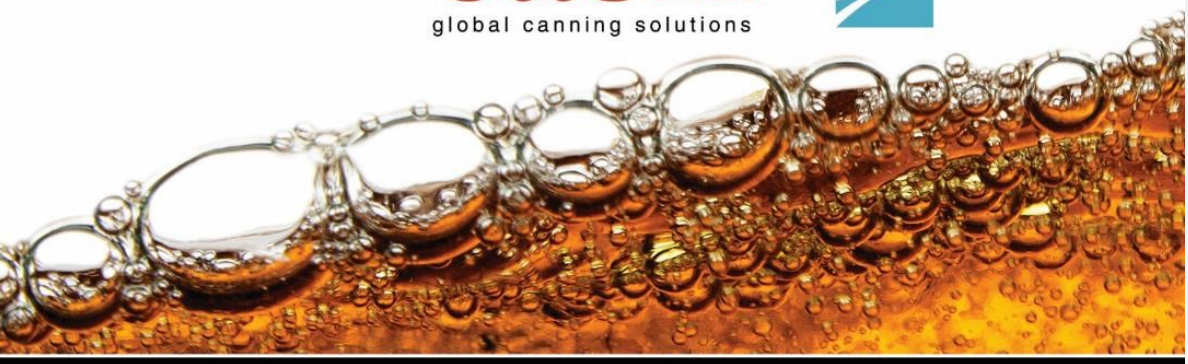
ACS V6 Operations Manual

CASK BREWING SYSTEM INC.

First Edition, April 2022

cask
global canning solutions



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1-800-661-8443 Option #4

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ACS V6 Installation Manual

First Edition April 2022

Disclaimer

The information presented in this manual has been reviewed and validated for accuracy. The included set of instruction and descriptions are accurate for the Cask Brewing Systems Inc. ACS V6 in its stock condition as supplied by Cask Brewing Systems Inc., at the time of this manual's production. However, subsequent products and manuals are subject to change without notice. Therefore, Cask Brewing Systems Inc. assumes no liability for damages incurred directly or indirectly from errors, omissions, or discrepancies between any subsequent or altered products and this manual.

Revision History & Document Control

Manual Version	Release Date	System	Updates
First Edition	April 2022	ACS V6	• Initial installation manual release

Future Updates

As we evolve future iterations of this Manual, we will post the most recent versions and updates on-line at our website.

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Section A. Before You Begin - Safety and Set-up

A.1 Safety and Precautions

Safety and Precautions

- Any and all operations, including but not limited to maintenance, troubleshooting, and normal machine operation should only be performed by authorized, trained employees.
- Be advised, at no time should any operators or persons enter the enclosed areas while control is enabled on the ACS V6. The ACS V6 should have the emergency stop engaged and be locked out at principal power source/switch, and deenergize the air supply at the regulator by following the lock-out procedure.
- Power should also be closed and deenergized before entering the control panel for any reason to avoid any risk of electric shock.
- Only certified electricians should attempt to connect or work on the power supply to the ACS V6.
- Failure to follow these safety guidelines may result in serious harm or death so absolute caution should be exercised at all times.

A.2 Safety Warnings Symbols

Electrical Shock Hazard	Hand Crush From Two Sides	Hand Entanglement Chain Drive	Hand Crush Force From Below
			
Electrical Ground Hazard	**Cut or Sever Possible**	**Burn Hazard Hot Surface**	**Hand Crush Force From Side**
			
Lock Out In De-energized State	**Connect Earth Terminal to Ground**	**Lock Out Electric Power**	
			

Table 1 - Safety Warning Symbols

A.3 Hazard Isolation Procedure

Prior to performing maintenance or minor adjustments performed on your equipment all sources of energy should disconnected and isolated. Failing to do so may result in serious injury or death. The ACS V6 has hazards associated with electricity, mechanical hazards, and compressed fluids. These hazards can cause serious harm if not isolated prior to performing maintenance. The following section will outline the guidelines that should be used to isolate the energy sources.

It is imperative that the owner/operator develop a comprehensive lockout/tagout procedure in accordance with local legislation. This procedure explains how to isolate and lockout the hazards but does not prescribe further administrative controls (such as tagging procedure, group lockouts, etc.) that may be required in your jurisdiction.

Below you will find an outline of the locations of the Electrical Panel and Air & CO2 manifolds where you will apply isolation/Lock-Out locks. Any point where lockout is required, or possible, you will find the blue lockout symbol:

Figure 1 - Lockout Symbol

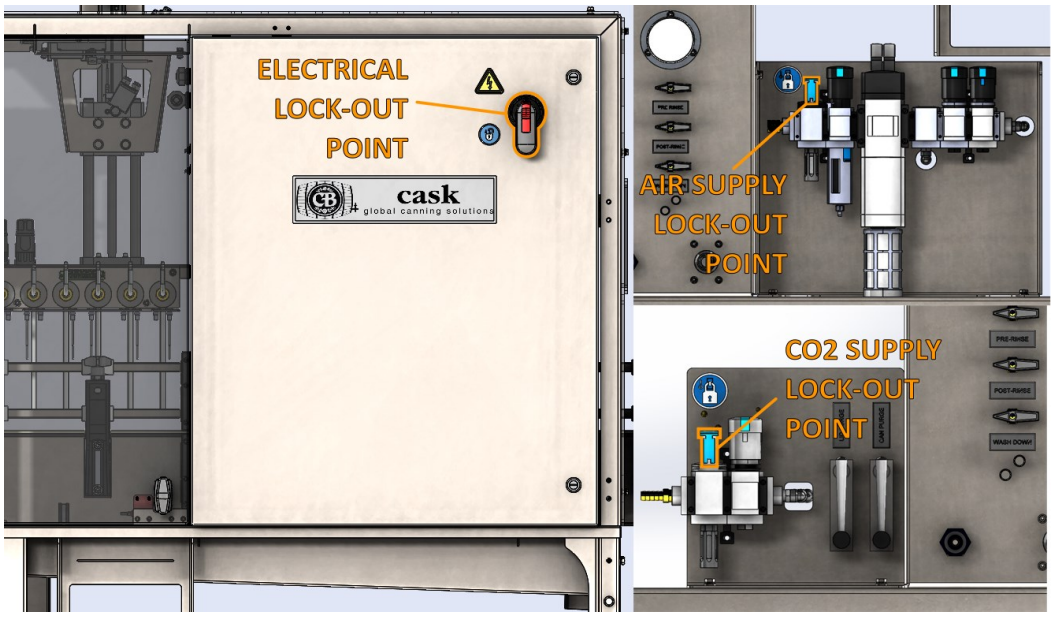


Figure 2 - Lock-Out Points

A.3.2 Electrical Isolation

Any time maintenance is being performed on the ACS V6 it should be isolated from electrical power by locking out the main electrical switch on the front of the electrical panel. To isolate, deenergize, and lock out the main power you need to follow the instructions below. These are instructions on how to isolate energy sources but are not a substitute for a lock-out/tag-out procedure. Appropriate lock-out and tag-out policies and procedures for your jurisdiction should be researched and used by the end user.

1. Turn main power switch to the off position by turning it counter clockwise. Give the power supply and machine a few moments to de-energize before beginning maintenance operations.	 
2. Once in the off position push the red lockout tab from the inside of the handle to expose the lockout point and apply a lock. This will prevent the switch from turning into the “ON” position. You may need to wiggle the switch a little to allow the lockout tab to slide out.	 

Table 2 - Electrical Isolation and Lock-Out

A.3.3 Air & CO2 Supply Isolation

Any time you are performing maintenance on the air or CO2 systems it is required that you isolate and de-energize the supply to avoid unwanted actuation that may cause injury. Below are instructions on how to isolate energy sources but it is important to understand these are not a substitute for a lock-out/tag-out procedure. Appropriate lock-out and tag-out policies and procedures for your jurisdiction should be researched and used by the end user.

The Air Supply and CO2 Manifolds for the ACS V6 are found on the lower portion of the ACS V6 on the operator-side, attached to the lower cross member of the frame.

1. Turn Air Supply off by turning the dial on the left 90 degrees so it is perpendicular to the air/gas inlet direction like in the photo on the right. The sound of Air the supply bleeding off can be heard as the pressure is released. The needle on the pressure gauge will also be at zero.		
2. Once in the off position push the blue lockout tab from the inside of the dial to expose the lockout point and apply a lock. This will prevent the dial from turning into the "OPEN" position. It may be necessary to wiggle the switch a little to allow the lockout tab to slide out when pushing/pulling on it.		

Table 3 – Air and CO2 Supply Isolation and Lock-Out

A.3.4 Fill Head Cylinder Potential Energy/Pneumatic Isolation

The fill heads of the ACS V6 are lifted and dropped by a pneumatic cylinder. These cylinders have built-in pilot operated check valves that allows the fill head to stay in the up position when control is removed from the air supply. Control is removed from pneumatic systems when the machine is in an e-stop state, or the safety interlocks on the doors are activated (when doors are open).

The check valve will hold potential energy from the air in the lines until the check valve is vented manually. To vent the check valve manually you'll need to push in on the release point using a small screw driver or another small pointed object like a pen or hex key. To release all the energy, you'll need to hold the release point button in until all air is exhausted. When air is exhausted the fill head will drop, so be mindful to not have hands, other body parts, or cans/tools under the fill head when you release the air.

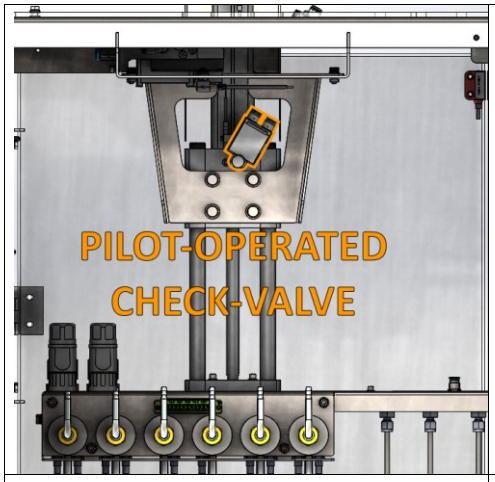
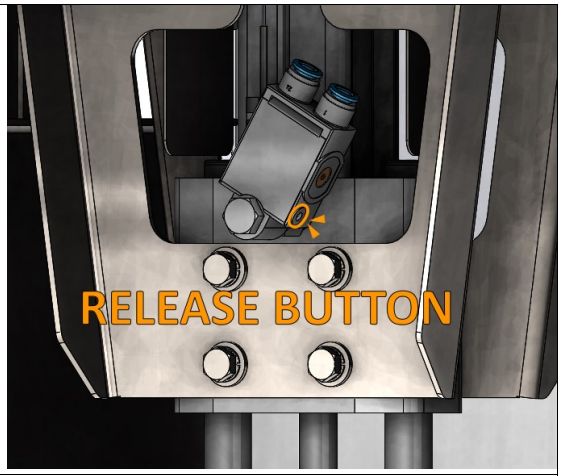
	
The check valve (pictured above) is found on the lower portion of each fill head cylinder.	To release the pneumatic energy in the fill head cylinders push in on the blue button (shown above) until the fill head drops and rests at the bottom of its stroke. Keep all body parts away from under the fill head when it drops.

Table 4 - Fill Head Cylinder Check Valve

A.4 Safety Interlocking Doors

All access doors to the ACS V6 are guarded by safety interlocking doors that will put the machine into an isolated state the moment the doors open. This is to protect the user from entering the machine's automated areas while the machine is moving/operating. These interlocks are magnetically activated and are found fastened to the doors and are wired to the machine's emergency stop module inside the panel. These switches are keyed in pairs and cannot be mixed/matched.

Disabling or modifying these interlocks puts end users in extreme danger and is not recommended.

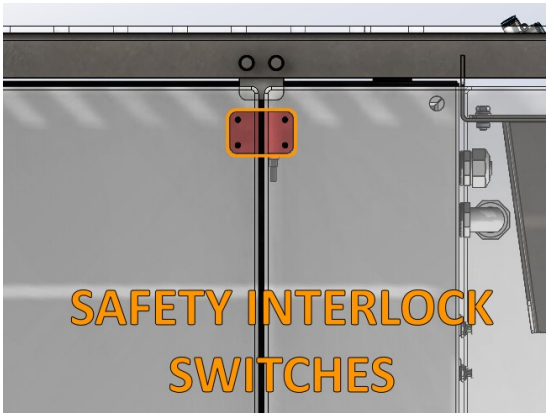


Figure 4 - Safety Interlock Doors

A.5 Emergency Stop Locations

There is one Emergency Stop Button (E-Stop) on the ACS V6. The E-Stop can be found on the lower portion of the HMI panel under the touch screen. **Note: E-Stop must be released to operate the filler.**

Figure 5 – Emergency Stop Location

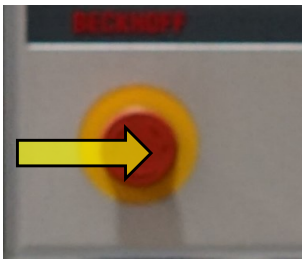
A.5.1 Emergency Stop Functionality

The E-Stop system on the ACS V6 will, when engaged, disable all functionality of the VFDs controlling the seamer and conveyor motors, the stepper motors controlling the carousel and seamer cam, all DC power to output devices is cut, and compressed air to all cylinders is cut and vented. One exception is the fill head air cylinder which has a pilot operated check valve to keep the fill head in the up-position when the e-stop is engaged, or when the safety interlocks are open.

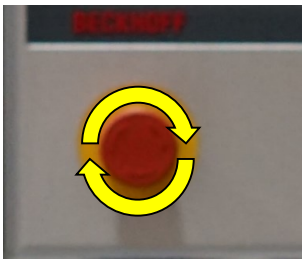
To reset the e-stop and re-activate all functionality that was disabled, twist the e-stop on the machine clockwise to disengage it, and press the blue button on the HMI.

Figure 6 - E-Stop Reset

Commented [LM1]: Change flex example to EIC example. Just to make sure they are not looking for another estop.



Push to engage



Twist to release

Figure 7 - E-Stop Engage/Release

A.6 System Requirements

Your Cask ACS V6 requires the following utilities.

Power	208/240 VAC, 50/60 Hz, 15 amps, 1 phase Electrical connection to be hardwired inside panel by certified electrician prior to Cask Technician arrival for initial system commissioning and training
Compressed Air	Filler and Seamer: 3 SCFM (85L/min) Delivered @ 90psi (6.2bar) Standard Air Dryer: 12 SCFM (340L/min) @ 30psi (2bar) Total Machine: Constant 15 SCFM (425L/min) at 90 psi (6.2bar) 3/8" barbed fittings **Recommended Compressor Specifications**: 80gal/300L – 5HP/3.8KW – Minimum 15CFM (425L/min) @90PSI (6.2bar) Equivalent Rated Refrigerated Air Dryer
CO_2 Supply	25 psi from plant system connected to machine with 3/8" barbed fitting
Beer	1.5" beer line from brite tank Beer supplied to machine at a temperature of 32 to 35.6 °F (0 to 2 °C) Beer carbonated to 2.4 to 2.9 v/v of CO_2 (or 4.6 to 5.6 g/L)

Table 5 - Automated Depal System Requirements

A.7 Uncrating Requirements

Recommended Tools:

- Forklift (Required)
- Bolt cutters or large pair of wire cutters to remove metal bands and a pry bar (recommend 2)
- Claw hammer
- Cordless drill with Robertson/Phillips bit
- Freestanding 10' Ladder

A.8 Uncrating Procedure

- Inspect crate exterior and document any damage incurred in transit
- Cut metal bands and remove from exterior of crate
- Use pry bars to remove plywood covering each end
- Next remove plywood skin from top of crate
- Leave end supports and remove all top cross supports with hammer
- Brace sides or have someone hold them in place and remove last top cross supports
- Gently fold sides of crate down to the floor
- You now have unfettered access to contents.
- It's also a good idea to take pictures of any damaged items are visible and report them to Cask immediately

A.9 Packing List

Inside the container you'll find the following items:

- ACS V6 Machine
- Spare Parts Kit
- Transformer (if ordered)
- Twist rinser (if ordered)

Section B. Unit Setup

Your ACS V6 will require automatic depalletization and, depending on your infeed configuration, extra infeed conveyance will be recommended to accommodate accumulation and date coding.

It's important to note that access to both sides of the ACS V6 is required so please keep this in mind when putting the machine in place. 3 feet/1 meter should be allotted on each side of the machine for working and maintenance space to allow the doors to open at all times.

Furthermore, it is crucial that your ACS V6 is level prior to operating. Place a 3ft/1m level along the lower frame cross members and use the leveling feet/jacks to set the machine in a level position once it is in its final position on the facility floor. For roll out/moving the machine, simply lower the machine onto its wheels using the cranks on the leveling jacks.

B.1 Unit Diagram

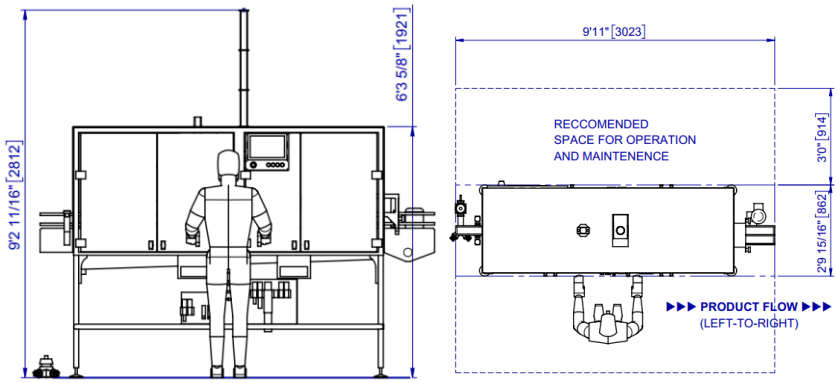


Figure 8 - Unit Diagram

Section C. HMI Overview

This section will give a brief overview of the HMI controls as they pertain to setting up your ACS V6.

There are three portions to the HMI:

1. Left Side Interchangeable Controls View
2. Center Fixed Controls View
3. Right Side Interchangeable Controls View

The centre of the screen is the fixed portion and will allow you to access the various controls pages. The right and left side will display which ever control screen you select.

To select a control screen simply tap on the “CB” logo (circled in yellow below) to reveal the control buttons then tap, hold, and drag the control icon you wish to use to whatever side of the screen you wish as the blue arrows show below.

