



OPERATOR'S MANUAL



CHAMPION SCREW COMPRESSOR CSE37 & CSE45

MODEL No. : _____

SERIAL No. : _____

MANUAL No. : 975425 REV C

EFFECTIVE FROM: MARCH 2008

MACHINE SERIAL # 20,471

This manual has been prepared by:

Champion Compressors Pty. Ltd.

Proudly Australian

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Champion is an Australian team committed to the design and delivery of innovative compressed air and cooling solutions in partnership with our customers.





At Champion, we design compressor packages, and into these packages, engineer consumable parts to optimise the performance and reliability of your compressor.

The “ULTIMIZER” Separator Element

Maximum pleat area, optimum filtration and reduced pressure drop across the element:

- ✓ Save \$ in running cost – reduced power consumption
- ✓ Saves \$ in oil – minimal oil carry over
- ✓ 4000 hr / 1 year warranty (whichever occurs first)

The “FILTRAFINE” Oil Filter

Microglass Media:

Smaller and more uniform fibres maintain filter efficiency as pressure drop increases to ensure:

- ✓ Protection for the compressor’s rotary screw element
- ✓ Excellent resistance against moisture
- ✓ Separation of foreign fluids without binding off
- ✓ No bypass to ensure consistent oil flow to the airend
- ✓ Antidrain Valve – for quick start up in horizontal mount position

The “FILTRAFINE” Air Filter

Durability and strength offers:

- ✓ Excellent resistance to moisture and solvents – prevents binding off
- ✓ Low micron rating at maximum efficiency for optimum continual performance
- ✓ Moulded soft seals prevent air leakages and stress points to ensure smooth compressor operation



“Champion Genuine Parts” Protect **Your** Compressor and **Your** Warranty

MAINTENANCE MANAGEMENT

Champion Compressors offer a variety of maintenance management options ranging from Routine Programs through to 5 Year (Extended Warranty) Maintenance Plans. These options have been developed over the years to meet your varying requirements.

For those of you remotely located, ask about our 'T.E.A.M.' program (Technical Education & Aircend Management). That's you and *Champion* working together to ensure the productivity of your compressor and most importantly to protect your production environment.

Preventative Maintenance is aimed at ensuring your compressor operates from service to service without an unscheduled stop. Should you require advice on any of the Maintenance plans available to suit your requirements, please contact *Champion Compressors* Customer Care Division (refer Section 11.0 - CHAMPION NETWORK). Ask about the dollars you will save.

We Care

At *Champion*, we care about our customers. Your air compressor is vital to the successful operation of your plant and business, and you expect it to give reliable service. Our concern is that your compressed air system receives quality maintenance - *Champion* Customer Service.

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1.0 INTRODUCTION

The *Champion* Marathon range of rotary screw compressors is the culmination of some 50 years experience and 25 years of development and refinement that has produced a product with a focus on simplicity and reliability. This commitment to design simplicity and functional reliability makes the *Champion* Marathon range the most advanced available in the world today.

The *Champion* Marathon range of heavy-duty compressors has as standard many features and innovations, including:

- an advanced, modified profile screw element.
- a simplified inlet controller.
- a large capacity centrifugal separator, for minimum oil carry-over and extended element life.
- a cyclonic air filter for longer package life.
- a heavy duty oil and air aftercooler sized for high ambient temperature operation.
- a sound attenuated enclosure to minimise noise emission.
- a sophisticated and user friendly electronic control panel.
- easy service access via large removable doors and panels.
- a small footprint.

This operator's manual is written to enable the end user to gain maximum service from their compressor. Please familiarise yourself with the contents before placing the compressor into service. Correct installation and ongoing maintenance using the *Champion* Maintenance Program and Service Contract will provide years of trouble-free service.

A copy of this manual should be given to the personnel responsible for operating the compressor.

All requests for information, service and spare parts should be directed to *Champion Compressors* Customer Care Division (refer Section 11.0 - CHAMPION NETWORK).



2.0 SAFETY

Champion Compressors manufacture their compressors so that they can be operated safely, however, **those that operate the compressor are ultimately responsible for their own safety.** The following safety precautions are suggested as a guideline with the aim of preventing injuries throughout the life of your compressor.

Do not operate the compressor in an unsafe condition. Tag the compressor and render it inoperative by disconnecting the power at the source. This will prevent others from being able to operate it.

2.1 Personal Protective Equipment

1. Ear and eye protection should be worn by personnel working on or around the compressor at all times.
2. Keep a first aid kit handy at all times.

2.2 Pressure

1. Before removing any line, fitting, valve, filler cap, drain plug, connection or any other component, ensure that the compressor is not running and is not pressurised. Relieve all internal pressure by shutting down the compressor and waiting for two minutes, allowing the compressor to vent internal pressure. Once the two minutes has elapsed, carefully loosen off the oil filler cap one turn. Ensure that the oil filler cap is tightened prior to starting the compressor.
2. Do not vary pressure settings from those listed in Section 6.5.6 - Pressure Settings without prior approval from *Champion Compressors* Customer Care Division.
3. Do not tamper with or remove the pressure relief valve.
4. Do not place any part of a person's body in the direct stream of process or cooling air discharge. Under no circumstances, direct compressed air at any part of a person's body.

2.3 Fire and Explosion

1. Clean up spills of lubricant or other combustibles immediately.
2. Keep sparks and other sources of ignition away from the compressor. Do not allow cigarette smoking near the compressor.
3. Keep electrical wiring and connections clean and free of dust, and keep all electrical connections tight.
4. Ensure that only *Champion Compressors* approved oils are used in the compressor.
5. Keep the compressor in a well ventilated area. Discharge cooling air can raise ambient temperature significantly.

2.4 Moving Parts

1. Keep loose clothing and parts of the body away from fans, motors, vee belts and other moving parts.
2. The compressor may start at any time without warning. Ensure that the compressor is electrically isolated prior to conducting any maintenance.
3. Do not run the compressor with any safety guards removed.

2.5 Dangerous Substances

1. Avoid bodily contact with hot fluid, hot surfaces and points of air discharge.
2. Do not use the air from this compressor for breathing, unless properly regulated and filtered by a breathing air package.
3. Under no circumstances, direct compressed air at any part of a person's body.

2.6 Plastic Pipes

1. *Champion Compressors* recommend against the use of thermoplastic pipe to transport compressed air or other compressed gases in exposed, above ground locations (e.g. in exposed plant piping).
2. Sullube should not be used with PVC piping systems as it may affect the bonding of cemented joints. Certain other plastic materials may also be affected.

2.7 Electrical Shock

1. Adjustments or repairs to exposed live parts of the system should only be carried out by authorised and licensed personnel. When making adjustments or repairs to exposed live parts of the compressor, maintain dry footing, stand on insulating surfaces and do not contact any other portion of the compressor. Make adjustments with one hand only so as to minimise the possibility of creating a current path through the heart.
2. Do not leave the compressor unattended with open electrical enclosures. If necessary to do so, disconnect and lock out all power at the source.

2.8 Lifting and Transportation

1. If a crane is used to lift the compressor, lift with slings using guide ropes to prevent twisting of the compressor, and spreader bars to prevent panel damage (refer Figure 4 - Lifting Points). When the compressor has been set to rest, check for cracked welds and loose bolts or nuts. Ensure that any equipment used is sufficiently rated to transport the compressor package (refer Section 4.1 - Machine Specifications for compressor shipping weights).
2. If lifting the compressor on a pallet or wooden bearers, be sure everything is correctly secured prior to lifting.
3. If lifting the compressor by fork lift truck, care should be taken that the forks are correctly spaced, are placed to lift the compressor from the front, and are fully engaged and tipped back prior to lifting (refer Figure 4 - Lifting Points). Fork lift tynes must extend to cover the full depth of the compressor. Ensure the fork lift truck load rating is sufficient to transport the compressor package (refer Section 4.1 - Machine Specifications for compressor shipping weights). Refer to local regulations for fork lift codes of practice.

2.9 Operation

1. As a general safety precaution, the compressor should not be operated with the door open (or any access panels removed) under any circumstances except to view the oil level. If necessary to do so, this should be done with utmost care to prevent personal injury by opening the door only to an extent to view the sight glass. Safety glasses must be worn while doing so.
2. The belt drive system is enclosed within a belt guard. The compressor should not be run without the belt guard securely in place.
3. The compressor protection devices are provided to offer safety of operation. However, these devices are not foolproof and are open to abuse. The operator should ensure and is solely responsible for personal safety at all times.
4. The compressor (unless specifically supplied with weather protection) is designed to work in a covered environment where it is not exposed to direct water impingement (either by rain or from any other sources). If the compressor has been exposed to water, do not operate it and contact *Champion Compressors* Customer Care Division for assistance.

3.0 GENERAL DESCRIPTION

Your new *Champion* Marathon rotary screw compressor will provide you with product reliability and greatly reduced maintenance, if maintained and operated in accordance with this manual.

The compressor can be adjusted for maximum capacity operation at pressures of up to 1300kPa, but is supplied as standard at 780kPa. Refer to *Champion Compressors* Customer Care Division should you wish to vary the operating pressure of your compressor.

The *Champion* design employs a modular concept, with the rotary screw airend, separator vessel and drive motor mounted on a sub-frame, which is isolated from the cabinet through rubber isolators.

The rotary screw airend fitted to the *Champion* Marathon range is manufactured to the highest standards and is an asymmetric profile screw offering the user maximum output for minimum power input.

The combined oil and air cooler assembly is mounted horizontally in the roof of the compressor housing. Cooling air is drawn through the inlet ducts, across the main drive motor and exhausted vertically through the air and oil cooler assembly. The oil is circulated through a filter and the cooler before being injected into the screw. While the oil temperature is low (e.g. just after start up), the oil is circulated through the filter but bypasses the oil cooler, before being injected into the airend.

The service door provides access to the oil level sight glass, oil filler, oil drain and the belt drive system. The air filter, thermo valve, separator vessel, separator element and minimum pressure valve are accessed by removing the top and side lift off panels. The fan is accessed by unscrewing the end access panel. Electrical controls are mounted in the cubicle behind the control panel door which hinges open for service.

Locations of various components are shown in Figure 1 - Internal Layout.

The access panels must be removed in the following sequence:

1. The service access door is opened by undoing the quarter turn latches, lowering the door outwards and lifting off the complete panel.
2. The top panel can then be lifted straight up. It is located on guide pins, but is not latched in position.
3. The side panels can then be lifted out. As with the top panel, they are located on guides and are not latched in location.

Warning: Under no circumstances should the top panel be removed without removing the door, as the cabinet configuration may become unstable.

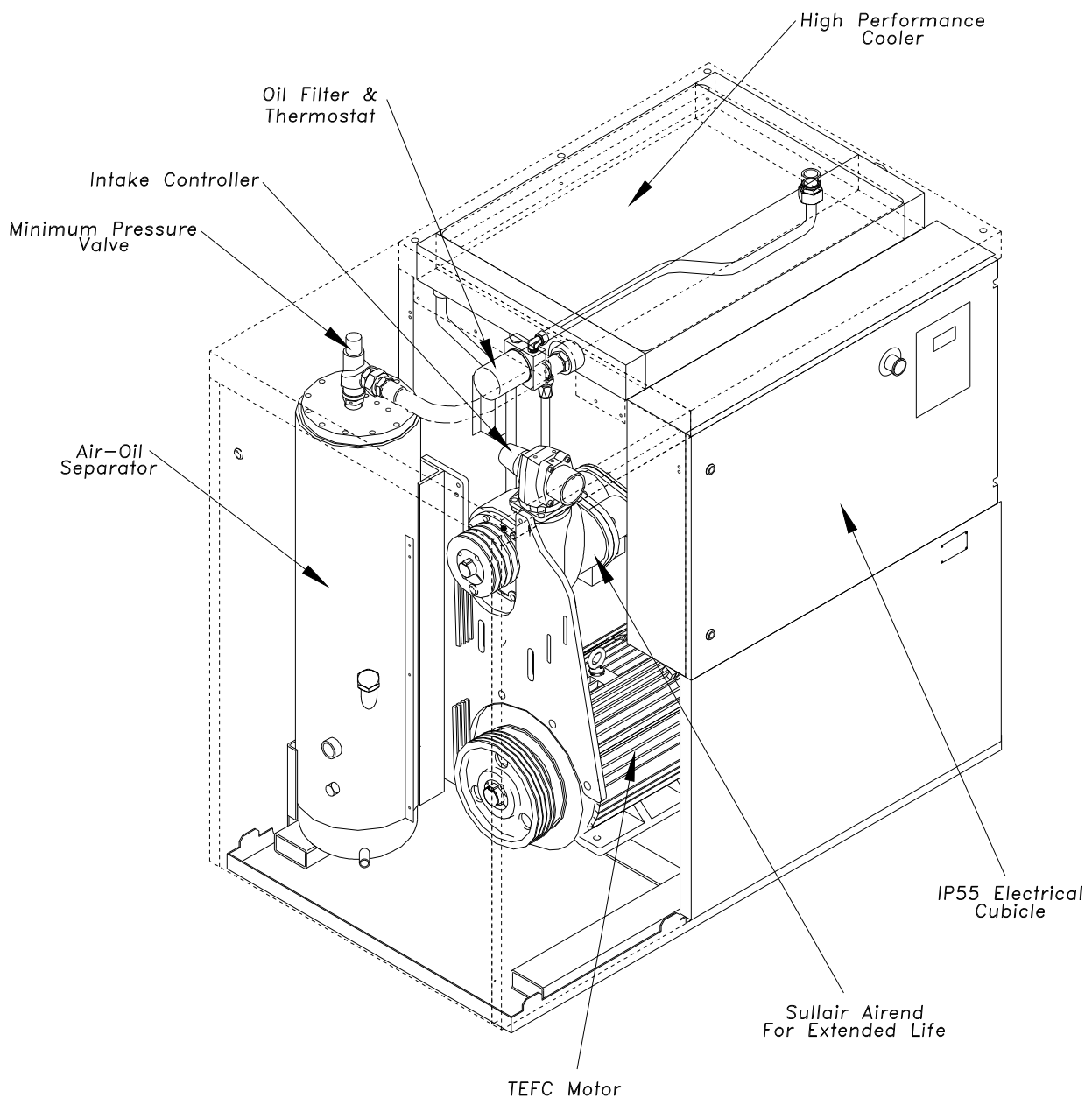


Figure 1 - Internal Layout

3.1 Principle of Operation

The main functional components of a rotary screw air compressor are the rotary screw airend and an air / oil separator vessel (refer Figure 2 - Flow Schematic). The airend rotors draw air through the air filter and inlet control valve. Oil is injected into the compression space to provide cooling, sealing and lubrication of the rotors and bearings as they turn, compressing the air.

The compressed air / oil mixture is discharged into the separator vessel via a flexible hose. The oil is reclaimed from the compressed air inside the separator vessel by the combined mechanical effects of centrifuge, impingement and gravity. The air then passes through the separator element, which is made up of ultra fine borosilicate glass fibres, and at this point nearly all the oil mist is removed.

The oil that is removed by the separator element is returned to the airend via the purge line. The returning air flow in this line is restricted by a small orifice, which is designed to minimise the loss of compressed air. The oil in this line is cleaned by the purge line filter.

The filtered compressed air then leaves the separator vessel and flows through the minimum pressure valve to the aftercooler, where the compressed air is cooled to 8 - 12°C above ambient before leaving the compressor.

The minimum pressure valve maintains pressure in the separator vessel during start up and during normal operation to assist oil circulation. Back-flow of compressed air from the air mains into the separator vessel is prevented by a non-return valve, which is incorporated in the minimum pressure valve.

The majority of the oil is collected in the separator vessel and piped to the oil cooler via the thermostatic valve. The oil then passes through the oil filter before re-injection into the airend.

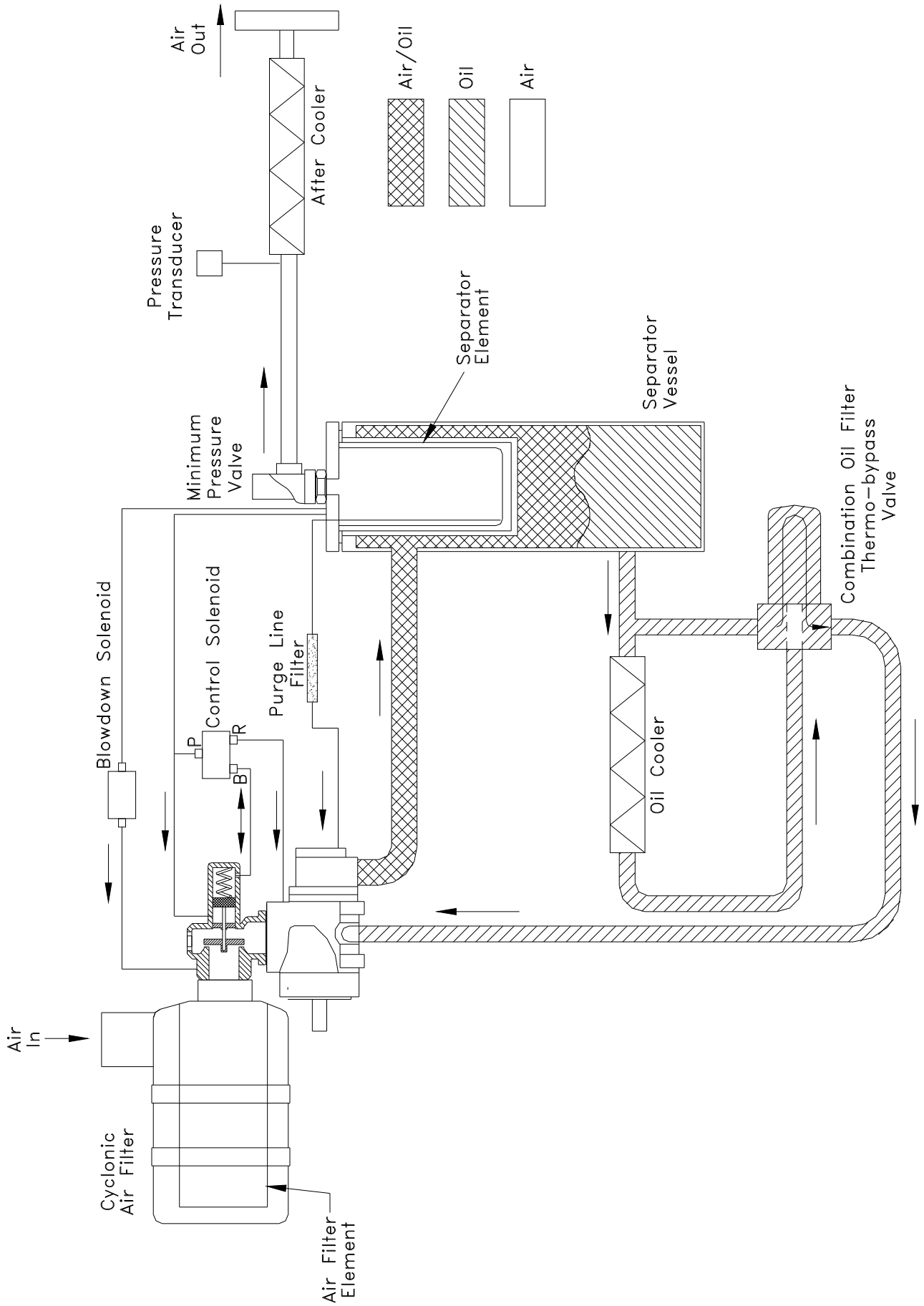


Figure 2 - Flow Schematic

3.2 Control System

The purpose of the control system is to open the compressor inlet control valve to allow compressed air to be generated. The system incorporates an inlet control valve with a normally closed inlet valve plate, an actuating piston, two solenoid valves and a pressure transducer (refer Figure 3 - Control System Schematic).

