

# CENTRIFUGE UTILITY PLATFORM CUP-30

## Installation, Operation & Maintenance Manual

Patented (US Patents #10814338, 11014098)



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## 1 Safety

Please read and follow all safety and operation instructions.

**THE FOLLOWING SAFETY NOTICES ARE GENERAL RECCOMENDATIONS FROM EXTRACTIONTEK.**

**CHECK WITH LOCAL AHJ (Authorities Having Jurisdiction) FOR ALL SITE SAFETY GUIDELINES. EXTRACTIONTEK SHALL NOT BE RESPONSIBLE FOR IMPROPER SETUP, MISUSE, DAMAGE TO EQUIPMENT OR FACILITY, INJURY OR DEATH.**

**ONLY TRAINED PROFESSIONALS WITH A COMPLETE OPERATIONAL UNDERSTANDING OF THE EQUIPMENT—AND A FULL UNDERSTANDING OF THE RISKS ASSOCIATED WITH ALCOHOL USE— SHOULD BE AUTHORIZED TO USE THE EQUIPMENT. THE USE OF ALCOHOL HAS RISKS. ANY MISUSE OF THIS EQUIPMENT CAN RESULT IN SEVERE INJURY, INCLUDING BUT NOT LIMITED TO DEATH, DISABILITY AND PROPERTY DAMAGE.**

### 1.1 Safety Notices



A **DANGER** notice indicates an immediate hazard which, if not avoided, will result in death or serious injury.



A **WARNING** notice indicates a hazardous situation which, if not avoided, could result in death or serious injury.



A **CAUTION** notice indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or damage to the equipment. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

IT IS THE OPERATOR'S SOLE RESPONSIBILITY TO USE EQUIPMENT IN A SAFE MANNER. OPERATOR ASSUMES ALL RISK ASSOCIATED WITH THE USE OF THIS EQUIPMENT AND AGREES THE EQUIPMENT IS ONLY TO BE UTILIZED FOR LAWFUL PURPOSES.

# SAFETY

Table 1-1: Dangers, Warnings, and Cautions



This equipment uses high-proof alcohol. Alcohol is a flammable liquid. Improper use may cause alcohol to discharge, resulting in an unsafe work environment. Use a properly-rated CFM fume hood, personal protective equipment (PPE), and appropriate detectors as required.



Inhalation of high concentrations of alcohol vapor may affect the central nervous system. This is characterized by nausea, headache, dizziness, unconsciousness and coma. It may cause respiratory tract irritation. In high concentrations, it may cause narcotic effects. Please read the Ethyl Alcohol Material Safety Data Sheet (MSDS) for further safety information.



Operator must follow all precautions and safety guidelines to ensure their own safety, the safety of other personnel, and the protection of property.



Always visually monitor fill levels, tanks, valves, and hoses for leakage. While the system is protected with pressure relief valves, care should be taken to ensure overfilling does not occur.



All hoses may contain alcohol under slight pressure. Wear proper personal protective equipment (PPE) such as safety goggles and gloves when disconnecting hoses and working around alcohol.



Imbalance of the basket may cause major damage to the bearing and shaft assembly and put the operator at risk. Proper bag loading is critical. The improper use of the CUP or unapproved modifications may result in serious injury.



Incorrect inflation of the Isolators will cause excessive vibration and could lead to potentially serious damage to system. Ensure isolator pressure is checked weekly and pressurized to factory spec.



Barrier Fluid Reservoir ships empty. Running system without barrier fluid filled and pressurized as described in this document will damage the system.



Before opening the lid manually, be sure that the basket has completely stopped spinning.

# SAFETY



Component wear varies depending on the amount of usage. Inspect all nuts, bolts, and gaskets before each use. If there is any question about the integrity of a component, replace it immediately.



Make certain all safety devices are functioning properly before operating the equipment.



The alcohol detector must be used always in and around the extraction zone.



Never apply pressure or vacuum to the system vessel.



Never apply pressure or more than 15 inHg vacuum to the system jacket. Exceeding these limits may cause damage to system.



It is important to have the manual relief valve open during filling to allow the displacement of the head pressure.



Solvent vapor is heavier than air and can settle in low places such as pits and drains.



DO NOT use or store equipment or containers where they could be exposed to excessive ambient temperatures. Relief valves can open allowing alcohol to escape. DO NOT artificially heat equipment or containers above 125°F.



This system is NOT equipped with an overfill prevention device. Ensure proper fill levels prior to operation.



All system containers must be carefully checked for accidental pressurization. Depressurize prior to opening by slowly cracking relief valves.



DO NOT allow children to tamper with or play near the equipment.

# SAFETY

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DO NOT stand or sit on the unit for any purpose.

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Slip-resistant footwear is highly recommended.

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## 1.2 Ethyl Alcohol Safety Information

### 1.2.1 Emergency Overview

**OSHA Vacated PELs:** Alcohol: 1000 ppm TWA; 1900 mg/m<sup>3</sup> TWA

**Flash Point:** 16.6° C (61.88° F)

**Auto-ignition Temperature:** 363° C (685.40° F)

**Explosion Limits, Lower:** 3.3 vol %

**Explosion Limits, Upper:** 19.0 vol %

**NFPA Rating:** (estimated) Health: 2; Flammability: 3; Instability: 0

### 1.2.2 Personal Protective Equipment

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

### 1.2.3 First Aid Measures

**Eyes:** Get medical aid. Gently lift eyelids and flush continuously with water for at least 15 minutes.

**Skin:** Get medical aid. Wash clothing before reuse. Flush skin with plenty of soap and water.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cups of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. **DO NOT** use mouth-to-mouth resuscitation.

### 1.2.4 General Information

Containers can build up pressure if exposed to heat and/or fire. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Vapors will burn if involved in a fire. Flammable liquid can release vapors that form explosive mixtures at temperatures above the flashpoint. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire.

### 1.2.5 Extinguishing Media

For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water.

## 1.3 Environmental Safety

This section includes safety recommendations that apply to the CUP-30 system. The CUP-30 is designed for installation in a C1D2 compliant area. The customer is responsible for following all local, state and federal regulations.

The CUP-30 has been designed to operate safely under the following environmental conditions:

- Indoor use only
- Maximum relative humidity of 75%
- Ambient temperatures of 5°C to 32°C

### 1.3.1 Fire Suppression

Install an automatic fire suppression system with 155° auto discharge heads, according to Local and State building codes. The manual release handle should be accessible outside the containment area, and accessible when the extraction area is closed. Install two Alcohol detectors in the work area. Place a 10 lb. manual fire extinguisher with appropriate ratings within the extraction area.

### 1.3.2 Lighting

Area should be well lit with a properly rated configuration. Clearly mark exits with a lighted sign and install emergency lights/battery backup in case of any power failures.

### 1.3.3 Ventilation

The ventilation system's purpose is to keep accidental liquid and vapor release concentrations low enough to prevent ignition. The exhaust ventilation system should comply with AHJ requirements and should be capable of capturing any solvent vapors, if released.

Fans must be able to extract enough air to match the vapors of a spill ½ the normal working volume (simulating a failure in either the recovery or source container of most of the systems in use, including rotary evaporators, Buchner funnels, etc.) for double the amount of time it would take a worker to safely contain the spill using appropriate tools and procedures.

Sanitary areas should be fitted with properly rated HEPA HVAC fan and filter equipment to control contaminants.

### 1.3.4 Ignition Prevention

No open flame devices will be allowed in the fume hood area. Smoking is not permitted in the work area and 'No Smoking' signs should be posted.

No appliances with pilot lights are permitted.

No appliances with the possibility of creating open sparks (i.e., open contacts/relays on most refrigerators, chillers, etc.) are permitted.

# SAFETY

No handheld electrical tools may be operated during extraction operations.

## **1.3.5 Static Control**

To reduce the possibility of static electricity sparks, antistatic mats can be placed around extraction and distillation equipment. Equipment will be grounded using grounding straps provided and shall conform to NEC/NFPA guidelines to help prevent static electricity and discharges.

## **1.3.6 Placement and Types of Electrical Equipment**

When possible, locate all electrical outlets, switches, light fixtures, electric appliances and equipment outside the extraction equipment area. All devices should be wired according to NEC & local AHJ.

Use low voltage circuits inside the containment area to help prevent sparks from high voltage devices.

## **1.3.7 Gas Detection and Monitoring**

Since the proposed extraction process utilizes alcohol for solvent extraction, presence of alcohol vapor will be monitored in the work area. Monitoring systems will provide readout and/or a signal that indicates that dangerous levels of flammable vapor have been reached. An additional fixed monitor will be placed in the inlet of the exhaust air fan to monitor alcohol vapor evacuation. Gas detection devices will be calibrated on a weekly interval.

# SPECIFICATIONS

## 2 Technical Specifications

Table 2-1 lists the technical specifications for the CUP-30.

