



MATHESON

ask...The Gas Professionals™

Purifiers



Operation Instructions

*READ AND COMPLY WITH THESE INSTRUCTIONS BEFORE
INSTALLING, OPERATING, OR SERVICING*

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I. SERVICE

General Service

A unit which is not functioning in a normal manner should be removed from service until such time that repairs or replacement can be made. Upon completion of repair, full testing should be performed to assure the user that the unit has been returned to its original operating parameters. MATHESON can repair or replace equipment. To arrange for repair or replacement service, call 1-800-828-4313 and ask for the Warranty Administrator. **No product will be received by MATHESON without indication of gas service and without proper return material authorization provided by the warranty administrator. (All repairs must be made by MATHESON or an assigned and approved facility to maintain any warranties or guarantees).**

If the unit is under an applicable warranty, return the unit to MATHESON for repair or replacement. To arrange for warranty service, call 1-800-828-4313 and ask for the Warranty Administrator. **No product will be received by MATHESON without indication of gas service and without proper return material authorization provided by the warranty administrator.**

If advised by the Warranty Administrator to return the product to MATHESON, prepare the product for shipment and write, in large lettering the RMA Number assigned by the Warranty Administrator on the outside of the box. Also, if required by the Warranty Administrator, supply the completed RMA form with the product. Make sure that the product is adequately packaged, in the original shipping container if possible, and shipped prepaid (MATHESON will not accept COD freight) with a description of the observed deficiency to the attention of the:

Warranty Administrator
MATHESON
166 Keystone Drive
Montgomeryville, PA 18936

The user is expected to periodically inspect the product for leaks, loose or worn parts, broken or non-functioning components and to address those situations immediately. If the user would require verbal assistance in ascertaining the potential of a problem with any MATHESON product, contact the local MATHESON branch for assistance or your MATHESON Sales Representative.

II. TROUBLE SHOOTING

1. Initial Tests

- 1.1 Remove the Purifier unit from the package in which it was shipped. Examine closely the packaging for signs of abuse during shipment. Make sure that the end dust plugs are attached to the unit and all seals of any cartridges intact. If the packaging appears to be abused, or if the end plugs are not installed, or if the seals of any cartridges are broken, arrange for return following the procedure set forth in the "SERVICE" Section.
- 1.2 For Purifier units having VCR connections, examine the sealing surface for signs of abuse. If the sealing surfaces are scratched or otherwise damaged, arrange for return following the procedure set forth in the "SERVICE" Section.
- 1.3 Examine the packing slip for the unit(s) ordered. Make certain that the unit(s) shipped matches the unit ordered as verified by the packing slip.

2. After Installation and Operation

- 2.1 Cartridges are considered expendable parts. Over periods of use, to be determined by the user, it will become necessary to exchange the cartridge for a new one.
- 2.2 Purifiers should be leak tested periodically, on a schedule provided by the user based on experience, for degradation of the seals used in installation by using one of the methods describe in the "INSTALLATION" Section.
- 2.3 Purifiers should be visibly inspected periodically, on a schedule provided by the user based on experience, for signs of corrosion or other abuse to purifier housing.
- 2.4 Purifiers exhibiting any of the deficiencies listed in this subsection should be immediately removed from service and replaced.

III. LIMITED WARRANTY

This equipment is sold by MATHESON under the warranties set forth in the following paragraphs. Such warranties are extended only with respect to the purchase of this equipment directly from MATHESON or MATHESON's Authorized Agent as new merchandise and are extended to the first Buyer thereof other for than the purpose of resale.

For a period of one year from date of original delivery (ninety days in corrosive service) to Buyer or to Buyer's order, this equipment, is warranted to be free from functional defects in materials and workmanship and to conform to the description of this equipment contained in this manual and any accompanying labels and/or inserts, provided that this equipment is properly operated under the conditions of normal use and that regular and periodic maintenance and service is performed or replacements are made in accordance with the instructions provided. Expendable parts of this equipment are similarly warranted to be free from functional defects in materials and workmanship and to conform to the description of this equipment contained in this manual and any accompanying labels and/or inserts. The foregoing warranties shall not apply if the equipment has been repaired other than by MATHESON or a service facility designated by MATHESON, or if this equipment has not been operated and maintained in accordance with written instructions provided by MATHESON, or has been altered by anyone other than MATHESON, or if the equipment has been subject to abuse, misuse, negligence or accident.