1. **Start-up:** On starting the compressor, the inlet control valve plate is held shut by a spring. The compressor therefore runs up to operating speed unloaded. A small amount of air is being drawn in through the anticavitation non return valve, building enough separator vessel pressure to ensure good oil circulation.
2. **Cracking:** After the compressor start sequence switches into delta (or run) mode, the electronic controller energises the solenoid valves. Vacuum from the throat is applied to port A (pressure is always applied port B). The differential pressure on the inlet piston forces it to retract, opening the valve plate. A small amount of air is drawn into the compressor and is compressed, which further acts to open the valve plate fully. The system pressure then rises.
3. **Full Load:** When the separator vessel pressure rises above 350kPa, the minimum pressure valve opens, allowing compressed air flow into the service line. The inlet control valve plate stays fully open whilst the service line pressure is below the unload setting.
4. **Unload:** The compressor builds pressure until the unload pressure setting is reached, at which point the electronic controller de-energises the solenoid valves, causing full line pressure to be applied to port A. As there is no longer any differential pressure between port A and port B, the spring force on the rear of the inlet valve piston closes the compressor inlet valve plate. Air vents through the blowdown solenoid valve, lowering the separator vessel pressure and reducing back pressure on the airend. Off load separator vessel pressure is maintained by a small amount of air being drawn in through the blowdown system, ensuring oil circulation to the airend bearings.

When system pressure falls to the load pressure setting, the compressor returns to load mode. The electronic controller energises the solenoid valves, the inlet control valve opens, and the system pressure rises. This cycle reliably continues as long as air demand is present.

5. **Stop:** When the compressor is stopped, the electronic controller de-energises the solenoid valves, and the inlet control valve plate closes. Separator vessel pressure is vented through the blowdown solenoid valve.

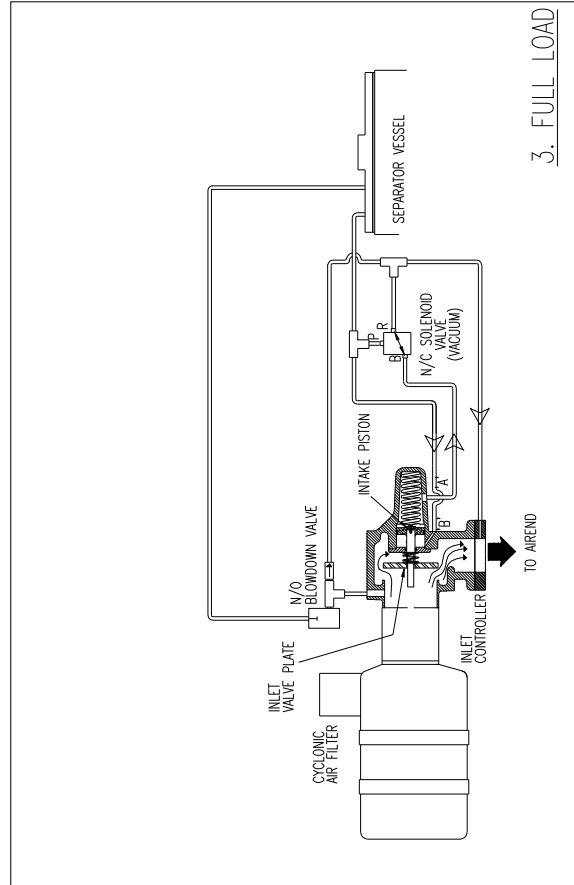
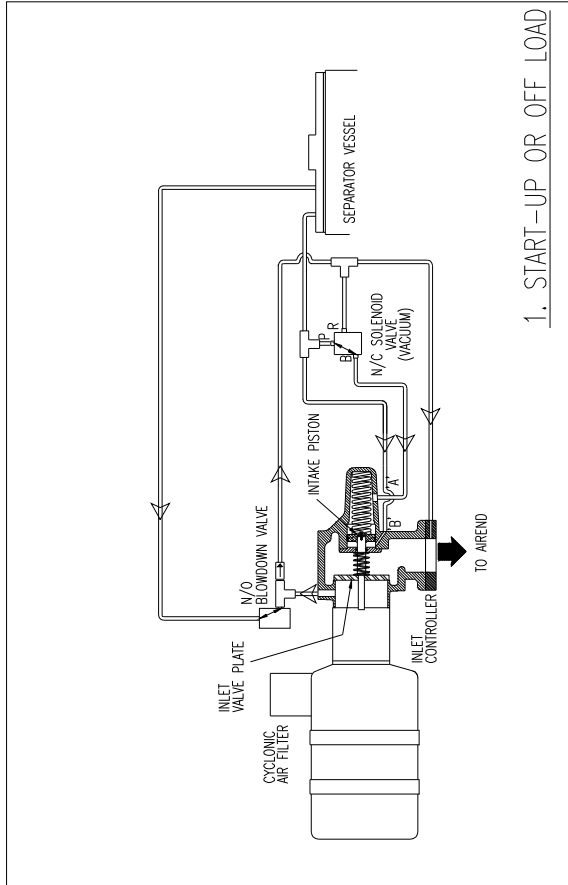
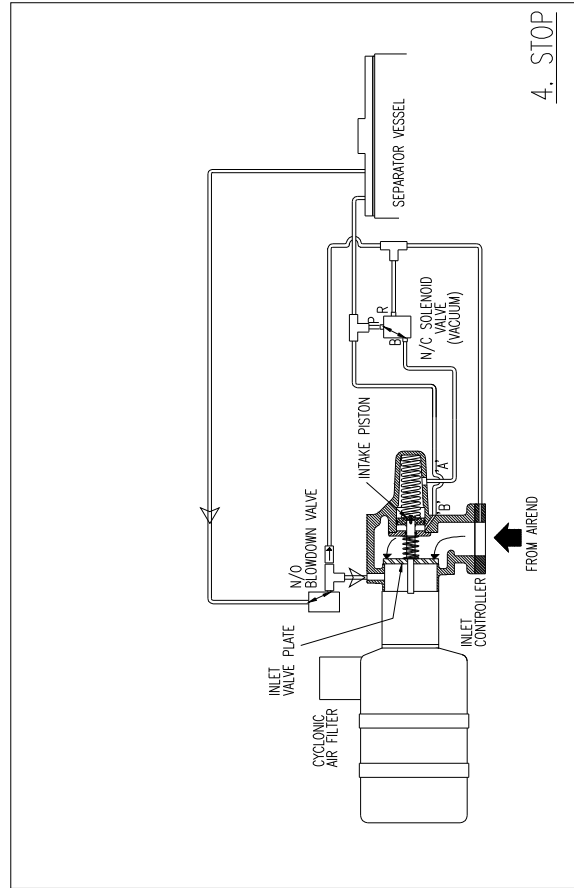
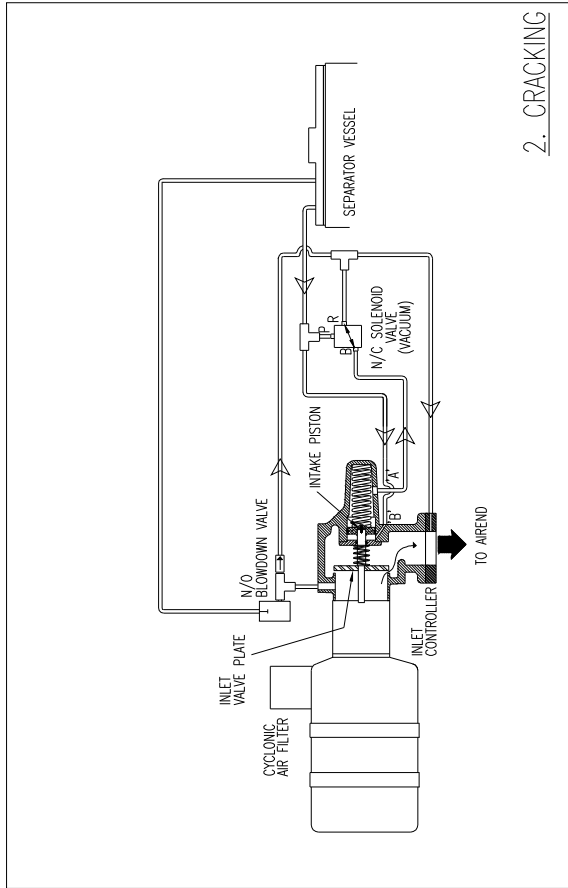


Figure 3 - Control System Schematic

3.3 Operating Temperature

Champion Marathon compressors are designed to operate at ambient temperatures between +5°C and +50°C, measured at the cooling air inlet duct. For operation outside this range, refer to *Champion Compressors* Customer Care Division.

The compressor operating temperature is measured at the discharge of the aircend. The operating temperature will vary depending on the ambient temperature, percentage loading, cooler cleanliness, inlet filter cleanliness, and oil filter condition. Normal compressor operating temperature is between 70°C and 90°C.

Champion Marathon compressors are fitted with a thermostatic valve which is set to open at 70°C and will only circulate the oil through the oil cooler once this temperature is reached. Compressors for export may be fitted with an 80°C thermostatic valve, at the discretion of *Champion Compressors* or the local distributor.

When the compressor is started from cold, oil temperature will rise quickly to approximately 85°C, where the thermostatic valve will fully open (the thermostatic valve will start to open at 70°C). If compressor load is low, the oil temperature will settle at about 70°C and the thermostatic valve will bypass the oil cooler thereby preventing over-cooling. As loading and oil temperature increase, the thermostatic valve will divert oil through the cooler core in order to maintain correct oil temperature.

If the operating temperature approaches 105°C, the compressor electronic controller will display an alarm warning of a high operating temperature condition. If the operating temperature exceeds 105°C, the compressor electronic controller will shut down the compressor and display a high operating temperature shutdown fault. Refer to *Champion Compressors* Customer Care Division for assistance in locating the cause and remedying the high temperature condition.

3.4 Condensation - Low Ambient

Under high humidity and low operating temperature conditions, water (formed by condensation) may collect in the oil. To ensure trouble free operation, *Champion* Marathon compressors are fitted with an oil bypass thermovalve, which is set at 70°C (the temperature required to evaporate water). Compressors for export may be fitted with an 80°C thermovalve, at the discretion of *Champion Compressors* or the local distributor.

In extremely low ambient temperatures (e.g. below 0°C) the electronic controller will prevent the compressor starting (refer Section 6.1.2 - Start Inhibits - Pressure and Temperature).

In areas where the ambient temperature is less than 5°C, steps may need to be taken to prevent condensation. This may include fitting anti-condensation heaters to the separator vessel. For assistance in correct operation of the compressor in very low ambient temperatures, please refer to *Champion Compressors* Customer Care Division.

3.5 Overheating - High Ambient

If the ambient temperature is above 50°C, the air drawn into the compressor may be too hot to satisfactorily cool the compressor when it is operating at full load. If the compressor load rating is less than 100%, higher ambient temperature operation may be possible. The maximum airend discharge temperature is 105°C and must not be exceeded. Where site ambient temperatures will exceed 40°C (for example, in a boiler room), then it is better to duct the cooling air from an area where the air is at a lower temperature.

If the compressor is located where there is a possibility for recirculation of cooling air discharge into the compressor inlet, or where it is proposed to duct cooling air to and from the compressor, *Champion Compressors* Customer Care Division should be consulted for guidelines on correct installation.

4.0 TECHNICAL DATA

4.1 Machine Specifications

MODEL	Unit	CSE37	CSE45
Free Air Delivery at 780kPa Operating Pressure	L/s	103	123
	m ³ /min	6.18	7.38
	cfm	217	260
Free Air Delivery at 1000kPa Operating Pressure	L/s	87	101
	m ³ /min	5.22	6.06
	cfm	184	213
Free Air Delivery at 1300kPa Operating Pressure	L/s	Refer	89
	m ³ /min	<i>Champion</i>	5.34
	cfm	Engineering	188
Drive System	Belts	4XPA	4XPA
Cooling Air Volume	m ³ /sec	2.3	2.9
Heat Rejection	kW	45.1	55.3
Oil Fill	Litres	20	20
Average Sound Pressure Level \pm 3dB(A)	dB(A) @ 1m	71	74
Air Outlet Discharge Size	BSPF	1.1/2"	1.1/2"
Dimensions	L (mm)	1540	1540
	W (mm)	900	900
	H (mm)	1435	1435
Shipping Weights	kg	1020	1150

4.2 Electrical Specifications

4.2.1 Australian Specifications

415V, 3 ϕ , 50Hz	Unit	CSE37	CSE45
Drive Motor Size (nominal)	kW	37	45
Fan Motor Size	kW	1.1	1.5
Drive Motor Thermal Overload Setting	A	41.6	50.2
Fan Motor Thermal Overload Setting	A	2.6	3.1
Maximum Package Current*	A	72.2	85.3

* Maximum Package Current is the maximum current the package can be expected to draw. This is not indicative of the current draw under normal operating conditions.

The drive motor is started by star / delta method, and the fan motor is started direct on line.

In all states of Australia, the electrical installation of the compressor must be performed by a licensed electrical worker, who must supply a Certificate of Electrical Safety. The electrical installation must also be checked by a licensed electrical worker to see that it is adequate for starting and running the compressor.

4.2.2 International Specifications

		Unit	CSE 37	CSE 45
Supply Voltage / Frequency	Drive Motor Size (nominal)	kW	37	45
	Fan Motor Size	kW	1.1	1.5
380V / 50Hz	Drive Motor Thermal Overload	A	45.6	54.8
	Fan Motor Thermal Overload	A	2.8	3.4
	Maximum Package Current*	A	79.1	93.0
440V / 60Hz	Drive Motor Thermal Overload	A	43.3	50.2
	Fan Motor Thermal Overload	A	2.7	3.4
	Maximum Package Current*	A	75	89.8
480V / 60Hz	Drive Motor Thermal Overload	A	41.8	48.8
	Fan Motor Thermal Overload	A	2.7	3.3
	Maximum Package Current*	A	70.5	83.3

* Maximum Package Current is the maximum current the package can be expected to draw. This is not indicative of the current draw under normal operating conditions.

The drive motor is started by star / delta method, and the fan motor is started direct on line.

4.3 Lubricant Specifications

The oil used to cool the screw compressor rotating elements must have the following properties:

- Low foaming capacity.
- Good demulsification.
- High oxidation resistance.
- Viscosity of 10.5 cSt at the oil injection temperature.

Where non-standard *Champion* lubricants are used, approval must be obtained from *Champion Compressors* Customer Care Division, or warranty may be void.

Refer to *Champion Compressors* Customer Care Division for ISO grades of oil that may be used for the ambient temperatures shown.

Mixing of different lubricants within the compressor will void all warranties. Contact *Champion Compressors* Customer Care Division for advice on the correct oil change procedure.

Ambient Temperature	Up to 40°C	40°C to 50°C	Above 50°C
Synthetic Oils	Sullube (Factory Fill)	Sullube (Factory Fill)	Refer to <i>Champion Compressors</i> Customer Care Division.
	Shell Corena AS46	Shell Corena AS68	
	Castrol SR46	Castrol SR68	
Mineral Oils	Smart Lube CH46	Shell Corena S68	Refer to <i>Champion Compressors</i> Customer Care Division.
	Mobil Rarus 425	Mobil Rarus 426	
	Castrol MR46	Castrol MR68	
Motor Bearing Grease	Refer Section 8.4	Refer Section 8.4	Refer to <i>Champion Compressors</i> Customer Care Division.

4.3.1 Synthetic Lubricants

Synthetic lubricants are used as standard in *Champion* Marathon compressors. If a compressor is to be changed from a synthetic based lubricant to a mineral lubricant (or vice versa), or the brand of lubricant is going to be changed, then contact *Champion Compressors* Customer Care Division for advice on the correct oil change procedure. Mixing of different lubricants within the compressor will void all warranties.

The use of incorrect lubricants may result in a major failure and void your warranty.

4.3.2 Electric Motor Bearings

Champion Compressors use and recommend Magnalube-G or Esso Polyrex EM grease (refer Section 8.4 - Electric Motor Maintenance for details). Refer to the motor nameplate for the grease type and total grease amount to be used.

The use of incorrect motor bearing grease may result in a major failure and void your warranty.

Mixing grease types may void your warranty. Consult *Champion Compressors* Customer Care Division prior to any change in motor bearing grease type.

5.0 INSTALLATION AND PRE START CHECKS

5.1 General

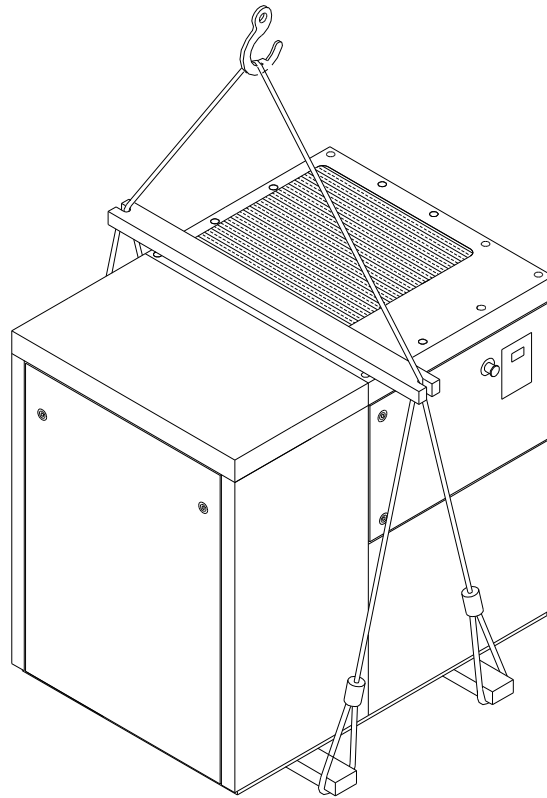
Warning: Incorrect installation may void warranty.

Before installing your *Champion* compressor, check carefully for any transport damage. Contact *Champion Compressors* Customer Care Division immediately if any such damage is noted.

