

GT ULTRA ZERO AIR GENERATOR USER MANUAL



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	4
2. INTRODUCTION	4
2.1. SYMBOLS DEFINITION	5
3. SAFETY	6
3.1. PERSONAL SAFETY INSTRUCTIONS	6
3.2. INSTRUMENT SAFETY INSTRUCTIONS	6
4. SPECIFICATIONS	7
5. ENGINEERING DESIGN OVERVIEW	8-9
5.1. FUNCTIONALITY	10
5.2. CONTROL BOARD	11
6. INSTALLATION	12
6.1. PACKING LIST	12
6.1.1. Items Not Included in Standard Shipping	13
6.2. UNPACK UNIT AND OPEN COVER	13
6.3. INSTALL 1/4" EXTERNAL INLET FILTER	13
6.4. CHECK VOLTAGE SETTING	13
6.5. UNIT POSITIONING	14
6.6. CONNECT AIR SUPPLY	15
6.7. CONNECT OUTPUT	15
6.8. LEAK CHECK	16
7. OPERATION	16
7.1. CONNECT POWER AND START UNIT	16
7.2. WARMING UP	16
7.3. NORMAL OPERATION	17
7.4. STARTUP TROUBLESHOOTING AND SYSTEM FAULTS	17
7.4.1. Inlet Pressure Low	17
7.4.2. Inlet Pressure High	18
7.4.3. Catalyst Temperature Low	18
7.4.4. Catalyst Temperature High	18
7.4.5. Catalyst Life Cycle Expired	18
7.4.6. Dryer Switch Valve Failure	18
7.4.7. Menu Options	19
7.5. SHUTDOWN PROCEDURE	20

8. MAINTENANCE.....	20
8.1. MAINTENANCE KITS	20
8.1.1. Annual Maintenance Kit	21
8.1.2. Three Year Catalyst Replacement Kit	21
8.2. FILTER REPLACEMENT	22
8.2.1. Annual Pre-filter Element Replacement	22
8.2.2. Annual High Grade In-Line Particulate Filter Replacement.....	23
8.2.3. Three Year Catalyst Chamber Replacement.....	24-25
8.2.4. NO _x Replacement	26
9. TROUBLESHOOTING.....	27
9.1. ERROR CODES ON MAIN BOARD.....	28
9.2. LEAKS.....	28
10. FLUIDICS DIAGRAM.....	29
11. SPARE PARTS LIST.....	30

1. VERSION HISTORY

VERSION	DATE	COMMENT/CHANGE
1.00.0100	January 10, 2017	VICI DBS layout, initial release
1.00.0200	January 17, 2017	Drawing changed from functional principle
1.01.0000	December 21, 2018	Update
1.02.0000	March 19, 2019	Layout and photo updates
1.03.0000	June 3, 2020	New layout, images and graphics, VICI Gig Harbor Group

2. INTRODUCTION

The GT Ultra Zero Air generator produces laboratory grade purified air for various GT-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 GT Ultra Zero Air generator will remove HC pollutants to less than 0.1 ppm. Operation of the generator is very economical since it is consuming 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 GT Ultra 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.



WARNING: Any misuse of this product will void the manufacturer's warranty.

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 GT Ultra 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 GT Ultra 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 GT Ultra Zero Air is not used strictly as specified by VICI DBS, the protection plan may become compromised or void.

GT ULTRA ZERO AIR GENERATOR USER MANUAL

4. SPECIFICATIONS

MODELS & SPECS

	GT PLUS 1500	GT PLUS 3000	GT PLUS 6000	GT PLUS 15000	GT PLUS 30000
Flow mL/min	1500	3000	6000	15000	30000
Purity - hydrocarbons	<0.1 ppm				
Purity - CO	<0.1 ppm				
Purity - CO ₂	<5 ppm				
Purity - NO _x	<0.1 ppm				
Purity - SO _x	<0.1 ppm				
Purity - O ₃	<0.1 ppm				
Dewpoint °C (°F)	-50 (-58)				
Inlet pressure barg (psig)	4.5 to 10 (65 to 145)				
Outlet pressure barg (psig)	1 (15) drop from inlet				
Inlet air quality	Clean dry compressed air ISO8573-1:2010 Class 1.2.1				
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)	220	565	565	565	565
Dimensions mm (in)	550W x 410H x 230D (21.6W x 16H x 9D)			630W x 470H x 310D (24.8W x 18.5H x 12.2D)	
Weight kg (lbs)	10 (22)	15 (33)	15 (33)	25.5 (56)	25.5 (56)
Shipping dimensions mm (in)	650W x 390H x 560D (25.6W x 15.3H x 22D)				
Shipping weight kg (lbs)	14 (31)	19 (42)	19 (42)	30 (66)	30 (66)
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 GT Ultra Zero Air generator utilizes a 5-stage process to purify ambient air into ultra zero grade air. All main components are manufactured with high grade stainless steel, oriented 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 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. This pressure is monitored by the control board with an electronic pressure sensor. The minimum allowable pressure is 4.5 bar; the maximum 8 bar. If the air supply is interrupted or if the regulator fails or is tampered, the control board will illuminate the yellow external LED and close the outlet valve, disabling the system.

Stage 2: Air Dryer

Air is next passed into a dual column pressure swing adsorption air dryer to remove water vapor and carbon dioxide. While one of the dryer columns is active, the other is regenerating by back-purging with excess air. The adsorbed water and carbon dioxide are vented to the atmosphere in this process. A solenoid valve, driven by the control board, automatically switches the air supply to the newly regenerated column when this process is completed.

Air pressure to dryer "B" is monitored by a dedicated pressure transducer on the control board to ensure proper switching is taking place. When dryer "B" is in the purge cycle, the pressure should be atmospheric. When it is in the generative cycle, the pressure should match the inlet. The control board will disable the system if proper dryer switching is not taking place, and will disable the system if a problem is detected.

