Kit Part Number: 710943

# **Breathe Safe**

Parts and Service Manual

# CATERPILLAR 793F / 795F HAULTRUCK

HEPA H14 Variable Speed Pressuriser | OnGuard Air Quality Monitoring and Control | HEPA Return Air Filter



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### **Breathe** Safe

### **INSTALLATION**

### **CONTENTS**

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INSTALLATION OVERVIEW					
Manufacturer	Caterpillar				
Туре	Haul Truck				
Model	793F / 795F				
Cabin Pressure Max					
Set Auto Cabin Pressure					





**HEPA H14 Variable Speed Pressuriser** 



**OnGuard Controller** 



**HEPA Return Air Filter** 

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**SAFETY** 

### **WARNING**

THE PRESSURISATION SYSTEM DESCRIBED IN THIS MANUAL HAS THE FOLLOWING AREAS WHICH MAY BE DANGEROUS IF NOT TREATED WITH GREAT CARE.

**OUALIFIED STAFF MUST WEAR THE CORRECT PERSONAL PROTECTIVE** EQUIPMENT WHEN CLEANING AND SERVICING THIS UNIT DUE TO DUST AND FIBRES WHICH MAY BE CAUGHT BY THE STAGES OF AIR FILTRATION DURING NORMAL UNIT OPERATION.

THE ELECTRICAL POWER SYSTEM IS SUPPLIED BY 12V DC OR 24V DC AND NO WORK SHOULD BE CARRIED OUT ON THE PRESSURISER SYSTEM WITHOUT THE CORRECT SAFE WORK PROCEDURES AND ELECTRICAL SAFETY MEASURES BEING TAKEN, AND ALL RELEVANT CIRCUIT BREAKER OPENED TO ISOLATE THE CIRCUIT.

THE AIR FILTRATION SYSTEM MAY HAVE SEVERAL TYPES OF HIGH-SPEED ROTATING EQUIPMENT INSTALLED WITH VERY SHARP EDGES. ENSURE ALL SAFETY GUARD ARE IN PLACE WHILE THE SYSTEM IS RUNNING.

Please be aware that HEPA filters cannot be cleaned and must be replaced at the end of their lifecycle or if filter media has been damaged.







Eye protection Dust mask



Ear protection



clothira

### Particulate Behaviour

This is the length of time it takes for a particle to drop from a height of 1.5m in STILL air.

20µm 10µm 5µm 0.5µm 3.6 mins 8.3 mins 35.7 mins 2.8 hrs 41.7 hrs











Warehouses and workshops do not have still air, so hazardous airborne particulates may remain in air for longer, increasing chance for workers to breathe in dust. Ensure PPE is worn when installing this system.



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### **CRITICAL PARTS & MAINTENANCE SCHEDULE**

### **Maintenance Schedule**

The following tables show our suggested maintenance schedule for all units. Please note that site conditions may alter this. Excludes high corrosion environments.

Data download is required to claim the 3-year warranty on Brushless Blower Motor.

### Inspect every 500 Hours and replace when filter is full\*

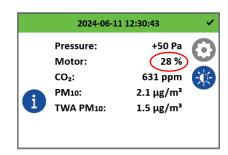
inspect every 300 frout 5 and replace when inter is fair					
Component / System	Action Required				
Turbo Pre-cleaner	Check operation of the Turbo Pre- Cleaner.				
Pressuriser Blower	Ensure blower is operational.				
HEPA Primary Filter p/n: <b>500000</b>	Inspect filter capacity indicator. Replace HEPA filter when 80% or greater. Vacuum out housing before replacing the filter elements.				
HEPA Return Air Filter P/N: <b>500011</b>	Vacuum inside cabin floor before replacing filter.				
Filter Frame Assembly, Mounts, Seals and Filter Housing	Check door seals, all bolts, screws, and all mounts are secure. Check the filter canister & ensure it is correctly fitted. Check latches are operational and in good order. Replace / Re-tension fixtures and fittings required.				

### 15,000 Hours / 36 months\*

Component / System	Action Required		
500 Hour Inspection	All 500-hour inspection actions.		
Pressuriser's Blower 200002	Replace BRUSHLESS Pressuriser blower.		

