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**SAES Pure Gas, Inc.**  
*A member of the SAES Getters Group*

# MICRO TORR®

## Point-of-Use Ambient Temperature Purifiers












## Introduction

MicroTorr® purifiers are designed to remove gaseous contaminants down to part-per-trillion levels. Product dimensional and purity performance specifications had been provided along with the present Product Manual.

MicroTorr® use a variety of specifically developed getter-stabilized zeolites (GSZ) and other media for ambient temperature purification (no power to function). Purification Media are specific to each gas and impurities removal is generally based on chemisorption, physisorption or catalytic oxidation and physisorption.

Most GSZ media can be fully regenerated providing the lowest cost of ownership purification solution available as well as eliminating hazardous waste disposal problems.

## Safety Precautions and Handling

	<p>COMPLETELY READ THIS MANUAL PRIOR INSTALLATION AND ANY OPERATION. For more specific information on Gas Handling and Safety Refer to gas supplier's Material Safety Data Sheet.</p>
	<p>PRESSURIZED GASES ARE DANGEROUS. Do not operate this product unless you are familiar with all necessary safety precautions taken to prevent hazardous conditions (pressure unexpected release). Ensure ventilation to the installation area to prevent operator's asphyxiation.</p>
	<p>USE THE PURIFIER ONLY FOR APPROVED GAS ONLY. If the product is exposed to gases different from what specified strong exothermic reactions or other adverse reactions may occur. It is user responsibility to install all safety equipment to prevent hazardous conditions.</p>
	<p>NEVER USE THE PURIFIER WITH MULTIPLE GASES UNLESS APPROVED BY SAES PURE GAS CUSTOMER SERVICE</p>
	<p>FAILURE TO CORRECTLY DEFACILITIZE THE PURIFIER BY NOT EXACTLY FOLLOWING THE REMOVAL PROCEDURE COULD CAUSE ATMOSPHERIC EXPOSURE OF PROCESS GAS RESIDUALS AND MAY RESULTS IN EQUIPMENT DAMAGE OR INJURY OF PERSONNEL.</p>
 Warning	<p>TO AVOID IRREVERSIBLE PURIFICATION UNIT DAMAGE OR PURIFICATION PERFORMANCE DEPLETION DO NOT EXCEED MAX OPERATING PRESSURE, FLOW RATE AND TEMPERATURE.</p> <p>For further information see the unit mechanical specification chart attached with this manual</p>
	<p>Initial operation with process specialty gases may product heat. Strictly follow the Operation Manual Installation instructions</p>
	<p>If the process gas is different than the purge gas used during installation, care must be taken to eliminate the risk of exposing the purification media to ambient air when switching gases</p>
	<p>High contaminant concentrations (&gt; 10 ppmV) or the use of low grade tubing and components upstream or downstream the unit may result in incomplete gas purification</p>

## Unpacking and Mounting Orientation

- Each purifier is filled with nitrogen or an inert gas and is shipped in a vacuum sealed bag. The inlet and outlet fittings are capped.
- The purifier must be installed vertically with process gas flow running from top to bottom (inlet to outlet) according the flow arrow label indication.
- For other mounting orientations please contact SAES Pure Gas Customer Service (Page 4)

## Installation

### Connection of purifier with factory-supplied isolation valves:

- Purge the process line with inert gas or nitrogen (99.999% pure minimum). Maintain the purge gas pressure of approximately 5 psig during the whole installation to prevent air from entering the purifier. The gas flow rate for purge should be minimum 50-100 sccm.
- Orient the purifier in the gas line with the flow arrow pointing in the direction of the gas flow

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*The following steps should be performed quickly and should take less than 30 seconds for each connection.*

