SERVOMEX
ANALYZERS
HIGH-PERFORMANCE GAS ANALYSIS

SERVOPRO PureGas

OPERATOR MANUAL

Part Number: **02005001A**
Revision: **0**
Language: **UK English**

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LIST OF CONTENTS

1 DESCRIPTION AND DEFINITIONS

1.1 Scope of this Manual

This operation manual provides the information required to operate the purifier.

This manual is not intended to provide servicing instructions to the user.

The purifier should be operated only by personnel who are familiar with the procedures required for safe operation.

It is strongly recommended that the factory be consulted before any maintenance or repairs are attempted.

1.2 Safety Information

This manual must be read and its contents fully understood before any attempt is made to install, operate or maintain the purifier. Important safety information is highlighted in this manual as WARNINGs and CAUTIONs, which are used as follows:

WARNING

Warnings highlight specific hazards which, if not taken into account, may result in personal injury or death.

CAUTION

Cautions highlight hazards which, if not taken into account, can result in damage to the purifier or to other equipment or property.

This manual also incorporates 'Be Aware of' information, which is used as follows:

This highlights information which is useful to be aware of (for example, specific operating conditions).

1.3 Warning Symbols

The identification label on the front of the purifier displays the following warning symbols, which are defined as follows:

Surface of enclosure will become hot.

Refer to manual.

1.4 General Warnings and Cautions

WARNING

The purifier must only be used with inert gases. The intended gas type will be stated on the front of the purifier. Do not use any other gas type. This purifier should never be used to purify oxygen, air or other gas containing oxygen above trace levels. If this purifier is used to purify oxygen, air or other gas containing oxygen above trace levels, the purifier will rapidly and uncontrollably overheat and could cause a fire or permanent damage to the purifier, voiding the factory warranty.

WARNING

Improper installation, operation, or service of the purifier can cause fire and electrocution.

WARNING

If a fire occurs inside the purifier, extinguish the fire with sand or an extinguisher intended for class d (metal) fires only. Do not attempt to extinguish a purifier fire with any other materials.

WARNING

The purifier is not a medical device as defined in the Medical Devices Directive 93/42/EEC (as amended), and is not intended for use with medical equipment.

The purifier is intended for operation in fixed installations indoors, or enclosed in a cabinet.

CAUTION

The purifier must have electrical power and applicable gas pressure for proper operation. If proper electrical power and applicable gas pressure are not supplied, the purifier could be permanently damaged and the factory warranty will be void.

1.5 Description

The purifier is designed for the purification of carrier gases used in Gas Chromatography (GC).Outlet impurity levels for H_2, O_2, H_2O, CO, CO_2, CH_4 (and N_2 in noble gases) are reduced to low parts per billion (ppb) levels.

The purifier comes completely assembled with a 1/8" compression fitting for both the gas inlet and the outlet. Both fittings are located on the top of the purifier. Optional 1/8" VCR connections are also available if requested.

1.6 Lifetime of the Purifier

CAUTION

The purifier does not incorporate integral flow or purity sensors. Therefore, it is the responsibility of the operator to manually adjust the values of sample gas flow rate and impurity levels if these change from the initial configuration during operation. If not, the calculation of the remaining life of the purifier may not be accurate.

At the rated flow of 200 sccm and at rated working temperature, the purifier has the capacity to purify up to sixty B50 200 Bar cylinders of typical 5 nines quality (99.999%) carrier gas or one hundered and twenty cylinders of typical 6 nines quality.

