Instruction Manual and Replacement Parts List

Vertecon

High Pressure Breathing Air Compressor Units

Legacy 13

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WARNING

This Instruction Manual and Replacement Parts List contains safety information and instructions for the Legacy 13 High Pressure Breathing Air Compressor Units.
You must read, understand and follow all safety precautions and instructions.

Editions, Revisions and Changes

- An Edition is the original or a complete rewriting of the entire Manual.
- A Revision occurs whenever a complete Section or Appendix is rewritten or added.
- A Change occurs when individual pages, drawings or tables are changed.

1st Edition: April 17, 2019

Rev	Chg	Date	Notes	Auth
0	1	Aug. 12, 2019	Alarm reset	SS
0	2	Dec. 4, 2019	Added Maint. Chart	SS
0	3	Sep. 14, 2020	Converted to ASY-5011, Enmet Mnr	SS
0	4	Jan. 15, 2021	Updated Enmet Chapter	SS
0	5	Feb. 2, 2021	Removed Legacy 10	SS

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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.

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 unit identification plate on the 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 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 Specifications

1.4.1 Legacy 13

Medium	air
Charging Rate	13.0 scfm (368 l/min)[1]
Free Air Delivery	10.8 scfm (306 l/min)[2]
Inlet pressure	atmospheric
Operating pressure, max.	6,000 psig (420 bar)
Ambient temperature range	40 - 115 °F (5 - 45 °C)
Weight	approx. 720 lb. (327 kg)

1.4.1.1 Compressor Block

IK12.14 II	Mod. 8
No. of stages	4
No. of cylinders	3
Cylinder bore, 1st stage	4.2 in. (105 mm)
Cylinder bore, 2nd stage	4.15/3.46 in. (105/88 mm)
Cylinder bore, 3rd stage	1.10 in. (28 mm)
Cylinder bore, 4th stage	0.47 in. (12 mm)
Piston Stroke	1.57 in. (40 mm)
Intermediate pressure, 1st stage	45 - 60 psig (3 - 4 bar)
Safety valve setting, 1st stage	75 psig (5 bar)
Intermediate pressure, 2nd stage	230 - 255 psig (16 - 17.5 bar)
Safety valve setting, 2nd stage	350 psig (24 bar)
Intermediate pressure, 3rd stage	985 - 1,130 psig (68 - 78 bar)
Safety valve setting, 3rd stage	1,380 psig (95 bar)
Direction of rotation when facing flywheel	CCW
Compressor speed	1,180 RPM
Oil capacity	3 qts.(2.8 liters)
Oil Pressure	60 - 85 psig (4 - 6 bar)
Recommended oil (Synthetic)	BAUER OIL-0024
Maximum Inclination	15° in all directions

1.4.1.2 Compressor Drive

Model	Voltage	Frequency	Phase	Power	Type	BAUER P/N
E3	208 - 460 VAC	60 Hz	3Φ	10 Hp	ODP	MTR-0523

1.4.1.3 Purification System Applicability

The Legacy 13 is equipped with the Bauer P5 Purification System and the Securus II® Electronic Moisture Monitoring System.

1. Based on recharging an 80 cubic foot (air volume) tank from 500 to 3000 PSIG
2. Compressor capacity (FAD) is.referenced to standard inlet conditions and 80% of the compressor's maximum working pressure. Tolerance on capacity ± 5%.

CHAPTER 2: PLC CONTROLLED UNIT OPERATIONS

2.1 Prestart Checks

1. Ensure that all scheduled maintenance is completed.
2. Check compressor oil level. Refer to Chapter 3.
3. On units with a gasoline or diesel engine, check engine oil level. Refer to Original Equipment Manufacturers (OEM) manual.
4. Check Emergency Stop Switch is pulled out.

2.2 Start-up Procedure

(See Figure 2-1)

1. Verify that all connections downstream of the compressor are secure.
2. Open the condensate drain valves to relieve any remaining pressure.
3. Close the condensate drain valves.
4. Apply electric power to the unit.
5. Turn the Compressor Control Switch to the ON position.

2.3 Post Start Procedures

1. Allow the compressor to build up pressure. Monitor the pressure gauge.
2. Listen to the unit as it operates. If excessive knocking or vibrations are observed shut down the unit.
3. Allow the compressor to reach full pressure.

2.4 Shutdown Procedures

1. Verify all bottle valves and fill valves are closed.
2. Turn the Compressor Control Switch to the OFF position.
3. After shutting down the compressor drive, open the condensate drain valves to relieve any remaining pressure and drain any moisture from the intermediate separators and the oil and water separator.
4. Close the condensate valves.
5. Leave Emergency Stop Switch pulled out for at least 8 hours every 30 days to maintain the charge on the internal PLC battery and preserve the PLC operating memory.
6. If the compressor is to remain idle for six months or longer, refer to the Appendix titled, Long Term Storage for preservation instructions.

2.5 Electric Panel Components

Figure 2-1 Electrical Panel

1. Compressor Control Switch	3. Alarm Light
2. Warning Light	4. Emergency Stop Switch

2.5.1 Emergency Stop Switch.

The Emergency Stop Switch is a switch with a mushroom head. The button must be pulled out for the unit to operate. In an emergency, depress the push button, which will shutdown the electric motor and all other periphery devices. Do not use the Emergency Stop Switch for securing the equipment under normal operation, use the Compressor Control Switch. Apply power to the unit by pulling out the Emergency Stop Switch.

2.5.2 Compressor Control Switch

2.5.2.1 2-Position (Standard)

OFF Position - The Compressor Control Switch switch must be in the OFF position when securing the compressor system.

ON Position - The Compressor Control Switch switch must be in the ON position to operate the compressor system. When positioning the switch to the ON position, it will illuminate Green. The compressor will start and stop automatically based on the status of the pressure switch.

2.5.3 Indicator Lamps

2.5.3.1 PLC Warning and Alarm Lamps

2.5.3.1.1 Warning Lamp - Amber

The lamp (Bauer P/N LIT-0128) is a LED lamp for long trouble free life. This lamp will flash a code IAW the logic of the PLC. See Paragraph 2.6.

2.5.3.1.2 Alarm Lamp - Red

The lamp (Bauer P/N LIT-0127) is a LED lamp for long trouble free life. This lamp will flash a code IAW the logic of the PLC. See Paragraph 2.7.

2.6 Warnings

The amber Warning Light located on the control panel flashes warning codes with a 0.5 second on, 0.5 second off sequence with a distinct pause between sequences. In addition the light will illuminate on initial start up for a period of 5 seconds, to serve as a lamp test function. The lamp is a LED lamp for long trouble free life.

2.6.1 One Flash - Securus Monitor

The compressor purification system may be equipped with an optional Securus® Electronic Moisture Monitor. This consists of a transmitter monitor (blue cap) connected to the purification chamber. It functions as a capacitive sensor, sensing the moisture in the chamber. When the chemicals in the purification cartridges have reached the point where they retain a set level of moisture, the Securus® monitor will issue a warning via the amber Warning Light. On a Securus® Warning condition, the compressor will run normally, and the warning code will flash. This warning is meant to prompt the operator to schedule replacement of the purification cartridge.

2.6.2 Two Flashes - Final Separator

The compressor unit is equipped with a final separator. To prevent fatigue failure of this pressure vessel, the PLC program monitors the pressurization, depressurization cycles of the separator and will first issue a Warning, and then an Alarm. The program is set up to provide the warning at 90% of the maximum recommended number of cycles. The program is configured to reflect these values when it is built. When the warning is illuminated, the unit will still continue to function properly, but will prompt the operator to contact Bauer Compressors for making arrangements to replace the Final Separator. When the Alarm level has been achieved, the compressor will no longer function, and will require the replacement of the Final Separator. Once the Final Separator is replaced, the unit can be reactivated by making adjustments to the PLC. Please contact Bauer Product Support for detailed instructions on this procedure.

WARNING

Do not attempt to override the Separator Shutdown Warning.
This feature is provided to protect personnel from injury or death.

2.7 Alarms

The red Warning Light located on the control panel flashes warning codes with a 0.5 second on, 0.5 second off sequence with a distinct pause between sequences. In addition the light will illuminate on initial start up for a period of 5 seconds, to serve as a lamp test function. The lamp is an LED lamp for long trouble free life.

NOTICE

To reset the alarm, turn the unit off with the compressor control switch.
Wait 30 seconds and turn the unit back on again

2.7.1 One Flash - Compressor High Temperature

The compressor high temperature switch is located on the compressor block, third, fourth or fifth stage head, depending on model. Under normal operating conditions, the switch is closed and the I1 lamp on

the PLC is illuminated. On a high temperature condition, the compressor will shutdown, the I1 lamp will extinguish, and the alarm code will flash.

2.7.2 Two Flashes - Compressor Low Oil Pressure

The compressor oil pressure switch is located on the back of the compressor block, mounted with the oil pressure gauge. The switch is N.O., Normally Open, and is connected to the PLC on terminal I2. During start-up of the compressor, the oil pressure switch is bypassed for a period of 45 seconds to allow the oil pressure to stabilize, then the switch will close. Then should the compressor lose oil pressure, the compressor will shutdown, the I2 lamp will extinguish, and the alarm code will flash.

2.7.3 Three Flashes - Compressor Overtime

The compressor has an overtime function, where if the compressor runs continuously for 5 hours, then the compressor will shutdown, and the alarm code will flash. This is done to secure the equipment if it were to be started and left unattended.

2.7.4 Four Flashes - Securus Monitor

The compressor purification system may be equipped with an optional Securus® Electronic Moisture Monitor. This consists of a control module and cable connected to the purification chamber. It functions as a capacitive sensor, sensing the moisture in the purified air. When the chemicals in the purification cartridge has reached the point where it retains a set level of moisture, the Securus® monitor will issue an alarm via the red Alarm Light. On a Securus® Alarm condition, the compressor will shutdown, the PLC I5 lamp will be illuminated, and the alarm code will flash.

2.7.5 Five Flashes - Final Separator Shutdown

WARNING

Do not attempt to override the Final Separator Shutdown. This feature is provided to protect operating personnel from injury or death.

The high pressure-breathing compressor is equipped with a final separator. To prevent fatigue failure of this vessel, the PLC program monitors the pressurization, depressurization cycles of the separator and will issue a Warning, and then later an Alarm. The program is set up to provide a warning at 90% of the maximum recommended number of cycles. The program is configured to reflect these values when it is built. When the warning is illuminated, the unit will still continue to function properly, but will prompt the operator to contact Bauer Compressors for making arrangements to replace the separator. When the Alarm level has been achieved, the compressor will no longer function, and will require the replacement of the separator. Once this is accomplished, the unit can be reactivated by making adjustments to the PLC. Please contact Bauer Product Support for detailed instructions

2.7.6 Six Flashes - Condensate Fault

The compressor condensate level float switch is located in the condensate collection tank. Under normal operating conditions, the switch is open and the I6 lamp on the PLC is off. On a high condensate level the float switch will close, the compressor will shutdown, the PLC I6 lamp will illuminate, and the

alarm code will flash. The operator should drain the condensate from the tank and resume operation of the equipment.

NOTICE

The compressor condensate contains some oil, and accordingly, should be disposed of in accordance with state and local regulations.

2.7.7 Seven Flashes - Motor Starter Overload Trip

The compressor overload relay is located in the electrical enclosure, directly beneath the motor starter. The relay is Normally Open and is not connected to the PLC, but is connected directly to the red Alarm Light. Under normal operating conditions, the switch is open. On an Overload Trip of the motor, the compressor will shutdown, and the Alarm Light will flash seven times..

2.7.8 Eight Flashes - Power Failure

The compressor will need to be restarted if there is a power failure. This is signaled by eight flashes of the alarm light.

2.7.9 Nine Flashes - Carbon Monoxide Sensor Alarm

The compressor system may be equipped with an optional carbon monoxide sensor. This consists of an electronic module that samples the compressed air supply. If the Carbon Monoxide level becomes excessively high (5 ppm or over), the red alarm light will flash nine times. The compressor will shutdown. The unit should be calibrated with a test gas monthly. Refer to the gas sensor chapter for this procedure.

2.7.10 Ten Flashes - H2S

The compressor system may be equipped with an optional hydrogen sulfide (H2S) sensor. This consists of an electronic module that samples the ambient air supply. If the H2S level becomes excessively high (10 ppm or over), the red alarm light will flash ten times. The compressor will shutdown. The unit should be calibrated with a test gas monthly. Refer to the gas sensor chapter for this procedure.

2.8 Replacement Parts List

Figure 2-2 Control Panel

Item	Qty	Part No.	Description	Notes
1	1	SWT-0416	Compressor Control Switch	
with	1	LIT-0251	Green LED light	
2	1	LIT-0257	Amber Lens	
with	1	LIT-0259	Amber LED	
3	1	SWT-0412	Emergency Stop Push Button	
4	1	LIT-0245	Red Lens	
with	1	LIT-0260	Red LED	

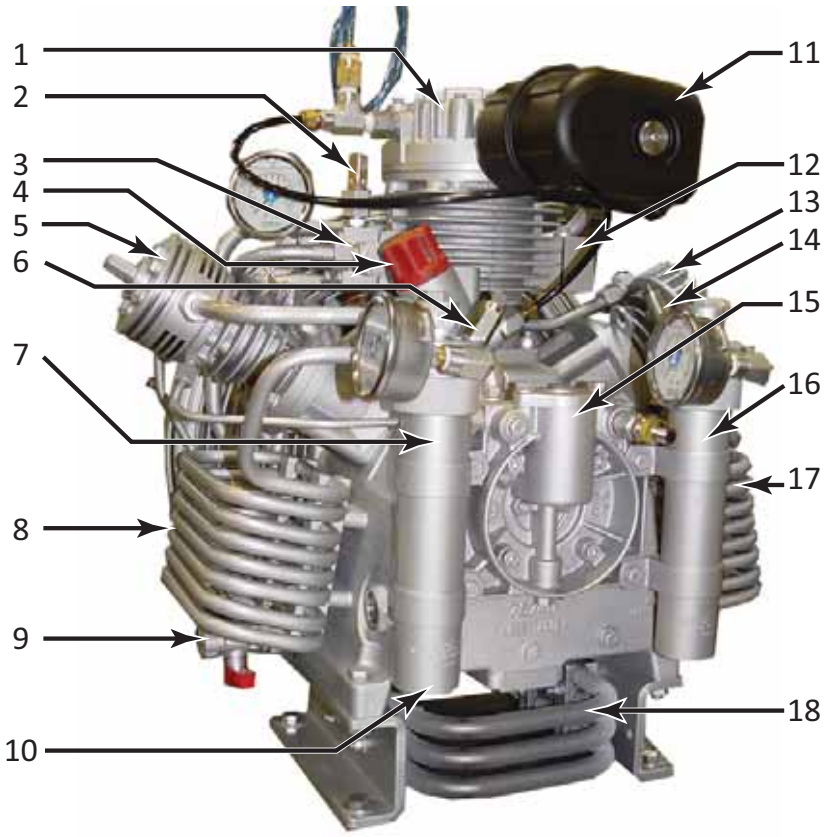
CHAPTER 3: IK 12.14 II COMPRESSOR BLOCK

3.1 Maintenance and Parts

The IK12.14 II compressor block is used to compress air up to 6,000 psi. This compressor is a four stage, three cylinder air cooled, oil lubricated reciprocating compressor. The cylinders are arranged in a "W" configuration, the 1st/2nd stage vertical stepped cylinder is in the center, 3rd stage on the right and 4th stage on the left looking from the intake filter side. This compressor block is particularly suitable for continuous operation because of their rugged design and corrosion resistant Inter-stage filter and cooler assemblies.

3.1.1 Component Location

Figure 3-1 IK12.14 II Compressor Block, Front View



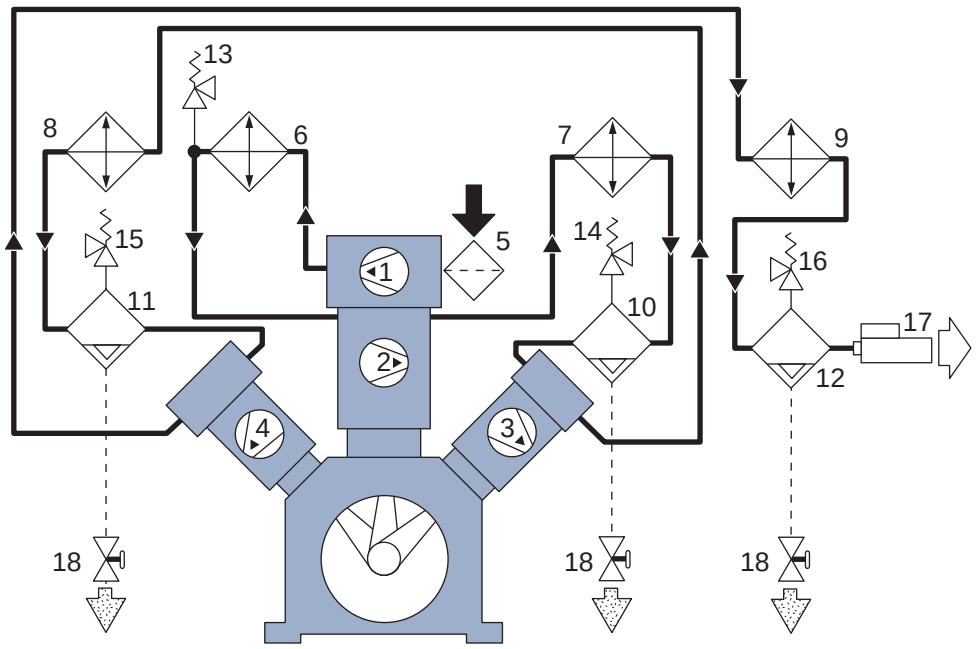
1. 1st Stage Valve Head	7. 3rd Stage Separator	13. 3rd Stage Cylinder
2. 1st Stage Safety Valve	8. 3rd Stage Inter-cooler	14. 2nd Stage Safety Valve
3. 2nd Stage Intake Manifold	9. Oil Drain Plug	15. Oil Filter Housing
4. Oil Filler Neck	10. Condensate Drain Connector	16. 2nd Stage Separator
5. 4th Stage Cylinder	11. Intake Filter	17. 2nd Stage Inter-cooler
6. 3rd Stage Safety Valve	12. 2nd Stage Pressure Manifold	18. 4th Stage Aftercooler

3.1.2 Air Flow Diagram

Refer to Figure 3-2. The air is drawn in through intake filter (1), compressed to the final pressure in cylinders (2, 3, 4, and 5) and cooled by inter-coolers (6, 7 and 8) and aftercooler (9). The safety valves (13, 14, 15 and 16) protect from overpressure in the individual stages. The compressed air is filtered by inter-

stage separator (10 and 11) and oil and water separator assembly (12). The inter-stage separator (10 and 11) and oil and water separator (12) are drained by condensate valves (18). The pressure maintaining valve (17) keeps the pressure constant within the separators (10, 11 and 12).

Figure 3-2 Air Flow Diagram



1. 1st Stage Cylinder	10. Inter-stage Separator after 2nd Stage
2. 2nd Stage Cylinder	11. Inter-stage Separator after 3rd Stage
3. 3rd Stage Cylinder	12. Oil and Water Separator
4. 4th Stage Cylinder	13. 1st Stage Safety Valve
5. Air Filter	14. 2nd Stage Safety Valve
6. 1st Stage Inter-cooler	15. 3rd Stage Safety Valve
7. 2nd Stage Inter-cooler	16. 4th Stage Safety Valve (Final Pressure)
8. 3rd Stage Inter-cooler	17. Pressure Maintaining Valve
9. 4th Stage Aftercooler	18. Manual Condensate Drain Valves

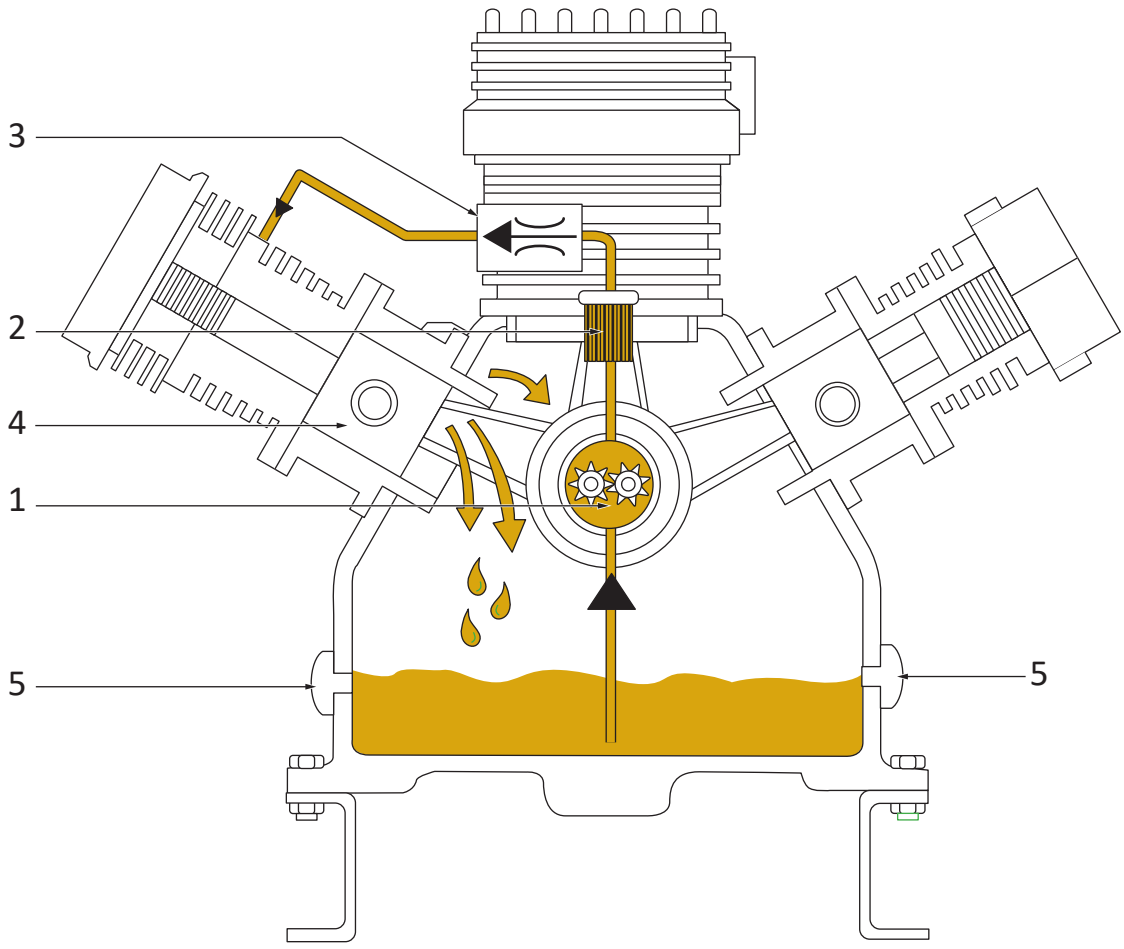
3.1.3 Lubrication System

Refer to Figure 3-3. The compressor is provided with forced-feed lubrication. The oil pressure is produced by a low speed gear pump. The oil pressure is approximately 73 psi.

The oil pump (1) is coupled to and driven by the crankshaft. It pumps oil through the oil filter (2) and a minimum pressure valve (3) to the 4th stage cylinder. The oil is then distributed by the guide piston (4) of the 4th stage and lubricates all the moving parts of the compressor block.

The minimum pressure valve allows for oil pressure indication at a pressure gauge and/or electronic oil pressure monitoring.

Figure 3-3 Lube Oil Circuit



1. Oil Pump 2. Oil Filter 3. Minimum Pressure Valve	4. Guide Piston 5. Oil Sight Glass

3.1.3.1 Type of Oil

For proper care and maintenance of the compressor, using the correct oil is of vital importance. Due to the thermal load on the compressor only high quality oil should be used. You are recommended to restrict oils to those which have been approved by Bauer Compressors, Inc. and are listed in Unit Specifications found in the paragraph titled Compressor Specifications in Chapter 1.

3.1.3.2 Oil Level Check

Check the oil level at the sight gauge on either side of the compressor block (See Figure 3-4) every day before putting the compressor into operation. Oil level must be between the minimum and maximum marks. Oil level must never be below the minimum mark as this will cause severe damage due to lack of lubrication. Oil level must also not exceed the maximum mark as this will cause excessive lubrication of the compressor and may result in a carbon buildup on the valves.

Figure 3-4 Oil Sight Glass

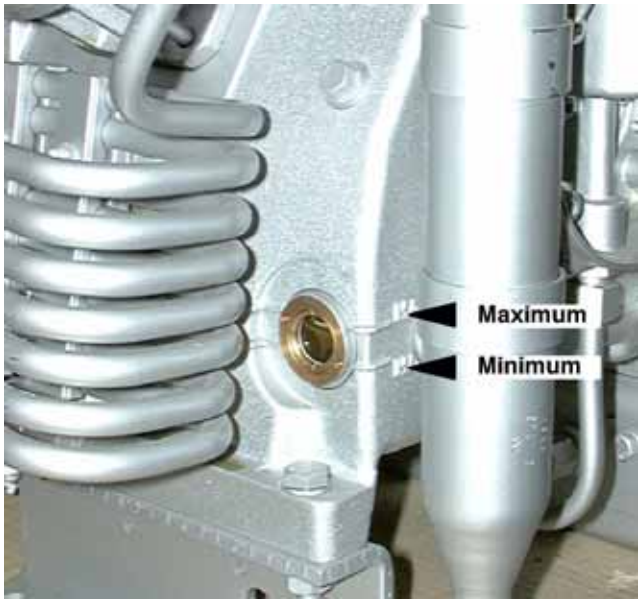


Figure 3-5 Oil Filler

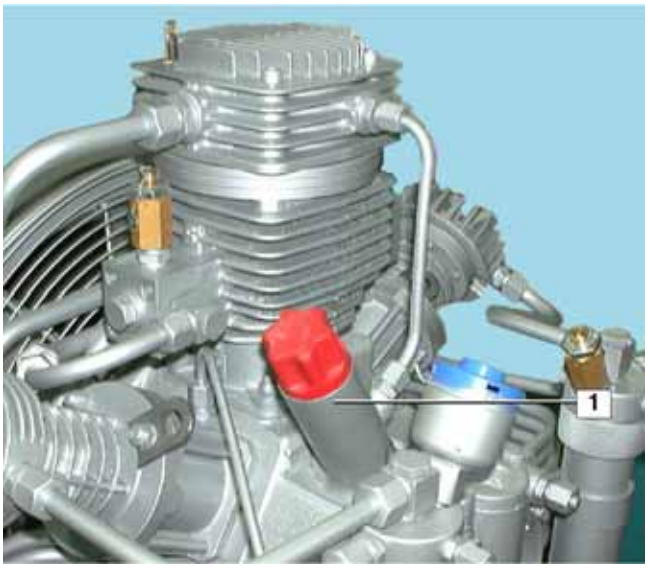


Figure 3-6 Removing the Oil Filter Cover

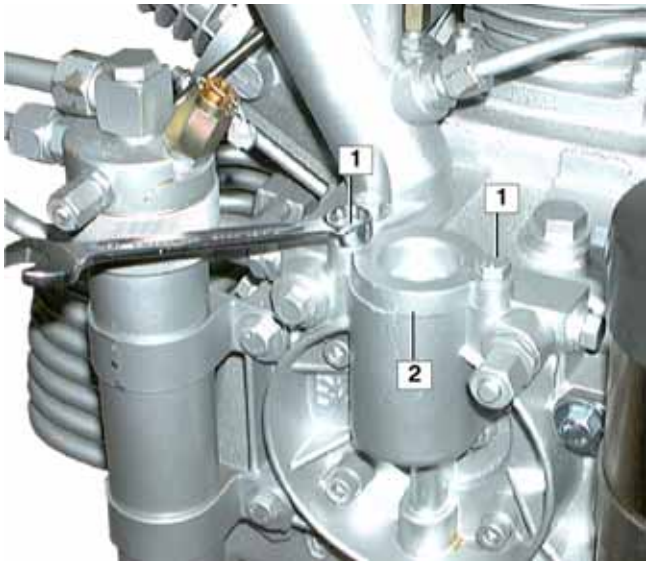
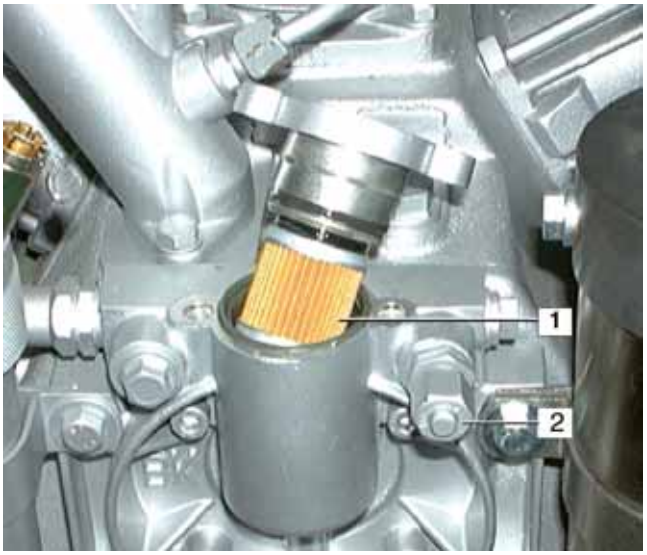


Figure 3-7 Replacing the Oil Filter



3.1.3.3 Oil Change

See the Maintenance Schedule for the recommended interval.

1. Run the compressor until it is warm then shut it down.
2. (See Figure 3-5). Remove the cap from the oil filler neck.
3. Drain oil while it is still warm by means of the oil drain plug.

CAUTION

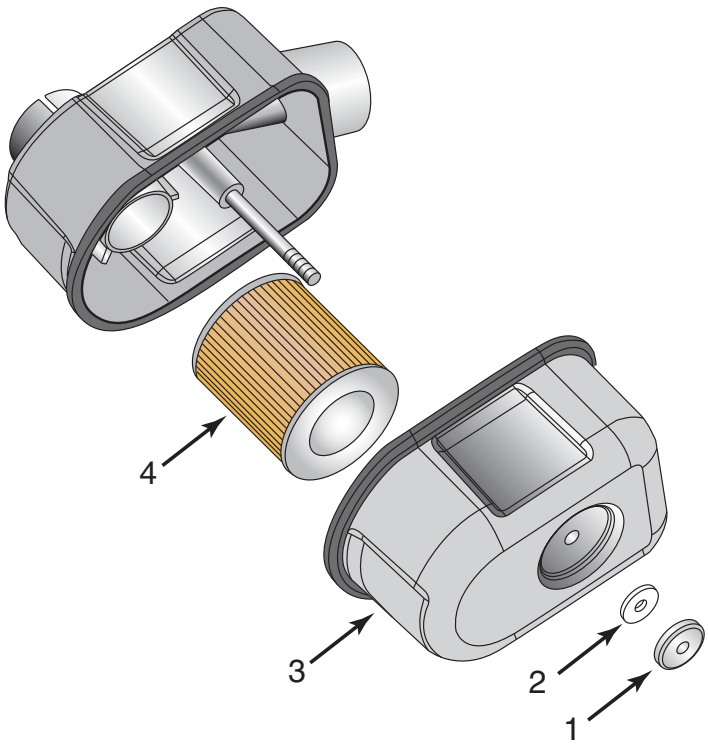
Replace the oil filter every oil change. Failure to do so will cause the filter to clog and the bypass valve to open resulting in unfiltered oil being circulated and possible damage to the compressor.

4. (See Figure 3-6). Remove the two bolts (1) with a 13 mm wrench. Remove the oil filter cover (2)
5. (See Figure 3-7). Remove the oil filter (1) from the rubber gasket at the cover.
6. Mount a new filter element (P/N N25326) and replace and fasten oil filter cover.
7. Slowly pour new oil through the oil filler neck until the level reaches the maximum mark on the sight gauge.
8. Wait a few minutes and adjust the oil level if necessary before putting the unit into operation.

3.1.4 Intake Filter

A dry, micronic filter is used to filter the intake air, See Figure 3-8. The filter cartridge must be changed at regular intervals. See the Maintenance Schedule for the recommended interval.

Figure 3-8 Intake Filter



1. Knurled Nut	3. Filter Housing
2. Washer	4. Filter Element

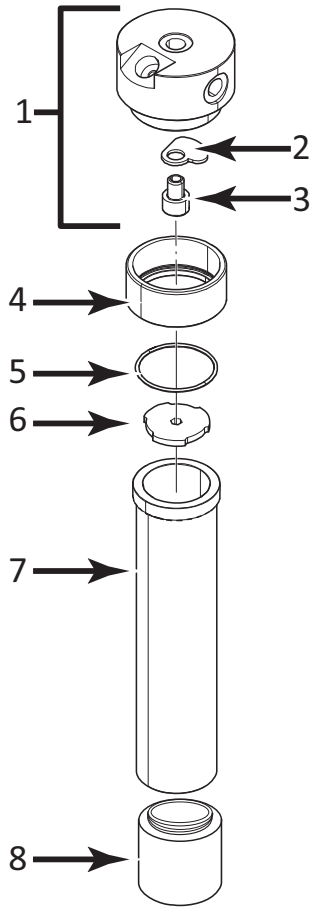
1. Unscrew and remove Knurled Nut (1)

2. Remove Washer (2) and Filter Housing (3).
3. Discard Filter Element (4) and replace with new Filter Element Bauer.
4. Reassemble in reverse order.

3.1.5 Inter-Stage Separators

Inter-stage separators are mounted on the compressor between the 2nd and 3rd stage and between the 3rd and 4th stages. These separators are designed to remove oil and water which accumulates due to the cooling of the medium after the compression process. Separation is achieved by means of centrifugal action.

Figure 3-9 Inter-Stage Separators



1. Cap	4. O-ring	7. Housing
2. Vortex Plate	5. Insert	8. Drain Adapter
3. Hollow Screw	6. Knurled Nut	

3.1.5.1 Maintenance

The Inter-stage Separator requires no maintenance.

WARNING

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

3.1.6 Cooling

The cylinders of the compressor, the Inter-stage coolers and the after cooler are air cooled. For this purpose the compressor is equipped with a fanwheel which draws the cooling air through the unit. The fanwheel is driven by the drive motor V-belt and is also used as the compressor flywheel.

3.1.6.1 Maintenance

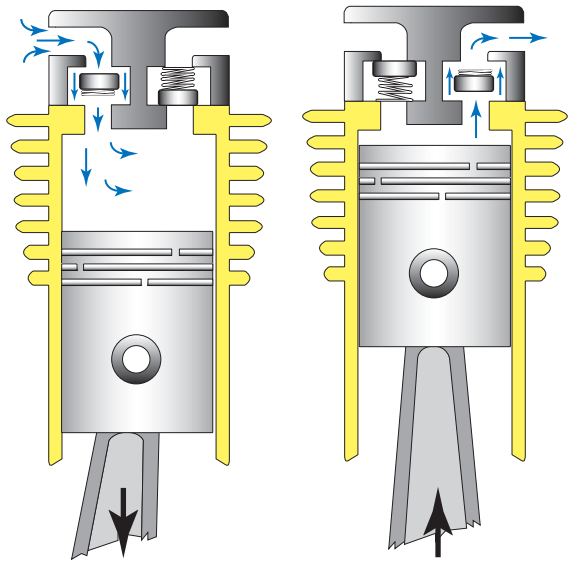
When dirty, clean the finned tubes, valve heads and cylinders by blowing off the dirt and dust with low pressure compressed air (80 -125 psi)

3.1.7 Compressor Valves and Heads

3.1.7.1 Functional Description

The valve heads of the individual stages form the top part of the cylinders. (See Figure 3-10).

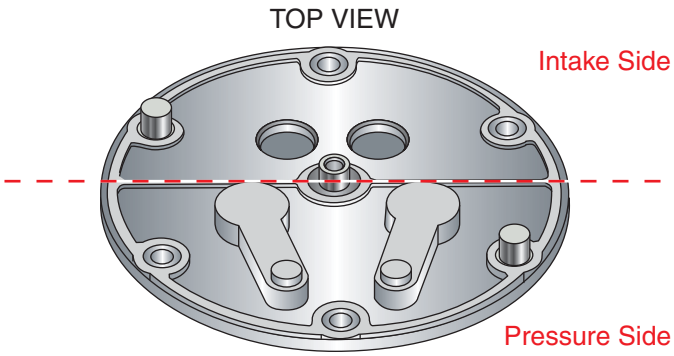
Figure 3-10 Valve Operation



The intake and pressure valves are fitted inside the valve heads. Note that the valves are operated by the flow of the medium. On the intake stroke, the intake valves open and the medium flows into the cylin-

ders. At the start of the pressure stroke the intake valve closes and the medium opens the pressure valve. The intake and pressure valve of the 1st stage are in a combined plate valve under the valve head. (See Figure 3-11).

Figure 3-11 1st Stage Valve Operation



3.1.7.2 General Instructions for Changing the Valves

- Always replace valves as a complete set.
- Carefully clean dirty valves. Never use a sharp tool for this purpose. Soak the valves in Varsol and clean with a soft brush.
- Check the individual components for excessive wear. If the valve seat or valve discs are dented, replace the valves.
- Check the valve space in the valve heads for dirt, and clean if necessary.
- Use only satisfactory gaskets and O-rings during reassembly.
- Observe the correct sequence when reassembling.
- After finishing all maintenance work on the valves, turn the compressor manually using the flywheel and check whether all items have been correctly installed.
- 30 minutes after restarting the compressor, stop the unit, let it cool down to ambient temperature, and retighten valve studs and cap nuts. Otherwise the gasket set may cause a leak.
- Remove and check the valves every 1,000 operating hours, unless otherwise specified.
- Replace the valves every 2,000 operating hours to avoid fatigue failure, unless otherwise specified.

