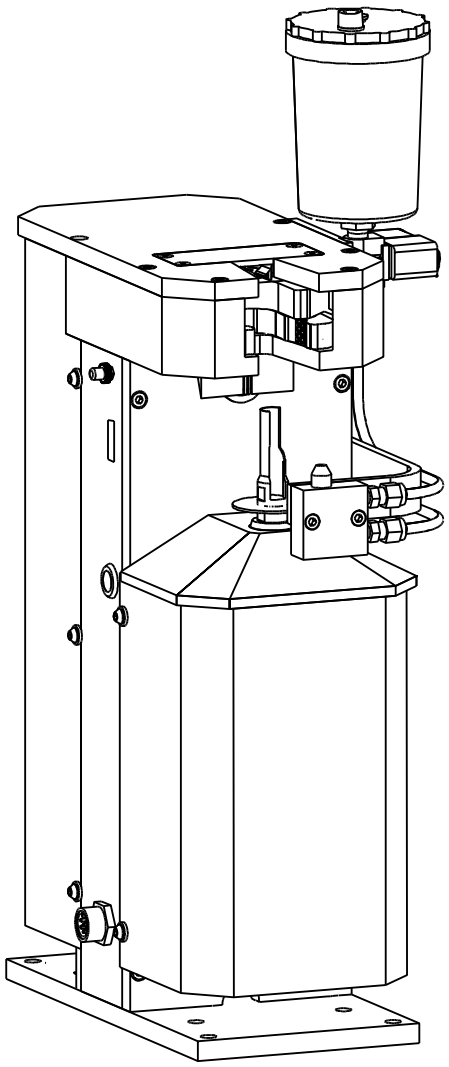
IM866

POWER REAM

August, 2010

For use with machines having code number **11172**

Safety Depends on You
Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part.
DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT. And, most importantly, think before you act and be careful.



Date of Purchase:_____
Serial Number:_____
Code Number:_____
Model:_____
Where Purchased:_____

OPERATOR'S MANUAL

LINCOLN® ELECTRIC

• Sales and Service through Subsidiaries and Distributors Worldwide •
Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com
• World's Leader in Welding and Cutting Products •

Before installation and commissioning of the POWER REAM, please read and understand all of the following safety information. Failure to follow these instructions may result in damage to the equipment or personal injury.

The POWER REAM is constructed to be safe to operate provided
- Only authorized personnel shall perform installation, commissioning and maintenance and all safety precautions in these operating instructions shall be observed.
-The accident prevention regulations as well as the safety specifications referenced below are observed
ANSI/RIA R15.06-1999 Industrial Robots and Robot Systems —Safety Requirements

-For additional safety information see references below

This product shall be integrated into a robot cell with independent safety system by plant engineering. Install within a secured area, which is only to be entered by qualified personnel for maintenance work or robot programming.

Before assembling, adjusting or working with the reamer, ensure all equipment in the area is locked out and disabled.

The torch-cleaning unit is to be used only for torch cleaning within the parameters of its technical specification.

Do not exceed the specified operating pressure of 80 PSI.

The torch-cleaning unit may only be operated with the cover closed when operated independently.

Keep hands away from unit while in operation.
Keep hands away from the clamp and reamer operating space.
Keep hands away from the wire cutter
Keep eyes away from the sprayer

Shut off the air supply when making adjustment so that the equipment is not pressurized.

Additional fittings or accessories that are not offered from the manufacturer may only be installed with the approval from the manufacturer.

Do not use the reamer with corrosive or aggressive vapors or liquids without first obtaining approval from the manufacturer.

Ensure that there is nothing in the reamer unit when shutting down the system.

Warning and instruction labels from the unit are not to be removed or defaced.

For additional safety information, refer to the following publications:

ANSI STANDARD Z49.1, SAFETY IN WELDING AND CUTTING,
American Welding Society, 550 LeJeune Rd. P.O. Box 351040, Miami, FL 33126

ANSI/RIA STANDARD R15.06-1999 Industrial Robots and Robot Systems —Safety Requirements
American National Standards Institute, 1430 Broadway, New York, NY 10018

Canadian Standards Association; Z434-03 Industrial Robots and Robot Systems – General Safety Requirements.
5060 Spectrum Way, Mississauga, Ontario, L4W 5N6, CANADA

Safety Symbols used in this manual

⚠WARNING

Moving parts can crush and cut.

Keep hands away from the operating area of the reamer, clamp, and wire cutter

⚠WARNING

Rotating Cutter.
Keep hands away from the operating area of the cutter.

⚠WARNING

Entanglement Hazard.
Do not operate with exposed long hair, jewelry or loose clothing.

⚠WARNING

Turn off power before servicing.

⚠WARNING

Turn off air supply and disconnect air supply hose before servicing.

⚠WARNING

Do not use damaged, frayed or deteriorated air hoses and fittings.

⚠WARNING

Maintain safe operating pressure (80 psi).

POWER REAM – (K2391-1)

PNEUMATIC SPECIFICATIONS	
Pressure: 80 psi	Flow: 15 scfm

Caution: Use Filtered (5 µm), Non Lubricated, Regulated Air

ELECTRICAL SPECIFICATIONS	
Voltage: 24V DC	Current: 0.5A DC

REAMING SPECIFICATIONS	
Speed: 1100 rpm	Power: 0.65 Hp

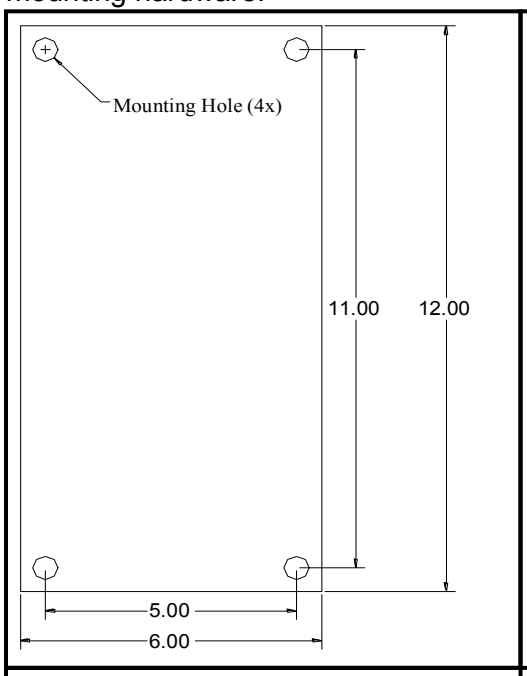
REAMING BIT SPECIFICATIONS
Nozzle inside diameter compatibility: 1/2”, 5/8”, 3/4” See section —optional accessories” for product numbers

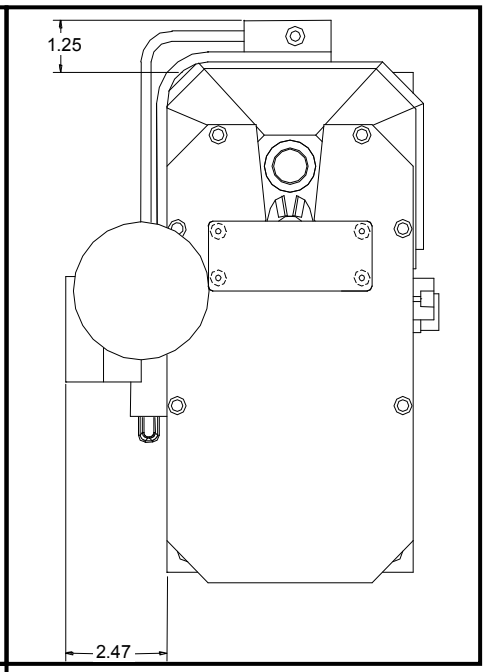
WIRE CUTTING SPECIFICATIONS
Minimum wire diameter: 0.030” (0.8mm) Maximum wire diameter: 0.063” (1.6mm)

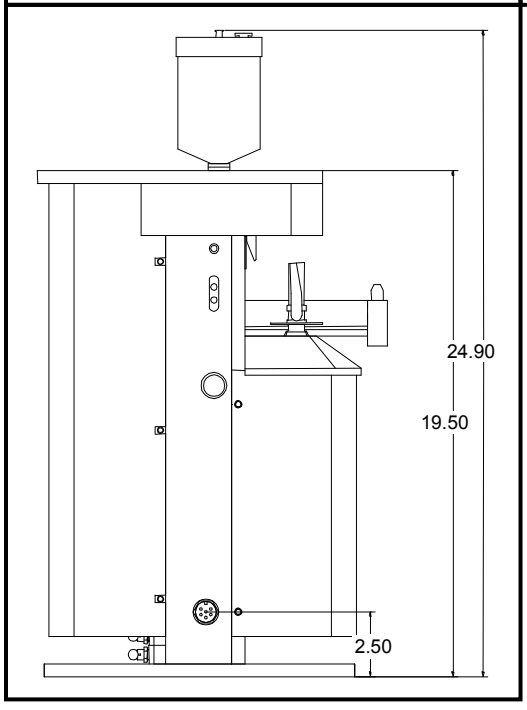
ANTI SPATTER FLUID SPECIFICATIONS
Use recommended water based anti spatter fluid in this product. See section —optional accessories” for product numbers. Do not use oil based anti spatter fluid.

PHYSICAL DIMENSIONS			
HEIGHT 19.50 in. (495mm) without Reservoir / 24.90 in. (633mm) with Reservoir	**WIDTH** 8.47 in 228 mm	**DEPTH** 13.25 in 337 mm	**NET WEIGHT** 62 lbs. 28 kgs.

Installation:
Before starting installation work in the area of the robot, ensure for your personal safety that all protective measures have been taken and will remain in place while you are in the area of the robot.
Danger of accident when connecting the pneumatic or electrical supply!
-Ensure that the air supply and electrical power to the torch maintenance center are disconnected until the installation is complete.
-The torch maintenance center should be installed within the weld cell at a convenient location. Be sure to consider movable fixtures, the confines of the robot and maintenance personnel accessibility.
-Before operating the unit, ensure that the correct reaming bit for the torch is applied.
-Affix torch maintenance center base to sturdy platform using the four boltholes provided for 3/8" mounting hardware.







Air Connection

Use only regulated, filtered, non lubricated air. Mount a 5 micron airline filter (not supplied) in the airline of the reamer.
AIR SUPPLY REQUIREMENTS: 80 PSI at 15 SCFM. Connect the inlet supply line to the quick connect pneumatic fitting located on the side of the unit.

Electrical Connections

WARNING: Damage to equipment may occur if connected improperly.
Only a qualified technician should perform the following operation.
-Secure the 6-pin connector into the receptacle on the base of the POWER REAM and feed the other end through a strain relief into the robot controller cabinet or other connection points on the robotic cell.
-Connect robot I/O signals according to the following description.

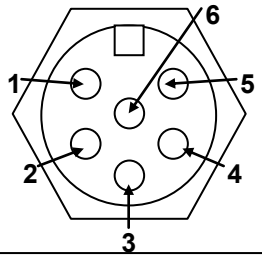
Electrical Diagram

Wire Color	Name	Description
Red	+24Vdc	Power supply (+24Vdc, 0.5 amp)
White	0Vdc	Power supply return.

It is recommended that power to the reamer be wired concurrent with robot servo power, interrupt-able by an E-stop condition.

Orange	Start	Robot output. Pulse this output from the robot for 0.5sec to start the ream cycle.
Black	Spray	Robot output. Pulse this output from the robot for approx. 0.5 sec while positioned over the sprayer. To activate the **Wire Cutter**, turn on both the start and spray outputs at the same time or subsequently.
Green	Complete	Robot input. The robot should check this input before and after a reaming cycle.
Blue	Error	Robot input. The robot can check this input after a reaming cycle to ensure error free operation. Refer to Diagnostics section for error codes.

