

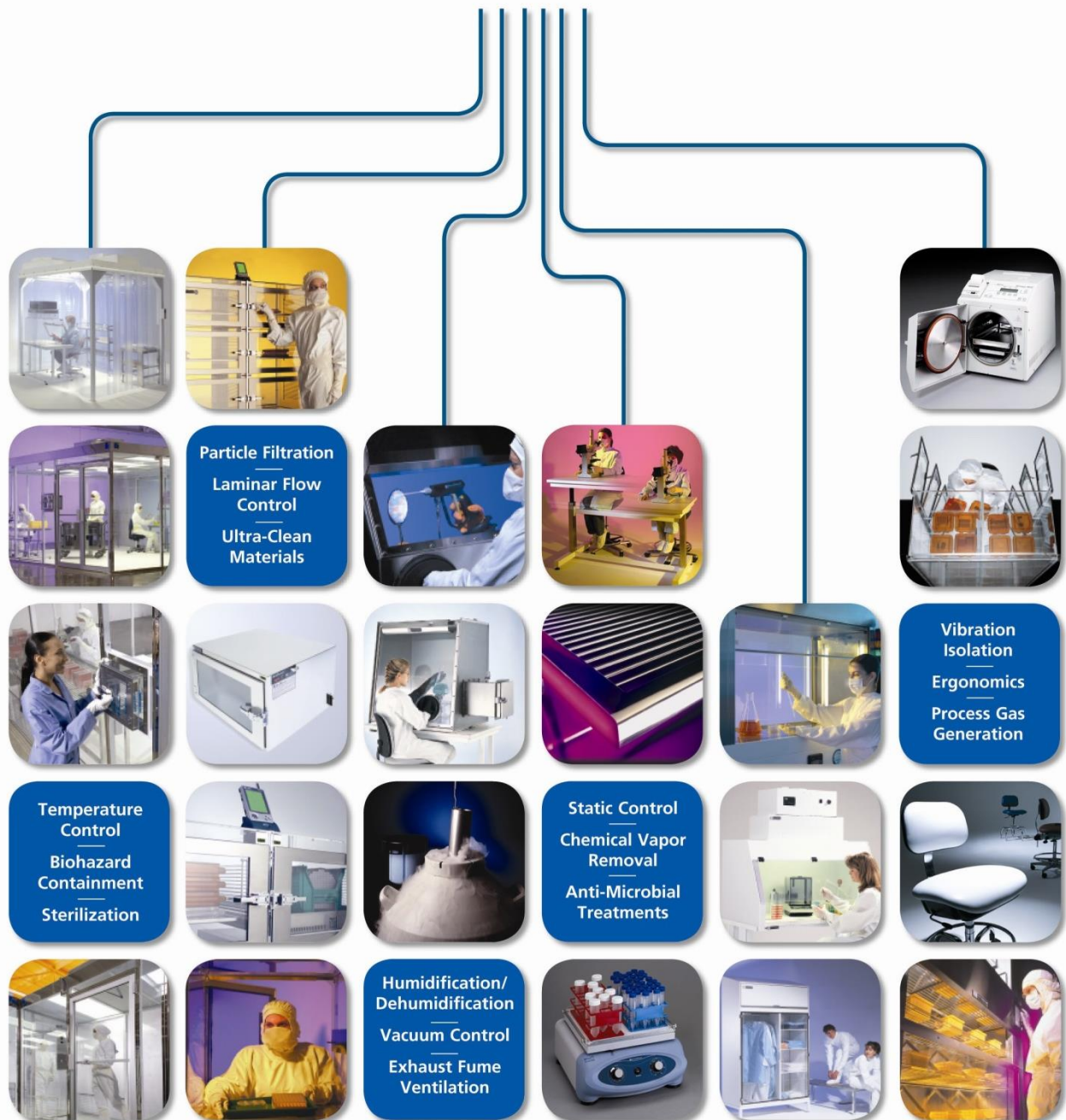


Installation and Operating Guide Document No. 1788-27

# Smart Pass-Through Chambers

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## Your Comprehensive Equipment Source





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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

The installation and operating instructions in this manual apply to both the standard Smart Pass-Through and the BioSafe+ Smart Pass-Through, which features a non-outgassing, potted polyurethane door seal. The standard model uses an “e”-shaped, heat-formed gasket to seal the doors.

