



High- Air Showers and Air Tunnels

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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.



CAUTION

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

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



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 Introduction

This manual provides information on installing and operating your Terra Universal Air Shower or Air Tunnel. By studying this document carefully, you can be assured of a long, efficient service life from the unit.

- Read all of the instructions before operating your unit.
- Pay particular attention to all safety precautions.
- Retain this Installation and Operating Guide for future reference.



Photo 1: Air Shower



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



Before servicing or cleaning your Air Shower/Tunnel, 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.



2.0 Description

Terra Universal's Air Showers and Air Tunnels remove surface-deposited particles from personnel as they enter and exit a cleanroom or other controlled environment. These units are rated to exceed ISO 5 particle count standards.

Air Showers use one (1) and Air Tunnels use two (2) or more HEPA Filtration System Blower Module(s) to achieve this contaminant removal.

The Blower Module circulates air at a very 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 electro-magnetic interlocks that keep both doors locked during the operation cycle to prevent outside disturbance and contamination. After the cycle, both doors will unlock to allow entry and exit. The cycle can then commence again after a delay time has passed.

There are two (2) oversized mushroom-head Emergency Stop Buttons (1 located inside and 1 located outside the Air Shower/Tunnel). Either button cuts power to the Blower Module(s), stops the blower cycle and allows either door to be opened.

Low-energy and low-voltage 24V LED lights are positioned along the ceiling of the Air Shower/Tunnel. Operation is controlled by a switch on the PLC touch screen control panel located on the exterior of the unit.

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

3.0 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

The following pre-installation requirements should be observed:

- Several people are required to unload individual components from the shipping crates.
- Because installation requires unpacking and assembling components, the customer is to ensure an adequate staging area for parts and equipment adjacent to the assembly area - clear and ready for work.
- The customer must provide permanent electrical connection from the facility supply panel to the Air Shower/Tunnel main junction box 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. See appended electrical wiring diagrams at the end of this Quick-Start Operating Manual for additional information.



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The Air Shower is normally shipped in two sections: the Main Enclosure and the top filter/blower housing. Each is packaged in its own shipping crate.

Required Installation Equipment (Not Included)

- At least one (1) forklift – Unloading crates from the shipping vehicle will be much easier if you have a truck-high loading dock.
- one (1) 2"x4" wooden stud long enough to span the bottom width of the Air Shower/Tunnel
- four (4) 2"x4" wood blocks
- portable drills and screwdrivers
- a measuring tape to make sure everything is flush and square
- floor anchor bolts (optional)

Components Inspection

Unpack all system components and check for damaged or missing parts. Refer to the components list to determine the correct quantity of 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.

Components List

Main Enclosure
Blower Module Housing
Mounting Brackets

Site Preparation



The Air Shower is preassembled and tested at the factory on a flat, level surface to ensure proper door operation and panel 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/Tunnel.
2. Mark a rectangle on the floor to indicate the perimeter of the air shower. Verify right angles by checking the diagonal dimensions with a measuring tape.



Stainless Steel Floors

Stainless steel floors are optional. If you ordered a stainless steel floor for your Air Shower or Tunnel, Terra ships the piece separately from the main unit (see Figure 2). A PVC sticker covering is applied to prevent scratching and damages on both sides. A hole is drilled into each corner for alignment with the marked floor perimeter and Air Shower/Tunnel. Anchor bolts can also be used to fasten the unit for seismic security.

Installation:

1. Peel off completely the PVC sticker covering from the bottom of the stainless steel floor.
2. Peel off approximately 7" of the PVC sticker covering from the top of the stainless steel floor at each edge.
3. Align and place the stainless steel floor within the marked floor perimeter.
4. Align the holes of the stainless steel floor with those of the Air Shower/Tunnel during positioning (see "Positioning the Air Shower" procedures below). The Air Shower/Tunnel can either sit above this stainless steel floor or can be fastened down with anchor bolts.

