



3-Cell Auto Control Panel
1-Cell Auto Control Panel

INTRODUCTION

The HM-4155 Pressure Control/Distribution Panel controls the distribution of air pressure, vacuum, tap water, and de-aerated water to support up to three triaxial test apparatuses. The distribution panel has controls to transfer water in and out of the de-airing tank as well as vacuum and pressure to the de-airing tank. It also provides a drain for the de-airing tank. It regulates system air pressure for the HM-2450A Automatic Pressure Controller. There are air pressure port connections for up to three automatic pressure controllers. There are also port connections for tap water and de-aerated water for the cell and sample which can be connected through the HM-4151A Air Bladder Cylinders and HM-2315 Automatic Volume Change Device for up to three triaxial tests simultaneously. An auxiliary pressure regulator supplies up to 10 psi air pressure for the de-airing tank and an auxiliary pressure port connection. It also has an auxiliary vacuum port connection. There is an inline air filter for the main air supply. A supply of compressed air is necessary as well as vacuum, tap water, and a drain to allow water to be removed from the test apparatus.

INSTALLATION

The HM-4155 is a simple, free standing bench mounted system which requires no fixed mounting.

PANEL MOUNTING

A pair of supporting feet is supplied with the panel so that it can be bench mounted and remain stable. Screws, nuts, and washers for the support feet are supplied so that the support feet can be attached as shown in Figure 1.

AIR/WATER CONNECTIONS

All connections will require either 1/4 inch OD or 1/8 inch OD flexible tubing. However, metric adapters are available to allow connecting the 1/4 inch tubing to 6 mm tubing.

PANEL CONNECTIONS

The panel is equipped with push-to-connect style fittings on the back side of the panel frame. It is necessary to use 1/4" OD flexible tubing to make the connections. Figure 2 shows how the connections are to be made with air and water sources as well as connections to the triaxial cell and other equipment. The panel is designed to accommodate 3 triaxial test apparatuses simultaneously. However, only the connections for one triaxial test apparatus are shown in the figure. The two remaining test apparatuses connect to their respective connection locations. Insert the tubing into the fittings. The seal in the fitting will resist the tubing and a little extra force will be required to get the tubing to pass through the seal in the fitting. To make sure the tubing is in all the way, lightly pull on the tubing. If it comes out of the fitting, it was not inserted completely.

While facing the back of the panel, the four connections starting from the left are for the water drain, tap water input, vacuum input, and compressed air input respectively. The last three connections are for de-aerated water return from the de-airing tank, tap water going to the de-airing tank, and air/vacuum to the de-airing tank respectively.

On the face of the panel are the connections for air pressure outputs to the HM-2450A Automatic Pressure Controllers, tap water and de-aerated water for the HM-4151A Air/Water Bladder Cylinders, HM-2315 Automatic Volume Change, and the triaxial cell. Also, there is an auxiliary pressure connection for air pressure up to 10 psi and an auxiliary vacuum connection. These connections are made using quick disconnect style fittings. These fittings have a barbed end which fits into the tubing and a nut which fits over the tubing to clamp the tubing on to the barbed end of the fitting. To disconnect the fittings from the panel, push down on the tab at the top of the socket half of the fitting as shown in Figure 3. The plug half of the fitting will pop outward. To reconnect it, just push the plug into the socket until the tab clicks and locks the plug in place. The connection for the tap water to the base of the sample via the volume change device requires a ¼ inch to 1/8 inch push-to-connect adapter to allow the attachment of ¼ inch tubing from the panel to the 1/8 inch OD tubing which connects to the volume change device. This adapter is supplied with the panel.

BLADDER CYLINDER CONNECTION

The HM-4151A Air/Water Bladder Cylinders have push to connect style fittings at the bottom of the assembly. These fittings use the ¼ inch OD tubing and attach the by the same method as the fittings on the back side of the panel. The right fitting is for air pressure from the Automatic Pressure Controller. The other push-to-connect fitting is for water from the connections on the front of the panel. There are two bladder cylinders required per triaxial cell. One bladder cylinder is for cell pressure and tap water supply, the other cylinder is for back pressure and de-aerated sample water supply. The air pressure line for one of the bladder cylinders will connect to the Cell air pressure connection on the back of the HM-2450A Automatic Pressure Controller and the water line for that bladder cylinder will connect to the Bladder A connection on the front of the panel. The air line for the second bladder cylinder will connect to the back pressure connection on the back of the HM-2450A Automatic Pressure Controller and the water line for the second bladder cylinder will connect to the Bladder B connection on the front of the panel as shown in Figure 2.

