

GC ZERO AIR GENERATOR USER MANUAL



www.vicidbs.com



Version 1.03.0000



APPLICABLE MODELS

This manual is applicable to the following models:

- GC Plus 1500
- GC Plus 3000
- GC Plus 6000
- GC Plus 15000
- GC Plus 30000

TABLE OF CONTENTS

1. VERSION HISTORY	2
2. INTRODUCTION	3
2.1 Symbol Definitions	3
3. SAFETY	4
3.1 Personal Safety Instructions	4
3.2 Instrument Safety Instructions	4
4. SPECIFICATIONS	5
5. ENGINEERING DESIGN OVERVIEW	6
5.1 Functionality	6
6. INSTALLATION	7
6.1 Packing List	7
6.1.1 Items Not Included In Standard Shipping	8
6.2 Unpack Unit and Open Cover	8
6.3 Install 1/4" External Inlet Filter	8
6.4 Check Voltage Setting	8
6.5 Unit Installation	9
6.6 Connect Air Supply	10
6.7 Connect Output	10
6.8 Leak Check	11
7. OPERATION	11
7.1 Connect Power and Start Unit	11
7.2 Warming Up	11
7.3 Shutdown Procedure	11
8. MAINTENANCE	12
8.1 Maintenance Kits	12
8.1.1 Annual Maintenance Kit	12
8.1.2 Three Year Catalyst Replacement Kit	123
8.2 Filter Replacement	13
8.2.1 Annual Pre-Filter Element Replacement	13
8.2.2 Annual High Grade In-Line Particulate Filter Replacement	14
8.2.3 Annual Catalyst Chamber Filter Replacement	15-16
9. TROUBLESHOOTING	17
9.1 Error Codes on Mainboard	18
10. FLUIDIC SCHEMATIC AND PARTS LISTS	19
10.1 Fluidic Schematic Diagram and Related Parts List	19
10.2 Spare Parts List	20

GC ZERO AIR GENERATOR USER MANUAL

1. VERSION HISTORY

VERSION	DATE	COMMENT/CHANGE
1.00.0100	01/10/2017	Layout and initial release, VICI DBS
1.01.0000	12/20/2018	Update
1.02.0000	03/14/2019	New layout, images and graphics, VICI Gig Harbor Group
1.03.0000	4/22/2020	New layout, images and graphics, VICI Gig Harbor Group

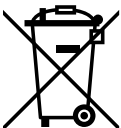
2. INTRODUCTION

The GC Zero Air generator produces laboratory grade purified Air for various GC-detection systems (e.g. FID, NPD, FPD) and dedicated analyzers. Designed with safety and convenience in mind, this system will generate purified air from an existing in-house oil-free compressed air supply, eliminating the need for inconvenient high-pressure gas cylinders. Eliminating gas cylinders reduces operating costs associated with materials, labor and down-time.

The GC Zero Air generator will remove HC pollutants to <0.1 ppm. Operation of the generator is very economical since it consumes reasonable quantities of compressed, oil-free air and electricity. This complete turnkey system is engineered with the highest quality components, is easy to install and requires only minimal annual maintenance.

NOTICE: This manual is intended to provide technical guidance on the installation, operation and maintenance of the GC Zero Air generator. Do not attempt to install or operate this product without having fully read and understood the information presented. If you have any questions, please contact your dealer.

2.1 Symbol Definitions

SYMBOL	DESCRIPTION
 OR 	General warning. Caution is necessary when operating the device or control close to where the symbol is placed, or to indicate that the current situation needs operator awareness or operator action in order to avoid undesirable consequences. <i>The manual must be consulted in all cases where this symbol is marked on the device.</i>
 OR 	Risk of asphyxia. Caution is necessary when operating the device in a not sufficiently ventilated area.
 OR 	Oxidant material. Caution is necessary due to the presence of oxidant material.
	WEEE symbol. When discard this product, it must be sent to separate collection facilities for recovery and recycling.
	Fuse. Notify replaceable fuse place.

3. SAFETY

3.1 Personal Safety Instructions

When using your GC Zero Air generator, basic safety precautions should always be followed, including the following:



- Read all instructions.
- **ALWAYS WEAR SAFETY GLASSES** when working with this equipment. Everyday eye glasses have only impact resistant lenses. They are **NOT** safety glasses.
- Avoid touching hot parts to avoid burns.
- Do not operate equipment with a damaged cable or if the equipment has been dropped or damaged – until it has been examined by a qualified serviceman.
- Never use the cable to pull the plug from the wall socket. Grasp the plug and pull to disconnect.
- If an extension cable is necessary, a cable with a current rating equal to or higher than that of the equipment should be used. Care should be taken to arrange the cable so that it will not be tripped over or pulled.
- Let the equipment cool completely before putting away. Loop the cord loosely around equipment during storage.
- To reduce the risk of fire, do not operate equipment in the vicinity of open containers with flammable liquids.
- To reduce the risk of electric shock, do not use on wet surfaces or near water.
- Use the GC Zero Air Generator only as described in this manual and as recommended by the manufacturer. Use only manufacturer's recommended attachments.

