

# SUPERPRESSURE

## MOTOR DRIVEN DIAPHRAGM-TYPE COMPRESSORS

|            |              |               |
|------------|--------------|---------------|
| 46-13411-2 | SINGLE ENDED | 10K PSI       |
| 46-13416-2 | SINGLE ENDED | 30K PSI       |
| 46-13418   | DOUBLE ENDED | 30K PSI       |
| 46-13421-2 | DOUBLE ENDED | 10K PSI       |
| 46-13427-2 | TWO STAGE    | 10K & 30K PSI |
| 46-13429   | TWO STAGE    | 6K & 10K PSI  |
| 46-13435   | TWO STAGE    | 6K & 30K PSI  |
| 46-13484   | SINGLE ENDED | 6K PSI        |
| 46-13487   | DOUBLE ENDED | 6K PSI        |

**This Manual is for:**

**Compressor Part No.** : \_\_\_\_\_  
**Sales Order No.** : \_\_\_\_\_  
**Serial No.** : \_\_\_\_\_  
**Date Manufactured** : \_\_\_\_\_  
**System Part No.** : \_\_\_\_\_

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## **I. INSPECTION**

If damage is discovered upon unpacking the equipment, an immediate request should be forwarded to the delivering carrier to perform an inspection and prepare a concealed-damage report. Concurrently, the nature and extent of damage should be reported to Newport Scientific, Inc., giving catalog and serial numbers, so that action may be initiated to replace damaged parts, or instructions issued for the return of the apparatus.

## **II. INTRODUCTION**

The Superpressure Diaphragm-Type Gas Compressors handle fluids of all types with absolute purity. The fluid being compressed comes into contact only with clean, dry, corrosion-resistant metallic surfaces. The compressors are suited for all types of laboratory applications as well as for pilot plant and industrial applications requiring low gas flows. The compressors operate at a 14 to 1 maximum compression ratio and are designed to circulate or boost gas from a low pressure to pressures of 6,000, 10,000, or 30,000 psi. These compressors may be used for testing and calibration of critical devices such as missile system components, etc., where hydrostatic pressure testing and calibration would be difficult or impossible.

These compressors may be easily cleaned. Fluids other than ordinary oil, such as oxygen-compatible fluorinated products, may be used for diaphragm pulsing if required for specific applications. Compressors can be constructed of materials other than those normally supplied for particular corrosion-resistant applications on special order. The compressors when specifically cleaned and serviced, are also used for oxygen service.

These compressors are adaptable to either gas or intermittent liquid service. Changeover from one to the other is accomplished by interchanging a set of intake and exhaust check valves. Single or double ball check valves are available from Newport Scientific, Inc. which enable the compressors to be used for intermittent liquid service.

## **III. PRINCIPLES OF OPERATION**

The plunger of the compression head is reciprocated as in a pump. Oil from the storage bulb is compressed by the plunger, which in turn pulses the diaphragm. The fluid to be compressed is taken in and discharged on the opposite side of the diaphragm through the check valves in the head plate on the down and up stroke of the diaphragm. Oil is drawn into the chamber beneath the diaphragm by the suction created on the plunger backstroke. Excess oil in the chamber can flow back to the storage bulb during the forward plunger stroke through the pressure limiting device. This built-in hydraulic device is manually adjustable and ensures that the discharge pressure of the compressor cannot exceed a preset limit. The plunger stroke is preset so that under normal operating conditions, oil will not flow through the pressure limiting device unless the maximum discharge pressure is exceeded.

## IV. PERFORMANCE CHARACTERISTICS AND SPECIFICATIONS

### CHARACTERISTICS:

- Contamination-free gas compression.
- Parts in contact with gas are made of the following materials:
- Upper head plates, 17-4PH SS; Valves, 302, 304, 316, 17-4PH SS and Nylon 101; Diaphragms, 302 SS.
- Compressor is suitable for suction at constant or continually varying suction pressures up to the maximum permissible discharge pressure.
- Compression ratios of up to 14-to-1 are obtainable for each stage.
- Diaphragm life in excess of 500 hours of operation normally attained.
- Absence of stuffing box permits leak-free operation.
- Elastomer packing provides a leak-free oil seal, long life and never needs tightening.
- Interchangeable check valves permit either continuous gas or intermittent liquid service.
- Check valves can be easily removed for cleaning and replacement.
- Floating hydraulic plunger ensures minimum wear on packing.

**SPECIFICATIONS:** All compressor intake and discharge check valve openings (female) are for ¼ inch O.D. Superpressure tubing.

### MOTOR-DRIVEN DIAPHRAGM COMPRESSOR SPECIFICATIONS

|                                            | SINGLE-END                                                                            |            |            | DOUBLE-END   |            | TWO STAGE  |           |          |
|--------------------------------------------|---------------------------------------------------------------------------------------|------------|------------|--------------|------------|------------|-----------|----------|
| CATALOG NUMBER                             | 46-13484                                                                              | 46-13411-2 | 46-13416-2 | 46-13487     | 46-13421-2 | 46-13427-2 | 46-13429  | 46-13435 |
| MAX. WORKING PRESSURE (PSI)                | 6,000                                                                                 | 10,000     | 30,000     | 6,000        | 10,000     | 30,000     | 10,000    | 30,000   |
| MIN. WORKING PRESSURE (PSI)                | 150                                                                                   | 150        | 150        | 150          | 150        | 50         | 50        | 50       |
| PLUNGER DIA. (IN.)                         | 3/4                                                                                   | 9/16       | 3/8        | 3/4          | 9/16       | 9/16,3/8   | 3/4, 9/16 | 3/4,3/8  |
| STROKE, NOMINAL (IN.)                      | 7/8                                                                                   | 1-1/16     | 7/8        | 7/8          | 1-1/16     | 1-1/16     | 1-1/16    | 1-1/16   |
| STROKES / MINUTE                           | 58                                                                                    | 58         | 58         | 58           | 58         | 58         | 58        | 58       |
| VOLUME AT ATMOS. PRESSURE (XU. IN./STROKE) | .36                                                                                   | .26        | .10        | .72          | .52        | .36        | .62       | .46      |
| WEIGHT (LB.) NET/SHIPPING                  | 245/295                                                                               | 238/289    | 254/305    | 285/335      | 270/320    | 286/327    | 286/327   | 286/327  |
| OVERALL DIM. L X W X H (IN.)               | 20 X 22 X 19                                                                          |            |            | 29 X 22 X 19 |            |            |           |          |
| MOUNTING DATA                              | 4 HOLES, 9/16 DIA. ON 13 X 14-1/4 CENTERS                                             |            |            |              |            |            |           |          |
| MOTOR CHARACTERISTICS                      | 1 HP, 1800 RPM, 230/460 VOLT, 3 PHASE, 60 HZ, EXPLOSION PROOF, W/58 RPM SPEED REDUCER |            |            |              |            |            |           |          |
| PORTS, WORKING FLUID INLET; OUTLET         | ¼ O.D. TUBING; ¼ O.D. TUBING                                                          |            |            |              |            |            |           |          |

## V. INSTALLATION

Installation requirements, installation procedures, and checkout procedures are contained in this section.

### ELECTRICAL REQUIREMENTS

Motors for the motor-driven compressors require 208-220 or 440V, 3-phase, 60 Hz power. This power must be connected by an electrician in accordance with local and national electrical code regulations. Observe the directions provided on the instruction plate attached to the motor.

### SPACE REQUIREMENTS

These compressors require the following minimum area: L 35 x W 21 x H 21 inches.

### GAS/LIQUID SERVICE CONVERSION

These compressors can be adapted for intermittent liquid service. To convert from gas to intermittent liquid service or vice-versa, replace the set of intake and exhaust check valves on the compressors with the set specified in Table for the particular service application. On the 6,000 and 10,000 psi gas head, for intermittent service with normal liquids, double-ball check valves must be used. Difficult liquids are water, volatile hydrocarbons, low or high-viscosity liquids and liquids containing sediments. On 30,000 psi gas heads, for intermittent liquid service, double-ball check valves must be used for all liquids.

### PRECAUTION

**\*\*Liquid service check valves CANNOT be used on Two-Stage Compressors.\*\***

### ORDERING DATA AND SPECIFICATIONS FOR CHECK VALVES

| COMPRESSOR CATALOG NUMBER          | QTY  | STANDARD GAS CHECK VALVES INLET/DISCHARGE    | LIQUID SERVICE SINGLE BALL INLET/DISCHARGE | LIQUID SERVICE DOUBLE BALL INLET/DISCHARGE |
|------------------------------------|------|----------------------------------------------|--------------------------------------------|--------------------------------------------|
| 46-13411-2<br>46-13484             | 1 Ea | 44-11102<br>44-11107                         | 44-14100<br>44-14115                       | 44-14210<br>44-14215                       |
| 46-13421-2<br>46-13429<br>46-13487 | 2 Ea | 44-11102<br>44-11107                         | 44-14100<br>44-14115                       | 44-14210<br>44-14215                       |
| 46-13416-2                         | 1 Ea | 44-13100<br>44-13120                         |                                            | 44-13140<br>44-13160                       |
| 46-13427-2<br>46-13435             | 1 Ea | 44-11102<br>44-11107<br>44-13100<br>44-13120 |                                            |                                            |

\*Also used where ultra-pure cleaning is required.

Each check valve listed in Table has a ¼ inch O.D. female tubing opening. Special-Inlet Adapter 45-16705 for liquid service can be used with the 44-13140, 44-14100, and 44-14210 Intake Check Valves when a ¼ inch NPT connection is desired. This adapter converts the ¼ inch O.D. female connection to ¼ inch NPT, female.

## **OXYGEN SERVICE CONVERSION**

All compressors can be modified for Oxygen Service. This involves Oxygen-cleaning all parts in contact with the gas, installing a set of Oxygen-service check valves, and replacing the packing. Contact Newport Scientific for details.

### **INSTALLATION PROCEDURE**

Perform the following procedures to install your compressor:

1. Remove cork seal from reservoir.  
Remove plastic plugs from the intake and exhaust check valves.
2. Secure compressor through mounting holes.
3. Fill oil reservoir with Oildyne Hydraulic Fluid 15-40 oil, except for oxygen service compressors. Fill oxygen service compressor's oil reservoir with fluorocarbon oil or halocarbon oil.
4. Connect inlet tubing to compressor as follows: When installing or removing tubing, keep all tubing lines and fittings clean. Flush tubing with solvent using a syringe and blow dry with clean air or gas. (Including new tubing.)

#### **PRECAUTION**

If dirt enters compressor, the diaphragm and check valves may be damaged.

- A. Install a 5 micron dry-type filter 49-14405 in the inlet tubing line.
- B. Connect inlet tubing line from filter as follows:

-For the single end or two-stage compressor, connect 45-11020 tubing to check valve marked IN on the head.

-For the double-end compressor, connect to the inlet manifold.

5. Connect outlet tubing from Discharge check valve to a pressure relief valve or rupture-disc assembly in accordance with standard ASME practice.

#### **PRECAUTION**

A relief valve or rupture-disc must be installed to prevent damage to equipment if an overpressure condition occurs.

Connect outlet tubing from relief valve or rupture disc to system equipment.

6. For motor-driven compressors, connect power line to motor in accordance with local and national electrical code regulations. Observe the power requirements and directions provided on the instruction plate attached to the motor. A switch or circuit breaker should be connected in the power line to enable turning the compressor on and off, as required.

**WARNING**  
**IMPROPER WIRING CONNECTIONS COULD PRESENT A SHOCK HAZARD.**

7. If necessary, adjust the crank stroke length. The crank length was preset by NEWPORT SCIENTIFIC, INC. and will require readjustment only if:

- the shoe clamping bolts work loose or are intentionally loosened.
- the head assembly is changed.