AUTO VOLUME CHANGE CONNECTION

The HM-2315 Automatic Volume Change Device has push-to-connect fittings for 1/8 inch OD tubing. The volume change device is connected

to the panel at the Base connection on the front of the panel as shown in Figure 2. The connection for the tap water to the base of the sample via the volume change device requires a ¼ inch to 1/8 inch push-to-connect adapter to allow the attachment of ¼ inch tubing from the panel to the 1/8 inch OD tubing which connects to the volume change device. This adapter is supplied with the panel. The Automatic Volume Change device also connects to the solenoid valve on the triaxial cell as shown in Figure 4. The solenoid valve has a compression fitting.

TRIAXIAL CELL CONNECTION

The triaxial cell has compression fittings on the front as shown in Figure 4. The Cell connection on the triaxial cell (valve V3 in Figure 4) connects to the Cell port connection on the front of the panel (see Figure 2).

DE-AIRING TANK CONNECTION

The de-airing tank has connections for the tap water in, de-aerated water out, and air/vacuum lines. These lines connect to the back side of the panel at the corresponding push-to-connect fittings located adjacent to the input connections for compressed air, vacuum, tap water, and drain.

ELECTRICAL CONNECTION

There are no electrical connections required on the HM-4155 Distribution Panel.

OPERATION

After making all of the necessary connections, check to make sure all of the valves on the front of the panel are set to the off position. Also, loosen the jam nuts on the regulators as shown in Figure 3.

AIR PRESSURE ADJUSTMENT

There are two separate regulators on the panel. The main regulator, located below the gauge labeled SYSTEM AIR PRESSURE, controls the supply of air for all air connections on the front of the panel and also for the auxiliary regulator. The auxiliary regulator labeled AUXILIARY AIR PRESSURE in the upper right corner controls the air pressure up to 10 psi for the auxiliary air pressure port and for the de-airing tank to assist in draining the de-airing tank. This regulator has a locking knob which must be pulled out to adjust the pressure or pushed in to lock it into position (Figure 5).

AIR/WATER CONTROL VALVES

There are several control valves on the panel for on/off operation of the air and water control. There are two valves under the De-Airing Tank heading (Figure 6). These valves control flow of water to and from the de-airing tank and air or vacuum to the tank. The water flow valve either allows tap water to fill the tank or allows the tank to be drained for cleaning and maintenance. The other valve is for the application of

vacuum to the de-airing tank to remove air from the water in the tank and it also allows compressed air to be pumped into the tank to assist in draining the water from the tank. The small auxiliary regulator controls the amount of pressure to assist in draining the water from the de-airing tank (Figure 5). Set the desired pressure by turning the knob on the auxiliary regulator in the clockwise direction.

NOTE: These valves must be in the off position during a test.

There are three valves under the AIR CONNECTION heading (Figure 7) on the front of the panel (one valve per triaxial cell). These valves allow air pressure to flow to the HM-2450A Automatic Pressure Controllers. These valves will be either in the on or off position.

There are six valves under the WATER CONNECTION heading. There are two valves for each triaxial cell apparatus. One of the two controls the flow of tap water to the cell and to the corresponding bladder cylinder and the other controls the flow of de-aerated water to the Auto Volume Change and to the other bladder cylinder in the apparatus (Figure 8). When the valve for the cell is in the FILL position, water flows to the cell and bladder cylinder at the same time. When the valve labeled PWP is in the FILL position, de-aerated water flows to the sample base through the Automatic Volume Change and to the second bladder cylinder at the same time. The CELL valve has a drain position which allows water to be drained from the cell.

NOTE: These valves should be in the off position during a test. The valve is in the off position when the knob is pointed to the left towards the quick connect sockets.

PRESSURE GAUGES

There is one pressure gauge on the panel. The gauge at the upper left side is used to monitor the pressure regulated by the main pressure input regulator. It is a mechanical gauge and requires no electrical source.

AIR FILTER

There is an in-line air filter which filters the incoming air from the compressed air source. It also traps water and other fluids in the line.

MAINTENANCE

There is very little maintenance required.