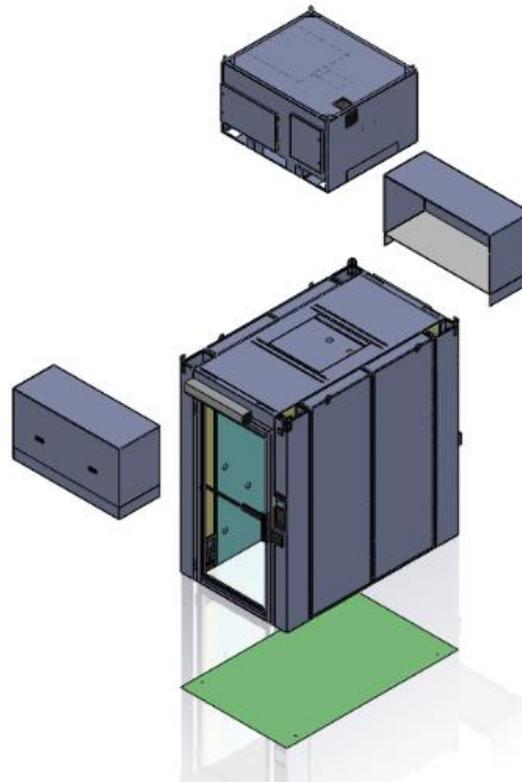


Figure 2: Air Shower shown in exploded view with a stainless steel floor. Floor not included. The customer can also opt for Terra's Knock-Down design to ship the order disassembled for easier transport through standard doorways or more space-restrictive access areas.



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Positioning the Air Shower

Your Air Shower/Tunnel shipment may be mounted on the pallet in three (3) ways:

Bolted to the pallet (screws are accessible through the vents) – This is generally typical for smaller units (Air Showers). The bolts can be accessed from four (4) corners inside the Air Shower behind the corner vents. Remove the two (2) screws to remove the vents (see Photos 2 and 3). Once the pallet bolts are removed, re-position the vents and secure in place with the same screws.

Un-bolted and held in place between grooves created by wood blocks – This is generally typical for larger units (Air Tunnels). There are no screws securing the unit to the pallet and the unit is elevated to allow forklift access.

Bolted to the pallet (screws are accessible only through removal of the pallet) – This is generally typical for units that have non-removable vents. In these cases, the pallet has to be cut off to expose the bolts underneath the unit while the forklift elevates it. The bolts can then be cut off once the pallet surrounding them is removed.



Photo 2: Removable corner vent at each corner inside the Air Shower/Tunnel



Photo 3: Vent removed. Pre-drilled hole shown for mounting to pallet or anchoring into the floor



Photo 4: Air Tunnel shown on shipping pallet in between grooves created by wood blocks

1. With a forklift, position the Main Enclosure to align inside the drawn rectangle. For optimal stability, Terra recommends that the unit be mounted to the floor using floor anchors (not included). The anchor bolts may be mounted through the pre-drilled holes behind the removable vents on each of the four (4) interior corners of the Main Enclosure (see Photos 2 and 3). Once the unit is set in place, mark the anchor locations through the pre-drilled holes on the floor.
2. With a forklift or crane, remove the unit and use a hammer drill to set the floor anchors. Replace the Air Shower Main Enclosure over the anchors and attach with 5/16 x 1" long bolts.
3. Uncrate the Blower Modules (labelled to match the corresponding side of the Air Shower/Tunnel) and temporarily remove the roof panel (fastened in place by four (4) 1/4" Phillips head screws) to allow for electrical connections once the Blower Module(s) are positioned on top of the Main Enclosure. For the Blower Module with the main junction box, there are two (2) interchangeable locations for the removable hardwire conduit plate and make-up air vent (see Photo 6). The default configuration has the hardwire conduit plate mounted on top of the roof panel and the make-up air



Photo 6: Make-up air vent



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4. vent mounted to the side of the Blower Module Housing. You may switch these locations if you prefer to run power to the side of the unit.
5. Use a forklift to place the Blower Module(s) on top of four (4) 2"x4" wood blocks, one (1) at each corner. See Photo 7.
6. Terra Universal's Air Showers generally have only one (1) Blower Module while Air Tunnels have two (2) or more Blower Modules. The Blower Modules of these units need to be mounted in the correct sequence and orientation to ensure proper operation. When there are multiple Blower Modules shipped out, Terra Universal labels which Blower Modules correspond to its respective side of the Air Tunnel. Although there is more than one (1) Blower Module per Air Tunnel, only one Blower Module has the main junction box.

