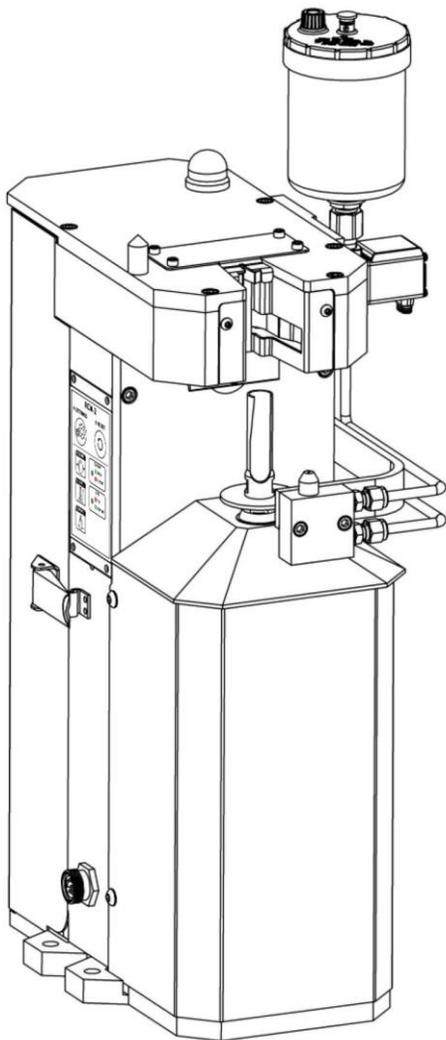


INTELLIREAM[®] MP

**Safety Depends on You**

DO NOT INSTALL, OPERATE, OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.

OWNERS MANUAL

Effective with serial No. IR2006001 & following.

"U.S. Patent No.: 7,952,052"

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WWW.NASARC.COM

Safety Information

Before installation and commissioning of the INTELLIREAM® MP, 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 INTELLIREAM® MP is constructed to be safe to operate provided:

- Only authorized personnel may perform installation, commissioning, and maintenance in observance of all safety precautions contained in these operating instructions.
- Accident prevention regulations, as well as the safety specifications referenced below are observed.
- ANSI/RIA R15.06-2012 Industrial Robots and Robot Systems – Safety Requirements

For additional safety information see references below:

This product shall be integrated into a robot cell with an independent safety system. This product shall be installed 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 Intelliream®, ensure all equipment in the area is locked out and disabled.

The Intelliream® is to be used only for torch cleaning within the technical operating specifications outlined in this document.

Do not exceed the specified operating pressure of 80 PSI.

Keep hands away from Intelliream® while in operation.

Keep hands away from the clamp and Intelliream® operating space.

Keep hands away from the wire cutter.

Keep eyes away from the sprayer.

Protective eye-wear should be worn at all times while working in the vicinity of the Intelliream®.

Protective gloves should be worn at all times when maintaining the Intelliream®.

Disconnect the air and power supplies when adjusting the Intelliream®.

Use only OEM parts and accessories.

Do not use corrosive or aggressive chemicals without first obtaining approval from the manufacturer.

Do not remove or deface warning and instruction labels on the Intelliream®.

For additional safety information, refer to the following publications:

- ANSI/RIA R15.06-2012 Industrial Robots and Robot Systems – Safety Requirements
Robotic Industries Association, 900 Victors Way, Suite 140, Ann Arbor, Michigan, USA 48108
- ANSI Z49.1:2012 Safety in Welding, Cutting, and Allied Processes,
American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126
- CAN/CSA-Z434-14 Industrial robots and robot systems,
Canadian Standards Association, 5060 Spectrum Way, Mississauga, Ontario, L4W 5N6, CANADA

Safety Information

⚠️ WARNING

Moving parts can crush and cut.
Keep hands away from the operating area of the reaming bit, 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

Disconnect power before servicing.



⚠️ WARNING

Disconnect air supply before servicing.



⚠️ WARNING

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



⚠️ WARNING

Maintain safe operating pressure (80 psi).

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INTELLIREAM® MP

1. Specifications

PNEUMATIC SPECIFICATIONS

Pressure: 80 PSI

Flow: 16.5 SCFM

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

ELECTRICAL SPECIFICATIONS

Voltage: 24 VDC

Current: 0.75 Amp DC

REAMING SPECIFICATIONS

Speed: 1100 RPM

Power: 0.6 HP

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.

Do not use oil based anti-spatter fluid.

PHYSICAL DIMENSIONS

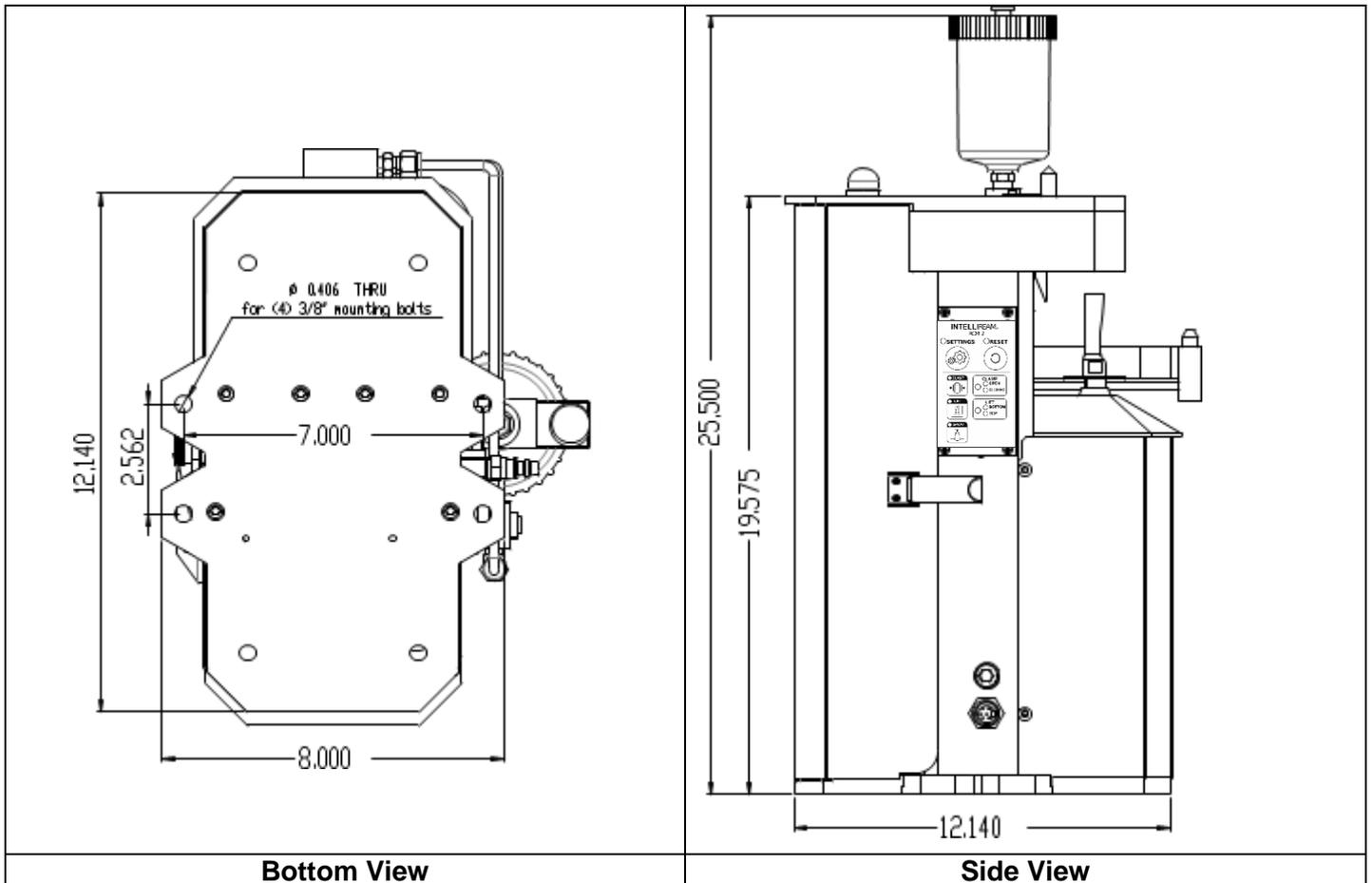
HEIGHT	WIDTH	DEPTH	NET WEIGHT
25.5 in., 648mm (with Reservoir)	8 in. 203mm	12.1 in. 308 mm	58 lbs 26.3 kg

INTELLIREAM® MP

2. Installation

Danger of accident when connecting the pneumatic or electrical supply!

- Prior to installation ensure that all protective measures have been taken and will remain in place while performing the installation.
- Ensure that the air supply and electrical power to the Intelliream® are disconnected until the installation is complete.
- The Intelliream® should be installed within the weld cell at a convenient location. Be sure to consider movable fixtures, robot envelope, and maintenance personnel accessibility.
- Affix Intelliream base to sturdy platform using the four bolt holes provided for 3/8" mounting hardware.
- Before operating the Intelliream®, ensure that the correct reaming bit for the torch nozzle is installed.



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2.1. Air Connection

Use only regulated, filtered, non-lubricated air. Mount a 5-micron airline filter (not supplied) in the airline to the Intelliream®.

AIR SUPPLY REQUIREMENTS: 80 PSI at 16.5 SCFM. Connect the inlet supply line to the quick connect pneumatic fitting located at the side of the Intelliream®.

2.2. Electrical Connection

Damage to equipment may occur if connected improperly. Only a qualified technician should perform the following connections. Secure the 6-pin connector by threading the connector to the receptacle near the base of the Intelliream®. The Intelliream® is powered through this connection and requires a 24 VDC, 0.75 Amp DC power supply. It is recommended that power to the Intelliream® (both +24VDC and 0VDC) is wired to safe power (i.e. concurrent with robot servo power), interruptible by an emergency stop condition.

Signal Description

Connect cable wires according to the following description

Wire Colour	Name	Description
Red	+24 VDC	Power supply (+24 VDC, 0.75 Amp DC)
White	0 VDC	Power supply return.
Orange	Start ¹	Robot output. Pulse this output for a minimum of 0.5 sec to start the ream cycle.
Black	Spray ¹	Robot output. Pulse this output for a minimum of 0.5 sec while positioned over the sprayer.
Green	Complete ²	Robot input. The robot should check this input before and after a reaming cycle.
Blue	Error ³	Robot input. The robot can check this input after a reaming cycle to ensure error free operation. Refer to the "Troubleshooting" section for error codes.

Interface Receptacle

Wiring

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

The INTELLIREAM® MP automatically detects sinking or sourcing inputs and outputs from the controller. It is not necessary to reconfigure the inputs and outputs of the INTELLIREAM® MP. Refer to the "I/O Configuration", section for more details.

¹NOTE: To activate the **wire cutter**, turn on both the "Start" and "Spray" outputs simultaneously. For further information regarding the wire cutter operation, refer to Appendix B: Wire Cutter

²NOTE: The "Complete" signal has additional functionality when the **nozzle detect** option has been purchased. For further information regarding the nozzle detect option, see Appendix C: Nozzle Detect Sensor

³NOTE: The "Error" signal functionality is changed with the Nozzle Gas Flow Sensor option installed, see Appendix E: Nozzle Gas Flow Sensor (NGFS).

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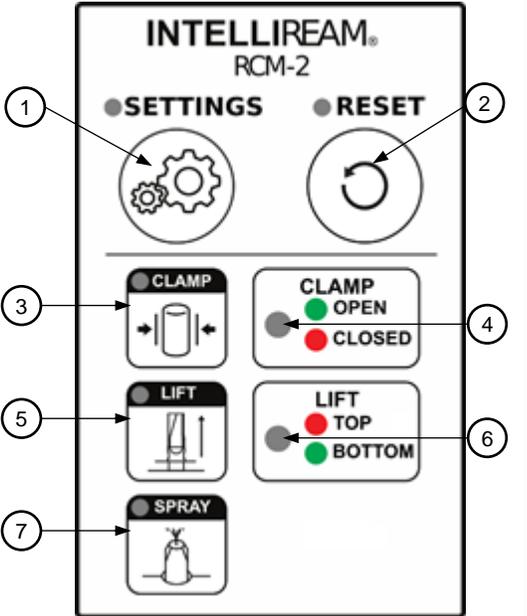
3. Operation

3.1. User Interface

The user interface is part of the Reamer Control Module (RCM) and can be found on the electrical supply side of the Intelliream® (opposite the reservoir). The user interface provides the following features:

- Manual operation of the clamp, lift and spray system.
- The status of each solenoid is shown on its respective button.
- Monitor sensor operation of the clamp and lift reed switches
- Input / Output configuration and other feature settings
- Control logic reset

Item	Name	Description
1	SETTINGS	Settings mode and status
2	RESET	Device and control logic reset
3	CLAMP	Solenoid activation and status
4	CLAMP SENSOR	Status (Red / Green)
5	LIFT	Solenoid activation and status
6	LIFT Sensor	Status (Red / Amber / Green)
7	SPRAY	Solenoid activation and status



3.2. Power-Up

Once the Intelliream® is wired into the controller and power is applied, the device status LEDs will display the power up sequence (green – yellow – red) and then show positions of the cylinders according to the legend next to the LEDs.

Power Up LED check	→				
CLAMP ● OPEN (Green) ● CLOSED (Red)	(G)	(Y)	(R)	()	(G)
LIFT ● TOP (Red) ● BOTTOM (Green)	(G)	(Y)	(R)	()	(G)

If the sensor LEDs are not reporting the clamp open and the lift at the bottom, then check the air pressure or sensor positions. If the sensor LEDs are flashing yellow and green check for **start lock** (see below). If the LEDs are flashing yellow, ensure the settings pushbutton is not pressed or defective.

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Start Lock: The start lock feature is a safety measure that blocks a command signal during power-up when it is unsafe to begin an operation. If a command is present while the Intelliream® powers up, the INTELLIREAM® MP will enter a start lock mode instead of cycling immediately and the “Error” input will be turned on. During power up, the device status LEDs will display the power up sequence (green-yellow-red) and then flash yellow/green if an output from the controller is present. To resume operation, turn all controller outputs to the Intelliream® off.

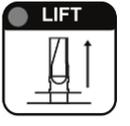
Robot Input: If the device has completed the power up sequence, and is not in cycle, then with the clamp open, and lift at the bottom, the “Complete” input to the robot controller will be on. Similarly, if an error has occurred during a machine operation, the “Error” input will be on.

Robot Output: If no action occurs by turning on the “Start” or “Spray” output from the robot controller, check the wiring of the sourcing outputs at the controller.

3.3. Manual Operation

Operation of the clamp, lift and spray valves is possible with the buttons on the user interface. The green LED indicator at the top left shows button feedback and solenoid operation. The sensor LED indicators to the right indicate the sensor feedback of the corresponding device.

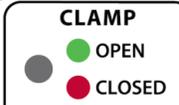
Note: a “Local Lockout” mode is enabled for 5 seconds following the press of any of these buttons. Robot I/O is disabled and the LEDs blink slowly during this time. The lockout will cancel itself after 5 seconds or if the “Settings” button is pressed. 1 second before the lockout is cancelled, the user interface LEDs will be turned on to indicate the lockout expiry.

		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.
		WARNING: the lift cylinder will operate under this condition. KEEP HANDS CLEAR of the operating space of the reaming bit. This device is intended for one-man operation during setup.
		WARNING: the spray will operate under this condition. KEEP FACE and HANDS CLEAR of the operating space of the sprayer. This device is intended for one-man operation during setup.

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3.4. Automatic Operation

The following diagram shows the 7-step reaming sequence and color of the device status LEDs at each stage. The LEDs show the position of the clamp and lift cylinders on the control module.

		1	2	3	4	5	6	7
CLAMP 								
	LIFT 							
		Ready	Clamp Closed	Raising Ream Bit	Ream Bit at Top	Lowering Ream Bit	Ream Bit at Bottom	Clamp Open
"Start" Output		Pulse 0.5s	Off					
"Complete" Input	On	On	Off					On

The above chart shows the robot inputs and outputs as the sequence progresses.

Automatic Retry

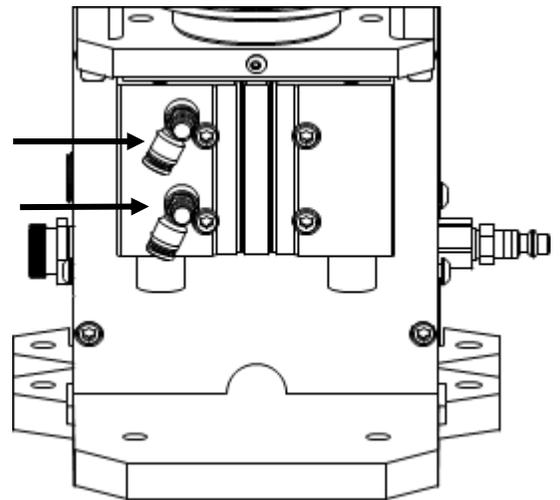
If excessive spatter is built up in the nozzle, or the programmed position of the nozzle is off center not allowing the reaming bit to extend to the full depth inside the nozzle within a specific amount of time, the INTELLIREAM® MP will automatically perform a single retry.

