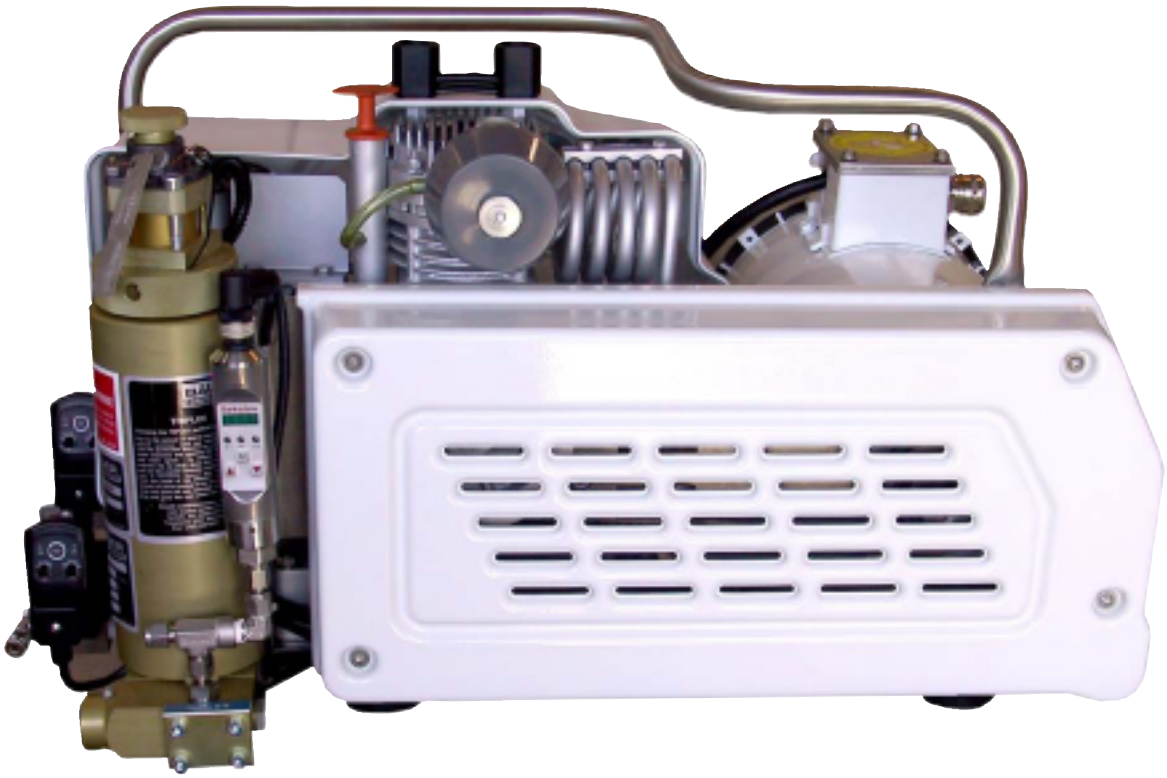
Yacht Pro Automatic Compressor Operator's Manual



YP45DF

Brownie's Southport Divers
1530 Cordova Road
Fort Lauderdale, FL 33316
Ph 954.524.2112 Fx 954.524.7598
info@yachtdiver.com

Brownie's Yacht Toys
2301 South Federal Hwy
Fort Lauderdale, FL 33316
Ph 954.463.9446 Fx 954.524.6722
Toll Free 800.949.0822

Brownie's Palm Beach Divers
3619 Broadway
Riviera Beach, FL 33404
Ph 561.844.3483 Fx 561.845.1500
info@yachtdiver.com

PREFACE

Thank You for purchasing a Brownie's Yacht Pro Series Compressor System. This manual explains the use and maintenance of your unit. All information here is based on the latest product data available at the time of publication. Brownie's Third Lung reserves the right to make unannounced changes at any time without incurring any obligations whatsoever.

This Operator's Manual is to be considered a part of the overall compressor package and should remain with the compressor in the event of sale to another party.

WARNING: Installation and operation of the system without the guidelines set forth in this manual may result in damage to the system and/or personal injury or death.

WARNING: Never tamper with or modify factory settings. This will void the warranty and could result in personal injury or death.

IMPORTANT NOTICE:

Read this manual before you operate your Yacht Pro Series Compressor, as it contains pertinent information for the safe operation of the system. Failure to follow the instructions in this manual may result in damage to the compressor and/or personal injury or death.

In order to familiarize yourself with the compressor features, please read this manual thoroughly before using the equipment. Physical layout is pictured on page 28.

For service, please contact:

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1530 Cordova Road
Fort Lauderdale, FL 33316
Ph 954.524.2112 Fx 954.524.7598
www.yachtdiver.com
info@yachtdiver.com

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Ph 954.463.9446 Fx 954.524.6722
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3619 Broadway
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www.yachtdiver.com
info@yachtdiver.com

Table of Contents

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COMPRESSOR QUALITY ANALYSIS RECORD

Date: _____

Serial # _____ Model # _____ Order# _____

Motor Wiring _____ V _____ PH _____ HZ

Belt Size _____ Tension _____

Connections Tight _____ Nuts & Bolts Tight _____

No Leaks _____

Control Wiring Correct _____ Final Pressure Setting _____

Drain System Operation _____ Interval _____

Oil Level _____ Tank Fill Time _____
(80 ft³ 500-3000 PSI)

Hour Meter Reading _____ Test Run Time _____

STANDARD EQUIPMENT PROVIDED

Filter _____ Sightglass Elements _____

Manual _____ Lubricant _____

OPTIONAL EQUIPMENT ORDERED

4TKMAN _____ HIP-RFPK _____

FC374-04RL (Additional for 4TKMAN Main) _____FT_____

Transformer _____ Oil Removed _____

Technician _____ Installer _____

Product Data

Category	Specifications
Free Air Displacement (a)(b):	4.1 scfm
* Operating Pressure (Std):	3200 PSI
** Pressure setting, final	3400 PSI pressure safety valve (STD)
Dimensions:	36”L x 17”W x 18”H (91 x 44 x 46 cm)
Weight:	Approx 185 lbs (84kg)
Use:	Compression of atmospheric air.
Intake Pressure:	Atmospheric Pressure
Compressor RPM:	1800
Drive Belt Type:	3VX355
Number of Stages	3
Number of Cylinders	3
Cylinder Bore 1st Stage	70 mm
Cylinder Bore 2nd Stage	28 mm
Cylinder Bore 3rd Stage	12 mm
Piston Stroke	24 mm
Intermediate Pressure 1st Stage	94 psi / 6.5 bar
Intermediate Pressure 2nd Stage	843 psi / 65 bar
Compressor Block Oil Cap.	1.4qt. / 1.3L
Recommended Oil Types:	CF-2000 Synthetic Compressor Lubricant
Max. ambient temperature	+43º to +100º F +5º to +38º C
Max. permissible inclination of compressor (b):	10º

* Unit has a max pressure rating of 5000 psi (3800 psi recommended)
** May be set higher or lower based on Pressure Switch settings
*** Electric motors also available; 3 phase, 50 or 60 HZ; and Single Phase 50 HZ
(a) free air delivered at tank filling from 0 to 3000 psi
(b) Value only valid if oil in level unit position is at highest mark on dipstick.

DESCRIPTION OF THE UNIT:

Your Yacht Pro Series is a fully automatic compressor, equipped with Automatic Condensate Drain (ACD). The YP series has been designed specifically with the traveling yacht owner in mind. The compressor system is designed for "HANDS FREE" operation.

STANDARD FEATURES

The complete Yacht Pro Series package includes:

- Dual Programmable Stainless Condensate Drain System Switch
- Digital Frequency Drive Control System
- One High Pressure Compressor with a 5HP (YP45DF) Motor
- Stainless Programmable Digital Pressure Switch with LED Display
- One Condensate Collection Jug
- One Purification Cartridge (X22679 for Gold Tower)
- One Purification Cartridge (X53240 for Black Tower)
- One Operator's Manual
- One Sightglass Element (moisture and CO monitor)
- Tool Kit
- One liter, Synthetic Compressor Oil

The following are included with the YP45DF

- One Four-way Manifold with 10 foot connection hose including stainless steel quick disconnect end
- One ½ inch padded Custom Cordura Manifold Bag

Optional Equipment:

- One Starboard Mounting and Spill Containment Tray
- Stainless Steel Quick Disconnect Set
- Custom Hose Lengths
- Remote Fill Plumbing Kit
- Cordura Nylon Cover
- Remote On/Off Switch (with installation)

NOTICE:

Please read this Owner's Manual before you operate your Yacht Pro Series Compressor

WARNINGS:

- Do not operate the compressor if the compressor is damaged.
- Do not operate the compressor near flammable substances or objects
- Make sure the air entering the compressor is clean atmospheric air.
- Do not operate unit in Ambient Temperatures exceeding 100ºF (38ºC)

USE OF COMPRESSOR:

The Yacht Pro Series is intended for the compression of air.

WARNING:

DO NOT ADD OXYGEN TO THE COMPRESSOR: THERE IS A DANGER OF EXPLOSION.

INSTALLATION

WARNING:

Improper installation may result in damage to the unit, personal injury or death.

All persons operating the Yacht Pro Series system must read this manual completely and fully understand the procedures for system operation and the responsibilities of the operator to insure the safety of divers supplied with air from the system. We recommend professional installation by our experienced installation technicians. The Yacht Pro Series must not be operated in an enclosure that does not meet the installation/operation guidelines for the unit. Contact our Technical Department for advice.

The Yacht Pro series tank fill compressor must be installed in accordance with the following recommendations:

1. Ambient temperature during operation must not exceed 100 deg F (38 deg C) maximum. The unit will produce heat when operating, therefore adequate ventilation must be provided to stay well within the maximum limit listed above. We recommend operating unit well below the maximum limit. Forced Ventilation must be used where poor air circulation is present. Contact our Technical Department with questions regarding proper ventilation.

2. Proper clearances must be allowed for the following:
   a. 6" minimum from the fan cover to any bulkhead. This provides adequate air supply for the cooling fan.
   b. 8" minimum above the filter tower. This allows easy filter removal/replacement and easy access to remove the oil dipstick for checking/changing oil.
   c. Allow working access to the electrical box for service/repair.
   d. The Oil drain tube must have clearance for oil changes.
   e. The condensate drain reservoir must be accessible for removal.
   f. Hour meter, on/off switch, and visual monitor must be accessible for safe operation.
   g. Belt Guard must be accessible for service of drive belt.

