
INSTALLATION AND OPERATIONS MANUAL FOR THE

FGS-101 DRYCLEAN

VACUUM CHAMBER CONTAMINANT REDUCTION SYSTEM

Galiso Part No. 200-51-3056H



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MANUAL NUMBER 21-11-1149

Revision F

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Attachments:

- Galiso, Inc. Warranty Terms and Conditions
- CERA97 Equipment Return Exposure Report
- Electrical Schematic No. 21-91-1149
- Piping and Instrument Diagram No. 21-61-1149

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1.0 INTRODUCTION

Galiso Incorporated would like to thank you for your investment and participation in this new technology. The Hot Gas System (HGS), is a new solution to an old problem and is the state of the art in chamber vacuum acquisition and contamination removal. The patented and patent pending HGS systems utilize a viscous flow approach to eliminating both moisture and particulate chamber contaminants rather than the use of high vacuum, molecular flow to remove contamination.

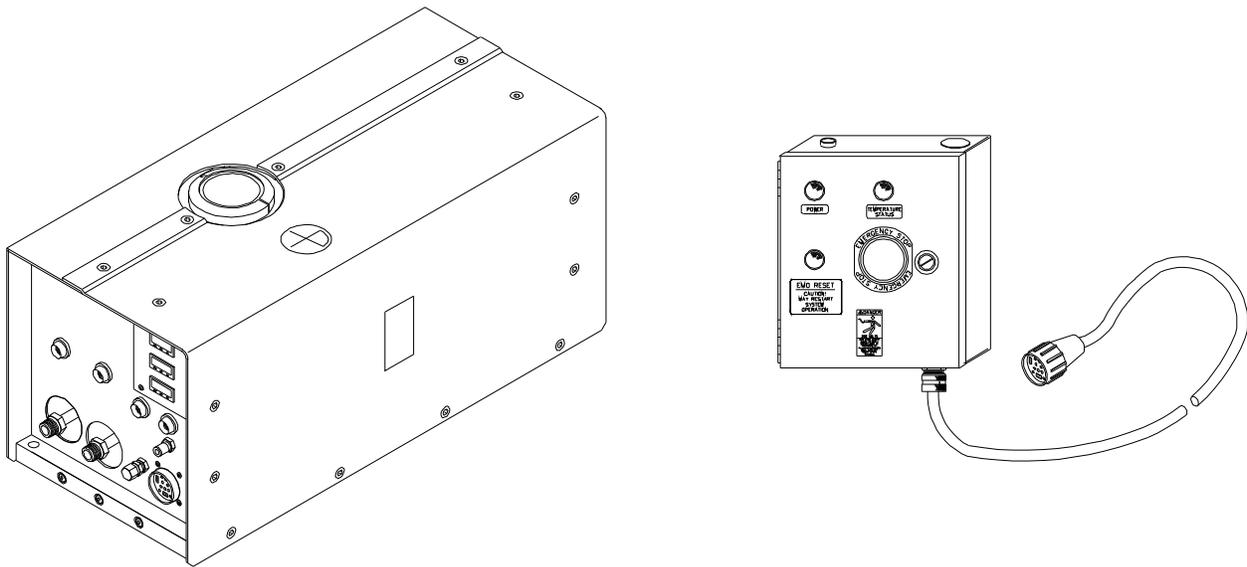


Figure 1 - HGS-101

The HGS-101 is designed to be connected to your chamber and operate only when necessary for scheduled service. A simplified schematic of installed HGS system is shown in figure 1-2, below.

This manual covers the installation, operation, troubleshooting and maintenance of the HGS-101 module.

1.0 INTRODUCTION, continued

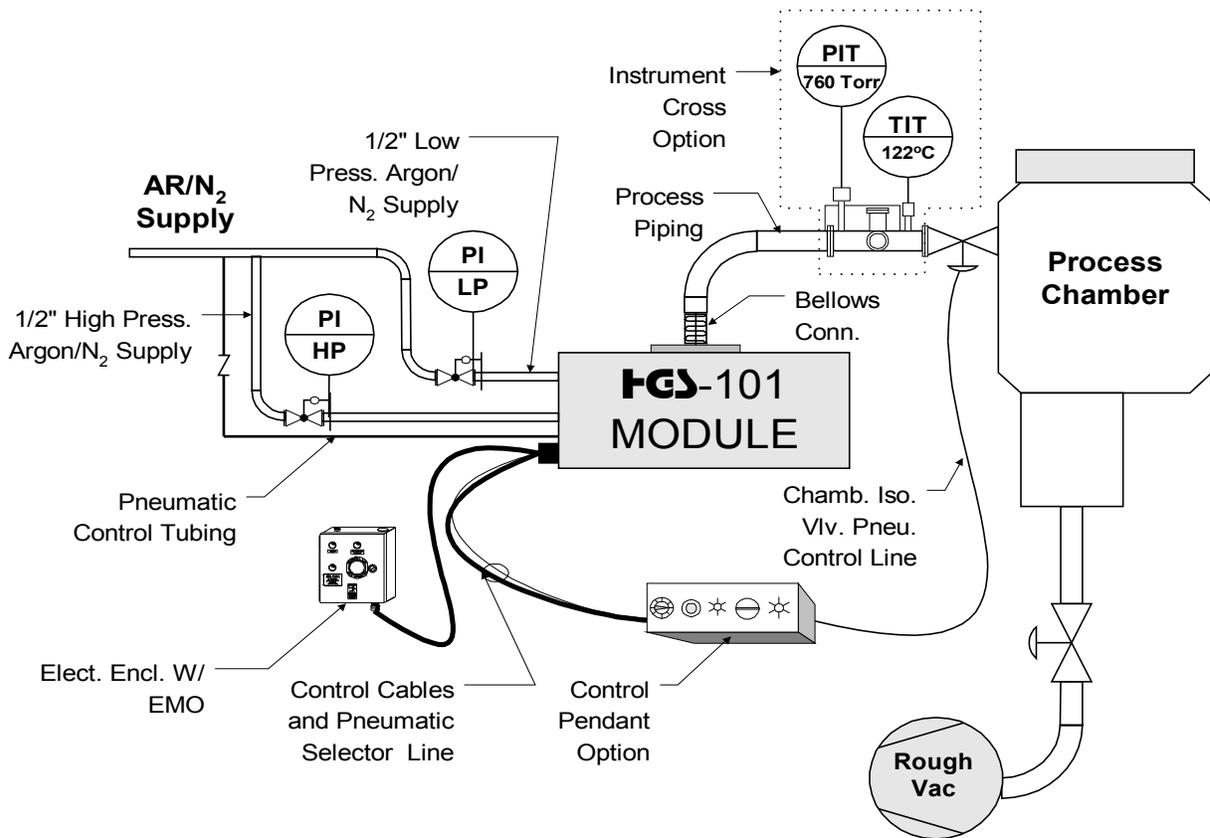


Figure 1 - : Process Schematic

Galiso Incorporated thanks you for selecting the HGS-101 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.net. We would like to solicit your comments and suggestions to help us further refine and improve our products.

2.0 PRODUCT SPECIFICATIONS

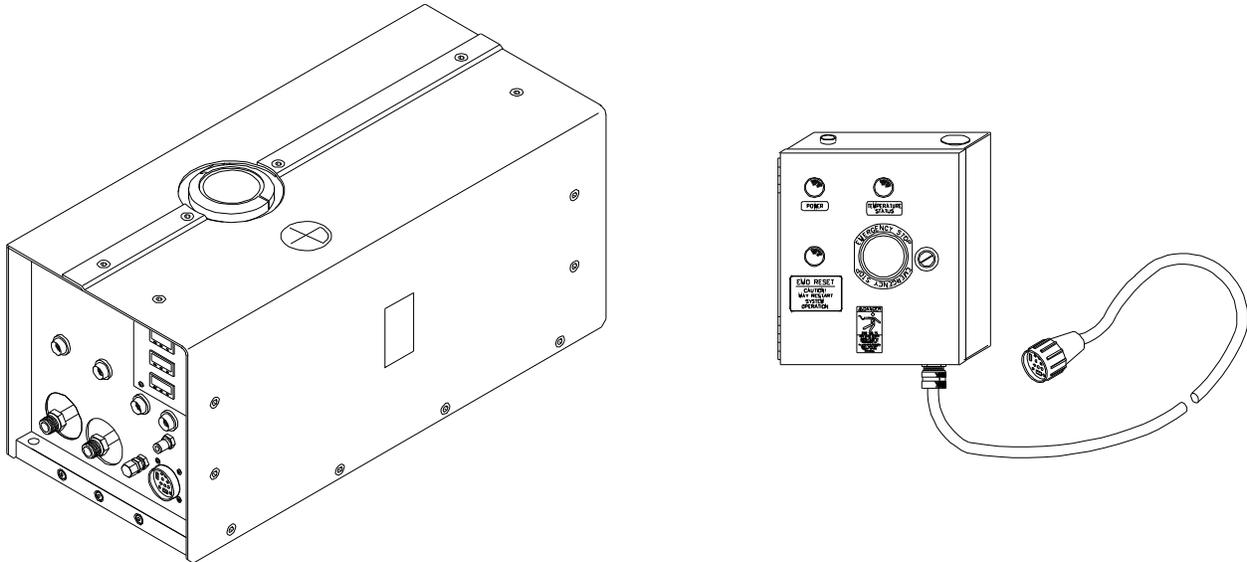


Figure 2 - : **HGS-101**

Dimensions: See page 2-2

Weight: 120 lbs (54.5 kg)

Electrical Requirements: 208-230 Volt, 3-phase, 9 Amps @ 60 Hz and 3450 RPM,
180-200 Volt, 3-phase, 10 Amps @ 50 Hz and 2850 RPM

Argon/N₂ Requirements: 5-25 scfm (141-700 sl/min) intermittent

Control N₂ Requirements: Less than 1.0 cfm (28 sl/min) intermittent N₂ @ 80 to 100 psig
(550-690 kPa)

Roughing Pump Requirements: 15-70 cfm (425-2000 L/min) @ 400 Torr.

