
FGS[®] for Lam 9600 TCP Systems



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- LAM9600 Wet Clean Checklist
- Product Warranty
- Service Exposure Report Form
- Control Schematics

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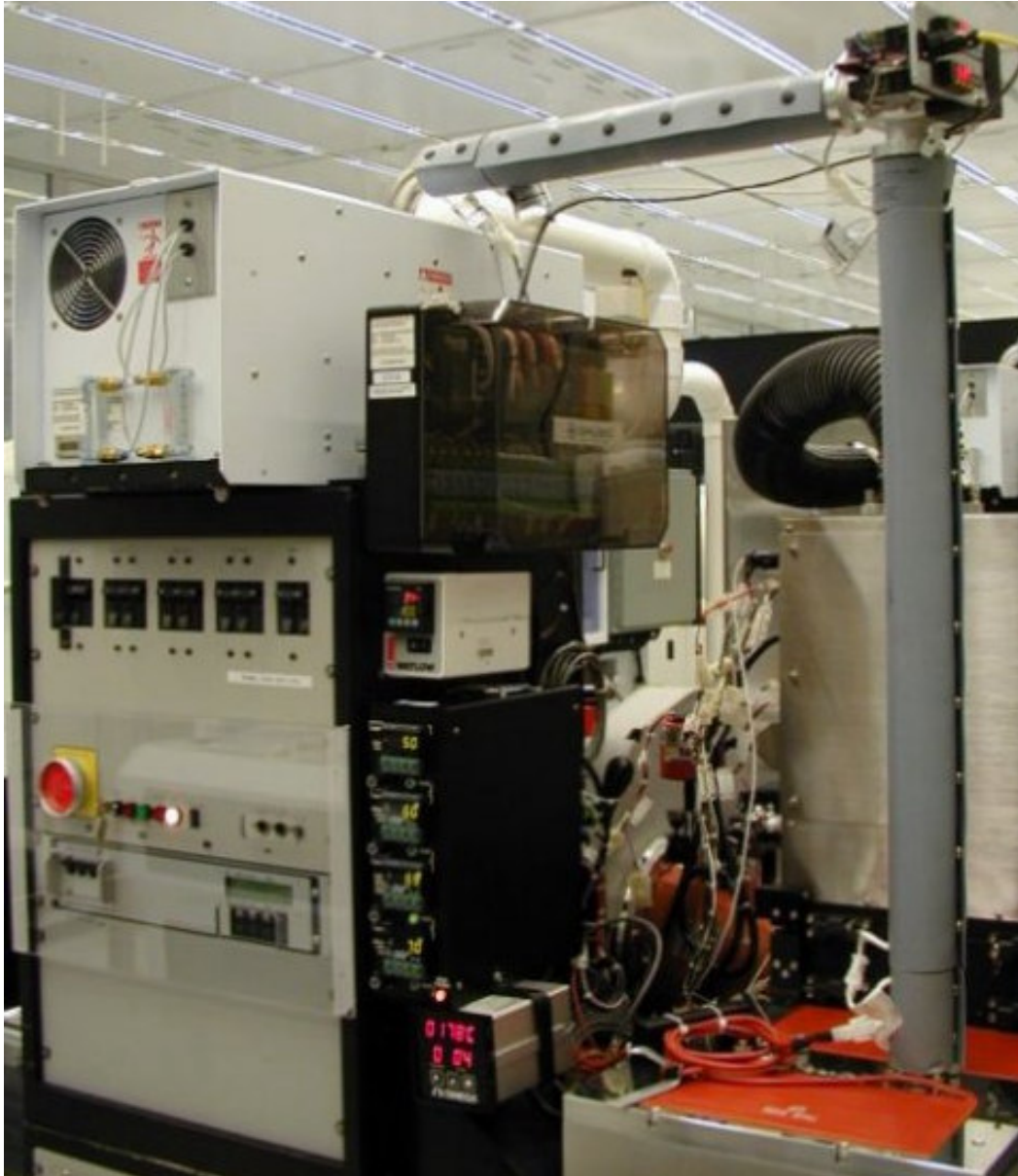
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1.0 INTRODUCTION

Galiso Incorporated would like to thank you for your investment and participation in **HGS**[®] technology. The Hot Gas Sweep (**HGS**[®]), is a new solution to the problem of chamber vacuum acquisition and removal. The patented **HGS**[®] system utilizes a viscous flow approach to eliminating both moisture and particulate chamber contaminants rather than relying on vacuum to remove contamination.



Galiso Hot Gas Sweep Particle Management System

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1.1 Scope of Manual

This manual includes part listings and descriptions with part numbers for the major assemblies required for Lam 9600 TCP **FGS** implementation. In addition, instructions for installation and operation of the system and equipment are included. Refer to Galiso document #21-11-1149 for additional information regarding operation of **FGS** components and equipment.

Galiso Incorporated thanks you for selecting the **FGS** product. If there is any way we can be of assistance in the use or care of this equipment, please contact us at (800) 854-3789, (970) 249-0233 or www.galiso.com. We would like to solicit your comments and suggestions to help us further refine and improve our products.

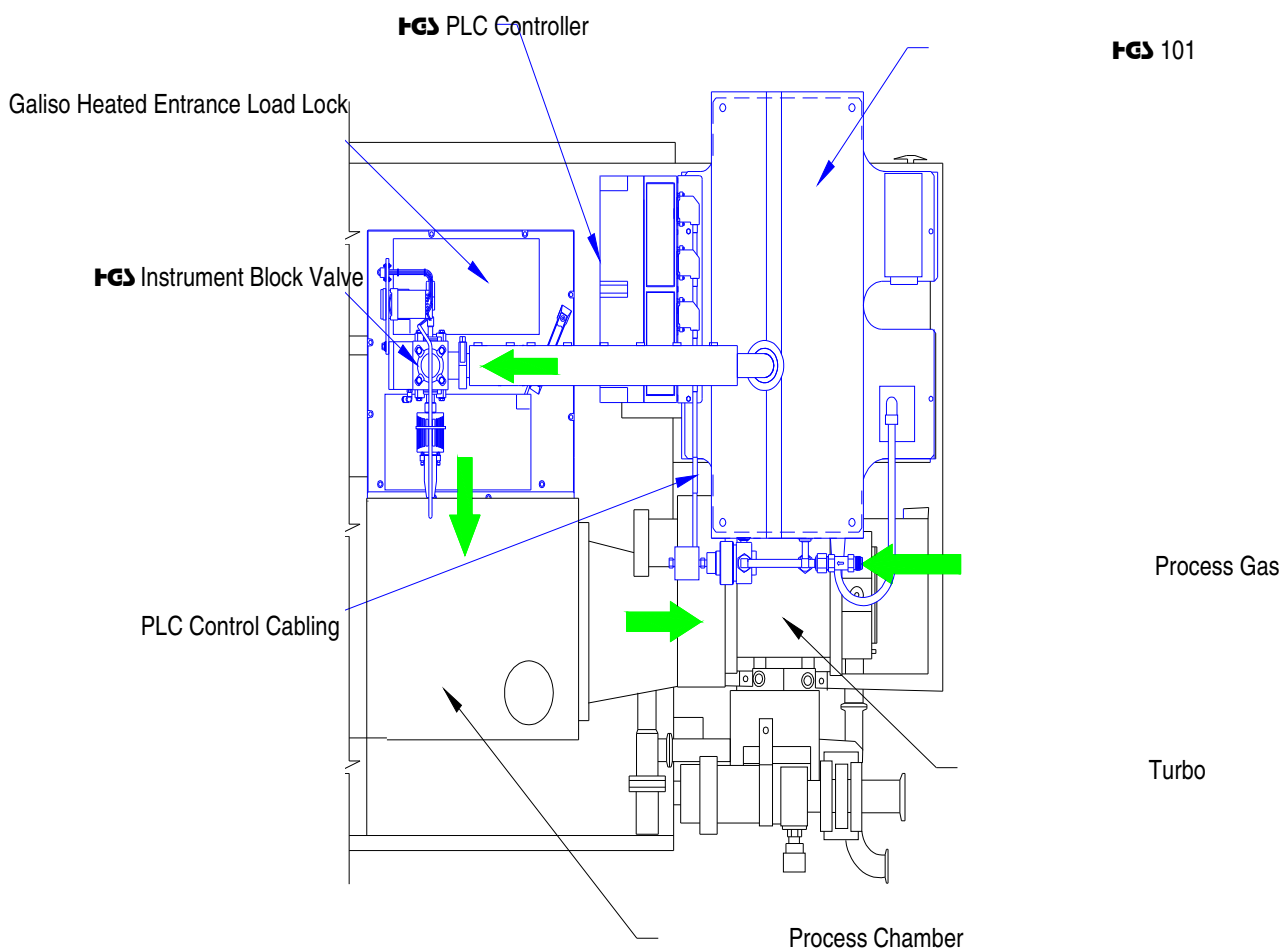


Figure 1 - 1: Plan Perspective

The **FGS** installation kit (Fig 1-1) includes all of the necessary components and equipment for automated **FGS** operations for Lam 9600 TCP stand-alone tools.

2.0 **FGS** SYSTEM COMPONENTS

This section summarizes the parts and assemblies required for a complete installation of PLC controlled **FGS** System for Lam 9600 TCP tools. The primary assemblies supplied with the **FGS** Installation Kit are listed in Table 2.1.

Table 2.1: FGS TCP Kit Assemblies

2.1 **FGS**-101 (GPN 200-51-3056)

GPN	Description
200-51-3056	FGS-101
200-41-3070	FGS TCP Controller w/Cable Harnesses
200-41-3083	Load Lock Process Interface
200-41-3084	Gas Supply Control Manifold
200-41-3085	FGS Instrument Valve
200-41-3089	FGS Mounting Kit
200-41-3095	Heated Load Lock Plate

An **FGS**-101 unit is depicted in figure 2-1.

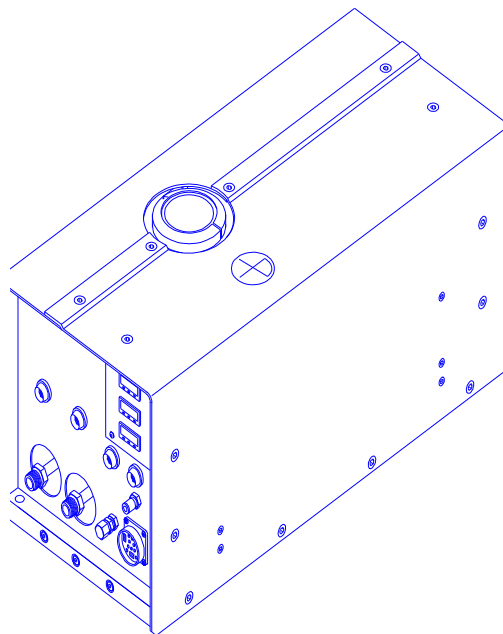
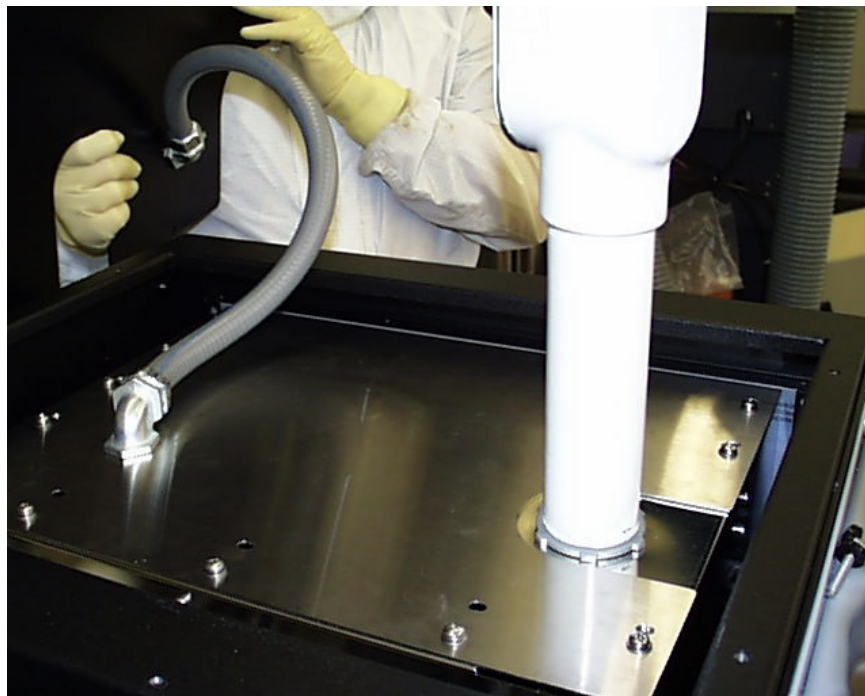


Figure 2 - 1: FGS-101

2.2 **HGS** Mounting Kit for 9600 TCP



HGS System mounted on top of the AC Tower



Galiso Inner Plate with 208V Power to HGS Mounting Plate

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2.2 **HGS** Mounting Kit for 9600 TCP (GPN 200-41-3089)

The **HGS** Mounting Kit includes an **HGS** Mounting Plate, Main Power Switch/Breaker, Power Cord, AC Interlock Plate, AMP Interlock Box Relocation Mount, and hardware. See Figure 2-2.

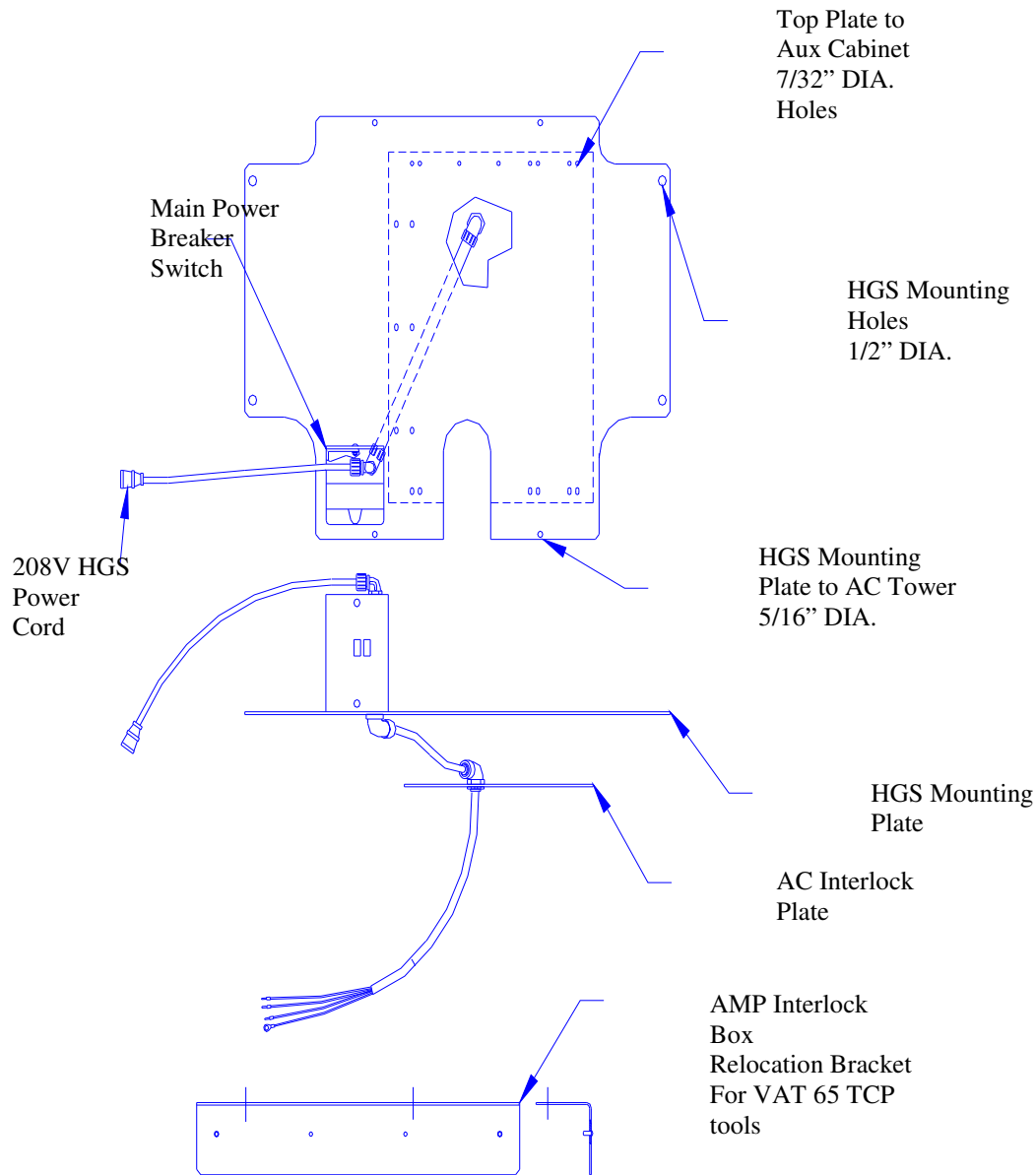


Figure 2 - 2: HGS-101 with Mounting Components

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2.3 Load Lock Process Interface Manifold



Process Manifolding to HGS-101 Unit

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2.3 Load Lock Process Interface Manifold (GPN 200-41-3083)

The 9600 TCP Load Lock Process Interface Manifold is depicted in figure 2-3. The Manifold includes the Vertical Pipe with Heater, Horizontal Pipe with Heater, Watlow Heater Controller, KF-40 Centering Ring, KF-40 Clamp Hex Handle, and KF-40 Clamp Tee Handle, to connect the **FGS** Process Outlet to the 9600 TCP Entrance Load Lock.

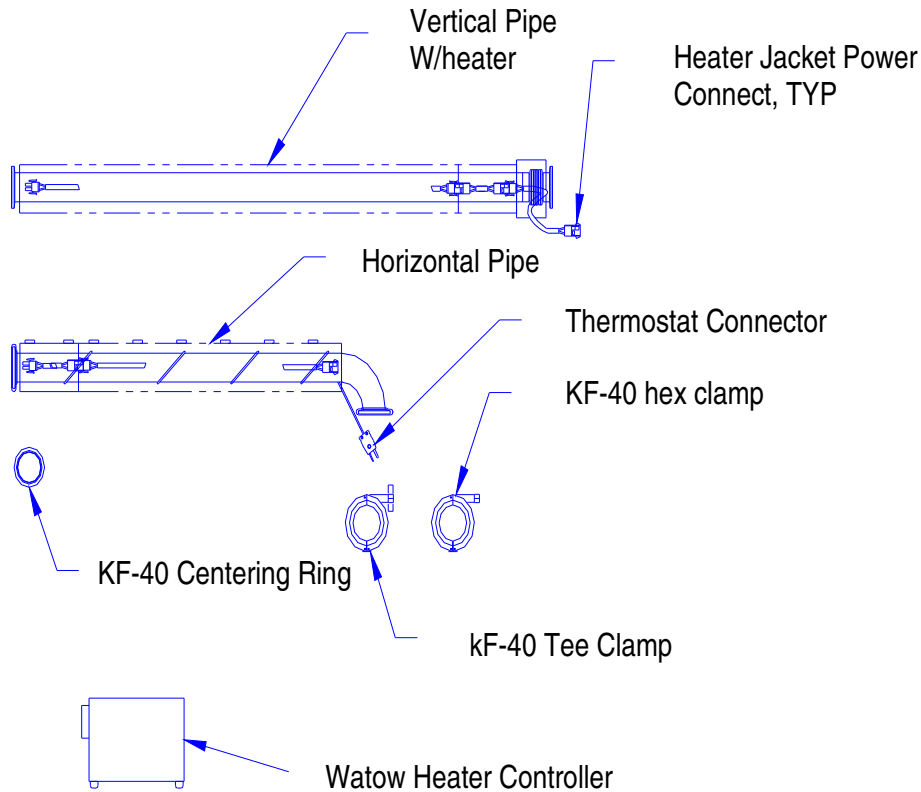
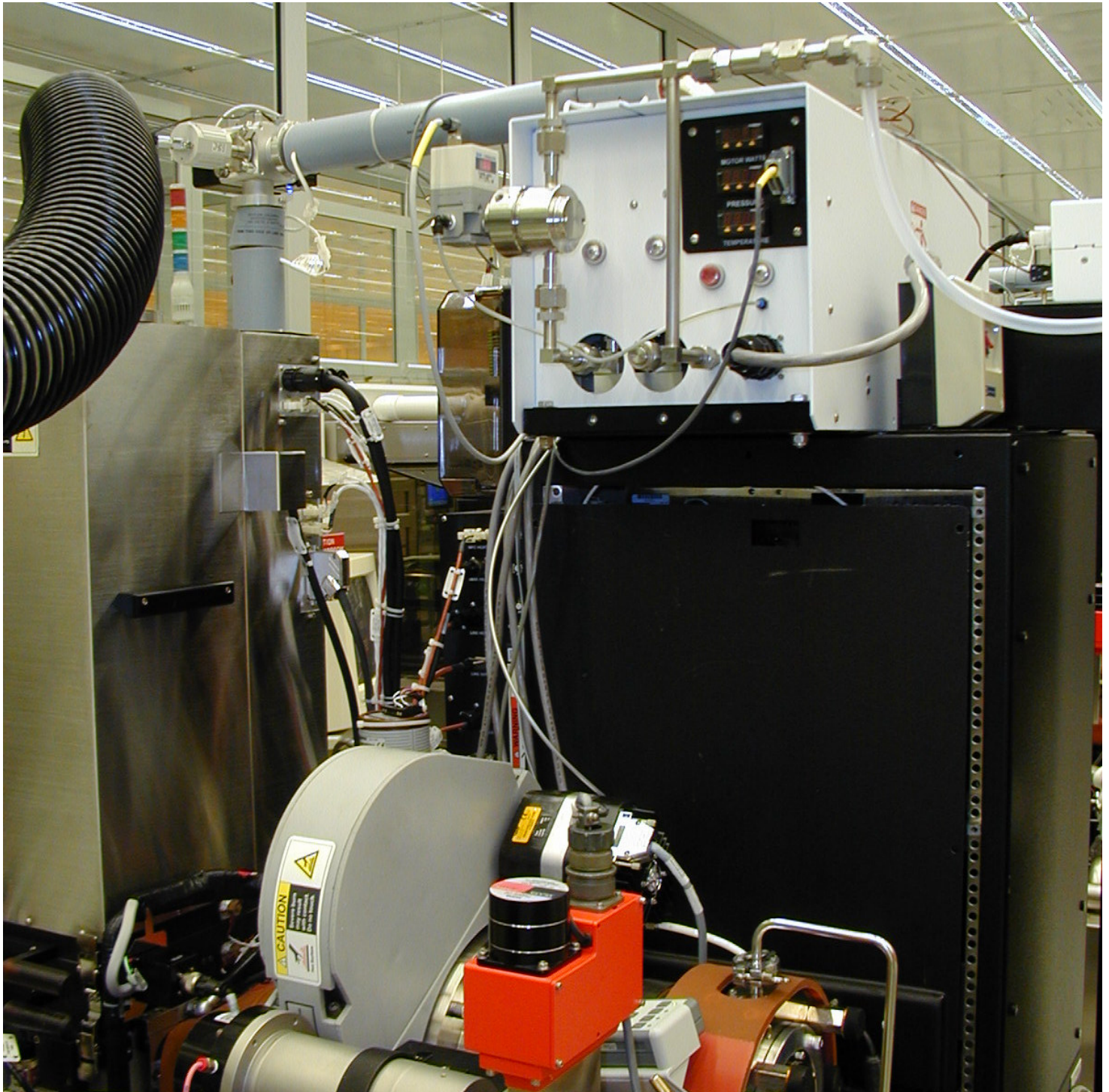


Figure 2 - 3:TCP FGS Process Inlet Manifold

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2.4 Gas Supply Manifold



Gas Supply Manifold shown mounted to HGS Unit

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2.4 **HGS** Gas Supply Manifold (GPN 200-41-3084)

The **HGS** Gas Supply Manifold is depicted in figure 2-4. The Gas Supply Manifold includes a Check Valve and an Electro-Pneumatic Regulator for automatic gas pressure/flow control.

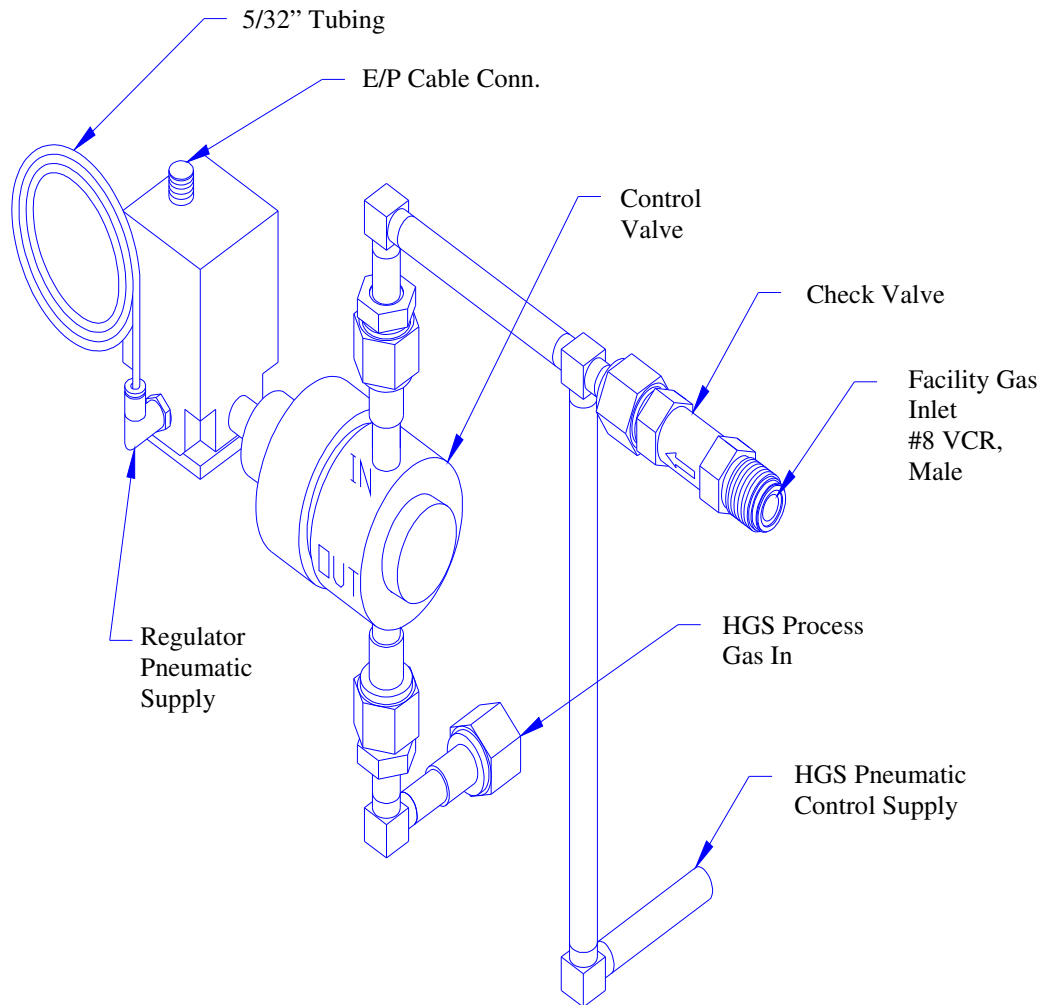
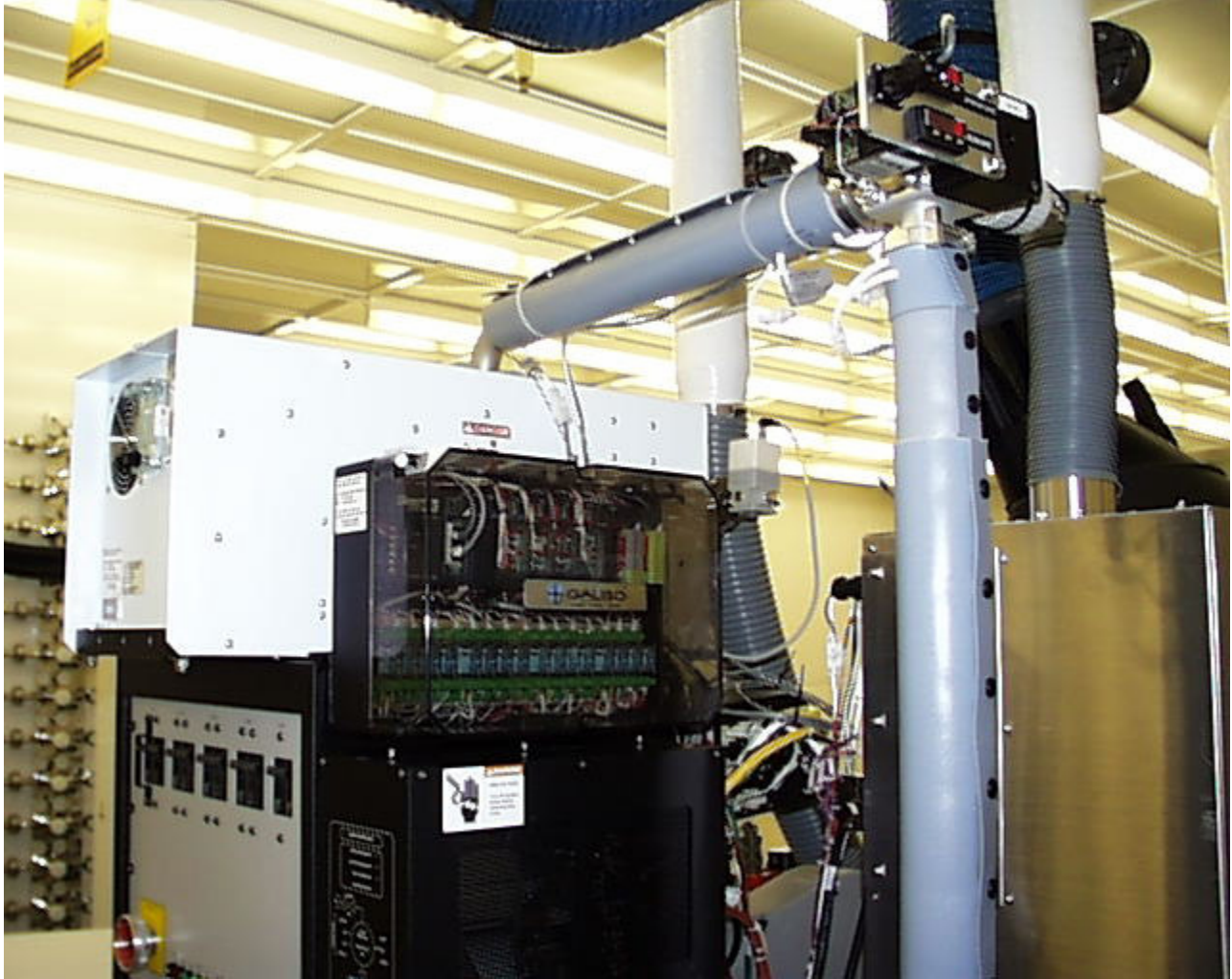


Figure 2 - 4: HGS Gas Supply Manifold

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2.5 Instrument Block Valve



**Instrument Block Valve: Always leave connected to the horizontal pipe.
Remove the vertical pipe for wet-cleaning.**

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2.5 **FGS** Instrument Valve (GPN 200-41-3085)

The **FGS** Instrument Valve includes a CDG for process pressure measurement, J-Type Thermocouple for temperature monitoring and Digital Controllers for display (LED) of process values. The instrument components are mounted to the main **FGS** Process Isolation Valve. See Figure 2.5.