3.2 Instrument Safety Instructions



- For indoor use only.
- Use only as described in this manual. Use only manufacturer's recommended attachments.
- Do not let the cable hang over the edge of a table, bench or counter or come in contact with hot manifolds or moving fan blades.
- The quantity of dust in the ambient Air can be very different from one place to another. We recommend to replace the dust filters every 4000 hours. In some dusty areas, this maintenance needs to be performed more frequently.
- Clogged dust filters may damage the generator or give a bad Air quality.
- The plug of the power cable must be disconnected in case of an emergency, it must be easily accessible at all times.
- If the GC Zero Air is not used strictly as specified by VICI DBS, the protection plan may become compromised or void.

GC ZERO AIR GENERATOR USER MANUAL



www.vicidsbs.com

4. SPECIFICATIONS

MODELS & SPECS	GC PLUS 1500	GC PLUS 3000	GC PLUS 6000	GC PLUS 15000	GC PLUS 30000
Flow mL/min	1500	3000	6000	15000	30000
Purity - hydrocarbons	<0.1 ppm				
Purity - CO	<0.1 ppm				
Inlet pressure barg (psig)	4.5 to 10 (65 to 145)				
Inlet air quality	Clean dry compressed air ISO8573-1:2010 Class 1.2.1				
Max outlet pressure barg (psig)	1 (15) drop from inlet				
Max HC in	100 ppm				
Max CO in	50 ppm				
Technology	Platinum catalyst				
LED indicators	Power on/off, system ready, errors				
Warm up time (minutes)	45				
Electrical supply	110-120V 60Hz / 220-240V 50Hz				
Power consumption (watts)	200	550	550	550	550
Dimensions mm (inches)	550W x 410H x 230D (21.6W x 16H x 9D)				
Weight kg (lbs)	9.5 (21)	11 (24)	11 (24)	12 (26.5)	13 (28.5)
Shipping dimensions mm (in)	650W x 390H x 560D (25.6W x 15.3H x 22D)				
Shipping weight kg (lbs)	14 (31)	15 (33)	15 (33)	16 (35)	17 (37.5)
Operating temp °C (°F)	15 to 35 (59 to 95)				
Inlet connection	1/4" Compression				
Outlet connection	1/8" Compression				
Certification	CE, FCC, MET (UL and CSA compliant)				

5. ENGINEERING DESIGN OVERVIEW

The GC Zero Air generator utilizes a 3-stage process to purify ambient air into zero grade air. All main components are manufactured with high grade stainless steel, assembled neatly in the cabinet for easy access and service.

Stage 1: Prefiltration and Pressure Regulation

Air is initially passed through a highly efficient combination coalescing/particulate pre-filter to ensure that only quality air enters the system. The pre-filter removes bulk moisture and larger particulates greater than 5 microns in size. The filter is supplied with an automatic float drain to remove periodic moisture build up.

The air pressure is then regulated with an adjustable forward pressure regulator, pre-set to 7 bar. The minimum allowable pressure is about 3 bar; the maximum 7.5 bar.

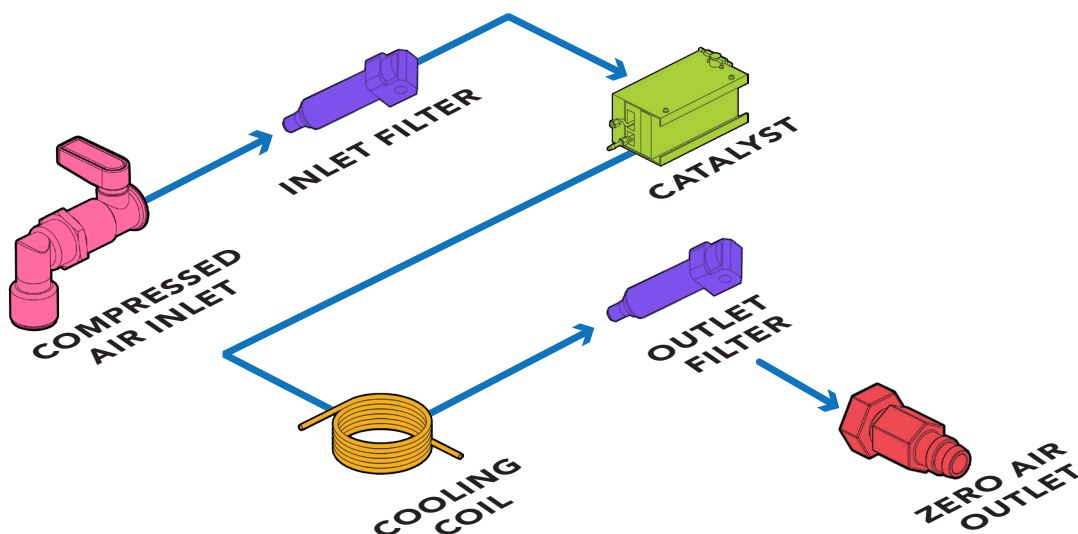
Stage 2: Hydrocarbon and CO Removal

Air is next channeled into a stainless steel catalyst chamber where background hydrocarbons and carbon monoxide are oxidized. This chamber is filled with a highly efficient platinum catalyst, heated to very high temperatures to ensure hydrocarbon removal to less than 0.1 ppm.

