



# **Carousel Auto Loader Generation 1**

**Model: UC-CAL**

**Patent #: Pending...**

**Patent #: US 7,996,946 B1**



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# OPERATING & SET-UP INSTRUCTIONS

Be sure to read this manual before starting operation, maintenance and cleaning of the machine.

Keep this manual in a safe place.

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However, if you find any errors or would like to make suggestions for improvement then write to Ultra Clean Technologies Corp. ([info@ultracleantech.com](mailto:info@ultracleantech.com)).

This manual was originally written in English. If applicable, a copy is available on written request.



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**TABLE OF CONTENTS**

<b>1</b>	<b>INTRODUCTION.....</b>	<b>4</b>
<b>2</b>	<b>GENERAL INFORMATION .....</b>	<b>5</b>
2.1	Intended Use.....	5
2.2	(Optional) Peripheral Equipment.....	5
2.3	Prohibition Machine-Modification .....	6
2.4	Warranty .....	6
<b>3</b>	<b>SAFETY .....</b>	<b>6</b>
3.1	Important Information.....	6
3.2	Description of Safety Symbols .....	7
3.3	Warning Labels on Control Station and Containment Barrel.....	7
3.4	Safety Precautions.....	8
<b>4</b>	<b>LAYOUT OF CONTROL STATION .....</b>	<b>9</b>
4.1	Front View.....	9
4.2	Rear View .....	9
<b>5</b>	<b>LAYOUT OF CONTAINMENT BARREL .....</b>	<b>10</b>
<b>6</b>	<b>SET-UP.....</b>	<b>11</b>
6.1	Connecting the Footswitch.....	11
6.2	Connecting the Containment Barrel.....	11
6.3	Connecting the Air Supply.....	12
6.4	Power Supply.....	12
6.5	Hopper Box Installation & Loading Projectiles .....	13
6.5.1	Installing the Hopper Box.....	13
6.5.2	Loading Projectiles.....	14
<b>7</b>	<b>GETTING STARTED / OPERATING INSTRUCTIONS .....</b>	<b>15</b>
7.1	Select Language .....	15
7.2	Enter "User ID" .....	15
7.3	Select Projectile Size .....	15
7.4	Cleaning Modes.....	16
7.4.1	Select Cleaning Mode.....	16
7.4.2	Normal Clean.....	16
7.4.3	Air Purge + 1 Projectile .....	16
7.4.4	Air Purge + 2 Projectiles .....	17
7.4.5	Timed Air Purge.....	17
7.5	Launch & Indicator Screens.....	18
7.5.1	The Launch Screen.....	18
7.5.2	Indicator Screens .....	18
7.6	Faults .....	19
7.7	When You're Finished / Changing Projectile Sizes .....	20
7.7.1	The Finish Button.....	20
7.7.2	Changing Projectile Sizes .....	20
7.8	Settings Menu .....	21
7.8.1	Projectiles Size Selection.....	21
7.8.2	Changing the Language.....	21
7.8.3	Air Ionization .....	22
7.8.4	Changing Password.....	22
7.8.5	Projectile Counters.....	23
7.8.6	Fault Counters .....	24
7.8.7	Timers .....	25
7.9	Data Logging Software.....	26
7.9.1	Download the Data Logging Program .....	26
7.9.2	Learn About Data Logging from Unitronics .....	27
7.9.3	Data Export Manual (DataXport).....	27
7.10	Icon Glossary .....	28

<b>8</b>	<b>CONTAINMENT BARREL – INDICATOR LIGHTS</b>	<b>29</b>
<b>9</b>	<b>CLEANING &amp; MAINTENANCE</b>	<b>30</b>
9.1	Areas of Concern	30
9.2	Cleaning Procedures	30
9.2.1	Hopper Box:	31
9.2.2	Projectile Drop Chute:	31
9.2.3	Firing Chamber:	31
9.3	Do's & Don'ts for Cleaning the UC-CAL	32
9.4	Air Filter	32
9.5	UC-D1 Super Dry Compressed Air Dryer	32
9.6	Replacing Indicator Lights	32
9.7	Disposal	32
<b>10</b>	<b>TROUBLESHOOTING</b>	<b>33</b>
10.1	Common Troubleshooting	33
10.2	Jammed Projectiles	34
10.3	Resetting the Machine	34
10.4	Contacting Support	34
<b>11</b>	<b>PERIPHERAL EQUIPMENT</b>	<b>35</b>
11.1	Hand Held Launcher	35
11.1.1	Installation	35
11.1.2	Operating Procedures	36
11.2	Marking System	37
11.2.1	Installing the Marking System (UC-CAL-MS model only)	38
11.2.2	Adjusting the Marking System	42
11.2.3	The Marking Pen	43
11.2.4	Operating Instructions	45
<b>12</b>	<b>TECHNICAL SPECIFICATIONS</b>	<b>47</b>
12.1	Specifications	47
12.2	Electrical Requirements	47
12.3	Pneumatic Requirements	47
12.4	Wiring Diagrams	48
12.4.1	UC-CAL Wiring Diagram	49
12.4.2	UC-CAL-MS Wiring Diagram	62
12.5	Pneumatic Diagrams	76
12.5.1	UC-CAL Pneumatic Diagram	76
12.5.2	UC-CAL-MS Pneumatic Diagram	77
12.6	Parts List	78
<b>13</b>	<b>APPENDIX</b>	<b>80</b>
13.1	Machine Plate	80
13.2	EC Declaration of Conformity for Machinery	81
<b>14</b>	<b>RECOMMENDED CLEANING PROCEDURES</b>	<b>82</b>
14.1	Hose	82
14.2	Tube	82
<b>15</b>	<b>SIZING CHARTS</b>	<b>83</b>
<b>16</b>	<b>X-Y AXIS REFERENCES</b>	<b>84</b>

## 1 INTRODUCTION

The Ultra Clean Carousel AutoLoader Gen. 1 (UC-CAL) is comprised of two main units:

- Carousel AutoLoader (CAL)
- Containment Barrel (CB)

### Features & Benefits of the Carousel AutoLoader (UC-CAL)

- Intuitive touchscreen allows for easy navigation and set-up in multiple languages.
- (4) Four Cleaning Modes with time-adjustable air purge.
- Capable of logging data such as projectile counts and faults to monitor that projectiles are not left inside a hose or tube that has been cleaned.
- Containment Barrel indicators inform the operator when a projectile has exited the hose assembly and when their selected cleaning process is completed.
- Employs an electronic foot switch to activate the firing sequence.
- The (Optional) UC-CAL-HH Electronic Hand Held Launcher can be utilized in lieu of the electronic footswitch.
- The (Optional) UC-CAL-MS Marking System variant will assist the operator in marking the hose cover with an indicator dot to assure proper stem depth insertion prior to crimping.
  - The indicator dot can also mean that projectile was fired and verified.
- Optional data exporting (RS-232 port / Ethernet port accessible upon request prior to purchase).

### Features & Benefits of Containment Barrel

- Catches and verifies that the projectile has been expelled.
- Includes a wheeled dolly for ease of use.
- Large filter allows compressed air to escape while retaining contamination residue.
- Built-in sight gauge indicates when system needs emptying.
- Indicator lights signify at which stage system is operating.

## 2 GENERAL INFORMATION

### 2.1 Intended Use

The purpose of the Carousel AutoLoader is twofold: first to guarantee that a projectile is never left inside a hose or tube that has been cleaned and second, to minimize human operation by automatically loading projectiles for the firing sequence. The unit has a self-contained launching system which may be augmented with optional hand-held launcher upgrades. Easy configuration of the firing and cleaning modes is enabled by specially designed software by Ultra Clean Technologies Corp. and may be set via the HMI Touch Screen on the unit.

### 2.2 (Optional) Peripheral Equipment

- UC-CAL-HH Hand Launcher
  - Gives the operator greater flexibility and control over complex applications (like bundled tubing) by extending the launching point to a hand-held launcher.



- UC-CAL-MS Marking System
  - Applies an indicator dot on the hose cover during the cleaning process. This indicator is fully adjustable and is intended to assist the operator on assuring the fitting's stem is has been fully inserted to the correct depth before the crimping process.



### **2.3 Prohibition Machine-Modification**

Do not attempt to make any modifications or alterations to the system without the prior written consent of Ultra Clean Technologies Corp. Unauthorized modifications or alterations to the units could cause serious physical injury and/or material damage. Prohibit using any other brand of projectiles other than Ultra Clean. Do not re-use projectiles as this will reintroduce contamination. Re-using projectiles may cause damage to the UC-CAL.

### **2.4 Warranty**

Ultra Clean Technologies Corp. has manufactured the UC-CAL Carousel AutoLoader with outstanding quality materials and production methods. Warranty for any manufactured defects are limited to replacement or repair of the verification system or parts of the system for 12 months after purchase date (date of purchase receipt). Ultra Clean Technologies Corp. will reject all warranty claims related to the following. (*misuse or modifications, contaminated compressed air, electrical surges, failure to provide scheduled cleaning and maintenance in accordance with Ultra Clean written instructions in section 9, any projectile other than a new, clean UC or Tube style from Ultra Clean Technoloiges Corp*).

## **3 SAFETY**

### **3.1 Important Information**

Before attempting to use the UC-CAL, read, understand, and know all the safety information in this chapter. If you do not follow all the warnings and procedures in this manual, it could lead to serious injury to yourself or others. This Ultra Clean Carousel AutoLoader (UC-CAL) was designed with safety in mind and includes features to help prevent injury and damage. However, all UC-CAL units can be dangerous if misused. This manual is intended to help you operate the units in a safe manner. In this manual the user is the body with authority and responsibility for the units, usually a company or a corporation. The operator is a person who physically interacts with the unit and/or the unit's control systems under the direction and with the consent of the user. In Ultra Clean Technologies' manuals an operator includes a person who cleans the machine. It is your responsibility to operate this system in accordance with all the safety instructions and procedures in this manual and with all other safety procedures in your workplace. It is the user's responsibility to make sure that the system is correctly installed, configured, commissioned, operated, serviced, and maintained so that such actions are only carried out by people who have been properly trained for those tasks. It is also the user's responsibility to make sure that the machine is only used in full accordance with laws - and regulations, which have the force of law - in the jurisdiction in which the machine is installed.

### 3.2 Description of Safety Symbols

Safety and Warning signs are attached to the machine to give safety information.

All Safety/Warning signs are repeated and usually further explained in this manual.

	Mandatory: Read User Manual before using this system.		Caution! Warning sign
	Use eye-protection		Caution! Moving and rotating parts.
	Use hearing protection		Electrical hazard

Table 2: Safety symbols in manual

### 3.3 Warning Labels on Control Station and Containment Barrel



Read User Manual before using this system



Electrical hazard

### 3.4 Safety Precautions

**The following precautions must be followed-up when using the UC-CAL. Failure to follow warnings and fully understand the operation of the UC-CAL could cause serious injury to the operator or other personnel and may void warranty.**



Before starting to use the Carousel AutoLoader read the operation instructions and take care of the safety precautions as indicated.



Safety glasses are mandatory when operating the UC-CAL and/or UC-CAL-HH Hand Held Launcher attachment.



Hearing protection should be worn when operating the UC-CAL and/or UC-CAL-HH Hand Held Launcher attachment.



The units are never to be operated with any safety cover(s) removed.

**Do not use the system until you are sure that the routine checks described have been completed and that the routine preventive maintenance program is up-to-date. If any part of the system is known (or suspected) to be defective or wrongly adjusted, do not use the system until a repair has been made.**



**Operation of the system with defective or wrongly adjusted components could create safety hazards. This could lead to serious personal injury.**

- The area around the units must be clean and dry at all times.
- Never point nor fire the firing device in the direction of a person. The projectile or expelled contamination could cause injury.
- Do not attempt to dislodge a projectile from the launchers when air hose is still connected to the Carousel AutoLoader.
- Do not place any objects into the Carousel AutoLoader other than **Ultra Clean Projectiles**.
- UC-CAL and projectiles are only to be used for hose and tubes rated for at 110 PSI / 7.5 Bar or more.
- A projectile catcher (such as the UC-CB-PS Containment Barrel) should always be used to catch spent Ultra Clean Projectiles and contamination.
- Keep hands and body parts away from the front of the nozzle when firing projectiles.

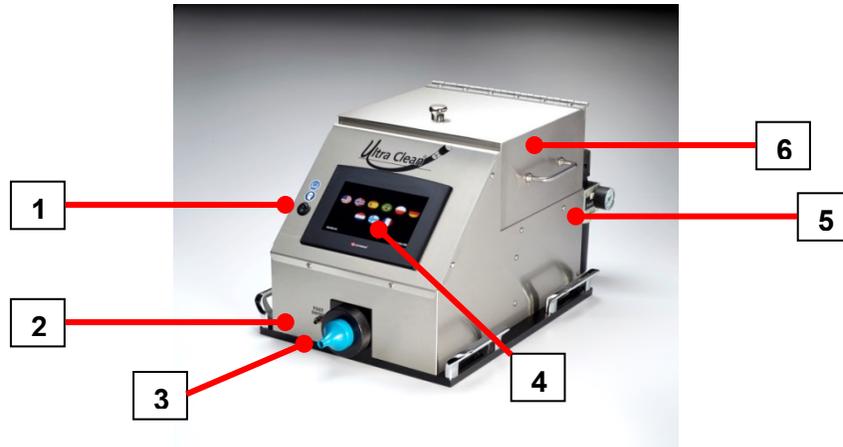


**WARNING – Do not insert fingers or objects into openings of the launcher while the unit is in operation. Serious physical injury and/or irreparable damage to the unit may result!**

**Please call Ultra Clean Technologies Corp. with any questions in regards to the safe operation of the UC-CAL.**

## 4 LAYOUT OF CONTROL STATION

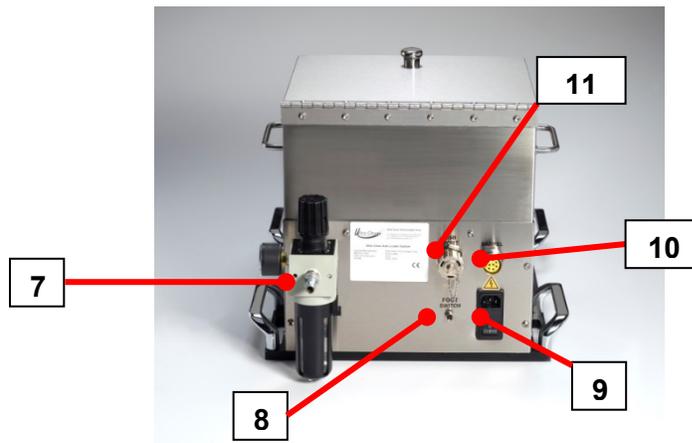
### 4.1 Front View



*Photo 1: Front view – Carousel AutoLoader*

- 1 = Power Switch.
- 2 = Foot Switch / Hand-Held connection port.
- 3 = Firing Nozzle.
- 4 = Touch Screen (HMI).
- 5 = Air Filter Regulator with Pressure Gauge.
- 6 = Projectiles Hopper Box.

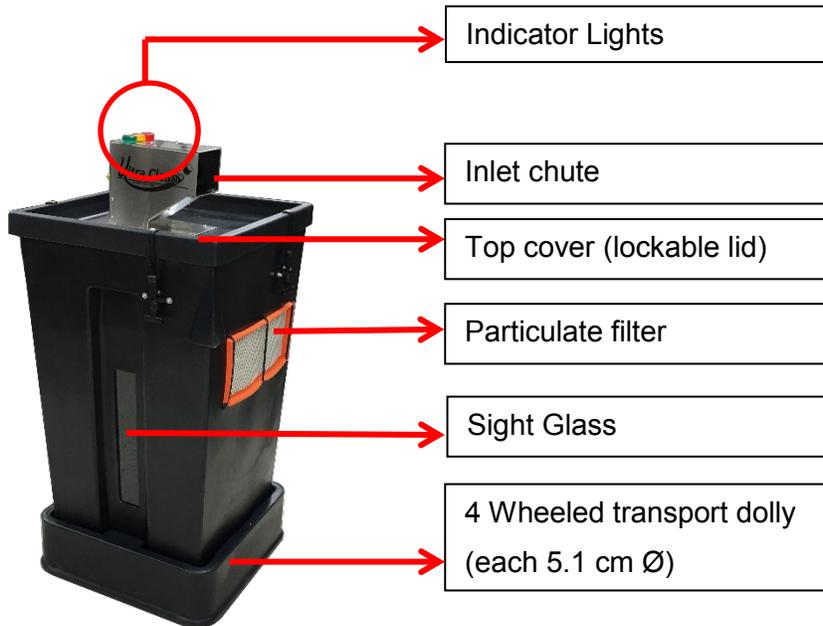
### 4.2 Rear View



*Photo 2: Rear view – Carousel AutoLoader*

- 7 = Air Filter Regulator / Air Connection Coupler.
- 8 = Alternative Foot Switch connection port.
- 9 = 120/240 VAC Power Supply Plug, Power Switch, and Fuse (with spare).
- 10 = Electrical connector for the UC-CB-PS Containment Barrel.
- 11 = USB Port.

## 5 LAYOUT OF CONTAINMENT BARREL



*Photo 4: Layout of Containment Barrel*

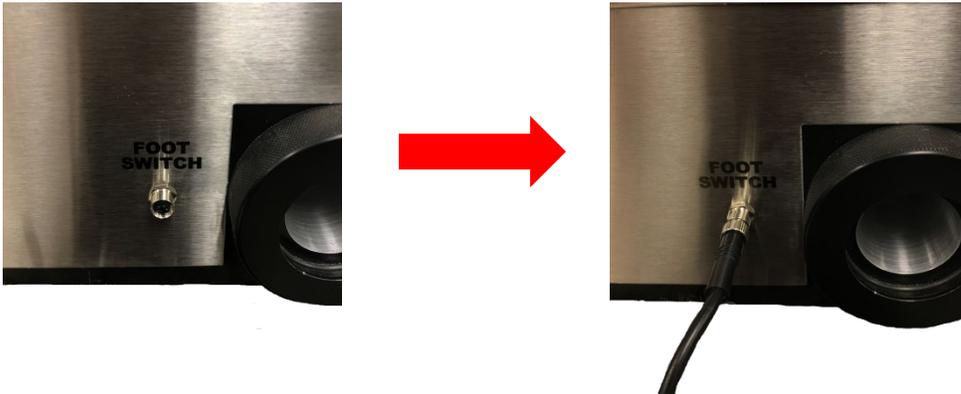
## 6 SET-UP



**DO NOT POWER UP THE CAROUSEL AUTOLOADER UNTIL ALL ELECTRONIC AND AIR CONNECTIONS HAVE BEEN MADE!**

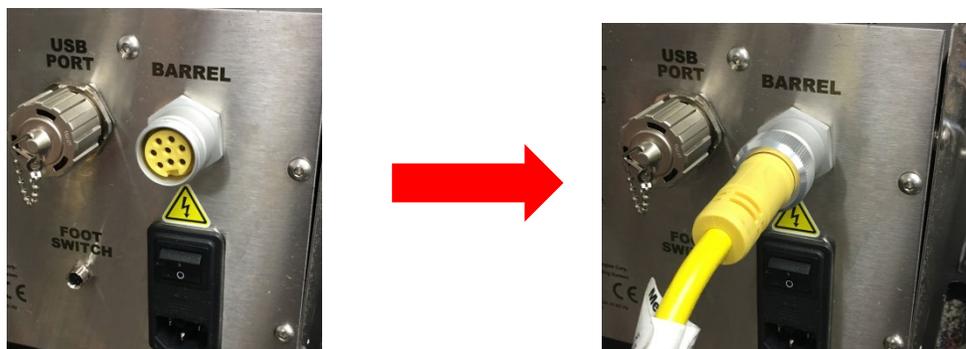
### 6.1 Connecting the Footswitch

The electronic footswitch may be connected to either the front or rear port labeled “Foot Switch” on the UC-CAL. Insert the keyed 4 prong cable into the port and then screw the locking ring to secure the cable.



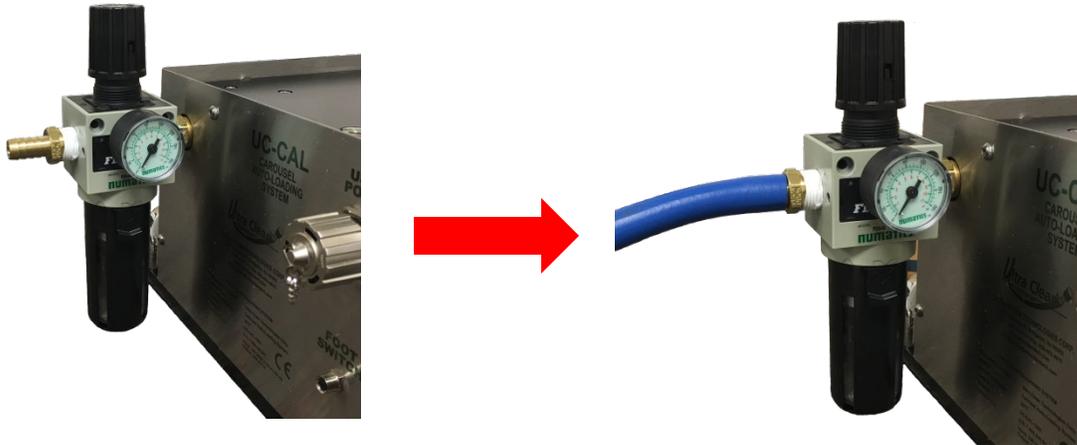
### 6.2 Connecting the Containment Barrel

The Containment barrel is connected with a keyed yellow 8 prong cable. Insert the cable into the port labeled “Barrel” on the rear side of the UC-CAL. Screw the locking ring to secure the cable.



### 6.3 Connecting the Air Supply

The UC-CAL comes equipped with a 5µ (micron) air filter regulator on the rear side of the machine. The air filter regulator is already outfitted with a ½” air hose barb. Insert your ½” air supply line over the barb to create a firm and secure connection. Once the airline has been connected, you may engage the air supply.



### 6.4 Power Supply



**DO NOT POWER UP THE CAROUSEL AUTOLOADER UNTIL ALL ELECTRONIC AND AIR CONNECTIONS HAVE BEEN MADE!**

When you are ready to connect the UC-CAL’s power supply, make sure all of your other connections and air supply have been made. Plug in the male side of the power supply cable into the 110VAC/240VAC port on the rear side of the UC-CAL. Then connect the 3 prong plug to your facility’s outlet. Once the power supply has been fully installed, push the power switch located right above the plug on the rear side of the UC-CAL into the “on” position.



Once you have all of your peripherals connected and the power supply engaged, you may then power on the HMI screen by pressing the rocker switch into the “on” position.