Interface Receptacle

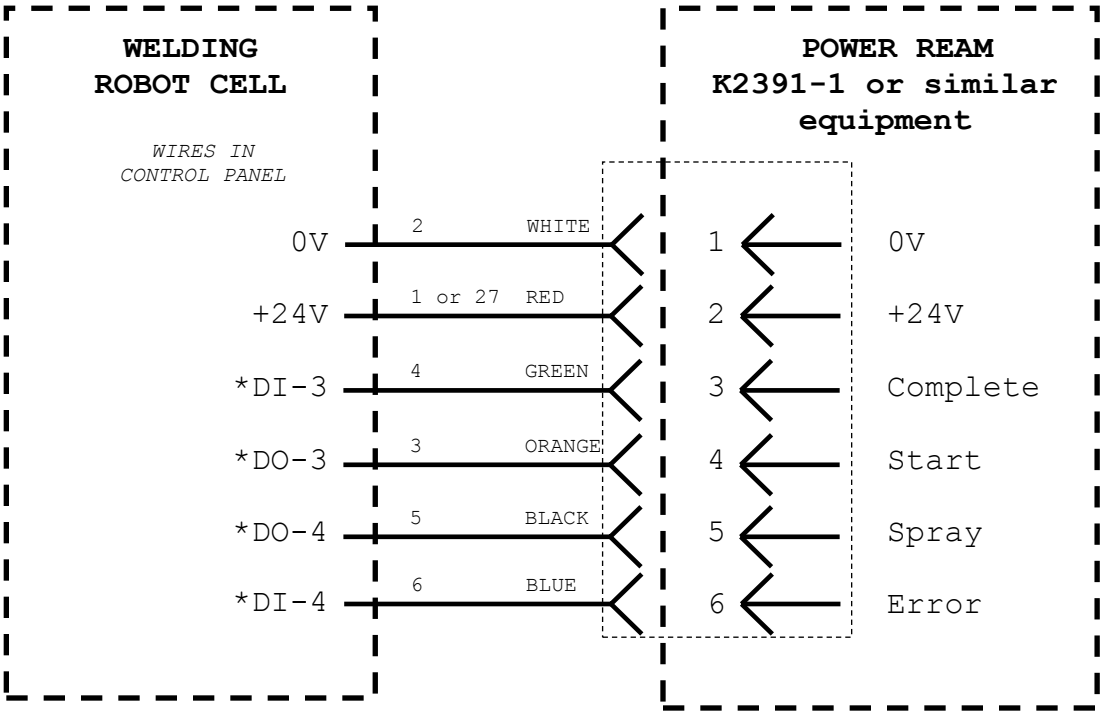


Wiring

1.	0V DC	(WHT)
2.	+24V DC	(RED)
3.	Complete	(GRN)
4.	Start	(ORG)
5.	Spray	(BLK)
6.	Error	(BLU)

The POWER REAM detects sinking or sourcing outputs from the robot and is capable of sinking or sourcing signals to the robot. Before connecting ensure I/O configuration is compatible with robot. POWER REAM factory setup is for robots with sinking outputs and active high inputs.

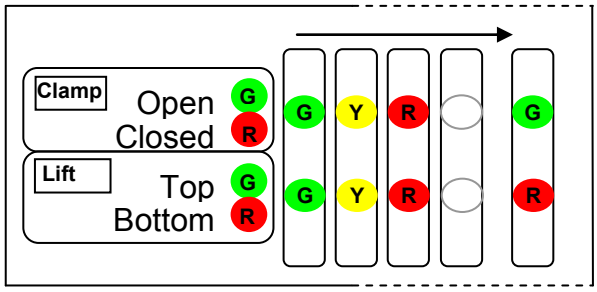
Power Ream to Lincoln Electric Welding Robot Cell



***These labels are for reference only.**

Power Up Sequence: Once the unit is wired into the robot and power is applied the LEDs will display the power up sequence (green – yellow – red) and then show positions of the cylinders according to the legend next to the LED window.

If the LEDs are not reporting the clamp open and the lift at the bottom then check the air pressure or position sensors. If the LEDs are flashing red or green check for start lock (see below). If the LEDs are flashing yellow ensure the setup pushbutton is not pressed or defective.



Start Lock: The start lock feature guards against a start signal present when the unit is powered up. If a start signal is present, the POWER REAM will not cycle immediately after powering up. The LEDs will display the power up sequence (green-yellow-red) and then flash green / red if an output from the robot is present.

Robot Input: With the clamp open and the lift at the bottom, the "Complete" input to the robot will be on. If it is not, the robot input type may need to be configured.

Robot Output: If by forcing on the "Start" or "Spray" output from the robot no action occurs, the robot output type may need to be configured.

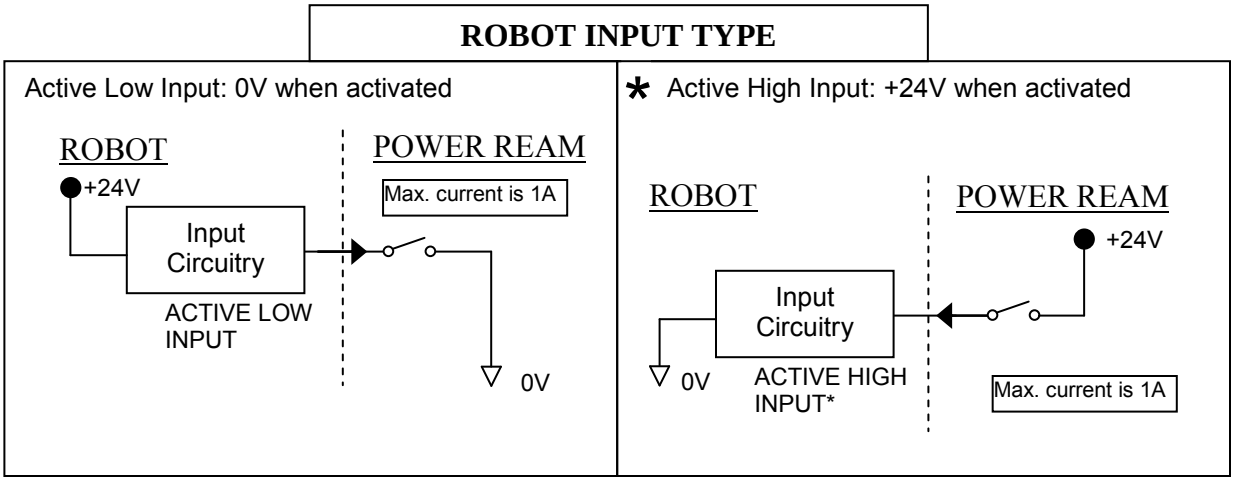
I/O Explanation

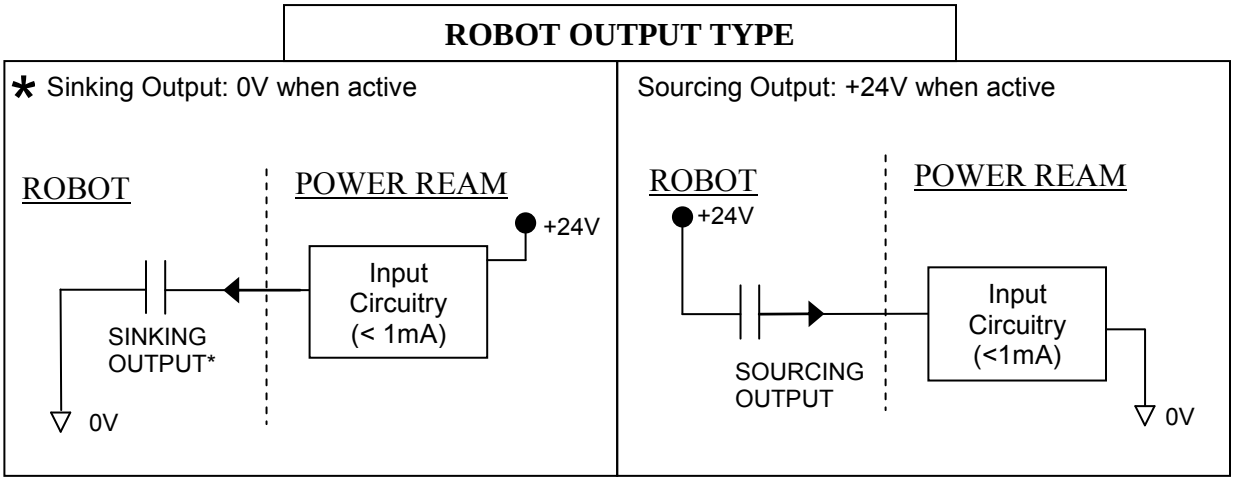
Fanuc robots use the following output methods
- Process I/O: Sink Output
- Terminal I/O: Source Output
- Model A I/O: Source Output

The terms sinking and sourcing define the direction of DC current flow in a load.

A sinking output provides a path to 0V for the load. Common terms used to describe sinking devices include NPN, Open Collector, Active Low and IEC Negative Logic. An active low input is connected to the positive supply (+24V) to detect a sinking output.

A sourcing output provides the power to the load. Common terms used to describe sourcing devices include PNP, Open Emitter, Active High and IEC Positive Logic. An active high input is connected to 0V to detect a sourcing output.

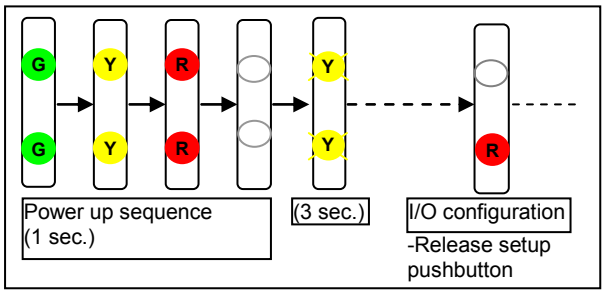




* Factory set options: Active high robot input. Sinking robot output.

The I/O types can be configured with the following procedure:
Press the reset and setup pushbuttons, release the reset pushbutton and continue to hold the setup button for approximately 4 seconds (when the bottom LED is solid red).

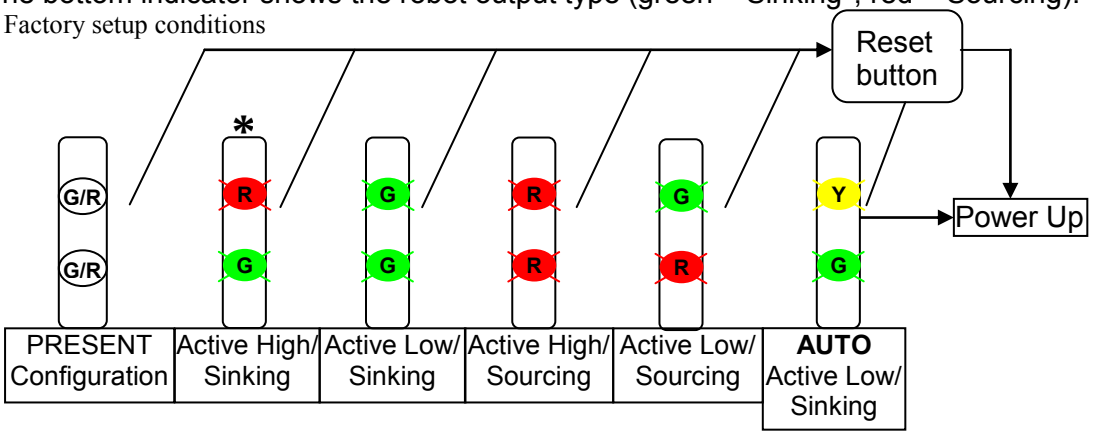
During this time the LEDs will show the power-up sequence (green-yellow-red), then flash yellow for 3 seconds, then the bottom LED will turn solid red. Release the setup button when the bottom LED is solid red. Continuing to hold the setup button will allow access to further configurations as described in "Features Setup" section.



Upon releasing the setup push button, the lights will show the present I/O configuration. This is the first in the sequence of teachable configurations.

