

User Handbook (Original Instructions)

HR04-HR07 Models (E, ER, ED, ERD)

Rotary Vane Air Compressors



Contents

1.0 Introduction	5
1.1 Customer Support.....	5
1.2 Warranty Terms.....	5
1.3 Product Development.....	5
1.4 Quality Standards.....	5
1.5 Model Range.....	5
1.6 Product Terminology.....	5
1.7 Warnings, Cautions and Notes.....	5
2.0 Product Information	7
2.1 Health and Safety Precautions.....	7
2.2 Compressor Performance.....	7
2.3 Operating Temperatures.....	7
2.4 Noise Level.....	7
2.5 Technical Data HR04-HR07	8
3.0 Installation	9
3.1 Lifting and Handling.....	9
3.2 Compressor Location.....	9
3.3 Compressor Ventilation (Fig.3.1).....	9
3.4 Electrical Connections.....	9
3.5 Electrical Installation (Fig 3.2).....	9
3.6 Compressor Rotation.....	10
3.7 RS Operation with other Compressors.....	10
4.0 General Description	11
4.1 Compressor/Hypac (Fig.4.1).....	11
4.2 Control Systems.....	11
4.3 Compressor Assembly (Fig.4.2).....	12
4.4 Electronic Controller.....	12
5.0 Operating Instructions	13
5.1 Checking Procedure Before Starting.....	13
5.2 Operator Control Keys (Fig 5.1).....	13
5.3 Status Display/Lights.....	13
5.4 Speed Indication (Variable Speed/RS).....	13
5.5 Displaying Values.....	13
5.6 Changing Values.....	14
5.7 Language Selection.....	14
5.8 Setting Time/Date (Timer).....	14
5.9 Starting Automatic Operation.....	14
5.10 Starting Continuous Operation.....	14
5.11 Starting Regulated Speed/RS.....	14
5.12 Stopping All Models.....	14
5.13 Emergency Stop.....	14
5.14 Compressor Vent Down.....	14
6.0 Adjustments	15
6.1 Compressor Control (Fig 6.1).....	15
6.2 Operation Selection.....	15
6.3 Operator Menus.....	15
6.4 Pressure Adjustment.....	15
6.5 Pressure Control RS Compressors.....	15
6.6 Servo Valve (Fig 6.2).....	16
6.7 Setting Timer Units.....	16
7.0 Maintenance	17
7.1 Routine Service.....	17
7.2 Service Kits.....	17
7.3 Service Instructions.....	17
7.4 Panel Removal.....	17
7.5 Oil Filling/Draining (Fig.7.1).....	17

7.6 Oil Filter (Fig 7.1)	17
7.7 Air Filter (Fig.7.1)	17
7.8 Oil Separator (Fig.7.1)	17
7.9 Oil Cooler/Aftercooler (Fig.7.2).....	18
7.10 Cabinet Air Filter (Fig 7.2)	18
7.11 Electric Motor	18
7.12 Electrical Connections	18
7.13 Service Schedule.....	18
8.0 Controller Messages.....	21
8.1 Status Messages	21
8.2 Warning/Faults.....	21

1.0 Introduction

1.1 Customer Support

Full support is available from your Hydrovane Distributor. If you need any specialist help or service, please contact your Distributor quoting the MODEL, TYPE and SERIAL NUMBER.

1.2 Warranty Terms

All compressors, which are serviced by an authorised Hydrovane Distributor, are guaranteed for 12 months from commissioning or 18 months from the date of shipment.

Warranty excludes normal service parts, oil and wear items, dirt ingress, cleaning of filters and fluid drain devices. Tightening of electrical and/or other connections and adjustment of controller settings are also excluded.

Consequential damage of any nature is not covered by the warranty.

An 'Advance' warranty is available for approved installations, contact your Hydrovane Distributor for details.

1.3 Product Development

Hydrovane adopt a policy of continual product development. The information in this Handbook, whilst fully up to date when issued, may be subject to change without notice.

1.4 Quality Standards

Hydrovane Quality Management Systems are approved to BS EN ISO 9001.

These instructions comply with the latest European Directives regarding content and are valid for machines carrying the CE mark.

Each machine has its own unique EC Declaration of Conformity supplied within the documentation pack.

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1.5 Model Range

This handbook relates to all enclosed HR04-HR07 vertical range compressors and hypac models.

HR04E07-2036D005	60Hz model
HR04E07-4035S000	50Hz model
HR04ER07-4035S000	50Hz model
HR04ED07-4035S000	50Hz model
HR04ERD07-4035S000	50Hz model
HR04E07-5736D005	60Hz model
HR04E10-2036D005	60Hz model
HR04E10-4035S000	50Hz model
HR04ER10-4035S000	50Hz model
HR04ED10-4035S000	50Hz model
HR04ERD10-4035S000	50Hz model
HR04E10-5736D005	60Hz model

HR05E07-2036D005	60Hz model
HR05E07-4035S000	50Hz model
HR05ER07-4035S000	50Hz model
HR05ED07-4035S000	50Hz model
HR05ERD07-4035S000	50Hz model
HR05E07-5736D005	60Hz model
HR05E10-2036D005	60Hz model
HR05E10-4035S000	50Hz model
HR05ER10-4035S000	50Hz model
HR05ED10-4035S000	50Hz model
HR05ERD10-4035S000	50Hz model
HR05E10-5736D005	60Hz model

HR07E07-2036D005	60Hz model
HR07E07-4035S000	50Hz model
HR07ER07-4035S000	50Hz model
HR07ED07-4035S000	50Hz model
HR07ERD07-4035S000	50Hz model
HR07E07-5736D005	60Hz model
HR07E10-2036D005	60Hz model
HR07E10-4035S000	50Hz model
HR07ER10-4035S000	50Hz model
HR07ED10-4035S000	50Hz model
HR07ERD10-4035S000	50Hz model
HR07E10-4035V000	50Hz model
HR07ER10-4035V000	50Hz model
HR07ED10-4035V000	50Hz model
HR07ERD10-4035V000	50Hz model
HR07E10-4636V005	60Hz model
HR07E10-5736D005	60Hz model

The last three digits of the product code represent mark number changes, you may receive a unit with numbers higher than those shown above.

1.6 Product Terminology

The product code segments signifies:

HR	Hydrovane Regeneration
04, 05, 07	kW motor (IE3 50/60Hz)
E, ER, ED, ERD	Enclosed, on Receiver, w/Dryer, on Receiver w/Dryer
07, 10	Delivery pressure in bars
20, 40, 46, 57	Voltage, tri-rated motors
3	Three phase
5, 6	50 or 60Hz
D, S,	Direct On Line, Star/Delta
V	Variable Speed or RS
000,100,200,300	Revision number European
005,105,205,305	Revision number USA





This publication refers to compressors with serial numbers from:

- HR04-000001-1409
- HR05-000001-1409
- HR07-000001-1409

All models are fitted with a new electronic controller, part number CC1054325 (STD) or CC1068566 (RS).

1.7 Warnings, Cautions and Notes

WARNING ! Is used to identify specific hazards which can cause injury or death as identified below.

-  Risk of electric shock
-  Risk of hazard or danger
-  Risk of hot surfaces
-  Eye protection must be worn



Dust protection must be worn



Warning pressurised vessel



Warning pressurised component or system



Warning unit is remotely controlled and may start without warning



Read the instruction manual



Do not operate the machine without the guard being fitted



Warning do not start the machine without consulting handbook



Lifting point



Direction of rotation

CAUTION ! Is used to identify incorrect procedures which can cause damage to the compressor.

NOTE ! Is used to draw attention to specific points of importance.

2.0 Product Information



NOTE !

PLEASE READ CAREFULLY AND PROCEED BY FOLLOWING THESE INSTRUCTIONS BEFORE INSTALLATION, OPERATION, MAINTENANCE OR REPAIR OF THE COMPRESSOR UNIT.