**Table 2-1: CUP-30 Technical Specifications**

Basket Capacity	25 - 30 lbs. / 11.3 - 13.6kg (depending on mill size)					
Approved Process Solvents	Ethanol					
Maximum Process Temperature	60° C (140°F)					
Minimum Process Temperature	-40° C (-40° F)					
Maximum Pressure ( <i>Vessel</i> )	Not recommended (5 PSI pressure relief)					
Vacuum ( <i>Vessel</i> )	Not recommended					
Maximum Pressure ( <i>Jacket</i> )	0 PSI					
Vacuum ( <i>Jacket</i> )	15 inHg					
Barrier Fluid Reservoir Nitrogen Pressure (REQUIRED)	10 PSI (Factory Setting)					
Barrier Fluid Reservoir Nitrogen Hose Fitting Connection	¼" JIC Male					
Barrier Fluid Reservoir Volume	~3.2 gal. (4 L) (Ethanol ONLY)					
Isolator Inflation Pressure (Air)	40 PSI +/- 5 PSI					
Input Voltage	208V - 240VAC, 3PH, 50/60Hz, 30A FLA					
Max Power Consumption	6500W					
Cord Length, Power Cable	25 ft. / 7.6m					
Cord Length, System to Panel	25 ft. / 7.6m					
Plug Adapter	L15-30P					
Motor Size/Type	5HP, TEFC, Explosion Proof, C1D2 HazLoc					
Maximum Basket Speed	1500 RPM					
Control System	SIEMENS Programmable Logic Control					
Speed Set Point and Time Limits	AGITATE			SPIN		
		SPEED	TIME		SPEED	TIME
	Min:	20 RPM	1 min	Min:	5 RPM	1 min
	Max:	200 RPM	15 min	Max:	1500 RPM	15 min

# SPECIFICATIONS

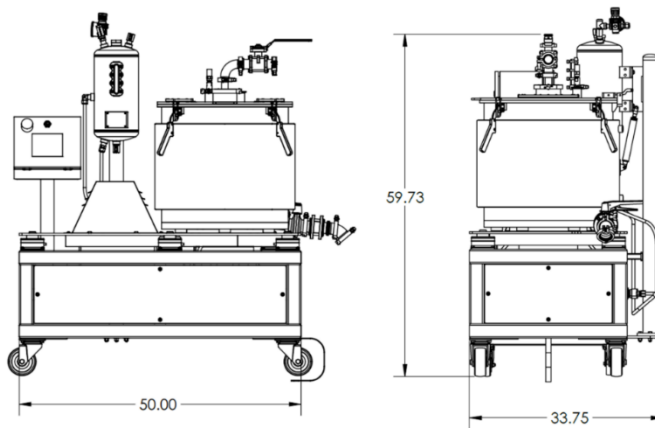
## 2.1 Dimensions and Weights

Table 2-2 and Figure 2-1, Figure 2-2 and Figure 2-3 show the physical characteristics of the CUP-30, Control Panel and Discharge Tank.

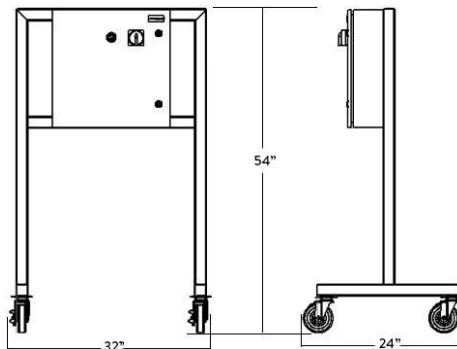
**Table 2-2: Weights and Dimensions**

Weights & Dimensions	L	W	H	Net Weight
<b>CUP-30</b>	50" (127 cm)	34" (86 cm)	62" (158 cm)	890 lbs. (404 kg)
<b>Control Panel Stand</b>	32" (81 cm)	24" (61 cm)	54" (137 cm)	150 lbs (68 kg)
<b>Discharge Tank (30 gal)</b>	30" (76 cm)	30" (76 cm)	24" (61 cm)	114 lbs. (52 kg)

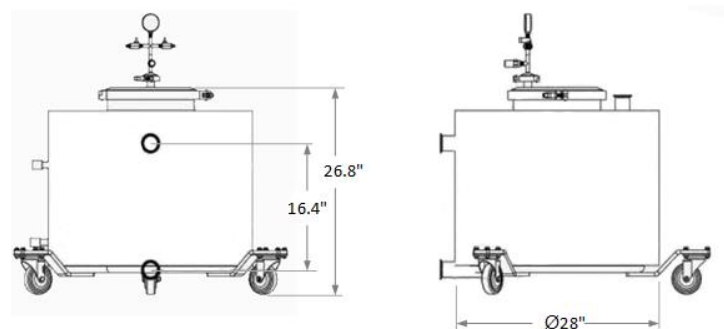
**Figure 2-1: CUP-30 Dimensions**



**Figure 2-2: Control Panel Stand Dimensions**



**Figure 2-3: Discharge Tank Dimensions**



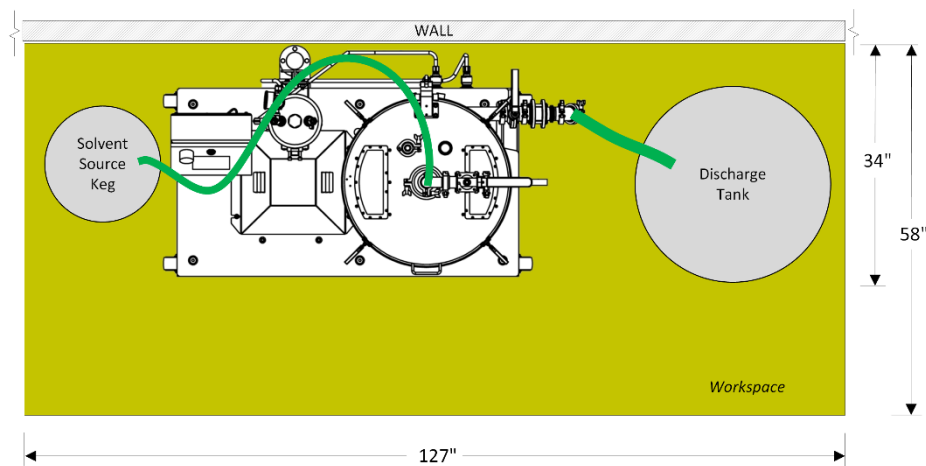
## 3 Facilities Preparation

Read and understand this section prior to installing the CUP system. Advanced planning is essential for successful installation.

### 3.1 Workspace Setup

The CUP system requires a level surface in a ventilated area approved by the local fire marshal. Allow sufficient space around the system to provide an unobstructed workspace. (See Figure 3-1)

**Figure 3-1: CUP-30 Equipment Workspace Layout**



### 3.2 Electrical and Grounding Requirements

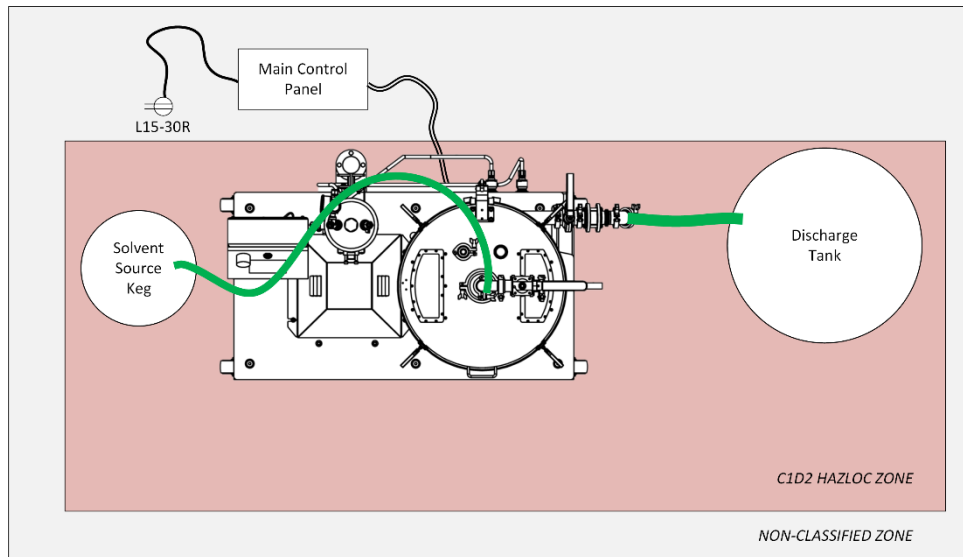
The user is responsible for complying with all local, state, and federal regulations. All electrical work should be completed by licensed electrician.

#### 3.2.1 Electrical Requirements

The Main Control Panel is not rated to be installed in the C1D2 Hazloc Zone. It will need to be placed outside the Hazloc, but within reach of the 25 ft. system cables to make motor and data cable connections. (See Figure 3-2)

# FACILITIES

**Figure 3-2: CUP-30 System Installation by Zone**



The system requires a dedicated 208-240V, 50/60hz, three-phase 30A circuit with NEMA L15-30R receptacle. The system is equipped with a NEMA L15-30P plug on the end of the power cable. (See Figure 3-3)

**Figure 3-3: L15-30 Receptacle and Plug**



# FACILITIES

## 3.2.2 Grounding Requirements

The system is equipped with a ground strap with a 3/8" eyelet. Provide an Earth ground rod at the tool for the ground strap per NEC and local codes. (See Figure 3-4)

**Figure 3-4: Grounding Strap**




## 3.3 Nitrogen Requirement

The Barrier Fluid Reservoir on the system requires nitrogen to pressurize the system seal. Supply a 3/8" hose with 1/4" Female JIC fitting with sufficient length to reach from source to the Barrier Fluid Reservoir nitrogen input. If using the optional Nitrogen-Assist Method for fluid transfer, supply additional nitrogen and tubing from source to points of use. (See Sections 4.3 and 7.9.1 for further information)

## 3.4 Required Tools and Customer-Provided Items

Prior to system installation and setup, obtain the following list of tools and supplies in Table 3-1.

**Table 3-1: Tools and Customer-Provided Items Needed for Installation**

 Item
Transport/Handling Equipment with minimum 1000 lb. capacity
High Proof Ethanol (~3.5 gal. minimum)
House and/or Bottled Nitrogen
Car Tire Pressure Gauge (Schrader Valve)
Air compressor with Schrader attachment or tire pump with Schrader attachment capable of 40PSI
Flathead screwdriver
Adjustable wrench with 1.5" span

# INSTALLATION

## 4 Installation and Setup

### 4.1 Lifting and Transport

All lifting and transport must be completed using proper handling equipment rated for the loads. The system must always remain in a vertical upright position and never leaned or turned over on the side.