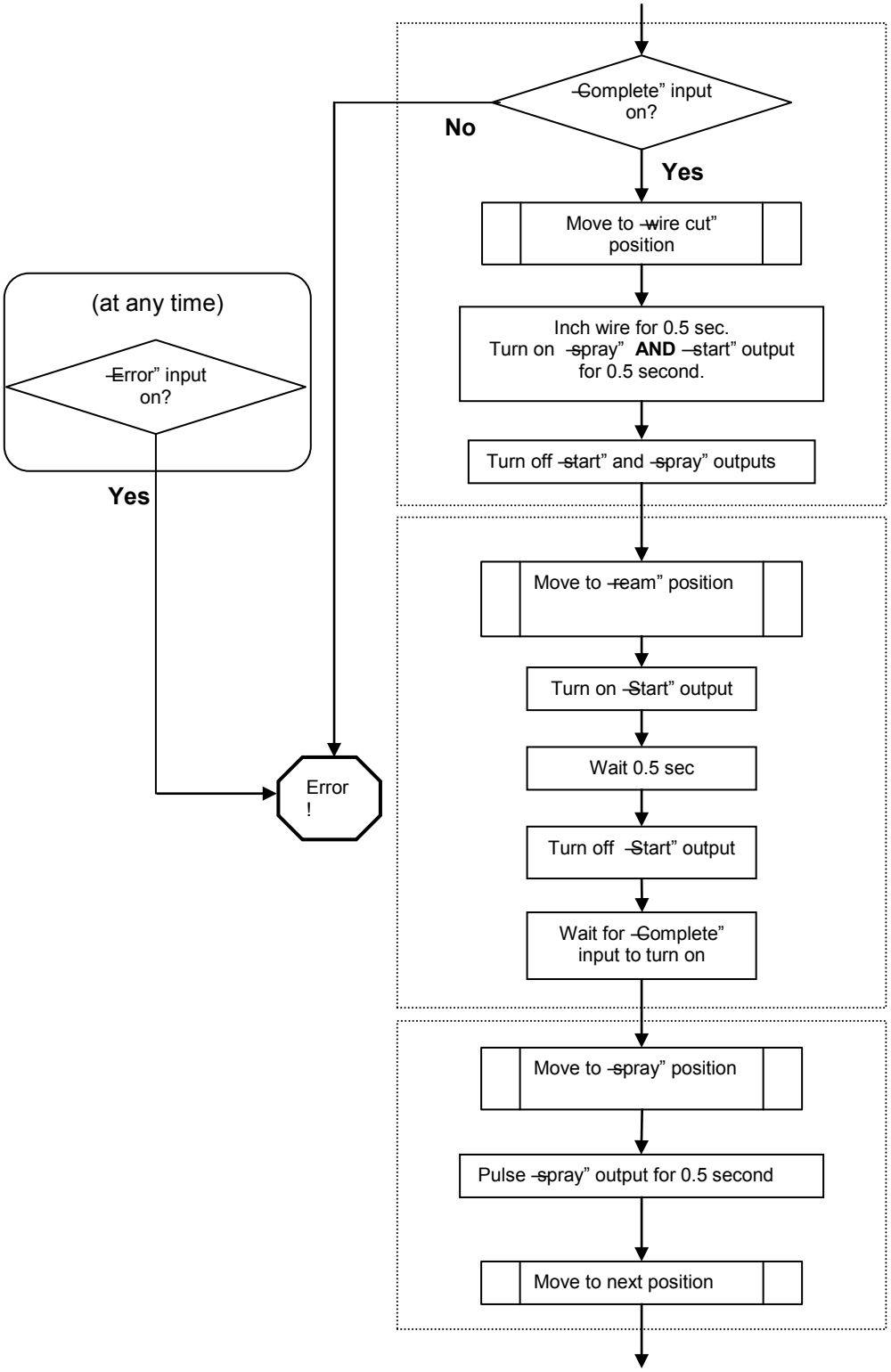
Subsequent pressing and releasing of the setup button will sequence the following configurations in order of appearance. To register the desired configuration, press the reset button when that configuration is displayed.

The top indicator shows the robot input type (green = Active low, red = Active high*).
The bottom indicator shows the robot output type (green = Sinking*, red = Sourcing).
* Factory setup conditions



Auto Active Low/Sinking *is for the automatic I/O configuration, setup as active low/sinking initially (see automatic I/O configuration section for details). Choosing one of the other configurations will disable this adaptability.*

The following flow diagram shows the recommended procedure for wire cutting, reaming, and spraying sequences. Use the robot controller to implement this sequence.



POWER REAM programming example for Fanuc robots

```
 1: DO[28]=PULSE,.5SEC;          Inch wire out for ½ second
 2: CALL HOME;                   Safe home point position
 3: IF DI[3]=OFF,JMP LBL[1];     Check if the reamer is ready
 4: J P[1] 100%   FINE;          Safe approach point over wire cutter
 5: L P[3] 500IPM FINE;          Wire cut position (see illustration)
 6: DO[3]=PULSE,.5SEC;           Pulse reamer "start" signal, and…
 7: DO[4]=PULSE,.5SEC;           Pulse reamer "spray" signal to cut
 8: WAIT .5SEC;                  Wait for the wire cutter
 9: WAIT DI[3]=ON;               Wait for reamer "complete" signal
10: L P[2] 500IPM FINE;          Ream position (see illustration)
11: DO[3]=ON;                    Turn on reamer
12: WAIT 2SEC;                   Adjustable time for reaming operation
13: DO[3]=OFF;                   Turn off reamer
14: WAIT DI[3]=ON;               Wait from reamer "complete" signal
15: L P[4] 500IPM FINE;          Spray position (see illustration)
16: DO[4]=PULSE,.5SEC;           Pulse anti-spatter spray
17: L P[5] 500IPM FINE;          Pull out point from spray position
18: LBL[1];                      Label for JMP statement, line 2
19: CALL HOME;                   Return to home point position
```

NOTE: The I/O points may be different, configuration specific.

How to teach reaming program instructions

CALL HOME;	Press NEXT key, press F1 INST key, cursor to line CALL, Enter. At new submenu, cursor to line Call Program, Enter. Now cursor to program HOME, Enter.
DO[28]=PULSE,.5SEC;	Press NEXT key, press F1 INST key, cursor to line I/O, Enter, cursor to line DO=...., Enter, Key in (28), Enter, At new submenu, cursor to desired line Pulse, Enter, key in desired time (.5), Enter.
IF DI[3]=OFF,JMP LBL[1];	Press NEXT, press F1 INST key, cursor to line IF/SELECT, Enter, cursor to line IF?.=?., Enter, cursor to line DI, Enter, Key in 3, Enter, cursor to OFF, Enter, cursor to JMP LBL, Enter Key in 1, Enter.
DO[3]=ON or OFF	Press NEXT key, press F1 INST key, cursor to line I/O, Enter, cursor to line DO[ ]=…, Enter, key in a 3, Enter, At new submenu, cursor to desired line On or Off, Enter
WAIT 2SEC;	Press NEXT key, cursor to line WAIT, Enter, at new submenu, cursor to line WAIT… (sec), Enter, key in desired number of seconds, Enter.
WAIT DI[3]=ON;	Press NEXT key, press F1 INST key, cursor to line WAIT, Enter, cursor to line WAIT…, Enter. At new submenu, cursor to line DI[ ], Enter, key in a 3, Enter. At new submenu, cursor to line ON, Enter.
DO[3]=PULSE,.3SEC;	Press NEXT key, press F1 INST key, cursor to line I/O, Enter, cursor to line DO[ ]=…, Enter, Key in desired output (3), Enter. At new submenu, cursor to desired line Pulse, Enter, key in desired time (.5), Enter

Robot Position Programming

The POWER REAM features a "no trial, no error" position programming technique as described below:

1. Wire cut Position: Center the nozzle at the desired stick-out height above the wire cutter. Record this position as the "**Wire Cut**" position described in "Robot Control Programming" section above.

2. Hold the "Setup Sequencer" button to raise the reamer. This will lift the reamer without spinning.

WARNING: the lift will operate under this condition. KEEP HANDS CLEAR of the operating space of the reamer. This device is intended for one-man operation during setup.

Once the reamer is at the top position ("Lift" indicator is green), release the "Setup Sequencer" button.

3. Using the robot, move the torch nozzle into the clamp such that the reaming bit is inset to the full depth required inside the nozzle.

4. Press and release the "Setup Sequence" button to verify all four faces of the clamp engage the cylindrical body of the nozzle equally, and that the nozzle does not change orientation or position when clamped.

WARNING: the clamp will operate under this condition, KEEP HANDS CLEAR of the operating space of the clamp and wire cutter. This device is intended for one-man operation during setup.

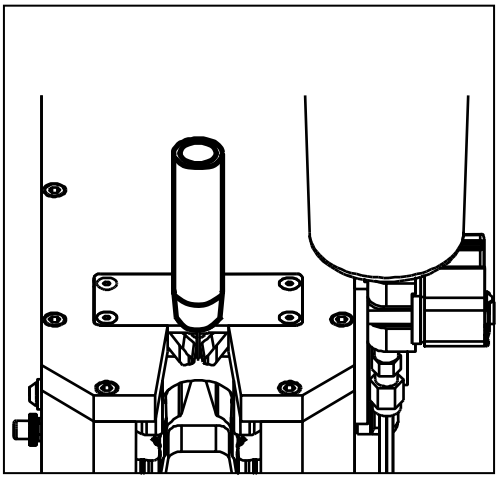
5. Register this position in the robot controller using a fine position level as the "**ream position**" described in flow diagram above.

6. Press the "Reset" button until the reamer lowers. The reamer will lower without spinning, and the clamp will open

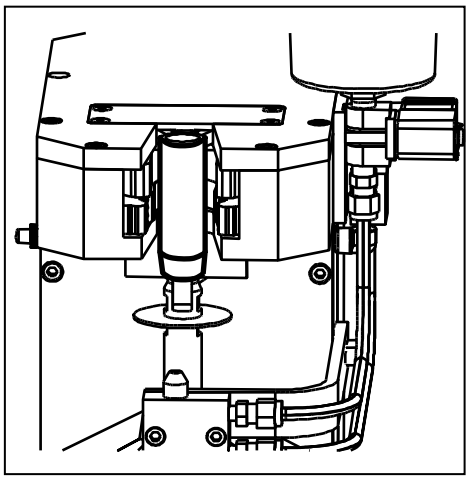
WARNING: the lift and clamp will operate under this condition. KEEP HANDS CLEAR of the operating space of the reamer. This device is intended for one-man operation during setup.

7. Spray Position: Center the nozzle 1½ inches above the spray head. Record this position as the "**Spray**" position described in the flow diagram above.

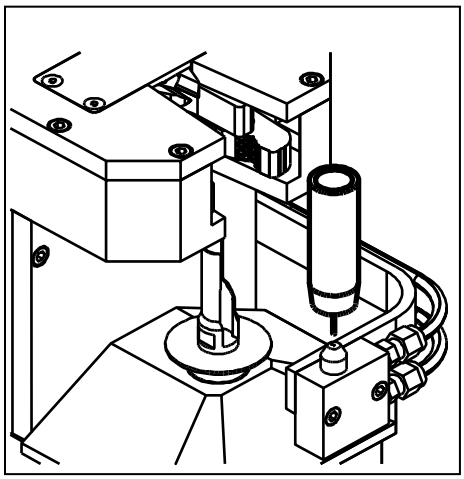
Note: The fluid line takes approximately 10 seconds to prime. The sprayer has a built in post-flow timer of 1 second. Airflow from the nozzle will be present for 1 second after the spray output is turned off.



Wire Cut Position



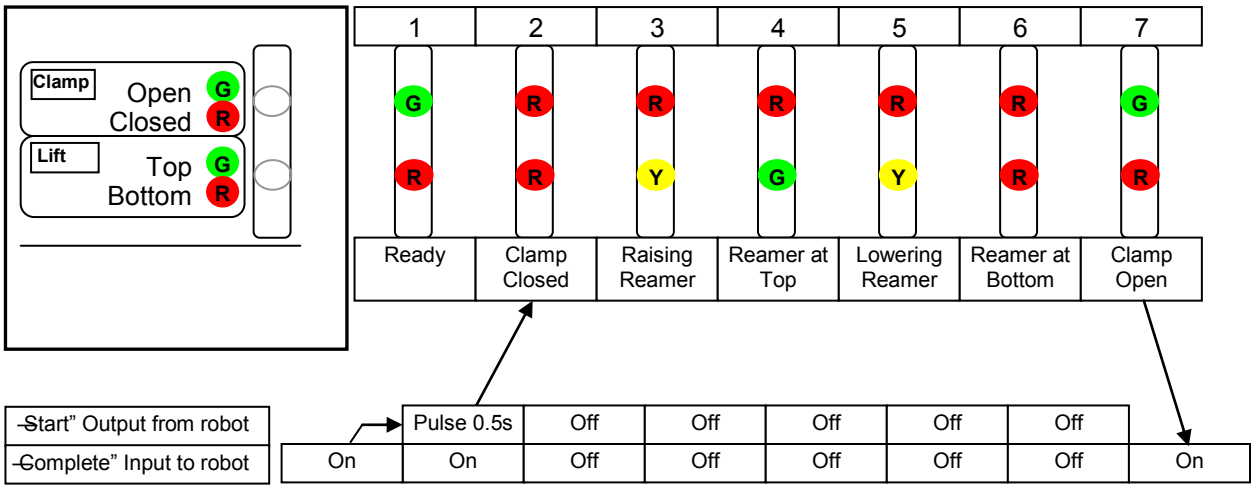
Ream Position



Spray Position

Operation

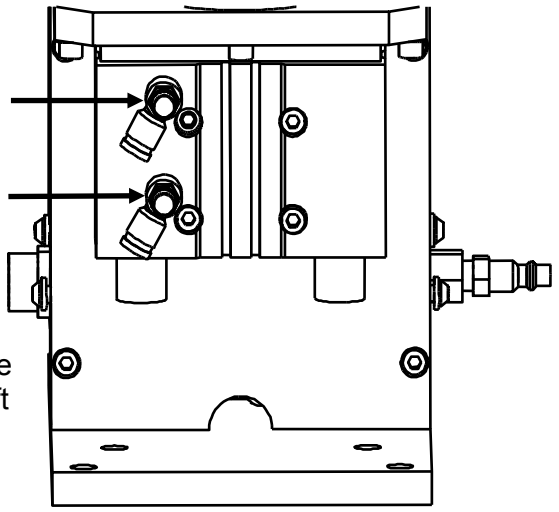
The following diagram shows the 7-step reaming sequence and color of the indicator lights at each stage. The indicator lights show the position of the clamp and lift cylinders on the user interface.



