

Detailed steps for successful installation of an IR furnace. Includes both standard and optional equipment.

## 2.1 Unpacking the Equipment

### 2.1.1 Un-banding and Verification

Remove the banding from the shipping container and carefully disassemble. Refer to the Equipment List in this manual and verify the model of your furnace system and good receipt of all options, accessories, and special configurations, which were ordered according to the original purchase order or specification. If you cannot locate a listed item, immediately notify the carrier and Technical Support.

### 2.1.2 Furnace Cabinet Enclosure Considerations

The furnace enclosure helps provide control of the furnace process environment. However, it is not a structural enclosure.

**WARNING:** Do not step or stand on the furnace top covers or on Load stations. All connections to the furnace shall be self-supporting and shall not impose an additional load on the furnace enclosure.

### 2.1.3 Machine Inspection

Remove the upper and lower side covers from both sides of the machine. Inspect all lamp connections for soundness and for loose hardware that may have become dislodged during shipment. Inspect the lower electrical compartment for shipping damage, loose connections, or components. Finally, inspect the furnace interior, checking for broken lamps, foreign objects, or any components that may have come loose during shipment. Report any shipping damage immediately to the LCI Furnaces or FurnacePros Technical Support Department.

### 2.1.4 Machine Label

The furnace label generally appears as in **Figure 2-1 Name Plate** and indicates the maximum power and current draw. Actual operating values are much lower and can be found in Section 5. This label will normally be located near the Power Input either on the side or rear of the Control Enclosure.

**NOTE: The furnace was rewired to produce more stable results at lower operating cost before shipment. The nameplate is correct as shown in Figure 2-1. The factory representative shall replace the nameplate on the actual machine during startup.**

**Note revised Peak Power is 31 kW, Peak Current is 41 amperes.**

 <span style="float: right;">INNOVATIVE FURNACE TECHNOLOGIES</span>	
Serial Number	2018290
Model Number	SMD-615
Input Service	415 Vac, 3 Wire / Neutral / Ground
Frequency	50 / 60 Hz
Peak Power	30 kW
Peak Current	41 A
Typical N <sub>2</sub> Gas Consumption	30 LPS
Max Input Pressure	75 PSI
Process Exhaust	10 LPS
Cabinet Exhaust 1	236 LPS
Manufactured Date	11-2018
TPolar + waveform is a registered trademark of TP Solar, Inc. All right reserved. TP solar furnace technology, furnaces, components and processing covered under one or more of: US Patent 7,805,064; R.O.C. Patent No. ZL200780023525.5; Taiwan Patent No. I-335978; and other pending US and Foreign Patents. Control programs are Copyright © 2018 TP Solar, Inc. MADE IN THE USA	
16310 Downey Ave., Paramount, CA 90723, USA    Tel: 562-808-2171    Fax: 562-529-2483	

**Figure 2-1 Name Plate**

### 2.1.5 Machine Location

**Furnace Environment Considerations.** Location of the machine is important. The furnace environment should be clean and dry, especially if the furnace is to be used for to create low oxygen or other controlled environment. The lower the moisture levels in the room where the furnace is located, the easier it will be to achieve low oxygen and moisture levels in the furnace. Locate furnace away from fans, blowers or other equipment or drafts that can influence atmospheric conditions inside the furnace.

**Installing Through a Wall.** If installing the furnace through a wall between two rooms, make sure that the room pressures are equalized to avoid influencing the furnace atmosphere.

## Section 2

### 2.1.6 Lifting and Moving the Furnace

Lift the machine at the approximate locations shown on the Furnace Arrangement drawing, and slide the shipment skid out from under the machine. Do not attempt to lift the machine at one point or at points other than recommended; failure to follow these instructions invites frame damage and will void the warranty.

**NOTE:** The lifting device must extend under the machine and support both sides of the frame structure. See drawing 803-091615 Furnace Arrangement for location.

Once the machine has been moved onto a smooth flat floor the furnace can usually be moved on its wheels. Raise the furnace feet above the elevation of the wheels using an open-end wrench on the screw flats (Figure 2-7). Carefully manually push the furnace to the desired location. To secure, lower feet to keep in place. Tighten leveling nuts to lock in place.

### 2.1.7 Machine Placement

**Furnace Environment.** Locate the machine on an unyielding floor in the final installation position so that the access panels along the length of the furnace can be removed for calibration, servicing and maintenance.

### 2.1.8 Removal of Shipping Restraint Brackets (**not required on post-2015 furnaces**)

Large furnaces operating at high temperatures experience considerable growth from thermal expansion. All models are equipped with support slides which allow stress free expansion to take place.

On some furnaces to secure the process chamber during shipment, restraining brackets (labeled SHIPPING BRACKET) attach directly between the chamber and frame.

If shipping brackets are installed, before operating the furnace first remove the top hex nuts and washers which secure each bracket to the frame. Then remove the shipping bracket and discard or store for use when moving the furnace again. To store inside the furnace, turn shipping bracket upside down and reinstall nuts, but leave them loose.



Figure 2-2 Shipping Brackets

**WARNING:** If present, failure to remove the top bracket invites structural damage and will void the warranty.

## 2.1.9 Installing Footpads

To avoid damage and loss of parts, the foot pads are shipped in a box with the furnace and the foot pad studs are raised to prevent damage.

To install the footpads, lift and remove furnace side covers. Using an open end wrench on the hex flats, adjust the leveling feet to align with existing equipment. If furnace is not connected to adjacent equipment, level the furnace to within 0.10 inch across the length and as closely as practical across the width of the furnace.

**A. Locate box and remove footpads.** See **Figure 2-3**.



Figure 2-3 Footpad

**B. Locate Support studs.** See **Figure 2-4**. Lift and remove furnace side panels above each stud to access top of stud. See **Figure 2-5**.



Figure 2-4 Stud

**C. Attach Footpads** to each Stud. Thread a foot pad on each stud. Using open end wrenches tighten foot pad on bottom of stud just snug. See **Figure 2-4** and **Figure 2-5**.

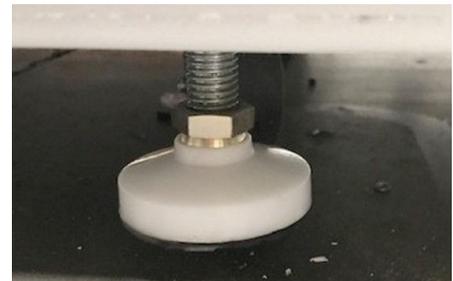


Figure 2-5 Footpad on Stud

**D. Adjust furnace height.** After footpads are installed, starting with the four corner studs, turn each stud clockwise until foot touches floor on all four corners. Then at whichever end of the furnace interfaces with another piece of equipment feeding or receiving parts, adjust furnace height to match adjacent equipment. Use an open end wrench to raise or lower feet at each end of wheels and even with sending receiving equipment. Use a bubble level across the Load/Unload station surfaces to level across furnace width.

If furnace has no interfacing equipment at either end, adjust **entrance** end first, leveling across the furnace at a convenient height so furnace is lifted off the wheels. Adjust exit end in a similar fashion using a bubble level on the top furnace cover or furnace frame to get the furnace approximately level.