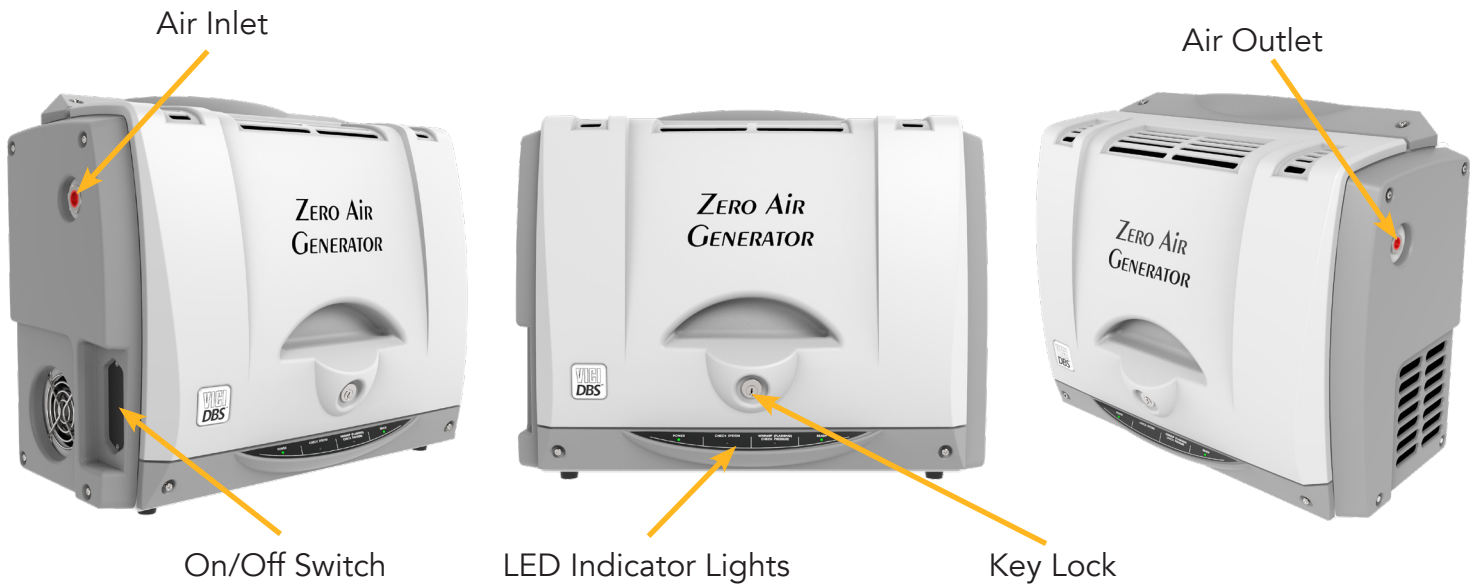
Stage 3: Final Filtration

A final high-grade filter is used to remove 99.99% of particulates greater than 0.5 microns in size. This will guarantee that no harmful particles will enter your GC-detection systems or analyzers.

5.1 Functionality



6. INSTALLATION



6.1 Packing List

- GC Zero Air generator, completely assembled and fully burned in, ready for installation
- High quality inlet air filter to remove particles and bulk moisture from air before entering the generator
- 1 Power cable
- 2 Fuses 220 VAC or 120 VAC
- 1 Installation kit consisting of:
 - 1 male to male adapter to attach your inlet filter to the generator
 - 2 machine screws with matching nuts and split lock washers to mount the generator
 - 2 door keys to lock the generator
 - USB stick with user manual

6.1.1 Items Not Included In Standard Shipping

- **Air Supply Shut-off Valve** (optional) placed downstream of the unit. This is required for safe and convenient installation and annual maintenance. A field upgrade is not possible.
NOTE: The inlet air filter assembly supplied with the unit can also be used to de-pressurize the system by pressing the pin-valve in the base of the filter housing.
- **Additional Filtration** may be required depending on the quality of the air supply. The pre-filter of the generator will remove nominal amounts of moisture and particulates. If the Air supply has excessive moisture, oil or particulates, then additional filters should be installed.
- **1/4" Fitting** to install into the supplied pre-filter. The exact type will depend on the supply tubing or hose from the air source. A hose clamp is recommended if flexible tubing is used.
- **1/8" Fitting** to install into the bulkhead fitting at the output of the unit. The exact type will depend on the transport tubing or hose of the GC-detection system or analyzer. A hose clamp is recommended if flexible tubing is used.

6.2 Unpack Unit and Open Cover



CAUTION: Remove plastic protective cover from outside AND inside unit before plugging in and powering up the unit.

- Remove plastic from 1/4" inlet & 1/8" outlet port plugs.

6.3 Install 1/4" External Inlet Filter

- Apply Teflon pipe sealant tape to both sides of the supplied 1/4" male to male adapter.
- Thread adapter to output side of the Air filter assembly. Do not over tighten.
- Attach Air filter assembly to input side (left side) of the generator, and secure.

6.4 Check Voltage Setting

Check the setting of the voltage selector on the side of the unit. The set voltage is indicated in the little window on the inlet power filter.

To change the voltage setting, proceed as follows:

- Using a small screwdriver, remove the voltage selector insert.
- Replace fuses:

VOLTAGE SETTING	FUSE
240 VAC	4 AT
120 VAC	6 AT

- Replace the voltage selector insert so that the white arrow points to the correct voltage.

