PennEngineering®

OPERATION AND MAINTENANCE MANUAL FOR PEMSERTER®
618 Pro+ Hardware Insertion Machine

OPERATION AND MAINTENANCE MANUAL

PEMSERTER® Hardware Insertion Machine

MODEL: 618 Pro+

SERIAL NUMBER:

PennEngineering®

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Preface

CONTENTS

Read Manual Before Operating Machine!

SECTION 1
INTRODUCTION

Use:

- This equipment is used for the riveting of some PEM screws, nuts and studs fastening products.
- This equipment is composed of a touch screen, a safety punch, a feeding system, a tooling fixture and an electrical system. The product to be riveted can be sent to the tooling fixture through the feeding system as required, and the product to be riveted can be riveted through the safety punch Press to the workpiece to complete the riveting process, the above process can also be done manually.
- According to different processes and workpieces, the tooling fixtures corresponding to different products can be replaced to achieve the purpose of riveting and connecting different products.

Features:

- Unique precise pressure riveting force and energy-saving riveting power consumption.
- PLC control system with touch screen interface.
- Provide simple and precise control for operators. The design of the machine setting, operation, maintenance, and fault diagnosis is simple and easy to use.

Specifications:

• Riveting Force	4~54kN (800-12000lbs)
• Control System	Hydraulic system
• Repeatability	±2% F.S.
• Air requirements	6~7bar Φ5/16 in dia. minimum line flow
• Long	43.635in
• Width	33.62in
• Hight	85.972in
• Weight	533kg
• Electrical	AC400V（+/- AC 23 V）, 50/60Hz
• Power	2kW
• Full Load Current	5A
• Short-Circuit Rating	10kA
• Air Consumption	approx. 2 liters/sec air at 1 Atm (15 Scfm) 6 insertions per minute
• Ambient Temperature	5°C~40°C （41°F ~ 104°F）
• Transport/Storage Temperature	-13°F to +130°F (-25°C to +55°C) and for short periods not to exceed 24 hours up to 160°F (70°C)
• Ambient Humidity	30% ~ 95% (Not reflective of inlet air)
• Installation Altitude	Max 1000m

- Installation requires horizontal installation on load-bearing ground
- EMC requires Do not allow a lot of electromagnetic interference around
- Light requires adequate illumination at the operating points and areas

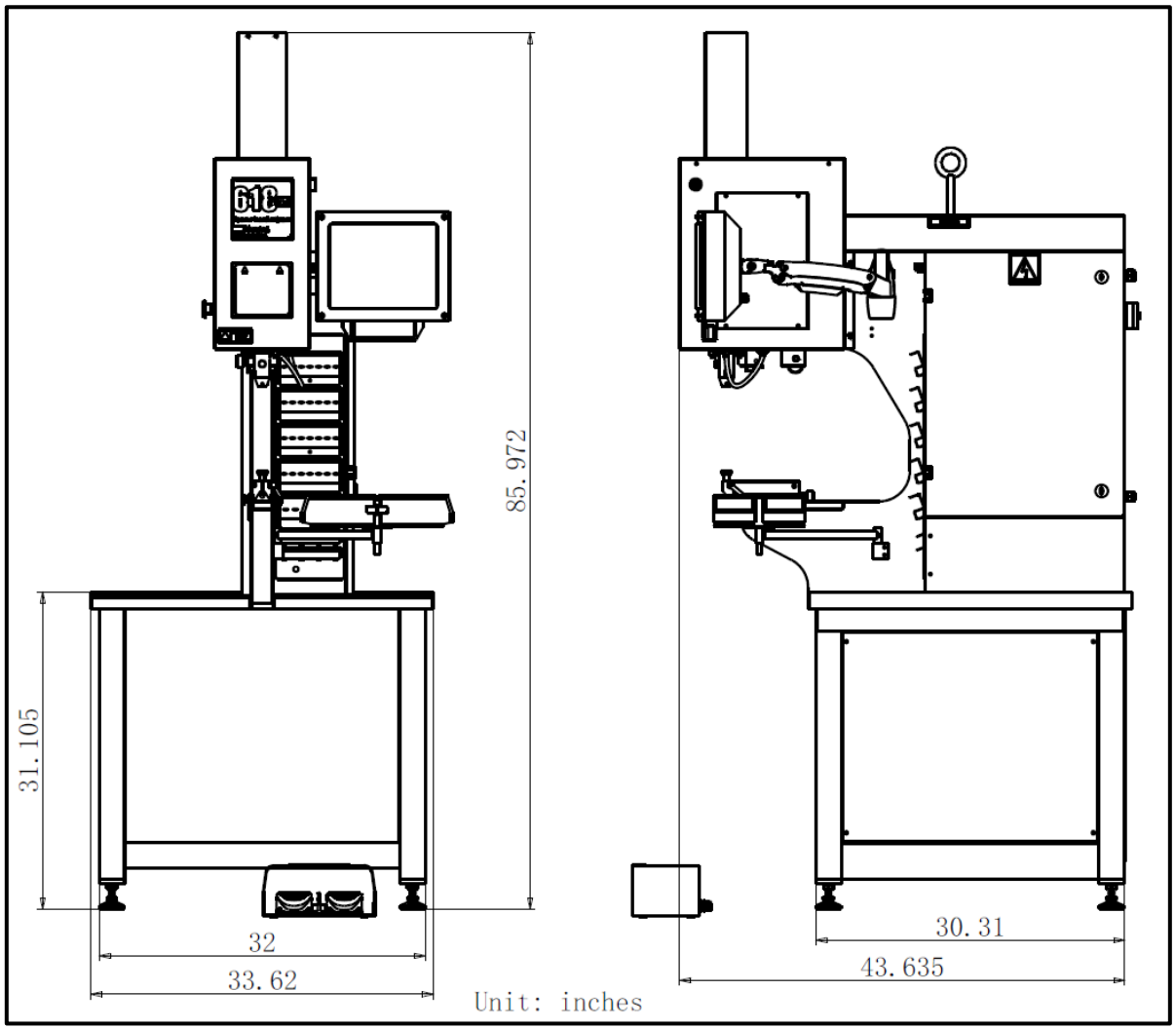

FIGURE 1-1

Dimensions of 618 Pro+ Hardware Insertion Machine

SAFETY

The Hardware Insertion Machine was designed to conform to applicable ISO, ANSI, OSHA, CEN and CSA safety standards.

MEASURES TO PREVENT MISOPERATION

- The equipment shall be provided with a permanent, clear and easily identifiable mark or signage. The signs or signs shall have the main characteristics required for safe use of equipment, such as rated parameters, connection mode, grounding mark, danger mark, special operation method and operation conditions, etc.

- Electrical control circuit with emergency stop button specified in safety requirements to prevent the occurrence of misoperation. At the same time, the device is equipped with interlock or limit protection device, safety grating, etc.

- Through the above safety device, if there is any wrong operation, the equipment will stop running in an emergency and send an alarm message the equipment can operate normally only after the warning information is processed.

- Riveting nuts approved by PEM shall be used in this equipment, and riveting workpiece on this equipment shall also be approved by PEM. PEM shall not be liable for any operation accident or loss caused by the use of rivet and rivet pressure parts not approved by PEM.

Please read and follow the safety precautions listed as below.

SAFETY PRECAUTIONS

- Always use safety goggles when operating or maintaining the Hardware Insertion Machine.
- Ear Protection is recommended.
- Always shut off the electrical power and remove the power cord before servicing the Hardware insertion machine.
- Before using the Hardware Insertion Machine, make sure that a shutoff device has been fitted on the air supply line and the location is easily accessible, so that the air supply to the Hardware Insertion Machine can be shut off in an emergency. Make sure that surge protection is installed in the electrical supply to the Hardware Insertion Machine.
- Check the air hose and fittings regularly for wear.
- Use only approved parts for maintenance and repairs.
- Do not use chipped, cracked or damaged accessories and tools.
- Attach airline securely.
- Keep body parts away from moving parts.
- Never wear jewelry, loose clothing or anything that could get caught in moving parts.
- If a new user is operating the pull riveting machine, be sure these instructions are readily available.
- Do not use the Hardware insertion machine in any way, other than for its intended purposes.
- Do not modify the Hardware insertion machine in any way.
- Fasteners are blown at a high velocity. Tubing must always be secured before machine is operated. Check integrity of tubing before use.
- Non-professionals are prohibited from disassembling this equipment.
- All personnel operating this equipment must be trained and qualified before they can take up the post of operation.

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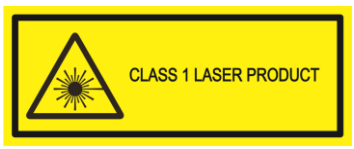
WARNING: Immediately upon receipt of your hardware insertion machine, establish a "Maintenance Code" for your supervisor/maintenance personnel only, as it is possible, however difficult, to operate the Hardware Insertion Machine without the standard safeguards in place in the Maintenance Mode. Only trained personnel should use the Maintenance Mode. PennEngineering is not responsible for improper maintenance mode procedures, which result in a loss of operation of the press or operator safety.

Label	Definition
	General Warning Label – There are items that require attention. These are specified in the operator's manual.
	Eye Protection Label – Eye protection must be worn when operating the press.
	Ear Protection Label – Ear protection must be worn when operating the pull riveting machine.
	Fastener Mandrel Point Label – Keep hands away from area.
	Electrical Shock/Electrocution Warning Label –Electrical shock hazard. Do not touch

OPTIONAL

Label	Definition
	**Class 1 laser product.** **Per EN 60825-1:** Class 1 laser products that are safe during use, including long-term direct intrabeam viewing, even when exposure occurs while using telescopic optics.

WARRANTY

PennEngineering® warrants that this product, when correctly used according to directions and under normal operating conditions, will be free from defects in material and workmanship for a period of one (1) year from the date of purchase.

This warranty shall not apply to any product which has been altered, changed or repaired, normal maintenance excluded, except as authorized by PennEngineering®. This warranty shall not apply to any product that has been subject to misuse, negligence or accident.

The purchaser's exclusive and sole remedy shall be limited to repair, modification or replacement at the discretion of PennEngineering®. In no event shall PennEngineering® be liable for the cost of any indirect or consequential damage. In no case shall PennEngineering® liability exceed the purchase price of the product.

This warranty is exclusive and in lieu of all other warranties. No oral or written information by PennEngineering®, its employees, representatives, distributors or agents shall increase the scope of the above warranty or create any new warranty.

Should any questions or problems arise concerning your Hardware Insertion Machine, contact the PennEngineering® Service Department. Toll-free telephone number +86(512) 5726-9310.

Set-up, Training and Repair Service is available to you as long as you own your Hardware Insertion Machine. Free telephone instruction and Service is available for the lifetime of your Hardware Insertion Machine by calling the PennEngineering® Service Department.

SECTION 2
IDENTIFYING AND LOCATING MAJOR COMPONENTS OF HARDWARE INSERTION MACHINE

Dentify the main components of the Hardware Insertion Machine.

This chapter introduces users to some of the main components of the Hardware Insertion Machine.

Main Frame

The frame is the structure of the hardware insertion machine. The main part of the frame consists of a solid steel structure with welded components forming the foundation, and other supporting parts. All components are directly or insightly installed on the frame.

Hydraulic cylinder

The riveting force of the hardware insertion machine is applied by the hydraulic cylinder, which is directly installed on the frame. The end of the piston rod of the main hydraulic cylinder is connected with a safety punch assembly, which will be described in Chapter 3.

Operator control

Except for the foot switch, all the control buttons of the operator are located on the door of the front chassis. These control buttons include touch screen, emergency stop button, power on (ON) button, power off (OFF) button, buzzer, and spotlight button.

- **Touch screen-** The touch screen is used for system operation, control, parameter setting and automatic feeding adjustment and configuration, user feedback and fault diagnosis. The touch screen can display text, and enables the operator to make selections by touching the buttons on different parts of the screen. To resume the operation of the screen, just touch anywhere on the screen. In Chapter 6 of this manual, the screen display in various situations is explained in detail.

- **Emergency stop button-**Press this button to disconnect the power supply to the quick exhaust/air supply valve (see the air supply input system on page 8). When the pressure is exhausted, all pneumatic actions are stopped. In an emergency stop condition, all outputs are shut down. The control system remains online and detects the emergency stop signal.

- **Power ON/OFF knob switch**- This knob switch can be used to turn on/off the power to the press control system, if the press power is on, then the green light of the electrical cabinet is on. If the power is cut off, it will also cut off the power of all moving elements including the quick exhaust/air supply valve.

- **RESET button**- Initializes the press, including applying pressure to the press and moving the ram to its retracted “home” position.

- **Foot switch**-The foot switch is a switch used by the operator to control the working cycle of the riveting machine. It frees the hands of the operator and can be used for the operation of the workpiece.

Hydraulic station

The hydraulic station is located in the base of the Hardware Insertion Machine. It is the actuator for pressure generation. It is mainly composed of an oil tank, a servo motor, an oil pump, a hydraulic valve block, an oil cooling mechanism, etc.

Electrical cabinet

Including different types of electrical components and power distribution terminals. The power switch and the foot switch are connected with the electrical cabinet. Electrical cabinet door latch with a key, is an electrical switch cabinet side. The electrical switch must be turned on (ON) before the riveting machine can be started. Once this switch is turned off, all power to the riveting machine is cut off. The plug of the power cord is inserted next to the switch. By unplugging the power cord, all power supplies of the riveting machine can be shut off during maintenance.

Vibration feeding system (Optional)

The vibrating feed system on the left side of the hardware insertion machine is used for the automatic feeding of fastened riveting parts. It is an electric drive device that can hold and move different types of fastening products. Connected to the vibrating plate are various types of tools so that the fastening rivets sent out of the hopper have their own directions of movement.

• Vibrating feeding controller-the amplitude or frequency of the vibrating plate is controlled by the vibrating feeding controller. The adjustment of amplitude and frequency is used to control the feeding rate and carry out the automatic feeding process.

Multi-Shuttle (Optional)

The air cylinder sliding assembly installed under the oil cylinder of the frame is used to support the multi-shuttle assembly. It can be matched with PEM standard screw, nut and stud multi-carrier platform tooling and vibration feeding system to send the products to be riveted to the riveting bar to complete the automatic riveting action.

Multi-Shuttle tooling (Optional)

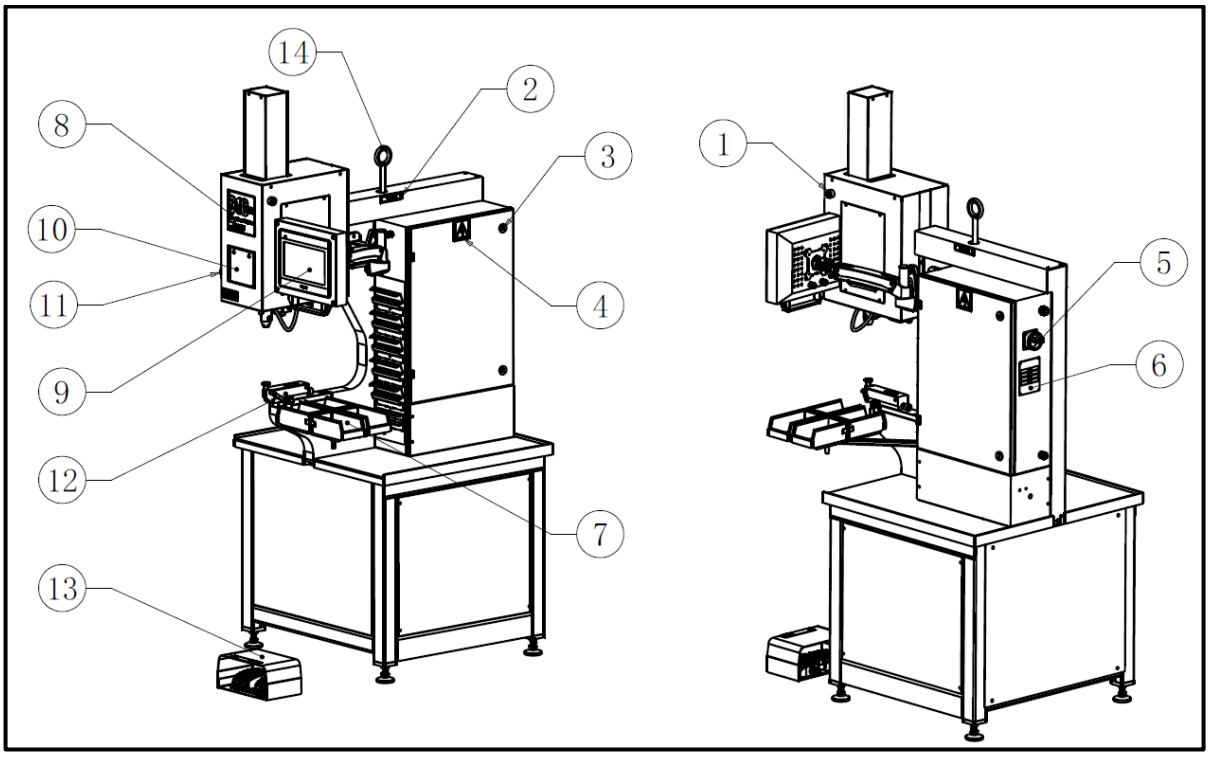
It is composed of vacuum anvil, lower tool, multi-module, flight pipe, tube connector and shuttle. Different types of PEM standard products correspond to different carrier platform tooling, and are used in conjunction with the feeding system and multi-carrier platform.