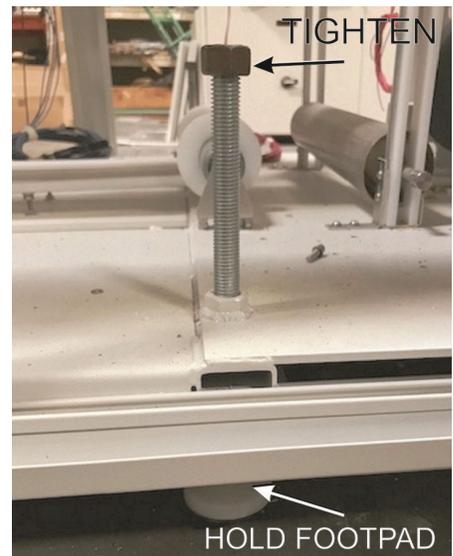


Figure 2-6 Tighten Footpad

## Section 2

Finally lower any intermediate feet (not at the corners) to  $\frac{1}{2}$  turn clockwise beyond just touching the floor to assure load is distributed fairly evenly and all wheels are free. See **Figure 2-7** and **Figure 2-8**.



Figure 2-7 Leveling Feet



Figure 2-8 Leveling feet detail

### 2.1.10 Leveling Chamber (not required on post-2015 furnaces)

Required on older furnaces. After the frame is level, adjust the 2 Leveling Nuts (Figure 2-8) on each of the 8 Chamber Support Brackets to 0.06 inch overall. See location of brackets in Figure 2-9. Adjust so that all brackets evenly support the weight of the furnace chamber assembly. Tighten nuts to lock in place.

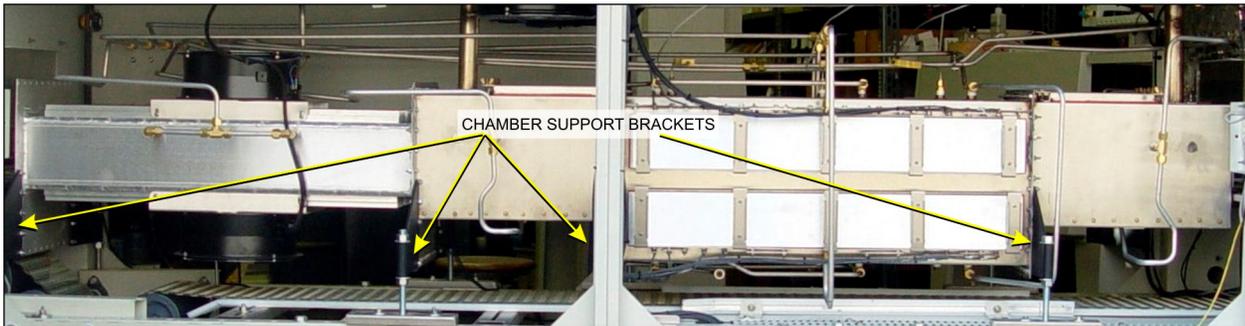


Figure 2-9 Location of Support Brackets (pre-2015)

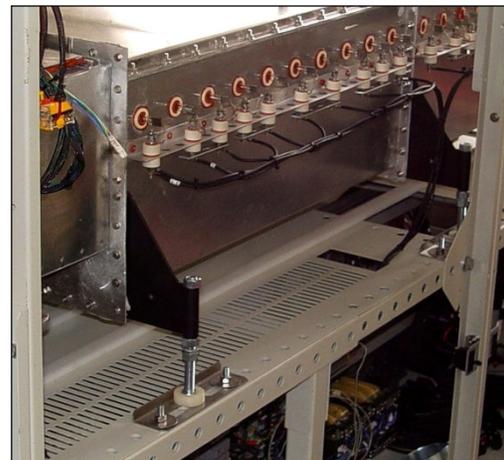


Figure 2-10 Chamber Support Brackets

### 2.1.11 Installation of the Transport Belt

SMD-615 furnaces are usually shipped with the belt already properly installed. However, if the furnace is shipped SPLIT or the shipment is expected to be exposed to rough handling or irregular terrain during shipment, the transport belt may have been intentionally left uninstalled to protect the furnace interior. This section can be used for installing the belt on a new furnace or for replacing a damaged or worn belt.

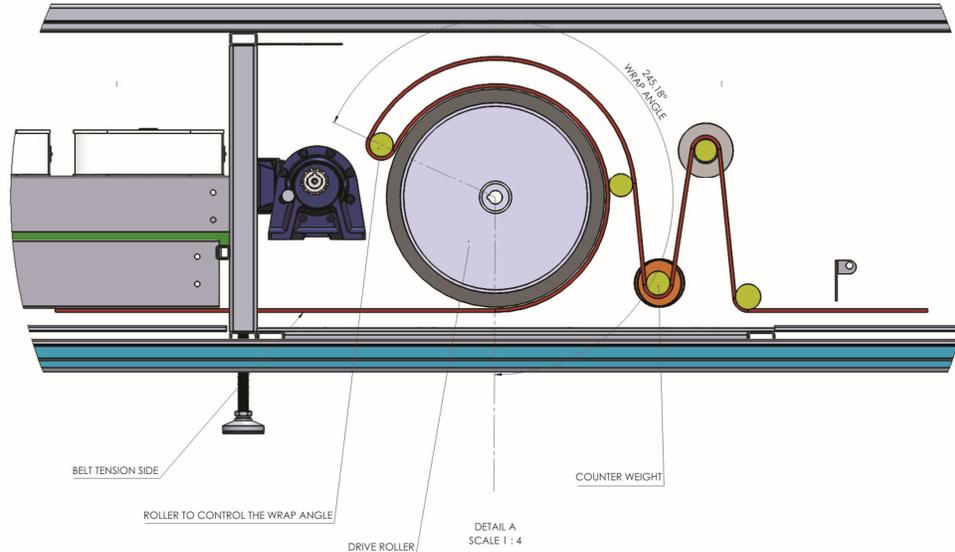


Figure 2-11 Belt Path

When installing the belt, have an assistant ready to help guide the belt into the furnace entrance.

#### A. Threading Belt

Extend a long wire or stick (to act as a pull rod) through the furnace chamber, being careful not to damage the lamps or insulation.

Securely attach the leading edge of the belt to the pull rod. Carefully pull the belt through the furnace from the exit end, while an assistant at the entrance unrolls and guides the belt into the furnace.

When the belt has been pulled through the furnace chamber, remove the pull rod and thread a pull wire through the rollers and drive drum, as shown in Figure 2-11. Pull the leading edge of the belt to the entrance and splice.

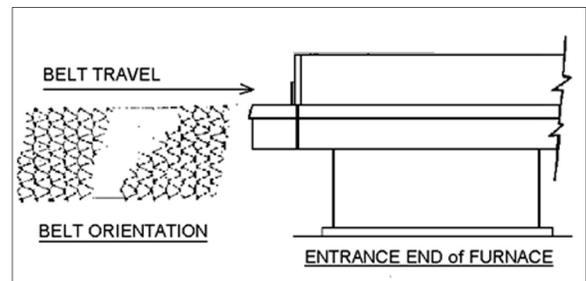


Figure 2-12 Belt Orientation

#### B. Splicing the Belt

Line up the ends of the belt so they are parallel and slightly overlapping.

