

## Instruction Manual and Replacement Parts List

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# Enclosed Horizontal High Pressure Breathing Air Compressor Unit I 230



March 9, 2012

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MNL-128631

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**⚠ WARNING**

This Instruction Manual and Replacement Parts List contains safety information and instructions for the I 230 High Pressure Breathing Air Compressor Unit.  
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: March 9, 2012**

<b>Rev</b>	<b>Chg</b>	<b>Date</b>	<b>Notes</b>	<b>Auth</b>

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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**

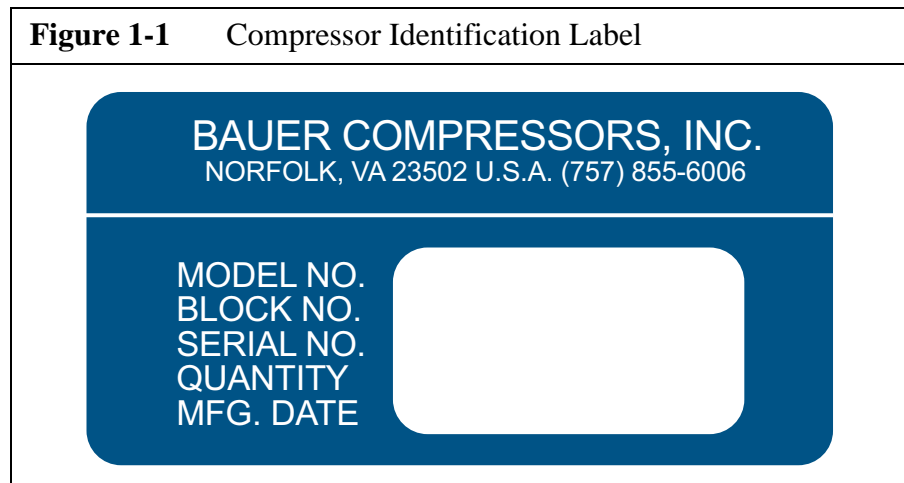
NOTE advise of technical requirements that require particular attention by the operator or the maintenance technician for proper maintenance and utilization of the equipment.

**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 compressor unit identification plate on the compressor unit frame.

Information	Example
Model Number	MVT 13
Serial Number	131365
Date of Manufacture	01/2012
Part Number	VAL-0169
Part Description	Valve
Part Quantity Required	1



**⚠ 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.
- The instructions for long term storage (over 90 days) of this product.
- Reproducible Forms
- Reference Data
  - Torque Values
  - Torque Sequence
  - Conversion Formulas
  - Approved Lubricants
  - Glossary of Abbreviations & Acronyms
- Additional Documents

#### 1.4 Description and Specifications

The BAUER I 230 model has a 60.0 SCFM charging rate capacity with a discharge pressure of up to 5,000 PSIG.

##### Standard Features:

- BAUER Breathing Air Purification System
- Air-cooled Interstage Coolers and Aftercooler
- Interstage and Final Separator with Manual Drains
- Interstage and Final Relief Valves
- Belt Guard designed to meet OSHA guidelines
- Inlet Filter
- High Temperature Switch
- Hourmeter
- Low Oil Pressure Sensor
- Oil Pressure Gauge
- Final Pressure Sensor
- Final Pressure Gauge
- Securus® Electronic Moisture Monitoring System
- Automatic Condensate Drain

**1.5 I 230**

Medium	air
Charging Rate	60 scfm (1,699 l/min) <sup>1</sup>
Free Air Delivery	50 scfm (1,416 l/min) <sup>2</sup>
Inlet pressure	atmospheric
Operating pressure, max.	5,000 psig (350 bar)
Ambient temperature range	40 - 115 °F (5 - 45 °C)
Weight	approx. 2,800 lb. (1,260 kgs)

**1.5.1 Compressor Block, IK23.0**

No. of stages	4
No. of cylinders	3
Cylinder bore, 1st stage	6.30 in (160 mm)
Cylinder bore, 2nd stage	6.30/5.12 in. (160/130 mm)
Cylinder bore, 3rd stage	1.4 in. (36mm)
Cylinder bore, 4th stage	0.71 in. (18 mm)
Piston Stroke	3.15 in. (80mm)
Intermediate pressure, 1st stage	30 - 45 psig (2 - 3 bar)
Safety valve setting, 1st stage	75 psig (5 bar)
Intermediate pressure, 2nd stage	220 - 260 psig (15 - 18 bar)
Safety valve setting, 2nd stage	340 psig (24 bar)
Intermediate pressure, 3rd stage	825 - 1,090 psig (57 - 75 bar)
Safety valve setting, 3rd stage	1,160 psig (80 bar)
Direction of rotation when facing flywheel	CCW
Compressor speed	1,320 RPM
Oil capacity	11 1/4 qts. (10.6 liters)
Oil Pressure	30 - 45 psig (2 - 3 bar)
Recommended oil (Synthetic)	BAUER OIL-0024
Maximum Inclination	10° in all directions

**1.5.2 Compressor Drive**

Voltage	Freq.	Phase	Power	RPM	Type	BAUER PN
208 - 460 VAC	60 Hz	3 Φ	40 Hp	3,600	TEFC	MTR-0121

**1.5.3 Purification System Applicability**

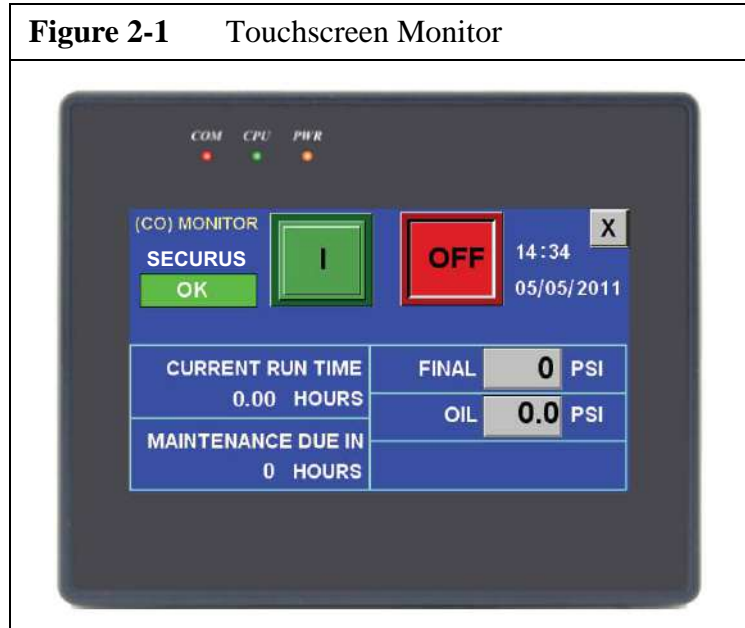
This unit is supplied with the Seccant Purification System, for information concerning this system see MNL-0103.

1. Based on recharging an 80 cubic foot tank from 500 to 3000 PSIG  
 2. Referenced to standard inlet conditions of 68°F and 36% humidity at 14.70 psia.

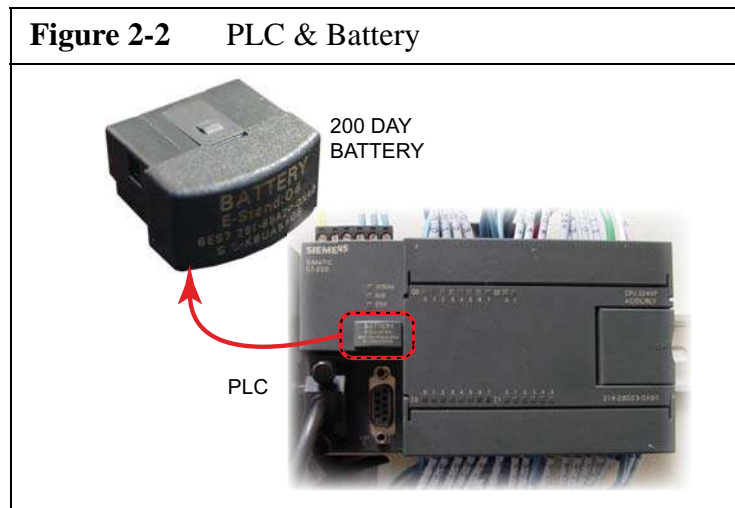
## CHAPTER 2: OPERATING INSTRUCTIONS; MAPLE SYSTEM

### 2.1 Description

The following instructions apply to units that use the Maple System touchscreen operator interface with program 31L.



The Electrical Panel Assembly will provide logical control and safety shutdowns for the compressor equipment. All necessary time delays, counters, shutdowns, sequencing and safety features are incorporated into a proprietary software program permanently saved into PLC memory using EEPROM technology. The PLC is equipped with a 200 day in battery to maintain the PLC’s internal clock. The software program is based on the pressure and use of the compressor. The operator uses the Operator Interface to communicate with the PLC which is located in the electrical enclosure.



#### 2.1.1 Emergency Stop Button

A Normally Closed switch when pulled out, when the E-Stop Button is pressed in, it disconnects the main power source, turning off the compressor, draining the ACD system and stopping air delivery to

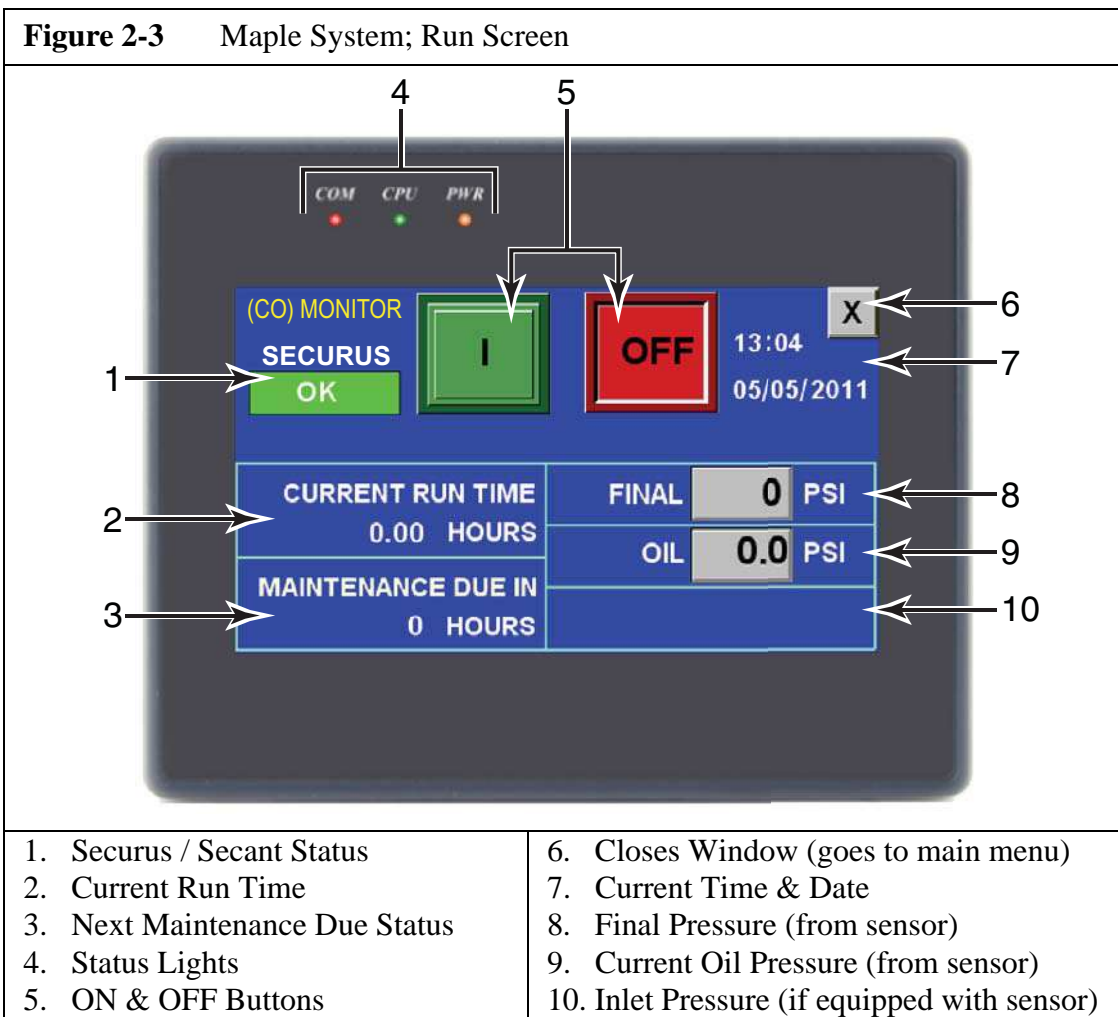
the consuming devices. This button is to be used in case of emergency. Normal operational stops should be accomplished using the operator interface.

**2.1.2 Operator Interface**

The operator interface is a 7 inch, 16 bit color LED, touchscreen operation with a 32 bit, 400 Mhz CPU. The operator interface is the input/output device for normal operation of the compressor unit. The compressor system is ready and able to operate after the emergency stop switch is pulled out and the red “COM” status light illuminates. The red status light will continuously strobe to show that the unit is ready.

**2.1.2.1 Run Screen**

The initial screen after startup allows control and monitoring of the compressor unit.

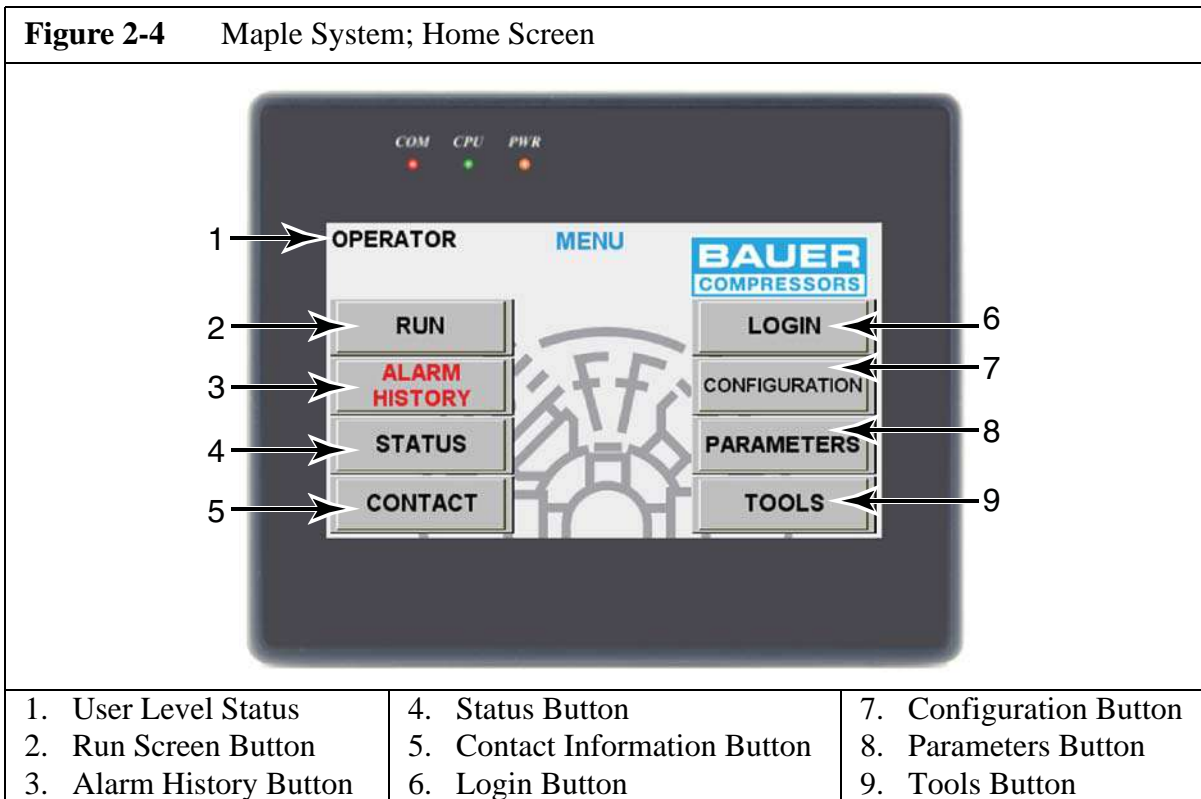


1. If the unit is equipped with a CO monitor, the words (CO) monitor are shown here. Also if the unit is equipped with a Securus or Seccant monitor, the status of the monitor is shown here.
2. This reading shows the current run time of the compressor in hours. Once the compressor is turned off this reading returns to zero. For total hours on the unit check the status screen.
3. This reading tells when the next maintenance is due on the compressor.



4. These lights show the status of electrical connections and communication. The red light strobes continuously to show communication is established with the PLC. The green light indicates that the PLC has power, and the yellow light indicates power is coming into the unit.
5. The ON and OFF buttons control the compressor. These buttons should be used for normal starting and stopping of the compressor. In an emergency the Emergency Stop button should be used.
6. This X button closes the Run screen and goes to the main menu screen. The compressor may still be operating when returning to the main menu screen.
7. The current time and date are shown here. This data can be corrected only by user levels 2 and 3.
8. The final pressure reading is displayed here. It is received from the final pressure sensor near the outlet.
9. This oil pressure reading displays a continuous pressure from the compressor. This reading is taken from the oil pressure sensor on the compressor block.
10. This space is reserved for units with inlet pressure sensors. A continuous inlet pressure reading is provided. This is mainly for units designed to compress natural or industrial gases.

2.1.2.2 Main Menu Screen



The home screen is the main screen used to navigate to the other 8 options. All of the option screens can be viewed but critical changes can only be made by user levels 2 & 3. Critical changes control the functions of the compressor. This feature is added to prevent unintentional changes to the unit's functions.

**2.1.2.2.1 Run**

This button returns the user to the RUN screen, See Paragraph 2.1.2.1 for further information.

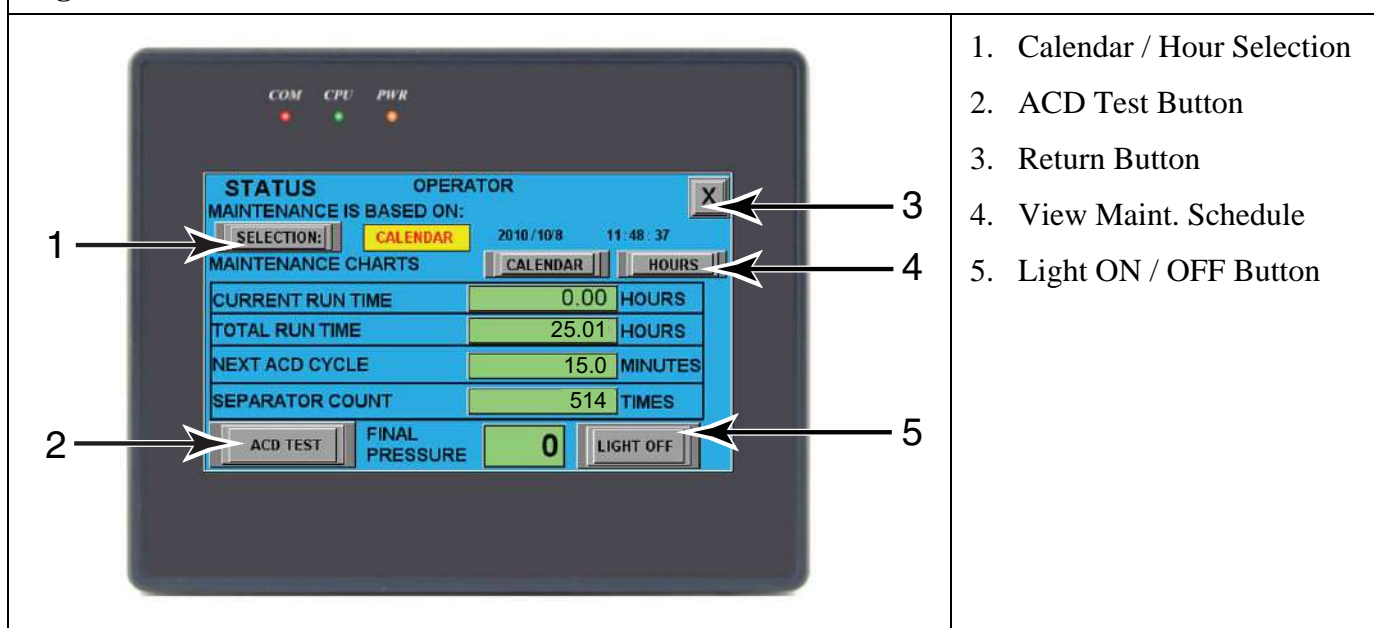
**2.1.2.2.2 Alarms History**

This button displays the history of alarms. The date of the alarm history can be changed with the drop down arrow or the forward and backward arrows adjacent to the date. To return to the Main Menu screen touch the X in the upper right corner.

**2.1.2.2.3 Status**

The status button takes the user to the status screen. The status screen allows the user to view the Current Run Time, Total Run Time, Minutes till next ACD cycle, current Separator Count, and the Current Final Pressure.

**Figure 2-5** Status Screen



1. Calendar / Hour Selection
2. ACD Test Button
3. Return Button
4. View Maint. Schedule
5. Light ON / OFF Button

The options on the Status screen are shown in Figure 2-5. The Selection button allows the operator to select maintenance warnings by the calendar schedule or the hourly maintenance schedule. The ACD Test button is used to perform an ACD test. Pressing this button opens the ACD valve and the operator should be able to hear the ACD draining. The Return button takes the user back to the Main Menu screen. The Maintenance schedule buttons allow the user to view the Maintenance schedule by calendar days or by hours (See Table 2-1& 2-2). The Light ON / OFF button is used on some models equipped with lights. This button toggles the light on and off.

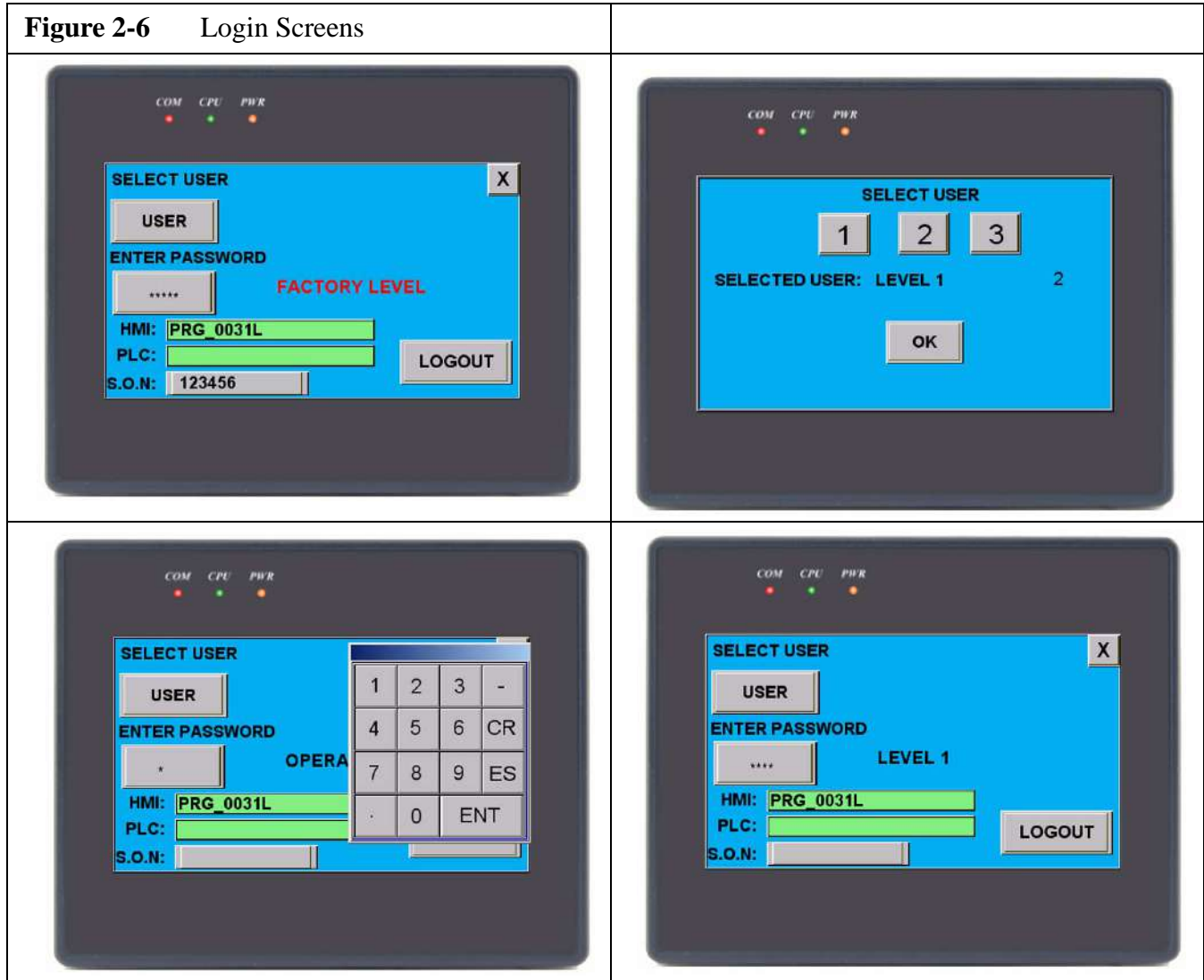
**2.1.2.2.4 Contact**

Pressing the contact button displays contact information for maintenance and assistance for your unit. It can only be edited by users 2 & 3.

**2.1.2.2.5 Login**

The login button takes the user to the login screen. The default option is User 1, Operator. No password is needed to operate the compressor at this user level. At this user level the operator can operate the unit and explore all the other menu screens but cannot change parameters or configuration settings. User 2, Level 1, can operate the compressor and also is allowed to change some parameters and configuration settings.

User 3, Factory Level, has total access to the unit and can change all parameters and configuration settings.



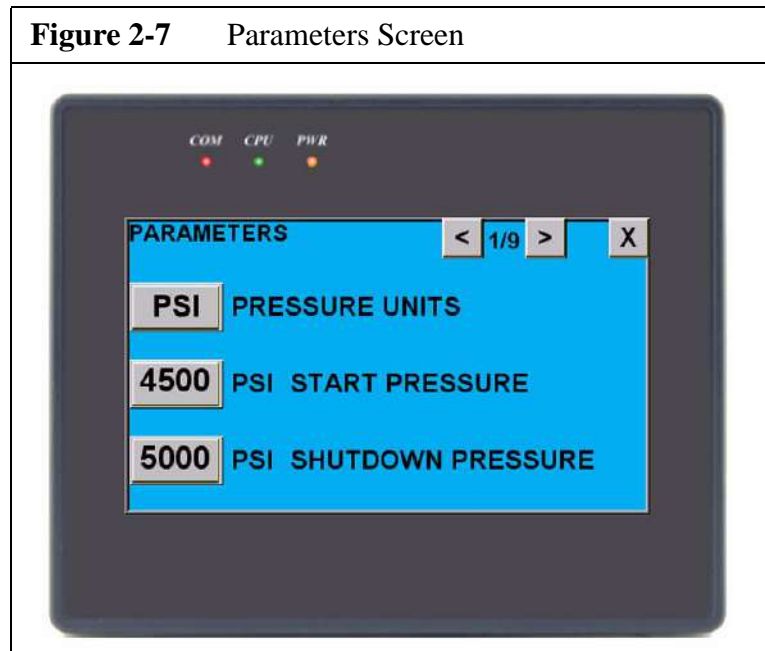
To change the user level press the “USER” button, select the desired user, and press “OK”. Then press the button below the words “Enter Password” and press the password numbers on the keypad. After entering the proper password press “ENT” on the keypad to enter the password. If the password is incorrect an “Invalid Password” screen will pop up. The only option on the screen is to click “OK”. If the password is accepted the screen will return to the login screen with the new user level shown.

**2.1.2.2.6 Configuration**

The Configuration button is used to setup the features that make the unit. There are a total of 4 pages in this option. The first two pages consist of 8 features which a unit may have. The third page is used to set the final pressure sensor limit. The fourth page is used to set the inlet pressure sensor limit. Similar to the Parameter’s settings changing the Configuration settings will change how the unit operates so only users 2 & 3 are allowed to change them. Pressing the X button returns the user to the main menu screen.

### 2.1.2.2.7 Parameters

This button takes the user to the parameters screens. There are a total of 9 screens. These parameters are set at the factory for each specific unit. Changing these parameters will change how the unit operates, so only users 2 and 3 are allowed to change them. If user 1, Operator, tries to change a parameter a window will pop up stating “Access Denied”. To change a parameter just touch the number which needs to be changed and a keypad will pop up. Punch in the new number and press the “ENT” key.



Pressing the Pressure Units button toggles the run screen pressures between PSI and BAR.

Pressing the X button will return the screen to the main menu.

### 2.1.2.2.8 Tools

Like the Parameters and Configuration options only users 2 & 3 can make changes or use this option. The first page of the tools option is used for maintenance purposes. The buttons are used to check the PLC and can only be used when the unit is OFF. The second page is used to set the internal calendar/clock and to select the language displayed on the monitor. English, Spanish, and Portuguese are the current choices. More languages may be added at a later date. The third page offers activation of the Anybus (internet) Server, to turn off or on the key beeping sound, or to clear the alarm history. The final button “START” is used to save the current set parameters to the internal EEPROM. If this button is pressed the current settings are saved to the memory and a status bar of the operation will be shown.

## 2.2 Starting and Stopping Unit

### 2.2.1 Before Starting.

1. Check the compressor oil level, See Chapter 3.
2. Ensure that all panels and guards are properly installed.
3. If the unit is equipped with doors, ensure all doors are closed.
4. Ensure that the E-Stop Button is pulled out.

**2.2.2 To Start Unit.**

Press the green START Button on the Run Screen. (See Figure 2-3)

If the pressure in the system is lower than the set “Start Pressure”, the drive motor will start up powering the compressor. If the system’s pressure is higher than the set “Start Pressure” or when the air pressure has increased to the set “Operating Pressure”, the drive motor will automatically shutdown. The Compressor will automatically restart when the system’s pressure drops below the set “Start Pressure”.

**⚠ WARNING**

Once started the compressor and drive motor will start and stop automatically. Stay clear of all moving parts whenever unit has power.

**2.2.3 To Stop Unit.**

Press the red STOP Button on the Run screen..

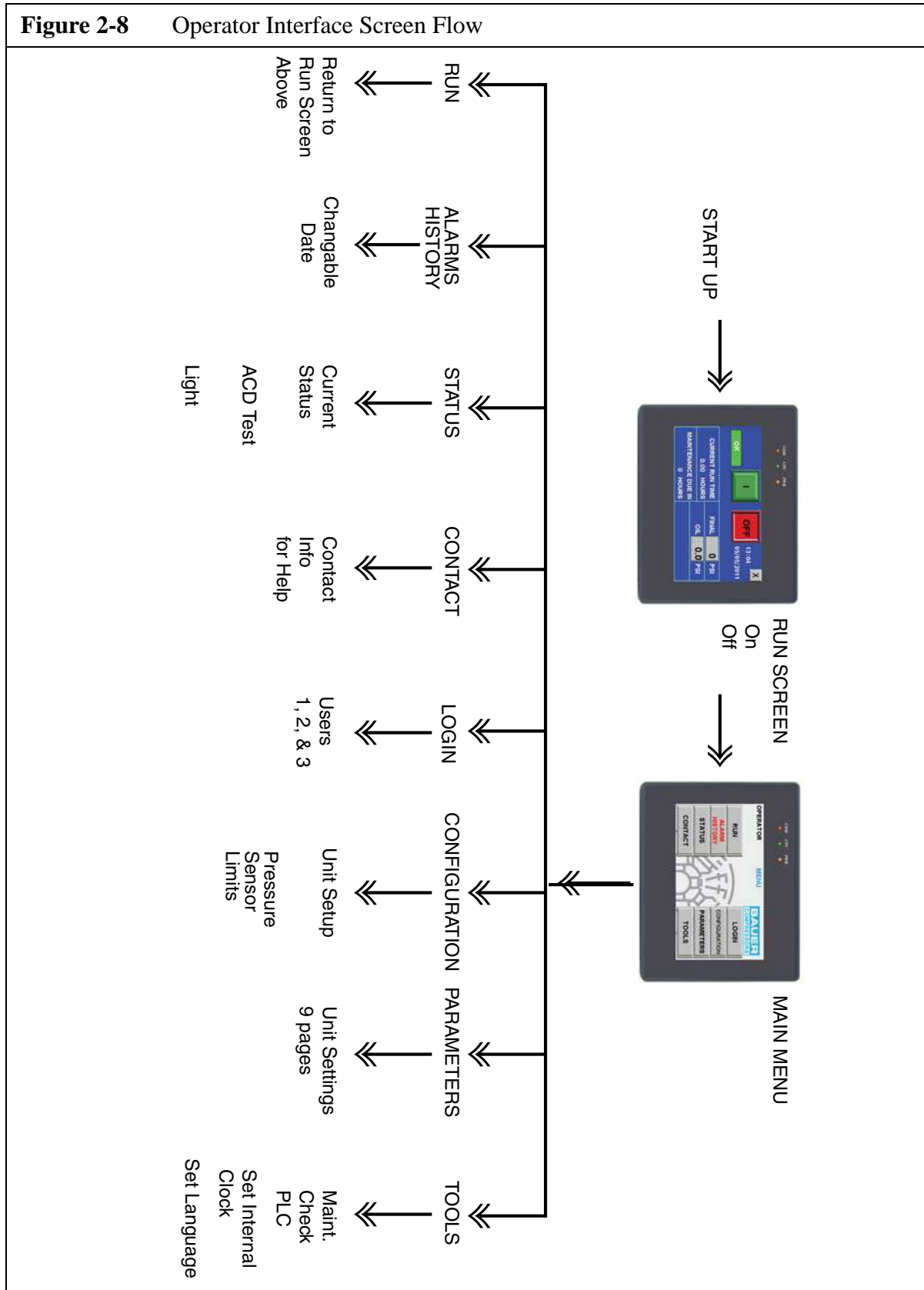
**NOTICE**

In an emergency the compressor is shutdown by pressing in the Emergency Stop Button.

<b>Table 2-1: Calendar Maintenance Interval Tasks</b>			
<b>Task</b>	<b>Monthly</b>	<b>Annually</b>	<b>Every Two Years</b>
Calibrate CO Monitor	X		
Check Oil Level	X		
Check Final Pressure Shutdown	X		
Check Automatic Condensate Drain	X		
Check V-belt		X	
Service Intake Filter		X	
Check all connections for leaks		X	
Inspect Compressor Valves		X	
Check all fasteners for tightness		X	
Change Synthetic Oil			X
Replace Compressor Oil Filter			X
Replace Compressor Valves			X
Replace CO Monitor Sensor			X

<b>Table 2-2: Operating Hours Maintenance Interval Tasks</b>					
<b>Task</b>	<b>250 Hours</b>	<b>500 Hours</b>	<b>1,000 Hours</b>	<b>2,000 Hours</b>	<b>3,000 Hours</b>
Check Oil Level	X				
Check Final Pressure Shutdown		X			
Check Automatic Condensate Drain	X				
Check V-belt	X				
Service Intake Filter		X			
Check all connections for leaks		X			
Check fasteners for tightness		X			
Inspect Compressor Valves			X		
Change Synthetic Oil				X	
Replace Oil Filter				X	
Replace Compressor Valves				X	
Inspect Pistons and Pistons Rings					X

2.3 Screen Flow



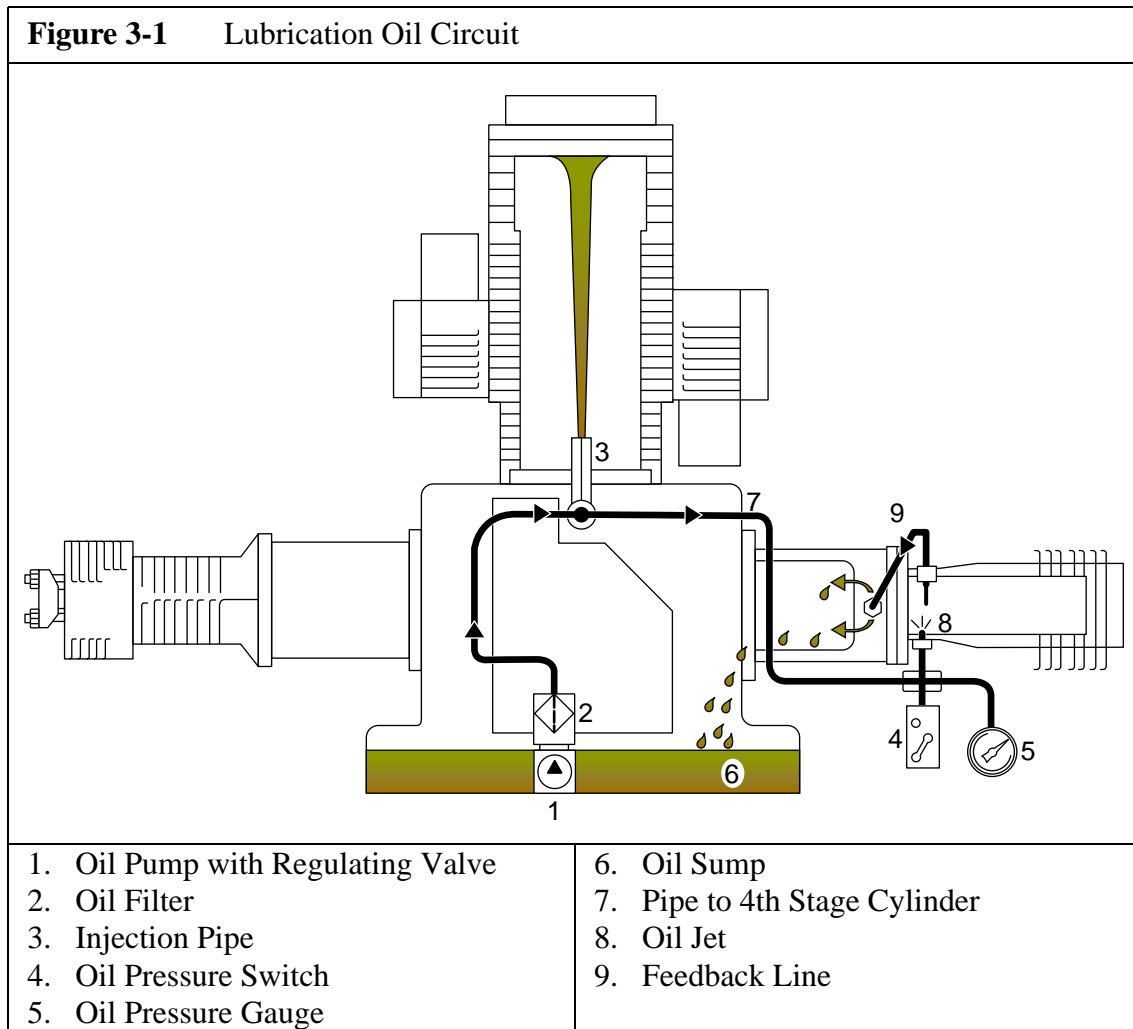


## CHAPTER 3: IK23.0 COMPRESSOR BLOCK

### 3.1 Maintenance and Parts

#### 3.1.1 Compressor Lubrication System

##### 3.1.1.1 Functional Description



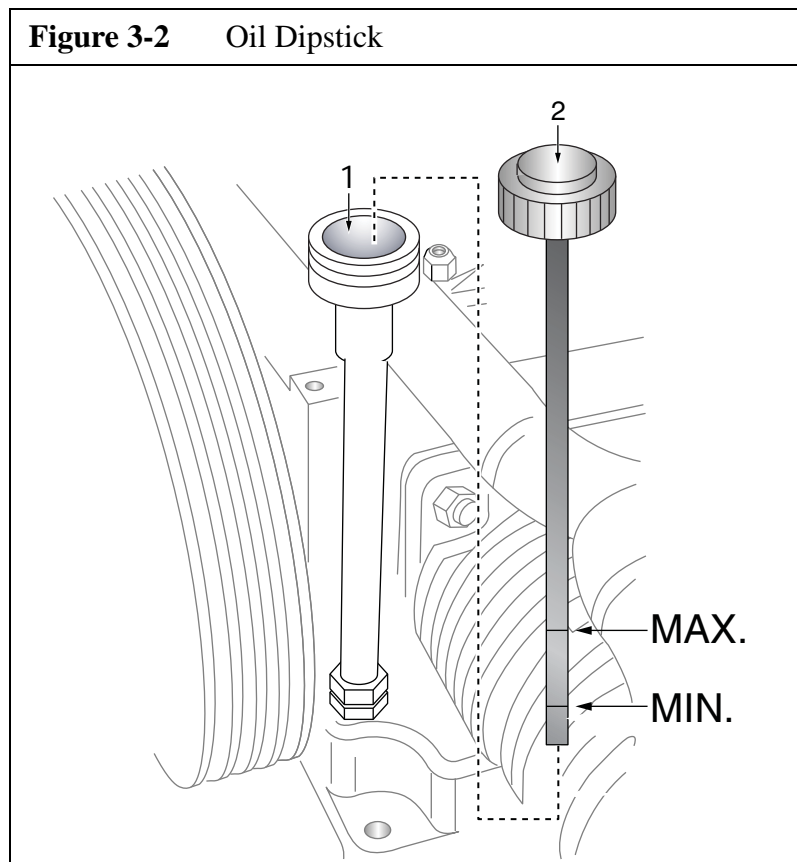
(See Figure 3-1). The oil pump (1) equipped with a regulating valve is driven by the crankshaft through pinion gears. The oil pump draws the oil from the crankcase oil sump (6) and pumps it through the oil filter (2). This filter is fitted with a replaceable cartridge which efficiently eliminates even the finest particles ( $\geq 10$  microns) from the oil. After the oil filter (2) the oil flow splits: through the injector (3) the oil enters the stepped piston of the 1st/2nd stage. It is sprayed from below against the piston head of the stepped piston where it is atomized and lubricates pistons and cylinders. Drip oil reaches the rotating crankshaft with its connecting rods where it is agitated to lubricate the moving parts of the compressor. Through the pipe (7) the oil is forced via the oil jet (8) to the 4th stage cylinder where it lubricates piston and piston rings. From there the oil flows back through feedback line (9) into the oil sump. The oil pressure in the lubricating system is indicated at pressure gauge (5) and monitored by oil pressure switch (4). If the oil pressure falls below 0.8 bar (12 psi), the monitoring unit shuts off the compressor.