Air supply input system (Optional)

The compressed air is input to the riveting machine through a system behind the machine. The system includes an air combination element (including a residual pressure relief three-way valve, a Soft Start-up Valve, a filter pressure reducing valve and an oil mist separator). The filter regulator pressure provided manually to control the pressure of the gas supply line. Open the residual pressure release three-way valve and Soft Start-up Valve to provide air source for the riveting machine. When the residual pressure release three-way valve or Soft Start-up Valve is closed, all the compressed air downstream of the riveting machine is quickly discharged.

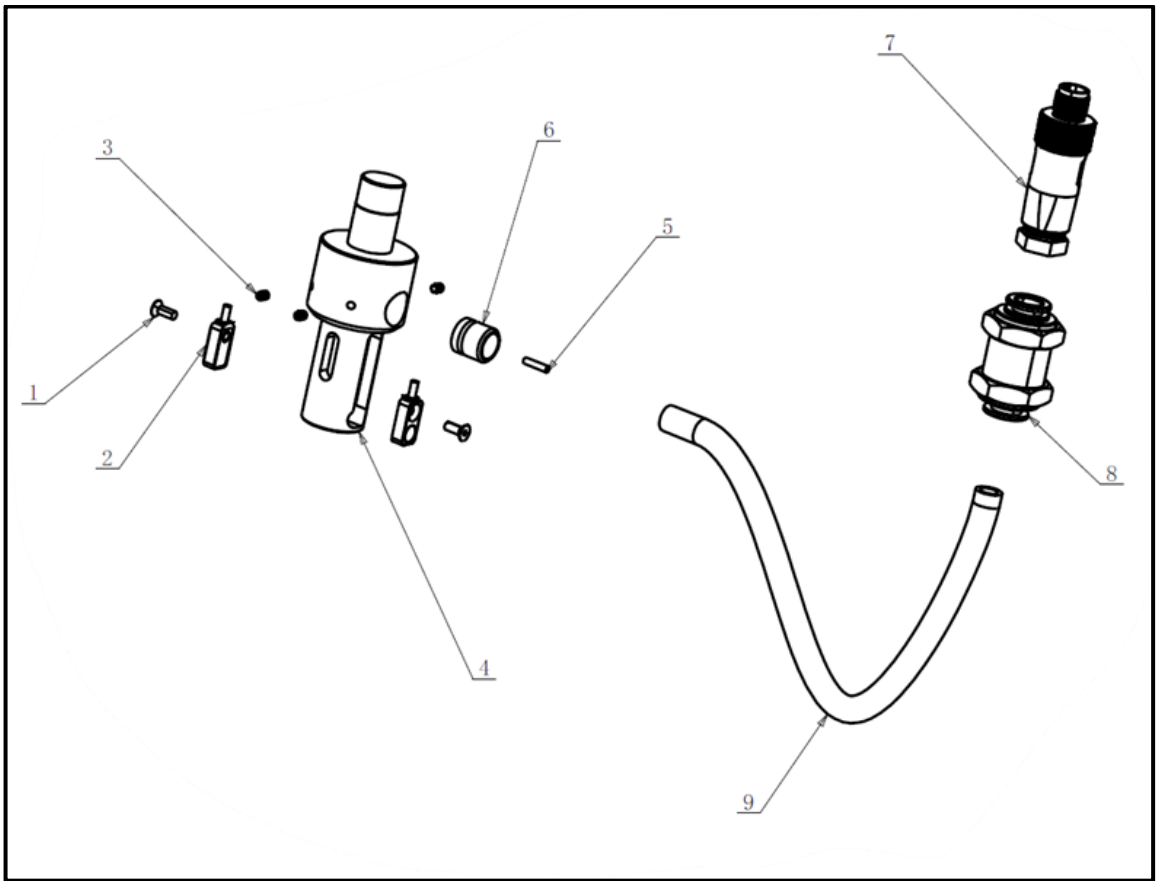
Laser Part Locating Light (Optional)

Provides a highly visible, easy-to-read, red beam of light over the lower tool to aid the operator in locating holes on larger parts. Increases productivity and decreases operator fatigue.



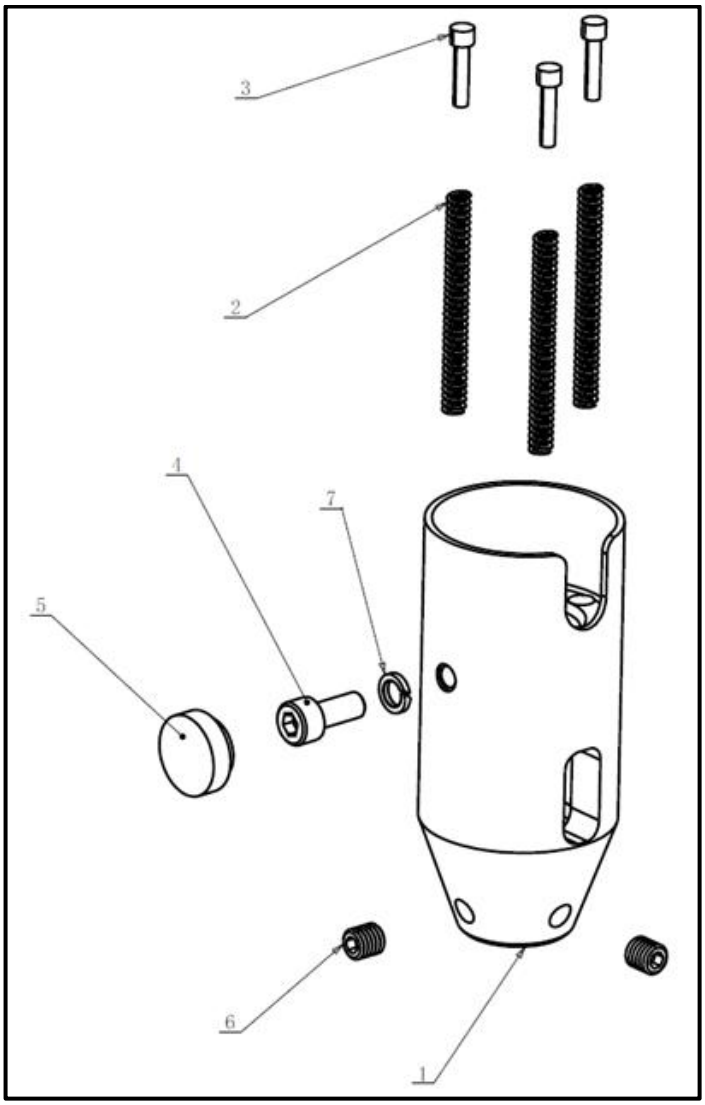
NO.	Part Number	DESCRIPTION	Quantity
1	MDS026130001	Buzzer	1
2	11-00515	LIFT HERE LABEL- ENGLISH	2
3	11-00232	DOOR LATCH, ALL MACHINES	2
4	C-16-00180	ELECTRIC SHOCK WARNING LABEL	1
5	PS190174	Electric door switch	1
6	10-01359	NAMEPLATE, ALL MACHINE	1
7	15-01293	PART BIN 7X4 RED	4
8	MDS162930009	618 Pro+ identification plate	1
9	MDS024930006	HMI touch screen	1
10	11-00361	Never Label- English	1
11	PS190172	Emergency button	1
12	H-166-8	618/824 LOWER TOOL HOLDER ASSY	1
13	H-1111	FOOTSWITCH ASSY. DUAL PEDAL	1
14	11-00186	3/4-10 X 6 GALV. EYEBOLT W/ SHOULDER	1

FIGURE 2-1
The components of 618 Pro+ Hardware Insertion Machine



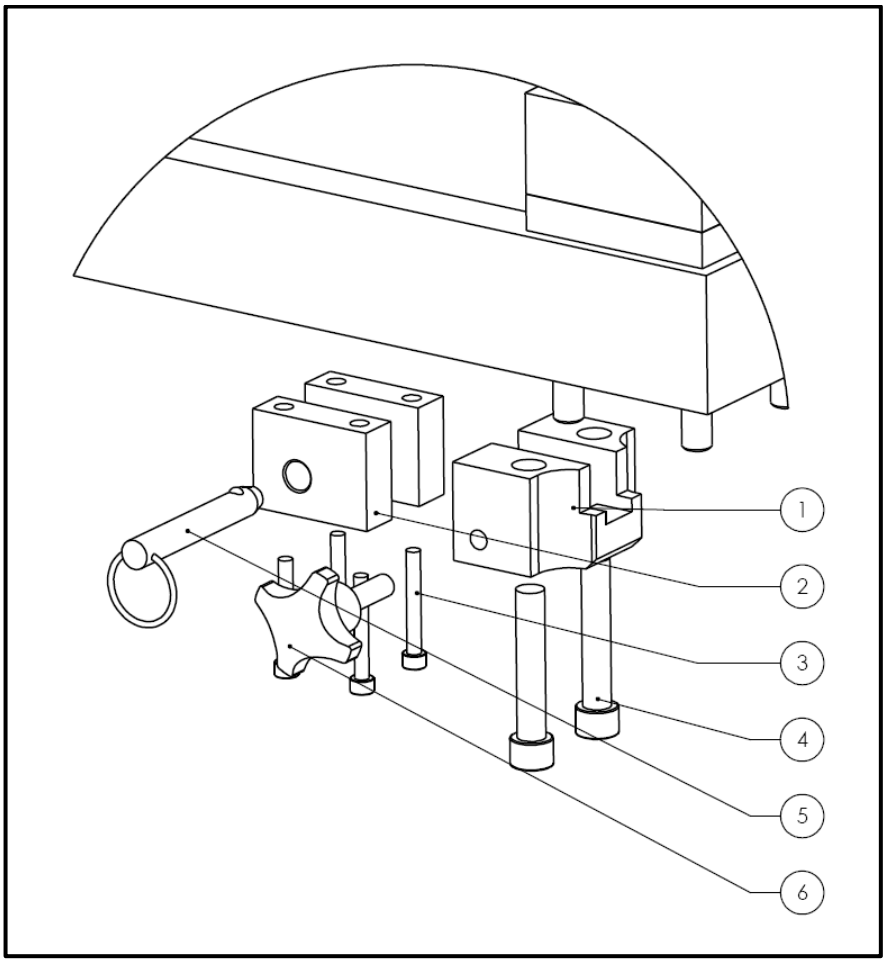
NO.	Part Number	DESCRIPTION	Quantity
1	15-01708	FHSCS, M3 x 0.5 x 8mm, Steel,	2
2	PS210815	SAFETY SENSOR of LEFT, TURCK, NO	2
3	H-3892	SSS, M3 x 0.5 x 4mm	3
4	PS210799	RAM ADAPTER, SAFETY SENSOR, 2nd GEN	1
5	10-00765	FERRULE, 18 GA, YELLOW	1
6	PS210801	BUSHING, 3/8" ID×1/2" OD	1
7	15-01450	CONNECTOR, 5 PIN, MALE	1
8	15-03209	FITTING, 3/8", BULKHEAD UNION	1
9	15-03208	HOSE, 3/8", AIR	1

FIGURE 2-2
Dual Safety Sensor Assembly



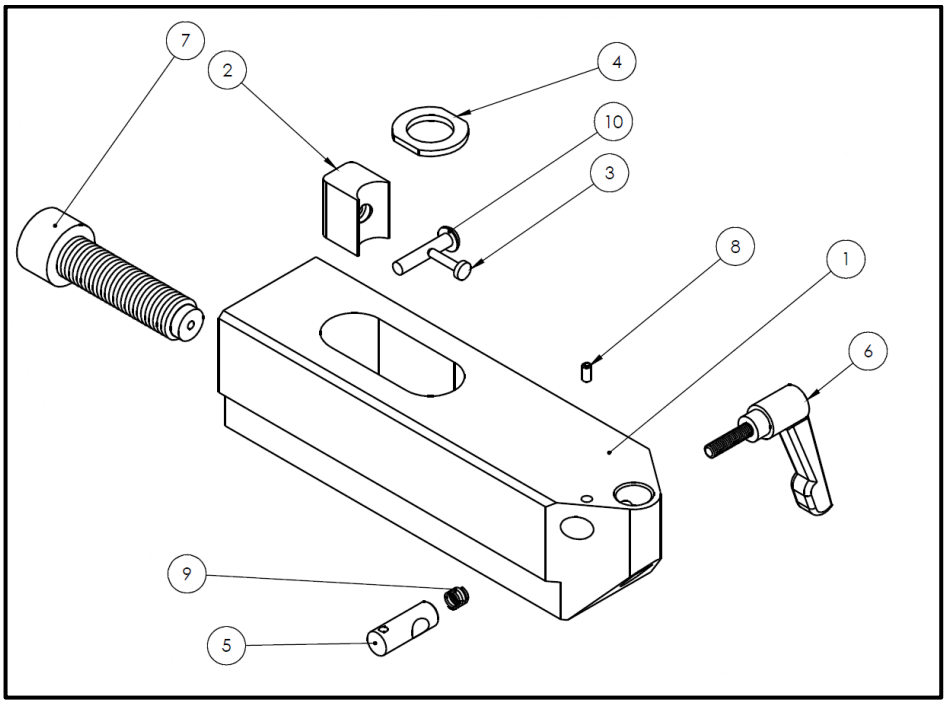
NO.	Part Number	DESCRIPTION	Quantity
1	MDS101430001	BODY, UPPER TOOL HOLDER, SAFETY SENSOR	1
2	15-03206	Continuity Spring	3
3	11-00016	CONTINUITY GUIDE PIN (BRASS)	3
4	H-3738	SHCS, M5 x 0.8 x 12mm	1
5	11-00241	Knob, Knurled, SHCS M5	1
6	11-00242	SSS M6 x 1.0 x 6mm	2
7	15-01392	WASHER, LOCK, M5, STEEL, ZINC	1