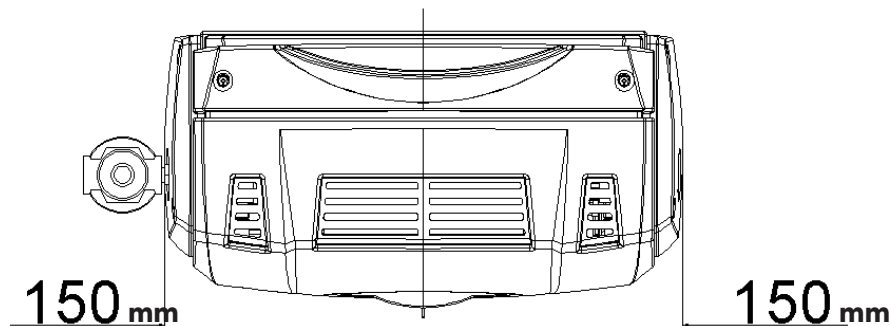
GC ZERO AIR GENERATOR USER MANUAL

6.5 Unit Installation

The GC Zero Air Generator can be installed two different ways. Either placed on a surface, like a table or lab bench, or mounted to a wall.

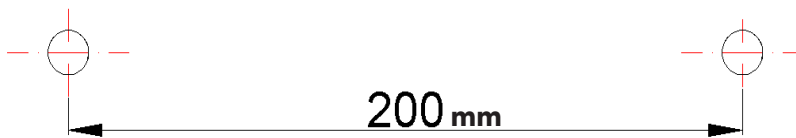
A. On a table/lab bench:

For optimum ventilation allow at least 150 mm (6 inches) clearance on either side of the unit.

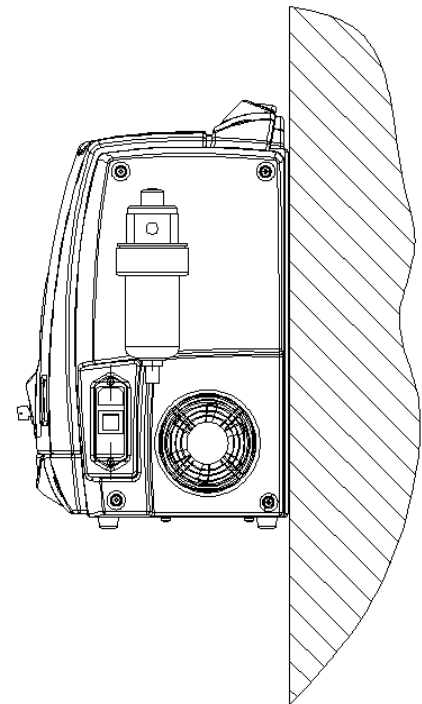


B) Mounted to a wall:

- Drill holes 200 mm (7.87 inches) apart into the wall and insert the supplied mounting screws. Tighten only enough so there is approximately 1/4" extruding from the surface.



- Hold the generator up to the extruding screws and insert the unit over the screws through the keyholes. Let the unit slide downwards as the screws slide up into the keyhole slots.



WARNING: Do not tighten screws fully. It must be possible to remove the generator from a permanent structure without the use of tools.

6.6 Connect Air Supply

The GC Zero Air generator requires a continuous supply of dry, oil-free compressed Air with a pressure between 4.5 (65.3 psig) and 10 barg (101.5 psig) for proper operation.



WARNING: Maximum inlet pressure 10 barg (145 psig). Do not adjust the outlet regulator on the unit without using an accurate pressure gauge (3-7 barg)

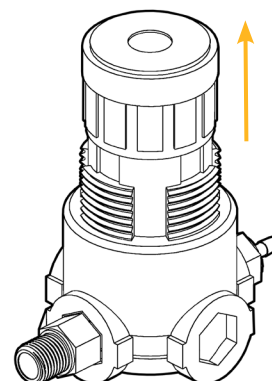
The air supply inlet pressure can be regulated with an adjustable forward pressure regulator, pre-set to 7 barg (101.5 psig). The minimum allowable pressure is about 3 barg (43.5 psig); the maximum 10 barg (145 psig).

It is important that the air supply be maintained at room temperature and dew point, and free of oils, hydrocarbons and particulates. If the compressed Air supply for the generator has excess moisture, oil or particulates, the inlet filter may need premature replacement and the unit may be damaged. Install extra coalescing and particulate filtration upstream from the unit if necessary.



WARNING: The catalyst chamber can be contaminated by high concentrations of lead, sulfur, phosphorous compounds, heavy metals, chlorinated solvents and chlorinated hydrocarbons. Extra care should be taken to avoid introducing such compounds to the system. Any contamination from oil, water or any of the substances mentioned above will void the warranty.

Lift and turn to
adjust pressure



6.7 Connect Output

- The output bulkhead of the GC Zero Air generator is located on the right side of the unit. It requires a 1/8" diameter fitting to attach the tubing or hose to the GC-detection system or analyzer air inlet port.
- In order to maintain the purity of the air from your GC Zero Air generator, stainless steel tubing or instrument grade Teflon tubing should be used to connect the generator to the GC-detection system or analyzer air inlet port. Copper tubing can also be used, but should be pre-cleaned or heated with a propane torch while blowing nitrogen through it. All plastic hose should be instrument grade and free of contaminants to avoid outgassing hydrocarbons or other pollutants over time.
- Maximum outlet flow rate is 1.5 L/min with 7.5 barg (101.8 psig) inlet pressure and no external restrictions. Actual outlet flow rate will depend on additional system pressure losses, if any.