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- Install a new VCR® gasket (included) into the inlet fitting of the purifier inlet isolation valve and connect to the upstream piping. Cycle Purge and then purge the VCR® connection while keeping the isolation valve closed. Tighten to VCR® fitting manufacturer specification, typically 1/8 of a turn past finger tight to complete each face seal fitting. Some slight additional tightening may be necessary to meet the desired leak rates. PLEASE USE CAUTION, excessive over-tightening can damage sealing bead (toroid) and possibly cause system leakage.
- Open the inlet valve of the purifier.
- Allow at least 10 seconds for the purifier to pressurize with purge gas.
- Open the outlet isolation valve. Install a new VCR® gasket (included) into the outlet fitting of the isolation valve installed. Connect the purifier to the downstream piping. Tighten to VCR® fitting manufacturer specification, typically 1/8 of a turn past finger tight to complete each face seal fitting. Some slight additional tightening may be necessary to meet the desired leak rates. PLEASE USE CAUTION, excessive over-tightening can damage sealing bead (toroid) and possibly cause system leakage.
- Flow inert gas for 15-30 minutes at 10% of the maximum purifier flow (see the Purification Unit Specs Provided). The Purifier installation is complete.
- Leak check with Helium all piping and connections according SEMI Standard F1-96 (Specification for Leak Integrity of High-Purity Gas Piping Systems and Components).

### Connection of purifier without factory-supplied isolation valves:

- Purge the process line with inert gas or nitrogen (99.999% pure minimum). Maintain the purge gas pressure of approximately 5 psig during the whole installation to prevent air from entering the purifier. The gas flow rate for purge should be minimum 50-100 sccm
- Orient the purifier in the gas line with the flow arrow pointing in the direction of the gas flow

The following steps should be performed quickly and should take less than 30 seconds for each connection.

3. Remove the inlet cap. Install a new VCR® gasket (provided), into the inlet fitting and connect the purifier to the upstream piping. Tighten to VCR® fitting manufacturer specification, typically 1/8 of a turn past finger tight to complete each face seal fitting. Some slight additional tightening may be necessary to meet the desired leak rates. PLEASE USE CAUTION, excessive over-tightening can damage sealing bead (toroid) and possibly cause system leakage.
4. Allow at least 10 seconds for the purifier to pressurize with purge gas. 5. Remove the outlet cap. Install a new VCR® gasket (provided), into the outlet fitting and connect the purifier to the downstream piping. Tighten to VCR® fitting manufacturer specification, typically 1/8 of a turn past finger tight to complete each face seal fitting. Some slight additional tightening may be necessary to meet the desired leak rates. PLEASE USE CAUTION, excessive over-tightening can damage sealing bead (toroid) and possibly cause system leakage.
5. Flow inert gas for 15-30 minutes at 10% of the maximum purifier flow (see the Purification Unit Specs Provided). The Purifier installation is complete.
6. Leak check with Helium all piping and connections according SEMI Standard F1-96 (Specification for Leak Integrity of High-Purity Gas Piping Systems and Components).

### Conditioning

Conditioning is required to ensure that the unit specified purity levels are met prior putting the purifier into service. After conditioning the purity specification will be met at the purifier outlet connection. Additional piping conditioning could be required if the purity specifications will be measured downstream the purifier through other gas pipelines and components.

If for any reason your set up does not allow to follow the below conditioning instructions please contact SAES Pure Gas Customer Service (Page 4) for alternative and customized conditioning recipes.

Below are the instructions for two types of conditioning: Type A and Type B.

Refer to the table below to determine the correct conditioning type for your purifier and process gas.

If the purification unit code is not included in the table above refer to the conditioning guidelines present with the unit Specification or contact SAES Pure Gas Customer Service (Page 4).