Stage 3: NO_x Scrubber

From the dryer, air is channeled into a scrubber to reduce NO_x levels to less than 0.1 ppm through an adsorption process. The NO_x scrubber media, contained in a cylinder, becomes saturated after one year of service and must be replaced.

Stage 4: 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.

Catalyst temperature is a critical factor in the purification process. The temperature is monitored and controlled with a digital thermostat on the control board. A type "K" thermocouple is embedded in the catalyst chamber to provide the temperature measurement. Any time the catalyst temperature is outside of the specified limits, appropriate LEDs are illuminated.

Stage 5: Final Filtration

A final high-grade filter is used to remove 99.99% of particulates greater than 0.5 microns in size. This will ensure that no harmful particles will be able to enter your analyzer.

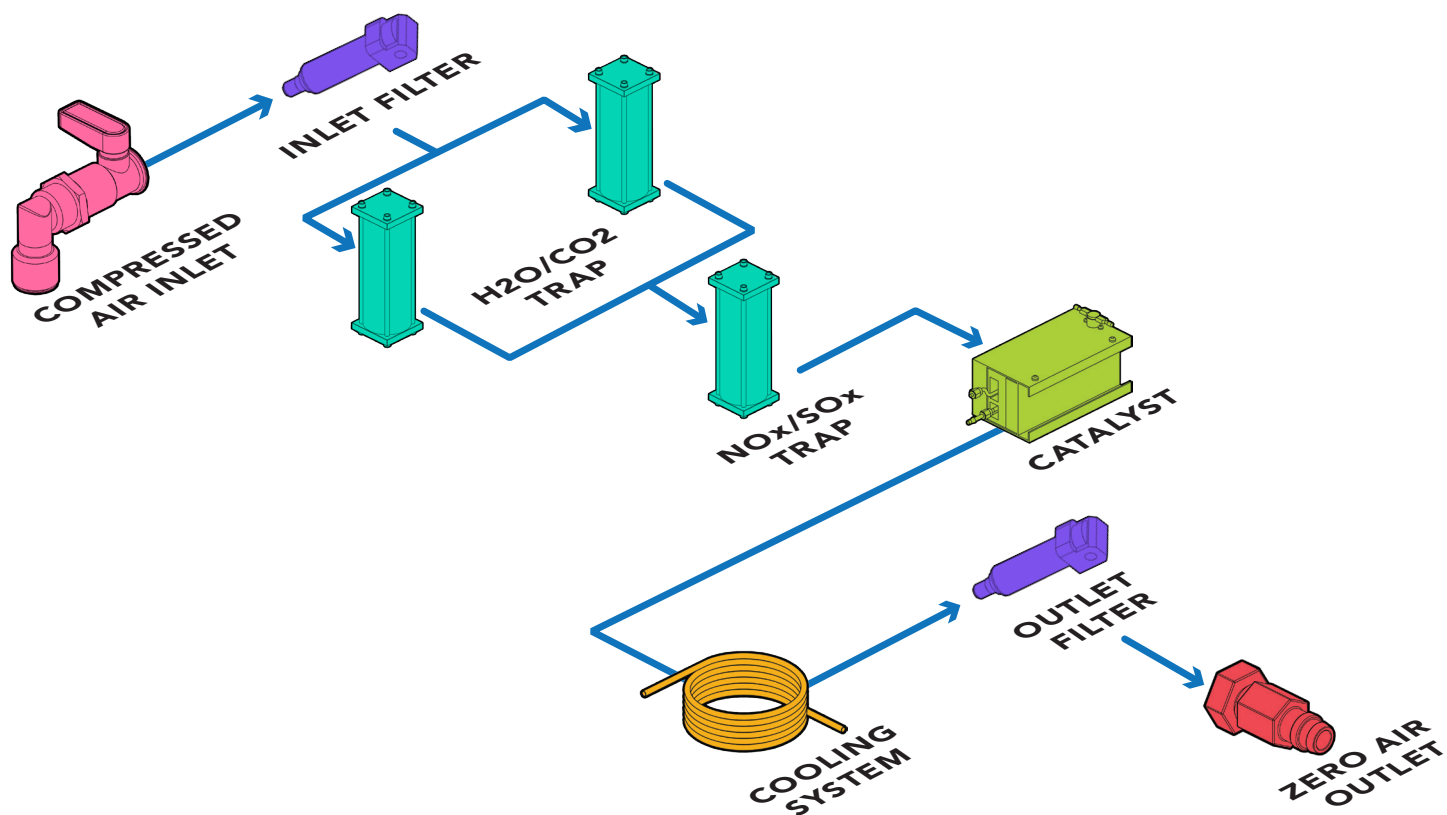
Outlet Solenoid valve

A solenoid valve, driven by the control board, enables or disables output flow of the system. The valve is always closed when power is off during warm up of the unit, or when the control board detects a system fault. Faults include low or high inlet pressure, low or high catalyst temperature, expired catalyst time and dryer valve switching failure.

Pressure Controls

Both inlet and outlet pressure regulators supplied with the unit are pre-set at the factory for your convenience. With a source pressure between 4.5 bar – 10 bar the inlet pressure regulator limits the inlet pressure of the system to 7 bar (minimum 4.5 – maximum 7.5). At the output, the forward pressure regulator is set to deliver ultra zero grade air at a pressure of 6 bar. This setting can be lowered if desired.