FIGURE 2-3
Dual Safety Sensor Assembly



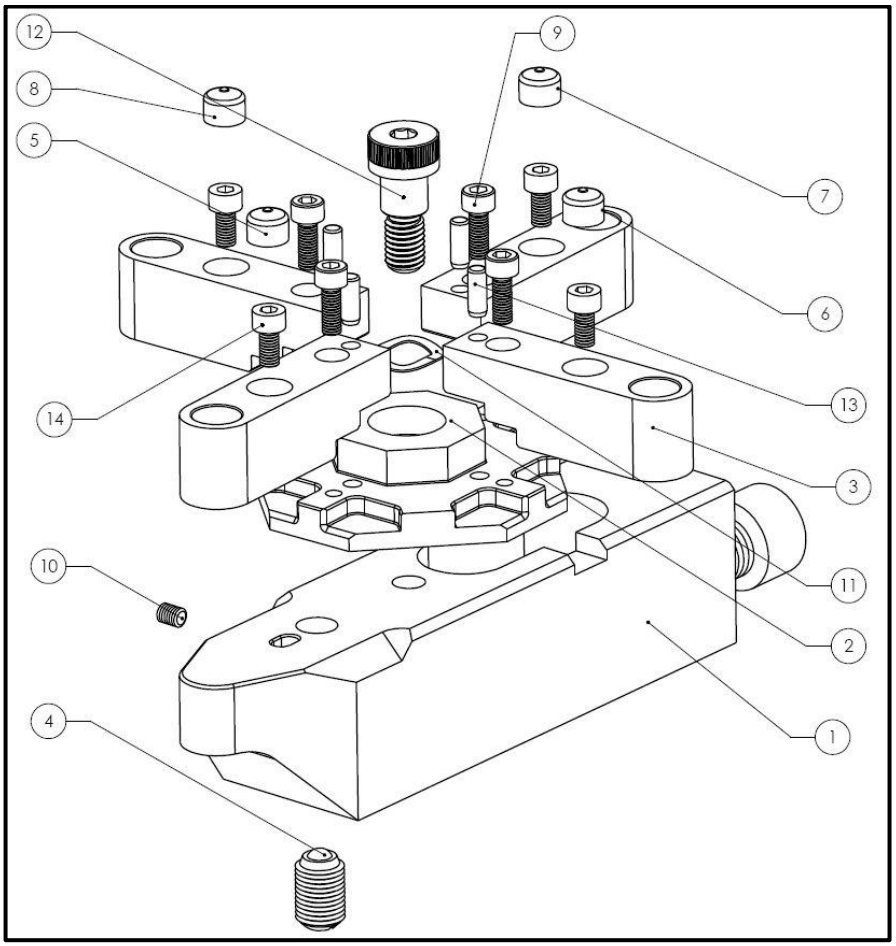
NO.	PART NUMBER	DESCRIPTION	Quantity
1	10-00003	618/618XL FRONT J-FRAME MTG. BRACKET	1
2	10-00002	618/618XL REAR J-FRAME MTG. BRACKET	2
3	10-01180	SHCS M6 X 1.0 X 45MM STAINLESS STEEL	4
4	10-01325	SHCS M12-1.75 X 65 LG	2
5	11-00581	QUICK RELEASE PIN 1/2 X 2 1/2"	1
6	11-00580	STAR KNOB, M10 X 35MM, PITCH	1

FIGURE 2-4
Quick Mount Assembly



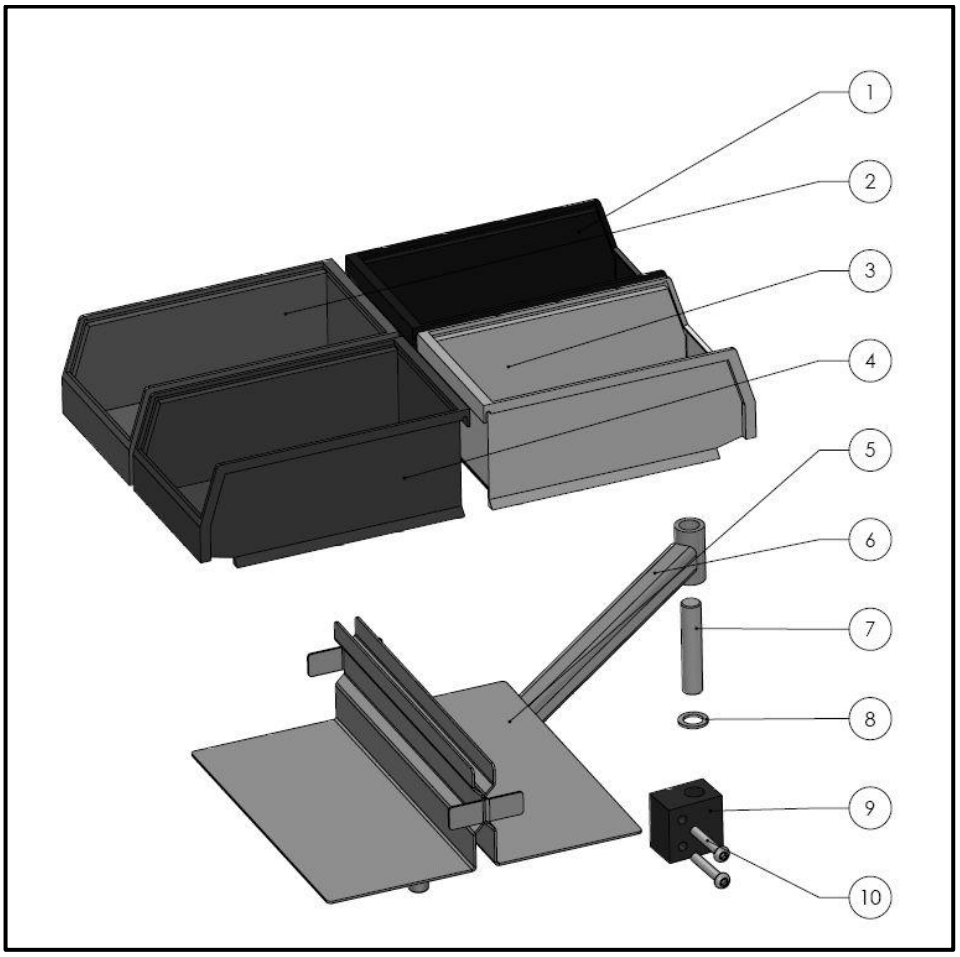
NO.	PART NUMBER	DESCRIPTION	Quantity
1	H-166-9	BODY, COMMON LOWER TOOL HOLDER	1
2	H-169-4	Shoe For Lower Tool Holder	1
3	H-169-5	Pin For Lower Tool Holder	1
4	H-169-6	Lower Tool Washer	1
5	11-00041	Lock Cylinder	1
6	11-00042	Black Locking Lever SERVICE ONLY	1
7	11-00191	SHCS, M16 Modified	1
8	11-00199	Pin, Spring, Slotted, 1/8" x 1/4", Steel, Zinc Plated	1
9	11-00212	Lock Cylinder Spring Music Wire	1
10	H-3731	BHSCS, M5 × 0.8 × 25mm, Steel, Black Oxide	2

FIGURE 2-5
Standard Lower Tool Holder



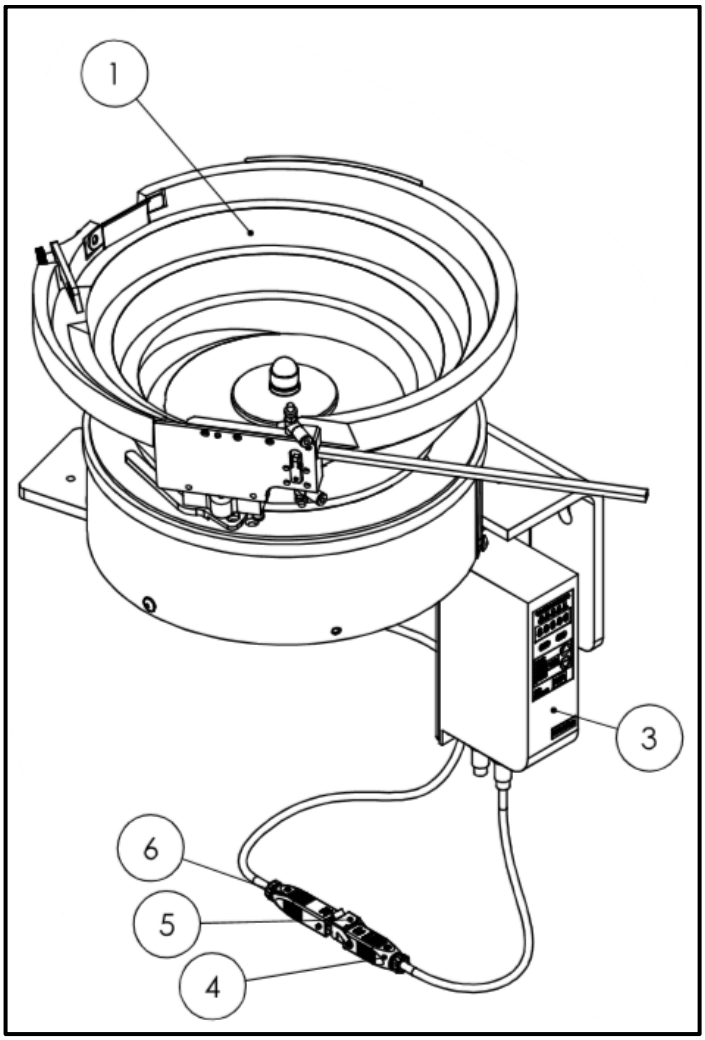
NO.	Part Number	DESCRIPTION	Quantity
1	15-01307	TIS Lower Tool Holder Assembly	1
2	15-01287	TIS-1, Center Hub	1
3	15-01288	TIS -1, Lower Tool Arm	4
4	15-01306	SPRING PLUNGER W/OUT NYLOCK 1/2-13 .75L .072 P .281 B Dia	1
5	15-01296	ROUND VINYL CAP GREEN 23 .320×1/16"	1
6	15-01297	ROUND VINYL CAP RED .320×1/16"	1
7	15-01298	ROUND VINYL CAP YELLOW .320×1/16"	1
8	15-01295	ROUND VINYL CAP BLUE 40 .320×1/16"	1
9	15-00450	SHCS, M5×0.8×14mm, Stainless Steel	4
10	11-00238	SSSCPP, M5×0.8×6mm, Steel, Black Oxide	1
11	15-01305	Washer, Wave, 1/2" (.51"x.76"x.02"), Steel, Plain	1
12	15-01304	SHOULDER SCREW 12MM HD DIA 18mm HT 8mm M10 16mm LG	1
13	15-01310	Pin, Dowel, Oversized, 3/16" (+.001")×1/2", Steel, Plain	4
14	15-00482	SHCS, M5 x 0.8 x 10mm, Stainless Steel	4

FIGURE 2-6
Turret Insertion Tool (Optional)

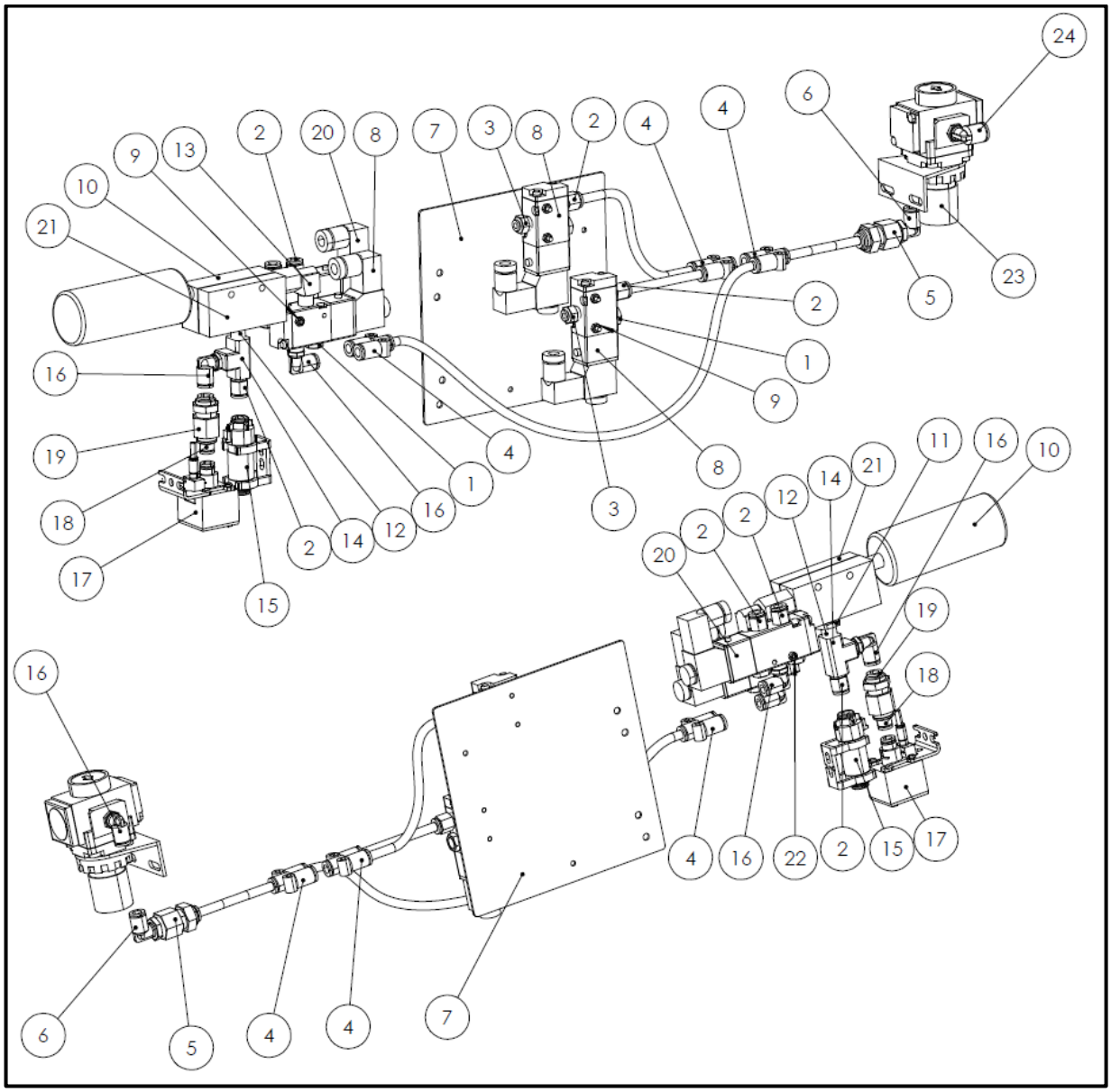


NO.	Part Number	DESCRIPTION	Quantity
1	15-01291	PART BIN 7×4 DARK BLUE FOR TIS ONLY	1
2	15-01292	PART BIN 7×4 MEDIUM GREEN FOR TIS ONLY	1
3	15-01294	PART BIN, 7×4, (YELLOW)	1
4	15-01293	PART BIN 7×4 RED	4
5	15-01299	WELDMENT, TIS BIN BRACKET	1
6	10-00152	618/618×1 Service Tray Arm	1
7	10-00159	1/2×2 1/2 Dowel Pin	1
8	10-00160	Bearing, Thrust, ID.507×OD.750 ×THK 1/16, Bronze	1
9	10-00153	618 Service Tray Bracket	1
10	11-00192	BHSCS, M6×1.0×35mm, Stainless Steel	2

