MODEL 1200
TABLE-TOP
FURNACE SYSTEM

USER MANUAL

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OPERATORS SAFETY SUMMARY

The general safety information in this part of the manual is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply and do not appear in this summary.

Terms in This Manual

CAUTION! statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING! statements identify conditions or practices that could result in personal injury.

DANGER! statements identify conditions or practices that could result in serious personal injury including loss of life.

Symbols in This Manual

This symbol indicates where cautionary or hazard information is to be found.

This symbol indicates where electrical shock hazard information is to be found.

This symbol indicates where hot surface burn hazard information is to be found.

This symbol indicates information on when heat resistant gloves should be worn.

This symbol indicates information on when safety glasses should be worn.

This symbol indicates where explosive hazard information is to be found.

Power Source and Grounding

This product is intended to operate from a 120 or 220 volt rms single phase three wire system with safety ground. In no case may the power source apply more than 130, or 252 volts rms between the supply conductors. The third wire, or safety ground, must always be connected and is essential for safe operation.

Danger Arising from Loss of Ground

Upon loss of the protective ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electrical shock.

Use the Proper Fuses

To avoid fire hazard, use only fuses of the correct type, voltage rating and current rating as specified in the fuse table.

Do Not Use Flammable or Toxic Process Gases

The use of flammable process gases (including hydrogen gas mixtures) with this product may result in a fire or explosion leading to serious personal injury and loss of life. Do not use toxic process gases without properly operating personal and equipment ventilation systems in place.

Pressurized Gas Hazard

Do not disassemble any portion of the gas plumbing system without first exhausting the chamber to atmosphere and disconnecting all pressurized gas lines to the product. A sudden release of pressurized gas could lead to serious personal injury.

Do Not Remove Covers or Panels

To avoid personal injury, do not remove the product covers or panels without disconnecting electrical power from the product. Always lock-out and tag-out the electrical service disconnect before removing covers or panels. Do not operate the product without the covers and panels properly installed.

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1. Introduction

1.1 Manual Contents Organization

This document is the operating, maintenance, and parts manual for the Model 1200 Table-Top soldering furnace built by SST International. The manual is designed to assist operators, process engineers and service personnel in understanding the machine's capabilities, operation, and routine maintenance requirements. A full description of the Model 1200 is contained in Section 1 together with specifications, safety information, and warranty statement.

Sections 2, 3, and 4 will be of specific interest to personnel who will set up, program and operate the soldering system.

The service manual, beginning with Section 5, contains a trouble shooting guide with detailed maintenance, repair, and parts identifying / ordering information. Section 6 contains the documentation package with additional service information where applicable.

The appendix, Section 7, contains the final acceptance report and operating addenda for custom features or optional equipment.

1.2 Machine Description

The Model 1200 Table-Top soldering furnace is primarily intended for process development work requiring highly repeatable control of vacuum, pressure, and temperature. From vacuum levels of below 100 millitorr up to positive pressures as high as 50 psig, the system operates automatically to evacuate, pressurize, purge and exhaust on a time-based cycle. Two selectable gas inputs are available and may be used throughout the entire temperature range with inert gas, N_2/formic acid mix, (optional), or with air at temperatures below 200 °C.

Process parameters are controlled via an embedded off-the-shelf programmable control system that allows heating, soaking, cooling, and pressurization to be initiated at specific points in the time-based cycle. An integrated proportional-integral-differential (PID) temperature control algorithm provides 1 °C repeatability throughout the operating range of the furnace, 100 to 450 °C.

1.2.1 Process Section

The process section of the Model 1200 Table-Top soldering furnace is housed in a custom built aluminum chamber. A graphite plate or "target" is heated directly from below with radiant flux emitted from a graphite element operating between ambient and approximately 1000 °C. The element is machined from a single sheet of graphite that is designed to overlap the target plate and to minimize unheated areas resulting in an extremely uniform flux field. The target plate can be used directly as a hot plate or can be custom machined with features for positioning components, inserts, and weights. Together with provisions in the

chamber for vacuum, pressure, instrumentation, and cooling, the individual components function as a system to control temperature, pressure, and process atmosphere.

- The chamber is designed for vacuum or pressure and incorporates a lid latching mechanism for rapid entry and automatic sealing. Both the lid and chamber are machined from solid 6061-T6 aluminum billet and are rated for operation from less than 100 millitorr vacuum to a maximum positive pressure of 50 psig. All internal surfaces and components are finely machined to enhance vacuum performance and reduce evacuation time. With the lid in the open position the working surface of the target plate is flush with the chamber sealing flange and machine enclosure to facilitate fine hand manipulation and viewing of components and tooling.

- Directly below the target plate and heating element, hermetically sealed electrodes enter the chamber through the bottom wall. Although the element is connected directly to the electrodes and suspended on ceramic rods, heat losses are kept to a minimum because the contacting areas are very small and the ceramic rods and electrodes are thermally isolated from the chamber. Additional thermal isolation is provided by surrounding the heating element with a highly polished radiation shield to prevent direct radiation from reaching the chamber, lid, or view port. Directly below the lower radiation shield a centrally located port provides diffused gas flow for cooling, purging, or for introduction of N_2/formic acid, (optional), when required by the process.

- The lid assembly incorporates a 3.5 in. (8.9 cm) diameter water-cooled view port assembly located directly over the target; clearance between target plate and window is fixed at 4.0 in. (10.2 cm). The view port is mounted in a dual-walled housing that is bolted directly to the lid; radiated energy from the target plate, being of relatively long wave length, is readily absorbed by the borosilicate sight glass which necessitates cooling, particularly when operating the furnace for prolonged periods above 300 °C. Directly above the target plate the lid incorporates a milled pocket providing .80 in (2.0 cm) clearance above the target plate in areas that are not directly below the view port. An array of angled holes, drilled directly into the lid along the edges of the milled pocket, are connected together with internally drilled passages to the gas distribution system which generates turbulent flow across the entire work area for rapidly cooling parts and fixtures to safe handling temperatures.

- To dissipate heat generated from potentially high process temperatures, the lid, chamber, and view port housing are continuously water-cooled. Both the chamber and lid are manufactured with integral coolant passages formed using deep-drilled holes. The high thermal conductivity of the base material, together with the size and placement of the passages, keeps the lid and chamber within a few degrees of each other throughout the operating range of

the furnace. Internal passages in the lid feed coolant between the inner and outer sleeve of the view port housing where it is forced to flow around the housing directly below the viewing glass. This technique keeps the housing cool and prevents the sight glass from becoming excessively hot; because borosilicate glass is a poor thermal conductor, the center of the glass will remain hot even though the edges are cooled.

- Typically the tooling supplied by SST International for the Model 1200 contains a target plate or "boat" and a heat plate. Component locating features machined directly into the boat together with pins or, in some applications, inserts allows parts to be positioned and held in precise alignment during the processing cycle. The plate is suspended above the heating element at each corner on small sheet metal tabs that are welded directly to the radiation shield. This unique arrangement allows radiant energy developed by the heating element to act directly on the boat and at the same time keeps losses to a minimum. A single thermocouple inserted directly into a hole on the edge of the target plate monitors the process temperature and provides feedback to the temperature control system.

1.2.2 Control System

The Model 1200 control system is intended to be used for basic process development work and has been intentionally designed for simplicity with off-the-shelf components and custom software. The system features a self-contained intelligent ramping controller, two customized programmable logic controllers, (PLCs), and discrete logic relays; this architecture supports and enhances fail-safe / fault tolerant operations.

System operation is accomplished with simple time-based incremental programs that are keyed directly into the ramping controller. An array of panel lights display the status of each function in real-time as the control system executes the program. Three manual pushbuttons supply the necessary inputs for starting, stopping, and operating the lid.

- Process profiles and temperatures are controlled directly with a Watlow Series F4 ramping controller. This controller features a four-line high definition LCD interface display with an internal 16 bit microprocessor. The system is capable of storing 40 nameable profiles with a total of 256 steps.

- Two manually adjusted gas inputs are used together with programmable selection valves for back-fill, pressurization, and cooling. Both inputs route through pressure regulators and then through flowmeters for distribution to either the cooling/pressurization jets located in the lid, or to the centrally located purging/exhaust port located below the radiation shield.

1.3 Specifications

1.3.1 Physical Specifications

Width:	34.0 in. (86.4 cm)
Depth:	28.0 in. (71.1 cm)
Height:	20.3 in. (51.6 cm)
Weight:	180 lb. (80 kg)

1.3.2 Electrical Specifications

Input Voltage:	110-120V, 208-240 V, 60-50 Hz, Single-Phase	
Input Power:	Peak	Average
	2.8 kW	.80 kW

1.3.3 Process Area Dimensions

Heated Area: 5.0 x 4.0 in. (12.5 x 10.0 cm)
Recommended Maximum Working Area: 3.5 x 3.5 in. (8.9 x 8.9 cm)
Clearance Between Target Plate and View Port: 4.0 in. (10.2 cm)
Clearance Between Target Plate and Lid Outside of Process Area: .80 in (2.0 cm)
View Port: 3.5 in. (8.9 cm) Diameter, Polished Both Sides

1.3.4 Thermal Performance

Note: The following thermal performance specifications are typical for a standard .25 in. (.64 cm) thick, blank target plate. Actual performance will vary depending on tool design and product configuration.

Maximum Heating Rate in Vacuum: 4.0 °C/sec.
Thermal Uniformity Across Work Area: 5 °C.
Typical Forced Cooling Rate: 2 °C/sec.
Maximum Operating Temperature: 450 °C.
Maximum Continuous Operating Temperature: 450 °C.

1.3.5 Control System

Self-contained intelligent ramping controller linked with programmable logic controller, (PLC), and custom software.

Features:

- Simple time-based programming scheme based on one-second increments.
- Maximum program time: 100 hours.
- Built in facility to store up to 40 programs.
- Program length of up to 256 steps total.
- Built-in program editor.
- Multiple temperature ramp and hold segments.
- Multiple gas / vacuum valve actuation.
- Multiple PID settings.

- Intelligent vacuum / vent cycle to assist lid operations.
- Solid state relay / burst-fire heater control.
- CE certified control components.
- Dual universal analog inputs (used with MT-2 options).

1.3.6 Chamber Operating Parameters

Maximum Operating Pressure: 50 psig (4.5 bar).

Rated Vacuum Level: 100 millitorr or less.

Maximum Allowable Case Temperature Excluding Sight Glass: 110 °F (43 °C).

1.3.7 Facilities Requirements

Process Gas:

- Two separate programmable inputs.
- Minimum recommended supply line: ¼ in., (.64 cm) inside diameter.
- Maximum recommended dew point: -100 °F, (-73 °C).
- Minimum operating pressure: 75 psig, (5.3 kg/cm^2).
- Maximum operating pressure: 90 psig, (6.3 kg/cm^2).
- Acceptable process gases at either port: air, (@ temperatures ≤200 °C), nitrogen, argon, helium, forming gas with 5% hydrogen maximum; consult factory for gases not listed.
- N_2/formic acid introduced at GAS 2 port only, (optional):

  Recommended operating pressure: 15 psig maximum, (1.06 kg/cm^2).

  Recommended flowrate: 10-20 scfh, (4.7-9.4 liter/min.) to atmosphere.

Cooling Water:

- 1.0 gpm, (3.8 lpm), @ 30.0 psig, (2.11 kg/cm^2) minimum recommended.
- Coolant temperature: 68-77 °F (20-25 °C).
- Drain Requirement: Gravity drain, or 30 psig, (2.11 kg/cm^2), minimum differential pressure from inlet to outlet with 60 psig, (4.22 kg/cm^2) maximum at inlet port.

Exhaust:

- Chamber exhaust: 6.3 ft^3/min, (178.4 l^3/min), average when exhausting chamber from full pressure.
- Vacuum pump exhaust: .20 ft^3/min, (5.6 l^3/min), average when evacuating chamber from atmospheric pressure with recommended pump.
- Process exhaust, fume hood: No established requirement, completely process related.

CAUTION! If the machine will be used with the N_2/formic acid option, all national, local, and in-house regulations concerning the proper exhaust and ventilation of acid vapor must be observed.

CAUTION! The exhaust line must not be valved off or blocked at any time to prevent the build-up of gas pressure in the system.

1.3.8 Optional Equipment Specifications

Vacuum Pumps:

- The VP-5 Option provides a two-stage, oil-sealed, rotary vane pump with an integral single phase motor, exhaust filter, and separate foreline trap. An included installation kit provides the necessary fittings, power cord and vacuum hoses to complete the installation.

  Weight: 41 lbs. (18.6 kg).
  Size: (L x W x H) 20.0 x 12.0 x 10.5 in. (50.8 x 30.5 x 26.7 cm).
  Additional Power Requirement: 30 kW @ 115/200-230 V 60 Hz single phase.
  30 kW @ 110/200-220 V 50 Hz single phase.
  Nominal Pumping Speed: @ 60 Hz, 3.0 cfm; @ 50 Hz, 2.5 cfm.
  Ultimate Total Pressure: $< 4 \times 10^{-3}$ Torr.

- The DP-5 Option provides a dry, multiple-stage, roots type vacuum pump with an integral single phase motor, exhaust silencer, and vibration isolation pads. This system completely eliminates the possibility of hydrocarbons migrating into the process chamber from the vacuum pump. An included installation kit provides the necessary fittings, power cord, and hose to complete the installation.

  Weight: 51 lbs. (23 kg)
  Size: (L x W x H) 19.7 x 7.5 x 10.6 in. (49.9 x 19.0 x 27.0 cm)
  Additional Power Requirement: 750VA @ 110/230 V 60/50 Hz single phase
  Nominal Pumping Speed: 8.2 cfm
  Ultimate Total Pressure: $< 38 \times 10^{-3}$ Torr

Instrumentation:

- The DVG-1 Option adds a panel mounted digital vacuum level display together with a Pirani type vacuum transducer that is plumbed to the furnace chamber. The system is calibrated for nitrogen gas and will automatically display vacuum level in either torr or millitorr units, from 999 torr to 1 millitorr. Note: Required option on 220-240 volt models.

- The MT-2 Option adds two thermocouples to the process chamber for research and process development work. Type K, .040" diameter x 18" long sheathed thermocouples are provided for durability and vacuum integrity.

Temperatures are displayed in real time with the built-in ¼ DIN ramping controller.

- The MA-5 Option provides a stand-alone moisture monitoring system for evaluating the process atmosphere. An aluminum oxide sensing unit is plumbed directly to the process chamber and is fully operational throughout the process. A valve and check downstream of the transducer is provided for purging and improving cell response.

  Measurement Range: –100 °C to +20 °C.
  Accuracy: ± 2 °C dew point over full range.

- The SW-1 Option provides PC software for use with a portable or standard Windows-based computer. The software provides the means to create and edit control profiles offline, and to upload/download profiles from the Table-Top soldering system via an included serial interface port. The software also provides real time viewing and data logging of profile runs, including two additional thermocouples if MT-2 Option is included.

Cooling Water Circulator and Pump:

- The CW-5 Accessory provides a closed-loop, self-contained cooling system for operations where facility supplied cooling water is not available, not adequate, or contaminated.

  Weight: 75 lbs. (34.1 kg)
  Size: (L x W x H) 12 x 12 x 24 in. (30.5 x 30.5 x 61.0 cm).
  Additional Power Requirement: .30 kW @ 115/230 V 60/50 Hz
  Cooling Capacity: 3.48 kW @ 60 Hz.

Formic Acid Operation:

- This option replaces the standard plumbing system with corrosion resistant components, fittings, and tubing allowing the use of nitrogen bound with 1-4% formic acid by weight for use as an active soldering atmosphere.

1.3.9 Specification Limitation

The specifications in this manual are for standard production models only, and may not apply if the machine was ordered with custom features or non-standard options.

1.4 Safety Information

The Model 1200 has been designed with many features to help prevent accidents and to warn operators of dangerous conditions. In spite of these built-in safety features it is virtually impossible to anticipate every hazard involved with daily operations, routine maintenance, and repair work. The only “foolproof” way to

avoid accidents is to develop safe working habits while taking every reasonable precaution.

- Thoroughly review and understand your process. In some applications it may be necessary to install a fume hood, wear protective glasses and clothing, and possibly be within easy reach of a safety shower, eyewash station, and fire extinguisher.

- **DANGER!** Never operate the furnace with the enclosures removed. Lethal voltages are present when the machine is in operation.

- **WARNING!** Never operate the furnace without adequate ventilation or with an improperly installed exhaust line. Please refer to Section 2.2.3.

- **DANGER!** Do not allow inexperienced technicians to work on the furnace. The main switch on the rear electrical enclosure has to be in the "OFF" position to disconnect all power. The disconnect switch should be locked and tagged "OFF" when working on the machine with the main enclosure, lid cover, electrode access plate, or aluminum filler plates surrounding the chamber removed.

- **DANGER!** Do not modify or adjust the chamber pressure-relief valve to a pressure setting higher than 50 psig (3.52 kg/cm^2). Pressures in excess of the design rating of the pressure vessel and latching mechanism may cause an explosion that could cause serious injury or death.

- **WARNING!** Do not attempt to disassemble parts of the gas distribution system without shutting off or disconnecting the gas supply.

- **WARNING!** The furnace must be located in a sufficiently large room with adequate ventilation to avoid the possibility of asphyxiation from leaking process gas.

- **WARNING!** If the process produces toxic gases, or uses an active atmosphere containing formic acid, the chamber must be adequately purged and evacuated before opening the lid.

- **WARNING! Tooling, product, sight glass, and radiation shield can get hot enough to cause severe burns. Always wear protective heat-resistant gloves or allow the furnace and tooling to sufficiently cool before removing the boat assembly from the process chamber.**

1.5 Warranty

SST International (hereinafter "SST") warrants to the original purchaser of products that the products will be free of manufacturing defects for a period of one year following date of shipment by SST. SST shall provide on-site parts repair and replacement for the first 90 days after shipment. For the remainder of the warranty period, defective part cost is covered under warranty, but labor charges for diagnosis, repair services and travel expenses will be invoiced to the customer.

This warranty excludes damage to the product resulting from accident, misuse, contaminated in-house water supply, poor water filtration system, liquid formic acid, modification or servicing by any facility other that an SST authorized facility. Should a product fail within the warranty period, SST's sole obligation shall be to repair or replace the product or any part of it, at SST's sole discretion. Products subject to warranty claim shall be shipped postage prepaid to SST, accompanied by a return freight authorization or voucher. SST IS NOT LIABLE FOR ANY SPECIAL, DIRECT OR INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES. Please call SST's Customer Service Department at 562-803-3361 for a Return Materials Authorization Number.

Other than as specified herein, there are no warranties expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness of the products, applicable to the product.

1.6 Contact Information

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2. Installation Requirements

2.1 Customer Service Start-Up (Optional)

When the Customer Service Start-Up Option is purchased it is the customer's responsibility to accomplish the tasks described in Sections 2.2.1 through 2.2.3 before scheduling a visit by an SST International Customer Service Engineer. When the Customer Service Engineer visits the user's facility the engineer will require the full-time attention (8 hours) of at least one customer representative who will be responsible for the operation and maintenance of the furnace system. Tasks to be performed by the Customer Service Engineer include:

- Remove the machine enclosures, open the rear electrical compartment and check that all mechanical, electrical, and pneumatic components are properly tightened, correctly installed, and that nothing has been damaged during shipment.

- Check that all facility connections to the furnace are correct and report to the customer representative any deficiencies noted in the installation.

- Run through the installation test procedure, apply power, and bring the furnace up to a fully operational state.

- Teach the appropriate people in the customer's plant how to set up, program and run the furnace system.

- Teach the appropriate people in the customer's plant how to perform the necessary preventative maintenance.

- Review and turn over the machine documentation and manual to the customer representative.

Note: The Startup Option is subject to the limitations as defined at the time of order. Please review the furnace purchase agreement for details.

2.2 Machine Installation

2.2.1 Machine Placement

The Model 1200 Table-Top soldering furnace can be placed on a work bench or table that is rated for a load of 300 lbs. (136 kg) or more. A standard height workbench with a height of 33-35 in. (83.8-88.9 cm) is preferred and will allow the operator to work comfortably while standing or sitting. Workbenches manufactured in the US are generally available in widths from 36 to 72 in. (91.4-182.9 cm), and depths from 24 to 36 in. (60.9-91.4 cm). As a minimum requirement the work surface must be at least 30 in. (76.2 cm) deep and 36 in. (91.4 cm) long. Obviously there are many considerations in selecting an

appropriate workbench, however if the intended facility can accommodate a standard workbench with a height of 34 in. (86.4 cm), depth of 30 in. (76.2 cm) and a length of 72 in. it will provide a more than adequate work area. Please refer to Figures 2.3 and 2.4 at the end of this section for a plan and elevation view of the Model 1200.

- Move the furnace close to the final installation position and carefully remove the shipping container. Referring to Figure 2.0, locate and remove four 3/8-16 hex head bolts that attach the furnace to the shipping pallet.

- When lifting the furnace from the shipping pallet to the workbench two people will be required. Ideally, one person will be positioned in front of the furnace and will grip the lift handles located directly underneath adjacent to the leveling pads; the second person, standing behind the rear electrical enclosure, will grip the rear lifting bar while keeping his/her hands spread far enough apart to help control the furnace horizontally. Depending on installation requirements the furnace can be picked up from the sides with additional lifting handles located adjacent to the rear leveling pads. Please refer to Figure 2.0 and 2.1 for an illustration of the lifting bar and lifting handles. Install the four leveling feet into the tapped holes on the bottom of the furnace.

CAUTION! The furnace is heavy. Each person lifting the furnace must be able to lift and control 100 lbs. (45.5 kg) comfortably. Do not attempt to lift the furnace from the enclosure, instrument housing, rear electrical enclosure, etc.; when other lifting techniques are used the furnace must be lifted from below so that the load is carried by the steel chassis. Failure to comply with these instructions can damage the plastic enclosures and will void the warranty.

2.2.2 Machine Inspection

Unlock the rear electrical compartment by turning the four slotted head ¼ turn fasteners in a counterclockwise direction. Carefully inspect the furnace for shipping damage or loose components that may have dislodged during shipment. Report any shipping damage immediately to the SST Customer Service Department at (562) 803-3361.

2.2.3 Facilities Connections

Note: Please refer to Figure 2.2 at the end of this section to locate the facility connections described in the following paragraphs.

Electrical

The furnace was built and tested to the voltage/power specified on the nameplate located on the rear electrical enclosure below the main disconnect switch. An electrical plug, matching the appropriate facility power outlet, is to be connected

to the supplied power cord. For 220 volt operation the plug must have at least a 250 V, 20 Ampere rating; for 120 volt operation the plug must have at least a 120V, 30 Ampere rating. As a minimum plugs will be UL listed for use in the US, or CE marked for use in Europe.

Cooling Water

Cooling water is not necessary for some applications. If the furnace will be used for medium temperature soldering applications such as gold/tin, (peak temperature typically 330 °C), and enough time is available between runs for the furnace to sufficiently cool off, cooling water will not be needed.

- There are two criteria that must be met for operation without cooling water:

    1. The outer temperature of the chamber and view port housing must not be allowed to operate above 110 °F (43 °C).

    2. The sight glass must not be allowed to exceed a temperature of 200 °F (93 °C). The sight glass is designed to operate at higher temperatures but the O-rings that seal the sight glass to the vacuum chamber will eventually fail.

- When cooling water is required it is to be connected to the furnace through the 3/8-NPT female connectors marked "Water In" and "Water Out." A flow rate of one gallon-per-minute is required for maximum temperature operations. The water temperature should be controlled within 5 °F (3 °C) for best results and should be sufficiently above the dew point in the facility to prevent condensation from forming on the lid, chamber, exhaust heat exchanger, and piping. The suggested cooling water temperature to avoid excessive thermal gradients is 68 °F (20 °C).

- If cooling water is not used the low flow switch must be disabled. Turn off the power to the furnace, remove the furnace enclosure and open the rear electrical panel. Locate a pair of wires from the flow switch, item 7, shown on pictorial drawing "Cooling System Installation," and disconnect it from the furnace electrical system. Locate the supplied jumper (P/N 35804) and connect it to the wires leading to the electrical panel. This procedure bypasses the flow switch allowing the furnace to run without cooling water.

- If the optional CW-5 cooling system was purchased for this installation there will be specific instructions included with the unit. Generally these self-contained cooling units require little more than connecting the supply and return lines to the furnace, filling with coolant, and connecting to an electrical outlet.

- Note: It is important to understand that the cooling system contains aluminum, copper, brass, and stainless steel components that must be

protected from corrosion with a suitable corrosion inhibitor added periodically to the cooling water supply. It is the Customer's responsibility to maintain their cooling system based on analysis performed in their plant with their test equipment. SST has no control over cooling water quality and in particular PH and therefore cannot extend warranty protection for damage caused by corrosion.

Chamber Exhaust

Warning! In all applications, process exhaust must be vented to the outside atmosphere. It is the customer's responsibility to review their process, local laws, and facility when specifying an exhaust system because some processes can produce poisonous or acidic gases. No valve shall be installed in the exhaust line; the exhaust line must always vent to free atmosphere with zero backpressure. The connection to the machine is 3/8"-NPT, (1/2"-NPT with formic acid option).

- In installations where cooling water is available meeting the required specifications, re-enforced polyurethane tubing with an inside diameter of ½-inch (12.7 mm) minimum is routinely used. It is not necessary to use high temperature tubing because process exhaust is forced through a water-cooled heat exchanger before exiting the furnace.

- In installations where the process envelope will not exceed the operating parameters specified for operations without cooling water, Hypalon rubber tubing, meeting ASTM D2000 CE-815, should be used instead of re-enforced polyurethane because of its higher temperature rating.

- In all installations where N_2/formic acid gas will be used it is highly recommended that all connections and fittings be corrosion resistant.

Vacuum Pump Exhaust

Caution! Vacuum pump exhaust must be vented to the outside atmosphere to prevent process-induced vapors from entering the facility. Please review the paragraph for Chamber Exhaust and follow the same general guidelines using ½ inch (12.7 mm) inside diameter re-enforced polyurethane tubing, the connection to the machine is ½" NPT. Note: Vacuum and chamber exhaust lines are to be kept separate to prevent chamber exhaust from flowing into the vacuum pump.

Process Gas

The 1200 Table-Top soldering furnace has two separate gas inputs identified as "GAS 1," and "GAS 2." Please refer to Paragraph 1.3.7 for a listing of gases that may be used with the furnace.

DANGER! Do not use flammable gases! Forming gas mixtures may be used with 5% hydrogen maximum.

Clean dry process gas with a maximum recommended dew point of -100 ºF (-73 ºC), is to be connected to the machine with ¼-inch minimum (0.64 cm) inside diameter lines. The supply pressure is to be externally regulated: 75 psig minimum (5.3 kg/cm^2), not to exceed 90 psig (6.3 kg/cm^2). Note: Connections are ¼"-NPT.

If the machine will be used with the N_2/formic acid option, the source is to be connected at the "GAS 2" port only using ¼-inch (0.64 cm) outside diameter corrosion resistant tubing. Polyethylene, polypropylene, or stainless steel tubing can be used with the supplied compression fittings. The supply pressure to the machine is not to exceed 15 psig (1.06 kg/cm^2) and the acid gas mixture must never exceed 4 % acid by weight; additionally the gas generator must be equipped with a condensing mechanism to prevent liquid acid from entering the machine.

Caution! Liquid formic acid must never enter the machine. Internal components will be damaged from highly concentrated acid, voiding the warranty.

2.2.4 Installation of Heating Element

The system is shipped with the heating element and insulators packed separately to avoid damage. Before operating the furnace, these items must be installed. Refer to Figure 5.4.14.

Remove the radiator shield (Item 2) from the chamber by removing three screws (Item 10). Remove the insulators (Item 37), nuts (Item11) and washers (Item 12). Install the 2 long insulators (Item 4) in the slots provided in the support (Item 6). Carefully place the heating element (Item 3) on the insulators and over the electrodes (Item 5). Replace all parts that were removed.

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MACHINE UNPACKING

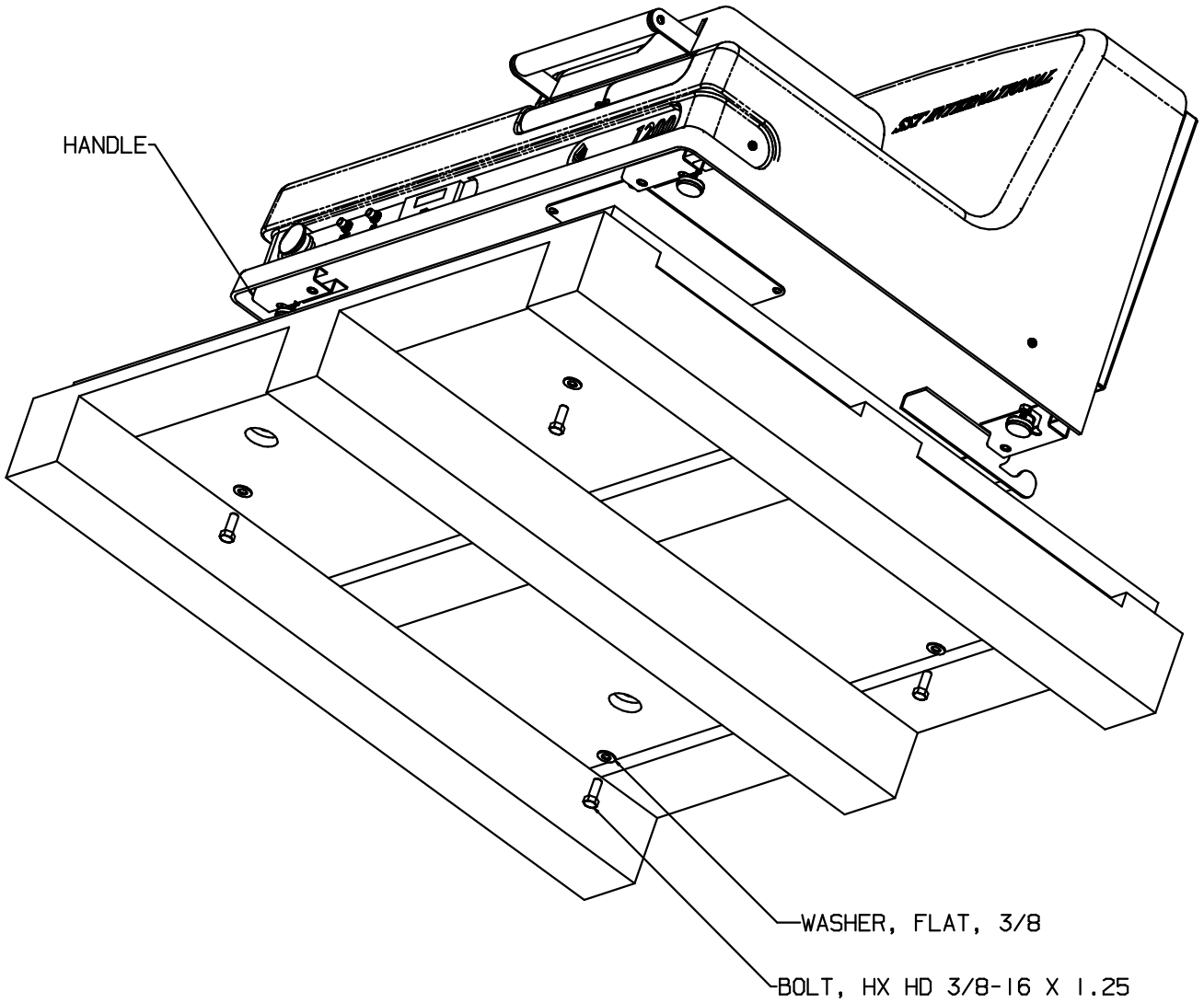


FIGURE 2.0

LIFT HANDLE LOCATIONS

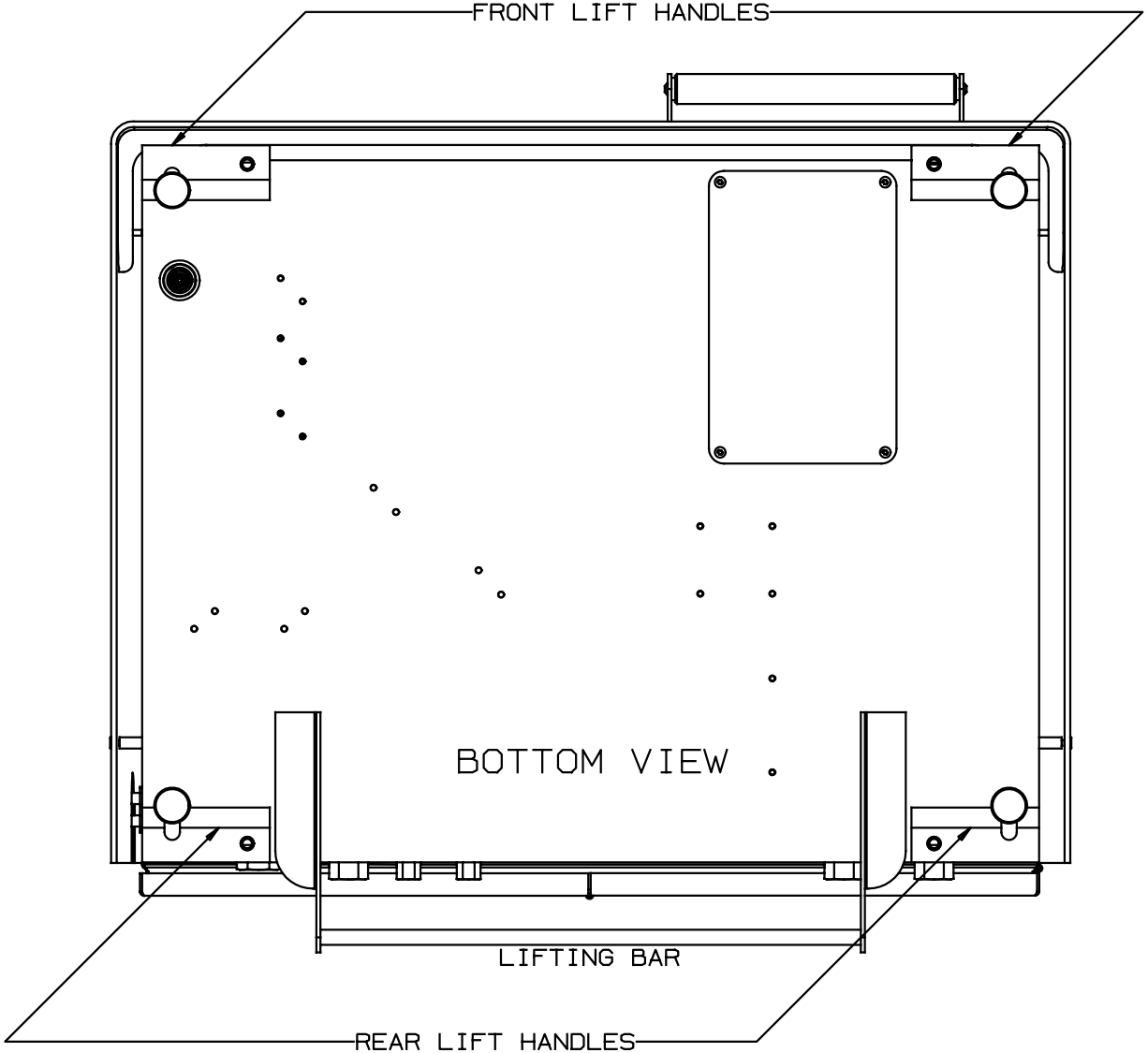
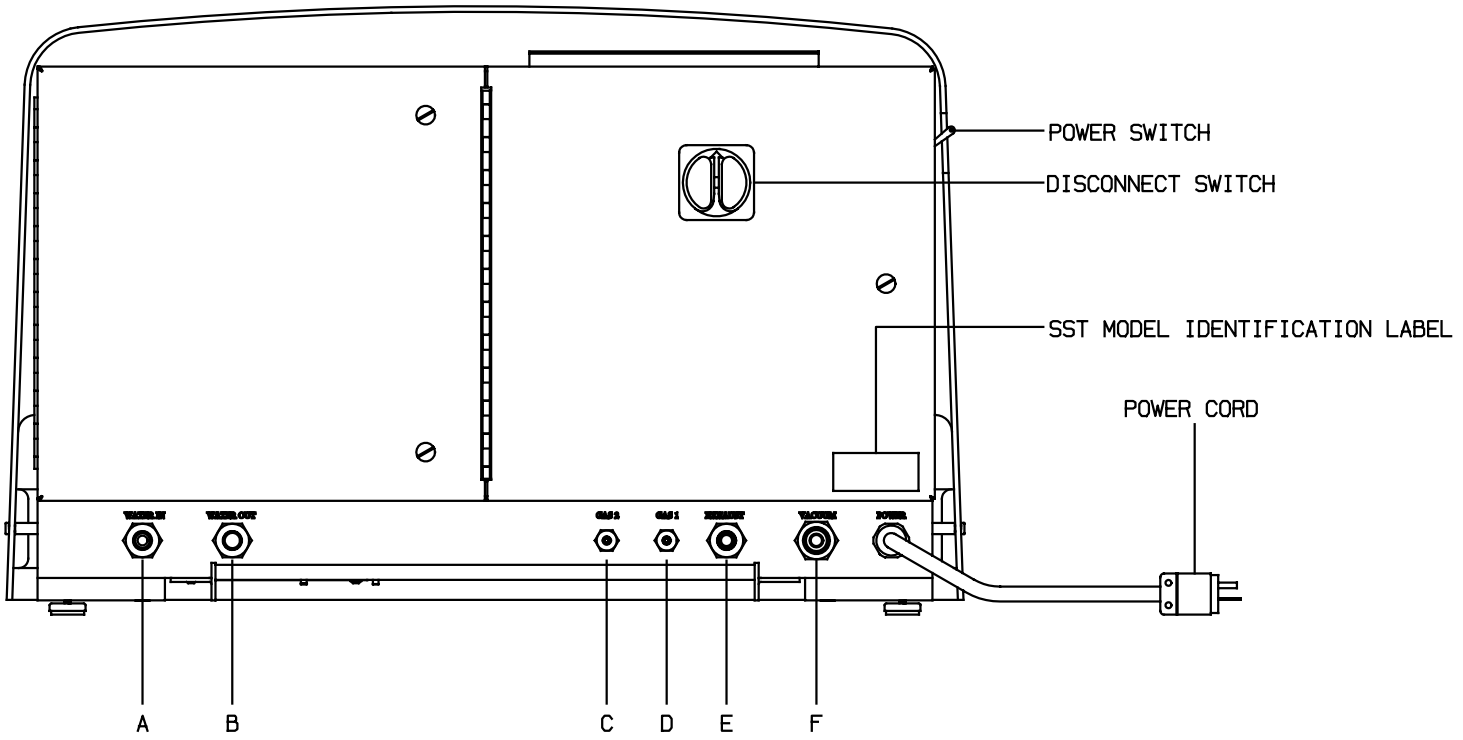