3.1.7.3 Changing the IK12.14 II 1st Stage Valves

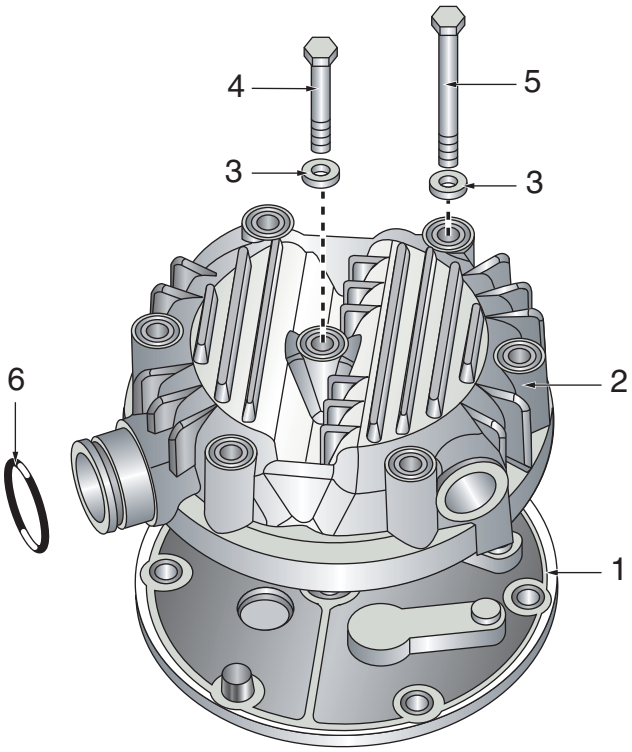
3.1.7.3.1 Removal

See Figure 3-12 and proceed as follows:

1. Remove all tubing connections and lines from the Valve Head (2).
2. Remove Hex Head Bolts (4) and Washers (3)
3. Remove the Plate Valve (1).
4. Clean Plate Valve, preferably in a ultrasonic cleaner, and check for damage.

5. Replace worn or damaged parts.
6. Check the underside of the Valve Head for flatness using a precision straightedge. If necessary use an emery cloth to smooth out the surface.

Figure 3-12 1st Stage Valve Head and Valves



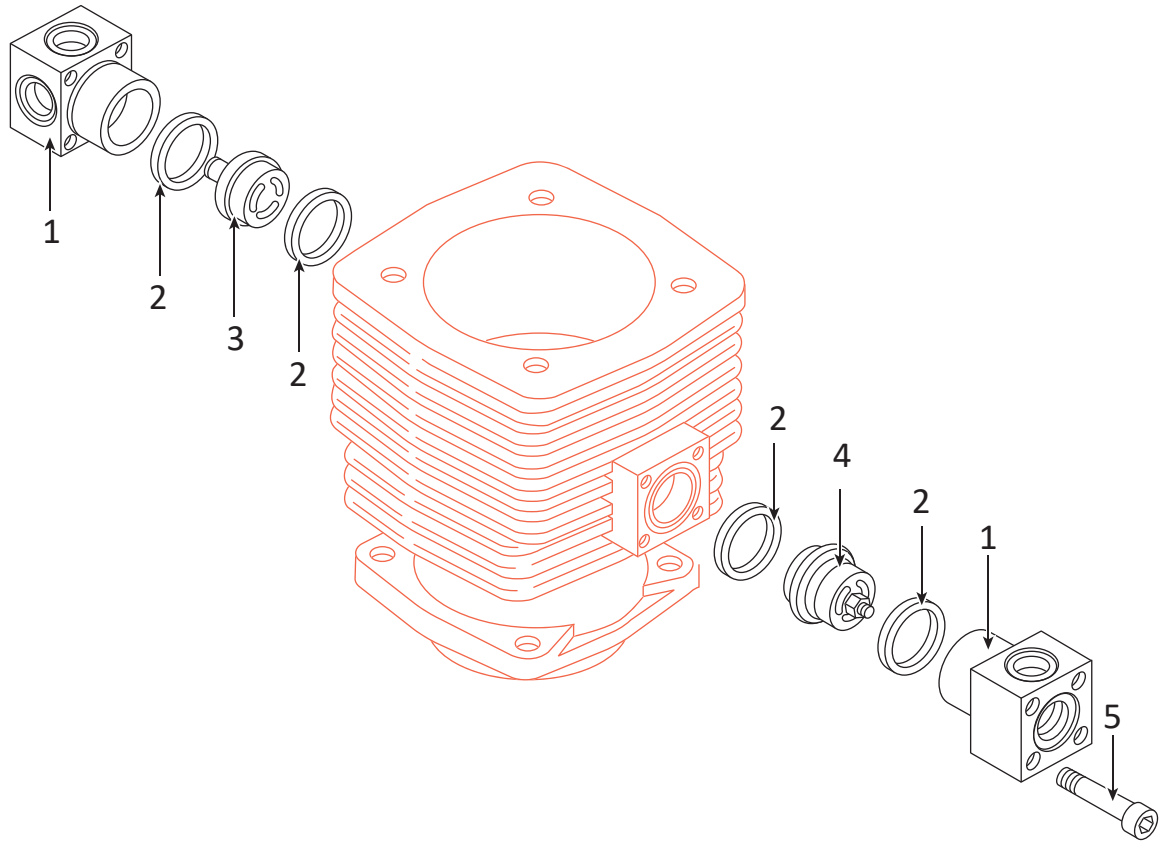
1. Plate Valve	4. Plate Valve Bolt
2. Valve Head	5. Hex Head Bolts
3. Washer	6. O-ring

3.1.7.3.2 Reassembly
See Figure 3-12.

1. Replace the Plate Valve ensuring that the side marked TOP is really at the top and the stamped “S” is on the intake side.
2. Place the Valve Head (2) on the cylinder and secure it with the Washers (3) and Hex Head Bolts (4). Tighten these Bolts. (Refer to the torque table in the Appendix.)
3. Reconnect all tubing connections and lines to the Valve Head (2).

3.1.7.4 Changing the 2nd Stage Valves

Figure 3-13 2nd Stage Valves

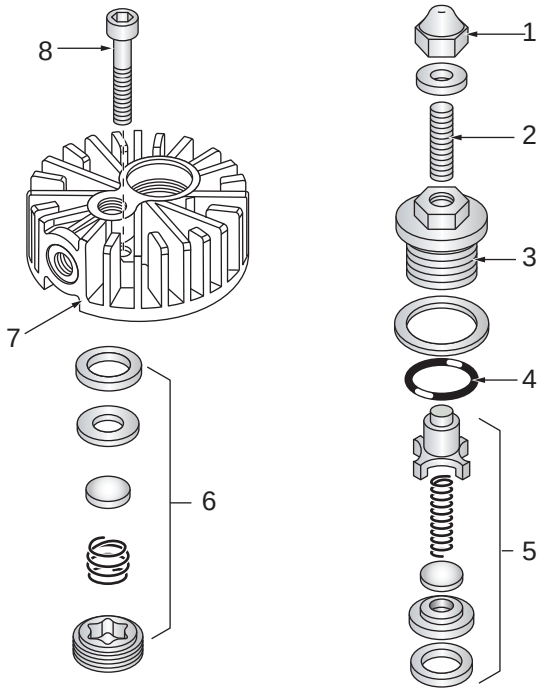


1. Manifold 2. Gasket 3. Intake Valve	4. Pressure Valve 5. Allen Screw

See Figure 3-13 and proceed as follows:

1. Remove the lines from the intake and pressure manifolds (1).
2. Remove the Allen Screws (5).
3. Remove gaskets (2) and replace with new ones.
4. Clean intake valve (3) and pressure valve(4) and check for wear or damage.
5. Reassemble in reverse order of above.

Figure 3-14 3rd Stage Valve Head and Valves



1. Cap Nut	5. Pressure Valve
2. Stud	6. Intake Valve
3. Pressure Plug	7. Valve Head
4. O-ring	8. Allen Screw

3.1.7.5 Changing the 3rd Stage Valves

3.1.7.5.1 Removal

See Figure 3-14 and proceed as follows:

1. Remove the intake and pressure lines from the valve head (7).
2. Remove the Allen Screws (8) holding the valve head onto the cylinder.
3. Replace two of the screws with two 8 mm diameter metal pins of any length.
4. Use these pins as a holding fixture by securing them in a vise with the valve head on top.
5. Using the special valve tool, remove the intake valve (6) (See Figure 3-15).
6. Turn the valve head over and replace it on the metal pins.
7. Remove the cap nut (1) and unscrew the stud (2) approximately five turns.
8. Remove the pressure plug (3) and take out the valve parts.
9. Clean the intake and pressure valves and check for wear and damage
10. Clean the valve head. check that the intake and pressure valve bores are in perfect condition.
11. Using a precision straightedge, check that the underside of the valve head is flat. If necessary use an emery cloth to smooth out the surface.

Figure 3-15 Using the Special Valve Tool

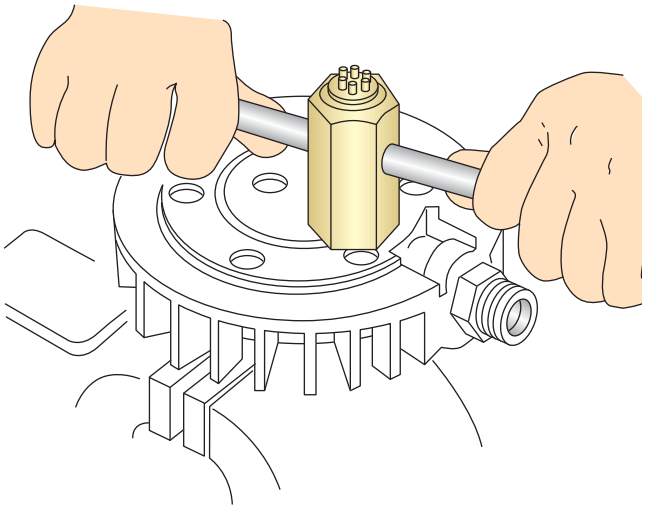
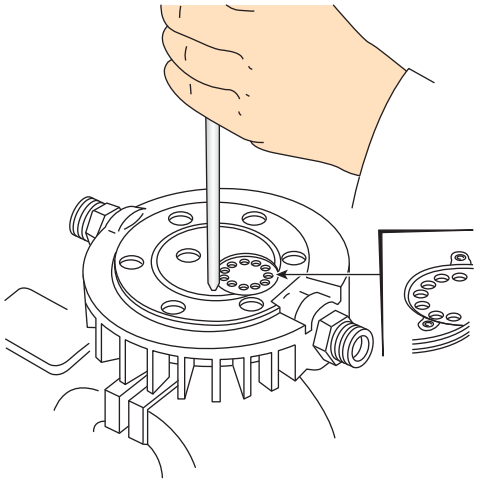


Figure 3-16 Securing the Intake Valve



NOTICE

Valve seats and plate valves must not show any signs of wear or damage. Replace damaged or worn parts.

3.1.7.5.2 Reassembly.

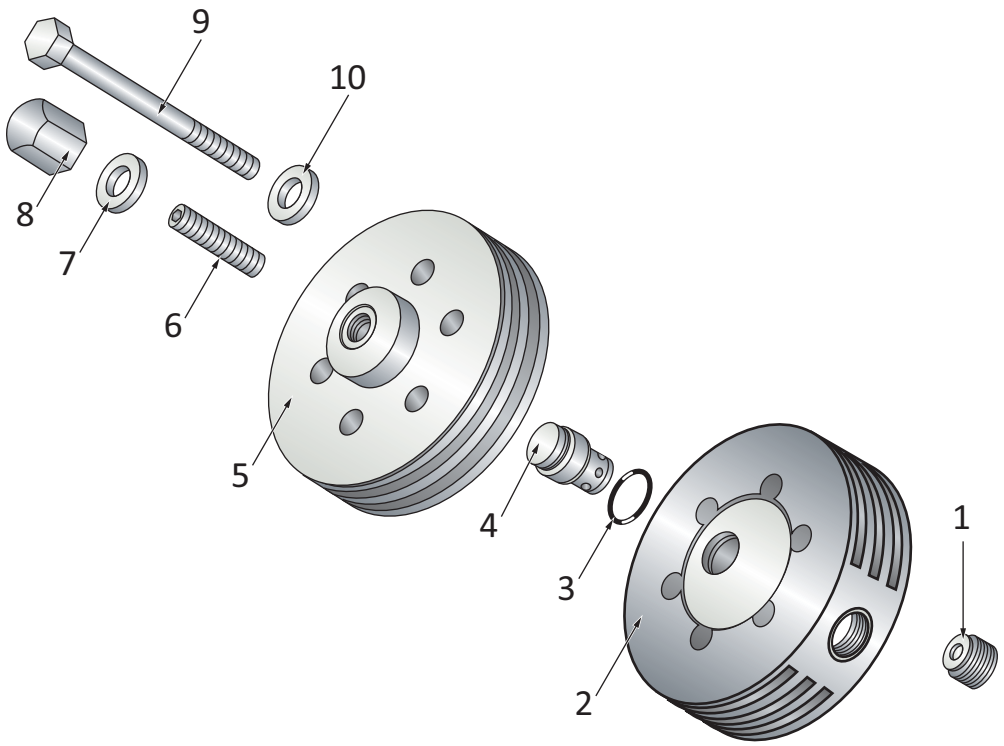
1. Replace the intake valve (6) using the special tool to tighten it.

CAUTION

The intake valve plate and valve spring must not be jammed.

2. Check the intake valve functions correctly by blowing compressed air through the valve in the direction of flow.
3. Secure the intake valve by peening the valve head aluminum over the screw-in thread of the intake valve in two places opposite one another. Use a small drift pin, approximately 5 mm in diameter. (See Figure 3-16).
4. Insert the O-ring (4) and the pressure valve parts(5).
5. Check the pressure valve function and stroke by lifting the valve parts.
6. Ensure the stud (2) is unscrewed, then screw in the pressure plug (3)and tighten.
7. Screw the stud (2) in firmly, fit a new gasket and secure it with the cap nut (1).
8. Replace the valve head (7) on the cylinder and secure it with the screws (8).
9. Reconnect the intake and pressure lines.

Figure 3-17 4th Stage Valve Head and Valves



1. Intake Valve	6. Stud
2. Valve Head	7. Gasket
3. O-ring	8. Cap Nut
4. Pressure Valve	9. Gasket
5. Valve Head Cover	10. Bolt

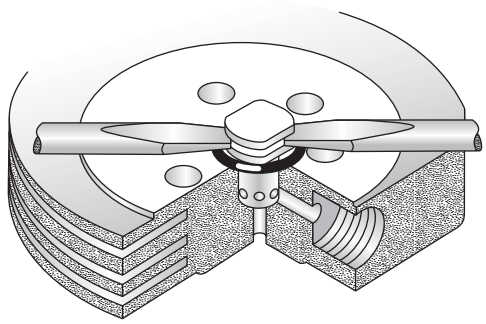
3.1.7.6 Changing the 4th Stage Valves

3.1.7.6.1 Removal

See Figure 3-17 and proceed as follows:

1. Remove the intake and pressure lines from the valve head (2).
2. Remove the cap nut (8) and loosen stud (6) three or four turns.
3. Remove the bolts (9) holding the valve head onto the cylinder and take off valve head cover (5).
4. Remove the pressure valve by putting two screwdrivers into the removal groove of the pressure valve body. See Figure 3-18. It may be necessary to loosen the valve body first by turning it with a 13 mm wrench used on the flat surfaces.
5. Insert two 8 mm diameter metal pins, any length, in the holes in the valve head and secure them in a vise with the valve head on top of the vise. The intake valve should be facing up.
6. Using the special valve tool (See Figure 3-15), remove the intake valve (1).

Figure 3-18 Removing the 4th Stage Pressure Valve



3.1.7.6.2 Reassembly

1. Replace the intake valve (1) using the special valve tool to tighten it.
2. Check the intake valve functions correctly by blowing compressed air through the valve in the direction of flow.
3. Reinstall the pressure valve (4) by putting O-ring (3) into valve head (2). Check it for abrasions.
4. Insert pressure valve through O-ring and into valve bore.
5. Put on valve head cover (5).
6. Reassemble valve head cover and valve head to cylinder. Torque bolts (9) to the proper value.
7. Screw in stud (6). Put on gasket (7). Screw on cap nut. (8).

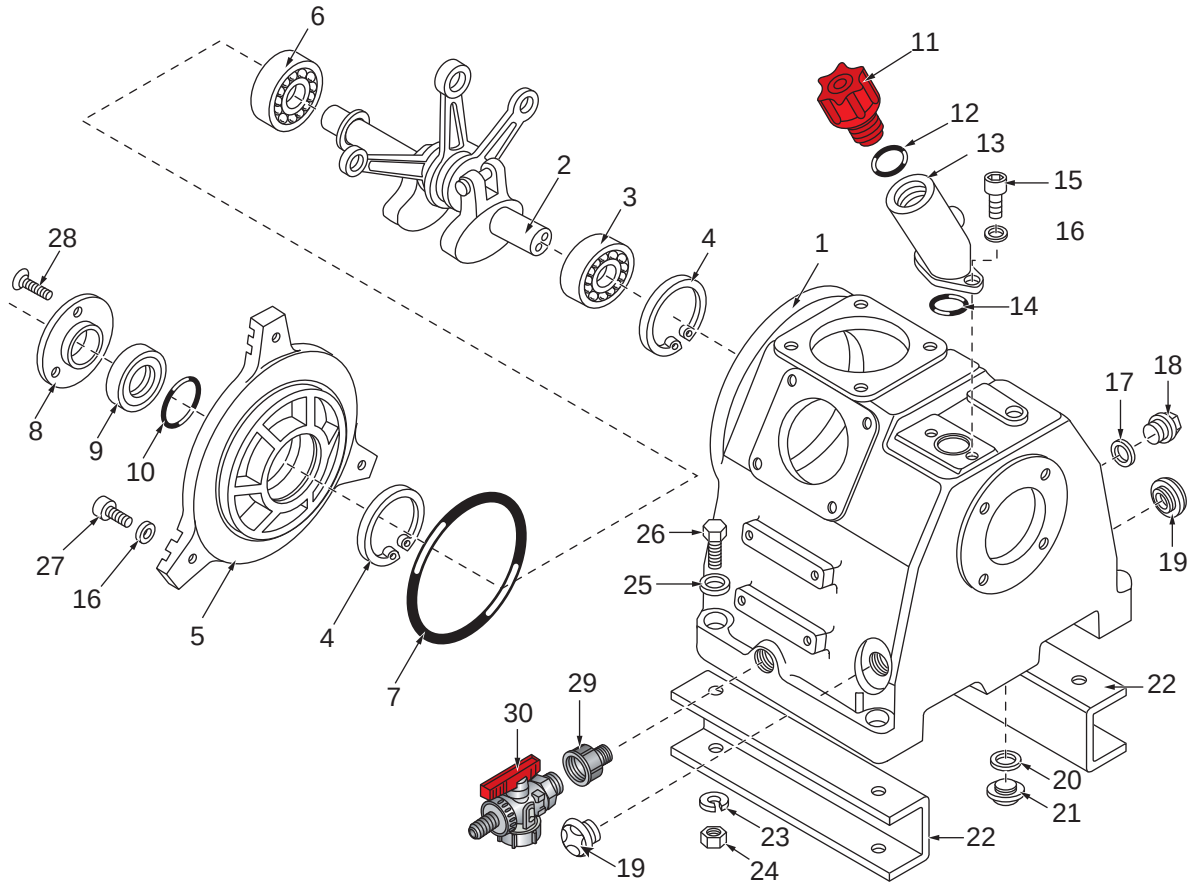
Table 3-1: Maintenance Interval Tasks

Every Year or 500 Hours for Breathing Air Compressors; Every Year or 1,000 Hours for Industrial Compressors
Clean Separators, Empty Condensate Tank
Exchange Intake Filter
Perform Leak Test and Visual Inspection
Electrical Terminals must be Tightened at Each Maintenance
Change Gaskets, Seals and O-Rings Included in Maintenance Kit
Check Pressure Vessels, Record Number of Load Cycles
Check Settings for Pressure Switches and Pressure Relief Valves
Check Pressure Maintaining Valves, Adjust as Needed
Change Final Separator Filters
Change Filter / Dryer Cartridges as Needed
Check V-Belts and Fanwheel/ Fan Blades
Check Piston & Sleeve Assembly of Final Stage
Check Function of Automatic Condensate Drain
Change Oil and Oil Filter
Check Pressure and Suction Valves
Check Tightness of Safety Valves
Check Intermediate Pressures and Oil Pressure
Function Test, Final Inspection, Test Run
Every 2 Years or 1,000 Hours for Breathing Air Compressors; Every 2 Years or 2,000 Hours for Industrial Compressors
Change all Pressure and Suction Valves
Test or Replace Safety Valves
Change Piston & Sleeve Assembly of Final Stage

Table 3-1: Maintenance Interval Tasks (Continued)
Every 4 Years or 2,000 Hours for Breathing Air Compressors; Every 4 Years or 4,000 Hours for Industrial Compressors
Check Temperature Sensors, Replace if Required
Change Fan Belts (if applicable)
Check cylinders, pistons and piston rings
Replace Drive Belt(s)

3.1.8 Replacement Parts List

Figure 3-19 Crankcase Assembly

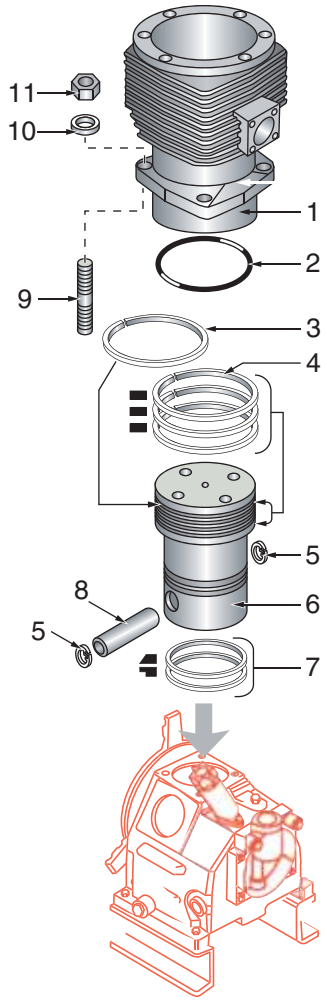


#	KIT	Qty	Part No.	Description	Notes
♦		1	076743	Crankcase assembly	
1	…	1	076740	Crankcase	
2	…	1	177906	Crankshaft, complete	
3	…	1	N2638	Roller Bearing	
4	…	2	N2635	Circlip	
5	…	1	66209	Bearing Cap	
6	…	1	N15406	Roller Bearing	
7	…	1	N15265	O-ring	
8	…	1	66684	Cover	
9	…	1	N170	Shaft Seal	
10	…	1	N3745	O-ring	
11	…	1	61054	Plug	
12	a..	1	N15412	O-ring	
13	…	1	73830	Oil Filling Pipe	

Figure 3-19 (cont.) Crankcase Assembly

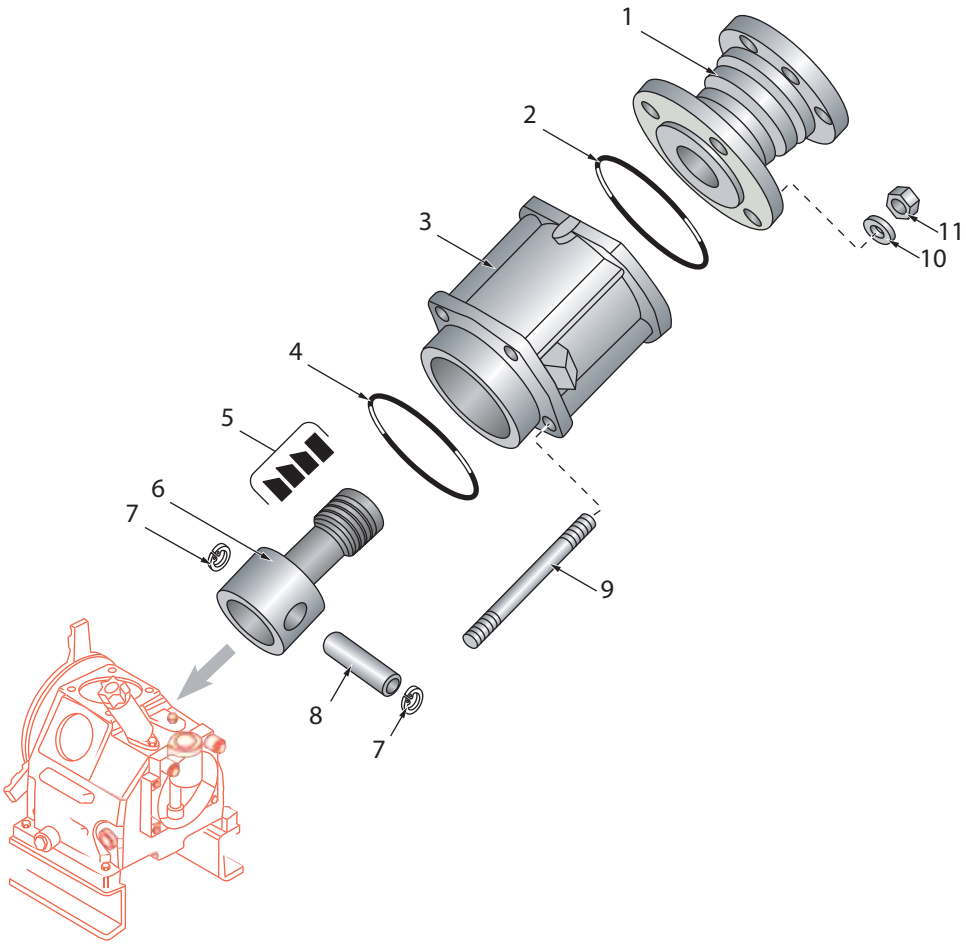
#	KIT	Qty	Part No.	Description	Notes
14	…	1	N4776	O-ring	
15	…	2	SCR-0020	Allen Screw	
16	…	8	WAS-0021	Washer	
17	…	2	N4261	Gasket	
18	…	2	N2796	Plug	
19	…	2	N25475	Oil Sight Gauge	
20	a..	1	N1316	Gasket	
21	…	1	N4570	Plug	
22	…	2	78038	Support	
23	…	4	WAS-0030	Spring Washer	
24	…	4	NUT-0076	Hex Nut	
25	…	4	WAS-0031	Washer	
26	…	4	N350	Hex Head Screw	
27	…	6	SCR-0113	Hex Head Screw	
28	…	3	N19487	Countersunk Screw	
29	…	1	N2375	Coupling	
30	…	1	N25638	Ball Valve	*oil drain valve*

Figure 3-20 1st/2nd Stage Piston and Cylinder



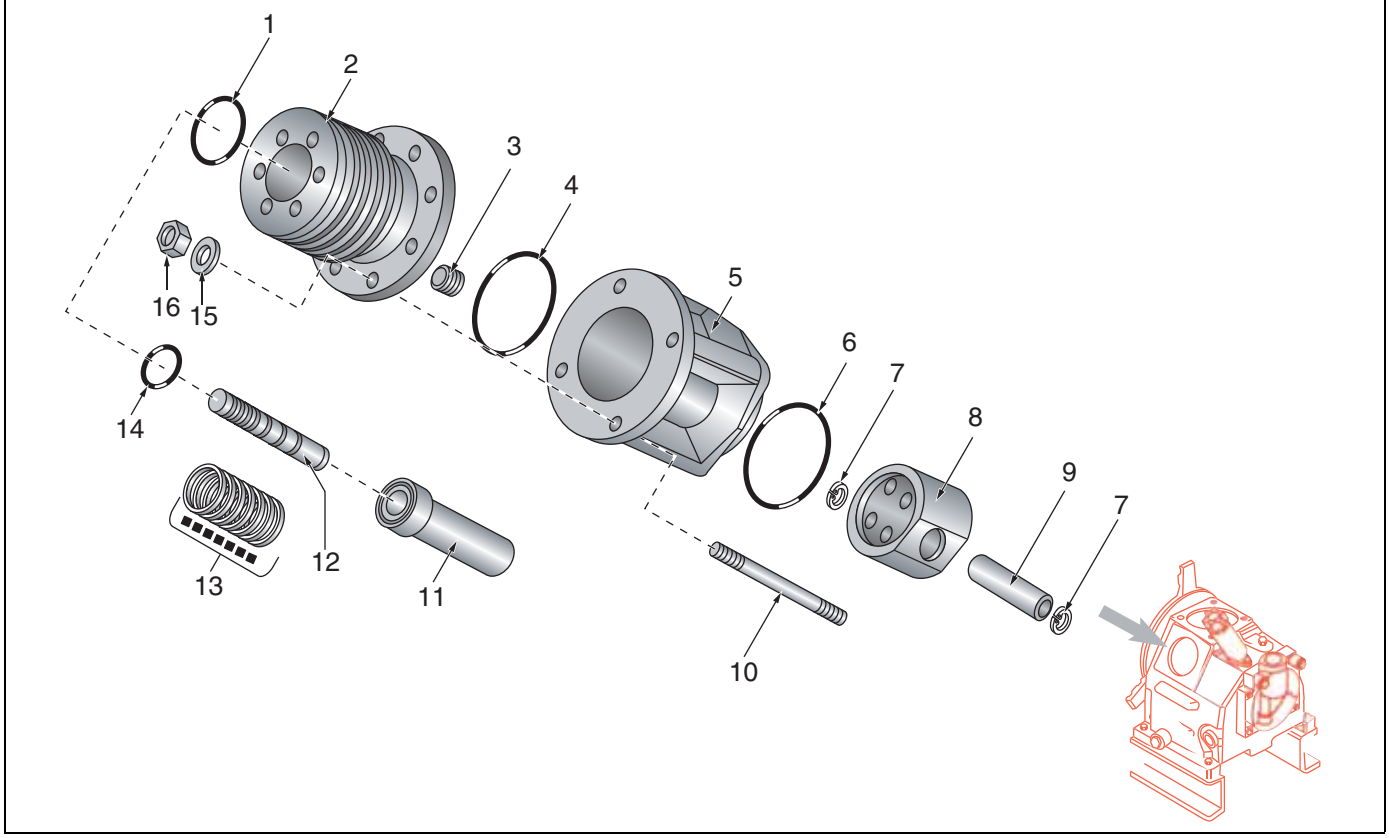
#	KIT	Qty	Part No.	Description	Notes
♦		1	84240	1st/2nd Stage Cylinder Assembly	
1	…	1	80729	Stepped Cylinder	
2	..c	1	N4654	O-ring	
♦		1	84238	Piston Assembly	Item 3 - 8
3	…	1	N28554	Guide Ring	
4	…	1	N25842	Piston Ring Set, 1st Stage	
5	…	2	N484	Circlip	
6	…	1	84212	Stepped Piston	
7	…	1	N25396	Piston Ring Set, 2nd Stage	
8	…	1	N1216	Piston Pin	
9	…	4	N215	Stud	
10	…	4	WAS-0021	Washer	
11	..c	4	NUT-0119	Self Locking Hex Nut	

Figure 3-21 3rd Stage Piston and Cylinder



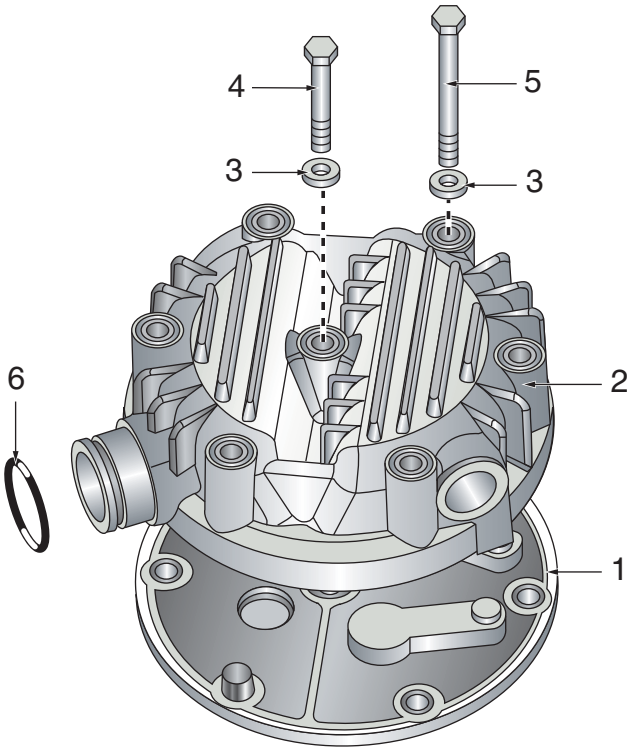
#	KIT	Qty	Part No.	Description	Notes
♦		1	178035	3rd Stage Cylinder Assembly	
1	…	1	67940	Cylinder	
2	..c	1	N7063	O-ring	
3	…	1	83404	Guide Cylinder	
4	..c	1	N2640	O-ring	
♦		1	178032	Piston Assembly	Items 5 - 8
5	…	1	N19833	Piston Ring Set	
6	…	1	67942	Piston	
7	…	2	N484	Circlip	
8	…	†	—	Piston Pin	Available only with 178032
9	…	4	N2790	Stud	
10	…	4	WAS-0021	Washer	
11	..c	4	N370	Self Locking Hex Nut	

Figure 3-22 4th Stage Piston and Cylinder



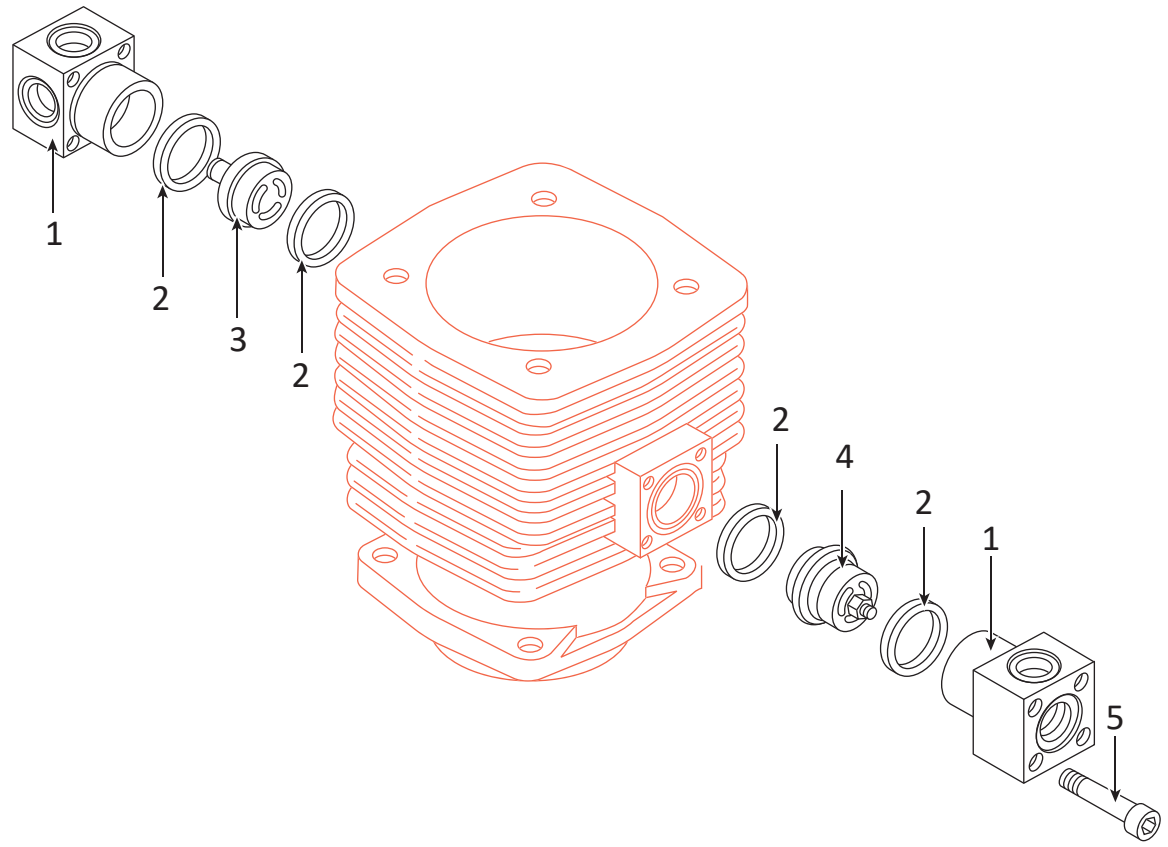
#	KIT	Qty	Part No.	Description	Notes
♦		1	178050	4th Stage Cylinder Assembly	
1	a..	1	N4868	O-ring	
2	…	1	082480	Cylinder	
3	…	1	N27318	Screw	
4	..c	1	N7063	O-ring	
5	…	1	083404	Guide Cylinder	
6	..c	1	N2640	O-ring	
♦		1	178045	Guide Piston Assembly	Items 7 - 9
7	…	2	N484	Circlip	
8	…	1	—	Guide Piston	Available only with 178045
9	…	1	—	Piston Pin	Available only with 178045
10	…	4	N2790	Stud	
♦		1	078045	Piston and Sleeve Assembly	Items 11 - 14
11	…	†	—	Piston Sleeve	Available only with 078045
12	…	†	—	Piston Pin	Available only with 078045
13	…	1	N23810	Piston Ring Set	
14	a..	1	N23755	O-ring	
15	..c	4	NUT-0119	Self Locking Hex Nut	
16	…	4	WAS-0021	Washer	

Figure 3-23 1st Stage Valve Head and Valve



#	KIT	Qty	Part No.	Description	Notes
♦		1	083652	1st Stage Valve Head Assembly	
1	…	1	N26531	Plate Valve	
2	…	1	080677	Valve Head	
3	…	7	N102	Washer	
4	…	1	N26646	Hex Head Screw	
5	…	6	N26568	Hex Head Screw	
6	a..	1	N1539	O-ring	

