MACHINE SOLUTIONS INC.

Machine Solutions

BEAHM DESIGNS MANDREL REMOVER
MODEL C-80

BEAHM DESIGNS

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| PM-68750 Rev. C |

WELCOME

Machine Solutions, Inc. (MSI) would like to take this opportunity to thank you for purchasing your new C-80 Mandrel Remover machine. At MSI, we are dedicated to bringing innovative process development solutions to both medical device and nonmedical organizations. MSI looks forward to helping your organization provide life-improving devices to your customers, today and tomorrow.

CONTROL SYSTEM OVERVIEW

The control system consists of an Allen-Bradley CompactLogix PLC and an Allen-Bradley PanelView Plus Compact Edition HMI 6" color display terminal. The PLC controls the operation of a linear actuator and a triple gripping system (HMI controlled grips on Auto machine only). The human machine interface (HMI) provides the operator with the means to monitor and control the operation of the puller and to set up control parameters.

PROCESS OVERVIEW

The Mandrel Removal System is a tool used to extract the core mandrel from a catheter assembly. Variable speed and distance controls allow control of the extraction process.

The mandrel is gripped by a collet mounted on the linear actuator. The product is gripped at several positions fixed to the frame.

When the process is started, the collet is moved up through three speed zones. After the mandrel and product are removed from the tool, the collet is returned to the starting position.

The operator can select a recipe from a set of 100 recipe files using a barcode scanner. Each file contains the variables used by the process sequence.

A passcode is used to control access to the recipe settings, machine settings, and several test screens on the HMI.

SAFETY

- Place the system on a level, sturdy surface at an ergonomically viable height for the user.
- Use of eye protection when working with compressed gases and heated materials is advised.
- The maximum observed Sound Pressure Level is below 70 dB(A).

Caution: high voltage. Remove power and use safety precautions when servicing.

Caution: pinch point. Keep hands and body parts clear while in operation.

INSTALLATION

1. Place the system on a level, sturdy surface.
2. Lock casters.
3. Connect the power cord to 120/240 VAC 50/60 Hz. Outlet. Confirm voltage on machine label.
4. Connect the air supply hose assembly to the system and then to a clean, dry, and filtered compressed air source.

TERMS AND DEFINITIONS

Term	Definition
A-B	Allen-Bradley
PVP	Allen-Bradley touchscreen family
Ethernet/ IP	Communications protocol for A-B automation equipment
HMI	Human Machine Interface providing an operational interface for a system.
PLC	Programmable Logic controller

CONTROLS AND FEATURES

Located on the front and rear panels are the following controls and features.
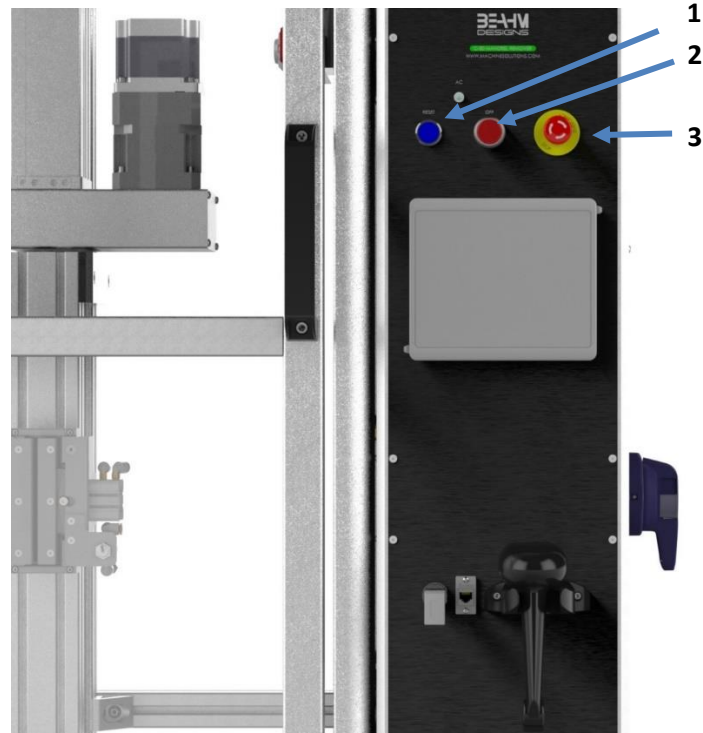
Figure 1. C-80 Mandrel Remover Front Panel Controls and Features

Table 1. C-80 Mandrel Remover Control and Display Functions

	Description	Function
1	Reset Button	Restores machines 48-volt DC, 24-volt DC, and machines air pressure.
2	Stop Button	Momentary pushbutton that disengages machines 48-volt DC, 24-volt DC, and machines air pressure.
3	Emergency Stop	E-stop pushbutton that disengages machines 48-volt DC, 24-volt DC, and machines air pressure.
4	Air Connection Valve	Connection for the compressed air at a max of 125 PSI.
5	Gripper Open/Close Switch	For manual pneumatics: a manual toggle valve located next to the grippers will engage and disengage each product gripper. For automatic pneumatics: a pushbutton on the HMI is used to toggle the grippers.