FIGURE 2.1

FACILITY CONNECTIONS



COOLING WATER IN (SUPPLY)	3/8 NPT	A
COOLING WATER OUT (RETURN)	3/8 NPT	B
PROCESS GAS 1 90 PSIG @ 100° F MAX	1/4 NPT	C
PROCESS GAS 2 90 PSIG @ 100° F MAX	1/4 NPT	D
PROCESS EXHAUST 6.3 FT^3 /MIN	3/8 NPT	E
VACCUM EXHAUST .20 FT^3 /MIN	1/2 NPT	F

FIGURE 2.2

FURNACE ELEVATION VIEW

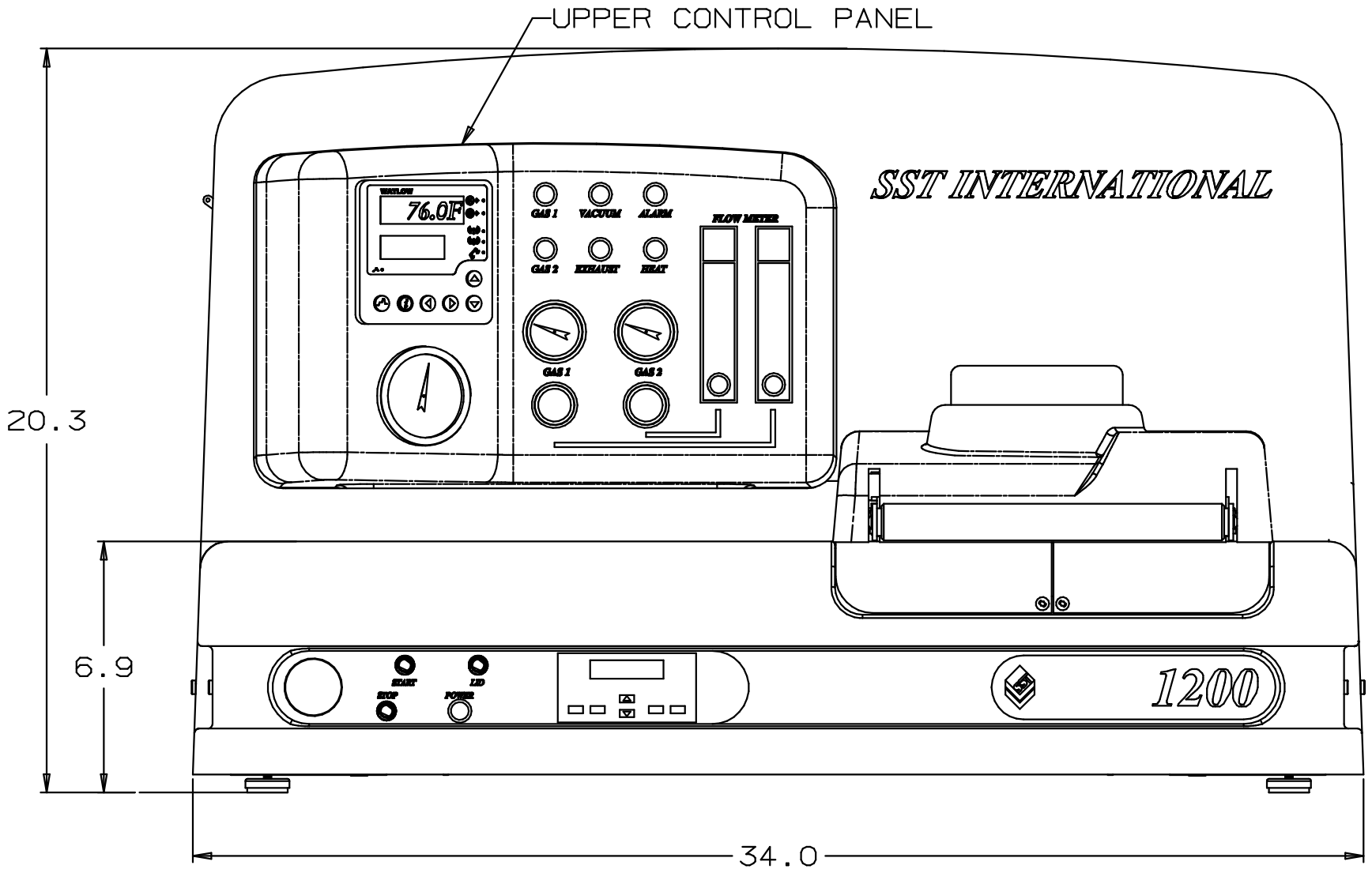


FIGURE 2.3

3. Operating Instructions

3.1 Controls and Indicators

Note: Figures 3.0, 3.1, and 3.2 at the end of this section illustrate the location of the controls and indicators described in the following paragraphs.

3.1.1 Status Indicators

Control Power (Green Indicator)

This lamp burns continuously whenever power is available to the control system.

GAS 1 (Green Indicator)

This lamp burns continuously whenever the GAS 1 solenoid valve is turned on.

GAS 2 (Green Indicator)

This lamp burns continuously whenever the GAS 2 solenoid valve is turned on.

Vacuum (Green Indicator)

This lamp burns continuously whenever the Vacuum solenoid valve is turned on.

Exhaust (Green Indicator)

This lamp burns continuously whenever the Exhaust solenoid valve is turned on.

Heat (Green Indicator)

This lamp burns continuously whenever the Heater contractor is turned on.

Alarm (Red Indicator)

This lamp burns continuously whenever there is a fault condition.

3.1.2 Control Switches

Power Switch

Actuating this switch causes the control system to perform its power-up sequence and power to be applied to the furnace system, as long as the Power Disconnect Switch is turned on and the Emergency Stop Switch is released. The Control Power Indicator described in 3.1.1 will illuminate.

Emergency Stop Switch

Actuating this switch shuts off the heater power contactor and all valves. To return the switch to the operating position, rotate the knob in the direction of the arrows.

Start Cycle Switch

Pushing this button initiates a programmed cycle. The valve state indicator lamps described in 3.1.1 will illuminate as the program is executed.

Stop Cycle / Alarm Silence Switch

Pushing this button when the furnace is in-cycle aborts the program; when not in-cycle pressing this button silences the audible alarm system.

Lid Cycle Switch

Note: The lid cycle switch initiates a canned routine that uses vacuum, exhaust, and backfill functions together with a mechanical latching mechanism to lock the lid.

- Closing the Lid: Pressing the Lid Cycle Switch when the lid is closed and the handle has been pushed into the DOWN position initiates the lid locking sequence. A timed Exhaust Cycle will be followed with a timed Vacuum Cycle; when the chamber is sufficiently evacuated the latching mechanism will automatically engage.

- Opening the Lid: Pressing the Lid Cycle Switch when the lid is locked initiates a timed Exhaust Cycle followed by a timed Vacuum Cycle; when the chamber is sufficiently evacuated pulling back on the handle and returning it to the up position disengages the latch. Pressing the Lid Cycle Switch a second time initiates a timed Backfill Cycle returning the chamber to atmospheric pressure and allowing the lid to be opened.

3.1.3 Audible Alarms

The control system generates audible alarms based on errors or failures that are detected while the furnace is in-process.

Water Flow Alarm

The control system will generate an audible alarm if coolant flow is insufficient or interrupted for longer than five seconds when the furnace is in-process. Note: In some applications the alarm may be disconnected, please refer to 2.2.3.

Lid Open Alarm

The control system will generate an audible alarm if the Start Cycle Switch is pressed while the lid is still open or if the lid handle is pulled back while the furnace is in-process.

3.1.4 Gas Flow Controls and Indicators

Pressure Regulator and Gage

Turning the regulator knob(s) clockwise increases pressure, counter-clockwise decreases pressure; pushing in on the knob locks the setting. The pressure gage indicates the setting.

Note: When adjusting the regulator(s) to the required pressure, make sure that the process is either stopped or that the regulator is not supplying gas to the furnace. Although a pressure regulator is a dynamic device, in this type of application it has to be set at zero flow.

Flowmeter

Turning the control valve clockwise decreases flow, counter-clockwise increases flow.

Note: Flowmeters of this type are calibrated to discharge at atmospheric pressure and will not read correctly unless the chamber exhaust valve is open. When the chamber exhaust valve is closed, the reading will continually decrease as the chamber pressure increases and reaches equilibrium.

Compound Pressure Gage

This gage indicates the level of vacuum or pressure in the chamber on a continuous basis.

Digital Vacuum Gage, (Optional on 120 Volt Models/Required on 220 Volt Models)

This gage indicates the vacuum level in the chamber on a continuous basis. The instrument is auto-ranging, switching between units of torr or millitorr depending on the vacuum level. Note: On 220 volt models SP1 is set to 5 torr, SP2 to 900 millitorr; these settings are used by the control system to inhibit heat until vacuum levels are sufficiently low enough to prevent arcing due to plasma.

3.2 ¼ DIN Ramping Controller

The Model 1200 Table-Top furnace system features a Watlow Series F4 ¼ DIN Industrial Controller. Please refer to Figure 3.3 at end of this section for an illustration of the controller. The F4 includes the following:

- Four-line high resolution LCD display.
- Guided setup and programming software.
- 16-bit microprocessor.
- 40 variable-length nameable profiles with up to 256 ramp steps.

3.2.1 Displays and Indicator Lamps

Upper Display

The upper display continuously monitors the process temperature when the furnace is running and reports controller errors as they occur.

Lower Display

The lower display is used during setup, programming, and operation of the controller.

Cursor (>)

The cursor indicates the selected parameter and value stored in memory. Cursor placement is controlled via the four navigation keys.

Profile Indicator Lamp (Run Hold Status)

This indicator burns continuously during a ramping profile; during operations as a static set point controller the lamp remains off.

Active Output Indicator Lamp (Output Status 1A)

This lamp burns continuously when the controller output is active and power is being supplied to the heating element.

Alarm Output Indicator Lamps (Alarm Status)

These Indicators are not used.

Communications Indicator Lamp (Communications Status)

This lamp pulsates when the controller sends or receives data while connected to a host computer.

Scroll Bar (Scroll Up / Scroll Down)

A scroll bar appears when additional information can be accessed from the Lower Display.

3.2.2 Main Page

The Main Page on the lower display shows error messages as well as input, output, profile status and provides access to the controller software (Go to Operations, Profiles, Setup and Factory).

The Main Page has been customized to display the following:

- Current File;
- Current Step;
- Set Point 1;
- Go to Operations;
- Input One (use with MT-2)

- Input Two (use with MT-2)
- Go to Profiles;
- Go to Setup;
- Go to Factory;

3.2.3 Keys and Navigation

The Lower Display is a window to the software table; using the navigation keys moves the cursor to the desired item(s).

Profile Key (Profile Run/Hold)

This key summons the menu that allows starting, holding, resuming, or terminating a profile.

Information Key (Toggle for More Information)

This key summons information about the cursor-selected parameter. Touch the key a second time and the display toggles back to the parameter.

Left and Right Keys (Back Out and Next)

Move right makes a selection to the right of the cursor, and proceeds to the next screen; move left exits.

Up and Down Keys (Move Up/Increase and Move Down/Decrease)

Moves the cursor (>) position through the software in the direction of the key arrow. Increases or decreases a value, or changes a letter in a user-nameable field, such as a profile name.

3.3 Functional Checkout

Before operating the Table-Top Furnace System for the first time, or after a prolonged shutdown, a check of the system is essential for successful operation.

3.3.1 Atmosphere Supply Gas

Connect dry nitrogen to both gas input connections. Turn on the facility valves that supply GAS 1 and GAS 2. Open both flowmeters by rotating the knobs fully counterclockwise. Adjust the regulators on the upper control panel as follows:

GAS 1, GAS 2 – 30 psig (2.12 kg/cm^2)

If the machine will be used with the N_2/formic acid option, turn on the facility valve for GAS 1 and adjust the regulator as described above. For GAS 2 check the output pressure of the acid supply system connected to the machine and adjust as necessary to a pressure of 15 psig (1.06kg/cm^2) or less. With the lid closed and the exhaust valve opened, adjust the GAS 2 regulator to a pressure that is slightly below the output pressure of the acid supply system. Adjust the GAS 2 flowmeter to approximately half scale: 10 scfh (4.7 lpm). Note: it is

important to understand that the input regulator for GAS 2 must be of the relieving type for safety reasons; once a pressure is set with the regulator, reducing the setting with the acid system in operation will release a small quantity of acid gas into the machine enclosure.

3.3.2 Cooling Water Supply

Turn on the cooling water supply or optional cooling water chiller and pump. If the coolant flow alarm has been disconnected from the system this step will not be required.

3.3.3 Main Disconnect

Turn on the main disconnect switch on the rear electrical enclosure.

DANGER! Dangerous voltages are now present throughout the machine enclosure.

3.3.4 Control Power Switch

Turn on the Control Power Switch. The Control Power Indicator (green lamp) illuminates. The ¼ DIN Ramping Controller boots up and the Main Page appears on the Lower Display.

3.3.5 Vacuum Pump

Turn on the vacuum system or optional vacuum pump.

3.3.6 Tool Installation

Open the Lid

- Press the Lid Cycle Switch. A timed Exhaust Cycle will be followed by a timed Vacuum Cycle.
- Pull the handle forward and move it to the UP position.
- Press the Lid Cycle Switch. A timed Backfill Cycle will return the chamber to atmospheric pressure.
- Raise the lid to the open position.

Install Tool

The test tool used with the machine test profile must be comprised of a bare target plate, SST #35228.

- Ensure that the heating element has been installed (see Section 2.2.4).
- Align the tool with the four tabs of the radiation shield.
- Carefully lower the tool until it touches the tabs.

Install Control Thermocouple

The control thermocouple must be in continuous contact with the tool for the temperature control system to function. Holes are drilled in the long edges of the tool (one on each side), so that one hole will be available for the thermocouple

regardless of tool orientation. Insert the control thermocouple in the right-hand hole until it bottoms out. Occasionally it will be necessary to bend the thermocouple slightly so that it pushes toward the hole. Do not omit this important step.

Note: If the machine is equipped with the MT-2 option there will be three thermocouples inside the chamber at all times. If either of the MT-2 thermocouples were to be accidentally inserted into the target plate the temperature control system would not function and the machine could be potentially damaged from excessive heating. This option includes a small ceramic bead installed on the control thermocouple to distinguish it from either of the MT-2 thermocouples. When replacing the control thermocouple, be sure to replace the bead and bend the thermocouple to keep it in place. Three additional beads were shipped with the MT-2 option; if additional beads are required they can be ordered directly from SST, (P/N 35378).

Close the Lid

- Lower the lid and move the handle to the DOWN position.
- Press the Lid Cycle Switch. A timed Exhaust/Purge Cycle will be followed by a timed Vacuum Cycle. The chamber locks will automatically engage when sufficient vacuum is obtained.

3.3.7 Profile Selection and Execution

A profile has to be selected before it can be executed unless a default profile was previously designated. Select a stored profile:

- From the Setup Page move the cursor to Go to Setup and then press the Right Key (>).
- From Choose to Setup, select Digital Input 1. Press the Right Key (>).
- From Choose to Name, select NO. Press the Right Key (>).
- From Choose Function, select Start Profile. Press the Right Key (>).
- Move the cursor to the desired profile. Press the Right Key (>).
- From Start Step, select Step 1. Press the Right Key (>).
- From Choose Condition, select LOW. Press the Right Key (>).
- To Exit, press the Left Key (<).
- From Save Setup Changes or Restore Value, Press the Save Key (<).

The compound gage on the Upper Control Panel will begin to move as vacuum is developed in the process chamber.

When process gas is called for, the appropriate pressure gage will momentarily drop and the corresponding flowmeter ball will rise as the valve opens. When pressure is called for, the compound gage will rise as the valve opens. At specific points in the program, thermal ramps or soaks will be apparent from the

temperature readout and from the current program step shown on the Lower display.

After the completion of the cycle, and after a sufficient cool-down, turn off the Control Power Switch. The control system will shutdown and all indicator lamps will extinguish. This completes the functional checkout.

3.4 Machine Operations

Daily operation of the machine requires that a routine be developed that assures long life for the machine and guards against premature failures. When a routine is adhered to, machine problems or failures will be immediately recognized.

3.4.1 Start-up Procedure

1. Turn on the Control Power. The ¼ DIN Ramping Controller will boot up and the Main Page will appear. Wait a minimum of 30 seconds after the control power has been shut off before turning it on again; this allows the ¼ DIN Ramping Controller to fully reset.
2. Turn on the supply gas at the source and adjust the input regulators as necessary. If the machine will be used with formic acid, please refer back to paragraph 3.3.1, and to Addendum 1 in Section 7 of this manual.
3. If the machine is equipped with the optional CW-5 cooling system, turn it on.
4. If the machine is equipped with the optional VP-5 vane pump or DP-5 dry pump, turn it on.
5. Open the lid: Press the Lid Cycle Switch and wait for the Exhaust/Vacuum Cycle to finish; pull the handle back and move it to the UP position. Press the Lid Cycle Switch a second time and wait for the Backfill Cycle to finish; move the lid to the open position.
6. Install the tool: Align the tool with the metal tabs on the radiation shield; gently lower the tool until it touches the tabs.
7. Insert the thermocouple.
8. Close the lid: Lower the lid to the closed position and continue pushing on the handle until it stops in the DOWN position. Press the Lid Cycle Switch and wait for the Vacuum Cycle to finish, verify that the locks have engaged.

3.4.2 Automatic Cycle Operation

1. Pressing the Start Cycle Switch runs the last profile; it is not necessary to re-select the program.
2. Pressing the Stop Cycle Switch interrupts the program at any time. The Main Page will appear and the process is immediately stopped.

3.4.3 Shutdown Procedure

1. Close the lid.
2. Turn off the Control Power Switch.

3. If the machine is equipped with the VP-5 or the DP-5 vacuum pump, turn it off.
4. If the machine is equipped with the CW-5 cooling system, turn it off.
5. Turn off the process gas at the source.

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UPPER CONTROL PANEL

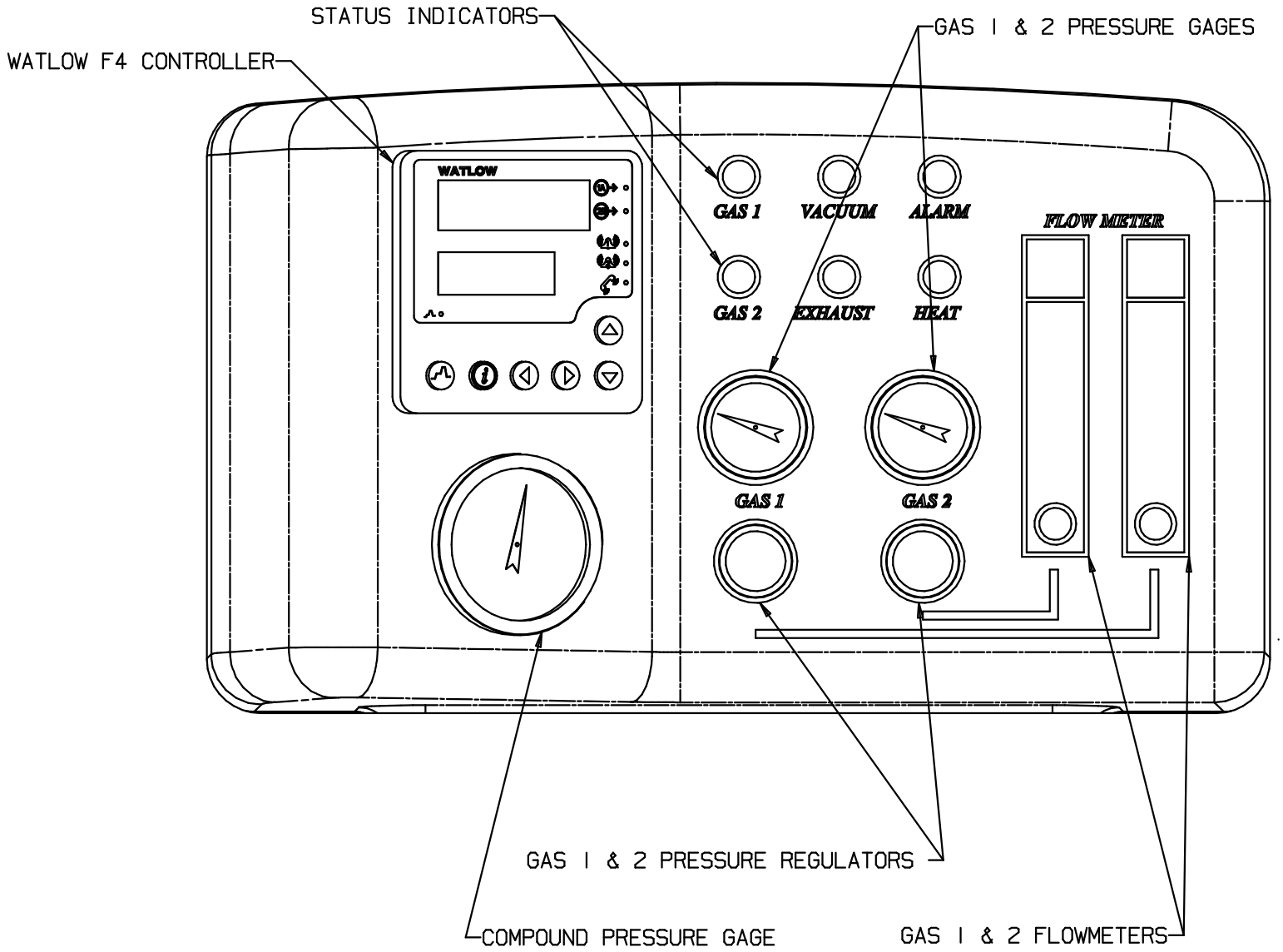


FIGURE 3.0

LOWER CONTROL PANEL

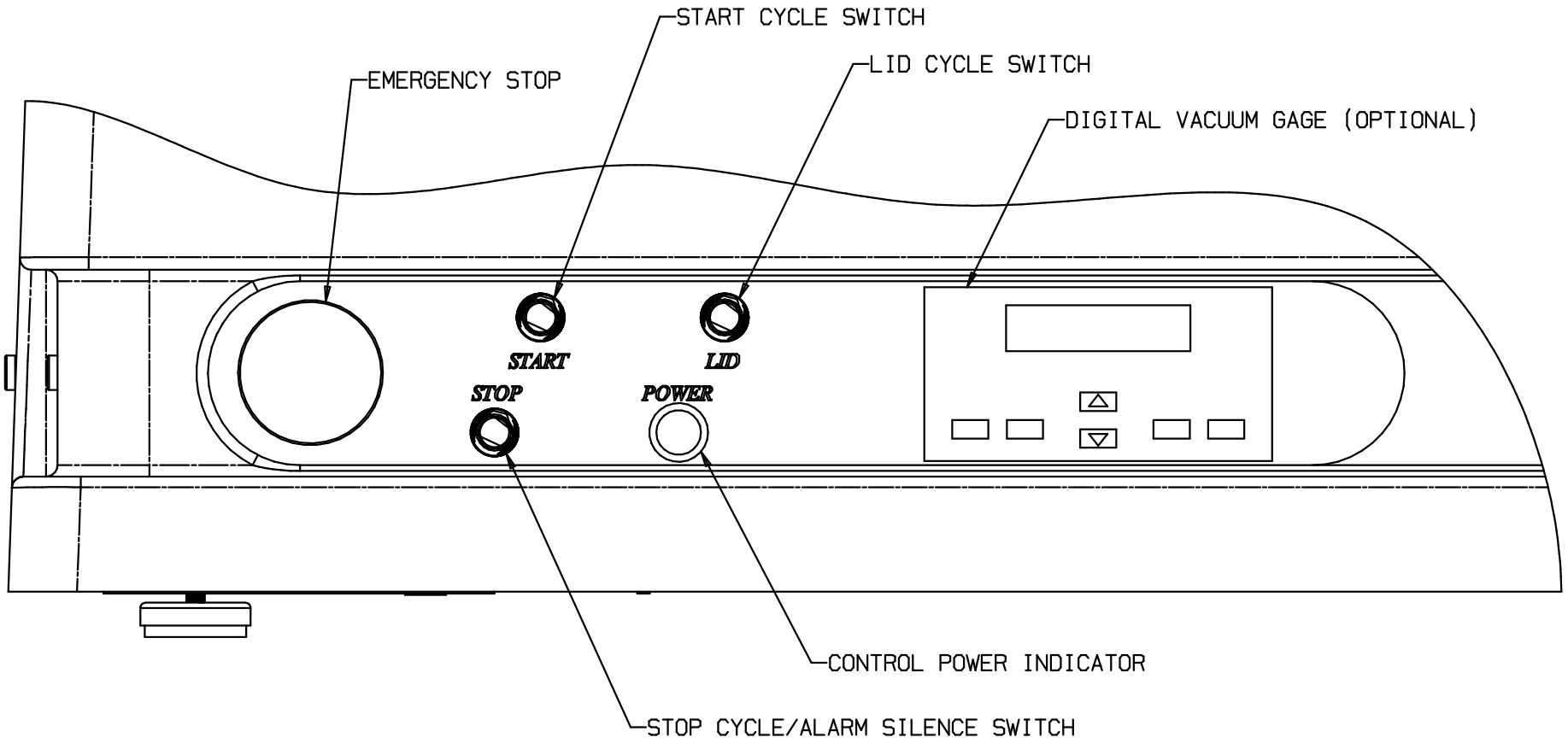
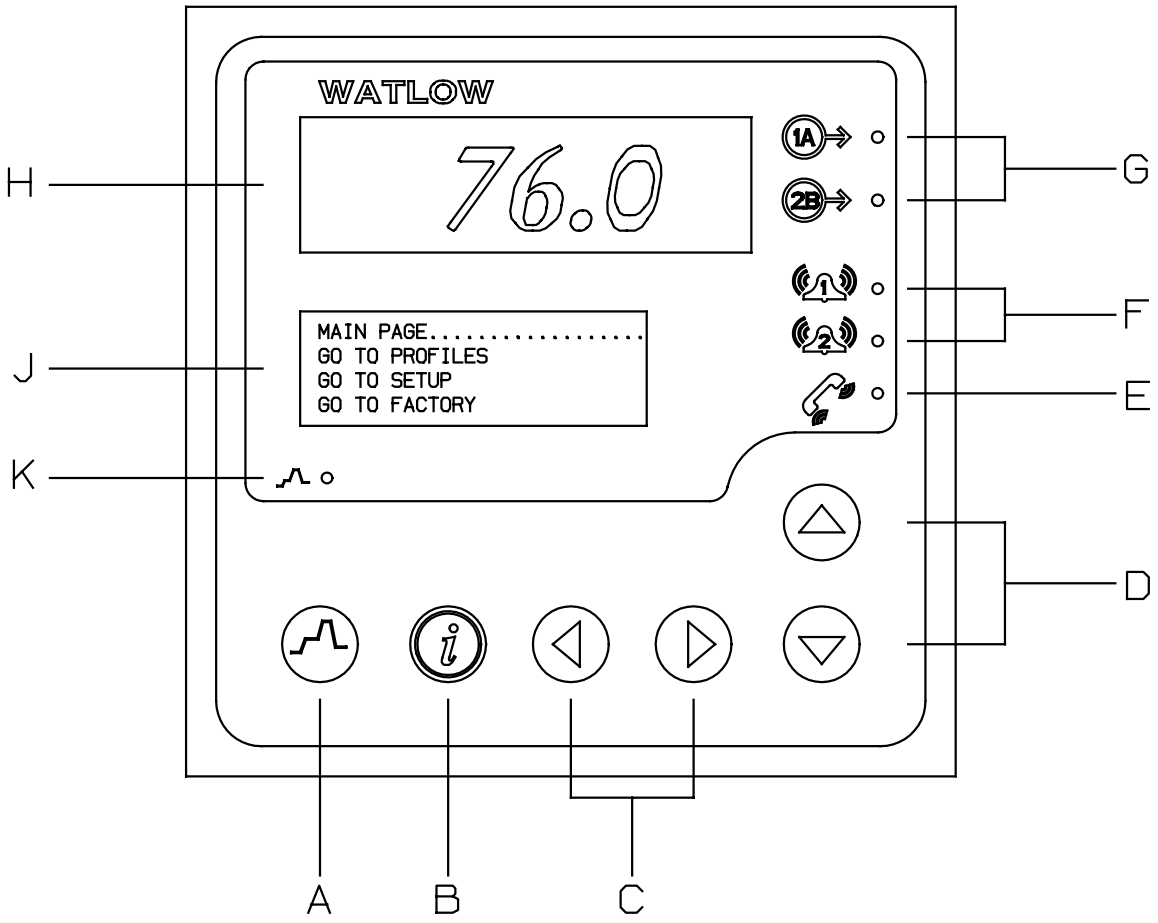


FIGURE 3.1

WATLOW F4 14 DIN CONTROLLER



PROFILE KEY	A
INFORMATION KEY	B
LEFT AND RIGHT KEYS	C
UP AND DOWN KEYS	D
COMMUNICATIONS INDICATOR	E
ALARM INDICATOR	F
ACTIVE OUTPUT INDICATOR	G
UPPER DISPLAY	H
LOWER DISPLAY	J
PROFILE INDICATOR	K

FIGURE 3.2

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4. Profile Programming

4.1 Overview

This section explains how to program and store a ramp-and-soak profile.

- 4.2 and 4.3 define and explain profiles, steps, and step type.
- 4.4 explains how to name and program a ramping profile. The ¼ DIN Ramping Controller presents the programmer with a sequence of questions that prompt for steps and step properties.
- 4.5 explains how to edit an existing profile.

4.2 What is a Ramping Profile?

A **ramp** is a programmed change from one set point to another. A **soak** maintains the set point over a period of time.

A **profile** is a set of instructions programmed as a sequence of steps. The controller handles the profile steps automatically, in sequence. As many as 40 different profiles, with a total of 256 steps, can be stored in the non-volatile memory.

