MOLEAER

ADVANCING NANOBUBBLE TECHNOLOGY

MOLEAER NEO™ NANOBUBBLE GENERATOR

Operation and Maintenance Instructions

IMPORTANT SAFETY INSTRUCTIONS
READ AND FOLLOW ALL INSTRUCTIONS
SAVE THESE INSTRUCTIONS

CUSTOMER SERVICE / TECHNICAL SUPPORT
If you have questions about ordering Moleaer, Inc. replacement parts and products, please use the following contact information:

CUSTOMER SERVICE:
Monday to Friday: 8:00 a.m. to 5:00 p.m. PST
Phone: +1 (424) 558-3567
Email: info@moleaer.com

WEBSITE:
www.moleaer.com

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European Declaration of Conformity

We, Moleaer Inc., declare under our sole responsibility that the product Moleaer nano bubble generator Neo as outlined in the product information below marked with the CE mark on the nameplate to which this declaration relates is in conformity with the Council Directives on the approximation of the laws of the EC member states listed below, following standards or other normative document(s).

The Nanobubble Generator NEO consists of a minimum of one pump, a pump starter, frame, pressure sensor, solenoid valve, on/off switch, nano bubble generator, pressure gauges, 24V power supply, alarm lights and a dissolved oxygen sensor.

General Information about the product

Product Name	Product Variant	General Feature
Neo 50, Neo 150, Neo 250	Standard	Off-board gas, Controller, Water pump.
Neo 50 O2, Neo 150 O2, Neo 250 O2	Onboard Oxygen Generator	Oxygen generator, Controller, Water Pump, Compressor.
Neo 50 O3, Neo 150 O3, Neo 250 O3	Standard w/ Ozone Generator	Ozone generator, Controller, Water Pump.
Neo 50 O2/O3, Neo 150 O2/O3, Neo 250 O2/O3	Onboard Oxygen & Ozone Generators	Oxygen generator, Ozone generator, Controller, Water pump, Compressor.
Neo 50 Enriched, Neo 150 Enriched, Neo 250 Enriched	Enriched Air generator	Enriched Air membrane, Controller, Water pump, Two compressors.

Applicable Directives

Machinery Directive (2006/42/EC); Low Voltage Directive (2014/35/EU) and EMC Directive (2014/30/EU); Pressure Equipment Directive (2014/68/EU); Standard Used: EN ISO 12100:2010; RoHS Directive: 2011/65/EU and 2015/863/EU; Standard Used: EN 50581:2012

The Technical Construction File is Maintained at:

20800 Belshaw Avenue, Carson CA 90746, USA

The Authorized Representative Located within the Community is:

Michiel De Jong; Evertsenlaan 24, 6881 GC, Velp, The Netherlands

Per Annex II.B of the Machinery Directive (98/37/EC):

The machinery, product, assembly, or sub-assembly covered by this Declaration of Conformity must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the applicable Directive(s).

This EU declaration of Conformity is only valid when published as part of the Moleaer, Inc. installation and operating instructions. (Publication numbers; 01/02/03/04/05/06 2019V1/2/3/4/5/6)

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Place of issue: Los Angeles, California, USA

Bruce Scholten, CTO

Introduction

Moleaer™ develops industrial-scale nanobubble systems that deliver extraordinary improvements in sustainable food production, chemical-free water treatment and the recovery of natural resources.

The Moleaer Neo is a nanobubble gas-injection technology tailormade for the food production industry. Its principle function is to harness the power of oxygen to improve the quality of irrigation water, promote plant growth, suppress or eliminate pathogens and remove biofilm from surfaces. With simplicity and near perfect efficiency, the Neo Nanobubble Generator super saturates water with dissolved oxygen and trillions of nanobubbles. Bubbles of this size exhibit extraordinary properties including neutral buoyancy, high negative surface charge, enormous surface area and strong oxidation potential. These characteristics enable Moleaer to deliver an easily implemented, chemical-free, sustainable and cost-effective solution to customers seeking to improve food production and water treatment. The combination of the Neo's high oxygen transfer efficiency and stable oxygen enriched nanobubbles enable higher oxygen transfer into the root zone where oxygen enrichment plays an important role in facilitating nutrient absorption and pathogen suppression.

Safety Instructions

Important Notice

This guide provides installation and operation instructions for this product. Consult Moleaer with any questions regarding this equipment.

Attention Installer

This guide contains important information about the installation, operation, and safe use of this product. This information should be given to the owner and / or operator of this equipment after installation. This Neo nanobubble generator is for **INDOOR USE ONLY**. If it must be installed outside, a minimum coverage is a full roof.

Attention User

This manual contains important information that will help you in operating and maintaining this product. Please retain it for future reference. Warnings and safety instructions for Moleaer Neo Nanobubble Generators and other related products are available at http://www.moleaer.com or call U.S. +1 (424) 558-3567 for additional free copies of these instructions.

READ AND FOLLOW ALL INSTRUCTIONS. SAVE THESE INSTRUCTIONS.

This is the safety alert symbol. When you see this symbol, on your system or in this manual, look for one of the following signal words and be alert to the potential for personal injury.

DANGER Warns about hazards that can cause death, serious personal injury, or major property damage if ignored.

WARNING Warns about hazards that may or can cause minor personal injury or property damage if ignored.

NOTE Indicates special instructions not related to hazards. Carefully read and follow all safety instructions in this manual and on equipment. Keep safety labels in good condition; replace if missing or damaged.

When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:

Risk of Electrical Shock

Connect only to a branch circuit protected by a ground-fault circuit interrupter (GFCI). Contact a qualified electrician if you cannot verify that the circuit is protected by a GFCI.

General Warnings

Install equipment in accordance with the current local Electrical Code and all applicable codes and ordinances.

Before servicing the pump, switch OFF power to the pump by disconnecting the main circuit to the Neo Nanobubble Generator.

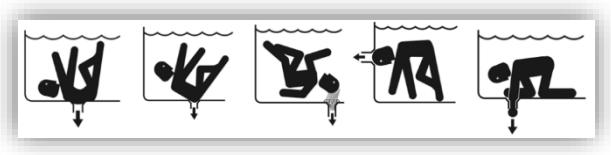
This Neo is not intended for use by persons (including children) of reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety.

DANGER

FAILURE TO FOLLOW ALL INSTRUCTIONS AND WARNINGS CAN RESULT IN SERIOUS BODILY INJURY OR DEATH. THIS PUMP SHOULD BE INSTALLED AND SERVICED ONLY BY A QUALIFIED SERVICE PROFESSIONAL. INSTALLERS, OPERATORS, AND OWNERS MUST READ THESE WARNINGS AND ALL INSTRUCTIONS IN THE OWNER'S MANUAL BEFORE USING THIS PUMP. THESE WARNINGS AND THE OWNER'S MANUAL MUST BE LEFT WITH THE PRODUCT OWNER.

Suction Entrapment Hazard

Stay off main drain and away from all suction inlets!



This generator produces high levels of suction and creates a strong vacuum at the main drain at the bottom of the body of water. This suction is so strong that it can trap adults or children under water if they come in close proximity to a drain or a loose or broken drain cover or grate.

DANGER

RISK OF ELECTRICAL SHOCK OR ELECTROCUTION. PUMPS REQUIRE HIGH VOLTAGE WHICH CAN SHOCK, BURN, OR CAUSE DEATH.

BEFORE WORKING ON THE NEO NANOBUBBLE GENERATOR PUMP, always disconnect power to the pump at the circuit breaker for the system before servicing the pump. Failure to do so could result in death or serious injury to service person, system users, or others due to electric shock.

NOTE: All suction plumbing must be installed in accordance with the current local codes, standards, and guidelines.

WARNING

A clearly labeled emergency shutoff switch for the pump must be in an easily accessible, obvious place. Make sure users know where it is and how to use it in case of emergency.

CAUTION

Install all electrical equipment, such as on / off switches, timers, and control systems, etc., to allow the operation (startup, shutdown, or servicing) of any pump or filter so the user does not place any portion of his / her body over or near the pump or isolation valves. This installation should allow the user enough space to stand clear of the system and pump during system startup, shutdown, or servicing of the system.

CAUTION

This generator has been evaluated for use with water only.

CAUTION

Before operation, be sure to prime the system to the pump.

WARNING

RISK OF ELECTRICAL SHOCK

This system is supplied with a grounding conductor. To reduce the risk of electric shock, be certain that it is connected only to a properly grounded, grounding-type receptacle.

DANGER

HAZARDOUS PRESSURE. STANDARD CLEAR OF SYSTEM DURING STARTUP. CIRCULATION SYSTEMS OPERATE UNDER PRESSURE. WHEN ANY PART OF THE CIRCULATING SYSTEM IS SERVICED, AIR CAN ENTER THE SYSTEM AND BECOME PRESSURIZED. PRESSURIZED AIR CAN CAUSE THE PUMP HOUSING COVER OR VALVES TO VIOLENTLY SEPARATE WHICH CAN RESULT IN SEVERE PERSONAL INJURY OR DEATH. STAND CLEAR OF ALL CIRCULATION SYSTEM EQUIPMENT WHEN TURNING ON OR STARTING UP SYSTEM. BEFORE SERVICING EQUIPMENT, MAKE NOTE OF THE WATER AND GAS PRESSURE. BE SURE THAT ALL CONTROLS ARE SET TO ENSURE THE SYSTEM CANNOT INADVERTENTLY START DURING SERVICE. TURN OFF ALL POWER TO THE SYSTEM. BEFORE STARTING THE SYSTEM, PLACE ALL SYSTEM VALVES IN THE "OPEN" POSITION TO ALLOW WATER TO FLOW FREELY FROM THE TANK AND BACK TO THE TANK. STAND CLEAR OF ALL EQUIPMENT AND START THE PUMP.

IMPORTANT: OBSERVE SYSTEM PRESSURE GAUGES AND BE SURE IT IS NOT HIGHER THAN THE PRE-SERVICE CONDITION.

General Installation Information

All work must be performed by a qualified service professional and must conform to all applicable local codes.

The Neo Nanobubble Generator will function correctly only if it is properly sized to the specific application and properly installed.

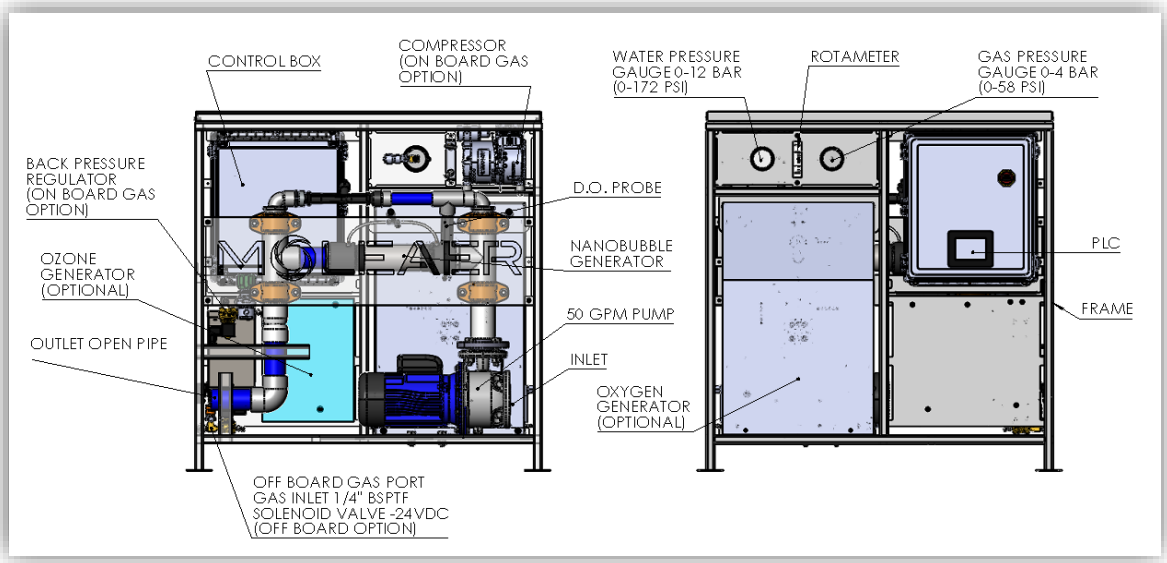
Refer to installation manual (available upon request).

Additional Documents (Available upon request)

1. P&ID drawings: Shows unit's process flow, general components specifications, and electrical requirements.

2. Electrical schematics: Detailed electrical wiring and general specifications of the components
3. GAD: General arrangement of the unit, dimensions and information about the inlet, outlet, and customer points of connection port sizes.
4. 3D CAD models: 3D CAD models of the units are available upon request. Contact Moleaer.
5. Installation Manual: Provides general instructions to install the product.
6. Installation Drawings: Provides visual installation schematic.

Equipment General Arrangement



Product Variants	General Features
Standard	Off-board gas, No compressor.
Onboard Oxygen Generator	On-board Airsep O2 generator, one compressor
Standard w/ Ozone Generator	Ozone generator (3g/hr), Jet-pump injection thru by-pass line, no compressor
Onboard Oxygen Generator & Ozone Generator	On-board Airsep O2 generator and Ozone generators, one compressor
Enriched	Enriched Air system, two compressors

Gas Compression System

The Moleaer Neo Nanobubble Generator Standard is designed for use with compressed oxygen. Inert gases and CO2 may be used on the Standard Neo variant within the operating pressure and flow of the product.

NOTED: Neo is not designed for hazardous and flammable gases or any mix of gas or liquid.

WARNING Do not mix gases within this system.

WARNING All gas fittings and hoses must be maintained free from oil and lubricants.

DANGER **DO NOT PERMIT SMOKING OR OPEN FLAMES IN ANY AREAS WHERE LIQUID OXYGEN IS STORED OR HANDLED. THE NEO NANOBUBBLE GENERATOR MUST BE SEPARATED FROM FLAMMABLES AND COMBUSTIBLES BY AT LEAST SIX (6) METERS OR A ONE-HALF (1/2) HOUR FIREWALL.**

Gas Connection (for Standard off-board models)

Moleaer Neo Nanobubble Generators come with a female 1/4" NPT/BSPT connection.

For all other models, the unit pulls ambient air to generator gas.

Gas Flow and Pressure

WARNING

DO NOT EXCEED 140 PSI (9.6 BAR) IN OFFBOARD GAS PRESSURE. INSTALL A RELIEF VALVE ON THE OFFBOARD GAS SUPPLY UPSTREAM OF THE UNIT.

Excessive gas pressure may compromise seals inside the generator and result in a sudden drop in pressure. If this occurs, close the gas flow meter completely, reduce the gas pressure feeding the generator, and slowly reopen the valve again to the desired gas flow set point.

1. Gas flow rates can be adjusted depending on application and desired effect. The Neo Nanobubble Generators are designed to deliver a spectrum of nano and micro bubbles to meet the requirements of the process or application. Low gas flow rates produce more nanobubbles and have a higher gas transfer efficiency, whereas higher gas flow rates produce both nano and microbubbles that have a lower gas transfer efficiency, but higher mass transfer rate. Refer to the specification table for suggested gas flow rates for the different size units.

Nanobubble Generator Operation

CAUTION

Pump must be fully primed before operation. Refer to installation manual for more details.

WARNING

Operation at or near zero water flow can cause extreme heat, personal injury, or property damage.

WARNING

THIS SYSTEM OPERATES UNDER HIGH PRESSURE.

When any part of the circulating system (e.g., Lock Ring, Pump, Filter, Valves, etc.) is serviced, air can enter the system and become pressurized. Pressurized air can result in serious injury, death, or property damage. To avoid this potential hazard, follow above instructions.

1. Open intake and discharge valves to flood piping and prime the pump.

   NOTE: All Neo models are equipped with flooded suction pumps. If the Neo Nanobubble Generator is located above the water line of the tank or water body, it is important to order the unit with a positive suction pump or build a positive suction plumbing assembly. In either case, a check valve just above the intake screen is required to prevent backflow. Moleaer recommended check valve size is double the size of the suction pipe.

2. Turn on main power disconnect on power panel. Start and test pump in manual mode with all valves opened, check piping for visible leaks. If necessary, adjust the pipe supports.

   NOTE: Normal operating pressure range on the pump is between 8 and 30 PSI (0.55 to 2.06 bar). Pump flow rates should be +/- 10% of the system's designed flow. Pump flow rates lower than the system specifications will result in larger bubbles and lower oxygen transfer efficiencies.

   NOTE: Normal operating pressure range of the gas is between 30-140 PSI (2.75 – 9.65 bar) for offboard gas units and 30-100 Psig (2.75-6.89 bar) for onboard gas units.

   NOTE: In normal operating conditions gas pressure must be at least 7 PSI (0.5 bar) above the water pressure.

3. Flow Adjustment:

   - **Standard Units (without oxygen generator):** Gas flow can be adjusted using the knob on the rotameter. See table below for rotameter adjustment.
   - **Units with Onboard Oxygen Generator:** Gas flow can be adjusted using the knob on the Oxygen Generator rotameter (see oxygen generator section). Make the adjustments according to the table below. Flow readings below are on the main rotameter. O2 generator flow readings are on the left side of the oxygen generator enclosure.

Model	Max Operating Flow (on main rotameter)	Optimal Flow (on main rotameter)	O2 generator Max allowable Flow * (on O2 generator flowmeter)
Neo 50	5 CFH / 2.5 LPM	2.5 CFH / 1.25 LPM	12 CFH / 6 LPM
Neo 150	15 CFH / 7.5 LPM	7.5 CFH / 3.2 LPM	21 CFH/ 10 LPM
Neo 250 (Off-board)	25 CFH / 12.5 LPM	12.5 CFH / 6.5 LPM	N/A
Neo 250 (O2 generator)	15 CFH / 7.5 LPM	12 CFH / 6 LPM	21 CFH/ 10 LPM

* Exceeding max allowable flow results in damage to Oxygen generator.

NOTE: Oxygen generator flowmeter and knob are located on the left side of the oxygen generator enclosure.

Oxygen generator flowmeter

PLC Operation

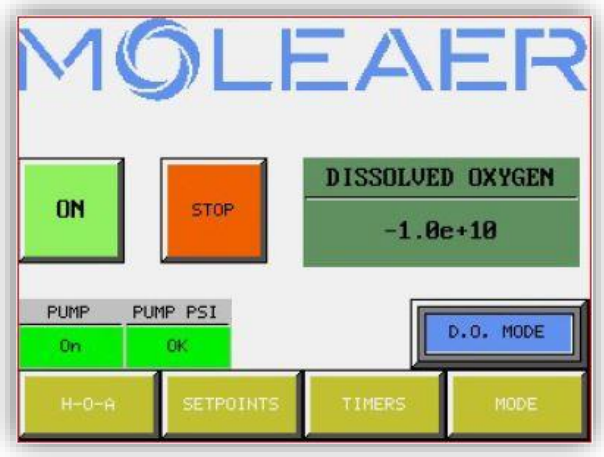
The LCD display interface allows easy monitoring of sensor values, with a simple menu-driven setup for configuring pump settings, system settings, sensor calibration, and more.

The main screen displays the real-time sensor readings from the attached sensors.

The screen turns off after 15 minutes and the user should touch the screen to light up the display.

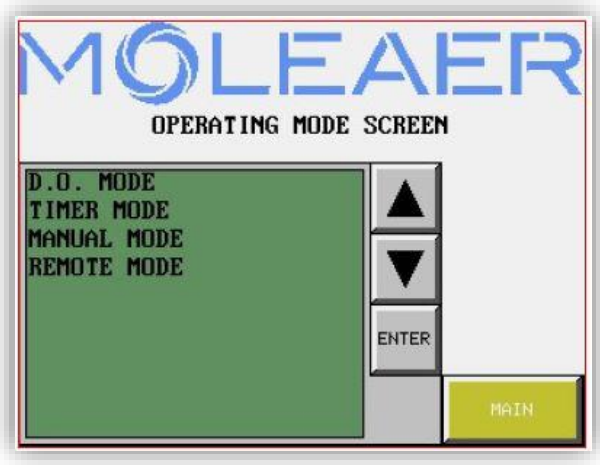
Without input from the user, the controller returns to the main screen after five minutes.

Main Menu Screen



1. **START** button starts the system.
2. **STOP** button stops the system.
3. **PUMP ON / OFF** indicator light indicates pump status and is **green** when it is ON and **red** with it is OFF.
4. **PUMP PSI OK / NOT OK** indicator light indicates that the water pressure is OK and is **green** when it is OK and **red** when it is NOT OK.
5. **GAS FLOW OK / NOT OK** indicator light indicates the gas flow is OK or NOT OK and is **green** when it is OK and **red** when it is NOT OK.
6. **MODE** display indicator displays what mode the system is currently in.
7. The **DISSOLVED OXYGEN** display displays the current DO sensor reading, which is only accurate when the pump is running.
8. The four buttons at the bottom of the page are the **GO TO** buttons for the other screens.

Operation Mode Screen

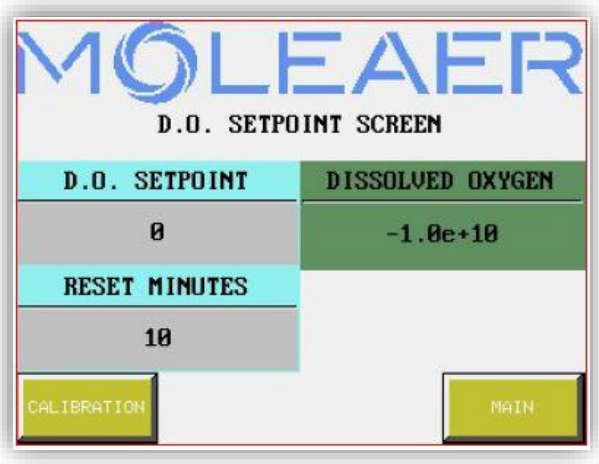


1. The system may be placed into **REMOTE, MANUAL, TIMER SCHEDULE,** or **DISSOLVED OXYGEN SCHEDULE (DO)** modes. Select one mode. Default mode is **MANUAL**.
2. In **MANUAL** mode, the system is started and stopped by pushing the START or STOP button on the MAIN MENU screen.
3. In **REMOTE** mode, the system is started and stopped by a remote signal provided by the customer.
4. In **TIMER SCHEDULE** mode, the system will start when the START button the MAIN MENU screen is pressed. It will run for the RUN TIME set on the timers screen and then stop for the OFF time set on the TIMERS screen. Minimum OFF time is 10 minutes.
5. In **D.O. SCHEDULE** mode, the system starts when the START button on the MAIN MENU screen is pressed; it will run until the DO setpoint is reached, which is the set on the SETPOINT screen. It will stay off for the OFF time set on the TIMERS screen. Minimum off time is five minutes. It restarts after the OFF timer times out and runs through the D.O. SCHEDULE cycle again.
6. The **MAIN** button on the bottom right is the button for returning to the main page.

Timers Screen

1. In **TIMER SCHEDULE** mode, RUN TIME and OFF TIME are set, then the system starts, stops, and starts based on these two alternating timers after the START button is pushed on the MAIN MENU screen.
2. In **DO SCHEDULE** mode, the OFF MINUTES should be set to the time that you require the system to stop between runs. Minimum RUN TIME is 10 minutes, maximum RUN TIME is 999 minutes. Minimum OFF TIME is 10 minutes, maximum RUN TIME is 999 minutes.