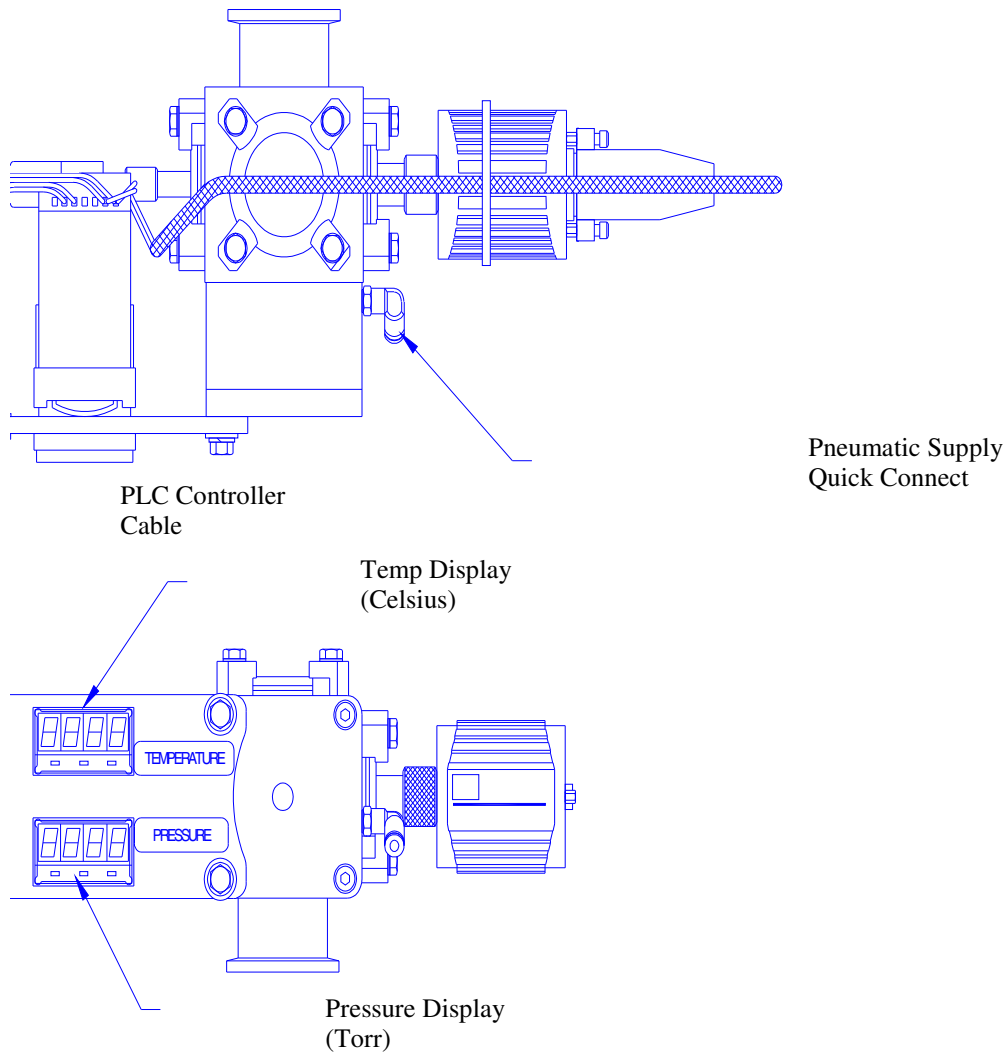


Figure 2 - 5: FGS Instrument Valve

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2.6 HGS Controller & Cable Harnesses



Galiso PLC shown mounted next to HGS unit.

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2.6 **FGS** Controller and Cable Harnesses (GPN 200-41-3070)

The **FGS** PLC for the 9600 TCP includes all the necessary monitoring and control modules to service the TCP Tool Load Lock, Main and DSQ chambers. Figure 2-6 depicts the **FGS** PLC. The cable harnesses are shown in Section 6.0 **FGS** Controller Installation.

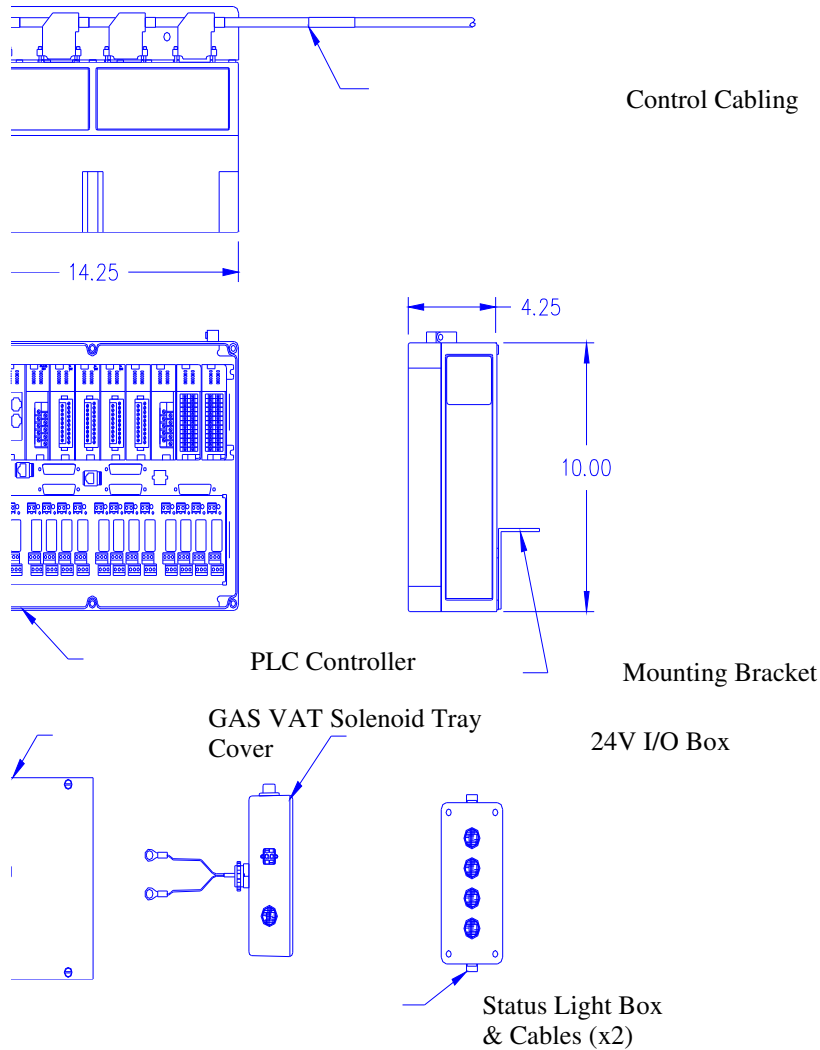
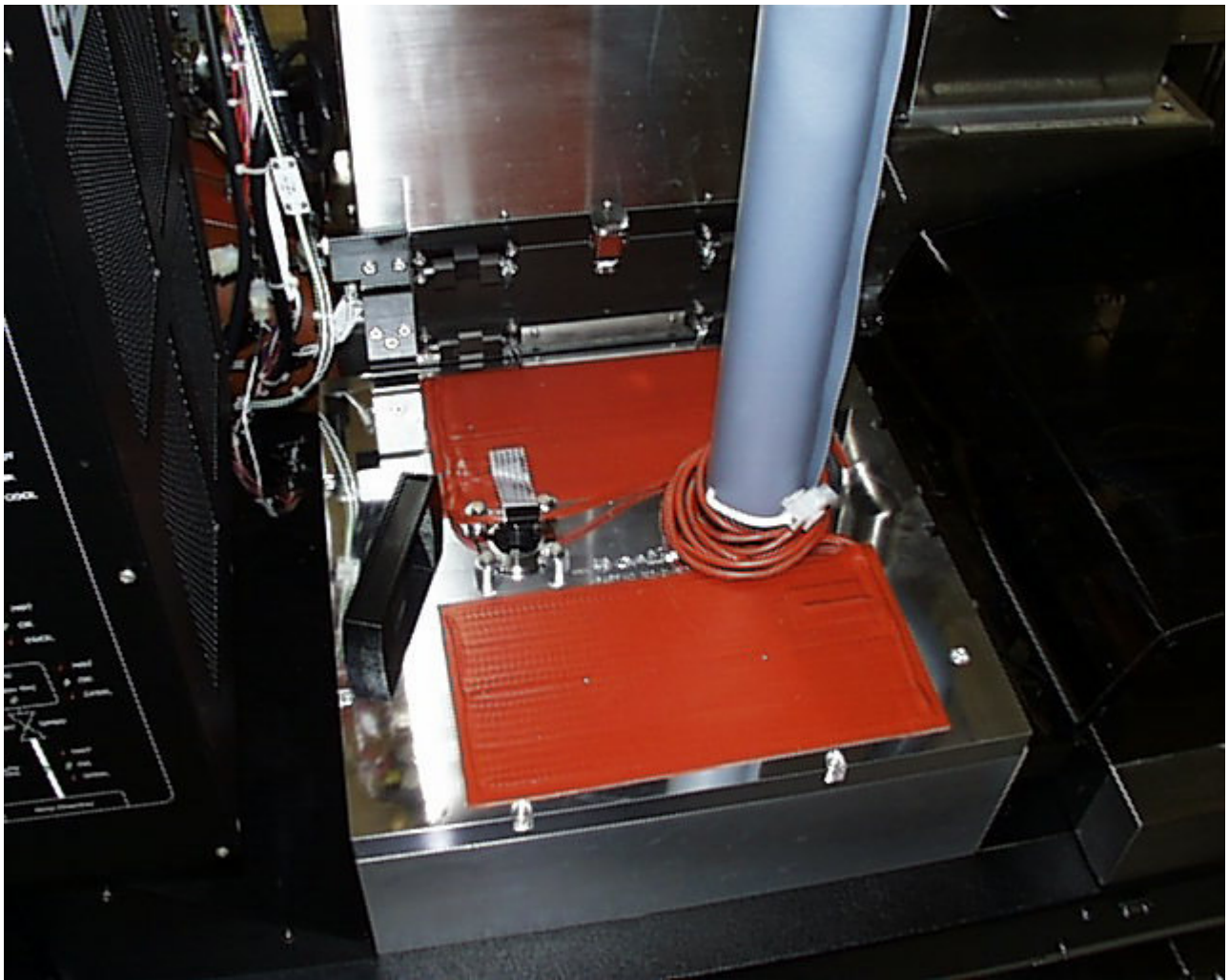


Figure 2 - 6: FGS PLC Module

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2.7 Galiso Heated Load Lock Plate



Galiso Heated ELL (HLL): Remove Vertical Pipe & Plate as one assembly when performing a wet-clean.

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2.7 Heated Load Lock Plate (GPN 200-41-3095)

The **FGS** Heated Load Lock Plate includes 2 heater blankets, a handle, 1 view port, and claw clamps with hardware, depicted in Figure 2-7.

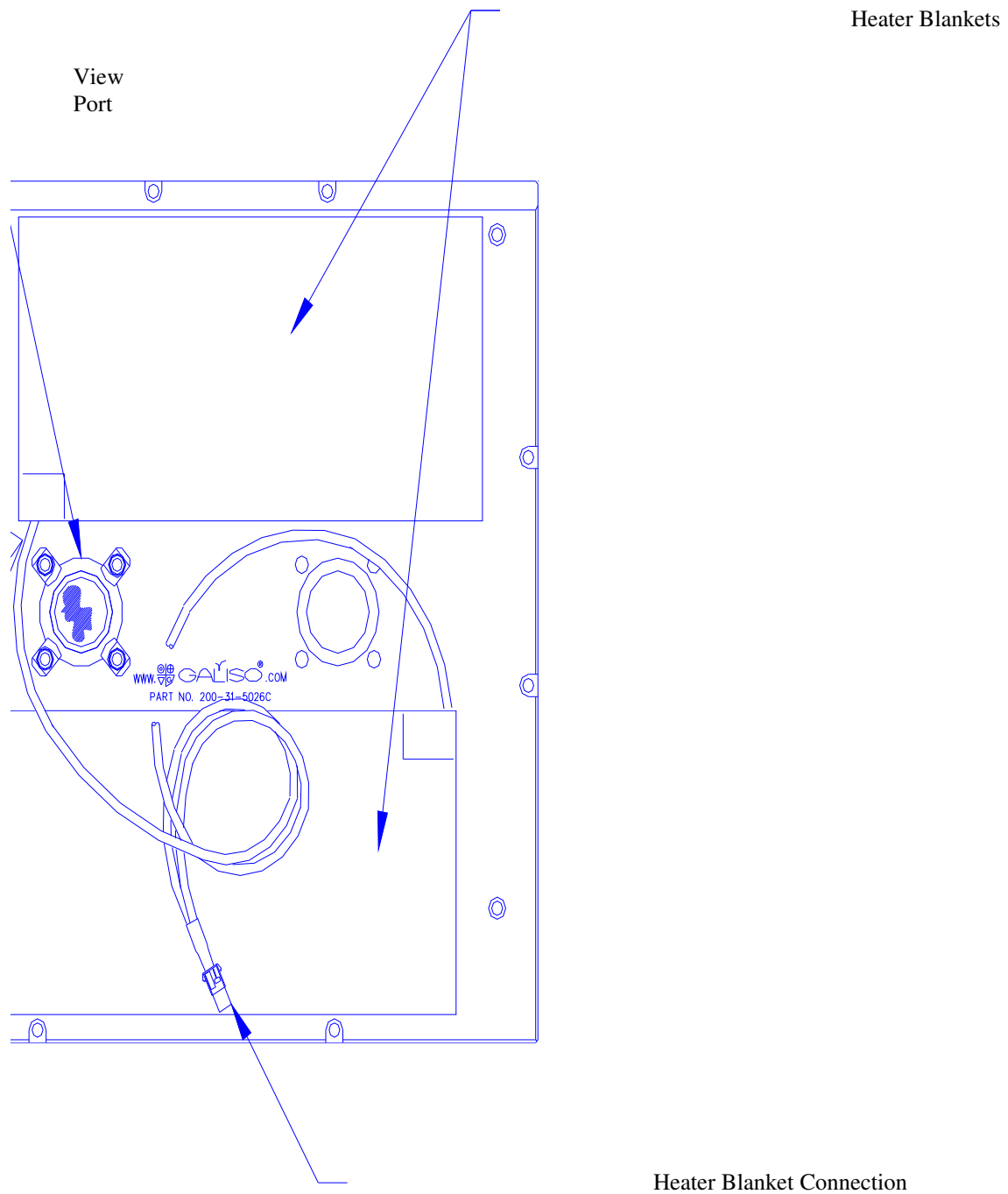


Figure 2 - 7: FGS Heated Load Lock Plate

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2.8 Heated End Point Window



Heated End-Point Window Assembly Galiso Supplied Items

Controller already included in the HGS Heated Load Lock Process Interface Manifolding.

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2.8 Heated End Point Window (GPN 200-41-3099)

The **FGS** Heated End Point Window Assembly includes the heater, mounting plate, center sight glass, and O-Ring. The dual controller is already included in the Load Lock Process Interface Manifold in section 2.3 of this manual.

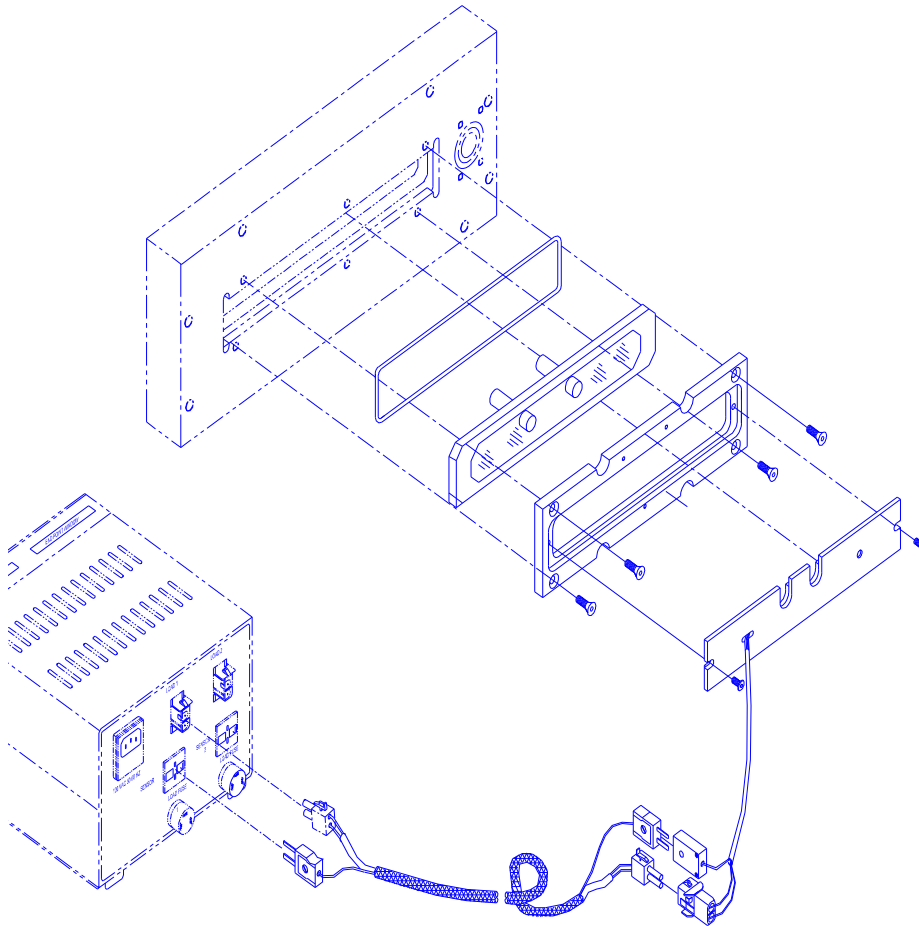


Figure 2 - 8: FGS Heated End Point Window

All components are Galiso supplied except the chamber plate.

3.0 SAFETY

Read all instructions before attempting to install or operate the **FGS** System.

GALISO INCORPORATED IS NOT RESPONSIBLE FOR DAMAGE OR INJURY CAUSED BY UNSAFE USE, IMPROPER MAINTENANCE OR IMPROPER APPLICATION OF THIS EQUIPMENT.

Contact your Galiso Incorporated representative for guidance if unsure of the proper safety precautions to be taken when installing or operating this equipment.

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- Installation of the **FGS** interface equipment requires manipulation of the TCP tool controls. The TCP tool must be shut off and in lockout/Tagout prior to commencement of TCP **FGS** interface equipment installation.
- Take all necessary precautions to ensure that installation personnel are not exposed to corrosive, flammable, volatile or toxic materials or gases.
- Take all necessary precautions to ensure that installation personnel are not exposed to electrical shock during TCP tool **FGS** interface cable installation.
- Interface equipment installation, **FGS** system adjustment or troubleshooting must be performed only by authorized, properly trained, and qualified personnel.

Any employer allowing use of the **FGS** System in a designated field of work, must distribute this manual to all users. The employer must also ensure all users read, understand and follow the instructions, safety warnings, labels, etc. as described in the manual.

3.1 **HGS** Power and TCP Tool Control System Installation

Galiso Inc. has designed the 9600 TCP **HGS** installation kit to minimize the need to install or maintain equipment that is energized and to minimize work that must be performed on components near exposed circuits. **There may be instances when work must be performed while electrical equipment is energized. It is the responsibility of TCP tool owners to ensure that the necessary electrical connections can be made safely within the Semi-S2 Guidelines during **HGS** Tool Control System installation.**

3.2 Heated Load Lock Adapter Plate Installation

The Heated Load Lock Adapter Plate mounts on the top of the 9600 TCP Entrance Load Lock Chamber. The Load Lock Process Pump must be isolated from the Load Lock during installation.

4.0 FGS POWER CONNECTIONS

The following instructions must be performed after a wet-clean. Do not condition the process chamber, until after the **FGS** Kit has been installed and cycle tested. Refer to Section 2.2 for Digital Pictures of the 208VAC & Mounting Kit.

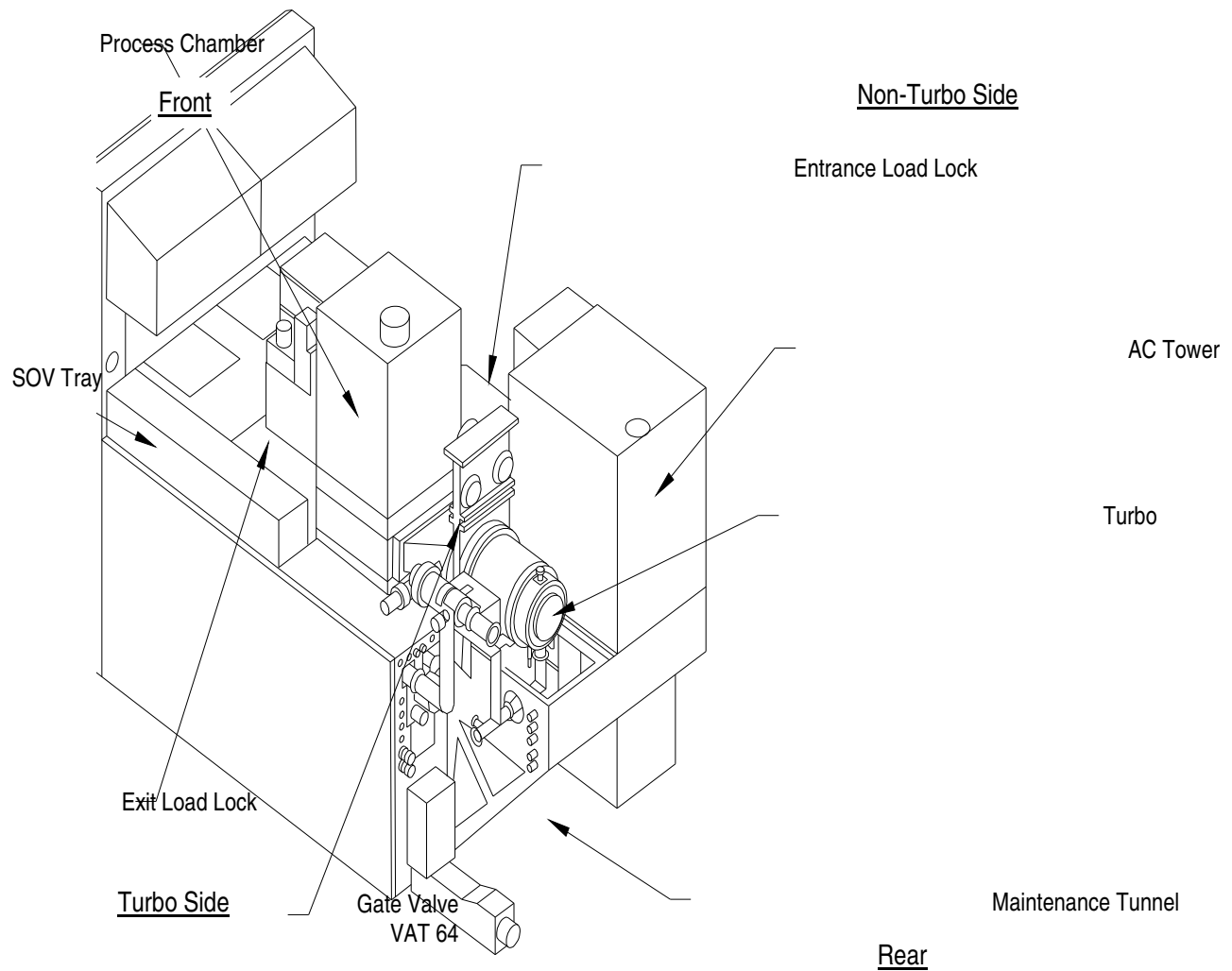
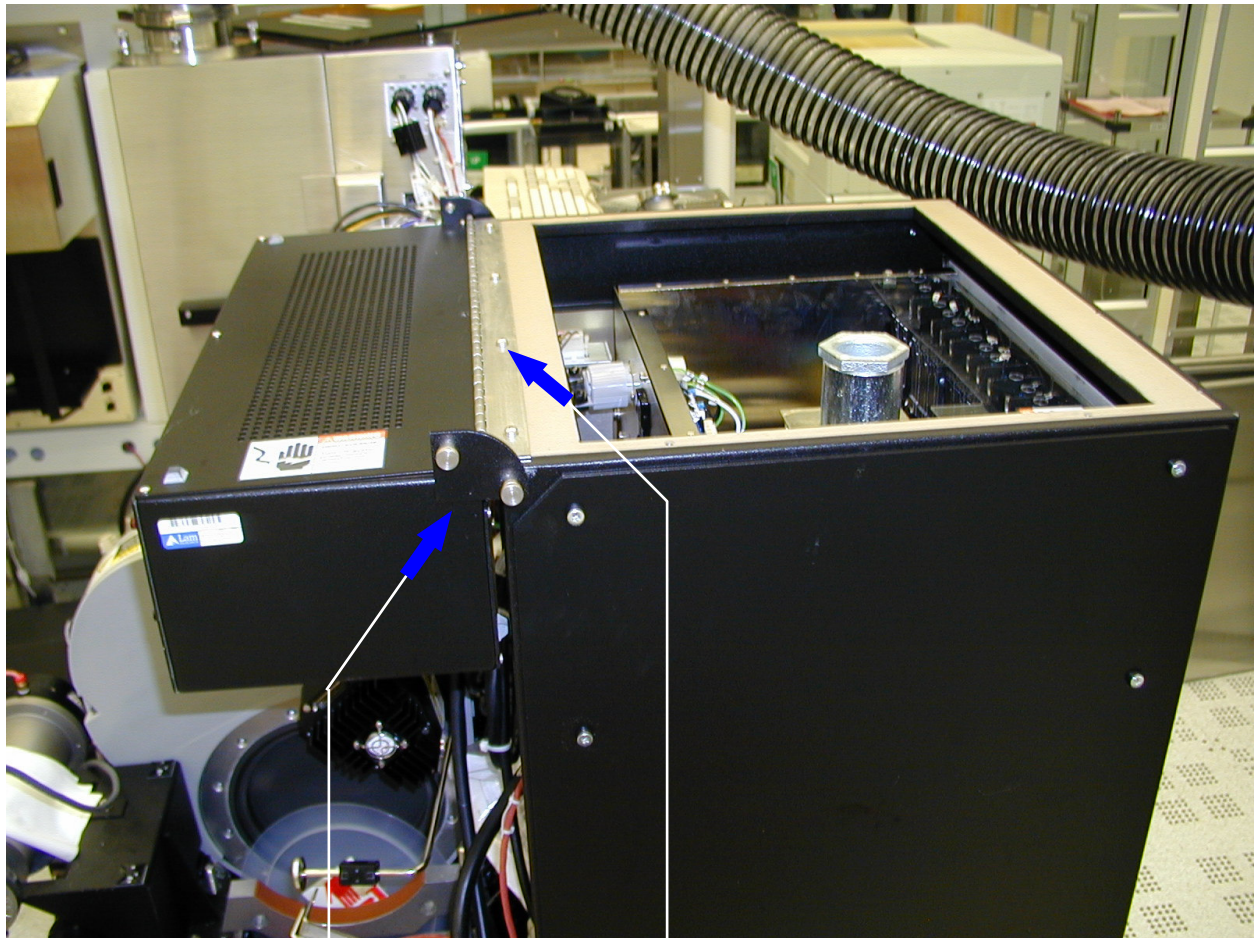


Figure 4 - 1: 9600 TCP

4.1 Removal of AMP Interlock box (on TCP tools so equipped)

Tools needed for this step: #2 Phillips screwdriver and a pair of channel lock pliers.