The 256 steps are grouped by profile. One profile could have 256 steps; or 39 profiles could have 6 steps and one could have 22, etc. The maximum number of steps is 256, and the maximum number of profiles is 40.

4.3 Step Types – Building Blocks of Profiles

Six types of steps are available with the ¼ DIN Ramping Controller, however only three of the six are appropriate for use with the Model 1200 Table-Top Furnace System. These are Ramp Time, Soak and End, which are the building blocks for all Model 1200 profiles. Auto Start, Ramp Rate, and Jump are not used and hence not addressed in the text.

<u>Ramp Time</u>

Ramp Time changes the set point to a new value in a chosen period of time. Define the Ramp Time step by choosing;

1. Wait for an event or process value, not used. (The Model 1200 is not configured for this behavior.)
2. Event outputs to turn on or off. (GAS1, GAS2, Vacuum, Exhaust, and Heat are assigned to event outputs.)
3. Time in hours, minutes and seconds.
4. Temperature in degrees Celsius.

5. PID set (one of five sets of PID parameters.)
6. Guaranteed Soak. (It is recommended to set this value to NO.)

Soak

Soak maintains the set point from the previous step for a chosen time in hours, minutes, and seconds. Define the Soak step by choosing:

1. Wait for an event or process value, not used. (The Model 1200 is not configured for this behavior.)
2. Event outputs to turn on or off. (GAS1, GAS2, Vacuum, Exhaust, and Heat are assigned to event outputs.)
3. Time in hours, minutes, and seconds.
4. PID set (one of five sets of PID parameters.)
5. Guaranteed Soak. (It is recommended to set this value to NO.)

End

End terminates the profile in a chosen state. All profiles must have an End Step; it cannot be deleted or changed to another step type. Define the End Step by choosing:

1. End with Hold, Control Off, All Off or Idle End State. (It is recommended to end using the All Off state.)

4.4 Creating / Programming a New Profile

The ¼ DIN Ramping Controller uses a question-and-answer format to prompt the user to define the steps and step types of a new profile.

1. Go to the Profile Page. Move the cursor to the Go to Profiles (at the bottom of the Main Page), and then press the Right Key (>).
2. Create a new profile. Press the Right Key (>).
3. Name the profile for future reference. A profile name can have up to 10 characters; to name a profile:
   (a) Press the Right Key (>) to enter the name space and the first character position.
   (b) Press the Up or Down Keys to scroll through the alphabet and choose a letter or number.
   (c) Press the Right Key (>) to move to the next position.
   (d) Continue until the name is complete, or until moving through the name space into the next screen.
   (e) Press the Right Key (>) to save the name of the profile. This name will be stored in memory and will appear on the Main Page when the profile is executed.
4. Choose the step type. There are three valid step types, each of which must be defined through different parameters.

5. Define each step type. The controller prompts the user to define the parameters for each step type. Continue defining step types until the profile is completed. The last step must be an End step.
6. Choose the end state. All profiles end with an End step, which will be pre-programmed into the new profile. Choose All Off as the end state.
7. Save the settings. Press the Up Key to save the profile or press the Down Key to restore values.

4.5 Editing a Profile

To change one or more parameters in any step of a profile, choose Edit on the Profile Page.

1. Go to the Profile Page. Move the cursor to Go to Profile (at the bottom of the Main Page), and then press the Right Key (>).
2. Choose Edit a Profile. Press the Right Key (>).
3. Choose the profile to edit. Move the cursor to profile. Press the Right Key (>).
4. Choose how to change the profile. Choose whether to insert a new step, edit a specific step, or delete a step.
   (a) To edit a step:
      i. Select the number of the step to edit from a list of steps and step types.
      ii. The next screen presents a list of all possible step types. The cursor will be positioned on the current step type. Press the Right Key (>) to retain this step type and make changes to the properties listed on succeeding screens.
      iii. If a different step type is selected, the controller will prompt for all necessary parameters.
   (b) To insert a step:
      i. Move the cursor to the number of the step that the new step will precede.
      ii. Press the Right Key (>). The controller will prompt for all necessary parameters. Inserting a step changes the step number of all subsequent steps.
   (c) To delete a step:
      i. Move the cursor to the number of the step to be deleted.
      ii. Press the Right Key (>). Deleting a step changes the numbers of all subsequent steps.
5. Save the settings. Press the Up Key to save the profile or press the Down Key to restore values.

4.6 Sample Profile

Most process profiles performed on the Model 1200 are similar and will typically share the following features:

- An initial evacuation lid/lock sequence (automatic)
- Purge cycle
- Valve timing/actuation(s)
- Temperature ramp(s) at programmed rate(s)
- Vacuum bake at a programmed time/temperature
- Backfill to a set pressure at a specific time
- Dwell for a set time/temperature
- Forced cooling after solidification
- Lid open sequence (automatic)

The following process steps are for performing a lid sealing operation using Gold/Tin solder. On the following page a programming sequence has been developed to illustrate the line by line/step by step procedure. Additional blank sheets at the end of this section are included for copying and creating practice profiles.

1. Evacuate the chamber for 40 seconds.
2. Backfill the chamber to 10 psig.
3. Purge with H_2 for 30 seconds.
4. Vent the chamber to 0 psig.
5. Initial vacuum for one minute.
6. Perform a vacuum bake, ramp from room temperature to 240 ºC in 1:30 minute, hold for 2 minutes.
7. Backfill the chamber to 4 psig.
8. Perform the final seal; ramp from 240 ºC to 325 ºC in 60 seconds, hold for 2 minutes.
9. Allow the solder to cool below the melting point.
10. Force cool to a safe handling temperature.

4.7 Optional Computer Software (Watview)

An optional computer software package (SW-1) is available for use with the Model 1200. This software package provides the following features:

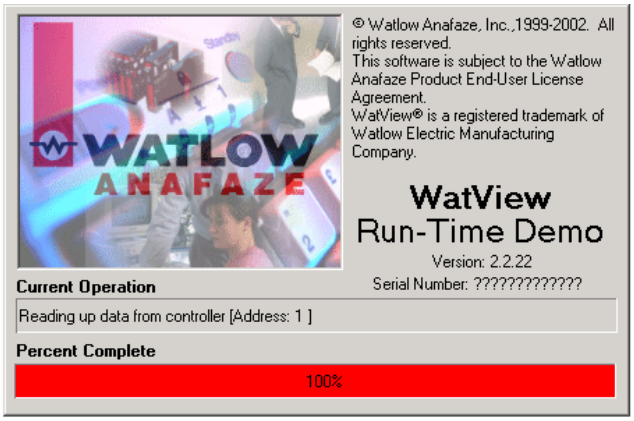
- Profile creation and editing
- Profile storage (on PC)
- Real time profile display
- Data logging

A Windows-based PC is required to operate this software package, together with a serial communications cable to connect the PC to the Model 1200.

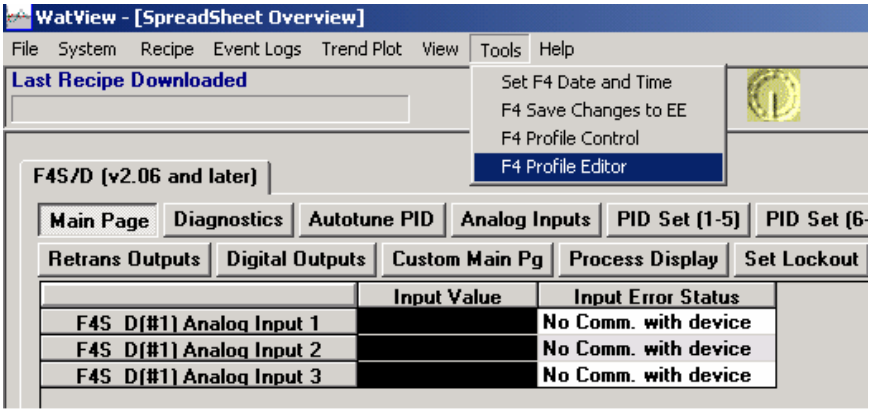
Detailed instructions on operation of the software package are included in the Watview User Manual. The user is encouraged to read this documentation for complete software features and instructions. Basic installation and usage instructions, as they apply to software use with the Model 1200, are provided below.

4.7.1 Watview Software Installation

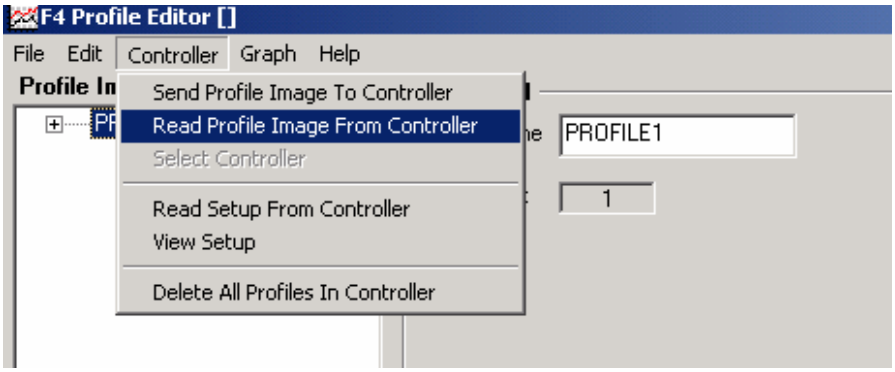
1. Install software according to the installation instructions that came with Watview software.
2. After Watview software has established communication with the 1200 controller, launch the Watview software. The software will begin reading data from the controller as shown below.



3. From Watview Spreadsheet Overview, choose “Tools” from the menu bar then choose “Profile Editor” from the dropdown menu.

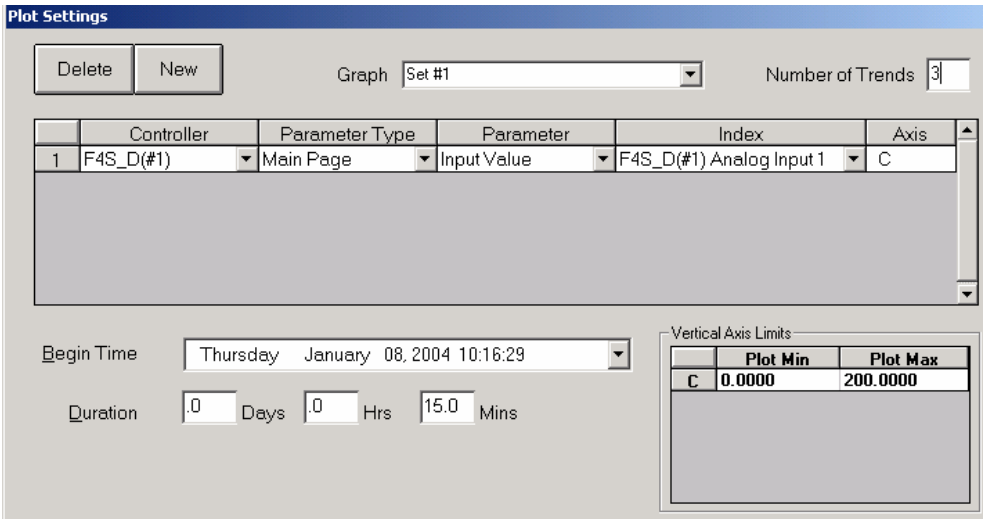


4. From the screen below choose “Read Profile Image From Controller.” The software will download all profiles stored on its memory and display it on the left as shown below. Save this profile image to the computer.

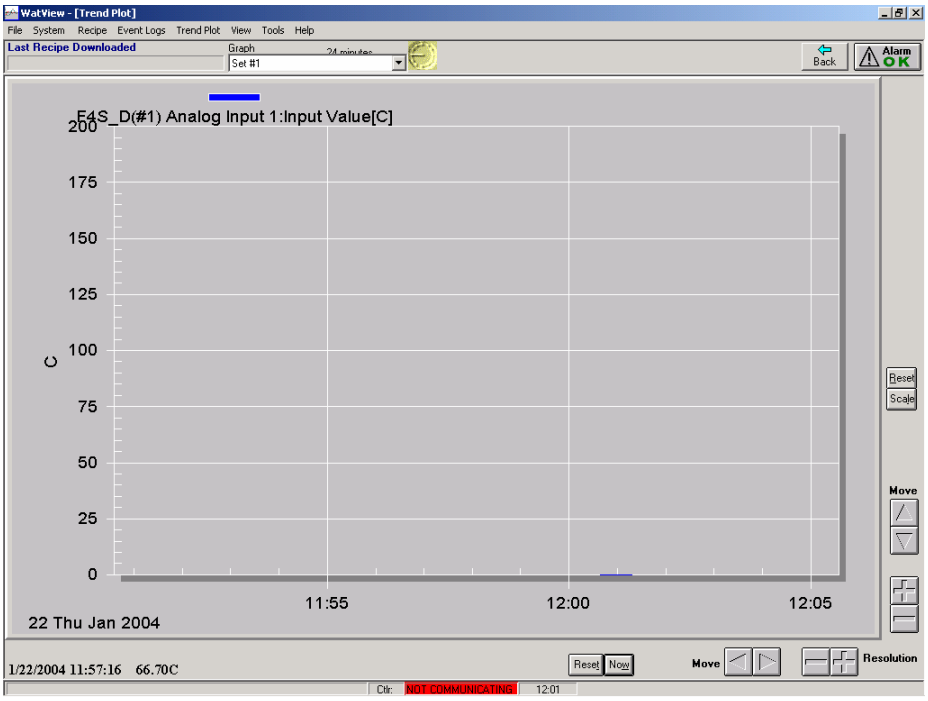


How to change the default value of a graph temperature unit from F to C.

1. Change the "Parameter Type" field value to “Main Page” from the dropdown menu.
2. Change "Parameter" field to “Input value” from the dropdown menu.
3. Change "Index" field to “Analog Input 1” from the dropdown menu.
4. The axis value will automatically change once the input value is changed, since the controller temperature unit is in C.

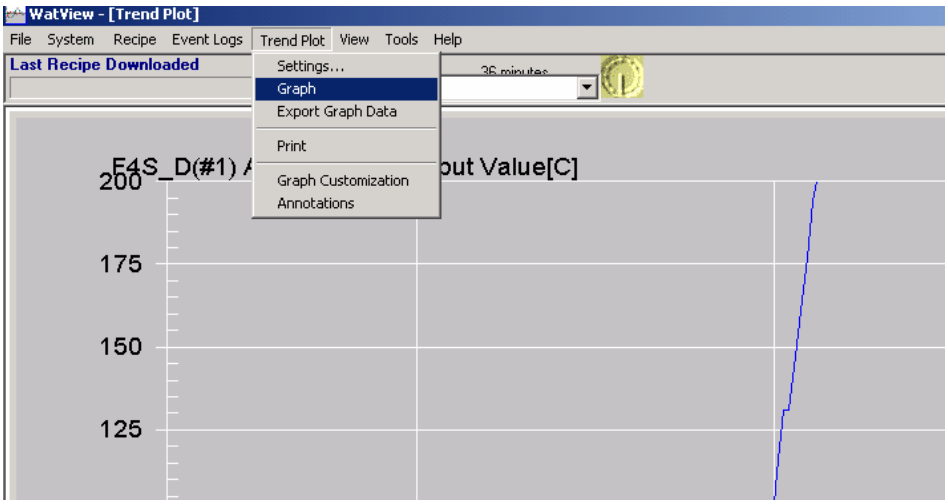


5. The display will be similar to the one shown below.



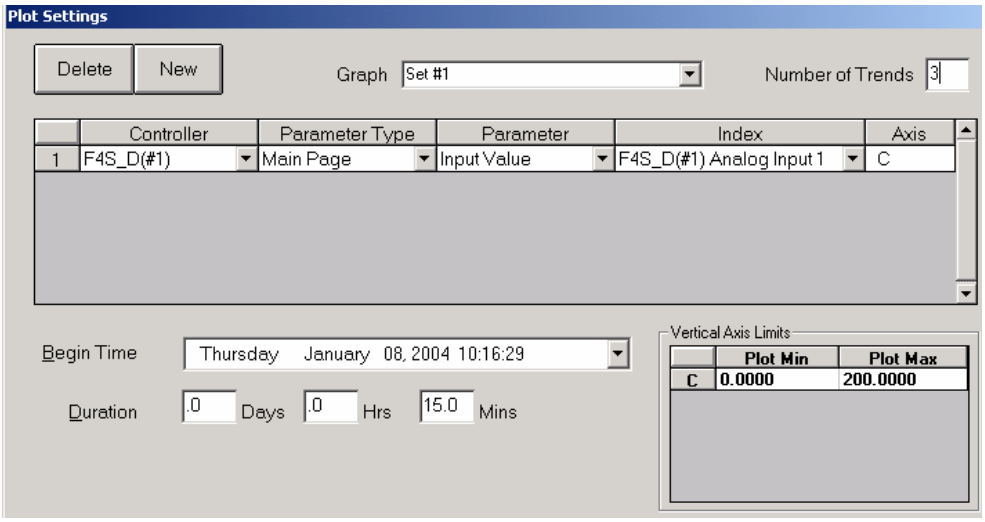
Displaying and adding one or more thermocouple(s) on the graph.

1. From Watview spreadsheets, choose “Trend Plot” from the menu bar, then choose “Graph” from the dropdown menu as shown below.



2. The default display will not be the thermocouple readings as shown in the controller. To choose control thermocouple to display in the graph, from the graph menu bar, choose “Trendplot Settings” as shown below. If

there is more than one thermocouple to be displayed (MT2 option only), change the "Number of Trends" field from one to three.

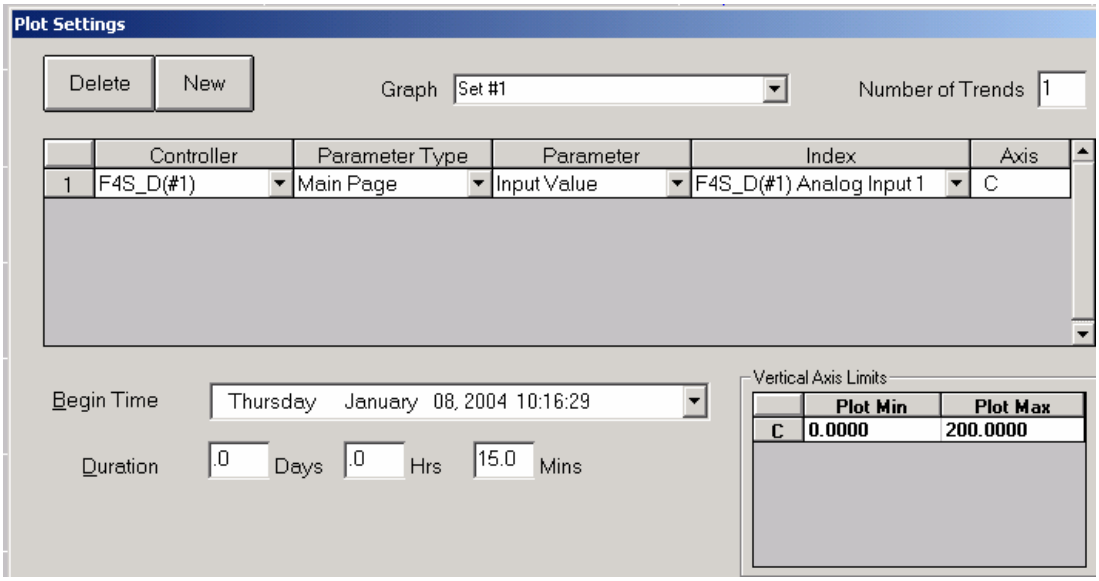


How to change vertical axis limit from default to 0 degrees C minimum to 200 degrees C maximum.

1. Change vertical axis field “Plot Min” and “Plot Max” respectively as shown below.

How to change horizontal/time limit from 30 minutes to 15 minutes.

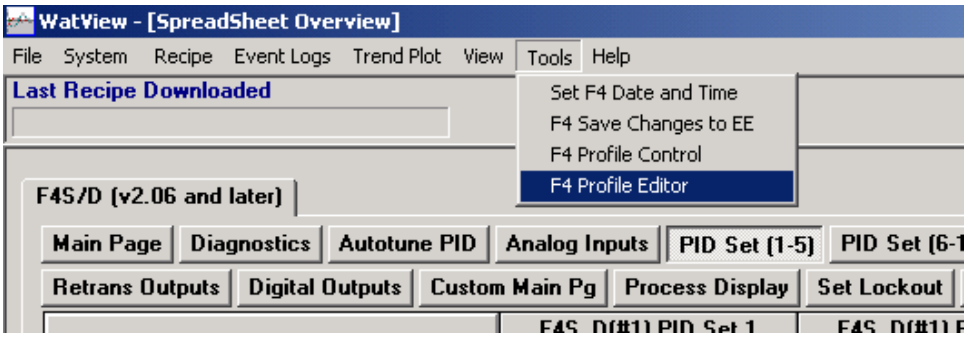
2. Change duration limit field to 15 as shown below.



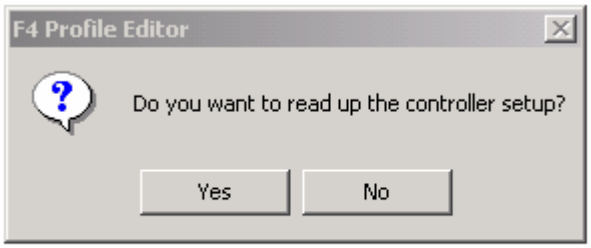
4.7.2 Real-Time Profile Display

Programming and uploading profile to the 1200.

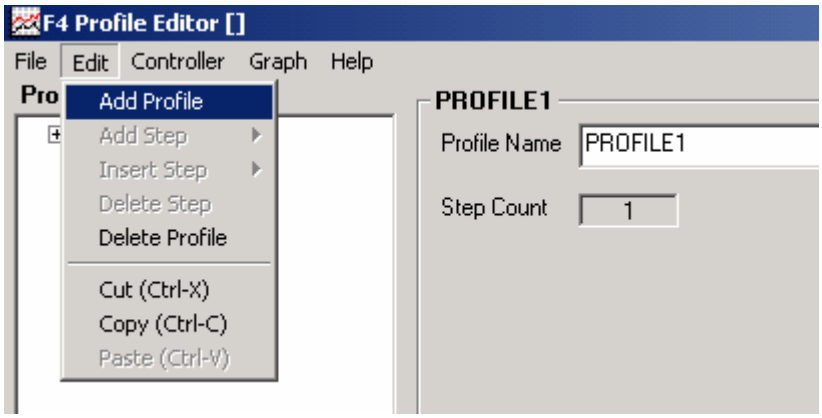
1. From the Watview spreadsheets overview choose "Tools" on the menu bar.
   Choose "Profile Editor" from the dropdown menu.



2. Choose "Yes" when prompted by the message below.

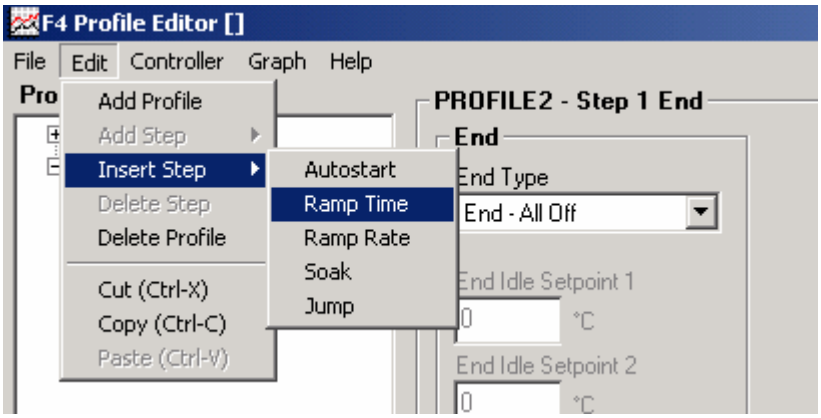


3. To create a profile, choose "Edit" from the profile editor, then choose "Add Profile" from the dropdown menu as shown below.



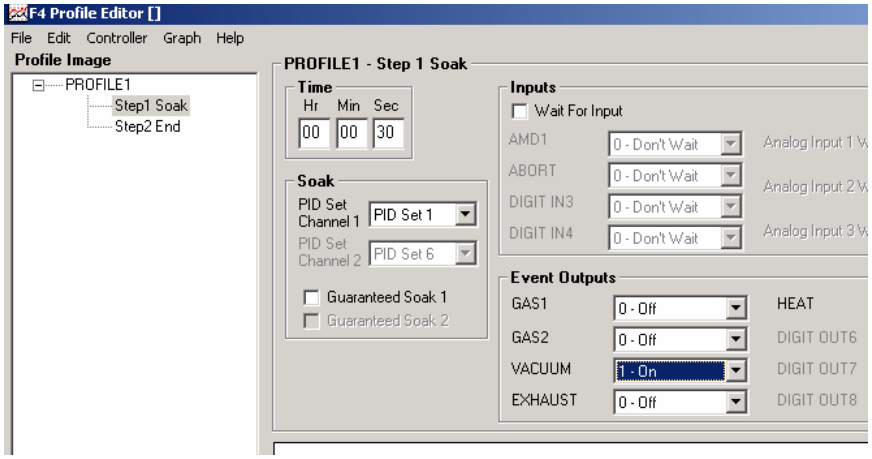
4. To add a step to a profile (for example a profile with a vacuum valve on for 30 seconds and then purges for 30 seconds using GAS1, finally ramping to heat for one minute to 150 degrees C).

5. From "Profile Editor," choose "Edit" and then from the dropdown menu, choose "Insert Step" followed by "Ramp Time" as shown below.



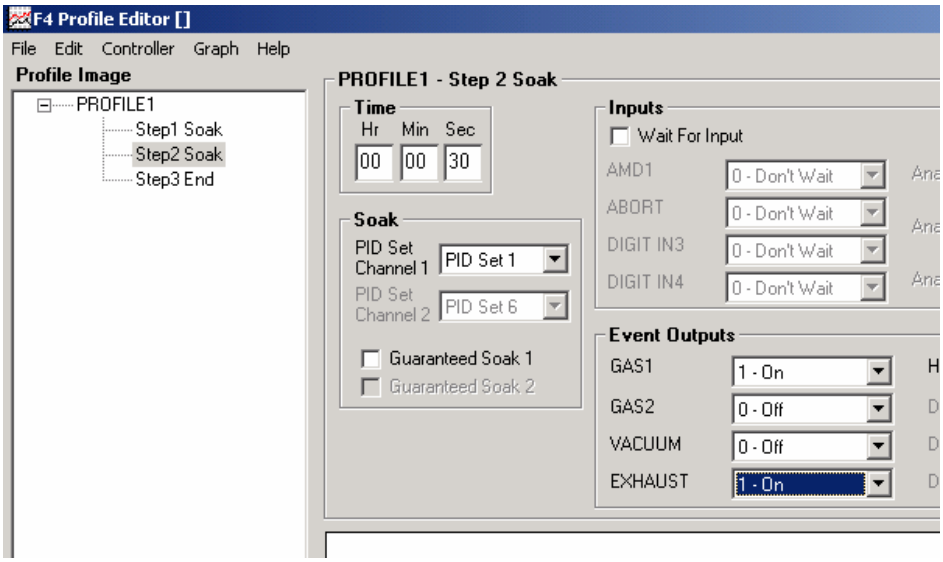
6. To add a vacuum in a profile for 30 seconds, choose "Soak," enter "30" in Sec field.

7. Turn vacuum to "On" in the "Event Outputs" field.

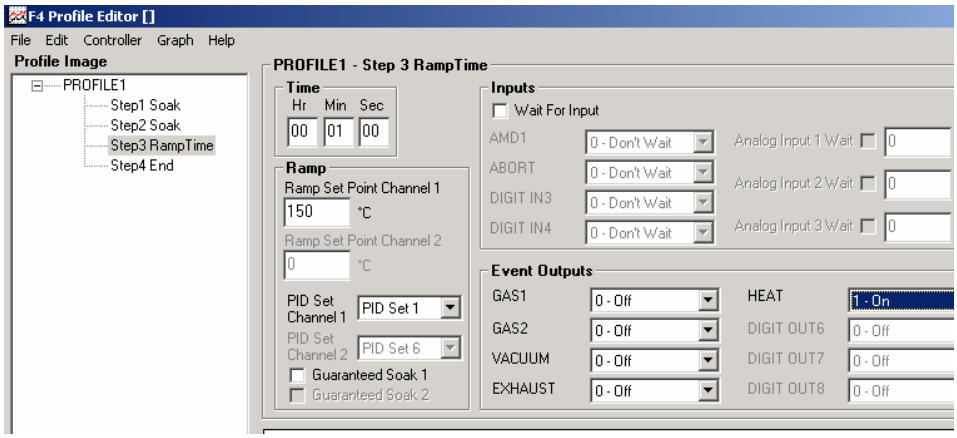


8. To add purges choose "Edit," then "Insert" from the dropdown menu, then choose "Soak."

9. Add 30 seconds in "Time" field, turn "Gas1" and "Exhaust" to "On" in the "Event Outputs" field.



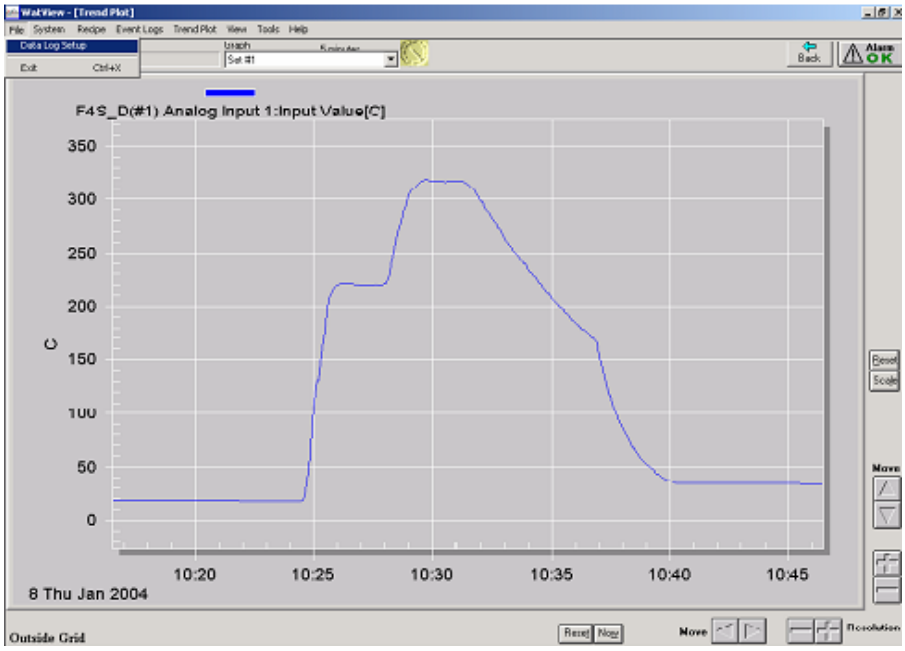
10. To add heat and ramp to 150 degrees C in one minute: Select from "Edit" menu, choose “Ramp Time,” then choose "01" minute in the "Time" - "Min" field, then add "150" in the "Ramp Set Point Channel 1" field and turn "HEAT' to "On" in the "Event Outputs" field.



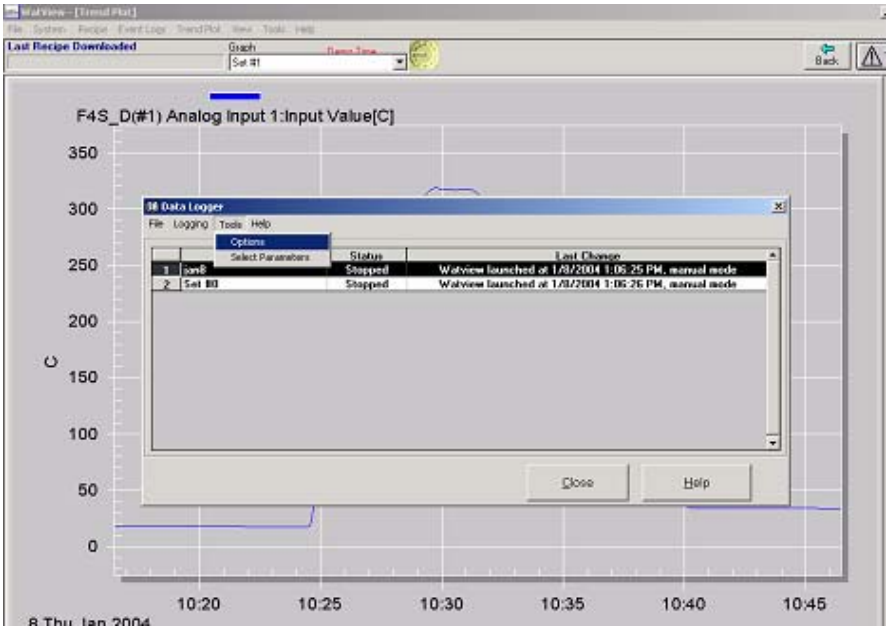
4.7.3 Data Logging

How to log data and view on a spreadsheet program like Excel.