	Critical Parts						
Item Part Number Qty.			Description	Service Interval			
1	500000	1	HEPA H14 Fresh Air Filter (Tested as per EN1822)	1000* Hours (>80% fan capacity)			
2	500011	1	HEPA Return Air Filter	500* Hours			
3	200002	1	Brushless Blower Motor – 24V	15,000 Hours			
4	200510	1	OnGuard TS User Interface inc. CO <sub>2</sub> & PM Sensor				
5	200361	1	OnGuard Main Unit Active				
6	200368	1	OnGuard Sensor Pod (Optional)				

### **Suggested Schedule Servicing\***



### **Fan Capacity Indicator**

The filter is serviceable if the motor capacity is between 10% & 80%. We recommend that the filter is changed if the capacity is over 80%.

\*Site dependent

<sup>\*</sup>Filter service hours are subject to cab sealing efficiency, site conditions and correct system use.

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### **OPERATOR GUIDE**

	OPERATORS CHECKLIST							
	PRE-START PRE-START							
1.	1. Visually inspect the pressuriser, ducting, mounting brackets, and return air filter assembly.							
2.	2. Visually inspect the cabin for any damage to doors, windows and seals.							
3.	3. Please remove dust & debris from shoes and clothes before entering the cabin.							
4.	4. Ensure door(s) and windows are closed correctly.							
5.	5. Start engine and turn HVAC blower to mid speed or greater.							
6.	6. After automatic pressure test, the BreatheSafe display will show 50 Pascals or pre-set value.							
	The system is working correctly when the pascal value is green.							
	>> There is no further action required <<							

#### **ALERTS**

#### **No Air Pressure**

Pressure warning has persisted and system has escalated warning to an alert. Check cabin sealing, outside pressure tube is connected to unit and not kinked or blocked, pressuriser is powered and running, and ducting from pressuriser to cabin is connected and undamaged.

### Very High CO<sub>2</sub> Level

Critical alarm threshold for CO<sub>2</sub> level reached. System will temporarily increase fresh air intake to reduce CO2 concentration. Ensure OEM air conditioning fan is set at mid-speed or greater to circulate air around the breathing zone and minimise CO<sub>2</sub>.

### **High Dust Level**

High dust load detected inside the cabin. System will temporarily flush enclosure with filtered air. Close doors and windows. Check filter is installed correctly, and ducting is not damaged.

#### **Sensor Not Detected**

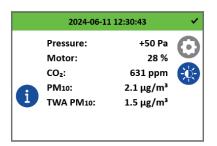
Unit failed to detect sensor pod. Check sensor pod cable is securely connected to the unit and sensor pod. Restart unit, and replace sensor pod if alert persists.

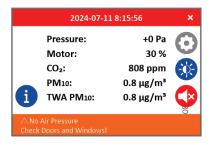
### **Sensor Fault**

Unit has detected a sensor pod fault. Ensure airflow to sensor pod is not blocked or obstructed. Replace sensor pod if alert persists.

### **No Air Pressure**

Pressure loss warning has persisted for longer than 2 minutes. Check cabin sealing, outside pressure tube is connected to unit and not kinked or blocked, pressuriser is powered and running, and ducting from pressuriser to cabin.





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### **Specifications High-Capacity HEPA Pressuriser**

Blower : Brushless Blower P/N 200002.

Protection : Locked Rotor Protection (Sub Zero Environments) Under

Voltage, Under/Over Current & Over Temperature.

Voltage : 24VDC.

Current Draw : 11 amps (peak). \*Note: Motor has slow start to stop excessive

in-rush current.

Air Flow : Up to  $30-300 \text{ m}^3/\text{h}$  or 50-215 CFM.

Pre-cleaner : Integrated VLR (Very Low Restriction). Turbo Pre-Cleaner.

Filter Element : BreatheSafe HEPA Primary Filter (H14=99.99% MPPS) TESTED AS

PER EN1822 - P/N 500000.

Plugs & Fittings : Mining Spec. Deutsch electrical plugs as standard.

Construction : High strength composite construction.

Serviceability : Easy access HEPA filter with twist-lock (TL) dust cap single

as sembly.

Mounting : Heavy Duty adjustable mounting brackets.

Design : Fully designed in SolidWorks 3D CAD & Ansys Engineering

Simulation Software.

FEA Testing : Critical components FEA (Finite Element Analyst) tested in Solid

Works Simulation.