1.7 Construction

- The purifier comprises of an aluminium enclosure which has ventilation holes at the top and bottom. There is a mounting bracket at the rear of the purifier.
- Anodized enclosure maintains a 45º C surface temperature.
- Ceramic fibre insulation with encapsulated heater coil
- 20 µm sintered filter on inlet and outlet
- 1/8" compression fittings (Optional 1/8" VCR)

2 SPECIFICATION

2.1 General

Purifier height (envelope)	312 mm (~12.3 in) 347 mm (~13.67 in) [optional VCR connections]
Purifier width (envelope)	112 mm (~4.4 in)
Purifier weight	1.8 Kg (~4 lbs)
Feed gas inlet	1/8” compression fittings (optional 1/8” VCR)
Purified gas outlet	1/8” compression fittings (optional 1/8” VCR)
Heater power consumption	40 W
Particle filter	20 µm sintered filter on inlet and outlet
Gas wetted surface finish	Up and downstream of Getter vessels = 304L SST, all welded construction

2.2 Environmental Limits

Indoor Installation, Ambient Temperature (min – max)	0°C to 35°C (32°F to 95°F)
Operating ambient humidity range	0% to 95% RH, non-condensing
Maximum operating altitude	2000m
Ingress protection	IP20

2.3 Electrical Data

Installed Power (Customer to specify voltage at time of order)	120 VAC, 1 Phase, 50/60 Hz 220 VAC, 1 Phase, 50/60 Hz
Plug Style (Customer to specify which power plug is required in their area at time of order)	USA (120 VAC) EU (220 VAC) UK (220 VAC)

* The purifier is supplied configured for operation with one of these voltage ranges. The voltage range must be specified when ordering the purifier.

2.4 Sample Gas

The sample gas must have a minimum purity of 5N (<10 ppm).

Recommended gases to be purified	Ar, He, Ne, Xe, Kr,
Recommended input purity	5N minimum (<10 ppm)
Expected output purity	8N minimum (<10 ppb)

CAUTION

The caps fitted to the gas inlet and outlet must be kept on until just prior to installation. The length of time that the purifier is left open to the air must be kept to a minimum, or the getter material may be prematurely depleted.

2.5 Purge Gas

The purge gas must have a minimum purity of 5N (<10 ppm).

Recommended purge gas	Gas to be purified in process
Recommended input purity	5N minimum (<10 ppm)
Inlet/outlet flow rate	100 ml/min
Maximum inlet pressure	1000 kPa gauge (145 psi gauge)

3 UNPACKING THE PURIFIER

3.1 Handling

The level of performance depends upon the care and attention to the proper handling of the purifier. Exposure to non UHP environments, and physical contact of sealing surfaces will reduce the quality and life of the purifier.

The purifier should be packaged and stored in a clean, dry environment until used. Do not open until the intended time of installation.

WARNING

Argon (Ar) is a simple asphyxiant. Exposure to atmospheres containing less than 19.5% oxygen may cause suffocation. Refer to the chemical supplier's precautions and the material safety data sheet (msds) before using.

WARNING

Strict adherence to uhp component handling procedure is required to maintain the factory specifications.

3.2 Unpacking and Inspection

Each purifier is backfilled with argon and sealed in a polyethylene bag. The ends of the purifier are plugged with caps. Check the label on the outlet connection and verify the application. "R" refers to rare gas applications.

- Remove packaging containers and materials such as boxes, crates, and cushioning outside the clean area.
- Do not tear the polyethylene bag. Use a sharp instrument to cut the seal, taking care not to damage the item inside the bag.

Retain the shipping documentation and packaging for future use (for example, return of the purifier to Servomex for servicing or repair).

CAUTION

Check that the gas type (shown on the rating label) is correct. If not, contact Servomex or the local Servomex agent immediately, as the purifier may be damaged by the exothermic reaction resulting from using the incorrect gas.

4 INSTALLATION AND SETUP

4.1 Mounting

A mounting bracket is supplied to simplify mounting. Any convenient location allowing the purifier to be mounted vertically is sufficient.

Only mount the purifier in a vertical position.

Overall dimensions for mounting of the standard and VCR versions are shown in figures 1 and 2 respectively.

WARNING

The purifier must be installed by a suitably skilled and competent technician or engineer in accordance with this manual.