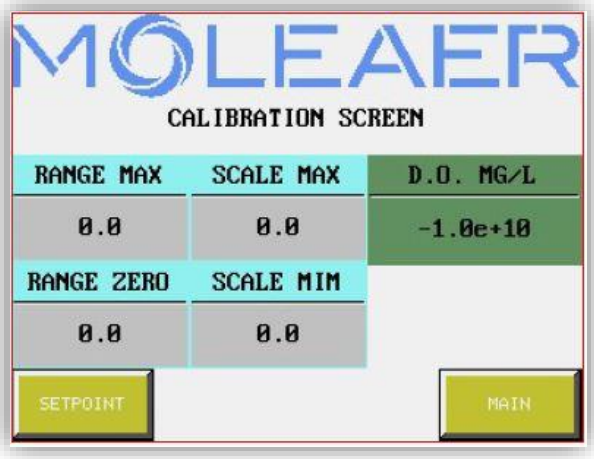
Setpoint Screen



1. On the right in the green box is the current reading of the sensor.
2. On the left is the current D.O. SETPOINT. If you touch the left D.O. SETPOINT button, it will bring

up a number pad that you can enter the desired SETPOINT. The minimum D.O. SETPOINT is 9.0 and the maximum D.O. SETPOINT is 50.0. The system will run up the D.O. SETPOINT while in **D.O. SCHEDULE** mode, which would need to be set on the **OPERATION MODE** screen, and will startup after the **START** button is pressed on the MAIN MENU screen.

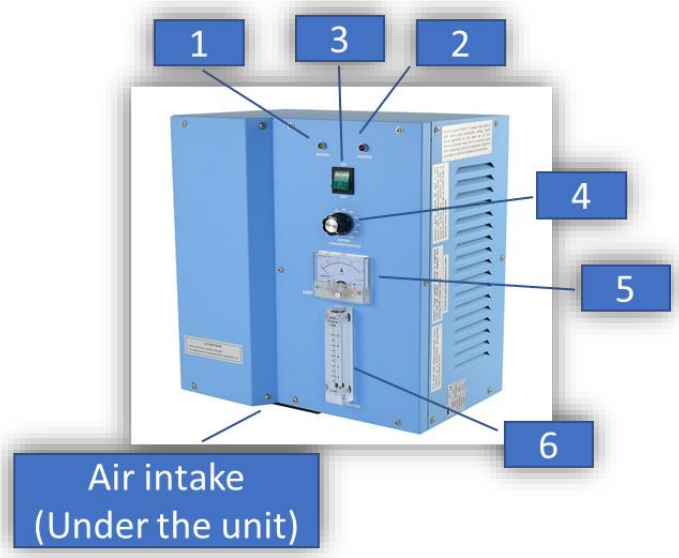
Calibration Screen



Ozone Generator (Optional)

Operation

The ozone generator injects gaseous ozone at ambient pressure and temperature into the by-pass line. Ozone concentration and power on/off are adjusted on the ozone generator unit. Recommended ozone concentration percentage is 70%. The ozone generator maximum capacity is 3g/hr.



1	Ozone Light	Indicates ozone is functioning.
2	Power Light	Indicates when there is power to the unit. If the power is supplied, the LED will illuminate.
3	Power Switch	Used to power the unit on and off.
4	Ozone Concentration Knob	Controls the percentage of ozone produced by the unit.
5	AMP Meter	Shows real time AMP usage.
6	Flow Meter	Shows the suction amount created by the venturi injector (measured in LPM).

Maintenance

Filter

The filter elements are located on the bottom of the cabinet. Inspect and clean the filter during the monthly inspection. Clean the filter with soap and water, rinse, and dry completely before reinstalling.
Follow steps below.

1. Turn the unit off.
2. Clean the filter screen with soap and water
3. Rinse
4. Dry the filter with a clean towel
5. Install the screen back onto the unit
6. Turn the ozone generator on

NOTE: Be sure filter does not touch fan blade

Check Valves

Two check valves are available for the ozone delivery system. There is a check valve close to where the ozone tubing attaches to the ozone generator and a check valve also is included in the venturi injector. The purpose of these check valves is to prevent water from backing up into the ozone generator. Inspect the PTFE ozone delivery to ensure water is not flowing back into the ozone generator. Replace check valves every 6 months to a year of use.

NOTE: The only time it is possible for water to flow back toward the ozone generator is during a system shutdown. Always inspect tube and check valve during this time.

Fuses

The fuse is located on the panel at the bottom of the SP-3G (110V) Ozone Generator. The fuse is 3 AMP for this unit.

Troubleshooting

The test method for failure of the ozone generator

1. Check the power input for correct voltage.
2. If the ozone generator is on, but not producing ozone, then the Ozone Generator is overheating or there is backflow to the ozone generator.
3. Turn off the ozone generator and let the air flow through the unit for 1 to 2 hours to dry the ozone tube.
4. Check the main fuse. Change it if needed.
5. Check the tubing inside the machine for kinks.
6. If the machine can produce some air without any ozone content; check the following.
    a. The power indication lamp is lit.
    b. Check the ozone control knob is set above zero.
    c. Check the ozone board fuse.
    d. Check the wire from terminal to ozone board.
    e. Check that the potentiometer wire is connected to the ozone board.

Enriched Air System (Optional)

Operation

Units equipment with the Enriched Air system are capable of increasing oxygen content of the air injected in to the nanobubble generator up to 40% or double the ambient oxygen content. The percentage varies by elevation and ambient temperature.

Occasional adjustment of the enriched air pressure is required to maximize the oxygen. Often times, the adjustment is needed when the ambient temperature significantly changes.

Nitrogen Membrane Operational Principle

The Enriched air system relies on separating nitrogen from the ambient air. The membrane tank (Prism) accumulates nitrogen of the compressed air and exhausts it through the enriched air back pressure regulator. The nitrogen filtered air, aka. enriched air, leaves the tank via a separate port and is used as the feed to the main compressor (See the P&ID diagram). There is a pressure gauge on the tank to monitor the enriched air pressure. Desired pressure ranges are as follows.

Enriched Air Pressure Ranges	
Optimal Range*	0 to 10 Psi
Maximum Range**	-5 to 20 Psi

Adjust the pressure by turning the enriched air pressure regulator knob.

****Exceeding this range may damage the enriched air compressor or significantly reduce the oxygen content.***

Maintenance

Enriched air system efficiency highly relies on the enriched air quality. Refer to the preventative maintenance for maintenance intervals of the compressor air filter.

Gas Compressors

This section applies to all product variants except the standard (offboard gas).

Units equipped with onboard oxygen generator have one main compressor that recompresses the oxygen from the output of the oxygen generator.

Units equipped with enriched air system, have two compressors: 1) The enriched air compressor that compresses the ambient air for the enriched nitrogen membrane tank (Prism). 2) The main compressor recompresses the enriched air from the nitrogen membrane tank (Prism).

NOTE: Standard models do not have any compressor and rely on offboard gas pressure and flow connected to the gas port. An optional oxygen regulator is available to purchase to regulated the pressure and flow from an external oxygen source.

Startup

Neo is equipped with a dump valve that vents the gas in all tubings when the system turns. During the venting process an audible puff of air is released. This will reduce the chances of running the compressors against pressure or vacuum and assists with draining the condensed water in the gas tubing.

If starting the compressors independently for diagnostics purposes, do not start against a vacuum or pressure load. Also, do not remove relief valve head while unit is operating. If motor fails to start or slows down significantly under load, shut off and disconnect from power supply. Check that voltage is correct for motor and that motor is turning in the proper direction. If the motor runs in the wrong direction, it will overheat.

⚠WARNING

Product surfaces become very hot during operation, allow product surfaces to cool before handling. Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection. Failure to follow these instructions can result in burns, eye injury or other serious injury.

Maintenance Tips

1. Regularly inspect and make necessary repairs to product to maintain proper operation.
2. Make sure that pressure and vacuum is released from product before starting maintenance.
3. If unit is operated at maximum duties in a clean, 65°F to 75°F (18°C to 24°C) ambient environment with 35% relative humidity, complete first inspection and maintenance after 4,000 hours/6 month of operation. Earlier maintenance may be required depending upon the environment.

Compressor Air Filter Replacement

Refer to preventative maintenance schedule for replacement intervals of the filter. Procedure is as follows.

1. Turn system off.
2. Take the existing filter out.
3. Cover the threaded portion of a new filter with 2 tight layers of Teflon tape counterclockwise.
4. Install the new filter.
5. Turn system on.

NOTE: Air filter is critical to optimal operation of the unit. Do not clean and reuse an old air filter. In dry or dusty sites, more frequent replacement may be needed.

Compressor Independent Shutdown

If working on the compressor independently for diagnostic or repair purposes, proper shutdown procedures must be followed to prevent pump damage. Failure to do so may result in premature failures. The Compressor is constructed of ferrous metals or aluminum which are subject to rust and corrosion when pumping condensable vapors such as water. Follow the steps below to assure correct storage and shutdown between operating periods.

1. Press the stop button on the touchscreen.
2. Disconnect the tubes on the compressor.
3. Pressure the Start button on the touchscreen.
4. Operate product for at least five minutes.
5. Run at maximum vacuum for 10 to 15 minutes by blocking the inlet of the compressor.
6. Repeat Step 4.
7. Disconnect power supply.
8. Plug open ports to prevent dirt or other contaminants from entering product.

Compressor Service Kit Installations

WARNING Disconnect electrical power supply cord before installing Service Kit. If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before installing Service Kit. Vent all air lines to release pressure or vacuum. Failure to follow these instructions can result in death, fire or electrical shock.

Service kit contents vary. Most contain head and cylinder gaskets, valves, piston rings and seals, rider rings and felt filters.

1. Press the stop button on the touch screen.
2. Turn the disconnect switch to the OFF position.
3. Disconnect air supply and vent all air lines to release pressure or vacuum.
4. Remove shroud, cylinder head and valve components.
5. Remove cylinder and rings.
6. Clean all parts with water or non-petroleum-based solvent such as Gast AH255B Solvent. Do NOT use kerosene or ANY other combustible solvents.
7. Install piston seals, piston rings and rider rings on piston. Locate ring joints approximately opposite each other.
8. Use cylinder screws with washers to attach cylinder to bracket. Tighten screws only until they are finger tight.
9. Move pistons to top dead center position. Adjust each cylinder flush with top of piston.
10. Torque cylinder screws to 150” to 160” pounds.
11. Replace valve components in original order.
12. Install cylinder head and head screws. The exhaust ports have been marked on the cylinder heads by omitting the ends of two of the fins. Do not tighten screws.
13. Install manifold nuts and seals on manifold. Insert into cylinder head and manifold.
14. Torque head screws to 150” to 160” pounds.
15. Turn fan by hand to check that rod assembly is not hitting head. If rod hits head, loosen cylinders, and adjust.
16. Install manifold and tighten manifold nut one-quarter to one-half turn beyond finger tight.
17. Operate unit for ten minutes. Tighten screws again.
18. Install fan shroud.
19. Check that all external accessories such as relief valves and gauges are attached to cover and are not damaged before reoperating product.

Capacitors Replacement

Compressor capacitor must be replaced per the preventative maintenance interval. The preventative maintenance kit contains the capacitor (or two capacitors for main and enriched compressors in enriched models). Each unit requires one capacitor per compressor. F

NOTE: Capacitors for the main and enriched air are not interchangeable. Cross-reference the capacitor etching with the replacement capacitor before installation. Wrong capacitor will result in premature failure of the pump. Contact Moleaer if further clarification is require to properly identify the right capacitor.

Compressor Troubleshooting

Each unit is equipment with a main compressor that injects air into the nanobubble generator. Units with the enriched air option have an additional compressor called the Enriched Air Compressor. Both compressors' design and operation principles are the same. The troubleshooting guide below applies to both compressors. F this troubleshooting guide does not address the problems, contact Moleaer for further assistance.

NOTE: Always follow the independent shutdown and start procedure in the Gas Compressor section of this document to repair or diagnose issues.

Problem	Corrective Action
Motor Will Not Start	1. Follow the independent compressor shutdown procedure in the Gas Compressors section. 2. Check that voltage from power source matches what is listed on the Neo nameplate and the compressor printed label on the housing. 3. Check wiring connections against diagram on the compressor label. Single voltage motors will operate only at the designated voltage range. 4. Reconnect electrical supply to unit. Check that power is on. If extension cord is used, check that it is the correct size and length to adequately supply power to the unit. 5. Follow the independent Startup procedure int the Gas Compressor section
Motor Starts at 0 PSI but Will Not Start Under Pressure	1. Follow the independent compressor shutdown procedure in the Gas Compressors section. 2. Replace the check valve. 3. If unit does not operate after following the steps above, contact Moleaer.
Motor Starts Intermittently	1. Follow the independent compressor shutdown procedure in the Gas Compressors section. 2. Check points in the pressure or vacuum switch for wear or dirt. 3. Check for dirt buildup or uneven wear. Replace damaged or maintenance items.
Unit or Motor is Running More Often than When First Installed	• Check system for air leaks. If new or different pneumatic equipment has been added, the air requirements may have changed. • Check and clean filters. • Check for buildup of foreign material on head. • Check valves and rings for wear and damage.

Winterizing

Outdoor Nanobubble Cold Weather Bulletin

PVC pipes are in danger of freeze-cracking when the ambient temperatures approaches -7˚C. Ice begins to form and gradually blocks the pipe. This blockage causes a rise in water pressure. Eventually, the pipe ruptures and damages the equipment. Some advanced planning will assist you in keeping your pipes intact during winter months. As a general rule, pipes should be buried at least 30cm below normal frost depth. Both intake and discharge (including goosenecks) should also be below frost depth; the impact strength of PVC pipe decreases during cold weather. At 0˚C, however, the pipe still maintains 70% to 90% of its strength at 23˚C.

Preparation for above water-freezing temperature

Insulate exposed pipes. Wrap pipes with thermal insulation or heat tape. Four types of thermal insulation are available for water pipes, and each one is assigned an R-value. The R-value indicates the heat retention for each material. spiral wrap is the lowest cost and has the lowest R-value and the most difficult installation process. R-4 foam tubing is highly recommended. Measure the insulation and trim to your pipe length. Seal your insulation using duct tape.

Preparation for below water-freezing temperature

If there is a chance that the system is going to lose power, then drain your system by opening pump lid and removing drain valve at bottom of pump housing, draining the whole system, and then reinserting the plug, and putting the lid back on loosely. Remove the SS plug from the lower discharge side of the nanobubble generator block. If you blow the system out with air, be careful to wear appropriate eye protection and stand away from unit. Do not pressurize above 3.5 bar, remove any sensors first. Do not blow the system from the pump. Close isolation valves after blowout.

Winterizing is a good time to lubricate the pump lid O-rings. Add one quart of food grade Propylene Glycol to any water remaining in the unit. Leave unit off until temperature remains above 0˚C for 24 hours.

⚠WARNING

Always disconnect power to the Neo Nanobubble Generator at the circuit breaker before servicing the pump. Failure to do so could result in death or serious injury to service people, users, or others due to electric shock. Read all servicing instructions before draining the pump.

Cleaning and Sanitizing

In normal operation, the internal elements of the Neo generator can become fouled by mineral scale, biological matter, colloidal particles, and insoluble organic constituents. Deposits can build up on the internal surfaces during operation and can cause diminished operation. Best practices include routine preventative cleaning with acid and alkali chemicals. In some instances, if large solids are allowed to pass into the generator, blockages can occur.

General Cleaning Procedures

1. Isolate the system.
2. Attach Clean-in-Place hoses to tee valves (not included).
3. Prepare the cleaning solution, normal to start with the pH opposite of the normal fluid pH.
4. Introduce the cleaning solution with reverse flow to normal flow.
5. Circulate for 10 minutes.
6. Soak for 10 minutes.
7. Conduct high-flow pumping.
8. Flush out.
9. Complete the same steps with the opposite pH.
10. Restart.

Safety Precautions

1. Maximize temperature 100˚C or 212˚F.
2. pH tolerance range 2 to 14.
3. Each cleaning situation is different; therefore, specific cleaning recommendations are dependent on the type of foulant. Consult the general cleaning instructions for information that is common to all types of cleaning, such as suggested equipment, pH and temperature limits and recommended flow rate, then apply the specific recommendation as needed.
4. When using any chemical indicated here, or in subsequent sections, follow accepted safety precautions. Consult the chemical manufacturer for detailed information about safety, handling, and disposal.
5. When preparing cleaning solutions, ensure that all chemicals are dissolved and well mixed before circulating the solutions through the elements.

Blockage Clearing Procedure

Should blockage occur from single or multiple oversized solids being pumped into the generator, immediately stop operation. Disconnect the pump from generator block and backwash water through the unit until the blockage is removed.

Clean-in-Place Bulletin

The cleaning circuit is an important part of Nanobubble Generator (NBG) operation. NBGs can become contaminated after they have been used for some time. Pollutants such as colloids, biofilms, mineral scale, and biological matter buildup over time. Contaminants can be absorbed by the diffuser surface and the pipes in the system, resulting in decreased performance and possibly even serious damage. Periodic cleaning is thus very important and essential to optimal system performance.

Cleaning of an NBG system is usually indicated by the following operating conditions:

1. The system is unable to reach 80% of specified nominal gas flow with gas flow valve wide open (see data sheet for each NBG to identify nominal gas flow for each system.)
2. The normal increase in dissolved oxygen in one pass has decreased by 25%.
3. The pressure of the gas injection required to maintain gas flow exceeds supply gas pressure.

If cleaning is delayed too long, complete recovery of the unit may not be possible.

Safety Precautions

1. When using any chemical indicated here or in subsequent sections, follow accepted safety practices. Consult the chemical manufacturer for detailed information about safety, handling, and disposal.
2. When preparing cleaning solutions, ensure that all chemicals are dissolved and well mixed before circulating the solutions through the system.
3. It is recommended that the system be flushed with good quality water (20˚C minimum temperature) after cleaning. City or well water of drinking water quality is recommended. Care should be taken to operate initially at reduced flow and pressure to flush the bulk of the cleaning solution from the system before resuming normal operating pressures and flows. Despite this precaution, cleaning chemicals will be present on the treated water side following cleaning. Therefore, the treated water should be diverted to a drain for at least 30 minutes, or until the water is clear when starting up after cleaning.
4. During recirculation of cleaning solutions, the maximum temperature must not be exceeded. The maximum allowed temperature is dependent on pH and material type. (See data sheet or consult Moleaer Sales or Tech Service for guidance.)
5. Ensure the system power is disconnected during cleaning procedures to avoid accidental startup of the pump or gas production system.
6. Closing main valves and starting main pump system may result in either piping failures or pump seal failure.

NOTE: The maximum temperature limit during cleaning is 45˚C (113ºF) for all PVC systems.

NOTE: The minimum and maximum pH limits for all PVC systems are 1 and 13, respectively.

The cleaning procedure of an NBG system consists of the following process steps:

1. **Production of the Cleaning Fluid:** The fluids used for the cleaning process need to be of a certain pH, and all chemicals must be dissolved and mixed before the cleaning fluid is added in the NBG.
2. **Removal of Feed Water from Piping that will be Treated with the Cleaning Fluid:** This includes closing the main isolation valves for process flow.
3. **Low-Flow Recirculation Through the System via the Clean-in-Place (CIP) Valves:** The cleaning fluid is low in the system, and the feed water has been forced out of the system.
4. **Soaking in the Cleaning Fluid:** The pump is shutoff, and the cleaning fluid will soak into the NBG.
5. **Drainage of the Cleaned Piping:** The applied cleaning fluid is pumped out of the system. By sampling the cleaning fluid and analyzing the samples, one can determine the amount of contamination.
6. **Rinsing Out the System:** For the rinsing process, either clean or good quality water is used.
7. **Starting Up the Cleaned System:** The installation is started up according to the usual process parameters. When cleaning fluid is still present in the piping, the system needs to be rinsed until water quality is satisfactory.

Cleaning Solutions for NBG Generators

Foulant / Cleaner	0.1% (W) NaOH and 1.0% (W) Na_4EDTA, pH 12, 35°C Max.	0.1% (W) NaOH and 0.025% (W) Na-DSS, pH 12, 35°C Max.	0.2% (W) HCl, 25°C and pH 1 - 2	1.0% (W) Na_2S_2O4, 25°C and pH 5	0.5% (W) H_3PO_4, 25°C and pH 1 - 2	1.0% (W) NH_2SO_3H, 25°C and pH 3 - 4
Inorganic Sales(i.e., $CaCO_3$)			Preferred	Alternative	Alternative	
Sulfate Scales ($CaSO_4$, $BaSO_4$)	OK					
Metal Oxides (i.e., iron)				Preferred	Alternative	Alternative
Inorganic Colloids (silt)		Preferred				
Silica	Alternative	Preferred				
Biofilms	Alternative	Preferred				
Organic	Alternative	Preferred				

System Troubleshooting

Problem	Possible Cause	Corrective Action
Pump Will Not Prime	• Air circulating in system • Power interruption	• Check suction piping and valve on any suction gate valves. • Be sure suction lines, pump strainer (applies to Pentair pumps), and pump volute are full of water. Be sure valve on suction line is working, clean and open.
Pump Motor Not Working	• Motor thermal protector tripped. • Open circuit breaker or overload tripped. • Impeller binding. • Motor improperly wired. • Defective motor.	• Reset overload. • Reset breaker or replace fuse. • Clear the impeller. • Check the motor is wired correctly.
Reduced Capacity and / or Head	• Air pockets or leaks in suction line. • Pump will not prime – too much air.	• Check suction piping and valve on any valve suction gate valves. • Secure lid on pump strainer pot and make sure lid gasket is in place. Check water level to make sure suction port is not drawing air. • Clean pump strainer pot. • Check to see if impeller or diffuser are clogged.

Clogged Impeller	• Debris in impeller.	• Switch OFF electrical power at the circuit breakers to the pump. Remove the nuts that secure the volute to the seal plate.
		• Slide the motor and seal plate away from the volute. Clean debris from impeller.
		• If debris cannot be removed, complete the following steps:
		  ○ Remove impeller reverse screw and O-ring.
		  ○ Remove, clean, and reinstall impeller.
		  ○ Reinstall anti-spin bolt.
		  ○ Reinstall diffuser and O-ring. Reinstall motor and seal plate into volute. Reinstall hardware around seal plate and volute and tighten securely.

Insufficient Dissolved Oxygen Saturation	• Vacuum leaks in suction line. • Gas flow too low.	• Check plumbing connections and suction piping. Check to be sure suction port is not drawing air into the system. • Increase gas flow. • Increase system run time.
Excessive Power Consumption	• Impeller binding. • NPSH too low – excessive suction lift or losses. • Discharge head too low – excessive flow rate.	• Clear the impeller. • Check the pump curve for NPSH requirements. • Check the flow.
Pump Flow Too Low	• Voltage too low.	• Check and correct the voltage.
Pump Back Pressure Too High	• Discharge nozzle or piping obstructed. • Discharge valve engaged too much.	• Check for blockage in piping. • Ensure all valves are fully open.

Problem	Possible Cause	Corrective Action
Low Gas Pressure on System Gauge	• Feed gas pressure too low. • Internal fouling.	• Follow specified “clean-in-place” procedures to internal cleaning. • Increase flow rate.
Gas Flow Meter Not Working	• Excessive Moisture in the rotameter. • Blockage in needle valve.	• Clean rotameter.
Too Many Large Bubbles	• Gas flow too high.	• Reduce gas flow on rotameter or flowmeter on the oxygen generator (for O2 models only)
Insufficient Gas Transfer	• Feed gas pressure too low. • Delta gas pressure out of range. • Excessive moisture and / or contaminant in the gas line. • Internal system fouling.	• Increase feed gas pressure at the gas regulator. • Clean rotameter, gas lines, and fittings. • Follow specified “clean-in-place” procedures for internal cleaning.
Excessive Noise and Vibration	• Impeller binding. • Pump is not primed fully – air or gases in pumpage. • NPSH too low – excessive suction lift or losses. • Incorrect rotation (three phase only). • Defective motor. • Discharge, suction plugged, or valve closed. • Impeller worn or plugged.	• Replace impeller if damaged. • Complete flood intake piping to prime fully. • Repair or replace motor if damaged. • Open discharge valve or reduce restriction.
Ozone generator is off	• Loose wiring • Power fuse • Fan not spinning	• Trace the power cable inside the control panel and tighten any loose wires. • Replace the fuse in the bottom of the unit. Refer to ozone generator section of this manual. • Make sure the fan foam filter is not in contact with the fan blades. • Replace fan and all the damage components because of the excessive heat.