1. From Watview "Trendplot" menu bar, choose “File” then choose “Data Log Setup” from the dropdown menu.

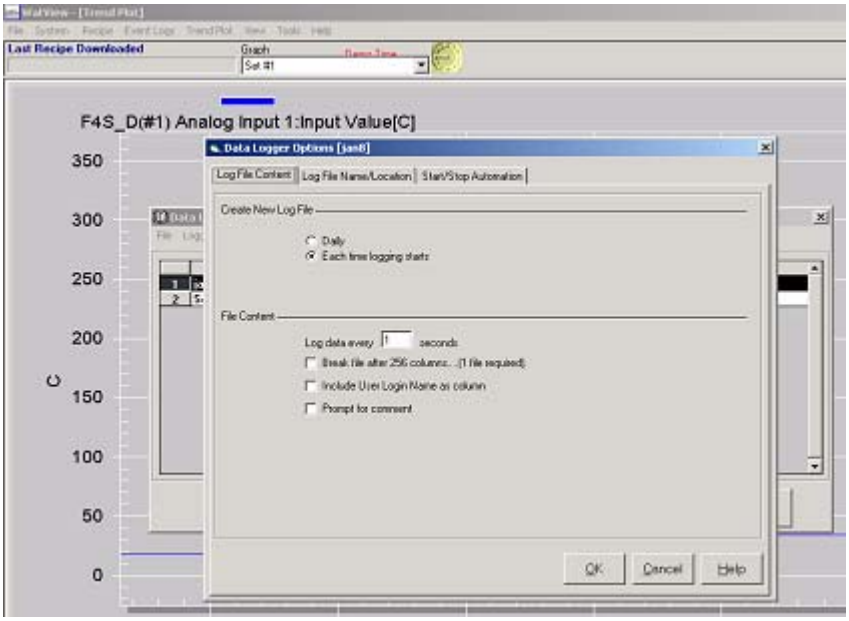


2. From the “Data Logger” window menu bar choose “Tool” and then choose “Options” from the dropdown bar as shown below.

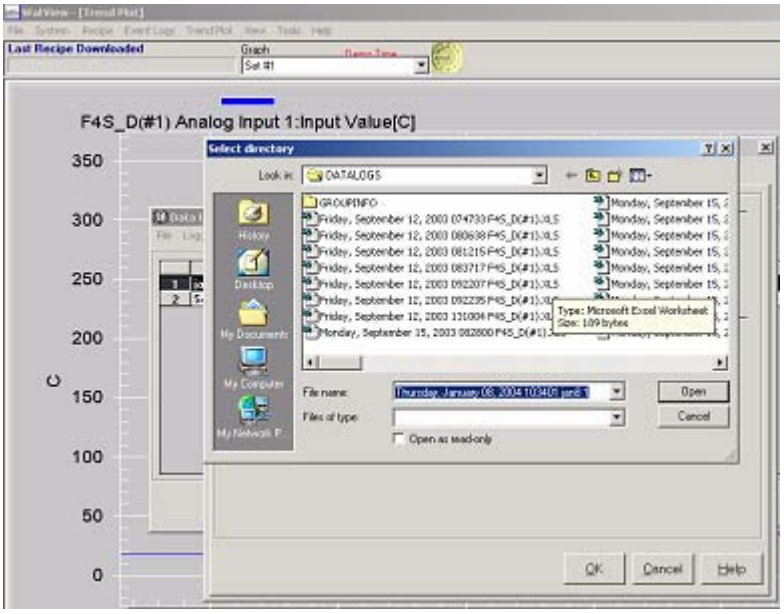


3. From the "Data Logger" window choose “Each time logging start” From the “Log data every seconds” field choose 1 second.

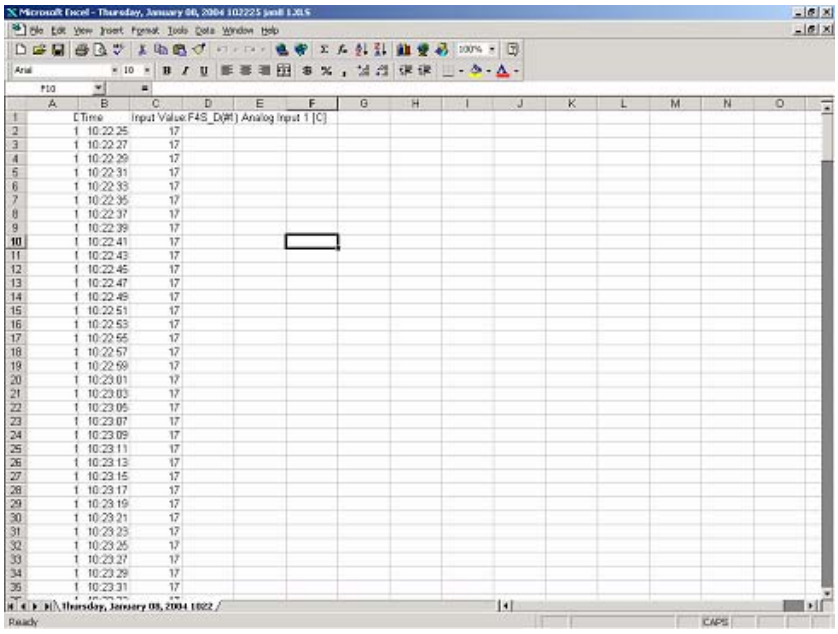
   To change name select “Log File Name/Location Folder” and choose “Modify” as shown below.



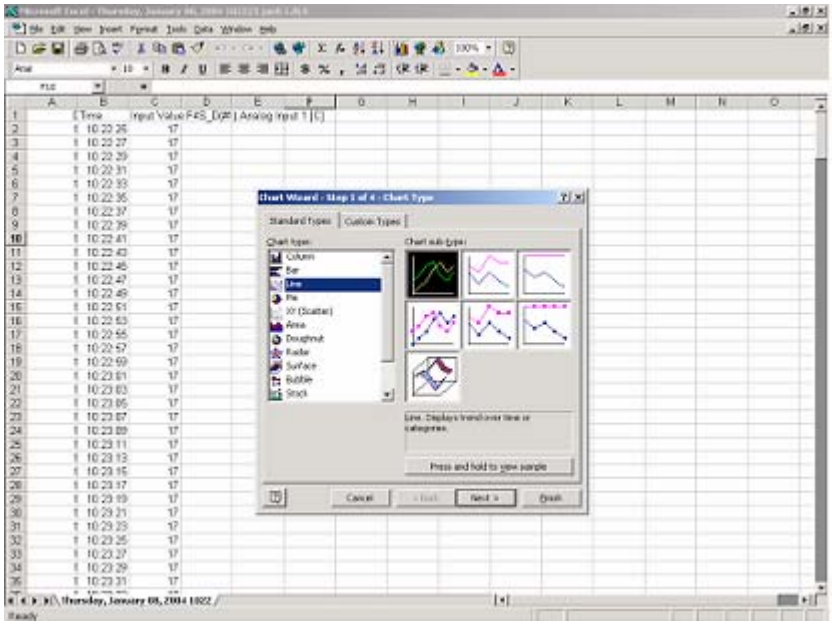
4. Rename file and/or its location as shown below.



5. To view logged data, go to "Program files/Anafaze/Watview/Datalogs." The data is in Excel format so if Microsoft Excel is installed in the computer, data will be displayed as shown below.



6. To display a graph in Excel format, go to "Chart Wizard" as shown below.



SST International Model 1200

Sample Profile

Profile Name:	**Gas 1 Pressure Set:**	**Gas 2 Pressure Set:**
Lid AuSn	30 psig	30 psig
Date Programmed:	**Gas 1 Flow Meter Set:**	**Gas 2 Flow Meter Set:**
	80 SCFH	20 SCFH

Step No.	Step Type	Gas 1	Gas 2	Vacuum	Exhaust	Heat	HH:MM:SS	Rate	PID Set	Guar Soak	End Step	Notes
1	ramp time						0:00:01	24	1	no		Initialize start from room temperature
2	soak			on			0:00:40		1	no		Evacuate the chamber
3	soak	on					0:00:05		1	no		Backfill to 10 psig
4	soak		on		on		0:00:30		1	no		Purge with nitrogen
5	soak			on			0:01:00		1	no		Initial vacuum
6	ramp time			on		on	0:01:30	240	4	no		Ramp to 240 C under vacuum
7	soak			on		on	0:02:00	240	2	no		Soak at 240 C under vacuum
8	soak		on			on	0:00:10		2	no		backfill to 4 psig
9	ramp time					on	0:01:00	325	4	no		Ramp to 325 C with 4 psig
10	soak					on	0:02:00	325	2	no		Soak at 325 C with 4 psig
11	ramp time						0:00:01	24	1	no		Initialize controller to room temperature
12	soak						0:04:00		1	no		Allow solder to cool below melting point
13	soak	on			on		0:02:00		1	no		Assist cooling with gas1 and exhaust
14	END										ALL OFF	
17												
18												
19												
20												
21												
22												
23	PID settings	Pband	Rate	Reset								
24	PID 1	20	3	7								
25	PID 2	25	2	14								
26	PID 3	15	3	14								
27	PID 4	7	3	7								
28	PID5	60	3	27								
29												
30												

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5. Service and Maintenance Information

5.1 Routine Maintenance

Daily:

There are no mechanical, electrical or pneumatic components in the Model 1200 Table-Top system that require maintenance on a daily basis. Daily operations however do require that an operator maintain system cleanliness, correctly install the thermocouple into the boat, and be sufficiently observant to recognize when problems start to develop.

- Cleanliness in vacuum furnace soldering is critical to both producing sound joints and in assuring fast pump down to low vacuum levels. It is important to understand that in order to keep a vacuum chamber clean the lid should remain shut at all times except when actually loading or removing product. Another source of contamination is directly from body oils and body lint that comes from touching the interior surfaces of the chamber and product with bare hands. By training operators to understand the importance of properly handling product and never working on or touching inside the process chamber with bare hands, very little cleaning will be required.

- How often should the chamber be cleaned? Particulate that accumulates inside the chamber from the graphite tooling and from the product is basically inert and doesn't need to be cleaned on a daily basis. Unless something such as a screw or other foreign object falls into the chamber and rolls underneath the radiation shield where it could get sucked into the vacuum inlet, it can be ignored. When it becomes necessary to replace the heating element, or when the view port becomes coated with process residue, the chamber should be cleaned. Please refer to Section 5.3, Repairs and Adjustments, to remove the radiation shield and heating element. Clean the chamber, lid, and sight glass with a suitable solvent and lint free cloth.

- If the control thermocouple is being inserted directly into the target plate, inspect and bend as necessary to ensure that it pushes itself completely into the hole and maintains pressure against the plate without lifting it off the radiation shield.

- When the furnace is started at the beginning of each shift, check each control and indicator to be sure that all functions are working correctly. Any controls that do not respond as expected, or alarms that will not clear, must be investigated and corrected before operating the furnace.

- Before processing parts the graphite tool should be out-gassed under vacuum at a temperature at least 50 °C higher than the process temperature. For processes that would exceed 425 °C the same temperature can be used.

Caution! The Model 1200 must never be operated without a graphite tool or target plate installed in the chamber. The vacuum seals and coolant seals on the view port window and housing will be quickly destroyed from excessive heating.

Monthly:

In general, monthly maintenance means four weeks of operation for one eight-hour shift per day. This period of operation is not an absolute number and it is possible that some of the tasks will be needed less often.

- Grasp the lid enclosure firmly on both sides and pull it straight up and away from the lid. Referring to the lid assembly drawing in the Illustrated Parts Manual, Section 5.4, wipe the old lubricant from the lock lever, latch, and lock pins; items 14, 15, and 16. Apply fresh grease, (white lithium recommended), wiping away any excess from the mechanism. Install the cover and push firmly to reattach the hook and loop fasteners.

- Test the system for leaks by pressurizing the system to 25 psig for three minutes. The chamber pressure should not leak down in this period of time. If the chamber will not hold pressure the leak will have to be located and repaired. Please refer to Section 5.2.2 of the Trouble Shooting Guide, and to Section 5.3.5 of Repairs and Adjustments.

- Load and run a typical processing profile. Shutoff the cooling water supply, the furnace control system should generate an audible alarm and the alarm lamp on the control panel should illuminate. If the water cooling function is not used the flow switch will be disabled and this test can be ignored.

- If the VP-5 Option was purchased with the furnace, check the oil level in the vacuum pump and top off. Use only SST #32505 Vacuum Pump Oil for this purpose.

- Look underneath the furnace for any signs of water leakage. If the system is leaking, refer to Section 5.2.3 for troubleshooting information.

Yearly:

- If the VP-5 Option was purchased with the furnace replace the oil. Use only SST #32505 for this purpose. Remove and inspect the in-line vacuum filter on the suction side of the pump. If the filter is full of debris on the inlet side, back flush it with a suitable solvent to remove the debris and bake it out, otherwise replace it.

5.2 Troubleshooting Guide

Troubleshooting information is provided in this section to assist the operator and service technician in diagnosis of equipment problems. SST International may be contacted directly by telephone, fax or e-mail for assistance in problem diagnosis and correction. When contacting SST International regarding your furnace, please be prepared to provide the serial number. The serial number is located on the nameplate on the rear electrical enclosure.

Danger! During troubleshooting and repair, dangerous voltages are present inside the rear electrical compartment and underneath the main machine enclosure when the Power Disconnect Switch is turned on. Service of this equipment must only be performed by a trained and qualified maintenance technician.

Whenever electrical problems are encountered, the supply voltage should first be checked to see that it meets specifications. In addition, internal power supply outputs and transformer secondary windings should be checked with a voltmeter for correct voltage levels. The system plumbing schematic together with the elementary wiring diagram will be helpful and should always be referred to when using this section, these documents can be found in the documentation package in Section 6.

User manuals for the optional vacuum pumps, digital vacuum gage and other optional features were shipped with the machine. Please refer to these manuals for more detailed diagnostic information when troubleshooting these items.

The information contained in this section is divided into the following general categories with possible causes for each symptom or failure. Specific instructions for parts replacement are to be found in Section 5.3.

- Vacuum
- Gas Pressure
- Cooling Water
- Alarms
- Heat
- Lid Lock Assist Failure

5.2.1 Vacuum Related Problems

Vacuum Failure - The chamber cannot hold a vacuum or cannot reach vacuum level specification.

Typical Causes:

- Leaking O-ring seals: O-rings are used to seal the lid, electrodes, thermocouple, sight glass and view-port cooling sleeve. These items can be found on the appropriate pictorial drawings in the Illustrated Parts Manual. Refer to Section 5.4.

  Referring to the pictorial drawing "Chamber Assembly," locate item 26. Item 26 is the electrode seal.

  Referring to the pictorial drawing "Thermocouple Installation," locate Item 2, this is the thermocouple O-ring.

  Referring to the pictorial drawing, "Lid Assembly," locate items 8, 10, and 12. Item 8 O-ring is for the sight glass, item 10 is for the cooling sleeve, and item 12 is the lid O-ring seal.

- Defective solenoid valves: Please refer to the plumbing diagram in Section 6 and locate 1BSOL and 2BSOL. These valves are designed for vacuum service and are used to isolate the chamber from the gas supply; if either is defective the chamber will leak. 3SOL is isolated from the chamber by check valve 3CV and cannot affect vacuum performance. 4SOL is used to isolate the vacuum pump from the system and remains open when the pump is evacuating the system.

  The gas distribution system as shown on the plumbing diagram is pictorially divided into three circuits to make it easier to troubleshoot and to locate components. 1BSOL and 2BSOL can be found on the pictorial drawing "GAS 1 & GAS 2 Circuit." 3SOL can be found on pictorial drawing "Exhaust Circuit," and 4SOL can be found on pictorial drawing "Vacuum Circuit."

- Defective check valve: Please refer to the plumbing diagram and locate 3CV check valve. This component is item 4 on pictorial drawing "Exhaust Circuit." If it is determined that this part is defective it must be replaced.

- Leaking or defective fittings: These are common failures but can be very difficult to find without leak detection equipment. Inexpensive bubble forming leak detectors can be used to locate gross leaks by pressurizing suspected areas and looking for bubbles; these soap solutions however are not capable of finding small leaks that typically affect vacuum performance.

- Low vacuum pump oil level if equipped with an oil sealed pump.

- Worn internal vacuum pump seals.

- Defective, contaminated, or out of calibration vacuum gage. All of the information necessary to service this instrument is to be found in the Granville Phillips Convectron Manual that was shipped with the furnace.

Note: When troubleshooting items that require removal of the main enclosure please refer to the pictorial drawing "Final Assembly." Grasp the lid enclosure firmly on both sides and pull it straight up and away from the lid. Disconnect the coolant lines and electrical harness from the lid. Locate the #8-32 socket head set screw that locks the hinge pin to the lid, item 13, and loosen it. Using a pin punch or similar tool drive the hinge pin, item12, out and remove the lid. Remove items 5, 9, 10, 11, and remove the hinge half that is attached to the chamber; finally remove the enclosure, item 4. When installing the hinge pin, position the milled flat so that when driven to final position the flat and set screw are aligned.

Excessive Vacuum Pump Smoke or Excessive Oil Consumption

Typical Causes:

- Assuming that the pump smokes with the vacuum valve closed the leak could be anywhere between the vacuum pump and exhaust valve. Check the line and the connections between the pump and the furnace. Referring to the pictorial drawing "Vacuum Circuit," check each component and connection between the bulkhead fitting, item 1, and the exhaust valve, item 6. If the pump smokes only when the vacuum valve is open check the fittings and the line between the vacuum valve and the hex manifold located underneath the chamber. If necessary additional access to the hex manifold can be obtained by laying the furnace over on the electrical enclosure and removing the access door, item 2, shown on the Frame Assembly pictorial.

- Process program calls for an excessively long purge, or a programming error has opened a gas valve and the vacuum valve at the same time.

Water in Vacuum Pump

Typical Cause

- Leaking exhaust heat exchanger. Referring to the pictorial drawing "Exhaust Circuit," the heat exchanger is item 16. If this part has failed it cannot be repaired and must be replaced.

Possible Causes

- Leaking seals in the view port housing. If it is determined that the view port housing is leaking water into the chamber it should be removed and sent back to SST to be disassembled, checked and rebuilt. Referring to the pictorial drawing "Lid Assembly," remove item 6 screws attaching the housing to the lid, remove the entire view port assembly and send to SST for service.

- Leaking in chamber or lid cooling passages. This condition is rare but can be caused by highly acidic cooling water. If it does occur, the chamber, lid, and view port assembly will all be damaged and must be replaced.

Oil in Chamber

- This condition can only occur if the vacuum pump exhaust line and the chamber exhaust line have been connected together. Please refer to Section 2.2.3 and correct as necessary. The furnace is incorrectly installed.

5.2.2 Pressure Related Problems

Pressure Failure – The chamber cannot hold pressure or cannot reach full pressure.

Typical Causes

- Lid O-ring leaking: Typically, when the lid O-ring leaks under pressure but functions correctly under vacuum, it is an indication that the latching mechanism is out of adjustment. Please refer to 5.3.4 for adjustment procedures.

- Pressure relief valve out of adjustment: Please refer to 5.3.5 for adjustment procedures. Note: If equipped with the N_2/formic acid option, the relief valve is factory set and cannot be adjusted.

- Defective vacuum valve, exhaust valve, or check valves: Referring to the plumbing diagram in Section 6, locate 3SOL, 4SOL, 1CV and 2CV. Any of these components, if defective, will cause a loss of pressure even though the system performs correctly under vacuum. 1CV and 2CV can be easily tested by substituting one for the other. The lines connecting 3SOL and 4SOL to the vacuum pump and to the exhaust can be temporarily disconnected to check for leaks. These components can be found on pictorial drawings, "GAS 1 & GAS 2 Circuit," "Exhaust Circuit," and "Vacuum Circuit."

5.2.3 Cooling System Problems

Water Leaking – Water leaks from underneath the lid cover and inside the furnace enclosure.

Typical Cause

- Coolant temperature entering furnace is below the dew point temperature in the facility causing condensation. This condition if ignored will cause damage to the furnace system.

Water Leaking – Water leaks from underneath the lid cover but not inside the machine enclosure.

Typical Cause

- O-ring seals between lid and view port housing are defective. Refer to section 5.4. Item 23 O-ring(s) shown on the "Lid Assembly" pictorial drawing must be replaced.

Water Leaking – Water leaks from inside furnace enclosure.

Typical Causes

- Leaking fittings, tubing, or exhaust heat exchanger. Remove the furnace enclosure and check each connection and tube with the cooling water flowing. Pay particular attention to dried water stains, or rust spots on the chassis to help in locating the leak. Refer to the pictorial drawing "Cooling System" to identify replacement parts.

5.2.4 Alarms

The alarm system on the Model 1200 is simplistic in design, providing one output for two possible fault conditions. It is important to understand how the system works so that the operator or technician can quickly determine what is wrong.

- The cooling system contains a flow switch that detects if water is flowing through the system. If the cooling water is interrupted, or the switch fails, the alarm will sound and the process will stop.

- The lid latching mechanism uses two switches wired in series to determine if the latch has fully engaged the strike assembly. If one of the switches fails or if the latch does not fully engage the strike pin, the process will not initiate when the start button is pressed and the alarm will sound.

Typical Causes - Coolant Related

- Defective water flow switch. Referring to the plumbing diagram in Section 6, locate 1FLW; item 7, on pictorial drawing "Cooling System."

- Insufficient or no water flow. Determine if water is being delivered to and returned from the furnace at the proper pressure and flow as specified in Section 1.3.7.

Typical Causes – Lid Related

- Lid latching mechanism incorrectly adjusted. Refer to Section 5.2.3.

- Foreign object left on chamber sealing flange. The chamber and lid when properly adjusted fit so close together that even a piece of paper or small piece of tape will prevent the latches from fully engaging the strike pins.

- Defective lid latch switch. Referring to the "Chamber Assembly" pictorial drawing, locate item 23. The switches cannot be adjusted; if inoperable for any reason they must be replaced.

Danger! The lid latch switches are absolutely essential to ensure that the lid is fully locked before pressure can be applied. Do not defeat, modify or replace either switch with anything except SST # 35256. Partially engaged latches could allow the lid to open under pressure, causing serious injury.

5.2.5 Heat Related Problems

No Heat – Temperature does not increase when program calls for heat.

Typical Causes

- Failed heating element. Refer to 5.3.1 and replace the element.

- Blown fuse. Check 3FU.

- Blown fuse. Check 1FU, 110-volt models, 1&2FU, 220-volt models. See fuse table in Section 6 for fuse type and rating.

- Defective solid-state power relay. Check 1SSR.

- Defective control relay. Check 1CR.

- Insufficient vacuum, 220-volt models only. Refer to 5.2.1.

Continuous Heating – Temperature continues to increase past temperature setpoint.

Typical Causes

- PID parameters improperly adjusted. See "Manual Tuning Procedure" on page 3.5 of Series F4 User's manual.

- Short-circuit on solid state power relay. Check 1SSR.

Inaccurate Temperature Control

Typical Causes

- Control thermocouple not making good contact with target plate.

- PID parameters improperly adjusted. See "Manual Tuning Procedure" on page 3.5 of Series F4 User's Manual.

5.2.6 Lid Lock Assist Failure

The lid lock assist employs two switches that are used to detect the lid handle position and to signal the control system at appropriate times to initiate either a vacuum, exhaust, or a backfill sequence. Referring to pictorial drawing "Lid Assembly," locate item 24. The up switch is located to the right of the down switch, when either of the switches fails the following symptoms will be observed:

Up Position Switch Failure

- Switch fails in the open position: System will not perform a backfill sequence after pressing the lid switch.

- Switch fails in the closed position: System performs a continuous backfill sequence after pressing the lid switch.

Down Position Switch Failure

- Switch fails in the open position: System will not initiate vacuum after pressing the lid switch.

- Switch fails in the closed position: System will not release vacuum after pressing the lid switch.

5.3 Repairs and Adjustments

5.3.1 Heating Element Replacement

- Referring to the pictorial drawing "Chamber Assembly" in Section 5.4, remove 4 flat head slotted screws, item 10, and the radiation shield, item 2, from the chamber. Remove two insulators, two hex nuts, two washers, and the old heating element, items 37, 11, 12, and 3 from the chamber. If the chamber needs cleaning, remove the insulator rods, element supports, insulator sleeves, and the lower radiation shield, items 4, 6, 21, and 18. Clean the chamber as required and reinstall the parts in the reverse order that they were removed. Be very careful with the new element and keep it supported while lowering it over the electrodes. When tightening the

hex nuts turn them firmly until resistance is felt using a nut driver and then stop, this compresses the electrode springs to the correct height and tension.

- Cycle the furnace to operating temperature several times and verify that heating rates are as expected for the selected profile.

- Procedure complete.

5.3.2 Thermocouple Replacement, SST #35229

- Run a vacuum leak down check and record the change in vacuum level over a 5-minute period starting from the lowest reading that the furnace can obtain.

- Referring to the pictorial drawing " Thermocouple Installation" in Section 5.4, hold the TC sealing plug, item 1, with one wrench and loosen the lock nut and TC sealing screw, items 3 and 4, with a second wrench. Remove the TC sealing screw, lock nut, thermocouple, and O-ring from the chamber. Slide the TC sealing screw, lock nut, and a new O-ring, item 2, onto the new thermocouple and reinstall in the reverse order of removal. Tighten the sealing screw carefully until the O-ring grips the TC shaft and locks it in place. When properly tightened the TC will rotate easily, but will not slide in the fitting; if the sealing screw is too tight the O-ring and TC can be damaged. Tighten the locknut with a wrench, making sure that the sealing screw remains stationary. If the TC sealing plug, item 1, turns at any time during removal or installation of the TC it should be completely removed from the chamber, cleaned and resealed with SST # 33643 thread sealant.

- Repeat the vacuum leak down check and verify that the TC installation has not affected vacuum integrity.

- Select a familiar profile and run the furnace observing that the temperature control system is working correctly.

- Note: If the machine is equipped with the MT-2 option a small ceramic bead is to be installed on the control thermocouple as a visual aid in distinguishing it from either of the reference thermocouples. Install the bead about two inches from the end of the thermocouple and bend the thermocouple shaft slightly as required to retain the bead in place. Three additional beads were shipped with the MT-2 option; if additional beads are required they can be ordered directly from SST, (P/N 35378).

- Procedure complete.

5.3.3 Lid O-Ring Replacement, SST #35164

- Remove the old O-ring using an O-ring pick or similar tool. Do not allow hardened steel tools to gouge or scratch the dovetail groove.

- Unpack the replacement O-ring. Before starting the installation process it is helpful to lay the O-ring on a table and mark it with a felt tip pen at two evenly spaced points. Pull the O-ring into two parallel strands while marking at each midpoint.

- Begin the installation by "tacking" the O-ring to the front and rear groove at the midpoints of the groove and the O-ring. Pull the O-ring to either side of the lid and locate the midpoint. "Tack" this point to the midpoint of the side groove(s).

- The O-ring must be evenly distributed around the groove with no twist. Continue "tacking" at several additional points before completing the installation. Cycle the O-ring through several evacuations and then adjust the lid latches, if necessary, per 5.3.4.

- Run a vacuum leak down and pressure check to verify integrity.

- Procedure complete.

5.3.4 Lid Latch Adjustment Procedure

- Remove the furnace enclosure. Referring to pictorial drawing "Chamber Assembly," locate item 19, attach bolts and loosen them so that the strike assemblies, items 7 and 24, on both sides of the chamber can be moved. With the lid in the open position observe that by rotating item 20 adjustment plate about item 9 dowel pin, the strike assemblies change position, thereby controlling the gap between lid and chamber in the closed position. Close the lid and push the handle down. Allow the furnace to reach full vacuum before performing the following adjustment procedures.

- With the furnace at full vacuum the lid handle should automatically slide forward into the locking position. If it does not slide, turn items 8 and 20 adjustment plates on both sides of the chamber such that the handle slides fully in and out of the locking position.

- Turn item 20 adjustment plate on the left side of the chamber until resistance is felt, at this setting the clearance between the latch and strike pin should be zero. Lightly tighten the attach bolts and test the adjustment by pulling up on the lid handle and sliding it forward. Repeat this procedure several times, fine tuning the adjustment until the clearance in the latching mechanism is virtually zero and the handle can

be pulled back without interference. Securely tighten the attach bolts and repeat the procedure on the right side latch.

- Before reinstalling the enclosure, cycle the system several times to make sure that the latch functions correctly and that vacuum leak down and pressure integrity are within acceptable performance limits.

- If the lid O-ring is more than a year old it would be wise to replace it before proceeding with the adjustment procedure. Please refer above to 5.3.3.

5.3.5 Pressure Relief Valve Adjustment Procedure (N/A With Formic Acid)

- Referring to the plumbing diagram in Section 6, the relief valve identifier is "1PR." Remove the furnace enclosure. Referring to the Exhaust Circuit pictorial drawing locate item 13, relief valve. Set the regulator on the GAS 1 circuit to 50 psig (3.52 kg/cm^2), open up the flow meter to 100%, and pressurize the chamber.

- If the compound gage reads 50 psig (3.52 kg/cm^2), and gas is not escaping through the relief valve - Stop! The relief pressure is set too high. Pull up on the knob to unlock and turn in a counterclockwise direction to reduce pressure; continue turning until the chamber pressure is reduced to less than 40 psig (2.82 kg/cm^2).

- Increase the setting on the GAS 1 regulator to 60 psig (4.22 kg/cm^2) and then slowly adjust the relief valve until the chamber reaches a pressure of 50 psig (3.52 kg/cm^2) or less.

- Referring back to the initial pressurization, if the compound gage will not reach 50 psig (3.52 kg.cm^2) the relief valve is set too low. In this case set the GAS 1 regulator to 60 psig (4.22 kg/cm^2) and adjust as previously described. Push in on the relief valve knob to lock the setting.

Danger! The pressure relief valve is absolutely essential to protect against an accidental over pressure condition. Do not modify or replace the pressure relief valve with anything other than SST #35093 (SST #35405 W/Formic Acid). Do not set the pressure relief valve to a pressure greater than 50 psig (3.52 kg/cm^2). Pressures in excess of the design rating of the containment vessel may cause an explosion that can cause serious injury or death.

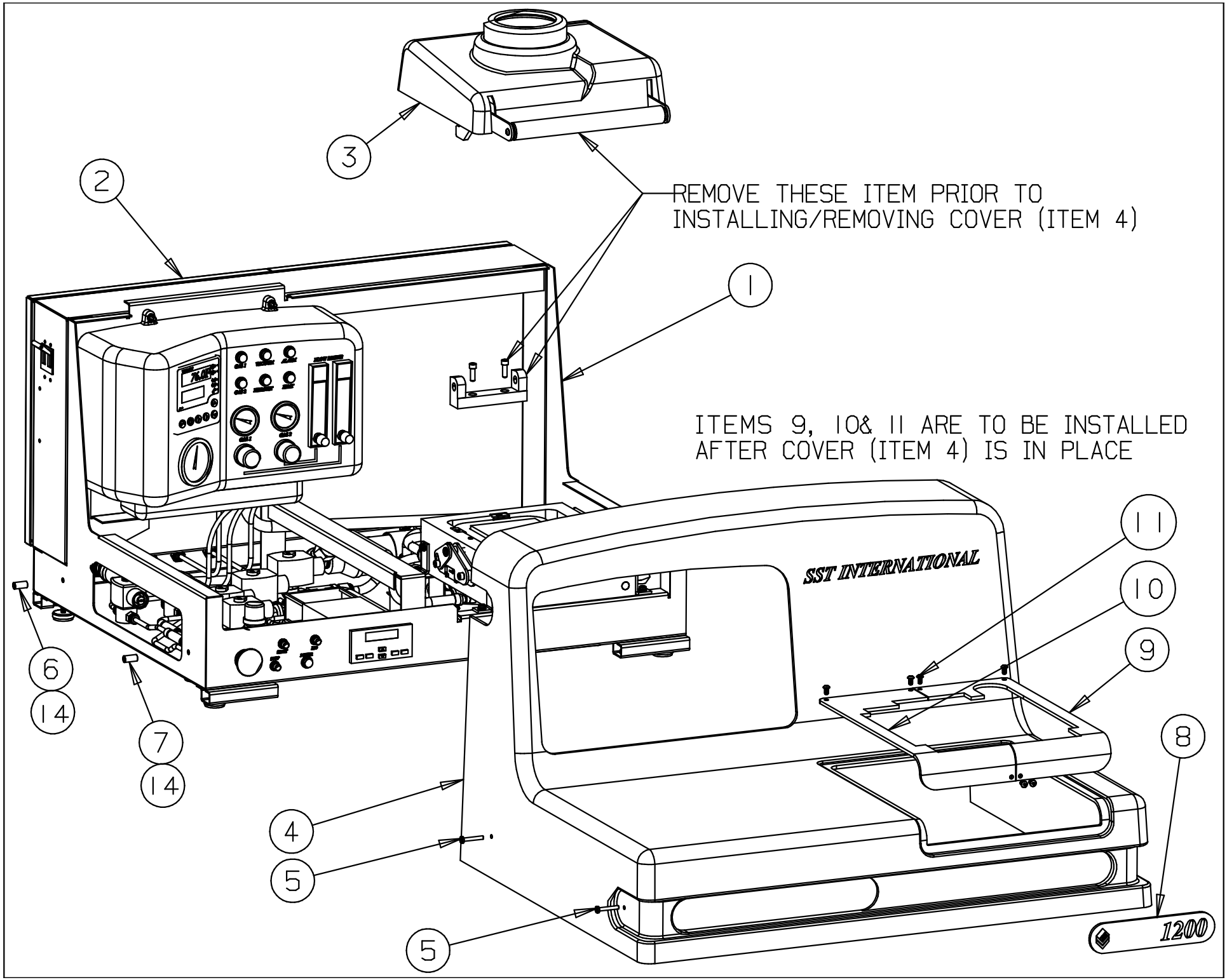
5.4 Illustrated Parts Manual

The Illustrated Parts Manual is divided into installation drawings that show how subassemblies and subsystems are installed into the furnace, and into assembly drawings that show how the various parts go together to form a subassembly. This method of presentation illustrates every replaceable component in the 1200 Table-Top soldering furnace and shows where it can be found. Please refer to this section when necessary to identify and to order replacement parts. Note: If equipped with the N_2/formic acid option, some of the parts are not interchangeable. Please refer to Addendum 1 in Section 7 of this manual for applicable replacement part information.