Splice the belt by inserting one of the cross-section wires through the belt mesh across the width of the belt as shown in Figure 2-13.

The wire should be even and parallel and aligned with the belt edges. The cross-section wire will stay in place without any finishing at either end.

#### C. Belt Weight

Install belt weight as shown in **Error! Reference source not found.** and Figure 2-16

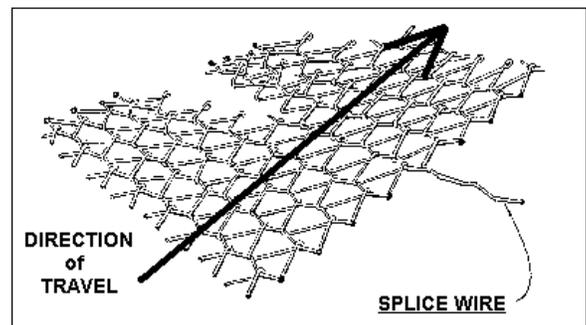


Figure 2-13 Belt Splice

## Section 2

### 2.1.12 Unpacking and Installation of Belt Weight

#### A. Locate and Unpack Belt Weight

Remove one of lower side panel near the furnace exit (below Control Enclosure). Using a flat screw driver turn the two latches to release and pull off the panel. This panel can be rotated and hung from the upper panel.

Locate the belt weight as shown in Figure 2-15 . Unwrap and remove packing.

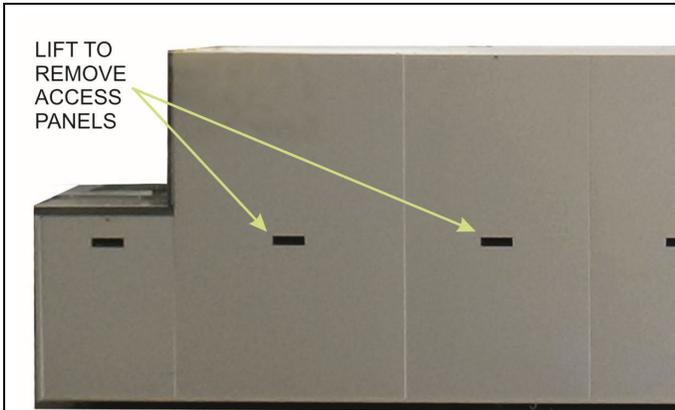


Figure 2-14 Rear Side Access Panels

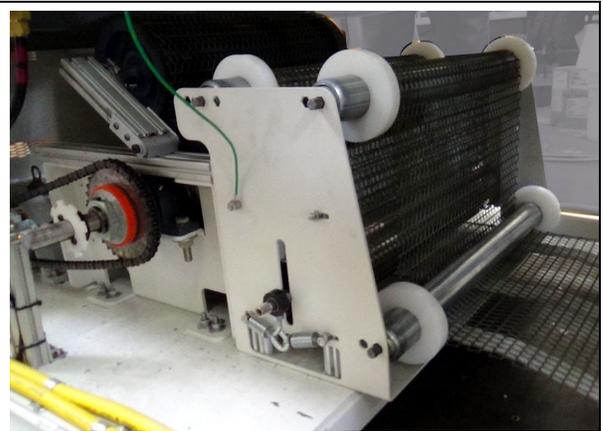


Figure 2-15 Belt Weight in guide

#### B. Install Belt Weight

Reinsert belt weight as shown in **Error! Reference source not found.**. If necessary, pull belt to the left or right to align Belt so that Belt Weight is allowed to move freely as shown in Figure 2-16.

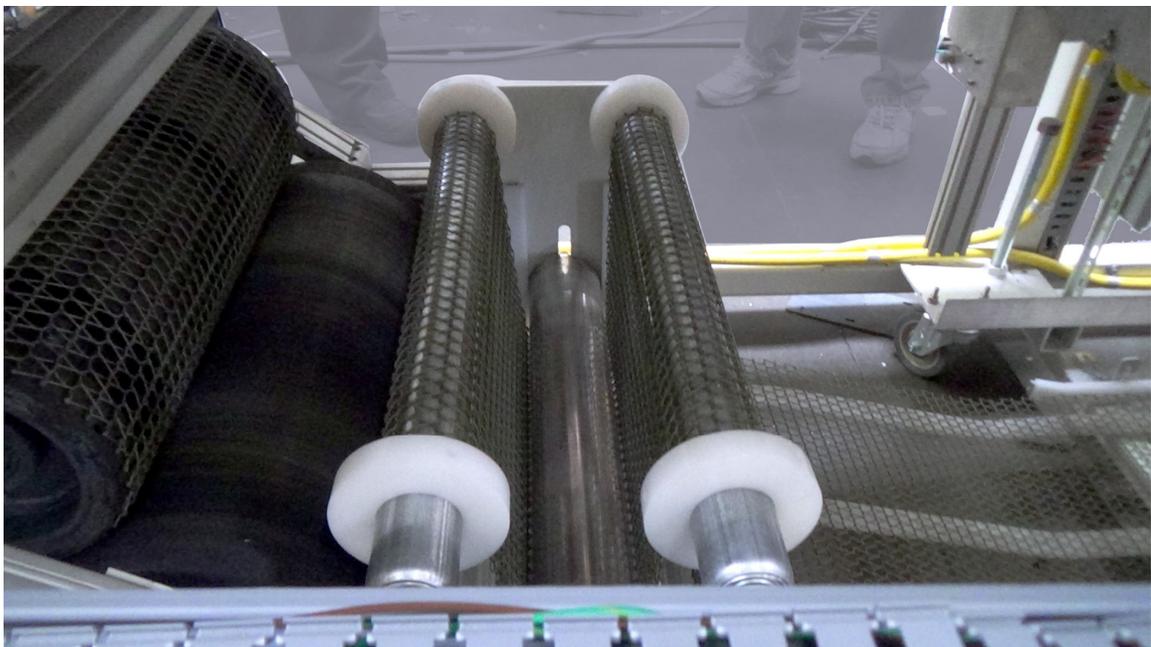


Figure 2-16 Proper Alignment of Belt Weight in guide

## C. Installing Belt Weight with UCD option

If an ultrasonic cleaner is installed on the furnace, the belt weight is installed the same manner as above, except in the UCD tank.