Figure 3-24 2nd Stage Valves and Valve Head



#	KIT	Qty	Part No.	Description	Notes
♦		1	073435	Valve Head, 2nd Stage	
1	…	2	78562	Manifold	
2	a..	4	56668	Gasket	
3	.b.	1	N4067	Intake Valve	
4	.b.	1	N4068	Pressure Valve	
5	…	8	SCR-0133	Allen Screw	

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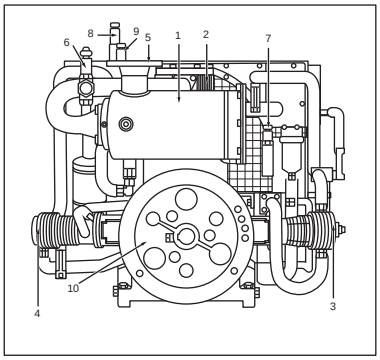
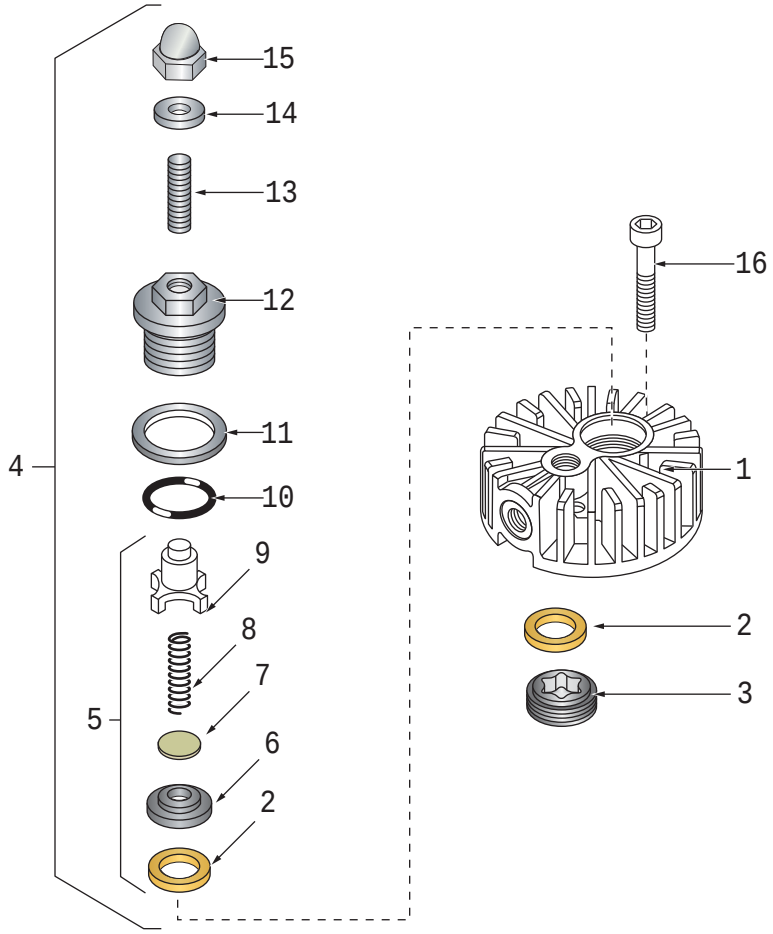


Figure 3-25 3rd Stage Valves and Valve Head

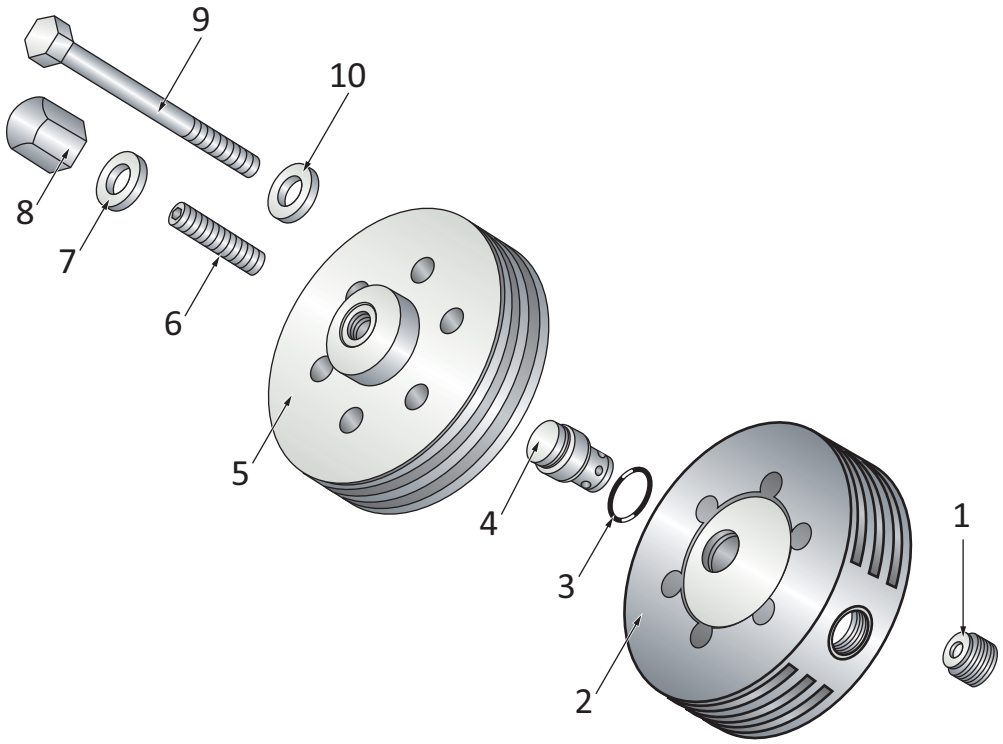


#	KIT	Qty	Part No.	Description	Notes
♦		1	069792	3rd Stage Valve Head Assembly	
1	…	1	14123	Valve Head	
2	a..	2	240	Gasket	
3	.b.	1	012836	Intake Valve	
4	…	1	014582	Pressure Valve Assembly	Items 5, & 10 - 15
5	.b.	1	012835	Pressure Valve Insert	Items 2 & 6 - 9
6	…	†	—	Valve Seat	Available only with 012835
7	…	†	—	Valve Plate	Available only with 012835
8	…	1	1026	Spring	
9	…	†	—	Valve Insert	Available only with 012835
10	a..	1	N3521	O-ring	
11	…	1	14332	Spring Washer	
12	…	1	14124	Coupling	
13	.b.	1	71064	Stud	

Figure 3-25 (cont.) 3rd Stage Valves and Valve Head

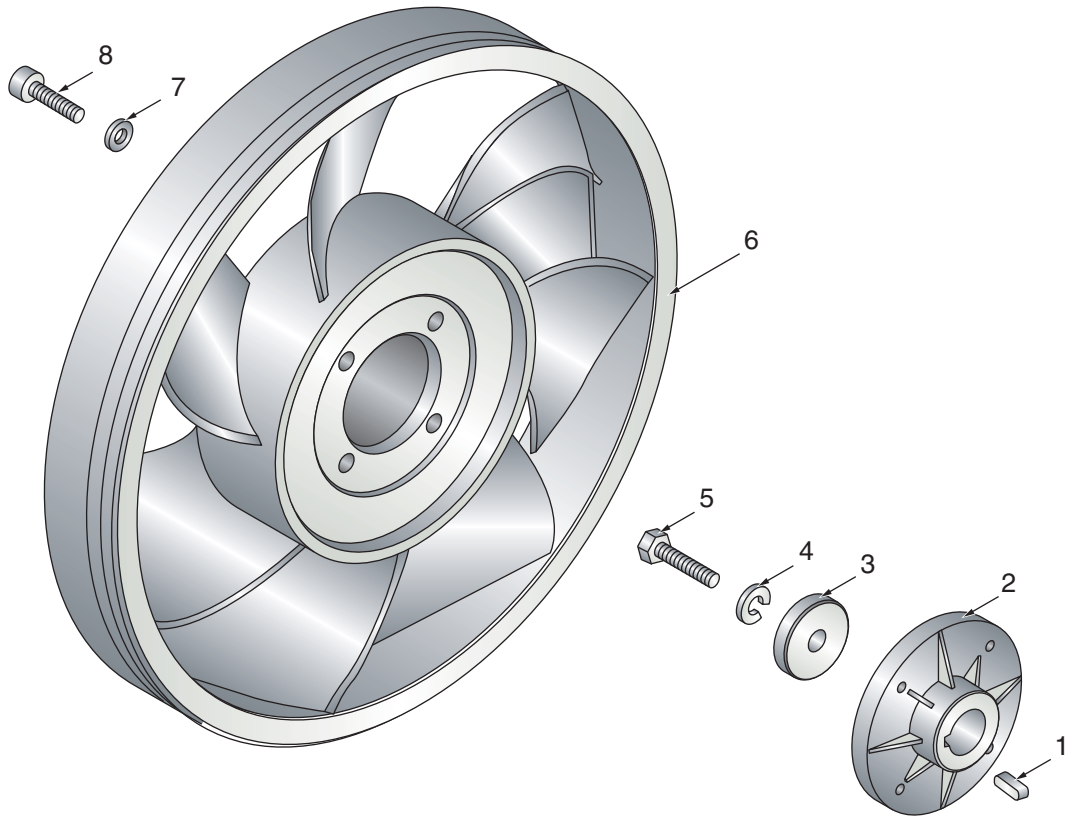
#	KIT	Qty	Part No.	Description	Notes
14	a..	1	N3625	Gasket	
15	…	1	N84	Cap Nut	
16	…	6	SCR-0180	Allen Screw	

Figure 3-26 4th Stage Valves and Valve Head



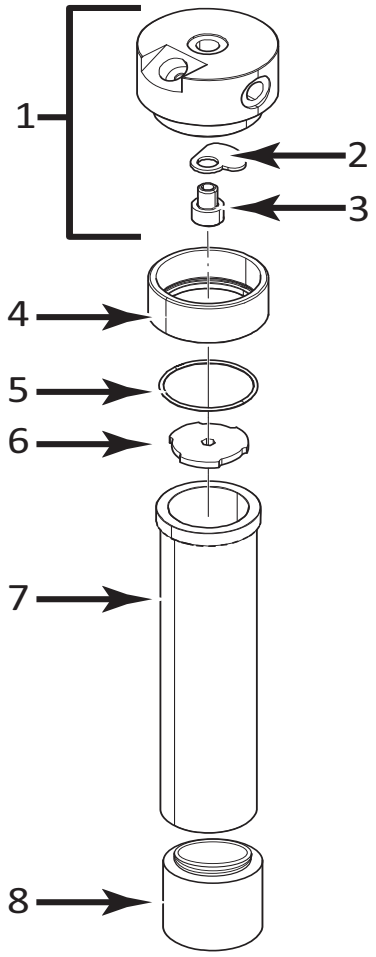
#	KIT	Qty	Part No.	Description	Notes
♦		1	082096	4th Stage Valve Head Assembly	
1	.b.	1	81409	Intake Valve	
2	…	1	82087	Valve Head	
3	a..	1	N2789	O-ring	
4	.b.	1	014121	Pressure Valve	Includes Item 3
5	…	1	82086	Valve Head Cover	
6	a..	1	124608	Stud	
7	a..	1	N3625	Gasket	
8	…	1	88609	Cap Nut	
9	…	6	N17730	Hex Head Cap Screw	
10	…	6	N58	Gasket	

Figure 3-27 Flywheel



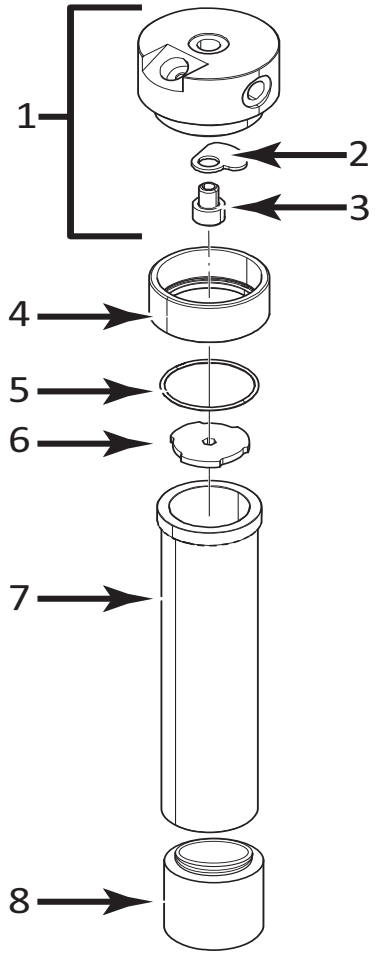
#	KIT	Qty	Part No.	Description	Notes
♦		1	082552	Flywheel Assembly	
1	…	1	N1386	Feather Key	
2	…	1	082553	Fanwheel Hub	
3	…	1	080975	Washer	
4	…	1	N176	Spring Washer	
5	…	4	N26666	Screw	
6	…	1	082496	Fanwheel	
7	…	4	N108	Spring Washer	
8	…	4	N19548	Screw	

Figure 3-28 Inter-Stage Separator, 2nd Stage



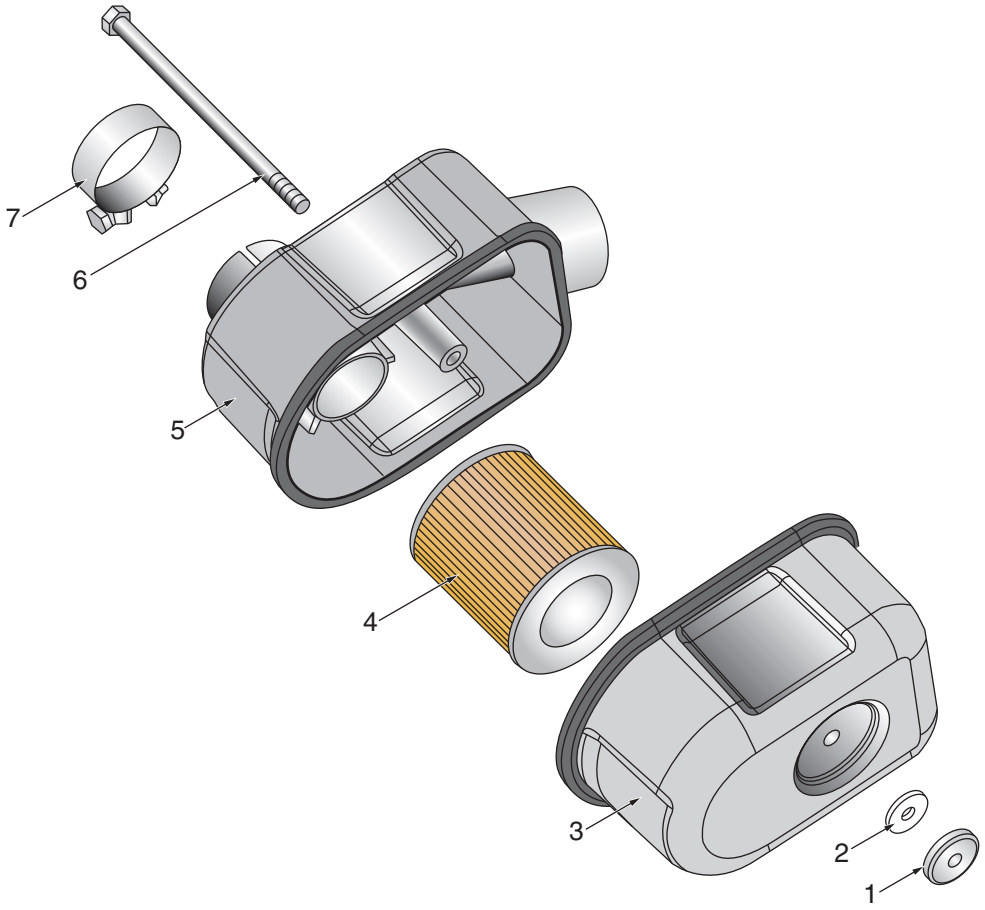
#	KIT	Qty	Part No.	Description	Notes
♦		1	172787	Inter-Stage Separator Assembly	
1	…	1	81149	Filter Head Assembly	
2	…	1	81148	Plate	
3	…	1	81643	Hollow Screw	
4	…	1	13937	Screw Cap	
5	a..	1	N3556	O-ring	
6	…	1	161781	Insert	
7	…	1	—	Housing	
8	…	1	173787-KD	Drain Adapter	for units with ACD
or	…	1	173113	Drain Adapter	for units with manual drain

Figure 3-29 Inter-Stage Separator, 3rd Stage



#	KIT	Qty	Part No.	Description	Notes
♦		1	172792	Inter-Stage Separator Assembly	
1	…	1	82264	Filter Head Assembly	
2	…	1	81148	Plate	
3	…	1	81643	Hollow Screw	
4	…	1	13937	Screw Cap	
5	a..	1	N3556	O-ring	
6	…	1	161781	Insert	
7	…	1	—	Housing	
8	…	1	173787-KD	Drain Adapter	for units with ACD
or	…	1	173113	Drain Adapter	for units with manual drain

Figure 3-30 Intake Filter



#	KIT	Qty	Part No.	Description	Notes
♦		1	79577	Intake Filter Assembly	
1	…	1	N4870	Knurled Nut	
2	…	1	N3313	Washer	
3	…	1	79574	Filter Housing, Front	
4	a..	1	N25950	Filter Element	
5	…	1	79575	Filter Housing, Back	
6	…	1	N19502	Hex Head Bolt	
7	…	1	N3374	Clamp	

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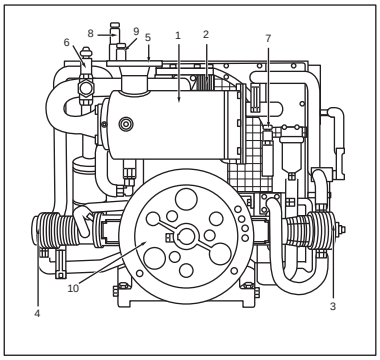
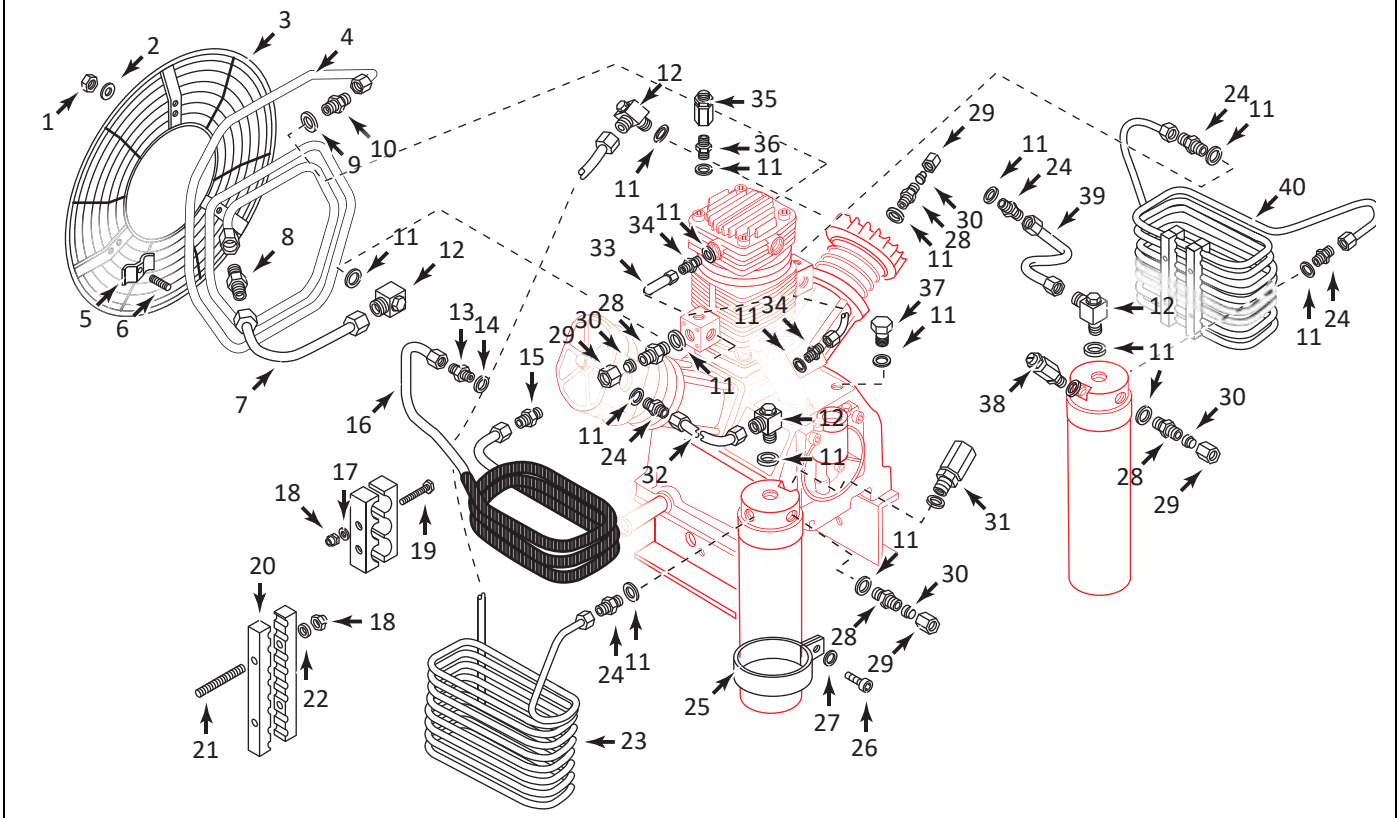


Figure 3-31 Cooling System

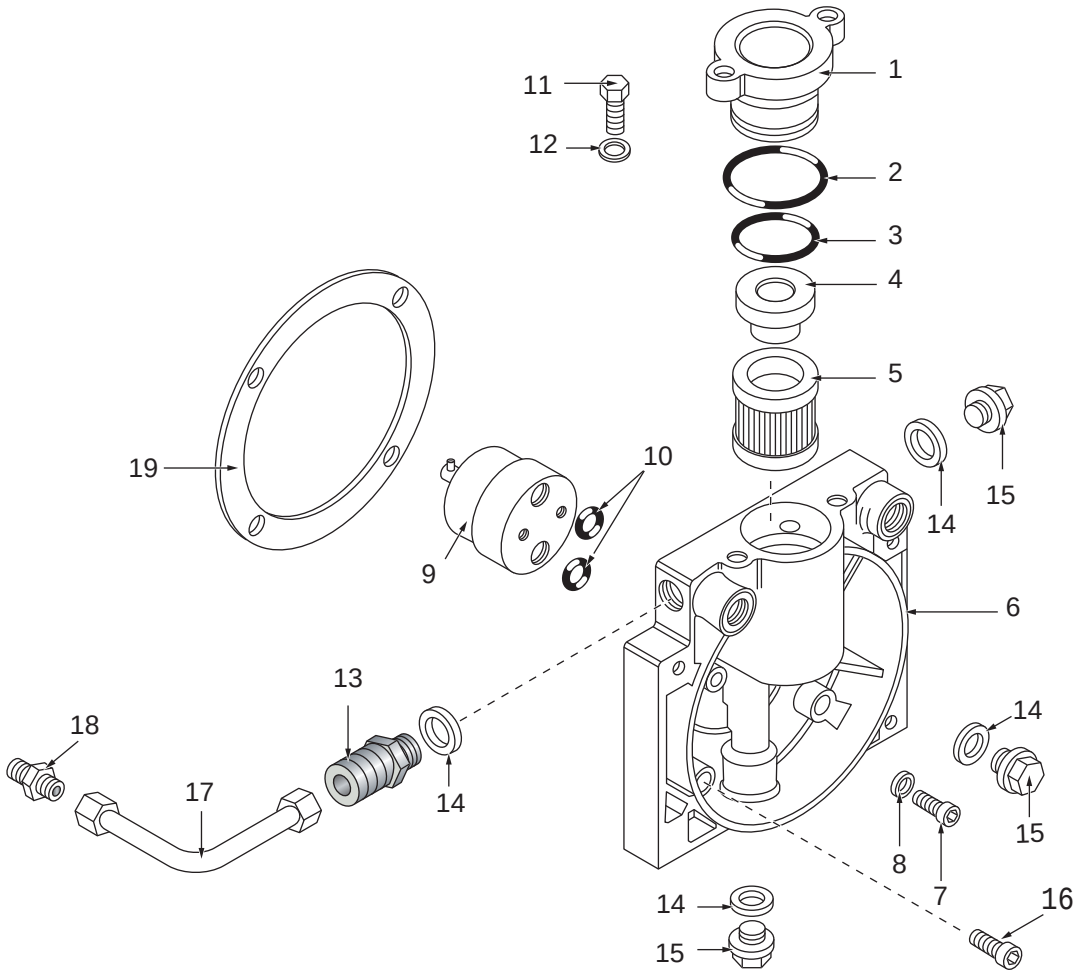


#	KIT	Qty	Part No.	Description	Notes
♦		1	81607	Cooling System Assembly	
1	…	3	N370	Hex Nut Self-Locking	
2	…	3	N58	Washer	
3	…	1	078200	Fan Guard	
4	…	1	081303	1st - 2nd Stage Inter-cooler	
5	…	3	011887	Double Strap Bracket	
6	…	3	078199	Stud	
7	…	1	078584	Connecting Tube	
8	…	1	N20202	Straight Male Reducer	
9	…	1	N293	Gasket	
10	…	1	N20231	Straight Male Connector	
11	…	18	N1316	Gasket	
12	…	4	N26751	Connector, Banjo Fitting	
13	…	1	071148	Straight Male Connector	
14	…	1	056983	Gasket	
15	…	1	N20208	Straight Male Connector	
16	…	1	078301	Aftercooler	
17	…	4	N03313	Washer	

Figure 3-31 (cont.) Cooling System, IK12.14 II

#	KIT	Qty	Part No.	Description	Notes
18	…	12	N1042	Hex Nut, Self-Locking	
19	…	4	N3498	Hexagon Screw	
20	…	16	062773	Tube Clamp	
21	…	16	N03494	Stud	
22	…	8	WAS-0024	Washer	
23	…	1	078195	3rd - 4th Stage Inter-cooler	
24	…	5	N20059	Straight Male Connector	
25	…	4	077894	Clamp	
26	…	4	N19506	Hexagon Screw	
27	…	4	N02460	Washer	
28	…	4	N20195	Straight Male Connector	
29	…	4	N3610	Screw Cap	
30	…	4	N04530	Plug	
31	…	1	122787	Safety Valve, 3rd Stage	100 bar, *includes gasket*
32	…	1	078352	Connecting Tube	
33	…	1	081306	Connecting Tube	
34	…	2	N20014	Male Connector	
35	…	1	81801	Safety Valve, 1st Stage	5 bar, *includes gasket*
36	…	1	N20201	Straight Male Connector	
37	…	1	N00052	Plug	
38	…	1	81810	Safety Valve, 2nd Stage	24 bar, *includes gasket*
39	…	1	078300	Connecting Tube	
40	…	1	80696	Inter Cooler Assembly	

Figure 3-32 Lubrication System



#	KIT	Qty	Part No.	Description	Notes
♦		1	83417	Lubrication System Assembly	
♦		1	081075	Lubricating System	Items 1 - 15
1	…	1	77885	Oil Filter Cover	
2	…	1	N04058	O-ring	
3	…	1	N25327	O-ring	
4	…	1	77774	Rubber Gasket	
5	…	1	N25326	Filter Element	
6	…	1	77878	Oil Pump Cover	
7	…	2	N634	Allen Screw	
8	…	2	N2889	Gasket	

Figure 3-32 (cont.) Lubrication System

#	KIT	Qty	Part No.	Description	Notes
9	…	1	N24585	Gear Pump	
10	…	2	N3489	O-ring	
11	…	2	N19506	Hex Head Screw	
12	…	2	N58	Washer	
13	…	1	81050	Regulating Valve	
14	…	4	N1316	Gasket	
15	…	3	N52	Plug	
16	…	4	N19551	Allen Screw	
17	…	1	83420	Connecting Tube Assembly	
18	…	1	N20237	Male Connector	
19	…	1	78421	Gasket	

3.1.9 Troubleshooting

Preventive maintenance usually involves replacing the valves, gaskets, and sealing rings.

3.1.9.1 Troubleshooting Table

Trouble	Cause	Remedy
No oil pressure	1. Low oil level	1. Check oil level.
Oil foam in crankcase	1. Last stage piston worn 2. Last stage pressure valve defective	1. Operate compressor with final stage valve head removed. If oil flows continuously out of cylinder, replace piston and sleeve. 2. Replace last stage valves.
Compressor output insufficient	1. Condensate drain valves or fittings leaking. 2. Premature opening of final safety valve. 3. Piston rings worn 4. Excessive piston clearance 5. Pipes leaking	1. Tighten and reseal. 2. Replace. 3. Replace. 4. Replace. 5. Tighten.
Safety valves between stages releasing pressure	1. Inter-stage pressure too high 2. Valves not closing properly	1. Service and clean valves. 2. Service and clean valves.
Compressor running too hot.	1. Insufficient supply of cooling air 2. Intake or outlet valve not closing properly 3. Wrong direction of rotation.	1. Check location for adequate ventilation 2. Check and clean valves, replace as necessary 3. Check arrow on compressor and correct accordingly.
Oil residue in delivered air	1. Improper maintenance of filters, purifier cartridge saturated. 2. Wrong oil type	1. Service filters, change purifier cartridge. 2. Change to proper oil and clean valves.
Compressor rotates in wrong direction	1. Electrical phases not connected properly	1. Reverse two of the three phase leads at the switch box. Do NOT change the leads at the motor terminal.

3.1.9.2 Repair Instructions

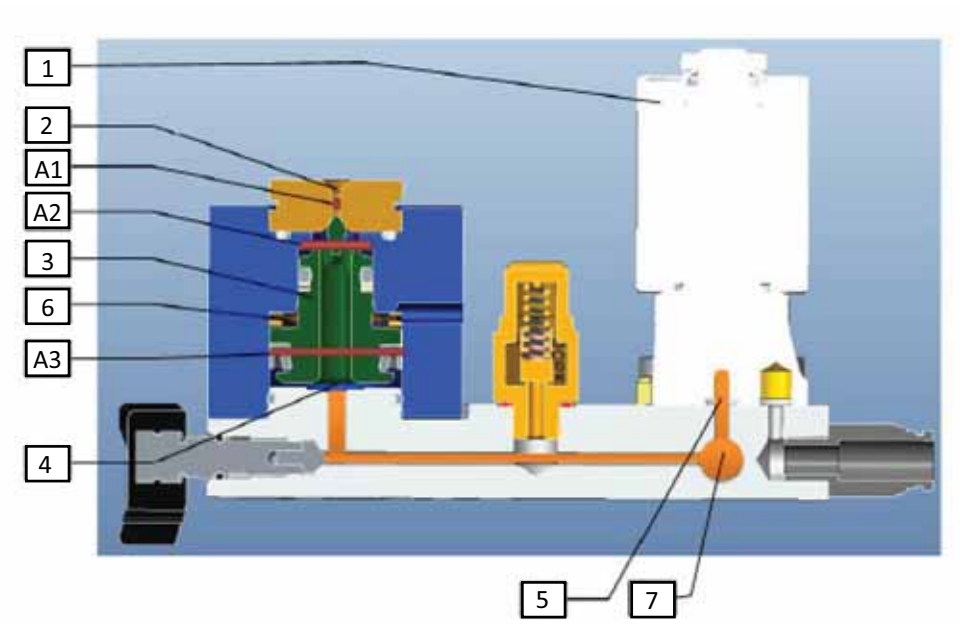
Repair work can be carried out on the compressor block to a certain extent but a certain level of experience and skill is necessary. It should be noted however that no repair should be carried out on the crankshaft nor on the bearings. Also safety valves are not repaired but always replaced.

CHAPTER 4: B-DRAIN

4.1 Description

The B-drain system is intended for condensate drainage in conjunction with intermediate separators, final separators and filter systems which are specifically designed for this purpose. The condensate drain valve is the centerpiece of the B-drain system and works as follows:

Figure 4-33 Drain Valve



The condensate drain valve acts as a pressure regulator (See Figure 4-33), i.e. a high operating pressure of up to 7,975 psi in the condensate separator (2) is reduced to a lower pilot pressure (7) of 29 - 130 psi.

The solenoid (1) is closed during operation and opened for condensate drainage and when switching the compressor off. When the compressor is started (system depressurized), the piston (3) is at the base of the container (4) (lower dead-point position). As a result, the condensate drain valve is open. The solenoid (1) is closed.

As the compressor pressure builds, the pilot pressure beneath the piston (4) also builds. This results in the piston (3) being pushed up due to the area ratio and the condensate drain valve closing.

To drain the condensate, the solenoid (1) is opened (open with zero current). This causes the pilot pressure (7) to drop and the piston (3) is pushed down due to the operating pressure on the area A1 and the spring force (6). The condensate now flows over the piston (3) and through the solenoid out of the condensate drain valve. There is a metering valve (5) in the solenoid (1) which brings about an increase in the pilot pressure. This pilot pressure closes the piston (3) to the point where a balance of forces is achieved. To a large extent, the outflow pressure of the condensate or the compressed air is degenerated by the operating pressure.

At the end of the condensate drainage process (time-controlled), the solenoid (1) is closed again. This causes the pilot pressure (5) to build until the condensate drain valve is closed.

According to this somewhat simplified description, the pilot pressure upon drainage and closing should be the same. This is not the case, as other influences such as friction, flow forces, impurities in the seat, tolerances mean that the pilot pressure upon closing is always higher than the pilot pressure when the condensate is drained.

Increased pilot pressure indicates that there are defects in the valve seat or valve piston in the form of furrows or nicks or there is dirt at the sealing point between the valve seat and valve piston. Differences in the shape and position of the valve seat and valve piston, caused by tolerances, can lead to leaks if the valve seat and valve piston do not fit together sufficiently. If the valve seat (2) is not properly sealed off by the valve piston (3), compressed air from the separator flows continuously into the condensate drain valve. This causes a constant increase in the pilot pressure (5) if the solenoid is closed, which could , in theory, climb to the operating pressure of the separator (2). For safety reasons, a safety valve was integrated into the lower section of the condensate drain valve for the oil and water separators, which limits the pilot pressure to a maximum 725 psi. The condensate drain valve for intermediate separators is manufactured without a safety valve. The bursting pressure of the solenoid and the condensate drain valve is higher than 2,900 psi.

The solenoid valves are equipped with a pressure relief function, i.e. if the pilot pressure is higher than 290 psi, the seal seat on the solenoid is pushed open and condensate or air can leak into the condensate canister. If the pilot pressure returns to below 290 psi, the seal seat seals off the valve seat again. Only solenoid s with the pressure relief function described above may be used for the B-drain system because conventional solenoids become permanently jammed if the permitted pilot pressure is exceeded and can no longer be relieved or vented.

WARNING

Only solenoid valves with pressure relief function may be used for the B-drain system.

4.1.1 ACD Check

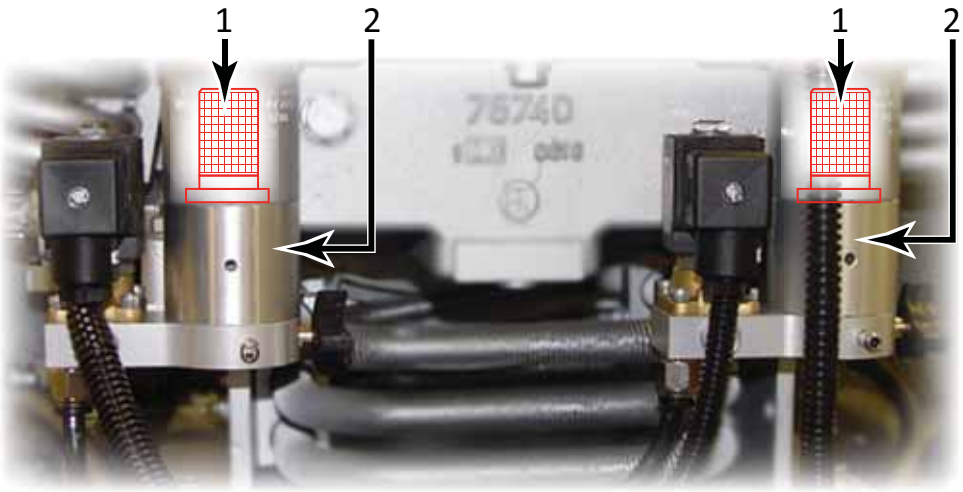
The condensate drain valve is provided with a manual drain valve to verify correct operation of the automatic system.

The automatic condensate drain system must be serviced once a week as follows:

1. Open all manual drain valve.
2. Observe the drainage of condensation.
3. If the system drains more than 2 ounces of liquid, either the system or the pneumatic condensate drain valve is not working properly.
4. Find the fault and remedy accordingly. (see troubleshooting table)
5. If little or no condensation emerges, the automatic system is operating properly.
6. The condensate collection tank should be emptied regularly. Due care must be taken to ensure that any oil which is drained with the condensate is disposed of properly. Check local, state and federal regulations.