- A. Remove the screws holding the piano style hinge to the top of the AC Tower. Allow the indicator light box to rest on the turbo.
- B. Remove the end brackets from the indicator light box.
- C. The actual mounting of this box is done during the Section 5.4.



Use Channel Locks to
remove end brackets

Remove Screws

Figure 4 - 2: Removal of Indicator Light Box

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4.2 Electrical 208VAC Power



Green — Black — Red — White

AC Tower

Galiso 208V Power Wiring to K1: T1=Black, T2=Red, T3=White
Connect the Green ground wire to screw labeled GND on bottom of box.

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4.2 Electrical – 208 VAC Main Power

Tools needed for this step: a 3/16” slotted screwdriver, 3/8” nut driver, 208V phase monitor, and a #2 Phillips screwdriver.



Take All Necessary Precautions To Ensure That Installation Personnel Are Not Exposed To High Voltage Electrical Shock During HGS Power Cable Installation.

Proceed with a Lockout/Tagout.

Remove the top cover plate on the 9600 AC tower and the interior AC cover plate. Route the main power cable conductors attached to the Galiso power cover plate to the 9600 TCP three phase main disconnect contactor and terminate the wires. See figure 4-3.

Use the Galiso Inc. phase monitor to check for correct phasing. Hook it to the end of the HGS Power Connector. The arrow on the monitor should be pointing to the 210 selection. Turn on the power switch on the HGS Main Power Switch Enclosure. When it is hooked up correctly, the light on the Phase Monitor will come on. If it does not come on, then go to your wire termination in the LAM AC Tower, and switch any two wires on the contactor. Check it again to be sure the phase is correct before securing both the HGS AC Interlock Plate and the HGS Mounting Plate.

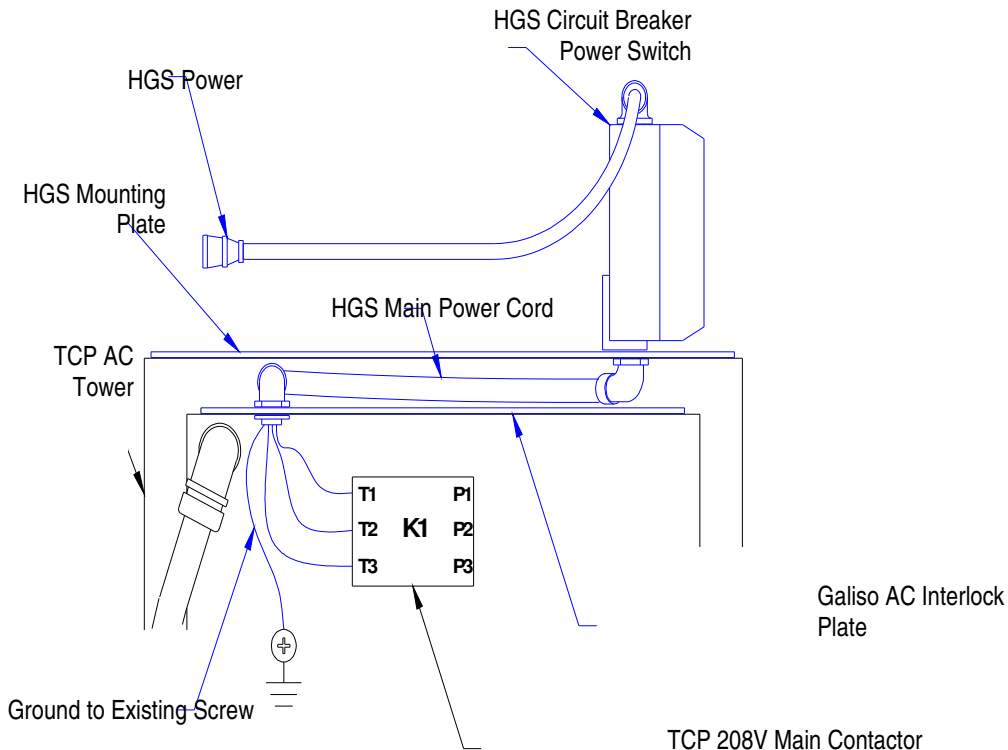


Figure 4 - 3: 208 VAC Power Wiring

4.3 AMP Interlock Box Relocation (Part 1 on TCP tools equipped with the VAT 65 Valve).

Part 1 of the AMP Interlock Box relocation is temporary because the same mounting holes are used to mount the HGS unit.

Tools needed for this step: 3/8" Nut driver and two 9/16" combo wrenches.

Use 3/8" x 1" bolts to secure the relocation mount to the **HGS** Mounting Plate. See Figure 4-4. Place the Indicator Light Box onto the studs. Place flat washers on and thread the nuts tight with the nut driver.

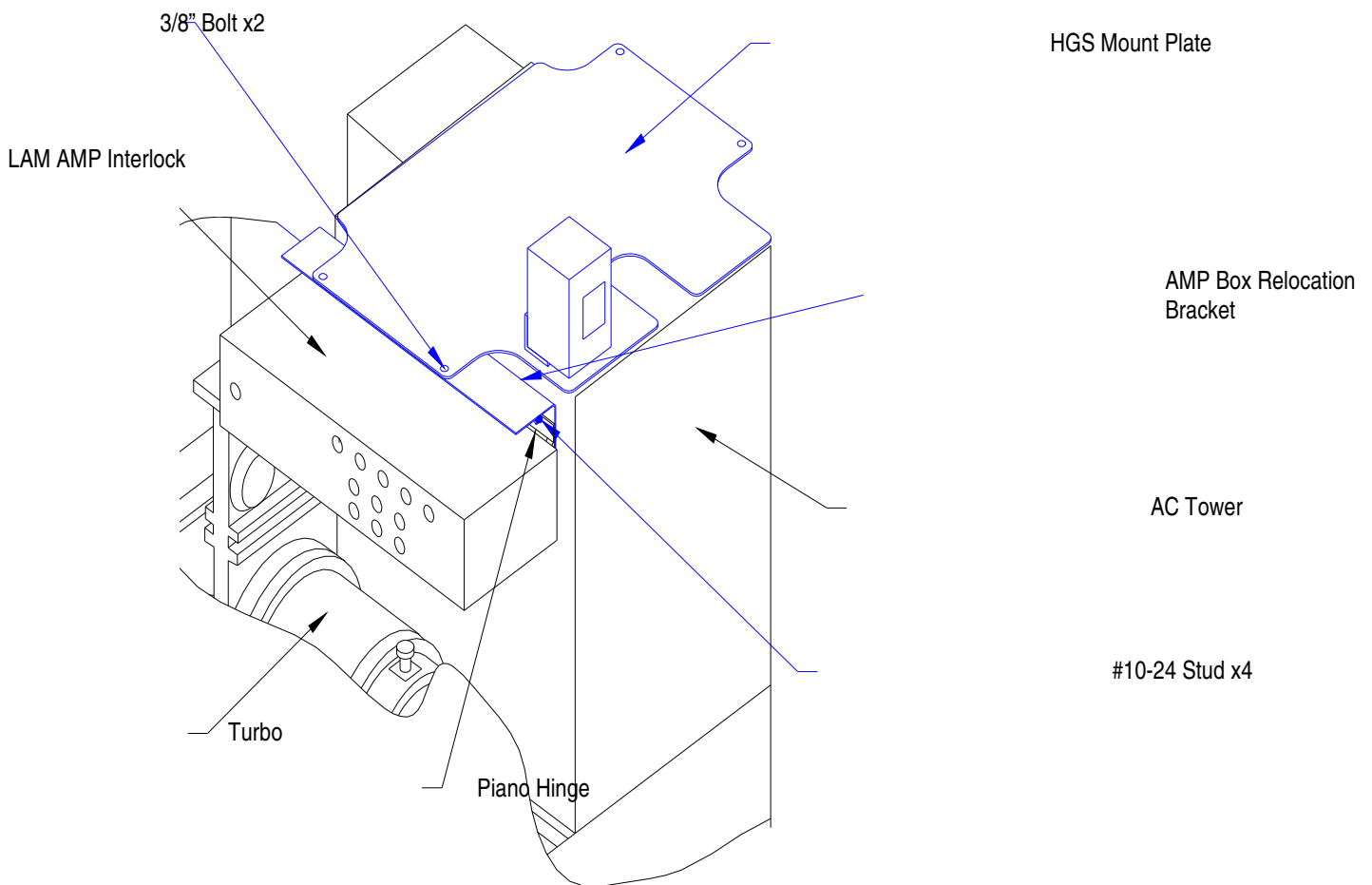
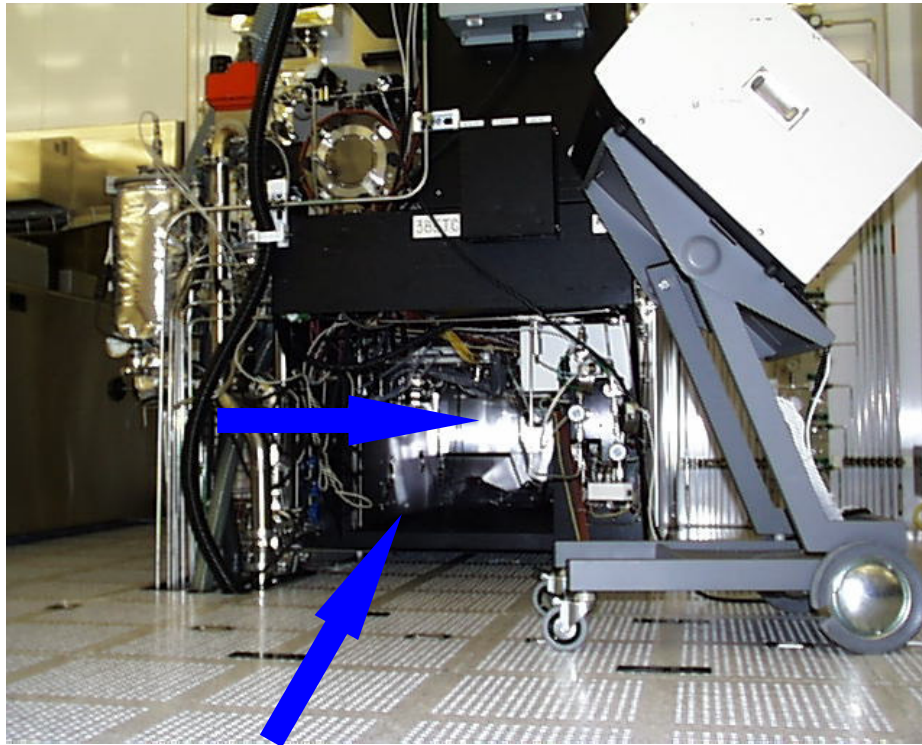


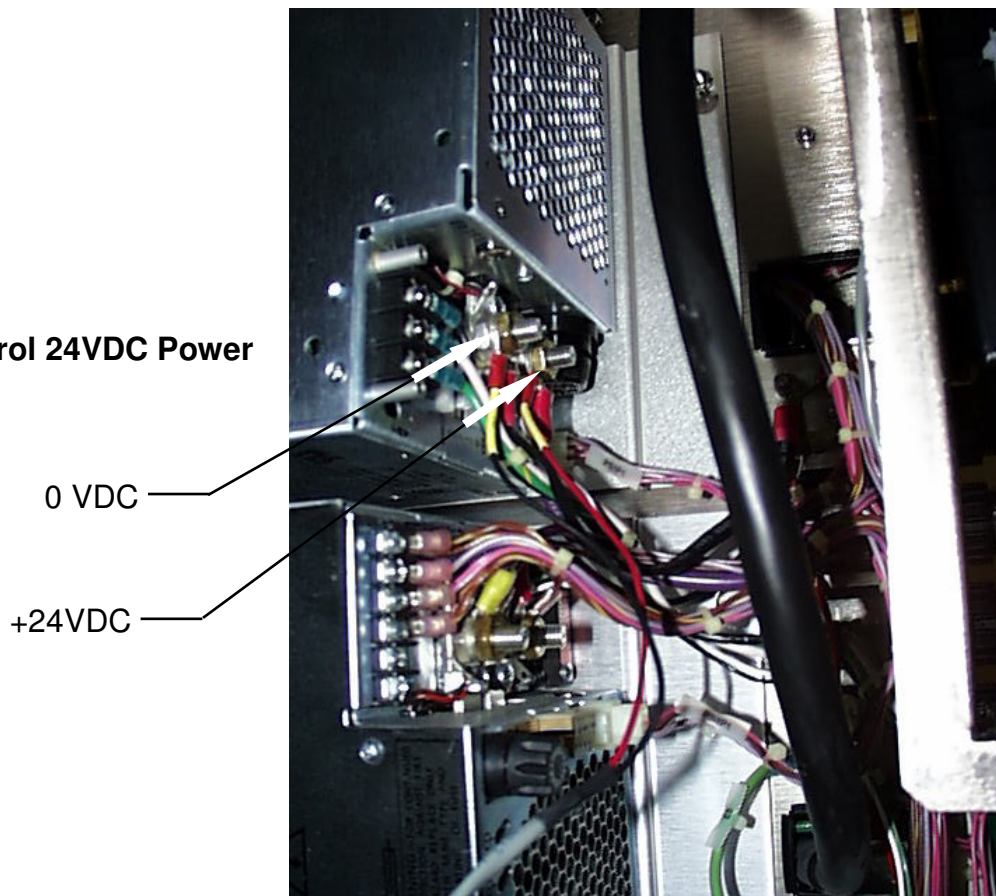
Figure 4 - 4: Temporary Mounting of AMP Interlock Box

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Maintenance Tunnel

4.4 PLC Control 24VDC Power Connections



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4.4 PLC Control 24 VDC Power Connection

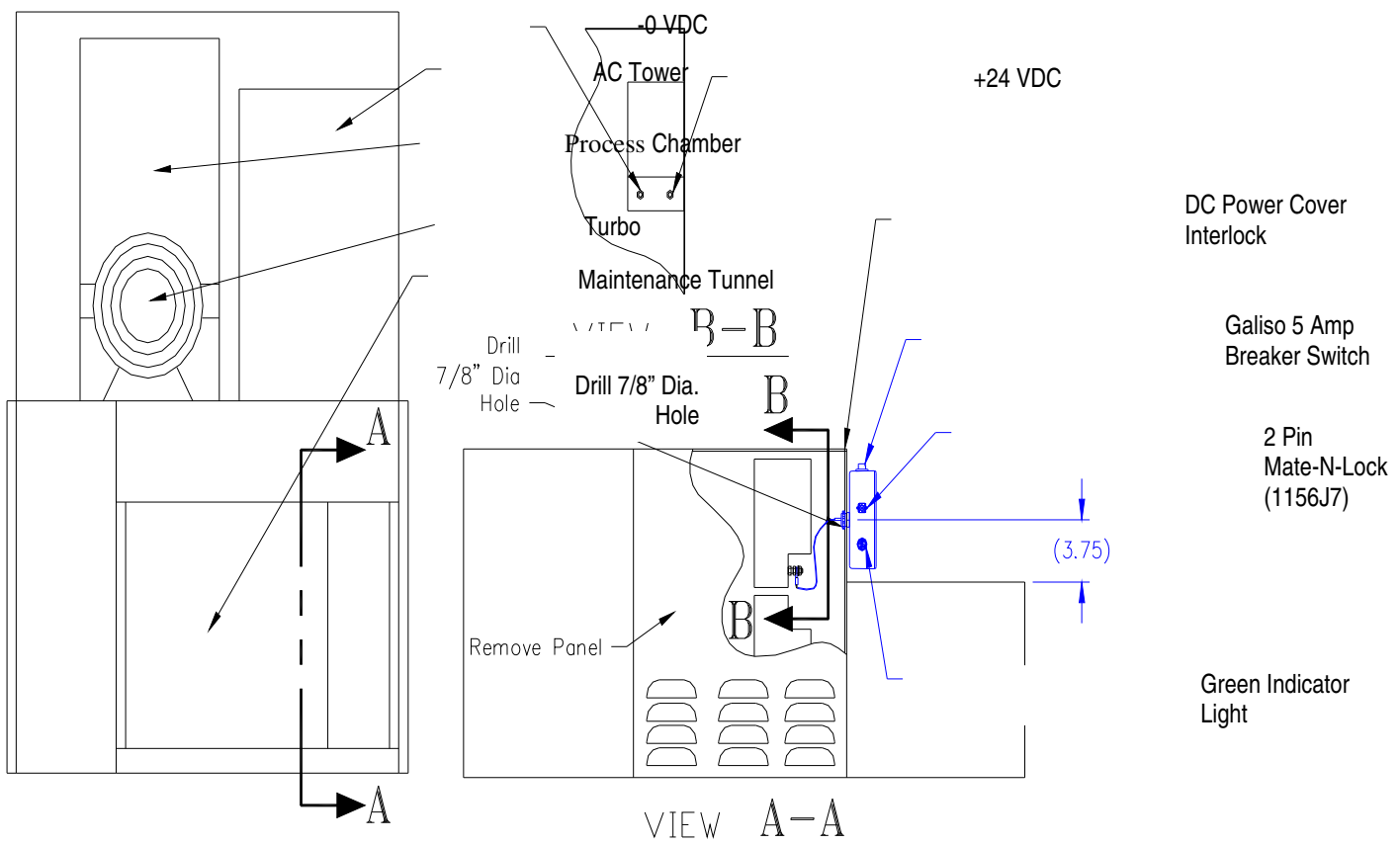
Tools needed for this step: 1/4" Drive Ratchet with 9/16 Socket, a pair of channel lock pliers. 3/8" drill bit with drill and 7/8" Knock out Punch.

Remove the cover from the DC panel in the 9600 TCP access tunnel. Drill/punch a 7/8" hole as shown in Fig 4-5. Feed the red and black wires with the ring terminal ends through the hole and secure the breaker/connector box with the ring nut provided. Connect the red and black wires to the +24 and 0 VDC terminals respectively and secure the ring terminals with the 5/16" jam nuts and star washers provided. Install the DC Cover back onto the enclosure. Be sure to latch the upper left corner, where the cover interlock is located. Connect the 2 Pin Mate-n-Lok connector to the receptacle on breaker box and route the cable to the HGS Controller.

! CAUTION !

Do Not Connect to the 15 VDC Power Terminals. The 24 VDC terminals are labeled and are above the 15 VDC Terminals.

Figure 4 –5: 24 VDC Power Connections



5.0 HGS EQUIPMENT INSTALLATION

This section covers the Gas Supply Manifold, mounting of **HGS** Heated Load Lock Plate, Piping, **HGS** Instrument valve, PLC Controller, Pneumatic Control Valve, ELL Door Actuator Modification, Heated End Point Window Assembly and the Watlow Heater Control Settings.

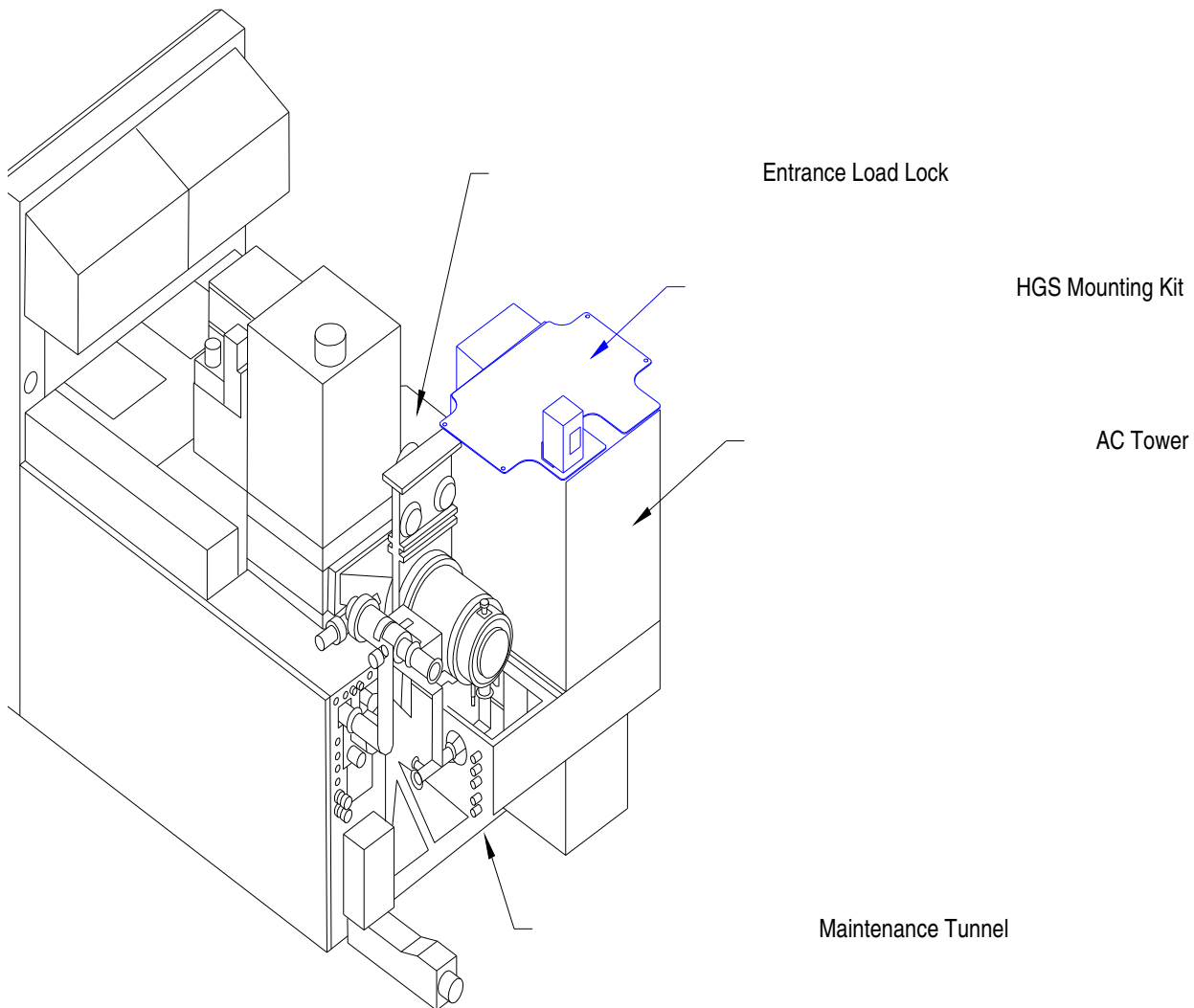


Figure 5 - 1: 9600 TCP with HGS Mounting Kit installed

5.1 Process Gas Supply Control Manifold Connections

Tools needed for this step: 1/2" & 9/16" combo wrench, and 2, 12" crescent wrenches.

Install the Gas Supply Manifold onto the front of the **HGS** -101 unit. Connect a 1/2" stainless steel process gas supply tubing line to the VCR-8 connection provided. See Facility Gas Inlet in Fig. 5-2. The high purity Nitrogen (or Argon) supply should be at 80-100 psig. Note that the gas control manifold includes a pneumatic control supply to the **HGS** unit.

Connect the 5/32" Poly Tube from the pneumatic supply connector on the E/P regulator to the quick connect on the **HGS**.

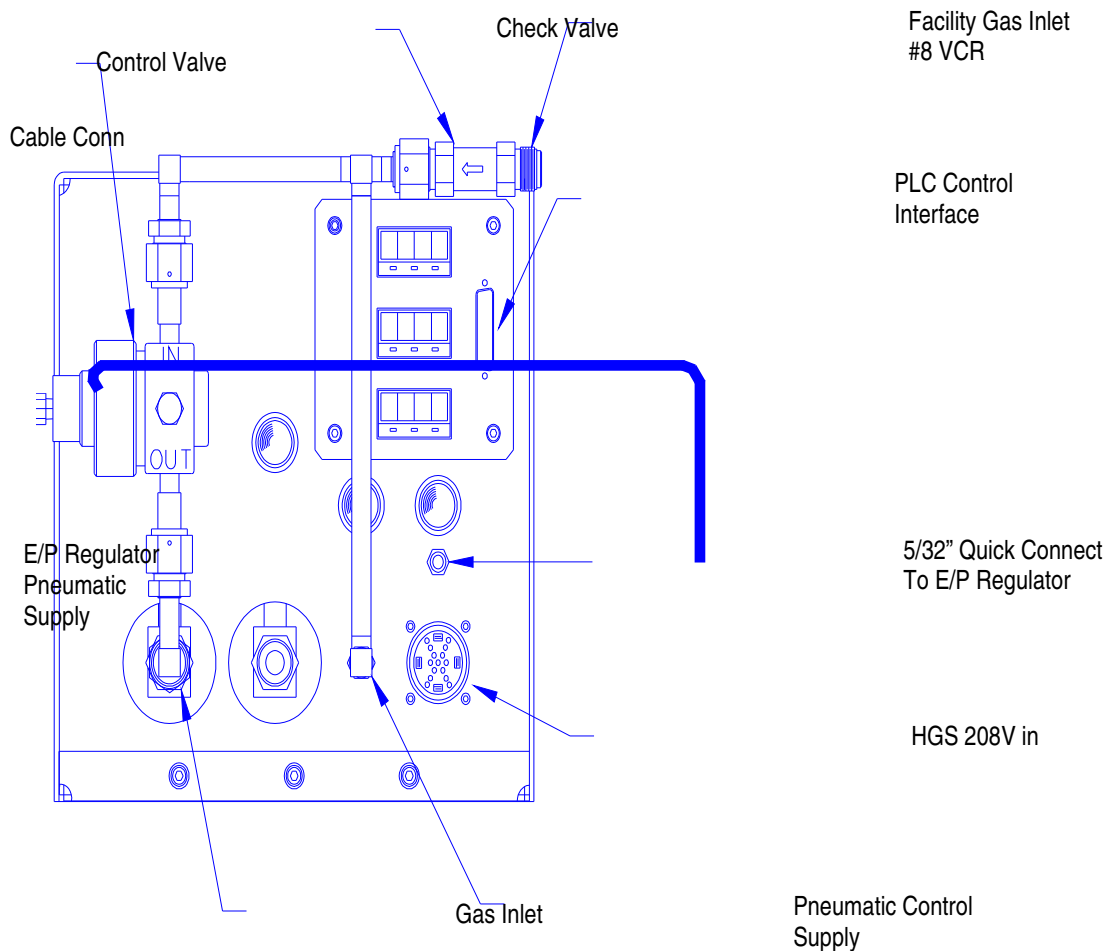


Figure 5 - 2: HGS Process Gas Supply Manifold

5.2 Mounting the HGS Unit

Tools needed for this step: 9/16” box wrench and 3/8” ratchet with 9/16” socket.

Units with AMP Interlock Box refer to section 5.3 AMP Interlock Box Relocation (Part 2).

Mount the HGS unit using the 3/8” bolts supplied; see Figures 5-3 and 5-4. Keep the (4) 3/8” x 2” bolts with nuts in a nearby location so that you can slip them into place without leaving the HGS unattended.

Lift the HGS unit up to the top of the AC Tower from the non-turbo side. Slide it into place over the mounting holes. See Figure 5-3.

Reminder: DO NOT ACCIDENTALLY BUMP THE EMO BUTTON!