Blower Pumping Speed: 100 cfm (2800 l/min) at atmosphere

Maximum Operating Exhaust Temperature: 130 °C

2.0 PRODUCT SPECIFICATIONS, continued

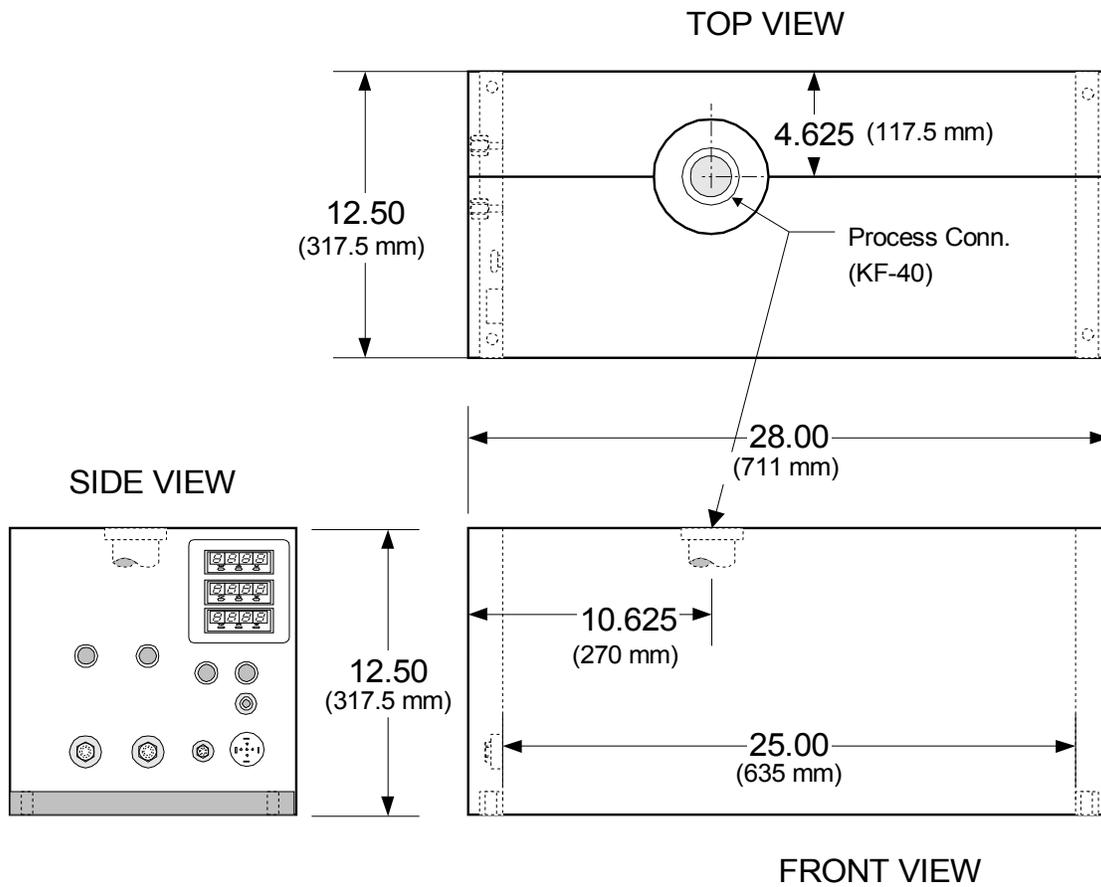


Figure 2 - : HGS-101 Dimensions

3.0 SAFETY

Read all instructions before attempting to install or operate the HGS-101.

GALISO INCORPORATED IS NOT RESPONSIBLE FOR DAMAGE OR INJURY CAUSED BY UNSAFE USE, IMPROPER MAINTENANCE OR IMPROPER APPLICATION OF THIS UNIT. CONSULT THE WARRANTY INFORMATION IN THIS MANUAL FOR ADDITIONAL INFORMATION.

Contact your Galiso Incorporated representative for guidance when in doubt as to the proper safety precautions to be taken when installing or operating this equipment.

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- Operation of the HGS-101 in the presence of flammable gases, fumes, high concentrations of oxygen or other types of explosive environments is a critical safety hazard and must be avoided.
- The HGS-101 is not compatible with corrosive, flammable, volatile or toxic materials or gases. Use only a recommended solvent to clean this equipment.
- Adjustment or troubleshooting must only be performed by properly trained and qualified personnel. Disconnect all power supplies before servicing the unit.

Any employer allowing use of the HGS-101 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 as described in the manual, safety warnings, labels, etc.

3.1 SEMI-S2 Classifications

Galiso Inc. has designed the HGS-101 to minimize the need to conduct testing or maintenance on equipment that may be energized and to minimize work that must be performed on components near exposed energized circuits. However, there may be instances when work must be performed while electrical equipment is energized. In this manual, the five SEMI-S2 conditions are used to identify the type of electrically energized condition(s) which may exist are:

- **Type 1** - Equipment is fully de-energized (electrically cold).
- **Type 2** - Equipment is energized. Live circuits are covered or insulated. Work is performed at a remote location to preclude accidental shock.
- **Type 3** - Equipment is energized. Live circuits are exposed and accidental contact is possible. Potential exposures are less than 30 volts RMS, +2.2 volts peak, 240 volt-amps and 20 Joules.
- **Type 4** - Equipment is energized. Live circuits are exposed and accidental contact is possible. Voltage potentials are greater than 30 volts RMS, +2.2 volts peak, 240 volt-amps, 20 Joules, or radio frequency (rf) is present.
- **Type 5** - Equipment is energized. Measurements and adjustment require physical entry into the equipment, or equipment configuration will not allow the use of clamp on probes.

Instances where maintenance, calibration or other work relates to one of the above Types will be noted in the appropriate section of this manual.

3.2 Safety Warning labels

In general, any potential hazards, precautions and dangers associated with the HGS-101 module are clearly identified with warning labels. The following pages provide the location, a description and illustration of labels used.

3.2 Safety Warning labels, continued

3.2.1 Voltage Danger Label

The locations marked designate areas within the HGS-101 that are powered with 208/230 volts of electricity. Power **MUST** be **OFF** and disconnected from the primary power source when ever possible before servicing. Caution should be used at all times while the unit is on or connected to a power source. Failure to observe proper safety precautions could result in severe injury or death.

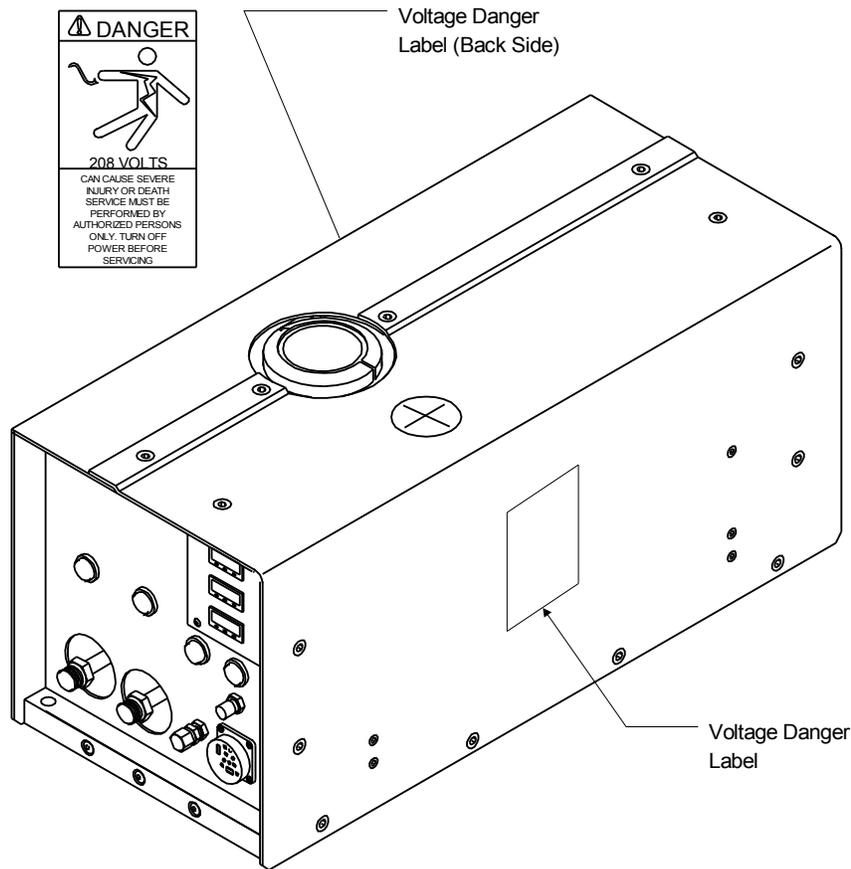


Figure 3 - : Voltage Danger Label(s)

3.2 Safety Warning labels, continued

3.2.2 Serial Number Plate and Information Label, continued

Figure 3-2 shows the location of the serial number and service information label.

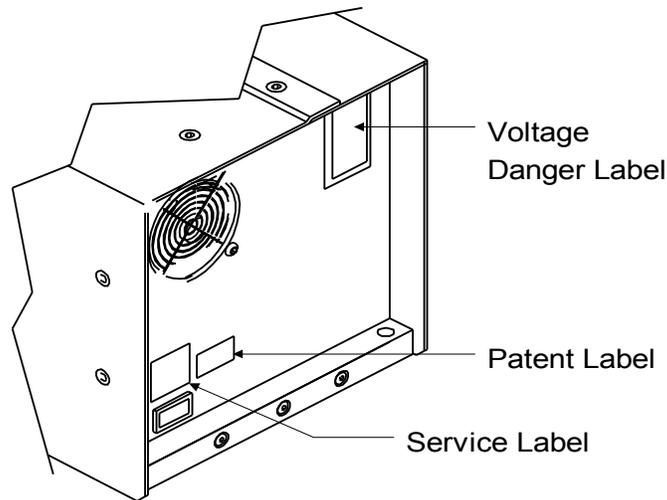


Figure 3 - 2 Information and Service Labels

3.3 Blower Over Temperature Protection

The HGS-101 blower is equipped with a manually re-settable snap disk thermostat (thermodisk) attached to the side of the blower. The thermodisk is set to open at 200 degrees F. If the temperature of the blower case exceeds 200° F, the thermodisk switch opens, interrupting the 208 VAC power to the blower motor contactor. When the temperature drops below 200° F, the operator may manually reset the thermodisk by pressing the reset button on the disk. This reset can only be done by removing the HGS-101 enclosure panel and pressing in the button on the disk. **Be sure to EMO the unit to turn off the 208 VAC power prior to removing the enclosure panels.** Be certain to replace any panels removed, before restarting the machine.

