Quick-Start Operating Guide Document No. 1800-81

Powder Containment Cleanroom

Your Comprehensive
Equipment Source

Particle Filtration

Laminar Flow Control

Ultra-Clean Materials

Vibration Isolation

Ergonomics

Process Gas Generation

Temperature Control

Biohazard Containment

Sterilization

Static Control

Chemical Vapor Removal

Anti-Microbial Treatments

Humidification/ Dehumidification

Vacuum Control

Exhaust Fume Ventilation
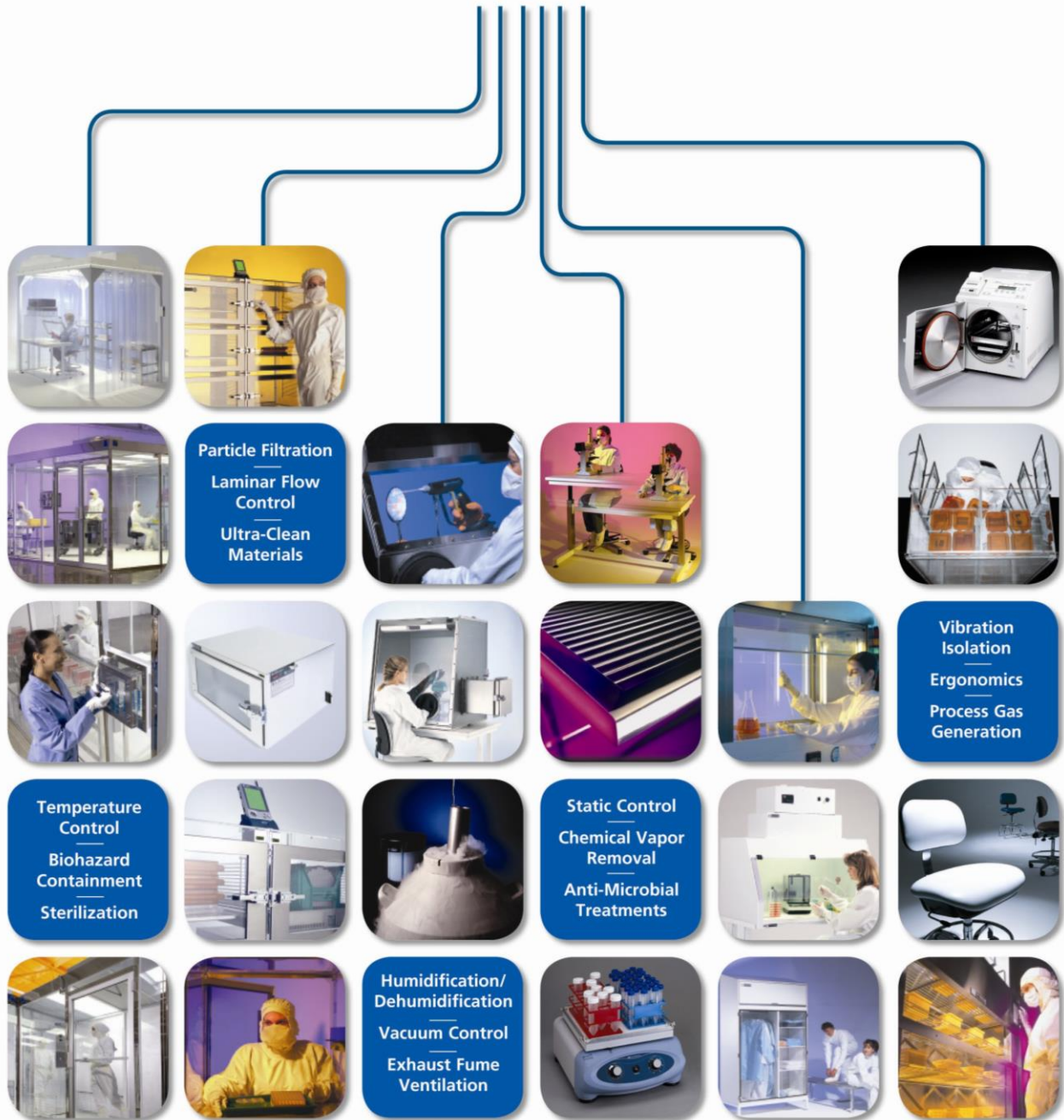
Proprietary Notice

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Terra Universal makes no warranties applying to information contained in this manual or its suitability for any implied or inferred purpose. Terra Universal shall not be held liable for any errors this manual contains or for any damages that result from its use.

