

Pyro-Clean®



This manual contains important operating and safety information. Carefully read and understand the contents of this manual prior to the operation of this equipment.

www.atspa.com

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For assistance with set-up or operation, contact the ATS service department. Please have this manual and product serial number available when you call.

Telephone: +1-724-283-1212.

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A. Introduction

A.1 Unpacking

Retain all cartons and packing materials until the unit is operated and found to be in good condition. If damage has occurred during shipping, notify Applied Test Systems (ATS) and the carrier immediately. If it is necessary to file a damage claim, retain the packing materials for inspection by the carrier.

A.2 Warranty Information

All new ATS systems are shipped with a warranty. Units have a warranty against defective parts and workmanship for one full year from the date of shipment. Please see APPENDIX A of this manual for complete details on the warranty.

A.3 After Sale Support

If there are any questions concerning the operation of the unit or software, contact the ATS Service Department at +1-724-283-1212.

Before calling, please obtain the software revision number and the serial number from the unit's data tag. A sample data tag is illustrated below, and can be completed with the unit's information for easy reference. Please be prepared to give a complete description of the problem to the ATS Service Department.


 APPLIED TEST SYSTEMS www.atspa.com MADE IN USA	NO. <input type="text"/>
	<input type="text"/> AMP <input type="text"/> VAC
	<input type="text"/> PH <input type="text"/> HZ
	DWG <input type="text"/>
<input type="text"/>	
<input type="text"/>	
<input type="text"/>	
<input type="text"/>	

Figure A.1: ATS Sample Data Tag

B. Safety

B.1 For Owners, Operators, and Maintenance

All ATS equipment is designed to be operated with the highest level of safety. This manual uses note, caution, and warning symbols throughout to draw your attention to important operational and safety information.

Read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions regarding operation of the unit or instructions in this manual, contact the ATS Service Department at +1-724-283-1212.

Read and follow these important instructions. Failure to observe these instructions can result in permanent damage to the unit, significant property damage, personal injury or death.

B.2 Safety Instructions

Your Pyro-Clean® has been designed with function, reliability, and safety in mind. It is the user's responsibility to install it in conformance with local electrical codes. For safe operation, please pay attention to the alert boxes throughout the manual.



WARNING: Warnings alert you to a possibility of personal injury.



CAUTION: Cautions alert you to a possibility of damage to the equipment.



NOTE: Notes alert you to pertinent facts and conditions.



HOT SURFACE: This symbol alerts you to a possibility of personal injury if you come in contact with a surface during use or for a period of time after use.



ELECTRICAL SHOCK: This symbol alerts you to a possibility of personal injury due to live electrical components which may be exposed inside of the cover or unit.

B.3 Warnings

The following statements are WARNING statements. Unlike CAUTION statements, WARNING statements alert the operator to conditions that may injure personnel. Operators must be aware of these conditions in order to prevent injuries that may occur while operating this equipment.



WARNING: To avoid electrical shock, this furnace must use a properly grounded electrical supply of correct voltage and current handling capacity, and be disconnected from the power supply prior to maintenance and servicing.



WARNING: To avoid personal injury do not use in Class I, II, or III locations as defined by the National Electrical Code.



WARNING: Do not use in the presence of flammable or combustible materials; fire or explosion may result. This device contains components which may ignite such materials.



WARNING: Do not put sealed containers in oven.



WARNING: Refer servicing to qualified personnel.



WARNING: THIS PRODUCT CONTAINS REFRACTORY CERAMIC, REFRACTORY CERAMIC FIBER OR FIBERGLASS (GLASS WOOL) INSULATION WHICH CAN PRODUCE RESPIRABLE FIBERS AND DUST WHEN HANDLED. THESE FIBERS OR DUSTS CAN CAUSE IRRITATION AND CAN AGGRAVATE PRE-EXISTING RESPIRATORY DISEASE. REFRACTORY CERAMIC INSULATIONS MAY CONTAIN OR MAY FORM CRYSTALLINE SILICA (CRYSTALITE) WHICH MAY CAUSE LUNG DAMAGE (SILICOSIS).

THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) HAS CLASSIFIED REFRACTORY CERAMIC FIBER AND FIBERGLASS AS (28) POSSIBLY CARCINOGENIC. IARC HAS CLASSIFIED CRYSTALLINE SILICA AS (2A) PROBABLY CARCINOGENIC.

The insulating materials are located in the door, the hearth collar, in the chamber of the product or the top plate assembly. Tests performed by the manufacturer indicate that there is no significant risk of exposure to dust or respirable fibers resulting from operation of this equipment under normal conditions. However, there may be a risk of exposure to respirable dusts or fibers when repairing or maintaining the insulating materials, or when otherwise disturbing the materials in a manner which causes release of dust or fibers therefrom. Through the use of proper handling procedures you can work safely with these insulating materials and minimize any exposure.

Accordingly, before you repair or replace any insulating materials, or perform any other servicing on this product which could disturb or cause exposure to dust from insulating materials, you should consult the appropriate Material Safety Data Sheets (MSDS's) for such products with respect to proper handling and appropriate protective equipment. For additional MSDS's, or additional information concerning the handling of refractory ceramic products, please contact the ATS Service Department at +1-724-283-1212.



WARNING: This warning is presented for compliance with California Proposition 65 and other regulatory agencies and only applies to the insulation in this product. This product contains refractory ceramic, refractory ceramic fiber or fiber glass insulation, which can produce respirable dust or fibers during disassembly. Dust or fibers can cause irritation and can aggravate pre-existing respiratory diseases. Refractory ceramic and refractory ceramic fibers (after reaching 1000°C) contain crystalline silica, which can cause lung damage (silicosis). The International

Agency for Research on Cancer (IARC) has classified refractory ceramic fiber and fiberglass as possibly carcinogenic (Group 2B), and crystalline silica as carcinogenic to humans (Group 1).

The insulating materials can be located in the door, the hearth collar, in the chamber of the product or under the hot plate top.

Tests performed by the manufacturer indicate that there is no risk of exposure to dust or respirable fibers resulting from operation of this product under normal conditions. However, there may be a risk of exposure to respirable dust or fibers when repairing or maintaining the insulating materials, or when otherwise disturbing them in a manner which causes release of dust or fibers. By using proper handling procedures and protective equipment you can work safely with these insulating materials and minimize any exposure. Refer to the appropriate Material Safety Data Sheets (MSDS) for information regarding proper handling and recommended protective equipment. For additional MSDS copies, or additional information concerning the handling of refractory ceramic products, please contact ATS Service Department at +1-724-283-1212.

C. System Overview

C.1 Equipment Parts

Front of Unit

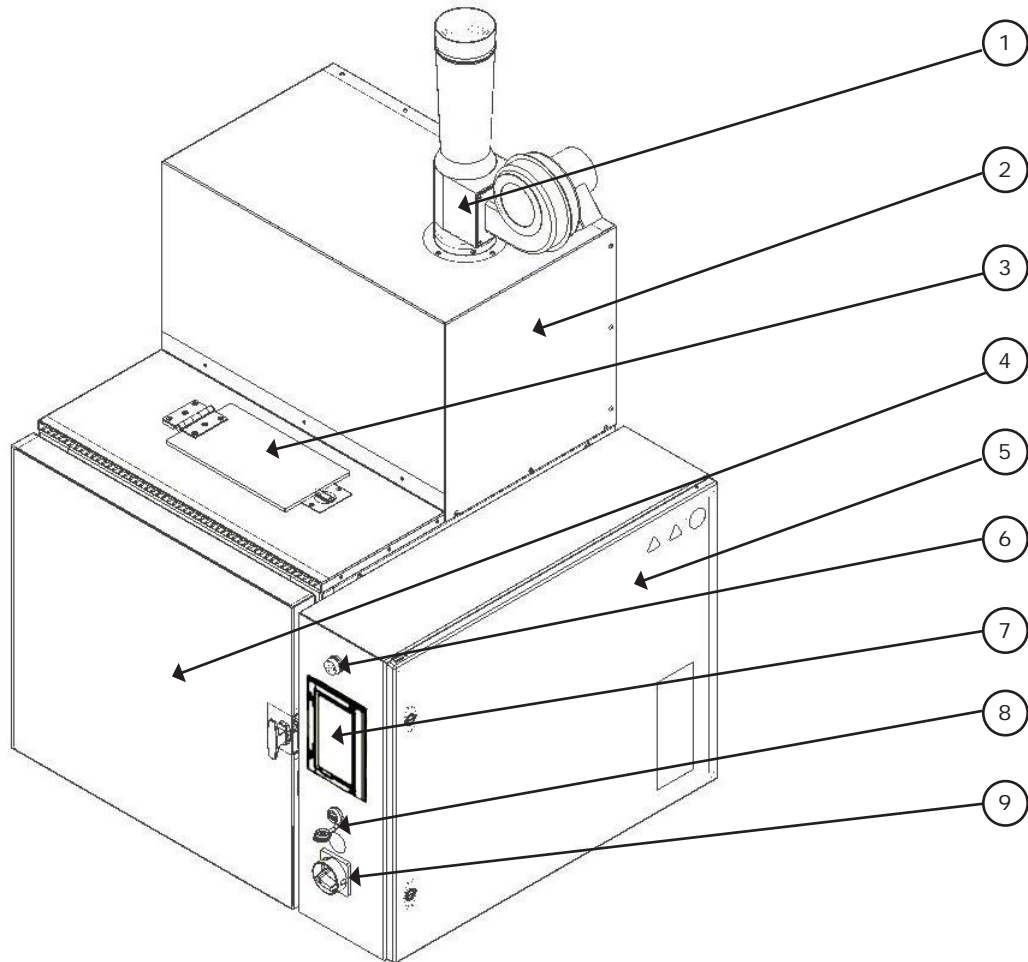


Figure C.1 - Pyro-Clean® Front

- | | |
|---------------------|---------------------|
| 1. Draft Inducer | 6. Power Light |
| 2. Oxidizer Chamber | 7. HMI Touch Screen |
| 3. Blow-Off Door | 8. USB Port |
| 4. Oven Chamber | 9. Power Switch |
| 5. Electrical Box | |

Back of Unit

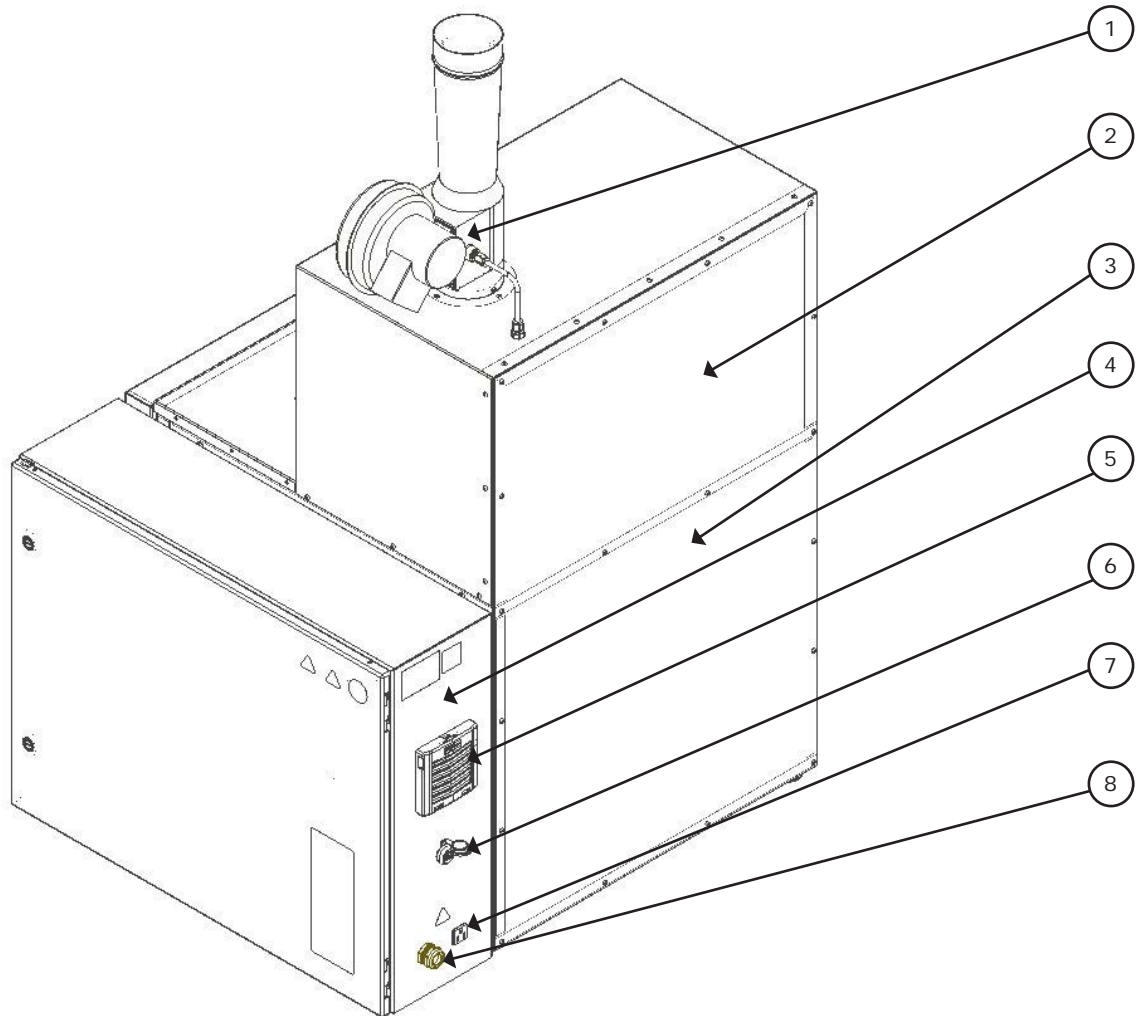


Figure C.2 - Pyro-Clean® (Rear View)

- | | |
|---------------------------|-------------------------------|
| 1. Draft Inducer | 5. Air Intake Filter |
| 2. Oxidizer Chamber | 6. Ethernet Port |
| 3. Oven Chamber | 7. Draft Inducer Power Outlet |
| 4. Electrical Control Box | 8. Power Cord |

C.2 General Overview

Use

The Pyro-Clean® is designed to clean glass or metal parts contaminated with residues of various organic substances such as polymers, waxes, resins, asphalts, tars, or other similar contaminants. Cleaning is done entirely with heat, eliminating the use of solvent or chemical cleaning. Organic residues are thermally decomposed and vaporized from glass or metal parts at 900 degrees F. Virtually all types of heat-resistant glass and metal parts can be cleaned in the oven. As long as the heat will not hurt the parts being cleaned, and the residues to be removed are organic and can be removed thermally, the Pyro-Clean® is a suitable alternative to solvent and chemical cleaning methods.

