



BMT USA

Electric Clean Steam Generator

Operation and Maintenance Manual

Golden Road Brewing

Model No.: ECSG400

Serial No.: SG1641003

Part No.: 110-50069



BMT USA, LLC
14532 169TH Drive SE
Suite 142
Monroe WA 98272
T: 360-863-2252
F: 360-863-2366

QUICK START GUIDE

Initial Power Up (after any power down/power failure)

- Restore power to the unit.
- Pull OUT the Emergency Stop button (if needed).
- Press the black, Emergency Stop Reset button (located below the Emergency Stop button).
- Press the High Pressure Cutoff Reset button.
- Log in to the unit.
- Go to Process, Operation Menu.
- Press Mode touch cell.
- Press the Low Water Cutoff Reset button when prompted.

Daily Startup (unit is powered on)

Start Production

- Press the Mode touch cell.
- Press the Low Water Cutoff Reset button when prompted.

Stop Production

- Press the Mode touch cell.

Emergency Stop

- Press the Emergency Stop button.

Reset

- Pull out the Emergency Stop button.
- Press the Reset button



BMT USA, LLC
14532 169TH Drive SE
Suite 142
Monroe WA 98272
T: 360-863-2252
F: 360-863-2366

Feed Water System – Initial Start up

1. Complete all utility connections to the steam generator. Remove the 1/2" plug located at the outlet of the feed water pump. Connect a temporary hose to this fitting, or place a drain pan under it. Turn on the feed water supply to the steam generator and vent air in the system. Reinstall the 1/2" plug on the outlet of the feed water pump.
2. Turn on the 480V 3 phase power to the unit.
3. Open the 3/4" ball valve installed in the bottom piping out of the vessel. Turn on the compressed air supply to the steam generator.

Reset the Emergency Stop by pressing the black Reset button below the Emergency Stop push button.

Log in as Engineer Level with user name **e**, and pass word **1**. Navigate to Force Discrete Outputs through the Service, Technical menu. Navigate to page 2 of 2 of Service, Discrete Outputs that displays the output O:00/05 LY500 Feed Water Fill Valve/P500 Feed Water Pump. Prepare to monitor water flow out of the drain connection and also the rotation direction of the feed water pump. Press the touch cell to turn on output O:00/05. The state will change from Off to On. To turn off, press the touch cell again – the state will change from On to Off. If the pump rotation direction is correct, water will flow strongly out of the drain valve to drain. If not, then the pump is rotating in the wrong direction. In this case, shutdown and lockout all power to the unit, and change the phasing to correct the pump direction. After restoring power, repeat the test above to confirm pump rotation is correct. Close the 3/4" drain valve.

4. Exit Discrete Outputs and Technical menu and navigate to the Process, Operation screen. To begin steam production, press the Mode button. The Mode status will change to Auto.
5. When the Mode touch cell is pressed, the first operation will be to fill the vessel with feed water. It will take approximately 10 minutes to reach the level for the Low Water Cutoff Level Sensor. **(Note: Do not adjust the feed water supply needle valve to shorten the fill time. It has been set for the optimal performance of the system at the normal operating set point)** When prompted by screen display, press the Low Water Level Cut Off Reset button. This enables the contactors for the heating elements. The filling will continue for ~ 3 more minutes, until the water level reaches the water level control sensor (and is visible in the sight glass).
6. It will take ~ 7 minutes after pressing the Low Water Level Cut Off reset for the steam pressure to build to the set point.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECG400
Serial No.: SG1641003
Part No.: 110-50069

Table of Contents

- INTRODUCTION..... 1
 - System Description..... 1
 - Customer Responsibilities 1
 - How to Use This Manual..... 1
 - System Warranty Certificate 2
- SECTION 1 ELECTRIC CLEAN STEAM GENERATOR SYSTEM 3
 - 1.1 Overview 3
 - 1.2 Standard Modes..... 3
 - 1.2.1 Off 3
 - 1.2.2 Automatic 3
 - 1.3 Operation Phases 3
 - 1.3.1 Fill Phase..... 3
 - 1.3.2 Production Phase 3
 - 1.4 Pressure Monitoring and Indicators 4
 - 1.4.1 Clean Steam Pressure 4
 - 1.5 Safety Features..... 4
 - 1.5.1 Clean Steam High Pressure Alarms 4
 - 1.5.2 Clean Steam Safety Relief Valve 4
 - 1.5.3 Heating Element Protection 4
 - 1.5.4 Emergency Stop..... 4
 - 1.6 Systems Description 5
 - 1.6.1 Feed Water System 5
 - 1.6.2 Clean Steam Condenser/Monitoring/Sampling System (Option) 6
 - 1.6.3 Compressed Air System (Option) 6
- SECTION 2 OPERATION 7
 - 2.1 Overview 7
 - 2.2 Operator Interface Overview..... 7
 - 2.2.1 Numeric Entry Keypad 7
 - 2.2.2 Alphanumeric Entry Keypad..... 8
 - 2.3 Password Security Levels..... 8
 - 2.4 Process Overview Description 9
 - 2.5 Screens..... 9
 - 2.5.1 System, Home Screen 9
 - 2.5.2 System, About Screen..... 10
 - 2.5.3 Login Popup 11
 - 2.5.4 Log Out..... 11
 - 2.5.5 Password Edit 12
 - 2.5.6 Process, Operation Screen 13
 - 2.5.7 Process, Setup Screens..... 14
 - 2.5.8 Notification, Alarm Active Screen 15
 - 2.5.9 Notification, Alarm History Screen 16
 - 2.5.10 Notification, Low Water Cut-off Popup..... 16
 - 2.5.11 Service, Date / Time Screen 17
 - 2.5.12 Service, I/O Screen 17
 - 2.5.13 Service, Technical Screen 20
 - 2.6 Alarm Descriptions..... 23
 - 2.6.1 Shutdown Alarms 23
 - 2.6.2 Informational Alarms 24

	<h2>Operation and Maintenance Manual</h2>	<p>Golden Road Brewing Model No.: ECSG400 Serial No.: SG1641003 Part No.: 110-50069</p>
---	---	--

2.7	Power Failure.....	25
2.8	Set-up Parameters.....	26
SECTION 3 MAINTENANCE		28
3.1	Overview	28
3.2	Maintenance Procedures.....	28
3.2.1	Maintenance Schedule.....	28
3.3	Troubleshooting	29
3.4	Clean Steam Pressure Control.....	30
3.4.1	Description of Operation	30
3.5	Manual Valves	30
3.5.1	Adjustable Valves.....	30
3.5.2	On/Off Valves.....	30
APPENDIX A – QUICK START GUIDE		31



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

INTRODUCTION

System Description

BMT USA Electric Clean Steam Generators are designed for production of clean steam for sterilization applications and for use in research and production processes.

Customer Responsibilities

Upon completion of installation and startup, it is the purchaser's responsibility to determine and execute validation activities as required.

Prior to validation, calibration of all temperature and pressure measurement, control, and recording devices must be calibrated by the purchaser. Revalidation and regularly scheduled calibration should be carried out as dictated by regulatory requirements governing the purchaser's specific process and products.

How to Use This Manual

The purpose of this manual is to provide instructions for installing, programming, operating, and maintaining the BMT USA Electric Clean Steam Generator.

Section 3, Electric Clean Steam Generator Systems: Provides an overview of the Electric Clean Steam Generator, operational, and safety features.

Section 4, Operator Interface and Operation: Provides illustrations of all operator interface screens and instructions to operate and control the steam generator.

Section 5, Maintenance: Provides maintenance and trouble-shooting tables intended for facilities maintenance personnel responsible for repair and service of the Electric Clean Steam Generator.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

System Warranty Certificate

ELECTRIC CLEAN STEAM GENERATOR EQUIPMENT WARRANTY

BMT USA makes the following warranty with respect to its products:

WARRANTY: All BMT USA equipment is fully warranted against defects in workmanship and materials under normal use and operation for one year from the installation and start-up of the equipment or eighteen months from the date of delivery, whichever occurs first.