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:

The information presented here is subject to change without notice.

! 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.**

1.0 Introduction

This manual provides information on installing and operating your Powder Containment Room.
By studying this document carefully, you can be assured of a long, efficient service life from your system.

> **Related Manuals – Available for download from www.TerraUniversal.com:**
> - BioSafe Cleanroom
>   (Doc. No. 1800-80)

2.0 Description

Terra's Powder Containment Room is available in 304/316 stainless or powder-coated steel and combines many benefits of a biological safety cabinet and a modular cleanroom. Its CleanZone exhaust filtration system draws contaminants away from personnel, capturing fine powders in HEPA filters positioned along the rear wall, while overhead HEPA Fan Filter Units (FFUs) can be configured to meet cleanliness standards to Class 100/ISO 5,

3.0 Installation

! **WARNING: Handling cleanroom shipping crates, which can weigh over 1,000 pounds each, requires at least one forklift. If crates must be moved through narrow aisles or entrances, two forklifts or pallet jacks are recommended, one to support each end.**

Unloading crates from the truck is much easier if you have a truck-high loading dock. Without such a dock, you will need at least one forklift and a support to brace one end while the forklift is positioned beneath the center of each crate. Several people are required to unload individual components from crates.

Before proceeding, carefully lay out all system components in staging area adjacent to the installation site. All system crates include packing lists; uncrate and inspect each component. Any damage should be reported immediately to the shipping company (refer to the Warranty below for further instructions). Please notify Terra immediately in the event of missing parts.

	IMPORTANT SAFETY NOTICE
⚠	Terra Universal cleanrooms are not designed to support more weight than the blower modules and lighting fixtures originally installed. Ceiling grid beams are no load-bearing and will not support personnel or other additional loads. Placing added weight on the ceiling grid may result in serious damage to the cleanroom and its occupants. *Safety notices supplied by Terra Universal must be affixed prominently on each side of the cleanroom grid.*

Required Tools: Forklift, power screwdriver(s), panel braces (weighted "L" members to hold panels vertically during installation), rubber mallet(s), measuring tape, six-ten locking C-clamps to hold beams and panels in place as you insert fasteners, hammer drill and floor anchors (if cleanroom panels are anchored to the floor).

Site Preparation

Component Inspection: Unpack all system components and check for damaged or missing parts (refer to component list/chart on the previous page). Any damage should be reported to the shipping company immediately. Contact Terra Universal if any parts are missing.

A.   Site preparation requirements should be observed for any installation performed by Terra Universal Technicians.

B.   Customer facility area where the cleanroom is to be installed must afford a minimum clearance of one foot (including fixtures ducts and pipes) on all sides and at least two feet of vertical clearance between the FFU inlet and ceiling.

C.   Customers must provide permanent electrical connection from supply panel to Terra Cleanroom Power Distribution Module (one power line per box) in conformance with local electrical code, as well as any vacuum, air, H20, sprinkler, or nitrogen connections required for the cleanroom.

D.   Customers must give advance notice of dates and times for Terra personnel to perform the installation. Short notice may result in higher fees for travel and accommodations.

E.   Customers are to provide utilities, installation power and removal of any packing material.

F.   Because installation requires unpacking and assembling components, customers are to ensure an adequate staging area for parts and equipment adjacent to the assembly area, clear and ready for work.

G.   Customers are to inform Terra Universal in advance of any requirements for security, escorts, special training, badges, work hours, parking areas or special identification and how to obtain all such required permissions and related items.

H.   Prior to shipping, all frame and ceiling members are stamped and then labeled at each end. Refer to the appendix for detailed information on how your cleanroom is numbered.

I.   Before you start assembly, it is mandatory that the floor is level to assure the completed room will fit properly and be rectangular. Failure to level the floor may result in the inability to complete the assembly of the room or the insertion of the blowers, lights or ceiling. For vertical alignment measure with the leveler before assembly.