## 6.5 Hopper Box Installation & Loading Projectiles

### 6.5.1 Installing the Hopper Box



The hopper boxes of the UC-CAL are designed to function for a specific projectile size. The measurement engraved on the sides of the hopper box designates the appropriate projectile size in mm to be used.

To install the hopper box, place onto the motor plate (the voided section of the UC-CAL). Align all of the corners and assure the carousel coupler is in line with the protruding rotary coupler. Place gently into position. The hopper box should sit completely level in the UC-CAL and be flush with the vertical wall of the HMI section (see images below on how to install the hopper box).





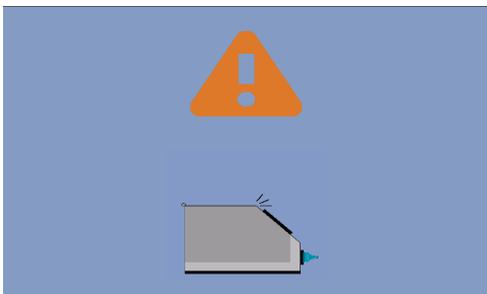
**Make sure the rotary coupler protruding from the UC-CAL's motor plate is lined up with the carousel's coupler on the bottom of the hopper box during installation.**



### 6.5.2 Loading Projectiles



To load the hopper box, lift the lid and pour the Ultra Clean projectiles into the hopper. When filling the hopper, assure that the amount of projectiles does not exceed the Max Fill line shown on the inside of the box. Make sure the ionized air hose and the lid sensor are not obstructed. When ready to operate the UC-CAL, close the lid to the hopper box. The lid of the hopper box should close completely without any added force.



Do not operate the UC-CAL with the hopper box lid open. Doing so will incur an error screen and the UC-CAL will halt functioning. This screen will remain prompt and the UC-CAL will remain idle until the lid has been closed.



**Do not use Abrasive or Scrub style projectiles with the UC-CAL. Only UC and Tube style projectiles are permitted.**

## 7 GETTING STARTED / OPERATING INSTRUCTIONS

You are able to configure the settings of the UC-CAL via the Touch Screen on the Control Station. In the following instructions the words “Select” and “Press” mean touch the desired option(s) on the screen. Follow the step-by step prompts to configure and launch your UC-CAL.

### 7.1 Select Language



When first powered on, the UC-CAL will open to **[Select Language]** screen. Select the flag representing the language of your choice (other languages may be installed upon request).

*Available languages:*

*English, German, Norwegian, French, Dutch, Italian, Spanish, and Portuguese.*

All subsequent startups will have the selected language initialized by default. Thereafter, you may change the language in the settings menu.

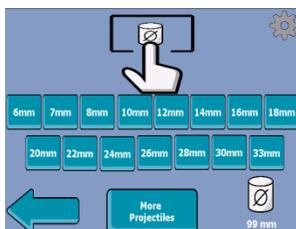
### 7.2 Enter “User ID”



You may enter or bypass your User ID. Press the text box to enter your User ID. The User ID can be your name or associated # (up to 10 characters). A keypad will appear to enter your User ID. Press “Enter” when finished. Your User ID will be displayed in the upper left corner on the following pages. To bypass a User ID, press the arrow button labeled “No User ID”.

### 7.3 Select Projectile Size

You will now be prompted to select the projectile size that you want to use. Be sure to refer to the Ultra Clean Recommended Sizing Charts to select the correct projectile size for your application. If you have any questions about sizing, you can contact us via email at [sales@ultracleantech.com](mailto:sales@ultracleantech.com) or visit our website at [www.ultracleantech.com](http://www.ultracleantech.com).



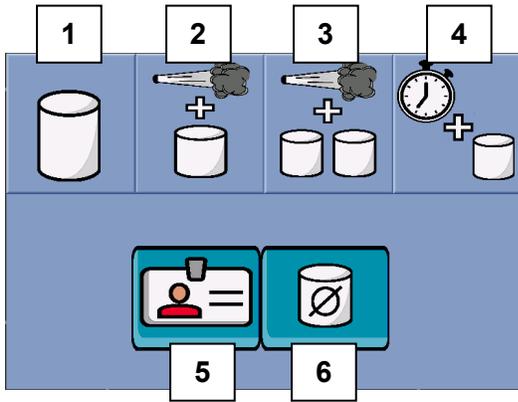
Select the projectile size you wish to use. Assure that the projectile selection, hopper box, and physical projectile sizes are all the same. Install the nozzle that corresponds with the projectile size and hose or tube application. After the projectile selection screen you will see the cleaning mode screen.

## 7.4 Cleaning Modes



**NOTE: Air Purge Cleaning Modes are to be used when large particles of contamination are generated from internally or externally skived hoses, or when cutting hoses with an abrasive wheel saw blade.**

### 7.4.1 Select Cleaning Mode



The “Select Cleaning Mode” screen will now be displayed. Options include the following:

1. Normal Cleaning
2. Air Purge + 1 Projectile
3. Air Purge + 2 Projectiles
4. Timed Air Purge
5. User ID
6. Projectile Selection

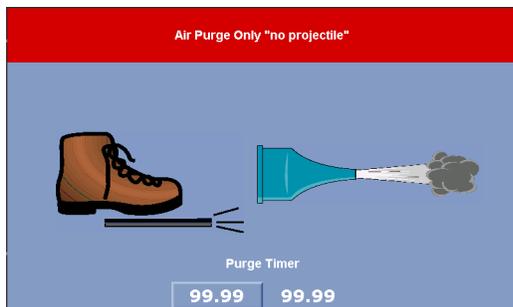
Select the Cleaning Mode of your choice. You will then be prompted to activate the foot switch/trigger to initiate the cleaning sequence. Follow the screen prompts during the sequence cycle.

### 7.4.2 Normal Clean



Press and release the foot switch of the UC-CAL Carousel AutoLoader or by activating the trigger of your UC-CAL-HH Hand Held launcher. [Activation occurs upon release of foot pedal or trigger]. The cleaning procedure is completed when the projectile is verified. After Projectile Verification, the next projectile will automatically be loaded.

### 7.4.3 Air Purge + 1 Projectile



*The Air-Purge status screen displays the pre-set purge time-limit.*

You can begin cleaning from this screen by pressing and releasing the foot pedal of the UC-CAL Carousel AutoLoader or by activating the trigger of your UC-CAL-HH Hand Held launcher.

The following screen will appear: AIR PURGE ONLY “NO PROJECTILE”.

The Air Purge Timer may be adjusted to the desired time interval from this screen. Touch the timer box at the bottom left of the screen to change timer.



*After the Air Purge, a projectile will automatically load and you will be prompted to fire the projectile.*

At the end of the sequence you will return to the “Air Purge Only” screen to restart the next sequence. The cleaning procedure is completed when the projectile is verified.

#### 7.4.4 Air Purge + 2 Projectiles



Follow the same prompts as the “**Air Purge +1 Projectile**” cleaning mode. There will be an additional prompt to fire a second projectile. The number at the upper left corner of the screen designated 1<sup>st</sup> & 2<sup>nd</sup> projectile. At the end of the sequence you will return to the air-purge screen to restart the cleaning sequence again. The cleaning procedure is completed when the projectile is verified.

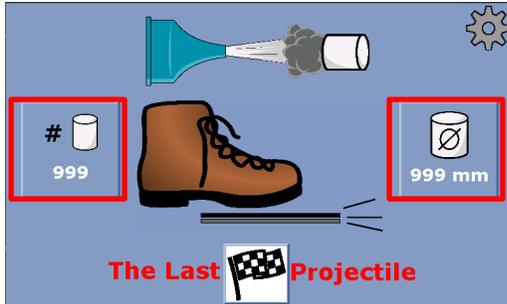
#### 7.4.5 Timed Air Purge



The Timed Air Purge mode fires the projectile and purges air for a predetermined amount of time. The Timed Air Purge mode DOES NOT verify that the projectile has exited the hose or tube. The counter will count each firing sequence. The air purge timer may be adjusted by pressing the timer button on the left of the screen. Alternately, this timer may also be adjusted in the settings menu (refer to section 7.8.7 Timers).

## 7.5 Launch & Indicator Screens

### 7.5.1 The Launch Screen



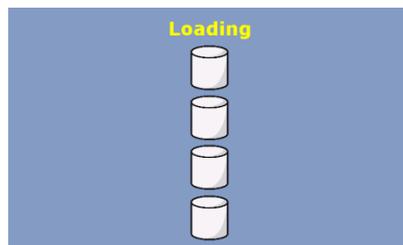
The launch screen will display your selected information for your desired cleaning mode. The dynamic projectile count shows on the left while the selected projectile size shows on the right. Indicator screens will display to assist you through the cleaning process.

### 7.5.2 Indicator Screens

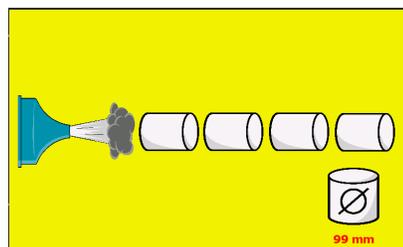
During each cleaning process, you may see **“Air Purge”**, **“Loading”**, or **“Firing”** screens appear when you trigger the cleaning sequences.



*Air Purge Screen*



*Loading Screen*



*Firing Screen*

## 7.6 Faults

A fault is generated when a projectile does not break the sensor in the containment barrel within the set fault timer limit. If there is a projectile misfire, or if something else occurs that causes a fault, the system will not continue until it is cleared.

### What Causes Faults:

- Double pressing the foot switch or trigger before a firing cycle is complete.
- Set fault timer expires before projectile is verified.
- Debris on the Containment Barrel sensor's lens / projectile doesn't enter the chute.
- Projectile fails to exit the launcher / hose assembly.



If there is a fault, the system will prompt you to enter a password to clear it. This is to ensure that the operator identifies the issue before overriding the system. Once the issue has been identified and corrected, the password can be entered to resume normal operation.



Enter your password and select the carriage-return key  
The following screen "Fault Air Purge" will appear.

*The factory default password is "0" (zero).*



The system will now prompt you to activate an air purge. This is to ensure that no projectile has been stuck in the line. If a projectile is dislodged during the air purge from the hose or tube, it will be counted. However, the Air Purge will continue until the time expires on the Purge Timer. The Fault Purge Timer may be adjusted to the desired time interval from this screen. Touch the timer box at the bottom left of the screen to change timer. **The Fault Purge Timer will default to no less than 3 seconds.**

A new projectile will be loaded and you may now resume operation of the cleaning sequence.

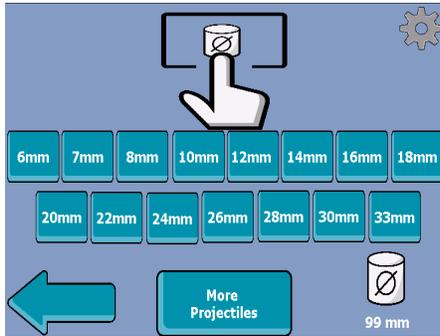
## 7.7 When You're Finished / Changing Projectile Sizes

### 7.7.1 The Finish Button



When you are ready to end the cleaning process, press the “Checkered Flag” at the bottom of the screen. This will prompt you to fire one last projectile to empty the firing chamber and will return you to the Projectile Selection menu. No more projectiles will be loaded.

*\*For Air Purge + 2 Projectiles, flag will appear on the “Fire 2<sup>nd</sup> Projectile stage”.*



*Projectile Selection menu after finishing the cleaning procedure.*

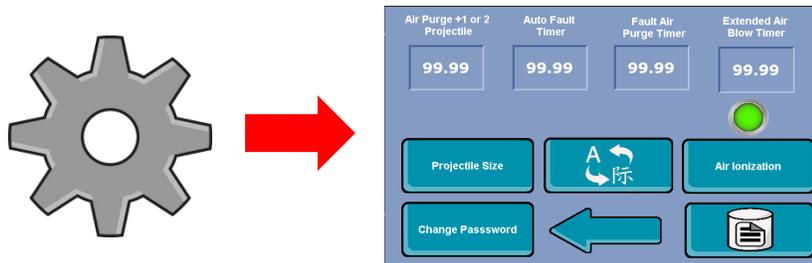
*Finishing a cleaning mode will reset the dynamic projectile count shown on the launch screen. However, the projectile counter found in the settings menu will show the accumulative running total until manually reset (refer to section 7.8.5 Projectile Counters).*

### 7.7.2 Changing Projectile Sizes

To change the Hopper Box/Projectile Size refer to “6.3 Hopper Box Installation & Loading Projectiles” & “7.3 Select Projectile Size”.

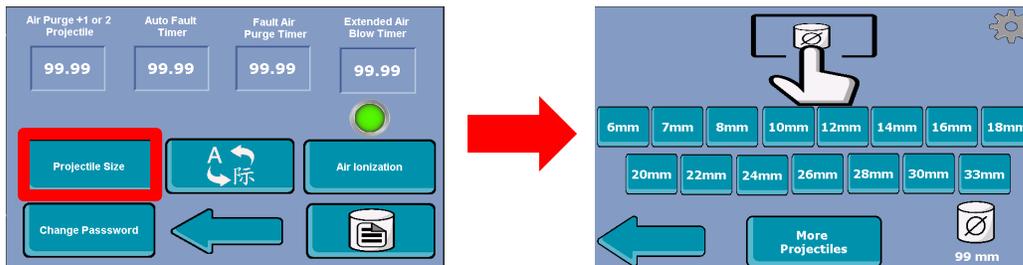
## 7.8 Settings Menu

The Gear icon can be found on the Projectile Selection Screen and all of the Launch Projectile Screens. Press the Gear icon in the upper right corner of the screen to enter the settings menu.



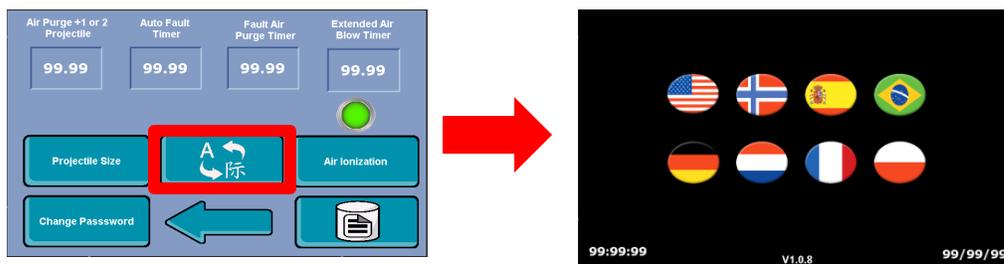
### 7.8.1 Projectiles Size Selection

You may return to the projectile size selection screen by pressing the Projectile Size button in the settings menu.



### 7.8.2 Changing the Language

To change the HMI's language, press the "Language" button. A screen with several country flags will appear. Each country flag will represent the corresponding national language. From this screen, press the appropriate flag for the language you desire. Once you have selected your preferred language, you will be redirected to the User ID screen.



### 7.8.3 Air Ionization

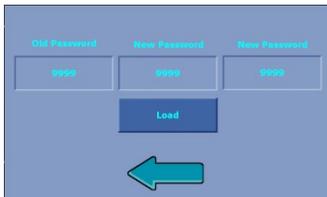
Air ionization will be activated automatically when the main power is turned on. This preferred feature is to reduce static electricity in the hopper box and drop chute. To turn air ionization on/off, press the “Air Ionization” button. The indicator light above the button will illuminate when this feature is engaged and extinguish when it is disengaged.



### 7.8.4 Changing Password



Press the “Change Password” button to initiate.



Enter the old password followed by the new desired password twice. Then press the “Load” button to engage the new password. **DO NOT** enter a password more than 4 characters in length as this may lock the machine. “0” (Zero) may not be used again as a password as this was the factory default password. Press the “Go Back” arrow to return to the settings screen.

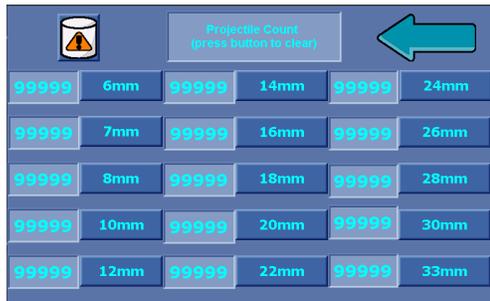
*The default factory password will be “0” (zero).*

### 7.8.5 Projectile Counters

You can access all projectile & fault counters by pressing the Projectile Info. icon.



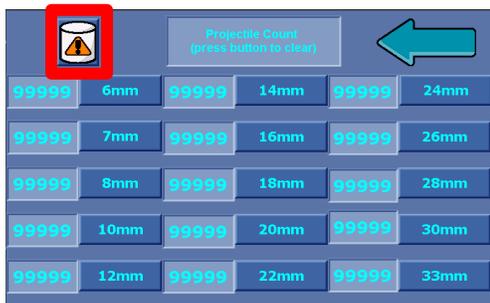
*This is the COUNTERS page. Here you may see the total number of projectiles fired for each size.*



Counters can be manually reset to zero by pressing the projectile size.

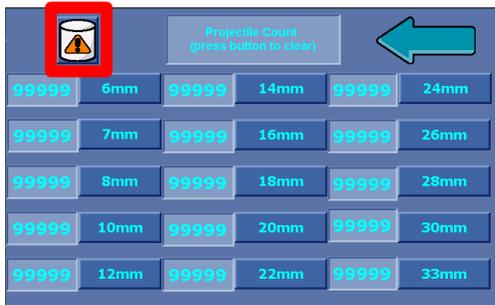


To access the Fault Counters, press the Fault Projectile icon.

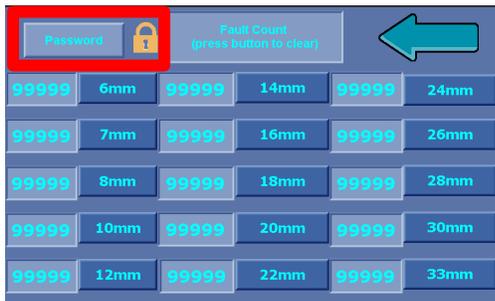


**Counters can only be reset manually. Powering off and on or changing users will not reset counters!**

### 7.8.6 Fault Counters



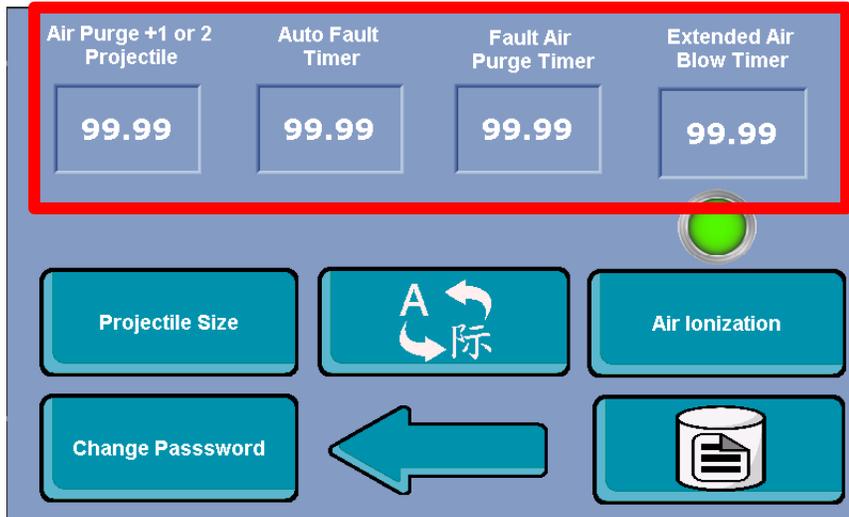
You can access the fault counters from the projectile counter screen by pressing the Fault Projectile icon.



To enable counter resetting, press the “Password” button. You will then be prompted to input a password. After entering the password the lock indicator should switch to unlock to signify the ability to reset fault counters. To reset a counter press the projectile size.

### 7.8.7 Timers

The UC-CAL has a variety of timers to govern air purge, faults, and other procedural options. These times are preset but may be adjusted to fit your application. To adjust a time threshold, press the appropriate timer and it will prompt you to input your desired time.



Setting	Description
<i>Air Purge +1 or 2 Projectile</i>	Adjusts the amount of time the “Air Purge” will be engaged during the firing sequence.
<i>Auto Fault Timer</i>	Time before the UC-CAL will trigger a fault if a projectile has not been verified. <b>This Auto Fault Timer cannot be set for less than 3 seconds.</b>
<i>Fault Air Purge Time</i>	The purge time after a fault has occurred. <b>This timer cannot be set for less than 3 seconds.</b>
<i>Extended Air Purge Timer</i>	After a projectile has been verified, the UC-CAL will continue to air purge for a specified amount of time.

## 7.9 Data Logging Software

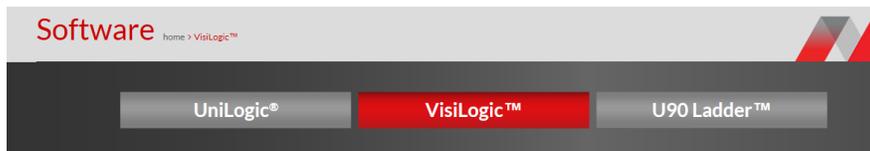
Below are several resources for downloading, installing, and learning about the Unitronics data logging software.

### 7.9.1 Download the Data Logging Program

1. Go to the following link to the Unitronics webpage:

<https://unitronicsplc.com/software-visilogic-for-programmable-controllers>

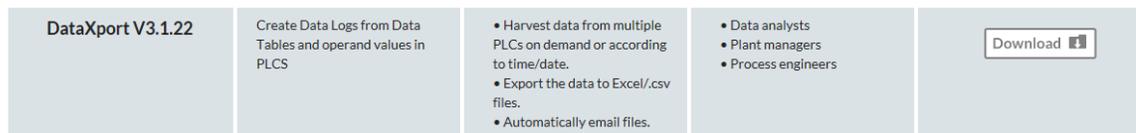
2. Select the VisiLogic button.



3. Scroll down and select the “Download Software Utilities” tab



4. Then select the “DataXport V3.1.22” or a newer version and download it.



### **7.9.2 Learn About Data Logging from Unitronics**

View the Unitronics recorded webinar on YouTube by going the following link:

<http://www.youtube.com/watch?v=lgnlQR45w2U>

### **7.9.3 Data Export Manual (DataXport)**

Go to the following link to open the DataXport manual:

<http://media.msanet.com/na/usa/permanentinstruments/HVACMonitors/ModCon75Controller/DataXportManual.pdf>

NOTE: You may need to “trust” this link in order to allow your computer to open the PDF manual online.

