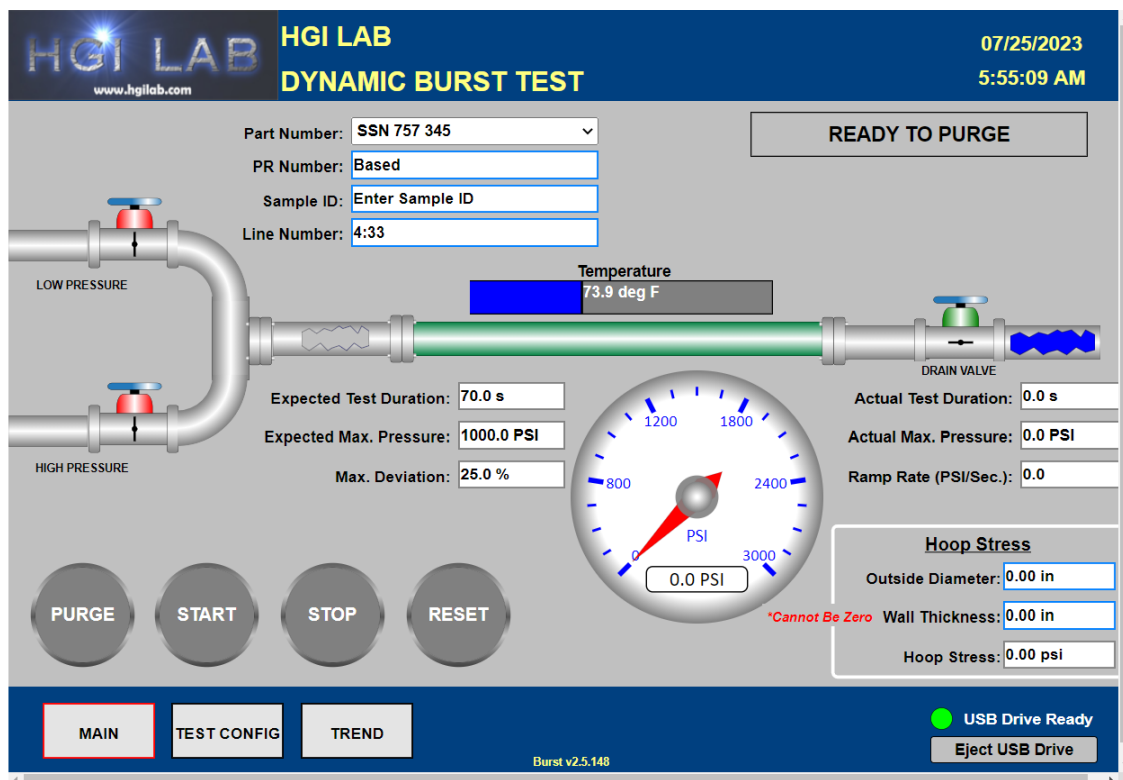




HGI LAB Dynamic Burst System Users Guide

Version 03



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1.0 Introduction

The HGI LAB Dynamic Burst Test System is designed to run a complete burst test, and generate complete test reports when the test ends, regardless of the cause. The system can purge, pressurize and drain the pipe sample automatically using the HGI LAB Control System that is part of the complete integrated test package.

The system consists of 4 main parts, designed to work together:

- High Pressure Supply: The high-pressure supply consists of an electric Tri-Plex pump pressurizing water into accumulator(s) with a pressure switch controlling the on/off function. Also included is an over pressure relief valve. The pump runs on 120 VAC, 60 Hz, 1 PH, and a 20 AMP circuit.
- Hardware: The hardware has been pre-configured, programmed, and wired to work as an integrated system. All measurement and control hardware are installed to a standard backplate, with terminations for all external signals. The key hardware components consist of a TBox controller, TBox Analog and Digital Measurement Modules, a Thermocouple Signal Conditioner, SPDT relays for all valve actuation, and terminal blocks for the pressure and control signals.
- Software: The software resides in the TBox controller and is 'served' via a web browser. The TBox controller to a Panel PC running a web browser (EDGE WORKS), and it can be accessed simply by typing the IP address of the TBox controller into the URL field of Edge Works. 192.168.1.136. Other web browsers can be used as well.
- Panel PC: A Touchscreen PC is provided with Windows 11 in an easy to use operator interface as well as a flash drive for data storage for the test log files.

NOTE

See Image on Page 6.

2.0 High Pressure Supply

Position the Burst Tester to allow close and easy access to electric, water, air and drain.

Installation

1. Connect the water supply line into the WATER inlet port on the side of the cabinet, from the customer provided shut off hand valve. It is recommended that additional water filters or Water Conditioner be added as required to provided clean water to the system.