### 3.1.1.2 Oil Level Check

(See Figure 3-2)

Check the oil level every day prior to starting the compressor.

1. Unscrew the dipstick (2) from the filler tube (1)
2. Wipe off the dipstick with a lint-free cloth.
3. Return the dipstick to the filler tube, screwing it in fully to get the correct reading.
4. Remove again and note the oil level which should always be between the upper and lower marks



## NOTICE

The oil level must not exceed the upper level mark as this causes over-lubrication of the compressor and results in carbon building up on the valves.

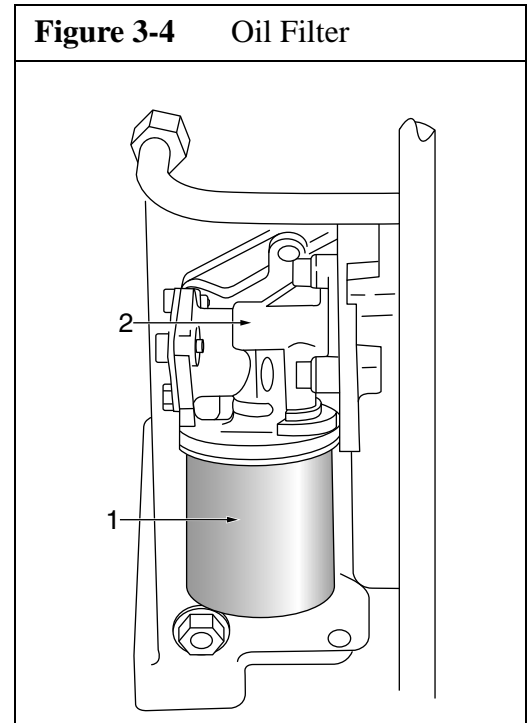
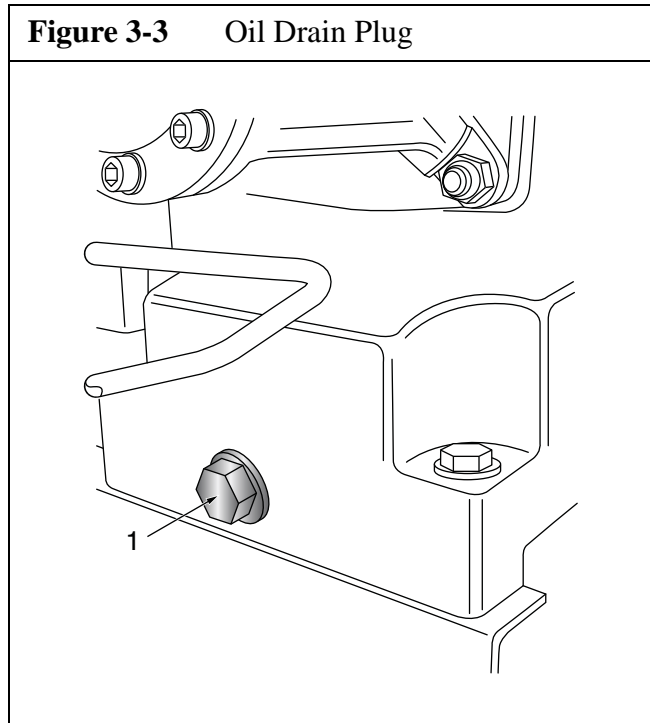
### 3.1.1.3 Oil Capacity and Type

The compressor oil capacity is approximately 11.0 liters (11.6 qt.) of synthetic oil; Bauer P/N OIL-0024.

### 3.1.1.4 Oil Change Procedures

#### **CAUTION**

The oil filter must be changed when the oil is changed.



1. Run compressor until it is warm.
2. Drain oil into a suitable oil collection container.
3. While oil is still warm open drain plug (1). (See Figure 3-3).
4. When oil is completely drained, close oil drain plug.
5. Remove the oil filter by unscrewing the filter element (See Figure 3-4, item 1) from the housing.
6. Using compressor oil (Bauer P/N OIL-0024) lubricate the sealing ring of the new filter element
7. Fill the new filter element with new compressor oil.
8. Screw the new filter element on until the sealing ring touches the surface.
9. Tighten the filter element another half turn by hand. Never overtighten or use tools to install the filter element.
10. Refill the compressor with new oil through the filler neck.

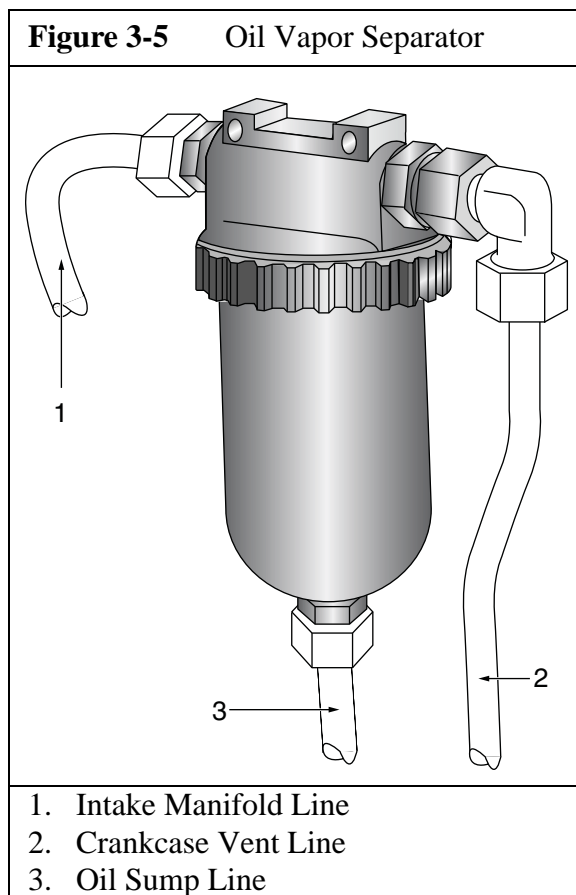
#### **NOTICE**

Dispose of the used oil in accordance with local, State and Federal regulations

### 3.1.1.5 Oil Pump, Description and Maintenance

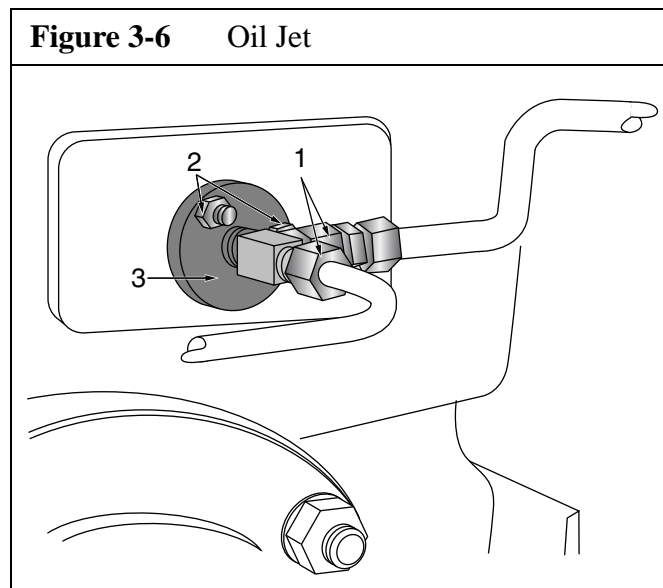
The compressor is fitted with a gear pump (Figure 3-4 item 2) with an integrated pressure relief valve. The oil pressure is set at 6 bar (87 psi). During operation check the oil pressure at the gauge, if it is not between 1 bar and 6 bar (15 to 87 psi) the oil pump is not functioning correctly and must be replaced. The oil pump cannot be repaired but must be replaced as a complete assembly.

### 3.1.1.6 Oil Separator, Description and Maintenance



(See Figure 3-5). The compressor is equipped with an oil separator. It separates liquid oil particles from the crankcase vent line (2) which are fed back into the oil sump through the oil sump line (3). The separator is connected to the intake manifold by intake manifold line (1). The oil separator requires no regular maintenance.

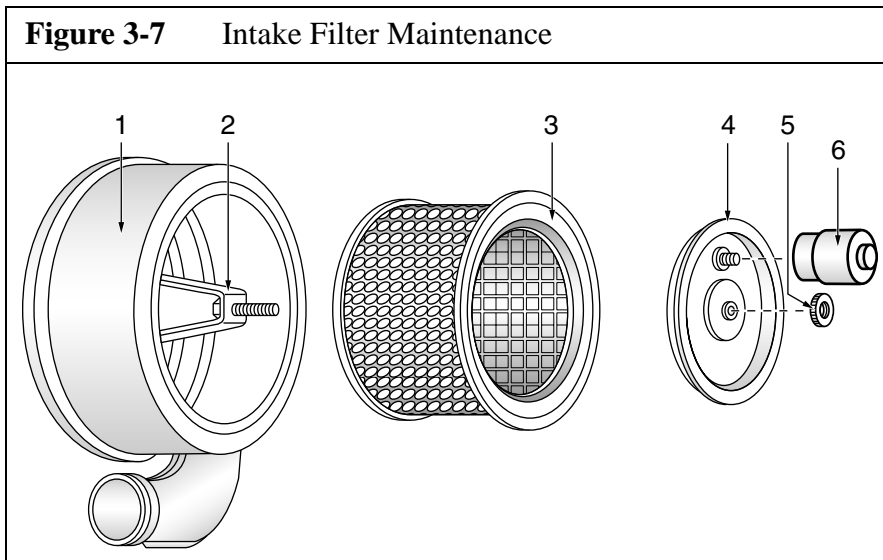
### 3.1.1.7 Oil Jet, Description and Maintenance



(See Figure 3-6) The lubrication of the compressor internal parts is controlled by the oil jet. Prolonged running with contaminated oil or oil filter will lead to clogging of this jet and reduce the flow of oil to the compressor rotating parts.

Oil jet maintenance is accomplished by doing the following:

1. Disconnect the pressure line from the oil jet (3) by undoing the tube fittings.(1)
2. Remove the two self-locking nuts(2) securing the oil jet (3) to the crankcase and pull out the oil jet.
3. Clean oil jet in a suitable solvent to remove deposits.
4. Remove old sealing compound from crankcase and oil jet sealing surfaces.
5. Install a new O-ring.
6. Apply a thin layer of silicone rubber compound on the sealing surfaces.
7. Replace oil jet in crankcase. Install two self-locking nuts.
8. Reconnect pressure lines and tighten tube fittings.



### 3.1.2 Intake Filter

See Figure 3-7. The Intake Filter is fitted with a Vacuum Indicator. If the Filter Cartridge is clogged, the Vacuum Indicator changes to red and the Filter Cartridge should be changed.

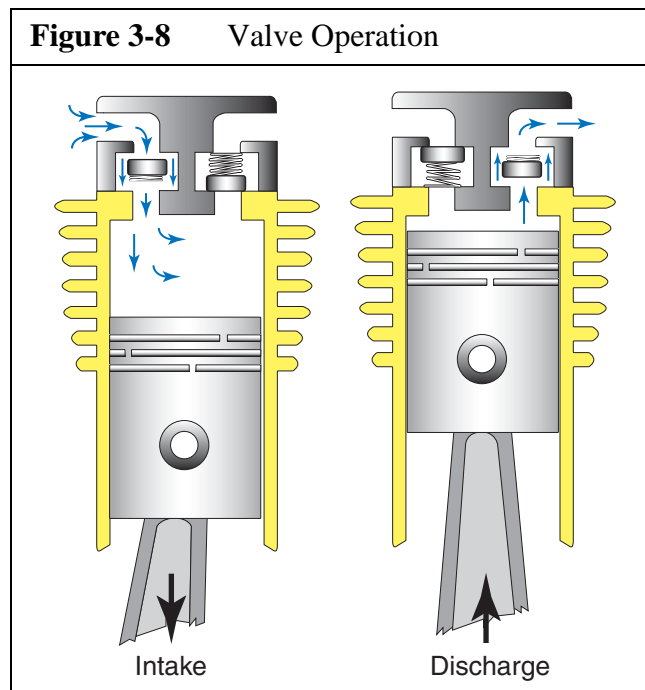
#### 3.1.2.1 Intake Filter Maintenance

To change the Filter Cartridge proceed as follows:

1. Remove Knurled Nut (5)
2. Remove Cover (4) from the Filter Housing (4).
3. Remove the Filter Cartridge (3).
4. Clean Filter Housing (1) inside with a damp cloth. Take care to prevent dust from going down intake.
5. Replace Filter Cartridge.
6. Mount Cover (4) and fasten with the Knurled Nut (5).
7. Reset Vacuum Gauge (6) by pressing button.

### 3.1.3 Compressor Valves

#### 3.1.3.1 Functional Description.



(See Figure 3-8). 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 cylinders. At the start of the pressure stroke the intake valve closes and the medium opens the pressure valve.

#### 3.1.3.2 General Instructions for Changing the Valves

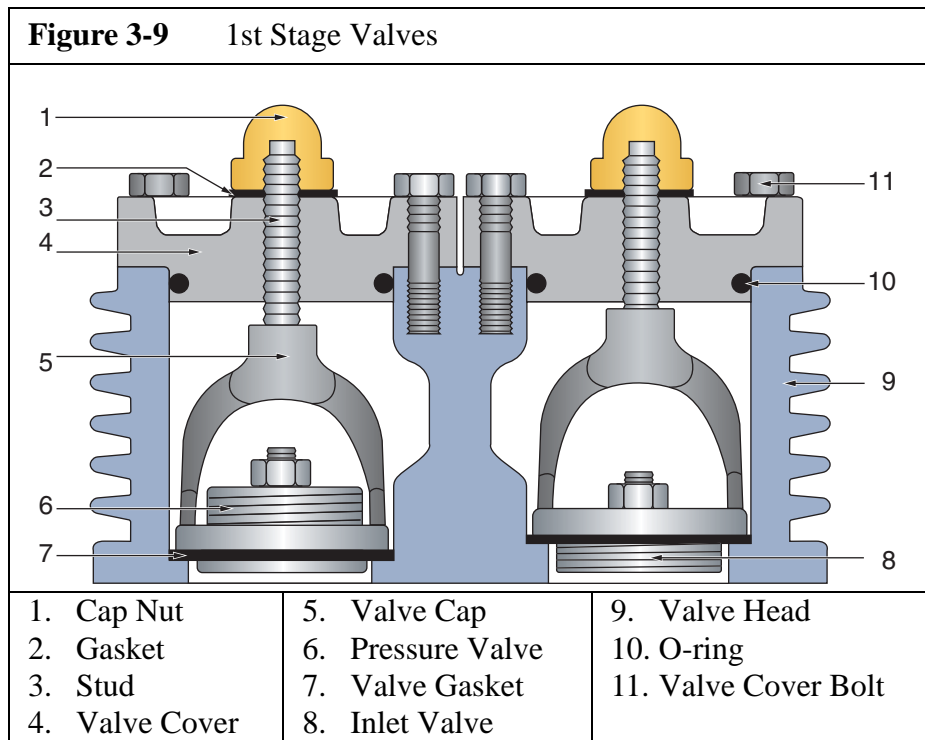
- Always replace valves as a complete set.
- Carefully clean dirty valves. Never use a sharp tool for this purpose. Soak the valves in Varsol and clean with a soft brush.
- Check the individual components for excessive wear. If the valve seat or valve discs are dented, replace the valves.
- Check the 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 1000 operating hours.
- Replace the valves every 2000 operating hours to avoid fatigue failure.

**3.1.3.3 Operational Check of Valves**

Check the valves for proper operation after approximately thirty minutes of operation. Do this by noting that the intake tubing is warm and the outlet tubing is hot.

**3.1.3.4 The 1st Stage Valves**

(See Figure 3-9). The 1st stage valves are located in the vertical 1st/2nd stage cylinder. Two inlet valves and two discharge valves are provided.



**3.1.3.4.1 Remove and reinstall the 1st stage valves**

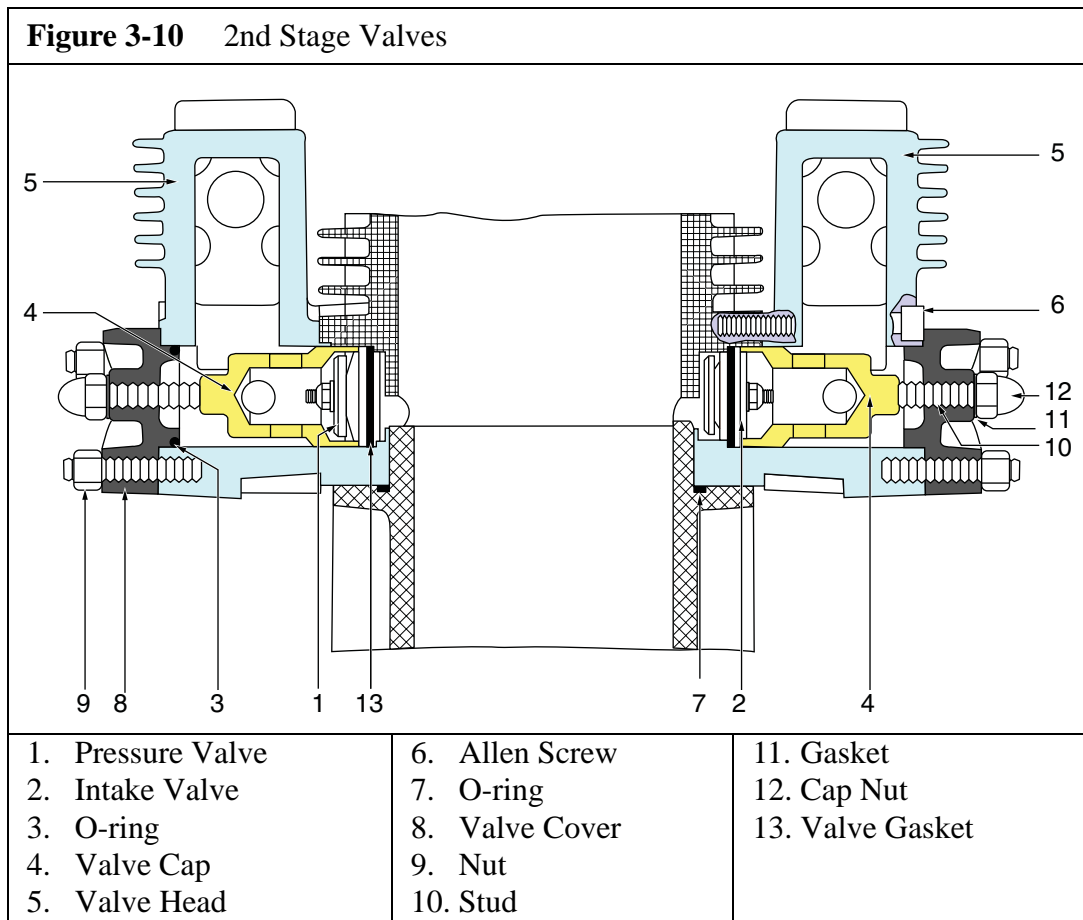
(See Figure 3-9). Remove and reinstall each of the 1st stage valves as follows:

1. Unscrew and remove cap nut (1).
2. Check and if required, replace gasket (2)
3. Unscrew stud (3) a number of turns.
4. Remove valve cover nuts (11) and remove valve cover (4).
5. Take off the valve cap (5) and take out the valve (6 or 8).
6. Check and if required, replace valve gasket (7)
7. Fit new valve (6 or 8) with valve gasket (7) and install into valve head (9).
8. Install valve cap (5).
9. Fit the valve cover (4) with O-ring (10) and fasten in place with valve cover bolts (11).
10. Tighten valve cover bolts to the correct torque using a torque wrench.
11. Tighten stud (3) using an Allen key wrench and replace cap nut (1).



### 3.1.3.5 The 2nd Stage Valves (See Figure 3-10).

The 2nd stage valves are located directly on each side of the 1st/2nd stage cylinder. One inlet valve and one discharge valve are provided.



#### 3.1.3.5.1 Remove and reinstall the 2nd stage valves

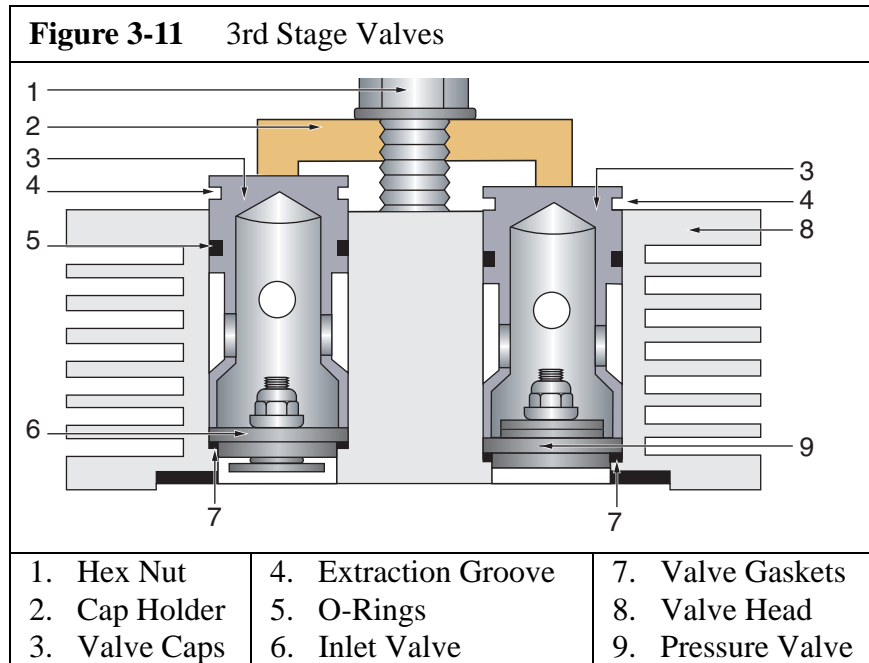
(See Figure 3-10). Remove and reinstall each of the 2nd stage valves as follows:

1. Unscrew and remove cap nut (12).
2. Check and if required, replace gasket (11)
3. Unscrew stud (10) a number of turns.
4. Remove valve cover nuts (9) and remove valve cover (8).
5. Take off the valve cap (4) and take out the valve (1 or 2).
6. Check and if required, replace valve gasket (13)
7. Fit new valve (1 or 2) with valve gasket (13) and install into valve head (5).
8. Install valve cap (4).
9. Fit the valve cover (8) with O-ring (3) and fasten in place with valve cover bolts (9).
10. Tighten valve cover bolts to the correct torque using a torque wrench.

11. Tighten stud (10) using an Allen key wrench and replace cap nut (12).

### 3.1.3.6 The 3rd Stage Valves

The 3rd stage valves are located in the horizontally positioned 3rd stage valve head. One inlet and one outlet valve are provided.



#### 3.1.3.6.1 Procedures to remove and reinstall the 3rd stage valves

(See Figure 3-11). Remove and reinstall each of the 3rd stage valves as follows:

1. Unscrew and remove hex nut (1).
2. Remove cap holder (2).
3. Insert two screwdrivers into the extraction grooves (4) of the valve caps (3) and lift out the valve caps with O-Rings (5).
4. Check and replace O-Rings if required.
5. Take out valves (6 & 9).
6. Check the valve gaskets (7) and replace if required.
7. Fit valves(6 & 9) with gaskets (7) and replace.
8. Fit valve caps (3) with O-Rings (5) and replace.
9. Replace cap holder (2) in the proper position.

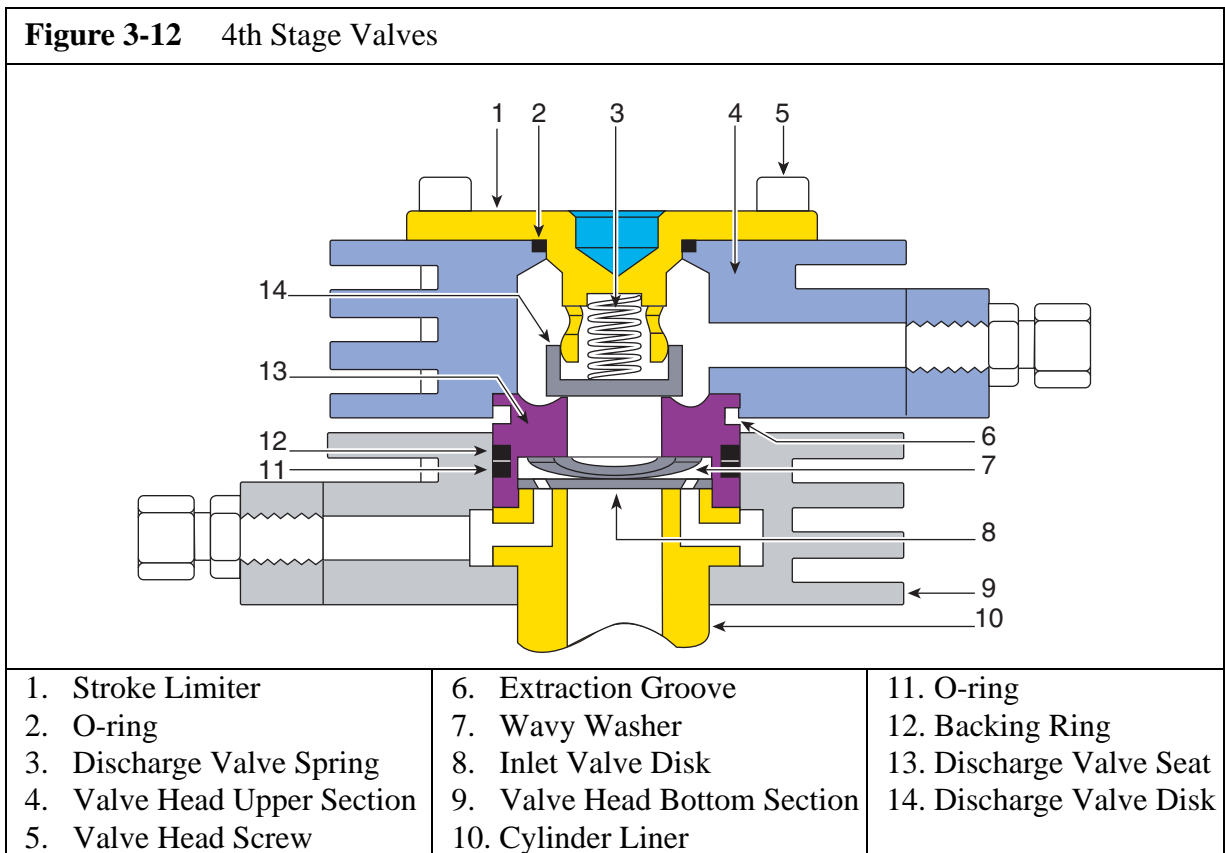
### ⚠ CAUTION

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

10. Screw on hex nut (1) and tighten with a torque wrench.

### 3.1.3.7 The 4th Stage Valves

The 4th stage valves are located in the horizontally positioned 4th stage valve head. The valve head is comprised of a bottom section and an upper section. The valve head is secured to the cylinder by means of the valve head screws. The inlet valve is comprised of a valve disk and wavy washer. The inlet valve seat is machined directly into the 4th stage cylinder liner. The discharge valve consists of the valve seat, valve disk, valve spring and stroke limiter



#### 3.1.3.7.1 Procedures to remove and reinstall the 4th stage valves

(See Figure 3-12). Remove and reinstall each of the 4th stage valves as follows:

1. Remove Valve Head Screws (5)
2. Take off the Valve Head Upper Section (4) and Stroke Limiter (1) with O-ring (2). This releases the Discharge Valve Disk (14) and Discharge Valve Spring (3).
3. Check Discharge Valve Spring (3) for satisfactory condition and resiliency. Replace if necessary.
4. Check condition of O-ring (2). Replace if necessary.
5. Insert two screwdrivers into the Extraction Groove (6) of the Discharge Valve Seat (13) and lift out Discharge Valve Seat (13) and O-ring (11).
6. Check condition of O-ring (11) and Backing Ring (12). Replace if necessary.
7. Remove Wavy Washer (7) and Inlet Valve Disk (8).
8. Check inlet valve seat on Cylinder Liner (10). If scored, remove cylinder liner (10), take out piston and lap valve seat.

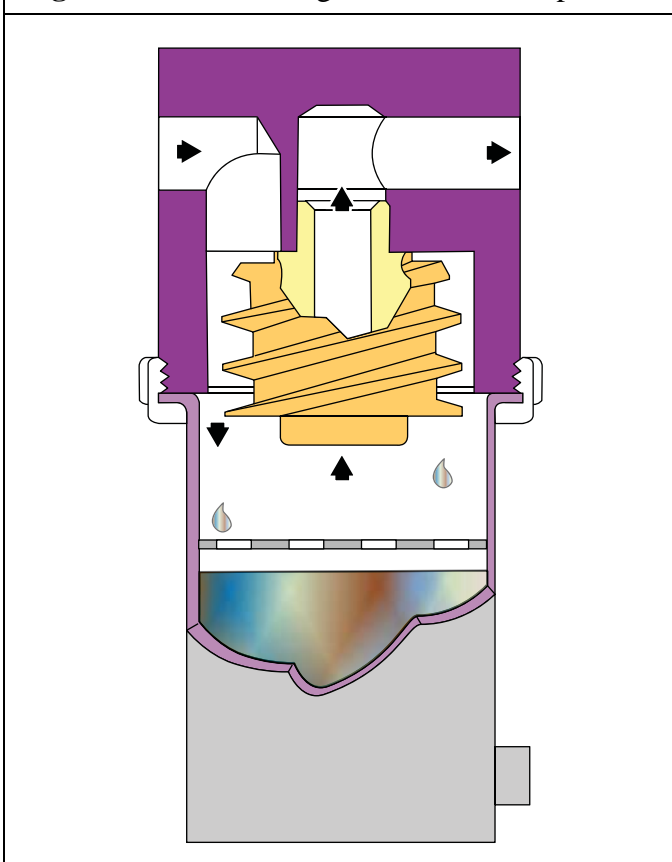
9. To reinstall, turn flywheel on compressor manually until the piston protrudes from the cylinder liner (10).
10. Place the Inlet Valve Disk (8) and Wavy Washer (7), both of which are prevented from side slip by the piston.
11. Insert the Discharge Valve Seat (13) in the Valve Head Bottom Section (9), taking care to avoid damage to the Inlet Valve Disk (8) and Wavy Washer (7).
12. Place Discharge Valve Spring (3) and Discharge Valve Disk (14) on Stroke Limiter (1) and place this in the Valve Head Upper Section (4).
13. Position the Valve Head Upper Section (4) on the Valve Head Bottom Section (9).
14. Replace the Valve Head Screws (5), tightening them diagonally using a torque wrench.

### 3.1.4 Separators

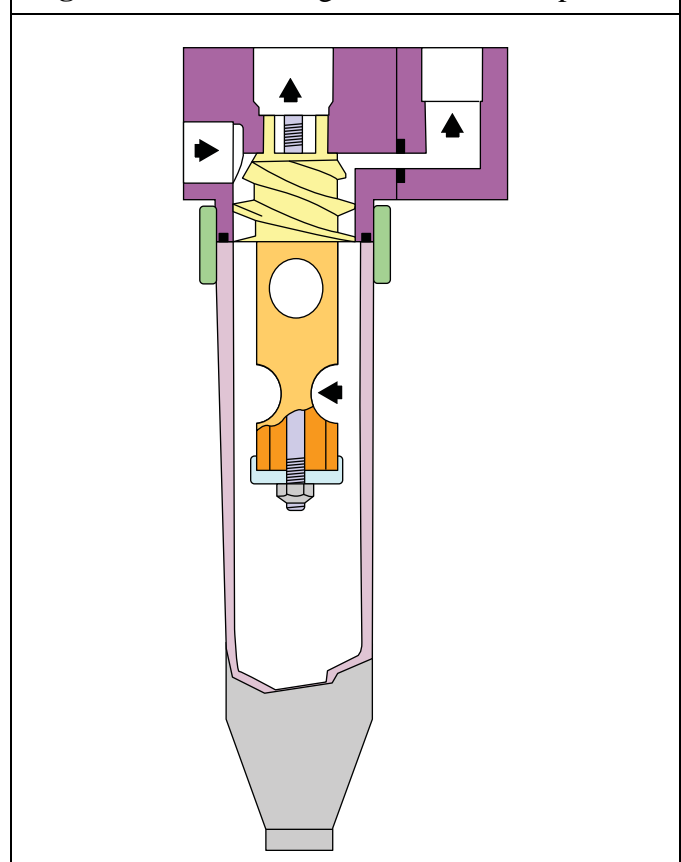
#### 3.1.4.1 Intermediate Separators

See Figure 3-13 and Figure 3-14. Intermediate separators are mounted on the compressor block between the 2nd and 3rd stage, and between the 3rd and 4th stage. These separators are designed to remove oil and water accumulating due to cooling after the compression process. Separation is achieved by means of centrifugal action provided by a helical insert. The separators are maintenance free. The condensate is drained at regular intervals by the Automatic Condensate Drain system.