FIGURE 2-7
Service Tray Assembly



NO.	Part Number	DESCRIPTION	Quantity
1	15-40015	Assy, MAS 350	1
3	MDS020630001	Voltage and frequency modulation feeding controller	1
4	MDS026930001	Rectangular Connectors (ST)	1
5	MDS026930002	Safety bracket	1
6	MDS026930003	Rectangular Connector (ST, Male)	1
FIGURE 2-8 MAS 350 automatic feeding assembly (Optional)			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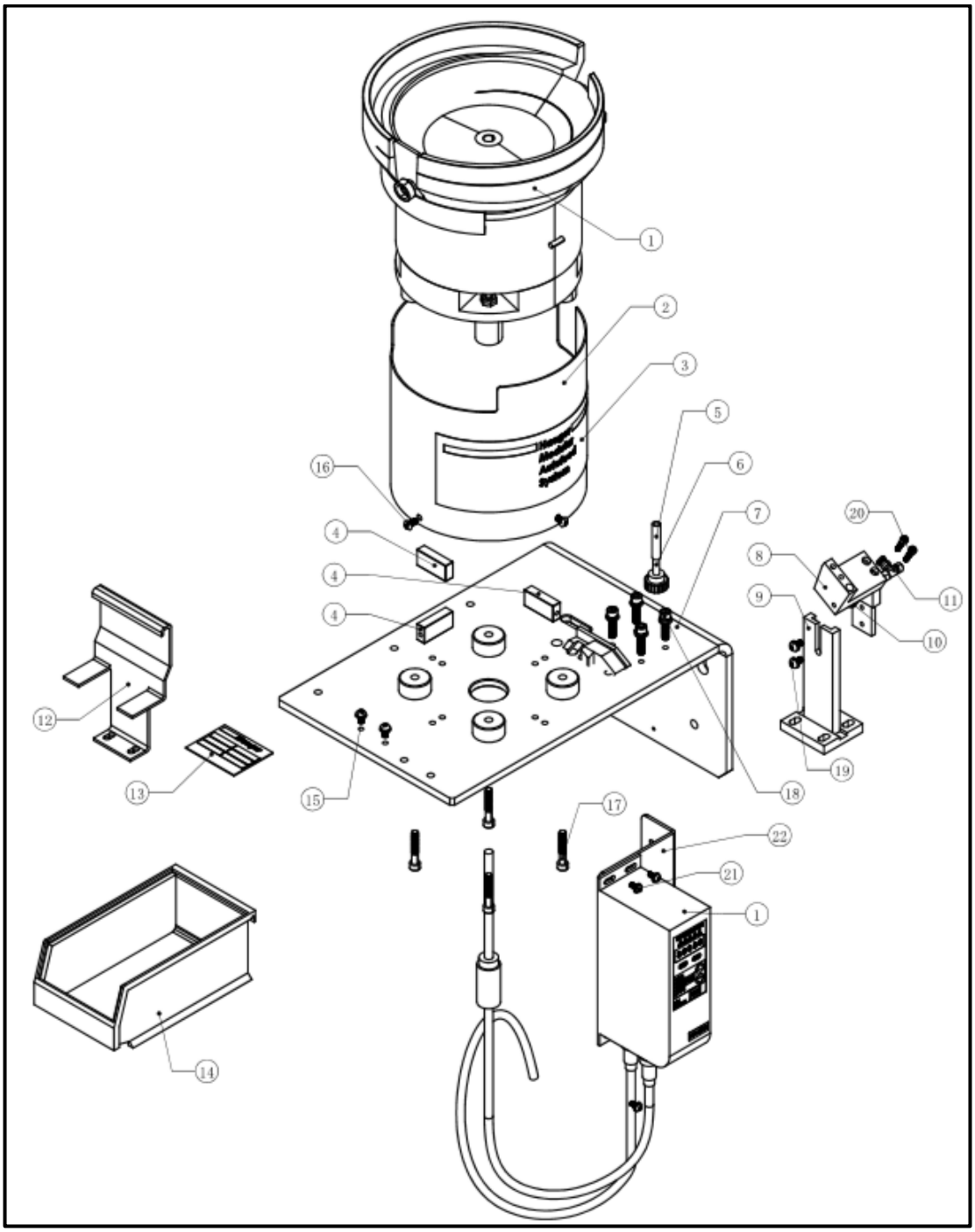
NO.	PART NUMBER	DESCRIPTION	Quantity
1	10-00210	BREATHER, 1/8", BRASS	5
2	14-00638	AIR FITTINGS 1/8" NPT X 1/4" T	5
3	15-03573	MALE CONNECTOR (5/32"OT-1/8NPT)	2
4	15-00275	FITTING, "Y", 1/4"	3
5	15-01893	FITTING, BULKHEAD 1/4 TUBE X 1/4 NPT	1
6	8009320	ELBOW 1/4NPT TO 1/4 OD TUBE	1
7	MDS100130138	ADAPTER, SOLENOID VALVE, Pro	1
8	11-00587	24V SOLENOID VALVE	3
9		NUT, M3	5
10	11-00589	VACUUM GENERATOR W/ SILENCER	1
11	15-01325	FITTING: BUSHING BRASS 1/4 MALE NPT X 18 FEMALE NPT	1
12	10-00209	1/8" BRASS CL. NIPPLE 112A-2	2
13	H-5021	STREET ELBOW, 1/8 FEMALE X 1/8	1
14	10-00211	1/8" BRASS TEE	1
15	15-03703	AIR FILTER, VACUUM GENERATOR, WT/OT-4HE CE & MSPE	1
16	H-5020	SWIVEL ELBOW, 90 DEG, 1/8 NPT X 1/4 TUBE	4
17	PS210784	2-color display high-precision digital pressure switch	1
18	MDS012130004	Straight connector with hexagon socket Φ6-Rc1/4	1
19	MDS012130003	Bulkhead Connector Φ1/4-Rc1/4	1
20	MDS011830017	Two-position five-way solenoid valve	1
21	15-03611	ADAPTER, VACUUM GENERATOR, MSP	1
22	MDS012930424	SHCS M3-0.5 x 40 LG	1
23	15-03684	AIR REGULATOR, 1/8 NPT PORT WT,MSPe,OT-LITE (-4,-5)	1
24	PS210856	Male Elbow 5/16"TUBE×NPT1/8"	1

FIGURE 2-9
Assembly of Vacuum Ejector for MAS 350 (Optional)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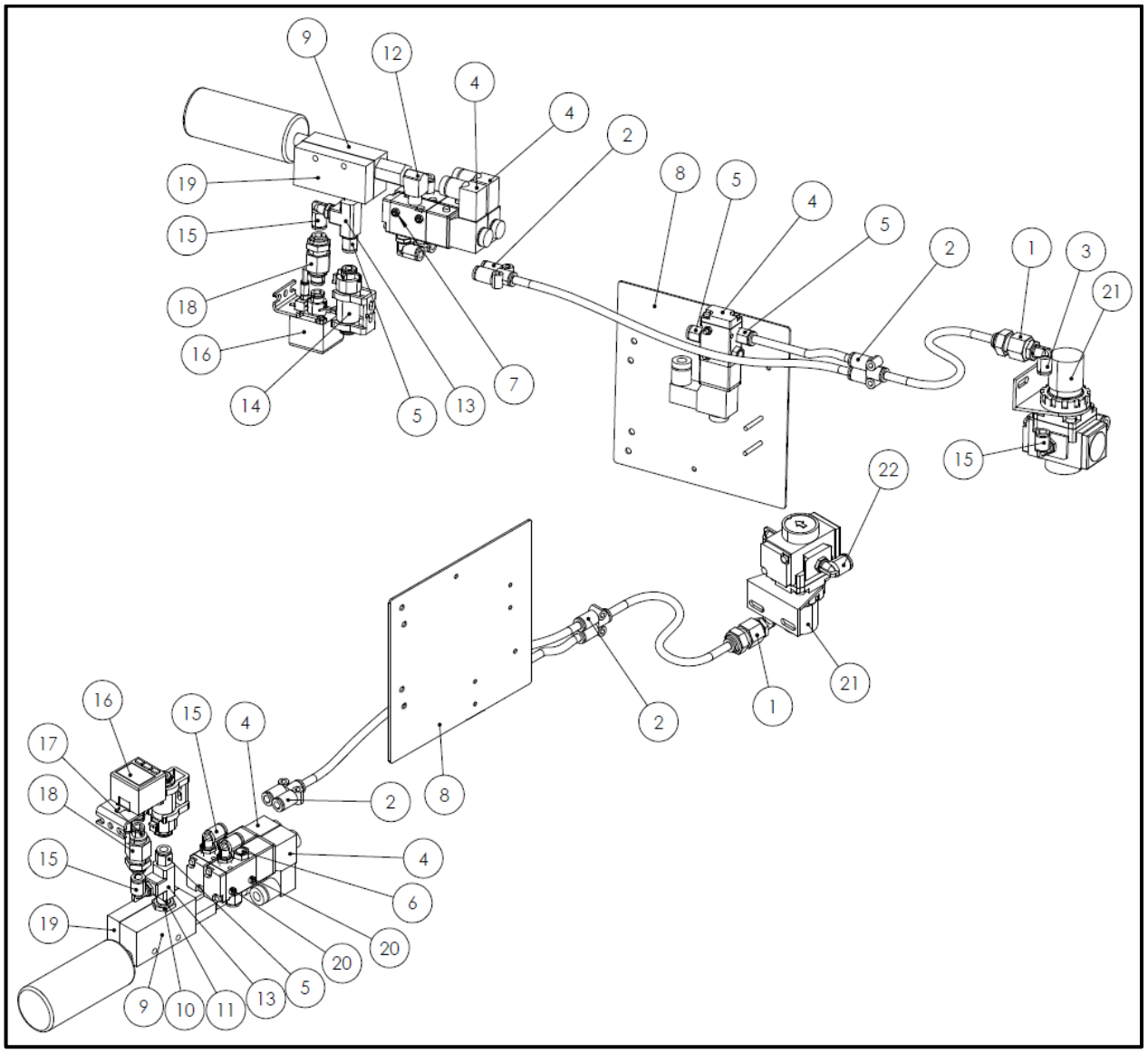
NO.	PART NUMBER	DESCRIPTION	Quantity
1	MDS010630007	9-inch nylon vibration device with controller	1
2	MDS100630006	Protective cover	1
3	10-00256	MODULAR AUTOFEED SYSTEM LOGO (2.5" X 11")	1
4	MDS160630001	Fixed block	4
5	15-00285	AIR TUBE, BLACK 95A, 1/4" X .1	1
6	15-01320	SIX LOBE KNOB W/55MM SCREWM5 * 0.8 SCREW	1
7	MDS100630005	Vibration device fixing plate	1
8	H-3357-3	SING. BRACKET UPPER PLATE WELDMENT	1
9	H-3357-1	SING. BRACKET LOWER PLATE WELDMENT	1
10	C-10-01344	Elbow, (Straight) 1/8 NPT/6mm	1
11	MDS012030047	Mini push-lock speed regulating valve	1
12	H-3343	EXIT TRAY BRACKET WELD.	1
13	H-3621	SERIAL PLATE FOR MAS	1
14	15-01293	PART BIN 7X4 RED	1
15	8012127	BHCS M5-0.8 x 12 LG	2
16	8012127	BHCS M5-0.8 x 12 LG	4
17	8010569	SHCS M6-1.0 x 35 LG	4
18	8010076	SHCS M6-1.0 x 25 LG	4
19	8012127	BHCS M5-0.8 x 12 LG	2
20	8015063	SHCS M4-0.7 X 16 LG	2
21	8013567	BHCS M4-0.7 x 10 LG	2
22	MDS160130002	Digital frequency modulation vibration controller connection board	1

FIGURE 2-10
MAS 9 automatic feeding assembly (Optional)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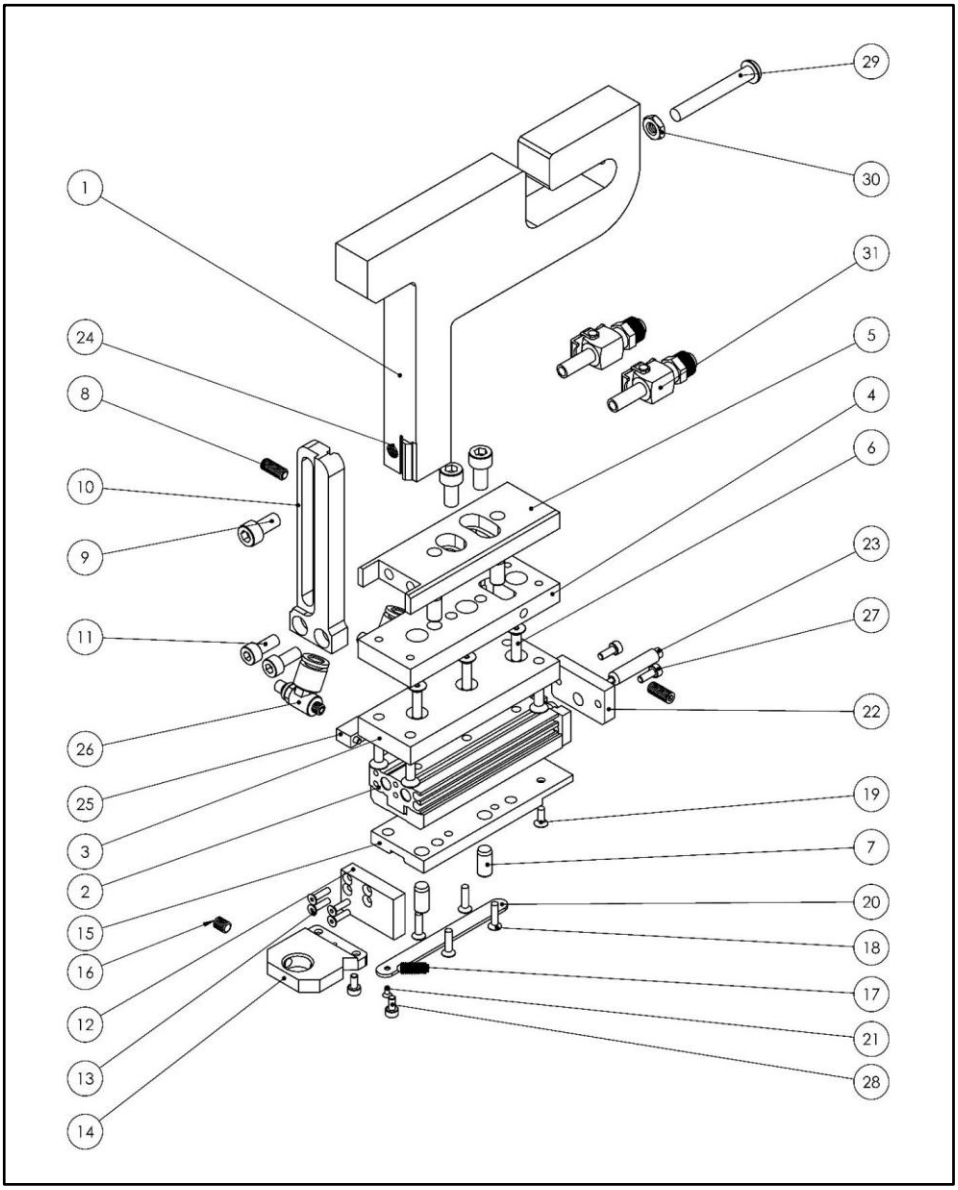
NO.	PART NUMBER	DESCRIPTION	Quantity
1	15-01893	FITTING, BULKHEAD 1/4 TUBE X 1/4 NPT*	1
2	15-00275	FITTING, "Y", 1/4"	2
3	8009320	ELBOW 1/4NPT TO 1/4OD TUBE	1
4	11-00587	24V SOLENOID VALVE	3
5	14-00638	AIR FITTINGS 1/8" NPT X 1/4" T	4
6	10-00210	BREATHER, 1/8", BRASS	3
7		Nut, M3	4
8	MDS100130138	ADAPTER, SOLENOID VALVE, Pro	1
9	11-00589	VACUUM GENERATOR W/ SILENCER	1
10	15-01325	FITTING: BUSHING BRASS 1/4 MALE NPT X 18 FEMALE NPT	1
11	10-00209	1/8" BRASS CL. NIPPLE 112A-2	2
12	H-5021	STREET ELBOW, 1/8 FEMALE X 1/8	1
13	10-00211	1/8" BRASS TEE	1
14	15-03703	AIR FILTER, VACUUM GENERATOR, WT/OT-4HE CE & MSPE	1
15	H-5020	SWIVEL ELBOW, 90 DEG, 1/8 NPTX 1/4 TUBE	4
16	PS210784	2-color display high-precision digital pressure switch	1
17	MDS012130004	Straight connector with hexagon socketΦ6-Rc1/4	1
18	MDS012130003	Bulkhead Connector Φ1/4-Rc1/4	1
19	15-03611	ADAPTER, VACUUM GENERATOR, MSP	1
20	MDS012930424	SHCS M3-0.5 x 40 LG	1
21	15-03684	AIR REGULATOR, 1/8 NPT PORT WT, MSPe, OT-LITE (-4, -5)	1
22	PS210856	Male Elbow 5/16"TUBE×NPT1/8"	1

