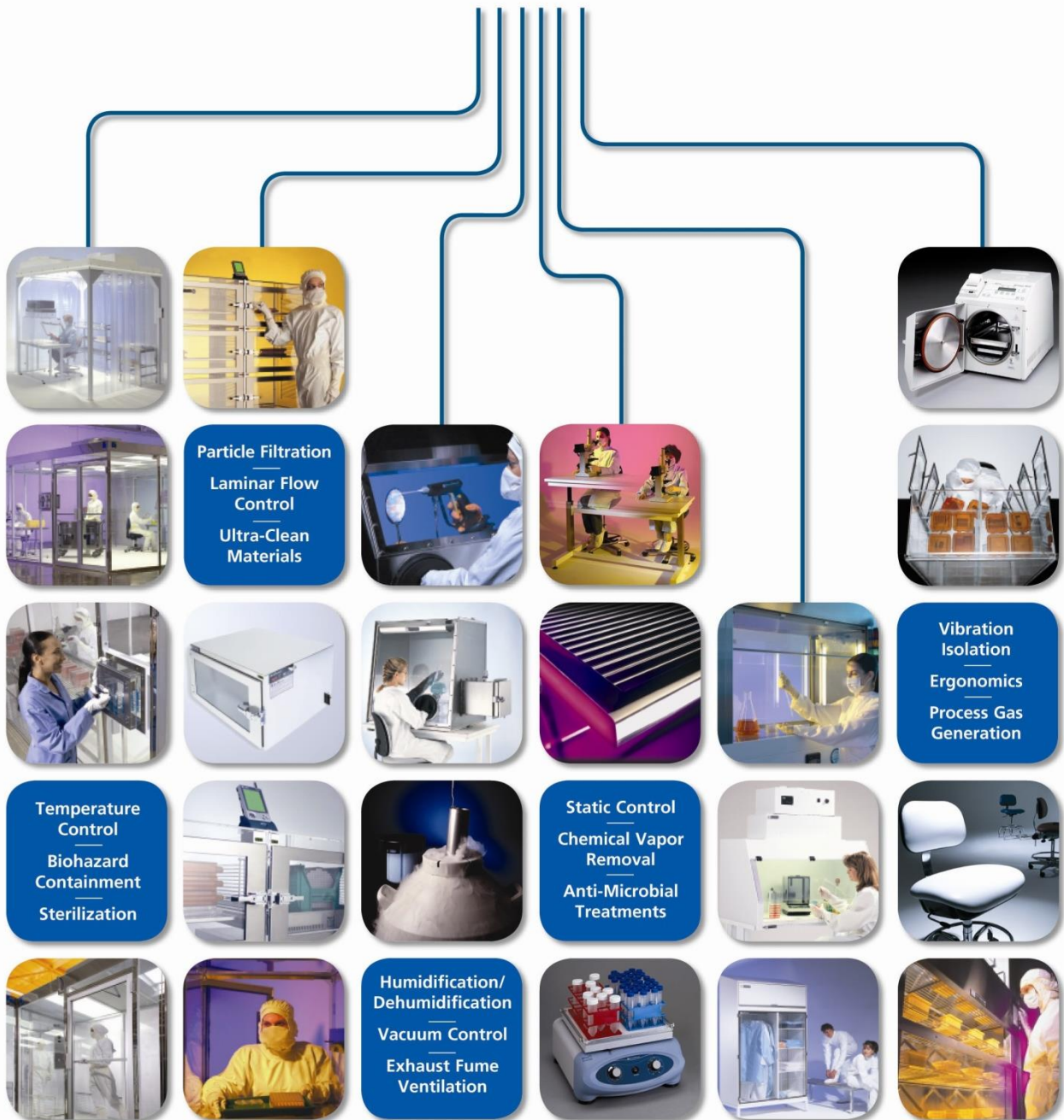


Low-Profile Air Shower

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Your Comprehensive Equipment Source





Low-Profile Air Shower

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Safety Notice

A thorough familiarity with all operating guidelines is essential to safe operation of the product. Failure to observe safety precautions could result in poor performance, damage to the system or other property, or serious bodily injury or death.