4.1.2 Replacement Parts List

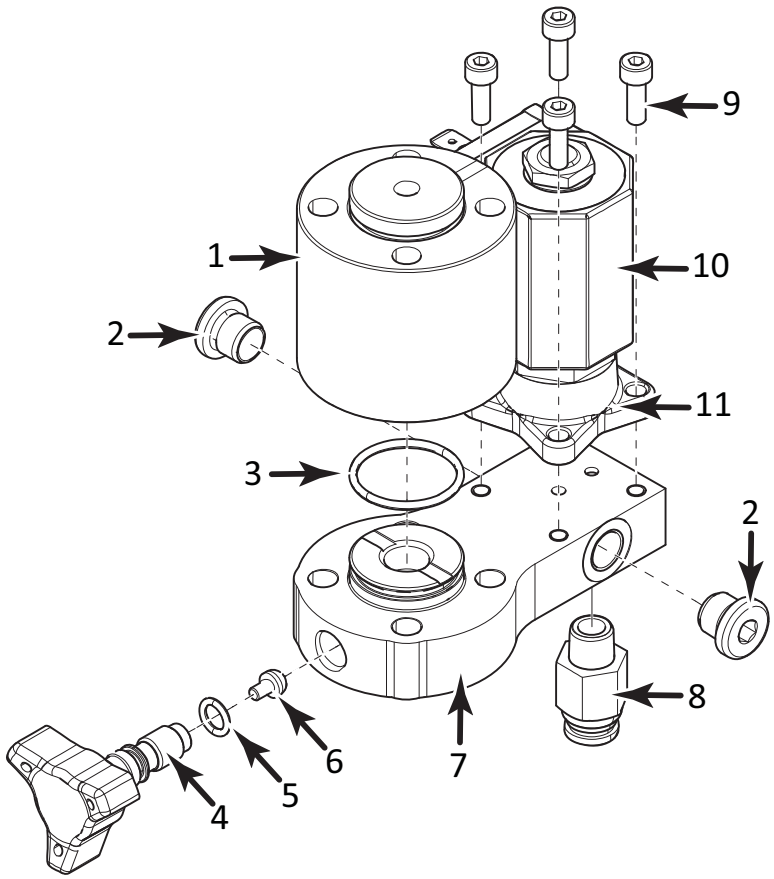
Figure 4-34 ACD System



Item	Qty	Part No.	Description	Notes
♦	2	165408[1]	B-Drain Assembly	
1	1	166088	Sieve	
2	1	172813	Condensate Drain Valve	See Figure 4-35

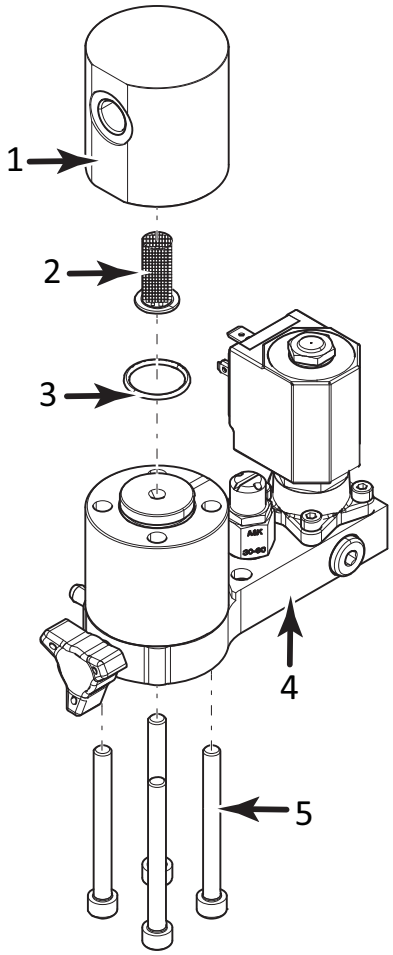
1. 165408-A1 is the P/N of the maint. kit. Each drain valve requires it's own maint. kit.

Figure 4-35 Condensate Drain Valve



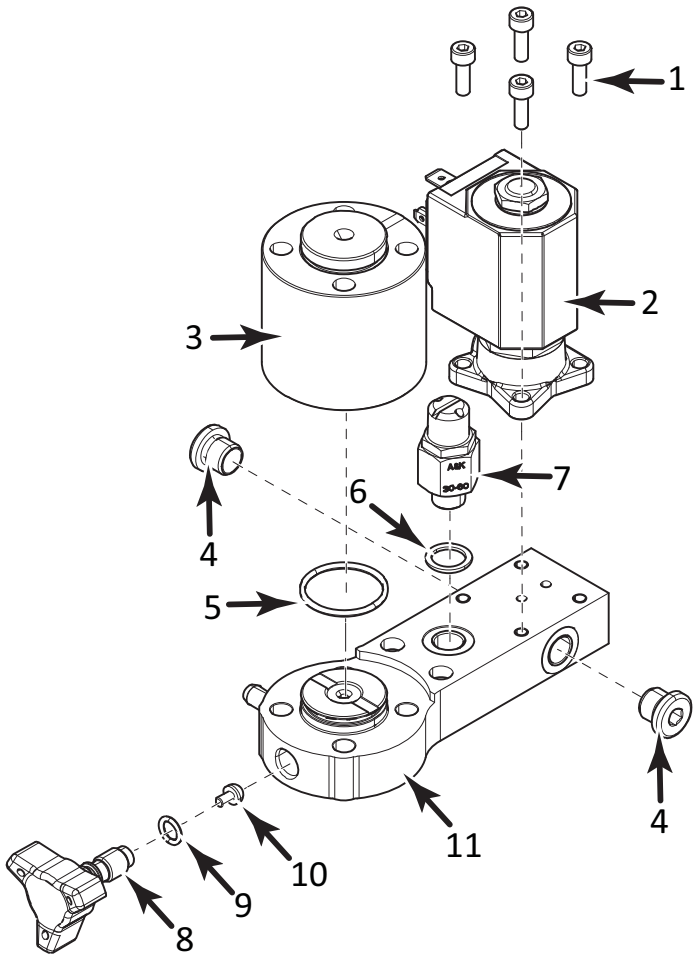
#	KIT	Qty	Part No.	Description	Notes
♦		1	172813	Condensate Drain Valve Assembly	
1	…	1	166085	Drain Valve	
2	…	2	N16504	Threaded Plug	
3	…	1	N32554	O-ring	
4	…	1	121020	Tommy Screw	
5	…	1	N16554	O-ring	
6	…	1	121015	Seal	
7	…	1	165748	Lower Section	
8	…	1	N37927	Threaded Plug	
9	…	4	N17970	Allen Screws	
10	…	1	165440-24VDC	Magnetic Coil	
11	…	1	165440	Solenoid	

Figure 4-36 Final Separator Drain Assembly



Item	Qty	Part No.	Description	Notes
♦	1	165787	Separator Drain Assembly	
1	1	167281	Upper Body	
2	1	168636	Sieve	
3	1	N2507	O-ring	
4	1	172824	Condensate Drain Valve	See Figure 4-37
5	4	N19541	Allen Screws	

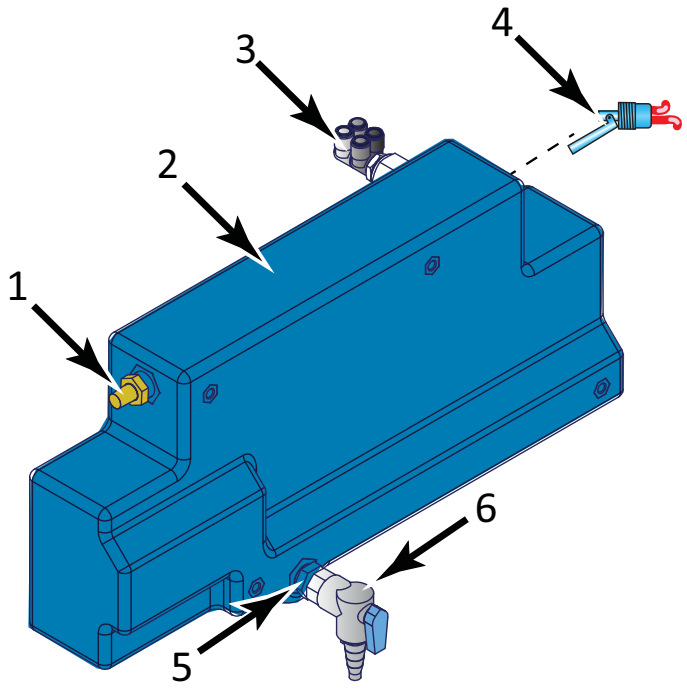
Figure 4-37 Final Separator Condensate Drain Valve



Item	Qty	Part No.	DescriptionNotes
♦	1	172824	Condensate Drain
1	4	N17970	Allen Screws
2	1	165440-24VDC	Magnetic Coil
3	1	166085	Condensate Valve
4	2	N16504	Threaded Plug
5	1	N32554	O-ring
6	1	N1052	Sealing Ring
7	1	N38033	Safety Valve
8	1	121020	Tommy Screw
9	1	N16554	O-ring
10	1	121015	Seal
11	1	165750	Lower Section

4.1.3 Condensate Collector Replacement Parts List

Figure 4-38 Condensate Tank



Item	Qty	Part No.	Description	Notes
♦	1	ASY-4021	Condensate Tank Assembly	
1	1	MUF-0007	Exhaust Muffler	
2	1	TNK-0136	Condensate Tank	
3	1	MFD-0103	Drain Hose Manifold	
4	1	SWT-0265	Float Switch	
5	1	RED-0067	Reducer	
6	1	VAL-0437	Manual Drain Valve	

4.1.4 Trouble shooting

Trouble	Cause			Remedy
Inadequate Drainage; more than 2 ounces of condensate drained during ACD check.	1. Solenoid opening time or cycle time incorrectly set 2. Solenoid not opening completely 3. Solenoid defective 4. Continuous voltage in solenoid 5. condensate hose clogged			1. Check opening time and cycle time and reset as needed. 2. Check, clean, or replace 3. Check replace as needed 4. Check control unit and timer 5. Clean out hose with compressed air or replace
Very little air/condensate escaping.	Drain valve sieve dirty			Remove clean and replace
Operating pressure is not reached or drain valve is dripping	Solenoid leaky	Pilot pressure above 217 psi	Valve seat defective	Remove, disassemble, clean valve, replace seat
			Valve piston stiff	Remove, disassemble, clean valve, check mobility of piston in the valve body. Replace piston if needed
			Valve piston surface damaged	Replace valve piston
		Solenoid is dirty		Clean, replace if needed
		Seat of solenoid is damaged		Replace solenoid
	Solenoid does not close	Solenoid is defective		Replace solenoid
		Solenoid receives no voltage		Check power supply and restore
	Drain valve/solenoid hos is leaky			Check hose, ensure it is seated correctly in connection; replace hose and/or plug connections if necessary

CHAPTER 5: PURIFICATION SYSTEM

5.1 Introduction

The purpose of all Bauer breathing air purification systems is to remove carbon monoxide, oil, water, taste and odor from the compressed air stream before final delivery.

The purpose of all Bauer industrial air purification systems is to remove oil and water from the compressed air stream before final delivery.

WARNING

Industrial air Purification System cartridges do not remove Carbon Monoxide and must not be used in breathing air applications.

The quality of air produced by the compressor is directly related to the quality and temperature of the air taken in by the unit. Intake air should as close as possible to 50 °F (10 °C) and cleanest available and as dry as possible. Bauer compressors normally add approximately 18 °F (10 °C) to the intake air temperature. The purification cartridges perform their best at approximately 68 °F (20 °C). Adequate ventilation enhances the quality and life of the purification cartridges.

5.1.1 General Purification System Procedures

1. Keep an accurate record of operating hours to ensure exact attention to maintenance intervals
2. Change all cartridges before reactivating a compressor unit that has been out of service more than three months. Leave cartridges in the unit as long as it is out of service.
3. While out of service keep all condensate drain valves closed. Maintain a pressure of 700 - 1,100 psi (50 to 80 bar) within the system to prevent moisture from entering the compressor and purification system.

5.1.2 Chamber Safety Bore

The chambers in all Bauer purification systems are designed to prevent pressurization if the cartridge is missing, not seated properly or damaged (Figure 5-1 & Figure 5-2). Without a cartridge properly in place the safety bore is not sealed, the air escapes into the atmosphere, no pressure can be built up and thus it is ensured that unfiltered air is not supplied to the consuming device. If air is escaping from the safety bore remove and check cartridge. If necessary replace the cartridge or O-rings.

Figure 5-1 Cartridge Safety Venting

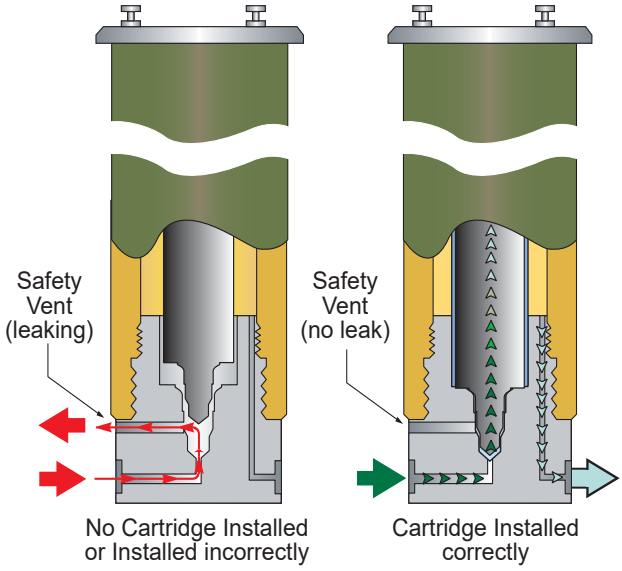
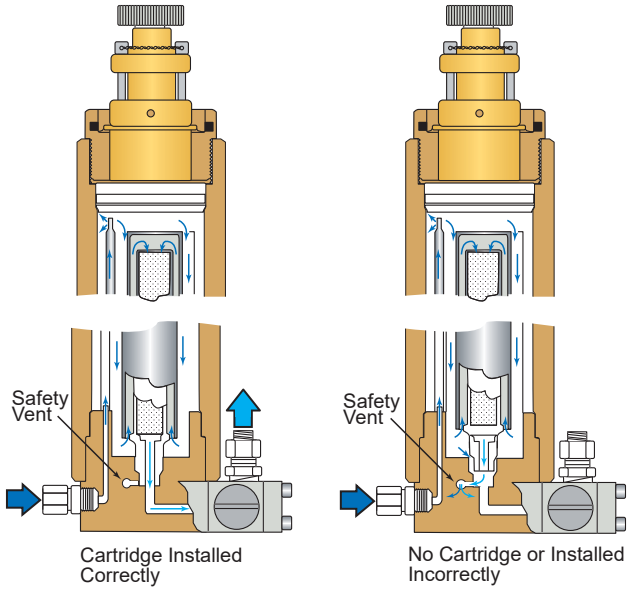


Figure 5-2 P0 & P31 Safety Venting



5.1.3 Manual Condensate Drainage

The condensate must be drained from the oil and water separator (final separator) before changing any cartridge, before beginning each filling procedure and in the absence of an Automatic Condensate Drain (ACD) system, every fifteen minutes during the operating procedure. This is done by slowly opening the manual condensate drain valves. They are opened approximately 1/3 of a turn to the left and held open until the condensate is completely drained. The condensate drain valves close by spring pressure but if necessary may be tightened by hand to ensure they are completely tightened.

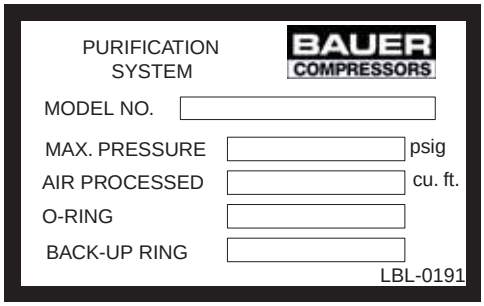
5.1.4 Model, Serial Number and Part Number Identification

5.1.4.1 Compressor Data Plate

The model number, date of manufacture and serial number can be found on the compressor unit identification plate in the main electrical enclosure and frame.

Figure 5-3 Purification System Data Plates (typical)

Purification System



Cartridge Installation

5.1.4.2 Purification System Data Plate

Refer to the compressor unit purification system data plate (Figure 5-3) on the compressor front to determine your purification system model and specifications.

5.1.4.3 Cartridge Installation Data Plate

The function performed by each chamber in the purification system is determined by the type of cartridge installed in that chamber. Refer to the cartridge installation data plate on the chamber to determine the purpose and part number of the cartridge installed in that chamber. (Figure 5-3).

5.1.5 Purification System Configurations

Purification System	Number and Type of Cartridges			Processing Capacity
	Dryer	Purification	Securus®	cubic ft $(ft)^3$
P0	Combined			3,200
P1	…	1	…	15,000
P2	…	1	…	40,000
P2 with Securus®	…	…	1	67,000
P4	1	1	…	60,000
P5	1	1	…	90,000
P5 with Securus®	1	…	1	150,000
P10	2	1		140,000
P10 with Securus®	2	…	1	230,000
P12[a]	1	1		420,000
P14 [a]	2	1		650,000
P31	Combined			11,760
P41	…	1		28,700
P41 with Securus®	…	…	1	47,000
P42	1	1	…	64,000
P42 with Securus®	1	…	1	107,000
P43	2	1	…	100,000
P43 with Securus®	2	…	1	164,000
P81	1	1		124,000
P81 with Securus®	1	...	1	198,000

a. P12 and P14 have the Securus® Electronic Moisture Monitor System as standard equipment.

5.1.6 Industrial Purification System Configurations

Purification System	Number and Type of Cartridges			Processing Capacity
	Dryer	Purification	Securus®	cubic ft (ft)[See Chapter 53]
P0	Combined			3,200
P1	…	1	…	15,000
P2	…	1	…	40,000
IP2 with Securus®	…	…	1	67,000
P4	1	1	…	60,000
P5	1	1	…	90,000
IP5 with Securus®	1	…	1	150,000
P10	2	1		140,000
IP10 with Securus®	2	…	1	230,000
P31	Combined			11,760
IP41 with Securus®	…	…	1	47,000
IP42 with Securus®	1	…	1	107,000
IP43 with Securus®	2	…	1	164,000

5.1.7 Cartridge Operating Life

NOTICE

Cartridge life is dependent on temperature and humidity variables. Heat and humidity lessen the cartridge life, requiring more frequent replacements.

Every Bauer purification system is designed to process a certain volume of air/gas before the cartridges require replacement. By using special test equipment that measures the quality of air/gas at the outlet any quality reduction may be detected. However as most compressor owners do not have this test equipment the recommended method of determining cartridge operating life is to maintain a written record of the volume of air/gas processed by the purification system.

Each Bauer compressor block is rated to produce a standard volume of air per minute and by using this number and the air processing capability of the purification system it is possible to calculate the maximum operating hours before the cartridges need to be replaced. See Paragraph 5.1.7.1 for the method of determining this figure.

The ambient air temperature and its ability to cool the compressor will effect the operating life of the cartridge. See Paragraph 5.1.7.2 for the method of calculating this adjustment factor.

The optimum place to measure the temperature is at the inlet to the final separator as this best reflects the temperature of the air as it enters the chambers. Experience has shown that this temperature is approximately 18 °F (10 °C) above the ambient temperature. Therefore for the purpose of calculating cartridge operating life use the Ambient air Temperature plus 18 °F.

A form titled air Purification Cartridge Operating Hours is found in Paragraph 5.1.8.1 and in the Appendices. It is used for recording the ambient temperature, operating time and adjustment factor. It is suggested that it be copied, placed in a protective folder and kept with the unit to record the adjusted operating hours. An example of how this form is used is shown in Figure 5-5.

5.1.7.1 Calculating the Maximum Cartridge Operating Hours

1. From the purification system data plate (See Figure 5-3) on the purification chamber determine the air Processed (cu.ft.)
2. From the paragraph titled Compressor Specifications in the instruction manual for your compressor unit determine the Charging Rate in SCFM of your compressor.
3. Divide the air Processed by the Charging Rate to obtain the Maximum Operating Time in minutes
4. Divide the Maximum Operating Time in minutes by 60 to obtain the Maximum Operating Hours.
5. Record the answer on the air Purification Cartridge Operating Hours form.

5.1.7.2 Calculating the Adjusted Cartridge Operating Hours

1. Using the air Purification Cartridge Operating Hours form record the Date, Operating Hours and Ambient air Temperature plus 18 °F.
2. Using either the graph or the chart in Figure 5-4 determine the Correction Factor.
3. Divide the Operating Hours by the Correction Factor and record it under the column labeled Today.
4. Add the hours recorded in Today to the previous Total and record it as the current Total.
5. When the Total approaches the Maximum Operating Hours replace the Cartridges.

5.1.8 Chambers

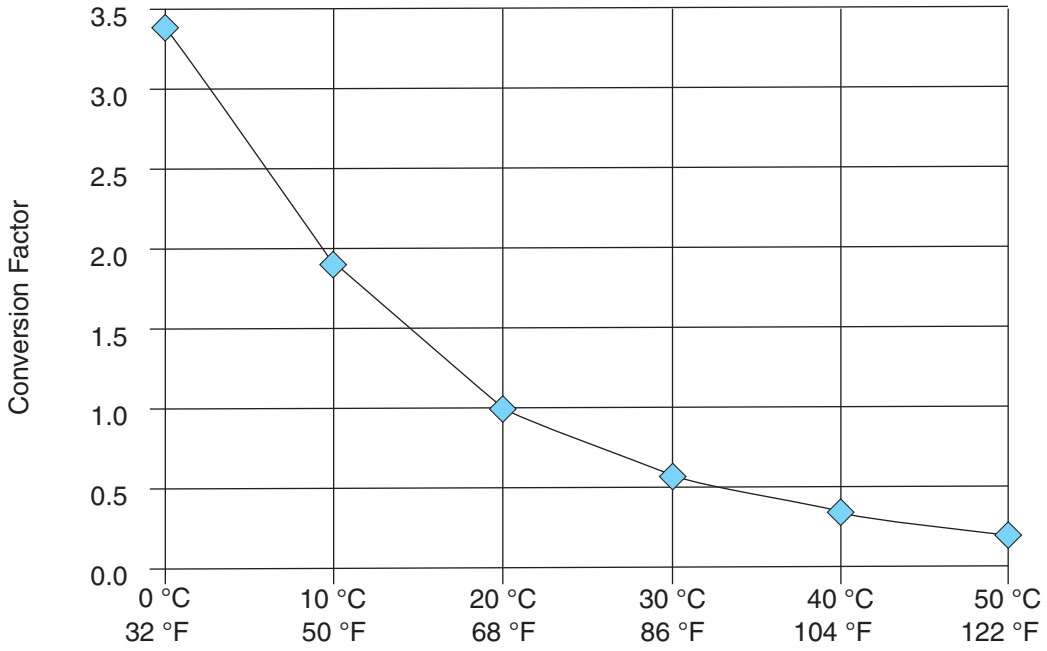
If consistent evidence shows that the maximum admissible number of load cycles has not yet been reached after five (5) years, BAUER Compressors recommends a visual inspection of the inner and outer sides of the pressure vessel.

If consistent evidence shows the maximum admissible number of load cycles has not yet been reached after ten (10) years A hydrostatic pressure test shall be executed. If the test is passed the chamber can be placed back in use for five (5) years. At the maximum number of load cycles or at fifteen (15) years the chambers must be replaced.

WARNING

All aluminum purification chambers, separators, check valves and pressure maintaining valves must be replaced after 15 years of use.

Figure 5-4 Correction Factor for Cartridge Operating Hours



°C [(°F - 32) x 5/9]	°F [°C x 9/5 +32]	Correction Factor
50	122	0.21
40	104	0.34
30	86	0.58
20	68	1.00
10	50	1.81
0	32	3.44

Figure 5-5 Example Record of Adjusted Operating Hours

Date	Operating Hours	Ambient Temp. during Compression +18 °F	Correction Factor	Adjusted Cartridge Hours	
				Today	Total
10/19/04	*8*	*92°F (33 °C)*	*0.5*	*16.00* (Op hrs / Corr. factor)	*16.00*
11/01/04	*4*	*45°F (7.2 °C)*	*2.25*	*1.78*	(Total hrs +Today hrs) *17.78*

5.1.8.1 Purification Cartridge Operating Hours Form

Date	Operating hours	Ambient temp. + 18°F during compression	Correction factor	Adjusted cartridge hours	
				Today	Total

5.2 P2 Securus II® Purification System

5.2.1 Major Components

The P2 S Purification System major components are a Oil and Water Separator, and a Purification Chamber with the Securus II® Electronic Moisture Monitor System. Figure 5-6 shows the functional interconnection of all the components.

Figure 5-6 P2S Purification System

1. Oil and Water Separator	6. Pressure Maintaining Valve
2. Safety Valve	7. Final Pressure Sensor
3. Pressure Gauge	8. Purification or Securus® Chamber
4. Check Valves	9. Securus II® Transmitter
5. Bleed Valve	

5.2.2 Component Description

5.2.2.1 Oil & Water (*condensate*) Separator

WARNING

The rapid de-pressurizing and re-pressurizing of the oil and water separator during condensate draining subjects it to metallurgical stresses. To prevent catastrophic failure with the possibility of damage, injury or death the oil and water separator (P/N 079416) must be replaced after a predetermined number of cycles. One load cycle equals one pressurization plus one de-pressurization.

Units operating between 3,000 and 5,000 psi = 130,000 load cycles (32,500 hours of operation)
Units operating between 5,000 and 6,000 psi = 55,000 load cycles (13,750 hours of operation)

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.

The air leaving the final stage is cooled in the aftercooler to approximately 18 - 27 °F (10 -15 °C) above ambient temperature and then enters the oil and water separator. The oil and water separator works by means of a sintered metal filter which separates liquid oil and water particles from the compressed air.

Figure 5-7 Oil and Water Separator

Figure 5-8 Oil and Water Separator Labels

5.2.2.2 Chamber

Each chamber is made up of an anodized aluminum housing and a filtering cartridge. There are two general types of filtering cartridges, drying or purifying. The cartridge type is determined by the ingredients packed in the cartridge. The chamber is named after the type of cartridge it contains, i.e. dryer chamber or purification chamber.

5.2.2.3 Cartridge

5.2.2.3.1 Cartridge Construction

The cartridge casing, top and bottom are aluminum and are packed with one or more of the following.

1. A catalyst to convert carbon monoxide to carbon dioxide.
2. Activated carbon which absorbs oil vapors effecting taste and odor.
3. Molecular sieve to absorb oil and water.

5.2.2.3.2 Cartridge Handling

1. Never open the protective packaging a cartridge comes in prior to its actual use. The highly sensitive filter materials will absorb moisture from the atmosphere becoming saturated and useless.
2. Used cartridges must be disposed of in accordance with local regulations.

5.2.2.4 Condensate Drain Valve

A manually operated valve used for maintenance and before start-up to drain the condensed liquids from the coalescing oil and water separator.

5.2.2.5 Check Valves

Valves allowing compressed air to flow in only one direction. One is used to maintain pressure in the chamber when the compressor is not operating. The other check valve prevents back-flow from filled storage cylinders or tanks.

5.2.2.6 Bleed Valve

A manually operated valve used to release the pressure in the chamber before maintenance.

5.2.2.7 Pressure Maintaining Valve

The pressure maintaining valve ensures that pressure is built up in the system from the start of delivery, thus achieving constant optimum purification. It also assures proper working conditions for the final stage of compression.

5.2.2.8 Safety Valve

The safety valve is located on the coalescing oil and water separator and acts as the safety valve for the final stage of the compressor.

5.2.2.9 Securus II® Electronic Moisture Monitor System

The Securus II® Electronic Moisture Monitor System is a factory installed system which warns the operator in advance of expiration of the life of the cartridges. The Securus II® Transmitter receives signals concerning the condition of the drying agent inside the Securus® cartridge from the attached sensors and supplies the appropriate control signals whenever the preset threshold values have been reached.

5.2.2.9.1 Securus® Cartridge

The Securus® Cartridge is packed with a catalyst which converts carbon monoxide to carbon dioxide, activated carbon which absorbs oil vapors, molecular sieve which absorbs oil and water and the sensor components of the Securus® Electronic Moisture Monitor System.

5.2.2.9.2 Securus II® Transmitter

The Securus II® Transmitter relays the operating condition of the Securus II® Electronic Moisture Monitor System to the operator control interface. The Securus II® issues a warning when the Securus® cartridge is approaching saturation, to warn the user to prepare to change the Securus® cartridge. Once the Securus® cartridge has reached total saturation the Securus II® monitor will issue an alarm condition to the operator interface and shut down the unit. Once the Securus® cartridge is replaced the compressor unit can be restarted.

5.2.3 Maintenance

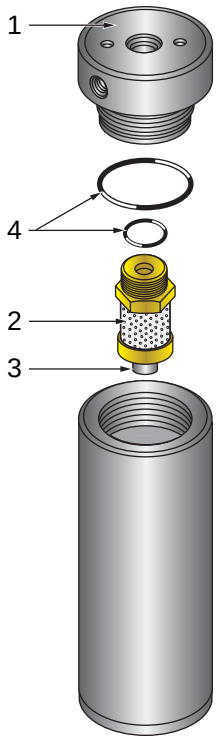
5.2.3.1 Oil and Water Separator

To remove the sintered metal filter proceed as follows: (See Figure 5-9). Disconnect the power and shut off the inlet supply line if applicable.

1. De-pressurize the system by means of the bleed valve.
2. Remove the tubes connected to the side of the filter head (1).
3. Unscrew and remove the filter head.
4. Unscrew the sintered metal filter (2) from the filter head.
5. Remove the center screw (3) to remove the sintered metal filter.
6. Clean the sintered metal filter using hot soapy water. Blow dry with compressed air.
7. After cleaning the element, record the number of operating hours to ensure exact attention to the maintenance intervals.
8. Lubricate the threads and O-rings as well as the threaded part of the sintered metal filter with petroleum jelly. Apply sparingly.

9. Dry the inside of the filter housing with a clean cloth and check for corrosion before reinstalling the sintered metal filter.
10. In the event you discover corrosion, replace the corroded parts with new Bauer parts.
11. Reinstall the sintered metal filter assembly and filter head.
12. Replace all removed tubes, close all valves and check for leaks.

Figure 5-9 Oil and Water Separator

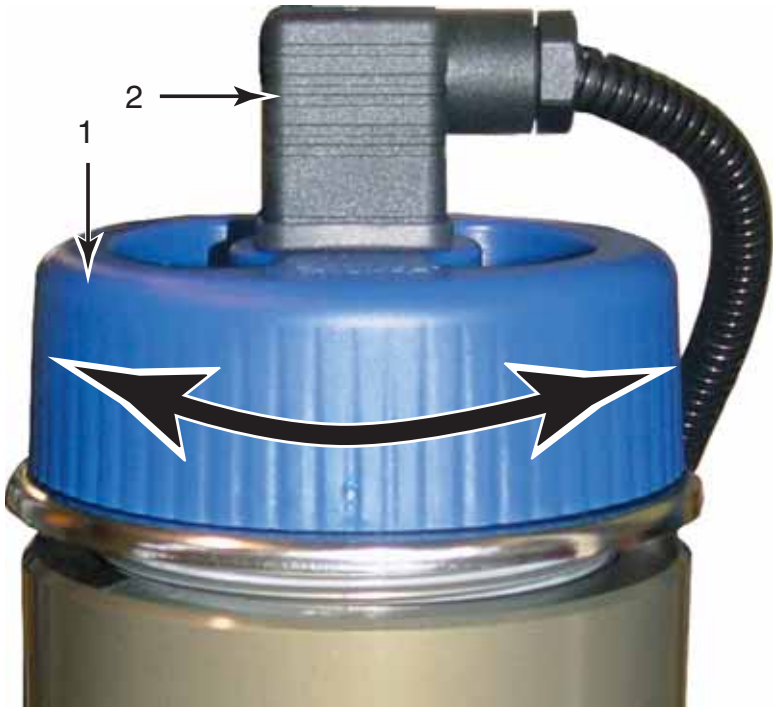


1. Filter Head	3. Center Screw
2. Sintered Metal Filter	4. O -rings

Figure 5-10 Sintered Metal Filter Assembly

5.2.3.2 Removal of the Securus II® Transmitter.

Figure 5-11 Removal of the Securus II® Transmitter



1. Securus II® Transmitter	2. DIN Connector

The Securus II® Transmitter is removed and replaced by rotating the blue plastic Securus II® Transmitter approximately ½ turn. It is not necessary to disconnect or remove the DIN Connector.

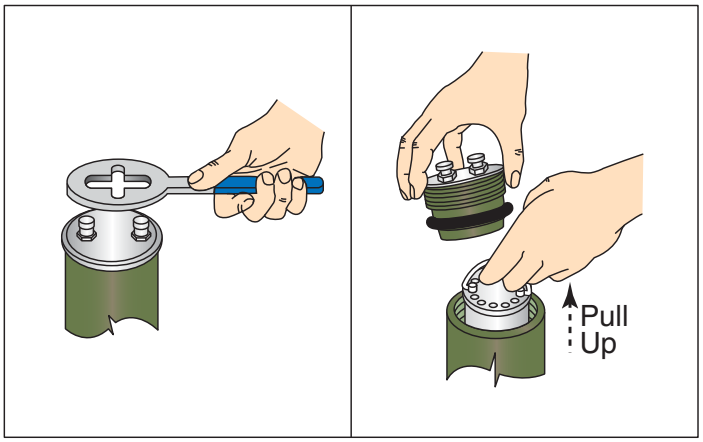
NOTICE

If the DIN Connector is removed, ensure that it is replaced in exactly the same position, otherwise electrical damage to the unit may occur.

5.2.3.3 Cartridge Replacement

To change the purification cartridge, proceed as follows. (See Figure 5-12)

Figure 5-12 Cartridge Replacement



1. Disconnect the power and shut off the inlet supply line, if applicable.
2. De-pressurize the system by means of the bleed valve.
3. If the chamber is part of the Securus II® Moisture Monitor System, remove the Securus II® Transmitter. See Paragraph 5.2.3.2.
4. Unscrew the chamber head using the special wrench supplied.
5. Pull out the cartridge using the lifting ring on top of the cartridge.
6. Dry the inside of the chamber with a clean cloth and check for corrosion.
7. Replace all corroded parts with new Bauer parts.
8. Remove the shipping covering and the protective cap from the bottom of the cartridge.
9. Lubricate the O-rings with white petroleum jelly. Apply sparingly.
10. Install the new cartridge. Be sure the cartridge snaps into place.
11. Reinstall the chamber head.
12. Close the bleed valve, restore the power and reconnect the inlet supply line, if applicable.

NOTICE

If air is detected bleeding out from the bottom of the chamber, the cartridge has not been installed properly or is missing. Follow the instructions below.