### 4.2 Receiving and Unpacking the Crate




*Check the Crate for damage. Report any damage immediately to ETS and wait for instructions prior to proceeding further.*

If the crate is in good condition:

- Check the tilt and shock indicators and notate condition before removing crate clamps with flathead screwdriver.
- Remove the packing cardboard box and the second nylon packing around the centrifuge.
- Inspect entire system for any shipping damage.
- Inspect crate contents to verify that items from Table 4-1 are included and in good conditions.
- Contact ETS immediately if anything is missing or damaged.

**Table 4-1: CUP-30 Crate Packing List**

 Item
CUP System
Main Control Panel
Inlet Valve Assembly
Lid Vent Valve Assembly
PRV Assembly
Outlet Valve Assembly
Distillery Hoses, Clamps, Gaskets (qty 2ea)
30-Gallon Discharge Tank
CUP System Packing List
CUP User Manual

**CUP-30 AUX Kit #401-00030 (Sold Separately)**

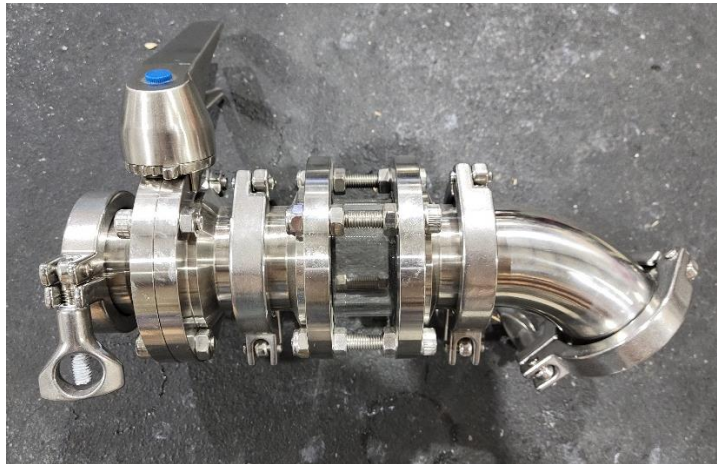
Mesh Bags (qty 10)
30 Gallon Kegs (qty 10)
Dip Tubes (qty 2)

# INSTALLATION

**Figure 4-1: Inlet Valve Assembly**



**Figure 4-2: Outlet Valve Assembly**



**Figure 4-3: PRV Assembly**

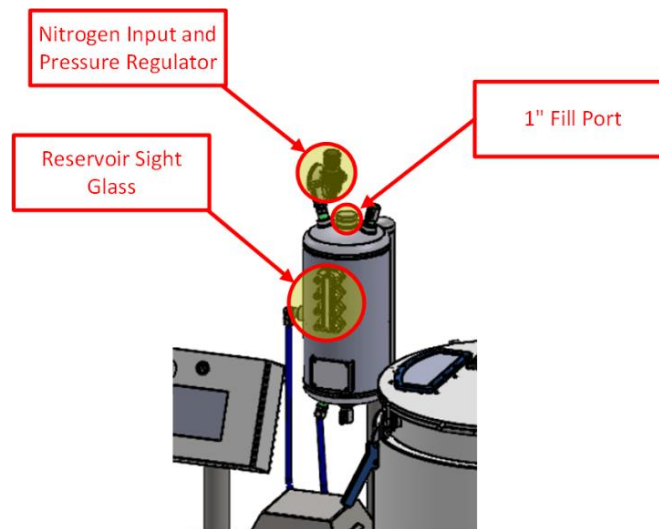


# INSTALLATION

## 4.3 System Setup

- Step 1.** Roll the CUP system into place. Verify that all four casters are on level ground. Lock the casters.
- Step 2.** Position the Main Control Panel outside the classified space, but within 25 feet of the CUP. Lock the control panel stand casters.
- Step 3.** Route the AC cable to the receptacle. Avoid creating a trip hazard. **DO NOT PLUG IN THE AC CABLE** until ready for Safety Check (below).
- Step 4.** Route and connect the HMI and motor cable to the main control panel. Avoid creating a trip hazard.
- Step 5.** Install the system grounding cable to the grounding location designated by electrician.
- Step 6.** Fill the Barrier Fluid Reservoir with high proof ethanol through the 1" port in the top of the reservoir. Fill the max line.

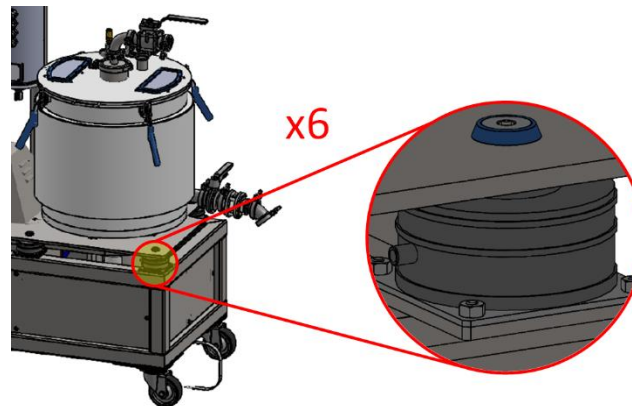
**Figure 4-4: Barrier Fluid Reservoir Setup**



- Step 7.** Connect a nitrogen supply – either house or pressurized bottle nitrogen– to Barrier Fluid Reservoir. Receiving connection is ¼" Male JIC. Open nitrogen supply valve and confirm factory setting on reservoir pressure regulator (20 PSI).
- Step 8.** Check the air pressure in the six Vibration Dampening Isolators and fill with air as needed (40 PSI +/- 5 PSI). The Isolators have standard automotive Schrader valves. (See Figure 4-5)

# INSTALLATION

Figure 4-5: Vibration Dampening Isolators



- Step 9.** If using the Nitrogen-Assist Method for liquid transfer, connect the nitrogen hose to the alcohol supply tank. If using an air driven pump for fluid transfer, connect air supply to pump.
- Step 10.** Move the discharge tank to the right of the system.
- Step 11.** Install the Inlet Valve Assembly and hardware and connect the longer hose. Connect the free end to the bottom port of the Discharge Tank.
- Step 12.** Install the PRV Assembly to one of the open 1.5" triclamp fittings on the lid. Install the Lid Vent Valve Assembly to the other open 1.5" triclamp fitting on the lid.
- Step 13.** Install the Outlet Valve Assembly and hardware and connect the shorter 2" dia. hose. Connect the free end to the top port of the Discharge Tank.
- Step 14.** Double check all connections to confirm they are tight. The system will vibrate during operation and loose components may fall off.
- Step 15.** Verify that the system is placed in a properly ventilated area that has been approved by your local fire marshal.
- Step 16.** System is ready for Safety Check Prior to Startup. (See Section 5.3)

## 4.4 Preparing the CUP-30 for Operation

The CUP arrives factory-tested and inspected for liquid leaks and manufacturing flaws. However, shipping and/or frequent moving of the system can loosen components. It is the operator's responsibility to check for leaks and damage prior to operation. It is advised to perform a 'liquid run' check with alcohol (no material) to clean the system and inspect for leaks prior to initial operation.



Each operator must learn and become familiar with all procedural operations and liquid transfer mechanics prior to use (e.g., system flow diagram, plumbing schematic, liquid transfer operations, and/or pneumatic pump assembly).