The Smart Pass-Through Series includes an electronic interlock which allows only one open door at a time, thus minimizing the amount of “dirty” air that can enter the cleanroom. This interlock system is operated by an integral Smart Controller, which features indicator lights and alarm bells as standard equipment. The Smart controller can also be equipped with any number of Smart Pass-through™ accessory modules, expanding its capabilities to include UV sterilization, air showers, load presence sensors, data-logging, and a host of high-tech security features.



CAUTION

The operator should always verify that the opposite door is fully shut prior to opening a door. Do not yank, shake, or apply excessive force to the doors. Attempting to force open a door while the interlock is engaged may result in damage to the unit.

### Smart Door Interlock™

Terra Universal’s Smart Pass-Through™ chambers are equipped with electronic interlocks to prevent the opening of both doors simultaneously. When one door is open, the other will remain locked until both doors have been closed.

This cross-contamination protection is accomplished using an internal Smart Pass-through Controller built into the body of the pass-through chamber. The unit arrives from the factory preprogrammed to control the door interlock system, alarm bells, and any Smart Pass-through™ accessories specified in the order.



Figure 1: Smart Pass-Through Chamber; slide-up door model.



## LED Status Indicator Lights

The interlock system also features LED indicator lights that show the status of the electronic interlock. When an indicator light turns red, the opposite door of the pass-through has been opened and the interlock has been engaged. When the indicator light is green, the pass-through can be opened.

In addition to the red indicator light, the glowing TUI logo will flash when the electronic door interlock has been engaged.

The location of these lights will vary depending on the final design of the Smart Pass-through and any specified options.

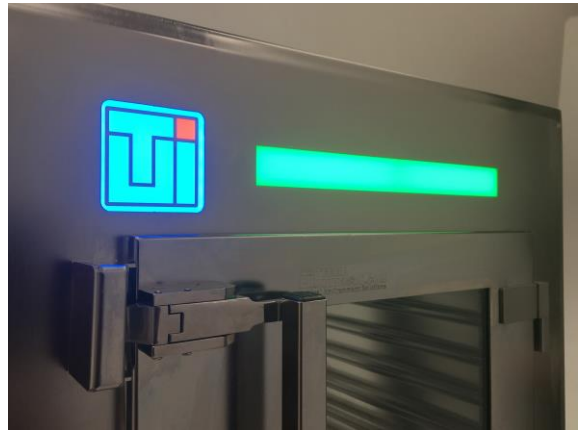


Figure 2: TUI logo and green LED Indicator Light

## Alarm Bells

The Smart Pass-Through chamber includes two wireless alarm bells that notify operators when one of the pass-through doors has been opened and the interlock has engaged, locking the door on the opposite side. The main purpose of the alarm bells is to alert personnel if the pass-through door on the opposite side has been opened and the interlock is engaged. This is particularly useful if the pass-through does not include windows.

Each alarm bell is synchronized with one of the doors on the pass-through. Once the Smart Pass-Through has been installed and connected to a power supply, each bell should be tested to determine the corresponding door.

If the alarm bells have not been labeled, use the following procedure to determine alarm bell placement:

- 1) Starting on the “clean” side of the pass-through (the side that is flush with the wall), plug one of the alarm bells into a standard 120V outlet.
- 2) Open the “clean” side pass-through door. If the bell begins chiming, move the alarm bell to the “dirty” side of the pass-through.
- 3) If nothing happens, unplug that alarm bell and plug in the other one. Open the “clean” side door again and verify that the alarm bell activates. Move the alarm bell that activates to the “dirty” side.
- 4) Make sure that when one side of the pass-through is opened, the alarm bell activates on the opposite side of the pass-through.