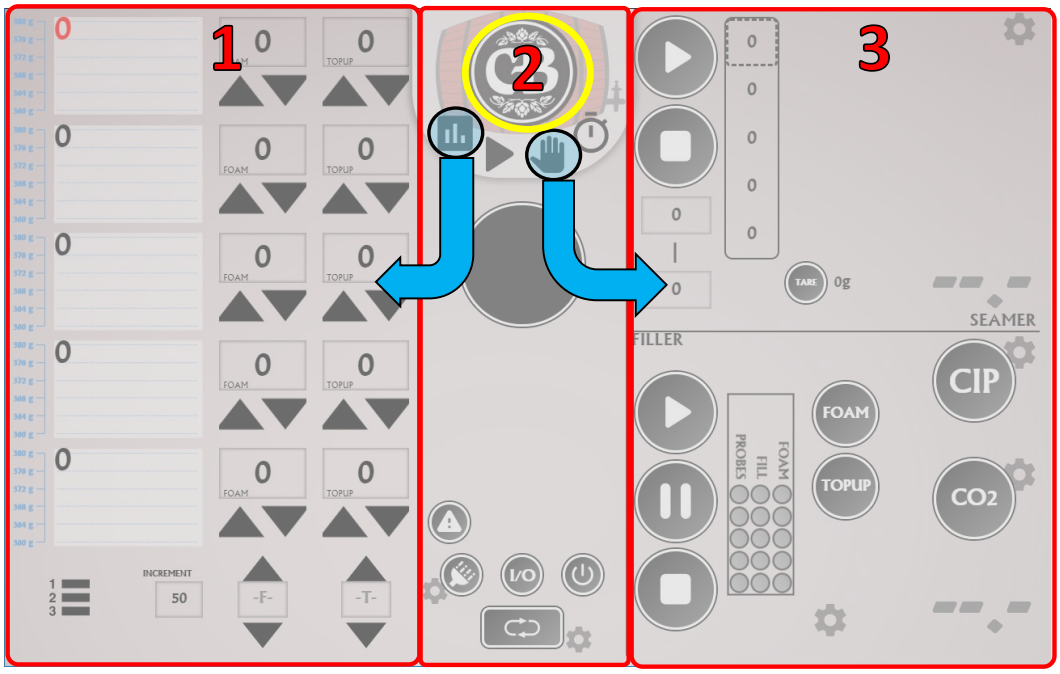


Figure 9 - HMI Page View

There are four possible screen selections and they are outlined below:

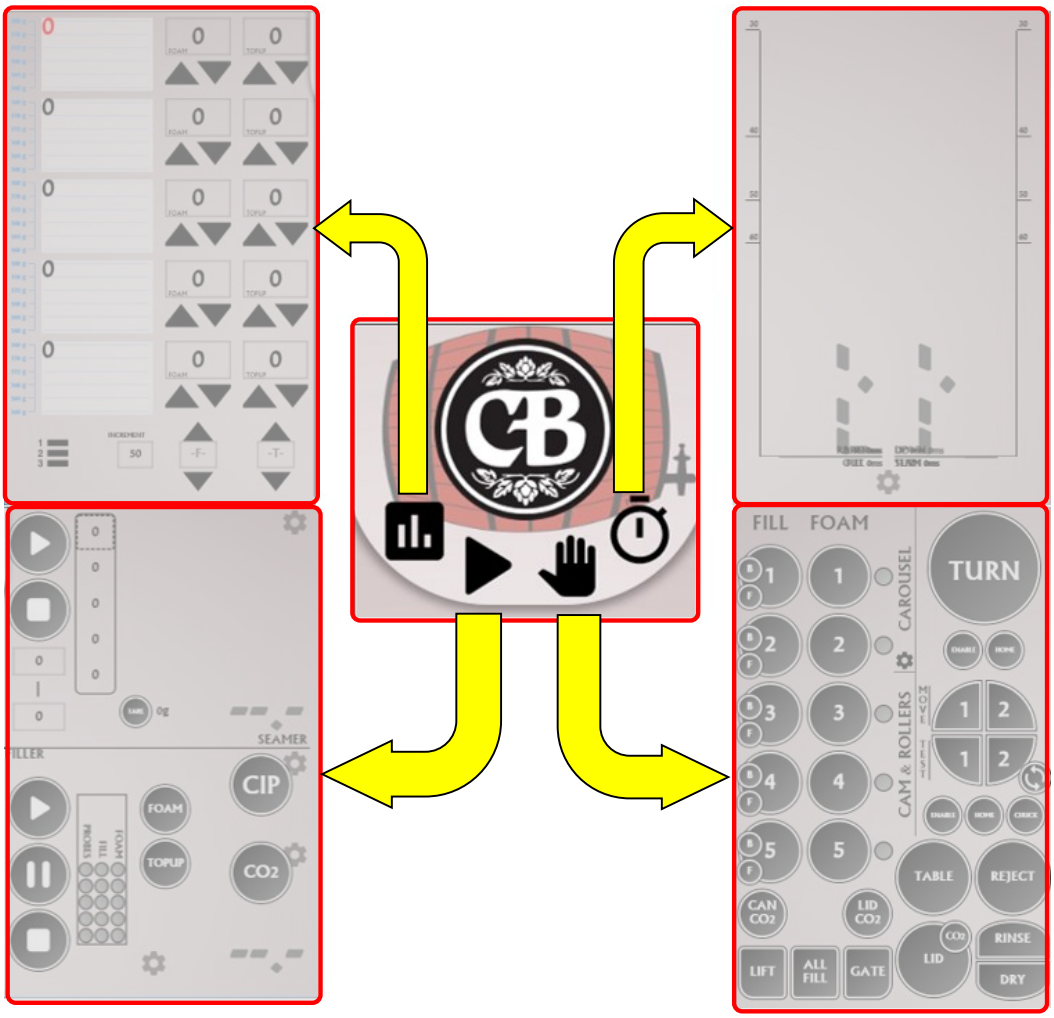


Figure 10 - HMI Page Options

C.1 HMI Physical Buttons

The HMI has four physical buttons on the frame; one is the E-Stop, and the others perform various tasks. Below is an outline of the buttons and their control configuration and function.

The Green, Red, and Blue buttons will also illuminate and flash to relay certain control conditions.

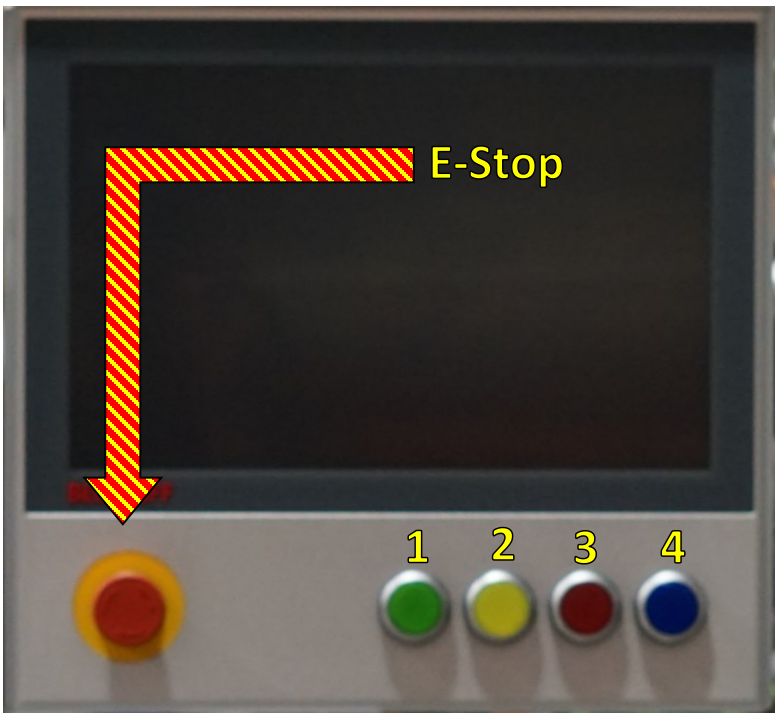


Figure 11 - HMI Button Overview

Button	Function
1. Auto/Run	• Puts machine into auto and run
2. Pause	• By Default, pauses fill heads after current can fill cycle is finished.
3. Stop	• Stops the Fill Cycle immediately but not the seamer.
4. Reset	• Resets all functions that are disabled by the E-Stop circuit after E-Stop is released.

Table 6 - HMI Button Descriptions

Commented [LM2]: No A and B side

C.2 HMI Center Control Pane

The HMI Center Control Pane is fixed and allows you to decide which screens to place on which side of the HMI, view product temperature and pressure, display errors and faults, and access general machine settings.

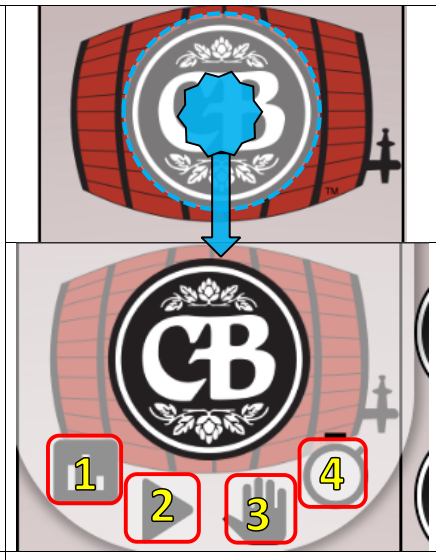
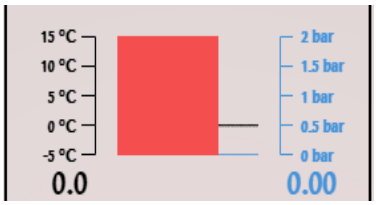
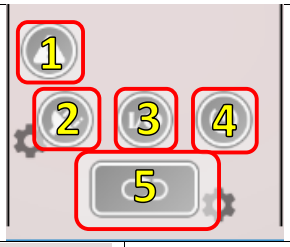
At the top of the center pane you will find the Cask "CB" Logo. Tap on the CB logo to reveal the control icons of the filler. Each of these control icons will allow you to sort which controls page you'd like to place on either of the two side panes. A list of what each of the icons represents is found on the far-right cell. A full breakdown of each control page will be provided in later sections.		1. Timers & Graphs 2. Run 3. Manual 4. Profile Detailed control page overviews can be found in later sections.
There are optional temperature and pressure sensors that can be built into the beer/product manifold that will give you a live reading on the center control pane. Temperature in red, pressure in blue.		You can customize units displayed by tapping on the graph to reveal a larger graph pop up. See section B.2.2.2 for pop up overview
At the bottom of the center pane you'll see five control buttons for general machine settings and information. There are some settings, pop ups, and control boxes that are revealed when tapping on the respective buttons.		1. Errors/Faults Log Display 2. Pre-Rinse Manual ON/OFF 3. Input/Output Display 4. PLC/Machine Shut-down 5. Conveyor ON/OFF Details for button funcitons can be found in later sections.
The Pre-Rinse button also has a settings button to access pre-rinse algorithm settings. See section B.2.1.2 for details.		The conveyor button has a settings button access conveyor speed settings. See section B.2.1.6 for details.

Table 7 - HMI Center Pane Information

C.2.1 HMI Center Pane Bottom Buttons Breakdown

The center pane on the HMI has a few buttons that will generate pop ups or settings pages when pressed. This section will break those down to provide the information necessary to customize and optimize your experience.

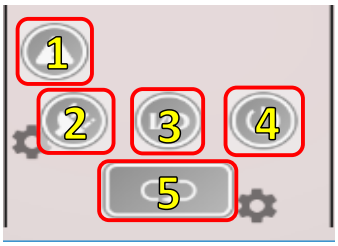
Function	Display
1. Errors/Faults Log Display 2. Pre-Rinse Manual ON/OFF & Settings 3. Input/Output Display 4. PLC/Machine Shut-down 5. Conveyor ON/OFF & Settings	

Table 8 - HMI Center Pane - Bottom Controls

C.2.1.1 1. Faults/Errors Display & Log

This button/area will display errors or faults based on the machine's sensors. A message will appear informing you of the type of error or fault on the main display and then you can get further details by opening the fault/error log by pressing on the button.

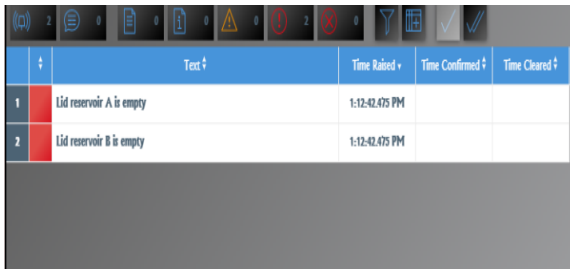
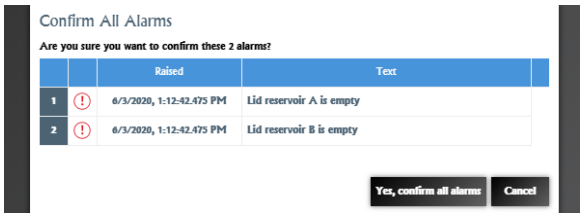
The warning button will display what faults are currently occurring and you can access the log by pressing the warning button.	
Once you press the warning button the error and fault log will appear on the screen with a list of the errors or faults and provide you with some actionable items to filter, clear, expand, or view more details. The top menu will give you options and quick filters. The screen will display and log the time of each fault or error as well as when you cleared or confirmed them.	
You can select a certain event and tap on the single check mark button to confirm and clear that event, or press the double check mark and get a full list of all events and confirm and clear all.	

Table 9 - HMI - Fault List

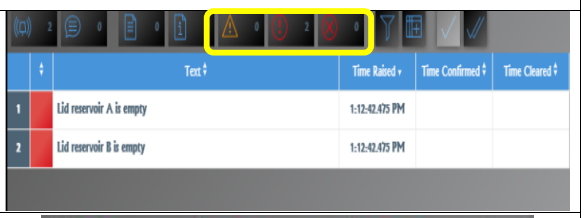
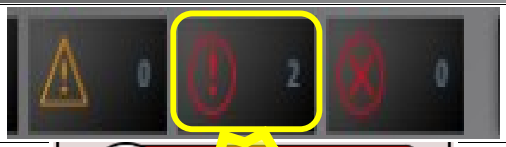
The Errors and Faults display will match the color related to whether it is a warning (yellow) or an error/fault (red) and describe in the banner what the issue is. Yellow warnings are just to let you know action will soon be required but is not going to stop the machine. Red errors or faults will put the machine into a pause or stop mode until they are resolved.	 
As mentioned above you can access more information from the Error/Fault Log by tapping on the warning triangle symbol. On the top of that screen, you will see many icons that allow you to filter or see what type of faults, and how many, are currently uncleared or active. The color of the banner on the center pain warning/error section will match the corresponding error type. Here, on the right, it shows zero warnings, two errors, and no faults.	 
You can also clear or reset whatever error or fault is showing in the warning bar by simply tapping or pressing on the colored banner. For example, if the error message says no lids you would place a new lid sleeve into the lid can, load it to the machine and tap on the no lids banner. This will put the lid drop back into auto and will automatically drop lids into the lid slides until the lid slide sensor tells the PLC the lid slide is full. This function will only work on errors or faults which are shown as a red banner, and not yellow banner warnings as warnings don't require immediate intervention and are more of a reminder to add lids.	 

Table 10 - HMI Fault Listing Cont'd

C.2.1.2 Pre-Rinse Settings

The ACS V6 gives you the option to control how long the pre-rinse stays on. To access these options, see the table below.

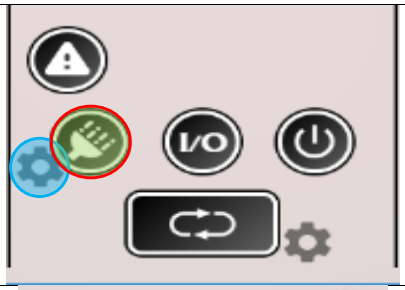
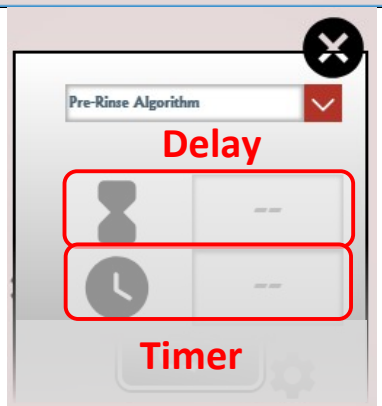
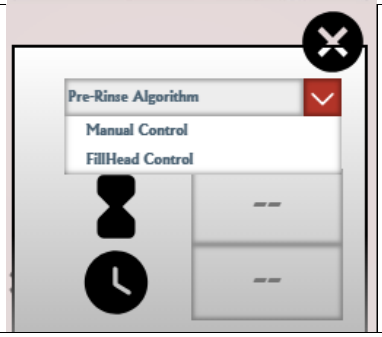
To turn on/off the pre-rinse function simply press or tap the shower head button. When on it will illuminate green. To access the settings menu which allows you to control how the rinser timers are tripped, press on the gear cog icon next to the shower head button.	
Inside the Settings menu you will find options to set delays and timers for the pre-rinse. The delay timer, represented by the hour glass symbol, will start as soon as the fill head is in the down position and picks up on the Fill Head Down sensor. The timer, represented by the clock symbol, will start as soon as the delay timer has finished its count.	
The pre-rinse algorithm will allow you to have the rinser start according to specific individual fill head down sensor, or conditions where the fill head must be down for the timer/delay to start. There is also a manual mode which will just have the rinser on at all times as long as the shower button is enabled. It should be noted that regardless of delay and timer settings, the pre-rinse will automatically shut off once the fills finish and the fill heads arrive at their up position in all modes except manual.	

Table 11 - HMI Pre-Rinse Settings

C.2.1.3 Input/Output Display

All of the ACS V6's inputs and outputs can be displayed on the HMI in a virtual PLC screen showing you what inputs and outputs are on or off, which air cards are firing, and also allowing you to calibrate the inline scales from each seamer section.

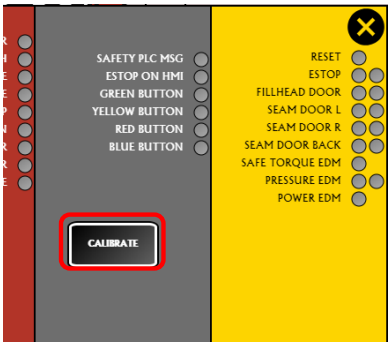
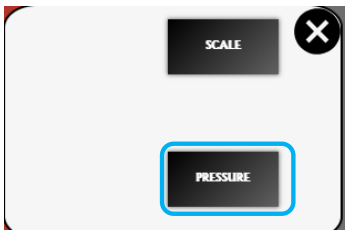
To access the Input/Output, or I/O page, tap on the “I/O” symbol on the center pane’s lower control section.	
After pressing the I/O button, you will see a screen that will display all of the inputs and outputs for the ACS V6. As each process is active it will illuminate next to the I/O name. This page is generally most helpful in troubleshooting scenarios. In the bottom section, the air cards for each side’s functions are displayed with a green light illuminating on which ever side of the card is activated. These will mimmic the lights on the physical air cards. One function that is available on this page is the calibrate function. You can find the Calibrate button in the top right-hand side of the screen.	
Calibration is something that should only be done when commissioning a new machine, or when replacing either the scale or the pressure sensors. When you press the Calibrate button you will get a warning pop-up to let you know that calibration is not an everyday occurance. To access the calibration pop-up press on the white arrow in the bottom right-hand corner of the warning pop-up. To return to the I/O screen press return.	
Scale calibration is described in the Install and Setup Guide provided with your machine. Please see that guide for instructions on how and when to calibrate your load cells/scales. The optional pressure sensor on the beer manifold can also be calibrated here, but should only be done during commissioning or after a new sensor has been placed. To calibrate the pressure sensor, remove any beer hoses on the inlet connection side and leave the manifold open to the atmospehre and bleed all liquid. This would force a 0 pressure scenario in the line and allow you to calibrate the pressure sensor by pressing the “Pressure” button on the calibration screen.	

Table 12 - Input/Output Pop-Up

C.2.1.4 PLC & Machine Shutdown

The ACS V6 has a complex power and controls system that requires you to put the machine into a proper shutdown procedure before shutting off main power switches. Shutting off the main power switch before using this shut-off button on the HMI could lead to corrupted controls and issues inside the HMI's computer. It's important to shut down the PLC using this button and wait for the HMI to say it is ok to shut down the power before switching the main disconnect to the off position.

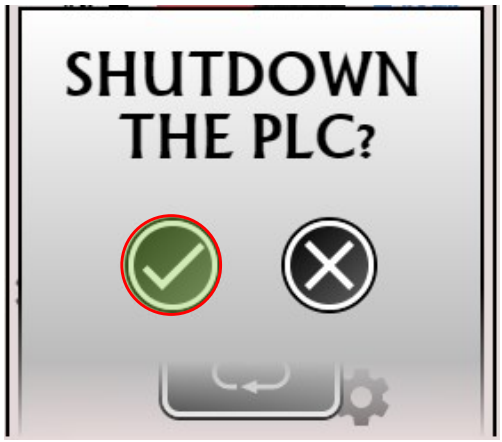


Figure 12 - PLC & Machine Shutdown

To show the shutdown pop-up press on the power button on the right-hand side of the lower controls section of the center pane.