To adjust the crank stroke length, perform the "Crank Stroke Adjustment Procedure" in Section IX.

8. Checkout the operation of the compressor by performing the procedure in Section VI.

**PRECAUTION**

**Do not run the compressor with no suction pressure, or very low suction pressure,** this will cause a build up of oil underneath the diaphragm and will result in the compressor ceasing to pump gas. If this does occur, turn on the gas suction, loosen the lock nut on the pressure limiting device (be sure not to lose the original setting), back off the set screw, and run the compressor to allow the excess oil to re-circulate. The limiter should then be returned to its original setting.

## **VI. OPERATION**

The operating procedures in this section describe how to operate the compressor, how to perform the priming procedure if the compressor fails to build-up pressure, and how to verify proper check valve operation.

**PRECAUTION**

If dirt enters the compressor, the diaphragm and check valves may be damaged. It is absolutely essential that the incoming gas is filtered. We suggest a 5 or 10 micron in-line Filter such as Cat. # 49-14405.

Also any lines to be placed between the Filter and the compressor should be thoroughly cleaned. Flush with solvent using a syringe, and blow dry with clean air or gas. (Even a new piece of high pressure tubing may contain sufficient particulate matter to foul the check valves).

To operate the motor-driven compressor, turn on electric power to the compressor. Observe the gas discharge pressure to ensure that the compressor is operating properly. If the compressor fails to build-up pressure, shut off power and perform the "Priming Procedure" in the next paragraph.

## **PRIMING PROCEDURE**

To prime the compressor, perform the following:

1. Close off the gas discharge line.
2. Apply suction pressure to the compressor inlet. (The term suction pressure means the positive pressure applied to the compressor inlet, e.g. a minimum suction pressure of 700 psi is recommended for 10,000 psi discharge on 46-13411-2).
3. Add oil to the reservoir if required.
4. Loosen the stop nut on the top of pressure limiting device, being careful not to lose the setting. Reverse the set screw back until it no longer applies tension to the spring. The stop nut will turn with the set screw, thereby maintaining the original Factory setting.
5. Run the compressor. While it is running, loosen the large gland nut at the base of the pressure limiting device by 1-1/2 turns, and pull back on the body of the limiter to release the orifice piece. This removes all force from the seat and allows fresh oil to be pulled in from the reservoir.

The large gland nut should be loosened just for a couple of strokes of the compressor and then retightened. Some oil will be spilled out during the above operation.

6. Return the setscrew to its' original setting and retighten the stop nut.

## **PROCEDURE FOR VERIFYING PROPER CHECK VALVE OPERATION**

1. Install pressure gauges on Compressor Inlet & Outlet, if not already present.
2. Apply suction pressure of 1,000 psi to Compressor Inlet.
3. Operate Compressor.
4. If either gauge fluctuates wildly then remove check valves and clean or replace.



## VII. TROUBLESHOOTING

The table below provides guidelines in localizing a compressor malfunction. Refer to "Corrective Maintenance" procedure to replace a component.

| Malfunction Indication                                                          | Probable Cause                                                                                                                                                                                                                                                                       | Action                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COMPRESSOR OPERATES AND BUILDS-UP PRESSURE BUT OUTPUT VOLUME IS IMPROPER</b> | <ol style="list-style-type: none"> <li>1.External leakage at check valve or diaphragm.</li> <li>2.Pressure limiting device setting is too low. Oil level in reservoir changes more than a little on each stroke.</li> <li>3.Intake or exhaust check valve malfunctioning.</li> </ol> | <ol style="list-style-type: none"> <li>1.Check for leakage using bubble test. Tighten or replace component as req'd.</li> <li>2.Perform "Adjustment of Pressure Limiting Device" procedure in Section IX Maintenance. Pressure limiting device should never heat.</li> <li>3.Perform the "Procedure for Verifying Proper Check Valve Operation" in Section VI, Operation.</li> </ol> |
| <b>COMPRESSOR OPERATES BUT PRESSURE DOES NOT BUILD-UP TO MAXIMUM</b>            | <ol style="list-style-type: none"> <li>1.Inlet Pressure too low.</li> <li>2.Pressure leakage.</li> <li>3.Faulty check valve.</li> <li>4.Compressor is not primed.</li> <li>5.Defective hydraulic check valve or pressure-limiting device.</li> </ol>                                 | <ol style="list-style-type: none"> <li>1.Check that compression ratio is 14:1 maximum.</li> <li>2.Isolate compressor from rest of system and check for pressure leaks.</li> <li>3.Perform "Procedure for Verifying Proper Check Valve Operation" in Section VI, Operation.</li> <li>4.Perform "Priming Procedure" in Section VI, Operation.</li> <li>5.Replace.</li> </ol>           |
| <b>BUBBLES IN OIL RESERVOIR</b>                                                 | <ol style="list-style-type: none"> <li>1.Leaking packing.</li> <li>2.Ruptured Diaphragm(s)</li> </ol>                                                                                                                                                                                | <ol style="list-style-type: none"> <li>1.Replace packing according to "Corrective Maintenance" in Section IX, Maintenance.</li> <li>2.Replace diaphragm(s) according to "Corrective Maintenance" in Section IX, Maintenance.</li> </ol>                                                                                                                                              |

## VIII. WARNINGS, PRECAUTIONS, AND LIMITATIONS

This section summarizes all warnings, precautions, and limitations contained in this manual. The warnings paragraphs list hazards which, if not observed, could lead to personnel injury. The precautions paragraph lists actions which could result in damage to the equipment.

## WARNINGS

The power line ground circuit for the motor-driven compressor should be continuous to the main power panel. The panel should be grounded directly to a water pipe or other electrical earth ground. Improper grounding could result in a shock hazard.

When performing maintenance on a motor-driven compressor, disconnect power from compressor and attach a warning label **DO NOT TURN ON SWITCH, MAINTENANCE BEING PERFORMED** to the power switch to ensure against inadvertent start-up of the compressor.

## PRECAUTIONS

Liquid service check valves **CANNOT** be used on Two-Stage Compressors.

A relief valve or rupture-disc must be installed in the outlet tubing line to prevent damage to equipment if an overpressure condition occurs.

Ensure that the fluid being compressed is maintained free of solid particulate contaminants. If dirt enters the compressor, the diaphragm and check valves may be damaged.

## LIMITATIONS

The pressure-limiting device should be set to an upper limit pressure of approximately 110 percent of the maximum operating pressure.

The pressure limiter on the first stage of a two-stage compressor (46-13427) should be set at 5000 psi and the inter-stage pressure should not exceed 4500 psi for optimum diaphragm life, and for compressors (46-13429 and 46-13435) set at 6,600 psi not to exceed 6,000 psi.

## IX. MAINTENANCE

### PERIODIC MAINTENANCE

#### A. Lubrication

This system is designed to automatically lube the drive mechanism. It will provide the right amount of grease to meet lubrication requirements for the Slotted Lever.

This unit should be checked every 3-5 hours of run time on the compressor to determine grease level. To refill Lube Site: Remove fasteners and guard from compressor. Simply refill by attaching the grease gun that is supplied with the unit to the grease fitting. Fill until the seal ring rises to the bottom edge of the "CAUTION" label. **DO NOT OVERFILL**. This should be done before the seal ring is down to the top of the base.

Also, when service is being done on the Lube Site, the pivot pins on the drive unit should be oiled with any 10W 30W or 10W 40W oil.

These instructions will allow the Lube Site to give you many years of trouble-free automatic lubrication.

## **B. Filter Replacement**

If a 49-14405 dry-type filter is installed in the inlet tubing line, periodically replace the filter discs (49-14490, set of four).

## **ADJUSTMENT OF PRESSURE LIMITING DEVICE**

**NOTE:** The Pressure Limiting Device was preset by Newport Scientific and should never need re-adjustment. This device was set to release oil back to the storage bulb when the discharge pressure reaches 110% of the maximum pressure rating of the compressor. This setting was obtained by turning the setscrew at the top of the pressure limiter until the desired release pressure was obtained.

The setscrew was then held stationary while the outer stop nut was tightened down to the limiter body to lock in the setting. As long as the stop nut is not turned relative to the setscrew, the setscrew can be turned out and in for priming and still maintain the original factory setting.

If the stop nut has been turned relative to the setscrew, the following procedure can be followed to reproduce the original setting.

1. Install pressure gauges in the inlet & outlet lines of the compressor if not already present.
2. Make sure system is primed and check valves are operating properly as per Section VI, Operation.
3. Stop compressor operation.
4. Loosen outer stop nut on top of pressure limiter and turn setscrew back until all tension is removed from the spring.
5. Apply suction pressure of at least 1000 psi.
6. Adjust setscrew slowly inward to obtain the following maximum discharge pressure.
  - for 6,000 psi compressors, set to 6,600 psi
  - for 10,000 psi compressors, set to 11,000 psi
  - for 30,000 psi compressor, set to 33,000 psi

**NOTE:** For a two stage compressor, set to 5,000 psi on first stage.

**NOTE:** Outlet pressure gauge needle will fluctuate slightly with each piston stroke, using the highest reading on each stroke when setting the pressure.

7. Hold setscrew stationary and tighten outer stop nut to lock in pressure setting.

**NOTE:** It is not recommended that the pressure limiter be set at a pressure lower than the original factory setting. If it is desired to maintain the system at a lower pressure, to prevent over-pressurization of components, the following configuration is recommended.

## **CRANK STROKE ADJUSTMENT PROCEDURE**

On Motor-Driven Compressors, the piston stroke length is preset by Newport Scientific and must be re-adjusted if:

- The slide block clamping bolts work loose or are intentionally loosened.
- The head assembly or packing are changed.

**NOTE:** The pressure limiter adjustment need not be changed unless the original factory setting was lost according to the last section on Adjustment of the Pressure Limiting Device. If the pressure limiter and the crank stroke both need adjustment, they must be performed simultaneously according to No. 11 of this section.

For maximum compressor efficiency, the volume of oil displaced is critical. This volume is proportional to the length of the piston stroke, and the adjustment procedure is the same for all compressors and all piston sizes. -Refer to Section IV, Specifications.

1. Stop compressor operation. Disconnect power and attach a warning label ("DO NOT TURN ON SWITCH, MAINTENANCE BEING PERFORMED") to the power switch to assure against inadvertent start-up of the compressor.
2. Remove guard.
3. Crack tubing gland nut on discharge check valve(s) to release system pressure. Re-tighten gland nut(s).
4. Bring crank to the vertical position. Rotate the motor armature by inserting a metal rod through the cooling slots in the rear of the motor and carefully turning the fan blades until crank is in the vertical position.
5. Loosen the two (2) slide block clamping bolts on the crank.
6. While crank is in vertical position, adjust the dimension to a distance between the bottom of the slot in the crank and the end of the slide block to approximately 7/16 inch. Tighten the two (2) slide block clamping bolts to 50-60 ft-lbs torque.
7. Place a piece of masking tape on the slotted lever beside the slide block and mark the position of the slide block with a pencil.
8. Apply suction pressure of at least 1000 psi.

9. Operate the compressor with the discharge dead-ended on a pressure gauge.
10. Make sure compressor is primed and that check valves are operating properly.
11. The slide block adjustment "A" of 7/16 inch was deliberately set in the high range to cause over stroking of the compressor. Over stroking is present when the oil level in the oil reservoir rises and falls before 110% of the maximum pressure is reached. While compressor is over stroking, pressure should build up to 110% of the maximum operating pressure.

| <u>Maximum Operating Pressure</u> | <u>110%</u> |
|-----------------------------------|-------------|
| 6,000 psi                         | 6,600 psi   |
| 10,000 psi                        | 11,000 psi  |
| 30,000 psi                        | 33,000 psi  |

**NOTE:** The pressure limiter on the first stage of a two-stage compressor should be set at 5,000 psi and the interstage pressure should not exceed 4500 psi for optimum diaphragm life.