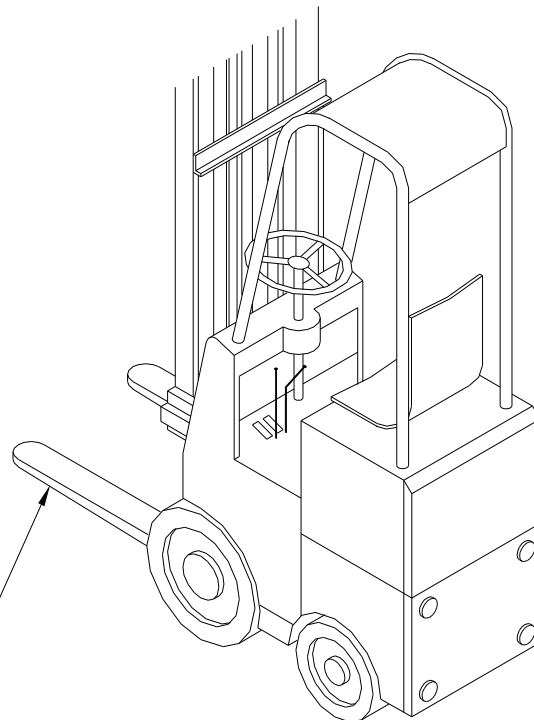
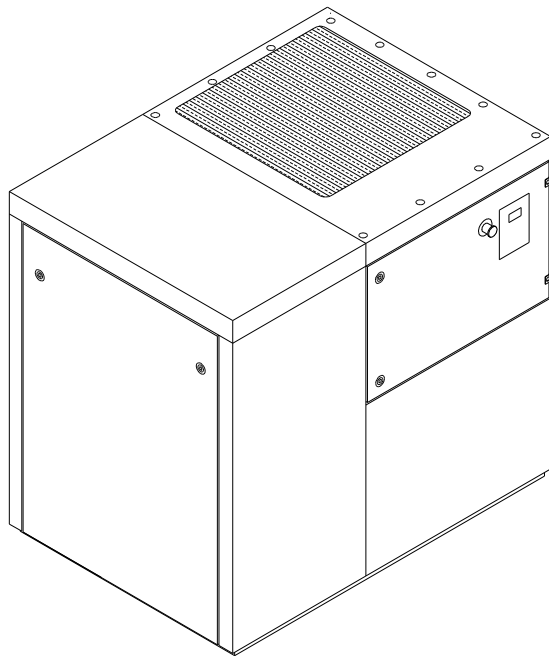
The compressor should preferably be lifted by fork lift truck. Care should be taken that the forks are correctly spaced, are placed to lift the compressor from the front, and are fully engaged and tipped back prior to lifting (refer Figure 4 - Lifting Points). Fork lift tynes must extend to cover the full depth of the compressor. Ensure the fork lift truck load rating is sufficient to transport the compressor package (refer Section 4.1 - Machine Specifications for compressor shipping weights). Refer to local regulations for fork lift codes of practice.

If a crane is used to lift the compressor, lift with slings using guide ropes to prevent twisting of the compressor, and spreader bars to prevent panel damage (refer Figure 4 - Lifting Points). When the compressor has been set to rest, check for cracked welds and loose bolts or nuts. Ensure that any equipment used is sufficiently rated to transport the compressor package (refer Section 4.1 - Machine Specifications for compressor shipping weights).

Note: A site assessment must be carried out to ensure forklift or crane access for removal and servicing of major components and compressor transport.



For slinging, support must be placed from front to back of the machine between the feet



FORKS MUST SUPPORT FULL LENGTH OF COMPRESSOR BASE.

Figure 4 - Lifting Points

5.2 Location

The standard compressor cabinet is not weatherproof. If the compressor has not been fitted with the factory-fitted weatherproofing option, the compressor should be installed inside (or in a sheltered position outside).

The compressor must be placed on a reasonably flat floor and it must remain level at all times (not more than 6mm or 1/4" unevenness allowed). Shims should be used to level the compressor. Bolting down is neither necessary nor desirable.

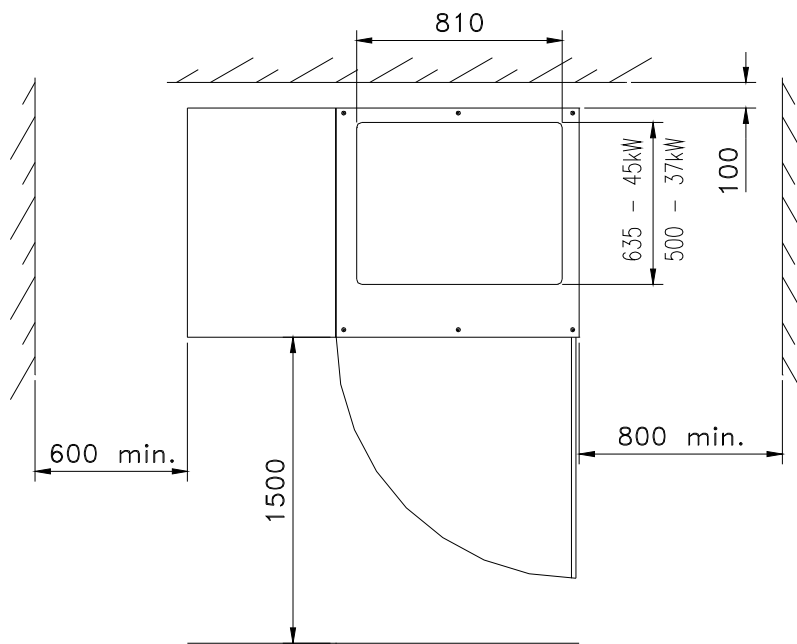
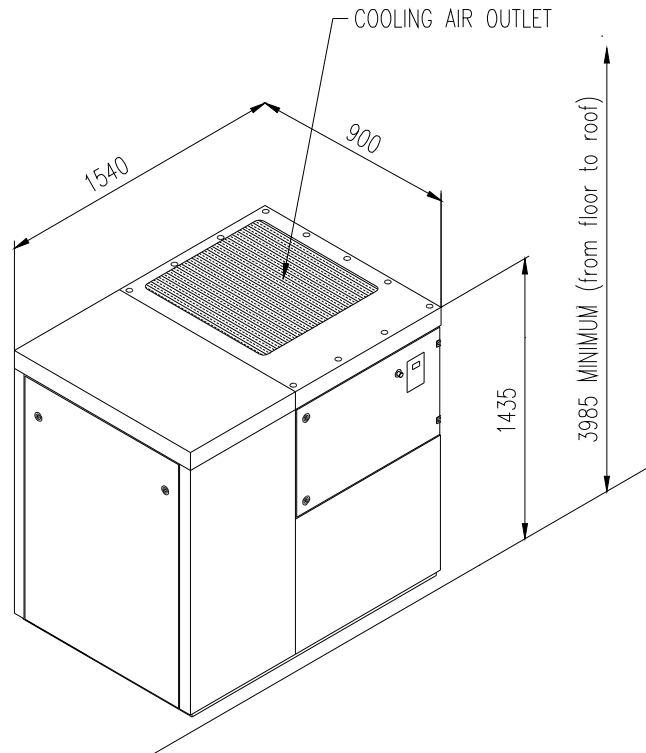
A site assessment must be carried out to ensure forklift or crane access for removal and servicing of major components.

IMPORTANT: Locate the compressor in an adequately ventilated area. Hot air from the discharge duct must not recirculate to the air inlet. Do not install in an area where exhaust fumes (or other toxic, noxious or corrosive fumes, chemicals or substances) can be drawn into the inlet. The cooling airflow for these compressors is shown in Section 4.1 - Machine Specifications.

Where more than one compressor is installed in the same location clear access to each compressor must be maintained. Special attention should be taken to ensure that there is no possibility of the heated cooling air discharge from one compressor being directed into the intake of another compressor.

The compressor should be installed in accordance with the minimum distances indicated in Figure 5 - Location. Consult *Champion Compressors* Customer Care Division for assistance in correct placement of your compressor.

If the cooling air discharge cannot be dissipated without raising the temperature of the immediate environment around the compressor, then it is recommended to duct the cooling airflow away from the compressor. Any additional ductwork fitted (including the outlet grill) should not have a pressure drop greater than 30Pa (refer to *Champion Compressors* Customer Care Division prior to installation) and **must not** apply any extra weight to the compressor cabinet. *Champion Compressors* recommend that there is a removable section of ducting to allow easy access to the compressor when cleaning is required.



Plan view showing minimum dimensions for ventilation and maintenance access

NOTE :- To prevent overheating ensure :-

1. That no hot exhaust air is recirculated to the compressor inlet.
2. The minimum air flow distances.
3. Free unrestricted airflow.
4. For multiple compressor installation – Refer Engineering Department for assistance.
5. If there is a potential for hot exhaust air recirculation, a full size inlet or exhaust duct is required to bring cool air or remove the hot exhaust. Refer Customer Care for assistance.

Figure 5 - Location

5.3 Heat Rejection

The amount of heat rejected by the compressor is considerable, and the area in which it is placed must be well ventilated. The heat rejection rates are shown in Section 4.1 - Machine Specifications.

If the cooling air is not adequately vented, ambient temperature will rise which may cause overheating. Of particular importance is the prevention of recirculation of the discharged cooling air to the inlet. This can be caused by installing the compressor in a room with too low a ceiling, or in a location where the discharge cooling air can only escape past the compressor cooling air inlet. Pre-heated inlet air will also reduce the performance output of your compressor.

The compressor should be installed in accordance with the minimum distances indicated in Figure 5 - Location. Consult *Champion Compressors* Customer Care Division for assistance in correct placement of your compressor.

5.4 Connection to Air System

The compressor is fitted with a threaded air outlet connection, located on the right hand side of the compressor (refer Section 9.0 - GENERAL ARRANGEMENT DRAWINGS). The connection size is shown in Section 14 - Machine Specifications. The plant airline connection should be at least this size in internal diameter and if the pipe run is of any substantial length, the pipe sizes should be increased by one size to minimise any pressure drop. Any connecting pipework must be independently supported, and installed to ensure that any condensate cannot flow towards the compressor, when not in service. This can be achieved by installing mains pipework adjacent to the compressor at a level below the air discharge.

Champion Compressors recommend the installation of an isolation gate valve immediately after the compressor discharge to facilitate servicing, installation or removal of the compressor.

As the internal components of the compressor are mounted on anti-vibration pads and are not rigidly supported, **it is necessary to provide a flexible connection between the compressor and the external pipework.** It is important that no load be transferred to the outlet connection of the compressor. Failure to comply with this instruction may result in damage to the compressor, and void your warranty.

5.5 Air System Management

5.5.1 Typical Air System - Wet Air Receiver

Figure 6 - Typical Air System - Wet Air Receiver shows a typical air system with a “Wet” air receiver, which is suited to the humid Australian environment. This setup allows the air to cool in the receiver where the majority of the moisture generated during compression is condensed and discharged from the system via a condensate drain. Installed after the air receiver are a pre-line filter (Zander “Z” filter), a refrigerated dryer and a post-line filter (Zander “X” filter), after which the air enters the air reticulation system (plant).

The line filters and dryer should have a bypass as shown in Figure 6 - Typical Air System - Wet Air Receiver. If the line filters and dryer do not have a bypass, the entire system must be shut down and drained of compressed air during servicing. This is not good practice, and usually disrupts plant production.

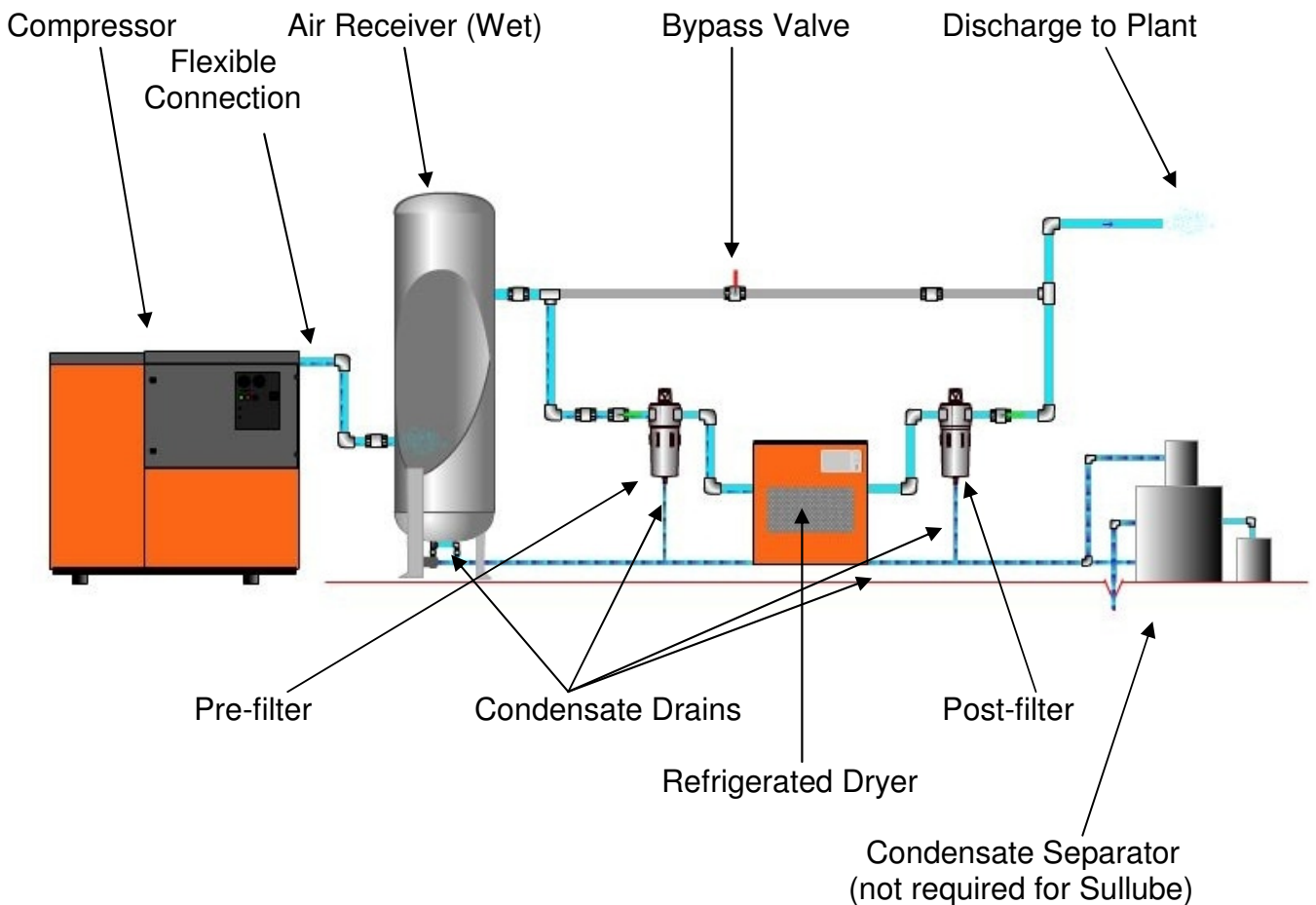


Figure 6 - Typical Air System - Wet Air Receiver

5.5.2 Typical Air System - Dry Air Receiver

Figure 7 - Typical Air System - Dry Air Receiver shows a typical air system with a “Dry” air receiver, which is suited to a dry European climate. In the humid Australian environment, this setup should also have as a minimum a cyclonic moisture separator to remove some moisture prior to entering the line filters and dryer. Installed after the moisture separator are a pre-line filter (Zander “Z” filter), a refrigerated dryer, a post-line filter (Zander “X” filter) and a “Dry” air receiver, after which the air enters the air reticulation system (plant).

The line filters and dryer should have a bypass as shown in Figure 7 - Typical Air System - Dry Air Receiver. If the line filters and dryer do not have a bypass, the entire system must be shut down and drained of compressed air during servicing. This is not good practice, and usually disrupts plant production.

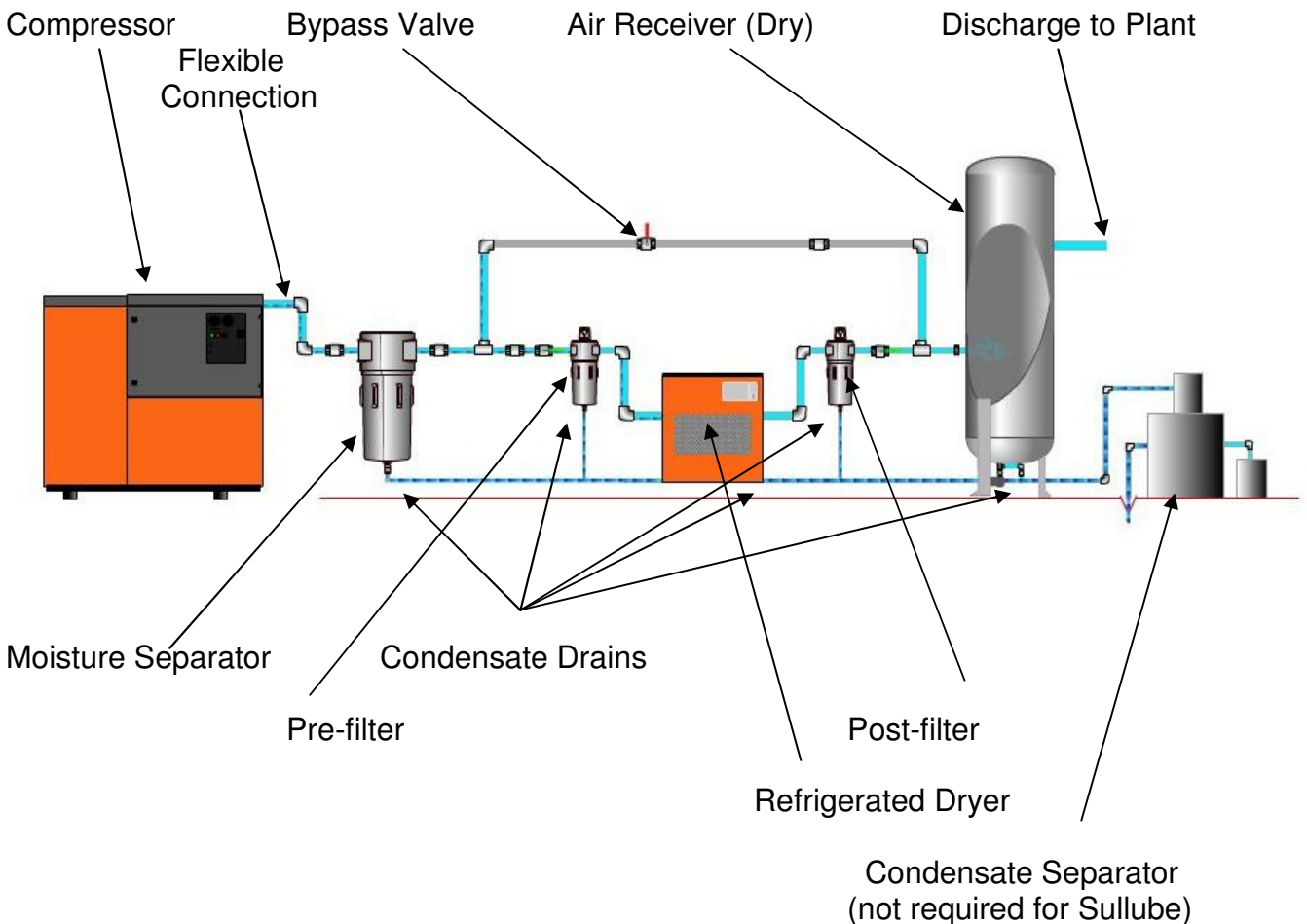


Figure 7 - Typical Air System - Dry Air Receiver

5.6 Pressure Vessel Registration

The customer should note that all states of Australia have regulations relating to the registration of plant, and more specifically, pressure vessels with Hazard Levels A, B or C.