Cycle Optimization

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

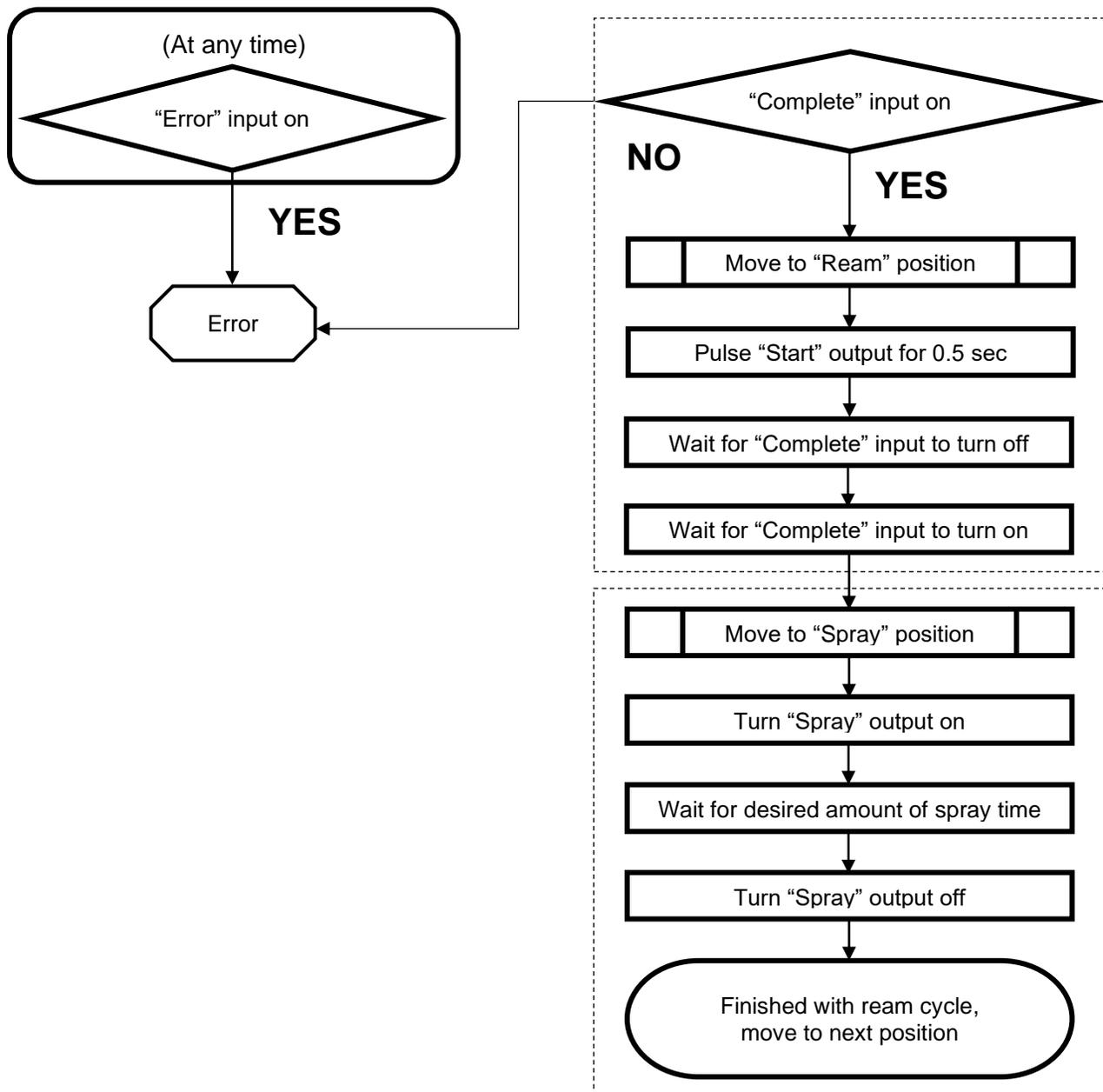
To set the lift rate, remove the front cover and adjust the top needle valve. Turning clockwise will decrease the lift rate (for more spatter removal), and turning counter clockwise will increase the lift rate (for a shorter cycle time).

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



4. Robot Programming

The following flow diagram shows the recommended procedure for the reaming and spraying sequences. The recommended procedure for configuring the position programming points for the ream cycle and sprayer is outlined on the following pages. For the wire cutter operation see Appendix B: Wire Cutter.



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4.1. Position Programming

The INTELLIREAM® MP features a “no trial, no error” position programming technique as described below:

1. Hold the “LIFT” button to raise the reaming bit without spinning.



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

Once the reaming bit is at the top position (“LIFT” LED is red), release the “Settings” button.

2. Using the robot, move the torch nozzle into the clamp so the reaming bit is inset to the full depth required inside the nozzle.

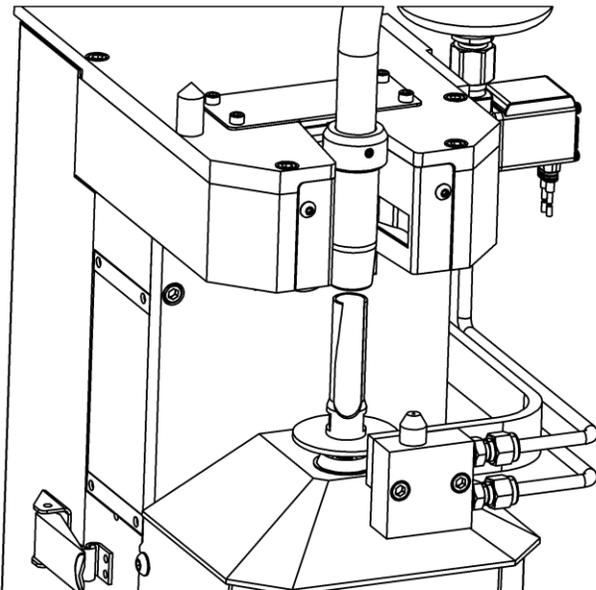
3. Press and release the “CLAMP” button to verify the clamp engages the cylindrical body of the nozzle equally, and the nozzle does not change orientation or position when clamped.



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.

4. Register this position in the robot controller using a fine position level as the “Ream” position described in the programming chart above.

Ream Position



INTELLIREAM® MP

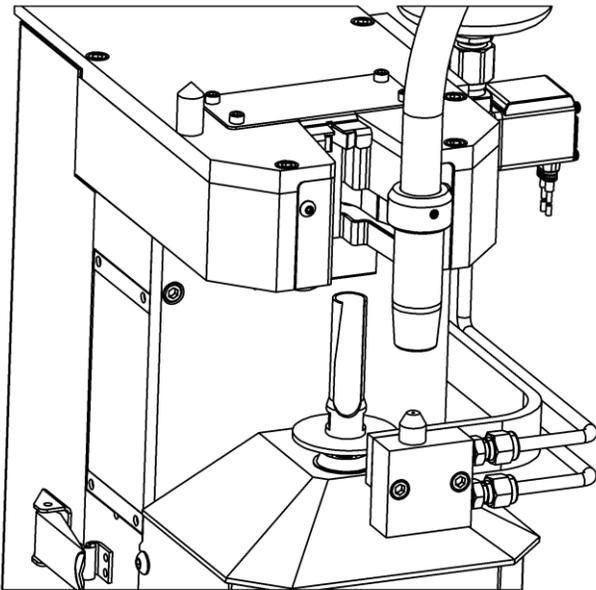
5. Press the “LIFT” button to exit programming mode. The reaming bit will lower without spinning.



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

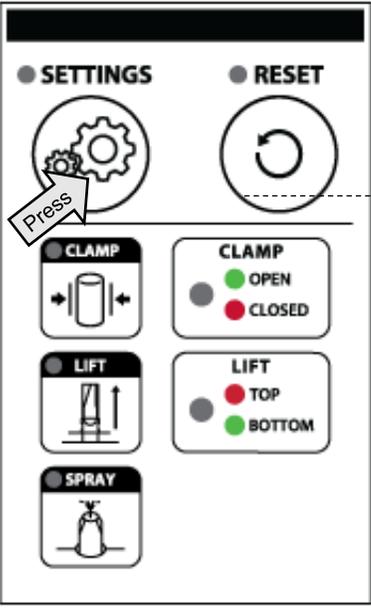
6. Spray Position: Center the nozzle approximately 25mm above the spray nozzle. Record this position as the “Spray” position described in the programming chart above. The sprayer may use a built-in post-flow timer of 0, ¼, ½, or 1 second. Airflow from the spray nozzle will be present for the post flow time after the spray output and corresponding fluid valve have been turned off.

Spray Position



5. Settings

Several features may be setup to optimize performance of the INTELLIREAM® MP. To access the configuration menus, press and hold the settings button for the required time as shown below. The device status LEDs will change their color pattern to indicate the menu that is accessible at a specific time. Release the settings button when the color pattern for the desired configuration menu is shown.

	>3 sec (I/O config)	>5 sec (Spray)	>7 sec (Extras)	>9 sec (Mode)	>11 sec (Diagnostic)	>13 sec
						
						
						
						

Note: The default setting for each configuration is first and last in each sequence.

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5.1. I/O Configuration

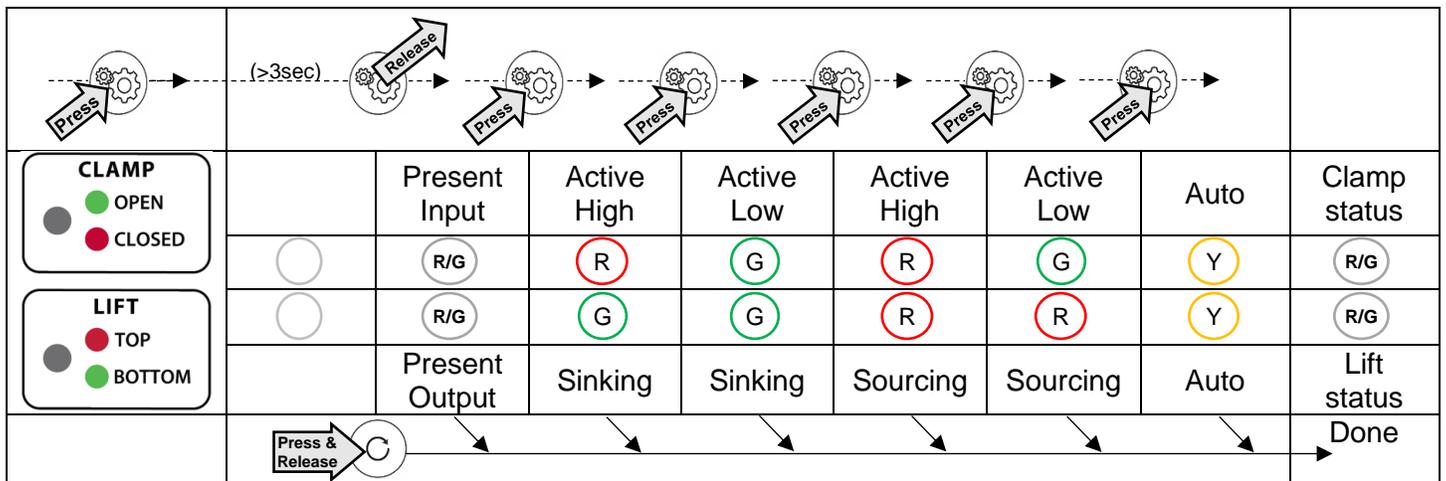
The INTELLIREAM® MP automatically detects sinking or sourcing inputs and outputs from the controller. For more information on discrete I/O See Appendix A: Discrete I/O Explanation.

To disable the automatic-detect feature and manually configure the I/O types, use the following procedure:

Press and hold the settings button for at least 3 seconds (until the LIFT bottom LED is solid red).

Upon releasing the settings button, the sensor LEDs will show the present I/O configuration. This is the first in the sequence of teachable configurations. Subsequent pressing and releasing of the settings 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 LED shows the controller input type (green = Active low, red = Active high).
The bottom LED shows the controller output type (green = Sinking, red = Sourcing).



AUTO: Enable the automatic I/O configuration feature. The sinking and sourcing outputs in the Intelliream® are short circuit protected with integrated over-current circuitry between 0.65-1.4 Amp DC. If a short circuit occurs, error code #8 will flash. (see Maintenance and Troubleshooting section 7).

5.2. Spray

The sprayer has a built-in post-flow timer. Airflow from the spray nozzle will be present for set time (0, ½ or 1 second) after the spray output and corresponding fluid valve have been turned off.

Follow the steps outlined in section 5 to access the spray settings menu. Upon releasing the settings button, the LEDs will show the current spray setting. This is the first in the sequence of teachable configurations. Subsequent pressing and releasing of the setting button will sequence the following configurations in order of appearance. To register the desired configuration, press the reset button when that configuration is displayed.

CLAMP 	Default	0 sec	¼ sec	½ sec	1 sec	Clamp status
LIFT 						
						Lift status
						Done

5.3. Extras

1. Blow-off: The motor spins and exhausts (blowing off over spray) for two seconds after spraying.

2. De-Ringer: A pilot reaming stroke removes the spatter ring that forms on the end of a welding nozzle, followed by a full extension reaming stroke. Using this technique, the spatter ring is not pushed into the nozzle where it may become lodged.

The features in the “extras” menu can be configured by the following procedure.

Follow the steps outlined above to access the “extras” configuration menu. Upon releasing the settings button, the LEDs will flash red on top and bottom. This is the first in the sequence of teachable configurations.

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

CLAMP 	Blow-off:	OFF	ON	OFF	ON	OFF	Clamp status
LIFT 							
	De-Ringer	OFF	OFF	ON	ON	OFF	Lift status
						Done	

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5.4. Running Mode

Several running modes are available to select from.

Automatic: Every aspect of the cycle is commanded, monitored, and checked by the control module.

Dry Run: The motor and fluid solenoid are 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.

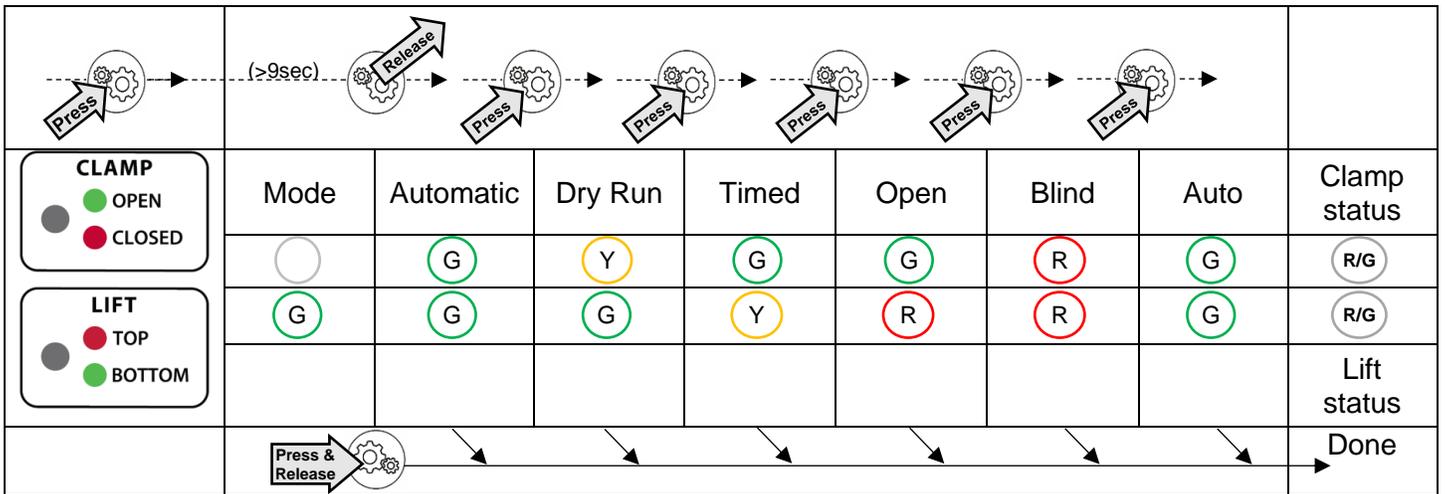
Open: Bypass the "extended" and "retracted" sensor. The robot must hold the start signal on for the reaming time and hold the robot in the clamp until the reaming bit is fully retracted.

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 settings button, the LEDs will flash green on top and bottom. This is the first in the sequence of teachable configurations.

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

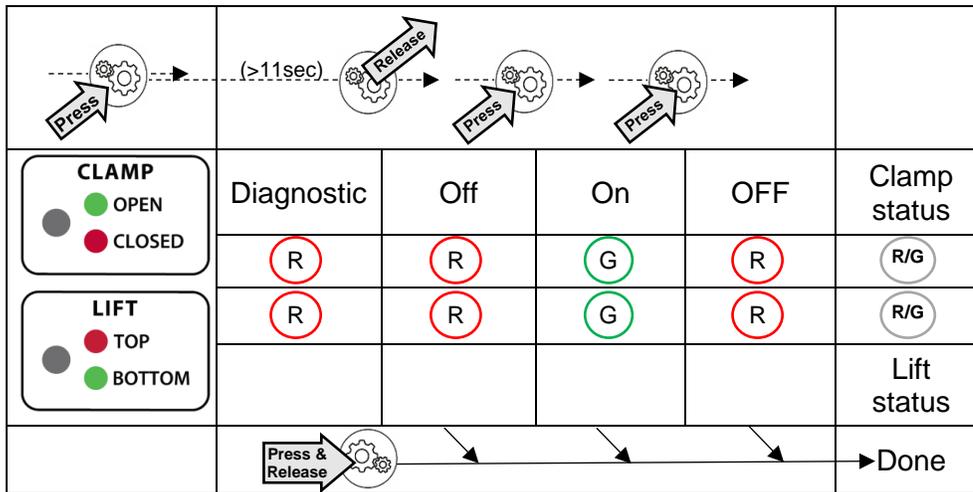
Mode



5.5. Motor Diagnostic

This feature allows a technician to test the air motor function manually.