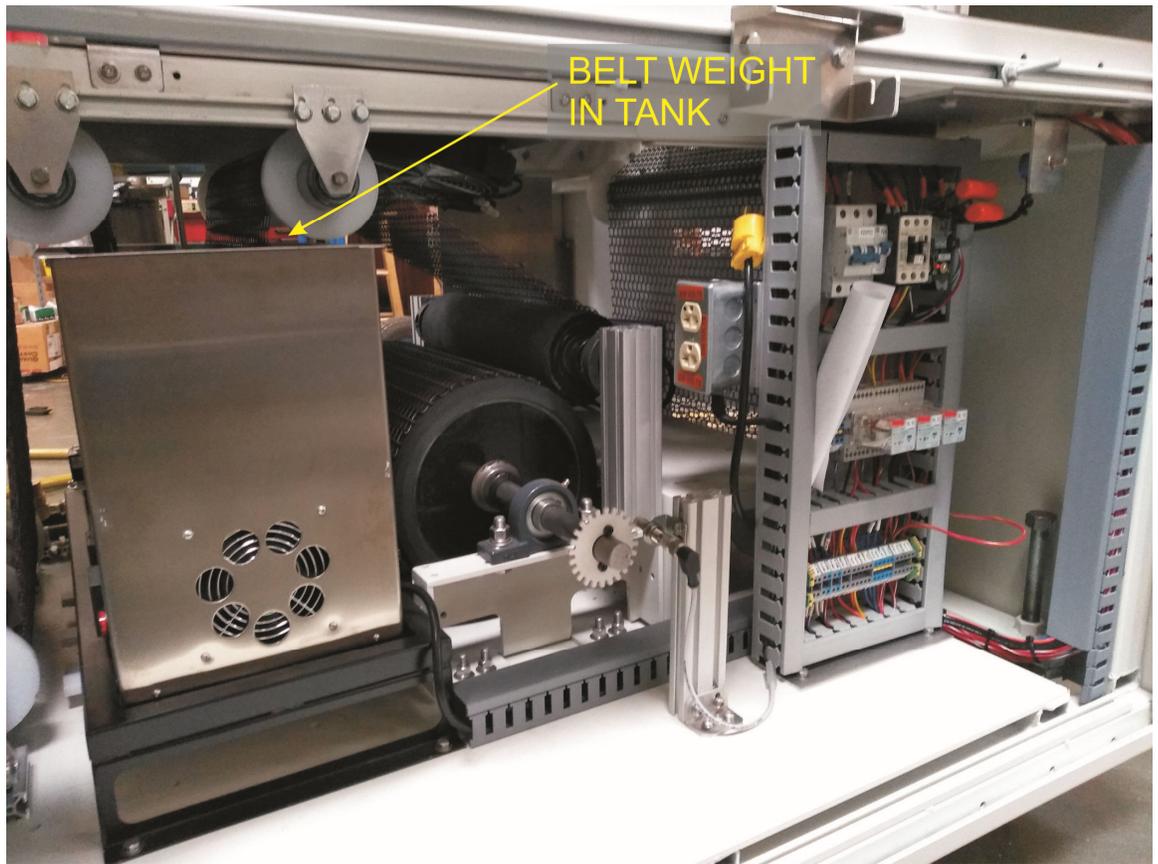


Figure 2-17 Belt weight in Tank on UCD system

### 2.2 Providing Power

The furnaces are shipped wired for the voltage specified on the nameplate. The nameplate is located either near where the power is to be connected typically either:

1. Either, adjacent to the power entrance hole in the lower electrical compartment near the contactor or circuit breaker; or

TP solar INNOVATIVE FURNACE TECHNOLOGIES	
Serial Number	2018290
Model Number	SMD-615
Input Service	415 Vac, 3 Wire / Neutral / Ground
Frequency	50 / 60 Hz
Peak Power	30 kW
Peak Current	41 A
Typical N <sub>2</sub> Gas Consumption	30 LPS
Max Input Pressure	75 PSI
Process Exhaust	10 LPS
Cabinet Exhaust 1	236 LPS
Manufactured Date	11-2018

TPsolar + waveform is a registered trademark of TP Solar, Inc. All right reserved. TPSI furnace technology, furnaces, components and processing covered under one or more of: US Patent 7,805,064; R.O.C. Patent No. ZL200780023525.5; Taiwan Patent No. I-335978; and other pending US and Foreign Patents. Control programs are Copyright © 2018 TP Solar, Inc. MADE IN THE USA

16310 Downey Ave., Paramount, CA 90723, USA Tel: 562-808-2171 Fax: 562-529-2483

**Figure 2-18 Nameplate**

2. for power supplied from the top of the furnace, the label shall generally be located on top of the furnace behind the top mounted enclosure closest to the supply power connection.

#### 2.2.1 3-Phase Interlock Disconnect Switch, Top Mount (option, supplied).

Depending on options supplied, connect electrical power, matching the specifications on the nameplate to the circuit breaker, 3-phase disconnect switch, or TB-6 or breaker accessed via the furnace lower rear Entrance panel through the Power Port shown on the Furnace Arrangement drawing per POWER CONTROL SCHEMATIC.

A ground terminal is provided for a safety ground. All city and local codes should be followed when wiring this system for power. See Furnace Arrangement drawing 803-091615 and Engineering and Specifications sections of this manual for power requirements. See Figure 2-21 Disconnect switch for detail



**Figure 2-19 Typical top mount circuit breaker top enclosure location**

**2.2.2 3-Phase Interlock Disconnect Switch, Lower Mount (option, ☐ not supplied).**

FURNACE Interlocked ON/OFF switch Equipment furnished with an interlock 3-phase disconnect may connection to the terminal block in the provided disconnect enclosure. Remove the upper and lower panels. The disconnect switch must be turned to OFF to remove the lower panel.

Locate the disconnect enclosure behind the lower panel and remove its cover by loosening the two screws. Remove one of the knockouts in the top of the enclosure [use center 1” opening for four (4) #8 AWG wires or larger 1-1/4” knockout for up to four (4) #4 wires]. Pass the 3-phase power lines through the Power Port in the top of the furnace into the disconnect box.

Connect three phase power lines to the provided terminal blocks. Replace the cover and the panels, making sure to properly engage the disconnect switch with the protruding switch shaft. Startup technician will make final connection at the contactor.



**Figure 2-20 Interlock disconnect switch enclosure**



**Figure 2-21 Disconnect switch & power connection terminal blocks**

**2.2.3 Furnace Network Connections**

Owner may connect the furnace to its network or the internet using either the RJ45 port located on the furnace Lower Entrance Panel with a Cat5e or Cat6 cable (see Figure 2-23)

The Ethernet port is the computer Local connection 2. In addition, the furnace can be equipped to accept a wireless network connection via one of the USB ports.

**WARNING: CONNECTING THE FURNACE COMPUTER TO THE INTERNET MAY EXPOSE THE FUNACE SYSTEM TO UNWANTED CHANGES TO THE OPERATING SYSTEM OR INTRODUCE A VIRUS THAT COULD INTERFERE WITH FURNACE PERFORMANCE.**

## Section 2

### 2.2.4 Furnace USB Connections

The furnace is equipped with two (2) USB 2.0 ports on the front of the furnace computer (Figure 2-22 and Figure 2-23). These USB ports can be used for connecting a portable drive or to connect a profiler.

Two (2) additional USB ports are located on the rear of the computer casing.