6	Collet Open/Close Switch	For manual pneumatics: a manual toggle valve located on the puller box, is used to engage and disengage the collet. For automatic pneumatics: a pushbutton on the HMI is used to toggle the collet.
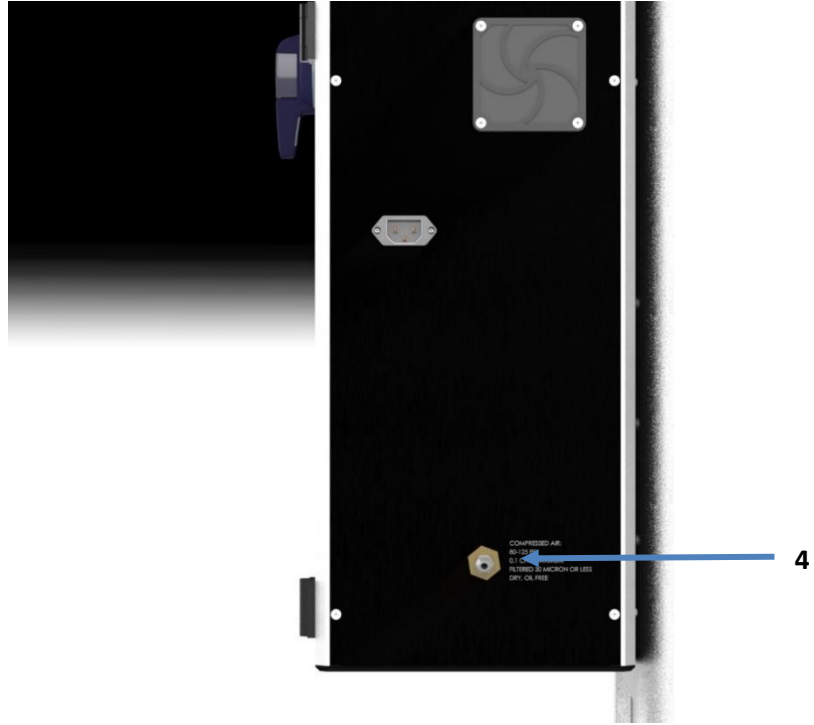
Figure 2. C-80 Mandrel Remover Back Panel Controls and Features
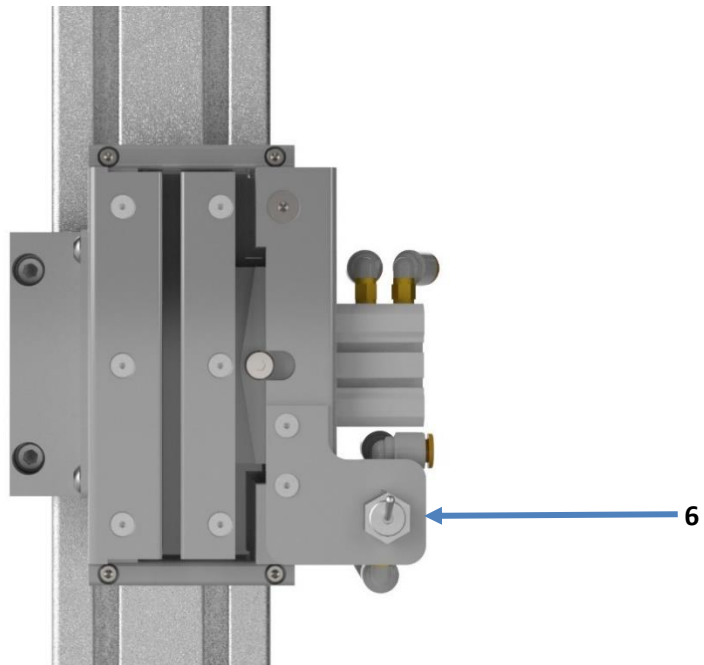
Figure 3. Gripper Open and Close Switch
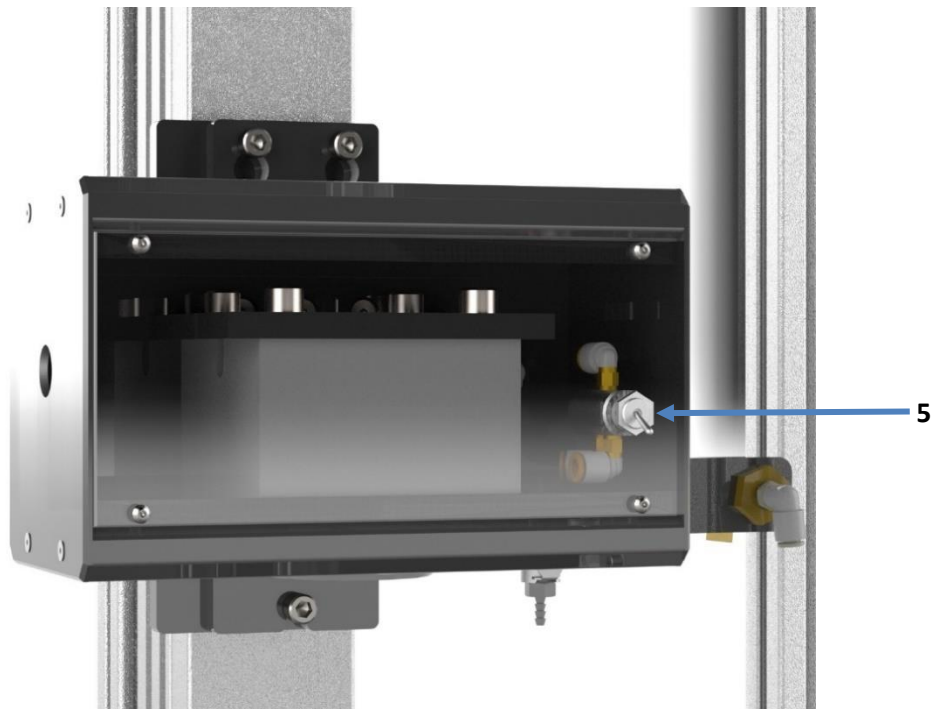
Figure 4. Collet Open and Close Switch

ELECTRICAL SYSTEM OPERATION AND FEATURES

Please see the electrical drawing set for full details of the electrical system.

Power Requirements

The C-80 is fed from a single 120V or 240V/1Ø/2W service. The tool is equipped with a door-interlocked disconnect switch that then goes to two 5amp circuit breakers. For potential current draw of 10amps.

Main Disconnect

The power cable can be removed from the socket for disconnect purposes.

Disconnect Switch

The door-interlocked disconnect switch can be locked out for service purposes.

Emergency Stop Loop and Hardwired Devices

A single emergency stop twist-to release switch is connected to a safety relay in the electrical enclosure. The emergency stop switch is wired in series with a red extended head stop switch. When the safety relay is active, the PLC and HMI remain energized. The safety relay will need to be reset to have machine functionality.

To reset the safety relay, both switches must be released, then the reset button must be pushed. The blue reset button illuminates, and power is applied to the two main contactors. This energizes the outputs of the PLC and the linear actuator motor.

CompactLogix Programmable Logic Controller System

The PLC system is built around a CompactLogix 1769-L24ER-QBFC1B PLC. The processor supports I/O modules for digital inputs, digital outputs, analog inputs, and analog outputs. The linear actuator is positioned using a stepper motor control module.

PLC Secure Digital Card

The PLC supports a 1GB SD Card memory backup. If a processor fault is detected, the stored program will be reloaded to the PLC's memory. Please note that user changes to the settings and the recipes may be lost in this event.

No memory battery is required for this model of PLC.

Barcode Scanner Connects to PanelView's USB Port

A barcode scanner sends data to the USB port on the HMI. When the operator brings up an alphanumeric keypad, the data from the scanner is written to the PLC.

Step Motor Drive Configuration

The step motor drive is configured to a motor resolution of 6500 steps/mm. The steps/mm value in the setting has been factory set to ensure proper travel distances.

SETTINGS AND RECIPE CONTROLS

The settings for the mandrel remover are adjustments that are rarely altered. The recipe controls allow easy process development with storage of the recipe when a good process has been established.

Alternate Display Units

The tool's native units for distance are millimeters.