Be sure to set up the installation process so that the forklift, the Blower Module, and the Main Enclosure will be oriented in the most efficient direction upon positioning the Blower Module on top of the Main Enclosure. Be sure to align the electrical controls box access panel directly above the door.

7. Slide the forklift underneath the elevated Blower Module(s). Have a second person position one (1) 2"x4" wood stud (long enough to span the width of the unit to support its sides) centered and between the bottom of the Blower Module and the forklift. See Photo 8.
8. Lift and position the Blower Module on top of the Main Enclosure so that the electrical box on the Blower Module is on the same side as the touch screen panel. The horizontal gap between the Blower Module and the Main Enclosure needs to be wide enough to insert one (1) 2"x4" wood stud to act as a lever in between these two units. See Photo 9.
9. Lower the Blower Module on top four (4) 2"x4" wood blocks at each corner on top of the Main Enclosure. See Photos 9 and 10 for orientation of the 2"x4" wood blocks.
10. Remove the forklift and the now-free 2"x4" wood bar. See Photos 11 and 12.
11. Insert a 2"x4" wood stud centered between the 2"x4" wood blocks to act as a lever. See Photo 13.

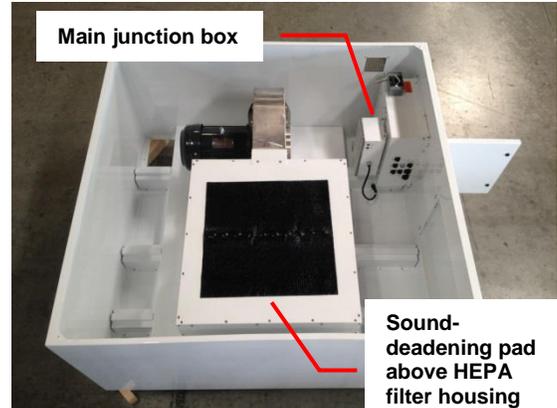


Photo 7: Blower Module shown placed on top of four (4) 2"x4" wood blocks, one (1) at each corner



Photo 8: Forklift shown elevating the Blower Module with the 2"x4" wood stud centered underneath the unit as support



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Photo 9: Blower Module being lowered onto the Main Enclosure in the correct orientation (electrical box shown)



Photo 10: Blower Module shown positioned on the 2"x4" wood blocks at two (2) of the corners



Photo 11: 2"x4" wood stud being removed from underneath the Blower Module



Photo 12: Wood stud removed and Blower Module is being supported by one of the four (4) 2"x4" wood blocks

12. Lever and pivot the Blower Module up to remove the first two (2) 2"x4" wood blocks. Then slide out the 2"x4" wood stud. See Photo 13.
13. Use the forklift to elevate the edge of the Blower Module on its tips so that it pivots on the opposite end (side not supported by any 2"x4" wood blocks). Have a second person remove the now-free remaining two (2) 2"x4" wood blocks. See Photos 14 and 15.
14. Lower the Blower Module until its edge touches and rests on top the Main Enclosure. See Photo 15.



Photo 13: 2"x4" wood stud used to lever the Blower Module up to remove the two (2) 2"x4" wood blocks



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Photo 14: Forklift shown levering the Blower Module to enable removal of the 2"x4" wood blocks



Photo 15: Forklift lowered and Blower Module shown with two (2) of the 2"x4" wood blocks removed

15. Manually push the Blower Module into place (see Photo 16).
16. Repeat Steps 5 through 15 for the remaining Blower Module(s). No additional fasteners are required.

Electrical Connections

- The electrical wiring should conform to the latest NEC standards.
- Appended assembly drawings, photos, and wiring diagrams for electrical details are available for reference at the end of this Quick-Start Operating Guide.