WARNING

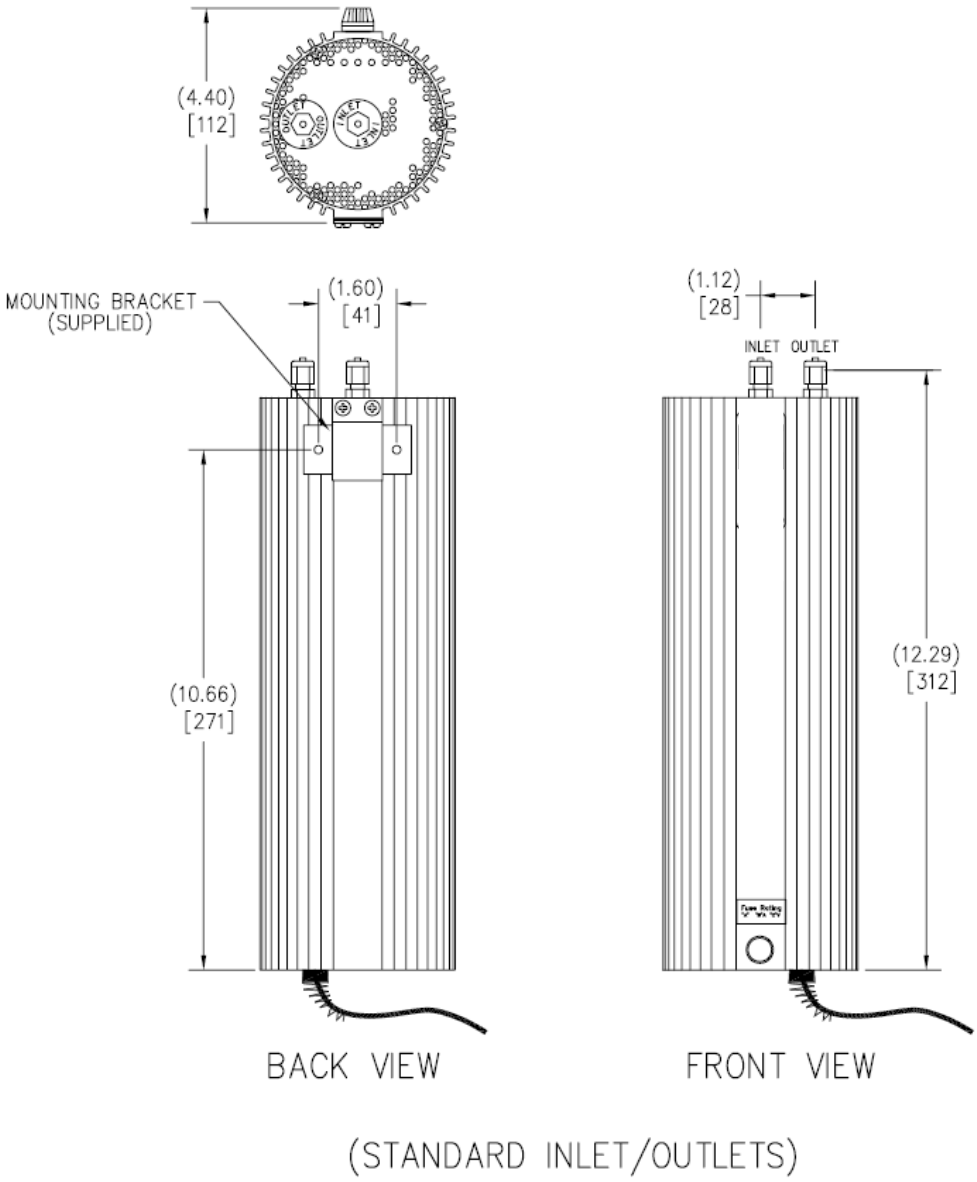
The purifier must be installed and operated in accordance with this and subsequent sections of the manual. Failure to do this may cause damage to the purifier and invalidate the manufacturer's warranty.