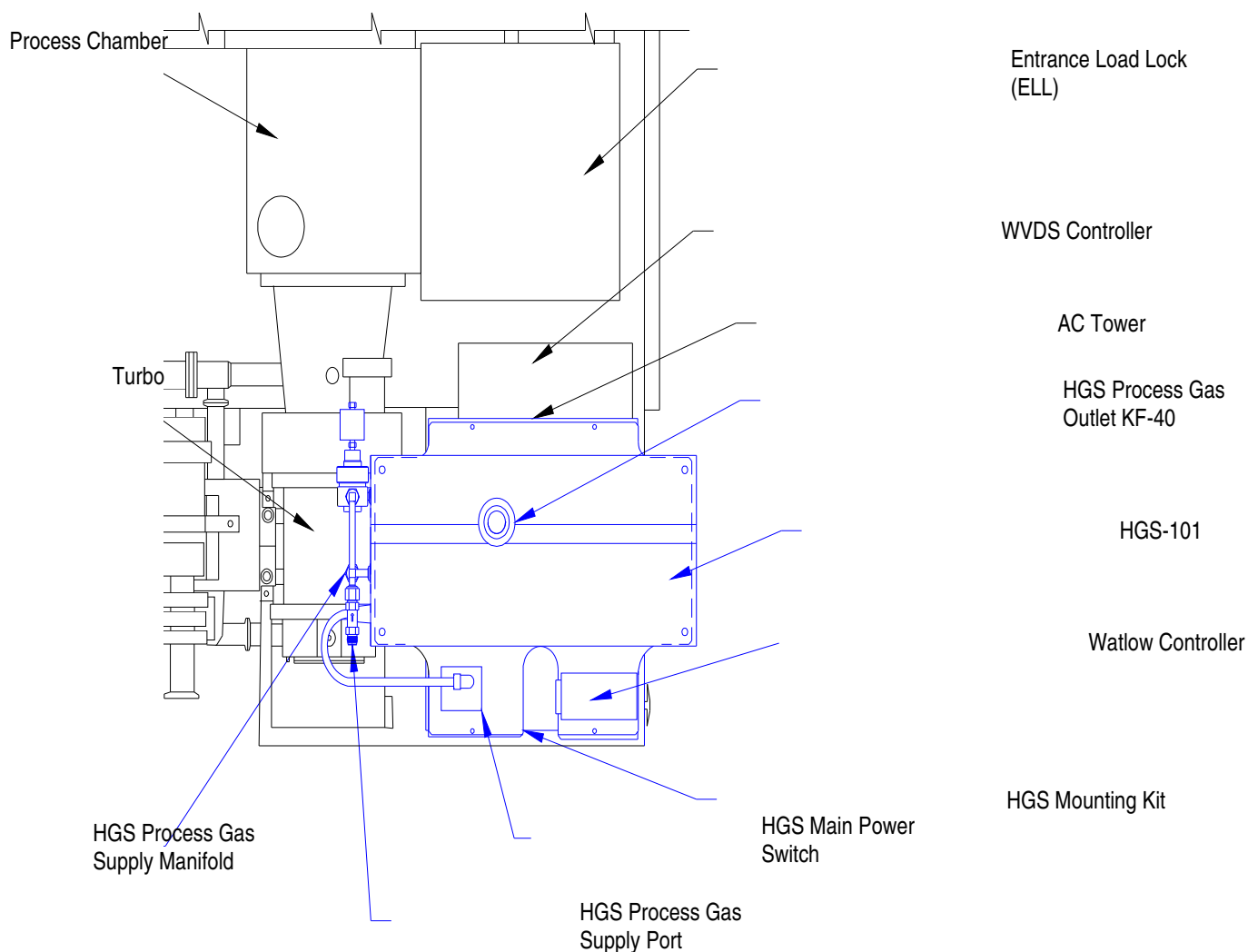


Figure 5 - 3: HGS Mounting – Top View

5.3 AMP Interlock Box Relocation (Part 2)

Note: On TCP tools with the AMP Interlock Box & a VAT 65 Valve.

Tools needed for this step: 3/8" nut driver, 9/16" Box end wrench, and a 1/4" drive with 9/16" socket.

First remove the AMP Relocation Bracket from the AC Tower.

Install the **FGS** using only the bolts that are on the non-turbo side of the AC Tower. Thread the nuts down on those two bolts only. Leave them loose enough to move the **FGS** unit as needed to line up the other side.

DO NOT ALLOW THE FGS UNIT TO SIT ON THE MOUNTING PLATE WITHOUT THOSE TWO BOLTS & NUTS HOLDING IT IN PLACE!

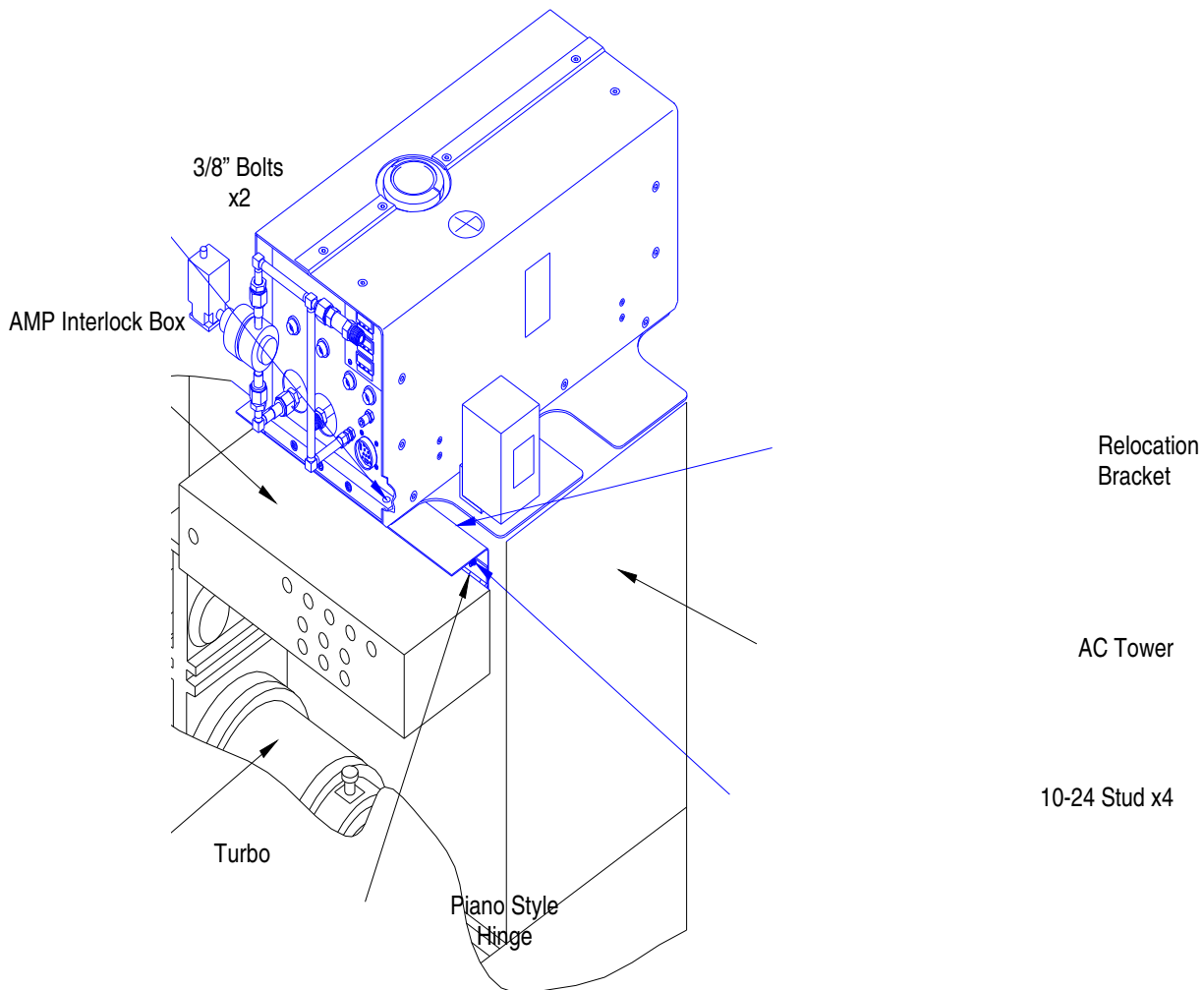


Figure 5 - 4: AMP Interlock Box Relocation

On the other side, above the turbo area, place the bolts into the mounting holes. Hold the AMP Interlock Box Relocation Mount up and into the bolt holes. See Figure 5-4.

5.4 Mounting the **HGS** Unit, continued

Mount the Watlow Controller onto the **HGS** mounting plate. Strip the backing off of the other side of the foam tape and stick the Controller on top of the **HGS** Mounting plate as shown in Figure 5-3. You may need to supply a 110v extension cord. Plug the cord into an adequate power source on the tool.

If the space on the **HGS** mounting plate is not available, find space on the tool that is accessible in order to make adjustments to the controller. Mount in the same manner, with the foam tape. **DO NOT** mount it on the **HGS** unit.

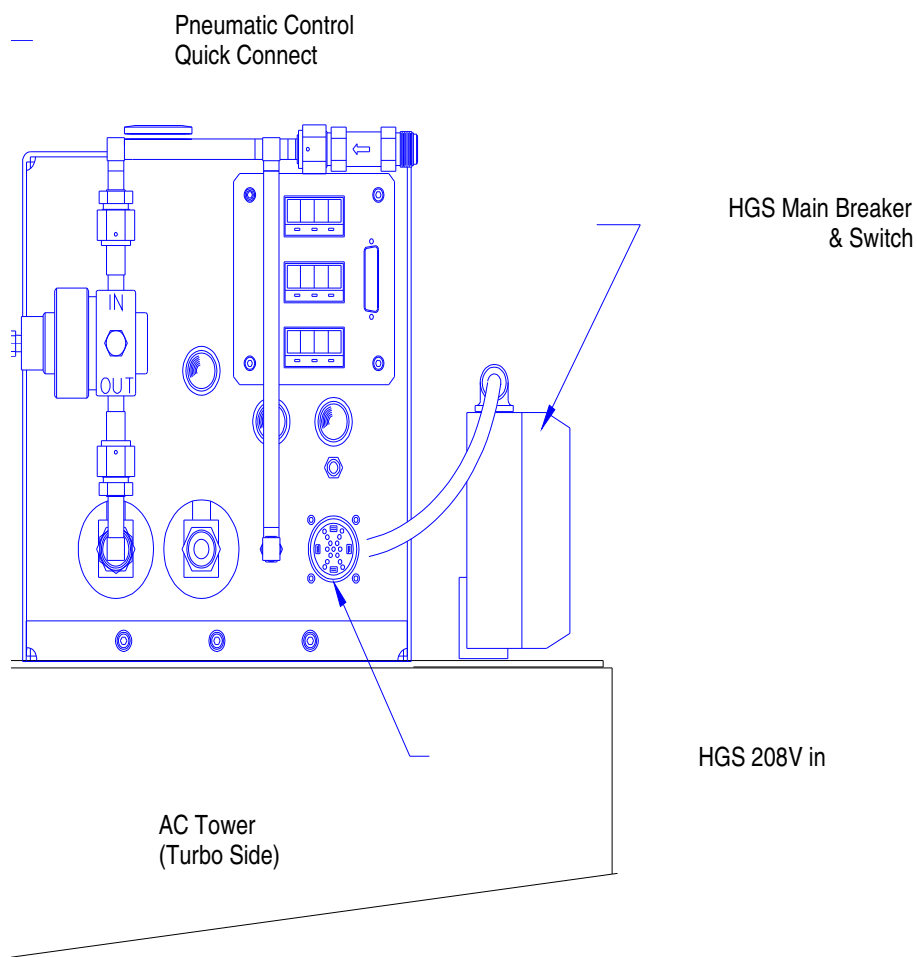


Figure 5 - 5: HGS Mounting – Turbo Side View

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5.5 Vertical Process Pipe and Heated Load Lock Plate Assembly

Tools needed for this step: one 10mm Box end wrench.

All sealed connections must be cleaned using Isopropyl Alcohol (IPA). They must be free of all residue and foreign material. Remove the seals from the centering rings to wipe clean if necessary. Clean and wipe the top of the Heated Load Lock Interface Plate (HLL) with IPA. Be certain to clean the process pipe mounting area and the pipe flange on the end going to the HLL plate. Connect the vertical tube to the Galiso HLL Interface Plate as shown in Figure 5-6.

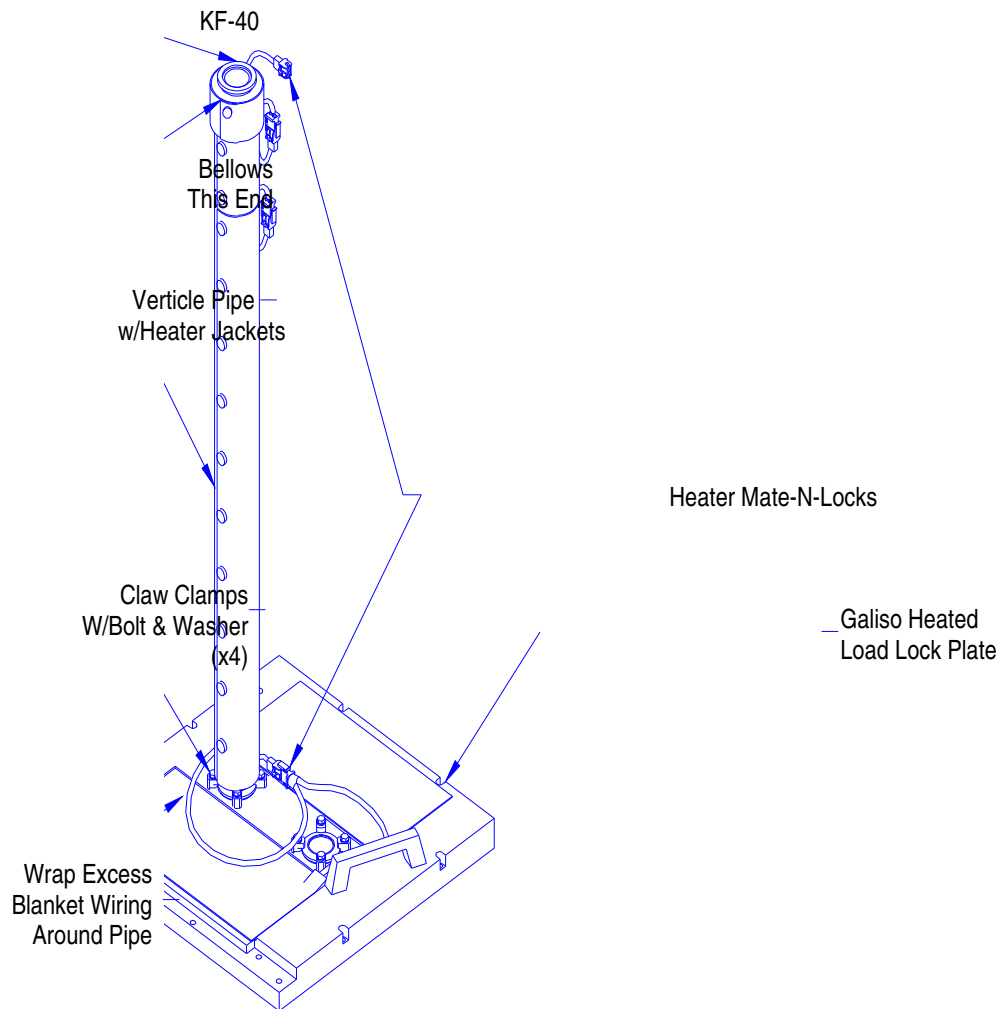


Figure 5 - 6: Vertical Process Pipe Mounting

Carefully lean the HLL to its side, and allow the process pipe to rest in such a way that you can clean the bottom side of the plate. Clean it with IPA and set aside.

Note: The Vertical Process Pipe remains connected to the HLL at all times. To remove the HLL Plate, disconnect the Vertical Process Pipe from the Instrument Block Valve at the KF-40 connection underneath it.

5.6 Vertical Process Pipe and Heated Load Lock Interface Plate Mounting

Tools needed for this step: one 3/16" Allen wrench, vacuum cleaner.

Remove the LAM 9600 Load Lock View Plate from the top of the Load Lock Chamber. Vacuum the screw holes to get all metal shavings out of the holes. Examine the female thread areas for thread damage and resolve any damaged thread issues at this time. Perform the normal procedure for cleaning this chamber.

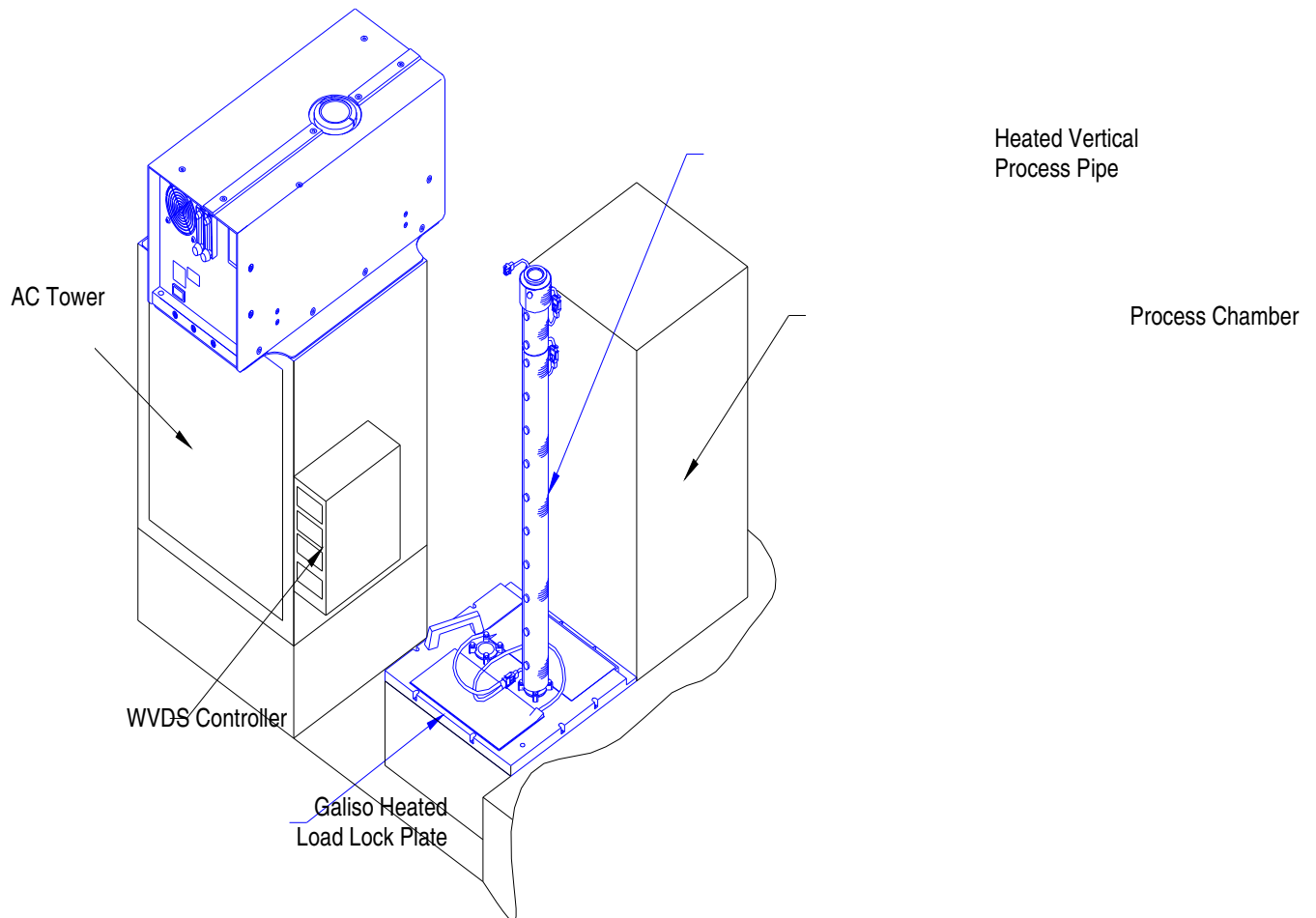


Figure 5 – 7: Heated Load Lock Plate Mounting

Wipe the O-Ring Groove with IPA until there are no traces of residue on the Alpha Wipe cloth. Be certain that the entire groove area is clean and free of contaminants. Perform the same process with a NEW O-Ring. Properly install the O-Ring. Immediately after installing the O-Ring, give the bottom of the ELL Lid a final wipe and carefully place it directly into position on the chamber, making sure that the orientation is correct. Use the Galiso supplied 1/4-20 x 3/4" SST screws to secure the plate. Be certain to start the threads of all screws first, before tightening any of them. Torque them little by little and in opposing sequence until tight.

DO NOT OVER TIGHTEN.

5.7 Horizontal Pipe and Instrument Block Valve

Tools needed for this step: one 10mm box end wrench

Remove the KF-40 blank from HGS process gas outlet. Clean the seal on the centering ring, clamp, and pipe flanges with IPA. Mount the horizontal pipe to the HGS. Leave it loose enough to maneuver into place without stressing the joint. After cleaning all sealed areas on the vertical pipe, centering ring, and Instrument Block Valve, mount the valve to the vertical pipe first, leave it loose. Then connect to the horizontal pipe flange. Tighten them both by tapping around the clamps while tightening to ensure centering, and even clamping on the flanges.

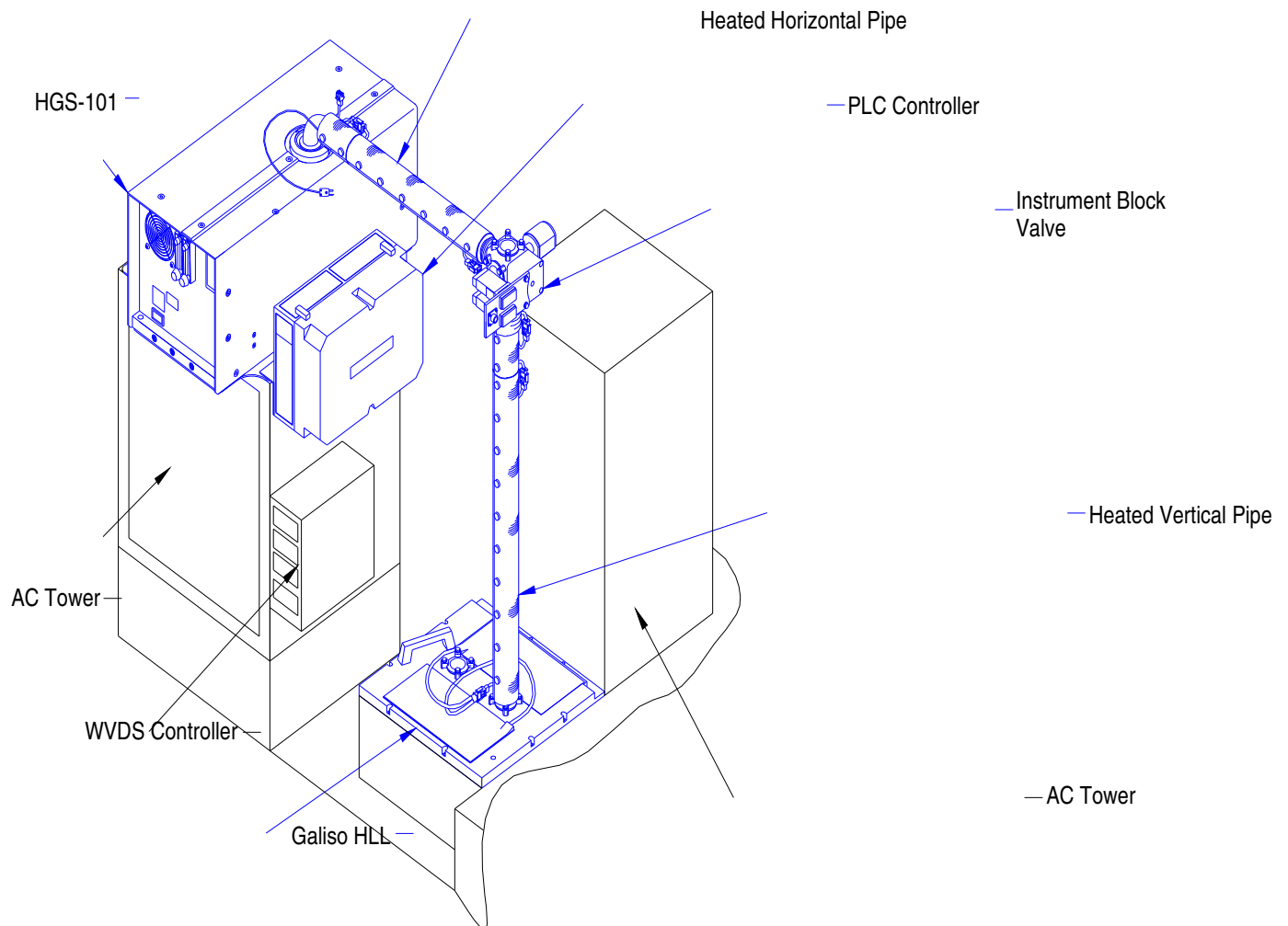


Figure 5 – 8: Horizontal Pipe Installation

Note: Do not remove vertical HGS pipe from Load Lock Plate for wet-cleans.

- a) Disconnect from below Instrument Block Valve KF-40 clamp with tee handle.
- b) Remove the ELL & Vertical Pipe as one piece.
- c) Place the plate assembly aside without scratching the bottom surface or stressing the bellows.

5.7 Horizontal Pipe and Instrument Block Valve (continued)

Tighten the other end of the horizontal pipe in the same manner. Connect all of the jacket and blanket connectors and route the final jacket connector from the end of the horizontal pipe to the Watlow controller. Do so in such a way that the **HGS** side panels can be removed without disconnecting the wire. Route the temperature probe wire in the same way. Plug them both into the Watlow Controller. Do not tie wrap anything at this time.

5.8 PLC Controller Mounting

Tools needed for this step: one #2, long shank, Phillips screwdriver.

Mount the PLC Controller as shown in Figure 5-9. If you reinstalled the Phillips head screws on the ELL side of the AC Tower Plate, remove them at this time. Use the Galiso supplied (longer screws) hardware to mount the PLC Controller enclosure with cables attached.

Controller cable harness connections are discussed in Section 6.0.