MATHESON's sole and exclusive obligation and the Buyer's sole and exclusive remedy under the above warranties is limited to repairing or replacing, free of charge, at MATHESON's sole discretion, the equipment or part which is telephonically reported to be a problem to the local MATHESON Branch Location, and which if so advised, is returned with a written statement of the observed deficiency, not later than seven days after the expiration of the applicable warranty, to the MATHESON Gas Equipment Technology Center during normal business hours, transportation charges prepaid, and which, upon examination, is found to comply with the above warranties. The Buyer shall pay for return trip transportation charges for the equipment or part.

MATHESON shall not be otherwise liable for any damages including but not limited to incidental damages, consequential damages, or special damages, whether such damages result from negligence, breach of warranty or otherwise.

There are no express or implied warranties that extend beyond the warranties hereinabove set forth. MATHESON makes no warranty of merchantability or fitness for a particular purpose with respect to the equipment or parts thereof.

Acceptance of the equipment by the final buyer indicates the final buyer's acceptance of all warranties and limitations set forth above.

IV. USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically, with the frequency of such inspections depending upon the scope of use. Damaged, worn or contaminated equipment should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, MATHESON recommends that a telephonic or written request for service advice be made to the MATHESON Equipment Engineering Group in Montgomeryville Pennsylvania or to the nearest MATHESON branch location.

This equipment or any of its parts should not be altered without the prior written approval of MATHESON Equipment Engineering Group. The user of this equipment shall have the sole responsibility for any malfunction, which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than MATHESON or a service facility designated by MATHESON. Further, the ultimate user of the equipment is responsible for the training and safe operation of the equipment by personnel in his/her employ.

V. SAFETY PRECAUTIONS

1. Many Specialty Gases are hazardous in nature. It is important that the user of the equipment carefully review the hazards associated with the gas to be used with the Purifier. **Before installing the purifier unit into any system, refer to the MSDS that was shipped with the gas or on file in your facility, as to the specific hazards associated with the gas to be used in the system. Also, refer to all applicable inserts contained with the equipment for additional precautions and operating instructions.**
2. Before using any Purifier unit on toxic, corrosive, pyrophoric, flammable or other type of hazardous gas, test the leak integrity of the purifier using an inert gas.
3. Make certain that the Purifier purchased is suitable for the application intended. All Purifier units supplied by MATHESON, a model number, and a pressure limitation label and/or stamping. Carefully review this information to establish the purifier fit for service in the desired application.
4. Make certain that the equipment purchased or delivered to the ultimate end user conforms to the specifications of the user. The user is responsible for selecting equipment compatible with gases that are to be used, physical parameters of operation and performance and normal material compatibilities. Selection information can be found in MATHESON Catalogs, MATHESON Tech Briefs and in the MATHESON Gas Data Book. In addition, any MATHESON representative would be pleased to aid in the selection of specific equipment.
5. Before installation of the Purifier unit into a system, note the direction of the flow arrow. Make certain that the arrow is in the same direction as the intended flow.
6. For Purifier units supplied with NPT connections, use an approved method of pipe sealing (such as an approved Teflon tape material) on the connection threads and tighten no more than one and one-half turn past hand tight.

CAUTION: Do not over tighten. Over tightening may crack the fitting housing and/or the purifier unit

7. For Purifier units supplied with compression tube connections, face and deburr the tubing to which the unit is to be attached. Following the manufacturer of the fittings recommendations for tightening the compression tube fitting make the connection. Most manufacturers of compression tube fittings recommend tightening the locking nut one quarter turn past hand tight.

CAUTION: Do not over tighten. Over tightening may obstruct the flow of gas through the tubing or the purifier unit.