The above diagram shows the robot input and output as the sequence progresses.

Automatic Retry

If excessive spatter is built up in the nozzle, or programmed position of the nozzle is off center not allowing reamer to extend to full depth within a specific amount of time, the POWER REAM will automatically retry once.



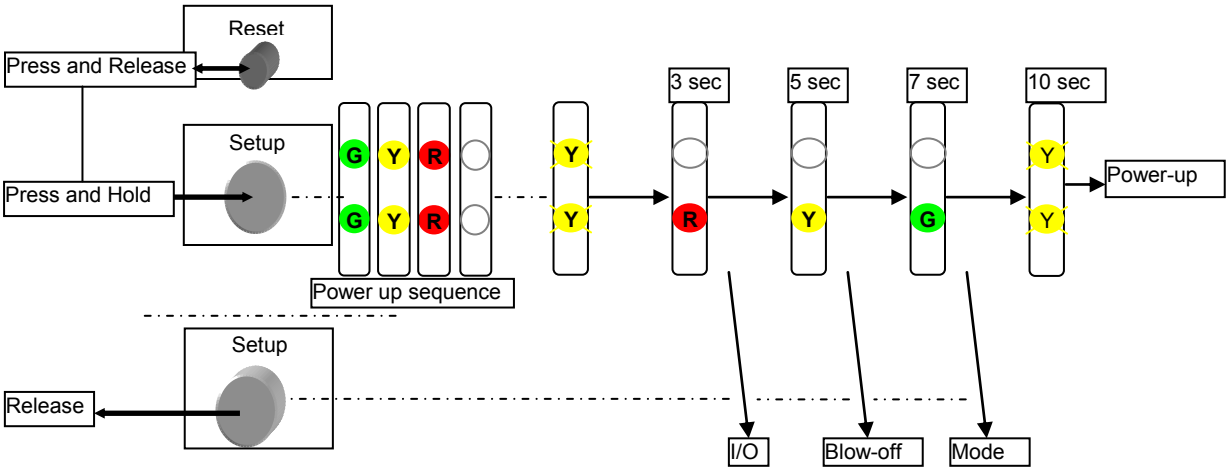
Cycle Optimization

The lift rate of the reaming bit will determine how many reaming revolutions will occur within the nozzle. This parameter should be set based on the amount of spatter built up in the nozzle between reaming cycles. More spatter buildup will require a slower lift rate. Less spatter buildup will allow a faster lift rate.

To set the lift rate, remove the front cover and adjust the top needle valve. Turning clockwise will decrease the lift rate (for more spatter removal), and turning counter clockwise will increase the lift rate.

To set the retracting rate, adjust the bottom needle. Turning clockwise will decrease the retracting rate, and turning counter clockwise will increase the retracting rate.

Several features may be setup to optimize performance of the POWER REAM. To access the configuration menus press the reset and setup pushbuttons, release the reset pushbutton and continue to hold the setup button for the specified time shown below. The LEDs will change color pattern to indicate the menu that is accessible at a specific time. Release the setup button when the color pattern is shown for the desired configuration menu.



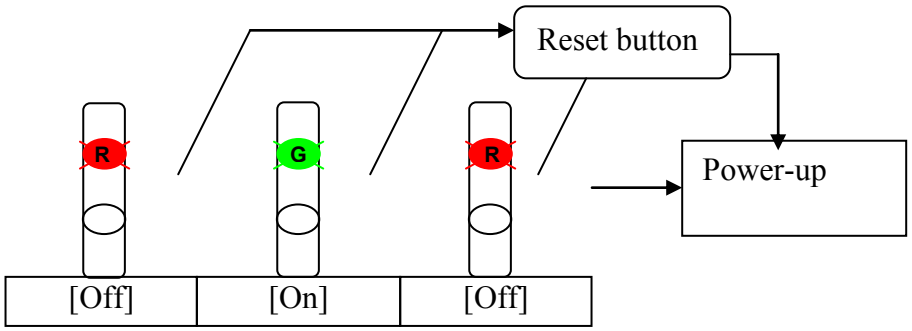
The default setting is first and last in the sequence of each configuration menu.

I/O configuration menu: See I/O configuration section on previous pages.

Blow-off: The motor spins and exhausts (blowing off over spray) for two seconds after spraying. The blow-off feature can be configured by the following procedure.

Follow the steps outlined above to access the blow-off configuration menu. Upon releasing the setup push button, the lights will flash red on top and blank on bottom. This is the first in the sequence of teachable configurations.

Subsequent pressing and releasing of the setup button will sequence the following configurations in order of appearance. To register the desired configuration, press the reset button when that configuration is displayed.



Blow-off configurations;
Off: This feature is disabled.
On: This feature is enabled.

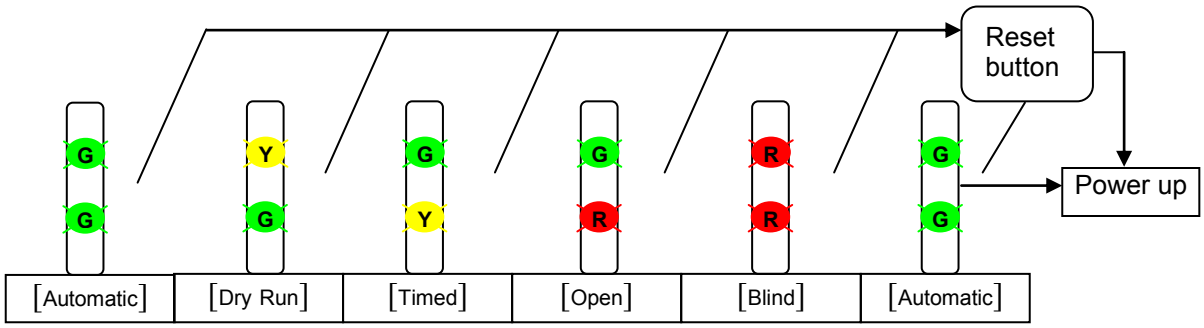
Running Modes. Several running modes are available to select from.

Automatic: Every aspect of the operation is commanded, monitored and checked by the controller.
Dry Run: Same as automatic mode, but the motor is disabled.
Timed: Bypass the "extended" sensor on the lift cylinder. The robot must hold the start signal on for the reaming time. Auto Retry is disabled in this and the following modes.
Open: Bypass the "extended" and "retracted" sensor. The robot must hold the start signal on for the reaming time and hold the robot in the clamp until the reaming bit is fully retracted.
Blind: Bypass all sensors. The robot must hold the start signal on for the ream time and hold the torch in the jaws until the reaming bit is fully retracted and the clamp is fully opened.

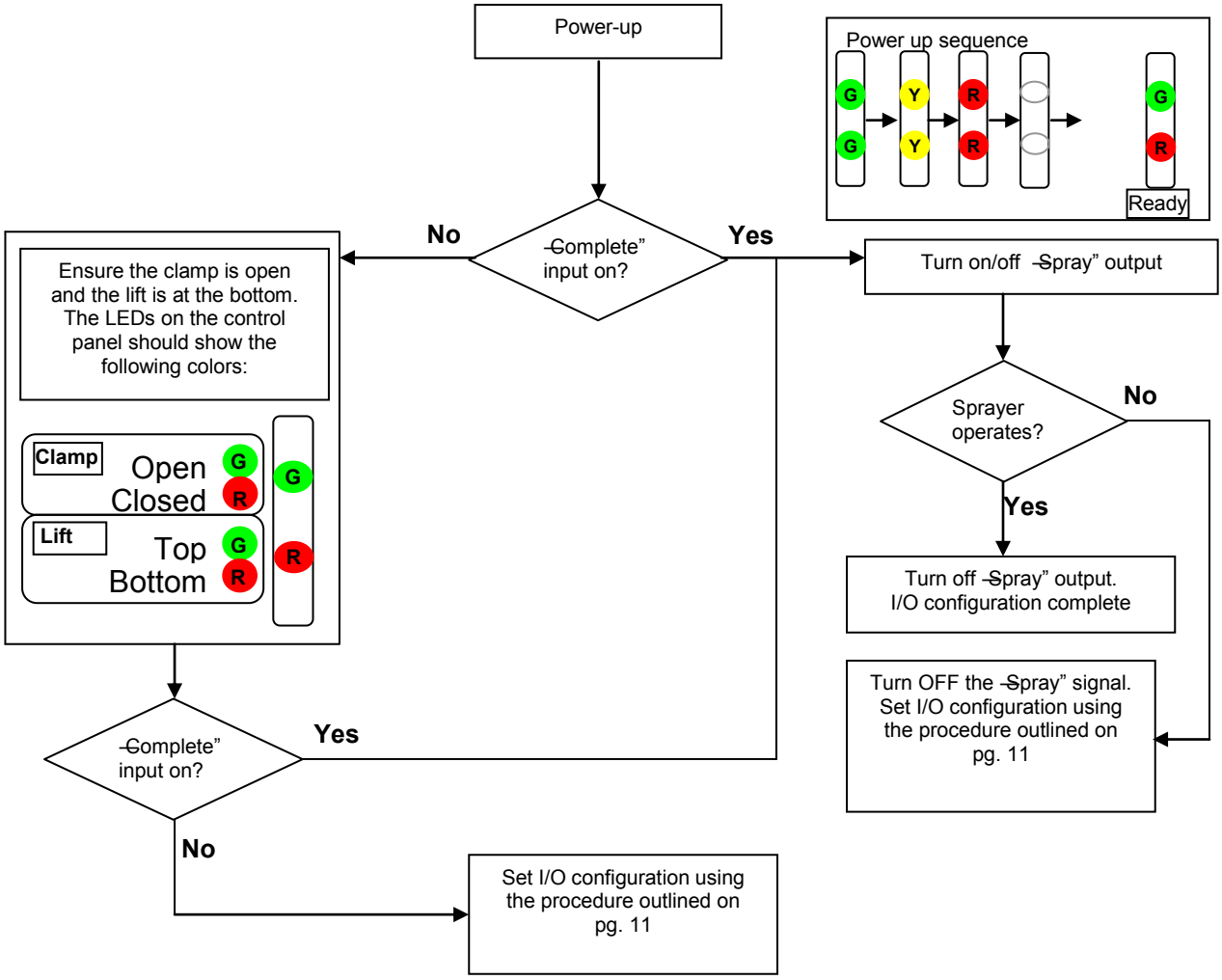
Mode configuration: A specific running mode can be configured by the following procedure.

Follow the steps outlined above to access the mode configuration menu. Upon releasing the setup push button, the lights will flash green on top and bottom. This is the first in the sequence of teachable configurations.

Subsequent pressing and releasing of the setup button will sequence the following configurations in order of appearance. To register the desired configuration, press the reset button when that configuration is displayed.



Automatic I/O configuration procedure:
The POWER REAM has an auto configuration I/O feature that is turned on by setting the I/O configuration to AUTO (see I/O configuration section). The automatic I/O configuration works as follows;
-The POWER REAM detects the type of robot input (active high / active low) when power is applied or after resetting. Once detected, the POWER REAM outputs are configured.
-The POWER REAM senses and configures its inputs when the robot sends an output signal (sinking or sourcing).
Use the following procedure to ensure that the POWER REAM is configured to the correct I/O type using auto configuration. ~~-S~~pray" refers to the spray output from the robot and ~~-C~~omplete" refers to the complete input to the robot.
CAUTION: the sprayer will operate in this procedure;
KEEP EYES AWAY from the sprayer



MAINTENANCE

The POWER REAM will require periodic maintenance to ensure a dependable service life. The following schedule is recommended.
Shut off the air supply and disconnect robot control cable when making adjustments.

DAILY
• Clean surface under reaming bit.
• Check airlines for leaks and robot control cable for splits or cracks.
• Clean clamp gripping surfaces to ensure optimal nozzle gripping.