WARNING

**ALWAYS CONNECT AND TURN ON THE WATER SUPPLY,
BEFORE TURNING THE PUMP POWER ON.**

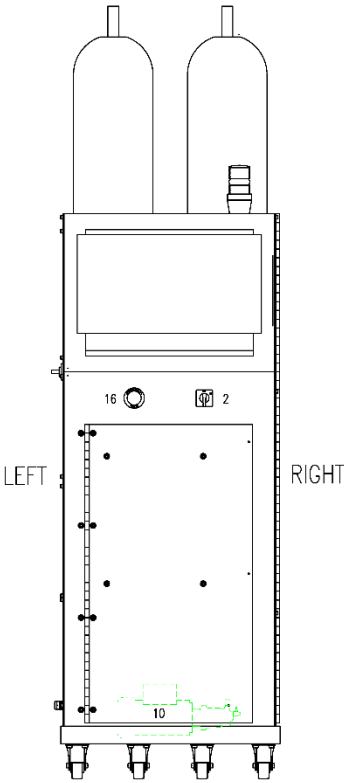
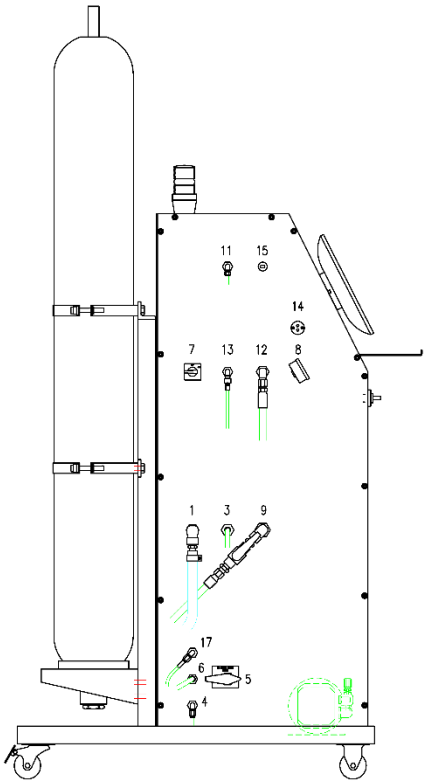
2. The pumping system will start as soon as power is turned on to the pump. Damage to the pump may result if the pump is run dry. 40 PSI is the minimum supply water pressure, and 100 PSI is the maximum supply water pressure. Use minimum 3 / 4" I.D. fittings. Using smaller size fittings could reduce the capacity of the pump and cause it to cavitate.
3. Connect the compressed air supply line into the "AIR SUPPLY" port on the side of the cabinet, from the customer provided filtered compressed air shut off hand valve. For the best performance, the air supply pressure should not drop below 100 PSI. The air supply pressure should not exceed 140 PSI.
4. Connect the DRAIN line from the DRAIN port on the side of the Burst Cabinet to either the drain port on the Burst Chamber or other drain line provided by customer.
5. Drain valve. This valve must remain closed during normal operation. If supply needs drained, open this valve SLOWLY. Full pressure will come from drain port if opened too fast.
6. Main electric power cord. Plug in the electrical power cable to the customer's power outlet. Normal electrical requirements are 120 Volt, 60 Hertz, 1 Phase, 15 AMP.
7. Main power electric on / off switch. This switch turns on all electric to Burst tester.
8. Pressure Gage – Indicates the supply pressure in the accumulators.
9. High Pressure shut off valve. Controls the high-pressure water from the accumulators to the Burst test controls.

10. High Pressure Pump – Is an electric Tri-Plex high pressure water pump, which provides the high-pressure water supply for the burst system. Refer to the manufacturer's instructions for more specific information about the pump.
11. High Pressure Relief Valve – The relief valve warns by leaking if the water pressure exceeds the maximum allowed pressure of the system.

WARNING

Immediate attention is needed if this valve starts relieving high pressure. Shut off the PUMP SWITCH (2) and bleed off the high pressure by slowly opening the High Pressure Drain valve (5) on the side of the cabinet, Check system thoroughly before returning to service.