2.1 Health and Safety Precautions

To comply with your responsibilities under the Health & Safety at Work Act 1974, it is essential that the compressor is operated and maintained by competent persons in accordance with the instructions in this handbook.

The standard build of all Hydrovane products are designed to compress clean, dry, atmospheric air and are not intended for any other purpose.

The compressor warranty will be invalidated if unapproved spare parts or oils are used. Using such items may cause the efficiency and service life of the compressor to be reduced, and could create a hazardous condition over which Hydrovane has no control.

Failure to maintain the compressor correctly, or modifying it without prior approval from Hydrovane, may create a hazardous condition. This will also invalidate the warranty.

Read and fully understand the contents contained in the User Handbook, ensure that it is not permanently removed from the compressor.

Hydrovane declines all liability in the event of material damage or bodily injury resulting from negligence in the application of these precautions, from non-observation or lack of elementary supervision in respect of handling, operation, maintenance or repair, even if not expressly stated in this instruction notice.

2.2 Compressor Performance

Your compressor will give optimum performance and trouble-free service life when the bulk oil temperature is maintained between 75-85°C (167-185°F).

Certain operating conditions sustained over a period of time may cause problems that affect the performance and reliability of this compressor.

Problems may occur when compressors run for short periods on low air demand where they don't reach normal operating temperatures.

Prolonged use under these conditions can cause condensation build up within the compressor and may eventually lead to emulsification of the oil.

Normal operating temperatures are reached in typically 10/15 minutes. To purge condensate from the compressor, a longer running period with a high air demand is needed, usually a minimum of 60 minutes will be required.

Conditions or applications which prevent the compressor temperature stabilising between these parameters should be avoided.

RS units have automatic stop/start cooling fans that cut in at 85°C (185°F) operating temperature.

Consult your local Hydrovane Distributor if you have any particular concerns about operational characteristics of your compressor.

2.3 Operating Temperatures

Assuming the compressor is serviced correctly, the machine is capable of operating in ambient temperatures up to a maximum of 45°C (113°F) (40°C/104°F RS).

When the compressor is working, the temperature should be:-

Initial start-up and warm-up period.	<70°C (158°F)
Optimum working temperature.	75-85°C (167-185°F)
High temperature.	90-100°C (194-212°F)

Some of the reasons for high compressor oil temperatures are:

- Low oil level.
- Blocked oil cooler or cooler flow restrictions.
- Wrong type or grade of oil.
- High ambient temperature.
- Cooling fan stopped or operating incorrectly.

NOTE ! The controller display will show a warning when the compressor temperature reaches 107°C (225°F).

NOTE ! The compressor will stop automatically if the temperature rises above 110°C (230°F).

If the bulk oil temperature frequently reads 100°C (212°F) then Fluid Force HPO oil should be used.

2.4 Noise Level

Although the sound pressure level for these units is relatively low, they should be positioned where noise will not be a problem.

2.5 Technical Data HR04-HR07

Model Number	HR04	HR05	HR07	HR07RS
PERFORMANCE DATA (50Hz)				
F.A.D. litres/sec (cfm) @ 7 bar/102 psi	11.42 (24.20)	15.35 (32.52)	21.23 (45.00)	20.53 (42.50)
F.A.D. litres/sec (cfm) @ 10 bar/145 psi	9.50 (20.10)	12.75 (27.02)	17.34 (36.75)	17.37 (36.80)
PERFORMANCE DATA (60Hz)				
F.A.D. litres/sec (cfm) @ 7 bar/102 psi	10.05 (21.30)	15.06 (31.90)	18.17 (38.50)	20.53 (42.50)
F.A.D. litres/sec (cfm) @ 10 bar/145 psi	8.35 (17.70)	10.34 (21.90)	14.21 (30.10)	17.37 (36.80)
PERFORMANCE				
Power - kW (hp)	4.0 (5.5)	5.5 (7.5)	7.5 (10)	
Noise Level - dBA	66		67	
Starter Type	DOL (60Hz) and SD (50Hz)			Inverter
Drive Type	Direct			
Operating Controls	Continuous Run, Automatic Stop/Start, Reduced Energy Vent System			Variable
Rotation Speed - rev/min 50Hz (60Hz)	1450 (1760)			870-2150
Ambient Temperature Range °C (°F)	0 to 45 (32 to 113)			0 to 40 (32 to 104)
Maximum Relative Humidity %	85 non-condensing			
Air Discharge Temp - °C (°F) above ambient	<6 (43)	<8 (46)	<10 (50)	
FACTORY SETTINGS				
Nominal Pressure – bar (psi)	7.0 or 10.0 (102 or 145)			7.0 (102)
Minimum Pressure Valve – bar (psi)	5.5 to 6.0 (80 to 87)			
Load/Cut-in Pressure – bar (psi)	6.5 or 9.5 (94 or 138)			7.0 (102)
Unload/Cut-out Pressure – bar (psi)	7.5 or 10.5 (109 or 152)			7.5 (109)
Servo Valve – bar (psi)	8.0 or 11.0 (116 or 160)			8.0 (116)
Vent Down Run Time @ 7 bar – sec	60			
Vent Down Run Time @ 10 bar – sec	90			
Pressure Display Units	0 (bar) (1 = psi, 2 = kpa)			
Temperature Display Units	0 = °C (1 = °F)			
Vacuum Relief Valve	1.5 turns anti-clockwise			
INSTALLATION				
Dimensions D x W x H –mm	685 x 630 x 1078			
Weights - kg	220			230
Air Outlet Size - Rp	3/4			
Minimum Room Volume - m ³	15			
Air Inlet/Outlet Area - m ²	0.3			
Ventilation Rate - m ³ /h	2000			
Cooling Air Flow m ³ /h (cfm)	1850 (1089)			
Recommended Air Receiver Capacity - litres	250			
COMPRESSOR OIL				
Approved compressor oil	Fluid Force Red 2000 (Mineral) and HPO (Synthetic)			
Oil Capacity – litres	3			
ELECTRICAL				
Starter reference 200/575V 3PH 60Hz DOL	CC1118983			
Circuit diagram 200/575V 3PH 60Hz DOL	CZ77996			
Starter reference 400V 3PH 50Hz SD	CC1054889			
Circuit diagram 400V 3PH 50Hz SD	CZ77989			
Starter reference 400/460 3PH 50/60Hz RS				CC1054890
Circuit diagram 400/460V 3PH 50/60Hz RS				CZ77990

3.0 Installation

3.0 Installation

CAUTION ! 

LIFTING AND TRANSPORTATION MUST ONLY BE CARRIED OUT BY AUTHORISED PERSONS.

ENSURE ALL EQUIPMENT EXCEEDS THE FULL LOAD OF THE UNIT.

3.1 Lifting and Handling

A fork lift or pallet truck are the most suitable means of moving the product. Pay particular attention to ensure stability to prevent the unit tilting over.

Lift the hypac or compressor and place in the desired location, damage to mountings may occur if you slide the compressor into position.

3.2 Compressor Location

Position the compressor/hypac in a room of adequate size on a firm surface, level in both planes within five degrees of the horizontal.

Ensure the area has sufficient load-bearing capacity, provide access, 1 metre/3.3 ft for routine service procedures around and above the unit.

Site the compressor/hypac away from sources of dirt, coarse solids, abrasive particles, steam, liquids and gaseous impurities.

This is an industrial compressor and is intended for installation in an indoor environment.

Any air connection made to the compressor outlet must be flexible as the base incorporates resilient mountings.

3.3 Compressor Ventilation (Fig.3.1)

Position the compressor/hypac in a well ventilated location. Do not restrict the air-flow around the compressor or allow the hot air discharge to re-circulate into the compressor intake.