Contents:

5.4.1 FINAL ASSEMBLY

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35154	ASSY, MECH, MODEL 1200	1
2	35156	ELECTRICAL SYSTEM INST'L, 220VAC	1
2	35156-110	ELECTRICAL SYSTEM INST'L, 110VAC	1
3	35161	LID ASSEMBLY, MODEL 1200	1
4	35333	ASSY, COVER, 1200 SERIES	1
5	32651-10	SCREW, BUT HD, #10-32 X .75 SSTL	4
6	35323-02	SPACER, COVER, 1.56" LONG	2
7	35323-01	SPACER, COVER, 1.13" LONG	2
8	35081	NAMEPLATE, 1200 SERIES	1
9	35119	INSERT, COVER, RH	1
10	35120	INSERT, COVER, LH	1
11	32651-07	SCREW, BUT HD, #8-32 X .75 SSTL	6
12	35271	SHAFT, LID HINGE	1
13	32375	SOC SET SCREW, #8-32 X 1/4"	1
14	23-3290	SOC SET SCREW, #10-32 X 1.0"	4


3
2
REMOVE THESE ITEM PRIOR TO
INSTALLING/REMOVING COVER (ITEM 4)
1
ITEMS 9, 10& 11 ARE TO BE INSTALLED
AFTER COVER (ITEM 4) IS IN PLACE
11
10
9
8
SST INTERNATIONAL
6
14
7
14
4
5
5
1200

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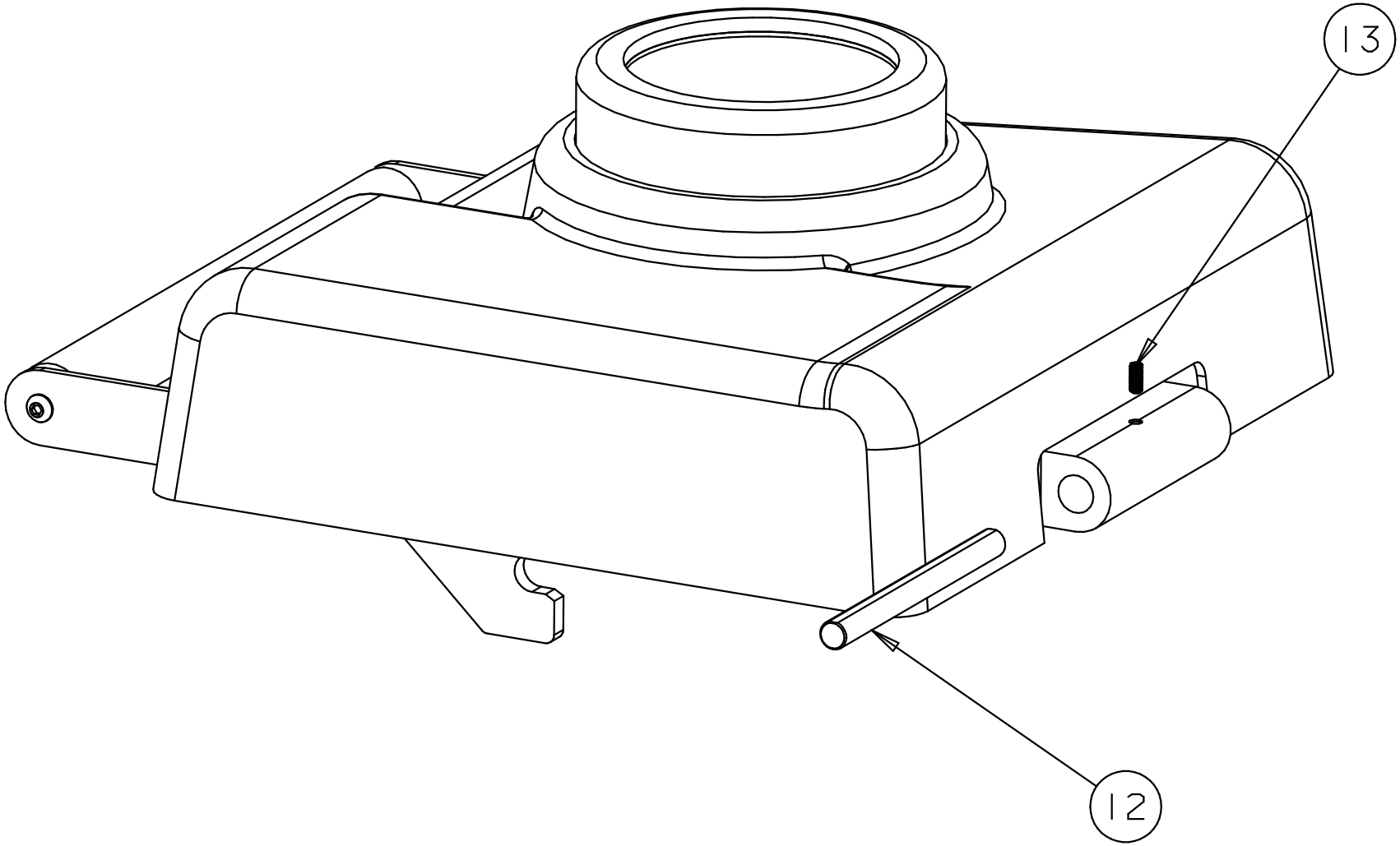
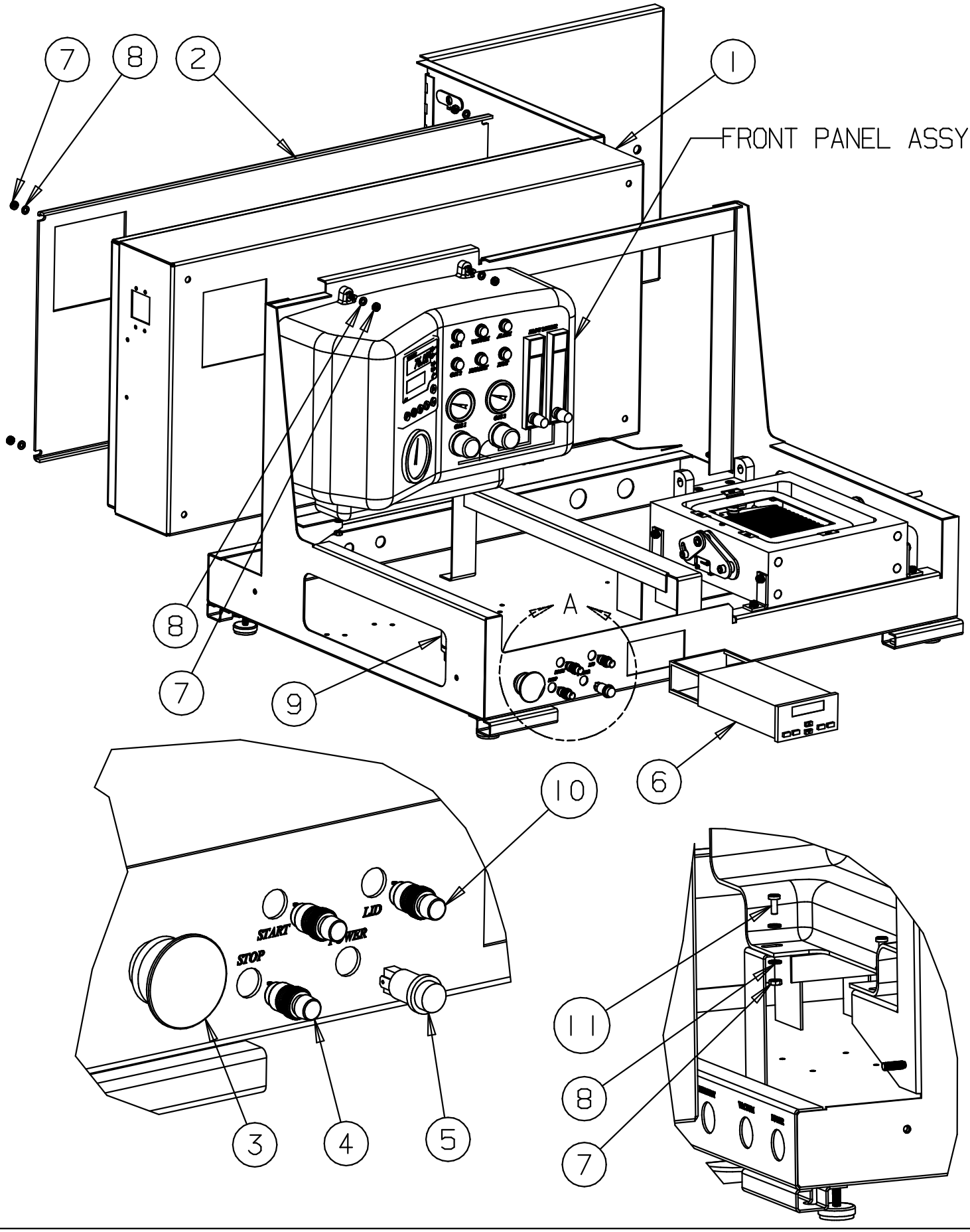

13
12

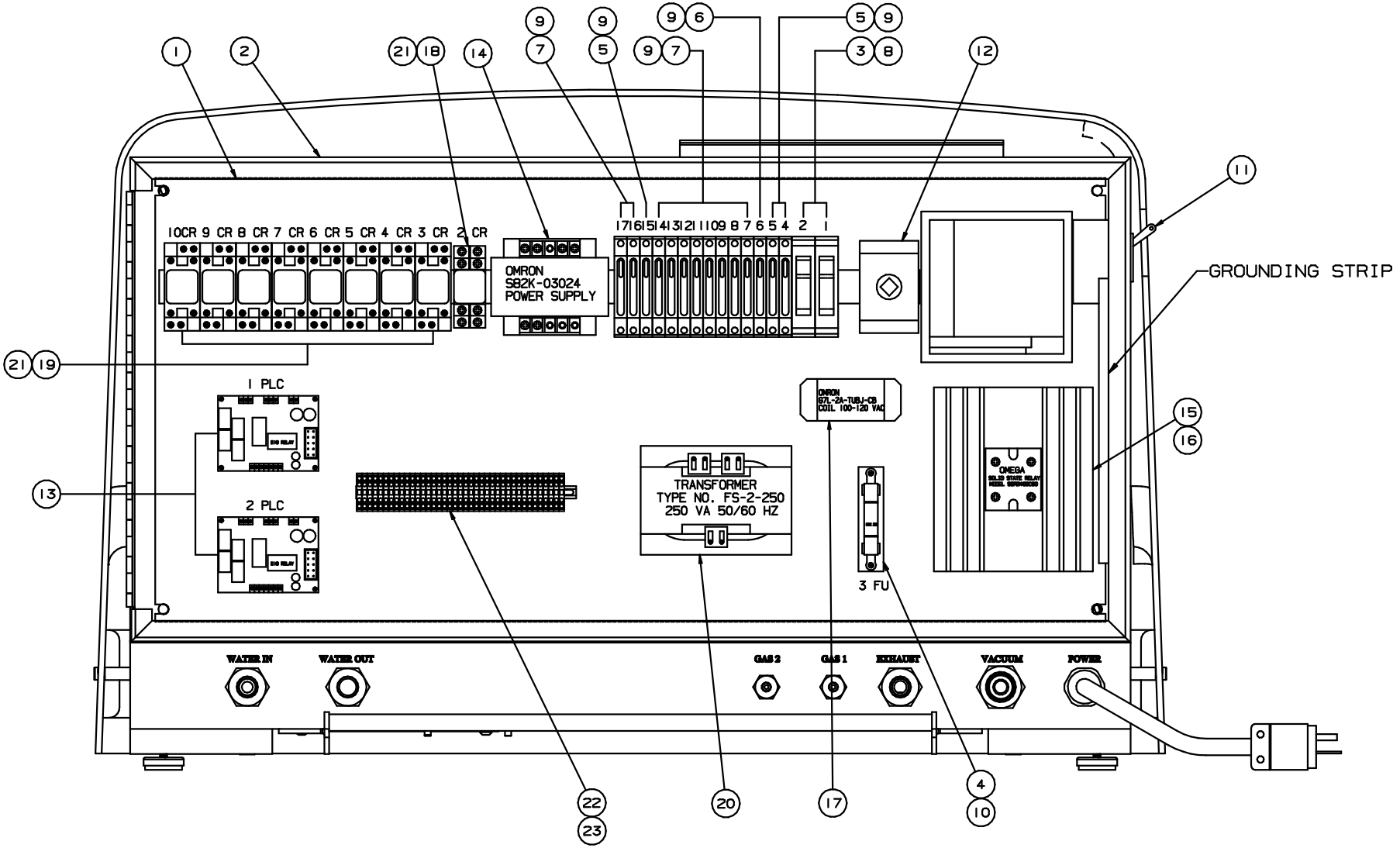
5.4.2 CONTROL SYSTEM INSTALLATION

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35079	W/A ENCLOSURE BOX	1
2	35118	PANEL, ELEC. BOX	1
3	22-1490-1	PUSH BUTTON ACTUATOR, EMER	1
4	12-0180	SWITCH, RED PUSH BUTTON	1
5	22-3420	GREEN LIGHT IDI 1052QC5	1
6	35276	DIGITAL VACUUM GAGE	1
7	30032	NUT, HEX, #10-32	12
8	33577-01	WASHER, FLAT, #10	14
9	500-A212	SONALERT #SC110	1
10	12-0190	SWITCH, BLACK PUSH BUTTON	2
11	32653-03	SCREW, PAN HD, #10-32 X .50	2


7
8
2
1
FRONT PANEL ASSY
8
7
9
A
6
10
LID
START
POWER
STOP
3
4
5
11
8
7

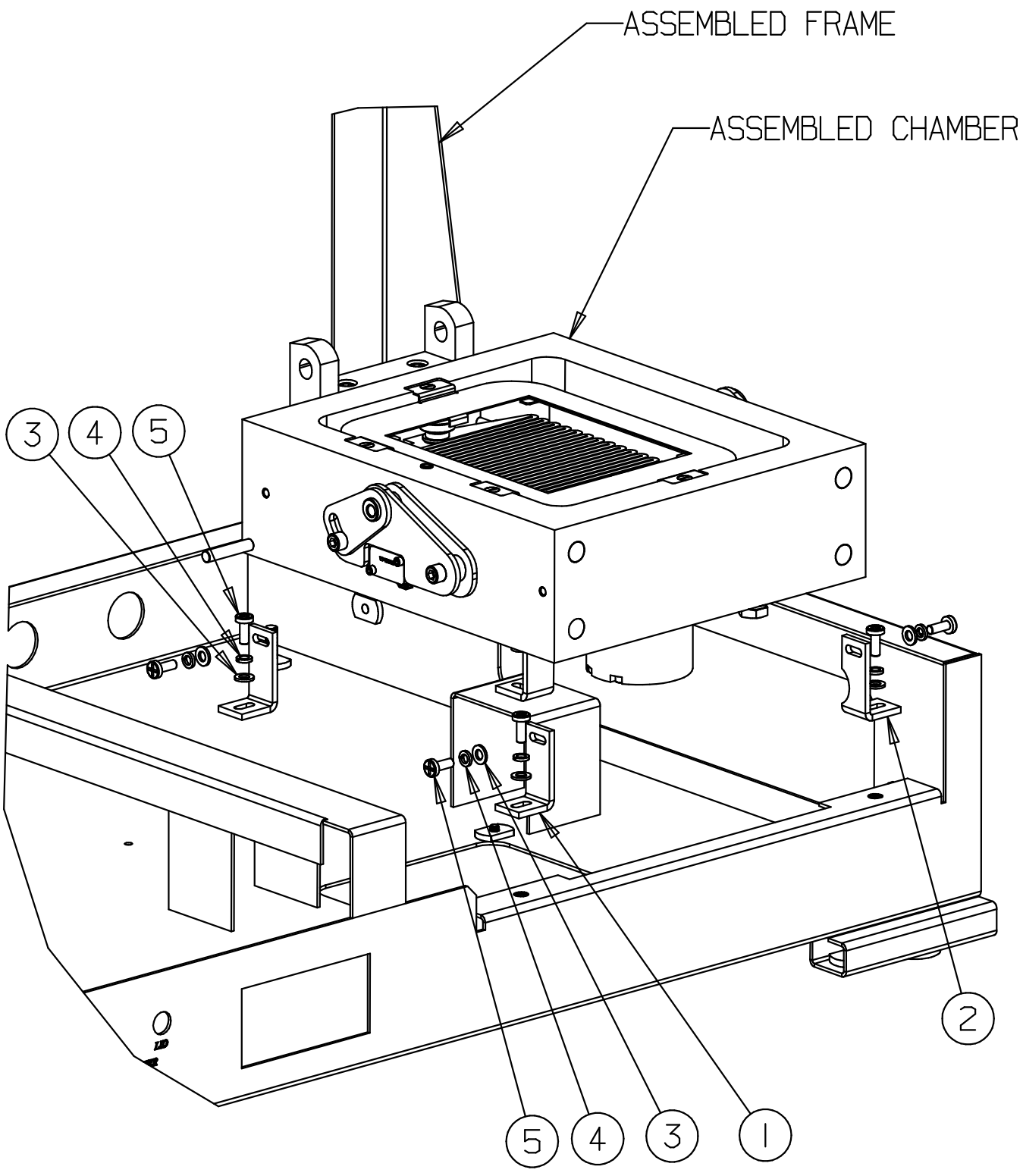
5.4.3 ELECTRICAL SYSTEM INSTALLATION

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35118	PANEL, ELEC. BOX	1
2	35079	W/A ENCLOSURE BOX	1
3	31741-25	FUSE, MIDGET, 600V, 25A (110V)	1
3	31741-15	FUSE, MIDGET, 600V, 15A (220V)	2
4	35170	FUSE, 25A 240VAC KAX-25	1
5	12-1820	FUSE, AGC, 1-1/2A 230 VAC 110,120V	1,3
6	12-1830	FUSE AGC, 3A 230 VAC	1
7	12-1810	FUSE AGC, 1/2A 230 VAC	10
8	22-3640	TERMINAL BLOCK, FUSE 10mm (110V)	1
8	22-3640	TERMINAL BLOCK, FUSE 10mm (220V)	2
9	22-3650	TERMINAL BLOCK, FUSE 6mm (110V)	12
9	22-3650	TERMINAL BLOCK, FUSE 6mm (220V)	14
10	35171	FUSE BLOCK, BUSS 4386	1
11	35339	MAG CKT BRKR 250VAC 30A (110V)	1
11	35173	MAG CKT BRKR 250VAC 20A (220V)	1
12	35340	DISC SW 600VAC 32A (110V)	1
12	35174	DISC SW 600VAC 25A (220V)	1
13-A	35175-1PLC	PLC CONF/TEST 1PLC	1
13-B	35175-2PLC	PLC CONF/TEST 2PLC	1
14	35176	POWER SUPPLY 24VDC 30W	1
15	35177	SSR 240VAC 25A	1
16	35178	HEAT SINK FHS-2	1
17	35179	RELAY DPST NO 25A 120VAC	1
18	34408	RELAY DPDT MINI 10A 120V	1
19	31769	RELAY DPDT MINI 10A 24DC	8
20	35180	XFRMR 240/480:110V 250W (220V ONLY)	1
21	31770	SOCKET, MINI RELAY DPDT	9
22	22-3670	TERMINAL BLK,MT1,5-QUATRO	40
23	22-3730	BRIDGE BAR FBRN 10-4 N	4


10CR 9 CR 8 CR 7 CR 6 CR 5 CR 4 CR 3 CR 2 CR
17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
OMRON
S82K-03024
POWER SUPPLY
GROUNDING STRIP
1 PLC
2 PLC
TRANSFORMER
TYPE NO. FS-2-250
250 VA 50/60 HZ
3 FU
OMRON
G7L-2A-TUBJ-CB
COIL 100-120 VAC
OMEGA
WATER IN
WATER OUT
GAS 2
GAS 1
EXHAUST
VACUUM
POWER

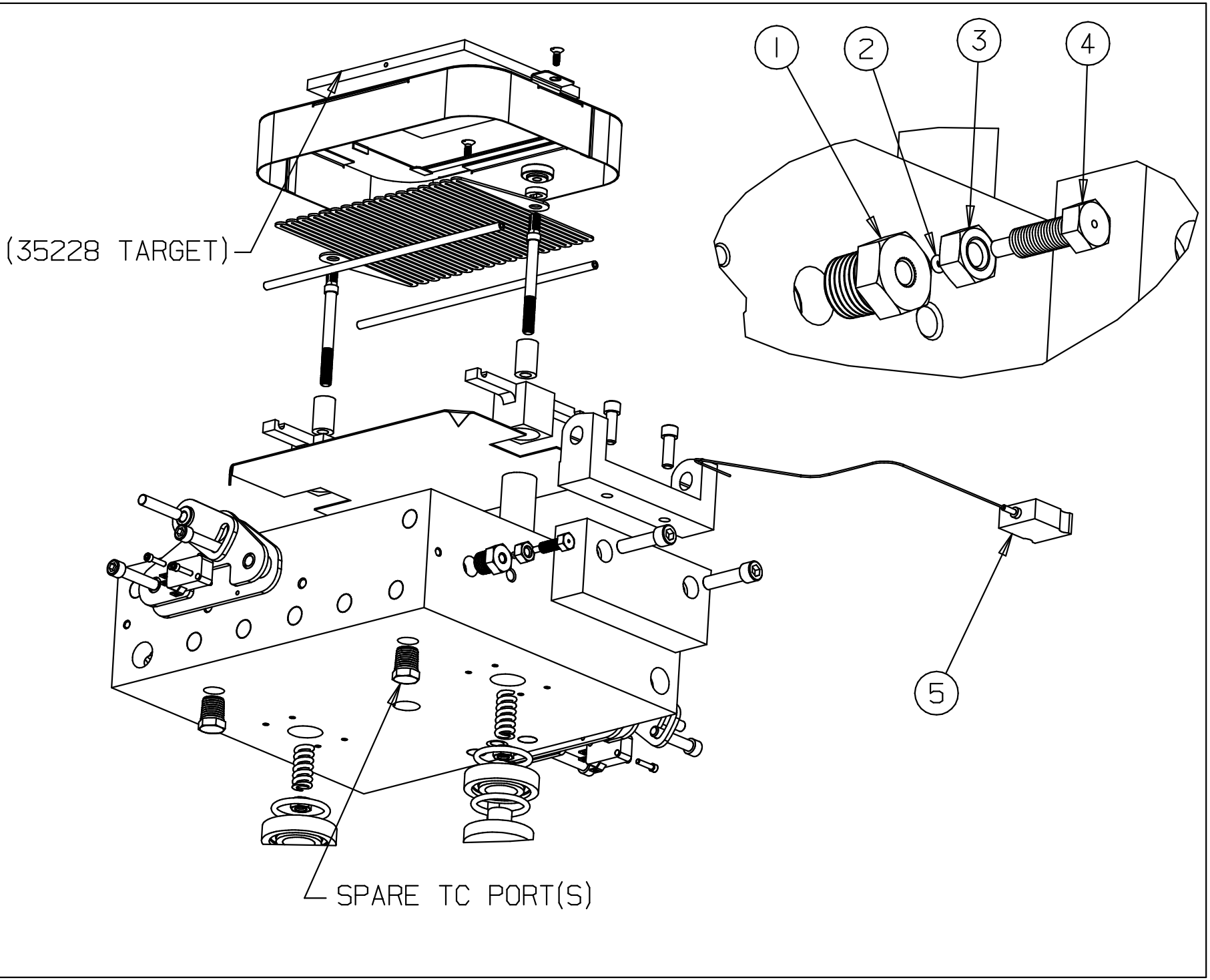
5.4.4 CHAMBER INSTALLATION

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35138	BRACKET, CHMBR, HOLD DOWN	3
2	35216	BRACKET, MODIFIED	1
3	32653-03	SCREW, PAN HD, #10-32 X .50	8
4	33577-01	WASHER, FLAT, #10	8
5	31803-06	WASHER, LOCK, #10	8


ASSEMBLED FRAME
ASSEMBLED CHAMBER
3
4
5
2
5
4
3
1

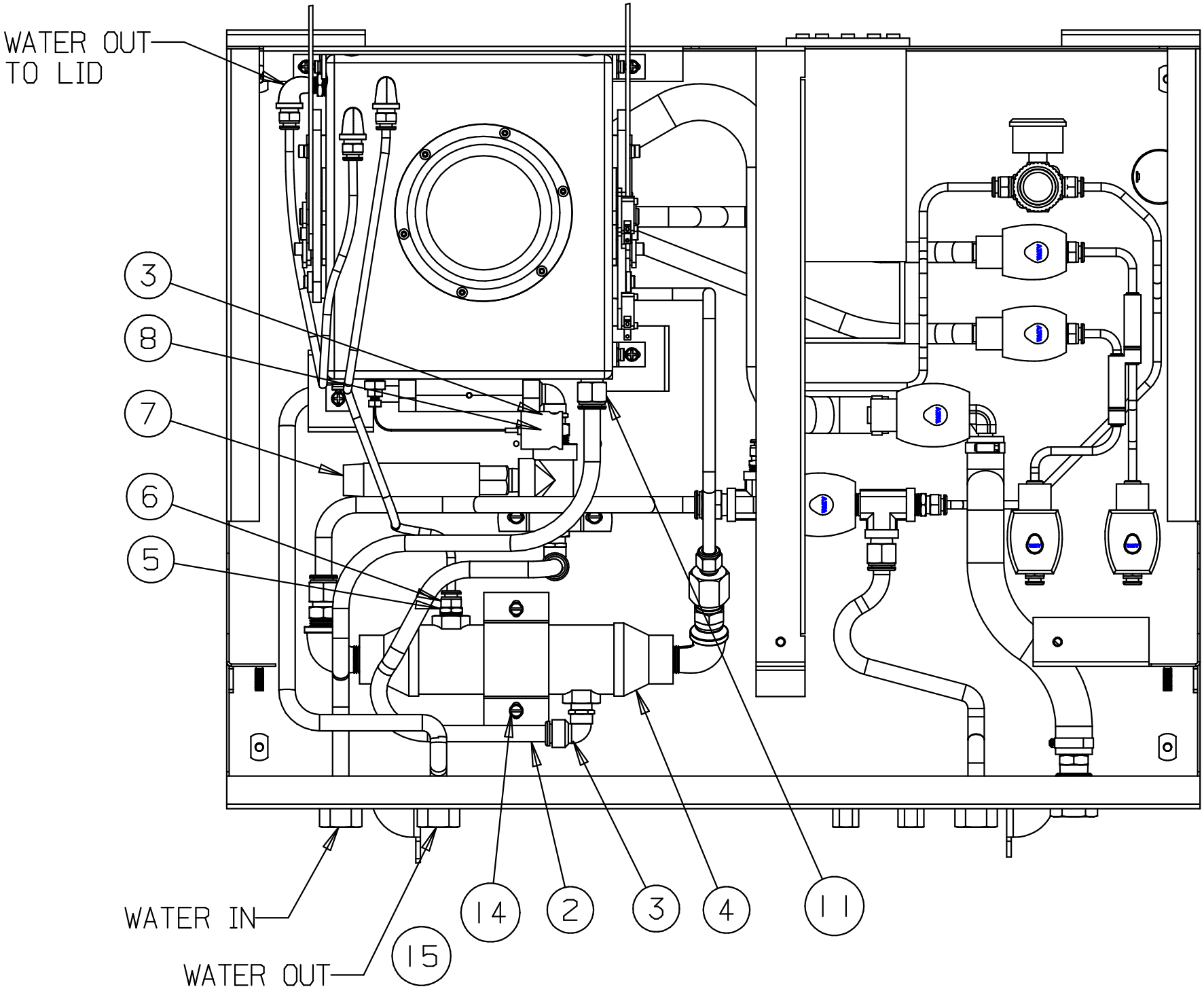
5.4.5 THERMOCOUPLE INSTALLATION

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35238	PLUG, MODIFIED, TC SEALING	1
2	35239	O-RING, 2-002, BUNA N	1
3	31515-02	NUT, HEX, 1/4-20	1
4	35237	SCREW, TC SEALING	1
5	35229	TC, UNG "K", .040 DIA X 12	1


(35228 TARGET)
1
2
3
4
5
SPARE TC PORT(S)

5.4.6 COOLING SYSTEM INSTALLATION

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35087	BULKHEAD 3/8NPT X 1/2 TUBE PUSHON	2
2	35086	TUBE, POLY, 1/2 OD	A/R
3	35089	ELBOW, 3/8NPT X 1/2 TUBE PUSHON	3
4	35091	HEAT EXCHANGER	1
5	23-4380	REDUCER, 3/8NPT X 1/4 NPT	2
6	31367	CONN, 1/4NPT X 1/4 TUBE PUSHON	4
7	35332	ASSY, 1GPM FLOW SWITCH, 120VAC	1
8	31499	REDUCER, 1/2NPT X 3/8NPT	2
9	31497	ELBOW, STREET, 1/4NPT, BRASS	3
10	31370	TUBE, POLY, 1/4 OD	A/R
11	35088	CONN, 3/8NPT X 1/2 TUBE PUSHON	1
12	35269	BRACKET, HEAT EXCHANGER	1
13	(STD CONDUIT)	BRACKET, FLOW SWITCH	2
14	32653-03	SCREW, PAN HD, #10-32 X 1/2"	6
15	33577-01	WASHER, FLAT, #10	6


WATER OUT
TO LID
3
8
7
6
5
WATER IN
WATER OUT
15
14
2
3
4
11

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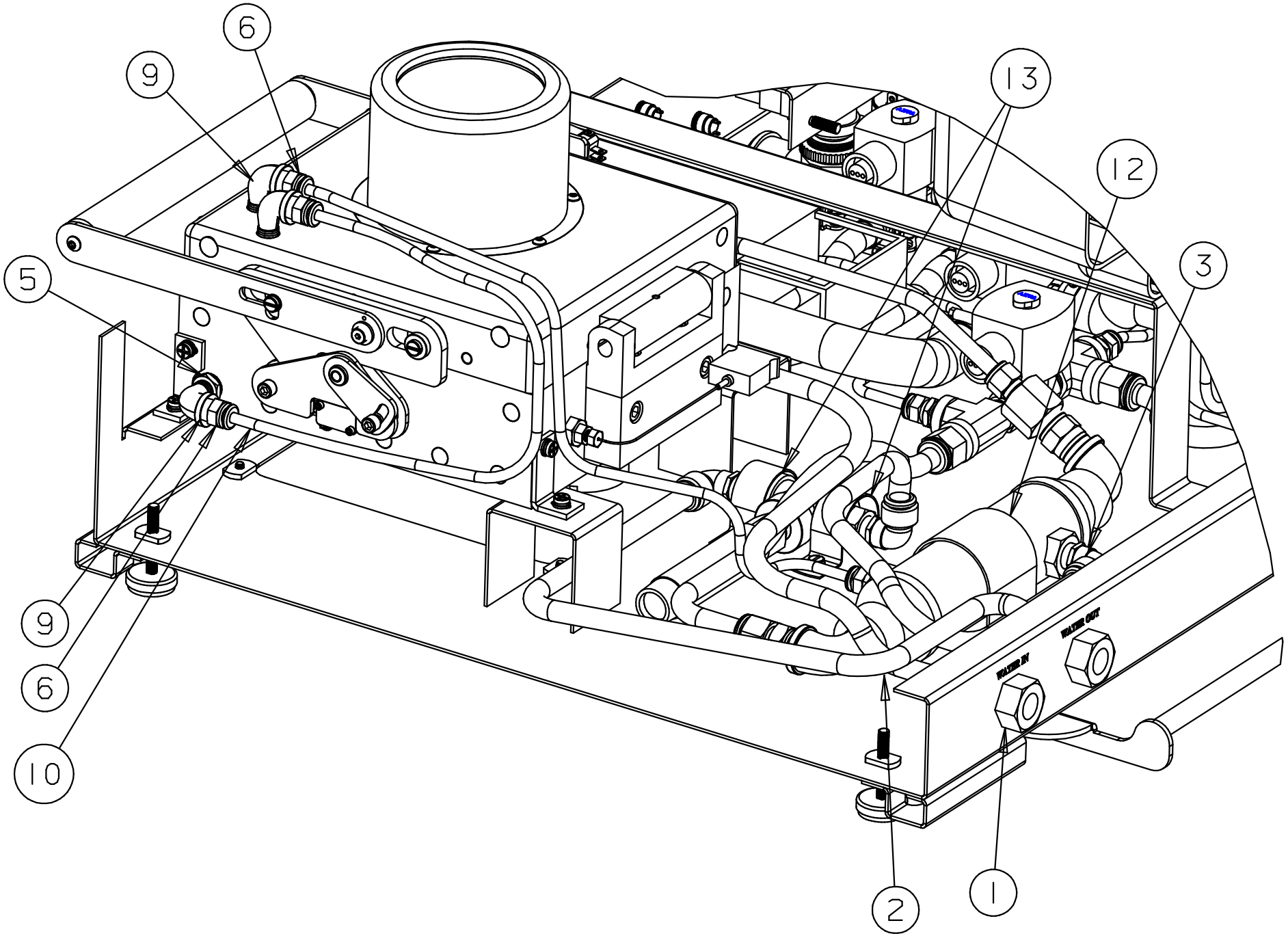
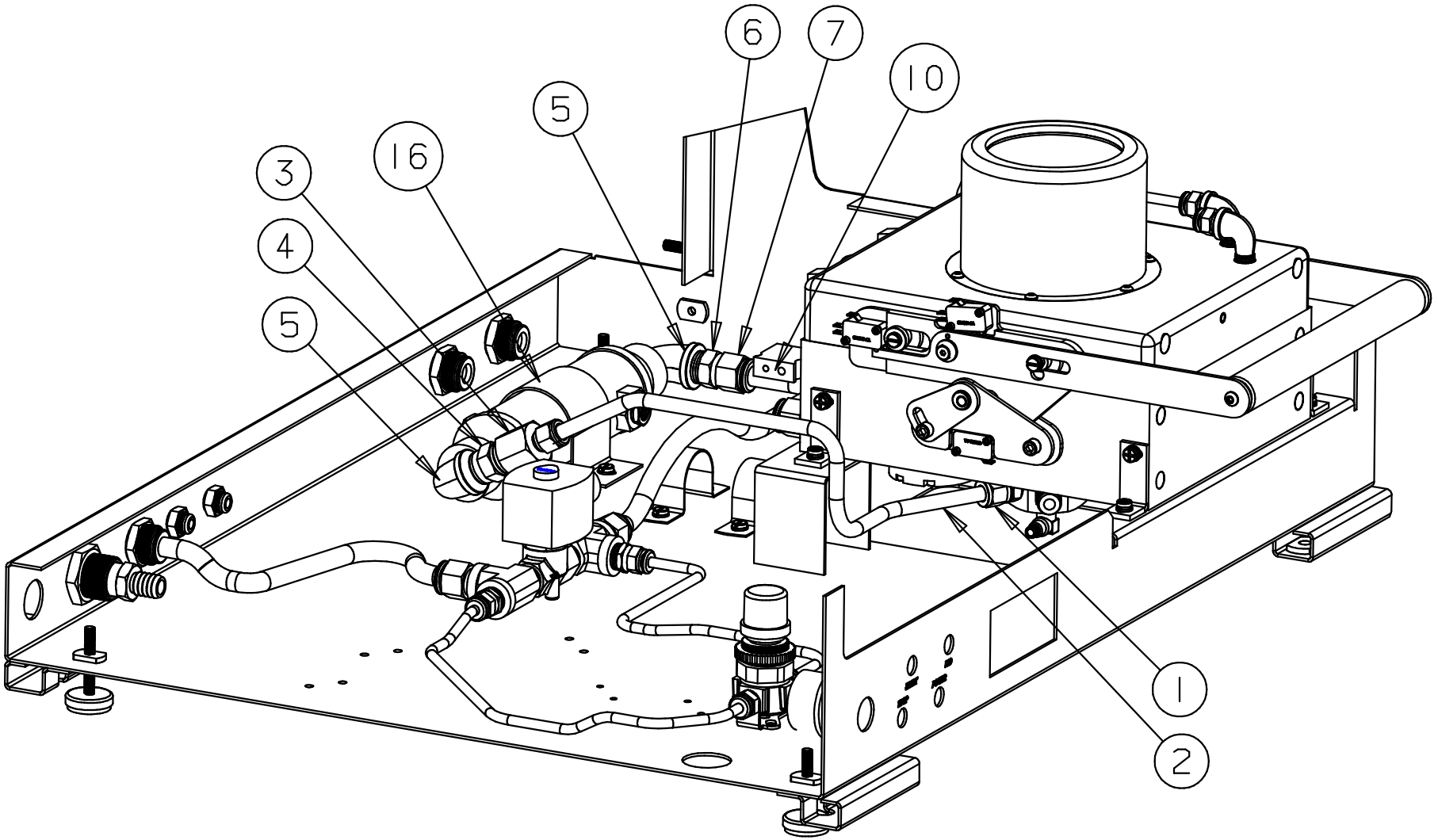