As your *Champion* Marathon compressor is fitted with a Hazard Level C pressure vessel, the owner / manager of the compressor / pressure vessel must register the equipment with the local authority.

Please refer to your local Occupational Health and Safety regulations for complete details regarding the obligations of the owner / manager of authority or plant, in your state.

5.7 Electrical Checks

All internal wiring is factory fitted and tested. The required connection wiring is minimal, but must be performed by a licensed electrical worker, who must supply a Certificate of Electrical Safety. The electrical installation must also be checked by a licensed electrical worker to see that it is adequate for starting and running the compressor (refer Section 4.2 - Electrical Specifications).

Champion Compressors have provided a circuit diagram in the rear cover of this manual. The circuit diagram number and revision is marked on the starter panel. Refer to the circuit diagram supplied with your compressor when performing any electrical work.

5.7.1 Power Supply

The standard requirements are:

Australian Power Supply: 415VAC, 3 phase, 50Hz with Earth
Control Voltage: 24VAC.

For other power supplies, refer to Section 4.2.2 - International Specifications.

Note: Compressors supplied with a mains transformer do not require a neutral wire (refer enclosed circuit diagram).

5.7.2 Motor Rotation Direction

Warning: Rotation in the wrong direction can damage the airend and may void your warranty.

Before attempting to check motor rotation direction, you **must** familiarise yourself with Section 6.0 - OPERATION of this manual.

The power supply must be correctly connected for the motor to rotate in the correct direction. This can be checked by following the instructions below.

1. Power the compressor up, release the Emergency Stop button, and press the Reset button.
2. Wait for the compressor electronic controller to display “READY TO START” in the status text line.
3. Press the Start and then the Stop button in quick succession to jog the motor. **Do not run the compressor for more than 1 second when determining motor rotation direction.**

The motor and airend must rotate in the direction indicated by the arrow on the mounting plate.

If the motor and airend do not rotate as indicated by the arrow on the mounting plate, the incoming mains power leads need to be reversed. Do not attempt to reverse any motor wires or starter wiring. This wiring is factory set and must not be modified. This work must only be carried out by a licensed electrical worker.

In the event that the motor has been disconnected or removed for service reasons, ensure that the power supply is connected in the correct sequence prior to start-up.

Refer to Section 7.6 - Phase Failure / Reversal regarding phase failure / reversal protection.

5.7.3 Australian Standards

The electrical standards adhered to are:

AS3000 SAA Wiring Rules.

AS3008.1 Electrical Installation - Selection of Cables.

Check the relevant authorities for local regulations.

For international standards, refer to your local Agent (refer Section 11.0 - CHAMPION NETWORK) for supply and installation details to suit your local regulations.

5.8 Mechanical Checks

Warning: Ensure that the compressor is electrically isolated before these checks are made.

5.8.1 Airend Check

Ensure that the airend is not hydraulically locked by rotating the driven pulley by hand through two complete revolutions, in the direction indicated by the directional arrows located on the mounting plate.

In the event that the compressor has not been run for two months or more, or has been in storage for that period of time, it will be necessary to remove the air intake piping and inlet control valve (refer Section 8.5.4 - Inlet Control Valve Maintenance) and pour half a litre of compressor oil into the airend. Rotate the driven pulley by hand through two complete revolutions to ensure all the oil has been drawn into the airend. Do not allow any foreign matter to enter the airend during this process. Ensure the rubber elbows are correctly seated when reassembling.

5.8.2 Oil Level Check

Check the oil level by opening the door to view the sight glass located in the separator. The oil level should be no lower than the centre of the sight glass, including whilst the compressor is running. The maximum oil fill is limited by the location of the oil filler port. Refer Section 8.6.1 - Oil Level for further details.

Top-ups: Add the appropriate amount of the prescribed grade of oil. Ensure that the oil filler cap is firmly secured and seated properly on the o-ring seal.

5.8.3 Vee Belt Check

Check that all belts are correctly seated in their grooves. The belt tension is maintained by adjusting a jacking nut located above the airend. Refer to Section 8.8 - Belt Tension Adjustment for the correct belt tension measurement and adjustment methods.

5.8.4 System Isolating Gate Valve Check

If a system isolating gate valve has been fitted to your compressor, check that it is open.

The compressor is now ready to be run.

Important: Refer to Section 6.0 - OPERATION for the correct compressor start up procedure.

6.0 OPERATION

6.1 Before Starting Your Compressor

6.1.1 Compressor Protection Features

Please note that your *Champion* Marathon compressor controller is capable of many advanced electronic functions. These functions are an integral part of your compressor, designed to optimise the performance of your system by adding additional protection to the motor, airend and electrical switchgear.

6.1.2 Start Inhibits - Pressure and Temperature

Champion Marathon compressors are fitted with an electronic controller designed to avoid restart in conditions which could cause the compressor damage - such as in very low ambient temperatures or against internal pressure.

After a sudden power loss or emergency stop situation, the internal pressure protection function ensures that there is a period during which the compressor will not restart. This delay allows any internal system pressure to reduce, therefore preventing the compressor starting against load. If you press the Start button during this period, the electronic controller will record this signal, and automatically start the compressor after the delay period has finished.

In extremely low ambient temperatures (e.g. below 0°C) the electronic controller will prevent the compressor starting. For assistance in correct operation of the compressor in very low ambient temperatures, please refer to *Champion Compressors* Customer Care Division.

6.1.3 Stop Run-On Timer

This feature is a soft stop function, which reduces load on the airend before stopping the compressor. Upon pressing the Stop button, the compressor will unload and run for a factory pre-set period, allowing the compressor separator vessel pressure to reduce. The Stop Run-On Timer function is indicated on the electronic controller display by the status text line "STOP RUN ON" along with the remaining time in seconds until compressor stop.

If during the stop delay period the Start button is pressed, the Stop Run-On Timer function is cancelled, and the compressor will run normally loaded / unloaded as necessitated by system pressure.

Pressing the Emergency Stop button at any time will cause the compressor to immediately stop. The electronic controller will display “EMERGENCY STOP” in the status text line indicating an emergency stop has been enacted. The Emergency Stop button must be reset, and the Reset button pressed before the compressor can be restarted.

The Stop button should be used to stop the compressor under normal circumstances.

6.2 Initial Start-Up Procedure

The following procedure should be used for initial starting of the compressor, or if the compressor has not been used for more than two months.

1. Read the preceding pages of this manual thoroughly.
2. Ensure that all preparations and checks described in Section 5.0 - INSTALLATION AND PRE START CHECKS have been performed.
3. Check the system isolating gate valve is fully open.
4. Switch the mains power on. The electronic controller will go through an initialisation sequence, first displaying the manufacturer’s logo, followed by the electronic controller software revision (e.g. ED: E09).
5. To start the compressor, press the Start button. The electronic controller may delay the compressor start to allow system pressure to reduce (refer Section 6.1.2 - Start Inhibits - Pressure and Temperature).
6. The compressor should start and audibly switch from the star starting configuration to the delta running configuration as it comes up to full speed. During star mode the electronic controller will display “STARTING” in the status text line along with the remaining time in seconds until delta mode. Once in delta mode, the electronic controller will briefly display “LOAD DELAY” in the status text line, followed by “RUNNING LOADED” or “STANDBY RUN ON” depending on downstream pressure.
7. Observe the electronic controller display. Correct operation of the compressor will be indicated by rising discharge air pressure and rising operating temperature (refer Section 3.1 - Principle of Operation).
8. On achieving the set operating pressure, the electronic controller will unload the compressor and the discharge air pressure will stop rising. The compressor will continue to run, but it will run unloaded and not compress air. While the compressor is in this mode, the electronic controller will display “STANDBY RUN ON”.

9. Run the compressor through a number of load / unload cycles (bleed air from the plant system, if necessary) and check for consistent operation, any leaks (air or oil), and stabilisation of the operating temperature as indicated in Section 3.3 - Operating Temperature.
10. Ensure that the compressor runs smoothly and that no excessive vibration is evident. Should the compressor show any excessive vibration, shut it down and contact *Champion Compressors Customer Care Division* immediately.

6.3 Subsequent Start-Up Procedure

1. If the compressor has been unused for a period of two months or more, perform the checks listed in Section 5.8 - Mechanical Checks.
2. Check that the correct oil level is visible in the oil sight glass. Top up if necessary (refer Section 8.6.1 - Oil Level). **Warning:** Allow two minutes for the oil level to settle and internal pressure to vent prior to opening the filler plug.
3. Drain any moisture from the system air receiver.
4. If a system isolating gate valve is fitted to the service line, ensure it is fully open.
5. Press the Start button. The electronic controller may delay the compressor start to allow system pressure to reduce (refer Section 6.1.2 - Start Inhibits - Pressure and Temperature).

6.4 Shut Down Procedure

Warning: Never assume that the compressor has completely stopped, even if the compressor does not appear to be running. The compressor may have stopped in Standby mode and may restart at any time. Do not remove covers or attempt any service without first ensuring the compressor is isolated from the mains power supply and is suitably tagged.

To shut the compressor down, simply press the Stop button. The compressor will begin a delayed stop sequence, indicated on the electronic controller display by the status text line "STOP RUN ON" along with the remaining time in seconds until compressor stop. The compressor will stop automatically after the delayed stop period.

If during the stop delay period the Start button is pressed, the Stop Run-On Timer function is cancelled, and the compressor will run normally loaded / unloaded as necessitated by system pressure.

6.5 Electronic Controller

The compressor electronic controller is mounted in the door of the electrical cubicle, which is located in the upper right hand corner of the compressor. The layout of the electronic controller is shown in Figure 8 .

The electronic controller has a digital display capable of displaying several parameters at once. All key compressor operating parameters can be viewed on the display by scrolling through using the keypad Up and Down buttons.

Functions and features of the electronic controller include:

- LCD digital display
- Start Button
- Stop Button
- Reset Button
- Parameter and Menu Navigation
- Status LED
- Fault LED
- Pressure and Temperature Display
- Status Display - Running, Loaded, Run On, Standby, Faults, Alarms
- Run and Loaded Hours
- Average load cycle
- Display of service element hours remaining
- Numerous built in compressor protection features

The information in this manual is intended as a basic overview of the functions of the electronic controller. For more detailed information, please obtain a copy of the “Electronic Controller Advanced Configuration” manual from *Champion Compressors* Customer Care Division.

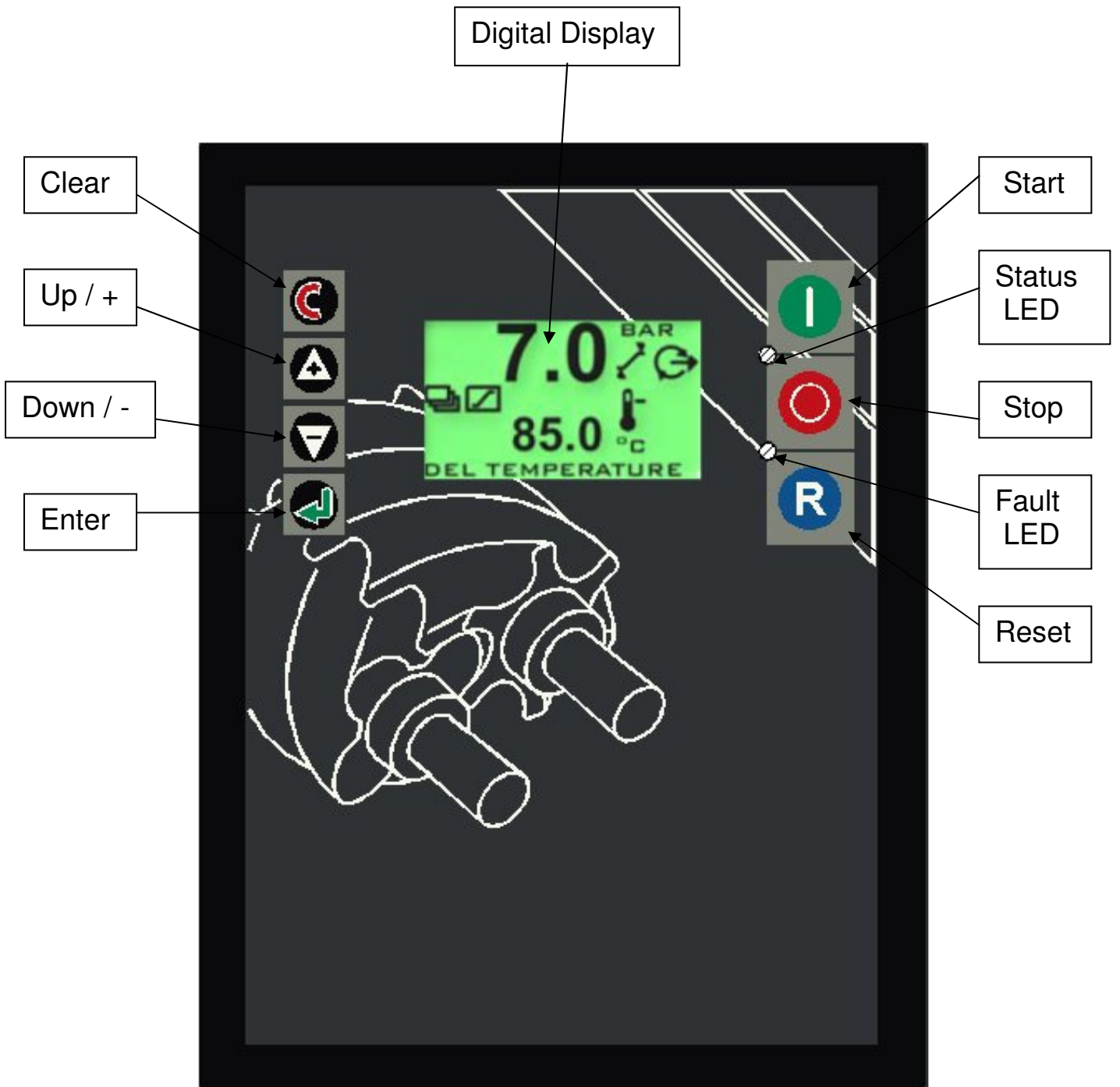


Figure 8 - *Champion* Electronic Controller

6.5.1 Digital Display

The *Champion* electronic controller has a digital display capable of displaying several parameters at once (refer Figure 9 - Digital Display).

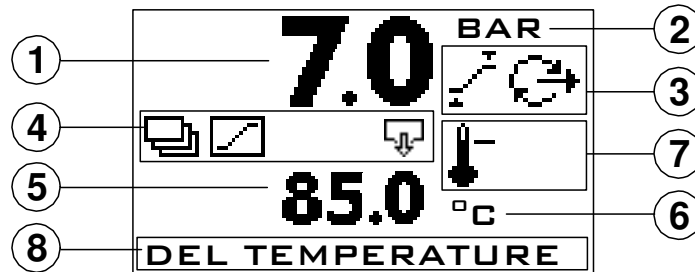


Figure 9 - Digital Display

The digital display has been designed to display the following information (refer Figure 9 - Digital Display for item numbers):




Line Pressure (Items 1 and 2)

The compressor line (package discharge) pressure will be displayed at all times in the top centre of the digital display screen. The pressure unit will be displayed to the right of the value. The pressure unit is user configurable (refer to the “Electronic Controller Advanced Configuration” manual for details on this procedure). The default pressure unit is bar.





Compressor Status (Item 3)

The compressor status is displayed as a continuous symbolic display located below the pressure unit. The following symbols are displayed here:

Control Pressure Symbols







-  Pressure is below the unload pressure setting.
-  Pressure is between the unload and load pressure settings.
-  Pressure is above the load pressure setting.

Compressor Status Symbols

-  Stopped, not in an active state
-  Standby, not running but in an active state
-  Running, not loaded
-  Loaded

Enabled Functions (Item 4)

This section of the display symbolically displays the status of enabled functions.

-  RS485 sequencing (flashing = data link fault)
-  Power failure automatic restart
-  Condensate drain active
-  Remote start / stop control
-  Remote load / unload enabled
-  Pressure schedule (flashing = pressure schedule override active)

User Selected Compressor Parameters (Items 5, 6, 7 and 8)

This part of the display allows the user to scroll through a list of status, information and value items using the Up or Down buttons.

Items 5 and 6 display the item value and unit (where applicable).

Item 7 displays a symbolic representation of the type of parameter being shown. Refer to Section 6.5.2 - Display Symbols for descriptions of the various display symbols.















Item 8 is the status text line which lists the name of the parameter being shown. Refer to Section 6.5.3 - Status Text Descriptions for further information.

Note that a parameter can be locked to be the default shown parameter (if the user scrolls off the locked parameter, the display will revert to the locked parameter after a short delay period). To lock a parameter, press the Enter button (a lock symbol will appear). To unlock a parameter, press the Clear button (the lock symbol will disappear).

Faults and warnings can also be displayed in the User Selected Compressor Parameters area of the display. An active fault or warning code becomes an additional item in the list of items that the user can scroll through, but will disappear once cleared. If several fault or warning conditions exist simultaneously, each will become a separate item in the User scroll menu. By default, the display will show the active fault or warning as the parameter being shown. For further information on faults and warnings refer to Section 6.5.5 - Faults and Warnings.

6.5.2 Display Symbols

Below is a list of common display symbols and a description of their meaning.

	Access code required / locked
	Item unlocked (can be edited)
	Item locked (cannot be edited) / scrolling parameter locked as default
	Star / delta
	Pressure
	Pressure differential
	Temperature
	Emergency stop
	Separator
	Motor error / motor running
	Sensor error
	Hour meter / time / timer / real time clock
	Service item / service due
	Power failure

6.5.3 Status Text Descriptions

Below is a list of some common status and operating parameter items that may be displayed by the electronic controller.

The operating parameters can be accessed by scrolling through the display using the up and down arrows.

Display	Description
Status Items:	
READY TO START	The compressor is in a state where it is ready to start
STARTING	The compressor is in star mode of star / delta start
LOAD DELAY	The compressor is enacting a short load delay
RELOAD DELAY	A minimum delay between offload and load status
RUNNING LOADED	The compressor is running and loaded
ON LOAD MODULATE	The compressor is loaded & modulating capacity to demand
STOP RUN ON	The compressor will stop after the displayed time elapses
STANDBY RUN ON	The compressor is offload, counting down to Standby mode
STANDBY	The compressor has entered standby mode
BLOWDOWN	The compressor is venting internal pressure
SHUTDOWN	The compressor has shut down due to a fault
Operating Parameters:	
NETWORK ADDRESS	The individual compressor number on the network
SCREW TEMP.	The airend discharge temperature
LINE PRESSURE	The package line (discharge) pressure
SUMP PRESSURE	The compressor sump (internal) pressure
DIFFERENTIAL P.	The differential between line and sump pressure
RUNNING HOURS	The number of hours the compressor has run
LOADED HOURS	The number of hours the compressor has been on load
SERVICE HOURS	The number of service hours left until next service
OIL FILTER HOURS	The number of service hours left in the oil filter
AIR FILTER HOURS	The number of service hours left in the air filter
DRIVE HOURS	The number of service hours left in the drive belts
SEPARATOR HOURS	The number of service hours left in the separator element
OIL HOURS	The number of service hours left in the compressor oil
SEQUENCE	Displays the current status of sequenced compressors
LOAD %	The average load cycle, calculated over a pre-set time

6.5.4 LED Indicators

The *Champion* electronic controller has two LED indicator lights located to the right of the digital display. The green Status LED provides a visual indication of the compressor operational status, while the red Fault LED provides a visual indication of the fault status of the compressor.