The HMI is organized to show the user's preferred units. For each distance and speed on the operating screens, one of two text strings are displayed.

Distance:	mm	or	inch
Speed:	mm/S	or	IPS

The settings table and internal recipe storage is maintained in mm.

Passcode Required to Change Settings

Changes to the settings require the entry of a user passcode. Two different user passcodes are adjustable in the settings. A passcode of "2694" is hard coded into the passcode logic.

The passcode is cleared after a time delay passes when the HMI is displaying the Run Parts screen. The time delay is adjustable in the settings and can be defeated by setting the timeout to ZERO.

Settings List

The machine settings are shown in the table below. Each setting has a minimum and maximum value that restricts the data entry keypad's range. The min/max is user- adjustable.

Table 2. Machine Settings

Machine Setting	Nominal	Range	Description
s00. Use Barcode Scanner (0 or 1)	1= YES	-	Operator must use the scanner to select a recipe.
s01. Distance Units (0 or 1)	0 = mm and mm/s	-	Enter a 1 to select inch and IPS.
s02. Actuator Homing Speed mm/S	4	1-6	Actuator speed to seek the upper limit switch. Excessive speed into the limit can cause a drive stall trip.
s03. Actuator Fast Speed mm/S	6	1-6	Actuator speed used to find the upper travel limit. Also sets the maximum recipe speed.
s04. Actuator Slow Speed mm/S	1	1-6	Actuator speed to find home position off the upper travel limit.
s05 Actuator Acceleration mm/S/sec	10	1-20	Actuator acceleration for speed changes. The rate is limited by the PLC to a maximum of 1900 steps/mS/sec.
s06. Actuator Steps per mm	6500	200-20000	Calibration for stepper motor.
s07. Maximum Length	1100	500-3000	Sets the tool length. Sets the maximum positions in the recipe.
s08. Minimum Recipe Speed mm/sec	0.01	0.01-1	Lowest acceptable recipe speed setting.
s09. Grip Pressure Regulator Full Scale PSIG	130	70-140	Full pressure rating of the regulator.
s10. Grip Pressure Deviation Limit PSIG	$\pm$2.5	0.1-100	Allowable grip pressure deviation.
s11. to s16.			spare
s17. Passcode Timeout secs	0= NO	0-9999	The user passcode is cleared after this time interval when observing the RUN PARTS screen. If set to zero, there is no timeout.
s18. User Passcode Code 1	1	1-9999	Access code for settings and screens.
s19. User Passcode Code 2	2	1-9999	Second access code.

Recipe Settings and Descriptions

100 different recipes are stored in the PLC. The operator optionally uses a barcode scanner to select a recipe. With a valid passcode entered, the recipe can be selected from a list. The passcode is required to make alterations and to save a recipe to the database.

Many recipe entries are restricted by the settings noted above. For example, heater temperature is limited by setting s10.

The recipe is a collection of setpoints that are directly copied to the machine controls when the recipe is selected.

Alternate Units

Speeds, distances, and temperatures may be shown in alternate units. The recipe is stored in native units of mm and °F.

Table 3. Recipe Settings and Descriptions

Recipe Settings	Units	Range	Description
Name	ASCII	-	Name stored with the recipe, entered using the alphanumeric keypad of the HMI.
Date	ASCII	-	Date recipe was saved or altered
Barcode	ASCII	-	Barcode string captured and associated with this recipe
Offset	mm	-15 to 100	Sets the home offset of the puller.
Collet Grip Pressure	PSIG	0 to 100 [s19]	Setting for the grip pressure regulator.
Product Grip Pressure	PSIG	0 to 100 [s19]	Setting for the grip pressure regulator.
Zone 1 Length	mm	1 to X1	First zone length. The maximum length is setting [s07].
Zone 2 Length	mm	1 to X2	2nd zone length. X2 = [s07] − X1
Zone 3 Length	mm	1 to X3	3rd zone length. X3 = [s07] − X2
Zone 1 Speed	mm/S	0.01 [s13] to 6.0 [s03]	Actuator speed for Zone 1
Zone 2 Speed	mm/S	0.01 [s13] to 6.0 [s03]	Actuator speed for Zone 2
Zone 3 Speed	mm/S	0.01 [s13] to 6.0 [s03]	Actuator speed for Zone 3

Information Messages

Information Messages are overlays triggered by the PLC. The messages are cleared from the display after a few seconds.

Table 4. Information Messages

Information Messages	Description
Passcode Required to Change this Item	Access code required.
Entry was too High or Low	Appears if a blank recipe was selected, indicates one or more recipe settings was changed.
Passcode is CLEARED	Access code was cleared by timeout or entry of an invalid code.
Barcode Saved into this Recipe	Confirms barcode association was successful
Barcode Match - First Match File Selected	Match was found for the barcode with an existing recipe.
No Match Found for this Barcode	No recipe file matched the scanned code.

Alarms

The PLC monitors the C-80 for multiple alarm conditions. When an alarm occurs, it brings up an alarm overlay banner on the HMI. The HMI stores the alarm time and the alarm text in an alarm log.

Table 5. Alarm Messages

Alarm Message	Comments
Alm00. PLC I/O Module Failure	Fault on one or more Compact I/O modules
Alm01. Collet Grip Pressure Fault	Pressure deviation exceeds value.
Alm02. Product Grip Pressure Fault	Pressure deviation exceeds value.
Alm03. Puller Actuator Fault	Drive error.
Alm04. Puller Upper Limit Trip	Proximity sensor detected puller box.
Alm05. Puller Lower Limit Trip	Proximity sensor detected puller box.
Alm06. – Alm30.	spares
Alm31. PLC Memory Reloaded from SD Card	Recipes will be lost if the memory was replaced. The SD card can be used to "preload" a new PLC.

Warnings

Warnings are shown on the HMI "Run Parts" screen as an aid to the operator.

Table 6. Warning Messages

Warning Message	Comments
Warn00. Controls Not Reset	Safety relay is not reset.
Warn01. Door is Not Locked	
Warn02. Door Interlock is Bypassed	Passcode needed to access the bypass button on the Settings screen.
Warn03. Passcode has Unlocked Controls	
Warn04. to Warn31.	spare

SEQUENCES OF OPERATION

Master Control Sequence

The master control sequence boots up the tool subsystems and serves as the main operator guide for the extraction operation.

Any alarm will cause the sequence to jump to State 31. Touch the CYCLE STOP button to release the alarm. An alarm will stop the actuator motion.

Holding the CYCLE STOP button down for 2 seconds resets the master control sequence.