Feed Water supplied to clean steam generators must have a minimum resistivity of 1 Megohm and contain no chlorides or chlorine. Failure to adhere to these requirements will void the warranty.

All parts and labor costs incidental to warranty service will be at BMT USA's expense or at the expense of BMT USA's Representatives. Thereafter all repair costs shall be borne by the Purchaser. This warranty does not extend to any equipment or products which have been subjected to misuse, neglect, accident or improper installation or application, or which have been serviced or altered by persons not authorized by BMT USA.

BMT USA's sole liability and the Purchaser's sole remedy under this warranty is limited to repair or replacement of the defective equipment or product at BMT USA's option. Repair or replacement of the defective equipment or product will be provided at Purchaser's facility by an authorized representative of BMT USA. Replaced parts shall become the property of BMT USA. All returns must be made under a "Return Materials Authorization" (RMA) assigned by BMT USA. BMT USA shall not be liable for special, indirect or consequential damage under any circumstances. Equipment, products or components returned to BMT USA under the terms of this warranty will be shipped at the Purchaser's expense and returned at BMT USA's expense, unless no warranted defect is found.

If a warranty service site visit is requested, and the problem is determined to be a utility problem, or operation error, the equipment owner will be billed for the service call and expenses.

This warranty does not cover damage or defects caused by the following: Use of parts other than BMT USA authorized parts, errors in installation of the equipment, accidents, abuse, misuse, tampering, alteration, modification, improper service, or lack of documented preventive maintenance as specified by the maintenance manual. Repair of leaks is considered basic maintenance and not covered by this warranty. BMT USA will provide replacement parts for installation by the equipment owner provided approval has been obtained by an authorized BMT USA service representative.

No waiver or modification of any provisions of this warranty will be binding upon BMT USA unless agreed to in writing by a duly authorized official of BMT USA. BMT USA does not authorize any person or company to create any warranty obligations on its behalf.

This warranty sets forth the only warranty applicable to BMT USA equipment and parts. No other representation or warranty on the part of BMT USA, expressed or implied, shall apply to equipment or parts, or their performance; all such warranties (including any warranty of merchantability or fitness for any purpose) being thereby disclaimed. BMT USA shall in no event be liable in respect to loss of business or profits on any similar or dissimilar consequential or incidental damages or losses arising out of, or in connection with this equipment.

Note: *This warranty does not cover repair or replacement of expendable service parts, including but not limited to, door seals, lubricants, lamps, fuses, gaskets, printer paper, and filters.*

_____	_____	_____	_____	_____
Client Name	Serial Number	Ship Date	Warranty Begins	Warranty Expires
_____	_____	_____	_____	_____
Customer Representative	Printed Name	Position	Date	
_____	_____	_____	_____	_____
BMT USA Representative	Printed Name	Position	Date	



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

SECTION 1 ELECTRIC CLEAN STEAM GENERATOR SYSTEM

1.1 Overview

This section provides a general overview of the operation, control system, and safety features of the clean steam generator.

1.2 Standard Modes

This section provides an overview of standard modes and includes general descriptions. These modes automatically sequence based on programmable parameters.

1.2.1 Off

Off mode places the equipment in an inactive state.

1.2.2 Automatic

Automatic mode provides a method for the equipment to produce clean steam without user assistance (beside initial setup). Automatic mode supports Drain, Fill, and Production phases. These phases will automatically sequence based on programmable parameters.

1.3 Operation Phases

This section provides an overview of operation phases and includes general descriptions.

1.3.1 Fill Phase

The Fill phase supports filling the pressure vessel to the water level switch and maintaining the level. Water level digital control is implemented.

1.3.2 Production Phase

The Production phase supports steam production. Clean Steam pressure loop control is implemented. Steam pressure is generated and maintained by cycling the heater elements. The Production phase will continue to utilize the Fill phase for automatic Water level digital control. The Blow Down valve will cycle open/closed when enabled at the rate and duration defined by the HMI parameters entered.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

1.4 Pressure Monitoring and Indicators

1.4.1 Clean Steam Pressure

A combination analog/digital pressure sensor is mounted on the clean steam outlet piping for monitoring and control of clean steam pressure. The analog signal from this sensor provides real time pressure monitoring to the PLC for control and alarm functions. The digital (switch) portion of this sensor is used for the alarming function for Clean Steam High Pressure Cutoff.

1.5 Safety Features

The following safety features, in the form of components and software, provide safe operation of the clean steam generator.

1.5.1 Clean Steam High Pressure Alarms

If the Clean Steam Pressure is equal to or greater than the set point of the Clean Steam High Pressure Cutoff switch, a Clean Steam High Pressure Cutoff Active alarm will occur and cause shutdown. To restart, the condition must be cleared and the High Pressure Cutoff Reset button must be pressed. A second alarm based on an adjustable parameter, Clean Steam Pressure High, will also cause shut down if the clean steam pressure exceeds the value of the parameter.

1.5.2 Clean Steam Safety Relief Valve

The Clean Steam Pressure Relief Valve protects the pressure vessel from overpressure conditions.

1.5.3 Heating Element Protection

If the water level in the column falls to the level of the Low Water Cutoff Sensor and the Low Water Level Cutoff Alarm occurs, the Low Water Cutoff circuit deactivates the heating elements.

1.5.4 Emergency Stop

An emergency stop pushbutton is provided for immediate shut down if needed. Pressing the emergency stop button will electrically disable all outputs and discontinue clean steam production if the system is in Automatic Mode.

Once depressed, the emergency stop circuit must be reset. Pull out the E-stop button and then depress the Reset button (located directly beneath the Emergency Stop button) to reset the circuit.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

1.6 Systems Description

1.6.1 Feed Water System

Pre-treated feed water is supplied to the vessel, which is heated and vaporized by heating elements. A pump (optional) is used to boost the supply water pressure to a level sufficiently above the Clean Steam Pressure set point. The Feed Water Level Sensor will turn the pump on and off as needed. The control is based on Proportional, Integral and Derivative (PID) parameters.

1.6.1.1 Initial Startup Steps After Installation

Follow the steps below to properly start the unit after the unit has been correctly installed on site.

1. Complete all utility connections to the steam generator. Remove the 1/2" plug located at the outlet of the feed water pump. Connect a temporary hose to this fitting, or place a drain pan under it. Turn on the feed water supply to the steam generator and vent air in the system. Reinstall the 1/2" plug on the outlet of the feed water pump.
2. Turn on the 480V 3 phase power to the unit.
3. Open the 3/4" ball valve installed in the bottom piping out of the vessel. Turn on the compressed air supply to the steam generator.

Reset the Emergency Stop by pressing the black Reset button below the Emergency Stop push button.

Log in as Engineer Level with user name **e**, and pass word **1**. Navigate to Force Discrete Outputs through the Service, Technical menu. Navigate to page 2 of 2 of Service, Discrete Outputs that displays the output O:00/05 LY500 Feed Water Fill Valve/P500 Feed Water Pump. Prepare to monitor water flow out of the drain connection and also the rotation direction of the feed water pump. Press the touch cell to turn on output O:00/05. The state will change from Off to On. (To turn off, press the touch cell again – the state will change from On to Off.) If the pump rotation direction is correct, water will flow strongly out of the drain valve to drain. If not, then the pump is rotating in the wrong direction. In this case, shutdown and lockout all power to the unit, and change the phasing to correct the pump direction. After restoring power, repeat the test above to confirm pump rotation is correct. Close the 3/4" drain valve.

4. Exit Discrete Outputs and Technical menu and navigate to the Process, Operation screen. To begin steam production, press the Mode button until the status displays: Auto.
5. When the Mode touch cell is pressed, the first operation will be to fill the vessel with feed water. It will take approximately 10 minutes to reach the level for the Low Water Cutoff Level Sensor. **(Note: Do not adjust the feed water supply needle valve to shorten the fill time. It has been set for the optimal performance of the system at the normal operating set point)** When prompted by the screen display, press the Low Water Level Cut Off Reset button. This enables the contactors for the heating elements. The filling will continue for ~ 3 more minutes, until the water level reaches the water level control sensor (and is visible in the sight glass).
6. It will take ~ 7 minutes after pressing the Low Water Level Cut Off reset for the steam pressure to build to the set point.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

1.6.2 Clean Steam Condenser/Monitoring/Sampling System (Option)

In Automatic mode, clean steam is condensed into condensate through a condenser. The resistivity or conductivity of the clean steam condensate is monitored continuously. If the resistivity or conductivity falls below preset alarm limits, the generator will automatically alarm as an information alarm.