The LED indicator lights can be in one of five states

- On - Illuminated continuously
- Fast Flash - On / Off four times per second
- Slow Flash - On / Off once per second
- Intermittent Flash - On / Off every four seconds
- Off - Not illuminated

The following table summarises the LED indicator light states for various compressor operating conditions.

Compressor Condition	Status LED (Green)	Fault LED (Red)
Shutdown Fault	Off	Fast Flash
Alarm Condition	Off	Slow Flash
Startup / Initialising	Off	Off
Start Inhibit Check	Off	Off
Start Inhibit Condition	Off	Slow Flash
Ready To Start	Off	Off
Blowdown	Fast Flash *	Off
Standby	Intermittent Flash	Off
Start Motor in star / delta	Fast Flash *	Off
Load Delay	Fast Flash *	Off
Load	On	Off
Reload Delay	Fast Flash *	Off
Standby Run on Time	Intermittent Flash	Off
Stop Run on Time	Slow Flash	Off

* Intermittent Flash if load state not being requested.

6.5.5 Faults and Warnings

Fault types are identified symbolically. Below are the fault warning symbols that may be displayed.



Shutdown, Trip, Immediate Stop Faults



Alarm or Warning



Run Inhibit

The fault warning symbol alternates with the display symbol that is relevant to the type of fault (refer Section 6.5.2 - Display Symbols). For example, a motor overload fault condition will result in the shutdown symbol alternating with the motor symbol.

The following tables list some of the fault, alarm and start inhibit warnings that the electronic controller may display.

Display	Description
<i>Immediate (Shutdown) Faults:</i>	
EMERGENCY STOP	An emergency stop condition has occurred
MOTOR OVERLOAD	The drive motor has tripped on overload
MOTOR OVERTEMP	The drive motor has tripped over temperature
FAN OVERLOAD	The fan motor has tripped on overload
LINE PRESS SENS	There is a fault with the line pressure transducer
LINE PRESS HIGH	The line (discharge) pressure is too high
SCREW T SENSOR	There is a fault with the delivery temperature sensor
SCREW TEMP HIGH	The airend discharge temperature is too high
SUMP PRES SENS	There is a fault with the sump pressure transducer
SUMP PRESS HIGH	The sump (internal) pressure is too high
SEPARATOR O/TEMP	The compressor separator has tripped over temperature
PHASE FAULT	There is a fault with the three phase power supply

Display	Description
Alarms:	
POWER FAILURE	There has been an interruption to the power supply
LINE PRESS HIGH	The line (discharge) pressure is too high
SCREW TEMP HIGH	The airend discharge temperature is too high
SUMP PRESS HIGH	The sump (internal) pressure is too high
DIFF PRESS HIGH	The separator element requires service
OIL FLT. DP HI	The oil filter element requires service
AIR FLT. DP HI	The air filter element requires service
SERVICE DUE	The compressor is due for a service
OIL FILTER SERV.	The compressor oil filter is due for a service
AIR FILTER SERV.	The compressor air filter is due for a service
DRIVE SERV.	The compressor drive components are due for a service
SEPARTOR SERV.	The compressor separator element is due for a service
OIL SERV.	The compressor oil is due to be changed
Run Inhibits:	
RUN INHIBIT	A condition exists preventing the compressor from starting

To reset a fault or alarm condition, press the Reset button. If the controller detects that the fault or alarm condition is no longer valid, the fault or alarm will clear. Once the fault or alarm has cleared, press the Start button, and the compressor will go through the start sequence as normal.

Warning: The electronic controller fault and alarm conditions are designed to protect the compressor from damage caused by operational parameters outside normal boundaries. If a fault or alarm condition occurs, the cause of the fault or alarm must first be determined and rectified before the compressor is run again. At no time must the compressor protection devices be bypassed.

6.5.6 Pressure Settings

The electronic controller has been programmed with the following pressure settings:

Nominal Operating Pressure (kPa)	Nominal Pressure Differential (kPa)	Load Pressure (kPa)	Unload Pressure (kPa)
780	80	700	780
1000	80	920	1000
1300	80	1220	1300

Warning: For safety reasons, under no circumstances should the electronic controller pressure settings be adjusted to anything other than the appropriate settings for the serial plate nominal operating pressure. If different pressure settings are desired, refer to *Champion Compressors Customer Care Division*. Adjusting the nominal operating pressure above the maximum working pressure of your compressor (as per the serial number plate) may damage your compressor and void your warranty.

6.6 High Temperature Shutdown

The *Champion Marathon* range of compressors has two devices for high temperature protection.

6.6.1 Screw Over Temperature

The compressor is fitted with an accurate airend discharge temperature transducer. The electronic controller will shut down the compressor if the discharge temperature of the airend exceeds 105°C. This setting is factory set and should not be adjusted. In the event of a high temperature shutdown (indicated by “SCREW TEMP HIGH” in the status text line of the electronic controller), urgent action should be taken to locate and remedy the cause of the problem. Refer to *Champion Compressors Customer Care Division* for assistance in rectifying the fault.

The occurrence of high temperature operation causes the electronic controller to go into fault status, and prevents the compressor from restarting. This lockout function may be reset (after the compressor has cooled down) by pressing the Reset button on the electronic controller. Do not restart the compressor unless the cause of the problem has been determined and rectified.

6.6.2 Separator Over Temperature

The discharge point of the separator vessel is fitted with a thermal fuse. This device will shut down the compressor if the temperature of the separator element exceeds 130 °C. This device is factory set and is not adjustable. In the event of a high temperature shutdown (indicated by “SEPARATOR O/TEMP” in the status text line of the electronic controller), urgent action should be taken to locate and remedy the cause of the problem. Refer to *Champion Compressors* Customer Care Division for assistance in rectifying the fault.

The compressor cannot be restarted until the cause of the problem has been rectified, the thermal fuse has been replaced and the Reset button on the electronic controller has been pressed.

6.7 Motor Thermal Overload

Both the compressor main drive motor and the fan motor are fitted with thermal overloads. In the event of a motor drawing excessive current, the thermal overload will trip and the electronic controller will shut down the compressor (indicated by either “MOTOR OVERLOAD” or “FAN OVERLOAD” in the status text line of the electronic controller). Urgent action should be taken to locate and remedy the cause of the overload condition. Refer to *Champion Compressors* Customer Care Division for assistance in rectifying the fault. The compressor cannot be restarted until the cause of the problem has been rectified and the Reset button on the electronic controller has been pressed. Do not restart the compressor unless the cause of the problem has been determined and rectified.

The overload settings are as shown in Section 4.2 - Electrical Specifications, and they should not be varied.

6.8 Thermovalve

When the compressor is started from cold, oil temperature will rise quickly to approximately 85 °C, where the thermovalve will fully open (the thermovalve will start to open at 70 °C). If compressor load is low, the oil temperature will settle at about 70 °C and the thermovalve will bypass the oil cooler thereby preventing over-cooling. As loading and oil temperature increase, the thermovalve will divert oil through the cooler core in order to maintain correct oil temperature.

Due to higher relative humidities, compressors for export may be fitted with an 80 °C thermovalve, at the discretion of *Champion Compressors* or the local distributor.

6.9 Run-On Timer

In line with *Champion Compressors* philosophy of keeping energy consumption to a minimum, the compressor electronic controller provides a Run-On Timer function. This function monitors the length of time that the compressor runs without actually compressing air. If this period exceeds the pre-set time (usually set to six minutes), the compressor will enter Standby mode, and will automatically restart if a fall in system pressure is registered. This mode is indicated by the electronic controller displaying “STANDBY RUN ON” whilst still running, and “STANDBY” once stopped.

The factory setting of this timer is six minutes, but it may be adjusted between zero and ten minutes in accordance with specific installation requirements to ensure that the compressor does not exceed six shut downs per hour. Adjustment is via the user menu structure in the electronic controller (refer to the “Electronic Controller Advanced Configuration” manual available from *Champion Compressors* Customer Support Division for details on this procedure). Please refer to *Champion Compressors* Customer Care Division prior to any adjustments being made, as an incorrect setting may result in damage to the compressor.

Warning: Never assume that the compressor has completely stopped, even if the compressor does not appear to be running. The compressor may have stopped in Standby mode and may restart at any time. Do not remove covers or attempt any service without first ensuring the compressor is isolated from the mains power supply and is suitably tagged.

6.10 Simple Sequencing

The electronic controller is equipped with a function that will enable pressure control regulation and sequence management of one or two other compressors that have controllers equipped with the same facility. This feature can be used to create an air compressor system, of up to three compressors, operating coherently to a single pressure target with automated timed sequence rotation. In this configuration the air compressor designated as compressor ‘1’ becomes the system master. System pressure is detected by the master’s delivery pressure transducer and pressure regulation is determined by the master’s pressure set points. The master also determines sequence rotation. Air compressors designated as ‘2’ or ‘3’ (slaves) will respond to load / unload commands from the master.

For configuration of the sequencing function, please refer to the “Electronic Controller Advanced Configuration” manual available from *Champion Compressors* Customer Care Division.

7.0 OPTIONS

The following is a selection of factory fitted options which may have been ordered with your compressor.

7.1 Deluxe Monitoring

The Deluxe Monitoring option adds the following features to your compressor.

7.1.1 Phase Failure / Reversal Relay

A phase failure / reversal relay is fitted as part of the Deluxe Monitoring Option. Refer Section 7.6 - Phase Failure / Reversal for further details.

7.1.2 Sump Pressure Transducer

A sump (internal) pressure transducer is fitted to the compressor to monitor the airend discharge pressure in the separator vessel. This is the pressure on the upstream or wet side of the air / oil separator element.

The over-pressure function provides additional drive motor protection in conjunction with the motor thermal overload system. The electronic controller will shut down the compressor in the event of the airend discharge pressure exceeding the pressure at which the drive motor could be damaged due to overload.

Sump over-pressure is indicated on the electronic controller by “SUMP PRESS HIGH“. The fault must be reset prior to the compressor restarting.

Additionally, the sump pressure transducer is used to determine whether internal pressure is sufficiently low for the compressor to start, effectively replacing the set time blowdown timer feature.

7.1.3 Separator Differential Pressure Monitoring

The compressor uses two pressure transducers (line and sump) to monitor the build up of differential pressure across the compressor separator element. Should this reach a differential of 100kPa, the electronic controller will display “DIFF PRESS HIGH” to indicate the element requires service.

7.1.4 Drive Motor Thermistors

Thermistors provide additional protection to the windings and insulation of the compressor drive motor. In the event of excessive drive motor temperature, the electronic controller will shut down the compressor, and will display “MOTOR OVERTEMP”.

This fault will require rectification and reset. Refer to *Champion Compressors* Customer Care Division for assistance in rectifying the fault.

7.1.5 Pressure Scheduling (7 Day Timer)

The Deluxe Monitoring option gives the user the option of pressure scheduling. The pressure scheduling function can be used to change the operating pressure set points, or force the compressor into a standby state, at specified times on specified days of the week. The pressure schedule cycles through on a weekly basis.

For configuration of the pressure scheduling function, please refer to the “Electronic Controller Advanced Configuration” manual available from *Champion Compressors* Customer Care Division.

7.2 Full Monitoring

The Full Monitoring option contains all the features of the Deluxe Monitoring option, plus the following features.

7.2.1 Oil Filter Differential Pressure Monitoring

The oil filter head is fitted with a differential pressure switch, factory set at 150kPa. When the oil filter element has reached the end of its useful service life, the electronic controller will display “OIL FLT. DP HI” indicating that the oil filter element needs to be serviced.

7.2.2 Air Filter Differential Pressure Monitoring

The air filter element is fitted with a differential pressure switch, which is factory set at 5kPa. When the air filter element has reached the end of its useful service life, the electronic controller will display “AIR FLT. DP HI” indicating that the air filter element needs to be serviced.

7.3 Pressure Scheduling (7 Day Timer)

A Pressure Scheduling (7 Day Timer) is available. Refer Section 7.1.5 - Pressure Scheduling (7 Day Timer) for further details.

7.4 Modulating Control

Modulating control may be fitted to provide constant delivery pressure when it is desirable to not have any fluctuation of delivery air pressure. The customer is given the option of operating the compressor in modulating mode or in the standard CSU (Constant Speed Unload) mode. Constant air pressure is delivered by increasing or decreasing the amount of air drawn into the compressor.

7.5 Remote Start / Stop

The Remote Start / Stop option may be fitted to provide intrinsically safe, low voltage remote operation of the compressor. A Local / Remote selector switch allows local operation when required for servicing. Voltage free contacts must be supplied by the customer to utilise the 24V Start / Stop circuit.

7.6 Phase Failure / Reversal

A phase failure / reversal relay may be fitted to protect against reverse motor rotation. The relay is designed to sense an under voltage condition, the absence of a supply phase, or the incorrect sequencing of the supply power.

If the phase failure / reversal relay detects any adverse condition in the power supply, the relay will sense the fault and stop the compressor. This fault is indicated by "PHASE FAULT" on the electronic controller. A licensed electrician is required to perform further checks.

There is a small light on the relay which is illuminated when the power supply is correctly sequenced and the voltage is adequate.

If the supply voltage is correct, the problem is most likely that the sequencing of the supply phases to the compressor is incorrect. To correct the sequencing, electrically isolate the compressor, and interchange any two of the supply phases (a licensed electrical worker is required to perform this work). Turn the power back on and check that the relay light is illuminated and that the motor is rotating in the correct direction.

7.7 Export Option

The Export option includes a Phase Failure / Reversal Relay as standard. Refer to Section 7.6 - Phase Failure / Reversal for further details.

7.8 Dirty Environment Pack

The compressor cabinet air inlet opening may be fitted with a low air resistance, replaceable filter mat when the compressor is to be installed in dirty or dusty environments (refer Section 9.0 - GENERAL ARRANGEMENT DRAWINGS).

The inlet pre-filter mats prevent the entry of dust and debris into the compressor cabinet that could restrict airflow through the cooler core. The filter mats also assist in maintaining a high level of general 'house keeping' inside the compressor cabinet. The inlet pre-filter mats are sized to ensure the cooling air flowrate required to maintain the correct compressor operating temperature under all ambient conditions.

7.9 Weatherproof Construction

Compressors built with the Weatherproof Construction option are fitted with a rain deflecting hood (refer Section 9.0 - GENERAL ARRANGEMENT DRAWINGS), painted internally with urethane paint, and have the electrical enclosure sealed to IP66 weatherproof rating. Additional sealing of panels renders the compressor suitable for outdoor installation.

The Dirty Environment Pack is standard with the Weatherproof Construction option. Refer Section 7.8 - Dirty Environment Pack for further details.

7.10 Generic Mine Site Electrics

The Generic Mine Site option includes a Phase Failure / Reversal Relay (refer to Section 7.6 - Phase Failure / Reversal for further details) and a mains isolator switch.

A mains isolator switch is fitted to provide safe isolation of the compressor electrical systems prior to any maintenance work being performed. This isolator is interlocked which ensures that the electrical enclosure cannot be opened without the isolator being in the off position.

The compressor control system voltage is 24VAC, which is classified as extra low voltage (ELV), and is generally compliant with mine regulations.

8.0 MAINTENANCE

8.1 General

Your compressor will serve you best if you ensure it is adequately maintained. Correct maintenance will increase its productive life and can result in large savings as a direct result of reduced down time.

Champion Compressors offer a variety of Maintenance Management options, which provide regular maintenance to ensure long life and trouble-free service from your compressor. Contact *Champion Compressors* Customer Care Division to arrange this service.

Protect your investment by using *Champion's* purpose designed Genuine Parts on your new or used compressors.

Disclaimer: Warranty may be void if non-OEM supplied parts are used on *Champion* compressors.

8.2 Daily Operation

8.2.1 Prior to Starting

Check the oil level of the compressor and top up as necessary (refer Section 8.6.1 - Oil Level).

Warning: Should there be a requirement to open the filler plug, allow two minutes for the oil level to settle and ensure that there is no pressure in the separator vessel.

Check for any obvious deterioration of the vee belts.

Drain any water from air receivers.

8.2.2 After a Routine Start

Observe the electronic controller display for any abnormal readings (i.e. temperature or pressure) and whether any faults are present. Check whether there are any oil or air leaks. Refer to *Champion Compressors* Customer Care Division to resolve any issues.

8.3 Maintenance Schedule Recommendations

Refer to the Parts Manual for all part numbers of items mentioned in this section.

8.3.1 Initial Service - 250 Hours

- Change the compressor oil (mineral oil only)*.
- Replace the oil filter element.
- Check the condition of the purge line filter and replace if necessary.
- Check the condition of the vee belts and replace if necessary.
- Check vee belt tension and adjust as necessary.
- Check that all electrical connections are tight.
- Assess the condition of the inlet pre-filter mat (if fitted) and the air filter element for indication of environmental conditions. If fouling is excessive, a reduced service interval may be necessary.

8.3.2 Every 1,500 Hours

- Replace the oil filter element.
- Replace the air filter element.
- Check the condition of the purge line filter and replace if necessary.
- Check the condition of the vee belts and replace if necessary.
- Check vee belt tension and adjust as necessary.
- Check that all electrical connections are tight.
- Grease the electric motor bearings (refer Section 8.4 - Electric Motor Maintenance).
- Change the compressor oil every 3000 hours (mineral oil only)*.
- Perform a functional check on the control system (every 3000 hours).
- Replace the inlet pre-filter mat (if fitted).

* For long life synthetic lubricant (Sullube), a sample should be taken and analysed, and the oil changed if necessary.

8.3.3 Every 6,000 Hours (Or Yearly)

Perform all checks listed for Every 1,500 hours as well as the following:

- Replace the separator element.
- Replace the purge line filter (when separator element replaced).
- Replace the vee belts ensuring the correct tension adjustment procedure is followed (refer Section 8.8 - Belt Tension Adjustment).
- Check the condition of the compressor oil if it has not been changed due to the lack of hours run.
- Check the condition of the inlet control valve and service if necessary.
- Check the condition of the minimum pressure valve and service if necessary.
- Check the condition of the thermostatic valve and service if necessary.
- Check all nuts, bolts, pipe fittings and electrical connections are tight.
- Check the operation of all safety devices.