# SYSTEM OVERVIEW

## 5 System Overview

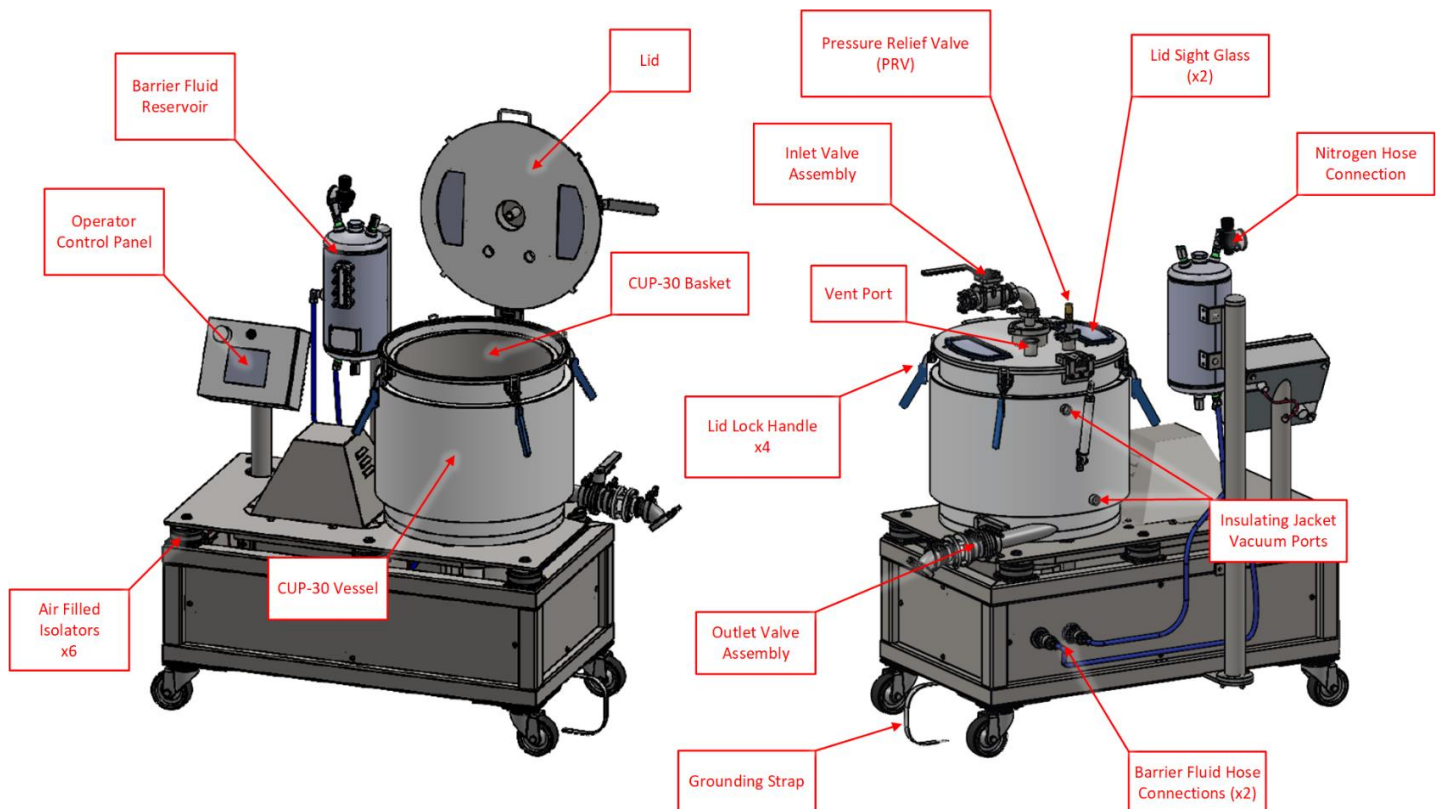
### 5.1 Introduction

The CUP (Centrifuge Utility Platform) alcohol extraction system provides the ability to extract and target botanical compounds from diverse plant species. This extraction technology can isolate specific botanical compounds through programmable sequences, effectively targeting the desired separation. The system combines closed-loop, cold alcohol extraction with mechanical agitation and centrifugation which ensures high-purity extractions.

Read and become familiar with all safety and operation procedures before using the CUP system.

### 5.2 System Components Overview

Figure 5-1: CUP-30 System Components Overview



# SYSTEM OVERVIEW

Figure 5-2: CUP-30 Lid Setup

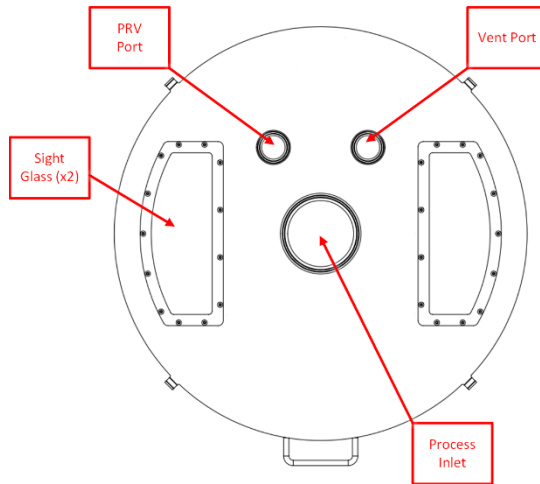
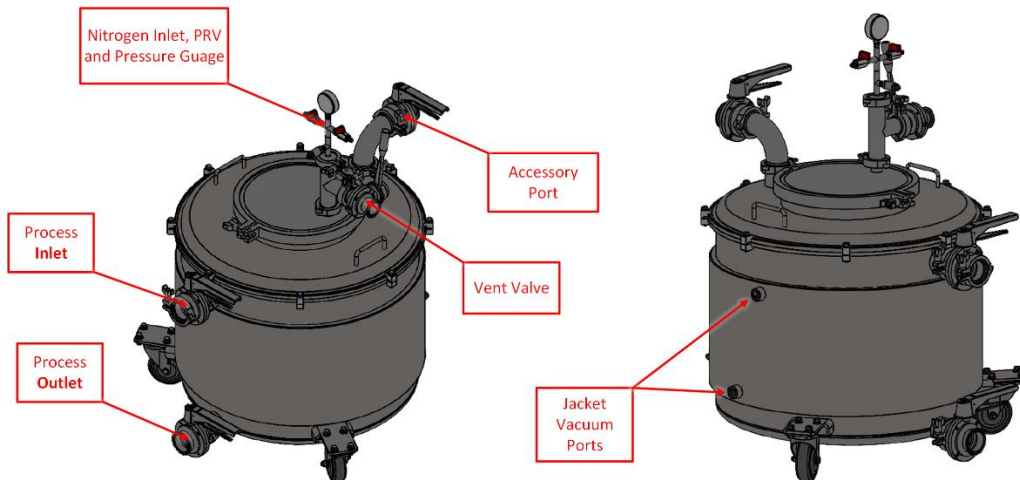


Figure 5-3: CUP-30 Discharge Tank Components Overview




## 5.3 Safety Check Prior to Operation

Verify that all items are inspected and meet the acceptance criteria prior to operating the CUP system. (See Table 5-1)

# SYSTEM OVERVIEW

**Table 5-1: Safety Checklist Prior to Startup**

 Item	Acceptance Criteria
Main control panel	Connected to a correctly rated 230V / 30 amp three-phase receptacle (NEMA L15-30R 250V).
System is level	Verify all system components are level.
Ground strap installed	Confirm ground strap is connect to grounding rod at system.
CUP chamber	Clean, no dents or other damage. System interior is clean and ready for use.
Basket assembly	Clean, no dents or other damage.
Lid seal	Clean, no tears, cracks or gouges.
Isolators (x6) inflated	Confirm isolators have been properly inflated to 40 PSI +/-5 PSI.
Tanks—Source and receiving	Confirm all plumbing and hardware are attached correctly and clamps are tight.
Barrier Fluid Reservoir connected and ready	Confirm barrier fluid hoses are connected to the machine and that the Barrier Fluid Reservoir is pressurized with Nitrogen and regulated to 10 PSI (factory set pressure).
Alcohol detectors	Inspected, tested, and functioning properly.
Ventilation system and fume hood	Inspected, functioning properly, and turned on.

Once the system has been cleaned, inspected, and the operator is familiar with the liquid transfer process, the operator may proceed with using the CUP system.

## 5.4 Precautions and Limitation of Use

Please pay special attention to the following:



The CUP basket rotates at a very high rate of speed. Never open the chamber lid while the basket is spinning. Serious injury may result.



DO NOT overload the chamber or run the system with an unbalance load. Intense vibrations could damage the system or cause serious injury.

# SYSTEM OVERVIEW

- Make sure the system placement is on flat, level ground.
- Always power OFF the main panel when not in use for longer than 60 minutes.
- Never overload the system or use the system without a balanced load.
- Ensure proper material loading and balancing of filter bags.
- Only use the system as described in this manual.

## 5.5 Basic Extraction Process Overview

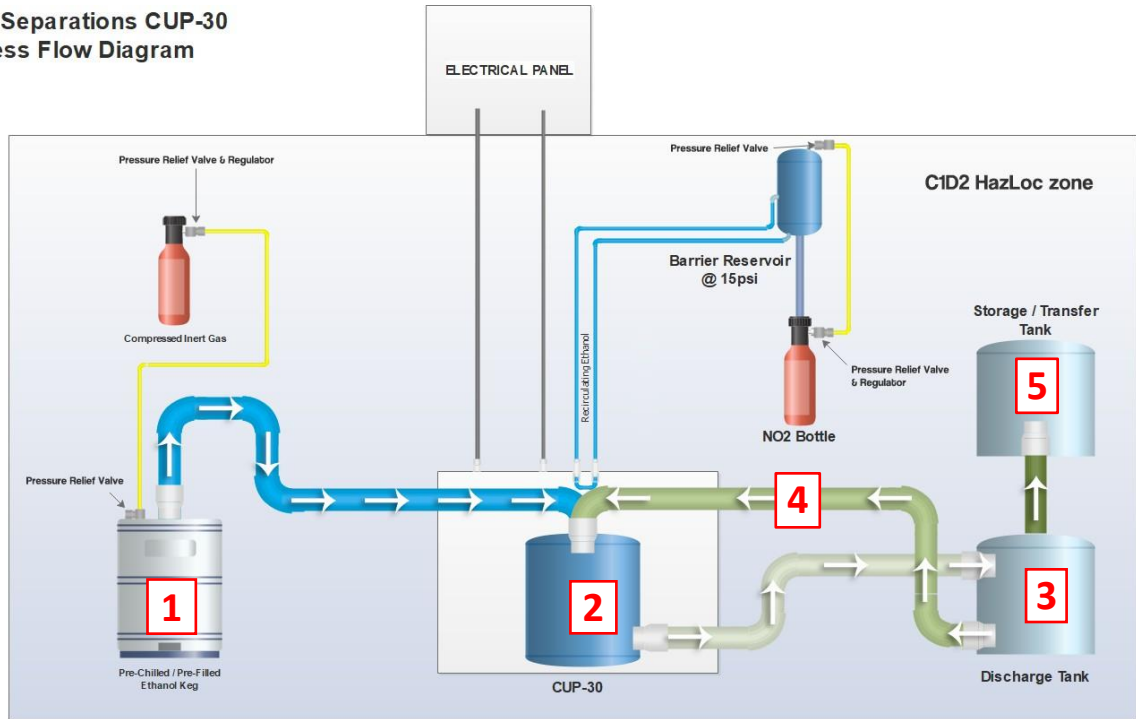
Following is an outline of a typical process to remove target compounds from biomass. Customer SOP and desired outcomes determine specific process parameters and options, such as the use of chiller units, processes temperatures and times. Detailed processing steps can be found in Section 7. See Figure 5-4 for a pictorial overview of this process.

- Step 1.** Load the CUP chamber with a filter bag containing biomass.
- Step 2.** Transfer alcohol (amount determined by your SOP) into the CUP chamber using one of two options.
- Option 1: Use compressed nitrogen to push alcohol into the CUP chamber.
- Option 2: Use a pneumatic transfer pump powered by a remote air compressor or by inert compressed gas to pump alcohol into the CUP chamber.
- Step 3.** Begin the bidirectional agitation to remove target compounds.
- Step 4.** When agitation is complete, open the Outlet Valve to empty the alcohol tincture in CUP chamber to a holding reservoir for future processing.
- Step 5.** Begin the drying cycle to use centrifugal force to remove up to 98% of the remaining alcohol tincture trapped in the plant material.
- Step 6.** Open the CUP chamber and remove the filter bag.
- Step 7.** Repeat the process as needed or recommended by your SOP.