5.1. FUNCTIONALITY

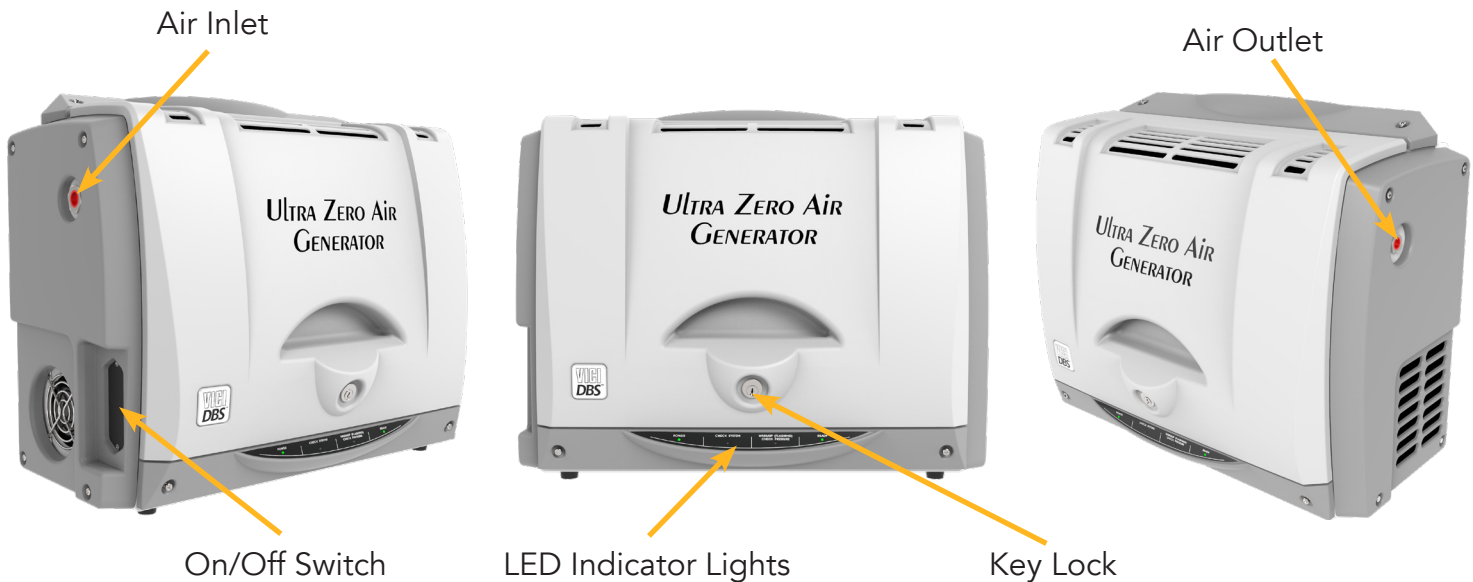


5.2. CONTROL BOARD

The control board performs the following functions:

- 1. Controls the warm up of the catalyst:** The control board tells the user if catalyst is warming up properly and when the catalyst has reached the set temperature.
- 2. Operates the pressure-swing dryer valve:** The control board automatically switches the pressure-swing dryer valve every 4 minutes, and monitors the pressure in the dryer cylinders to ensure that proper switching occurred. If the control board detects that proper switching did not occur, then a fault is indicated by the red external LED, and the output flow is disabled.
- 3. Monitors critical system parameters:** The control board serves as a QA monitor, continuously checking for proper inlet pressure and catalyst temperature to ensure Ultra Zero Air purity specifications are always met.
- 4. Digital thermostat:** The control board limits the maximum temperature to 650°C to preserve the functionality of the heating element. Without a thermostat, temperatures would often exceed this limit, especially if the air supply is interrupted. With the control board, you never have to worry about overheating.
- 5. Catalyst life cycle alarm:** The control board reminds you when the 3-year life cycle of the catalyst is exceeded. After 3 years, the red external "Check System" LED begins to flash. From this time, the operator has 60 days to replace the catalyst or the control board will stop the system.

6. INSTALLATION



6.1 Packing List

- GT Ultra 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
- 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

6.1.1. Items Not Included in Standard Shipping

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 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

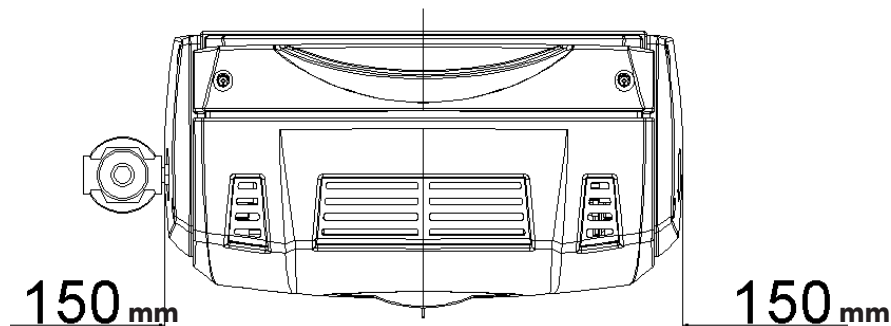
- Replace the voltage selector insert so that the white arrow points to the correct voltage.

6.5 Unit Installation

The GT Ultra 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.