5.2.3.4 Leaking at the Safety Bore

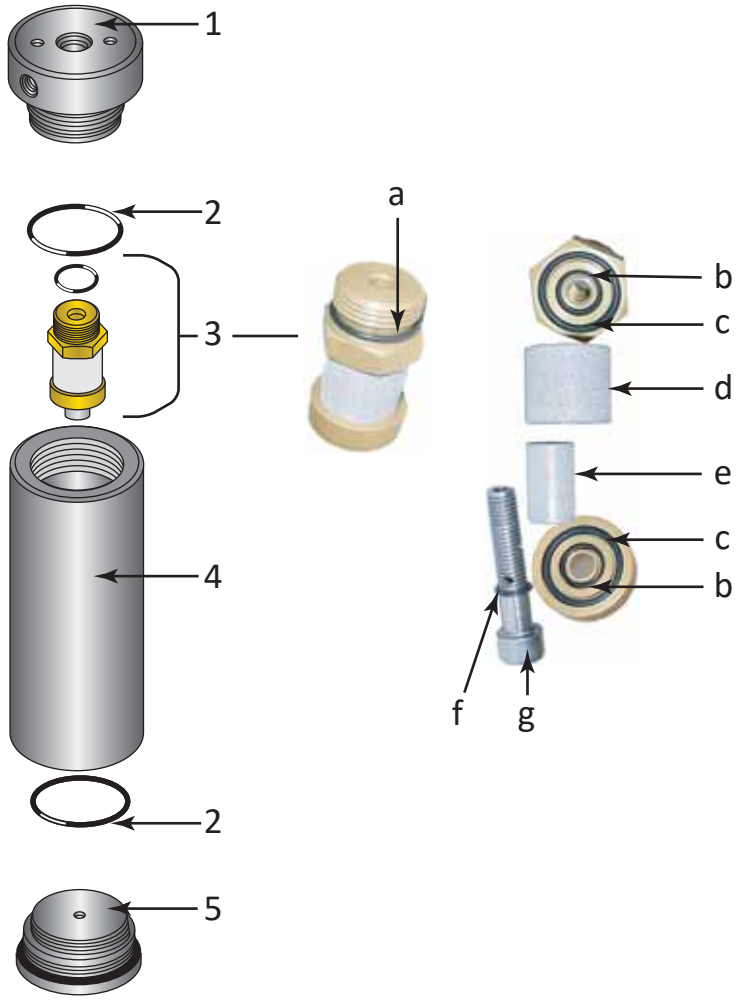
1. Remove the cartridge following steps 1. to 4. in Paragraph 5.2.3.2.
2. Install cartridge if missing.
3. Remove cartridge and inspect O-rings.
4. Replace O-rings if necessary.
5. Ensure protective caps and devices have all been removed.
6. Replace cartridge following steps 8. to 11. in Paragraph 5.2.3.2

5.2.4 Replacement Parts List

Figure 5-13 P2S Purification System Parts List

Item	Qty	Part No.	Description	Notes
1	1	079416	Oil and Water Separator	See Figure 5-14
2	1	VAL-0169	Safety Valve	
3	2	GAG-0009W	Pressure Gauge	0 - 7,500 psi
4	2	VAL-0590	Check Valves	
5	1	VAL-0377	Bleed Valve	
6	1	VAL-0053	Pressure Maintaining Valve	
7	1	SEN-0035	Pressure Sensor	0 - 8,700 psi, 0 - 10 Volt.
8	1	080145	Securus® Chamber	See Figure 5-15
9	1	MNR-0042	Securus II® Transmitter	24 VDC

Figure 5-14 Oil and Water Separator Parts List



Item	Qty	Part No.	Description	Notes
♦	1	079416	Oil and Water Separator Assembly	
1	†	…	Separator Head	Available only with 079416
2	2	N04586	O-Ring	
3	1	061860	Sintered Metal Filter	
3a	1	N15133	O-Ring	
3b	2	N04496	O-Ring, small	
3c	2	N04385	O-Ring, large	
3d	1	061858	Sleeve Element, large	
3e	1	061859	Sleeve Element, small	
3f	1	N07091	O-Ring	
3g	1	061857	Screw	
4	†	…	Separator Housing	Available only with 079416
5	†	…	Bottom Plug	Available only with 079416

This page is inserted to provide proper page sequencing

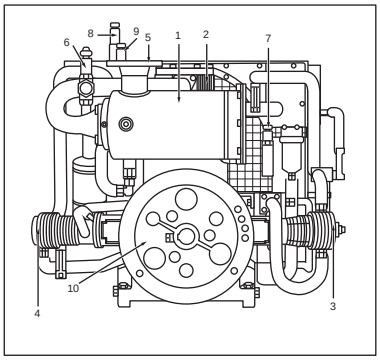
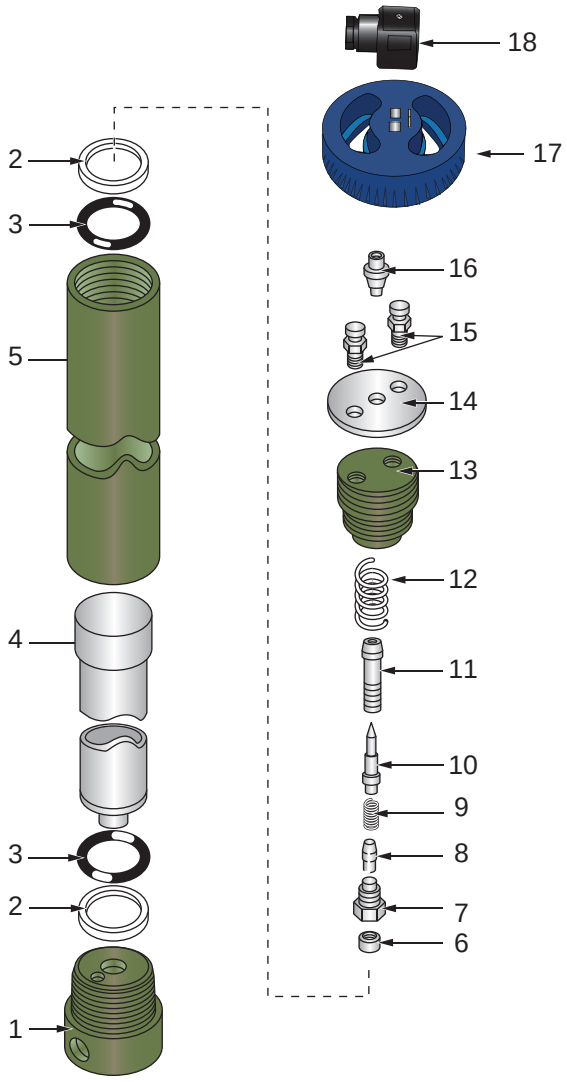


Figure 5-15 Securus II® Electronic Moisture Monitor System Parts List



Item	Qty	Part No.	Description	Notes
♦	1	80145	Securus® Chamber Assembly	
1	†	…	Bottom Plug	Available only with 80145
2	2	N04736	Backup Ring	
3	2	N04735	O-ring	
4	1	060037	Securus® Cartridge	
5	†	…	Filter Body	Available only with 80145
6	1	059855	Nut	
7	1	059852	Drawback Screw	
8	1	059854	Loose Pin	
9	1	060062	Compression Spring	
10	1	059853	Fixed Pin	

Figure 5-15 (cont.) Securus II® Electronic Moisture Monitor System Parts List

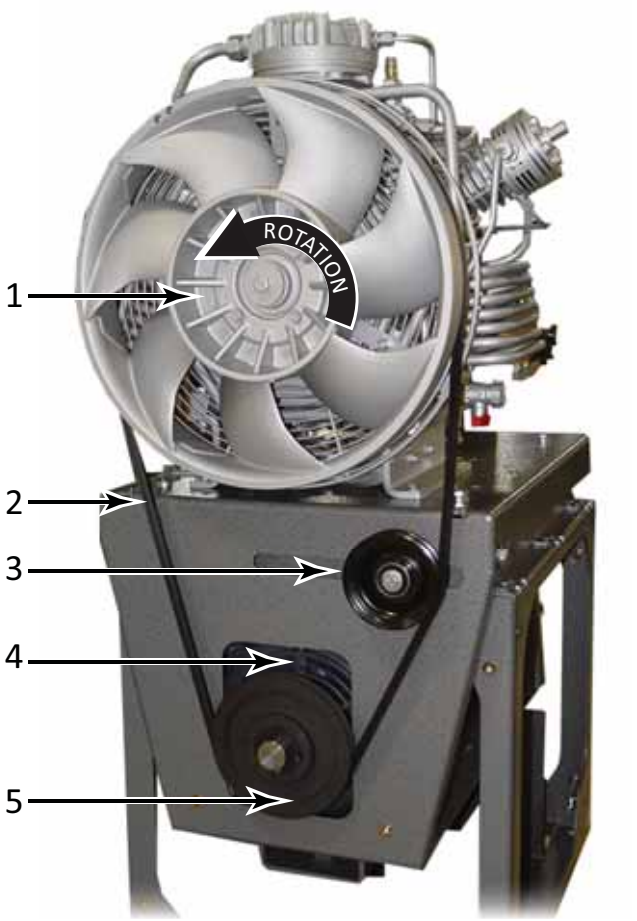
Item	Qty	Part No.	Description	Notes
11	1	059851	Bolt	
12	1	002181	Compression Spring	
13	†	…	Filter Head	Available only with 80145
14	1	060135	Cover Plate	
15	2	012293	Tool Post Screw	
16	1	059850	Socket, RF type	
17	1	MNR-0042	Securus II® Transmitter	24 VDC
18	1	CON-0319	Connector	

CHAPTER 6: COMPRESSOR DRIVE; LEGACY 13

6.1 Vertical Compressor Drive

The compressor is driven by the drive motor through a V-belt. The direction of rotation, as seen facing the flywheel, is counterclockwise. Observe the arrow on the compressor block. Check the V-belt regularly for damage and wear. See Paragraph 6.2.2. Replace if necessary.

Figure 6-1 Vertical Drive with Idler (typical)



1. Compressor Flywheel	4. Electric Motor
2. V-belt	5. V-belt Sheave & Bushing
3. Idler Sheave (pulley)	

6.2 Maintenance of the V-belt and Sheaves

6.2.1 Check The Sheaves.

Before a new set of drive belts are installed, the condition of the sheaves should be checked. Dirty or rusty sheaves impair the drive's efficiency and abrade the cover of the belts, which results in premature failure. Worn sheaves shorten belt life as much as 50%. If the grooves are worn to the point where the belt bottoms, slippage may result and the belts may burn. If the side walls are "dished out," the bottom shoulder ruins the belt prematurely by wearing off the bottom corners.

6.2.2 Check the V-belt

Check the V-belt regularly for damage and wear. Replace if necessary. To adjust the V-belt tension first loosen the tensioning sheave block using TOO-0120. V-belt tension is adjusted with the tensioning bolt. Once the tension is correct retighten the tensioning sheave block.

Figure 6-2 Tensioning 1

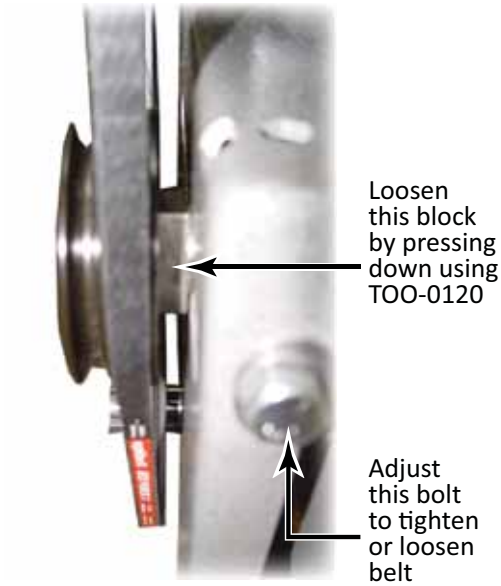
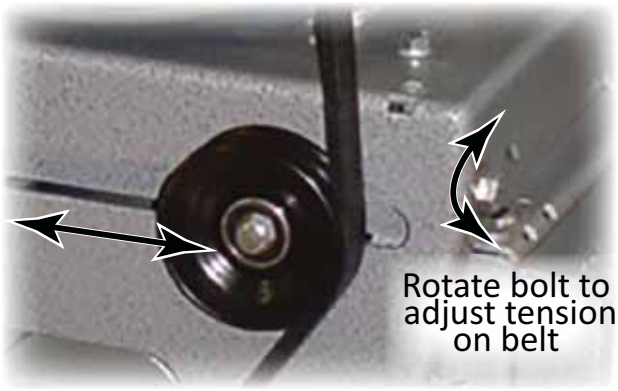


Figure 6-3 Tensioning 2



6.2.3 Replacing the Belt

To replace the belt use TOO-0120 and a ratchet or wrench to rotate the tensioning bolt to create slack in the belt. The belt should be slack enough to pull off of the flywheel and motor's sheave. Replace with the correct replacement belt and tighten the tensioning bolt, making the belt tight. Then tighten the sheave block using TOO-0120.

NOTICE

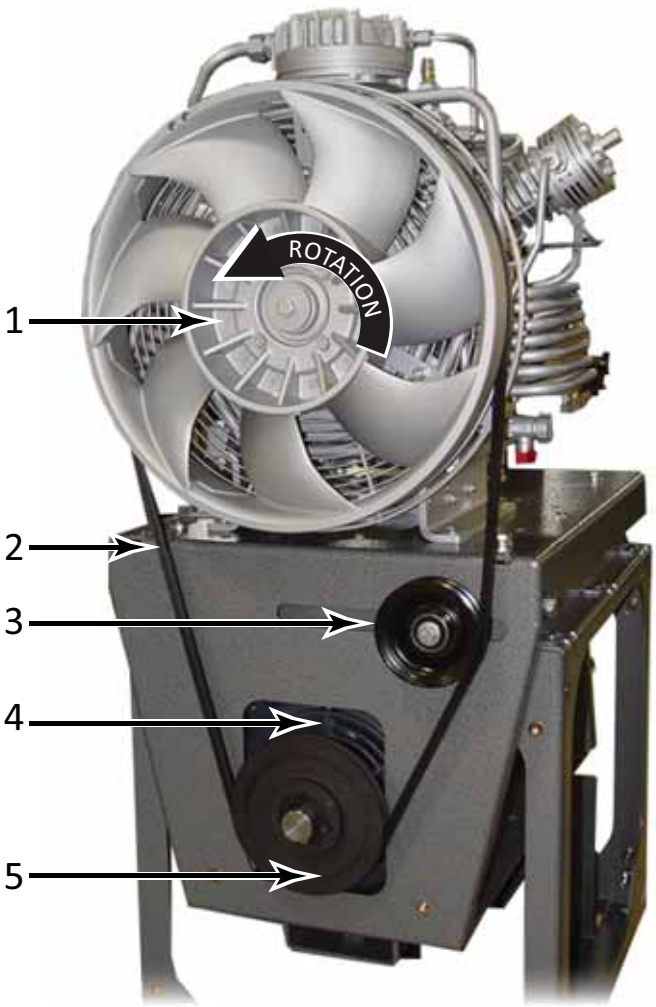
Ensure the belt is tightened enough to maintain friction on the flywheel and sheave.

6.2.4 Replacing the Sheave

A gear puller can be used to remove the sheave and sheave bushing from the motor's drive shaft. Ensure the drive shaft is clean then slide the new sheave onto the drive shaft. Bolt the sheave bushing onto the sheave then tap the feathered key into the key slot. Ensure the feathered key is snug with both the shaft and sheave. There should no play once the key is in place. The feathered key should run the entire length of the bushing and sheave key slots.

6.3 Replacement Part List

Figure 6-4 Legacy 13, Vertical Drive with Idler



Item	Qty	Part No.	Description	Notes
♦			**Legacy 13**	
1	1	IK 12.14 II	Compressor Block	
2	1	BET-0258	V-belt	
3	1	PLY-0012	Pulley, V-belt	
4	1	MTR-0523	Electric Motor	10 Hp, 3 Phase
5	1	SHE-0319	Sheave	V-belt
with	1	BUS-0159	Sheave Bushing	

CHAPTER 7: ELECTRICAL PANEL, ASY-1266

7.1 Overview

These instructions apply to units that use electrical panel, ASY-1266 and operator controls.

Figure 7-1 ASY-1266 & Controls

The Electrical Panel provides 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 used in this Electrical Panel is based on the pressure and use of the compressor.

In an emergency the compressor is shutdown with the E-stop push button.

7.2 Electrical Panel

This electrical panel is designed for use with 5, 7½, 10, 15 or 20 horsepower electric motors. It is also designed for supply voltages from 208 VAC to 460 VAC, single or three phase and 50Hz or 60 Hz. All supply voltage options are not available with each horsepower rating.

The basic panel components consist of a programmable logic controller (PLC), motor starter, overload relay, fuses, terminal strips for internal wiring and connectors for attachment to wire harnesses. The panel is built to match the horsepower, voltage, phase and frequency of the customer's requirements.

7.2.1 Wiring Diagram

The wiring diagram for your specific compressor unit is stored inside the electrical panel. If a wiring diagram for your machine is not found inside the electrical panel, then please call Bauer Compressors product support group for a replacement. Please have the serial number of the compressor available; it is written on a label (See Figure 7-2) inside the Electrical Panel door.

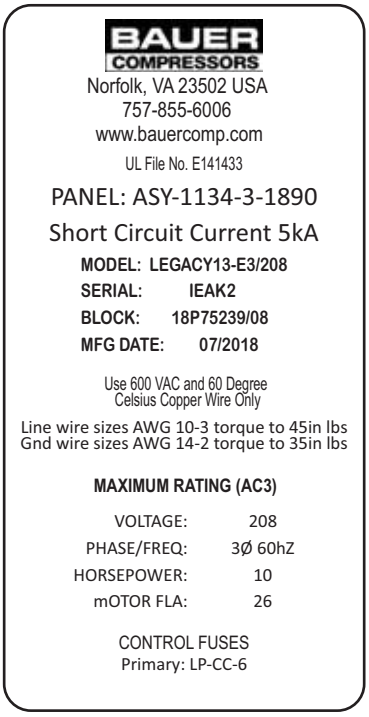
7.2.2 Electrical Panel Interior Access

The interior of the Electrical Panel is accessed by using a coin or screwdriver to turn the latch on the front of the Electrical Panel.

7.3 AC Power Requirements

The Electrical Panel must be supplied with electricity of the correct voltage, phase, and frequency to ensure proper operation. Wiring and conduit selection must be in accordance with all national, state and local codes. The customer is responsible for providing a means of disconnection from the power source and protection from instantaneous short circuit. The Electrical Panel voltage and phase are displayed on the exterior of the Electrical Panel as well as being written on a label (See Figure 7-2) on the inside of the Electrical Panel door. In this example shown, the panel is wired for 208 volt, three phase, serial number IEAK2.

Figure 7-2 Electrical Panel Label



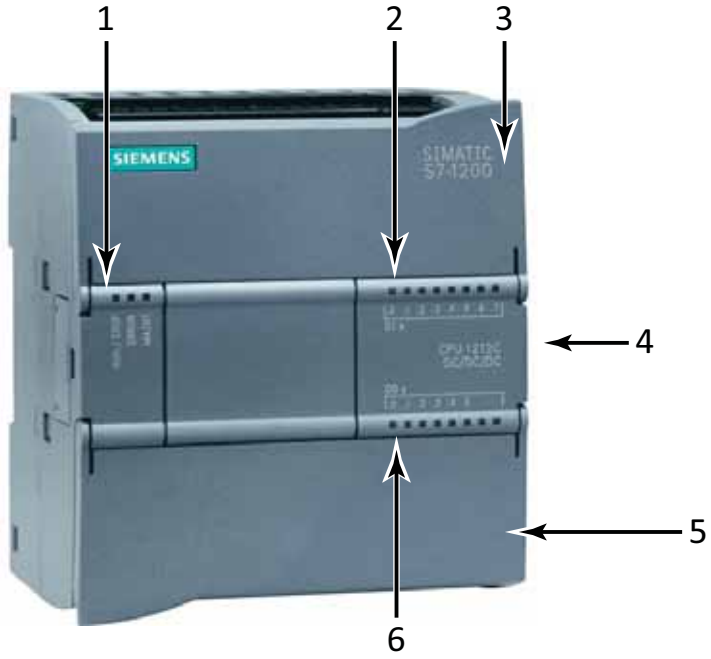
The panel assembly number is important to know when referencing the replacement parts list. The above label's panel assembly number is ASY-1134-3-1890. That means the assembly is ASY-1134. The 3 means the panel is wired for 3 phase, and the 1890 means the unit is wired to handle 18 - 90 Amps.

7.4 Electrical Panel Components

7.4.1 Programmable Logic Controller (PLC)

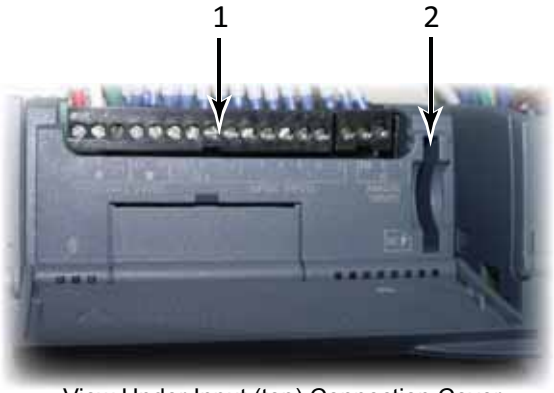
The PLC is 24 I/O and 120 VAC. The data stored in RAM is protected for 100 hours, in event of a power loss.

Figure 7-3 PLC, CNT-0095



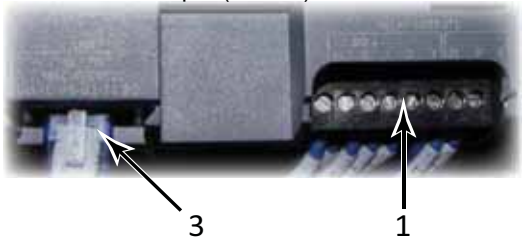
1. Status LEDs
2. Output LEDs
3. Output Connections Cover
4. Expansion Access Door
5. Input Connections Cover
6. Input LEDs

Figure 7-4 Connector Block Removal



View Under Input (top) Connection Cover

View Under Output (bottom) Connection Cover



1. Notch in the Terminal Block
2. Memory Card Slot
3. Network Connection

7.4.1.1 Replacing the PLC

Replacing the PLC does not require removal of any wiring as the connections are made with push in Connector Blocks. To replace the PLC proceed as follows.

1. Turn off unit and disconnect from main power supply.
2. Lift the input connections cover. See Figure 7-3.
3. Insert a small flat bladed screwdriver in the notch in the back center of the terminal block. Gently pry the terminal block loose. See Figure 7-4.
4. Repeat Steps 2 and 3 for the to the terminal block on the output side of the PLC.
5. Unclip the PLC from the DIN rail by using a small flat bladed screwdriver to pull the DIN rail clip out until the PLC is free.
6. The terminal blocks are replaced by pushing them gently down onto corresponding pins until they click into place.
7. Restore power and operate the unit.

7.4.1.2 Installing a New Program

The PLC program can be updated in two ways. If a Bauer technician is on-site, they will connect directly to the PLC using a notebook computer. Another method to install a new program is to use an external memory card. The memory card would be programmed at the Bauer factory and shipped either to the customer or to a authorized distributor.

7.4.1.3 Installing a Memory Card

To install or replace a memory card proceed as follows:

1. Turn off unit and disconnect from main power supply.
2. The memory card is keyed to fit only one way and requires minimal force to insert it.
3. Push the memory card into the slot until it snaps into place.
4. If the memory card is being retained in the PLC, restore power to the unit and operate as normal.
5. If the memory card is for a software update and is to be returned to Bauer or a distributor continue as follows.
6. Restore power to the unit.
7. After the software has initialized and the run screen is displayed, shutdown the unit and disconnect from the main power source.
8. Restore power to the unit again. After the software has initialized a second time and the run screen is displayed, shutdown the unit and disconnect from the main power source.
9. Remove the memory card and close the protective cover.
10. Restore power and operate the unit.

7.4.2 Hour Meter

The panel is equipped with an hour meter. The hour meter is not resettable and used to monitor the run hours of the compressor. It is powered by 10 -80 VDC.

Figure 7-5 Hour Meter, HMR-0032

7.4.3 Motor Starter.

See Figure 7-6. The Eaton XTD 65 amp contactor operates on DC current.

7.4.4 Overload Relay

See Figure 7-7.The overload relay provides thermal overload protection and its size will be based on the voltage and motor horsepower. The dial is set to the Full Load Amperage (FLA) of the electric motor at the factory. If the Overload Relay is replaced set the dial to the FLA listed on the motor name-plate or the label inside the Electrical Panel. The Overload Relay plugs into the Motor Starter.

Figure 7-6 Motor Starter (typical)

Figure 7-7 Overload Relay (typical)

7.4.5 Power Supply

The Power Supply is a 24 Volt DC, 10 Amp Power Supply used to provide power to the communications modules and operator interface, SPL-0088. It is not standard in all models.

Figure 7-8 Power Supply

7.5 Alarms

The following paragraphs describe the warning and alarm conditions that are monitored and controlled by the Electrical Panel.

7.5.1 Final Separator Warning

The high pressure-breathing compressor is equipped with a final separator. This is a stainless steel vessel, approximately 3¾ inch diameter, located on the purification panel. To prevent fatigue failure of this vessel, the PLC program monitors the pressurization and de-pressurization cycles of this separator and will first issue a Warning, and then later an Alarm function.

The program is set up for a 90% warning and a 100% shutdown alarm for this counter feature. The program would be configured to reflect the following values when it is built.

Table 7-1: Final Separator Warning and Shutdown Cycle Count

Maximum Compressor Pressure	Warning	Shutdown
5,000 psi	117,000 cycles	130,000 cycles
6,000 psi	49,500 cycles	55,000 cycles

When the warning is displayed, the unit will still continue to function properly, but will prompt the operator to contact Bauer Compressors to make arrangements to replace the separator. When the Alarm level has been achieved, the compressor will no longer function, and will require the replacement of the separator. When this is accomplished, the unit can be reactivated by making adjustments to the PLC software. Please contact Bauer Product Support for detailed instructions.

WARNING

Do not attempt to override this Separator Shutdown. This feature is provided to protect operating personnel from injury or death.

7.5.2 Securus® Electronic Moisture Monitor System

The compressor purification system may be equipped with an optional Securus II® Electronic Moisture Monitor System. The Securus II® Electronic Moisture Monitor System warns the operator in advance of expiration of the life of the cartridges. The Securus II® Transmitter receives signals concerning the condition of the drying agent inside the Securus® cartridge from the attached sensors and supplies the appropriate control signals whenever the preset threshold values have been reached.

7.5.2.1 Securus® Cartridge

The Securus® Cartridge is packed with a catalyst which converts carbon monoxide to carbon dioxide, activated carbon which absorbs oil vapors, molecular sieve which absorbs oil and water and the sensor components of the Securus II® Electronic Moisture Monitor System.

7.5.2.2 Securus II® Transmitter

See Figure 7-9. The Securus II® Transmitter relays the operating condition of the Securus II® Electronic Moisture Monitor System to the Operator Interface. The Securus II® issues a warning when the Securus® cartridge is approaching saturation, to warn the user to prepare to change the Securus® cartridge. On a Securus® Warning condition, the compressor will run normally and the warning will be shown on the Operator Interface. Once the Securus® cartridge has reached total saturation the Securus II® Transmitter will issue an alarm condition to the Operator Interface and shut down the unit. Once the Securus II® cartridge is replaced it is possible to restart the compressor. The Securus II® Transmitter is removed and replaced by rotating the blue plastic Securus II® Transmitter approximately ½ turn. It is not necessary to disconnect or remove the DIN Connector.

Figure 7-9 Securus II® Transmitter

NOTICE

If the DIN Connector is removed, ensure that it is replaced in exactly the same position, otherwise electrical damage to the unit may occur.

7.5.3 Compressor High Temperature

See Figure 7-10. The compressor high temperature switch is mounted on the high pressure compressor block, on the third, fourth or fifth stage head, depending on model. Under normal operating conditions, the switch is closed. On a high temperature condition, the compressor will shutdown and the alarm will be displayed on the Operator Interface.

Figure 7-10 High Temperature Switch

Figure 7-11 Pressure Sensor (Typical)

7.5.4 Compressor Low Oil Pressure

See Figure 7-11. The compressor Oil Pressure Sensor is located on the back of the compressor block, mounted with the oil pressure gauge. During start-up of the compressor, the oil pressure sensor is bypassed for a time period set in the program by **OIL PRESS TD** parameter. This allows the oil pressure to stabilize at operating pressure before the an alarm is sensed. After this initial time period, should the compressor lose oil pressure, the Oil Pressure Sensor will cause the alarm to be displayed on the Operator Interface.

7.5.5 Compressor Overrun Timer

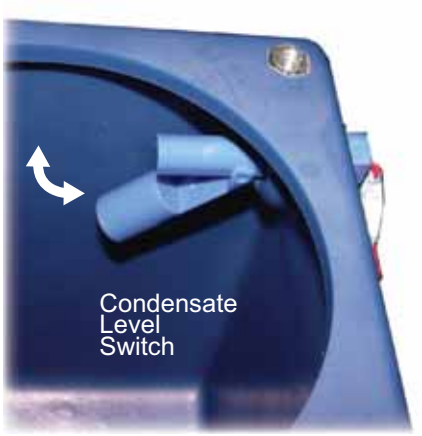
The compressor has an timer, where if the compressor runs continuously for a number of hours set by the **OVERRUNTIMER** parameter, the compressor will shutdown, and the alarm will be displayed on the Operator Interface. This is done to secure the equipment if it were to be started and left unattended.

7.5.6 Condensate Fault

See Figure 7-12. The compressor condensate level switch is located in the condensate collection tank, below the Automatic Condensate Drain separator. The switch is N.O., Normally Open, and is connected to the PLC. Refer to wiring diagram for additional information. As the condensate tank fills up the Condensate Level Float Switch rises until it closes. At this time the compressor will shutdown and

the alarm will be displayed on the Operator Interface. The operator should drain the condensate from the tank and resume operation of the equipment.

Figure 7-12 Condensate Level Float Switch



NOTICE

The compressor condensate contains some oil, and accordingly, should be disposed of in accordance with state and local regulations.

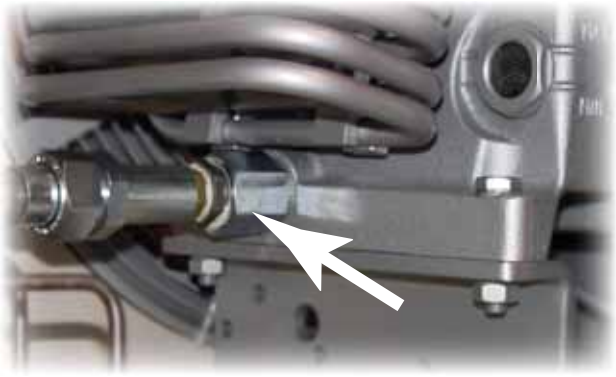
7.5.7 Motor Starter Overload Trip

The compressor overload relay is located in the Electrical Panel, See Figure 7-7. Under normal operating conditions, the switch is open. On an Overload Trip of the motor, the compressor will shutdown, and the Alarm will be displayed on the Operator Interface.

7.6 Compressor Block Heater

This unit may be equipped with an optional block heater for the compressor crankcase if requested at time of order. This heater operates when the unit is powered on and the block temperature is below 40 °F. It warms the oil in the crankcase body keeping the oil within its optimum temperature range.

Figure 7-13 Compressor Block Heater (HTR-0112)



7.7 PLC Inputs and Outputs

All PLC inputs are 24 VDC. The power supply physically exists inside the PLC. All PLC outputs are of a relay type, and are powered through the control transformer supplying 120 VAC single phase to the various loads. Please refer to the wiring diagram provided with each unit for the as built specifications.

Table 7-2: PLC Inputs

I0.0	Securus II® Monitor Alarm
I0.1	Overload Relay
I0.2	Temperature Switch
I0.3	CO Monitor Alarm
I0.4	Condensate Alarm
I0.5	
I0.6	
I0.7	Seccant Monitor Alarm
I1.0	High Inlet Pressure Switch[1]
I1.1	Low Inlet Pressure Switch[a]
I1.2	
I1.3	
I1.4	
I1.5	

Table 7-3: PLC Outputs

Q0.0	Motor Contactor
Q0.1	ACD 1
Q0.2	ACD Final
Q0.3	Audible Alarm
Q0.4	ACD 2
Q0.5	ACD 3
Q0.6	
Q0.7	ACD 4 or Inlet Solenoid
Q1.0	Unloader Solenoid Valve
Q1.1	Panel Light

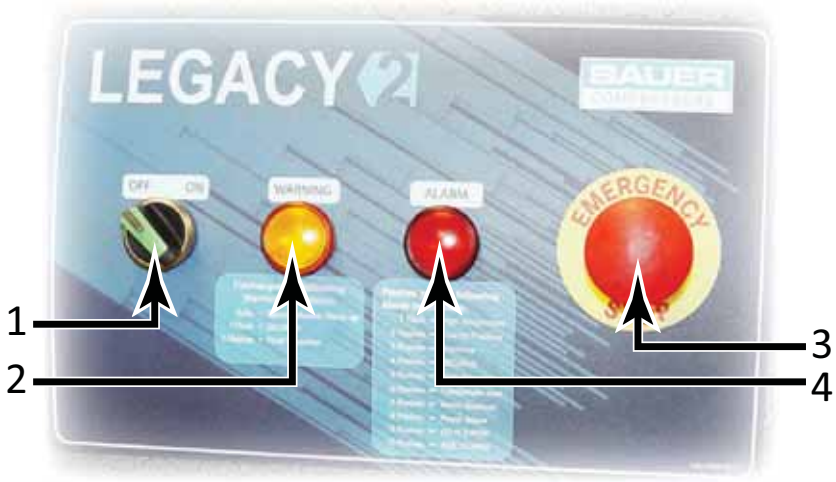
1. Applies only to compressors for mediums other than air

7.7.1 Analog Inputs to the PLC.

The Air Pressure Switch and the Oil Pressure Switch are connected in parallel and provide their input to the PLC through PLC Input Terminal M.

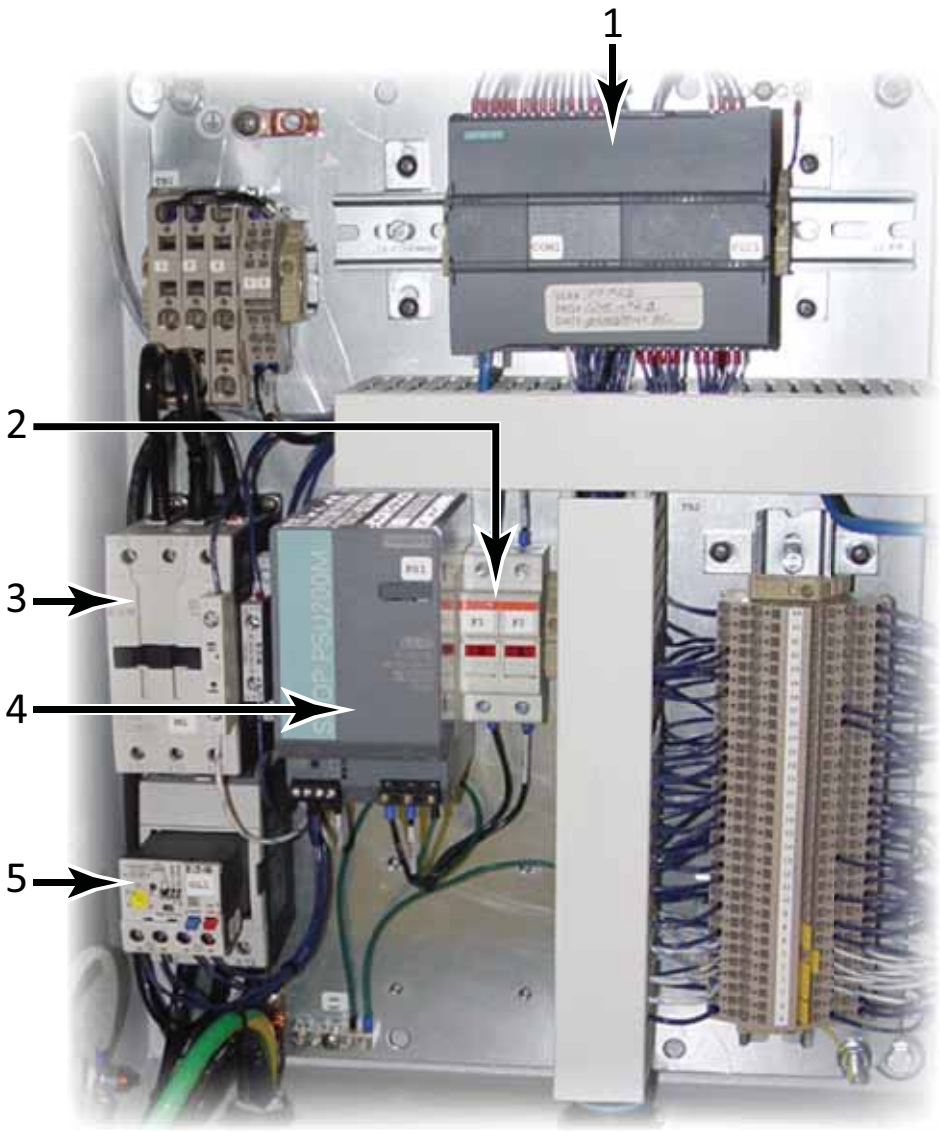
7.8 Replacement Parts List

Figure 7-14 Control Pane



Item	Qty	Part No.	Description	Notes
1	1	SWT-0416	Compressor Control Switch	
with	1	LIT-0251	Green LED light	
2	1	LIT-0257	Amber Lens	
with	1	LIT-0259	Amber LED	
3	1	SWT-0412	Emergency Stop Push Button	
4	1	LIT-0245	Red Lens	
with	1	LIT-0260	Red LED	

Figure 7-15 ASY-1266, Interior



Item	Qty	Part No.	Description	Notes
♦	1	ASY-1266	Electrical PanelInterior View	
1	1	CNT-0195	PLC	*Siemens S7-1200, 1215C*
2	1	HOL-0081	Fuse Holder	2 Pole
with	2	FUS-0166	Fuse, Time Delay	6 Amp
3	1	SRT-0317	Motor Starter	3 Phase, 65 Amps
4	1	SPL-0088	Power Supply	24 VDC, 10 Amp
5	1	RLY-0244	Overload Relay	3 Phase, 32 - 65 Amps

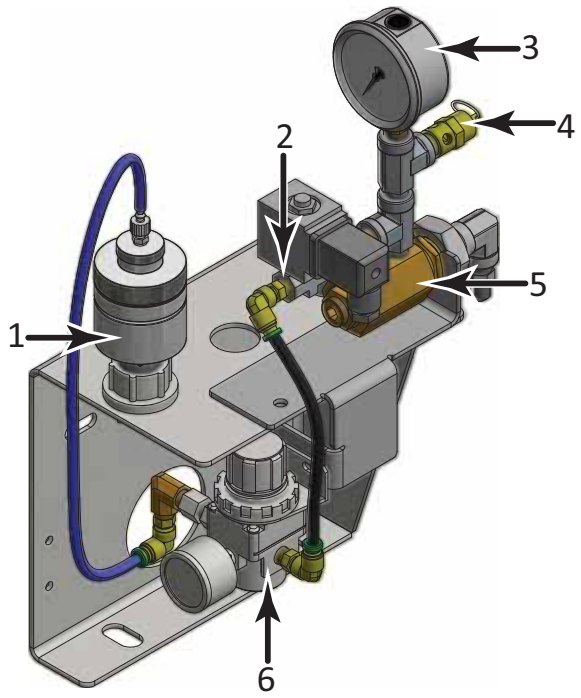
CHAPTER 8: BAUER GAS-TEK SENSORS

8.1 Description

The gas monitors are a factory installed option which may have been ordered with your unit.

The oxygen (O), carbon monoxide (CO), and carbon dioxide (CO_2) monitors sample the gas as it leaves the unit. The hydrogen sulfide (H_2S) monitor samples the ambient air. The O, CO, and H_2S monitors use an electrochemical sensor element to detect the targeted gas. The CO_2 monitor uses an infrared sensor to detect the CO_2.

Figure 8-1 Regulator & Monitors



1. CO Sensor
2. Solenoid
3. Pressure Gauge
4. Safety Valve
5. Regulator
6. Regulator

8.2 Operation

The Bauer Gas-Tek Sensor work automatically when enabled on the “Gas Sensors” portion of the program. The regulators reduces the pressurized air/gas to levels the monitors can use. When any of the sensors detect the set concentration of gas it activates an alarm condition and shuts down the compressor unit. Once the gas concentration has returned below the acceptable limit, the monitor will allow the unit to be restarted.

Assemble KIT-0439 before attempting to calibrate the sensor. To assemble the kit, attach one end of the clear hose to the regulator. Attach the white plastic adapter to the other end of the clear hose. When zeroing or calibrating, the clear regulator hose should be attached to the sensor in place of the blue hose which connects the sensor to the regulator. Zero the sensor first using the zero test gas. After pressing the **Sensor** button on the main menu of the touch screen follow the on screen instructions to zero the sensor. Once the sensor is zeroed it can be calibrated using the 20 ppm CO gas. Again, follow the steps as presented on the touch screen to calibrate the sensor.

Figure 8-2 Basic Calibration Kit & Test Gases

1. Calibrating Regulator (KIT-0439)	1. 20 ppm Carbon Monoxide Test Gas	2. Zero Test Gas

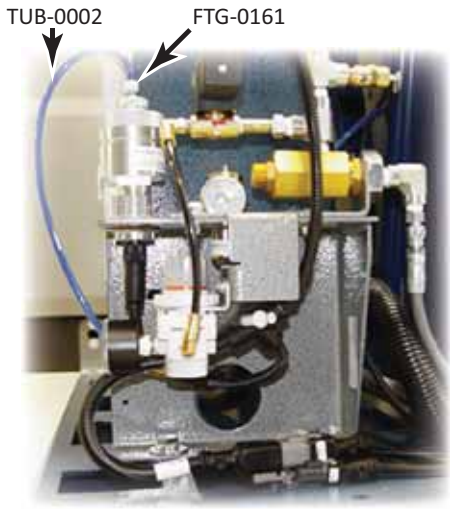
NOTICE

NFPA states that gas monitors must be calibrated on a 30 day cycle. For non-NFPA applications local, state and corporate codes must be referenced.

