MATHESON TRI•GAS

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LABORATORY ULTRA ZERO AIR GENERATOR

ZAC-ULT Series

USER MANUAL

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1.0 Introduction

NOTICE: This manual is intended to provide technical guidance on the installation, operation and maintenance of the ZAC-ULT Series 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 questions, please contact Matheson Tri-Gas.

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

Product Description

The ZAC-ULT Series Ultra Zero Air Generator produces laboratory grade purified air for the most precise equipment. Designed with safety and convenience in mind, this system will generate purified air from an existing in-house oil-free compressed air supply.

The ZAC-ULT Series Ultra Zero Air Generator will remove CO and HC pollutants to less than 0.1 ppm, and NOx contaminants to 0.1 ppm. Carbon dioxide is also removed to 10 ppm levels. Operation of the generator requires low levels of air consumption and electrical power. This complete turnkey system is engineered with the highest quality components, is easy to install, and requires only minimal annual maintenance.

2.0 Safety instructions

When using ultra zero air generator, basic safety precautions should always be followed, including the following:

2.1 Read all instructions.

2.2 Care must be taken as burns can occur from touching hot parts.

WARNING

HOT SURFACE INSIDE

CONTACT MAY CAUSE BURN

ALLOW TO COOL BEFORE SERVICING

2.3 Do not operate equipment with a damaged cord or if the equipment has been dropped or damaged – until it has been examined by a qualified service person.

2.4 Do not let cord hang over edge of table, bench, or counter or come in contact with hot manifolds or moving fan blades.

2.5 If an extension cord is necessary, a cord with a current rating equal to or more than that of the equipment should be used. Cords rated for less current than the equipment can overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled.

2.6 Never use the cord to pull the plug from the outlet. Grasp the plug and pull to disconnect.

2.7 Let equipment cool completely before putting away. Loop cord loosely around equipment when storing.

2.8 To reduce the risk of fire, do not operate equipment in the vicinity of open containers of flammable liquids.

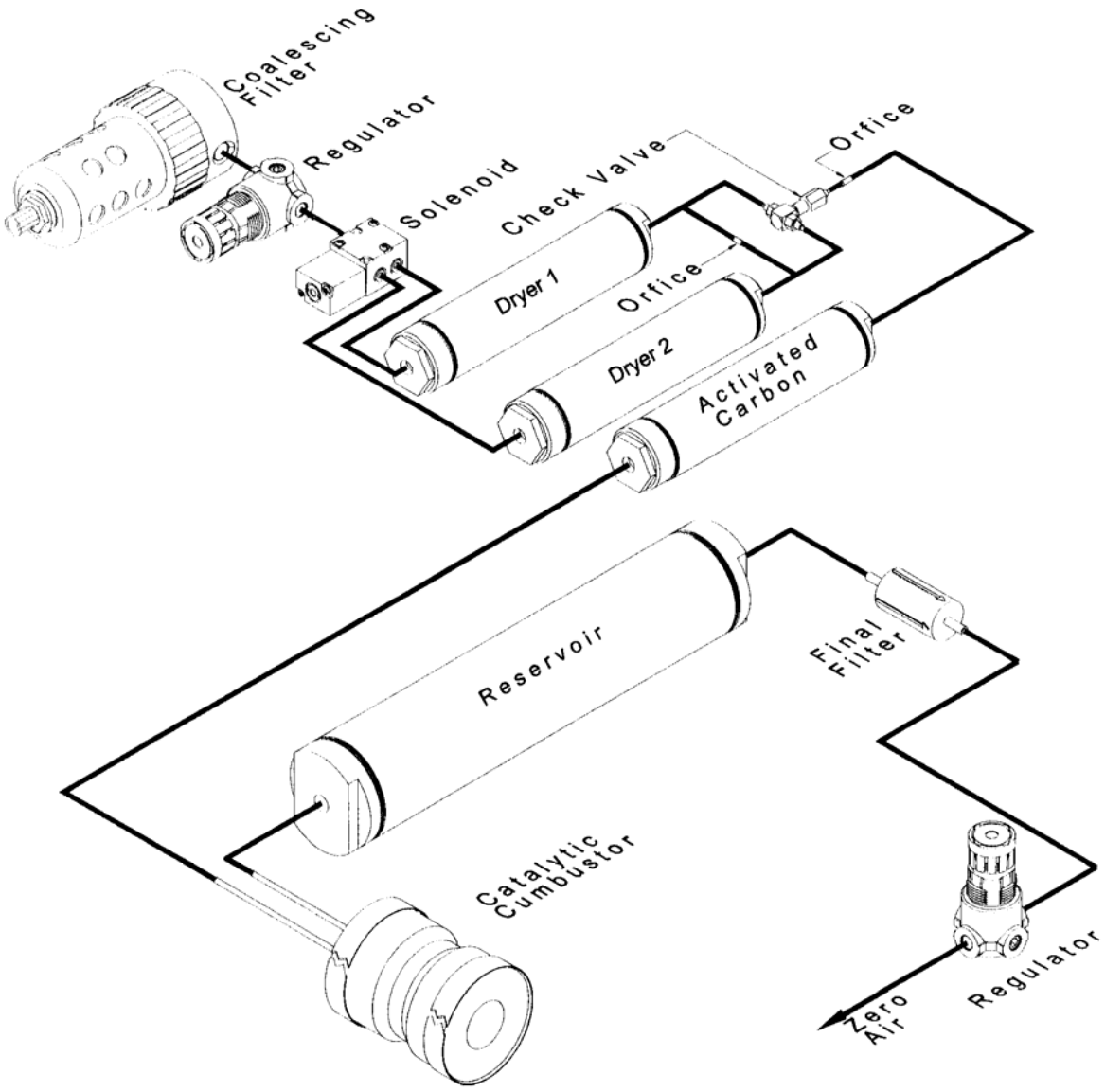
2.9 To reduce the risk of electric shock, do not use on wet surfaces or expose to rain.