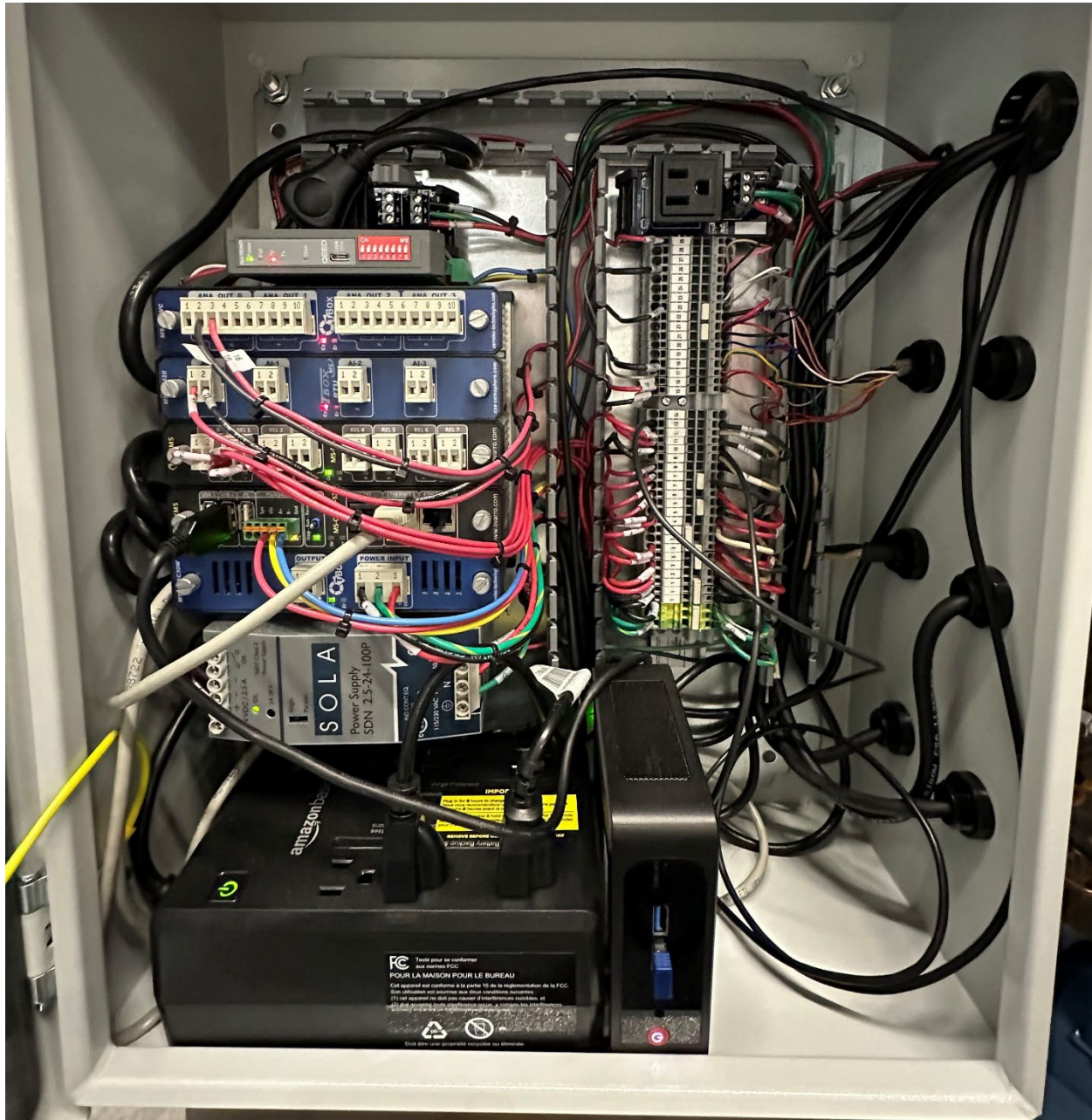
12. High Pressure to specimen to specimen port. This is the high-pressure hose to sample chamber enclosure.
13. High Pressure return from specimen port. This is the high-pressure hose from sample.
14. Thermocouple input. Plug in thermocouple from Burst chamber / enclosure.
15. Flash Drive. This is where the test results will automatically go when test is stopped or ends.
16. E-Stop to stop Burst test for any reason. The E-Stop must be left in until sample pressure reaches 0 PSI.
17. Regulator vent to drain port.