CFD Testing : CFD (Computational Fluid Dynamics) simulations in Flow Works

to ensure optimum air flow through the system.

### SPECIFICATIONS HIGH-CAPACITY HEPA PRESSURISER

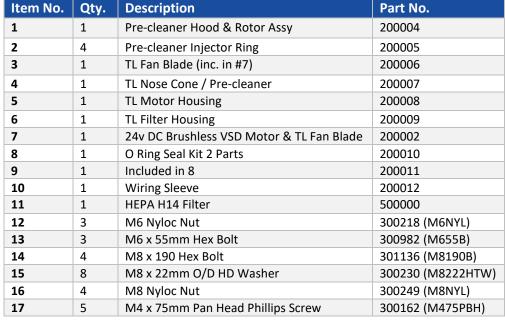
	List of Abbreviations					
DH	Dual HEPA					
DHPR	Dual HEPA Powered Recirculation					
DHAC	Dual HEPA Activated Carbon					
DHACPR	Dual HEPA Activated Carbon Powered Recirculation					
СРМ	Cabin Pressure Monitor					
CPU	Central Processing Unit					
DB	Decibel Sensor					
DPM	Diesel Particulate Matter					
GAS	Gas Sensor					
HEPA	High-Efficiency Particulate Air Filter					
HPAFU	High Pressure Air Filtration Unit					
HRAF	HEPA Return Air Filter					
HVAC	Heating Ventilation and Air Conditioning					
MAF	Mass Air Flow					
OEM	Original Equipment Manufacturer					
PM	Particulate Mass					
RH	Relative Humidity					
TEMP	Temperature					
TS	Touch screen					
UI	User Interface					
VMS	Vehicle Monitoring System					
VS	Vibration Sensor					
OGSP	OnGuard Sensor Pod					
CO2s	CO2 Sensor INPRESS TS					

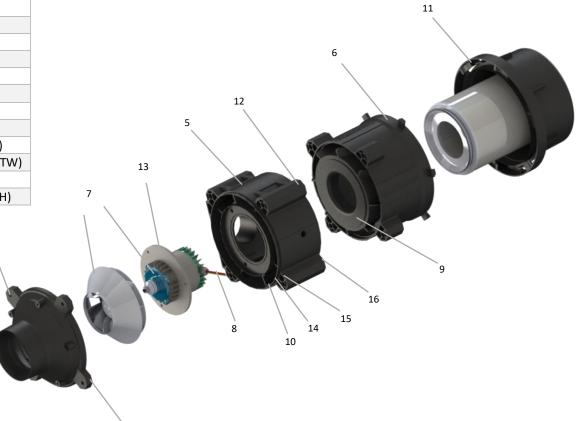
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### **Breathe Safe**

PARTS LIST – 24V DC PRESSURISER UNIT

PRESSURISER ASSEMBLY No: 200000





PART NO. TLF700ENI
SERIAL NO. AB0186
TEST DATE: 2022/04/26

Breathe Safe
Air Purification

HEPA H14 GLASS FIBER FILTER
TESTED METHOD EN1822
EFFICIENCY 99.995% @0.3 MICRONS

Support: 1300 667 597
Sizes @breathe-safe.com

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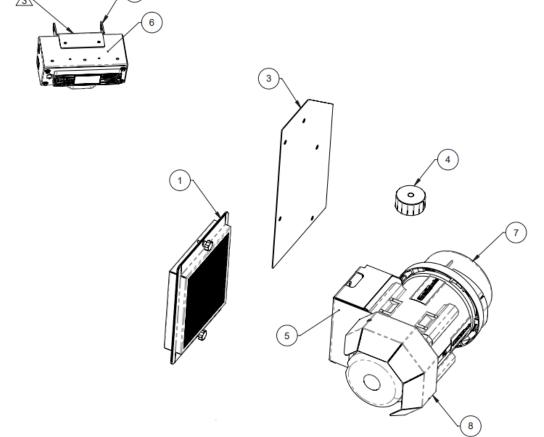