# SYSTEM OVERVIEW

Figure 5-4: Basic Operation Sequence

## Delta Separations CUP-30 Process Flow Diagram



## Legend:



# CONTROLS

## 6 Control System Overview

The CUP-30 system has two control panels. The **Operator Control Panel** is mounted to the centrifuge platform and is designed for direct operation of the equipment within the C1D2 HAZLOC extraction zone. The **Main Control Panel** is mounted on a separate frame, tethered by two 25-foot cables and located outside the C1D2 HAZLOC extraction zone.

### 6.1 Main Control Panel

The Main Control Panel includes the Main Disconnect Switch and an Emergency Stop (E-STOP) Button on the exterior and a variable frequency drive (VFD) and Programmable Logic Circuit (PLC) inside (See Figure 6-1). In the event of an emergency, press the E-STOP to completely shut down and disable the system. Pull out the E-STOP to re-enable the system.

**Figure 6-1: Main Control Panel**



# CONTROLS

## 6.2 Operator Control Panel

The Operator Control Panel consists of the Human-Machine Interface (HMI) touchscreen, the Emergency STOP (E-STOP) Button, and the hazardous location (HAZLOC) information plate. The operator control panel is mounted to the CUP centrifuge frame. (See Figure 6-2) Like the Main Control panel, in the event of an emergency, press the E-STOP to completely shut down and disable the system. Pull out the E-STOP to re-enable the system.

**Figure 6-2: Operator Control Panel**



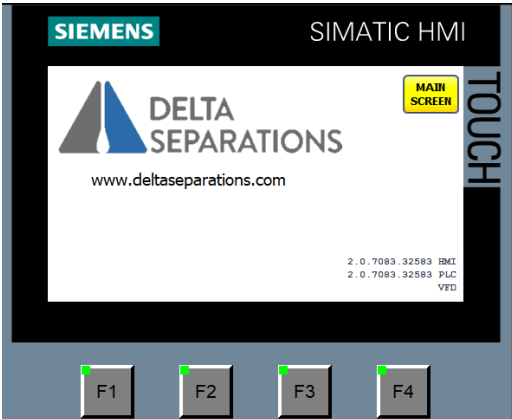
## 6.3 HMI Screens Overview

Use the touchscreen HMI (Human Machine Interface) on the Operator Control Panel to access the control system and operate the system.

### 6.3.1 Splash Screen

The system boots up and lands on the Splash Screen. Press the “Main Screen” button to advance to the main menu. (See Figure 6-3)

**Figure 6-3: Splash Screen**

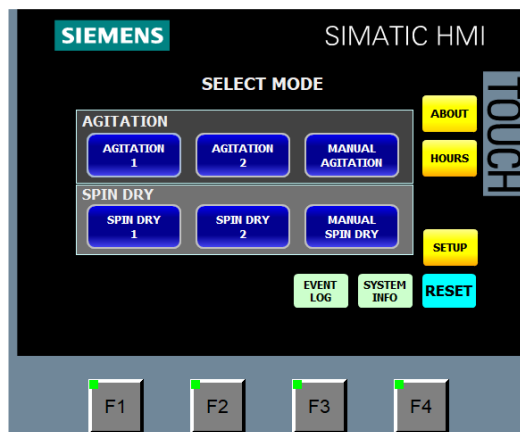


# CONTROLS

## 6.3.2 Main Menu

Navigate between program modes and info screens via the Main Menu. (See Figure 6-4)

Figure 6-4: Main Menu Screen



The CUP-30 has two program modes:

- *Agitation Mode* – runs a bi-directional agitation to wash biomass with solvent.
- *Spin Dry Mode* – runs a high-speed centrifugation to separate biomass from solvent solution.

Each program mode page has two programmable profiles and one manual profile. The programmable profiles retain the last user parameters entered. The manual profile resets to the factory default settings after every use. Select the program mode on the Main Menu. (See Figure 6-4)

There are several buttons that navigate to info screens used for diagnostic, maintenance and recordkeeping purposes.

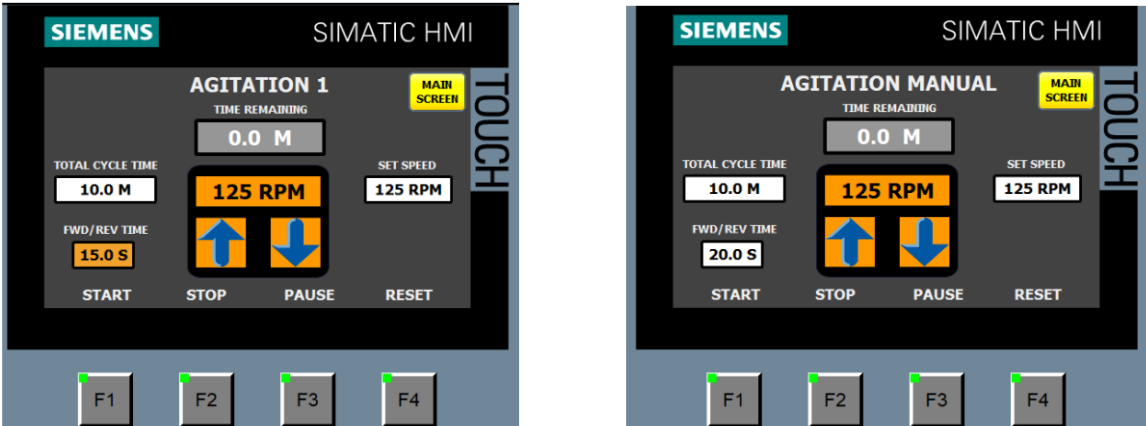
- *Event Log* – Navigates to system log for events, alarms and faults log.
- *System Info* – Navigates to system info page with diagnostic information about motor operations.
- *Hours* – Navigates to hours logs for motor maintenance and system upkeep.
- *About* – Navigates back to the Splash Screen which also contains software rev information.

## 6.3.3 Agitation Mode Screens

From the Main Menu, the Agitation Mode buttons 1 and 2 lead pre-configured agitation mode settings retained from the last use; the Manual Agitation button leads to a configurable agitation mode that is not saved by the system. Press START to begin agitation cycle. (See Figure 6-5)

# CONTROLS

Figure 6-5: Agitation Mode Screens

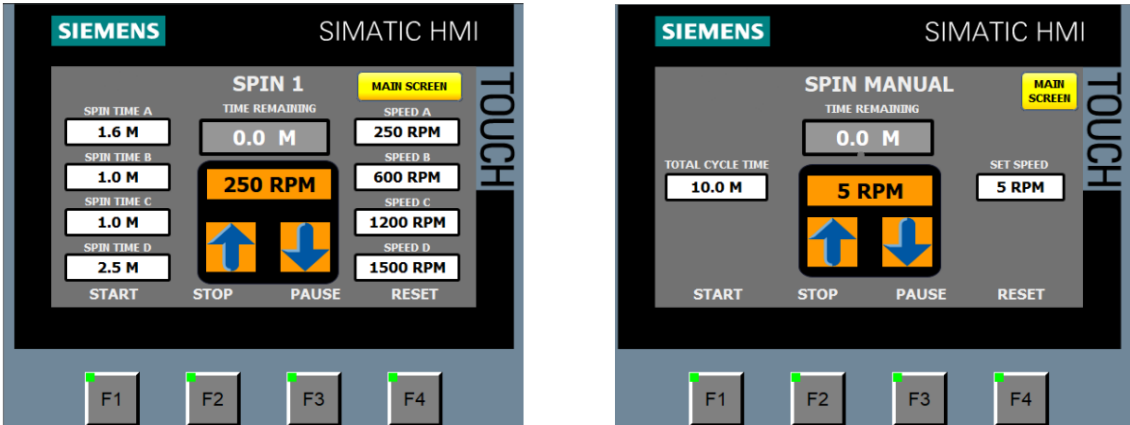


- *Total Cycle Time*: The duration of the spin cycle.
- *FWD/REV Time*: The duration between direction changes.
- *Set Speed*: The starting speed in the cycle (speed can be changed during operation).
- *Time Remaining*: When in operation, displays the time remaining in the cycle.
- *Current Speed* is displayed during operation in the orange box in the center.

### 6.3.4 Spin Dry Mode Screens

When a programmable Spin Dry Mode (1 or 2) is selected from the Main Menu, the sequenced spin time and corresponding RPMs previously configured by the operator populate the setpoints. Press START to begin the cycle. (See Figure 6-6)

Figure 6-6: Spin Dry Screens



- *Total Cycle Time*: The duration of the spin cycle.
- *Set Speed*: The starting speed in the cycle (speed can be changed during operation).
- *Time Remaining*: When in operation, displays the time remaining in the cycle.

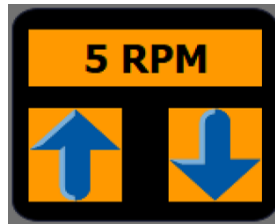
# CONTROLS

- *Current Speed* is displayed during operation in the orange box in the center.

## 6.4 Manual Speed Control

In all modes, Manual Speed Control is available to finely adjust speed at any time during operation. (See Figure 6-7)

Figure 6-7: Manual Speed Control



- UP Arrow Button – Pressing the UP arrow key will incrementally increase the basket speed.
- DOWN Arrow Button – Pressing the DOWN arrow key will incrementally decrease the basket speed.

NOTE: Holding either arrow button for longer than 3 seconds will rapidly change the basket speed.