When the pop-up appears, press the check mark to cause the machine to enter its shutdown procedure.

When the shutdown procedure is complete you will get a message on the screen letting you know it is safe to shut down the machine's main power.

Once that message appears, turn the main disconnect to the off position and your machine will be safely shut down.

C.2.1.5 Conveyor Control

The Conveyor control button is an on/off toggle button that also has a settings button associated with it. This settings section can allow the user to change the frequency of the conveyor motor VFD on the HMI screen as well as configure what the physical red button on the HMI body controls.

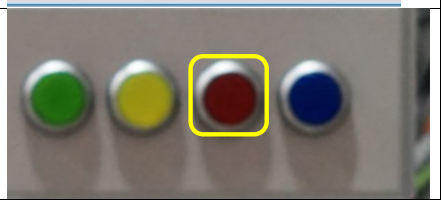
The conveyor button on the lower control section of the center pane will toggle the conveyor belt on or off. It will illuminate green when it is activated and black when it is off. There is also a settings button which is represented by a gear symbol on the right-hand side of the this button. - Conveyor Control	
After pressing the settings button, a pop-up will appear on the screen allowing you to edit the frequency, or speed, of the conveyor. Just tap on the dialog box next to Conveyor Hz and you'll be able to enter a value up to 60hz, which is the fastest, and default setting. See section C.1.1 for conveyor and VFD information. To configure the physical red button on the HMI frame all you have to do is tap on the stop seamers or stop fillers buttons. You can have the red button control just the seamer, just the filler, or both.	 

Table 13 - Conveyor Control

C.2.2 Other HMI Center Pane Controls

There are two other important pieces of information the center pane displays and allows you to interact with. An outline of those functions and their settings can be found below.

C.2.2.1 Can Count and Speed Display

The HMI center pane has a can speedometer (black circle) in the center of its display which will show the total cans per minute speed. Above the can speedometer there is also a total can count which, when tapped, will display information about different can count categories.

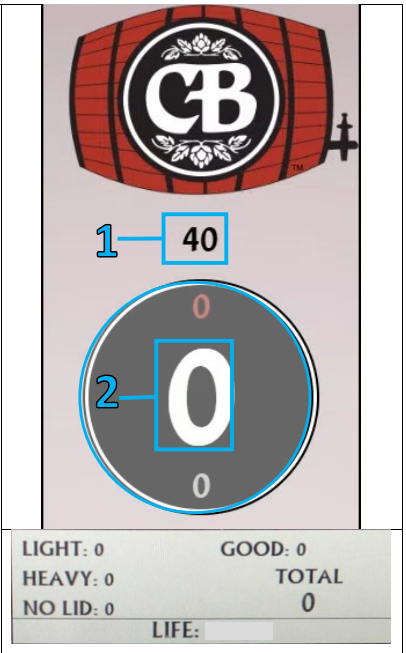
There are four numbers displayed on the can count and speed section of the center pane: 1. Total Can Count 2. Can Speed (Cans per minute) If you tap on the Can Count you will reveal a pop-up dialog box giving you information on how many cans were light, heavy, no lid, good, and total can count. There is also a lifetime can count in this dialogue box as well which acts as a can odometer. The heavy and light categories for the filler will be determined by the can weight ranges you select on the run page. You can find how to set these settings in Section B.4.1 You can also reset the total count by tapping anywhere inside the grey area for that section.	

Table 14 - Can Count and Speed Display

C.2.2.2 Temperature and Pressure Settings

The ACS V6 has an optional temperature and pressure sensor on the beer manifold for monitoring the temperature and pressure in the infeed lines. This data is displayed on an inlaid graph in the center of the center pane and can be configured by accessing a pop-up settings window by tapping on the center pane graph area.

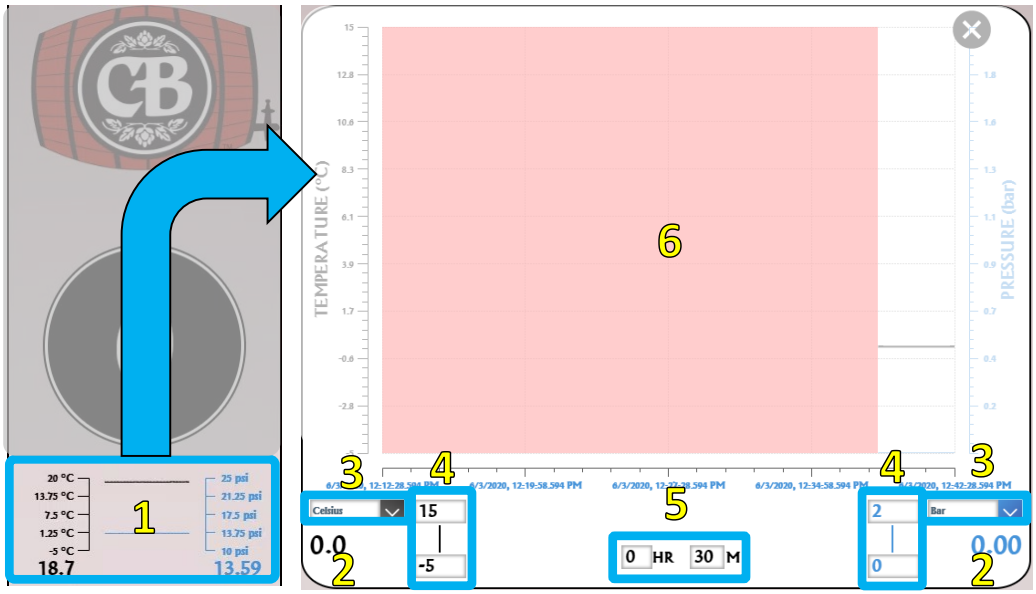


Figure 13 - Temperature & Pressure Settings

Button	Function
1. Center Pane Live Feed Graph	Displays live readouts of temperature and pressure in the beer lines
2. Current Temperature and Pressure	Current temperature and pressure in beer lines
3. Unit Selection	Allows you to select which units to display temperature and pressure
4. Temperature and Pressure Axes Range	Top and bottom of the ranges for respective axes
5. Time Axis Display Timeframe	Total timeframe shown on the graph
6. Graph Display	Temperature and Pressure Graph

Table 15 - Temperature and Pressure Display Functions

C.3 HMI – Timers and Graphs Page

The Timers and Graphs page has two main functions; to display fill weights for each can/fill head, and to allow adjustment to the foam and top up timers. These functions go hand in hand because the foam and top up timers can be used to mitigate fill volume or weight variance.

Cask fill technology is a two-stage process where we first put a layer of foam in the bottom of the can, then fill with beer underneath the foam cap. Doing it this way allows two things; 1. fill under the foam cap providing an extra layer between atmospheric oxygen and the beer, and 2. since foam is created first, it is unnecessary to agitate the beer during filling to create a good cap-on-foam scenario. Fill volumes and weights are more difficult to manage the more volatile your fill process is. By adding the foam cap first, we can use smooth laminar flow through our fill tubes and get more consistent fill weights/volumes and save the end user from excess waste from over or under fills.

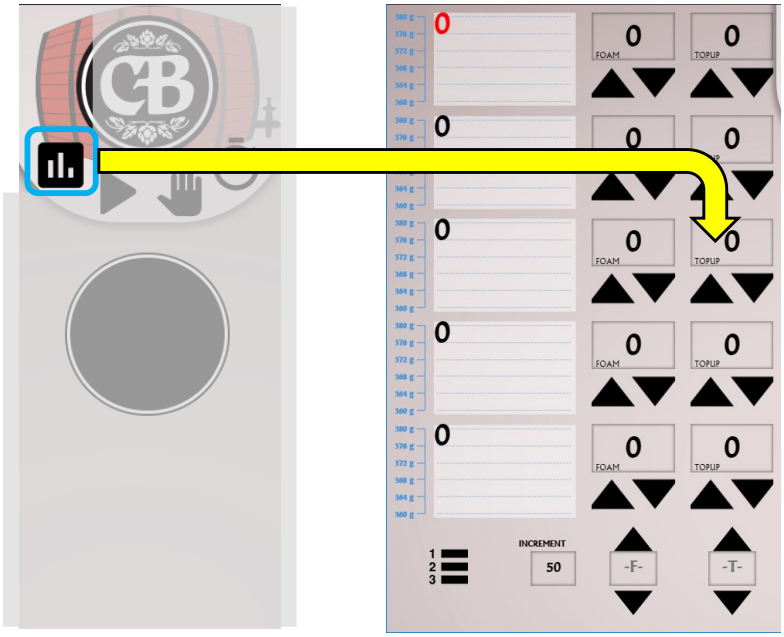


Figure 14 - Timers and Graphs Outline

To access the Timers & Graphs page tap, drag, and drop the Bar Graph Symbol onto the side pane on the HMI.

Once the Timers & Graphs page is loaded you can manage your top up and foam timers for each fill head as well as monitor their fill weights over time. It's important to note that the values enter here are in milliseconds. A value of 150 would mean 0.150 seconds. An explanation of how to work with these functions is found on the next page.

Commented [LM3]: Add an example of what 150 would represent as in 150ms and not 1.5 seconds like the Festo machines. One flex customer was confused by this as they moved away from a V5 to the flex.

C.3.1 Weights, Foam & Top Up Timers, and Settings

Each row on the timers and graphs page represents a fill head on the ACS V6. The top row is for fill head #1 which is the fill head closest to the seamer, fill head #2 is below that, following all the way to the last row which is for fill head #5 as labeled in blue in this table.

There are three sections on the timers and graphs page which are as follows:

A) <u>Fill Weight Graphs:</u>
The fill weight graphs will display a history of the weights of the cans coming from that fill head. The last can weighed for any fill head will show in the top left corner of the graph in black. The can that is currently being weighed will display with a red number.

B) <u>Foam Timer Settings:</u>
Foam timer settings will allow you to adjust the number of milliseconds that a particular fill head will open the foam valves for prior to filling. Foam timers are used to create the cap-on-foam scenario used to reduce DO pickup.

C) <u>Top Up Timer Settings:</u>
Top up timer settings will allow you to adjust the number of milliseconds that a particular fill head will open the top up function for once the fill level probes detect liquid. Top up timers are used to replace the volume the fill tubes take up in the liquid when the fill head is in the down position.

Pressing the settings button (gear symbol) will open the increment and recipe pop-up which allows you to adjust **ALL** timers ("F" for foam, "T" for top up), the increment value increase or decrease (in ms), and access the recipe/settings storage and selection page outlined in section B.3.3.

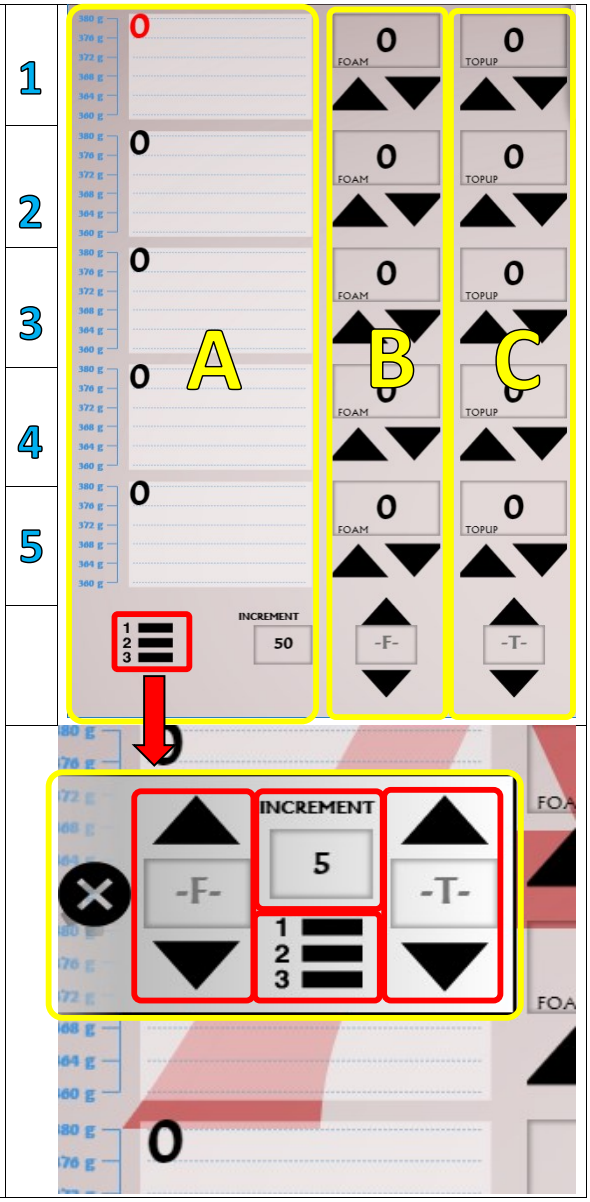
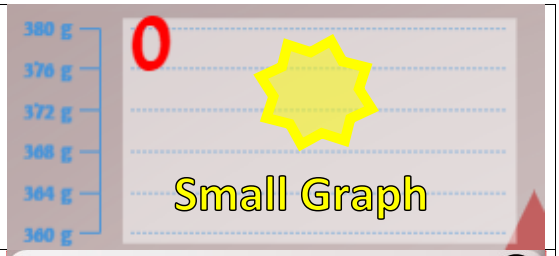


Table 16 - Weights, Foam, & Top Up Timers and Settings

C.3.2 Graphs Settings

There are two graphs for each fill head that will represent the weight trends for the cans filled at that particular fill head. The one on the Timers & Graphs main page is called the “Small” graph and inside the graph settings pop-up you will find the “Detailed” graph.

To access the graph settings pop-up, tap on the small graph for the fill head you’d like the data for.



Once you access the graph settings pop up you will have some options on how to display the graphs. These options include how large a sample will be displayed in each of the detailed and small graphs, the range of weights displayed, options to clear the data .

1. To clear position specific graph data, as well as the sample and population mean and standard deviation, tap on the appropriate button under “Clear”.
2. To change the range of weights displayed, tap on the number under the range.
3. The number of samples for the detailed or small graphs is how many cans worth of weights will display as data points on that graph. These are a rolling tally and once the total samples reach 10 000 (the memory limit, or “Buffer”) the PLC will start to override the previous samples.
4. An average, or mean, weight for that fill head will be displayed either in a rolling sample of 100 cans, or the entire population. Standard deviation will also be displayed in the same way.
5. The small graph on the right will show how your can weights are distributed across the entire sample.

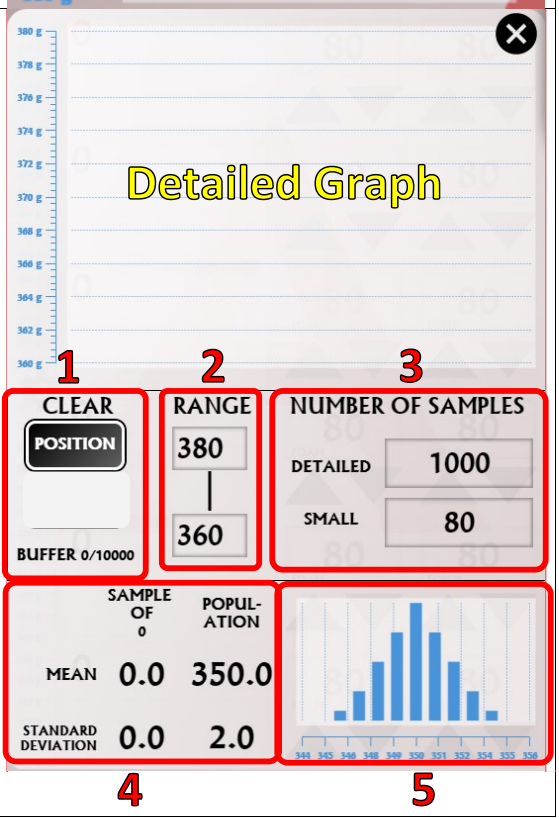


Table 17 - Graphs Settings

Commented [LM4]: The EIC should not have a clear Side button this is from the Flex2

C.3.3 Timer Settings and Storage

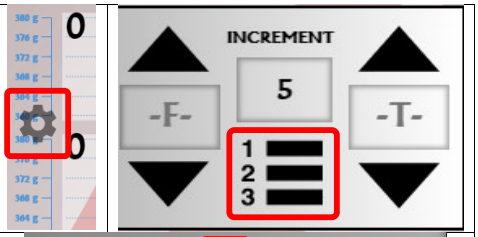
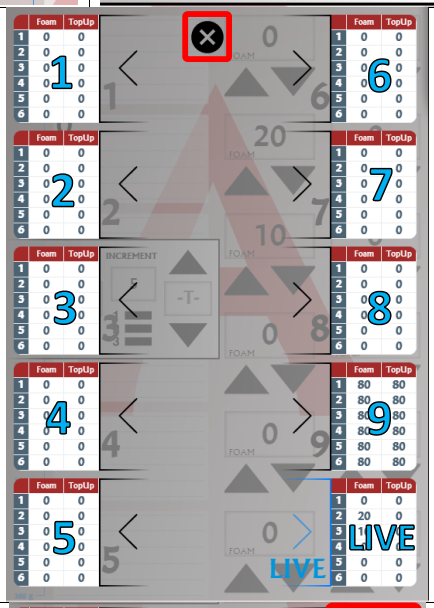
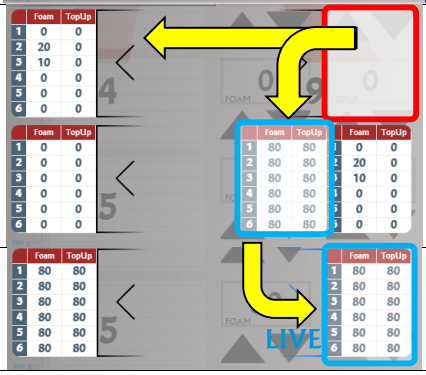
You can save your foam and top up timer settings on the settings storage page. To access settings and storage for the foam and top up timers, tap on the gear symbol to open the settings pop-up. Once the pop-up appears, tap on the “1,2,3” icon to display the settings storage page.	
The foam and top up settings you set on the Timers & Graphs main page will be shown in the bottom right corner and highlighted with a “LIVE” blue marker. You can store up to nine different timer settings on the settings storage page. This can help facilitate different carbonation and foaming settings of various beer or product styles. To exit this screen and return to the Timers & Graphs page, tap on the “X” at the top-center of the screen.	
You can copy any pre-set to another slot by tapping, holding, and dragging it to the black arrow next to the desired save-slot. To save the current settings in your “Live” settings, tap, drag, and drop the “Live” settings box to the desired save slot. To change the live settings to one of the 9 pre-sets you have saved, tap, drag, and drop it next to the “Live” pre-set and those timer settings will be immediately applied to the fill valves.	

Table 18 - Timers Settings

C.4 HMI – Run Page

The HMI's Run Page is where you will find the controls related to running the filler and seamer areas of the ACS V6. You can start and stop the seamer as well as start, stop, or pause the filler. You can toggle the foam and top up timers and CIP mode. You can also access settings for CIP, CO2 Can Purge, Fill Head Drop Delay, as well as an early table drop and post-fill dry/rinse settings. The following tables will provide instructions on how to access and manage these functions.

To access the Run Page tap, drag, and drop the play button icon from the center pane to either the left or right-side panes of the HMI.