Follow the steps outlined below to access the motor diagnostic configuration menu. Upon releasing the settings button, the LEDs will flash red on top and bottom. This is the first in the sequence of teachable configurations. Subsequent pressing and releasing of the settings button will sequence the following configurations in order of appearance. To register the desired configuration, press the reset button when that configuration is displayed.



Motor Diagnostic Configurations:

Off: This feature is disabled.

On: This feature is enabled.

Note: Running the motor diagnostic will disable the feature so that it can only be run once each time it is enabled.

Motor Diagnostic Operation: Once the reset button is released, the unit will display the power-up sequence. Follow this procedure to test the air motor manually:

1. **LIFT function:** Press and hold the “LIFT” button to raise the reaming bit (without spinning) until it reaches the top position. Check that the “LIFT” LED on the control module is green.



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

Once the Intelliream® is at the top position (“LIFT” LED is green), release the “LIFT” button and the reaming bit will maintain its position.

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2. CLAMP function: Press the “CLAMP” button to close and open the clamp. Check that the “CLAMP” LED on the control module changes from green to red when the clamp is closed.



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 test.

Note: The LEDs on the control module will flash red from this point on in the sequence to indicate **CAUTION** for the operating devices being tested.

3. MOTOR function: With the reaming bit raised, press both the “CLAMP” button and “LIFT” button to test the “Motor” solenoid.



WARNING: the motor will operate under this condition. KEEP HANDS CLEAR of the operating area of the reaming bit. Do not operate with exposed long hair, jewelry, or loose clothing. This device is intended for one-man operation during test

6. Preventative Maintenance

The INTELLIREAM® MP will require periodic maintenance to ensure a dependable service life. The following schedule is recommended.

Shut off the air supply and disconnect the power cable when making adjustments.

DAILY

- Check the fluid level in spray reservoir.
- Check the reaming bit visually.

WEEKLY

- Clean out Spatter Containment Unit (option) if installed
- Clean surface underneath the reaming bit.
- Check airlines for leaks and robot control cable for splits or cracks.
- Clean clamp gripping surfaces to ensure optimal nozzle gripping.

YEARLY

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

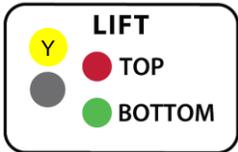
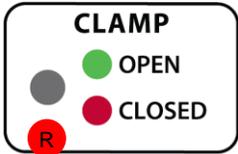
7. Troubleshooting

Problem	Possible Cause	Solution
No device status LEDs on	-Power is off -Fuse is blown (controller cabinet) -Reset button defective -Circuit board defective	-Turn power on -Replace fuse -Replace reset button -Replace circuit board
Clamp/Motor/Lift/Cutter not working	-Insufficient air supply -Air line cut, disconnected, or twisted -Intelliream® in setup mode -Excessive spatter buildup -Dry run mode selected -Defective solenoid -Check error codes	-Set to 80 PSI, 15 SCFM -Replace or re-connect airline -Reset Intelliream® -Ream more often -Select automatic mode -Replace necessary valves -Check cable wiring -Perform a visual inspection of the equipment
Ream bit does not retract	-Ream bit jammed in nozzle -Extended sensor defective -"Start" output held on -Lift cylinder defective -Check error codes	-Replace damaged parts -Replace extended sensor -Pulse "Start" output for 0.5 sec -Replace lift cylinder
Controller cannot start a cycle or controller cannot complete a cycle	- "Complete" input signal not responding	-Check error codes -Reset Intelliream®
No anti-spatter liquid and/or no air flow from sprayer	-Low anti-spatter volume -Reservoir not vented -Fluid line blocked -Insufficient air supply -Solenoid valve defective -Spray nozzle clogged	-Refill anti-spatter reservoir -Open vent if closed -Clean or repair fluid line -Set to 80 PSI -Replace solenoid valve -Clean or replace spray nozzle *HAND TIGHTEN ONLY

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7.1. Error Codes

The INTELLIREAM® MP reports errors using the status light. When an error is reported, the status light flashes at a rate of 2 flashes per second.



<p>When an error occurs during the reaming process, the clamp opens, the lift retracts, and the diagnostic report is shown with the top sensor LED in red. The LED will flash a certain number of times, pause, then repeat. The error count begins at 2.</p> <p>Count the number of flashes between the pause and use the following chart to find the cause of the problem.</p>
<p>2: Closing Fault: The clamp took too long to close.</p> <ul style="list-style-type: none"> -Check air inlet pressure -Check clamp sensor -Check clamp air lines -Check clamp solenoid -Check clamp cylinder
<p>3: Raising Fault: The lift cylinder took too long to extend from the retracted sensor.</p> <ul style="list-style-type: none"> -Check air inlet pressure -Check extending needle valve (top needle valve on lift cylinder) -Check retracted sensor (bottom) -Check lift air lines -Check lift solenoid -Check lift cylinder
<p>4: Extending Fault: The lift took too long to fully extend.</p> <ul style="list-style-type: none"> -Automatic retry; excessive spatter build up in the nozzle (ream more often), or incorrect programmed position of the nozzle not allowing the reaming bit to extend to full depth -Check air inlet pressure -Check extending needle valve (top needle valve on lift cylinder) -Check extended sensor (top) -Check lift air lines -Check lift solenoid -Check lift cylinder
<p>5: Lowering Fault: The lift cylinder took too long to retract from the top while lowering.</p> <ul style="list-style-type: none"> -Check air inlet pressure -Check retracting needle valve (bottom needle valve on lift cylinder) -Check extended sensor (top) -Check lift airlines -Check lift solenoid -Check lift cylinder
<p>6: Retracting Fault: The lift cylinder took too long to fully retract.</p> <ul style="list-style-type: none"> -Check air inlet pressure -Check retracting needle valve (bottom needle valve on lift cylinder) -Check retracted sensor (bottom) -Check lift airlines -Check lift solenoid -Check lift cylinder
<p>7: Opening Fault: The clamp took too long to open.</p> <ul style="list-style-type: none"> -Check air inlet pressure -Check clamp sensor -Check clamp airlines -Check clamp solenoid -Check clamp cylinder
<p>8: Short Circuit Fault: The output is short circuited.</p> <ul style="list-style-type: none"> -Check wiring to robot or PLC controller
<p>9: Solenoid Voltage Fault: The voltage to actuate the solenoids is too low.</p> <ul style="list-style-type: none"> -Check the voltage between the solenoid voltage and 0V and adjust power supply as needed -Check the wiring of the solenoid voltage/emergency stop circuit

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Note: Clearing Errors – If an error has occurred with the INTELLIREAM® MP, indicated by the “Error” input being turned on, it is possible to clear errors so that an operator is not required to enter the robotic welding cell. For example, if the air supply was not turned on and a ream cycle is required, the operator can simply turn on the air supply, and clear the error from outside the cell. This can be done by pulsing the “Start” output from the controller/teach pendant.

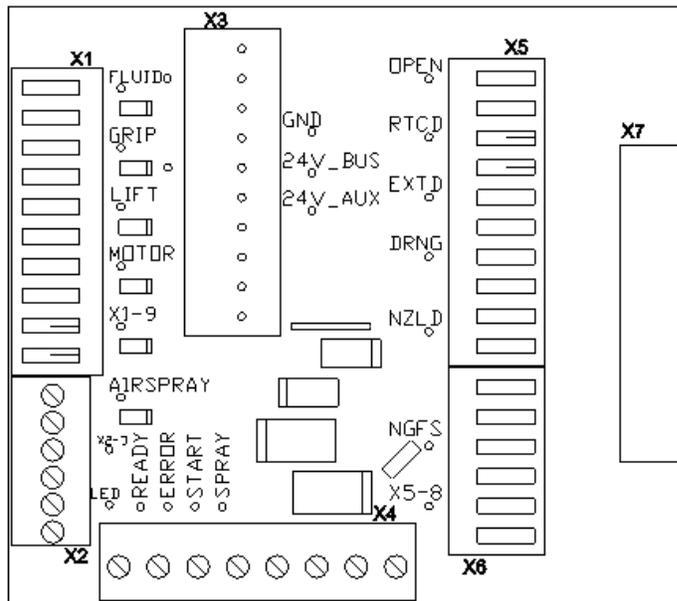
7.2. Advanced Troubleshooting

Use the test points in the following table to take readings with a voltmeter. Connect the (+) lead to the first test point and the (-) lead to the second test point.

Refer to the diagram below for test point locations.

(+) Lead Point	(-) Lead Point	Description	“On” Voltage	“Off” Voltage
24V_AUX	FLUID	Fluid Solenoid	24 V	0 V
24V_AUX	GRIP	Grip Solenoid	24 V	0 V
24V_AUX	LIFT	Lift Solenoid	24 V	0 V
24V_AUX	MOTOR	Motor Solenoid	24 V	0 V
24V_AUX	AIRSPRAY	Air Spray Solenoid	24 V	0 V
DRNG	GND	De-ringer Sensor	24 V	0 V
EXTD	GND	Extended Sensor	24 V	0 V
RTCD	GND	Retracted Sensor	24 V	0 V
GND	GND	Clamp Sensor	24 V	0 V
24V_BUS	GND	+24 VDC	24 V	0 V
SPRAY	GND	Spray	24 V sourcing 0 V sinking	0 V sourcing* 24 V sinking*
START	GND	Start	24 V sourcing 0 V sinking	0 V sourcing* 24 V sinking*
READY	GND	Complete	24 V sourcing 0 V sinking	0 V sourcing 24 V sinking
ERROR	GND	Error	24 V sourcing 0 V sinking	0 V sourcing 24 V sinking
24V_BUS	LED	Status Light	24 V	0 V

*A trace value of 6V is measured prior to activation
Note: all voltage readings +/- 10%

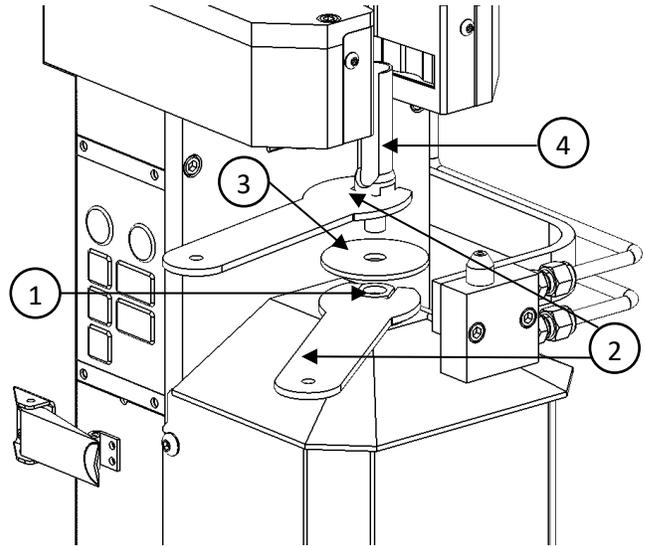


8. Parts Replacement

8.1. Reaming Bit Replacement

⚠ WARNING

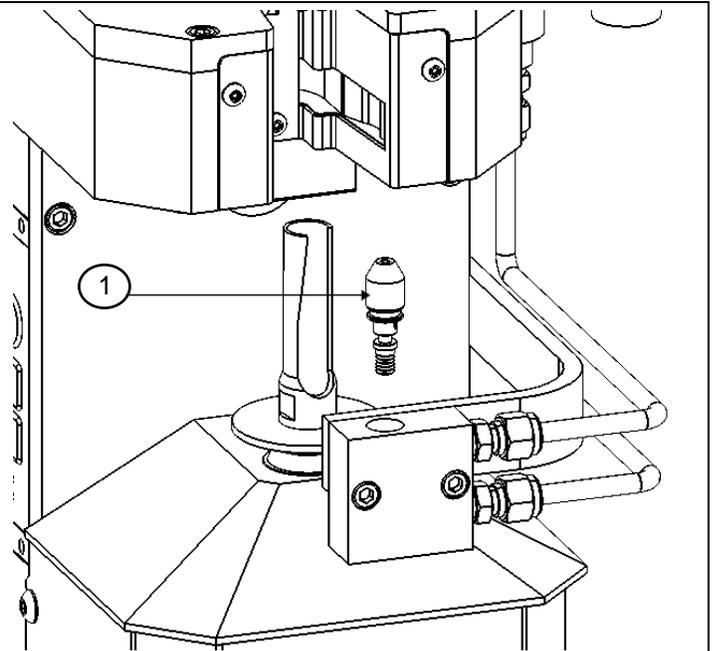
- Disconnect air and electrical supply.
- Hold the ream rod, **item 1**, from rotating with one of two 5/8" wrenches, **item 2**, under the washer, **item 3**.
- Unfasten the reaming bit, **item 4**, with a second 5/8" wrench.
- Remove the reaming bit, **item 4**.
- Insert the new reaming bit through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



8.2. Spray Nozzle Replacement

⚠ WARNING

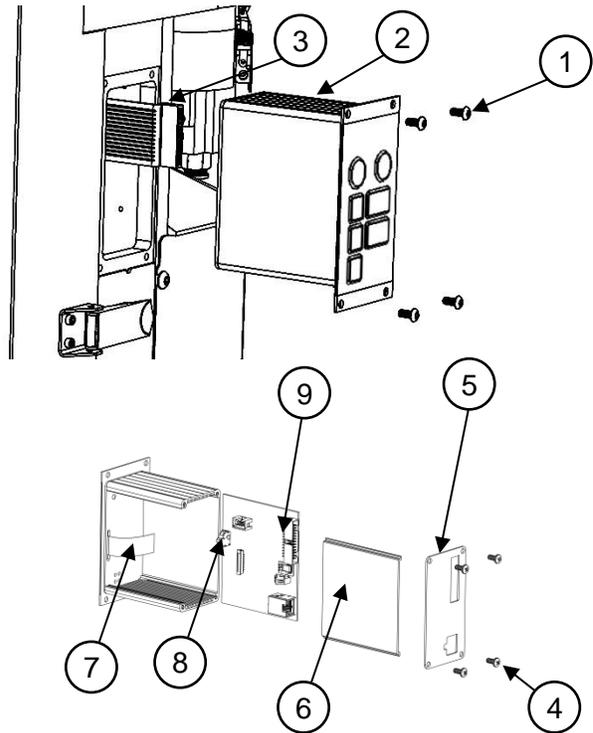
- Disconnect air and electrical supply.
 - Unscrew spray nozzle, **item 1**, by hand.
 - Insert new spray nozzle.
- TIGHTEN BY HAND ONLY.**
- Reconnect air and electrical supply.



8.3. PC Board Replacement

⚠WARNING

- **Disconnect air and electrical supply.**
- Remove four #8-32 socket head cap screws, **item 1**, to remove the module, **item 2**. (9/64" hex drive)
- Disconnect the ribbon cable, **item 3**, from the module.
- Remove four screws, **item 4**, from the back of the module to remove the back plate, **item 5**. (Phillips screwdriver)
- Remove the belly plate, **item 6**, from the module.
- Disconnect the user interface ribbon tail, **item 7** from the PC board by pulling upwards on the black locking clip, and then pulling upwards on the ribbon tail. (not shown)
- Disconnect the grounding wire from the spring terminal, **item 8**, using a small, flat head screwdriver. (not shown)
- Remove the PC board, **item 9**.
- Insert the new PC board.
- Re-assemble the module by following all steps in reverse order.