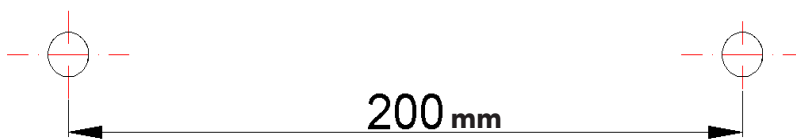
A. On a table/lab bench:

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

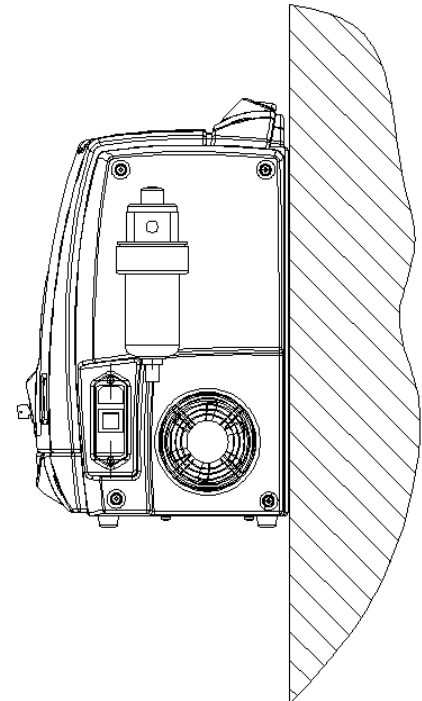


B) Mounted to a wall:

- 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 GT Ultra 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.

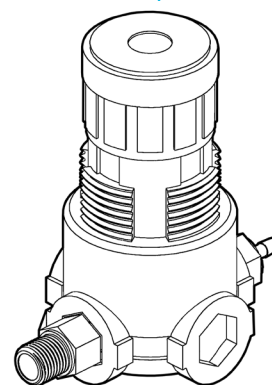


WARNING: Maximum inlet pressure 10 barg (145 psig). Do not adjust the outlet regulator on the unit without using an accurate pressure gauge (3-7 barg)

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.

Lift and turn to
adjust pressure



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.

6.7 Connect Output

- The output bulkhead of the GT Ultra 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 GT Ultra 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 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

To start unit:

- Insert the female end of the supplied power cord to the power supply connection on the left side of the unit, and plug the male end into a properly grounded socket.
- Power up the unit using the power switch on the unit.
- For the first 3 seconds, all panel LEDs will be illuminated. This verifies proper operation of the control board firmware and the LEDs.

7.2. WARMING UP

After power-up, the system goes through a warm-up cycle.

The yellow "Warm-up/Check Pressure" LED flashes at 1 Hz, indicating the system is in warm-up mode. If the catalyst temperature is above the minimum level of 485°C and no faults are detected, the system will go immediately to operation mode. This quick-start feature is for customer convenience when power is interrupted only for short periods, and a full warm-up cycle is not required. Warm-up cycle takes 45 min.

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

Verify that:

- "POWER" green LED is on
- "WARM UP" yellow LED is flashing

7.3. NORMAL OPERATION

When the system is in operation mode, the green "System Ready" panel LED is illuminated and the outlet valve is open, supplying continuous Ultra Zero Air. During operation mode, the microcontroller continuously monitors the inputs. If a fault occurs, the system will enter into a particular fault state if it is not corrected within the specified time.

Verify that:

- "POWER" green LED is on
- "READY" green LED is on

7.4. STARTUP TROUBLESHOOTING AND SYSTEM FAULTS

If there are any improper conditions detected by the control board, the unit will not come out of the warm up cycle. Instead, fault conditions are indicated by the panel LEDs.

Any of the following conditions will prevent the unit from going to operation mode:

- If catalyst heater temperature is still below the minimum threshold, then a low temperature fault is indicated by the red "Check System" LED.
- If the catalyst has expired, the system does not start the warm-up cycle. The processor immediately flashes the red "Check System" LED. If the catalyst is within 2 months of expiring, then the red "Check System" LED will flash, but the system will still start to operate.
- If a low or high inlet pressure condition exists, then a fault is indicated and the outlet valve will remain closed. The yellow "Warm up / Check Pressure" panel LED is illuminated steadily.
- If the dryer valve is not switching properly, then a fault is indicated and the outlet valve will remain closed. The red "Check System" LED is illuminated steadily.
- During normal operation, if any of the following conditions occur, the control board will indicate a fault or warning and close the outlet.

7.4.1. Inlet Pressure Low

Low inlet pressure warnings are indicated by a steady yellow "Check Pressure" panel LED on the cabinet. If pressure is not restored to a minimum of 4.5 bar within three minutes, the control board automatically closes the outlet valve, shutting off the Ultra Zero Air supply from the generator. The control board will continue to monitor the inlet pressure, and will automatically restore the unit to normal operating mode when pressure is within range.

7.4.2. Inlet Pressure High

The maximum pressure that can be supplied to the unit is 10 bar. However, the inlet pressure regulator reduces inlet pressure to an adjustable level. The regulators are pre-set at the factory at 7 bar. The maximum allowable regulated inlet pressure is 7.5 bar. This condition is monitored by the control board.

A high inlet pressure fault can occur if the inlet pressure regulator fails or has been tampered. Warnings are indicated by a steady yellow "Check Pressure" panel LED on the cabinet. If pressure is not restored to the proper range within three minutes, the control board automatically closes the outlet valve, shutting off the Ultra Zero Air supply from the generator. The control board will continue to monitor the inlet pressure, and will automatically restore the unit to normal operating mode when pressure is within range.

7.4.3. Catalyst Temperature Low

A low catalyst temperature fault illuminates the red "Check System" panel LED on the cabinet. Low catalyst temperature will also prevent the unit from coming out of the warm up cycle, and will result in a fault after one hour if the warm up fails.

7.4.4. Catalyst Temperature High

The on-board thermostat is designed to limit the catalyst temperature to 650°C. An over-temperature fault occurs if this limit is exceeded for more than 10 minutes. This could indicate that the thermostat circuit or the catalyst thermocouple are not functioning properly. This fault is indicated by the red "Check System" panel LED on the cabinet.

7.4.5. Catalyst Life Cycle Expired

The life cycle of the catalyst is maximum 3 years, starting at the time of shipment from the factory. After 3 years, the control board will flash the red "Check System" LED as a warning. From this time, the operator has 60 days to replace these components or the control board will close the outlet valve, and continue to flash the red "Check System" LED.