FIGURE 2-11
Assembly of Vacuum Ejector for MAS 9 (Optional)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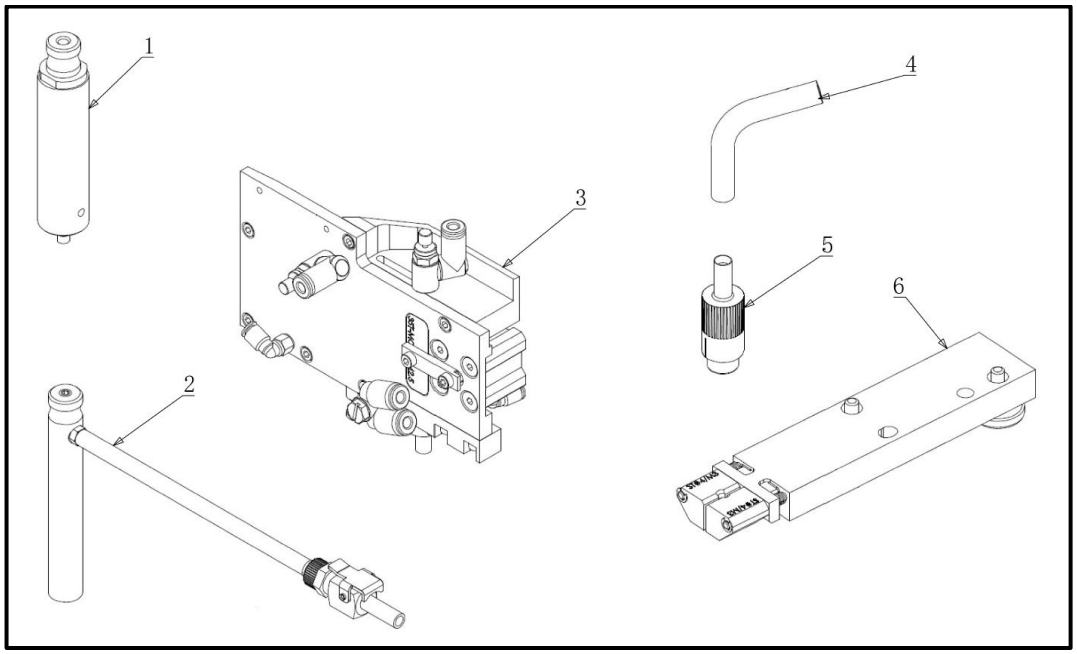
NO.	PART NUMBER	DESCRIPTION	Quantity
1	15-03623	T-BRACKET, MSP, MULTISHUTTLE	1
2	15-01870	SLIDE TABEL, MXS6, MULTI-SHUTTLE	1
3	15-02883	INSULATOR PLATE, MULTI-SHUTTLE	1
4	15-02881	ALIGNMENT PLATE, MULIT-SHUTTLE	1
5	15-02882	MOUNTING PLATE, MULTI-SHUTTLE	1
6	15-00305	FHC, M4 X 0.7 X 16MM	4
7	15-01754	DOWEL PIN, ¼ " X ½ ", HARDENED STEEL	4
8	H-3871	SHSS, M5 X 0.4 X 12MM, BLACK OXIDE ALLOY STEEL	2
9	H-3815	SHCS, M6 X 1.0 X 12MM	3
10	15-02884	ALIGNMENT TRACK, MULTI-SHUTTLE	1
11	H-3738	SHCS, M5 X 0.8 X 12MM, BLACK OXIDE	2
12	15-01546	TUBE CONNECTOR MOUNT	1
13	15-01974	M2.5 X 0.45 X 10MM STEEL SHFS	4
14	15-01557	MOUNT, TUBE CONNECTOR	1
15	15-01852	MODULAR PLATE, MULTI-SHUTTLE	1
16	11-00238	SHSS, M5 X 6MM, BLACK OXIDE	1
17	H-3681	SPRING PLUNGER, M5, STEEL	1
18	15-02057	FHCS, M3 X 0.5 X 10MM	6
19	15-01708	FHCS, M3 X 0.5 X 8MM	2
20	15-01558	LID, TUBE CONNECTOR	1
21	15-01709	FHCS, M2 X 0.4 X 4, BLACK OXIDE	1
22	15-02513	SPRING BLOCK, MULTI-SHUTTLE	1
23	15-01867	SHOCK ABSORBER, MULTI-SHUTTLE	1
24	15-03552	M6 HELICOIL	1
25	15-02048	STOP FOR SLIDE TABLE	1
26	15-01172	FLOW CONTROL ELBOW, 10-32 X ¼, METER OUT	2
27	H-3872	SHCS, M3 X 0.5 X 8MM, BLACK OXIDE	2
28	H-3873	SCHS, M3 X 0.5 X 6MM, BLACK OXIDE	8
29	15-00898	BHSCS, M6 X 1.0 X 45MM	1
30	11-00300	HEX NUT, M6	1
31	H-2535	QUICK DISCONNECT, 1/4"	2

FIGURE 2-12
15-03624 ASSY, Multi-Shuttle (Optional)



NO.	DESCRIPTION
1	Lower Tool
2	Vacuum Anvil
3	Multi-Module
4	Flight tube
5	Tube Connector
6	Shuttle

FIGURE 2-13
Multi-shuttle stud tooling (Optional)

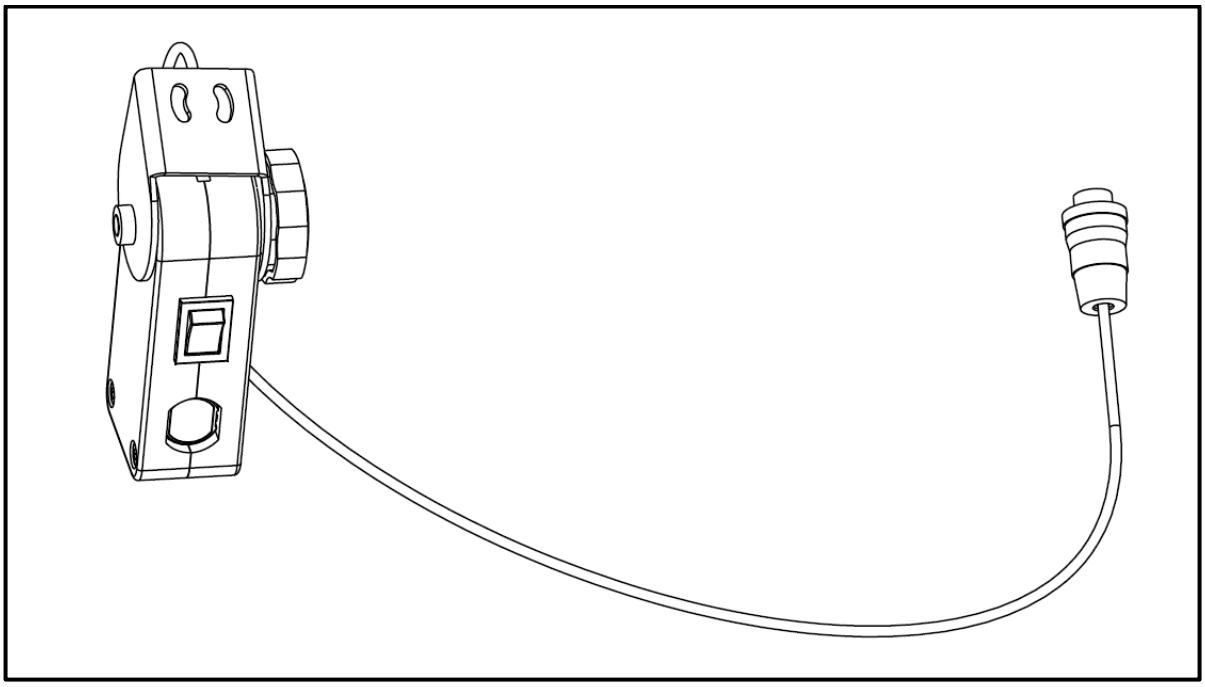


FIGURE 2-14
15-01801 Laser Part Locating Light (Optional)

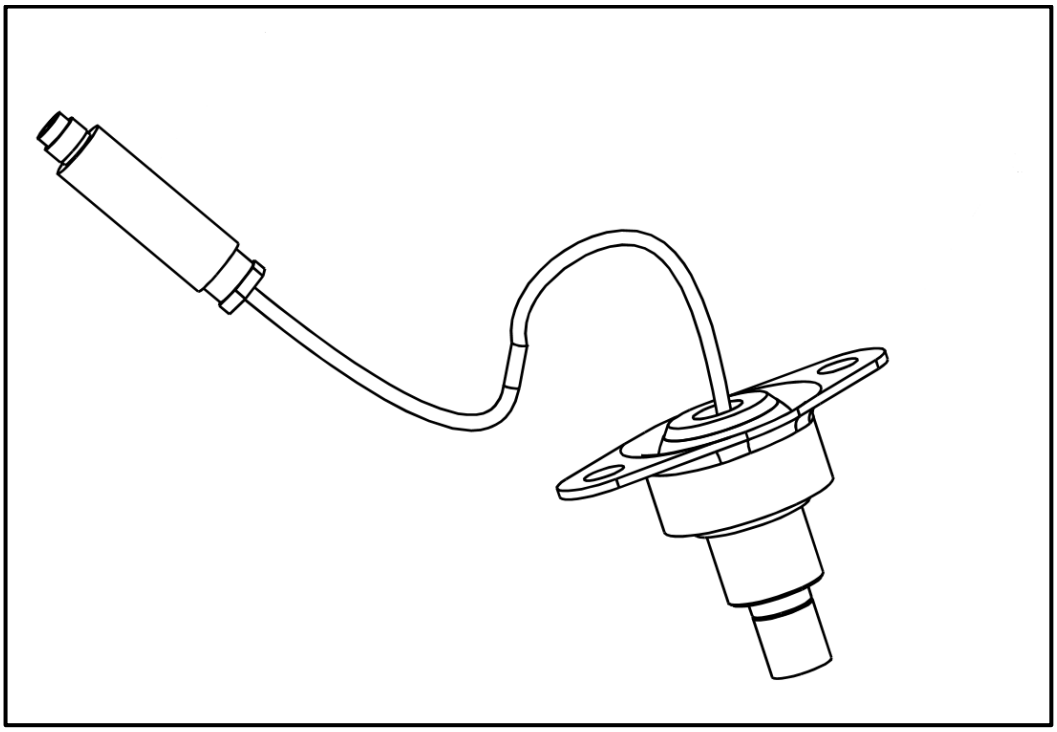


FIGURE 2-15
MDS100920002-SPOTTING LIGHT ASSY (CLASS 2) (Optional)

SECTION 3
SAFETY SYSTEM OPERATION

WARNINGS - To avoid injury:

1. Always shut off the electrical power, and remove the power cord, before servicing this machine.
2. Only authorized and trained personnel should maintain, repair, setup, or operate this equipment.
3. Always use eye protection when operating or maintaining the pull riveting machine.

3.1 SYSTEM SAFETY FEATURES

1. Turning off the electrical power, with either the "OFF" push-button, the ON/OFF switch, or pushing the E-Stop button, will cause the electric quick exhaust/supply valve to exhaust all air pressure in the Hardware Insertion Machine. WITHOUT ANY CONTAINED PRESSURE, ALL PNEUMATIC MOTION STOPS.
2. The electrical cabinet has been locked with a key to prevent unauthorized personnel from opening it.
3. Has a first-level password protection measure for safe access.

3.2 SECURITY OF USAGE MODE

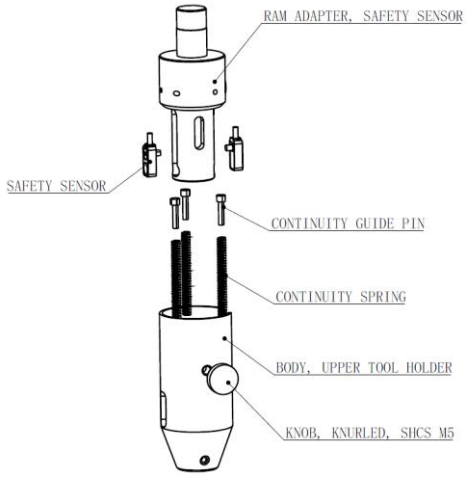
Conductive Mode

When the Safety System detects a non-conductive material between the Upper and Lower Tools, the Upper Tool's downward motion reverses immediately and returns to its' Up position.

Non-Conductive Mode

The Upper Tool's downward motion stops when any material is placed between the Upper and LowerTools. If the Down Footswitch is depressed a second time after the Upper Tool has stopped, the machine continues the hardware insertion cycle. It applies the machine's set down force to the material. The Upper Tool then returns to its Up position.

In both Conductive and Non-Conductive modes, the Safety System relies on the Safety Switch inside the Cylinder Adapter (see Following Figure), and position monitoring fulfilled by the Tooling Protection System (TPS). The Upper Tool Holder Retainer Screw secures the Upper Tool Holder to the Cylinder Rod. There is a black serrated knob on this Retainer Screw. It enables the Upper Tool Holder to move up on the Cylinder Ram Adapter .45 in/11.4 mm. To move up, the Upper Tool Holder must overcome the light force of the Continuity Spring.



If the Upper Tool Holder moves up .015 in/0.4 mm to 0.02 in/0.5 mm, the Safety Sensor will lose the target in the upper tool holder. Sensors should change state simultaneous otherwise the machine will bring the ram up.

In order to continue in the down motion of the ram the following conditions must be met in conductive mode:

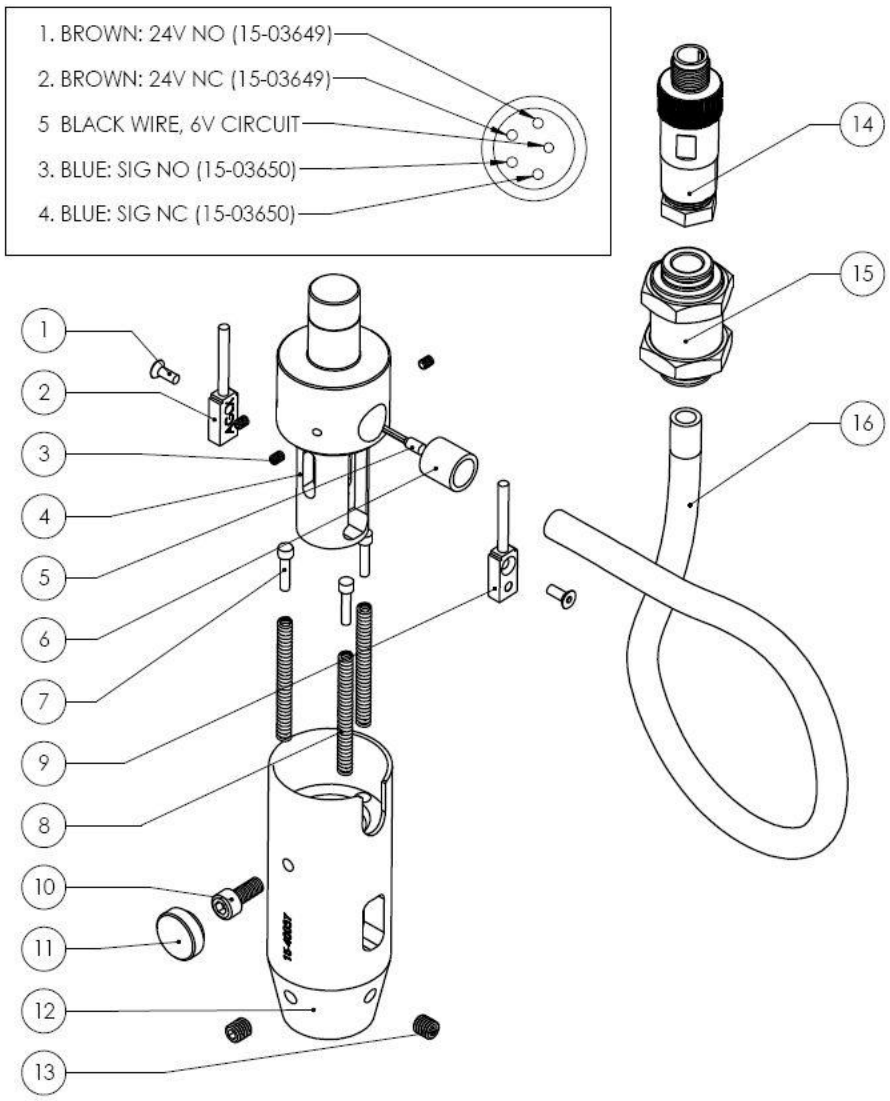
- Conductivity detected between the upper and lower tool.
- Within safe position set by the TPS.