Questions concerning the download, installation, or troubleshooting tips regarding the program should be directed to Unitronics (P: +1-617-657-6596). Any questions concerning the physical equipment may be directed to Ultra Clean Technologies Corp. (+1-800-791-9111).

## 7.10 Icon Glossary



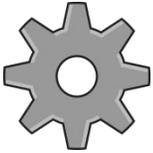
Projectile Data / Counters



Projectile Size Selection



Fault Indicator



Settings



Return / Back

## 8 CONTAINMENT BARREL – INDICATOR LIGHTS

During the cleaning procedure the indicators of the Containment Barrel will illuminate or blink as follows:

Color of Indicator	Meaning
<b>GREEN</b> indicator illuminates	Ready to launch a projectile and/or has successfully received the projectile in the containment barrel.
<b>AMBER</b> indicator flashes	Projectile has been fired and is on its way through a hose or tube.
<b>RED</b> indicator illuminates	Projectile was not verified and may still be in the hose or launcher. Fault.

Table 3: Indicators on containment barrel

The **amber** light will flash until the Ultra Clean Projectile has exited the hose, tube or pipe and passes through a light sensor inside of the Containment System. Once the Ultra Clean Projectile passes through the light sensor the flashing **amber** light will go off and the steady **green** light will come on. The air will automatically shut off and the Projectile will be verified and counted. (NOTE: when using the *Air Purge Modes*, a steady **green** light will illuminate while the **amber** light flashes simultaneously during the air purge). Repeat this process to complete the cleaning procedure.

If a projectile fails to break the light sensor, the UC-CAL will fault once the timer has exceeded the preset Fault Air Purge Timer. The light will now illuminate a steady **red** to indicate a fault. Locate the misfired projectile by visually checking the inside of the UC-CAL launching orifice. Check the nozzle by unscrewing the locking ring and removing it from the UC-CAL. Check the inside of the chute on the containment system. The projectile may be lodged in the hose. Clear the fault by pressing the text field and inputting the fault password. To dislodge a stuck projectile, flip the hose around and utilize the fault air purge to force the projectile back out the way it was introduced. The UC-CAL System will reset and the light will be a steady **green**. Repeat this process to complete the cleaning Procedure.



**If you cannot find the misfired projectile, it may be in the hose assembly. Reset the UC-CAL and follow the screen prompts outlined in section 7.6 (Faults) of this manual.**

## 9 CLEANING & MAINTENANCE



**Always turn off all incoming electrical and pneumatic power to the UC-CAL before cleaning & maintenance. As an extra precaution, disconnect air supplies and peripheral equipment.**

### 9.1 Areas of Concern

- Only use clean dry compressed air.
- Always perform cleaning procedures.
- Use only Ultra Clean Projectiles in the UC-CAL as they are sized correctly for the Hopper Boxes (they are the correct density to load and fire correctly).
- Assure the Containment Barrel's light sensors are clean and free of debris.
- Never use dirty, contaminated or washed projectiles in the Hopper Box.

*Foreign projectiles (non-Ultra Clean) utilized in the UC-CAL will void the warranty.*

### 9.2 Cleaning Procedures

The following cleaning supplies come as part of the UC-CAL Auto Loader:

- Portable Vacuum Cleaner (with hose and brush attachments)
- Anti-Static Spray
- Swiffer Cleaning Wand and Replacement Pads
- Anti-Static Wipes

Keeping the UC-CAL clean is important. There are 3 main parts to be cleaned, the Hopper Box (inside and out), Projectile Drop Chute, and the Firing Chamber. Cleaning must be done when changing Hopper Box sizes or when filling the Hopper Boxes with either Ultra Clean UC or Tube style Projectiles.



**Portable Vacuum**



**Anti-Static Spray**



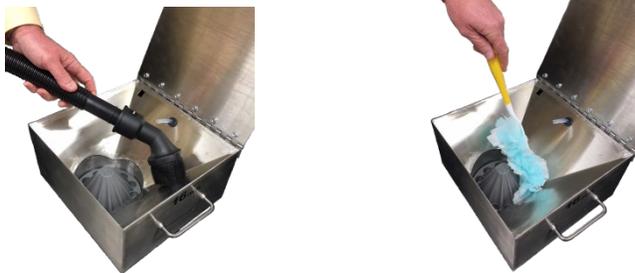
**Swiffer Cleaning Wand  
& Replacement Pads**



**Anti-Static Wipes**

### 9.2.1 Hopper Box:

Clean the inside, outside, and bottom with the portable vacuum cleaner and soft brush attachment that come as part of your UC-CAL System. Spray a small amount of Anti-Static spray onto the Swiffer cleaning pad and allow to dry for 15 seconds. Use the Swiffer to clean the carousel on the inside of the Hopper Box and the underside of the Hopper Box itself. The Swiffer, when treated with the Anti-Static spray, will remove any static electricity should it be present.



### 9.2.2 Projectile Drop Chute:

Spray a small amount of Anti-Static spray onto the Swiffer cleaning pad and allow to dry for 15 seconds. Remove the Hopper Box from the UC-CAL. Gently insert the Swiffer cleaning pad into the Projectile Drop Chute. Insert with a twisting action until the Swiffer touches the bottom. Run it up and down the Projectile Drop Chute 3 to 4 times and then remove.



### 9.2.3 Firing Chamber:

Remove the locking ring and nozzle from the Firing Chamber. Gently insert the Anti-Static treated Swiffer cleaning pad with a twisting action into the Firing Chamber until it reaches the end. Run the treated Swiffer cleaning pad in and out 3 to 4 times and then remove.



### 9.3 Do's & Don'ts for Cleaning the UC-CAL

- X Do Not spray Anti-Static spray directly into the Hopper Box, Firing Chamber, or Projectile Drop Chute.
- X Do Not use hard, sharp objects for cleaning.
- X Do Not use solvents or chemicals for cleaning
- ✓ Do clean when changing Hopper Box sizes.
- ✓ Do clean before filling the Hopper Box with Projectiles
- ✓ Do cover the machine with a clean cloth or cover when the UC-CAL is not in operation.

### 9.4 Air Filter

The UC-CAL comes with a 5 $\mu$  (micron) air filter for removing contamination that may be present in your compressed air system. It is absolutely necessary to use CLEAN DRY compressed air at all times during operation of the UC-CAL. Failure to insure clean dry air automatically voids the manufacturers 1 year warranty. You must check the air filter on a weekly basis to make sure the filter is clean and dry. If contamination or moisture is present, disconnect the air supply and remove the filter bowl from the filter body. Clean the filter bowl and filter element and reattach to the filter body.

### 9.5 UC-D1 Super Dry Compressed Air Dryer

If your compressed air contains moisture-oil-solid particles you should install the UC-D1 Super Dry Compressed Air Dryer. This Air Dryer contains two highly efficient polypropylene coalesce elements at the inlet and outlet ports to absorb oil and all solid particles. This unit is highly recommended for the UC-CAL- Carousel Auto Loader, UC-PVS-G4 Projectile Verification System and UC-BM1.25 bench Mount Launchers.

### 9.6 Replacing Indicator Lights

1. Twist the colored lens counter clockwise and remove.
2. Remove the white bulb cover.
3. Using P/# HT8LAMPTOOL (lamp/bulk removal tool), for the tool over the end of the ECX1902 bulb.
4. Press down and turn the bulb one quarter of a turn counter clockwise.
5. Pull up and remove the bulb from the fixture.
6. Install the new bulb by reversing the procedure using the HT8LAMPTOOL.

### 9.7 Disposal



At the end of the life-cycle of the CAL the equipment has to be disposed according to local legislation.

## 10 TROUBLESHOOTING

### 10.1 Common Troubleshooting

Problem	Possible cause	Solution
Resistance and pressure build up in air hose.	A projectile is stuck in the air hose/tube.	Remove the projectile by turning the air hose assembly 180 degrees to dislodge the projectile with air only. Make 100% certain that the projectile exits the hose assembly.
<b>Amber</b> light on the CB keeps flashing and the air continues to blow.	The projectile fails to break the light sensor.	Depress and release the trigger again to stop the air flow. The indicator light will illuminate a steady <b>red</b> . Locate the misfired projectile (Refer to Section 8 in this manual).
Containment barrel doesn't verify the projectile.	There may be debris on the containment barrel's sensors.	Remove the lid of the containment barrel. Clean the lens on the sensors located on the underside of the chute assembly.
Unit doesn't start or blank screen.	Disruption in the power supply.	Assure the power supply is connected and all the appropriate power switches are turned on. In the event of a power surge, analyze the fuse (located below the main on/off switch).
Faults when firing small projectiles.	Not allowing time for the projectile to fall into the firing chamber.	Wait 1-2 more seconds before firing. Turn off Air Ionization.

- If there is **NO** Projectile present the compressed air should freely flow through the hose/tube with very little back pressure.
- If a Projectile was left in the assembly and it is not stuck it will exit and verify when it enters the Containment Barrel.

### 10.2 Jammed Projectiles

During operation, if you experience misfiring or a prolonged projectile loading screen, you may have a projectile that has become lodged within the components of the UC-CAL. To correct this issue, you should first remove the hopper box. Gently oscillate the hopper to free up the projectiles from the loading mechanism. Before reinstalling the hopper, visually inspect the Projectile Drop Chute and Firing Chamber for any lodged projectiles.



### 10.3 Resetting the Machine



**Resetting the UC-CAL will restore all default settings. This function will remove all stored data such as, projectile counters, custom password, timer settings, & pre-set data logs configured for exporting.**



If your UC-CAL displays symptoms of desync between functions or you find yourself stuck in a process, you may need to reset the machine. To reset your UC-CAL, navigate back to the User ID screen or cycle power. Press the upper left area of the screen and hold for ~10 secs. The HMI will shut down and reset itself. When the reset is complete, it will automatically relaunch the program. The default factory reset password will be "0" (zero). *The HMI may also be reset from the fault screen, if you forgot your password.*

If you find yourself resetting the machine repeatedly for a particular issue, please document the problem or concern and contact Ultra Clean customer support for further assistance (refer to section 10.4 Contacting Support).

### 10.4 Contacting Support

If you are experiencing any major issues that are inhibiting your machines functionality or operating procedures, please contact us at +1-800-791-9111 or [sales@ultracleantech.com](mailto:sales@ultracleantech.com). Our technicians are available for assistance to resolve any issue(s) that may occur.

## 11 PERIPHERAL EQUIPMENT

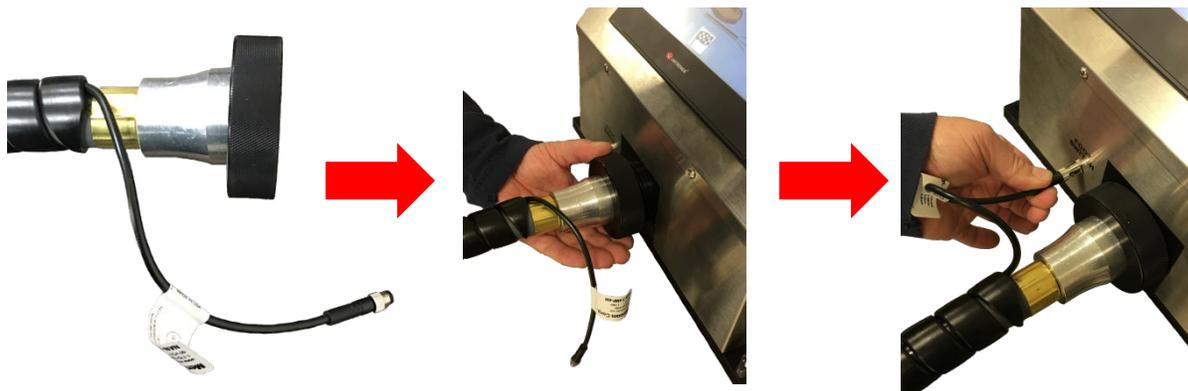
### 11.1 Hand Held Launcher



The UC-CAL-HH Carousel Autoloader Hand Held Launcher is a viable option for when you require more precision during the cleaning procedure. The hand held launcher offers more flexibility to the operator and extends the cleaning range compared to the traditional setup. This configuration allows the operator to bring the cleaning to the hose rather than the hose to the cleaning. The hand held launcher is ideal for cleaning bundled hoses/tubes, heat exchanger systems, and other various application where it would be difficult to move the assembly.

#### 11.1.1 Installation

To install the UC-CAL-HH Carousel AutoLoader Hand Held Launcher, first remove the factory installed locking ring on the front of the unit. Screw the UC-CAL-HH's locking ring to the front of the unit. Once secured, take the electronic trigger cable and plug it into the front footswitch port. Screw the plugs locking ring to secure it.



Once the launcher has been connected to the unit, remove the locking ring on the launcher, insert the appropriate nozzle for the application, and secure the locking ring back onto the launcher. You are now ready to utilize the hand held launcher.

The UC-CAL has three hand held launchers available, 1/2, 5/8, and 3/4. The chart below will show which projectile sizes are compatible with each hand launcher.

<i><u>P/#</u></i>	<i><u>Compatible Projectile Sizes</u></i>
UC-CAL-HH-1/2	UC07, UC10, UC12
UC-CAL-HH-5/8	UC07, UC10, UC12, UC14
UC-CAL-HH-3/4	UC07, UC10, UC12, UC14, UC16, UC18, UC20, UC22

**11.1.2 Operating Procedures**

Utilizing the UC-CAL-HH Carousel AutoLoader Hand Held Launcher follows the same procedures as the traditional set-up (refer to section 7 Getting Started / Operating Instructions). The main difference would be utilizing an electronic trigger in lieu of a footswitch. When launching projectiles with the hand held, assure a firm connection between the launcher’s nozzle and hose.

## 11.2 Marking System



The UC-CAL-MS variant may be equipped with a Marking System. This system is designed to assist the operator with applying a reference mark on their hose during the cleaning process. The reference mark serves as a quality assurance protocol by allowing the operator to visually confirm they have installed a hose fitting to the proper depth during stem insertion.

The Marking System serves other applications as well such as:

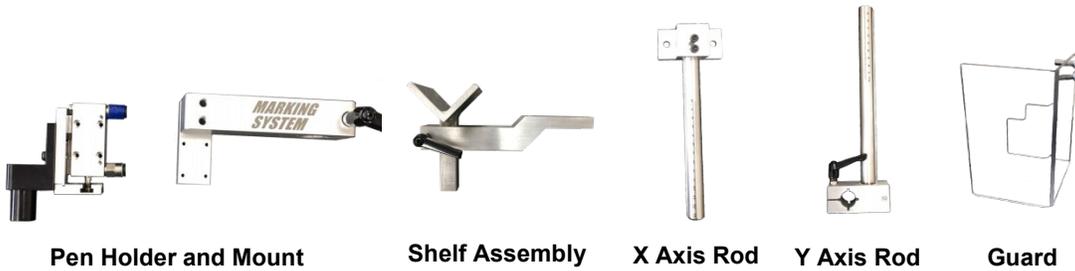
- Indicates which hoses have been cleaned.
- Various colors to designate hose type or batch.
- Reference point for applying inventory stickers or retail tags.



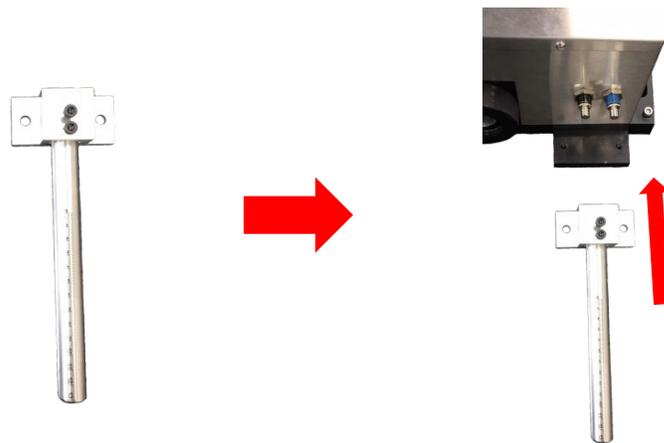
**Only the UC-CAL-MS variant may be equipped with the Marking System.  
The Marking System is incompatible with the traditional UC-CAL.**

**11.2.1 Installing the Marking System (UC-CAL-MS model only)**

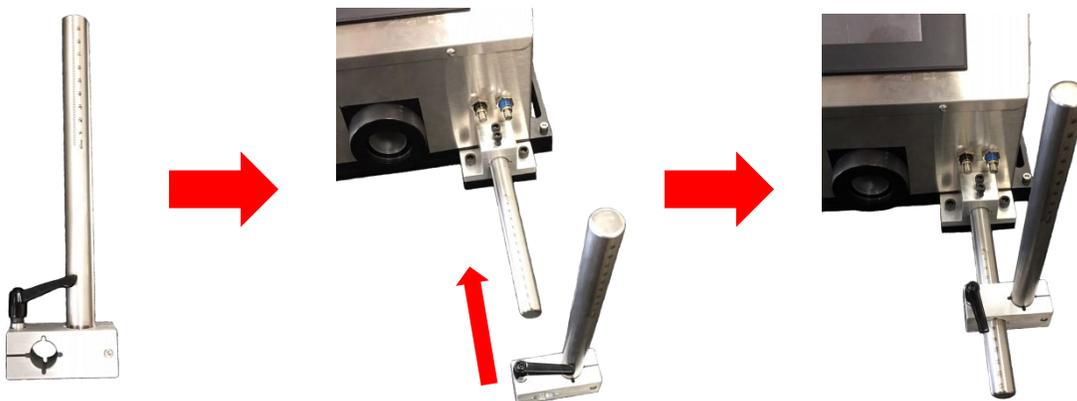
The Marking System (UC-CAL-MARK) is composed of several items:



Take the X Axis Rod and fasten it to the extended platform located towards the front right side of the machine.



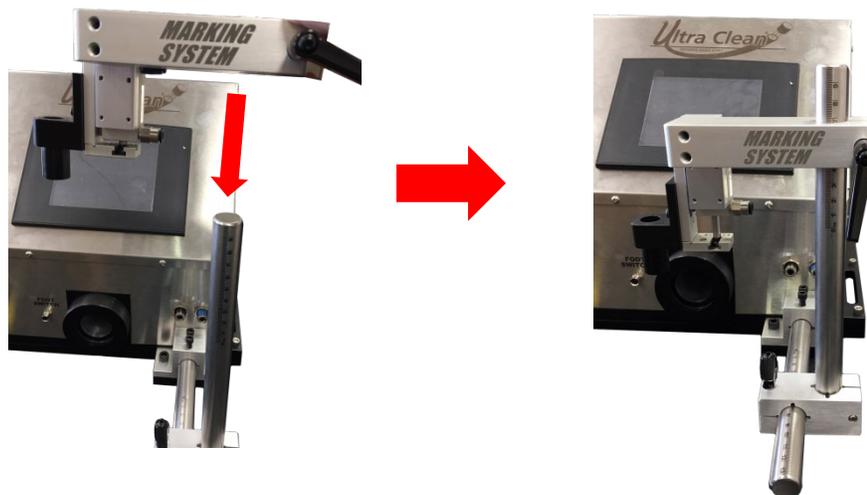
Once the X Axis Rod has been installed, insert the Y Axis Rod's base mount onto the X Axis Rod. Secure the Y Axis Rod's position by twisting the black handle.



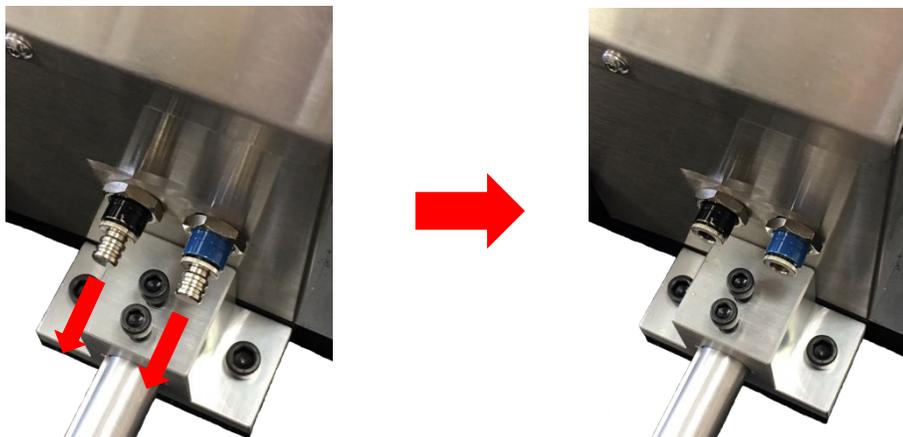
Fasten the Pen Holder to the Mount by lining up the pneumatic valve with the exposed bracket. Make sure the Pen Holder is suspended freely to the side of the mount. The Pen Holder should not be behind the mount.



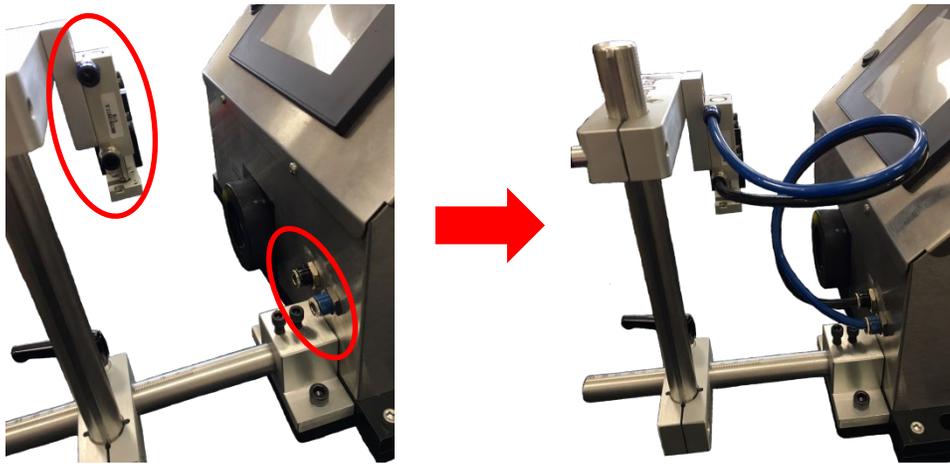
Once the Pen Holder Mount has been constructed, insert it onto the Y Axis Rod. Secure into position by twisting the black handle.