3.3 Blower Over Temperature Protection, continued

! CAUTION !

If the thermodisk is reset and the system pressure is below the pressure controller settings (section 5.3), the blower may automatically restart if enable power is supplied to the unit.

3.4 Emergency Shutdown - EMO Operation

The Emergency off circuit (EMO) is a circuit that controls the power to all of the electrical components in the HGS-101 enclosure. The EMO switch (and the EMO reset switch) are located on the cover of the main disconnect box (see figure 3-3). Depressing the EMO switch will automatically disconnect all power to the HGS-101 unit. After the EMO switch is actuated, all of the HGS-101 components will be in a SEMI-S2 Type 1 condition. The unit is also configured to accept a remote EMO/EMO Reset signal, see Section 4.0 for design/installation details.

3.4.1 EMO Switch Use

The EMO switch is intended for use under any condition which could potentially cause damage to equipment and/or personnel injury. Typical indications where EMO switch use would be warranted include:

- A. Unusual or loud noises emanating from the HGS-101 module.
- B. Smoke and/or unusual odor emanating from the HGS-101 module.
- C. Excess vibration within the unit.
- D. Any environmental condition within the customers facility that could adversely affect safe operation of the unit, such as fire , earthquake, etc.

Note that to restart the unit, the EMO reset button must be pushed.

3.4 Emergency Shutdown - EMO Operation, continued

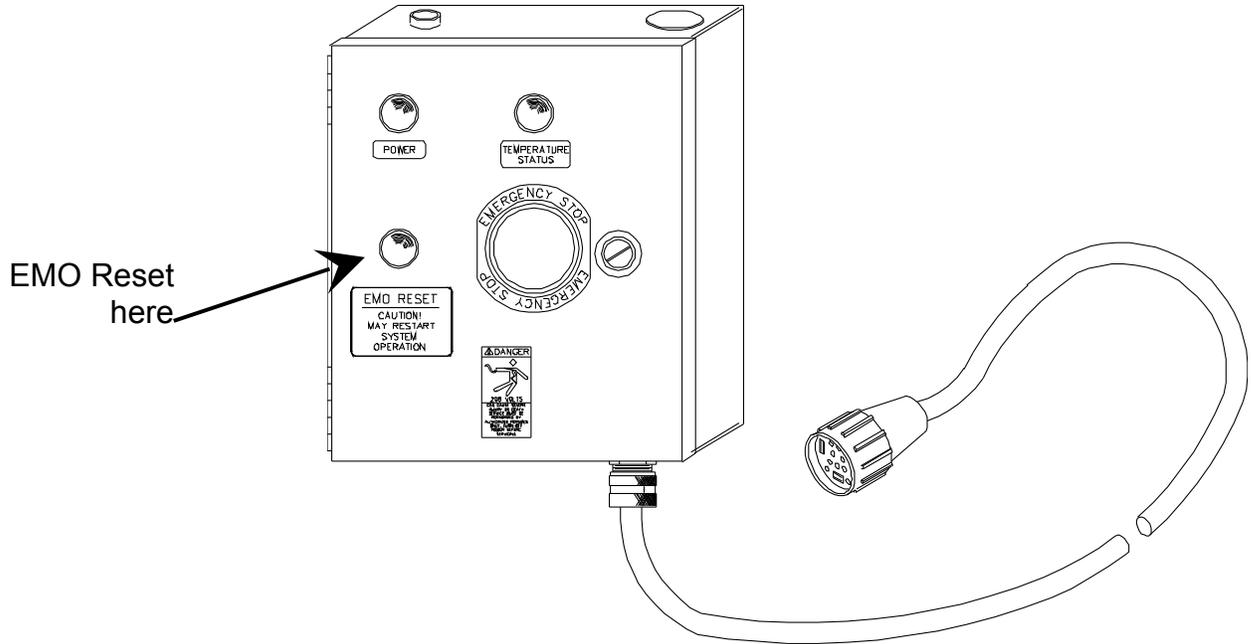


Figure 3 – 3

EMO Switch

4.0 INSTALLATION

4.1 Mounting the Unit

The unit is equipped with four 1/2" diameter mounting holes as shown in figure 4-1. Use 3/8" bolts to mount the unit on a suitable surface.

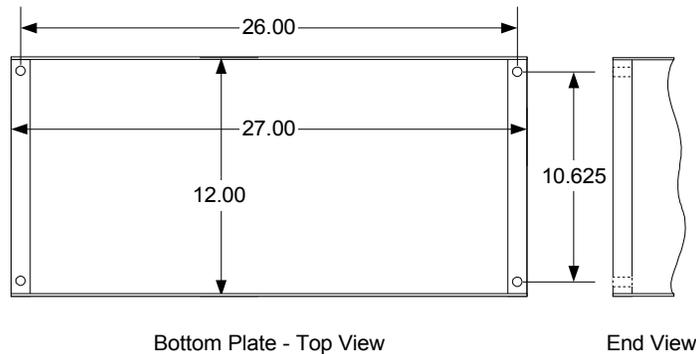


Figure 4 - : Bottom Plate Mounting Hole Locations

4.2 Utility Connections

Refer to figure 4-2 as necessary for HGS-101 utility connections locations.

4.2.1 Low Pressure Argon/N₂

Connect a 1/2" stainless steel tubing line to the VCR-8 male connection provided on the HGS-101 unit (see figures 4-2 and 4-6). The low pressure line must have an adjustable pressure regulator set initially to 0 psig output pressure.

4.2.2 High Pressure Argon/N₂

Connect a 1/2" tubing line to the VCR-8 male connections provided on the HGS-101 unit (see figures 4-2 and 4-6). The high pressure line must have an adjustable regulator set initially to 0 psig output pressure. A main supply shut-off valve is also recommended.

4.2 Utility Connections, continued

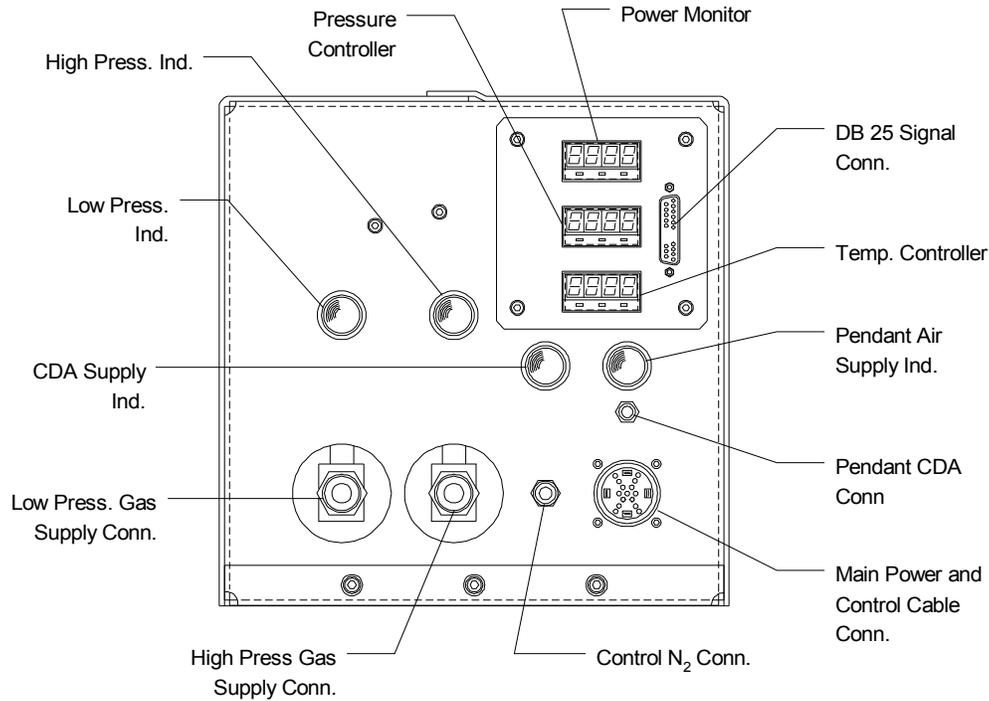


Figure 4 - : HGS-101 Utility Connections

4.2.3 Control N₂ Supply

Connect a Nitrogen tubing line with check valve to the 1/2" swagelok pneumatic control connection on the HGS-101 unit (see figures 4-2 and 4-6). The control N₂ pressure should be between 80 and 100 psig.

4.2 Utility Connections, continued

4.2.4 Electrical - Main Power

The HGS-101 unit is supplied with 20 feet of power cord connected to a enclosure equipped with an EMO switch. Connect the incoming power cable conductors to the phase terminals as depicted in figure 4-3. Use only Code approved 14 gauge-4 conductor 600 volt rated power cable. Note that when the phase wiring is correct, the Power Indicator light (see figure 4-4) will be on. If the Power Indicator light does not light, switch the wire leads to different phase legs until the phase indicator light comes on.