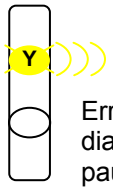
WEEKLY
• Check the fluid level in spray reservoir.
• Check the reaming bit visually.
• Check the wire cutter visually.
The service life of the cutting edges are dependant on the type of application. Inspect for dullness and possible breakage.

YEARLY
• Inspect drive belt for wear and tension. Replace if excessive wear is evident.

TROUBLESHOOTING

Problem	Possible Cause	Solution
No Indicator lights	-Power is off -Fuse is blown (robot cabinet) -Reset button defective -Circuit board defective	-Turn power on -Replace fuse -Replace reset button -Replace circuit board
Reamer stops rotating	-Insufficient air supply -Excessive spatter buildup -Dry run mode selected	-Set to 80psi -Ream more often -Select automatic mode
Clamp/Motor/Lift not working	-Insufficient air supply -Air line cut or twisted -Reset button defective -Check error codes	-Set to 80psi min -Replace airline -Replace reset button
Reamer does not go down	-Ream bit jammed in nozzle -Lift cylinder defective -Top sensor defective -"Start" output held on -Check error codes	-Replace damaged parts -Replace lift cylinder -Replace top sensor -Pulse "Start" output 0.5 sec
Robot cannot start a cycle or Robot cannot complete a cycle	- "Complete" signal not responding	-Check error codes
No Anti-Spatter liquid Or air flow from sprayer	-Insufficient air supply -Solenoid valve defective -Spray nozzle clogged	-Set to 80psi -Replace solenoid valve -Clean or replace spray nozzle *hand tighten only
Air flow from sprayer but no Anti-Spatter liquid	-Check anti-spatter level -Check vent on reservoir -Fluid line blocked -Spray nozzle clogged	-Refill reservoir -Open vent if closed -Clean or repair fluid line -Clean or replace spray nozzle ***hand tighten only**

The POWER REAM reports errors using the indicator lights on the user interface
When an error is reported, the indicator light flashes at a rate of 2 flashes per second



Error: When an error occurs during the reaming process; the clamp opens, the lift lowers, and the diagnosis is shown with the top indicator light in yellow. The light will flash a certain number of times, pause, then repeat. The error count begins at 2.
Count the number of flashes between the pause and use the following chart to find the cause of the problem.

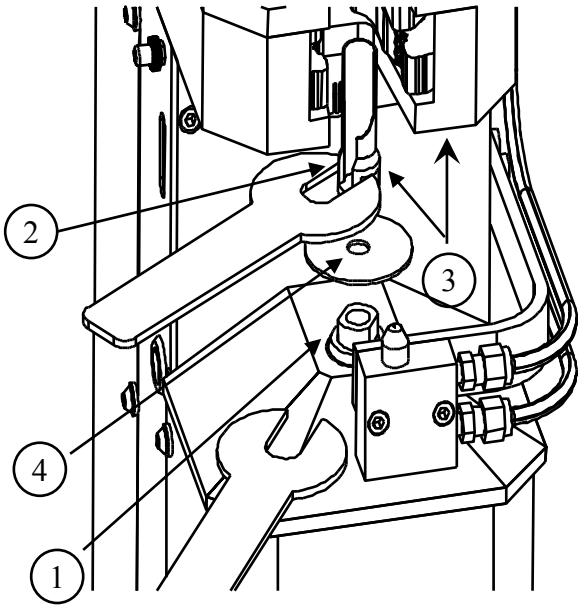
2: Closing Fault: the clamp took too long to close. -Check air inlet pressure -Check clamp sensor -Check clamp air lines -Check clamp solenoid. -Check clamp cylinder
3: Raising Fault: The lift cylinder took too long to extend from the bottom limit -Check air inlet pressure -Check extending needle valve (top needle valve on lift cylinder) -Check bottom sensor. -Check lift air lines -Check lift solenoid. -Check lift cylinder
4: Extending Fault: The lift cylinder took too long to fully extend. -Automatic retry; excessive spatter build up in the nozzle (ream more often), or incorrect programmed position of the nozzle, not allowing reamer to extend to full depth. -Check air inlet pressure -Check extending needle valve (top needle valve on lift cylinder) -Check top sensor. -Check lift air lines -Check lift solenoid. -Check lift cylinder
5: Lowering Fault: The lift cylinder took too long to retract from the top while lowering -Check air inlet pressure -Check retracting needle valve (bottom needle valve on lift cylinder) -Check top sensor. -Check lift airlines. -Check lift solenoid. -Check lift cylinder.
6: Retracting Fault: The lift cylinder took too long to fully retract. -Check air inlet pressure -Check retracting needle valve (bottom needle valve on lift cylinder) -Check bottom sensor. -Check lift airlines. -Check lift solenoid. -Check lift cylinder.
7: Opening Fault: the clamp took too long to open. -Check air inlet pressure -Check clamp sensor. -Check clamp cylinder airlines. -Check clamp solenoid. -Check clamp cylinder.

Note: The robot —start” signal may be used to reset an error so that the operator does not have to go inside the robotic welding cell. For example, if the air supply was not turned on the operator may turn it on and reset the error by cycling the start output from the robot pendant.

Reaming Bit Replacement

⚠WARNING

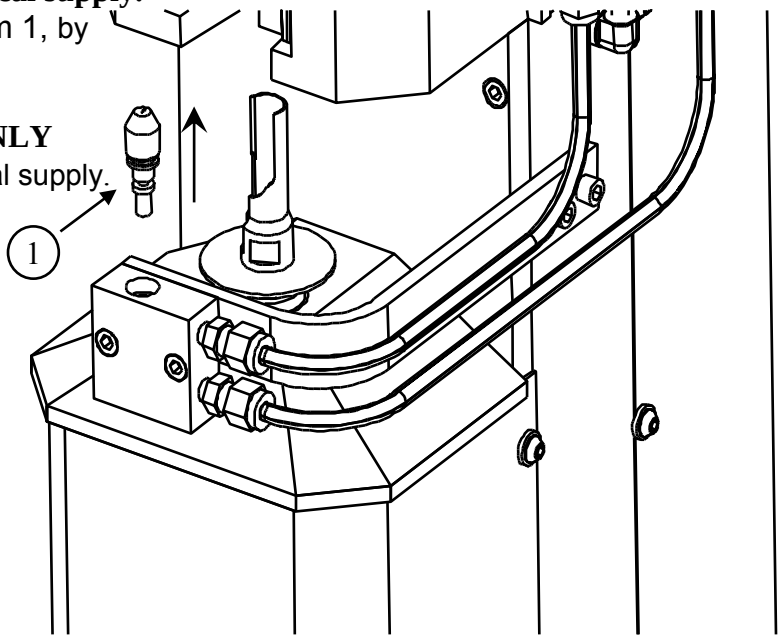
- **Disconnect air and electrical supply.**
- Hold the reaming rod, item 1, from rotating with 5/8” wrench under the washer.
- Unfasten the reaming bit, item 2, with a second 5/8” wrench.
- Remove the reaming bit, item 3.
- Insert the new reaming bit through the flat washer, item 4.
- Insert the reaming bit into the ream rod.
- Hold the reaming rod from rotating with a 5/8” wrench under the washer.
- Tighten the reaming bit with a second 5/8” wrench.
- Reconnect air and electrical supply.



Spray Nozzle Replacement

⚠WARNING

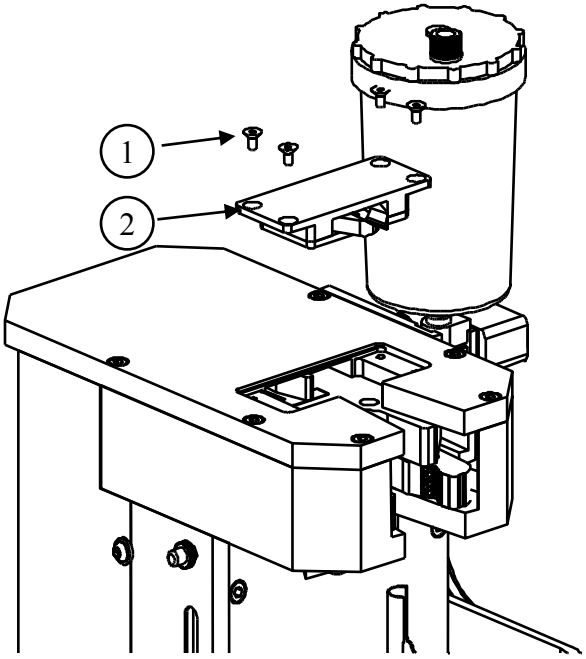
- **Disconnect air and electrical supply.**
- Unscrew spray nozzle, item 1, by hand.
- Insert new spray nozzle. **TIGHTEN BY HAND ONLY**
- Reconnect air and electrical supply.



Wire Cutter Replacement

⚠WARNING

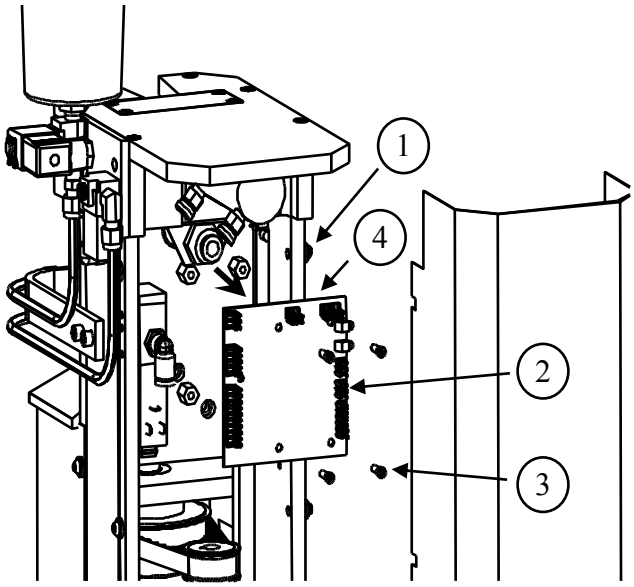
- **Disconnect air and electrical supply.**
- Unfasten (4) #8-32 flat head socket cap screws, item 1.(3/32" hex drive)
- Remove wire cutter module, item 2.
- Insert new wire cutter module. NOTE: The cutters will close slightly when positioning the rollers against the wedge.
- Fasten (4) #8-32 flat head socket cap screws, item 1. Apply medium strength threadlocker. (3/32" hex drive)
- Reconnect air and electrical supply.



PC Board Replacement

⚠WARNING

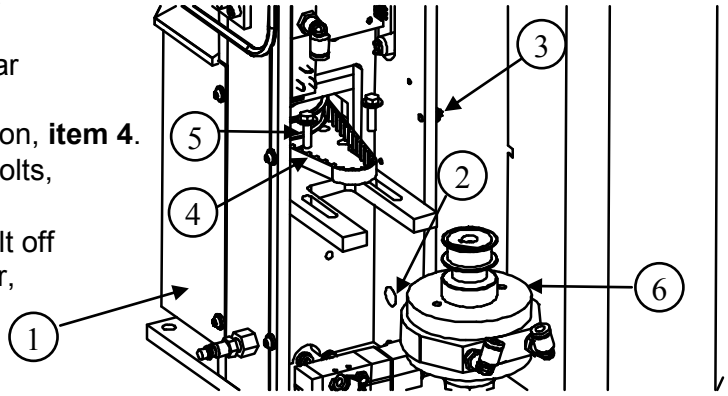
- **Disconnect air and electrical supply.**
- Loosen (6) button head cap screws , **item 1**, to remove rear cover. (5/32" hex drive)
- Remove (7) connectors, **item 2**, from PC board.
- Remove (5) #6-32 socket head cap screws, **item 3**, from PC board. (7/64" hex drive)
- Remove PC board, **item 4**.
- Insert new PC board.
- Follow steps in reverse order to reassemble unit.