WARNING

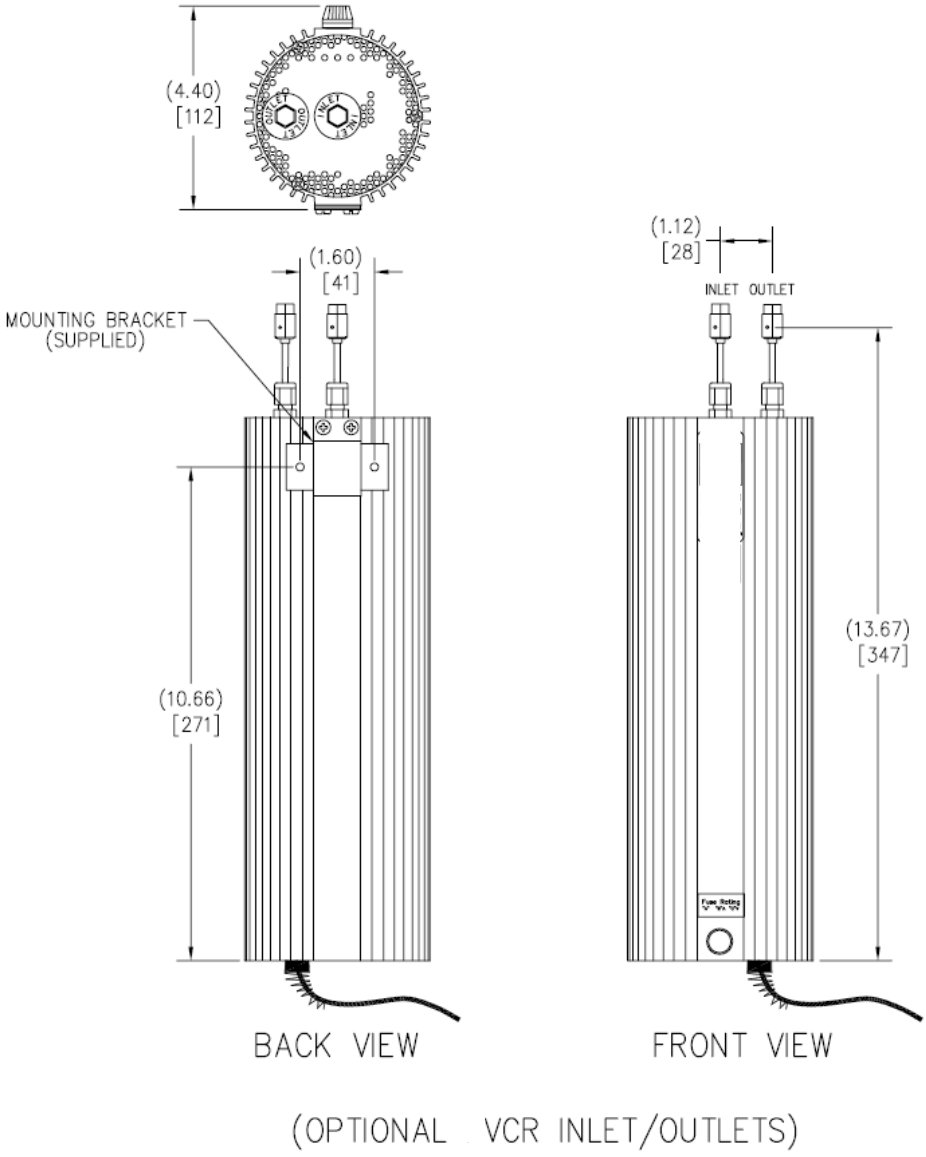
Do not apply electrical power until directed to do so by the start-up procedure. Incorrect application of electrical power may cause electrocution, electrical shock, fire or other damage to the purifier.

WARNING

The purifier is not suitable for installation in hazardous areas.



4.1.1 Figure 1 – Overall and fixing dimensions (Standard)



4.1.2 Figure 2 – Overall and fixing dimensions (VCR))

4.2 Mechanical Installation and purging

WARNING

Do not remove any fittings or open any valves until the inlet and outlet lines are connected and purged.