How it Works

1. Heat Decomposes and Vaporizes Organic Residues from the Glass or Metal Parts

The Pyro-Clean® is a high-temperature oven capable of operating at 800-1000 degrees F. This temperature is sufficient to thermally decompose (vaporize) most polymeric residues and other organic material to volatile gases and carbonized residues without harming the glass or metal parts. The pyrolysis smoke and gases produced by degradation of the organic residues reacts with a catalyst suspended in stainless steel wire mesh which comprise of two racks (trays) inside the oven chamber. If sufficient smoke or pyrolysis gases are produced inside the oven, the oxidation of this smoke will consume oxygen inside the oven and actually inert the oven to a very low oxygen level of one to two percent.

2. Pyrolysis Smoke and Gases are consumed by Electric/Catalytic Oxidizer (Afterburner)

Any un-reacted pyrolysis products formed inside the oven exit through a pipe at the top of the oven and passes through a small Oxidizer chamber which sits on top of the oven. The Oxidizer is a combination electric/catalytic system which preheats the oven exhaust gases to 1300-1500 degrees F with excess air before they pass through a honeycomb ceramic catalyst which completes any oxidation not occurring in the preheat zone of the chamber. This pollution control method is very effective at destroying any smoke and odor produced during the cleaning process. The exhaust gases from the oxidizer chamber are mixed with fresh air, resulting in a pollution-free exhaust at temperatures of 130-160 degrees F.

3. Final Cleaning is accomplished by the Oxidation Stage.

The heat-cleaning process actually consists of two distinct stages. The first stage is the pyrolysis stage described above. The second stage consists of oxidation of any carbonized residues produced during the first, pyrolysis stage. Virtually all organic materials produce some soot-like, carbon residues on thermal decomposition. Injecting air into the 950 degree F oven chamber during the final cleaning stage oxidizes carbon residues, leaving the glassware or metal parts completely free of any organic matter. Ash or other inorganic material is left behind) on the parts and can be washed off with water.

Parts That Can Be Cleaned

Any part which the normal cleaning temperature of 800-950°F will not hurt can be cleaned in the oven. Laboratory glassware, particularly the heat resistant types are easily cleaned without damage or distortion. Ceramic parts which can tolerate the heat can also be cleaned.

Organic Residues That Can Be Cleaned

Virtually any contaminant which is organic in nature can be removed at the normal operating temperature of the cleaning oven, 950 degrees F. In recent years, new high temperature polymers have been developed which are very resistant to heat and are not easily removed thermally. However, the numbers of these polymers are limited.

Organics Which Should Not be Processed

Plastics or polymers which contain large amounts of halogens such as chlorine, bromine, or Fluorine would not be processed in the oven as they will react with the catalyst contained inside the oven trays and deactivate it. The most common example of this plastic is PVC (polyvinyl chloride). The oven Oxidizer is designed to handle organic residues which contain predominantly only carbon, hydrogen, and oxygen. Do not process any parts which may emit vapors of toxic metals such as lead or mercury. Do not process any material which decomposes violently upon heating. Nitrocellulose or other explosive materials are in this category.

Never clean any hollow, sealed glass or metal parts which might build up dangerous, internal pressures during the heating cycle. Make sure all parts have vent holes or openings to allow pyrolysis gases or steam to escape as they are formed. Any pumps, pipes, or vessels must have openings to allow pyrolysis gases to escape, otherwise they could rupture in an explosion.



WARNING: NEVER PLACE GLASSWARE OR OTHER PARTS IN THE OVEN WHICH CONTAINS RESIDUES OF VOLATILE, FLAMMABLE SOLVENTS SUCH AS ACETONE, TOLUENE, MINERAL SPIRITS, MEK, ETC., AS THEY WILL FORM AN EXPLOSIVE MIXTURE INSIDE THE OVEN CHAMBER.



SPECIAL NOTE REGARDING SILICONES: Silicone oil is commonly used in many laboratories as a heating medium for carrying out reactions in glass vessels. Glassware which contains silicone oil residues from the heating medium should be wiped off with a cloth or paper towels or rinsed with acetone. Experience has shown that when silicone polymers are removed in the oven, they leave a “cloudy” residue which etches the glassware and affects its appearance. A round bottomed flask coated on the outside with silicone heating oil will be cloudy if cleaned in the oven without removing the silicone. Glass stopcocks lubricated with silicone grease should likewise be wiped free of silicone before cleaning the glassware in the oven.

Silicones are poisons for the catalysts used both in the oven chamber and the catalyst used in the afterburner and should not be removed in the oven.

Automatic Cleaning Cycle

The Pyro-Clean® is equipped with an Automatic Cycle Time Feature which adjusts itself to the load placed in the oven. The cleaning time is limited by the processing speed of the oxidizer. The more organic residues or polymers on the parts, the more smoke that will be evolved off the parts during the thermal cleaning process. The oxidizer is equipped with a temperature sensor and controller which monitors the amount of smoke evolved off the parts and controls the heatup rate of the oven to prevent the oxidizer from being overwhelmed by too much smoke. The oxidizer control system will cut off the oven heaters if too much smoke is being produced. The oven temperature seeks whatever temperature is necessary to produce the maximum amount of smoke the oxidizer can process. Thus the oxidizer actually controls the heatup rate. When all the organic residue is pyrolyzed/vaporized off the parts, smoke evolution will fall off, allowing the oven temperature to climb to the normal processing temperature of 950 degrees to finish the pyrolysis stage of the cleaning process.

For the oxidation stage, a cycle time is located on the settings screen, with an adjustable range of 1 to 1000 hours. The Factory setting of 2 hours is recommended for most applications.



NOTE: For removing asphalts, a factory setting of 3 to 4 hours is recommended as asphalts are among the more difficult organics to remove. Asphalts produce a carbon residue during pyrolysis that is resistant to oxidation, therefore requires more processing time during the oxidation stage of the cleaning cycle. Glassware should be loaded to promote drainage. This will speed up the cleaning process.

The Cycle Time does not start until the oven temperature reaches within -10 degrees F of the set-point of the Oven Temperature Controller.

With a normal set-point of 950 degrees F, the Cycle Time does not start timing until the oven temperature reaches 940 degrees °F. When the timer is started, the status bar will show "Run Cycle". If the glass or metal parts does not come clean with a 2 hour setting on the Cycle Time, then increase the time until any soot-like, carbonaceous residues are completely removed. If cleaning times require more than 5 hours on the Cycle Time, then consult Factory as this would be quite uncommon. (Asphalt residues are the exception).

For safety reasons, never set the Cycle Time to less than one hour. This amount of time at 950 °F should ensure that the oven cycle does not shut down before all organic residues are evolved off as smoke or pyrolysis gases.

Limitations

Pyro-Clean®s clean only with heat, so they cannot remove any non-volatile, inorganic residues from the parts being cleaned. This includes paint pigments such as titanium dioxide, fillers such as clay, talc, fiber glass, ordinary dirt, or any other inorganic ashes. However, such inorganic residues normally are easily removed from the glass or metal parts by wiping off with a cloth or rinsing with water. The ashes are easy to remove because all organic resins which act as a binder or "glue" are decomposed, freeing the inorganic material.

Cost of Operation

Cost of operation depends on the local rates for electrical power. The Pyro-Clean® consumes a maximum of 28 amperes at 240 volt, single phase. This is 6.6 kilowatts. At a cost of 0.06 cents per KWH (our current Factory rate in Butler, PA), operating costs would be 6.6 KWH x \$0.06 = \$0.40 per hour. With a typical complete cycle times of 5 to 7 hours, then cost per cleaning cycle would average about \$2.00 to \$ 3.00.

Training of Operators

Because the success and safety of the cleaning process is dependent upon proper loading and operation of the Pyro-Clean®, do not allow anyone to use the oven unless they fully understand how it works and its limitations. Users of the oven must be cautioned against overloading the oven with glass or metal parts containing very large amounts of organic residues. The oven is designed for removing small amounts of asphalts, organic residues, or plastics only, from 1/4 pound up to about 2 pounds. More than 2 pounds of organic residues should not be loaded into the oven.

C.3 Product Specifications

Environmental Conditions	Operating: 17°C to 27°C; 20% to 80% relative humidity, non-condensing. Installation Category II (overvoltage) in accordance with IEC 664. Pollution Degree 2 in accordance with IEC 664.
Altitude Limit	2,000 Meters
Storage	-25°C to 65°C; 10% to 85% relative humidity
Cleaning Temperature	800 – 950°F
Burnoff Temperature	Approximately 1300°F
Electrical Power	240 V, 60 Hz., Single Phase, 28 A
Safety Controls	High temp switch on both oven and oxidizer
Weight	380 lbs.
Exterior Dimensions	37.85" wide x 59.3" high x 32.8" deep
Oven Capacity	14.88" wide x 16" high x 18.5" deep (2.5 cubic foot)
Construction	Stainless Steel, welded interior, dual gasket system, pressure release door

D. Installation

D.1 Installation Overview



WARNING: Do not use in Class I, II or III locations as defined by the National Electrical Code.



CAUTION: Be sure ambient temperature does not exceed 104°F (40°C). Ambient above this level may result in damage to controller.



NOTE: Allow at least 4 inches of space between the oven and any vertical surfaces.



NOTE: Pyro-Clean® are supplied with a power cord but not a plug. The plug will need to handle 240Vac @ 30A.



WARNING: Use a properly grounded electrical outlet of correct voltage and current handling capacity.



NOTE: Disconnect from the power supply prior to maintenance and servicing. Refer servicing to qualified personnel.



WARNING: Do not use in the presence of flammable or combustible materials; fire or explosion may result. This device contains components which may ignite such material



NOTE: Do not put sealed containers in oven.



NOTE: A 30 amp breaker is recommended because the total load of the oven is 28 amps.

D.2 Receiving

The Pyro-Clean® is shipped partially assembled and crated. Inspect the oven crate and any other additional boxes or crates carefully upon receipt. If there is any sign of damage to the crate or oven, do not sign the delivery receipt until the freight company has been notified and such damage has been noted on the receipt. Claims for shipping damage must be made by the customer to the Freight Company and not to the distributor or manufacturer.

Remove the crate lumber carefully to avoid damaging or scratching the surface of the oven. The Pyro-Clean® weighs about 400 pounds crated and can be moved with a fork truck or heavy dolly while crated. Uncrated, the oven weighs slightly over 350 pounds and can be moved by hand with sufficient help. Avoid excessive leverage on

the door to prevent from bending or spraining its hinges. Use heavy gloves or other protection to prevent cutting or slicing your hands when lifting on the oven. The door is removable if necessary by removing its hinges.

A draft inducer is wrapped in protective bubble wrap and is packed on top of the oven. After the oven is uncrated and in position, the draft inducer should be attached to the top of the exhaust port on top of the oven Oxidizer as shown in the attached photograph. A small section of 1/4 inch aluminum tubing is used to sense the pressure of the Draft Inducer blower motor.



NOTE: THIS CONNECTION MUST BE MADE AS THE OVEN HEATERS ARE INTERLOCKED TO THIS PRESSURE SWITCH. THE OVEN HEATERS CANNOT COME ON UNTIL THE PRESSURE SWITCH CLOSSES AS THE BLOWER MOTOR RUNS.

Exhaust gases from the draft inducer must be vented outdoors. Proper venting is very critical. Refer to section D.5 for additional information.