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802-2-00145

3.0 Hardware

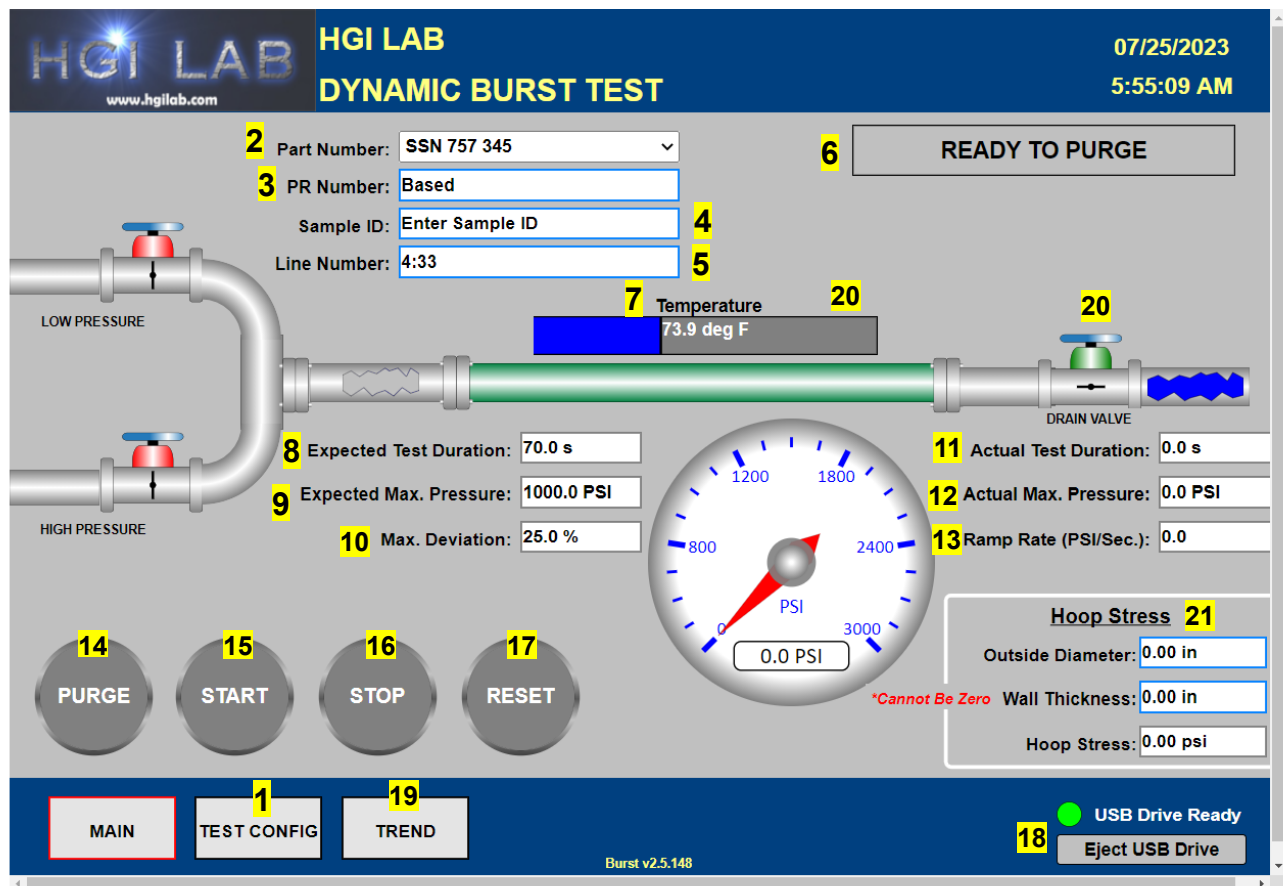
The HGI LAB Dynamic Burst Test System hardware is designed to be panel mounted. All hardware is preconfigured and mounted onto a length of DIN rail for easy installation on a bulkhead panel in an electrical enclosure.



4.0 Display Information and Menu System

The Operator Interface Unit provides the visualization and control for HGI LAB Dynamic Burst Tester. The dedicated trend screen that can be viewed at any time during the test, complete with a downloadable data file of the test results. In addition, there is a separate configuration screen (accessible via the TEST CONFIGURATION button at the top of the main screen) where all of the pipe description and test setup data (including duration, setpoint and allowed deviation) can be entered.

4.1 Main Display



Sample: Main Screen Display highlighting the 21 features of the screen.

The main display shown here depicts a test ready to start. Understanding each element (1 – 21) of the display, is explained more in the next section.

Main Page: Detailed Description

The key elements (1 – 21) and operation of the main display are as follows:

1. **Set Up Button:** Pressing the TEST CONFIG button will take you to the recipe set up screen, where preloaded configurations (including part number, test duration, pressure setpoint, max deviation and ramp rate) can be set for each of up to 60 recipes.
2. **Part Number:** The Part Number used to select the recipe that is required for the desired test, and is set up via the TEST CONFIG screen. Part Numbers will display via a pull down menu selected from the main screen.
3. **PR Number:** **THIS IS YOUR SEARCH IDENTIFIER FOR THE TEST RESULTS. LABEL THIS ACCORDING TO WHAT YOU WILL SEARCH FOR WHEN YOU ARE LOOKING FOR TEST RESULTS. (DO NOT USE ANY SPECIAL CHARACTERS – WINDOWS 11 WILL NOT SAVE THE TEST RESULTS)** The PR number is defined by the operator for each test, and is only used to be displayed on the end of test report. It is not saved anywhere else.
4. **Sample ID:** The Sample ID is defined by the operator for each test, and is only used to be displayed on the end of test report. It is not saved anywhere else.
5. **Line Number:** The Line Number is defined by the operator for each test, and is only used to be displayed on the end of test report. It is not saved anywhere else.
6. **Current Status:** The Current Status box will dynamically display the various states of testing that are possible. Current Status step are currently defined as:

- **READY TO PURGE:** System is reset and ready to initiate purge.

