BAUER COMPRESSORS

Instruction Manual and Replacement Parts List

Stationary Integrated Systems

High Pressure Breathing Air System

UNICUS 4i - 25

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WARNING

This Instruction Manual and Replacement Parts List contains safety information and instructions for the UNICUS 4i High Pressure Breathing Air System.
You must read, understand and follow all safety precautions and instructions.

1st Edition May 1993

Rev	Chg	Date	Notes	Auth
1	0	Aug. 1993		
2	0	May 1997		
3	0	Dec. 1999	Area Code Change	JH

2nd Edition; March 15, 2017

Rev	Chg	Date	Notes	Auth
0	0	Mar. 15, 2017	Converted from UN II 13, 19 & 25 to UN 4i - 25	SS
0	1	Mar. 30, 2017	Added RFID Chapter, updated Electrical	SS
0	2	Apr. 26, 2017	Updated Drive Chapter	SS
0	3	Nov. 6, 2017	Added and Reworded RFID Notes	SS

FCC Compliance Statement

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

This product meets the applicable FCC Part 15 rules and Industry Canada's license exempt RSSs. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent materiel est conforme aux CNRexempts de licence d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne peut pas provoquer d'interférences, et (2) cet appareil doit accepter toute interférence, y compris celles susceptibles de provoquer le fonctionnement du dispositive

To limit RF exposure, please ensure 4 inches (10 cm) of separation from the transmitter antennas at all times.

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CHAPTER 1: INTRODUCTION

1.1 How To Use This Manual

This manual contains the operating and maintenance instructions for the Bauer Compressors, Inc. products listed on the front cover.

All instructions in this manual should be observed and carried out as written to prevent damage or premature wear to the product or the equipment served by it.

If your unit is equipped with nonstandard accessories and or options, supplemental information is normally included in other documentation; i.e. OEM Manuals or additional Bauer Manuals.

While every effort is made to ensure the accuracy of the information contained in this manual, Bauer Compressors, Inc. will not, under any circumstances be held accountable for any inaccuracies or the consequences thereof.

NOTICE

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This product meets the applicable FCC Part 15 rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

To limit RF exposure, please ensure 4 inches (10 cm) of separation from the transmitter antennas at all times.

1.1.1 Manual Safety Notices

Important instructions concerning the endangerment of personnel, technical safety or operator safety will be specially emphasized in this manual by placing the information in the following types of safety notices.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This is limited to the most extreme situations.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTICE

NOTE advise of technical requirements that require particular attention by the operator or the maintenance technician for proper maintenance and utilization of the equipment.

1.2 How to Use the Replacement Parts List

- A lozenge ♦ in the Item Number column indicates the part number for a complete assembly.
- a dagger (†) in the Qty column with or without an ellipse (...) in the Part Number column means the part is illustrated for assembly purposes only and is not available for sale as an individual component. This part can be obtained by ordering the complete assembly.
- AR in the Qty column means that the item is cut or manufactured to the size which the customer specifies.
- A dash (—) in the Item Number column indicates that there is more than one part number applicable to the preceding Item Number.
- The letters in the columns labeled Kit indicate the number of operating hours when the part is to be replaced; a replaced every 1,000 hours, b replaced every 2,000 hours and c replaced every 4,000 hours.
- NS in the Item Number column indicates the part is not illustrated but is available.

When placing an order for spare parts, please provide the following information to ensure delivery of the correct parts. The model number, date of manufacture and serial number can be found of the compressor unit identification plate on the compressor unit frame.

Information		Example
Model Number		UN 4i 25
Serial Number		196156
Date of Manufacture		02 2017
Part Number		VAL-0169
Part Description		Valve
Part Quantity Required		1

Figure 1-1 Compressor Identification Label

WARNING

The use of repair parts other than those included in the Bauer Replacement Parts Lists may create unsafe conditions over which Bauer has no control. Such unsafe conditions can lead to accidents that may be life-threatening, cause substantial bodily injury, and/or result in damage to the equipment. Therefore, Bauer Compressors, Inc. can bear no responsibility for equipment in which unapproved repair parts are installed.

1.3 How to Use the Appendix

Information contained in the Appendix to this manual includes the following.

- The safety instructions applicable to this product. They must be read, understood and complied with prior to operating the product.
- The instructions for installing this product. They must be read, understood and complied with prior to operating the product.
- Reproducible Forms
- Reference Data
  - Torque Values
  - Torque Sequence
  - Conversion Formulas
  - Approved Lubricants
  - Glossary of Abbreviations & Acronyms
- Additional Documents

1.4 Unit Specifications

All specifications are subject to change without prior notice.

1.4.1 UNICUS 4i - 25

Medium	air
Charging Rate	25.2 scfm (714 l/min)[1]
Free Air Delivery	21.0 scfm (595 l/min)[2]
Inlet pressure	atmospheric
Operating pressure, max.	6,000 psig (420 bar)
Ambient temperature range	40 - 115 °F (5 - 15 °C)
Weight	approximately 1,550 lb.(2,064 kgs)

1.4.1.1 Compressor Block,

IK18.1 II	Mod. 8
No. of stages	5
No. of cylinders	4
Cylinder bore, 1st stage	5.92 in. (130 mm)
Cylinder bore, 2nd stage	3.465/2.367 in. (88/60 mm)
Cylinder bore, 3rd stage	1.26 in. (32 mm)
Cylinder bore, 4th stage	0.709 in. (18 mm)
Cylinder bore, 5th stage	0.394 in. (10 mm)
Piston Stroke	1.969 in. (50 mm)
Intermediate pressure, 1st stage	45 - 60 psig (3 - 4 bar)
Safety valve setting, 1st stage	85 psig (6.0 bar)
Intermediate pressure, 2nd stage	195 - 225 psig (13.5 - 15.5 bar)
Safety valve setting, 2nd stage	350 psig (24 bar)
Intermediate pressure, 3rd stage	625 - 640 psig (43 - 44 bar)
Safety valve setting, 3rd stage	1,160 psig (80 bar)
Intermediate pressure, 4th stage	1,930 - 2,145 psig (133 - 148 bar)
Safety valve setting, 4th stage	2,610 psig (180 bar)
Direction of rotation when facing flywheel	CCW
Oil capacity	6 1/3 qts (6 liters)
Oil Pressure	60 - 85 psig (4 - 6 bar)
Recommended oil (Synthetic)	BAUER OIL-0024
Maximum Inclination	10° in all directions

1.4.1.2 Compressor Drive

	Voltage	Frequency	Phase	Power	RPM	Type
-E3	208 - 460 VAC	60 Hz	3Φ	20 Hp	3,600	ODP

1.4.1.3 Purification System Applicability

The Bauer P5 Purification System with Securus II® Electronic Moisture Monitoring is the standard purification system supplied.

1. Based on a charging rate of 30 cubic feet per hour from 200 to 3000 PSIG
2. Referenced to standard inlet conditions of 68°F and 36% humidity at 14.70 psia

1.5 Component Locations

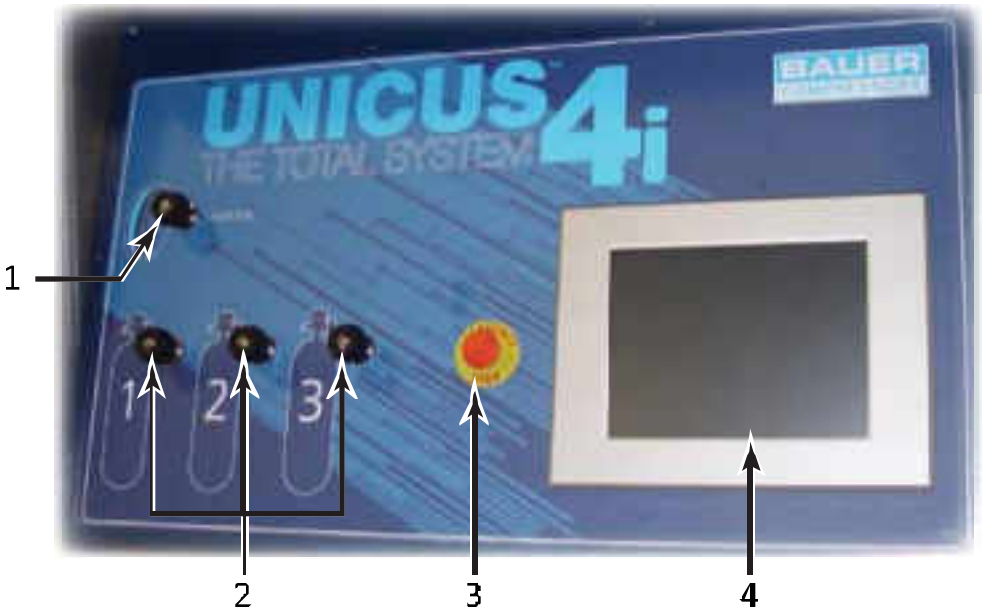
Figure 1-2 UNICUS 4

1. Lab On Locale (LOL)	6. Containment Fill Station Controls
2. Electronic Auto Cascade	7. 12" Touch Screen Monitor
3. Electrical Enclosure	8. Purification
4. HP Hose Reel	9. Containment Fill Station
5. Drain Valves for ASME Storage Cylinders	