D.3 Electrical Service

The oven has been completely tested and checked at ATS before shipment. A power cord 10 feet long is supplied with the oven. You will need to supply a plug and receptacle for 30 amp, 240 volt, single phase. The total power use of the Pyro-Clean® unit is about 6600 watts. The oven heaters draw about 16.7 amperes at 240 volts, and the afterburner heater draws about 9.7 amps at 240 volts. The oven control circuit is 24Vdc and supplied by a 180W power supply. The oven should be connected to its own separate, 30 amp circuit breaker, and should be clearly labeled to prevent accidental shut-down of the oven if it is located in a breaker box where personnel routinely shut off lights or other equipment by using the breakers. Power should be available to the oven at all times except when it requires electrical service. The power plug should be pulled or the circuit breaker turned off and locked out when work is necessary inside the control box.

D.4 Installing Unit with Tilt

Rather than install the oven on a level basis, we recommend installing the oven so the front of the unit is about 1/2 to 3/4 inch higher than the back of the unit. The oven has 4 adjustable legs so this small front-to-back tilt is easily achieved. This front elevation of the unit helps to prevent any liquid residues that might miss the drain pan on the bottom of the unit from flowing out onto the bottom of the door gaskets. Instead any material that degrades and flows should drain toward the back of the oven interior, which is welded solid. The flowable material will be destroyed during the cleaning cycle, rather than draining out of the gaskets and bottom of the unit.

D.5 Location and Venting



CAUTION: Pyro-Clean®s are not “ordinary” industrial ovens and have special venting requirements which must be met. Read and follow the guidelines given in the following sections carefully. Consult ATS if you have any questions.

For the oven to work properly and safely, it must be correctly vented. Standard double walled vent pipe (6 inch I.D.) should be used. Long runs and runs with excessive elbows should be avoided to minimize friction losses to achieve the correct draft. In most cases, long runs of flexible vent hose or pipe should not be used as it will often result in very high friction losses, preventing you from getting an acceptable draft.

However, a small section of flexible six inch duct (6 to 8 inches long) is strongly recommended to allow the Draft Inducer to be removed and replaced for final adjustment of the draft as seen in Section D.7.

The preferred place for this piece of flexible pipe is between the rigid 6 inch duct pipe and the 6 inch side of the 4 to 6 inch adapter which connects to the top of the Draft inducer. The draft inducer located on top of the oven generates a negative pressure of about 0.06 inches water column (w.c.) at initial cold start, before any vent pipe is added to the exhaust of the draft inducer. It is extremely important that the final draft achieved on the oven is 0.06 inches w.c. at initial cold start. The final duct pipe and venting arrangement must achieve this result, regardless of the specifics of how the oven is ducted. Some general guidelines for various possible installations are discussed below.

If There Are Any Questions Regarding Venting Of The Oven, Consult ATS For Recommendations For Your Specific Location And Circumstances.

For convenience, the system will allow you to turn on the draft inducer and see the current draft. See the “Manual Screen” section of this manual, but please consult ATS if uncertain how to measure the small negative pressures required by Pyro-Clean®s.

Venting to the Outdoors Through Wall or Roof

Standard 6 inch I.D., double walled vent pipe should be used for venting to outdoors for best results. The exhaust temperature of the gases ranges from 120 to 150 degrees F, so is not much hotter than the exhaust from a clothes dryer or other low-heat appliance. Elbows can be used, but should be kept to a minimum to prevent excessive friction losses. Because the Draft Inducer diameter is 4 inch, an adapter to go from 4 to 6 inch duct is necessary. This adapter is commonly available from most heat/air conditioning supply houses. A non-restricting vent hood or cap should be used to prevent rain from entering the exhaust pipe.

Regardless of the final physical arrangement of the vent pipe and cap, it should be 0.06 inch w.c. of draft at initial cold start.

If your venting arrangement to the outdoors gives insufficient draft, then means to achieve the proper draft must be supplied, by an additional powered draft inducer or otherwise. Again, it must be emphasized that if the oven exhaust pipe is connected to a device capable of pulling a high draft (negative pressure), then the pressure must be adjusted so it is not too high!

Venting to a Lab Hood or Other Negative Pressure Exhaust System

The Pyro-Clean® requires a small negative pressure of about 0.06 inches w.c. at initial cold start to work correctly. Connection of the vent pipe system of the oven to a lab hood or vent system is recommended and acceptable as long as the final measured draft of the oven itself is 0.06 inches w.c. at initial cold start.

Do not pipe the oven exhaust directly into the duct work itself of a powered exhaust system, as the suction (negative pressure) may be too strong to permit adjustment to the slight negative pressures required.



CAUTION: IF THE OVEN IS EXHAUSTED INTO A POWERED VENT SYSTEM SUCH AS A LAB HOOD, THE HOOD EXHAUST SYSTEM SHOULD BE ON ALL THE TIME THAT THE OVEN IS ON. DO NOT LEAVE THE BUILDING AND SHUT OFF THE HOOD, THEREBY SHUTTING OFF THE EXHAUST SYSTEM FOR THE OVEN.



WARNING: Draft Inducer must be installed as shown with the ¼” metal tubing connected so that the Pressure Switch located inside the control box can sense the pressure of the Draft Inducer Blower Motor. The Blower Motor is interlocked via the Pressure Switch so that the Oven Heaters cannot come on unless the Draft Inducer Blower Motor runs.

If the Blower Motor fails, the Pressure Switch will sense the loss of fan pressure and shut off the oven heater elements and give an alarm fault to the operator.

D.6 How to Measure Oven Negative Pressure (Draft)

1. Close and latch the oven door.
2. Go to the “Manual Screen” (see “manual screen” section). Observe whether the oven exhibits any draft due strictly to the installed exhaust piping. For example, connection to a hood exhaust might pull a slight negative pressure dependent on the power of the hood system itself.
3. Press the “Draft Inducer” button momentarily to start the oven exhaust blower, and observe the negative pressure achieved inside the oven. The optimum draft is 0.06 inches w.c. at initial cold start. If the exhaust system/duct to which the oven is piped pulls a draft higher than 0.06 inches, then the oven exhaust must be adjusted until the correct draft is achieved. The oven draft has been factory adjusted with the draft inducer running without any exhaust stack. Adding stack to the top of the Draft Inducer will change the draft slightly, but it still should remain in the proper range.
4. Once the oven exhaust has been properly installed and checked, press the “Draft Inducer” button momentarily to stop the oven exhaust.



CAUTION: DO NOT END A CLEANING CYCLE BY TURNING OFF THE MAIN POWER TOGGLE SWITCH. THIS PREVENTS THE MAIN OVEN EXHAUST FAN FROM RUNNING TO REMOVE THE NORMAL HEAT PRESENT DURING COOL-DOWN. IT WILL ALSO UNLOCK THE DOOR BEFORE COOL DOWN WHICH MAY INTRODUCE AN EXPLOSIVE SITUATION IF THE DOOR IS OPENED.

D.7 How to Adjust to Oven Draft

Once the Pyro-Clean® unit is installed and vented, the oven draft should be measured as described in previous sections. If the draft is not within proper limits, then it must be adjusted. Oven draft is achieved by the venturi effect of air sucked around the Oxidizer exhaust pipe. See Figure 1. The Draft Inducer suction pulls air past and around the stainless steel exhaust pipe.

TO INCREASE OVEN DRAFT, THE HEIGHT OF THE EXHAUST PIPE IS INCREASED. TO LOWER OVEN

DRAFT, THE HEIGHT OF THE EXHAUST PIPE IS DECREASED.

Changing the height of the pipe out of the Oxidizer chamber is done by positioning a screw in the side of the pipe. The pipe has 5 or 6 holes drilled in it to allow adjustment of the pipe height outside the chamber. The entire pipe can be pulled out of the Oxidizer chamber (with pliers if the pipe is hot), the screw repositioned to raise or lower the pipe height. The Draft Inducer must be removed from the top of the unit so you can reach down inside the exhaust duct with pliers to remove the pipe. The Draft Inducer must be replaced and restarted to measure the oven draft after any change of the pipe height. See Figure D.1 for pipe location.

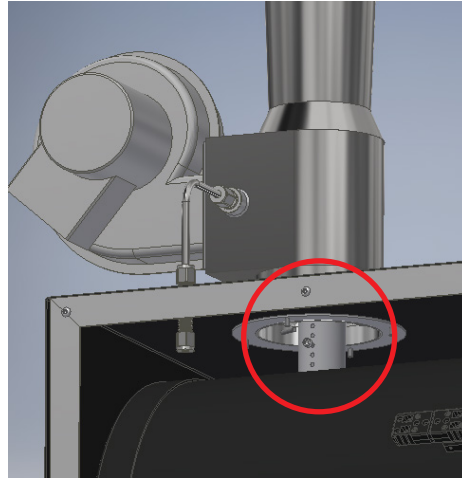


Figure D.1 - Oxidizer Pipe

It is important to recognize that Pyro-Clean®s manufactured by ATS are not ordinary ovens. Pyro-Clean® systems are specialized, high-temperature systems specifically designed and built for thermal cleaning of valuable objects such as lab glass or metal parts. When organic residues are on the parts being cleaned, pyrolysis gases are created during the cleaning process.

If the oven pressure is positive instead of slightly negative, these pyrolysis gases may escape into the room and smoke or odor will be observed.

If the oven pressure is too highly negative then excessive air is sucked through the oven (even though it is tightly sealed). This excessive leakage rate can prevent the oven from reaching its normal set-point (or struggle to reach its set-point) and/or ignition of any combustible, pyrolysis gases may occur because of the high oxygen level caused by excessive draft and leakage.

D.8 Pressure Switch for Draft Inducer Blower Motor

The Pyro-Clean® is equipped with a pressure sensing switch mounted inside the main control box which senses the pressure generated by the Draft Inducer when it is running. This pressure switch is interlocked to the oven heaters so they cannot come on if the Draft Inducer blower motor is not running. If the pressure switch does not close, then the power relay for the oven heater does not receive power.

The Draft Inducer pressure switch is connected to the Draft Inducer with a short piece of 1/4" metal tubing. This tubing must be connected for the pressure switch to sense that the blower motor is running.

E. Software Overview

E.1 Software Screen Map

Figure E.1 shows the Pyro-Clean®'s software screens.

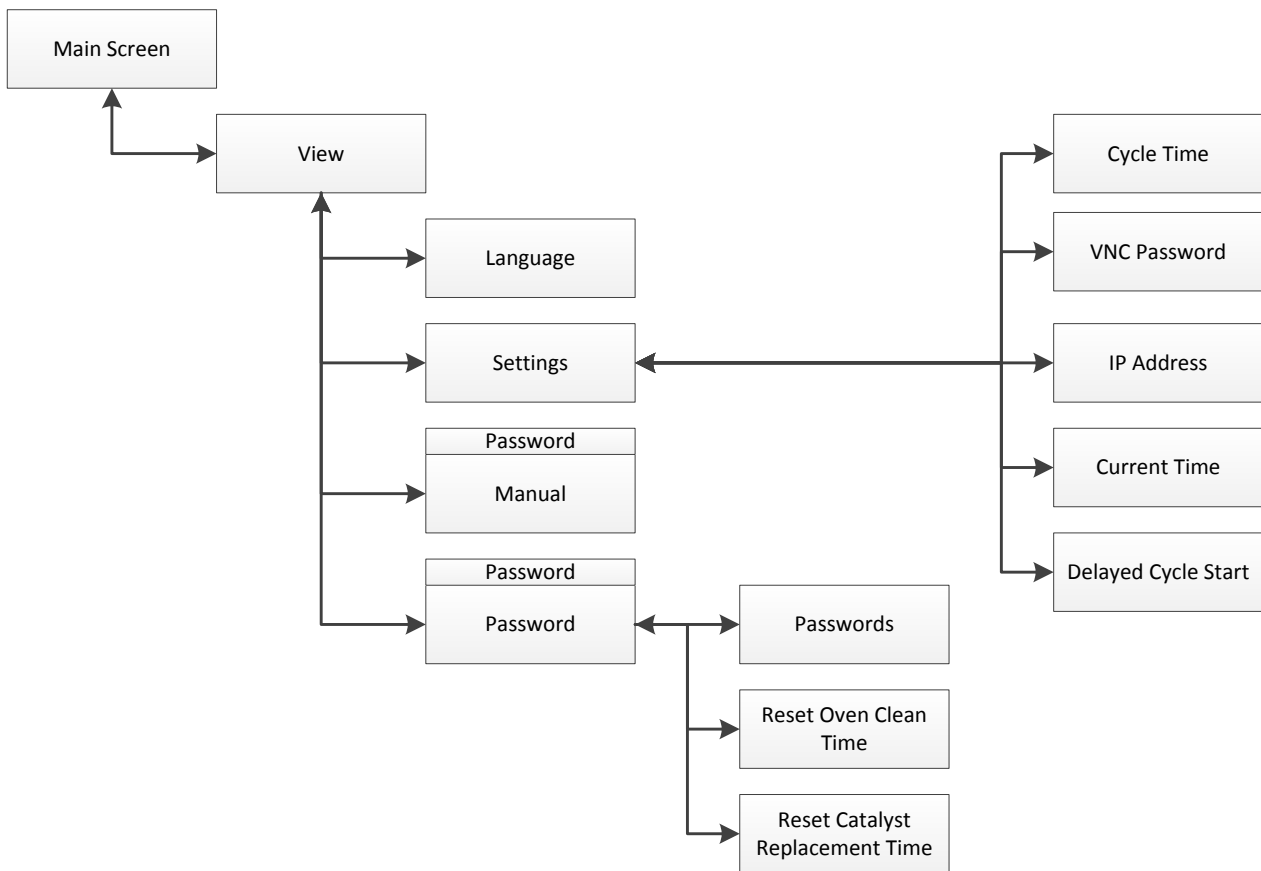


Figure E.1 - Pyro-Clean® Software Screen Map

E.2 Main Screen

Figure E.2 shows the Main Screen that is shown when the Pyro-Clean® is started. It allows you to setup and run oven cycles.