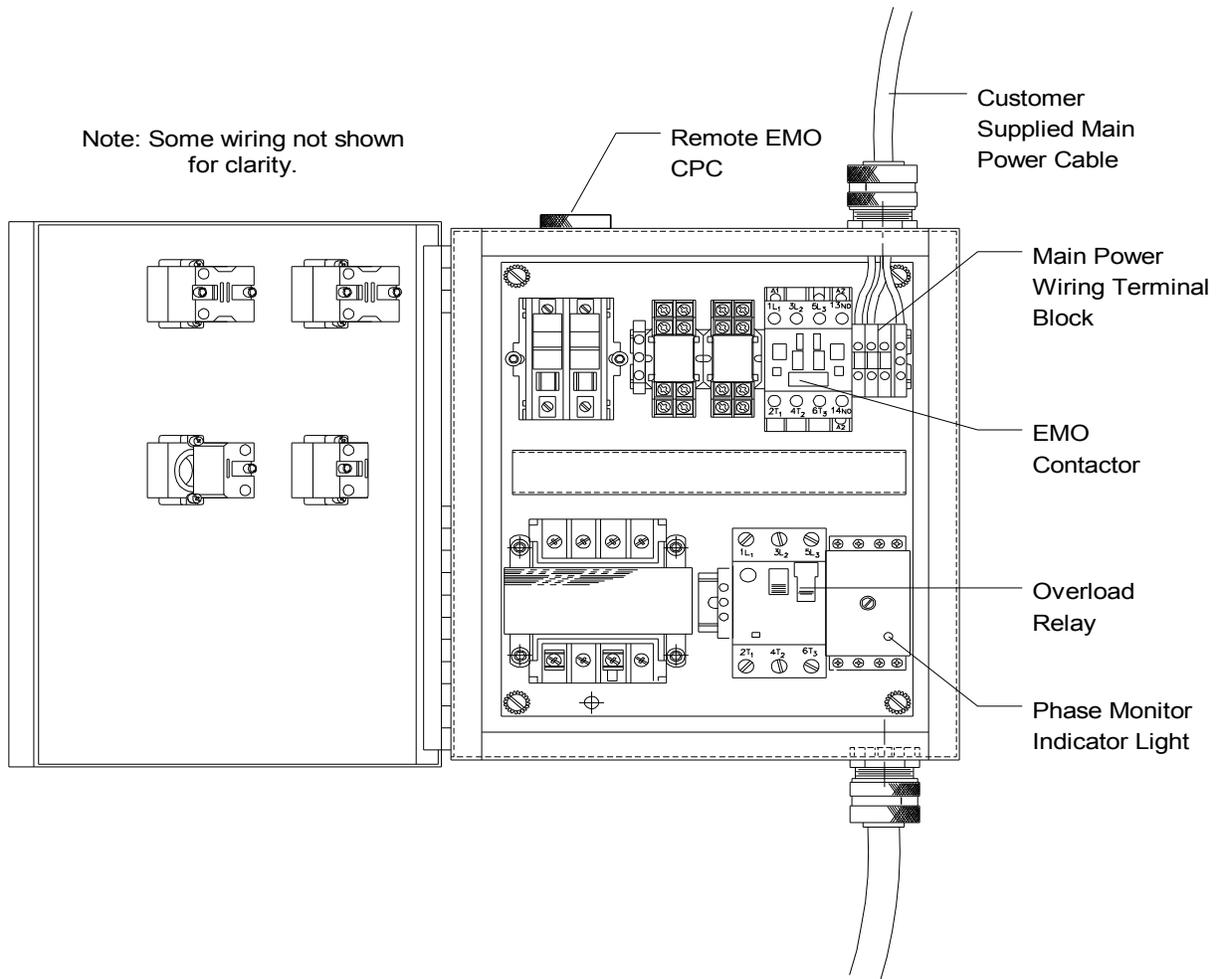


Figure 4 - : HGS-101 Power Wiring

4.3 Controls - Pendant Option

The HGS-101 unit can be supplied with the remote control and indication pendant option shown in figure 4-4. The control pendant includes a 20 foot cable to allow the operator greater flexibility during HGS operations. The control pendant may be mounted or placed in a suitable location as the needs of the facility and/or operator dictate.

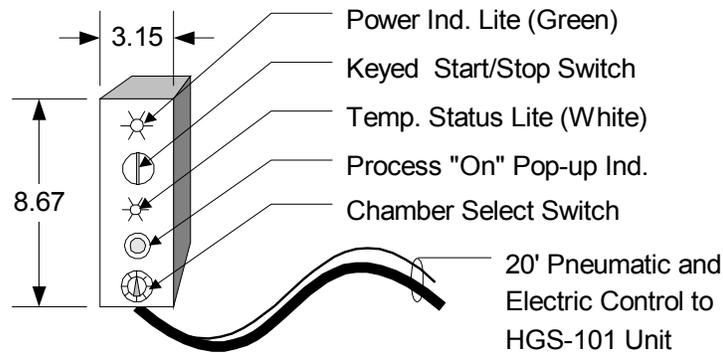


Figure 4 - : HGS-101 Control Pendant

See Section 5.0, Operations for details regarding control pendant functions and use.

4.4 Remote Electronic Monitoring and Control:

The DB-25 connection on the front of the HGS, see figure 4-2, provides for remote monitoring and control. To utilize the HGS remote electronic enable/start circuit, a customer supplied, normally open, SPST, (dry contact) switch across pins 3 and 4 on the DB-25 connector must be installed, see figure 4-5 . The switch used must be rated for 50 mAmps @ 24VDC. Refer to the HGS Electrical Schematic Diagram, no. 21-91-1149G, attached, as necessary for additional wiring details.

4.4 Remote Electronic Monitoring and Control, continued

The DB-25 connection also provides for external HGS motor power monitoring. To utilize the motor power 0 to 10 VDC output signal, use pin 2 as the 0-10 VDC signal output and pin 1 as the signal common to the customer supplied display device. To properly provide remote HGS motor power monitoring, the display device used must be scaled as follows:

0 volts = 0 watts motor power

10 volts = 2,798 watts motor power

Refer to the HGS Electrical Schematic Diagram, no. 21-91-1149G, attached, as necessary for additional wiring details.

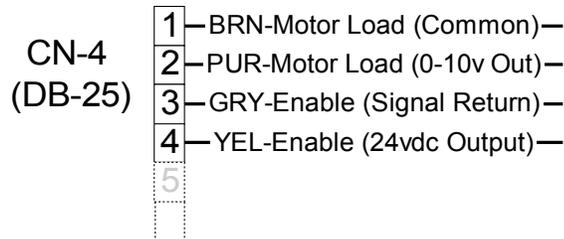


Figure 4 - : Remote Monitoring and Control Contacts

4.5 Process Piping Connections

The HGS-101 unit is designed to be mounted in close proximity to the chamber requiring processing. Attach a 5” KF-40 bellows to the process connection located on the top of the HGS-101 unit. Complete the process connection to the chamber(s) using additional 1-1/2” piping as required. Note that the length of piping used and number of bends should be minimized in order to optimize HGS-101 processing efficiency. In addition, heat tracing the piping to the process chamber to maintain approximately 70 -150°C is recommended to maximize HGS unit processing efficiency. If heat tracing is not practical, the process lines should be insulated to reduce heat loss. A schematic depiction of a completed HGS-101 installation is shown in figure 4-6.

4.6 Rough Vacuum

The HGS system relies on the rough vacuum capability of the chamber process (dry) pump for proper operation. Each HGS unit is adjusted at the factory based on a 500 liter per minute rough vacuum pumping speed. If the process chamber vacuum pumping speed is significantly greater than 2000 Liters per minute, a throttle valve may need to be installed in the chamber vacuum line.

NOTE:

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

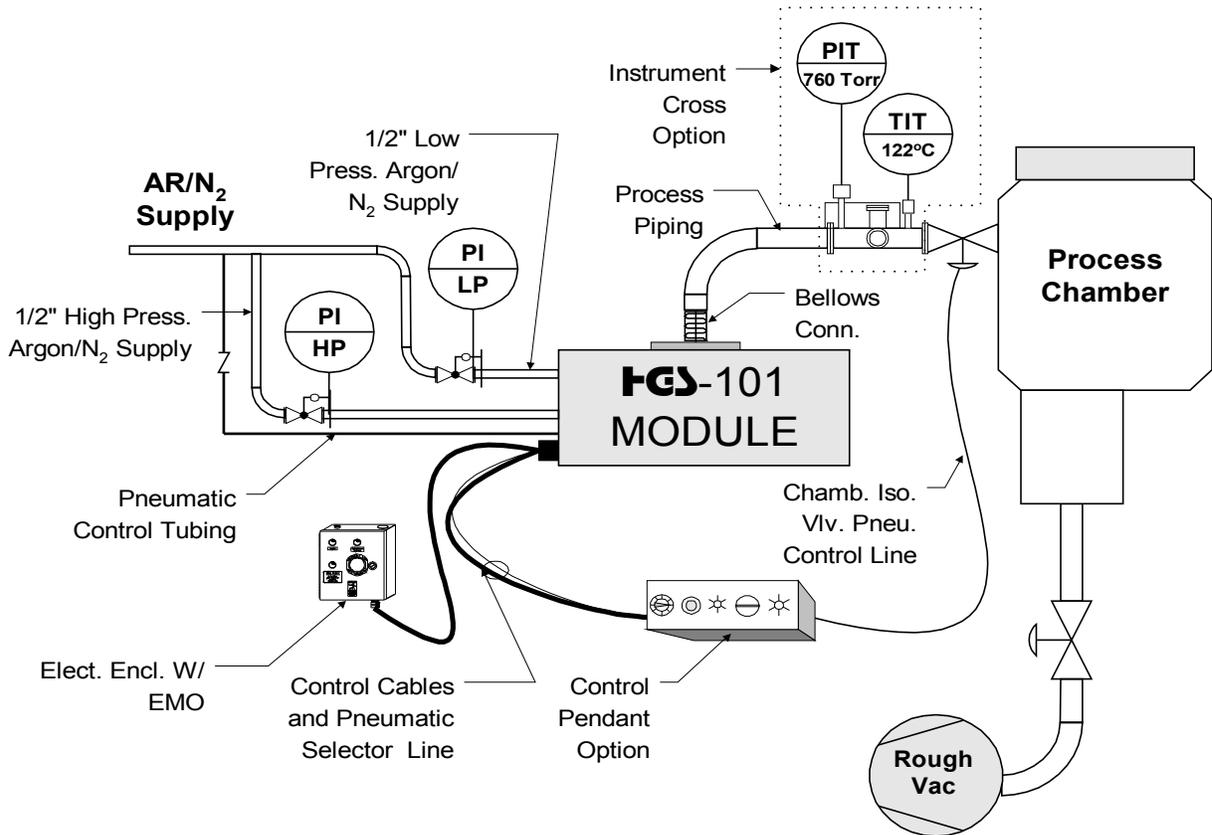


Figure 4 - : HGS-101 System

5.0 SYSTEM OPERATIONS

This section provides instructions for HGS-101 system initial start-up, gas pressure and electronic controller adjustments, as well as an overview of system operations

5.1 Powering-up the Unit:

Before turning the power on to the unit, verify that the installation is complete and correct in accordance with Section 4.0 of this manual. Also ensure that the chamber isolation valve is closed and isolated from control pneumatics to prevent inadvertent processing of the chamber selected. Verify that the CDA supply to the unit is on, as indicated by the pop-up indicator above the CDA supply connection, see figure 5-2. Proceed as follows to start the unit.