Figure 1-3 UNICUS 4i Rear

1. Air Compressor 2. Automatic Condensate Drain Assembly	3. HP Storage (ASME or ISO/UN)

Figure 1-4 UNICUS 4i Front Panel

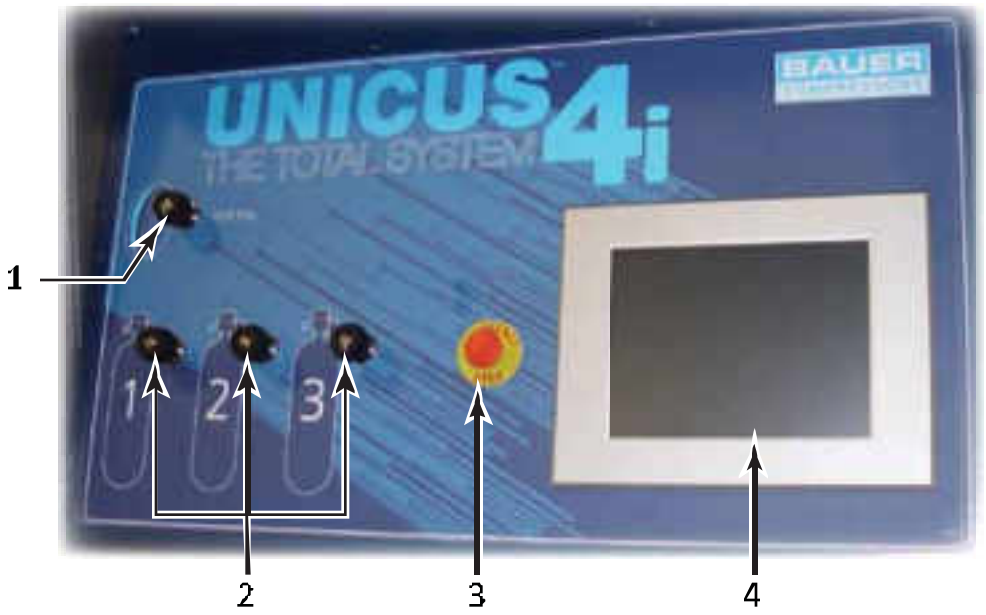


1. Hose Reel Fill Valve	3. Emergency Stop Push Button
2. CFS Fill Valves	4. Touch Screen Control Monitor

CHAPTER 2: OPERATING INSTRUCTIONS

The following instructions apply to the Unicus 4i. The monitor for this unit is a 15" graphic touch screen and uses a Windows 7, 64 bit operating system.

Figure 2-1 Control Panel



1. Hose Reel Fill Valve
2. CFS Fill Valves
3. Emergency Stop
4. Touch Screen Control Panel

The electrical panel assembly & PLC will provide logical control and safety shutdowns for the compressor equipment. All necessary time delays, counters, shutdowns, sequencing and safety features are incorporated into a proprietary software program permanently saved into PLC memory. The software program is based on the pressure and use of the compressor. The operator uses the touchscreen interface to communicate with the PLC which is located within the electrical enclosure.

2.1 Emergency Stop Button

A normally closed switch when pulled out, when the E-Stop button is pressed in, it disconnects the main power source, turning off the compressor, draining the ACD system and stopping air delivery to the consuming devices. This button is to be used in case of emergency. Normal operational stops should be accomplished using the operator interface.

2.2 Operator Interface

The operator interface is a 15 inch, graphic, touchscreen operation monitor. The operator interface is the input/output device for normal operation of the compressor unit. The compressor system is ready and able to operate after the emergency stop switch is pulled out.

2.2.1 Badge Screen

The initial screen after startup is the badge screen. The administrator must enter their badge number and password to have access to the compressor. Enter the badge number and press the check mark for OK. Then Enter the password and press the check mark to log onto the unit.

Figure 2-2 Initial Screen

2.2.2 Admin. Main Menu Screen

Figure 2-3 Admin. Main Menu Screen

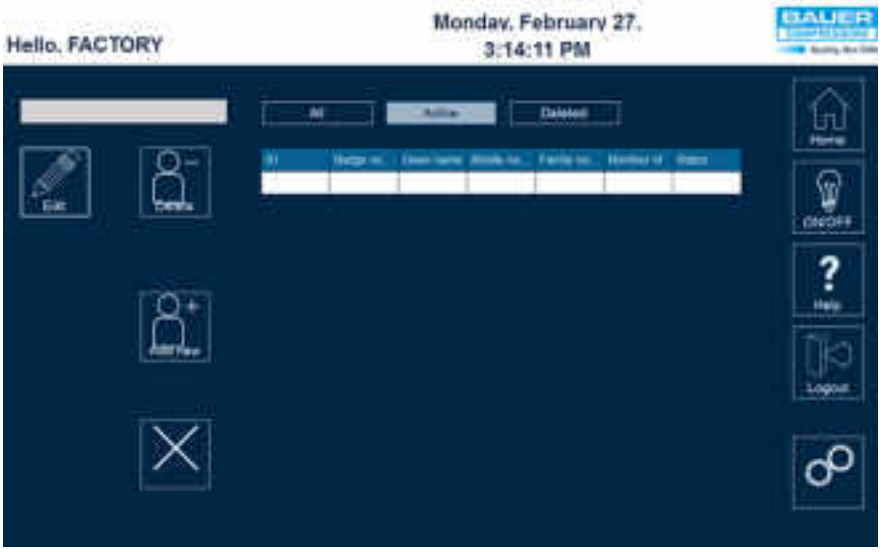
Once an administrative user has logged in they will be presented with the Admin. Main Menu screen. Along the right side are navigation keys. The HOME button presents the operator Home page, this is used to operate the unit. The LIGHT button toggles on and off the LED light above the control panel. The HELP button presents an explanation of the present screen. The LOGOUT button logs the present user out. The interlocking gear logo tells if the compressor is RUNNING, OFF, or in STANDBY mode. The GO / STOP button allows the user to turn the compressor ON or OFF.

Along the left side of the screen are the following buttons which allow administrator to perform essential tasks.

2.2.2.1 PERSONNEL

The personnel button will take the administrator to a page where they can ADD, DELETE, or EDIT the files for each person in the database. The buttons across the top sort the listed users as ALL (deleted and active), ACTIVE, or DELETED.

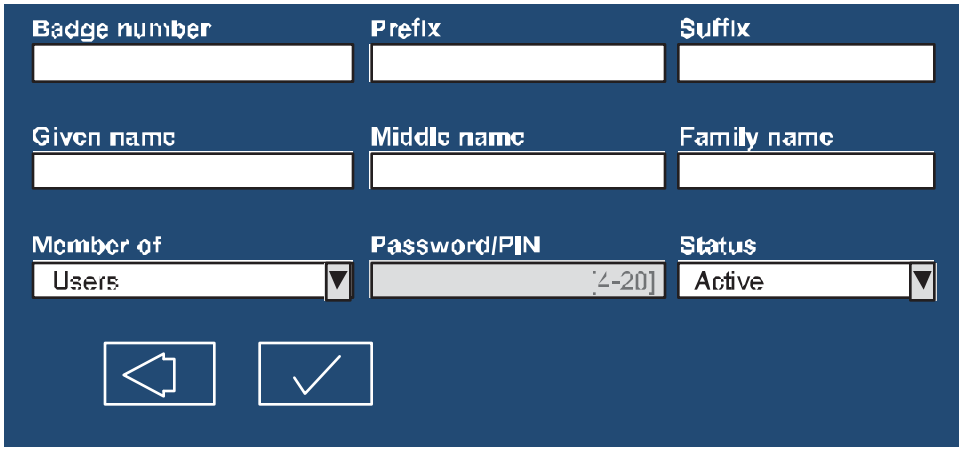
Figure 2-4 Personnel



When the ADD NEW button is pressed (See Figure 2-5), a screen appears for input of new personnel information. Required information are the Badge number, Given name and the Family name. Under Members of is a drop down box, USERS or ADMINISTRATORS and be chosen. Users only have the ability to operate the unit. Administrators can add or delete personnel and cylinders as well as change settings on the unit. If Administrator is chosen a password or pin of 4 - 20 digits must be chosen. Status also has a drop down box where Active or Deleted can be chosen. Once the new personnel's information is entered press the check mark to accept. The left facing arrow takes the user to the previous page without entering the information.