Table 7. Master Control Sequence

Master Control Sequence Label	Comments
Mandrel Removal System Full Reset	User must release the RESET button to leave this step. Door lock is released.
Controls Not Reset - Push RESET Button	Master Safety Relay is not reset. Clear the emergency stop and push the blue reset button
STARTUP: Opening Main Air Valve	Allows 2 seconds for air to fill system.
STARTUP: Touch CYCLE START to Lock Door	
STARTUP: Waiting for Door to Close	Door lock is de-energized to latch the door. A signal is received when the latch is made.
READY: Touch CYCLE START to home Actuator	Homing starts when doors are closed.
HOMING: Homing Puller to Home Offset	Actuator finds and clears the home limit sensor. The recipe offset position is applied.
HOMING: Move Puller to Zero Position	Moves the actuator to mechanical zero.
Master Control Sequence Label	Comments
STARTUP: Use Scanner to Select Recipe	When every power is reset, the operator must select a recipe using the barcode scanner. If the passcode is in effect, pushing the CYCLE START button bypasses this step. Door lock is released.
STARTUP: Move Puller to Zero Position	Returns collet to the load position after a run.
LOAD: Set Collet Grip	For auto: Use the HMI button to close the collet grip. For manual: Toggle the valve, then press the HMI button. Note that the pressure regulators must

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	provide sufficient pressure to move the grips.
LOAD: Set Product Grip	For auto: Use the HMI button to close the product grips. For manual: Toggle the valves, then press the HMI button.
READY: Touch CYCLE START to proceed	Touching CYCLE START begins the cycle.
READY: Waiting for Door to Close	
RUN: Zone X at Speed Y for Distance Z	Pulls the mandrel from the product. X, Y, and Z are filled in as the process runs.
UNLOAD: Release Product Grip	For auto: Use the HMI button to open the product grip. For manual: toggle the product valves open, then press the HMI button.
UNLOAD: Release Collet Grip	For auto: Use the HMI button to open the collet grip. For manual: toggle the collet valve open, then press the HMI button.
UNLOAD: Remove Part – Touch CYCLE START to proceed.	
UNLOAD: Waiting for Door to Close	Wait for door, then return to Step 11
ERROR: Tripped on Alarm - Touch CYCLE STOP to reset	Alarm state. Stops motion. Door lock is released.

Linear Actuator Motor Control Sequence

The step motor module on the PLC sends step and direction signals to the linear actuator step motor drive. The PLC uses a control sequence to send module commands in the correct order. The control sequence below allows for the operator to manually   move the stepper motor and supports automatic operation.

Table 8. Linear Actuator Motor Control Sequence State Labels

State Label	Description
Step Sequence Reset	Reset by master sequence
Stepper Module Not Ready	PLC must have good comms to step module.
Wait for Controls Reset	Power must be reset to the stepper drive
Wait for Module OK	Module ready to accept commands.
Motor Selected OFF	HAND/OFF/AUTO control set to OFF.
Writing Module Config	Sending configuration words to the module
Switch to Command Mode	Tells the module to go to command mode
Actuator Ready at [Position Reading]	Wait for manual or auto command.
Homing: Find CCW Limit	Fast jog to the upper travel limit
Homing: Jog CW of CCW Limit	Slow jog down to find electrical zero.
Set Homed OK	Sends PRESET POSN command, defining the home offset as 0 mm.
Jogging Positive Up	Jogging.
Jogging Negative Down	Jogging.
Hold Motion	Stops motion. Absolute moves are soft stopped; blend moves are immediately stopped.
Relative Move	not used
Move to [Position Reading]	Absolute move, used for START and LOAD moves
ERROR: Positive Limit Hit	Manual jog.
ERROR: Negative Limit Hit	Manual jog
ERROR: Positive Limit Trip	Unexpected hit.
ERROR: Negative Limit Trip	Unexpected hit.
ERROR: Home Not Found	not used
ERROR: No Hardware Enable	not used
ERROR: Motor Software Error	Module command/config error detected
ERROR: Motor Hardware Fault	Fault relay from drive is OFF.

PANELVIEW PLUS HMI DISPLAY DESCRIPTION

The Human Machine Interface (HMI) provides the primary source of operator interaction with the control system. The laminating system is controlled by the Allen-Bradley PLC. The HMI reads data from the PLC and allows changes to variables in the PLC. The HMI allows the operator to observe the operation of the system.

Data Entry Keypads

When a numeric value is to be entered, the operator touches the display, which pulls up a keypad similar to the one shown below. The label of the keypad shows the range that can be entered with the keypad.

A similar keypad is available to enter the name of the recipe.
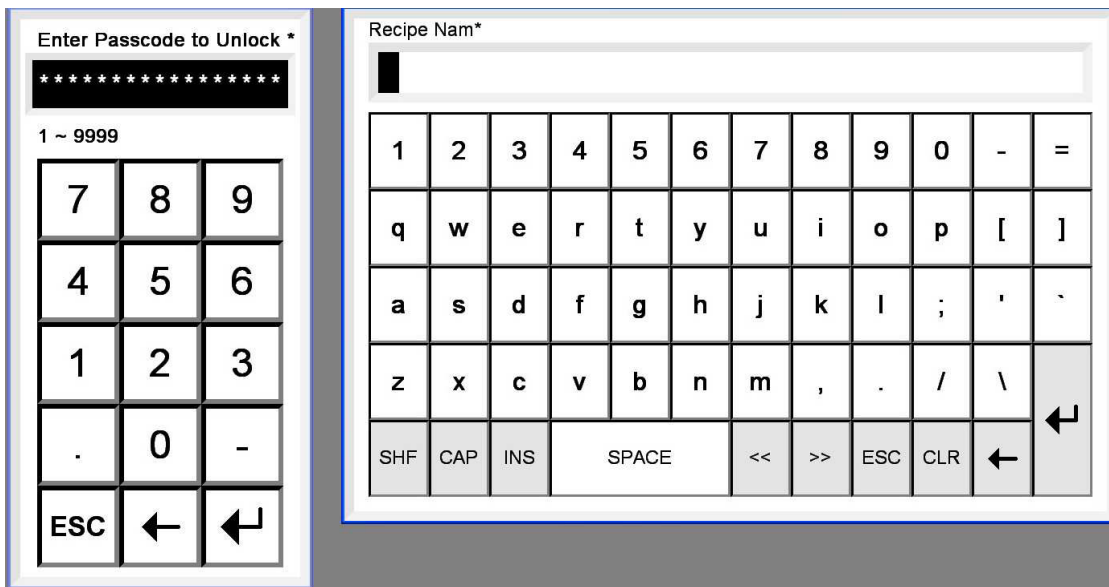
Figure 5. Data Entry Keypad

Main Menu (Screen #01)

The Main Menu screen provides an access point to the remaining screens in the system. Some menu items are hidden unless the passcode has unlocked the HMI.