1.6.3 Compressed Air System (Option)

Compressed air is used for the operation of all the air actuated valves. All the air actuated valves are controlled by an electric pilot solenoid that receives the operating signal from the PLC.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

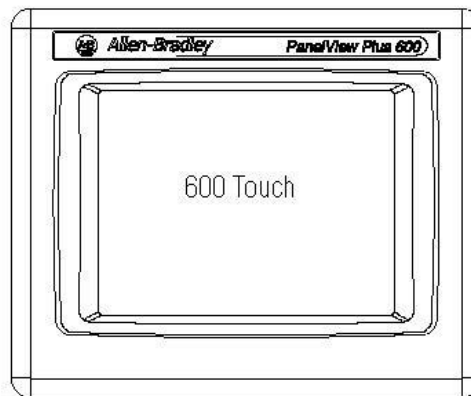
SECTION 2 OPERATION

2.1 Overview

This section describes the operational procedures for the Clean Steam Generator.

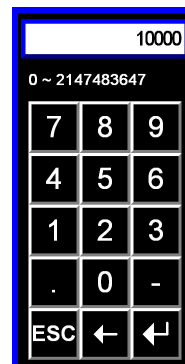
2.2 Operator Interface Overview

The Allen-Bradley PanelView Plus 600 Operator Interface Terminal (OIT) is the operator access point for system control. It includes a touch screen and provides status and alarm information based on what is occurring in the PLC. As system conditions change, so will the information on the controller screens.



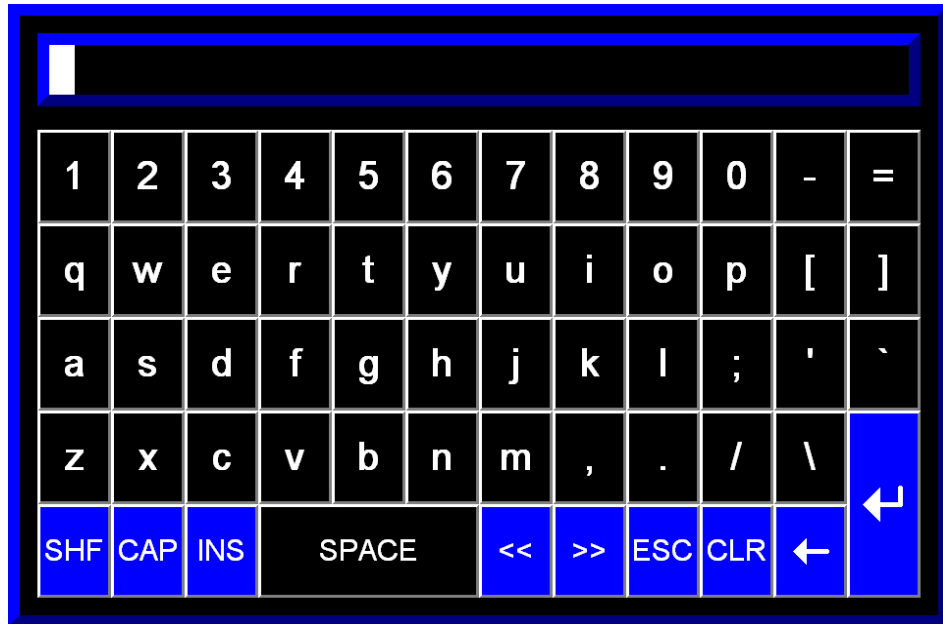
2.2.1 Numeric Entry Keypad

Numeric data can be entered through the popup Numeric Entry touch cell keypad. These touch cells allow the user to enter a password or to enter a numerical value when needed.



2.2.2 Alphanumeric Entry Keypad

Text data can be entered through the popup Alphanumeric Entry touch cell keypad.



2.3 Password Security Levels

Three levels of password security protection are provided which allow or deny access to specific menus and touch cells. Menu and touch cells that are denied levels 2 & 3 do not display on the OIT. Log In, Log Out, Password Edit and navigation keys are available to all security levels. The table below shows the security access of each level.

Level Number & Name	Hard-coded Username	Password	Security Access
Level 3 Operator	o	3	Operation screens, I/O view screens, Alarm screens.
Level 2 Supervisor	s	2	Level 3 screens plus Parameter Setup screens.
Level 1 Engineer	e	1	All

Note: When the password is entered onto the screen, it is hidden by an * for security reasons.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

2.4 Process Overview Description

When the Feed Water pump and the Feed Water valve are activated, the vessel fills with water. Heating elements in the vessel heat the feed water to produce clean steam. Steam pressure builds to the set point for Clean Steam and is monitored by a pressure transmitter. As the pressure approaches the set point, PID logic is used to begin shutting down the heater circuits to control the clean steam pressure. When clean steam demand increases, the resulting pressure drop causes the heating elements to be reactivated and to restore and maintain the pressure set point.

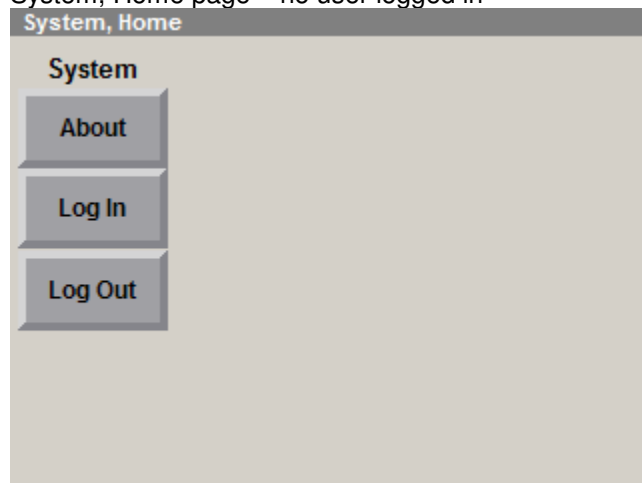
2.5 Screens

The following section describes the OIT screens and their related functions. The screen illustrations throughout this manual show what displays for security level 1, Engineer. The Security Access table that appears next to each screen illustration indicates the screen and touch cell accessibility for each security level (A = access allowed; R = restricted, denied). Only touch cells that are security protected are listed in the table. If access to the screen gives access to all touch cells, no touch cells will be listed in the table. Keep in mind that touch cells listed as restricted in the Security Access table do not display on the OIT for that security level.

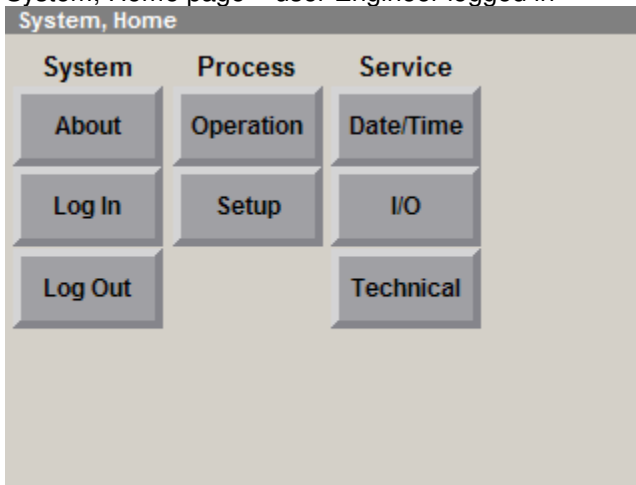
2.5.1 System, Home Screen

This screen allows the user to access to System, About screen, as well as access the system log in and log out functions. Once Logged in, the System, Home page will allow access to the Process and Service pages as determined by the User security level.

