OPERATIONS / INSTALLATION MANUAL

GREAT LAKES
AUTOMATION L.L.C

OPERATIONS / INSTALLATION MANUAL

Read this manual carefully before installing, operating or servicing this equipment

Failure to observe the following warnings could result in injury.

- The Ream Master contains pinch points & a rotating cutter which can create serious injury if operated or serviced by untrained personnel. This tool is designed to be installed inside the protected environment of a robot welding cell. The Robot welding cell must have safety door interlock gates as well as light curtains to prevent entry from untrained personnel. The purchaser of this tool assumes all liabilities in regards to the exposed pinch points & rotating cutter on this tool. When servicing this tool, all lock out / tag out procedures must be followed to avoid injury.
- This tool operates on 75-90 p.s.i. maximum air pressure.
- This tool operates on 24vdc.
- Never remove warning labels.
- When servicing ALWAYS Lock-Out / Tag- Out the O.S.H.A. approved air inlet safety lockout valve.
- Read carefully ALL supplied literature for specific maintenance and warranty terms on supplied components.
- The Ream Master-3 is shipped WITHOUT oil in the air line lubricator. Before startup, the lubricator MUST be filled with oil suited for use in air lubricators. Once the unit is filled, it must also be adjusted to dispense a sufficient amount of oil into the air motor. Insufficient lubrication will reduce the air motor's performance as well as void the warranty. (see the enclosed manufacturers maintenance documentation for air line lubrication as well as periodic gear lubrication schedules)
- Routinely (Daily) check and fill the lubrication fluid level in the lubricator reservoir. Failure to do so will result in excessive premature wear to the air motor.
- Perform routine maintenance to all components as prescribed in the attached product manuals.

Installation instructions

Installation of this tool must be performed by authorized, trained personnel. Improper installation can result in damage to this tool, damage to the robot, or personal injury to the installer.

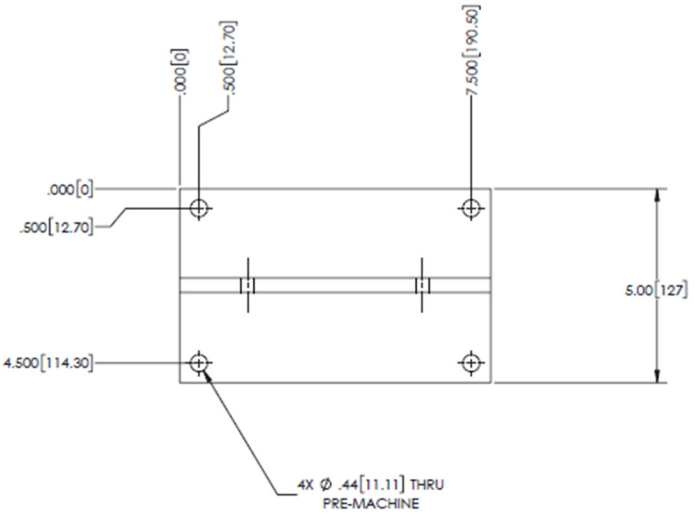
Follow these installation guidelines for the safe and proper operation of the Ream Master.

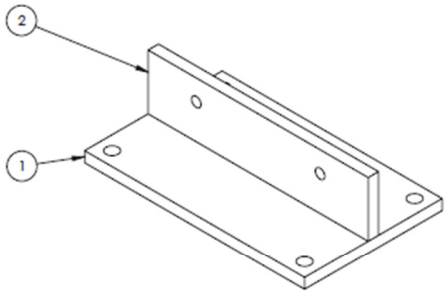
1. Unpack the unit carefully. The Ream Master MUST be anchored securely to a vibration free surface within the welding cell. The optional Tool Stand (RMTS) will position the operating height of the Ream Master within the range of motion of the robot arm.
2. The Ream Master must be installed in the upright position. If installed horizontally the lubrication system will not function properly, causing premature air motor failure, voiding the warranty.
3. Connect a ¼ npt airline into the air inlet lock-out valve. This air supply must be capable of providing a maximum of 75-90psi compressed air.
4. Before pressurizing the tool with air, familiarize yourself with the operation of the air inlet lock-out valve. Twisting the red color handle on this safety valve will allow air to pass through to the directional control valves. Reversing the red color handle valve position will relieve all stored air within the pneumatic system of the tool. This position will also allow an O.S.H.A. approved locking device to be attached to the handle when servicing is needed.

Fill the air lubricator with tool oil specified for use in air-line lubricators & adjust per the instructions in this manual. ***If this tool is used in a sensitive weld application such as Aluminum MIG, the automatic lubricator may atomize oil mist into the weld atmosphere thru the exhaust port of the reamer cutter air motor, potentially affecting the weld quality. As an option, the lubricator reservoir may be left empty. To reduce atomization of oil, deposit a few drips of air motor oil directly in to the air motor's air line per every 8 hours of run time. See the air motor's mfgr's instruction manual for more information.***

5. Once air has been connected to the tool, the nozzle clamp cylinder and reamer lift cylinders can be operated manually (individually) by depressing the small non-locking mechanical override buttons found on the surface of the pneumatic directional control valves.