3. The unit must be installed on a flat, level surface. No more than 10 deg inclination must occur during operation.

4. The Yacht Pro Series units are provided as a complete assembly ready for installation. NOTE: Some installations may require remote mounting of package components. This must be approved by our Technical Department.

NOTE: Any alterations of the original system without approval by our technical department will void the manufacturer's warranties.

5. Clean, fresh air must be provided to the air intake of the compressor as close to the operating ambient temperature of the unit as possible. Remote air intake plumbing may be required. A non-collapsible plastic hose with 3/4" ID is the simplest method. The 3/4" ID may be run for a length of 10'. Longer runs may be used by following this guideline: For every 10' of run the preceding 10' diameter must be doubled. All 90 deg fittings should be considered as 1 foot of length.

NOTE: The intake must be protected from water entry, as this will cause severe damage to the unit.

6. The unit must be protected from any type of water exposure. Such exposure will seriously effect the longevity of the unit and may result in personal injury or death.

7. Electrical Requirements:
Yacht Pro series compressors come standard with 220 VAC 60HZ single phase electric motors. They are equipped with 120 VAC 60HZ controls and components. All units require correct electrical supply components be provided in accordance with local, state and federal codes for land installation and marine codes for on-board installation. An electrician should be consulted for supply power recommendations. Standard units require that a neutral wire be provided with the standard power supply, for correct operation. An optional remote transformer can be used to provide control voltage if neutral is not available. Some voltage and cycle combinations will require an optional transformer for correct operation.Yacht Pro Series are available for other electrical requirements. Please contact our Technical Department for specifications.

WARNING: Divers lives depend upon proper operation of the system. Brownie's Third Lung highly recommends that all system operators take a System Training Course.

PRE START-UP CHECKS

Consult the system log to see if the following maintenance needs to be done:

- Purification Cartridge inspection/replacement (see pages 11, 20, 22)
- Sightglass Element replacement (see page 18) (6 month installed life)
- Oil Check/Change (see pages 17, 27)

1. Check oil level

The oil level must be between the upper and lower marks on the dipstick (see picture page 17). If the oil is low, add oil through the dipstick tube. Use only Brownie's recommended oil (see page 11 for recommended oils). Do not mix oils or use non-recommended oils which may adversely affect the life of the unit or even destroy the unit.

2. Check Purification Cartridges

Inspect both cartridges by following the procedure on page 11. Replace either cartridge if present cartridge has been used up or the cartridge has been in place for 6 months. (This is the maximum installed life of the purification cartridges. If the cartridges are close to expiration, Brownie's recommends replacing the cartridge with a new one.) Replacement Cartridge for the Black Tower is X53240. Replacement cartridge for the Gold Tower is X22679.

WARNING: Failure to monitor or replace the purification cartridge WILL contaminate all air lines, fill assemblies, divers air tanks, regulators, and may cause severe injury or even diver death. The system operator is responsible for the lives and safety of the divers using air produced by the system.

3. Check Visual Carbon Monoxide / Moisture Indicator

The visual indicator has two elements. An outer blue ring for indicating the presence of moisture, and a central tan to orange disc, indicating the presence of carbon monoxide. Any change in color, (the central disc (CO) turns dark brown or has black spots, and/or the outer ring (moisture) turns pink or beige, indicates that the air leaving the purification system is contaminated and not breathable. The visual monitor is the last monitor of the air leaving the purification system, and must be checked during operation for any changes.

WARNING: Any color change in the elements of the visual indicator means that contaminated air has passed downstream. All air lines, fill assemblies, and equipment must be cleaned or replaced. An Air Test must be done to insure thoroughness of all cleaning. Breathing contaminated air may result in personal injury or death.

4. Check Air Intake

Remove and inspect the Air Intake Filter. If the system is equipped with a remote air intake, be sure it is properly located, and clear of any water or obstructions.

5. Add all pre-startup maintenance/inspection notations to the system log with date, hours, and operator name.

6. Inspect ALL tanks to be filled:
   - Make sure the tanks are in good condition with no deep scratches, gouges, or pitting.
   - The tanks must be within current hydrostatic test and Visual Inspection dates.
   - Do not fill empty tanks without first visually inspecting them for water intrusion.
   - Make sure that the valves are in good condition and not in need of service. Do not fill tanks with damaged valves.
   - Do not fill tanks that have been exposed to extreme heat, i.e.: tanks that have been in or near fires.
   - Do not fill tanks designated for air with other gas mixtures, ie: Nitrox, Trimix, etc.

TANKFILL PROCEDURES

(See Demonstration p 24-26)

WARNING: **Tanks must be secured (protected from falling or being knocked over) during filling.**

1. Hook up fill manifold to compressor air outlet or remote fill panel.

2. Slightly open tank valve just long enough to blow any moisture or particles clear of connection surfaces.

3. *Standard Yoke* - Hook fill yokes to the tank valves and tighten yoke hand wheel “finger tight”. Close bleed screws and open tank valves. Open the fill yoke valves. The tanks will now equalize.

Din Yoke - Screw the male din yokes into the valves until the “o-ring” is snugly in place against the base of the female din valves. Close bleed screws and open tank valves. Open the fill yoke valves. The tanks will now equalize.

4. Start the Compressor
Note the indicator light is now on. If the compressor is equipped with a dual pressure switch, be sure the control switch is in the correct pressure position (high or low) for the tanks being filled. The compressor will now operate automatically, draining the condensate and shutting off when the tanks are full. The operator need only check the operation from time to time during the filling process to verify the following:

- Condensate is accumulating in the reservoir.
- No color change has occurred in the visual indicator.
- Pressure is building on the fill gauge.

Fill times are based on filling a single standard 80 cu ft aluminum cylinder from 500 psi to 3000 psi and are approximately as follows: YP45DF - 16 minutes per tank. Cylinder volume, starting tank pressure, and tank pressure ratings will vary the fill times.

WARNING: **Brownie’s recommends a two hour (approximately 4 tanks) duty cycle, with a one hour period between cycles.**

Note that the indicator light is still on after the compressor automatically stops. This indicates that the compressor is in an AUTOMATIC START MODE and will restart if the stop pressure drops approximately 500 psi.

If you intend to fill more tanks you may leave the on/off switch in the “on” position while changing the tanks out. Simply opening the tank and fill yoke valves will restart the compressor.

5. Remove full tanks by first closing the fill yokes and tank valves. Depressurize the yokes by opening the bleed screws. Remove the fill yokes from the tanks.

6. When you are done filling for the day, turn the on/off switch to the off position. Empty the condensate reservoir.

7. Bleed the pressure from the fill manifold by opening one of the fill yoke valves slowly until all pressure is vented and the gauge reads zero.

8. Remove the manifold from the hose using the quick disconnect and store the manifold in its bag.

WARNING: **Do not try to remove the quick disconnect while the system is pressurized. Doing so may result in property damage or personal injury.**

9. Allow the compressor to cool prior to installing the optional Cordura fabric cover.

10. Update the system log, noting running hours of compressor and any maintenance performed.

PURIFICATION SYSTEM

Explanation:

The YP45DF compress air in three stages. Air leaving the outlet (discharge) of each stage is at an elevated temperature. The air passes through cooling tubes and the temperature is reduced prior to entering the inlet of the next stage. As this air cools, moisture is released and accumulates in the condensate traps (separators). This process of moisture removal is based on *dew point*. Dew point is the total moisture saturation point of air at a specific temperature. The higher the temperature, the greater the amount of suspended moisture. When air leaves the last or final separator and enters the purification cartridge it is at approximately 15 deg F above the ambient temperature. This temperature is referred to as *inlet temperature*. Higher inlet temperatures reduce the life of the purification cartridge.

As an example, an ambient temperature of 90 deg F will yield an inlet temperature of 105 deg F. The life of the purification cartridge at this temperature will be significantly less than a cartridge processing air at an 80 deg F ambient temperature, which yields a 95 deg F inlet temperature.

The Yacht Pro purification system will process 15,000 cu ft of CGA Grade “E” Air at an inlet temperature of 80 deg F. At this inlet temperature the purification system cartridges should last approximately 60 hours in the YP45DF.

The Yacht Pro Purification system uses three chemicals to process the air. The first chemical is molecular sieve 13x, and is the desiccant or moisture/oil remover. The second chemical is a catalyst called hopacolite, that converts carbon monoxide to carbon dioxide. The third chemical is activated carbon which removes taste and odor. The X53240 cartridge uses a Lifeband™ to indicate usage and replacement (see page 21). The cartridge Lifeband ™ should be inspected prior to each use to determine whether the cartridge needs to be replaced. The hours the cartridge is used and replaced needs to be recorded in the system log.

The Yacht Pro purification cartridges have a shelf life of two years in the original sealed package and a maximum installed life of six months.

Spare cartridges should be kept in a cool, dry location. The boxes must not be crushed and the packaging must not be punctured.

WARNING: Do not use cartridges that have expired, have punctured packaging or that are damaged in any way!

Lubrication Specifications

Use	Lubricant
O-rings, rubber and plastic parts, filter housing threads	White Petroleum DAB9 # N19091 or WEICON WP 300 White part # N19752
Sealing Rings	Universal grease
Paper Gaskets	Apply silicone compound on both sides (WACKER silicone compound part # N 18247) before assembly
Bolts, nuts, studs, valve parts, CU gaskets and pipe connectors (threads, cap nuts, compression rings)	Compounds with Copper or MoS^2 additives (WEICON ANTI-SEIZE AS 040 P part # N 19753)
High Temperature connections (valve heads / cylinders)	Temperature resistant compound (WACKER silicone compound, part # N 18247

Recommended Maintenance

WARNING: We recommend that any maintenance other than preventative be performed by an authorized service center or technician. Contact Brownie's for service center information.

MAINTENANCE INTERVAL	TYPE OF MAINTENANCE	DATE	SERVICE CENTER
After 25 hrs initially, and every 50 - 100 hours thereafter	Oil Change (every 50 hours when using regular oil, and every 100 hours if using synthetics) or six months		
After 25 hrs initially, and every 150 hours thereafter	Check function and tightness of filling valve Clean and change intake filter Check tightness of o-rings Check drive belt and condition Check cooler brackets Check zero on gauge when depressurized		
After 1st year or 300 hours of operation	Air and tightness check Replace filter chamber o-rings Drive belt inspection (replace after 300 hrs) Cleaning of air intake filter and filter unit.		
After 2nd year or 600 hours of operation	Check air tightness and performance Drive belt inspection (replace after 600 hrs) Replace filter chamber o-rings Cleaning of air intake filter and filter unit.		
After 3rd year or 900 hours of operation	Check air tightness and performance Drive belt inspection (replace after 900 hrs) Replace filter chamber o-rings Cleaning of air intake filter and filter unit.		
After 4th year or 1200 hours of operation	Check air tightness and performance Drive belt inspection (replace after 1200 hrs) Replace filter chamber o-rings Replacement of air vent hose Replace cylinder head o-rings. Clean air intake filter & unit.		
After 5th year or 1500 hours of operation	Check air tightness and performance Drive belt inspection (replace after 1500 hrs) Replace filter chamber O-rings Cleaning of air intake filter and filter unit.		
After 6th year or 1800 hours of operation	Check air tightness and performance Drive belt inspection (replace after 1800 hrs) Replace filter chamber o-rings Cleaning of air intake filter and filter unit.		
After 7th year or 2100 hours of operation	Check air tightness and performance Drive belt inspection (replace after 2100 hrs) Replace filter chamber o-rings Cleaning of air intake filter and filter unit.		

