LubriMist® Model VFP

Oil Mist Generating System

Installation and Operating Manual

WARNING

READ AND UNDERSTAND THIS OPERATING MANUAL BEFORE ATTEMPTING TO INSTALL, COMMISSION, OR USE THIS EQUIPMENT. FAILURE TO UNDERSTAND THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY AND/OR LOSS OF LIFE AND/OR PROPERTY.

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Table of Contents

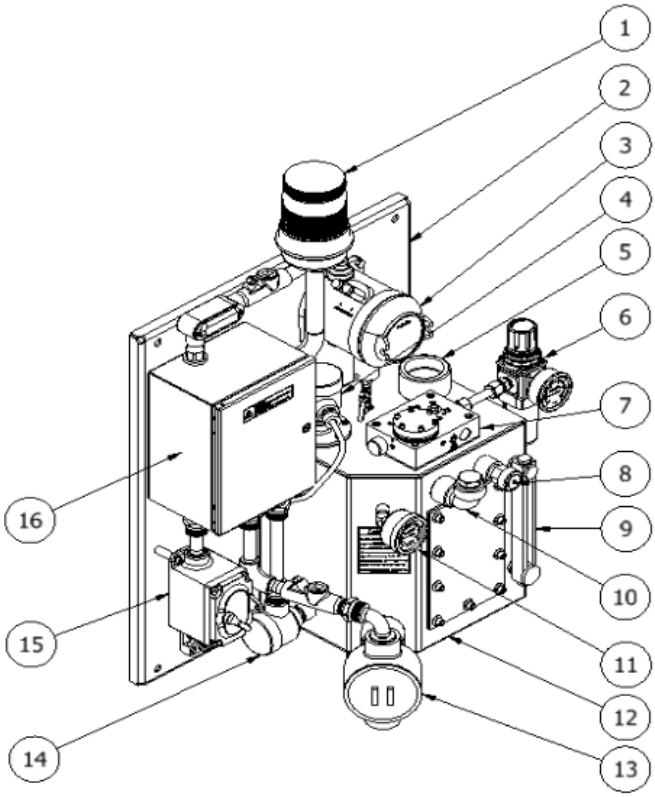
Introduction

A *LubriMist*® Oil Mist System is a centralized lubrication system that generates, conveys, and automatically delivers lubricant to bearings, gearboxes, chains, and sliding surfaces in various industrial machinery and equipment. This publication provides instruction and information for the *LubriMist*® Oil Mist Generator Unit Model "VFP." Design, application, and distribution of *LubriMist*® Oil Mist are covered in other publications.

Description

The "VFP" panel mounted LubriMist® oil mist generator is designed for use in intermediate size centralized oil mist lubrication systems. The equipment is designed to meet the requirements of Class 1, Group B, C and D, Division 2, Hazardous Areas. The "VFP" is equipped with a three-gallon capacity oil reservoir and important monitoring features. All LubriMist® oil mist generators utilize proprietary Vortex mist generation technology, which delivers superior reliability and performance. Model "VFP" is available in 60, 213, and 475 Bearing Inch capacities which provide an oil mist supply range of 0.36 to 15.0 SCFM. Standard monitoring and control features include an oil level gauge with thermometer, low oil level switch, mist pressure gauge, mist pressure switch, pressure relief valve, immersion oil heater with thermostat and a low oil temperature switch. All electrical devices are wired to the junction box which houses terminal strips and a common, dry contact. The low oil level and mist pressure switches operate the highly visible, red/green, operating status lights. Also included as standard equipment is an integral inlet air supply filter/regulator with gauge. The "VFP" also comes equipped with an on/off power switch to facilitate electrical connection and unit maintenance/inspection.

The unit is constructed of heavy gauge stainless-steel. The "VFP" can be packaged in *LubriMist*® weather-tight stainless-steel enclosure. In addition, the "VFP" can be mounted on a rigid, stable, stainless-steel stand. Please refer to the model code table below to define the unit you have obtained.



LEGEND

1 OPERATING STATUS LIGHT
2 MOUNTING PANEL
3 MIST PRESSURE SWITCH
4 LOW OIL LEVEL SWITCH
5 MIST OUTLET 2 INCH NPT
6 AIR PRESSURE REGULATOR WITH GAUGE AND AUTO DRAIN AIR FILTER
7 VORTEX OIL MIST GENERATING HEAD
8 PRESSURE RELEASE VALVE
9 OIL LEVEL GAUGE WITH THERMOMETER
10 FILL PORT
11 MIST PRESSURE GAUGE
12 THREE GALLON RESERVOIR
13 IMMERSION OIL HEATER WITH THERMOSTAT
14 LOW OIL TEMPERATURE SWITCH
15 POWER SWITCH
16 ELECTRICAL ENCLOSURE

Figure 1: Model VFP Oil Mist Generator

VFP Model Code

Option Description	Option Code	Description
Oil Mist Generator Model, See Note 4 ☐	VFP	VFP Model , Oil Mist Generator
Reservoir Oil Heater See Note (1) ☐	A	Explosion Proof Immersion Oil Heater w/Thermostat & Thermometer 120Vac - 375 Watts
☐	B	Explosion Proof Immersion Oil Heater w/Thermostat & Thermometer 240Vac - 410 Watts
Mist Pressure Switches ☐	X	None
☐	A	High/Low Mist Pressure Switch
Cabinet Enclosure ☐	X	None; To Be Panel Mounted
☐	A	Single Door Cabinet - Stainless Steel
Stainless Steel Mounting Stand ☐	X	None
☐	S	Included
Local Status Lights See Note 3 ☐	L	Red & Green Status Lights (120 or 240VAC)
☐	NL	Not Included

** **OPTIONAL SUFFIXES FOR ADD ON ACCESSORIES:**

☐	**4**	LOW TEMPERATURE SWITCH
☐	**6**	OIL LEVEL SWITCH

Figure 2: VFP Model Code

Notes:

(1) Immersion Oil Heater's connection will have loose wires if there are no other switch option included.
(2) Ambient Rating is -25°C<AMB<+70°C for all assemblies where Local Warning Lights are included
(3) Local Status Lights Option is only available along with the Mist Pressure switch, low Temp. Switch, and Oil Level Switch to indicate alarms.
(4) Mist Head size to be selected and added into the build-out, the maximum Mist Head size is 475 BI.