If the pressure obtained is lower or higher than that shown above, then adjust the pressure limiter according to the Adjustment of Pressure Limiting Device earlier in this section.

12. With pressure limiter set at proper pressure, adjust the crank dimension "A" to obtain optimum stroke. Optimum stroke is obtained when oil level just begins to rise and fall as 110% of maximum pressure is reached.
13. Stop compressor operation.
14. Bring crank to vertical position and loosen bolts according to steps 3, 4, and 5.
15. Adjust slide block downward in increments of 1/32 inch from the last setting and tighten bolts to 50-60 ft-lb. Mark new position of slide block.
16. Operate the compressor.
17. Check for over stroking according to step 11. If compressor is still over stroking, repeat steps 13 through 17 until optimum stroke is achieved.

**NOTE:** Compressor is under stroking when pressure fails to build up to 110% of the maximum pressure.

18. Replace guard.

## **CORRECTIVE MAINTENANCE**

The following paragraphs describe how to replace the check valves, the diaphragm, the packing and the pressure-limiting device.

### **WARNING**

**ON MOTOR-DRIVEN COMPRESSORS, DISCONNECT POWER FROM COMPRESSOR AND ATTACH A WARNING LABEL ("DO NOT TURN ON SWITCH, MAINTENANCE BEING PERFORMED") TO THE POWER SWITCH TO ENSURE AGAINST INADVERTENT START-UP OF UNIT.**

### **Check Valve Replacement**

1. Stop compressor operation.
2. Release pressure from tubing lines.
3. Disconnect tubing connected to check valve.
4. Remove check valve.
5. Examine check valve for foreign particles, wear or damage. Replace with new check valve, if required.
6. Install check valve on compressor. Ensure that the lens rings are properly seated. Improper seating of the lens rings may result in a leaking check valve.

### **Diaphragm Replacement**

1. Stop compressor operation.
2. Release pressure from system and tubing lines to compressor.
3. Close off intake and discharge lines.
4. Crack connection to check valves to allow trapped pressurized fluid to escape, then disconnect all gas lines.
5. Support head and remove the four (4) caps screws which secure it to the frame.
6. Pull head straight back, being careful not to scratch the piston which will remain connected to the drive assembly.
7. Secure hydraulic section in a clamping device.
8. Remove head bolts and pull the head plate. Inspect the head for damage. Clean head and cover with a protective cloth.
9. Remove the check valves, inspect, clean and cover with a protective cloth.

10. Remove diaphragm. The 6,000 psi and 10,000 psi compressor heads have one (1) diaphragm per head. The 30,000 psi compressor heads have two (2) diaphragms per head.
11. Thoroughly clean and install new diaphragm(s).
12. Reinstall head, head bolts, and check valves. Lubricate head's washer and bolt threads with bearing grease when compressor is used for normal fluids. When used for oxygen service, use fluorocarbon grease. Reinstall all tubing removed (use check valves as guide for proper tubing installation).
13. Hand-tighten all the head bolts, using a torque wrench. Sequentially tighten OPPOSING head bolts in 10 ft-lb increments to a final torque of:
  - 150 ft-lbs for 6,000 psi and 10,000 psi compressor heads
  - 350 ft-lbs for 30,000 psi compressor heads
14. Attach all gas connections.
15. Perform the "Priming Procedure" in Section VI, Operation.

#### **Packing Replacement**

1. Perform Steps 1 through 9 of Diaphragm Replacement (above).
2. Remove packing and clean packing cavity.
3. Replace worn packing components according to the spare parts list.
4. Perform steps 13 through 16 of diaphragm replacement.

#### **Pressure-Limiting Device Replacement**

1. Stop compressor operation.
2. Release pressure from system and tubing lines to compressor.
3. Crack connection at bottom of pressure-limiting device to allow trapped pressurized fluid to escape.
4. Hold body of pressure-limiting device with one (1) wrench while unscrewing gland nut with another wrench, Figure 5-1.
5. Unscrew orifice 62006001001, 2 or 4 by wrenching at the flats or the seat.
6. Replace the pressure limiting device (62006001201 or 62006001202) or parts, as required.
7. Reassemble and reinstall on compressor.

## X. RECOMMENDED SPARE PARTS

| DESCRIPTION                                                                        | CAT. NO<br>OR<br>PART NO. | 46-<br>13411-2 | 46-<br>13416-2 | 46-<br>13421-2 | 46-<br>13427-2 | 46-<br>13429 | 46-<br>13435 | 46-<br>13484 | 46-<br>13487 |
|------------------------------------------------------------------------------------|---------------------------|----------------|----------------|----------------|----------------|--------------|--------------|--------------|--------------|
| CHECK VALVE,<br>HYDRAULIC                                                          | 44-14110                  | 1              | 1              | 2              | 2              | 2            | 2            | 1            | 2            |
| CHECK VALVE,<br>INTAKE                                                             | 44-11102                  | 1              |                | 2              | 1              | 2            | 1            | 1            | 2            |
| CHECK VALVE,<br>DISCHARGE                                                          | 44-11107                  | 1              |                | 2              | 1              | 2            | 1            | 1            | 2            |
| CHECK VALVE,<br>INTAKE                                                             | 44-13100                  |                | 1              |                | 1              |              | 1            |              |              |
| CHECK VALVE,<br>DISCHARGE                                                          | 44-13120                  |                | 1              |                | 1              |              | 1            |              |              |
| DIAPHRAGM                                                                          | 62018000500               | 1              | 2              | 2              | 3              | 1            | 2            |              |              |
| DIAPHRAGM                                                                          | 84001001100               |                |                |                |                | 1            | 1            | 1            | 2            |
| OILER                                                                              | P1004002900               | 1              | 1              | 2              | 2              | 2            | 2            | 1            | 2            |
| SOFTGOOD<br>PACKING KIT                                                            | 85001000900               | 1              |                | 2              | 1              | 1            |              |              |              |
| SOFTGOOD<br>PACKING KIT                                                            | 85001000500               |                | 1              |                | 1              |              | 1            |              |              |
| SOFTGOOD<br>PACKING KIT                                                            | 85001001100               |                |                |                |                | 1            | 1            | 1            | 2            |
| PACKING<br>RETAINER                                                                | 64042002500               | 1              |                | 2              | 1              | 1            | 1            |              |              |
| PACKING<br>RETAINER                                                                | 65013002700               |                | 1              |                | 1              |              |              |              |              |
| PACKING<br>RETAINER                                                                | 84001000800               |                |                |                |                | 1            | 1            | 1            | 2            |
| PACKING<br>FOLLOWER                                                                | 64042002200               | 1              |                | 2              | 1              | 1            | 1            |              |              |
| PACKING<br>FOLLOWER                                                                | 65013002800               |                | 1              |                | 1              |              |              |              |              |
| PACKING<br>FOLLOWER                                                                | 84001000700               |                |                |                |                | 1            | 1            | 1            | 2            |
| ½" DIA PISTON ASSEMBLY FROM POLY-PACK TO LEATHER PACKING SEE DRAWING # 85001001300 |                           |                |                |                |                |              |              |              |              |



## **XI. ASSEMBLY DRAWINGS & CAPACITY CURVES**

### **COMPRESSOR # 46-13411-2 MOTOR DRIVEN SINGLE ENDED 10K PSI**

|                 |                                      |
|-----------------|--------------------------------------|
| 46-13411-2      | Compressor Assembly Sheet            |
| 64042002702     | Head & Drive Assembly Single Acting  |
| 64042002802     | Head Assembly (Left Side) 10,000 PSI |
| 84001000400     | Drive Piston Assembly                |
| 44-11102        | Intake Check Valve 10,000 PSI        |
| 44-11107        | Discharge Check Valve 10,000 PSI     |
| 44-14110        | Inlet Check Valve Single Ball        |
| 62006001200     | Assembly Relief Valve-Liquid Service |
| Curve 10K Motor | Capacity Curve                       |

### **COMPRESSOR # 46-13418 MOTOR DRIVEN DOUBLE ENDED 30K PSI**

|                 |                                        |
|-----------------|----------------------------------------|
| 46-13418        | Compressor Assembly Sheet              |
| 73064000302     | Head & Drive Assembly Double Acting    |
| 65013000502     | Head Assembly Left Side 30,000 PSI     |
| 65013000602     | Head Assembly Right Side 30,000 PSI    |
| 84002000400     | Drive Piston Assembly                  |
| 44-13100        | Intake Check Valve 30,000 PSI          |
| 44-13120        | Discharge Check Valve 30,000 PSI       |
| 44-14110        | Inlet Check Valve Single Ball          |
| 62006001200     | Assembly Relief Valve – Liquid Service |
| Curve 30K Motor | Capacity Curve                         |

### **COMPRESSOR # 46-13421-2 MOTOR DRIVEN DOUBLE ENDED 10K PSI**

|                 |                                      |
|-----------------|--------------------------------------|
| 46-13421-2      | Compressor Assembly Sheet            |
| 64042002902     | Head & Drive Assembly Double Acting  |
| 64042002602     | Head Assembly 10,000 PSI             |
| 64042002802     | Head Assembly 10,000 PSI             |
| 84002000400     | Drive Piston Assembly                |
| 44-11102        | Intake Check Valve 10,000 PSI        |
| 44-11107        | Discharge Check Valve 10,000 PSI     |
| 44-14110        | Inlet Check Valve Single Ball        |
| 62006001200     | Assembly Relief Valve-Liquid Service |
| Curve 10K Motor | Capacity Curve                       |

**COMPRESSOR # 46-13427-2 MOTOR DRIVEN TWO STAGE 10 & 30K PSI**

|                  |                                        |
|------------------|----------------------------------------|
| 46-13427-2       | Compressor Assembly Sheet              |
| 73064000202      | Head & Drive Piston Assembly           |
| 44-11102         | Intake Check Valve 10,000 PSI          |
| 44-11107         | Discharge Check Valve 10,000 PSI       |
| 44-13100         | Intake Check Valve 30,000 PSI          |
| 44-13120         | Discharge Check Valve 30,000 PSI       |
| 64042002602      | Head Assembly 10,000 PSI               |
| 65013000502      | Head Assembly 30,000 PSI Left Side     |
| 44-14110         | Inlet Check Valve Single Ball          |
| 62006001200      | Assembly Relief Valve – Liquid Service |
| Curve 1030 Motor | Capacity Curve                         |

**COMPRESSOR # 46-13429 MOTOR DRIVEN TWO STAGE 6 & 10K PSI**

|                 |                                      |
|-----------------|--------------------------------------|
| 46-13429        | Compressor Assembly Sheet 1          |
| 84002000300     | Head & Drive Piston Assembly         |
| 64042002802     | Head Assembly 10,000 PSI             |
| 84001001500M    | Head Assembly 6,000 PSI              |
| 84002000400     | Drive Piston Assembly                |
| 44-11102        | Intake Check Valve 10,000 PSI        |
| 44-11107        | Discharge Check Valve 10,000 PSI     |
| 44-14110        | Inlet Check Valve Single Ball        |
| 62006001200     | Assembly Relief Valve-Liquid Service |
| Curve 610 Motor | Capacity Curve                       |