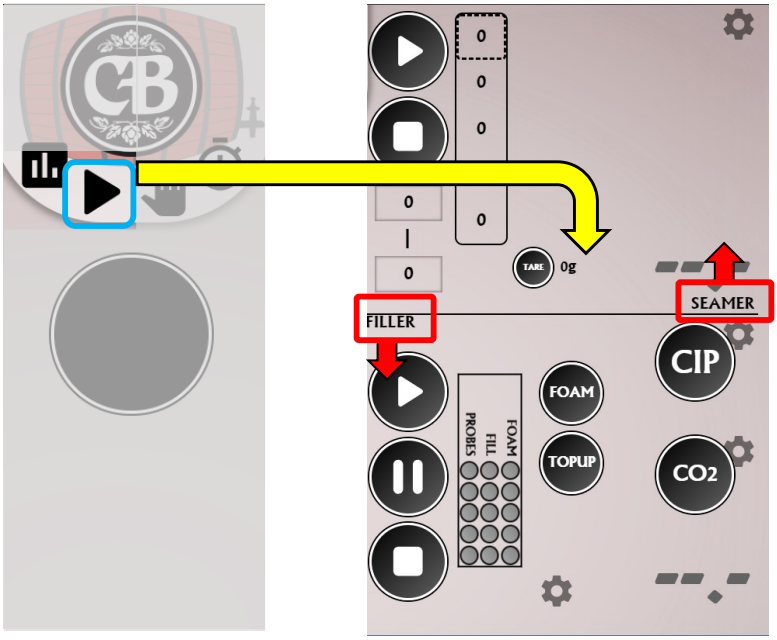


Figure 15 - HMI - Run Page

The top half of the Run Page is dedicated to seamer and post-fill operations and the bottom half is dedicated to the filler side of things. It's important to know that whatever settings for top up and foam you set in the Timers & Graphs page will only take effect if the Foam and/or Top Up buttons are activated on this screen. Both the seamer and filler areas will show the CPM (cans per minute) speed of the respective areas as well.

On the seamer (top) side of the Run Page you can set the reject weight parameters which will tell the seamer to reject cans that are outside of those numbers, as well as see a running weight for each fill head and the current weight on the scale.

On the filler (bottom) side of the Run Page you will also see indicator lights for the fill level probes, the foam coils, and the fill coils.

C.4.1 Seamer Settings & Controls

The top portion of the Run Page is dedicated to seamer controls and settings. At the start of any run, or after a carousel/seamer jam, make sure to tap on the upper most value in box #3 outlined below to tell the PLC can #1 is next for the load cell to read. You can also choose which cans to reject or not by tapping on the **light, heavy, no lid,** buttons in box #9.

To access the settings for early drop %, dry and rinse times tap on the gear symbol.

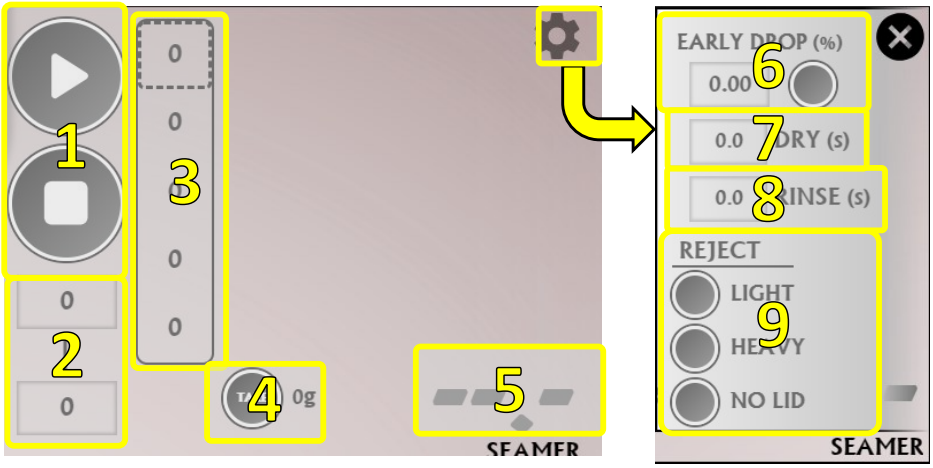


Figure 16 - Seamer Settings and Controls

Button(s)	Functions
1. Seamer Start & Stop	Play button starts seamer, stop button stops it.
2. Reject Weight Tolerances	The top input is acceptable high weight limit, bottom is acceptable low weight limit. Any cans that weigh outside these values will be rejected.
3. Current Fill Weights by Fill Valve	The dashed square will highlight the current can being weighed. The eights of each fill valve's cans will display here until the next can from that fill head is weighed.
4. Tare and Current Can Weight	The Tare button tares the scale to 0g – please only press with no can on the scale. The read out next to the tare button will be the weight of whatever is currently on the scale and is a live reading.
5. Seamer Speed (CPM)	Seamer speed as a representation of how many cans per minute are being seamed.
6. Early Table Drop %	Allows you to program the seaming lift table to start to drop after a certain percentage of the seaming process is complete.
7. Post-Fill Dryer Time	Allows you to set how long the dryer stays on after the proximity sensor sense a can.
8. Post-Fill Rinse Time	Allows you to set how long the post-fill rinse nozzles will stay on after a can exits the carousel.
9. Reject Control	Allows you to toggle rejects for light, heavy, or no lid cans.

Table 19 - Seamer Settings Page Functions

C.4.2 Filler Settings & Controls

The lower or bottom portion of the Run Page has all the controls and settings for the filler or fill head area of the ACS V6. There are three separate settings pop-ups for this page which will be broken down in their own sub-section. Those three pop-ups are for the Fill Head Drop Delay, Can CO2 Purge, and CIP Timers.

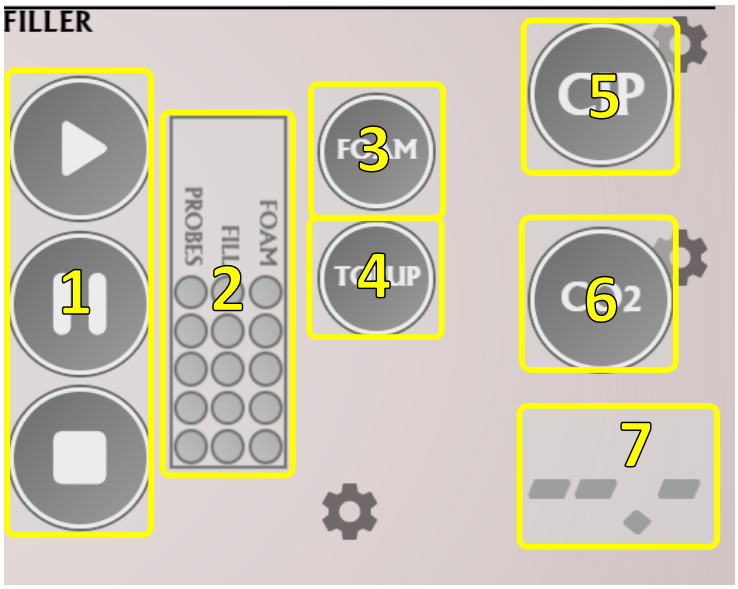


Figure 17 - Filler Settings & Controls

Button(s)	Functions
1. Filler Start, Pause & Stop	Play button starts Filler, pause button will finish the current can cycle and then stop, stop button stops it immediately.
2. Probe & Valve Indicators	Indicates what probes and valves are currently activated/open.
3. Foam Timer Toggle	Toggles foam timers on/off.
4. Top Up Timer Toggle	Toggles Top Up timers on/off.
5. CIP Mode	Places ACS V6 in CIP mode and begins the CIP process.
6. Pre-Fill CO2 Purge Toggle	Turns on the CO2 solenoids for the pre-fill can purge.
7. Seamer Speed (CPM)	Filler speed as a representation of how many cans per minute are being filled.

Table 20 - Filler Settings Functions

The settings pop-ups for the filler portion of the run page will be described in the sections that follow.

C.4.2.1 Filler Settings Pop-Ups

There are three settings pop-ups that you can access on the filler section of the run page.

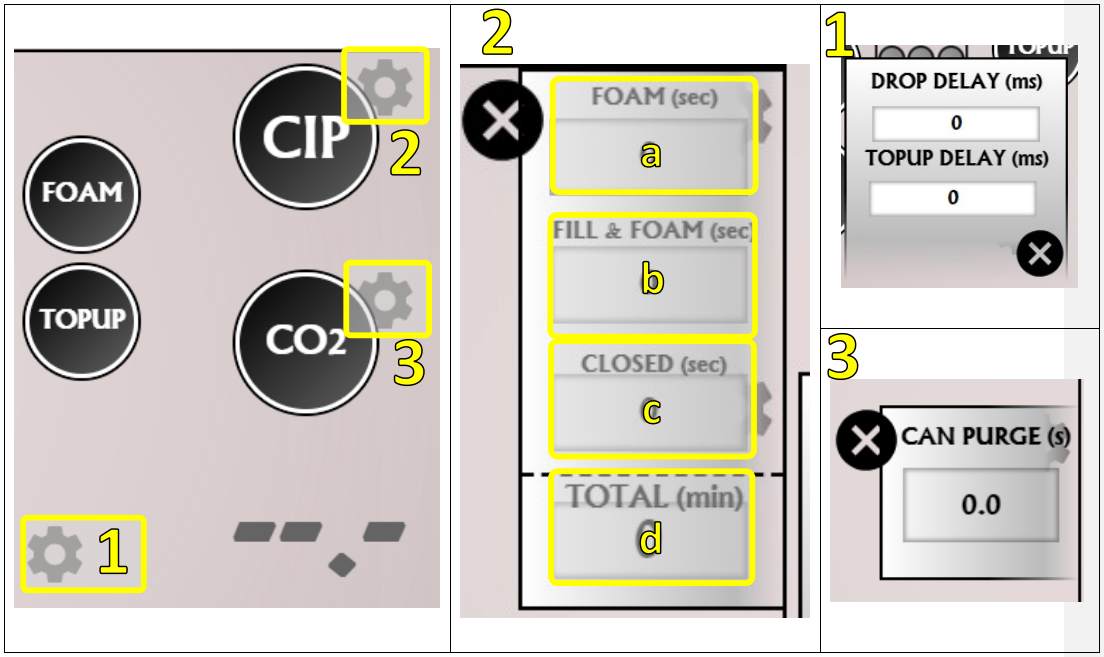


Figure 18 - Filler Settings

Button(s)	Functions
1. Fill Head Drop Settings	A) Allows you to set a delay from when the can-count-in sensor counts the 5th can in to when the fill head drops. This is useful for 19.2oz cans, or can be used to slow the fill process down by a few seconds per cycle if you wish. B) Top Up Delay – Will delay the top up function to avoid overflow in high flow set-ups.
2. CIP Settings	The CIP process cycles through 3 steps continuously until its total timer is done. a) Timer to open foam valves ONLY b) Timer to open BOTH foam and fill valves c) Timer to keep valves closed to allow for chemical contact time d) Total CIP run time
3. Can Pre-Purge Settings	Sets the number of seconds the CO2 pre-purge runs for.

Table 21 - Filler Settings Pop-Ups Functions

Configuring the CO2 pre-purge timer is important when changing can sizes as fill times will be longer for bigger volume cans. You can see how long the fill process is taking on the profile page which is outlined in section B.5.

C.5 Profile Page

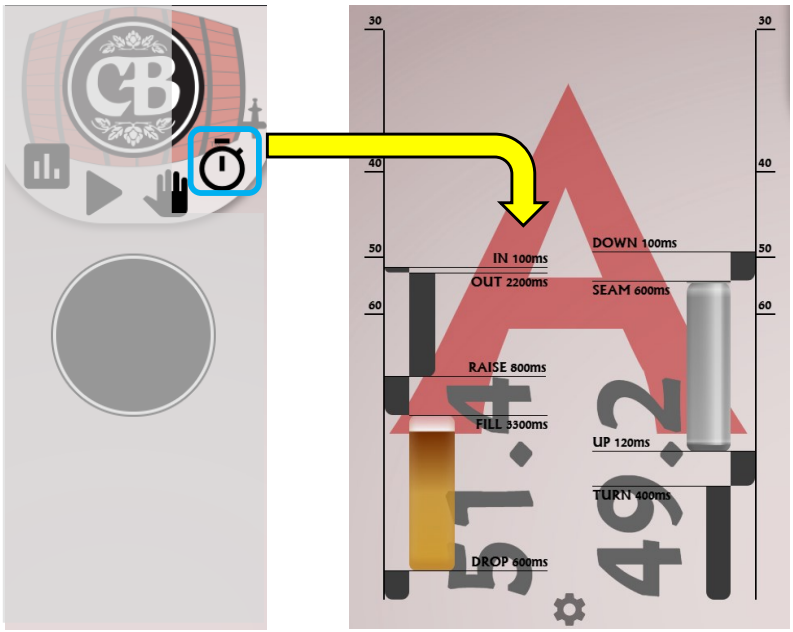


Figure 19 - Profile Page

The profile page will tell you how long each of the fill and seaming process take. On the left side of the page will be the filler portion which will tell you how fast the fill head drops, fills, raises, and then lets cans out and into the fill head area. It will also show the speed of that portion of the process for both the fill and seaming side. The seamer side is on the right and will show you how long each of the seaming processes take.

The graphic on the lower left-hand side will show the fill process as it is filling and can also be configured to show either a beer and foam type graphic, or a blue water graphic if you're not running beer. To access the graphic changes, tap on the gear symbol in the lower center of the page and select your display color/style.

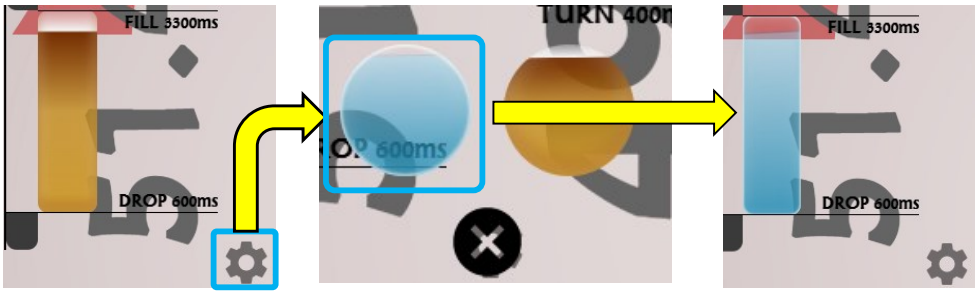


Figure 20 - Product Profile View Changes

C.6 Manual Controls Page

On the manual page you will find all the controls necessary to run the machine manually. The majority of the controls on this page will be used for set-up and testing purposes, but some will be necessary for homing the stepper motors too.

To access this page tap, drag, and drop the hand icon from the center pane onto either the left or right panes on the HMI.

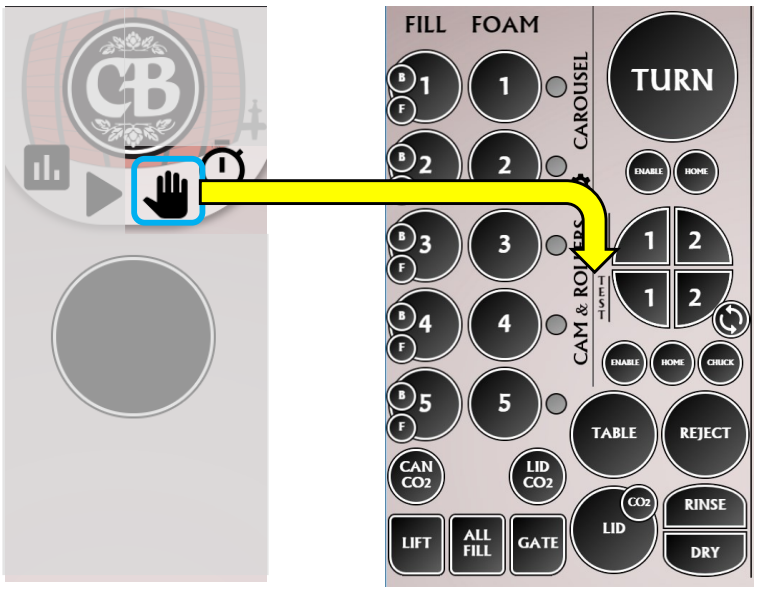


Figure 21 - Manual Controls Page

Unlike the other pages, the Manual Page has very few settings to play with and operates mainly as a toggle button page to toggle the various outputs of the machine's automation. The one settings page is used for homing the carousel and setting its rotational speeds and acceleration. The following subsections will break down the various sections and controls this page can offer.

When any toggle switch is in its non-normal state, the button will illuminate green. If you press and hold on a toggle switch for an air actuated function it will turn yellow signifying that control is in "Cycle" mode and will cause that pneumatic output to extend and retract until pressed again. Also, when the carousel and cam stepper motors are enabled, the enable buttons will illuminate green.

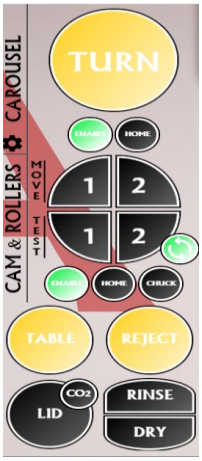


Figure 22 - Manual Controls Page Button Conditions

C.6.1 Fill & Foam Coil Toggles

You can toggle any individual coil by pressing on the associated coil number under the fill and foam headings on the Manual Page.

For operating the fill and foam valves in manual mode there are two main groups of buttons and one display group to operate/view:

A) Fill

This section will allow you to manually toggle an individual fill valve by pressing and holding on the number of the valve you'd like to test. This button will open both fill tubes at once. Since cask fill heads all have two fill tubes, its important to note that the filling capabilities are available on both tubes – the tube associated with the double coil, or PX2 valve has fill and foam capabilities and the single coil side, or PX1 valve, has only fill capabilities.

There are "B" and "F" buttons on each of these toggles and their function will be explained in further detail below. These buttons will also be used to perform a "Coil" test which will be explained later in this manual in section C.2.4.4

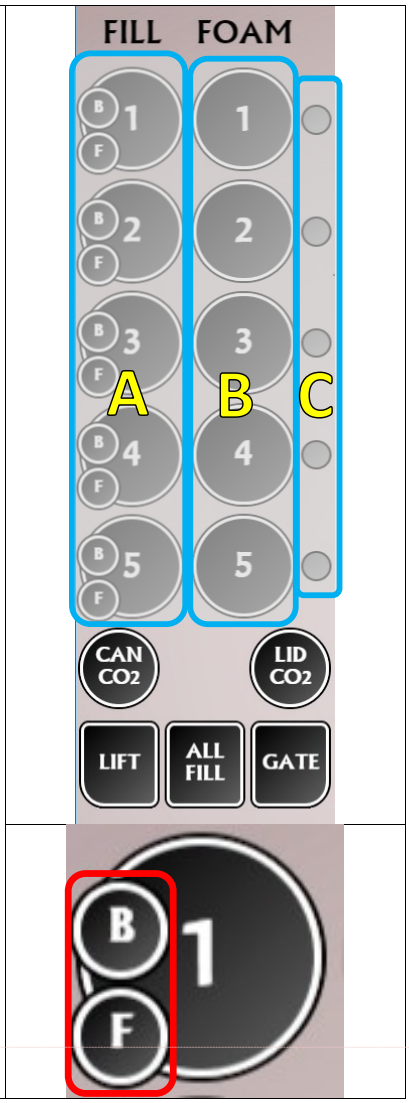
B) Foam

This section will allow you to toggle individual foam valves to test the foam valve and shuttle functionality. Since cask fill heads all have two fill tubes, its important to note that the foaming capabilities are only available on one of the two tubes – the tube associated with the double coil, or PX2 valve. These buttons will also be used to perform a "Coil" test which will be explained later in this manual in section C.2.4.4

C) Probes

This section will illuminate green when the fill probes are tripped, or in other words in contact with liquid, or bridged mechanically. In a scenario where empty cans are under the probes and they are showing as activated please ensure nothing is making contact with the probes. Any conductive material that touches both the fill tubes or machine framework and the probes at the same time will illuminate these lights.

