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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:

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

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



Model Shown:
No. 1610-14A

This manual provides information on installing and operating your Terra Universal Air Shower.

1.0 Equipment Description

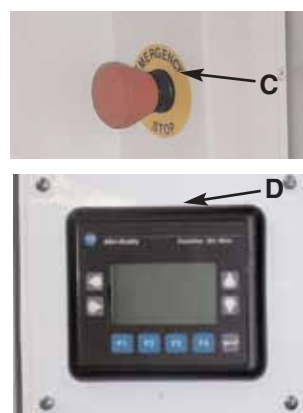
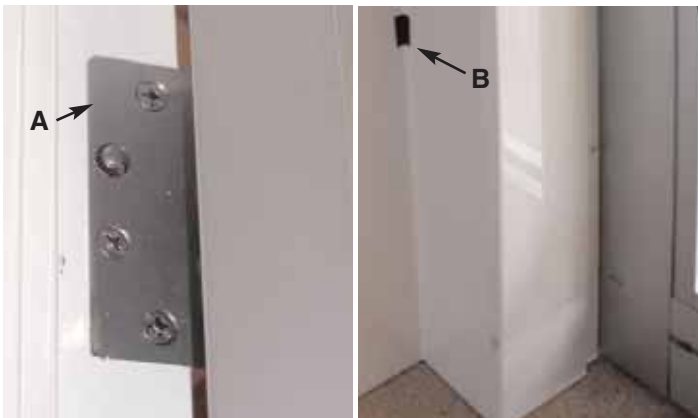
Terra Universal's Air Shower removes surface-deposited particles from personnel as they enter and exit a cleanroom or other controlled environment. An electromagnetic interlock prevents that possibility of cross-contamination by allowing only one door at a time to open.

The system uses two HEPA filtration systems to achieve this contaminant removal:

The Ceiling Filtration System (optional) directs a flow of air downward through a ceiling-mounted HEPA filter (rated 99.99% efficient @ 0.3-micron particles) to provide a vertical flow of clean air moving at an average speed of 90 feet/minute. This air is returned to the filter/fan unit through air plenums in the double-wall steel structure of the Air Shower. This vertical laminar flow of clean air helps remove particles dislodged by the Purge Filter System.

The Purge Filter System circulates air at very high speed (over 6,000 feet per minutes) through 1.5"-diameter nozzles positioned on two sides of the air shower. Each nozzle can be adjusted to control the direction of the air flow. A high-capacity HEPA filter, rated 99.99% efficient @ 0.3-micron particles, captures contaminants before air is forced through the nozzles. The Purge Filter cycle is activated by presence sensors and lasts for a user-defined time (default: 30 seconds).

Presence Sensors — This Purge Filter System is activated by a photoelectric eye presence sensor installed at each door of the air shower. Each of these full-time systems consists of a beam transmitter and receiver. As soon as someone enters the Air Shower, breaking either sensor beam, and the door closes, the Purge Filter System operates for 30 seconds and then shuts off. At this time, the presence sensors remain inactive for ten seconds, allowing ample time for personnel to exit the Air Shower.



System Features

- A. Door switch monitors open/closed door conditions
- B. Presence Sensor (receptor shown) monitors presence of personnel in shower
- C. Emergency Stop (EPO) Button immediately cuts system power and unlocks doors
- D. Panel View (PLC) controls system operation



Interlocks — The Air Shower is equipped with electro-magnetic interlocks that allow only one door at a time to open, thereby preventing cross-contamination. The presence sensors activate magnetic locks on both doors, which remain locked during the Purge Filter cycle. After this time, either door can be opened.

Emergency Operation — An oversized mushroom-head Emergency Stop buttons is located inside the Air Shower next to each door. It cuts power to the Purge Filtration System and allows the either door to be opened.

Lighting — Two low-energy T8 fluorescent light fixtures are positioned in the ceiling of the air shower. Operation is controlled by a switch on the PLC control panel located on the exterior of the Air Shower.

System options include ionizing bars, which neutralize surface charges to minimize the chance of electro-static discharge and eliminate particle attraction.

Refer to separate operating guides for system options.

2.0 Installation

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.

Carefully uncrate and inspect each section. Any damages should be reported immediately to the shipping company (refer to Warranty below for further instructions).