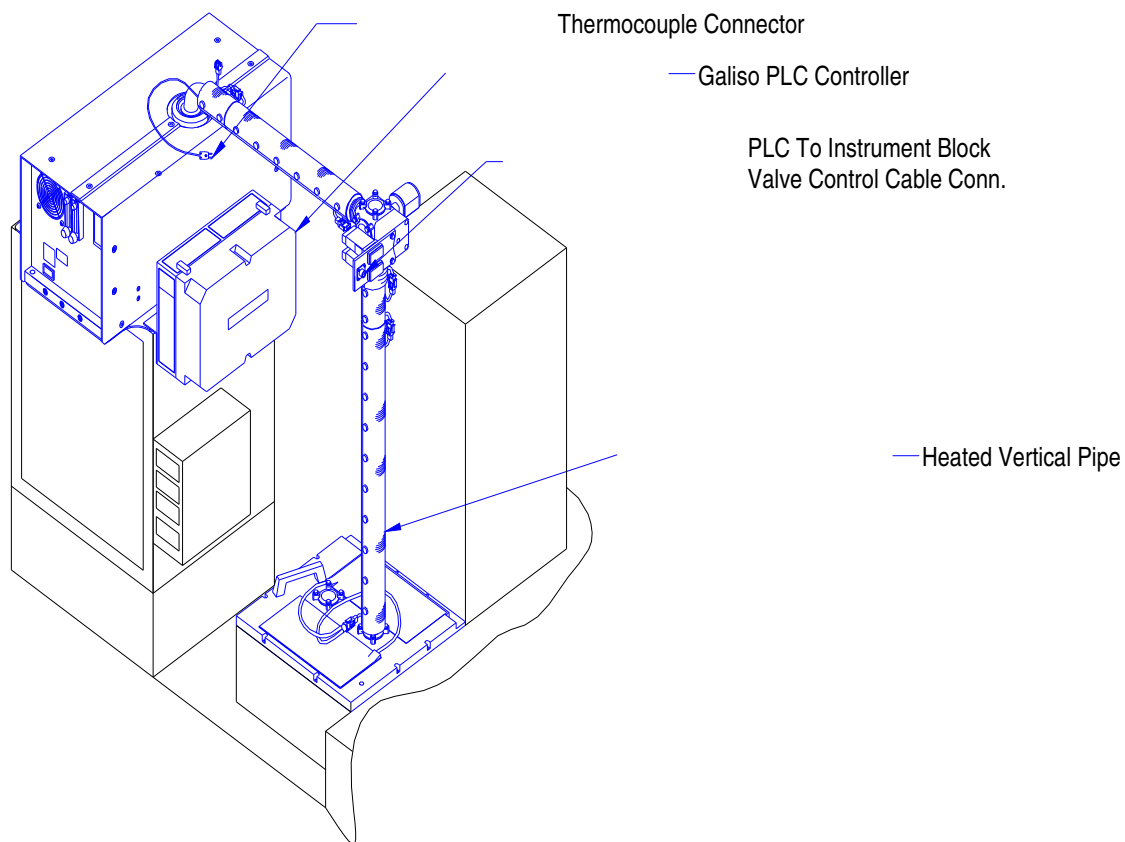


Figure 5 – 9: Controller Mounting

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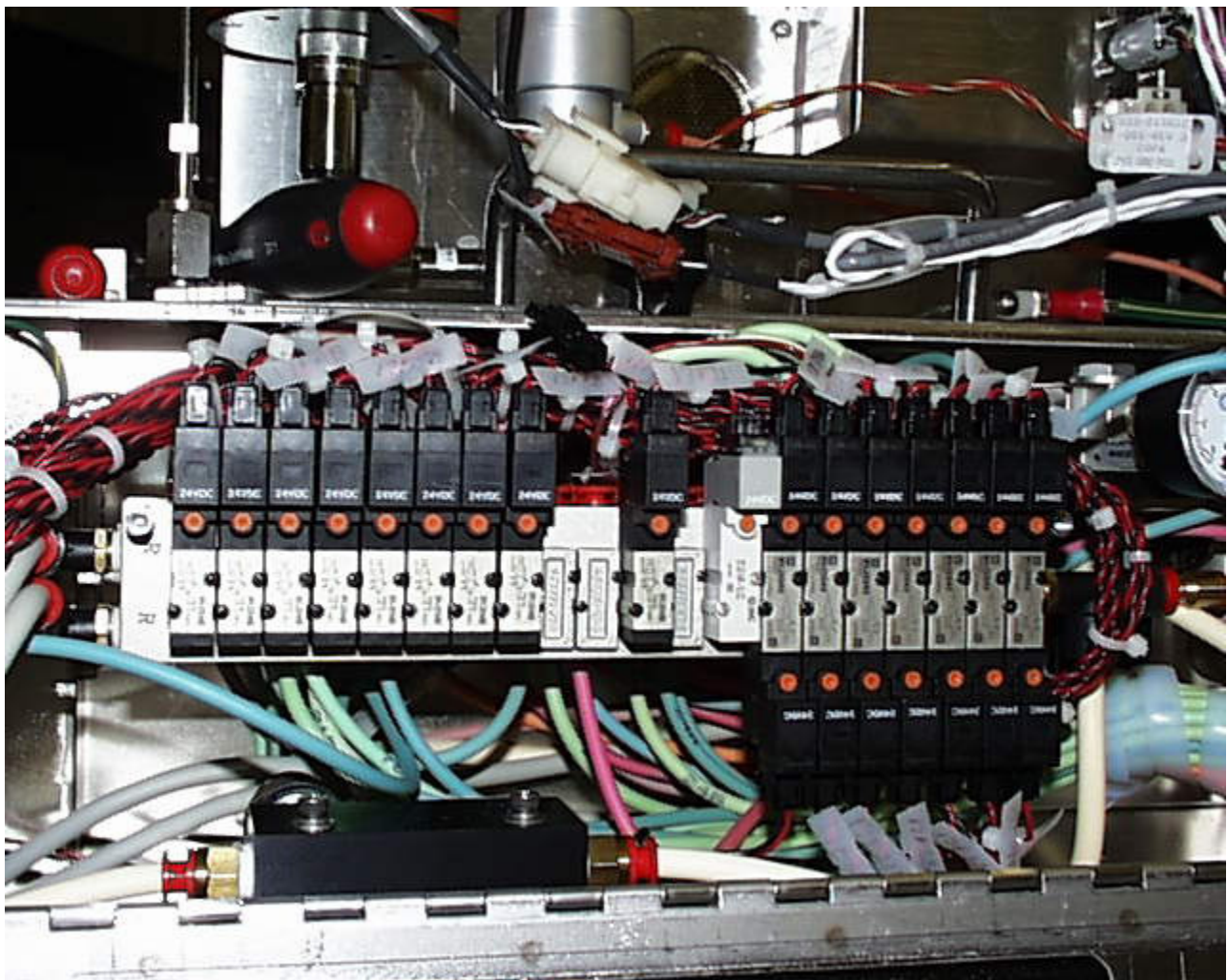
5.9 Rough Vacuum

The **FGS** system relies on the rough vacuum capability provided with the TCP tool (load lock, main chamber and DSQ process pumps) for proper operation. The gas control manifold automatically adjusts gas flow/pressure for the pressure setting inputs used for each chamber.

NOTE:

If there are concerns regarding process pump overloading, installation of a pressure switch interlocked to the **FGS** enable circuit may be required.

5.10 Pneumatic Control Installation



Solenoid Valve stack with Galiso Valve (Gray) installed

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5.10 Pneumatic Control Installation (continued)

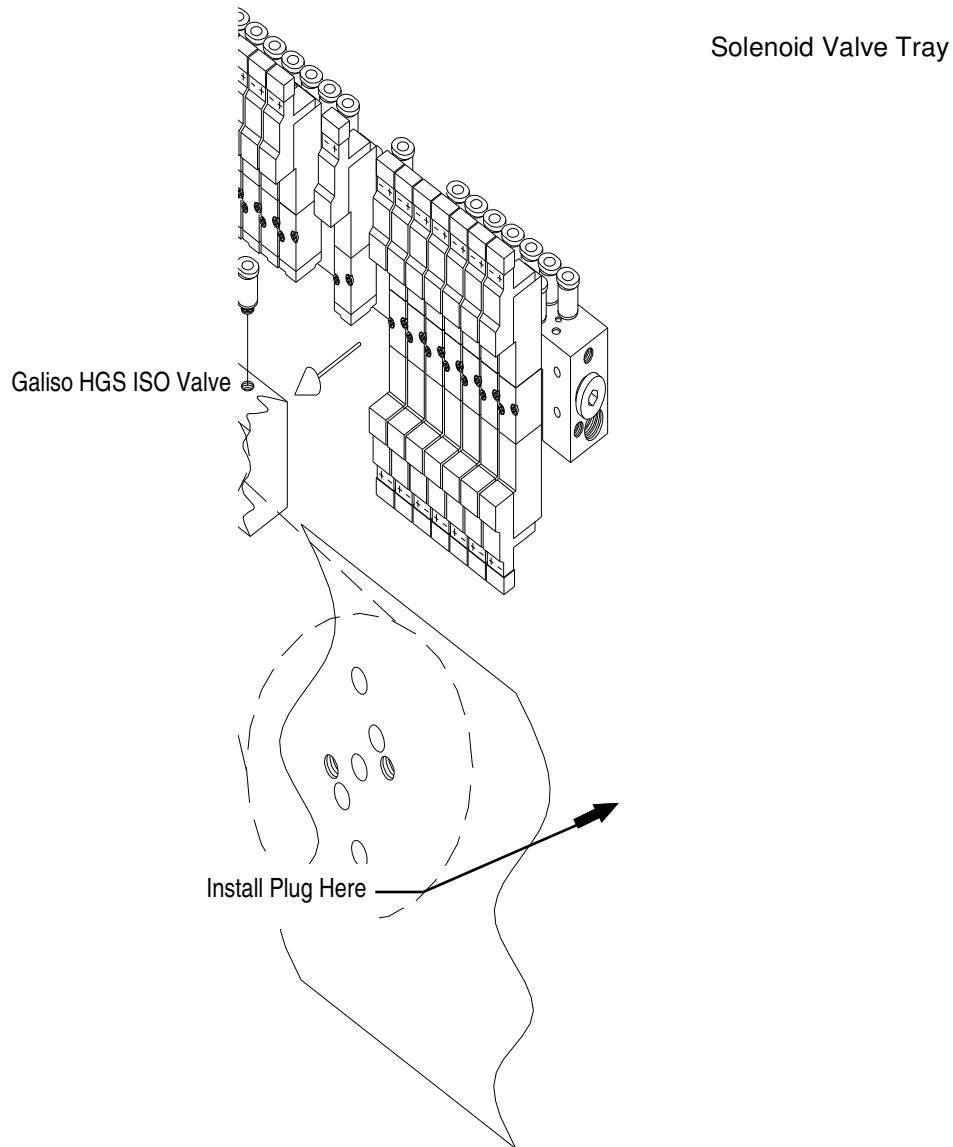


Figure 5-10: Pneumatic Control Valve

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5.11 ELL Door Actuator



ELL Door Actuator
Bend the actuator tab as shown

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5.11 ELL Door Actuator

Locate the enclosure for the ELL Door Actuator. It is in the upper, or top area of the maintenance tunnel. Bend the actuator tab downward and away from the interlock solenoid switch. Make sure it will not contact the switch when actuated.

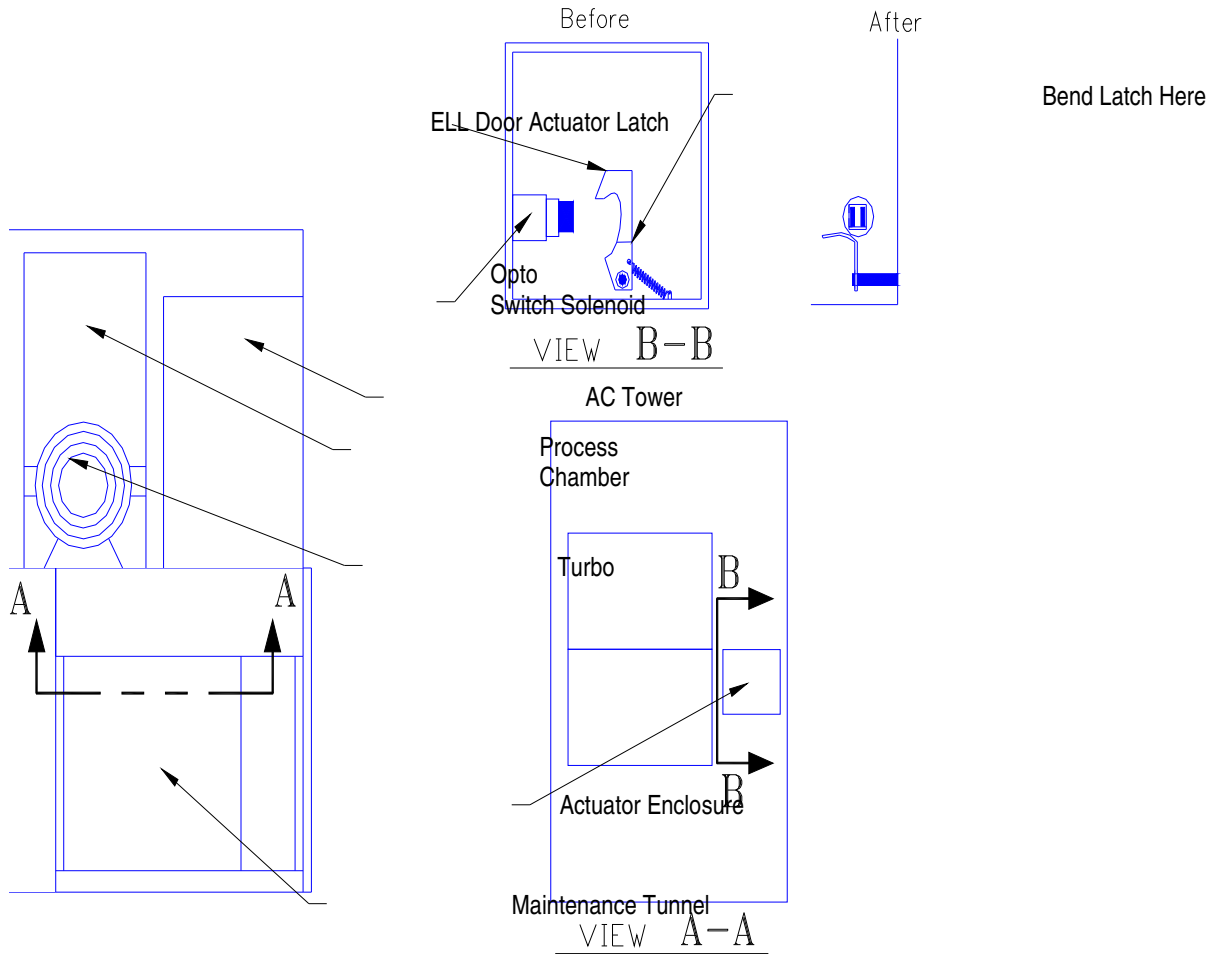


Figure 5-11: ELL Door Actuator

5.12 Heated End Point Window Assembly

Remove the existing End Point Window. Assemble the heater block and detector to the Galiso prepared mounting frame and heater assembly. Replace the mounting O-Ring with the Galiso supplied O-Ring, and install the detector and mounting frame assembly to the chamber, plate using just the four corner screws. Be careful to tighten a little at a time in sequence so as to not stress the frame and quartz with awkward pressure. Tighten the screws just tight enough to hold the assembly in place.

5.13 Watlow Controller Settings

Objective: To ensure that the temperature of the heating system runs and operates at the correct temperatures. Near 130 °C (+/-5 °C) for the piping jackets and load lock blankets, and 100 °C or within 10 °C of the chamber temperature.

Process Piping Temperature setting instructions:

1. Set the temperature to run at 50 °C. Press the <UP> Arrow Key on the Watlow Controller, and advance the value to 50 °C.
2. Monitor the temperature to ensure it stabilizes at 50 °C.
3. After the temperature stabilizes at 50 °C, increase the value to 100 °C by using the <UP> Arrow Key.
4. Monitor the temperature to ensure it stabilizes at 100 °C.
5. After the temperature stabilizes at 100 °C, increase the value to 130 °C.
6. Monitor the temperature to ensure it stabilizes at 130 °C.
7. Set the Range Low limit to 120 °C.
 - a) Hold the <UP> and <Down> Arrow Keys simultaneously for 3 seconds, until <LOC> is displayed.
 - b) Use the <Advance> Key to scroll the display to <rL>.
 - c) Use the up arrow to increase the value to 120 °C.
8. Allow the controller to return to the default display (process over setpoint), by waiting 60 seconds.

End Point Window Temp setting instructions:

1. The same as above, only stop at 100 °C.
2. Set the Range Low Limit to 70 °C.

6.0 HGS CONTROL CONNECTIONS

The Galiso Inc. **HGS** system is a LAM software, recipe driven operation for the 9600 TCP. **HGS** Tool Control Cabling must be installed. The **HGS** PLC Controller is depicted in Figure 5-8. Control Cable harness installation is discussed in Sections 6.1 through 6.9.

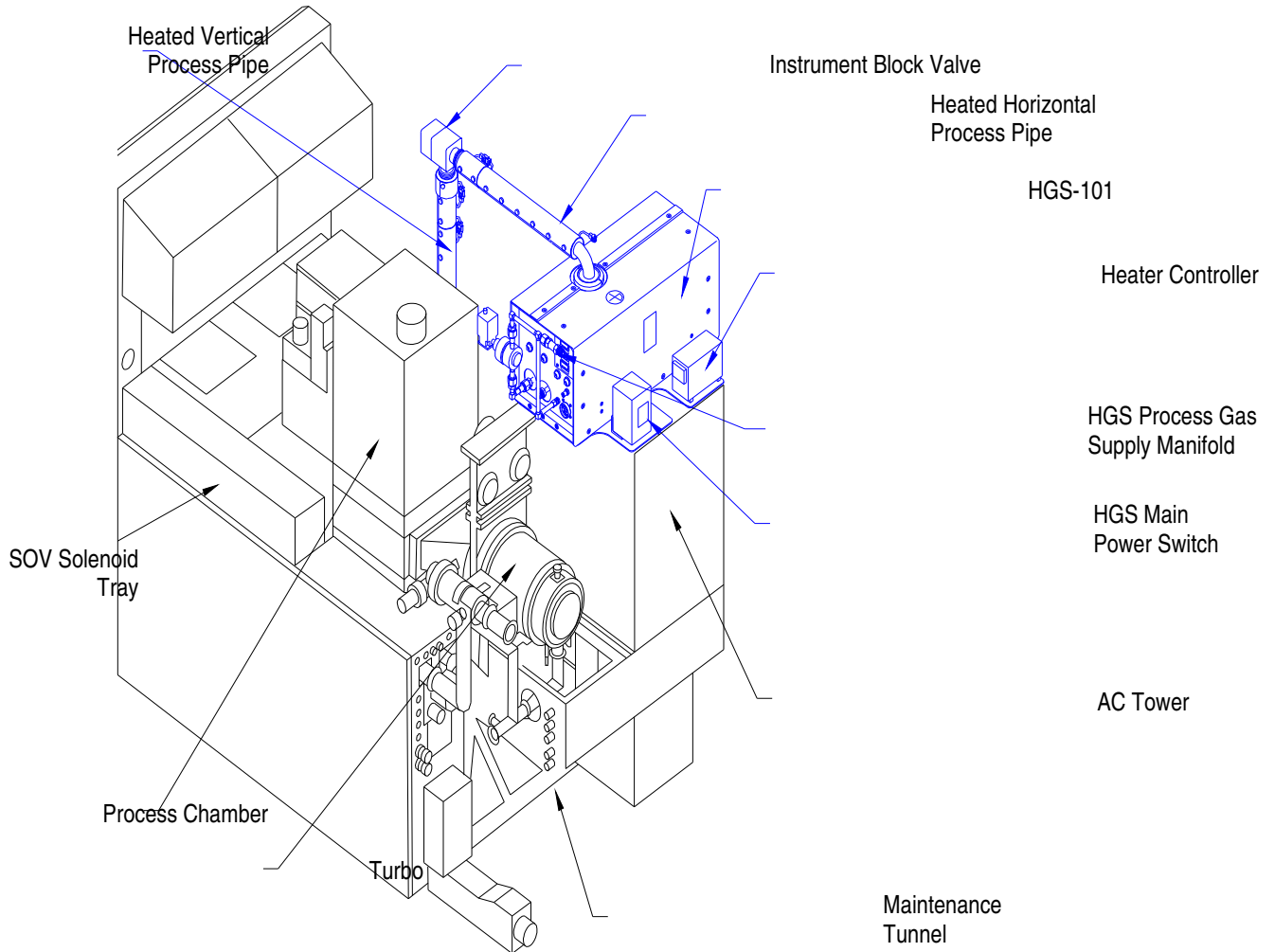


Figure 6 - 1: 9600 TCP

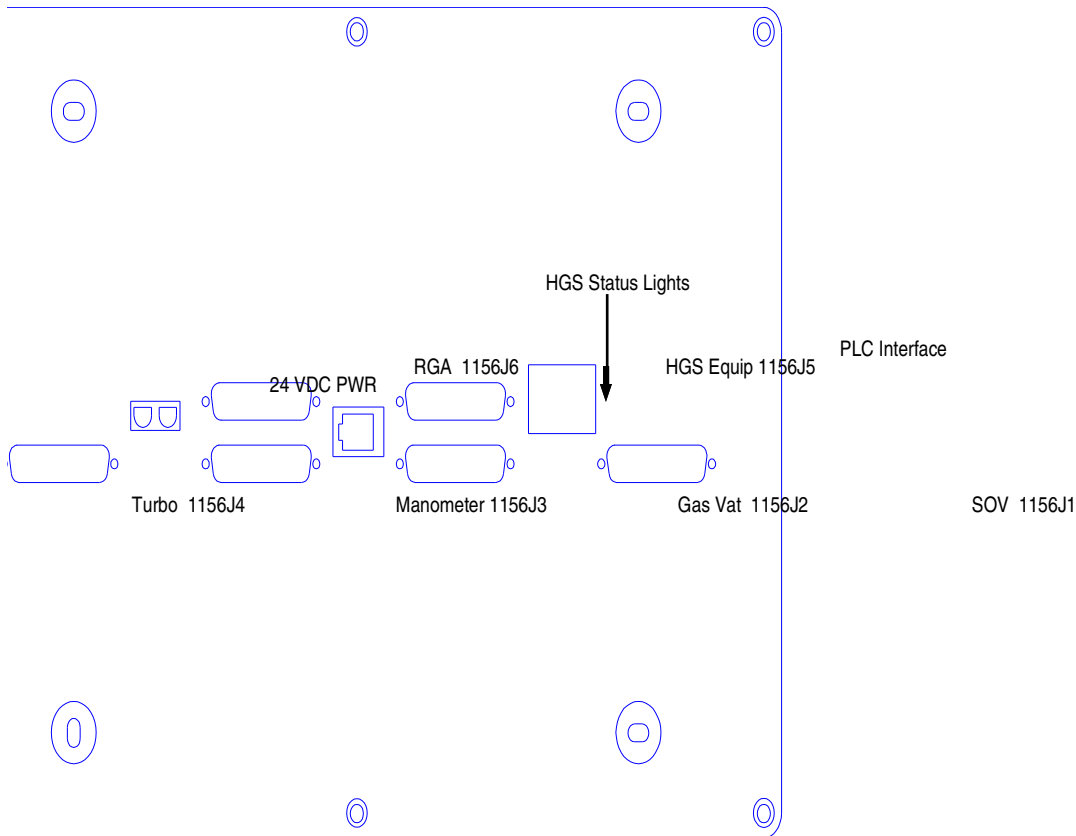


Figure 6 –2: HGS Controller Cable Harness Connections

6.0 Controller Cable Routing

1. All control cabling is supplied connected to the PLC Controller, except for the various extensions and optional wiring that may or may not be required. The control cabling is harnessed and loomed to best facilitate routing to their final designations on the tool.
2. Leave the Equipment Control, and Tran. Mano. branch of the Manometer cable up and hanging loose toward the ELL.
3. Route the entire harness assembly down between the turbo mounting brackets on the tool side of the turbo. Route the Turbo Control cable to the rear of the Seiko Seiki controller. Keep in mind that these particular wires are removed upon replacement of the turbo, so tie them accordingly to facilitate that future need.
4. Route the <I/O Box Power to Controller Cable> to the I/O Box 2-Pin Mate-n-Lock. Tie it up & neatly out of the way of the maintenance tunnel access.

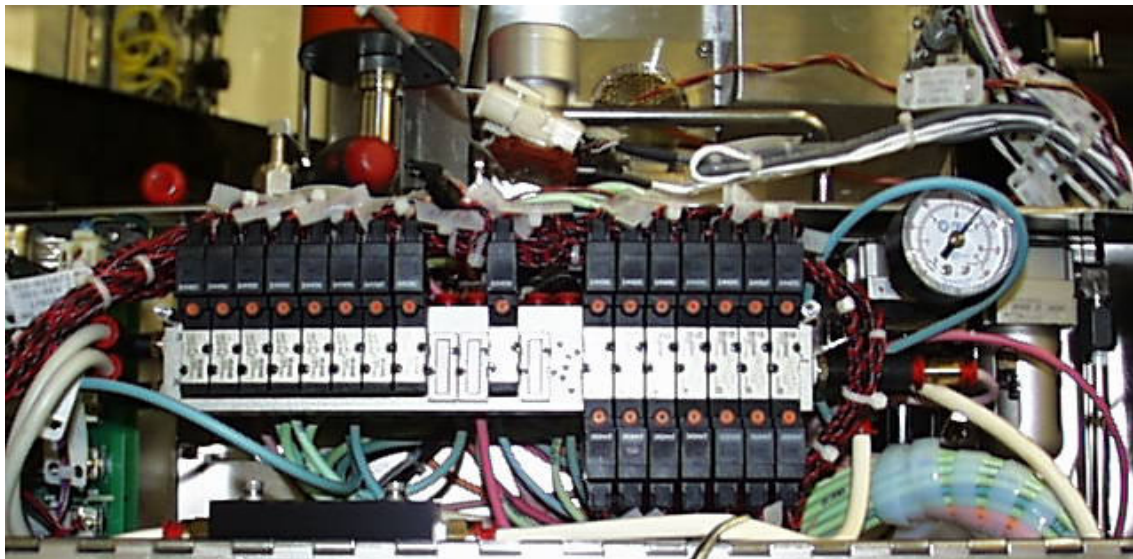
6.0 Controller Cable Routing (continued)

5. Route the rest of the Manometer cable upward between the turbo mounting brackets on the piping side of the turbo
6. Route the rest of the harness to the top of the Gas Valve Cabinet. Neatly tie the harness to the frame using adhesive tire wrap anchors. Take care to loop them as needed, and not to be concerned with having enough length, as there should be plenty. Run the harness along the top of the Gas Valve Cabinet. Tie it neatly above the cabinet ceiling. Be sure to allow for the cabinet cover to be opened and closed easily with the harness in place. The areas of concern are the cover corners and latches.
7. Cut the remaining white wire ties holding the harness together. Route the GAS VAT cable through the gap toward the outside of the TCP. Being sure to correctly orient the Galiso cover plate, run the GAS VAT harness through the plate, and secure the cover to the heat-shrink area on the harness.
NOTE: While doing the wire connections, keep the cover propped up so the wires are not supporting the weight of the entire harness and cover.
8. Route the SOV harness. Run a poly tube down through the same hole on the left that is used for the original LAM harness. Get it to the same area inside the Maintenance Tunnel where the SOV harness left off. Tape the tube to the poly tube that is already snaked to the SOV harness, pull it up into the SOV tray area, and tie wrap it secure with the other harness in the tray.
9. Cut the white wire ties holding the Status Indicator Light phone cord.
10. Route it through the hole in the center-front of the Maintenance Tunnel. This hole may have a cover on it that needs to be removed. Neatly place adhesive tie wrap anchors along the cabinets and floor of the tunnel so the phone cord is down and out of the way as much as possible. Screw the cover back on over the hole, but don't tighten it too much as to pinch the cord. Use adhesive tie wrap anchors to route the cord to the turbo side of the TCP, and up the wall to the Status Indicator Light display box location.

! CAUTION !

The 9600 TCP tool must be placed in a safe (de-energized) state prior to attempting control cable installation. Tool control cable connections should be performed only by properly trained authorized personnel.

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Solenoid Valve Tray (SOV)

6.1 SOV Control Cable Harness Connections

The SOV Control Cable Harness provides control of various electro-pneumatic control valves during the HGS process. Table 6.1 and Figure 6-3 specify the 9600 TCP control connections required. Note that all required connections are located in the main solenoid tray.

Table 6.1: SOV Control Cable Harness Connections

Cable No.	HGS Tool Control Cable	9600 TCP Device-Conn. No.
1	Entrance Loadlock Outer Door Open Signal	SOV-22 Control-17J22A
2	Exit Loadlock Outer Door Open Signal	SOV-22 Control 17J20A
3	Exit Loadlock Pump Isol. Valve Signal	SOV-2 Control - 17P2B
	Exit Loadlock Pump Isol. Valve Position	SOV-2 Valve - 17J2B
4	Entrance Loadlock Pump Isol. Valve Signal	SOV-5 Control - 17P5B
	Entrance Loadlock Pump Isol. Valve Position	SOV-5 Valve - 17J5B
5	Chamber Manometer Isol. Valve Signal	SOV-8 Control - 17P8B
	Chamber Manometer Isol. Valve Position	SOV-8 Valve - 17J8B
6	Exit Loadlock Inner Door Open Signal	SOV-21(Top) Control - 17P21A
	Exit Loadlock Inner Door Open Position	SOV-21(Top) Valve - 17J21A
7	Exit Loadlock Inner Door Closed Signal	SOV-21(Bot) Control - 17P21B
	Exit Loadlock Inner Door Closed Position	SOV-21(Bot) Valve - 17J21B
8	Entrance Loadlock Inner Door Open Signal	SOV-23(Top) Control - 17P23A
	Entrance Loadlock Inner Door Open Position	SOV-23(Top) Valve - 17J23A
9	Entrance Loadlock Inner Door Close Signal	SOV-23(Bot) Control - 17P23B
	Entrance Loadlock Inner Door Close Position	SOV-23(Bot) Valve - 17J23B
10	HGS Isolation Valve SOV	HGS-1156SOV1P

- NOTES:
1. See Figure 6-3 for additional installation information.
 2. Connect Cable 10 to the HGS Isolation SOV installed in Main TCP SOV rack, see Section 5.10.