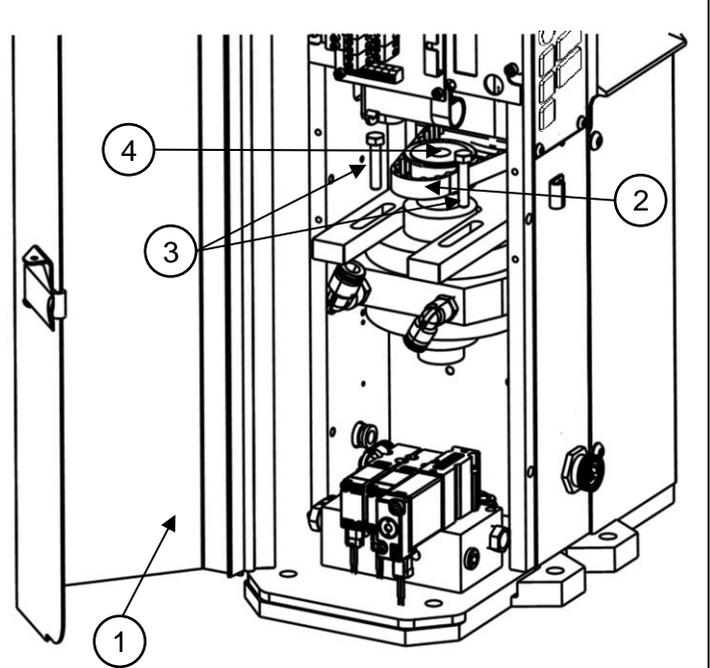


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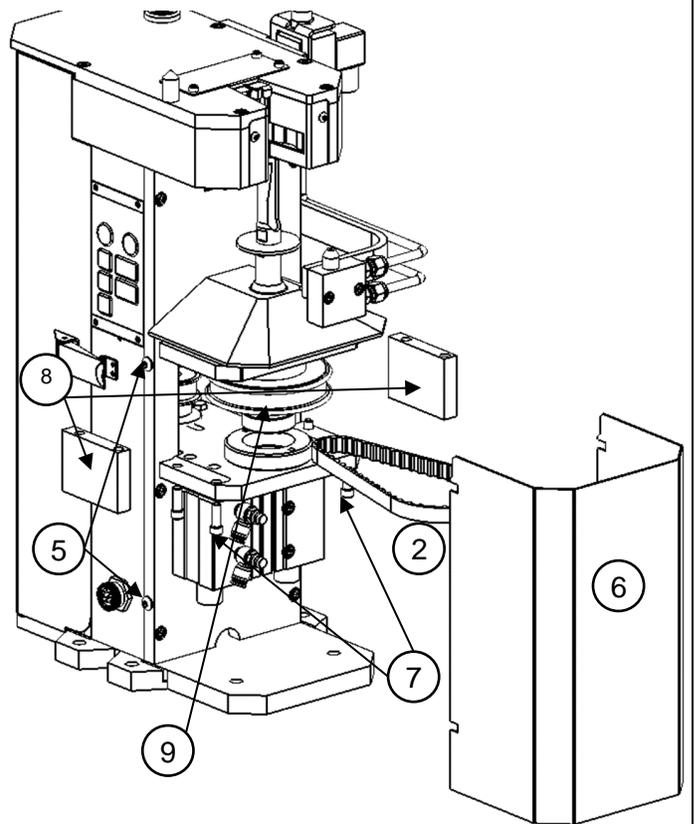
8.4. Belt Replacement

⚠ WARNING

- **Disconnect air and electrical supply.**
 - Open back door, item 1.
 - Check and note the belt tension, item 2.
 - Loosen three 6mm hex head bolts, item 3, connected to motor.
- LOOSEN ONLY** (10 mm wrench)
- Slide motor forward, slip belt off the pulley, item 4.



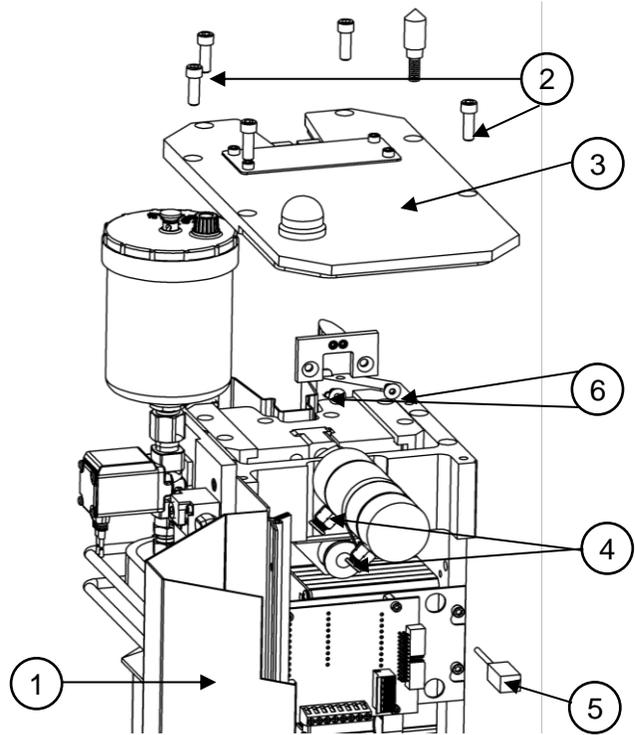
- Remove four button head cap screws, **item 5**, to remove front cover, **item 6**. (5/32" hex drive)
- Remove four socket head cap screws and lock washers, **item 7**, from bottom plate of motor carriage. (3/16" hex drive)
- Remove two side plates, **item 8**.
- Lift up on the front pulley, **item 9**, slip belt off and remove belt, **item 2**. (above)
- Lift up on the front pulley, slip new belt over front pulley.
- Follow steps in reverse order to reassemble Intelliream®.
- Apply medium strength thread locker to **item 7** above.



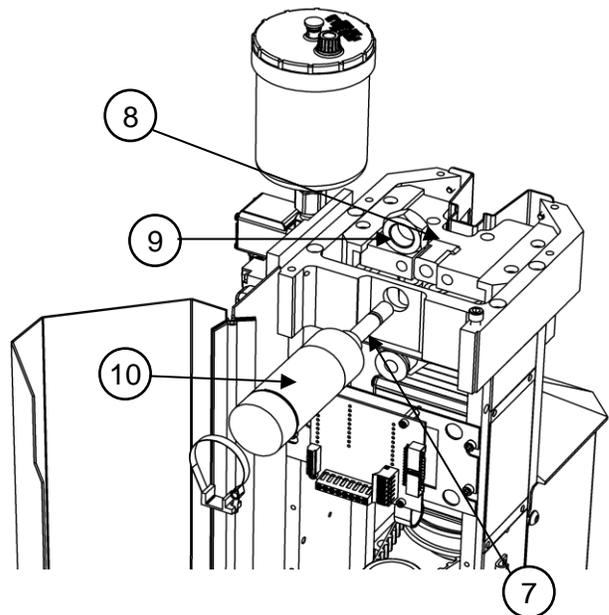
8.5. Clamp Cylinder Replacement

⚠WARNING

- Disconnect air and electrical supply.
- Open back door, **item 1**.
- Remove five socket head cap screws, **item 2**, and TCP check pin to remove top lid, **item 3**. (3/16" hex drive)
- Disconnect hose 121 and 122, **item 4**, from cylinder ports.
(see page 29)
- Remove reed switch, **item 5**, from cylinder. Flat Head Screwdriver)
- If wire cutter option is installed, remove two #10-24 flat head socket cap screws, **item 6**, to remove wedge plate. (1/8" hex drive)



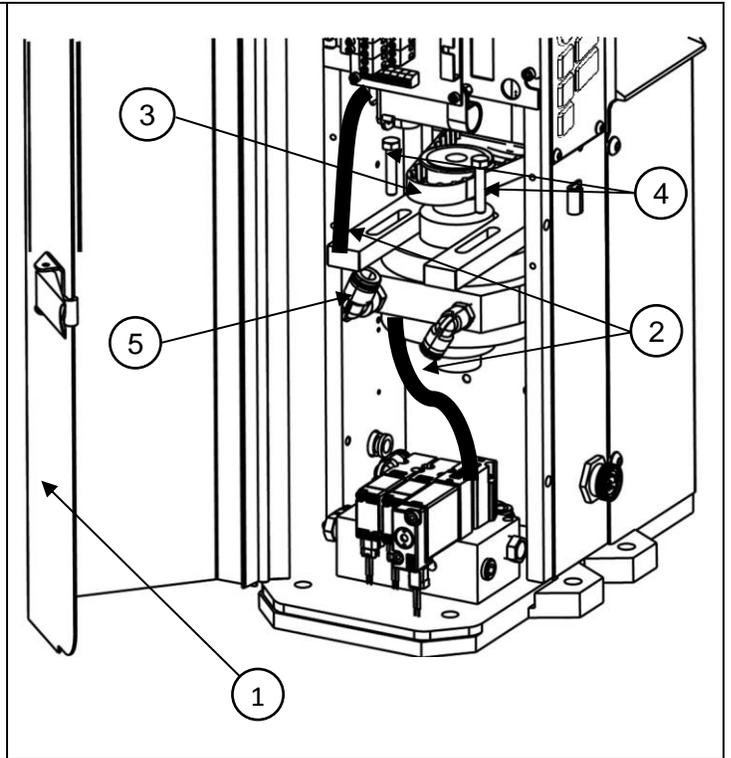
- Unfasten cylinder rod, **item 7**, from T-nut, **item 8**. (3/8" wrench)
- Loosen and remove cylinder nut, **item 9**. (1 1/8" wrench)
- Remove and replace cylinder, **item 10**.
- Follow steps in reverse order to reassemble Intelliream®.
- Apply medium strength thread locker to **item 6, 7, and 9**.
- Check the position of the reed switch, **item 5**. The LED should be on when the clamp is open with the electrical supply connected.



8.6. Air Motor Replacement

⚠WARNING

- Disconnect air and electrical supply.
- Open back door, **item 1**.
- Disconnect hoses 141 and 142, **item 2**, from the motor.
- Check and note the belt tension, **item 3**.
- Hold the motor from below and remove two 6mm hex head bolts, **item 4**. (10mm wrench)
- Slip belt off motor pulley and remove motor, **item 5**.
- Insert new motor into mount.
- Follow steps in reverse order to reassemble Intelliream®.
- Apply medium strength thread locker to **item 4**.

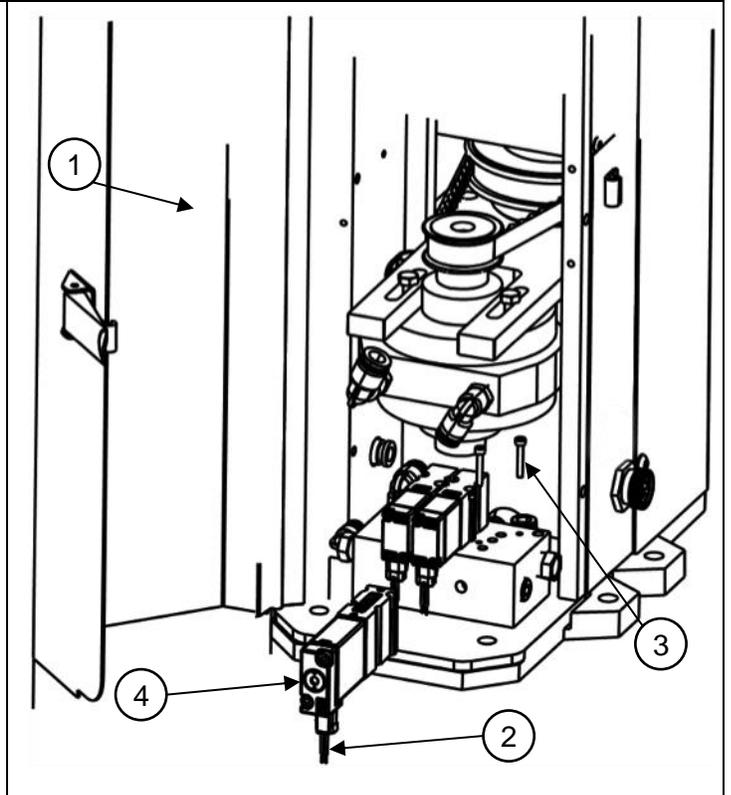


8.7. Motor/Lift/Clamp Solenoid Replacement

Note: The right solenoid is for the motor, the middle solenoid is for the lift cylinder, and the left solenoid is for the clamp cylinder. Similar procedures are used for each solenoid.

⚠WARNING

- Disconnect air and electrical supply.
- Open back door, **item 1**.
- Remove electrical connector, **item 2**, from corresponding solenoid.
- Remove two M3 socket head cap screws, **item 3**, from solenoid. (2.5mm hex drive)
- Remove and replace solenoid, **item 4**.
- Follow steps in reverse order to reassemble Intelliream®.



8.8. Spray Solenoid Replacement

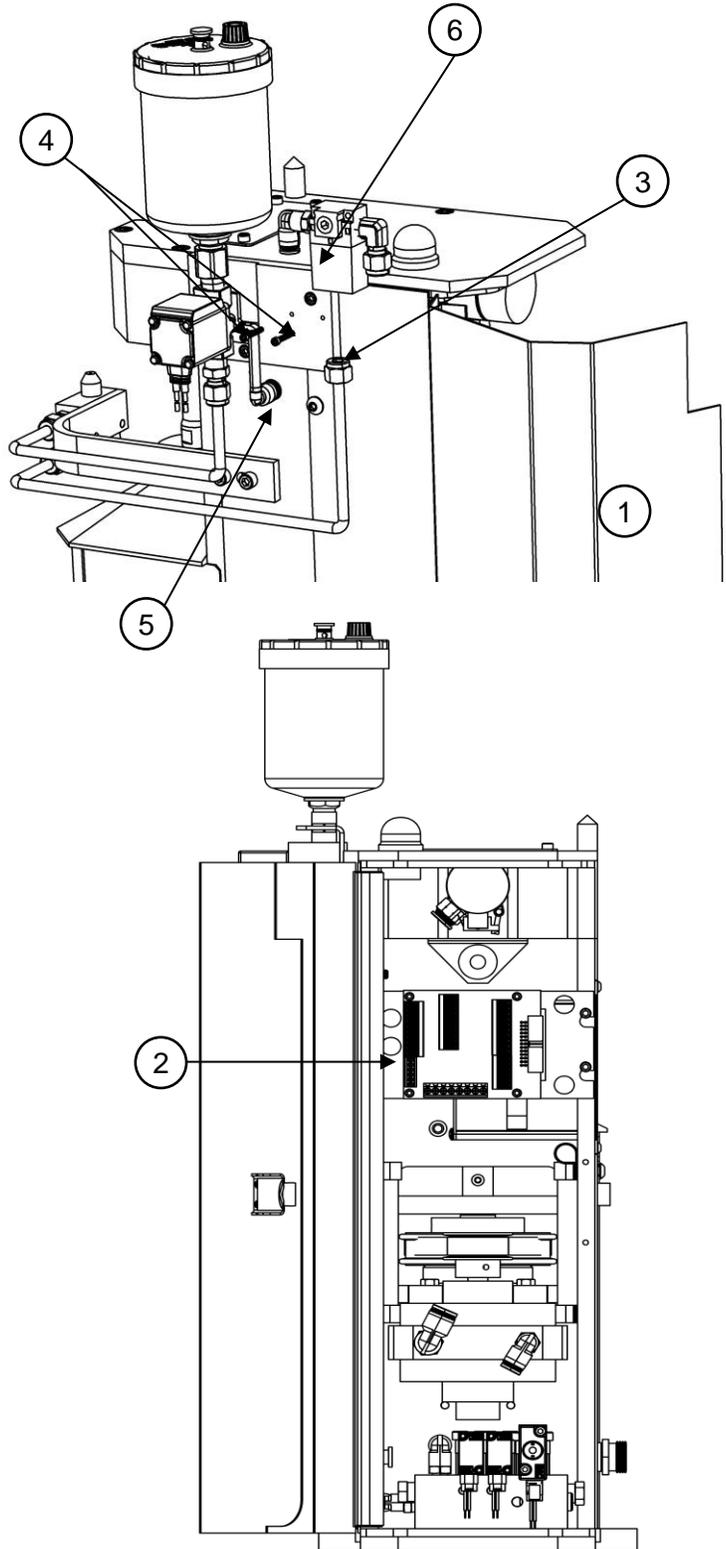
⚠WARNING

- **Disconnect air and electrical supply.**
- Open back door, **item 1**.
- Remove two black wires, **item 2**, from left terminal block. (position 102 and 112, 2nd from the top). Pull wires through the hole in main unit to the outside.

- Unfasten bottom nut, **item 3**, of compression fitting. (9/16" wrench)

DO NOT REMOVE.

- Remove two #4-40 socket head cap screws, **item 4**, from spray solenoid. (3/32" hex drive)
- Raise spray solenoid valve while detaching plastic fitting, **item 5**, from the side.
- Remove and replace spray solenoid, **item 6**.
- Follow steps in reverse order to reassemble Intelliream®.
- When tightening bottom nut, **item 3**
DO NOT OVER TIGHTEN.