**PARTS LIST GA** 

**COMPLETE ASSEMBLY No: 710943** 

Item No.	Part No.	Rev	Description	Qty	Colour	Category
1	08035	4	Return Air Filter Assembly	1	Black Satin 27219268	Assembly
2	07445	2	INPRESS Mount Bracket	1	Black Satin 27219268	Part
3	11326	1	TL, SO2 Blanking Plate	1	Black Satin 27219268	Part
4	250520	[*]	Ø76 Tube Slip Cap	1	(As Req'd)	Stock Item
5	250005	0	CAT 793F TL Mount	1	(As Req'd)	Stock Item
6	250101	[*]	Monitor Box, Large	1	(As Req'd)	Stock Item
7	200000	[*]	HPAFU 24VDC VSD TL4	1	-	Stock Item
8	250068	1	TL WC Guard Short with Spacer	1	(As Req'd)	Stock Item
9	300852	-	76 ID Silicone Hose @58L	1	-	Pipework
10	300001	-	65-89mm Hose Clamp	2	-	Pipework

Kit Part Number: 710943

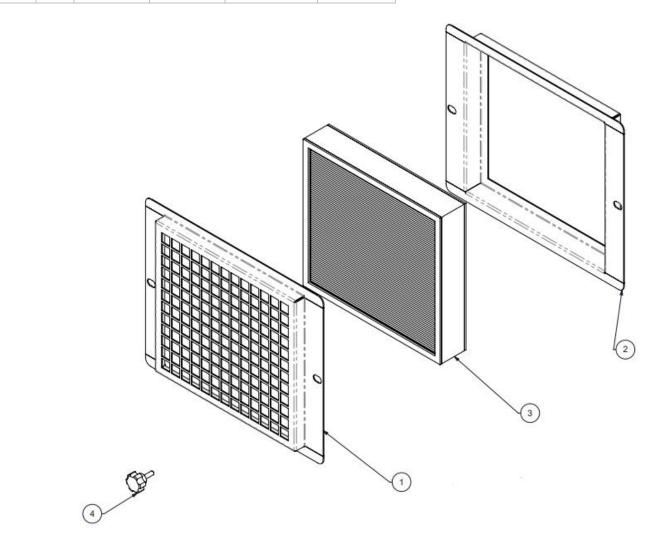


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### **Breathe** Safe

Item No.	Part No.	Rev	Description	Qty	Material	Thickness	Colour	Category
1	08036	1	Filter Cover	1	Zan	1.55	-	-
2	08037	1	Filter Housing	1	Zan	1.55	-	-
3	500011	0	HEPA Filter Assy 270 x 250 x 51	1	N/A	-	-	-
4	300814	-	M6 x 20 Male Scallop Knobs	2	-	-	-	-

### PARTS LIST – RETURN AIR MODULE



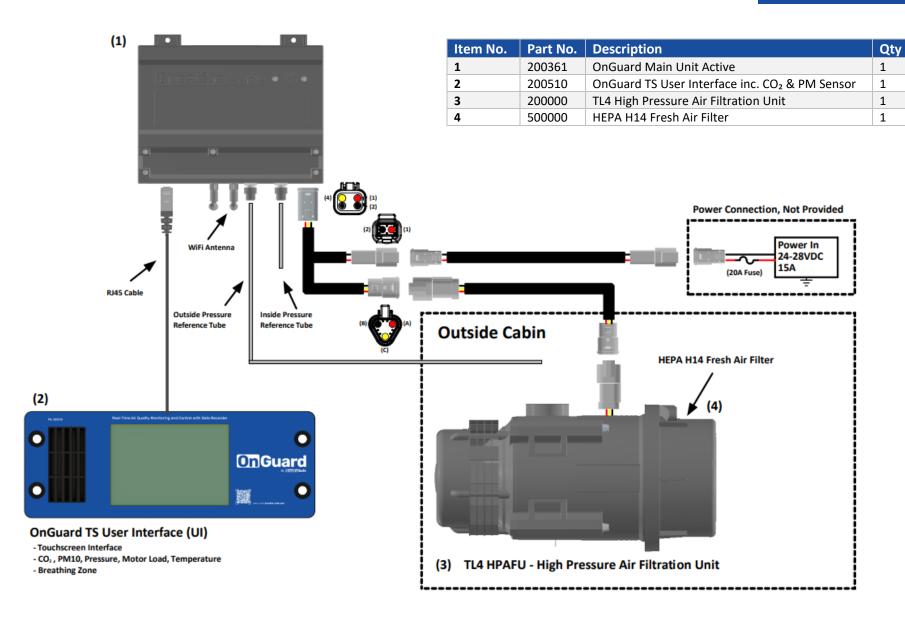


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Wiring Diagram

TECHNICAL DETAILS



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\* Do not handle until MSDS & all safety precautions have been read and understood. Use personal protective equipment as required.