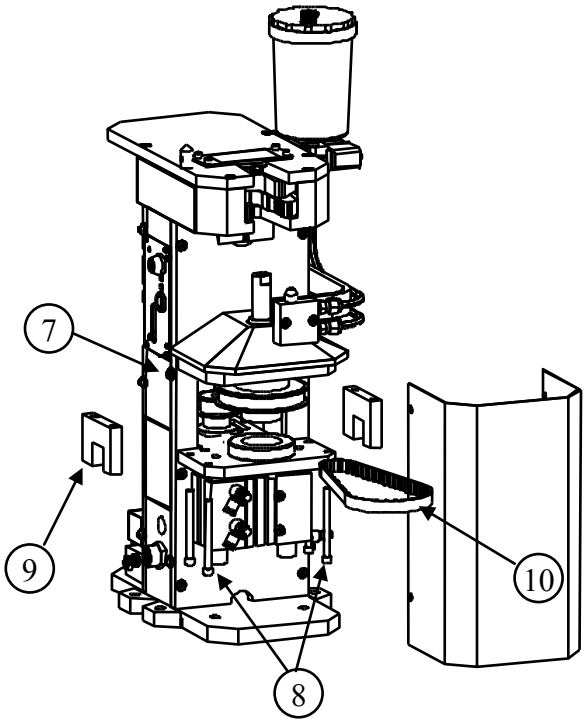
Belt Replacement

⚠WARNING

- **Disconnect air, item 1, and electrical supply, item2.**
- Loosen (6) button head cap screws, **item 3**, to remove rear cover. (5/32" hex drive)
- Check and note the belt tension, **item 4**.
- Remove (2) 6mm hex head bolts, **item 5**. (10 mm wrench)
- Slide motor forward to slip belt off motor gear and remove motor, **item 6**.



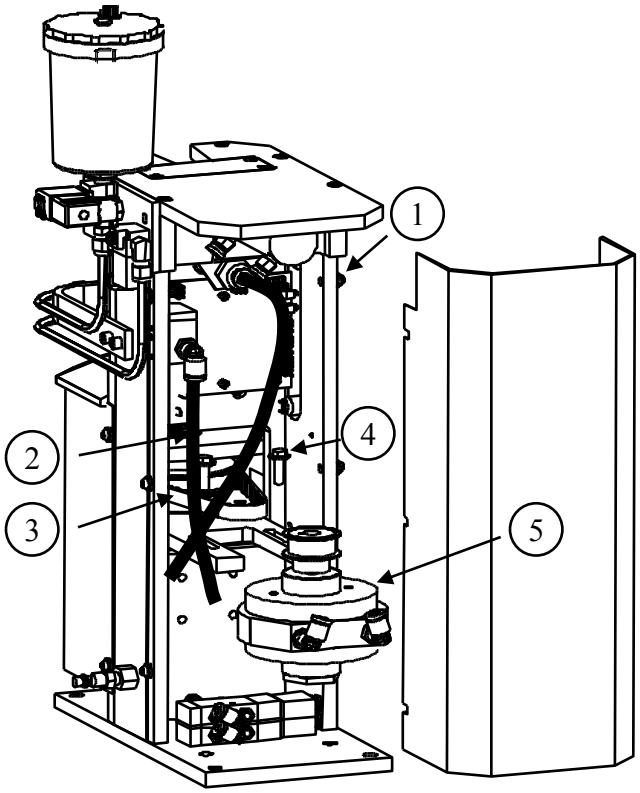
- Remove (4) button head cap screws, **item 7**, to remove front cover (5/32" hex drive)
- Remove (4) socket head cap screws and lock washers, **item 8**, from bottom plate of motor carriage. (3/16" hex drive)
- Remove (2) side plates, **item 9**.
- Lift up on the front gear, slip belt off and remove belt, **item 10**.
- Lift up on the front gear, slip new belt over front gear.
- Follow steps in reverse order to reassemble unit.
- Apply medium strength threadlocker to **item 5**.



Air Motor Replacement

⚠WARNING

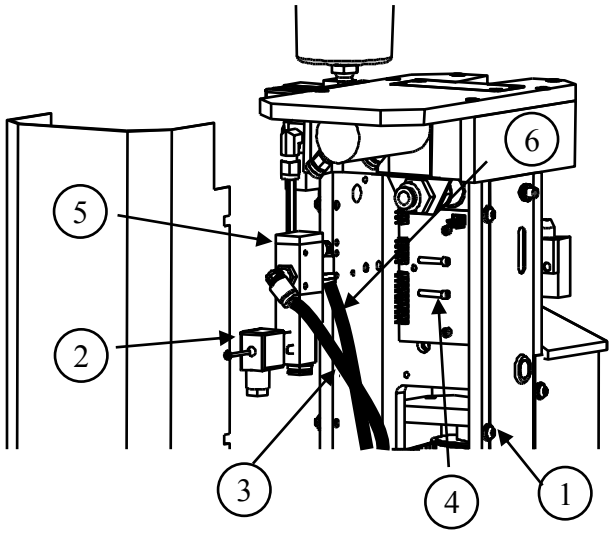
- **Disconnect air and electrical supply.**
- Loosen (6) button head cap screws, **item 1**, to remove rear cover. (5/32" hex drive)
- Disconnect hoses 111 and 112, **item 2**, from the motor.
- Check and note the belt tension, **item 3.**
- Hold the motor from below and remove (2) 6mm hex head bolts, **item 4.** (10mm wrench)
- Slip belt off motor gear and remove motor, **item 5.**
- Insert new motor into mount.
- Follow steps in reverse order to reassemble unit.
- Apply medium strength threadlocker to **item 4.**



Motor Solenoid Replacement

⚠WARNING

- **Disconnect air and electrical supply.**
- Loosen (6) button head cap screws, **item 1**, to remove rear cover.
- Remove electrical connector, **item 2**, from motor solenoid. (Star screwdriver)
- Disconnect hose 111, **item 3**,from motor solenoid.
- Remove (2) #8-32 socket head cap screws, **item 4**, from solenoid. (9/64" hex drive)
- Remove motor solenoid, **item 5**.
- Disconnect hose 110, **item 6**,from motor solenoid.
- Follow steps in reverse order to reassemble unit.

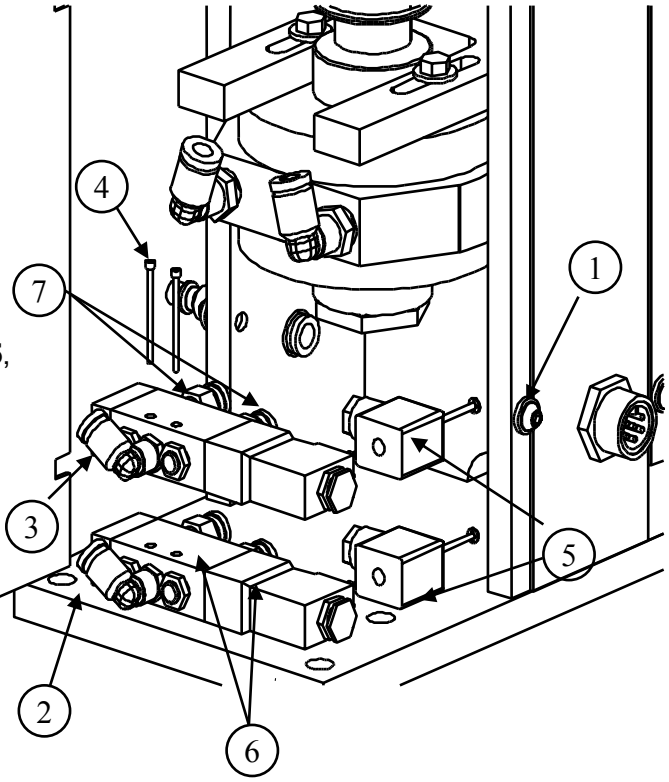


Lift\Clamp Solenoid Replacement

Note: The lift and clamp cylinder solenoids are stacked. The top solenoid is for the clamp cylinder, the bottom solenoid is for the lift cylinder. Similar procedures are used for each solenoid.

⚠WARNING

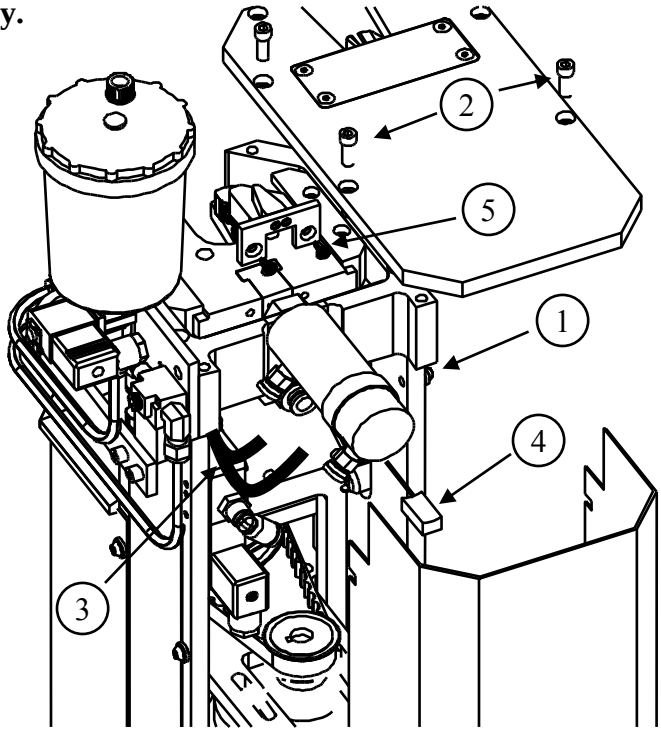
- **Disconnect air and electrical supply.**
- Loosen (6) button head cap screws, **item 1**, to remove rear cover. (5/32" hex drive)
- *Lift Solenoid*: Disconnect hose 130 from solenoid in-port, **item 2**.
  Clamp Solenoid: Disconnect hose 120, **item 3**, from solenoid in-port.
- Remove(2) #4-40 socket head cap screws, **item 4**, from solenoids. (3/32" hex drive)
- Remove electrical connector, **item 5**, from solenoid. (star screwdriver)
- *Lift Solenoid*: Disconnect hose 131 and 132 from solenoid out-port, **item 6**.
  Clamp Solenoid: Disconnect hose 121 and 122 from solenoid out-port, **item 7**.
- Remove solenoid, insert new solenoid.
- Follow steps in reverse order to reassemble unit.



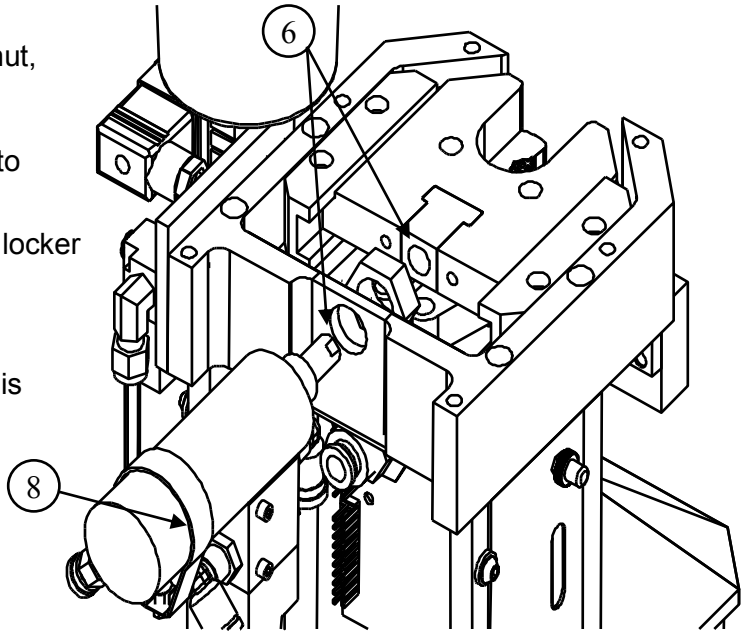
Clamp Cylinder Replacement

⚠WARNING

- **Disconnect air and electrical supply.**
- Loosen (6) button head cap screws, **item 1**, to remove rear cover.
- Remove (6) socket head cap screws, **item 2**, to remove top cover.(3/16" hex drive).
- Disconnect hose 121 and 122, **item 3**, from cylinder in-ports.
- Remove reed switch, **item 4**, from cylinder.(5/64" hex drive)
- Remove (2) #10-24 flat head socket cap screws, **item 5**, to remove wedge plate. (1/8" hex drive)



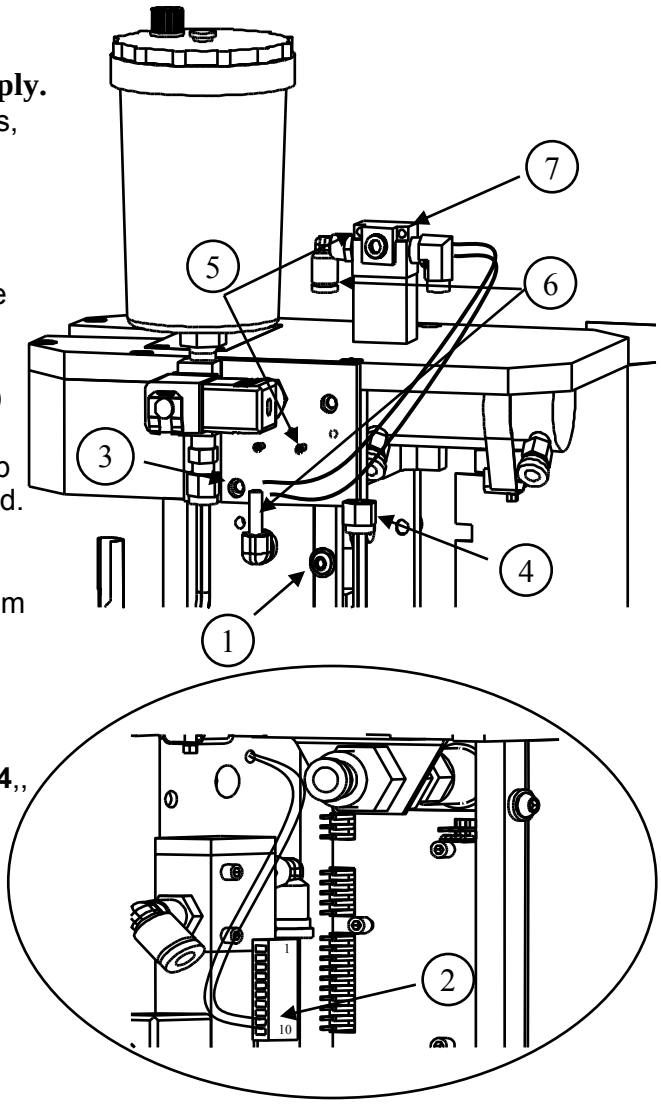
- Unfasten cylinder rod, **item 6**, from T-nut. (3/8" wrench)
- Loosen and remove cylinder nut, **item 7**, (1 1/8" wrench)
- Remove cylinder, **item 8**.
- Follow steps in reverse order to reassemble unit.
- Apply medium strength threadlocker to **item 5, 6 and 7.**
- Check the position of reed switch, **item 4**. The led should be on when the clamp is open with electrical supply connected.