WARNING: Do not use PVC or any other non-instrument grade plastic tubing anywhere in your system. Many plastics will out-gas hydrocarbons and will contaminate your purified Air.

6.8 Leak Check

Before powering the generator, perform a leak check on the external plumbing.

- Open supply air valve to pressurize the system.
- Apply certified liquid leak detectors to all external fittings and check for air bubbles.
- Tighten any leaky connections. Additional Teflon tape may be required in some cases.

7. OPERATION

7.1 Connect Power and Start Unit

For power supply voltage settings follow customer specification. To start the unit:

- Insert the female end of the supplied power cord to the power supply connection on the left side of the GC Zero Air generator and plug the male end into a properly grounded socket.
- Power up the unit using the power switch of the unit.
- Verify that the unit is powered by checking the green LED "POWER" light.

7.2 Warming Up

After powering the generator, please wait 45 minutes before providing compressed air to it.

The GC Zero Air generator is designed to run continuously. Continuous operation preserves the performance of the catalyst. Shutdown should only be performed for maintenance.

After the warm up cycle is completed, verify that:

- Green LED "POWER" light is on
- "READY" LED is on

7.3 Shutdown Procedure

Before performing any service or maintenance to the GC-1500 Zero Air generator, be sure to complete the following steps:

- Turn off power using the switch of the unit.
- Disconnect the outlet tubing, and freely run air through the unit for several minutes to cool the catalyst. Allow a minimum of 2 hours to cool the catalyst before replacing it.
- Shut off the air supply.
- De-pressurize the unit and disconnect the power source before servicing.

8. MAINTENANCE



WARNING: Before service is performed, make sure that the system shut down has been performed according to instructions above.

1. Supply air pressure has been shut off with an in-line valve.
2. Line pressure has been released with an in-line relief valve.
3. Unit has been shut-off and isolated from electrical power.

8.1 Maintenance Kits

TYPE	DESCRIPTION	FREQUENCY	PART NUMBER
CONSUMABLES	Annual maintenance kit for all GC models	Every 12 months	DB-10375
SERVICE KITS	3-year catalyst replacement kit for GC-1500	Every 3 years	DB-10379
	3-year catalyst replacement kit for GC-3000	Every 3 years	DB-10381
	3-year catalyst replacement kit for GC-6000	Every 3 years	DB-10383
	3-year catalyst replacement kit for GC-15000	Every 3 years	DB-10385
	3-year catalyst replacement kit for GC-30000	Every 3 years	DB-10387

8.1.1 Annual Maintenance Kit

The GC Zero Air generator is designed to operate continuously for an entire year before service is required. An annual maintenance kit is available as a spare part. This kit includes the following parts:

- 1 Inlet filter replacement cartridge
- 1 Internal filter

8.1.2 Three Year Catalyst Replacement Kit

A 3-year catalyst replacement kit is available as a spare part. The catalyst must be replaced every 3 years to ensure the removal of CO and HC to the 0.1 ppm level. This kit includes the following parts:

- 1 Oven/Catalyst
- 1 Cooling coil

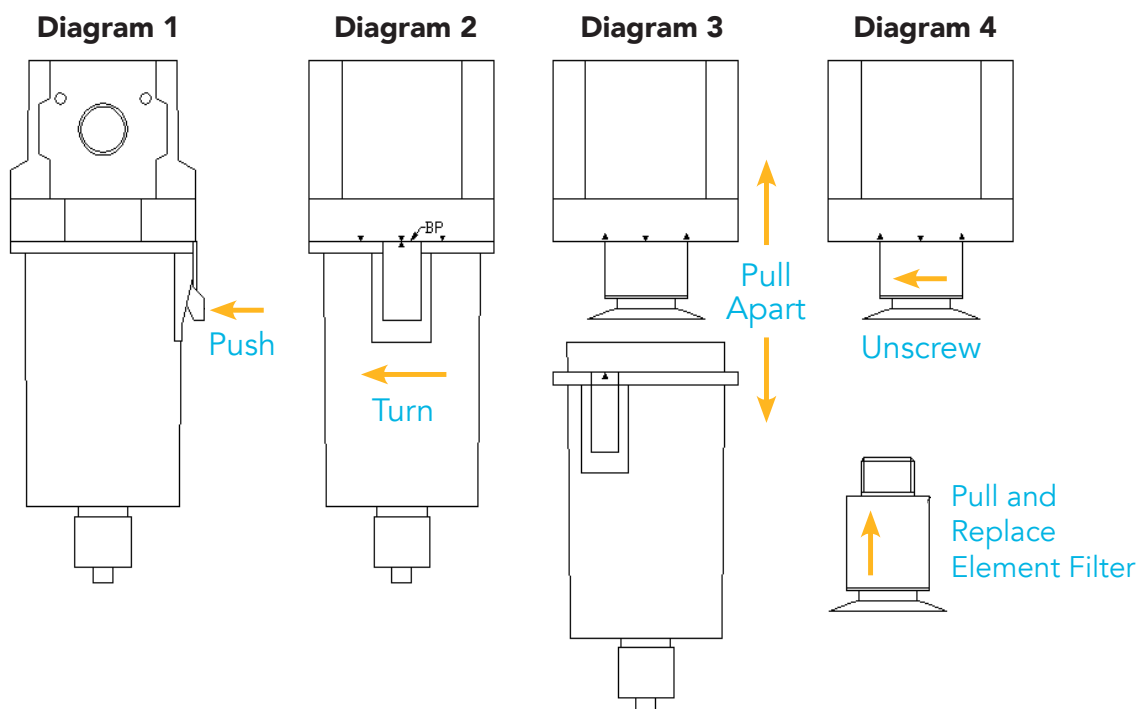


WARNING: Only qualified staff should perform service on this generator. Any damage done to this product as a result of improper maintenance procedures will void the warranty.