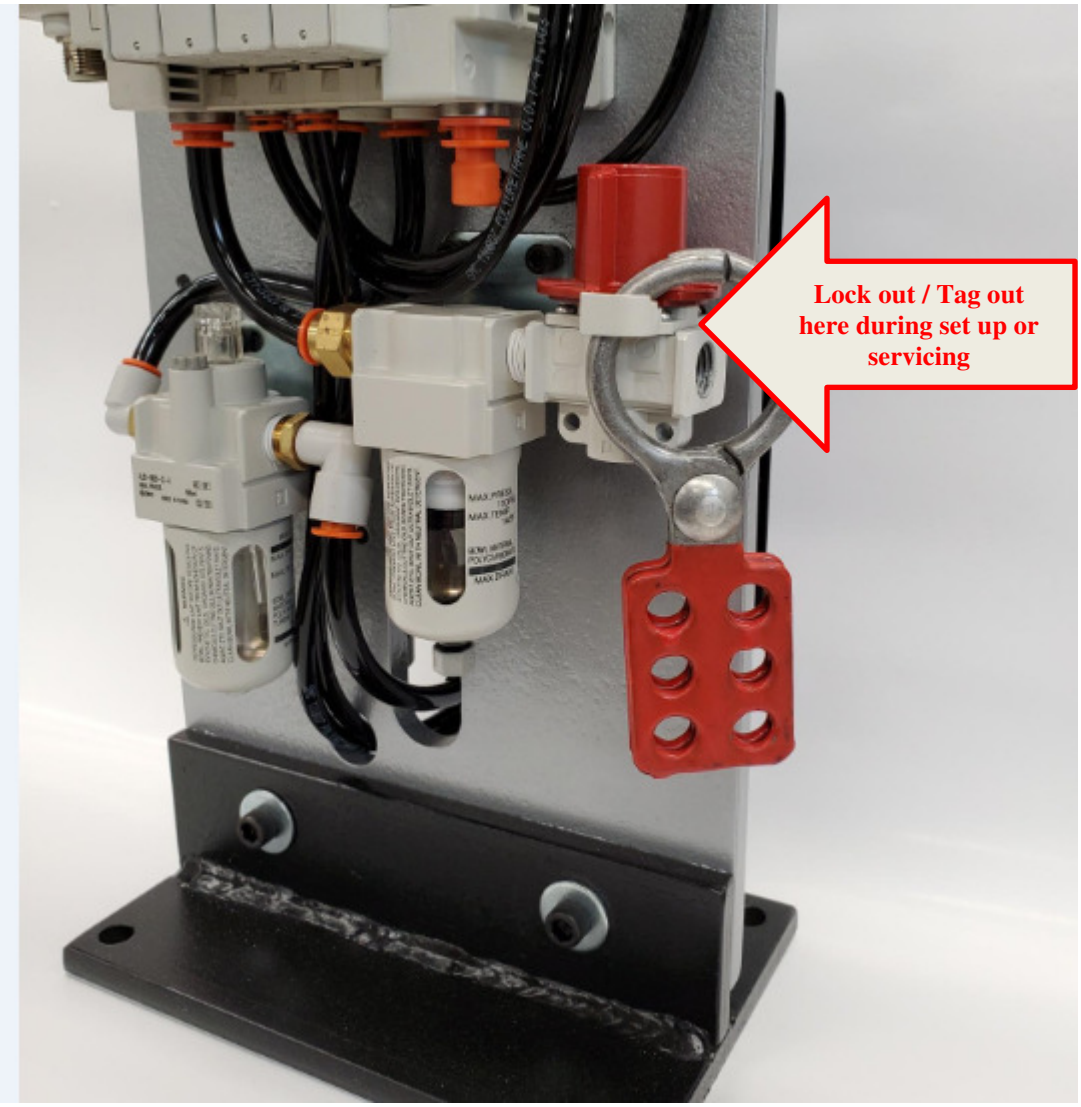
Mounting Base Hole Pattern





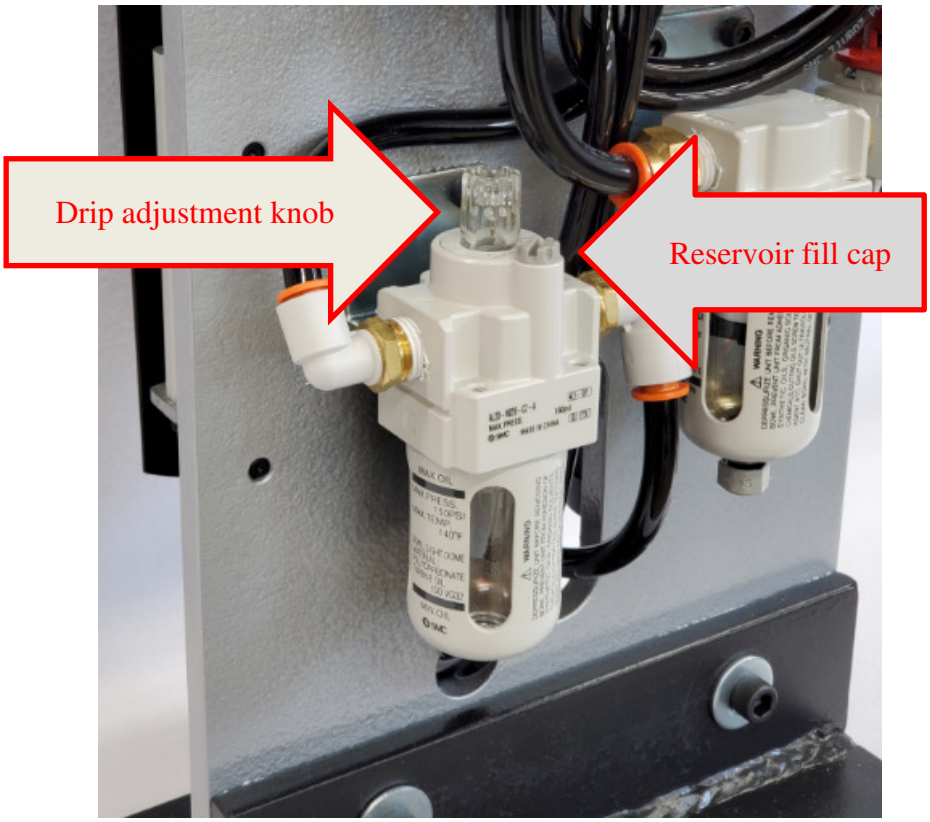
AIR INLET SAFETY LOCK-OUT VALVE

This valve is designed to release all compressed air, stored energy in this tool. This 3-port valve design complies with lock-out / tag-out procedures. This valve must be locked out prior to set up or servicing of the torch reamer to prevent injury.

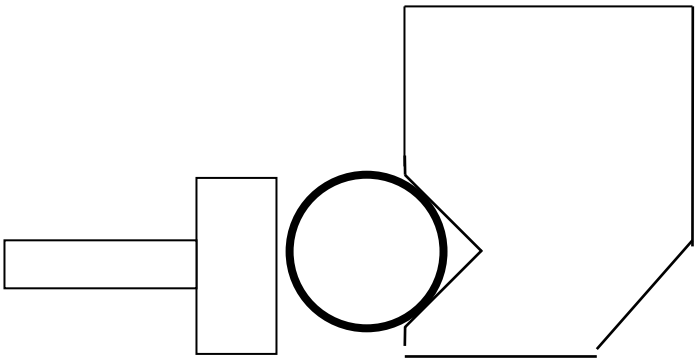


AIR LUBRICATIOR

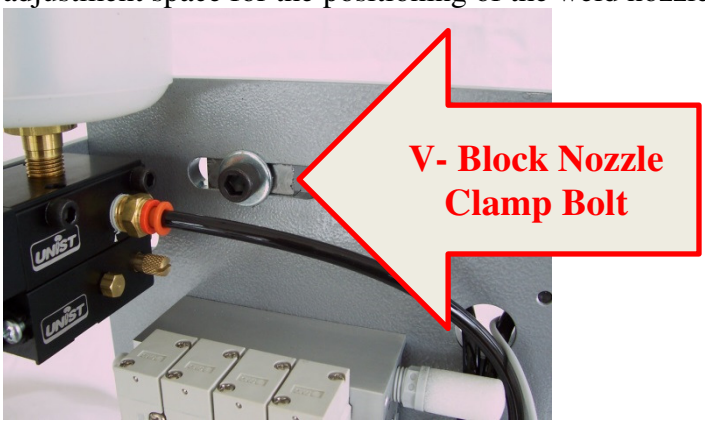
The Ream Master is equipped with a “drip type” air lubricator. This component will deposit lubricating oil directly into the air-line to the reamer cutter air motor. This unit must be filled with high quality air tool oil. Failure to use quality air tool oil will result in premature loss of power or complete air motor failure which will void the warranty. To fill the unit with oil, release all air pressure in the tool by twisting the red safety dump valve. Unscrew & remove the grey filler cap on the top of the reservoir. Fill to the level line on the bowl guard. To adjust the fluid flow, run the reamer motor & watch for a drip of oil to form on the drip tube under the clear plastic observation cap on the top of the reservoir. The observation cap can be twisted clockwise to decrease or counterclockwise to increase or decrease drip formation speed. Typically a 1-or 2 setting on the knob is sufficient. ***If this tool is used in a sensitive weld application such as Aluminum MIG, the automatic lubricator may atomize oil mist into the weld atmosphere thru the exhaust port of the motor, potentially affecting the weld quality. As an option, the lubricator reservoir could be left empty. Deposit a few drips of air motor oil directly in to the air motor’s air line per every 8 hours of run time. See the air motor’s mfgr’s instruction manual for more information***



POSITIONING THE WELD NOZZLE



After releasing all compressed air from the tool. Confirm that the nozzle gripper clamp air cylinder is fully retracted. Loosen the cap screw bolt which holds the v-block gripper clamp on the rear side of the main plate & slide it as far to the right as possible. By having both the cylinder & V-block retracted, this will allow adjustment space for the positioning of the weld nozzle & reamer cutter.



Position the robot welding torch & nozzle as vertical as possible, directly over the reamer cutter. Leave approximately ¼" (10mm) of clearance between the face of the weld nozzle & the surface of the reamer cutter. Once this position is found, by hand, lift the reamer cutter slide cylinders allowing the reamer cutter to enter the inner diameter of the weld nozzle. Re-position the robot weld torch & nozzle until the reamer cutter enters the i.d. of the weld nozzle with little to no alignment interference.