Emergency Spare Parts

US Models

Emergency Spare Parts, Neo US models	
Part Number	**Description**
30A0-072	Neo 50 standard (off board gas), Emergency spare parts list, US and EU models
30A0-073	Neo 50 with onboard oxygen generator, Emergency spare parts list, US models
30A0-074	Neo 150 standard (off board gas), Emergency spare parts list, US and EU models
30A0-075	Neo 150 with onboard oxygen generator, Emergency spare parts list, US models
30A0-076	Neo 250 standard (off board gas), Emergency spare parts list, US and EU models
30A0-077	Neo 250 with onboard oxygen generator, Emergency spare parts list, US models

Ozone Generator, Emergency Spare Parts	
Part Number	**Description**
30A0-078	Ozone generator, Neo, Emergency Spare Parts, US & EU

EU Models

Emergency Spare Parts

Emergency Spare Parts, Neo EU models	
Part Number	**Description**
30A0-072	Neo 50 standard (off board gas), Emergency spare parts list, US and EU models
30A0-081	Neo 50 with onboard oxygen generator, Emergency spare parts list, EU models
30A0-074	Neo 150 standard (off board gas), Emergency spare parts list, US and EU models
30A0-083	Neo 150 with onboard oxygen generator, Emergency spare parts list, EU models
30A0-076	Neo 250 standard (off board gas), Emergency spare parts list, US and EU models

30A0-085	Neo 250 with onboard oxygen generator, Emergency spare parts list, EU models

Ozone Generator, Emergency Spare Parts	
Part Number	**Description**
30A0-078	Ozone generator, Neo, Emergency Spare Parts, US & EU

Preventative Maintenance

Monthly Inspection Checklist

Model	Component	Description
All	Gas Leakage	Use soap water to check the gas leakage on the joints and fittings. Check for signs of cracking on the tubes
All	Water Pressure	Check water pressure gauge (8-30 Psi). Compare historical values on the remote monitoring dahsboard (requires subscription).
All	Compressors visual inspection	Check for erratic vibration or heat marks on the housing.
All	Rotameter	Check rotameter value and compare with previous readings
All	Visual inspection	Check gas tubing and look for spots with condensation, and heat marks
All	Main pressure regulator	Check the outlet of main pressure regulator. Combination of high gas pressure (above 90SPi) and constant outgoing flow from regulator can be a sign of diffuser fouling or gas blockage inside the nanobubble generator. CIP may be needed.
Onboard O2 generator	Ozone generator operation	While the unit is running, the green power switch must be in "on" position with green light.
Onboard O2 generator	Oxygen generator intake filter	Replace oxygen generator air intake foam filter with the spare filter. See manual for instructions. Save cleaned filter for next use.
All except standard	Gas Pressure	Check gas pressure gauge (40-110 Psi). Compare with historical values on the remote monitoring dashbaord (requires subscription).
All except standard	Compressor suction	Detach the suction tube on the compressors. Check the suction by putting a piece of paper on the tube to block the air flow.
All except standard	Main compressor flow	Detach tube from the back of the rotameter and check gas flow.
Enriched and offboard	Rotameter	Note rotameter value and compare with previous readings. Adjust flow by using rotameter knob
Aquatic pumps (Pentair/DAB)	Pump basket	Stop the unit. Take the pump lid out. Inspect and clean the basket.

Model	Component	Description
Onboard oxygen generator	Rotameter	Note rotameter value and compare with previous readings. Adjust flow by using oxygen generator rotameter knob
Onboard O2 generator	Oxygen generator air circulation	Check the fan and the inlet foam filter. Follow manual instructions to clean the foam filter
Onboard Ozone generator	Oxygen generator flow	Check for internal gas leakage. Detach the main compressor inlet tubing. Gas must flow from O2 generator.
Onboard Ozone generator	Ozone generator fan	Remove fan cover and visually inspect the fan. Inspect foam filter and replace/clean if needed.
Onboard Ozone generator	Ozone generator settings	Check rotameter value and ozone concentration. Adjust ozone concentration if desired. Max value must be below 80% for continuous operation.
Enriched	Enriched air pressure regulator	the outlet of the regulator is located outside the unit right under the regulator. Air must constantly flowing out under the unit.
Enriched	Enriched air pressure	Enriched air pressure must between -2 to +5 Psi. Adjust the pressure by turning the enriched air back pressure regulator while the unit is running
Enriched	Enriched compressor flow	Detach the tube between primary compressor and prism. Check gas flow.

Preventative Maintenance Schedule

Moleaer offers preventative maintenance kits that includes all the components that needs to be replaced as noted in the below table.

Schedule	Description
Week 1	Perform monthly inspection
Week 2	perform monthly inspection
Week 4	perform monthly inspection
6 months	Perform monthly inspection
	Replace main compressor air filter (all units except standard)
	Clean O2 generator enclosure (onboard O2 units only)
1-year	Perform monthly inspection
	Visually inspect electrical enclosure. Look for heat marks & loose wires. Wipe out condensed water.
	Perform CIP
	Replace main compressor capacitor (All units except standard)

Schedule	Description
	Replace main compressor air filter (All units except standard)
	Replace enriched air compressor capacitor (enriched units only)
	Swap O2 generator foam filter (onboard O2 units only)
	Clean O2 generator enclosure (onboard O2 units only)
	Clean ozone generator fan filter (onboard ozone units only)
	Replace ozone generator check valves
18 months	Perform 6 months maintenance
	Perform 1 year maintenance
	Replace DO sensor
	Rebuild O2 generator feed and waste solenoid valve (onboard O2 units only)
	Reseal O2 generator compressor (onboard O2 only)
	Replace O2 generator mount sandwich (onboard O2 only)
2 years	Replace O2 generator Equalization valve
2.5 years	Perform 6 months maintenance
	Perform 1 year maintenance items
	Check and adjust set pressure of the enriched air back pressure regulator (All units except standard)
3 years	Check and adjust set pressure of the main back pressure regulator (All units except standard)
3.5 years	Perform 6 months maintenance
	Perform 1 year maintenance
	Calibrate Prosense pressure switch
	Replace DO sensor
	Rebuild O2 generator feed and waste solenoid valve (onboard O2 units only)
	Replace O2 generator compressor (onboard O2 only)
	Replace O2 generator Equalization valve (onboard O2 only)
4 years	Optional: Replace Prism membrane tank (enriched units only)

Schedule	Description
	Optional: Reseal pump (locate pump brand on the unit and contact Moleaer)
	Optional: Replace or calibrate all pressure transducers.

Preventative Maintenance Kits

NOTE: Neo Standard version does not require any maintenance kit.

NOTE: Maintenance Kits include the Airsep Oxygen generator service kits.

Neo with onboard oxygen generator	
Part Number	**Description**
99E0-161	1 year preventative maintenance kit, All Neo models with oxygen generator
30K0-006	Maintenance kit, 2 years, Neo 50 with onboard Oxygen generator
30K0-007	Maintenance kit, 4 years, Neo 50 with onboard Oxygen generator
30K0-008	Maintenance kit, 2 years, Neo 150 and Neo 250 with onboard Oxygen generator
30K0-009	Maintenance kit, 2 years, Neo 150 and Neo 250 with onboard Oxygen generator

Neo with Enriched Air Option. All Models	
Part Number	**Description**
30K0-010	Maintenance Kit, 1 year, Neo, Enriched Air, US & EU
30K0-011	Maintenance Kit, 2 years, Neo, Enriched Air, US & EU
30K3-012	Maintenance Kit, 4 years, Neo, Enriched Air, US & EU

EU Lowara Pumps Specifications Sheets

Most Neo EU units are equipped with Lowara centrifugal flooded suction pumps. Always check your unit's pump model and brand before referring to this section. For all other pumps, contact Moleaer for specifications.

NOTE: A flooded suction in a centrifugal pump is where liquid originates. The liquid is held at a level above the suction port of the pump and allows liquid to arrive at the pump through gravity. In order to operate this pump, liquid must already be within the flooded suction.

EU 50 GPM Neo Pump Information - Lowara

LOWARA
a xylem brand

Customer	Date 8/17/2020
Contact	Project
Phone number	Project no.
Email	

Technical Data

ESHE 32-125/11/S25RSNA

101860140

Operating data

Pumpe type	Single head pump		Fluid		Water, pure
No. of pumps / Reserve	1 / 0		Operating temperature t A	°C	4
Nominal flow	m³/h	0	pH-value at t A		7
Nominal head	m	0	Density at t A	kg/m³	1000
Static head	m	0	Kin. viscosity at t A	mm²/s	1.569
Inlet pressure	kPa	0	Vapor pressure at t A	kPa	100
Environmental temperature	°C	20	Solids		0
Available system NPSH	m	0	Altitude	m	0

Pump data

Make	Lowara				Nominal	m³/h	( )
Speed	rpm	2900	Flow		Max-	m³/h	24
Number of stages		1			Min-	m³/h	9
Max. casing pressure	kPa				Nominal	m	
Max. working pressure	kPa	203.5	Head		at Qmax	m	9.7
Head H(Q=0)	m	21			at Qmin	m	19
Weight	kg		Shaft power			kW	( )
Max.	mm	128	Max. shaft power			kW	1.1
Impeller R designed	mm	128	Efficiency			%	
Min.	mm	114	NPSH 3%			m	
Suction nozzle	DN 50 PN 12 EN1092-2 (e-SH)		Discharge nozzle			DN 32 PN 12 EN1092-2 (e-SH)	

Pump Materials

Pump body	Stainless steel / AISI 316L
Impeller	Stainless steel / ASTM CF8M
SEAL HOUSING	Stainless steel / AISI 316L
Wear Ring	Stainless steel / AISI 316L
Counterwear ring	Stainless steel / AISI 316L
Shaft extension	Stainless steel / AISI 316L
Rigid shaft coupling	Stainless steel / AISI 316
Impeller locknut and washer	Stainless steel / AISI 316
Tab	Stainless steel / AISI 316L

Shaft Seal

Single Seal	
e-SH - uniten	Roten
Rotating Assembly	V-Ceramic
Fixed Assembly	B-Resin impregnated carbon
Elastomers	V-FKM (FPM)
Springs	G-AISI 316
Other Components	G-AISI 316

Motor data

Manufacturer	Lowara	Electric voltage	220 V
Specific design	IE3 Three phase surface motor		
Type	SM90R.../311 PE		
Rated power	1.1 kW	Electric current	4.19 A
Speed	2870 rpm	Degree of protection	IP 55
Frame size	90R	Weight	11.4 kg
Shaft diameter	0 mm	Colour	RAL 5010
Insulation class	F		

Coupling

Manufacturer	
Series	
Type	
Frame size	
Spacer length	
Weight	
Coupling protection	

LOWARA
a xylem brand

Customer	Date 8/17/2020
Contact	Project
Phone number	Project no.
Email	

ESHE 32-125/11/S25RSNA

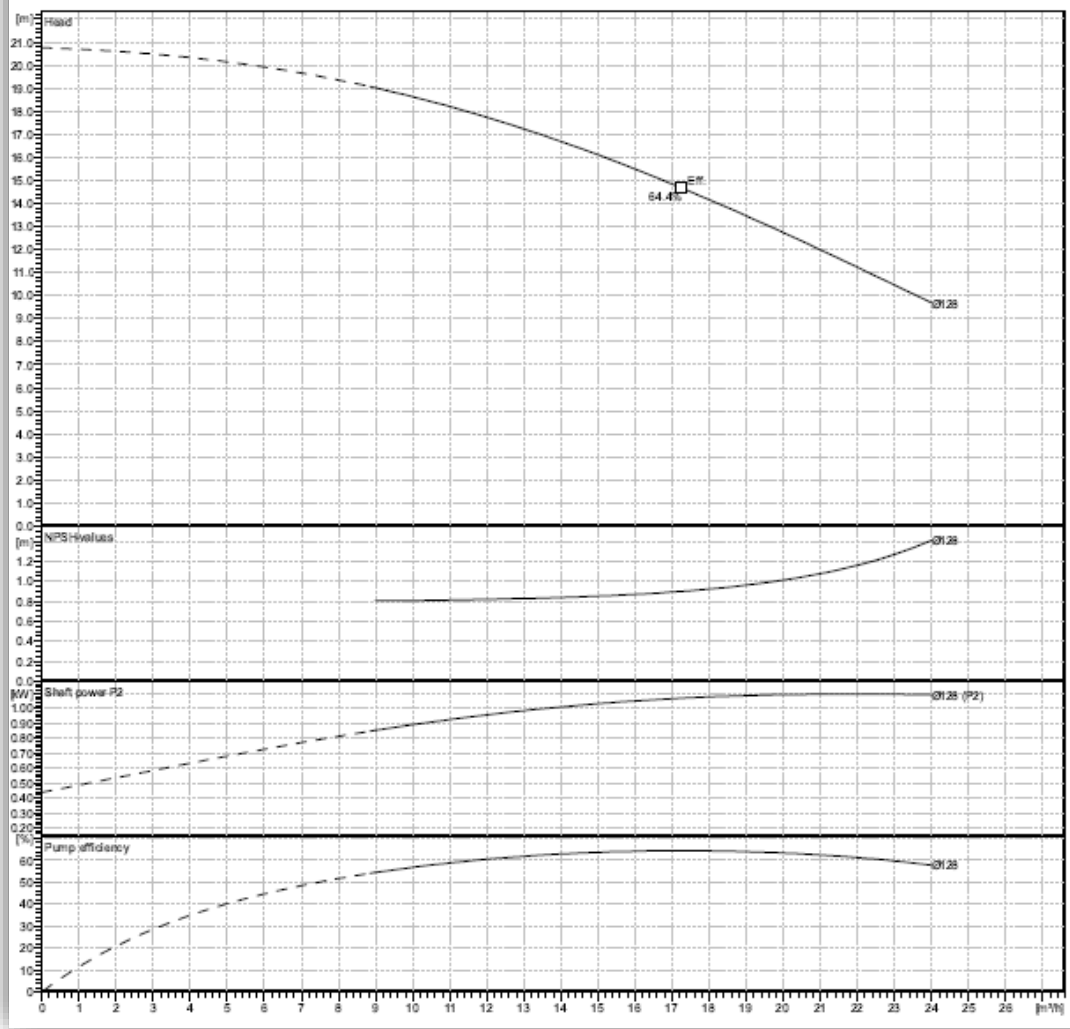
101860140

Tender Hydraulic

Hydraulic data

Operating Data Specification		Hydraulic data (duty point)		Impeller design	
Flow	0 m³/h	Flow		Impeller R	128 mm
Head	0 m	Head		Frequency	50 Hz
Static head	0 m	MEI >=0,4		Speed	2900 rpm

Power datas referced to:
Water, pure [100%] ; 4°C; 1000kg/m³; 1.57mm²/s
Performance according to ISO 9906:2012 – Grade 3B



EU 150 GPM Neo Pump Information _ Lowara

ESHE 40-125/22/P25RSSA

Technical Dat

Operating data

Pumpe type	Single head pump		Fluid		Water, pure
No. of pumps / Reserve	1 / 0		Operating temperature t A	°C	4
Nominal flow	m³/h	34	pH-value at t A		7
Nominal head	m	14,8	Density at t A	kg/dm³	1
Static head	m	0	Kin. viscosity at t A	mm²/s	1,569
Inlet pressure	bar	0,098	Vapor pressure at t A	bar	0,0083
Environmental temperature	°C	20	Solids		0
Available system NPSH	m	0	Altitude	m	1000

Pump data

Make	Lowara			Nominal	m³/h	34,6	(34,6)
Speed	1/min	2900	Flow	Max-	m³/h	45	
Number of stages		1		Min-	m³/h	18	
Max. casing pressure	bar			Nominal	m	15,3	
Max. working pressure	bar	2,4	Head	at Qmax	m	10,2	
Head H(Q=0)	m	23		at Qmin	m	21,1	
Weight	kg		Shaft power		kW	2,1	(2,1)
Max.	mm	133	Max. shaft power		kW	2,1	
Impeller R designed	mm	133	Efficiency		%	69,31	
Min.	mm	112	NPSH 3%		m	2,1	
Suction nozzle	DN 65	PN 12 EN1092-2 (e-SH)	Discharge nozzle		DN 40	PN 12 EN1092-2 (e-SH)	

Pump Materials

Pump body	Stainless steel / AISI 316L
impeller	Stainless steel / AISI 316L
Seal casing	Stainless steel / AISI 316L
Wear ring	Stainless steel / AISI 316L
Counterwear ring	Stainless steel / AISI 316L
Shaft extension	Stainless steel / AISI 316
Rigid shaft coupling	Stainless steel / AISI 316
Impeller locknut and washer	Stainless steel / AISI 316
Tab	Stainless steel / AISI 316L

Shaft Seal

Mechanical seal	
e-SH - uniten	Roten
Rotating Assembly	V-Ceramic
Fixed Assembly	B-Resin impregnated carbon
Elastomers	V-FKM (FPM)
Springs	G-AISI 316
Other Components	G-AISI 316

Motor data

Manufacturer	Lowara	Electric voltage	220 V
Specific design	IE3 Three phase surface motor		
Type	PLM90.../322 E3	Electric current	7,97 A
Rated power	2,2 kW	Degree of protection	IP 55
Speed	2880 1/min	Insulation class	F
Frame size	90	Weight	18 kg
Shaft diameter	0 mm	Colour	RAL 5010

Coupling

Manufacturer	
Series	
Type	
Frame size	
Spacer length	
Weight	
Coupling protection	

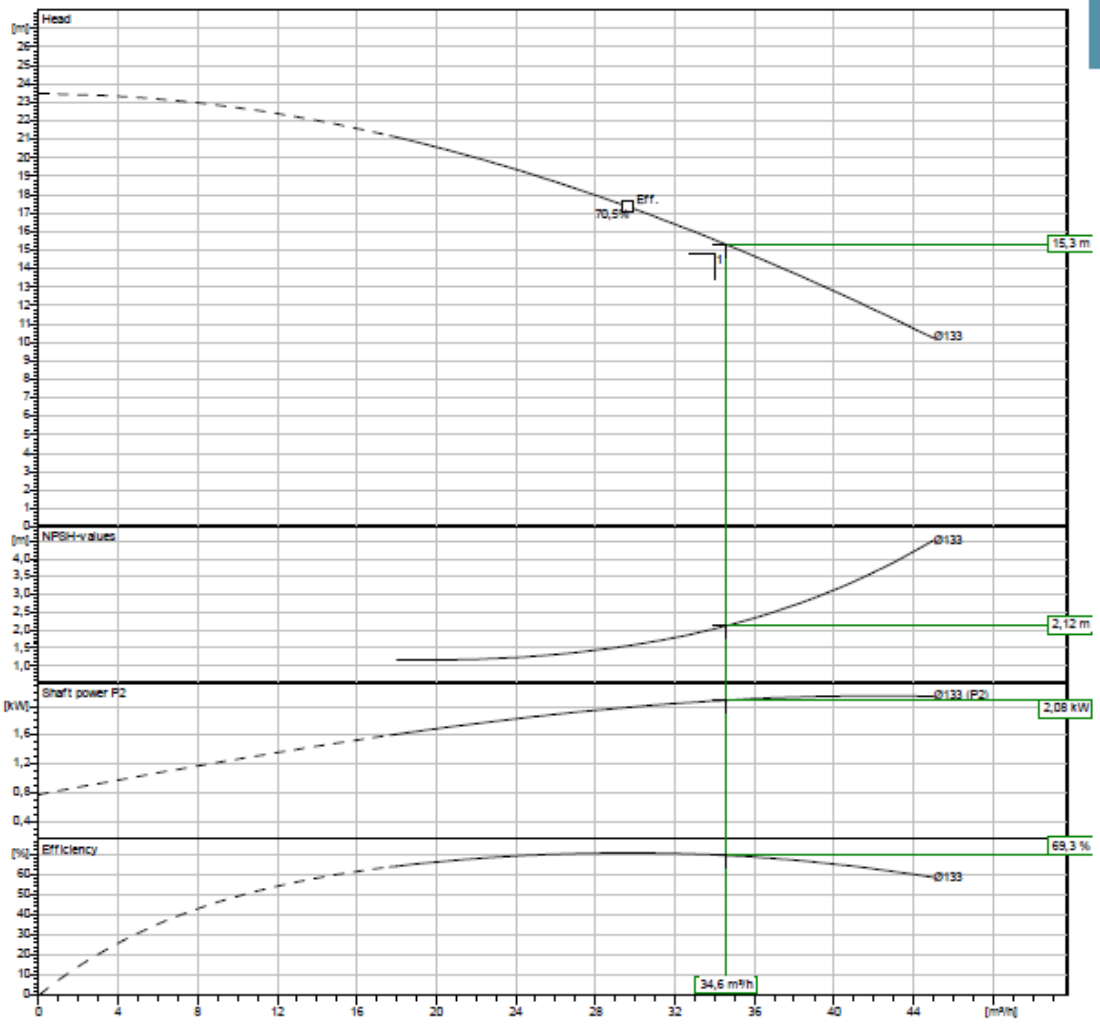
ESHE 40-125/22/P25RSSA

Tender Hydr

Hydraulic data

Operating Data Specification		Hydraulic data (duty point)		Impeller design	
Flow	34 m³/h	Flow	34,6 m³/h	Impeller R	133 mm
Head	14,8 m	Head	15,3 m	Frequency	50 Hz
Static head	0 m	MEI >=0,4		Speed	2900 1/min

Power datas referced to:
Water, pure [100%] ; 4°C; 1kg/dm³; 1,57mm²/s
Performance according to ISO 9906 - Annex A



EU 250 GPM Neo Pump Information - Lowara

ESHE 65-250/40/P45VSNA

101863640

Technical Da

Operating data

Pumpe type	Single head pump		Fluid		Water
No. of pumps / Reserve	1 / 0		Operating temperature t A	°C	4
Nominal flow	m³/h	56.8	pH-value at t A		7
Nominal head	m	15.24	Density at t A	kg/m³	1000
Static head	m	0	Kin. viscosity at t A	mm²/s	1.569
Inlet pressure	kPa	0	Vapor pressure at t A	kPa	100
Environmental temperature	°C	20	Solids		0
Available system NPSH	m	0	Altitude	m	0

Pump data

Make	Lowara				Nominal	m³/h	57.5 (57.5)
Speed	rpm	1450	Flow		Max-	m³/h	72
Number of stages		1			Min-	m³/h	30
Max. casing pressure	kPa				Nominal	m	15.6
Max. working pressure	kPa	200.1	Head		at Qmax	m	12
Head H(Q=0)	m	20			at Qmin	m	19.5
Weight	kg		Shaft power			kW	3.4 (3.4)
Max.	mm	255	Max. shaft power			kW	3.7
Impeller R designed	mm	240	Efficiency			%	71.6
Min.	mm	240	NPSH 3%			m	
Suction nozzle	DN 80	PN 12 EN1092-2 (e-SH)	Discharge nozzle			DN 65	PN 12 EN1092-2 (e-SH)

Pump Materials

Pump body	Stainless steel / AISI 316L
Impeller	Stainless steel / ASTM CF8M (AISI 316 cast)
SEAL HOUSING	Stainless steel / AISI 316L
Wear Ring	Stainless steel / AISI 316L
Counterwear ring	Stainless steel / AISI 316L
Shaft extension	Stainless steel / AISI 316
Rigid shaft coupling	Stainless steel / AISI 316
Impeller locknut and washer	Stainless steel / AISI 316
Tab	Stainless steel / AISI 316L

Shaft Seal

Single Seal	
e-SH - uniten	Roten
Rotating Assembly	V-Ceramic
Fixed Assembly	B-Resin impregnated carbon
Elastomers	V-FKM (FPM)
Springs	G-AISI 316
Other Components	G-AISI 316