7.4.6. Dryer Switch Valve Failure

The proper operation of the dryer switch valve is determined by monitoring the pressure on one of the dryer cylinders. The pressure should alternate between high and low values as the valve cycles. If this does not occur, then the control board illuminates the red "Check System" LED, and closes the outlet valve.

GT ULTRA ZERO AIR GENERATOR USER MANUAL

7.4.7. Menu Options

Condition	Warm-up / Check Pressure	Ready	Check System	Outlet Port
	YELLOW	GREEN	RED	
System Off:				CLOSED
System General:				
Power Control:				
Power Fault:	OFF	OFF	OFF	CLOSED
Heater Control: If catalyst temperature exceeds 650°C, the catalyst power will be shut down				
Heater Control Fault: If catalyst temperature exceeds the allowed maximum of 650°C	OFF	OFF	ON	CLOSED
Fault: Catalyst Replacement:				
After 3 years			1 Blink Hz	OPEN
After 3 years plus 60 days		OFF	ON	CLOSED
Startup:				
Quickstart Mode (0 to 3 minutes max.)	Blink 1 Hz	OFF	OFF	CLOSED
The control board will continuously check whether catalyst temperature is within limits. If yes, other faults will be checked; will go to Operation Mode if no faults are found. If catalyst temperature is not within limits, the warm-up cycle will continue for 40 more minutes.				
Warm-up Mode (3 to 40 minutes max.)	Blink 1 Hz	OFF	OFF	CLOSED
System Fault: Catalyst temperature is low at the 40 min. checkpoint	OFF	OFF	ON	CLOSED
Operation:				
Normal Device Operation	OFF	ON	OFF	OPEN
Inlet pressure control: If pressure is out of range, unit will enter fault condition after 3 min.				
Check Pressure: Inlet pressure low (< 4.5 bar)	ON	ON	OFF	CLOSE
Check Pressure: Inlet pressure high (> 8 bar)	ON	ON	OFF	CLOSE
Fault: Inlet pressure low (< 4.5 bar)	ON	ON	ON	CLOSE
Fault: Inlet pressure high (> 8 bar)	ON	ON	ON	CLOSE

7.5. SHUTDOWN PROCEDURE

Before performing any service or maintenance, 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 air supply.
- De-pressurize the unit and disconnect power source before servicing.

8. MAINTENANCE

8.1. MAINTENANCE KIT



WARNING: Before service is performed, make sure that the following conditions are met:

1. System shut down has been performed according to instructions above.
2. Supply air pressure has been shut off with an in-line valve.
3. Line pressure has been released with an in-line relief valve.
4. Unit has been shut-off and isolated from electrical power.

TYPE	DESCRIPTION	FREQUENCY	PART-NUMBER
Consumables	Annual maintenance kit for GT-1500	Every 12 months	DB-10376
	Annual maintenance kit for GT-3000 and GT-6000	Every 12 months	DB-10377
	Annual maintenance kit for GT-15000 and GT-30000	Every 12 months	DB-10378
Service Kit	3-Year catalyst replacement kit for GT-1500	Every 3 years	DB-10380
	3-Year catalyst replacement kit for GT-3000	Every 3 years	DB-10382
	3-Year catalyst replacement kit for GT-6000	Every 3 years	DB-10384
	3-Year catalyst replacement kit for GT-15000	Every 3 years	DB-10386
	3-Year catalyst replacement kit for GT-30000	Every 3 years	DB-10388

8.1.1. Annual Maintenance Kit

The GT Ultra 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
- 1 activated carbon column

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

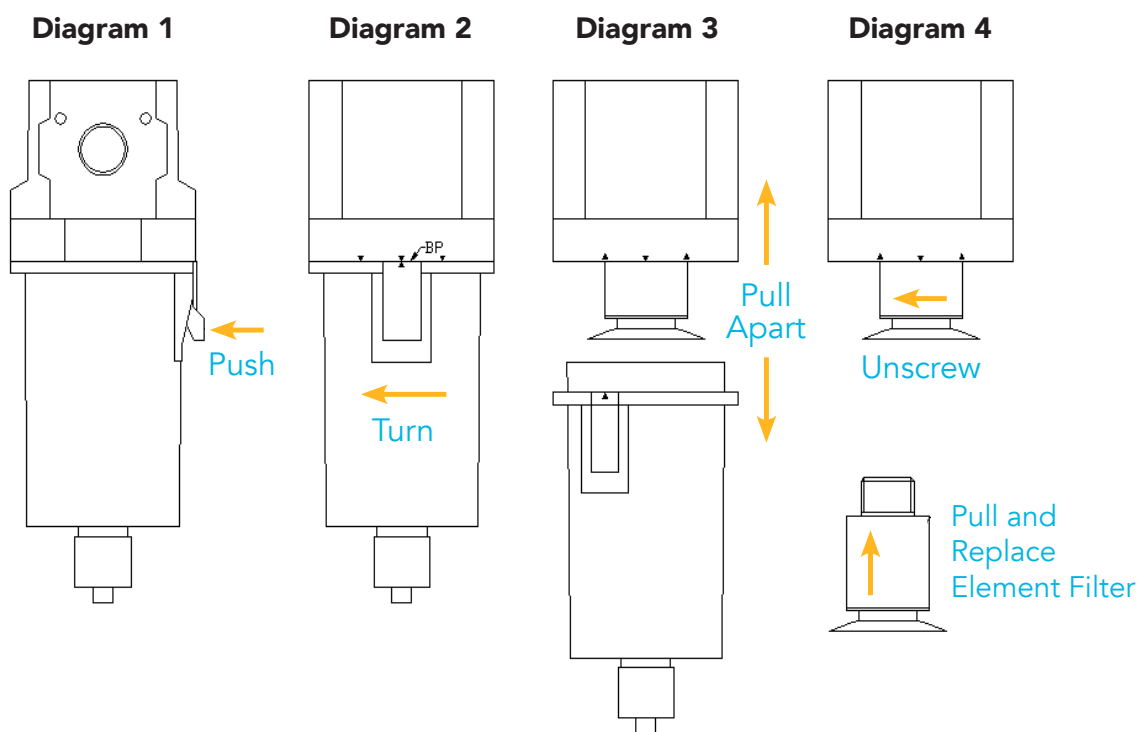


WARNING: Only qualified staff should perform service on this generator. Any damage done to this product as a result of improper maintenance procedures will void the warranty.