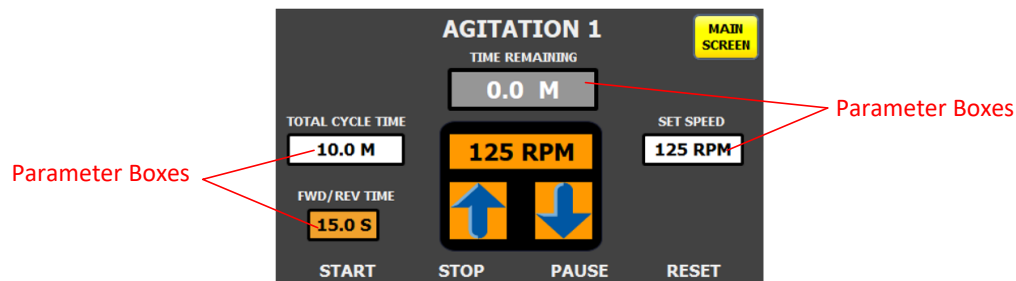
## 6.5 Changing Parameters

To set the RPM, cycle times, or any other parameters within each program mode:

1. Touch the parameter box you want to change. (See Figure 6-8)
2. A popup keypad will appear (Figure 6-9). Enter a number that is between the *Min and Max Setpoint Value* for that parameter.
3. Press the *Enter Key* (↵).

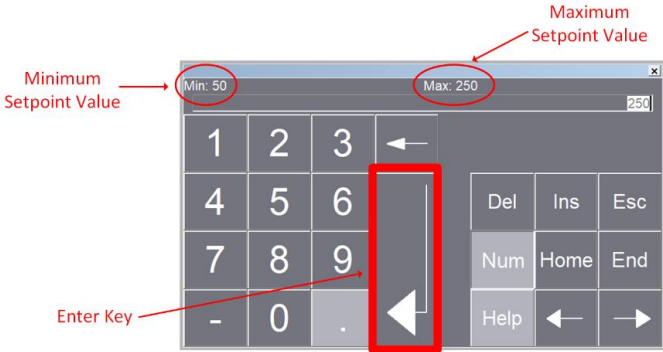
NOTE: Each parameter's control boundary is factory set.

Figure 6-8: Parameter Boxes



# CONTROLS

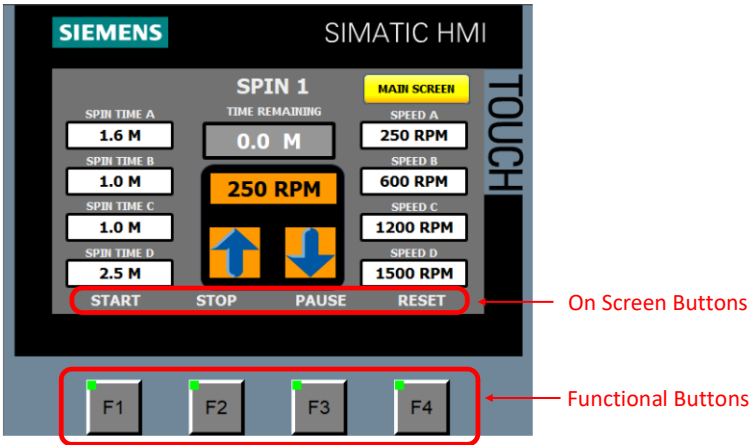
Figure 6-9: Popup Keypad



## 6.6 Functional Buttons for Operation

In all modes, both the F1-F4 physical keys and on-screen buttons (see Figure 6-10) control operation of the system as below:

Figure 6-10: Functional Buttons



- **START or F1:** begin or resume an agitation or spin cycle.
- **STOP or F2:** end the cycle and reset the timers.
- **PAUSE or F3:** stop the motor but save the time remaining in a cycle.
- **RESET or F4:** reset errors and faults.

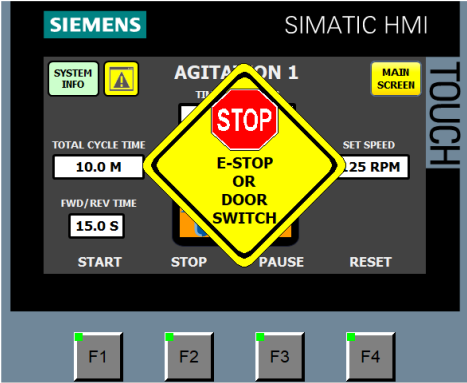
## 6.7 Faults and Alarms, Causes and Resolutions

The following section covers the potential alarms and faults that may be displayed on the HMI screen.

When the one of the two E-STOP buttons is depressed, the screen will display a E-Stop Warning (see Figure 6-11). Pull out the E-STOP button and press “RESET” (or F4) on any screen to clear the warning.

# CONTROLS

Figure 6-11: E-STOP Warning Message



When a fault or alarm occurs, the warning lamp will illuminate and flash on each screen (see Figure 6-12). Pressing the warning lamp will open the Alarms Window where alarms and fault messages will be displayed (see Figure 6-13).

Figure 6-12: Fault/Alarm Warning Lamp

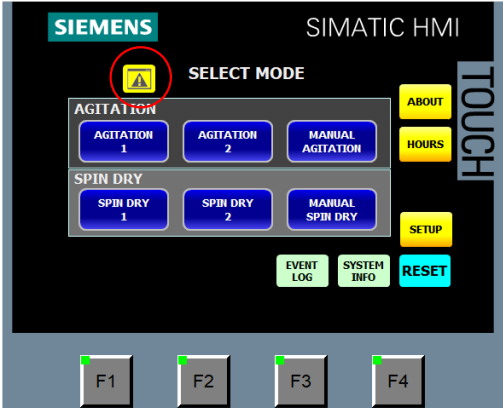
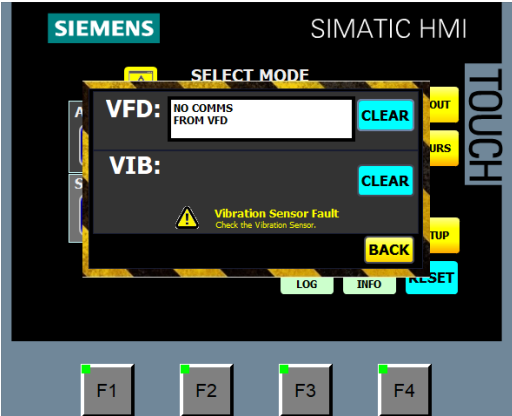


Figure 6-13: Alarms Window



# CONTROLS

The following table lists potential faults or alarms, their potential causes and resolutions. In most cases it will be necessary to correct the issue and then press the “Reset” (or F4) key on any page.

**Table 6-1: Faults, Alarms, Causes and Resolutions**

<b>Fault/Alarm Message</b>	<b>Possible Causes</b>	<b>Possible Resolutions</b>
“Sensor is out of operational range. Check the sensor and wiring.”	Vibe sensor not connected	<ul style="list-style-type: none"> <li>• Wiring issues at operator panel or HMI Meltric connector. Confirm connections or call Customer Support</li> </ul>
“The vibration sensor has triggered a warning level. Repack the bag and restart the process.”	Vibe sensor warning due to high vibration for extended period	<ul style="list-style-type: none"> <li>• Repack bag</li> <li>• Check Isolator Pressure</li> </ul>
“The vibration sensor has triggered the fault level. Repack the bag and restart the process.”	Excessive vibration for extended period has triggered a fault and the system shut down.	<ul style="list-style-type: none"> <li>• Repack bag</li> <li>• Check Isolator pressure and pressurize to factory spec</li> </ul>
“The vibration sensor has triggered the critical fault level. Repack the bag and restart the process.”	Extreme vibration level exceeded; system shut down.	<ul style="list-style-type: none"> <li>• Repack bag</li> <li>• Check Isolator pressure and pressurize to factory spec</li> </ul>
“VFD Faulted”	Various, read additional fault information on screen	<ul style="list-style-type: none"> <li>• Contact Customer support for Assistance</li> </ul>
“VFD Failed to Start”	VFD not responsive	<ul style="list-style-type: none"> <li>• Contact Customer support for Assistance</li> </ul>
E-STOP or Door Switch	E-STOP on operator or main panel engaged	<ul style="list-style-type: none"> <li>• Check that E-STOP buttons are pulled out on both panels</li> </ul>

# OPERATIONS

## 7 Operations

This section outlines a basic extraction process. Depending on materials used and desired results, details within each step of the process may be different.

### 7.1 Before Extracting

ONLY TRAINED PROFESSIONALS WITH A COMPLETE OPERATIONAL UNDERSTANDING OF THE EQUIPMENT AND OF THE RISKS ASSOCIATED WITH SOLVENT USE SHOULD BE AUTHORIZED TO USE THE EQUIPMENT. THE USE OF SOLVENT HAS RISKS. ANY MISUSE OF THIS EQUIPMENT CAN RESULT IN SEVERE INJURY, INCLUDING BUT NOT LIMITED TO DEATH, DISABILITY AND PROPERTY DAMAGE.



This equipment uses high-proof alcohol. Alcohol is a flammable liquid. Improper use may cause alcohol to discharge, resulting in an unsafe work environment. Use a properly rated CFM fume hood, personal protective equipment (PPE), and appropriate detectors.



Operator must follow all precautions and safety guidelines to ensure their own safety, the safety of other personnel, and the protection of property.

### 7.2 Extraction Overview

A basic overview of the extraction process follows. Each step is explained in detail in the subsequent sections.