The following symbols are intended to call your attention to two levels of hazard involved in operation:



CAUTION

Cautions are used when failure to observe instructions could result in significant damage to equipment.



WARNING

Warnings are used when failure to observe instructions or precautions could result in injury or death.

The information presented here is subject to change without notice.

1.0 Description



NOTE

The Air Shower is a supplemental control measure designed to remove particles from garments prior to entering an ISO-classified space, similar in function to a pass-through. The Air Shower chamber does not constitute an ISO-classified space and cannot be treated as such when designing a cleanroom facility.

Terra Universal's Low-Profile Air Shower removes surface-deposited particles from personnel as they enter and exit a cleanroom or other controlled environment. These units are designed to provide bursts of HEPA-filtered air that exceed the standards for ISO 5 particle counts.

The Blower Module circulates air at high speed through 1"-diameter nozzles positioned throughout the interior walls and ceiling of the Air Shower/Tunnel. Each nozzle can be adjusted to control the direction of the air flow. A high-capacity HEPA filter (rated to be 99.99% efficient @ 0.3-micron particles and installed with a closed-cell gasket) captures contaminants before air is forced through the nozzles.

The Air Shower is equipped with electromagnetic interlocks that keep both doors locked during the operation cycle to prevent inadvertent contamination. After the cycle ends, both doors will unlock to allow entry and exit. A timed delay will prevent the activation of another cycle, allowing the user to exit the air shower.

There are three Emergency Stop buttons installed on the Air Shower (one interior button, one at the entrance, and one at the exit). Pressing any of the Emergency Stop buttons immediately cuts power to the Blower Module(s), stopping the blower cycle and unlocking both doors. The blower and the locks will not activate until the depressed button is reset (See **Section 4**).

Energy-efficient, 24V LED lights are positioned along the ceiling of the Air Shower/Tunnel. The lights are controlled by the PLC touch screen control panel located next to the entry door.

Customers may also opt for their Air Shower order to be shipped disassembled for easier transport through standard doorways or more space-restrictive access areas.



WARNING

To reduce the risk of fire, electric shock, or injury to persons, use this unit only in the manner intended by Terra Universal.



2.0 Installation



Terra Universal strongly recommends that installation work and electrical wiring be done by licensed and qualified person(s) in compliance with all applicable codes and standards, including fire-rated construction.

Unloading Shipment

- Several people are required to unload individual components from the shipping crates.
- Because installation requires unpacking and may require some assembly, the customer is to ensure an adequate staging area for parts and equipment adjacent to the assembly area.
- The Air Shower must be connected to the facility power supply in conformance with local electrical codes. Depending on the system's requirements, the power source voltage needs to be either 208V, 230V, 240V, or 460V with a 40-A circuit breaker. Please check your original order form for the exact specifications applicable to your unit.

The Air Shower is normally shipped in two sections: the main enclosure and the filter/blower housing, which also contains the electrical box. If the enclosure was bolted to the pallet for shipping purposes, you may have to break away parts of the pallet to reach the bolts.

Required Installation Equipment (Not Included)

- A forklift or pallet jack
- portable drills and driver extensions
- a measuring tape
- floor anchor bolts (optional)

Components Inspection

Unpack all system components and check for damaged or missing parts. Any damage should be reported to the shipping company immediately. Contact Terra Universal if any parts are missing. Refer to **Section 9.0: Warranty** for further information.