8.3.4 Every 8,000 Hours

- Change synthetic oil (Sullube)

Note: Service intervals may be extended if the compressor is installed in a clean, cool environment. Refer to *Champion Compressors* Customer Care Division for advice on the correct service interval for your installation.

8.4 Electric Motor Maintenance

Electric motor bearings should be lubricated as per the greasing intervals listed below with the nameplate grease. Refer to the motor nameplate for the grease type and total grease amount to be used.

Grease	Interval (hours)
Magnalube-G	3000
Polyrex EM	3000

Note that the fan motor bearings are double shielded and are replaced whole when necessary. Ensure that bearings are replaced with the correct part (refer *Champion Compressors Customer Care Division*). Do not use standard sealed bearings in fan motors.

The main drive motor should be lubricated as follows:

1. Wipe the grease nipples with a clean cloth.
2. Run the motor by pressing the Start button. While the motor is running, add the prescribed amount of grease as specified on the motor nameplate. Extreme care should be taken to stay clear of the pulley. If it is not possible to run the motor whilst introducing fresh grease, then the grease must be introduced in 1/3 amounts, running the motor briefly between each greasing.
3. Keep the motor clean by wiping with a clean cloth. Avoid over greasing as excess grease can cause bearing damage.

Care should be taken to ensure that grease relief ports are not blocked, as old grease must purge out these ports.

Mixing grease types may void your warranty. Consult *Champion Compressors Customer Care Division* prior to any change in motor bearing grease type.

Warning: Extreme care must be taken to stay clear of all moving parts, when the main drive motor and fan are operating.

8.5 Maintenance Instructions

Refer to the Parts Manual for all part numbers of items mentioned in this section.

Warning: Do not attempt any maintenance when the compressor is running or pressurised. Stop the compressor, relieve all internal pressure and isolate the power supply before performing maintenance. Service should only be performed by a competent person, experienced in compressor service.

8.5.1 Oil Filter Maintenance

The oil filter element should be changed every 1500 hours of service. The electronic controller will display a warning when the oil filter has exceeded its useful service life (Full Monitoring option only). Use the following procedure when replacing the oil filters (refer Figure 10 - Oil Filter):

1. Remove the old element and o-ring using a filter wrench.
2. Clean the o-ring seating surface.
3. Apply a light film of compressor oil to the new o-ring.
4. Hand tighten the new element until the o-ring is seated.
5. Continue to tighten the element by hand an additional 1/2 to 3/4 turn.
6. Restart the compressor and check for any leaks.

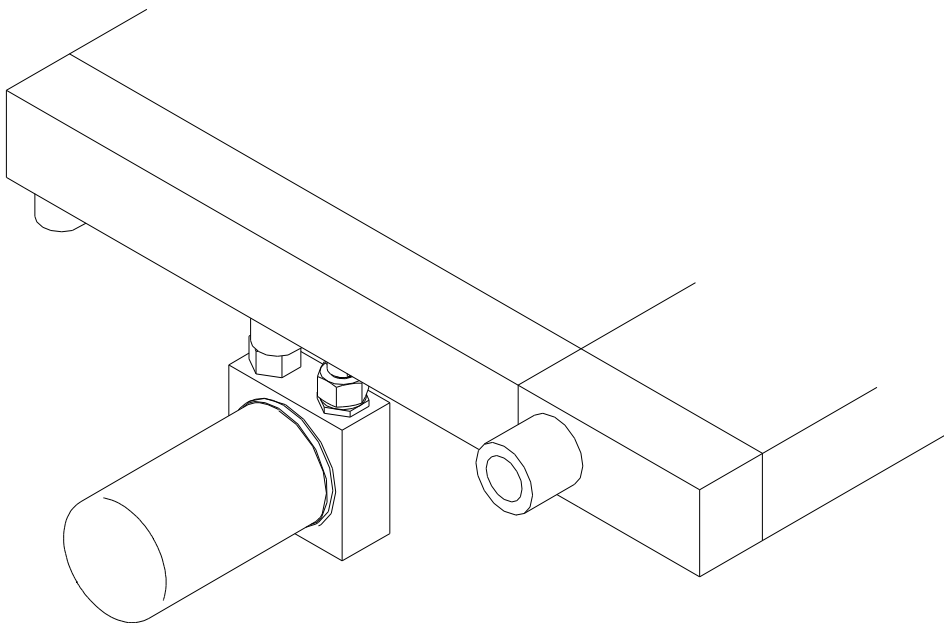


Figure 10 - Oil Filter

8.5.2 Air Filter Maintenance

The air filter element should be inspected every 1500 hours of service and if necessary, replaced. The electronic controller will display a warning when the air filter has exceeded its useful service life (Full Monitoring option only), however holes in the element will only be detected by visual inspection. Use the following procedure when replacing the air filter (refer Figure 11 - Air Filter Assembly):

1. Clean the exterior of the air filter cover.
2. Remove the air filter cover (Item 1) by pressing the quick release clips.
3. Remove the air filter element (Item 2) by gently easing it towards yourself. Clean the base and the interior of the cover using a damp cloth. Do not use compressed air to clean the cover or base.
4. Inspect the air filter element using a bright light to check for holes, and replace if necessary.
5. Fit the air filter element by pushing it firmly into the housing.
6. Replace the air filter cover, ensuring both clips are correctly located and secured.

Note: When performing maintenance, care must be taken that no dirt or foreign matter enters the intake housing.

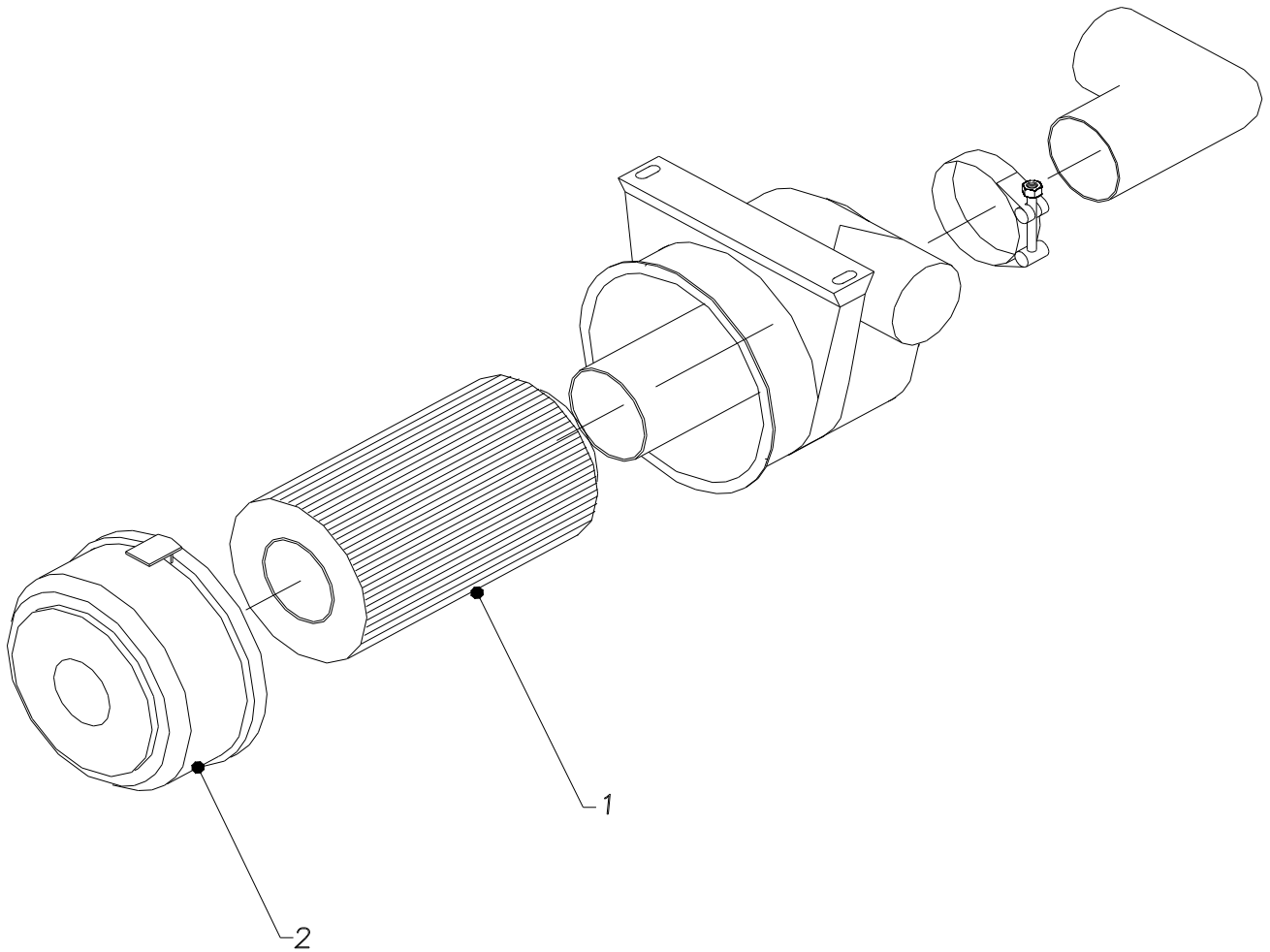


Figure 11 - Air Filter Assembly

8.5.3 Air / Oil Separator Element Maintenance

The separator element should be replaced at least every 6000 hours of service, or when indicated by the electronic controller (Deluxe Monitoring and Full Monitoring options only). Separator elements may need to be replaced more frequently where dusty or hot conditions prevail. Use the following procedure when replacing the separator element (refer Figure 12 - Air / Oil Separator):

1. The separator can be accessed through the side inspection / access door and lift off roof panel (refer Figure 1 - Internal Layout).
2. Loosen the swivel nut on the discharge pipe connecting the minimum pressure valve to the air aftercooler.
3. Disconnect the fittings and pipes from the separator cover marking them to ensure correct reassembly.
4. Remove the separator cover retaining bolts.
5. Lift the cover clear, taking care to clear the purge line tube projecting into centre of the filter element.
6. Lift the element clear (refer Figure 12 - Air / Oil Separator).
7. Replace with a new separator element and gasket assembly. Please note that the staples incorporated in the gaskets are for the purpose of maintaining an earth contact at the separator. The staples must not be removed.
8. Reassemble in the reverse order, taking special care to check the length of purge line tube (refer Section 8.5.5 - Purge Line Filter Maintenance).
9. Evenly tension the separator bolts using a torque wrench to the appropriate settings listed in Section 8.7- Fastener Torques.
10. Re-tension the separator bolts after the compressor has been heated to operating temperature (refer Section 8.7 - Fastener Torques).

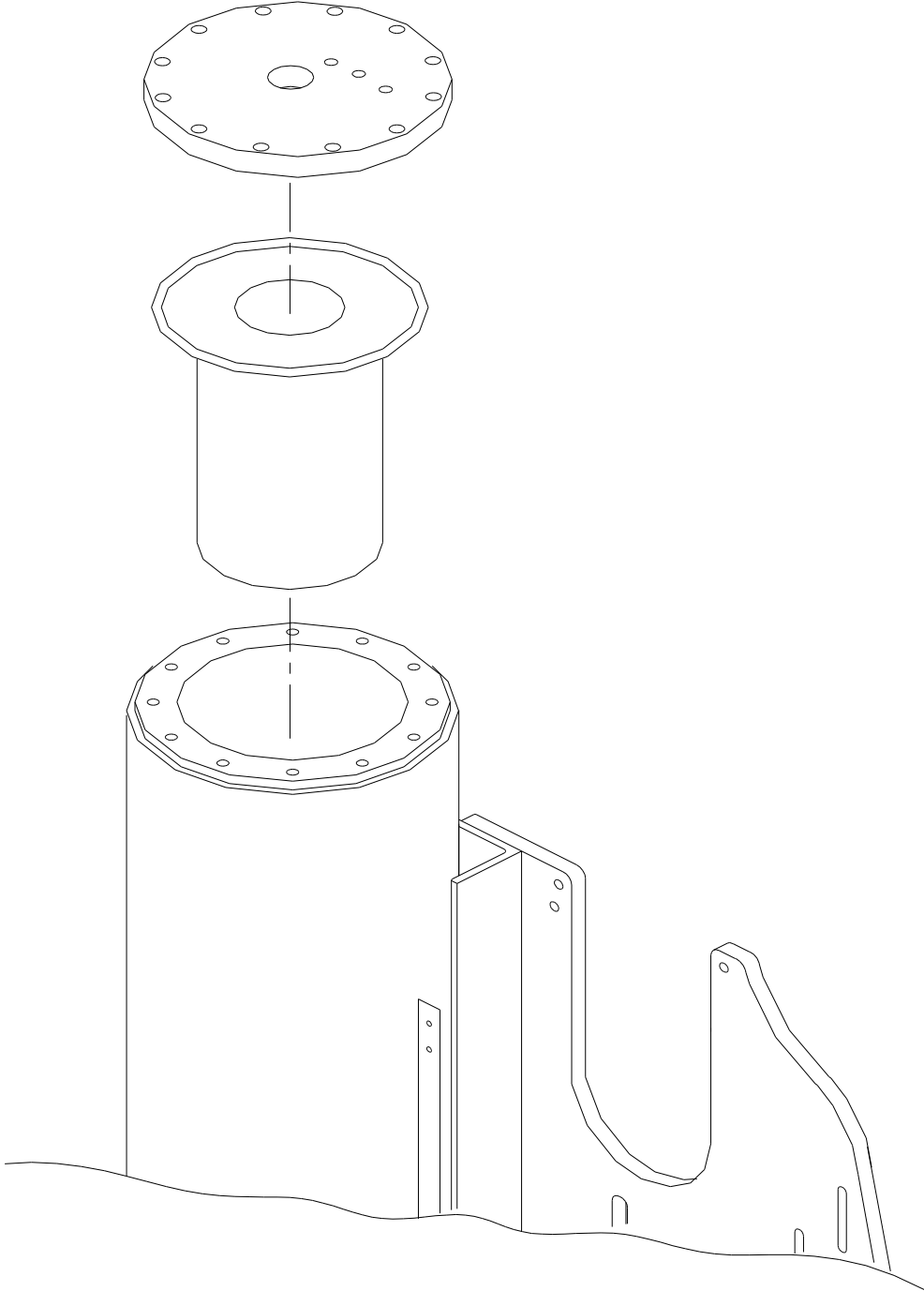


Figure 12 - Air / Oil Separator

8.5.4 Inlet Control Valve Maintenance

The inlet control valve should be functionally checked every 6000 hours. Use the following procedure when servicing the inlet control valve (refer Figure 13 - Inlet Control Valve Assembly):

1. Remove the air filter and housing.
2. Remove the inlet control valve from the compressor.
3. Unbolt the air filter base, and remove the valve plate, spring and plunger. **Warning:** Extreme care must be taken during disassembly of Items 1-13, as there is a large amount of spring force in the assembly. A press or similar device is required to hold and slowly release spring pressure during removal of Item 11.
4. Check the condition of Items 5, 6, 8, 9, 15, 20 and 23 and replace if necessary.
5. Check the condition of Item 24 and lap if necessary.
6. Reassemble in the reverse order.
7. Refit the inlet control valve assembly.
8. Restart the compressor and check the operation of the valve plate.
9. Check the seal between the inlet control valve and the airend. Incorrect sealing will be evident as an oil leak when the compressor is shut down.
10. Replace the air filter and housing.

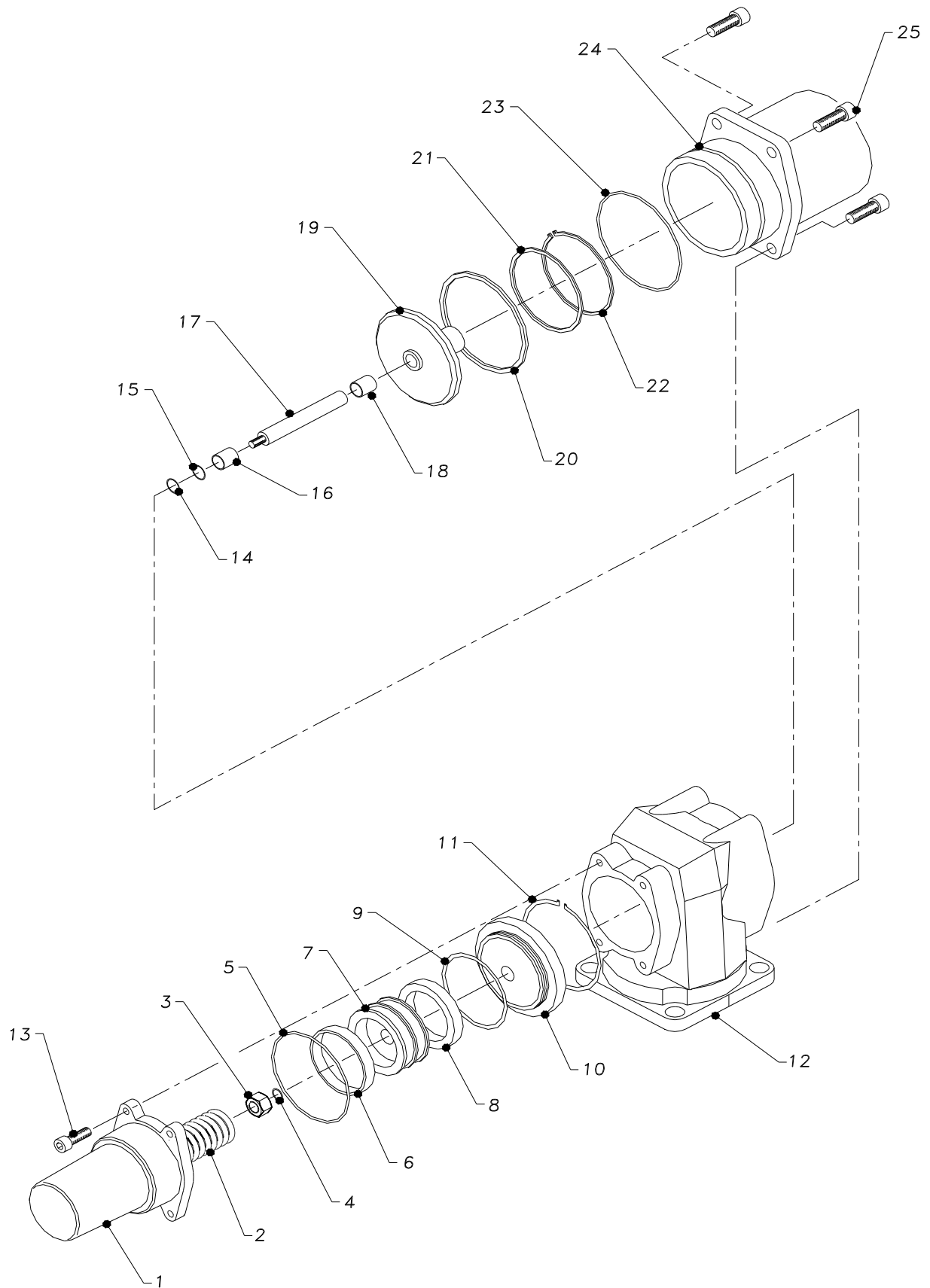


Figure 13 - Inlet Control Valve Assembly

8.5.5 Purge Line Filter Maintenance

The purge line filter should be cleaned after the first 250 hours of service, checked every 1500 hours of service for blockages or other problems, and be replaced when the separator element is replaced.