Installing the Inner Steel Panels

Begin installation of the room by assembling the steel panels that form the perimeter of the room. This operation will require at least two installers and panel braces to hold the panels upright until enough of the unit is complete for it to become self-supporting.

Each panel consists of a 1.75" – thick inside panel (with welded socket attachments) and a .75"-thick outside sheet (with ball attachments). DO NOT attach the outside panels until the room is otherwise complete, as you may require access to the inside of each panel to complete wiring and other connections.

All inside and outside panel members are labeled with peel-off stickers to simplify installation. Beginning with inside panel #1, attach adjoining inside panels using self-tapping sheet metal screws. Make sure the panels are correctly oriented, with the pre-drilled holes for ceiling joists facing up and corner holes for floor anchors facing down. As screws are tightened, the closed-cell PVC gaskets mounted on the edge of one panel sheet will seal against the adjoining sheet. Continue connection of the internal panel until the entire perimeter is completed. Then, connect the inside panels of any internal or antechamber walls.

Note: Refer to your custom drawings for detailed instructions on your system and location of HEPA filters within the powder-containment room.

Installing the Ceiling Grid

Installation Note: Before beginning installation of the support frame, familiarize yourself with the placement of the frame members and ceiling "T" joists.

Note: Quantity of joists may vary depending upon your custom system. See system drawings for proper placement of ceiling joists.

A. Begin the ceiling grid by installing the long span "T" – joists across the smaller width of your cleanroom. All joists are labeled with adhesive stickers; refer to system drawing for joist location. Joists are mounted to the tops of panels using 12 X ¾" self-tapping sheet metal screws, which attach to the pre-drilled holds on the top of the panels.

B. The joists that lie at the ends of the cleanroom are predrilled to accommodate the Power Distribution Modules (junction boxes) that are positioned so that these predrilled holes are in opposing locations.

C. Next, install the shorter (typically 2-foot) divider "T" – joists that form the 2' x 4' ceiling bays. These connect to the span joists by means of plastic clips – span joists should be marked to indicate the position of these clips.

Installing Ceiling Modules

A. Refer to your specific system drawings for locations of Filter/Fan Units, lights, and ceiling panels. Carefully lower each module in place, making sure that the module perimeter sits against the ceiling grid frame to form a tight seal.

B. Refer to your specific system drawings for location of ceiling power distribution module(s) (junction boxes), which attach to the corresponding ceiling joists with 12 x ¾" self-tapping screws. Install the Control Panel(s) and any duplex power boxes to the inside panel sheets.

C. Each distribution module features external fittings for Filter/Fan Units, Lights, and Duplex Power Boxes. Refer to system drawings for details on how to make these connections using the provided yellow 6-pin cables. To

preserve the UL listing on Terra's Fan Filter Units, Terra must configure them for hard wiring. Refer to page 7 for wiring instructions.

D.   To test for proper operation, hard wire the unit to a grounded 115/230 VAC power source and turn the switches ON to activate the lights and FFUs.

Installing the Outer Panels

Attach each outer panel to the corresponding inner panel. Carefully align the male fastener welded to each outside panel to corresponding socket welded to the inside panel and press firmly to engage the clip.