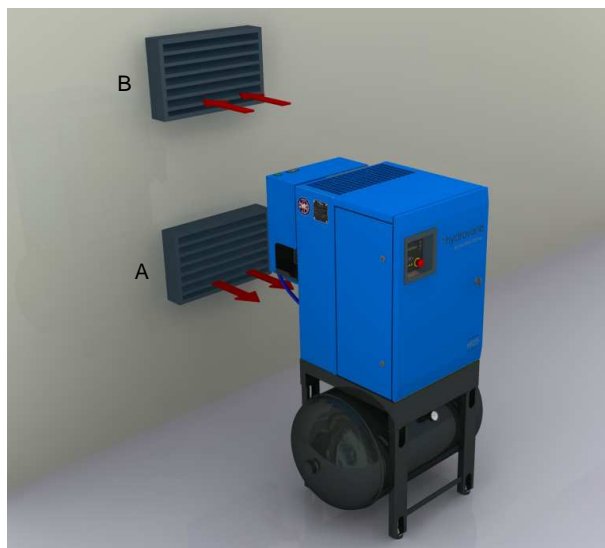


Fig 3.1 Compressor Ventilation

Any cooling-air inlet (A) should be positioned low allowing unrestricted air-flow to the compressor intake. The warm-air outlet (B) should be positioned high, and well away from the inlet, to ensure a positive cooling air-flow through the compressor.

For maximum efficiency and reliability, the compressor should be operated in a moderate ambient temperature. If temperatures frequently fall below 0°C (32°F), a different grade of oil may be required.

Compressor air intake and exhaust grills have captive nuts fitted as standard to attach ducting.

Air ducting, if fitted, must not cover or restrict the cooling air flow of the compressor. Total resistance of the system must not exceed 50 mbar. If resistance is expected to be greater, fan assistance will be required.

3.4 Electrical Connections

WARNING !  

CONNECTION TO, OR INSTALLATION OF, AN ELECTRICAL POWER SUPPLY MUST ONLY BE CARRIED OUT BY QUALIFIED ELECTRICIANS. THE INSTALLATION MUST MEET THE WIRING REGULATIONS PRESENTLY IN PLACE.

Before connecting to the mains electrical supply, ensure that the system can sustain the additional electrical load. To ensure reliable low resistance joints, make sure that your incoming supply cables are firmly secured to the starter terminals and that they are of correct size.

NOTE ! The starter door panel should always be secured by the supplied key for safety reasons and to prevent unauthorized access.

Refer to starter circuit diagrams (located inside the starter door panel) before starting work. The instructions given for earthing, fuses and cable size are important.

Fuses to BS 88 (Type gG) must be used to protect the starter, refer to the sizes specified on the starter circuit diagrams.

Circuit breakers are not recommended since they may not fully protect the starter contacts in an overload condition.

Water drain, filters or dryers fitted downstream of the compressor discharge must be correctly sized to avoid excessive flow restrictions to ensure stable operation of the speed control system.

3.5 Electrical Installation (Fig 3.2)

WARNING ! 

BEFORE STARTING WORK ENSURE THAT THE MAIN-LINE FUSES HAVE BEEN REMOVED FROM THE DISTRIBUTION BOARD. PRECAUTIONS SHOULD BE TAKEN TO PREVENT THEM BEING REFITTED UNTIL THE INSTALLATION IS COMPLETE.

Starter cables must be connected to the mains electrical supply via a lockable, switched and suitably rated fused isolator. The isolator should be positioned as near as possible to the compressor with clear, unrestricted access.

To access starter terminals, unlock the starter door panel and pass incoming cables through the entry hole in the floor for HR04-HR07.

Connect the three mains supply cables to the terminals marked L1, L2 and L3, and connect the earth cable to the earth terminal E. Ensure the connections are secure.

Refer to IEEE Regulations for electrical equipment installed in buildings to determine the size required, pay particular attention to the circuit diagrams provided.

If the compressor is located a long way from the isolator and/or the ambient temperature exceeds 35°C (95°F), the cable size should be increased.

Check that the transformer fuse is positioned to suit the supply voltage of the installation.

Ensure all electrical connections are tight, high voltage supply to contactors and incoming terminals are critical.

Close the starter door and secure with the key provided before replacing the main line fuses.

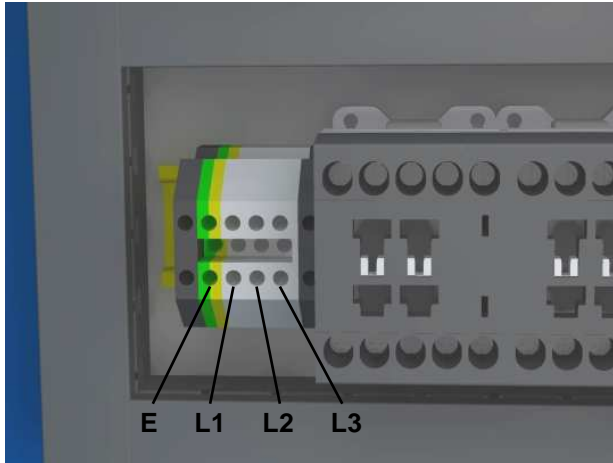


Fig 3.2 Starter Connections

3.6 Compressor Rotation

CAUTION !

BEFORE INITIAL START-UP ENSURE THE COMPRESSOR IS FILLED WITH A HYDROVANE APPROVED OIL. DO NOT OVERFILL OR MIX OILS.

With the mains isolator on, press the green start button on the control panel and watch the pressure gauge.

Rotation is correct if the pressure display rises immediately, after a few seconds if no pressure is displayed rotation is incorrect.

WARNING !

SERIOUS DAMAGE WILL OCCUR IF THE UNIT IS ALLOWED TO RUN IN REVERSE. IF ROTATION IS INCORRECT, STOP AND ISOLATE FROM THE ELECTRICAL SUPPLY.

Open the starter door and change over any two of the incoming cables connected to the starter terminals L1, L2 and L3.

Close and lock the starter door to prevent unauthorised access and switch the mains electricity supply on.

Restart the compressor and verify that direction of rotation is correct by observing pressure rise on the compressor gauge.

Cooling fan operation is clockwise, all RS units have automatic stop/start cooling fans that cut in at 85°C (185°F) operating temperature.

Remove the cabinet filter from the lower half of the rear panel to view the cooling fan through the mesh grill.

3.7 RS Operation with other Compressors

Hydrovane RS compressors may be operated efficiently in conjunction with other Hydrovane compressors fitted with automatic stop-start control.

Adjust the RS minimum air line pressure to midway between the maximum and minimum air line pressure settings of the other compressor. The RS compressor will automatically assume the lead compressor role after several cycles.

NOTE ! If the RS compressor is operated with other Hydrovane standard single speed compressors feeding a common pressure system, the minimum air line pressure of the RS compressor must be limited to the lowest maximum air line pressure of the single speed machine(s). No attempt must be made to increase the operating pressure of the single speed machine(s).

The pressure transducer sensing point is located in a filter housing adjacent to the outlet from the compressor. If the pipework from the compressor to the system is restricted, or prone to excessive pressure fluctuation, rapid speed changes and/or frequent stopping and starting of the motor may occur.

Should this condition arise, consult a Hydrovane Distributor who will arrange to re-site the pressure transducer location.

4.0 General Description

4.1 Compressor/Hypac (Fig.4.1)

This manual covers Vertical HR04-HR07 compressors, hypac's combine either a receiver, air dryer or both, depending on the installation required.

A compressor without ancillary equipment is used where air demand is constant and does not exceed the output capacity of the unit.

An air dryer is used to provide dry air (pressure dew point 3°C/37°F) for specialised applications.

Where air demand fluctuates a compressor with receiver is used to store large quantities of air. A dryer can be combined with the compressor and receiver for applications requiring large volumes of dry air.