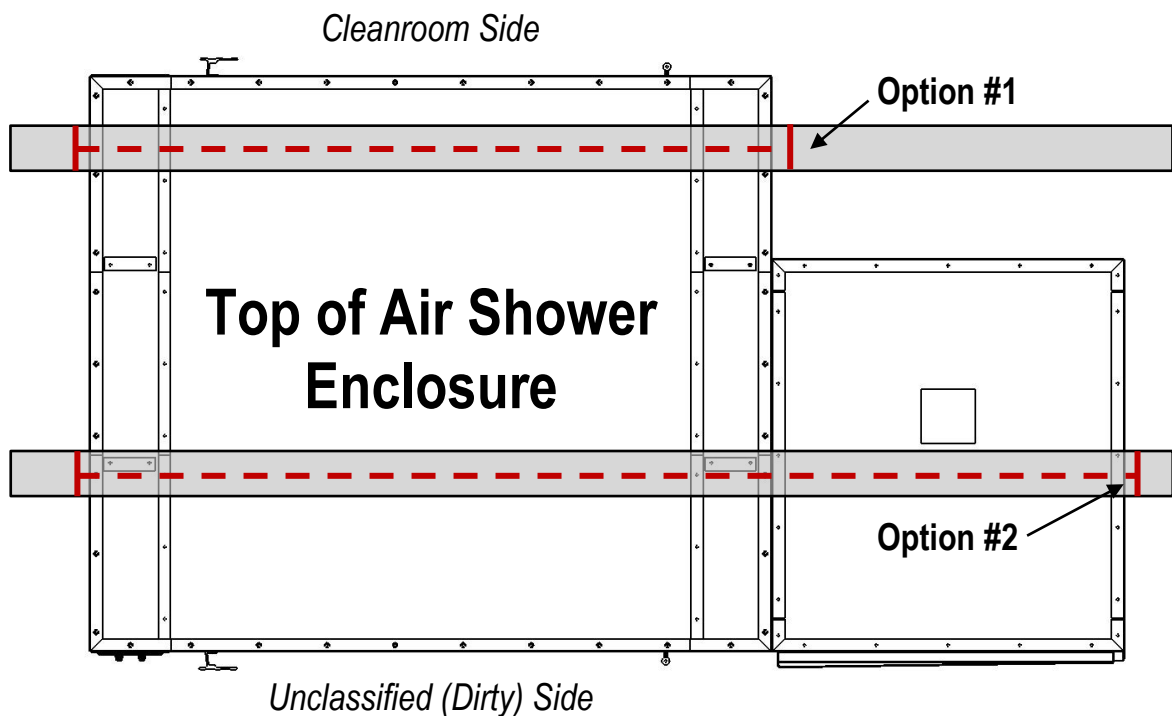


Site Preparation



The Air Shower is preassembled and tested at the factory on a flat, level surface to ensure proper door operation and fit.

1. Verify that the floor on which the unit will operate is flat, level, and adequately supported. Shimming may be required if the floor is not level. Failure to level the floor may result in the inability to complete the assembly of the Air Shower.
2. If the Air Shower will be inserted into a wall, there are two options for the required wall cut-out:



Option #1 is a wall cut-out that only needs to be large enough to allow the main enclosure to slide through. This would be the optimal solution, as the Air Shower could then be positioned so that the face is flush with the wall surface. This keeps the entire filter/blower section on the outside of the cleanroom and eliminates any ledges created by the roof of the Air Shower.

Option #2 will cause the Air Shower to extend into the cleanroom, but this may be the only option if floor space is restricted on the unclassified side. This may be less of a concern if the roof of the Air Shower meets the ceiling of the cleanroom, avoiding the issue of horizontal, dust-collecting surfaces in the cleanroom.