When replacing the separator element, adjust the purge line tube so that it sits centrally with a maximum clearance of 3mm (minimum clearance is 0mm) from the separator element base when the separator element is installed (refer Figure 14 - Purge Line Filter).

Ensure that the purge line filter is fitted in the correct direction of flow (indicated by the arrow on the side of the filter).

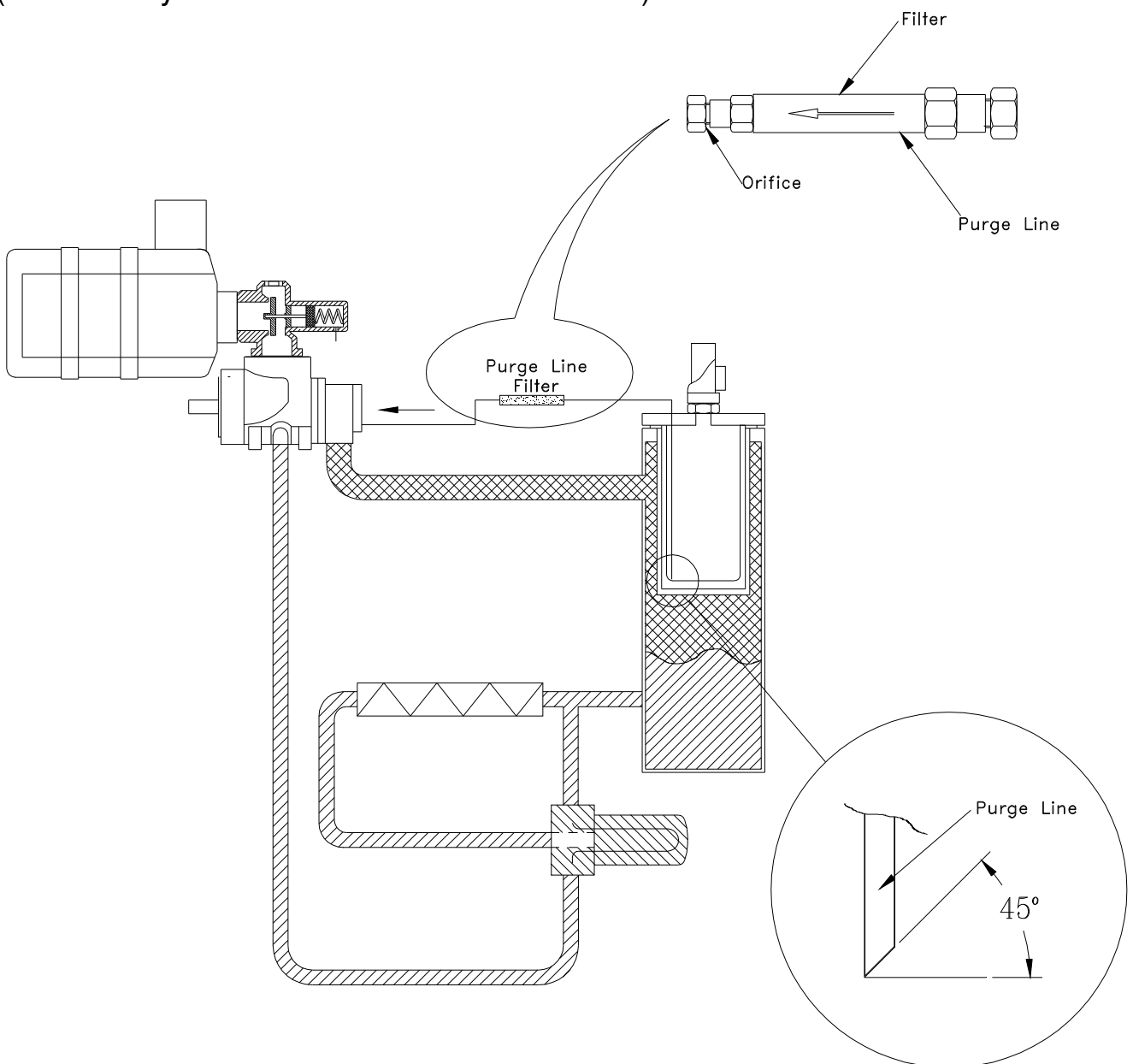


Figure 14 - Purge Line Filter

8.5.6 Minimum Pressure Valve Maintenance

The minimum pressure valve should be inspected when replacing the oil separator element. Use the following procedure when servicing the minimum pressure valve (refer Figure 15 - Minimum Pressure Valve Assembly):

1. Remove the cap (Item 14) by unscrewing it from the housing. Care must be taken as internal assembly spring forces exist.
2. Lift the cap clear and remove the piston, spring and plunger / seat assembly (Items 2 - 13).
3. Inspect the condition of the piston o-ring (Item 9) and replace if necessary.
4. Check the condition of the Teflon disk (Item 5) and valve seat (Item 6), and lap if necessary.
5. Reassemble in the reverse order, taking care to lubricate all surfaces with High Temperature grease.

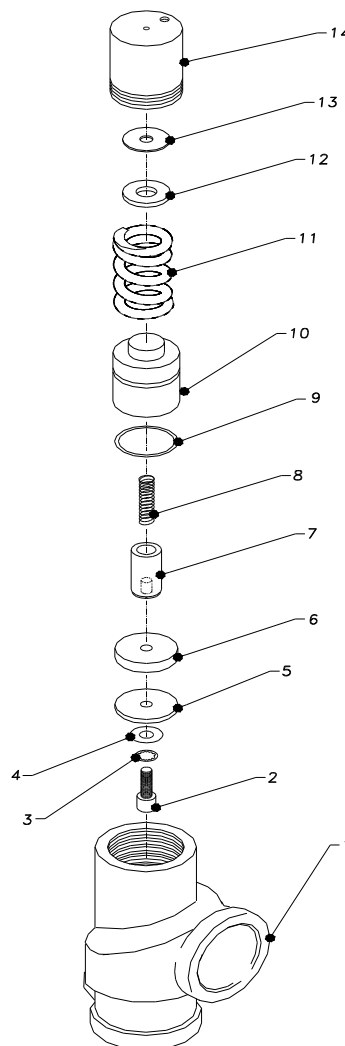


Figure 15 - Minimum Pressure Valve Assembly

8.6 Oil Change

Synthetic oil (Sullube) should be changed every 8000 hours of service or when indicated by oil analysis. Samples for oil analysis need to be tested every 1500 hours.

Mineral oils should be changed after the first 250 hours of service and every 3000 hours of service thereafter. Oil changes should be more frequent where the compressor is operating in a hot or dusty environment.

Use only *Champion* recommended oils (refer Section 4.3 - Lubricant Specifications).

Access to oil drain tap is via the left hand door.

Use the following procedure when changing the compressor oil:

1. Close the pressure hold 1/4 turn ball valve whilst the compressor is running. The pressure hold valve (stop cock) is located near the inlet controller on top of the airend.
2. Stop the compressor.
3. Remove the plug from the oil drain tap.
4. Securely attach a drain hose to the oil drain tap at the bottom of the separator vessel. It may be convenient to run the waste oil directly into a waste oil drum.
5. Slowly open the oil drain tap. **Caution: Oil is hot and under pressure.**
6. When all the oil has been drained, open the pressure hold valve to vent the air remaining in the separator vessel.
7. Close the oil drain tap, and replace the plug.
8. Remove the oil filler cap and refill the compressor with a recommended oil until the oil level reaches the bottom of the oil filler socket.
9. Replace the oil filler cap and ensure that the o-ring is properly seated.
10. Run the compressor for a short period of time and check the oil level again, topping up if necessary.

Warning: Mixing of different lubricants within the compressor will void all warranties. Contact *Champion Compressors* Customer Care Division for advice on the correct oil change procedure.

8.6.1 Oil Level

The maximum oil level should be measured when the compressor is cold or has been stopped for 30 minutes.

The minimum oil level should be measured when the compressor is running.

Refer Figure 16 - Maximum and Minimum Oil Levels for the maximum and minimum oil level measurement locations.

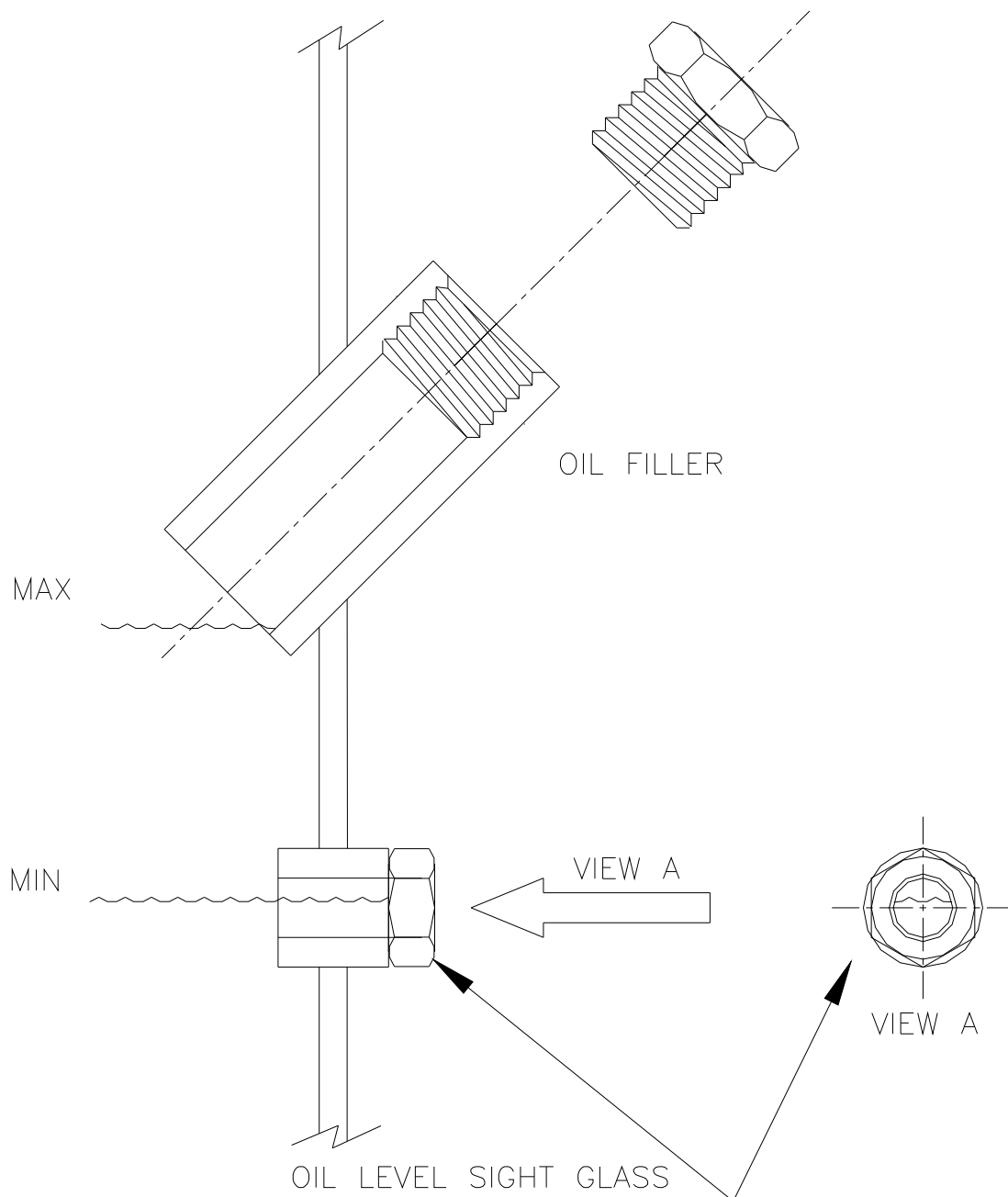


Figure 16 - Maximum and Minimum Oil Levels

8.7 Fastener Torques

The following is a list of tightening torques which may be required during routine service or for repairs to the compressor:

Bolt Size	Mild Steel		Heat Treated	
	Standard N.m (Ft.lbs)	High Tensile N.m (Ft.lbs)	Socket Head N.m (Ft.lbs)	Socket C/Sunk N.m (Ft.lbs)
M6	4 (3)	9 (7)	20 (15)	9.5 (7)
M8	9.5 (7)	22 (16)	34 (25)	23 (17)
M10	18 (13)	43 (32)	61 (45)	46 (34)
M12	30 (22)	77 (57)	142 (105)	81 (60)
M16	74 (55)	190 (140)	270 (200)	200 (150)
M20	143 (106)	370 (270)	650 (480)	400 (295)
M24	248 (183)	640 (470)	1110 (810)	640 (471)
3/8" UNC	2.3 (27)	3.2 (38)	61.5 (45)	39.6 (29)
1/2" UNC	5.6 (66)	7.8 (92)	147 (109)	96 (71)

8.8 Belt Tension Adjustment

The correct drive belt tension is essential to ensure that full motor power is transmitted to the airend. The belt tension is achieved by turning the jacking nut, located above the airend. This will raise the airend which has the effect of increasing belt tension.

Belt tension must be adjusted five minutes after a new set of belts is fitted and then again ten minutes later. This will ensure that the belts have completed their initial stretch. Subsequent to this, belt tension needs to be checked (and adjusted if appropriate) every 1500 hours for the duration of the belt life.

8.8.1 Belt Tension Measurement

Belt tension is measured by using a Tensiometer (*Champion* Part No. 270965 - refer Figure 17 - Belt Tension Adjustment).

Use the following procedure to measure belt tension.

1. Set the large o-ring so that the o-ring bottom is at the 8mm mark.
2. Ensure that the small o-ring is set at the zero mark.
3. Hold the top of the Tensiometer and press it at right angles to the belts, midway between the airend pulley and motor pulley into one of the vee belts. When the bottom of the large o-ring is level with the top of the

other belts stop pressing it in and read the kilogram figure off the bottom of the small o-ring.

4. Move the small o-ring back to the zero mark and repeat the operation for the other belts.
5. Record the results.
6. Rotate the motor pulley through one complete revolution and measure the belts again, recording the results.
7. Once again rotate the motor pulley and take another set of readings.
8. Average the three sets of readings to come up with a belt tension figure.

The belt tension must be adjusted between the minimum and maximum belt tension values listed in the table below:

Model	Minimum	Maximum	Initial
CSE 37	3.5 kg	4.7 kg	5.8 kg
CSE 45	3.5 kg	4.9 kg	6.4 kg

8.8.2 Belt Tension Adjustment

Refer to Figure 17 - Belt Tension Adjustment for locations of the components named in this procedure.

1. Switch off and isolate the compressor.
2. Remove the side doors and the belt guard.
3. Loosen the five airend mounting bolts by 3/4 of turn.
4. Turn the jacking nut to increase or decrease the belt tension.
5. Confirm correct belt tension as per Section 8.8.1 - Belt Tension Measurement.
6. Tighten up the airend mounting bolts as per Section 8.7 - Fastener Torques.
7. Replace the belt guard and side doors.
8. Ensure that the discharge hose is not kinked, over-bent or has been placed under undue stress or strain.

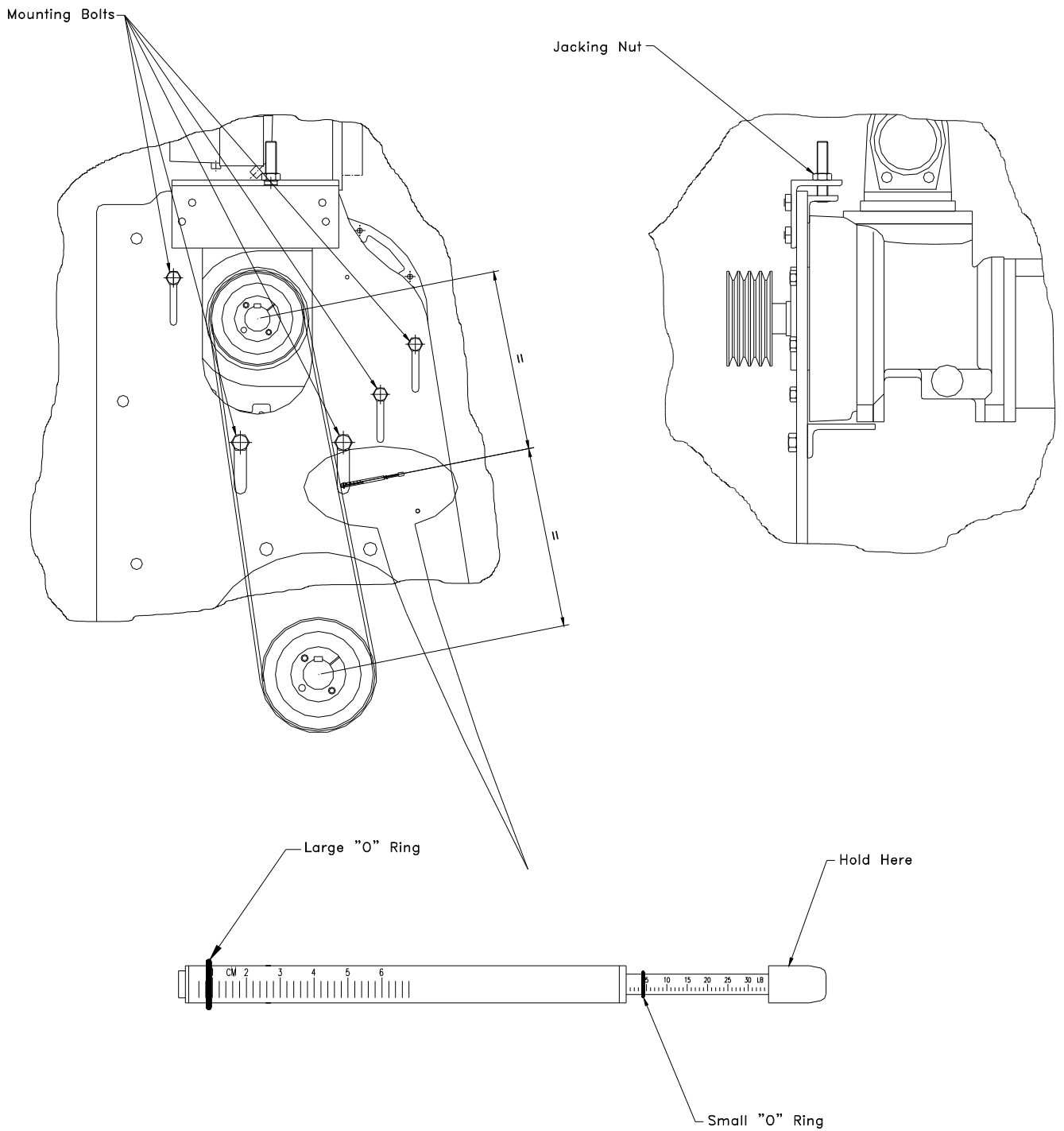


Figure 17 - Belt Tension Adjustment

8.9 Belt Replacement

Belt replacement should be carried out in the same manner as belt tension adjustment. The only variation is to unwind the jacking nut sufficiently to remove the old belts and replace them with a new set of belts.