Figure 4.1 shows general views of typical units, the compressor assembly is detailed in Section 4.3 / Fig 4.2, the air dryer is supplied with its own manual.



Fig 4.1 General Views

4.2 Control Systems

Compressors can be operated in either automatic stop/start (set as default) or in continuous operation.

All units benefit from REVS (Reduced Energy Venting System) and Smart Servo to minimise power consumption during operation.

On start up a short delay prevents full pressure delivery to reduce motor power consumed.

With maximum line pressure established the venting system lowers compressor pressure to provide substantial cost savings due to the off-load power reduction.

Smart servo control isolates the servo and vacuum valve feeds during full load operation to reduce losses and maximise compressor efficiency.

During off-load run on time at minimum pressure the compressor will either stop with no air demand or return to on-load running if more air is required.

Automatic Operation

This is the normal operation selected giving maximum efficiency and economy for applications with fluctuating air demands. The compressor will load/unload and stop/start automatically in response to air demand.

Motor restarts are set to 10 times per hour for single speed units and 30 times for RS units.

Run-on time to stop can be increased to reduce or limit motor restart frequency to lower levels if required.

Continuous Operation

When in continuous operation the compressor will supply air from full to zero flow rates. The energy saving benefits of REVS will not be maintained.

Regulated Speed (RS) Operation

Regulated speed compressors are automatic stop/start operation only.

The RS compressor saves energy and operating cost when compared with a fixed speed compressor of similar size. The saving is achieved by automatically regulating the compressor speed to precisely match the compressor output to the system demand.

If the system pressure rises above the unload pressure the electric motor speed will decrease, conversely, if the system pressure falls below the load pressure the motor speed will increase. The speed will vary between load and unload limits dependent upon system demand.

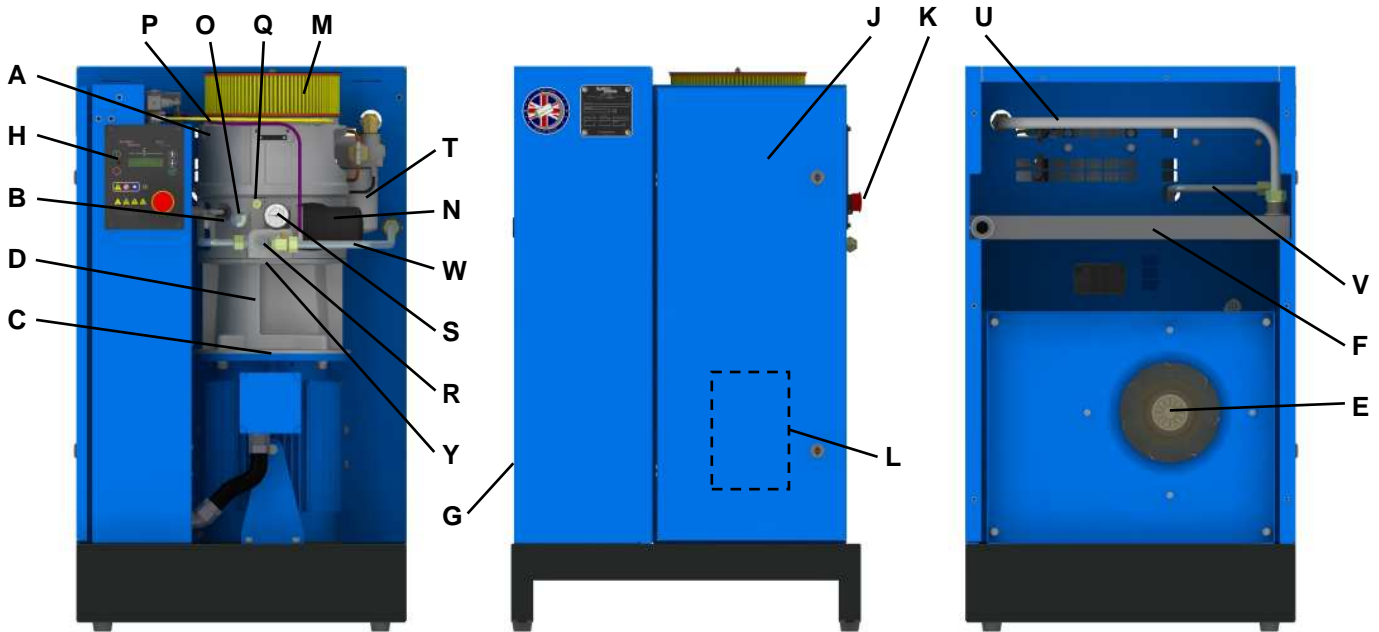


Fig 4.2 Compressor Assembly

4.3 Compressor Assembly (Fig.4.2)

The unit comprises of a single stage, oil flooded, rotary, sliding vane compressor driven by an electric motor mounted to a base. It is supplied with control panel, starter, and oil cooler/air aftercooler with all accessories piped in and electrically connected.

The intake cover (A) is assembled directly to the compressor (B) which is fitted to the motor flange (C). A flexible coupling drives the compressor rotor from the motor drive shaft, enclosed inside the bell housing (D). The motor is bolted to the vertical column supported by the base.

An electrically driven, impellor type, horizontally mounted fan (E) is located below the combination oil cooler/air aftercooler matrix (F). This draws cooling air through the air filter (G) and forces it through the cooler matrix.

The electronic controller (H) with an LCD screen is mounted in the starter (J). An emergency stop button (K) is located on the front controller panel.

For RS models, the inverter drive (L) is mounted inside the starter compartment, behind the starter panel door (J).

The compressor air intake is protected by an air intake filter (M), and the oil system is filtered by an oil filter (N). An oil level sight glass (O) is mounted adjacent to the oil filter.

The compressor is filled and topped up with oil via the oil filler (P). The sight glass (O) will be full when oil overflows from the level plug orifice (Q).

Oil is drained from the compressor and cooler by removing the drain plug (R).

The compressor pressure gauge (S) is visible when the front panel is open.

Oil separator (T) located on the compressor separator manifold ensure air delivered through the minimum pressure valve has a cleanliness of less than 3 ppm (parts per million by weight).

Air is delivered through the air delivery pipe (U) to the after cooler (F) before discharge from the unit.

The oil supply to the cooler is through oil feed pipe (V) with the cool oil return through oil return pipe (W). For a quick warm up, a thermal by-pass valve (Y) allows the oil supply to by-pass the cooler on initial start up.

4.4 Electronic Controller

Controllers have menu structures that contain all the parameters and settings for safe operation of the compressor.

- a) [MAINTENANCE SCHED]
- b) [CONTROL MENU]
- c) [FAULT MEMORY]
- d) [TIMER CONTROL]
- e) [LIMIT VALUES]
- f) [OPTIONAL IN/OUTPUTS]

All menus are available to view, the [MAINTENANCE SCHED] and [LIMIT VALUES] are reserved for fully trained personnel and require a service or master code for entry.

Further explanation on menu structures is given in the following sections, 5.0 Operating Instructions and 6.0 Adjustments.

5.0 Operating Instructions



WARNING !

THE COMPRESSOR SHOULD BE OPERATED BY AUTHORISED PERSONS FULLY TRAINED IN THE STARTING, STOPPING AND EMERGENCY STOP PROCEDURES.

5.1 Checking Procedure Before Starting

- a) Check oil sight glass is full.
- b) Check filler, drain/oil level plugs are fitted securely.
- c) Check for any signs of oil leaks.
- d) Check air-outlet valve is open.
- e) Check that the emergency stop button is released.
- f) Turn mains electricity supply on.

5.2 Operator Control Keys (Fig 5.1)

When power is applied the controller display illuminates to show compressor output values and status messages.



Fig 5.1 Controller

The two keys on the left above and below the green and red LED's have a single function:

- Start key.
- Stop key.