The "B" and "F" buttons on the fill side represent front and back. This refers to operation/opening of the individual fill tubes. Pressing the large fill number button will open both tubes, "B" will open just the tube in the back, and "F" will open just the tube on the front, or operator side of the fill head.



Commented [LM5]: The front of what? Reference fill head

Table 22 - Foam/Fill Coil Buttons

C.6.2 Fill Head Controls

The fill head controls can also be found on the manual page and allow you to lower or raise the fill head, test or toggle the CO2 pre-purge and under lid purge, perform an “All Fill” command, and open or close the filler gate.

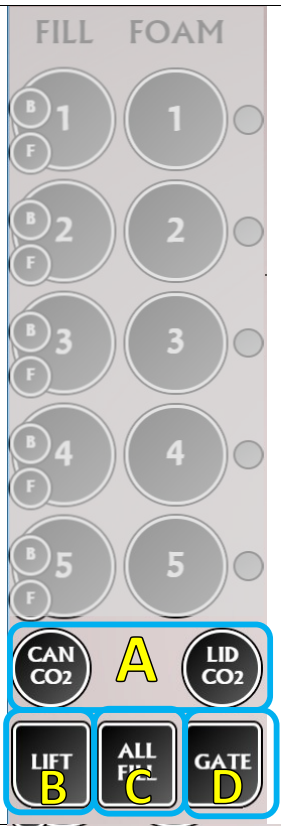
There are five buttons on the manual page that allow you to control various fill head functions. They are as follows:

A) **CO2 Can/Lid Purge**
These buttons will open the CO2 supply to the five CO2 Pre-Purge tubes that purge the cans before filling as well as the under-lid gassing on the lid slide. This should be used prior to any canning run to ensure there is sufficient CO2 flow for purging.

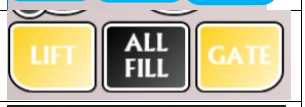
B) **Fill Head Lift**
This button will allow you to raise or lower the fill head. Common reasons for using this button are as a pre-cursor to purging/bleeding the product lines before a run or after a stop in production, or to adjust the fill level probes using a “probe height relative-to-can” approach. You can also tap and hold on this button to place it in “Cycle” mode which will perpetually raise and lower the fill head allowing you to adjust the air cylinder flow controls to increase or decrease rise and drop speed.

C) **All Fill**
The All Fill feature allows you to open all fill valves at once. This is generally used to ensure flow is possible on all valves, and more commonly used to purge or bleed the product lines prior to running or after a lengthy stop. This button is latching which means once you tap it, the valves will all remain open until you press it again.

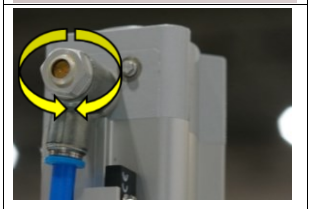
D) **Gate**
This button will allow you to open and close the filler gate manually. This button is latching which means once pressed, the gate will remain open until you press it again.



The Lift and Gate buttons/functions, since operated pneumatically by an air cylinder, can be put in “Cycle” mode (highlighted yellow buttons) which allows you to extend and retract the cylinder perpetually to make speed adjustments.



To adjust the speed of extension or retraction of any air cylinder, including the gate and fill head lift/drop cylinders, locate the flow control valves on the appropriate air cylinder and tighten or loosen the brass screw. Tightening will restrict air flow thus slowing down the actuation, and loosening will open up the air flow and increase the speed of the actuation.



The flow controls will manage retraction or extension based on their location. Furthest from the cylinder arm will be retraction, and closest will be extension.

Table 23 - Fill Head Controls

C.6.3 Table, Reject, Lid, and Rinse/Dry

In the bottom right-hand corner of the manual page you will find five buttons for controlling the can lift table, the reject gate, dropping lids, and activating the dryer and rinse solenoids. You can also toggle the under-lid gassing CO2 solenoid on this section to test for flow.

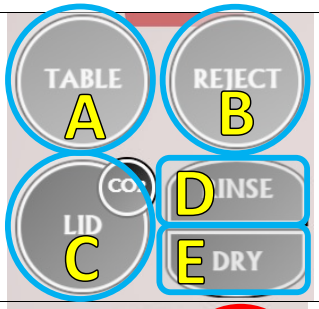
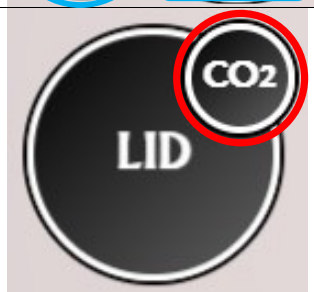
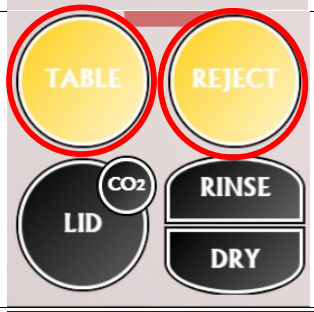
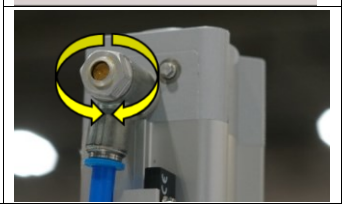
There are five buttons on the lower right portion of the manual page that will allow you to control the following: A) Table – Allows you to lift and lower the can lift table B) Reject – Opens and closes the reject gate C) Lid – Drops a lid into the lid chute/slide D) Rinse - Turns the post-fill rinse function on/off E) Dry – Turns the post-fill dryer on/off	
Above the Lid button there is a CO2 button. This button will actuate the under-lid gassing CO2 solenoid allowing you to test for flow through the under-lid gassing outlet inside the lid slide.	
The Table and Reject buttons actuate pneumatically controlled associated air cylinders. These air cylinders can be placed into “Cycle” mode by tapping and holding them until they turn yellow. This will extend and retract the cylinders perpetually until the buttons are pressed again. This function is used to adjust the speed of the flow controls. To adjust the speed of extension or retraction of any air cylinder, including the gate and fill head lift/drop cylinders, locate the flow control valves on the appropriate air cylinder and tighten or loosen the brass screw. Tightening will restrict air flow thus slowing down the actuation, and loosening will open up the air flow and increase the speed of the actuation. The flow controls will manage retraction or extension based on their location. Furthest from the cylinder arm will be retraction, and closest will be extension.	 

Table 24 - Table, Reject, Lid, Rinse/Dry Controls

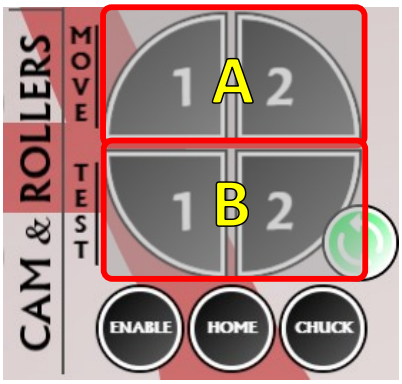
C.6.4 Cam & Rollers Controls

In the right-middle portion of the manual page you will find a section labeled Cam & Rollers. This section will be used in seamer set-up and testing, to home the cam stepper motor, and to turn the chuck motor on and off.

There are two controls for each seaming die (die 1 & die 2) found in the Cam & Rollers section:

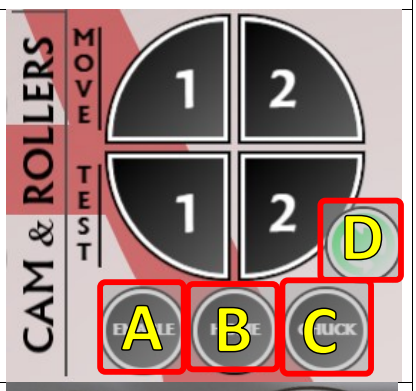
A) **Move** - Allows you to move either Die 1 or Die 2 to the engaged position where it will rest during seaming to form the seam. This area is used for seamer set-up for lateral and vertical adjustments. These adjustments and set-up instructions are found in the "ACS V6 Install and Setup Guide" and will be further gone over with your Cask Install Technician during training.

B) **Test** – Allows you to test, or simulate a seaming operation for either die. NOTE: if a test was done for Die 1, do not place this partially seamed can back into the seamer area to perform a test on Die 2. Please use a new can for any and all seam tests each time you perform one.



Below the Move and Test buttons you'll fine three more buttons which will allow you to control the seamer cam stepper and chuck motors.

A) **Enable** – This will enable the cam stepper motor. The steppers will be disabled after an e-stop, opening a door, or on start up of the machine. Ensure this button is pressed and is green before starting your run.
B) **Home –** This will set the current position of the cam as its home, or reference position. Further explanation of how to home both the cam and carousel steppers will be found below.
C) **Chuck –** This will turn the chuck, or seamer motor, to the on position.
D) **Full Seam Test –** This button allows you to place a can in the first carousel pocket and do a full test die 2 procedure. It will carousel the can into the seamer, perform both 1st and 2nd operation seams, and then discharge the can.



The correct position for homing the seaming cam is shown on the left. There is a slight groove in the cam (labeled "Y") where the die 1 cam follower (labeled "X") should rest when aligned in the correct home position.

You can rotate the cam by hand until the follower for die 1 rests in the slight groove then press the "Home" button to set that position.

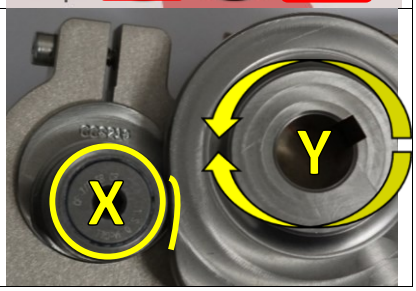


Table 25 - Cam & Rollers Controls

C.6.5 Carousel Controls

The top right corner of the manual page is home to the carousel controls. These will control turning, homing, and enabling the carousel. You will find descriptions and instructions on how to operate and control these functions below.

To turn the carousel, you first need to enable it, and before running you'll need to ensure the carousel has been homed. The three buttons to allow this are as follows:

- **A) Turn –** Once homed and enabled, this button will rotate the carousel one pocket/position each time you press it.
- **B) Enable –** This will enable the carousel stepper motor. The steppers will be disabled after an e-stop, opening a door, or on start up of the machine. Ensure this button is pressed and is green before starting your run.
- **C) Home –** This button will rotate the carousel until the homing sensor sees the homing slot in the carousel shaft in image number 2 on the right.
- **D) Homing Slot & Sensor –** There is a fibre-optic sensor attached to each carousel housing that will detect when the homing slot is in a certain position. This is the official home position and will align here when pressing "home"
- **E) Position "Apply to Offset" –** The home position set by the homing sensor and slot may not necessarily line up with the correct carousel position to center the cans on the seaming chuck/lift table. This button applies the correct rotational offset to align the chuck/lift table with the carousel pockets.
- **F) Home Offset –** This area will display the position of the applied offset from the "Apply to Offset" button in number of partial rotations from the "home" position. You can also enter this number manually if you wish by tapping on it and inputting the offset you'd like.
- **G) Max Speed** - This is the maximum rotational speed of the carousel measure in RPMs.
- **H) Max Acceleration –** This is how fast the carousel will accelerate once set in motion.
- **I) Max Jerk –** This is how abruptly the carousel will stop and start when it is instructed to turn. The lower the number, the smoother the spin.

NOTE: See the following section for homing instructions.

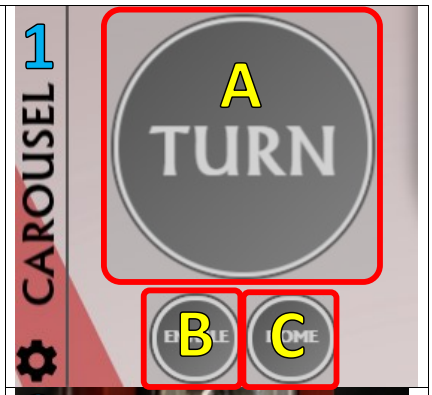
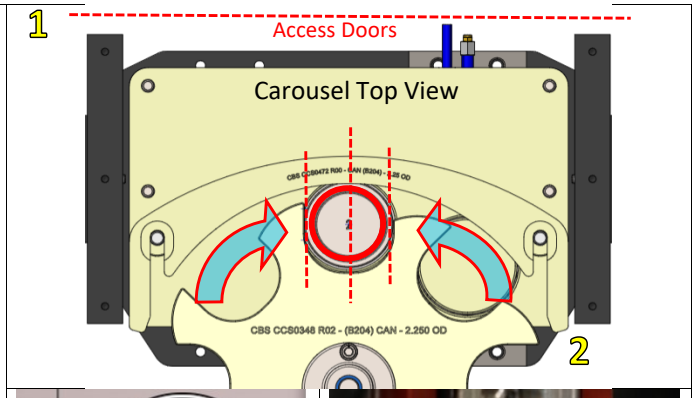


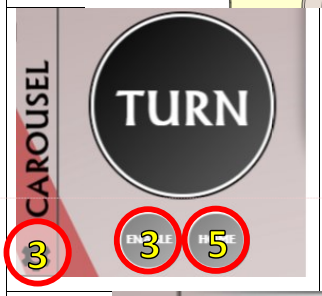
Table 26 - Carousel Controls

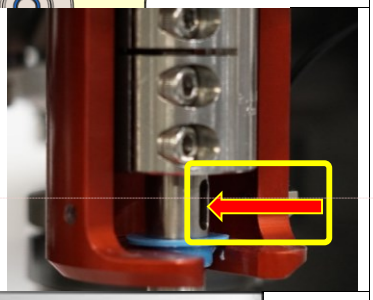
C.6.5.1 Carousel Homing Procedure

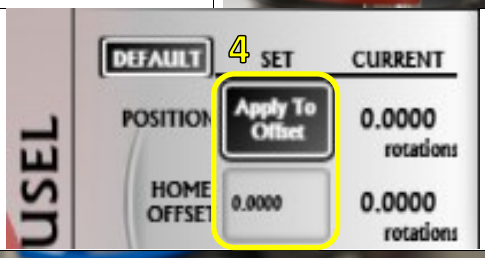
1. With the doors open to the seamer area and place a can in the carousel, rotate the carousel by hand so a pocket is centered over the can lift table.
2. Once the Carousel is centered around the can lift table, close the doors and go to the HMI.
3. Press enable and then Open the settings page by pressing on the gear symbol.
4. Press “apply to offset” to set the position into memory.
5. Press the “Home” button to get the carousel to rotate until it finds the homing sensor and slot then back to the applied new offset position. Ensure that no liquid is present in front of the sensor or homing will be incorrect.
6. The carousel is now homed.

You may also enter the home offset position manually. It may be beneficial to do the automatic “Apply to Offset” procedure and record the number. In the future you can simply enter that value manually and press home.









The fiber-optic sensor for homing has a controller that is found in a grey junction box attached to the frame of the ACS V6. This controller is factory set to the correct parameters and will be good to go when your machine arrives.

If you find the carousel will not home, or continues to spin, the controller is likely in need of adjustment. Please contact Support@cask.com for help.

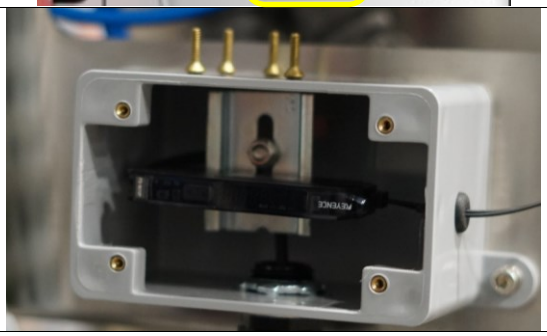


Table 27 - Carousel Homing Procedure

Commented [LM6]: Reference somewhere that the shaft must be removed of all water/beer. It’s been an issue at Dandy where they didn’t, and the water would change the homing location.

Section D. Fill Process Flow

Now that you've gone through the operation of the HMI and have a deeper understanding of how to operate the controls of the ACS V6 it's a good idea to understand just how all of those controls apply to the normal Fill Process Flow. Below you will find a flow diagram to explain the order of operations to can your product on the ACS V6.

The processes shown here will be outlined further in this section.

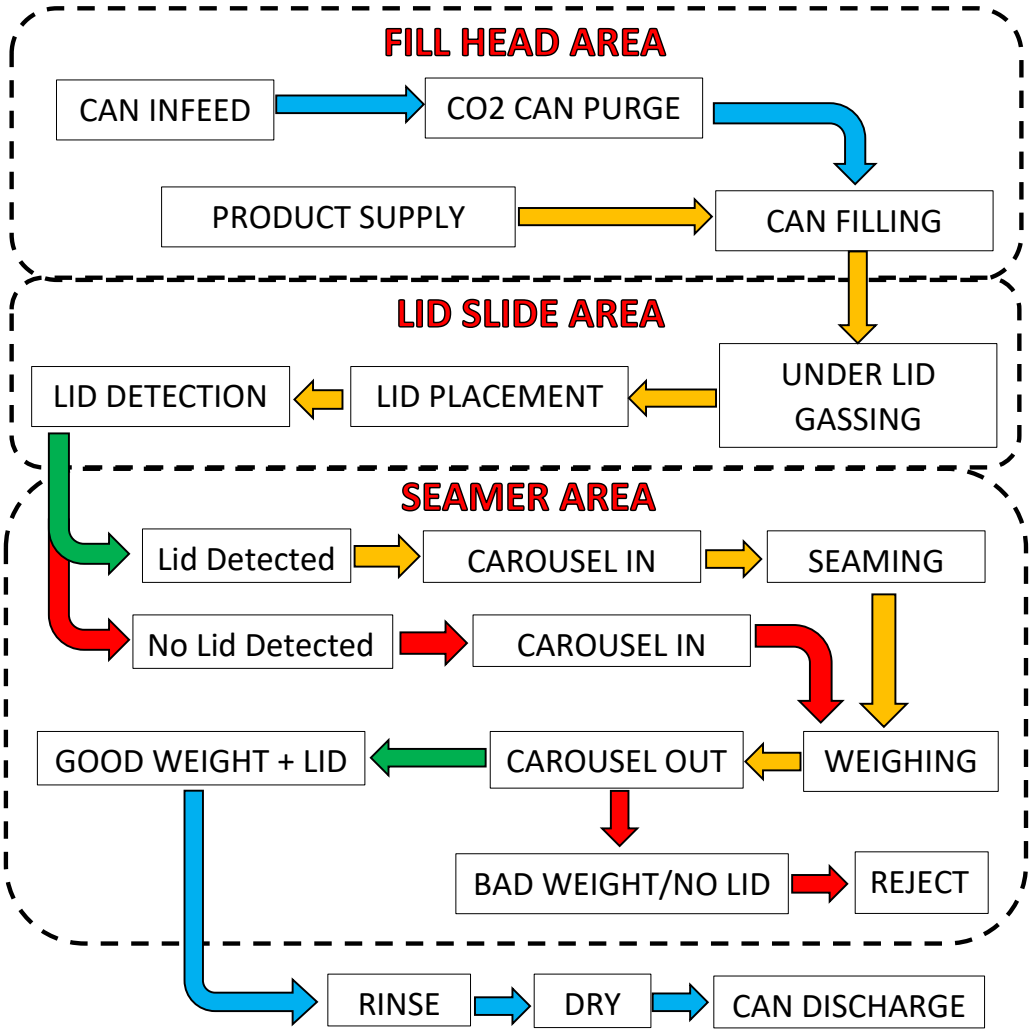


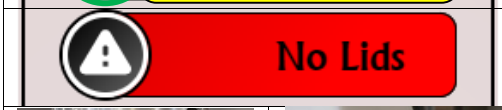
Figure 23 - Fill Process Flow Chart

D.1 Lid Loading

You'll need to load the lid cage with lids prior to starting the filling process. Step by step instructions for loading the lid cage is found below.