2.1 Site Preparation

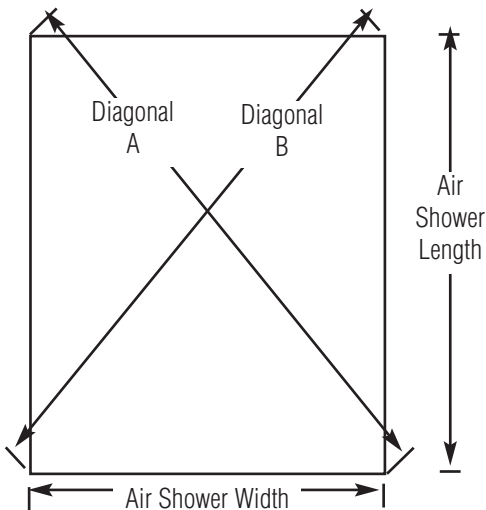
The Air Shower is preassembled and tested on a flat, level surface. To ensure proper door operation and panel fit,

- 2.1.1 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.
- 2.1.2 Mark a rectangle on the floor to indicate the perimeter of the air shower. Verify right angles by checking the diagonal dimensions (see below).

2.2 Positioning the Air Shower

- 2.2.1. The Air Shower is bolted to a reinforcement pallet at the factory to protect it during shipping. To remove the pallet, unscrew the four corner panels to expose the bottom panel. Remove the two hex bolts on the base panel at each corner.

Note: These two bolt cut-outs are also used to secure the Air Shower to the floor following installation — see below.



2.1.2 Mark floor and verify that Diagonal A = Diagonal B

2.2.1 Separating Air Shower from Reinforcement Pallet

- a. Remove 10/32 screws to remove corner panel.
- b. Remove hex bolts
- c. Repeat for other three corners

(Leave corner panels OFF until installation is complete)

Exact bolt locations may differ somewhat, depending on overall Air Shower dimensions.

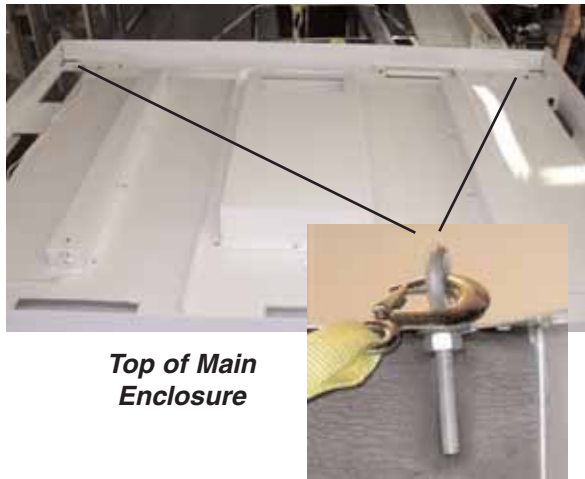




2.2.2 A forklift or crane is recommended for positioning the Air Shower in place. The Air Shower is shipped with four eyebolts that can be used to secure strapping (see photo). Eyebolts should be attached to the cut-outs at each of the four corners.

Begin by positioning the main enclosure in place. For optimal stability, it is recommended that the unit be mounted to the floor using floor anchors. Once the unit is set in place, mark the anchor locations (the cut-outs that were used to secure the unit to the pallet) on the floor.

2.2.2 Positioning Air Shower



- Use eyebolts in 4 corners of main enclosure to attach rigging straps or other suitable support**
- Position main housing and mark locations for floor anchors**
- Anchor main enclosure.**
- Attach eyebolts to filter housing and position on top of main enclosure.**

Forklift moving filter housing into position on top of main enclosure.

CAREFUL — Make sure that the louvered electrical panel on the filter housing is positioned above the enclosure entrance.

2.2.3 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. Remove the eyebolts and rigging straps for re-use on the filter housing.

2.2.4 Remove the two top panels from the filter housing to expose the corner cut-outs. Attach the eyebolts and rigging strap; then use a forklift to position the filter housing carefully on top of the main enclosure.

Make sure that the louvered electrical panel on the filter housing is positioned directly above the entrance door (the door with the Panel View PLC control). The filter housing rests inside a retaining lip — no fasteners are required.