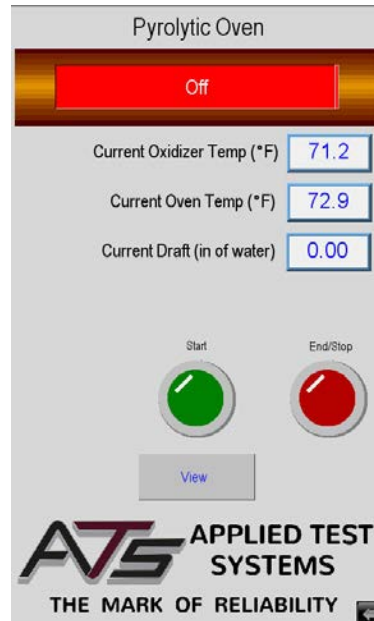


Figure E.2 - Main Screen

This screen will show values for Oxidizer chamber temperature and Oven temperature. It also has several controls to set-up and run the oven.

Start Button

Used to tell the system that parts are loaded, to start the oven cycle.

End/Stop Button

Used to tell the system to finish the cycle. It can also be used anytime the oven is in cycle to stop the cycle. When the run cycle has finished this button will blink to show the cycle is finished. If this button is pressed anytime that the oven is hot the system will go into cool down before you can open the door.

Alarm Button

If the system has an Alarm, Warning, or Fault the Alarm Button will be displayed and the Start Button is hidden. This can be seen in Figure E.3. The operator will have to press the Alarm Button to go to the alarm screen and clear the alarm condition before the system can start another cycle.

View Button

Used to get to all other screens in the system for Set-up. This will be hidden and a Graph Button will be displayed when a cycle is running.

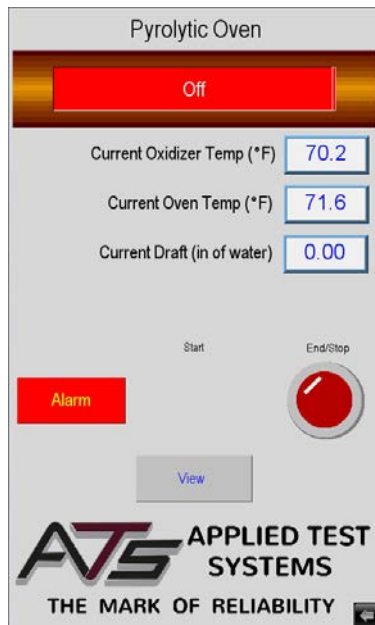


Figure E.3 - Main Screen, Alarm State

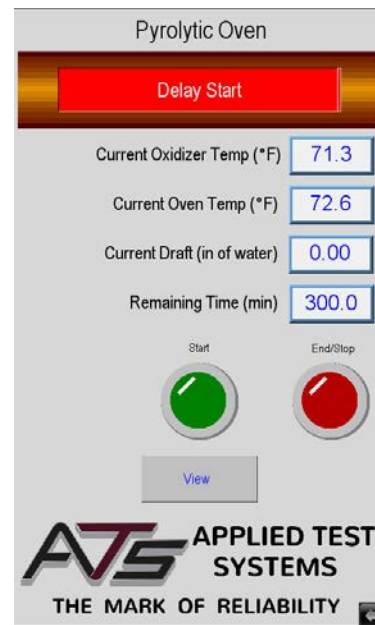


Figure E.4 - Main Screen, Delay Start State

Figure E.4 illustrates what the Main Screen looks like when the system is in delay start state. Note the Remaining Time displayed. This will show up for the Preheat Delay, Oven Soak, and the Run Cycle states and will display the time remaining for that part of the cycle. The oven soak time may restart several times until it becomes stable at temperature.

State Status Indicator Bar

Near the top of the display is a status bar that will show the current state of the oven cycle. Below are the different states in the order that they usually run.

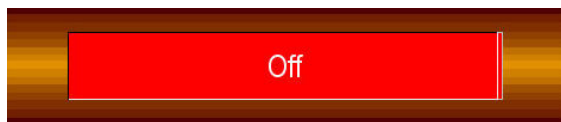


Figure E.5 - Off State Status Bar



Figure E.6 - Oxidizer Preheat State Status Bar

Off State

Indicates that the system is sitting idle. No heat or cycle is running.

Oxidizer Preheat

Indicates that the oxidizer chamber is heating up. The system will stay here until the chamber is at temperature and stable.

Oven Soak

Indicates the oxidizer chamber is stable at temperature, after which the oven starts to soak temperature. It is at this stage that “smoke” is generated to burn off in the oxidization chamber. The Oxidization chamber and the oven will interact so that the oxidization chamber is not overloaded. The system will stay here until the interaction dies down and the oven is at soak temperature and stable.

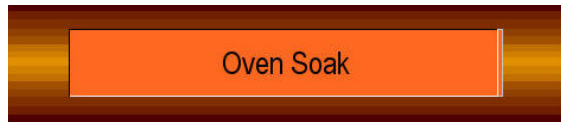


Figure E.7 - Oven Soak State Status Bar



Figure E.8 - Run Cycle State Status Bar

Run Soak

Starts when the oven is at the soak temperature and stable. The oven will change to the cycle temperature and sit in this state until the cycle time has expired.

Cool Down

Starts when the run cycle has timed out. The oxidizer chamber and oven shut off and start to cool down. The system will stay here until the oven drops below the cool down temperature.



Figure E.9 - Cool Down State Status Bar



Figure E.10 - Cycle Finished State Status Bar

Cycle Finished

Starts when the oven temperature has dropped below the cool down temperature and the system is waiting for the operator to press the End Button and remove the parts.



CAUTION: When the oven unlocks to allow the removal of parts, remember that they are still 500°F and you will need protective equipment to handle them.

Delay Start

Indicates the system has been set up to start the oven cycle automatically after a time delay. You can think of this like a “coffee timer”.

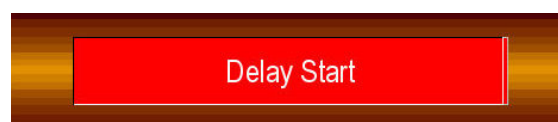


Figure E.11 - Delay State Status Bar

E.3 View Screen

Figure E.12 shows the View Screen. It is shown anytime the View Button is pressed on the Main Screen. It allows access to the rest of the screens in the system.



Figure E.12 - View Screen



NOTE: If the system is not idle this button is not visible and you will not be able to get to this screen to make changes.

The screen will show the current version of the software in the PLC and HMI. This is very important information, and is most often ask for when calling into ATS service.

ID

A user ID should be set to the user access you wish to use.

Password

Associated with the User ID and used to access other screens. When the correct ID and Password are entered other buttons (colored on the above screen) will be displayed.

Manual Button

Will not be displayed until the correct ID and Password has been entered. Once it is displayed, pressing it will go to the manual screen. (Default ID: 1, Password: 111111).

Passwords Button

Will not be displayed until the correct ID and Password has been entered. Once it is displayed, pressing it will go to the password screen. (Default ID: 2, Password: 222222).

Standardize Button

Will not be displayed until the correct ID and Password has been entered. Once it is displayed, pressing it will go to the standardize screen. (Default ID: 3, Password: 333333).

Settings, Language, Data, and Alarm Buttons

Each take you to their screens which are described later in this section.

Done Button

Returns you to the Main Screen.

E.4 Language Screen

Figure E.13 shows the Language Screen that is shown when you press the Language Button on the View Screen. It allows you to set the language used in all the screens.

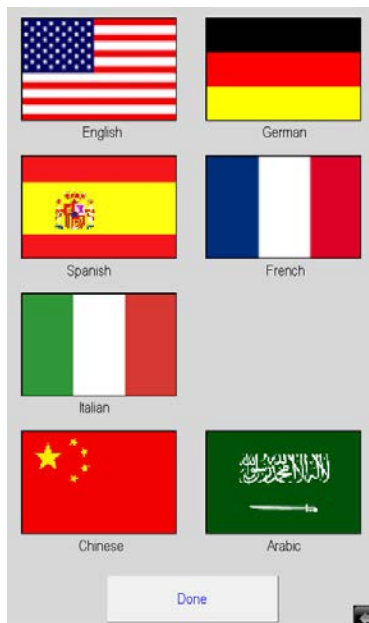


Figure E.13 - Language Screen

Simply select your language of choice then press the Done Button to go back to the View Screen.

E.5 Settings Screen

Figure E.14 shows the Settings Screen. It is shown when the Settings Button is pressed on the View Screen. It allows set up of the system.



Figure E.14 - Settings Screen

Cycle Time

The amount of time the oven sits at cycle temperature before it shuts off and goes into cool down.

IP Address

Used to allow someone at a remote location to monitor the system using a VNC viewer program.

Current Time

Allows the operator to set the current time of the system. This affects the oven clean and catalyst replacement warning times. It is also used for alarm and data logging times.

Preheat Delay

Used to allow the system to be set up to start automatically after a time delay. You can think of it like a “coffee timer”. Just enter the Hours and Minutes you wish to wait before oven start and press the yellow button. The button will light to show that a delay has been set. The delay button is a toggle switch, so to turn off a delay that has been started just press the button again. Note the status of the system will show Delay Start when it is active and the remaining time before cycle start is shown.

Done Button

Will return you to the View Screen.

E.6 Manual Screen

Figure E.15 is the Manual Screen. It is shown when the Manual Button is pressed on the View Screen. It allows trouble shooting of the system.

Caution should be used as all system safety features are disabled during Manual operation.



Figure E.15 - Manual Screen

Six Buttons Across Top of Screen

Allow you to turn individual sub-systems on and off to test them.

Indicators on the Left Side

Show which inputs the system sees.

Values on the Right Side

Show the current temperature and over temperature being reported for the oven and oxidizer chambers.

Set Point for Both Oven and Oxidizer Chamber

These values are locked at a maximum value of 500° to eliminate the risk of explosion.

Current Draft

Shown to help in the adjustment of the draft tube during ventilation set-up.

Done Button

Will return you to the View Screen.

F. Operation

F.1 Important Operation Notifications

There are several notifications that may appear when operation of the Pyro-Clean® is initiated. These are broken into three categories of severity: warnings, alarms, and faults. **DO NOT IMMEDIATELY SHUT THE MACHINE DOWN WHEN THESE NOTIFICATIONS APPEAR.** Allow unit to continue cycle to completion. If the unit is required to shut down, it will do so on its own.

Warnings, alarms, and faults are color coded in yellow, orange, and red. Refer to the list below for descriptions of these common operation notifications. If additional assistance is required, contact the ATS Service Department at +1-724-283-1212.

Warnings (Yellow)

These do not stop the cycle but are things that you may wish to check after it is complete. Do not shut the machine down if these appear. They may indicate:

- 6 Month Clean Warning
- 1 Year Catalyst Replacement Warning
- Low Draft Warning

Alarms (Orange)

These do not stop the cycle but are things that should be checked before next cycle. Do not shut the machine down if these appear. They may indicate:

- Low Draft Alarm

Faults (Red)

These are faults that will automatically stop the current cycle. They must be fixed before next cycle.

- Oven Chamber Over-Temp
- Oxidizer Chamber Over-Temp
- Oven Chamber Over-Press
- Standardization Error
- Door Lock did not Engage
- Draft Inducer Error
- Low Draft Fault

F.2 Initial Start-Up: Empty Load

Do not operate the oven with a load if the correct, slight negative draft/pressure in the oven chamber is not achieved. Refer to Installation Instructions or call the ATS Service Department at +1-724-283-1212 for technical assistance.

1. After the Pyro-Clean® has been installed and properly vented with the correct draft, it is ready to operate. However, it is best to run the oven through a short cleaning cycle with it empty to:

- a. Familiarize the operator with the normal operating sequence and location of the controls.
- b. Check that all controls, indicating lights, and components are operating normally.

2. The oven door latch is a compression type and must be turned completely to the right until the door “pulls up” and is completely latched.

3. When the main power toggle switch is turned on, the indicator light and HMI should power up. For this test only, set the Cycle Time on the Settings Screen to about 10 minutes.