2.10 Use only as described in this manual. Use only manufacturer's recommended attachments.

2.11 ALWAYS WEAR SAFETY GLASSES when working with this equipment. Everyday eyeglasses have only impact resistant lenses. They are NOT safety glasses.

SAVE THESE INSTRUCTIONS

3.0 System components



4.0 Design overview

The ZAC-ULT Series 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.

4.1 Stage 1: Prefiltration and Pressure Regulation

4.1.1 Air is initially passed through a highly efficient combination coalescing/particulate pre-filter to ensure 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.

4.1.2 The air pressure is then regulated with a pressure regulator, pre-set to 100 psig (7 bar). The control board monitors the pressure with an electronic pressure sensor. The minimum allowable pressure is 65 psig (4.5 bar). If the air supply is interrupted or if the regulator fails, the control board will illuminate the yellow external LED and close the outlet valve, disabling the system

4.2 Stage 2: Air Dryer

4.2.1 Air is next passed into a dual column pressure swing adsorption air dryer to remove water vapor and carbon dioxide from the supply. 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 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 complete.

4.2.2 A dedicated pressure transducer on the control board monitors the air pressure to dryer B to insure that proper switching is taking place. When dryer B is in the purge cycle, the pressure should be atmospheric. When it is in the regenerative cycle, the pressure should match the inlet. The control board will disable the system if proper dryer switching is not taking place or if a problem is detected.

4.3 Stage 3: NO_x Scrubber

From the dryer, air goes into a scrubber to reduce NOx 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.

4.4 Stage 4: Hydrocarbon and CO Removal

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

4.4.2 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 specified limits, appropriate LEDs are illuminated.

4.5 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 insure that no harmful particles will be able to enter your gas analyzers during zero calibration.

4.6 Stage 6: Flow regulation

A flow regulator is used to limit maximum flow rate on the outlet. The setting cannot be changed by users.

WARNING!

DON'T ADJUST THE OUTLET FLOW REGULATOR
ADJUSTMENT OF THE OUTLET FLOW REGULATOR CAN DAMAGE UNIT
ANY DAMAGE DONE TO THIS PRODUCT AS A RESULT OF IMPROPER MAINTENANCE PROCEDURES WILL VOID THE WARRANTY.

4.7 Outlet solenoid valve

A solenoid valve, driven by the control board, enables or disables flow of the system. The valve is always closed when there is no power to the unit, 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, and dryer valve switching failure.

4.8 Pressure Controls

Both inlet and outlet pressure regulators supplied with unit are pre-set at the factory. With a source pressure within 65 – 145 psig (4.5 bar – 10 bar), the inlet pressure regulator limits the inlet pressure of the system to 100 psig (7 bar). At the output, the forward pressure regulator is set to deliver ultra zero grade air at a maximum of 94 psig (6.5 bar) to fill an external storage tank. This setting can be lowered if desired.

5.0 Control board

The control board performs the following functions:

5.1 *Controls the warm up of the unit:* the control board tells user if catalyst is warming up properly and when the catalyst has fully heated.