- **PURGING PIPE:** When used, low pressure valve opens and purge begins.

- **READY TO START:** With purge cycle complete the system is ready to start.
- **TEST UNDERWAY:** High pressure valve is opened, and sample is charged.
- **TEST COMPLETE:** Time elapsed without a failure, so test ends.
- **PIPE BURST:** Pressure loss detected so test ends as a “burst”.
- **MANUAL STOP:** Test stops do to operator intervention.

7. **Temperature:** The water temperature inside the test chamber and is displayed in real time here, expressed in Degrees Fahrenheit.
8. **Expected Test Duration:** The expected test duration is loaded from the recipe selected with ‘Part Number’.
9. **Expected Maximum Pressure:** The expected maximum pressure is loaded from the recipe ‘pressure setpoint’ selected with ‘Part Number’.
10. **Maximum Deviation:** The maximum deviation, loaded from the part number recipe, is displayed here. This is the max error from setpoint that will be allowed to pass the test.
11. **Actual Test Duration:** This is the actual amount of time until the test failed, or successfully completed.
12. **Actual Maximum Pressure:** This is the actual maximum pressure that was reached before the test ended, or the pipe burst.
13. **Ramp Rate (PSI / Sec):** The ramp rate (set up via recipes in SET UP) depicts the max PSI per second that the specimen will pressurize. Longer ramp rates provide slower pressurization, whereas short ramp rates more quickly get to the desired setpoint.
14. **Purge Button:** The purge button (when used) energizes the purge relay and opens the drain valve so that a sample can be pre-filled with water (removing the air from the sample). Press once to open, press again to close.
15. **Start Button:** Once a sample has gone through the purge cycle. The START function is enabled. Once pressed, START will close the drain valve, OPEN the high-pressure fill valve, and begin charging the sample per the ramp rate and set point of the recipe selected.

16. **Stop Button:** The STOP button will immediately terminate the test, opening the DRAIN valve and closing the FILL valve. A RESET will be required after a manual STOP.
17. **Reset Button:** The RESET button is used to prepare the system for a new test. All valves are put into their starting position, all trends and max variables are reset, and the system will go to a 'READY TO PURGE' state.
18. **Eject USB Drive:** All end of test report data is automatically stored onto a USB drive (when attached). To remove the USB drive (to transfer the report data), it is recommended that you 'dismount' the drive first. That is accomplished by pressing the 'Eject' button. The indicator light will turn RED when ready to eject.
19. **Trend Screen Button:** This will display the trend screen for the test and can be viewed at any time during the test. To view the resulting trend report (either during or at the end of a test, simply press the TREND button.) More details in the TREND section of this manual.
20. **Animations:** The main screen has a few helpful animations to indicate what the state of the test is:

- *Dynamic Pressure Gauge that displays real time pressure data.*

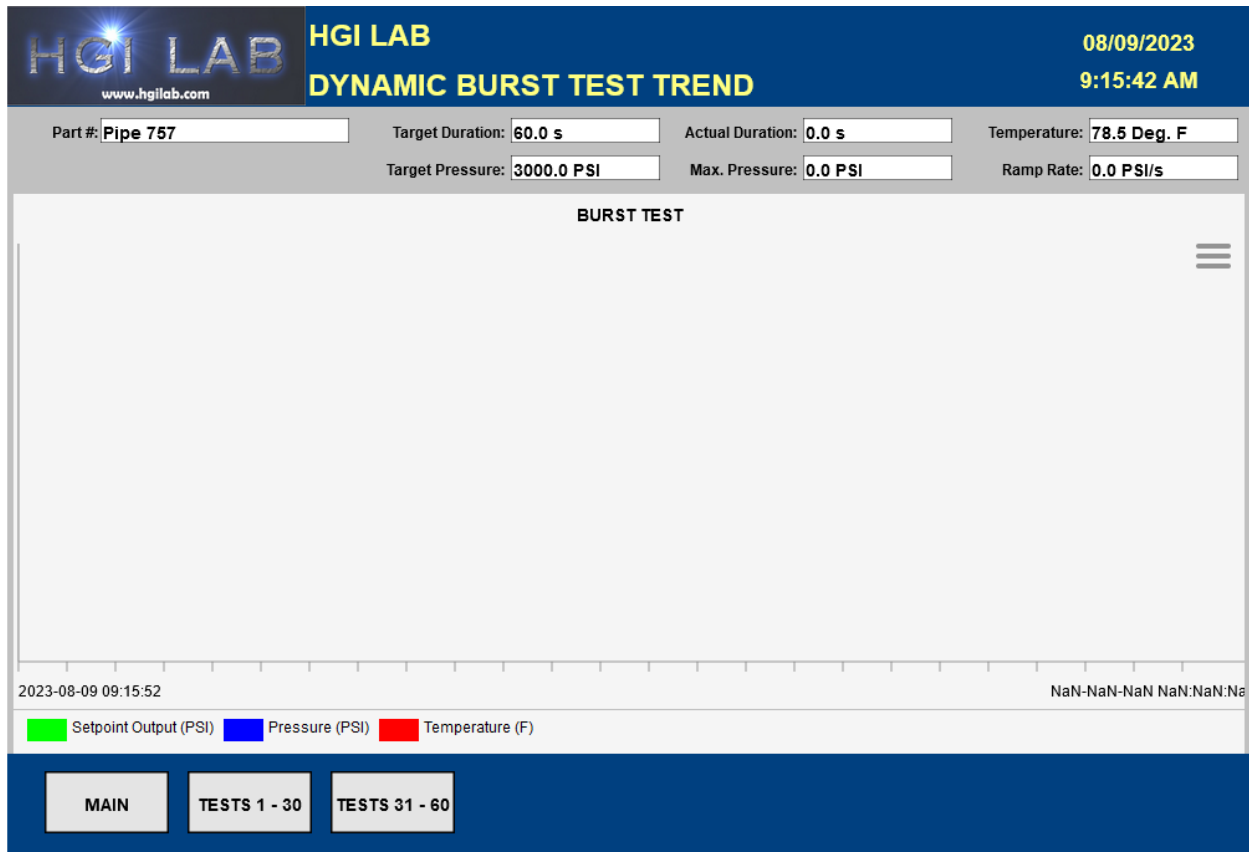
- *Dynamic Valve Position animations (showing open and closed states).*

- *Dynamic Flow Indication, when water is running through the sample.*

- *Temperature bar graph showing the real time temperature of the sample.*

21. **Hoop Stress:** The hoop stress is calculated using the O.D. and wall thickness.

4.2 Trend Screen Sample



Sample: Trend Screen

The trend screen will record and display the actual test results for each station, plotting the pressure and the temperature for the pipe under test. In addition to the 'chart recorder' display, it is also possible to create a text or .csv file that can be saved to the Touchscreen PC, then opened and manipulated in a spreadsheet program (such as Excel).

4.3 Configuration Screen (TEST CONFIG)

The configuration screen is where up to 60 unique profiles (recipes) can be entered and then selected from the PART NUMBER selection menu on the main screen. The components of each profile are as follows:

Part Number: A user defined field that will show up on the pipe selection menu on the main screen.

Duration: The duration (expressed in seconds) for the test.

Setpoint: The maximum pressure setpoint (expressed in PSI) for the test.

Deviation: The maximum deviation allowed (expressed in percent) for the test. If this deviation (from setpoint) is exceeded, the test will stop and need to be reset.

Ramp Rate: The duration (expressed in seconds) of the ramp to setpoint.

HGI LAB www.hgilab.com		HGI LAB DYNAMIC BURST TEST CONFIGURATION (Tests # 1 - 30)				08/09/2023 9:16:15 AM	
	PART NUMBER	DURATION (seconds)	SETPOINT (PSI)	DEVIATION (percent)	RAMP RATE (seconds)		
1	Pipe 757	60	3000.0	10.0	70.0	16	
2		0	0.0	0.0	0.0	17	
3		0	0.0	0.0	0.0	18	
4		0	0.0	0.0	0.0	19	
5		0	0.0	0.0	0.0	20	
6		0	0.0	0.0	0.0	21	
7		0	0.0	0.0	0.0	22	
8		0	0.0	0.0	0.0	23	
9		0	0.0	0.0	0.0	24	
10		0	0.0	0.0	0.0	25	
11		0	0.0	0.0	0.0	26	
12		0	0.0	0.0	0.0	27	
13		0	0.0	0.0	0.0	28	
14		0	0.0	0.0	0.0	29	
15		0	0.0	0.0	0.0	30	

MAIN
TESTS 31 - 60
TREND
ENTER

Sample: Configuration Screen.

To enter data into the fields for each profile, simply click (or touch) inside the white box for each field. A dialog box will pop up, allowing you to enter the field data. Once the data is entered, clicking (or touching) 'OK' will save the data to the controller.