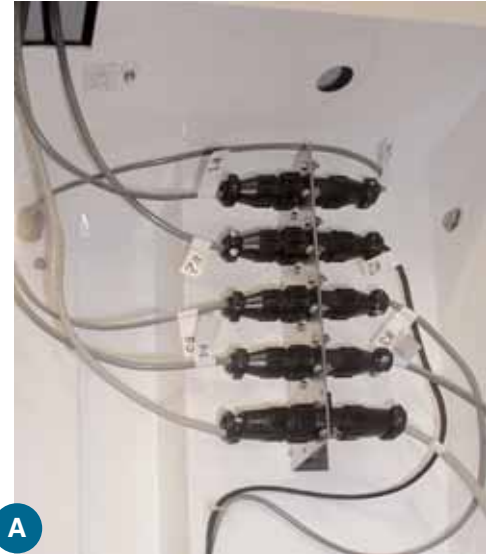
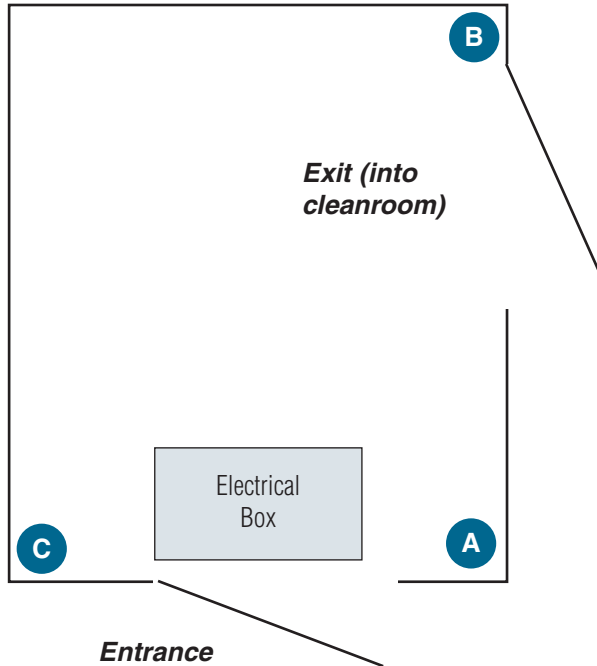
Quick-Start Operating Guide Air Showers

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2.3 Electrical Connections

2.3.1 Once the two units are correctly positioned, wiring harnesses must be pulled from the filter housing through three of the four corners to reach the corresponding connectors in the main enclosure (see photos below). Harnesses and their corresponding connectors are clearly labeled (see sample photos below).

2.3.1 Electrical Connections



1. Door Magnet (interlock)
2. Presence Sensor Receptor
3. Emergency Stop Button
4. Panel View Power
5. Panel View Signal



6. Door Switch*
7. Door Magnet (interlock)

Not Shown: Light (yellow wire with 4-conductor molex coupling)

NOTE: Exact wire locations may vary, depending on Air Shower configuration, but all are clearly marked to assist in proper connection.



8. Presence Sensor Transmitter
9. Door Switch*

Light (yellow wire with 4-conductor molex coupling)

* Door switches indicate door open/door closed status



2.4 Completing Installation

- 2.4.1 Inspect the fluorescent lights inside the Air Shower and remove any tape or other packaging used to secure the bulbs during shipment.
- 2.4.2 Remove eyebolts from the top of the filter housing
- 2.4.3 Re-attach the two panels that cover the filter housing using 10/32 machine screws.
- 2.4.4 Re-attach the four corner panels using 10/32 machine screws.
- 2.4.5 A panel cut-out in the panel cover immediately above the electrical box allows access to the main system junction box. Using appropriate couplings, connect the box to a 240VAC, 50/60Hz, 3-phase/4-wire power line.

3.0 Set-Up and Operation

Check the oversized mushroom-head Emergency Stop pushbutton inside the access door to make sure it is not in the depressed position.

Wipe down the Air Shower inside and out with a particle-free cloth.

3.1 System Operation

- 3.1.1 After connecting the system to a 240V power supply (see Installation, above), turn system power ON.
- 3.1.2 When the system is first turned on, it will be initialized with the following information:
 - Door #1: Defined as the entrance.
 - Door #2: Defined as the exit.
 - Cycle Time: Default = 30 seconds.
 - Exit Time: Default = 10 seconds.

The display will read:

```

F1  START  F3  SET SHOWER TIME
F2  LIGHT
SHOWER TIME
30

```

At this time the Air Shower is in operating mode with the initialized information.

- 3.1.3 **To start or stop the Ceiling Filter Module**, press the F1 key. For most effective operation, this filter should remain ON at all times.
- 3.1.4 **To turn ON or OFF the two fluorescent lights**, press the F2 key.
- 3.1.5 Once the Air Shower is initialized, the interlocks are functional. When you enter (from the exterior door, next to the PLC control panel) and close the door, the Purge Filter Module will begin operation and both doors will lock magnetically for the duration of the purge cycle (30 seconds).