WARNING

The purging process must be carried out at room temperature. Do not switch the purifier on at this stage.

WARNING

Ensure that the pipes to be connected to the purifier are routed so that they do not present a trip hazard to people.

WARNING

Purge and sample gases are asphyxiant in high concentrations. Ensure that the purge outlet pipe is vented to an area where the gases will not be a suffocation hazard to people.

WARNING

Purge and sample gases are asphyxiant in high concentrations. To prevent the build-up of such gases, ensure that the purifier is used in a sufficiently well-ventilated environment.

WARNING

Strict adherence to UHP components handling procedures is required to maintain the factory specifications. Do not allow the purifier column and the internal piping surface to be exposed to atmosphere. The purifier should be purged with the application gas only.

- The purifier comes sealed in an argon atmosphere and must be purged before purification can begin.
- Purge the lines, with an inert gas, upstream of the purifier thoroughly.
- While under purge, using standard UHP procedures, remove the inlet cap and connect the inlet fitting to the line as quickly as possible, no longer than 30 seconds.
- Remove the outlet fitting cap and, using standard UHP procedures, connect the downstream gas line as quickly as possible, no longer than 30 seconds.
- The purifier should be purged with the application gas for at least ten minutes prior to the start of heating.
- The purifier can now be activated.

Leak testing the purifier is recommended before activating. The purifier has been certified helium leak tight to less than 10^{-9} scc/sec of He (inboard). Once installed, the purifier connections should be tested for leak integrity.

The ventilation slots at the top and bottom of the purifier must not be obstructed.

The wall fixings must be capable of supporting the purifier wall bracket, plus any connected pipes not supported by other means.

5 Operation

5.1 Activating

Activation starts when the heater is plugged in. The purifier should be operated for at least two hours prior to injecting any sample into the purifier.

The effluent carrier gas should be vented and not directed to the process during this period. The use of high purity purge gas through all purging and activation procedures is strongly recommended.

WARNING

Do not allow the getter alloy to be exposed to atmosphere in a heated (greater than 50°C) condition. The purifier should be purged with the application gas until it is down to room temperature.

5.2 Electrical Safety

WARNING

Ensure that the electrical installation of the purifier conforms with all applicable local and national electrical safety requirements.

WARNING

Obey the safety instructions given below when the purifier is installed. If not, the manufacturer's warranty may be invalidated, the purifier may not operate safely, correctly or it may be damaged.

- The purifier does not incorporate an integral on/off switch. A suitable means of externally isolating the electrical supply from the purifier must be provided: a suitable switch or circuit breaker must be located close to the purifier, clearly marked as the disconnecting device for the purifier.
- The electrical supply coupler or plug must be easily accessible for disconnection from the electrical supply.
- The electrical supply circuit must incorporate a suitable fuse or over-current protection device.
- Ensure that the available electrical supply can provide the necessary maximum power consumption: refer to Section 2.1.

6 Disconnecting the Purifier

WARNING

Do not attempt to disconnect any of the components while the purifier is in a heated (greater than 50^{O}C) condition. Exposure of the getter alloy to atmosphere under these circumstances could be hazardous.

If it is necessary to disconnect the purifier to carry out plant/factory maintenance, for example, and the purifier will not be used for several days, the following procedure must be followed:

- Prior to removal, the power must be shut off and the purifier allowed to cool to room temperature (this takes approximately 3 hours).
- While cooling, purge the purifier with inert gas.
- While under purge, quickly disconnect the outlet line and replace the outlet cap. Next, quickly disconnect the inlet line and replace the inlet cap.
- Remove the purifier from the mounting bracket.
- Upon replacement, follow the mounting, purging and activating instructions.

7 Service

The purifier is maintenance free. It is designed to operate continuously without service throughout its rated capacity as long as the gas flowing is the carrier gas.
The only service encountered is at the end of the life, when the purifier has to be replaced.