The air filter should be checked every day to determine if the white filter element is dirty or if fluid must be drained from the clear plastic bowl. To remove water or fluids from the bowl, turn the black knob at the bottom of the clear plastic bowl. To purge the fluids from the bowl, turn the knob as if tightening a right handed screw and the fluids will drain out of the bottom. To close it, turn the knob as if loosening the screw.

Caution: The filter may be under pressure. If so, the fluids will spray out at high velocity.

If the filter becomes dirty and clogged, open the drain plug as described above to relieve pressure. Remove the bowl by rotating the bowl counterclockwise to unscrew it from the filter body. Be careful not to lose or damage the o-ring that seals the bowl to the body of the filter. Next, unscrew the filter support by turning it counterclockwise until it comes off. Slide the filter element off of the support and replace it with a new filter. Reassemble the air filter assembly in the reverse order.

SERVICE

Please contact Humboldt for service: 1-800-544-7220.

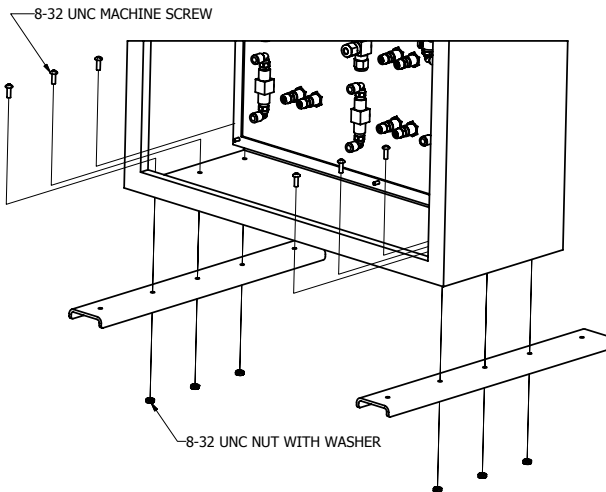


Figure 1: Mounting Feet Assembly

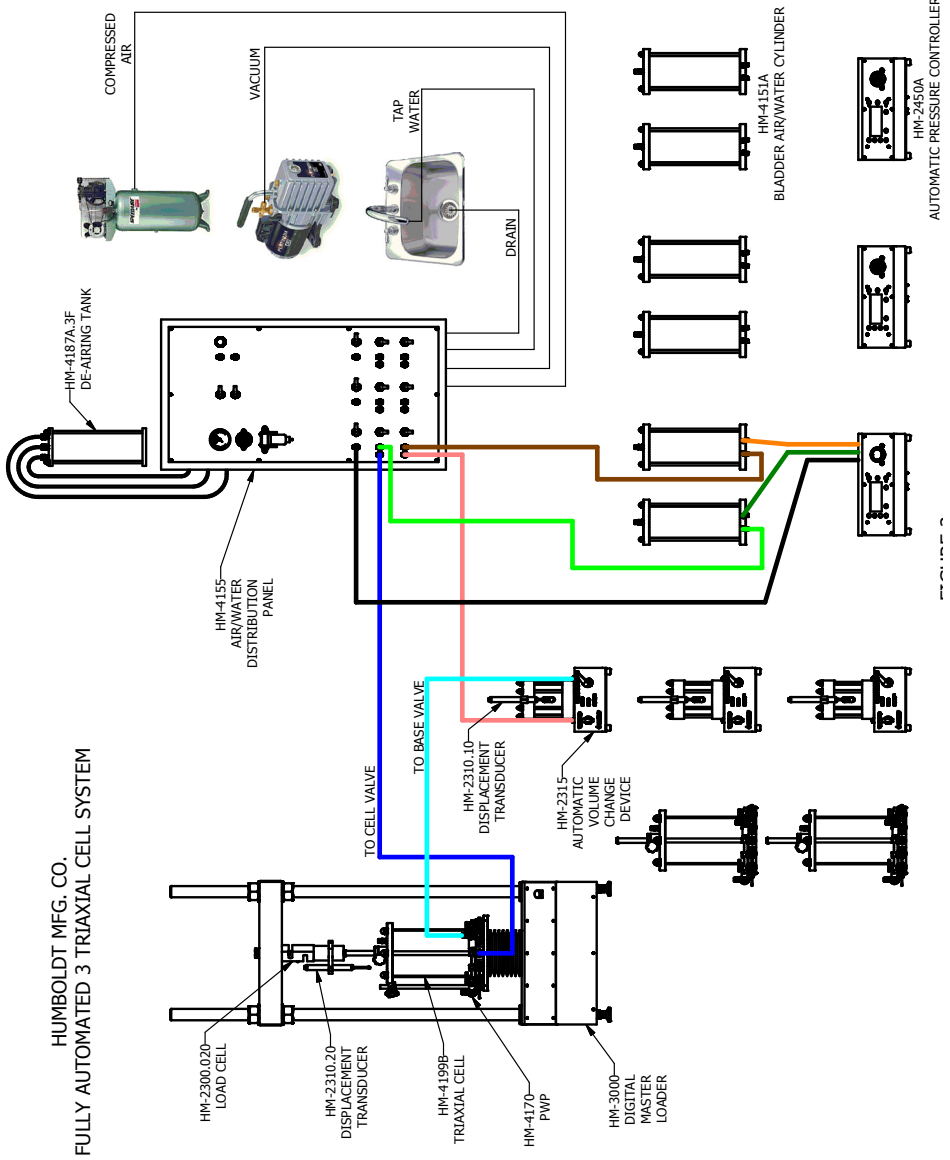


Figure 2

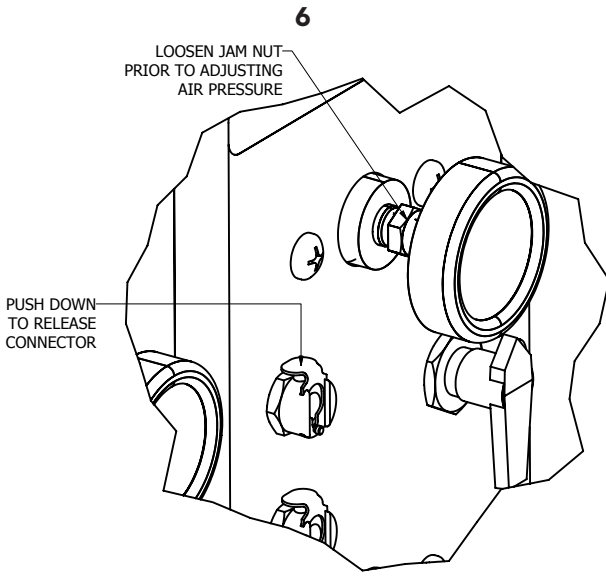


Figure 3

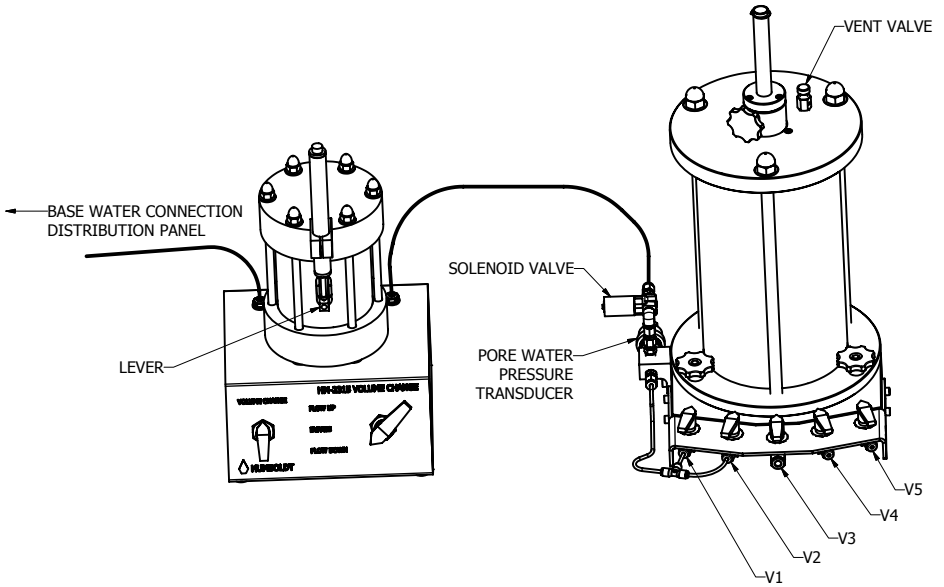


Figure 4 Triaxial Cell

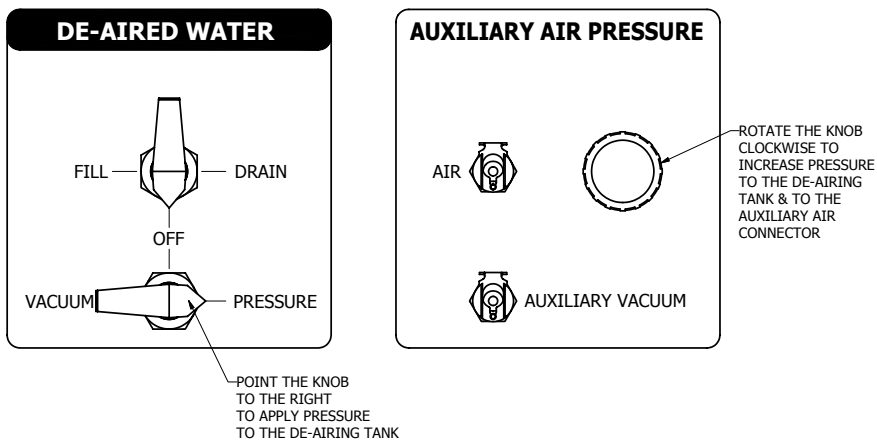


Figure 5

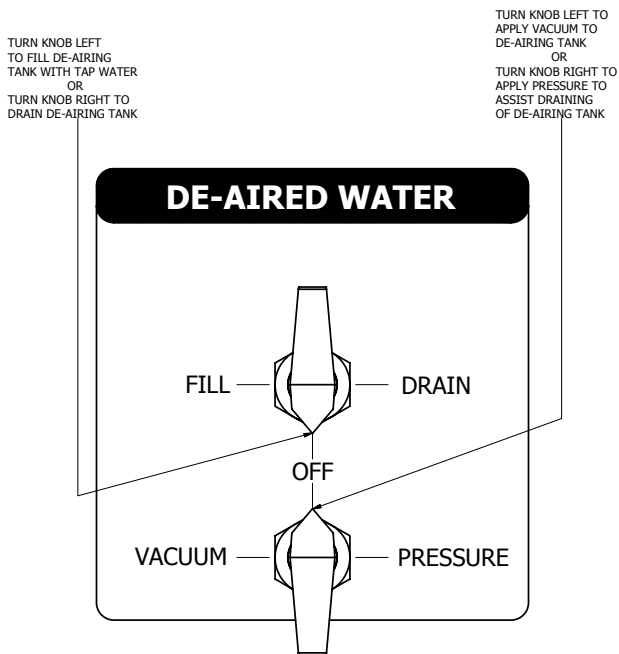


Figure 6

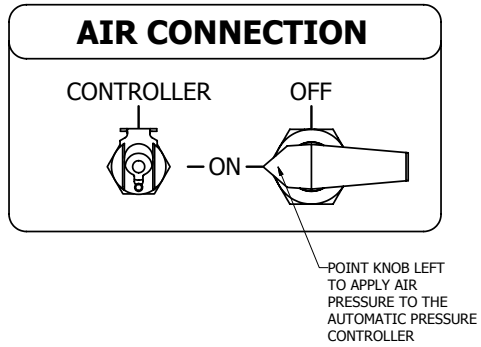


Figure 7

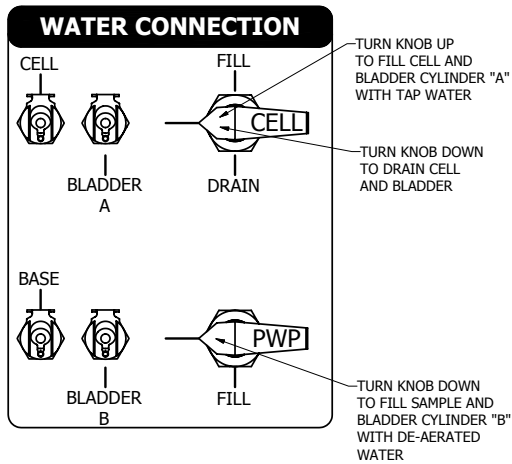


Figure 8

Wilkerson Lubricators and Filters

Pneumatic Division
 Richland, Michigan 49083
 269-629-5000

Installation & Service Instructions: 1M103G

**Miniature Series
 Micro-Mist Lubricators &
 Particulate Filters**

**ISSUED: November, 2003
 Supersedes: September, 2000
 Doc.# 1M103, ECN# 030539, Rev. 8**

⚠ WARNING

To avoid unpredictable system behavior that can cause personal injury and property damage:

- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to this product before installation, servicing, or conversion.
- Operate within the manufacturer's specified pressure, temperature, and other conditions listed in these instructions.
- Medium must be moisture-free if ambient temperature is below freezing.
- Service according to procedures listed in these instructions.
- Installation, service, and conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversion, air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or the product does not operate properly, do not put into use.
- Warnings and specifications on the product should not be covered by paint, etc. If masking is not possible, contact your local representative for replacement labels.