Before use, carefully read the product label. Safe work practices are advised to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking, and smoking in contaminated areas. Avoid inhalation. Mechanical extraction ventilation is recommended when the removal of atmospheric contaminants is required. Maintain dust / fume levels below the recommended exposure standard. For small amounts, absorb with sand, vermiculite or similar and dispose of at an approved landfill site.

#### WARNING

For Professional Use Only – keep out of reach of children.

Do not ignite near or around flammable materials.

Use only in well-ventilated areas, outdoors, and/or with proper respiratory protection.

Persons with respiratory sensitivity should avoid exposure to any smoke.

Concentrated smoke may cause severe burns to the skin, eyes, or respiratory system.

Improper use may result in sufficient inhalation of smoke to cause respiratory tract irritation and lung damage.

Harmful if swallowed.

#### **DANGER**

Use only as directed. Do not handle until all safety precautions, including Safety Data Sheet, have been read and understood. The product contains hexachloroethane. Wear protective clothing. If exposed or concerned, get medical advice. Store in a cool, dry, secure location. KEEP OUT OF REACH OF CHILDREN. Dispose of contents/container per location regulations. When used as directed, exposure should be limited and usually poses no hazard because the hexachloroethane is consumed inside the tube as smoke is produced.

### **Directions: (Smoke Bomb)**

- Ensure other workers in close proximity are informed of use. Place on a non-combustible container, away from flammable materials.
- 2 Place at Blower intake, or upwind of target area, or near centre of space.
- Orient "Smoke Issues Here" toward air stream, away from surfaces. Place candle on a flame / heat resistance plate if not it will melt into the plastic surface.
- 4 Ensure smoke will not create any hazard where it is anticipated to go.
- 5 Ignite emitter inside the cabin using site approved device i.e., solder torch or 'lighter' and conduct smoke test.
- 6 Do not touch or hold smoke generator after ignition item becomes very hot & remains hot after use.

#### **Smoke Emitter Cabin Pressure Leak Test**

- 1 The pressuriser system is switched on (TEST MODE).
- 2 Hold the smoke emitter angled down.
- 3 Ignite emitter using site approved ignitor i.e., solder torch or 'lighter'.
- 4 When the product ignites, remove the lighter.
- 5 If the product flames up, blow out the flame.
- 6 Place the emitter in a non-flammable container and place it inside the cabin at floor level and close the door/windows.
- 7 Observe smoke leaks to indicate worn-out or broken seal locations. Check leakage points outside the cabin.
- 8 Do not come into contact with or inhale smoke haze.
- Wait until the smoke haze **completely** disperses before re-entering the cabin. Open door to allow sufficient ventilation of smoke prior to entering cabin.

### **SMOKE EMITTER CABIN PRESSURE LEAK TEST**

Link to MSDS: SMOKE GENERATOR TQ7621AT30S.pdf

Personal Protective Equipment (PPE)						
<b>(2)</b>	Safety glasses must be worn at all times.					
2	Sturdy footwear with rubber soles must be worn.					
<b>2</b>	Respiratory protection devices may be required.					
	Gloves may be worn.					
	Pre-Operational Safety Checks					
~	Locate and ensure you are familiar with all machine operations and controls.					
<b>~</b>	Check work area and walkways to ensure no slip/trip hazards are present.					
Ensure the work area is clean and clear of any flam material & fire extinguish device is present.						
	Operational Safety Checks					
<b>✓</b>	Ensure other persons do not inhale smoke haze.					
<b>~</b>	Take care and do not place a lit emitter close to a flammable surface.					
	<b>Ending Operations and Cleaning Up</b>					
<b>~</b>	Leave the work area in a safe, clean, and tidy state.					
	Potential Hazards					
i	Falls					
(i) (i)	Fumes					
	Fire					
May cause cancer						
Exposure is highly unlikely when the product is used as directed. Direct contact with the product does not occur.						
Don't						
×	Do not use if an open flame is forbidden.					
×	Never leave the emitter [cabin test] unattended.					
****	WD door not possessarily sover all possible bazards associated					

<sup>\*</sup>This SWP does not necessarily cover all possible hazards associated with this equipment and should be used in conjunction with other references. It is designed as a guide to be used to compliment training and as a reminder to users prior to equipment use.