- [System Inspection and Power Up](#)
- [Pulling Vacuum on the Insulating Jacket \(OPTIONAL\)](#)
- [Chilling the Alcohol \(OPTIONAL\)](#)
- [Material Preparation](#)
- [Loading the Filter Bag](#)
- [Loading the Centrifuge Basket](#)
- [Filling the Chamber with Alcohol](#)
- [Running the Agitation Cycle](#)
- [Draining the System](#)
- [Running the Spin Dry Cycle](#)
- [Unloading the System](#)
- [Cleaning the System](#)
- [Clean in Place \(C.I.P.\) Procedure](#)

# OPERATIONS

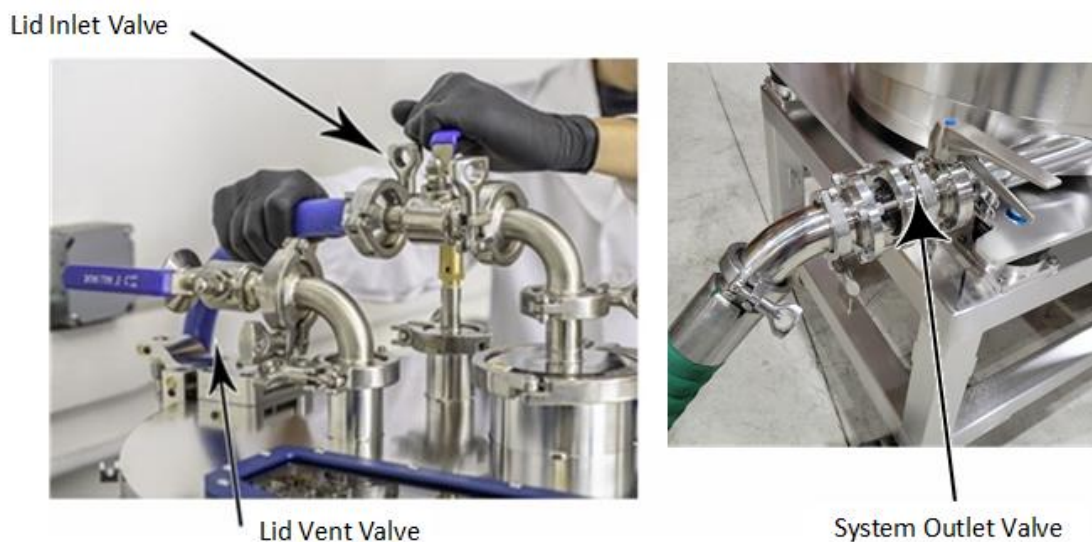
## 7.3 System Inspection and Power Up

Prior to powering up the system, confirm the following:

**Step 1.** Verify valves are set as follows: (See Figure 7-1)

- Lid inlet valve: OPEN
- Lid vent valve: OPEN
- System Outlet Valve: CLOSED

**Figure 7-1: Process Valves**



**Step 2.** Inspect the system for loose fittings or damaged seals. Tighten fittings and replace seals as needed.

**Step 3.** Inspect the Barrier Fluid Reservoir level. Note any changes in liquid level. Add if needed.

**Step 4.** Turn the main control panel power switch to **ON**. The operator panel begins the power-up sequence. The power-up sequence takes 1-2 minutes. The Splash Screen appears on the HMI touchscreen when the power up sequence is complete.

## 7.4 Pulling Vacuum On the Jacket (OPTIONAL)

When pulling vacuum on the jacket, it will be necessary to provide an ½" NPT plug, ½" NPT threaded tee, ½" NPT pressure gauge (or ¼" gauge with ½" x ¼" reducing bushing), ½" NPT valve and fittings rated for vacuum service. When doing so, observe the following precautions:

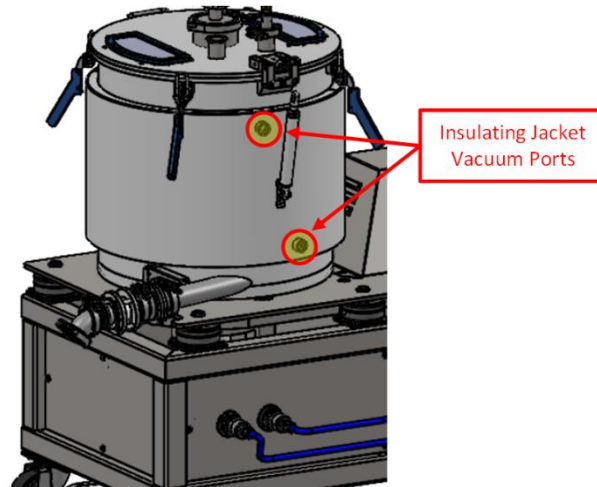
- Install ½" NPT plug in one of the two jacket ports.
- Install ½" NPT tee with a pressure gauge and a ball valve rated for vacuum on the other port and

# OPERATIONS

connect vacuum system to this valve.

- Open the valve, pull vacuum and then close the valve once the desired vacuum pressure has been reached. Do not exceed 15inHG of vacuum.

**Figure 7-2: Insulating Jacket Vacuum Ports**



## 7.5 Chilling the Alcohol (OPTIONAL)

If your SOP calls for chilled ethanol processing method, alcohol is to be pre-chilled in an explosion-proof freezer to the desired the temperature per your SOP.

The CUP is rated to a minimum temperature of -40°C.



Operating the CUP-30 below -40°C voids the system warranty and may cause system damage. **DO NOT OPERATE BELOW -40°C.**

### NOTE

If running the cold alcohol method, we recommend pulling a mild vacuum of up to 15 inHg (not full vacuum) on the system's insulation jacket. This is to help keep heat transfer to a minimum.

## 7.6 Material Preparation

- Prepare the wet or dry botanical material by milling it to a medium-coarse grind (1/4 – 3/8-inch mill size) prior to loading into the filter bag.
- Weigh out a maximum of 30 lbs. of botanical material.

# OPERATIONS

## 7.7 Loading the Filter Bag



An unbalanced basket can cause major damage to the bearing assembly and excessive wear on the system. Proper loading of the filter bag is VERY important. Always make sure to pack the material evenly by layering and lightly packing each layer. Repeat until the material is evenly loaded. AVOID STEMS AND STICKS AND UNEVEN LOADS. HOMOGENEOUS BIOMASS IS PREFERRED.

- Load 20-30 lbs. of wet or dry biomass into the primary filter bag.
- Evenly distribute the biomass in the filter bag.

### IMPORTANT!

Always use only ETS's closed zipper filter bags. Make sure the zipper is fully closed and the bag evenly loaded

## 7.8 Loading the Centrifuge Basket

- Step 1.** Gently place the preloaded filter bag into the system basket while keeping the material equally distributed. (See Figure 7-3)

**Figure 7-3: Loading the CUP-30 Basket**



- Step 2.** Close the lid and securely fasten all lid clamps. (See Figure 7-4)

# OPERATIONS

Figure 7-4: Locking Lid Clamps



**PINCH HAZARD!** To avoid risk of injury, DO NOT place fingers or limbs on rim of vessel when operating the lid.



DO NOT OPERATE THE MACHINE WITH THE LID OPEN OR CLAMPS UNLOCKED. DOING SO MAY RESULT IN DAMAGE OR INJURY.

## 7.9 Filling the Chamber with Alcohol

### 7.9.1 Pneumatic Transfer Pump Solvent Transfer Method

To transfer solvent from a source tank into the CUP chamber, it is necessary to use either a pneumatic liquid transfer pump or the “Nitrogen-Assist Method” (described in Section 7.9.2). The procedure to fill the CUP using the Pump Method follows:

- Step 1.** Verify the hose from the source tank to the pump inlet is properly connected and clamps are tight.
- Step 2.** Verify that the hose assembly from the pump outlet to the system lid is properly connected and clamps are tight.
- Step 3.** Set the air compressor regulator between 60 - 90 PSI or per pump specifications. Allow the air compressor to reach the desired pressure in the tank before use.
- Step 4.** Connect the air compressor throttle valve hose to the transfer pump.
- Step 5.** Open the alcohol source tank valve and slowly turn the throttle valve to begin the liquid transfer into the system.

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**Step 6.** Monitor the air flow to the pump to ensure the flow is consistent with the manufacturer’s recommendations for safe pump operation.



Always visually monitor fill levels, tanks, valves, and hoses for leakage. While the system is protected with pressure relief valves, care should be taken to ensure overfilling does not occur.

## 7.9.2 Nitrogen-Assisted Filling and Fluid Transfer Method (OPTIONAL)

It is possible to use a nitrogen-assisted fluid transfer procedure to move solvent between a source vessel and the CUP-30 and to and between various holding vessels. Use only nitrogen as it is inert and won’t affect the botanical compounds. The procedure for “Nitrogen-Assist Method” follows:

**Step 1.** Close all valves on the Discharge Tank dip tube manifold. (See Figure 7-5)

**Figure 7-5: Dip Tube Manifold, Valves Closed**



**Step 2.** Attach the regulator to the nitrogen tank. Use a wrench to tighten the connection. Do not over-tighten. (See Figure 7-6)

**Figure 7-6: Regulator and Nitrogen Tank Connection**



# OPERATIONS

**Step 3.** Attach the ¼" pressure hose to the nitrogen tank regulator. Use a wrench to tighten the connection—do not over-tighten. (See Figure 7-7)

**Figure 7-7: Pressure Hose and Nitrogen Tank Regulator Connection**



**Step 4.** Attach the other end of ¼" JIC pressure hose to the dip tube manifold. (See Figure 7-8)

**Figure 7-8: Pressure Hose to Dip Tube Manifold Connection**



**Step 5.** Open the main valve on the nitrogen tank. (Right side gauge shows tank pressure) (See Figure 7-9)

**Figure 7-9: Main Valve Tank Pressure**



# OPERATIONS

**Step 6.** Slowly turn the knob on the regulator until 15 PSI shows on the left gauge.

**Figure 7-10: Set Regulator Pressure 15 PSI**



**Step 7.** Close the lid inlet valve.

**Figure 7-11: Lid Inlet Valve in Closed Position**



**Step 8.** Close the system outlet valve.

**Figure 7-12: System Outlet Valve in Closed Position**



# OPERATIONS

**Step 9.** Open the ¼” ball valve on the dip tube manifold to pressurize the vessel. Do not exceed 15 PSI.

**Figure 7-13: Dip Tube Manifold Ball Valve in Open Position**



**Step 10.** Open the Lid Vent Valve on the CUP, then open the Lid Inlet Valve and begin filling. (Note: The Inlet Valve is attached to the center of the lid with the 4-inch Triclamp) View liquid fill levels through the lid sight glass and close the Inlet Valve when the desired fill level is achieved – usually 1 inch above the filter bag.