Safe Operating Electrical Conditions

- Indoor/Outdoor Use
- Ambient Temperature range: -25°C to +70°C (-5°F to +158°F) *
- Altitude to 2000m (6561 ft.)
- Relative humidity not exceeding 80%
- Mains supply fluctuations not exceeding 10%
- Over Voltage Category II, IEC 60364–4–44. Clause 443.
- IEC 60947-1, Pollution Degree 2

***** Actual ambient operating temperature for the proper production of oil mist depends on various factors such as oil viscosity grade, ambient temperature, etc.

Mechanical Operating Conditions

- Operating regulated air pressure range: 10 psig (1 bar) to 65 psig (4.5 barg)
- Maximum instrument air inlet pressure: 150 psig (10.3 barg)
- Minimum instrument air inlet pressure: 65 psig (4.5 barg)
- System Output Mist Pressure 20 inches Water Column (508 mm Water Column)

Installation

Mounting/Location

Mount the “VFP” to a wall or column in an upright position using the four mounting holes on the unit panel or enclosure. If your model is on a stand, secure the stand to a level surface using appropriate mounting bolts. See figures 4, 9 and 10 for mounting hole location. The oil level gauge on the front of the reservoir should be in full view and the oil fill port, located on the top front of the oil reservoir, should be easily accessible. Allow space for oil filling and for adjusting the oil heater thermostat. If your unit is enclosed in a cabinet, allow for opening of the door.

There are no ventilation requirements if the unit meets the operating conditions.

Mist Distribution System Connection

Connect the oil mist distribution system to the oil mist outlet (2” NPTF) located on the top of the reservoir with 2” coupling if your model is enclosed in a cabinet. Do not use Teflon tape or conventional pipe dope on the pipe thread.

Compressed Air Supply

Connect a clean, dry compressed air supply to the integral air filter/regulator (1/2” NPT) located on the right side of the unit.
Note: Maximum air supply pressure is 150 PSIG (10.3 BARG) and minimum air supply pressure is 65 PSIG (4.5 BARG).

This LubriMist® Oil Mist Generator has been designed and factory tested with LubriMist® Synthetic Oil (LSO). RRS recommends LSO for this oil mist generator to ensure optimum performance.

Electrical

Electrical connections should be made by a qualified electrician. All “VFP” electrical components are wired to a terminal strip located in the electrical enclosure. Refer to Figure 6.1 and 6.2 for diagrams of the electrical component configuration, incoming power connection, and common remote alarm connection.

Warning:
If the equipment is not used in the manner described in this manual the protection provided by the equipment may be impaired.
THIS INSTRUMENT MUST BE EARTHED. See Figure 5: Earth Ground Connection.
EXPLOSION HAZARD – For units used in hazardous areas do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous**.**

IMPORTANT:
Electrical power service must have adequate circuit protection. See Figure 6.1 and 6.2: Electrical Wiring Diagram for selection.
Electrical connections should be made by a qualified electrician and comply with local wiring regulations.

Start-Up

Prior to start-up recheck all connections and ensure that all fittings are tight and electrical connections are properly made. Ensure that the oil mist distribution system, reclassifiers and application point connections, vents and drains are properly installed.

To Start the *LubriMist*® Model "VFP":

1) Remove the oil cap located on the front of the reservoir (Item 10, Figure1) and fill the oil reservoir taking care not to exceed the "high" level mark on the oil sight gauge. Oil selection should be made based on lubrication and viscosity requirements dictated by the machinery components being serviced. DO NOT USE MOTOR OIL or any oil containing viscosity modifying additives. Replace the fill cap. See Figure 3 for fill capacities.

While filling the oil supply reservoir, monitor the oil level gauge. **DO NOT OVER FILL.** An air space must be maintained above the oil level for mist generation and flow between the mist generator and the mist outlet. If your system includes auto drain legs allowance must be made to collect the return oil volume. Overfilling will result in oil overflowing out of the fill connection and onto the ground, and it will impede oil mist generation.

2) Turn on the air supply to the air filter/regulator. Adjust the regulated air pressure by turning the air filter/regulator knob (Item 6, Figure 1) until the desired mist pressure reading is achieved. The mist pressure gauge (Item 11, Figure 1) should read 20" H_20 for "mist" reclassifier systems and 35" H_20 for "condensing" and "spray" reclassifier systems. Regulated air pressure must not be below 10 PSIG. If under 10 PSIG, the Vortex mist head may not produce oil mist. If this condition exists, a lower capacity mist head should be installed, or additional lube points (greater flow) should be added to the system.

3) Turn on the electrical power. The green light should illuminate indicating normal/satisfactory operation. If the red light is illuminated refer to the "Trouble Shooting" section of this manual found on page 13.

4) Monitor the oil temperature using the oil temperature gauge (Item 9, Figure1). The oil heater should maintain the oil at 110°F (43°C). Adjustments to the oil temperature can be made by adjusting the oil thermostat located inside the wiring enclosure of the oil heater (Item 13, Figure1). A temperature gauge is located on the reservoir for manual verification of proper temperature setting.

CAUTION:
Adjustments to the oil heater thermostat require that the oil heater terminal enclosure cover be removed. To avoid electrical shock and explosion hazard, turn off electrical power before removing the cover and making adjustments. The cover should be reinstalled and securely fastened before power is re-initiated to the unit.