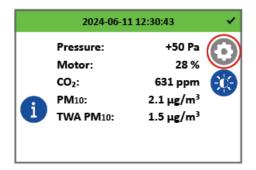
## CATERPILLAR 793F / 795F Haul Truck



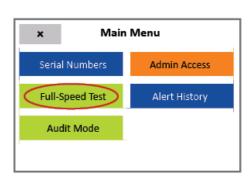
**CABIN SEALING TEST PROCEDURE** 

### **Cabin Sealing Efficiency Test Procedure**

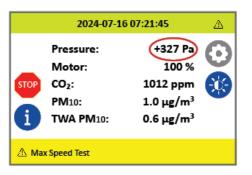
New replacement filter is required to perform this check. Start engine (pressuriser ON) and ensure all windows & door(s) are CLOSED correctly (no cabin pressure leaks).







Press "Full-Speed Test" button.



Cabinet sealing needs to be checked and improved if maximum pressure is below 250 Pa with a new filter.

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### **COMMISSIONING PROCEDURES – CABIN PRESSURISER**

### **Commissioning Procedures**

### Step One:

Access the commissioning form via the following link or scan the QR code:

https:cthree.breathe-safe.com/coregform

#### Step Two:

Carry out commissioning procedure correctly and collect required results.

- System Check Guide:
- Start engine (pressuriser ON) and ensure all windows & door(s) are CLOSED correctly (no cabin pressure leaks).
- Take a photograph of the pressure reading on the UI while the Full-Speed Test is running.
- Press settings and "Cancel System Check" to end the test.

Cabin sealing is an integral part of RS20 & ISO 23875; you must ensure that cabin seals are adequate for maintaining positive pressure. In addition, the site (end-user) must have the correct procedure(s) for servicing operator enclosure seals in a proactive manner rather than reactive. Items such as door and window seals must be in good working order or new seals fitted before the BreatheSafe system installation. The minimum BreatheSafe requirement for cabin sealing efficiency is 250 pascals; if this result is not met, it is essential to reexamine and find pressure leaks of the enclosure and apply new sealing measures.

#### Step Three:

Fill out the commissioning form on the BreatheSafe website.

#### Step Four:

- Upload the following required commissioning images:
- Job Sheet with Receiver's Signature
- Whole Machine (Showing Pressuriser)
- Mounted Pressuriser
- Return Air Filter Label
- Return Air Filter Installation
- Pressure Test Result
- Actual Pressure and Motor Load
- Commissioning Sticker
- Machine S/N Plate
- Engine Hours / Odometer

### Step Five:

- Fill in the BreatheSafe service tag with the following details:
- Machine serial number and installers details
- Date installed and "Full-Speed Test" result (max cabin pressure)
- The set cabin pressure with actual pressure and motor percentage output
- Verify the 250 pascal threshold was achieved = pass OR not achieved = fail\*\*

Please upload machine and installation details in conjunction with the required images. A Commissioning Certificate will be sent to the email address you nominate. \*\*Extended warranty for (RS20 & ISO 23875) BreatheSafe systems is only applicable to operator enclosures meeting this requirement.



Breathe Safe Part of Aire Safe Air CONDITIONING FAN MUST BE TURNED TO HEDIUM SPEED TO CIRCULATE AIR & MINISTRECO. LEVELS.							
MACHINE SN:	BREATHESAFE CONTROLLER SN:						
DATE INSTALLED:	MACHINE HOURS:						
AUTO PRE-SET PRESSURE (Pa):	MAX CABIN PRESSURE (Pa):						
NOTES (FILTER PART NUMBERS):							
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31						
JAN FEB MAR APR MAY JUN	JUL AUG SEP OCT NOV DEC						
2023 2024 2025 2026 2027 2028  Technical Support Phone: 1300 667 597   www.breathe-safe.com							

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**INPRESS TL WARRANTY** 

#### **Express Warranty**

All BreatheSafe products carry a warranty against defects in materials or workmanship, provided the defects are not from factors outside of BreatheSafe's control (including neglect, lack of maintenance, improper installation or operation, unauthorized servicing repair, etc.). BreatheSafe will replace goods defected in material or workmanship at our Queensland factory or designated branch\*. All parts deemed as failed or faulty must be returned to BreatheSafe for evaluation unless otherwise stated in writing.