**Figure 7-14: Lid Inlet and Vent Valves in Open Position**



NEVER fill the system with the lid vent valve closed. Always monitor the filling procedure and close the inlet valve when liquid transfer ends (indicated by sputtering). Always visually monitor fill levels, tanks, valves, and hoses for leakage. While the system is protected with pressure relief valves, care should be taken to ensure neither overfilling nor pressurization of the CUP chamber occurs.

# OPERATIONS

## 7.10 Running the Agitation Cycle

From the HMI touchscreen, select and run the desired Agitation Cycle. The bi-directional Agitation Cycle is aimed at fully removing targeted botanical compounds. Make sure the vent valve is open during agitation. (See Section 6.3.3 for more information on settings for the Agitation Cycle)

## 7.11 Draining the System

Upon completion of the agitation cycle, open the Outlet Valve to drain the system. Make sure the lid and the keg vent valves are open to ensure full flow. The tincture is diverted to a properly rated storage reservoir for further processing. Observe the discharge sight glass to make sure at the liquid is fully drained before proceeding to Spin Dry.



Allow system to completely drain all liquid before starting spin cycle. Starting the spin dry cycle with remaining liquid in the chamber may cause errors and stop the process.

## 7.12 Running the Spin Dry Cycle

From the Operator Control Panel, select and run the desired Spin Dry Cycle. The Spin Dry Cycle uses centrifugal force to remove up to 98% of the remaining alcohol tincture trapped within the biomass after the washing process is complete.



Never leave the system unattended during the Spin Dry Cycle. Always monitor the system for excessive vibration. If excessive vibration occurs at any point, immediately push the Emergency Stop button on the front of the Operator Panel, and resume with lower RPMs until the batch is complete.



When using Spin Dry, never allow excessive vibrations. If the balance of the basket is causing excessive vibrations when the cycle reaches maximum speed, gently walk the speed down using the RPM-down arrow until there is no more heavy vibration. If heavy vibration persists, stop the system and re-balance the bag.

# OPERATIONS



During the Spin Dry Cycle, it is important to remove most of the liquid at lower RPMs (150 to 200). This keeps the system from overloading and heavily vibrating at higher RPMs. Never increase RPMs faster than the liquid can be removed from the material.

Make sure the system discharge sight-glass is mostly empty before ramping up to 1500 RPM (generally 2-3 minutes).



The system is equipped with a vibration sensor and will shut down if severe vibration is excessive or for too long of a duration. It will be necessary to reset the vibration fault and inspect and repack the bag should the system shut down due to excessive vibration.

## 7.13 Unloading the System

Upon completion of the Spin Dry Cycle, unload the system by opening the lid and removing the filter bag from the basket.



**LIFTING HAZARD:** The contents of the filter bag may be heavier due to being saturated with alcohol. Two people may be needed to remove the filter bag from the chamber to avoid injury.

## 7.14 Cleaning the System

Wiped down the system after every use. Immediately clean up any spills including all accessories and working surfaces.

Suitable cleaning agents are alcohol, isopropanol, limonene and warm water. Only use nonabrasive cleaning utensils. Never use abrasive cleaning products.

## 7.15 Clean in Place (C.I.P.) Procedure

Fill system with 5 gallons of alcohol, which should rise to 1-inch above the bottom of the basket. Close the lid and begin manual spin sequence. Increase the RPM of the spin sequence to a maximum speed of 500 RPM. Monitor for excessive vibration and reduce the RPM if needed. Drain the system, refill and repeat as many times as needed per your SOP.

# MAINTENANCE

## 8 Maintenance and Support

### 8.1 Periodic Maintenance

Periodic maintenance is essential for safe and proper operation of the CUP system. Replace worn components immediately.



Component wear varies depending on the amount of usage. Inspect all nuts, bolts, and gaskets before each use. If there is any question about the integrity of a component, replace it immediately.



Using third-party replacement components voids the warranty and invalidates the engineering peer review of this equipment. Contact ETS customer service to order replacement parts.

See Table 8-1 for recommended inspection and replacement schedule.

**Table 8-1: Maintenance Schedule**

Component	Inspection Interval	Maintenance / Replacement Schedule
Drive Belt	Monthly	12 – 18 months
Barrier Fluid Reservoir Level	Before each use	Fill as needed
Isolators	Weekly	40 PSI +/- 5 PSI, add air as needed
Hoses	Before each use	3 – 6 months
Lid Gasket	Before each use	6 – 12 months
Tri-Clamp Gasket	Before each use	6 – 12 months
Sanitary Clamp	Before each use	12 – 18 months
Pressure Relief Valve	N/A	N/A
Ball Valves	Before each use	12 – 18 months

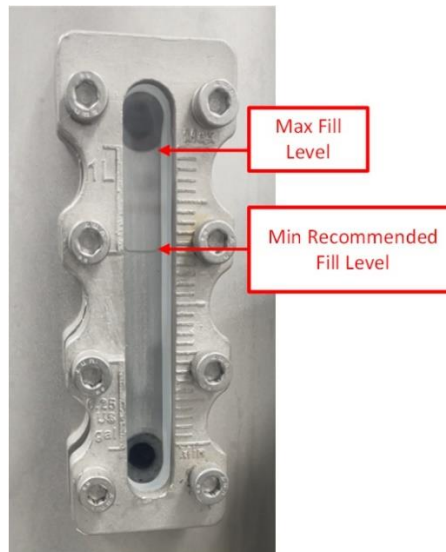
# MAINTENANCE

## 8.2 Barrier Seal Maintenance

The Barrier Fluid Reservoir shipped with the CUP system is an essential piece of equipment that ensures proper function of the CUP system. The barrier fluid, in this case alcohol, is used to lubricate the mechanical seals equipped on the machine. The vessel provided on the stand is located at the correct height to ensure proper operation of the barrier seal.

**The reservoir is shipped empty and it is absolutely critical to fill it prior to system use. Additionally, once filled, it is critical to keep the reservoir pressurized with nitrogen using an external nitrogen bottle or house nitrogen.** The pressure regulator on top of the vessel is set at the factory to 20 PSI. Check the level of the ethanol in the reservoir with the site glass on the side and fill if it falls below the minimum recommended fill level (see Figure 8-1).

**Figure 8-1: Barrier Fluid Reservoir Site Glass Max/Min Fill Levels**



The seals on the machine consume a small amount of alcohol from the vessel during operation. Replenish the alcohol so that it stays above the minimum recommended fill level.



Do not attempt to lower or raise the height of the Barrier Fluid Reservoir in relation to the CUP chamber, doing so may result in damage to system seals.



Do not attempt to lengthen the hose or locate the vessel further away from the machine as this may result in damage to system seals.



Do not increase or decrease the pressure regulator or damage to the seals could result.

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**CAUTION**

Do not attempt to run the machine without the Barrier Fluid Reservoir attached, or without fluid in the reservoir. Seal damage will result.



**CAUTION**

Do not use compressed air or any other gas other than nitrogen to pressurize the Barrier Fluid Reservoir. Machine damage or injury will result.

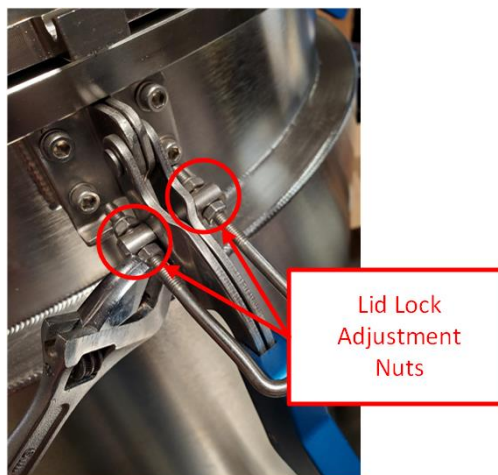
## 8.3 Lid Lock and Lid Alignment Adjustment

Over time, should liquid begin to leak through the lid gasket seal during operation, the lid locks may need to be re-adjusted or the lid may need to be re-aligned. The following sections outline those adjustment procedures.

### 8.3.1 Lid Lock Handle Tension Adjustment Procedure

- Step 1.** Evenly adjust the two pairs of Lid Lock Adjustment Nuts on each lid lock handle (See Figure 8-2). Loosening the nuts lengthens the lid lock arm and reduces the clamping force. Tensioning the nuts has the opposite effect.
- Step 2.** Tension nuts in small increments until the lid lock is secure when clamped but not overtightened.
- Step 3.** Repeat on each lid lock, as needed to evenly clamp lid

**Figure 8-2: Lid Lock Adjustment Nut Pairs**



If that is not successful to seal the lid, it may be necessary to re-adjust the lid pitch by using the two Lid Alignment Set Screws on the top of the hinge as pictured in Figure 8-3 and using the following procedure:

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## 8.3.2 Lid Alignment Procedure

- Step 1.** Disengage all lid locks
- Step 2.** Set the pitch of the lid by loosening one set screw and tightening the other until the lid lands flat on the gasket when closed.
- Step 3.** Open and close the lid lightly a few times to confirm even landing
- Step 4.** Re-clamp lid locks and re-test for leaks.

**Figure 8-3: Lid Alignment Set Screws**