Figure 3: Smart Alarm Bells

Following set up, the appropriate alarm bell will emit a single chime and the red LED indicator light will blink whenever the door is opened on the opposite side of the pass-through. When both doors are closed, the indicator light will stop blinking.



**If one of the doors is left ajar for an extended period of time, both alarm bells will ring continuously until the door is shut.**



## 2.0 Installation



The wall cut-out should be properly framed with an appropriate support material.

**Wall Cut-Out Measurements:** Add 3" to chamber width and 1" to chamber height.

To allow the pass-through to be removed for maintenance without requiring shut down of the cleanroom environment, be sure to finish the surfaces of the wall cutout with an appropriate non-shedding material, taking care not to obstruct the power supply connection.

**Installation Video:** To view a video demonstrating a similar installation, please visit the following link:

<http://www.terrauniversal.com/cleanroom-passthroughs/cleanseam-plus-pass-through.php>

- 1) Standing on the "clean" side of the wall, slide the pass-through completely into the wall until the welded mounting bracket is flush with the "clean"-side wall surface. The "clean"-side mounting bracket should fit tightly against the wall without the need for fasteners.
- 2) Install any support brackets and check the alignment of the pass-through chamber by following the procedures outlined in **Section 3.0 Door Alignment**.
- 3) The "dirty"-side mounting bracket is shipped preassembled. Pop off the bracket covers and slide the bracket onto the body of the pass-through (See **Figure 4**). If necessary, detach one section of the mounting bracket by removing the two screws at each corner, creating a "C" shape. Slide the "C"-shaped bracket onto the chamber and then reattach the missing section, tightening all corner screws once the bracket is in place.



**Figure 4:** Push the Smart Pass-through into the cut-out from the "clean"-side until it is flush with the wall



**Figure 5:** Slide the "dirty"-side mounting bracket onto the body of the Smart Pass-through

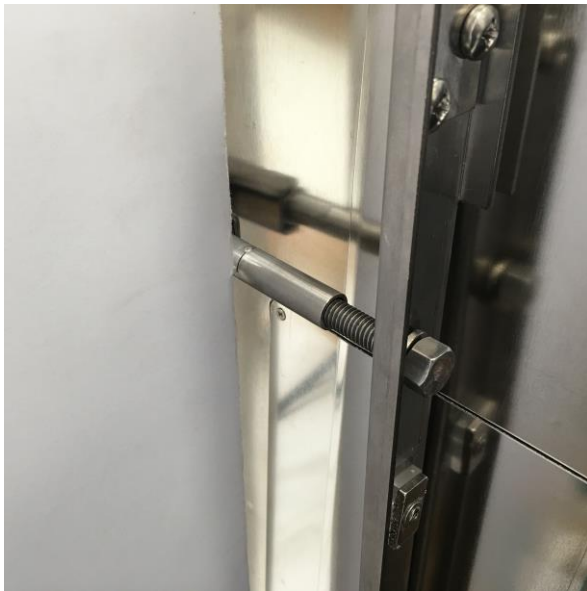


# Smart Pass-Through Chambers

- 4) Confirm chamber positioning with a level, and insert the provided lag bolts into the pre-drilled holes in the mounting bracket. Thread the lag bolt into the guide that extends from the “clean”-side mounting bracket (See **Figure 6**). The size of the pass-through will determine the number of bolts required. Use a socket wrench to tighten the lag bolts into the pre-welded nuts until the mounting bracket is flush against the wall.



**Be careful not to over-tighten the “dirty”-side mounting bracket lag bolts. The bracket should be secured against the wall but should not bend inward (forming gaps).**



**Figure 6:** Thread the lag bolt into the guide attached to the “clean”-side bracket, sandwiching the wall between the brackets



**Figure 7:** Snap the bracket covers back into place to hide the lag bolts and other hardware

- 5) Install the bracket covers by snapping each of them into the bracket clips (See **Figure 7**).