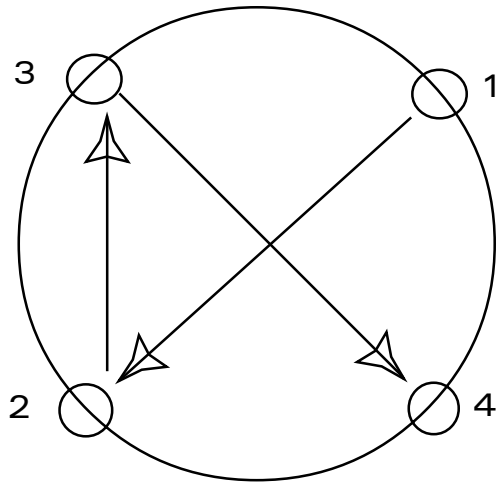
TORQUE VALUES AND SEQUENCING

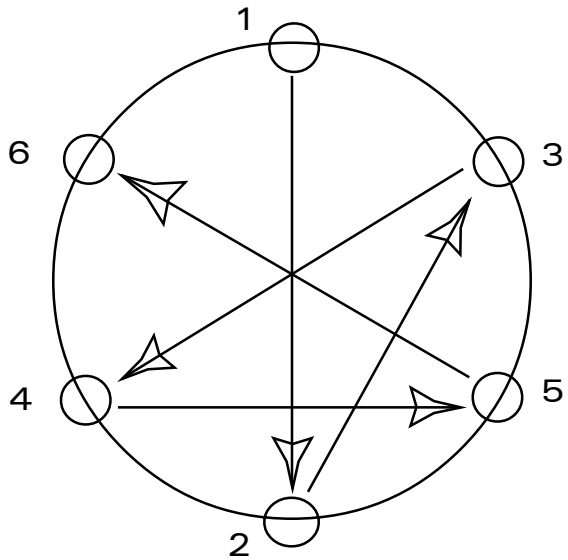
Torque Values: Unless otherwise noted in text, the following torque values apply. **All valve head screws require torque wrench tightening.**
The indicated values are for bolts in greased condition. Replace self-retaining nuts on reassembly.

Screw or Bolt	Thread	Max Torque
Hex and Allen Head	M 6	7 ft.lbs (10 Nm)
Hex and Allen Head	M 8	18 ft.lbs (25 Nm)
Hex and Allen Head	M10	32 ft.lbs (45 Nm)
Hex and Allen Head	M12	53 ft.lbs (75 Nm)
Hex and Allen Head	M14	85 ft.lbs (120 Nm)
Hex and Allen Head	M16	141 ft.lbs (200 Nm)
Pipe Connections (swivel nuts)		Finger tight + ½ turn

Torque Sequencing:

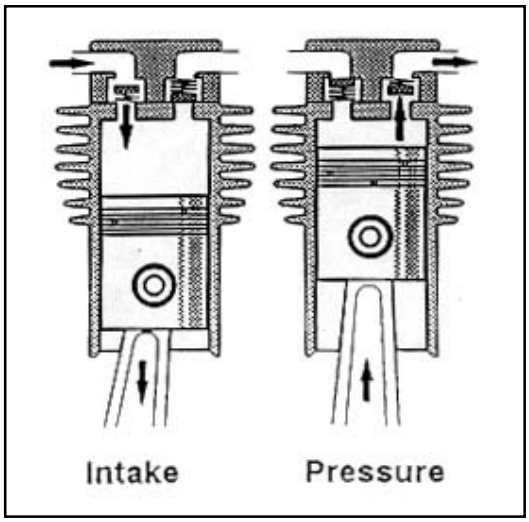
Tighten valve head and cylinder bolts/nuts equally in the sequence shown here. Be sure to tighten all parts in **cold condition only.**





VALVES

Valve Functioning



The valve heads of the individual stages form the top part of the cylinders. The intake and pressure valves are fitted inside the valve heads. Note that the valves are operated by the flow of the gas. On the suction stroke, the intake valves open and the gas flows into the cylinders, and on the compression the intake valve closes, and gas flows out the pressure valve.

Initial Operational Check

After roughly half an hour's operation, valves should be checked. Note that the inlet line to the valve heads should be warm, and outlet piping should be hot. Valves are then shown to be operating properly.

If the intake pipe to the valve head of the second stage heats up excessively, and the first stage safety valve blows off, either the intake or pressure valve of the second stage is malfunctioning. It is necessary then to remove the valve head and to check and clean these valves or to replace them.

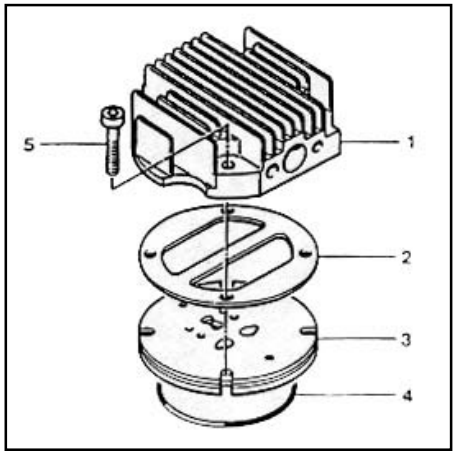
Valve Change General Instructions

- Always replace valves as a complete set.
- Carefully clean dirty valves. Never use a sharp tool for this purpose. Soak the valves in diesel oil or petroleum, and clean with a soft brush.
- Check individual components for excessive wear. If the valve seat and valve disks are dented, replace the valves.
- Valve head screws must be tightened with a torque wrench (See tightening instructions page 13)
- Check the valve space in the valve heads for dirt, and clean if necessary.
- Use gaskets and o-rings in reassembly only if they are in satisfactory condition, otherwise replace them.
- Observe the correct sequence when reassembling.
- When maintenance work has been completed, turn the compressor manually using the flywheel to verify correct assembly.
- 30 minutes after restarting the compressor unit, stop the unit, let it cool to ambient temperature, and retighten the valve studs and cap nuts to specifications (page 13). Otherwise valves could work loose due to setting of the gaskets.
- Replace valves every 2000 hours to avoid fatigue failure.

CHANGING THE 1ST STAGE VALVES

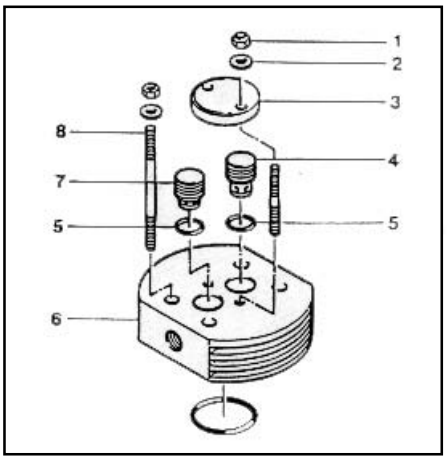
Intake and pressure valves for the 1st stage are combined in one plate valve under the valve head, as seen in the diagram.

- Loosen two cap nuts from tube connectors and remove after-cooler.
- Remove four allen screws (5) from valve head (1). Take off valve-head.
- Remove gasket (2) and plate valve (3).
- When re-installing the valve, check that the mark "TOP" is facing upwards. Also pay attention to the orientation of the valve: check that the two eye-shaped inlet openings are facing the intake filter side. The crossbar of the gasket (2) seals these openings with respect to the outlet openings of the pressure valve.



1.Valve Head 2.Gasket 3.Plate Valve 4.O-ring 5.Valve Head Screw

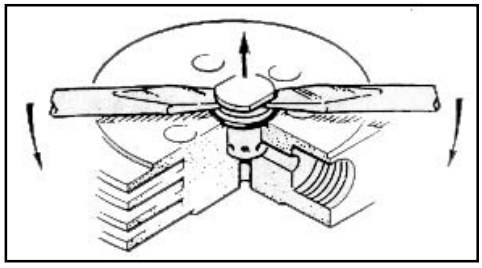
CHANGING THE 2ND STAGE VALVES



Both the pressure and intake valves can be serviced from the outside.

- Remove two captive nuts (1) and springwashers (2).
- Remove plate (3).
- Remove valves (4) and (7) using two screwdrivers as shown in the diagram below.
- Assemble in reverse sequence.
  Position springwashers (2) with curved side facing up.
  Fasten nuts so that plate (3) is parallel to the valve head.
  Torque as specified.

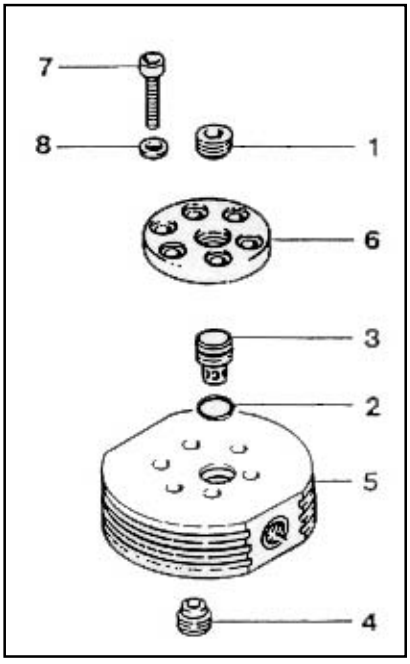
1.Nut 2.Springwasher 3.Plate 4.Pressure Valve 5.O-ring
6.Valve Head 7.Intake Valve 8.Valve Head Screw



Removal of 2nd and 3rd stage valves:

- Place two screwdrivers into the groove of pressure valve body. If necessary turn valve loose using a 13mm wrench on the flat surfaces.
- Lift out pressure valve together with o-ring.

CHANGING THE 3RD STAGE VALVES



- On this valve head, the valves are arranged on the upper and lower side due to the small diameter of the cylinder.