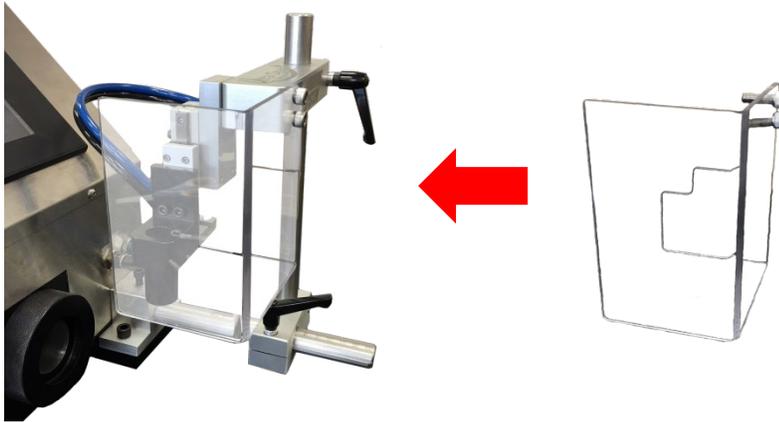
Remove the port plugs by pushing inwards on the port's collar and pull outward on the plug.



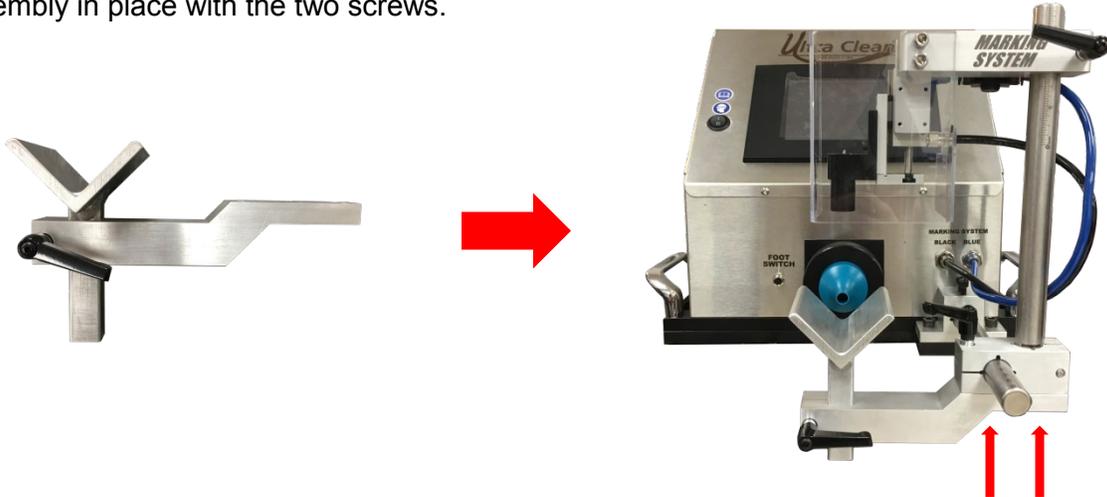
Take the supplied twin-line hose and connect them to their respective colored ports on the UC-CAL-MS and Pen Holder Mount.



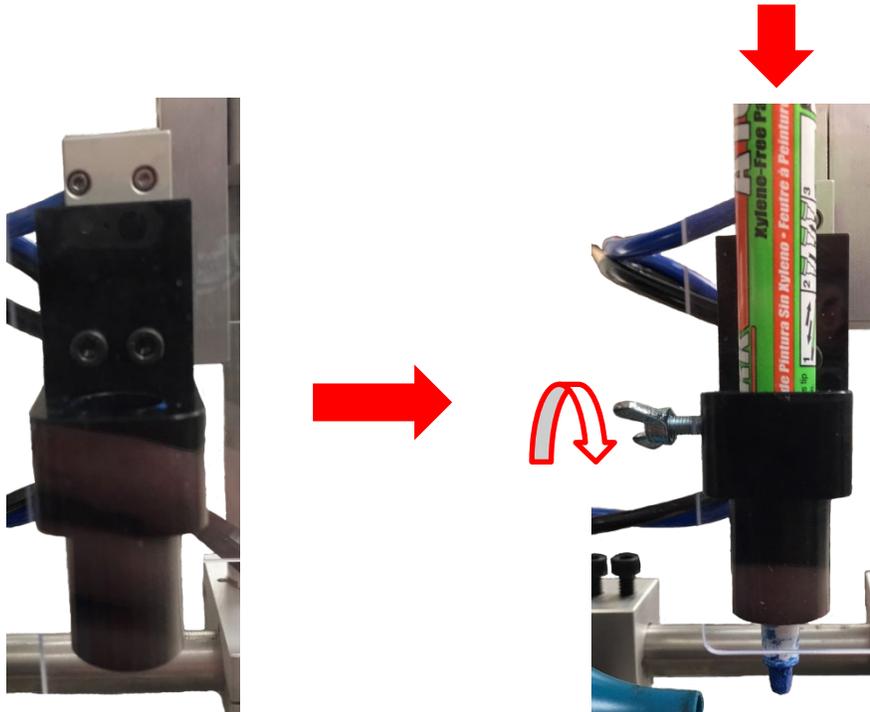
Now that the Marking System's apparatus has been installed, you may attach the marking Guard. The Guard is attached by two screws into the Pen Holder Mount.



Now you may install the shelf assembly to the Mark System. Attached the Shelf Assembly to the bottom side of the Y Axis Rod's base (which is affixed to the X Axis Rod). Secure the Shelf Assembly in place with the two screws.



To complete the Marking System, remove the cap of your marking pen and insert (tip down) into the Pen Holder. Secure the Pen by twisting the set screw.



When the Marking System is not in use, be sure to remove your marking pen and reapply the cap to preserve it.



*The stand that comes with the pens may also be used as a cap.*

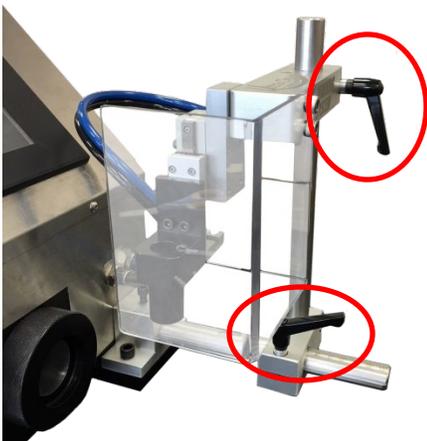
### 11.2.2 Adjusting the Marking System



The Marking System comes equipped with laser etched rulers on both the X Axis Rod and Y Axis Rod in metric and nominal inch. To switch between the two, remove the set screw found on the base mount and remove the rod. Orient to the desired ruler and reinsert into the mount. Secure the rod back into position by re-installing the set screw.

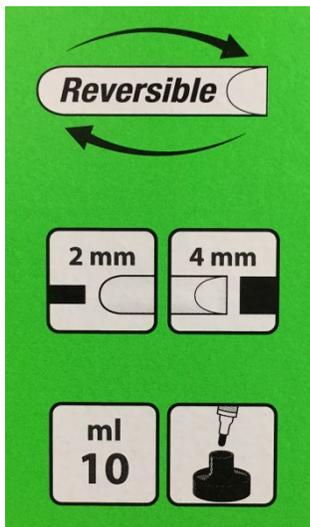


The Y Axis Rod is etched with a reference mark. When changing the rod's orientation, be sure the reference mark is flush with the top of the mount before securing. This assures your logged measurements will remain accurate.



The Marking System may be adjusted by loosening the black handles on the X & Y Axis Rod mounts. The rulers provide the operator with coordinates of where the pen's mark will be applied. Logging reference points will insure accurate and consistent marks every time.

### 11.2.3 The Marking Pen



The Marking Pen is a high quality paint-like marker. The ink is wear, fade, and bleed resistant. Ultra Clean offers a variety of colors:

- UC-Mark-Blue
- UC-Mark-Red
- UC-Mark-White
- UC-Mark-Yellow

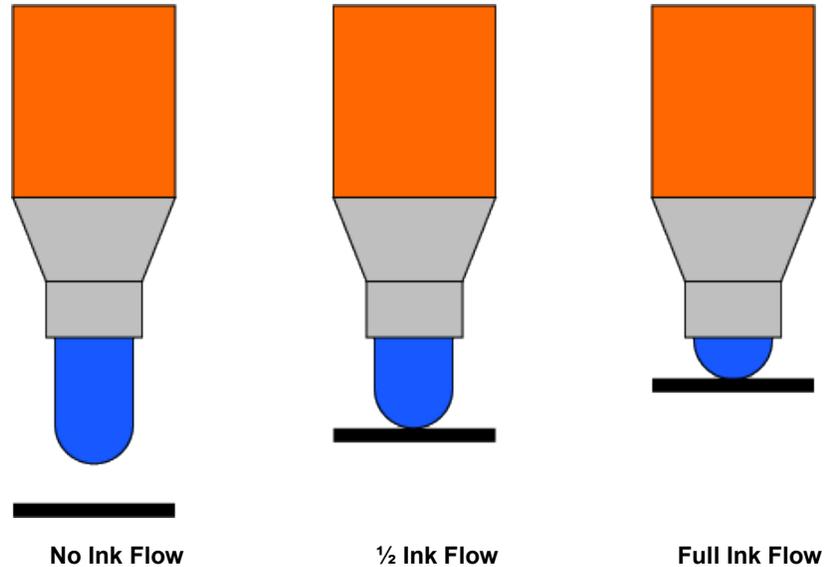
The Marking Pen also has two tips available, bullet drop & chisel. To switch between the two, firmly grasp the tip and remove it from the pen's body. Rotate the isolated tip 180° and then reinsert. The Marking Pen contains 10ml of ink.

#### 11.2.3.1 Preparing the Marking Pen



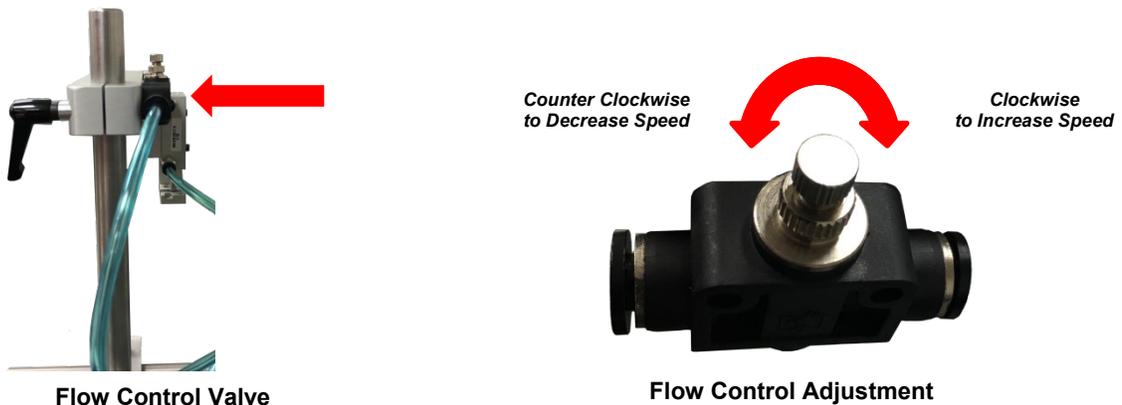
### 11.2.3.2 Positioning the Marking Pen

The Marking Pen's ink is gravity fed through the tip. The more compression the tip receives the more ink will flow through it. When the Marking Pen is engaged, make sure the tip is compressed upon contact with the assembly to allow the ink to flow. The pen may be adjusted on the Y Axis Rod to increase or decrease the tip's compression to achieve the desired amount of ink to be applied as the reference mark.



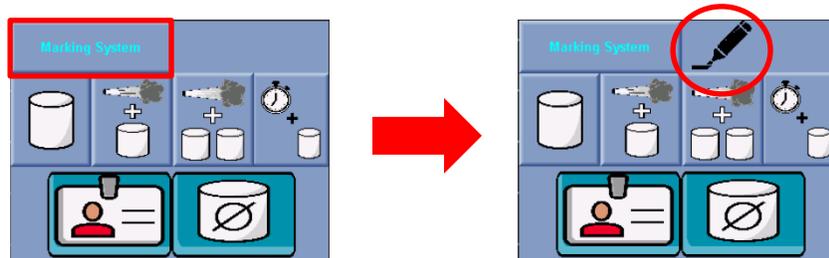
### 11.2.3.3 The Flow Control Valve

On the rear side of the Marking Pen Mount is the Flow Control Valve. This valve adjusts the downward speed of the Marking Pen. Since the Marking Pen operates via a gravity fed tip, as the ink depletes the ink flow through the tip may be reduced. To compensate, increasing the downward speed on a nearly depleted pen will force more ink to through the tip. If too much ink is being applied, decrease the downward speed until you achieve your desired amount.

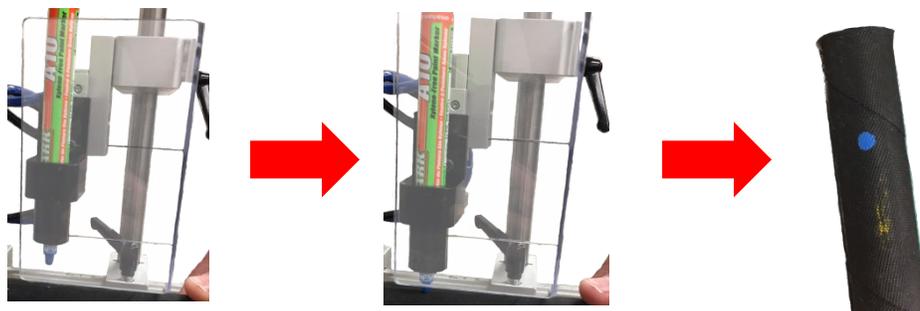
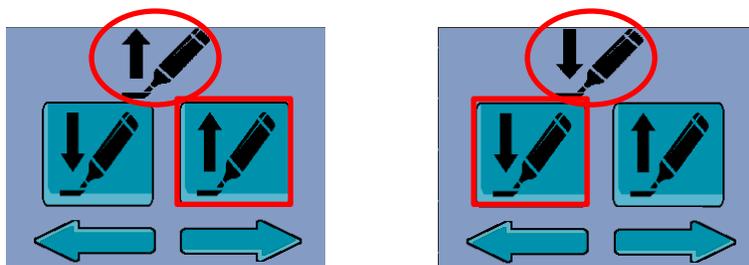


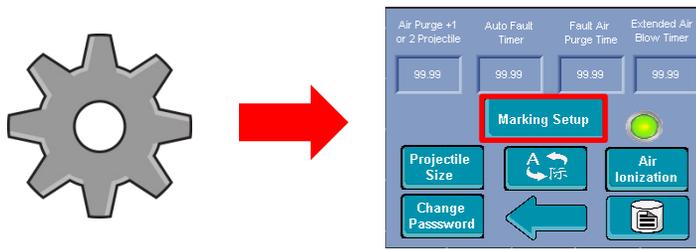
### 11.2.4 Operating Instructions

The Marking System option is found on the Select Cleaning Mode screen. Press the “Marking System” button, found in the upper left corner of the screen, to toggle the system on/off. A marker image will appear to the right of the button indicating the system is engaged.



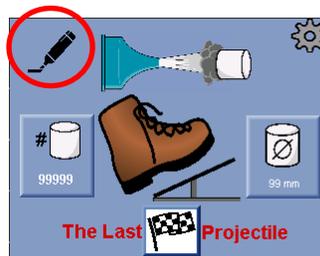
After you have chosen your desired cleaning mode, if the marking system has been engaged, you will be prompted to a calibration screen. Two buttons are presented to manually apply the marking system into the up and down positions (position is indicated by the marker image at the top of the screen). Utilize this time to test the marking system and assure the marking pen is functioning correctly, is secured in the pen holder, and is applying reference marks in the appropriate location (refer to section 11.2.2 Adjusting the Marking System). When you are finished making adjustments, press either the left arrow button to return to the previous menu or the right arrow button to proceed to the cleaning procedure (refer to section 7 Getting Started / Operating Instructions).





The Marking System adjustment screen may also be accessed through the settings menu when the system is engaged.

During the cleaning mode, a marker image will be present on the various screens indicating the Marking System is engaged. The marking pen will apply a dot of paint simultaneously upon projectile verification in both **7.4.2 Normal Clean** and **7.4.5 Air Purge + 2 Projectiles**. In **7.4.4 Air Purge + 1 Projectile** the marking pen will apply a dot of paint at the end of the air purge and upon projectile verification. During **7.4.5 Timed Air Purge** the marking pen will apply a dot of paint at the end of the air purge. The Marking System may only be toggled at the Select Cleaning Mode screen.



**The Marking System is incompatible with the UC-CAL-HH Carousel AutoLoader Hand Held Launcher.**

## 12 TECHNICAL SPECIFICATIONS

### 12.1 Specifications

Net Dimensions Length x Width x Height	AutoLoader: 18 x 14 x 13 inch (46 cm x 46 cm x 28 cm) Containment Barrel: 19 x 19 x 42 inch (48,5 cm x 48,5 cm x 107 cm)
Weight	31 kg / 68 lbs with hopper box.
Air Pressure	5.5 - 7.5 Bar (80-110 PSI)
Power Consumption	Input: 100 – 240V / 50-60 Hz / 1.5 Amp Output: 8V / 3.25 Amp
Noise Level	<70 dB(A)
Projectile Firing Cycle Time	Less than 5 second variation because of hose or tube length and inside diameter.

Table 1: Specifications

### 12.2 Electrical Requirements

- The UC-CAL is supplied with all required electrical cords and connections.
- 230Vac-50Hz for European Countries.
- 120Vac-60Hz for North American Countries.
- The UC-CAL converts all incoming AC current into 28Vdc.

### 12.3 Pneumatic Requirements

- 80 PSI (5.5 Bar) minimum to 110 PSI (7.5 Bar) maximum.
- UC-D1 Super-Dry Compressed Air Dryer is strongly recommended.