Note: The airend discharge hose may need to be loosened during belt replacement to ensure the hose is not damaged by undue stress or strain. Ensure that the discharge hose is retightened once belt tensioning is complete.

New belts should be initially tensioned to the initial tension settings outlined in Section 8.8.1 - Belt Tension Measurement. As described above, belt tension needs to be adjusted five minutes after these belts are fitted and then again ten minutes later. This will ensure that the belts have completed their initial stretch. After this first fifteen minutes of operation, the belts should be correctly tensioned to the table in Section 8.8.1 - Belt Tension Measurement.

8.10 Pulley Alignment

In the event of the motor or airend having been removed and refitted, pulley alignment will have to be carried out.

The misalignment of pulleys can cause rapid wear of the vee belt form, considerably shortening the service life of both belts and pulleys. Due to the innovative design of the CSE range, only parallel alignment of the drive pulleys needs to be checked (refer Figure 18 - Pulley Alignment).

Parallel alignment can be checked by placing a straight edge against the pulleys near their centres. For correct alignment, the straight edge must be sitting flat against both pulleys, i.e. full face contact.

To correct parallel misalignment, first check that the rear face of the airend pulley is positioned 10mm off the mounting face (this is required to ensure that the belts clear the motor mounting bolts). With the airend pulley correctly positioned, move the motor pulley on the shaft to achieve correct alignment.

The following tolerance must be achieved (refer Figure 18 - Pulley Alignment):

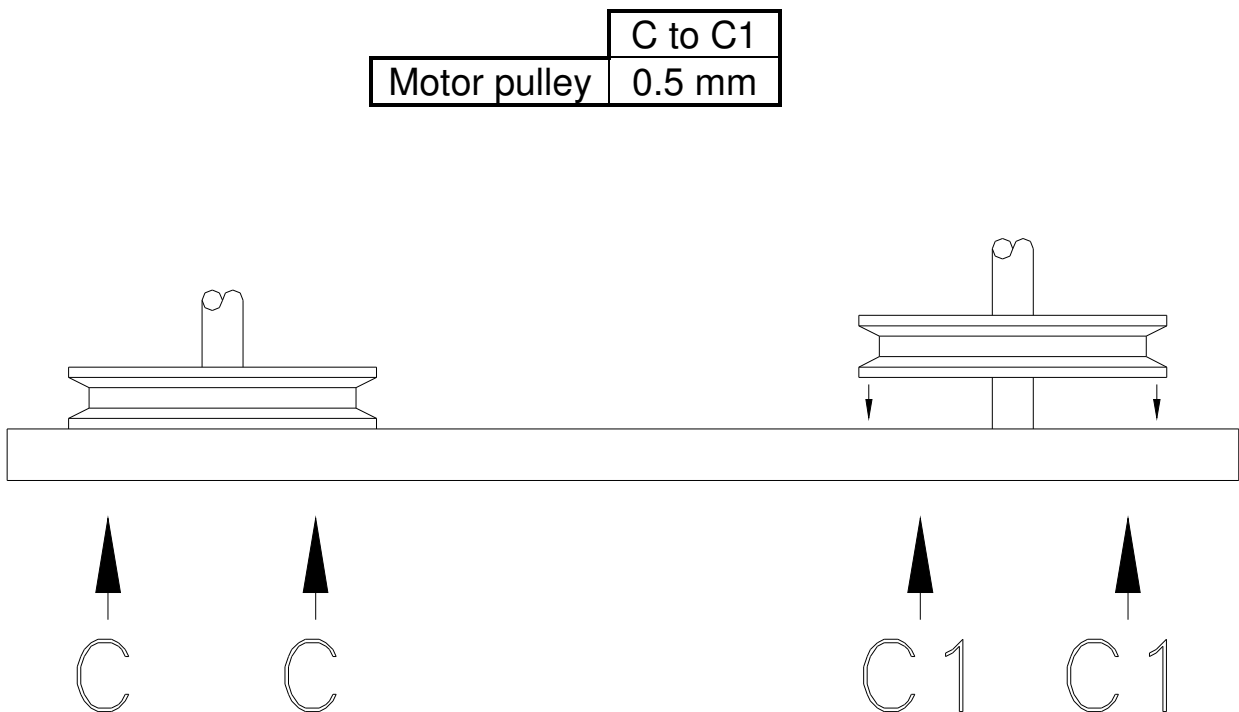


Figure 18 - Pulley Alignment

9.0 GENERAL ARRANGEMENT DRAWINGS

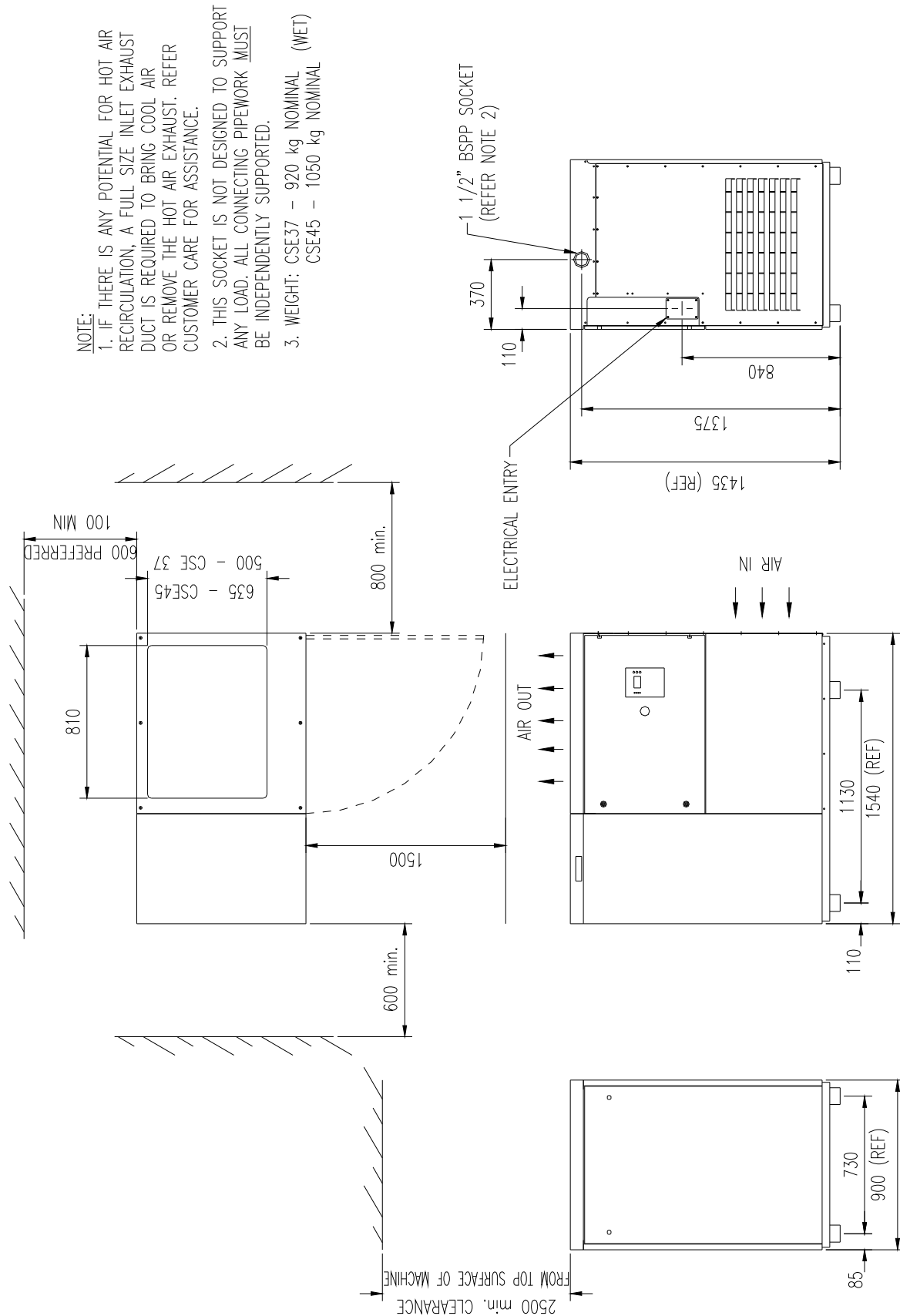


Figure 19 - General Arrangement Drawing - CSE37 / 45

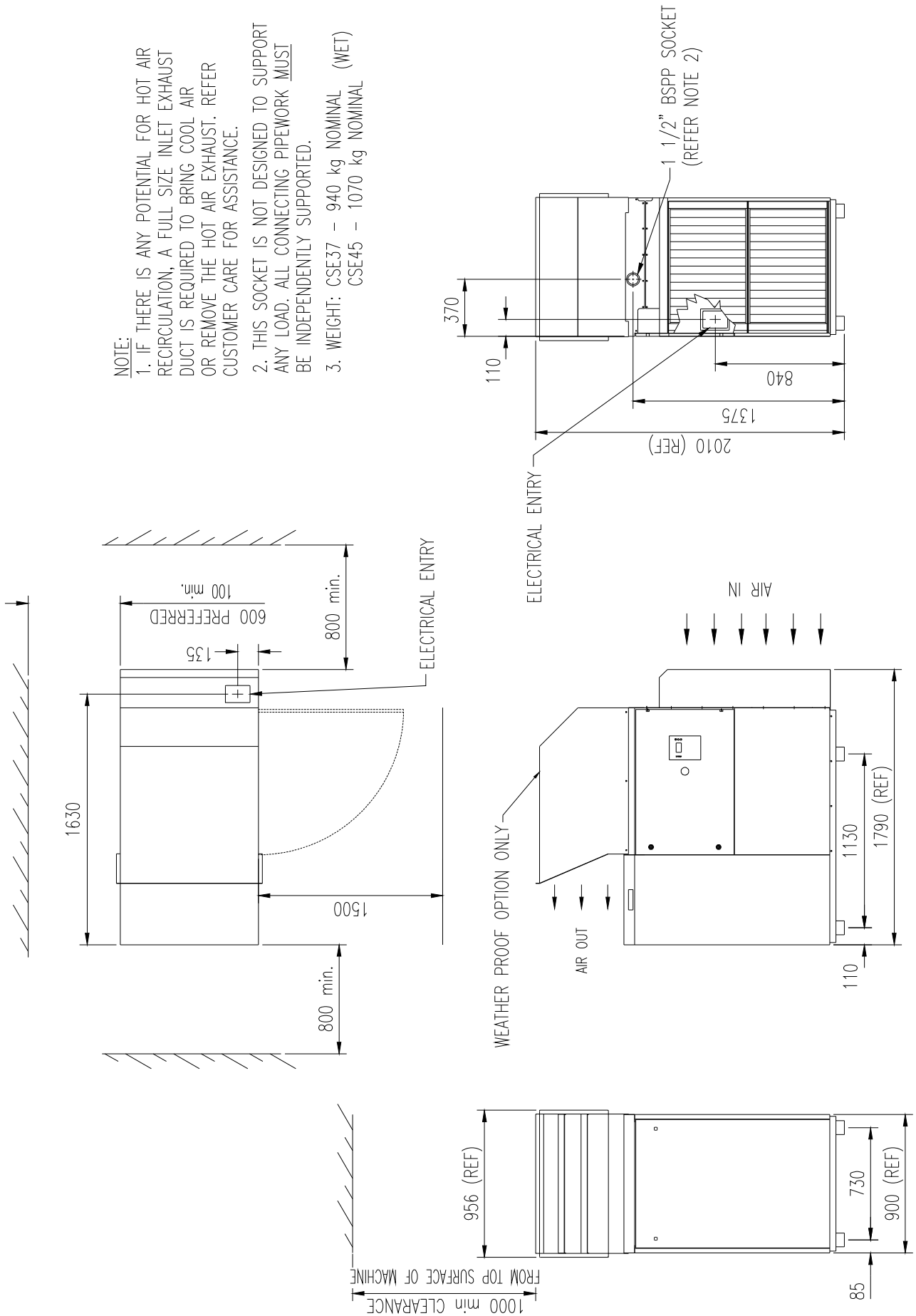


Figure 20 - General Arrangement Drawing - CSE37 / 45 Options

11.0 CHAMPION NETWORK

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12.0 CUSTOMER FEEDBACK SHEET

In line with *Champion Compressors* TQM system, we value customer feedback with regard to product and service. Could you please take the time to fill out this sheet after your compressor has been commissioned.

Name: _____ Contact Number/s: _____

Company Details: _____

How would you rate the following?

Compressor: Model: _____ Serial No: _____

	<i>Excellent</i>					<i>Poor</i>
	1	2	3	4	5	
Condition of compressor when it arrived	1	2	3	4	5	
Build quality of compressor	1	2	3	4	5	
How does it compare to your expectations?	1	2	3	4	5	
Other Comments: _____						

Dryer (if applicable): Model: _____

Condition of dryer when it arrived	1	2	3	4	5
Build quality of dryer	1	2	3	4	5
How does it compare to your expectations?	1	2	3	4	5
Other Comments: _____					

Ancillaries (if applicable):

Ancillary Details: _____

Condition of filters etc.:	1	2	3	4	5
How does it compare to your expectations?	1	2	3	4	5
Other Comments: _____					

Installation (if Champion installed):

How would you rate the installation?	1	2	3	4	5
How does it compare to your expectations?	1	2	3	4	5
Other Comments: _____					

Please detach this page and fax it to: *Champion Compressors* Head Office (Melbourne):

Fax: (+613) 9703 8077

Please return fax this document to:

Champion Compressors

(+613) 9703 8077

13.0 APPENDIX A - WARRANTY

CHAMPION COMPRESSORS PTY. LTD. WARRANTY POLICY

A.C.N. No 006732332

Hereinafter the word "Seller" refers to Champion Compressors Proprietary Limited. "Purchaser" refers to the person or company invoiced for the goods.

1. SCOPE

The Seller warrants that product of its manufacture and supply shall be free from defects in material and workmanship. Where the Seller supplies goods that are not of its manufacture then the warranty that applies shall be the warranty, if any, extended by that Manufacturer.

Where the Seller accepts liability for warranty then it may, at its option either:

- a) Repair or replace the product, or the supply of equivalent goods.
- b) Supply replacement parts on an ex-works basis, supply the service again or, subject to the conditions hereunder, reimburse the customer for the costs of locally purchased materials and subcontract services.

NOTE: No claim will be accepted by the Seller unless notified in writing prior to any works being undertaken on its behalf. The Claimant must obtain a written order from the Seller before proceeding.

2. ESTABLISHMENT OF BONA FIDES

For every warranty claim request the onus lies with the Claimant to establish its validity. The Seller will not proceed with the repairs unless a customer order has been provided.

3. TIME HORIZON FOR WARRANTY LIABILITY

Any request, claim, or action from warranty liability must be commenced within 45 days of the event occurring - or the claim may be disallowed.

4. CONDITIONS AND LIMITATIONS

a) PAYMENT IN FULL

No warranty claim will be considered unless the Claimant has fully complied with the terms of payment as set down in the conditions of sale or in the quotation for supply of the goods concerned.

b) INSTALLATION / ENVIRONMENT

The warranty is conditional upon the correct and proper installation and application of the product. No claim will be allowed where the environment is hostile to the product and no warranty is given in respect of the suitability of materials of construction of the product unless specifically so stated, in writing, by the Seller.

c) PROPER COMMISSIONING AND OPERATION

Warranty is subject to and conditional upon the equipment having been installed, commissioned and maintained in accordance with the Seller's recommendations as set down in the appropriate instruction manual.

Service work may only be carried out by parties authorised by the Seller and using only genuine Spare Parts.

d) UNAUTHORISED MODIFICATIONS

Any alterations or modifications to the equipment carried out by any party, without the express written approval of the Seller, will render the warranty null and void.

e) MISUSE

Warranty expressly excludes damage as a result of accident, abuse, misuse, negligence or incorrect operation by the Claimant or his agent

f) LABOUR CHARGE

The Seller will provide labour free-of-charge (subject to further conditions hereunder) during the nominated warranty period only, and during normal working hours, Monday to Friday (Public Holidays excepted).

g) TRAVEL TIME AND COSTS

Time to travel to site will be charged at current hourly rates to the Claimant.

Mileage, accommodation, meals and any other costs associated with effecting warranty repairs will be charged to the Claimant.

h) WARRANTY WORK OUTSIDE NORMAL HOURS

For work required outside normal working hours the differential penalty rates applicable will be charged to the Claimant.

NOTE: Our "Out of Hours" call out fee is charged where work is required on that basis.

5. WARRANTY PERIOD

-Equipment Manufactured by the Seller

- One (1) year from date of commissioning, or Eighteen (18) months from date of delivery from the Sellers works, whichever comes first.

- A further Twelve (12) months extended warranty is granted in respect of the Rotary Screw Element contained within the rotary screw compressors manufactured by the Seller.

-Equipment and Assembly Components not manufactured by the Seller

In accordance with Clause 1, the Seller extends to the Purchaser the warranty so provided by the equipment or component Manufacturer.

NOTE: No extension of the initial warranty period will be provided by the Seller as a consequence of any work carried out under the Warranty Policy.

6. CONSEQUENTIAL COSTS

The Seller will not be liable under any circumstances, for any costs incurred by the Purchaser, as a consequence of the failure of the product. Furthermore the Seller will not be liable for any damages which may follow as a consequence of the product failure.

7. ADMISSION OF LIABILITY

Acknowledgement and / or investigation initiated or actioned by the Seller for any product failure does not admit its liability or acceptance of any claim.

8. TOTALITY OF THE POLICY

No departure from this policy is granted by the Seller unless it is approved in writing by the Seller.

9. TERMS AND CONDITIONS OF SALE OF GOODS

This warranty policy is to be read in conjunction with Champion Compressors Pty. Ltd. "Terms and Conditions of Sale of Goods".

14.0 APPENDIX B - DN - METRIC NOMINAL SIZES

DN - Nominal Size for Valves, Flanges and Fittings.

International Definition refer ISO 6708-1980

Nominal size (DN): A numerical designation of size which is common to all components in a piping system other than components designated by outside diameters or by thread size.

It is a convenient round number for reference purposes and is only **loosely related** to manufacturing dimensions.

The nominal size is designated by DN followed by a number, which shall be shown **without the addition** of the unit of measure. Refer to DN equivalents on the table shown below.

It should be noted that not all piping components are designated by nominal size, for example steel tubes are designated and ordered by outside diameter and thickness.

NOTE: The nominal size DN cannot be subject to measurement and shall not be used for purposes of calculation.

Metric DN (Nominal Size) A dimensionless designation.	=	Imperial NS (Nominal Size) Designated in inches sometimes as ND, NB or NPS
6	=	1/8"
8	=	1/4"
10	=	3/8"
15	=	1/2"
20	=	3/4"
25	=	1"
32	=	1.1/4"
40	=	1.1/2"
50	=	2"
65	=	2.1/2"
80	=	3"