Note: Outside panels may be removed by means of suction handles (not included).
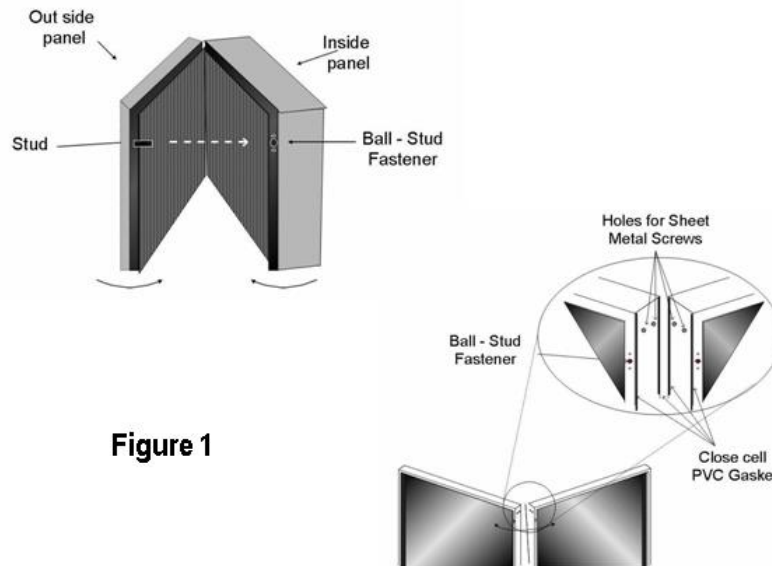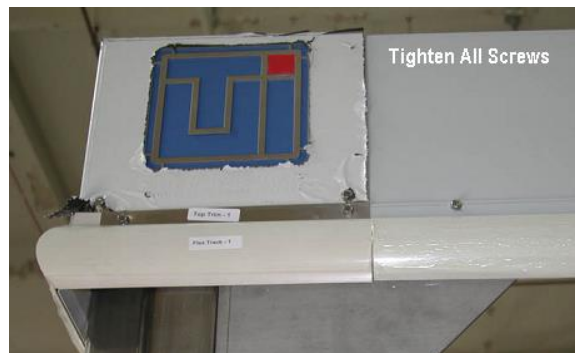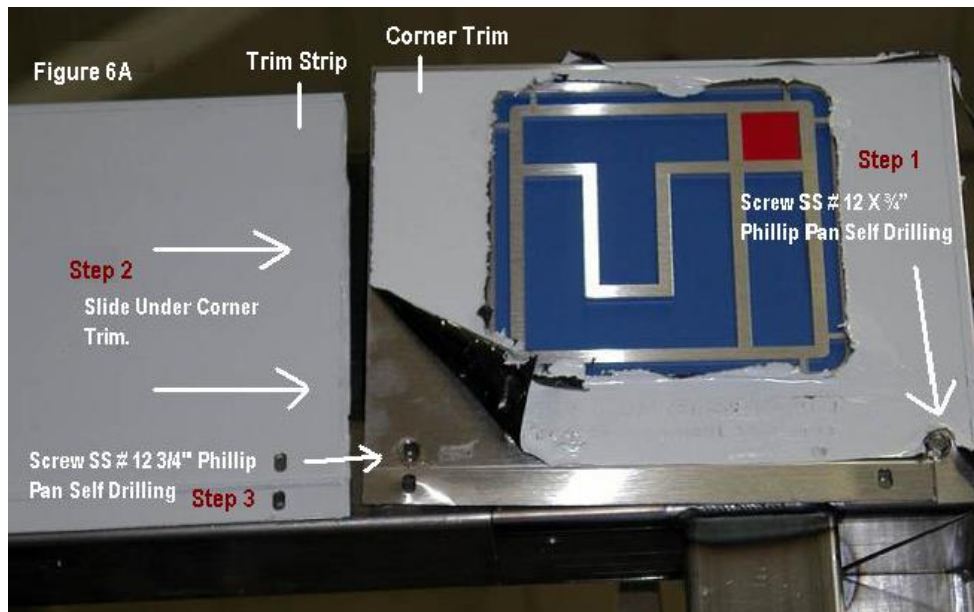

Figure 1

Installing Trim Strips & Grip-Track

A.   Begin by positioning the corner trim (TUI Logo) on the corner posts so that all holes are aligned. Screw in with Screw SS # 12 X ¾" Phillip Pan Self Drilling (As Shown In Step 1 in Figure 6A).

B.   Install the Trim Strip by sliding each along the frame until it slides into place underneath the corner trim. (Step 2, Figure A). Slide so the holes in the corner trim, the trim strip and the frame are aligned. Insert one Phillip pan self-drilling screw on the top hole. Do Not Tighten (Step 3, Figure 6A). Hold into place with C-Clamps and then remove screw Inserted in Step 3. (See Figure 6B).

C.   Install Grip-Track by sliding from underneath the trim strip from left to right. Push up into the Trim strip until the holes align and insert screw SS # 12X3/4" Phillip Pan Self-Drilling. (See Figure 6C). Tighten All Screws.