Prior to making any adjustments to the oil mist generator, make sure that the system is located in a non-hazardous area and/or that the proper work permit has been obtained if required. There is a possibility of creating an ignition source (i.e. spark). Only a qualified person should make adjustments.

5) If adjustments to the High-Low Mist Pressure Switch are necessary remove the adjusting screw for the corresponding switch, see section "Adjusting High-Low Mist Pressure Switch", and turn the adjustment screw clockwise or counterclockwise until the desired switch pressure is reached. The high-pressure switch has been factory set at 30 inches H_2O, while the low-pressure switch has been set at 10 inches H_2O.

Operation

The daily operation of the "VFP" oil mist system has been reduced to checks of the generator and lubricated equipment. Except for emergencies, routine adjustment of the mist generator is not required. The "VFP" oil mist system, once installed and balanced, supplies a constant amount of oil mist to several lubrication points. The "VFP" is equipped with optional operational status lights, which indicate normal operation when the green light is illuminated and red when a malfunction has occurred. The monitored operating variables are low oil level in the "VFP" reservoir and high or low oil mist pressure in the mist distribution system. Any change in oil mist pressure or regulated air pressure (supply pressure) from initial set points is an indication that some mist system component or compressed air supply system may have mal-functioned. If needed, refer to the "Trouble Shooting" section to make suggested corrective actions of the "VFP" controls.

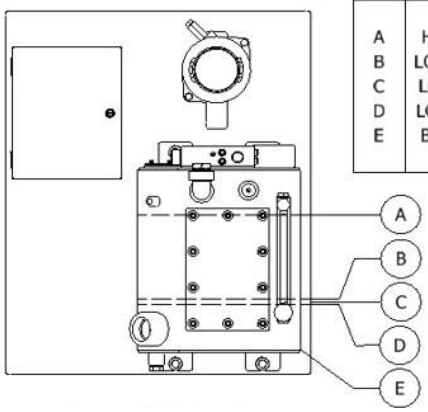
Daily Check

1) Check reservoir oil level and fill as required.
   a) To fill the reservoir, first turn off the electrical power using the power supply switch and then close the compressed air supply.
   b) Fill the "VFP" reservoir through the oil fill port located at the front of the reservoir (Item 10. Figure 1). **Do not overfill.**
   c) Turn electrical power on and reset air supply pressure to attain proper oil mist pressure.
2) Check the regulated air pressure and mist header pressure. Changes or fluctuations in mist pressure readings indicate broken or plugged lines or reclassifier fittings in the distribution system. These problems must be solved before adjusting the regulated air supply.
3) Check reservoir oil temperature to ensure that the oil heater is operating properly.

Maintenance

The following maintenance procedures should be performed at least on a semi-annual basis to help ensure proper system operation. If your "VFP" is installed in an extremely dusty or humid environment or if you are concerned about the quality of your compressed air supply, the maintenance schedule should be accelerated. Consult the nearest LSC office/service center for further discussion and recommendations.

1) Replace air filter element.
2) Inspect and clean interior of the "VFP" reservoir. Use lint-free rags to wipe the reservoir.
3) Inspect and clean the oil suction screen. Use cleaner that is compatible with the oil and use lint-free rags.
4) Check the high and low set points of the mist pressure switch.
5) Check the operation of the remote alarm circuit if one has been installed.
6) Make an overall assessment of the "VFP" and mist distribution system and correct obvious deficiencies and problems.



KEY	LOCATION	VOLUME TO E (GALLONS)
A	HIGH LVEL MARK	4.6
B	LOW LEVEL ALARM	1.8
C	LOW LEVEL MARK	1.7
D	LOSS OF SUCTION	1.6
E	BOTTOM OF RES.	0.0

Figure 3: Oil Level

IMPORTANT: DO NOT DISASSEMBLE THE VORTEX MIST HEAD.

Replacement of filter/regulator element kit

A qualified person should make replacement of spare parts.
The Filter Element Air kit, Part Number 77500472, should be cleaned or replaced whenever noticeable drop in pressure occurs. To replace or clean the filter element, shut off and vent all air line pressure to the unit being cleaned. Before removing the bowl, turn adjusting screw counterclockwise until it stops. Carefully remove the bowl. Remove filter element baffle and retainer. Wipe parts clean with soapy water or denatured alcohol.

Caution:
Never use solvents like carbon tetrachloride, trichloroethylene, acetone, or paint thinner to clean any parts. If using compressed air to blow dry, be sure to wear appropriate eye protection. Torque bowl before using. Torque bowl and element retainer hand tight, (5 to 10 in/lbs).

Warning: Shutting off the air-line supply will stop oil mist from being delivered to its lubricating point destination.
DO NOT leave oil mist generator unattended while replacing the filter element.

EXPLOSION HAZARD – Substitution of components may impair suitability for Class I, Division 2.

EXPLOSION HAZARD – Static Discharge Hazard. Clean all surfaces with damp cloth only.