6.1 SOV Control Cable Harness Connections, continued

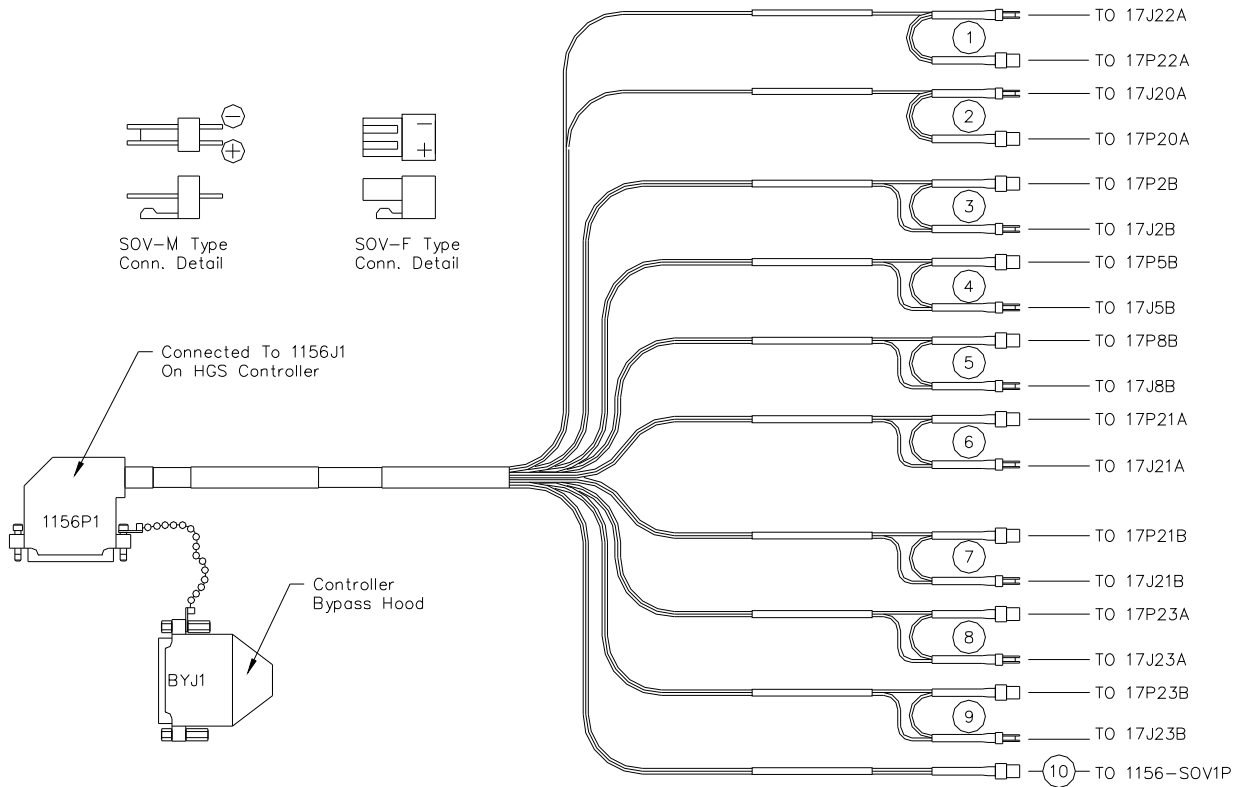


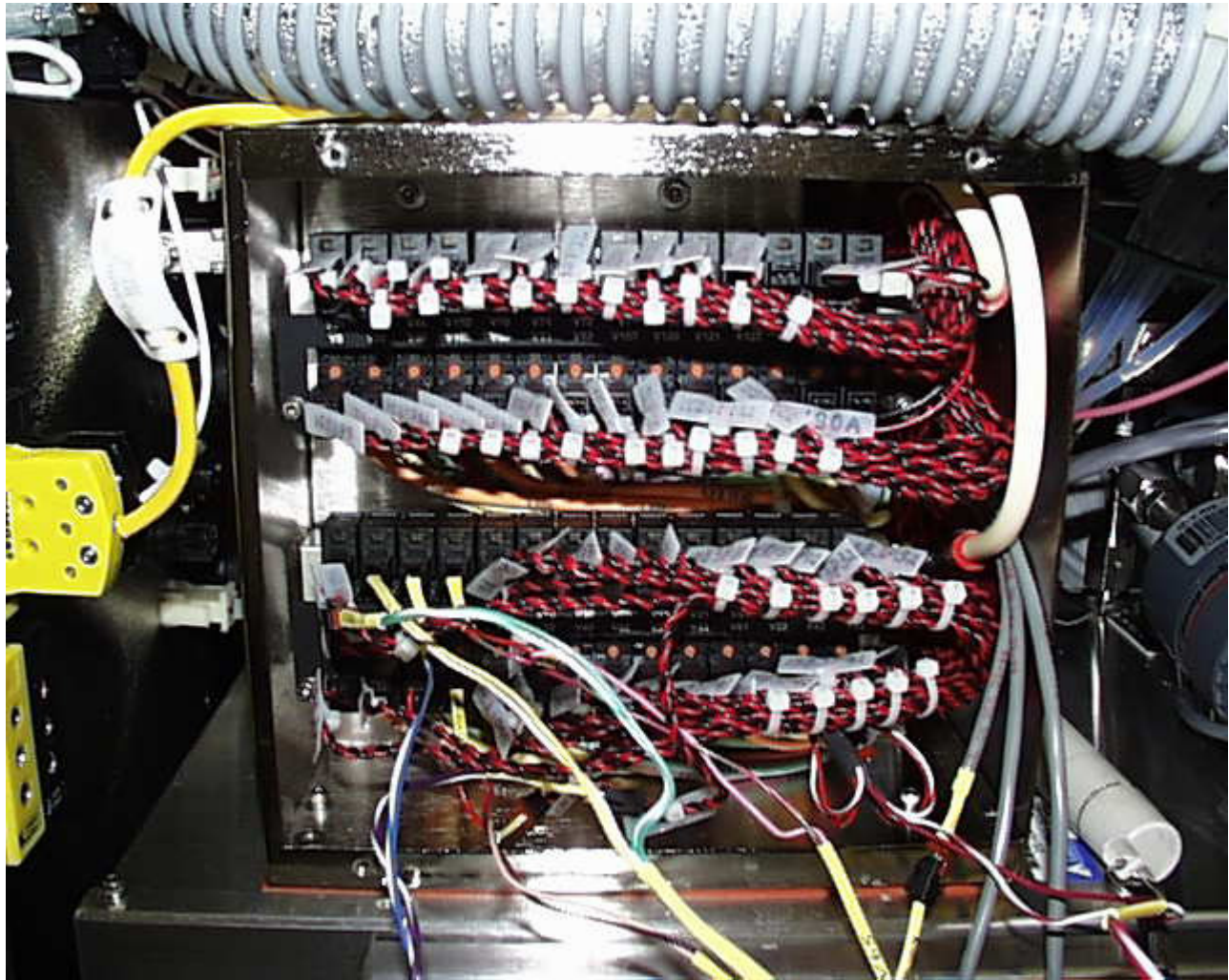
Figure 6 - 3: SOV Cable Harness Connections

Installation Note:

1. Disconnect existing SOV plugs from required SOV's and make connections as indicated in Table 6.1 and figure 6-3, above.
2. Connect the 5/32" poly tube that was originally snaked with the Galiso SOV cable to the Galiso HGS ISO valve installed in section 5.10 of this manual.

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GAS VAT Solenoid Valve Rack

Installation Notes:

Cables 1 through 8 must be routed into the Gas Box SOV Rack area for connection to the required devices. Connect Cables 7P, 8P and 9P to their respective pressure switches, and then connect the SOV connector ends to cables 7J, 8J and 9J. Route Cables 9, 10 and 11 to the Turbo Solenoid Tray, and connect them as indicated. Note that cable 11 connects to an HGS control SOV installed in the Turbo Solenoid Tray.

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6.2 GAS-VAT Control Cable Harness

The GAS-VAT Control Cable Harness provides control of the electro-pneumatic control valves controlling the Shower Head Purge, Gas Box Pressure Switches and the VAT valve during the HGS process. Table 6.2 and Figure 6-4 specify the 9600 TCP control connections required for this cable harness.

Table 6.2: GAS-VAT Control Cable Harness Connections

Cable No.	HGS Tool Control Cable	9600 TCP Device - Conn. No.
1	Input Signal for HGS Recipe Start	Unused Primary Gas SOV
2	Gas Manifold (N2) Purge Signal	SOV-3 Control - 15B3P3
3	Gas Manifold (N2) Purge Valve	SOV-3 Valve - V3
4	Chamber Gas Delivery Signal	SOV-5 Control - 15B3P5
5	Chamber Gas Delivery Valve	SOV-5 Valve – V5
6J – 6P	Chamber Delivery Vacuum Pressure Switch	PSH-3 - PSH3P1
7J – 7P	N2 Purge Pressure Switch	PSH-9 - PSH9P1
8J – 8P	Precharge Vacuum Pressure Switch	PSH-2 - PSH2P1
9	V65 ELL Vent Valve	V65 Valve/Control – 15B3P65/V65
10	V75 XLL Vent Valve	V75 Valve/Control – 15B3P75/V75
11	For Galiso RGA He Leak Option	For Galiso RGA He Leak Option

- NOTES:
1. See Figure 6-4 for additional installation information.
 2. Connect extension cables 6P, 7P and 8P to make final pressure switch connections.
 3. Alternative HGS Start configurations can be installed if a single primary Gas SOV for HGS recipe start is not available. Contact your Galiso Customer Service Representative for additional information.

6.2 GAS-VAT Control Cable Harness (continued)

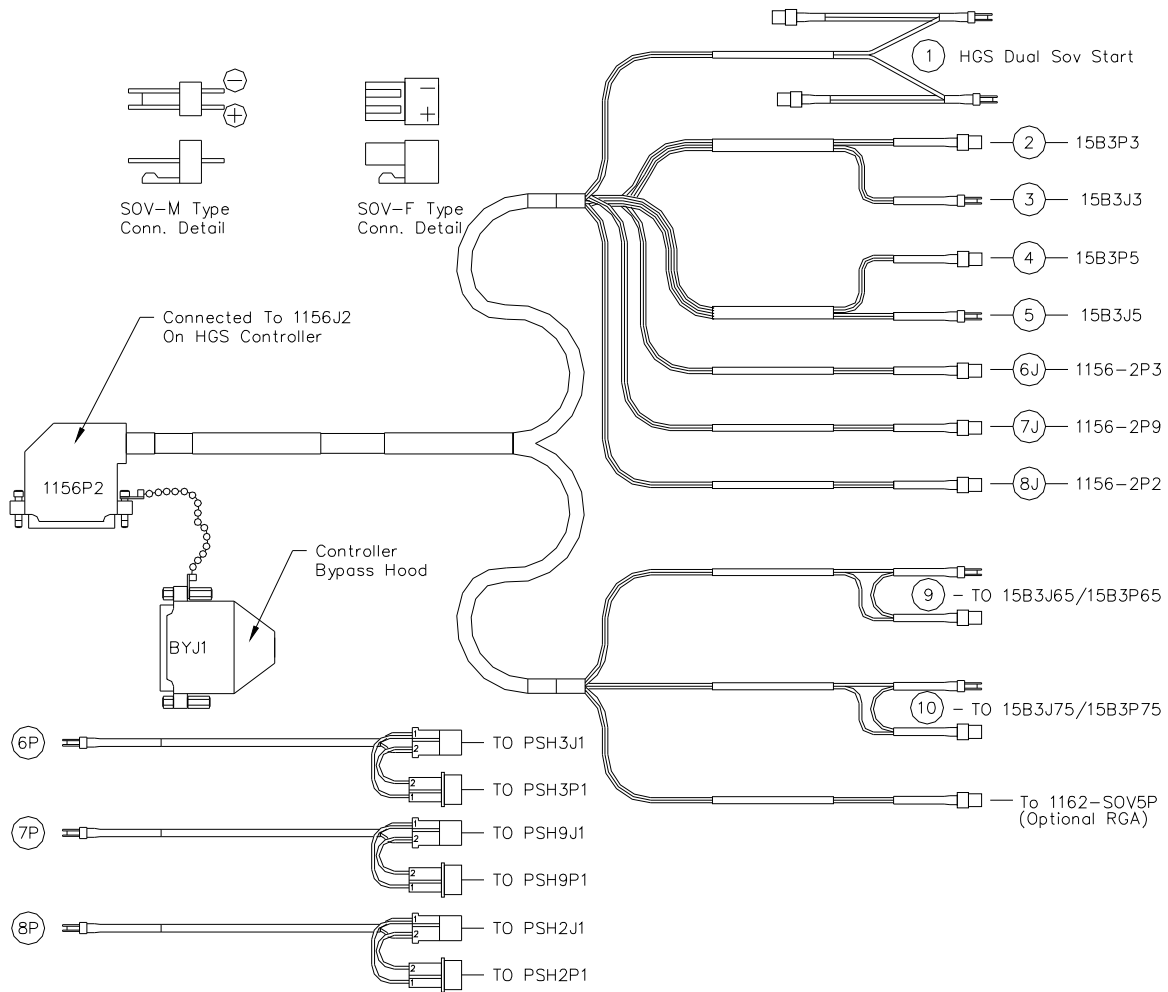


Figure 6-4: GAS-VAT Cable Harness Connections

6.3 Manometer Control Cable Harness

The Manometer Control Cable Harness provides control of the tool chamber manometer signals and pressure switches, main 24 VDC power to the HGS PLC and the GRC Bypass control during the HGS process. Table 6.3 summarizes the 9600 TCP control connections required for this cable harness. The majority of these connections are between the Main Chamber and the VAT Valve/Turbo assembly. Note that the GRC connection is normally located on the top of the GRC enclosure near the process pumps.

Table 6.3: Manometer Control Cable Harness Connections

Cable No.	9600 TCP Tool Device/Function	9600 TCP Device – Conn. No.
1	Transition Manometer Analog Signal Cable	55B8J/P3 via DB-9 Adapter
2	Transition Manometer 500 mTorr Switch Cable	55B8J2
3	Transition Manometer 3 Torr Switch Cable	55B8J21
4	75 Torr Interlock Cable	16P13
5	Reference Manometer Analog Signal Cable	16J/P11 via DB-9 Adapter
6	Reference Manometer Switch Cable	40J35
7	GRC bypass Cable	PL-5, Remote I/P
8	MAN Chamber / DSQ MANO Analog Signal	5P3 / 5J3, Common / Output

NOTE: See figure 6.5 for additional installation information.

Installation Note:

- Use 2 x 3 pin adapter(s) as necessary.
- Use GRC adapter as necessary.

6.3 Manometer Control Cable Harness, continued

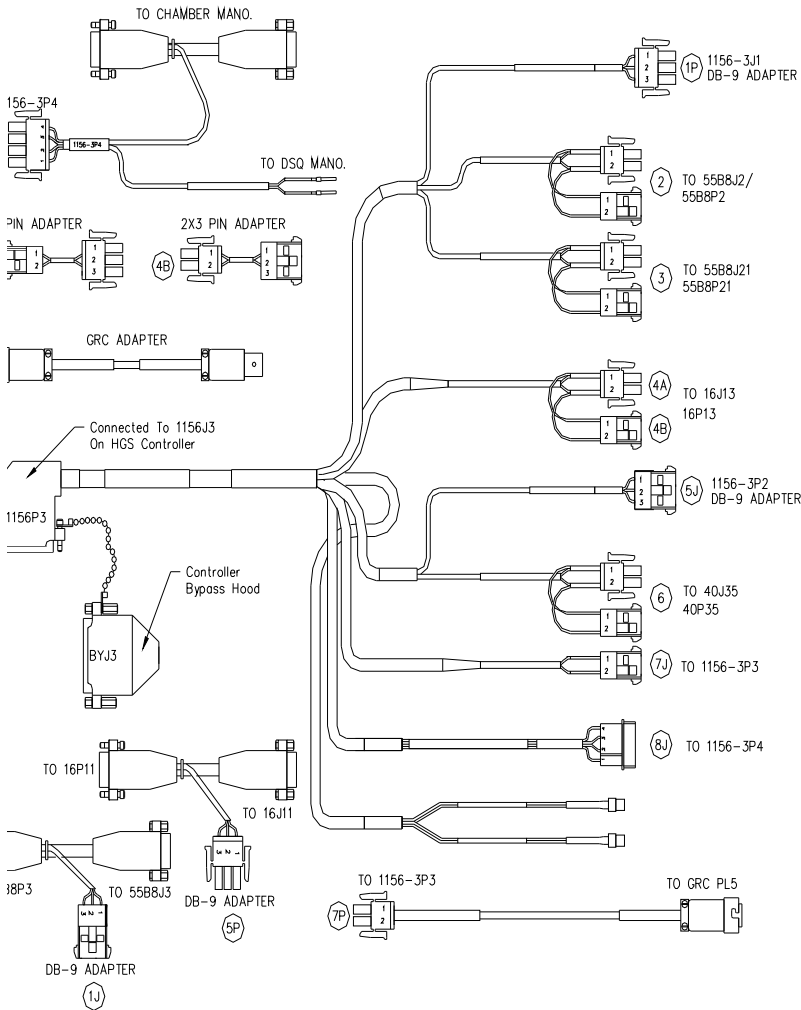


Figure 6 – 5: Manometer Cable Harness Connections

6.4 Turbo Control Cable Harness

The Turbo Control Cable Harness provides monitoring and control of the Turbo Controller signals during the **HGS** process. Table 6.4 summarizes the 9600 TCP control connections required for this cable harness. Note that wiring connections required are located at the back of the Turbo Controller, beneath the AC power enclosure.

Table 6.4: Turbo Control Cable Harness Connections

Cable No.	HGS Tool Control Cable	9600 TCP Device-Conn. No.
1	Turbo Inhibit Switch (Red) (Orn)	Seiko Seiki Controller TB3(5)
		Seiko Seiki Controller TB3(7)
	Turbo Brake Signal (Yel) (Grn)	Seiko Seiki Controller TB2(12)
		Seiko Seiki Controller TB2(14)
	Turbo Normal Operation Signal (Blu) (Pur)	Seiko Seiki Controller TB2(13)
		Seiko Seiki Controller TB2(16)
	Turbo Acceleration Signal (Brn) (Gry)	Seiko Seiki Controller TB2(17)
		Seiko Seiki Controller TB2(18)
	Turbo Alarm (Blk) (Red)	Seiko Seiki Controller TB2(10)
		Seiko Seiki Controller TB2(11)
2	Turbo Inhibit Switch (Wht/Red) (Wht/Orn)	HGS Turbo TB(5)
		HGS Turbo TB(7)
	Turbo Brake Signal (Wht/Yel) (Wht/Grn)	HGS Turbo TB(12)
		HGS Turbo TB(14)
	Turbo Normal Operation Signal (Wht/Blu) (Wht/Pur)	HGS Turbo TB(13)
		HGS Turbo TB(16)
	Turbo Acceleration Signal (Wht/Brn) (Wht/Gry)	HGS Turbo TB(17)
		HGS Turbo TB(18)
	Turbo Alarm (Blk) (Red)	HGS Turbo TB(10)
		HGS Turbo TB(11)

- NOTES:
1. See figure 6-6 for additional Turbo Control installation information.
 2. Remove existing Turbo Control Wiring and install Cable 1 wires as indicated. Re-terminate TCP Turbo Control Wiring on **HGS** Turbo TB as indicated.

6.4 Turbo Control Cable Harness, continued

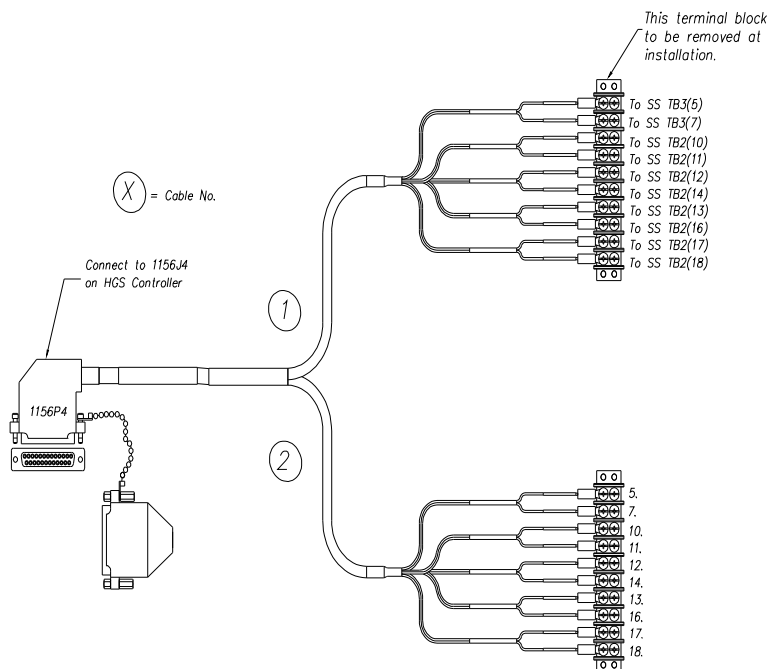


Figure 6 –6: Turbo Cable Harness Connections

Installation Note:

Remove existing wires from Seiko Seiki controller and re-terminate on cable 2 terminal board. Remove jumper on SS TB3 pins 5 & 7. Terminate Cable 1 wires to Seiko Seiki Controller TB2 and TB3 as indicated in figure 6-6, above. Note that **ALL** Turbo Cable 1 wires must be terminated to provide proper **HGS** controller operation. **Be careful to terminate the Galiso Cable 1 Turbo Inhibit wires (ref. Table 6.4) to the Seiko Seiki TB3 pins 5 & 7 only, and NOT to SS TB2!**

6.5 Equipment Control Cable Harness

- A. Connect the Instrument Valve Cable harness plug to the Instrument Block Valve CPC (ref. 21-91-1152, CN-1). See figure 6-7.
- B. Connect the **HGS** Control Cable Harness to the DB-25 connector on the front of the **HGS**-101 unit (ref. 21-91-1149, CN-4). See figure 6-7.
- C. Connect the Gas Control cable to the **HGS** E/P Controller on the **HGS** Gas Supply Control Manifold. See figure 6-7.

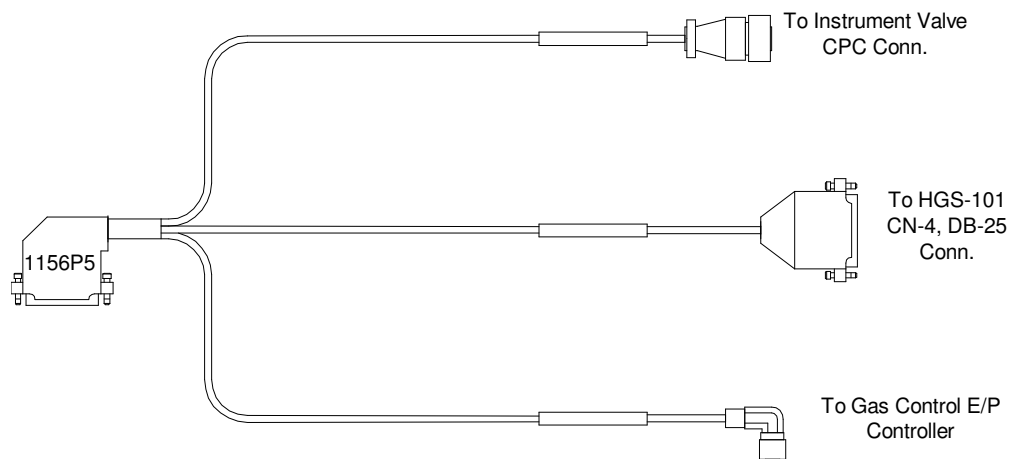


Figure 6 – 7: HGS Equipment Control Cable Harness

6.6 HGS Status Indicator Lights

The 9600 TCP HGS Kit includes two Status Indicator Light display boxes with two 25-foot connecting cords. One should be placed near the 9600 TCP light bar in the operator bay, and the other in the equipment chase, local to the applicable 9600 TCP tool. The Status Indicator Light Boxes are designed to be “daisy-chained” together and additional units are available from the Galiso Customer Service Department.

A Status Light box is depicted in figure 6-8. The indicator light functions are described in Section 7.0, System Operations.

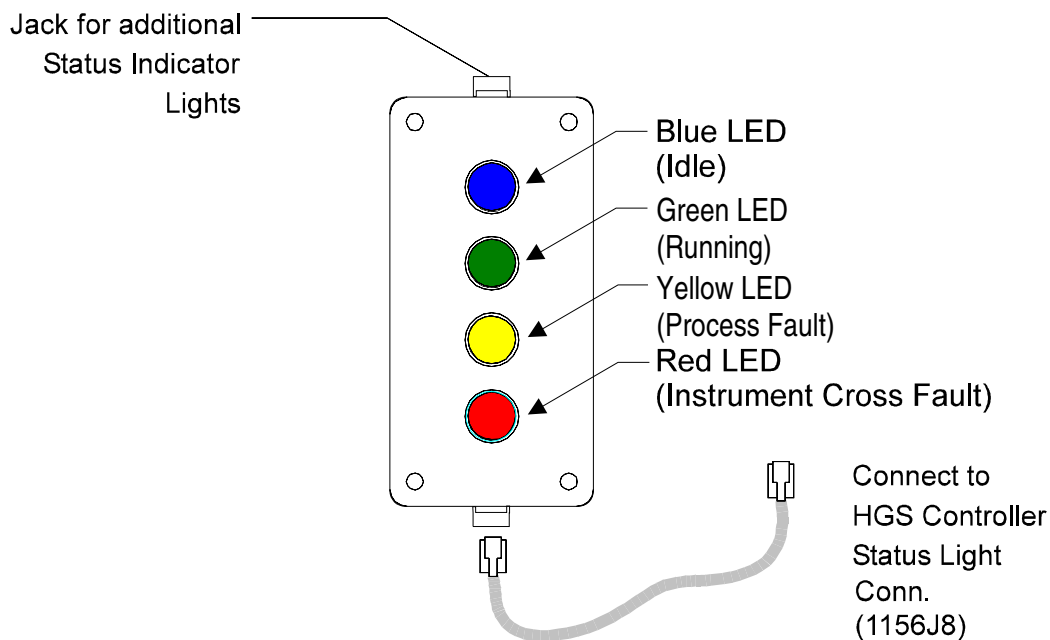


Figure 6 - 8: Status Indicator Light Connections

7.0 **HGS** SYSTEM OPERATIONS

This section provides an overview of **HGS** System Operations for Lam 9600 TCP systems. Initial **HGS**-101 Controller Adjustments, are covered in Galiso document #21-11-1149.

7.1 Preparations for Start-Up

The following tasks must be performed to prepare the **HGS** system for automatic operation and return the 9600 TCP Tool to Normal Operation after **HGS** equipment installation if the RS232 Control Cable was disconnected.

7.1.1 VAT-64 Relearn Sequence

Assuming that the 9600 tool was powered down for **HGS** equipment and control cable installation, the VAT Relearn Sequence must be run. Note that there are slight differences between the VAT-64 and the VAT-65 Relearn Sequences. Proceed as follows to complete the Auto Learn Sequence for VAT-64 Valves:

- A. On the VAT 64 controller place the VAT controller from “Remote” control to “Local” control.
- B. Push the “Open” and “Close” buttons on the controller console at the same time, the VAT controller screen will display “autosize”.
- C. When the VAT Controller is done autosizing, the VAT display will say “Normal”.
- D. Place the VAT Controller back to “Remote” control.
- E. Go to the LAM TCP tool control monitor and go to the “Process” page screen and change the “Chamber Pressure” field to 10 mTorr.
- F. On the “Process” page screen, initiate 60 sccm of Argon Gas Flow.
- G. Go to the “Diagnose” page screen and then to the “Turbo Macro” screen.
- H. On the “Turbo Macro” screen, highlight the “#6 Turbo” Macro.

7.1.1 VAT-64 Relearn Sequence (continued)

- I. On the “#6 Turbo Macro” page, click on the “ProcChm_turbo_Gate_AutoLearn” macro.
- J. Then select “Active”. When AutoLearn is completed, the status display will change from “Active” to “Inactive”.
- K. Go back to the “Process” page and return the “Chamber Pressure” back to 0 mTorr and 0 sccm of Argon gas flow.

7.1.2 VAT-65 Relearn Sequence

Assuming that the 9600 tool was powered down for **HGS** equipment and control cable installation, the VAT Relearn sequence must be run. Note that there are slight differences between the VAT-64 and the VAT-65 Relearn sequences. Proceed as follows to complete the Auto Learn sequence for VAT-65 Valves:

- A. Go to the LAM monitor and select the “Process page” screen and change the “chamber pressure” field to 10 mTorr.
- B. On the Process page screen, initiate a flow 40 sccm of Argon gas.
- C. Go to the “Diagnose page” screen and select the “Turbo Macro” page.
- D. On the “Turbo Macro” page highlight the “#6 Turbo” Macro.
- E. On the “#6 Turbo” Macro page, click on the “ProcChm_turbo_Gate_AutoLearn” Macro.
- F. Then select “Active”. When AutoLearn is completed, the status display will change from “Active” to “Inactive”.
- G. Go back to the “Process page” and return the “Chamber pressure” back to 0 mTorr and the Argon flow to 0 sccm.

7.1.3 **FGS** Recipe Set Points for LAM OEM Software:

The **FGS** PLC has been designed and programmed to start and run from a Recipe configured in the Lam Envision or Classic tool control software platforms. Note that the Recipe to be used is typically based on use of an available primary process gas channel. The following general parameters must be specified for the **FGS** Recipe.

Note: Operator must use inert gases for both Gas 1 & Gas 2.

Gas 1·Set Gas Flow = to 1.0 sccm

- Set Tolerance=Offset for 99%

Gas 2·Set Gas Flow = to 1.0 sccm

- Set Tolerance=Offset for 99%
- Time=(1230 seconds minimum)
- DSQ H₂O Temperature (equal to WVDS idle temp.)
- Flow=Torr pressure set at 0.1 millitorr
- Set Tolerance = at off set at 99%

Once the **FGS** Recipe is configured and saved, an **FGS** recipe can be run at any time. However, the operator must place tool from **Load Process to Process Chamber Only before the operator starts the FGS Recipe.**



The TCP Software Recipe Duration Must Exceed the **FGS**[™] Cycle Time Or Control Of The Tool Will Not Be Returned To The TCP Tool Control Software

Various **FGS** PLC settings must be input to the controller prior to operating the system. These settings are normally input by Galiso personnel using the hand-held PC/PLC interface during system installation.

- **FGS** Double Start
- Turbo Foreline Valve Position
- Process PLL (DSQ)
- RGA Option
- Twice Per Day **FGS**

A. System Counters

- Good **HGS** Runs
- Bad **HGS** Runs
- Missed **HGS** Runs

B. System Floats

- Ramp Down
- Ramp Up
- Starting

Contact your Galiso Customer Service Representative for additional information regarding **HGS** Recipe development and **HGS** Process PLC settings.