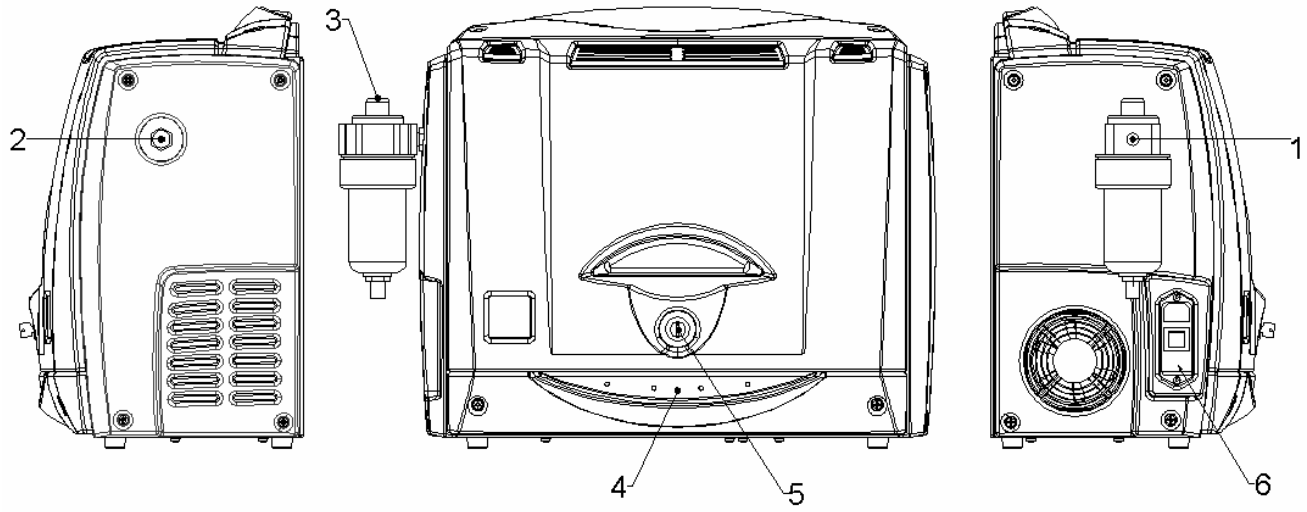
5.2 *Operates the pressure-swing dryer valve*. The control board automatically switches the pressure-swing dryer valve every 4 minutes, and monitors pressure in the dryer cylinders to insure that proper switching occurred. If the control board detects that proper switching did not occur, then the red external LED indicates a fault, and the output flow is disabled.

5.3 *Monitors critical system parameters.* The control board serves as a QA monitor, continuously checking for proper inlet pressure and catalyst temperature to insure ultra zero air purity specifications are always met.

5.4 *Digital thermostat*: the control board limits the maximum temperature to 650°C to preserve the life of the heating element. Without a thermostat, temperatures would often exceed this limit, especially if the air supply were interrupted.

5.5 *Catalyst life alarm*: the control board reminds you when the 3-year life 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 disables the system.

6.0 Installation



1 Air inlet

2 Air outlet

3 Inlet air filter

4 Led membrane

5 Door lock

4 Power button and fuse location for appropriate voltage setting.

Items supplied with the unit:

1. **ZAC-ULT series ultra zero air generator**, completely assembled and is ready for installation

2. One (1) high quality **inlet air filter assembly** is supplied with each system to remove particulates and bulk moisture before entering your unit

3. One (1) **power cord**

4. Two (2) **fuses**

5. One (1) **installation kit:**
   - ✓ One (1) pipe nipple to attach your inlet filter to the unit;
   - ✓ Two (2) machine screws with matching nuts and split lock washers to mount your unit;
   - ✓ Two (2) door keys to lock your unit;
   - ✓ One (1) user manual.

Items not included with the unit:

1. **Air supply shut-off valve** placed upstream of the unit. This is required for safe and convenient installation and for any needed maintenance.

2. **Bleeder valve** installed between the shut-off valve and the inlet of the unit.

   NOTE: The inlet air filter assembly supplied with your unit can also be used to de-pressurize your system by de-pressing the pin-valve in the base of the filter housing.

3. **Additional Filtration** may be required depending on the quality of your air supply. The pre-filter of the unit will remove nominal amounts of moisture and particulates. If the air supply has excessive moisture, oil, or particulates, then additional filters should be installed.

4. **Tube fitting** to install into the supplied pre-filter. The exact type will depend on the supply tubing or hose from air source. A hose clamp is recommended if flexible tubing is used.

5. **Tube fitting** to install into the bulkhead fitting on the output of your unit. The exact type will depend on the transport tubing or hose to your analyzer. A hose clamp is recommended if flexible tubing is used.

CAUTION: ***Remove plastic wrap inside unit before applying power.***

6.1 Unpack unit and open cover.

Remove plastic inlet & outlet port plugs.

6.2 Install external inlet filter.

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

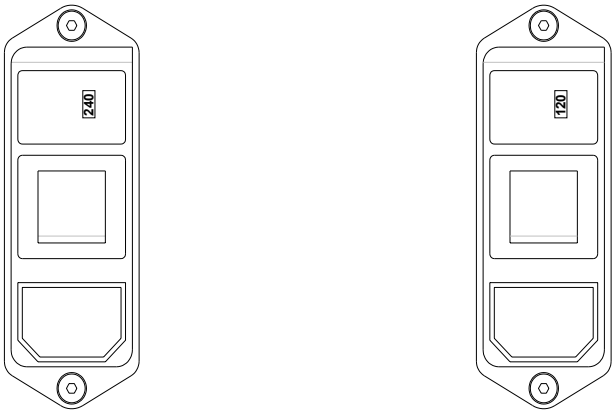
6.3 Check voltage setting.