**Terra Universal provides lag bolts that accommodate wall thicknesses between 4” and 6”. Longer lag-bolts are required for thicker walls (not provided by Terra).**

- 6) Open the access panel on the side of the pass-through by removing the small screws that hold the panel in place.
- 7) Locate the power cord bundled inside of the pass-through wall. A predrilled hole is available if the power cord will be hidden inside of the wall. Alternatively, a second hole can be drilled in a more suitable location on the bottom of the pass-through, if needed. Install the provided cord grip and guide the power cord through the exit hole.



**Although the mounting brackets are designed to provide a sufficient seal against the wall surface, caulking may be used to fill any seams or gaps after the installation is complete.**



## 3.0 Door Alignment

Pass-through chambers being installed in a cleanroom wall must be properly aligned to ensure proper operation of the interlock mechanism.

- 1) In a properly aligned pass-through chamber, the self-closing fire-rated door shuts and latches completely without assistance and the LiftLatch is centered in the corresponding catch (See **Figure 8**). To align the chamber, one corner may need to be shimmed before tightening the mounting brackets to the wall.
- 2) Large chambers may include support legs with leveling feet. The feet adjacent to the cleanroom wall should be adjusted to support the chamber once the “clean” side door has been properly aligned.
- 3) Repeat this procedure for the opposite (i.e., “dirty”) door. Raise or lower the chamber corners until the door latch engages the center of the catch. Then adjust the support frame leveling feet to retain this alignment.



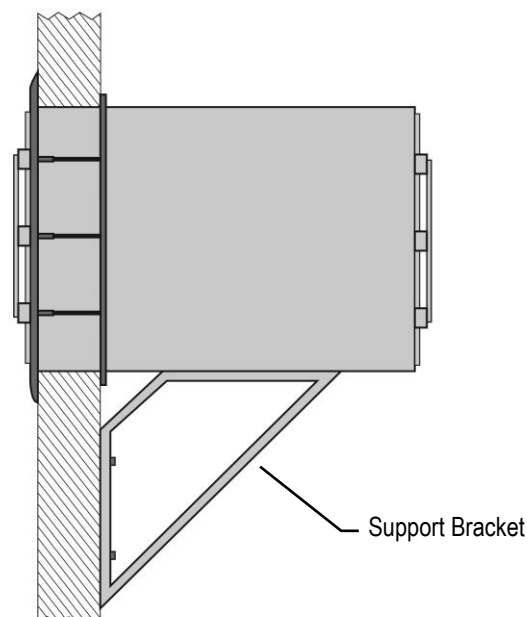
**Figure 8:** Properly aligned LiftLatch

- 4) Pass-through chambers deeper than 24” require support brackets. If your installation includes support brackets, fasten these to the wall underneath the chamber to achieve correct door alignment. The pass-through chamber should rest on top of the support bracket without the need for additional fasteners (See **Figure 9**).



Pass-through doors can be removed for sterilization by lifting upwards at the hinges.

NOTE



**Figure 9:** The support bracket is fastened to the wall below the pass-through



## 4.0 Smart Pass-through Accessory Modules



Refer to the original order form for details and specifications relating to your Smart Pass-through.

The following section provides information relating to each of the available accessory modules. Each module must be specified at the time of order and typically cannot be retrofitted or field-installed. Smart Pass-throughs can be equipped with any number of accessory modules, resulting in many different possible combinations. Because of the customized nature of the Smart Pass-through, some details may differ from your particular configuration. Contact Terra Universal with any questions not answered by the information presented below.

### UV-C Disinfection



**Avoid direct exposure to UV-C light. Never attempt to open the pass-through doors when the UV disinfection cycle is in progress.**

The UV-C Sanitizing Module performs an exposure cycle that neutralizes bacteria, viruses and mold spores within the pass-through chamber. The recessed UV-C light fixture is located in the ceiling of the chamber behind a quartz glass window that allows for complete transmission of UV-C wavelengths. The glass windows of the pass-through doors block UV-C light during the exposure cycle.