System, Home page – no user logged in

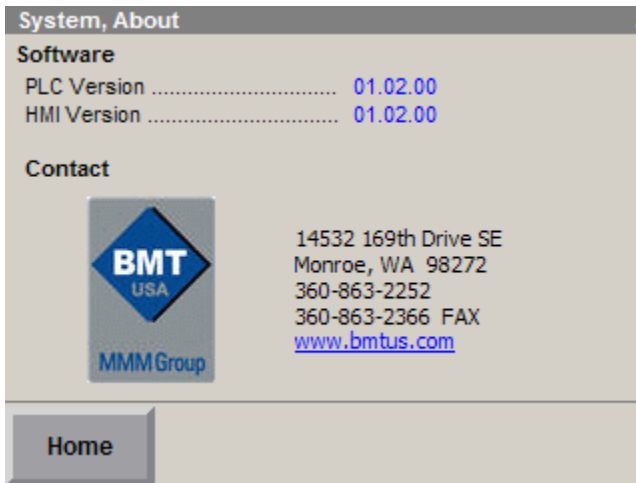


System, Home page – user Engineer logged in



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A
Menu Touch cells			
Operation	A	A	A
Setup	A	A	R
Date/Time	A	R	R
I/O	A	A	A
Technical	A	R	R

2.5.2 System, About Screen



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A

The System, About screen displays Contact information for BMT USA, as well as the PLC and HMI software versions.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

2.5.3 Login Popup

From the System, Home screen access the login popup screen by pressing the Log In touch cell.

Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A

The user logs in to the system from the login popup window. Pressing the User touch cell accesses the alphanumeric keypad from which the user login name is entered. Pressing the Password touch cell accesses the numeric keypad from which the password is entered.

The “enter” touch cell accepts the keyed input and begins the login authentication process. Pressing the ESC touch cell cancels the action/input.

2.5.4 Log Out

To log the current user out of the system navigate to the System, Home screen and press the Log Out touch cell.

Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A

2.5.5 Password Edit

The Password Edit touch cell on the Service, IO screen provides a way for the currently logged in user to edit their password. When the Password Edit touch cell is pressed, the Change Password popup appears. The popup displays the current user name and touch fields for editing the old, new, and confirming password.

Old Password

Press the Old Password touch cell to access the numeric popup display. Enter the appropriate numeral. Press the enter touch cell to accept the selected numeral. An * appears in the Old Password field.

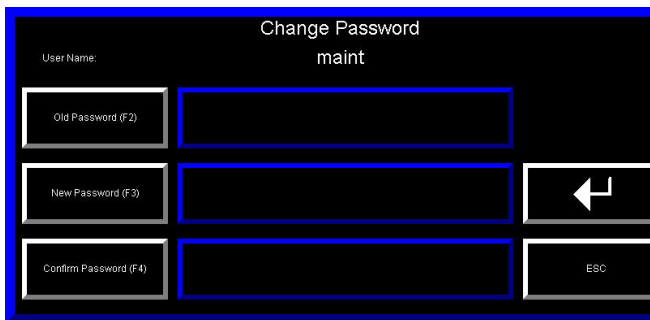
New Password

Press the New Password touch cell to access the numeric popup display. Enter the appropriate numeral. Press the enter touch cell to accept the selected numeral. An * appears in the New Password field.

Confirm Password

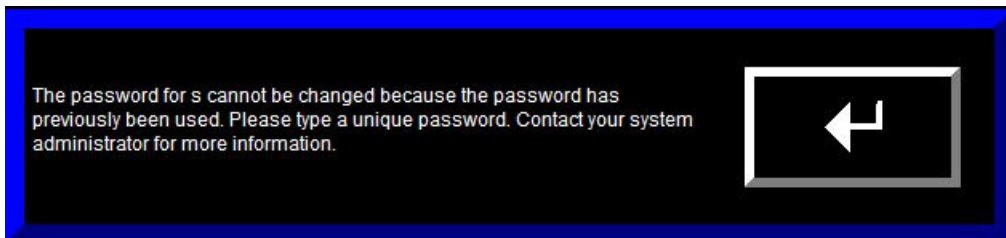
Press the Confirm Password touch cell to access the numeric popup display. Enter the appropriate numeral. Press the enter touch cell to accept the selected numeral. An * appears in the New Password field.

When the popup display clears (automatically) then the new password is in effect.



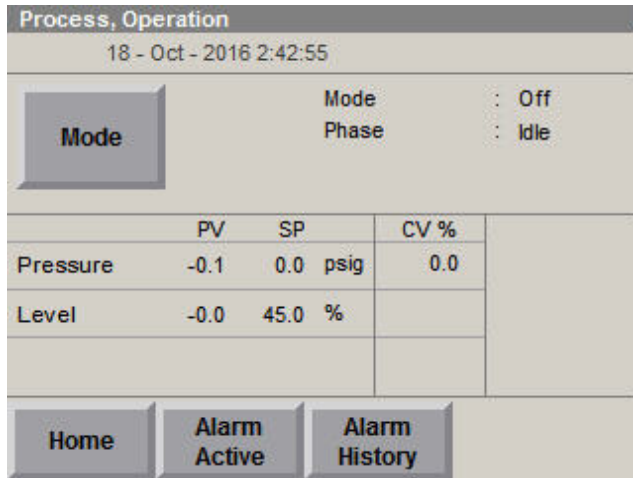
Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A

A unique password must be used. The system tracks the last 3 passwords used and will not accept a duplicate entry. If a duplicate password is entered the following screen appears. (Note, in this illustration the user 's' is referenced. The actual message will correctly identify the user level attempting to edit their password.)



To reuse one of the last 3 passwords, first go through the password edit steps described above **three consecutive times**. For each edit, enter a unique password. Upon the fourth edit, the desired password may be used.

2.5.6 Process, Operation Screen



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A
Menu Touch cells			
Alarm Active	A	A	A
Alarm History	A	A	A

The Process, Operation screen displays:

- Date and Time
- System process variables
- System set-points
- Mode
- Phase
- Touch cells

The user may select between Off and Automatic production mode of operation on this screen. It also allows access to the Notification, Alarm Active and Notification, Alarm History pages.

Start / Stop Operation

To begin operation, press the Mode touch cell until Automatic appears in the Mode field. To stop production, press the Mode touch cell until Off appears in the Mode field. Pressing the Mode touch cell toggles between Off and Automatic production modes. The Mode status cell must be active (i.e. not dimmed) with no active alarms or interlocks present in order to start operation.



Operation and Maintenance Manual

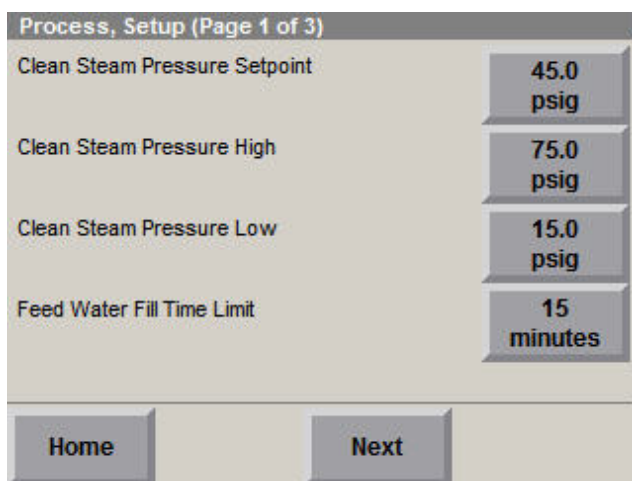
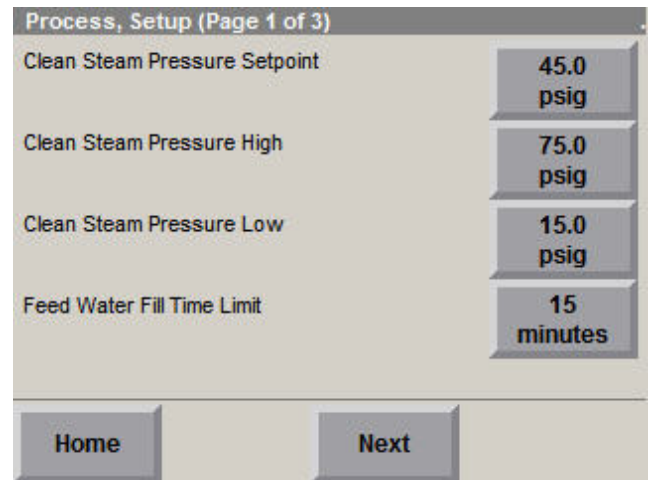
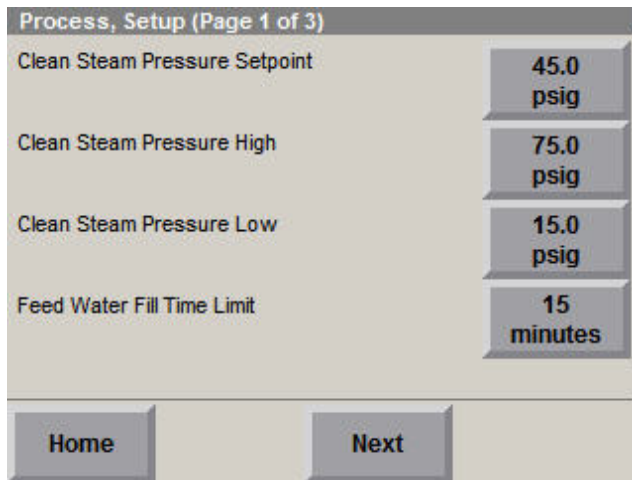
Golden Road Brewing
 Model No.: ECSG400
 Serial No.: SG1641003
 Part No.: 110-50069