Check the setting of the voltage selector on the side of the unit. The white arrow indicates the voltage setting. To change the voltage setting, proceed as follows:

6.3.1 Using a small screwdriver, remove the voltage selector insert
6.3.2 Replace fuses

Voltage setting	Fuse
240 VAC	2 AT
120 VAC	2 AT

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

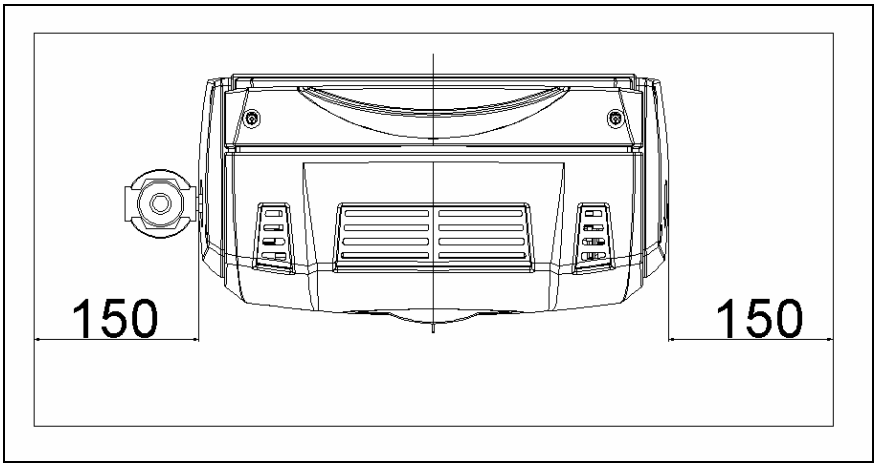


6.4 Unit positioning

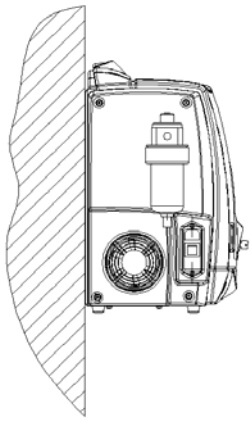
There are two different positions the units can be placed:

a) On a table

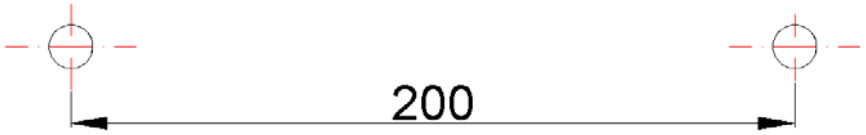
(Allow at least 6 inches (150 mm) clearance around the sides of the unit for proper ventilation.)



b) Fixed on a wall or permanent structure



✓ Drill appropriate holes in the wall or permanent structure and insert supplied mounting screws. Tighten only enough so there is approximately 1/4” extruding from the surface. The mounting holes are spaced 7-7/8 in (200 mm) apart.



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

WARNING

DO NOT TIGHTEN SCREWS FULLY. THE ZAC ULT SERIES GENERATOR IS NOT DESIGNED TO BE PERMANENTLY MOUNTED TO A WALL OR OTHER PERMANENT STRUCTURE. IT MUST BE POSSIBLE TO REMOVE THE UNIT WITHOUT THE USE OF TOOLS.

6.5 Connect the air supply

The unit requires a continuous supply of dry, compressed air between 65 and 145 psig (4.5 and 10 bar) for proper operation. 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.

6.5.1 A shut-off valve and bleeder valve should be installed near the system in order to perform installation and maintenance on the unit without affecting other systems.
6.5.2 Connect the air supply to the 1/4" FPT port on the inlet filter.

WARNING

MAXIMUM INLET PRESSURE 145 psig (10 bar)

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 on your unit.

6.6 Connect to the outlet.

- ✓ The output bulkhead of the ZAC-ULT Series is located on the right side of the unit.
- ✓ In order to maintain the purity of the air from your ZAC-ULT Series Ultra Zero Air Generator, stainless steel tubing or instrument grade Teflon tubing should be used to connect the generator to the analyzer port. All plastic hose should be instrument grade and free of contaminants, so that it will not out-gas any hydrocarbons or other pollutants over time.

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.

6.7 Leak check.

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

6.7.1 Slowly open the supply air valve to pressurize to the system.
6.7.2 Apply a leak check solution to all external fittings and look for air bubbles.
6.7.3 Tighten any leaky connections. Additional Teflon tape may be required in some cases.