The light is activated when the pass-through door closes. Once the cycle begins, the interlock activates and the pass-through cannot be opened until a preset period of time has passed.



Figure 10: Recessed UV-C light



Figure 11: Cycle time can be adjusted via the timer on the "dirty"-side of the pass-through





## Recirculating Air Showers

The Recirculating Air Shower configuration equips the Smart Pass-through with one of Terra's fan/filter units. HEPA-filtered air flows down from the ceiling of the chamber and exits through vents at the bottom of the chamber before circulating back up through the walls of the pass-through. This recirculating air flow prevents particles from settling and accumulating within the pass-through chamber, while making the interior air progressively cleaner with each pass over the HEPA filter.



**Figure 12:** A stainless steel screen hides the HEPA filter



**Figure 13:** Air escapes through the exhaust vents along the bottom of the chamber

The FFU is controlled using a separate power switch and fan speed dial located on the “dirty” side of the pass-through. When switched on, the blower can take up to 30 seconds to ramp up to the indicated speed. Increasing the speed of the blower will increase the number of air exchanges per hour and increase the pressure within the chamber. However, increasing the speed too much can cause turbulence within the chamber and generate excessive heat from the motor.

A Minihelic gauge displays the pressure differential between the chamber and the external environment in inches of water column. A typical pressure differential will read as a fraction of an inch of water column (e.g. 0.5” WC), depending on the speed setting and the remaining life of the HEPA filter.



**Turn off both power switches prior to servicing the pass-through. If the unit is equipped with a key-switch, insert the key and turn it to BYPASS mode to disable the Smart Interlock.**

### HEPA Filter Replacement

The HEPA filter should be replaced if there is a noticeable reduction in air flow or if a leak is present. Airflow should be measured with an air speed monitor and FFUs should be tested periodically to detect these changes.

- 1) Remove the metal screen on the ceiling of the chamber to expose the HEPA filter (See **Figure 12**).
- 2) Rotate the clips that hold the filter in place and allow the HEPA filter to drop out of the housing.



**Figure 14:** Exposed filter after removing protective screen



Figure 15: Rotate the retaining clips to release the filter

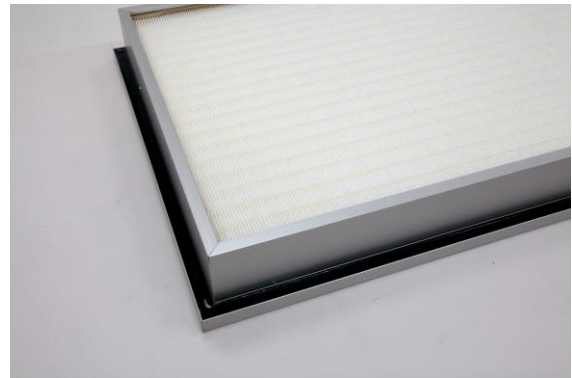


Figure 16: Black gel-filled channel forms a seal when installed

- 3) The HEPA filter assembly is surrounded by a gel-filled channel. Touching only the aluminum frame, lift the new HEPA filter up into the housing, pressing the knife-edges into the gel. Rotate the clips to secure it in the proper position.
- 4) Snap the protective metal screen back into the ceiling.

Replacement HEPA Filters	
Filter Size	Cat. #
2' x 2'	6601-27-R
2' x 3'	6601-26-R
2' x 4'	6601-25-R

## Load Presence Sensors

The optional Load Presence Sensors can detect objects placed within the pass-through using a pair of infrared beams. Whenever interference is detected between the IR transmitter and receivers, the Smart Pass-through Controller sends a signal to the "Load Presence" indicator lights on both sides of the pass-through, alerting personnel of materials ready for transfer. The indicator lights will blink until the object causing the interference has been removed.