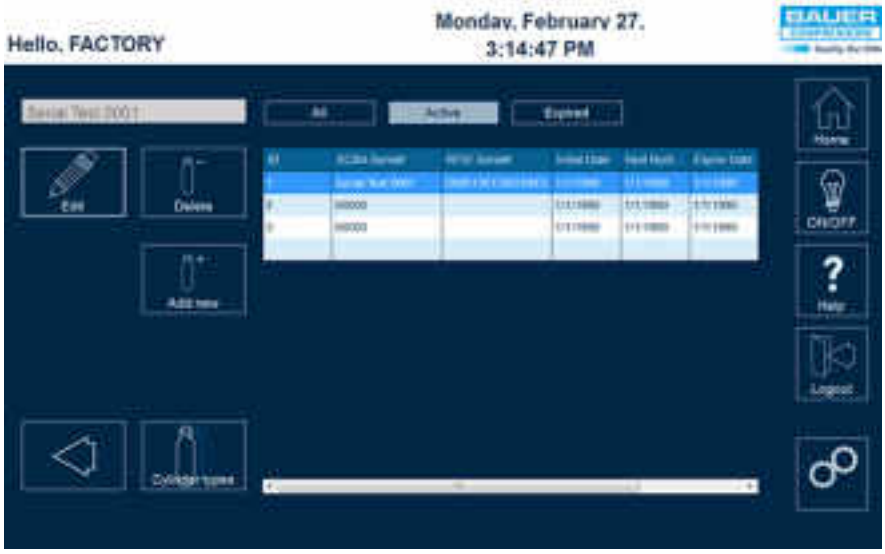
The EDIT button allows the administrator to make changes to an already existing personnel file and the DELETE button allows the administrator to change a file from active to deleted.

Figure 2-5 Add New



2.2.2.2 Cylinders

Figure 2-6 Cylinders

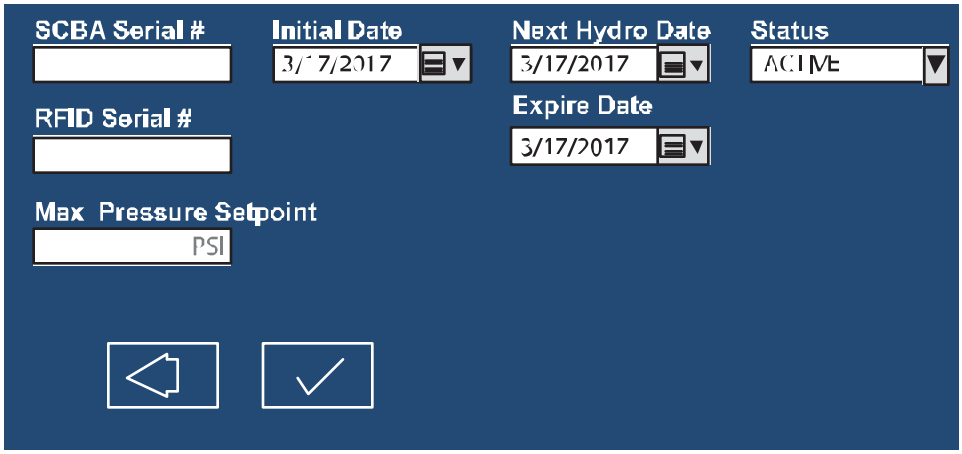


The cylinders button takes the administrator to a page similar to the personnel page however this page is for the cylinders database. Here the administrator can ADD, DELETE, or EDIT the files for each cylinder. The buttons across the top of the listed cylinders sort the entries as ALL (active and expired), ACTIVE or EXPIRED.

The EDIT button allows the administrator to edit an already existing cylinder record. The DELETE button deletes an already existing record.

The ADD NEW button opens the add new cylinder screen(See Figure 2-7).

Figure 2-7 Add New Cylinder

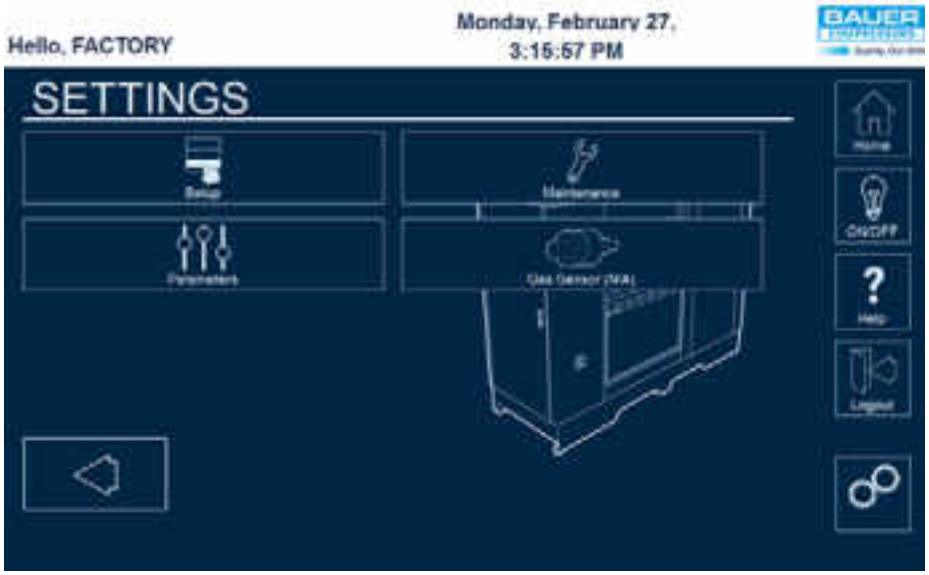


The SCBA Serial # and MAX Pressure Setpoint must be entered. The Initial Date, Next Hydro Date, and Expire Date will self fill with the present date. To change the date press the icon to the right of the box and enter the correct date. STATUS can be left as Active or changed to Expired by use of the drop down box. If the cylinder has a RFID serial number that should be entered in the appropriate box.

Once all information for the cylinder is entered press the check mark button for OK. The left facing arrow will take the administrator back to the cylinders list.

2.2.2.3 Settings

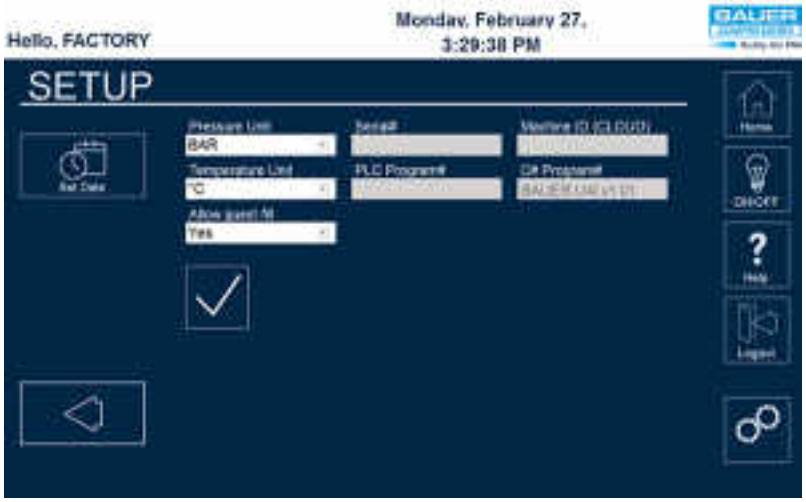
Figure 2-8 Settings



The settings button takes the user to the settings page (See Figure 2-8). The choices on this page are SETUP, PARAMETERS, MAINTENANCE, and GAS SENSORS.