3. Measure and mark a rectangle on the floor to indicate the footprint of the air shower.

Installing Stainless Steel Floors (Optional)

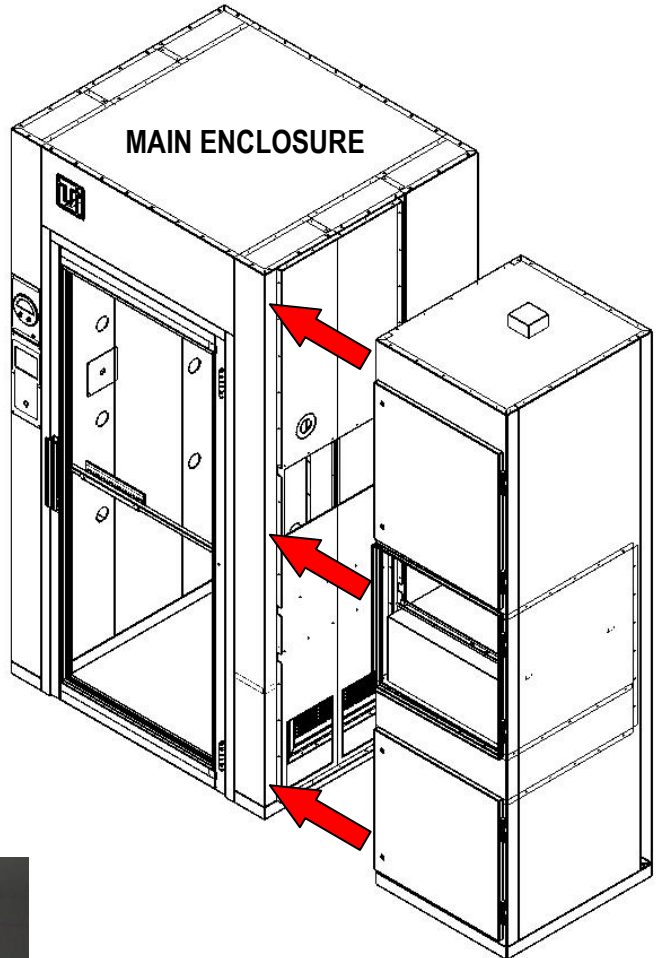
If you ordered a stainless steel floor for your Air Shower, peel off the PVC sticker covering the bottom of the stainless steel floor. Peel off approximately 7" of the PVC sticker covering from the top of the stainless steel floor at each edge. Align and place the stainless steel floor within the marked floor perimeter. The Air Shower simply rests on top of this flooring.



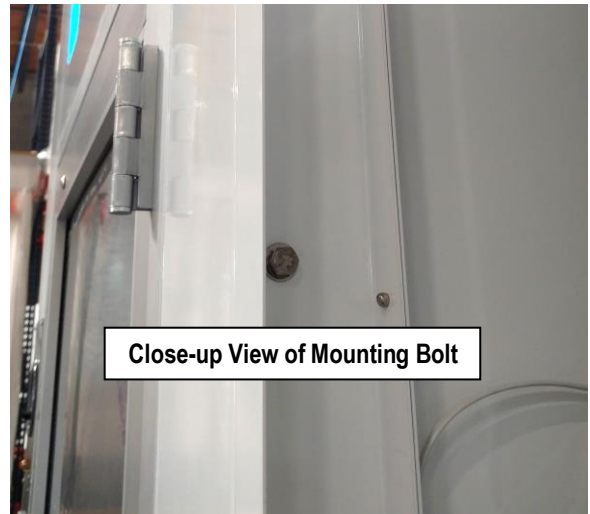
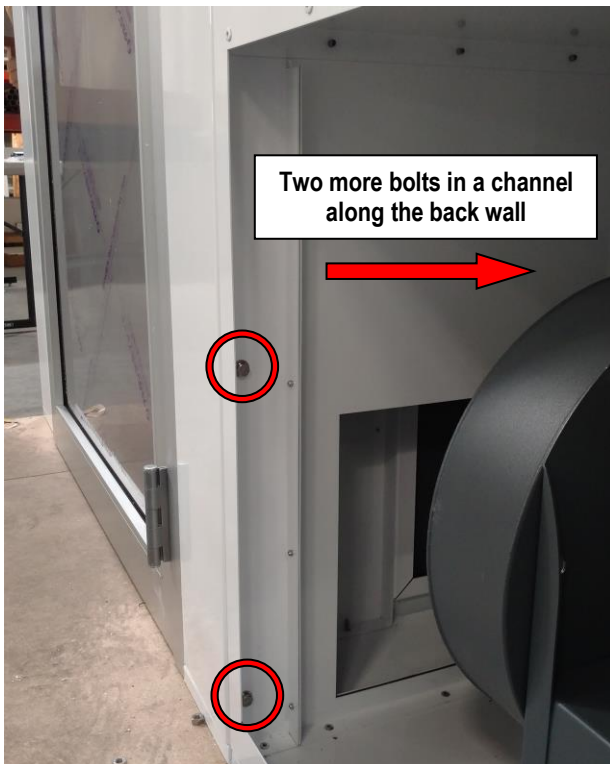
Low-Profile Air Shower