4. To start the empty test run, press the Start Button. The status bar will change to Oxidizer Preheat on the HMI. The oven exhaust fan will be powered at this time and you may hear a slight noise from the exhaust. A small air pump which feeds a stream of air to the oxidizer is started at the same time. The Afterburner heaters come on and you should see the Afterburner temperature begin to rise to its normal set point of 1300°F. Typical heat-up times for the Afterburner to reach 1300°F is about 80 minutes. 10 minutes after the oxidizer reaches 1250°F, the status bar will change to Oven Soak, the oven will turn on, and the door will lock.

5. During an empty run, the oven will heat up to its ramp/soak set-point, typically 900°F and control at this temperature for the stable time of 180 minutes. Then the status bar will change to Run Cycle, the oven heat up will continue to the normal set-point of the oven temperature controller, 950°F. When the oven temperature reaches 940°F, a timer will start for the cycle time set. When it times out, the status bar will change to Cool Down, and both the oxidizer and the oven will shut off.

6. After the oven has cooled down to below 500°F, the status bar will change to Cycle Finished, the draft inducer, air pump, and door lock will all turn off. At this point press the End/Stop button to finish the cycle. The door can be opened to allow faster cooling. However, in a normal cleaning cycle for glass or metal parts, it is best to let the oven cool down as much as possible to minimize the handling of hot parts.

F.3 Starting a Normal Load of Dirty Glasswear or Metal Parts

Tips on Loading

The glass or metal parts should have relatively small amounts of organic residues, on the order of grams to a couple pounds. Parts with very heavy residues of combustible organic matter should not be processed in the Pyro-Clean®. A practical limit for the oven is in the range of 1 to 2 pounds of asphalt or other organic residues per load/cycle.

Whenever possible, always load the parts to promote drainage of any visible residues. The oven is furnished with a metal tray on the chamber bottom to catch molten residues which drains off the parts. This will give the best cleaning results. Longer cycle times will virtually always be required if the contaminants are not allowed to drain out of the parts during the pyrolysis cleaning cycle.

The Pyro-Clean® is furnished with two racks (trays) to hold the metal parts. Both of these racks have a stainless steel wire mesh on the bottom which holds catalyst pellets which help destroy the pyrolysis gases formed during the cleaning cycle. Use both trays during every cycle. Both must not be left out of the oven under any circumstance. A metal drip pan on the bottom of the oven is furnished to catch any dripping. The drain pan helps prevent any plastic or polymer from running down on the oven floor and onto the door gaskets where the residue could cool, harden and tear off the gasket when the door is opened. Always place any metal parts with the heaviest residues toward the back of the oven to prevent any organic material from dripping on the oven door gaskets.

F.4 Cycle Times for Cleaning

The Pyro-Clean® is equipped with an Automatic Cycle Time Feature which adjusts itself to the load placed in the oven. The cleaning time is limited by the processing speed of the oxidizer. The more asphalt or other organic residues on the parts, the more smoke that will be evolved off the parts during the thermal cleaning process.

The oxidizer is equipped with a temperature sensor and controller which monitors the amount of smoke evolved off the parts and controls the heat-up rate of the oven to prevent the oxidizer from being overwhelmed by too much smoke. The oxidizer control system will cut off the oven heaters if too much smoke is being produced. The oven temperature seeks whatever temperature is necessary to produce the maximum amount of smoke the oxidizer can process. Thus the oxidizer actually controls the heat-up rate if sufficient plastic residues are on the parts. When all of the organic residues are pyrolyzed/vaporized off of the parts, smoke evolution will fall off, allowing the oven temperature to climb to the normal processing temperature of 900°F to finish off the cleaning process.

A cycle time is set on the Setting screen. The Factory setting of 1 hour (3-4 for asphalts) is recommended for most applications. The Cycle Time does not start until the oven temperature reaches within -10°F of the set-point of the Oven Temperature Controller. With a normal set-point of 950°F, the Cycle Time does not start timing until the oven temperature reaches 940°F.

The Cycle Time does not actually start until the oven temperature is within minus 10°F of set-point. This ensures that the dialed amount of time is a true “time at temperature”. For safety reasons, never set the Cycle Time at less than 1 hour. This ensures that volatile, pyrolysis gases are exhausted from the oven before the oven shuts down.

For most organics, pyrolysis and vaporization into smoke will actually begin below 900°F, so it is quite common for the oven temperature to seek a level of about 700 to 800°F while the maximum amount of smoke is being vaporized off of the parts. After the bulk of the smoke is gone, the Oxidizer controller senses this and allows the oven to heat up to process set-point, typically 950°F. For large glassware, the parts themselves may serve as heat-sinks and allow the oven temperature to reach set-point even though the parts are too cool to produce enough smoke to turn off the oven heaters. In this case, the oven temp may reach set-point for 20-30 minutes until the glass parts get hot enough to start significant smoke production. Then the Oxidizer Controller will take control of the cleaning process and limit the oven temperature to that which produces the maximum smoke, processing rate of the Oxidizer. Thus the oven temperature may reach set-point until enough smoke is produced to drive the oven temperature to a lower level. After all the smoke is vaporized away, the oven temperature is then allowed to climb to 950°F and finish the cleaning cycle.

F.5 Cool-Down Before Removing the Glasswear or Metal Parts

When the cycle ends, the oven and afterburner heaters shut off, ending the cleaning cycle. The oven exhaust fan continues to run to help remove the heat as the oven and afterburner cools. The oven will need to cool to at least 500°F before the door is unlocked and can be opened. Where possible, it is best to let the oven cool down low enough that the parts can be removed and handled comfortably without special gloves or precautions.

F.6 Additional Operation Precautions



WARNING: Do not rinse glassware or metal parts with flammable solvents such as acetone, toluene, etc. and then clean the parts in the oven without allowing the solvents to dry. Flammable solvents such as acetone or toluene will ignite or explode inside the oven if present in sufficient concentration.



CAUTION: Do not clean remove silicon materials in the oven as it will poison the catalytic system of the oven (and afterburner, if so equipped).



WARNING: Do not clean any sealed vessel, glass or metal, which could develop explosive forces and rupture inside the oven.



WARNING: Do not overload the oven with metal parts containing heavy organic residues. The maximum load for the Pyro-Clean® is 1 to 2 pounds of polymer or plastic. Consult Applied Test Systems if heavier loads need to be cleaned.



CAUTION: Do not operate the oven without the special catalytic trays inside the oven. This trays contain a special catalytic material which helps inert the oven atmosphere and destroys the pyrolysis gases produced during the cleaning process.

F.7 Operation Instructions

1. Turn the power switch on the front of the Pyro-Clean® to the ON position. The POWER light located on the front of your oven will light up and the HMI display will power on. The status display will show “Off”.
2. Select “View” on the HMI Main screen.
3. Select “Settings” on the HMI View screen.
4. Verify that the “Cycle Time” is set up to the value you wish. A setting of 2 hours is recommended for most applications. However, for removing asphalts, a setting of 4 to 5 hours is recommended as asphalts are among the more difficult organics to remove.
5. Select “Done” to return to the “View” screen.
6. Select “Done” to return to the “Main” screen.
7. Load the oven with the parts that you wish to clean. Parts should be loaded to promote drainage. Read “Principles of operation and use” section before loading parts to verify what the Pyro-Clean® can clean.
8. Close the oven and latch it.
9. Press the “Start” button to start the oxidizer chamber heating to 1300°F. The draft inducer and air pump will turn on. The status display will change to “Oxidizer Preheat”.
10. Once the oxidizer temperature is stable (1300°F ±50°F for 10 minutes). The oven door will lock and the oven will start to heat to 900°F. The status display will change to “Oven Soak”.
11. In the “Oven Soak” stage, the oven will heat up creating smoke that gets burnt off in the oxidizer chamber. If the oxidizer temperature goes over 1500°F it will shut off the oven heat until the temperature goes below 1350°F. It will then turn the oven back on. This cycle will continue back and forth until the smoke generation dies down and the oven temperature is stable (900°F ±10°F for 180 minutes). The oven will then heat to 950°F and the air select will shift the air flow from the oxidizer to the oven. The status display will change to “Run Cycle”.

12. Once the oven gets to cycle temperature (950°F ±10°F) it will sit for the cycle time.

13. Once the cycle time has expired, both the oxidizer and oven chamber heat will turn off and the status display will change to “Cool Down”.

14. When the oven temperature drops below 500°F the draft inducer and air pump will turn off and the oven door will unlock. The status display will change to “Cycle Finished”.

15. At this point press the “End\Stop” button to return the system to “Off”.



CAUTION: When the oven unlocks to allow the removal of parts, remember that they are still at 500°F and you will need protective equipment to handle them.

G. Troubleshooting

G.1 Troubleshooting Electrical Problems

A ladder wiring diagram for the Pyro-Clean® is included in this manual, along with a drawing of the inside of the control box showing the lay-out of the parts and their identification. A qualified electrician should find this sufficient to locate any electrical problems with the unit. The oven electrical circuit has a number of fuses, so check first to determine if a blown fuse is the problem. If assistance is needed to determine the problem, contact Applied Test Systems and ask for technical help.

G.2 Manual Operation to Check Electrical Operaton

A manual operation screen is included so that all parts can be controlled manually to check operation and help troubleshoot the system.



NOTE: In manual operation the temperature control systems will only allow the temperature to be set to 500°F as a safety precaution.

H. Maintenance

H.1 Door Seals and Gaskets

The oven door has two gaskets. One is a high temperature gasket which serves both as a seal and a heat barrier to protect the silicone gasket. Periodic replacement of the high temperature gasket is considered necessary routine maintenance. The high temp gasket contains an inner core stainless steel mesh, covered with woven glass fiber. Because of its porous nature, the high temp gasket will gradually absorb condensed smoke or vapors from inside the oven and begin to harden. This gasket can be recycled and used again by removing it, replacing it with a new high temp gasket, and cleaning the old gasket inside the oven at the same time a typical load of glass or metal parts are cleaned. The blackened, old gasket will come out of the oven looking almost new. The gasket can be used again unless it was mechanically torn, ripped, or otherwise damaged during removal.

The silicone gasket mounted on the oven door serves as a second seal for the oven chamber and prevents excessive air leakage inside the oven. Parts should never be loaded such that any molten organic residues drains from the metal parts, misses the metal pan on the floor of the oven, and runs down on the door gaskets. When cool, such material can harden and rip the door gasket off when the door is opened.

H.2 Cleaning the Oven Trays

Both of the two oven trays has a bottom of stainless steel wire mesh containing special catalytic pellets which help destroy the pyrolysis gases inside the oven chamber by reaction with the oxygen in the oven atmosphere. As these trays get dirty and accumulate inorganic ashes, it should be removed and rinsed with water to get the catalyst pellets free of obstruction or coatings which would prevent it from working.

H.3 Removal of Ashes and Pigments

Ashes, pigments, dirt, or other inorganic matter left from the cleaning process should be removed as necessary to maintain good housekeeping. Do not allow such material to collect at the door gaskets where it might interfere with a good, tight seal.

H.4 Periodic Empty Tests & “Self-Cleaning” Cycles

Every 3 to 6 months, run an empty test run (cycle) during daytime hours so the operator of the oven can verify that the oven controls are working properly. With no glassware in the oven, this test run will also act as a “self-cleaning” cycle and help remove any residual, built-up carbon residues which may be deposited by numerous moderate to heavy loads of organic contaminants.

H.5 Cleaning of Draft Inducer Fan

Periodically, the squirrel cage blower of the Draft Inducer should be blown out with compressed air to remove accumulated dust and lint.

H.6 Replacement of Parts

When electrical components must be replaced, refer to the Parts List included in this manual for the appropriate descriptions. Consult Factory for current prices. Electrical parts on the oven are warranted for one year.

Every Six Months

1. Exchange Hi-Temp door gasket:

a. The oven door has two gaskets. One is a high temperature gasket that serves both as a seal and a heat barrier to protect the silicone gasket. The high temp gasket contains an inner core stainless steel mesh, covered with woven glass fiber. Because of its porous nature, the high temp gasket will gradually absorb condensed smoke or vapors from inside the oven and begin to harden.

b. The high temperature gasket can be recycled and used again by removing it, replacing it with a new high temp gasket, and cleaning the old gasket inside the oven. The blackened, old gasket will come out of the oven looking almost new. The gasket can be used again unless it was mechanically torn, ripped, or otherwise damaged during removal.

c. During the cleaning cycle for the gasket, verify that the controls are working properly.

2. Check draft

a. Turn the power on. Go to Manual screen and start the Draft Inducer.

b. Move the draft control to make sure the range of draft pressure can be adjusted from at least 0.06 initial cold start.

c. Leave the draft control in position to give a draft pressure of about 0.06 initial cold start.

d. Remember, the draft sensor is only a measuring device; it only reads the draft and does not create draft. Also, the draft sensor is set to read a negative pressure in the oven as positive pressure on the screen (essentially it reads backwards).

3. Clean draft inducer blower (exhaust blower)

a. The squirrel cage blower of the draft inducer should be blown out with compressed air to remove accumulated dust and lint.

4. Removal of Ashes and Pigments

a. Ashes, pigments, dirt, or other inorganic matter left from the cleaning process should be removed as necessary to maintain good housekeeping. Do not allow such material to collect at the door gasket(s) where it might interfere with a good, tight seal.