**Figure 3-13** 2nd Stage Intermediate Separator

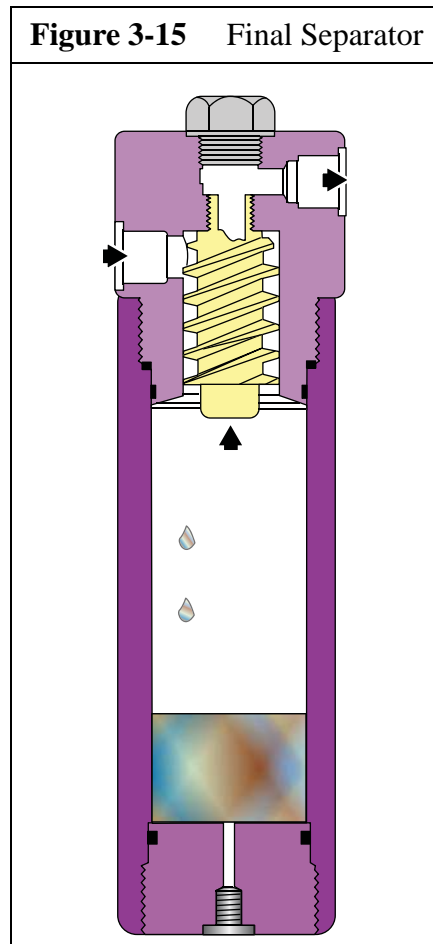


**Figure 3-14** 3rd Stage Intermediate Separator



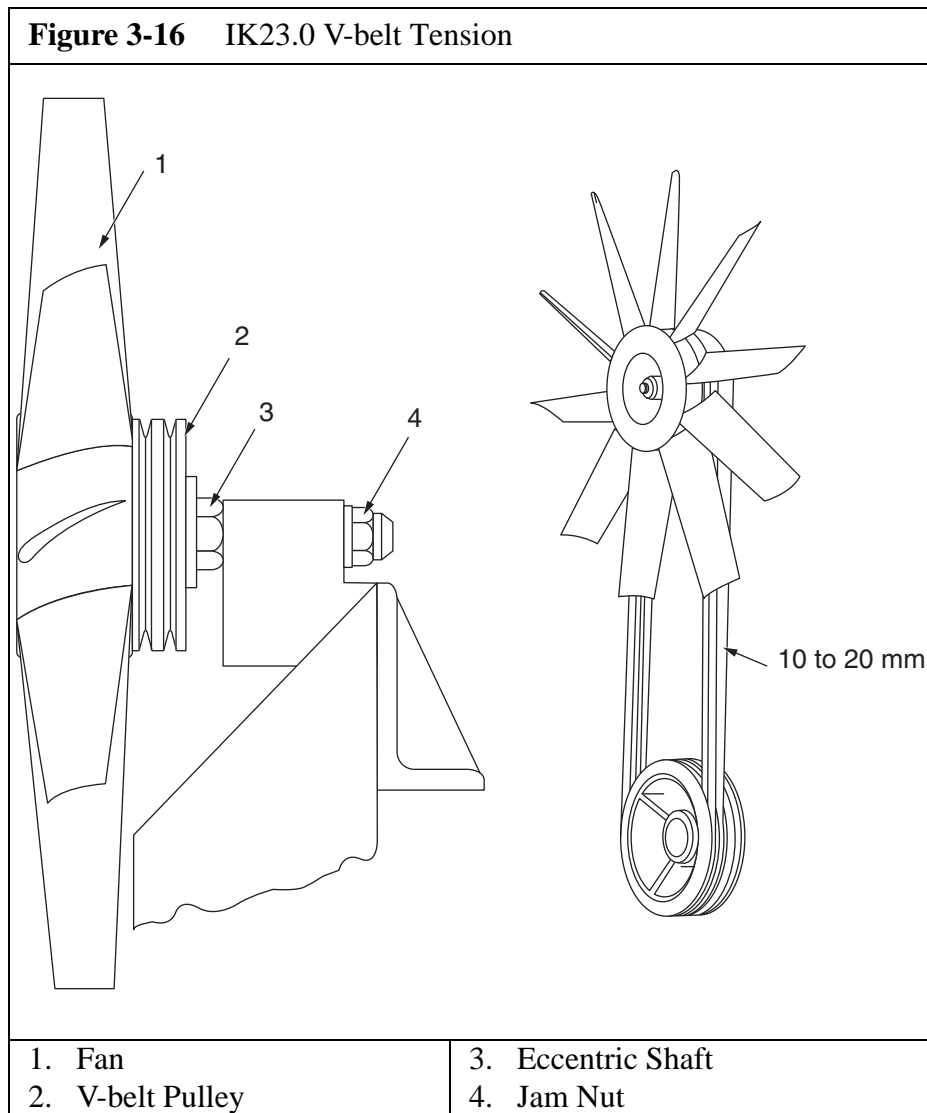
### 3.1.4.2 Final Separator

(See Figure 3-15) The compressed medium leaving the final stage is cooled in the after-cooler to approximately 15 °C above ambient temperature before it enters the Final Separator. Separation of the condensate produced by this cooling by means of centrifugal action provided by a helical insert. The separators are maintenance free. The condensate is drained at regular intervals by the Automatic Condensate Drain system.



## 3.2 Cooling System

The cylinders of the compressor as well as the intercoolers and aftercooler are air-cooled. The compressor is equipped with a fan wheel which draws cooling air from the cooling air inlet.

**3.2.1 Maintenance**

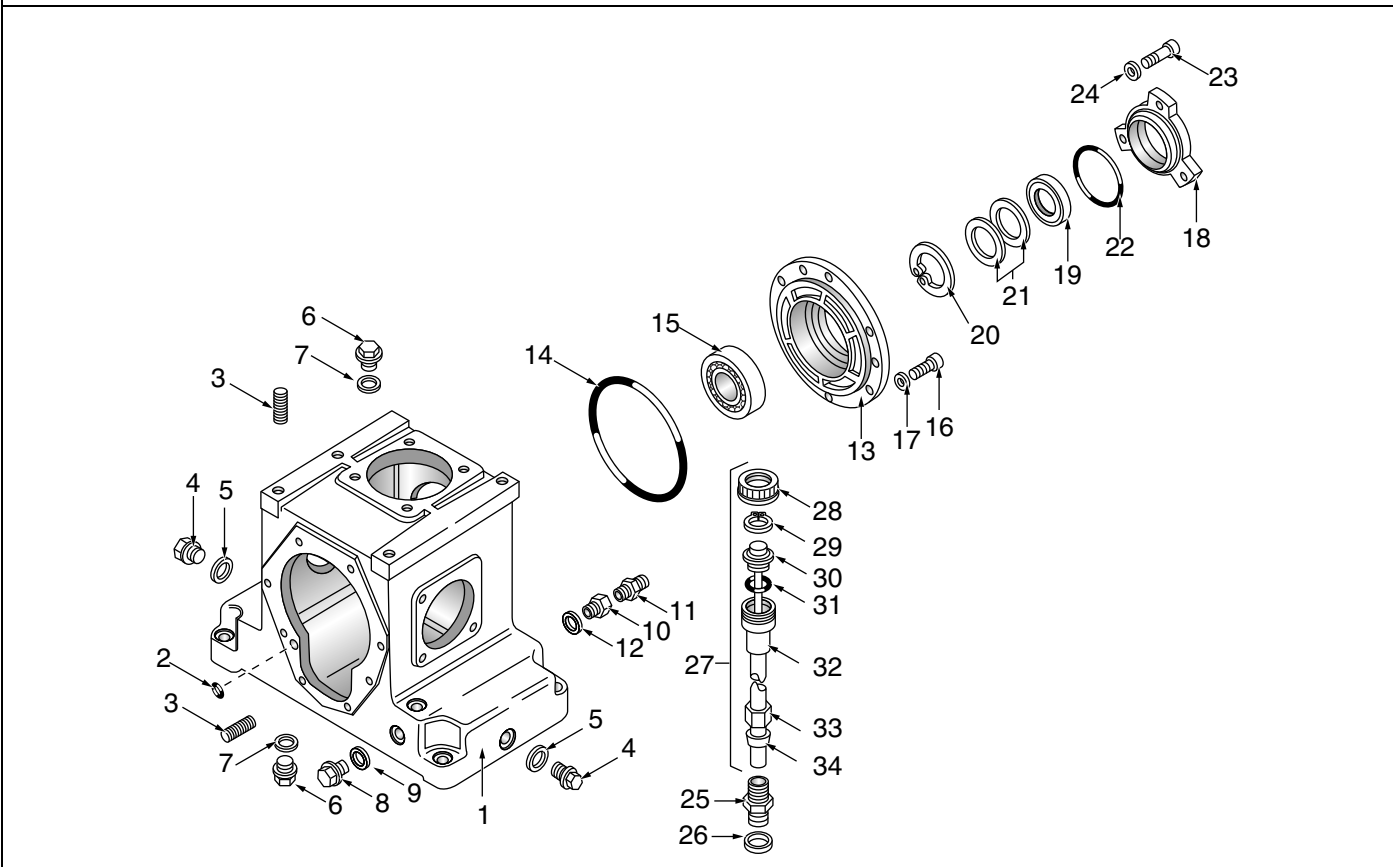
The tension of the V-belt should be checked as follows:

1. Turn the compressor manually using the flywheel and check the condition of the entire length of the V-belt. Replace the V-belt as set, if required.
2. Keep the eccentric shaft (3) from turning using a wrench and loosen the jam nut (4).
3. Turn the eccentric shaft (3) until the correct belt tension has been achieved.
4. The correct V-belt tension is achieved when both belts can be pressed down in the middle by approximately 10 to 20 mm).
5. Again keep the eccentric shaft (3) from turning using a wrench and tighten the jam nut (4).



**3.2.2 Replacement Parts List**

**Figure 3-17** IK23.0 Crankcase



Item	Qty	Part No.	Description	Notes
◆	1	072568	Crankcase Assembly	
1	1	66466	Crankcase	
2	1	N19120	O-ring	
3	8	N15972	Stud	M10 x 30
4	2	N2321	Plug	
5	2	N8114	Gasket	
6	2	N52	Plug	
7	2	N1316	Gasket	
8	1	N2796	Plug	
9	1	N4261	Gasket	
10	1	N2375	Reducing Coupling	
11	1	N20018	Male Connector	
12	1	N4261	Gasket	
13	1	66623	Cover Plate	
14	1	N4061	O-ring	
15	1	N4161	Roller Bearing	

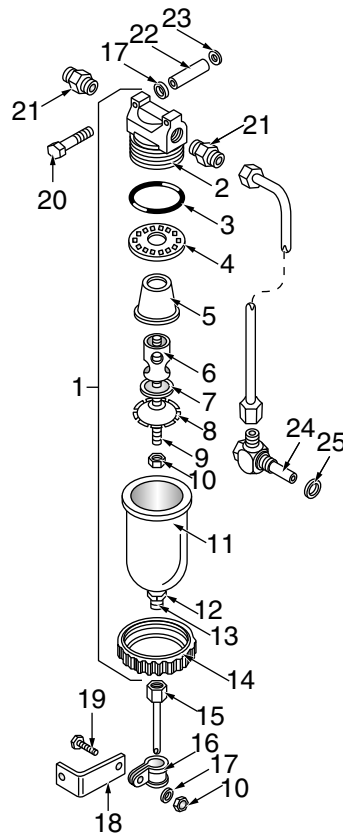


Figure 3-17 (cont.)

IK23.0 Crankcase

Item	Qty	Part No.	Description	Notes
16	6	N312	Hex Head Screw	M10 x 30
17	6	N16	Washer	
18	1	72550	Cover	
19	1	N21990	Shaft Seal	
20	1	N21992	Snap Ring	
21	2	72554	Spacer Disc	
22	1	N4778	O-ring	
23	3	N210	Allen Screw	
24	3	N102	Washer	
25	1	N20230	Male Connector	
26	1	N4261	Gasket	
27	1	066973	Oil Filler Assembly	Items 28 to 34
28	1	N2721	Screw Cap	
29	1	N1809	Circlip	
30	1	066971	Dipstick	
31	1	N18617	O-ring	
32	1	066972	Oil Filler Pipe	
33	1	N7436	Screw Cap	
34	1	N7444	Cutting Ring	

**Figure 3-18** IK23.0 Crankcase Oil Separator



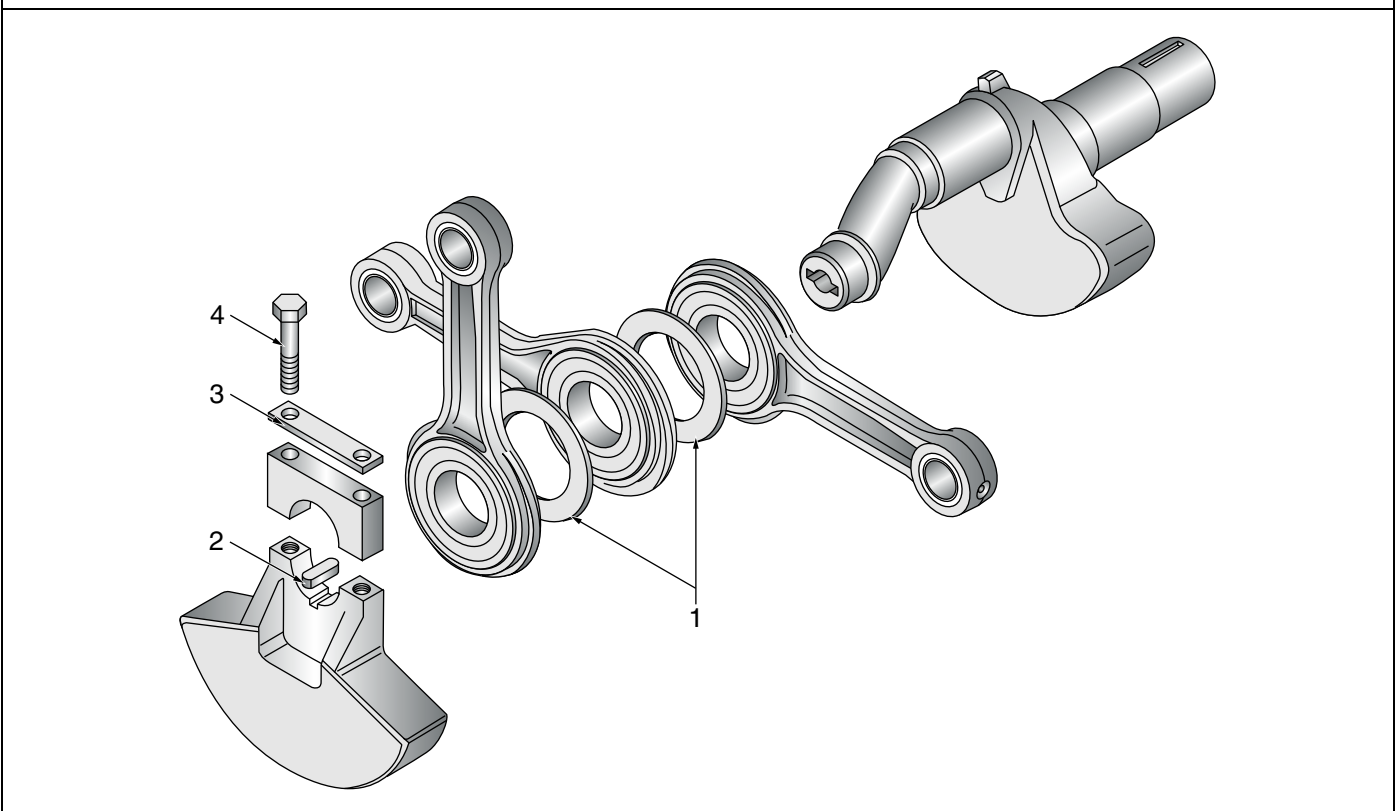
Item	Qty	Part No.	Description	Notes
1	1	073890	Crankcase Oil Separator Assembly	
2	1	N17464	Filter Head	
3	1	N19122	O-ring	
4	1	N2484	Distributing Plate	
5	1	N2483	Baffle Funnel	
6	1	61751	Distance Tube	
7	1	N2480	Baffle Plate	
8	1	N2479	Baffle Washer	
9	1	N3677	Stud	
10	2	N1042	Self Locking Hex Nut	
11	1	73888	Filter Bowl	
12	1	N20277	Compression Fitting	
13	1	N22972	Compression Ring	
14	1	N3511	Screw Cap	
15	1	072564	Connecting Tube	
16	1	N16145	Clamp	
17	3	N102	Washer	

**Figure 3-18 (cont.)**

IK23.0 Crankcase Oil Separator

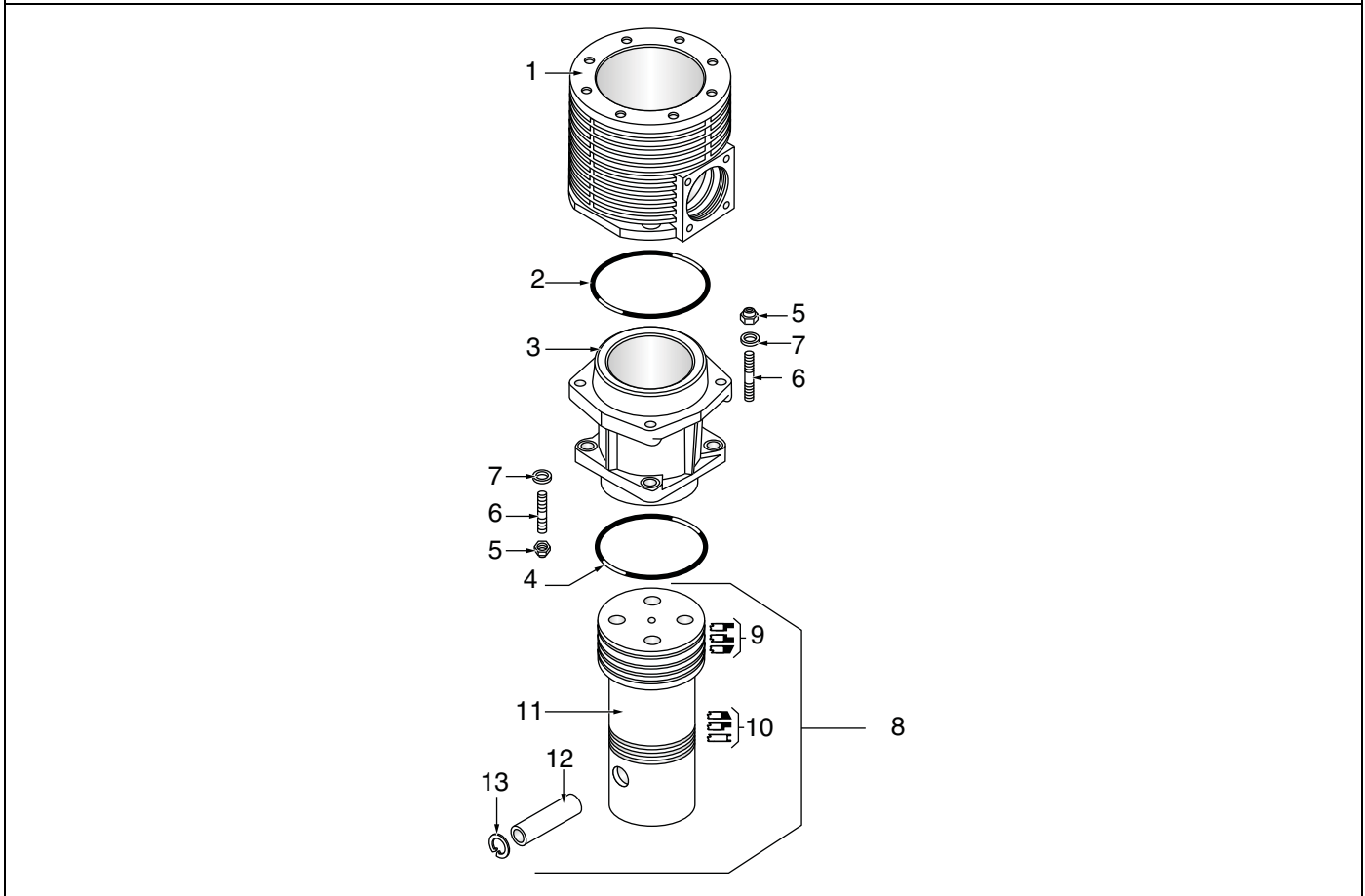
<b>Item</b>	<b>Qty</b>	<b>Part No.</b>	<b>Description</b>	<b>Notes</b>
18	1	69840	Bracket	
19	1	N2900	Hex Head Screw	
20	2	N17734	Hex Head Screw	
21	3	N20075	Male Fitting	
22	2	N4699	Standoff	
23	2	N3313	Washer	
24	1	69837	Oil Jet	
25	1	N293	Gasket	

**Figure 3-19** IK23.0 Driving Gear Assembly



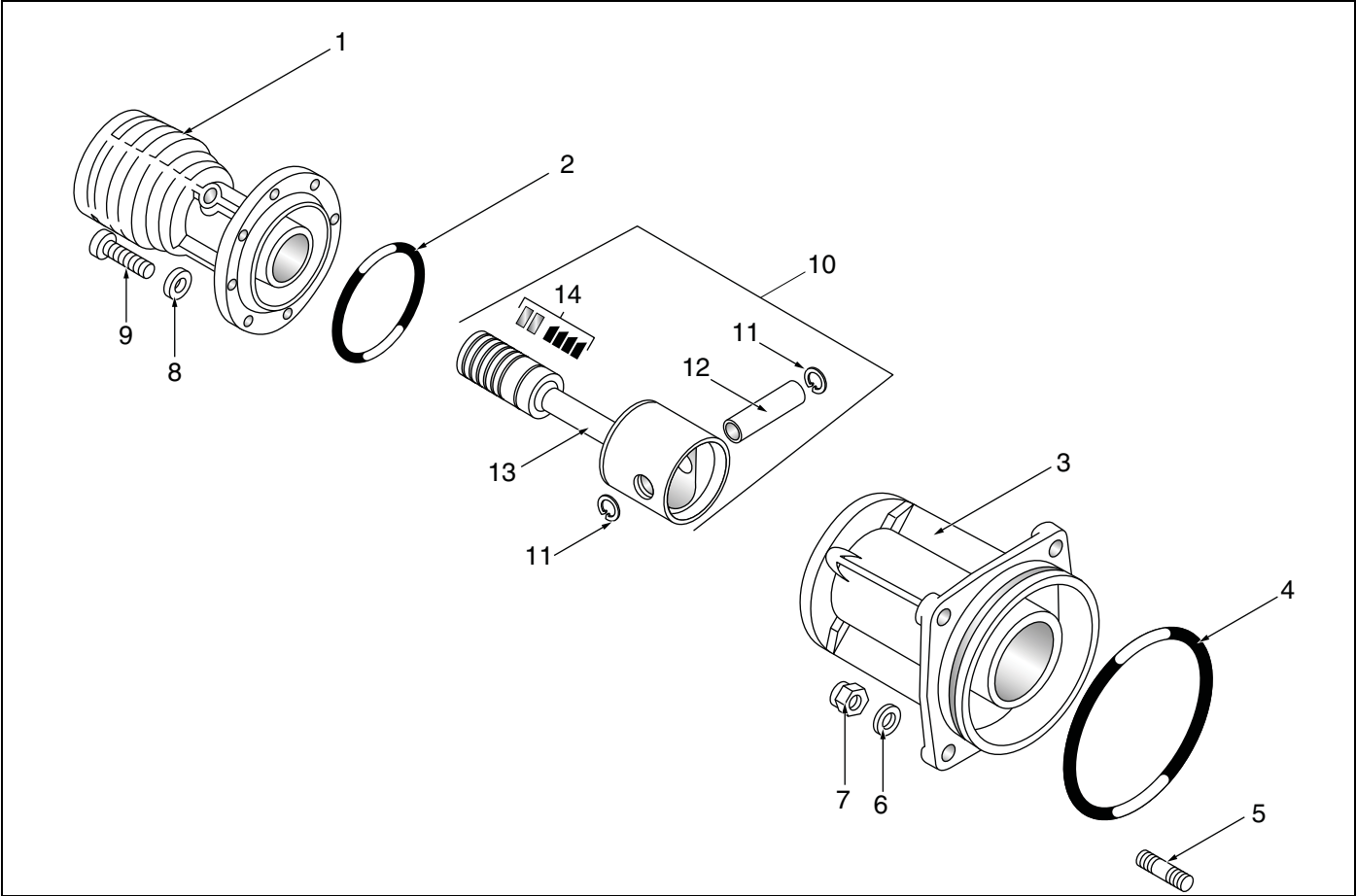
Item	Qty	Part No.	Description	Notes
◆	1	072567	Driving Gear Assembly	
1	†	...	Crankshaft	Available only as part of 072567
2	2	62310	Spacer	
3	†	...	Connecting Rods	Available only as part of 072567
4	2	N9977	Hex Head Screw	
5	1	62311	Locking Plate	
6	†	...	Counter Balance	Available only as part of 072567
7	1	N4528	Key	

**Figure 3-20** IK23.0 1st and 2nd Stage Cylinder



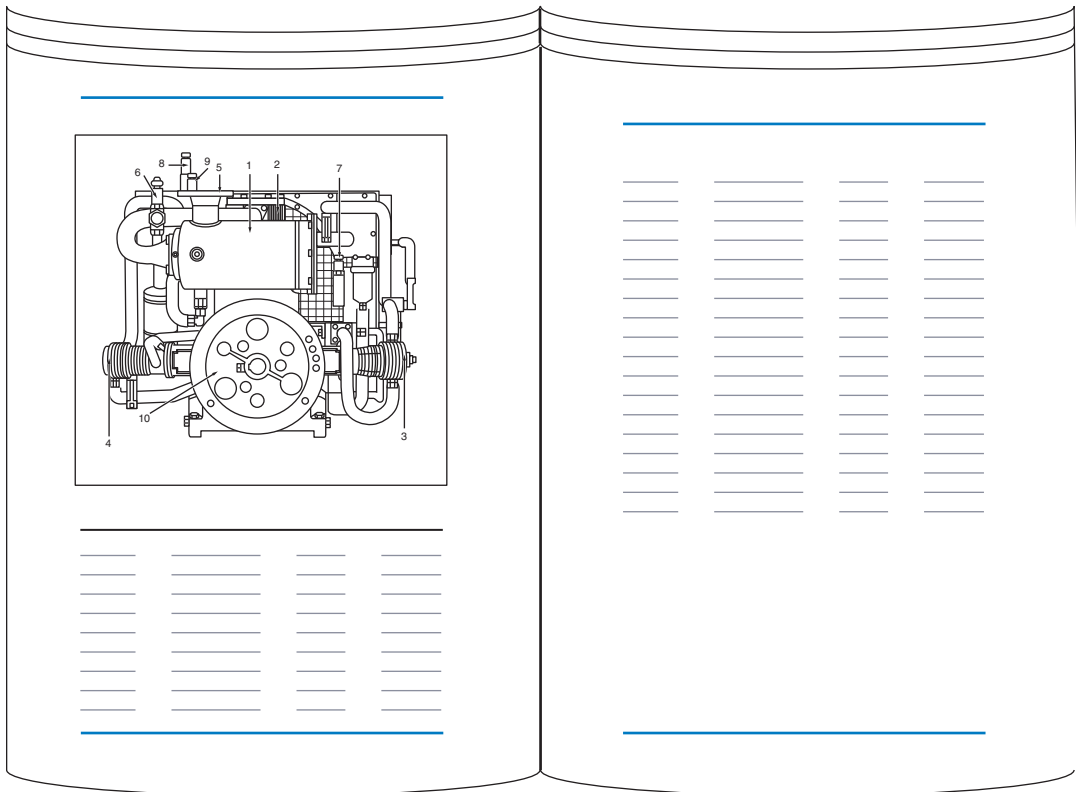
Item	Qty	Part No.	Description	Notes
◆	1	066541	1st and 2nd Stage Cylinder Assembly	
1	1	66534	Upper Part, Stepped Cylinder	
2	1	N16594	O-ring	
3	1	64602	Lower Part, Stepped Cylinder	
4	1	N19123	O-ring	
5	8	N7093	Self Locking Hex Nut	
6	8	N4082	Stud	M12 x 40
7	8	N1594	Washer	
8	1	073508	Stepped Piston Assembly	
9	1	N17463	Piston Ring Set	
10	1	N4642	Piston Ring Set	
11	1	66488	Stepped Piston	Available only as part of 073508
12	1	N16111	Piston Pin	Available only as part of 073508
13	2	N529	Circlip	

**Figure 3-21** IK23.0 3rd Stage Cylinder

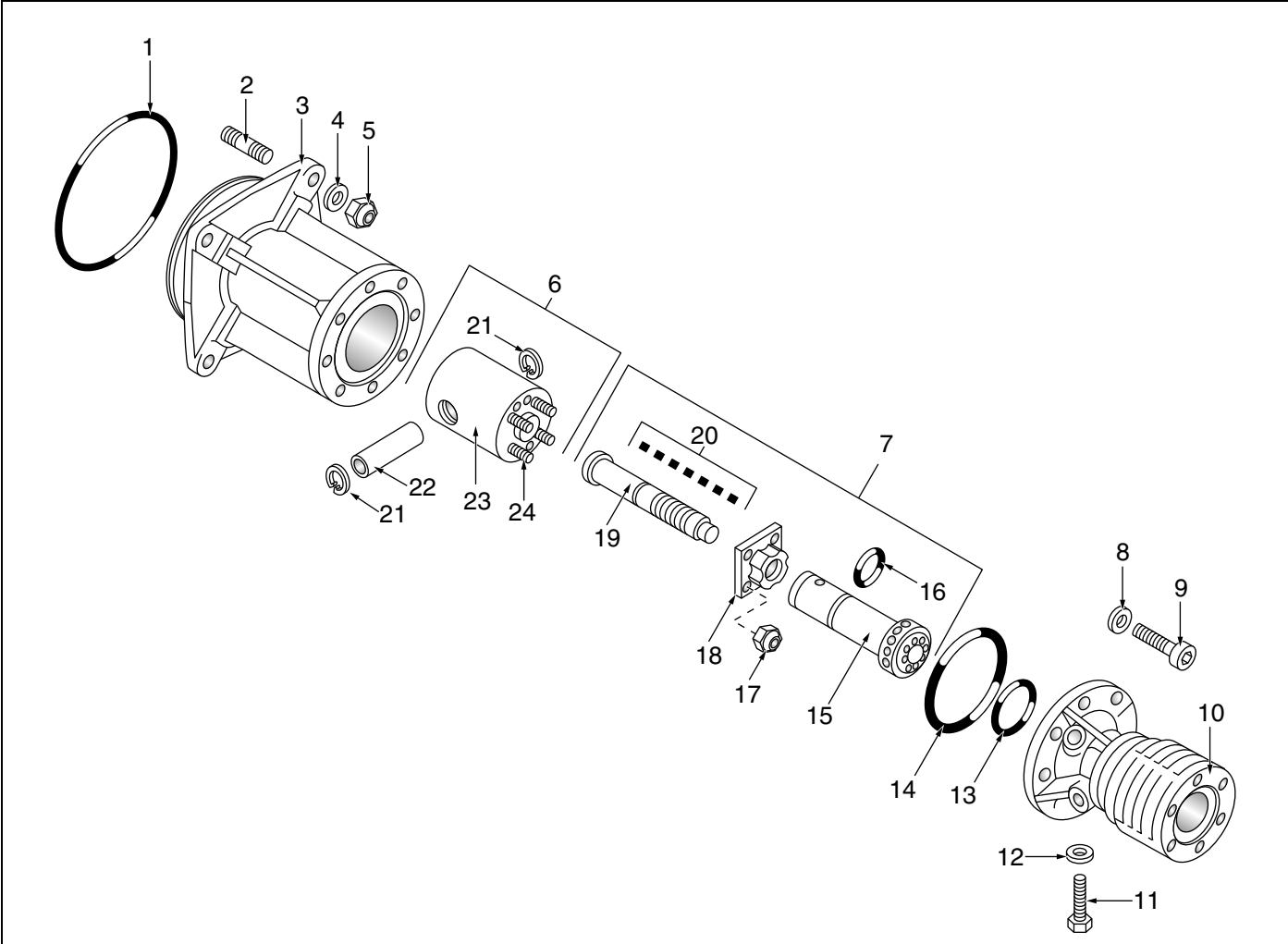


Item	Qty	Part No.	Description	Notes
◆	1	071629	3rd Stage Cylinder Assembly	
1	1	56182	Cylinder	
2	1	N3165	O-ring	
3	1	59770	Guide Cylinder	
4	1	N19123	O-ring	
5	4	N4082	Stud	
6	4	N1594	Washer	
7	4	N7093	Self Locking Hex Nut	
8	8	N58	Washer	
9	8	N61	Allen Screw	
10	1	071630	Piston Assembly	Items 11 - 14
11	2	N529	Circlip Ring	
12	†	...	Piston Pin	Available only as part of 071630
13	1	63435	Stepped Piston	
14	1	N18451	Piston Ring Set	

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**Figure 3-22** 4th Stage Cylinder and Piston Assembly



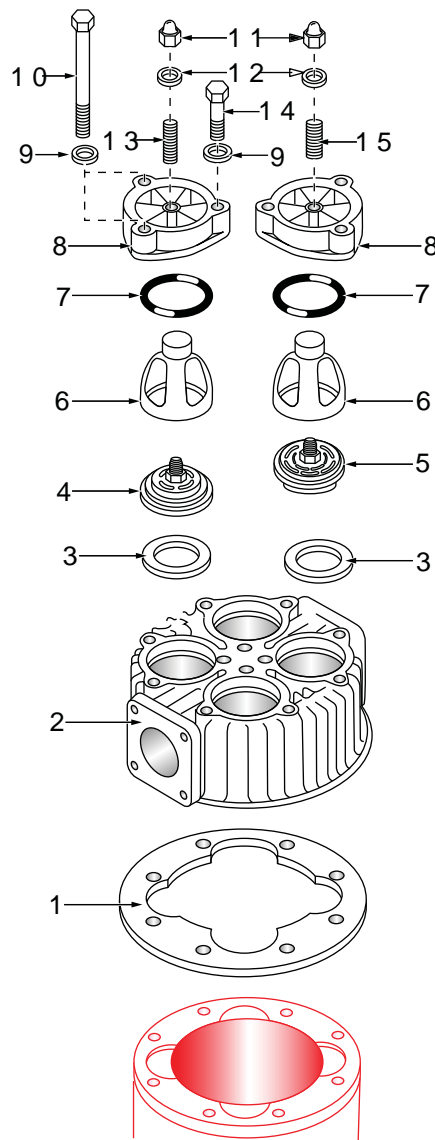
Item	Qty	Part No.	Description	Notes
◆	1	066975	4th Stage Cylinder Assembly	
1	1	N19123	O-ring	
2	4	N4082	Stud	
3	1	59770	Guide Cylinder	
4	4	N1594	Washer	
5	4	N7093	Self Locking Hex Nut	
6	1	072505	Guide Piston Assembly	Items 21 - 23
7	1	062019	Piston and Sleeve Assembly	Items 13 - 20
8	6	N58	Washer	
9	6	N61	Allen Screw	
10	1	63014	Cylinder	
11	1	N16040	Hex Head Screw	
12	1	N2889	Gasket	
13	1	N15540	O-ring	



**Figure 3-22 (cont.)** 4th Stage Cylinder and Piston Assembly

<b>Item</b>	<b>Qty</b>	<b>Part No.</b>	<b>Description</b>	<b>Notes</b>
14	1	N3165	O-ring	
15	†	...	Sleeve	Available only as part of 062019
16	1	N19124	O-ring	
17	4	N2765	Self Locking Hex Nut	
18	1	61953	Press Pad	
19	†	...	Piston	Available only as part of 062019
20	1	N22050	Piston Ring Set	
21	2	N529	Circlip	
22	†	...	Piston Pin	Available only as part of 062019
23	1	59770	Guide Cylinder	
24	4	N55	Stud	

**Figure 3-23** 1st Stage Valve Head

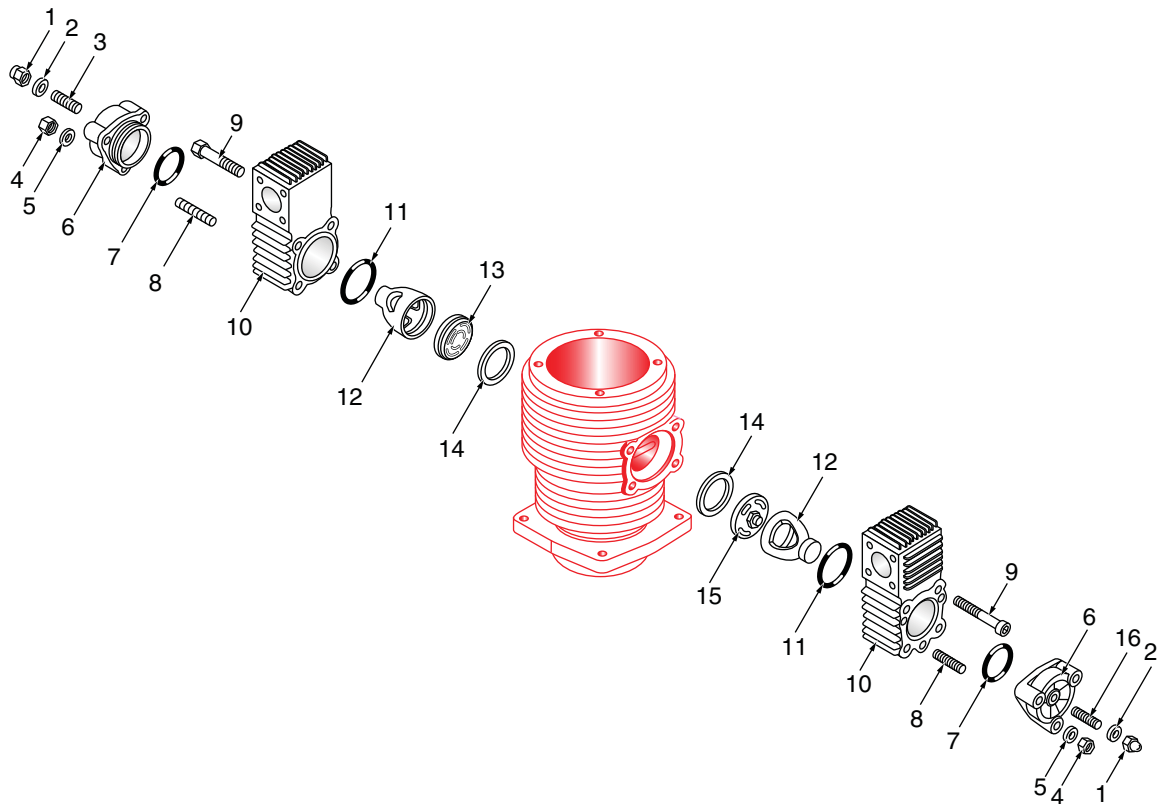


Item	Qty	Part No.	Description	Notes
◆	1	066563	1st Stage Valve Head Assembly	
1	1	66560	Gasket	
2	1	56390	Valve Head	
3	4	5298	Gasket	
4	2	N19973	Pressure Valve	
5	2	N19974	Intake Valve	
6	4	60233	Hood	
7	4	N4085	O-ring	
8	4	60240	Pressure Flange	
9	12	N16	Washer	