Note: To prevent scratching, leave protective plastic on steel trim until assembly is complete.

Figure 6A

Trim Strip • Corner Trim

Step 1
Screw SS # 12 X ¾"
Phillip Pan Self Drilling

Step 2
Slide Under Corner Trim.

Screw SS # 12 3/4" Phillip Pan Self Drilling — Step 3

Figure 6B

Figure 6C

Screw SS # 12 X ¾"
Phillip Pan Self Drilling

Tighten All Screws

Fan Filter Unit Hard Wiring

⚠ **WARNING: Disconnect the unit from the electrical power source before attempting any service.**

To preserve the UL listing of Terra Fan Filter Units, Terra must configure them for hard-wiring. Cords are dressed to simplify this operation, which typically does not require an electrician.

1. Remove the blue prefilter, which rests on top of the fan filter unit (Figure 1).

2. Unscrew metal top panel of the electrical housing (Figure 2) to expose wiring junction (Figure 3).

3. Install cord grip as shown (Figures 4, 5) into appropriate opening.

4. Thread the AC power chord through the cord grip and connect to wire port as shown (Figure 6). Match the colors of the wiring; green to green, black to black and white to white. Tighten retaining screws to fasten wires.

5. Tighten cord grip to secure AC power chord.

6. Replace the metal panel on top of the electrical housing.
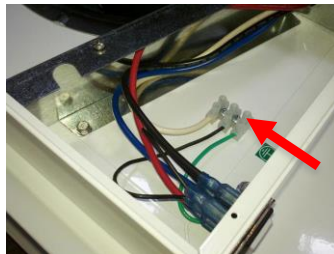
7. Replace the blue prefilter.

**Fig 1**

Fig 2

Fig 3

Fig 4

Fig 5

Fig 6

Speed Configuration with PDM

> ⚠️ **WARNING**
>
> **To avoid thermal overload on FFU's with Permanent Split Capacitor (PSC) motors, do not use LOW speed switch when the FFU is connected to a PDM.**

The electric circuit design of the PDM limits speed configurations of FFU's with PSC motors. All FFU's with PSC motors should be switched to MEDIUM or HIGH speed setting when connected to a PDM. Thermal overload can occur when one FFU is set to LOW, and the others are set to MEDIUM or HIGH speed settings. The FFU motor set to LOW can draw excess current from the PDM which can lead to thermal overload on the motor, motor failure, and/or electrical hazards.
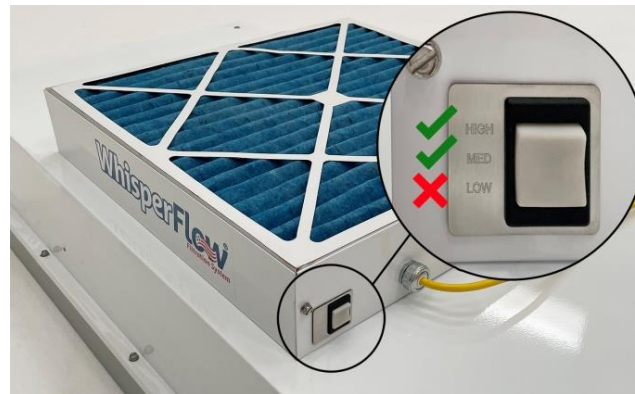
NOTES:

1. Setting all FFU's with PSC motors to LOW does not cause an immediate problem. However, it is not advised as there is a risk of accidently adjusting one FFU's speed setting to HIGH or MEDIUM, which could lead to thermal overload on a FFU motor that is still on LOW speed.

2. "Night service" mode from the control panel is unaffected and operates correctly when all individual FFU's are switched to HIGH or MEDIUM speed settings.

3. This limitation does not apply if the FFU with PSC motor is used individually without a PDM, and powered directly from a standard wall outlet.