Or in non-conductive mode:

- Foot pedal must be released and pressed a second time.
- Within safe position set by the TPS.

Before each cycle the state of the 2 sensors in the ram adapter are monitored by the dedicated Safety Controller to ensure the upper tool holder is installed, and in released state.

In operation, when the Safety Sensors is actuated in Conductive Mode and a non-conductive material is between the Upper and Lower Tools, the Upper Tool Holder's downward motion is reversed immediately and returns to its Up position. If the Safety Sensors is actuated and a conductive material is between the Upper and Lower Tools, the machine will continue the hardware insertion cycle if inside the TPS window. The machine will apply the set down force to the conductive material between the Upper and Lower Tools and then return to its Up position.



Warning-Do not tamper with any part of the Safety System. The Haeger Hardware Insertion Machine will not operate properly if any part of the Safety System is removed or damaged.

Warning - Never test or demonstrate the Safety System by placing any portion of your body between the Upper and Lower Tools.

Warning - When operating the machine in the Non-Conductive Mode, be very careful. Do not press the Down Footswitch a second time with any portion of your body near the tooling.

Warning - The heavy-duty, retractable Safety Electrical Cord is very durable, but caution should be taken when working close to the edges of deep cans. Operating with the Safety System Electrical cord too close to sharp metal edges may cut or shear the cord off.

Warning - Test the Safety System every day before you use the machine. See the Safety System Test in this section of this manual.

Risk of crushing-A high risk crushing hazard is created by the Upper Tool and Lower Tooling.

Warning - Safety of the operator in non- conductive access operation must remain accessible only to trained and authorized personnel that are experienced in appropriate machinery operating conduct.
Do not operate this machine while wearing any metal objects (i.e., rings, watches, bracelets, etc.) that may come into contact with the Upper Tool,Lower Tool or work piece.

WARNING - Immediately upon receipt of your hardware insertion machine., establish a "Maintenance Code" for your supervisor/maintenance personnel only, as it is possible, however difficult, to operate the press without the standard safeguards in place in the Maintenance Mode. Only trained personnel should use the Maintenance Mode the PennEngineering® is not responsible for improper maintenance mode procedures which result in a loss of operation of the Hardware Insertion Machine. or operator safety.

3.3 Safety System Tests

Note: In this manual, the use of the terms left and right refers to the machine operator 's left and right when they are standing in front of the machine, facing the work area between the Upper Tool Holder and the Lower Tool Holder.

Warning - There are three (3) Steps in this testing procedure. Do not skip or ignore any of them!

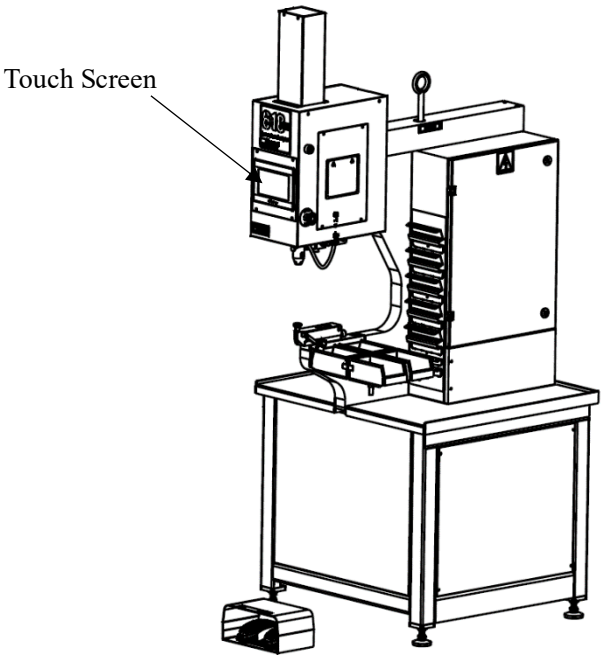
Step 1: Safety Switch Test Procedure

WARNING: Experienced personnel must test the Safety System at the beginning of each work shift. See the Safety System Test in this section of this manual.
Depending on the ambient shop temperature, you may need to warm up your Hardware Insertion Machine before beginning any operations. To do this, turn it on and let it run for about ten minutes.

1. Turn the *Main Disconnect Switch to* the *On* position. The Main Disconnect Switch is located on the electrical cabinet to the right side of the machine.

2. Start the machine by pressing the On Switch on the touch screen control panel. The green light in the switch will be displayed and the motor will start. If the machine doesn't turn on, twist the Off/E-Stop Switch(s) clockwise until it pops out and try pressing the On Switch again.

Except for the Down Footswitch and the *Off/E-Stop Switch*, all the other operating controls referred to in the rest of this procedure are on the Touchscreen Panel. The Touchscreen Panel is located on the front of the machine cover.



3. Using the touch screen controls, Rotate the conductive/non-conductive button to the conductive position, and a password is required when the mode is switched.

Conductive Mode **Non-Conductive Mode**

4. Turn the single stroke/dual stroke button to the single stroke position.

Single stroke **Dual stroke**

5. Keep your hands away from the Tool Holder area. Use the Footswitches to lower or raise the Upper Tool Holder until it is about 4 in. /100 mm above the Lower Tool Holder. Remove your foot from the Footswitches and keep your feet away from it.
6. Carefully grasp the sides of the Upper Tool Holder and push it upwards. This upward movement should actuate the Safety Sensors and the Upper Tool Holder should move up. The movement will continue until the RAM reaches top of stroke. Remove your hand from the Upper Tool Holder as soon as the movement starts.
7. If the RAM moves up, the Safety System Sensors are operating. Go to **Step 2, "Conductive Mode Test Procedure."**
8. If the Upper Tool Holder does not move up, the Safety System has failed!

Immediately turn the machine off by depressing the *E-Stop* button and turning the Main Disconnect Switch to the *Off* position. Contact your Supervisor. The machine's Main Disconnect Switch must be locked in the *Off* position until repairs are begun and follow Lock-out/Tag-out procedures. Do not operate this machine until qualified personnel have repaired the machine and the Safety System Sensors has been properly tested.

WARNING: There are three (3) Steps in this testing procedure.
Do not skip or ignore any of them!

Step 2: Conductive Mode Test

Never attempt to test or demonstrate this machine's Safety System by placing any portion of your hand or body between the Upper and Lower tools. Always use the test procedure outlined in Step 3 of this manual.

Never operate this machine without the proper tooling installed If no material and fasteners is used, you must use two flat anvils.

1. Following the Upper and Lower Tool installation instructions, install the 1 in/25mm Flat Anvils in both the Upper Tool Holder and the Lower Tool Holder.
2. If you have just completed Step 1: "Safety Switch Test Procedure,"
   a) The machine is On and the green light in the On Switch is still illuminated. If not, return to Step 1 and restart the machine by following instructions 1 and 2.
   b) The Conductive/Non-Conductive selection is in the Conductive display. If not, select Conductive.
3. Set the machine to Setup mode by touching the box next to the words "Setup Mode" on the screen. The Setup Mode icon will display the downward arrow. This represents the motion of the ram movement.
4. Change the machine's force to 13kN by touching the box next to "Force", entering 13 and touching the Enter button. You can also use the +/- buttons.
5. Raise the Upper Tool Holder about 4 in/100mm by depressing the Up Footswitch.
6. Keep your hands away from the tooling area.
   a) Depress the Down Footswitch. The RAM should move down, the Anvils will contact, the machine will apply the set force to the Lower Anvil and the Upper Tool Holder will return to the Up position.
   b) If this machine completes the above sequence correctly, go to Instruction 9.
   c) If the machine does not complete the above sequence correctly, check the screen settings. If they are not correct, reset them and repeat the test. If the machine performs correctly, go to Instruction 9.
7. If the machine does not complete the above sequence correctly, there is a failure in the machine's control circuit.
8. Trained personnel must correct it. Immediately turn the machine off by pressing the red Off Switch and turning the Main Disconnect Switch to the Off position. The machine's Main Disconnect Switch must be locked in the Off position until repairs are begun, and follow Lockout/Tag-out procedures. Do not operate this machine until qualified personnel have repaired the machine and the Conductive Mode has been properly tested.
9. Next, place a small non-conductive material (e.g., plastic or paper) on top of the Lower Anvil, making sure the object completely covers the top of the Anvil. Keep your hands away from the tooling area. Depress and hold the Down Footswitch. The Upper Tool Holder should move down, the Anvil will contact the non-conductive object and, **without applying the pre-set force**, return to the Up position.
   a) This part of Safety System is operating correctly in Conductive Mode. After confirming that no force was applied to the non-conductive object, go to **Step 3, "Non-Conductive Mode Test Procedure."**
10. If the force was applied to the non- conductive object, **the Safety System has failed!**
    a) Immediately turn the machine Off by pressing the red Off Switch and turning the Main Disconnect Switch to the Off position. The machine's Main Disconnect Switch must be locked in the Off position until repairs are begun, and follow Lock-out/Tag-out procedures. Do not operate this machine until qualified personnel have repaired the machine and the Conductive Mode has been properly tested.

WARNING: There are three (3) Steps in this testing procedure.
Do not skip or ignore any of them!

Step 3: Non-Conductive Mode Test

1. If you have just completed Step 2:

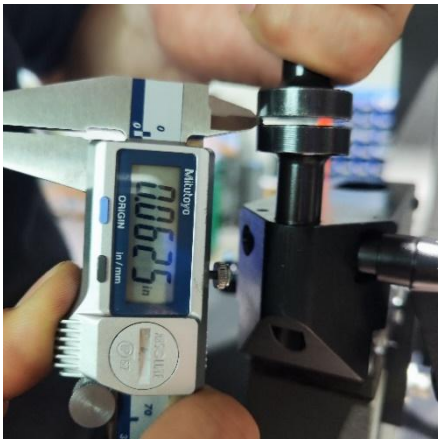
   a) The machine is On and the green light in the On Switch is still illuminated. If not, return to Step 1 Safety Sensors test procedure and restart the machine by following Instruction in Steps 1 and 2.
   b) The Conductive/Non-Conductive mode is displayed in the Conductive selection. Select Non-Conductive from the touchscreen display.
   c) The Run/Setup Switch is in the Run position.
   d) The machine's Force has been set to deliver 13KN. If this has been changed, repeat the instructions in Step 2, Instruction 4.
   e) Verify the 1 in/25.4 mm Flat Anvils are installed in both the Upper and Lower Tool Holders.

2. Using the touch screen controls, Rotate the conductive/non-conductive button to the Non-Conductive position, and a password is required when the mode is switched.
3. Keep your hands away from the tooling area. Depress the Down Footswitch. The Upper Tool Holder should move down, the flat Anvils will contact, and the Upper Tool Holder should stop immediately. If this machine completes the above sequence correctly, go to Instruction 4.

WARNING: When operating this Hardware Insertion Machine in the Non-Conductive Mode, be very careful! Do not depress the Down Footswitch a second time after the Upper Tool Holder has stopped on the down stroke with any part of your body near the tooling area.

   a) If the machine does not complete the above sequence correctly, check the touch screen settings. If they are not correct, reset them and repeat the test. If the machine performs correctly, go to Instruction 3.
   b) If the machine does not complete the above sequence correctly, there is a failure in the machine's control circuit and it must be corrected by qualified personnel. Immediately turning the machine Off by pressing the red Off Switch and turn the Main Disconnect Switch to the Off position. The machine's Main Disconnect Switch must be locked in the Off position until repairs are begun. Do not operate this machine until qualified personnel have repaired the machine and the Non- Conductive Mode has been properly tested.

4. Remove your foot from the Foot pedal switch box.
5. Carefully grasp the sides of the Upper Tool Holder and raise it until a positive stop position is reached. With a calibrated measuring instrument (Digital calipers are best), measure the vertical distance between the upper and lower Anvils. If this measurement is more than .01 in./.25 mm, go to Instruction 6.



a) If this dimension is less than 1/4 in. /6 mm, **the Safety System has failed!**

Immediately turn the machine off by pressing the red Off Switch and turning the Main Disconnect Switch to the Off position. The machine's Main Disconnect Switch must be locked in the Off position until repairs are begun and follow Lock-out/Tag-out procedures. Do not operate this machine until qualified personnel have repaired the machine and the Non-Conductive Mode has been properly tested.

6. Next keep your hands away from the tooling area. Turn machine back "ON" and depress the Down Foot pedal switch a second time. The machine should exert the pre-set 13KN force to both upper and lower Anvils and then return to its Up position.

If this machine completes the above sequence correctly, the test of the Safety Sensors and Safety System is complete and operating properly.

There are three (3) Steps in this testing procedure.
Do not skip or ignore any of them!

SECTION 4
INSTALLATION OF HARDWARE INSERTION MANCHINE

Transportation of the hardware insertion manchine

- When using a forklift or pallet jack be sure that the forks are properly located between the fork guide tabs under the base of the hardware insertion machine. (See Fig 4-1)

WARNING: Unbalanced loading of the hardware insertion machine or sudden stops may lead to toppling of the hardware insertion machine.

Locating the Hardware Insertion Machine

- Select a well-lit clean area with a (relatively) level floor. The floor must be able to support the weight of the Hardware Insertion machine.

Leveling the Hardware Insertion Machine

- The hardware insertion machine should be leveled and stabilized after it has been located. This is done by adjusting the height of each footpad then locking each footpad in position by tightening a jam nut. This task requires two 24mm wrenches (See Fig 4-2). An adjustable wrench may also be used. Adjust the foot pad while reading the level at the tooling nut gate adapter. The universal escapement adapter must sit level for proper functioning of the feed systems.

Open Space Requirements

- PennEngineering® has no specific requirements for providing open space around the perimeter of the hardware insertion machine. However, be sure to comply with any national or regional safety codes that may dictate otherwise. We do recommend that you at least leave enough space around the hardware insertion machine so the various storage and maintenance enclosures can be opened fully and so the largest workpieces can be accommodated.

Original Installation Requirements

- After the final installation of the hardware insertion machine verify the continuity of the protective bonding circuit (TN-System) in accordance with EN 60204-1 Clause 18.2.2 standards.

Never lift with the forklift in front or on the side.

Always position the forklift to the rear of the machine.