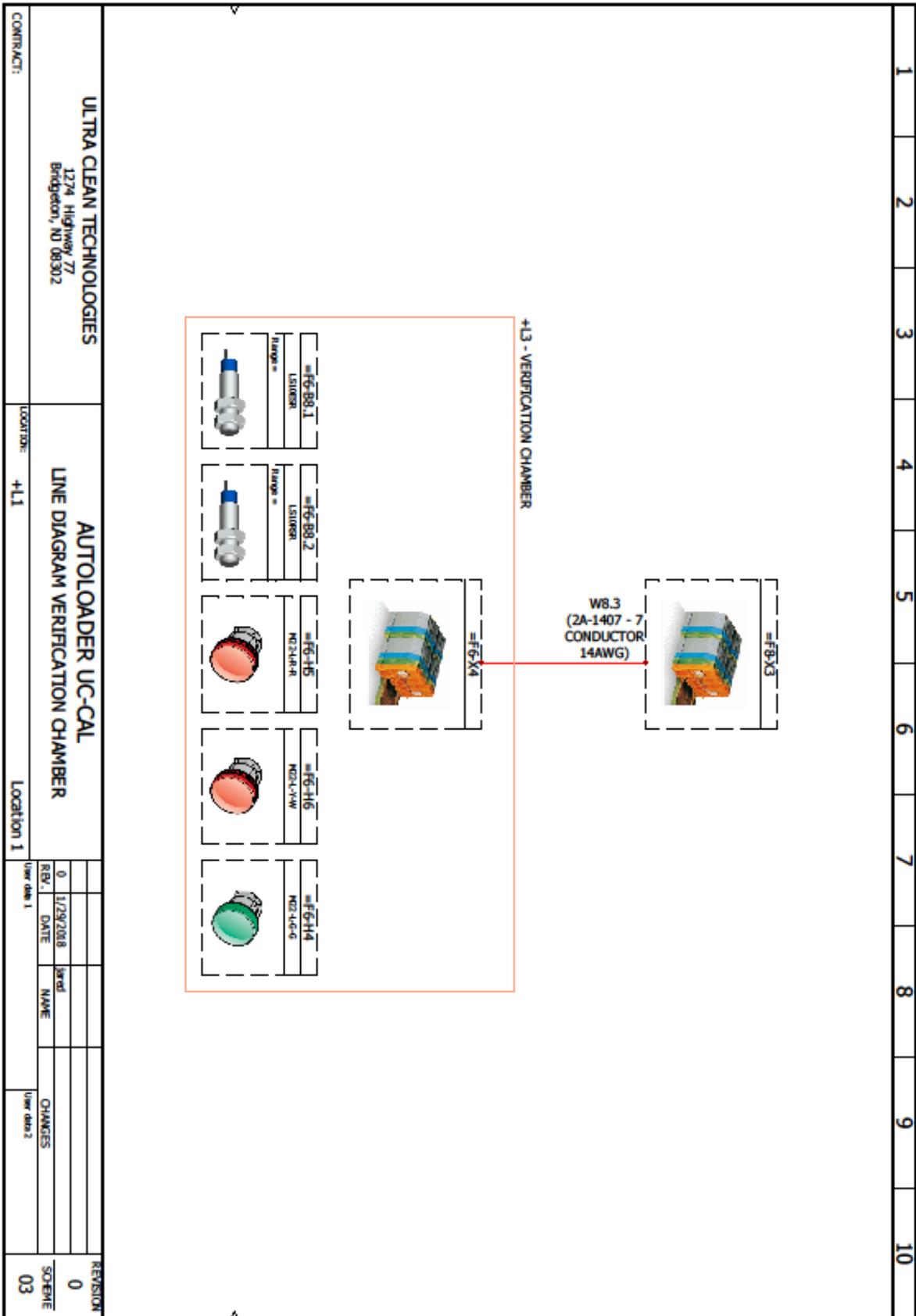
## 12.4 Wiring Diagrams

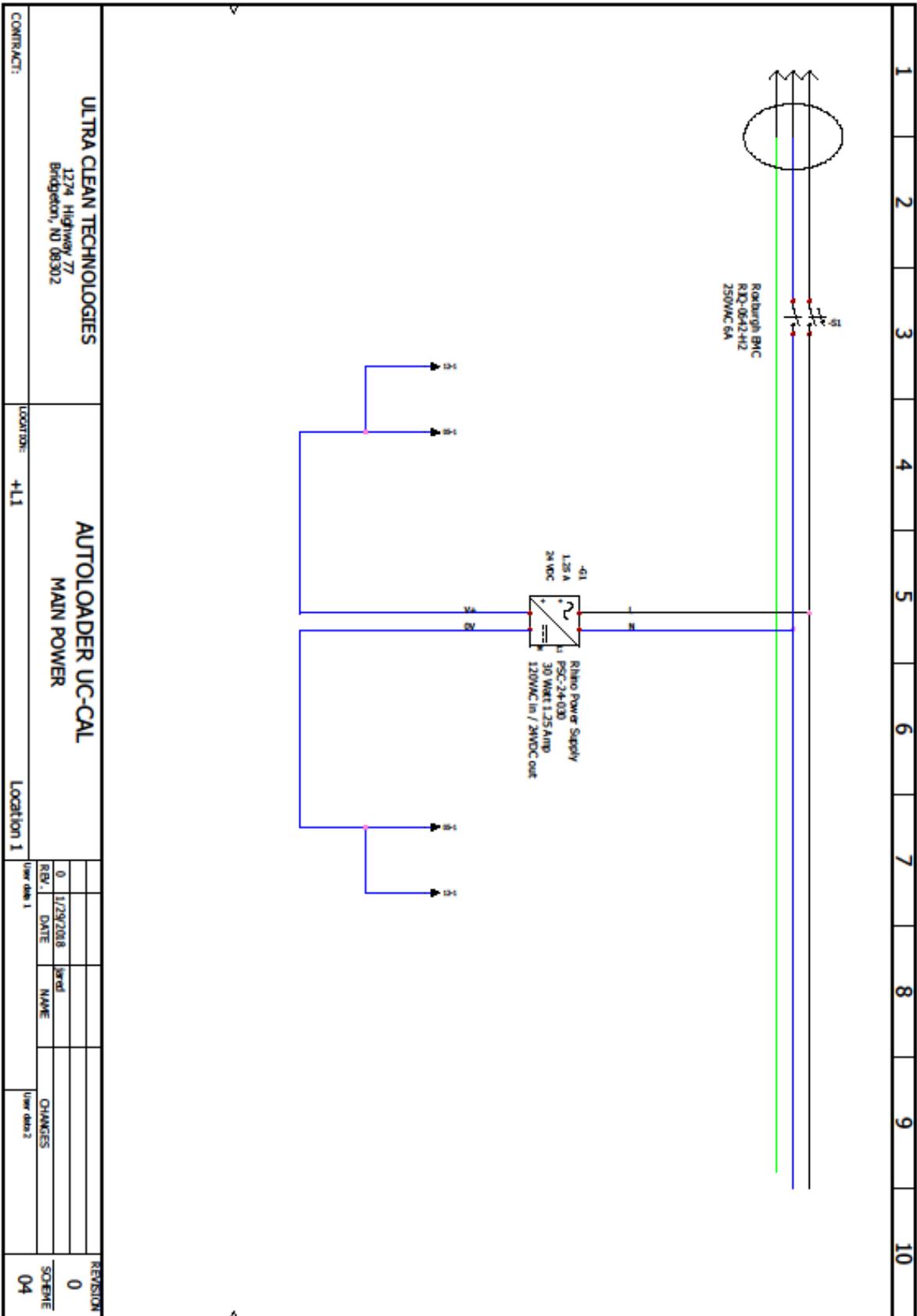


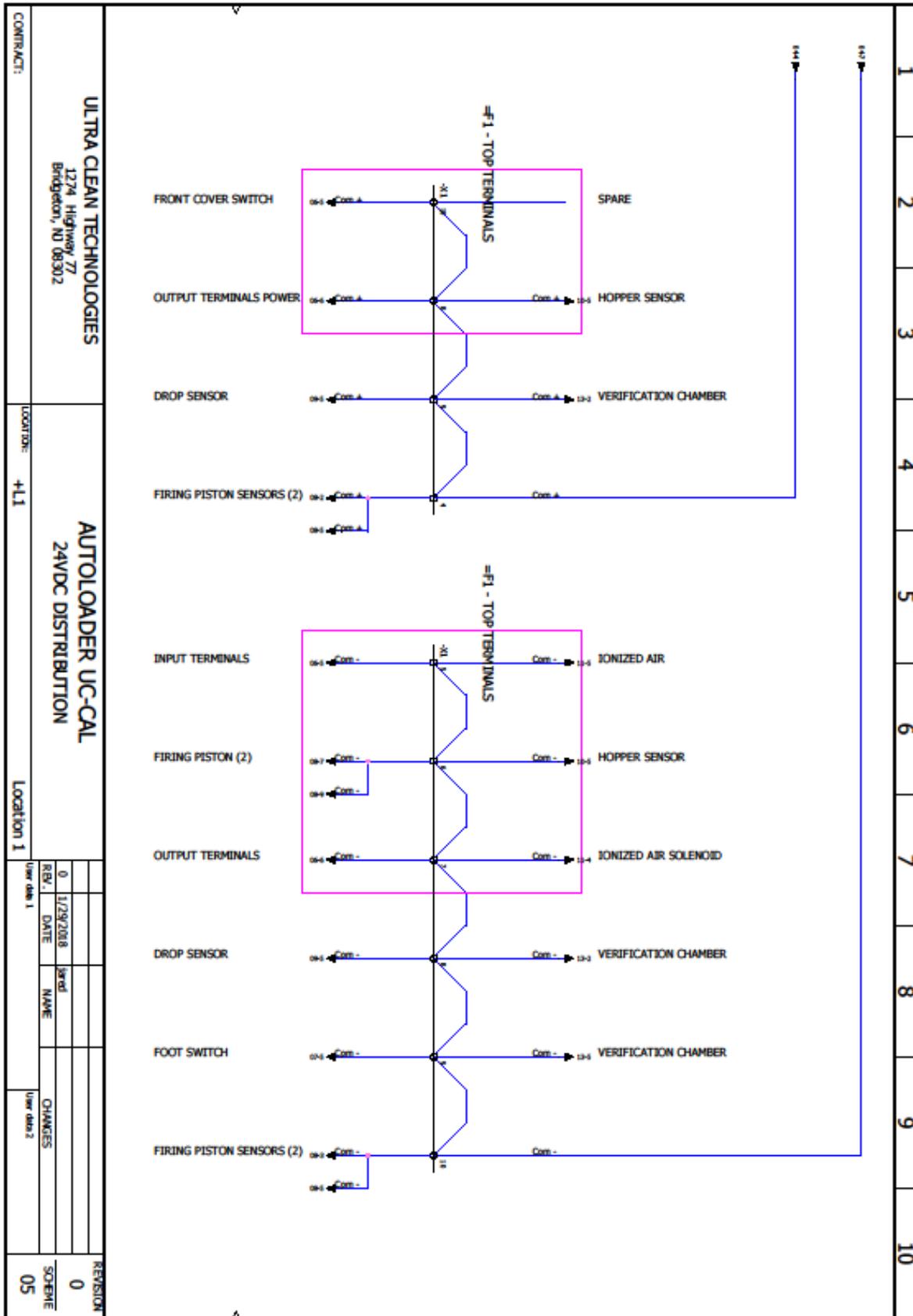
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02	PL	L1	0	1/29/2018	jsed	Drawing list							
03	PL	L1	0	1/29/2018	jsed	LINE DIAGRAM VERIFICATION CHAMBER							
04	PL	L1	0	1/29/2018	jsed	MAIN POWER							
05	PL	L1	0	1/29/2018	jsed	24VDC DISTRIBUTION							
06	PL	L1	0	1/29/2018	jsed	PLC POWER							
07	PL	L1	0	1/29/2018	jsed	FOOT SWITCH							
08	PL	L1	0	2/9/2018	jsed	PIPING MOTOR							
09	PL	L1	0	2/9/2018	jsed	DRIP SENSOR							
10	PL	L1	0	2/9/2018	jsed	NOPIER SENSOR							
11	PL	L1	0	2/9/2018	jsed	DOMICER							
12	PL	L1	0	2/9/2018	jsed	STEPPER MOTOR							
13	PL	L3	0	1/29/2018	jsed	VERIFICATION CHAMBER ID							

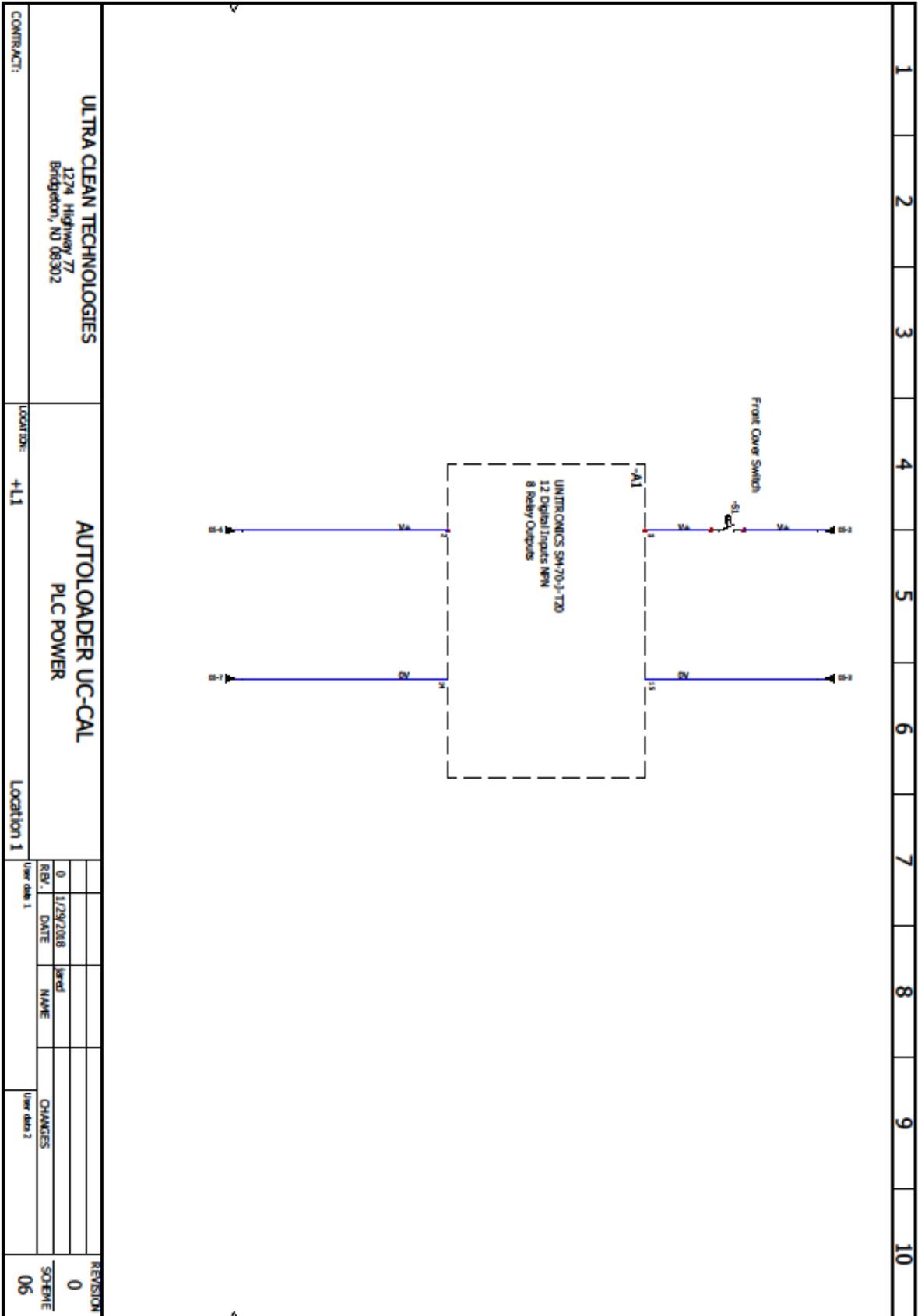
  

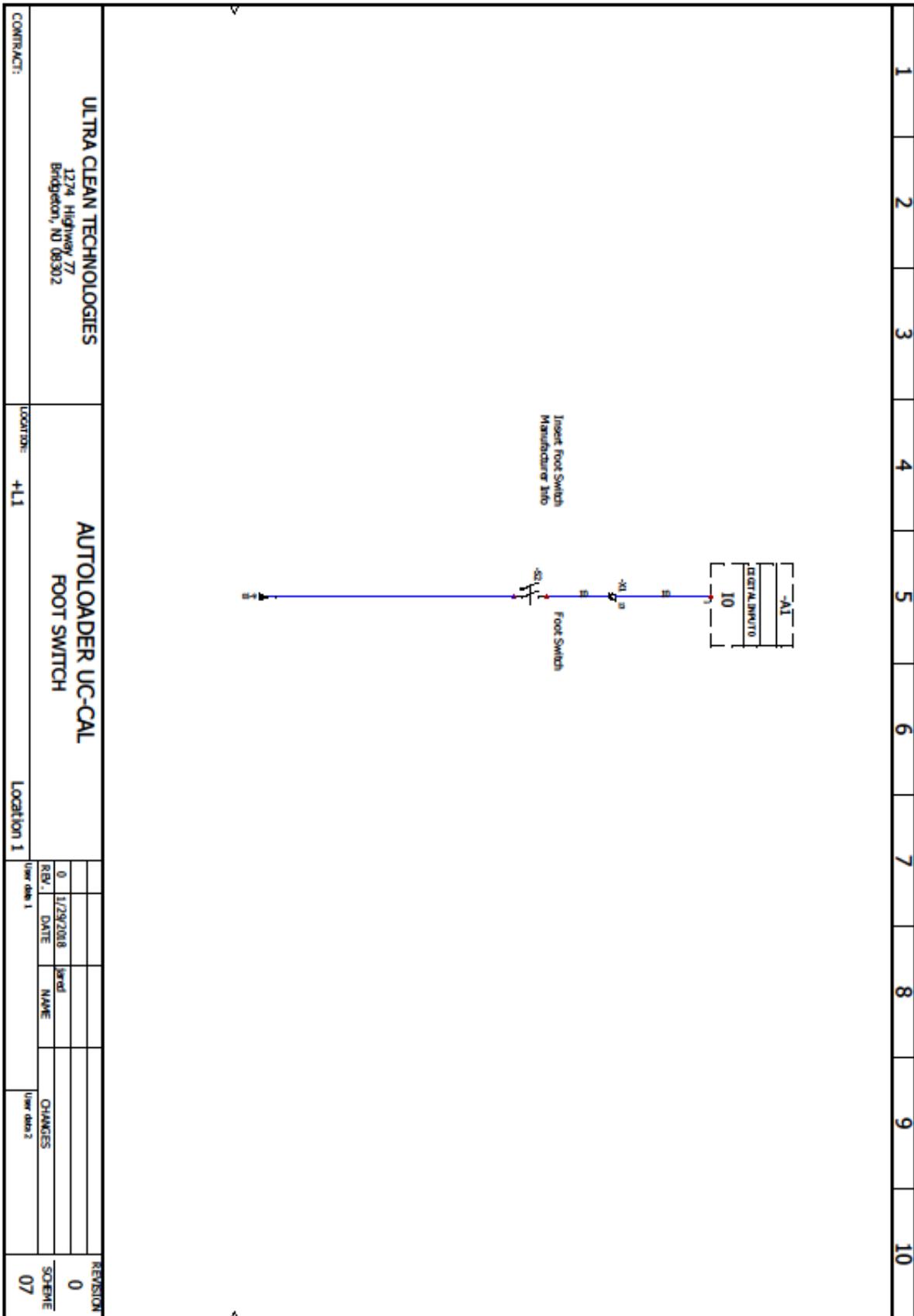
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CONTRACT:		LOCATION: +L1		REVISION: 02	
REV.	DATE	BY	NAME	CHANGES	
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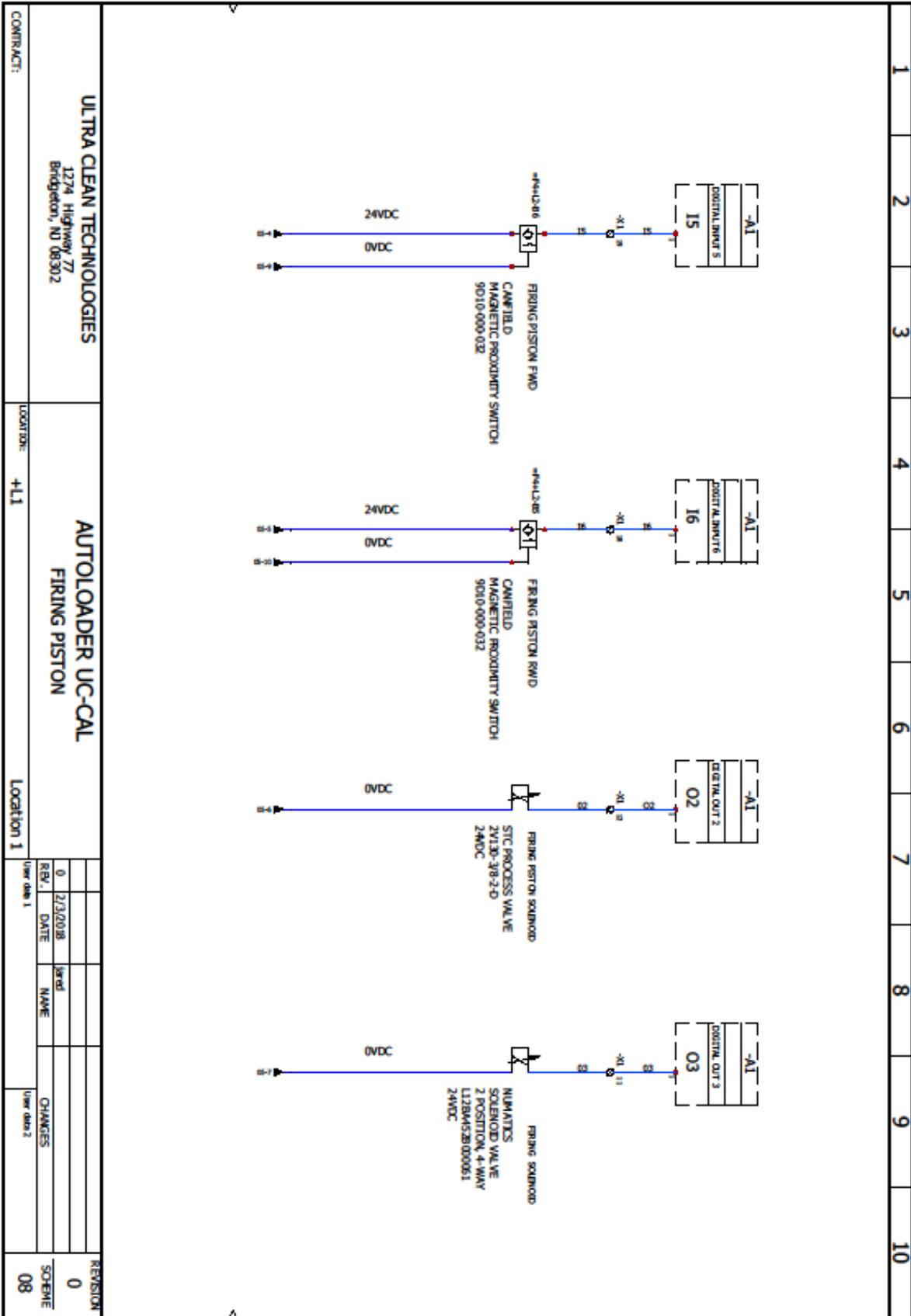