- For removal and installation of the intake valve (4) use the special tool (part # 004555) which is part of the tool set provided with the unit.

- Pressure valve (3) is merely inserted into valve head (5). It is sealed by the o-ring (2), and fixed to the valve head by bolt (1).

CHANGE INTAKE AND PRESSURE VALVES OF THE 3RD STAGE AS A SET ONLY

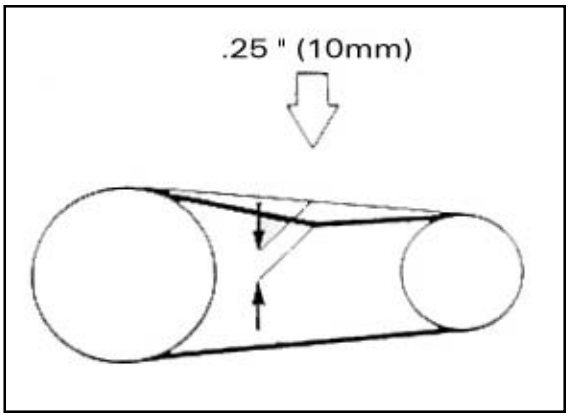
Removal of the 3rd stage pressure valve (3).

- Unscrew screw (1) a couple turns.
- Remove allen screws (7), take off valve head cover (6).
- Using screwdrivers as shown above, lifting out the pressure valve (3) together with the O-ring (2).

Reinstall pressure valve (3) in reverse sequence:

- Put o-ring (2) into valve head (5). Check o-ring for abrasion, and replace if worn.
- Insert pressure valve (3). Install valve head cover (6).
- Fasten valve head with allen screws (7) and washers (8).
- Screw in and torque stud (1) as specified.

CHECKING THE DRIVE BELT

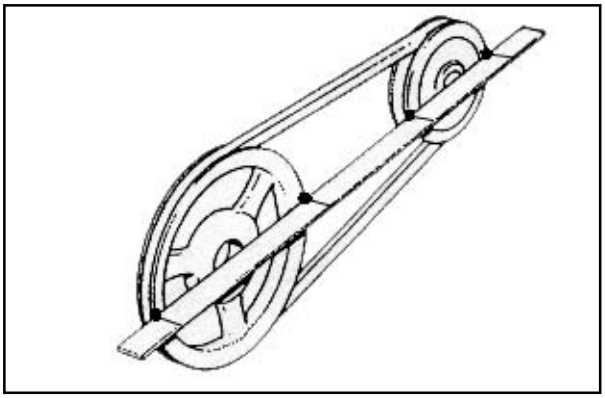


The best tension for belt drive is the lowest possible, while not slipping when under full load. This is best quantified by belt depression with thumb pressure between the two pulleys, with the belt deflecting ¼ " (10mm) .

- Re-adjust v-belt after 25 hours of operation.
- Check the tension and adjust every 125 hours, assessing the belt for wear or damage.

V-BELT TENSION ADJUSTMENT

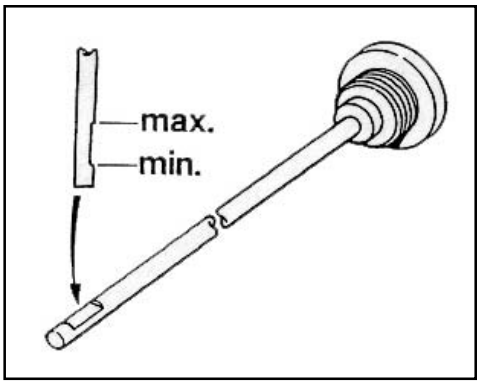
- Slightly loosen motor mounting nuts.
- Adjust motor until the v-belt tension is correct.
- Tighten motor mounting nuts.
- Run motor for approximately 5 minutes. Stop motor, check belt tension, and readjust if necessary.
- Check that after tension adjustment and tightening the motor mounting nuts, both pulleys are in a straight line to avoid excessive wear of the v-belt. Hold a straight edge against the compressor and motor pulleys as shown. Edge must touch the pulleys at four points, or you must re-adjust motor.



COOLING SYSTEM

- The cylinders of the compressor block, the intermediate coolers, and the after-cooler are all air cooled.
- For this purpose, the compressor is equipped with a fanwheel connected to the counter-weight at the crankshaft end opposite to the V-belt pulley. It draws the cooling air through the fanwheel cover from the surroundings.
- Refer to page 6 for specific ambient temperature data.

OIL LEVEL CHECK



Check oil level daily prior to operating compressor. Use the dipstick and a lint free cloth to check the oil, by wiping off oil several times. Note that the oil level must be between the minimum and maximum dipstick notches.

Add oil if necessary and recheck level. Oil should not exceed the maximum level, as this could result in valves sooting up.

OIL TYPES

Using the correct oil is of utmost importance for proper care and maintenance of the compressor, along with keeping the life and function of your compressor at its best.

Only use oils that:

- are low in deposits
- have no carbonizing effect, especially in the valves
- have good anti-corrosive properties
- provide emulsification of the condensate in the crankcase
- are physiologically and toxicologically suitable

Due to the thermal load on the compressor, only high quality oil should be used. You are recommended to restrict oils to those which have been approved by the manufacturer and are in our list of oils (see page 11).

Synthetic Lube Oils

For operating under severe conditions such as continuous running and/or higher ambient temperatures, we recommend Part No. CF-2000 (Synthetic Compressor Lubricant, Food Grade). CF-2000 has been specially formulated for use in high pressure compressors and will provide optimal performance through a wide range of conditions.

NOTE: The compressor systems are delivered with one liter of natural oil, Part No. BTLHPN-25.

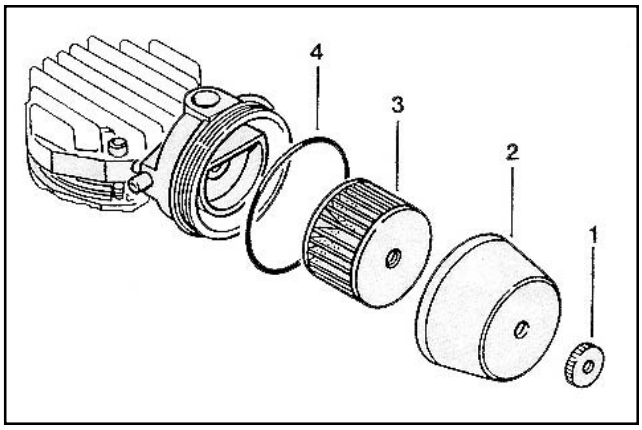
INTAKE FILTER

The intake filter is a dry micronic filter used to filter the intake air.

Filter Maintenance:

Filter cartridge must be changed at regular intervals according to maintenance schedule on page 12.

- Remove knurled nut (1) and take off plastic cap (2). Remove filter cartridge (3) and clean with a brush or by blowing air from the inside to out.
- Turn the cartridge 90º when replacing. Replace the dirty cartridge once it has been turned three times and been used through the full system.
- Clean filter housing inside with a damp cloth. Take care to prevent dust from entering the intake pipe.
- Replace o-ring (4) if damaged.



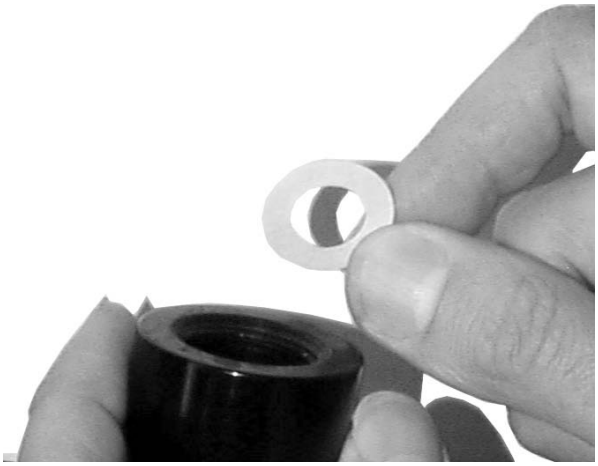
SIGHTGLASS CO MOISTURE ELEMENT CHANGE DEMONSTRATION

Replacement Element Part #M7414 (Assy # VM211-EL)

WARNING: Make sure all pressure is relieved prior to changing element.

1. Unscrew window cap in counter-clockwise direction. (NOTE: The orientation of the sightglass assembly may vary.)

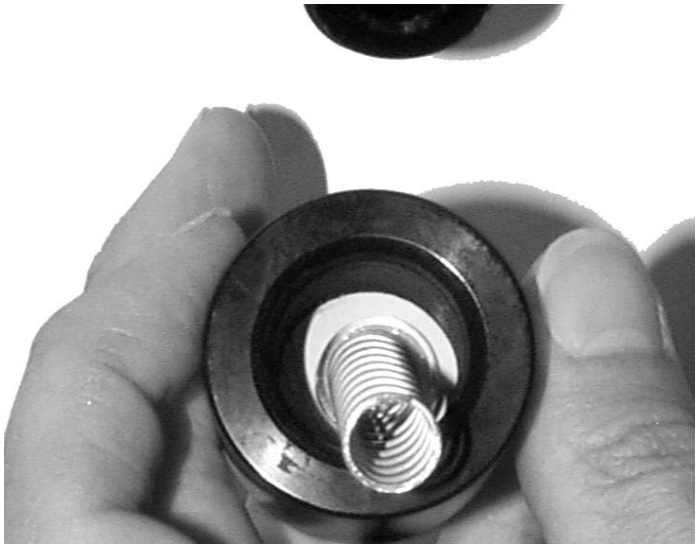
2. Here the cap is shown having been removed, and the retaining spring exposed. Old elements are removed from the window at this time.



3. The moisture indicator ring is placed into the window first. Minimal handling is best, and care should be taken with the packaging contents and their disposal.

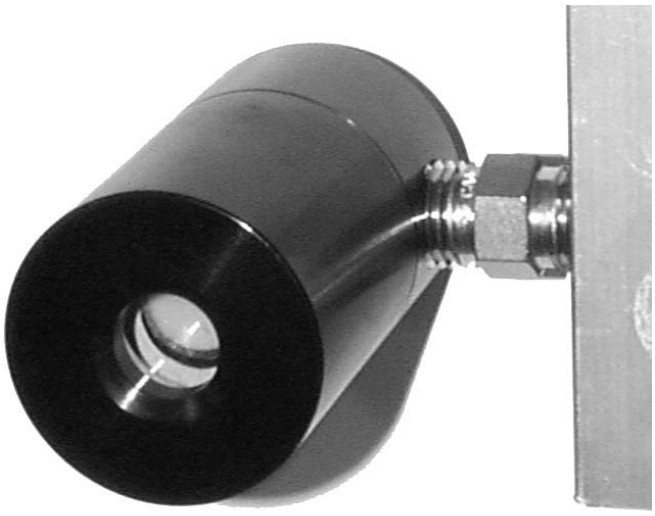
4. This view shows the ring properly installed in the window.