4. This limitation does not apply to Smart® FFU's with Electronically Commutated (EC) motors. Smart® FFU's do not use PSC motors.
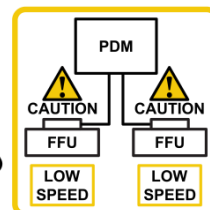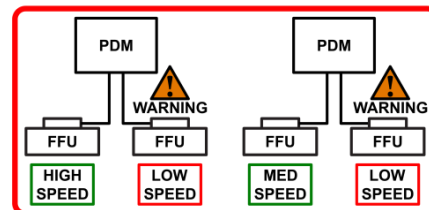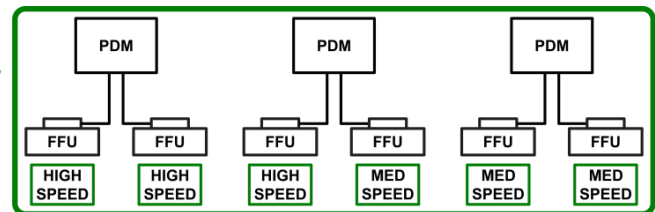
Installing Clean Zone Recirculation System

A. Install the horizontal exhaust panel over the HEPA filters and screw down to the outside panels of the cleanroom.

B. Attach "L" shaped exhaust panel on top of the horizontal piece and screw down to the outside panels to complete installation of the CleanZone recirculation system.

C. The Complete system will run up the back of the Cleanroom and over the top of the FFU located on the roof of the powder-containment room.

Note: Refer to system drawings for specific instructions on installation of the Clean Zone Recirculation System.

4.0 Operation & Maintenance

An on/off switch for lights and push buttons for the Filter Fan Units control operation of the Powder Containment Modular Cleanroom. Both controls are located on a control panel adjacent to the front access door. Ceiling Filter/Fan Units feature 3-position speed controls. All FFUs are factory-set at medium speed, which provides the 90 fpm air speed typically required for cleanroom operation.

The Filters provide effective operation for years under typical operating conditions. The filter does not require replacement until the backpressure it generates increases to the point that the system can no longer provide an adequate airflow velocity to maintain required particle counts. To monitor this condition, periodic testing with a particle counter is recommended.

Filter Replacement

NOTE: Removal of the Clean Zone Recirculation System is necessary in order for access to the FFU and HEPA filters.

Roomside Filter Replacement

Frequent replacement of the roomside-replaceable HEPA filters assures a longer life of the FFU filter as well as proper protection of users from hazardous agents. To replace HEPA filter, remove thumbscrews holding the retaining plate that secures the filters in place.

Replacement Filter: HEPA, 27.75" X 13" X 3" Part # 1681-02

WARNING: When removing and replacing filters be aware that particles trapped inside the HEPA filter may dislodge during handling. Please take the necessary precautions so that possible hazardous powders are not exposed to operators and installers.

Fan Filter Unit Replacement

WARNING: To replace the FFU filter, disconnect system power and remove the filter/fan unit from the top of the structure. Then position it to come through the 2' x 4' opening and into the cleanroom.

See chart below for ordering information. Detailed replacement instructions on the next page.

Replacement Filters for Terra WhisperFlow™ Fan Filter Units		
Type	Size	TUI Part #
HEPA	2 X 2	6601-27
	2 X 3	6601-26
	2 X 4	6601-25
ULPA	2 X 2	6601-30
	2 X 3	6601-29
	2 X 4	6601-28

Instructions for removing the Filter/Fan Unit from the cleanroom ceiling grid
2 installers minimum
2 ladders or step stool.

1. Disconnect the fan/filter unit from the PDM.
2. Attach double stick tape to a polypropylene panel – place on all four sides. The panel protects the HEPA filter from damage (See Figure 1).
3. Place the polypropylene panel over the filter screen, making sure that it only adheres to the screen without overlapping the edges (See Figure 2).
4. Push one side of the FFU up (See Figure 3), rotate it 90° (See Figures 5 and 6) and lower through the ceiling grid.
5. Place the unit on a flat work surface and remove the 10 sheet metal screws that hold the HEPA/ULPA filter to the case (See Figure 7).
6. Replace with a new HEPA/ULPA filter carefully handling edges only.
7. Secure filter to the case with the same screws used previously.
8. Place unit back onto the ceiling grid.