Figure 6. Main Menu Screen

Table 9. Main Menu Screen Buttons/Displays and Descriptions

HMI Screen Object Descriptions	
Item	**Description**
Title	Unit number is read from the PLC.
Status, History, Settings Puller, Valves, Grips, Edit	Menu Buttons. Made visible when a valid passcode is entered.
Select	Menu Button. Not Visible when Barcode Scanner is used.
previous Run Parts	Menu Buttons. Always visible.
Total Cycles	Numeric Readout. Shows the number of times the machine process has run to completion.
Unlocked w/ Passcode	Indicator. Shows a valid passcode is active
Enter Passcode to Unlock Screens	Keypad. Used to enter the passcode.

This is how the Main Menu appears when there is no passcode present. The "Select Recipe w/Scanner is used when Setting s27 is set to require the operator to use a barcode for recipe selection.

Figure 7. Main Menu No Password Present Screen

Run Parts (Screen #10)

This screen is used by the operator to start and stop the tool and monitor the process.

Figure 8. Run Parts Screen

Table 10. Run Parts Screen Buttons/Displays and Descriptions

HMI Screen Object Descriptions	
Item	**Description**
Menu Buttons	Direct access to specified screens. RECIPE EDIT and RECIPE SELECT are only visible with a good passcode
Run Recipe #1 [NAME] Run Modified Recipe	Two-state indicator. Shows the recipe number and name. If the recipe has been changed, will show MODIFIED recipe in yellow.
Alm01. Warn12.	Multistate Indicators. Indicators cycle through all alarms and warnings present. See the lists in Section 4.6 and Section 4.7 for descriptions
STARTUP: Touch CYCLE START to Lock Door	Multistate Indicator. Shows the state of the Master Control Sequence. The various possible states are described in Section 5.1 above.
Puller Actuator Ready for Command	M/S Indicator. Shows the state of the actuator control sequence. See also Section 5.2 for details
Speed, Position	Numeric Readouts. Shows the actuator's speed and position.
CYCLE START CYCLE STOP	Pushbuttons. Used to start and stop the machine sequence.

CYCLE START Pushbutton

This button is used by the operator when prompted to advance the Master Control Sequence. The operator will be prompted to home the linear actuators, scan a barcode, load the mandrels, and run the process.

CYCLE STOP Pushbutton

This button is used to reset alarms. If the machine detects any of the alarms described in Section 4.6, the CYCLE STOP button is tapped to release the alarm.

Holding the CYCLE STOP button down for 2 seconds forces a full Master Control Sequence reset.

Run Parts Screen without Passcode

The Run Parts screen is slightly different when the passcode hasn't unlocked the controls. The "Recipe Selected w/ Scanner Only" label shows when the settings require the use of the barcode scanner to select recipes.

Figure 9. Run Parts Screen Without Passcode

Passcode Cleared on System Power Up

Note that a setting is available to automatically clear the passcode after a length of time. The passcode is also cleared when power is first applied to the machine (first pass of the PLC's program).

Recipe Select (Screen #4)

Access to this screen requires the passcode.

100 recipes can be stored on the Mandrel Removal System. The buttons for saving a recipe are only visible when the passcode is entered.

If the barcode scanner is used, the 100 files will be searched for a match. The first recipe that has a match will be loaded as the current recipe.
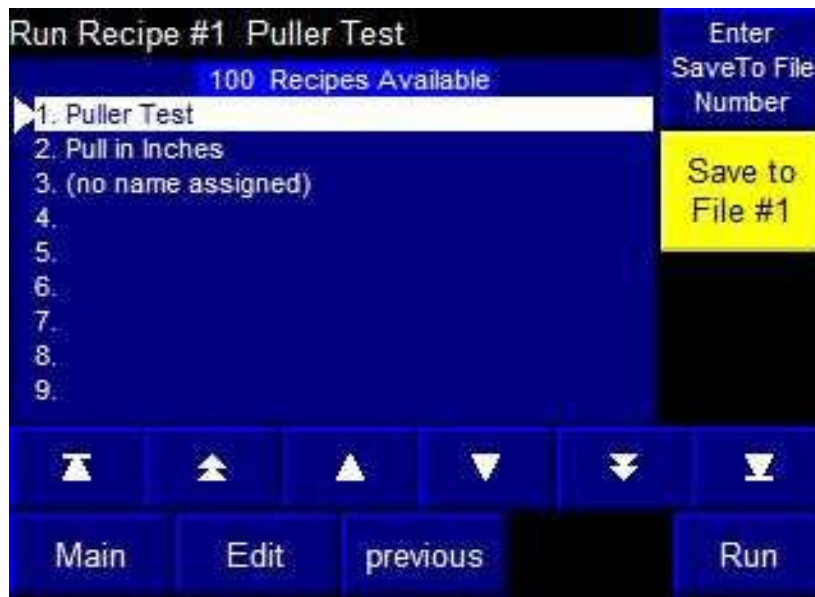
Figure 10. Recipe Select Screen

Table 11. Recipe Select Screen Buttons/Displays and Descriptions

HMI Screen Object Descriptions	
Item	**Description**
Menu Buttons	Direct access to specified screens.
Enter Recipe File Number	Keypad. Used to set the file number for recipe storage.
Save Recipe to File #1.	Pushbutton. The file number is shown on the button. When touched, the user has 5 seconds to touch a CONFIRM button to complete the save.
100 Recipes Available [Recipe Names on List]	List Selector. Use the middle row of navigation keys to point to the desired recipe. The recipe will be loaded when the screen is changed.

Recipe Edit (Screen #5)

Access to this screen requires the passcode.

This screen is used to change the control settings for the sequence. Each of the variables can be changed by touching the display.

Figure 11. Recipe Edit Screen

Table 12. Recipe Edit Screen Buttons/Displays and Descriptions

HMI Screen Object Descriptions	
Item	**Description**
Menu Buttons	Direct access to specified screens.
Edit Recipe # [NAME]	Shows the currently loaded recipe file number and name.
Recipe Name	Alphanumeric keypad. Touch to enter a name for the recipe.
Barcode for this Recipe	Alphanumeric keypad. Touch, then scan the barcode for the recipe.
Offset, Collet Grip, Product Grip, Zones, Speeds 6	Keypads. Each keypad has a minimum and maximum value. The functions of each parameter are reviewed in Section 4.4 above.

Settings (Screen #3)

This screen is used to change settings. A passcode must be entered to make the screen accessible from the Main Menu.