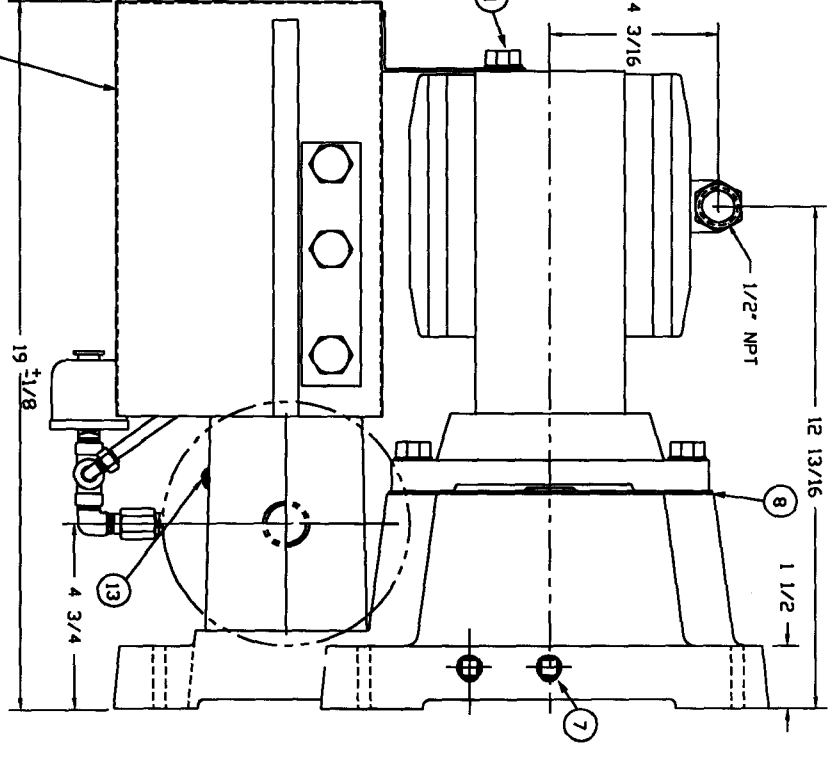
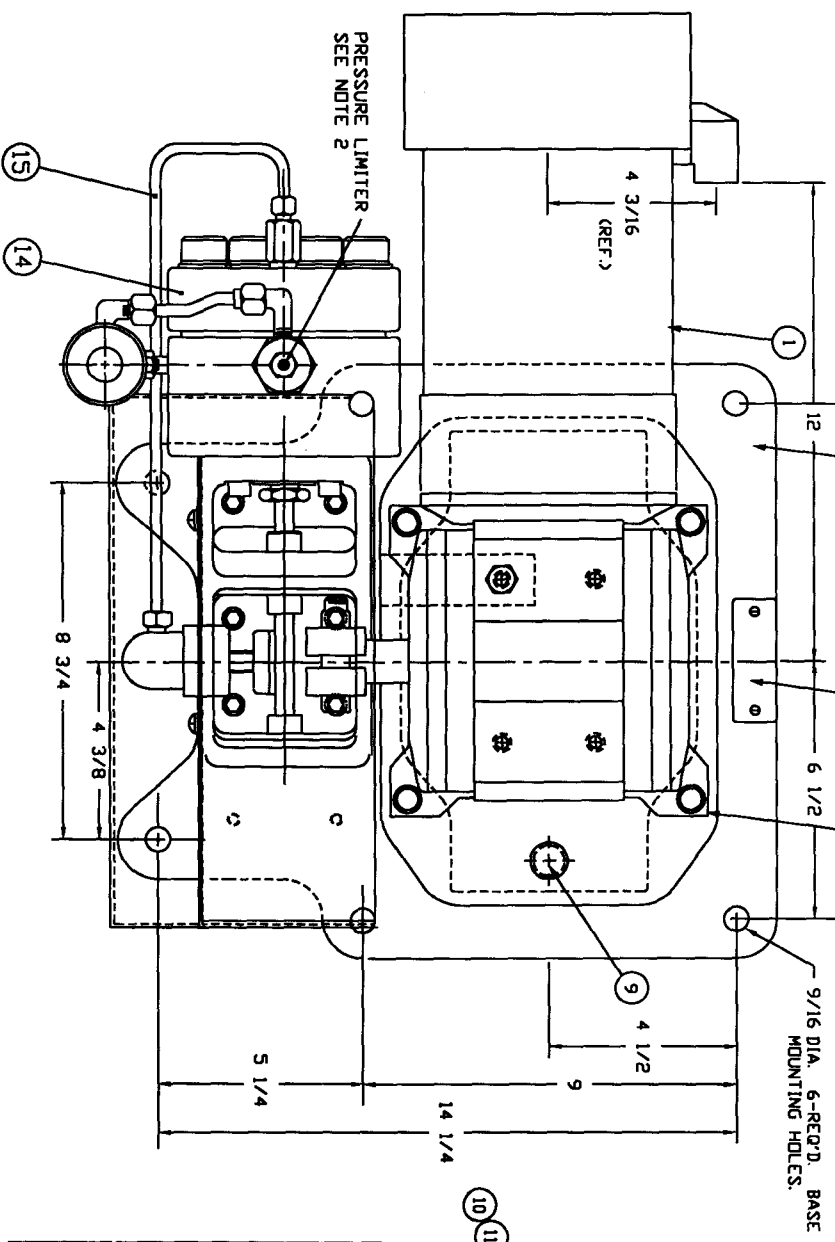
**COMPRESSOR # 46-13435 MOTOR DRIVEN TWO STAGE 6 & 30K PSI**

|                 |                                      |
|-----------------|--------------------------------------|
| 46-13435        | Compressor Assembly Sheet            |
| 84002000600     | Head & Drive Piston Assembly         |
| 84001001500     | Head Assembly 6,000 PSI              |
| 65013000502     | Head Assembly 30,000 PSI             |
| 84002000400     | Drive Piston Assembly                |
| 44-11102        | Intake Check Valve 10,000 PSI        |
| 44-11107        | Discharge Check Valve 10,000 PSI     |
| 44-13100        | Inlet Check Valve 30,000 PSI         |
| 44-13120        | Discharge Check Valve 30,000 PSI     |
| 62006001200     | Assembly Relief Valve-Liquid Service |
| Curve 630 Motor | Capacity Curve                       |

**COMPRESSOR # 46-13484 MOTOR DRIVEN SINGLE ENDED 6K PSI**

|                |                                      |
|----------------|--------------------------------------|
| 46-13484       | Compressor Assembly Sheet            |
| 84001000200    | Head & Drive Piston Assembly         |
| 84001000300    | Head Assembly 6,000 PSI              |
| 84001000400    | Drive Piston Assembly                |
| 44-11102       | Intake Check Valve 10,000 PSI        |
| 44-11107       | Discharge Check Valve 10,000 PSI     |
| 44-14110       | Intake Check Valve 40,000PSI         |
| 62006001200    | Assembly Relief Valve-Liquid Service |
| Curve 6k Motor | Capacity Curve                       |

- NOTE:
- 1 - COMPRESSOR BASE MUST BE BOLTED TO A FLAT SURFACE.
  - 2 - SET PRESSURE LIMITER AT 11,000 PSI (APPROX)
  - 3 - MOTOR OUTPUT SHAFT TO RUN IN A COUNTERCLOCK DIRECTIONAL ROTATION.



| REV | SYMBOL | DESCRIPTION | DATE |
|-----|--------|-------------|------|
|     |        |             |      |

| ITEM NO. | REQ'D | DESCRIPTION                                                                     | PART NO.               | MATERIAL            |
|----------|-------|---------------------------------------------------------------------------------|------------------------|---------------------|
| 14       | 1     | HEAD & DRIVE PISTON ASSEMBLY SINGLE ACTING                                      | 64042002702            | AS PER DETAIL       |
| 13       | 2     | BINDING HD. MACH. SCREW No. 10-32 x 3/8 LG                                      | 2916-106 / 00706012615 | BRASS N.P.          |
| 12       | 1     | GUARD                                                                           | 63173010600            | STEEL               |
| 11       | 1     | HEX. CAP MACH SCREW 1/2-13 x 3/8 LG                                             | 2125-706 / 01850024315 | STEEL               |
| 10       | 1     | FLATE WASHER 1/2 I.D. NDM                                                       | 1065-082               | STEEL               |
| 9        | 1     | PLUG K.D. BOX SNAP INBANK 3/4 SPRING TYPE                                       | P0417023500            | BRASS N.P. POLISHED |
| 8        | 1     | COVER                                                                           | 63173002100            | AL                  |
| 7        | 3     | PLUG, 1/4 NPT.                                                                  | P0205000100            | BRASS               |
| 6        | 4     | FLAT WASHER 3/8 I.D. NDM                                                        | 63167001300            | STEEL               |
| 5        | 4     | HEX CAP MACH SCREW 3/8-16 x 1 1/2 LG                                            | 2123-724 / 01850013934 | STEEL               |
| 4        | 2     | BINDING HD. SHEET MET. SCR. No 2-56 x 1/8 LG                                    | 3302-302 / 02240031107 | STEEL N.P.          |
| 3        | 1     | NAME PLATE                                                                      | 52-63070               | AL                  |
| 2        | 1     | BASE (REF.)                                                                     | 63173002000            | AL. ALLOY           |
| 1        | 1     | MOTOR RELIANCE XL GEAR, RIGHT ANGLE REDUCTION, 1-HP, 36 RPM, FRAME, K56-VM 21 B | P0552005400            | MATERIAL            |

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONS ± 1/64  
DECIMALS ±  
ANGLES ±  
REMOVE ALL BURRS AND SHARP EDGES  
DO NOT SCALE THIS DRAWING

BY: \_\_\_\_\_ NAME: \_\_\_\_\_ DATE: \_\_\_\_\_  
CHECKED: \_\_\_\_\_  
ENGR/ISSN: \_\_\_\_\_  
APPROVED: \_\_\_\_\_  
MATERIAL: \_\_\_\_\_

AS NOTED

MOTOR DRIVEN SINGLE END  
DIAPHRAGM COMPRESSOR  
10,000 PSI ASSEMBLY - 9/16 DIA PISTON  
CODE GEN. NO. 59505  
PART NO. 46-13411-2  
DRAWING NO. 46134112