**WARNING: CONNECTING AN EXTERNAL DEVICE TO THE FURNACE COMPUTER MAY EXPOSE THE FURNACE SYSTEM TO UNWANTED CHANGES TO THE OPERATING SYSTEM OR INTRODUCE A VIRUS THAT COULD INTERFERE WITH FURNACE PERFORMANCE.**



Figure 2-22 Furnace Computer

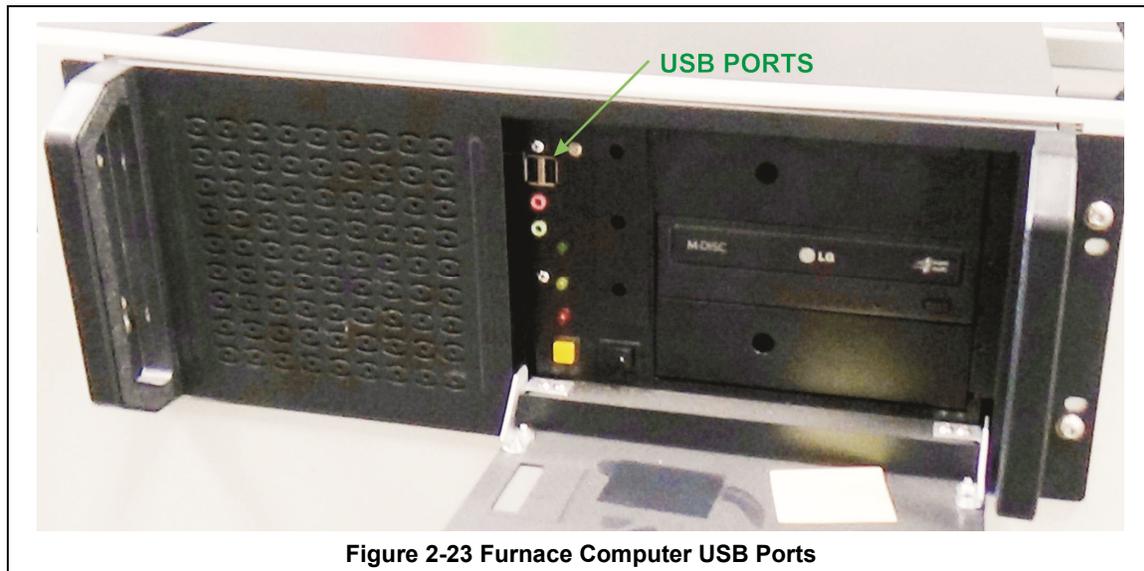


Figure 2-23 Furnace Computer USB Ports

### 2.2.5 Product Handling (SMEMA) Connections (Option not supplied)

If so equipped, SMEMA mechanical equipment standard interface is controlled via the furnace software. Enable and disable the SMEMA product tracking by clicking on the radio button on the title bar of the furnace software. Refer to drawing 803-10001-02 for SMEMA connections to the PLC. Locate HSK terminals (see 2.2.6) at the entrance and exit to make connections to upstream and downstream equipment. See Appendix 10.3 for SMEMA protocol details.

### 2.2.6 Handshake (HSK) Connections (Supplied Option)

The HSK option includes terminal blocks for NO and NC located on the front side for the furnace at the entrance and exit panels. The NO and NC contacts change condition at the entrance HSK connection when the furnace READY state is detected. The NO and NC change condition at the exit when a BOARD\_AVAILABLE or part available signal is detected at the exit. See appendix 10.3 for SMEMA protocol details if included as an option.

## 2.2.7 Factory Standard UPS

A small uninterruptable power supply (UPS) has been installed at the factory to provide 6 minutes for orderly shutdown of the furnace computer and PLC in the event of power failure or inadvertent disconnect of the furnace. Computer, monitor and Opto22 PLC stay on for 5-6 minutes. This UPS is located behind the computer access door next to the furnace computer.



Figure 2-24 Factory Standard UPS

## 2.2.8 Owner Supplied UPS

If desired an uninterruptable power supply (UPS) can be installed by the factory, or the Owner to continue to run the entire furnace or just the furnace belt for a specified duration. See Sections 4 and 5 for information on computer power requirements necessary for sizing the UPS.

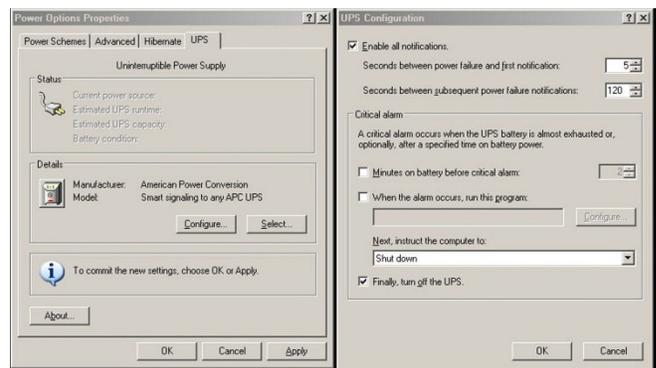
To install the UPS, locate the lower access panel located near the entrance of the furnace on the side opposite the Control Console. Install the UPS in this area on the furnace floor panel so that it is well supported. Provide power to the UPS through the standard 117 Vac socket labeled “COMPUTER UNSWITCHED”. Plug the UPS serial or USB connector into the rear panel of the computer tower.

To install the manufacturer’s software, insert the UPS Installation Disk in the optical drive accessed through the computer access opening below and left of the control console. Follow UPS manufacturer’s instructions for proper installation and configuration of the UPS to allow normal computer system shutdown in the event power is removed from the furnace system.

To install the UPS in Windows®7, start the computer and insert the UPS Installation Disk in the computer optical drive accessed through the computer access door below and to the right of the Control Console and follow the prompts.

To setup the UPS in Windows:

1. Click on Start/Control Panel
1. Select Power Options
2. Select the UPS tab.
3. Select manufacture and model buttons and enter preferences to allow normal computer system shutdown in the event power is removed from the furnace system.



## Section 2

### 2.3 Providing Process Gas

Oil-free dry process gas at a maximum recommended dew point of 15°C (59°F), shall be brought to the machine through a customer supplied lines with a minimum inside diameter of 3/4 inch. Initial supply pressure shall not exceed 175 psig. Supply line filters and condensate traps should be installed on each supply line connection before gas enters the furnace. Each supply line that does not have an internal pressure regulator installed in the furnace must have an external pressure regulator to reduce supply pressure to **75 psig** must be installed. Pressure regulators are best installed close to the furnace.

The supply temperature of both gas and air should be above the dew point of the room air to prevent condensation from forming on the feed lines and dripping into the furnace.

See Furnace Arrangement drawing for location and size of process gas line connections. An example of typical process gas connection is shown in Figure 2-26 shows typical Nitrogen and Hydrogen gas connections to a mixing enclosure.

**WARNING: The flowmeters on these furnaces are calibrated at 70 psi (5 bar) maximum. Operating above 100 psi exposes the operator to possible injury, may cause damage to the furnace internals and insulation and voids the furnace warranty**

#### 2.3.1 Single Gas Furnaces

On single gas furnaces, Gas 1 is a 3/4 inch female pipe connection for connecting CDA (clean dry compressed air) or nitrogen or other process gas to supply all furnace flowmeters on the front of the control console as well as providing pressure to the transport tensioning system.

Gas shall be supplied at 65-70 psig.



Figure 2-25 N<sub>2</sub>, CDA Connection

#### 2.3.2 Dual Gas Furnaces (☑ supplied option)

On Dual Gas furnaces (optional), Gas 1 is a 3/4 inch female pipe connection. Gas 1 is the primary gas connection for CDA or nitrogen to all furnace auxiliaries including entrance exhaust stack eductor and exit stack eductors (2). Gas 1 also provides pressure to the transport tensioning system. Gas 1 shall be supplied at 65-75 psig.

Gas 2 is a 3/4 inch female pipe connection for nitrogen or forming gas supply connects to furnace heating chambers, baffle sections and plenums. Gas 2 shall be supplied at 65-75 psig.

Note: The supply line to the furnace can be plumbed to provide the same gas to both Gas 1 and Gas 2, if desired.