Motor data

Manufacturer	Lowara	Electric voltage	380 V
Specific design	IE3 Three phase surface motor		
Type	PLM4112.../340 E3		
Rated power	4 kW	Electric current	8.4 A
Speed	1445 rpm	Degree of protection	IP 55
Frame size	112	Weight	57 kg
Shaft diameter	0 mm	Colour	RAL 5010
Insulation class	F		

Coupling

Manufacturer	
Series	
Type	
Frame size	
Spacer length	
Weight	
Coupling protection	

ESHE 65-250/40/P45VSNA

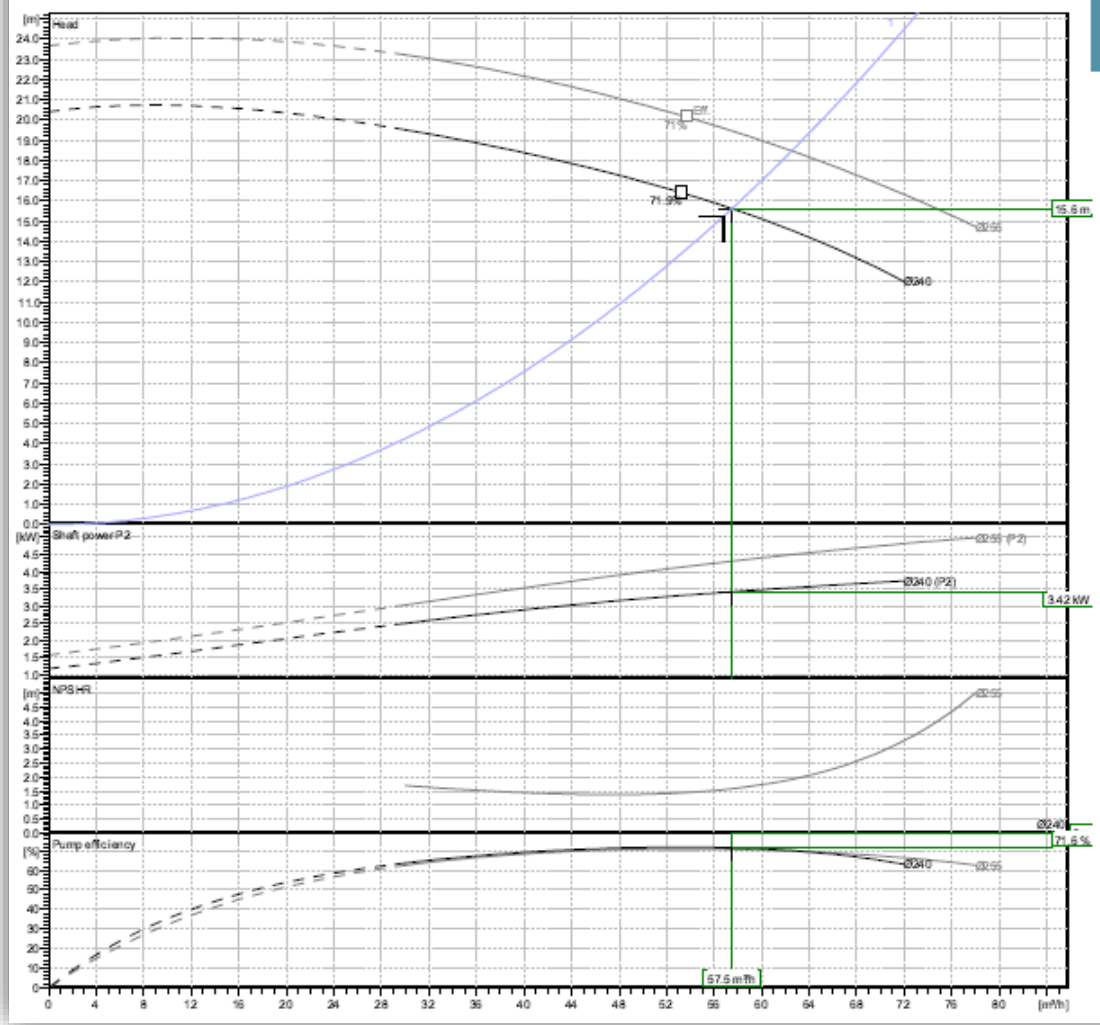
101863640

Tender Hydr

Hydraulic data

Operating Data Specification		Hydraulic data (duty point)		Impeller design	
Flow	56.8 m³/h	Flow	57.5 m³/h	Impeller R	240 mm
Head	15.24 m	Head	15.6 m	Frequency	50 Hz
Static head	0 m	MEI >=0,4		Speed	1450 rpm

Power datas referced to:
Water [100%] ; 4°C; 1000kg/m³; 1.57mm²/s
Performance according to ISO 9906:2012 – Grade 3B



US Neo Gould Pumps Performance Specifications

Most Neo US units are equipped with Gould centrifugal flooded suction pumps. Always check your unit's pump model and brand before referring to this section. For all other pumps, contact Moleaer for specifications.

NOTE: A flooded suction in a centrifugal pump is where liquid originates. The liquid is held at a level above the suction port of the pump and allows liquid to arrive at the pump through gravity. In order to operate this pump, liquid must already be within the flooded suction.

50 GPM Neo Pump Information - Gould

GOULDS WATER TECHNOLOGY
a xylem brand

15SH08B02T4F2

Technical data

Company Name
Contact
Phone number
E-Mail address

Operating data							
1	Pumpe type	Single head pump		Fluid			Water
2	No. of pumps		1	Operating temperature t A		°F	39.2
3	Nominal flow	US g.p.m.	50.02	pH-value at t A			7
4	Nominal head	ft	54.99	Density at t A		lb/ft³	62.4
5	Static head	ft	0	Kin. viscosity at t A		ft²/s	1.689E-5
6	Inlet pressure	psi	0	Vapor pressure at t A		psi	14.5
7	Environmental temperature	°F	68	Content of solid%	Solid size inch		0 0
8	Available system NPSH	ft	0	Altitude		ft	0
Pump data							
9	Design	Highly efficient stainless steel end suction pumps					
10	Specific design	Rotation: 12 oClock [STD]		Impeller Ø	Max.	inch	8 1/4
11	Operating speed	rpm	1750		designed	inch	7 13/16
12	Group		S		Min.	inch	6 1/8
13	Suction flange		NPS 2.5 / CL150 / ASME B16.5 (e-SH)	Flow	Nominal US g.p.m.		50.5
14	Discharge flange		NPS 1.5 / CL150 / ASME B16.5 (e-SH)		Max- US g.p.m.		118
15	Max. casing pressure	psi			Min- US g.p.m.		27
16	Max. working pressure	psi	26.6	Head	Nominal	ft	56.1
17	Impeller type		Radial impeller		at Qmax	ft	35.3
18	Head H(Q=0)	ft	61		at Qmin	ft	59.9
19	Max. shaft power	hp	1.9	Shaft power		hp	1.5
20	Pump weight	lb	65.0	Efficiency		%	49.7
21	Total weight	lb	On demand	NPSH 3%		ft	6.8

Materials					
22	Pump		Shaft Seal		
23	Casing	Stainless steel 316L	John Crane	Elastomer Bellows Shaft Seal	
24	Impeller	Stainless steel 316L	Type 21		
25	Wear Ring	Stainless steel 316L	Seal faces	Carbon [STD]	
26	Adapter	Gray cast iron class 20B	Stationary ring	Silicon Carbide	
27	Ball bearing (outboard)	Steel	Elastomers	FKM	
28	Pump shaft	Steel grade 1213	Springs	Stainless steel CF8M (316)	
29	Deflector	Buna-N	Other metal parts	Stainless steel CF8M (316)	
30	Shaft Sleeve	Stainless steel CF8M (316)			
31	Bearing Cover	Gray cast iron class 20B			
32	Ball bearing (inboard)	Steel			
33	Impeller Key	Steel			
34	Seal Housing	Stainless steel 316L			
35	Impeller Washer	Stainless steel CF8M			
36	Bearing Frame	Gray cast iron class 20B			
37	Lip Seal	Not available			
38	V-Ring	Buna-N			
39	Casing bolt with nut (casing to adapter)	Stainless Steel			
40	Retaining ring	Steel			
41					

Motor data							
42	Manufacturer	Baldor					
43	Specific design	NEMA3 ph TEPE [STD]					
44	Type	Frame 145JM - 2 hp					
45	Rated power	2 hp	Item no.				
46	Nominal speed	1800 rpm	Service factor	1.15			
47	Frame size	145JM	Electric voltage	460 V			
48	Weight lb	45.0					

15SH08B02T4F2

Performance Curve

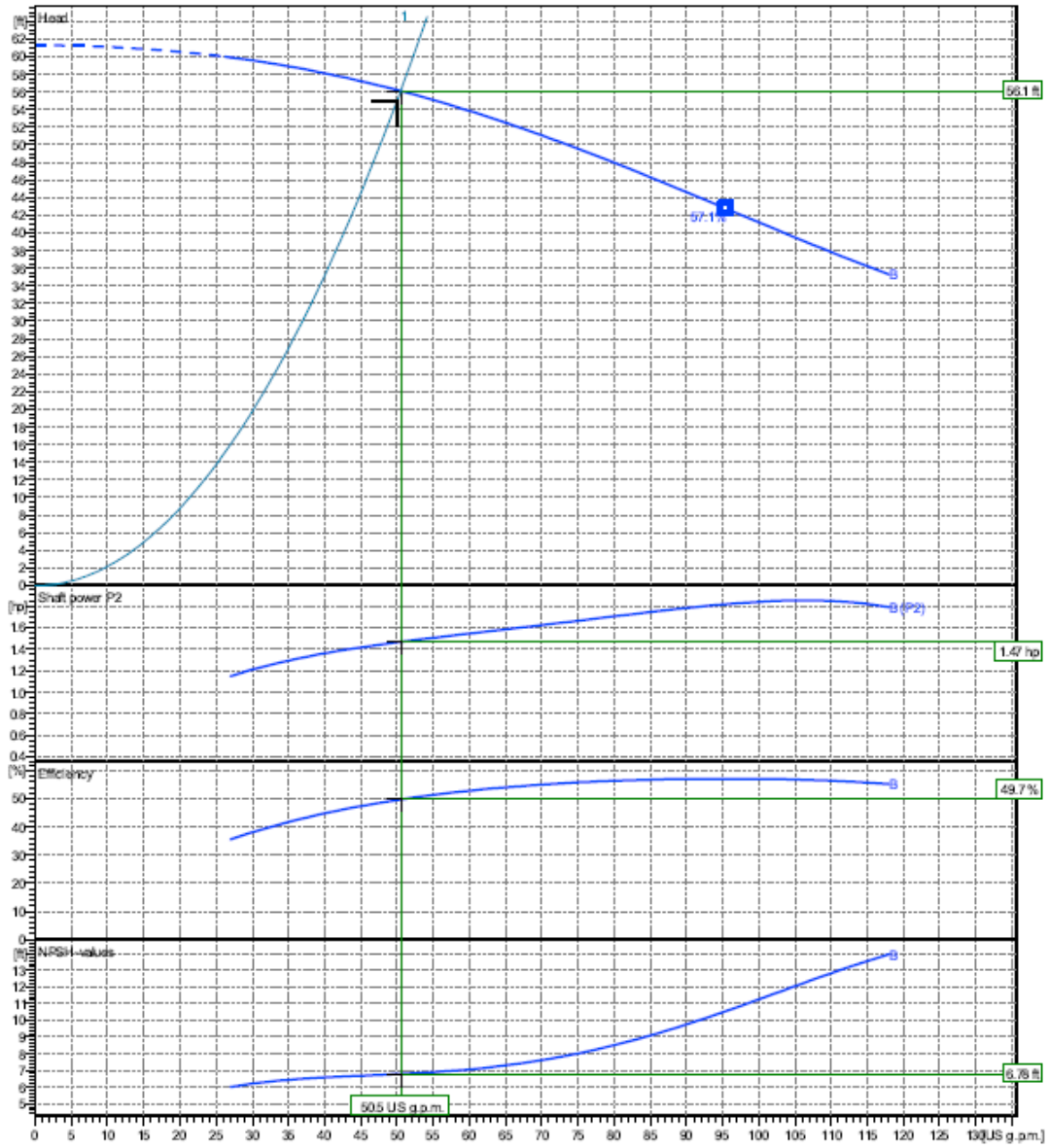
Company Name
Contact
Phone number
E-Mail address

	Ø	Delivered Flow Application Range Min.	Delivered Flow Application Range Max.	η Max.	Lift Capability H(Q=0)	Lift Capability η Max.	Shaft Power P2 P2(Q=0)	Shaft Power P2 Max.	Shaft Power P2 η Max.
	inch	US g.p.m.	US g.p.m.	US g.p.m.	ft	ft	hp	hp	hp
Is	7.812	27	118	95.5	61.3	42.8		1.85	1.82
Min.	6.125	/	/	78.4	37.7	25		/	0.887
Max.	8.250	/	/	95.3	67	52.9		/	2.04

Frequency	Hz	60
Operating speed	rpm	1750
Nominal flow	US g.p.m.	50.02
Nominal head	ft	54.99
Inlet pressure	psi	0
Static head	ft	0

Power datas referced to:

Water [100%] ; 39.2°F; 62.4lb/ft³; 1.69E-5ft²/s



150 GPM Neo Pump Information - Gould

GOULDS WATER TECHNOLOGY
a xylem brand

02SH08A03T4F2

Technical data

Company Name
Contact
Phone number
E-Mail address

Operating data								
1	Pumpe type	Single head pump		Fluid			Water	
2	No. of pumps		1	Operating temperature t A		°F	39.2	
3	Nominal flow	US g.p.m.	150	pH-value at t A			7	
4	Nominal head	ft	50	Density at t A		lb/ft³	62.4	
5	Static head	ft	0	Kin. viscosity at t A		ft²/s	1.689E-5	
6	Inlet pressure	psi	0	Vapor pressure at t A		psi	14.5	
7	Environmental temperature	°F	68	Content of solid%	Solid size	inch	0	0
8	Available system NPSH	ft	0	Altitude		ft	0	
Pump data								
9	Design	Highly efficient stainless steel end suction pumps						
10	Execution	Rotation: 12 oClock [STD]		Impeller Ø	Max.	inch	8 1/4	
11	Operating speed	rpm	1750		designed	inch	8 1/4	
12	Group		S		Min.	inch	6 3/16	
13	Suction flange		NPS 2.5 / CL150 / ASME B16.5 (e-SH)	Flow	Nominal	US g.p.m.	153.1	
14	Discharge flange		NPS 2 / CL150 / ASME B16.5 (e-SH)		Max-	US g.p.m.	207	
15	Max. casing pressure	psi			Min-	US g.p.m.	35	
16	Max. working pressure	psi	30	Head	Nominal	ft	52.1	
17	Impeller type		Radial impeller		at Qmax	ft	39	
18	Head H(Q=0)	ft	69		at Qmin	ft	68.5	
19	Max. shaft power	hp	3.3	Shaft power		hp	3.1	
20	Pump weight	lb	68.0	Efficiency		%	65.4	
21	Total weight	lb	On demand	NPSH 3%		ft	5	

Materials					
22	Pump		Shaft Seal		
23	Casing	Stainless steel 316L	John Crane	Elastomer Bellows Shaft Seal	
24	Impeller	Stainless steel 316L	Type 21		
25	Wear Ring	Stainless steel 316L	Seal faces	Carbon [STD]	
26	Adapter	Gray cast iron class 20B	Stationary ring	Silicon Carbide	
27	Ball bearing (outboard)	Steel	Elastomers	FKM	
28	Pump shaft	Steel grade 1213	Springs	Stainless steel CF8M (316)	
29	Deflector	Buna-N	Other metal parts	Stainless steel CF8M (316)	
30	Shaft Sleeve	Stainless steel CF8M (316)			
31	Bearing Cover	Gray cast iron class 20B			
32	Ball bearing (inboard)	Steel			
33	Impeller Key	Steel			
34	Seal Housing	Stainless steel 316L			
35	Impeller Washer	Stainless steel CF8M			
36	Bearing Frame	Gray cast iron class 20B			
37	Lip Seal	Not available			
38	V-Ring	Buna-N			
39	Casing bolt with nut (casing to adapter)	Stainless Steel			
40	Retaining ring	Steel			
41					

Motor data							
42	Manufacturer	Baldor					
43	Specific design	NEMA3 ph TEPE [STD]					
44	Type	Frame 182JM - 3 hp					
45	Rated power	3 hp	Item no.				
46	Nominal speed	1800 rpm	Service factor	1.15			
47	Frame size	182JM	Electric voltage	460 V			
48	Weight lb	70.0					

02SH08A03T4F2

Performance Curve

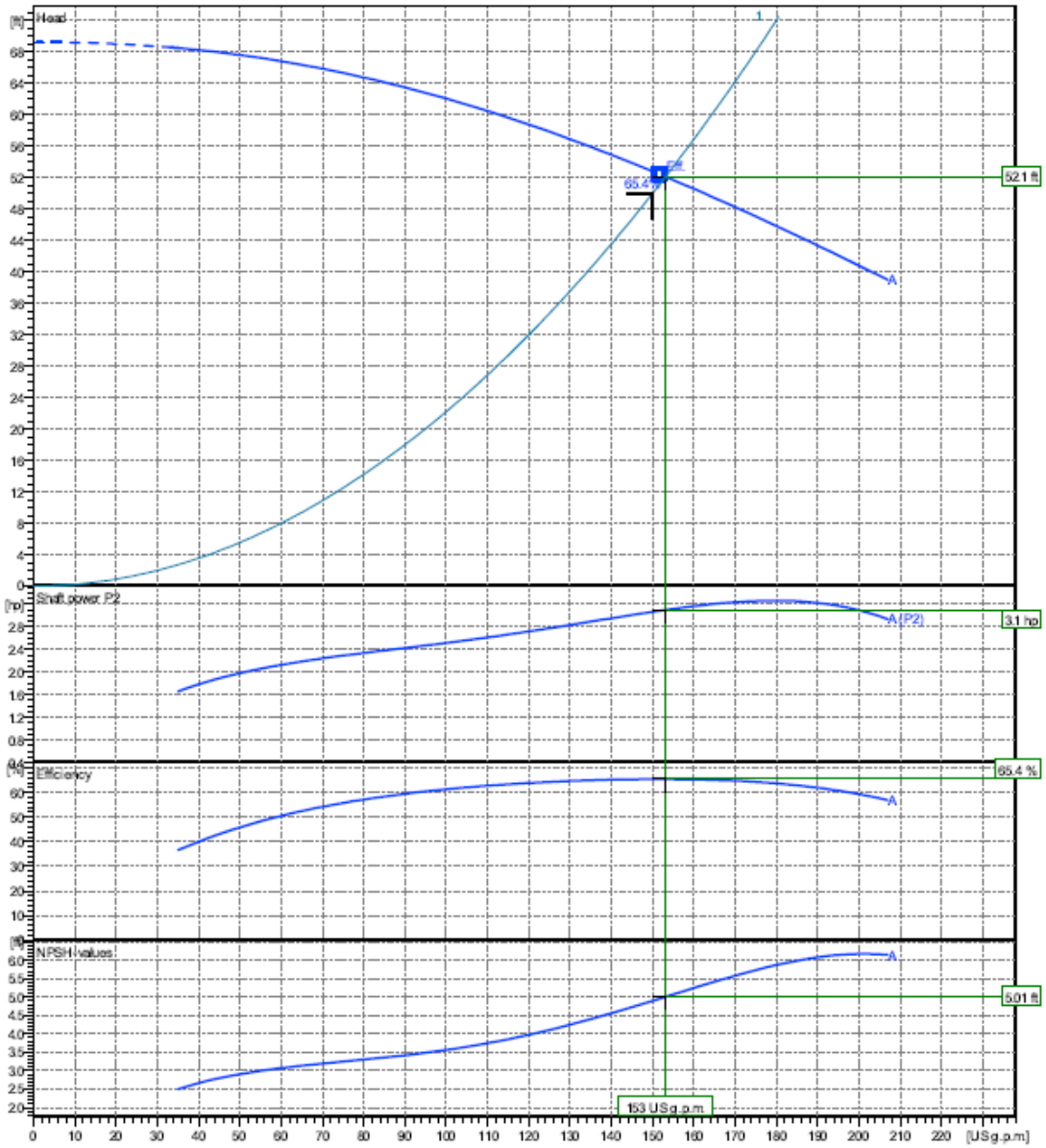
Company Name
Contact
Phone number
E-Mail address

	Ø	Delivered Flow Application Range Min.	Max.	η Max.	Lift Capability H(Q=0)	η Max.	Shaft Power P2 P2(Q=0)	Max.	η Max.
	inch	US g.p.m.	US g.p.m	US g.p.m	ft	ft	hp	hp	hp
Is	8.250	35	207	152	69.2	52.4		3.26	3.08
Min.	6.187	/	/	117	38.8	32.7		/	1.69
Max.	8.250	/	/	152	69.2	52.4		/	3.08

Frequency	Hz	60
Operating speed	rpm	1750
Nominal flow	US g.p.m.	150
Nominal head	ft	50
Inlet pressure	psi	0
Static head	ft	0

Power datas referced to:

Water [100%] ; 39.2°F; 62.4lb/ft³; 1.69E-5ft²/s



250 GPM Neo Pump Information - Gould

GOULDS WATER TECHNOLOGY
a xylem brand

02SH10D05T4F2

Technical data

Company Name
Contact
Phone number
E-Mail address

Operating data								
1	Pumpe type	Single head pump		Fluid			Water	
2	No. of pumps		1	Operating temperature t A		°F	39.2	
3	Nominal flow	US g.p.m.	149.9	pH-value at t A			7	
4	Nominal head	ft	66.01	Density at t A		lb/ft³	62.4	
5	Static head	ft	0	Kin. viscosity at t A		ft²/s	1.689E-5	
6	Inlet pressure	psi	0	Vapor pressure at t A		psi	14.5	
7	Environmental temperature	°F	68	Content of solid%	Solid size	inch	0	0
8	Available system NPSH	ft	0	Altitude		ft	0	
Pump data								
9	Design	Highly efficient stainless steel end suction pumps						
10	Specific design	Rotation: 12 oClock [STD]			Impeller Ø	Max.	inch	9 7/8
11	Operating speed	rpm	1750			designed	inch	8 13/16
12	Group		M			Min.	inch	7 11/16
13	Suction flange		NPS 2.5 / CL150 / ASME B16.5 (e-SH)		Flow	Nominal	US g.p.m.	149.8
14	Discharge flange		NPS 2 / CL150 / ASME B16.5 (e-SH)			Max-	US g.p.m.	202
15	Max. casing pressure	psi				Min-	US g.p.m.	35
16	Max. working pressure	psi	34.9		Head	Nominal	ft	65.9
17	Impeller type		Radial impeller			at Qmax	ft	51.7
18	Head H(Q=0)	ft	80			at Qmin	ft	80.3
19	Max. shaft power	hp	4.2	Shaft power		hp	4	
20	Pump weight	lb	125.0	Efficiency		%	63.01	
21	Total weight	lb	On demand	NPSH 3%		ft	5	

Materials					
22	Pump		Shaft Seal		
23	Casing	Stainless steel 316L	John Crane	Elastomer Bellows Shaft Seal	
24	Impeller	Stainless steel 316L	Type 21		
25	Wear Ring	Stainless steel 316L	Seal faces	Carbon [STD]	
26	Adapter	Gray cast iron class 20B	Stationary ring	Silicon Carbide	
27	Ball bearing (outboard)	Steel	Elastomers	FKM	
28	Pump shaft	Steel grade 1213	Springs	Stainless steel CF8M (316)	
29	Deflector	Buna-N	Other metal parts	Stainless steel CF8M (316)	
30	Shaft Sleeve	Stainless steel CF8M (316)			
31	Bearing Cover	Gray cast iron class 20B			
32	Ball bearing (inboard)	Steel			
33	Impeller Key	Steel			
34	Seal Housing	Stainless steel 316L			
35	Impeller Washer	Stainless steel CF8M			
36	Bearing Frame	Gray cast iron class 20B			
37	Lip Seal	Steel/Buna-N			
38	V-Ring	Not available			
39	Casing bolt with nut (casing to adapter)	Stainless Steel			
40	Retaining ring	Steel			
41					