8.3 Sensor Set-up/Preparation for Calibration & Regulator Adjustment

1. **IMPORTANT!** Disconnect the sensor inlet air tube (TUB-0002) at the Luer fitting (FTG-0161) on each sensor.

Figure 8-3 Sensor Fitting



2.

A. For compressor systems with on-board HMI, apply power to the unit and pull out the Emergency Stop button to allow the HMI to power up.

B. For "Legacy" model compressor systems without an on-board HMI, use of a Legacy HMI Kit is required.

- KIT-0618 = LEGACY HMI kit without calibration gas kit.
- KIT-0623 = LEGACY HMI kit with CO calibration gas kit
- KIT-0624 = LEGACY HMI kit with CO and H_2S calibration gas kits.

Reference the manual provided with the LEGACY HMI kit.

Connect the 120 V power cord from the kit to a wall receptacle.

Connect the CAT 5 cable from the kit to the CAT 5 connector on the LEGACY unit controls enclosure.

Apply power to the LEGACY unit and pull out the Emergency Stop button to allow the unit controls to power up.

8.3.1 Sensor Configuration

1. Make sure the home screen is displaying properly on the HMI. Select the Configuration menu.

Figure 8-4 Main Menu

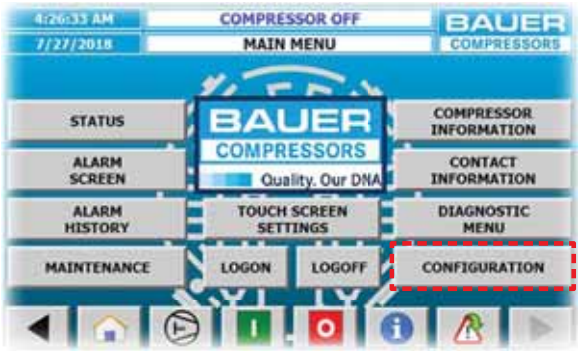
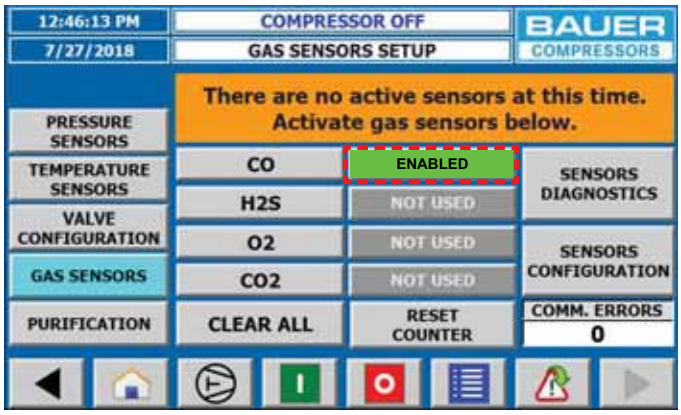


Figure 8-5 Configuration

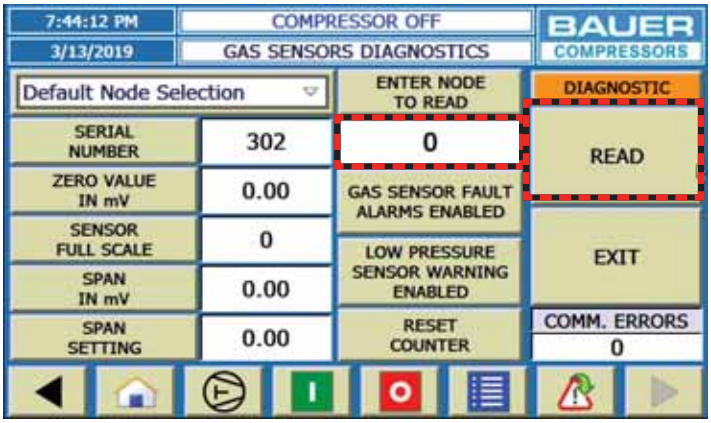
This will take you to page one of the configuration screen (Figure 1-15). From there press the gas sensors button. This will take you to the gas sensor setup page (Figure 1-16). On this screen press the “Not Used” button next to the required sensors. The button should turn green and read “Enabled”. After enabling the gas monitor reboot the system to ensure the monitor has been enabled.

Figure 8-6 Gas Sensor Setup



2. In the Sensor Diagnostics screen type in the corresponding node number for “Enter Node to Read”. Then press “Read”.

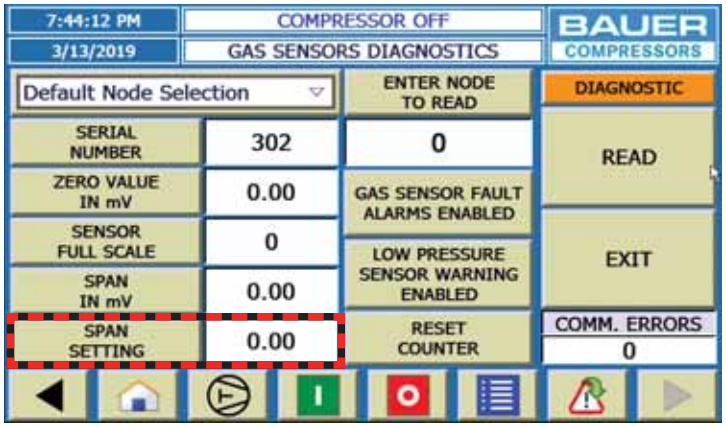
Figure 8-7 Sensor Diagnostics



NODE NUMBER	
CO	1
H_2S	11
O_2	6
CO_2	16

3. All the readings should appear in boxes. Check for proper serial number. Check “Span Setting” value, it should match the span setting from the following table, if not follow steps 4-7.

Figure 8-8 Span Setting



Span Setting	
CO	20.00
H_2S	25.00
O_2	4.00
CO_2	1000.00

4. If span is not reading table value, press “Exit” and then go to “Sensor Configuration”.

Figure 8-9 Exit

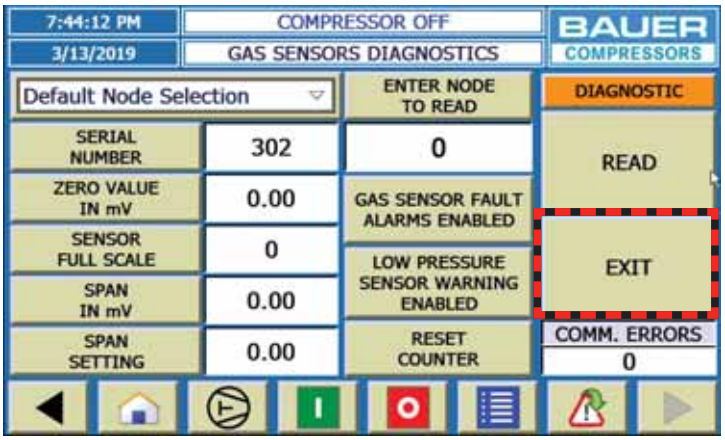
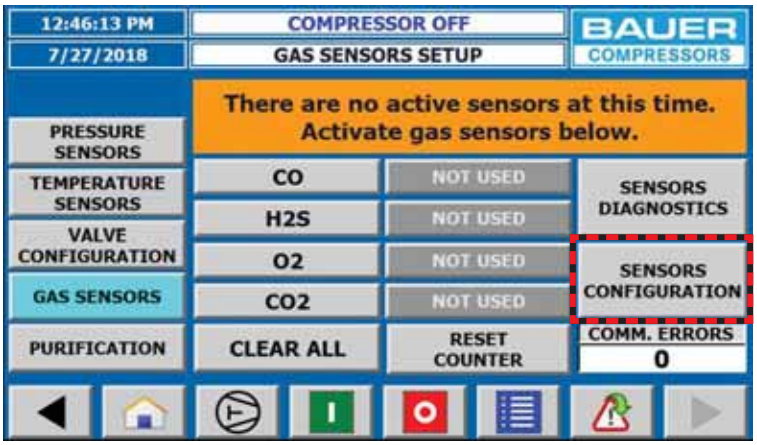
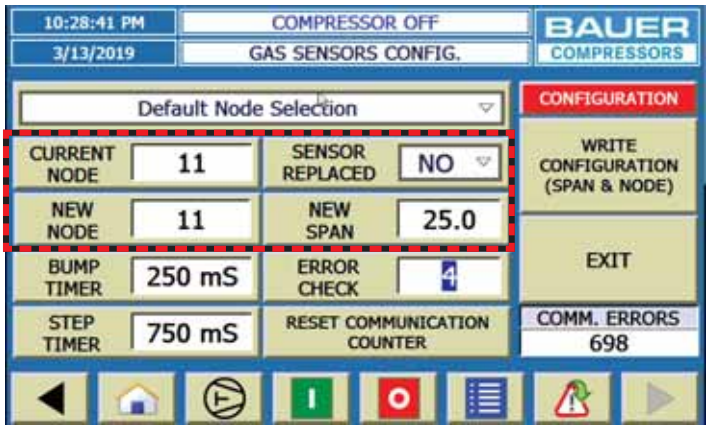


Figure 8-10 Sensor Configuration



5. Change “Sensor Replaced” to YES. Retype the “Current Node” value, “New Node” value, and “New Span” value as per the table.

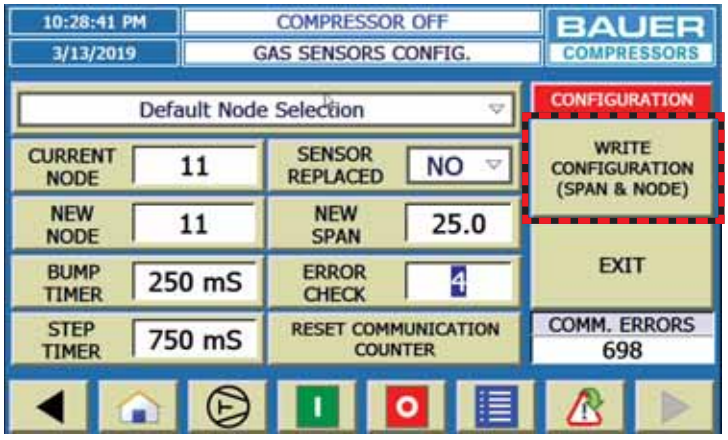
Figure 8-11 Sensor Replaced



GAS	NODE	SPAN
CO	1	20.00
H_2S	11	25.00
O_2	6	4.00
CO_2	16	1000.00

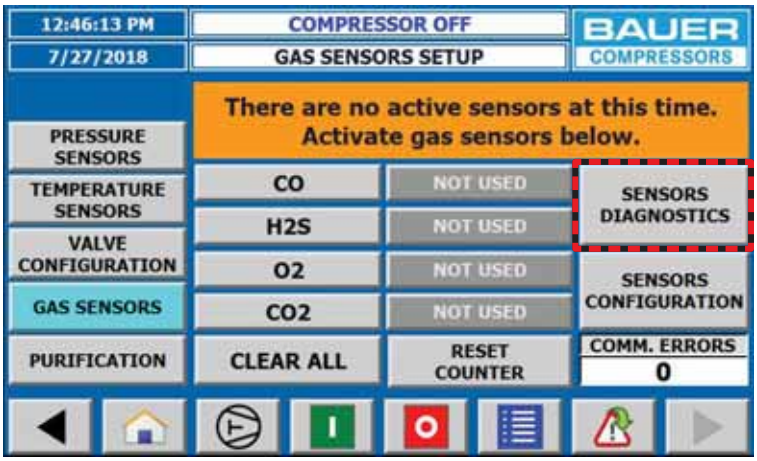
6. Press, “Write Configuration (Span & Node)”. This is the **ONLY** time and reason to change anything in “Configuration”!

Figure 8-12 Write Configuration Span & Node



7. Exit and go to “Sensors Diagnostics” to check for correct span setting as per table.

Figure 8-13 Sensor Diagnostics



8. Press “Read” to update your initial reading to the value from the previous table and then select “Exit”.

This action may require pressing “READ” up to 3 times. If correct span reading does not appear or serial number is lost, go back to step 4.

Figure 8-14 Read

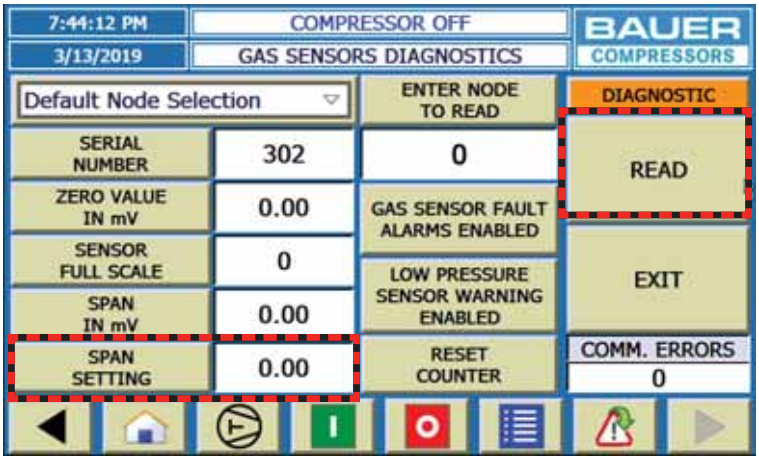
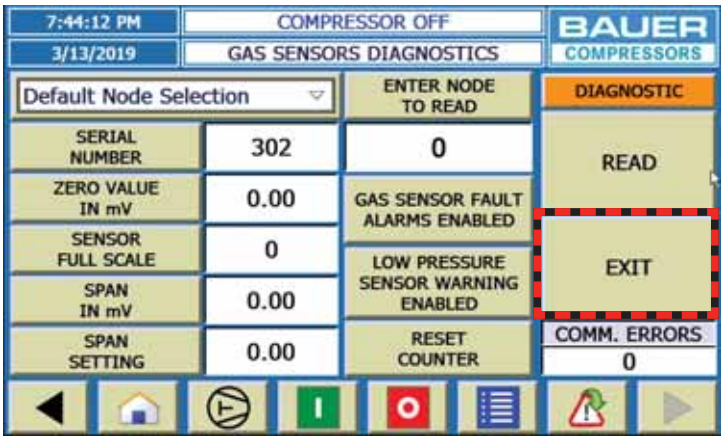


Figure 8-15 Exit



9. Press the right arrow on the bottom of the display to access the sensor “View” screen.

Figure 8-16 Right Arrow

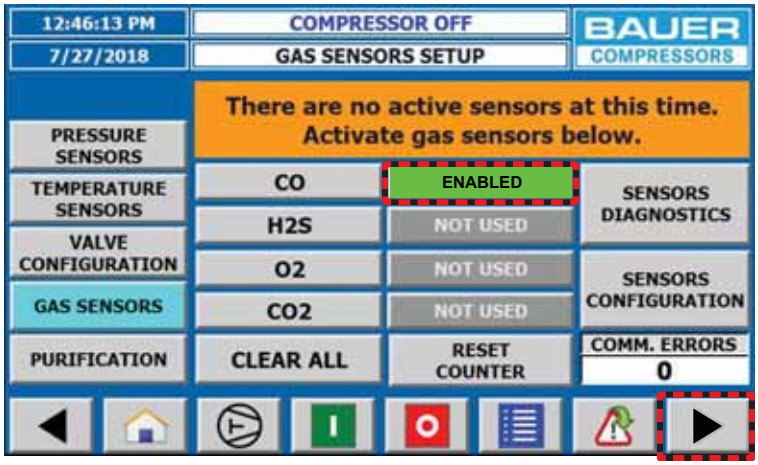
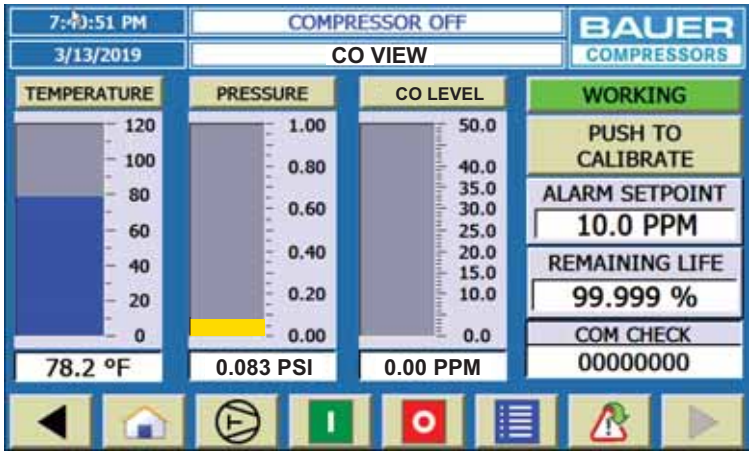
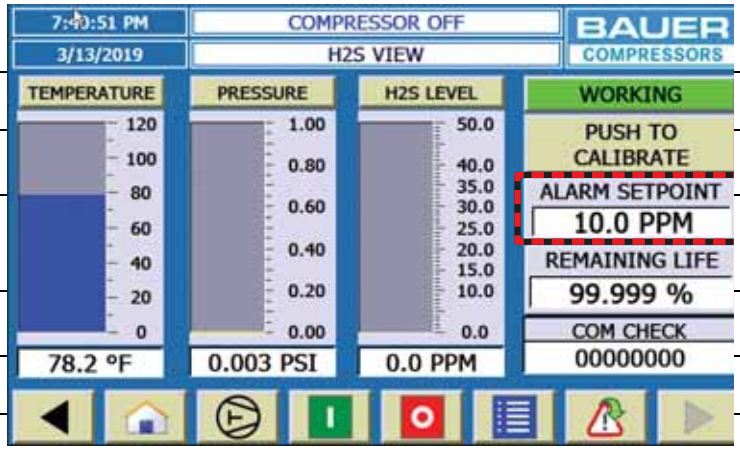


Figure 8-17 View Screen



10. Verify that the alarm set point for the sensor is correct. Reference the table below.

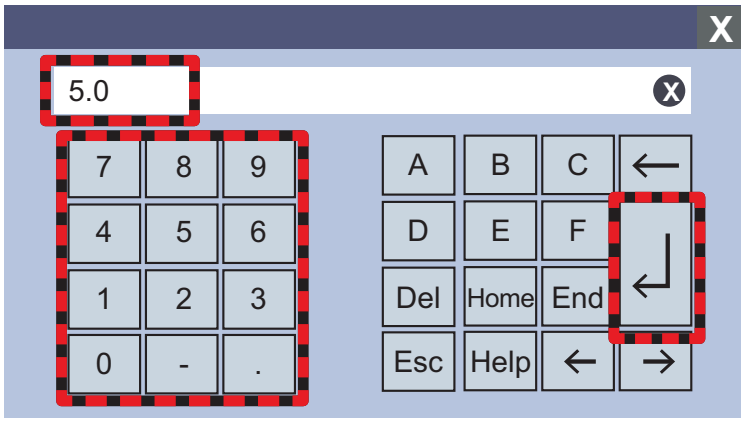
Figure 8-18 Alarm Set Point



GAS	Alarm Set Point
CO	High Alarm 5.00 PPM
H_2S	High Alarm 10.00 PPM
O_2	High Alarm at 22.5% Low Alarm at 19.5%
CO_2	High Alarm at 500 PPM

11. If the alarm setting needs to be changed, press the alarm Set Point field to access the number pad. Type in the correct alarm setting and press the return arrow to save.

Figure 8-19 Number Pad



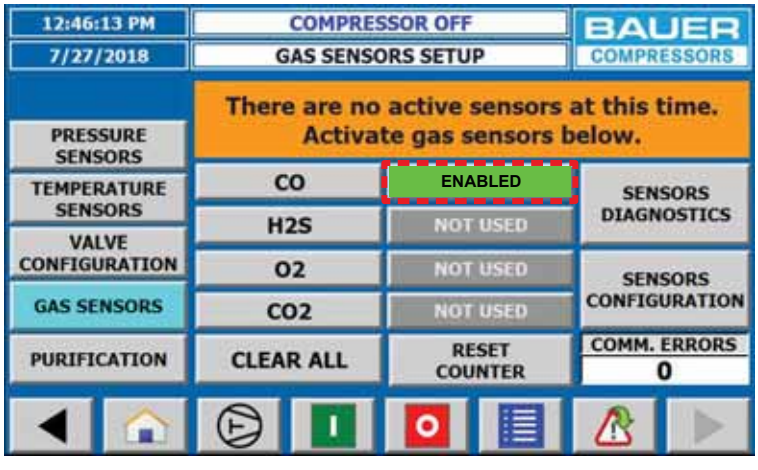
8.3.2 Calibration

Each sensor on the panel must be calibrated separately.

1. On the HMI “GAS SENSOR” screen, ensure that the type of sensor being used has been enabled and highlighted green.

**Using CO gas sensor for this example*

Figure 8-20 Gas Sensor



2. Press the right arrow on the bottom of the display. A new screen appears displaying the live values.

Figure 8-21 Right Arrow

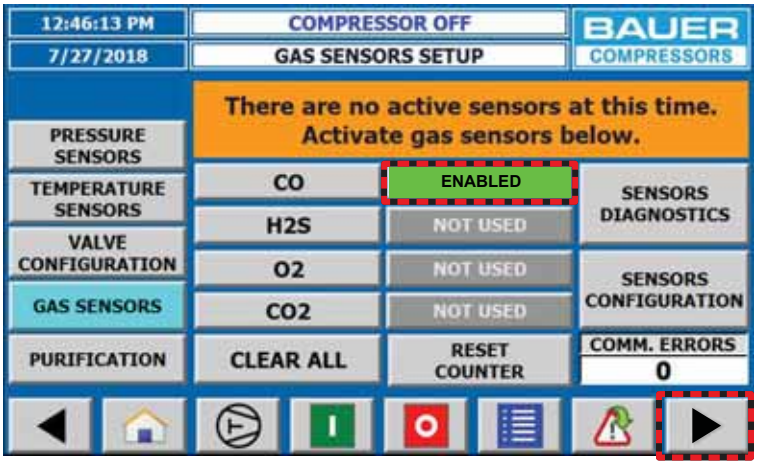
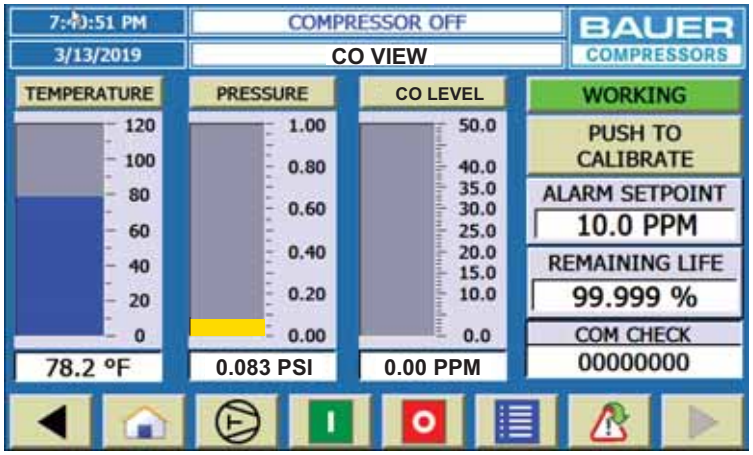


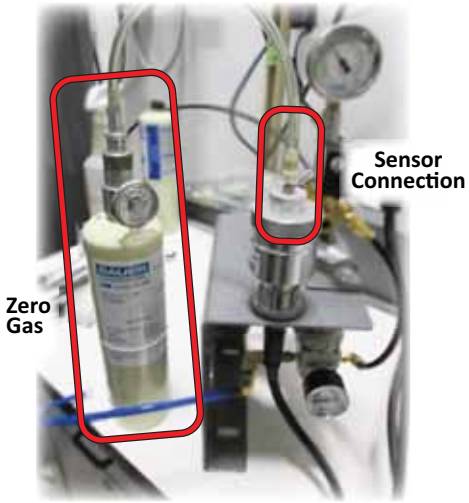
Figure 8-22 View Screen



3. Use the table below to reference for the correct gases and regulator kits for each sensor type. Connect the Zero Gas cylinder tot he sensor inlet and open the cylinder by pulling the valve operator up.

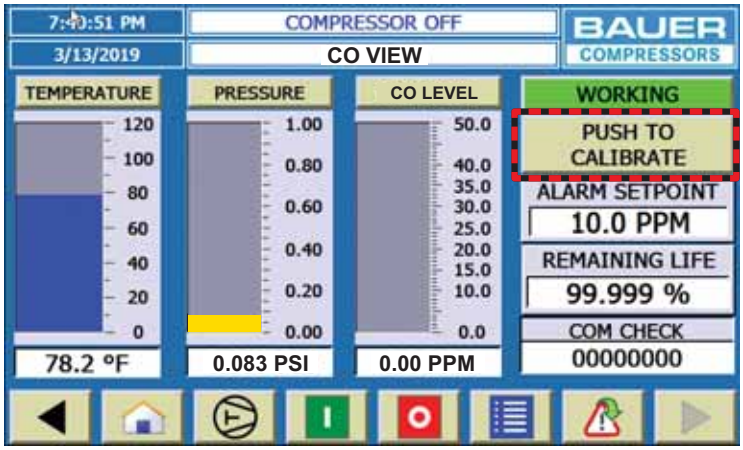
SENSOR	CAL. GAS	ZERO GAS	REGULATOR
CO	CYL-0016	CYL-0020	KIT-0439
H_2S	CYL-0091	CYL-0093	KIT-0438
O_2	CYL-0095	CYL-0079	KIT-0439
CO_2	CYL-0092	CYL-0020	KIT-0439

Figure 8-23 Zero Gas Connection



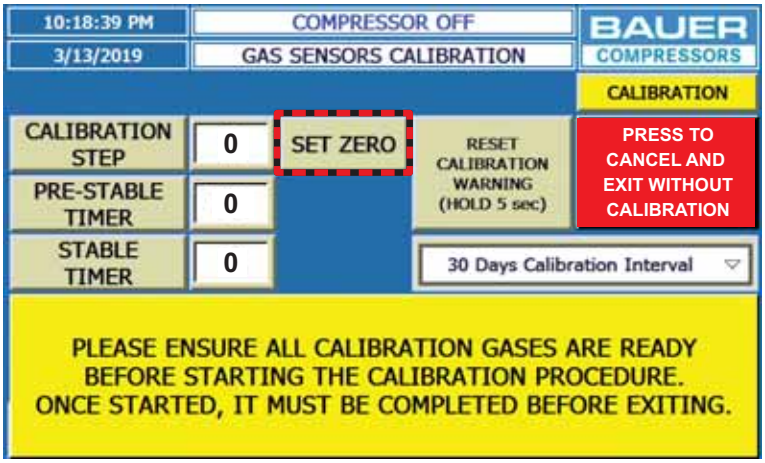
4. On the screen, press the “Push to Calibrate” button.

Figure 8-24 Push to Calibrate



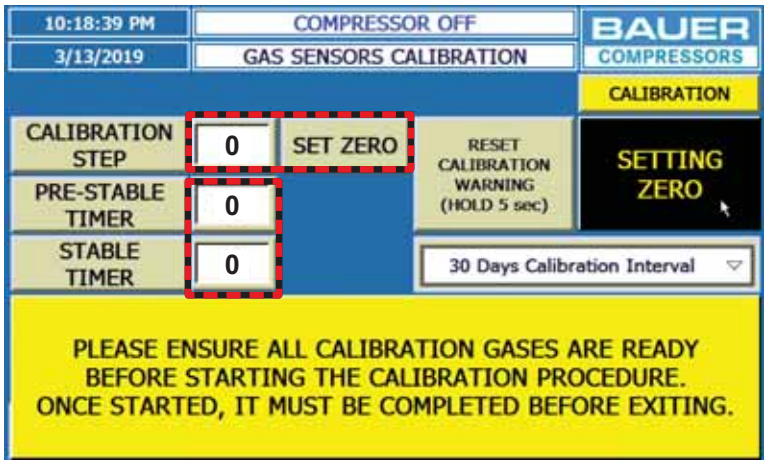
5. A new screen will appear, select “Set Zero”.

Figure 8-25 Set Zero



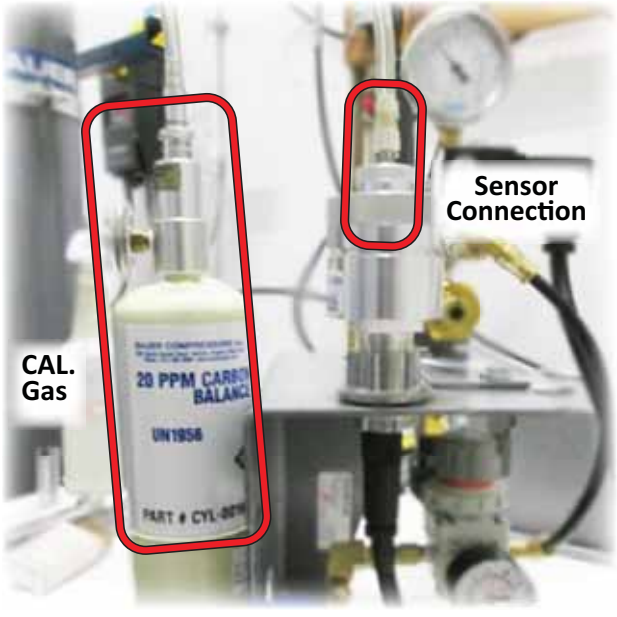
6. If the “Calibration Step” goes to 4, just press “Set Zero” one more time and wait for the “Pre-Stable Timer” and “Stable Timer” to reach zero.

Figure 8-26 Timers to Zero



7. Close the Zero Gas cylinder regulator and remove the Zero Gas cylinder. Replace it with the CAL. Gas cylinder and open the valve.

Figure 8-27 Calibration Gas



8. On the screen, press “Set Span”. Notice a new yellow block appears highlighting the phrase “Setting Span”.

Figure 8-28 Set Span

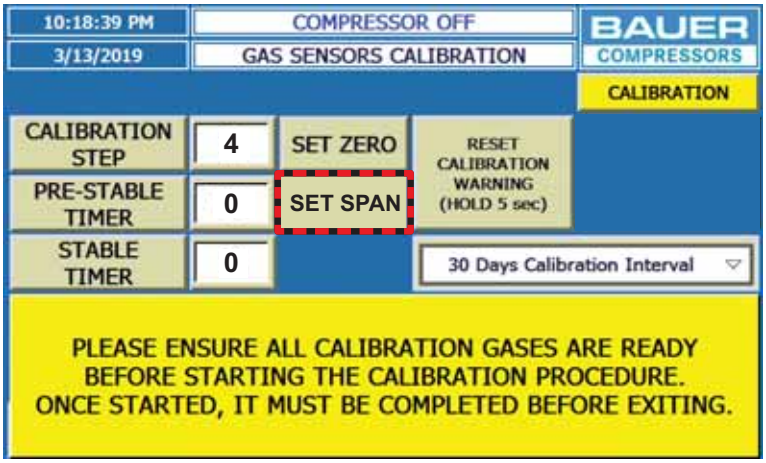
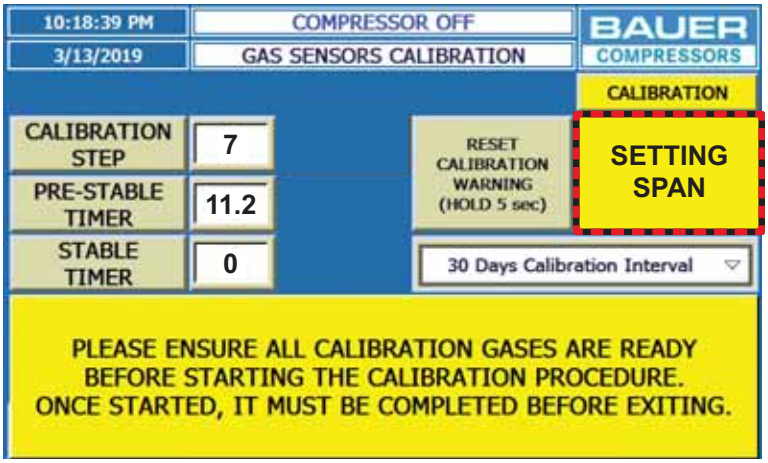
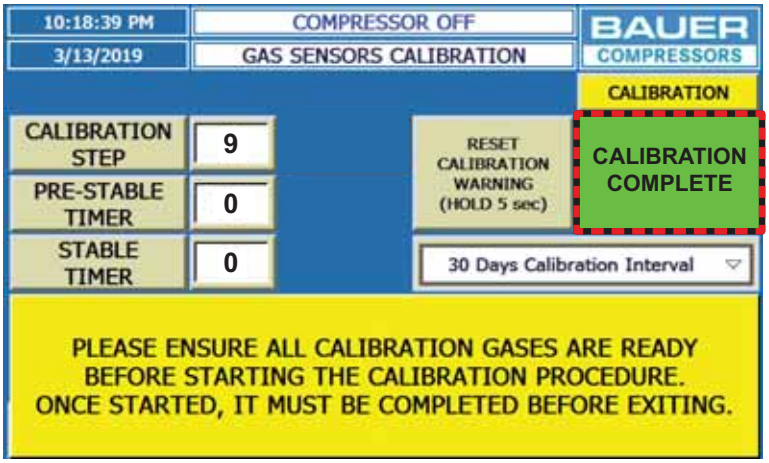


Figure 8-29 Set Span Highlight



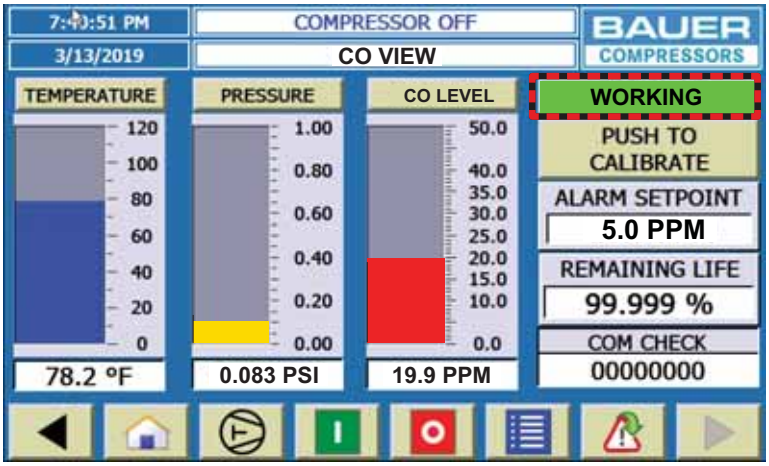
9. Once complete, a green box will appear highlighting the phrase “Calibration Complete”, wait 5 seconds to ensure the information is saved, then click on the green square.

Figure 8-30 Calibration Complete



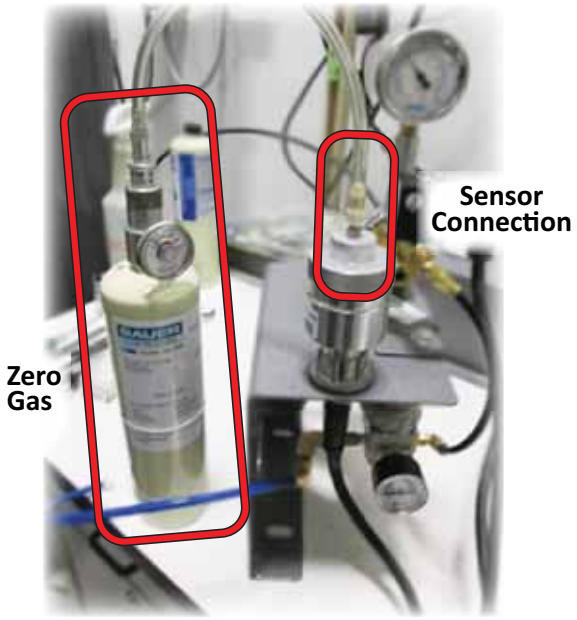
10. The previous screen will appear and notice that it should say “Working” in the top right corner.

Figure 8-31 Working



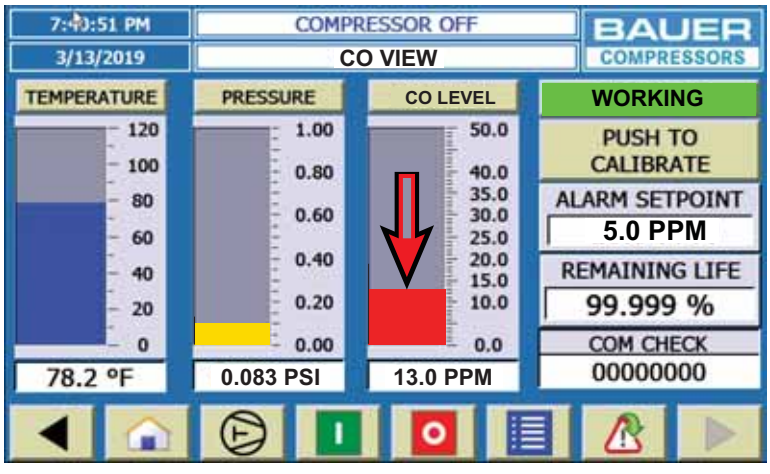
11. Close the cal. gas cylinder regulator, remove the Cal. Gas cylinder and replace it with the Zero Gas cylinder, then open the regulator.