Figure 12. Settings Screen

Table 13. Settings Screen Buttons/Displays and Descriptions

HMI Screen Object Descriptions	
Item	Description
Menu Buttons	Direct access to specified screens.
Settings List	List Selector. Use the arrow keys to navigate to a particular setting.
Door Locks Active	Pushbutton. Used to temporarily defeat the door interlocks. Will clear when the passcode is cleared.
Change Setting	Keypad. Used to enter a numeric value for the selected list item.
Min/Max Enable	Pushbutton. Brings up keypads for the minimum and maximum settings used by the Change Setting keypad. Requires the 2694 factory passcode for visibility.

This screen shows the appearance after the Min/Max Enable button is touched. The keypads will disappear if the HMI shifts to another screen.

Figure 13. Settings screen after Min/Max Enable button selected

Table 14. Settings Screen after Min/Max button selected Buttons/Displays and Descriptions

HMI Screen Object Descriptions	
Item	Description
Low Limit High Limit	Keypads. Enter the desired minimum and maximum range for the associated list item.

Puller Linear Actuator (Screen #11)

Access to this screen is from the Main Menu when a good passcode has been entered. The screen is used to exercise each step motor running the linear actuators.

Figure 14. Puller Linear Actuator Screen

Table 15. Puller Actuator Screen Buttons/Displays and Descriptions

HMI Screen Object Descriptions	
Item	**Description**
Menu Buttons	Direct access to specified screens.
Hand/Off/Auto	Interlocked Pushbuttons. Set to AUTO to run the process. Set to HAND to allow use of the controls on this screen. AUTO mode is forced when the CYCLE START button is pushed.
Ready for Command	M/S Indicator. Shows the state of the Actuator control sequence. See also Section 5.2 for details
Actuator Position Actuator Speed	Keypads with Numeric Readout Overlays. Used to monitor and to manually enter position and speed setpoints.

Table 16. Linear Actuator Screen Buttons/Displays and Descriptions

Linear Actuator HMI Screen Object Descriptions	
Item	**Description**
Homed OK Neg Limit Active Pos Limit Active Home LS Active	Indicators. Shows the status of the travel limits and whether the stepper control module has problems.
Fast Jog Selected Touch for Slow	Pushbutton. Toggles between the fast and slow jog speeds.
Jog Up Jog Down	Pushbuttons. Used to manually move the step motor.
Go Home	Pushbutton. Causes the actuator to run to the left limit, then sets the zero offset just as the limit switch comes back on.
Move to Zero Move from Keypad	Pushbuttons. Once the actuator is homed, these buttons will cause absolute moves from the recipe settings or the keypad.
Stop	Pushbutton. Sends the stop motion command.
Reset	Pushbutton. Restarts the stepper control sequence.

Solenoid Valves (Screen #12)

Access to this screen is from the Main Menu when a good passcode has been entered. This screen is used to test the pneumatic components.

Figure 15. Solenoid Valves Screen

Table 17. Solenoid Valves Screen Buttons/Displays and Descriptions

HMI Screen Object Descriptions	
Item	**Description**
Menu Buttons	Direct access to specified screens.
Main Air Manual/Off/Auto	Interlocked Pushbuttons. Turns the main air valve on and off.
Door Lock Manual/Off/Auto	Interlocked Pushbuttons. Turns the unlock solenoid on and off.
Main Air Valve Open Door Unlock Sol OFF Door Lock Input 1 ON Door Lock Input 2 ON	Indicators.

Grip Regulators (Screen #13)

The regulators are turned on whenever the controls are reset. This screen allows setpoint changes in MANUAL mode. AUTO mode uses the current recipe's setpoints.

Figure 16. Grip Regulators Screen

Table 18. Grip Regulators Screen Buttons/Displays and Descriptions

HMI Screen Object Descriptions	
Item	**Description**
Menu Buttons	Direct access to specified screens.
Manual/Off/Auto	Interlocked Pushbuttons. Forces the device ON or OFF when not in AUTO.
Collet Grip Reg is ON Product Grip Reg is ON Collet Clamp Open Product Clamp Open	Indicators.
Grip Pressure Set Grip Pressure Reading	Keypad w/Readouts. Shows the setpoint and pressure feedback reading in PSIG.

PLC Status and HMI Shutdown (Screen #2)

Access to this screen is from the Main Menu when a good passcode has been entered. This screen shows the machine model number and some PLC variables. The HMI application can be shut down from this screen.
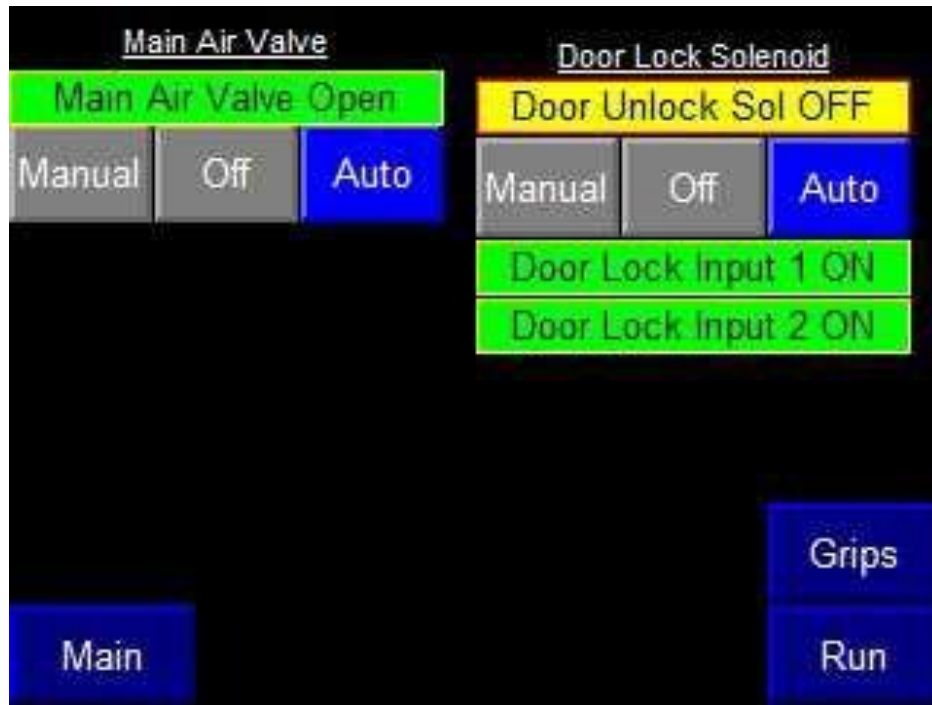

Figure 17. PLC Status and HMI Shutdown Screen Buttons/Displays and Descriptions

Table 19. PLC Status and HMI Shutdown Screen Buttons/Displays and Descriptions

HMI Screen Object Descriptions	
Item	**Description**
Menu Buttons	Direct access to specified screens.
Model Number.	Numeric Readout. Taken from the PLC in case of more than one unit.
PanelView S/W Revision	Text. Manually changed while creating the application file.
Power On Hours PLC Software Revision Scan Times	Numeric Readouts. Length of time PLC has been running, plus variables to show what software is on the PLC.
PLC Memory Battery OK PLC Memory Battery Low	Indicator. Shows the state of the PLC's memory battery, located under a cover on the left side of the PLC assembly.