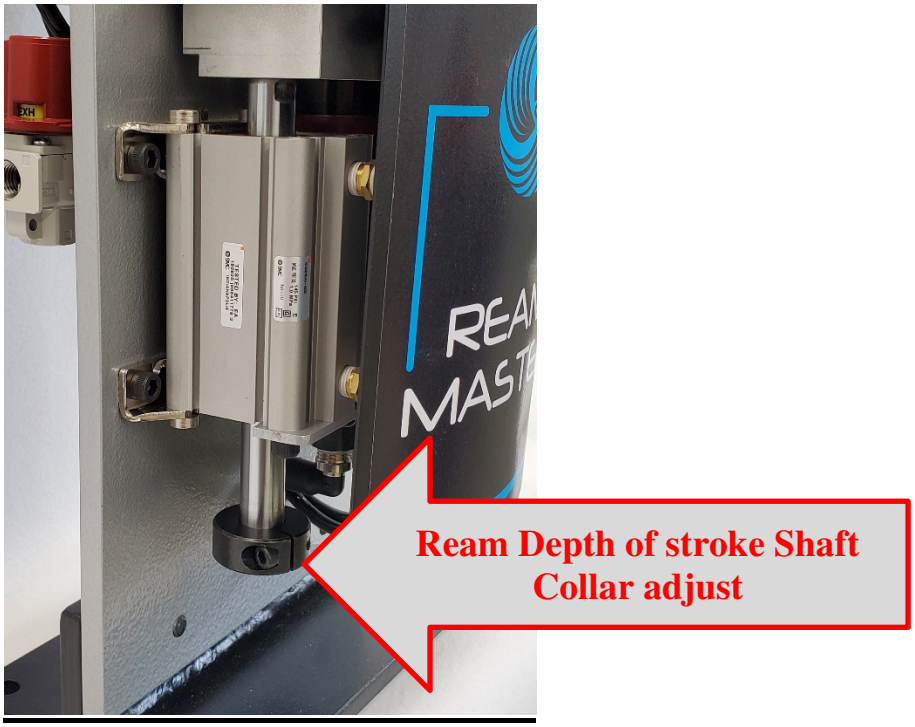
Once the alignment of the reamer cutter & torch nozzle is complete, slide the nozzle clamp V-block into place making contact with the o.d. of the weld nozzle. Tighten the cap screw bolt which holds the V-block clamp into position. Re-confirm the alignment of the reamer cutter/ weld nozzle & v-block before proceeding.

The nozzle clamp cylinder should not require adjustment as the cylinder has been designed with ample stroke to accommodate all diameters of weld nozzles.

SETTING THE REAMER SLIDE DEPTH OF STROKE

To set the reamer cutter stroke depth, proceed to removing all compressed air & locking out the safety lock out valve. Remove the weld nozzle, exposing the contact tip & gas diffuser components. With the contact tip and gas diffuser exposed, manually (by hand) push the reamer cutter slide to an acceptable reaming depth position (the cutter should be nearly touching the gas diffuser)

Once the proper reaming depth has been established, slide the shaft collar adjustable stops found on the lower side of the slide cylinders into position for accurate ream depth & tighten their set screws. The shaft collar stops must be adjusted to make contact with each cylinder body simultaneously. Care must be taken in this adjustment as both shaft collars must come in contact with their cylinder body stop plates at the exact same time. Uneven contact with the shaft collars may result in slide misalignment potentially damaging the cylinder bushings & seals, voiding the warranty.



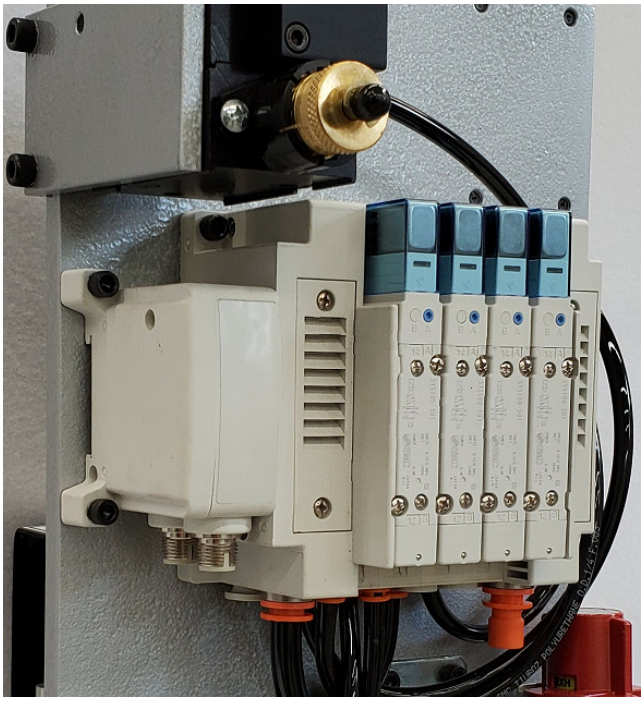
PNEUMATIC DIRECTIONAL CONTROL VALVES

Installation of this tool must be performed by authorized trained personnel.
All local and national electrical codes must be followed to insure safe installation.
Improper installation can result in damage to this tool, damage to the robot, or personal injury to the installer. The Ream Master operates on 24volts D.C. only.
Failure to follow the installation / wiring diagram could result in personal injury.