2.5.7 Process, Setup Screens

The following screens allow the user to view and edit the parameters in order. Pressing on the corresponding parameter touch cell allows the user to edit a parameter via the numeric keypad or by toggling between Enable and Disable.

Use the touch cells along the bottom of the screen to navigate among the different Process, Setup screens or return to the System, Home screen.

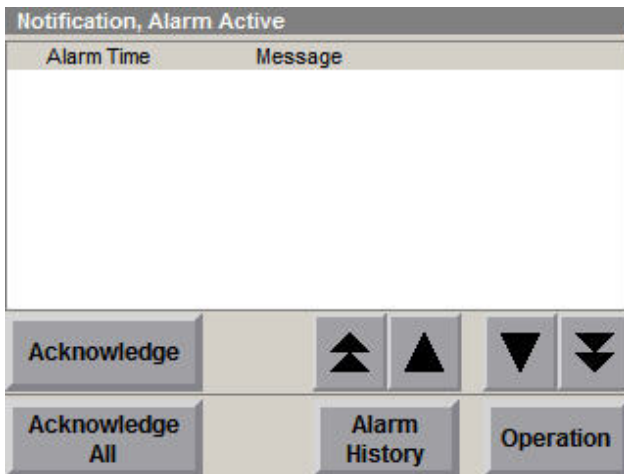
Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	R



2.5.8 Notification, Alarm Active Screen

The Notification, Alarm Active screen allows the user to view and acknowledge active alarms. Use the up and down arrow touch cells to scroll through the alarms. To page through the alarms, use the up and down double arrow touch cells.

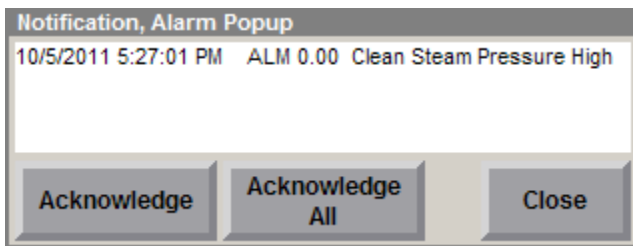
When an active alarm is present, pressing the Acknowledge touch cell will acknowledge the alarm. Once the alarm condition has been corrected, the alarm message clears from the screen. The alarm event and the acknowledgement are logged in alarm history.



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A

3.5.9.1 Notification, Alarm Popup Screen

The Notification, Alarm Popup screen notifies the user of an alarm.



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A

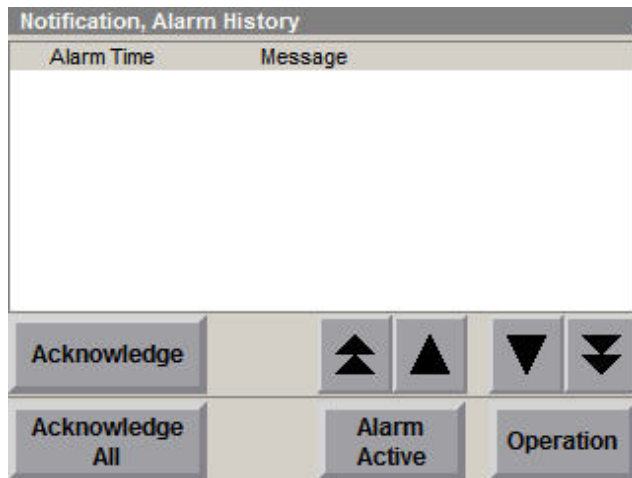
The alarm(s) may be acknowledged from this screen by pressing either the Acknowledge or Acknowledge All touch cell. Pressing the Close touch cell closes the popup screen.

2.5.9 Notification, Alarm History Screen

The Notification, Alarm History screen stores up to 1,000 alarm events.

Unacknowledged alarms are highlighted on the screen. Selecting an unacknowledged alarm and pressing the Acknowledge touch cell will acknowledge the alarm. The alarm will change from highlighted to a white background signifying the alarm has been acknowledged. The alarm event and the acknowledgement are logged in alarm history.

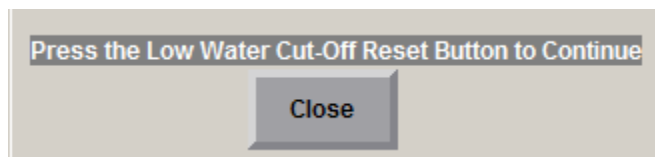
To acknowledge all active alarms at once, press the Acknowledge All touch cell. The alarms change from highlighted to a white background signifying the alarms are acknowledged. The alarm events and acknowledgements are logged in alarm history.



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A

2.5.10 Notification, Low Water Cut-off Popup

During the Filling Phase, the Notification, Low Water Cut-Off Popup notifies the user that the water level has risen above the Low Water Sensor and to press the Low Water Cut-Off Reset Button so that the Filling Phase may complete. Press the Close touch cell to exit the popup.



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A

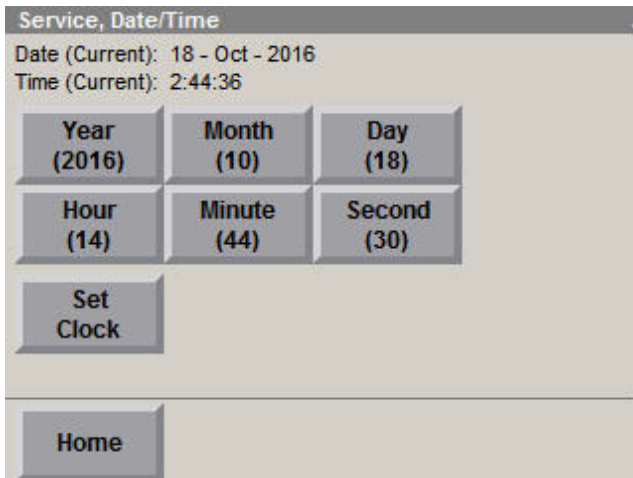


Operation and Maintenance Manual

Golden Road Brewing
 Model No.: ECSG400
 Serial No.: SG1641003
 Part No.: 110-50069

2.5.11 Service, Date / Time Screen

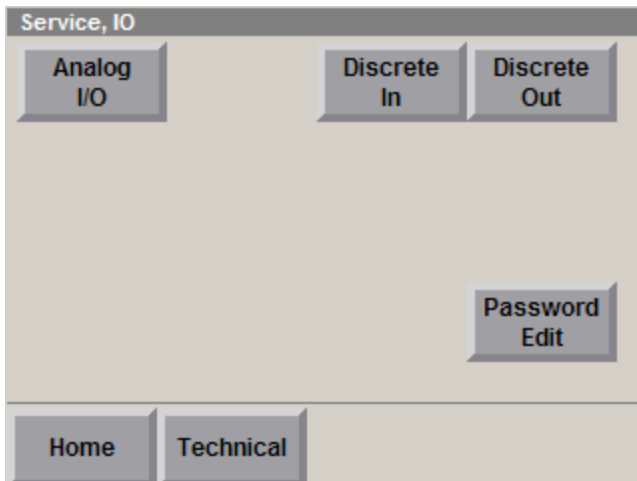
The Service, Date / Time screen allows the user to view the current date and time, as well as set the date and time. Pressing any of the numeric entry touch cells will access the numeric keypad.