5. The CO monitoring disc is shown ready to install into the window. It is placed in and then centered in the moisture indicator ring.



6. The spring is placed into the window, centered on the CO disc and the whole unit is then ready to be reassembled.

7. The cap is replaced and it is screwed back into place, finger tight. Make sure the CO disc remains in place.



8. With change and reassembly completed, both indicators are easily viewed in the window and the cap is tightened down.

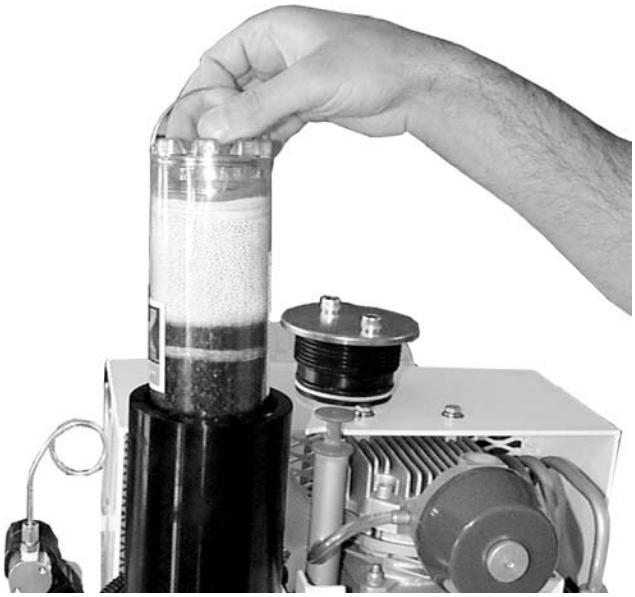
BLACK FILTER CARTRIDGE REPLACEMENT DEMONSTRATION

REPLACEMENT CARTRIDGE PART #X53240

WARNING:
Prior to changing the filter, purge all pressure using the bleeder valve.

1. Remove Cap

Counter-clockwise rotation of the cap using a wrench as shown will loosen the cap for removal.



2. Remove Old Filter

While removing the old filter, check the Lifeband ™ indicator to determine filter usage or replacement.

3. Prepare Filter

- Uncover top plug by removing tape.
- Remove top plug with pliers using rocking motion.
- Remove bottom plug.

Discarded Items:

4. Place New Filter

Place the new filter into the chamber seating it on the bottom.

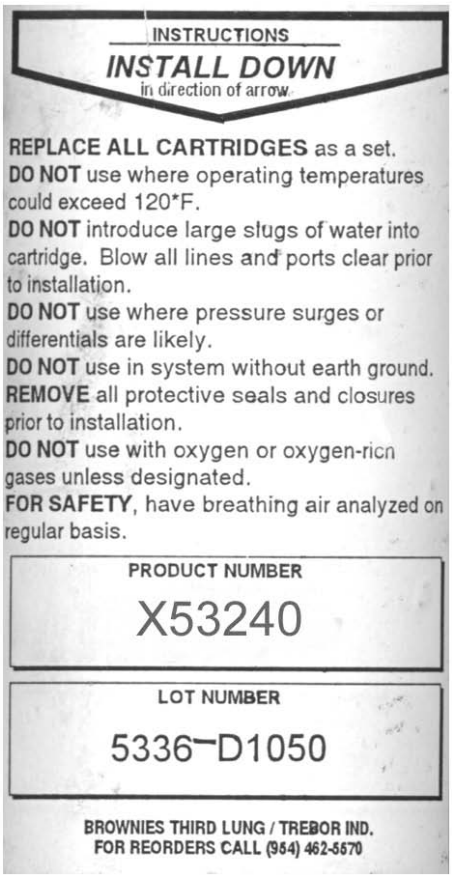
5. Prepare to replace cap

Inspect o-rings for damage and replace if necessary. Use a food grade silicone grease to lube threads and ring if needed.

6. Replace Cap

Clockwise rotation of the cap using a wrench as shown will tighten the cap for replacement.

Figure 1 Black Filter Cartridge



GOLD FILTER TOWER CARTRIDGE REPLACEMENT DEMONSTRATION

1. Vent Pressure

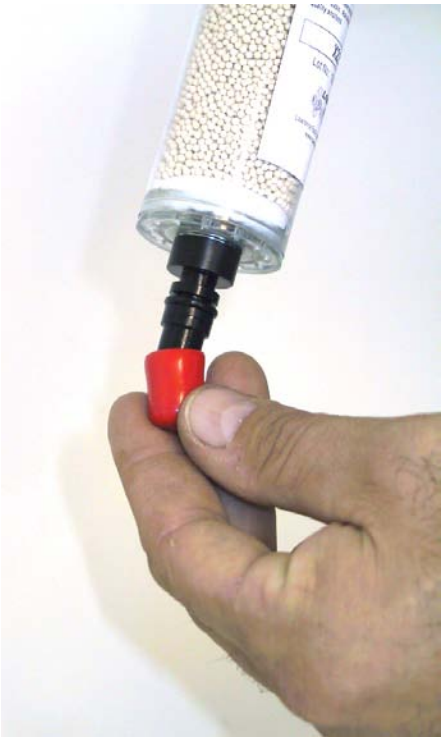
Prior to changing the filter, purge all pressure using the bleeder valve. It may be necessary to vent excess pressure by turning the small cap on the gold tower clockwise. After venting pressure, close cap by turning counter-clockwise.

2. Remove Cap

Insert rod tool into holes in cap and turn counter-clockwise.

3. Remove Old Filter

Remove old filter by pulling up on wire.



4. Prepare Filter

Pull plastic cap off of bottom plug of cartridge and discard.

5. Install Cartridge

Insert new cartridge making sure to push down as far as possible.

6. Lubricate O-ring

Inspect o-rings for damage and replace if necessary. Use a food grade silicone grease to lube threads and ring if needed.

7. Replace Cap

Insert rod tool into holes and turn clockwise to tighten cap.

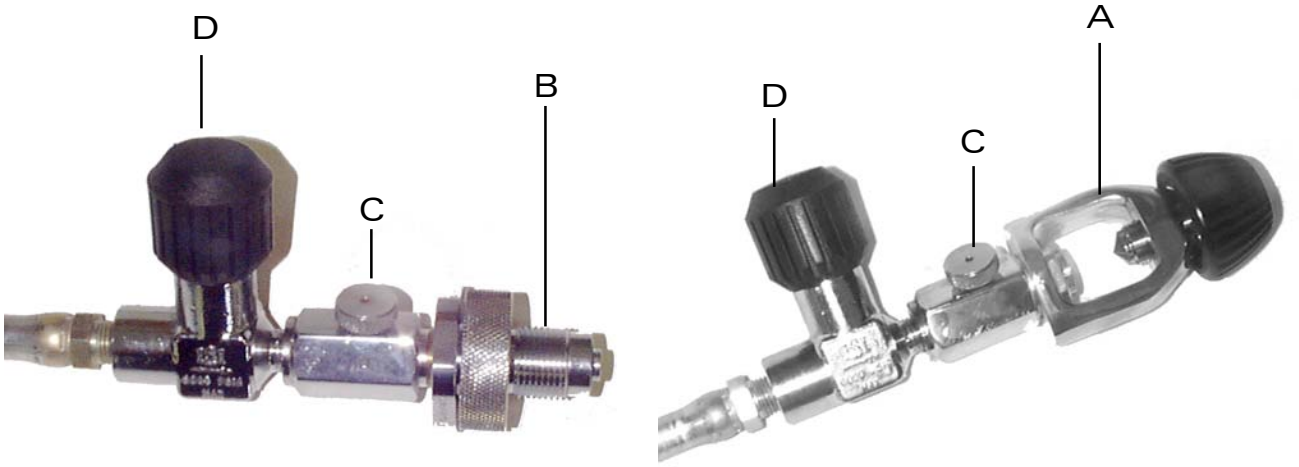
Figure 2 Gold Filter Cartridge

Replacement cartridge part number is X22679.

TANKFILL DEMONSTRATION

Tank Fill Whip Assemblies:
Shown are the tankfill whip ends for DIN and Yoke systems.

A. Yoke connector
B. DIN connector
C. bleeder valve
D. fill valve



NOTE: Remember to check the system log before compressor use and to update the system log after you are done.

1. Tank Attachment

- Open tank valve slightly to blow any moisture clear from fill opening.
- Connect tanks to fill whips using appropriate fittings (DIN, Yoke, or conversion adapters). Tighten only finger tight.

2. Close Bleeder Valves

Clockwise rotation of the valve closes the bleeder valve.

3. Open Tank Valves

Counter-clockwise rotation of this valve will open the tanks for filling.

4. Open Fill Valves

Counter-clockwise rotation of this valve will open the line to the tanks. The tanks will now equalize any differences in their pressures.

5. Start The Compressor

The indicator light will come on. If you have a dual pressure switch, be sure the control is in the correct position.

NOTE: If you are filling more tanks, the compressor may be left “ON”.

6. Close Fill Lines

Clockwise rotation of the knob closes off the fill lines.

7. Close Tanks

Clockwise rotation of the knob closes the tank valves.

8. Open Bleeder Valves

Counter-clockwise rotation of this valve will allow pressure to vent.

9. Remove Tanks

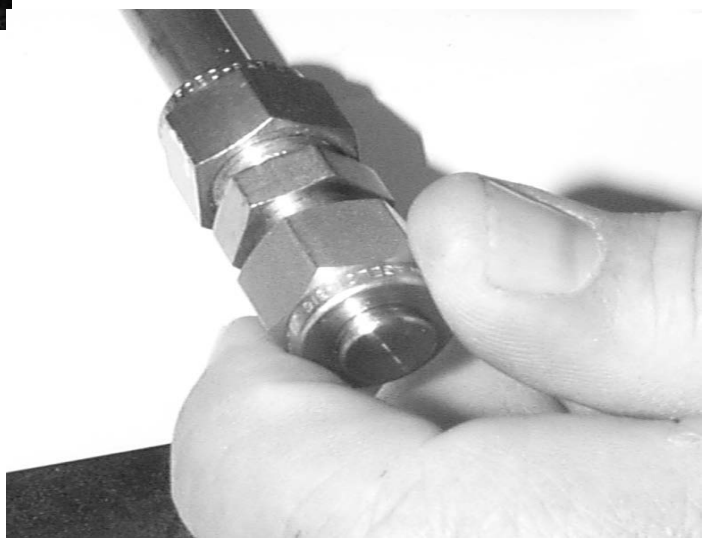
Disconnect tanks from the fill line. New tanks may be attached at this time and the process repeated.