A temperature label has been affixed to the purifier to assist in monitoring the temperature during conditioning (the green number indicates the unit current temperature)

	Media Type			
	404, 502, 602, 702, 703, 802, 905		202, 203, 302, 403, 902, 904, 906	
	Type A Conditioning		Type B Conditioning	
Model	Flow	Flow Period	Flow	Flow Period
MC1/NT12	0.1 slpm	4 hours	0.1 slpm	1 hour
MC50/SP150	0.1 slpm	4 hours	0.2 slpm	2 hours
MC190/HP190/PG1	0.4 slpm	5 hours	0.5 slpm	2 hours
MC200	0.4 slpm	5 hours	0.5 slpm	2 hours
MC400/HP400	0.7 slpm	5 hours	0.7 slpm	2 hours
MC450	0.7 slpm	5 hours	0.7 slpm	2 hours
MC500	0.7 slpm	5 hours	1.0 slpm	4 hours
MC700/HP700	0.7 slpm	5 hours	1.0 slpm	4 hours
MC1500	2.2 slpm	5 hours	2.0 slpm	4 hours
MC3000/HP3000	3.0 slpm	5 hours	5.0 slpm	4 hours
MC4500	7.0 slpm	5 hours	7.5 slpm	4 hours
MC9000	10.0 slpm	5 hours	10 slpm	4 hours
SP70	0.3 slpm	5 hours	1.0 slpm	2 hours
SP300	0.4 slpm	5 hours	1.0 slpm	2 hours
SP600	0.7 slpm	5 hours	1.0 slpm	2 hours
<b>Model numbering explanation: MC1-202FV</b> (MC1= Purifier size 202= Media F= 0.003 µm filter V= Valves)				

### Type A Conditioning

It is recommended that the purifier is properly vented to a scrubber during conditioning.

For MC1, NT12, MC50 unit conditioning, only perform Steps 1 & 3.

Switch to process gas for conditioning.

1. Begin flowing process gas at rate indicated on chart below. Carefully monitor temperature on temperature label (the green number indicates the current temperature).
2. Monitor to ensure temperature stays below 60°C for 30 minutes. (If temperature rises over limit, isolate the purifier and let cool to less than 45°C. When cooled, go back to Step 1).
3. Purge with process gas for at least 5 hours at rate indicated.

**NOTE** for media 502: extend the conditioning to total 6 hours and do not stop and isolate the purifier until the end of the conditioning process.

### Type B Conditioning

Switch to process gas for conditioning.

1. Begin flowing process gas at rate indicated on chart below. Carefully monitor temperature on temperature label (the green number indicates the current temperature).
2. Monitor to ensure temperature stays below 60°C. If temperature rises over limit, isolate the purifier and contact SAES Pure Gas Customer Service (Page 4)
3. The period of flow on chart is required to confirm that the purifier is not heating

## Decommissioning

- Cycle purge with inert gas or nitrogen: decrease line pressure to minimum pressure achievable – must be less than .3 bar (5 psig) but higher than atmospheric pressure – then increase to maximum achievable without exceeding operating pressure of unit (100 psig is recommended) – this must be at least 5 bar (75 psig). Repeat through 10 cycles for nitrogen and rare gases and 50 cycles for specialty gases.
- For specialty gases, after cycle purging, continue purging with nitrogen or inert gas for 48 hours at 30% the maximum purifier flow rate.
- After the above purging is complete, regulate the gas pressure to max 20 psig and then close the outlet valve. Disconnect the purifier outlet VCR® connection and cap using a new VCR® gasket (not included). Tighten to VCR® fitting manufacturer's specifications.
- While purging the gas at 20 psig, close inlet valve. Disconnect the inlet VCR® connection and cap using a new VCR® gasket (not included). Tighten to VCR® fitting manufacturer's specification.

## Purifier Lifetime

The purification unit will operate for a specific lifetime based on the following parameters:

- Application average flow rate (slpm, scfm, nm<sup>3</sup>/hour, scfh...)
- Application duty cycle (hours/week/years the purifier will be in service)
- Application inlet gas purity levels (ppmV-w-mole, ppbV-w-mole, ng/l...)
- Application purity outlet requirements (ppbV-w-mole, pptV-w-mole, ng/l...)