6
9
13
12
3
5
9
6
10
2
1
WATER IN
WATER OUT

5.4.7 EXHAUST CIRCUIT INSTALLATION

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	13-0330	CONN, 1/4NPT X 3/8 TUBE	1
2	13-1000	TUBE, 3/8 OD SOFT COPPER	A/R
3	13-1760	CONN, 1/2NPT X 3/8 TUBE (B-600-7-8)	1
4	35236	VALVE, CHECK, #2232B-4-MM-1	1
5	31498	ELBOW, STREET, 1/2 NPT	2
6	31499	REDUCER, 1/2NPT X 3/8NPT	1
7	35088	CONN, 3/8NPT X 1/2 TUBE PUSHON	3
8	35267	TEE, STREET, 3/8NPT, PARKER #2225P-6	2
9	35096	VALVE, SOL, 2WAY, 8263G206	1
10	35086	TUBING, 1/2 OD POLY	A/R
11	35087	B'HEAD, 3/8NPT X 1/2 TUBE PUSHON	1
12	31367	CONN, 1/4NPT X 1/4 TUBE PUSHON	4
13	35093	VALVE, RELIEF, V07-200-NNKA	1
14	33235	TUBING, 1/4 OD POLY	A/R
15	23-4380	REDUCER, 3/8NPT X 1/4NPT	2
16	35091	HEAT EXCHANGER, 9222-3-7	1


6
7
10
5
16
3
4
5
1
2

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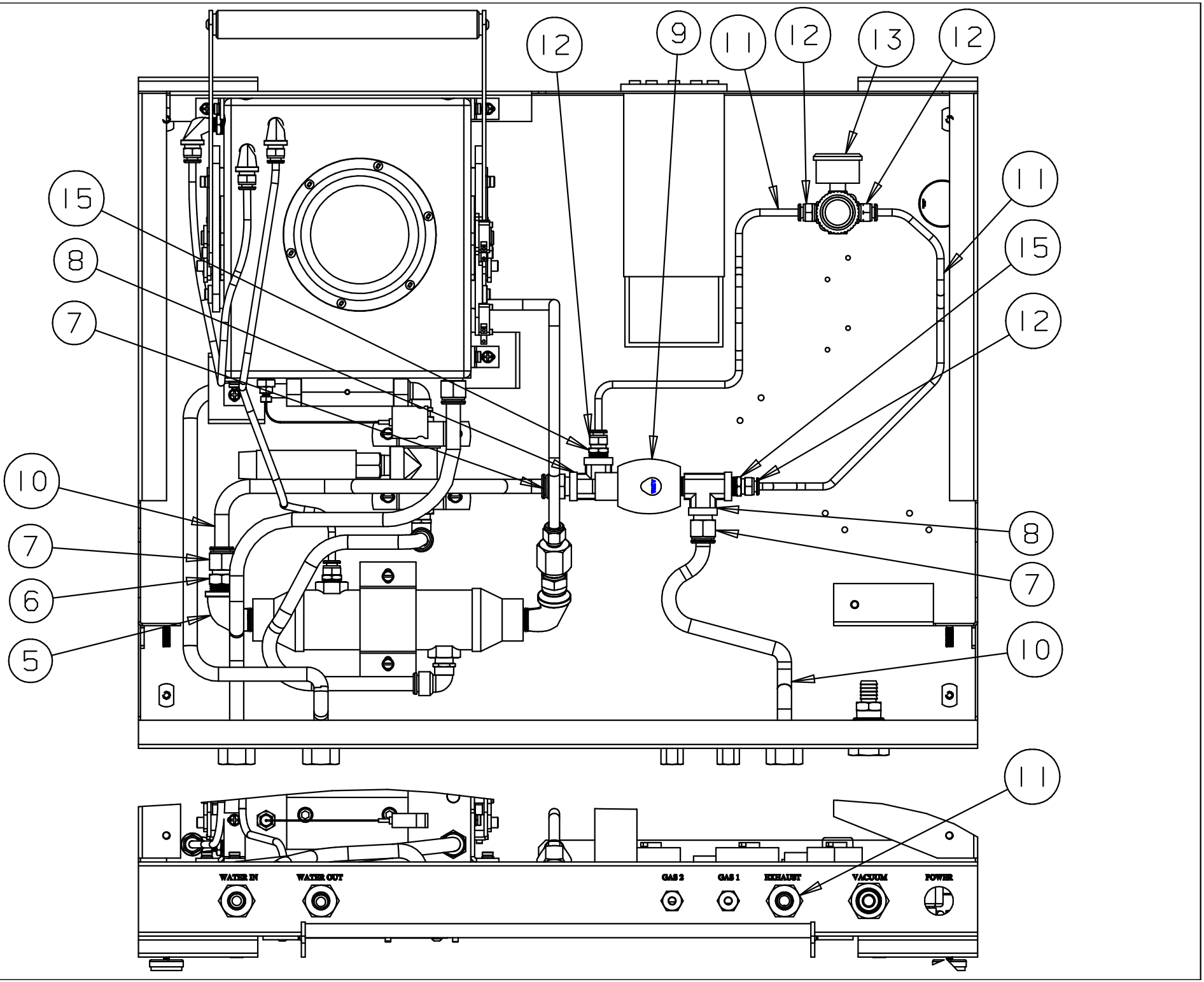
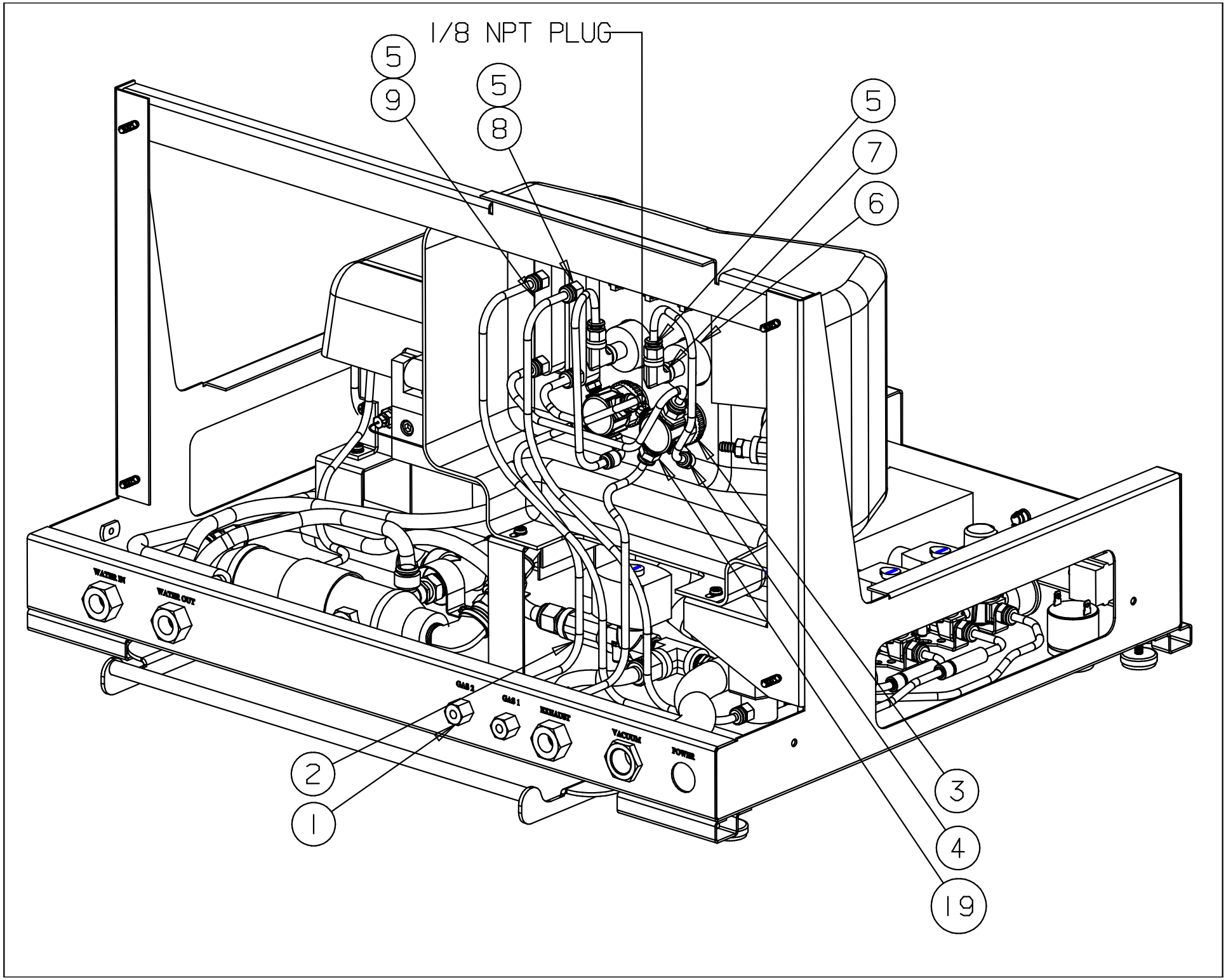
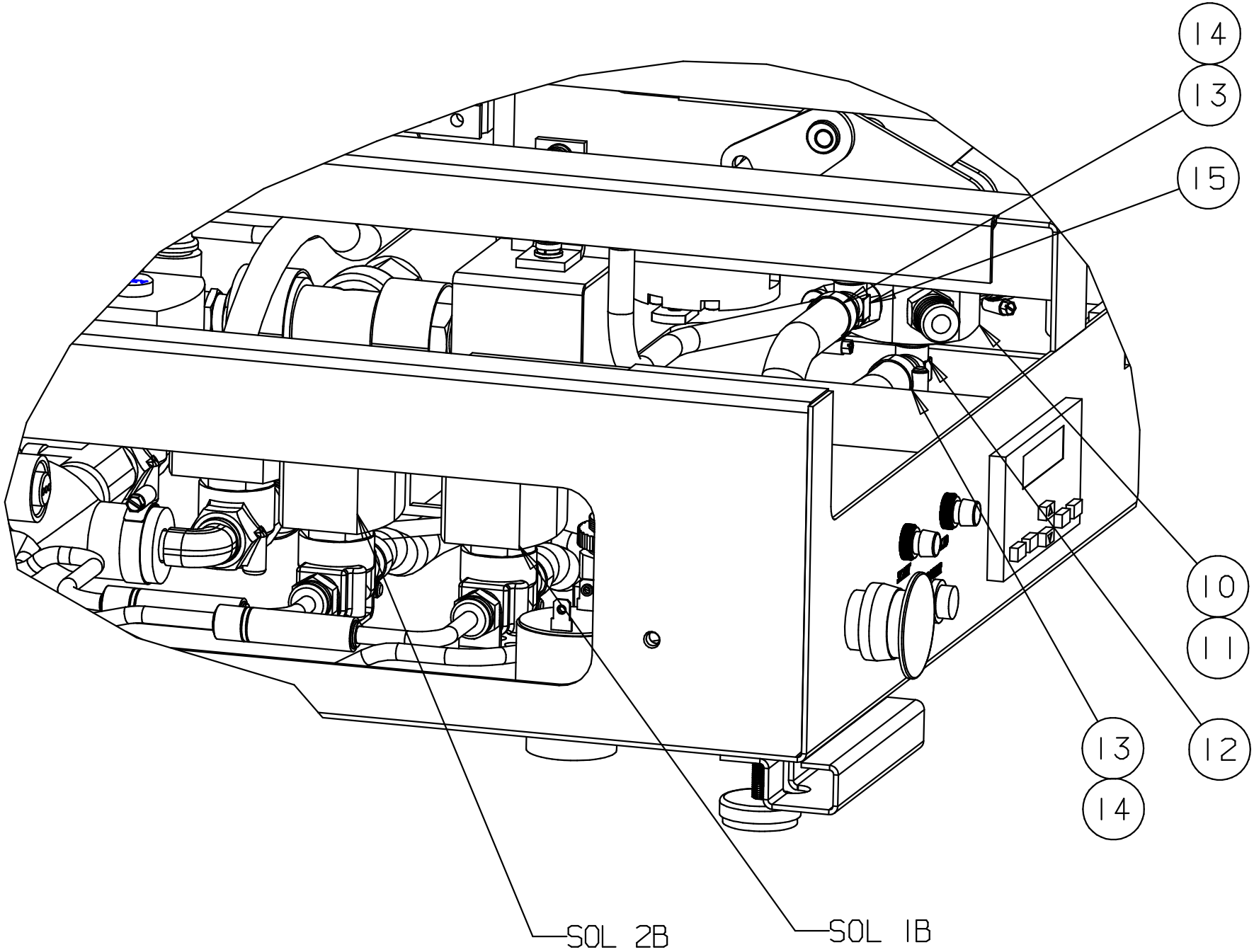
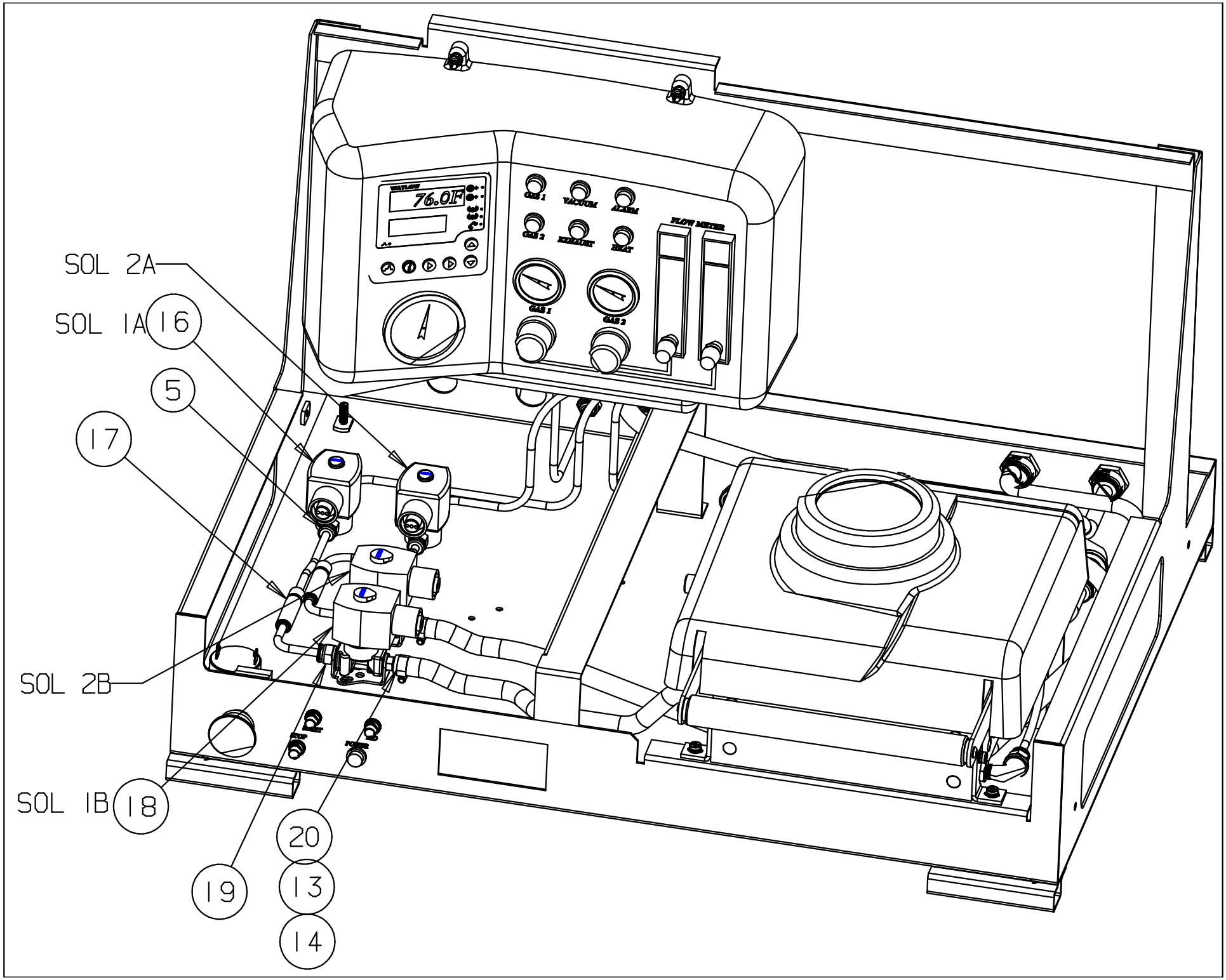

12
9
11
12
13
12
15
8
7
11
15
12
10
7
6
5
8
7
10
11
WATER IN
WATER OUT
GAS 2
GAS 1
EXHAUST
VACUUM
POWER

5.4.8 GAS 1 & 2 CIRCUIT INSTALLATION

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35099	1/4 NPT BULKHEAD FITTING KQE07-35	2
2	31370	1/4 O.D. X .13 I.D. PLOY TUBING	A/R
3	35090	INPUT REGULATOR	2
4	35100	ELBOW, 1/8 NPT X 1/4 PUSHON, KQLO7-34S	2
5	31368	CONN, 1/8 NPT X 1/4 PUSHON, KQH07-34S	8
6	35085	GAGE, PRESSURE, 0-60	2
7	33640	ELBOW, 1/8 NPT	2
8	35097	FLOWMETER, 0-20, #RMA-2 (GAS 2)	1
9	13-0060	FLOWMETER, 0-100, (GAS 1)	1
10	35102	HEX MANIFOLD	1
11	34912	NIPPLE, CLOSE, 1/4 NPT STAINLESS STEEL	1
12	35260	W/A ELBOW, MANIFOLD	1
13	35261	TYGON TUBE, 1/4 ID X 5/8 OD	A/R
14	31935-08	CLAMP, WORM DRIVE	4
15	35262	ELBOW, 1/4 NPT X 1/4 HOSE BARB	1
16	35094	VALVE, SOL, 2WAY, ASCO 8262G2	2
17	35098	VALVE, CHECK, T50Y0004	2
18	32473	VALVE, 2WAY SOL, ASCO 8030G13VM	2
19	31367	CONN, 1/4 NPT X 1/4 PUSHON, KQH07-35S	6
20	35263	NIPPLE, 1/4 NPT X 1/4 HOSE BARB, BRASS	2

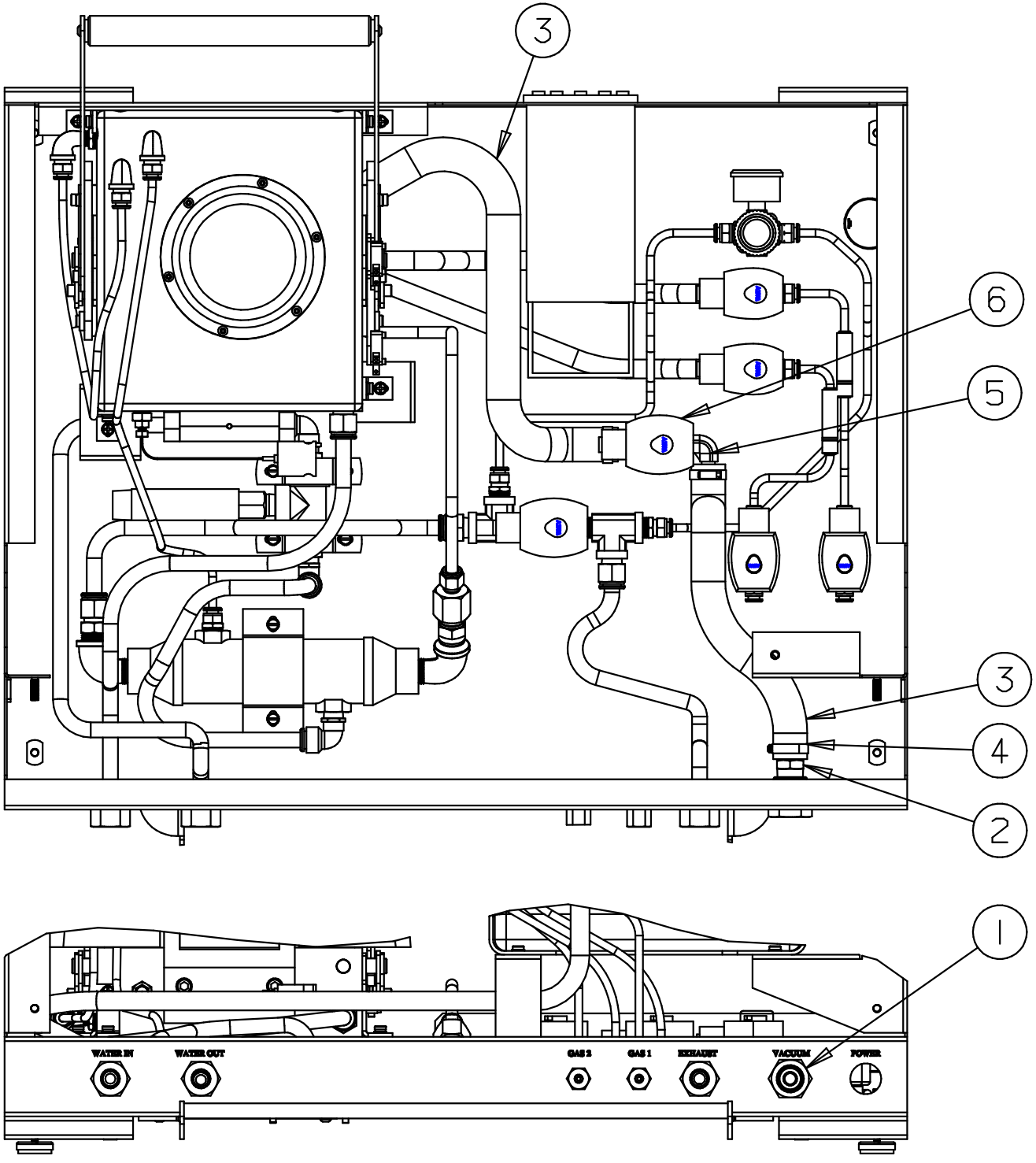

1/8 NPT PLUG
5
9
5
8
5
7
6
WATER IN
WATER OUT
GAS 2
GAS 1
EXHAUST
VACUUM
POWER
2
1
3
4
19


14
13
15
10
11
13
12
14
SOL 2B
SOL 1B


SOL 2A
SOL 1A
16
5
17
SOL 2B
SOL 1B
18
19
20
13
14
76.0IF
GAS 1
VACUUM
ALARM
GAS 2
EXHAUST
HEAT
FLOW METER

5.4.9 VACUUM CIRCUIT INSTALLATION

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	31970	1/2 X 1/2 NPT BULKHEAD FITTING	1
2	31966	CONN, 1/2NPT X 1/2 HOSE BARB, BR	1
3	35265	TUBING, PVC VACUUM 1 1/8 OD	A/R
4	31935-06	CLAMP, HOSE, WORM DRIVE	4
5	35266	ELBOW, 3/8NPT X 1/2 HOSE BARB, BR	1
6	35096	VALVE, SOL, 2WAY, ASCO 8263G206	1
7	35263-2	CONN, 3/8NPT X 1/2 HOSE BARB, BR	1
8	35263-1	CONN, 1/4NPT X 1/2 HOSE BARB, BR	1


3
6
5
3
4
2
1
WATER IN
WATER OUT
GAS 2
GAS 1
EXHAUST
VACUUM
POWER

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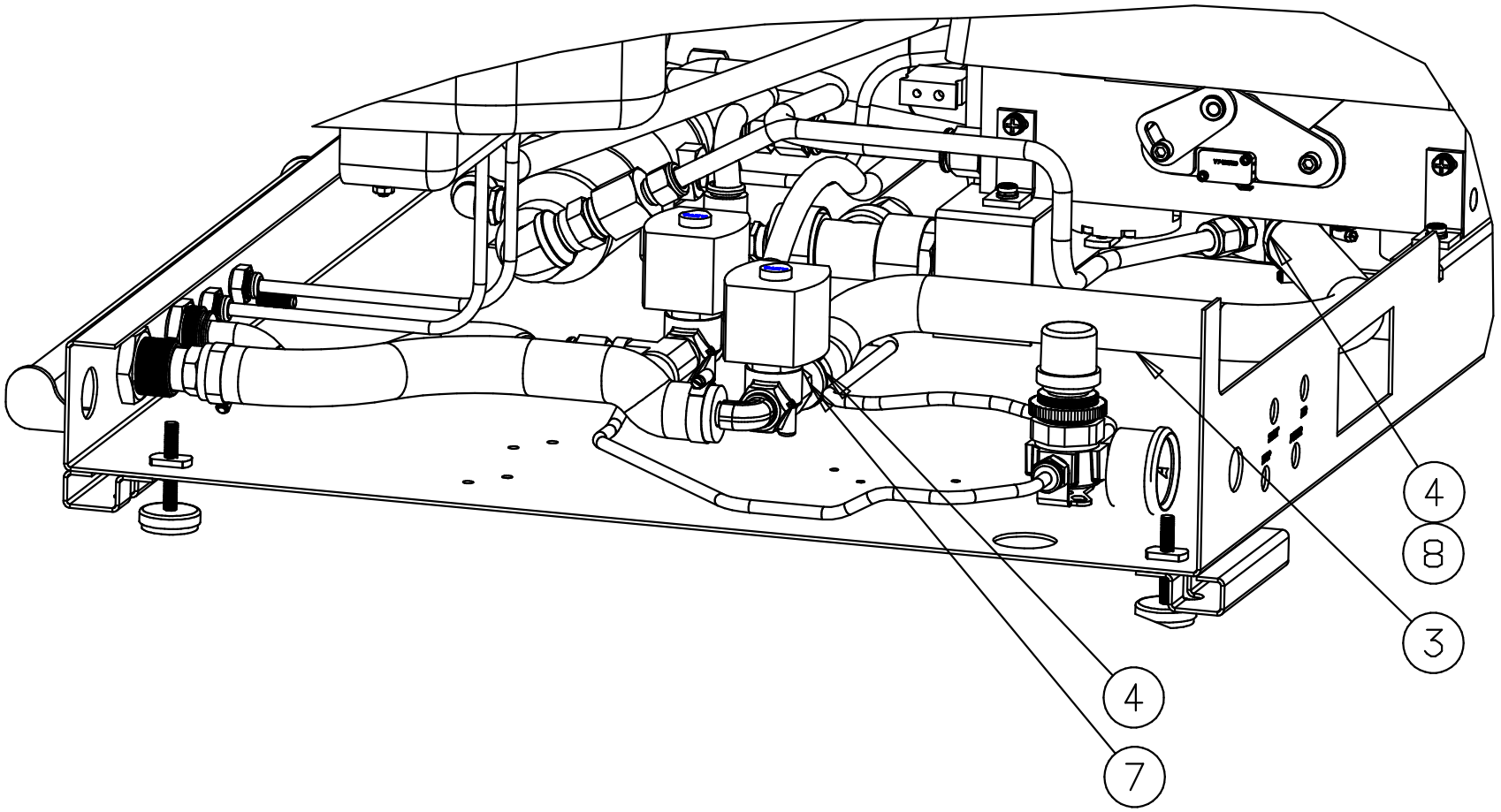
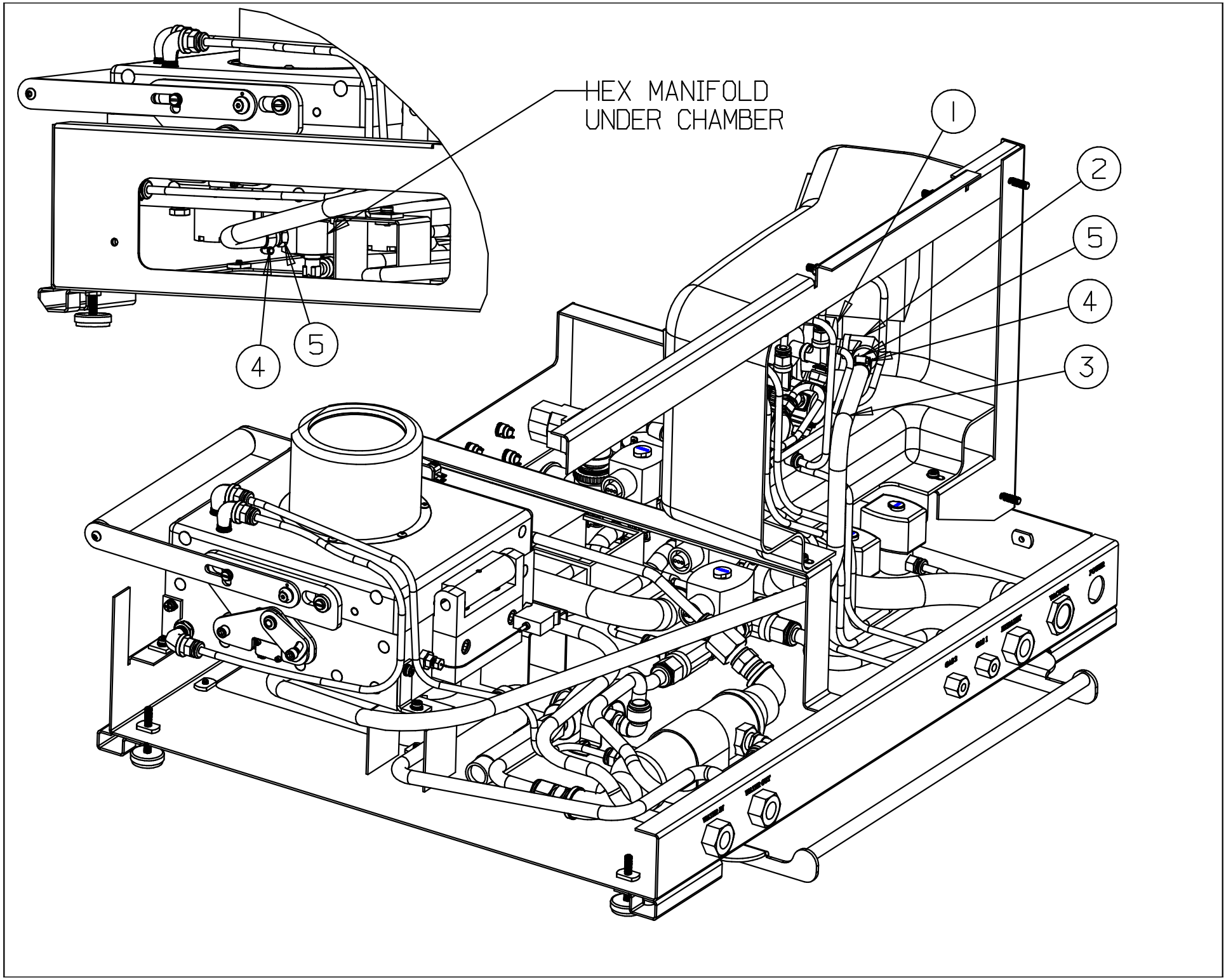

4
8
3
4
7

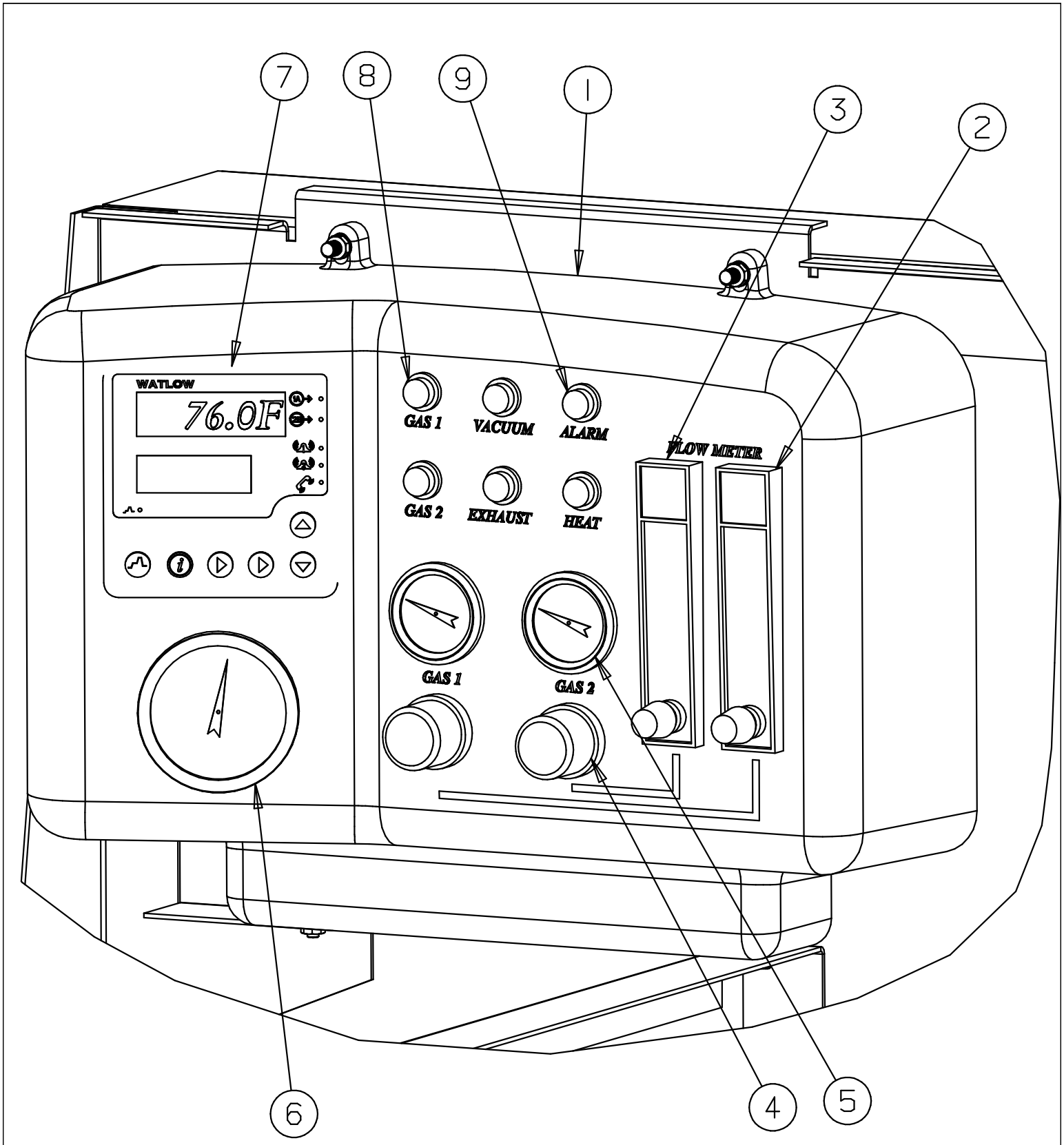
5.4.10 COMPOUND GAGE INSTALLATION

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	13-0050	COMPOUND GAGE, VAC-60PSIG	1
2	34920	ELBOW, 1/4 NPT, FEMALE	1
3	35261	TYGON TUBE, 1.4 ID X 5/8 OD	A/R
4	31935-08	CLAMP, HOSE WORM DRIVE	2
5	35263	CONN, 1/4NPT Z 1/4 HOSE BARB, BR	2