OIL CHANGE DEMONSTRATION

1. Remove the dipstick.

2. Removing the oil plug as demonstrated using one wrench to hold the tube and fitting and another to loosen the plug.

3. Remove the plug and allow the oil to drain. Care should be taken in draining the oil into a proper container for disposal per local guidelines and laws.



4. Replace the oil plug again using a wrench to stabilize the drain and another one to secure the plug. Fill the unit with approved oil through the dipstick tube. Check the level with the dipstick and add as necessary for proper levels.

Figure 3 Front and Back Compressor View

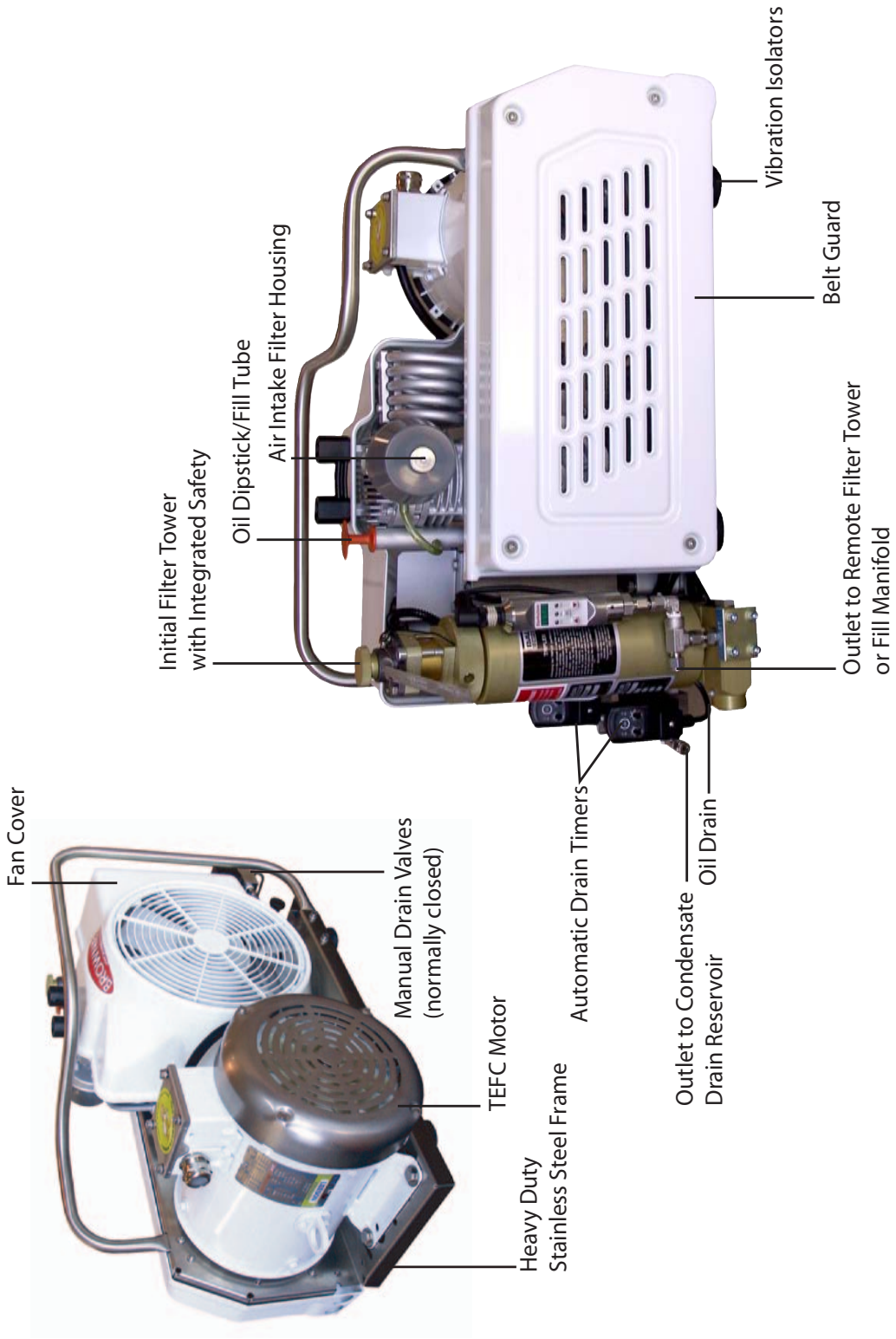


Figure 3 Front and Back Compressor View

Figure 4 Auto Drain System and Compressor Features

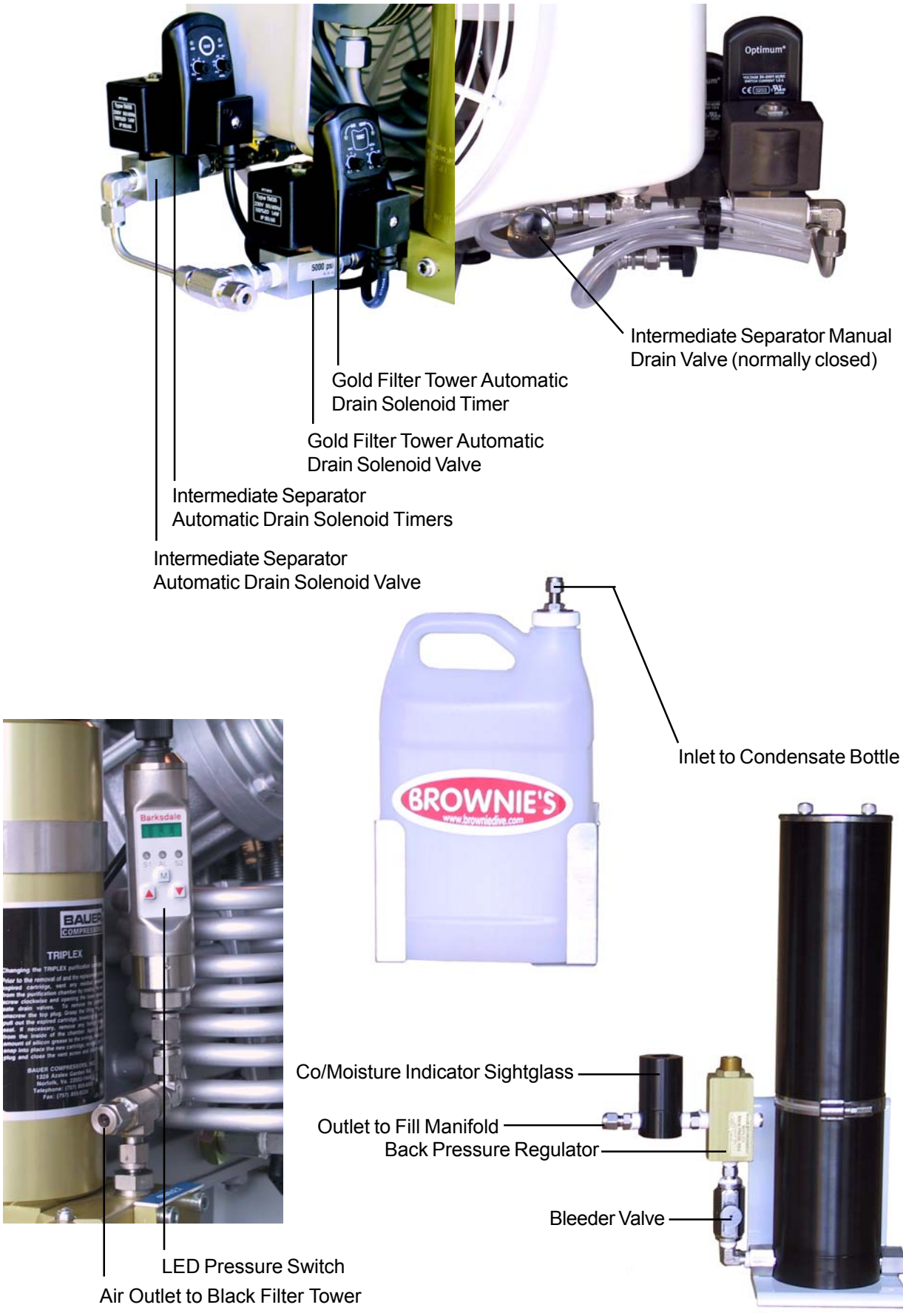
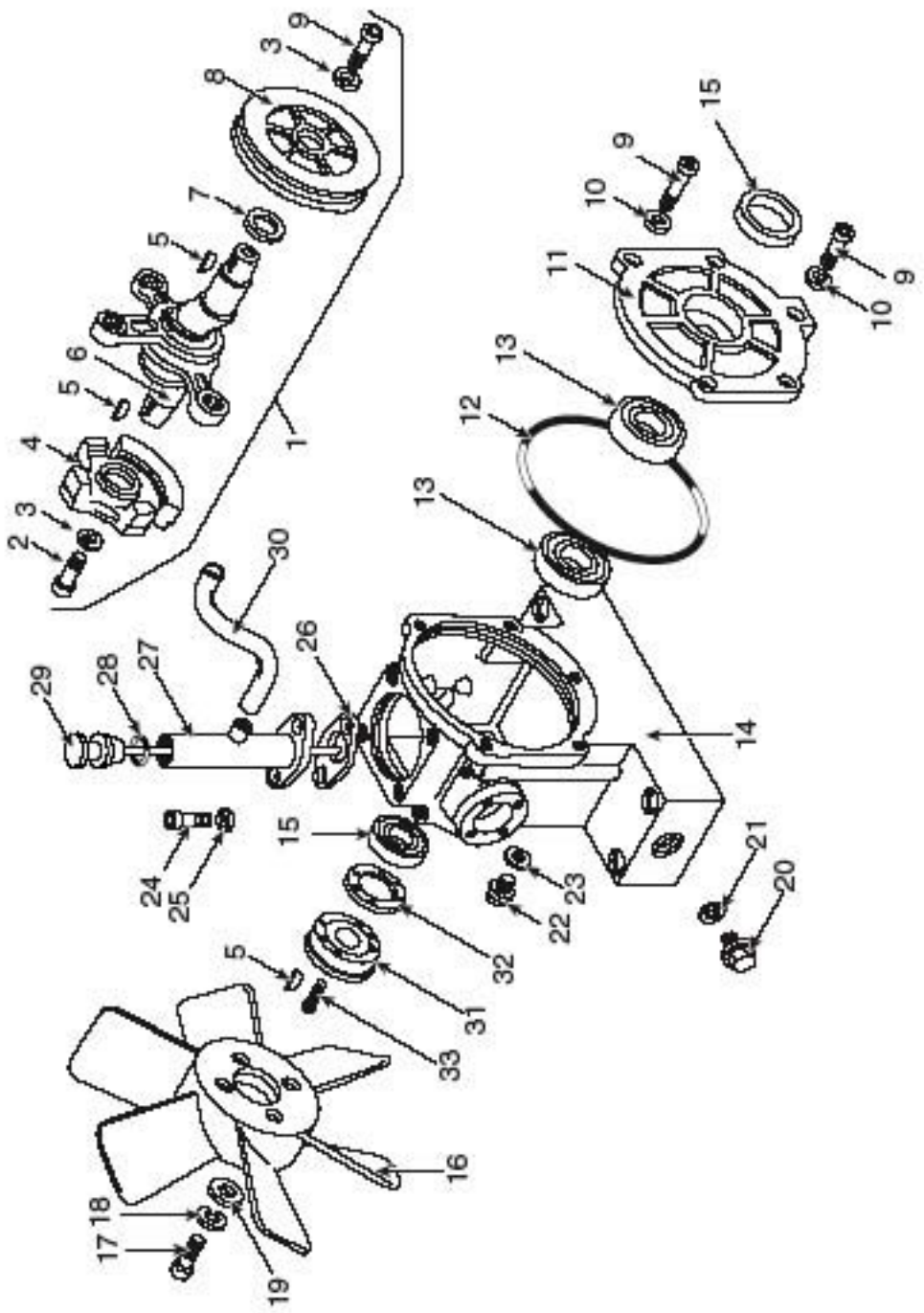