- A. Push the black motor overload start switch in the Main Disconnect box.
- B. Press the EMO Reset button on the cover of the Main Power Disconnect box, see figure 5-1. This should light-up the control pendant indicator lights, figure 5-1. If it does not power up, check the overload breakers in the EMO Box and HGS enclosure and make sure the black start switch is pushed in and phase wiring correct as discussed in Section 4.2.4.

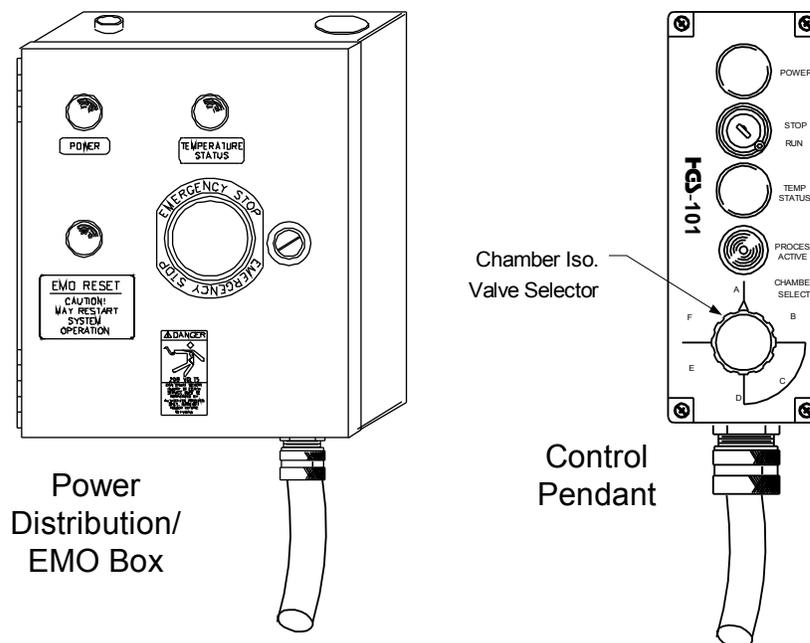


Figure 5 -

5.2 Gas Pressure Adjustment

To properly adjust the inlet gas pressures, proceed as follows:

- A. Re-connect the chamber isolation valve pneumatic control supply.
- B. Initially, set both the high and low pressure regulators to 0 psig.
- C. Turn the chamber isolation valve selector knob on the control pendant to the letter corresponding to the chamber to be processed (figure 5-1).
- D. Turn the keystart switch on the control pendant (figure 5-1) or turn on the remote enable switch, to open the chamber isolation valve and start the unit.

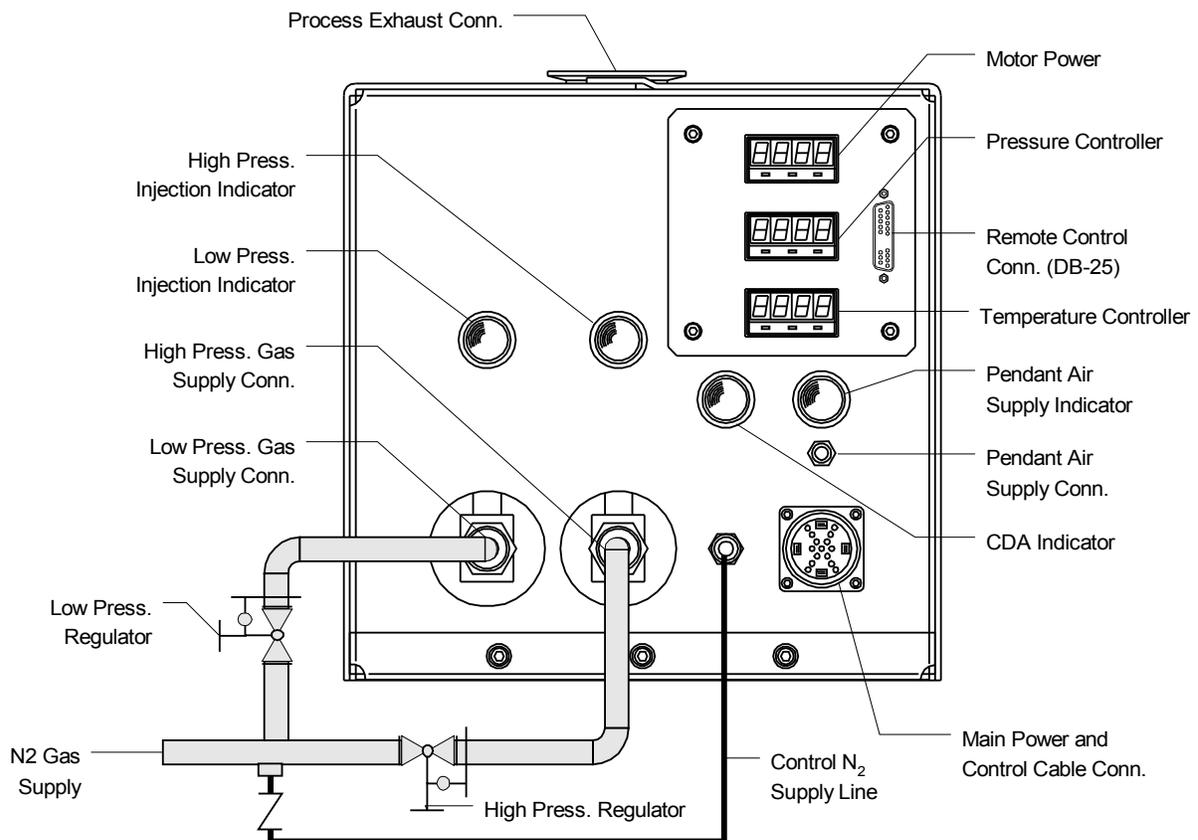


Figure 5 -

5.2 Gas Pressure Adjustment, continued

- E. The unit should immediately begin to pump down. Once the pressure sensed by the HGS unit drops below the pressure setpoint value minus one-half the hysteresis setting (120 Torr for factory controller settings), the unit will enter the HP-HGS mode. The HP-HGS mode is factory set to a five (5) minute time cycle.

! CAUTION !

The gas output of the HGS system can overload some rough vacuum pumping systems. Make sure the rough pump system used has been properly protected from overload prior to performing gas pressure adjustments.

F. High Pressure Regulator Adjustment

During the initial HP-HGS mode, adjust the high pressure gas regulator to obtain 200 Torr as indicated on the pressure controller display, see figure 5-3. Allow the unit to continue to run until the unit switches to the LP-HGS mode. Note that when the HGS-101 switches to the LP-HGS mode, the high pressure gas injection pop-up indicator (see figure 5-3) will switch to off.

G. Low Pressure Regulator Adjustment

After approximately 300 seconds (5 min.) the unit should switch to the LP-HGS mode. During the LP-HGS mode, the high pressure injection valve is closed as indicated by the pop-up indicator located above the high pressure injection line, see figure 5-1. With the high pressure injection valve closed, adjust the low pressure regulator to obtain approximately 200 Torr as indicated by the pressure controller display. Allow the unit to complete the operating cycle and then to cool for 5 to 10 minutes in the CFP mode. Note that the CFP mode will continue until either the keystart switch on the control pendant is turned to off or the remote enable switch is turned off.

5.2 Gas Pressure Adjustment, continued

H. Verify Gas Pressure Adjustments

Restart the cycle and observe the pressure and temperature indicators. In addition, check the motor power display on the HGS unit (see figure 5-2) and the chamber process pump motor amperage to ensure that the pump/blower motors are operating within acceptable limits.



HGS-101 motor power should not exceed 2.8 kw.

Continue to monitor the pressure (and temperature) display(s) noting any significant deviations from the curves shown in Section 5.4 (figures 5-6 and 5-7). Table 5-1 shows the standard HGS-101 component operations and instrument setpoints used for automatic operation.

Table 5 - : HGS-101 Standard Operating Conditions

System or Component Condition	Operating Mode			
	High Pressure HGS Mode		Low Pressure HGS Mode	CFP Mode
	Gas Injection	Pump Down		
Gas Temperature	Less than 130 °C and Rising	Less than 130 °C and Decreasing	Maintained @ setpoint ± 7°C	Decreasing
Gas Pressure	Increasing from 120 to 320 Torr	Decreasing from 320 to 120 Torr	≈200 Torr	≈200 Torr
Blower	On	Off	On	Off
GCV-LPI	Open	Closed	Open	Open
GCV-HPI	Open	Closed	Closed	Closed

5.3 Process Controller Settings

The HGS-101 is designed and set-up at the factory for optimum operation on a 200 Liter chamber with a rough vacuum (scroll) pumping speed of 18 cfm (500 L/min). Significant differences in chamber characteristics and/or maximum rough vacuum pumping pressure may require adjustment of the process controller factory settings.