To determine the precise lifetime, after having collected the above info, contact your local SAES Getters office or send an email to [spg@saes-group.com](mailto:spg@saes-group.com)

## Disposal of purifier

Follow proper disposal procedures for the purifier. The disposal of the material, as with any other industrial waste, should be performed in accordance with the specific local and national laws and regulations. Dispose the purifier referring to the appropriate Material Safety Data Sheet (MSDS) sent by SAES Pure Gas along with the purification unit. If there are any questions concerning correct disposal methods, contact your local SAES Getters office.

## Purifier Regeneration

Purifier factory regeneration is an environment friendly service SAES Pure Gas is offering to minimize product's cost of ownership. Instead of expensive hazardous materials waste disposal, MicroTorr units could be factory regenerated. Regenerated units will have the same purity performance, lifetime expectation and warranty as a fresh unit.

Please consult the following chart to see if your purifier is regenerable as well if the purification material requires special care for shipment.

The media refers to the three digit number located in the part number of the purifier. For example, the purifier MC1-902F contains 902 media which is regenerable.

Media	Is it Regenerable (Yes/No)	Is the media classified as Dangerous Goods (Yes/No)
202	Yes	No
203	Yes	No
302	No	No
403	No	No
404	Yes	No
502	No	No
602	Yes	Yes
702	Yes	Yes
703	Yes	Yes
802	No	Yes
902	Yes	Yes
904	Yes	Yes
905	Yes	Yes
906	Yes	No

## Additional Information, Regeneration and Reorder

For additional information or any kind of assistance visit please contact your SAES Pure Gas representative or call SAES Pure Gas:

- **Lifetime evaluation:** + 1 (805) 541-9299; [spg@saes-group.com](mailto:spg@saes-group.com)
- **Reorder:** + 1 (805) 541-9299; [spg@saes-group.com](mailto:spg@saes-group.com)
- **Regeneration service :** +1 (805) 781-2392 ; [spg.fse@saes-group.com](mailto:spg.fse@saes-group.com)
- **Customer Service:** USA (800) 934-3628; International +1 (805) 781-2392 ; [spg.fse@saes-group.com](mailto:spg.fse@saes-group.com)

Additional and updated information is also available at SAES Pure Gas Website [www.saespuregas.com](http://www.saespuregas.com)



**SAES Pure Gas**  
The Technology of Pure Gas

SAES Getters Group, Pure Gas Technologies

Customer Service  
24 Hours, 7 days/week

(1-805) 781-2392 International  
(1-800) 934-3628 US Domestic

[www.saespuregas.com](http://www.saespuregas.com)

Email: [spg@saes-group.com](mailto:spg@saes-group.com)

# Product Warranty

## Limited Warranty and Disclaimer of Warranties

SAES warrants that its products and parts will perform in accordance with SAES's published specifications or the specifications agreed to by Buyer and SAES in writing and referring to this order. This warranty shall have a term of TWELVE (12) MONTHS from the date of installation at Buyer's facility or EIGHTEEN (18) MONTHS from the date of shipment, whichever term is shorter. In the case of after-sale field upgrades or non-warranty repairs, SAES shall warrant all materials and workmanship for a period of NINETY (90) DAYS from the date of installation or upgrade. Subject to the remainder of this Paragraph, any action by Buyer for any alleged breach of this warranty shall be brought by Buyer within thirty (30) days of Buyer's discovery of the breach. This warranty shall only apply to the Buyer and may not be assigned.

During the term of the warranty set forth above, SAES will promptly repair goods which do not conform to the specifications and which Buyer returns to SAES at the address provided below. Buyer shall be responsible for all transportation charges incurred in returning goods to SAES for repair, provided that SAES shall be responsible for such charges if Buyer obtains a Returned Material Authorization ("RMA") number and specific shipping instructions from the SAES PURE GAS Field Support Group prior to its shipping of the goods to SAES. SAES shall not unreasonably deny Buyer authorization to ship goods to SAES and an RMA number upon Buyer's request under this Paragraph. SAES shall return repaired goods to buyer, with surface transportation charges prepaid by SAES.