The screenshot displays the 'HGI LAB DYNAMIC BURST TEST CONFIGURATION' interface. The top header includes the HGI LAB logo, the website 'www.hgilab.com', the date '08/09/2023', and the time '9:16:51 AM'. The main area contains a table with columns for 'PART NUMBER', 'DURATION (seconds)', 'SETPOINT (PSI)', 'DEVIATION (percent)', and 'RAMP RATE (seconds)'. The table is divided into two sections, with rows numbered 1 to 30. Row 1 is pre-filled with 'Pipe 757', '60', '3000.0', '10.0', and '70.0'. All other rows are empty. An 'Input' dialog box is open over the table, showing 'Value : Pipe 757' and 'OK'/'Cancel' buttons. At the bottom, there are buttons for 'MAIN', 'TESTS 31 - 60', 'TREND', and an 'ENTER' button.

	PART NUMBER	DURATION (seconds)	SETPOINT (PSI)	DEVIATION (percent)	RAMP RATE (seconds)		PART NUMBER	DURATION (seconds)	SETPOINT (PSI)	DEVIATION (percent)	RAMP RATE (seconds)
1	Pipe 757	60	3000.0	10.0	70.0	16		0	0.0	0.0	0.0
2		0	0.0	0.0	0.0	17		0	0.0	0.0	0.0
3		0	0.0	0.0	0.0	18		0	0.0	0.0	0.0
4		0	0.0	0.0	0.0	19		0	0.0	0.0	0.0
5		0	0.0	0.0	0.0	20		0	0.0	0.0	0.0
6		0	0.0	0.0	0.0	21		0	0.0	0.0	0.0
7		0	0.0	0.0	0.0			0	0.0	0.0	0.0
8		0	0.0	0.0	0.0			0	0.0	0.0	0.0
9		0	0.0	0.0	0.0			0	0.0	0.0	0.0
10		0	0.0	0.0	0.0			0	0.0	0.0	0.0
11		0	0.0	0.0	0.0	26		0	0.0	0.0	0.0
12		0	0.0	0.0	0.0	27		0	0.0	0.0	0.0
13		0	0.0	0.0	0.0	28		0	0.0	0.0	0.0
14		0	0.0	0.0	0.0	29		0	0.0	0.0	0.0
15		0	0.0	0.0	0.0	30		0	0.0	0.0	0.0

MAIN TESTS 31 - 60 TREND ENTER

Sample: Configuration Screen – Input Tab

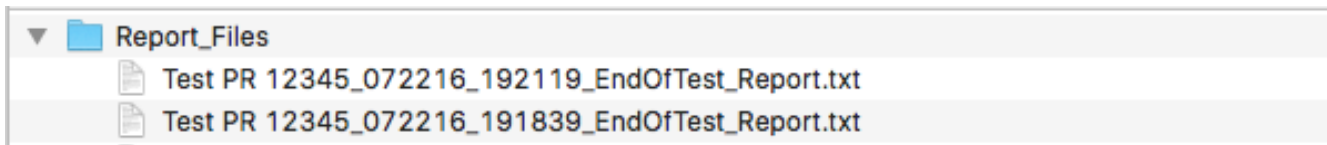
Selecting the 'Return to MAIN Screen' button at the bottom right side of the screen will return you to the main page.

5.0 Reporting

The reporting capabilities of the system allow automatic generation of 'end-of-test' reports that show pressure and temperature readings second by second, along with all test result data required for archiving purposes. This report is completely automatic and will transmit the resulting report (in a text or .csv format) to an attached USB drive and / or internal storage location (in the controller) that can be accessed remotely via FTP over an optional internet / intranet connection.

5.1 End Of Test Reports (via USB)

The most common way to capture report data is via a connected USB drive. When this drive is present in the system, reports are automatically stored in a subdirectory named 'Report Files'. The file name contains all pertinent information of the test, as shown in the sample below:



- The first group of letters represents the PR Number of the test (Test PR 12345).
- The second group number represents the date in MMDDYY of the test (072216).
- The third group represents the time of the test in 24-hour format (192119 = 7:21 pm).
- The last group will always say 'End of Test Report'.

It is important to note that the time of the test is always the time in the file name, NOT the time that it says the file was saved. The file saved time is represented using a Linux operating system and is always a UTC time (not the same as 'local' time, which is in the file name).

A sample of what a test report will look like is on the next page. This report can be customized for specific needs by contacting HGI LAB directly. Also, it is probably a good

idea to back the reports from the USB drive to another safe location on a routine basis, removing them from the USB when this has been successfully done.