Spray Solenoid Replacement

⚠WARNING

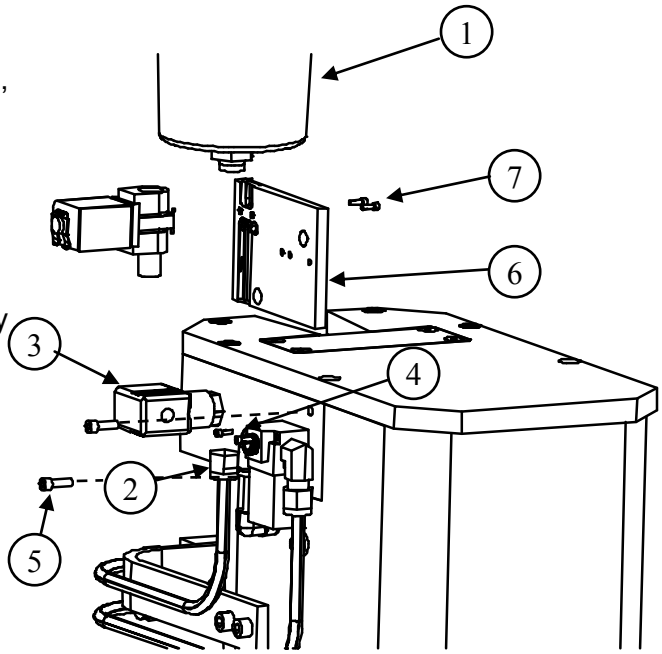
- **Disconnect air and electrical supply.**
- Loosen (6) button head cap screws, **item 1**, to remove rear cover.
- Remove (2) wires, **item 2**, from 10-position connector (pins 9 and 10 at the bottom).
- Pull wires, **item 3**, through the hole in main unit to the outside.
- Unfasten bottom nut, **item 4**, of compression fitting. (9/16” wrench) DO NOT REMOVE
- Remove (2) #4-40 socket head cap screws, **item 5**, from spray solenoid. (3/32” hex drive)
- Raise spray solenoid valve while detaching plastic fitting, **item 6**, from the side.
- Remove spray solenoid, **item 7**.
- Follow steps in reverse order to reassemble unit.
- When tightening bottom nut, **item 4**,, DO NOT OVER TIGHTEN

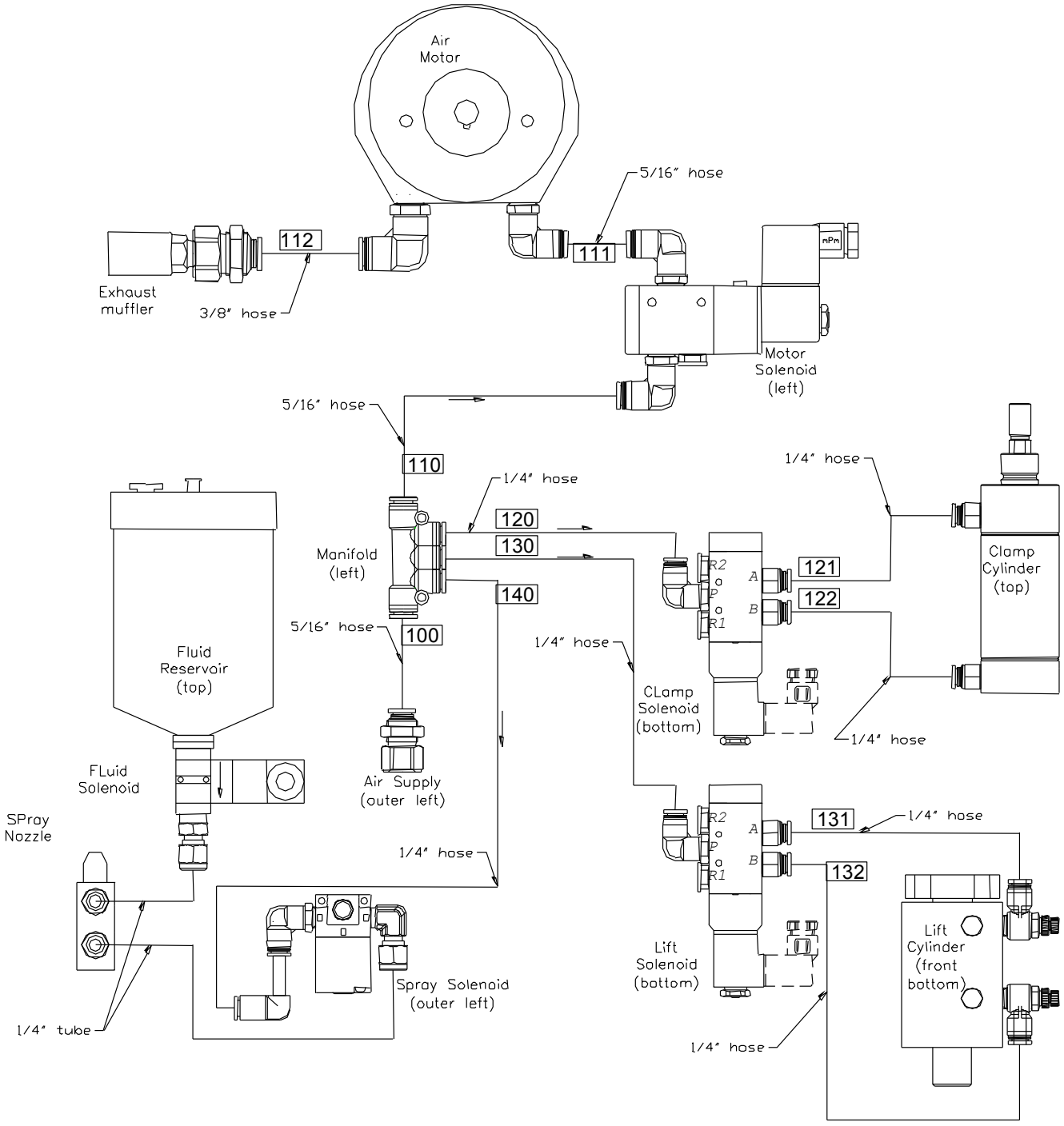


Fluid Solenoid Replacement

⚠WARNING

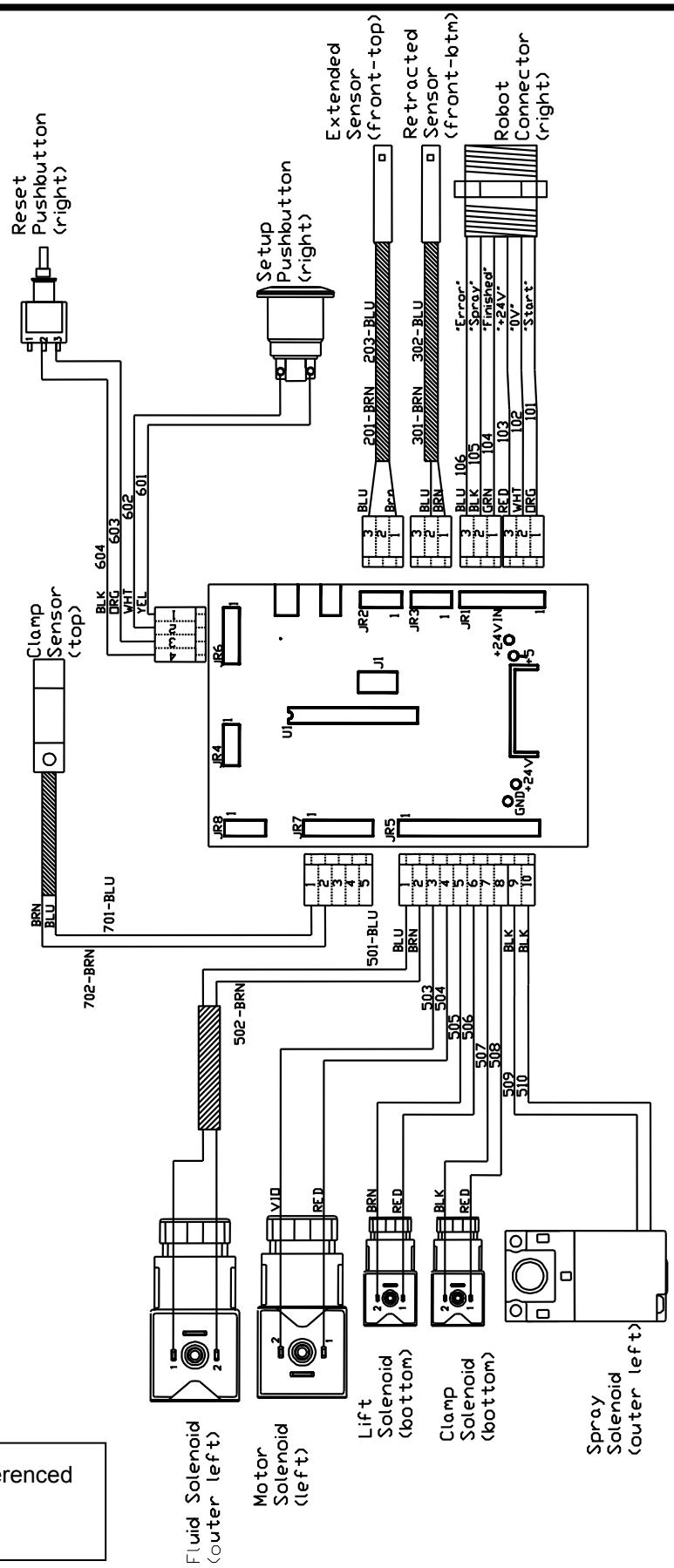
- **Disconnect air and electrical supply.**
- Remove anti spatter fluid reservoir, **item 1**. (3/4" wrench)
  WARNING: Contents may spill.
- Remove bottom nut, **item 2**, of compression fitting. (9/16" wrench)
- Remove electrical connector, **item 3**, from fluid solenoid valve. (star screwdriver)
- Remove (2) 4-40 socket head cap screws, **item 4**, from spray solenoid. (3/32" hex drive)
- Remove (2) #8-32 socket head cap screws, **item 5**, from spray assembly plate. (9/64" hex drive)
- Raise spray plate **item 6**.
- Remove (2) 3mm socket head cap screws, **item 7**, from back of spray assembly plate and replace fluid solenoid. (3/32" hex drive)
- Follow steps in reverse order to reassemble unit.
- When tightening bottom nut, **item 2**, **DO NOT OVER TIGHTEN**





Note: All locations are referenced from the back of the unit
Additional pneumatic troubleshooting information:

- Air enters the unit through hose 100 and is distributed to the solenoids through the manifold
- Hose 110 feeds the motor solenoid. Air flows through hose 111 and 112 when the motor is on.
- Hose 120 feeds the clamp solenoid. Hose 121 is normally pressurized, keeping the clamp in the open position. When the clamp is closed hose 122 become pressurized. Air flows through lines 121, 122, and out the breather vents of the clamp solenoid when opening or closing.
- Hose 130 feeds the lift solenoid. Hose 131 is normally pressurized, keeping the lift in the bottom position. When the lift is raised hose 132 becomes pressurized. Air flows through lines 131, 132, and out the breather vents of the lift solenoid when raising or lowering
- Hose 140 feeds the spray solenoid. Air flows through the tubing when the sprayer is on.