8.2 Filter Replacement

8.2.1 Annual Pre-Filter Element Replacement

- Remove the filter bowl by pressing on the lever and turning the bowl counter-clockwise until the arrows are aligned (Diagram 1 and 2).
- Unscrew the filter element base and remove element (Diagram 3).
- Insert the new element from your annual maintenance kit and reassemble the filter in reverse order (Diagram 4).

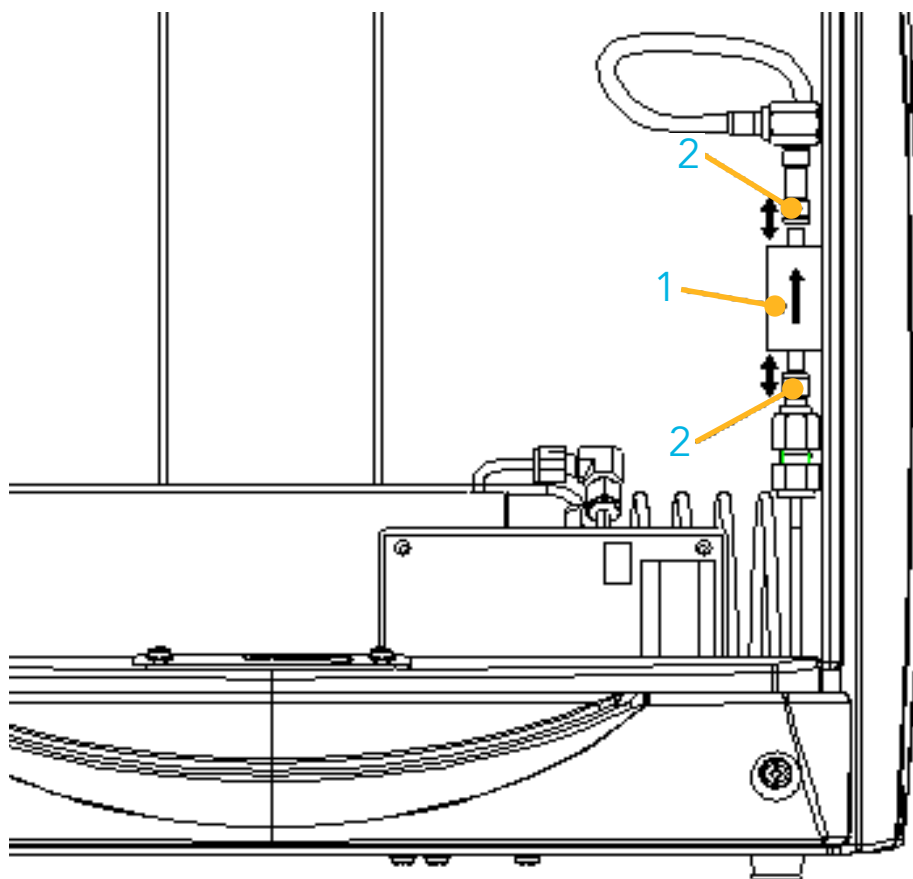


NOTE: More frequent replacement of the inlet filter may be required depending on the quality of the air supply. Alternately, more filtration can be applied upstream of the GC Zero Air generator.

8.2.2 Annual High Grade In-Line Particulate Filter Replacement

The high grade in-line particulate filter is the final component before the outlet. The filter body is clear plastic and is held by inlet and outlet plastic air lines.