After 30 seconds, the exit door will unlock and the entrance door will remain locked until you exit the Air Lock and the exit door closes.

4.0 Programming

- 4.1 **To access and change the Purge Cycle Time, press the F3 key.**

```

Press the UP/DOWN key to
set shower time in
seconds
F1 BACK TO          30
MAIN

```

Press the UP arrow to increase the digit by one, or the DOWN arrow to decrease the digit by one. Press the left arrow key to move the cursor to the left, and the right arrow key to move the cursor to the right.

After the desired cycle time is entered, press the ENTER key.

Press F1 to return to the main menu.



4.2 Emergency Mode

Pressing the oversized mushroom-head pushbutton on the inside of the enclosure will stop the blower motors and disengage the interlocks, allowing either door to be opened.

To return to normal operating mode after pressing an emergency button, simply pull the emergency pushbutton back to its original position.

5.0 Maintenance

5.1 Filter Replacement

Under typical conditions (8 hours of operation per day), filters should be replaced every year.

For optimal operation, the Air Show should be monitored periodically with an Air Velocity Meter. Air velocity will initially average about 90 feet/minute, measured 6" below the optional ceiling filter, and 6,000 feet/minute, measured at each air nozzle. 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.

CAUTION!!!: Because HEPA filter mini-pleats are easily damaged, always handle the filter by the edges. Avoid touching the filter face.



**5.1 Replacing the Purge Module HEPA Filter.
Remove the #10 cap nuts for filter access**

To replace the Ceiling Module Filter (optional feature),

- 5.1.1 From inside the Air Shower, unscrew the 1/4-20 screws that hold the filter support bracket in place. Be careful to support the filter as screws are removed (requires two technicians).
- 5.1.2 Once all screws are removed, the filter support bracket and filter can be lowered from the Air Shower ceiling and the filter discarded.
- 5.1.3 Place the replacement filter, gasket side down, against the filter support bracket and reinsert into the Air Shower ceiling. Reattach the bracket screws.

To replace the Purge Module Filter,

- 5.1.4 Remove the cap nuts that hold the filter chamber cover (located near to top of the left exterior of the Air Shower).
- 5.1.5 Remove the filter support and filter (See photo above).
- 5.1.6 Insert the replacement filter, with the gasket side facing in, inside the filter chamber and replace the filter holder. Reattach the cover screws.
- 5.1.7 Repeat for second filter (if included).

Replacement HEPA Filters

	Cat. #
Ceiling Filter (27.75" x 13" x 3" thick)	1681-02
Purge Filter (24" x 10" x 12" thick)	2100-50



5.2 Fluorescent Lighting

Replace fluorescent light bulbs when you observe flickering or burnout. To replace a bulb, enter the Air Shower and pull down gently on the lamp cover to remove it. Rotate the tube inside the fixture until it disengages and slides free. Replace with lamp below (typical life: two years of continuous operation). If the ballast fails, replace the entire light fixture (typical life: five years of continuous operation).

Cat. #

Fluorescent Lamp

For 36" fixture

2400-40

Replacement Fluorescent Fixture

(including bulb)

36"

2400-41

5.3 Electrical Maintenance

A circuit panel located inside the electrical service box guards against circuit overloads (see "Troubleshooting" below for service box access). If any of the electrical subsystems fails (lights, ceiling filter blower, purge filter blower or door interlocks), remove the electrical box cover and verify that the three breakers are in the ON position.

A single resettable 4.0 Amp fuse, which protects the 24V circuit by protecting the AC transformer, is located near the right side of the terminal block.