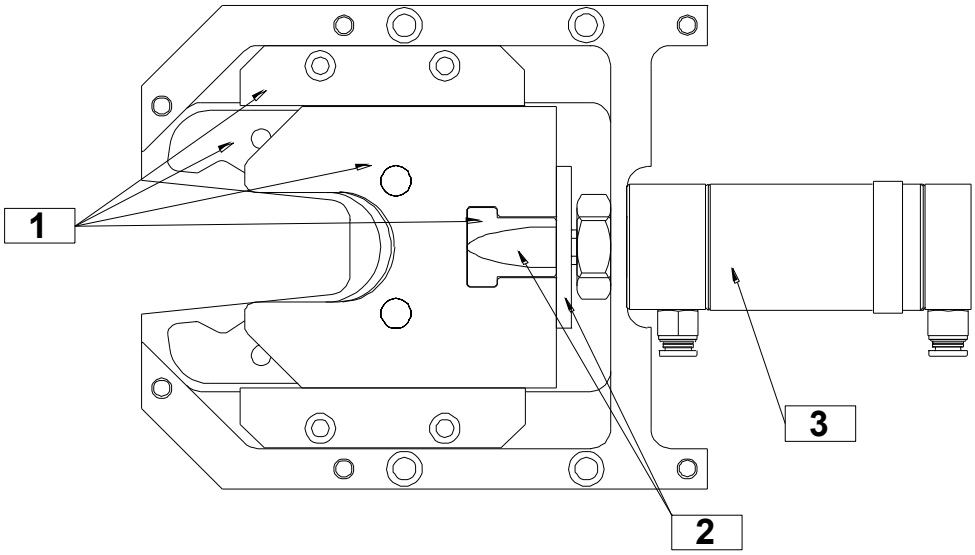


Note: All locations are referenced from the back of the unit

Additional electrical troubleshooting information:
Use the wire numbers in the following table to take readings with a voltmeter.
Connect the (+) lead to the first wire number and the (-) lead to the second wire number.

Wire #	Description	Active Voltage	Inactive Voltage
101 to 102	Start output from robot	24V sourcing 0V sinking	0V sourcing 24V sinking 12V auto detect
103 to 102	24V power	24V	0V
104 to 102	Finished input to robot	24V sourcing 0V sinking	Floating
105 to 102	Spray output from robot	24V sourcing 0V sinking	0V sourcing 24V sinking 12V auto detect
106 to 102	Error input to robot	24V sourcing 0V sinking	Floating
201 to 203	Extended reed sensor	1.5V	23.3V
301 to 302	Retracted reed sensor	1.5V	23.3V
502 to 501	Fluid solenoid	24V	0V
504 to 503	Motor solenoid	24V	0V
506 to 505	Lift solenoid	24V	0V
508 to 507	Clamp solenoid	24V	0V
510 to 509	Spray solenoid	24V	0V
601 to 602	Setup pushbutton	0V	5V
604 to 603	Reset pushbutton	0V	5V

Note: all voltage readings +/- 10%



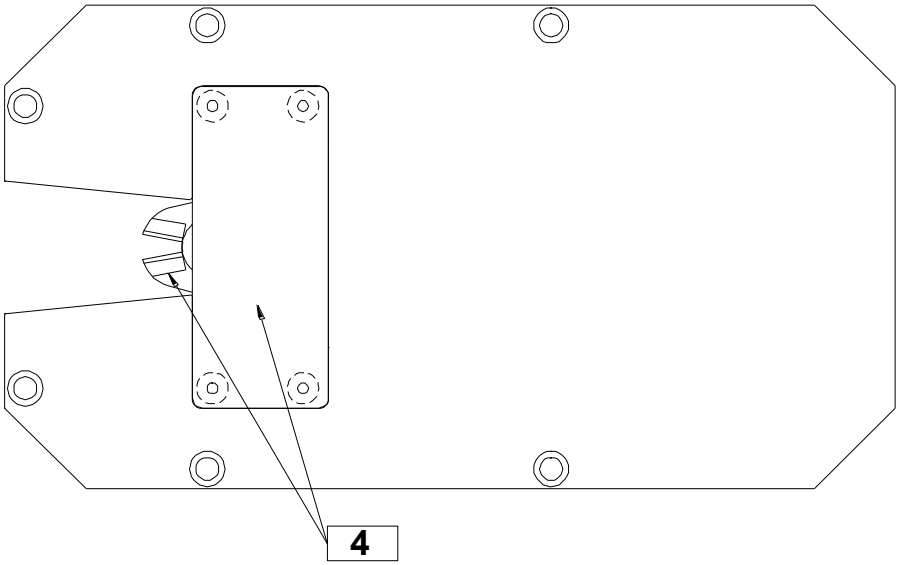
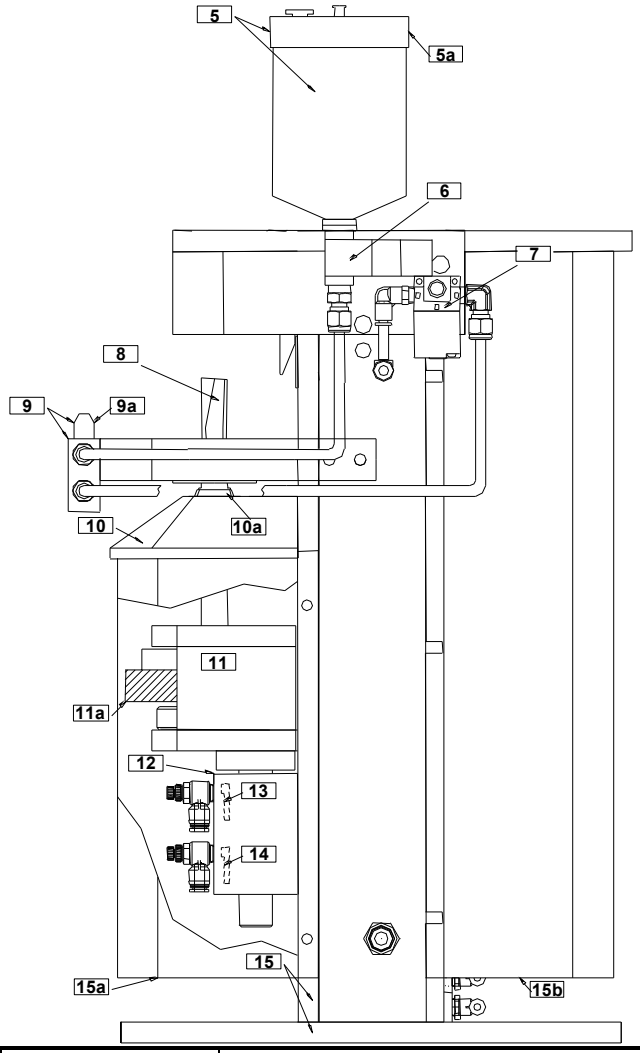
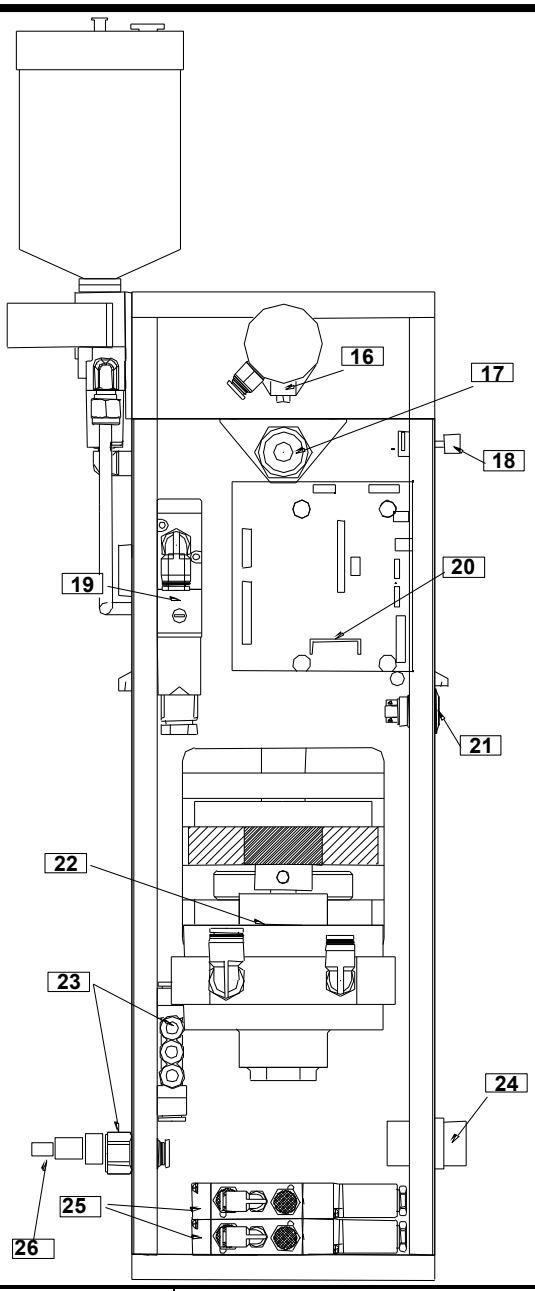


TABLE 2

ITEM	PART #	DESCRIPTION
1	G4827-3	CLAMP ASSEMBLY
2	G4827-4	WEDGE ASSEMBLY
3	G4827-5	CLAMP CYLINDER ASSEMBLY
4	G4827-6	WIRE CUTTER ASSEMBLY



ITEM	PART #	DESCRIPTION
5	G4827-7	FLUID RESERVOIR ASSEMBLY
5A	G4827-8	RESERVOIR LID
6	G4827-9	FLUID SOLENOID ASSEMBLY
7	G4827-10	SPRAY SOLENOID ASSEMBLY
8	KP2435-4	REAMING BIT, 5/8” (W/WASHER)
8A	G4827-1	REAMING BIT WASHER
9	G4827-11	SPRAY NOZZLE ASSEMBLY
9A	G4827-12	SPRAY NOZZLE
10	G4827-13	DOME ASSEMBLY
10A	G4827-14	ROD WIPER SEAL
11	G4827-15	CARRIAGE ASSEMBLY
11a	G4827-16	TIMING BELT
12	G4827-17	LIFT CYLINDER ASSEMBLY
13	G4827-18	EXTENDED SENSOR ASSEMBLY
14	G4827-19	RETRACTED SENSOR ASSEMBLY
15	G4827-20	FRAME ASSEMBLY
15A	G4827-21	FRONT COVER
15B	G4827-22	BACK COVER



ITEM	PART #	DESCRIPTION
16	G4827-23	OPEN SENSOR ASSEMBLY
17	G4827-24	EXHAUST MUFFLER ASSEMBLY
18	G4827-25	RESET PUSHBUTTON ASSEMBLY
29	G4827-26	MOTOR SOLENOID ASSEMBLY
20	G4827-27	P.C. BOARD W/ MICROCONTROLLER
21	G4827-28	SETUP PUSHBUTTON ASSEMBLY
22	G4827-29	AIR MOTOR ASSEMBLY
23	G4827-30	AIR DISTRIBUTION ASSEMBLY
24	G4827-31	ROBOT CONNECTOR ASSEMBLY
24A	K2433-1	POWER REAM ROBOT CABLE, 20 FT
25	G4827-32	CYLINDER SOLENOID ASSEMBLY (2)
26	S23044	PNEUMATIC FITTING (1/4 –NPT)

PART NO.	DESCRIPTION
KP2435-1	REAMING BIT, ½" (W/WASHER)
KP2435-3	REAMING BIT, 5/8" (15.5mm) (W/WASHER)
KP2435-5	REAMING BIT, ¾" (W/WASHER)
KP2457-1	ANTI SPATTER FLUID, 1 GALLON
K2433-1	POWER REAM ROBOT CABLE, 20FT
K2434-1	REMOTE POWER REAM RESERVOIR KIT
S22633-50	CONNECTOR, PLUG, HONDA, 50 SOCKET
S22510-1	CONNECTOR, COVER, HONDA, STRAIGHT, 50 PIN

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