Motor data							
42	Manufacturer	Baldor					
43	Specific design	NEMA3 ph TEPE [STD]					
44	Type	Frame 184JM - 5 hp					
45	Rated power	5 hp	Item no.				
46	Nominal speed	1800 rpm	Service factor	1.15			
47	Frame size	184JM	Electric voltage	460 V			
48	Weight lb	93.0					

02SH10D05T4F2

Performance Curve

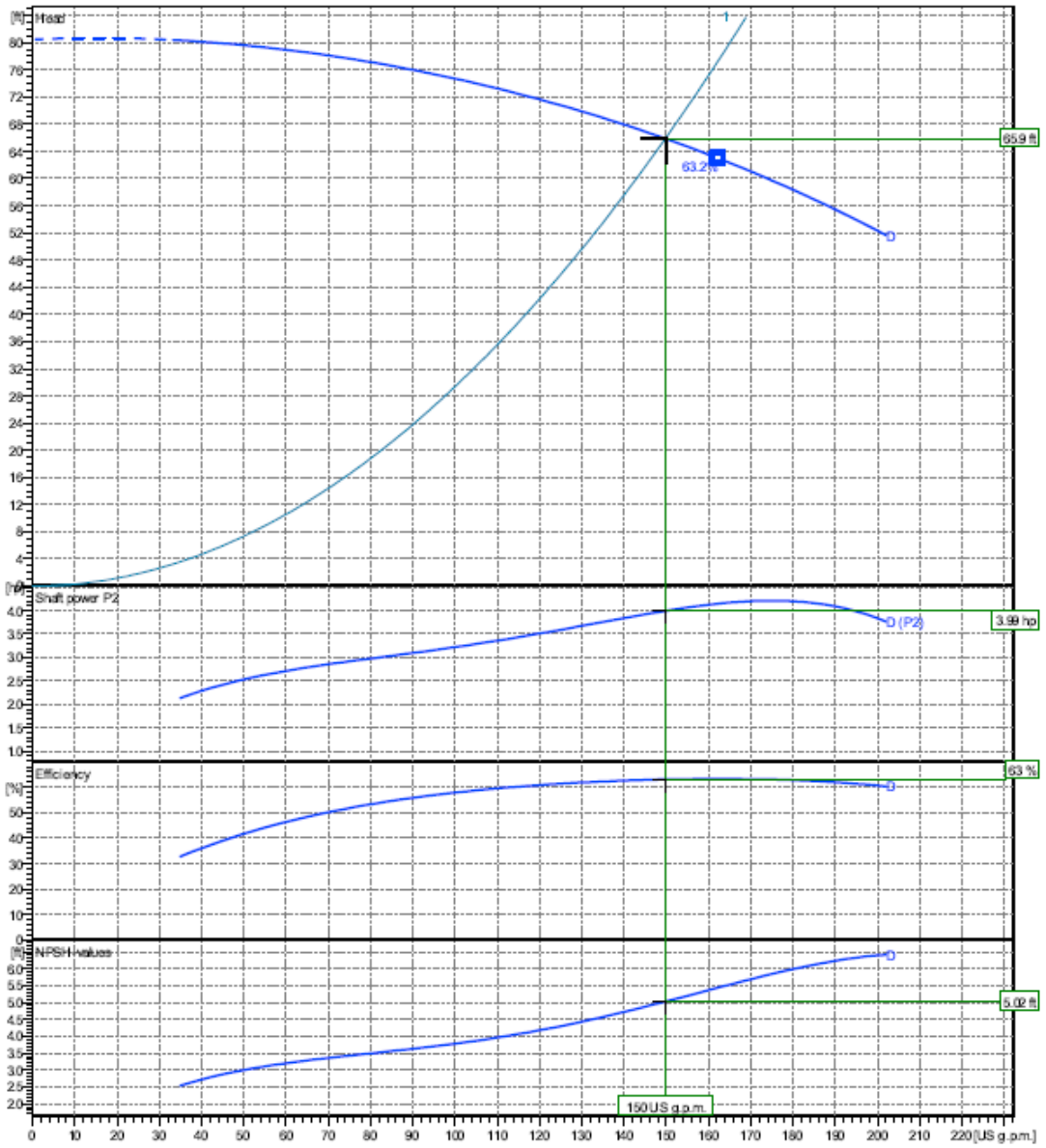
Company Name
Contact
Phone number
E-Mail address

	Ø	Delivered Flow Application Range Min.	Max.	η Max.	Lift Capability H(Q=0)	η Max.	Shaft Power P2 P2(Q=0)	Max.	η Max.
	inch	US g.p.m.	US g.p.m.	US g.p.m.	ft	ft	hp	hp	hp
Is	8.812	35	202	162	80.5	63		4.21	4.14
Min.	7.687	/	/	134	60	48.2		/	2.77
Max.	9.875	/	/	183	101	77.4		/	5.4

Frequency	Hz	60
Operating speed	rpm	1750
Nominal flow	US g.p.m.	149.9
Nominal head	ft	66.01
Inlet pressure	psi	0
Static head	ft	0

Power datas referced to:

Water [100%] ; 39.2°F; 62.4lb/ft³; 1.69E-5ft²/s

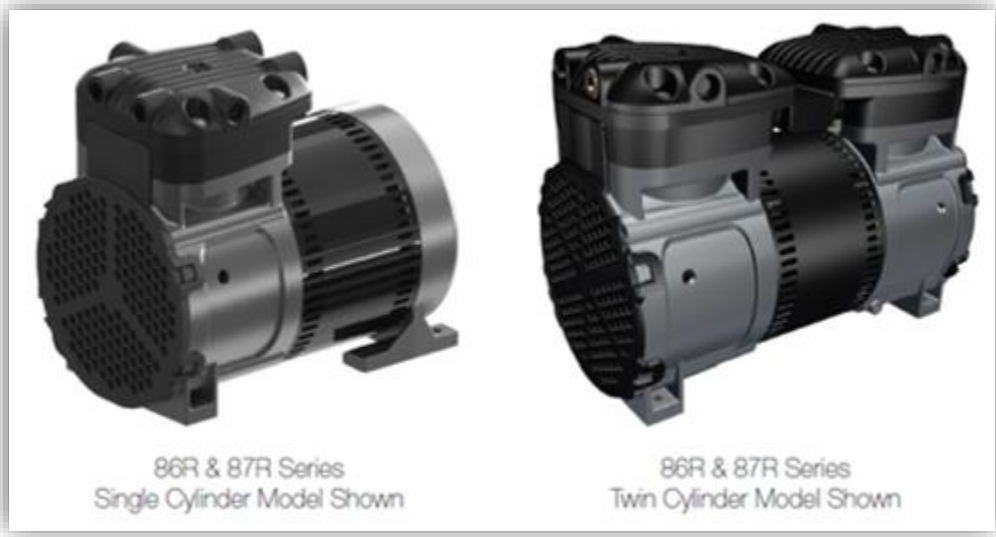


Gas Compressor Operation Manual

PART NO. 70-6953 (REV. A)

86R and 87R SERIES
ROCKING PISTON
OIL-LESS PUMPS

Operation and Maintenance Manual



86R and 87R Series Rocking Piston Oil-Less Pump.

Production Use Criteria and Purpose

1. Pump only clean, dry air.
2. Operate at 32˚F to 104˚F (0˚C to 40˚C).
3. Protect unit from dirt and moisture.
4. Do not pump flammable or explosive gases or use in an atmosphere that contains such gases.
5. Protect all surrounding items from exhaust air. This exhaust air can become very hot.
6. Corrosive gases and particulate material will damage unit. Water vapor, oil-based contaminants, or other liquids must be filtered out.
7. Consult your Gast Distributor / Representative before using at high altitudes.
8. This pump is oil-less and requires NO lubrication.

Installation

WARNING

ELECTRICAL SHOCK HAZARD

Disconnect electrical power at the circuit breaker or fuse box before installing this product.

Install this product where it will not come into contact with water or other liquids.

Install this product where it will be weather protected.

Electrically ground this product.

Failure to follow these instructions can result in death, fire, or electrical shock.

WARNING

Blocking air flow over the product in any way can cause the product to overhead.

Mounting

This product can be installed in any orientation. Mounting the product to stable, rigid operating surface and using shock mounts will reduce noise and vibration.

Plumbing

Remove plus from the IN and OUT ports. Connect with pipe and fittings that are the same size or larger than the product's threaded ports. Be sure to connect the intake and exhaust plumbing to the correct inlet and outlet ports. Ports will not support plumbing.

Electrical Connection

WARNING

ELECTRICAL SHOCK HAZARD

This product must be properly grounded.

Do not modify the plug provided. If it will not fit the outlet, have the proper outlet installed by a qualified electrician.

If repair or replacement of the cord or plug is necessary, do not connect the grounding wire to either flat blade terminal. The wire with insulation that is green or green with yellow stripes is the grounding wire.

Check the condition of the power supply wiring.

Do not permanently connect this product to wiring that is not in good condition or is inadequate for the requirements of this product.

Failure to follow these instructions can result in death, fire, or electrical shock.

Operation

WARNING

INJURY HAZARD

Install proper safety guards as needed.

Keep fingers and objects away from openings and rotating parts.

When provided, motor terminal covers must be in place for safe operation.

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Wear hearing protection. Sound level from motor may exceed 70 dBA.

Failure to follow these instructions can result in burns, eye injury, or other serious injury.

Start Up

If motor fails to start or slows down significantly under load, shutoff and disconnect from power supply. Check that the voltage is correct for motor and that motor is turning in the proper direction. Check the plug, cord and switch for damage. If so equipped, the thermal protection switch has tripped, the motor can restart after cooling.

Maintenance

ELECTRICAL SHOCK HAZARD

Disconnect electrical power supply cord before performing maintenance on this product.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before performing maintenance on this product.

Failure to follow these instructions can result in death, fire, or electrical shock.

INJURY HAZARD

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Clean this product in a well ventilated area.

Failure to follow these instructions can result in burns, eye injury, or other serious injury.

It is your responsibility to:

1. **Regularly inspect and make necessary repairs to product to maintain proper operation. See Preventative Maintenance Schedule in this manual.**
2. **Make sure that pressure is released from product before starting maintenance.**

Check intake and exhaust filters after first 500 hours of operation. Clean filters and determine how frequently filters should be checked during future operation. This one procedure will help to assure the product's performance and service life.

1. Disconnect electrical power supply to unit.
2. Vent all air lines.
3. Remove filter cover.
4. Check filter felt. Replace felt if it is covered with contamination or shows signs of increasing differential pressure.
5. Reinstall felt and filter cover.

Check that all external accessories, such as relief valves and gauges are attached to cover and are not damaged before re-operating product.

Shutdown Procedures

It is your responsibility to follow proper shutdown procedures to prevent product damage. NEVER ADD OIL TO THIS OIL-LESS PUMP.

Proper shutdown procedures must be followed to prevent pump damage. Failure to do so may result in premature pump failure. Gast Manufacturing Rocking Pistol Oil-Less Pumps are constructed of ferrous metals or aluminum, which are subject to rust and corrosion when pumping condensable vapors, such as water. Follow the steps below to assure correct storage and shutdown between operating periods.

1. Disconnect plumbing.
2. Operate product for at least five minutes without plumbing.
3. Run at maximum vacuum for 10 to 15 minutes.
4. Repeat Step 2.
5. Disconnect power supply.
6. Plug open ports to prevent dirt or other contaminants from entering product.

Service Kit Installation

ELECTRICAL SHOCK HAZARD

Disconnect electrical power supply cord before installing Service Kit.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before installing Service Kit.

Vent all air lines to release pressure or vacuum.

Failure to follow these instructions can result in death, fire, or electrical shock.

Gast will NOT guarantee field-rebuilt product performance. For performance guarantee, the product must be return to a Gas Authorized Service Facility.

Service Kit contents vary. Most contain gasket and filter parts.

1. Disconnect electrical power to pump.
2. Disconnect air supply and vent all air lines to release pressure or vacuum.
3. Mark the orientation of the ports so cover will be reinstalled correctly.

4. Remove screws from the head of the pump. Remove the head of the pump.
5. Mark orientation of valve plate(s). remove valve plate(s).
6. Remove and discard old cup(s), retainer, screws, cylinder O-ring(s), head O-rings, valves, and valve retainers.
7. Install new cup(s) on rod(s) facing up.
8. Reinstall retainer plates.
9. Apply a thread locking compound (Loctite 222) to retainer screws. Torque screws to 50” pounds.
10. Carefully install cylinder(s) over cup(s) at an angle to avoid damaging cup(s).
11. Clean valve plates with water-based solvent. Take care to not scratch valve seats.
12. Install valves and valve retainers. Check that the orientation with the ports is correct.
13. Apply a thread locking compound (Loctite 222) to retainer screws. Torque screes to 10” to 13” pounds.
14. Install cylinder O-ring(s) in the bottom of valve plate(s).
15. Check that the orientation of valve plate(s) with the ports is correct.
16. Install head O-rings in the O-ring grooves on top of valve plate.
17. Reinstall head over valve plate(s) checking that orientation with ports is correct.
18. Torque screws to 50” pounds.

Check that all external accessories, such as relief valves and gauges, are not damaged before re-operating product.

If pump still does not product proper vacuum or pressure, send unit to a Gast Authorized Service Facility for repair.

Main Compressor Specifications

GAST/JUN-AIR

GAST MFG. INC.& JUN AIR
A Unit of IDEX Corporation
Post Office Box 97
Benton Harbor, Michigan 49022 U.S.A.
Ph: 269/926-6171
Fax: 269/925-8288

PART NUMBER: RTD882A
REVISION: D

PRODUCT SPECIFICATIONS

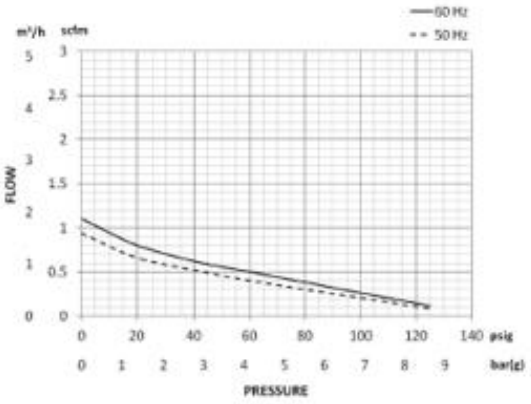
MODEL NO.	MOTOR	RPM 60HZ	RPM 50HZ	AMP 60HZ	AMP 50HZ	HP	kW	NET WT. lbs.	NET WT. kg	CAPACITOR mfd.	CAPACITOR VOLT
86R123-101-N170X	100-120/200-240 (60Hz) 100-120/200-240 (50Hz)	1725	1425	1.4/0.8	1.7/0.9	1/8	0.09	14.9	6.8	17.5	370

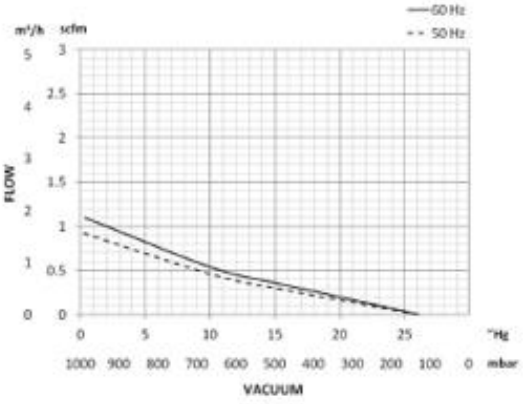
SOUND LEVEL LESS THAN 65 db(A)
NORMAL AMBIENT +5°C - +40°C
RELATIVE HUMIDITY 20% - 80%
ENVIRONMENT CLEAN DUST FREE

NOTES:
1. TECHNICAL DATA SUBJECT TO CHANGE WITHOUT NOTICE.
2. THIS PUMP MUST BE INSTALLED IN AN ENCLOSURE.
3. ALL DIMENSIONS ARE FOR REFERENCE ONLY.
4. KIT P/N: K961.
5.

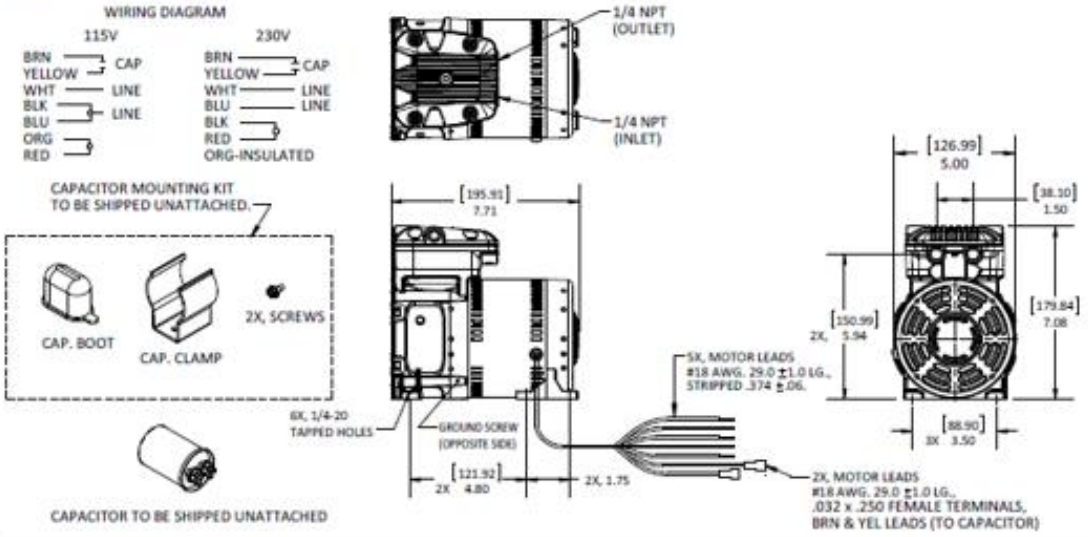
PRODUCT PERFORMANCE:

50Hz & 60Hz CURVES BASED ON 240V.





PRODUCT DIMENSIONS:



Enriched Air Compressor Specifications (Enriched models only)

GAST/JUN-AIR®

GAST MFG. INC.& JUN-AIR
A Unit of IDEX Corporation
Post Office Box 97
Benton Harbor, Michigan 49022 U.S.A.
Ph: 269/926-6171
Fax: 269/925-8288

PART NUMBER: RTD877A
REVISION: B

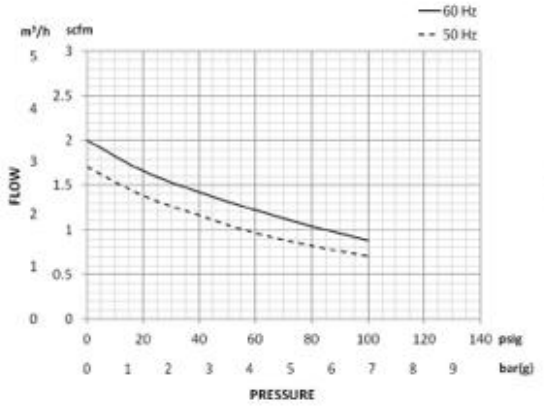
PRODUCT SPECIFICATIONS

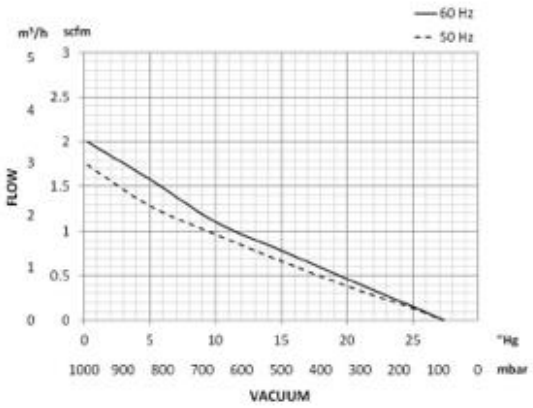
MODEL NO.	MOTOR	RPM 60HZ	RPM 50HZ	AMP 60HZ	AMP 50HZ	HP	kW	NET WT. lbs.	NET WT. kg	CAPACITOR mfd.	CAPACITOR VOLT
86R142-101-N270X	100-120/200-240 (60Hz) 100-120/200-240 (50Hz)	1725	1425	2.8/1.4	3.5/1.8	1/4	0.19	14.9	6.8	30	370

SOUND LEVEL LESS THAN 65 db(A)
NORMAL AMBIENT +5°C - +40°C
RELATIVE HUMIDITY 20% - 80%
ENVIRONMENT CLEAN DUST FREE

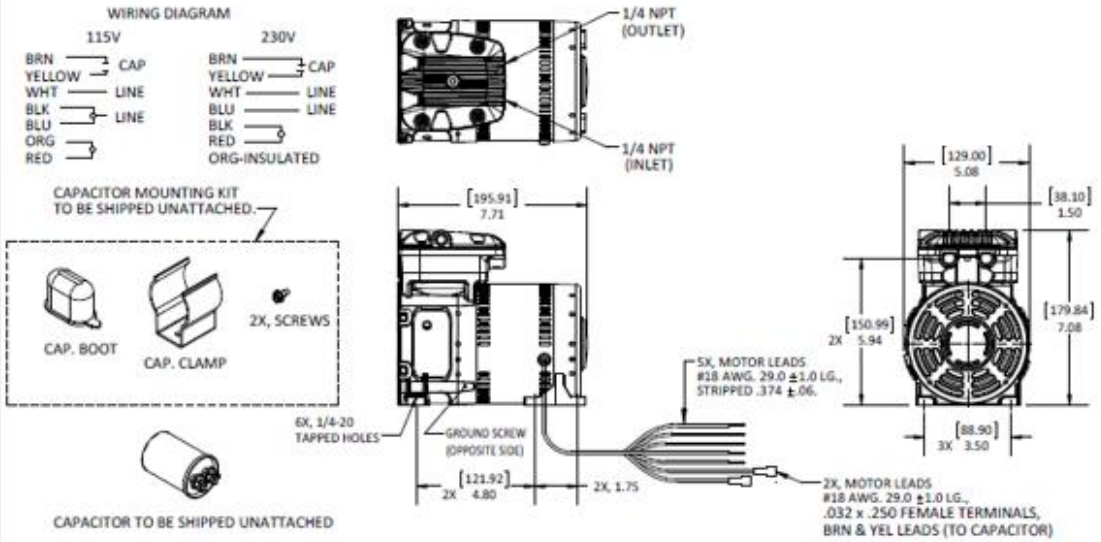
NOTES:
1. TECHNICAL DATA SUBJECT TO CHANGE WITHOUT NOTICE.
2. THIS PUMP MUST BE INSTALLED IN AN ENCLOSURE.
3. ALL DIMENSIONS ARE FOR REFERENCE ONLY.
4. KIT P/N: K961.

PRODUCT PERFORMANCE: 50Hz & 60Hz CURVES BASED ON 230V.





PRODUCT DIMENSIONS:



Troubleshooting Chart

Pressure		Low Vacuum	Excessive Noise	Overheating	Will Not Start	Possible Reason
Low	High					
x						Dirty filter.
		x				Dirty muffler.
x		x				Dirty valves – clean or replace.
x		x				Bent / damaged valves – replace.
x		x	x			Damaged / worn cup – replace.
x		x	x			Leaky hose.
x					x	Leaky check valve.
	x	x		x	x	Plugged vacuum or pressure line.
				x	x	Low voltage.
x						Leaky relief valve.
				x	x	Motor not wired correctly – check wiring diagram / line voltage.