Photo 16: Blower Module shown manually pushed into place

1. Once the Blower Module(s) is/are correctly positioned on top of the Air Shower/Tunnel, pull the wiring from the Air Shower/Tunnel through the corresponding openings at the corners located adjacent to the main junction box.
2. Most, if not all, components for electrical connections within the Air Shower/Tunnel come pre-wired. Connect any remaining pre-labelled wires to their corresponding connectors on the main junction box. See Photo 17.
3. Using the appropriate couplings, hardwire the main junction box to a power source based on your system's requirements (208V, 230V, 240V, or 460V and 60Hz/3-phase). See appended electrical wiring diagrams at the end of this Quick-Start Operating Manual for additional information.



Photo 17: Main Junction Box Connections Panel

4. Re-mount the roof panel to the Blower Module(s) using the provided 1/4" Phillips head screws.



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4.0 Operation

PLC Touch Screen Control Panel and System Settings

1. After connecting the system to the power source (see Section 3.0, Electrical Connections, above), verify the following:
 - a. the Air Shower/Tunnel is properly installed per assembly instructions;
 - b. all wiring harnesses to the main junction box are plugged into their appropriate corresponding connectors;
 - c. the PLC touch screen comm cable is plugged into the top of the PLC; and
 - d. the power feed is run and the correct voltage is supplied to the unit.
2. Turn the system power ON.

The Air Shower/Tunnel is factory-equipped with a programmable logic control system that provides proper sequence for usage.

3. Once the system is turned on, the Main Screen will show the following (see Photo 19):

(Time is displayed in seconds)

Time Remaining – The duration of the Air Shower/Tunnel cycle. The user will see this number count down once the cycle commences.

Exit Time Remaining – The delay time between when one cycle ends and the next can commence. During this time, operation of the Air Shower/Tunnel cycle is disabled.

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

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



Photo 18: Touch Screen Control Panel

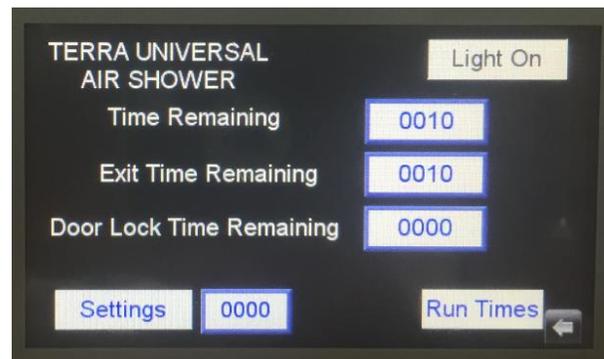


Photo 19: Main Screen Menu



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Light ON/OFF – Pressing this button toggles the lights on and off. Note: Turning on the Smart Lights function will override this feature.

Run Times – Pressing this button takes operators to the Run Time/Cycles Screen where they can keep track of the total operation time and a cumulative count of cycles that the Air Shower/Tunnel completed. Pressing “Reset” to any of these options zeros out the corresponding accrued value(s) (see Photo 20). This feature helps operators set and maintain a filter-replacement schedule based on their maintenance protocol.

4. To access the Settings Menu, press “Settings” from the Main Menu and enter your security code (see Photo 21). Your default, unchangeable security code is “2345.”
5. Settings Menu - Five (5) time settings can be customized in this menu (see Photo 22):
 - a. Shower Time – The Air Shower/Tunnel cycle time.