Installing the Air Shower

1. Determine the correct orientation for the Air Shower. The Control Panel and utility access doors should NOT face into the cleanroom; this is considered the "dirty side" due to the surface obstructions. The opposite side has much smoother surfaces, making it more appropriate for an ISO-rated environment.
2. Maneuver the main body of the Air Shower into its final position. If applicable, slide the Air Shower into the wall cut-out.
3. Slide the second section (housing the HEPA filter and blower) up against the main body as shown in the diagram.
4. Open the three access doors on the second section. Carefully guide the wiring harnesses and air tubing from the main Air Shower into the top cabinet containing the electrical components.
5. There are four (4) mounting holes located along the front and rear channels inside of each utility cabinet. Use the provided bolts and washers to fasten the two sections together (12 bolts total).



FILTER/BLOWER HOUSING





6. Connect the wiring harnesses by matching the labels. Connect the air hose to the port below the wiring harnesses. Check for any loose wires anywhere in the electrical box before proceeding.

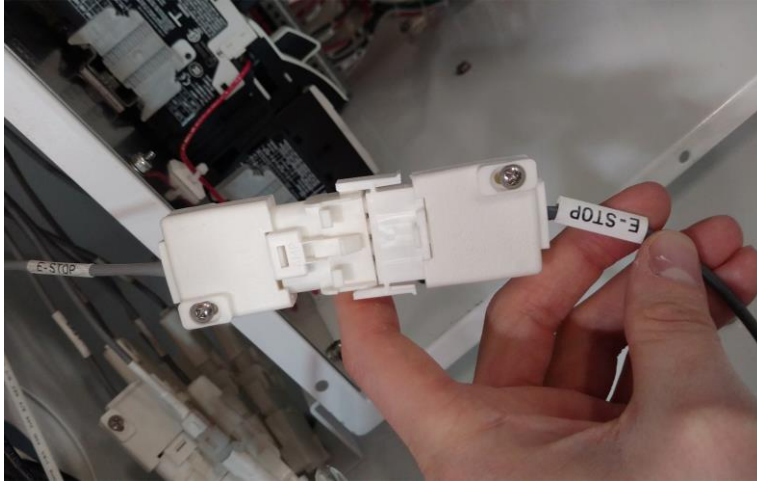


Figure 1: Wiring harness (with labels) connected



Figure 2: Air hose port

7. Connect the Air Shower power cable to a power supply of the appropriate voltage.

3.0 Control Panel Set-Up

After the system is powered on, the Touchscreen Control Panel will display the Main Menu (see Figure 3).

Main Menu Description

Time Remaining – The duration of the Air Shower cycle. The user will see this number count down when the cycle begins.

Exit Time Remaining – The delay time between when one cycle ends and the next can be activated. After a cycle finishes, operation of the Air Shower cycle is disabled while the number is counting down.

Door Lock Time Remaining – The duration of time after the end of the Air Shower cycle when both entrance and exit doors remain locked. This allows any particulates within the enclosure to settle prior to allowing the user to exit.

Settings – Pressing this button takes the operator to the Settings Screen where it will allow them to change any time setting displayed.

Light ON/OFF – Pressing this button manually toggles the lights on and off. Please note that turning on the Smart Lights function in the Settings will override this feature.