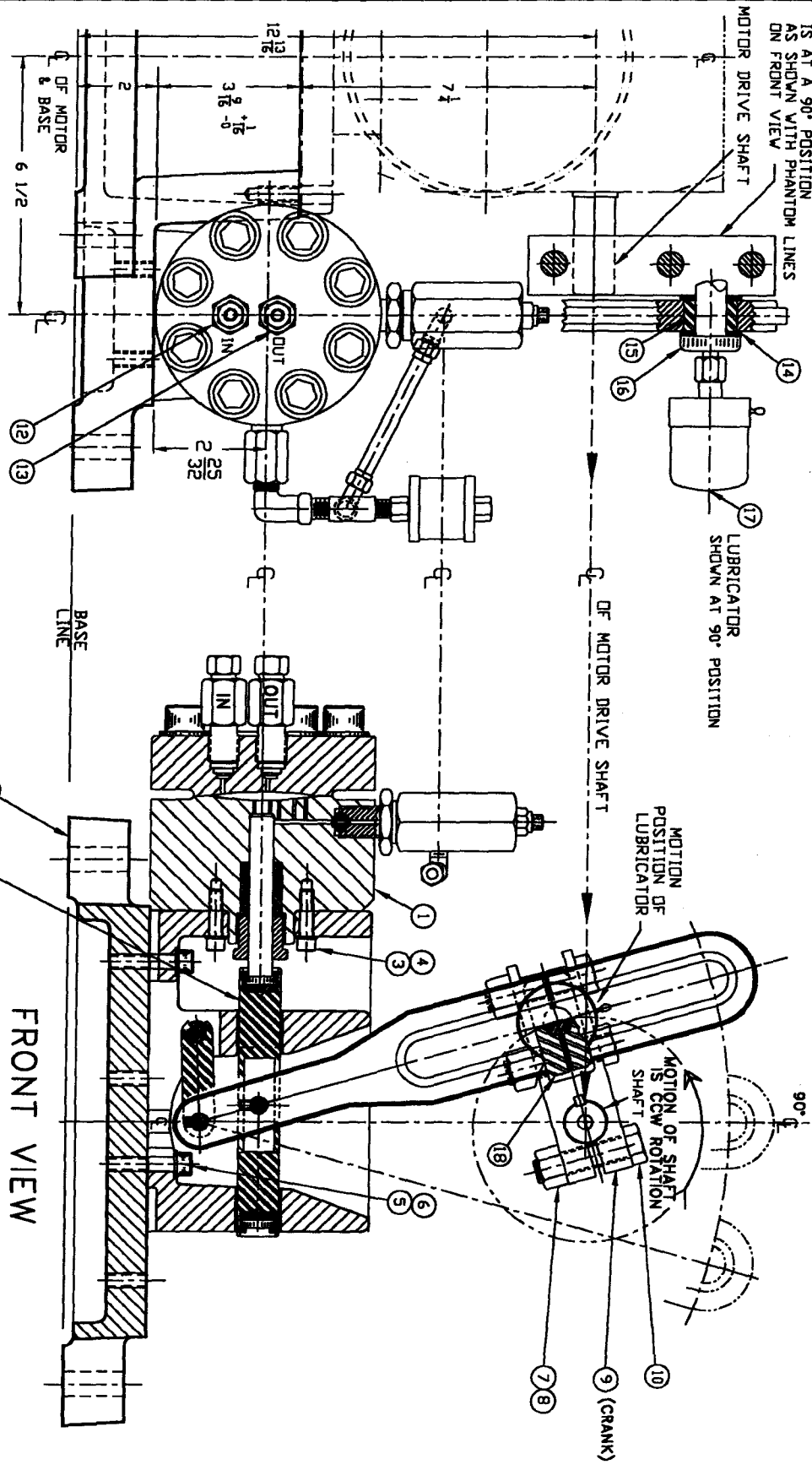
SCALE: NONE WEIGHT: \_\_\_\_\_ SHEET: \_\_\_\_\_ OF: \_\_\_\_\_

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SUPERPRESSURE

LIST OF MATERIAL

NOTE:  
 POSITION OF THIS CRANK (ITEM 9),  
 WHEN SLOTTED LEVER  
 IS AT A 90° POSITION  
 AS SHOWN WITH PHANTOM LINES  
 ON FRONT VIEW



LEFT END VIEW

FRONT VIEW

NOTE:  
 1— FOR PARTS NOT SHOWN, SEE FINAL  
 INSTALLATION DWG. NO. 46-13411-2.

UNLESS OTHERWISE SPECIFIED  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES:  
 FRACTIONS ±  
 DECIMALS ±  
 ANGLES ±

REMOVE ALL BURRS AND SHARP EDGES  
 DO NOT SCALE DRAWING  
 FINISH:  
 PREPARED BY: RLH (2-5-2007)  
 CHECKED BY: PZ (4-30-08)  
 DATE: 4-30-08  
 APPROVED BY: [Signature]  
 MATERIAL: [Blank]  
 FOR LIST OF MAT'L: [Blank]  
 SEE: SHEET 2



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|                                                                           |         |                      |                      |
|---------------------------------------------------------------------------|---------|----------------------|----------------------|
| 46-13411-2                                                                | USED ON | SCALE: NONE          | WEIGHT:              |
| NEXT ASSY                                                                 |         |                      |                      |
| APPLICATION                                                               |         |                      |                      |
| MOTOR DRIVEN SINGLE END DIAPHRAGM COMPRESSOR HEAD & DRIVE PISTON ASSEMBLY |         | CODE DESK. NO. 59505 | PART NO. 64042002702 |
| DRAWN BY: [Blank]                                                         |         | SIZE: D              | DRAWING NO. 27640422 |
| DATE: [Blank]                                                             |         |                      | SHEET 1 OF 2         |

| ITEM NO. | QTY | DESCRIPTION                                  | PART NO.    | MATERIAL       |
|----------|-----|----------------------------------------------|-------------|----------------|
| 18       | 1   | CLAMP ADJUSTMENT, SLIDE BLOCK                | 63173003300 | STEEL          |
| 17       | 1   | LUBRICATOR                                   | P1809050400 | ASSEMBLY       |
| 16       | 1   | CRANK PIN                                    | 73067002200 | STEEL          |
| 15       | 1   | ROLLER BEARING                               | 50024008400 | TOOL STEEL     |
| 14       | 2   | WASHER, FLAT                                 | 01835000500 | BRONZE         |
| 13       | 1   | CHECK VALVE, EXHAUST                         | 44-11107    | AS PER DETAILS |
| 12       | 1   | CHECK VALVE, INTAKE                          | 44-11102    | AS PER DETAILS |
| 11       | 1   | BASE                                         | 63173002000 | ALUM. ALLOY    |
| 10       | 3   | SCREW, 5/8-18 UNF-2A, HEX HD. 3-1/2 LONG     | Q1850014846 | STEEL          |
| 9        | 1   | CRANK                                        | 63173003200 | STEEL          |
| 8        | 3   | WASHER, FLAT 5/8 I.D.                        | P1065008700 | STEEL          |
| 7        | 3   | HEX NUT, 5/8-18 UNF-2B                       | P1062030700 | STEEL          |
| 6        | 4   | WASHER, FLAT 3/8 I.D.                        | 63167001300 | STEEL          |
| 5        | 4   | SCREW, SOC HD CAP 3/16 UNC 2A, 1-1/2 LONG    | Q4650023934 | STEEL          |
| 4        | 4   | SCREW, SOC HD CAP 5/16-18 UNC 2A, 1-1/4 LONG | P2021072000 | STEEL          |
| 3        | 4   | WASHER, FLAT 5/16 I.D.                       | 63167001200 | AS PER DETAILS |
| 2        | 1   | DRIVE PISTON ASSEMBLY                        | 84001000400 | AS PER DETAILS |
| 1        | 1   | HEAD ASSEMBLY-10,000 PSI (LEFT SIDE)         | 64042002802 | AS PER DETAILS |
|          |     |                                              |             |                |
|          |     |                                              |             |                |
|          |     |                                              |             |                |
|          |     |                                              |             |                |
|          |     |                                              |             |                |
|          |     |                                              |             |                |

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PART NO.  
**64042002702**  
 DRAWING NO.  
**27640422**

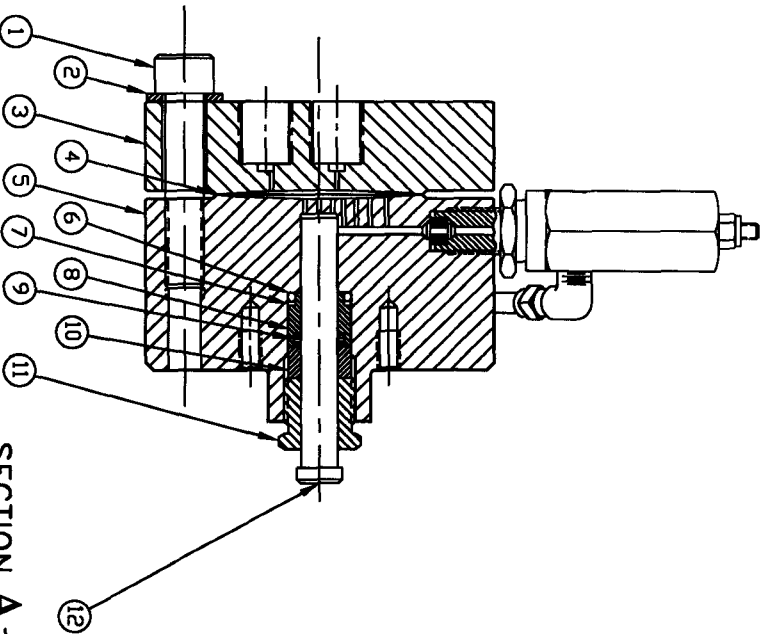
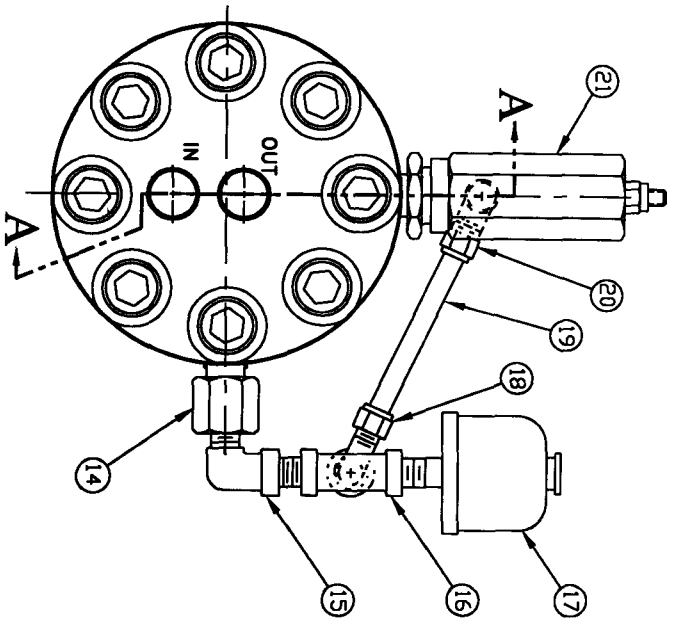
TITLE  
**MOTOR DRIVEN - SINGLE END  
 DIAPHRAGM COMPRESSOR  
 10,000 PSI - 9/16 DIA PISTON  
 HEAD & DRIVE ASSEMBLY**

SHEET NO.  
**2 OF 2**

CHECKED BY/DATE  
**P. ZIEG 4-30-08**

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CODE IDENT. NO.  
**59505**



SECTION A-A

NOTE:  
1 MARK DR TAG WITH ASSEMBLY NUMBER

| ITEM | QTY | DESCRIPTION                                       | PART NO.     | MATERIAL          |
|------|-----|---------------------------------------------------|--------------|-------------------|
| 21   | 1   | RELIEF VALVE - ASSEMBLY                           | 622006001201 | AS PER DETAILS    |
| 20   | 1   | 90° ELBOW, COMPRESSION 1/8 NPTM X 1/4 O.D. TUBING | P0215025100  | BRASS             |
| 19   | 0.5 | TUBING 1/4 O.D. X 6' LONG, APPROX. 035W           | P1245000100  | COPPER            |
| 18   | 1   | 90° ELBOW, COMPRESSION 1/4 NPTM X 1/4 O.D. TUBING | P0215025400  | BRASS             |
| 17   | 1   | DILER, TRIGOD <sup>®</sup> TYPE PC # 400B1        | P1004002900  | AS PER DETAILS    |
| 16   | 1   | STREET TEE 1/4 NPTF X 1/4 NPT MALE RUN            | P0201060100  | BRASS             |
| 15   | 1   | 90° STREET ELBOW 1/4 NPTM X 1/4 NPTF              | P0201004100  | BRASS             |
| 14   | 1   | CHECK VALVE VALVE, INTAKE (OIL SIDE)              | 44-14110     | AS PER DETAILS    |
| 13   | —   | NOT USED                                          |              |                   |
| 12   | 1   | PISTON 9/16 DIA.                                  | 64042002300  | TYPE 440 C.ST.ST. |
| 11   | 1   | PACKING GLAND NUT                                 | 64042002400  | TYPE 416 ST.ST.   |
| 10   | 1   | PACKING FOLLOVER                                  | 64042002200  | AMPCD # 15        |
| 9    | 1   | POLYPAK SEAL PACKING                              | P1615009000  | MOLYTHANE         |
| 8    | 1   | PACKING RETAINER                                  | 64042002500  | AMPCD # 15        |
| 7    | 1   | BACK-UP RING (8-210-N300-9)                       | P1620009600  | BUNA -N-          |
| 6    | 1   | O-RING (2-210)                                    | P1604011000  | BUNA -N-          |
| 5    | 1   | BODY                                              | 64042003102  | 4340 HR. HT       |
| 4    | 1   | DIAPHRAGM                                         | 62018000500  | TYPE 302 ST.ST.   |
| 3    | 1   | HEAD                                              | P1634041400  | STEEL, HARDENED   |
| 2    | 8   | WASHER, PLAIN 21/32 I.D. X 1/8 THICK              | P2030074800  | STEEL, B.L. DK.   |
| 1    | 8   | SCREW, SDOCK.T. HD. CAP. 5/8-18UNF-2A X 3" LONG   |              | STEEL, B.L. DK.   |

| ITEM | QTY     | DESCRIPTION | PART NO. | MATERIAL |
|------|---------|-------------|----------|----------|
| 27   | 64042-2 | 46-13421-2  |          |          |
| 46   | 13411-2 | USED ON     |          |          |