If SAES, in its sole discretion, determines that it is not commercially practicable to repair goods returned by Buyer, SAES will either (i) replace those goods or (ii) refund the purchase price to Buyer, less the reasonable pro-rated rental value of the goods for the period during which Buyer used them prior to its discovery of their failure to comply with the warranty set forth above. Buyer expressly agrees that should SAES replace returned goods, the replacement goods may consist of or contain refurbished goods and/or parts. Any refurbished goods or parts SAES ships to Buyer under this Paragraph shall be equivalent to new in performance, shall meet SAES's published specifications or the specifications agreed to by Buyer and SAES in writing and referring to this order, and shall be subject to the limited warranties set forth in this Paragraph. SAES shall be responsible for any surface transportation charges incurred in shipping replacement goods to Buyer.

The warranty set forth above shall not apply to damage resulting from (i) loss or damage in transit; (ii) unreasonable use (including without limitation the failure to provide reasonable and necessary maintenance); (iii) accident; (iv) Buyer's attempt to make or cause to be made any repairs or alterations on the goods and parts covered during the warranty period without the prior written permission of SAES; (v) Buyer's acts or omissions which subject the goods to more rigorous environments than are set forth in the applicable specifications, including without limitation Buyer's use of toxic, corrosive or caustic liquids and/or gases with the goods; (vi) Buyer's negligence, mishandling, misuse, abuse or use which is not in accordance with SAES's specifications and instructions; or (vii) any defects in those purchased goods which Buyer has detected after the end of the term of the warranty herein. SAES reserves the right to examine the goods returned to determine if the warranty is applicable. SAES MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND SAES DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SAES MAKES NO WARRANTY THAT THE GOODS DO NOT INFRINGE ANY PATENT, TRADEMARK, COPYRIGHT, OR SIMILAR RIGHTS OF THIRD PARTIES AND SAES DISCLAIMS ANY IMPLIED WARRANTY OF NONINFRINGEMENT.

The warranty set forth above is the only warranty made by SAES with respect to the goods delivered hereunder, and no employee, representative or other person or entity is authorized to assume for SAES any obligations or liability beyond or at variance with that warranty in connection with the sale of SAES's goods.

**Limitation of Liabilities. BUYER AND SAES AGREE THAT (I) THE SOLE AND EXCLUSIVE REMEDIES FOR BREACH OF ANY**

**WARRANTY CONCERNING THE GOODS SHALL BE REPAIR OR REPLACEMENT OF THOSE GOODS OR THEIR COMPONENT PARTS OR REFUND OF THE PURCHASE PRICE AS STATED IN THIS PRODUCT WARRANTY ABOVE; AND (II) SAES SHALL HAVE THE EXCLUSIVE RIGHT TO SELECT ANY SUCH REMEDY IN ITS SOLE DISCRETION.**

IF SAES BREACHES THIS AGREEMENT, BUYER'S SOLE DAMAGES SHALL BE THE DIFFERENCE BETWEEN THE MARKET PRICE AND THE CONTRACT PRICE. SAES SHALL NOT BE LIABLE FOR CONTINGENT, INCIDENTAL OR CONSEQUENTIAL DAMAGES TO PERSONS OR PROPERTY AND SAES'S SOLE LIABILITIES AND BUYER'S EXCLUSIVE REMEDIES HEREUNDER ARE AS PROVIDED IN THESE STANDARD TERMS AND CONDITIONS OF SALES. SAES SHALL NOT BE LIABLE FOR ANY EXCESS REPROCUREMENT COSTS OR SPECIFIC PERFORMANCE.

Notwithstanding any implication to the contrary, SAES shall have no liability whatsoever unless and until Buyer shall have paid the full purchase price of all goods delivered.

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