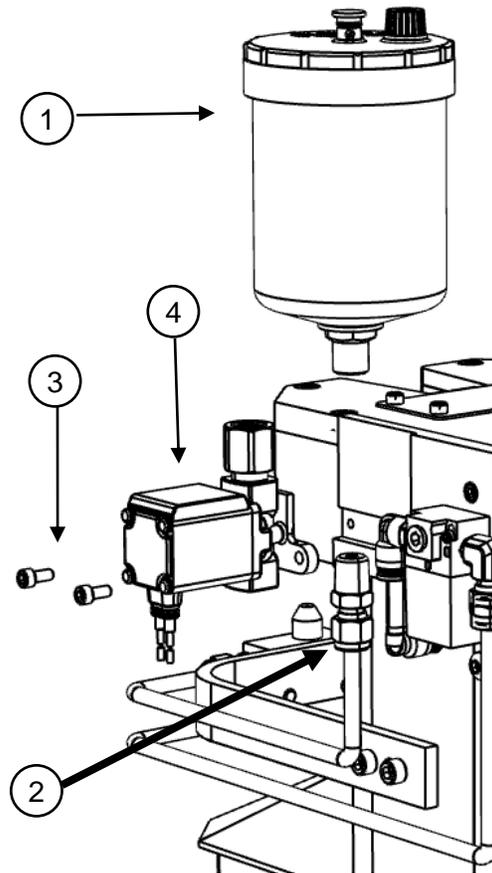
INTELLIREAM® MP

8.9. Fluid Solenoid Replacement

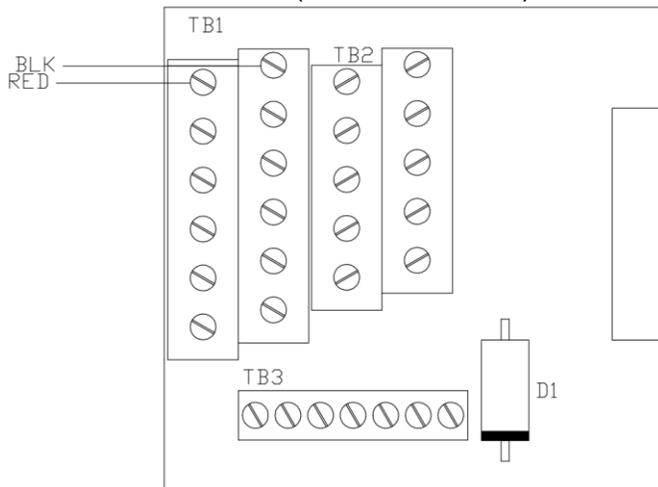
⚠ WARNING

- **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)
- Disconnect wires from the terminal block board (**refer to the wiring diagram included**)
- Remove (2) #8-32 socket head cap screws, **item 3**, that secure fluid solenoid to spray plate. (9/64" hex drive)
- Remove fluid solenoid, **item 4**.
- Follow steps in reverse order to reassemble unit. (**Note: if older solenoid is being replaced, the holding bracket is no longer needed.**)
- When tightening bottom nut, **item 3**, **DO NOT OVER TIGHTEN.**

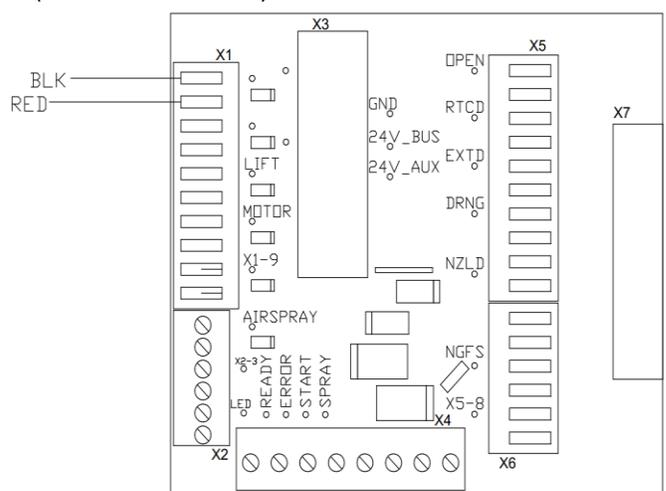
Note: Bottom compression nut, **item 2**, included in replacement kit is extra and not required for the repair.



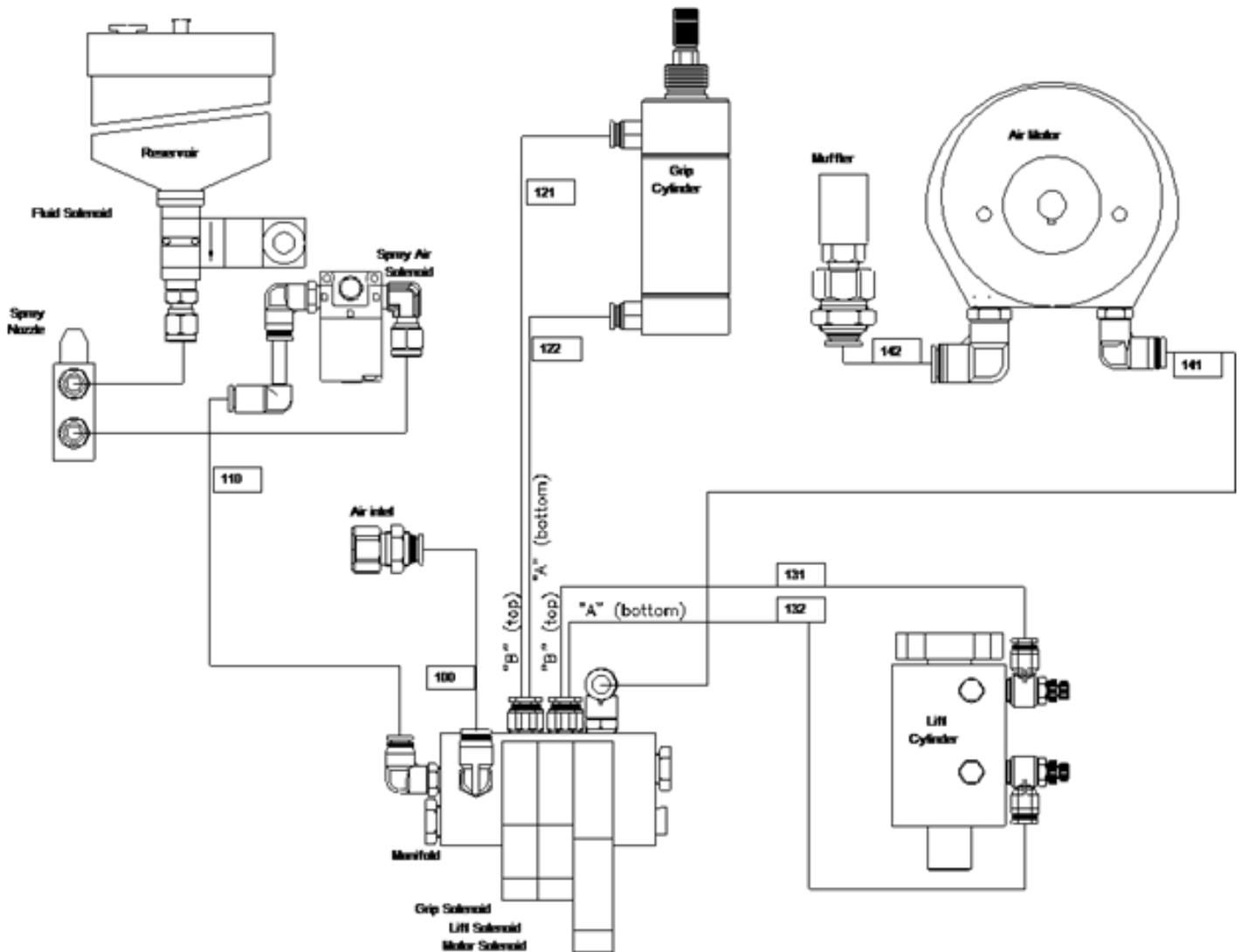
Wiring for an IRE020007-00 Terminal Block Board (IRM02 Machines)



Wiring for an IRE080001-01 Terminal Block Board (IRM03 Machines)



9. Pneumatic Diagram



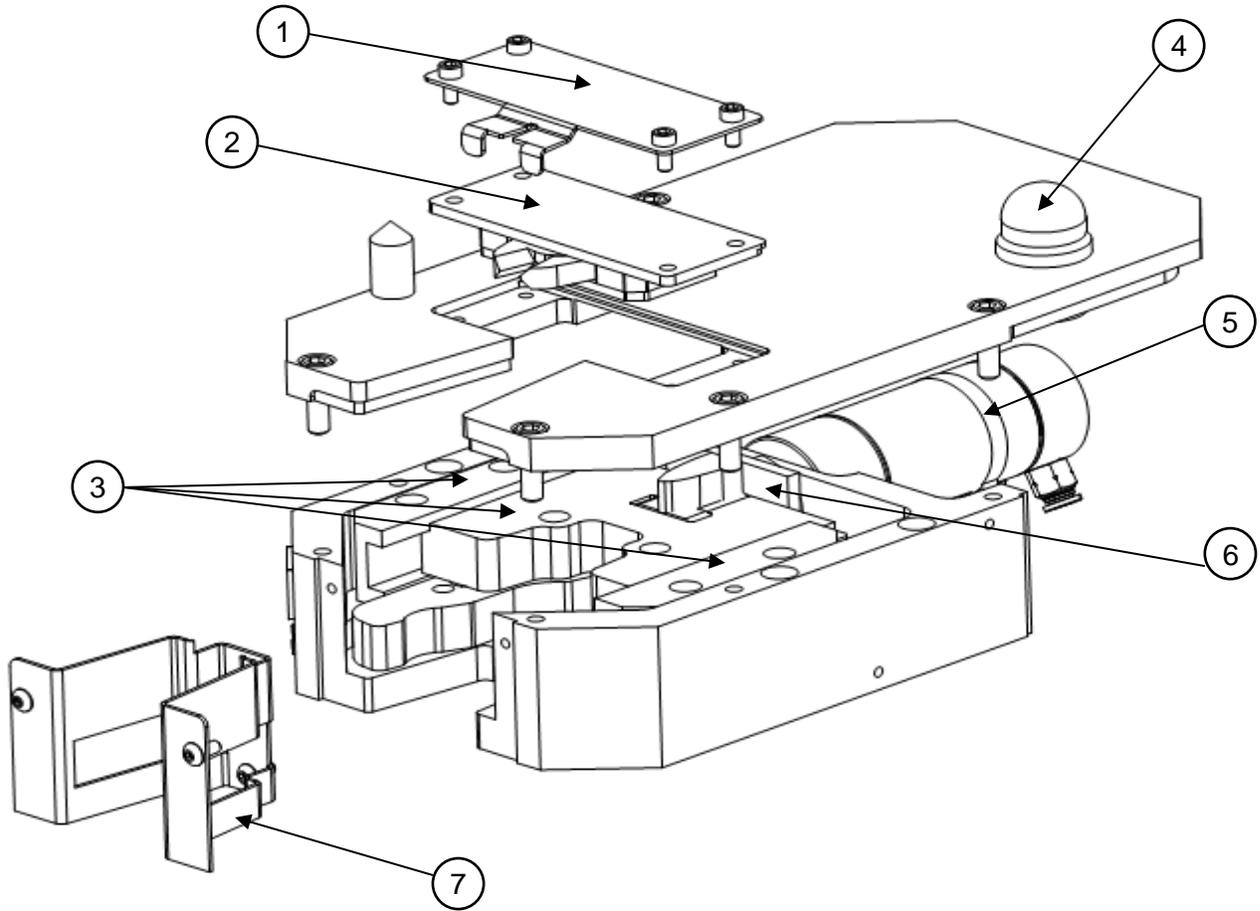
Additional pneumatic troubleshooting information:

- Air enters the Intelliream® through hose 100 and is distributed to the solenoids through the manifold.
- Hose 110 feeds the spray solenoid. Air flows through the piping when the sprayer is on. Fluid flows through the fluid solenoid and piping when sprayer is on.
- Hose 121 is normally pressurized, keeping the clamp in the open position. When hose 122 becomes pressurized, the clamp moves into the closed position. Air flows through lines 121, 122, and out of the breather vent when opening or closing. As the wire cutter (Appendix B) is driven by the same pneumatic circuit, any pneumatic issues that affect the clamp operation will also affect the wire cutter operation.
- Hose 131 is normally pressurized, keeping the lift in the bottom position. When hose 132 becomes pressurized, the lift cylinder moves to the top position. Air flows through lines 131, 132, and out the breather vent when extending or retracting.
- Air flows through hose 141 and 142 when the motor is on.

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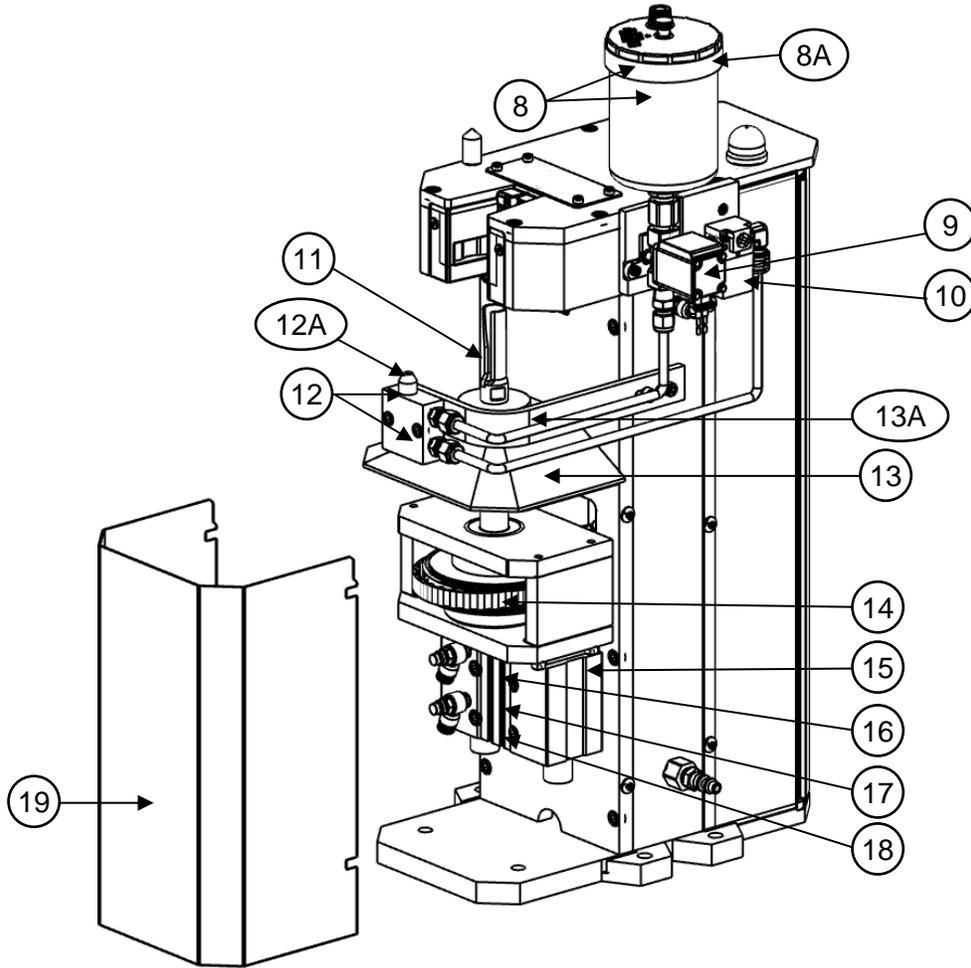
11. Parts List

11.1. Gripper Head



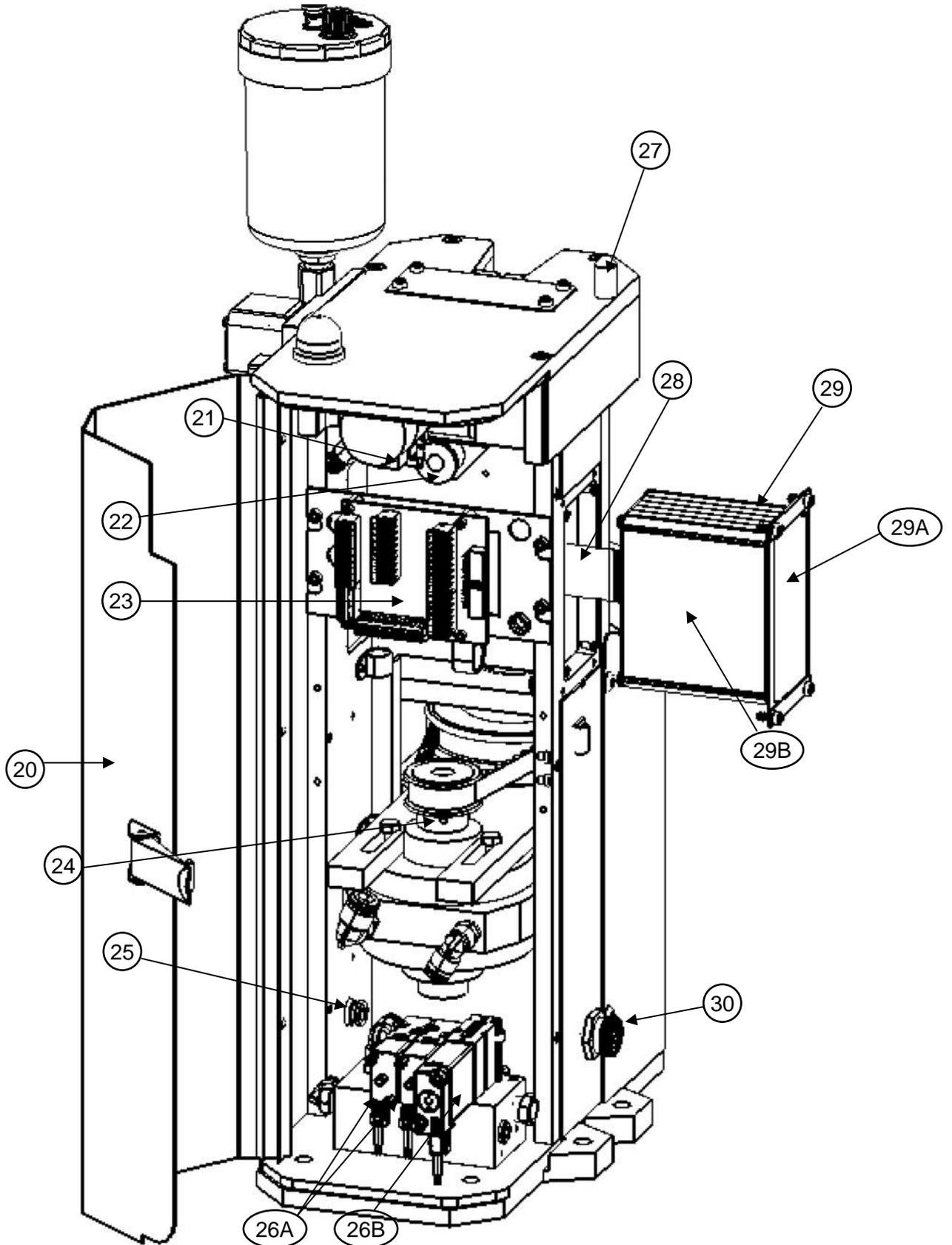
ITEM	PART #	DESCRIPTION
1	IRW010007-03	(Optional) WIRE CUTTER GUARD
2	IRW010099-00	(Optional) WIRE CUTTER ASSEMBLY
3	IRG010099-00	CLAMP ASSEMBLY
4	IRE020099-09	STATUS LIGHT ASSEMBLY
5	IRG010099-01	CLAMP CYLINDER ASSEMBLY
6	IRW010099-01	(Optional) WEDGE ASSEMBLY
7	IRG010001-14	GRIPPER HOUSING, FRONT PLATE