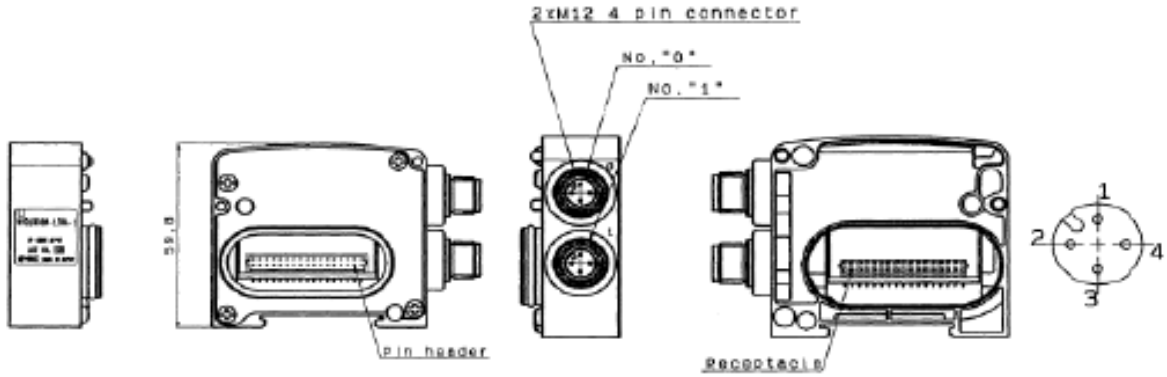
This tool is provided with two air valve manifold control system options. One is discrete wiring, the other is a Fieldbus network module.

Either option is equipped with the same 24vdc single solenoid, non polar directional control valves. When in set-up tool setup, the valves can be operated manually by depressing the blue color non locking mechanical override button located on each valve body. Each valve has a status LED status light on it's coil cover that illuminates when activated.

Discrete Wired Option:

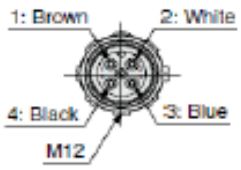


Discrete Wiring Endplate:



M-12 Cable Pin-out:

NOZZLE CLAMP, Valve #1, = Pin 4, Connector "0" (Black Wire)
SLIDE RAISE, Valve #2, Pin 2, Connector "0" (White Wire)
AIR MOTOR, Valve #3, Pin 4, Connector "1" (Black Wire)
ANTI SPATTER SPRAY, Valve #4, Pin 2, Connector "1" (White Wire)



PIN # 3 is "Common" on both Connector "0" and Connector "1", (Blue Wire)

Fieldbus Module Option:

The SMC EX260 Fieldbus option is offered in a variety of common protocols listed below.
Operations manuals, setup videos, configuration & EDS & IIOD files can be downloaded @
https://www.smcusa.com/help-support/instruction-manuals/fieldbus-products-ex-series/

- EX260-SEN3, EtherNet IP
- EX260-SDN3, DeviceNet
- EX260-SIL1, I/O Link

Many other Fieldbus protocols are available upon request when ordering.

When choosing the fieldbus control system, additional cables will be needed to connect the fieldbus module to your PLC or distribution blocks within the weldcell. Due to a variety or control system designs in your weldcell, fieldbus cables are not supplied with this tool.
Shown below are SMC cable options & can be provided at an additional cost upon order.

Ethernet IP Fieldbus option, a communication cable shown below may be needed as well as an "A" coded M12 power supply cable.

I/O link Port Class B option, an "A" coded standard M-12 cable will be needed.

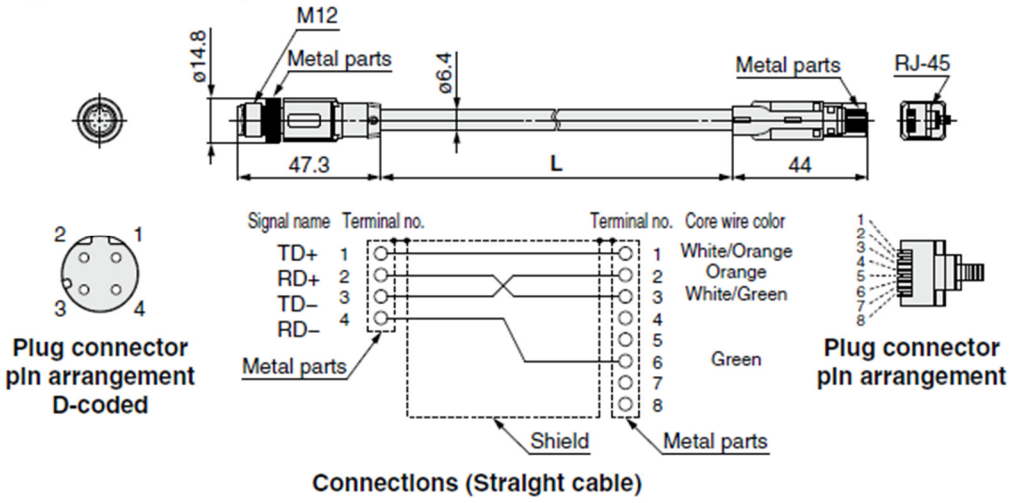
DeviceNet fieldbus option, a communications cable shown below & an "A" coded M-12 cable will be needed.