AirSep® Oxygen Generator

Safety

General

Oxygen, the most abundant of the elements, makes up approximately 50% of the earth's crust. In its free state, it forms about 1/5 of our air by volume. Although oxygen is classified as a non-flammable gas, it supports combustion. As an active element, it combines directly or indirectly with all elements, except the rate gases. It is an invisible gas that is colorless, odorless, and tasteless.

To ensure your safety, thoroughly read and familiarize yourself with this section of the manual. AirSep Corporation strongly recommends that you review this section periodically.

Potential Hazards

Before you attempt to install, operate, or repair the oxygen generator, read, and thoroughly understand this manual. Improper operation can result in severe bodily injury, damage to the unit, or poor performance.

WARNING

Oxygen vigorously accelerates the burning of combustible materials. In some oxygen-enriched atmosphere, many materials that do not burn in normal air require only a slight spark or moderate heat to set them aflame.

To avoid fire or an explosion, keep gasoline, kerosene, oil, grease, cotton fibers, paint, and any other combustible material away from any part of the oxygen generator.

Do not smoke or use an open flame near the oxygen generator.

Post "NO SMOKING OR OPEN FLAMES" signs in the area where the oxygen generator is located. AirSep Corporation STRONGLY recommends that only individuals trained and experienced in the safe handling of oxygen operate this unit.

WARNING

Take extreme care to keep all oxygen piping and vessels clean. To avoid fire or an explosion, oxygen-clean all surfaces that can come in contact with oxygen. Check all oxygen fittings / joints for leaks with an oxygen-compatible leak detecting solution.

WARNING

ELECTRICAL SHOCK HAZARD

Only trained personnel may open the oxygen generator. The interior of the oxygen generator contains electrical parts that can produce an electrical hazard if not handled properly.

WARNING

Connect the oxygen generator power cord to a properly grounded wall outlet on a circuit that cannot be accidentally turned off. Do not use extension cords. Do not position the generator in an area that makes it difficult to disconnect the power.

WARNING

To prevent fire or electrical shock, locate the oxygen generator indoors away from rain or any other type of moisture.

Safety Publications

This section is not a complete summary of required safety procedures. Review the following publications for additional information on the safe handling of oxygen:

1. "Standard for Bulk Oxygen Systems at Consumer Sites," NFPA No. 50, National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101 USA.
2. "Oxygen," Pamphlet G-4, Compressed Gas Association, 1725 Jefferson Davis Highway, Arlington, VA 22202-4102 USA.
3. "Cleaning Equipment for Oxygen Service," Pamphlet G-4.1, Compressed Gas Association, 1725 Jefferson Davis Highway, Arlington, VA 22202-4102 USA.

System Description

General

The AirSep Corporation PSA Oxygen Generator is a self-contained unit that uses Pressure Swing Adsorption (PSA) technology to produce oxygen onsite. The PSA process extracts oxygen from ambient air to deliver product oxygen continuously to an application that requires feed oxygen.

The oxygen generator uses compressed air from its internal air compressor as a feed gas to produce the product oxygen. Ambient air enters the air intake, passes through a gross particle filter to remove large airborne particulate matter, then flows into the internal air compressor. The air compressor pressurizes the feed air and delivers the feed air to a heat exchanger for cooling. The cooled, pressurized air then enters one of the adsorber vessels.

The oxygen generator uses in its adsorber vessels an inert ceramic material called molecular sieve to separate compressed air into oxygen and other gases. The unique properties of molecular sieve allow it to attract, or adsorb, nitrogen physically from air under pressure. This allows oxygen to exit the adsorbers as a product gas and flow into a mixing tank, which maintains stable flow and purity of the product oxygen. The product oxygen flows from the mixing

tank through a pressure regulator that allows the delivery pressure to be set as required for your application. Finally, the product oxygen flows through a flowmeter, which allows you to set the flow rate required for your application.

While one adsorber produces oxygen, the other depressurizes to exhaust the waste gases it adsorbed (collected) during the oxygen production cycle. The entire oxygen generating process is completely regenerative, which makes it both reliable and virtually maintenance-free. The molecular sieve does not normally require replacement when maintained and used according to this instruction manual.

Refer to the Appendix A of this instruction manual for a detailed flow diagram, an electrical schematic, and specifications for the oxygen generator.

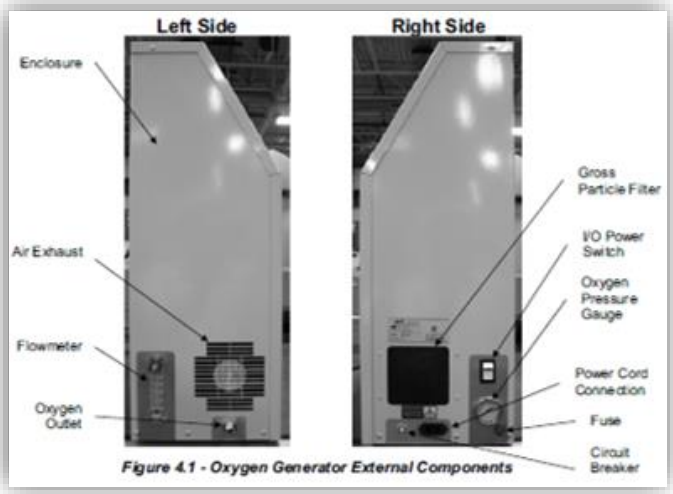


Figure 4.1 - Oxygen Generator External Components

Components Description

The drawings in this section illustrate the location of the main components of the **Topaz / Topaz+ / Topaz Ultra** oxygen generators. All models include similar components, unless noted otherwise. Refer to Appendix A of this instruction manual for general layout drawings and specifications. Oxygen Generator Model designation is as follows.

Moleaer Product	Oxygen Generator Model
Neo 50	Airsep Topaz
Neo 150	Airsep Topaz Ultra
Neo 250	Airsep Topaz Ultra

External Components

Enclosure

The enclosure protects the components inside the unit (e.g., circuit board, air compressor, and valves.)

Gross Particle Filter

The washable gross particle filter removes airborne particulate matter from the room air drawn into the unit.

Oxygen Pressure Gage

This gauge indicates the delivery pressure of the product oxygen.

Flowmeter

The flowmeter allows you to view and adjust the flow rate of the product oxygen. The flowmeter should never be adjusted beyond the setpoint designated for the unit.

NOTE: Increasing the flowmeter beyond the setpoint designed for the particular model can potentially cause damage to the molecular sieve and will void the warranty.

Model	Max allowable Flow *
Neo 50	12 CFH / 6 LPM
Neo 150	21 CFH/ 10 LPM
Neo 250	21 CFH/ 10 LPM

*Reading on the O2 generator flowmeter.

Oxygen Outlet

The “B” size adapter at the oxygen outlet connects to your application.

Air Exhaust

Heat from the unit escapes through the air exhaust, located on the left side of the enclosure.

Power Cord

The power cord (not shown) and its grounded plug connect from a connection (See Figure 4.1) on the unit to a properly grounded electrical outlet to supply electrical power to the unit.

I/O Power Switch

The I/O power switch starts and stops the operation of the unit. When you set the switch to /, the green indicator light illuminates.

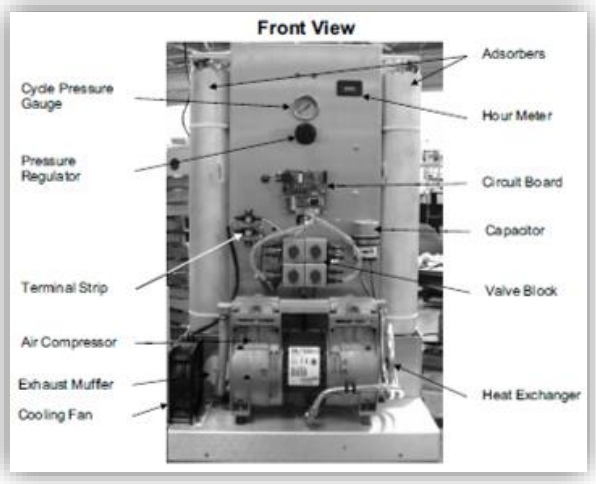
Circuit Breaker

Use the circuit breaker button to reset the unit after an electrical overload shutdown.

Fuse

For the 240V units, an additional fuse safety is provided as per the CE regulations.

Internal Components



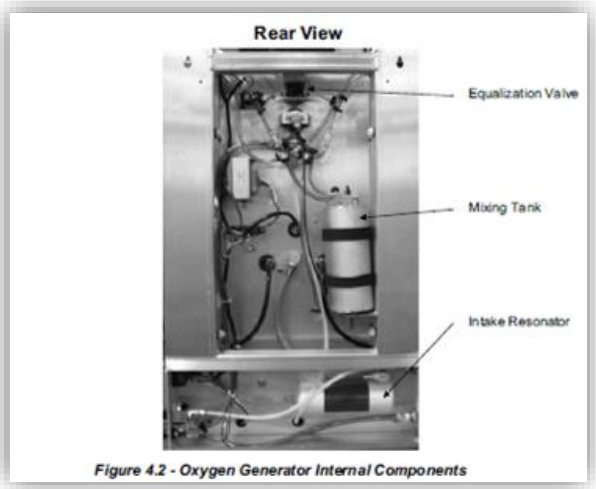


Figure 4.2 - Oxygen Generator Internal Components

Intake Resonator

The intake resonator reduces noise from the air compressor (see below).

Air Compressor

The air compressor pressures ambient air and delivers it to the adsorbers (see below).

Cooling Fan

The cooling fan increases airflow inside the enclosure to cool the air compressor. The models without enclosures do not have a fan installed.

Capacitor

The capacitor stores additional electrical power to enable the air compressor to start.

Heat Exchanger

The heat exchanger cools the pressurized air from the air compressor.

Adsorbers (Sieve Beds)

The adsorbers, or sieve beds, contain the molecular sieve that adsorbs (attracts) nitrogen from compressed air and allows oxygen to pass through as the product gas.

Cycle Pressure Gauge

The cycle pressure gauge indicates the pressure inside the sieve beds.

NOTE: The cycle gauge does not indicate the pressure set by the pressure regulator. The oxygen pressure gauge on the right side of the enclosure indicates the pressure set by the pressure regulator.

Valve Block

The valve block houses the solenoid valves.

Equalization Valve

The equalization valve balances the pressure between the two sieve beds.

Circuit Board

The circuit board controls the cycle time and sequence of each solenoid valve.

Terminal Strip

The terminal strip provides a connection point for the wiring to the circuit board and the air compressor.

Mixing Tank

The mixing tank provides stable flow and purity for the short-term surge in oxygen demand.

Pressure Regulator

The pressure regulator controls the delivery pressure of the product oxygen. This regulator is factory set and should never be adjusted.

NOTE: Changing the regulator setpoint in any way can potentially cause damage to the molecular sieve and will void the warranty.

Exhaust Muffler

The exhaust muffler allows waste gas to exit the adsorbers.

Hour Meter

The hour meter indicates the total number of hours that the unit cycles.

System Operation

When you complete the installation as described in the previous section, the oxygen generator is ready for easy startup and operation.

Startup

1. Set the I/O power switch to /, and wait two minutes to allow the product oxygen to attain the purity specified in the Appendix A of this instruction manual.

   Rotate the flowmeter knob counterclockwise to increase flow or clockwise to decrease flow, as required for your application. The flowmeter must never indicate a setting higher than that specified in Appendix A for the particular model.

2. The flowmeter must be set at the specified flow rate. Refer to Appendix A for the specified flow rates. At the appropriate flowrate setting, top of the ball of the flowmeter will be at the level mark.

   NOTE: Increasing the flow of the product oxygen above the flow specified in appendix a of this instruction manual results in reduced purity of the product oxygen, potential damage to the molecular sieve, and the warranty will be voided.

3. Begin oxygen use by your application.

Operation

The oxygen generator operates automatically after startup. Monitor the performance of the oxygen generator at regular intervals to make sure the product oxygen remains within the specifications. (Refer to Appendix A of this instruction manual.)

Shutdown

1. To stop oxygen delivery, rotate the flowmeter know clockwise until the flowmeter registers zero.

2. Set the I/O power switch to *O*.

⚠WARNING

Using the oxygen generator at flows higher than 15% above those specified in Appendix A of this manual will result in the likely contamination of the molecular sieve beds. This damage is not covered under the standard warranty.

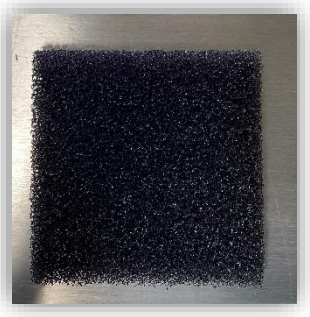
Maintenance

The oxygen generator requires little maintenance. Use the following chart as a guide to preventive maintenance at the required intervals.

Interval	Maintenance
Every Two Weeks	Clean gross particle filter. (Refer to Section “Cleaning the Gross Particle Filter.”)
Every Month	Make sure product oxygen remains within specifications in Appendix A of this instruction manual.* Clean enclosure. (Refer to Section “Cleaning the Enclosure.”)
Every Month	Check performance of solenoid valves. Rebuild or replace, as necessary.

*If product oxygen does not meet specifications, refer to Section “Troubleshooting.”

Each Neo unit is supplied with one spare gross particulate filter.



Cleaning the Gross Particle Filter

Clean the gross particle filter on the right side of the oxygen generator enclosure (see Figure 4.1) every two weeks, or

more frequently if site conditions warrant. A clean filter allows the unit to cool properly.

The Filter housing is located inside the O2 generator. To access the filter, the front sheet metal panel must be taken off.

Use the following procedure to clean the gross particle filter:

1. Shut down the oxygen generator as described in Section “Shutdown.”
2. Disconnect the power cord from the electrical outlet.

   NOTE: Do not operate the unit without the gross particle filter in place.
3. Remove the filter and insert the second filter provided with unit.
4. Restart the unit.
5. Wash the filter removed from the unit in a solution of soap and warm water.
6. Rinse the filter thoroughly and remove excess water with a soft, absorbent towel.
7. Allow the filter to dry, and then store it in a clean location. Alternate the clean filter with the filter on the unit each time you perform this procedure.

Cleaning the Enclosure

WARNING

Only trained personnel may open the oxygen generator. To prevent electrical shock, shutdown the oxygen generator and disconnect the main power supply before you clean the enclosure.

Use the following procedure to clean the enclosure:

1. Shutdown the oxygen generator as described in Section “Shutdown.”
2. Disconnect the power cord from the electrical outlet.
3. Use a dry, lint-free cloth on the enclosure, taking care to wipe the enclosure clean.

WARNING

DRY CLOTH CLEAN ONLY

Do not apply liquid directly to the enclosure or use any petroleum-based solvents or cleaning agents.

Air Compressor

The typical preventive maintenance interval for the air compressor is 15,000 hours or two years. Refer to preventative maintenance schedule in this manual.

Troubleshooting

Technical Support

For assistance in troubleshooting or repairing the unit, or to order replacement parts, contact the AirSep Commercial Products Service Department by telephone Monday through Friday between 7:30 a.m. and 4:30 p.m. Eastern time. In the USA or Canada, call **1-800-320-0303**. Outside the USA or Canada, call **716-691-0202**. Send fax inquiries anytime to **716-691-1255**. Address written inquiries to:

AirSep Corporation
260 Creekside Drive
Buffalo, NY 14228-2075 USA

Attention: Commercial Product Service Department

Email: cpdservice@airsep.com

Visit www.airsep.com to know about our complete range of standard Oxygen Generators.

Troubleshooting Chart

WARNING

ELECTRICAL SHOCK HAZARD

The interior of the oxygen generator contains electrical parts that can produce an electrical shock if not handled properly. Disconnect the main power supply before removing the enclosure.

⚠WARNING

Because the capacitor stores electrical power, it present an electrical shock hazard even when the main power is disconnected. Never touch both leads on the capacitor simultaneously. Before handling the capacitor, safely discharge the power from the capacitor by using an insulated screwdriver to contact both leads simultaneously.

Problem	Possible Cause	Corrective Action
Unit Does Not Operate	• No electrical power to unit. • Circuit breaker on I/O power switch tripped. • Blown fuse. • Faulty electrical connections. • Defective I/O power switch.	• Make sure power cord connects to electrical outlet and that electrical outlet receives power. • Reset the circuit breaker and set I/O power switch to / to restart unit. • Replace the fuse provided in 240 VAC units. • Disconnect main power supply, remove enclosure, and make sure all electrical connections, connect securely. • Replace I/O power switch.
Unit Stops Unexpectedly	• No electrical power to unit. • Circuit breaker on I/O power switch tripped.	• Make sure power cord connects to electrical outlet and that electrical outlet receives power. • Reset the circuit breakers and set I/O power switch to / to restart unit. If circuit breaker immediately trips again, check the wiring for any short circuit. Also, check I/O power switch, circuit board, capacitor, and air compressor. Replace all defective components.
Air Compressor Stops Unexpectedly or Does Not Operate when Cooling Fan Operates	• Restricted air flow to compressor. • Thermal shutdown activated on air compressor. • Faulty electrical connections. • Improper power voltage. • Defective capacitor. • Defective air compressor.	• Clean gross particle filter or remove obstruction. • Allow air compressor to cool, then restart unit. • Disconnect main power supply, remove enclosure, and make sure all electrical connections, including air compressor leads, connect securely. • Make sure power meets specifications in Appendix A of this instruction manual. • Replace capacitor. • Rebuild or replace air compressor (as applicable.)
Unit Operates, but Air Does Not Circulate into Unit	• Faulty electrical connections to cooling fan. • Defective cooling fan.	• Disconnect main power supply, remove enclosure and make sure all electrical connections, including cooling fan leads, connect securely. • Replace cooling fan.
Purity of Product Oxygen Does Not Remain within Specification in Appendix A of this Instruction Manual	• Leak in unit. • Obstructed exhaust muffler. • Defective solenoid valve(s). • Excess temperature inside enclosure due to inadequate ventilation outside enclosure, high ambient temperature, dirty gross particle filter, blocked air intake, or defective cooling fan. • Defective or worn air compressor. • Defective circuit board. • Contaminated adsorbers.	• Pressurize unit, set I/O power switch to *O*, and disconnect power supply. Remove enclosure and make sure tubing remains connected to fittings. Use an oxygen-compatible leak detecting solution to check all hoses, tubing, and fittings in unit. Most leaks are audible when area is quiet. Repair leaks and replace hoses or tubing as necessary. • Replace exhaust muffler. • Repair or replace solenoid valve(s). • Provide proper ventilation, make sure ambient temperature does not exceed specification in Appendix A of this instruction manual, clean filter, remove obstruction, or replace cooling fan. • If maximum cycle pressure is below 179 kPa (26 psig), replace air compressor. • Replace circuit board. • Replace adsorbers.

Flowmeter Fluctuates or Flow Rate of Product Oxygen Changes Unexpectedly	• Leak in unit. • Improperly set or defective pressure regulator. • Defective solenoid valve(s). • Defective air compressor. • Defective circuit board.	• Pressurize unit, set I/O power switch to *O*, and disconnect power supply. Remove enclosure and make sure tubing remains connected to fittings. Use soapy water to check all hoses, tubing, and fittings in unit. Most leaks are audible when area is quiet. Repair leaks and replace hoses or tubing as necessary. • Check regulator setting or replace defective regulator. • Repair or replace solenoid valve(s). • Replace air compressor. • Replace circuit board.
Unit Operates, but I/O Power Switch Does Not Illuminate	• Defective I/O power switch.	• Replace I/O power switch.
Pressure of Product Oxygen Changes Unexpectedly	• Leak in unit. • Improperly set or defective pressure regulator. • Relief valves release. • Defective air compressor.	• Pressurize unit, set I/O power switch to *O*, and disconnect main power supply. Remove enclosure and make sure tubing remains connected to fittings. Use soapy water to check all hoses, tubing, and fittings in unit. Most leaks are audible when area is quiet. Repair leaks as necessary. • Check regulator setting or replace defective regulator. • Refer to “Popping sound indicates release of relief valves” problem in troubleshooting chart. • Rebuild or replace air compressor (as applicable).
“Popping” Sound Indicates Release of Relief Valves	• Obstructed exhaust muffler. • Improperly set or defective pressure regulator. • Defective solenoid valve(s). • Defective circuit board. • Contaminated adsorbers.	• Replace exhaust muffler. • Check regulator setting or replace defective regulator. • Repair or replace solenoid valve(s). • Replace circuit board. • Replace adsorbers.
Chattering or Buzzing Noise from Solenoid Valve(s)	• Low voltage to valve(s). • Defective or worn solenoid valve(s).	• Make sure electrical power remains within specification in Appendix A of this manual. If power at inlet to unit is correct, but is low at valve(s), contact AirSep. • Repair or replace solenoid valve(s).

Technical Data

Specifications

Data in this section refer to the Topaz, and Topaz Ultra oxygen generators. Consult your sales representative to determine whether your oxygen generator requires modifications for your application.

Provide proper voltage from a grounded outlet to the oxygen generator. Main power supply voltage fluctuation must not exceed 10% of the nominal supply voltage.

Topaz

Specification	Description
Oxygen Flow	0.31 Nm^3/hr* 12 SCF/hr** (6 LPM on the flowmeter)
Standard Oxygen Pressure	9 psig (62 kPa)
Oxygen Purity	93% ± 3% at specified oxygen o/p
Dew Point	-73°C (-100°F)
Sound Level	55dB at 1 meter (open field cond.)
Dimensions	48 x 25 x 69 cm (W x D x H) 19 x 10 x 27 in. (W x D x H)
Weight	21 kg (46 lbs.)
Power Requirements	100 V~± 10%, 50 or 60 Hz, 5.5 A 120 V~± 10%, 60 Hz, 5.0 A 240 V~± 10%, 50 or 60 Hz, 2.5 A (all the above are single phase)
Ventilation	Do not install adjacent to heat source and allow a minimum of 6" around unit to provide adequate airflow.
Ambient Temperature Range	40°C (104°F) maximum 4°C (40°F) minimum
Other Specifications:	
Pollution Degree	2
Installation Category	II
Maximum Altitude Above Sea Level	2,000 m (6,562')

*Nm^3 (normal cubic meters) gas measured at one atmosphere and 0˚C.

**SCF (standard cubic foot) gas measured at one atmosphere and 70˚F.

Topaz Ultra

Specification	Description
Oxygen Flow	0.54 Nm^3/hr* 21 SCF/hr** (10 LPM on the flowmeter)
Standard Oxygen Pressure	20 psig (138 kPa)
Oxygen Purity	93% ± 3% at specified oxygen o/p
Dew Point	-73°C (-100°F)
Sound Level	55dB at 1 meter (open field cond.)
Dimensions	48 x 25 x 69 cm (W x D x H) 19 x 10 x 27 in. (W x D x H)
Weight	21 kg (46 lbs.)
Power Requirements	120 V~± 10%, 60 Hz, 6.0 A 240 V~± 10%, 50 Hz, 3.0 A (all the above are single phase)
Ventilation	Do not install adjacent to heat source and allow a minimum of 6” around unit to provide adequate airflow.
Ambient Temperature Range	40°C (104°F) maximum 4°C (40°F) minimum
Other Specifications:	
Pollution Degree	2
Installation Category	II
Maximum Altitude Above Sea Level	2,000 m (6,562’)

*Nm^3 (normal cubic meters) gas measured at one atmosphere and 0˚C.