11.2. Front Components



ITEM	PART #	DESCRIPTION
8	IRS010005-00	FLUID RESERVOIR
8A	IRS010005-01	RESERVOIR LID
9	IRP040099-00	FLUID SOLENOID ASSEMBLY
10	IRP020099-04	SPRAY SOLENOID ASSEMBLY
11		REAMING BIT (SEE ACCESSORIES)
12	IRS010099-01	SPRAY NOZZLE ASSEMBLY
12A	IRS010003-00	SPRAY NOZZLE
13	IRD010099-02	DOME ASSEMBLY
13A	IRD010002-03	ROD WIPER SEAL
14	IRC010009-00	TIMING BELT
15	IRC010099-02	LIFT CYLINDER ASSEMBLY
16	IRE010012-00	EXTENDED SENSOR
17	IRE010012-00	DE-RINGER SENSOR
18	IRE010012-00	RETRACTED SENSOR
19	IRF020006-00	FRONT COVER

11.3. Rear Components



ITEM	PART #	DESCRIPTION
20	IRF020099-00	BACK COVER ASSEMBLY
21	IRE020099-04	OPEN SENSOR ASSEMBLY
22	IRP010099-06	EXHAUST MUFFLER ASSEMBLY
23	IRE080001-01	TERMINAL BLOCK BOARD
24	IRC010099-01	AIR MOTOR ASSEMBLY
25	IRP010006-00	BULKHEAD 5/16
26	IRP020099-03	MANIFOLD ASSEMBLY
26A	IRP020011-00	CYLINDER SOLENOID
26B	IRP020012-00	MOTOR SOLENOID
27	IRW010008-00	TCP CHECK PIN
28	IRE020099-08	RIBBON CABLE ASSEMBLY
29	IRE070099-01	RCM-2 CONTROL MODULE, COMPLETE
29A	-IRE070099-05	-RCM-2 Membrane Enclosure
29B	-IRE070001-01	-PC BOARD (RCM-2)
30	IRE010010-00	ROBOT CONNECTOR

Accessories

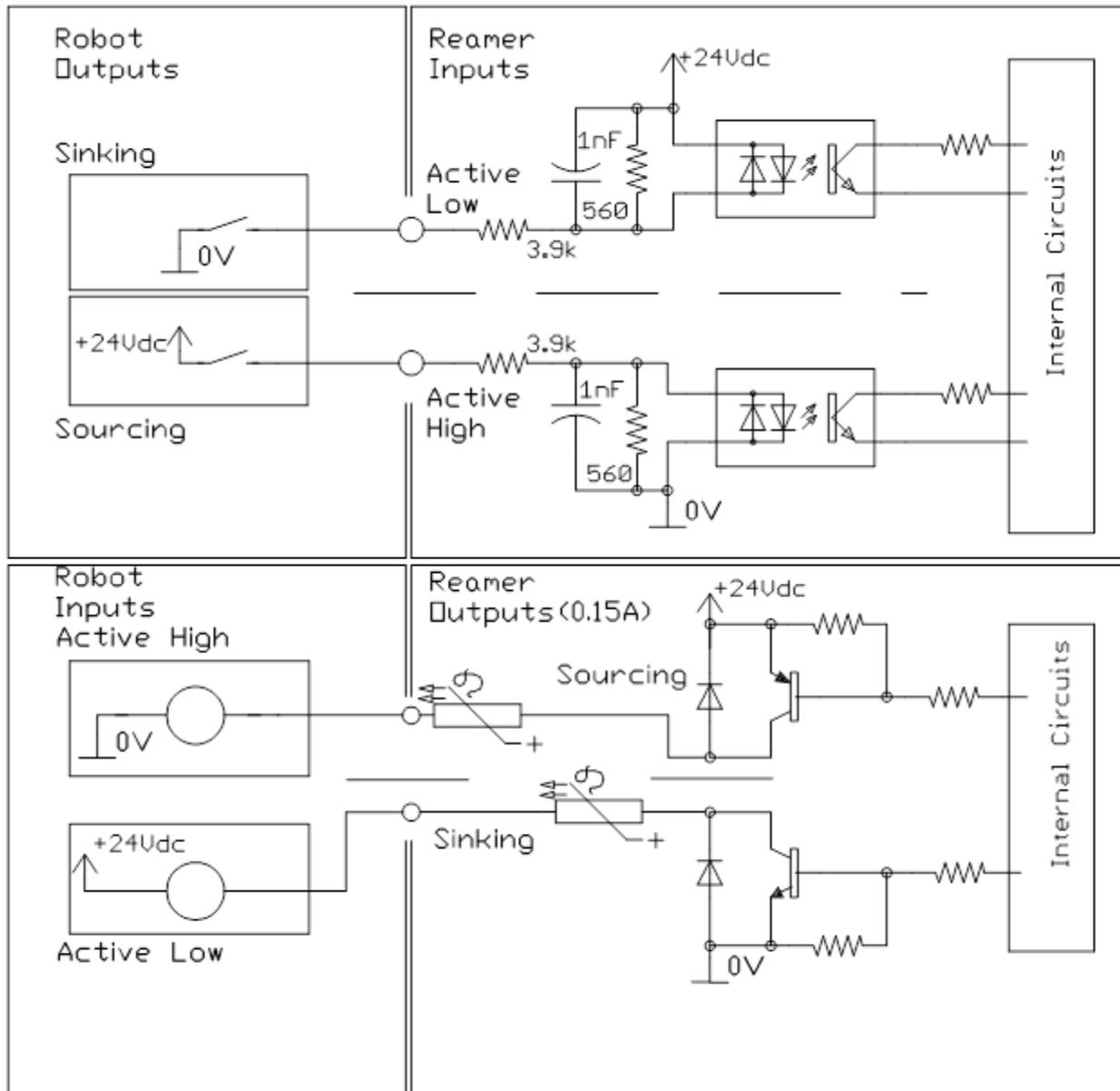
PART #	DESCRIPTION
IRB010500-00	REAMING BIT, 1/2" (W/WASHER)
IRB010501-00	REAMING BIT, BOTTLENECK, 1/2" (W/WASHER)
IRB01M155-00	REAMING BIT, 15.5mm (W/WASHER)
IRB010625-00	REAMING BIT, 5/8" (W/WASHER)
IRB010750-00	REAMING BIT, 3/4" (W/WASHER)
IRE010090-20	ROBOT CABLE, 90 Degree 20FT
IRE010090-30	ROBOT CABLE, 90 Degree 30FT
IRE010090-50	ROBOT CABLE, 90 Degree 50FT

Appendix A: Discrete I/O Explanation

The terms sinking and sourcing describe 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.

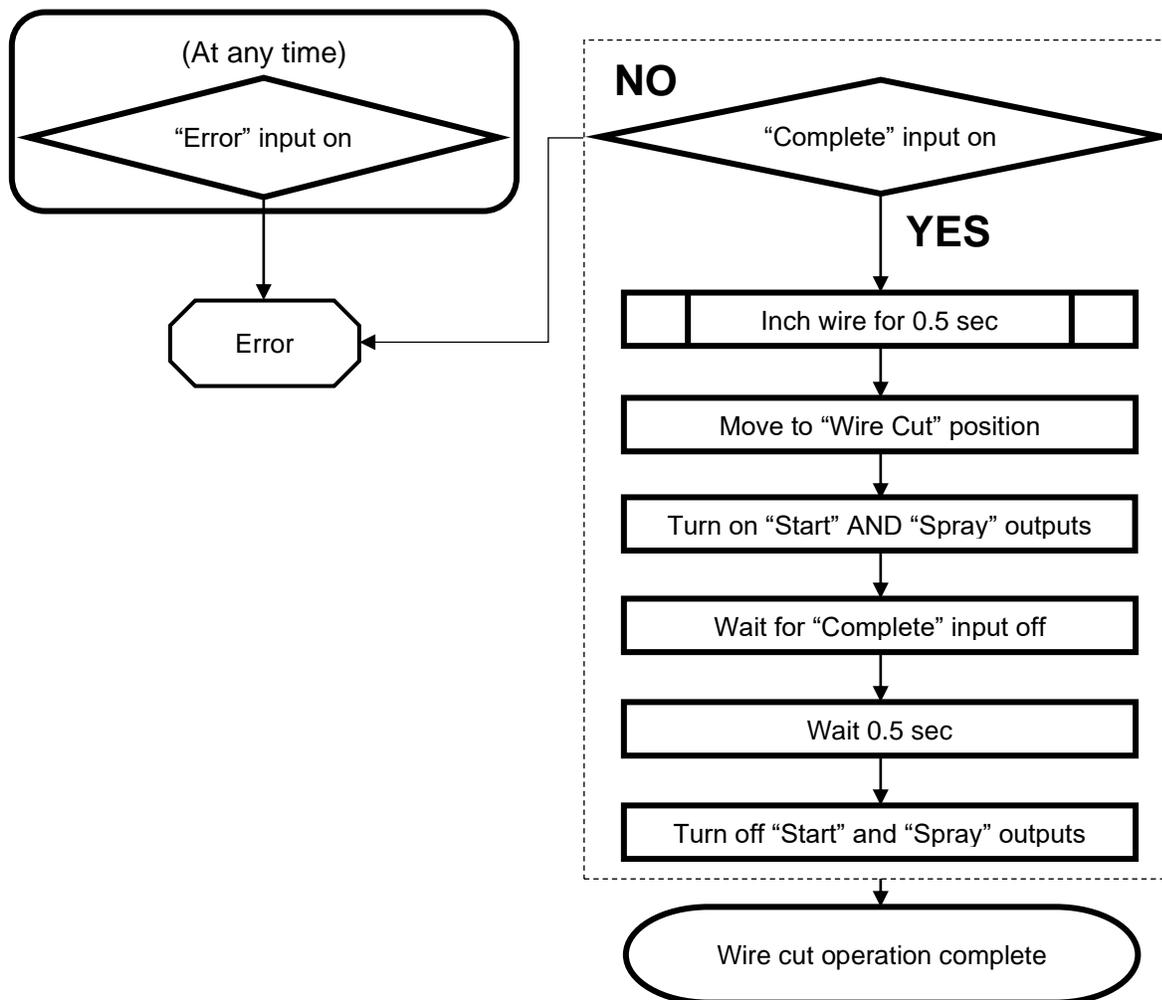


Appendix B: Wire Cutter

The Intelliream® MP offers an optional wire cutter (IRW010099-00) used to cut off the ball created by the welding process. It will leave the welding wire with a tapered point at the end of the wire stick-out for improved arc starting.

B.1 Wire Cutter Programming

The wire cutter utilizes the clamping cylinder and sensor already present on every Intelliream® MP device. The Intelliream® will perform a wire cut operation if both the “Start” and the “Spray” outputs are turned on simultaneously. Following is the suggested wire cutting program logic.



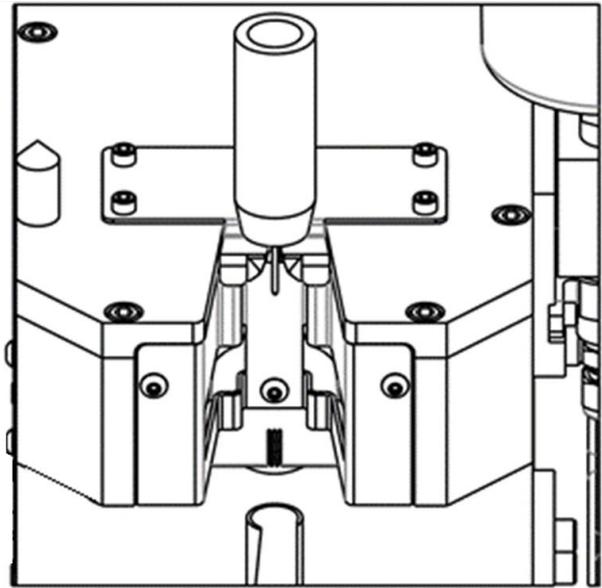
Wire Cutter Programming Cont'd



WARNING: Anytime the clamp is closed, the wire cutters will be closed as well. Keep hands clear of the wire cutter area and clamp area.

To obtain the “Wire Cut” position mentioned in the procedure outlined, center the nozzle at the desired stick-out height above the wire cutter and record this position.

Once a week, the wire cutter should be inspected visually. Look for dullness and possible breakage of the cutting blades, replace if necessary.

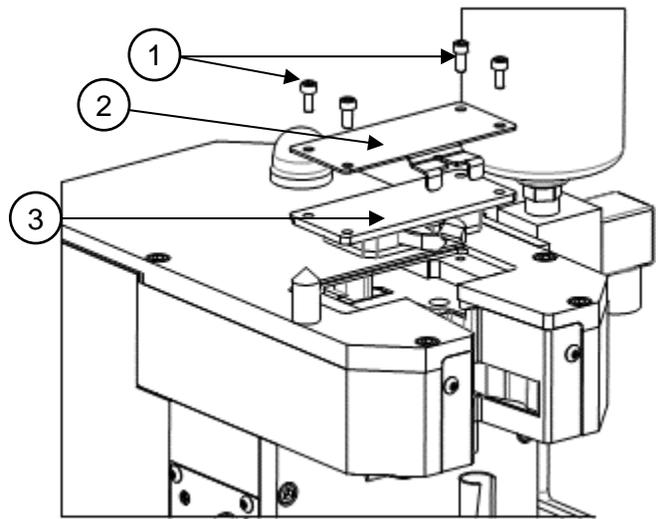


B.2 Wire Cutter Replacement

⚠ WARNING

Disconnect air and electrical supply.

- Unfasten (4) #8-32 button head cap screws, item 1. (9/64" hex drive)
- Remove wire cutter guard, item 2.
- Remove wire cutter module, item 3.
- Insert new wire cutter module. NOTE: The cutters will close slightly when positioning the rollers against the wedge.
- Replace wire cutter guard, item 2.
- Fasten (4) #8-32 button head cap screws, item 1. Apply medium strength thread-locker. (9/64" hex drive)
- Reconnect air and electrical supply



B.3 Wire Cutter Troubleshooting

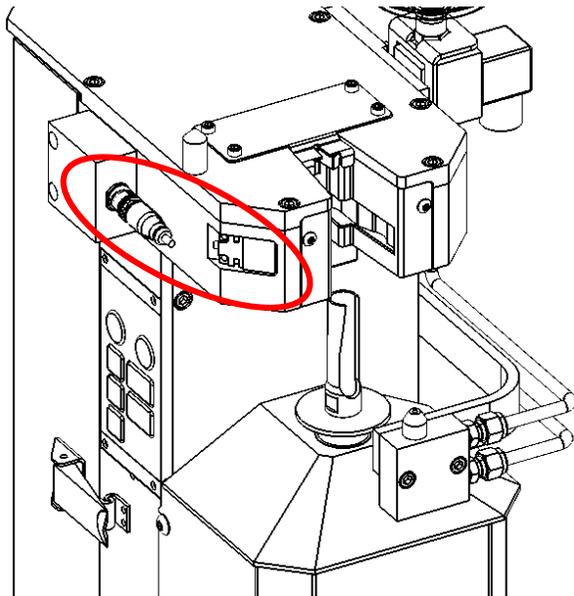
Problem	Possible Cause	Solution
Wire cutter won't cut wire but the cutter closes	-Insufficient air supply -Cutters are worn or damaged -Wire diameter too large	-Set to 80 PSI -Replace damaged components -Check wire diameter

Additional troubleshooting information can be found in the Troubleshooting Section 7. As the wire cutter uses the same electrical and pneumatic signals as the clamp, check the troubleshooting instructions for the clamp.

Appendix C: Nozzle Detect Sensor

The Intelliream® MP provides for an optional nozzle detect assembly (IRE120099-02). The integrated nozzle detect sensor is used to validate that the nozzle remains on the torch after the reaming process is complete. The nozzle detect sensor is integrated into the gripper housing on the side opposite the fluid reservoir as shown below.