EX260-SEN3, EtherNet IP communications cable:

EX9-AC 020 EN-PSRJ (Plug/RJ-45 connector)

Cable length (L)

010	1000 mm
020	2000 mm
030	3000 mm
050	5000 mm
100	10000 mm



Connections (Straight cable)

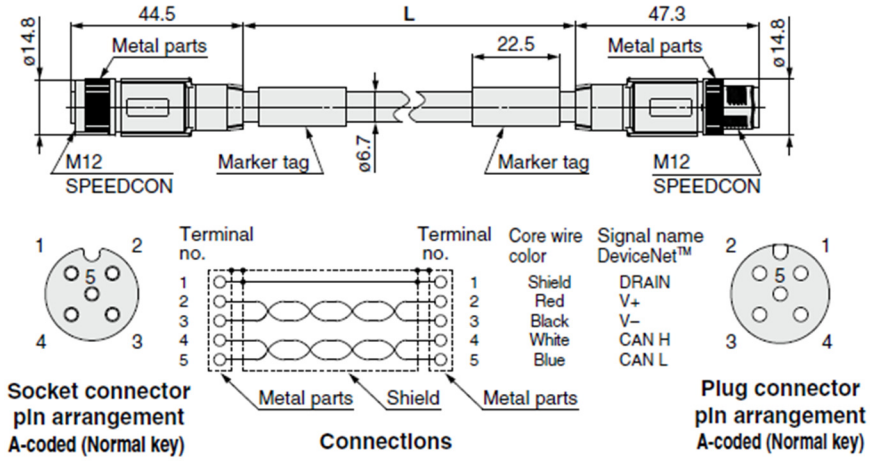
- EX260-SDN3, DeviceNet communications cable:

EX9-AC 005 DN-SSPS (With connector on both sides (Socket/Plug))

Cable length (L)

005	500 mm
010	1000 mm
020	2000 mm
030	3000 mm
050	5000 mm
100	10000 mm

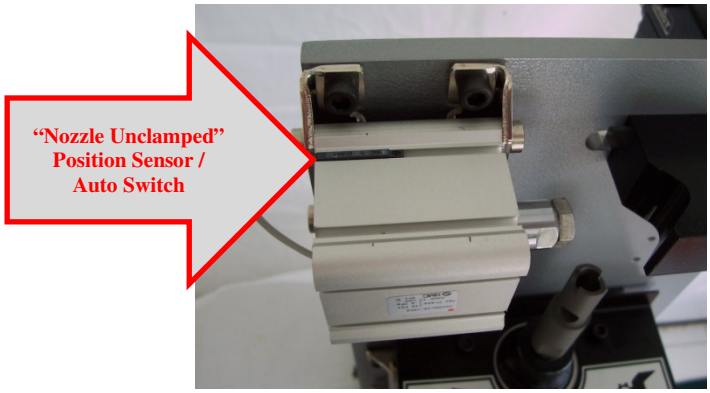
Item		Specifications
Cable O.D.		ø6.7 mm
Conductor nominal cross section	Power pair	0.34 mm²/AWG22
	Data pair	0.25 mm²/AWG24
Wire O.D. (Including insulator)	Power pair	1.4 mm
	Data pair	2.05 mm
Min. bending radius (Fixed)		67 mm