7.2 **HGS** Recipe Operation for 9600 TCP Systems

To Start the **HGS** Recipe, select *Chamber Process* , load **HGS Recipe** (or the **HGS** recipe number), and start the recipe. The **HGS** PLC will automatically take control of the 9600 TCP tool signals and devices necessary to support **HGS** cycle operation. The standard **HGS** cycle operating sequence is discussed, in detail, in Sections 7.2.1 through 7.2.7.



Do Not Run The **HGS Recipe With Wafers In The Load Lock, Main Or DSQ Chambers!**

7.2.1 HGS Operating Sequence: HGS-P1

Upon receipt of a **HGS** Start signal from the Lam TCP control system the **HGS** PLC will initiate the HGS-P1 process. During the HGS-P1 process, **HGS** process gas enters the TCP Entrance Load Lock and sweeps contaminants out through the Load Lock Process Pump. The Process then shuts down the **HGS**. This process is depicted in figure 7-1, below.

HGS-P1: Entrance Load Lock Process

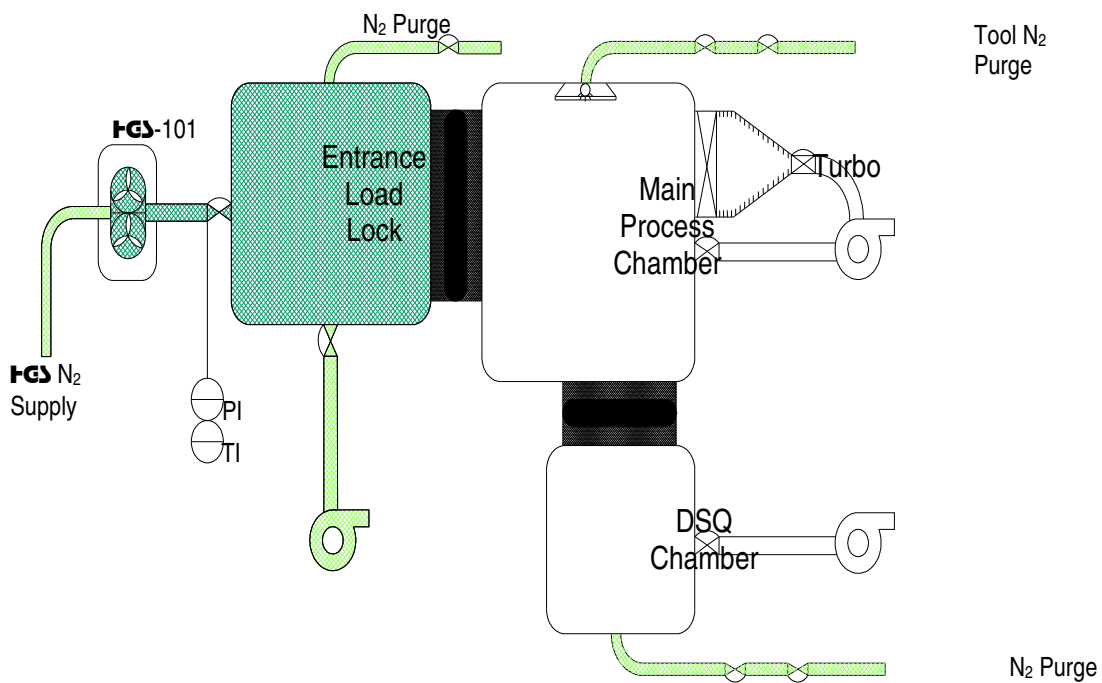


Figure 7 - 1

Note that during the HGS-P1 process, the Main and DSQ chambers remain in a pump-down state and the Turbo has been inhibited and is decelerating.

7.2.2 **HGS** Operating Sequence: HGS-P2

When the **HGS** PLC receives a Turbo Decelerate OFF and no Turbo Accelerate or Normal signal is present, the **HGS** will enter the HGS-P2 process. P2 initiates nitrogen gas flow through the main chamber shower head purge to pre-flow the Main Chamber, Load Lock and Turbo. The HGS-P2 process is depicted in figure 7-2, below.

HGS-P2: Main Chamber Shower Head Purge Precharge

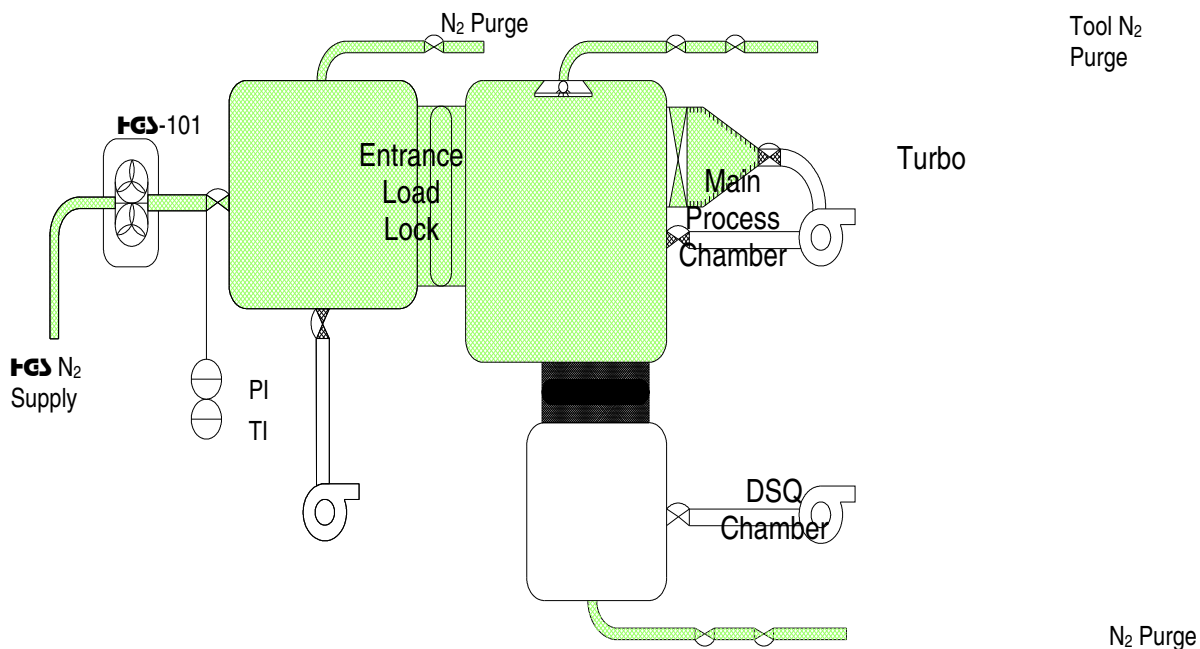


Figure 7 - 2

Note that during the HGS-P2 process, the Load Lock and Main chambers are isolated from their process pumps, while the DSQ remains in pump-down.

7.2.3 HGS Operating Sequence: HGS-P3

When the Load Lock and Main Chambers reach the pre-flow pressure set-point, the HGS will end the P2 Process & enter the HGS-P3 process. The HGS-P3 process opens the Load Lock Inner Door and initiates process gas flow through the Load Lock, Main Chamber and Turbo to the Main Chamber Process pump. The HGS-P3 pressure set-point is preset. The HGS-P3 process is depicted in figure 7-3, below.

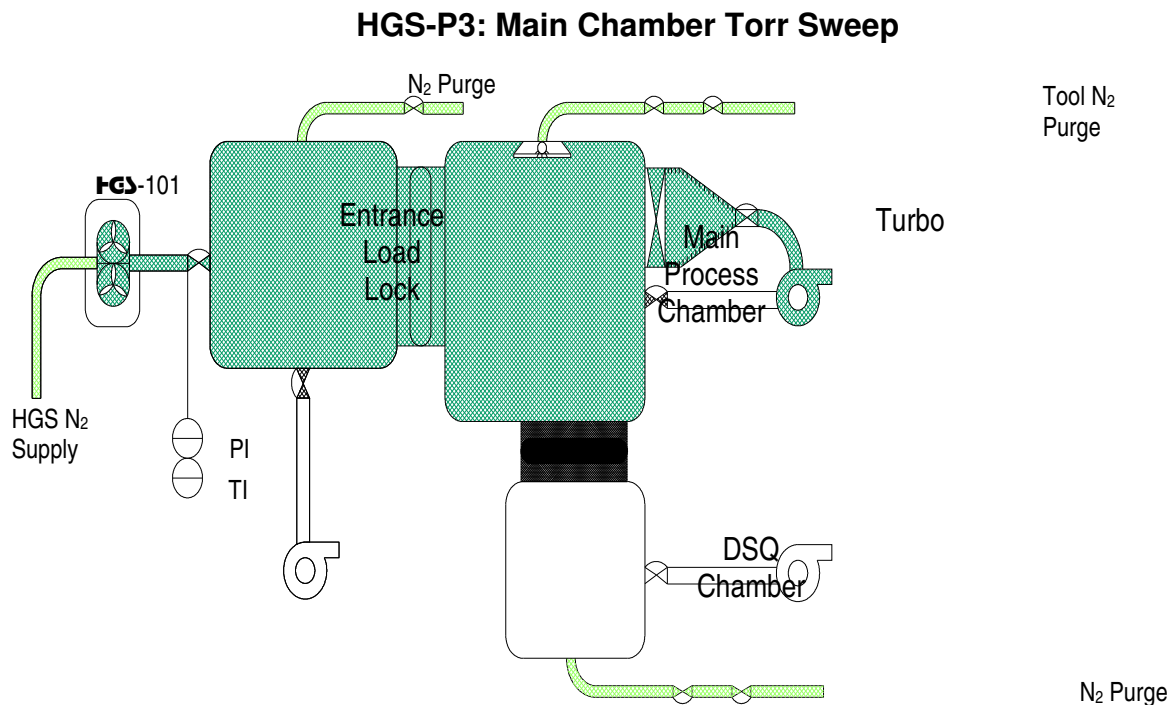


Figure 7 - 3

Note that during the HGS-P3 process, the shower head purge gas continues to flow while the DSQ remains in pump-down.

7.2.4 HGS Operating Sequence: HGS-P3 (continued)

The HGS-P3 then closes the Isolation valve, turning off the shower head purge gas and opening. The HGS-P3 process opens the Load Lock pump isolation valve and the Main Chamber Bypass and Turbo isolation valves to the Main Chamber Process Pump. The purpose of the HGS-P3 process is to pump down the Load Lock and Main Chambers in advance of opening the Exit Load Lock Inner Door. The HGS-P4 process is depicted in figure 7-4, below.

**HGS-P4: EnLL & Main Chamber Pump Down
ExLL Inner Door Closed @ <1.0 Torr for Turbo ramp-up**

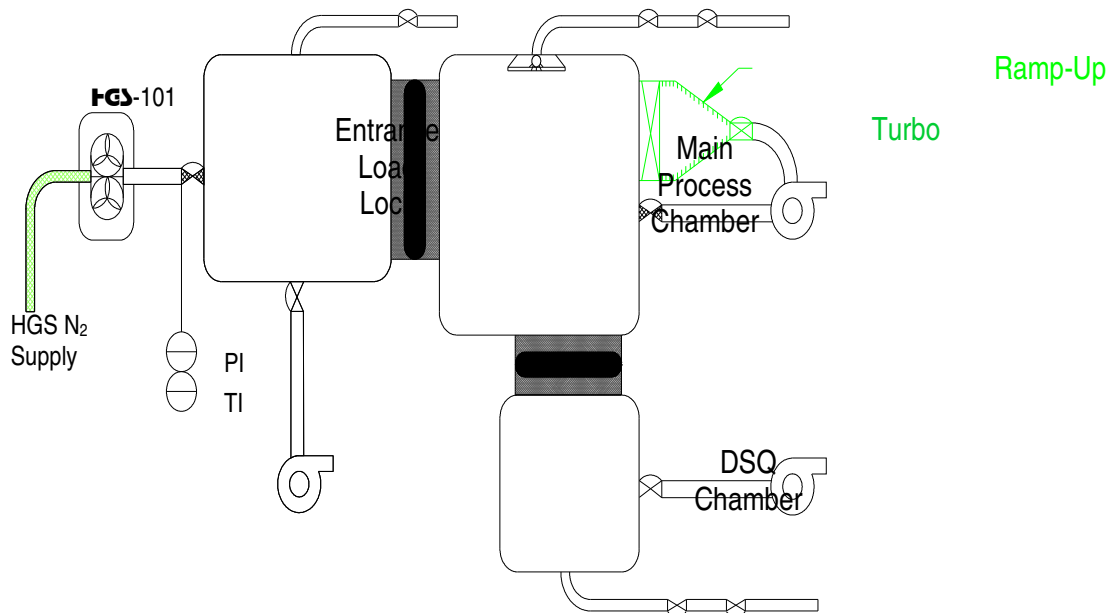


Figure 7 - 4

Note: During the HGS-P3 process, the entrance load lock inner door is closed while the DSQ remains in pump-down.

7.2.6 HGS Operating Release Sequence: HGS-P4

The purpose of the HGS-P4 process is to return the tool to a Load and Process Idle condition. During the HGS-P4 process, the HGS -101 is off and isolated, all chambers are in pump-down while the HGS PLC monitors the status of the Turbo. When the Turbo switches from Accelerate to Normal, the HGS PLC releases control of all 9600 TCP devices and the tool is ready for normal service. Note that it normally takes 6-7 minutes for the Turbo to spin-up to the normal operating state.

HGS-P4: Tool Control Return

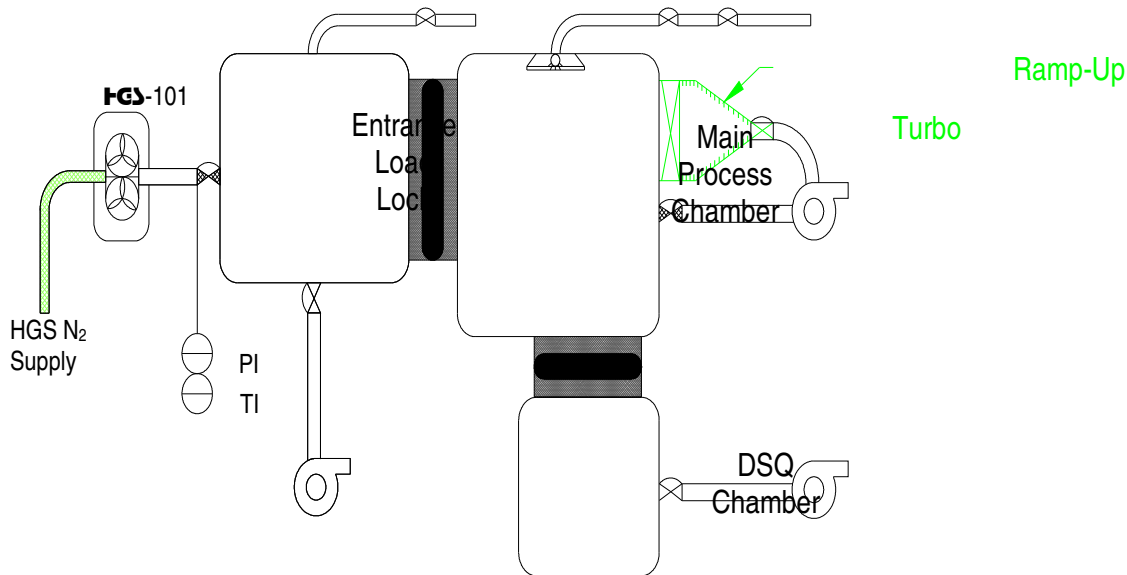


Figure 7 - 5

7.2.5 **HGS** Optional Operating Sequence upon Galiso Customer Service Recommendation Only:

When the **HGS** Instrument Valve Pressure Transducer senses that the system pressure is below 1.0 Torr, the **HGS** PLC opens the Exit Load Lock Inner Door and enters the HGS-P5 mode. The HGS-P5 process pumps hot gas through the Load Lock, Main and DSQ chambers to the DSQ process pump at approximately 250 Torr. During the HGS-P5 process, the shower head purge gas continues to flow. The HGS-P5 process runs for approximately 6 minutes. The HGS-P5 process is depicted in figure 7-5, below.

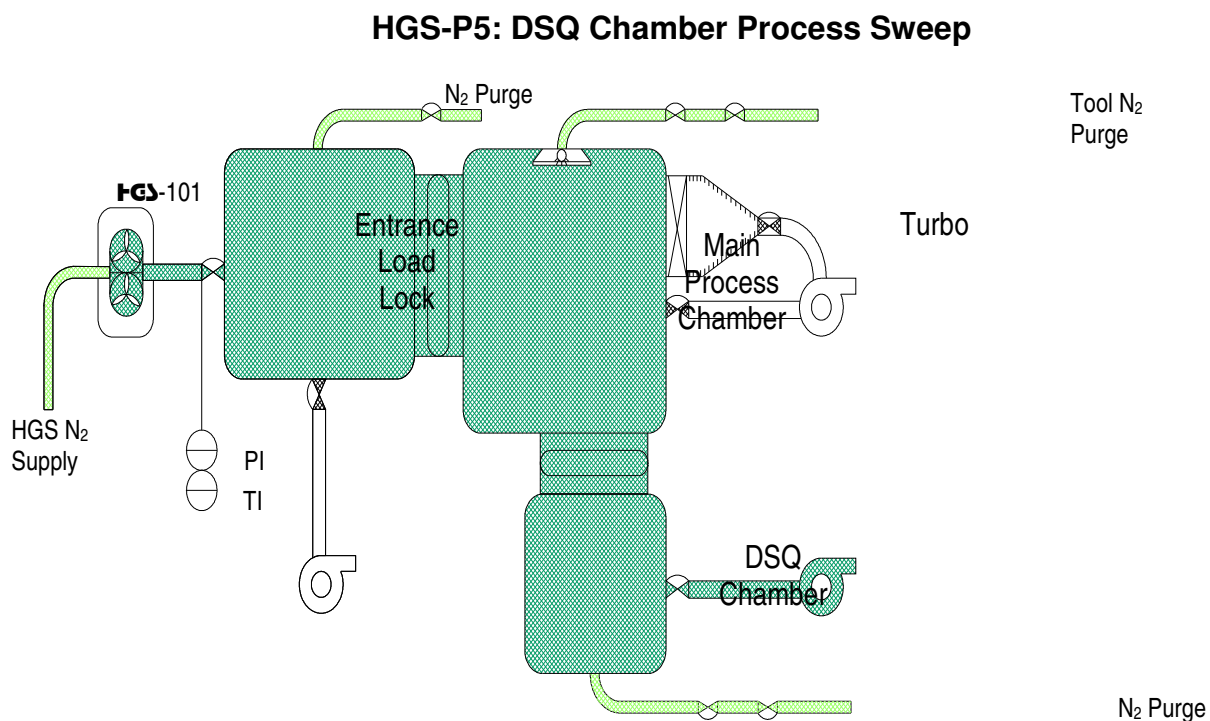


Figure 7 - 6

Note that the HGS-P5 or DSQ process is optional and may be deleted by changing the PLC settings.

7.3 HGS Status Indicators

The HGS Kit for 9600 TCP Systems includes system status indicator light modules. These are designed to continuously indicate HGS system status. Figure 7-7 shows the basic indicator functions.

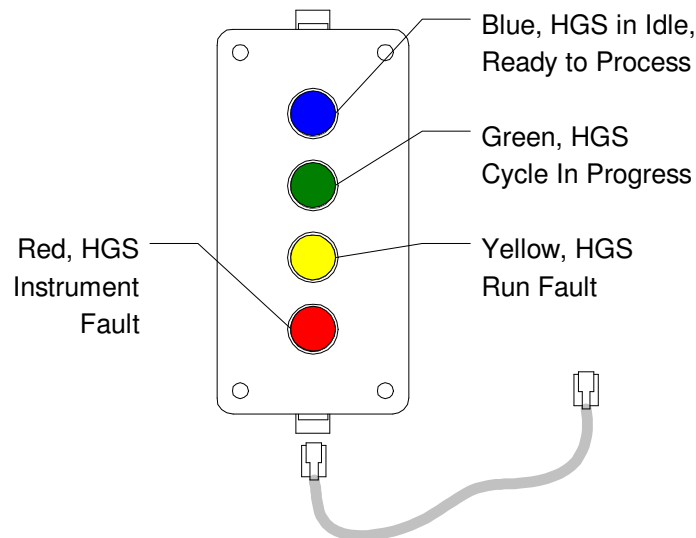


Figure 7 - 7: HGS Status Indicators

Additional indicating functions are as follows:

- Alternating Blue/Green flashing – Indicates more than 12/24 hrs since last HGS run. **This means it is time to RUN the HGS program!**
- HGS Run Faults include;
 - 1) System over-pressure during run, and
 - 2) HGS Run interrupted
- Note that the HGS operating cycle will terminate if an instrument fault is sensed, and gas flow will be stopped when a system overpressure fault occurs.

Blank Page



Lam: _____ Date: _____ WW: _____ PC RF Hours: _____ DSQ RF Hours: _____ PM Type? WC or Qrtly		
Root Cause of Wet Clean _____		
System Preparation	Tech Sign	Comments
Check to see if a Quarterly PM needs to be done.		
Perform a main chamber leak rate with the Load Locks Vented.		Result _____
Change system temperatures to 45°C: Diagnose/Menu/Custom I/O - DSQ Paddle temperature in Process/DSQ – <XLL_Rcp_Paddle_Temp_SetPt> = 240°C - Chamber temperature in Chamber 1 – <ProChm_Temp_Default> = 70°C - Gate Valve temperature in Chamber 1 – <Gate_Valve_Temp_Setpt> = 70°C		
Run HGS or complete 200 Pump/Purge cycles from the Maintain/Main Chamber page		
Turn on the chiller bypass for the lower electrode		
Auto Vent the chamber through Maintain/Main Chamber		
After the chamber is vented, put the system in Manual Mode through Diagnose/Custom I/O		
Bring the Turbo to a stop and turn off power on the Turbo Controller		
CMI ONLY: Open the process chamber and take digital pictures of the Upper Ceramic, Vat Housing (from chamber), ELL door area of chamber, and endpoint area of chamber.		
Vent the ELL through Diagnose/ELL . When at ATM – Close vent		
Close the Heated Process Pump Isolation Valve		
Turn off endpoint window heater (Disconnect heater power connector)		
Disconnect EII Heater jacket power connector (between the vertical & horizontal HGS pipes).		
Disconnect and tilt and or remove the DSQ.		
Remove the chamber ceramics		
Set the ESC Protective Cover in place		
Remove the Quartz End Point Window (4 outer screws, leave the detector on)		
Verify Turbo Iso Valve is open and remove Main Chamber Vacuum Line for cleaning.		
Put VAT Controller in Local mode & open gate/pendulum valve.		
Remove the VAT cover & valve assembly.		
System Cleaning	Tech Sign	Comments
Use DI water & Alpha Wipes to remove polymer. Do final wipe with IPA. Check uppers with mirror.		
Vacuum clean loose debris from the Main Chamber, Turbo Flange, & Vat housing.		
Clean the Process Chamber. Be careful not to get water in the lifter pin holes or down in crevices.		
Clean the Turbo flange. Verify with a mirror that the upper area is clean and that the flange has no discoloration.		
Clean the VAT Housing.		
Remove & clean the ELL/XLL inner door and the XLL outer door.		
Replace the inner door O-Rings, part # 205756.		
Replace the End Point Window O-Ring. Size 160.		
Vacuum clean the EII & XIL. Wipe down with IPA.		
Wipe down the DSQ Quartz. If RF Hours are >70, replace DSQ TCP O-Ring.		
Wipe down the APM bowl/chuck using Alpha Wipes & IPA.		
Wipe down the DSQ Quartz. If the DSQ RF hours are >70, replace DSQ TCP-Window O-Ring. If PM is performed, reset the RF On Timer through the Maintain/PLL page.		

<u>System Assembly</u>	<u>TECH</u>	<u>Comments</u>
Install the cleaned doors.		
Install a cleaned VAT valve assembly.		
Install the cleaned vacuum line.		
Close VAT valve.		
Reinstall VAT cover.		
Remove the ESC protective cover & wipe the E-Chuck with IPA & Alpha Wipes.		
Install clean ceramic listed above on the System Cleaning portion of this checklist.		
Complete the ELL/XLL arm calibrations to the Load Station, Process Chamber, & APM		
Wipe the ESC again. Close and latch the chamber.		
Use the N2 gun and a vacuum to clean the DSQ. Follow with an Alpha Wipe & IPA.		
Install the DSQ or close the Flip-Top DSQ.		
<u>System Restoration</u>	<u>TECH</u>	<u>Comments</u>
Open the XLL inner door and soft-pump the chamber through the XLL until it reaches 20000 mtorr, then open the XLL isolation valve and close the soft-pump valve on the Diagnose/XLL macro .		
Clean the ELL Cover with Alpha Wipes & DI / IPA. Replace cover on tool.		
Soft-pump the ELL to 20000 mt, then open the ELL isolation valve and close the soft-pump valve. Diagnose/ELL macro		
Verify the Turbo ISO valve is open. Open the heated process pump isolation valve and verify the ProcChm_Ref_Mano_Pres_Mon is less than 300 mt with the ProcChm_N2_Bals_Vlv85_DO set to close on the Diagnose/Chamber Macro page.		
Turn on Turbo power and bring it up to speed.		
Put the VAT controller in Remote.		
Close the XLL inner door when the XLL pressure reaches 100mt or less.		
Put the system in Auto Mode through Diagnose/Custom I/O		
Turn off the Auto Vent in Maintain/Main Chamber 1.		
Turn off the chiller bypass for lower electrode.		
Change system temperatures back to original. Diagnose/Custom I/O .		
Reset RF Upper, Lower, & wafer counters 1-5 in Maintain/Chamber Counters . Reset DSQ RF hr. values 1 & 2 if O-Ring was changed, Maintain/PLL Counters		
Helium leak check the system. Check the Process Chamber, ELL, and DSQ.		
Run HGS.		
Verify Chamber ROR is less then 3mt/min with ELL/XLL at ATM.		
Change Particle Reduction Options in Setup/Main Chamber 1: - Change the Crossover Gas Number and Ballast Gas Number to 0		
Zero the Main Chamber Manometer.		
Activate VAT Valve Auto Zero through Diagnose/Turbo Macro .		
Vat valve Autolearn: –Flow 75sccm. Of SF6 & 75sccm of AR through Process/Main Chamber . – Activate Autolearn function through Diagnose/Turbo Macro .		
Change Particle Reduction Options in Setup/Main Chamber 1: - Change the Crossover Gas Number and Ballast Gas Number to 9. –Change the flow for FS^ & AR to 0sccm. In Process/Main Chamber .		
Verify the ELL/XLL Loadlock Isolation Valve at Idle is set to true.		
Verify correct Ballast/Crossover N2 pressure:		
Run Weekly LAM PM.		
Run 50 condition wafers.		
Calibrate the endpoint detectors.		
Log tool over to Eng./Serp Eval.		
Turn tool over to Production for Particle, Serpentine, & Etch Rate Quals.		
Clean all the chamber hardware removed before considering this PM complete.		

Quarterly PM		
<u>Procedure</u>	<u>TECH</u>	<u>Comments</u>
Perform concurrently with Wet-Clean Checklist		
Vat Motor (VAT 65)		
Remove the VAT motor & clean the motor shaft.		
Replace the VAT motor housing seals. Size 329.		
Reinstall during system assembly section of the Wet-Clean Procedure.		
Manometer Trees		
Remove the trees from the side-plate & clean thoroughly.		
Pull the Turbo Manometer Tree & clean thoroughly.		
Replace Nupro Valvestem Tips.		
Reinstall during system assembly section of the Wet-Clean Procedure.		
End Point Window Side-Plate		
Remove End Point Window Side-Plate		
Replace Side Plate O-Ring		
Reinstall during system assembly section of the Wet-Clean Procedure.		
Isolation Valve		
Remove & clean Turbo Iso Valve. Replace O-Rings if needed.		
Remove & clean Turbo Bypass Valve, & replace O-Rings if needed.		
Reinstall during system assembly section of the Wet-Clean Procedure.		
Mid Chamber		
Remove Upper TCP Ceramic & O-Ring		
Inspect Mid Chamber for Pitting & Corrosion .		
Replace Mid Chamber if necessary.		
Replace Mid Chamber O-Ring.		
Wipe Down Mid Chamber & Ceramics with DI / IPA.		
Reinstall during system assembly section of the Wet-Clean Procedure.		
XLL (with DSQ)		
Remove Inner & Outer Door O-Rings. Clean both O-Ring grooves.		
Replace door O-Ring (Chemraz),		
Look for rubbing on both bellows covers. Adjust if necessary.		
DSQ Rebuild		
Disconnect & remove the DSQ & place it on holder.		
Remove & clean Manometer weldment. Install new Nupro stem tip.		
Remove & clean quartz with DI / IPA.		
Remove O-Rings & replace with new. Outer Gas, Inner Gas, both Spacers, TCP Top & Bottom.		
Reassemble DSQ.		
Reset the RF On Timers through the Maintain/PLL page.		
Reconnect & replace the DSQ onto the tool.		