WARNING

The user must not attempt to open the purifier as there are no serviceable parts inside. Any attempt to open the purifier would invalidate the warranty on the purifier, the purifier may not operate safely or provide reliable data.

7.1 Cleaning the Purifier

When necessary, use a dry brush or cloth to wipe clean the outer surfaces of the purifier, to prevent the entry of dust or other particulates into the interior of the purifier.

WARNING

Liquids must never be applied when cleaning the purifier, due to the risk of electric shock.

WARNING

Liquids must never allowed to enter the inlet/outlet pipework as the purifier may not operate safely or provide reliable data.

8 STORAGE AND DISPOSAL

8.1 Storage

Refit the protective caps securely on the purifier inlet and outlet (see Section 4.2) and place the purifier and any associated equipment in its original packaging before storage. Alternatively, seal it inside a waterproof bag or storage box.

Store the purifier and any associated equipment in a clean, dry area. Do not subject it to excessively hot, cold or humid conditions: see Section 2.2.

8.2 Disposal

Follow proper disposal procedures for the purifier. The disposal of the material, as with any other industrial waste, should be performed in accordance with specific local and national laws and regulations.

The purifier is not suitable for disposal in municipal waste streams (such as landfill sites, domestic recycling centres and so on). Refer to Appendix A2 for disposal requirements in accordance with the WEEE Directive within the EC.

If the purifier is sent to Servomex or the local Servomex agent for disposal, it must be accompanied by a correctly completed contamination certificate.

WARNING

Dispose of the purifier and any associated equipment safely, and in accordance with all local and national safety and environmental requirements.

WARNING

Dispose exhausted purifiers in full compliance with federal, state, provincial, and local regulations.

9 APPENDIX

9.1 Appendix A1 MATERIALS IN CONTACT WITH SAMPLE GAS

The materials of the parts of the purifier in contact with the sample gas are listed below. These materials have a wide range of chemical compatibility and corrosion resistance.

Purifier for Inert Sample Gas
316 stainless steel
316L stainless steel
Zr-V-Fe alloy

9.2 APPENDIX A2 DISPOSAL IN ACCORDANCE WITH THE WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) DIRECTIVE

The logo shown in Figure A1 is displayed on the identification label on the purifier.

Figure A1 – The WEEE logo

This logo identifies that:

- The purifier is considered to be within the scope of the Waste Electrical and Electronic Equipment (WEEE) Directive.
- The purifier is not intended for disposal in a municipal waste stream, but shall be submitted for material recovery and recycling in accordance with the local regulations which implement the WEEE Directive.

For additional information and advice on the disposal of the purifier in accordance with the WEEE Directive, contact Servomex or the local Servomex agent.

If the purifier is sent to Servomex or the local Servomex agent for disposal, it must be accompanied by a correctly completed contamination certificate.

9.3 APPENDIX A3 REACH REGULATION

In pursuance of the requirements included in Article 33 of the European REACH Regulation on the Registration, Evaluation, Authorisation and restriction of CHemicals, information on Substances of Very High Concern (SVHC) contained in Servomex products is provided on www.servomex.com

9.4 APPENDIX A4 COMPLIANCE AND STANDARDS INFORMATION

The ServoPro PureGas purifier is made in the USA for Servomex by SEAS Pure Gas Inc

- The purifier complies with the European Community “Electromagnetic Compatibility Directive”: 2004/108/EC
    - Emissions: Class B – Equipment suitable for use in domestic establishments and in establishments directly connected to a low voltage supply which supplies buildings for domestic purposes.
    - Immunity: “Basic” – Considered appropriate to equipment intended for use in domestic, commercial and light industrial environments.
- The purifier complies with the European Community “Low Voltage Directive”, by the application of EN 61010-1 and rated for Over Voltage Category II, Pollution Degree 2.

9.5 APPENDIX A5 CONTACT INFORMATION

For Global contact details go to our web site www.Servomex.com and click on “contact us”