**SCF (standard cubic foot) gas measured at one atmosphere and 70˚F.

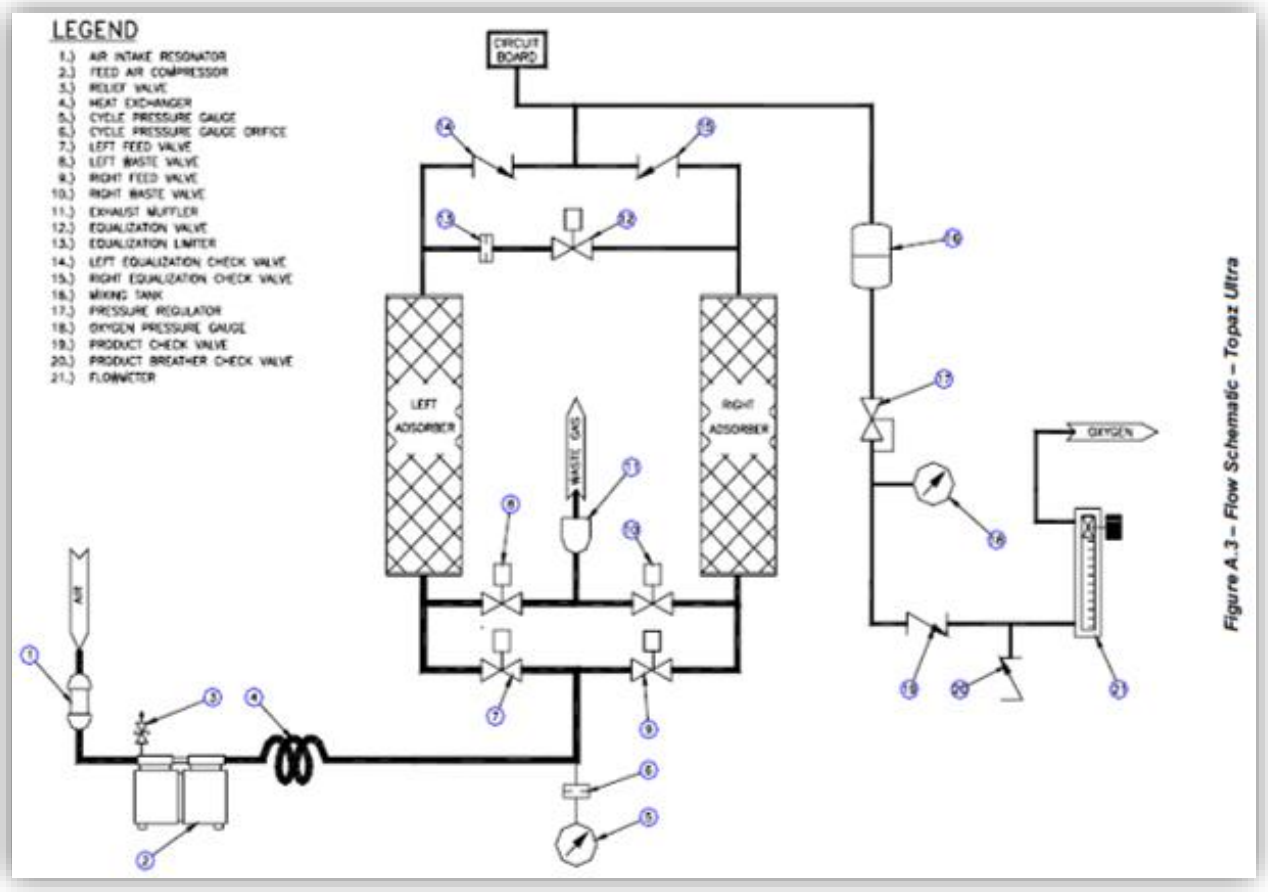


Figure A.3 – Flow Schematic – Topaz Ultra

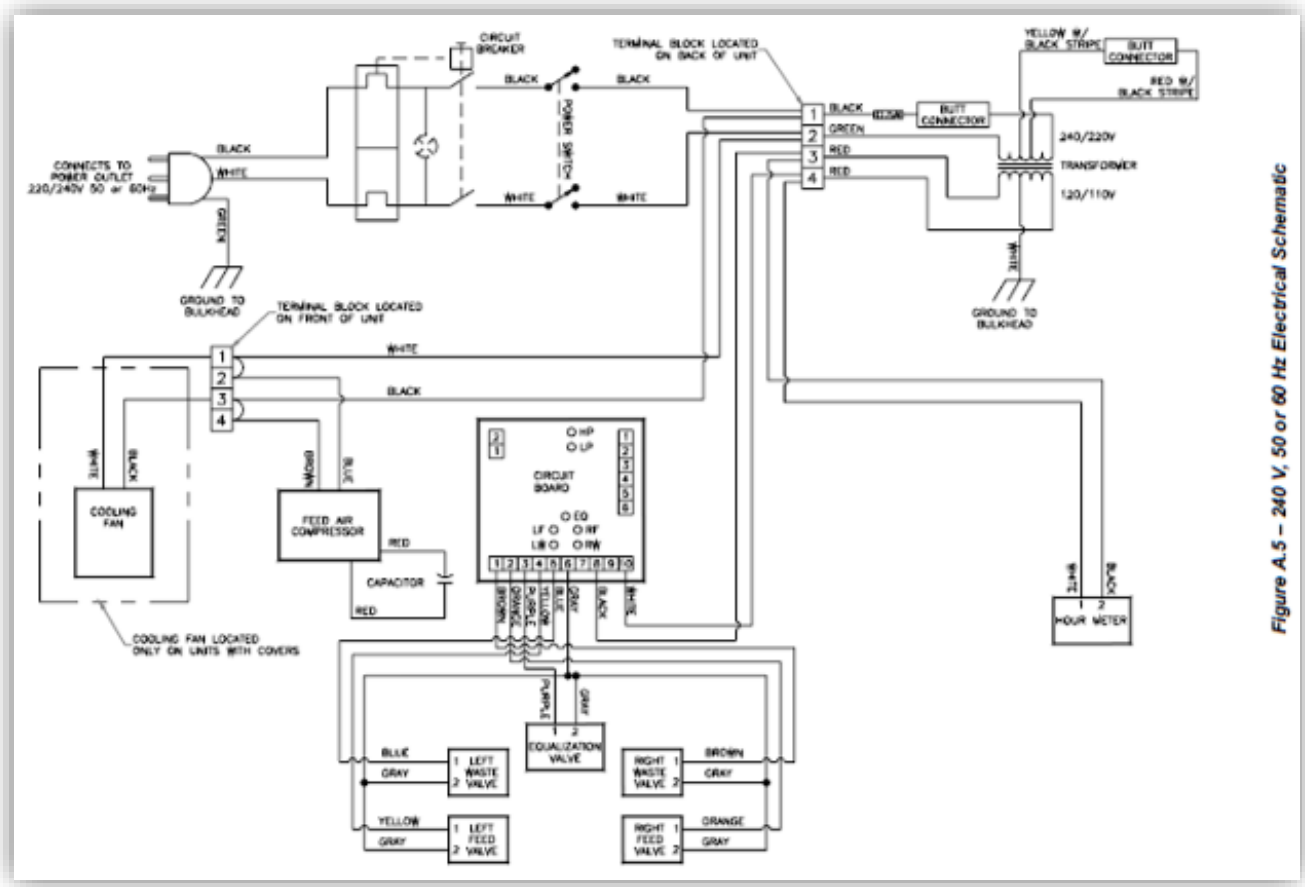


Figure A.5 – 240 V, 50 or 60 Hz Electrical Schematic

ProSense Pressure Switch Manual

MPS25 SERIES MECHANICAL PRESSURE SWITCHES

MPS25 Series Mechanical Pressure Switches

The ProSense MPS25 series mechanical pressure switches are designed for the toughest applications where conventional pressure switch designs often do not measure up. These cost-effective switches, depending on the pressure range, have either an all welded 316 stainless steel sealed diaphragm actuator design or a direct acting 316 stainless steel piston design with a Buna-N O-ring. The rugged 316 stainless steel enclosure provides uncompromising protection and long life in difficult environments. The robust design is resistant to vibration and shock and provides reliable operation over a wide operating temperature range. Pressure ranges from vacuum to 7,500 Psig are available, along with a 1/4" NPT male threaded process connection and a precision snap-acting SPDT, 3 Amp, mechanically operated switch output. Choose from either an integral 6' (1.5m) cable with 1/2" NPT male conduit connection, or a DIN 175301-803C L-connector.

Applications

1. Process control and automation
2. Pump and compressors
3. Hydraulic systems
4. Pneumatic systems
5. Engine monitoring
6. Presses
7. Machine tools

Features

1. Compact size.
2. 316 stainless steel enclosure.
3. All stainless welded diaphragm or stainless piston and Buna-N O-ring.
4. Pressure ranges from -15 psig vacuum to 7,500 psig.
5. Tamper resistant field adjustment.
6. *Integral 6' cable with 1/2" NPT male conduit connection or DIN form C electrical connections.
7. 1/4" NPT male process connection.
8. Wide operating temperature range.
9. Precision snap-acting SPDT, 3 Amp mechanically operated switch.
10. UL*, CSA, CE, and RoHS compliance
11. Three-year warranty.

General Specifications

Specification	Description
Setpoint	Field adjustable (factory default 50% of full scale)
Setpoint Repeatability	±2% of range above 100 psig and ±5% for 100 psig and below (additional setpoint shift of ±2% of range per 40°F from initial setpoint set at 70°F typical)
Vibration	Passed MIL-STD-202G
Shock	75G's 10 milliseconds 3-axis
Piston Actuator	Stainless steel with Buna-N O-ring, 200 to 7500 psig
Mechanical Life Piston Design	>1,000,000 operations typical
Diaphragm Actuator	316L SS, up to 100 psig
Mechanical Life Diaphragm Design	>400,000 operations typical
Enclosure Material	316L SS
Enclosure Rating	NEMA 6, IP 67
Pressure Connection	1/4" NPT male
Electrical Output	SPDT 3A @ 125 VAC / 2A @ 30MDC resistive
Electrical Termination	1/2" NPT male conduit connection or Micro DIN 175301-803C with mating connector
Agency Approvals	UL (#E320431) cable version only, CSA, CE, RoHS

MPS25 Series Mechanical Pressure Switches Performance Characteristics

Part Number	Setpoint Adjustability			Setpoint Repeatability			Dead Band*		
	psig	bar, kg / cm2	kPA	psig	bar, kg / cm2	kPa	psig	bar, kg / cm2	kPa
MPS25-1C-D30x	6 - 30	0.4 - 2	4 - 200	±15	±0.1	±10	1-5	0.07 – 0.36	7 – 35

*Due to the mechanical design of the MPS25 switch, the actual dead band will vary from one switch to another but will be within the specified dead band range. Generally, the expected dead band for a setpoint at the lower end of the range will trend towards the lower end for the dead band range. The dead band for a setpoint at the upper end of the range will trend towards the upper end for the dead band range.

Material and Temperature

Ranges	Wetted Material	Temperature Range
Up to 100#	SS	-40°C – 100°C (-40°F – 212°F)
200#	SS, Buna	-28°C – 100°C (-18.4°F – 212°F)
500# to 7500#	SS, Buna	-40°C – 100°C (-40°F – 212°F)

Proof Pressure

Ranges (listed in psig)	psig	bar, kg / cm2	kPa
Up to 100#	1000	70	7000
200#	2000	140	14000
500# to 2000#	8000	500	55000
5000# to 75000#	15000	1000	100000
500# to 2000#	>30000	>2100	>210000
5000# to 7500#	>50000	>3500	>350000

Electrical Connections

1/2" NPT Male Conduit Connector with 6' (1.5m) Integral Cable

Wire Color / Function

Wire Color	Function
Red	Normally closed
White	Common
Blue	Normally open
Green	Ground

DIN 175301-803C L-Connector

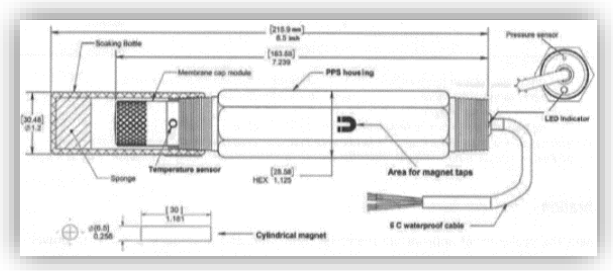
1. Common
2. Normally closed
3. Normally open
4. Ground

Dissolved Oxygen Probe

DOGB-0004 (0-5 V Output) Optical Dissolved Oxygen Probe

DOGB-004 optical dissolved oxygen probe utilizes florescence quenching technology to measure the concentration and saturation percentage of dissolved oxygen (DO) in an aqueous solution. The probe outputs 0V to 5V corresponding to the oxygen concentration of 0 to 50 mg / L and the saturation of 0% to 500%. The DO reading is automatically calculated and compensated by the integration data from the temperature and pressure sensors and sophisticated algorithms in the firmware. The Magnetic controlled commands make sure the necessary functions can be done on the probe side with no software interface, and greatly simplifies the user's setup of the controller. The integrated coefficient database also makes the sensor cap replacement convenient without an external Micro SD card. The working temperature of this sensor is 0˚C to 50˚C while the pressure compensation scope is 51 to 112 kPa (0.5 to 1.1 atm). The water-proof pressure sensor can bear a maximum pressure of 10 atm.

Probe General Dimensions and Overview



Connections to power supply and customer controller are shown below:

Wire Color	Description
Red	Power (4.5 -7V DC)
Black	GND and the **black** / ground test probe of multimeter
Green	UART_RX (for upgrading or PC connections)
White	UART_TX (for upgrading or PC connections)
Yellow	DO (%) output and the **red** / V test probe of multimeter
Blue	DO (mg / L or ppm) output and the **red** / V test probe of multimeter

NOTE:

1. ***The two UART wires can be cut if users do not need PC monitoring and firmware updates.***
2. ***Outputting temperature or pressure (depth) is also optional based on the customer requirements.***
3. ***The wire color might be changed and please refer to the manual attached to the probe.***

Conversion Equations

Equation	Description
DO Concentration (mg / L)	4.1667 x V – 0.4167 (V = voltage readings between blue and black wires)
DO Sat. %	(0.4167 x V – 0.0417) x 100% (V = voltage readings between yellow and black wires)

Magnetic-Controlled Commands and LED Indicator

Special commands can be performed using a magnetic switch controlled by a user's magnet. Tapping the magnetic market of the probe is indicated with a bicolor red / blue LED. This LED is used to confirm the taps and the activation of the corresponding commands. The tap times, the related commands, and the LED conditions are all summarized in Table 1.

Table 1. Corresponding Operations and Commands of the LED Indicator

Magnet Taps = Red LED Blinks	Commands	Blue LED Confirming the Command
1	Salinity off	1 blink
2	Salinity on (35 ppt)	2 blinks
3	1 point calibration	3 blinks

NOTE:

1. ***A successful magnet tap is related to a red LED blink, otherwise re-tap is needed.***
2. ***Magnet tapping is similar to "Morse Code," as an intended action for preventing the unexpected or accident magnetic trigger.***
3. ***Time between taps must be less than five seconds for a single command.***
4. ***No matter how long the magnet is held on the magnet are of probe, it is counted as one tap.***
5. ***To avoid accidentally calibrating probes during measuring, the one point calibration is set as three taps.***

Calibration

Connect the problem to an appropriate meter or controller and provide -5V DC to power the probe. One point calibration for the 100% saturation can be done by any of the following means:

NOTE: Sensor Calibration requires a sensor cap. Each unit is shipped with a DO sensor cap. Contact Moleaer if the cap is missing or lost.

1. In Air-Saturated Water (standard method with error <0.5%):

   Air-saturated water (i.e., in a 500 ml container) can be obtained by either continuously purging water with air using an air bubbler or some type of aeration for three to five minutes, or stirring water with a magnetic stirrer at 800 rpm for one hour, and then:

   - Immerse the sensor cap and temperature sensor of the probe in the air-saturated water and waiting until the reading becomes stable (usually one to three minutes).
   - Tap the magnetic area of the probe three times using the magnet head to start the calibration.
   - If the calibration is done successfully, the blue LED should blink three times. The related voltage output (between yellow and black wires) will be calibrated to 2.50V, corresponding to the standard 100% saturation. If not, please redo the steps above.

2. In Water-Saturated Air (convenient method and error <2%):

Alternative, the one point calibration can be done using water-saturated air, but 0 to 2% error might occur. The recommended procedures are given below:

i. Immerse the sensor cap and temperature sensor of the probe in fresh / tap water for one to two minutes.

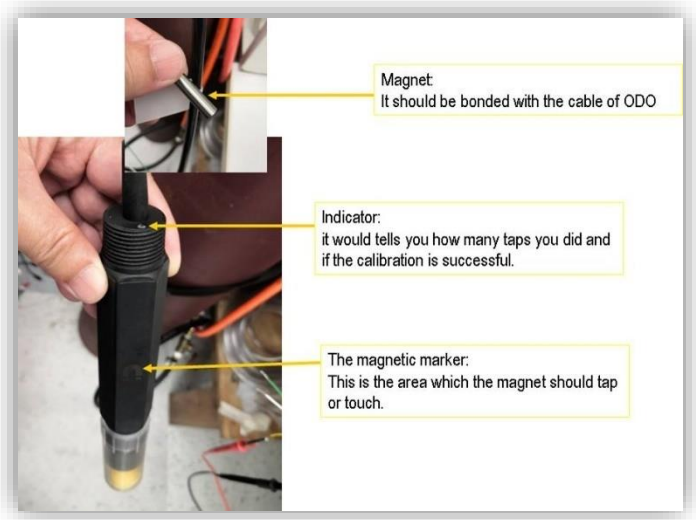
ii. Take the probe out and quickly tap dry the surface of sensor cap with a tissue.

iii. Put the sensor end of the probe in the calibration / storage bottle with a wet sponge and a small amount of water inside. Avoid direct contact of the sensor cap with any water in the calibration / storage bottle during this calibration step.

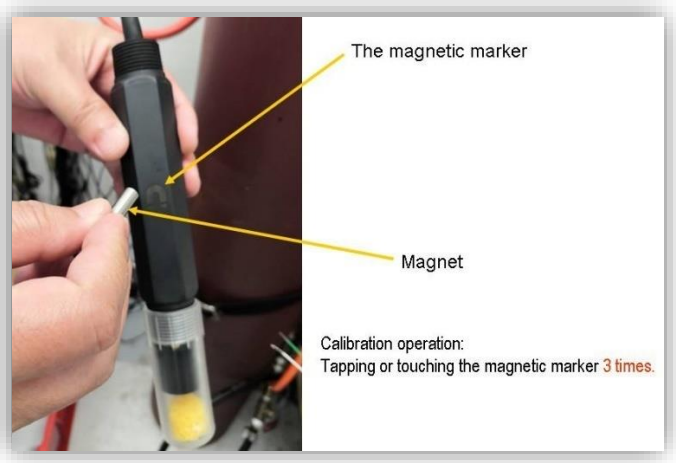
Loosely screw the calibration / storage bottle onto the probe. Keep the distance between the sensor cap and the wet sponge being 1cm to 2cm. Be careful not to completely tighten the bottle on the probe to ensure the pressure inside the calibration / storage bottle is the same as ambient pressure.

iv. Follow Procedure below.

1) Prepare



2) Tap the magnetic marker 3 times.



3) Observe

Salinity Compensation

This ODO has a preset salary compensation option to compensate for seawater and similar applications. It can be cancelled or selected by tapping the magnetic market of the probe once and twice, respectively. As shown in Table 1, two taps sets salinity compensation to 35ppt, which is a typical seawater salinity concentration.

If manual salinity compensation is desired for other salinity values, a compensation factor “S” can be used to correct the DO concentration “mg / L” in salt water as follows:

DO “mg / L” (after correction) = DO “mg / L (before correction) x s

Compensation factor $S = e^x$, where x = (- [ppt] x (0.017674 + (-10.754 + 2140.7/T)/T)), where salinity is in parts per thousand (ppt) and temperature is in Kelvin (K.). For example, in freshwater (“normal” mode) salinity is 0 ppt and S = 1, while in seawater mode (assuming the salinity level is 35 ppt), the factor is S = 0.816 (at 22˚C).

In addition, if users just have the conductance value, the conversion equation between salinity (in ppt) and specific conductance (SC in US/cm) is:

$$ppt = 5.572 \times 10^{-4}(SC) + 2.02 \times 10^{-9} \times (SC) \times (SC)$$

Maintenance

1. Probe maintenance includes cleaning the sensor cap, as well as the proper conditioning preparation, and storage of the test system.
2. When the probe is not in use, it is highly recommended to store the probe with its sensor cap installed and the calibration / storage bottle, which was included in the original packaging, threaded onto the probe. A breaker of clean water or a moist / humid capping mechanism can also suffice if the calibration / storage bottle is not available. The sponge inside the calibration / storage bottle should be kept moist for best results.
3. Avoid sensor cap touching organic solvent, and abusive collisions to strengthen and lengthen the working life of the sensor cap. Special care should be taken to clean the coating of cap, to dip probe and cap in fresh water, and then to tap dry the surface with a tissue. Do not wipe the coating surface.
4. Replace the sensor cap, if the cap coating is faded or stripped away. **DO NOT touch the clear window on the probe tip after unscrewing the old cap.** If any contaminants or residue are present on the window or inside the cap, carefully remove them with a powder free wipe. Then re-screw the new sensor cap onto the probe.

Preliminary Specifications

Range

Specification	Description
DO Saturation Percentage	0% to 500%
DO Concentration	0 to 50 mg / L (ppm)

Specification	Description
Operating Temperature	0°C to 50°C
Storage Temperature	-20°C to 70°C
Operating Atmospheric Pressure	40 kPa to 115 kPa
Maximum Bearing Pressure	1000 kPa

Response Time

Specification	Description
DO	T90 = 50s for 100 to 10%
Temperature	T90 = 45s for 5°C to 45°C (with stirring)

Accuracy

Specification	Description
DO	0% to 100% less than ±1% 100% to 200% less than ±2% 200% to 300% less than ±5% 300% to 400% less than ±8% 400% to 500% less than ±15%
Temperature	±0.2°C
Pressure	±0.2 kPa

Calibration

Description
One point (100% cal point) in air-saturated water or water-saturated air (calibration bottle).

Input / Output

Specification	Description
Input	4.5 to 7 VDC
Consumption	Average 70 mA at 5V

Specification	Description
Output	Two 0 to 5V lines

DO Compensation Factors

Specification	Description
Temperature	Automatic, full range
Salinity	0 to 35 ppt selected by user
Pressure	Compensation by instantaneous pressure valve if pressure sensor is above water or less than 20cm of water compensation by default pressure value if the pressure sensor is more than 20cm of water. The default is taken from the pressure sensor during the last one point calibration and recorded in non-volatile probe memory.

Resolution

Specification	Description
Low Range (<1 mg / L)	1 ppb (0.001 mg / L)
Mid-Range (<10 mg / L)	4 to 8 ppb (0.004 to 0.008 mg / L)
High Range (>10 mg / L)	10 ppb (0.01 mg / L)*

*The higher the range, the lower the resolution.

Expected Sensor Cap Life

Description
A useful life of up to two years is feasible in optimum situations.

Others

Specification	Description
Waterproof	IP68
Certifications	RoHs, CE, C-Tick (in progress)
Materials	Ryton (PPS) body
Cable Length	2 meters

Test Results for DOGB-0504

Barcode	T (°C)	P (kPa)	Output of Concentration		Output of Saturation	
			mg / L	Voltage (V)	%	Voltage (V)
BM14009	20.8	102.7	9.11	0.974	99.9	1.059
			0	0.101	0	0.100

NOTE:

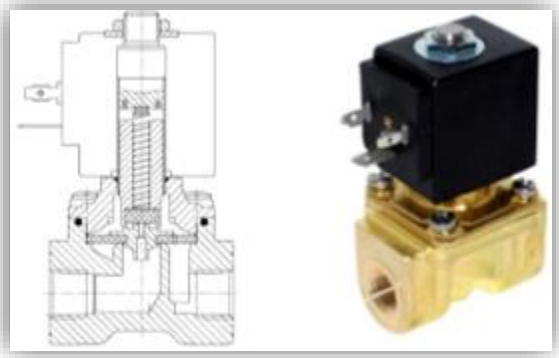
1. *The output of zero point is -0.1V.*
2. *The output of 100% is -1.06V.*
3. *The output of 500% is -4.9V.*
4. *Users can directly use the conversion equations shown in the manual.*

Solenoid Valve

GRANZOW® INC.