Filters Normal – This field indicates the status of the HEPA filter and will notify users when a replacement is needed. Alternatively, users can monitor the saturation of the HEPA filter using the backpressure gauge mounted above the Control Panel (if equipped). See **Section 5 Maintenance** for guidelines on replacing the HEPA filter.



Figure 3: Main Menu



Settings

Recommended Minimum Settings	
Shower Time	20 seconds
Exit Door Delay Time	5 seconds

1. To access the Settings Menu, press the “Settings” button on the Main Menu and enter your security code. The default security code is “**2345**” (this security code cannot be changed).



Figure 4: Settings Menu

2. Settings Menu - Five settings can be customized in this menu (all time values are in seconds):
 - a. **Shower Time** – This value determines Air Shower cycle time.
 - b. **Entrance Door Delay Time** – This setting determines the delay between the entry door closing and the activation of the air shower cycle. This feature allows a short time for the user to settle in before the cycle begins.
 - c. **Exit Door Delay Time** – This setting delays the start of another cycle for a specified time after the end of an air shower cycle. This timer allows the user to leave the unit prior to the start of the next cycle.
 - d. **Door Lock Delay Time** – This setting determines how long the doors remain locked after the cycle is complete. This allows for any airborne particulates within the enclosure to settle prior to opening the doors.
 - e. **Smart Light Delay Time** – This setting determines how long the LED lights will stay on after the last movement detected by the motion sensor. This delay only occurs when the Smart Light mode is in use.
 - f. **Main** – Pressing this button takes the operator back to the Main Menu.
 - g. **Smart Light ON/OFF** – Pressing this button toggles the Smart Light mode. Please note that turning on this feature disables the Light ON/OFF button on the Main Menu.
 - h. **Normal/Doors Reverse** – Pressing this button reverses the function of the Entrance and Exit doors. In Normal mode, the Entrance Door is on the same side as the Touchscreen Control Panel. Tap the “Normal” button to switch to Doors Reverse mode, where the opposite door will function as the Entrance Door. Tapping “Doors Reverse” will return the unit to Normal mode.



- To change any of the time settings in the Settings Menu, tap the value on the screen to open the editing field (see Photo 23). Type in the desired time (in seconds) and press Enter to save the setting.



Figure 5: Settings Menu (Edit Time Field)

4.0 Operation

The air shower cycle is activated by a motion sensor inside of the enclosure. Once the cycle begins, the electromagnetic interlock system locks both the entry and exit doors until the cycle is complete. In case of an emergency, personnel can push the Emergency Stop button located inside the air shower to stop the cycle and unlock the doors.

Before attempting to operate the Low-Profile Air Shower, check all Emergency Stop push buttons to make sure they have not been depressed. The air shower cycle cannot be activated as long as any of the Emergency Stop buttons remains depressed.

To reset an Emergency Stop button, twist the button in the direction indicated by the arrows. The button should spring outward and return to its normal position.

After installation is complete, thoroughly clean the inside of the Air Shower and run several air shower cycles to purge the system of any remaining debris.

Filter Monitor Setup

The Photohelic gauge (mounted above the control panel) measures the pressure levels at the HEPA filter. As the HEPA filter accumulates particles, the pressure reading will increase and the HEPA filter will become less efficient. To configure the pressure gauge:

- Begin by turning the right-hand dial clockwise until the corresponding orange needle is near the end of the gauge.
- Start an air shower cycle and note the pressure reading.
- Turn the left-hand dial clockwise to set the corresponding orange needle at the observed pressure reading.
- Turn the right-hand dial counter-clockwise to move the corresponding needle to twice the observed pressure level.

In general, the HEPA filter should be replaced when backpressure levels double. Once the gauge is configured, the main control panel will automatically display an alert to notify operators when the HEPA filter needs to be replaced.