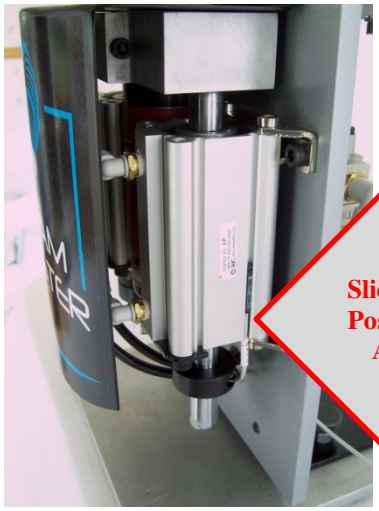


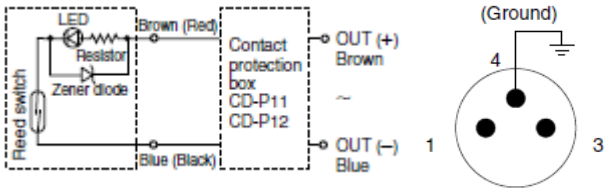
Connections

POSITION SENSORS / AUTO SWITCHES

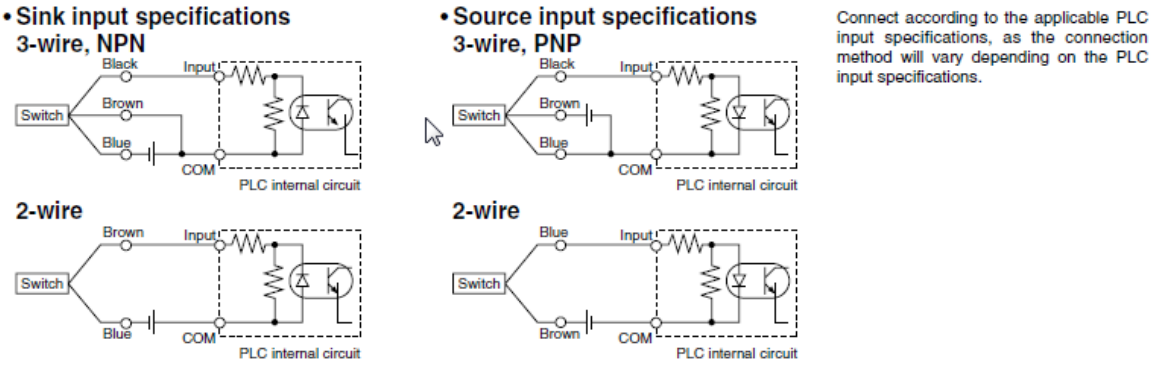
The Ream Master is equipped with two reed style position sensors to confirm to the PLC or Robot Controller that the nozzle clamp cylinder & the Reamer Slide is fully retracted signaling the welding robot is free to proceed to the Anti-Spatter station or wire nipper. The sensors are equipped with led indicator lights to visually confirm actuator position sensing. Both position sensors are supplied with M-12 quick connect ends. Adjust the sensors to the desired retract stop position in the cylinder sensor grooves & tighten the lock screw in the sensor head to retain the sensor position.







Example of Connection with PLC (Programmable Logic Controller)



Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

ANTI-SPATTER SPRAY UNIT

The Ream Master is equipped with a positive displacement, anti-spatter spray pump. This pump can be adjusted to deliver between 1-3 drips of fluid per cycle. The force of atomizing air pressure per spray cycle can also be adjusted.

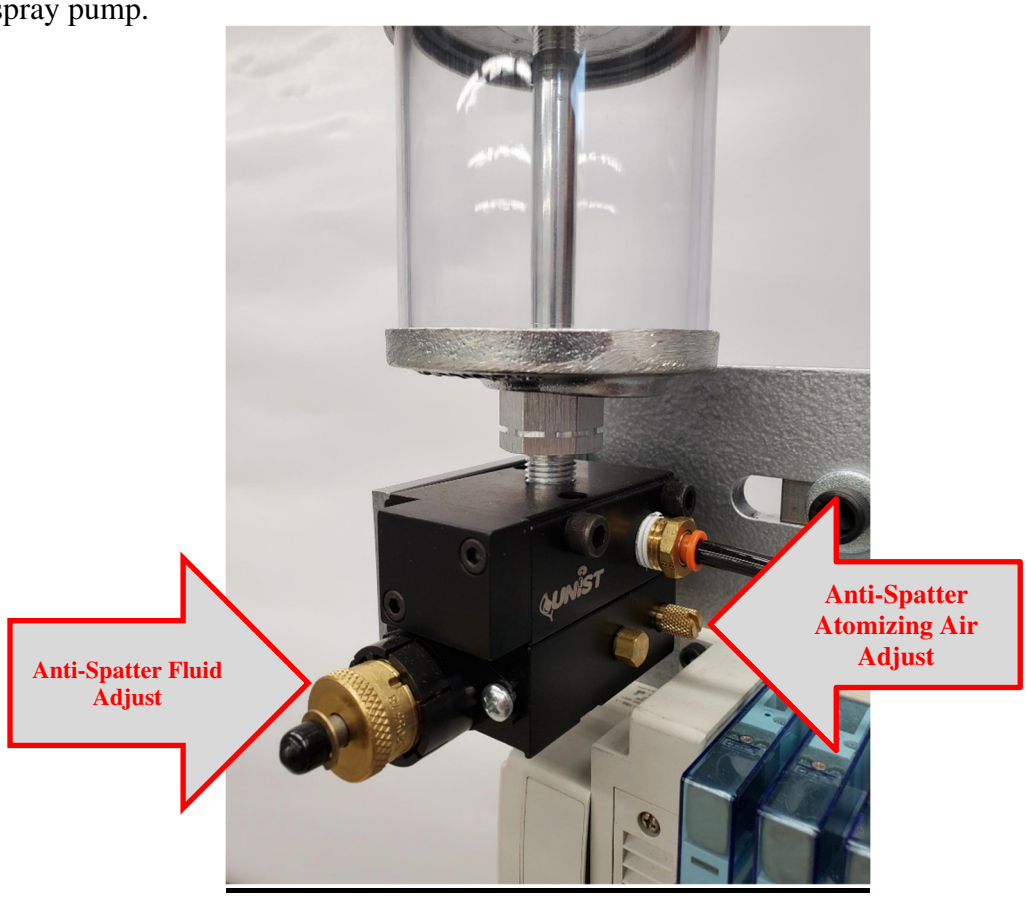
To adjust the fluid:

Turn the large knurled knob clockwise to increase the fluid amount to be applied per cycle. Counterclockwise adjustment will decrease the fluid, clockwise will increase the fluid.