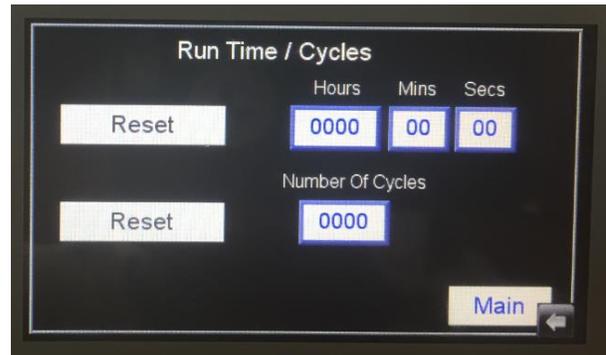


Photo 20: Run Times Screen

- b. Entrance Door Delay Time – Opening the Entrance Door triggers the cycle to commence. The Entrance Door Delay Time assigns the amount of time between when the Entrance Door closes to when the Air Shower/Tunnel starts its cycle. This feature allows some time for the user to settle in and prepare before the cycle begins.
- c. Exit Door Delay Time – This setting delays the start of the next cycle for a specified time after the end of the previous cycle. This feature allows time for the previous user to leave the unit prior to the start of the next cycle and activation of door interlocks.

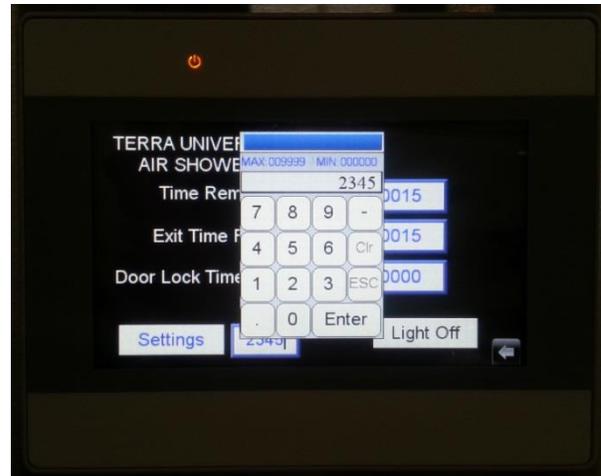


Photo 21: Security Code Screen

- d. Door Lock Time Remaining – The duration of time after the end of the Air Shower/Tunnel cycle when both entrance and exit doors remain locked. This allows any particulates within the enclosure to settle prior to allowing the operator to leave and the next operator to enter.
 - e. Smart Light Delay Time – The duration of time after the occupancy sensor last detected an “occupant” in the Air Shower/Tunnel prior to automatically switching off the LED lights.
- f. Main – Pressing this button takes the operator back to the Main Screen Menu.



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- g. Smart Light ON/OFF – Pressing this button toggles the Smart Lights on and off. Note: Turning on this feature automatically overrides the manual Lights toggle.
 - h. Doors Reverse – Pressing this button reverses the function of the Entrance and Exit doors.
6. To change any of the time settings in the Settings Menu, press the corresponding button to change the time value (see Photo 23).
 7. The Air Shower/Tunnel electromagnetic interlock system consists of solenoid interlocks, which are mounted into the door frame. Once the Air Shower is initialized, the electromagnetic interlocks become functional and lock both entry and exit doors for the duration of the shower cycle.
 8. The Emergency Stop Button (see Photo 24) – There are two (2) emergency stop buttons – one (1) located at the entrance and one (1) located on the interior of the Air Shower/Tunnel. Depressing either button while the Air Shower/Tunnel is in operation stops the shower cycle immediately, disengages the electromagnetic interlocks, and prevents the next cycle from starting. To reset, twist the button in the direction notated on the button to release the spring mechanism.



Photo 22: Settings Menu Screen



Photo 23: Settings Menu Screen (Time Input)



The Operation Status Indicators located above the entry/exit doors flash as long as the emergency stop is engaged.



System Operation

- Check both oversized mushroom-head Emergency Stop push buttons to make sure they are not activated.
 - Prior to initial personnel use, run the shower cycle several times to purge the system and remove all construction debris.
1. Open the entrance door to enter the Air Shower/Tunnel and close the door to commence the shower cycle. Both entrance and exit doors will be locked for the duration of the shower cycle.
 2. Once the shower cycle completes, both entrance and exit doors unlock and the user will be allowed an Exit Door Delay Time (See Section 4.0, PLC Touch Screen Control Panel and System Settings) to exit the unit before the next cycle can begin and door interlocks can be engaged.
 3. The next shower cycle will commence once the next personnel enters the unit and both Exit Door and Entrance Door Delay Times (See Section 4.0, PLC Touch Screen Control Panel and System Settings) pass.
 4. In case of an emergency, push either Emergency Stop Button to immediately stop the shower cycle and unlock all doors.