The three keys on the right next to the display have a dual function:

- Call up or exit menu / sub-menu.
- Switch to next sub-menu / menu item, or reduce a value.
- Switch to previous sub-menu / menu item, or increase a value.
- Reset/Enter key.

In a menu / sub-menu, the reset key functions as an enter key

5.3 Status Display/Lights

The controller is fitted with a three-row display.

The first row permanently displays compressor discharge temperature and system pressure.

The following symbols may also appear.

- Second pressure range / timer active
- Remote start / stop activated

The second row is reserved for menu items, values like the total service hours and set values like nominal pressure are viewed here.

The third row shows status, fault and warning messages.

The HYDROVANE Pro is fitted with two light signals (green, red).

- Flashing, system is ready, the motor may start up automatically at any time.
Lit up permanently, the drive motor is running
- Flashing slowly, warning, maintenance due
Flashing rapidly, fault, unit is stopped until fault has been rectified

The red light signal only goes out once the warning or fault has been rectified and confirmed using the Reset/Enter key.

During operation, the controller records the total running hours, the hours run on load and counts down to the next service interval.

The controller service interval is set for 2000 hours when using Fluid Force Red 2000 oil. This interval will be reduced if the unit operates above the recommended temperature.

5.4 Speed Indication (Variable Speed/RS)

The speed is displayed in the second row of the display. If the menu navigation is displayed, the speed display is faded out.

Examples of speed displayed:

- a) [_____ | ____] 3290 rpm
Speed in controlled range.
- b) [| _____] 1300 rpm
Speed in lower controlled range, minimum speed not yet reached.
- c) [| ◀ _____] 1280 rpm
Minimum speed reached.
- d) [_____ ▶ |] 3650 rpm
Maximum speed reached

5.5 Displaying Values

You can display values, e.g. total hours, and set the control system, e.g. cut-in and cut-out times, in the sub-menu.

To reach the main menu, you must press the and keys at the same time.



Use the or keys to switch between the following sub-menus:

- a) [MAINTENANCE SCHED]
- b) [CONTROL MENU]
- c) [FAULT MEMORY]
- d) [TIMER CONTROL]
- e) [LIMIT VALUES]
- f) [OPTIONAL IN/OUTPUTS]

Enter a sub-menu by pressing the key.

Use the or keys to go to a menu item.

To exit the sub-menu, press the and keys at the same time.





To exit the main menu, you must press the  and  keys at the same time.

5.6 Changing Values

Enter the sub-menu and then the menu item containing the value you wish to change.





Press the  key, the value flashes. Press the  or  key to change the value. Press the  key again to confirm the value.

5.7 Language Selection





Change the language by pressing the  +  or  +  keys. Press these keys at the same time until the right language appears.



5.8 Setting Time/Date (Timer)

The HYDROVANE *Pro* will retain its settings after a power loss lasting about two to three weeks. If power is lost for longer periods, the timer's time and date are lost and have to be re-entered.

Press the  +  keys at the same time. Use the  key to go to the [TIMER CONTROL] sub-menu and press the  key. The date and time are displayed in the following format:

TU 30.10.07 12:10:34


Press the  key, the left-hand value (day of the week) starts to flash. Use the  or  keys to select, confirm by pressing the  key.

All values can now be set in succession using this procedure. When the last value (seconds) has been set, the timer is active, exit the menu by pressing the  +  keys twice at the same time. For further settings see Section 6.7.

5.9 Starting Automatic Operation



IN AUTOMATIC OPERATION COMPRESSORS WILL RESTART WITHOUT WARNING.

Press the  key, the compressor will start if system pressure is below the load/cut-in pressure set point.

On initial start with no pressure in the system, the pressure display will quickly rise to the full delivery pressure. During this period, the green LED will be continuously illuminated.

The compressor will continue to run and pressure will vary within the load/cut-in and unload/cut-out pressure set points to match the system demand.


If system demand reduces and pressure rises to the unload/cut-out pressure set point, the REVS (Reduced Energy Venting System) sequence will begin.

If there is an air demand during the REVS run on time sequence the compressor returns to full load operation.

If there is no air demand during the REVS run on time sequence the compressor will stop.

Automatic restart will occur when system pressure falls to the load/cut-in pressure set point.

5.10 Starting Continuous Operation

Press the  key, the compressor will start, and run continuously within the load/cut-in and unload/cut-out pressure set points to match system demand.

On initial start with no pressure in the system, the pressure display will quickly rise to the unload/cut-out pressure set point.

During this period, the green LED will be continuously illuminated.


5.11 Starting Regulated Speed/RS

For variable speed models, the starting sequence is the same as single speed automatic operation except that, the compressor speed will vary automatically to match system demand.

With no system demand when running at minimum speed the compressor will stop after the REVS venting sequence.

Automatic restart will occur when system pressure falls to the load/cut-in pressure set point.

5.12 Stopping All Models

To stop the compressor, press the  key, system pressure will remain high initially, but will fall gradually with the rate of decay depending on system usage.

5.13 Emergency Stop


If an emergency occurs, press the EMERGENCY STOP button.

The button will lock in the depressed position and stop the compressor immediately.

The red LED on the controller will flash quickly with the FAULT EM-STOP message displayed.

Clear any faults that may have occurred. Do not reset until it is safe to do so.

Reset the emergency stop button by twisting clockwise before restart.

Press the  key on the controller to cancel the red LED and FAULT EM-STOP message.

Operation of the emergency stop button is recorded in the controller error log.

5.14 Compressor Vent Down

Venting is controlled automatically by the REVS system for either operation selected.

6.0 Adjustments

6.1 Compressor Control (Fig 6.1)

The compressor controller has Operator Menus with parameter settings that can be modified within set limits to suit system requirements.

The controller has a built-in time delay to prevent pressurised restart that inhibits the automated motor start sequence and controls the vent solenoids.

The venting system (REVS) is controlled by solenoid valves mounted on the starter enclosure under the top panel cover.

A normally closed solenoid valve (A) controls compressor delivery pressure using the REVS start system to reduce power.

The normally open solenoid valve (B) vents the compressor during the REVS sequence for off-load power savings and after stopping allows quick restart if required.

The normally open solenoid valve (C) isolates the servo and vacuum valve feeds during full load operation to reduce losses and maximise compressor efficiency.

System pressure is shown on the controller, compressor pressure can only be viewed on the gauge fitted to the drive end cover.

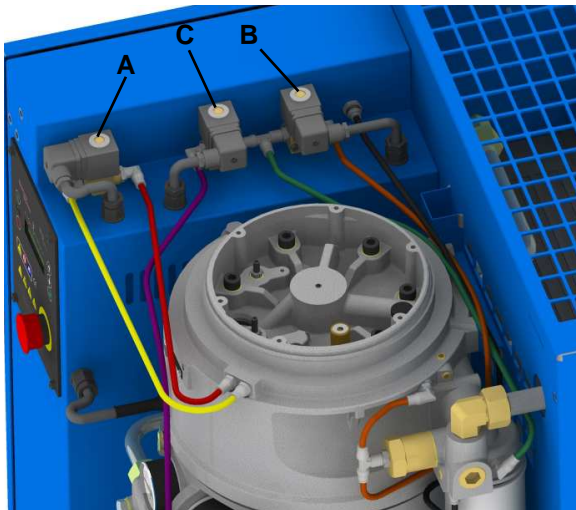


Fig 6.1 Solenoid Locations

6.2 Operation Selection

The controller has AUTOMATIC OPERATION stop/start set as default to achieve maximum efficiency. Go to the [CONTROL MENU] sub-menu and use the key to go to the AUTOMATIC OPERATION menu item.

Press the key the AUTOMATIC OPERATION value starts to flash. Use the key to switch to CONTINUOUS OPERATION, confirm by pressing the key.

6.3 Operator Menus

To alter default values in menus, or view error codes, press the and keys together.