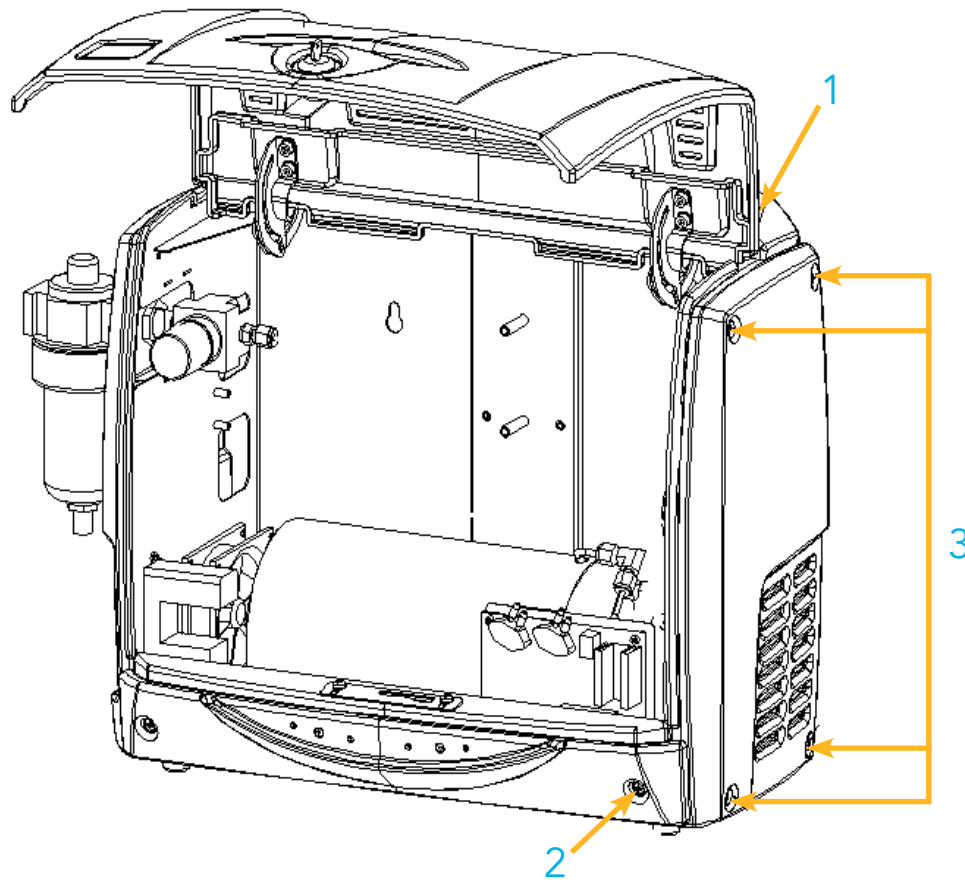
- Disconnect the filter (1) from the push-in connectors (2) of the air line.
- Replace the used filter with the new one. Make sure that the flow direction indicated on the filter housing points in the "downward" direction, toward the outlet pressure regulator on the unit.



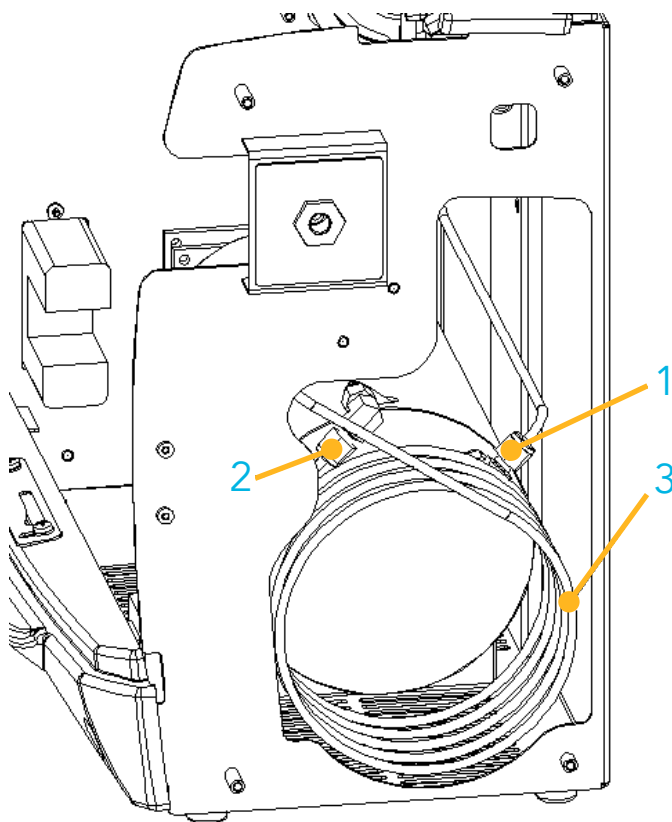
8.2.3 Three Year Catalyst Chamber Replacement

The catalyst chamber used in the GC Zero Air generator should be replaced every three years to maintain carbon monoxide and hydrocarbon specifications. The system should be shut down as described above prior to replacement. Allow the unit to cool down for a minimum of two hours before replacement.

- If unit has been powered recently and catalyst is hot, turn off the power. **DO NOT turn off the air at this time.**
- Remove the outlet connection and allow the outlet air to flow freely for two hours to cool the catalyst. After two hours of cool-down, disconnect the air supply. Depressurize the system by depressing the pin at the bottom of the inlet filter housing.
- Open front panel with door key.
- Unscrew screws (1) and (2) and remove the right side plastic cover by removing screws (3).



- Carefully disconnect the two compression air fittings (1 and 2) to remove the cooling spiral (3).
- Remove heater connections from the control board.
- Unscrew the two screws to remove the aluminum plate from the metal heat shield covering the catalyst.
- When the catalyst chamber is cool enough to touch, extract the catalyst chamber from the side.
- Install the new catalyst chamber assembly using the reverse process.
- Connect heater connections to control board.
- Pressurize the system and check thoroughly for leaks.



9. TROUBLESHOOTING

1. Green LED "Power" Off

- Verify power cable connection.
- Verify that you are using the proper fuses and power supply voltage settings.

2. Red LED "Check System" On

Red LED is on if the internal heater has failed and the thermocouple reads a value higher than the allowed maximum of 704°C (1300 °F). In this case, the power supply to the heater is stopped.