Photo 24: Emergency Stop Buttons – one (1) located inside and one (1) located outside the unit

Air Nozzles

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/Tunnels require minimal-maintenance. It is recommended that personnel perform periodic visual electrical and mechanical inspections based on the environment and frequency of use.



Always disconnect primary power source prior to performing inspection or servicing the unit.

Cleaning

Periodically wipe down the interior and exterior panels of the Air Shower/Tunnel with a clean, non-linting wiper (Terra Universal recommends using a polyester material), clean water, and a mild detergent. Use uni-directional (not circular) swipes 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(s) on the Air Shower/Tunnel can be accessed by removing the roof panel at the top of the unit. Terra Universal recommends inspecting the blower module every 3-6 months for potential dust accumulation. For more information, refer to the appended Dayton Motor Installation and Maintenance Information at the end of this Quick-Start Operating Guide.

HEPA Filter Replacement

The number of HEPA filters on your Air Shower/Tunnel varies depending on your specific unit. There is one (1) HEPA filter per Blower Module.

Depending on usage under typical conditions, Terra Universal recommends replacing HEPA filters every two (2) to three (3) years.

For optimal operation, the Air Shower/Tunnel should be monitored periodically with an air velocity meter. When either reading drops to below 80% of the initial value, the corresponding HEPA filter is approaching the end of its useful service life and should be replaced.



Photo 25: Unit in operation



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

To replace the HEPA filter (see Photos 26-31),

1. From outside the Air Shower/Tunnel, unscrew the fasteners of the outside access panel door with a flat-head screwdriver and remove the door. This provides access to the inside panel door to the HEPA filter.



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2. Unscrew the fasteners on the inside panel door with a Phillips head screwdriver and remove the door.
3. The HEPA filter is held down by a polycarbonate shim screwed into place. Unscrew these fasteners and remove the shim.
4. While handling only by the edges, slide out and discard the HEPA filter.
5. Slide in the new replacement HEPA filter.



Photo 26: Outside access panel door shown while fasteners are being removed



Photo 27: Inside panel door shown while fasteners are being removed



Photo 28: Inside panel door shown being removed



Photo 29: HEPA filter shown held in place by a polycarbonate shim



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Photo 30: HEPA filter shown being removed



Photo 31: HEPA filter

6. Screw the new replacement HEPA filter in place with the polycarbonate shim.
7. Re-install the inside panel door and the outside access panel door.

Replacement HEPA Filter Cat. #: PA06648



LED Lighting

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.

Troubleshooting

The Air Shower/Tunnel's main junction box is located directly above the entry door. For access to the unit's main junction box, remove the machine screws along the perimeter to remove the electrical access panel.

If any of the electrical systems (control panel, lights, ceiling filter blower, or door interlocks) fails to turn on,

1. Verify that the system is connected to a 60Hz, 3-phase power source. The voltage can be either 208V, 230V, 240V, or 460V depending on your system's requirements. See appended electrical wiring diagrams at the end of this Quick-Start Operating Guide for additional information.
2. A circuit panel located inside the electrical service box guards against circuit overloads. Verify that the three (3) 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.) See Photo 33.
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 (see Photo 17);
 - 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 resettable 4.0A fuse protecting the 24V power circuit. See Figure 1 for amperage designations.
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.