HEX MANIFOLD
UNDER CHAMBER
1
2
5
4
3
4
5

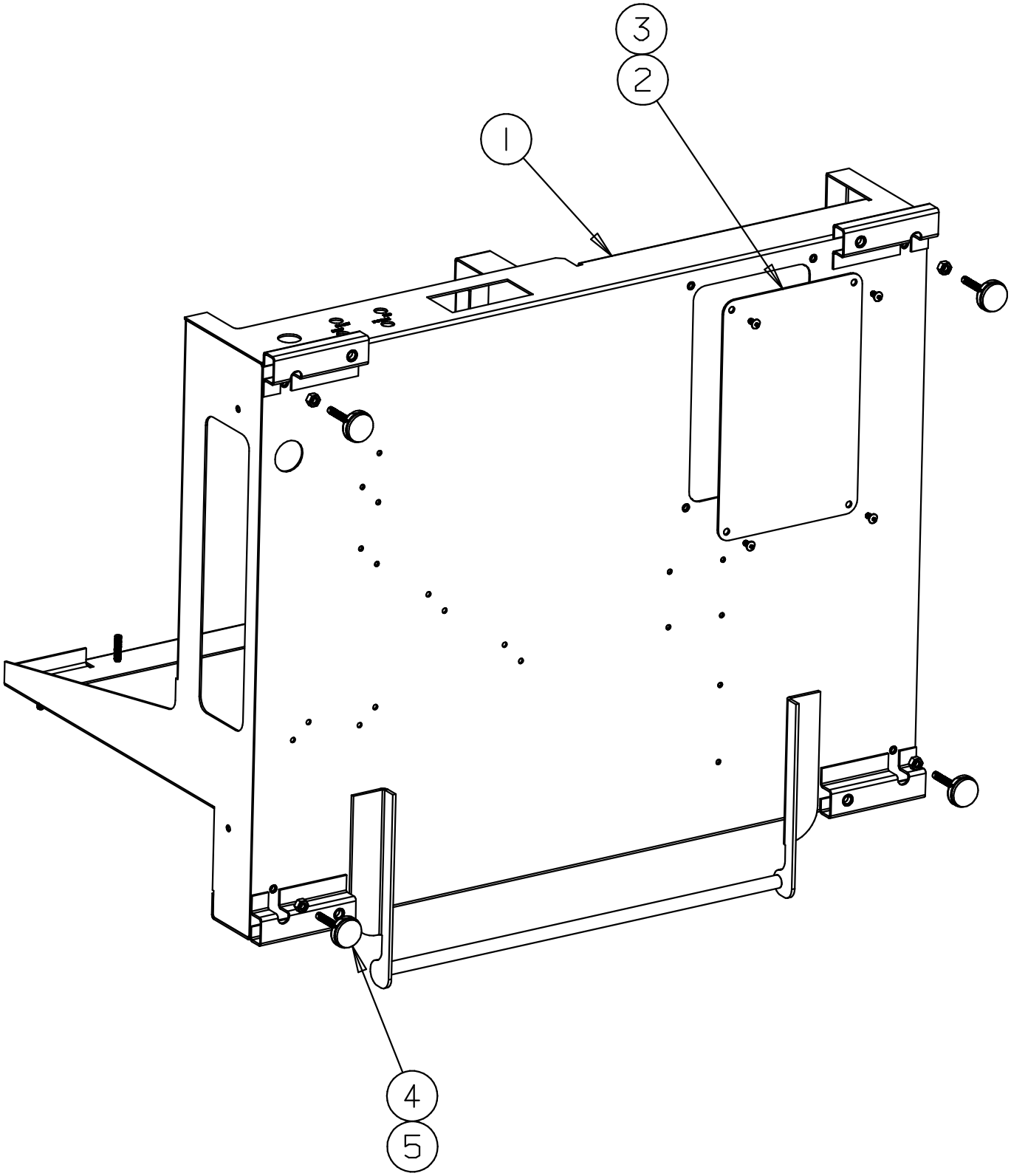
5.4.11 FRONT PANEL ASSEMBLY

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35255	FRONT PANEL SILKSCREENED	1
2	35097	FLOW METER, RMA-2#6, DWYER	1
3	13-0060	FLOW METER, 0-100 SCFH	1
4	35090	REGULATOR, R07-100-RGEA	2
5	35085	PRESSURE GAGE, 0-60 PSIG	2
6	13-0050	GAGE, COMPOUND	1
7	35172	CONTROLLER, F4SH-CAA0-01RG	1
8	22-3420	GREEN LIGHT IDI 1052QC5	5
9	500-A244	LAMP, RED IDI 1040 QC 1	1


7
8
9
1
3
2
WATLOW
76.0F
GAS 1
VACUUM
ALARM
GAS 2
EXHAUST
HEAT
FLOW METER
GAS 1
GAS 2
6
4
5

5.4.12 FRAME ASSEMBLY

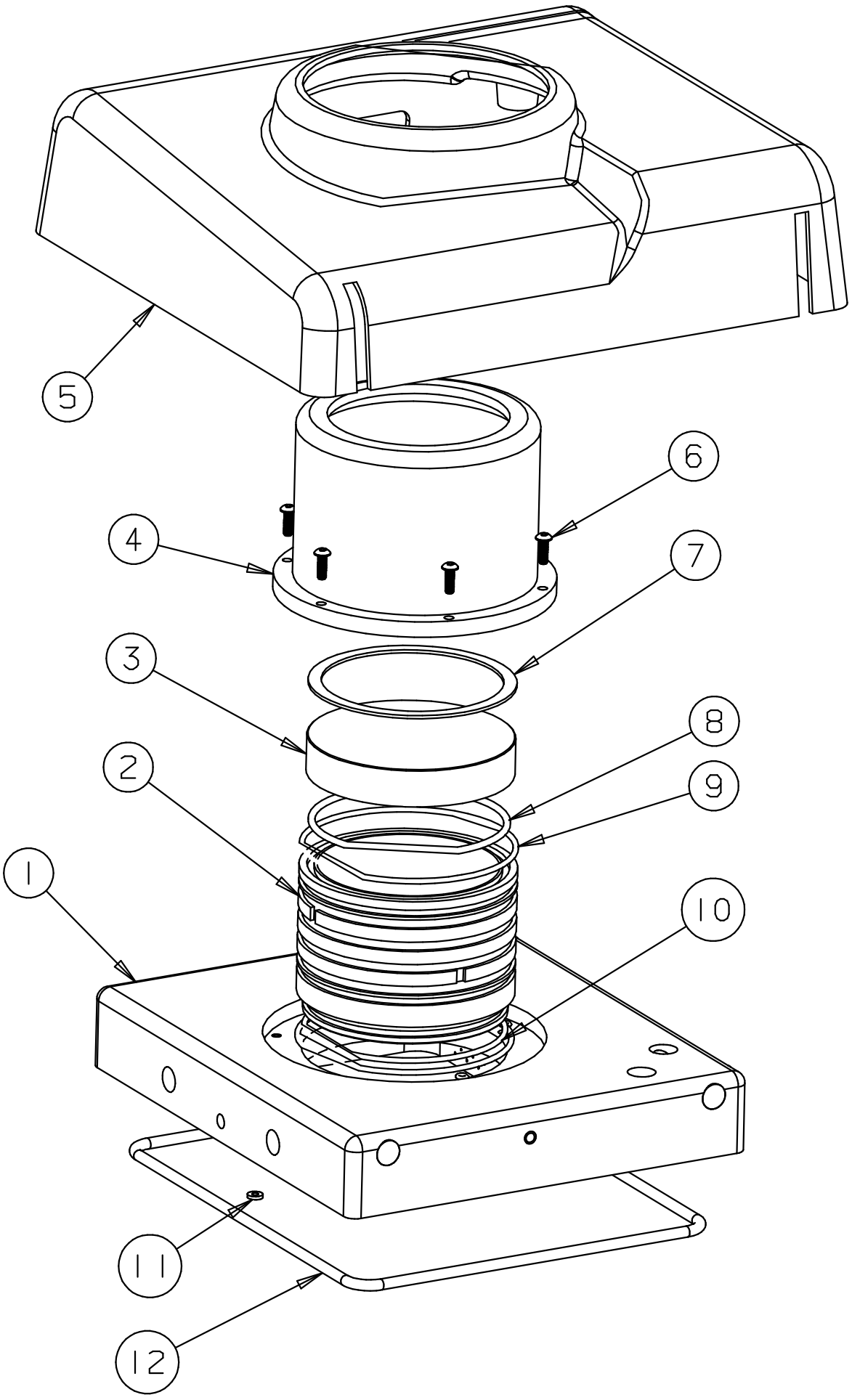
ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35082	W/A FRAME, 1200 SERIES	1
2	35221	DOOR, ACCESS, 1200 FRAME	1
3	32653-03	SCREW, PAN HEAD, #10-32 X 1/2	4
4	35084	LEVELING GLIDE, 1/4-20	4
5	31515-02	NUT, HEX, 1/4-20	4


3
2
1
4
5

5.4.13 LID ASSEMBLY

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35126	LID, 1200 SERIES	1
2	35127	SLEEVE, COOLING	1
3	35070	GLASS, SIGHT	1
4	35128	MOUNT, VIEW PORT	1
5	35076	COVER, LID 1200 SERIES	1
6	32651-08	SCREW, BHSC, #8-32 X .50 LONG	6
7	35141	SPACER, SIGHT GLASS	1
8	33276-08	O-RING, BUNA-N, #2-239	1
9	33276-06	O-RING, BUNA-N, #2-155	2
10	33276-09	O-RING, BUNA-N, #2-154	1
11	35200	GASKET, PROCESS GAS	1
12	35164	O-RING, LID, 1200 SERIES	1

Note: Items 2, 3, 4 and 7 must be replaced as a matched set. Order replacement part #35548.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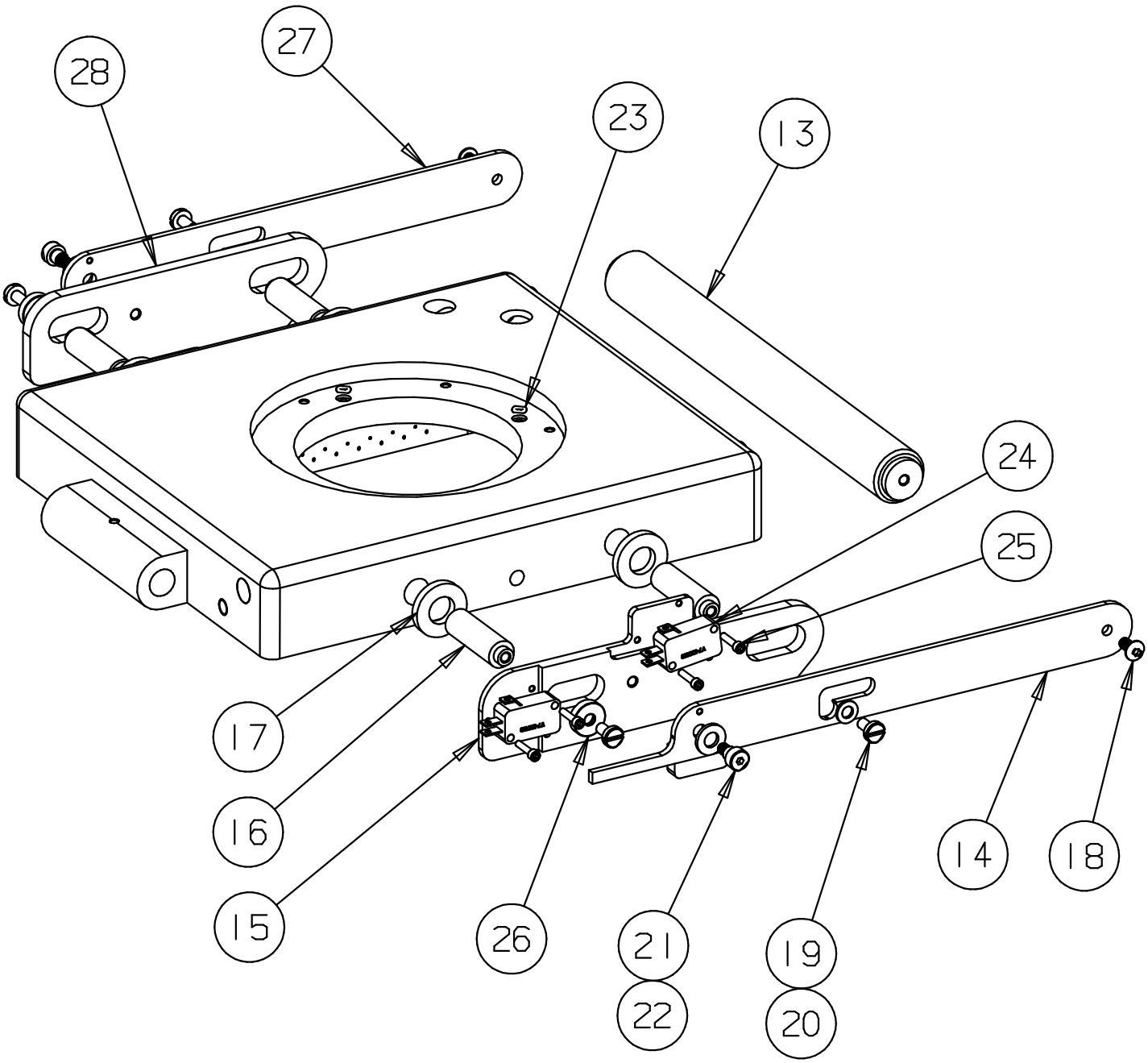
5.4.13 LID ASSEMBLY (CONT'D)

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
13	35110	HANDLE	1
14	35112	LEVER, LOCK LATCH, LH	1
15	35114	LATCH, 1200 SERIES LH	1
16	35108	PIN, LID LOCK	4
17	35132	SPACER, LID LATCH	4
18	32651-09	SCREW, BHSC, #10-32 X .50" SSTL	2
19	32653-03	SCREW, PAN HD, #10-32 X .50"	
20	30036	WASHER, FLAT, #10 SS	2
21	35258	SCREW, SHOULDER, .25 DIA X .188,SS	2
22	30112	WASHER, FLAT, 1/4, SS	2
23	33276-10	O-RING, BUNA-N, #2-006	2
24	35256	SWITCH, MICRO, V7-1C17E9	2
25	31378-34	SCREW, SHC, #4-40 X .50"	4
26	35109	KEEPER, LID LOCK PIN	2
27	35111	LEVER, LOCK LATCH, RH	1
28	35113	LATCH, 1200 SERIES RH	1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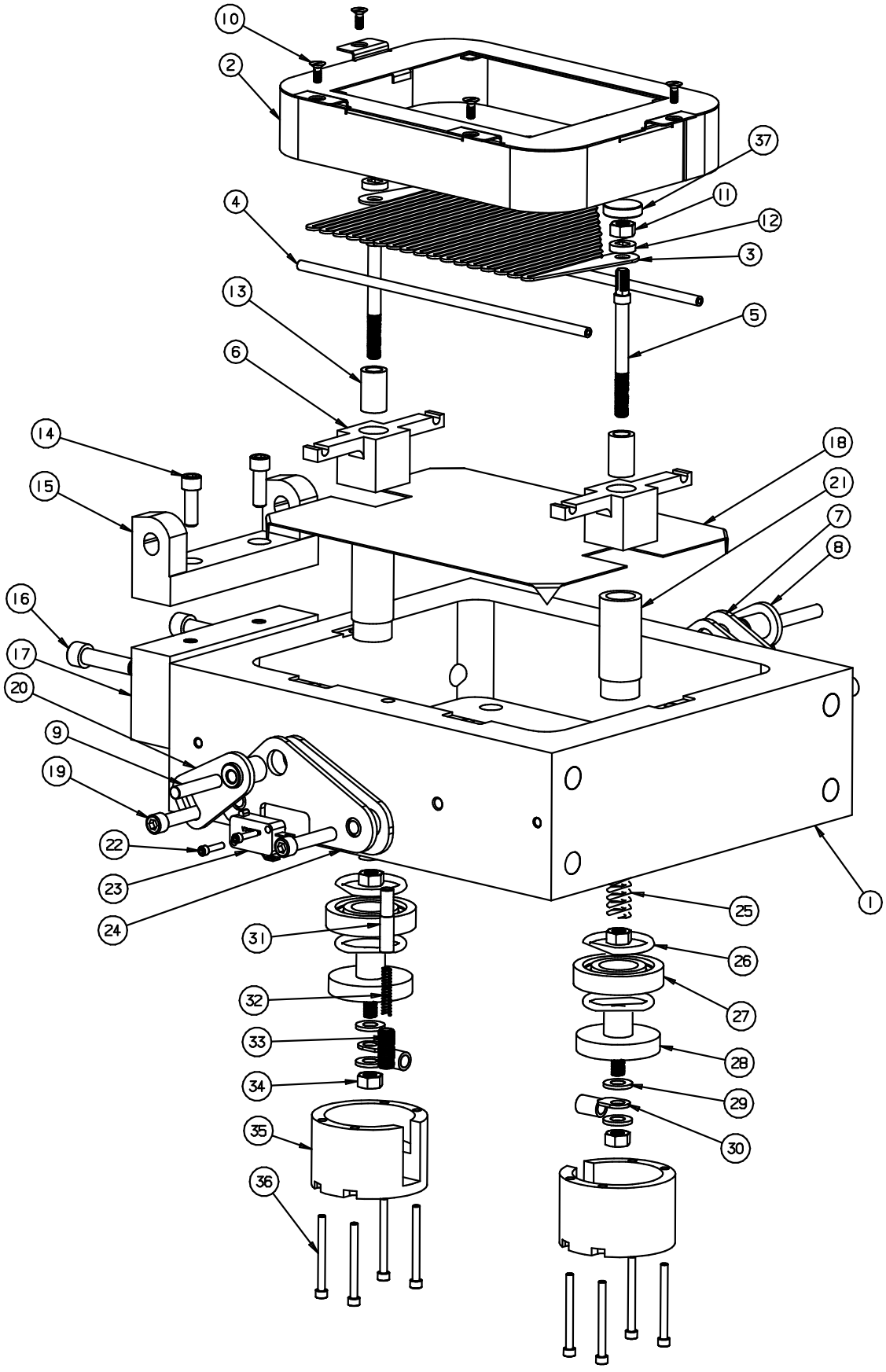
5.4.14 CHAMBER ASSEMBLY

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
1	35101	CHAMBER, 1200 SERIES	1
2	35083	W/A SHIELD, RADIATION	1
3	35329-02	ELEMENT, 2.5KW @120VAC	1
3	35329-01	ELEMENT, 2.5KW @ 220VAC	1
4	35152	INSULATOR	2
5	35131	ELECTRODE, 3KW HEATER	2
6	35104	SUPPORT, HEATING ELEMENT	2
7	35116	W/A STRIKE, LID LATCH, RH	1
8	35235	W/A ADJUSTMENT PLATE, RH	1
9	34717	DOWEL PIN, 1/4 DIA X 1.00 LONG	2
10	30021	SCREW, FH, SLOT, #6-32 X .38 LG, SS	4
11	31573	NUT, 1/4-20, STAINLESS STEEL	2
12	35129	WASHER, ANTI-ROTATION	2
13	35133	SPRING STOP, ELECTRODE	2
14	31378-35	SCREW, SHC, 1/4-20 X .75 LONG	2
15	35202	BRACKET, LID HINGE	1
16	31378-13	SCREW, SHC, 5/16-18 X 1.00 LONG	2
17	35115	PLATE, HINGE	1
18	35080	SHIELD, BOTTOM	1
19	31378-04	SCREW, SHC, 1/4-28 X 1 1/4, STL	4
20	35234	W/A ADJUSTMENT PLATE, LH	1
21	35122	SLEEVE, INSULATOR	2
22	31378-34	SCREW, SHC, #4-40 X .50 LONG, STL	4
23	35256	SWITCH, MICRO, V7-1C17E9	2
24	35117	W/A STRIKE, LID LATCH, LH	1
25	35222	SPRING, ELEMENT, 1200	2
26	13-0350	O-RING, .12 X 1.12 X 1.37 BUNA-N	4
27	35106	ISOLATOR, ELECTRODE	2
28	35105	CONNECTOR, ELECTRODE	2
29	30112	WASHER, FLAT, 1/4, SS	4
30	(REF)	WIRE LUG, #12	N/A
31	35198	DISCONNECT, PROCESS GAS	1
32	35201	SPRING, COMP, 70398S	1
33	35197	SPRING STOP, PROCESS GAS	1
34	35335	HEX NUT, 1/4-28, BRASS	4
35	35107	GUARD, ELECTRODE	2
36	31378-33	SCREW, SHC, #6-32 X 1.50, STL	8
37	35321	INSULATOR, ELECTRODE NUT	2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5.4.15 AVAILABLE SPARE PARTS KITS

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY
		#35241 KIT, O-RINGS, 1200 SERIES	
1	33276-06	O-RING, BUNA-N, 2-155	2
2	33276-08	O-RING, BUNA-N, 2-239	1
3	33276-09	O-RING, BUNA-N, 2-154	1
4	33276-10	O-RING, BUNA-N, 2-006	2
5	13-0350	O-RING, BUNA-N, 2-216	4
6	35164	O-RING, LID, 1200 SERIES	1
7	35239	O-RING, BUNA-N, 2-002	2
		#35242 KIT, REPLACEMENT TC, 2X	
1	35229	TC, UNG "K", .040" DIA X 12.0"	2
2	35239	O-RING, BUNA-N, 2-002	2
		#35243 KIT, HEATING ELEMENT 220VAC	
1	35329-01	ELEMENT, HEATING, 2.5KW@220VAC	2
		#35243-01 KIT, HEATING ELEM. 110VAC	
1	35329-02	ELEMENT, HEATING, 2.5KW@110VAC	2
		#35344 KIT, 2X GRAPHITE TARGET	
1	35228	PLATE, TARGET	2
		#35245 KIT, SPARE FUSES, 220VAC	
1	31741-15	FUSE, MIDGET, 600V 15A	2
2	35170	FUSE, KAX-25, 240VAC 25A	1
3	12-1820	FUSE, AGC, 230VAC 1.50A	2
4	12-1830	FUSE, AGC, 230VAC 3A	1
5	12-1810	FUSE, AGC, 230VAC .50A	4
		#35374 KIT, SPARE FUSES, 110VAC	
1	31741-25	FUSE, MIDGET, 600V 25A	2
2	35170	FUSE, KAX-25, 240VAC 25A	1
3	12-1820	FUSE, AGC, 230VAC 1.50A	2
4	12-1830	FUSE, AGC, 230VAC 3A	1
5	12-1810	FUSE, AGC, 230VAC .50A	4

6. Documentation Package

Model Card for 220VAC Operation

Installation Drawing

Plumbing Diagram, Model 1200

Elementary Wiring Diagram, Model 1200, 20VAC Operation

Plate, Target

Fuse Table

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SST International
9801 Everest Street
Downey, CA 90242

MODEL CARD FOR 1200 SERIES, 220 VAC

Serial Number: 1200-039 **Sales Order No:** 11759

Customer: Temic Automotive of North America
Address: 611 Jamison Road, Elma NY 14059

NAME PLATE INFORMATION

Serial Number: 1200-039 **Voltage:** 220
Frequency: 50/60 **Phase:** 1
Full Load Current: 13 AMPS **Largest Load Current:** 11 AMPS
Main Breaker Interrupting Capacity: 1500 AMPS
Elementary Diagram Number: 35275

STANDARD MACHINE CONFIGURATION

Part No.	Qty	Description
35437	1	ASSY, COMPLETE, MODEL 1200/220VAC
(35154)	(1)	Assy, Mechanical, Model 1200
(35155)	(1)	Inst'l, Cooling System
(35156)	(1)	Inst'l, Electrical System Model 1200/220VAC
(35157-01)	(1)	Inst'l, Control System, Dual Monitor
(35158)	(1)	Inst'l, Pneumatic Plumbing
(35546)	(1)	Skin Kit, 1200 Series
(35246-102)	(1)	Kit, Ship-Away, 1200/220VAC

STANDARD OPTIONS

Part No.	Qty	Description
35001	-	Equipment Installation/Training
35370-01	1	Multiple Point Temp. Measurement (MT-2)
35393	-	Cool. Water Recirc. & Pump (CW-5)
35421-100	1	Rotary Vane Pump (VP-5) 115/230v 60/50 Hz
35422	-	Dry Mechanical Vacuum Pump (DP-5)

STANDARD OPTIONS (CONT'D)

Part No.	Qty	Description
35276	1	Digital Vac Gauge & Sensor (DVG-1)
35642	-	Moisture Analyzer (MA-5)
35415-01	1	Computer Software (SW-1)
35247-01	-	User Manual (Extra)
CRATING-1200	-	Crating

SPARES KITS

Part No.	Qty	Description
35241	1	Kit, O-Rings, 1200 Series (SP-5)
35242	1	Kit, Replacement TC, 2X (SP-3)
35243	1	Kit, 2X2.5kW Heating Element, 220VAC (SP-2)
35244	1	Kit, 2X Graphite Target (SP-1)
35245	-	Kit, Spare Fuses, 220VAC (SP-4)

CUSTOM PARTS

Part No.	Qty	Description
11729-100	1	Modified Target Plate Assy with locating holes, dowels and T/C holes at 3, 6 and 9 o'clock positions

REFERENCE DOCUMENTS

Part No.	Qty	Description
35272	(ref)	Diagram, Plumbing, Model 1200
35274	(ref)	Installation Drawing, 1200
35275	(ref)	Diagram, Elementary, Model 1200/220VAC

OEM DOCUMENTATION

Part No.	Qty	Description
5016	-	Alcatel ACP 15-28-40 (Part No. 35422)
5017	-	Granville Phillips Series 375
5018	-	WatView Manual Rev A
5019	1	Watlow F4S Rev F
5020	1	Leybold D4B/D8B (Part No. 34241-100)

Originator:	**Software Version:**	**PLCI VERSION** **PLC2 VERSION**	**HIZ402** **HIZLID4**
Revision: C	**Release Date:**	**26 OCT 04**	**ECO: 2557**

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ELECTRICAL SERVICE:
SINGLE PHASE 3 WIRE SYSTEM.

SHOP COMPRESSED AIR:
RECOMMENDED DEW POINT: 59°F (15°C) MAXIMUM.

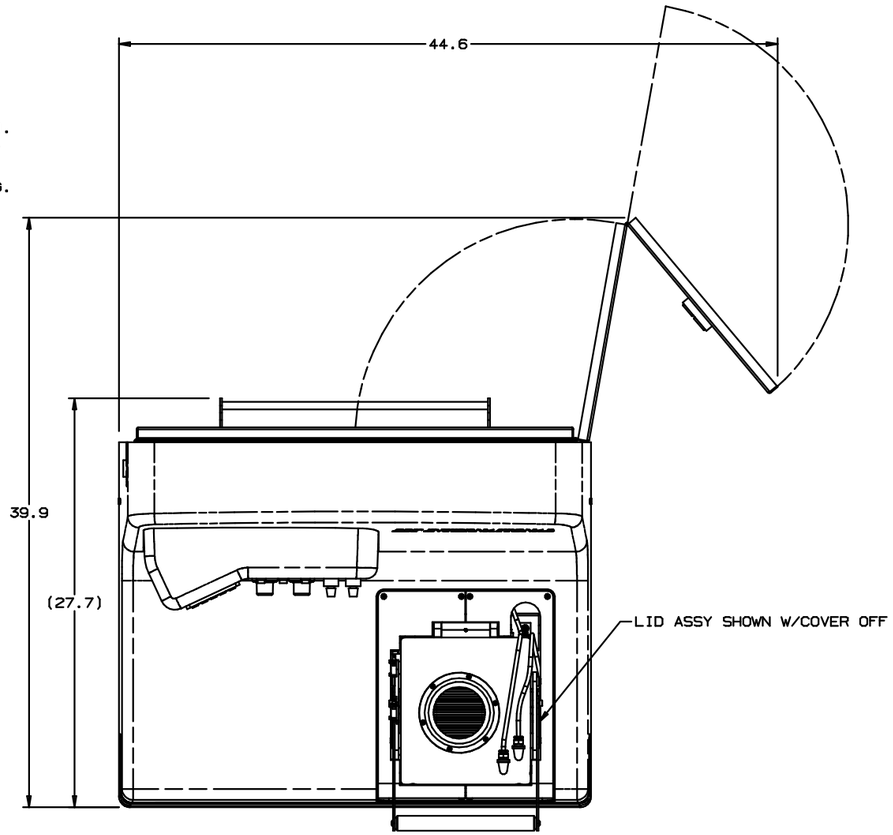
FACILITY COOLING WATER:
WATER SUPPLY TEMPERATURE 77°F ±9°F (25°C ±5°C).
BEWARE CHILLED WATER VS AMBIENT AIR DEW POINT.

EXHAUST DUCTING:
RECOMMEND EXHAUST TO NEGATIVE PRESSURE DUCTING.
EXHAUST TO OUTSIDE.

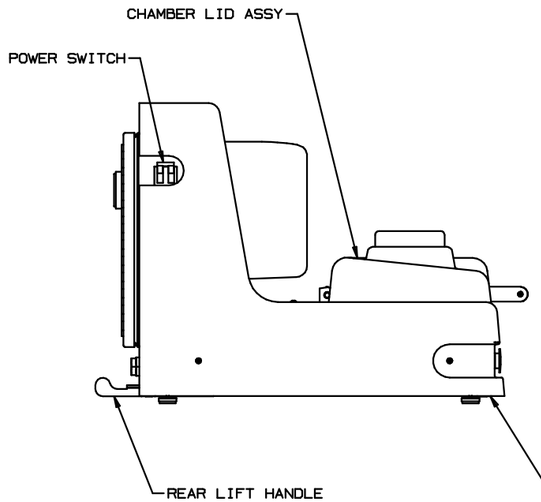
WEIGHT: EST 180 LB (81 KG).

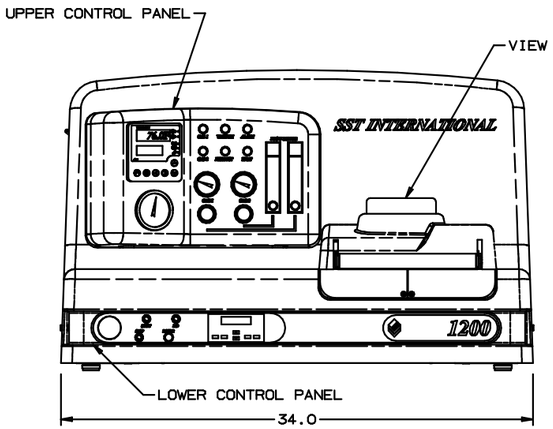
RECOMMENDED WORK TABLE/DESK 48 X 30 MIN.