7.0 Operation

7.1 Connect power and start up unit

7.1.1 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.
7.1.2 Turn the power on to the unit.
7.1.3 For the first 3 seconds, all panel LEDs illuminate. This verifies proper operation of the control board firmware and LEDs.

7.2 Warming up

After power-up, the system enters a warm-up cycle.

7.2.1 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 present the system will go immediately to operation mode. This quick-start feature is for customer convenience when power is interrupted only for brief periods, and a full warm-up cycle is not required. The warm-up cycle takes 50 min.

NOTE: ZAC-ULT Series ultra zero air generator is designed to run continuously. Continuous operation preserves the life of the catalyst. Shutdown should only be performed for maintenance.

7.2.2 Verify that the “POWER” green LED is on.
7.2.3 Verify that the “WARM UP” yellow LED is flashing.

7.3 Normal operation

When the unit comes out of warm up:

7.3.1 The yellow LED will turn off.
7.3.2 The green “System Ready” panel LED is illuminated.
7.3.3 The outlet solenoid valve will open, supplying continuous ultra zero air. During operation mode, the microcontroller continuously monitors the inputs. If a fault occurs, the solenoid valve will close.
7.3.4 Verify that the “POWER” green LED is on.
7.3.5 Verify that the “READY” green LED is on

7.4 Startup troubleshooting

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

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 enter warm-up mode. 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 enter operation mode.
- 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 operating, if any of the following conditions occur, the control board will indicate a fault or warning and close the outlet valve:

Inlet Pressure Low

A steady yellow “Check Pressure” panel LED on the cabinet indicates low inlet pressure warnings. If pressure is not restored to a minimum of 65 psig (4.5 bar) within three minutes, the control board automatically closes the outlet valve, shutting off the 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.

Inlet Pressure High

The maximum pressure that can be supplied to the unit is 145 psig (10 bar). However, the inlet pressure regulator reduces inlet pressure to an adjustable level. The regulator is pre-set at 100 psig (7 bar). The maximum allowable regulated inlet pressure is 115 psig (8 bar). The control board monitors this condition.

A high inlet pressure fault can occur if the inlet pressure regulator fails or has been tampered with. A steady yellow “Check Pressure” panel LED on the cabinet indicates warnings. If pressure is not restored to the proper range within three minutes, the control board automatically closes the outlet valve. 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.

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 warm up, and will result in a fault after one hour if the warm up fails.

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 catalyst thermocouple is not functioning properly. The red “Check System” panel LED on the cabinet indicates this fault.

Catalyst Life Expired

The life of the catalyst is a maximum of 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.

Dryer Switch Valve Failure

The proper operation of the dryer switch valve is determined by monitoring 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.

Condition	Power GREEN	Check System RED	Warmup/ Check Pressure YELLOW	Ready GREEN	Outlet valve
System Off	OFF	OFF	OFF	OFF	
Start-up					
System check (3 seconds)	Blink 1 Hz	Blink 1 Hz	Blink 1 Hz	Blink 1 Hz	
System fault	OFF	OFF	OFF	OFF	
Quickstart Mode		OFF	Blink 1 Hz	OFF	
System check (5 seconds)	ON	OFF	Blink 1 Hz	OFF	
Ready	ON	OFF	OFF	ON	OPEN
Warm-up					
Warm-up (50 minutes)	ON	OFF	Blink 1 Hz	OFF	
Fault: catalyst temperature below set point (after 20 min)	ON	ON	OFF	OFF	
Operation					
Ready	ON	OFF	OFF	ON	OPEN
General system fault conditions					
Inlet pressure below 4.5 bar (0 to 10 minutes)	ON	OFF	ON	OFF	CLOSE
Inlet pressure below 4.5 bar (after 10 minutes)	ON	ON	ON	OFF	CLOSE
Wrong dryer pressure configuration (0 to 30 seconds) *(dryer valve switches every 30 seconds)*	ON	OFF	OFF	OFF	OPEN
Wrong dryer pressure configuration (after 30 seconds)	ON	OFF	ON	OFF	CLOSE
Catalyst temperature exceeds set point	ON	ON	OFF	OFF	CLOSE
Catalyst temperature below set point	ON	ON	OFF	OFF	CLOSE
Catalyst life: after 3 years	ON	(1) Blink 1 Hz	ON	ON	CLOSE
Catalyst life: after 3 years and 2 months	ON	ON	OFF	OFF	CLOSE

Control Board Program Logic Table

7.5 Shutdown Procedure

Before performing any service or maintenance to the zero air generator, be sure to complete the following steps:

7.5.1 Turn off the power by using the switch on the unit.

7.5.2 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.

7.5.3 Shut off the air supply.

7.5.4 De-pressurize the unit and disconnect the power source before servicing.

8.0 Maintenance

WARNING:

Before service is performed, make certain that the following conditions are met:
1. System shut down has been performed according to instructions above.
2. Supply 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.