- Turn the unit off and on again to reset to initial status.

If the problem cannot be solved with these steps, contact your local distributor.

3. Leaks

- Apply approved liquid leak detector to all external fittings and check for Air bubbles.
- Tighten any leaky connections. Additional Teflon tape may be required in some cases.

Condition	Warm-up / Check Pressure	Ready	Check System	Number on the Board
	YELLOW	GREEN	RED	
System General:				
Power Fault:	OFF	OFF	OFF	
Fault: Catalyst replacement				
After 3 years			(1) Blink 1 Hz	4
After 3 years plus 60 days		OFF	ON	4
Startup:				
Quickstart Mode (0 to 3 minutes max.)				
System Fault: Catalyst temperature is low at the 40 min checkpoint				5
Warm-up Mode (3 to 40 minutes max.)				
System Fault: System is not warming up	OFF	OFF	ON	5
System Fault: Catalyst temperature is low at the 40 min. checkpoint	OFF	OFF	ON	5
Operation:				
System Fault: Catalyst temperature exceeds limit of 650°C	OFF	OFF	ON	6

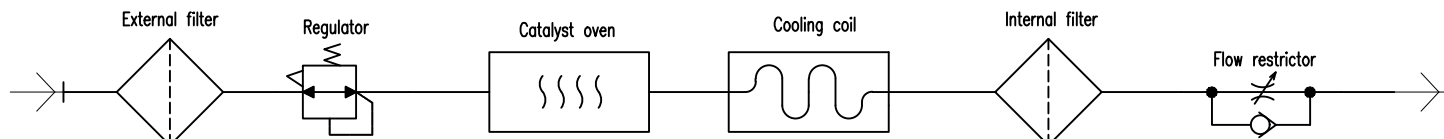
9.1 Error Codes on Mainboard

DISPLAY NUMBER	CHECK SYSTEM RED LED STATUS LIGHT	DESCRIPTION
Blinking 4	BLINKING	Catalyst replacement pre-alarm
4	ON	Catalyst replacement alarm
5	ON	Minimum temperature alarm pre-heating timeout
6	ON	Maximum temperature alarm
7	ON	EEprom alarm
8	N/A	During start-up the code 8 is shown if the bridge JP2 is short to reset the timer for catalyst/oven. Remove JP2 and restart again.

GC ZERO AIR GENERATOR USER MANUAL

10. SPARE PARTS LIST

10.1 Fluidic Schematic Diagram and Related Parts List



	EXTERNAL FILTER	REGULATOR	CATALYST OVEN	COOLING COIL	INTERNAL FILTER	FLOW RESTRICTOR
GC1500	DB-N-FIL001	DB-NGT000-001	DB-NGT001-010	DB-NGT000-025	DB-N-FIL002	DB-NGT001-016
GC3000	DB-N-FIL001	DB-NGT000-001	DB-NGT002-010	DB-NGT000-028	DB-N-FIL002	DB-NGT002-016
GC6000	DB-N-FIL001	DB-NGT000-001	DB-NGT003-010	DB-NGT000-028	DB-N-FIL002	DB-NGT003-016
GC15000	DB-N-FIL001	DB-NGT000-001	DB-NGT004-010	DB-NGT000-026	DB-N-FIL002	DB-NGT004-016
GC30000	DB-N-FIL001	DB-NGT000-001	DB-NGT005-010	DB-NGT000-026	DB-N-FIL002	DB-NGT005-016

GC ZERO AIR GENERATOR USER MANUAL

10.2 Spare Parts List

SPARE PARTS FOR GC AND GT MODELS	PART NUMBER
GC Models are Zero Air generators; GT Models are Ultra Zero Air generators * Included in annual maintenance kit for GC ** Included in 3-year maintenance kit *** Included in annual maintenance kit for GT	
Inlet filter housing complete with filter cartridge	DB-N-FIL001
Inlet filter replacement cartridge*	DB-N-CART001
Filter for all models (internal)*	DB-N-FIL002
Oven/Catalyst for GC-1500 v2**	DB-NGT001-010
Oven/Catalyst for GC-3000 v2**	DB-NGT002-010
Oven/Catalyst for GC-6000 v2**	DB-NGT003-010
Oven/Catalyst for GC-15000 v2**	DB-NGT004-010
Oven/Catalyst for GC-30000 v2**	DB-NGT005-010
Air supply shut-off valve for model GC only (no field up-grade)	DB-NGT000-012
Cooling coil for GC-1500 and GT-1500 (stainless steel)**	DB-NGT000-025
Cooling coil for GC-15000 and GC-30000 (copper 6mm)**	DB-NGT000-026
Cooling coil for GT-15000 and GT-30000 (copper 6mm)**	DB-NGT000-027
Cooling coil for GC/GT-3000 and GC/GT-6000 (stainless steel)**	DB-NGT000-028
Push-in connector for 4mm cooling coil for GC/GT-1500**	DB-NGT000-023
Annual maintenance kit for all GC models	DB-10375
3-Year catalyst replacement kit for GC-1500	DB-10379
3-Year catalyst replacement kit for GC-3000	DB-10381
3-Year catalyst replacement kit for GC-6000	DB-10383
3-Year catalyst replacement kit for GC-15000	DB-10385
3-Year catalyst replacement kit for GC-30000	DB-10387