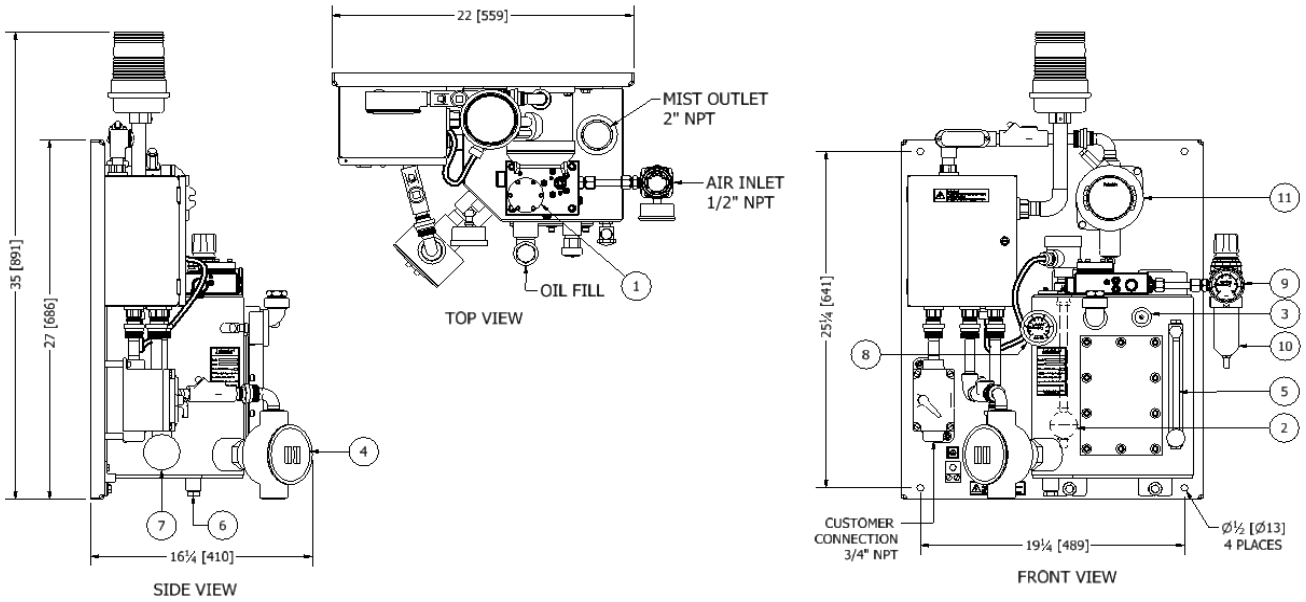


Figure 4: Model "VFP" LubriMist Oil Mist Generator

Parts List

ITEM NO.	PART NO.	DESCRIPTION
1	77720092 77780160 77780161 77780162	Mist Generating Head Long Tube (See Purchase Order for Proper Mist Head Cartridge Kit Selection) 60 BI Mist Head Cartridge Kit 213 BI Mist Head Cartridge Kit 475 BI Mist Head Cartridge Kit
2	VFP-PHANTOM-4P	Low Oil level Switch Assembly
3	77780269	Relief Valve
4	77600685 77500364	Oil Heater w/Thermostat and Explosion Proof Enclosure 120VAC / 375 W / Single Phase Oil Heater w/Thermostat and Explosion Proof Enclosure 240VAC / 410 W / Single Phase
5	77720344	Oil Level Gauge w/Thermometer
6	76050031	Oil Drain Plug
7	77500446	Low Oil Temperature Switch
8	77600087	Mist Pressure Gauge, 0-100 in H_2O
9	77600088	Air Pressure Gauge, 0-100 PSIG
10	77600542	Integral Air Filter/Regulator
11	U6993X	High-Low Mist Pressure Switch

Spare Parts List

PART NO.	DESCRIPTION
77780628	Low Level Oil Switch
77600685 77500364	Oil Heater w/Thermostat and Explosion Proof Enclosure 120VAC / 375 W / Single Phase Oil Heater w/Thermostat and Explosion Proof Enclosure 240VAC / 410 W / Single Phase
77600542	Integral Air Filter/Regulator
77600543	Replacement Kit for Filter/Regulator
77780269	Pressure Relief Valve
77600088	Air Pressure Gauge
77600087	Mist Pressure Gauge
77500446	Low Oil Temperature Switch
77500721 77700293	Remote Alarm Relay (120 VAC option) Remote Alarm Relay (240 VAC option)
U6993X	High-Low Mist Pressure Switch
77780160 77780161 77780162	Mist Head Cartridge Kit (See Purchase Order for Proper Mist Head Cartridge Kit Selection) 60 BI Mist Head Cartridge Kit 213 BI Mist Head Cartridge Kit 475 BI Mist Head Cartridge Kit