MODEL #E2B19-000

SERIES E SOLENOID VALVE



2-Way, Internally Piloted, Normally Closed Solenoid Valve

Series E Solenoid Valve

Specification	Description
1/4"	Pipe size (inch)
7/16”	Orifice size (inch)
1.50	Flow factor (CV)
120 VAC	Voltage (AC)
8 Watts	Wattage (W)
2-300 psi	Pressure range (PSI)
NBR	Sealing material
14ºF – 195ºF	Temperature range
Cable Grip DIN	Connector supplied
Air, Inert Gas, Water	Medium examples

Materials of Construction

Specification	Description
Body	Brass
Armature Tube	Stainless steel 300
Fixed Core	Stainless steel 400
Plunger	Stainless steel 400
Spring	Stainless steel 300
Shading Ring	Copper
Orifice	Brass
Pipe Threading	NPT

Electrical Specifications

Specification	Description
Rating	NEMA 4
Inrush VA	25.0
Holding VA	14.5

Spare Part Numbers

Specification	Description
Armature Tube	Not available
Repair Kit	RK-E001
Coil / Connector	C-B19

Enriched Air Membrane Tank – Prism (Enriched Air models only)

AIR PRODUCTS

PRISM® MEMBRANE DRYERS PC3010, PC3020 and PC3030

For Air and Gas Dehydration

A typical membrane separator contains thousands of fibers that are bundled and encased at both ends in epoxy resin. The ends of the bundle are cut, which leaves the fiber bores open on both ends, allowing the gas to travel from one end to the other. The fiber bundle is enclosed in a suitable casing. The casing protects the fibers and routes the gas properly.

PRISM PC3010, PC3020, and PC3030 membrane dryers deliver exceptional value and benefits to OEM customers and end users. Severe duty construction, solid performance, and exceptional lifetime, make these membrane dryers the choice for industrial applications.

Features

Industrial Grade

PRISM PC3010, PC3020, and PC3030 membrane dryers, also known as PRISM Cactus dryers, are constructed with heavy gauge ABS shells and aluminum caps which makes them extremely durable for applications where equipment is operating in all types of conditions. A stainless steel shell option makes severe duty and corrosive applications, like offshore and shipboard, possible without secondary containment.

Design Flexibility

Simple, fixed-purge design makes the PC dryers a flexible choice for system designers. Dew point depressions are set with no additional equipment or plumbing required.

Reliable Operation

PRISM membrane separators are field-proven in the most demanding applications and environments, like offshore platforms and mining operations. PC dryers have no moving parts and require no replaceable media. This makes them the choice for point-of-use and severe duty applications where bulky dryer equipment is not practical.

Model Specifications - PC3010-D2

Feed Air Conditions	Pressure Dew Point	Feed Flow	Outlet Flow	Outlet Purge
100 psig 100°F 100°F PDP	40°F	7.8 scfm	6.7 scfm	14.1%
	20°F	6.5 scfm	5.4 scfm	16.9%
	0°F	5.5 scfm	4.3 scfm	21.8%
	-20°F	4.7 scfm	3.5 scfm	25.5%
	-40°F	3.9 scfm	2.7 scfm	30.8%

Materials

Material	Description
Shell Tube: 3A / 4A	High performance ABS
End Caps: 3A / 4A	6061 T6 aluminum
Shell Tube: 2E / 2F	316L stainless steel
End Caps: 2E / 2F	316L stainless steel

Mechanical Design Limits

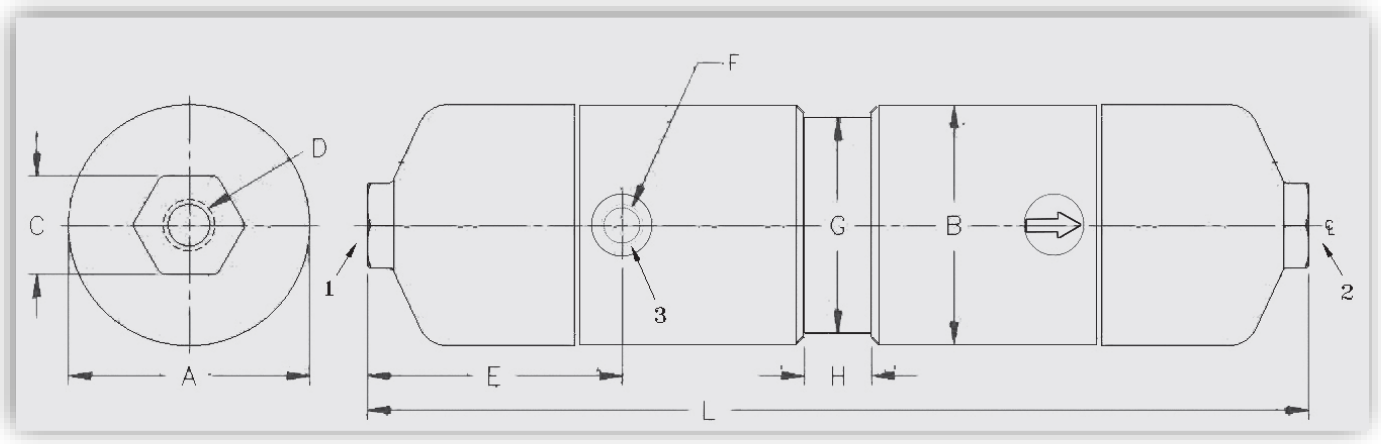
Specification	Description
Design Pressure	385 psig (265 BARG)
Design Temperature	150°F (65°C)

Typical Operating Range

Specification	Description
Pressure	30 to 300 psig/ (2.1 to 20.7 BARG)
Temperature	-10°F to 150°F (-23°C to 65°C)

Dimensions

ABS Shell



Ports:

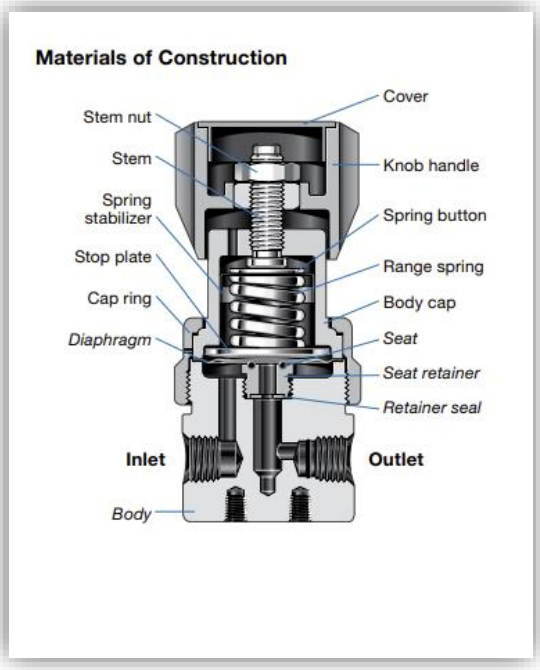
1. Compressed Air Inlet
2. Dry Air Inlet
3. Purge Outlet

Part No.	Model No.	A	B	C	D	E	F	G	H	L	Weight
179702	PC3010-N1-3A-00	3.91" (99.3 mm)	3.88" (98.6 mm)	1.38" (35.1 mm)	3/4" NPT	4.13" ±.06 (104.9 ± 1.5 mm)	⅜" NPT	3.50" (88.9 mm)	1.10" (27.9 mm)	15.25" (387.4 mm)	4.6 lb (2.09 kg)

Back Pressure Regulator Manual

KBP1F0D4A5A20000

Specifications



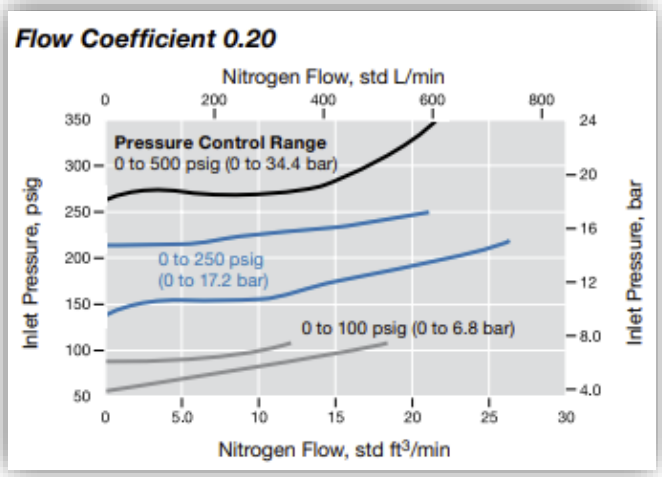
Component	316 SS	Brass CW721R
	Material	
Knob handle, cover	Nylon with 316 SS insert	
Spring button	316 SS (0 to 500 psig range) Zinc-plated steel (all other ranges)	
Spring stabilizer①	301 SS	
Range spring	316 SS (0 to 10 through 0 to 50 psig control ranges) Zinc-plated steel (0 to 100 through 0 to 500 psig control ranges)	
Stem, stem nut, cap ring, stop plate, body cap, panel nuts②	316 SS	
VCR nuts②	316 SS	–
Nonwetted lubricant	Hydrocarbon-based	
Seat retainer	*316 SS*	
Retainer seal	*PCTFE or PEEK*	
Seat	*Fluorocarbon FKM or Kalrez*	
*Diaphragm*③	*Alloy X-750*	
Body	*316 SS*	*Brass CW721R*
*Tube butt weld ports,*② *VCR gland ports*②	*316L SS*	–
Wetted lubricant	*PTFE-based*	

Wetted components listed in *italics*.
① Not included in regulators with 0 to 500 psig (0 to 34.4 bar) control range.
② Not shown.
③ Regulators with control ranges higher than 0 to 100 psig (0 to 6.8 bar) are assembled with two diaphragms.

The KBP series is a high-sensitivity, general-purpose regulator designed to control back-pressure levels in analytical or process systems upstream of the regulator. The convoluted diaphragm provides excellent sensitivity and set-point repeatability. The metal-to-metal diaphragm seal minimizes the potential for leakage.

Features

- Convoluted, nonperforated.
- Diaphragm
- Metal-to-metal diaphragm seal
- Low internal volume
- Two-piece cap design provides linear load on the seal.
- Maximum Inlet Pressure
- Equal to pressure control range
- Pressure Control Ranges



Maintenance

Maintenance kits include:

- all wetted components, except for
- the regulator body and piston, if
- applicable
- wetted lubricant with MSDS
- instructions.

Maintenance Instructions

Maintenance instructions for all Swagelok regulators are available from your Swagelok website.

Maintenance Tools

Specially designed tools and tool kits are available to assist in the service and repair of Swagelok regulators. Contact Moleaer or your authorized Swagelok representative for more information.

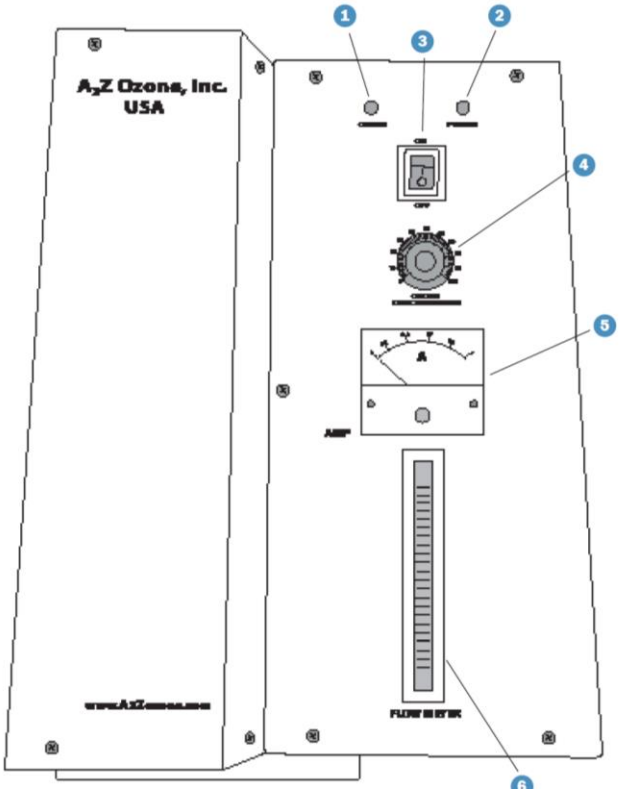
A2Z Ozone Generator

SPG-3

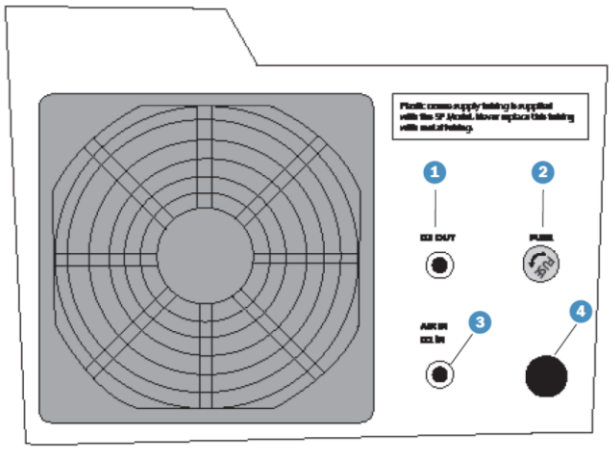
Specifications

SP-3G Ozone Generator Features:

- LED status Indicators
- CD Corona Discharge Technology
- Air-Cooled
- Variable Ozone Output (10-100%)
- PTFE tube for O3 outlet
- Stainless steel fittings
- Quartz Glass



1	Ozone Light	Indicates ozone is functioning.
2	Power Light	Indicates when there is power to the unit. If the power is supplied, the LED will illuminate.
3	Power Switch	Used to power the unit on and off.
4	Ozone Concentration Knob	Controls the percentage of ozone produced by the unit.
5	AMP Meter	Shows real time AMP usage.
6	Flow Meter	Shows the suction amount created by the venturi injector (measured in LPM).



1	Ozone Out Port	The ozone out.
2	Main Fuse	If the unit has no power, check here first.
3	Air/Oxygen In Port	This sucks in air for the unit to produce ozone. Please do not block this intake port. Optional oxygen intake or air pump connection.
4	Power Cord	Supplies power to the unit.

Spares

Items below are included in each unit.

- Spare fuse
- Check valve (x2)
- Spare fan filter

EZ-Touch Mini 4 PLC Manual

MiniPLC

EZ-Touch Mini PLC

Installation

Guidelines

Safety Considerations

Please follow all applicable local and national codes to ensure maximum safety of the equipment and personnel. The installation and operational environment must be maintained per the latest revision of these codes.

You are responsible to determine the codes to be followed and to verify the compliance of equipment, installation, and operation with the latest revision of these codes.

It is an absolute must to follow all applicable sections of:

1. The National Fire Code
2. The National Electrical Code (NEC)
3. The National Electrical Manufacturer's Association (NEMA) Codes

Safety Guidelines

Safety is the most important element of a proper system installation. Adhering to these safety considerations ensures the safety of yourself and others, as well as the condition of your equipment. We recommend reviewing the following safety guidelines:

1. **Disconnecting Main Power:** The main power switch should be easily accessible to the operators and maintenance personnel. It is important to make sure that all other sources of power including pneumatic and hydraulic are de-energized before starting the work on a machine or process controlled by an EZ EZTouch miniPLC.
2. **Safety Circuits:** Most of the machines are installed with safety circuits, such as limit switches, emergency stop pushbuttons, and interlocks. These circuits should always be hardwired directly to the EZTouch miniPLC. These devices must be wired in series so that when any one device opens, the PLC is automatically de-energized. This removes power to the machine. These circuits should not be altered in any case, since this could result in serious injury or damage to the machine.
3. **Fail-Safe Operation:** Our products are not fault-tolerant. They are not designed or intended for use as online control equipment in hazardous environments requiring fail-safe performance, such as in operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct lift-support machines, weapons systems, clutch control systems on presses, in which the failure of the product could lead directly to death, personal injury or severe physical or environmental damage. External fail-safe and / or redundant components are required to make your control system fail-safe.

Maintenance and Troubleshooting

Hardware Maintenance

Routine maintenance checks should be performed on the unit to avoid any risk of hardware problems. The EZTouch miniPLC is designed to be a very rugged controller so that just a few checks periodically will help keep it up and running.

The key points to be check include:

1. Ambient operating conditions.
2. Wiring and connections

Maintaining the Ambient Operating Conditions

Keeping the EZTouch miniPLC's environment within specified operating conditions is the best method to minimize the maintenance.

1. Always ensure that ambient temperature inside the cabinet is within EZTouch miniPLC's temperature ratings.
2. If any other equipment inside or outside of the cabinet is producing heat, employ cooling methods like a blower fan to reduce "hot spots" around the EZTouch miniPLC.
3. Periodically inspect and clean if there are any filters on the cabinet. Ensure that the PLC is free from dust, humidity, and corrosive gases.

Environmental Specifications

Specification	Description
Operating Temperature	-10°C to 60°C
Storage Temperature	-20°C to 70°C
Relative Humidity	5% to 95%, non-condensing
Vibration	5 to 55Hz, 2g for 2 hours in X, Y, and Z axis
Shock	10g for under 12ms in the X, Y, and Z axis

Specification	Description
Noise Immunity	NEMA ICS 2-230 Showering arc, ANSI C37.90a SWC; Level C Chattering Relay Test

Changing the Battery

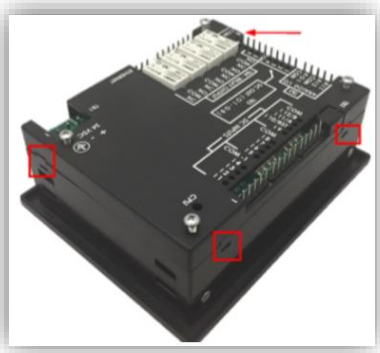
The EZTouch miniPLC units come with a built in Lithium coin cell battery with a five year life expectancy. The steps below outline the process to change the battery in the EZTouch miniPLC units. Since only the information saved to the registers / discretes available on a power cycle will remain intact, please save pertinent information before attempting to change the battery. Then remove power from the unit.

Necessary Equipment

- Philips and flathead screwdriver
- Lithium Ion CR1220 3V battery

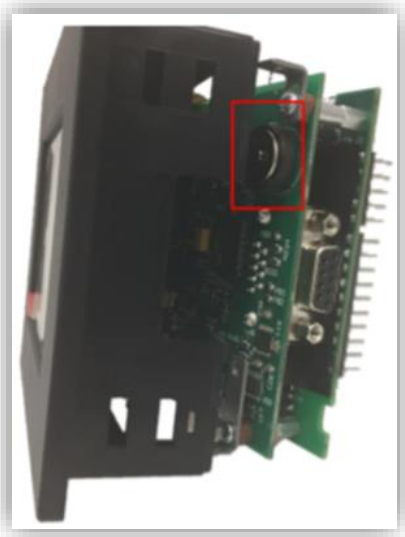
1. Using a Philips head screwdriver, remove the four screws holding the back plate on the unit.

2. Next, make sure clips come loose (four clips are holding the back to the front.) You can loosen them with a flat head screwdriver.



3. Next, lift off the back cover straight up and set the back cover aside. Then you will need to remove the four side screws using the Philips head screwdriver.

4. Lift the circuit board assembly output side up so that you have access to the battery.



5. Remove the depleted battery and insert a new CR1220 3V Lithium battery (or equivalent) with the positive side facing up into the coin cell battery holder.

   NOTE: If necessary, use the small blade screwdriver to remove the old battery.

6. Return the circuit board assembly back into the unit and screw in the side screws first. Then put the back cover on and snap in place. Finally, screw the back cover screws in.

   NOTE: Once inserted, the back cover retainer snaps will click into place.

The Real-Time Clock (RTC) will need to reset after the battery has been replaced. All information saved to the registers / discretes available on a power cycle will remain intact. Data not save to registers / discretes available during a power cycle will be lost. For information on registers / discretes available during a power cycle, please review this table.

Troubleshooting

If you encounter difficulties while using our EZTouch miniPLC device, please consult the table below. Additional assistance is also available within the **Panel Editor Programming Software Help**. Alternatively, you may also find answers to your questions on our website: www.ezaautomation.net.

Operation

Problem	Possible Cause	Corrective Action
Indicator LED is Off	• Disconnected or faulty power source. • Input power level is outside of EZTouch miniPLC's power rating specifications.	• Check and repair power source. Also, check the wiring for loose contacts and secure them if found, finally, ensure that proper polarity is observed. • Ensure that the power being presented to the EZTouch miniPLC terminal is within the specified range.
Indicator LED is Blinking Red	• Outdated firmware.	• Update firmware for unit.
Real-Time Clock Function Not Enabled	• Low battery.	• Remove old battery and insert new CR1220 3V Lithium battery.

Communication

Problem	Possible Cause	Corrective Action
No Communication with PC via Ethernet	• Disconnected or loose cable. • Wrong IP address.	• Check the wiring for loose contacts and secure them if found. • Update IP address associated with unit and reattempt a connection.
No Communication with the PC (RS232 Port Error)	• Disconnected or loose cable. • Wrong / broken cable. • Wrong communication port settings. • Wrong COM port assignment on the computer.	• Check the wiring for loose contacts and secure them if found. • Ensure the correct communication cable is being used (EZ-PGMCBL). • Check and correct the COM port attributes. • Check if correct Serial Port (COM1) assignments on the computer have been made.

Limited Warranty

Warranty

Moleaer warrants that the Goods will be free from defects in material and workmanship for a period of 12 months from delivery. Moleaer shall in no event be liable for defects or damage attributable to modifications performed or repair work done other than by Moleaer personnel or to abuse, accident, catastrophe, force majeure event, shipment, improper use, maintenance, storage or application or any other external cause.

EXCEPT FOR ANY WRITTEN PERFORMANCE WARRANTY THAT MOLEAER HAS EXPRESSLY INCORPORATED IN THIS CONTRACT, MOLEAER DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT.

Claims; Exclusive Remedy

Any warranty claim must be made to Moleaer in writing within 10 days of discovery of the alleged defect. After obtaining prior written authorization from Moleaer, Buyer shall return all allegedly defective Goods, freight pre-paid, for examination by Moleaer. If Moleaer finds that the Goods are defective and covered by the warranty, Moleaer's sole obligation shall be, at Moleaer's option, to repair or replace the Goods, or to refund the purchase price therefor, and to reimburse Buyer's reasonable shipping costs. Buyer shall be responsible for all charges for handling of returned items not found defective. The remedy set forth in this Paragraph 4 is Buyer's sole and exclusive remedy for any breach of warranty or claim related to the Goods other than pursuant to any written performance warranty that Moleaer has expressly incorporated in this Contract.

Limited Warranty

MOLEAER SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING DAMAGES FOR LOST OR PROSPECTIVE PROFITS OR OTHER ECONOMIC DAMAGES, ARISING OUT OF OR RELATED TO THIS CONTRACT OR THE GOODS. MOLEAER'S TOTAL LIABILITY, WHETHER IN CONTRACT OR TORT OR OTHERWISE, SHALL NOT EXCEED THE PORTION OF THE PRICE PAID BY BUYER ALLOCABLE TO THE GOODS GIVING RISE TO THE LIABILITY. THE LIMITATIONS IN THIS PARAGRAPH WILL APPLY NOTWITHSTANDING THE FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY.

This limitation shall not apply to claims for personal injury directly caused by Moleaer's willful or reckless acts.

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Document Revision History

Revision	Description	ECO No.	Assignee	Date Finished
A	Initial release.	x	x	x
B	Content updated. Reduced component content sub-manuals.	1114	VS, PM	7/31/2020
C	Update content. Combine US and EU manuals.	1149	PM, JM	10/30/2020
D	Revised operation instruction, O2 generator manual, and pressure regulator manual. Added Ozone operation instructions and manual section	1202	PM	4/14/2021