FIGURE 4-1
Move Location Diagram

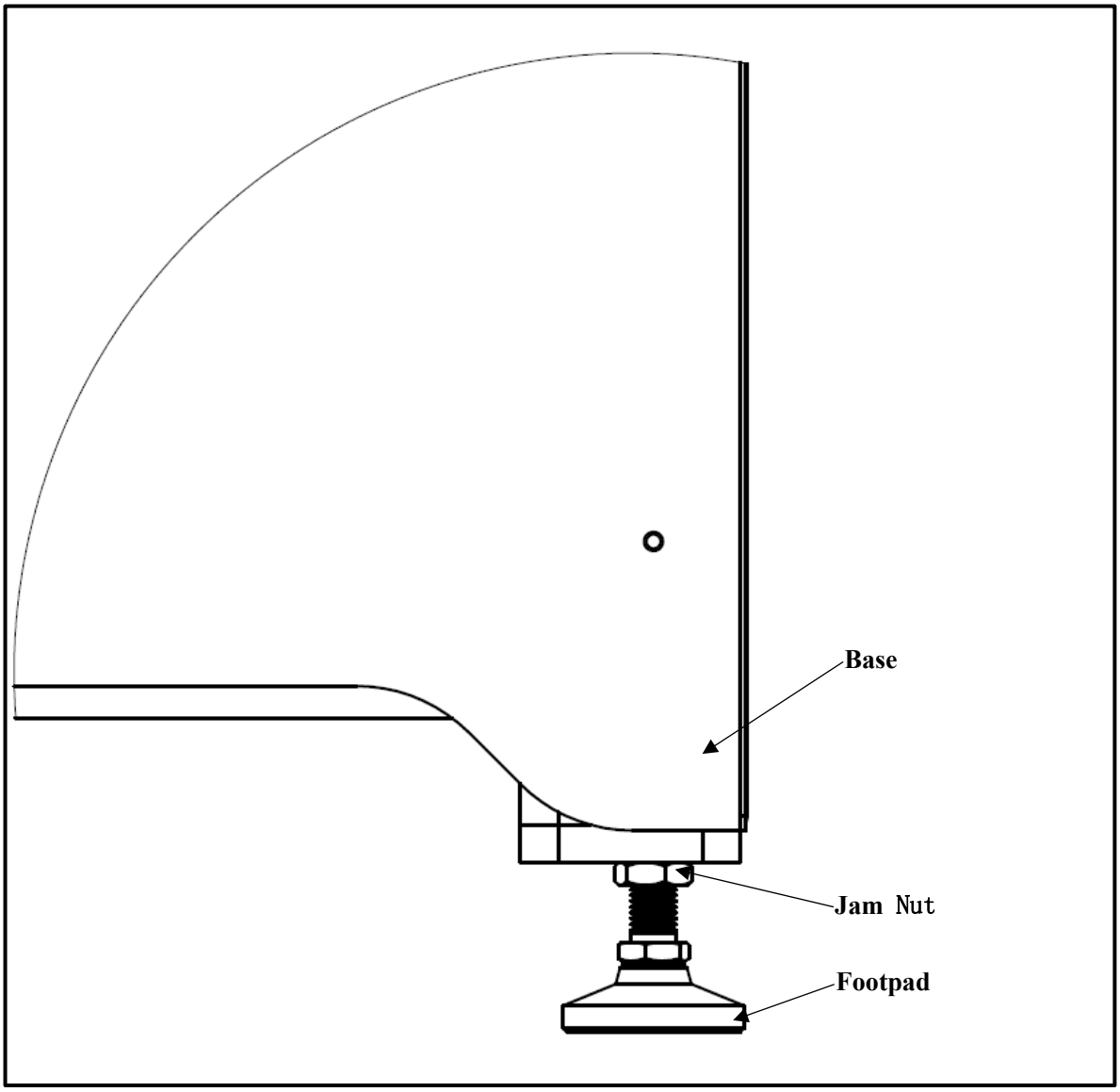


FIGURE 4-2
Adjustable Footpad

Recommended Air Supply Hook-Up Arrangement

Proper air supply is very important to the performance and maintenance of the hardware insertion machine. Following these simple guidelines will ensure good machine performance.

- **Air Quality** - The quality of the air supply is very important. The air must be clean and dry. Moisture and debris will contaminate the oil and valve systems and lead to machine performance and maintenance problems.
- **Air Supply Flow** - Use a minimum 12mm diameter line and fittings from the compressed air source to the Hardware Insertion Machine. Shop pressure ranging between 6 to 7 bar (90 psi to 100 psi) is acceptable. Inadequate air flow will affect machine performance.
- **Air Consumption -** Air consumption in automatic mode is about 2.5 liters of compressed air per cycle. Average air consumption running at 6 insertions per minute is about 0.3 liters/sec at 1 atm.
- **Piping Installation** – Proper piping hookup will help achieve the above requirements. See Figure 4-3 on the next page.

- Connect to your supply line with a pipe pointing upwards that curves over and down. This - arrangement will help prevent water and compressor oil from entering the machine.
- Connect to that drop with your supply fitting for a 12mm or larger hose.
- Continue the end of the drop to a drain valve. This will help collect additional water and oil and allow the system to be purged.
- If your factory air supply falls short of the above recommendations, an air reservoir tank of an appropriate size for your location can be used.
- An auxiliary filter/separator installed immediately outside the machine is recommended.

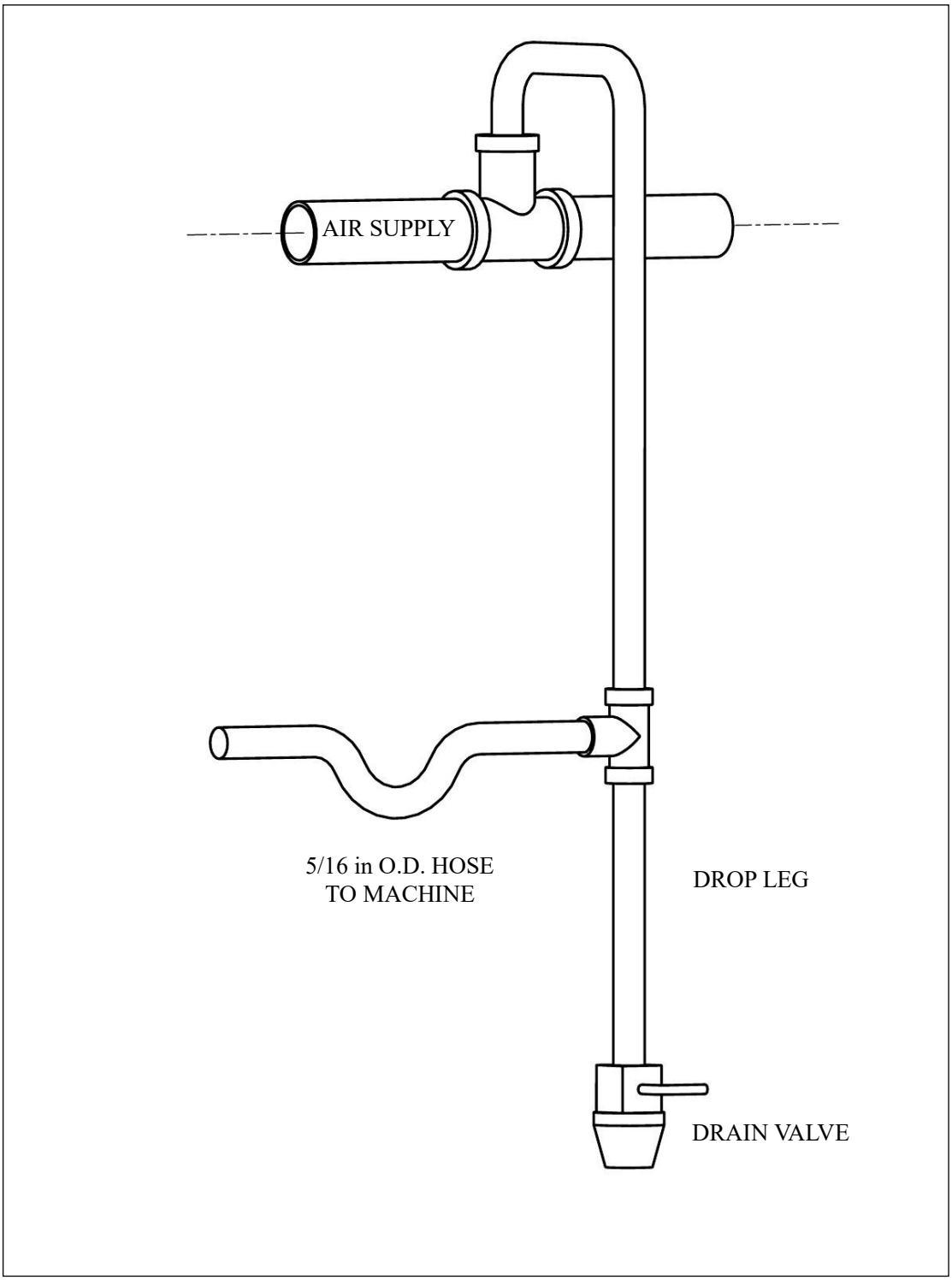


FIGURE 4-3
AIR SUPPLY

SECTION 5
GENERAL FUNCTION DESCRIPTIONS

System Function:

The function of **PEMSERTER® 618 Pro+ Hardware Insertion Machine** is to safely, quickly and consistently install riveting screws, nuts or studs for various types of plates. In order to achieve this function, the riveting machine adopts the following technologies and devices:

- Precise computer-controlled pressure riveting force and pressure riveting position.
- The automatic feeding system and Multi-Shuttle platform tooling can be selected according to the needs, and the product to be riveted can be positioned on the Vacuum Anvil (upper die), so that the operator can be released and can operate the workpiece freely.

Setting up the Hardware Insertion Machine:

The following section of the manual describes the setup process in general. For details on setting up and operating the Hardware Insertion Machine see the appropriate section in the manual.

Step 1: Choice of tooling

The selection of tooling includes selecting suitable tooling for the delivered products and workpieces to be pressure riveted, including the tooling used for pressure riveting tooling and feeding control. The specific tooling type can be inquired through the website https://www.haeger.com/ATW or Haeger Wizard APP, or consult the PEMSerter technical department.

Step 2: Select the Setup for the Tooling and Riveting Fastener on the Touchscreen.

Once the tooling is installed, the next step is to setup the Hardware Insertion Machine by using the touchscreen. The touchscreen setup is simple and can be done one of three ways.

- **Choice of tooling**-Choose tooling mode, riveting fastener size and types
- **Call pre-stored pressure riveting parameters**- Select from a previously programmed Job stored in the Hardware Insertion Machine.
- **Call the parameters of the last pressure riveting**-Call the same operating program that the riveting machine just ran last time, even after the shift is selected, the Hardware Insertion Machine will automatically set the operating variables and continue to perform security settings.
- **Manually set the pressure riveting parameters**-according to the needs of the product, manually set the pressure riveting parameters

Step 3: Safety Setup

The next step is very quick and simple but very important.

The operator can select two modes: Conductive Mode and Non-Conductive Mode.

Riveting Automatic Feed Functions:

The automatic feeding function is completed by the vibrating feeding system and the storage system sending the products to be riveted into the multi-carrier platform tooling through the feeding tube. Take the following steps:

- The vibrating feed system moves the riveting product to the edge of the vibrating tray and transmits it to the Multi-Module.

- The direction of the riveting products is determined in the multi-module dislocation mechanism and sent to the Multi-Shuttle through the Tube. The riveting products to be riveted will be taken away by The Vacuum Anvil (Upper mold) through vacuum adsorption, and then be pressed into the workpiece. In the vibrating feeding system, the rest of the tightened riveting products with incorrect postures are blown out of the Multi-Module by compressed air and returned to the storage vibrating tray.

Pressure riveting process:

- When the riveting product contacts the workpiece, the riveting machine judges whether it is conductive, and then judges whether the safety punch is triggered. Only when the above two conditions are met, the riveting process continues.

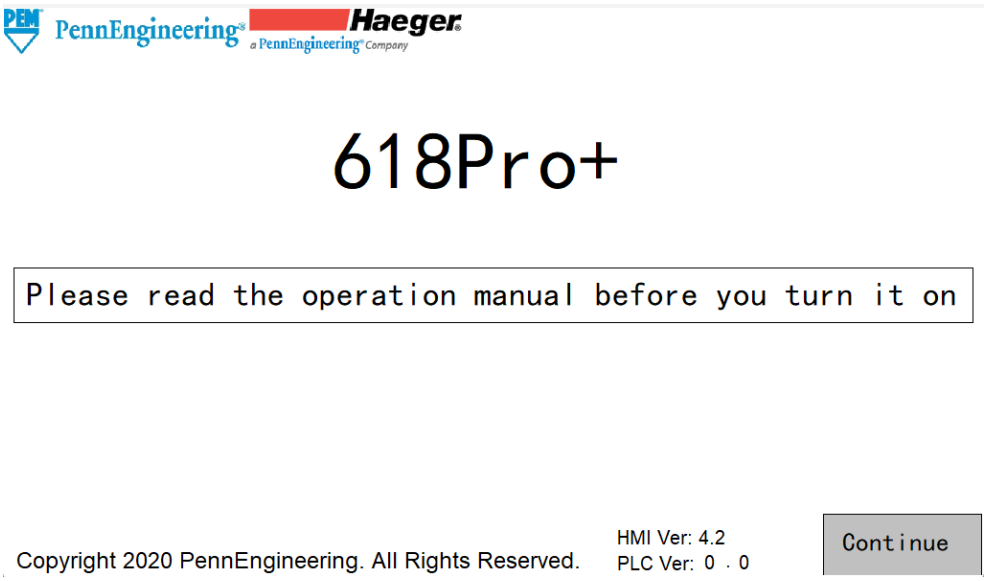
- If the safety trigger conditions are correct, apply pressure riveting force to the riveting product, and then the Anvil exits and returns to the origin.

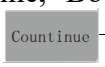
SECTION 6
TOUCH-SCREEN CONTROLS

PLC controls the functions of the Device. The operator sends commands to the PLC and reads data from the PLC through a system of menus and information displayed on its touch screen. An operator need only touch the buttons displayed on the touch screen to make a selection.

The touch screen controls allow the operator to setup the Hardware Insertion Machine for operation, operate special functions and maintain and troubleshoot the machine.

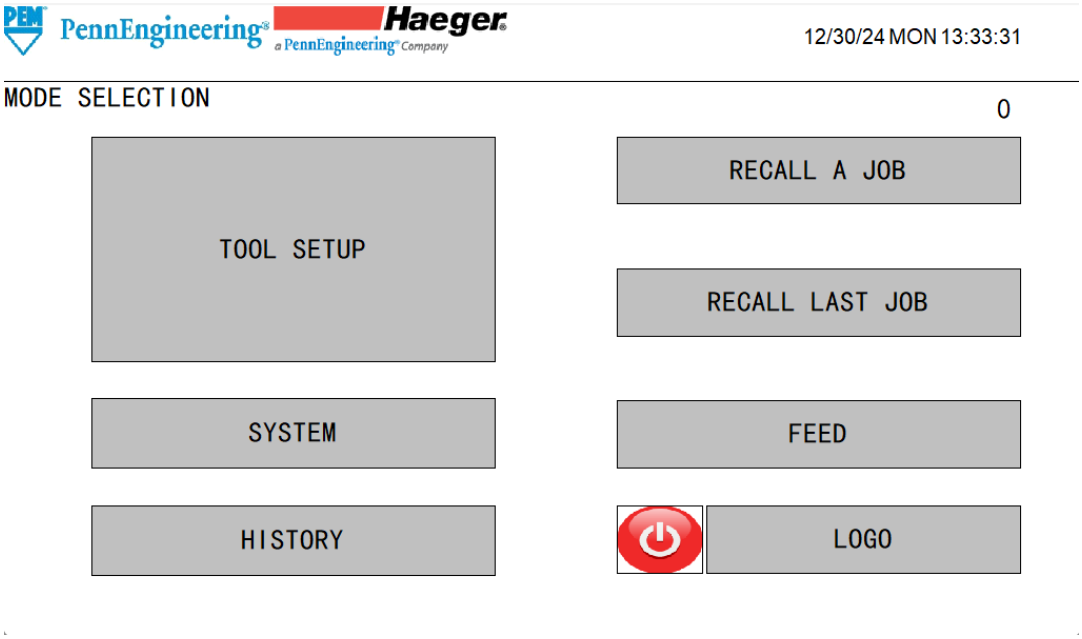
6.1 Boot Screen



When you start powering up the machine, 'Boot Screen' will show. Version information is displayed on the screen. Press countinue button 

→6.2.