To adjust the atomizing air:

Turn the smaller knurled knob on the side of the pump body clockwise to decrease the force of atomizing air, counterclockwise increases the force of atomizing air.

The anti-spatter spray pump supply air is delivered to the unit by cycling the directional control valve on the air valve manifold. When this valve is cycled, the volume of fluid per spray cycle is controlled by the positive displacement pump in the sprayer body. The directional control valve should pulse for 1 second or less for one cycle of the spray pump.



SEQUENCE OF OPERATIONS

Follow the sequence of operations closely for proper performance of the Ream Master.

The Ream Master-4 requires 4-Non-Polarized output signals from the controlling device and will send 2-input signals back to the controlling device through the position sensors.

The 4- output signals to the Ream Master's pneumatic directional control valves are as follows:
*Nozzle clamp "Extend"
*Slide "RAISE".
*Reamer air motor "ON"
*Spatter Spray pulse

The 2-intput signals are as follows:
- Nozzle clamp cylinder, " Retracted"
- Reamer Slide "Lowered"

CYCLE TIMING CHART

The following chart is designed to be used as a guideline for the approximate cycle timing of the Ream Master-3. Cycle times and durations may be adjusted to insure complete removal of slag per the welding process.

Air Motor "On"	*----------*			
Slide "Raise"	*----------*			
Slide "Lower"		*----------*		
Air Motor "Off"			*	
Nozzle Clamp "Open"			*	
Anti spatter spray				*----------*
Seconds	1	2	3	4

Final Cautions & Warnings

Once the Ream Master has been properly and completely installed it is ready for operation.
Note: It is impossible to estimate the frequency of reaming cycles needed to keep the weld nozzle free of spatter. If you experience an incomplete cleaning cycle as a result of the reamer cutter stalling or hanging up inside the weld nozzle, more frequent cleaning cycles are necessary.

- The alignment of the cutter into the weld nozzle is critical. If the alignment is incorrect, side torque on the air motor drive shaft may result in premature wear to the reamer cutter & potential air motor failure.
- The Ream Master front safety guard MUST be in place during operation to prevent foreign matter from accumulating on the slide cylinder rod seals.
- The "Warning" label MUST be in place on the safety guard reminding of "Pinch Point" hazards.
- If the safety guard is removed for servicing, the air inlet valve MUST be "Locked out /Tagged out" to prevent personal injury to the serviceperson. This tool is designed to be installed inside a caged, robot weldcell. The entry points of the weldcell should be protected via light curtains & interlock sensors to prevent unauthorized entry into the weldcell. Failure to prevent pinch point injuries on this tool by not following "Lock out / Tag out" procedures is the responsibility of the customer. Non-qualified employees should never be allowed to service or operate this tool within the protected weldcell.
- Place the air system lubricator on a daily reminder list to check the operating level of the air motor lubrication oil.
- Wipe foreign matter from the slide cylinder rod seals & reamer cutter air motor shaft seal daily.

If spare or replacement parts are needed, please contact your Ream Master distributor.

During set-up & normal, automatic operation of this tool, there are exposed pinch points present. Pinch points & rotating cutter dangers must be fully understood by the customer & their employees. The customer must have protective interlock systems installed in the robot weldcell's entry point to prevent entry of non-authorized employees & vendors. If personal injury occurs from improper training on the operation of this tool, Great Lakes Automation L.L.C. will not be held liable for damages or injury. If damage to the tool or personal injury to an employee is the result of programming errors in the weldcell, Great Lakes Automation L.L.C. will not be held liable.

Ream Master Warranty & Returns

Great Lakes Automation L.L.C. (seller) warrants solely to the original buyer that its products will be free from defects in materials and workmanship for a period of 90days from date of purchase. This warranty does not apply to the products that have been subjected to misuse, modification, misapplication, negligence, abuse, improper installation or a lack of routine maintenance.
Components supplied on the Ream Master by other manufacturers may be warranted separately by their specific manufacturer for a longer period of time (see enclosed product literature for each product's warranty & liability statement).
The seller reserves the right to substitute any or all components used on its products at any time. The seller's liability under this warranty shall be limited, at the seller's sole option, to repair or replace the defective product. In either case the seller shall have no liability under this warranty except for the products returned to the seller's factory, freight prepaid, with a valid Return Material Authorization (RMA) number clearly marked on the package and referenced in the shipping documents within 90 days of the original buyer's proof of purchase. Upon repair of the defective product, the seller will pay the freight charges for return shipment only. The seller's maximum liability is limited to the purchase price of the product, and in no event shall the seller be liable for any consequential, indirect, incidental, or special damages of any nature arising from the sale or use of this product. This warranty is supplied in lieu of all warranties implied at law.

Note: Some states do not allow limitations on incidental or consequential damages or how long an implied warranty lasts so that the above limitations may not apply to you.
This warranty gives you specific legal rights and you may also have other rights which could vary from state to state.

Return Policy:
All returns must be personally discussed with Great Lakes Automation L.L.C. within 30 days of invoice. Beyond 30 days of invoice, a return will be rejected. Returns will be considered only on a completely unused un-mounted tool in it's original packaging. Returns may be subjected to a return / re-stock fee. All freight charges returning a tool will be the customers responsibility.

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