2.2.2.3.1 Setup

Figure 2-9 Setup



the SETUP button allows the administrator to adjust the display of pressure as PSI or BAR and the Temperature as Fahrenheit or Celsius. On the Setup page the administrator can see the display of unit's serial number, PLC program version and the monitor's program version. Also on the setup page the administrator can set the current date, and allow guest to use the compressor. If this feature is enabled, instead of having to submit a badge number, a user can simply press the Guest button on the initial screen. The guest will only be allowed to use the unit, not change any settings or add personnel or cylinders.

2.2.2.3.2 Parameters

Figure 2-10 Parameters

The Parameters screen displays multiple fields that dictate how the unit works, changing these settings will change the operation of the unit. For this reason only qualified personnel should be given administrative privileges.

2.2.2.3.3 Maintenance

The maintenance screen lists the maintenance schedule by working hours, and calendar days. Also displayed here are the Total run time of the unit and when the last maintenance was performed.

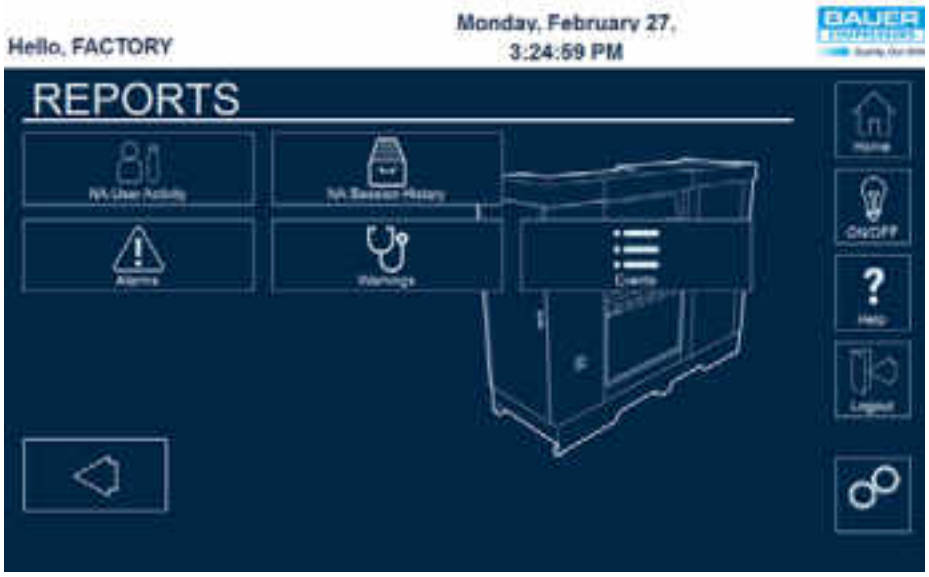
2.2.2.3.4 Gas Sensor

The final button on the settings page is the gas sensor setup. This screen will walk the administrator through the steps to zero and calibrate the gas sensor if your unit is equipped with one. For more information on the gas sensor see Chapter 7.

2.2.2.4 Reports

Back to the Administrative main menu screen another option is reports.

Figure 2-11 Reports

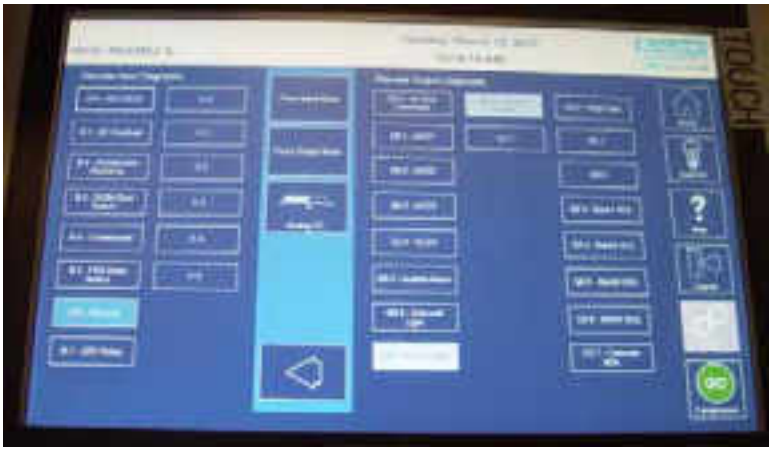


The reports screen allows the administrator to view reports on User Activity, Session History, Alarms, Warnings or All Events

2.2.2.5 Diagnose

Pressing the Diagnose button takes the administrator to a diagnostic screen used to troubleshoot the unit. This page is used to force input signals to the PLC or output signals from the PLC. Also from the diagnostic screen, the analog button can be pressed to view the actual voltage reading from the sensors.

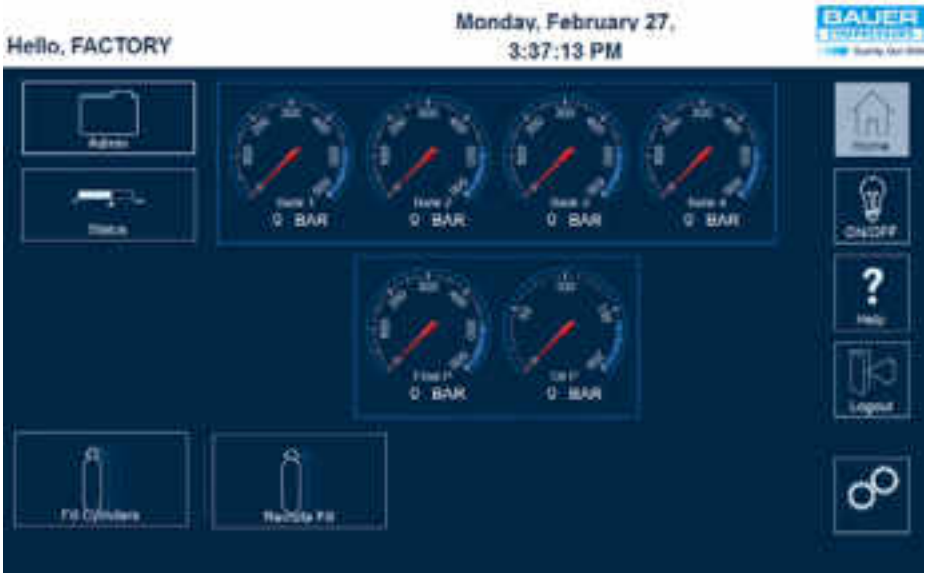
Figure 2-12 Diagnostic



2.2.3 Home Screen

The HOME button at the top of the screen on the right hand side takes the administrator to the home screen that a user or guest would initially see after logging in.

Figure 2-13 Home Screen, Operator



This screen displays the pressure of each storage bank, the compressor's oil pressure and final pressure. On the upper left side is a button labeled ADMIN which will return to the administrators main menu page.

2.2.3.1 Compressor Status

Under the ADMIN button is the COMPRESSOR STATUS button. This button takes the user to the status page.

Figure 2-14 Compressor Status

The compressor status page displays the following

- Compressor Status
- Total Run Time
- Security Frequency
- Discharge Pressure
- Oil Pressure
- Final Separator Count
- Current Run Time
- Maintenance Due in
- Shutdown Pressure
- Restart Pressure
- Previous ACD Cycle

2.2.3.2 Fill Cylinders

On the HOME screen in the lower left is an icon to fill cylinders. If the operator wants to fill cylinders using the Containment Fill Station (CFS), press this button.

Figure 2-15 Fill Cylinders

See Paragraph 2.3 for information on mechanical aspects of filling cylinders.

On the fill cylinders screen, for each cylinder to be filled, use the drop down box for each fill position to select the cylinder's SCBA number[1]. In the block SCBA Filling Pressure select the pressure the cylinder is to be filled, or select custom and enter the desired pressure.

WARNING

This system is capable of operating with pressures in excess of the normal bottle fill pressure. It is important not to overfill bottles as explosive forces may be released if the bottle fails

If filling only from the storage, connect the cylinders as described below and press the green Start button in the upper right corner. The pressure reading in the storage banks will drop as the pressure reading of the cylinders will rise. Once all cylinders are filled press the Stop button.

If filling will require the compressor or you wish to fill the storage banks as you fill the SCBA cylinders, press the green compressor start button in the lower right first, then the green filling start button in the upper right.