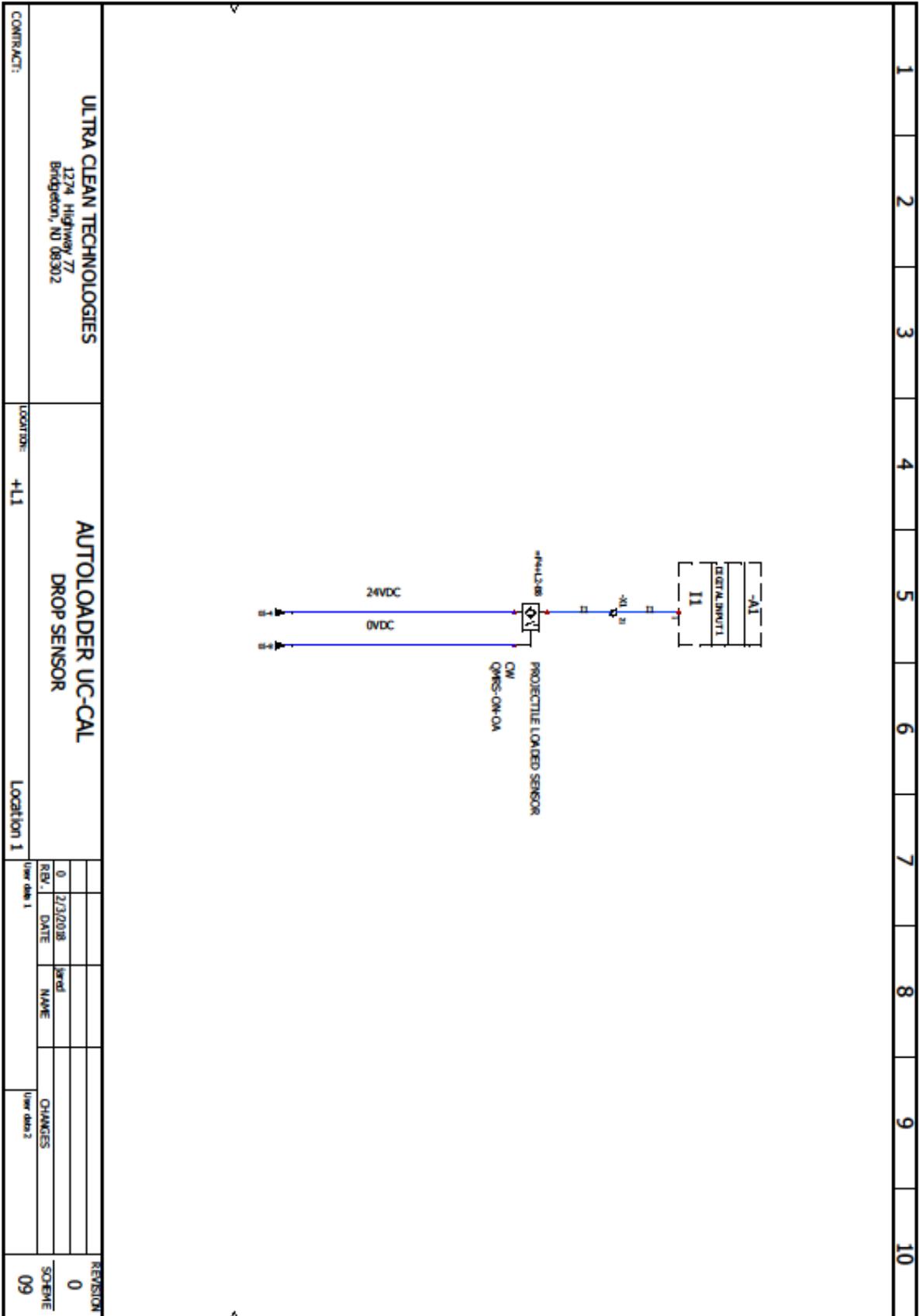


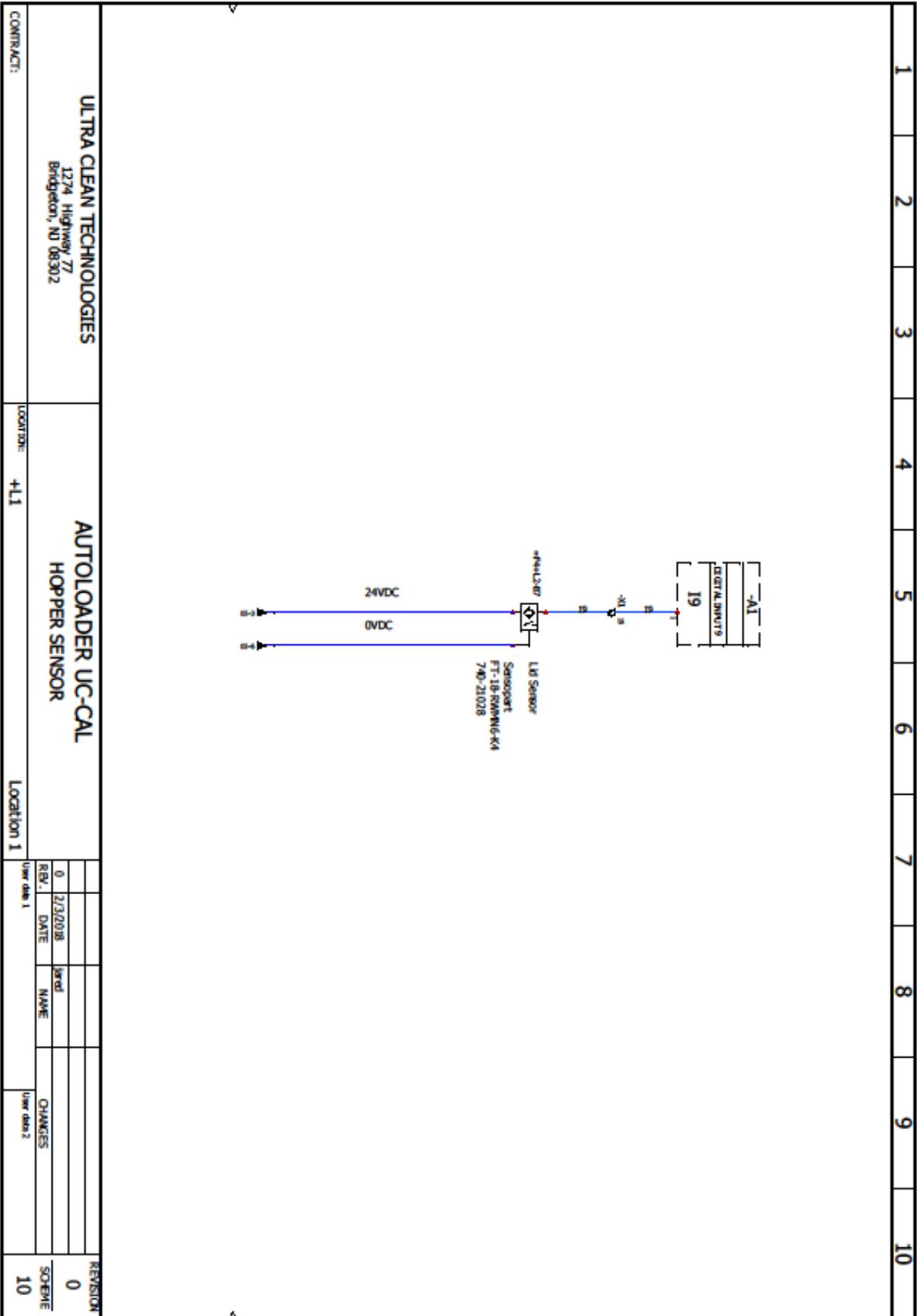


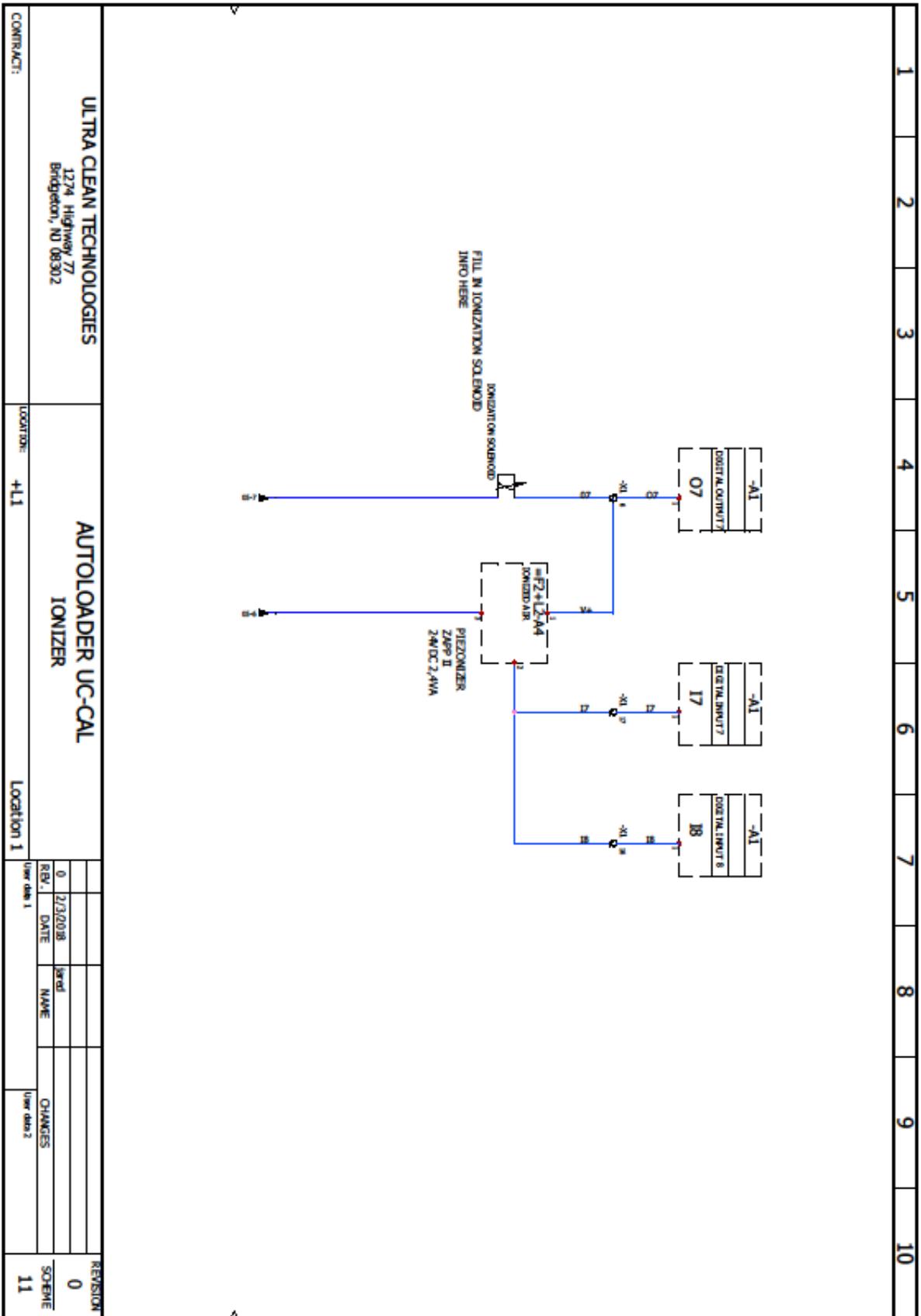


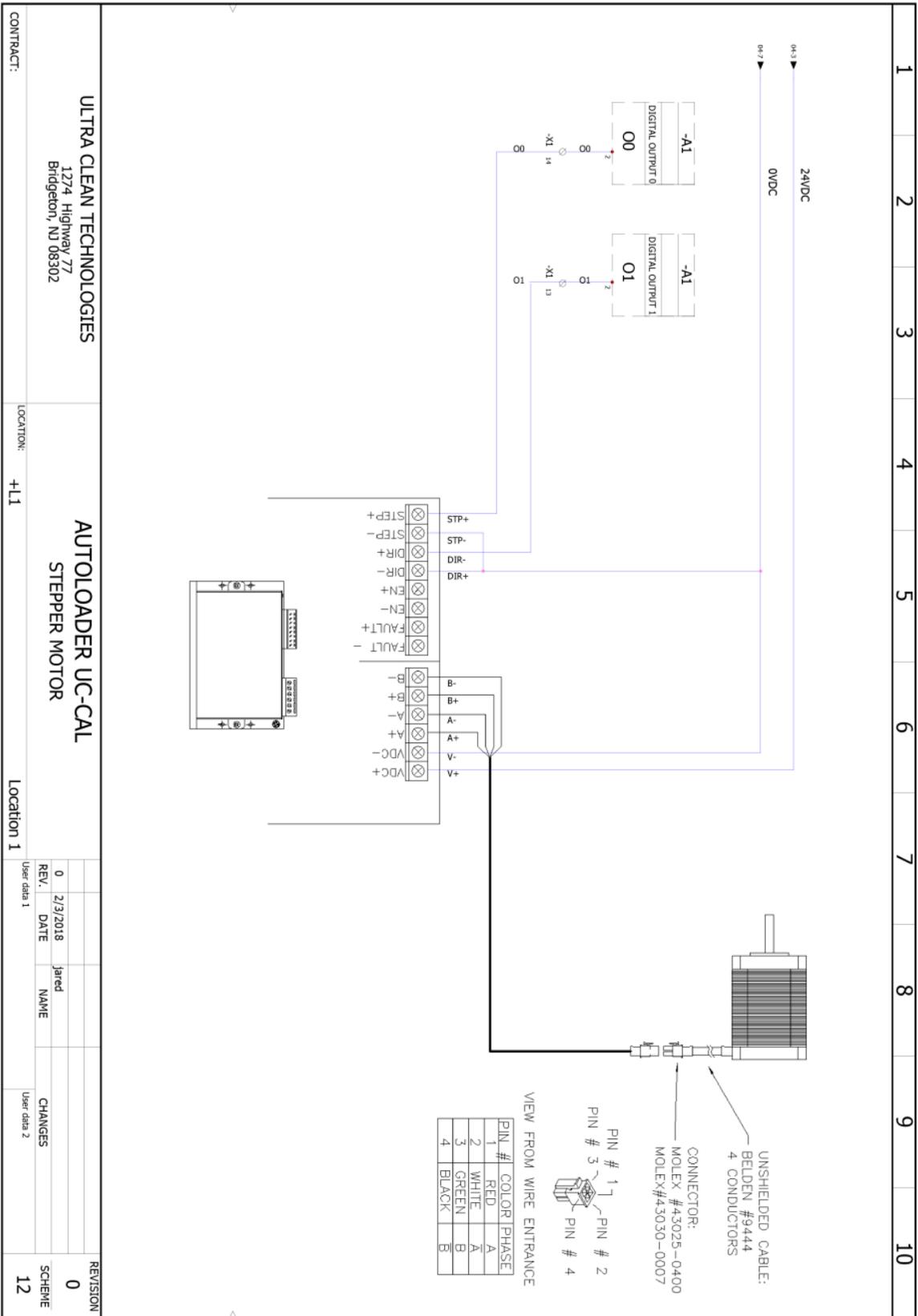
<p><b>ULTRA CLEAN TECHNOLOGIES</b> 1274 Highway 77 Bridgeport, NJ 08302</p>	<p><b>AUTOLOADER UC-CAL</b> <b>FOOT SWITCH</b></p>														
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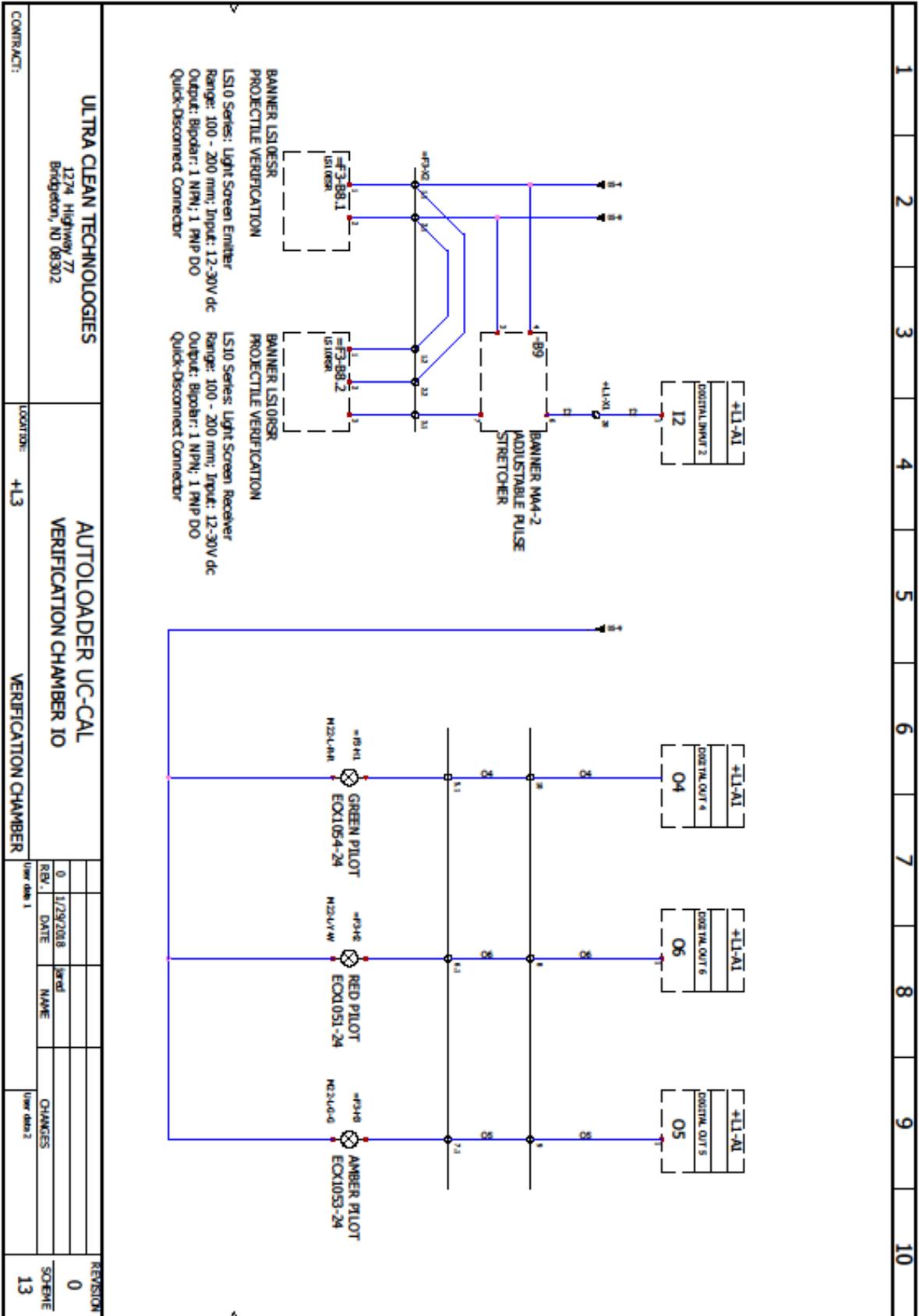
**ULTRA CLEAN TECHNOLOGIES**  
 1274 Highway 77  
 Bridgeton, NJ 08302

**AUTOLOADER UC-CAL**  
**STEPPER MOTOR**

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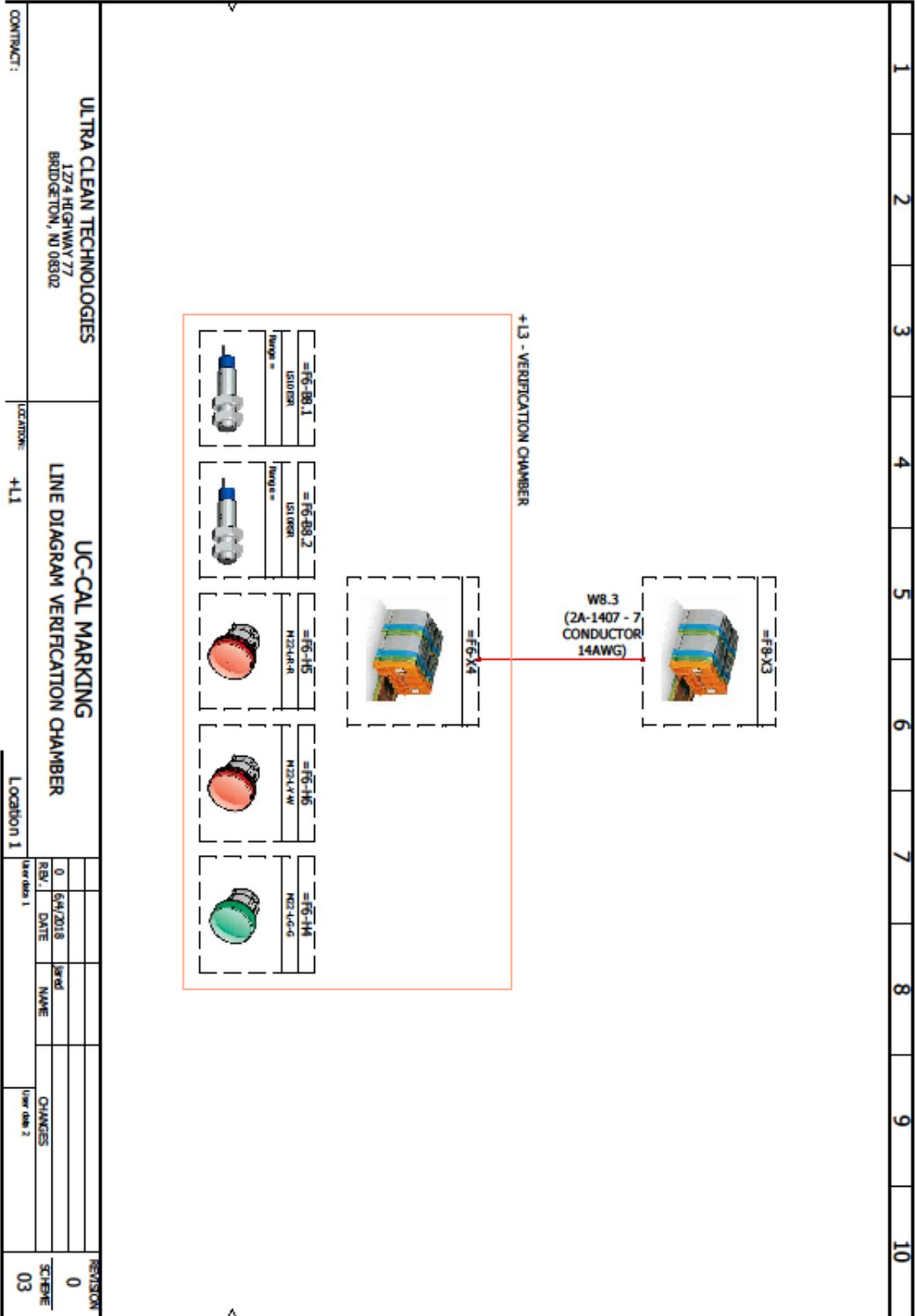


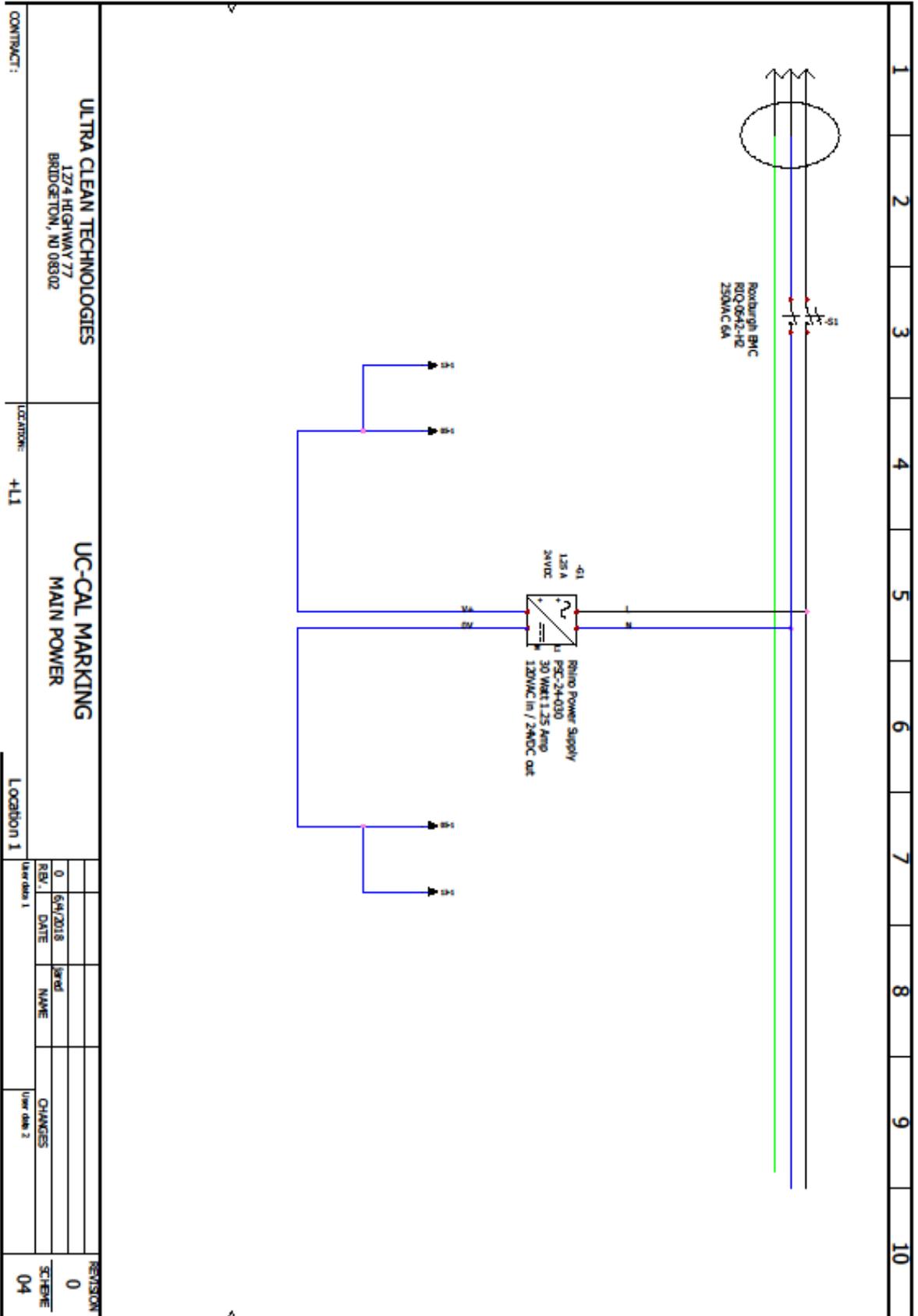
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09	PL	L1	0	6/4/2018	jmnd	OROP SENSOR			
10	PL	L1	0	6/4/2018	jmnd	HOPPER SENSOR			
11	PL	L1	0	6/4/2018	jmnd	IONICER			
12	PL	L1	0	6/4/2018	jmnd	STRIBER MOTOR			
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14	PL	L1	0	6/4/2018	jmnd	HAIRING			