8. For Purifier units supplied with VCR type connections, make certain that the connection in the system will mate to the connections supplied on the Purifier unit, before attempting installation.

CAUTION: Most VCR type connections require the use of an expendable gasket. This gasket is to be used once. Make sure that the material of the gasket used is compatible with the gases to be used.

VI. GENERAL DESCRIPTION

MATHESON Purifiers are designed for specific services. Make certain that the purifier ordered is compatible with the application and the gases and/or liquids to be purified.

Purifiers function as chemical barriers to contaminant materials. The purifiers marketed by MATHESON use catalytic or absorption methods for purification. These methods as well as the series numbers to which they pertain are listed below.

1. **CATALYTIC PURIFIERS (Series 64-1000, 6406)**
2. **ABSORPTION PURIFIERS (Series 450, 460, 465)**

Catalytic Purifiers generally consist of an active metal catalyst that either reduces or oxidizes the impurity to be removed. Over time, the exposed surface of the catalyst becomes either fully reduced or oxidized and needs to be replaced. The efficiency of these purifiers is directly proportional to the exposed surface area of the catalyst to the subject gas and inversely proportional to the flow rate of the subject gas. In simpler terms, the lower the flow rate and the more volume of the catalyst, the better the efficiency.

Absorption Purifiers generally consist of a material that specifically absorbs an impurity based either on the molecular size or affinity for that impurity. Over time, the material becomes fully saturated with the absorbed material and needs to be replaced. In the case of the Models 450 and 460 Series, this involves the exchange of expendable cartridges. In the case of the Model 465 Indicator, the cartridge can either be replaced or regenerated by flushing the indicator with a dry gas or by heating the indicating element in an oven at 150°C for 2 to 3 hours. The efficiency of these purifiers is directly proportional to the exposed surface area of the purifying material to the subject gas and inversely proportional to the flow rate of the subject gas. In simpler terms, the lower the flow rate and the more volume of the purifying material, the better the efficiency.

<p>NOTE: Purifiers are not filters. Purifiers remove only chemical contaminants from gases and do not afford the capability to remove particulate contaminants.</p>
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VII. INSTALLATION

For maximum performance and service life, the purifier should be installed in a clean, dry atmosphere, relatively free of shock and vibration. Sufficient room for access to plumbing should be provided to facilitate maintenance. Fitting dust caps should be removed just prior to installation.

1. Gas Connections

- 1.1 Ensure that the flow in the system in which the Purifier unit(s) is/are to be installed is in the direction of the arrow indicated on the body of the Purifier(s).
- 1.2 MATHESON supplies the Purifier unit(s) with a variety of end connections. Use an approved method of sealing on the connection.

CAUTION: Do not over tighten. Over tightening may cause damage to the purifier unit(s).

- 1.2.1 For Purifier units supplied with NPT connections, use an approved method of pipe sealing (such as an approved Teflon tape material) on the connection threads and tighten no more than one and one-half turns past hand tight.

CAUTION: Do not over tighten. Over tightening may crack the fitting housing and/or the purifier unit(s).

- 1.2.2 For Purifier units supplied with compression tube connections, face and deburr the tubing to which the unit is to be attached. Following the manufacturer of the fittings recommendations for tightening the compression tube fitting make the connection. Most manufacturer compression tube fittings recommend tightening the locking nut one quarter turn past hand tight.

CAUTION: Do not over tighten. Over tightening may obstruct the flow of gas through the tubing or the purifier unit(s).

- 1.2.3 For Purifier units supplied with VCR type connections, make certain that the connection in the system will mate to the connections supplied on the Purifier unit, before attempting installation.

CAUTION: Most VCR type connections require the use of an expendable gasket. This gasket is to be used once. Make sure that the material of the gasket used is compatible with the gases to be used.

- 1.3 Use only pre-cleaned tubing or pipe and clean, dry (< 1.0 ppm H₂O) gases.
- 1.4 After Purifier unit installation prior to the use of the unit, the plumbing system should be thoroughly leak tested using either an approved soap solution or by pressurizing the entire system with Helium and using an approved leak detector and monitor for a leak rate of less than 1×10^{-5} cc/sec He.