2.2.3.3 Remote Fill

To use the remote fill option press the remote fill icon. Select the desired pressure or Custom and enter the desired pressure. Press the green start button in the upper right to fill. If the compressor will be needed press the green compressor start button in the lower right of the screen.

1. If this unit is equipped with RFID option and the cylinder has a RFID tag, this field will automatically populate.

2.3 Fill Station Operation.

WARNING

Every bottle is stamped with a maximum pressure and the last inspection date. Do not fill a bottle with an outdated inspection stamp.

WARNING

Visually inspect each bottle and valve for signs of damage before filling. Do not fill any bottles which appear to be damaged. See ASME and CN regulations and manufacturer's recommendations for damage criteria. Be sure the fill pressure and safety valves are properly set.

1. Unlock the fill station door by pushing the fill station door handle down and pulling the door open.
2. Insert the bottle riser, supplied with your system, into the bottom of the bottle holder. Adjust the bottle riser height by lifting the bottle riser and rotating it to one of the two predetermined positions which are noted by the numbers 1 and 2 on the top of the bottle riser. (See Figure 2-16). Different SCBA bottles have different lengths. A proper height adjustment will leave the bottle valve slightly below the top of the bottle holder.

Figure 2-16 Bottle Riser

CAUTION

Minimum bend radius for the fill hose is 1 ½ inches. Less than this will cause damage to or failure of the fill hose. Place the bottle so that the bend radius of the hose is greater than 1½ inches.

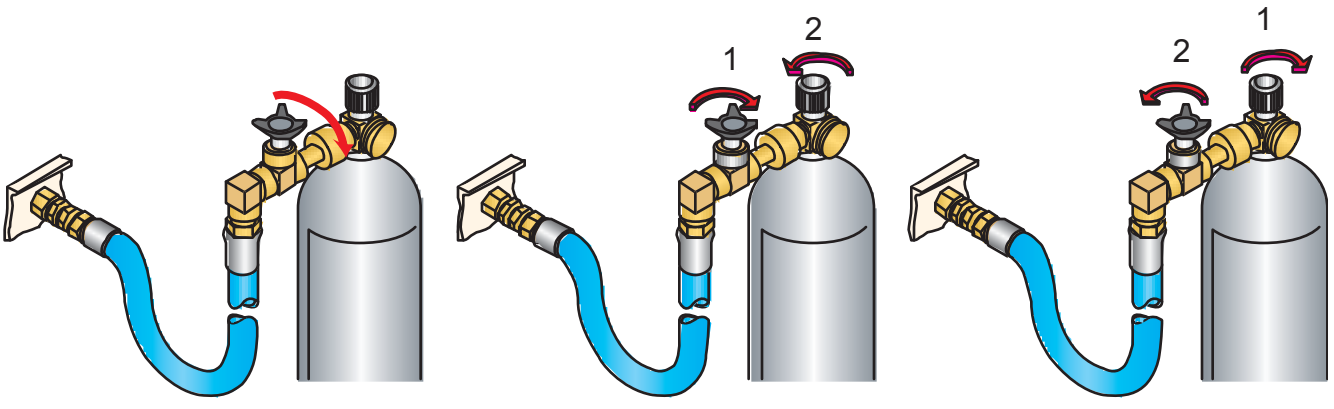
3. Place the bottles to be filled into the holder and connect the fill adapters to the bottles valve using a fill hose with the CGA-346 fill adapter for 2,216 psi bottles, a CGA-347 adapter for 4,500 psi bottles or a SCUBA yoke for SCUBA bottles. The CGA-347 fill adapter seals on 4,500 psi rated bottle valves, but vents on lower rated pressure bottles
4. CGA valves should be hand tightened only.
5. Close the hose bleed valves and open the bottle valves.
6. Close and lock the fill station door by pushing the fill station door closed, allowing the door lock bar to drop into position.

NOTICE

The Containment Fill Stations will not fill the bottles unless the door is closed and locked.

7. By closing the door, the bottle holders are returned to their upright position.
8. Set the fill pressures to the appropriate amount.
9. Open the fill valves to fill the bottles.
10. The pressure indication on the fill pressure gauge will drop while bottles are filling. Filling is completed when the fill pressure gauge reaches the desired pressure.
11. Close the fill valves.
12. Unlock the fill station door by pushing the door handle down.
13. Open the fill station door. The bottles are now in a tilted position.
14. Close the bottle valves and open the fill hose bleed valves.
15. Remove the fill adapters from the filled bottles and place them in the hose holders.

Figure 2-17 Bottle Valve Sequences



2.3.1 Remote Fill Connection

The optional remote fill connection is rated for up to 6,000 psig service. The remote fill hose reel is located on the left side of the unit.

2.3.1.1 Connecting an Air Bottle

Connect to the air bottle valve using a fill hose with the CGA-346 fill adapter for 2,216 psi bottles, a CGA-347 adapter for 4,500 psi bottles or a SCUBA yoke for SCUBA bottles. The CGA-347 fill adapter seals on 4,500 psi rated bottle valves, but vents on lower rated pressure bottles. CGA valves should be hand tightened only.

2.3.1.2 Filling the Air Bottle

1. Close the bleed valve on the fill hose (1) (See Figure 2-17).
2. Open the bottle valve (2).
3. Adjust the regulator on the fill panel to the desired pressure.
4. Open the filling valve on the fill panel to the filling position. The bottle will fill.

2.3.1.3 Removing the Air Bottle

1. After reaching the desired bottle pressure, close the fill valve located on the fill panel.
2. After the fill valve is closed, close the bottle valve.
3. Open the bleed valve (2) to vent the residual pressure in the fill hose.
4. Disconnect the fill adapter from the air bottle valve.

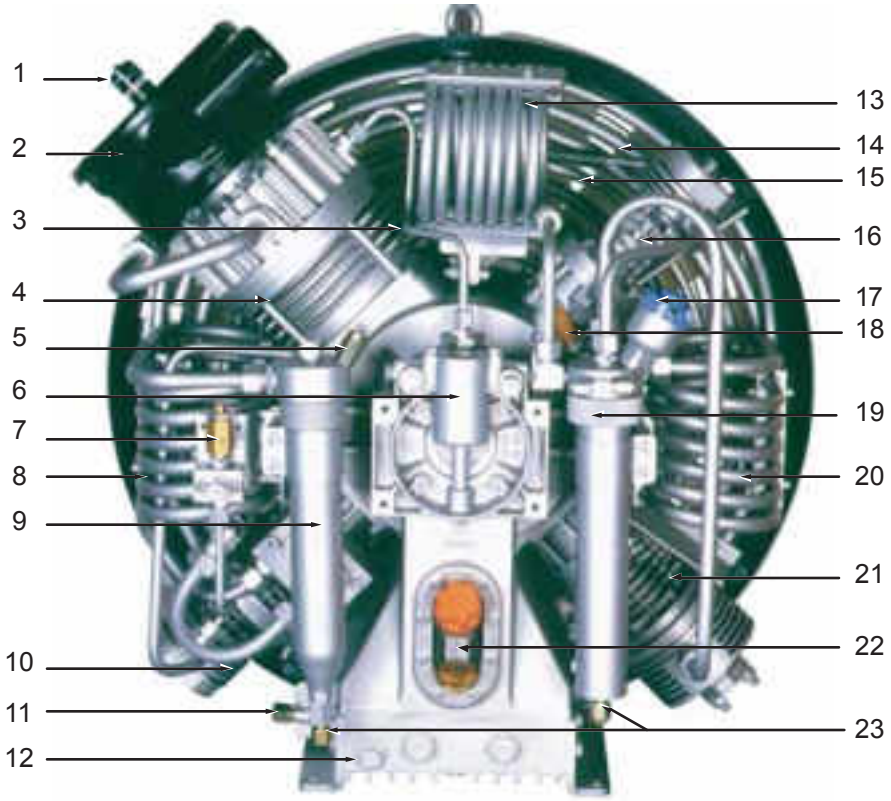
CHAPTER 3: IK 18.1 II COMPRESSOR BLOCK

3.1 Description

The IK18.1 II compressor is used to compress air up to 6,000 psi. This compressor is a four cylinder, five stage air cooled, oil lubricated reciprocating compressor. The 4th stage cylinder is lubricated by means of the forced feed lubrication system, while the other cylinders are splash lubricated. The cylinders are arranged 90° apart, with the 1st and 2nd stage, and the 3rd and 4th stage opposite each other. This compressor block is particularly suitable for continuous operation because of their rugged design and corrosion resistant interstage filter and cooler assemblies.