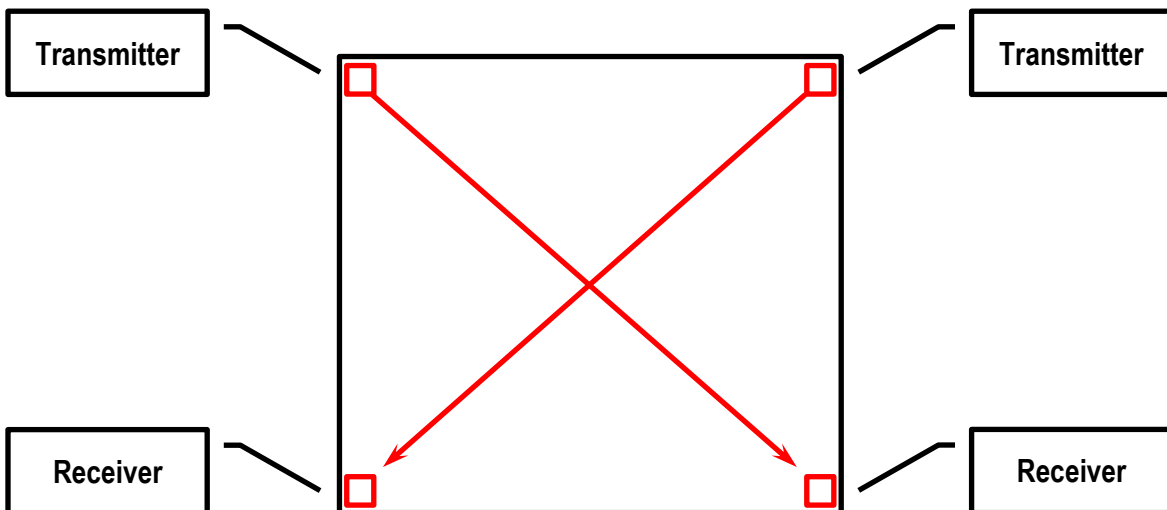


Figure 17: View from above of the IR beam pattern



Be sure to always place materials near the center of the pass-through to avoid potential blind spots.



## Refrigeration Module

The optional Refrigeration Module quickly and quietly cools the internal chamber to the user's specifications. The module is mounted on top of the "dirty" side of the pass-through and requires that a support frame be installed below the pass-through (see **Figure 9** on Pg. 5).

Be sure that the evaporator drain tube exits from the bottom of the pass-through (see **Figure 15**). Connect the drain tube to an appropriate drainage device.

Turn on the unit using the green master power switch on the "dirty" side of the pass-through. The temperature controller is preconfigured for basic operation prior to shipment.



Figure 18: Drain tube exiting the evaporator inside the pass-through



**To prevent overheating of the compressor and evaporator coils, the refrigeration module's air intake and exhaust vents must be clear of obstruction after installation.**

To enter a new set-point:

- 1) Press MENU once to open Setpoint 1 (Press MENU twice for Setpoint 2)
- 2) Display flashes the first digit of Setpoint 1
- 3) Press MAX to set the digit, 0-9
- 4) Press MIN to activate the next digit (flashing)
- 5) Repeat steps 3 and 4 until all digits are set
- 6) Press ENTER to save the new setting and return to Run Mode

For additional instructions on setting alarms or reconfiguring the controller, refer to the manual from the controller manufacturer: <http://www.omega.com/Manuals/manualpdf/M2491.pdf>

Specifications			
Condenser		Evaporator	
Refrigerant	R-22	Btu/hr @ 10° TD	1,200
Horsepower	¼ HP	Btu/hr @ 12° TD	1,440
Btu/hr	3,660	Btu/hr @ 15° TD	1,800
Power Requirements	115V, 60Hz, 1Ph	CFM	210
		Defrost	Electric
		Drain Connection	½" O.D.
		Fan Diameter	5-1/2"
		Number of Fans	2
		Volts	115



## 5.0 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](http://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!*