HMI Support Screens

Information Overlay

The Information Message Banner is triggered by the PLC from the list described in Section *Information Messages*. The banner automatically closes after 3 seconds, or the CLOSE button can be touched.

Figure 18. Information Message Banner

Alarm Banner Overlay

The Alarm Banner is triggered by the PLC from the list described in Section *Alarms*. Use the CLOSE button to remove the banner.

If the banner legend is blank, an alarm occurred but has been restored. Check the Alarm Log to determine the specific alarm that triggered the banner.

Figure 19. Alarm Banner

Alarm Log

The Alarm Log holds a record of the last 128 alarm occurrences. The alarm message is saved along with the time the alarm was tripped.

The time is taken from the HMI's internal real-time clock. Shut down the application (see Section *PLC Status and HMI Shutdown (Screen #2)*) to adjust the clock.

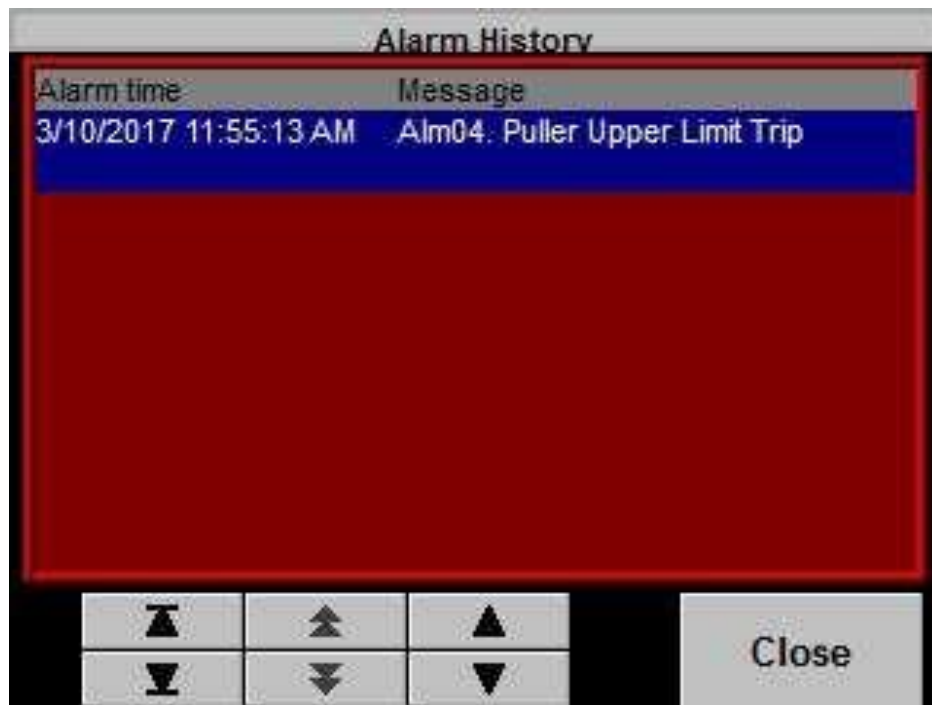Access to this screen is passcode protected.

Figure 20. Alarm Log Screen

MAINTENANCE

Note: Ensure the machine is unplugged for any servicing or maintenance work.

**Caution: pinch point/crush hazard. Keep fingers, hands, and clothing clear of moving parts.**

Caution: high voltage. Remove power and use safety precautions when servicing.

Cleaning

1. Use 99% isopropyl alcohol to wipe down the outside of the machine. Do not attempt to clean the inside of the machine. The machine should not be washed down.
2. Cleaning should be with a soft dry cloth only.

Exchanging Collets

1. Using a 5/32" hex wrench, loosen the collet retention screw a couple turns on the left side of the collet gripper assembly. Take care to not fully remove screw.
2. Using the provided 5C collet wrench unscrew the collet.
3. Remove collet and set aside.
4. Install replacement collet using the collet wrench.
   Note: Take care not to overtighten collet. Overtightening collet will result in mandrel not fitting in collet opening.
5. Using 5/32" wrench, tighten the collet retention screw.