NOTE: This step is required by the user when the purifier unit is to be used in any hazardous material applications, such as but not limited to, flammable, toxic, corrosive, or pyrophoric applications.

2. Environmental Requirements

Refer to the "SPECIFICATIONS" section for the applicable Series of Purifier.

3. Mounting

- 3.1 The Purifier unit should be supported by some method compatible with the application and location of the unit in a gas or liquid line.
- 3.2 The Purifier unit should NOT be supported by only the tube or pipe to which it is attached. This may cause radial or other stress to the connections securing the unit in the gas or liquid line.
- 3.3 The Purifier unit will function regardless of the physical position of mounting (eg. horizontal, vertical or anywhere in between).

VIII. OPERATING INSTRUCTIONS

Read the "SAFETY PRECAUTIONS" and "INSTALLATION" sections before operation of the equipment.

1. After installation in the system and prior to operation, the system should be thoroughly leak checked (as described in Section VII, 1.4).
2. Begin to apply pressure to the system in a controlled manner using a regulator or other approved device for pressure regulation.
3. Within the system note the pressure before the purifier in the line and after the purifier in the line. Record this information in a secure place.

NOTE: All purifiers experience some pressure drop across the point where they are installed. This is not uncommon and should be expected.

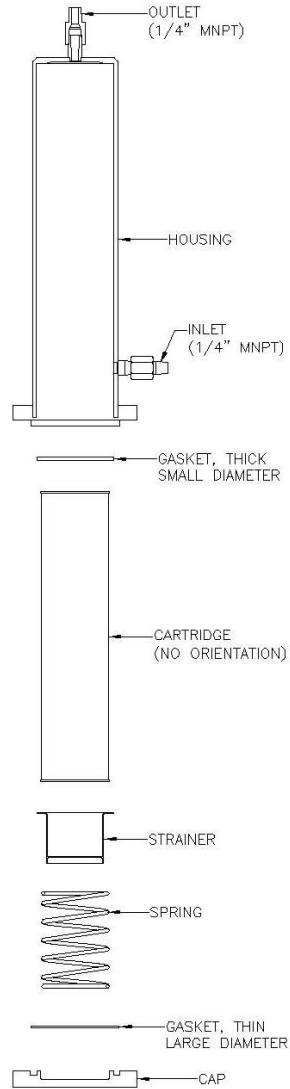
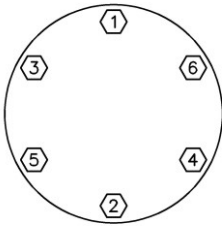
4. If there is sufficient flow and pressure across the purifier, the system is now ready for operation.

IX. MAINTENANCE

1. Purifiers contain expendable parts. No maintenance is required until the purifier unit exceeds the parameters listed in the TROUBLE SHOOTING Section. If the parameters are exceeded, it is time to replace the unit.
2. Purifiers that are secured in a line with VCR type fittings require additional attention. If the VCR seals are broken after original installation, the gasket employed is expendable and must be replaced to ensure leak tight operation.
3. The maintenance period should be established by the user based upon historical experience in the user's particular application.

X. MODEL 460 CARTRIDGE REPLACEMENT

1. Disassemble the flange from the end of the Model 460 Purifier.
2. Remove the contents, discarding the depleted cartridge, shell gasket, and flange gasket.
3. Take the new cartridge and the two gaskets out of the hermetically sealed container/
4. Replace the flange gasket.
5. Lay the shell gasket on the end of the cartridge.
6. Slide these parts up the holder, followed by the strainer-spacer and the spring.
7. Reassemble the end flange. Tighten the bolts (about 10 ft-lbs) in the sequence shown.