**Figure 3-23 (cont.)** 1st Stage Valve Head

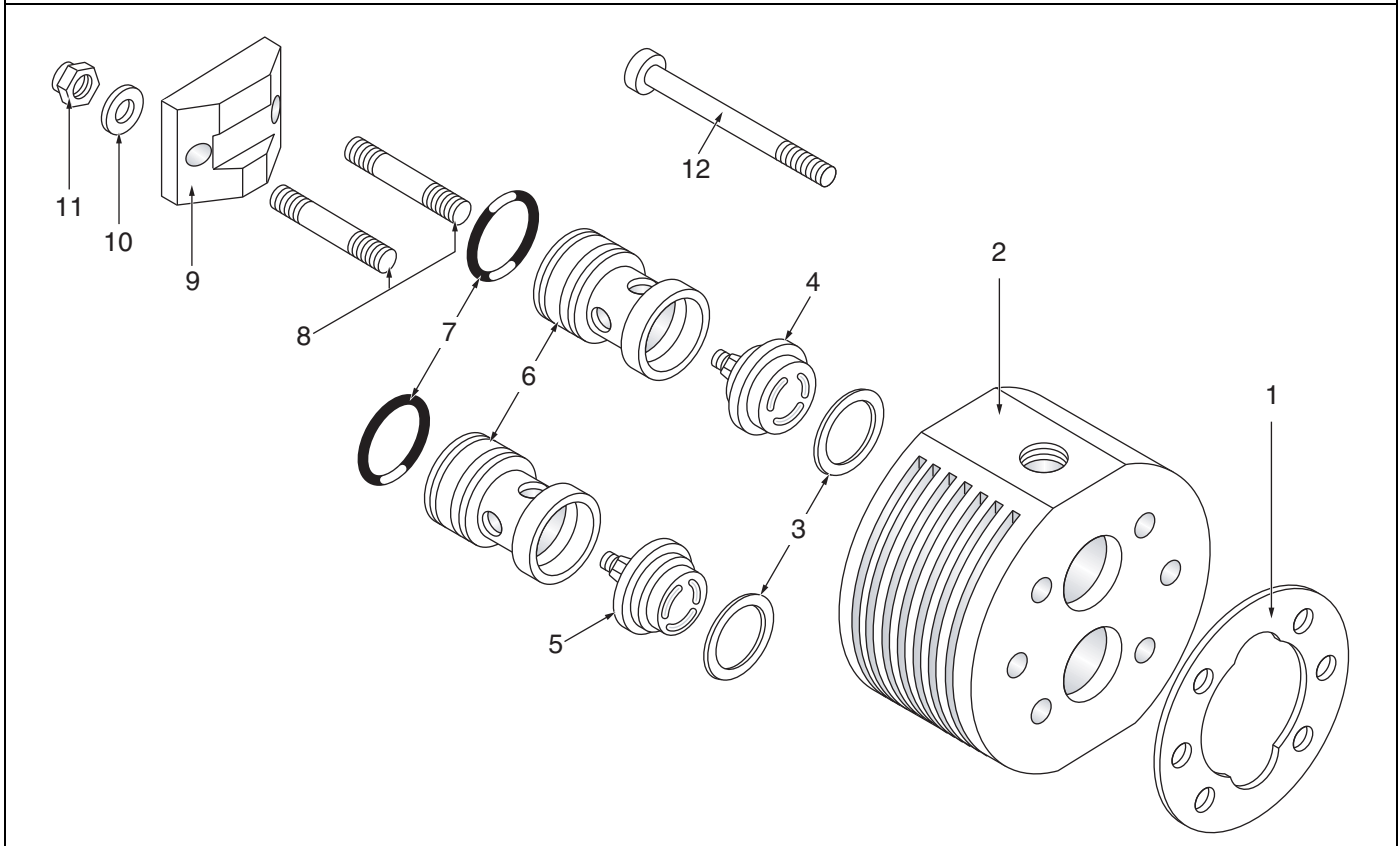
<b>Item</b>	<b>Qty</b>	<b>Part No.</b>	<b>Description</b>	<b>Notes</b>
10	8	N4301	Hex Head Screw	
11	4	N309	Acorn Nut	
12	4	N1316	Gasket	
13	2	71067	Stud	
14	4	N689	Hex Head Screw	
15	2	71066	Stud	

**Figure 3-24** 2nd Stage Valve Head



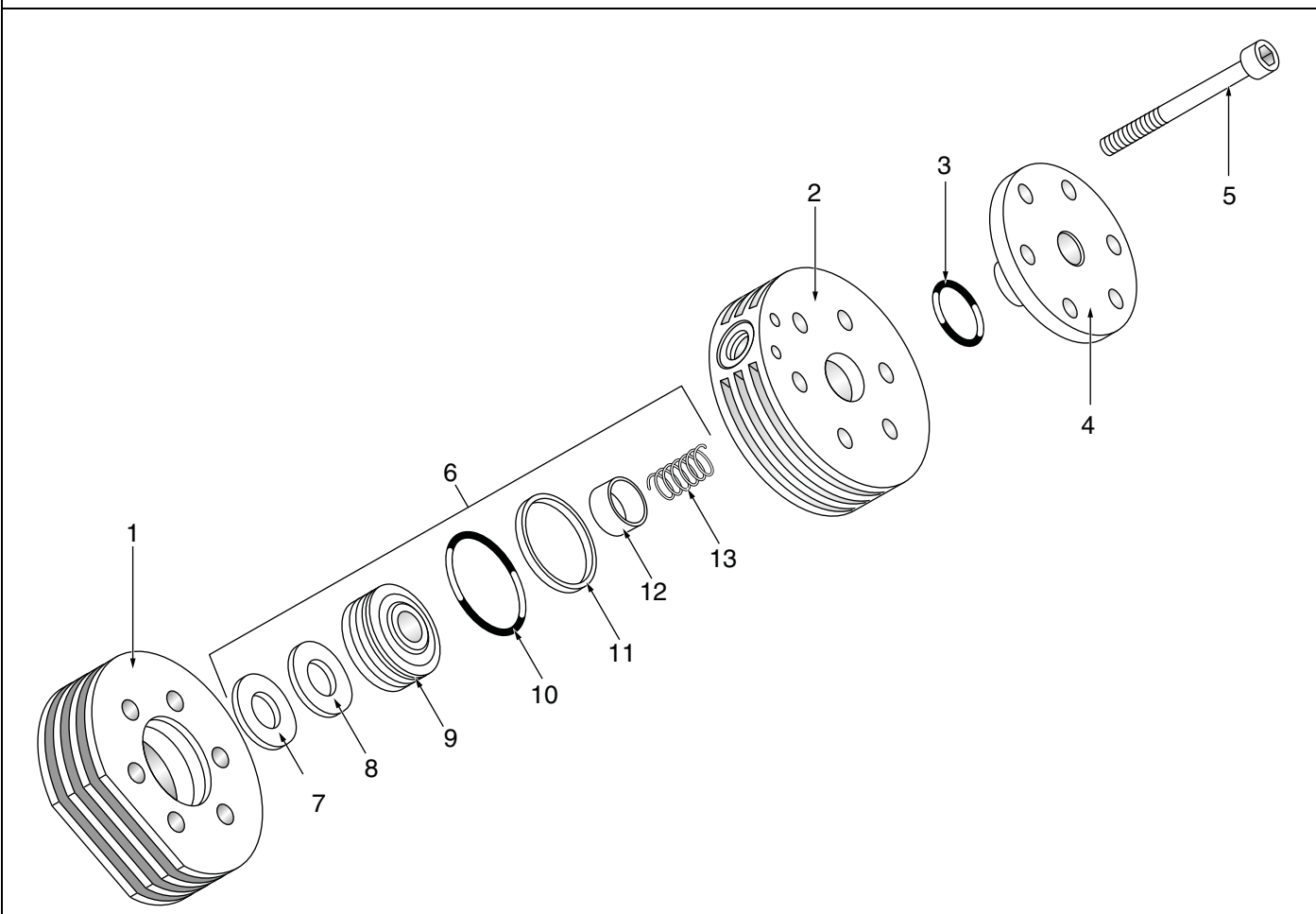
Item	Qty	Part No.	Description	Notes
◆	1	064967	2nd Stage Valve Head Assembly	
1	2	N309	Acorn Nut	
2	2	N1316	Gasket	
3	1	71075	Stud	
4	6	N644	Self Locking Hex Nut	
5	6	N16	Washer	
6	2	60240	Pressure Flange	
7	2	N4085	O-ring	
8	6	N4190	Stud	M12 x 60
9	8	N2374	Allen Screw	
10	2	63316	Valve Head	
11	2	N4154	O-ring	
12	2	60233	Hood	
13	1	N4149	Discharge Valve	
14	2	5298	Gasket	
15	1	N2975	Intake Valve	
16	1	71076	Stud	M12 x 70

**Figure 3-25** 3rd Stage Valve Head Assembly



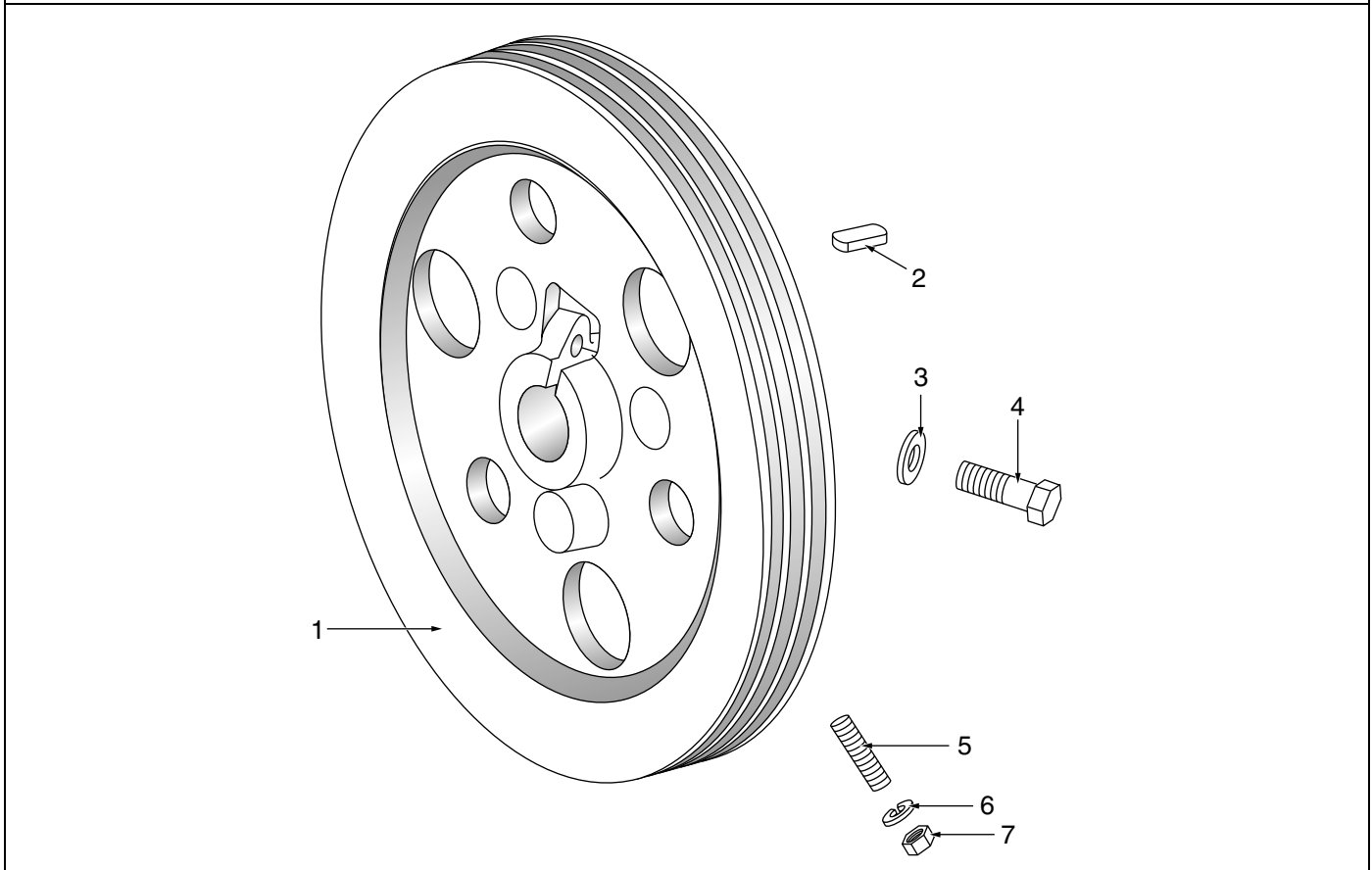
Item	Qty	Part No.	Description	Notes
◆	1	072566	3rd Stage Valve Head Assembly	
1	1	56185	Gasket	
2	1	66980	Valve Head	
3	2	56668	Gasket	
4	1	N4068	Pressure Valve	
5	1	N4067	Intake Valve	
6	2	56183	Valve Cap	
7	2	N3997	O-ring	
8	2	N4190	Stud	
9	1	62924	Press Pad	
10	2	N16	Washer	
11	2	N3474	Self Locking Hex Nut	
12	6	N1282	Allen Screw	

**Figure 3-26** 4th Stage Valve Head Assembly



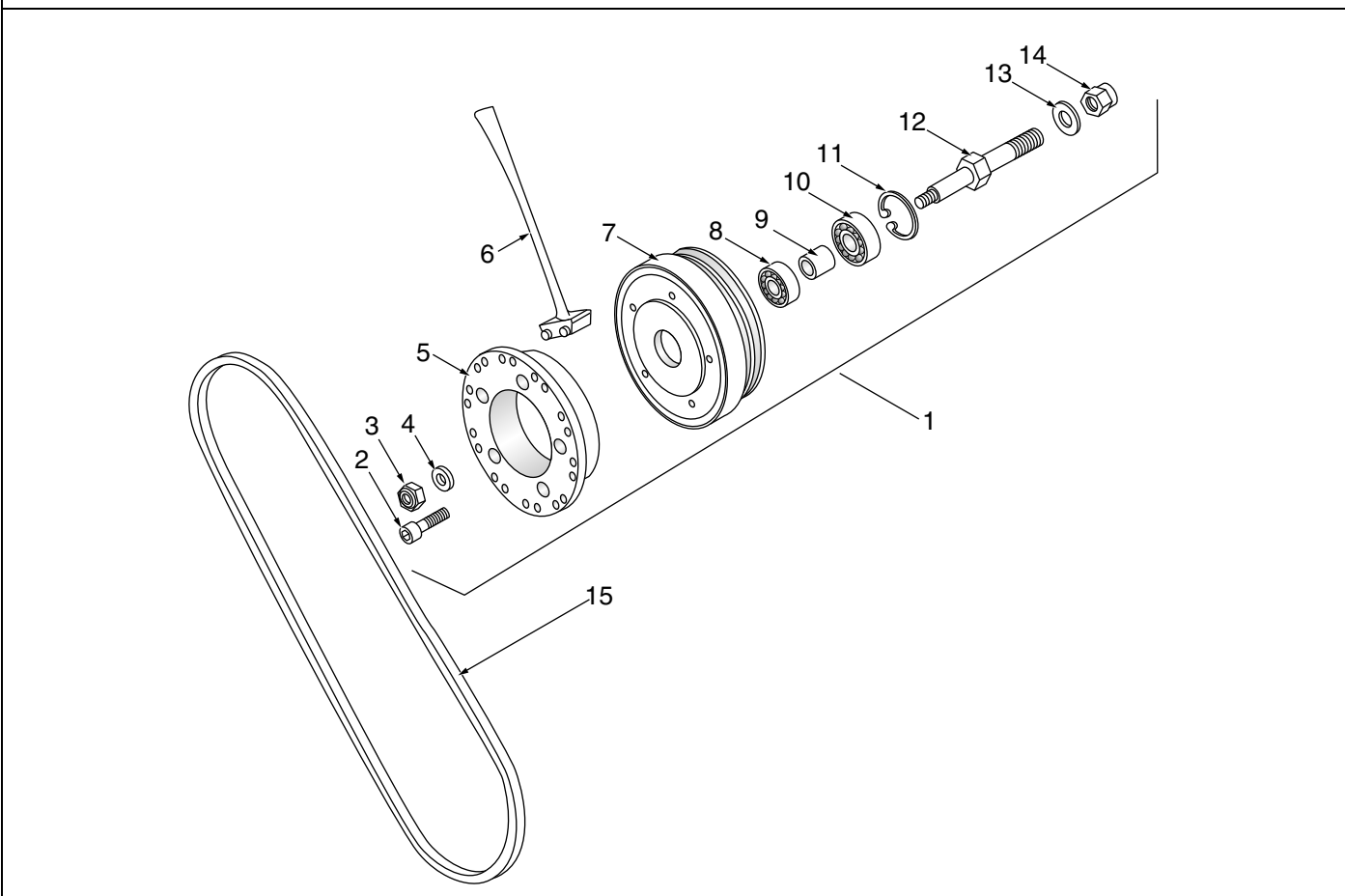
Item	Qty	Part No.	Description	Notes
◆	1	071425	4th Stage Valve Assembly	
1	1	56204	Valve Head, Lower Part	
2	1	57235	Valve Head, Upper Part	
3	1	N4385	O-ring	
4	1	57231	Stroke Limiter	
5	6	N3317	Allen Screw	
6	1	064154	Intake & Pressure Valve Assembly	Items 7 -13
7	†	...	Intake Valve Plate	Available only as part of 064154
8	†	...	Intake Valve Spring	Available only as part of 064154
9	†	...	Pressure Valve Seat	Available only as part of 064154
10	1	N4058	O-ring	
11	1	N4059	Back-up Ring	
12	†	...	Pressure Valve Plate	Available only as part of 064154
13	1	1026	Valve Spring	

**Figure 3-27** Flywheel Assembly



Item	Qty	Part No.	Description	Notes
◆	1	062006	Flywheel Assembly	
1	1	62031	Flywheel	
2	1	N4173	Key	
3	1	N418	Spring Washer	
4	1	N1223	Hex Head Screw	
5	1	N4151	Set Screw	
6	1	N176	Spring Washer	
7	1	N177	Hex Nut	

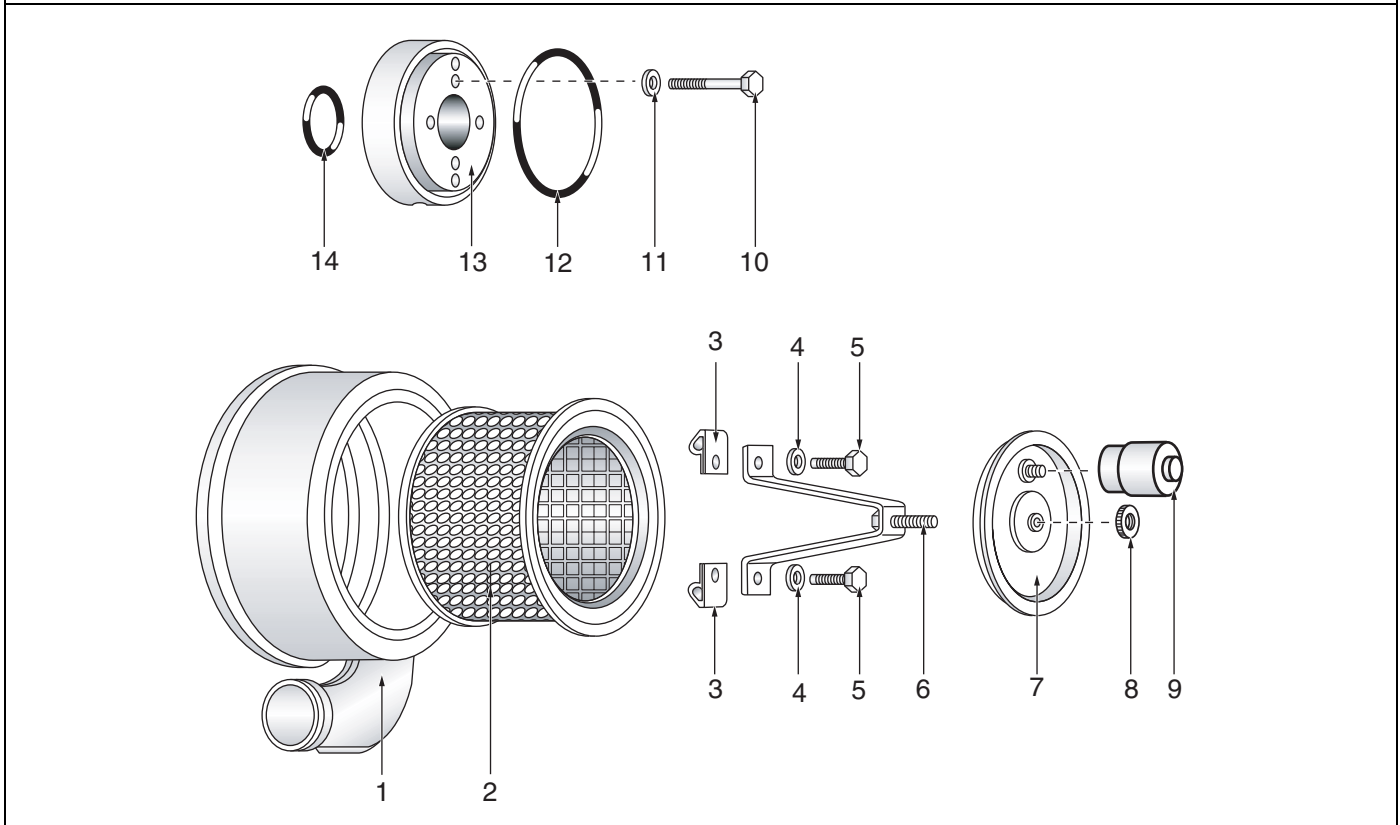
**Figure 3-28** Fan Wheel Assembly



Item	Qty	Part No.	Description	Notes
◆	1	066664	Fan Wheel Assembly	
1	1	063476	Fan Wheel	Items 2-14
2	5	N123	Allen Screw	
3	1	N7093	Self Locking Hex Nut	
4	1	N1594	Washer	
5	1	61323	Fan Wheel Blade Support	
6	10	N15962	Fan Wheel Blade	
7	1	63475	Fan Wheel Hub	
8	1	N3947	Ball Bearing	
9	1	56147	Bushing	
10	1	N3948	Ball Bearing	
11	1	N17689	Circlip	
12	1	59821	Shaft	
13	1	N219	Washer	
14	1	N2740	Self Locking Hex Nut	
15	2	N3316	V-belt	

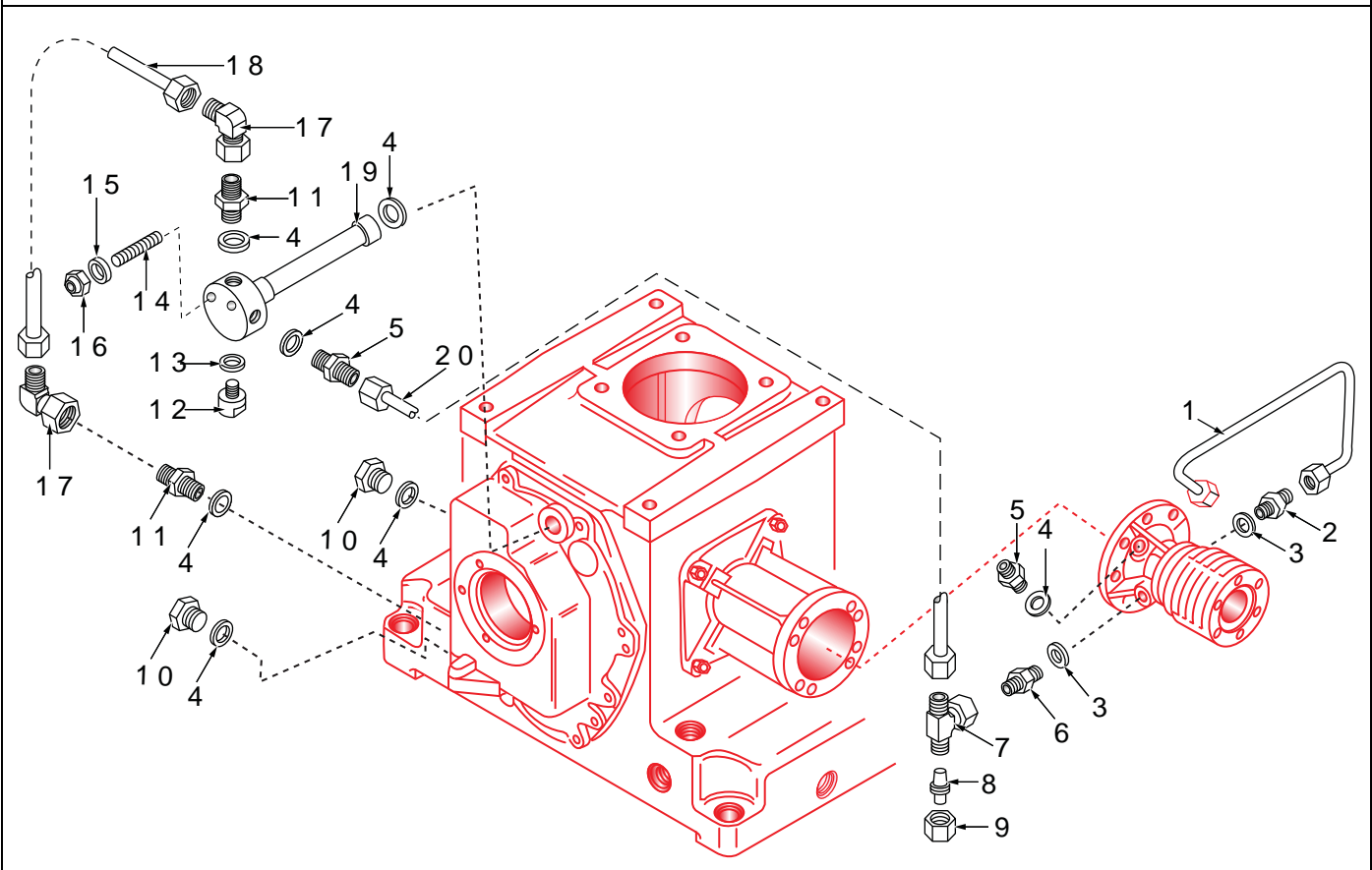


**Figure 3-29** Intake Filter Assembly



Item	Qty	Part No.	Description	Notes
◆	1	069339	Intake Filter Assembly	
1	1	N18903	Filter Body	
2	1	N18906	Filter Cartridge	
3	2	N18905	Clamp	
4	2	N58	Washer	
5	2	N88	Hex Head Screw	
6	1	69312	Retainer	
7	1	N18904	Filter Cover	
8	1	N4870	Knurled Nut	
9	1	N2221	Vacuum Indicator	
10	4	N3667	Hex Head Screw	
11	4	N16	Washer	
12	1	N18907	O-ring	
13	1	69298	Flange	
14	1	N7063	O-ring	

**Figure 3-30** IK23.0 Lubricating System

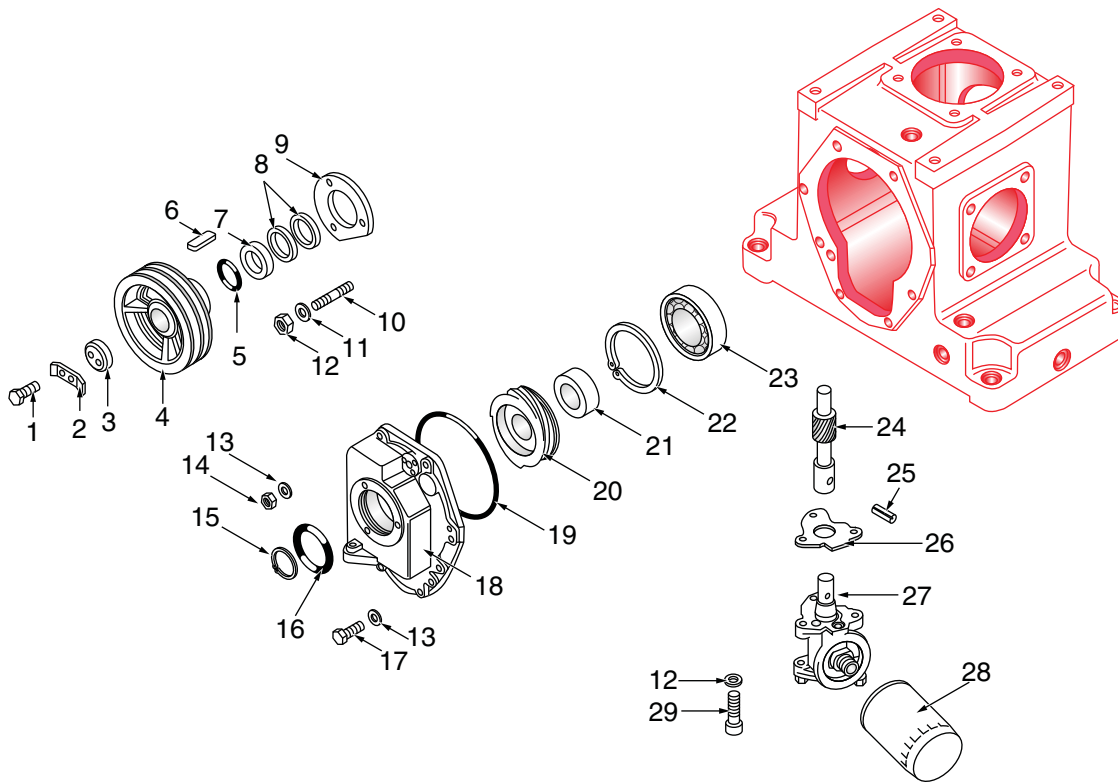


Item	Qty	Part No.	Description	Notes
1	1	071603	Connecting Tube	
2	1	N20188	Male Connector	
3	2	N842	Gasket	
4	7	N1316	Gasket	
5	2	N20014	Male Connector	
6	1	63079	Injection Nozzle	
7	1	N20155	Tee Coupling	
8	1	N16309	Plug	
9	1	N1049	Screw Cap	
10	2	N52	Plug	
11	2	N20201	Male Connector	
12	1	N15688	Plug	
13	1	N4051	Gasket	
14	2	N3494	Stud	
15	2	N102	Washer	
16	2	N1042	Self Locking Hex Nut	
17	2	N20160	Elbow Connector	

**Figure 3-30 (cont.)**      IK23.0 Lubricating System

<b>Item</b>	<b>Qty</b>	<b>Part No.</b>	<b>Description</b>	<b>Notes</b>
18	1	072570	Connecting Tube	
19	1	73273	Oil Jet	
20	1	072572	Connecting Tube	

**Figure 3-31** Oil Pump and Fan Wheel Drive Assembly



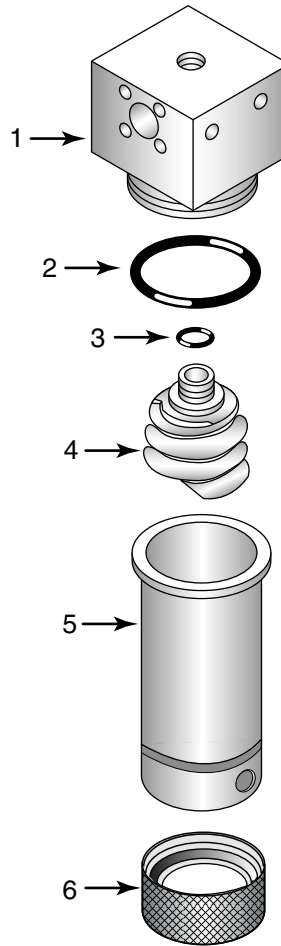
Item	Qty	Part No.	Description	Notes
◆	1	069620	Oil Pump and Fan Wheel Assembly	
1	2	N689	Hex Head Screw	
2	1	57737	Locking Plate	
3	1	57739	Washer	
4	1	63091	V-belt Pulley	
5	1	N21979	O-ring	
6	1	N1782	Key	
7	1	N21796	Shaft Seal	
8	2	72548	Spacer Disc	
9	1	70441	Disc	
10	3	N15126	Stud	
11	6	N58	Washer	
12	3	N370	Self Locking Hex Nut	
13	8	N16	Washer	
14	6	N644	Self Locking Hex Nut	
15	1	N8980	Circlip	
16	1	N4522	O-ring	
17	2	N312	Hex Head Nut	
18	1	61754	Bearing Cap	

**Figure 3-31 (cont.)**

## Oil Pump and Fan Wheel Drive Assembly

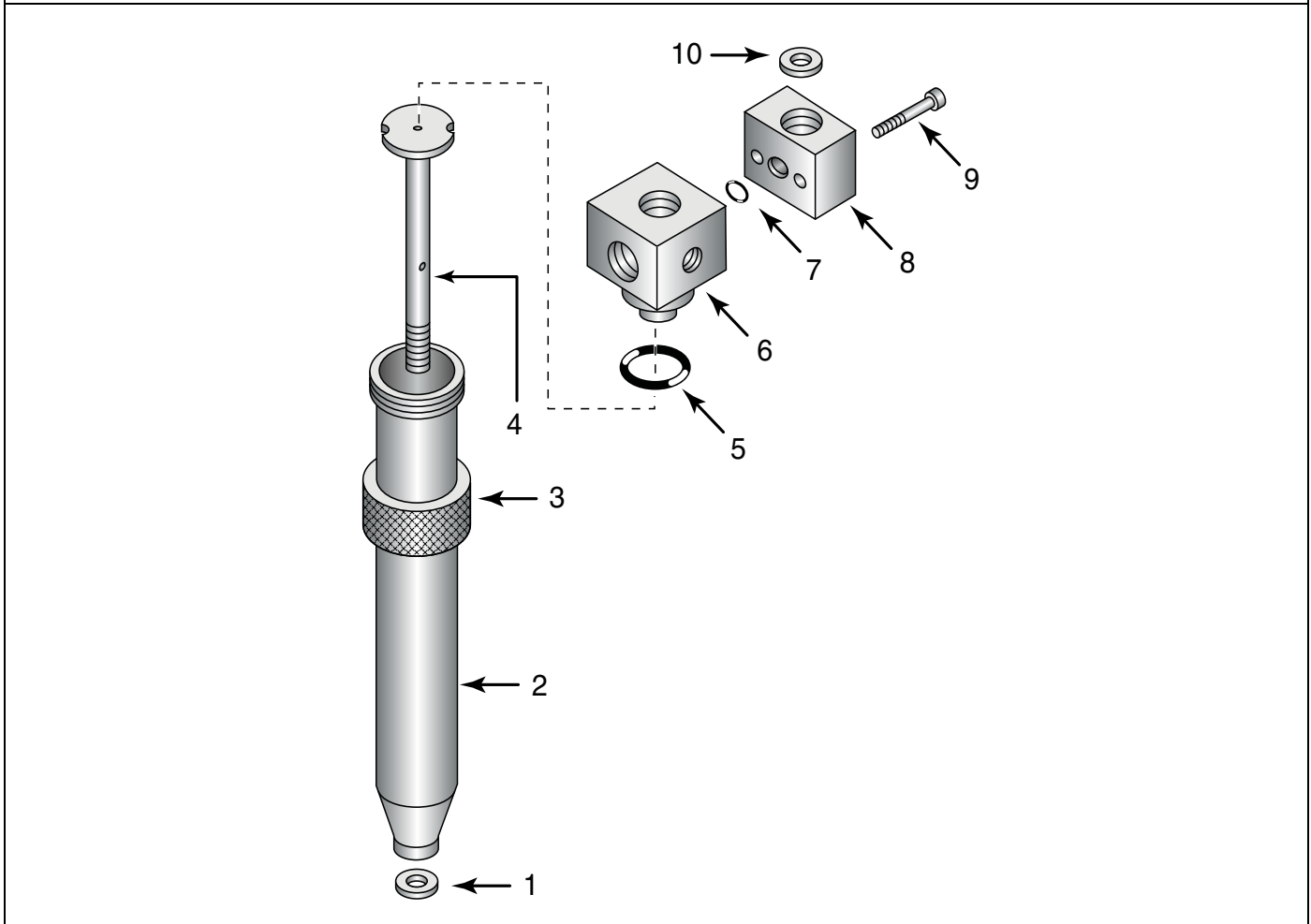
<b>Item</b>	<b>Qty</b>	<b>Part No.</b>	<b>Description</b>	<b>Notes</b>
19	1	N19125	O-ring	
20	1	61825	Helical Gear	
21	1	57334	Distance Sleeve	
22	1	N8663	Circlip	
23	1	N4162	Roller Bearing	
24	1	61826	Helical Gear	
25	1	N1609	Adaptor Sleeve	
26	1	084681	Gasket	
27	1	N28765	Oil Pump	
28	1	N15839	Oil Filter	
29	3	N109	Allen Screw	

**Figure 3-32** Separator



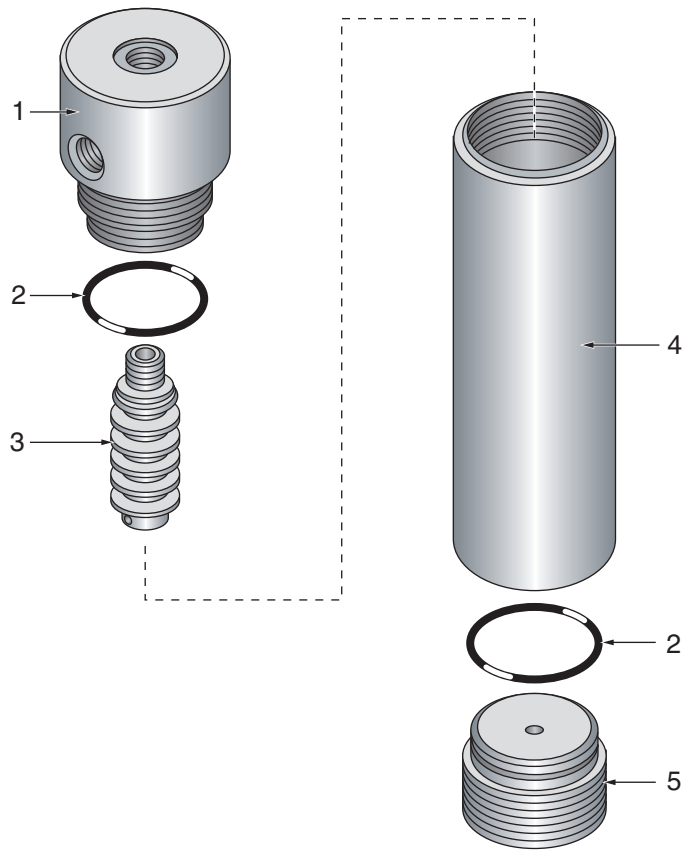
Item	Qty	Part No.	Description	Notes
◆	1	063859-EU	Separator Assembly	
1	1	63854	Separator Head	
2	1	N16185	O-ring	
3	1	N18616	O-ring	
4	1	63686	Vortex Insert	
5	1	064339	Separator Body	
6	1	80569	Knurl Ring	

**Figure 3-33** Intermediate Separator



Item	Qty	Part No.	Description	Notes
◆	1	81788	Intermediate Separator	
1	1	N1316	Gasket	
2	1	59799	Filter Housing	
3	1	13937	Knurl Ring	
4	1	76613	Insert	
5	1	N3556	O-Ring	
6	1	81782	Filter Head	
7	1	N7091	O-Ring	
8	3	62057	Coupling Block	
9	2	N19551	Allen Screw	
10	1	N293	Gasket	

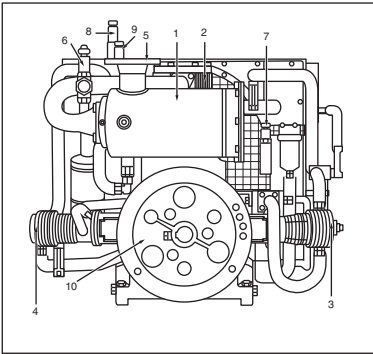
**Figure 3-34** Final Separator



Item	Qty	Part No.	Description	Notes
◆	1	087139-EU	Oil and Water Separator Assembly	
1	†	...	Separator Head	Available only with 087139
2	2	N04586	O-Ring	
3	1	064124	Vortex Insert	
4	†	...	Separator Housing	Available only with 087139
5	†	...	Bottom Plug	Available only with 087139