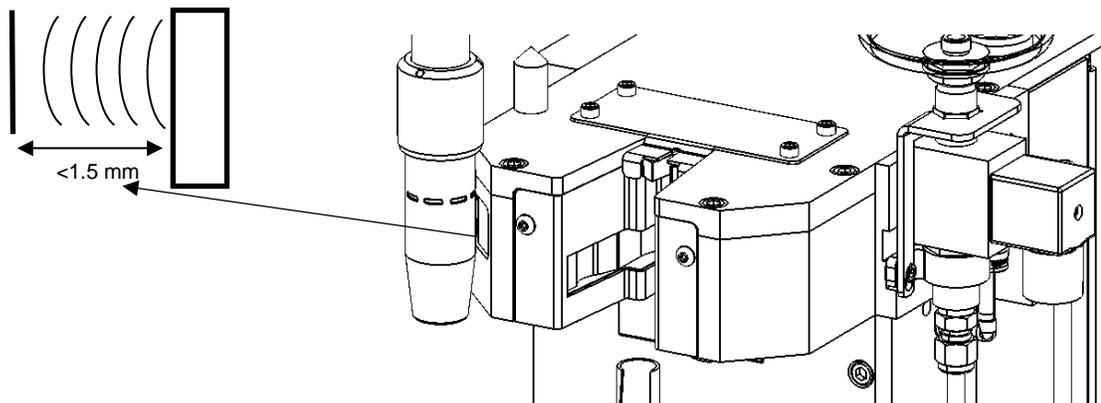
The nozzle detect sensor replacement assembly can be ordered with part number IRE020099-13



C.1 Nozzle Detect Position Programming

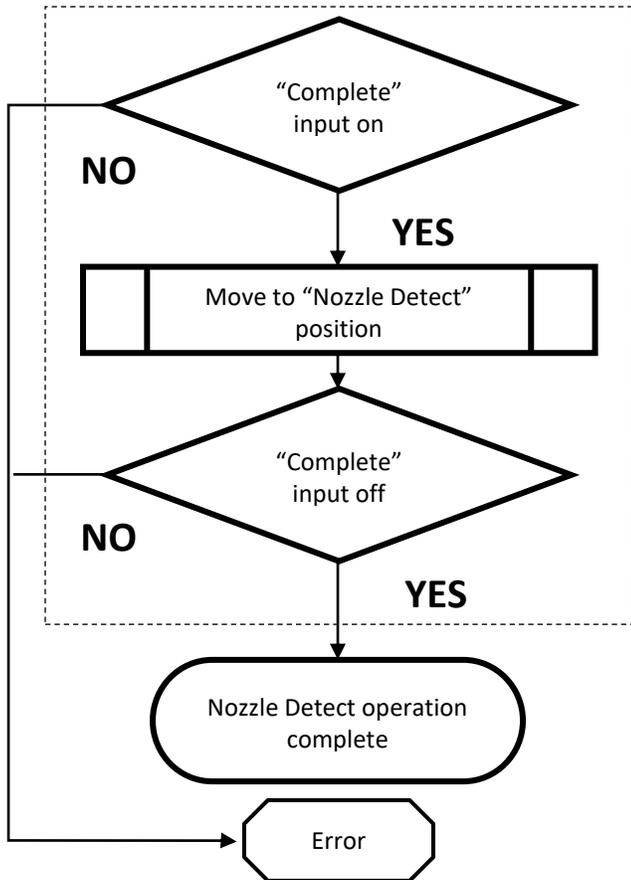
In order to perform a nozzle detection, the correct robot position must be found with the nozzle attached to the torch. The figure below illustrates the proper nozzle detect position, where the distance between the nozzle wall and the sensor must be less than or equal to 1.5 mm.

The inductive sensor has a maximum sensing range of 1.5 mm



INTELLIREAM® MP

When a nozzle is detected by the sensor, the “Complete” input (green wire) will reflect the change. To utilize the nozzle detect sensor, the Intelliream® MP must be in its ready state and no outputs from the controller should be active. When this happens, the “Complete” input will be on. If, while the “Complete” input is on, a nozzle is brought within range of the nozzle detect sensor, the “Complete” input will be turned off until the nozzle is out of the sensing range again. The process for checking for nozzle presence is outlined in Figure 4.

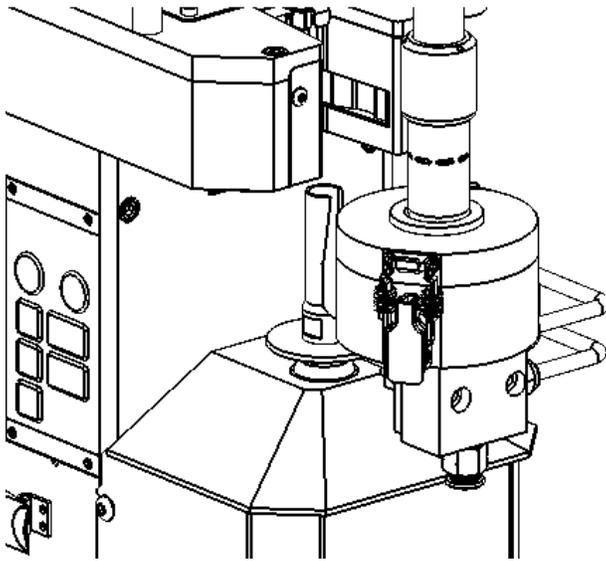


Appendix D: Spray Containment Unit

The Spray Containment II assembly (IRS020099-00) helps to manage overspray from the spray nozzle and maintain a clean robot welding cell. This unit may be factory installed or purchased and installed as a kit.

D.1 Spray Position Programming

Center the nozzle 1½ inches above the spray head. Record this position as the “Spray Approach” position. Move the nozzle into the hole at the top of the spray containment unit and record this position as the “Spray Target” position. The sprayer has a built-in post-flow timer. Airflow from the spray nozzle will be present for set time (0, ½ or 1 second) after the spray output and corresponding fluid valve have been turned off.



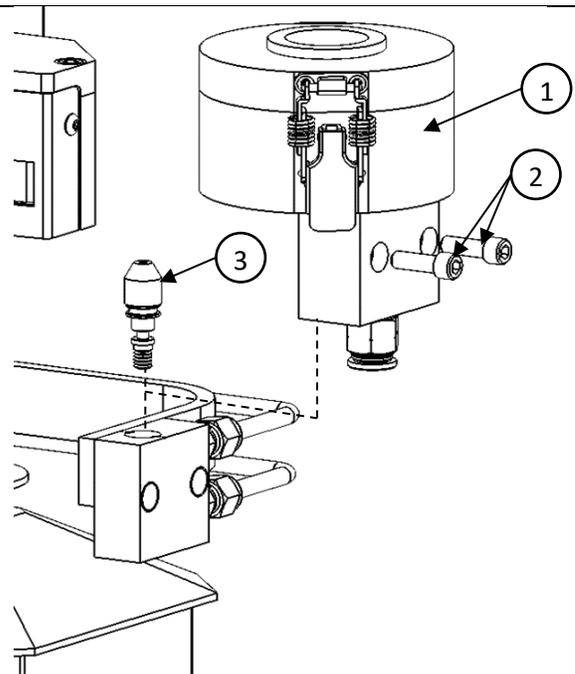
D.1 Spray Nozzle Replacement

⚠ WARNING

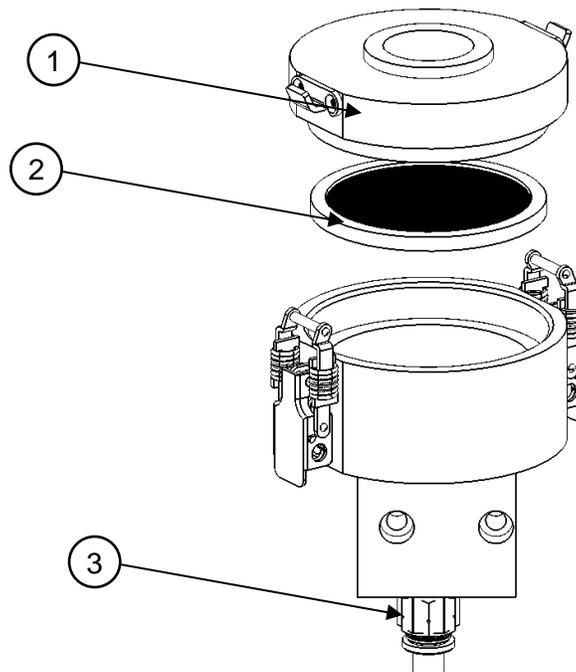
- Disconnect air and electrical supply.
- Remove Spray Containment Unit option (item 1), if installed, with two ¼-20 SHCS (item 2).
- Unscrew Spray Nozzle (item 3).
- Insert New Spray Nozzle.

TIGHTEN BY HAND ONLY

- Reassemble the module by following all steps in reverse order.
- Reconnect air and electrical supply.



D.2 Spray Containment Parts Diagram



ITEM	PART #	DESCRIPTION
1	IRS020099-07	Spray Containment II Top Assembly
2	IRS020099-06	Spray Containment II Mesh Assembly
3	IRS010009-00	Spray Containment Drain Quick Connect

D.3 Spray Containment Preventative Maintenance

The spatter containment unit will require periodic maintenance to ensure a dependable service life. The following schedule is recommended.

Shut off the air supply and disconnect the power cable when making adjustments.

WEEKLY

- Clean out mesh assembly: Remove the top lid using the latches on the side. Remove the mesh assembly and clean the spatter off of the top.
- Check the level of spent anti-spatter fluid in the collection bucket below, empty when required.

INTELLIREAM® MP

Appendix E: Nozzle Gas Flow Sensor (NGFS)

The Intelliream® MP offers an optional nozzle gas flow sensor (IRE060099-00) that will measure gas flow at the end of the nozzle. This method is advantageous to an inline flow sensor installed in the gas hose as there may be undetected leaks downstream. By measuring gas flow at the nozzle, the point of use, the system verifies adequate gas coverage for the weld puddle where it is required.

E.1 NGFS Specifications

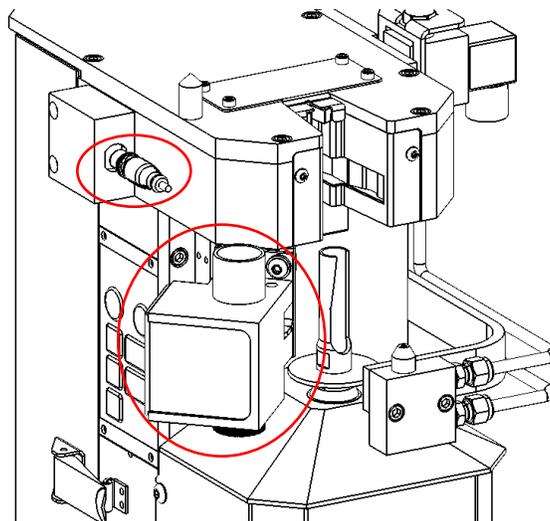
GAS FLOW SPECIFICATIONS			
Max Pressure: 60 PSI		Flow: 10 - 60 SCFH	
For use with CO ₂ , AR, or Mixed gas (AR , CO ₂ , He)			

ELECTRICAL SPECIFICATIONS	
Voltage: 24 VDC	Current: 0.01 Amp DC

PHYSICAL DIMENSIONS			
HEIGHT	WIDTH	LENGTH	WEIGHT
2.5 in.	2.5 in.	2.8 in.	1.5 lbs
64 mm	64 mm	71 mm	0.17 kg

E.2 NGFS Integration

The Nozzle Gas Flow Sensor is installed in-line with the Nozzle Detect Sensor when purchased as an option to the Intelliream® MP (see diagram below). The gripper head is customized to accommodate the mounting bracket for the Nozzle Gas Flow Sensor. An M12 receptacle is mounted on the side of the gripper head for interfacing with the Intelliream® control module, and the firmware is customized to enable a secondary of the "Error" signal for nozzle flow indication.



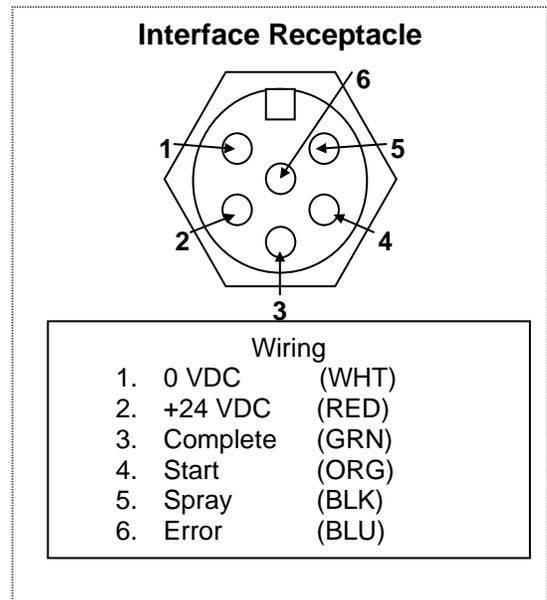
INTELLIREAM® MP

Signal Description Addendum

The following explains the normal and additional functionality of the Intelliream® MP with the Nozzle Gas Flow Sensor.

<u>Wire Color</u>	<u>Name</u>	<u>Description</u>
Blue ¹	Error	Robot input. The robot can check this input after a reaming cycle to ensure error free operation.

NOTE 1: The “Error” signal has additional functionality when the **Nozzle Gas Flow Sensor** option has been purchased. When no error is present (i.e. the Intelliream® is in its waiting state), the Error signal will turn on when gas flows through the Nozzle Gas Flow Sensor at the preset flow rate.



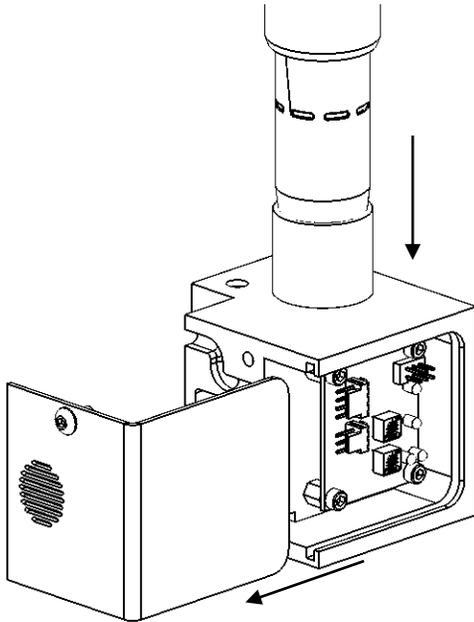
E.3 NGFS Operation

When the welding gas solenoid turns on there is normally a surge of gas before the flow stabilizes to the steady state flow preset by the regulator. The Nozzle Gas Flow Sensor Signal will turn on after 0.5 sec of stable gas flow within a defined window of operation.

E.4 NGFS Setup

There are two settings available to change the window of operation; (1) Flow Set point and (2) Flow Tolerance Band. The set point adjustment (1) will move the entire band (minimum and maximum) up or down. The tolerance band adjustment (2) will adjust the span between the maximum and minimum levels.

Setup Procedure



1. Using an independent measurement device, set the desired welding nozzle gas flow to the desired flow rate.
2. Move the robot to bring the nozzle to the target position with the nozzle fully engaged in the flow cone. The module has a small amount of movement built in to the spring mounts which will allow the nozzle to fully contact the cone for optimal flow transfer.
3. Remove the side plate to expose the circuit board.
4. Check for sensor power supply on (LED4 is ON).
5. Turn on gas flow through the nozzle at desired flow rate.
6. Adjust the Flow Set Point potentiometer (P1) until LED1 and LED2 are flashing equally. If LED1 is flashing alone turn P1 Clockwise, if LED2 is flashing alone turn P1 Counter Clockwise.
7. Check for output signal active (LED3 is ON).
8. Turn off gas flow.
9. Check that the output signal deactivates (LED3 is OFF) and the High Side (6) / Low Side (5) LEDs are also off.
10. Move the robot to bring the nozzle out of the flow cone to the approach position.

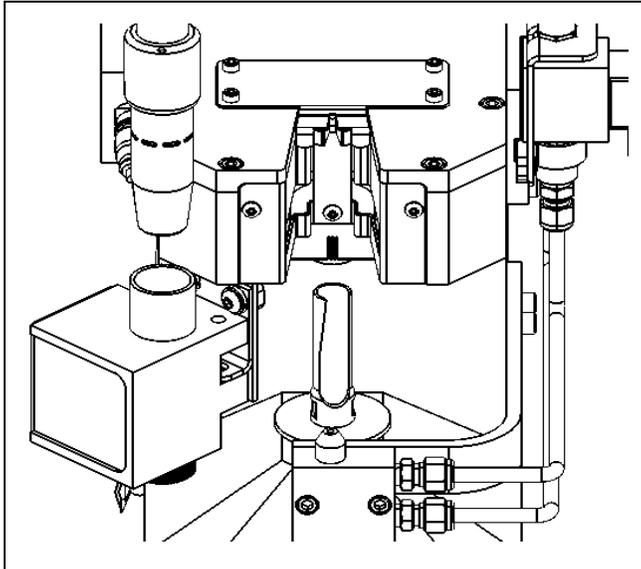
Circuit Board Detail

	Designator	Description
	P1	Flow Set point
	P2	Tolerance Band
	LED3	Output Signal Active
	LED4	Sensor Power Supply
	LED1	Low Side indicator
	LED2	High Side indicator

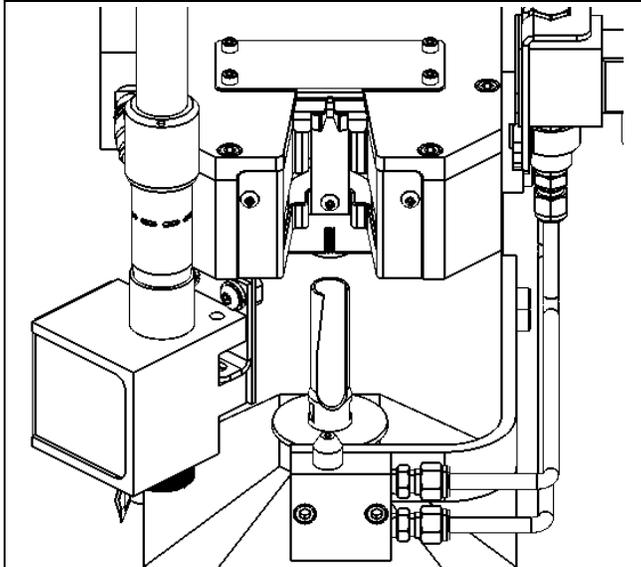
E.5 NGFS Robot Programming

In order to properly detect gas flow, the correct robot position must be programmed with the nozzle inserted into the cone of the sensor. An approach position is recommended as the first step followed by the target position inside the cone.