The three controllers on the face of the HGS unit (figure 5-2) may be adjusted to modify the HGS processes. Section 5.5 discusses specific HGS controller configurations for specific applications. The controller adjustment procedure is described below for each controller.

5.3.1 General - Controller functions

Table 5-2 below shows the primary controller functions used for the HGS-101 unit.

Table 5 - HGS Controller Functions

CONTROLLER	PRIMARY FUNCTION	ADJUSTABLE SETTINGS
Power Monitor	<ol style="list-style-type: none"> 1. Displays motor power in watts. 2. Controls HP-HGS mode cycle time. 	SV,ASP1, A1SF
Pressure	<ol style="list-style-type: none"> 1. Displays HGS outlet press in Torr. 2. Controls max./min. outlet pressures. 3. Controls LP-HGS mode cycle time. 	SV, ASP1,HYST, A1SF
Temperature	<ol style="list-style-type: none"> 1. Displays outlet temp. in °C 2. Controls maximum HGS outlet temp. 	SV, HYST

The controller used in the HGS system is shown in figure 5-4. The touch/input key functions are described in table 5-3.

5.3.1 General - Controller functions, continued

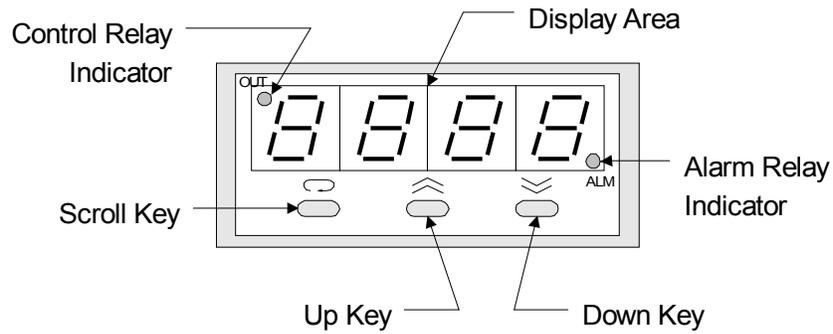


Figure 5 -

Table 5 - Controller Key Functions

KEY	FUNCTION
Scroll Key	1. Press to select parameter to change
Up Key	1. Press momentarily to view setpoint 2. With parameter selected, press momentarily to select digit to change. 3. Press and hold to increase digit value
Down Key	1. Press momentarily to view setpoint 2. With parameter selected, press momentarily to select digit to change. 3. Press and hold to decrease digit value

NOTE:

Additional key functions and controller setting modifications are possible. Tables 5-2 and 5-3 show only those necessary for HGS-101 operating mode adjustments.

5.3.2 Controller Factory Settings

The factory settings for the controllers are shown in Table 5-4. Note that with the pressures properly adjusted, the settings shown in Table 5-4 will result in the operating curve shown in figures 5-6 and 5-7.

Table 5 - Controller Factory Settings

Parameter	CONTROLLER		
	Motor Power	Pressure	Temperature
SV (Setpoint)	2798 watts	220 Torr	130 °C
ASP1 (Dwell Timer)	5 minutes	10 minutes	Not Used
HYST (Hysteresis)	N/A	199 Torr	7 °C
A1SF (Alarm 1 Special Function)	To.oF	T0.oF	Not Used

Table 5-5 shows the order in which the HGS controllers will display the adjustable function parameters in response to key press inputs.

Table 5 - Parameter Menu Display Sequence

Controller Key Action	Power Monitor	Pressure Controller	Temperature Controller
Press UP or DOWN key momentarily once	SV	SV	SV
Press SCROLL key momentarily once	ASP.1	ASP.1	HYST
Press SCROLL key momentarily again	A1SF	HYST	Returns to process value display
Press SCROLL key momentarily again	Returns to process value display	A1.SF	
Press SCROLL key momentarily again		Returns to process value display	

5.4 Process Controller Adjustments

HGS-101 operating characteristics may be customized to meet specific facility/process chamber requirements. Instructions for changing the controller settings governing HGS-101 system operations are provided in the following sections.

To change the controller settings, they must be powered up. Controller changes should be made “off-line”. To make changes “off line”, vent up the HGS unit and isolate the outlet line from the process vacuum system. This will disable the motor power when the unit senses high outlet pressure. The controllers will remain on and changes can be made without disturbing the process chamber.

5.4.1 Power Monitor Controller Settings

The only power monitor controller adjustment available is the alarm setpoint value (ASP. 1), which controls the cycle time, in minutes, for the High Pressure HGS mode. To change the HP-HGS mode time, proceed as follows:

- A. Press the SCROLL key momentarily once to access the first level 0 parameter. The display will flash “ASP.1” as shown in figure 5-4.

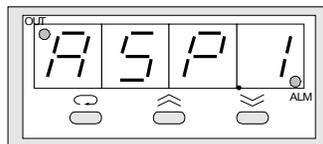


Figure 5 -

- B. The display will then begin to flash the ASP.1 setting of 5 minutes.
- C. Use the UP or DOWN key to select the digit to be changed. The display will highlight the digits as they are selected.
- D. To change the highlighted digit, press and hold the UP or DOWN key until the selected digit reads the desired value. Repeat the process for all digits to be changed.
- E. When changes are complete, allow the controller to return to normal function, (about 15 seconds).

5.4 Process Controller Adjustments, continued

5.4.2 Pressure Controller Settings

The pressure controller settings control the gas outlet pressure of the HGS unit. Table 5-4 summarizes the function of the pressure controller settings available for adjustment.

Table 5 - Pressure Controller Adjustable Settings

Setting	Function
SV (Setpoint)	Target pressure value in Torr used for HGS control.
ASP.1 (Dwell Time)	Configured as a dwell timer, disabling blower motor power at the end of the time value (in minutes).
hYSt (Hysteresis)	Defines the operating pressure band around the setpoint value. ¹
A1SF (Alarm 1 Special Function)	Provides instruction for alarm 1 control relay, To.oF opens relay at time out, To.oN latches relay at time out.

1. The operating pressure band equals the pressure setpoint (SV) plus and minus one-half the hysteresis (hYSt) value.

To change the setpoint value, proceed as follows:

- A. Press the UP or DOWN key momentarily to view the current setpoint value. The controller will automatically highlight a digit to be changed.
- B. Press the UP (or DOWN) key to select the digit to be changed, the controller will highlight each digit selected in sequence for each push of the UP (or DOWN) key.
- C. To change the digit, press and hold the UP or DOWN key until the selected digit reads the desired value, then release it.
- D. Select and change each digit desired, and then allow the controller to return to its normally operating state. The SCROLL key may be pressed to access the parameter menu, see Table 5-5.

5.4.3 Temperature Controller Settings

The only Temperature Controller adjustments available are the setpoint value (SV) and the hysteresis (hYSt), which control the maximum HGS outlet temperature. To change the setpoint value, proceed as described in Section 5.3.2 above. To change the hysteresis proceed as follows:

NOTE:

The maximum temperature setpoint (SV) allowable is 130°C. The maximum hysteresis (hYSt) value is 11 °C. Do not attempt to set these values above the maximum allowable.

- A. Press the SCROLL key momentarily once to access the first level 0 parameter. The display will flash “ hYSt” as shown in figure 5-5.

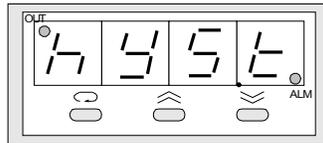


Figure 5 -

- B. Press the UP (or DOWN) key momentarily once to view the hYSt setting on the controller display. The controller will automatically highlight a digit for change.
- C. Use the UP or DOWN key to select the digit to be changed. The display will highlight the digits as they are selected.
- D. To change the highlighted digit, press and hold the UP or DOWN key until the selected digit reads the desired value.
- E. With the desired changes made, allow the controller to return to normal function, (about 15 seconds).

5.5 Operations Overview

With the system properly installed and configured as described in the previous sections, HGS system operation is extremely simple. The following sections describe the options for initiating HGS system operations. In addition, operating data curves for standard system operation based on the factory settings are provided.

5.5.1 Operation with Pendant Control

If the remote enable circuit capability provided (ref. Section 4.3.1) is not used, system operation must be initiated using the Keystart switch on the control pendant (see figure 5-1). Proceed as follows to start the HGS cycle:

- A. Verify process chamber integrity, rough vacuum system capability, chamber isolation valve pneumatic control and process connection(s).
- B. Select the chamber to be processed using the chamber isolation valve selector switch.
- C. Turn the Keystart switch to Run. This will turn on the controllers, and open the process chamber isolation valve, exposing the HGS unit to the process chamber rough vacuum system. The unit will automatically run through it's operating cycle. Figures 5-6 and 5-7 show the process parameter operating curves for a standard (properly adjusted) system using the factory controller settings.
- D. When the unit has completed it's operating cycle (approximately 15 minutes) turn the pendant Keyswitch to Stop. Note that if the Keyswitch is left on, the unit will remain in the CFP mode.

5.5.2 Operation with Remote Enable

In order to use the remote enable/start feature, a customer supplied “HGS Start” switch must be connected to pins 3 and 4 of the DB-25 connector on the front of the HGS unit, see figure 5-6 and Galiso Schematic 21-91-1149 rev. G. The remote enable works in a similar manner to the pendant Keystart switch, however, the Keystart switch must be left in the Stop position, or the pendant must be disconnected. Note that if the pendant is disconnected, the customer must provide for chamber isolation valve control. Follow the same procedure described above, using the remote enable switch in place of the pendant Keystart switch to start and run the HGS-101 unit.