Introduction

Follow these instructions when installing, operating, or servicing the product.

Application Limits

These products are intended for use in general purpose compressed air systems only.

Operating Inlet Pressure:

	kPa	PSIG	bar
with Polycarbonate Bowl	1000	150	10.3
with Metal Bowl	1700	250	17.0

NOTE: The maximum recommended pressure drop for a particulate filter is 70 kPa (10 psig, 0.7 bar)

Ambient Temperature Range:

with Polycarbonate Bowl	0°C to 52°C (32°F to 125°F)
with Metal Bowl	0°C to 80°C (32°F to 175°F)

ANSI Symbols



Lubricator



Particulate Filter

Micro-Mist Lubricators (Figure 1)

Description

These micro-mist lubricators are designed to deliver an atomized oil mist to air operated tools, motors, and other pneumatic equipment. Units are equipped with full-view sight glass for visual indication of oil drop rate, needle valve feed adjustment to regulate oil drop rate, and a venturi bypass disc to compensate for changes in air flow demands.

Installation of Lubricator

1. Lubricator should be installed with reasonable accessibility for service whenever possible - repair service kits are available. Keep pipe and tubing lengths to a minimum with inside clean and free of dirt and chips. Pipe joint compounds should be used sparingly and applied only to the male pipe - never into the female port. Do not use PTFE tape to seal pipe joints - pieces have a tendency to break off and lodge inside the unit, possibly causing malfunction.
2. Install lubricator so that air flow is in the direction of arrow on body.
3. Installation should be upstream from, and as close as possible, to the device it is to lubricate (valve, cylinder, tool, etc.). Whenever possible, avoid locations that require air-borne oil to move in an upward direction to reach the device to be lubricated.
4. The installation of an individual lubricator for each air consuming device provides best assurances of proper lubrication.

5. In new installations, it is good practice to "wet down" the inside diameter of piping and those with oil before making final connections. Although your lubricator delivers oil to the line, pre-coating the inside diameter with oil helps insure that proper amounts of oil are delivered to the point of application.

Operation & Service of Lubricator

⚠ Warning: Before filling, inlet pressure must be eliminated and then de-pressurize system pressure.

1. **FILLING** - After de-pressurizing system, remove fill plug or bowl to refill lubricator. Fill bowl to fill line indicated on the bowl with oil of 150 to 200 SSU at 100°F viscosity - same as SAE No. 10 (petroleum based hydraulic oils or spindle oils are good examples). DO NOT USE OILS WITH TACKY ADDITIVES, COMPOUND OILS CONTAINING SOLVENTS, GRAPHITE, SOAPS OR DETERGENTS. (Automotive oils generally contain detergents and are not recommended.)
2. Replace the fill plug or bowl and seat firmly. Excessive torque is not necessary. The lubricator is now ready for setting.
3. **OIL DELIVERY ADJUSTMENT** - To adjust oil delivery, turn the adjusting needle on top of the lubricator.

Leaner - Clockwise Richer - Counterclockwise

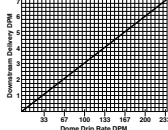
By counting the number of drops per minute in the sight dome, you can adjust lubricator to your required setting. Approximately 3% of the droplets visible in the sight dome go downstream; adjust drip rate accordingly. Consult oil delivery conversion chart (see below).

Generally, one drop per minute downstream for every 10-15 SCFM flow is satisfactory, 25 drops per minute equals one ounce per hour - volume of oil passing through the sight dome.

NOTE: This is a constant density type lubricator which delivers a constant ratio of oil to air flow. Therefore, if air flow increases or decreases, oil delivery will be effected proportionately. ONLY IF DIFFERENT RATIO IS DESIRED NEED YOUR NEEDLE VALVE SETTING BE CHANGED AFTER YOUR INITIAL SETTING.

Oil Delivery Conversion

3% of Drip Rate to Downstream



⚠ WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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