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONS ±  
DECIMALS ±  
ANGLES ±0°-30°  
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NEPORT SCIENTIFIC INC.  
SUPERPRESSURE

DATE: \_\_\_\_\_  
BY: \_\_\_\_\_  
CHECKED: \_\_\_\_\_  
ENGR/DESIGN APPROVED: \_\_\_\_\_  
MATERIAL: \_\_\_\_\_

THIS MOTOR DRIVEN DIAPHRAGM COMPRESSOR 10,000PSI, LEFT SIDE HEAD ASSEMBLY 9/16 DIA. PISTON

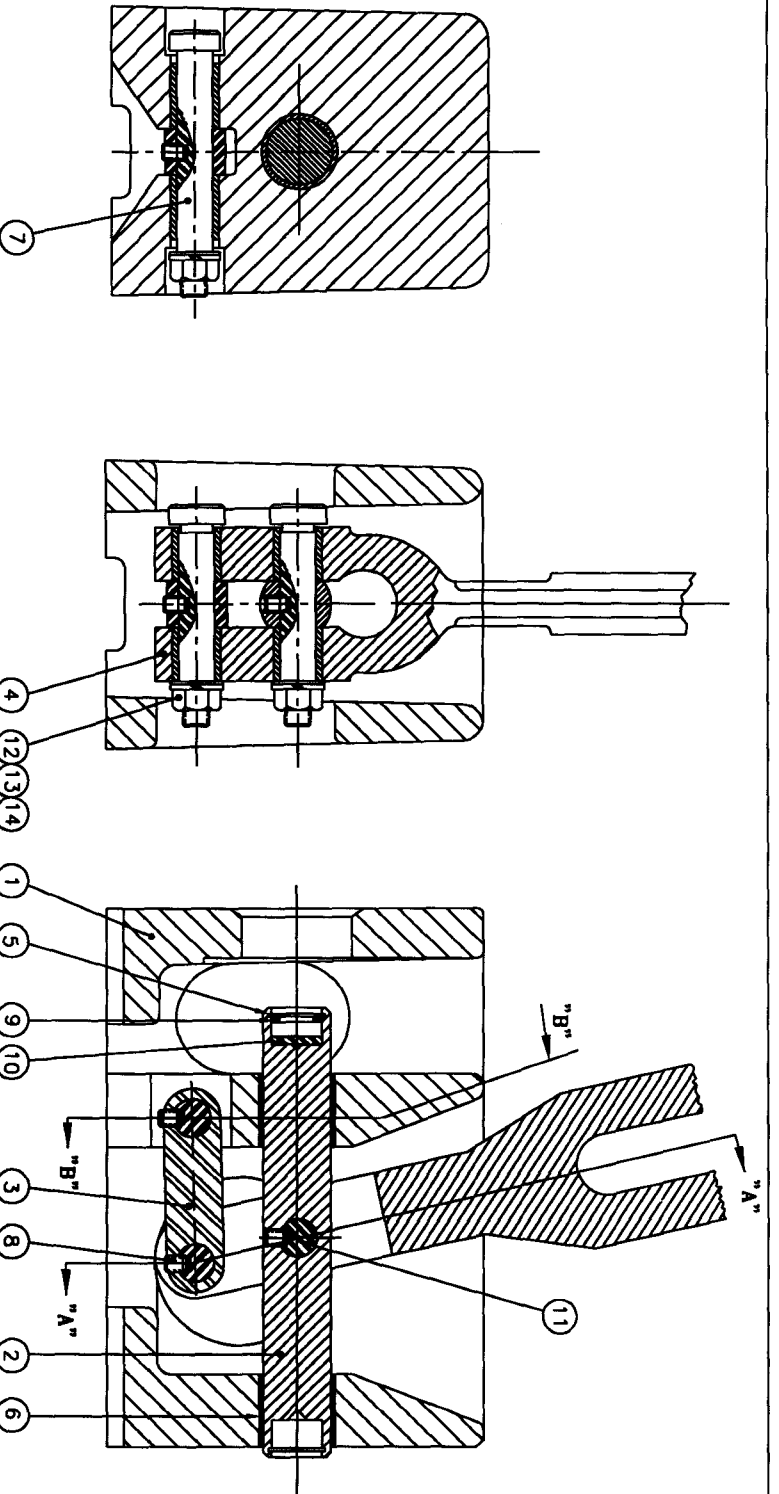
CODE IDENT. NO. 59505  
SHEET 0 OF 1  
PART NO. 64042002802  
DRAWING NO. 2864042

SCALE: NONE  
SHEET 1 OF 1

SEE SH 2

APPLICATION

LIST OF MATERIAL



SECTION B - B SECTION A - A

| ITEM NO. | QTY | DESCRIPTION                            | PART NO.    | MATERIAL               |
|----------|-----|----------------------------------------|-------------|------------------------|
| 14       | 3   | LOCK WASHER 3/8 I.D.                   | R1061005400 | STEEL                  |
| 13       | 3   | FLAT WASHER 3/8 I.D.                   | R1065007200 | STEEL BL. OX.          |
| 12       | 3   | HEX. NUT 3/8 - 16                      | R1050001500 | STEEL, CAD. PL.        |
| 11       | 2   | SHOULDER SCR. 1/2 DIA X 2 1/4 LG       | 63167004000 | STEEL                  |
| 10       | 1   | THRUST WASHER                          | 63167002500 | TYPE 416 ST. ST.       |
| 9        | 1   | "C" RING                               | 84001001300 | TYPE 316 ST. ST.       |
| 8        | 3   | SET SCREW 1/4-28X1/4 LG HALF DOG POINT | P1020021300 | ALLOY STEEL, BL. OXIDE |
| 7        | 1   | SHOULDER SCR. 1/2 DIA X 1 LG           | 63167004100 | STEEL                  |
| 6        | 2   | BEARINGS (REF.)                        | 1500-250    | NYLON AND STEEL        |
| 5        | 1   | RETAINING RING                         | P1620021800 | STEEL                  |
| 4        | 1   | SLOTTED LEVER                          | 63173010100 | STEEL                  |
| 3        | 1   | LINK                                   | 63173010400 | CARBON STEEL           |
| 2        | 1   | DRIVE PISTON                           | 63173010300 | ALLOY STEEL            |
| 1        | 1   | BASE                                   | 63167004300 | ALUM. ALLOY            |

LIST OF MATERIAL

|                                                     |        |             |                                                                                                                                                                                                                                    |
|-----------------------------------------------------|--------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PREPARED BY                                         | DATE   | FINISH:     | <p><b>PROPRIETARY</b></p> <p>This document is issued in strict confidence on condition that it is not copied, reprinted, or disclosed to a third party, wholly or in part, without written consent of Newport Scientific, Inc.</p> |
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| APPROVED                                            |        |             |                                                                                                                                                                                                                                    |
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| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |        |             |                                                                                                                                                                                                                                    |
| FRACTIONS ±                                         |        |             |                                                                                                                                                                                                                                    |
| DECIMALS ±                                          |        |             |                                                                                                                                                                                                                                    |
| ANGLES ± 0-30'                                      |        |             |                                                                                                                                                                                                                                    |
| REMOVE ALL BURRS AND SWAGE EDGES                    |        |             |                                                                                                                                                                                                                                    |
| TITLE                                               |        |             |                                                                                                                                                                                                                                    |
| DRIVE PISTON-ASSEMBLY                               |        |             |                                                                                                                                                                                                                                    |
| SINGLE ACTING, MOTOR DRIVEN                         |        |             |                                                                                                                                                                                                                                    |
| CODE IDENT. NO.                                     | SIZE   | PART NO.    |                                                                                                                                                                                                                                    |
| 59505                                               |        | 84001000400 |                                                                                                                                                                                                                                    |
| SCALE                                               | WEIGHT | DRAWING NO. |                                                                                                                                                                                                                                    |
|                                                     |        | 484001      |                                                                                                                                                                                                                                    |
|                                                     | SHEET  | OF          |                                                                                                                                                                                                                                    |
|                                                     | 1      | 1           |                                                                                                                                                                                                                                    |

APPLICATION USED ON

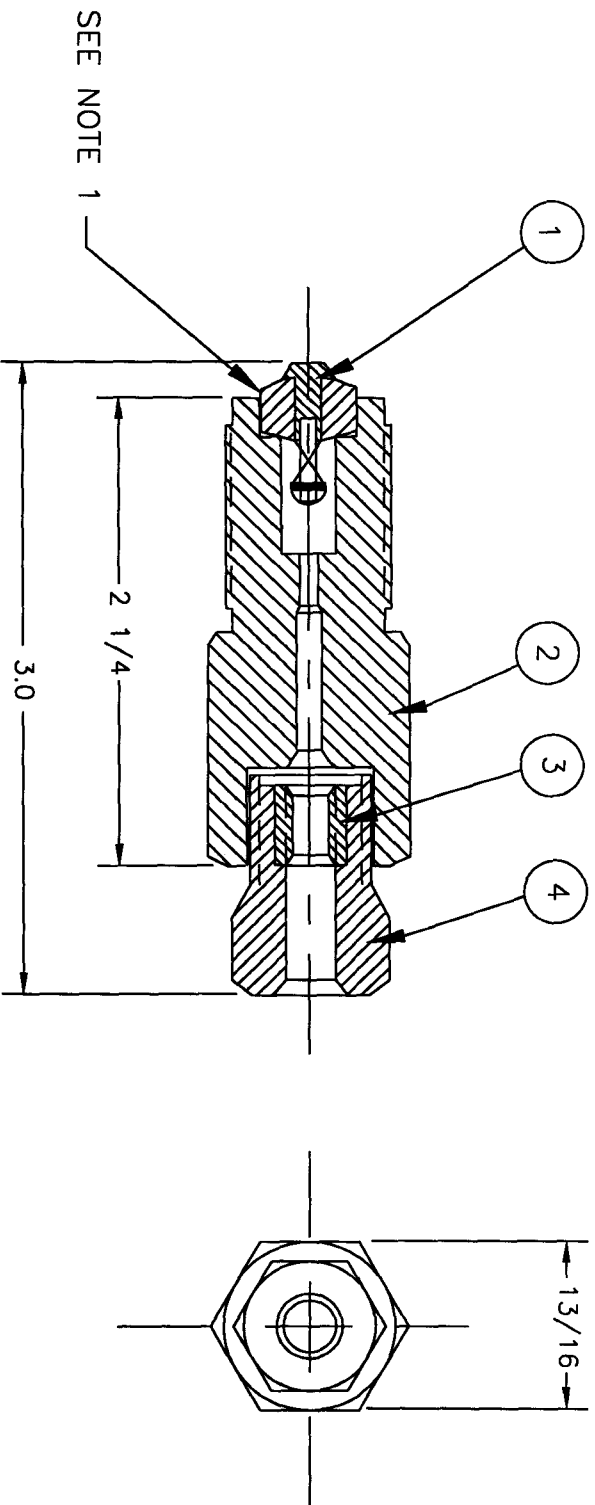
SEE CHART

SCALE

WEIGHT

SHEET 1 OF 1





NOTES:

1. STAKE LENS RING OF POPPET; SUB-ASSEMBLY ITEM 1 IN PLACE WITH CENTER PUNCH IF NECESSARY.
2. TIGHTEN GLAND NUT ITEM 4 HAND TIGHT FOR SHIPPING.
3. TIGHTEN GLAND NUT ITEM 4 TO A TORQUE OF 15 FT./LBS. APPROX. WITH TUBING INSTALLED.
4. PRESS,RATING = 10,000 P.S.I.
5. ELECTRO ETCH/MARK
- A. SUPERPRESSURE DIAMOND
- B. CAT NO.
- C. PRESSURE RATING (IF APPLICABLE)
- D. LOT NO. (IF APPLICABLE)
- E. D.O.M.
- F. FLOW ARROW (IF APPLICABLE)

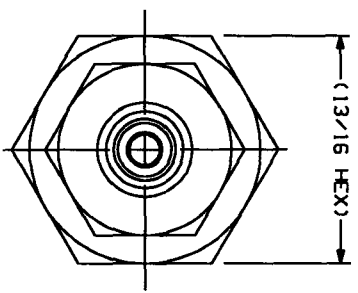
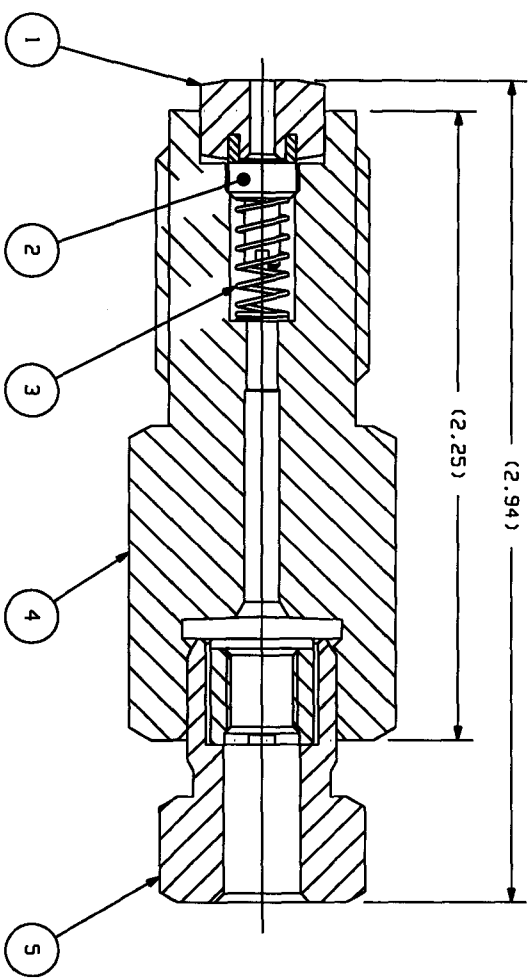
| ITEM | QTY. | DESCRIPTION         | PART NO     | MATERIAL          |
|------|------|---------------------|-------------|-------------------|
| 1    | 1    | POPET; SUB-ASSEMBLY | 66005000100 | AS PER DETAIL     |
| 2    | 1    | VALVE BODY          | 62004001000 | TYPE 316 ST. STL. |
| 3    | 1    | INNER SLEEVE        | 45-11316    | TYPE 416 ST. STL. |
| 4    | 1    | GLAND NUT           | 45-11313    | TYPE 416 ST. STL. |

| LIST OF MATERIAL | ASSEMBLY | USED ON |
|------------------|----------|---------|
|                  |          |         |

|                                                                                                                                                                                |                            |                                                                                                                                                                                  |                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONS ±<br>DECIMALS ±<br>ANGLES ±<br>REMOVE ALL BORES AND SWAG BORES<br>DO NOT SCALE THIS DRAWING |                            | <b>PROPRIETARY</b><br>This document is issued in strict confidence on condition that it is not copied, reprinted, or in part, without written consent of Newport Scientific Inc. |                                                                                |
| PREPARED BY: _____<br>CHECKED BY: _____<br>DREW/ISSUED BY: _____<br>APPROVED BY: _____                                                                                         | NAME: _____<br>DATE: _____ | FINISH: _____<br>TITLE: GAS SERVICE CHECK VALVE 10,000 PSI INTAKE SOFT SEAT                                                                                                      | CODE DEPT. NO. 59505<br>SCALE: _____<br>WEIGHT: _____<br>SHEET: _____ OF _____ |
| MATERIAL: _____                                                                                                                                                                |                            | PART NO. 44-11102<br>DRAWING NO. 4411102                                                                                                                                         |                                                                                |



| REVISIONS |      |             |      |          |
|-----------|------|-------------|------|----------|
| SYM       | ZONE | DESCRIPTION | DATE | APPROVED |
|           |      |             |      |          |



SEE NOTE 4

NOTES:

1. PRESSURE RATING = 10,000 PSI.
2. TIGHTEN GLAND NUT, (ITEM 5) HAND TIGHT FOR SHIPPING.
3. TIGHTEN GLAND NUT, (ITEM 5) TO A TORQUE OF 15 FT/LBS (APPROX) WITH TUBING INSTALLED.
4. STRIKE LENS RING ASSY, (ITEM 1) IN PLACE WITH A CENTER PUNCH IF NECESSARY.
5. ELECTRO ETCH/MARK
  - A. SUPERPRESSURE DIAMOND
  - B. CAT NO.
  - C. PRESSURE RATING (IF APPLICABLE)
  - D. LOT NO. (IF APPLICABLE)
  - E. D.O.M.
  - F. FLOW ARROW (IF APPLICABLE)

| ITEM | QTY | DESCRIPTION                    | DWG/PART NO. | MATERIAL    |
|------|-----|--------------------------------|--------------|-------------|
| 5    | 1   | ASSEMBLY, GLAND NUT AND SLEEVE | 45-11310     | PER DETAILS |
| 4    | 1   | BODY                           | 62004001000  | TYPE 316 SS |
| 3    | 1   | SPRING                         | 50029003201  | TYPE 302 SS |
| 2    | 1   | POPET                          | 66004001000  | TYPE 316 SS |
| 1    | 1   | ASSEMBLY, VALVE SEAT           | 66005000300  | PER DETAILS |

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES:

|                                 |  |
|---------------------------------|--|
| FRACTIONS ±                     |  |
| DECIMALS ±                      |  |
| ANGLES ±                        |  |
| REMOVE ALL BURS AND SHARP EDGES |  |
| DO NOT SCALE THIS DRAWING       |  |
| MATERIAL:                       |  |

**PROPRIETARY**

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|               |           |      |      |
|---------------|-----------|------|------|
| CONTRACT      | BY        | NAME | DATE |
|               |           |      |      |
|               | PREPARED  |      |      |
|               | CHECKED   |      |      |
|               | ENGR/DJGM |      |      |
|               | APPROVED  |      |      |
| CERTIFICATION |           |      |      |

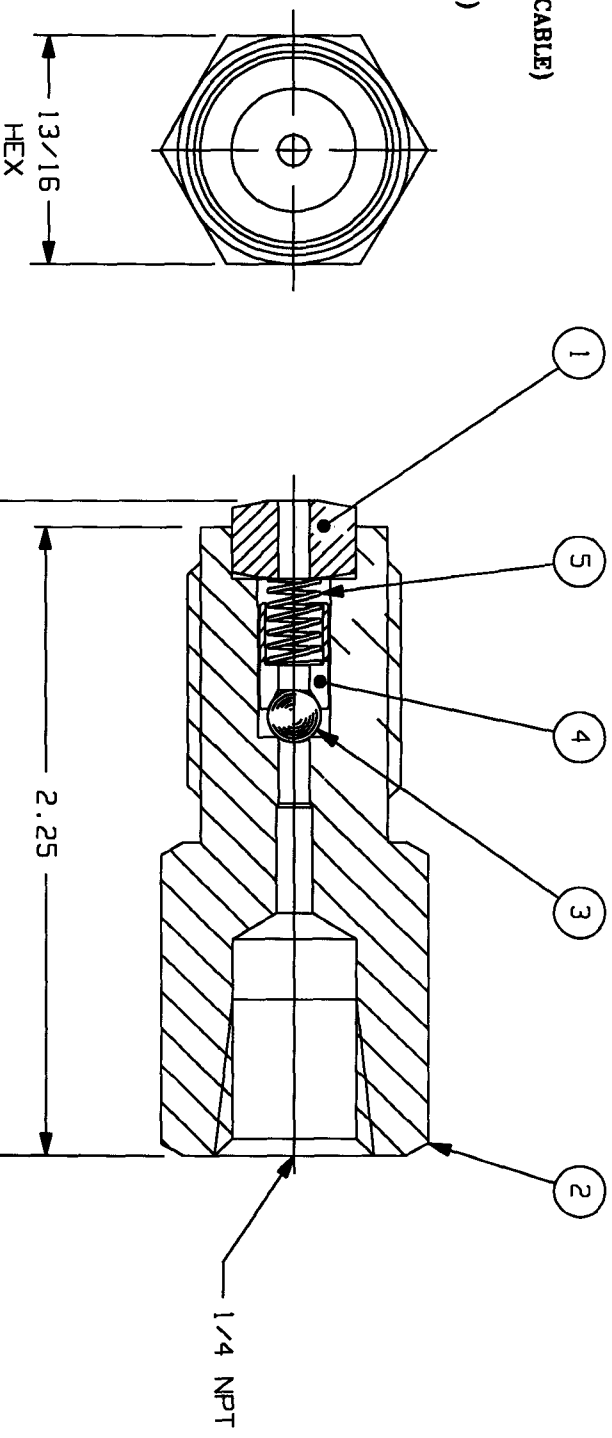
|                                  |             |
|----------------------------------|-------------|
| TITLE                            | GAS SERVICE |
| CHECK VALVE 10,000 PSI DISCHARGE | SDFT SEAT   |
| CODE IDENT. NO.                  | 59505       |
| SIZE                             |             |
| PART NO.                         | 44-11107    |
| DRAWING NO.                      | 4411107     |
| SCALE                            |             |
| WEIGHT                           |             |
| SHEET                            | 1 OF 1      |



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**ELECTRO ETCH/MARK**

- A. SUPERPRESSURE DIAMOND
- B. CAT NO.
- C. PRESSURE RATING (IF APPLICABLE)
- D. LOT NO. (IF APPLICABLE)
- E. D.O.M.
- F. FLOW ARROW (IF APPLICABLE)



| ITEM | QTY | DESCRIPTION   | DMG/PART NO. | MATERIAL                    |
|------|-----|---------------|--------------|-----------------------------|
| 5    | 1   | SPRING        | 50029003204  | TYPE 18-8 STAINLESS STEEL   |
| 4    | 1   | BALL RETAINER | 62002000400  | TYPE 316 STAINLESS STEEL    |
| 3    | 1   | BALL          | P1500013300  | TYPE 440 STAINLESS STEEL    |
| 2    | 1   | BODY          | 62079000400  | TYPE 316 STAINLESS STEEL    |
| 1    | 1   | LENS RING     | 63038000400  | TYPE 17-4PH STAINLESS STEEL |

**LIST OF MATERIAL**

- NOTES:**
1. STRIKE ITEM 1 (LENS RING) IN PLACE WITH R CENTER PUNCH IF NECESSARY.
  2. DIMENSIONS SHOWN ARE FOR REFERENCE ONLY