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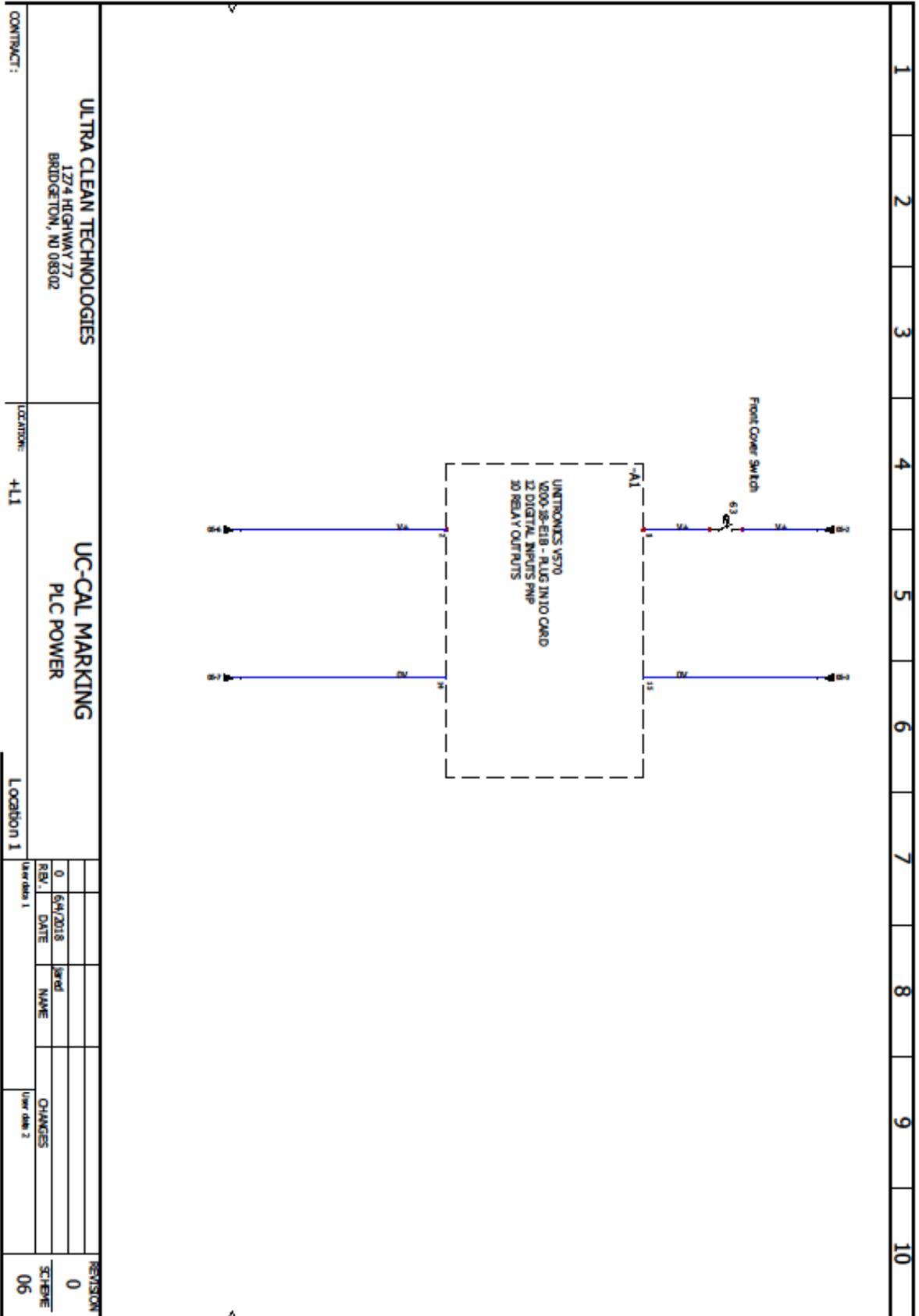
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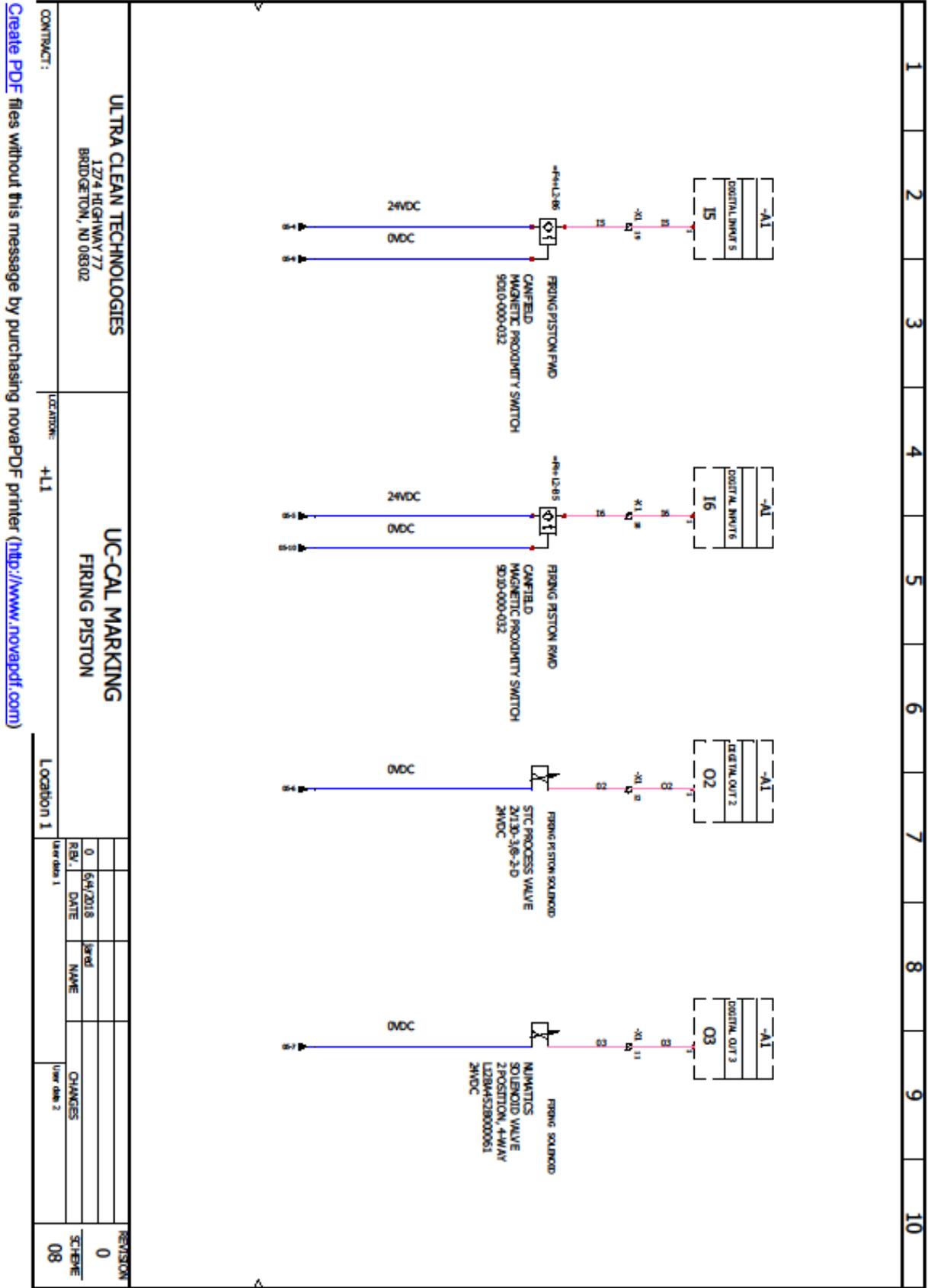
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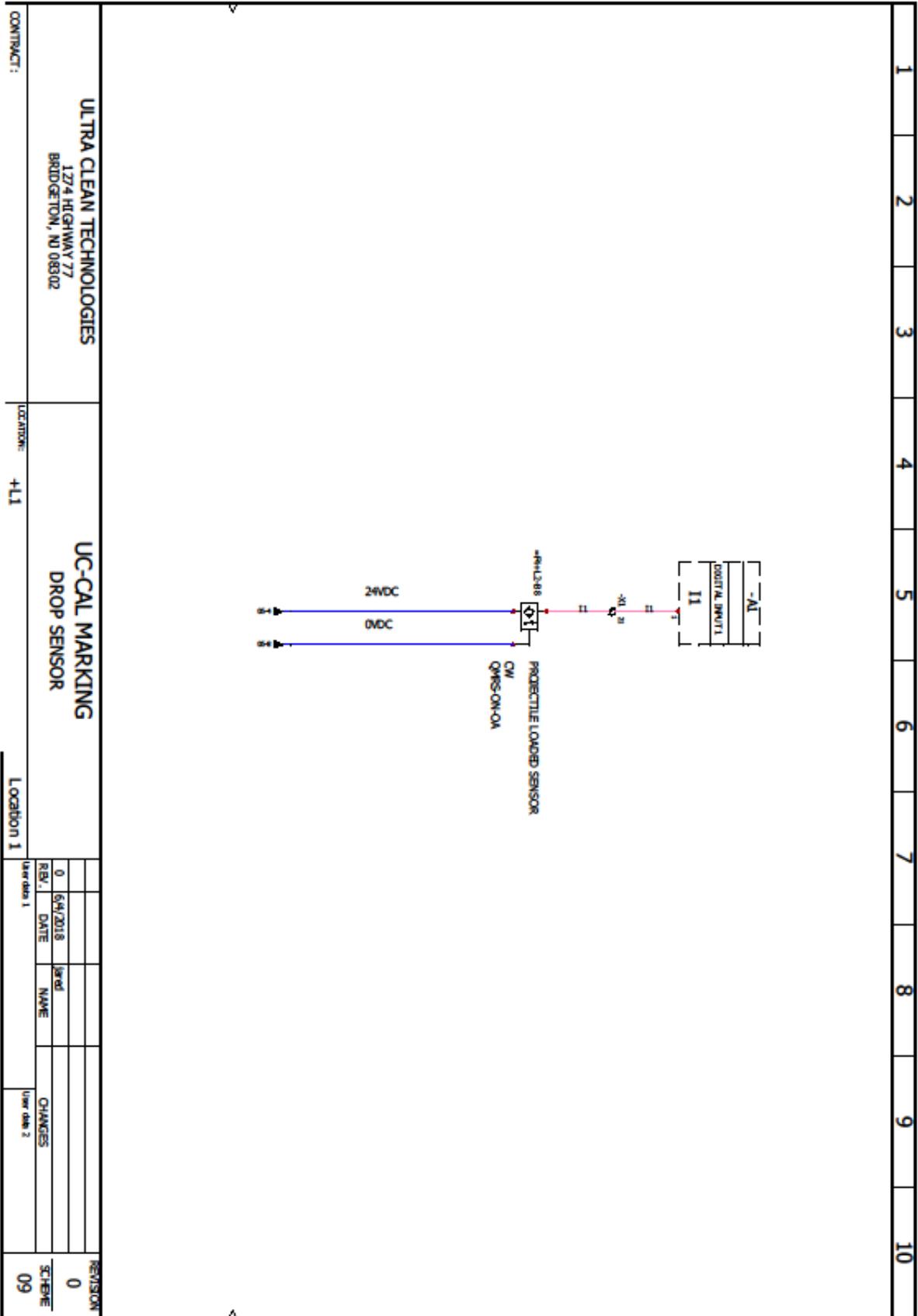




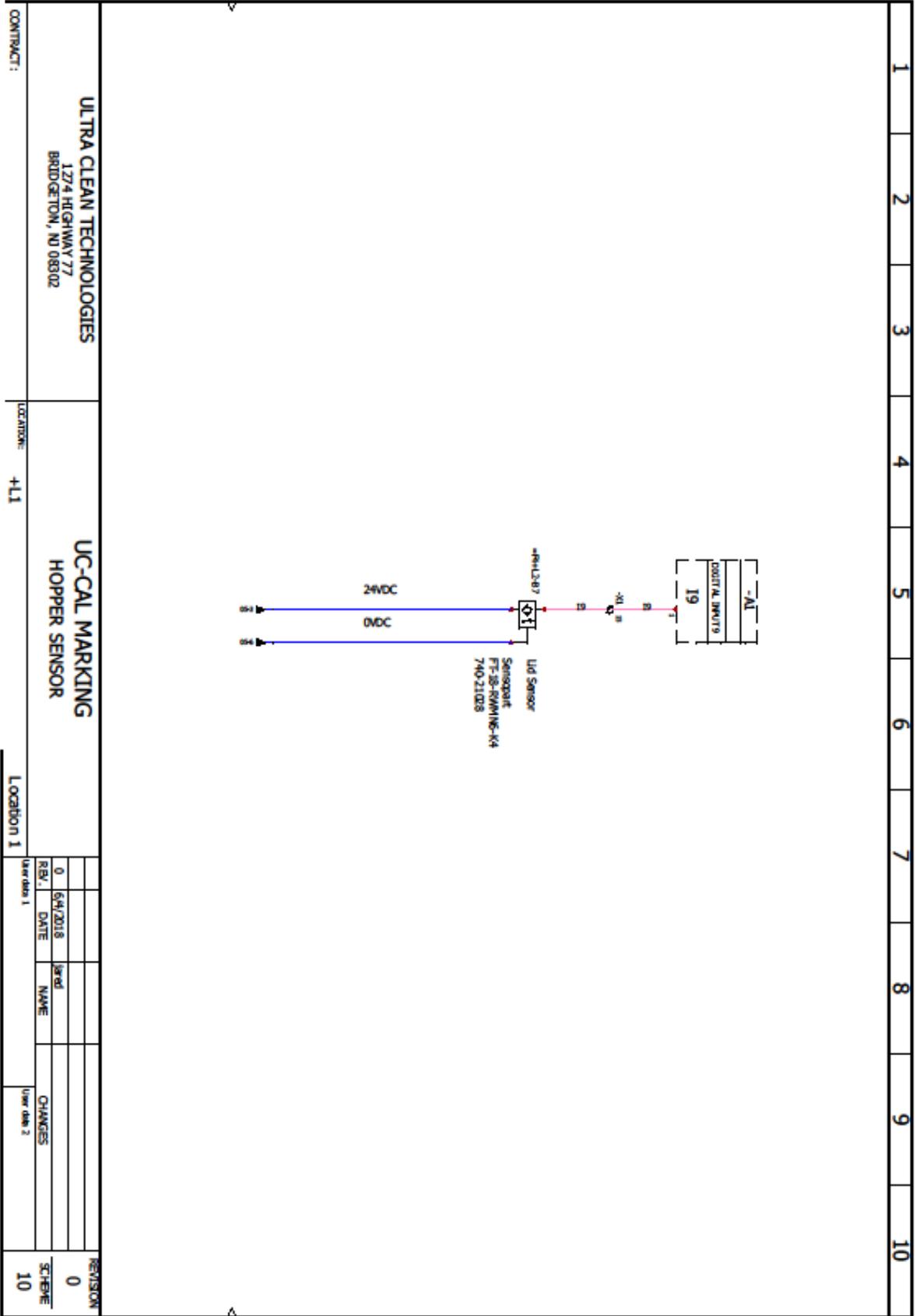
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 1274 HIGHWAY 77  
 BRIDGETON, NJ 08302

**UC-CAL MARKING**  
 HOPPER SENSOR

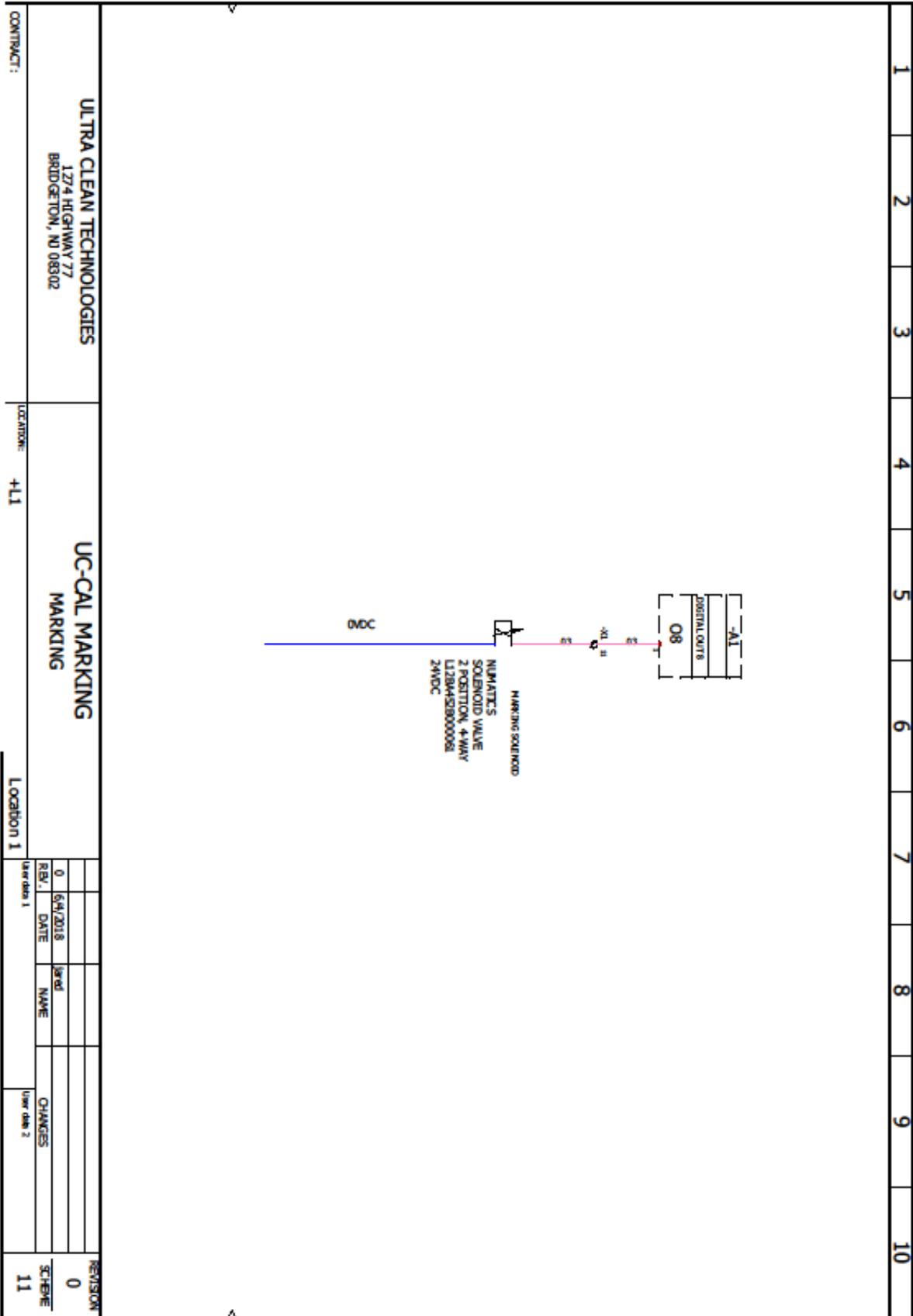
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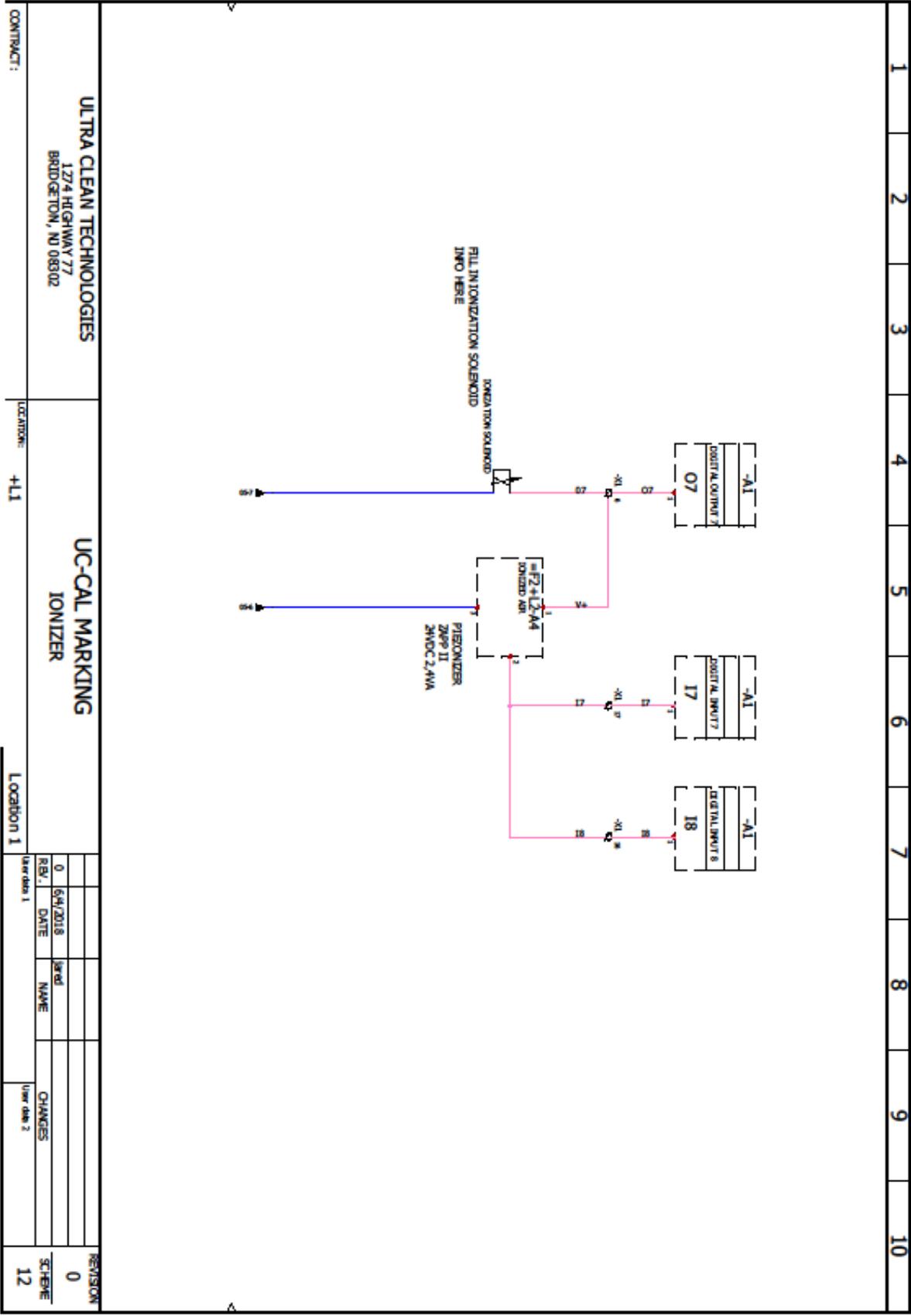
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<b>ULTRA CLEAN TECHNOLOGIES</b> 1274 HIGHWAY 77 BRIDGEFORD, NJ 08302		<b>UC-CAL MARKING</b>	
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SCHEME 11			REVISION 0