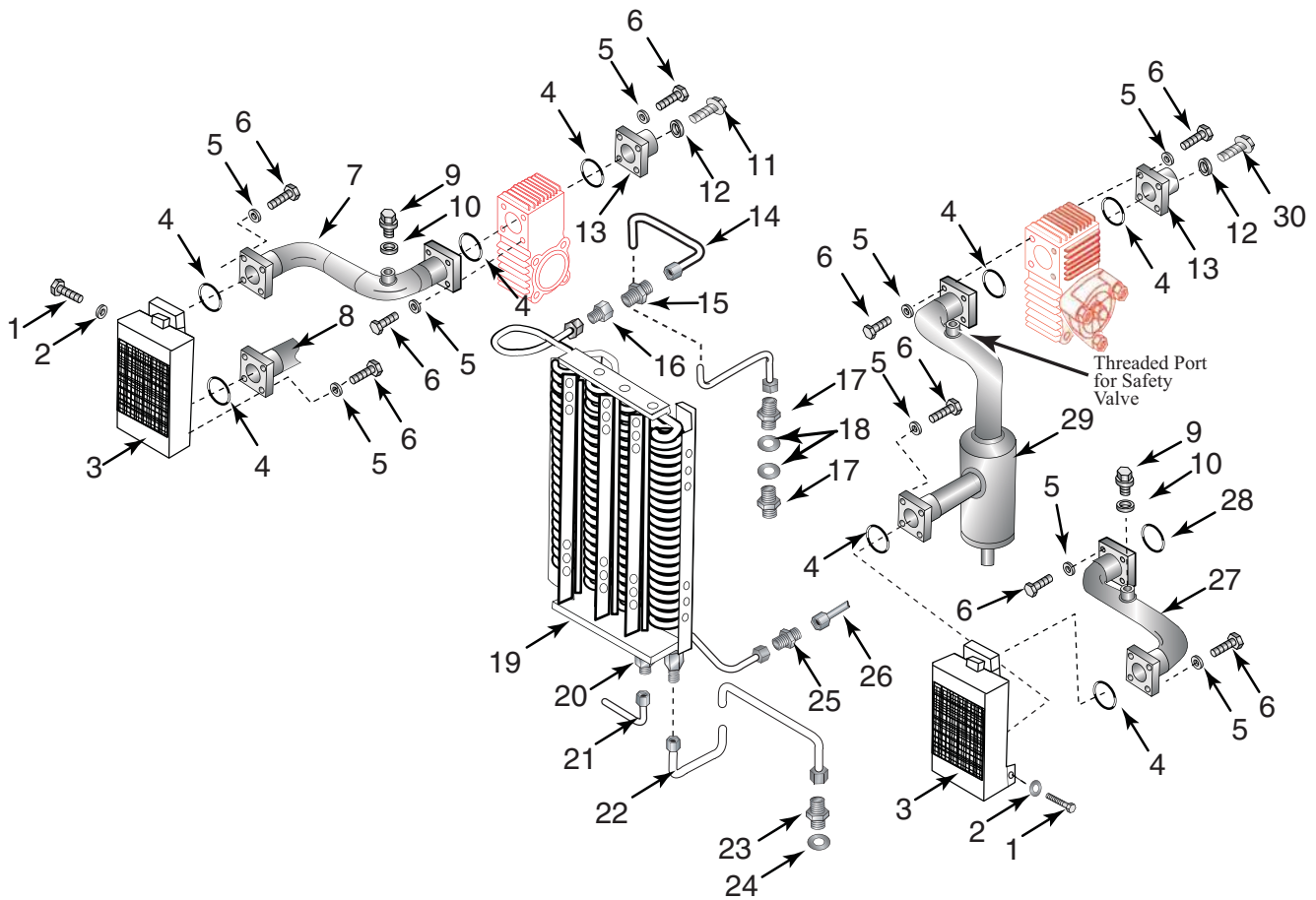
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**Figure 3-35** Cooling System

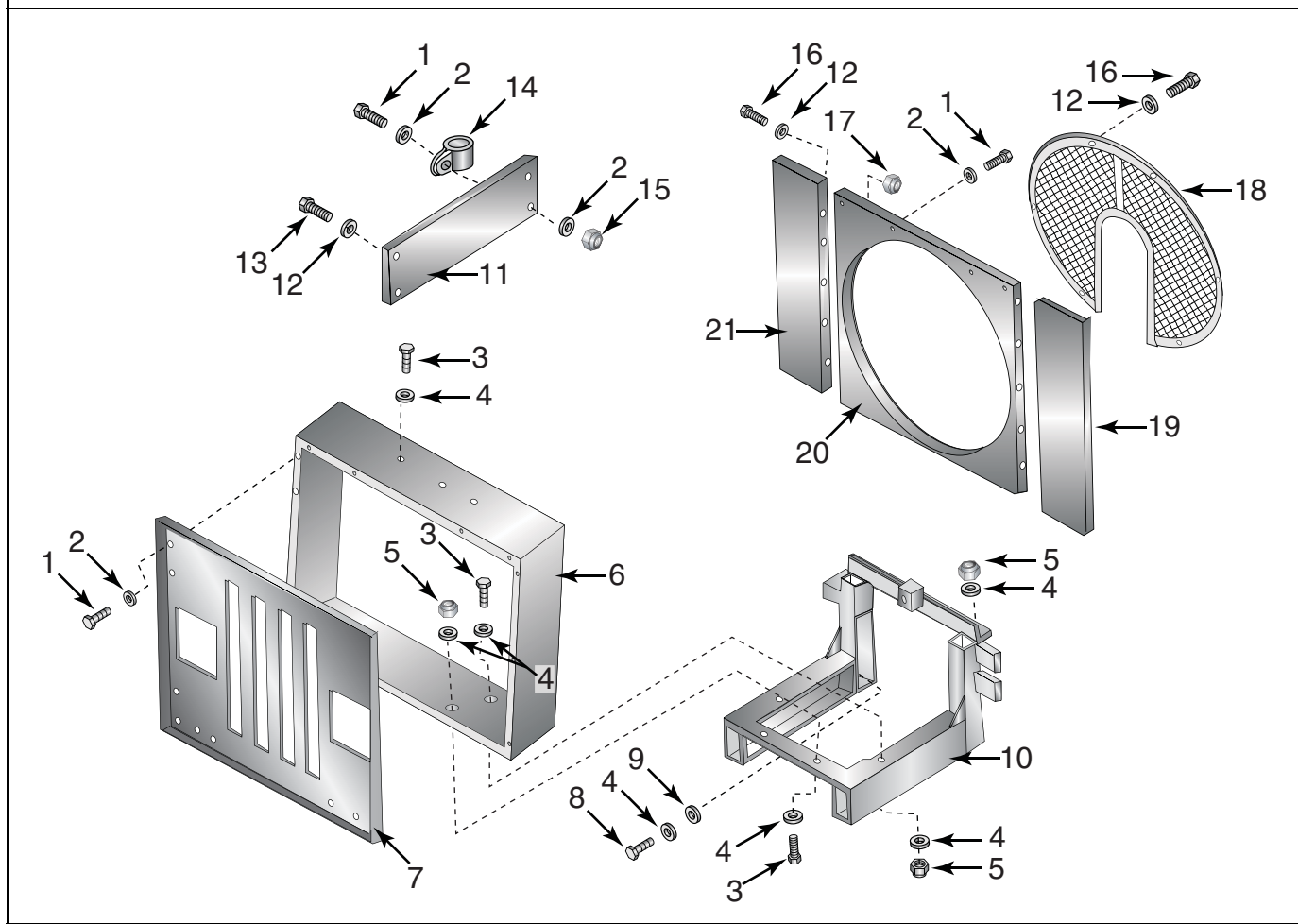


#	KIT	Qty	Part No.	Description	Notes
◆		1	072626	Cooling System	
1	...	8	N171	Allen Screw	
2	...	8	N58	Washer	
3	...	2	N16646	Cooler	
4	..c	8	N4262	O-Ring	
5	...	44	N176	Spring Washer	
6	...	44	N357	Hex Head Bolt	
7	...	1	67002	Connecting Tube Assembly	
8	...	1	73294	Connecting Tube Assembly	
9	...	2	N314	Plug	
10	...	2	N293	Gasket	
11	...	1	N52	Plug	
12	...	2	N1316	Gasket	
13	...	2	61610	Blind Flange	

**Figure 3-35 (cont.)** Cooling System

#	KIT	Qty	Part No.	Description	Notes
14	...	1	072577	Connecting Tube Assembly	
15	...	1	N20275	Straight Bulkhead Connector	
16	...	1	N20290	Reducer	
17	...	2	N20239	Straight Male Connector	
18	...	2	N4261	Gasket	
19	...	1	066674	Cooler	
20	...	2	N20418	Reducer	
21	...	1	072585	Connecting Tube Assembly	
22	...	1	072583	Connecting Tube Assembly	
23	...	1	60217	Intermediate Connector	
24	...	1	N16057	O-Ring	
25	...	1	N20277	Straight Bulkhead Connector	
26	...	1	072579	Connecting Tube Assembly	
27	...	1	67005	Connecting Tube Assembly	
28	..c	1	N7063	O-Ring	
29	...	1	67001	Connecting Tube Assembly	

**Figure 3-36** Cooling System Frame



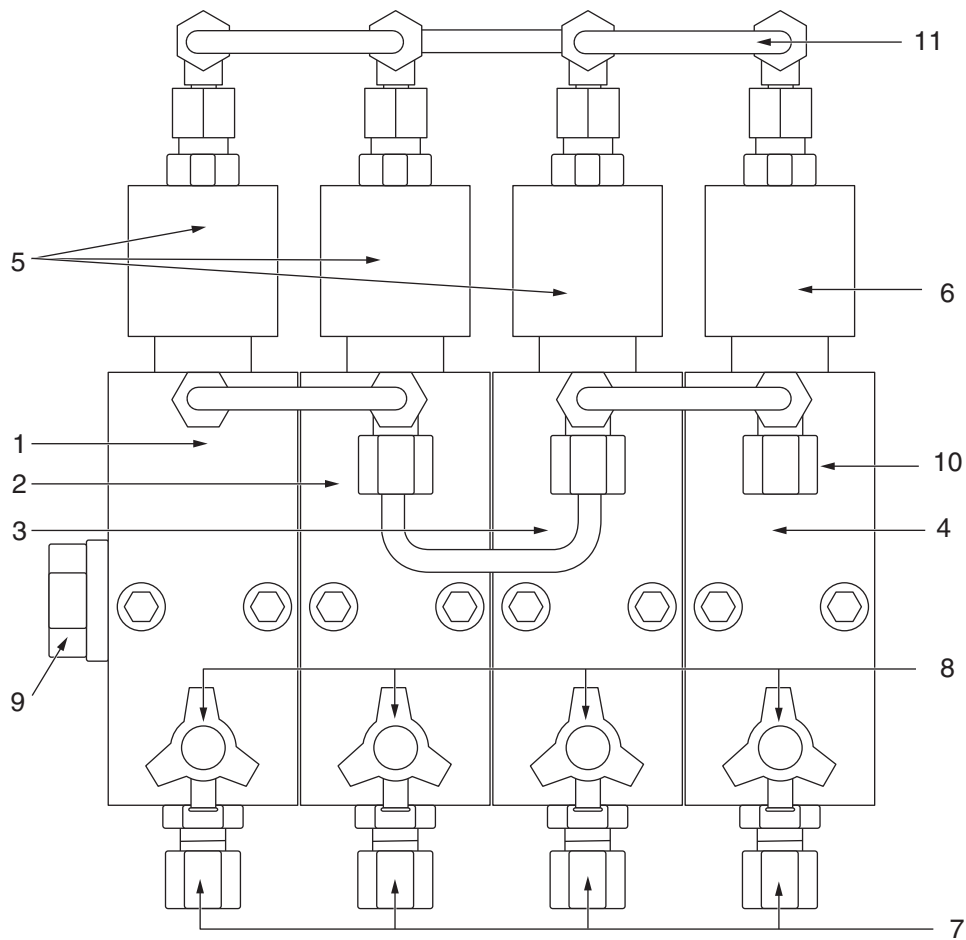
Item	Qty	Part No.	Description	Notes
1	42	N198	Hex Head bolt	
2	42	N58	Washer	
3	6	N700	Allen Screw	
4	12	N16	Washer	
5	6	N644	Hex Nut, Self Locking	
6	1	66568	Cooler Housing	
7	1	—	Cover Plate	
8	2	N312	Hex Head Bolt	
9	2	N16317	Washer	
10	1	66604	Frame	
11	1	68179	Support	
12	22	N100	Spring Washer	
13	2	N1553	Hex Head Bolt	
14	2	N3296	Tube Clamp	

**Figure 3-36 (cont.)** Cooling System Frame

<b>Item</b>	<b>Qty</b>	<b>Part No.</b>	<b>Description</b>	<b>Notes</b>
15	2	N370	Hex, Nut, Self Locking	
16	20	N101	Hex Head Bolt	
17	16	N16184	Square Nut, Self Locking	
18	1	63747	Fan Wheel Protection Grid	
19	1	—	Cover Plate	
20	1	—	Air Intake Ring	
21	1	—	Cover Plate	

**3.3 Automatic Condensate Drain (ACD) System for IK23.0**

**Figure 3-37** 4 Stage Automatic Condensate Drain System



- |  |  |
|--|--|
| 1. Condensate drain valve, 1st stage separator     | 7. Condensate inlet connections (tube connector) |
| 2. Condensate drain valve, 2nd stage separator     | 8. Manual condensate drain valves                |
| 3. Condensate drain valve, 3rd stage separator     | 9. Condensate collector bottle connection        |
| 4. Condensate drain valve, oil and water separator | 10. Control medium connection                    |
| 5. Solenoid valves, 1st, 2nd, and 3rd stages       | 11. Control medium feedback                      |
| 6. Solenoid valve, 4th stage                       |  |

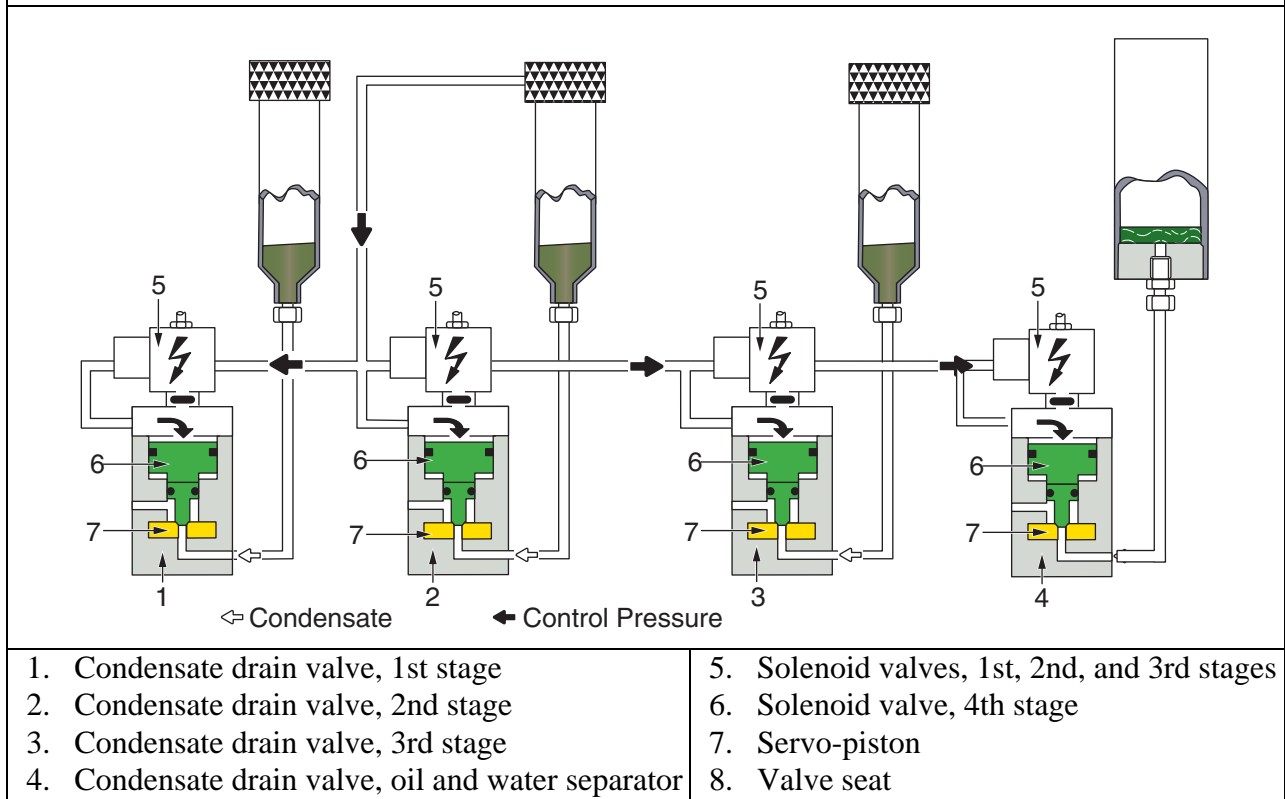
**3.3.1 Description**

The automatic condensate drain system operates electropneumatically and is comprised of the following:

- |   |                               |
|---|-------------------------------|
| Four electrically controlled solenoid valves.       | Four electrical Timers        |
| Four pneumatically operated condensate drain valves | A condensate manifold         |
| A condensate separator/silencer                     | A condensate collector bottle |

The automatic condensate drain system drains the intermediate separators and the oil and water separator every 15 minutes during operation. Additionally the automatic condensate drain system unloads the compressor during the starting phase and drains these separators at shutdown of the compressor unit.

**Figure 3-38** ACD, Normal Operation



### 3.3.2 Compressor Normal Operation

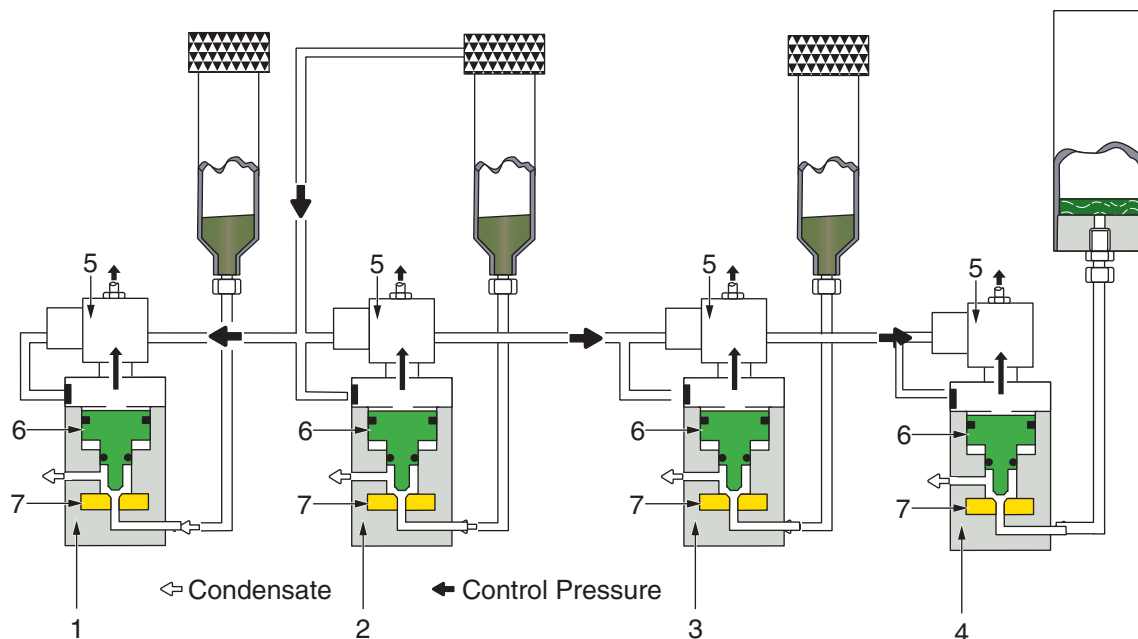
See Figure 3-38

The condensate drain valves are operated pneumatically via a normally closed solenoid valve by an electrical signal from a Timer. The control pressure applied to the condensate drain valves by the solenoid valve is taken from the intermediate separator after the 2nd stage.

Before compressor start-up the separator condensate drain valves (1), (2) and (3) are open. The oil and water separator condensate drain valve (4) is closed by spring pressure.

After start-up and once the wye -delta motor has switched from wye to delta phase the solenoid valves (5) are energized and open. The solenoid valve (6) is not energized and remains closed. This results in control pressure being applied to condensate drain valves (1, 2, and 3). The servo-pistons (7) are pressed into the valve seats (8) and the condensate drain valves close. The condensate drain valve (4) is not pressurized by the control pressure. It remains closed by spring pressure and due to the pressure build of the compressor. The compressor then delivers compressed air to the connected systems.

**Figure 3-39** ACD, Draining Position



- |  |  |
|--|--|
| 1. Condensate drain valve, 1st stage               | 5. Solenoid valves, 1st, 2nd, and 3rd stages |
| 2. Condensate drain valve, 2nd stage               | 6. Solenoid valve, 4th stage                 |
| 3. Condensate drain valve, 3rd stage               | 7. Servo-piston                              |
| 4. Condensate drain valve, oil and water separator | 8. Valve seat                                |

### 3.3.3 Condensate Draining

See Figure 3-39

#### 3.3.3.1 Intermediate Separators

Sequentially every fifteen minutes the condensate is drained from one of the intermediate separators. The appropriate solenoid valve (5) is de-energized by its Timer and closes for approximately six seconds. This causes the control pressure on the top of the servo-piston (7) of the condensate drain valve (1, 2, or 3) to be vented through the relief port of the solenoid valve (5). This causes the servo-piston (7) to be raised from its valve seat (8) by the pressure from the intermediate separator. This opens the passage which allows the condensate to drain from the intermediate separator through the condensate drain valve and into the condensate collection system. After six seconds the solenoid valve (5) is reenergized and opens. This applies control pressure to the top of the servo-piston (7) resetting it in the valve seat (8) and closing the passage to the condensate collection system.

#### 3.3.3.2 Oil and Water Separator

Also every fifteen minutes and independently of the intermediate separators, the oil and water separator is drained. The solenoid valve (6) is energized for approximately three seconds by its Timer and opens. This causes the control pressure to be applied to the top of the servo-piston (7) of the condensate drain valve (4). This moves the servo-piston (7) down and lifts the valve off the valve seat (8). The passage opens and allows condensate to drain from the oil and water separator through the condensate drain valve and into the condensate collection system. After three seconds the solenoid valve is de-energized and closes, shutting off the control pressure. The servo-piston is unloaded as the residual control pressure is vented



through the relief port of the solenoid valve. The pressure from the oil and water separator causes the valve to reset and return to normal operation.

### 3.3.4 Start Unloading

The unloading of the compressor during the starting phase is possible because of the lack of control air immediately after starting the unit. After the compressor has attained nominal speed, control pressure starts to flow through the open solenoid valves (5) to the condensate drain valves. The control pressure closes the condensate drain valves (1, 2, and 3). Once these valves close, the compressor delivers to the consuming device.

### 3.3.5 Standstill Drainage

At compressor shutdown, the solenoid valves (5) are de-energized, open and vent condensate drain valves (1, 2, and 3). The servo-pistons are raised by the residual pressure within the separators which opens the passage and drains the separators.

### 3.3.6 Condensate Drain Piping

The outlet opening of the condensate drain manifold is equipped with a tube connector. From here the condensation is directed into a collecting bottle by means of a tube

### 3.3.7 Electrical Connections

For electrical connection of the automatic condensate drain, refer to any included wiring diagrams.

## CAUTION

The condensate drain interval is adjusted at the factory. If the regular operating time of the compressor unit is less than the drain cycle, adjust the timing relay accordingly to ensure regular draining of the oil and water separator. If the compressor is shut off before the first drain cycle is completed, the timing relay would be reset each time causing the drain cycle to be started again. The condensate drain cycle would never be completed, which could result in flooding of the separator and damage to the connected systems

### 3.3.8 ACD Maintenance

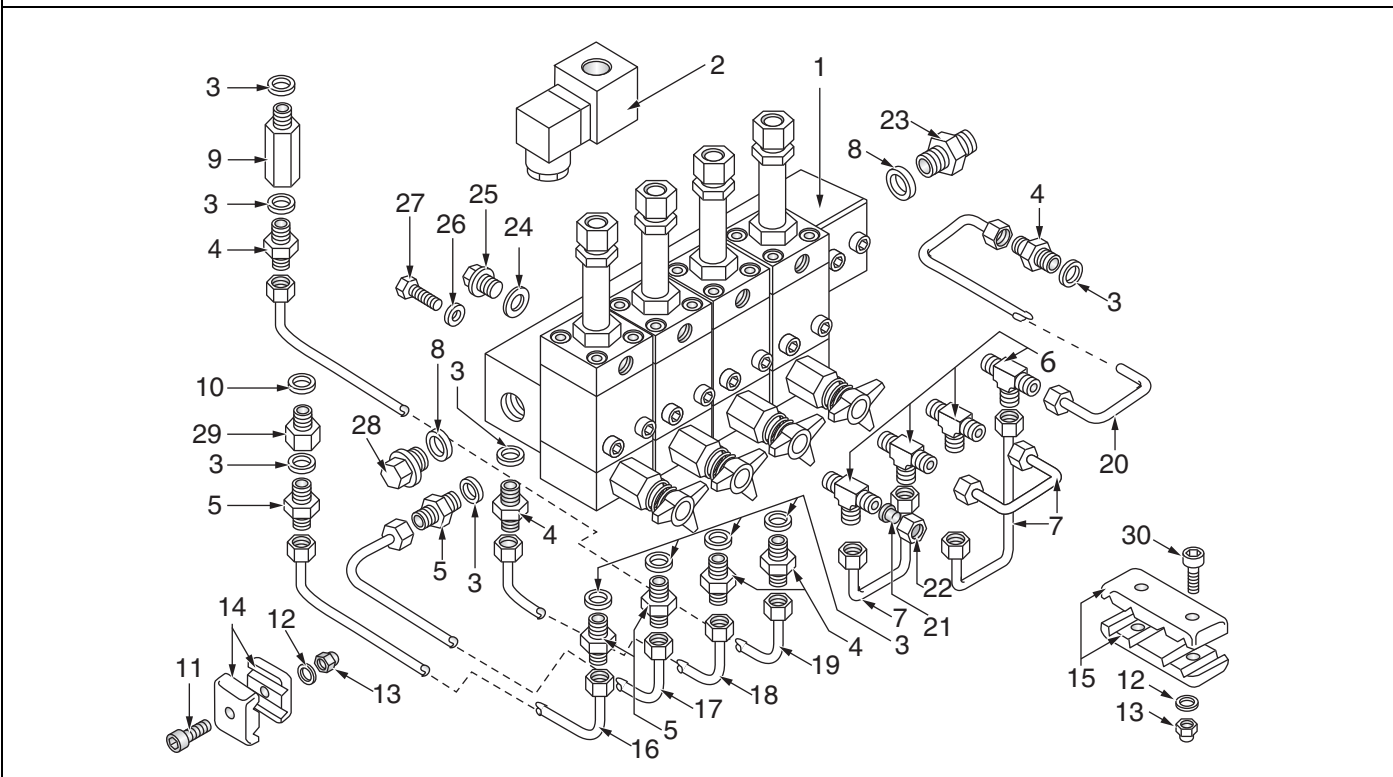
The condensate drain valves are provided with manual drain valves to verify correct operation of the automatic system.

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

1. Open all manual drain valves one after the other.
2. Observe the drainage of condensation.
3. If the system drains more than 2 ounces of liquid per stage, either the system or the corresponding condensate drain valve is not working properly.
4. Find the fault and remedy accordingly.
5. If little or no condensation emerges, the automatic system is operating properly.
6. The condensate collection bottle 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.

**3.3.9 Replacement Parts List**

**Figure 3-40** ACD System



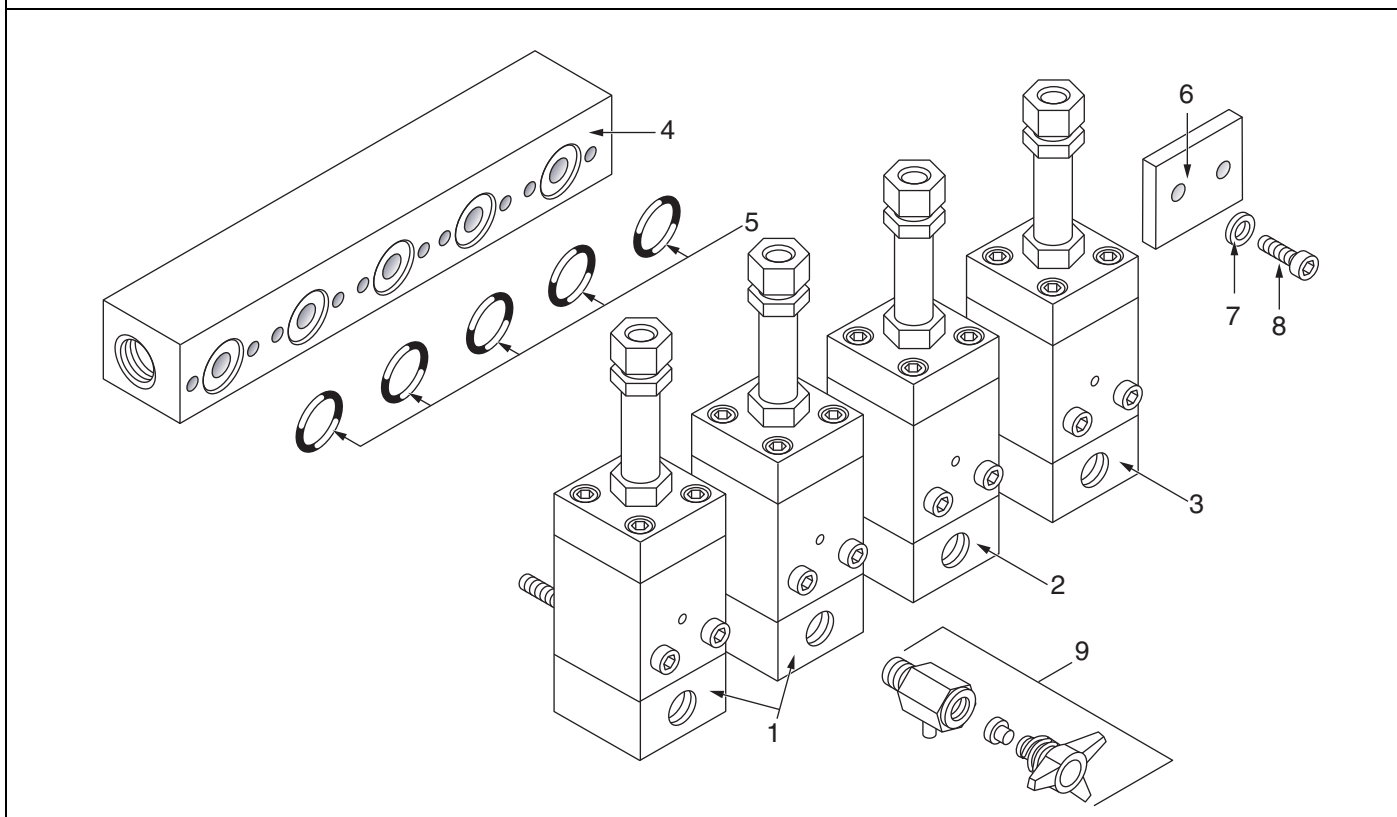
Item	Qty	Part No.	Description	Notes
◆	1	073434	Automatic Condensate Drain System	
1	1	073256	Automatic Condensate Drain Unit	
2	1	N04182	Solenoid Valve	115 VAC 50 - 60 Hz
—	1	N04185	Solenoid Valve	12 VDC
3	9	N1316	Gasket	
4	5	N20195	Straight Coupling	
5	4	N20014	Straight Coupling	
6	4	N20346	Tee Fitting	
7	3	073286	Connecting Tube Assembly	
8	2	N4261	Gasket	
9	1	65567	Reducer	
10	1	N293	Gasket	
11	1	N1511	Allen Screw	
12	8	N102	Washer	
13	5	N1042	Self Locking Hex Nut	
14	2	13967	Mounting Bracket	
15	4	55589	Mounting Bracket	
16	1	073408	Connecting Tube Assembly	
17	1	073410	Connecting Tube Assembly	

**Figure 3-40 (cont.)**

ACD System

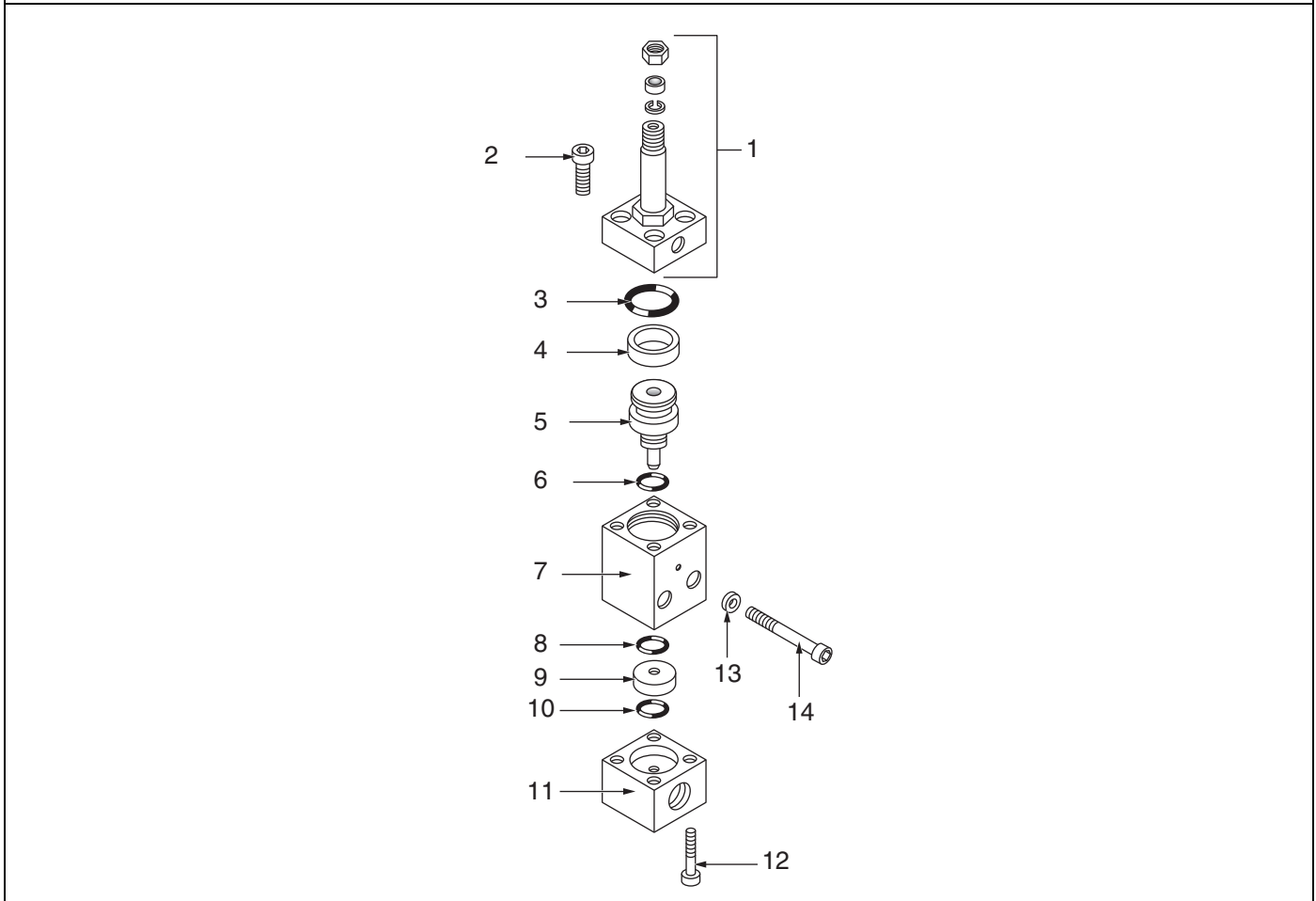
<b>Item</b>	<b>Qty</b>	<b>Part No.</b>	<b>Description</b>	<b>Notes</b>
18	1	073412	Connecting Tube Assembly	
19	1	073430	Connecting Tube Assembly	
20	1	073414	Connecting Tube Assembly	
21	1	N4530	Plug	
22	1	N7430	Screw Cap	
23	1	N2796	Plug	
24	4	N4051	Gasket	
25	4	N3459	Plug	
26	4	N102	Washer	
27	4	N101	Hex Head Screw	
28	1	N20230	Straight Coupling	
29	1	N9155	Gasket	
30	4	N19539	Allen Screw	

**Figure 3-41** Automatic Condensate Drain Unit



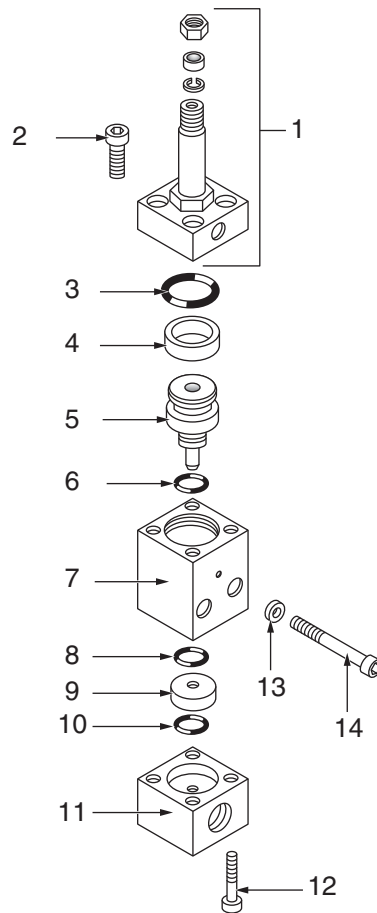
Item	Qty	Part No.	Description	Notes
◆	1	073256	Automatic Condensate Drain Unit	
1	2	064010	Condensate Drain Valve	
2	1	062523	Condensate Drain Valve	
3	1	064012	Condensate Drain Valve	
4	1	72781	Manifold	
5	5	N4333	O-ring	
6	1	...	Cover Plate	
7	2	N102	Washer	
8	2	N210	Allen Screw	M6 x 20
9	4	011430	Manual Condensate Drain Valve	(See Figure 3-45)

**Figure 3-42** 1st and 2nd Stage Condensate Drain Valve



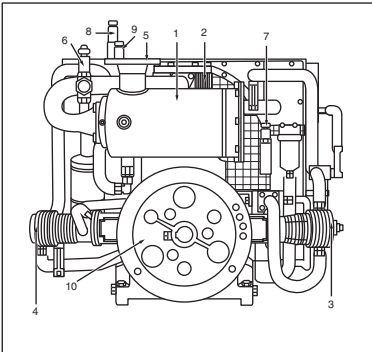
Item	Qty	Part No.	Description	Notes
◆	1	064010	Condensate Drain Valve	
1	1	058053	Solenoid Valve	
2	4	N210	Allen Screw	M6 x 20
3	1	N2720	O-ring	
4	1	N4177	Grooved Ring	
5	1	57628	Valve Piston	
6	1	N3489	O-ring	
6	†	...	Valve Body	Available only with 064010
7	1	N2507	O-ring	
8	1	56687	Valve Seat	
9	1	N4178	O-ring	
10	1	60416	Valve End	
11	4	N1511	Allen Screw	M6 x 60
12	2	N102	Washer	
13	2	N781	Allen Screw	M6 x 35

**Figure 3-43** 3rd Stage Condensate Drain Valve



Item	Qty	Part No.	Description	Notes
◆	1	062523	Condensate Drain Valve	
1	1	058053	Solenoid Valve	
2	4	N210	Allen Screw	M6 x 20
3	1	N2720	O-ring	
4	1	N4177	Grooved Ring	
5	1	57629	Valve Piston	
6	1	N3489	O-ring	
7	†	...	Valve Body	Available only with 062523
7	1	N2507	O-ring	
8	1	56691	Valve Seat	
9	1	N4178	O-ring	
10	1	60416	Valve End	
11	4	N1511	Allen Screw	M6 x 60
12	2	N102	Washer	
13	2	N781	Allen Screw	M6 x 35

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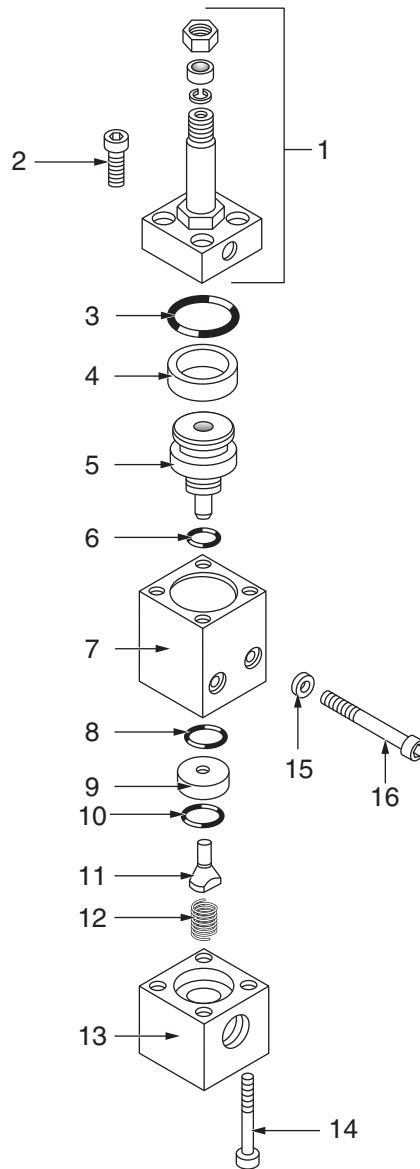


Four columns of horizontal lines for notes, located below the diagram on the left page.