Figure 8-32 Zero Gas



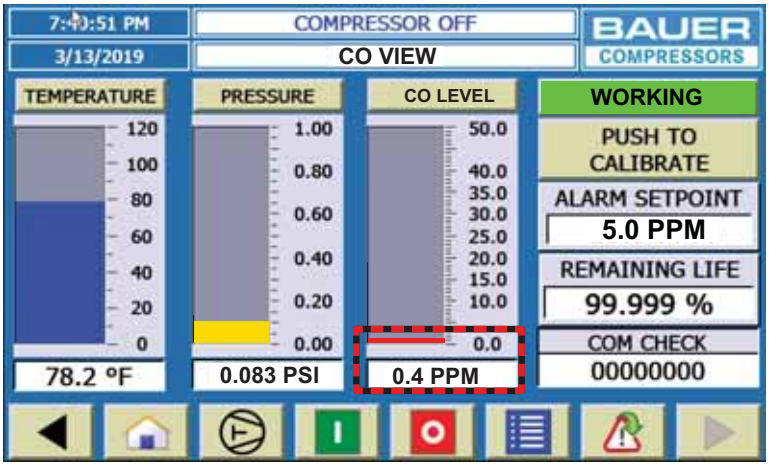
12. The Cal. Gas level will soon begin to drop.

Figure 8-33 Calibrating Gas Level Drop



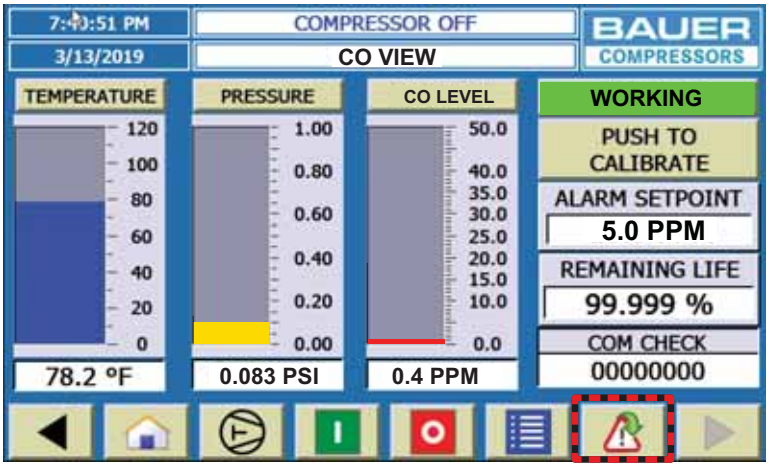
13. Once the level reaches 0.5 ppm the sensor has been cleared of the calibration gas.

Figure 8-34 Sensor Cleared



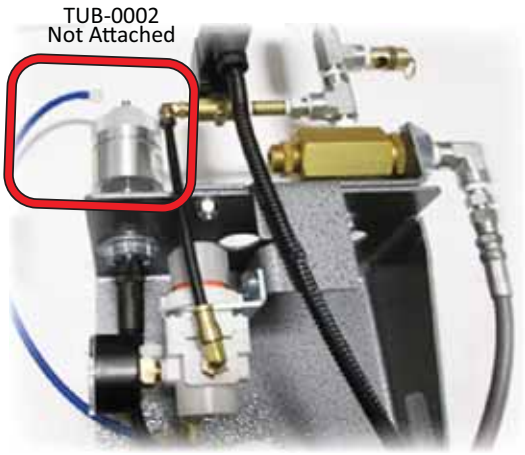
14. Press the Hazard Sign in the bottom right corner to clear the alarms.

Figure 8-35 Clear Alarms



15. Close the valve on the Zero Gas cylinder and disconnect it from the sensor. **DO NOT ATTACH TUB-0002 AT THIS TIME.**

Figure 8-36 TUB-0002 Not Attached



8.3.3 Pressure Regulators Adjustment

1. Ensure the high-pressure pneumatic supply air connection is made to the sensor panel inlet. The supply air for the sensor panel is connected to the compressor system downstream of the pressure maintaining valve.

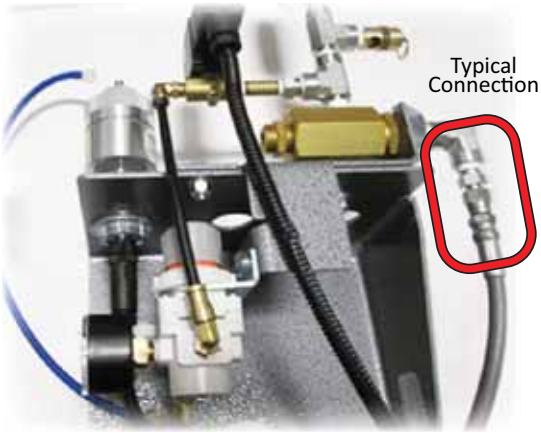
2. On the Verticus, Vertecon and Legacy models, this connection is provided at a tee below the final pressure sensor on the pressure maintaining valve located on the purification panel. When adjusting the primary and secondary pressure regulators on the sensor panel, there must be at least 1,000 psig on the outlet of the system. This pressure can be observed either on the HMI or a containment fills station inlet pressure gauge.

   On Unicus 4s and Unicus 4i, this connection is made after the pressure maintaining valve and prior to the storage system and is viewable as the compressor final pressure from the HMI.

   On Truck Mod. and BP systems, this connection is made either on the compressor skid after the pressure maintaining valve or, if a remote purification panel is installed, from the outlet of the remote panel. The pressure would be seen on the inlet pressure gauge on the storage system or containment fill station.

   Typical high-pressure air supply connection for Verticus, Vertecon, Legacy, Unicus systems:

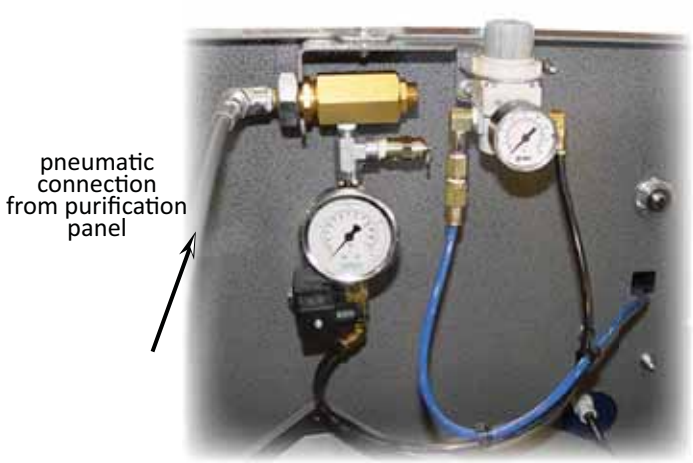
Figure 8-37 Typical Connection



NOTE: *The H_2S sensor is an ambient area sensor and is not affected by pressure regulator adjustments.*

Typical high-pressure air supply connection for Truck Modules and BP systems:

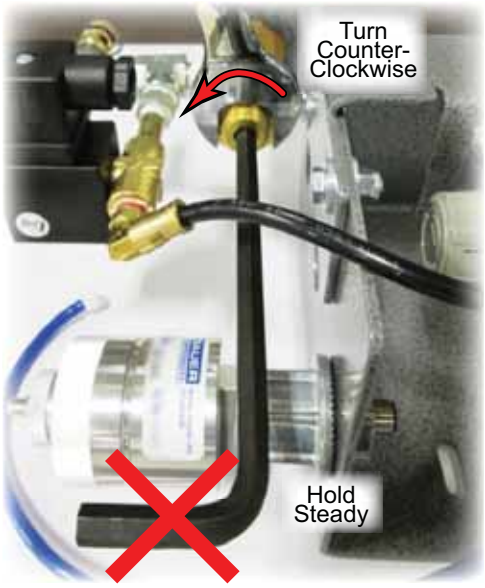
Figure 8-38 Truck Modes & BP Systems



8.3.3.1 Setting Primary Regulator (REG-0043)

1. Loosen the lock nut on REG-0043 by turning counter-clockwise using a 22 mm wrench while keeping the adjusting screw in place with the 8 mm hex key.

Figure 8-39 Loosen Lock Nut



2. The pressure setting for the primary regulator will vary depending on the high-pressure supply pressure. A minimum of 1,000 psig is required in the compressor system to properly set these regulators. The following table is used to determine the proper pressure setting of the Primary Regulator.

Compressor System Pressure (psig)	Primary Regulator REG-0043 (5 psig increments)	Secondary Regulator REG-0098 (2 psig increments)	Sensor Pressure via HMI (REF. ONLY)
1,000	**130**	**40**	Between 0.2 and 0.25 psig
1,500	110	42	
2,000	100	42	
2,500	**95**	**44**	
3,000	85	44	
3,500	80	46	
4,000	70	46	
4,500	65	46	
5,000	60	46	
5,500	55	48	
6,000	45	40	

EXAMPLE:

If the system pressure downstream of the compressor pressure maintaining valve is at 1,000 psig, the primary pressure regulator must be set to 130 psig. (green highlight)

If the system pressure downstream of the compressor pressure maintaining valve is at 2,500 psig, the primary pressure regulator must be set to 95 psig. (blue highlight)

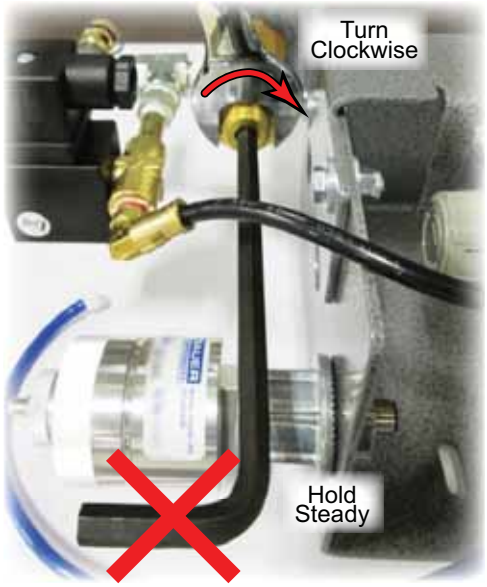
3. Open the adjuster on REG-0043 by using the 8 mm hex key turning clockwise until the inlet pressure displayed on GAG-0006 reaches the proper pressure needed.

Figure 8-40 Open Adjuster

Figure 8-41 Pressure Gauge

4. Then tighten the lock nut on REG-0043 by rotating it clockwise with a 22 mm open end wrench while keeping the adjusting screw in place with 8 mm hex key.

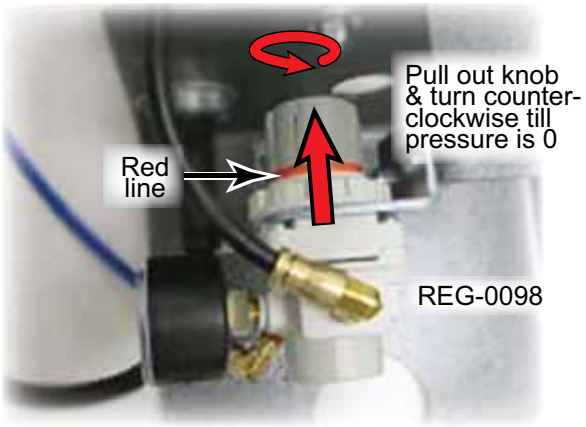
Figure 8-42 Tighten Lock Nut



8.3.3.2 Setting Secondary Regulator (REG-0098)

5. ****IMPORTANT** Pull the REG-0098 knob out and turn it counter-clockwise to fully decrease the displayed pressure to 0 psi.**

Figure 8-43 Zero REG-0098

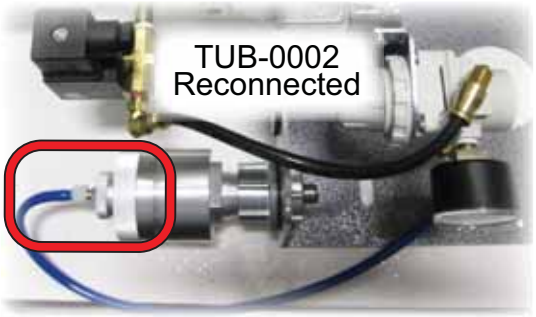


*NOTE: A red line will be visible beneath the knob when it is pulled out.

Figure 8-44 REG-0098 Gauge at Zero

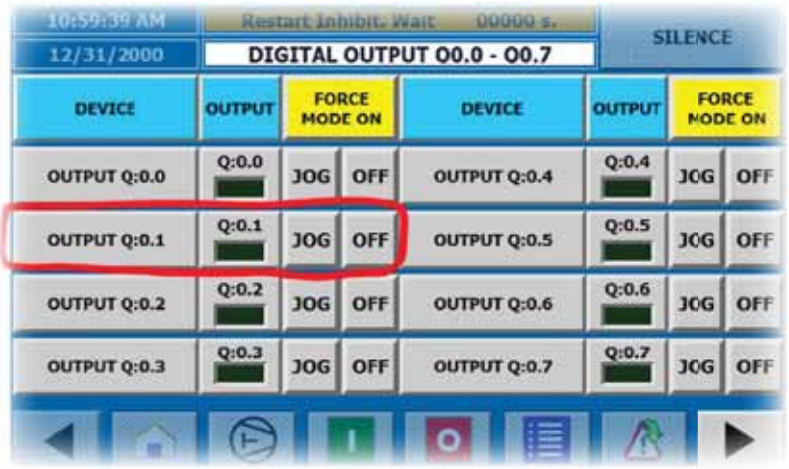
1. Reconnect TUB-0002 to the sensors on the panel.

Figure 8-45 Reconnect TUB-0002



2. To force the solenoid open to allow gas flow to the secondary pressure regulator proceed as follows:
   - From the main menu press “Diagnostic Menu”
   - Then press “Digital Output”
   - Force the solenoid open by pressing “JOG” on digital output Q0.1

Figure 8-46 Jog Solenoid



3. The pressure setting for the secondary regulator will also vary depending on the high-pressure supply pressure. A minimum of 1,000 psig is required in the compressor system to properly set these regulators. Use the following table to determine the proper pressure setting of the REG-0098:

Compressor System Pressure (psig)	Primary Regulator REG-0043 (5 psig increments)	Secondary Regulator REG-0098 (2 psig increments)	Sensor Pressure via HMI (REF. ONLY)
1,000	**130**	**40**	Between 0.2 and 0.25 psig
1,500	110	42	
2,000	100	42	
2,500	**95**	**44**	
3,000	85	44	
3,500	80	46	
4,000	70	46	
4,500	65	46	
5,000	60	46	
5,500	55	48	
6,000	45	40	

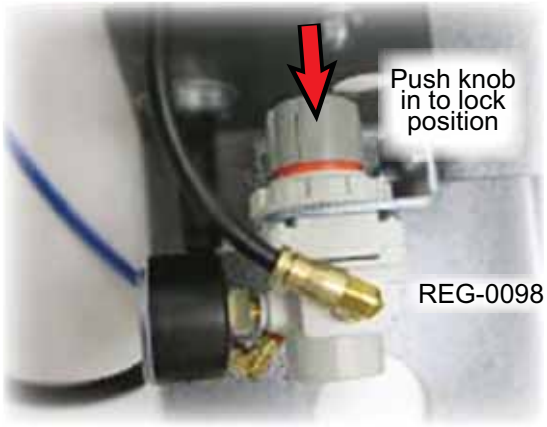
EXAMPLE:

If the system pressure downstream of the compressor pressure maintaining valve is at 1,000 psig, the secondary pressure regulator must be set to 40 psig. (green highlight)

If the system pressure downstream of the compressor pressure maintaining valve is at 2,500 psig, the secondary pressure regulator must be set to 44 psig. (blue highlight)

4. Lock the knob of the secondary pressure regulator by pushing the knob down towards the housing.

Figure 8-47 Lock REG-0098



8.3.3.3 Verification of Pressure Regulator Adjustments

To verify that the pressure regulators have been set properly, the actual pressure reading at the sensor can be observed on the HMI.

8.3.3.3.1 Single Sensor Panels

(H2S sensor is an area sensor and is not affected by pressure regulator adjustments)

1. On the HMI go to the gas sensor set up screen. Press on the installed sensor to display the pressure at the sensor.

Figure 8-48 Installed Sensor

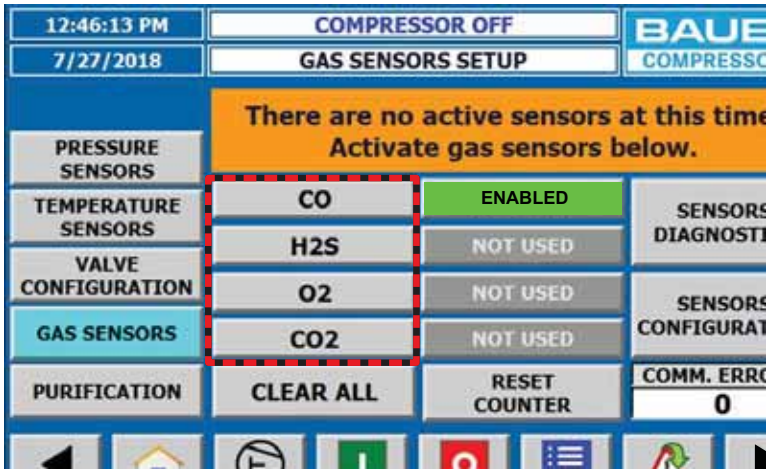
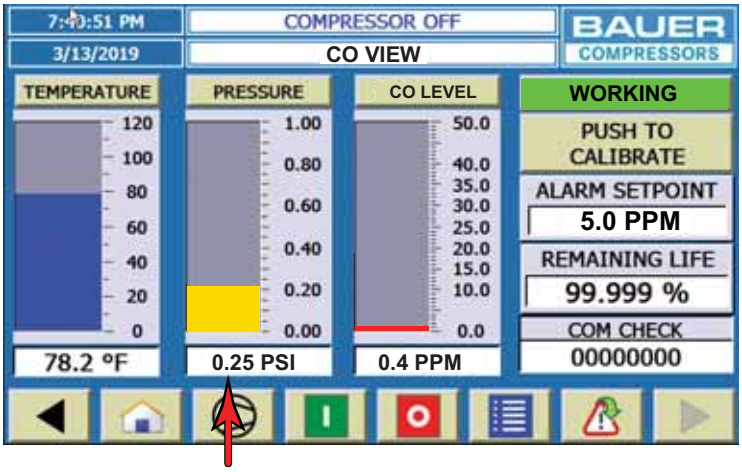


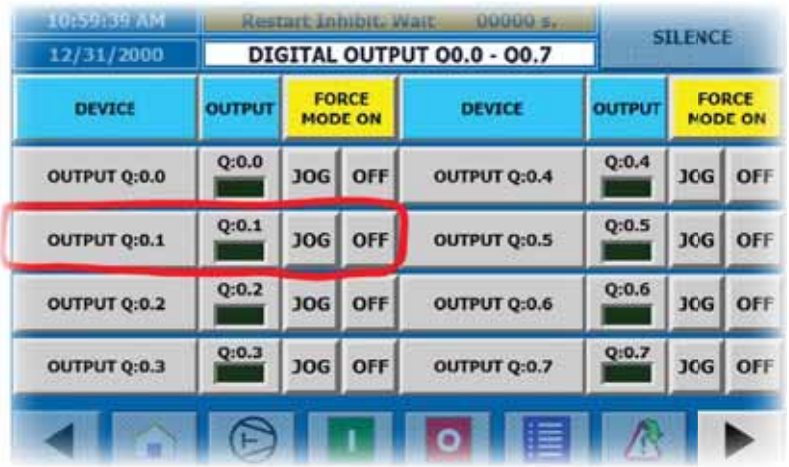
Figure 8-49 Pressure at Sensor



The pressure seen at the sensor will be displayed on the vertical pressure gauge and will be between 0.2 and 0.25 psig. If the pressure is outside of this range, reduce the pressure on the secondary pressure regulator to zero psig by pulling out the knob and rotating it fully counter-clockwise. Remove the flexible tube from the sensor at the Luer fitting and return to step one of Section 5, “Pressure Regulators Adjustment”.

2. If the pressure readings at the sensor cell are within the proper range, return to the main menu
   - Press “Diagnostic Menu”.
   - Then press “Digital Output”.
   - De-energize the solenoid by pressing “OFF” on “Output Q:0.1”

Figure 8-50 De-energize Solenoid



3. The sensor and/or sensor panel set-up is complete.

4. As is good operational practice, perform a last leak check by spraying soapy water on all fittings. If you observe any bubbles, stop the test, vent and remove all pressure. Then fix the leak.

8.3.3.3.2 Panels with Multiple Pressurized Sensors
*(H_2S Sensor is an area sensor and is not affected by pressure regulator adjustments)

1. On the HMI, go to Gas Sensor Setup Screen. Then press the installed sensor that is the last one in the series of pressurized sensors that is pressurized on the panel, to display the pressure at the sensor.

Figure 8-51 Last Installed Sensor

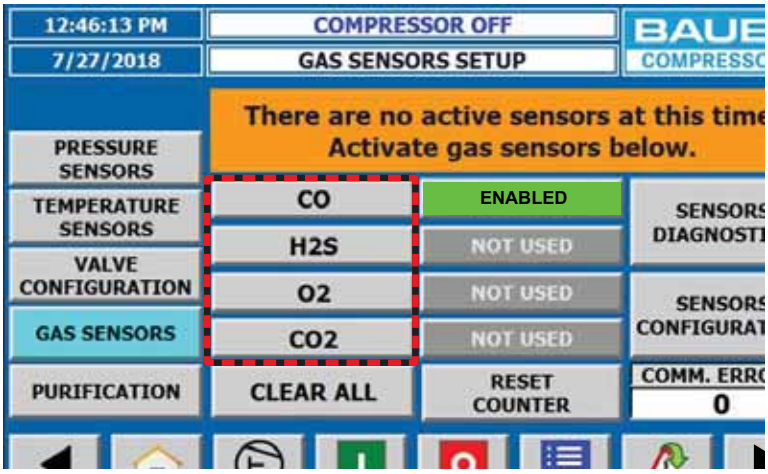
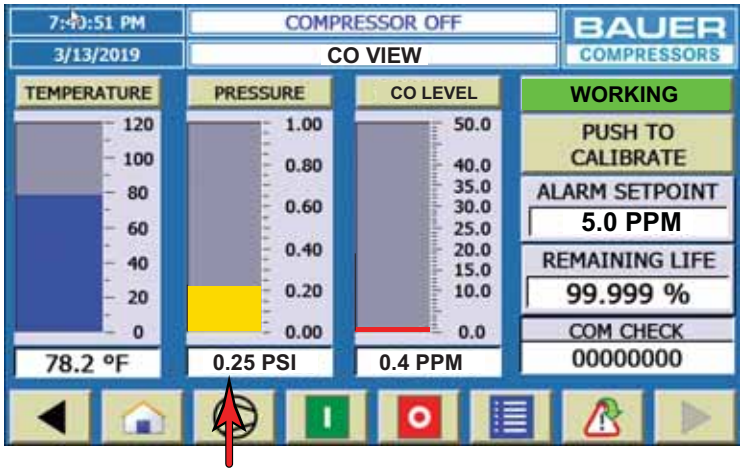


Figure 8-52 Pressure at Sensor



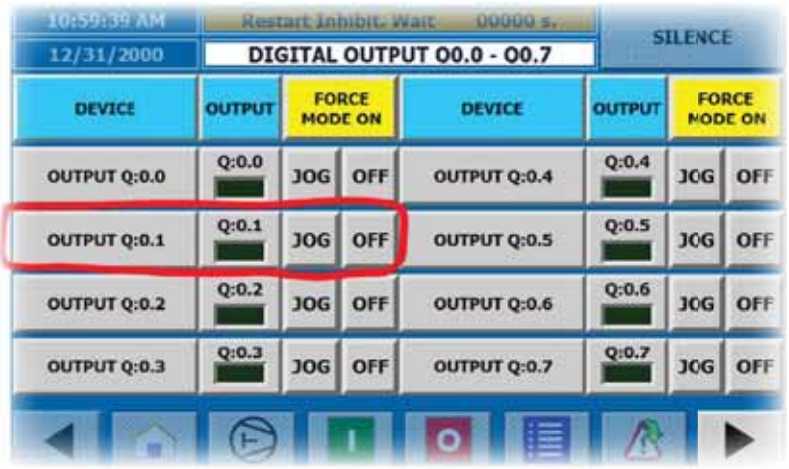
The pressure seen at the sensor will be displayed on the vertical pressure gauge and will be a minimum of 0.1 psig. If the pressure is below this range, increase the pressure on the Secondary Pressure Regulator in 2 psig increments by pulling out the knob and rotating it clockwise until 0.1 psig is reached. Change screens to view the status of the first sensor in the series of pressurized sensors that is pressurized on the panel to display the pressure at this sensor. The pressure on this first sensor in the series should not exceed 0.4 psig.

If the pressures are outside of this range, reduce the pressure on the secondary Pressure Regulator to 0 psig by pulling out the knob and rotating it fully counterclockwise. Remove the flexible tube from the sensor at the Luer fitting and return to step one of Section 5, Pressure Regulator Adjustments and repeat the adjustment steps.

2. If the pressure readings at the sensor cell are within the proper range, return to the main menu
   - Press “Diagnostic Menu”.

- Then press “Digital Output”.
- De-energize the solenoid by pressing “OFF” on “Output Q:0.1”

Figure 8-53 De-energize Solenoid



3. The sensor and/or sensor panel set-up is complete.

4. As is good operational practice, perform a last leak check by spraying soapy water on all fittings. If you observe any bubbles, stop the test, vent and remove all pressure. Then fix the leak.

8.4 Sensor Replacement

Gas-Tek sensors are considered a consumable item as the sensor cells and on-board batteries have an expected life span of approximately two-years. To keep sensor replacement costs to a minimum BCI Customer Support has established a rotatable sensor cell replacement program where a sensor is replaced by a refurbished sensor. Replacement sensor part numbers are as follow:

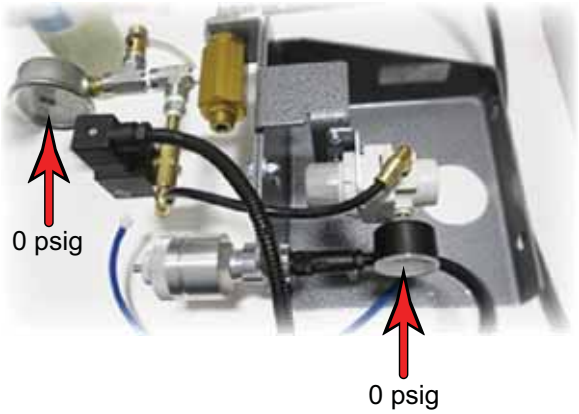
CO = SEN-0134R
O_2 = SEN-0135R
CO_2 = SEN-0136R
H_2S = SEN-0137R

To replace a sensor, proceed as follows:

1. Turn off the compressor system and pull out the Emergency Stop push button. This ensures that the sensor panel inlet solenoid is closed preventing high pressure air from entering the panel.

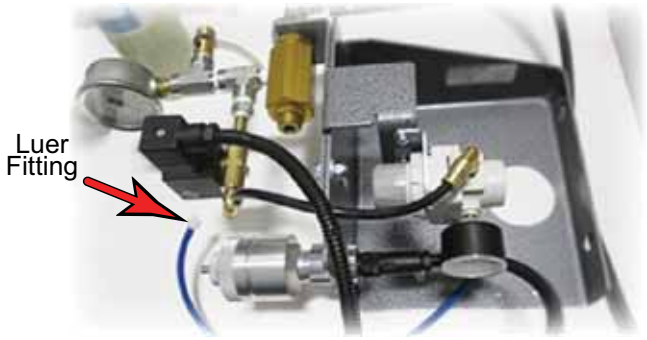
2. Verify that the pressure as seen on the Primary and Secondary Regulator pressure gauges are showing zero.

Figure 8-54 Both Regulators at Zero



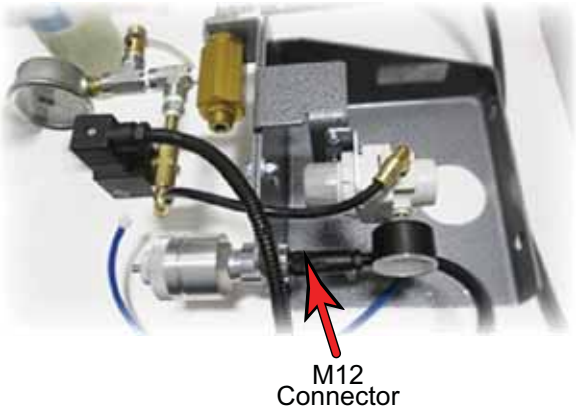
3. Disconnect the flexible tube connected to the sensor at the Luer fitting.

Figure 8-55 Luer Fitting



4. Disconnect the M12 electrical connection from the opposite end of the sensor by unscrewing the connector.

Figure 8-56 M12 Connector



5. Using a wrench to hold the bulkhead mounting connector in place, remove the entire sensor by unscrewing it from the bulkhead mounting connector.

Figure 8-57 Bulkhead Mounting

6. Insert a new sensor into the bulkhead mounting connector and tighten until snug.

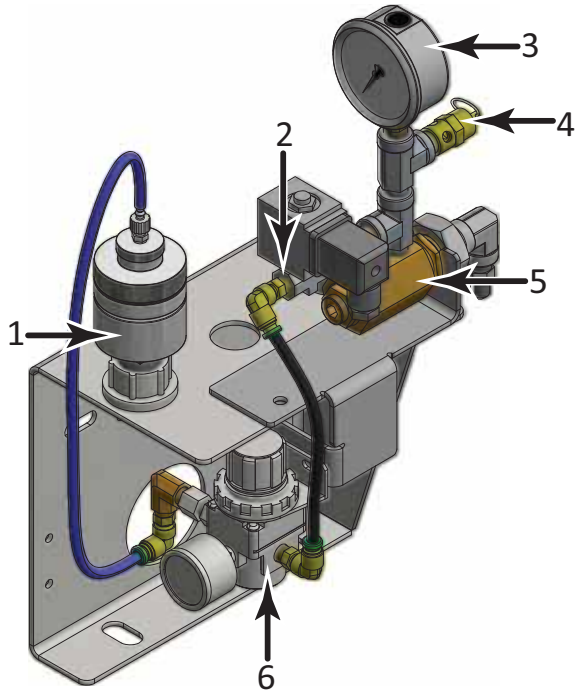
7. The M12 electrical connector is a keyed-type connector. Note where the key is located, insert and tighten the electrical connector on the sensor.

IMPORTANT - DO NOT CONNECT THE FLEXIBLE TUBE TO THE SENSOR AT THIS TIME

8. Proceed to Section 2, “SENSOR SET-UP/PREPARATION FOR CALIBRATION...” in Paragraph 8.3 and follow instructions through, “SENSOR CONFIGURATION” in Paragraph 8.3.1, “CALIBRATION” in Paragraph 8.3.2 and, “PRESSURE REGULATOR ADJUSTMENTS” in Paragraph 8.3.3.

8.5 Replacement Parts

Figure 8-58 Regulator and Monitors



Item	Qty	Part No.	Description	Notes
1	1	SEN-0134	CO Monitor,	*(See Figure 8-59)*
2	1	VAL-0510	Solenoid, NC	8 W, 24 VDC
3	1	GAG-0150W	Pressure Gauge	0 - 200 psig (14 barg)
4	1	VAL-0384	Safety Valve	@165 psig (11.4 barg)
5	1	REG-0043	Regulator,6,000 psia IN; 0-250 psia OUT	set to 150 psig (10.3 barg)
6	1	REG-0098	Regulator, 145 psi IN; 7.3 to 102 psi OUT	

Figure 8-59 Monitors & Replacement Parts

Item	Qty	Part No.	Description	Notes
1	1	SEN-0134*	Carbon Monoxide Monitor	
1	1	SEN-0135*	Oxygen Monitor	
1	1	SEN-0136*	Carbon Dioxide Monitor	
1	1	SEN-0137*	Hydrogen Sulfide Monitor	

*Sensors 134 - 137 can be ordered new, or BCI also offers a sensor replacement program that utilizes refurbished sensors at a lower cost, but still carry the full 1-year Warranty. If a refurbished sensor is desired when ordering place the letter R after the part number. (e.g. **SEN-0134R**").

Figure 8-60 Calibration Components

Item	Qty	Part No.	Description	Notes
1	1	KIT-0439	Calibrating Regulator, Hose, & Adapter	
2	1	CYL-0016	CO Test Gas	20 ppm
3	1	CYL-0020	CO Test Gas, Zero Gas	0 ppm

CHAPTER 9: INDICATORS & VALVES

9.1 Description

The Hour Meter is used to record the number of hours the unit has been operated.

The unit is also equipped with one or more of the following pressure indicators.

Interstage Pressure Gauges- Indicate the pressure between compression stages.

Final Pressure Gauge - Indicates the final operating pressure of the compressor.

Inlet Pressure Gauge - Indicates the pressure applied to the inlet of the compressor.

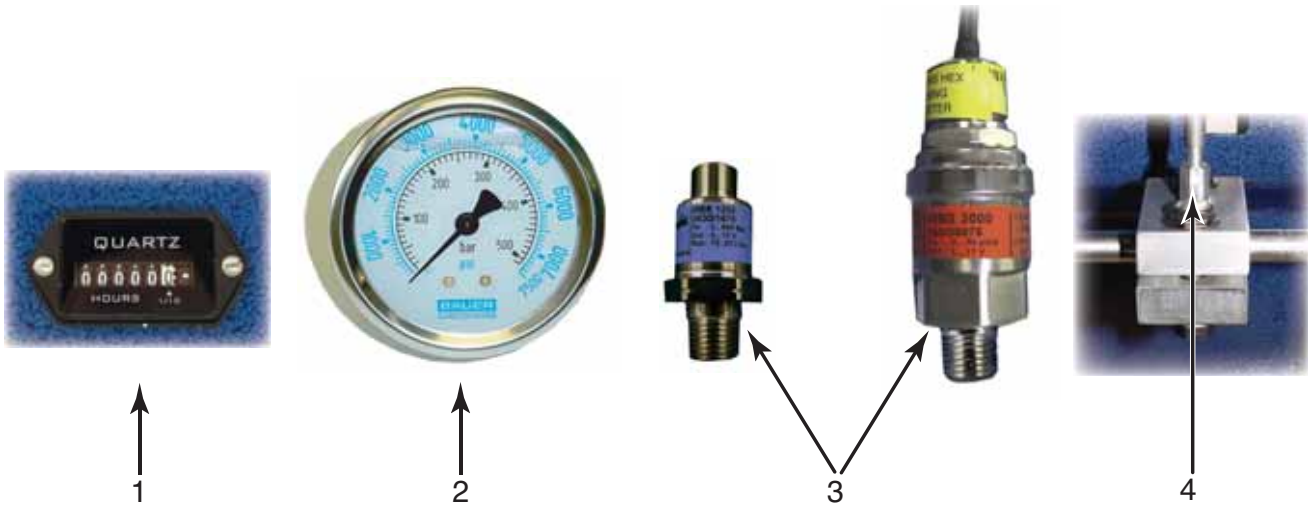
Oil Pressure Gauge - Indicates the compressor oil pressure.

Pressure Sensors - Provide a signal to the PLC indicating Gas, gas, or oil pressure.

Temperature Sensors - Provides temperature readings for the PLC.

9.2 Replacement Parts List

Figure 9-1 Indicators



Item	Qty	Part No.	Description	Notes
1	1	HMR-0036	Hour Meter	AC units
or	1	HMR-0039	Hour Meter	DC units
2	—[1]	—	2.5” Pressure Indicator	See Table 9-1:
3	—[2]	—	Pressure Sensor	See Table 9-2:
4	1	N30545	Temperature Sensor	*Optional*

1.Number of pressure gauges and type vary with model

2.Number of pressure sensors and type vary with model

Table 9-1: Pressure Gauges, 2.5” PSI & BAR

Part Number	Pressure Range
GAG-0042W	0 - 100 psi (6.89 bar)
GAG-0006W	0 - 200 psi (13.79 bar)
GAG-0007W	0 - 600 psi (41.37 bar)
GAG-0008W	0 - 1,500 psi (103.42 bar)
GAG-0011W	30 “ HG- 15 pis (58.06 mm HG - 2.5 bar)
GAG-0031W	0 - 3,000 psi (207 bar)
GAG-0009W	0 - 7,500 psi (517 bar)
GAG-0015	0 - 10,000 psi (689.5 bar)

Table 9-2: Pressure Sensors

Part Number	Pressure Range	Thread	Scale
SEN-0169	0 - 30 psig (2 bar)	1/4 NPT	4-20 mA
SEN-0170	0 - 150 psig (10.34 bar)	1/4 NPT	4-20 mA
SEN-0171	0 - 150 psig (10.34 bar)	G1/4	4-20 mA
SEN-0187	0 - 150 psig (10.34 bar)	G 1/4	0 - 10 V
SEN-0172	0 - 232 psig (16 bar)	1/4 NPT	4-20 mA
SEN-0141	0 - 500 psi (34.5 bar)	1/4 NPT	4-20 mA
SEN-0173	0 - 870 psig (60 bar)	1/4 NPT	4-20 mA
SEN-0174	0 - 1,450 psig (100 bar)	1/4 NPT	4-20 mA
SEN-0175	0 - 2,000 psig (138 bar)	1/4 NPT	4-20 mA
SEN-0176	0 - 8,700 psig (600 bar)	1/4 NPT	4-20 mA
SEN-0186	0 - 8,700 psig (600 bar)	1/4 NPT	0-10 V
SEN-0191[a]	0 - 8,700 psig (600 bar)	1/4 NPT	0-10 V

a.also temp. sensor 40 - 85 °C

9.1 Nonadjustable Valves

The condensate drain valve, bleed valve and check valves are not adjustable. The condensate drain valve and bleed valve have seats and seals which should be replaced if the valve leaks. Check valves are not adjustable or repairable and must be replaced if they malfunction.

Figure 9-1 Check Valve

Figure 9-2 Pressure Maintaining Valves (PMV)

9.2 Pressure Maintaining Valve

The pressure maintaining valve is adjusted at the factory to the required pressure and does not normally require maintenance or readjustment.

If readjustment does become necessary proceed as follows.