Figure 1: Polypropylene panel with tape

Figure 2: Panel attaching to exposed HEPA filter

Figure 3: Panel fully attached to filter screen without overlapping edges

Figure 4: FFU pushed up on one side for removal

Figure 5: Personnel rotating FFU to remove from ceiling grid

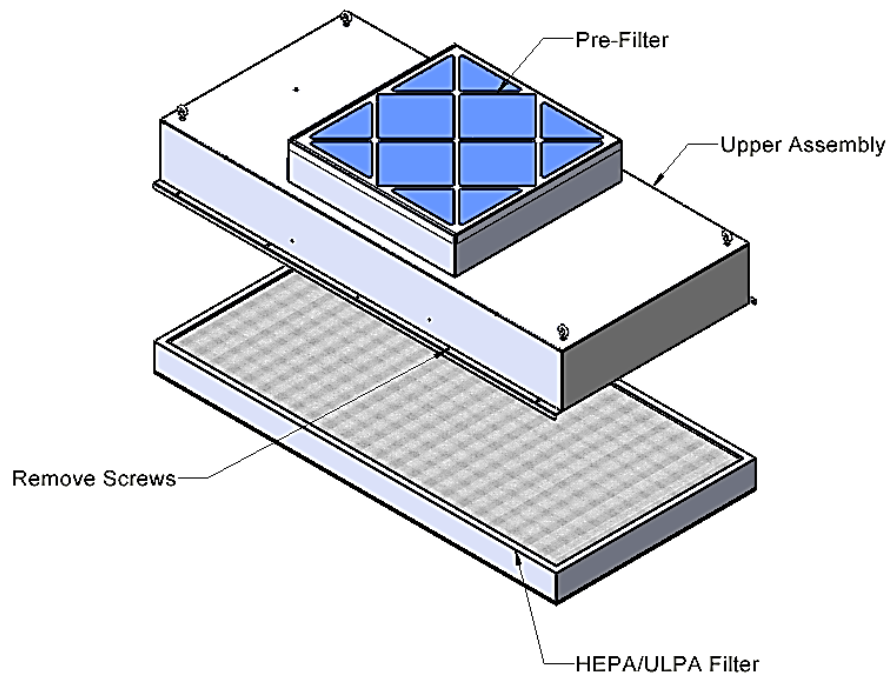Figure 6: FFU rotated 90° and lowered completely from ceiling grid

Figure 7: Diagram of FFU assembly

Removal and Replacement of the HEPA / ULPA Filter (Standard Unit)

⚠ **WARNING: Disconnect the unit from the electrical power source before attempting any service.**

⚠ **CAUTION: The Standard Filter is protected with an expanded metal face screen. This is never to be used to handle the filter. It is only for protection against an accidental touch of the filter. Handle filter only by the frame.**

Tools Required: Phillips Head Driver

Step 1: Disconnect the yellow power cable and remove unit from ceiling (see instructions on previous page).

Step 2: Remove the 10 screws holding the HEPA / ULPA filter to the lid assembly.

Step 3: Lift the lid assembly off the HEPA / ULPA filter (see figure below). Discard the used filter per applicable regulations.

Note: Before replacing with a new HEPA / ULPA filter, carefully inspect the new filter for any visible damage.
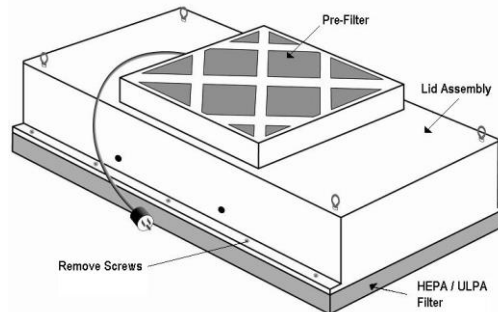
Replacing the Fluorescent Light

Turn OFF system power. Rotate the fluorescent tube inside the fixture until it disengages and slides free. Replace with tube below (typical life: two years of continuous operation).

2 X 4 Ceiling Module 115VAC / 60Hz	TUI # 3800-80
2 X 4 Flow – Through Module 115VAC / 60Hz	TUI # 6704-77
2 X 4 Ceiling Module 277 VAC / 60Hz	TUI # 3800-80-277
2 X 4 Flow - Through Module 277 VAC / 60Hz	TUI # 6704-77-277

4.0 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!