Earth Grounding Connection

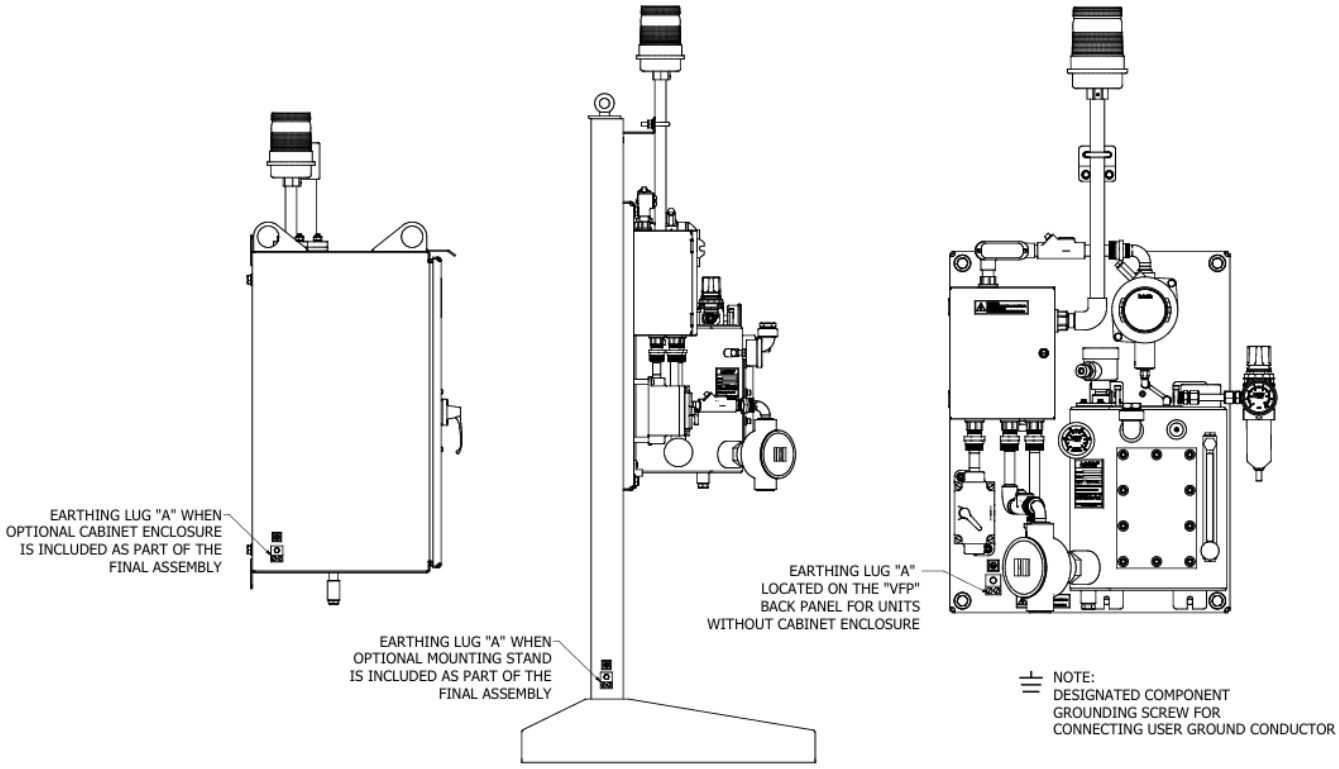


Figure 5: Earth Ground Connection

Electrical

All components are wired to the terminal strip in the electrical enclosure as indicated below. All contacts are shown in their shelf position.