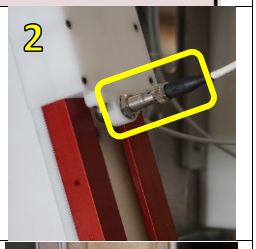
When you start up your machine you will likely have a warning showing that the lids are low, or no lids at all, on the center pane of the HMI.

Lids low will mean the sensor in the lid cage area (item #1) is not seeing any lids and no lids would mean the lid slide sensor (item #2) doesn't see lids.



At start-up you may see both errors/warnings but you will be able to clear them once you fill the lid cage and lid slide with lids.

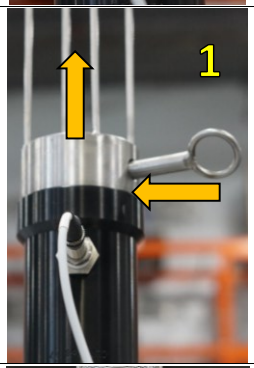
At any time during operation you see "low lids" warnings it just means the sensor no longer sees lids. There should still be 50-60 lids in the tube, giving you time to keep running and replace the lids in the cage.

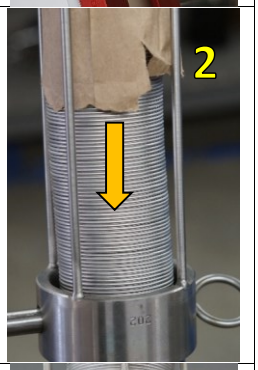


The first step to getting lids to your machine is to fill the lid cage with a sleeve of lids.

1. Put the pin in the bottom of the lid cage and remove it from the sensor tube.
2. Ensuring the pin is still in place, slide a sleeve of lids into the cage and lift the paper sleeve slightly out of the way. You can fold the top portion of the paper sleeve over the top of the cage to prevent it from sliding down into the lid feed.
3. Once the lids are loaded into the lid cage, place the entire cage back into the tube securely.
4. Finally, pull the pin swiftly to allow the lids to fall back into the tube.

To load the lid slide you can just put the machine in "run" on the "Run" page and it will automatically fill it, or press the "Lid" button on the manual page to drop one lid at a time.





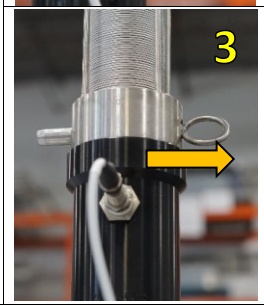


Figure 24 - Loading Lids

D.2 Fill Head Area

This section will outline the machine's automated processes that occur in the fill head area as outlined in the flow chart at the start if Section C but with some added detail.

The fill head area is where it all begins! Here there are two major components, the CO2 pre-purge, and the fill head itself where all the fill valves and tubes fill the cans with your product.

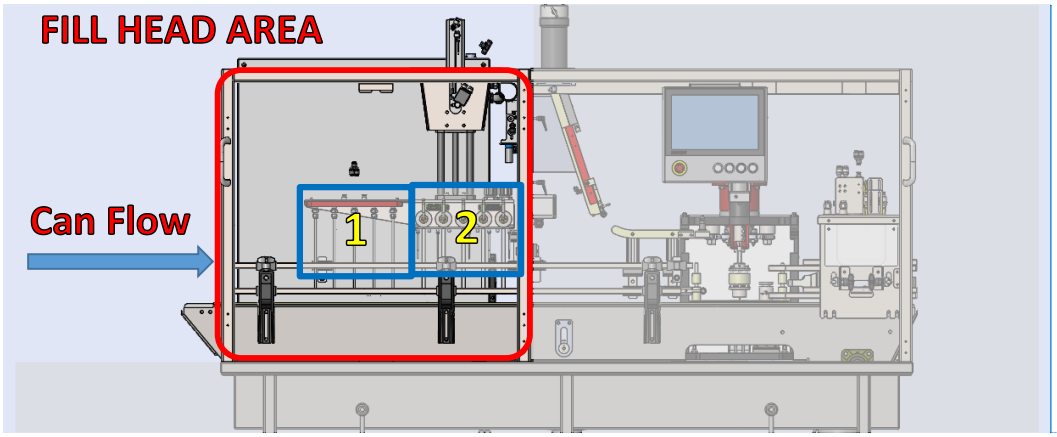


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Figure 25 - Fill Head Area

Number	Component
1	CO2 Pre-Purge
2	Fill Head/Valves

Table 28 - Fill Head Area Components

From the flow chart at the beginning of section C you will remember that the process for the fill head area is as follows:

1. Cans are fed into the machine at the same time product supply manifold brings beer to the fill head.
2. Cans are stopped under the CO2 pre-purge and fill tubes by the fill gate and the head is dropped allowing the CO2 pre-purge to run.
3. At the same time as the pre-purge the fill valves will open and fill the first five cans.
4. When they are read as full by the fill level probes, the gate opens and the cans pass onto the lid slide area.

D.3 Beer Manifold and Flow Control

The ACS V6 has two options to supply product and as such has a multi-part manifold to manage the options for fill control and data management. There is an optional temperature probe (item “3” below” and pressure meter (item “4” below) in-line component with digital readouts to measure how warm or cold your product is entering the machine and how much pressure the line is under that integrates with the HMI screen to show you real time temperature and pressure readings. The readouts and data viewing options will be explained in the operations manual. This component will connect in between the flow control dial (item “1” below) and the “Y” Manifold (item “2” below) to the stock configuration at points “B” and “C” shown below.

The stock configuration has a flow control dial that connects to your inlet beer hose at point “A” (shown below) to allow quick and easy flow restriction to manage breakout and infeed flow to the filler that connects to the temperature and pressure meter add-on with a tri-clamp. Below is an outline of each of those components and their functions.

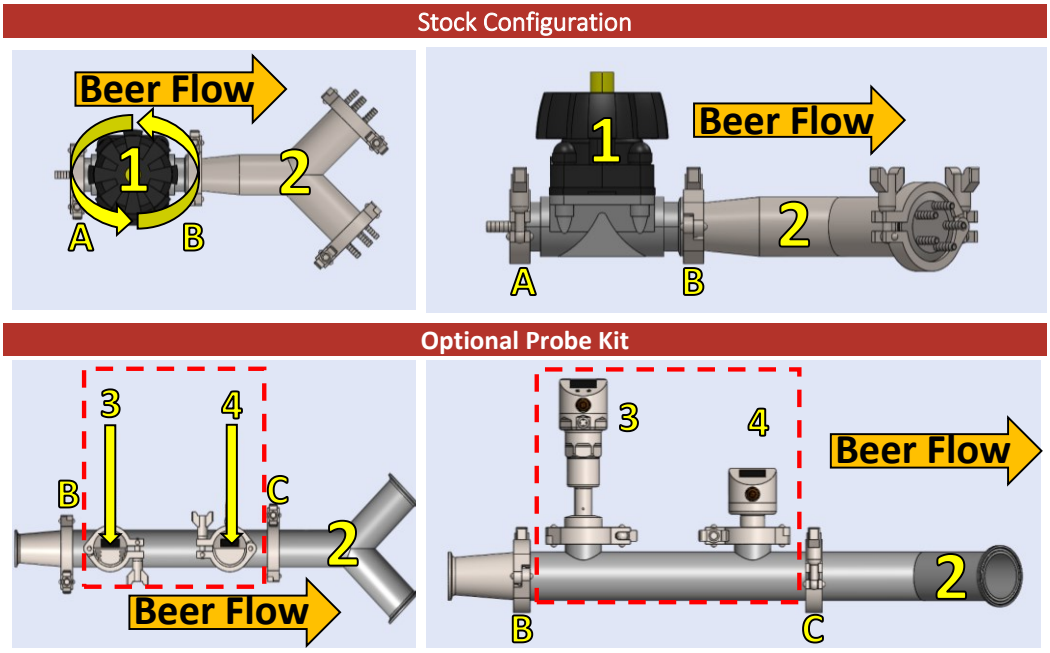


Figure 26 - Beer Manifold and Flow Control

***1** – Flow Control Dial*

***2** – “Y” Manifold*

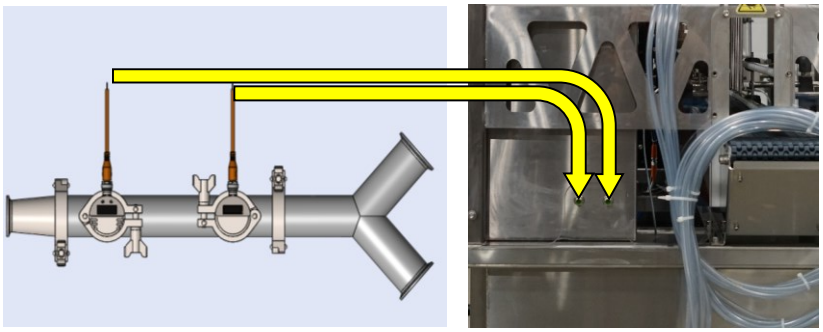
***3** – Temperature Probe*

***4** – Pressure Probe/Meter*

***A** – Beer Hose Connection Point/Flow Control Dial Inlet*

***B** – Flow Control Dial Outlet/Optional Temp*

***C** – “Y” Manifold Inlet Connection Point*



The optional temperature and pressure probe assembly will need to be connected to the main power panel so it can be fully integrated for live read-outs on the HMI screen.

Each of the probes has a cable with a pin connector that connects to the ports on the side of the main power panel on the infeed side of the line. The correct ports will be labelled inside the panel for identification.

Commented [LM8]: Just say that the bulkheads are labelled inside the panel on the wiring as to which one is pressure and temperature.

Fine tuning the correct flowrate will be crucial to maintaining smooth, laminar flow throughout the fill process. Higher flow can result in a higher probability of breakout and volatile fills but will fill faster, and conversely lower flow can result in smoother flow and less breakout but slower fill rates. The volatility of your product will vary depending on the product used and it should be understood that flowrate, temperature, pressure, and carbonation levels will ultimately effect how these adjustments should be made to find the ideal settings for your product.

For optimal fill performance and quality Cask recommends beer/product supply be kept inside the following parameters:

- Temperatures between 32-36°F (0-2°C)
- Carbonation levels between 2.40-2.90 vol./vol. (4.6-5.6g/L)
- Brite Tank Head pressure between 12-20psi (0.8-1.3bar)

D.3.1 Start-up – Line Bleed & Starting the Line

To start the fill process, you'll need to have the entire line full of cans. Due to the requirement of having the line full to start, it is recommended that you discard the first 5 cans out of each fill side as they will not be purged with CO2 at start up. This process should be considered and repeated any time you stop either fill head side for longer than 20-30 seconds to avoid rendering the CO2 purge useless.

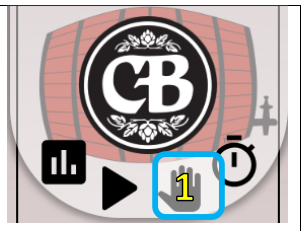
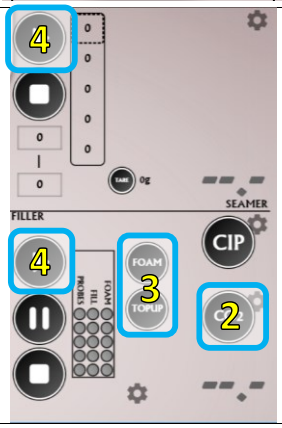
Once the line is full of cans, you'll need to purge the lines to bleed any breakout or air pockets that may be found in your lines. 1. Go to the manual page by tapping and dragging the hand icon onto either the left or right side-panes 2. Lower the fill head by pressing "Lift". 3. Press "All Fill", observe the beer/product overflowing the cans until smooth, clear, no bubbles beer/product is pouring out and press "All Fill" again to stop the purge. 4. Press "Lift" again to raise the fill head to its starting position. NOTE: The "All Fill" button is latching which means when you press it, it will stay on until you press it again.	 
Once the line purge is complete you can start the automated filling cycle. 1. Navigate to the "Run" page by tapping, dragging, and dropping the play button icon to either the left or right side-panes of the HMI. 2. Enable the CO2 pre-purge by pressing on the CO2 button. 3. Turn the Foam and Top Up timers on by pressing the Foam and Top Up buttons. 4. Press the play button on both the seamer and the filler portions of the run page and the fill head will drop and start the CO2 Pre-Purge and the Fill process to purge and fill your cans.	 

Table 29 - Start-up Procedure

D.3.2 Start-up – Fill Weight Management

Once you start the line it will be very important to monitor the fill weights and adjust the top up and foam timers accordingly.

Before making those adjustments, please reference section B.3 to refresh yourself on how to manage the weights and graphs pages and settings. It is in here where we can add top-up or foam time to not only replace fill tube volume and ensure a good foam cap is created, but we can also use foam and top up timers to manage the fill weights of each fill head individually, in real time.

It is important to note that due to the volatility of carbonated beverages you should always adjust weights with top up and foam based on **TRENDS** and not single anomalies. If you noticed a fill head is trending on the high or low side of its weight range over the course of a few minutes make foam and top up adjustments on the Graphs page and observe the trends. You'll get a good idea of the weight trends on the main graphs page, but the detailed page will provide even more data.

The more samples shown in the detailed and small graph area, the easier long-term trends will be to spot.

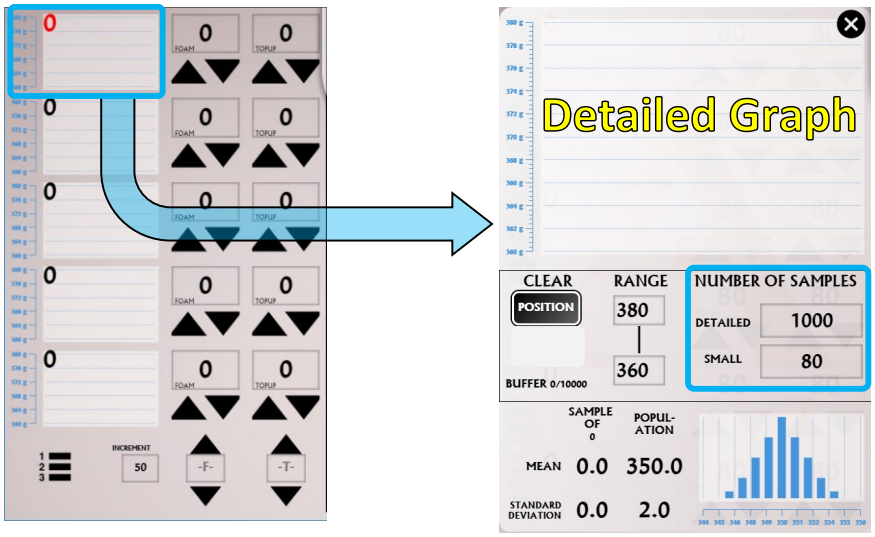


Figure 27 - Fill Weight Management

The table below describes how to manage fill weights using the top up and foam timers.

Adjustment	Top-Up Timer	Foam Timer
Increase	More Weight	Less Weight
Decrease	Less Weight	More Weight

Table 30 - Foam/Top-Up Weight Mitigation

D.3.3 Fill Valve Overview

The Fill Valves are second only to the seamer in the level of importance of functional components on the ACS V6. There are two types of fill valves on the ACS V6 – a single, or PX1 valve, and a double, or PX2 valve. The single PX1 valves have only coil, the beer coil and one shuttle and only serve to deliver product through the fill tubes. The double PX2 valves are the valves that create the foam cap and operate under the foam timer control and thus have a beer coil and a foam coil. The fill head has 5 PX1 valves on one side, and 5 PX2 valves on the other.

Below is a general breakdown of how each of the valves are assembled and functions.

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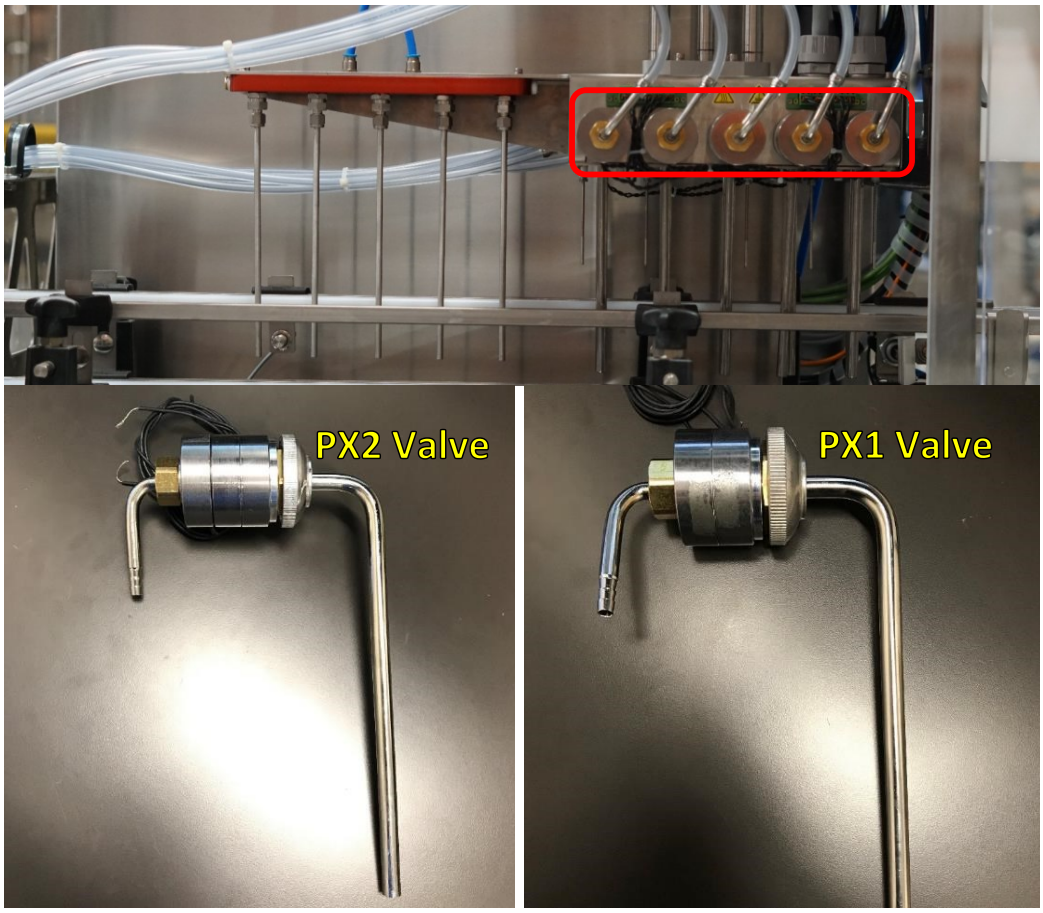


Figure 28 - PX1 & PX2 Fill Valves

D.3.3.1 PX1 & PX2 Valve Components

The PX2 valve is the valve that allows for foam creation by having two coils and shuttles, one for product filling, and one for foam creation. The valve works by sending current through coils that then creates an electromagnet and pulls the shuttles back out of the way to allow foam and/or product to flow out of the fill tubes. Below is a section view of the PX2 valve to illustrate its parts. A description of how the PX2 valve functions can also be found below.