Use the button to switch to the [CONTROL MENU] or [FAULT MEMORY] sub-menu then press the key to select.

In the [CONTROL MENU] the CUT-OUT POINT menu item appears on the display. Press the key, the value will flash. Increase or decrease this value using the or key, confirm the value set by pressing the key.

Press the or key to scroll through available parameter settings, press the key to select.

- a) CUT-OUT POINT
- b) CUT-IN POINT or TARGET PRESSURE (RS)
- c) p₂ CUT-OUT POINT
- d) p₂ CUT-IN POINT or p₂ TARGET PRESSURE (RS)
- e) RUN-ON TIME
- f) AUTOMATIC OPERATION
- g) ENABLE REMOTE-START
- h) TIMER CONTROL
- i) p₂ TIMER CONTROL
- j) AUTO RESTART
- k) POWER LOSS TIME
- l) START-UP DELAY
- m) DRYER PRE-RUN
- n) RS485-ProTOCOL
- o) RS485-BAUDRATE
- p) RS485-ADDRESS

A selected item will flash, press the or key to change a value or select an alternative, press the key to select.

The [FAULT MEMORY] retains the most recently recorded warning or fault and the hours when the event occurred. The last warning or fault recorded is always at the top.

In order to distinguish between faults and warning messages, faults are marked with an exclamation (!). Use the or key to switch between the individual memory areas in the fault memory.

See Section 8.0 Controller Messages for warnings and faults.

6.4 Pressure Adjustment

WARNING !

PRESSURE ADJUSTMENTS SHOULD BE MADE BY TRAINED SERVICE ENGINEERS. FAILURE TO COMPLY WITH THIS REQUIREMENT MAY INVALIDATE THE COMPRESSOR WARRANTY.

Press the and keys together. Use the key to switch to the [CONTROL MENU] sub-menu, press the key to select.

The unload CUT-OUT POINT appears first, press the key, the value will flash, press the or key to change the value to the desired pressure and press the key to select.

Press the key to switch to the load CUT-IN POINT, press the key the value will flash, press the or key to change the value to the desired pressure and press the key to select.

The load/cut-in pressure should be set 0.5 bar (7 psi) below the nominal pressure required and unload pressure 0.5 bar (7 psi) above, servo valve pressure is 1.0 bar (14.5 psi) above the nominal.

Both parameters load/cut-in and unload/cut-out pressure must be set on the controller together with manual servo adjustment to ensure that the compressor functions correctly.

6.5 Pressure Control RS Compressors

The load/cut-in (TARGET) and unload/cut-out pressure may be adjusted from the default settings shown in 2.0 Product Information in the range of 6, 7, 8, 9 or 10 bar (87, 102, 116, 130 or 145 psi).

In the [CONTROL MENU] match the load/cut-in (TARGET) pressure to the nominal bar figure required, the unload/cut-out CUT-OUT POINT pressure 0.5 bar (7 psi) above, servo valve pressure is 1.0 bar (14.5 psi) above the nominal.

Manual servo valve adjustment is necessary to match pressure selected on the controller.

6.6 Servo Valve (Fig 6.2)

The servo valve controls pressure when there is no demand for air, settings shown in Section 2.0 Product Information are a maximum and must not be exceeded.

Access to the servo valve requires the cabinet front door to be opened, the top cover panel, the intake filter and the intake filter support to be removed.

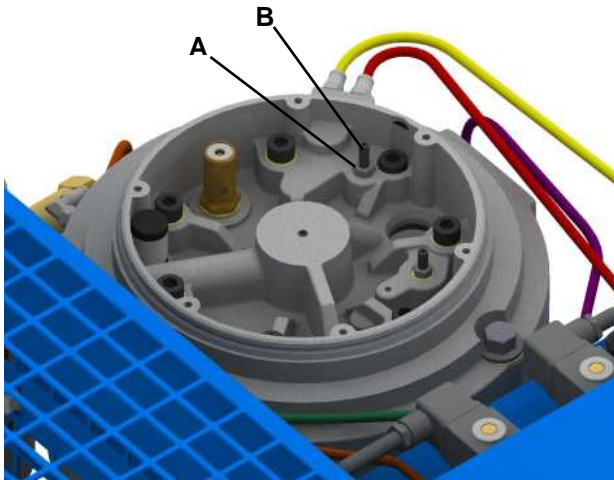


Fig 6.2 Servo Valve

If the servo needs adjustment or a lower pressure is required then carry out the following procedure.

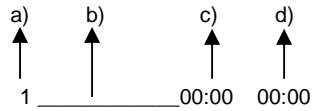
- a) Turn the electrical supply on at the isolator, disconnect the air outlet valve from the system and fit an air silencer.
- b) Select continuous operation from the [CONTROL MENU], start the compressor open the outlet valve and allow to warm up.
- c) Release locknut (A), turn grub screw (B) anti-clockwise for two turns and close the outlet valve.
- d) Screw in grub screw (B) clockwise to increase pressure to the desired setting, allow pressure to stabilise.
- e) Open and close the outlet valve, allow pressure to stabilise, check the pressure gauge reading.
- f) If low turn grub screw (B) clockwise to increase or anti-clockwise to decrease pressure.
- g) With the correct pressure showing on the gauge secure the servo locknut (A).
- h) Reset the compressor from continuous operation back to automatic stop/start operation.

Stop the compressor, isolate from electrical supply and remove air silencer, re-connect the outlet valve to the system.

6.7 Setting Timer Units

The time and date will have been set as described in Section 5.8, this is the basis for accurate timer operations.

Go to the TIMER CONTROL sub-menu, use the \downarrow or \uparrow key to select from seven different timer units. The status line of each switching unit is as follows:



- a) Unit no.
- b) Days of the week [SMTWTFS] = Sunday, Monday
- c) Switch-in point
- d) Switch-out point

If there are no days of the week selected in the switching unit line, the switching unit is not active. The switching unit only becomes active when the day of the week is set.

When the \leftarrow key is pressed, the first underscore _ starts to flash. You can now use the \uparrow key to set the first day of the week (Sunday). Then use the \rightarrow key to confirm the day of the week.

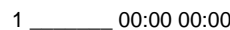
The next underscore _ then starts to flash. If you do not want to confirm a day of the week as set, press the \leftarrow key.

You can run through all seven days of the week in this way. Once you have confirmed the last day of the week (Saturday), the first unit of the switch-in point starts to flash. You can either set this using the \uparrow or \downarrow key. Once the last unit of the switch-out point has been confirmed, the whole timer unit is activated.

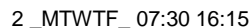
The next step is to go to the [CONTROL MENU] sub-menu and then the TIMER CONTROL menu item. You will now see the default setting TIMER CONTROL OFF. Press the \leftarrow key, the OFF value starts to flash. Use the \uparrow key to change the value to ON. Press the \leftarrow key again to confirm the entry. The timer is now switched on, press the \rightarrow key to activate.

Timer unit setting examples are explained below.

Switching unit 1 not active:



The unit should run Monday to Friday between 7.30 am and 4.15 pm.



- a) Days of the week Monday to Friday
- b) Switch-in point
- c) Switch-off point

7.0 Maintenance



SERVICING MUST ONLY BE CARRIED-OUT BY TRAINED SERVICE ENGINEERS COMPETENT IN THE MAINTENANCE, MAINS ELECTRICAL SUPPLY AND STARTER EQUIPMENT

7.1 Routine Service

The work listed must be carried-out at the indicated running hours, which must be regarded as a maximum. In dusty, hot or humid conditions, more frequent servicing may be necessary.

On RS units after long periods, speed control unit capacitors and cooling fan(s) should be replaced to ensure reliability of the unit.

7.2 Service Kits

If you are unable to carry-out the work safely in the required manner, your Hydrovane Distributor will be pleased to help.

Use genuine parts and approved oils during routine servicing, the following service kits are available:

Oil change kit, 2000 hour/12 months, use KOHR457.