Gas shall be supplied at 65-75 psig.



Figure 2-26 H<sub>2</sub> & N<sub>2</sub> Connections



**DANGER: Except for furnaces specifically equipped with the hydrogen option, combustible gas should NOT be connected to the furnace. Forming gas or other gas mixtures which have a combustible gas component can be safely introduced into furnace provided the delivered concentration is below its lower flammable limit (LFL) in air.**

### 2.3.3 Supply Gas Mixing System (option, not supplied)



Figure 2-27 Supply Gas Mixing System

An option on Dual Gas furnaces, the Supply Gas Mixing System facilitates connection of two process gases which can then be alternatively selected or mixed while the furnace is operating. In addition, the system includes two pressure regulators that can accept supply line pressures of from 100 psi – 3500 psi (6.5-240 bar). Pressure gauges in both lines allow the user to adjust the pressure on both lines to the pressure the furnace requires: 75 psig (4.8 bar).

Gas 1 is a 3/4 inch female pipe connection for connecting nitrogen to all furnace auxiliaries including inlet and transition tunnel baffles, entrance exhaust stack eductor, lamp seals and CACT cooling chamber. In addition, this port feeds the N2 (Nitrogen) supply pressure gauge and flowmeter located on the side of the control console. Gas 1 also provides pressure to the transport tensioning system.

Gas 2 port is a 3/4 female pipe connection for premixed FG (forming gas) supply. This port feeds the FG (N2/H2) premix supply pressure gauge and flowmeter on the side of the control console.

## 2.4 Exhaust Requirements

### 2.4.1 Cabinet Ventilation Requirements (by customer)

A 10-inch (254 mm) round duct can be directly connected above each 10-inch diameter cabinet exhaust ring connection on the top of the furnace to redirect much of the additional heat load the furnace can add to its environment. The cabinet exhaust duct generally does not need to be insulated but must be equipped to draw at least 500 cfm (240 LPS) per connection. As this vent only cools the cabinet interior, if the furnace is installed in an adequately ventilated room, and operated at temperatures under 500C this vent duct may not be required.

Make sure any connection to the furnace is self-supporting and does not impose an additional load on the furnace. See connections examples in Figure 2-28 and Figure 2-29.

See the INSTALLATION or FACILITY ARRANGEMENT drawing for location of cabinet vents and suggested duct sizes.



Figure 2-28 Cabinet Exhaust Example



Figure 2-29 Cabinet Exhaust Examples

### 2.4.2 Non-combustible Process Gas Exhaust Requirements (by customer)

In most applications, process exhaust and heat are vented to the outside atmosphere. It is the customer's responsibility to review the process, local laws, and facility in deciding on an exhaust system.

The furnace exhaust stacks are 2.0 inch diameter. Insulated exhaust tubing and a collector hood, is routinely used for non-combustible process gas. **Do not make any direct connections to the furnace exhaust stacks.** A minimum 2.0 inch clearance between the 2-inch diameter exhaust stacks and venting hood or device is required.

Collector hoods are typically 8-10 inches diameter connected to a 4-6 inch diameter duct. Ducts from multiple stacks can be connected above. Butterfly dampers (shown) can be used to balance exhaust flow and to minimize facility exhaust system influence on the furnace atmosphere.

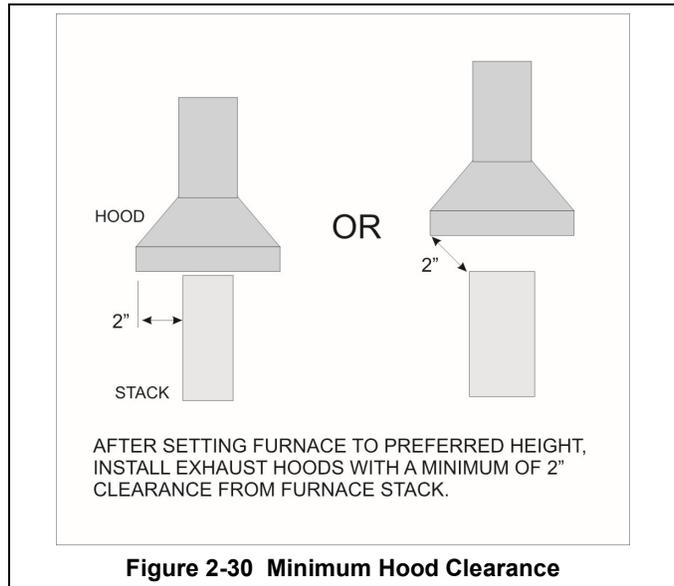


Figure 2-31 Exhaust Connection and Figure 2-32 Exhaust Connection Detail show typical exhaust connections. See the INSTALLATION or FACILITY ARRANGEMENT drawing for suggested duct and hood locations.

**WARNING: Do not connect process gas exhaust duct directly to furnace or furnace stack to avoid erratic furnace control behavior, damage to the furnace internals and insulation and voiding the furnace warranty.**



### 2.4.3 Combustible Process Gas Exhaust Requirements (hydrogen option only □ )

In most applications, process exhaust and heat must be vented to the outside atmosphere. It is the user's responsibility to review the process, local laws, and facility in deciding on an exhaust system. If combustible gases are present, a wide collector hood suitable for 300°C operation with a 30-inch inside diameter, or larger, is routinely used. These hoods are typically located a minimum of 24 inches above each igniter stack. See Furnace Arrangement or Installation drawing for suggested sizes and locations.

Do not make any direct connections to any chamber exhaust stack. Clearance between the exhaust stacks and venting device is required. See Figure 2-33 for example of a typical hydrogen furnace exhaust connection.



Figure 2-33 Typical Hydrogen Furnace Process Gas Exhaust Connection

## Section 2

### 2.5 Water and Drain Connections

#### 2.5.1 Water Supply and Drain Connections for UCD (supplied option)

Furnaces equipped with an ultrasonic cleaner dryer (UCD) system will require the customer to connect clean water supply lines to the connections provided. Ultrasonic System water and drain connections can normally be accessed through rear panels near furnace exit (see Figure 2-14 Rear Side Access Panels).

Pipe water supply connection through pipe connections under panel or through rectangular opening in lower panel similar as shown in **Error! Reference source not found.** If the furnace includes a factory installed water pressure regulator, supply pressure to the regulator should not exceed 100 psi. If factory regulator is not supplied, user must install a pressure regulator at the furnace to control water pressure to a maximum of 30 psig.

**Drains.** For UCD systems a drain line capable of intermittent flows of 40 gpm at 40 psi (5-10 minute durations) must be connected to the water drain connection. See Furnace Arrangement or Installation drawing for connection locations, sizes and maximum and design flow rates.