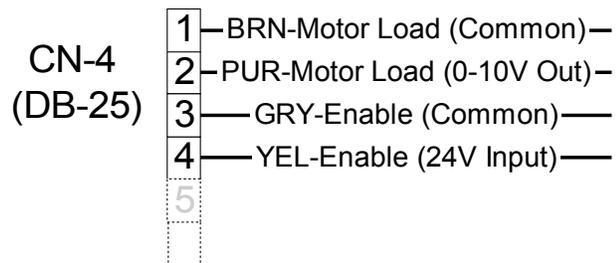


Figure 5 - : Remote Start Wiring

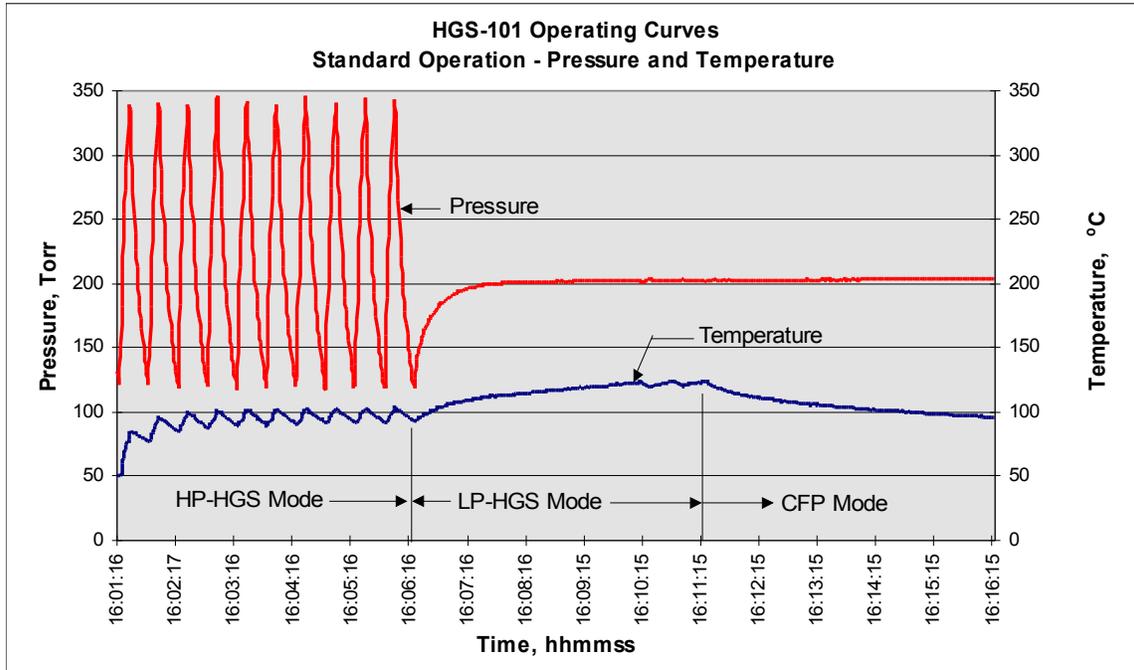


Figure 5 -

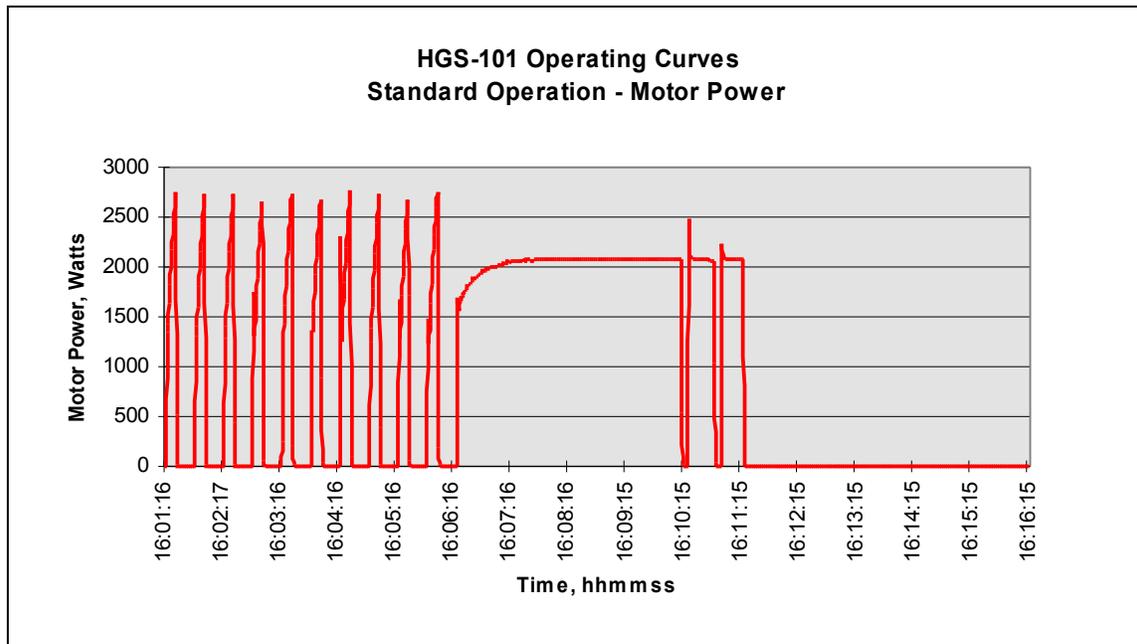


Figure 5 -

5.6 HGS-101 Operating Cycle Modifications

The controllers used on the HGS-101 unit provide the potential for an extremely large number of variations to the factory set operating cycle. Once the user/operator becomes familiar with the HGS system and the process configuration, customizing the HGS operating cycle to meet unique facility/process requirements becomes a matter of understanding the controller's capabilities.

Based on our experience with previous versions of the HGS unit, we have developed two alternative HGS operating cycles. The alternative operating cycles involve both gas pressure adjustments as well as controller setting changes. The alternative operating cycles developed are:

- A. Standard operating cycle without the High Pressure HGS mode. Instructions for making the controller adjustments required for this operating cycles are contained in Appendix A.
- B. Analog HGS Emulation operating cycle. Instructions for making the gas pressure and controller adjustments required for this operating cycle are contained in Appendix B.
- C. In order to summarize the HGS-101 installation and setup process, a flow chart was developed to identify the major considerations involved. The flow chart is shown in figure 5-8, below.

5.6 HGS-101 Operating Cycle Modifications, continued

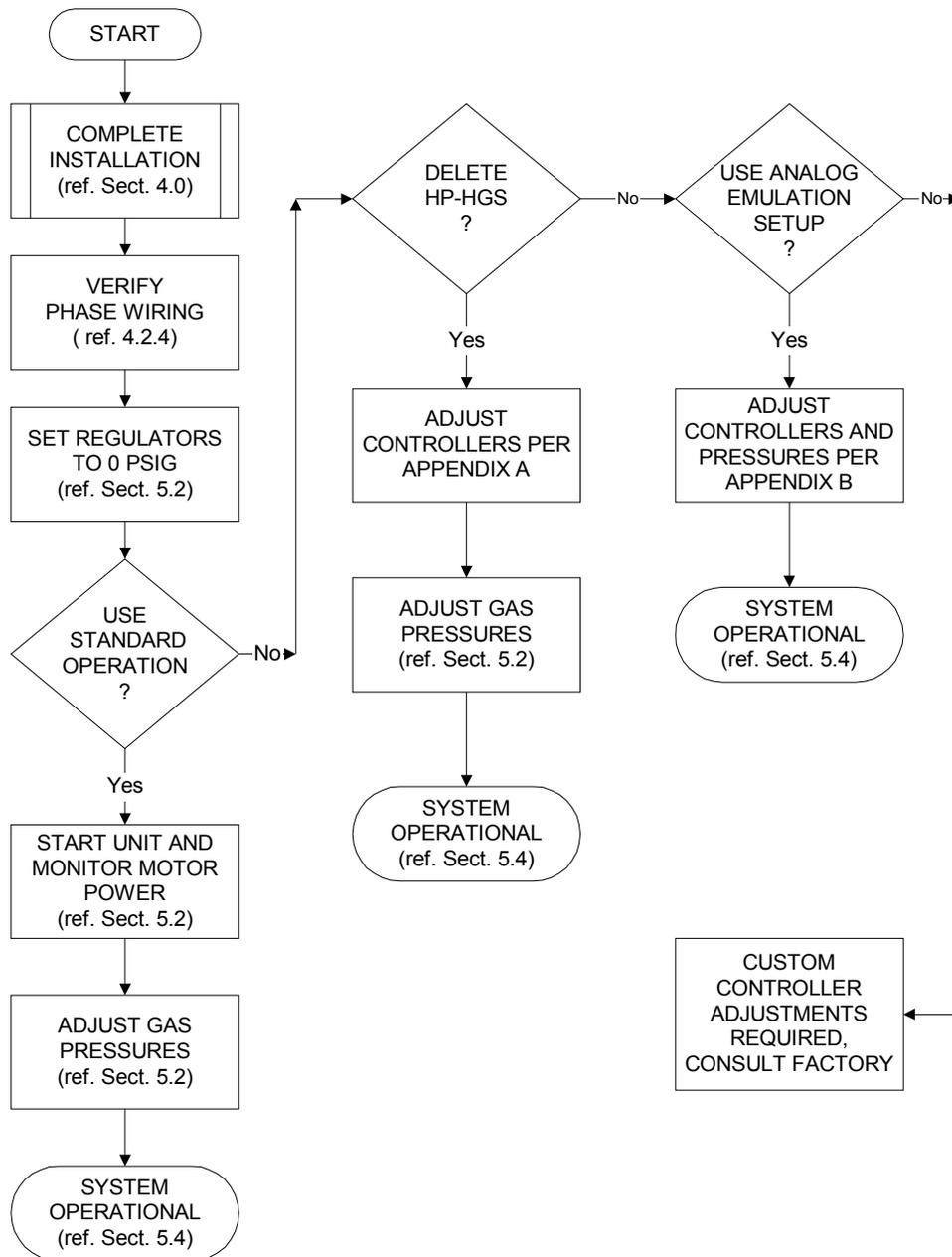


Figure 5 -

6.0 MAINTENANCE AND TROUBLESHOOTING

6.1 Maintenance

HGS-101 units are designed for maintenance-free operation. Should the need to perform any maintenance activities occur, only properly trained, Galiso certified technicians are authorized to work on HGS-101 units. Contact your Galiso customer service representative at (800) 854-3789 if you have any maintenance issues or concerns.