PX2 Components
1. Product Inlet Tube
2. Foam Shuttle Spring
3. Foam Coil
4. Foam Shuttle
5. Beer/Product Coil
6. Beer/Product Shuttle Spring
7. Beer/Product Shuttle
8. Fill Tube

Table 31 - PX2 Components

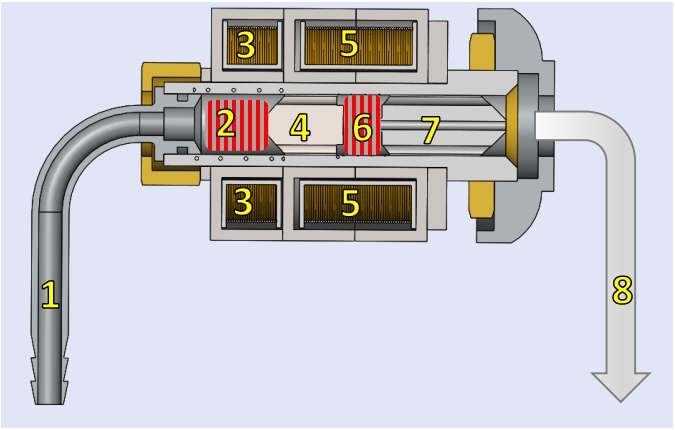


Figure 29 - PX2 Component Section View

PX1 Components
1. Product Inlet Tube
2. Beer/Product Shuttle Spring
3. Beer/Product Coil
4. Beer/Product Shuttle
5. Fill Tube

Table 32 - PX1 Components

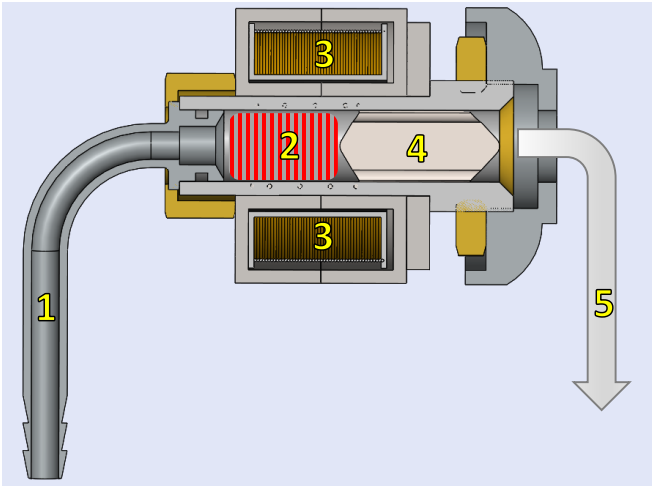


Figure 30 - PX1 Component Section View

D.3.3.2 PX1 Valve Function Overview

The PX1 valve is designed to deliver beer or product from the infeed lines to the cans by using a single coil, spring, and shuttle system. This system is driven by turning the coil into an electromagnet by sending a current through the coil which in turn pulls the shuttle back against the spring allowing beer/product to pass through the valve housing and out through the fill tube. When the cans are full the PLC sends a signal to cut the current to the coil so the shuttle may be forced closed by the spring again.

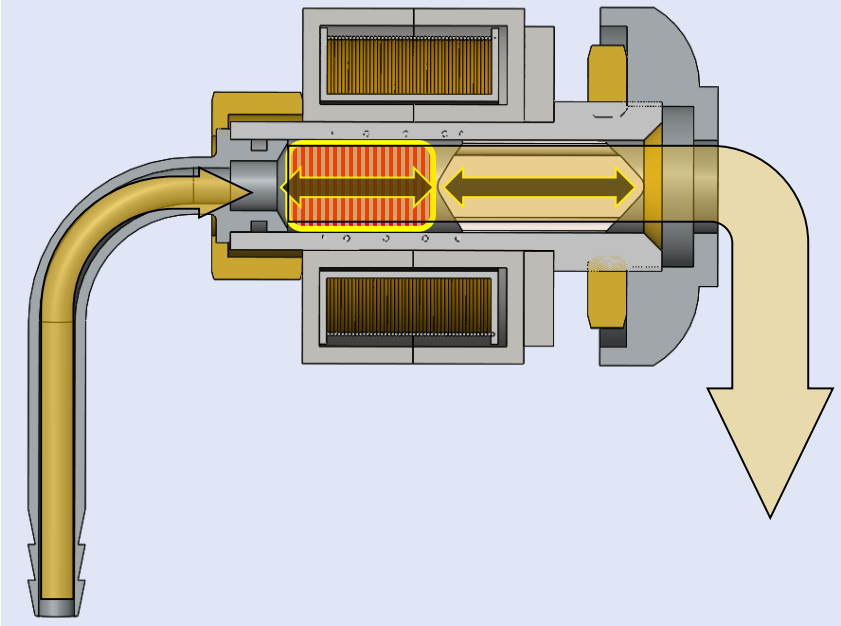


Figure 31 - PX1 Valve Function Overview

The process can be laid out in a step-by-step manner as such:

1. Beer/product enters the valve from the inlet tube and fills and stops inside the valve housing where the spring forces the shuttle closed until a current is applied to the coil.
2. When a current is applied to the coil, the shuttle will pull back and open a passage for the product to pass over the shuttle grooves and out into the fill tubes into the can.
3. When the fill level probes tell the PLC that the can is full, the current to the coil will stop and the shuttle will then be forced closed by the spring again blocking product from passing by to allow fresh, empty cans to gather under the fill heads.
4. If you are using the top-up timer function, the valve will close when that timer finishes.
5. The process begins again when new cans arrive under the fill heads.

D.3.3.3 PX2 Valve and Function Overview

The PX2 valve is designed to deliver beer or product from the infeed lines to the cans by using a double coil, spring, and shuttle system. This system is driven by turning the coils into an electromagnet by sending a current through the coils which in turn pulls the shuttles back against the spring allowing for foam creation and beer/product to pass through the valve housing and out through the fill tube. When the cans are full the PLC sends a signal to cut the current to the coil so the shuttles may be forced closed by the springs again.

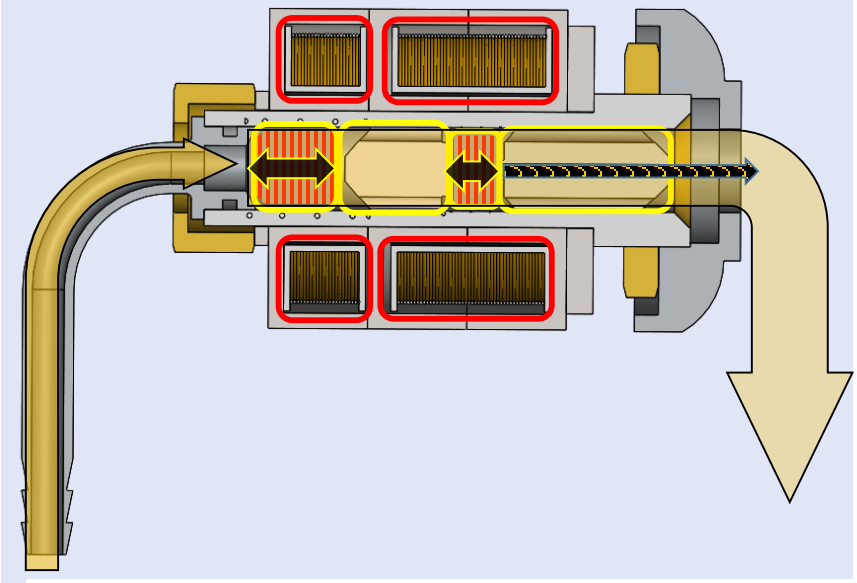


Figure 32 - PX2 Valve Function Overview

The process can be laid out in a step by step manner as such:

1. Beer/product enters the valve from the inlet tube and fills and stops inside the valve housing where the springs force the shuttles closed until a current is applied to the coils.
2. If using the foam timer, the foam coil will actuate first, pulling the foam shuttle back from the beer/product shuttle forcing product through the small orifice in the center of beer/product shuttle creating foam.
3. Then a current is applied to both coils, the beer product shuttle is pulled back against the foam shuttle blocking the orifice and opens a passage for the product to pass over the shuttle grooves and out into the fill tubes into the can smoothly.
4. When the fill level probes tell the PLC that the can is full, the current to the coils will stop and the shuttles will then be forced closed by the springs again blocking product from passing by to allow fresh, empty cans to gather under the fill heads.
5. If you are using the top-up timer function, the valve will close when that timer finishes.
6. The process begins again when new cans arrive under the fill heads.

D.3.3.4 Coil Trouble Shooting Tests

One of the most common troubleshooting tests to perform on the fill head is a coil test. This test is used to determine if filling issues are related to burned out coils or some other issue. This test is performed by isolating the coil that's believed to be burned out by disconnecting the wiring harnesses and using the manual controls to actuate the coils. The process is described below.

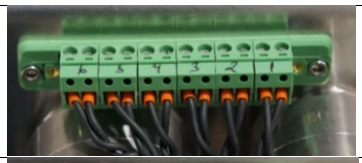
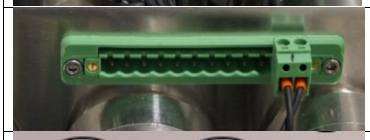
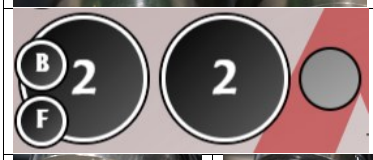
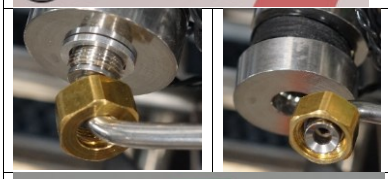
1. Identify which coil is suspected of causing an issue. This is usually determined by slower than usual filling on one fill valve, or in the case of a foam coil being burned out, no foam creation is happening. 2. Remove all but the problematic coil's wires from the phoenix connector harness by pulling them outward. 3. With product connected and under pressure to the fill head, navigate to the manual page and actuate the fill valve controls for that fill valve. 4. If no product or only foam is dispensed when pressing the "fill" coil buttons, or nothing comes out when pressing the "foam" coil buttons it is possible that the associated coil is burned out. 5. To test if it is indeed the coil that is burned out or if it is another electrical or mechanical issue, remove the problematic wire from the harness position and move it to an adjacent plug/slot and actuate that coil's button on the manual page. 6. If, after swapping the coil plug position, product does not come out or create foam, replace the coil. If the coil functions properly after swapping it, it can be determined that the coil is working correctly and further troubleshooting on the electrical side may be required. 7. Reference your wiring schematic, found in the electrical panel, for locations of relays and wires leading from the coil connections to the panel and PLC for non-coil issues. 8. If you need to replace a coil simply remove the wires from the green harness plug, close and bleed product and pressure from inlet lines, remove the brass nut on the fill valve and slide the affected coil off the valve. Please be cautious to not lose the stainless spacer from the PX2 valves as it is specifically machined to allow correct spacing for the coils to interact with the shuttles. 9. When replacing with a new coil, place either coil wire in either of the two slots, screw it down, and plug it back in. There is no convention required for which side of the plug each wire goes.	      

Table 33 - Coil Test

D.3.4 Fill Level Probes

Once product is being put into cans the ACS V6 PLC knows when to stop filling when the fill level probes are tripped. These probes function on a 24V system where a current is delivered from the panel to the probes. This circuit is open and no signal is received back until product touches both the probes and the fill tubes. When the product touches both the fill probes and the fill tubes, a circuit is completed and a signal is sent to the PLC to tell it to stop filling.

The probes require a product to have a conductivity of 100 micro-siemens/cm its possible that purified water or other products may not conduct enough current to complete the circuit and pass the signal on to the PLC telling the valves to close and stop filling. If this is the case there is a safe-guard in place that will close the valves after 30 seconds and produce an "overflow" error. If your product has less than the required conductivity levels, please contact support@cask.com for some possible configuration solutions.

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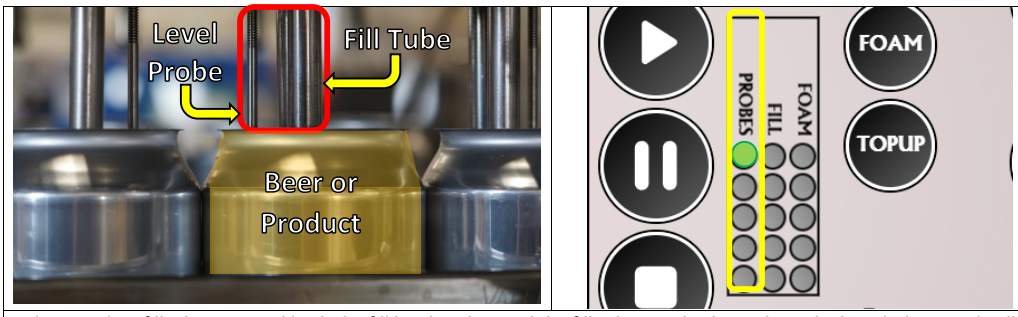

When Product fills the cans and both the fill level probes and the fill tubes are both touching the liquid, the signal will be sent to the PLC to stop filling. You can see when this signal is made by observing green lights illuminating the "Probes" section on the "Run" page.

Table 34 - Fill Level Probes Functions

To test if the probes are connected correctly, and functioning as they should you can bridge the fill level probes and the fill tubes with a screw driver, hex key, or any other metal object and observe if the green light for the associated probe lights up on the probe section of the run page. If the signal is not made and the lights don't illuminate when bridging, remove the fill head bottom plate by removing the four 3mm hex bolts from the corners and inspect for loose or damaged wires on the inside portion of the fill head plate.

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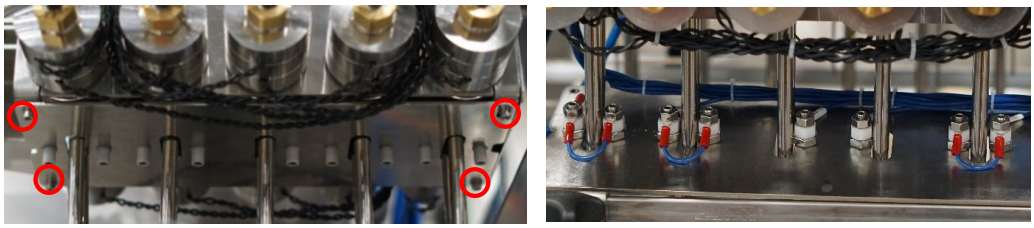


Figure 33 - Lowering the Fill Plate

D.4 Lid Slide Area

The lid slide area is where the cans will spend the least amount of time but go through a very critical process. It is here that the cans will get under-lid CO2, actually get a lid place on the can, pass under the lid skate to ensure the lids are on properly and then pass under the lid detect sensor to ensure a lid is present before the carousel rotates it into the seaming area. If the lid detector doesn't see a lid, the can will bypass the seaming process and exit the carousel into the reject lane.

The lid slide will automatically fill whenever the ACS V6 is in auto mode. There is a metal detecting proximity sensor on the lid slide that tells the PLC to drop a lid whenever it doesn't see a lid in front of it.

The first step in the lid slide area is to pass under the lid slide where CO2 will exit the lid slide for under lid purging and gassing. CO2 is brought from the main CO2 supply and is plumbed into the back of the lid slide with a 4mm air line. This is done to help reduce O2 pick up from under the lid when the can passes by for lid application.

Next the cans slide under the lid slide where the can's body hook, and the lids cover hook mate and the can pulls the lid down while the lid weight ensure it rolls on smoothly and squarely.

Finally, the can moves toward the seamer area while passing or meeting three sensors:

1) Can Approach Sensor – This is what tells the carousel a can is coming and must wait for the can in place sensor to detect if the can is in place in the carousel pocket

2) Can In Place Sensor – This sensor detects when a can is in place in the carousel pocket and tells the PLC to rotate the can to the seaming area via the carousel.

3) Lid Detect Sensor – This sensor will determine whether or not a lid is present on the cans. If it is present the can will be seamer. If a lid is not present, the can will bypass the seaming process entirely and be rotated out to be rejected.

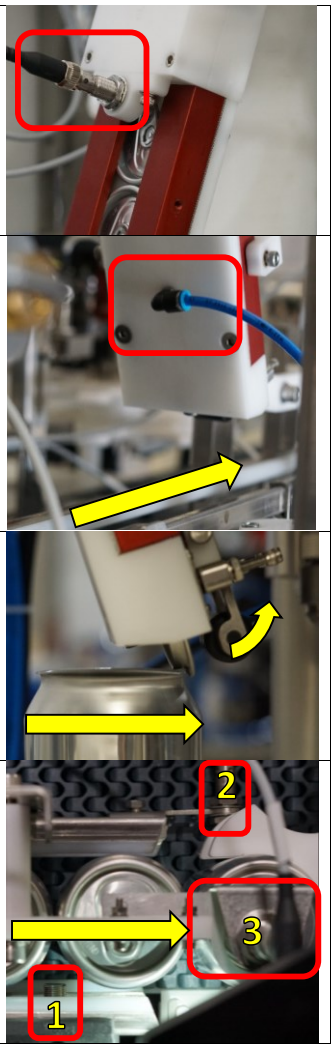


Table 35 - Lid Slide Area

D.5 Seamer Area

The seamer area is where your cans will be seamed and weighed on their way to post-packaging. There are many moving parts in this area including the carousel, lift table, chuck, seaming dies, load cell/scale, and the reject gate. Below you'll find a description of how the cans progress through this area and interact with the various components.

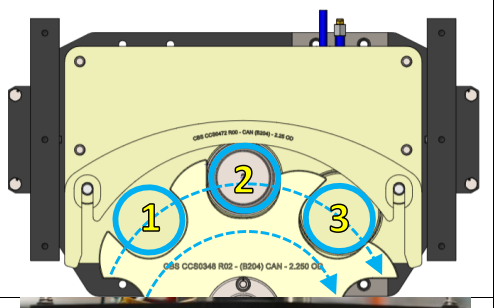
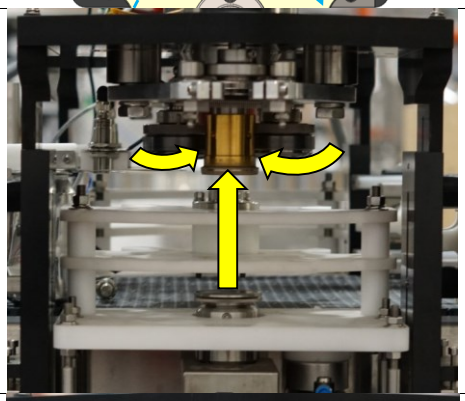
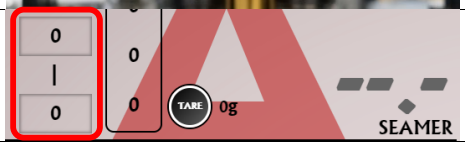
Once the cans pass by the can in place sensor the carousel will rotate them through the seaming process. There are three positions on the seaming side of the carousel: 1. This slot doesn't have any specific functions 2. This is where the can will be lifted into the chuck and get seamed 3. This is where the load cell is that weighs the cans and tells the reject gate to open or closed depending on whether or not the cans are within their specified weight range.	
Seaming a can is a two-operation procedure that uses two separate seaming dies to form what's called a double seam. The carousel will get the can to the can lift table where it will be lifted into the seaming chuck, have the 1st and 2nd seaming operations completed, lower on the table and rotate toward the load cell where it stops to get weighed while the can behind it in the carousel gets seamed. The seaming dies are forced into the can and chuck by a cam and cam follower bearings/rollers. A stepper motor controls the rotation of the cam in a specifically timed sequence so each seaming die can contact the can long enough to form well formed seams. For a full explanation of how the cam interacts to make the dies form the seams, see the installation and set up guide. Once the can is weighed it will be sent to either the rejection lane or the outfeed. The settings that determine which way it goes are set in the	
The tolerances for weight rejection are set out on the run page in the area highlighted on the right. The weight of each can for each fill head will be displayed in the column on the right of the tolerances while the current weight on the scale is further on the right.	