1. Loosen the locking nut (1).
2. Set the adjusting screw (2) to the required pressure using an appropriate hex type wrench.
3. Turn clockwise to increase pressure, counterclockwise to decrease pressure.
4. Determine if the PMV is properly adjusted:
   a. De-pressurize the final separator and purifier chamber by slowly opening the bleed valve.
   b. Close the bleed valve and start the compressor.
   c. Observe the final pressure gauge and note the pressure at which the valve opens (delivers).
   d. If the pressure is not at the specified pressure ± 100 psi, readjust the PMV.

9.3 Safety Valves

Figure 9-3 Safety Valves

The safety valves are adjusted at the factory to the required pressure and do not normally require maintenance or readjustment. They should be checked annually for proper operation. In case readjustment does become necessary, have the safety valve adjusted by a Bauer qualified technician or return the valve to the factory (contact the Bauer Product Support Department for details).

CHAPTER 10:APPENDIX

10.1 Safety

10.1.1 General Safety Precautions

- Read the operating manual before installing or operating this compressor unit. Follow appropriate handling, operation and maintenance procedures from the very beginning. The maintenance schedule contains measures required to keep this compressor unit in good condition. Maintenance is simple, but must be executed regularly to achieve safe operation, maximum efficiency and long service life.
- We recommend that all maintenance work be recorded in a service book, showing the date and details of the work carried out. This will help to avoid expensive repair caused by missed maintenance work. If it is necessary to make a Claim against the warranty, it will help to have proof that regular maintenance has been carried out and that the damage has not been caused by insufficient maintenance.
- This compressor unit must be installed, operated, maintained and repaired only by BAUER authorized, trained and qualified personnel. Information on BAUER training and becoming BAUER authorized can be accessed at (757)858-6006 or productsupport@bauercomp.com.
- Consult and follow all OSHA, NEMA, ASME and local regulations, laws and codes covering the installation and operation of this compressor and accessories before operating the unit.
- Do not operate this unit in excess of its rated capacity, speed, pressure, temperature, or otherwise than in accordance with the instructions contained in this manual. Operation of this unit in excess of the conditions set forth in this manual will subject the unit to limits which it may not be designed to withstand.
- Keep safety guards in place.
- Do not modify the compressor or its systems.
- Do not wear loose clothing around machinery. Loose clothing, neckties, rings, wrists watches, bracelets, hand rags, etc. are potential hazards.
- Provide adequate fire protection. Make sure fire extinguishers are accessible. Select alternate routes of escape and post such routes.
- Make sure you are equipped with all required safety equipment; hearing protection, safety glasses, hard hats, safety shoes and fire extinguisher.
- Visually inspect the unit before starting. Remove and or replace any loose or broken components, tools, valves, missing equipment, etc.
- Do not tamper with, modify, or bypass safety and shutdown equipment.
- Do not tighten or adjust fittings or connections under pressure.
- The use of plastic pipe or rubber hose in place of steel tube or iron pipe, soldered joints or failure to ensure system compatibility of flex joints and flexible hose can result in mechanical failure, property damage, and serious injury or death.
- The use of plastic or nonmetallic bowls on line filters without metal guards can be dangerous.
- Replace damaged fan blades promptly. Fan assemblies must remain in proper balance. An unbalanced fan can fly apart and create an extremely dangerous condition.

- Allow the compressor to cool before servicing. Whenever the compressor is shut down and overheating is suspected, a minimum period of 15 minutes must elapse before opening the crankcase. Premature opening of the crankcase of an overheated unit can result in an explosion.
- Incorrect placement of the inlet and pressure valves in a compressor cylinder head can cause an extremely dangerous condition. Refer to the appropriate section of this manual before installing or replacing valves.
- Before doing any work involving maintenance or adjustment, be sure the electrical supply has been disconnected, and the complete compressor system has been vented of all internal pressure. Failure to follow these warnings may result in an accident causing personal injury and/or property damage.
- Before working on the electrical system, be sure to disconnect the electrical supply from the system at the circuit breaker or other manual disconnect. Do not rely on the ON/OFF switch to disconnect the electrical supply.
- Installer must provide an earth ground and maintain proper clearance for all electrical components.
- All electrical installation must be in accordance with recognized national, state, and local electrical codes.
- Do not use gasoline, diesel fuel or other flammable products as a cleaning solution.
- A compressor which has been used for gas service is unsuitable for Gas applications. Should the purchaser and/or user proceed to use the compressor for Gas service after it has been used for gas, the purchaser and/or user assumes all liability resulting therefrom without any responsibility being assumed by Bauer Compressors, Inc. The purchaser is urged to include the above provision in any agreement for resale of this compressor.
- The use of repair parts other than those listed in this manual or purchased from Bauer Compressors, Inc. 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 non-approved repair parts are installed.

10.1.2 Safety Warning Labels

Notes, labels and warning signs are displayed on the compressor unit according to model, application or equipment and may include any of the following.

	HOT SURFACES DO NOT TOUCH! Danger of burning if cylinders, cylinder heads, or pressure lines of individual compressor stages are touched.
	HIGH VOLTAGE! Life threatening danger of electrical shock. Maintenance work on electric units or operating equipment should be carried out by a qualified electrician or by a person supervised by a qualified electrician according to electrical regulations.
	AUTOMATIC COMPRESSOR CONTROL UNIT MAY START WITHOUT WARNING! Before carrying out maintenance and repGas work, switch off at the main switch and ensure the unit will not restart.
	THE INSTRUCTIONS MUST BE READ BEFORE OPERATING THE UNIT! The instruction manual and all other applicable instructions, regulations, etc. must be read and understood by the operating personnel before using the machine.
	HEARING PROTECTION MUST BE WORN! Hearing protectors must be worn when working on a machine which is running.
	DIRECTION OF ROTATION! When switching on the machine, check the arrow on the compressor to ensure correct direction of rotation by the drive motor.

10.2 Unpacking, Handling and Installation

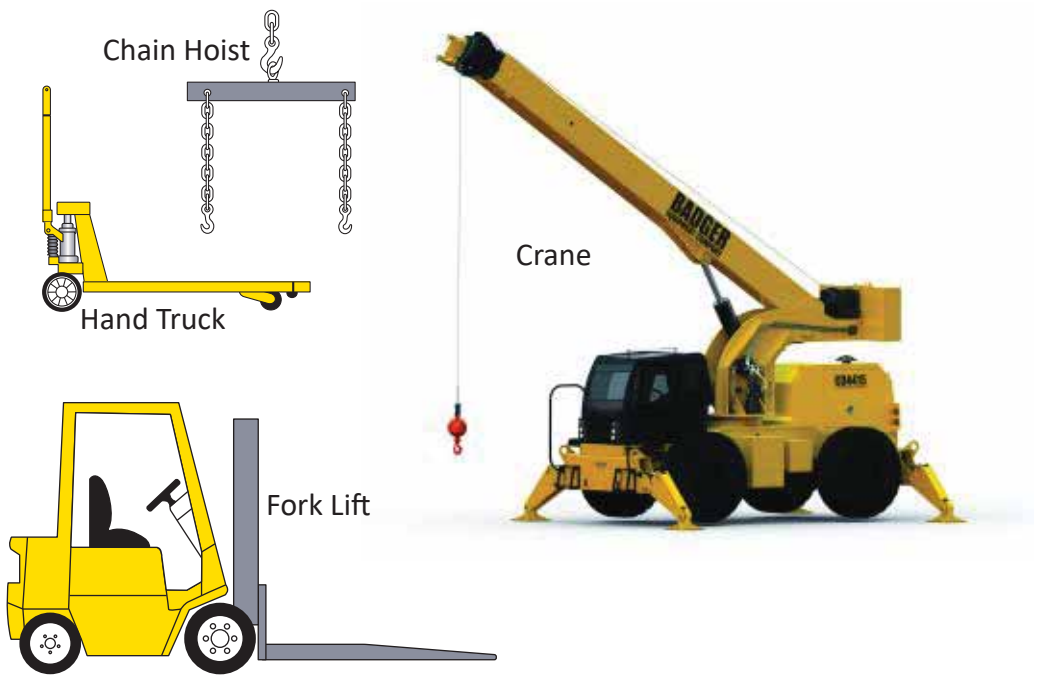
10.2.1 Unpacking and Handling

This compressor unit is packaged according to the requirements for shipping via the requested type of carrier service. It is possible that the compressor unit could have been damaged during shipping. For this reason, we urge you to thoroughly examine the unit for possible damage and report any such damage to the shipping company immediately.

Care must be taken in unpacking the compressor unit. Serious damage could result by not checking for clearance between the item being unpacked and the packaging to be removed.

Handling of the unpacked unit should be performed using only the following devices. See Figure 10-1.

Figure 10-1 Lifting Devices



1. Chain Hoist	2. Hand Truck	3. Forklift	4. Crane

WARNING

Be sure the lifting devices are capable of handling the weight of the unit (see Paragraph 1.4 for the approximate weight of the unit). Before lifting the unit, secure all loose or swinging parts to keep them from moving. Stay clear of lifted load.

The compressor unit may be furnished with one or more shipping braces for shipping and handling only. After installation and before operation, these braces must be removed entirely. Under no circumstances should the braces remain installed during operation or the manufacturer's warranty for the compressor unit will be voided. All braces are tagged and labeled.

10.2.2 Installation of the Compressor Unit

10.2.2.1 General

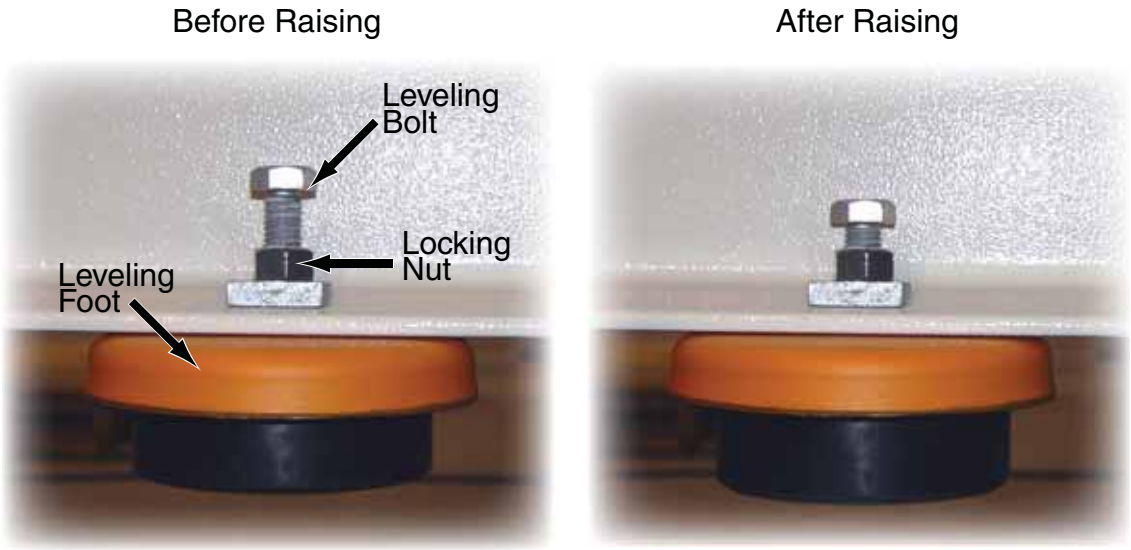
The floor site must be capable of supporting the weight of the unit. Secure the compressor unit to the floor using ½" lag bolts. Position the unit so that it is level. Permissible inclination of the compressor unit is listed in Paragraph 1.4.

CAUTION

The inclination values listed in Paragraph 1.4 are valid only if the oil level of the compressor is level with but does not exceed the upper mark of the oil dipstick or oil level sight glass.

If equipped with machine leveling feet, ensure the unit is leveled to prevent movement when operating. Raise the unit with a forklift or crane to raise the unit at the leveling foot. Loosen the locking nut and turn the leveling bolt clockwise to desired height. Lock the leveling foot in place with the provided hex-nut once the desired height is achieved. Set the unit back down on the floor and check adjusted height. If further adjustment is needed repeat.

Figure 10-2 Leveling Feet



Ensure that the compressor Gas intake is supplied with fresh Gas. The intake Gas must not contain any exhaust fumes or flammable vapors such as paint solvents, which may cause an internal fire. Make sure that the intake Gas is unobstructed and moisture in the intake Gas is kept to a minimum. It is important that units draw in clean Gas. The quality of the incoming Gas determines the quality of the compressed Gas. This is important even for industrial Gas, as any incoming fumes will also be compressed and will increase the toxicity to anyone working with the compressed Gas.

If a remote control is provided, the unit must be equipped with a clearly visible plate warning the possibility of the unit starting. As an additional measure, anyone starting the unit by remote control must

make sure that no one is checking or operating the unit. For this purpose, a second warning plate should be provided at the remote control unit.

AUTOMATIC COMPRESSOR CONTROL
UNIT MAY START WITHOUT WARNING!
Before carrying out maintenance and repair work, switch off at the main switch and ensure the unit will not restart.

Observe and maintain an ambient temperature range of 40 - 115 °F (5 - 45 °C).

The area in which the compressor unit is installed should be well lit and easily accessible to facilitate servicing and routine maintenance.

10.2.2.2 Ventilation

During normal compression, heat is generated by the compressor and by the drive motorengine. For Gas-cooled compressor units, this heat needs to be vented away by sufficient ventilation.

10.2.2.2.1 Outdoor Installation

It is recommended that all gasoline and diesel engine driven compressor units be installed outdoors. Electrically driven compressor units may be installed outdoors only if enclosed with weatherproof enclosure panels.

10.2.2.2.2 Indoor Installation

The best location to install the compressor unit indoors is against an outside wall with a suitably large Gas vent in front of the cooling fan. Additionally, it is necessary to position an exhaust opening in the opposite wall, close to the ceiling or in the ceiling.

As a basic rule of thumb, the room should be ventilated sufficiently so as to prevent the ambient room temperature from exceeding 105 °F (41 °C). Additional heat generating equipment or piping should be avoided or must be well insulated.

10.2.2.2.3 Natural Ventilation

Natural ventilation should only be used up to a maximum drive power of 20 Hp. Units with higher powered drives should incorporate forced ventilation. To determine the size of the required intake and exhaust openings for natural ventilation, refer to the following table:

Drive Hp	Intake and Exhaust Openings Dependent on Room Volume (V) and Height (h)					
	V = 1750 ft³ h = 6.5 ft		V = 3500 ft³ h = 10 ft		V = 7000 ft³ h = 13 ft	
	Intake (ft²)	Exhaust (ft²)	Intake (ft²)	Exhaust (ft²)	Intake (ft²)	Exhaust (ft²)
3	1.3	1.1	…	…	…	…
5	3.2	2.7	1.3	1.1	…	…
7.5	4.5	3.8	2.6	2.2	1.3	1.1
10	9.7	8.1	6.5	5.4	2.6	2.2
15	14.5	12.4	9.7	8.1	5.8	4.8
20	20.6	17.2	15.6	12.9	9.7	8.1

10.2.2.2.4 Forced Ventilation

Forced ventilation should be utilized on units with drive power higher than 20 Hp. For units with lower powered drive natural ventilation may be used. To determine the size of the required intake and exhaust openings for forced ventilation, refer to the following table

Drive Hp	Intake & Exhaust Openings Dependent on Room Volume (V) and Height (h)[a]					
	V = 1750 ft³ h = 8 ft		V = 3500 ft³ h = 10 ft		V = 7000 ft³ h = 13 ft	
	Intake (ft²)	Exhaust cfm	Intake (ft²)	Exhaust cfm	Intake (ft²)	Exhaust cfm
25	3.3	3,300	3.2	3,200	3.0	3,000
30	4.0	3,960	3.8	3,840	3.6	3,600
40	5.3	5,280	5.1	5,120	4.8	4,800
50	6.6	6,600	6.4	6,400	6.0	6,000
60	7.9	7,920	7.7	7,680	7.2	7,200
75	9.9	9,900	9.6	9,600	9.0	9,000
100	13.2	13,200	12.8	12,800	12.0	12,000
125	16.5	16,500	16.0	16,000	15.0	15,000
150	19.8	19,800	19.2	19,200	18.0	18,000

a. The intake sizes given in the above table are for a cooling Gas velocity of 1000 ft.min. Bauer recommends that the cooling Gas velocity be in the range of 600 ft. min. to 2000 ft.min.

10.2.3 Intake Gas

The quality of Gas produced by the compressor unit is directly related to the quality of Gas that is taken in by the compressor. Bauer compressors require clean, dry, shop Gas for optimal performance. The intake Gas source must be free of contaminants such as fumes, engine exhaust, and solvents. If the intake source will be piped in adhere to the following general rules:

- Use PVC or similar material that will not corrode and contaminate the incoming Gas.
- The entire run should be the same sized piping
- Install a moisture trap with a drain prior to the compressor inlet
- If using glue on the piping, allow sufficient time for the vapors to dissipate before using the compressor

10.2.3.1 Inside Gas Source

The location of the compressor and its Gas intake are significant to the quality of the Gas produced and the performance of the drying system. Locating the Gas intake near other heat producing equipment must be avoided when possible. A close proximity to water heaters, boilers, and such are potential contaminates to the quality of the processed Gas. Drying cartridge lifespans are dramatically reduced when the processed Gas's temperature is elevated. Inadequate ventilation reduces the ability of the compressor to cool itself or the Gas being compressed.

High levels of CO_2 are another cause of breathing Gas to become contaminated. CO_2 limits are 1,000 ppm. and most fresh Gas already contains about 330 ppm. A number of people inside poorly ventilated rooms can easily bring the CO_2 levels up to 600 ppm or more. If high levels of CO_2 are normally present at the compressor intake, increased ventilation may alleviate the problem. Moving the intake to an outside location is another viable solution.

10.2.3.2 Outside Gas Source

Moving a compressor's Gas intake to an outside location can improve the quality of the processed Gas and increase the lifespan of the drying filters. Before moving a compressor's intake to an outside location take into account the changing conditions that may occur around where the Gas intake will be. Other exhausts vents, vehicle or machinery exhausts and fumes may contaminate the Gas in the area you wish to place your Gas intake. Gas samples can be taken and submitted for laboratory analysis if there are any doubts in the Gas quality.

If your Gas source is located outside, inspect the inlet piping regularly to ensure nothing has obstructed or contaminated the Gas that is being taken in.

10.2.4 Compressor Intake Piping

It is best to keep intake piping as short and straight as possible. Minimum height should be 8 - 10 ft. The end of the piping should point downward to avoid precipitation. Nothing should be allowed to restrict the Gas flow.

Breathing Gas can often fail to meet CGA standards, unless procedures are taken to provide a fresh Gas source for the compressor intake. The inlet source should be the cleanest ambient Gas available. Factors to consider when installing compressor intake piping in a building are the length of pipe, the diameter, and the number of 90° bends. All intake pipes must have a bug screen on the inlet end to prevent birds, bugs, or large debris from entering the inlet system. A gooseneck end or water trap on the pipe will prevent water from entering the compressor system. See the following table for recommended inlet pipe diameter.

Guideline for Intake Piping with Max. Four 90° bends

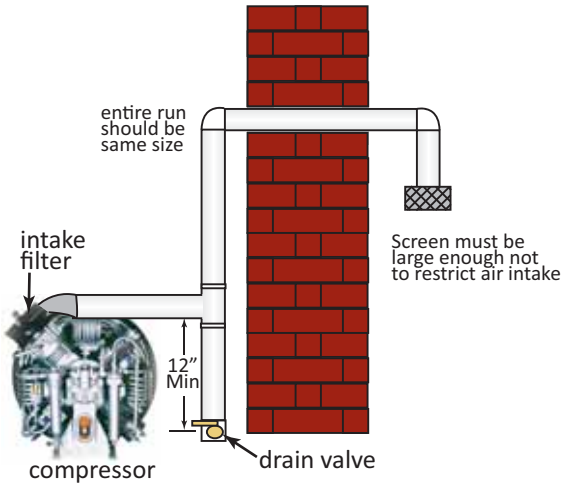
Inlet Capacity	Distance	Pipe Diameter[a]
≤ 13 SCFM	≤50 ft	2”
	50 - 100 ft	3”
	100 - 150 ft	4”
13 - 30 SCFM	≤50 ft	3”
	50 - 100 ft	4”
	100 - 150 ft	5”
30 - 50 SCFM	≤50 ft	4”
	50 - 100 ft	5”
	100 - 150 ft	6”

a. Add 1” of pipe diameter if the number of 90° bends exceeds four

10.2.5 Installation Procedures

1. Use PVC pipe for ease of installation.
2. Ensure pipe is attached securely to the wall.
3. Terminate the PVC pipe 3 to 5 ft from the compressor intake with a stub reducer the same size as the compressor inlet housing pipe.

Figure 10-3 Example of Gas Intake Piping



10.2.6 Electrical Installation

10.2.6.1 Electric Drive

When making the electrical connections to the system, the following instructions are mandatory:

- Comply with all local, state and federal regulations concerning electrical installation.
- Arrange for the electrical connections to be made by a certified electrician only.
- Ensure that the motor voltage, control unit voltage, and frequency conform with the main voltage and frequency. Do not connect the compressor unit to a voltage other than the one specified on the name-plate.
- Provide all necessary cables and main fuses and a master disconnect switch. The fuse protection for the compressor must be carried out in compliance with local, state and national electrical regulations.

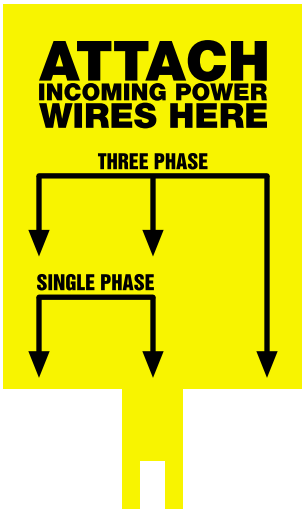
10.2.6.2 Electrical Supply

The machine is factory wired according to order. If the voltage is to be changed, consult the factory for instructions and necessary parts.

For standard models the only customer wiring necessary is from the customer supplied disconnect switch to the compressor unit electrical enclosure. All wiring should be done by a licensed electrician familiar with national, state and local electrical codes.

The label shown in Figure 10-4 indicates where the incoming power is connected to the compressor unit electrical enclosure. This label must be removed before using the equipment.

Figure 10-4 Incoming Power Wiring Label



The use of improperly sized wire can result in sluggish operation, unnecessary tripping of overload relays and/or blowing of fuses. The following tables are provided as a guide for proper wire size

1 PHASE									
Motor Hp	Full Load Amps			Fuse Amps[a]			Minimum Wire Size[b]		
	120 V	208 V	230 V	120 V	208 V	230 V	120 V	208 V	230 V
2	24	13.2	12	30	20	17.5	10	…	14
3	34	18.7	17	50	30	25	8	10	10
5	56	30.8	28	80	50	40	4	8	8
7.5	80	44	40	100	70	60	3	8	8
10	…	55	50	…	90	60	…	6	6

a. Dual element time delay fuse Amps.

b. Normal Copper wire with THW, THWN, or XHHW insulation.

3 PHASE									
Motor Hp	Full Load Amps			Fuse Amps[a]			Minimum Wire Size[b]		
	208 V	230 V	460V	208 V	230 V	460V	208 V	230 V	460V
2	7.5	6.8	3.4	12	10	5.6	14	14	14
3	10.6	9.6	4.8	17.5	15	8	14	14	14
5	16.7	15.2	7.6	25	25	12	10	12	14
7.5	24.2	22	11	40	30	17.5	8	10	14
10	30.8	28	14	50	40	20	8	8	12
15	46.2	42	21	60	60	30	6	6	10
20	59.4	54	27	90	80	40	4	4	8
25	74.8	68	34	100	100	50	3	4	8
30	88	80	40	125	100	60	2	3	8
40	114	104	52	175	150	80	1/0	1	6
50	143	130	65	200	200	100	3/0	2/0	4
60	169	154	77	250	200	100	4/0	3/0	3
75	211.2	192	96	300	300	150	300 mcm[c]	250 mcm	1
100	273	248	124	400	350	175	500 mcm	350 mcm	20
125	343.2	312	156	500	400	200	700 mcm	600 mcm	30
150	396	360	180	600	500	250	900 mcm	700 mcm	40
175	—	—	203	—	—	300	—	—	300 mcm

a. Dual element time delay fuse Amps.

b. Normal Copper wire with THW, THWN or XHHW insulation.

c. mcm = 1,000 circular mils

In the above tables, all values are based on 2011 NEC articles 430 and 310 (NFPA 70). These values are provided as a general guide; however, the information given on the motor nameplate supersedes the above information.

10.2.7 Pneumatic Leaks

Each unit is tested prior to leaving the manufacturing facility. All loose or leaking fittings are tightened prior to shipping. During the shipping process pneumatic connections may work loose and leaks may develop. Ensure each unit is leak tested prior to being placed in full operational usage.

WARNING

Never tighten or adjust fittings or connections under pressure. Always de-pressurize first.

10.3 Long Term Storage

10.3.1 General

If the compressor unit will be out of service for more than six months, it should be preserved in accordance with the following instructions:

1. Make sure that the compressor is kept indoors in a dry, dust-free room.
2. Cover the compressor with plastic sheets only if no condensation will form under the sheet.
3. Remove the sheet from time to time and clean the outside of the unit.
4. If this procedure cannot be followed, or if the compressor will be out of service for more than 24 months, please contact Bauer Product Support for special instructions.

10.3.2 Preparations

Prior to preserving the compressor unit, it must be run until warm, i.e., up to the specified service pressure. Operate the unit for approximately 10 minutes, then carry out the following checks.

1. Check all pipes, filters and valves (including safety valves) for leakage.
2. Tighten all couplings, as required.
3. After 10 minutes, open the outlet valve and operate the compressor at adjusted minimum pressure using the pressure maintaining valve for approximately 5 minutes.
4. After the 5 minutes, shut the compressor unit down and completely drain all separators and filters. Close all valves.
5. Remove filter heads and lubricate the threads with petroleum jelly.

10.3.2.1 Units Equipped with a Filter System

1. Ensure that cartridges remain in the drying system chambers. This will prevent oil from entering the outlet lines as a result of preservation procedures.
2. Remove the drying inlet tubing completely.

10.3.3 Preserving the Compressor

1. Operate the compressor again and slowly spray approximately 0.35 oz. (10 cc) of oil into the inlet port while the compressor is running. Keep the shut-off valve and the condensate drain valves open.
2. After spraying the oil into the inlet port, run the compressor unit for an additional 5 minutes before shutting the compressor unit down.

3. Close the shut-off valve and condensate drain valves.
4. Close the inlet port with a dust cap and/or tape.

10.3.4 Preventive Maintenance During Storage

Operate the compressor once every six months as follows:

1. Remove the dust cap from the inlet port and install the inlet filter.
2. Open the outlet valve and allow the system to run approximately 5 minutes until there is outflow from the valve and oil is visible in the sight glass of the oil regulating valve.
3. Shut down the compressor.
4. Open the condensate drain valves, de-pressurize the unit, then close the drain valves again.
5. Remove the intake filter and replace the dust cap on the inlet port.

10.3.5 Lubrication Oils for Preservation

1. After prolonged storage periods, the oil will age in the compressor crankcase. The oil must be drained at least every 24 months and replaced with fresh oil.
2. The stated period can only be attained when the crankcase is sealed during the preservation period in accordance with the preservation requirements.
3. After changing the oil, the compressor must be operated according to the instructions above.
4. Check the lubrication of the compressor during the every-six-month brief operation.
5. The oil pump is functioning properly when oil can be seen flowing through the sight glass of the oil pressure regulator or if the oil pressure gauge indicates the prescribed pressure.

10.3.6 Reactivating the Compressor Unit

1. Remove any dust cap or tape from the inlet port and install an intake filter cartridge.
2. Change the oil, ensuring proper oil level when refilled.
3. The motor must be thoroughly dry before applying power.
4. For units with a drying system, change all cartridges.
5. Run the compressor with open outlet valve for approximately 10 minutes. Check for proper operation of the lubricating system.
6. After 10 minutes, close the shut-off valve and run the system up to final pressure until the final pressure safety valve vents. On compressor units with a compressor control system, raise the pressure switch setting the switch above normal limits to override the pressure switch. Be sure to reset the switch after checking.
7. Check the interstage safety valves for leakage.
8. Establish the cause of any faults and remedy.
9. Stop the unit when it is running properly. The compressor is then ready for operation.

10.4 Reproducible Forms

10.4.1 Scheduled Maintenance Form

Daily	Para.	Date	Signature

Weekly or as required.	Para.	Date	Signature

500 Operating Hours.	Para.	Date	Signature

1,000 Operating Hours.	Para.	Date	Signature

2,000 Operating Hours.	Para.	Date	Signature

3,000 Operating Hours.	Para.	Date	Signature

Annually.	Para.	Date	Signature

Biennially. (Every two years)	Para.	Date	Signature

10.4.2 Cartridge Operating Hours

Date	Operating hours	Ambient temp. + 18°F during compression	Correction factor	Adjusted cartridge hours	
				Today	Total

10.4.3 Record of Operating Hours

Date	Minutes	Total
Subtotal:		

Date	Minutes	Total
Subtotal:		

10.5 Reference Data

10.5.1 Tightening Torque Values

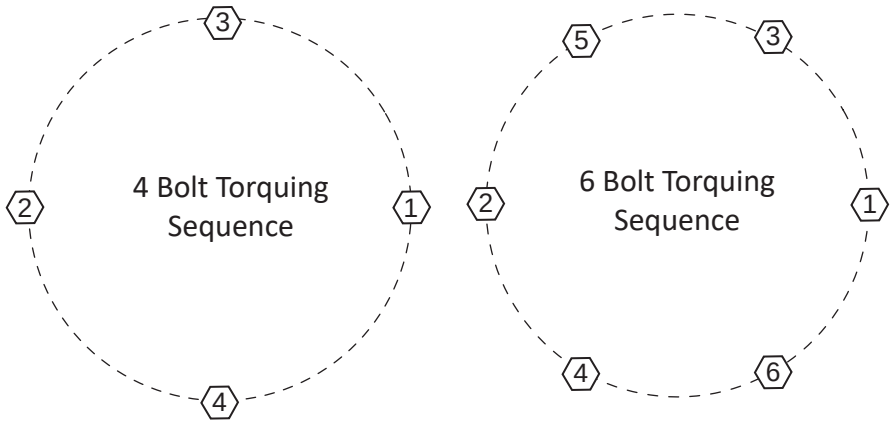
1. Unless otherwise specified in text, the torque values in Table 1 apply.
2. The indicated torque values are valid for bolts in greased condition.
3. Self locking nuts must be replaced on reassembly
4. Pipe connections (swivel nuts) should be tightened just enough so that leakage is stopped. Not more than finger tight plus up to an additional half turn.

Table 10-1: Torque Values

Bolt or Screw	Size	Max. Torque
Hex and Socket Head	1/4 in (6 mm)	7 ft-lb. (9.5 N m)
Hex and Socket Head	5/16 in (8 mm)	18 ft-lb. (24.4 N m)
Hex and Socket Head	3/8 in (10 mm)	32 ft-lb. (43.4 N m)
Hex and Socket Head	1/2 in. (12 mm)	53 ft-lb. (71.9 N m)
Hex and Socket Head	9/16 in (14 mm)	85 ft-lb. (115.3 N m)
Hex and Socket Head	5/8 in (16 mm)	141 ft-lb. (191.2 N m)

10.5.2 Torque Sequence Diagrams

Figure 10-5 6 Bolt and 4 Bolt Torque Sequence



10.5.3 Conversion Formulas

°F = 9/5 °C + 32
psi = bar x 14.5

°C = 5/9 x (°F - 32)
bar =psi x 0.0689

10.5.4 Approved Lubricants Chart

Unless otherwise specified in text, use the lubricants in Table 2.

Table 10-2: Lubricant Chart

Usage	Lubricants
O-rings, rubber and plastic parts; filter housing threads, sealing rings	Parker Super "O" Lube
Bolts, nuts, studs, valve parts, Copper gaskets and tube connection parts (threads, cap nut and compression rings)	Never-Seez® NSWT, Pipe Dope or teflon tape
Paper gaskets	DOW Corning 732 or equivalent silicone compound applied on both sides before assembly,
High temperature connections	DOW Corning 732 or equivalent temperature resistant compound,
Tube connection ferrules,	Never-Seez® NSWT

10.5.5 Glossary of Abbreviations and Acronyms

AC	**A**ctivated **C**harcoal, removes odor and taste
ACD	**A**utomatic **C**ondensate **D**rain
ASME	**A**merican **S**ociety of **M**echanical **E**ngineers
CW	**C**lock **W**ise
CCW	**C**ounter-**C**lock**w**ise
CGA	**C**ompressed **G**as **A**ssociation
DIN	**D**eutsches **I**nstitut für **N**ormung (≈ ASME)
DOT	**D**epartment **o**f **T**ransportation
E1	single phase electrical supply (**E**lectric **1**)
E3	three phase electrical supply (**E**lectric **3**)
HP	**H**opc**a**lite, a chemical catalyst which converts carbon monoxide to carbon dioxide
IAW	**I**n **A**ccordance **W**ith
MS	**M**olecular **S**ieve, removes moisture
NEC	**N**ational **E**lectrical **C**ode
NEMA	**N**ational **E**lectrical **M**anufacturers **A**ssociation
NFPA	**N**ational **F**ire **P**rotection **A**ssociation
OSHA	**O**ccupational **S**afety & **H**ealth **A**dministration
ODP	**O**pen **D**rip-**p**roof (motor)
OEM	**O**riginal **E**quipment **M**anufacturer
PLC	**P**rogrammable **L**ogic **C**ontroller
PMV	**P**ressure **M**aintaining **V**alve
SC	**Sec**urus® moisture sensing device

10.6 Additional Documents

10.6.1 Diagrams and Drawings

Any included drawings, wiring diagrams, pneumatic flow diagrams, etc., will be bound next to the back cover in a hard copy manual or included as a separate file on a CD.

10.6.2 Other Documents

OEM Manuals and other Bauer manuals may be included in the documentation shipping package.

BAUER
COMPRESSORS

Maintenance Schedule for Breathing Air Units

Maint. Kit	—► —► —► —► —► —► —► —► —►		a1	ab1	a1	abc1	a1	ab1	a1	abc1
	Task	6 Mnths	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years	7 Years	8 Years
	Check Pressure Hoses for tightness/damage	X	X	X	X	X	X	X	X	X
	Check/Maintain ACD/ B-Drains		X	X	X	X	X	X	X	X
	Check Anti-Vibration Elements		X	X	X	X	X	X	X	X
	Lubricate Electric Motor (if fitting available)		X	X	X	X	X	X	X	X
	Check Electric Terminal Clamps for Strength		X	X	X	X	X	X	X	X
	Check Function of Emergency Shutdown		X	X	X	X	X	X	X	X
	Check Cooling Fan Blades (if applicable)		X	X	X	X	X	X	X	X
	Change Final Separator Filter		X	X	X	X	X	X	X	X
	Check Fittings for Tightness/Torque		X	X	X	X	X	X	X	X
a1	Change Intake Filter		X	X	X	X	X	X	X	X
	Check Intermediate Pressures and oil Pressure		X	X	X	X	X	X	X	X
	Leak Test / General Visual Inspection		X	X	X	X	X	X	X	X
	Change Oil (if mineral/petroleum based)		X	X	X	X	X	X	X	X
a1	Change Oil Filter		X	X	X	X	X	X	X	X
	Check Oil Injection Nozzle (clean or change)		X	X	X	X	X	X	X	X
	Check Final Piston and Sleeve Asy.		X		X		X		X	
	Check Pressure Gauges		X	X	X	X	X	X	X	X
	Check/Change Pressure Relief/Safety Valves		X	X	X	X	X	X	X	X
	Check Pressure Switches		X	X	X	X	X	X	X	X
a1	Change Seals and O-Rings per. Maint. Kit		X	X	X	X	X	X	X	X
	Clean & Check Condensate Collector		X	X	X	X	X	X	X	X
	Check Pressure & Suction Valves (all stages)		X		X		X		X	
	Check V-belt		X	X	X	X	X	X	X	X
	Perform Function Check / Final Inspection		X	X	X	X	X	X	X	X

May 25, 2021

Maintenance Schedule for Breathing Air Units (con't)

Maint. Kit	—► —► —► —► —► —► —► —► —►		a1	ab1	a1	abc1	a1	ab1	a1	abc1
	Task	6 Mnths	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years	7 Years	8 Years
	Record Work Hours and Load Cycles		X	X	X	X	X	X	X	X
	Attach Test Sticker		X	X	X	X	X	X	X	X
	Change Oil (synthetic)			X		X		X		X
b1	Change Pressure and Suction Valves (all stages)			X		X		X		X
b1	Change Final Piston and Sleeve Asy.			X		X		X		X
	Check All Cylinders, Pistons & Piston Rings for Wear					X				X
	Check All Pressure & Temperature Sensors					X				X
c1	Change Seals and O-Rings per. Maint. Kit					X				X
	Change V-Belt					X				X
	Check All Pressure Vessels (per Pressure Vessels Mnl.)						X			
	Change All Pressure Hoses							X		
	Change Oil Injection Nozzle									X
	Change Anti-Vibration Elements									X
	Change Cooling Fan Blades (if applicable)	**Every 10 years**								
	Change Pressure Vessels (per Pressure Vessels Mnl.)	**Upon Reaching Max Load Cycles**								
	Change Cylinders, Pistons and Piston Rings (as sets only)	**As Required**								
	Change Filter Cartridges	**As Required / According to Saturation**								

*Maintenance after 8 years repeats the maintenance cycles above

CORRECTIONS & COMMENTS

In an effort towards constant improvement, the Documentation section of Bauer Compressors, Inc. would like to give you the opportunity to suggest improvements or corrections to this manual. If you find any inaccuracies or have suggestions feel free to E-mail us at: *documentation@bauercomp.com*, or fill out the form below and mail it to us:

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Unit Information:

Model: _____

Serial#: _____

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