RETENTION SCREW
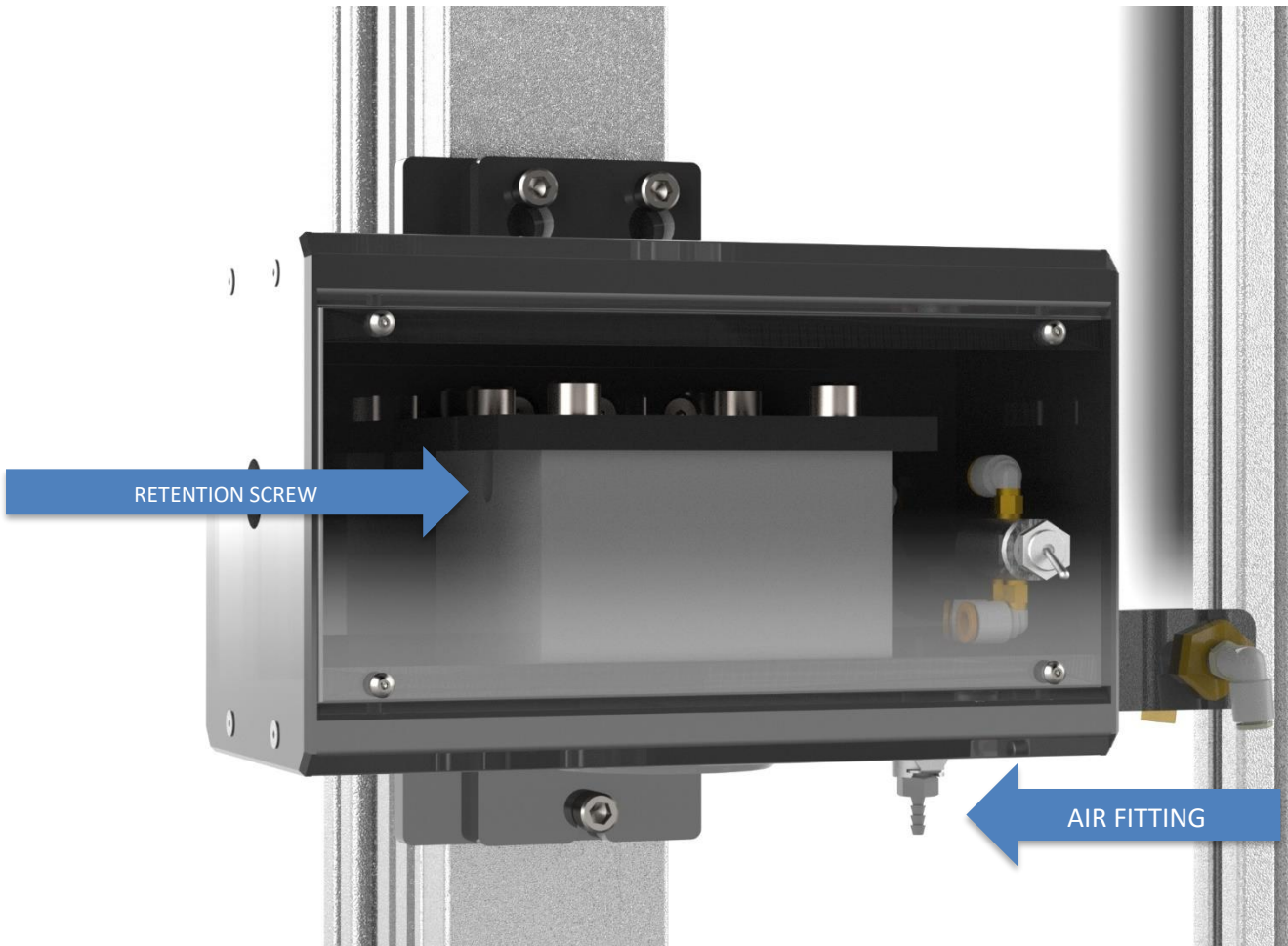
AIR FITTING

Stretch Grips Installation

1. Unplug air fitting on collet grip assembly.
2. Loosen the three socket head cap screws that fasten the collet grip assembly to the actuator.
3. Lift up and pull collet gripper assembly. Set aside.
4. Take actuator mount stretch gripper assembly and set onto the three socket head screws.
   Note: actuator mount stretch gripper will have the same air fitting as the collet grip assembly. Shown above.
5. Tighten three socket heads cap screws.
6. Re-install air fitting.
7. Install tee nuts onto lower rail.
   Note: Depending on where you wish to place the lower stretch grip you may need to temporarily remove one more grip assemblies from the rail.
8. Install lower alignment block onto tee nuts.
9. Set extrusion mount stretch grip assembly onto the alignment block and align tee nuts under mounting holes.
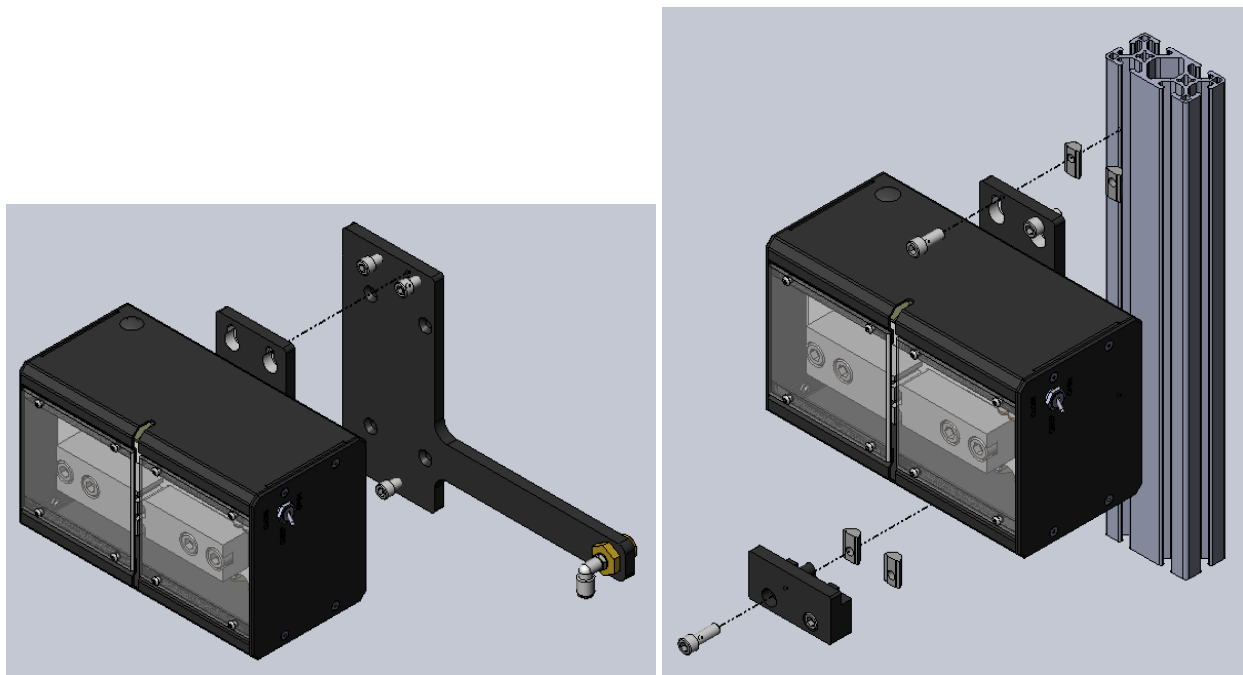10. Tighten socket head cap screws onto tee nuts. Re-install air tube onto push fitting.

Figure 21. Stretch Grips Installation

CRITICAL PARTS

For replacement or spare parts, please contact us at service@machinesolutions.com, or call 928-556-3109.

Description	Part Number	Quantity
POWER SUPPLY, 48VDC, 10A	1134326-001	1
POWER SUPPLY, DIN, 90W, 3.75A, 24VDC	1149765-001	1
CONTACTOR, IEC 9A, AC1 16A, 600V/3P, 1 NC, 24VDC	1145600-001	2
DRIVE CONTROL, DC STEPPER, ST SERIES, ETHERNET/IP	1153240-001	1
HMI, TOUCHSCREEN, 6INCH, ALLEN BRADLEY	1147244-001	1
REGULATOR, ELEC-PNE, 1500LPM, 90 PLG, FLAT BRKT	1345768-015	2

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Machine Solutions Inc. welcomes your comments and inquiries about our products and services.

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Fax: 928-556-3084
E-Mail: service@MachineSolutions.com

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