Quarterly PM (cont.)		
<u>Procedure</u>	<u>TECH</u>	<u>Comments</u>
XLL Arm Rebuild (Perform only as needed)		
Remove the heated DSQ Paddle.		
Remove XLL Arm & housing cover.		
Replace the arm post Quad Seal O-Ring.		
Replace the arm Shaft Seal O-Ring. Size 017		
Replace the arm Housing Cover & XLL Arm.		
Reinstall the DSQ Heated Paddle.		
Align & calibrate the XLL Arm.		
Align the DSQ Paddle		
ELL Arm Rebuild		
Remove ELL Arm & housing cover.		
Replace the arm post Quad Seal O-Ring.		
Replace the arm Shaft Seal O-Ring. Size 017		
Replace the arm Housing Cover O-Ring.		
Reinstall the arm Housing Cover & ELL Arm.		
Align & Calibrate the ELL Arm.		



PRODUCT WARRANTY

1. **DURATION:** Galiso extends a one-year warranty from date of purchase, to the original purchaser, for all its manufactured products. For all spare parts purchases, Galiso extends the manufacturer's warranty or 90 days, whichever is longer. Soft goods parts, such as speed seals, washers, and O-rings, which are subject to wear in the normal course of operation, are not covered under this warranty. Collar Tooling products are warranted for six months.
2. **COVERAGE:** Galiso manufactured equipment is warranted against defective materials or workmanship. THIS WARRANTY IS VOID IF:
 - A) THE EQUIPMENT HAS BEEN DAMAGED BY ACCIDENT OR UNREASONABLE USE, IMPROPER SERVICE/MAINTENANCE, IMPROPER INSTALLATION, ABNORMAL OPERATING CONDITIONS, NEGLIGENCE, REPAIR BY ANY PERSON NOT AUTHORIZED BY GALISO, INC. OR OTHER CAUSES NOT RELATED TO MATERIAL DEFECTS OR WORKMANSHIP.
 - B) THE SERIAL NUMBER HAS BEEN ALTERED OR DEFACED.
3. **PERFORMANCE:** Galiso reserves the right to make warranty determination only after inspecting the item at the Galiso manufacturing facility. If the warranty determination indicates that the defective item is covered under warranty, the item will be repaired or replaced with same parts/items or parts/items of equivalent quality, at the option of Galiso. In the event of replacements, the replacement unit will continue under the original equipment warranty or carry a 90-day warranty, whichever is longer. No charge will be made for warranty repairs, and/or replacements. All freight charges are the responsibility of the customer requesting warranty service.

If the warranty determination indicates that the item is not covered by warranty, a repair/replacement cost estimate will be submitted to the purchaser for approval prior to initiating any repair work.
4. **CLAIMS:** In the case of equipment malfunction, notify Galiso (1-800-854-3789) and provide the Model Name, Model Number, Serial Number and a description of the problem. Return Authorization Number, shipping and/or service information will be provided on receipt of the required information.
5. **SERVICE EQUIPMENT:** Galiso attempts to make available, whenever possible, a limited amount of service equipment at a minimal use charge, plus freight expense, for those customers wishing to avoid downtime during repair of their equipment. Such items are available on a first come, first served basis and are billable at the specific service charge applying with a one-month minimum.
6. **MODEL CHANGES:** Galiso reserves the right to make changes in materials and specifications, without notice. Galiso may offer, for a stipulated fee, the opportunity to upgrade your equipment to the latest configuration.
7. **DISCLAIMERS:** Galiso provides technical data and assistance to aid customers in the selection and use of our products. There are no implied warranties of merchantability nor suitability for a particular purpose associated with the transmittal of technical data and/or customer assistance.

Galiso does not assume liability for any consequential, incidental, or special damages. Liability under this warranty is limited to repairing, or replacing Galiso equipment items returned to the factory or an authorized facility.

Return of Equipment

Service Exposure Report - CERA97 Procedure



INTRODUCTION:

Before you return your equipment, you must notify your Galiso supplier if the substances you used and/or produced in the equipment can be dangerous. You must do this to comply with health and safety at work laws.

You must complete the Declaration on the back of this page and send it to your Galiso supplier BEFORE you dispatch the equipment.

If you do not, your Galiso supplier will assume that the equipment is dangerous and will refuse delivery.

If the Declaration is not completed correctly, there may be a delay in processing your equipment.

CONSIDERATIONS:

- 1- It is specifically stated in the equipment operators manual that Galiso equipment is designed to be used only for Clean Atmospheric Air, Nitrogen, Argon, and inert gas applications.
- 2- Your equipment may be considered UNCONTAMINATED if it has not been used or if it has only been exposed to the substances specified in #1 above.
- 3- Your equipment is CONTAMINATED if it has been exposed to any substances other than those specified in #1 above.
- 4- If your equipment is contaminated, you must decontaminate it before you return it to your supplier. You must send independent proof of decontamination (for example, a certificate of analysis) to your supplier with the completed Declaration. Contact your supplier for additional information.
- 5- Your Galiso supplier will refuse delivery of any equipment that is contaminated as defined above.

PROCEDURE:

- 1- Complete the Declaration. All sections must be completed.
- 2- Send a copy of the completed Declaration to your Galiso supplier.
- 3- Retain the original completed Declaration to be included in the shipping documents.
- 4- Contact your Galiso supplier for a Return Authorization (RA) number for your equipment. Customer is responsible for all shipping. Please provide return instructions.
- 5- Remove any accessories or attachments that are not standard components of your equipment.
- 6- Seal all inlets and outlets on the equipment with blanking flanges or heavy gauge PVC tape.
- 7- Package the equipment in its original shipping container. If the original container is not available, use a suitable box or crate. Use sufficient packing material to avoid damage to the equipment during transit.
- 8- Seal the original Declaration in an envelope and attach securely to the OUTSIDE of the equipment package.
- 9- Write your Return Authorization Number clearly on the OUTSIDE of the equipment package.

CONTACTS:

If you have any questions regarding the return of Galiso equipment, contact us at:

Galiso Inc.

Phone: (970) 249-0233

22 Ponderosa Ct.

Fax: (970) 249-0607

Montrose, CO 81401

Tech Support: (800) 854-3789

Service Exposure Report - CERA97 Declaration

To return equipment, you must:

- > Read the procedure (CERA97) on the back of this form before you complete this Declaration.
- > Know about all of the substances which have been used and/or produced in the equipment.
- > Complete all sections of this Declaration and send a copy to your Galiso supplier before returning equipment.
- > Contact your Galiso supplier to obtain an Return Authorization Number.

SECTION 1: Equipment Identification

Equipment Model: _____ Serial Number: _____

Has the equipment been used, tested, or operated? YES NO

FOR SEMICONDUCTOR APPLICATIONS ONLY:

Tool Reference # : _____ Process: _____

Malfunction Date: _____ Replacement Unit S/N: _____

SECTION 2: Equipment Exposure

Were any of the substances used or produced in the equipment-

- > Radioactive YES NO > Biologically active YES NO > Dangerous to human health and safety YES NO

SECTION 3: List of Substances

You must give complete information on all substances that have been used and/or produced in the equipment. All substances must be listed. Attach additional page if necessary.

Substance Name	Chemical Symbol	CAS Number	OSHA PEL (mg/m3)	MSDS Attached
				Y / N
				Y / N
				Y / N
				Y / N

If your equipment is contaminated, you must decontaminate it before you return it to your NUVAC supplier. You must send independent proof of decontamination (for example, a certificate of analysis) to your Galiso supplier with the completed Declaration. Contact your supplier for additional information.

SECTION 4: Return Information

Reason for return: _____

Malfunction Symptoms: _____

FOR EQUIPMENT BEING RETURNED FOR WARRANTY EVALUATION:

Name of Supplier: _____ Supplier's Invoice Number: _____

SECTION 5: Declaration

Your name: _____ Your job title: _____

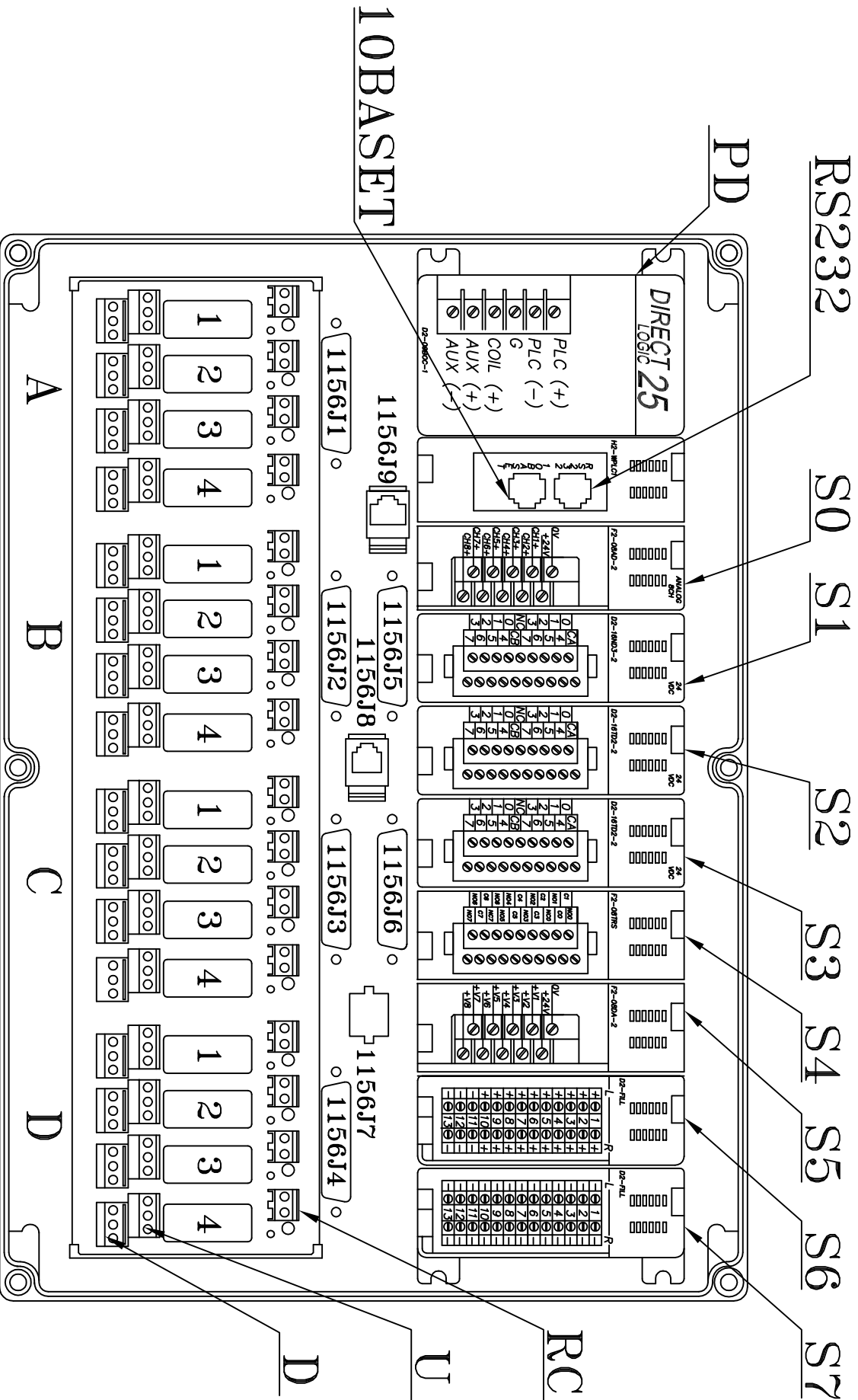
Your Company: _____ Telephone # : _____

Address: _____ Fax # : _____

I have made reasonable inquiry and I have supplied accurate information in this Declaration. I have not withheld any information. I have followed the Galiso Equipment Return-CERA97 procedure on the back of this form.

igned: _____ Date: _____

REV.	AUTHORITY	DATE	BY
A	PRODUCT RELEASE	10/27/00	GJH
B	ECN #00-074	11/30/00	GJH



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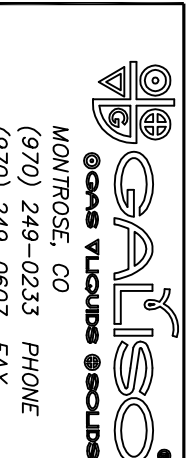
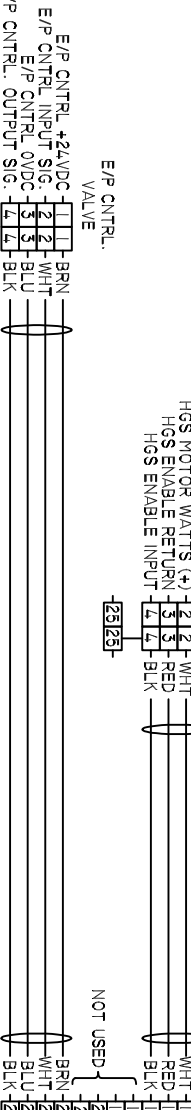
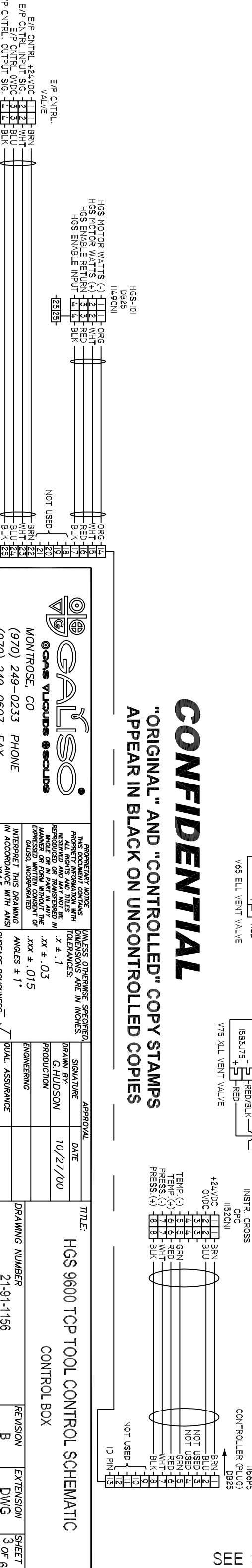
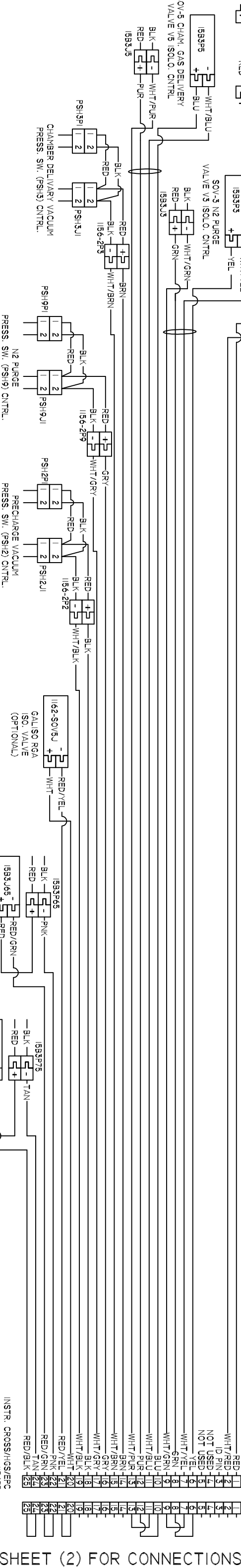
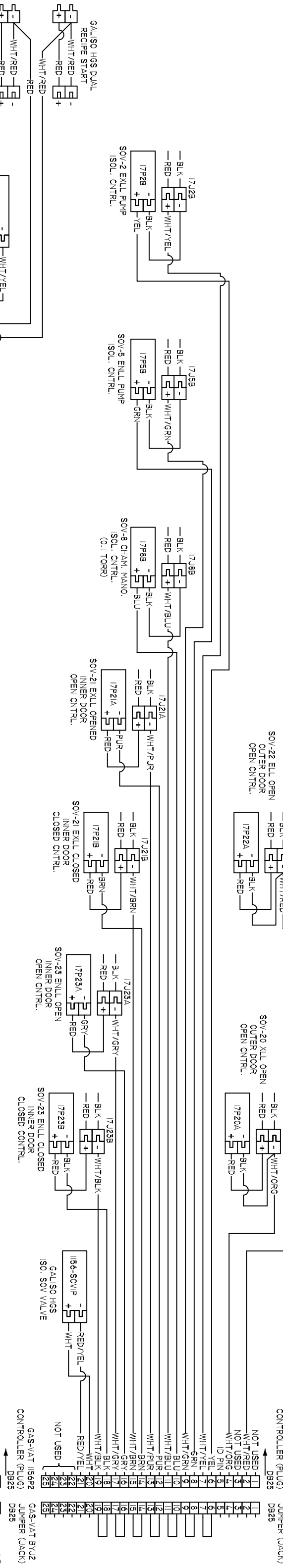
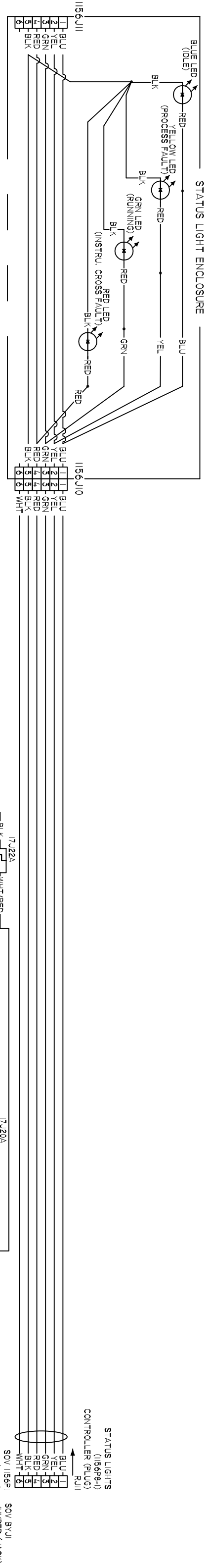
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				QUAL. ASSURANCE			
				DRAWING NUMBER		21-91-1156	
				REVISION		B	
				EXTENSION		DWG	
				SHEET		1 OF 6	

HGS 9600 TCP TOOL CONTROL SCHEMATIC
PLC COMPONENT LAYOUT



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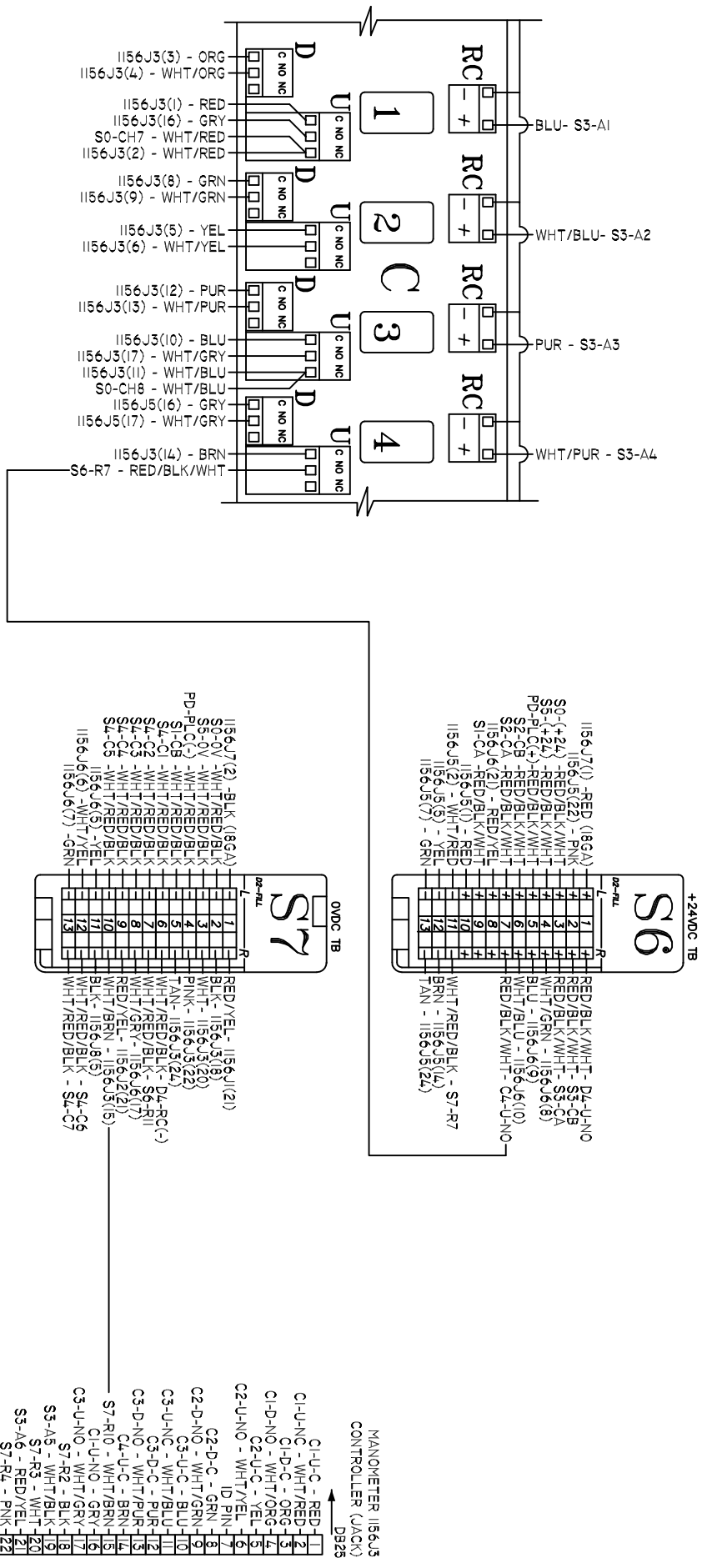
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REVISION B		EXTENSION DWG	
SHEET 3 OF 6			

SEE SHEET (2) FOR CONNECTIONS

NOTES:

1. THIS OPTIONAL WIRING FOR THE GRC, IS FOR A +24V SWITCH AT RELAY.



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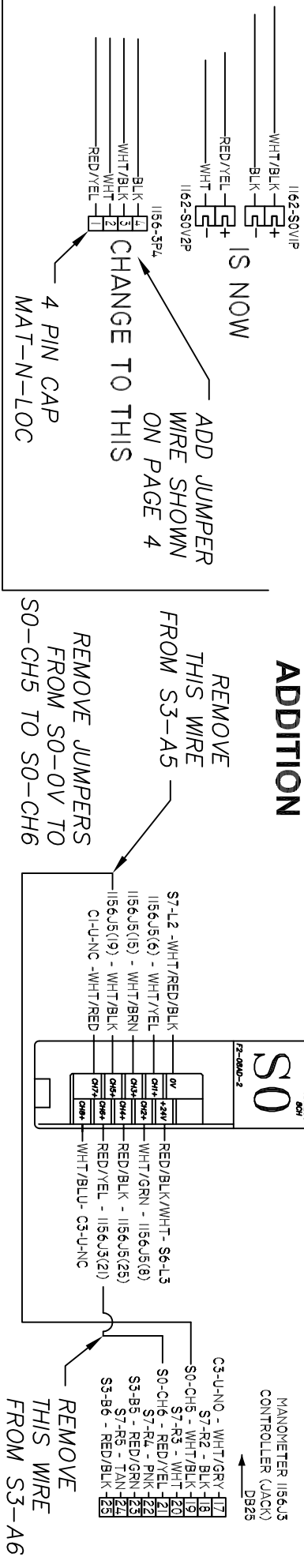
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CONTROLLER CABLE

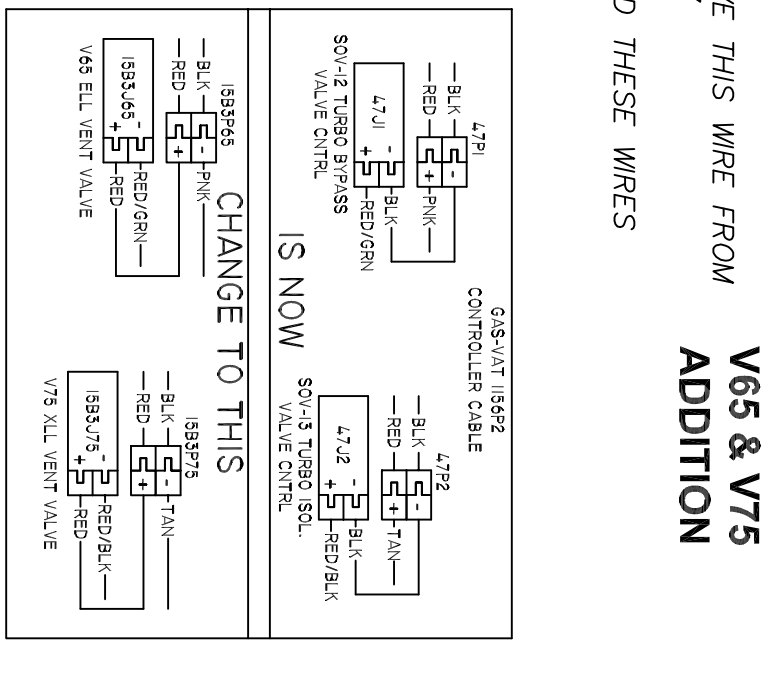
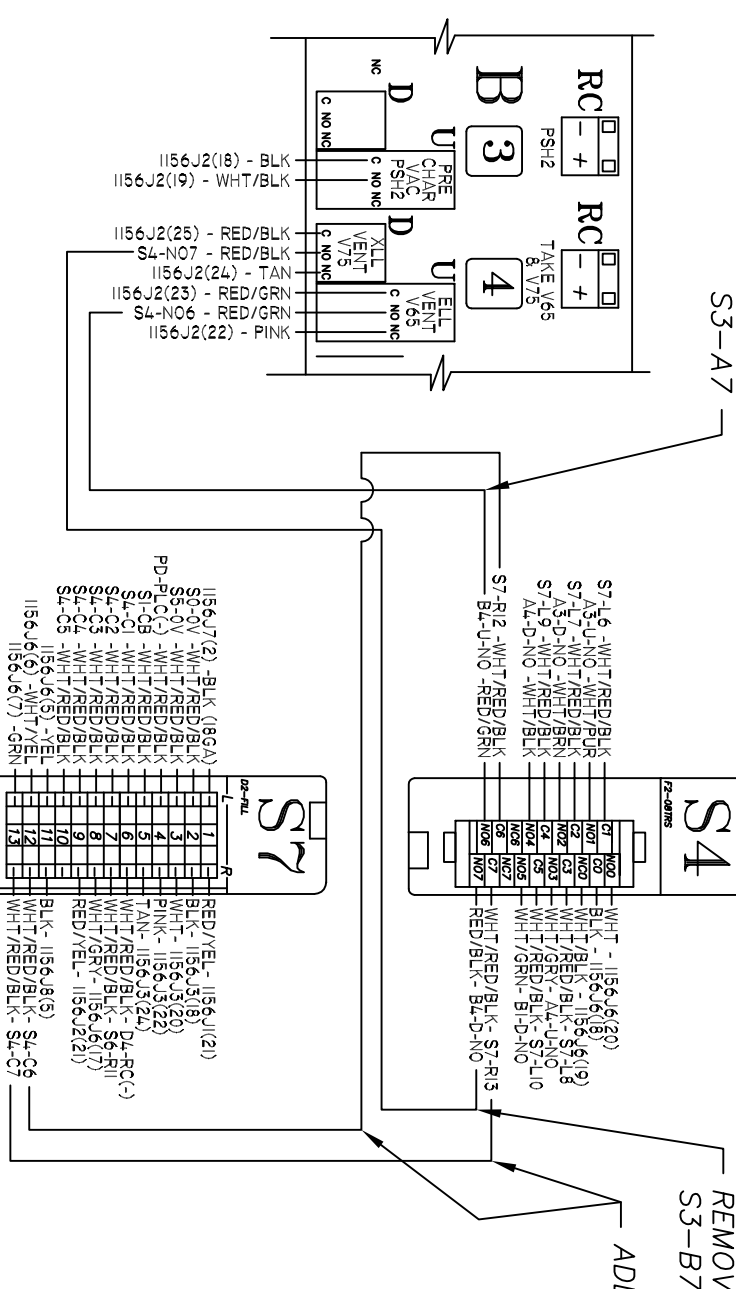
MAIN CHAMBER & DSQ MANO. ADDITION

ANALOG INPUTS

MANOMETER 1156J5
CONTROLLER (JACK)
D925



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.XXX ± .015
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DRAWN BY: G.HUDSON		02/19/01
ENGINEERING		

TITLE:	REVISION	EXTENSION	SHEET
HGS 9600 TCP TOOL CONTROL SCHEMATIC	B	DWG	6 OF 6
GRC OPTIONAL WIRING			
DRAWING NUMBER 21-91-1156			