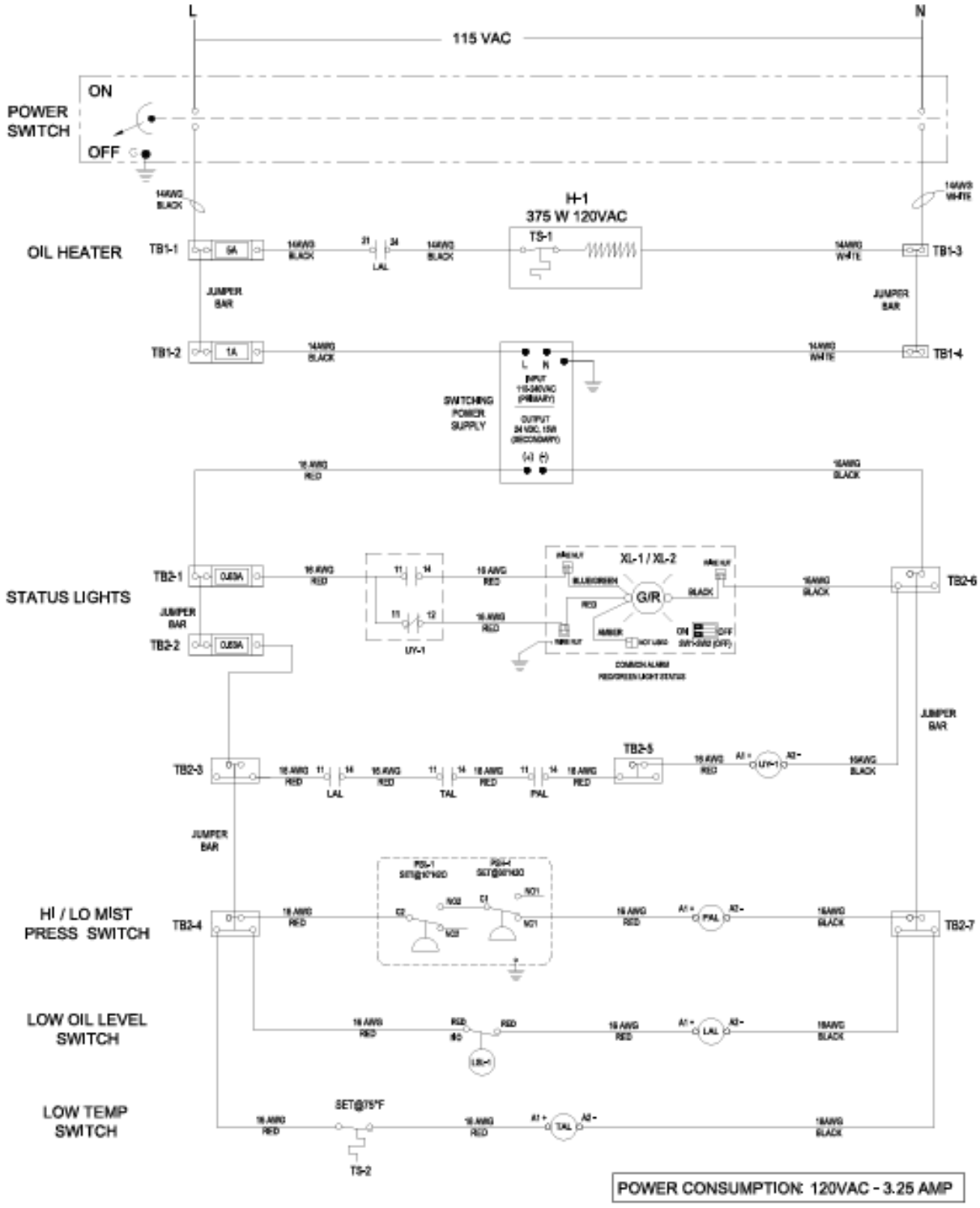


Figure 6.1: 120VAC Electric Schematic

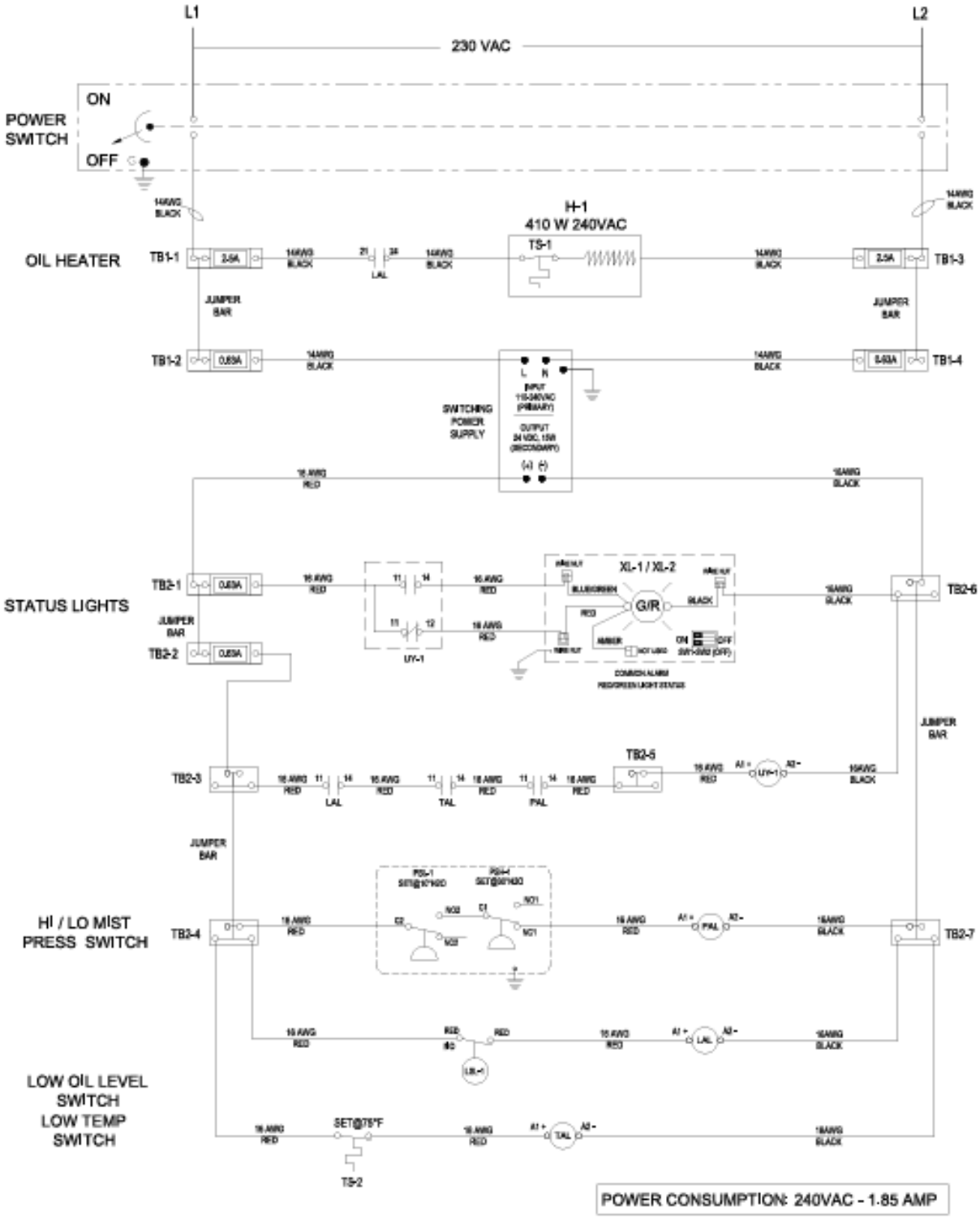


Figure 6.2: 240VAC Electric Schematic

Adjusting High-Low Mist Pressure Switch

(Part Number U6993X)

*Do not remove screw completely or it will be difficult to re-install.

Max. Continuous Current 10 AMPS for 120/240 VAC.
NEMA 7 Enclosure

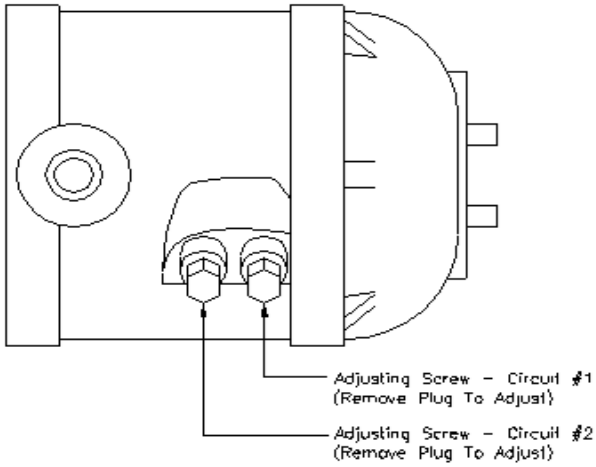
Wire Code		
LEAD	PRESSURE	
	CIRCUIT #1	CIRCUIT #2
NORMALLY OPEN	RED	YELLOW
COMMON	PURPLE	BROWN
NORMALLY CLOSED	BLUE	ORANGE

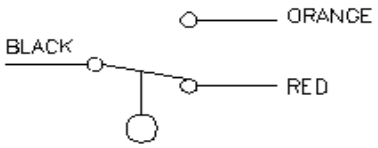
Adjustment Instructions:
To increase – Turn Counter-Clockwise
To decrease- Turn Clockwise

Circuit #1 is for the High-Pressure Switch (HPS), set at 30 inches 1-120 PSIG.
Circuit #2 is for the Low-Pressure Switch (LPS), set at 10 inches 1-120 PSIG.