Figure 4 Auto Drain System and Compressor Features

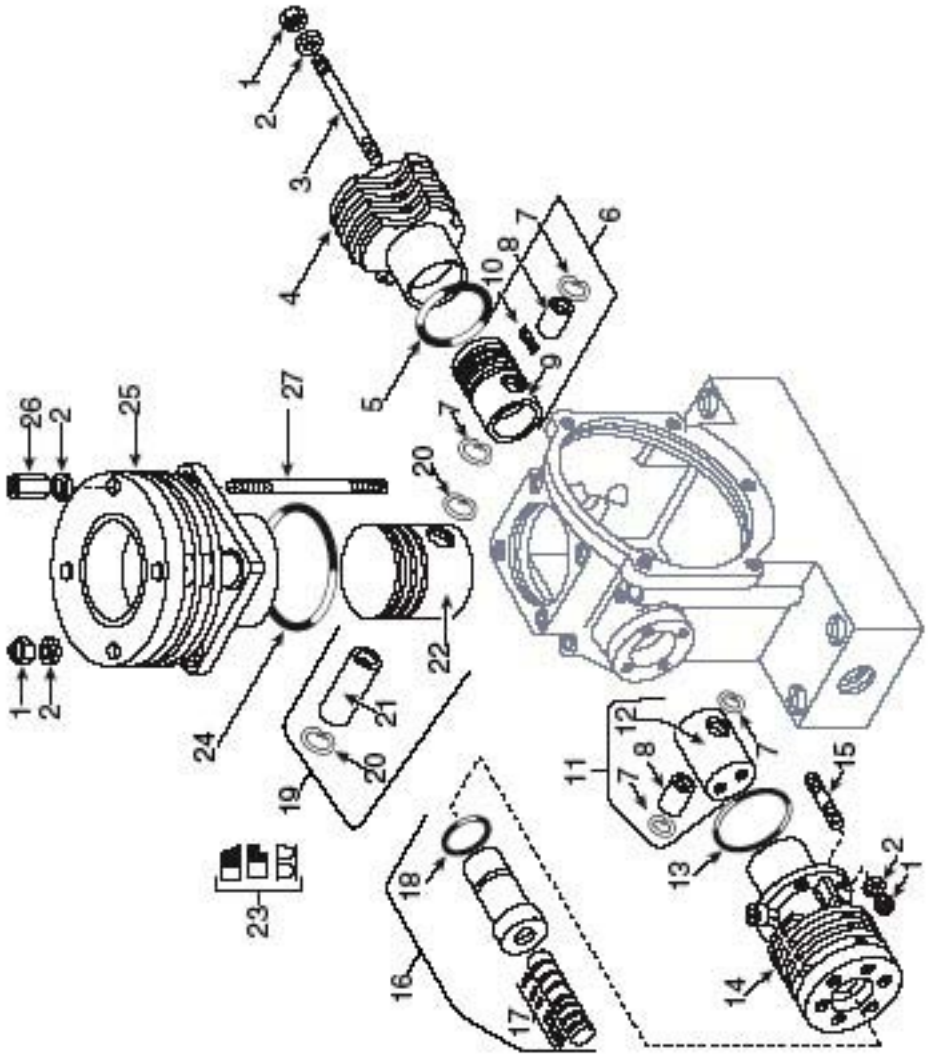
Parts Drawing 1



Parts Drawing 1- CRANKCASE, DRIVING GEAR AND FANWHEEL

Parts Drawing 1

#	QTY	PART #	DESCRIPTION	NOTES
1	078444	Driving Gear Assembly Items 2 - 9		
2	4	SCR-0179	Allen Screw	M8x30 DIN912
3	7	N2862	Washer 8mm	DIN7349
4	1	61374	Counterweight	
5	2	N4889	Key	3x5 DIN6888
6	1	078447	Crankshaft Assembly	
7	1	59470	Thrust Washer	
8	1	67027	V-belt Pulley	
9	1	SCR-0136	Allen Screw	M8x20 DIN912
10	5	N58	Washer	B8,4 DIN125
11	1	59397	Cover	
12	1	N4855	O-ring	Ø 140x2
13	2	N3702	Roller Bearing	Ø 20xØ 52x15
14	1	078198	Crankcase	
15	2	N2861	Shaft seal	A20xØ 47x7
16	1	13920	Fan	
17	1	SCR-0159	Allen Screw	M8x20 DIN912
18	1	WAS-0001	Split Lock Washer	8mm DIN127
19	1	N2460	Washer	8mm DIN9021
20	1	N204	Plug with plastic gasket	R 3/8”x8 DIN910
21	1	N842	Gasket	A 17x24 x2 DIN7603
22	1	N15688	Plug	R 1/8” DIN908
23	1	N4051	Gasket	A 10x15 DIN7603
24	2	SCR-0144	Allen Screw	M6x16 DIN912
25	2	N3026	Wave Washer	6mm
26	1	12560	Paper Gasket	23x30x0.5mm
27	1	67007	Oil Filler	
28	1	N3951	O-ring	Ø 12x2.5
29	1	067013	Dip-stick	
30	1	TUB-R-0038	Hose	DN5, PVC, 110mm
31	1	N25542	Oil Pump	
32	1	78346	Gasket	
33	6	N25542	Hex Head Screw	M4x35 DIN24014