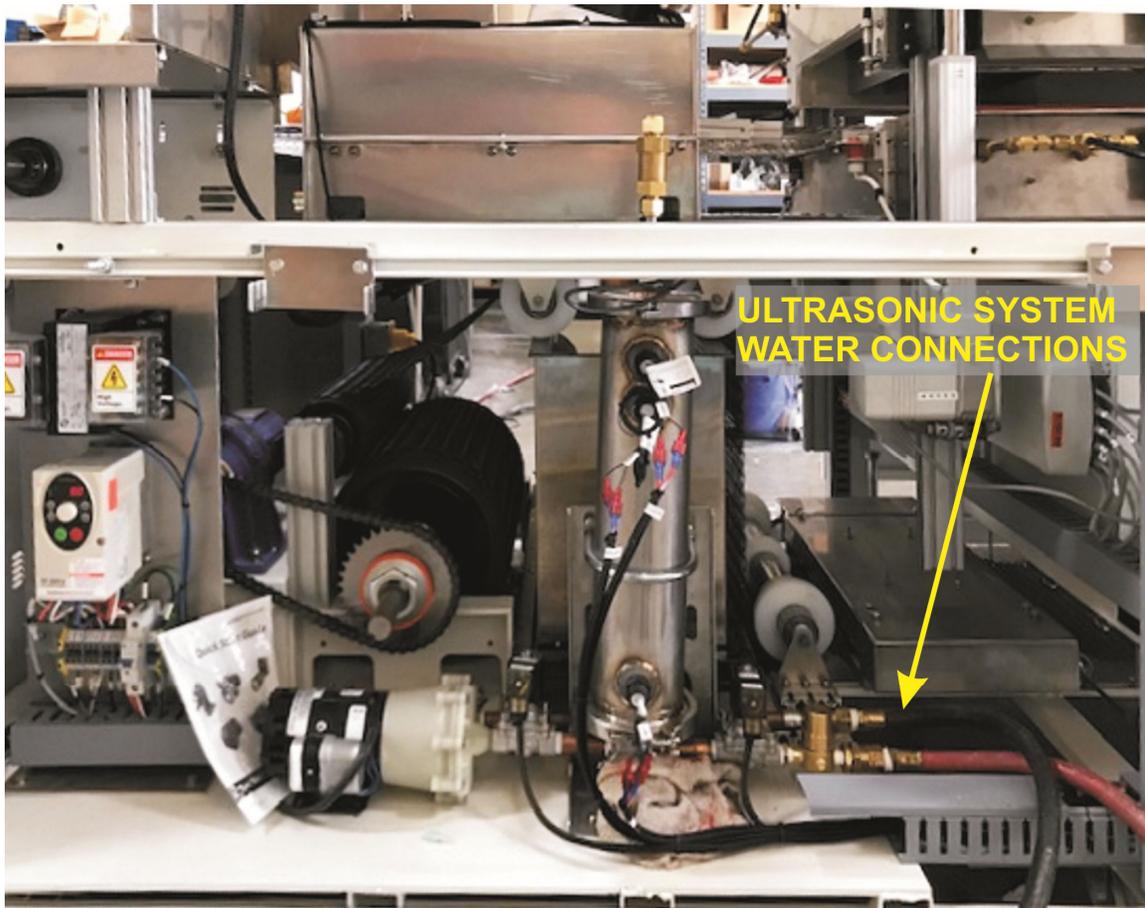
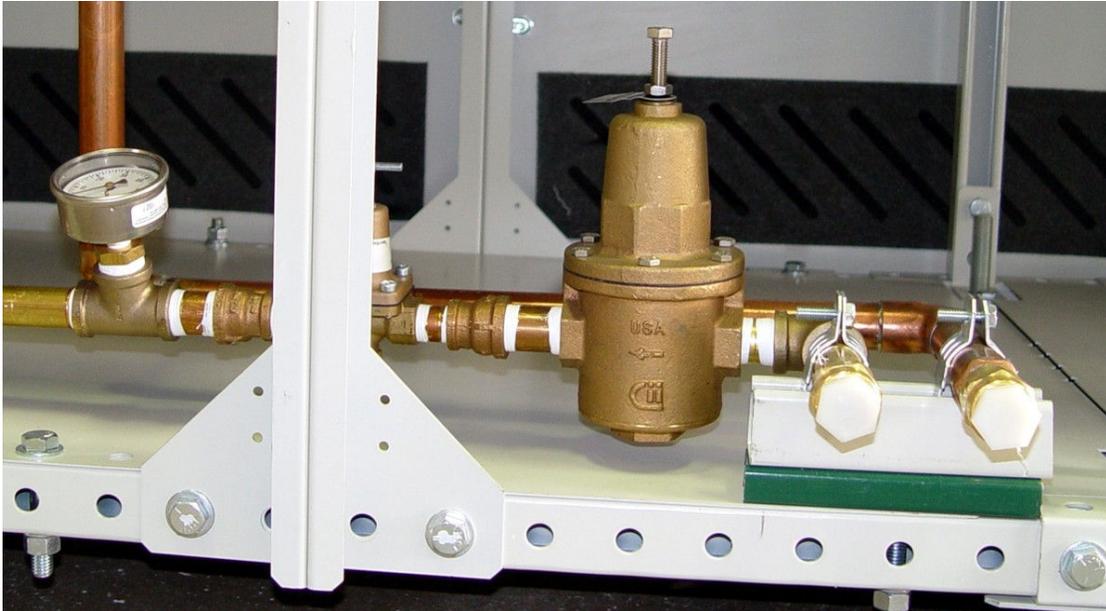


Figure 2-34 UCD Water Connections

## 2.5.2 Water Supply and Drain Connections for CAWC (option not supplied)

Optional Controlled Atmosphere Water Cooling (CAWC) systems require clean water supply supplied to the connections provided. Water cooling systems generally operate best when connected to a recirculating deionized water (DI) cooling system. Pipe water connection through rectangular opening in lower panel similar to Figure 2-35.

If the furnace includes a factory installed water pressure regulator, supply pressure to the regulator should not exceed 100 psi. Otherwise user must install a pressure regulator at the furnace to control water pressure to a maximum of 30 psig. Often furnaces include dual pressure regulators to reduce water pressure smoothly at 30 psig. See Furnace Arrangement or Installation drawing for connection locations, sizes and maximum and design flow rates.



**Figure 2-35 CAWC Water Supply & Drain Connections**

## Section 2

### 2.6 Emergency Machine Off (EMO)

Pressing these buttons, located at each end of the furnace, cuts all power to the machine circuits immediately. Rotating the button CW and pulling outward will reset the button. Both buttons must be in the SET position for power to enter the furnace.



Figure 2-36 EMO buttons at Entrance

**Note:** These buttons are for emergency use only and are not recommended for routine shutdown of the furnace.

### 2.7 Interlocks (optional)

There may be a number of electrical interlocks on the furnace on either both the front and rear sides of the furnace. Figure 2-37 shows a typical interlock switch location. Circuit breaker access doors located on the rear side of the furnace near the entrance may be interlocked to that breaker must be OFF to access enclosure.

All interlocked furnace side covers should be in place for power to enter the furnace in normal operation. Removing any one of an interlocked panel will cause the furnace to be isolated from electrical power supply. This is a safety precaution for your protection as DC and 117 Vac, 220 Vac and 3-phase power circuitry and connections are inside the cavity.

Except when placed into maintenance mode by qualified technicians, the lower panels should always be in place while power is being applied to the furnace. Trained personnel with a good understanding of the dangers involved may choose to override the interlocks by pulling outward on the interlock shaft to the “maintenance” position which will restore power to the furnace with the control box covers removed.