Four columns of horizontal lines for notes, located on the right page.

A single horizontal line at the bottom of the right page.

**Figure 3-44** Oil and Water Separator Condensate Drain Valve



Item	Qty	Part No.	Description	Notes
◆	1	060412	Condensate Drain Valve	
1	1	058053	Solenoid Valve	
2	4	N19534	Allen Screw	M6 x 20
3	1	N2720	O-ring	
4	1	N4177	Grooved Ring	
5	1	60417	Valve Piston	
6	1	N3489	O-ring	
8	†	...	Valve Body	Available only with 060412
7	1	N2507	O-ring	

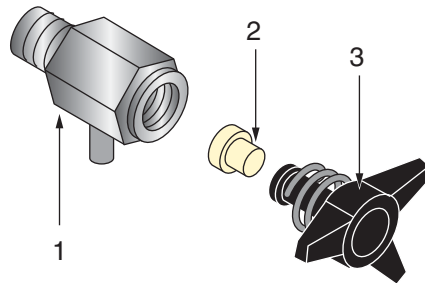


**Figure 3-44 (cont.)**

## Oil and Water Separator Condensate Drain Valve

<b>Item</b>	<b>Qty</b>	<b>Part No.</b>	<b>Description</b>	<b>Notes</b>
8	1	60419	Valve Seat	
9	1	N4178	O-ring	
10	1	60418	Sealing Cone	
11	1	60600	Spring	
12	1	60415	Valve End	
13	4	N1511	Allen Screw	M6 x 60
14	2	N102	Washer	
15	2	N781	Allen Screw	M6 x 35

**Figure 3-45** Manual Condensate Drain Valve



Item	Qty	Part No.	Description	Notes
◆	1	011430	Condensate Drain Tap	
1	1	068410	Drain Valve Body	
2	1	13283	Seal	
3	1	055888	Handle	

**3.3.10 Trouble shooting**

Trouble	Cause	Remedy
Solenoid Valve does not drain.	<ol style="list-style-type: none"><li>1. Solenoid valve receives no electrical signal</li><li>2. Plunger of drain valve sticking</li></ol>	<ol style="list-style-type: none"><li>1. Check connections, Timer. Replace if necessary.</li><li>2. Clean or replace valve.</li></ol>
Condensate Drain Valve does not drain.	<ol style="list-style-type: none"><li>1. Solenoid valve does not depressurize drain valve.</li><li>2. No control medium available.</li><li>3. Solenoid valve sticking.</li><li>4. Drain valve sticking in open position</li></ol>	<ol style="list-style-type: none"><li>1. Check solenoid valve, replace if necessary</li><li>2. Check supply lines</li><li>3. Clean or replace</li><li>4. Clean or replace</li></ol>

### 3.4 Condensate Separator

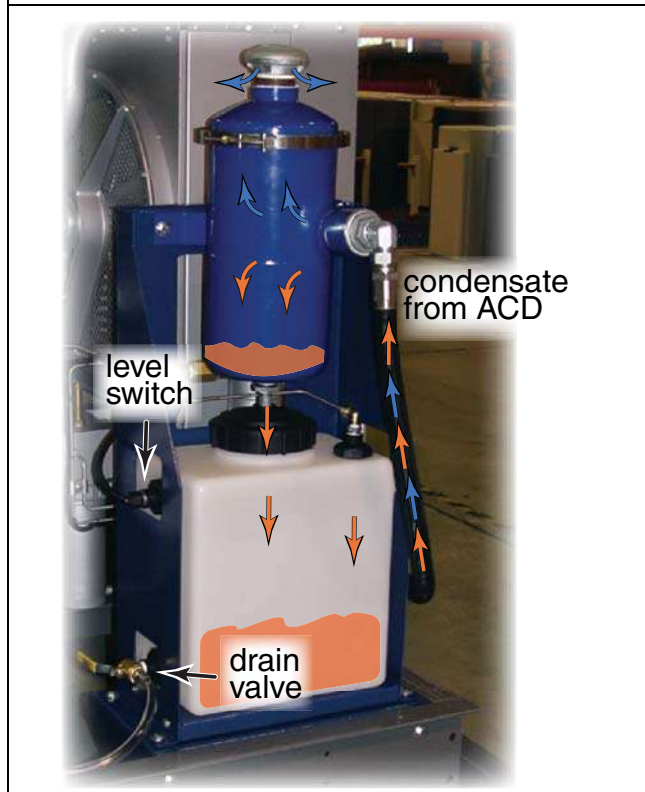
During compression the water content of the gas is removed after each compression stage by a separator. Each separator is periodically drained by the automatic condensate drain system.

This water, additionally, has a small oil content. The separation of entrained oil from the liquid condensate is not possible through simple methods; therefore the condensate must be completely removed. It is most practical to collect this condensate in special containers and dispose of it entirely.

**Figure 3-46** Condensate Separator



**Figure 3-47** Condensate Flow



The condensate is drained from the compressor's interstage separators by the ACD system and sent to a separator tank. The separator tank drains off any liquid condensate and allows the aerated condensate to flow through the exhaust filter. This filter collects more liquid from the aerated condensate. The collected condensate drips back down to the separator and drains off to a condensate collection tank. The collection tank must be emptied periodically.

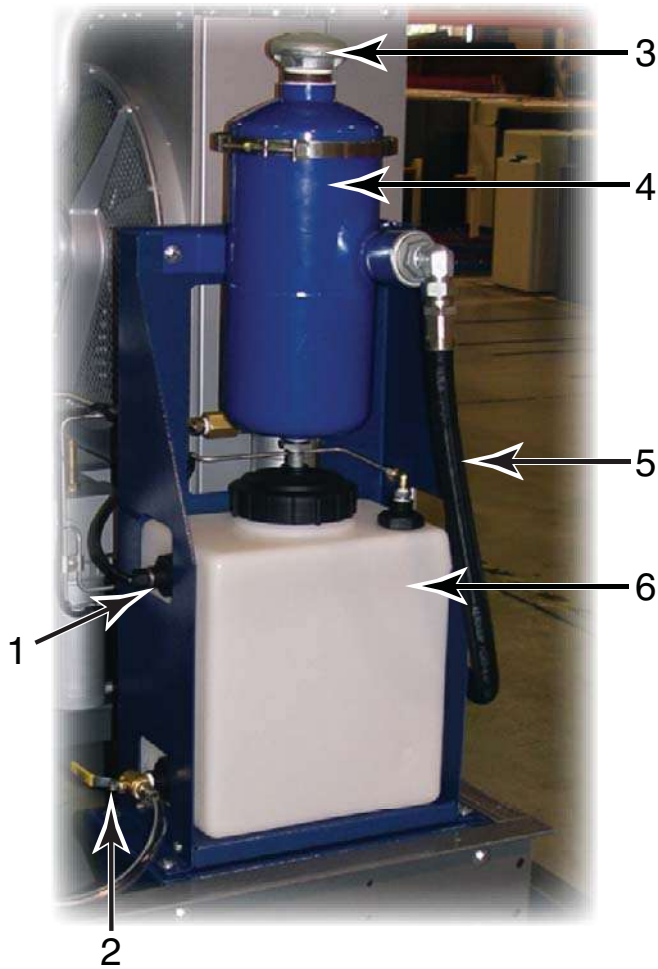
#### **CAUTION**

The liquid condensate contains oil and must be disposed of properly. Dispose of collected condensate in accordance with local, State and Federal regulations.

Near the top of the condensate collection tank is a level switch. When the condensate level activates the switch the unit will shutdown. The unit will not restart until the condensate has been drained. For more information on this switch refer to the electrical section.

**3.4.1 Condensate Separator Replacement Parts List**

**Figure 3-48** Condensate Separator (horizontal unit shown)



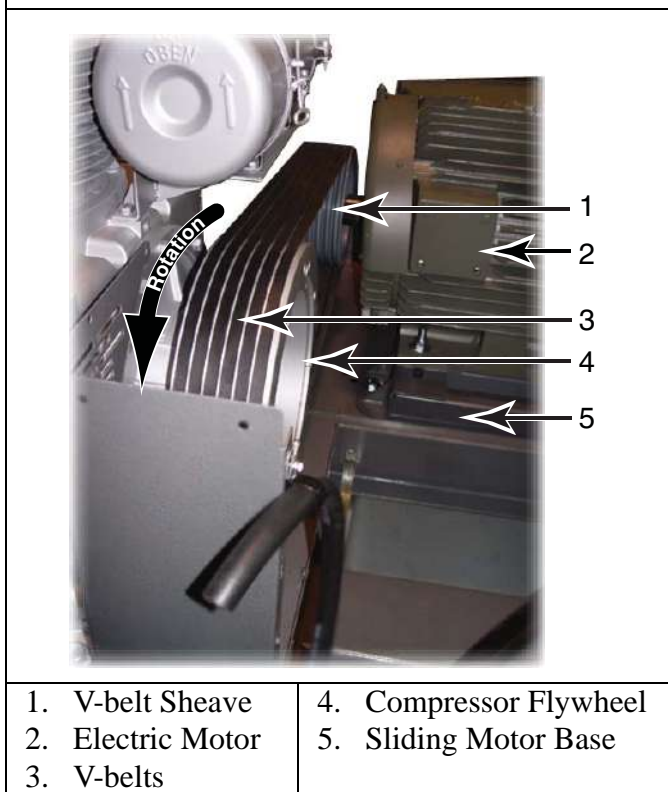
Item	Qty	Part No.	Description	Notes
◆	1	ASY-1089	Condensate Assembly	
1	1	SWT-0273	Condensate Level Switch	
2	1	VAL-0386	Condensate Drain Valve	Ball Valve
3	1	FLR-0145	Filter	
4	1	SEP-0028	Separator	
5	AR	HOS-R-0002	Flexible Hose	
6	1	CNS-0008	Condensate Tank	7 gal.

## CHAPTER 4: COMPRESSOR DRIVE SYSTEM

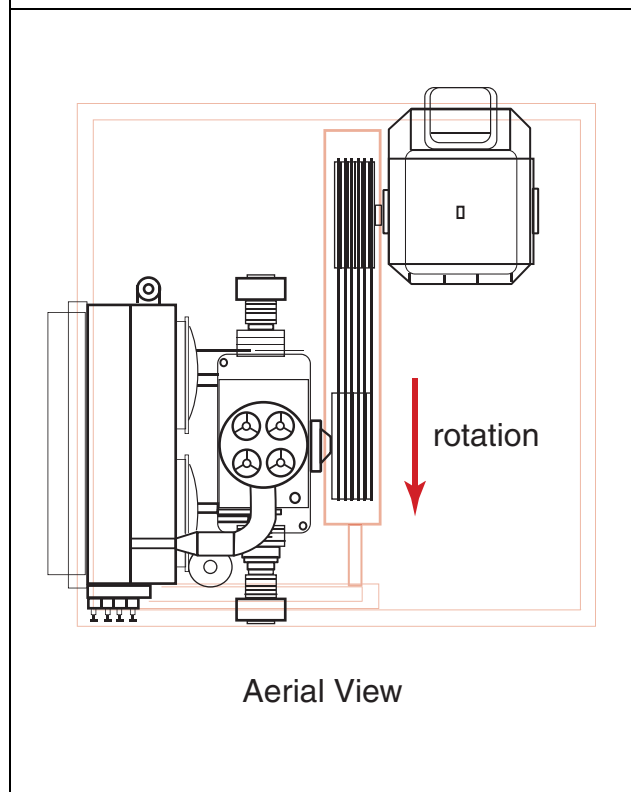
### 4.1 Description, Horizontal Sliding

The compressor is powered by the drive motor through 6 V-belts. The direction of rotation, as seen facing the flywheel, is counterclockwise. Observe the arrow on the compressor block below.

**Figure 4-1** Horizontal Motor Mount (typical)



**Figure 4-2** Drive Assembly, Aerial View



### 4.2 Maintenance of the V-belt and Sheave

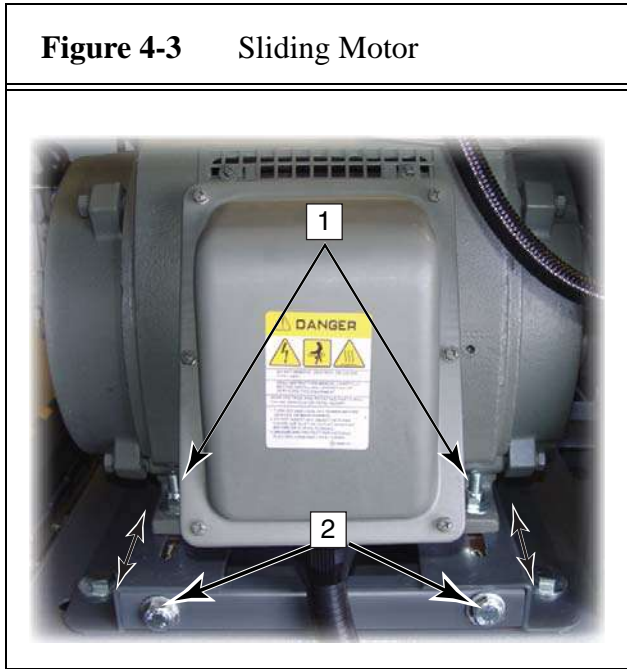
#### 4.2.1 Checking the Sheave.

Before a new drive belt is installed, the condition of the sheave should be checked. A dirty or rusty sheave impairs the drive's efficiency and abrades the cover of the belt, which results in premature failure. A worn sheave shortens belt life as much as 50%. If the groove is worn to the point where the belt bottoms, slippage may result and the belt may burn. If the side wall is "dished out," the bottom shoulder ruins the belt prematurely by wearing off the bottom corners.

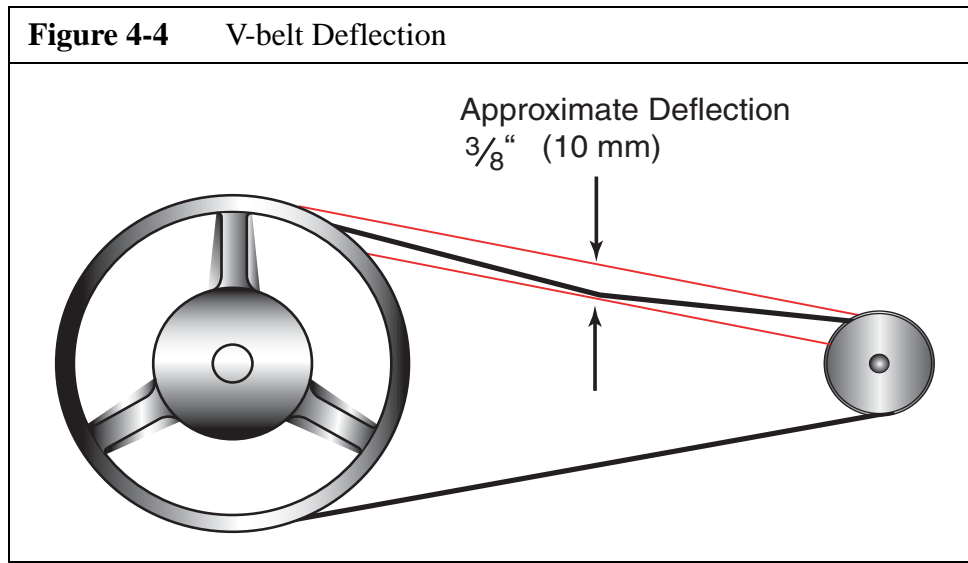
#### 4.2.2 Checking the V-belt

Inspect the V-belt regularly for damage and wear. Replace if necessary.

**4.2.3 V-belt tension**



The electric motor is secured on a sliding base. To obtain the correct belt tension loosen the 4 bolts securing the motor to the base (1). Then adjust the 2 motor adjustment bolts (2). Adjust V-belt until pressing down on the V-belt between the sheaves results in an approximate deflection of 3/8" (10 mm). (See Figure 4-4). Retighten the 4 bolts securing the motor to the base.



**4.3 Maintenance of the Drive Motor/Engine**

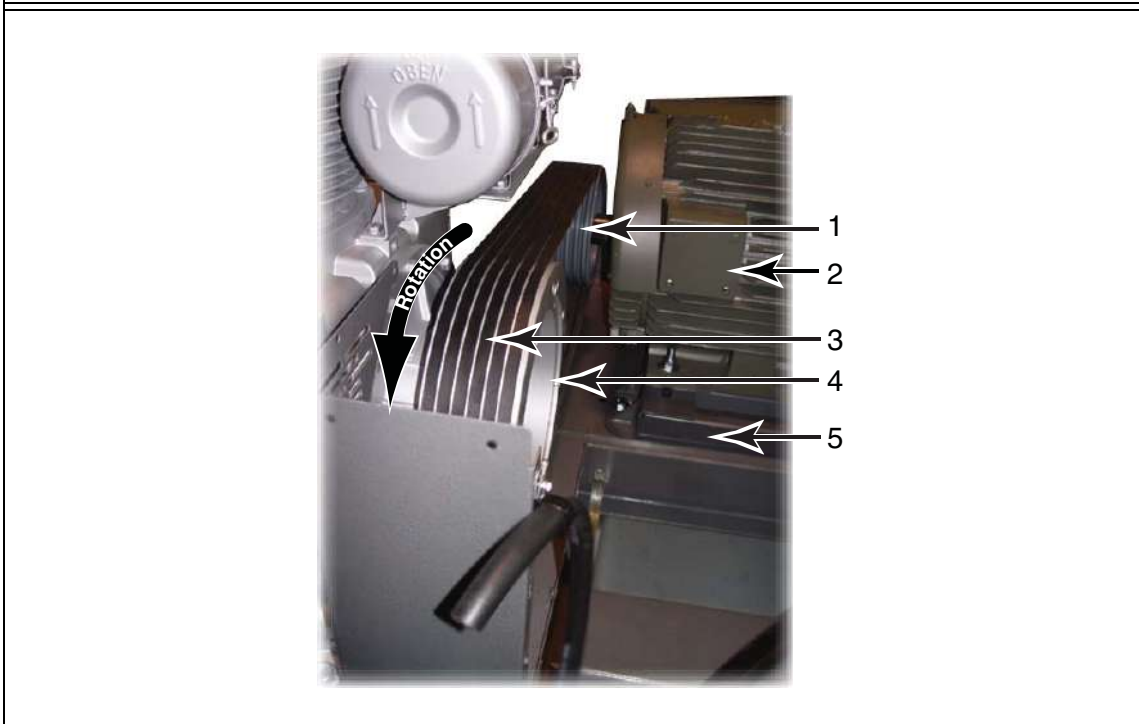
For maintenance of the electric motor see the instruction plate attached to the motor. If maintenance instructions are shown for the motor, they supersede these general instructions.

**⚠ WARNING**

Always disconnect the electrical power before working on the motor

4.4 Replacement Parts List

**Figure 4-5** I 230 Drive, (typical setup)



Item	Qty	Part No.	Description	Notes
◆			<b>I 230 Drive Assembly</b>	
1	1	SHE-0160	V-belt Sheave	4 groove
—	1	BUS-0005	Sheave Bushing	
2	1	MTR-0121	Electric Motor	40 Hp, 3 Phase, TEFC
3	4	BET-0100	V-belt	
4	1	IK 23.0	Compressor	
5	1	BAS-0013	Sliding Motor Base	



## CHAPTER 5: ELECTRICAL PANEL ASSEMBLY

### 5.1 Overview

The following instructions apply to electrical panel assembly 128631-G with touch screen operator interface, MNR-0060.

**Figure 5-1** Panel Assembly, 128631-G



**Figure 5-2** MNR-0060



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 using EEPROM technology. The software program used in this Electrical Panel is based on the pressure and use of the compressor.

The input/output device for normal operation of the compressor unit is the Operator Interface, MNR-0060. In an emergency the compressor is shutdown with the Red Button.

## 5.2 Electrical Panel

This Electrical Panel is designed for use with 30 or 40 horsepower electric motors. It is also designed for supply voltages from 208 VAC to 480 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, Soft Start, Circuit Breaker, Power Transformer, Fuses, Overload Reset Button, Hourmeter, 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.

### 5.2.1 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 5-3) inside the Electrical Panel door.


### 5.2.2 Electrical Panel Interior Access

The electrical panel must be turned off with the Rotary Handle Breaker to gain access. The interior of the Electrical Panel is then accessed by using a screwdriver to turn the latches on the front of the Electrical Panel.

## 5.3 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 5-3) on the inside of the electrical panel door. In this example shown, the panel is wired for 230 volt, single phase, serial number 100210.

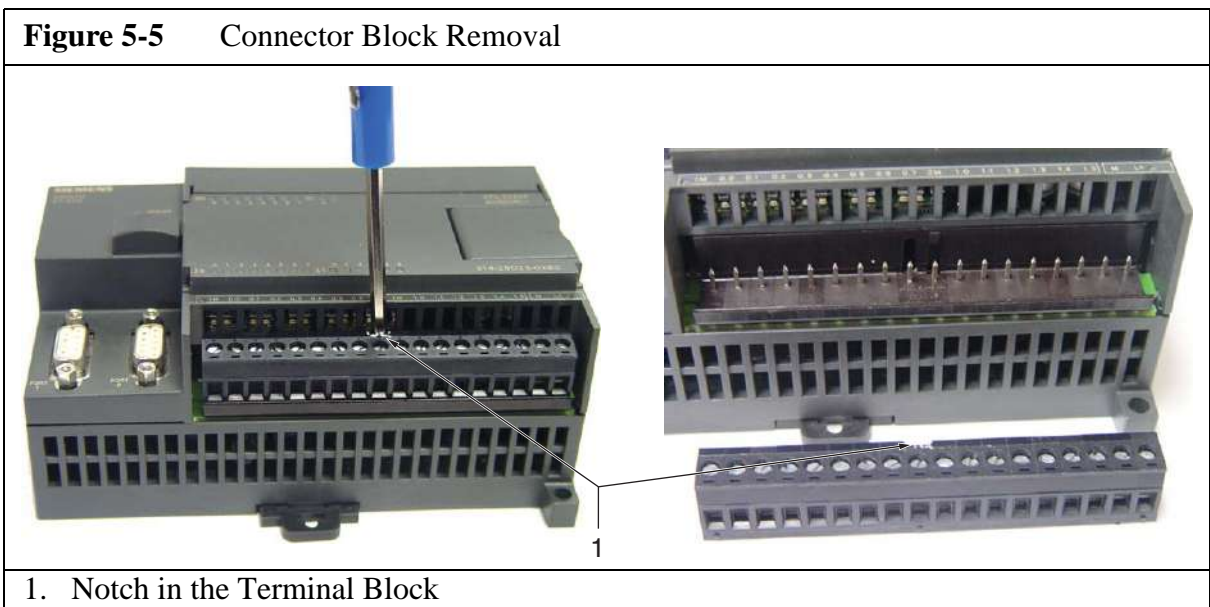
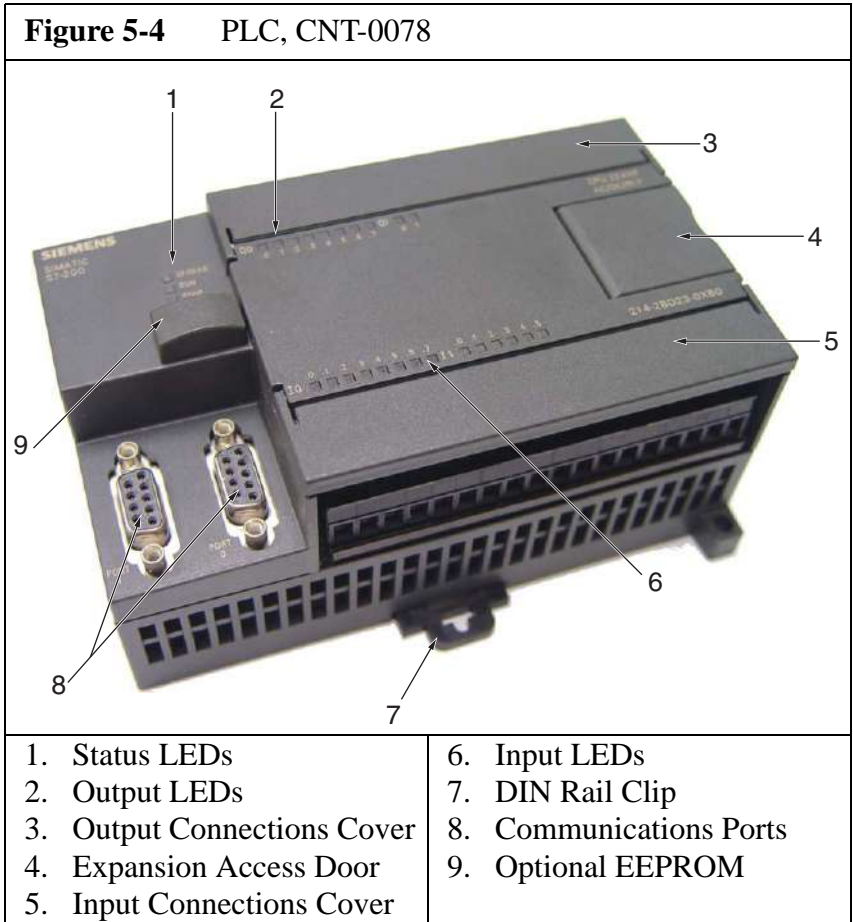
**Figure 5-3** Electrical Panel Label (*example*)

 Norfolk, VA 23502 USA 757-855-6006 www.bauercomp.com UL File No. E141433		MODEL: VE-13-E1/230V SERIAL: 100210 BLOCK: P0808762/06 MFG DATE: 2/2009										
PANEL: <u>ASY-1058</u>		Use 600 VAC and 60 Degree Celsius Copper Wire Only										
Short Circuit Current: <u>XX,XXX</u> KA	<table border="1"> <thead> <tr> <th>Terminal</th> <th>Wire Range</th> <th>Torque</th> </tr> </thead> <tbody> <tr> <td>Line</td> <td>awg 10-3</td> <td>45 in-lb</td> </tr> <tr> <td>Ground</td> <td>awg 14-2</td> <td>35 in-lb</td> </tr> </tbody> </table>	Terminal	Wire Range	Torque	Line	awg 10-3	45 in-lb	Ground	awg 14-2	35 in-lb		
Terminal	Wire Range	Torque										
Line	awg 10-3	45 in-lb										
Ground	awg 14-2	35 in-lb										
MAXIMUM RATING (AC3)	CONTROL FUSE LEGEND											
<table border="1"> <tr> <td>1 Ph 60 Hz</td> </tr> <tr> <td>230V</td> </tr> <tr> <td>10 HP</td> </tr> <tr> <td>46 FLA</td> </tr> </table>	1 Ph 60 Hz	230V	10 HP	46 FLA	<table border="1"> <tr> <td>1FU</td> <td>2FU</td> <td>3FU</td> </tr> <tr> <td>ATQR - 3A</td> <td>ATQR - 3A</td> <td>TRM - 2A</td> </tr> </table>	1FU	2FU	3FU	ATQR - 3A	ATQR - 3A	TRM - 2A	
1 Ph 60 Hz												
230V												
10 HP												
46 FLA												
1FU	2FU	3FU										
ATQR - 3A	ATQR - 3A	TRM - 2A										

### 5.4 Electrical Panel Components

#### 5.4.1 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.



### **5.4.2 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 5-4, Item 5.
3. Insert a small flat bladed screwdriver in the notch in the back center of the Connector Block. Gently pry the Connector Block loose. See Figure 5-5.
4. Repeat Steps 2 and 3 for the to the Connector Block on the Output side of the PLC.
5. The Power Connector on the side opposite side from the DIN Rail Clip, Figure 5-4, Item 7, is removed by pulling it straight out from the PLC.
6. 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.
7. Replace the PLC and slide the DIN Rail Clip in with the screwdriver until it is secure.
8. Replace the Power Connector by pushing it into the socket in the side of the PLC.
9. The Connector Blocks are replaced by pushing them gently down onto corresponding pins until they click into place.
10. Restore power and operate the unit.

### **5.4.3 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 EEPROM cartridge. The EEPROM would be programmed at the Bauer factory and shipped either to the customer or to a authorized distributor.

### **5.4.4 Installing an EEPROM**

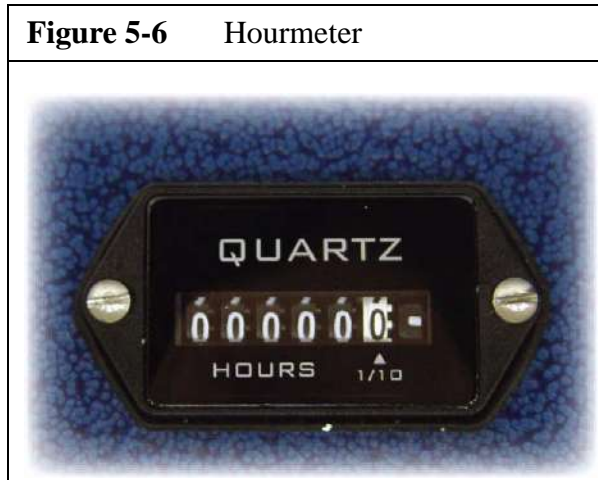
To install or replace an EEPROM Cartridge proceed as follows:

1. Turn off unit and disconnect from main power supply.
2. Lift straight up to remove the EEPROM cover. Keep the cover. See Figure 5-4, Item 9.
3. The EEPROM is keyed to fit only one way and requires minimal force to insert it.
4. Push the EEPROM down until it snaps into place.
5. If the EEPROM is being retained in the PLC, restore power to the unit and operate as normal.
6. If the EEPROM is for a software update and is to be returned to Bauer or a distributor continue as follows.
7. Restore power to the unit.
8. After the software has initialized and the Home Screen is displayed, shutdown the unit and disconnect from the main power source.
9. Restore power to the unit. After the software has initialized a second time and the Home Screen is displayed, shutdown the unit and disconnect from the main power source.

- 10. Remove the EEPROM and replace the EEPROM protective cover.
- 11. Restore power and operate the unit.

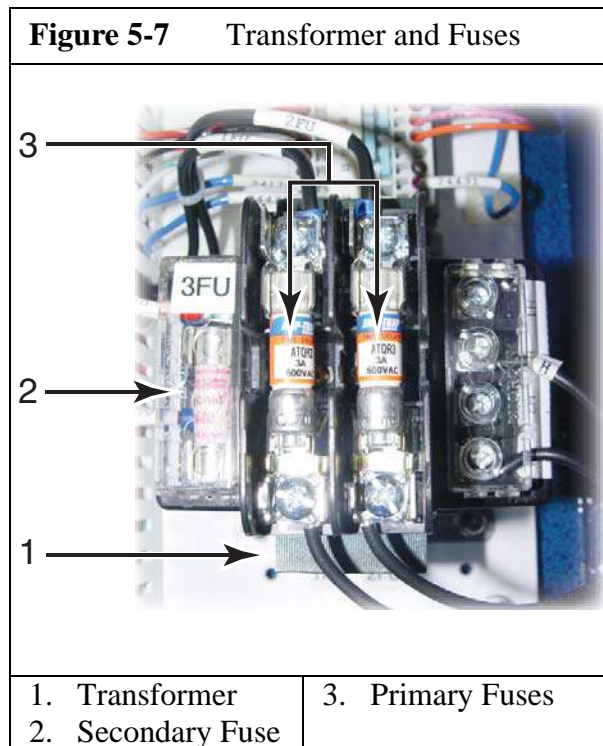
**5.4.5 Hourmeter**

The panel is equipped with an Hourmeter. The Hourmeter is not resettable and used to monitor the run hours of the compressor. It is powered by 120 VAC.



**5.4.6 Transformer and Fuses**

The Transformer is fitted with three fuses. The primary coil of the transformer has two fuses. The secondary coil of the transformer has one fuse.



### 5.4.7 Motor Starter.

See Figure 5-8. This application will require an across the line IEC starter with thermal overloads and its size will be based on the voltage and motor horsepower. Control voltage is 120 VAC.

### 5.4.8 Soft Start

See Figure 5-9. The soft start utilizes solid state devices to control the current flow when starting the motor; therefore its size will be based on the voltage and motor horsepower.

**Figure 5-8** Motor Starter (typical)



**Figure 5-9** Soft Start (typical)



### 5.4.9 Starter Reset

There is a starter reset push button on the front of the Electrical Panel. Should the electric motor have overloaded and tripped out during normal operation, then depressing this button after giving the motor sufficient time to cool, will reset the overload relay.

### 5.4.10 Enclosure Heater

This unit is equipped with an enclosure heater. Once power is supplied to the unit, the heater can be controlled with the rheostat knob on the heater itself.

### 5.4.11 Enclosure Light

The florescent light inside the enclosure is controlled with the OFF/ON switch on the front of the electrical enclosure. The light is a 4', 2 bulb covered light fixture

**Figure 5-10** Enclosure Heater & Light**Figure 5-11** Power Supply

#### 5.4.12 Power Supply

The Power Supply is a 24 Volt 1.3 Amp Power Supply used to provide power to the optional Communications Modules and Operator Interface, MNR-0049. It is not standard in all models.

### 5.5 Alarms

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

#### 5.5.1 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 depressurization 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.

<b>Table 5-1: Final Separator Warning and Shutdown Cycle Count</b>		
<b>Maximum Compressor Pressure</b>	<b>Warning</b>	<b>Shutdown</b>
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.

<b>⚠ WARNING</b>
Do not attempt to override this Separator Shutdown. This feature is provided to protect operating personnel from injury or death.

**5.5.2 Securus II® 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.

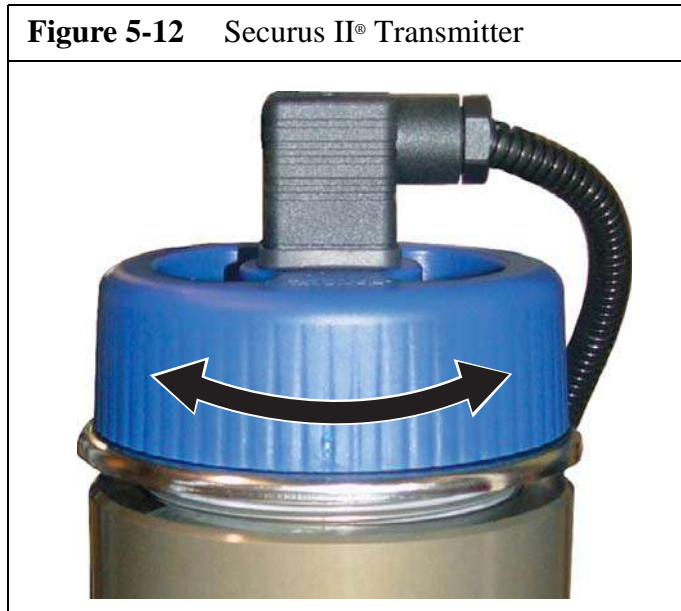
**5.5.2.1 Securus® Cartridge**

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.



### 5.5.2.2 Securus II® Transmitter

See Figure 5-12. 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.



### 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.

### 5.5.3 Compressor High Temperature

See Figure 5-13. 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 5-13** High Temperature Switch**Figure 5-14** Pressure Sensor (Typical)

#### 5.5.4 Compressor Low Oil Pressure

See Figure 5-14. 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.

#### 5.5.5 Compressor Overrun Timer

The compressor has an timer, where if the compressor runs continuously for a number of hours set by the **OVERRUN TIMER** 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.

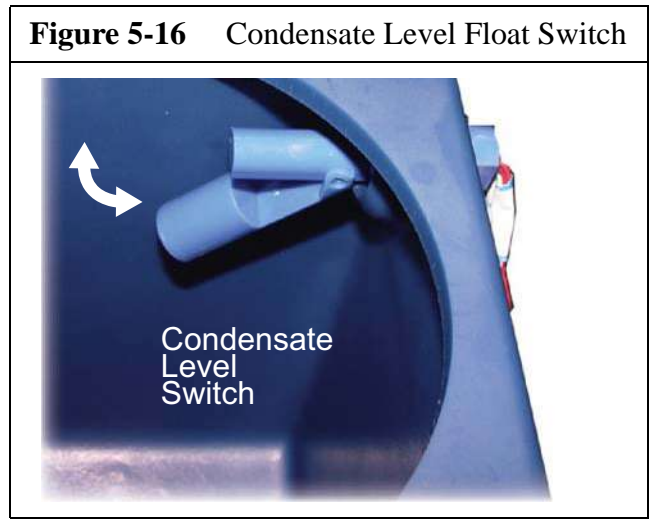
#### 5.5.6 Carbon Monoxide Monitor Alarm

See Figure 5-15. The compressor system may be equipped with an optional Carbon Monoxide Monitor. This consists of an electronic module that samples the compressed air supply. The unit will provide a continuous display of the Carbon Monoxide level in ppm, parts per million. The unit should be calibrated with a test gas monthly. Refer to the manual section on the Carbon Monoxide Monitor. If the Carbon Monoxide level becomes excessively high, then the monitor will alarm with a red light. The alarm relay in the Carbon Monoxide Monitor is connected to the PLC. Refer to Wiring Diagram for additional information. On a Carbon Monoxide Alarm condition, the compressor will shutdown, and the alarm will be displayed on the Operator Interface.