Maintenance kit, 4000 hour/2 year, use KMHR457.

Full overhaul/top-up kit, 24000 hour/10 year, use KTHR457 (inc. KWHR457)

Additional kits available for full product support are as follows:

Solenoid valve kit, 8000 hour/4 year, use KSVLDOLHR457, KSVSDHR457.

Contact kit, non-scheduled item, use KCHR457DOL, KCHR457RS, KCHR457SD

Electrical kit, 24000 hour/10 year, use KEHR457DOL, KEHR457RS, KEHR457SD

Wear sleeve kit, 24000 hour/10 year, use KWHR457.

Motor bearing kit, 24000 hour/10 year, use KBH132 (HR04), KBV132 (HR05/07)

7.3 Service Instructions



STOP THE COMPRESSOR AND ISOLATE FROM THE MAINS ELECTRICAL SUPPLY. LOCK THE ISOLATOR IN THE OFF POSITION. FIT A SAFETY NOTICE ADVISING THAT WORK IS BEING CARRIED OUT ON THE COMPRESSOR.

CLOSE THE AIR OUTLET VALVE TO ISOLATE THE COMPRESSOR FROM THE AIRLINE SYSTEM. FIT A SAFETY NOTICE ADVISING THAT IT IS NOT TO BE OPENED.

DO NOT PROCEED UNTIL THE AIR PRESSURE GAUGE READS ZERO !

AVOID UNNECESSARY CONTACT WITH HOT OIL AND COMPONENTS. GLOVES ARE RECOMMENDED IF DRAINING OIL WHEN THE COMPRESSOR IS HOT!

7.4 Panel Removal

Unlock and open the hinged front door panel to allow removal of the top panel. Remove any fixing screws and pull the top panel from the location slots and lift clear of the compressor.

7.5 Oil Filling/Draining (Fig.7.1)

Remove filler plug (A) with bonded seal (B), remove and retain the level plug (C).

Place a suitable container below the oil drain point, remove drain plug (D) with bonded seal (E) and allow oil to drain.

When draining is complete, replace the drain plug and clean away any oil spillages.

Fill with approved oil to overflow from the level plug. Stop filling, replace the level and filler plugs, and clean away any spillage.

If the oil filter has been replaced, run the compressor for a short time (30 seconds) and re-check the oil level.

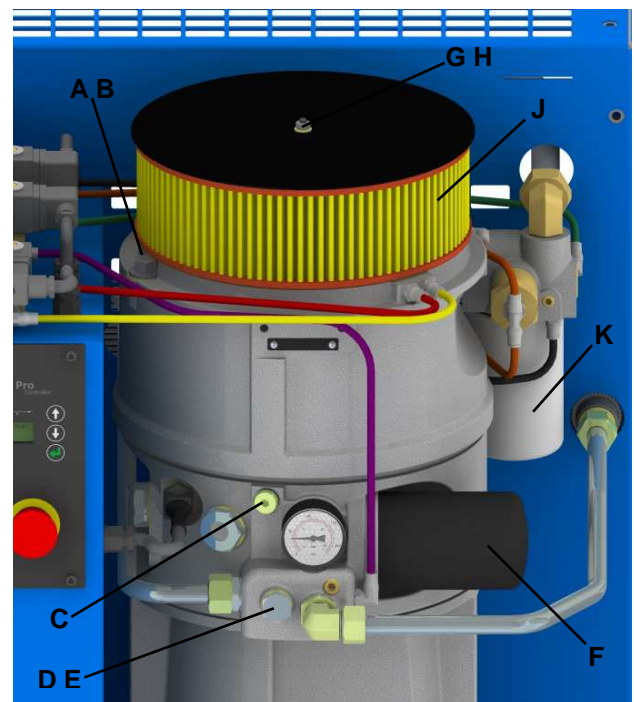


Fig 7.1 Filler Plug, Air Filter, Separator, Oil Drain and Filter

7.6 Oil Filter (Fig 7.1)

Unscrew oil filter (F) anti-clockwise, minimise spillage from the canister and discard in a safe manner.

Using a new filter, smear a small amount of oil onto the seal, screw in clockwise, hand tight only.

7.7 Air Filter (Fig.7.1)

Remove M6 Nut (G) with bonded seal (H), remove the cover plate. Lift off the air filter element (J) and discard in a safe manner.

Using a new air filter element, replace over filter support and fix the cover plate back on with, nut and bonded seal.

7.8 Oil Separator (Fig.7.1)

Unscrew oil separator (K) anti-clockwise and discard in a safe manner.

Using a new separator, smear a small amount of oil onto the seal, screw clockwise, hand tight only.

7.9 Oil Cooler/Aftercooler (Fig.7.2)

Undo and remove the fixing screws that secure the dryer vent panel to rear side panel.

With the internal face of matrix (A) exposed use low pressure air (2 bar/29 psi) and brush and blow over the whole area.

Internal filters (C) are positioned inside the starter enclosure and should be replaced at regular service intervals.

Vacuum up debris from the cooler and fan ducting area behind the cabinet filter frame (B) before replacing the filter frame.

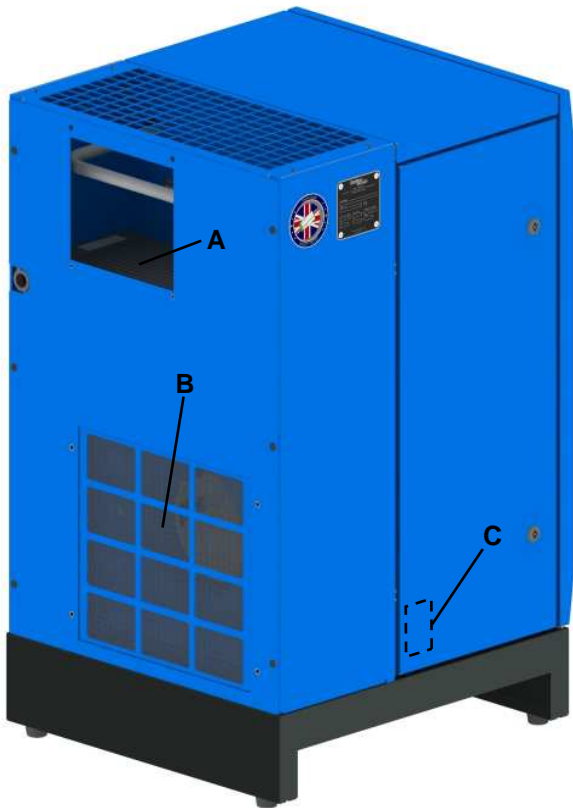


Fig 7.2 Intake and Cooler Matrix

7.10 Cabinet Air Filter (Fig 7.2)

Remove the filter frame (B) located in the rear panel by sliding upwards, pull the bottom edge forward to clear retaining lips. Refit in the reverse sequence.

7.11 Electric Motor

Remove any dust or dirt from motor bodies and air intake cowls located under the compressor base.

7.12 Electrical Connections

Open the starter panel door and remove any terminal covers fitted to contactors and incoming supply terminals.

Check for any signs of overheating and ensure that all electrical connections are tight.

Pay special attention to power connections, cables connected to contactors and incoming terminals and ensure all earthing wiring is present and undamaged.

Close the starter panel door and lock with the key provided to prevent unauthorised access.

All discarded items and waste oil must be disposed of in an approved manner.

On completion of the service refit all panels, remove safety notices and switch the mains electricity on and open the outlet valve.

7.13 Service Schedule

The following maintenance charts cover all compressors using Hydrovane Fluid Force Red 2000, Clear and HPO oils.

NOTE ! Certain items may not be applicable to all units, shaded items are Distributor maintenance tasks only.

For normal ambient conditions bulk oil temperatures must not exceed 90°C/194°F (100°C/212°F for HPO oil) with 2000 hour oil change periods.