5. Clean the Oven Trays

a. Both trays contain special catalytic pellets in a stainless steel mesh. The catalyst helps destroy the pyrolysis gases inside the oven chamber by reaction with the oxygen in the oven atmosphere. It should be removed and rinsed with water to get the catalyst pellets free of obstruction or coatings, which would prevent it from working.

b. Empty the catch tray in the bottom of the oven (into floor sweeps).

6. Clean Electronics Cabinet

a. Vacuum out any areas in the electronics cabinet that appear dirty.

Every Twelve Months

Perform the 6 month steps, plus:

1. Replace catalyst trays

a. Discard the old trays containing the catalyst and replace them with a new ones.

b. Order replacement catalyst trays.

H.7 Spare Parts List

The following should be kept on hand for regular maintenance:

- Tray, Stainless Steel, Catalytic, QTY 1
- Thermocouple, Oven Control Type K, QTY 1
- Thermocouple, Oven Hi-Limit Type K, QTY 1
- Thermocouple, Oxidizer Control, Type K, 1/4" by 6" long, 36" leads, QTY 1
- Gasket, Door Replacement, Hi-Temp, QTY 1**

Part No.	Description
F5250	Gasket, Door Replacement, Hi-Temp, 78"
101770	Gasket, Door Replacement, Silicone, 88"
XXXXXXXX	Thermocouple, Oven Type K
103219	Heater Elements, Model 3 Oven

Part No.	Afterburner (Oxidizer) Parts
XXXXXXXX	Thermocouple, K, 1/8" by 6" long, 36" leads
102703	Air Pump, Oxidizer

Part No.	Oven Trays & Pans
4-14329	Tray, S.S., Catalytic
2-9229	Pan, Drain, S.S.

H.8 New HMI Software

From time to time a new software version may come out for the HMI. Below are instructions for downloading the new software. The new version of software must be on the root of a flash drive.

1. Power up the machine.
2. Open USB port cover and install flash drive containing the new version of software into the USB port.
3. After a few seconds the menu in Figure H.1 will appear. Choose Download.



Figure H.1 - Pop-Up Menu

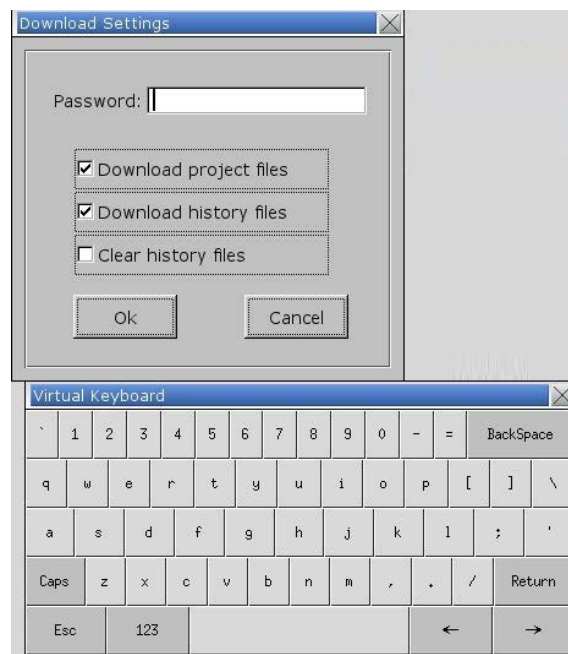


Figure H.2 - Second Pop-Up Window

4. Another pop-up menu will appear prompting for a password. Using the keyboard displayed on the screen (Figure H.2), enter 111111. Check the box that indicates Download Project files and uncheck the boxes that indicate Clear History files and Download History files and select OK.

5. Next will appear 2 subdirectories - pccard and usbdisk. Click usbdisk, select disk_a_1, and click OK.

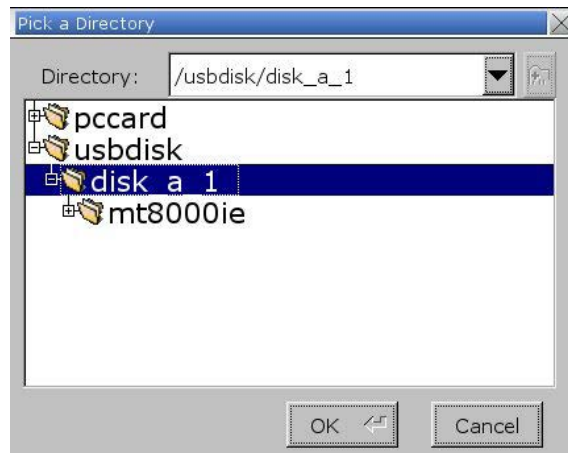


Figure H.3 - disk_a_1

6. The necessary files will now be downloaded.
7. When done, remove the flash drive and replace the USB port cap.

Appendix A: Warranty

Your Applied Test Systems product has been manufactured and inspected by experienced craftsmen. Applied Test Systems warrants, for the original purchaser, each product to be free from defects in material and workmanship for a period of thirteen (13) months from date of shipment or twelve (12) months from date of installation - whichever comes first. This warranty does not apply to failures caused by normal usage, misuse, or repair or service by unauthorized personnel, nor does it cover limited life electrical components which deteriorate with age such as tubes, lamps, fuses, and heaters. Load cells are covered for manufactured defects only - incidents of over load or other customer misuse are not covered under warranty. The warranty does not extend to products not manufactured or assembled by Applied Test Systems.

This warranty is expressly limited to the repair, replacement, or adjustment of the product at Applied Test Systems' option. The product must be returned to the Applied Test Systems factory or an authorized repair center. Applied Test Systems shall not be liable for any labor, transportation, or installation costs that may arise in connection with the product or return.

To obtain warranty service:

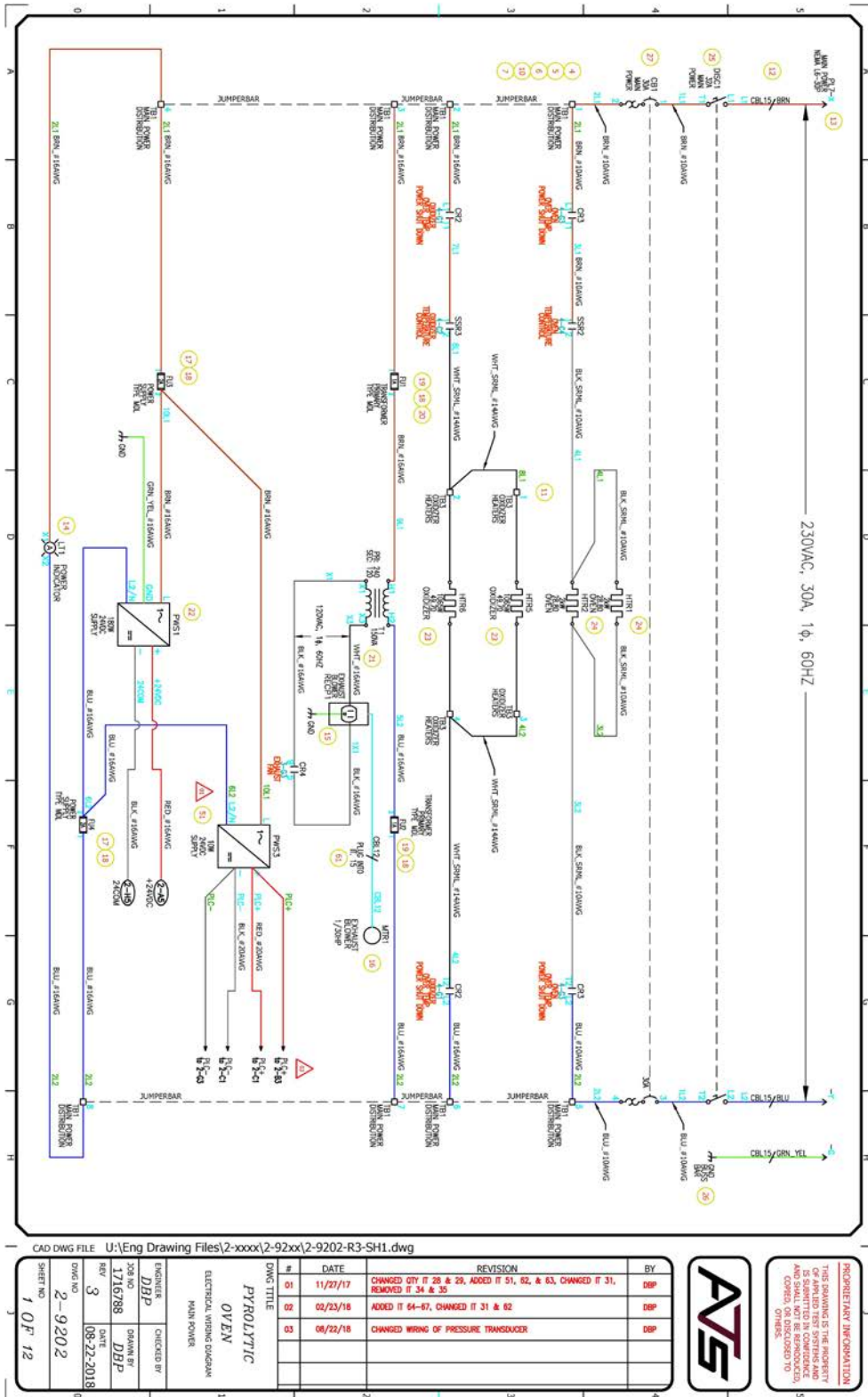
1. Applied Test Systems must be promptly notified in writing of the defect.
2. Upon receipt of written authorization, said defective equipment is returned as directed, with transportation charges prepaid by the buyer and –
3. Applied Test Systems examination of such equipment discloses to its satisfaction that the defect exists and was not caused by negligence, misuse, improper installation, accident, or unauthorized repair or alteration.

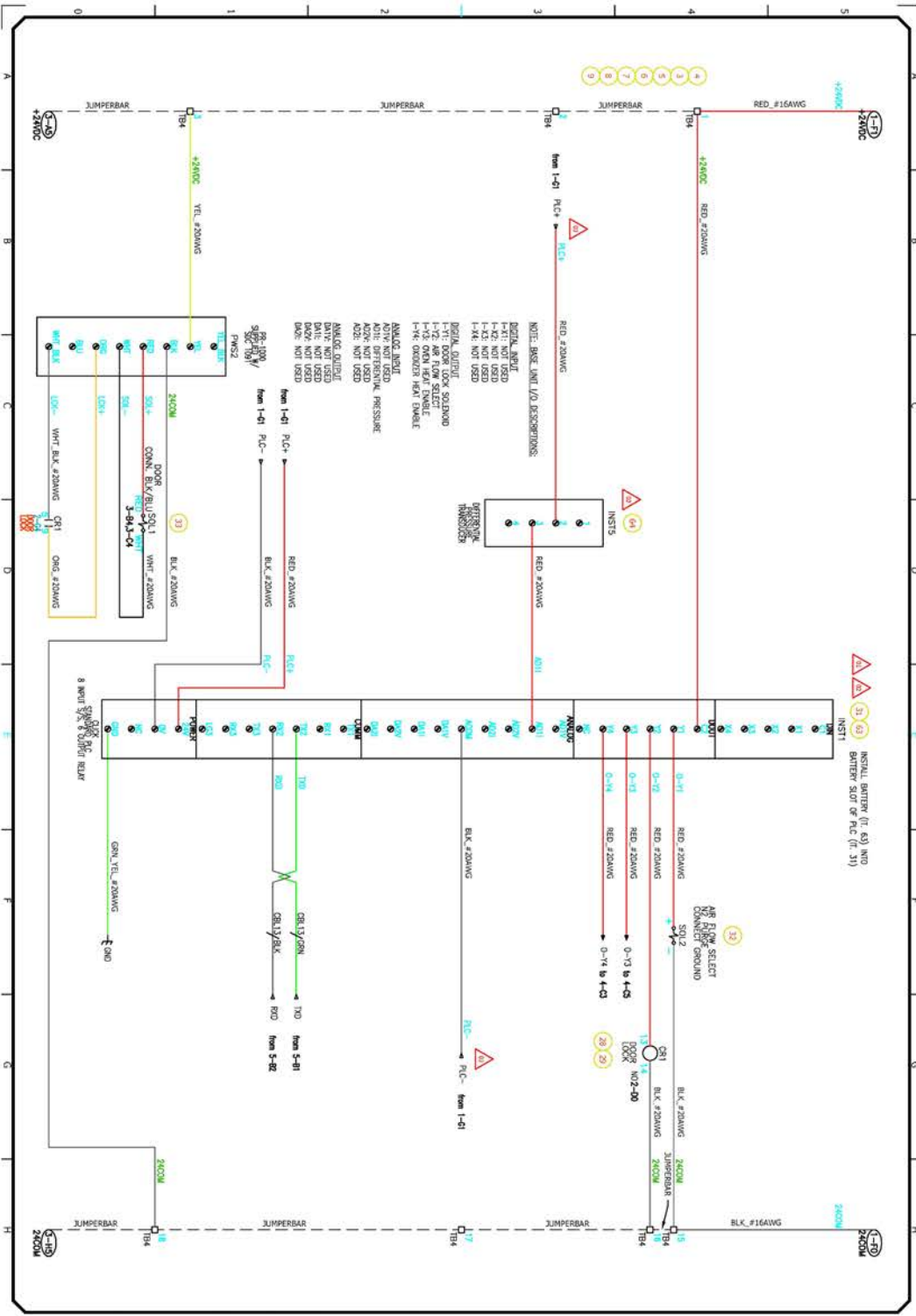
This warranty is in lieu of all other warranties, expressed or implied, including the implied warranty of merchantability or fitness for particular purpose. In no event shall Applied Test Systems be liable for direct, indirect, special, incidental, collateral, or consequential damages.