6.2 Troubleshooting

There are several potential problems that can be relatively easy to identify and solve in the field. These are categorized and tabulated below for ease of reference.



Opening the main disconnect box with the power on is a SEMI-S2 Type 4 activity. Take precautions to avoid electrical shock. Turn off power before opening HGS enclosure.

A. System Will Not Power Up

When the EMO Reset button is pushed, the unit should power-up as indicated by the power indicator light and the Temp status light on the control pendant. If the pendant lights do not turn on, troubleshoot the system as described below.

CHECK	ACTION
Overload Breaker In Main Disconnect Box	Push In Black Start Switch
Overload Breaker In HGS Enclosure	Push In Black Start Switch
Thermodisk In HGS Enclosure	Reset (push the red button in) If Actuated , If Not , Check Continuity, Switch May Require Replacement
Phase Monitor In Main Disconnect Box	If Indicator Light Is Off, Correct Phase refer to installation instructions

6.2 Troubleshooting, continued

Note:

If the thermodisk is tripped or damaged, the Pendant Power light will be on and the Temp. status light will be off.

B. Low pressure and temperature

CHECK	ACTION
Gas Supply	Turn on gas supply / Increase regulator settings
Rough Vacuum System	If pumping speed is too high for connected gas supply system, a throttle valve may be required between the process chamber and pump

C. Controller Error Messages

DISPLAY MESSAGE	ACTION
LLEr	Signal out of range low. Check sensor wiring, replace sensor
HHEr	Signal out of range high. Check sensor wiring, replace sensor
SbEr	Sensor break error, replace sensor
AdEr	A to D module damage, replace module
Others	Consult the factory

HGS-101 Operating Cycle Modification

HP-HGS Mode Elimination

This appendix provides instructions for eliminating the High Pressure HGS (HP-HGS) operating mode. Refer to Section 5.0 of the HGS-101 manual as necessary for additional information.

1.0 Motor Power Controller Setting Changes

The Motor Power controller settings must be changed from the factory settings to eliminate the HP-HGS operating mode. Proceed as follows to change the required Motor Power controller settings:

- A. Press the SCROLL key momentarily once to access the first level 0 parameter. The display will flash "ASP.1" as shown in figure 1.

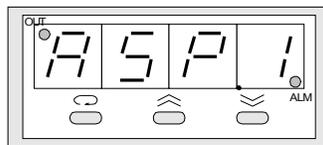


Figure 1

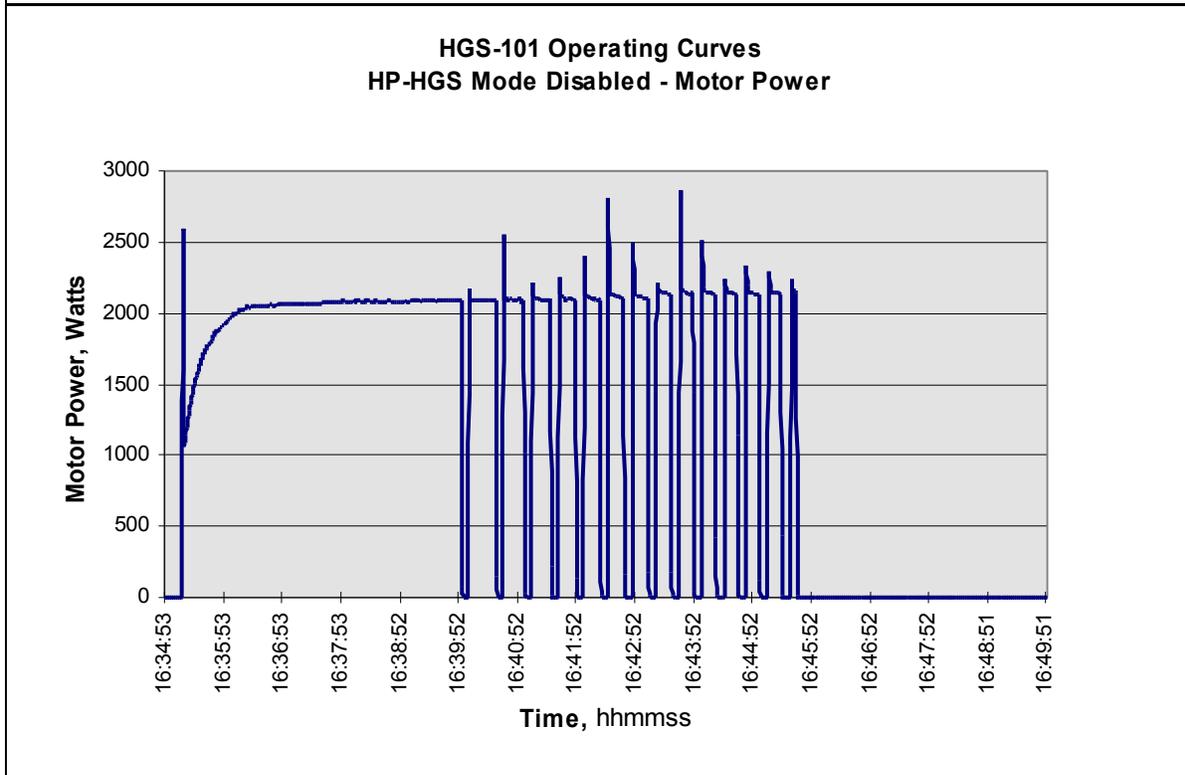
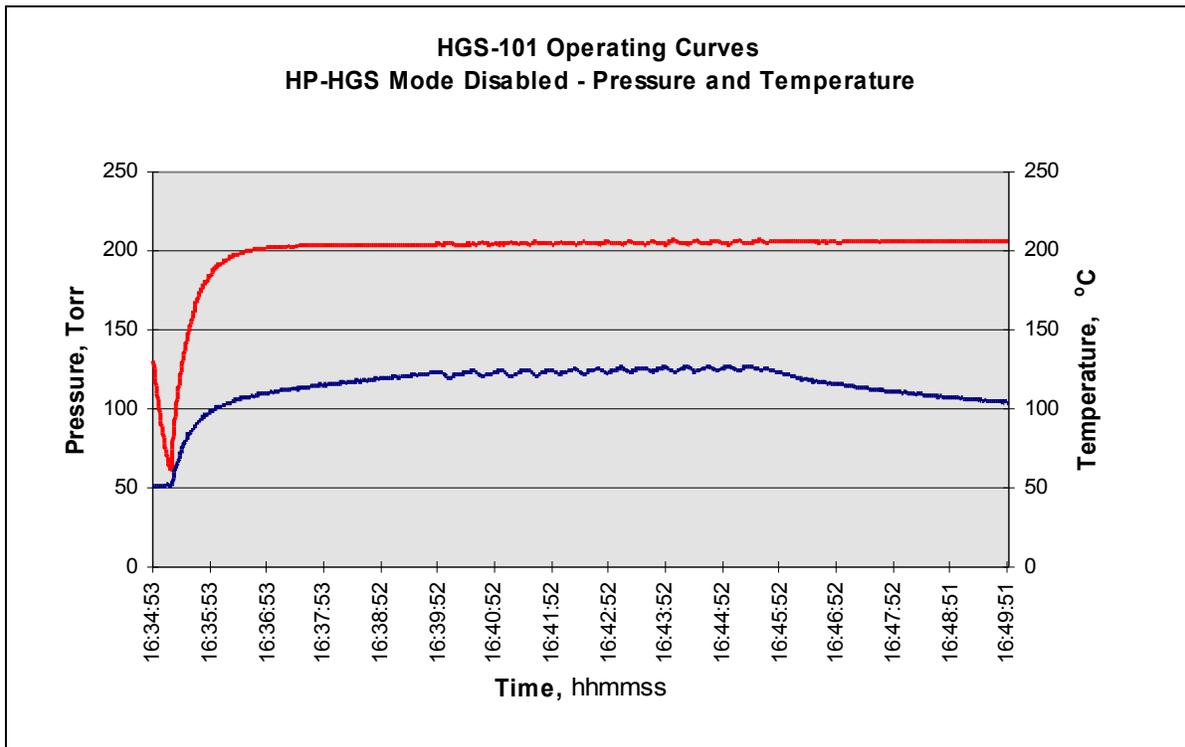
- B. The controller will begin to flash the ASP1 setting on the controller display. The display should show the factory set value of 5 minutes.
- C. Use the UP or DOWN key to select the 5 digit. The 5 digit will be highlighted on the display.
- D. Press and hold the DOWN key until the selected digit reads zero (0) and release.
- E. With the change made, allow the controller to return to normal function (about 15 seconds).

2.0 Pressure Controller Setting Changes

The Pressure controller settings must be changed from the factory settings to eliminate the HP-HGS operating mode. Because of the way this controller is configured, the process dwell timer controlling the LP-HGS mode cycle time will not start until the outlet pressure is greater than or equal to the setpoint value. Therefore, for systems set-up to operate at 200 Torr, the setpoint must be below the operating pressure to start this process timer. If the process pressure remains below the pressure setpoint value, the HGS unit will remain in the LP-HGS mode until it is shutdown by the operator. Proceed as follows to change the required Pressure controller settings:

- A. Press the UP or DOWN key momentarily once to view the factory setting for the pressure setpoint which is 220 Torr.
- B. Press the UP (or DOWN) key to select the digit to be changed, the controller will highlight each digit selected in sequence for each push of the UP (or DOWN) key. Select the first digit (200).
- C. Press and hold the DOWN key until the first (200) digit changes to 1 (100) then release it.
- D. Select the second digit (20) and Press and hold the UP key until the second (20) digit changes to 8 (80) then release it. The setpoint should now be 180 Torr.
- E. With the change made, allow the controller to return to normal function (about 15 seconds).

3.0 Operating Data Curves



Figures 1 and 2

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.