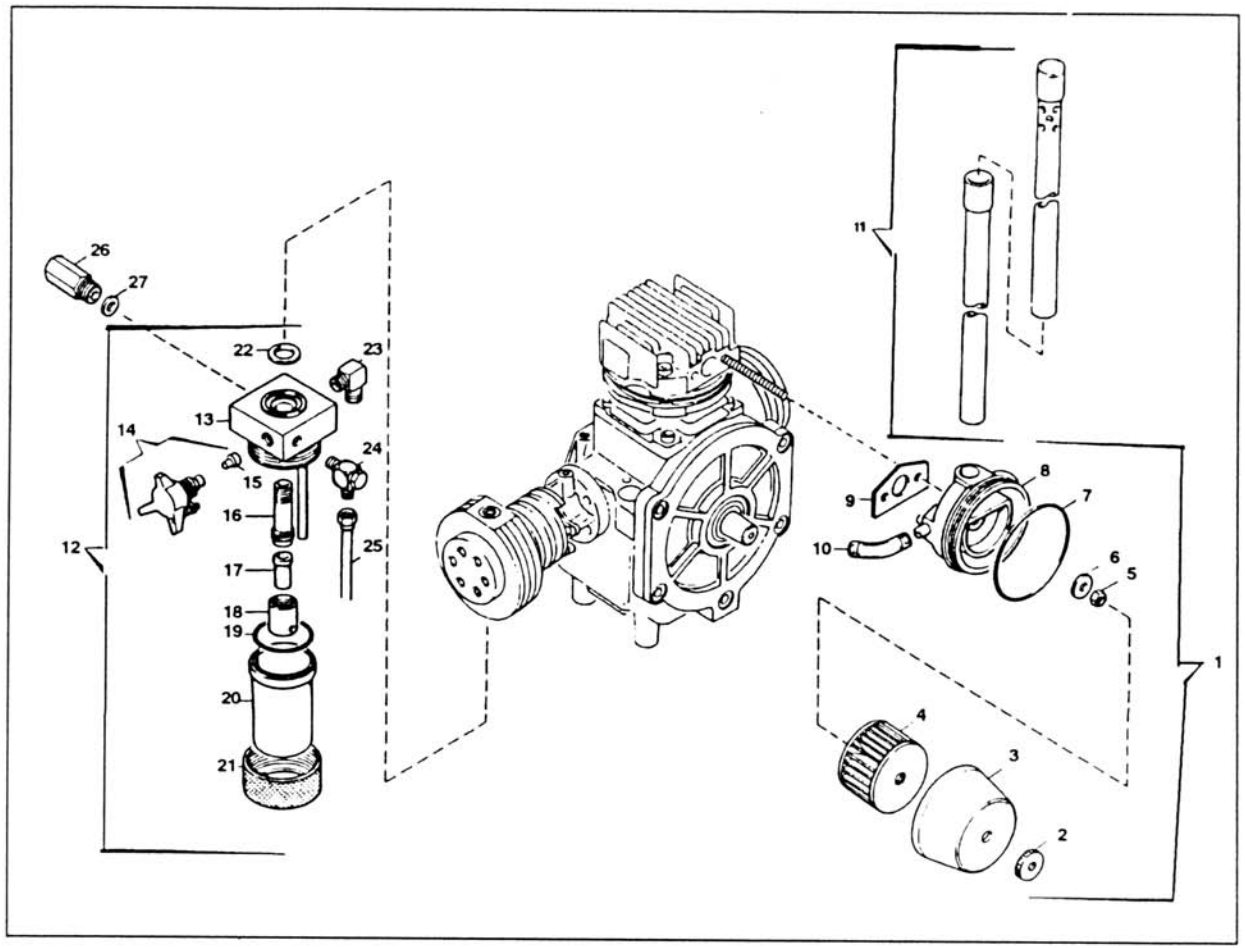


Parts Drawing 2 - PISTONS AND CYLINDERS

Parts Drawing 2

Parts Drawing 2

#	QTY	PART#	DESCRIPTION	NOTES
1	2	NUT-0118	Hex Nut, Self Locking	M6 DIN985-8
2	4	WAS-0024	Flat Washer	6mm DIN125B-ST
3	4	N4615	Stud	M6x70 DIN835
4	1	61354	Cylinder, 2nd Stage	
5	1	N3157	O-ring	Ø 31. 47x1.78
6	1	069920	2nd Stage Piston Assy	
7	4	N15294	Circlip	J9.5x1
8	2	60904	Piston Pin	
9	1	60900	2nd Stage Piston	
10	1	N15816	Piston Ring Set	Ø 28mm
11	1	069927	3rd Stage Piston Assy	
12	1	61370	Guide Piston	
13	1	N4868	O-ring	Ø 33.05x1.78
14	1	67096	Cylinder, 3rd Stage	Ø 12mm
15	6	N15691	Stud	M6x20 DIN835
16	1	075310	Piston and Sleeve Assy	
17	1	N23810	Piston Ring Set	
18	1	N2507	O-ring	Ø 18.77x1.78
19	1	073906	1st Stage Piston Assy	
20	2	N1033	Circlip	J14x1.0mm DIN472
21	1	N17440	Piston Pin	14x9x52mm DIN73126
22	1	67028	1st Stage Piston	60x3x14mm
23	1	N3856	Piston Ring Set	Ø 60
24	1	N4948	O-ring	Ø 72.75x1.78
25	1	78455	Cylinder 1st Stage	Ø 60mm
26	2	67518	Hex Bushing	6mm27 4 N15495 Stud M6 x 60



NO	DESIGNATION	PART NO.
1	Intake Filter Assy	059377
2	Knurled Nut	N4870
3	Filter Cap	59433
4	Filter Cartridge	N4823
5	Hex Nut	N287
6	Washer	N3313
7	O-ring	N4877
8	Filter Support	59434
9	Gasket	65985
10	Hose	N17442
11	Telescopic Intake Tube	062080
12	Intermediate Separator A.	069934
13	Filter Head Assy	069933
14	Drain Tap Assy	065500
15	Gasket	4479
16	Hollow Bolt	61364
17	Filter Insert	N15705
18	Coupling Nut	61975
19	O-ring	N3556
20	Filter Housing	61361
21	Threaded Collar	13937
22	Gasket	240
23	Male Elbow	N1065
24	Male Run T	N16334
25	Hose	N17073
26	Safety Valve 2nd Stg	012886
27	Gasket	64498

Parts Drawing 3

Figure 5 Black Filter Tower

Figure 5 Black Filter Tower

TROUBLESHOOTING

Warning:
Compressor repairs are to be performed by an authorized dealer/service center only. Any repairs made by the user are to be made at the user's own risk and will void Brownie's Third Lung warranty unless the user has been authorized to make a repair and has been given appropriate repair instructions. Repairs must never be carried out without sufficient knowledge and understanding of compressor technology. If you have any questions or are unsure of a problem's cause, contact our Service Department for advice prior to disassembly of the unit or component parts.

PROBLEM	CAUSE	ACTION
Unit does not start	a) Power off b) Loose electrical connections c) Bad internal fuse d) Overload in motor activated	a) Check breaker b) Check electrical connections & retighten c) Check electrical legs for proper voltage and replace fuse if necessary d) Press reset button
Not automatically draining (ACD does not operate properly)	a) Line valve closed b) Loose electrical terminal at solenoid c) Bad solenoid d) Bad drain timer	a) Make sure line valve is fully open b) Make sure connections are tight at solenoid c) Remove and replace solenoid d) Replace drain timer
Compressor does not reach final pressure	a) Leak in tubing or Automatic Condensate Drain b) Final pressure safety valve blows too soon (defective) c) Unloader valve needs service	a) Tighten all threaded attachments and connectors. b) Replace safety valve c) Service unloader valve
Pressure Relief valves of 1st and 2nd Stages engage	a) Intermediate pressures too high b) Pressure relief valve leaking c) Check valve bad on ACD	a) Check intake valve of next stage: Clean it (replace if necessary) b) Replace pressure relief valve c) Replace check valve on ACD
Air delivery rate decreases	a) piston rings worn out b) 1st stage valve leaking c) Intake filter soiled d) Pipe coupling leaking e) Excessive wear of 3rd stage piston f) Drive belt slipping	a) Replace piston rings b) Replace intake valve c) Clean or replace filter d) Retighten couplings e) Replace piston and sleeve of 3rd stage f) Tighten or replace drive belt

NOTE: Troubleshooting of electrical problems may require the use of a multimeter with AC capability.

PROBLEM	CAUSE	ACTION
Intermediate pressure safety valve blows	a) Intermediate pressure too high due to defective inlet or pressure valve of the next stage b) Safety valve leaking	a) Check / replace inlet or pressure valve b) Replace safety valve
Any taste in air	a) Filter cartridge saturated b) Unqualified lubricant being used	a) Replace cartridge b) Replace oil with an approved brand c) Air Test (contact our Service Dept for kit)
Compressor overheats	a) Insufficient cooling air b) Ambient temp. too high c) Direction of rotation wrong d) Inlet/pressure valves on one stage leak	a) Inlet and pressure valve of one stage leaking: direction of rotation incorrect b) Check location, ventilation for max +100º F (+38º C) c) Check / correct rotation d) Check valves, clean or replace
Unit cannot be switched off		a) Turn breaker off b) Call Brownie's for technical advice
Unit runs rough and/or vibrates	a) Drive belt worn out b) Drive belt loose	a) Replace drive belt b) Tighten drive belt

If you encounter a problem that cannot be solved with this troubleshooting guide, please contact an authorized Brownie's Third Lung Service Center. In the case of problems with the electrical system, consult a qualified electrician for repairs.

When you call for service or technical advice, please have the following information:
a) unit serial number and/or model number
b) hours of operation

Yacht Pro Systems Operation Log

NOTE: Check Maintenance Log for Service Intervals with each operation

DATE	HOURS	Operator	Checks	Maintenance Performed & Comments
			☐ Oil Level ☐ Purification ☐ CO Sightglass ☐ Air Intake	
			☐ Oil Level ☐ Purification ☐ CO Sightglass ☐ Air Intake	
			☐ Oil Level ☐ Purification ☐ CO Sightglass ☐ Air Intake	
			☐ Oil Level ☐ Purification ☐ CO Sightglass ☐ Air Intake	
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KEEP THIS LOG MAINTAINED!!!

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			☐ Oil Level ☐ Purification ☐ CO Sightglass ☐ Air Intake	
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NOTES:

Warranty Information

BROWNIE'S THIRD LUNG warrants that this tank fill compressor system conforms to applicable drawings and specifications approved in writing by BROWNIE'S THIRD LUNG, and that the compressor and BROWNIE'S THIRD LUNG manufactured components are free of defects in both material and workmanship for a period of eighteen months from the date of shipment from BROWNIE'S THIRD LUNG, or 12 months from date of start-up, whichever occurs first.
WARRANTY REGISTRATION CARD must be on file at BROWNIE'S THIRD LUNG within 30 days of start-up. If, within such periods, BROWNIE'S THIRD LUNG receives from the Buyer written notice of any alleged defect or non-conformance in the compressor system, and if in the judgement of BROWNIE'S THIRD LUNG the system does not conform or is found to be defective in the material or workmanship, BROWNIE'S will, at its option, either:

a. Upon return of the component F.O.B. to BROWNIE'S THIRD LUNG in Ft Lauderdale, Florida, USA, the part will be repaired or replaced, or credit issued (defective material must be shipped within 30 days of receipt of authorized return instructions), with return freight charges to be incurred by the Buyer, or

b. furnish a service representative to correct the defective workmanship. Deterioration or wear occasioned by chemical and/or abrasive action, excessive heat or abuse shall not constitute defects.

The sole responsibility of BROWNIE'S THIRD LUNG and Buyers exclusive remedy hereunder is limited to such repair, replacement, and repayment of the purchase price. Component parts or assemblies not manufactured by BROWNIE'S THIRD LUNG are warranted only to the extent that they are warranted by the original manufacturer. BROWNIE'S THIRD LUNG shall have no responsibility for any cost or expense incurred by Buyer due to the inability of BROWNIE'S THIRD LUNG to repair under said warranty when such inability is beyond the control of BROWNIE'S THIRD LUNG, or caused solely by the Buyer.

THERE ARE NO OTHER WARRANTIES, EXPRESSED, STATUTORY, OR IMPLIED, INCLUDING THOSE OF MERCHANTABILITY AND/OR FITNESS FOR PURPOSE; NOR ANY AFFIRMATION OF FACT OR REPRESENTATION WHICH EXTENDS BEYOND THE DESCRIPTION ON THE FACE HEREOF.

This warranty shall be void and BROWNIE'S THIRD LUNG shall have no responsibility to repair, replace, or repay the purchase price of defective or damaged parts or components resulting directly or indirectly from the use of repair or replacement parts including filters or oil, not manufactured or approved by BROWNIE'S THIRD LUNG or from Buyer's failure to store, install, maintain, and operate the compressor according to recommendations contained in the OWNER'S MANUAL included with your compressor and standard engineering practices.

CONTACT INFORMATION - SALES AND SERVICE

Brownie's Southport Divers
1530 Cordova Road
Fort Lauderdale, FL 33316
Ph 954.524.2112 Fx 954.524.7598
www.yachtdiver.com
info@yachtdiver.com

Brownie's Yacht Toys
2301 South Federal Hwy
Fort Lauderdale, FL 33316
Ph 954.463.9446 Fx 954.524.6722
Toll Free 800.949.0822
www.yachtdiver.com
info@yachtdiver.com

Brownie's Palm Beach Divers
3619 Broadway
Riviera Beach, FL 33404
Ph 561.844.3483 Fx 561.845.1500
www.yachtdiver.com
info@yachtdiver.com

MANUFACTURED BY: Brownie's Third Lung, 940 NW First Street, Fort Lauderdale, FL 33311
Ph 954-462-5570 Fx 954-462-6115 www.tankfill.com / info@tankfill.com

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