The aforementioned provisions do not extend the original warranty period of any article that has been either repaired or replaced by Applied Test Systems.

Applied Test Systems reserves the right to change published specifications.

Appendix B: Wiring Diagrams





CAD DWG FILE U:\Eng Drawing Files\2-xxxx\2-92xx\2-9202-R3-SH2.dwg

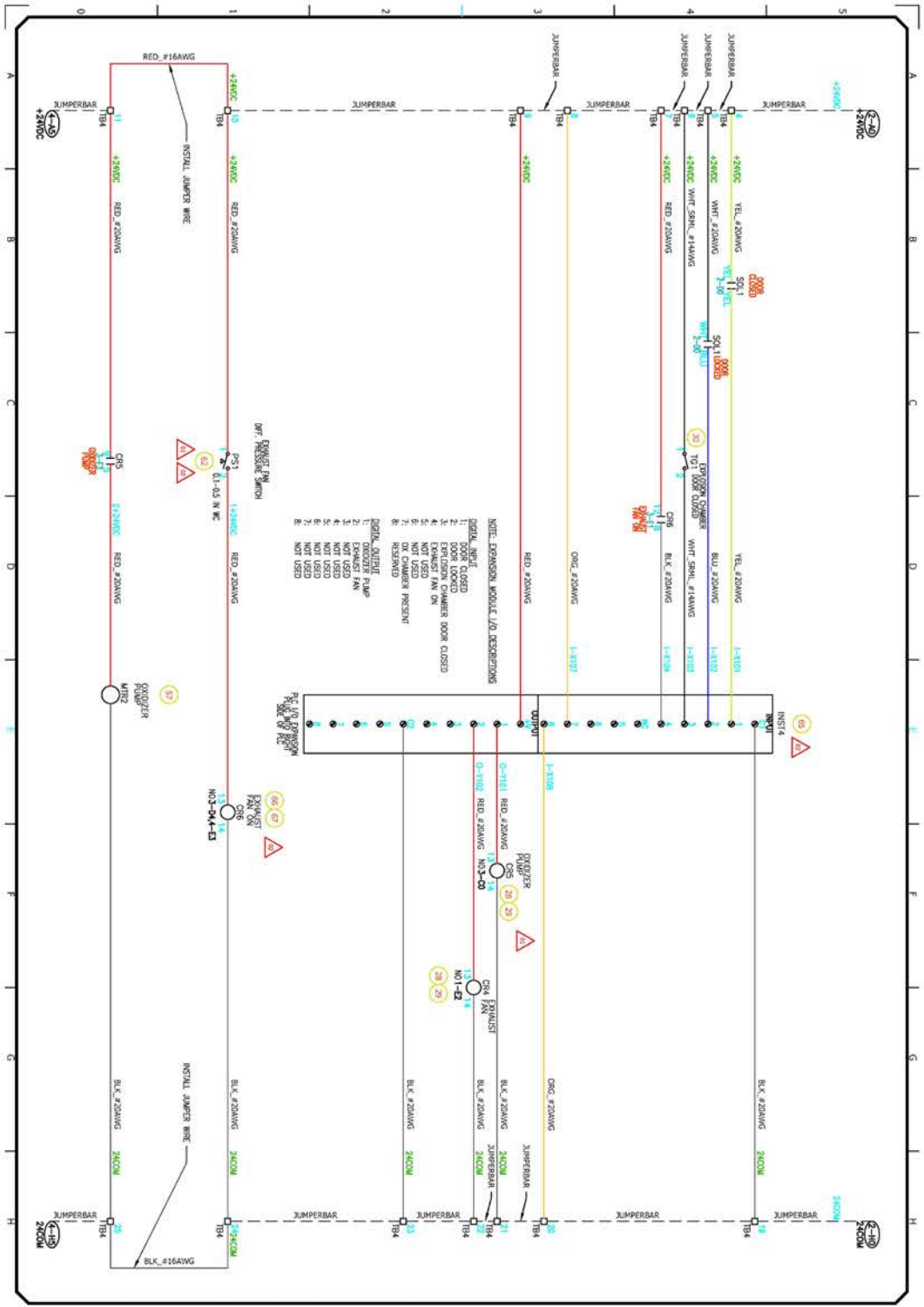
#	DATE	REVISION	BY
01	11/27/17	CHANGED QTY IT 28 & 29, ADDED IT 51, 62, & 63, CHANGED IT 31, REMOVED IT 34 & 35	DBP
02	02/23/18	ADDED IT 64-67, CHANGED IT 31 & 62	DBP
03	08/22/18	CHANGED WIRING OF PRESSURE TRANSDUCER	DBP

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AVS

Pyrolytic Oven
ELECTRICAL WIRING DIAGRAM
P/C/PRESSURE TRANSDUCER
DOOR LOCK SOLENOID

ENGINEER: **DBP**
CHECKED BY: **DBP**
JOB NO: 1716788
DATE: 08-22-2018
DWG NO: 2-9202
SHEET NO: 2 OF 12



CAD DWG FILE U:\Eng Drawing Files\2-xxxx\2-92xx\2-9202-R3-SH3.dwg

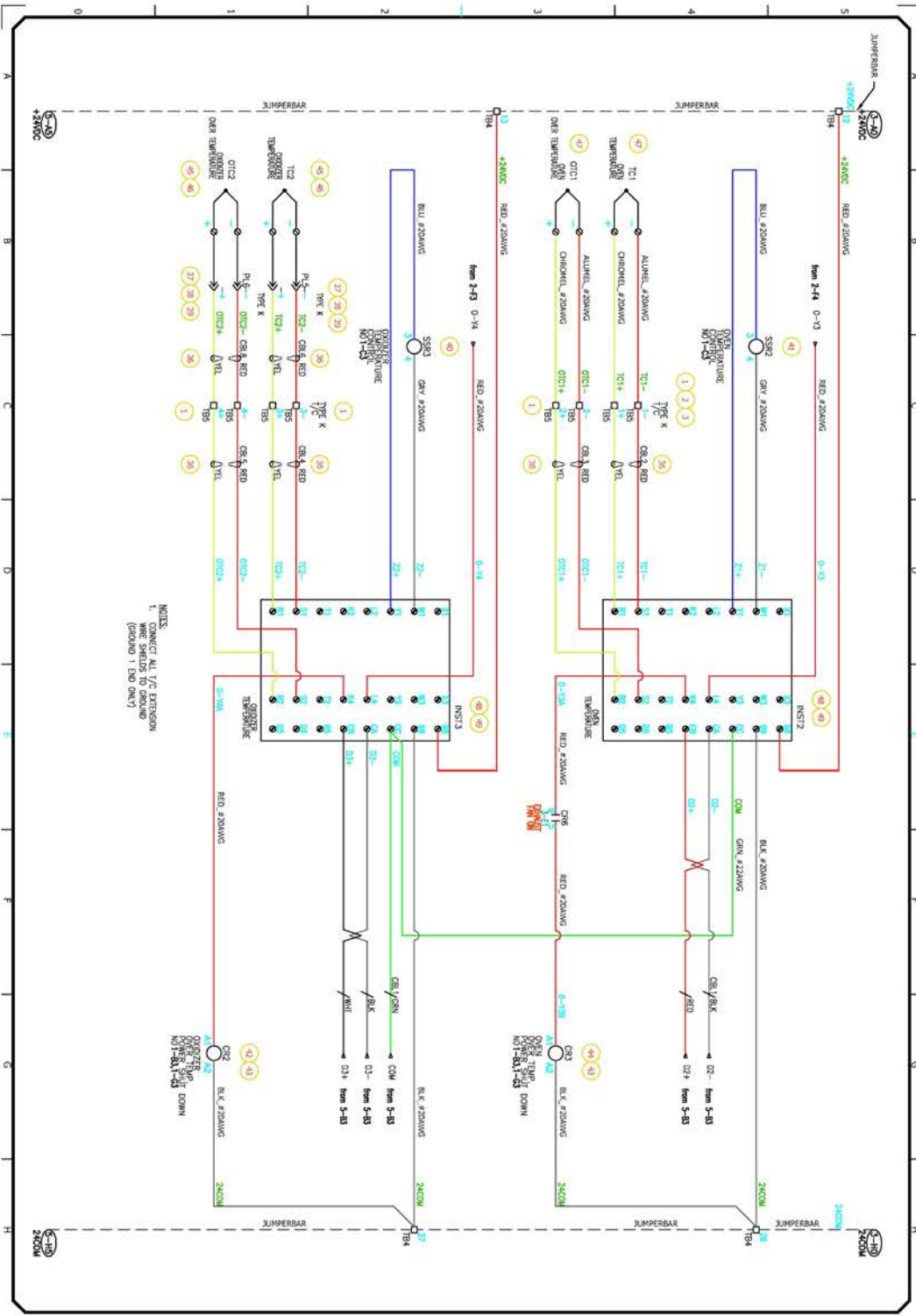
#	DATE	REVISION	BY
01	11/27/17	CHANGED QTY IT 28 & 29, ADDED IT 51, 62, & 63, CHANGED IT 31, REMOVED IT 34 & 35	DBP
02	02/21/18	ADDED IT 64-67, CHANGED IT 31 & 62	DBP
03	08/22/18	CHANGED WIRING OF PRESSURE TRANSDUCER	DBP

DWG TITLE: PYROLYTIC OVEN
ELECTRICAL WIRING DIAGRAM
P.C. I/O EXPANSION MODULE
PRESSURE SWITCH/WAMP

ENGINEER: DBP
CHECKED BY: DBP
JOB NO: 1716788
DRAWN BY: DBP
REV: 3
DATE: 08-22-2018
DWG NO: 2-9202
SHEET NO: 3 OF 12

AVS

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NOTES:
 1. CONNECT ALL 1/2" EXTENSION
 CONDUIT TO 1/2" CONDUIT
 (GROUND 1 END ONLY)

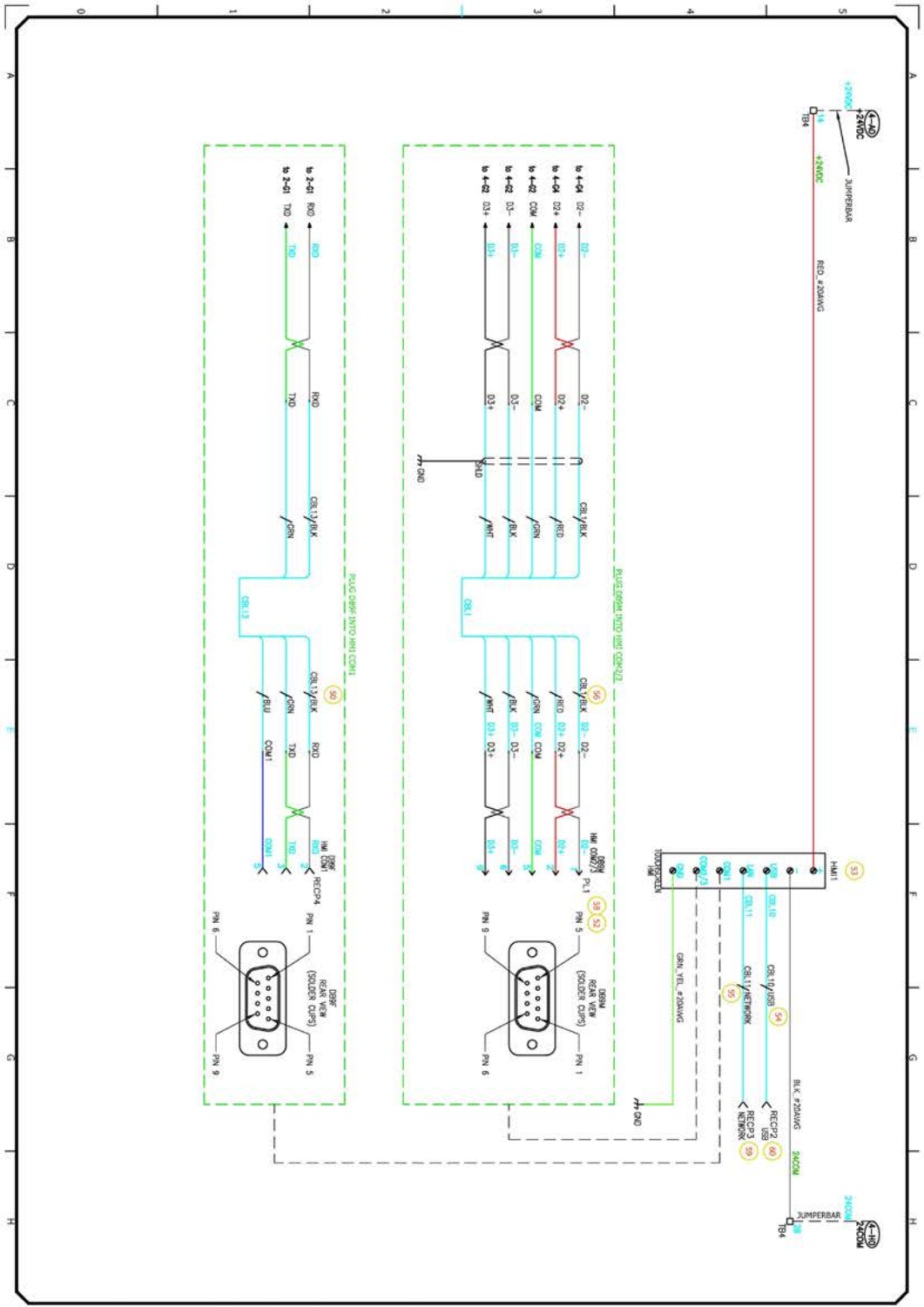
CAD DWG FILE U:\Eng Drawing Files\2-xxxx\2-92xx\2-9202-R3-SH4.dwg