XI. SPECIFICATIONS

Model 460

Materials of Construction

- Shell Body: Aluminum
- Strainer Assembly: Monel & brass
- Gaskets: Neoprene
- Cartridge: 461: 4A Molecular sieve
462: 13X Molecular sieve
463: Activated charcoal

Specifications

- Maximum Operating Pressure: 350 psig
- Temperature Range: -40 to 200°F (-40 to 93°C)
- Maximum Flow Rate: 10 SCFM for short periods (<15 mins)
1 to 3 SCFM for extended use
- Pressure Drop: 0.12 psi for 3 SCFM
1 psi for 7.5 SCFM
- Capacity: 461: 134 grams H₂O
462: 126 grams H₂O
- Dew Point Achieved: -100°F (-73°C) (1.5 ppm)
- Dimensions: 4-3/4" dia. x 16-3/4"L
- Inlet & Outlet: 1/4" MNPT, stainless steel (non-removable)
- Gasket, Flange (SEQ GSK0066NB): 3-3/8" OD x 3" ID x 0.06" (90 Durometer)
- Gasket, Shell (SEQ GSK0155NB): 2-15/16" OD x 1-3/4" ID x 1/8"
- Flange Bolts Torque: ~10 ft.-lbs

Model 6406 Series

Materials of Construction

- Body: Aluminum
- Inlet/Outlet Fittings: Brass
- Catalyst: Proprietary

Specifications

- Maximum Operating Pressure: 125 psig
- Maximum Operating Temperature: 212°F (100°C)
- Purity level: < 1 ppm H₂O
< 1ppm O₂
- Maximum Flow Rate: 2 SLPM
- Dimensions: 3" dia. x 6-3/4" H
- Inlet/Outlet: 1/4" Compression Fittings

Model 450B

Materials of Construction

- Shell Body: Black anodized aluminum
- Cylinder Head: Nickel plated brass
- O-Ring: Buna N
- Cartridge: 451: 13X Molecular sieve
452: 4A Molecular sieve
453: Sintered bronze
454: Activated charcoal

Specifications

- Maximum Operating Pressure: 2000 psig
- Maximum Oxygen Operating Pressure: 500 psig
- Temperature Range: -40 to 165°F (-40 to 74°C)
- Pressure Drop: 0.2 psi for 1 SCFM
0.9 psi for 2 SCFM
2.4 psi for 3 SCFM
- Dimensions: 2" dia. x 5-3/4" L
- Inlet & Outlet: 1/4" FNPT
- Water Removal Capacity: 451: 5.4 grams
452: 6 grams
- Dew Point Achieved: -100°F (-73°C) (1 .5 ppm)

Model 64-1000 Series

Materials of Construction

- Body: Stainless Steel
- Catalyst: Proprietary

Specifications

- Maximum Operating Pressure: 1800 psig
- Maximum Allowable Oxygen Level (inlet): 1% by volume
- Purity level: < 1 ppm O₂
- Maximum Flow Rate: 64-1008: 8
(SCFH) 64-1015: 15
64-1030: 30
64-1050A: 50
64-1100A: 100
- Dimensions: 64-1008: 1-1/2" x 5"
(D x L) 64-1015: 2" x 5-1/4"
64-1030: 2" x 9"
64-1050A: 2" x 13-3/4"
64-1100A: 3-1/2" x 11"
- Inlet/Outlet: 1/4" FNPT (1/2" FNPT – 64-1100A)

Model 465

Materials of Construction

- Body: Brass
- Window: Pyrex
- O-ring: Buna-N
- Indicator: Silica Gel

Specifications

- Maximum Operating Pressure: 500 psig
- Inlet Connection: 1/4" NPTF
- Outlet Connection: 1/4" NPTM
- O-ring: 11/16"ID x 7/8"OD x 3/32" (ASA 115)
- Dimensions: 2-3/4"L x 1-3/8"W x 1-7/8"H

The unit is furnished with a standard indicating dyed silica gel, which gradually changes from blue (at relative humidities less than 4%) to pink (at relative humidities higher than 40%).

The silica gel can be regenerated by flushing the indicator with a dry gas or by heating the indicating element in an oven at 150°C for 2 to 3 hours.

NOTES:



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INT-0071 rev C

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