Low Oil Level Switch (Part Number 77500049)
Contacts rated 20 W - 120/240 VACRED
(Hermetically sealed reed)

Immersion Oil Heaters
120VAC / 375 W / Single Phase (Part Number 77600685)
240VAC / 410 W / Single Phase (Part Number 77500364)
Thermostat set at 110 ^{O}F (43 ^{0}C)
NEMA 7 enclosure





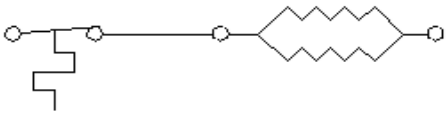


Figure 8: Adjusting Pressure Switch

Trouble Shooting Guide

Optional features offer normal operations indicated by an illuminated green status light and a red light that illuminates when a fault condition occurs. The "VFP" alarms for low oil level as well as high and low mist pressure. If the red light is illuminated, the following system checks should be made:

1) Check oil level by making a visual check of the oil level gauge (Item 9, Figure 1). If oil level is below the low alarm level set point (see Figure 3), add oil.
2) Check mist pressure by making a visual check of the mist pressure gauge (Item 1 1, Figure 1). The high and low mist pressure alarm limits are factory set at 30 in wc and 10 in wc, respectively. Normal operating pressure for "mist" reclassifier systems is 20 inches H_2O. Although adjusting the regulated air supply may clear a mist pressure alarm, it must be recognized that mist pressure alarms are most likely caused by situations external to the oil mist generator. The following should be investigated:
   a) Low pressure may indicate a leak in the distribution system, a missing reclassifier or a broken line.
   b) High mist pressure may indicate plugged mist fittings, restricted bearing housing vents or an open-air bypass valve in the mist generating head.
   c) No mist pressure could indicate loss of air supply to the mist generator.
   d) Surging mist pressure usually is caused by an oil pocket or trap in the distribution header or fluctuating air supply.

If neither the red nor green status lights are illuminated, ensure that the electrical power has not been turned off. If the circuit breaker is tripped, have electrical personnel check for shorts in the circuit. If power is "ON" to the "VFP" and there are no other apparent problems, check for burned out light bulbs or faulty warning relay.
Note: a qualified and knowledgeable person familiar with basic electrical systems who is able to read, understand and troubleshoot using electrical wiring diagrams should conduct electrical checks.

Please note that this oil mist generator contains very sensitive instruments and during shipping they may be exposed to severe vibrations that may offset the factory set limits. To verify the proper operation of the high-low mist pressure switch and oil level switch follow the following steps:

Verifying the operation of the High and Low-Pressure Switch (HPS and LPS)

Use an ohmmeter to verify switch contact operation.
Switch settings should be as follows:
High Mist Pressure – 30 inches H_2O Ascending
Low Mist Pressure – 10 inches H_2O Descending

Verifying the proper operation of the Low Oil Level Switch

Using a digital multimeter, set the ohmmeter to Ohm; connect the black (common) to the Common (COM) on the level switch. Connect the red wire from the ohmmeter to the Normally Close switch wire. The meter should show no resistance in the shelf position. Move the float up and down to verify a change in meter reading. Then connect the red lead from the ohmmeter to the Normally Open switch wire. The meter should show infinite amounts of resistance in the shelf position. Move the float up and down to verify normally open and normally closed in shelf position.

Enclosure and Mounting Stand

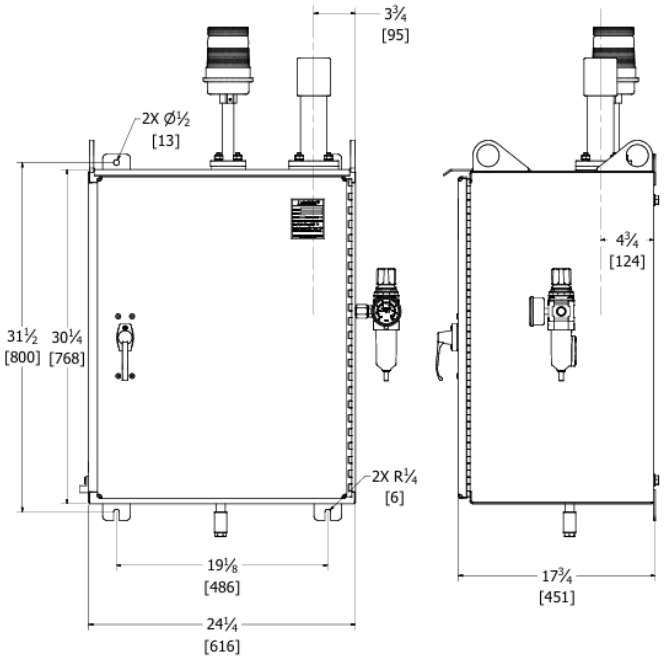


Figure 9: Enclosure

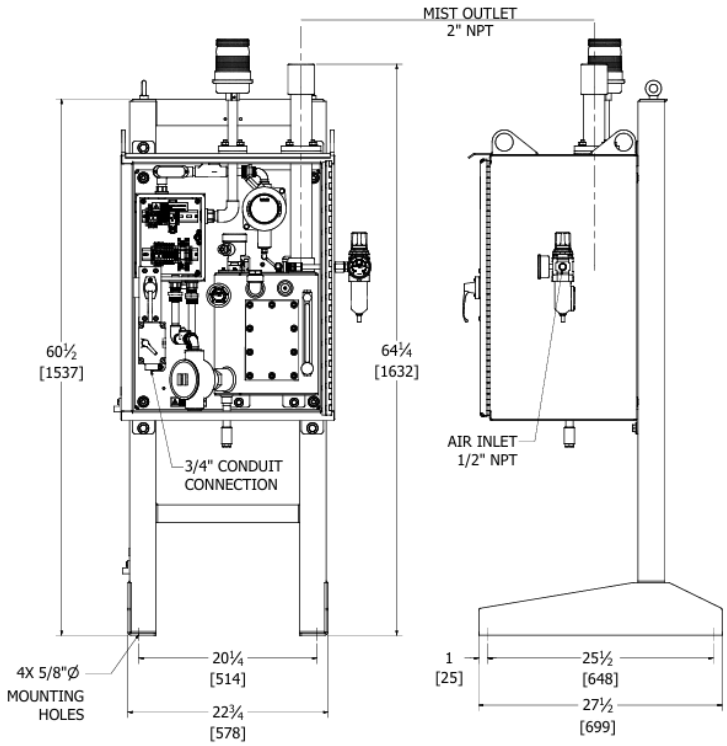


Figure 10: Mounting Stand

Controlling the Oil Mist

LubriMist® Vortex oil mist generation technology allows for maximum control and adjustment of oil mist properties. There are three basic controls (see Figure 11).