#	DATE	REVISION	BY
01	11/27/17	CHANGED QTY IT 28 & 29, ADDED IT 51, 52, & 63, CHANGED IT 31, REMOVED IT 34 & 35	DBP
02	02/23/18	ADDED IT 64-67, CHANGED IT 31 & 62	DBP
03	08/22/18	CHANGED WIRING OF PRESSURE TRANSDUCER	DBP

ENGINEER	DBP	CHECKED BY	
JOB NO.	1716788	DRAWN BY	DBP
REV	3	DATE	08-22-2018
DWG NO.	2-9202		
SHEET NO.	4 OF 12		



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CAD DWG FILE U:\Eng Drawing Files\2-xxxx\2-92xx\2-9202-R3-SH5.dwg

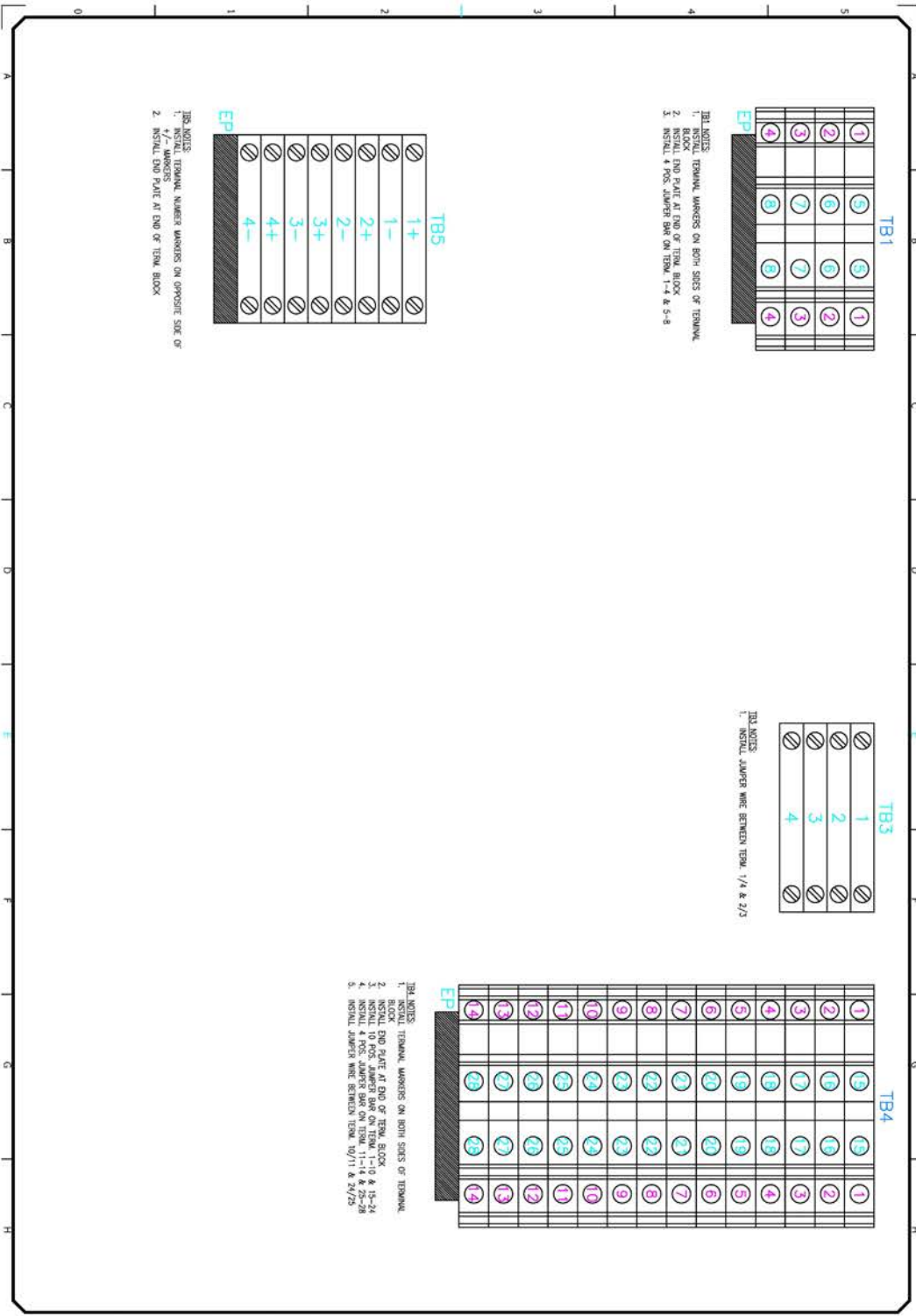
#	DATE	REVISION	BY
01	11/27/17	CHANGED QTY IT 28 & 29, ADDED IT 51, 62, & 63, CHANGED IT 31, REMOVED IT 34 & 35	DBP
02	02/21/18	ADDED IT 64-67, CHANGED IT 31 & 62	DBP
03	08/22/18	CHANGED WIRING OF PRESSURE TRANSDUCER	DBP

DWG TITLE
PYROLYTIC
OVEN
ELECTRICAL WIRING DIAGRAM
HNT

ENGINEER DBP	CHECKED BY
DRAWN BY 1716788	DATE 08-22-2018
REV 3	DWG NO 2-9202
SHEET NO 5 OF 12	



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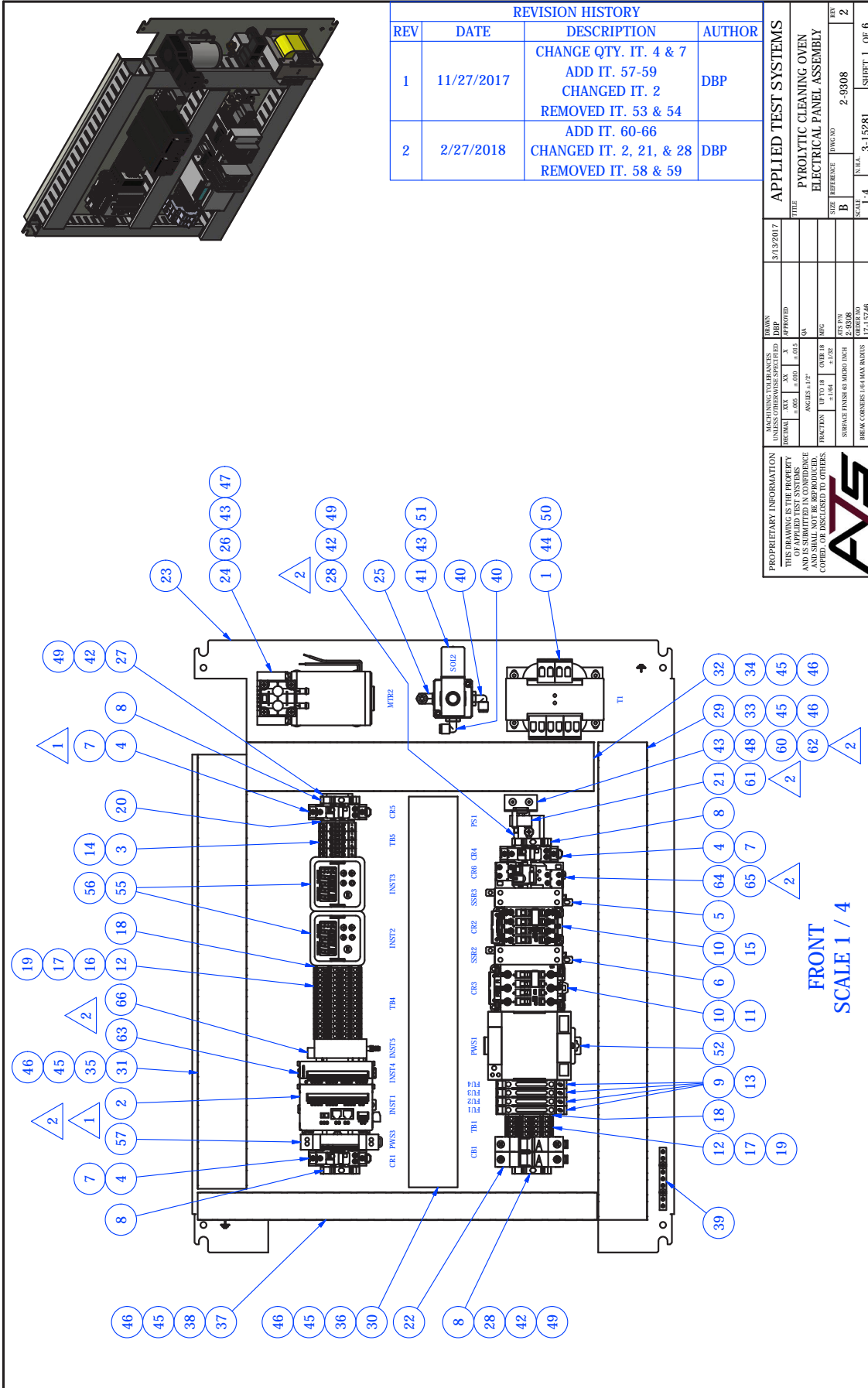
CAD DWG FILE U:\Eng Drawing Files\2-xxxx\2-92xx\2-9202-R3-SH6.dwg

#	DATE	REVISION	BY
01	11/27/17	CHANGED QTY IT 28 & 29, ADDED IT 51, 62, & 63, CHANGED IT 31, REMOVED IT 34 & 35	DBP
02	02/23/18	ADDED IT 64-67, CHANGED IT 31 & 62	DBP
03	08/22/18	CHANGED WIRING OF PRESSURE TRANSDUCER	DBP

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PYROLYTIC OVEN
 ELECTRICAL WIRING DIAGRAM
 TERMINAL BLOCK LAYOUT

ENGINEER	DBP	CHECKED BY	DBP
JOB NO.	1716788	DRAWN BY	DBP
REV	3	DATE	08-22-2018
DWG NO.	2-9202		
SHEET NO.	6 OF 12		



FRONT
SCALE 1 / 4

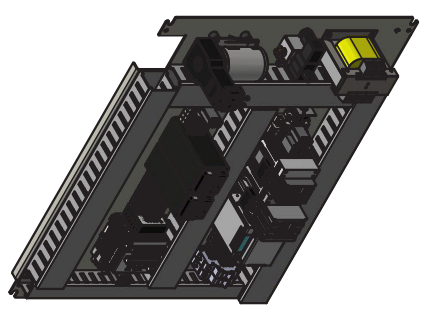
REVISION HISTORY			
REV	DATE	DESCRIPTION	AUTHOR
1	11/27/2017	CHANGE QTY. IT. 4 & 7 ADD IT. 57-59 CHANGED IT. 2 REMOVED IT. 53 & 54 ADD IT. 60-66	DBP
2	2/27/2018	CHANGED IT. 2, 21, & 28 REMOVED IT. 58 & 59	DBP

APPLIED TEST SYSTEMS	
DATE	3/13/2017
TITLE	PYROLYTIC CLEANING OVEN ELECTRICAL PANEL ASSEMBLY
SIZE	B
REFERENCE	DWG. NO. 2-9308
REV	2
SCALE	1:4
N/A.	3-15281
SHEET	1 OF 6

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
DECIMALS .XX XX X
FRACTIONS 1/16 1/8 1/4 3/8 1/2 5/8 3/4 7/8
TOLERANCES:
FRACTION .005 1/16 1/8 1/4 3/8 1/2 5/8 3/4 7/8
DECIMAL .005 .010 .015 .020 .030 .040 .050 .060 .070 .080 .090 .100 .125 .150 .175 .200 .250 .300 .375 .450 .500 .625 .750 .875 1.000
SURFACE FINISH: 63 MICRO INCH
HOLE FINISH: 125 MICRO INCH
HOLE DRILLING: 2-9308
HOLE FINISH: 125 MICRO INCH
HOLE DRILLING: 17-15281

APPROVED: DBP
DATE: 3/13/2017



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