Note- Systems must be installed and commissioned as per BreatheSafe installation and commissioning instructions. Once commissioned, the online commissioning sheet must be filled in, extending the components warranty as below. In addition, the system must be serviced and maintained correctly and by trained and qualified personnel. This requisite includes BreatheSafe technicians, qualified automotive air-conditioning technicians, or qualified auto electricians.

#### Warranty period - Standard

- 1 year or 10,000 hours (whichever occurs first).
- Controllers 1 year no extended warranty option.
- Warranty Period Extension when commissioning documents are registered online within 28 days of installation
- Extended warranty\*\* only offered if commissioning maximum pressure test reaches at least 250Pa.
- Brushless motor fixed speed two years, or 10,000 hours (whichever occurs first).
- Variable speed brushless motor 15,000 hours, or 3 years\*\* (whichever occurs first).

Must be supplied with a variable speed pressure controller, data download required for 3-year warranty option. Link to online Commissioning and Extended Warranty Registration form <a href="https://www.breathe-safe.com.au/commission/">https://www.breathe-safe.com.au/commission/</a>

#### What is not covered under Express Warranty?

- Failures are due to incorrect application.
- Damage resulting from neglect, misuse, lack of maintenance, improper installation, or operation, inappropriate or abnormal use, accidental or unauthorized servicing repair.
- Failures are due to parts not being sold or approved by BreatheSafe.
- Failures arising from any other cause that is not directly related to a defect in material or workmanship.

This Express Warranty is VOID if the product is altered, modified, or used in the manner it was not designed for, also including unauthorized repairs, or using maintenance and repair parts other than those supplied by BreatheSafe.

#### BreatheSafe responsibilities

If there is a defect in material or workmanship not caused by the excluded failures during the warranty period, BreatheSafe will either replace the defective goods at our Queensland factory, or designated branch. \*

Alternatively, BreatheSafe may elect to provide new replacement parts, BreatheSafe approved repair parts or assembled components needed to repair the defect. BreatheSafe reserves the right to provide a refund of the purchase price in lieu of replacement or repair at BreatheSafe's discretion. The replacement or repaired product will be sent to you freight prepaid by the customer or made available for pick-up on site.

#### **Users Responsibilities**

The customer should ensure that the system is maintained according to BreatheSafe service requirements and only authorized parts must be used to service and maintain BreatheSafe systems. In the event of a suspected warranty claim, BreatheSafe should be contacted in the first instance to arrange the repair or to assist with diagnosis. Claims should be made within one week of the repair.

After contacting BreatheSafe, you may be required to deliver or send the parts to BreatheSafe's Queensland factory or designated branch. \* Link to online Warranty claim form https://www.breathe-safe.com.au/warranty/

#### **Exclusion and Limitations on Damages and Remedies**

This warranty is provided in lieu of all other warranties, written or oral, whether expressed by affirmation, promise, description, drawing, model, or sample. To the extent allowed by law, all warranties other than this warranty, whether express or implied, including implied warranties of fitness for a particular purpose, are disclaimed. The maximum liability of BreatheSafe under this warranty shall not exceed the original purchase price of the product. Interference with the equipment by or abuse, or by operating the equipment at ambient temperatures or with electrical power characteristics outside the ranges indicated in our specification shall be excluded from this warranty, as shall consequential damages.

Excluded from any express warranty are costs incurred in relation to service outside our factory our designated service branch, including traveling time, waiting time, transport costs, mechanical and overtime payments required. As per Australian Consumer Law: You are entitled to choose a refund or replacement for major failures with goods. If a failure with the goods or service does not amount to a major failure, you are entitled to have the failure rectified in a reasonable time. If this is not done, you are entitled to a refund for the goods and to cancel the contract for the service and obtain a refund of any unused portion. You are also entitled to be compensated for any other reasonably foreseeable loss or damage from a failure in the goods or service.

\*This express warranty gives you specific legal rights, and you may also have other rights that vary from country to country.