3.1.1 Component Location

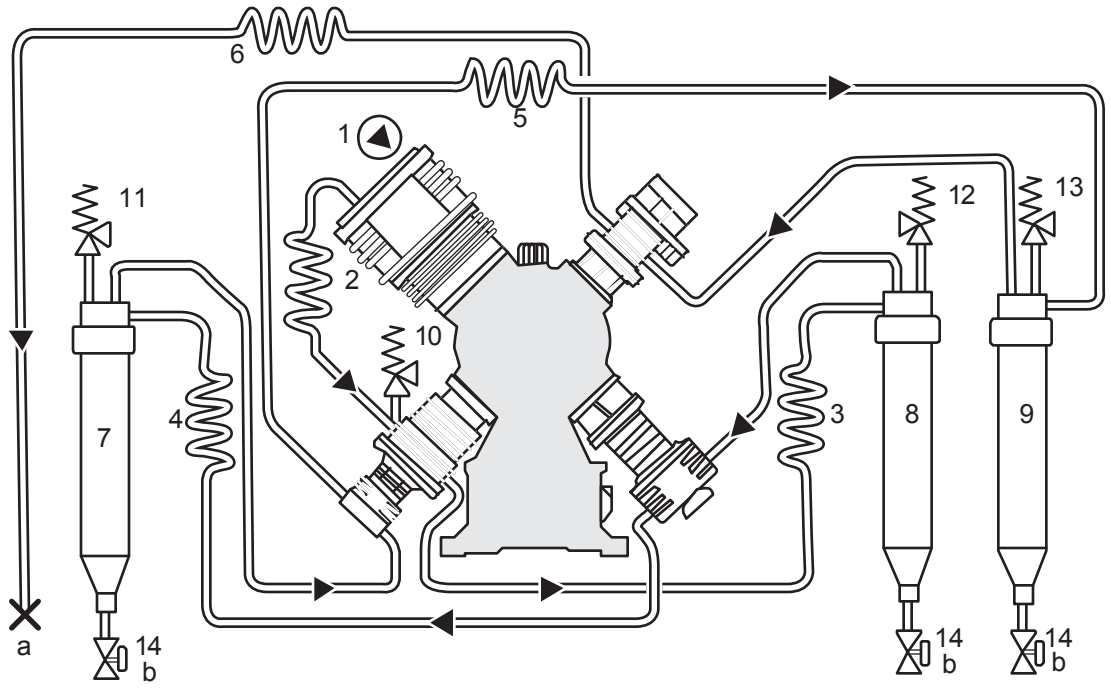
Figure 3-1 Compressor Block (Front View)



1. Service Indicator	9. 3rd Stage Separator	17. 4th Stage Safety Valve
2. Intake Filter	10. 2nd/4th Stage Cylinder	18. 2nd Stage Safety Valve
3. Crankcase Vent	11. Compressed Air Outlet	19. 4th Stage Separator
4. 1st Stage Cylinder	12. Oil Drain	20. 2nd Stage Intercooler
5. 3rd Stage Safety Valve	13. 4th Stage Intercooler	21. 3rd Stage Cylinder
6. Oil Pump Housing	14. 1st Stage Intercooler	22. Oil Filler with Sight Glass
7. 1st Stage Safety Valve	15. 5th Stage Aftercooler	23. Condensate Outlets
8. 3rd Stage Intercooler	16. 5th Stage Cylinder	

3.1.2 Air Flow Diagram

Figure 3-2 Five Stage Compressor Air Flow



1. Intake filter	8. 2nd stage Separator
2. Intercooler 1st stage	9. 4th stage Separator
3. Intercooler 2nd stage	10. Pressure Safety Valve, 1st stage
4. Intercooler 3rd stage	11. Pressure Safety Valve, 3rd stage
5. Intercooler 4th stage	12. Pressure Safety Valve, 2nd stage
6. Aftercooler	13. Pressure Safety Valve, 4th stage
7. 3rd stage Separator	14. Manual condensate drain valves
a. Air outlet	b. Condensate drain outlet

3.1.3 Lubrication System

3.1.3.1 Description.

The compressor is provided with forced-feed lubrication. The oil pressure is produced by a low revving gear pump. The oil pressure is between 44 psi and 87 psi (3 to 6 bar).

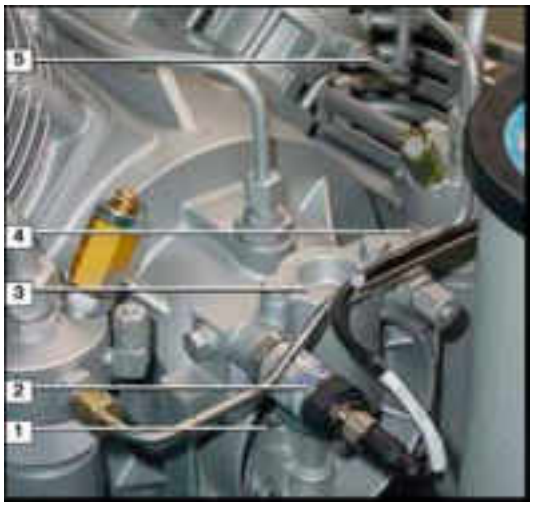
CAUTION

This oil pump must be operated in the correct direction of rotation, other wise no oil pressure will be built up and the compressor may be damaged.

(See Figure 3-3) The oil pump (1) is coupled to and driven by the crankshaft. It pumps oil from the crankcase through an oil filter (3) and the oil pressure regulating valve (4) to the 4th stage cylinder. The oil is then distributed by the guide piston of the 4th stage and lubricates all the moving parts of the compressor

block. The oil pressure sensor (2) allows mounting for an optional oil pressure gauge or electronic pressure monitoring.

Figure 3-3 Lubrication Oil System



1. Oil Pump Housing	4. Oil Pressure Regulating Valve
2. Oil Pressure Sensor	5. Injection Line to Final Stage
3. Oil Filter Housing	

Figure 3-4 Oil Sight Gauge

3.1.3.2 Oil Level Check

Check the oil level at the oil filler sight gauge on the compressor block every day before putting the compressor into operation. Oil level must never be below the minimum mark molded into the sight gauge as this will cause severe damage due to lack of lubrication. Overfilling is prevented by the design of the filler neck; i.e. oil should be filled right to the edge of the opening.

3.1.3.3 Oil Change Interval

The synthetic oil should be changed every 2,000 operating hours or biennially, whichever is reached first.

3.1.3.4 Oil Capacity

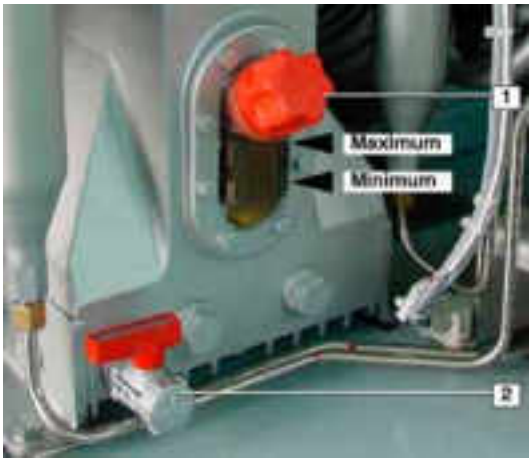
The oil capacity is approximately 6.5 quarts (6.0 liters). The amount of oil between the minimum and maximum marks is approximately 1.7 quarts (1.6 liters).

3.1.3.5 Oil Change

CAUTION

Replace the oil filter at every oil change, otherwise when the filter becomes clogged a bypass valve opens and the oil circulates without being filtered.

Figure 3-5 Oil Sight Gauge & Drain



1. Oil Fill Cap
2. Oil Drain Valve

Figure 3-6 Removing the Oil Filter Cover

Figure 3-7 Replacing the Oil Filter

1. Run the compressor until it is warm.
2. Remove cap from Oil Filler Sight Gauge.
3. (See Figure 3-5) Drain the Oil into a suitable container by opening the Oil Drain Valve (2)
4. After oil has stopped draining, close Oil Drain Valve.
5. (See Figure 3-6) Remove two bolts (1) with a 13 mm wrench. Remove cover (2).
6. (See Figure 3-7) Remove the Oil Filter (1) from the rubber gasket at the cover.
7. Mount a new filter element and replace and fasten cover.