Table 36 - Seamer Area

Section E. Shutdown Procedure

At the end of the canning day there are certain procedures which are required to shutdown the ACS V6. Those procedures include best practices for cleaning/CIP as well as standard control shutdown steps to follow to shut everything down safely.

Please see the Maintenance and Cleaning Guide sent with this document package for information on how to maintain and clean the ACS V6.

A clean machine will run longer and more efficiently and need less critical maintenance over time.

E.1 Clean-In-Place (CIP)

The CIP procedures mentioned below are minimum standard and guidelines and it should be noted that your facility's standard cleaning procedures may be implemented to enhance the process. An outline of how to set the automated CIP process in motion is found below.

Equipment Required:

1. Cart/Variable speed-controlled pump to supply the machine with the cleaning and rinsing solutions that allows you to keep the supply pressure under 23psi.
2. 150-200L/50-55 gal. vessel to mix and supply ACS V6 with cleaning and rinsing solutions.
3. Optional tee between pump outlet and supply lines to the ACS V6 to allow pump priming/bleeding.
4. Optional CO2 inlet on a tee post-pump outlet to purge lines of liquid when finished packaging product/CIP.
5. Optional hose to go from basin drain to floor drain to avoid caustic puddles and splashing.

Cask Recommended Process and Concentrations:

1. Run a hot caustic rinse/flush of the system. NaOH based solutions are recommended at a concentration between 0.5%-2% at a temperature **NO GREATER THAN 65C/150F.**
2. Warm-Hot (**NO GREATER THAN 65C/150F)** water flush to rinse lines and machine of caustic. Cold rinse also works but will take longer. Test with PH strips or tester for accurate neutralization/rinse completion.
3. Cold sanitizer flush. Concentrations between 0.2-0.5% is more than sufficient. Non-foaming, Peracetic Acid is recommended chemical for sanitizing.
4. **NOTE: DO NOT, UNDER ANY CIRCUMSTANCE, USE PHOSPHORIC OR NITRIC BASED ACIDS ANYWHERE ON THIS MACHINE. DOING SO MAY CAUSE PERMANENT DAMAGE TO THE INTERNALS AND EXTERNAL PARTS OF THIS MACHINE AND MAY COMPROMISE QUALITY AND FUNCTIONALITY OF KEY COMPONENTS.**

If you are planning to have more than 24 hours between sanitizing and product runs it is highly recommended that you flush/purge all liquid and sanitizer out of the machine after CIP and run a short sanitizing cycle prior to running the next production run.

Please note that the fill head areas are not wash down ready and you should avoid spraying water inside the fill head area at all costs. Ignoring this precaution will cause serious damage to the fill head electronics controls and may cause serious harm from electric shock.

For the seamer area please avoid spraying water near the top of the seamer assembly as the motors and controls may malfunction when sprayed.

DO NOT USE HIGH PRESSURE SPRAYERS OR HOSES TO CLEAN THIS MACHINE.

Before initiating the automated CIP function please be sure to connect the supply vessel, pump, and appropriate hoses and lines to the supply manifold and open all valves associated with chemical delivery. Running the CIP procedure without liquid flowing through the product/beer valves can lead to coil burnout and overheating.

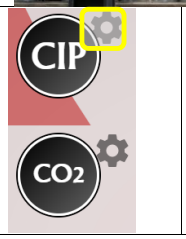
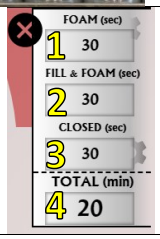
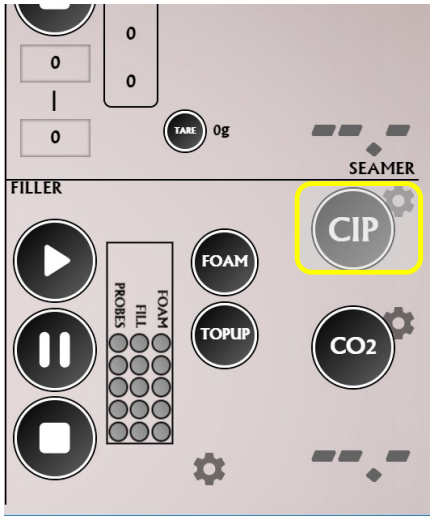
Place a can under EACH fill valve on the ACS V6. The cans are meant to help clean the fill tubes on the outside while overflowing onto the conveyor and down into the basin for cleaning and draining. Ensure the cans are aligned and centered under the fill tubes as the fill head will drop down into them upon turning on the CIP cycle.	
To initiate the automate CIP cycle navigate to the Run Page to find the CIP button and its setting's "gear" icon. You can customize how long each step in the CIP cycle takes, as well as total cleaning time. To set up the CIP cycle times tap on the gear icon to set the following settings: 1. Foam Time – number of seconds the process will open JUST the foam valves for cleaning/rinsing 2. Fill & Foam – number of seconds the process will open both, beer/product and foam, valves for cleaning rinsing 3. Closed – number of seconds the valves will stay closed to allow for chemical contact time 4. Total – number of minutes the CIP cycle will run 30 seconds for 1 ,2, and 3 is default and recommended cycle time. 20 minutes per cycle is recommended, however you may wish to run the cycle for less or more time, or base it on volume of cleaning solution instead of time. For volume based you can simply set the timer for whatever you choose and just restart the CIP process until your vessel runs empty. Its important to monitor the remaining volume of CIP liquid in your vessel and to stop the CIP process as soon as it runs out. Prolonged operation of the valves without liquid running through them may burn out the coils. Start and Stop the CIP cycle by tapping on the black CIP button. It will be green when initiated.	  

Table 37 - CIP Procedure

FOR INSTRUCTIONS ON HOW TO MAINTAIN AND CLEAN THE REMAINDER OF THE MACHINE PLEASE SEE THE MAINTENANCE AND CLEANING GUIDE SENT WITH THIS DOCUMENT PACKAGE.

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E.2 Machine Shutdown

Once the product run and CIP processes are done you may shutdown your machine. Please follow the steps outlined below to ensure correct and proper shutdown of your ACS V6.

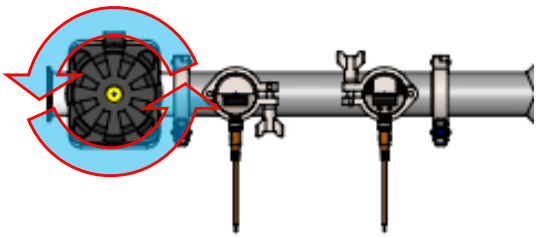
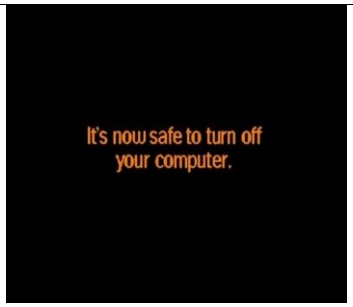
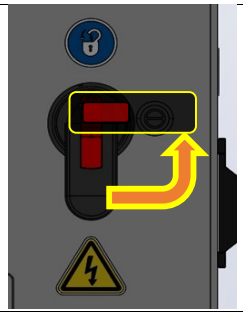
Close product/cleaning solution supply to the ACS V6 and close the flow restrictor dial on the supply manifold all the way counter-clockwise.	
Turn off main CO2 and Air supplies on their respective regulator banks by turning the main switch (left most) to a position that is 90 degrees from the inlet direction.	 
Navigate to the center pane of the HMI and tap on the power symbol. The PLC shutdown pop-up will appear. Press the check mark to initiate the shutdown procedure.	 
Wait until the HMI says that it is now safe to turn off the power. Close the main power disconnect switch to the OFF position.	 

Table 38 - Shutdown Procedure

Section F. Panel Overviews

There are two electrical panels on the ACS V6 – one on each side of the machine. One panel is for control terminals and wiring and the other is the main power distribution panel. Below is an outline of each of those panels and their components.

F.1 Main Power Panel Overview

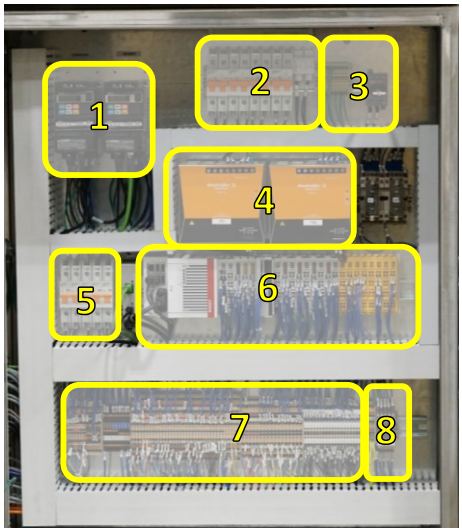


Figure 34 - Main Power Panel

Panel Components
1. Variable Frequency Drives (VFDs)
2. Circuit Breaker Bank 1
3. Main Disconnect and AC power distribution
4. DC Power Supplies
5. Circuit Breaker Bank 2
6. PLC
7. DC Power Distribution Terminals
8. Level Probe Relays

Table 39 - Main Power Panel Components

F.1.1 Variable Frequency Drives

There are two Variable Frequency Drives on the ACS V6 which control the two motors involved for operation. An overview of these VFDs and what they control is found below.

Figure 35 - Motor VFDs

Component	Function	Frequency
1. Conveyor VFD	Controls the conveyor motor speed	HMI Configurable
2. Seamer Motor	Controls the speed of the seamer motor	45Hz

Table 40 - VFD Functions

The frequencies for the Seamer VFD are set and programmed in production and should be left as is as they are programmed for proper seaming timing with the other seaming protocols. The conveyor motor speed can be configured on the HMI's center panel by tapping on the settings "gear" symbol next to the conveyor control button.

The conveyor settings pop-up will also allow you to decide what the physical red button on the HMI will control.

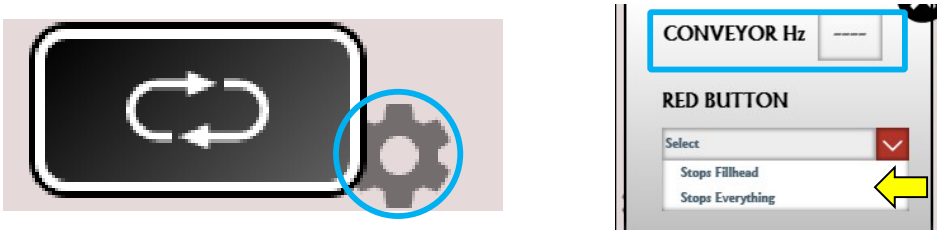


Figure 36 - Conveyor Frequency Settings

NOTE: Default setting for Conveyor Hz is 45 Hz. Deviating from this will require you to adjust the can count in senor, can count out senor, can approach senor, and filler gate speed to accommodate the timing for faster or slower speeds.

F.1.2 Circuit Breaker Banks

The ACS V6 has two circuit breaker banks which will trip any time an overload occurs on the circuit they control. An outline of what each of the circuit breakers (CB) control is found below. Down/green means off/dead, up/red means on/live.

You can also find the functions of each of the circuit breakers in the included wiring schematic, found in the panel door.

Figure 37 - Circuit Breaker Banks

Circuit Breaker (CB)	Control/Function
1	Conveyor VFD
2	Seamer Motor VFD
3	Power Supply 1 (PS1)
4	Power Supply 2 (PS2)
5	Seamer Cam Stepper Motor
6	Seamer Carousel Stepper Motor
7	HMI Power
8	PLC - Power for I/O
9	PLC - Power for PLC Internal Electronics

Table 41 - Circuit Breaker Controls

F.1.3 Power Supplies

There are three power supplies to route power to the ACS V6's DC power systems. These power supplies will convert the main AC power supply to the machine into DC power for control functions.

Figure 38 - Power Supplies

Component	Function
1. PS1	Control Power
2. PS2	Fill Head Power

Table 42 - Power Supply Functions

F.1.4 DC Power Distribution Terminals

The DC power distribution terminals relay DC 24V power from the power supplies to the control side to control sensors and other processes essential to operation. The wiring schematic included with your machine, found inside the electrical panel, will outline each of these wires and terminals and their routings and functions.

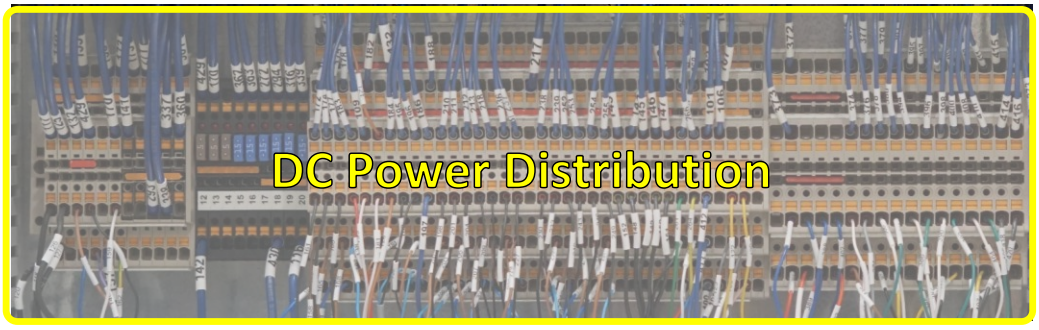


Figure 39 - DC Power Distribution

F.1.5 Main Disconnect and AC Power Distribution

The ACS V6 runs on 208-240VAC single phase power that's connected to the main disconnect switch inside the panel. As mentioned in the Installation and Setup Guide, you'll need a certified electrician to connect the ACS V6 to power via this switch.

Reference the ACS V6 wiring schematics included with your machine, found inside the panel door, for more information.

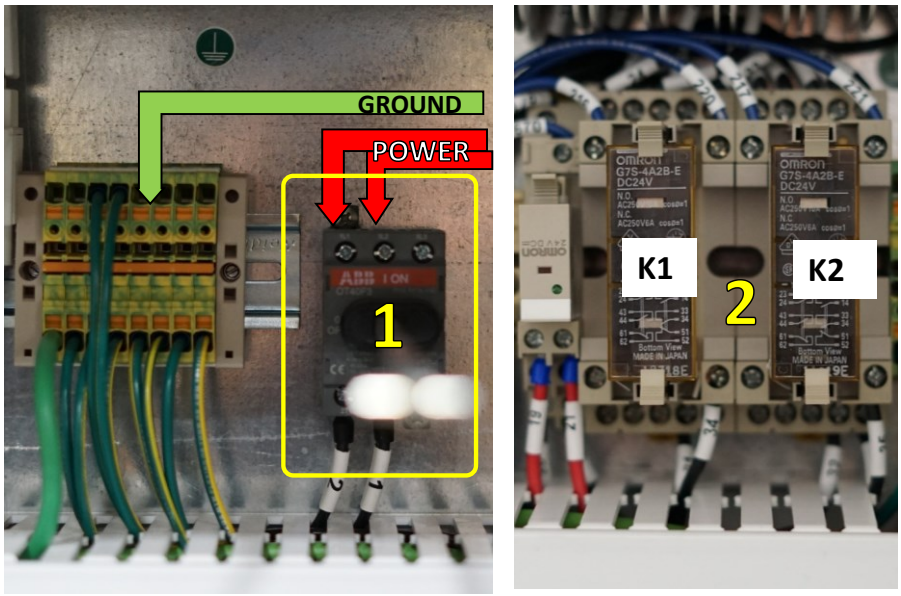


Figure 40 - Main Disconnect and AC Power Distribution

Component	Function
1. Main Disconnect	Main AC power and ground connection and disconnect switch.
2. K1/K2 Safety Relay	When the E-Stop is engaged, removes power/control from the Fill Head power supply

Table 43 - Safety Relays and Main Disconnect Function

F.1.6 Relay Functions

Figure 41 - Relays

Relays	Functions
R1	Fill Level Probe 1
R2	Fill Level Probe 2
R3	Fill Level Probe 3
R4	Fill Level Probe 4
R5	Fill Level Probe 5

Table 44 - Relay Functions

Section G. Water Manifold Connections & Operation

You will need to connect your ACS V6 to a water supply to provide rinse water for various pre and post filling needs. The function of each of the valves on the water manifold are outlined in the Water Manifold section of the installation and setup guide. Here you will find a brief description of how to turn the valves on and off. It should be noted that there is no inline water filter so you should consider water cleanliness for rinsing before connecting the canning line to your main water supply.

Since the Valve Panel has the piping behind the stainless plate, you cannot easily see the direction of flow. The arrows below will show you the correct positions for the valves when in their respective on or off positions.

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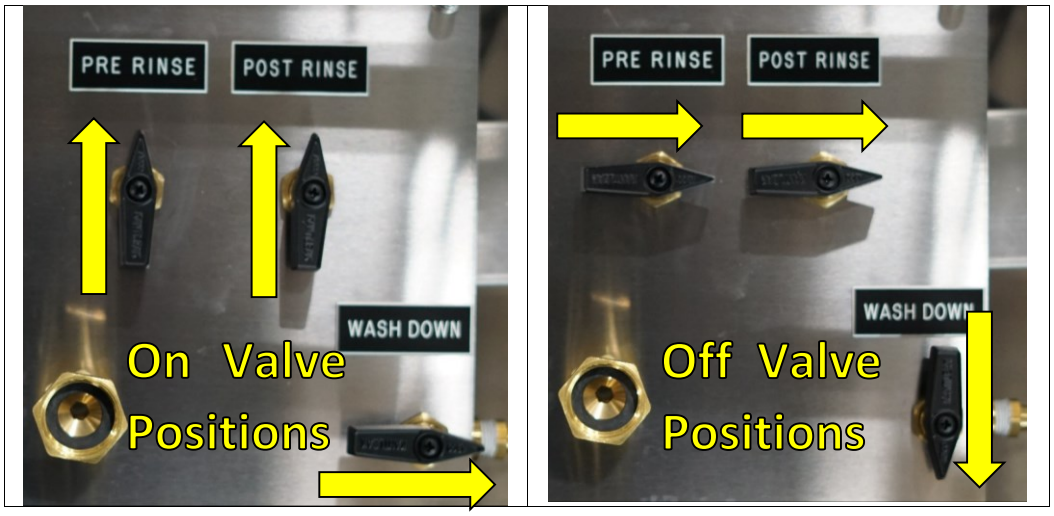

Figure 42 - Water Manifold Connections

Section H. Additional Documents and Information

Further to this Installation and Set Up Guide there is an Operation Manual and Recommended Maintenance Guide that should be referenced for their respective purposes. Further troubleshooting documentation is available on request, as well as full technical support contacts found in section G on the following page can help you with anything you may need.

Going through all documentation prior to the arrival of an installation and training technician is highly recommended to get you as familiar with the machine as possible.

To book install and commissioning training please contact training@cask.com.

Section I. Company Information

North American Office

Cask Brewing Systems Inc.
Bay 60, 5100-64 Ave SE
Calgary, Alberta, T2C 4V3
CANADA

European Office

Cask European Support Office
Oldcourt, Templeorum, Piltown
Co Kilkenny, Ireland
E32 PP52

Toll Free	+1-800-661-8443
Direct	+1-403-640-4677
Fax	+1-403-640-4680
Email	info@cask.com
Website	www.cask.com

Parts, Technical Service & Support North America
Direct: +1-403-640-4677 Option #4
Toll Free: +1-800-661-8443 Option #4
support@cask.com

Hours: 5AM-6PM MST (UTC -7)

Parts, Technical Service & Support Europe
Support Desk: +353-5678-07026 Option #4

support@cask.com

Hours: 7AM-3:30PM Irish Standard Time (UTC +1)