In higher ambient conditions using 4000 hour oil change periods HPO oil should not exceed 90°C/194°F. In extreme conditions HPO oil should be used at the 2000 hour oil change periods.

If the oil is working above these temperatures the oil life will be significantly reduced.

CAUTION ! 

When changing recommended oil types, it is advisable to flush the compressor with the oil to be used, drain then refill to remove contaminated oil, do not mix oils.

Service Schedule Fluid Force Red, Clear and HPO Oil (2000 hour change period)

Maintenance Actions	Install	Daily	Weekly	Every 2000 Hours	Every 4000 Hours	Every 24000 Hours
Site-sufficient access for service	X					
Site-protected from weather	X					
Site-adequate ventilation	X	X	X	X	X	X
Site-ambient temperature within limit	X	X	X	X	X	X
Site-dust free ambient	X	X	X	X	X	X
Check/torque electrical connections	X			X	X	X
Check oil level at filler plug/sight glass	X	X	X	X	X	X
Check correct drive rotation	X					X
Check for air leaks	X		X	X	X	X
Check for oil leaks	X		X	X	X	X
Check air intake filter/clean if necessary	X		X	X	X	X
Check power on-load	X			X	X	X
Check power off-load	X			X	X	X
Check oil temperature	X		X	X	X	X
Check RSU temperature	X		X	X	X	X
Check servo pressure off-load	X			X	X	X
Check motor conduit/cables secure	X			X	X	X
Check motor for damage	X					
Check motor/starter for loose connections	X			X	X	X
Check motor for vibration	X			X	X	X
Check flexible control pipes				X	X	X
Check oil seal for leakage				X	X	X
Check drive media/key						X
Check starter contactors					X	X
Check motor insulation resistance						X
Check combi cooler matrix			X	X	X	X
Check solenoid valve operation				X	X	X
Clean cabinet filter			X	X	X	X
Clean any external dirt from compressor	X		X	X	X	X
Clean any external dirt from motor	X		X	X	X	X
Change separator element					X	X
Change 2000 hour oil				X	X	X
Change oil filter				X	X	X
Change air intake filter				X	X	X
Change cabinet filter				X	X	X
Change starter enclosure filter				X	X	X
Change unloader valve seals						X
Change MPV seals					X	X
Change vacuum valve seals						X
Change flexible control pipes					X	X
Change thermal motor					X	X
Grease motor bearings (if applicable)					X	X
Full air end inspection (internal)						X
Change drive coupling element						X
Change oil seal						X
Change wear sleeve						X
Change pressure gauge						X
Change motor bearings						X
Full operational test/check	X			X	X	X

Service Schedule for Fluid Force HPO Oil (4000 hour change period)

Maintenance Actions	Install	Daily	Weekly	Every 4000 Hours	Every 24000 Hours
Site-sufficient access for service	X				
Site-protected from weather	X				
Site-adequate ventilation	X	X	X	X	X
Site-ambient temperature within limit	X	X	X	X	X
Site-dust free ambient	X	X	X	X	X
Check/torque electrical connections	X			X	X
Check oil level at filler plug/sight glass	X	X	X	X	X
Check correct drive rotation	X				X
Check for air leaks	X		X	X	X
Check for oil leaks	X		X	X	X
Check air intake filter/clean if necessary	X		X	X	X
Check power on-load	X			X	X
Check power off-load	X			X	X
Check oil temperature	X		X	X	X
Check RSU temperature	X		X	X	X
Check servo pressure off-load	X			X	X
Check motor conduit/cables secure	X			X	X
Check motor for damage	X				
Check motor/starter for loose connections	X			X	X
Check motor for vibration	X			X	X
Check flexible control pipes				X	X
Check oil seal for leakage				X	X
Check drive media/key					X
Check starter contactors				X	X
Check motor insulation resistance					X
Check combi cooler matrix			X	X	X
Check solenoid valve operation				X	X
Clean cabinet filter			X	X	X
Clean any external dirt from compressor	X		X	X	X
Clean any external dirt from motor	X		X	X	X
Change separator element				X	X
Change 2000 hour oil				X	X
Change oil filter				X	X
Change air intake filter				X	X
Change cabinet filter				X	X
Change starter enclosure filter				X	X
Change unloader valve seals					X
Change MPV seals				X	X
Change vacuum valve seals					X
Change flexible control pipes				X	X
Change thermal motor				X	X
Grease motor bearings (if applicable)				X	X
Full air end inspection (internal)					X
Change drive coupling element					X
Change oil seal					X
Change wear sleeve					X
Change pressure gauge					X
Change motor bearings					X
Full operational test/check	X			X	X

8.0 Controller Messages



RISK OF ELECTRIC SHOCK FROM CHARGED CAPACITORS WHEN WORKING ON VARIABLE SPEED (RS) MACHINES.

DISCONNECT THE POWER SUPPLY, WAIT 10 MINUTES TO ALLOW POWER CAPACITORS TO DISCHARGE.

The Controller sequential logic monitors and checks compressor status through all stages of the operational cycle. At each stage, the configuration and parameter limits set within the Controller must be met for continued safe operation of the compressor.

8.1 Status Messages

The status messages are shown in the third row of the display. With longer texts, the indication may 'alternate'.

Status messages:

- a) **READY TO START**
The unit is ready to start and can be switched on.
- b) **WARNING START WITH**
Alternating with PRESSURE REQUIREMENT
The unit has been switched on and is ready. The unit starts automatically following the pressure requirement from your system.
- c) **WARNING START WITH**
Alternating with TIMER CONTROL
The unit has been programmed, switched on and the start key pressed. The compressor is now waiting for start approval from the timer (See 6.7).
- d) **WARNING START BY**
Alternating with REMOTE OPERATION
The unit has been switched on and is ready. Remote unit operations have been activated in the control menu. The unit starts via a remote signal.
- e) **WARNING START IN xxs**
Alternating with AFTER POWER LOSS
A power loss has caused the unit to shut down. The 'automatic restart' function has been selected in the control menu. The unit now starts automatically after a previously set time.
- f) **WARNING START IN**
Alternating with AFTER DRYER PRE-RUN
The unit has been switched on and is ready. The unit starts automatically after the dryer pre-run.
- g) **MOTOR START PHASE**
The unit has been switched on and the motor is starting.
- h) **SOFT STOP TIME xxs**
The system has been switched off. The unit stops after the soft-stop time of xx seconds.
- i) **FAULT <fault text>**
The unit has been shut down due to a fault.
- j) **WARNING <warning text>**
There is a warning in place. Ignoring a warning may result in a fault and shut down the compressor.
- k) **MAINTENANCE DUE xxxh**
A maintenance interval is about to lapse or has already done so.
- l) **ON-LOAD**
The compressor is on-load.

- m) **OFF-LOAD**
The compressor is off-load.
- n) **RUN-ON TIME xxs**
The unit has been switched off and is now in off-load for xx seconds. After xx seconds the unit automatically shuts down and is ready to start again.



8.2 Warning/Faults

If warnings or faults occur they appear on the Controller display in the third row, the red LED will flash slowly.

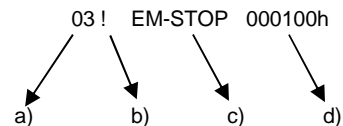
Warning messages do not result in the compressor shutting down. However, ignored warnings may cause faults.

In order to protect the unit, all detected faults result in the compressor shutting down immediately or do not permit the compressor to be started.

Faults must be located and rectified, press the Reset/Enter key to cancel the error, the compressor can now re-start.

In the [FAULT MEMORY] use the  or  key to switch between the individual memory areas in the fault memory.

The faults are displayed as follows:



- a) The same fault has occurred three times.
- b) This relates to a fault.
- c) Fault has occurred as a result of the emergency stop button being pressed.
- d) Fault occurred at 100 running hours.

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