Annual Maintenance parts

The ZAC-ULT Series Ultra Zero Air Generator is designed to operate continuously for an entire year before service is required. Spare parts needed on a yearly basis:

1. New pre-filter element (ZAC-EXT-CART)
2. New high-grade particulate final filter (ZAC-INT-CART).
3. Optional replacement NO_x scrubber assembly. It is recommended to replace the NOx scrubber annually if removal of nitrogen oxides is critical for your application. NOx scrubbers should be replaced every 3 years at a minimum.

3-year Catalyst Replacement Kits

A catalyst kit will also be available as spare part for its 3-year replacement. The catalyst must be replaced every 3 years to insure the removal of CO and HC to 0.1 ppm levels.

WARNING

ONLY QUALIFIED PERSONNEL SHOULD PERFORM SERVICE ON THIS PRODUCT. ANY DAMAGE DONE TO THIS PRODUCT AS A RESULT OF IMPROPER MAINTENANCE PROCEDURES WILL VOID THE WARRANTY.

8.1 Annual pre-filter element replacement

8.1.1 Remove the filter bowl (Fig. 1, pos. 1) pressing on the lever and turning the bowl counter-clockwise until the arrow are aligned.

8.1.2 Unscrew the filter element base and remove element (Fig. 1, pos. 3).

8.1.3 Insert the new element and reassemble the filter in reverse order.

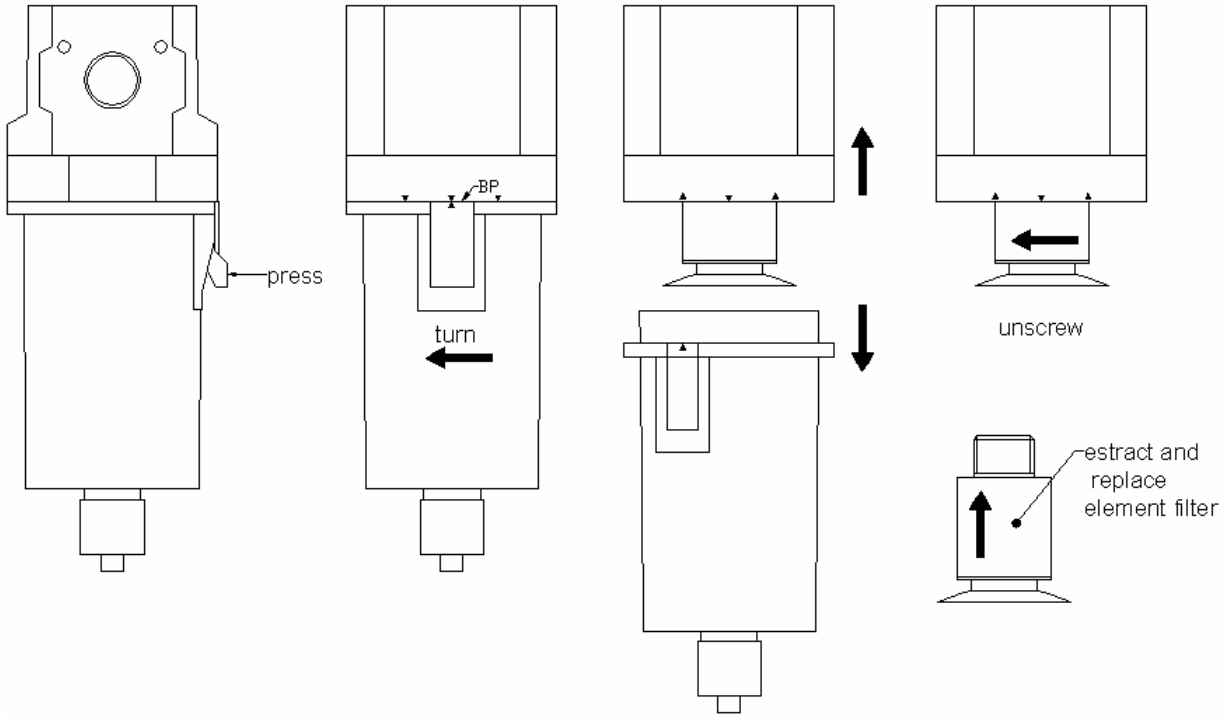


fig. 1: Pre-filter disassembling for element filter replacement.

NOTE: More frequent replacement of the inlet filter may be required depending on the quality of the air supply in the garage. Alternately, more filtration can be applied upstream of the ultra zero air generator.

8.2 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.

8.2.1 Disconnect the filter from the push-in connectors of the air line.

8.2.2 Replace the used filter with the new one. Make certain the flow direction indicated on the filter housing points toward the outlet on the unit.