Operating Procedures

Entering the cleanroom through the Air Shower:

1. Enter the Air Shower and close the Entrance Door. Wait until the Entrance Door Delay Time expires. During this delay period, the exit door will remain locked, but the user may still leave through the entry door before the cycle begins.
2. After the delay period ends, both doors will lock and the air shower cycle begins.
3. During the cycle, operators may rotate slowly within the enclosure to ensure adequate coverage. Sudden, rapid movements are discouraged.
4. At the end of the cycle, the operator must wait for the Door Lock Delay Time to expire before exiting the Air Shower. Both entrance and exit doors will unlock after the delay period and a countdown until the next cycle will begin (Exit Door Delay Timer). Operators must exit the Air Shower before this delay expires to avoid activating another cycle.

Exiting the cleanroom through the Air Shower:

1. Enter the Air Shower and close the Exit Door.
2. Immediately exit the Air Shower through the Entrance Door. No air shower cycle is required when exiting a cleanroom due to the low particle counts.
3. If the user does not exit the Air Shower before the Exit Door Delay Time ends, a cycle will begin and the user will have to wait until the cycle is complete before exiting.



The Operation Status Indicators located above the entry/exit doors will flash as long as one of the Emergency Stop buttons is engaged.

Air Nozzle Adjustment

1. To adjust the direction of air flow on each air nozzle, unscrew by hand the locking mechanism to loosen the nozzle.
2. Re-direct the air nozzle to preference.
3. Tighten the air nozzle to secure it in place.

5.0 Maintenance

Terra Universal's Air Showers require minimal maintenance. Depending on the working environment and frequency of use, it is recommended to periodically perform visual inspections of the Air Shower, looking for any electrical or mechanical issues.



Before servicing or cleaning your Air Shower, switch off the power at the service panel and lock the service disconnect to prevent the system from being accidentally switched back on. If the service disconnect cannot be locked, attach a visible warning sign to the service panel.

Cleaning

Periodically wipe down the interior and exterior panels of the Air Shower with a clean, non-shedding wiper (Terra Universal recommends using a polyester material), clean water, and a mild detergent. Use unidirectional (not circular) motions to remove all surface contaminants.



Blower Module

The blower module consists of a direct-drive blower that is selected for continuous operation. Blower bearings are sealed and maintenance is not required. All other bearings are permanently lubricated. The Blower Module can be accessed through the lower access door, located immediately below the HEPA filter access door. Terra Universal recommends inspecting the blower module every 3-6 months for potential dust accumulation.

HEPA Filter Replacement



CAUTION

Because HEPA filter mini-pleats are easily damaged, avoid touching the filter face and always handle the filter by the edges.

Replacement HEPA Filter: Cat. # PA06648

To replace the HEPA filter,

1. On the middle access panel, use a flathead screwdriver to turn the slotted latches 180°, releasing the access panel door.
2. The HEPA filter is held in place by two retaining brackets. Unscrew the nuts on each of the bracket posts to loosen the retaining brackets.
3. Slide out the old HEPA filter and discard it.
4. Handling only the edges, carefully slide in the new HEPA filter and reattach the retaining brackets.



Figure 6: HEPA filter shown installed



Figure 7: Retaining bracket post

LED Light Replacement

Replace LED lights when you observe flickering or burnout. Contact Terra Universal and any sales associate can help you order replacement LED lighting for your Air Shower/Tunnel.



6.0 Troubleshooting

The Air Shower's main junction box is located in the top cabinet of the filter/blower housing.