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).

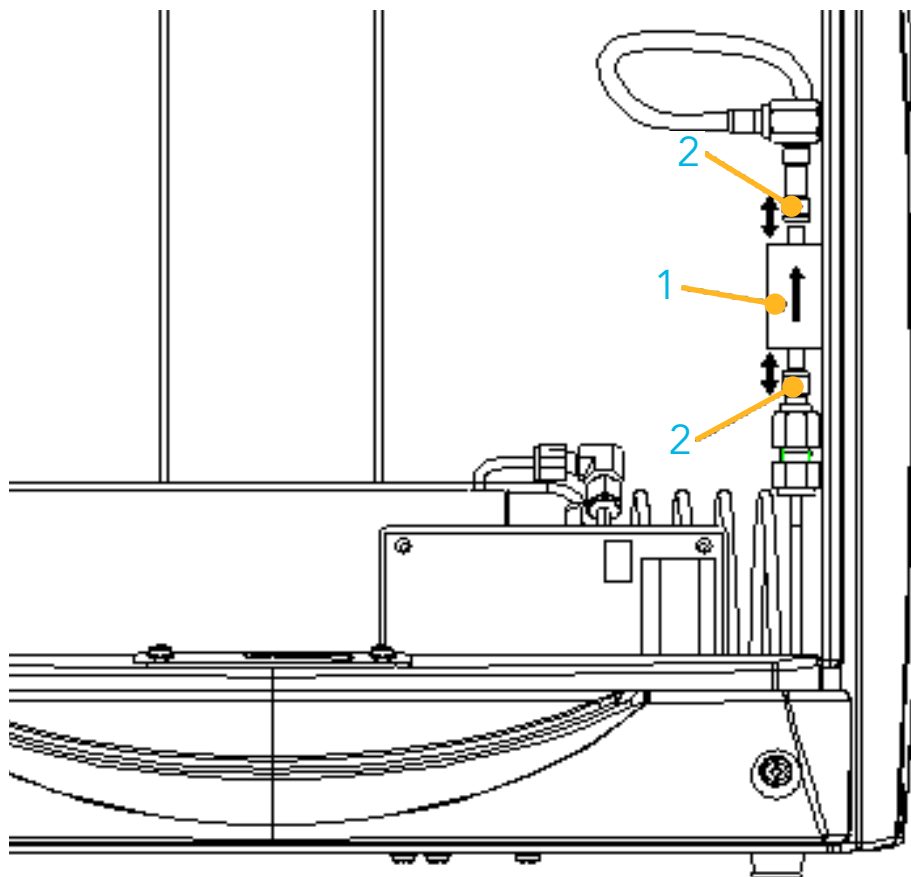


NOTE: More frequent replacement of the inlet filter may be required depending on the quality of the air supply. Alternately, more filtration can be applied upstream of the GT Ultra Zero Air generator.

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.

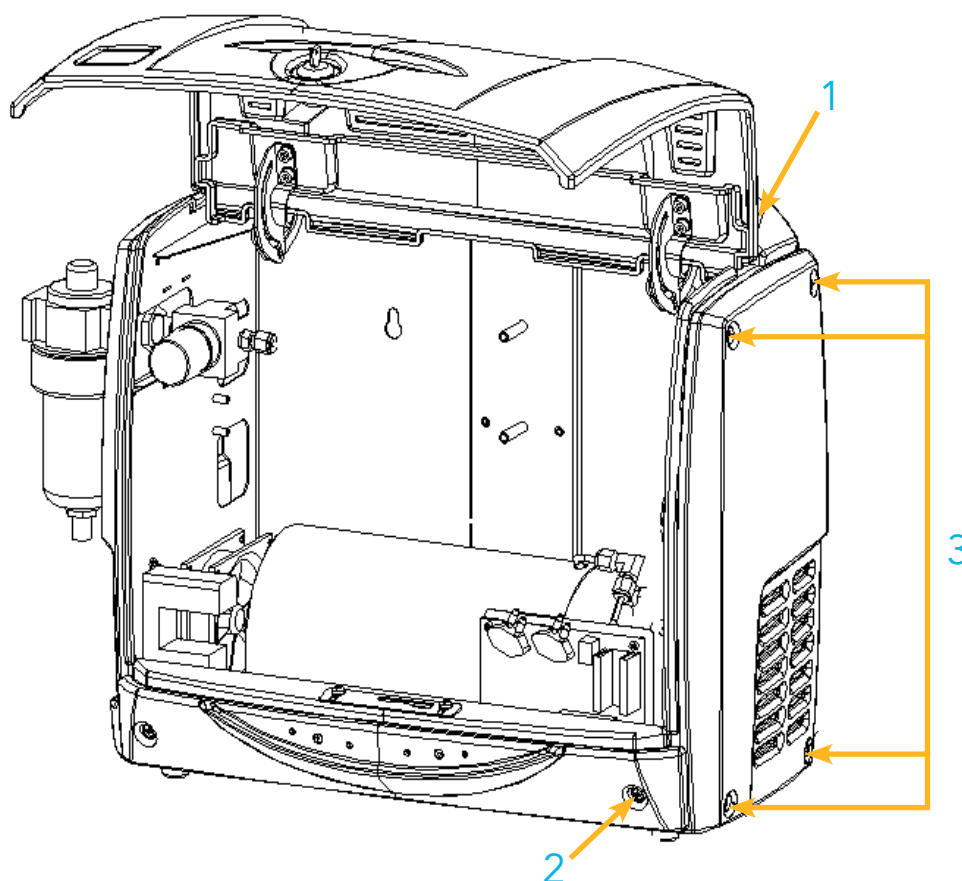
- Disconnect the filter (1) from the push-in connectors (2) of the air line.
- Replace the used filter with the new one. Make sure that the flow direction indicated on the filter housing points in the "downward" direction, toward the outlet pressure regulator on the unit.