8.3 Three year catalyst chamber replacement

The catalyst chamber used in the ultra zero air generator should be replaced every 3 years to maintain carbon monoxide and hydrocarbon specifications.

8.3.1 The system should be shut down as described above prior to replacement.

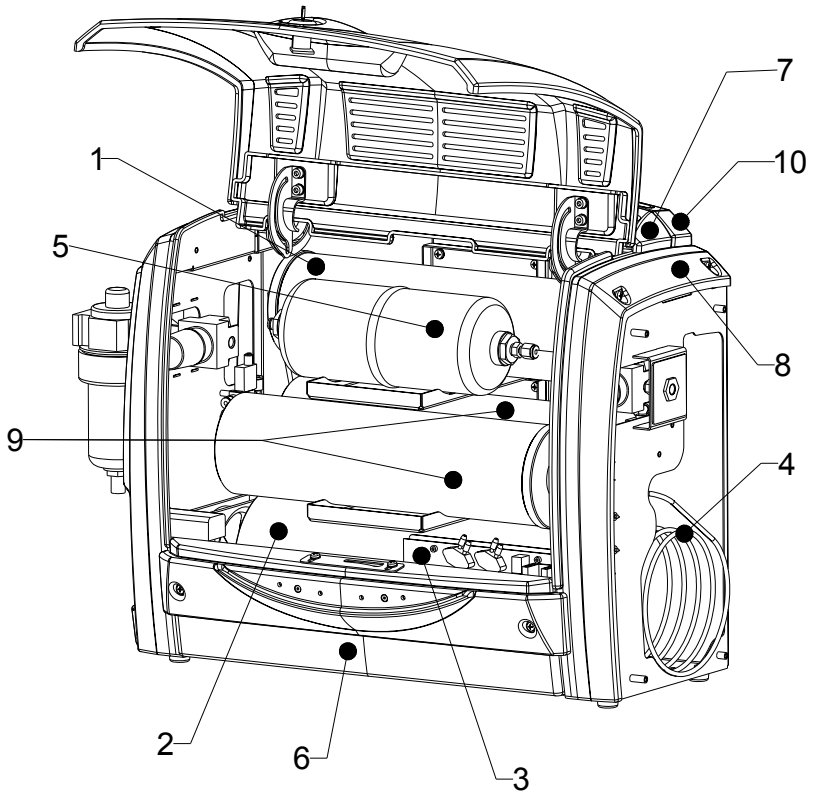
8.3.2 If unit has been powered recently and catalyst is hot, turn off the power. DO NOT turn off the air at this time.

8.3.3 Remove the outlet connection and allow the outlet air to flow freely for 2 hours to cool the catalyst.

8.3.4 After 2 hours of cool-down, disconnect the air supply.

8.3.5 Open front panel with door key.

8.3.6 Remove the front panel (pos.6);



8.3.7 Disconnect connector from board and remove main board chassis together with board and plastic tubing (pos. 3) (previously disconnect plastic tubes of pressure sensor from push-in connector).

8.3.8 Remove side panel on right side of unit.

8.3.9 Carefully disconnect the compression air fittings to remove the cooling spiral (pos.4).

8.3.10 Remove both dryer columns (pos. 9) and their chassis (previously disconnect plastic tube from push-in connector).

8.3.11 When the catalyst chamber (pos. 2) is cool to the touch, remove the four screws connecting the catalyst chamber to the main chassis.

8.3.12 Remove the catalyst chamber from unit.

8.3.13 Install the new catalyst chamber assembly using the reverse process.

8.4 NO_x scrubber replacement

8.4.1 If unit has been powered recently and catalyst is hot, turn off the power. DO NOT turn off the air at this time.

8.4.2 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.