5.4 Cleaning

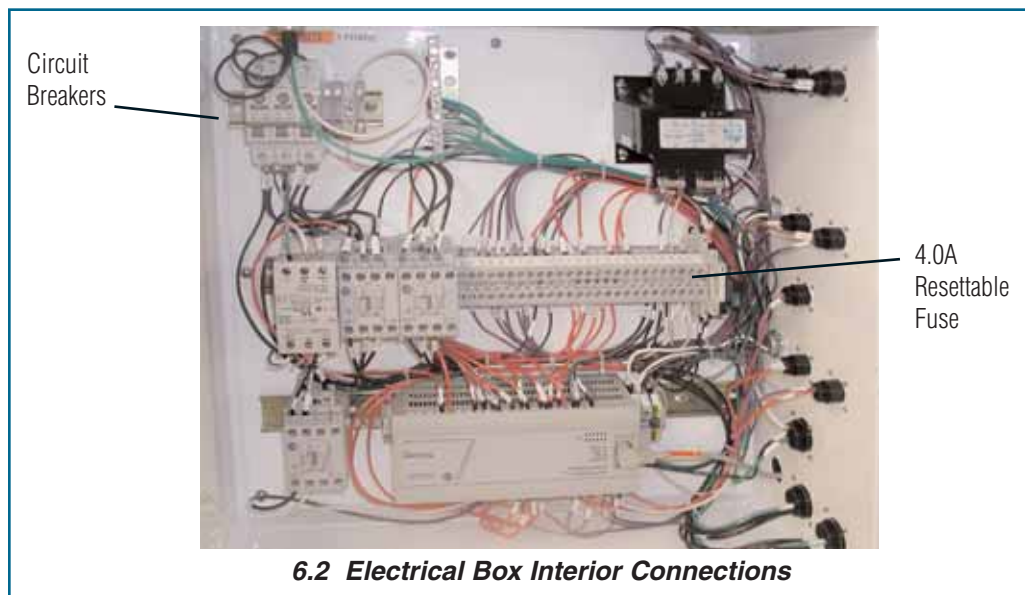
Periodically, wipe down the interior and exterior panels of the Air Shower with a clean, non-linting wiper (polyester recommended), using clean water and a mild detergent, if necessary. Use uni-directional (not circular) motion to remove surface contaminants from the edges of all surfaces.

CAUTION!!!: Avoid contact with the mini-pleat filter face of the optional Ceiling Filter Module, visible from the inside ceiling. Do not overspray the filter with water or other liquids.

6.0 Troubleshooting

If the Control Panel fails to turn on,


- 6.1. Verify that the system is connected to a 240VAC, 3-phase power supply (4-wire, with neutral).
- 6.2. If the unit still fails to respond, unplug system power and verify electrical service box connections. For access to the inside of the box, remove the electrical panel cover, located on the front of the filter/fan housing module, by removing the machine screws along its perimeter. Inspect the labeled panel to ensure that all cables and harnesses are securely connected into the appropriate sockets. Inspect the terminal block for any wires that may have come loose. Verify that no circuit breakers have been tripped. Inspect the resettable 4.0A fuse protecting the 24V power circuit. Replace the electrical panel cover.



6.2 Electrical Box Interior Connections



- 6.3. To inspect the exterior electrical panel connection, remove the top cover of the Air Shower by removing the machine screws along the top perimeter of the unit. Inspect the corresponding connectors on the exterior of the electrical control panel to ensure that all cables and harnesses have been pulled up to the control box and plugged into the appropriate sockets. Replace the top cover.
- 6.4. Reconnect system power. If the system still does not respond, contact Terra Universal for assistance.



6.3 Electrical Box Exterior Connections (locations may vary, depending on configuration)

A. Receptor
For presence sensor (to right of door)

B. Sensor
Presence sensor transmitter (to left of door)

C. Panel View
Signal to/from PLC Controller

D. Magnet #2
Contact Closure: Exit Door

E. Magnet #1
Contact Closure: Entry Door

F. Light
Fluorescent Fixture #1

G. Enter
Entrance Door Open/Closed Switch

H. E-Stop
Emergency Stop Pushbutton

I. Exit
Exit Door Open/Closed Switch

J. Light
Fluorescent Fixture #2

K. Motor 120V
For optional Ceiling Filter (not used)

L. Motor
Purge Blower #1

M. Motor
Purge Blower #2

7.0 Specifications

- Dimensions: See drawings for details
- Construction
 - Exterior: 16-gauge CR steel, powder-coated white
 - Nozzles: ABS plastic
- System Power: 240VAC, 50/60Hz, 3-phase with neutral (4-wire)
- Performance:
 - Air Speed: 6000 FPM (average) measured where air exits the nozzle
- HEPA Filters: Purge filter: 24" x 10" x 12" thick
- Filter Media: Polyurethane minipleats. Ceiling filter uses thermal plastic separators with aluminum frame; Purge filter uses aluminum separators with particle-board frame.
- Fan/Motor:
 - for Purge Filter 3 HP, 240V, 3 phase 3475 RPM motor drives 12.5" dia. high-pressure direct drive radial blade blower



8.0 Warranty

Products Manufactured by Terra: Terra Universal, Inc., warrants products which it manufactures to be free from defects for a period of 90 days for parts and labor. Terra's sole responsibility is to repair or replace, at its option, any part of the product which 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.

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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!***