1) The INTEGRAL AIR FILTER/REGULATOR is used to adjust the volume of air flow to the Vortex chamber, which in turn controls oil mist volume (Item 6, Figure 1). The volume of oil mist is proportioned to each bearing or application point by the reclassifier. With the air bypass valve (described below) closed, the air pressure regulator setting must be high enough for oil mist production. Regulated air pressure should be adjusted to maintain proper mist pressure. Since changes in regulated air pressure affect the volume of oil mist produced, it also affects oil consumption.

2) The OIL FLOW VALVE controls oil mist density (oil/air ratio). Its normal position is fully closed. By turning it counterclockwise toward "Less" (opening the bypass) the mist density can be reduced when leaner density oil mist is desired. It should not be open for more than three turns. Adjustments to the oil flow valve do not affect oil mist pressure in the distribution lines or in the generator.

   Note: The oil/air ratio or mist density is also dependent on the characteristics of the oil, oil temperature and supply air temperature. Density decreases with lower temperatures and higher oil viscosity.

3) The AIR BY-PASS VALVE controls mist pressure without increasing oil output. Its normal position if fully closed, but by turning it counterclockwise toward "Open" more air will be added to the oil mist leaving the generator, thus increasing mist pressure. Velocity of mist through the distribution lines and reclassifiers will also increase when this valve is opened.

Note: 1) The oil/air ratio or mist density is reduced by opening the air by-pass valve. However, oil output is not affected.
2) These adjustments should be made while using an oil consumption meter.

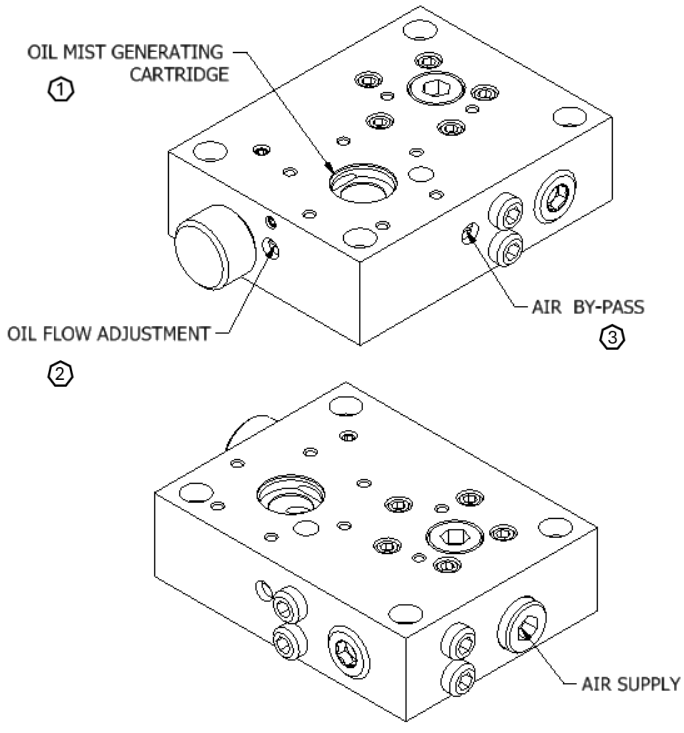


Figure 11: Controlling the Mist

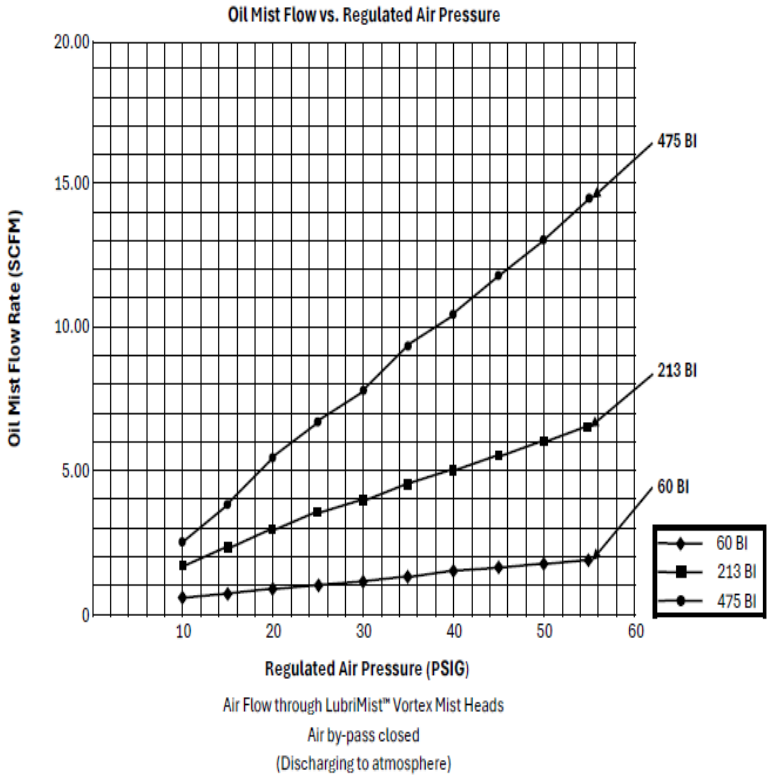


Figure 12: Air Flow