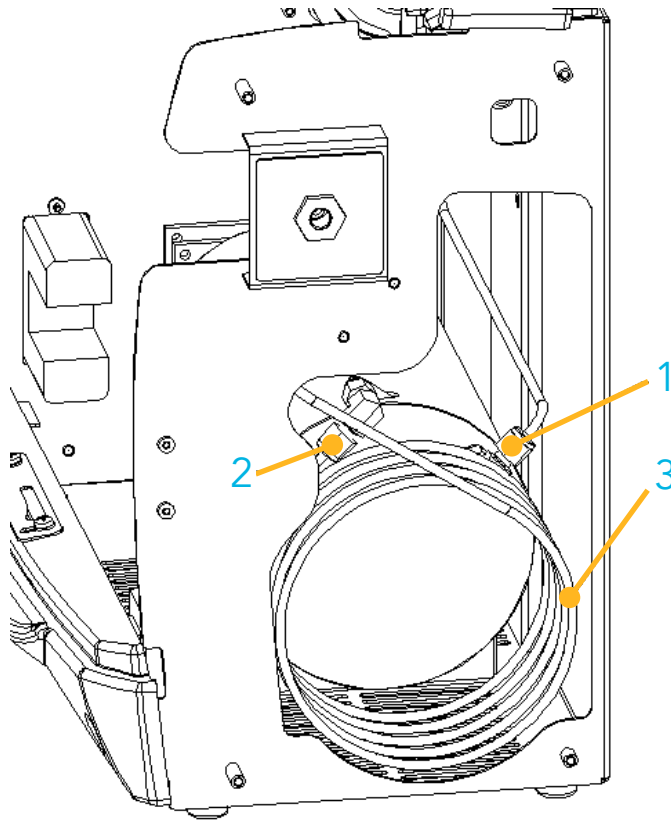
8.2.3 Three Year Catalyst Chamber Filter Replacement

The catalyst chamber used in the GT Ultra 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).

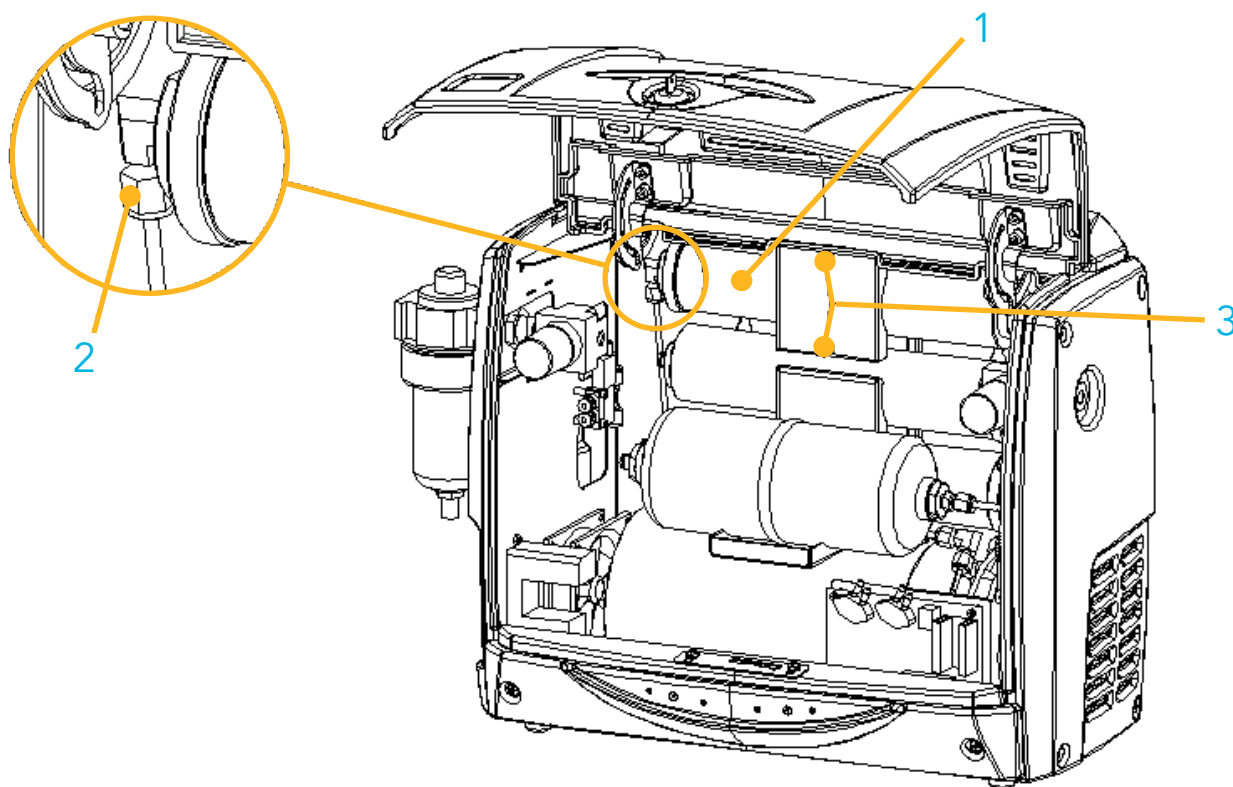


- Carefully disconnect the two compression air fittings (1 and 2) to remove the cooling spiral (3).
- Remove heater connections from the control board.
- Unscrew the two screws to remove the aluminum plate from the metal heat shield covering the catalyst.
- When the catalyst chamber is cool enough to 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.