Photo 32: Typical Air Shower/Tunnel LED lighting



Photo 33: PLC Panel



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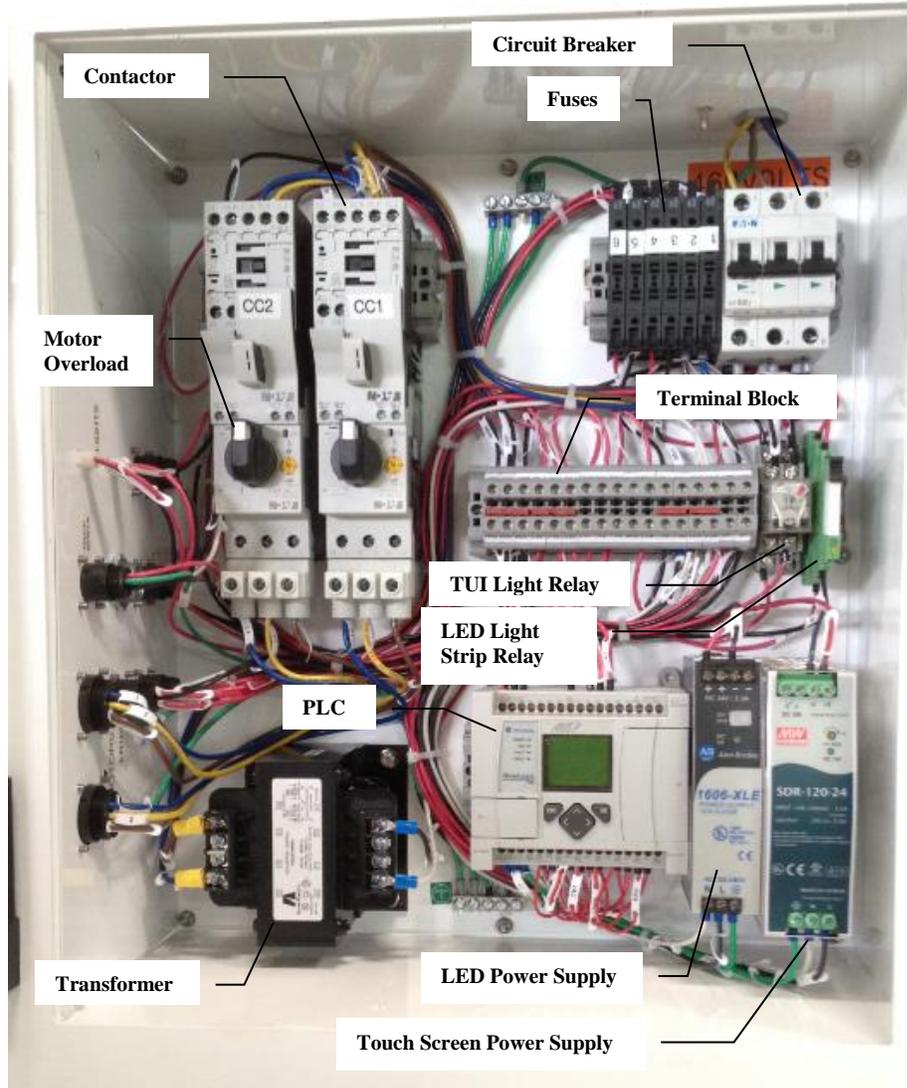


Photo 34: Main Junction Box

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

Figure 1: Fuse Amperage Reference Chart



6.0 Specifications

<u>Dimensions:</u>	See drawings for details
<u>Construction</u>	
Exterior:	16-gauge CR steel, powder-coated white
Nozzles:	ABS plastic
Door:	anodized aluminum narrow style frame with static-dissipative PVC panel
<u>System Power:</u>	208VAC, 230VAC, 240VAC, or 460VAC, depending on system requirements (see appended electrical wiring diagrams at the end of this Quick-Start Operating Manual for additional information)
	50/60Hz
	3-phase with neutral 4-wire
<u>HEPA Filters:</u>	pleat depth: 27.5 mm
	efficiency: 99.99%
	maximum relative humidity: 99%
	dimensions to outer flange: 24" x 24" x 11.5"
<u>Filter Media:</u>	polyurethane mini-pleats with thermal plastic separators and aluminum frame.
<u>Blower Motor:</u>	See appended document for information pertaining to your system.

7.0 Warranty

For more information about our warranty system, please visit our [company's warranty website](#).

***Thank you for ordering from
Terra Universal!***