**PROPRIETARY**

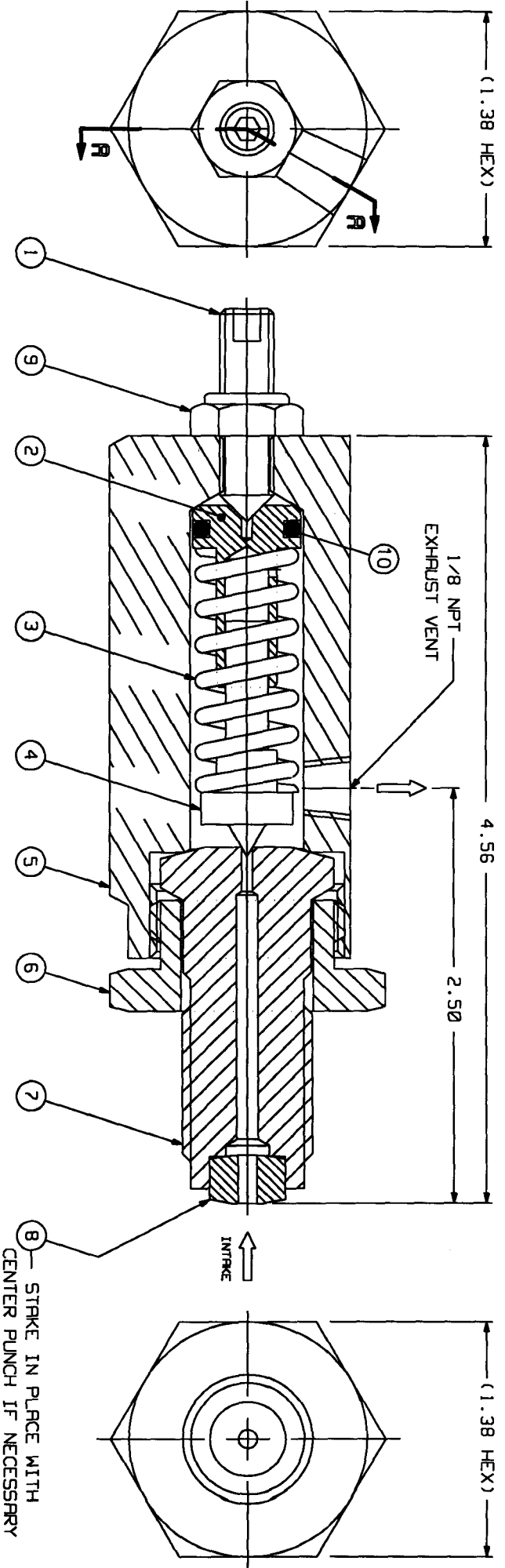
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|                                                                 |  |                                                                                                                                  |                     |
|-----------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------|---------------------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES: |  | CONTRACT                                                                                                                         |                     |
| FRACTIONS ± SEE DECIMALS ± NOTES                                |  | BY                                                                                                                               | NAME                |
| ANGLES ± REMOVE ALL BURS AND SHARP EDGES                        |  | PREPARED                                                                                                                         | DATE                |
| DO NOT SCALE THIS DRAWING                                       |  | CHECKED                                                                                                                          |                     |
| MATERIAL:                                                       |  | ENGR/DSSN                                                                                                                        |                     |
| SEE MATERIAL LIST                                               |  | APPROVED                                                                                                                         |                     |
|                                                                 |  | CERTIFICATION                                                                                                                    |                     |
| CODE IDENT. NO. 59505                                           |  | SIZE                                                                                                                             | PART NO. 44-14110   |
| SCALE                                                           |  | WEIGHT                                                                                                                           | DRAWING NO. 4414110 |
| SHEET 1 OF 1                                                    |  | <p style="text-align: center;"><b>LIQUID SERVICE</b></p> <p style="text-align: center;"><b>CHECK VALVE 40,000 PSI INTAKE</b></p> |                     |



**NEWPORT SCIENTIFIC INC.**

| REVISIONS |                |         |          |
|-----------|----------------|---------|----------|
| SYM       | DESCRIPTION    | DATE    | APPROVED |
| A         | ADDED ITEM #10 | 10-2-01 |          |



| DRSH NO. | ORIFICE DIA | PRESSURE RANGE (PSI) |
|----------|-------------|----------------------|
| -4       | .125        | 3,000 - 7,500        |
| -3       | .046        | 20,000 - 50,000      |
| -2       | .062        | 14,000 - 35,000      |
| -1       | .093        | 5,000 - 14,000       |

**SECTION A-A**

STAMP PART NO.  
AND D.O.M.

REPLACES  
DRAWING NO.  
B1-62006

| APPLICATION |
|-------------|
| NEXT ASSY   |
| USED ON     |

| ITEM | QTY | DESCRIPTION                           | DMG/PART NO. | MATERIAL             |
|------|-----|---------------------------------------|--------------|----------------------|
| 10   | 1   | "0" RING                              | P1604025100  | BUNA "N"             |
| 9    | 1   | STOP NUT, THIN ELASTIC, 5/16-24UNF-2B | P1054005500  | STEEL                |
| 8    | 1   | GASKET, LENS RING                     | 63038000400  | 17-4 PH STEEL        |
| 7    | 1   | VALVE SEAT (SEE CHART)                | 62006001000  | 17-4 PH STEEL        |
| 6    | 1   | NUT                                   | 62006001100  | CRS                  |
| 5    | 1   | BODY                                  | 62006000900  | CRS                  |
| 4    | 1   | STEM                                  | 64079000200  | 440C STAINLESS STEEL |
| 3    | 1   | SPRING                                | P1632014900  | FILLOY STEEL         |
| 2    | 1   | GUIDE, SPRING                         | 64079000300  | 416 STAINLESS STEEL  |
| 1    | 1   | SET SCREW, SOCKET HD, 5/16-24UNF-2H   | 62006000800  | STEEL                |

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES:

FRACTIONS ±

DECIMALS ± .03

ANGLES ±

REMOVE ALL BURRS AND SHARP EDGES

DO NOT SCALE THIS DRAWING

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECKED \_\_\_\_\_

ENGR/ISSN \_\_\_\_\_

APPROVED \_\_\_\_\_

MATERIAL \_\_\_\_\_

SEE CHART

TIME

ASSEMBLY

RELIEF VALVE FOR

LIQUID SERVICE

CODE IDENT. NO. 59505

SIZE D

PART NO. 62006001200

DRAWING NO. 1262006

SCALE 2=1

WEIGHT \_\_\_\_\_

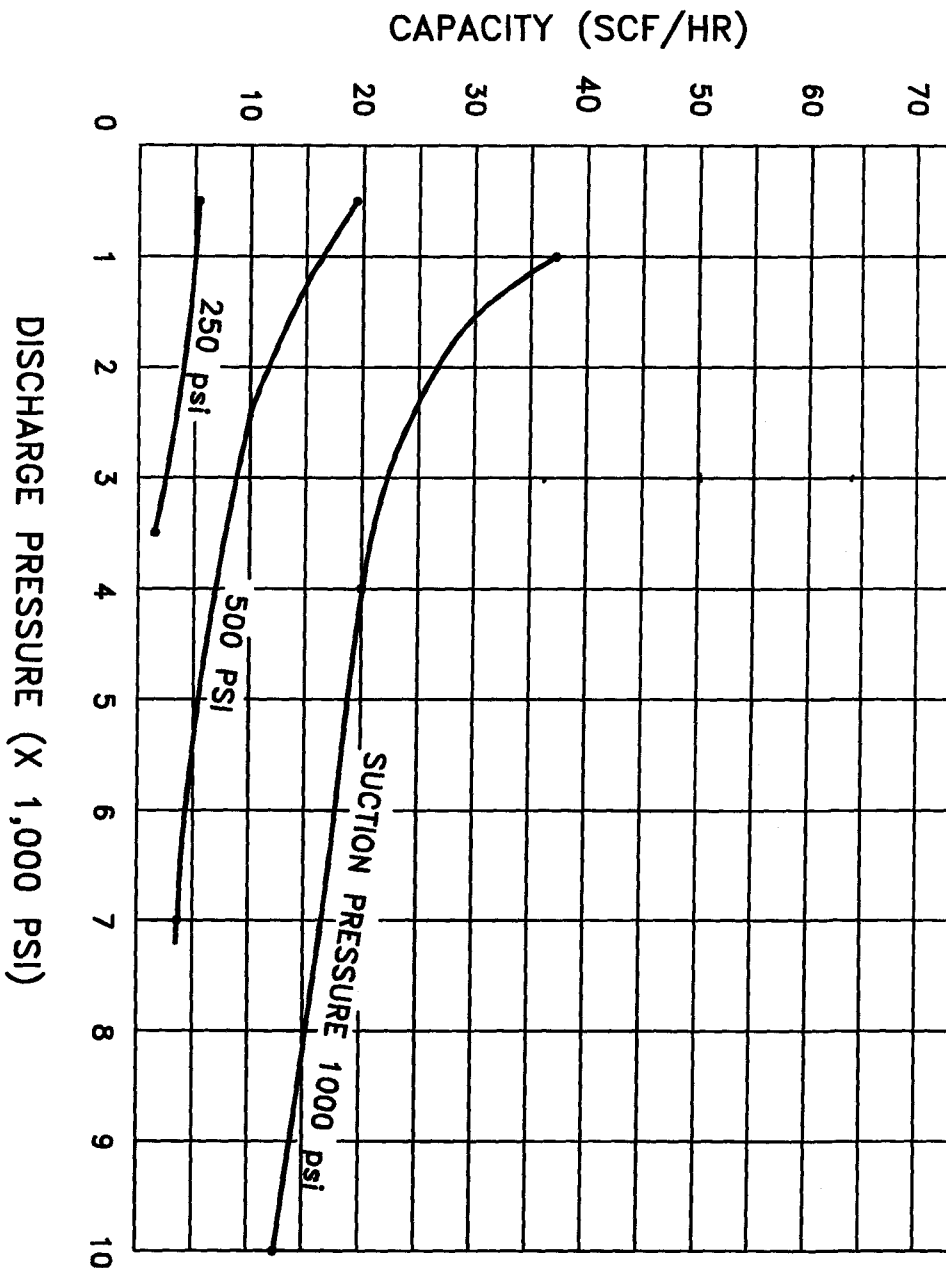
SHEET 1 OF 1

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**NEUPORT SCIENTIFIC INC.**

LIST OF MATERIAL



CAPACITIES FOR DOUBLE END  
 UNIT No.46-13421-2 ARE  
 APPROX. 2 TIMES FOR THE  
 SINGLE END UNIT 46-13411-2

TEST DATA  
 GAS : NITROGEN  
 TEMPERATURE : 70°F  
 OIL : SAE 20

DISCHARGE PRESSURE (X 1,000 PSI)

|             |         |
|-------------|---------|
| APPLICATION | USED ON |
| NEXT ASSY   |         |

UNLESS OTHERWISE SPECIFIED  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES:  
 FRACTIONS ±  
 DECIMALS ±  
 ANGLES ±

REMOVE ALL BURRS AND SHARP EDGES  
 DO NOT SCALE THIS DRAWING

BY: [ ] NAME: [ ] DATE: [ ] FINISH: [ ]  
 CHECKED: [ ]  
 DATE/INITIAL: [ ]  
 APPROVED: [ ]  
 MATERIAL: [ ]

SCALE: [ ] WEIGHT: [ ]

CODE IDENT. NO. 59505  
 PART NO. CURVE 10K MDT  
 DRAWING NO. CURV10KMDT

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**SUPERPRESSURE** **NEWPORT SCIENTIFIC INC.**

**CURVE FOR SINGLE END 10K PSI MOTOR DRIVEN #46-13411-2**