8.4.3 Open front panel with door key. The NO_x column is on the top (pos.1).

8.4.4 Remove side panel on right side of unit.

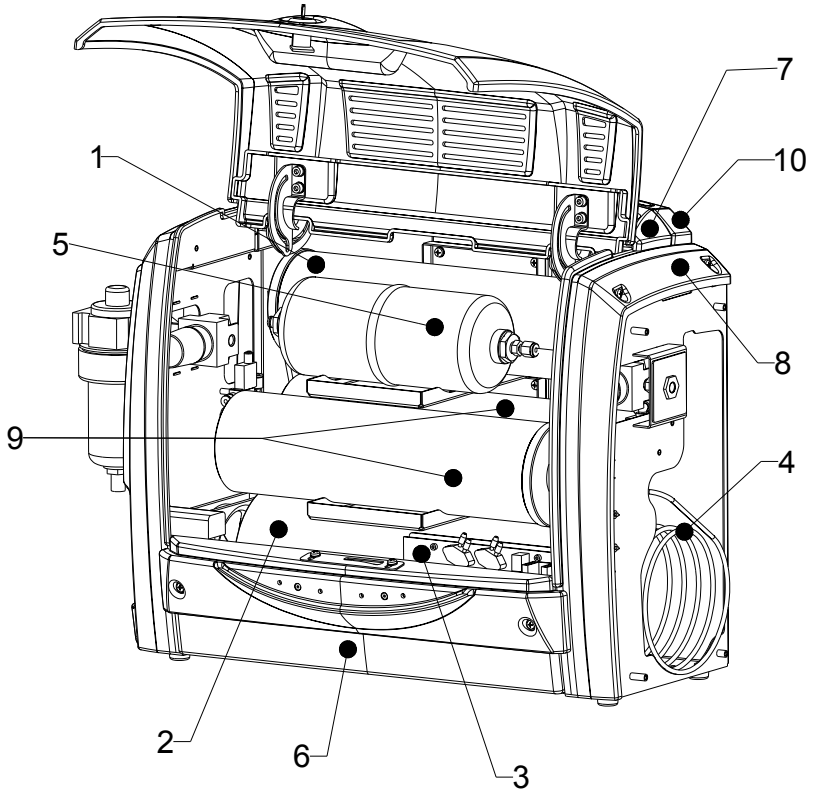
8.4.5 Carefully disconnect the compression air fittings from left side and push-in connection from right side.

8.4.6 Remove the reservoir.

8.4.7 Take the column out of the unit.

8.4.8 Replace it with new one.

8.4.9 Assemble using the reverse process.



9.0 Troubleshooting guide

9.1 Fault table

Condition	Power GREEN	Check System RED	Warmup/ Check Pressure YELLOW	Ready GREEN
System Off	OFF	OFF	OFF	OFF
Start-up				
System fault	OFF	OFF	OFF	OFF
Warm-up				
Warm-up (50 minutes)	ON	OFF	Blink 1 Hz	OFF
Fault: catalyst temperature below set point (after 20 min)	ON	ON	OFF	OFF
General system fault conditions				
Inlet pressure below 4.5 bar (0 to 10 minutes)	ON	OFF	ON	OFF
Inlet pressure below 4.5 bar (after 10 minutes)	ON	ON	ON	OFF
Wrong dryer pressure configuration (0 to 30 seconds) *(dryer valve switches every 30 seconds)*	ON	OFF	OFF	OFF
Wrong dryer pressure configuration (after 30 seconds)	ON	OFF	ON	OFF
Catalyst temperature exceeds set point	ON	ON	OFF	OFF
Catalyst temperature below set point	ON	ON	OFF	OFF
Catalyst life: after 3 years	ON	(1) Blink 1 Hz	ON	ON
Catalyst life: after 3 years and 2 months	ON	ON	OFF	OFF

System can be reset to initial condition:

- ❑ Turn off unit to reset system;
- ❑ Turn on unit and check for led configuration;

9.2 Leaks

- ❑ Apply soapy water to all external fittings and look for air bubbles;
- ❑ Tighten any leaky connections. Additional Teflon tape may be required in some cases.

10.0 Specifications

Outlet Hydrocarbon Concentration		<0.1 ppm
Outlet Carbon Monoxide Concentration		< 0.1 ppm
Outlet Carbon Dioxide Concentration		< 10 ppm
Outlet Nitrogen Oxides Concentration		< 0.1 ppm
Outlet Dewpoint		< -58 °F (-50 °C)
Outlet Particles < 0.5 microns removed		99.99%
Outlet Air Temperature		Ambient +27 °F (15 °C)
Max Inlet Hydrocarbon Concentration		100 ppm
Max Inlet Carbon Monoxide Concentration		100 ppm
Max Inlet Carbon Dioxide Concentration		500 ppm
Max Inlet Nitrogen Oxides Concentration		50 ppm
Max Inlet Temperature		104 °F (40 °C)
Inlet Pressure Range (regulated to 7 bar)		65-145 psig (4.5 -10 bar)
Pressure Drop @ max. Flow Rate		15 psig (1 bar)
Maximum Outlet Pressure		85 psig (6 bar)
Maximum Air Loss		Same as specified flow rate
Maximum Relative Humidity		80%
Startup Time for Specified THC Concentration		50 minutes
Inlet Port		1/4" FPT
Outlet Port		1/8" FPT
Surge Tank (Internal)	1.5, 3 & 6 LPM	1.0 L (approximate)
	15 & 30 LPM	1.5 L (approximate)
Electrical Requirements		115/230VAC
System Dimensions (HxWxD)	1.5, 3 & 6 LPM	16“ x 18“ x 10“ (41 x 47 x 25 cm)
	15 & 30 LPM	22“ x 17“ x 11“ (55 x 44 x 27 cm)
Generator Weight	1.5 LPM	12 lbs (5.5 kg)
	3 & 6 LPM	29 lbs (13 kg)
	15 & 30 LPM	62 lbs (28 kg)