Example of an End of Test Report:

```

8 IPS PVC_110818_133105_EndOfTest_Report - Notepad
File Edit Format View Help
Pipe Burst Test Report for Test Completed at 01:31:06 PM on 11-08-18

Pipe Part Number: Test 10

"Part Number:      8 IPS PVC"

"Sample ID:        Enter Sample ID"

"Line Number:      11-8-18"

Result of Test:     PIPE BURST

Target Duration :   70.0 Seconds
Actual Duration :   63.1 Seconds

Target Pressure :   1000.0 PSI
Maximum Pressure:   867.0 PSI

Ending Pipe Temp:   65.1 Deg. F

Outside Diameter:   8.50 in
Wall Thickness:      0.50 in
Hoop Stress:         6936.00 psi @ Maximum Pressure

11/8/2018      1:31:05 PM      0      0      65.1
11/8/2018      1:31:04 PM      0      0      65.1
11/8/2018      1:31:03 PM      0      0      65.1
11/8/2018      1:31:02 PM      0      0      65.3
11/8/2018      1:31:01 PM      0      0      65.3
11/8/2018      1:31:00 PM      0      0      65.3
11/8/2018      1:30:59 PM      0      0      65.3
11/8/2018      1:30:58 PM      0      0      65.1
11/8/2018      1:30:57 PM      0      0      63.7
11/8/2018      1:30:56 PM      0      0      62.8
11/8/2018      1:30:55 PM      964    708    63
11/8/2018      1:30:54 PM      948.6  777    63
11/8/2018      1:30:53 PM      933.2  846    63
11/8/2018      1:30:52 PM      917.8  867    63
11/8/2018      1:30:51 PM      902.4  864    63
11/8/2018      1:30:50 PM      887     855   63.1
11/8/2018      1:30:49 PM      871.7  843    63
11/8/2018      1:30:48 PM      856.3  825   63.1
11/8/2018      1:30:47 PM      840.9  813    63
11/8/2018      1:30:46 PM      825.5  792   63.1
11/8/2018      1:30:45 PM      810.1  786   63.1
11/8/2018      1:30:44 PM      794.8  771   63.3
11/8/2018      1:30:43 PM      779.4  744   63.1
11/8/2018      1:30:42 PM      764     735   63.1
11/8/2018      1:30:41 PM      748.6  723   63.3
11/8/2018      1:30:40 PM      733.2  714   63.3
11/8/2018      1:30:39 PM      717.8  693   63.3
11/8/2018      1:30:38 PM      702.4  666   63.1
11/8/2018      1:30:37 PM      687.1  651   63.3
11/8/2018      1:30:36 PM      671.7  642   63.3

```

6.0 How to Test a Sample

This operation must be done by a qualified operator.

Prepare Sample: Fuse ends on pipe or install endcaps capable of performing the maximum pressure calculated for the pipe. Connect hoses on the sample and place in Burst chamber so the highest point of the sample is the return hose (this allows for purging air from sample – **MUST PURGE ALL AIR FROM SAMPLE BEFORE TESTING**). Close Burst Chamber Lid / Door.

Choose Parameter or Make New One: Choose a present in the pull down menu under PART NUMBER, if one is not available go to TEST CONFIG and create a new parameter.

Type in Diameter and Wall thickness for HOOP Stress Calculation.

Reset Test: Be sure the flash drive is installed on side of cabinet and the USB Drive Ready light is green. (Test can still operate if light is not green, but no results will be saved on the flash drive) PUSH RESET TWICE. Current Status should say READY TO PURGE.

WARNING

**ENCLOSURE LID OR DOOR MUST BE CLOSED AND SECURED
BEFORE CONTINUING.**

Purge Air: Touch PURGE button. Light will go green, low pressure water valve opens and sample will begin filling with water. Watch vent tube in Burst Enclosure. Allow enough time for air to be replaced with water. This could take several minutes, depending on the size of the sample. Do not stop purge until water is steadily streaming out of vent tube and all air is replaced with water. Touch PURGE again to shut off the flow. Current Status should say READY TO TEST.

Test Sample: Enter info for test into the 3 identifiers (PR Number, Sample ID, Line Number). Double check parameters of test by viewing the Expected Test Duration and Expected Maximum Pressure, change part number or make new one if necessary.

If all is correct, touch START button.

After Test Completes: Check Actual Test Duration and Actual Maximum Pressure to be sure the test is within the specs required. If test did not meet requirements, choose another Part Number from the menu, or create a new one. Results will automatically be saved on Flash Drive. Press EJECT USB Drive to remove Flash Drive. Copy results onto computer or database for permanent records.

7.0 Backup Of Setup “recipes”

Be sure to take a picture of the setup screen showing the information for each test in the event of a violent failure of the program so there is a backup of all the information.

For More Information or Support:

Please contact HGI LAB directly.



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