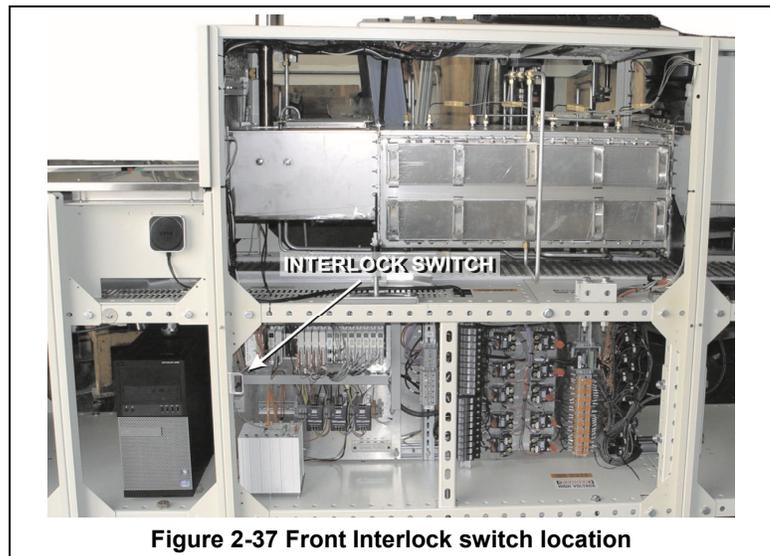


Figure 2-37 Front Interlock switch location

**Warning:** Dangerous voltage and current (potentially lethal) may be present in the control box with the interlocks in “maintenance” position.

## 2.8 Initial Startup

### 2.8.1 Supervisor initial setup

The supervisor establishes who can access the furnace and at what level. The furnace control software has 5 user access levels with various permission levels. The furnace software initially shipped without any Supervisor password. A number of test users at different levels may be found on initial on-site startup.

**A. The Supervisor initially should:**

- Establish a password for Supervisor,
- Add a user at Engineer level and establish password,
- Add a user at Operator level and establish password.

**B. Optionally the supervisor can:**

- Add user at Maintenance Engineer level.
- Delete all unnecessary users (except Factory)

**C. Access Level Permissions**

Below is a table showing the common access User Name, their respective Access Levels and permissions.

Table 2-1 Access Levels		
User Name	Access Level	Permissions
Disabled	<b>Disabled</b>	Cannot make any changes
Peter	<b>Operator</b>	Allows the operator to Start, Stop the furnace and Load and Run a Recipe and initiate a process.
Maintenance	<b>Maintenance Engineer</b>	Operator level plus Calibration and Test access.
Alex	<b>Process Engineer</b>	Maintenance Engineer level plus Operation Set-point, Recipe changes.
Supervisor	<b>Supervisor</b>	Operator level plus User management
TP Solar	<b>Factory</b>	Factory level. Restricted to Manufacturer's personnel only.

Note: User Name can be the same or different than its respective Access Level name.

### 2.8.2 Supervisor Log-On screen



From the Menu Bar, the Supervisor selects the Log-On button to access the Log-On & User Information screen.

**A. Editing Supervisor password (Supervisor level only)**

- Click on the Supervisor. A User Edit window will open.
- Click on **Reset Password** to erase the password. The password is set by logging in as the new user and entering the new password.
- Click on **OK** to close the window.

**B. Adding users (Supervisor level only)**

- Supervisor clicks on blank user name field. A User Edit window will open.
- Click on **User Name** to add the name.
- Click on **Access Level** to set the access level, Click on **OK** to close the window.
- The password is set by logging in as the new user and entering the password. The password can be set by the supervisor or by the new user. Once set, it can only be changed by a supervisor. See Editing Users below.

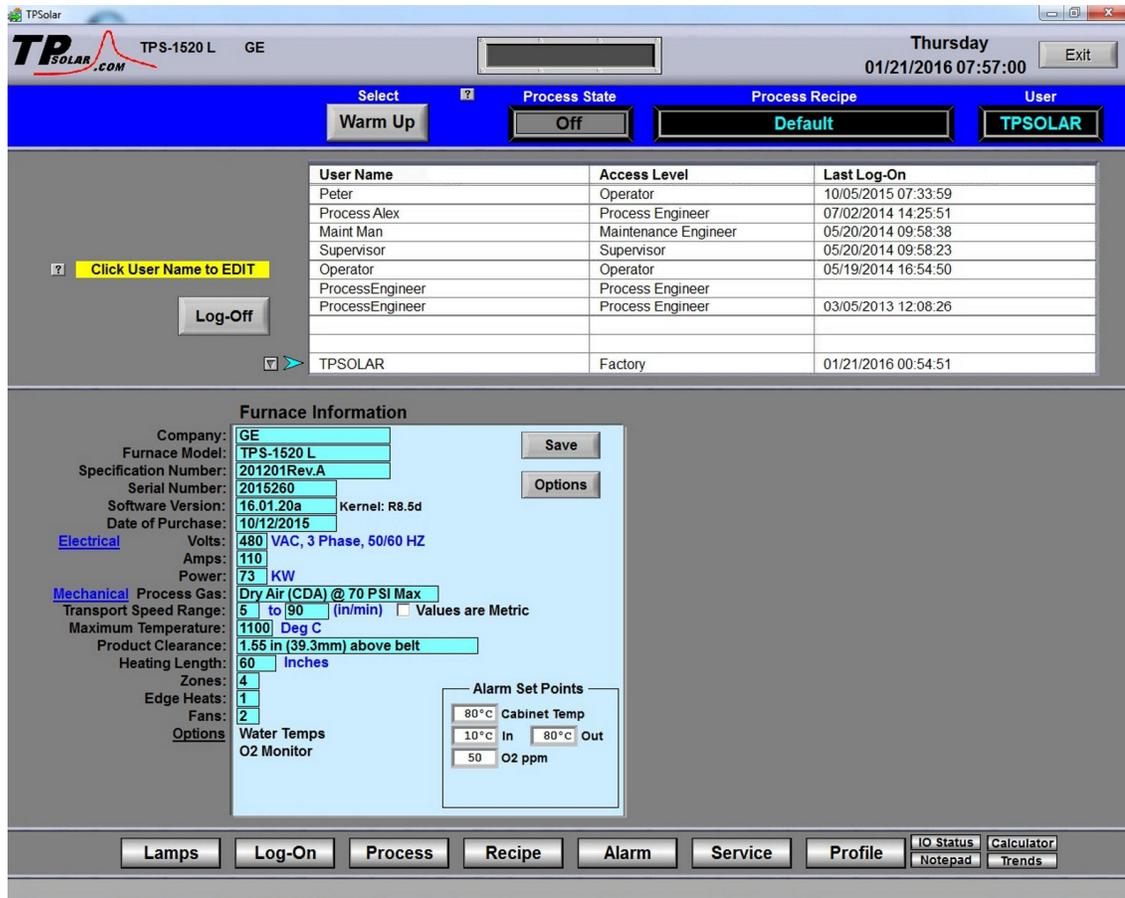


Figure 2-38 Typical Log-On screen

### C. Editing users (Supervisor level only)

Click on the user name. A User Edit window will open.

Click on **Delete** to remove the user.

Click on **User Name** to change the name.

Click on **Access Level** to change the access level.

Click on **Reset Password** to erase the password. The password is set by logging in as the new user and entering the new password.

Click on **OK** to close the window.