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	R	R

2.5.12 Service, I/O Screen

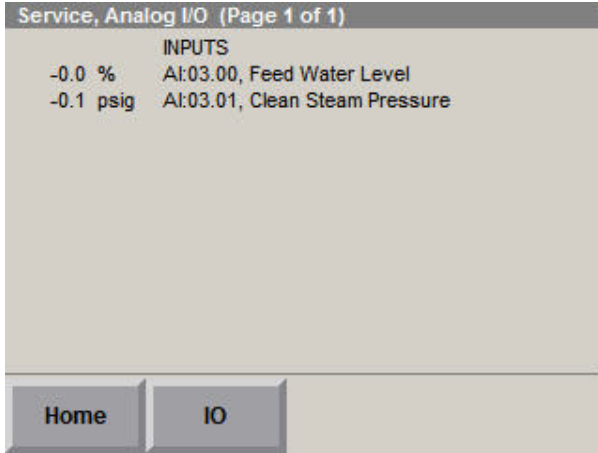
The Service, I/O screen allows the user to navigate to the Analog Inputs, Discrete Inputs, Discrete Outputs and Technical screens. It also provides access to the Password Edit function.



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A
Touch cell			
Analog	A	A	A
Password Edit	A	A	A
Discrete In	A	A	A
Discrete Out	A	A	A
Technical	A	R	R

2.5.12.1 Service, Analog Inputs Screen

The Service, Analog Inputs screen allows the user to view the status of the Analog Inputs.

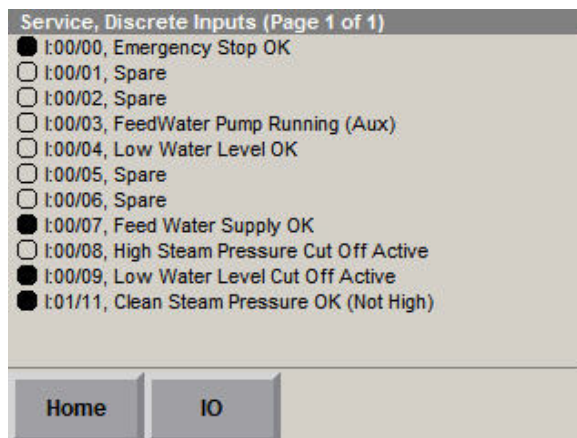


Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A

2.5.12.2 Service, Discrete Inputs Screens

The Service, Discrete Inputs screen allow the user to view the status of the Discrete Inputs.

Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A





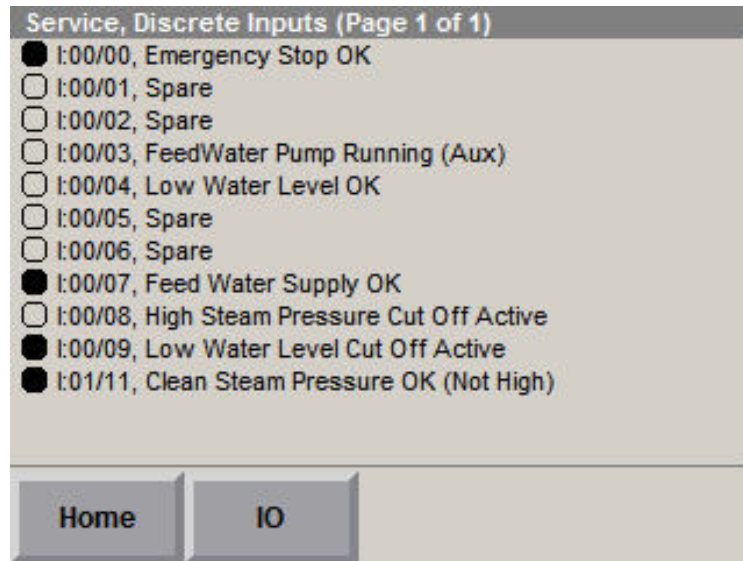
Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

2.5.12.3 Service, Discrete Outputs Screens

The Service, Discrete Outputs screens allow the user to view the status of the Discrete Outputs.

Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	A	A

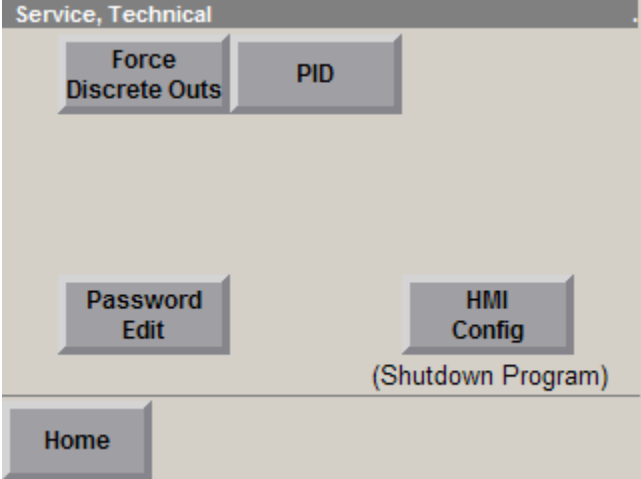


2.5.13 Service, Technical Screen

The Service, Technical page provides access to the Service, Discrete Out pages which are used to force the associated outputs on and off. It also provides access to the Service, PID page which is used to set the Clean Steam Control Loop tuning parameters.

The HMI Config touch cell allows the user to access the operating system for the PanelView. For more details on HMI Configuration, refer to the Allen-Bradley OEM User’s Manual. If the HMI Configuration screen is accessed, the user is automatically logged out of the system upon exiting, and must log back in again. To exit the HMI Configuration screen, press the Run Application touch cell.

The Password Edit touch cell serves the same function as covered in section 3.5.5.



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	R	R



Operation and Maintenance Manual

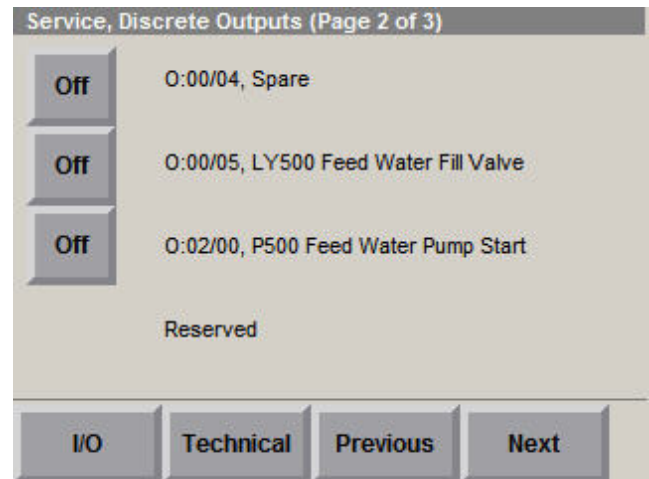
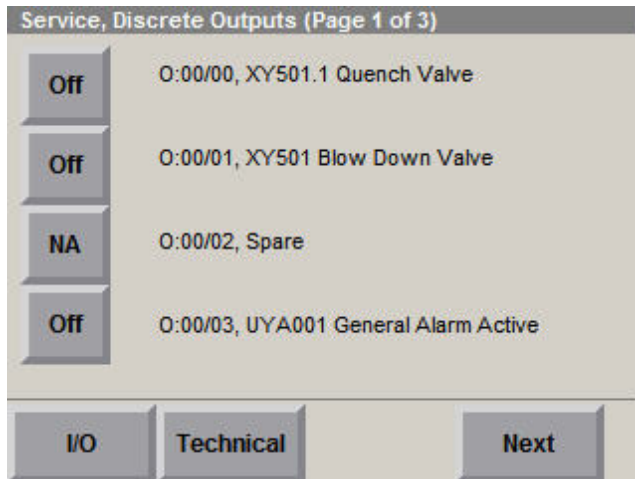
Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

2.5.13.1 Service, Discrete Outputs

The Service, Discrete Outputs screens allows the user to manually control individual outputs. Pressing a discrete output corresponding touch cell will toggle it between Off and On. As a safety feature, when the user exits the Service, Discrete Outputs screen(s) and returns to the Technical screen, whatever outputs were turned on will automatically turn off. Pressing the emergency stop will also switch all outputs to off.