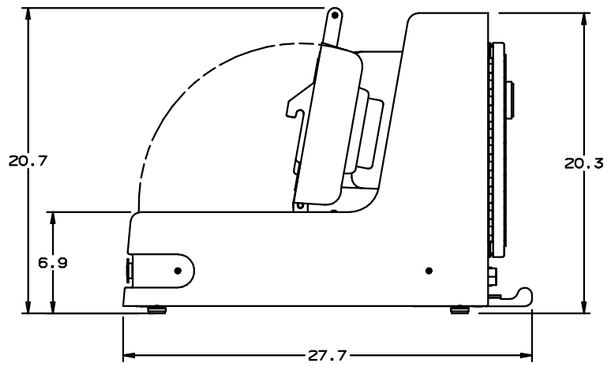
REV	DESCRIPTION	ECO#	DATE
NC	ENGINEERING RELEASE		09/20/02

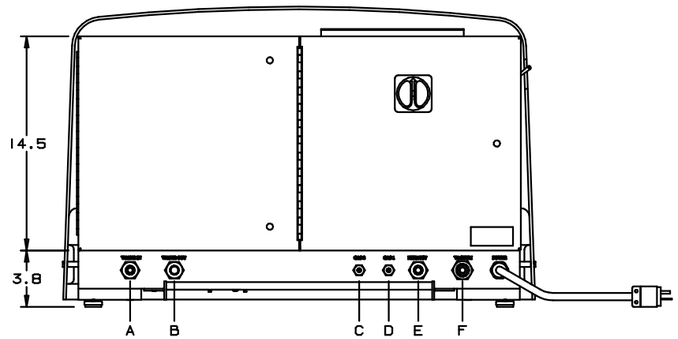


VOLTAGE		120VAC	220VAC	SIZE	CODE
POWER CONSUMPTION	PEAK	4.0 KW		CORD	
	AVERAGE	.80 KW			
MAX CURRENT		24.0 AMPS	13.5 AMPS		
GAS CONSUMPTION		PROCESS DEPENDENT		-	-
GAS 1				1/4" NPT	D
GAS 2				1/4" NPT	C
WATER SUPPLY		1.0 GPM @ 30 PSI MIN		3/8" NPT	A
WATER RETURN		GRAVITY DRAIN		3/8" NPT	B
VACUUM PUMP EXHAUST		.20 FT^3 / MIN WHEN OPERATING		1/2" NPT	F
PROCESS EXHAUST (MAX)		6.3 FT^3 / MINUTE		3/8" NPT	E









REAR VIEW

TOLERANCES UNLESS SPECIFIED DIMENSIONS ARE IN INCHES
X ± .50
.XX ± .25
- MACHINE SURFACES FLAT WITHIN .002 INCH/INCH.
- OTHER SURFACES FLAT WITHIN .005 INCH/INCH.
- TIR WITHIN 1/2 SUM OF DIAMETER TOLERANCE .005 MINIMUM

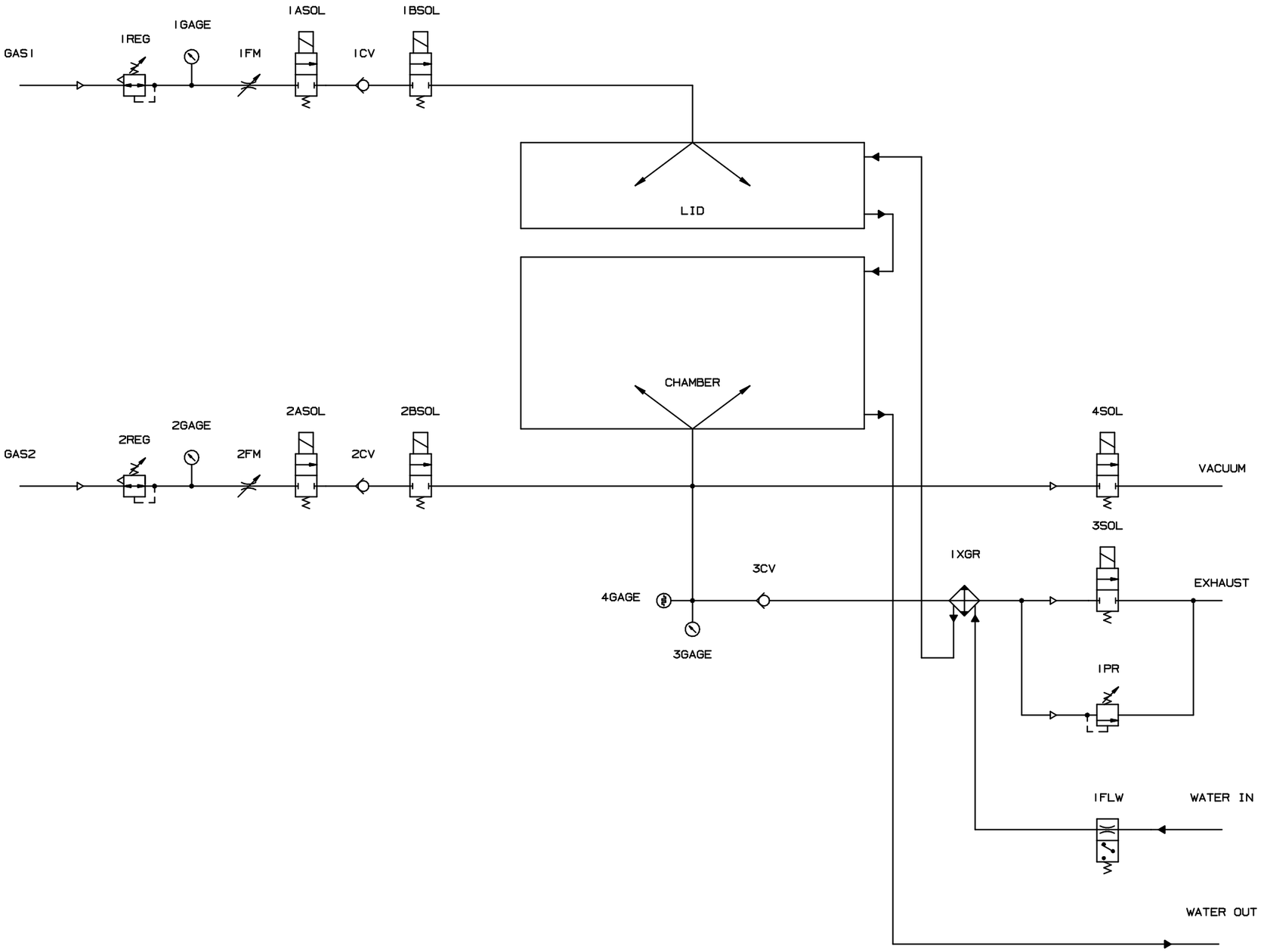
MATL:
FINISH:
SCALE:
NEXT ASSY:
REF:
DIR: MODEL 1200
FILE: 35274

SST INTERNATIONAL
CALIFORNIA USA (562)803-3361

TITLE: INSTALLATION DRAWING, 1200

DR BY: D.F. | PART # 35274
CHK.BY: A.B | DATE: 09/20/02 | SHT 1 OF 1

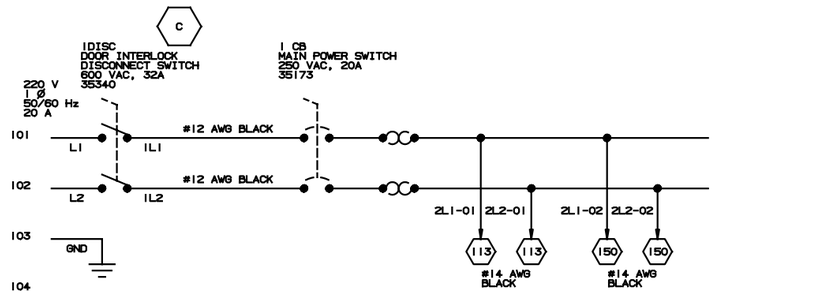
REV	DESCRIPTION	ECO#	DATE
NC	ENGINEERING RELEASE	2089	AUG 21 02

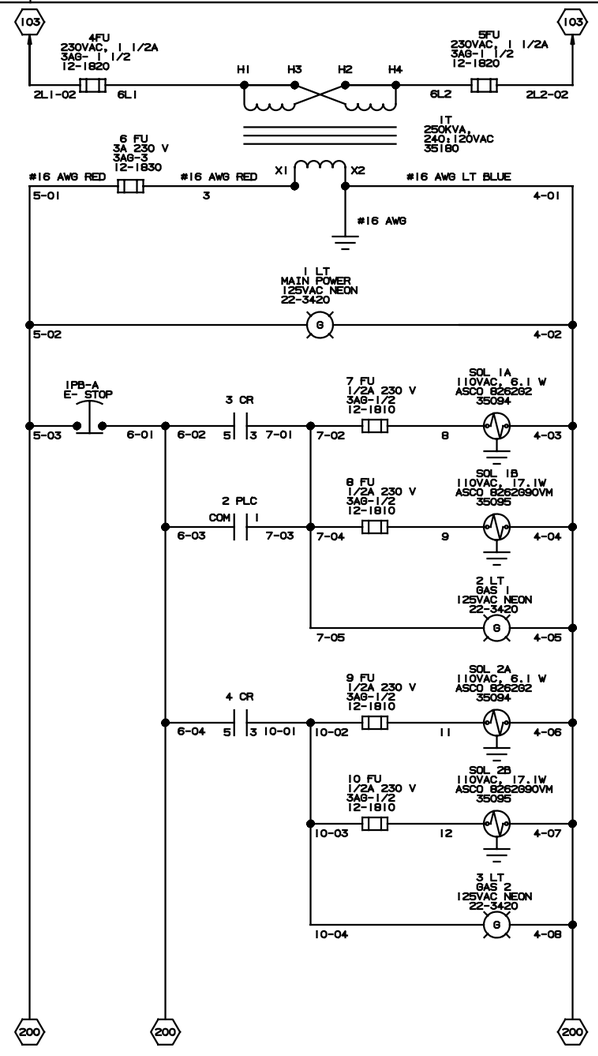


	1XGR	HEAT EXCHANGER	35091
	1PR	RELIEF VALVE, ADJ V07-200-NNEA	35093
	1FLW	ASSY, FLOW SWITCH	36457
	4SOL	2-WAY SOLENOID VALVE 8263G206	35096
	3SOL	2-WAY SOLENOID VALVE 8263G206	35096
	2BSOL	VACUUM SOLENOID VALVE 8262G90VM	35095
	2ASOL	2-WAY SOLENOID VALVE 8262G2	35094
	1BSOL	VACUUM SOLENOID VALVE 8262G90VM	35095
	1ASOL	2-WAY SOLENOID VALVE 8262G2	35094
	3CV	CHECK VALVE 2232B-4-MM-1	35236
	2CV	CHECK VALVE NORGREN T50Y0004	35098
	1CV	CHECK VALVE NORGREN T50Y0004	35098
	2FM	FLOW METER 20 SCFH	35097
	1FM	FLOW METER 100 SCFH	13-0060
	4GAGE	DIGITAL VACUUM GAUGE	(OPTION)
	3GAGE	COMPOUND GAUGE 30" - 60 PSIG	13-1470
	2GAGE	PRESSURE GAUGE 0-60 PSIG	35085
	1GAGE	PRESSURE GAUGE 0-60 PSIG	35085
	2REG	REGULATOR NORGREN R07-100-RGEA	35090
	1REG	REGULATOR NORGREN R07-100-RGEA	35090
ITEM	SYM	DESCRIPTION	PART NUMBER

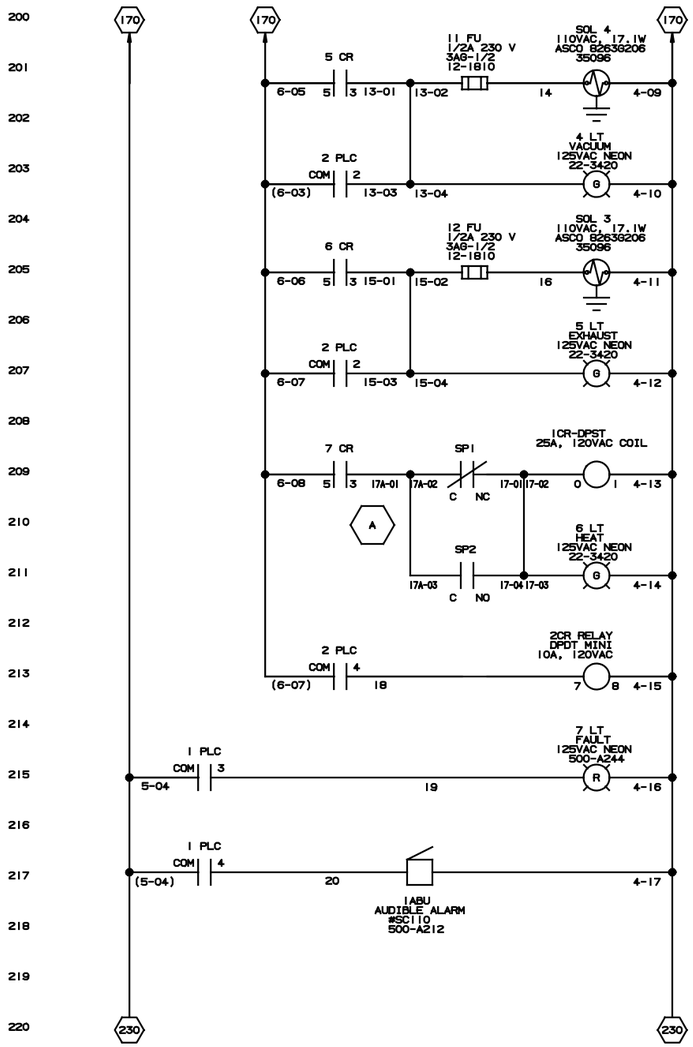
MATL:	SST INTERNATIONAL	
FINISH: 32	CALIFORNIA USA (562) 803-3361	
SCALE:	TITLE: PLUMBING DIAG MODEL 1200	
NEXT ASSY:		
REF:		
DIR: 3-MANFACT	DR BY: RH	PART # 35272
FILE: 35260	CHK.BY: AB	DATE: AUG 21 02 SHT 1 OF 1

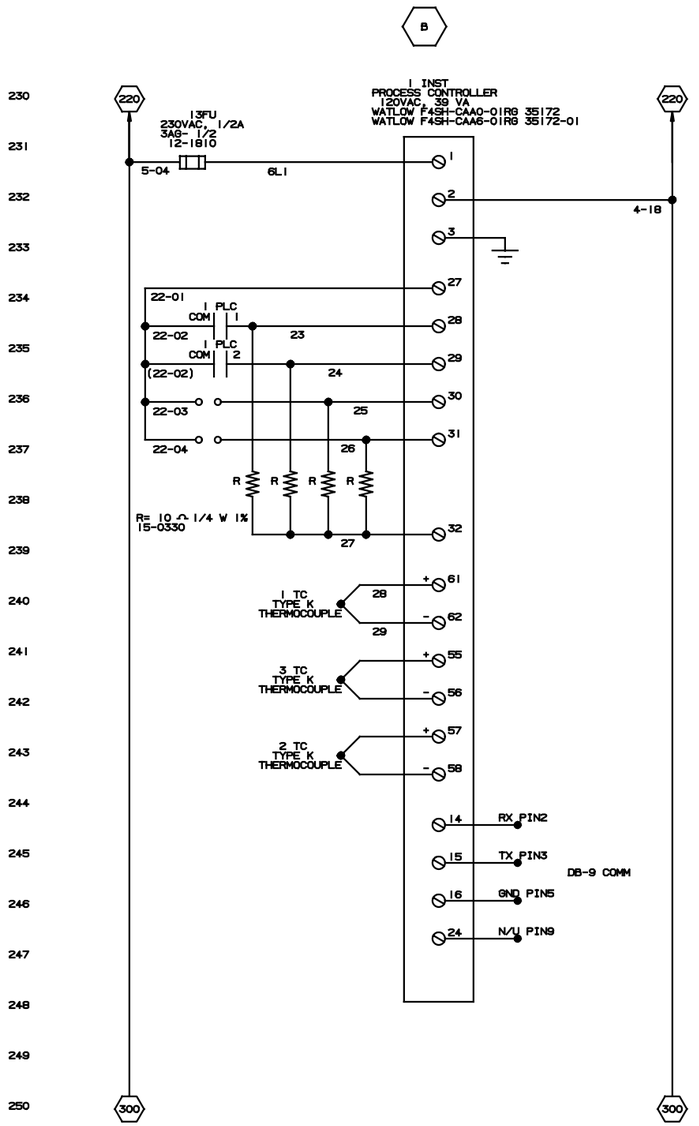
REV	DESCRIPTION	ECO#	DATE
NC	ENGINEERING RELEASE		09/20/02
A	SSR PLACED ON SAME SIDE AS SEMICON FUSE		06/18/03
	VACUUM GAUGE CONTROLLER ADDED		
B	DUAL T/C CHANNEL WIRING ADDED		NOV 10 03
C	35340 DISCONNECT, 32 A WAS 35174 DISCONNECT, 25 A	2401	FEB 23 04
D	DRAWING NUMBER ERROR: 35275 WAS 35276	2413	MAR 08 04
E	35175-1PLC AND 35175-2PLC GIVEN DISTINCT PART NOS.	2855	DEC 19 05



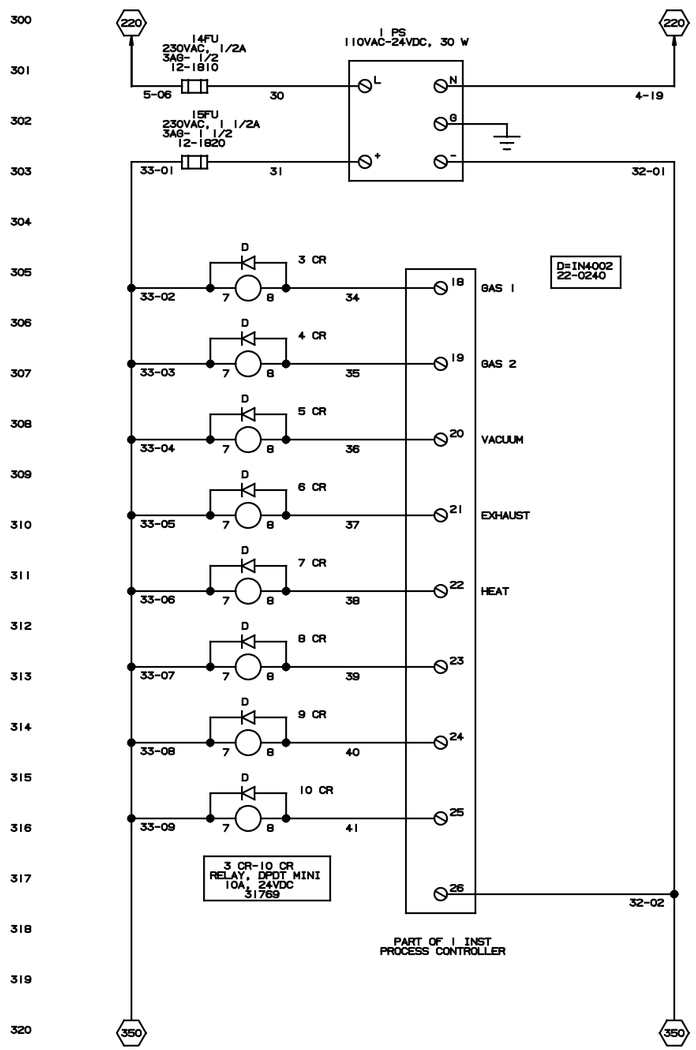


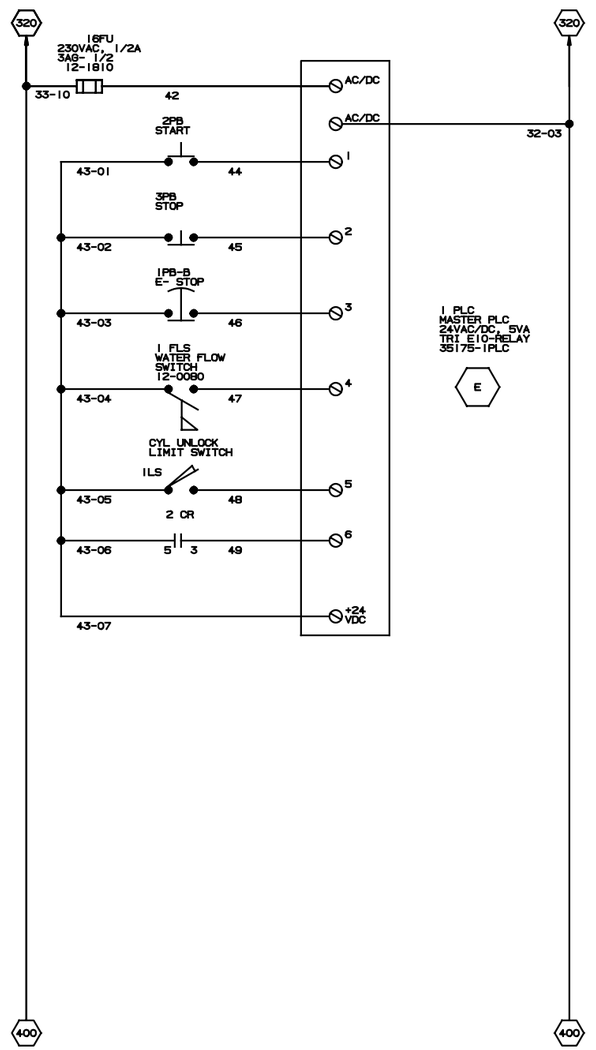
MATL:	SST INTERNATIONAL CALIFORNIA USA (562) 803-3361
FINISH: 32	
SCALE:	
NEXT ASSY:	TITLE: ELEMENTARY DIAGRAM, MODEL 1200
REF:	
DIR: MODEL 1200	DR BY: D.F. / PART # 35275 (D)
FILE: 35275 (D)	CHK.BY: R.H. / DATE: 09/20/02 / SHT 1 OF 4





MATL:	SST INTERNATIONAL		
FINISH: 32	CALIFORNIA USA (562) 803-3361		
SCALE:			
NEXT ASSY:	TITLE: ELEMENTARY DIAGRAM, MODEL 1200		
REF:			
DIR: MODEL 1200	DR BY: D.F.	PART # 35275	
FILE: 35275	CHK.BY: R.H.	DATE: 09/20/02	SHT 2 OF 4





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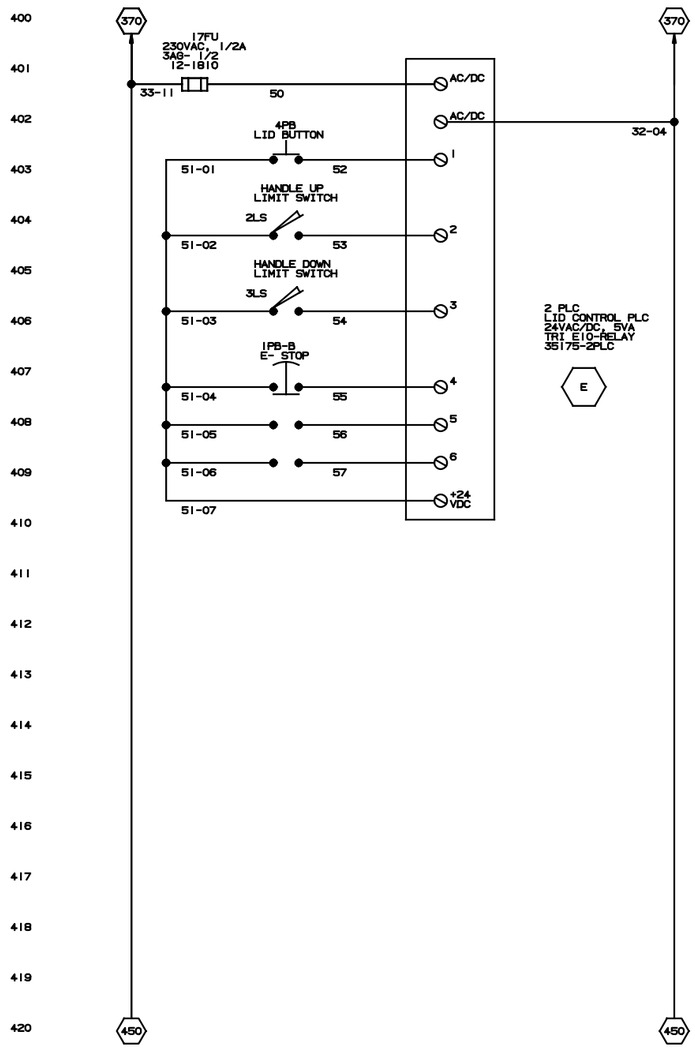
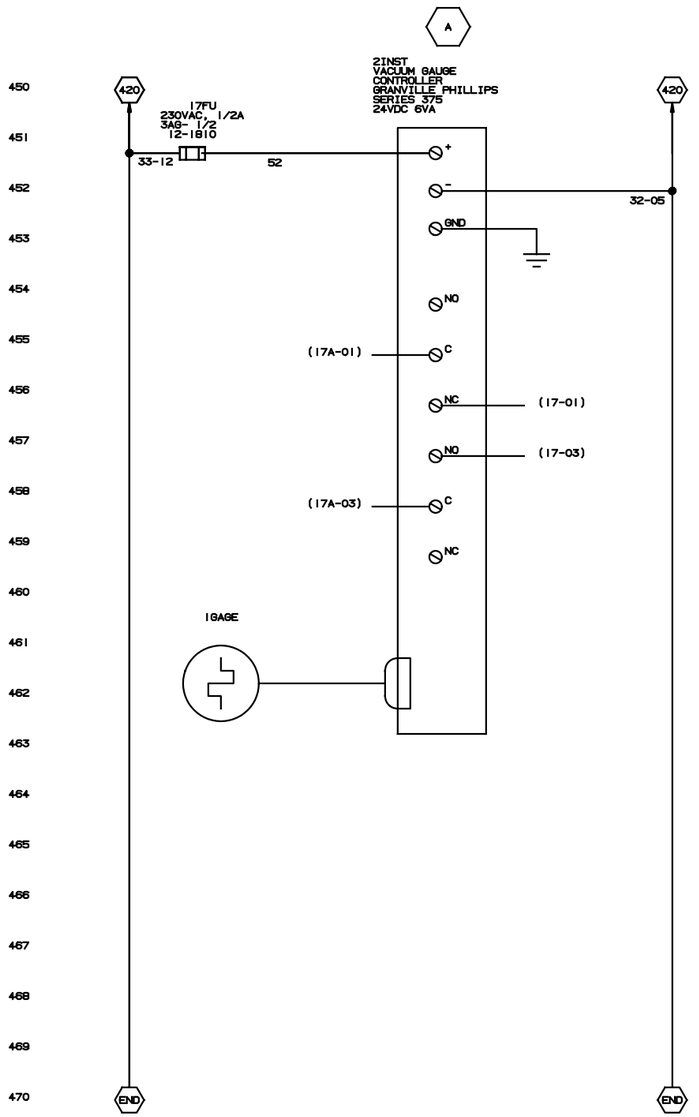
FINISH: 32	CALIFORNIA USA (562) 803-3361		
SCALE:			
NEXT ASSY:	TITLE: ELEMENTARY DIAGRAM, MODEL 1200		
REF:			
DIR: MODEL 1200	DR BY: D.F.	PART # 35275	
FILE: 35275	CHK.BY: R.H.	DATE: 09/20/02	SHT 3 OF 4



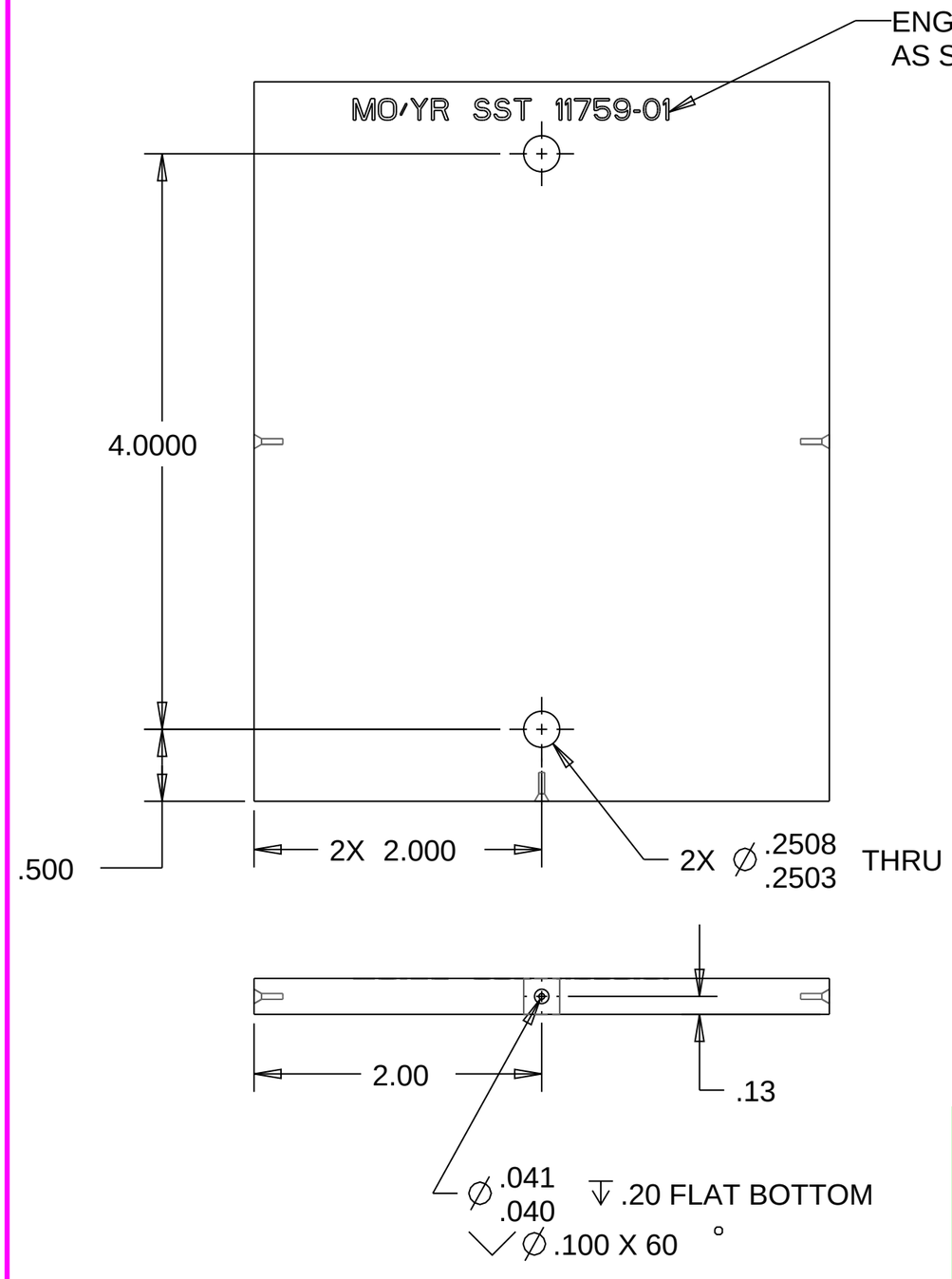


MATL:	SST INTERNATIONAL		
FINISH: 32	CALIFORNIA USA (562) 803-3361		
SCALE:			
NEXT ASSY:	TITLE: ELEMENTARY DIAGRAM, MODEL 1200		
REF:			
DIR: MODEL 1200	DR BY: D.F.	PART # 35275	
FILE: 35275	CHK.BY: R.H.	DATE: 09/20/02	SHT 4 OF 4

THIS DOCUMENT CONTAINS MATERIAL PROPRIETARY TO SST INTERNATIONAL.

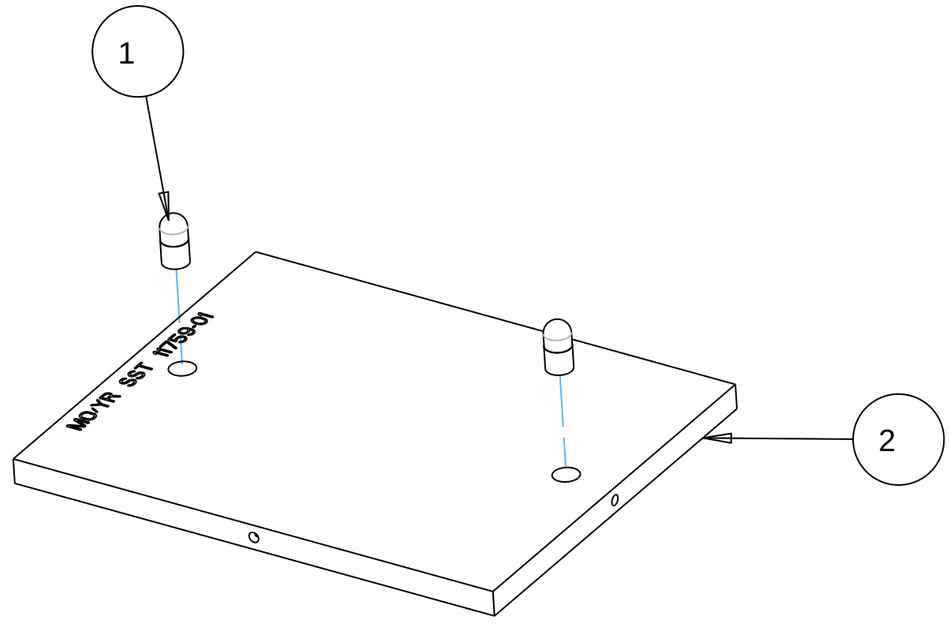
ITEM #	PART #	QTY	DESCRIPTION
1	500-172-4	2	DOWEL, BULLET-NOSE
2	11759-01	1	TARGET PLATE

REV	DESCRIPTION	ECO #	DATE
NC	INITIAL RELEASE	3358	13 AUG 07



11759-01 TARGET PLATE

MAKE FROM 35228



SCALE 0.750

TOLERANCES UNLESS SPECIFIED
DIMENSIONS ARE IN INCHES

.X	± .030
.XX	± .010
.XXX	± .003
.XXXX	± .0010
ANG.	± 30'

- MACHINE SURFACES FLAT WITHIN .002 INCH/INCH.
- OTHER SURFACES FLAT WITHIN .005 INCH/INCH.
- TIR WITHIN 1/2 SUM OF DIAMETER TOLERANCE .005 MINIMUM

MATL: NOTED		
FINISH:		
SCALE: 1.000 & NOTED		
NEXT ASSY: TEMIC	TITLE: ASSY, TARGET PLATE	
REF:		
DIR: /TEMIC/SO11759	DR BY: DNR	PART # 11759-100
FILE: 11759-100_TARGET_PLT_ASSY	CHK.BY: AB	DATE: 13 AUG 07 SH 1 OF 1

SST INTERNATIONAL

CALIFORNIA USA (562)803-3361

FUSE TABLE 110V, 220V

Symbol	Description	Function	Part Number
(110V)			
1FU	25A, 250V, BLF-25	Heater Circuit	31741-25
6FU	3A, 240V, 3AG-2	Control Circuit	12-1830
(220V)			
1FU	15A, 250V, BLF-15	Heater Circuit	31741-15
2FU	15A, 250V, BLF-15	Heater Circuit	31741-15
5FU	1.5A, 240V, 3AG-1.5	Cont. Trans. Primary	12-1820
6FU	3A, 240V, 3AG-2	Cont. Trans. Secondary	12-1830
(110V, 220V)			
3FU	25A, 240V, KAX-25	SSR Protection	35170
4FU	1.5A, 240V, 3AG-2	Control Circuit	12-1820
7FU	.5A, 240V, 3AG-.5	GAS 1A Solenoid	12-1810
8FU	.5A, 240V, 3AG-.5	GAS 1B Solenoid	12-1810
9FU	.5A, 240V, 3AG-.5	GAS 2A Solenoid	12-1810
10FU	.5A, 240V, 3AG-.5	GAS 2B Solenoid	12-1810
11FU	.5A, 240V, 3AG-.5	Vacuum Solenoid	12-1810
12FU	.5A, 240V, 3AG-.5	Exhaust Solenoid	12-1810
13FU	.5A, 240V, 3AG-.5	Process Controller	12-1810
14FU	.5A, 240V, 3AG-.5	DC Power Supply Line	12-1810
15FU	1.5A, 240V, 3AG-1	DC Power Supply Load	12-1820
16FU	.5A, 240V, 3AG-.5	Master PLC	12-1810
17FU	.5A, 240V, 3AG-.5	Lid Control PLC	12-1810

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