8. Fill new oil through filler neck to the Maximum mark on the Oil Fill Sight Gauge.
9. Pour oil in slowly, wait until the level settles then replace cap in the Oil Fill Sight Gauge.
10. Return the unit to operation.

3.1.3.6 Venting the Oil Pump

CAUTION

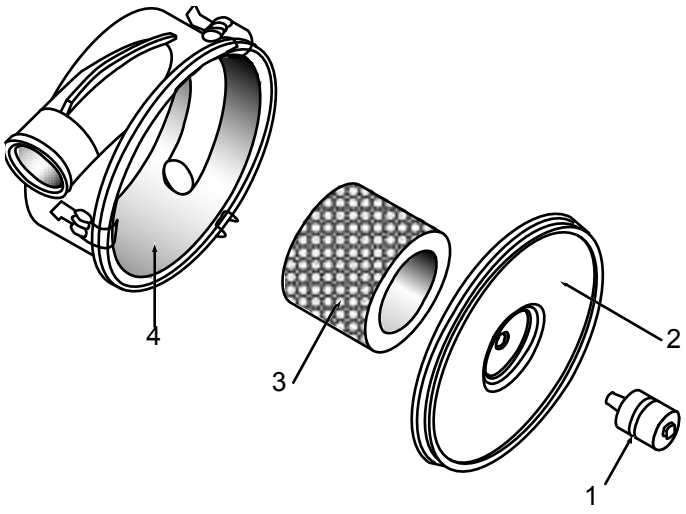
To avoid damage after maintenance the following measures should be strictly adhered to.

(See Figure 3-7). If after the start of the compressor no oil pressure builds up, venting the oil pump may be necessary, especially after maintenance and repair work. It may also be necessary if the unit has been operated in the wrong direction of rotation.

1. With the unit running, open the condensate drain valves.
2. Open Oil Pump Vent Plug (2) and wait until oil comes out bubble free.
3. Replace Oil Vent Plug.

3.1.4 Intake Filter

Figure 3-8 Intake Filter



1. Service Indicator	3. Filter Element
2. Cover	4. Filter Housing

3.1.4.1 Description

(See Figure 3-8). A dry micronic filter is used to filter intake air in breathing air units. Nitrogen compressors use a separate inlet regulation system.

3.1.4.2 Maintenance

The vacuum in the intake filter is monitored by the Service Indicator (1). When the preset vacuum pressure is reached the indicator changes to red and the Filter Element (3) should be replaced as follows.

1. Open clips on Filter Housing (4) and remove Cover (2).
2. Remove the Filter Element (3).
3. Clean the inside of the Filter Housing with a damp cloth. Take care to prevent any dust from entering the intake manifold.
4. Replace the Filter Element (3).
5. Mount the Cover (1) and fasten with the clips.
6. Reset the Service Indicator (1) by pressing the button.

WARNING

The rapid de-pressurizing and re-pressurizing of an interstage separator during condensate draining subjects it to metallurgical stresses. To prevent catastrophic failure with the possibility of damage, injury or death the interstage separator must be replaced after 85,000 load cycles. A load cycle equals one de-pressurization- repressurization. The Bauer recommended frequency of condensate draining is every fifteen minutes and is a balance between maximizing the life of the separator chamber and maintaining the quality of the delivered air.

3.1.5 Interstage Separators

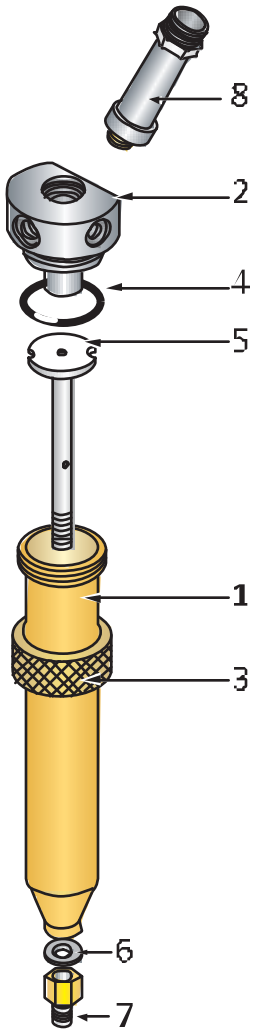
3.1.5.1 Description

Three interstage separators are mounted on the compressor, one after the 2nd stage and another after 3rd stage and the last after the 4th stage. These separators are designed to remove oil and water which accumulates due to the cooling of the air after the compression process. Separation is achieved by means of centrifugal action. In the 2nd stage separator the design of the filter head provides this action. In the 3rd and 4th stage separators the centrifugal action is provided by a vortex plate additionally a sintered metal filter is provided to remove dirt contamination.

3.1.5.2 Maintenance

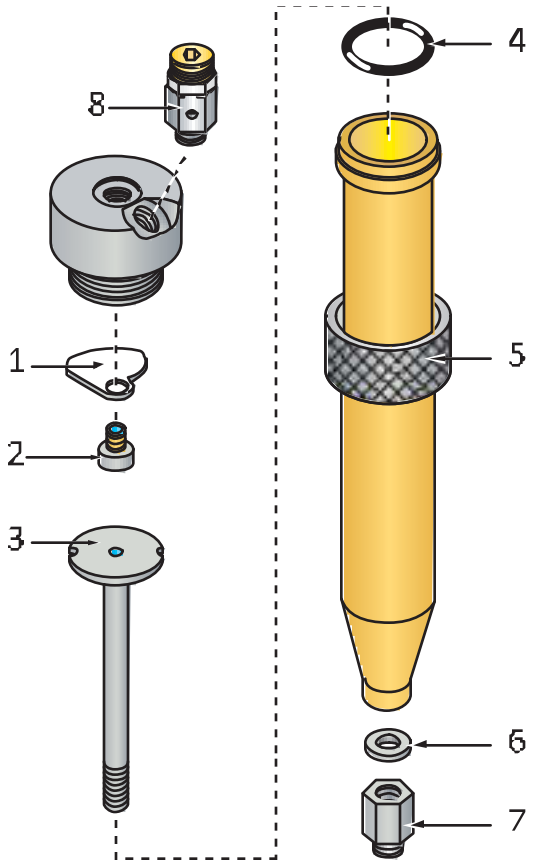
The interstage Separators require no maintenance.

Figure 3-9 2nd Stage Interstage Separator



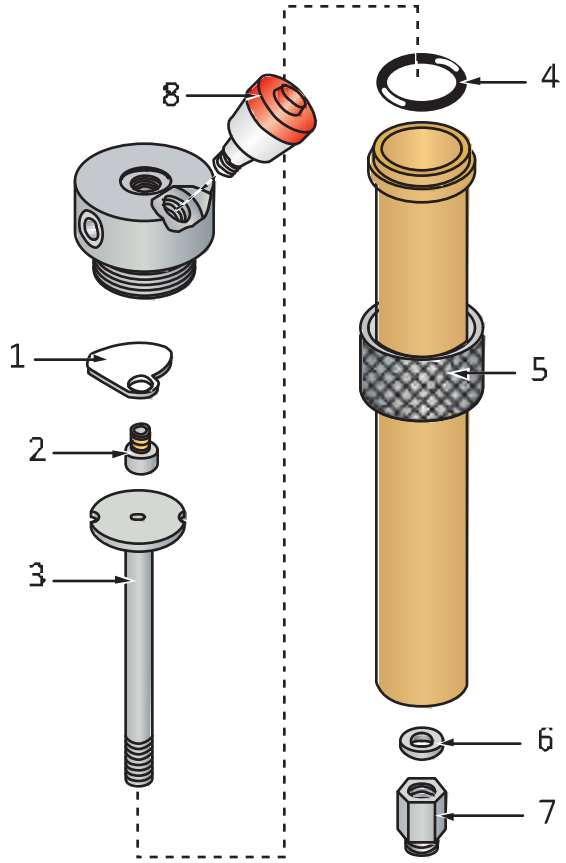
1. Separator Body	5. Insert
2. Separator Head	6. Gasket
3. Knurled Nut	7. Fitting
4. O-ring	8. Safety Valve

Figure 3-10 3rd Stage Interstage Separator



1. Vortex Plate	5. Knurled Nut
2. Hollow Screw	6. Gasket
3. Center Insert-ring	7. Fitting
4. O-ring	8. Safety Valve

Figure 3-11 4th Stage Interstage Separator



1. Vortex Plate	5. Knurled Nut
2. Hollow Screw	6. Gasket
3. Center Insert-ring	7. Fitting
4. O-ring	8. Safety Valve

3.1.6 Compressor Valves and Valve Heads

3.1.6.1 Functional Description

The valve heads of the individual stages form the upper part of the cylinders. The inlet and pressure valves are fitted inside the valve heads.