If any of the electrical systems (control panel, lights, blower, or door interlocks) fail to operate,

1. Verify that the system is connected to a 60Hz, 3-phase power source of the correct voltage.
2. A circuit panel located inside the electrical service box guards against circuit overloads. Verify that the three (3) circuit breakers are in the ON position.
3. Verify that the "Power" and "Run" LED lights are lit on the PLC. (Contact Terra Universal for assistance if the "Fault" LED light is lit.)
4. If the unit still fails to respond, unplug system power and verify electrical service box connections. To do so,
 - a. inspect the labeled connections panel to ensure that all cables and harnesses are securely connected into their appropriate sockets;
 - b. inspect the terminal block for any wires that may have come loose;
 - c. verify that no circuit breakers have been tripped; and
 - d. inspect the fuses (see table below)



Figure 8: Internal PLC Panel

Fuse #	Designation	Amperage
1	Primary on the transformer	2 A
2	Primary on the transformer	2 A
3	Secondary on the transformer	2 A
4	Touch-screen control panel	4 A
5	PLC	2 A
6	LED Light Strip	3 A

5. Replace the electrical access panel.
6. Reconnect system power and replace the electrical access panel. If the system still does not respond, contact Terra Universal for additional assistance.



7.0 Specifications

Construction	
Exterior	16-gauge CR steel, powder-coated white
Air Nozzles	ABS plastic
Door	Anodized aluminum with static-dissipative PVC panel
Power Requirements	
Voltage	208VAC
Frequency	50/60Hz
Phase	3-phase
HEPA Filters	
Pleat Depth	27.5mm
Efficiency	99.99%
Maximum Relative Humidity	99%
Filter Media	Polyurethane with thermal plastic separators
Blower Motor	
Type	High pressure, direct drive, radial blade
Power	3 HP
Maximum Ambient Temp.	104°F (40°C)
Estimated Noise Level	90dBA



8.0 Warranty

Products Manufactured by Terra: Terra Universal, Inc., warrants products that it manufactures to be free from defects for a period of 12 months for parts and 90 days for labor, commencing from the date of shipment. Terra's sole responsibility is to repair or replace, at its option, any part of the product that proves defective or malfunctioning during this time limit. In some cases, components incorporated in Terra Universal products are covered by additional warranties from component manufacturers; obtain specific information from Terra sales representatives. This warranty is void if the equipment is abused or modified by the customer, is operated outside Terra's operating instructions or specifications, or is used in any application other than that for which it is specified. This warranty does not include routine maintenance or service procedures, breakage of quartz baths after 60 days, shipping damage, nor damage from misuse, intentional or unintentional abuse, neglect, natural disasters, or acts of God.

Products Manufactured by Others: Terra Universal, Inc., warrants that, to the best of its ability, Terra's representations of products that are manufactured by others reflect the manufacturer's representations, subject to change without notice. Sole warranty for these products is the original manufacturer's warranty that is passed forward to the purchaser and constitutes the customer's sole remedy for these products. Detailed warranties for distributed products are available through Terra sales representatives.

Freight Shortage or Damage: Upon receipt of any equipment from Terra Universal, Inc., customer shall immediately unpack and inspect for damage or shortage. The customer shall not accept a damaged package or a short shipment until the carrier makes a "damage or shortage" notation on both the carrier's and customer's copy of the freight bill or delivery receipt. Service title passes when the shipment is loaded, so customer is responsible for filing and collecting a freight claim. Any replacement products must be ordered and paid for separately. For Terra's "Policy and Procedures for Returning Goods," see Terra's Internet site: www.TerraUniversal.com.

Generally, customers can improve the chance of collecting on a freight claim by following these procedures: 1) formally requesting that the carrier inspect the shipment immediately upon suspecting damage or shortage to verify condition; 2) notifying the carrier upon discovery of concealed damage and requesting an inspection within 15 days of receipt, both in person or phone and following up via mail; 3) keeping the shipment as intact as possible, including retaining original packaging materials and keeping the product as close to the original receiving location as possible; 4) holding salvage for disposition by the carrier.

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Warranty Returns: All warranty returns must be authorized in advance by Terra Universal and approved under an RMA. Unless approved in advance for good reason, all returns must be in original condition, including all manuals, and must be packaged in original packaging materials. All returned goods are to be shipped to Terra Universal, freight prepaid at customer's expense. See Terra's "Policy and Procedure for Returned Goods."

*Thank you for ordering from
Terra Universal!*