Also, as a matter of safety, and to prevent element damage there is a hard coded feature in the software that prevents even the maintenance person from energizing the elements without the 'Water Level' sensor being wet.

Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	R	R



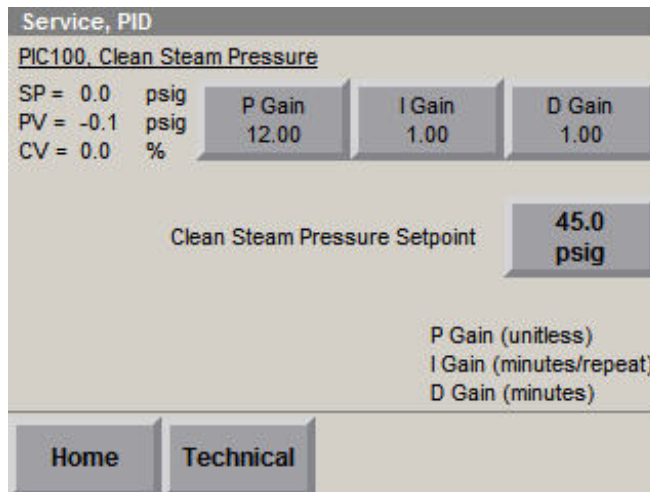


Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

2.5.13.2 Service, PID Screen

The Service, PID screen allows the user to edit the Proportional, Integral and Derivative parameters to tune the PID loops for clean steam pressure. Pressing any of the numeric entry touch cells accesses the numeric keypad.



Security Access			
	Level 1	Level 2	Level 3
Screen Access	A	R	R



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

2.6 Alarm Descriptions

The alarm system is divided into two groups.

2.6.1 Shutdown Alarms

Shutdown alarms switch the system mode to off. All shutdown alarms require acknowledgement from the user. Alarm status is independent of the acknowledgement. The sole purpose of acknowledging alarms is to alert the user of the occurrence of the alarm event(s). This section describes shutdown alarms and their associated triggers.

2.6.1.1 Clean Steam Pressure Transmitter Fault Alarm

'ALM 0.01 Clean Steam Pressure Transmitter Fault' is triggered when the Clean Steam Pressure transmitter fails. A failure is determined if the transmitter signal is under-range (i.e. < 4mA.) or over-range (i.e. > 20mA.).

2.6.1.2 Water Level High High Alarm

'ALM 0.02 Water Level High High' is triggered when all of the following conditions are met: 1) System mode is in Automatic, 2) System Phase is in Production, 3) Clean steam generator has reached the operating setpoint and 4) Feed Water Level is equal to or greater than the HMI parameter 'Water Level High High Setpoint' for longer than the HMI parameter 'Water Level Control Target'.

2.6.1.3 Low Water Level Cutoff Alarm

'ALM 0.03 Low Water Level Cutoff' is triggered when all of the following conditions are met: 1) System mode is in Automatic, 2) Initial Filling Phase has reached the Low Level sensor, 3) the Low Water Cutoff Reset Button has been pressed and 4) the Low Water Level sensor does not detect water. To resume normal operation, the condition must be cleared and the Low Level Cutoff Reset button must be pressed.

2.6.1.4 Feed Water Fill Time Exceeded Alarm

'ALM 0.04 Feed Water Fill Time Exceeded' is triggered when all of the following conditions are met: 1) System mode is in Automatic, 2) System Phase is in Fill and 3) the step time is equal to or greater than the HMI parameter 'Feed Water, Fill Time Limit'.

2.6.1.5 Clean Steam High Pressure Cutoff Alarm

'ALM 0.06 Clean Steam High Pressure Cutoff' is triggered when the Clean Steam Pressure is equal to or greater than the Clean Steam High Pressure Cutoff Switch manual set point. To restart, the condition must be cleared and the High Pressure Cutoff Reset button must be pressed.

2.6.1.6 Water Level Low (Analog) Alarm

'ALM 0.07 Water Level Low (Analog)' is triggered when all of the following conditions are met: 1) The Low Water Cut Off is not active, 2) System Phase is in Production, 3) Water Level is below the HMI parameter 'Water Level Low Setpoint'. A (5) second hard coded delay provides a delay time the conditions may be active prior to alarming. This alarm will also trigger the Low Water Cut Off. To resume normal operation, the condition must be cleared and the Low Level Cut Off Reset button must be pressed.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

2.6.1.7 System Emergency Stop Active Alarm

'ALM 0.09 System Emergency Stop Active' is triggered when the Emergency Stop circuit is de-activated. The Emergency Stop circuit may be reset by returning the Emergency Stop button to normal operating position and pressing the 'Reset' pushbutton.

2.6.1.8 Feed Water Supply Fault Alarm

ALM 0.10 Feed Water Supply Fault is triggered when the Feed Water Supply OK sensor does not detect the presence of feed water.

2.6.2 Informational Alarms

Informational alarms serve the sole purpose of information only with no associated control functions. This section describes informational alarms and their associated triggers.

2.6.2.1 Clean Steam Pressure Low Alarm

'ALM 2.01 Clean Steam Pressure Low' is triggered when the following conditions are met: 1) System mode is in Automatic, 2) System Phase is in Production and 3) Clean Steam pressure falls below the HMI parameter 'Clean Steam Pressure Low'.

2.6.2.2 CPU Battery Low Alarm

'ALM 2.02 CPU Battery Low' is triggered when the battery voltage drops below the manufacturer's recommendations. This alarm requires user acknowledgement.

2.6.2.3 CPU Power Failure Alarm

'ALM 2.03 CPU Power Failure' is triggered when the CPU experiences a power failure or a mode change (Note: The CPU mode is separate and unrelated to the system equipment mode.). This alarm requires user acknowledgement.

2.6.2.4 Clean Steam Pressure High (Analog) Alarm

'ALM 2.06 Clean Steam Pressure High (Analog)' is triggered when the Clean Steam Pressure is equal to or greater than the HMI parameter 'Clean Steam Pressure High'

2.6.2.5 Water Level High Alarm

'ALM 2.07 Water Level High' is triggered when all of the following conditions are met: 1) System mode is in Automatic, 2) System Phase is in Production, 3) Clean steam generator has reached the operating setpoint and 4) Feed Water Level is equal to or greater than the HMI parameter 'Water Level High Setpoint'.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

2.7 Power Failure

If power is lost while the Clean Steam Generator is in operation, the unit will stop production. When power is restored, ALM 0.09 System Emergency Stop Active is triggered. The reset button must be pressed even though the Emergency stop button was not actually pressed because electrical power is used to hold the Emergency Stop circuit relay on.

When power is restored the following indicator lights on the control panel will be active:

- Alarm Active
- Low Level Cutoff Reset
- High Pressure Cutoff Reset

Depress the following Reset buttons:

- Reset
- High Pressure Cutoff Reset
- Low Level Cutoff Reset *

From the Process Operation screen press the Mode button to display 'Auto' and begin steam production.

* If there is sufficient water in the vessel, the Low Level Cutoff Reset light will turn off when the reset button is depressed. Otherwise the button will remain lit and when steam production is started, the user will be prompted via the display screen to depress the Low Level Cutoff Reset button.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

2.8 Set-up Parameters

The table below contains a list of the setup parameters with ranges and units. Security access is as indicated.