When the piston moves downwards, the resultant vacuum in the piston cylinder opens the inlet valve. When the piston moves upwards, the inlet valve is closed and the pressure valve opened by the pressure created in the compression process. See Figure 3-13.

The Intake and Pressure Valve of the 1st Stage are combined in a Plate Valve under the Valve Head. See Figure 3-12.

Figure 3-12 1st Stage Valve Function

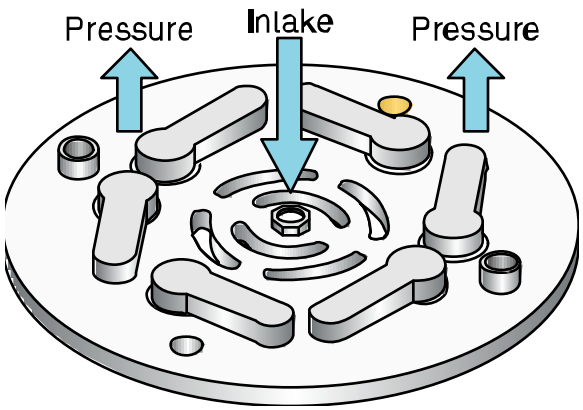
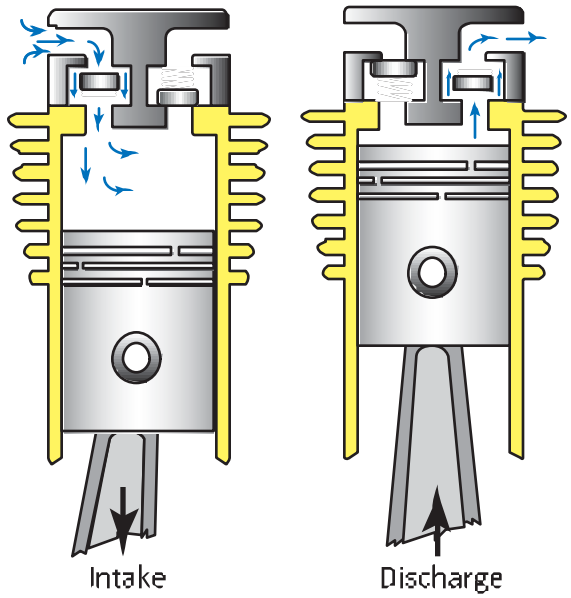


Figure 3-13 Valve Function



3.1.6.2 Initial Operational Check of the Valves

After roughly half an hour of operation, the valves should be checked. The outlet piping should be hot if the valves are operating properly. Note that the inlet line to the valve heads should be warm to the touch.

WARNING

Do not touch the outlet piping with bare hands, use a thermometer.

3.1.6.3 General Instructions for Changing the Valves

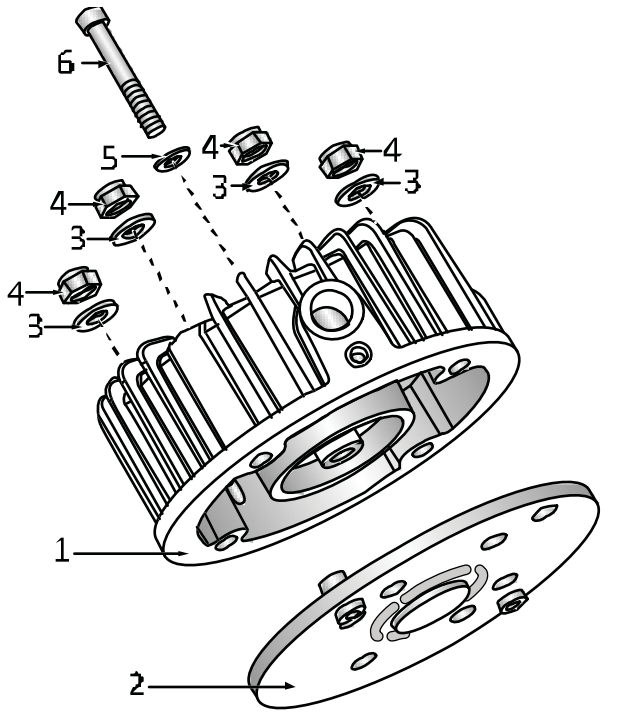
Please observe the following instructions for valve maintenance:

1. Always replace valves as a complete set.
2. Carefully clean dirty valves. Never use a sharp tool for this purpose. Soak the valves in Varsol and clean with a soft brush.
3. Check the individual components for excessive wear. If the valve seat or valve discs are dented, replace the valves.
4. Check the valve space in the valve heads for dirt, and clean if necessary.
5. Use only satisfactory gaskets and O-rings during reassembly.
6. Observe the correct sequence when reassembling.
7. After finishing all maintenance work on the valves, turn the compressor manually using the fly-wheel and check whether all items have been correctly installed.
8. 30 minutes after restarting the compressor, stop the unit, let it cool down to ambient temperature, and re-tighten valve studs and cap nuts. Otherwise the gasket set may cause a leak.

9. Remove and check the valves every 1000 operating hours.
10. Replace the valves every 2000 operating hours to avoid fatigue failure.
11. Use an assembly tool (Bauer P/N: 011365) for all work on valve heads (See Figure 3-19).

3.1.6.4 Changing the 1st Stage Valves.
See Figure 3-14

Figure 3-14 1st Stage Valve and Head



3.1.6.4.1 Removal Procedure.

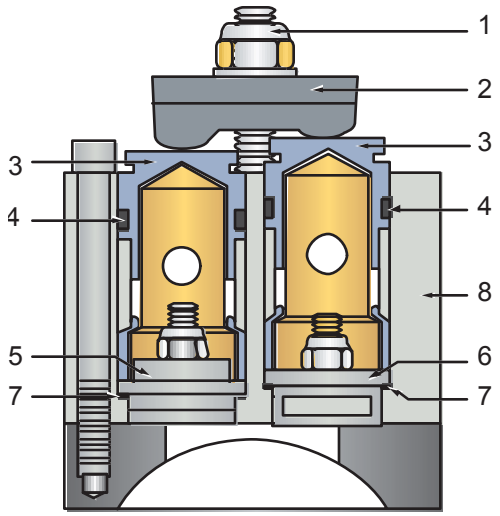
1. Unscrew and remove cap nuts (4) and washers (3).
2. Remove Valve Head Assembly (1) from studs in cylinder.
3. Remove Valve (2) and unscrew and remove center screw (6) and washer (5).

3.1.6.4.2 Installation Procedure

1. Fasten new Valve (2) with center screw (6) and washer (5).
2. Place assembled Valve Head (1) on studs in the cylinder.
3. Install washers (3) and cap nuts (1) and tighten to the torque value listed in the Appendix.

3.1.6.5 Changing the 2nd Stage Valves

Figure 3-15 2nd Valve Head and Valves



1. Hex Nut	4. O-ring	7. Valve Gasket
2. Cap Holder	5. Discharge Valve	8. Valve Head
3. Valve Caps	6. Inlet Valve	

3.1.6.5.1 Removal Procedure
See Figure 3-15

1. Unscrew and remove Hex Nut (1).
2. Remove Cap Holder (2).
3. Insert two screwdrivers into the Extraction Grooves of the Valve Caps (3) and lift out the Valve Caps with O-Rings (5).
4. Check and replace O-Rings if required.
5. Take out Valves (6 & 9).
6. Check the Valve Gaskets (7) and replace if required.

3.1.6.5.2 Installation Procedure

1. Fit valves(6 & 9) with gaskets (7) and replace.
2. Fit valve caps (3) with O-Rings (5) and replace.
3. Replace cap holder (2) in the proper position.

CAUTION

The valve cap for the inlet valve protrudes 0.98 in (2.5 mm) out of the valve head more than the valve cap for the discharge valve. The cap holder is designed accordingly.