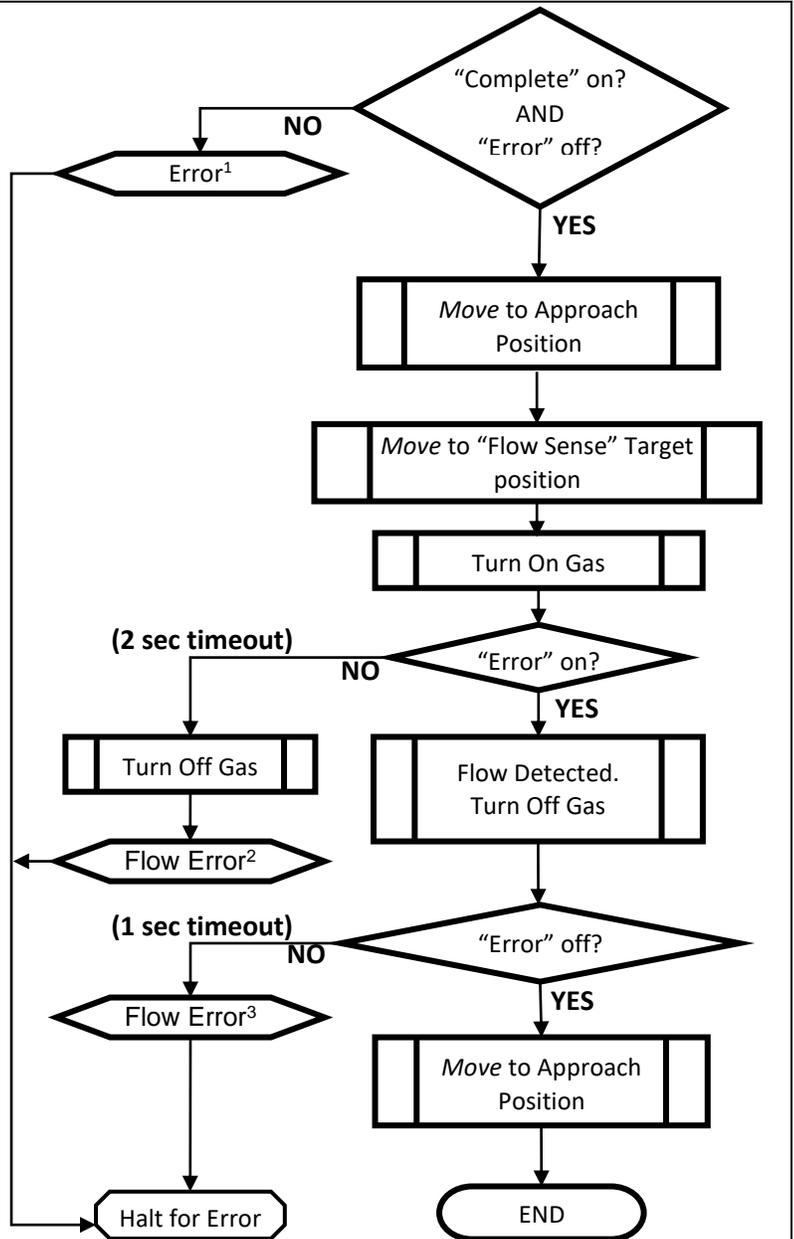
The following figures and flowchart show the recommended programming sequence with nozzle location for the approach and target positions.



Approach Position: the nozzle is in-line with and directly above the cone.



Target Position: The nozzle lightly touches the inside of the cone. The nozzle is vertical. If using the Nozzle Detect sensor, ensure the nozzle is within the sensing distance (1.5 mm).

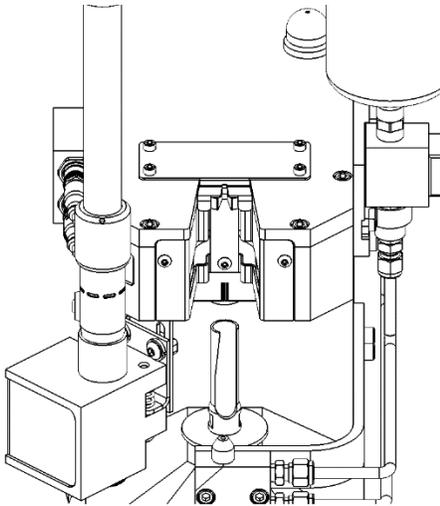
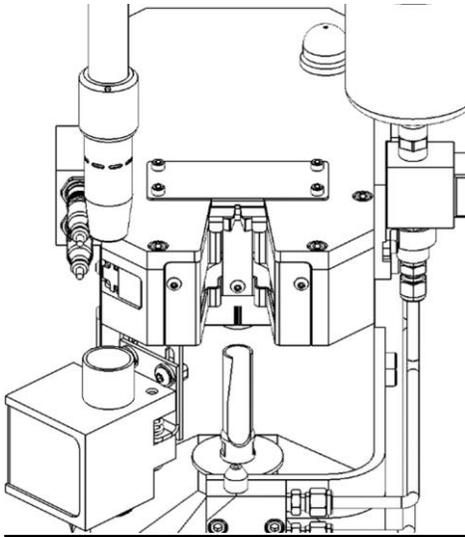


Errors:

1. Intelliream® Error from previous Cycle
2. Gas flow turn-on undetected
3. Gas flow turn-off undetected

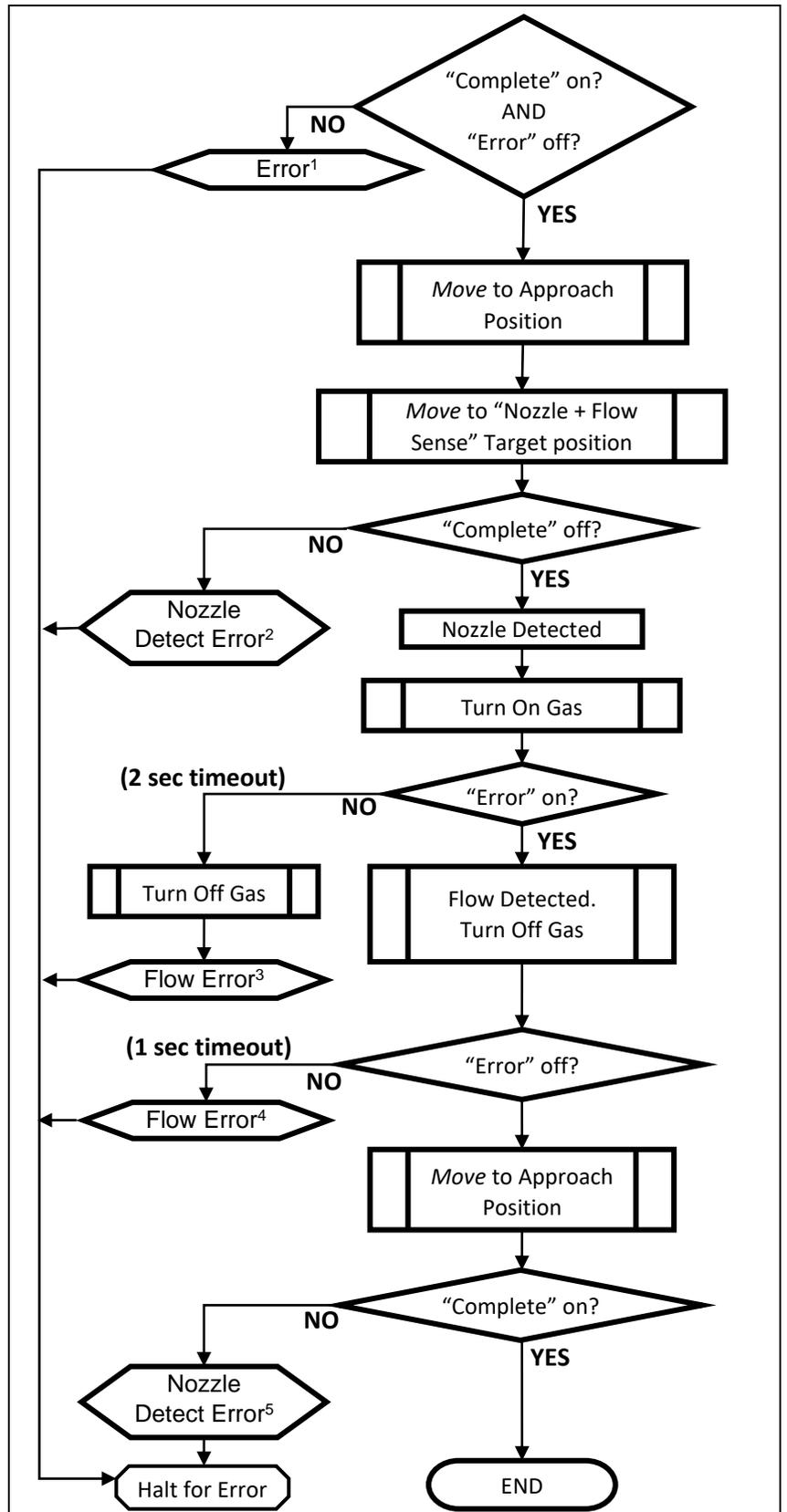
E.5 NGFS Robot Programming with Nozzle Detect

The following flowchart describes the recommended programming sequence when a Nozzle Detect option is installed with a Nozzle Gas Flow Sensor. Note: the target position must also comply within the sensing range (1.5 mm) of the Nozzle Detect sensor.



Errors:

1. Intelliream® Error from previous Cycle
2. Nozzle presence undetected
3. Gas flow turn-on undetected
4. Gas flow turn-off undetected
5. Nozzle presence unexpected



E.6 NGFS Preventative Maintenance

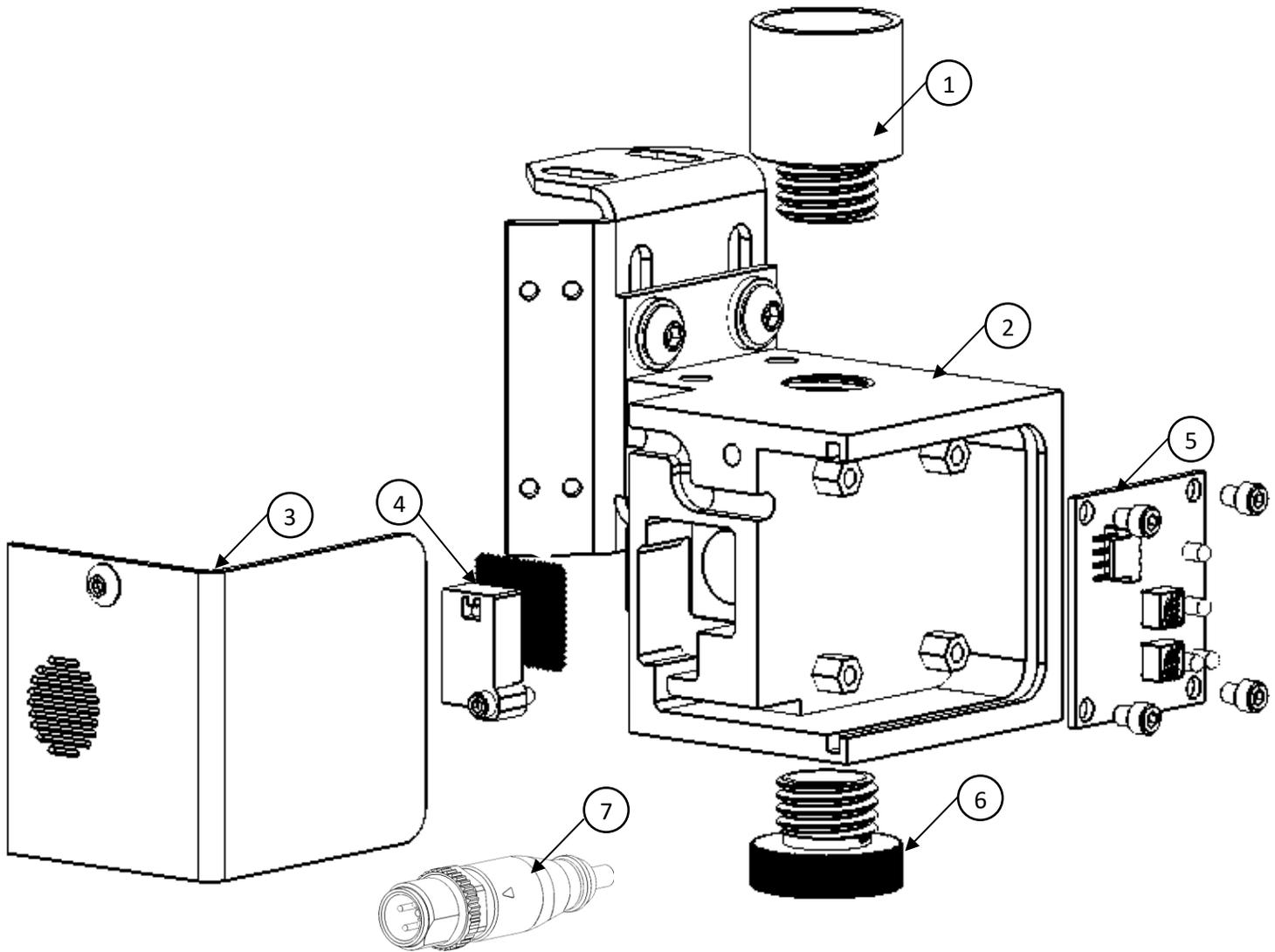
The nozzle gas flow sensor will require periodic maintenance to ensure a dependable service life. The following schedule is recommended.

Shut off the air supply and disconnect the power cable when making adjustments.

WEEKLY

- Clean the inside face of the flow cone, **item 1**, to remove surface buildup.
- Clean debris from the main cavity by removing the plug, **item 7**, at the bottom.
- Check the mesh filter of debris, **item 3**. Clean or replace as required.

E.7 NGFS Parts Diagram



ITEM	PART #	DESCRIPTION
1	IRE060005-00	Flow Cone
2	IRE060006-00	Sensor Block
3	IRE060010-00	Cover Plate
4	IRE060012-00	Sensor
5	IRE060007-00	Circuit Board
6	IRE060014-00	Drain Plug
7	IRE060015-99	Cable / Connector Assembly
8	IRE060016-00	Nylon Brush (not shown)

Warranty

NASARC Cert-Equip WARRANTY POLICY

Intelliream® MP is warranted by **NASARC** to the original commercial or institutional end user/owner against defects in materials and workmanship as follows:

Motor, Solenoids, circuit board, cylinders – 1 year

External parts, Intelliream®, spray nozzle, cables, and accessories – 90 days

The warranty becomes effective on the date of purchase. During the warranty period, equipment covered by the warranty and found to be defective will be repaired or replaced at the manufacturer's discretion without charge. The manufacturer's responsibility is limited to repair or replacement of damaged or defective parts. The equipment must be returned, transportation charges prepaid with proof of purchase date, to an authorized service center or to **NASARC**. If a product warranty card has not been completed or proof of purchase is not available, the warranty will be deemed to become effective at the time the product leaves the factory authorized **NASARC** warehouse. Warranty repair service does not extend the period of warranty beyond the original period. The warranty is not transferable.

This warranty does not cover defects in the equipment caused by ordinary wear and tear, abuse, misuse, accident, or any other cause that is not the result of defective materials or workmanship.

Repair or replacement is the exclusive remedy for defective equipment under this warranty. This warranty is in lieu of all other warranties written and implied, including any implied warranty of fitness for a particular purpose of this equipment. **NASARC** shall not be liable for any consequential or incidental damages for breach of any express or implied warranty of this equipment.

The month of manufacture can be found on the serial plate

```
+----- yy:  Year
| +----- mm:  Month (01 .. 12)
| | +---- nnn:  Unit number within the month (001..999)
| | |
IRyymmnnn
```

For example IR1605033 is the 33rd unit manufactured in May (05) of 2016 (16)

Please fill in the Product Warranty Card below, cut out, and send to NASARC for full warranty registration of your product.

Nasarc Technologies, Inc.
602 Colby Drive
Waterloo, Ontario, N2V 1A2

Product Warranty Card	
Model Name:	Product Name
Serial Number:	_____
Purchase Date:	_____ (MM / DD / YYYY)
Name:	_____
Address:	_____

Distributor Name:	_____
Address:	_____