**5.5.7 Condensate Fault**

See Figure 5-16. 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.



**NOTICE**

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

**5.5.8 Motor Starter Overload Trip**

The compressor overload relay is located on the Soft Start, See Figure 5-9. 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.

**5.6 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 Wiring Diagram for the as built specifications.

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	
I1.0	High Inlet Pressure Switch <sup>a</sup>
I1.1	Low Inlet Pressure Switch <sup>a</sup>
I1.2	
I1.3	
I1.4	
I1.5	

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

a. Applies only to compressors for mediums other than air

**5.6.1 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.

## 5.7 Wiring Harness Layout

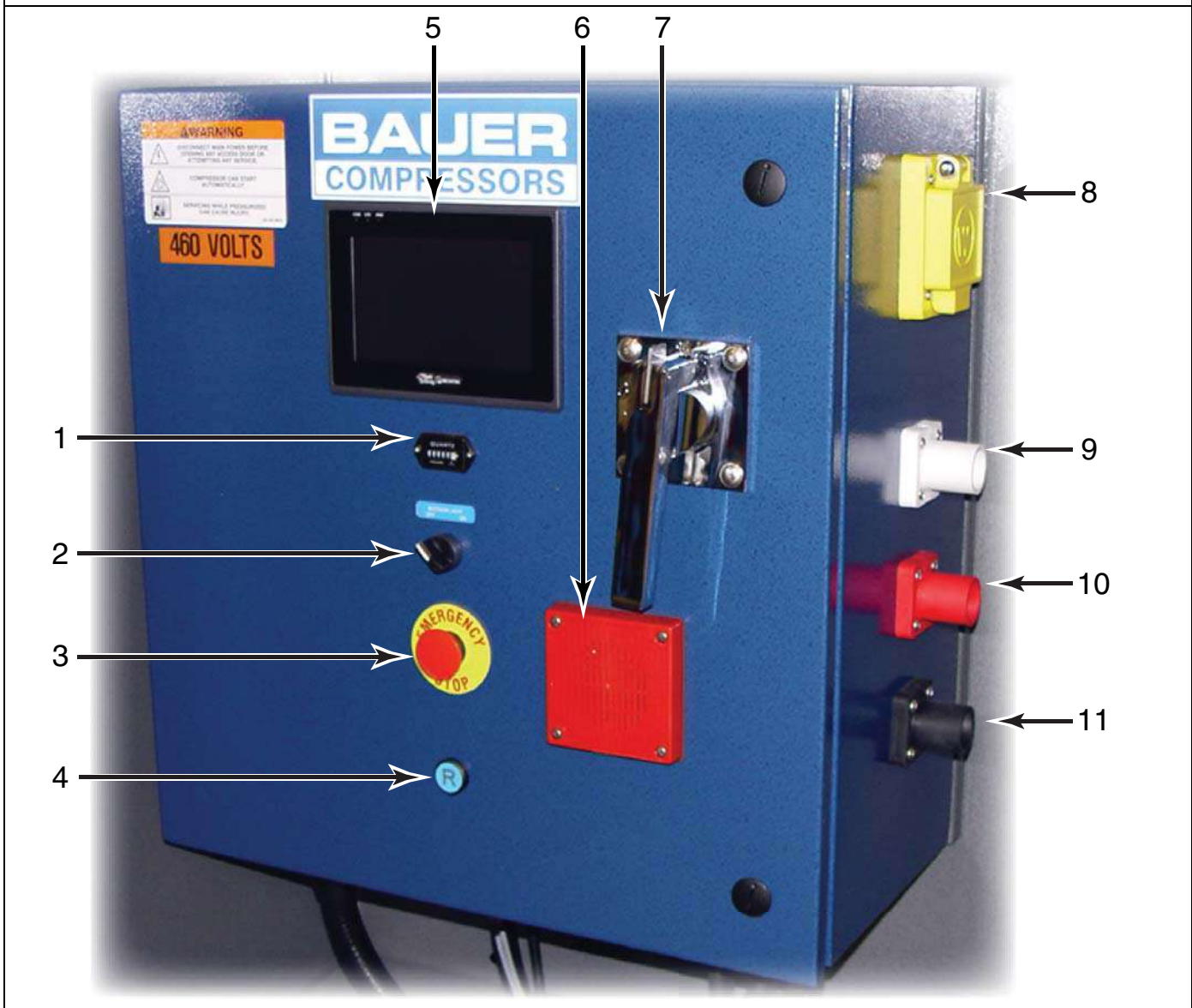
**Table 5-4:** Wiring Harness, HNS-0116

Description	Legend	Wire Colors	Pin	PLC IN	PLC Out
CO Monitor (Optional)	CO	Brown/White	1		
	CO SV	Black/Yellow	2		
	CO Common	Gray/White	22		
E-Stop Pushbutton	1PB	Black	3		
		White/Red	9		
ACD 1	ACD1	Blue/White	4		Q0.1
ACD Common 1	ACD Common	Orange/White	21		
ACD Final	ACDF	Yellow/Black	5		Q0.2
ACD 2	ACD2	Violet/White	6		Q0.4
ACD Common 2	ACD Common	White/Yellow	12		
Inlet Solenoid Valve or ACD 3	1SV	Pink/White	7		Q0.5
Panel Light	1LT	White/Brown	8		Q1.1
		Red/Orange	11		
Unloader Solenoid Valve	3SV	White/Violet	10		Q1.0
		Red/Blue	14		
Audible Alarm	1AA	Blue/Yellow	13		Q0.3
		White	15		
Seccant Monitor Alarm	SA	Brown/Yellow	16	I0.7	
		Black/Brown	17		
Low Inlet Pressure Switch <sup>a</sup>	5PS	Violet/Black	18	I1.1	
		White/Blue	19		
Spare		Blue/Orange	20		
Temperature Switch	1TS	Yellow	23	I0.2	
		Violet	24		
Not Assigned		Blue	25	I0.6	
		Orange	26		
High Inlet Pressure Switch <sup>a</sup>	3PS	White/Orange	27	I1.0	
		Red/Yellow	28		
Condensate Alarm	CA	Gray	31	I0.4	
		Pink	32		
CO Monitor Alarm	COA	White/Black	33	I0.3	
		Red/White	34		
Securus II	SEC II	Black/White	35	I0.0	
		Violet/Orange	36		
		Black/Orange	37		

a. Applies only to compressors for mediums other than air

5.8 Replacement Parts List

Figure 5-17 Electrical Enclosure, 128631-G

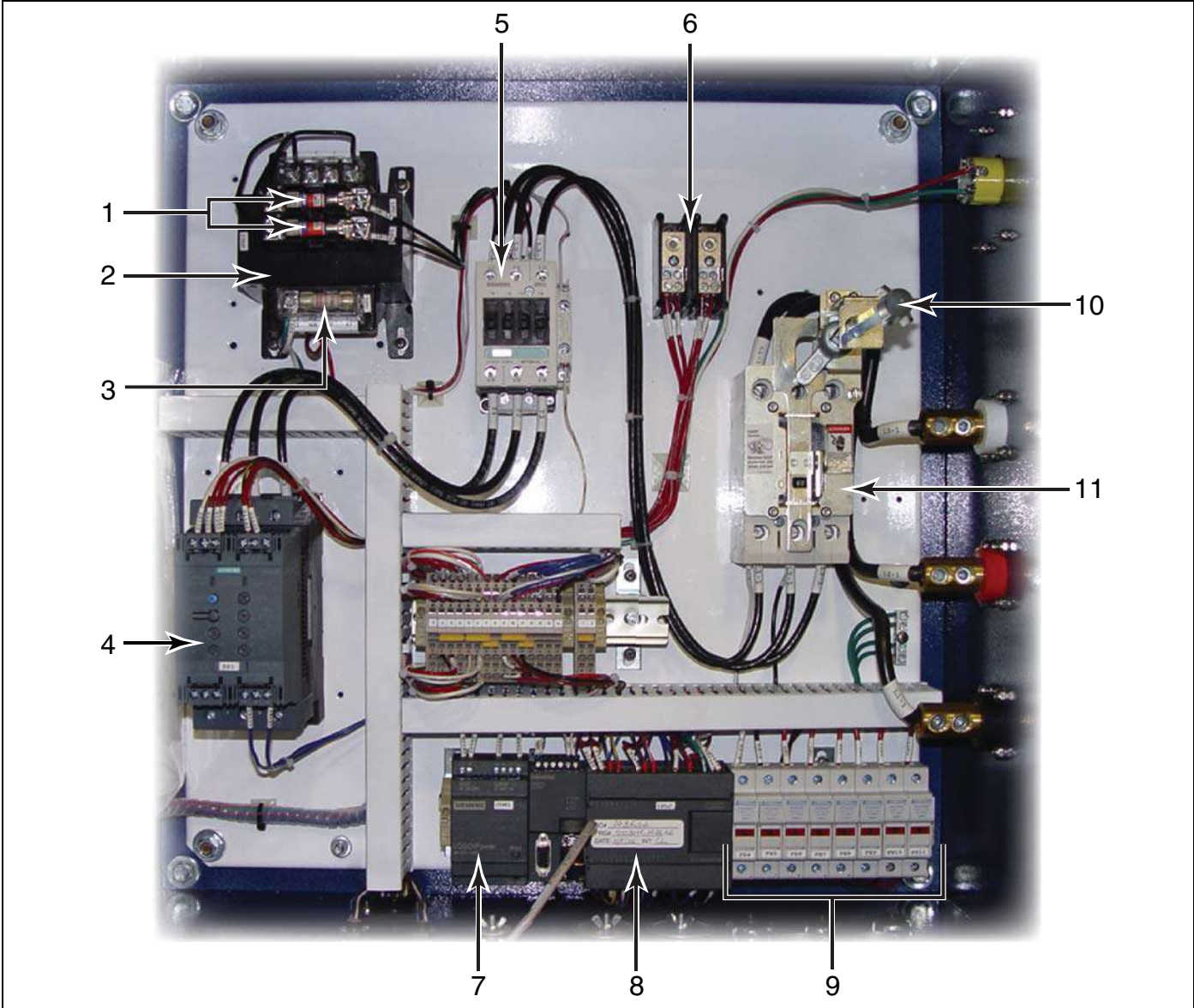


Item	Qty	Part No.	Description	Notes
◆	1	128631-G	Control Panel, 30 / 40 Hp	
1	1	HMR-0036	Hour Meter	
—	1	GKT-0069	Hour Meter Gasket	
2	1	SWT-0241	Interior Light OFF / ON Switch	
3	1	SWT-0308	Emergency Stop Pushbutton	
4	1	SWT-0317	Overload Reset Button	NC contact
5	1	MNR-0060	Touch Screen Control Monitor	7"
6	1	IND-0038	Audible Alarm	
7	1	OPR-0021	Rotary Handle, Breaker	must be in OFF position to open

**Figure 5-17 (cont.)** Electrical Enclosure, 128631-G

<b>Item</b>	<b>Qty</b>	<b>Part No.</b>	<b>Description</b>	<b>Notes</b>
8	1	SKT-0060	Socket, Single Receptacle	15 Amp, 125 V
9	1	SKT-0061	Socket, Black	400 Amp, 600 V
10	1	SKT-0062	Socket, Red	400 Amp, 600 V
11	1	SKT-0063	Socket, White	400 Amp, 600 V

**Figure 5-18** Electrical Panel, Interior



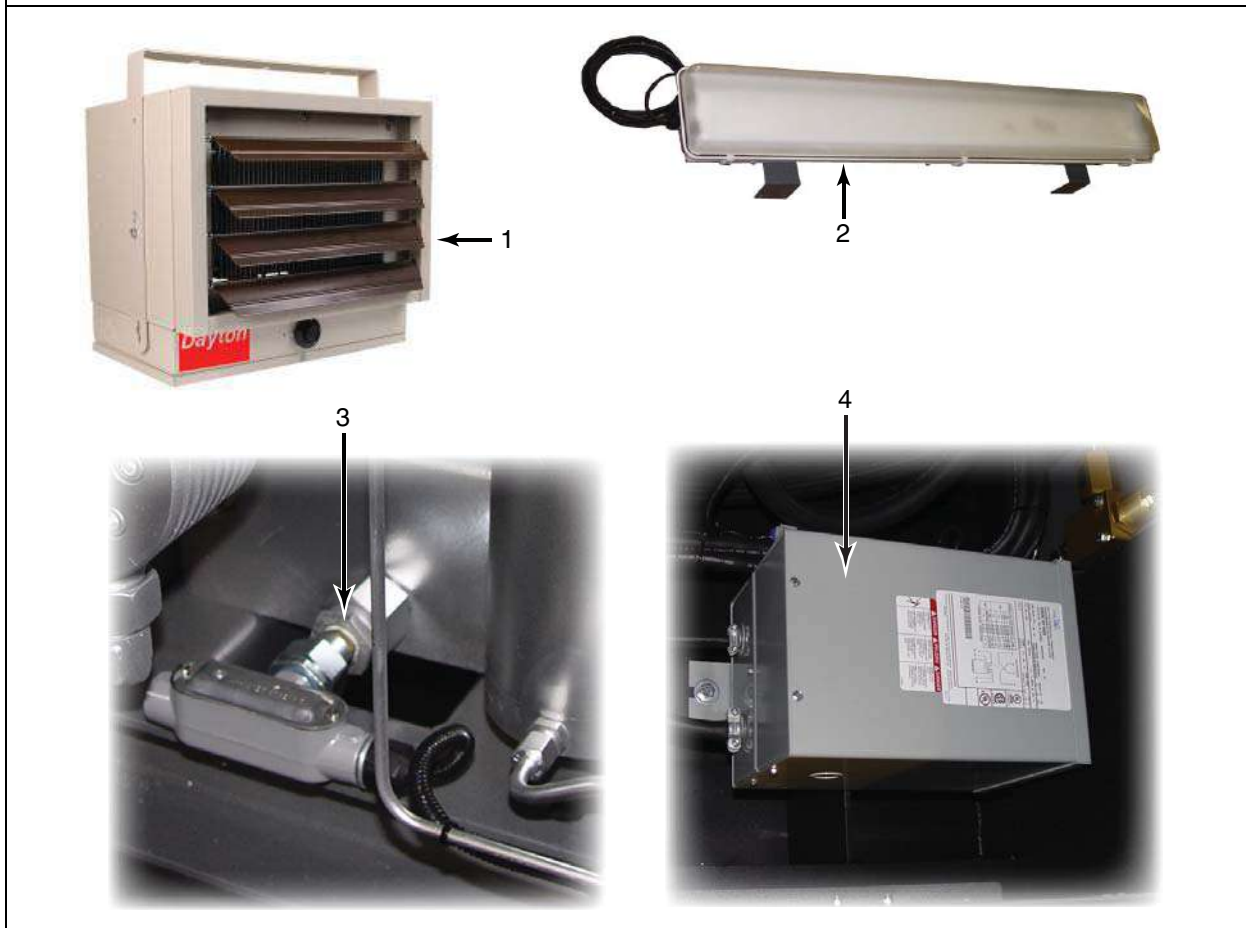
Item	Qty	Part No.	Description	Notes
◆	1	128631-G	Electrical Panel	Interior View
1	2	FUS-0092	Fuse, Primary	2 Amp, 600 V
2	1	TRR-0093	Transformer	350 VA
3	1	FUS-0016	Fuse, Secondary	4 Amp, 250 V
4	1	SRT-0242	Soft Start	73 Amp
5	1	SRT-0241	Motor Contactor	50 Amp
6	1	BLK-0173	Block, Power Distribution	600 V, Class 9080
7	1	SPL-0077	Power Supply	1.3 amp, 24 Volt
8	1	CNT-0078	Siemens, CPU 224XP	24 I/O, 120 VAC



**Figure 5-18 (cont.)** Electrical Panel, Interior

<b>Item</b>	<b>Qty</b>	<b>Part No.</b>	<b>Description</b>	<b>Notes</b>
9	8	HOL-0111	Fuse Holder	
&	2	FUS-0158	Fuse, (FU4 & FU5)	15 Amp, 600 V
&	3	FUS-0063	Fuse, (FU6, FU7 & FU11)	10 Amp, 250 V
&	2	FUS-0134	Fuse, (FU8 & FU9)	20 Amp, 250 V
&	1	FUS-0070	Fuse, (FU10)	1 Amp, 250 V
10	1	OPR-00024	Rotary Shaft Operator	
11	1	LCH-0074	Latch, Circuit Breaker Operator	
&	1	BKR-0046	Circuit Breaker, 3 Pole	60 Amp

**Figure 5-19** Electrical Accessories



Item	Qty	Part No.	Description	Notes
1	1	128631-B	Enclosure Heater	
2	1	128631-C	Interior Light	
3	1	HTR-0112	Crankcase Heater	
4	1	TRR-0109	Transformer	3,000 VA, 240/480 - 120/240V

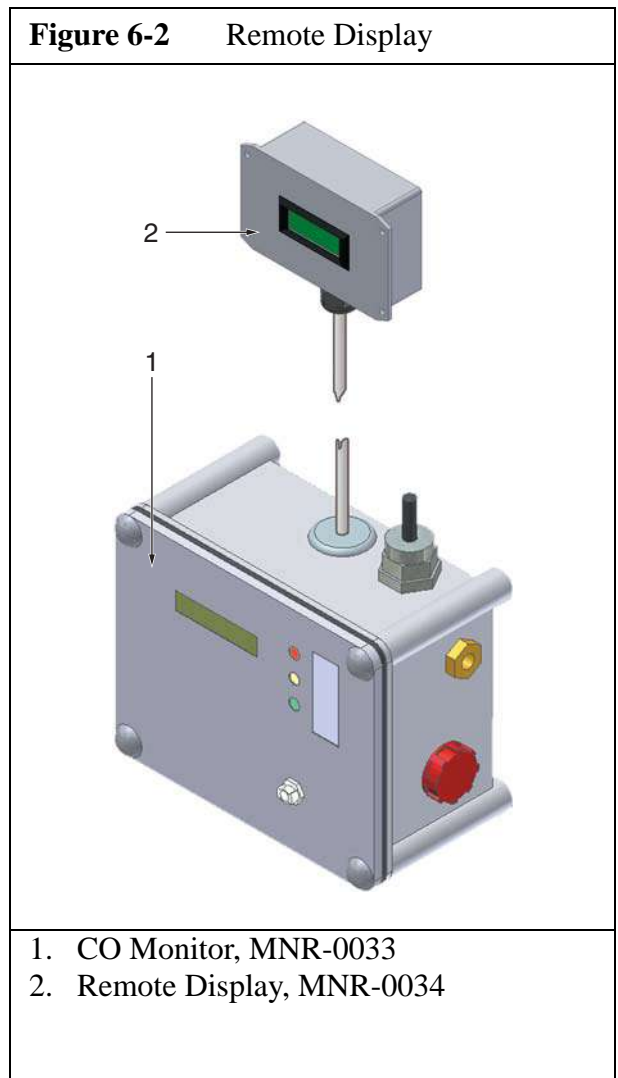
## CHAPTER 6: CARBON MONOXIDE MONITOR

### 6.1 Description

The Carbon Monoxide (CO) Monitor is a factory installed option which may have been ordered with your unit.

The Carbon Monoxide Monitor, Bauer P/N; MNR-0029, is a standalone assembly, which may be installed on a compressor unit or trailer.(See Figure 6-1).

The Carbon Monoxide Monitor, Bauer P/N; MNR-0033 (See Figure 6-2) appears outwardly identical to MNR-0029 but is designed for use with a remote display, which can be located up to 100 feet from the compressor unit. The Remote Display, Bauer P/N; MNR-0034, is powered by the Carbon Monoxide Monitor, MNR-0033.

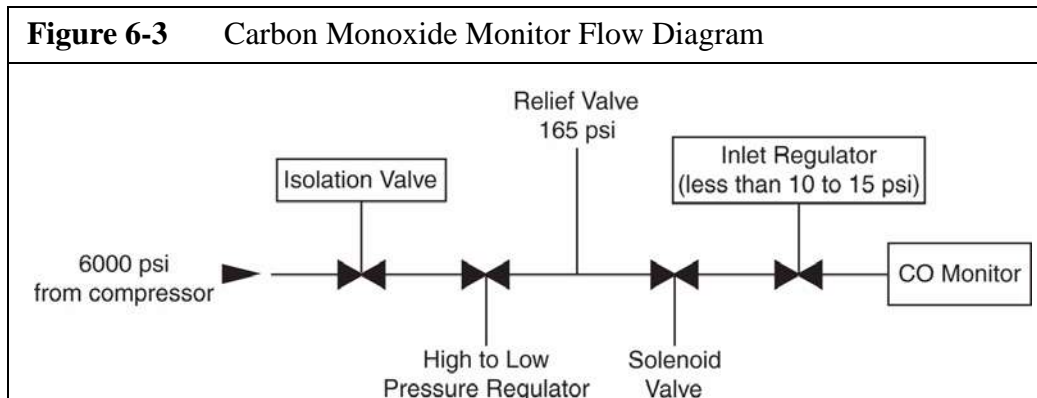


- The Carbon Monoxide (CO) Monitor is designed to provide continuous monitoring of the carbon monoxide levels in breathing air.
- The Carbon Monoxide Monitor is enclosed in a NEMA-4X case and operates on 12 VDC or 120 VAC.

- Calibration adjustment is performed automatically by the internal microprocessor.
- The Carbon Monoxide Sensor Cell has a life expectancy of one and a half to three years if the calibration check is done every 30 days as recommended.

### 6.1.1 Component Description

The following are the major components for the standard and trailer Carbon Monoxide Monitor Assembly installations. See Figure 6-3.



#### 6.1.1.1 Isolation Valve

Controls the input of air from the compressor to the Carbon Monoxide Monitor.

#### 6.1.1.2 High Pressure to Low Pressure Regulator

Typically set for 50 psi out with 5,000 psi in.

#### 6.1.1.3 Relief Valve

A relief valve which is factory set to 165 psi to prevent over-pressurization of the Carbon Monoxide Monitor.

#### 6.1.1.4 Solenoid Valve

Allows air to flow to the Carbon Monoxide Monitor when the compressor is running.

#### 6.1.1.5 Inlet Regulator

A regulator the operator uses to set the appropriate rate of flow (0.5 to 0.8 SCFH) to the Carbon Monoxide Monitor.

#### 6.1.1.6 Carbon Monoxide Monitor

The Carbon Monoxide Monitor contains the LCD Display, Flowmeter, Microprocessor, Carbon Monoxide Sensor Cell, Air Inlet Connection and the Calibration Port.

##### 6.1.1.6.1 Carbon Monoxide Sensor Cell.

The Carbon Monoxide Sensor Cell is an electrochemical element inside the Carbon Monoxide Monitor which senses the amount of Carbon Monoxide in the airstream and produces an analog electrical signal for the control and display functions of the Carbon Monoxide Monitor.

#### 6.1.1.7 Test Gas Storage

This provides a place to keep Calibration Gas bottles so that the Carbon Monoxide Monitor can be calibrated in all situations. Normally these are only found only in trailer installations.

## 6.2 Carbon Monoxide Monitor Setup

The initial setup of the Carbon Monoxide Monitor is done prior to shipping the unit.

### 6.3 Operation

1. Start the compressor unit.
2. The LCD Display will show introductory messages and a warm up countdown (**WARM XX**).
3. After the warm up countdown of 120 seconds, the instrument will display Carbon Monoxide level readings.
4. The Inlet Regulator may be adjusted at any time to set the flow level from 0.5 to 0.8 SCFH on the Flow Indicator.
5. If the compressor is not running then a **LOW FLOW** indication will show on the display.
6. If carbon monoxide readings remain high or below zero calibration may be needed.

### 6.4 Maintenance

#### 6.4.1 Calibrating Carbon Monoxide Monitor.

#### NOTICE

Calibration is recommended every thirty days.

1. Before calibration, be sure that the test gas bottles in the calibration kit have an adequate amount of gas in the them. Attach the fixed flow regulator to the gas bottle and then detach it. You should hear a slight popping sound.
2. Turn on the compressor unit. The compressor itself does not have to run, because the test gas is being substituted for the air supply from the compressor.
3. The compressor unit power needs to be applied to the unit for 15 minutes so the unit can stabilize. If you attempt to calibrate before the end of this 15 minute period, **TO SOON** will appear on the LCD Display.
4. Close Isolation Valve by turning counterclockwise until it stops. This will ensure that the air flow from the compressor unit is shut off.
5. If the gas flow from the compressor unit was not shut off, a message **SUPPLY OFF** will appear. If this message appears, shut off the supply air and then begin the calibration process again.
6. Connect the 20 ppm Carbon Monoxide Test Gas to the fixed flow regulator and connect it to the Calibration Port of the Carbon Monoxide Monitor.
7. Turn the value on the Fixed Flow Regulator counterclockwise until the Carbon Monoxide Monitor Flow Indicator shows between 0.5 and 0.8 SCFH.
8. The Display will count down from 60 seconds. At the conclusion, the display will prompt **Carbon Monoxide G SET** or **CAL FAILED**
9. The the display will prompt **REMOVE Carbon Monoxide GAS**.
10. Turn the valve on the Fixed Flow Regulator clockwise until it is closed and disconnect it from the Calibration Port and disconnect the 20 ppm Carbon Monoxide Test Gas bottle from the fixed flow regulator.

11. Allow 10 minutes for the remaining gas in the Carbon Monoxide Sensor Cell to dissipate after the calibration process.

<b>NOTICE</b>
If the compressor is started before the test gas dissipates, it could lead to incorrect Carbon Monoxide level readings.

12. Turn the compressor on, compressor must be running, adjust Inlet Regulator to 0.5-0.8 SCFH to restore normal operations.

**6.4.2 Troubleshooting a Calibration Failure**

If the unit fails to calibrate, it maybe due to low pressure in Test Gas Bottles, mixing up the Test Gas Bottles during calibration or an aging Carbon Monoxide Sensor Cell.

1. Ensure the Test Gas supply is adequate. See Paragraph 6.4.1 Step 1.
2. Initialize the Carbon Monoxide Monitor following the procedures in Paragraph 6.4.4. This will allow for a greater percentage of compensation for the gas.
3. If the Test Gas is good and the Carbon Monoxide Monitor still refuses to calibrate, replace the Carbon Monoxide Sensor Cell. See Paragraph 6.4.3.
4. If it still doesn't calibrate, contact Bauer Product Support.

<b>Figure 6-4</b> Basic Calibration Kit		
		
1. 20 ppm Carbon Monoxide Test Gas	2. Zero Test Gas	3. Fixed Flow Regulator

**6.4.3 Carbon Monoxide Sensor Cell Replacement** (See Figure 6-5)

When Carbon Monoxide test gas fails to show a gas response during calibration, a new Carbon Monoxide Sensor Cell is required. Most Carbon Monoxide Sensor Cells will last from one and a half to three years. After installing a new Carbon Monoxide Sensor Cell, an initialization step permits the Carbon Monoxide Sensor Cell to be calibrated to zero regardless of the background air. Caution must be taken that the inlet air is free of carbon monoxide or an Impurity Free Air test gas is used for the initial calibration.

1. Disconnect the power from the unit.

**⚠ CAUTION**

Be sure the power is disconnected from the unit.

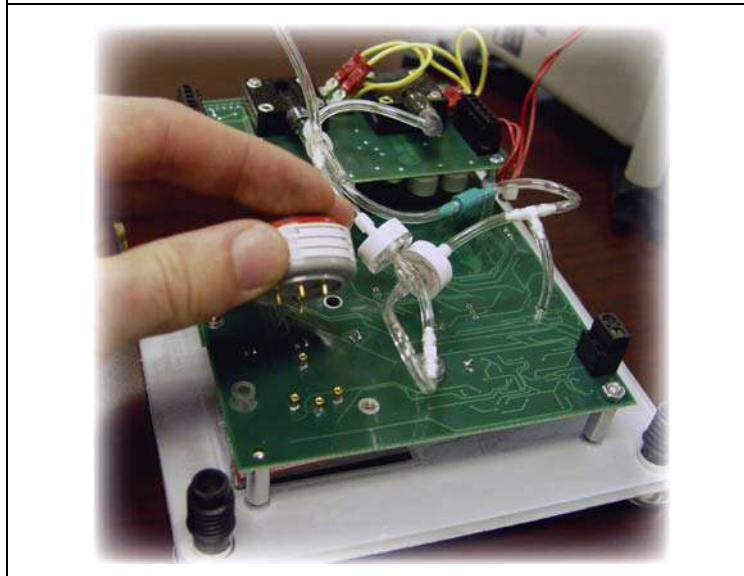
2. Remove the four corner screws and open the Carbon Monoxide Monitor front cover.
3. Remove the screws that hold the Carbon Monoxide Sensor Cell cover.
4. Remove the Carbon Monoxide Sensor Cell from its socket by pulling it up from the circuit board.
5. Install a new Carbon Monoxide Sensor Cell.

**⚠ CAUTION**

Be sure the shorting wire is removed from the new Carbon Monoxide Sensor Cell.

6. Replace the Carbon Monoxide Sensor Cell Cover, ensuring the longer screw is in its indicated hole.
7. Reassemble the Carbon Monoxide Monitor and reconnect to power.
8. Let the new Carbon Monoxide Sensor Cell warm-up for an hour before doing the Initialization.
9. See Paragraph 6.4.4 for Carbon Monoxide Monitor Initialization procedures.

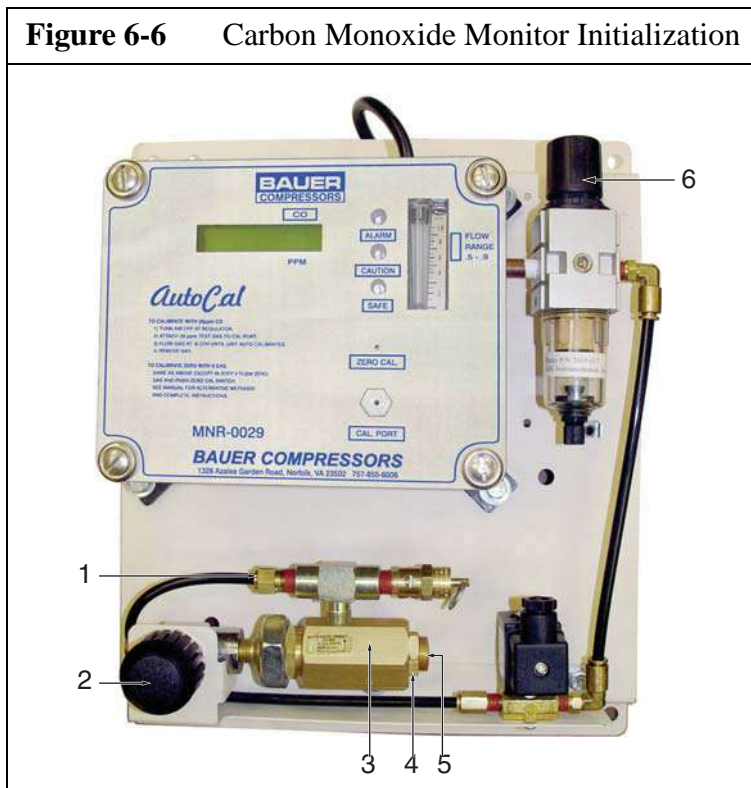
**Figure 6-5** Carbon Monoxide Sensor Cell Removal



#### 6.4.4 Carbon Monoxide Monitor Initialization

Initialization of the Carbon Monoxide Monitor will need to be done if a calibration fails, the Carbon Monoxide Sensor is replaced or any other maintenance on the internal components of the Carbon Monoxide Monitor System was performed.

### 6.4.4.1 Setting the LP Regulator



(See Figure 6-6)

1. Attach a Pressure Gauge (0 -100 psi) to the Outlet (1) of the Regulator (3).
2. Apply 5,000 psi to the Regulator (3) using Isolation Valve (2).
3. Loosen Jam Nut (4).
4. Using an Allen wrench turn the regulator adjusting screw (5) until the Pressure Gauge reads 50 psi with an input pressure of 5,000 psi.
5. Tighten Jam Nut (4), Remove Pressure Gauge and reattach Outlet Connection.

### 6.4.4.2 Initialization Calibration

1. Before calibration, be sure that the test gas bottles in the Calibration Kit (See Figure 6-4) have an adequate amount of gas in the them. Attach the Fixed Flow Regulator to the gas bottle and then detach it. You should hear a slight popping sound.
2. Turn on the compressor unit. The compressor itself does not have to run, because the test gas is being substituted for the air supply from the compressor.
3. The compressor unit power needs to be applied to the unit for 15 minutes so the unit can stabilize. If you attempt to calibrate before the end of this 15 minute period, **T O S O O N** will appear on the LCD Display.
4. Close Isolation Valve by turning counterclockwise until it stops. This will ensure that the air flow from the compressor unit is shut off.



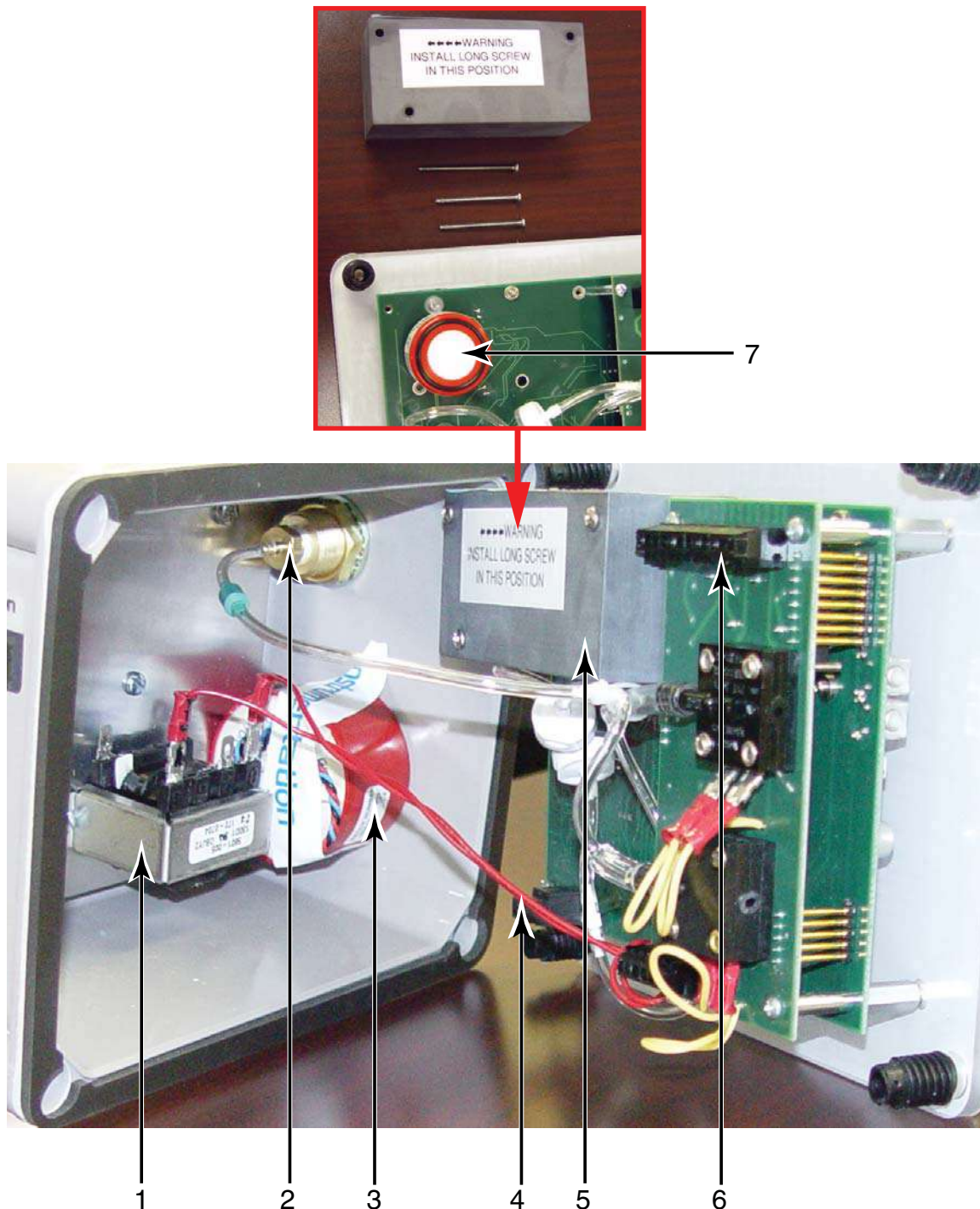
5. If the gas flow from the compressor unit was not shut off, a message **SUPPLY OFF** will appear. If this message appears, shut off the supply air and then begin the calibration process again.
6. Depress the Zero Cal Set Switch on the front of the Carbon Monoxide Monitor with a paper clip for approximately 30 seconds.
7. Connect the Zero Gas bottle to the Fixed Flow Regulator and connect it to the Calibration Port of the Carbon Monoxide Monitor.
8. Turn the valve on the Fixed Flow Regulator counterclockwise until the Carbon Monoxide Monitor Flow Indicator shows between 0.5 and 0.8 SCFH.
9. The Display should read **ZERO CAL** and will count down from 60 seconds. At the conclusion, the display prompts, **REMOVE ZERO GAS**.
10. Turn the valve on the Fixed Flow Regulator clockwise until it is closed and disconnect it from the Calibration Port.
11. Disconnect the Zero Gas Bottle and the display will indicate **20 ppm CAL GAS REQUIRED**
12. Connect the 20 ppm Carbon Monoxide Test Gas to the Fixed Flow Regulator and connect it to the Calibration Port of the Carbon Monoxide Monitor.
13. Turn the valve on the Fixed Flow Regulator counterclockwise until the Carbon Monoxide Monitor Flow Indicator shows between 0.5 and 0.8 SCFH.
14. The Display will count down from 60 seconds. At the conclusion, the display will prompt to **REMOVE Carbon Monoxide GAS**.
15. Turn the valve on the Fixed Flow Regulator clockwise until it is closed and disconnect it from the Calibration Port and disconnect the 20 ppm Carbon Monoxide Test Gas Bottle from the Fixed Flow Regulator.
16. Allow 10 minutes for the remaining gas in the Carbon Monoxide Sensor Cell to dissipate after the calibration process.