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**ULTRA CLEAN TECHNOLOGIES**  
 1274 HIGHWAY 77  
 BRIDGEFORD, NJ 08302

**UC-CAL MARKING IONIZER**

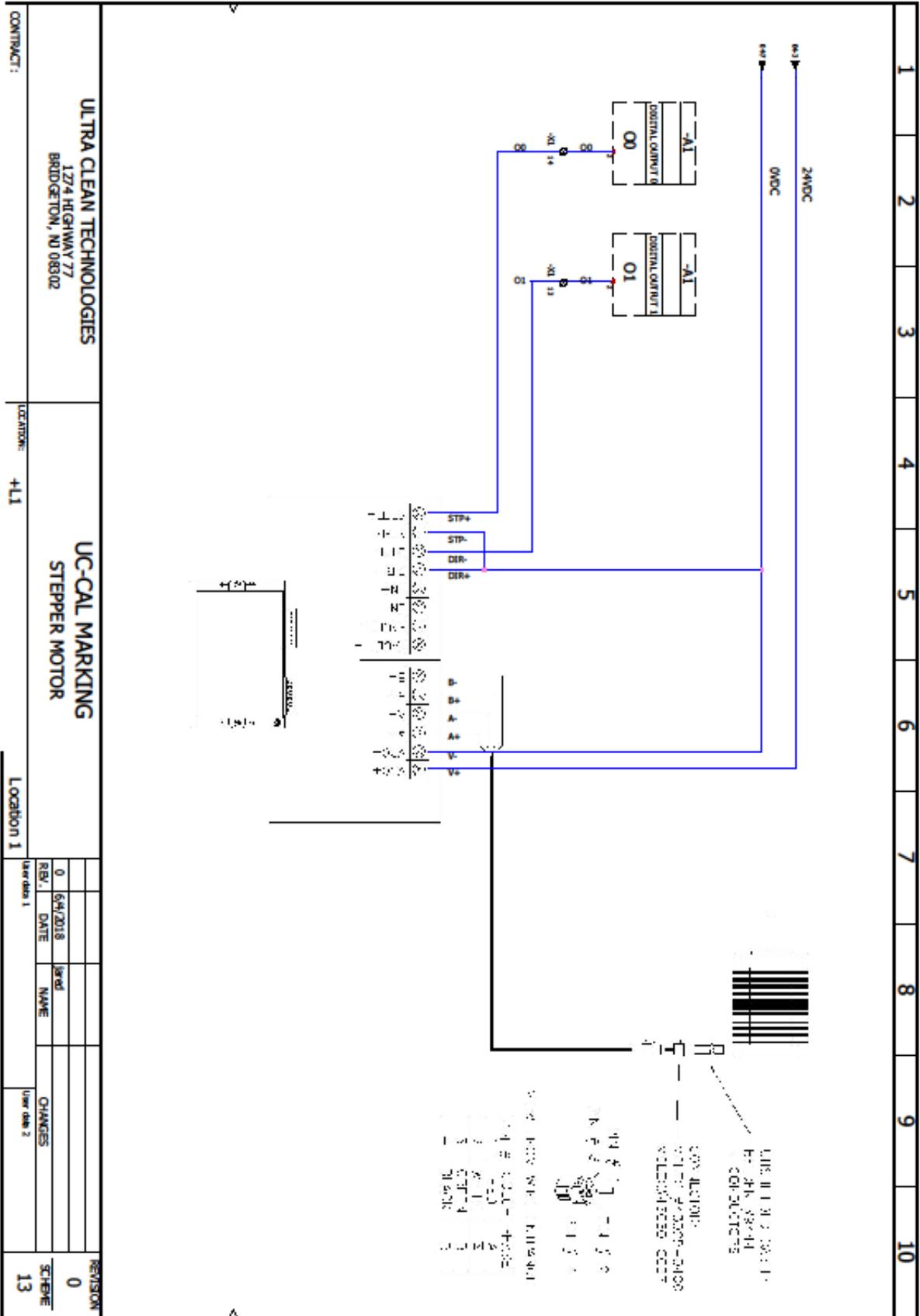
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1274 HIGHWAY 77  
BRIDGEFORD, NJ 08302

LOCATION: +L1

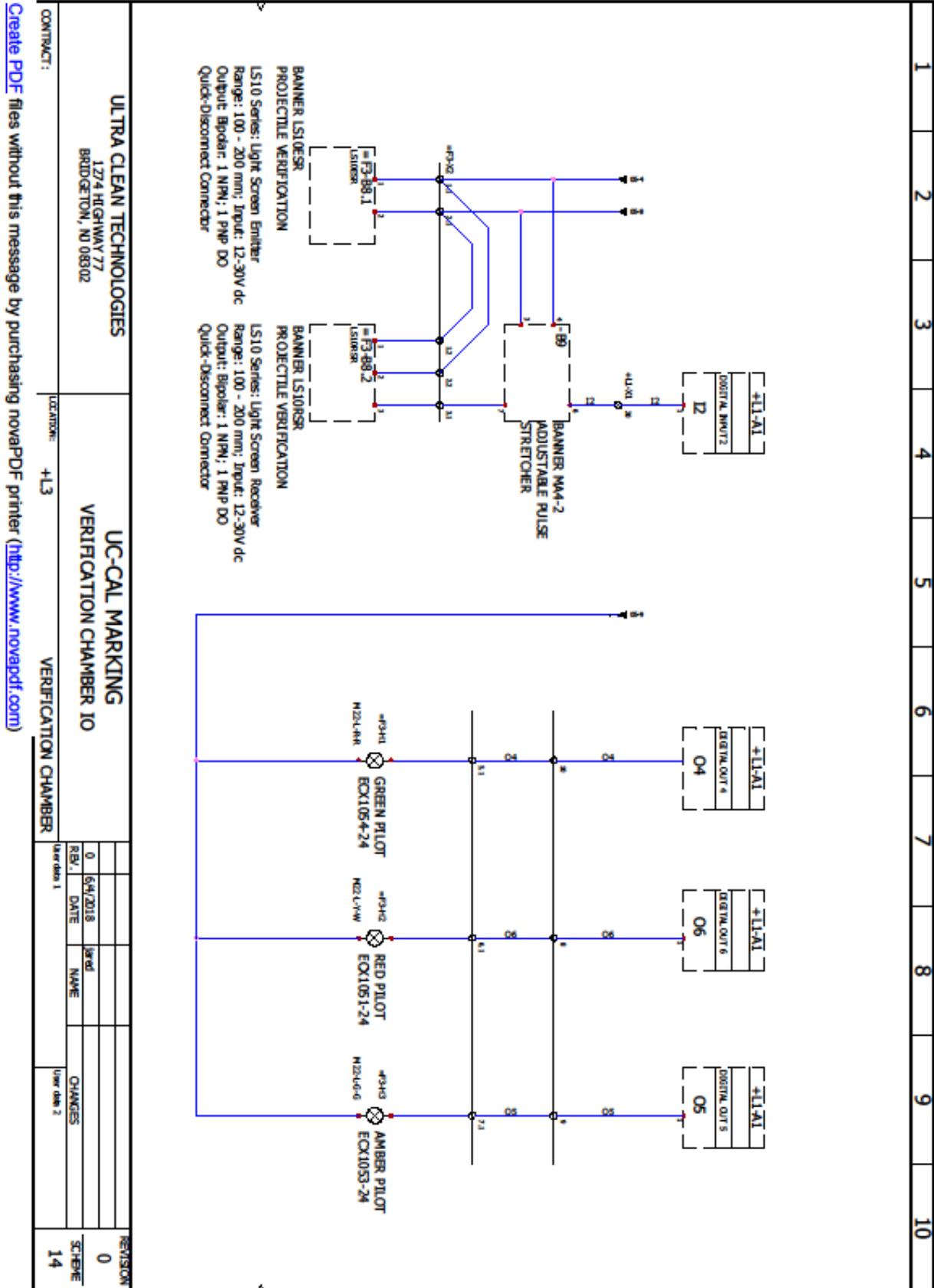
UC-CAL MARKING  
STEPPER MOTOR

Location 1

Location 2

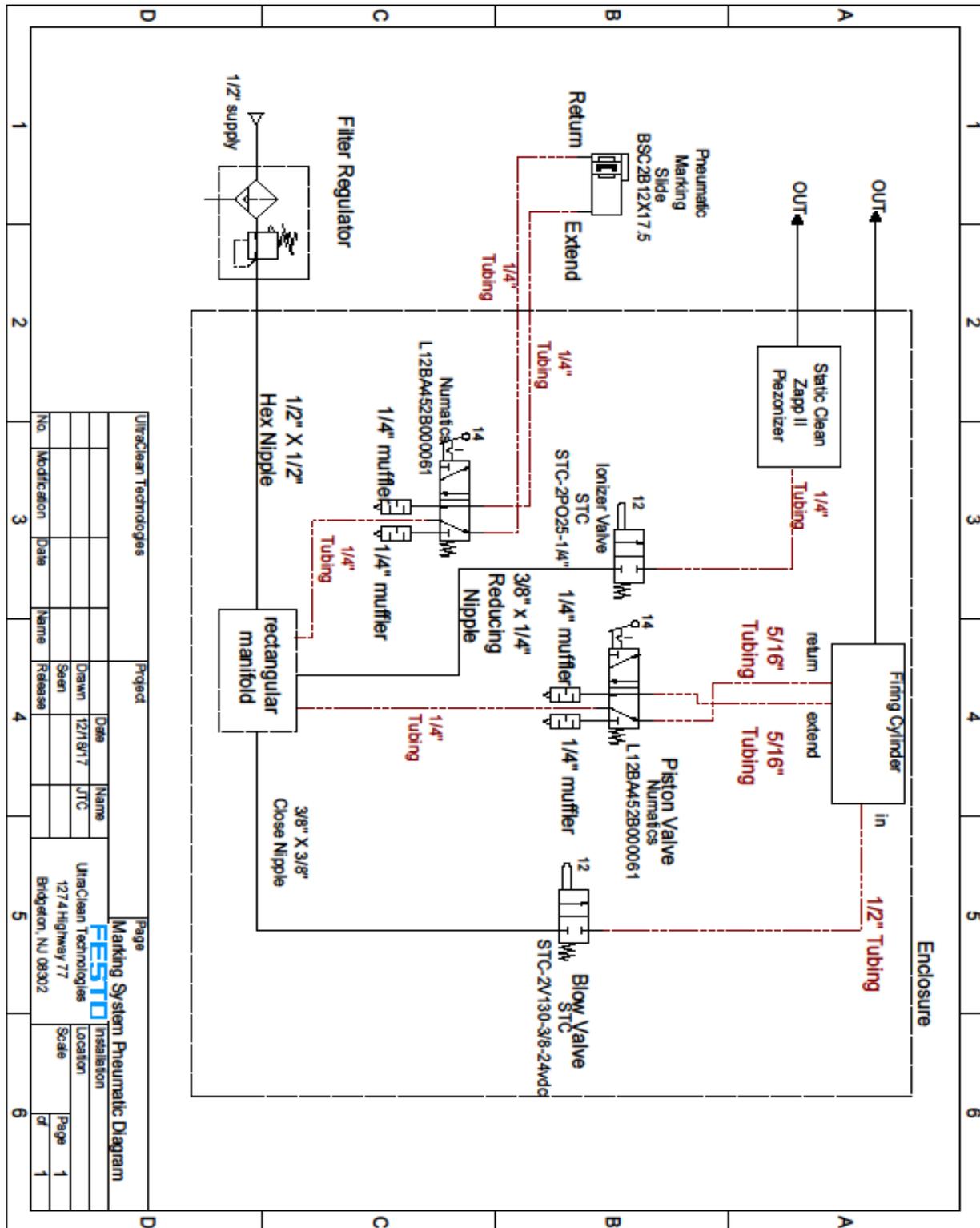
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12.5.2 UC-CAL-MS Pneumatic Diagram



## 12.6 Parts List

<b>Parts list UC-CAL (without Marking System)</b>		
<b>Part Number</b>	<b>Description</b>	<b>QTY</b>
UC-AL-SHZAPPII-H	Zapp II ionizer	1
SM70-J-T20	SM 70 Samba PLC 7" screen	1
UC-AL-FT18-2-RWM-NS-K4	Lid Sensor	1
UC-AL-9D10-000-032	Piston position sensor	2
UC-AL-STP-DRV-6575	Micro Stepping Drive	1
UC-AL-STP-MTR-17060	Stepper Motor	1
UC-AL-QMRS-0N-0A	Sensor dropping chute	1
UC-AL-RIQ-0642-H2	Main on/off switch with fuse	1
UC-AL-L12BA452B000061	Flow control solenoid	1
UC-AL-PSS24-050	Power Supply 110V/240V	1

<b>Parts list UC-CAL-MS (with Marking System)</b>		
<b>Part Number</b>	<b>Description</b>	<b>QTY</b>
UC-AL-SHZAPPII-H	Zapp II ionizer	1
UC-V570-57-T20B-JN	HMI/PLC CONTROLLER/SCREEN	1
UC-AL-FT18-2-RWM-NS-K4	Lid Sensor	1
UC-AL-9D10-000-032	Piston position sensor	2
UC-AL-STP-DRV-6575	Micro Stepping Drive	1
UC-AL-STP-MTR-17060	Stepper Motor	1
UC-AL-QMRS-0N-0A	Sensor dropping chute	1
UC-AL-RIQ-0642-H2	Main on/off switch with fuse	1
UC-AL-L12BA452B000061	Flow control solenoid	2
UC-AL-PSS24-050	Power Supply 110V/240V	1

<b>Parts List UC-CAL-MARK (Marking System)</b>		
<b>Part Number</b>	<b>Description</b>	<b>QTY</b>
UC-MS-GUARD	Transparent plexiglass guard	1
UC-BSC2B12x17.5	Pneumatic Cylinder	1
UC-MS-PENHOLDER	Marking system pen holder	1

<b>Parts List UC-CB-PS (Containment Barrel)</b>		
<b>Part Number</b>	<b>Description</b>	<b>QTY</b>
UC-MA4-2	MA4-2 Micro-Amp Logic Module	1
UC-ECX1051-24	Red Indicator Light	1
UC-ECX1052-24	Green Indicator Light	1
UC-ECX1053-24	Yellow Indicator Light	1
UC-LS10ESR	Emitter Banner Light	1
UC-LS10RSR	Receiver Banner Light	1
UC-ECX-1902	Replacement Bulb	1
UC-LS10SR	Replacement Lens	1
UC-P525130	Air Filter	1

## 13 APPENDIX

### 13.1 Machine Plate

The machine plate is located on the Control Station.

	<b>Ultra Clean Technologies Corp.</b> 1274 Highway 77, Bridgeton, NJ, 08302 USA T: +1-856-451-2176 F: +1-856-453-4975 www.ultracleanotech.com
<b>Carousel AutoLoader</b>	
Supplier:	Ultra Clean Technologies Corp.
Machine Type:	Carousel AutoLoader
Year of Construction:	2017
Serial#:	UC-CAL-0001
Patent#:	US 7,996,946 B1
Technical Data:	Input: 100-230V 1.5A 47. Output: 24V 4.71A
	

*Machine Plate (example)*

## 13.2 EC Declaration of Conformity for Machinery

**EC DECLARATION OF CONFORMITY FOR MACHINERY**  
**(Directive 2006/42/EC, Annex I)**

**Manufacturer:** Ultra Clean Technologies Corp.  
**Address:** 1274 Highway 77, Bridgeton NJ 08302, USA

Herewith declares that the

UC-CAL Carousel AutoLoader, production year 2018 onwards,

is in conformity with the requirements of:

- **Machinery Directive (2006/42/EC)**
- **EMC Directive 2004/108/EC**

The following standards have been applied for these products:

**EN ISO 12100 ; EN ISO 4414 ; EN ISO 13849-1; EN ISO 13849-2 ;**  
**EN IEC 61000-6-2 ; EN IEC 61000- 6-4 ; EN IEC 60204-1**

Responsible person Technical Documentation: Mr. B. Riley

Bridgeton NJ 08302 USA, March 1<sup>st</sup> , 2018

Signature:



Bruce Riley  
Owner

## **14 RECOMMENDED CLEANING PROCEDURES**

### **14.1 Hose**

When hydraulic hose is cut with saws that use metal blades or abrasive wheels a tremendous amount of heat is generated. The heat from the cutting process will cause the rubber dust and metal particle contaminants to stick to the hose tube as they cool. It is vitally important to clean the hose immediately after the cutting process before the contaminants cool and stick to achieve the best results. An Ultra Clean projectile should be fired through the hose prior to the installation of end connections. Fire one projectile in each direction through the length of the hose. This will allow cleaning in the areas occupied by the insertion of the hose nozzle at either end during the cleaning process. After the crimping or swaging of fittings, an Ultra Clean projectile should be fired through the entire hose assembly. This projectile will remove the metal flash from the crimping or swaging process. It is also vitally important to cap the end fittings immediately following the last projectile. Apply Clean Seal Capsules to the hose ends which will keep airborne contaminants from entering the hose while protecting the threads.

### **14.2 Tube**

When tubing requires cutting, the ends should be thoroughly deburred prior to the use of the cleaning system. A tube nozzle and two Ultra Clean projectiles may then be implemented to clean the tube. If the tube appears to contain rust, weld slag or other corrosion on the inside surface, then an abrasive projectile should be used first, as many times as is necessary to remove the corrosion. Follow by using an Ultra Clean projectile to insure proper cleanliness. If flaring is required, this should also be done prior to cleaning. In this case, the use of a JIC nozzle will be necessary to mate properly with the flared end of the tubing. If special fittings are used that require crimping, then the use of an Ultra Clean projectile, in addition to the procedure described above, is also recommended after the assembly is complete.

## 15 SIZING CHARTS

HOSE SIZING CHART - NOMINAL INCH							
HOSE ID		NOZZLE	HOPPER BOX	ULTRA CLEAN PROJECTILE	HAND HELD (Optional)		
NOM. IN.	DN MM				UC-CAL-HH-1/2	UC-CAL-HH-5/8	UC-CAL-HH-3/4
¼"	6	UC-H06	UC-HB-10	UC-10BE-AS	✓	✓	✓
5/16"	8	UC-H08	UC-HB-12	UC-12BE-AS	✓	✓	✓
¾"	10	UC-H10	UC-HB-14	UC-14BE-AS	✗	✓	✓
½"	13	UC-H13	UC-HB-18	UC-18BE-AS	✗	✗	✓
5/8"	16	UC-H16	UC-HB-20/22	UC-22BE-AS	✗	✗	✓
¾"	19	UC-H19	UC-HB-24/26	UC-26BE-AS	✗	✗	✓
1"	25	UC-H25	UC-HB-33	UC-33BE-AS	✗	✗	✗

TUBE SIZING CHART - NOMINAL INCH						
OD X WALL	NOZZLE	HOPPER BOX	TUBE PROJECTILE	HAND HELD (Optional)		
				UC-CAL-HH-1/2	UC-CAL-HH-5/8	UC-CAL-HH-3/4
¼" X .028"	UC-T06	UC-HB-07	UC-07BTE-AS	✓	✓	✓
¼" X .035"	UC-T06	UC-HB-07	UC-07BTE-AS	✓	✓	✓
¼" X .049"	UC-T06	UC-HB-07	UC-07BTE-AS	✓	✓	✓
¼" X .065"	UC-T06	UC-HB-07	UC-07BTE-AS	✓	✓	✓
5/16" X .028"	UC-T08	UC-HB-10	UC-10BTE-AS	✓	✓	✓
5/16" X .035"	UC-T08	UC-HB-07	UC-07BTE-AS	✓	✓	✓
¾" X .028"	UC-T10	UC-HB-10	UC-10BTE-AS	✓	✓	✓
¾" X .035"-.049"	UC-T10	UC-HB-10	UC-10BTE-AS	✓	✓	✓
¾" X .065"	UC-T10	UC-HB-10	UC-10BTE-AS	✓	✓	✓
½" X .035"	UC-J13/T13	UC-HB-14	UC-14BTE-AS	✗	✓	✓
½" X .049"	UC-J13/T13	UC-HB-12	UC-12BTE-AS	✓	✓	✓
½" X .065"	UC-J13/T13	UC-HB-12	UC-12BTE-AS	✓	✓	✓
½" X .083"	UC-J13/T13	UC-HB-12	UC-12BTE-AS	✓	✓	✓
5/8" X .049"	UC-J16/T16	UC-HB-16	UC-16BTE-AS	✗	✗	✓
5/8" X .065"	UC-J16/T16	UC-HB-16	UC-16BTE-AS	✗	✗	✓
5/8" X .083"	UC-J16/T16	UC-HB-14	UC-14BTE-AS	✗	✓	✓
¾" X .049"-.065"	UC-J19/T19	UC-HB-20/22	UC-20BTE-AS	✗	✗	✓
¾" X .095"	UC-J19/T19	UC-HB-18	UC-18BTE-AS	✗	✗	✓
7/8" X .049"	UC-J25/T22	UC-HB-24/26	UC-26BTE-AS	✗	✗	✗
7/8" X .065"	UC-J25/T22	UC-HB-20/22	UC-22BTE-AS	✗	✗	✗
7/8" X .095"	UC-H16	UC-HB-20/22	UC-22BTE-AS	✗	✗	✗
1" X .065"	UC-J32/T25	UC-HB-28/30	UC-28BTE-AS	✗	✗	✗
1" X .083"-.095"	UC-J32/T25	UC-HB-24/26	UC-26BTE-AS	✗	✗	✗
1" X .120"	UC-J32/T25	UC-HB-24/26	UC-26BTE-AS	✗	✗	✗