8.2.4. NO_x Column 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 2 hours to cool the catalyst. After 2 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; NO_x column is on the top (1).
- Disconnect the copper tube from the outlet of the NO_x column (2).



- Disconnect the plastic tube from the push-in connector of the inlet of the NO_x column.
- Remove screws (3) and extract the NO_x column and replace it with a new one.
- Connect inlet and outlet.
- Pressurize the system and check thoroughly for leaks.

9. TROUBLESHOOTING

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:				
Quick Start 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
System Fault: Inlet pressure low (< 4.5 bar)	ON	ON	ON	1
System Fault: Inlet pressure high (> 8 bar)	ON	ON	ON	2

System can be reset to initial condition:

- Turn unit off to reset system
- Turn unit on and check the LED configuration

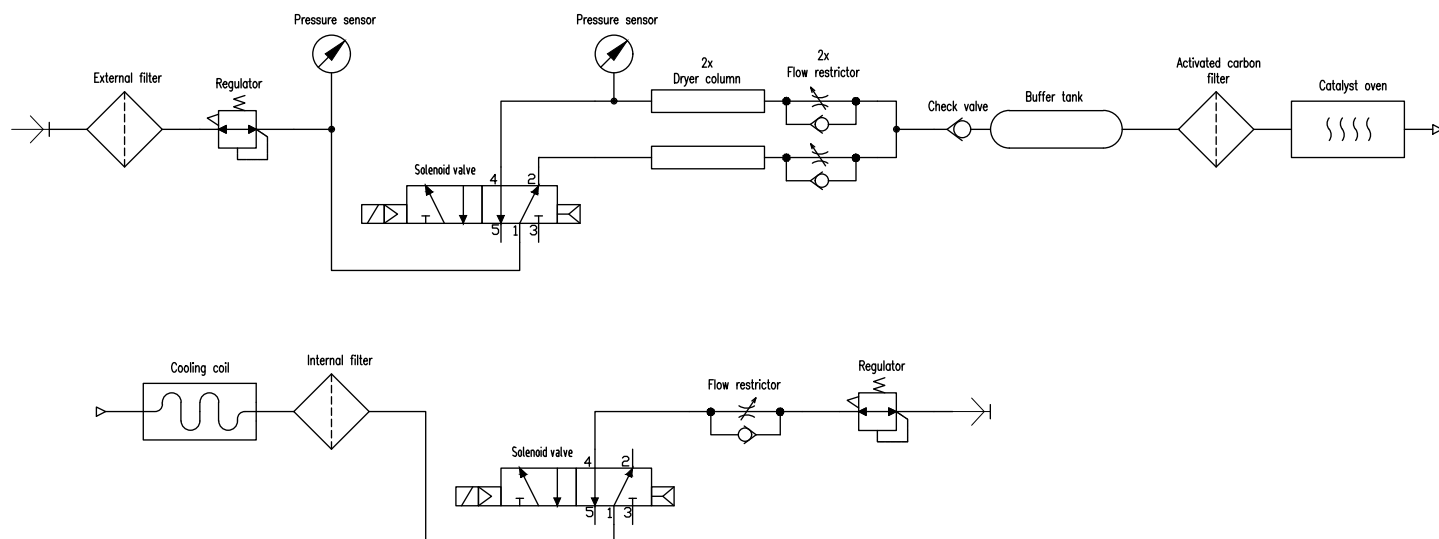
9.1. Error Codes on Main Board

DISPLAY #	CHECK SYSTEM RED LED STATUS	DESCRIPTION
BLINKING 1	OFF	Minimum Pressure Pre-Alarm
BLINKING 2	OFF	Maximum Pressure Pre-Alarm
BLINKING 3	ON	Valve Switching Pre-Alarm
BLINKING 4	BLINKING	Catalyst Replacement Pre-Alarm
1	ON	Minimum Pressure Alarm
2	ON	Maximum Pressure Alarm
3	ON	Valve Switching 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 startup the code 8 is shown if the bridge JP2 is short to reset the timer for catalyst/oven. Remove JP2 and restart again.

9.2. LEAKS

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

10. FLUIDICS DIAGRAM



11. 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 GT-1500 v2**	DB-NGT001-010
Oven/Catalyst for GT-3000 v2**	DB-NGT002-010
Oven/Catalyst for GT-6000 v2**	DB-NGT003-010
Oven/Catalyst for GT-15000 v2**	DB-NGT004-010
Oven/Catalyst for GT-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
Activated carbon column for GT-1500***	DB-NGT001-008
Activated carbon column for GT-3000 and GT-6000***	DB-NGT001-009
Activated carbon column for GT-15000 and GT-30000***	DB-NGT002-009
Annual maintenance kit for GT-1500	DB-10376
Annual maintenance kit for GT-3000 and GT-6000	DB-10377
Annual maintenance kit for GT-15000 and GT-30000	DB-10378
3-Year catalyst replacement kit for GT-1500	DB-10380
3-Year catalyst replacement kit for GT-3000	DB-10382
3-Year catalyst replacement kit for GT-6000	DB-10384
3-Year catalyst replacement kit for GT-15000	DB-10386
3-Year catalyst replacement kit for GT-30000	DB-10388