#### NOTICE

If the compressor is started before the test gas dissipates, it could lead to incorrect Carbon Monoxide level readings.

17. Turn the compressor on, the compressor must be running, adjust Inlet Regulator to 0.5-0.8 SCFH to restore normal operations.

**Figure 6-7** Carbon Monoxide Monitor Internal Components



- |  |                                      |
|--|--------------------------------------|
| 1. Power Connection                          | 5. Carbon Monoxide Sensor Cell Cover |
| 2. Gas Inlet                                 | 6. Alarm Connections                 |
| 3. Audible Alarm (not used)                  | 7. Carbon Monoxide Sensor Cell       |
| 4. Remote Display Connection (only MNR-0033) |                                      |

**6.4.5 Carbon Monoxide Monitor Test Mode Buttons**

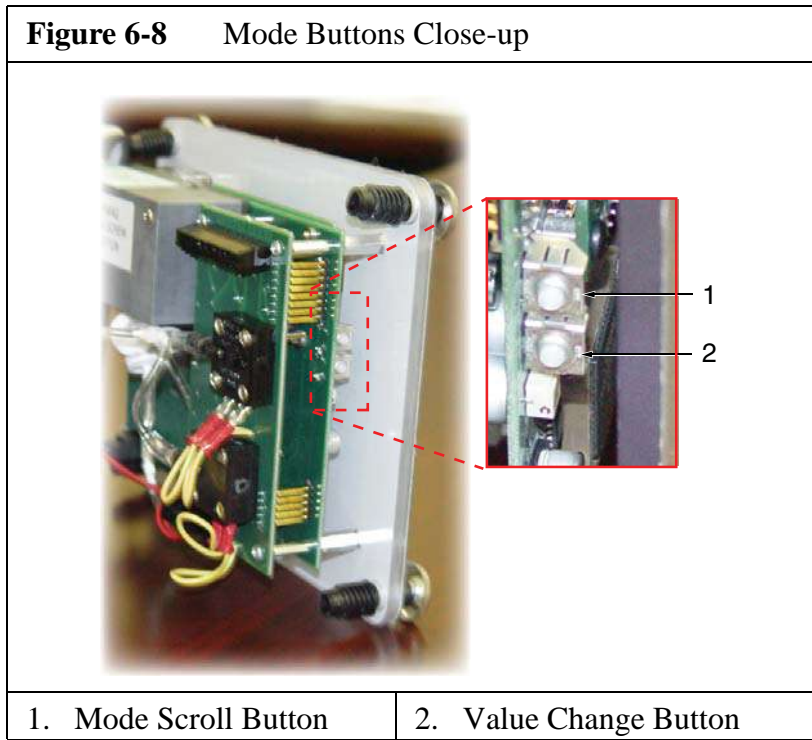
**⚠ CAUTION**

Except for the Carbon Monoxide Sensor Cell, all internal Carbon Monoxide monitor parts are to be serviced only by the manufacturer.

Do not adjust factory settings with the setup menu Mode Buttons unless absolutely necessary and by a trained technician. The only reason to access the setup information is to test the alarm relay interface of the control system which simulates the compressor going into an alarm state. The following describes how to access the TEST MODE.

**⚠ CAUTION**

Except for testing the Display LCD, adjusting the parameters set at factory incorrectly could be dangerous. Adjustment, if necessary, must be done by a trained technician.



1. Unscrew the four large screws on all corners of the Front Cover (See Figure 6-1).
2. Lift the Front Cover carefully, to not harm any of the attached wires inside the Carbon Monoxide monitor.
3. Find the two white mode buttons on the left side of the motherboard (See Figure 6-8). By briefly depressing the top button six times it is possible to cycle through the set up parameters to access the TEST MODE.

4. When TEST MODE is displayed simply depress the bottom Value Change Button. Depressing the Value Change Button sends an input signal to the PLC, shutting down the compressor system and annunciating a high Carbon Monoxide alarm (reference the electrical section of this manual for more information). TEST MODE also sounds the auxiliary horn (if installed) and activates the solid squares on Front Cover LED Readout.
5. The top mode button must be depressed again to return to Normal Mode.
6. Replace Front Cover and screw in place.

## 6.5 Remote Display Setup

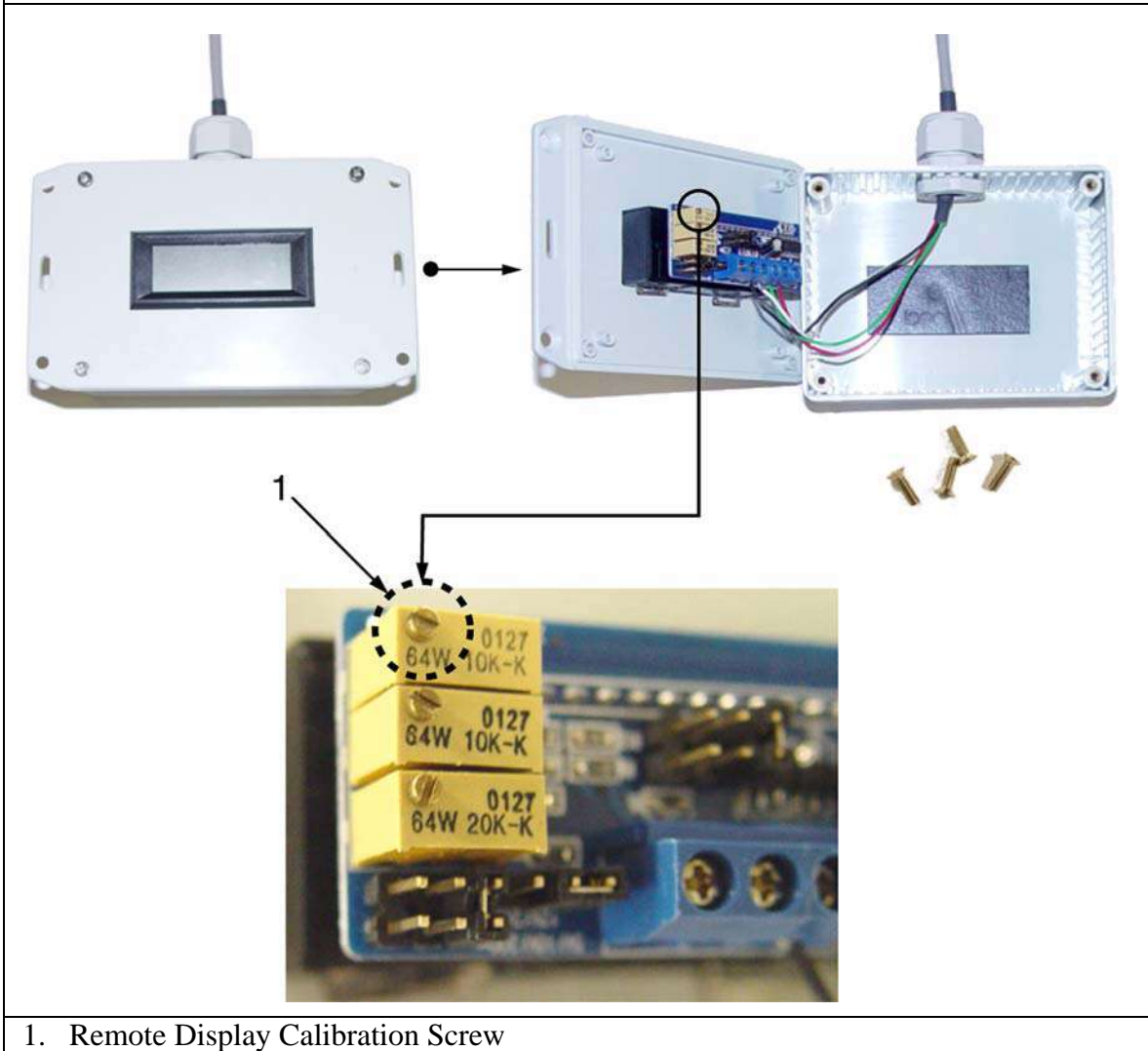
### NOTICE

The Remote Display must not be installed more than 100 feet from the Carbon Monoxide Monitor.

(See Figure 6-9) To calibrate the Remote Display, adjust the internal potentiometer with the compressor system control switched on, so the Carbon Monoxide Monitor will be energized. However do not have the compressor running, because the air supply from the compressor is unnecessary for the Remote Display setup.

1. To calibrate the Remote Display unit during normal operation of the compressor unit, make sure that both the compressor and Carbon Monoxide Monitor units are on.
2. Open the Remote Display (See Figure 6-9). Find the top potentiometer and adjust it to match the Carbon Monoxide Monitor Carbon Monoxide display reading. Notice that the Carbon Monoxide Monitor rounds off to whole numbers while the Remote Relay displays decimal places, so adjust as close as possible.
3. When the display readings match, reassemble the Remote Relay. Realign readings if necessary.

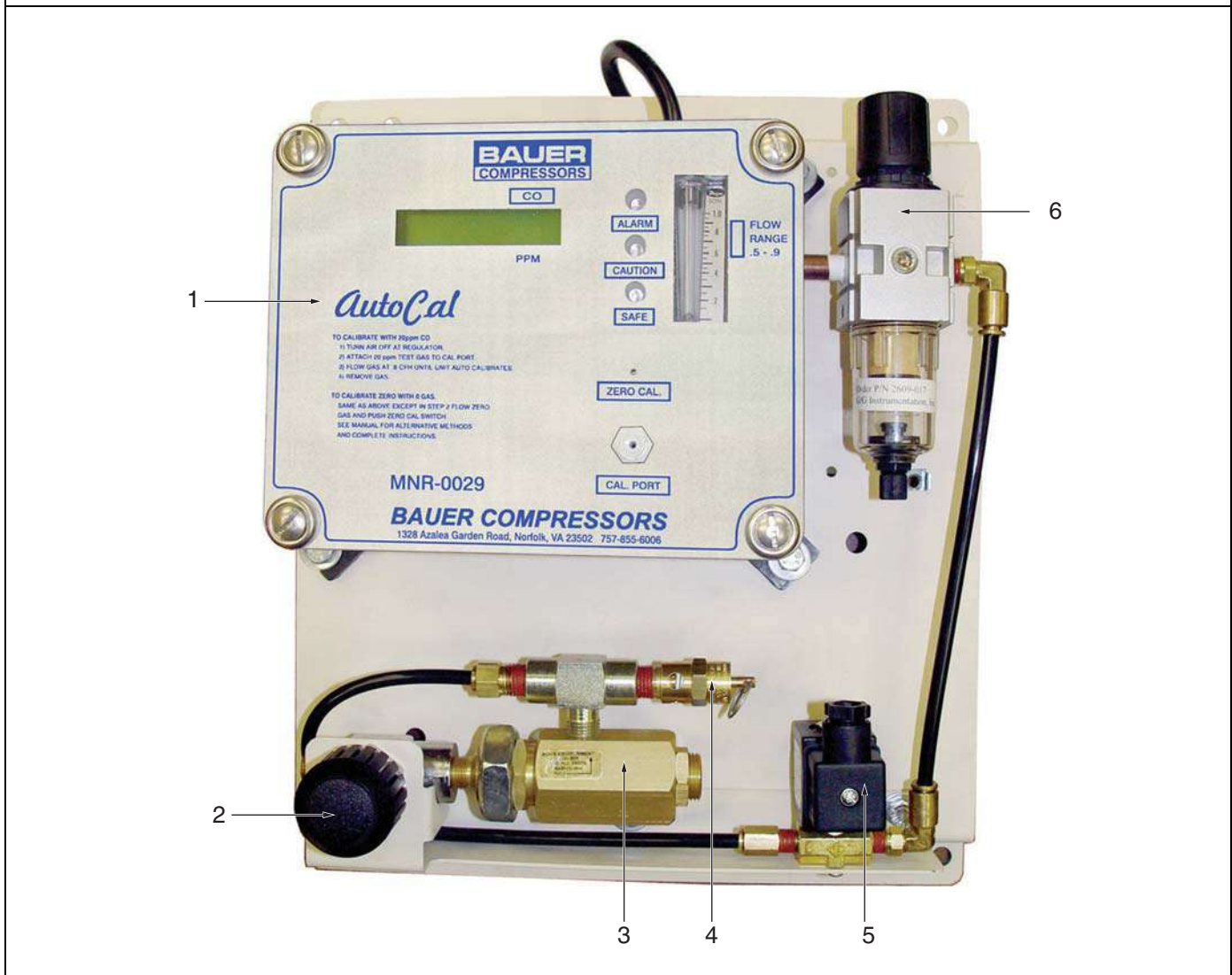
**Figure 6-9** Remote Display



1. Remote Display Calibration Screw

6.6 Replacement Parts List

**Figure 6-10** Carbon Monoxide Monitor Assembly - Standard



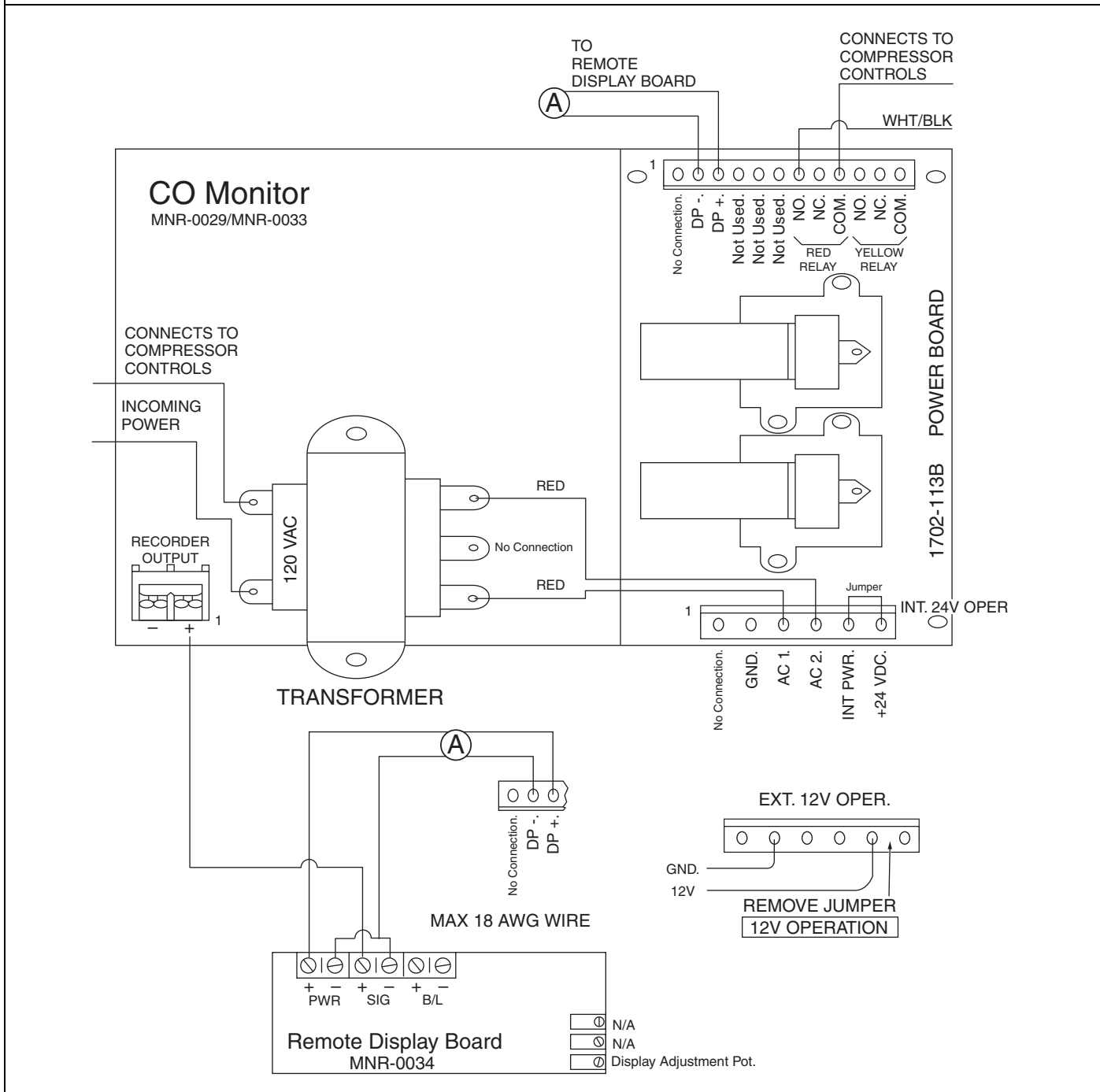
Item	Qty	Part No.	Description	Notes
◆		ASY-0890	Carbon Monoxide Monitor Assembly	
1	1	MNR-0029	Carbon Monoxide Monitor	
2	1	VAL-0076	Isolation Valve	
3	1	REG-0043	High - Low Pressure Regulator	
4	1	VAL-0432	Safety Valve	145 psi
5	1	VAL-0348	Solenoid Valve	115 VAC
or	1	VAL-0349	Solenoid Valve	12 VDC
6	1	REG-0060	Inlet Regulator	
N.S.	1	SEN-0025	Carbon Monoxide Sensor Cell	

**Figure 6-11** Calibration Components



Item	Qty	Part No.	Description	Notes
1	1	CYL-0016	CO Test Gas	20 ppm
2	1	CYL-0020	CO Test Gas, Zero Gas	0 ppm
3	1	KIT-0190	Calibrating Regulator	

**Figure 6-12** Carbon Monoxide Monitor Schematic





## CHAPTER 7: INDICATORS & VALVES

### 7.1 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.

Intermediate 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.

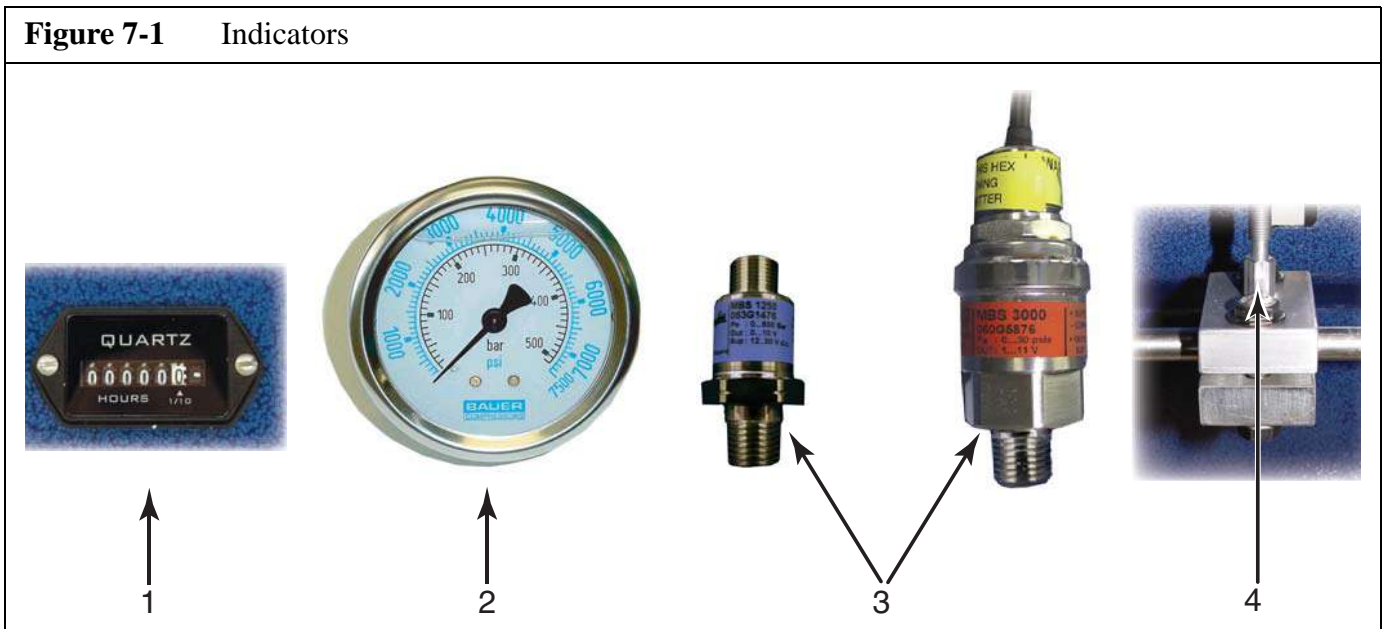
Oil Pressure Gauge - Indicates the compressor oil pressure.

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

Temperature Sensors - Provides temperature readings for the PLC.

### 7.2 Replacement Parts List

**Figure 7-1** Indicators



Item	Qty	Part No.	Description	Notes
1	1	HMR-0036	Hour Meter	
2	— <sup>1</sup>	—	2.5" Pressure Indicator	See Table 7-1:
3	— <sup>2</sup>	—	Pressure Sensor	See Table 7-2:
4	1	N30545	Temperature Sensor	<i>Optional</i>

1.Number of pressure gauges and type vary with model  
 2.Number of pressure sensors and type vary with model

**Table 7-1:** 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-0031W	0 - 3,000 psi (207 bar)
GAG-0009W	0 - 7,500 psi (517 bar)
GAG-0015	0 - 10,000 psi (689.5 bar)

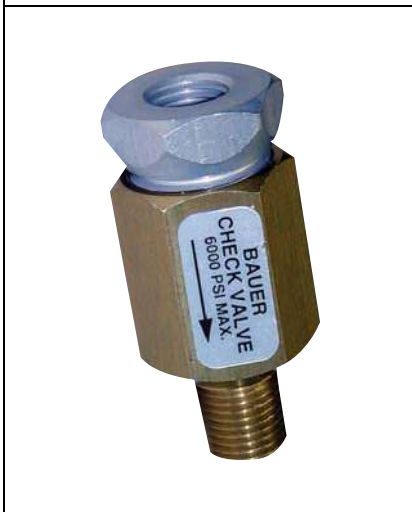
**Table 7-2:** Pressure Sensors

Part Number	Pressure Range	Thread	Color	Comments
SEN-0035	0 - 8,700 psi (600 bar)	1/4 NPT	Yellow	
SEN-0049	0 - 8,700 psi (600 bar)	1/4 G	Blue	
SEN-0036	0 - 150 psi (10.34 bar)	1/4 NPT	Yellow	
SEN-0050	0 - 150 psi (10.34 bar)	1/4 G	Yellow	
SEN-0051	0 - 1,450 psi (100 bar)	1/4 NPT	Green	
SEN-0052	0 - 870 psi (60 bar)	1/4 NPT	Grey	
SEN-0053	0 - 232 psi (16 bar)	1/4 NPT	Khaki	
SEN-0054	0 - 14.5 psi (1 bar)	1/4 NPT	Red	
SEN-0055	0 - 30 psi (2 bar)	1/4 NPT	Red	Class I, Div 2, Groups A,B,C,D
SEN-0046	0 - 150 psi (10.34 bar)	1/4 NPT	Red	Class I, Div 2, Groups A,B,C,D
SEN-0047	0 - 7,500 psi (517 bar)	1/4 NPT	Red	Class I, Div 2, Groups A,B,C,D

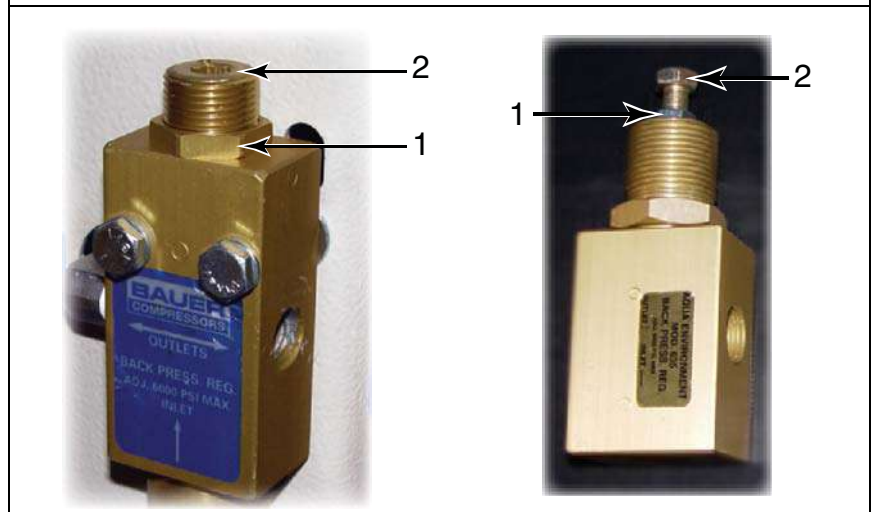
## 7.1 Nonadjustable Valves

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 7-1** Check Valve



**Figure 7-2** Pressure Maintaining Valves (PMV)



## 7.2 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. Depressurize 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  $\pm 100$  psi, readjust the PMV.

### 7.3 Safety Valves

**Figure 7-3** Safety Valves



The safety valves are adjusted at the factory to the required pressure and do not normally require maintenance or readjustment. 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).

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## CHAPTER 8: APPENDIX

### 8.1 Safety

#### 8.1.1 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 repairs 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 authorized, trained and qualified personnel.
- 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 air applications. Should the purchaser and/or user proceed to use the compressor for air 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.

**8.1.2 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.

	<p style="text-align: center;"><b>HOT SURFACES DO NOT TOUCH!</b></p> <p>Danger of burning if cylinders, cylinder heads, or pressure lines of individual compressor stages are touched.</p>
	<p style="text-align: center;"><b>HIGH VOLTAGE!</b></p> <p>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.</p>
	<p style="text-align: center;"><b>AUTOMATIC COMPRESSOR CONTROL UNIT MAY START WITHOUT WARNING!</b></p> <p>Before carrying out maintenance and repair work, switch off at the main switch and ensure the unit will not restart.</p>
	<p style="text-align: center;"><b>THE INSTRUCTIONS MUST BE READ BEFORE OPERATING UNIT!</b></p> <p>The instruction manual and all other applicable instructions, regulations, etc. must be read and understood by the operating personnel before using the machine.</p>
	<p style="text-align: center;"><b>HEARING PROTECTION MUST BE WORN!</b></p> <p>Hearing protectors must be worn when working on a machine which is running.</p>
	<p style="text-align: center;"><b>DIRECTION OF ROTATION!</b></p> <p>When switching on the machine, check the arrow to ensure correct direction of rotation by the drive motor.</p>

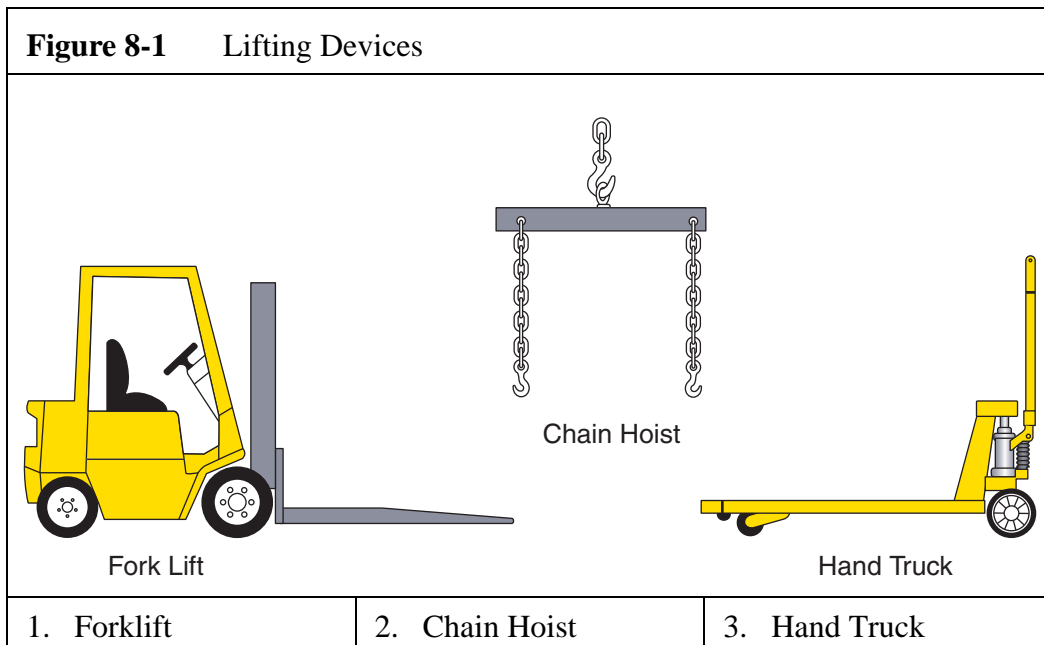
## 8.2 Unpacking, Handling and Installation

### 8.2.1 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 8-1.



### **⚠ 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 labelled.



## 8.2.2 Installation of the Compressor Unit

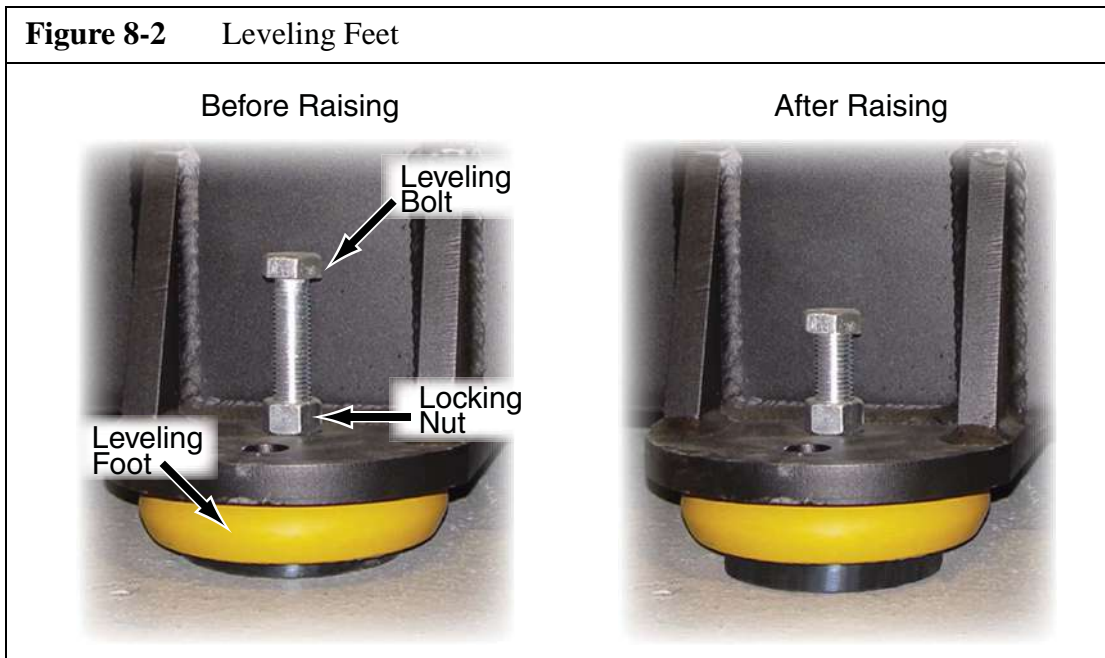
### 8.2.2.1 General

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.



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

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.

**8.2.2.2 Ventilation**

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

**8.2.2.2.1 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.

**8.2.2.2.2 Indoor Installation**

The best location to install the compressor unit indoors is against an outside wall with a suitably large air 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.

**8.2.2.2.3 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 ft <sup>3</sup> h = 6.5 ft		V = 3500 ft <sup>3</sup> h = 10 ft		V = 7000 ft <sup>3</sup> h = 13 ft	
	Intake (ft <sup>2</sup> )	Exhaust (ft <sup>2</sup> )	Intake (ft <sup>2</sup> )	Exhaust (ft <sup>2</sup> )	Intake (ft <sup>2</sup> )	Exhaust (ft <sup>2</sup> )
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

#### 8.2.2.2.4 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) <sup>a</sup>					
	V = 1750 ft <sup>3</sup> h = 8 ft		V = 3500 ft <sup>3</sup> h = 10 ft		V = 7000 ft <sup>3</sup> h = 13 ft	
	Intake (ft <sup>2</sup> )	Exhaust cfm	Intake (ft <sup>2</sup> )	Exhaust cfm	Intake (ft <sup>2</sup> )	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 air velocity of 1000 ft.min. Bauer recommends that the cooling air velocity be in the range of 600 ft.min. to 2000 ft.min.

#### 8.2.2.3 Electrical Installation

##### 8.2.2.3.1 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.

##### 8.2.2.3.2 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.

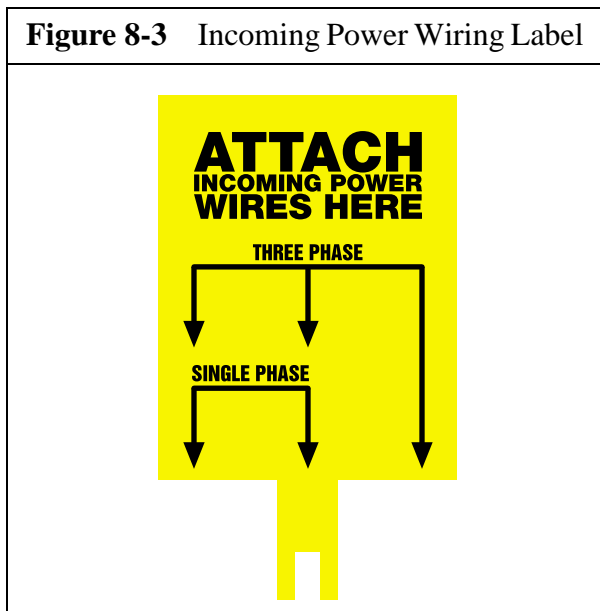
For standard models the only customer wiring necessary is from the customer supplied disconnect switch to the compressor unit electrical enclosure. All wiring should be done by a licensed electrician familiar with national, state and local electrical codes.

The label shown in Figure 8-3 indicates where the incoming power is connected to the compressor unit electrical enclosure. This label must be removed before using the equipment.

**NOTICE**

If this unit is equipped with an Air Kool system, consult the Air Kool Section for electrical installation.

**Figure 8-3** 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 <sup>a</sup>			Minimum Wire Size <sup>b</sup>		
	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 <sup>a</sup>			Minimum Wire Size <sup>b</sup>		
	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	0	1	6
50	143	130	65	200	200	100	30	20	4
60	169	154	77	250	200	100	40	30	3
75	211.2	192	96	300	300	150	300	250	1
100	273	248	124	400	350	175	500	350	20
125	343.2	312	156	500	400	200	2-40	2-30	30
150	396	360	180	600	500	250	2-300	2-40	40

a. Dual element time delay fuse Amps.

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

In the above tables, all values are based on 1996 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.

**8.2.2.3.3 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.

<b>WARNING</b>
Never tighten or adjust fittings or connections under pressure. Always depressurize first.

## 8.3 Long Term Storage

### 8.3.1 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.

### 8.3.2 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.

#### 8.3.2.1 Units Equipped with a Filter System

1. Ensure that cartridges remain in the purification system chambers. This will prevent oil from entering the outlet lines as a result of preservation procedures.
2. Remove the intake filterintake pipe completely.

### 8.3.3 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.

### **8.3.4 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, depressurize the unit, then close the drain valves again.
5. Remove the intake filter and replace the dust cap on the inlet port.

### **8.3.5 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.

### **8.3.6 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 purification 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.





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

<b>3,000 Operating Hours.</b>	<b>Para.</b>	<b>Date</b>	<b>Signature</b>

<b>Annually.</b>	<b>Para.</b>	<b>Date</b>	<b>Signature</b>

<b>Biennially. (Every two years)</b>	<b>Para.</b>	<b>Date</b>	<b>Signature</b>



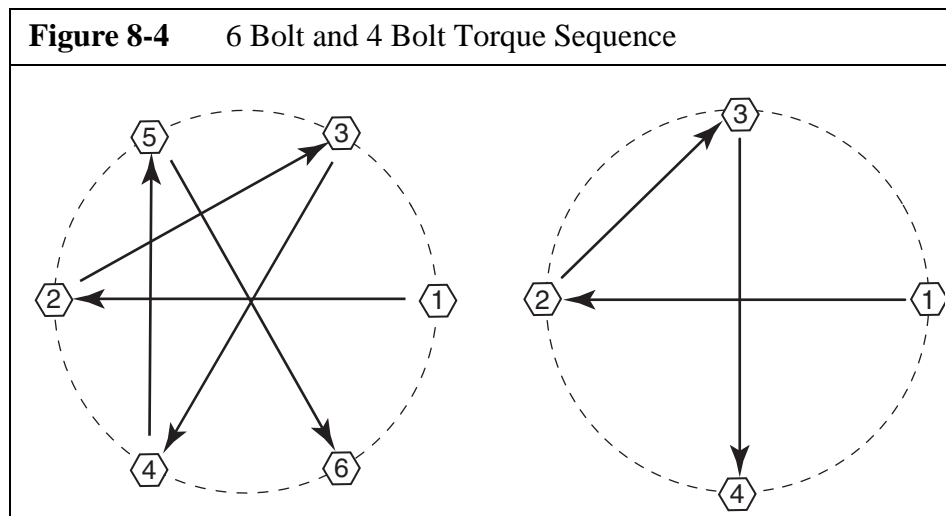
**8.5 Reference Data**

**8.5.1 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.

<b>Table 8-1: Torque Values</b>		
<b>Bolt or Screw</b>	<b>Size</b>	<b>Max. Torque</b>
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)

**8.5.2 Torque Sequence Diagrams**



**8.5.3 Conversion Formulas**

$$^{\circ}\text{F} = 9/5 \text{ }^{\circ}\text{C} + 32$$

$$\text{psi} = \text{bar} \times 14.5$$

$$^{\circ}\text{C} = 5/9 \times (^{\circ}\text{F} - 32)$$

$$\text{bar} = \text{psi} \times 0.0689$$

### 8.5.4 Approved Lubricants Chart

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

<b>Table 8-2: Lubricant Chart</b>	
<b>Usage</b>	<b>Lubricants</b>
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

### 8.5.5 Glossary of Abbreviations and Acronyms

◆	Available Only as Part of a Complete Assembly
AC	Activated Charcoal, removes odor and taste
ACD	Automatic Condensate Drain
ASME	American Society of Mechanical Engineers
CW	Clock Wise
CCW	Counter-Clockwise
CGA	Compressed Gas Association
DIN	Deutsches Institut für Normung
DOT	Department of Transportation
E1	single phase electrical supply (Electric 1)
E3	three phase electrical supply (Electric 3)
HP	Hopcalite, a chemical catalyst which converts carbon monoxide to carbon dioxide
IAW	In Accordance With
MS	Molecular Sieve, removes moisture
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety & Health Administration
ODP	Open Drip-proof (motor)
OEM	Original Equipment Manufacturer
PLC	Programmable Logic Controller
PMV	Pressure Maintaining Valve
SC	Securus® moisture sensing device

## **8.6 Additional Documents**

### **8.6.1 Diagrams and Drawings**

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

### **8.6.2 Other Documents**

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

# 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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Inaccuracies: page# \_\_\_\_\_ figure# \_\_\_\_\_ paragraph# \_\_\_\_\_

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