Name	Group	Range	Units	Security Access
Clean Steam Pressure Set point	Auto – Production	0.0 – 90.0	psig	All
Clean Steam Pressure High	Auto – Production	0.0 – 90.0	psig	All
Clean Steam Pressure Low	Auto – Production	0.0 – 90.0	psig	All
Feed Water, Fill Time Limit	Auto – Filling	1 – 30	Minutes	All
Water Level Hysteresis	Auto	0 – 10	seconds	All
Blow Down, Enable	Auto	Disabled, Enabled	n/a	All
Blow Down, Frequency	Auto	1 – 720	minutes	All
Blow Down, Duration	Auto	0 – 60	seconds	All
Water Level Control Target	Auto – Production	0.0 – 100.0	% Level	All
Water Level High High Setpoint	Auto – Production	0.0 – 100.0	% Level	All
Water Level High Setpoint	Auto – Production	0.0 – 100.0	% Level	All
Water Level Low Setpoint	Auto – Production	0.0 – 100.0	% Level	All

Clean Steam Pressure Set point

This parameter will provide a method to establish the operating pressure set-point for Clean Steam.

Clean Steam Pressure High

This parameter will provide a method to establish the alarm set-point for high Clean Steam pressure conditions. This parameter will be used for alarming. Please see the alarm section for further details.

Clean Steam Pressure Low

This parameter will provide a method to establish the alarm set-point for low Clean Steam pressure conditions when the unit is operating in the Production phase. This parameter will be used for alarming. Please see the alarm section for further details.

Feed Water, Fill Time Limit

This parameter will provide a method to control the maximum amount of time allowed to complete the Filling phase prior to alarming and switching to Off mode. The intent of this parameter will be to provide equipment malfunction protection.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

Water Level Hysteresis

This parameter will provide a method to control the delay on and delay off time for the Feed Water Level High Switch. This is to adjust the fill cycle since filling is based on the Feed Water Level High Switch.

Blow Down, Enable

This parameter will provide a method to control whether blow down occurs when the unit is in Automatic mode. When disabled, no blow down occurs. When enabled, blow down occurs in Automatic Mode based on the settings of parameters Blow Down, Frequency and Blow Down, Duration.

Blow Down, Frequency

This parameter will provide a method to control the frequency of blow down in Automatic mode and Blow Down is enabled. Blow Down will occur whenever the value set for Blow Down, Frequency counts down to zero. For example, if the parameter is set for 2 hours, a software timer will start when the unit goes into Production mode. After 2 hours the Blow Down event will occur.

Blow Down, Duration

This parameter will provide a method to control the duration of blow down in Automatic mode and Blow Down is enabled. When the Blow Down event begins based on the setting of the parameter Blow Down, Frequency, the blow down valve will open for the length of time set by this parameter.

Water Level Control Target

This parameter will provide a method to establish the operating level which will trigger addition and cut off of the Feed Water.

Water Level High High Setpoint

This parameter will provide a method to establish the alarm set-point for High High Water Level conditions when the unit is operating in the Production phase. This parameter will be used for alarming. The alarm also turns off the Steam Generator. Please see the alarm section for further details.

Water Level High Setpoint

This parameter will provide a method to establish the alarm set-point for high Water Level conditions. This parameter will be used for alarming. Please see the alarm section for further details.

Water Level Low Setpoint

This parameter will provide a method to establish the alarm set-point for Low Water Level conditions. This parameter will be used for alarming. Please see the alarm section for further details.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

SECTION 3 MAINTENANCE

3.1 Overview

This section provides maintenance and troubleshooting information.

3.2 Maintenance Procedures

This section describes maintenance procedures for the clean steam generator. Preventive maintenance and failures resulting from a lack of preventive maintenance are not covered under warranty.

Maintenance procedures described in this section should be performed regularly at the intervals indicated to provide the longest useful life possible for your clean steam generator. Refer to the maintenance schedule for daily, weekly, quarterly, annually and as needed procedures. Refer to the recommended spare parts list for any replacement parts needed and contact BMT USA to place orders.



When checking vessel safety valves, avoid the discharge outlet of the safety valve when operating the pressure release lever. The handle of the pressure relief valve may be hot. Care should be taken to avoid burns when test operating these valves.

3.2.1 Maintenance Schedule

Daily

- | |
|---|
| • Inspect unit for obvious leaks in both Off and Automatic Modes. |
| • Check for loose parts, unusual noise and/or vibrations. |
| • Check for alarm notifications. |
| • Check 'Blow down / Quench' operation, if enabled. |
| • Check for a clear drain. |

Quarterly

- | |
|---|
| • Check all air pilot valves, pneumatic angle seat valves, and check valves, for smooth operation and wear. Replace or install repair kits as needed. |
| • Verify incoming water supply pressures. |

	<h2>Operation and Maintenance Manual</h2>	<p>Golden Road Brewing Model No.: ECSG400 Serial No.: SG1641003 Part No.: 110-50069</p>
---	---	--

Annually or As Needed

<ul style="list-style-type: none"> • Replace all sanitary gaskets.
<ul style="list-style-type: none"> • Check and clean the compressed air regulator filter and cup, replace filter if needed.
<ul style="list-style-type: none"> • Check tightness of terminal wiring in connection blocks.
<ul style="list-style-type: none"> • Remove relief valve from pressure vessel and inspect for presence of scale or corrosion, de-scale as needed.
<ul style="list-style-type: none"> • Check circuit breakers, fuses and relays.
<ul style="list-style-type: none"> • Check voltage readings: VAC _____ and VDC _____
<ul style="list-style-type: none"> • Check front panel push buttons and lights.

3.3 Troubleshooting

The following table is provided showing possible problems that may occur while operating the equipment. Conditions are shown in italics in the ALARM/PROBLEM column. Multiple RECOMMENDED RESPONSE(s) are provided where more than one POSSIBLE CAUSE is shown for a specific ALARM/PROBLEM.

ALARM/PROBLEM	POSSIBLE CAUSES	RECOMMENDED RESPONSE
<i>Clean Steam Pressure High Alarm</i>	Damaged relay(s) or incorrect parameters.	Replace relay(s) or change parameters.
<i>Clean Steam Pressure Transmitter Fault Alarm</i>	Loose or broken connection to/or from transmitter. Faulty unit.	Repair or replace
<i>Clean Steam Pressure Low Alarm</i>	Faulty elements, relay, connections, control issue.	Repair
<i>Feed Water Fill Time Exceeded Alarm</i>	Line restriction, closed valve, bad pump, faulty water level sensor, faulty connection	Repair or replace
<i>Feed Water Supply Fault Alarm</i>	Loss of feed water supply, faulty sensor, broken cable	Restore source, replace sensor.



Operation and Maintenance Manual

Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069

3.4 Clean Steam Pressure Control

3.4.1 Description of Operation

A pressure sensor mounted on the outlet piping of the steam generator accomplishes clean steam outlet pressure control for the BMT USA Electric Clean Steam Generator. This device is an analog transmitter and is connected to the control system, providing a linear electrical signal representative of the clean steam outlet pressure.

Steam pressure builds to the set-point for clean steam pressure as monitored by analog pressure transmitter PT100. As the pressure approaches the set-point, PID logic is used to begin shutting down the heater circuits to control the clean steam pressure. When clean steam is demanded by supplied equipment, the subsequent pressure drop causes the heating elements to activate again (sequenced) to restore and maintain the pressure set-point.

3.5 Manual Valves

The steam generator is equipped with manual valves for various purposes. This section describes the usage and settings of these manual valves.

3.5.1 Adjustable Valves

Feed Water Fill Valve (HV500)

The purpose of this adjustment valve is to regulate the feed water flow rate into the vessel.

Blow Down Valve (HV505)

The purpose of this adjustment valve is to regulate the feed water flow rate into the vessel.

3.5.2 On/Off Valves

Drain Valve (HV501)

The purpose of the drain valve is to allow the user to drain water from the vessel.



**Operation and
Maintenance Manual**

**Golden Road Brewing
Model No.: ECSG400
Serial No.: SG1641003
Part No.: 110-50069**

**APPENDIX A –
QUICK START GUIDE**