6.2 Mode Selection

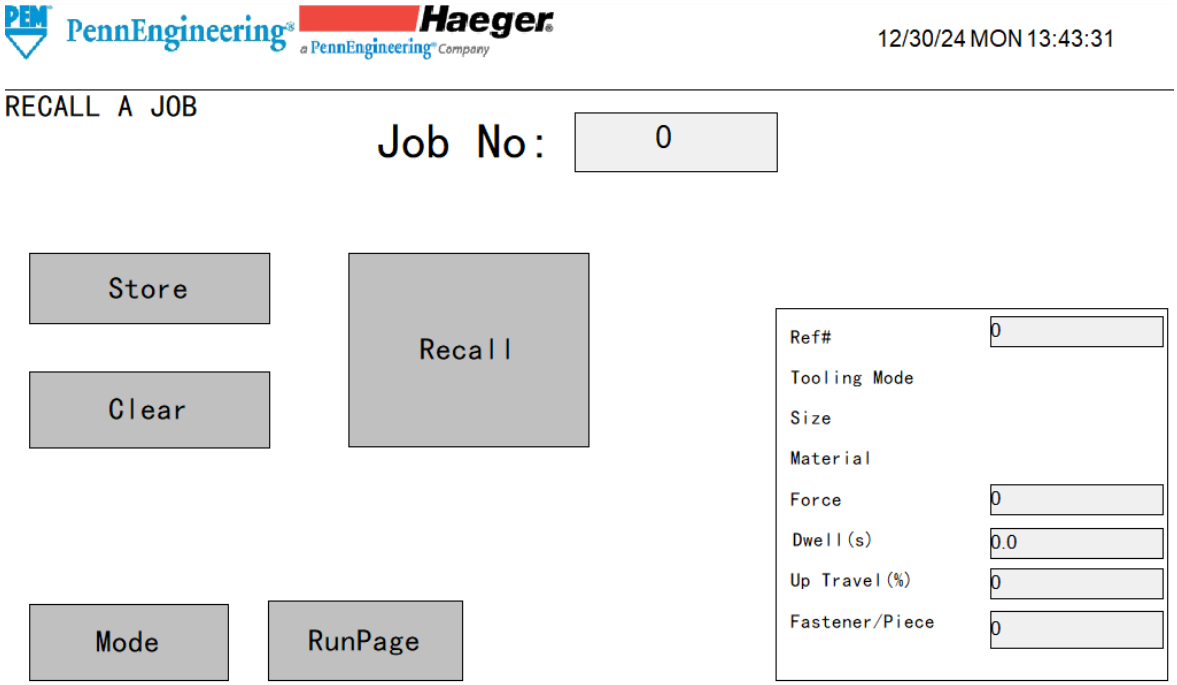


[]:After you press this button , the metor will power on.

6.3 Recall Last Job

The parameters of the last run are called, and the operation screen is entered at the same time.

6.4 Recall A Job



[Job No: 0]: **Select the task number to save or call.**

[Store]: **Stores the parameters of the current task number.**

[Recall]:**Recall the parameters of the current task number.**

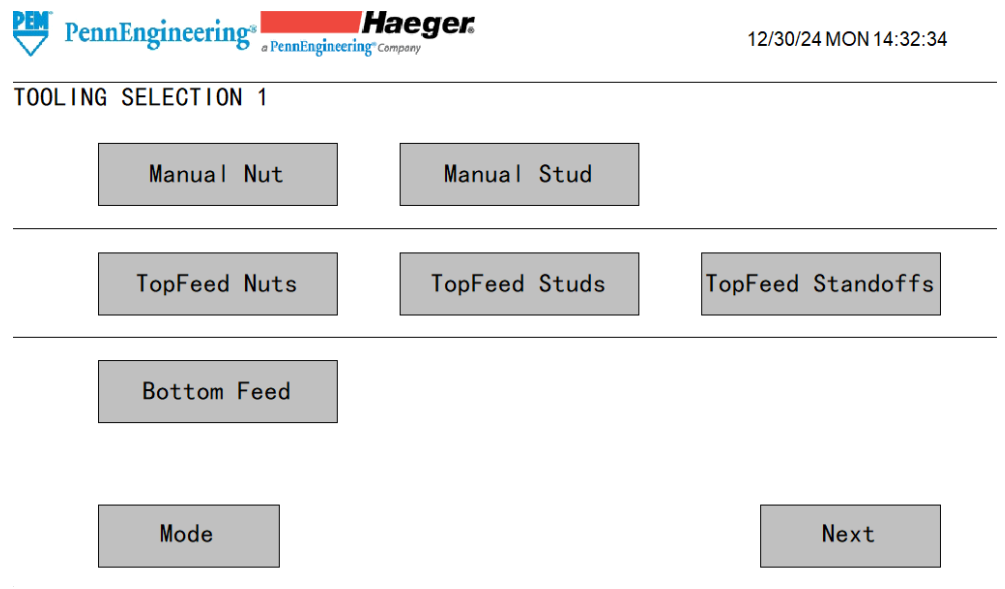
[Clear]:**Clear the parameters of the current task number.**

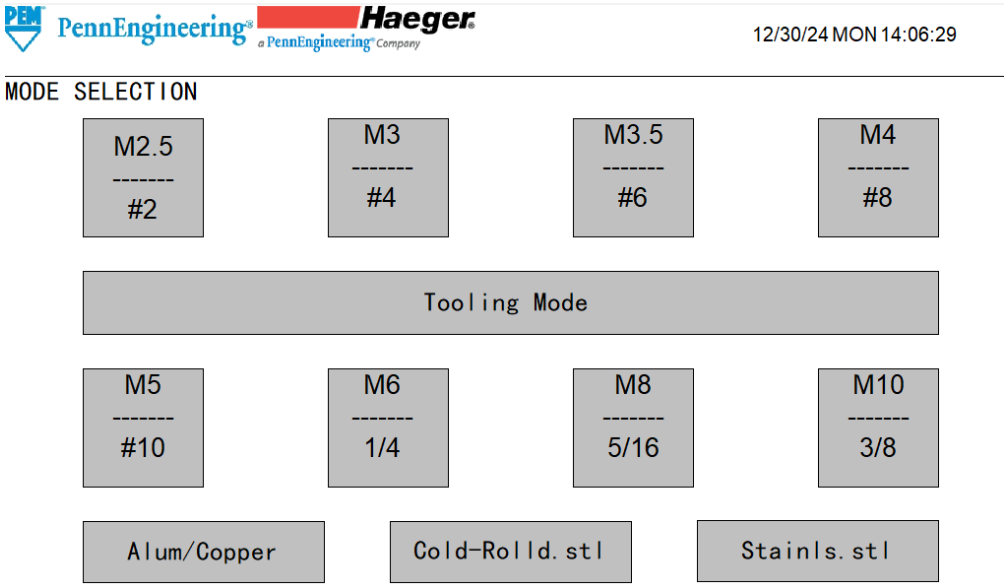
[Mode]:**Back to Mode Select Screen.**

[RunPage]:**Enter the Run Screen.**

6.5 Tooling Mode

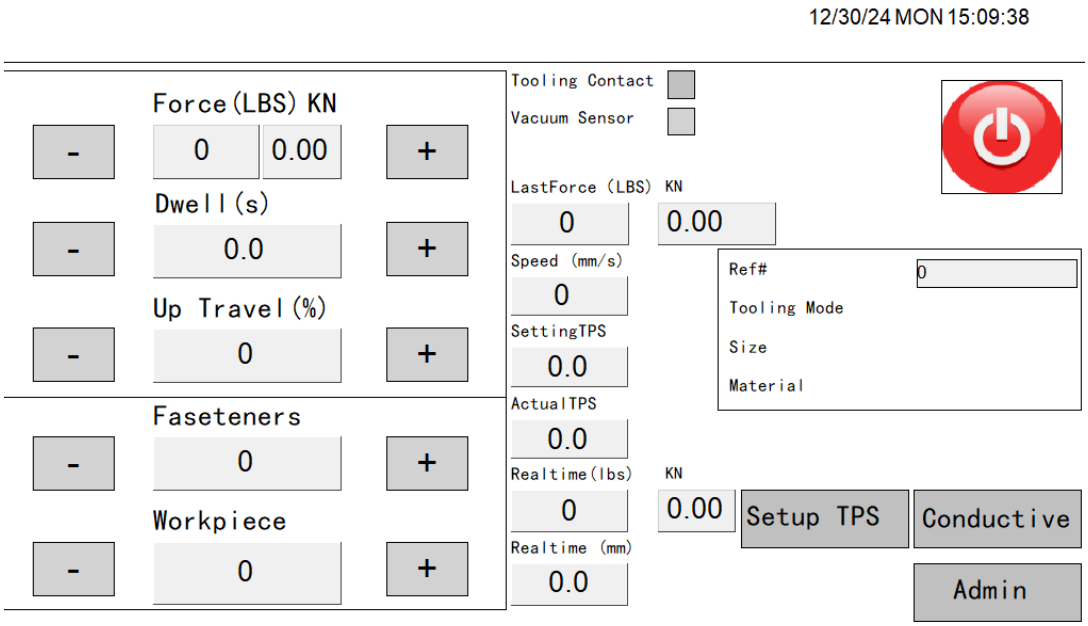
Select Feed Type





Select Fastener Size and Material, Provide the recommended pressure and switch to the running screen.

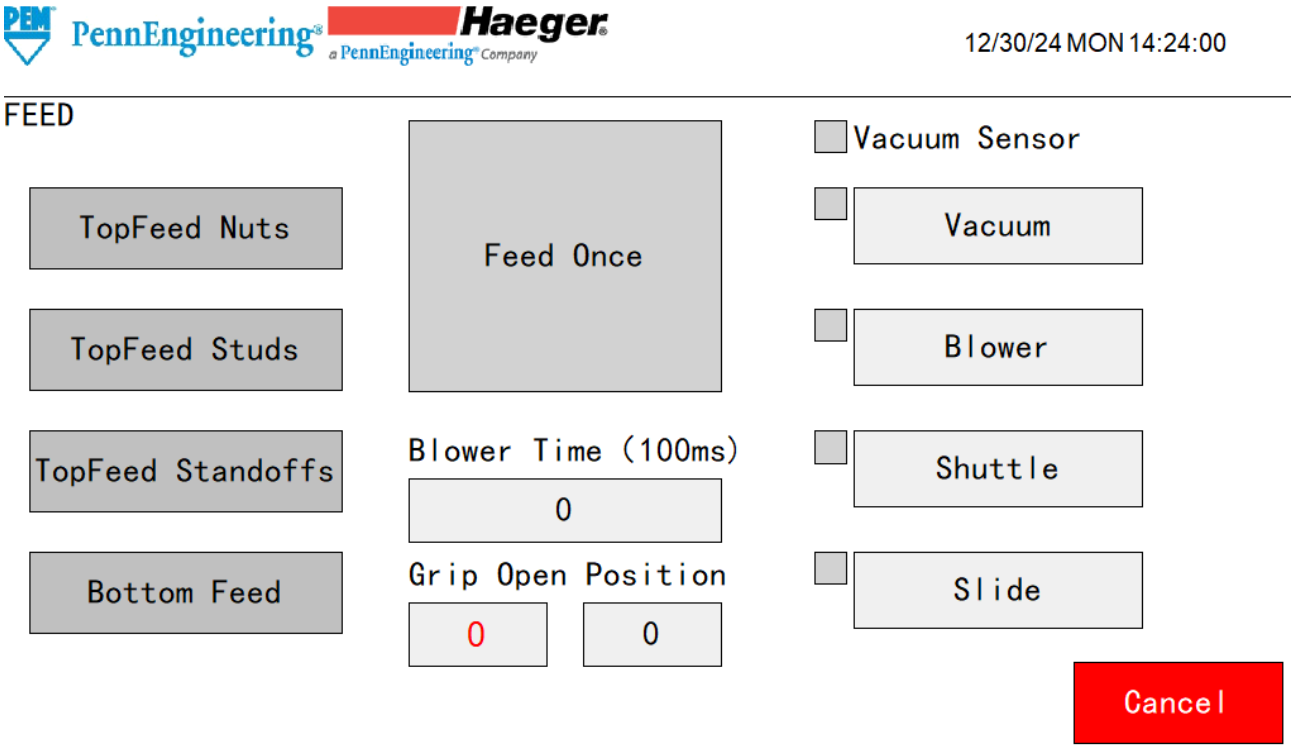
6.6 Run Screen



The Set TPS button flashes, click Set TPS, and the screen switches to the TPS setting page.

Put on the workpiece and fasteners, step on the pedal, and when it comes into contact with the workpiece, release and step on the pedal again, and the punch will automatically return. The page automatically returns to the home page.

6.7 Feed



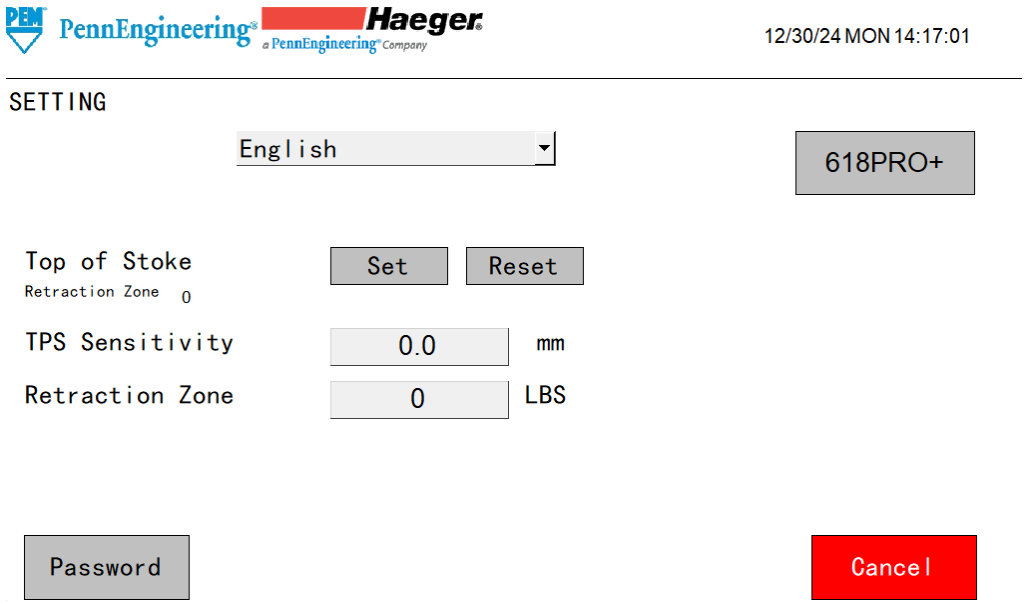
When choosing automatic feeding, the blowing time can be set, controlled by a single valve, or a single feeding

6.8 History

Displays alarm information

6.9 System

To enter the system screen, you need to enter the password, password: year*(month+day)+37.



Set language, TOS, TPS and pressure tolerances

SECTION 7
PNEUMATIC-HYDRAULIC SYSTEM

A. The initial pressure input of the pneumatic system

• Your factory air supply should be clean, dry and, ideally, have a high flow capability. Airline feeds smaller than 1/4 in will increase cycle time.

• Factory compressed air, set between 6 and 7 bar (90 to 100 psi), enters the system through a manually adjusted filter/regulator.

After flowing through the air filter pressure reducing valve, connect the 1/4 in pipe to the pneumatic valve assembly plate:

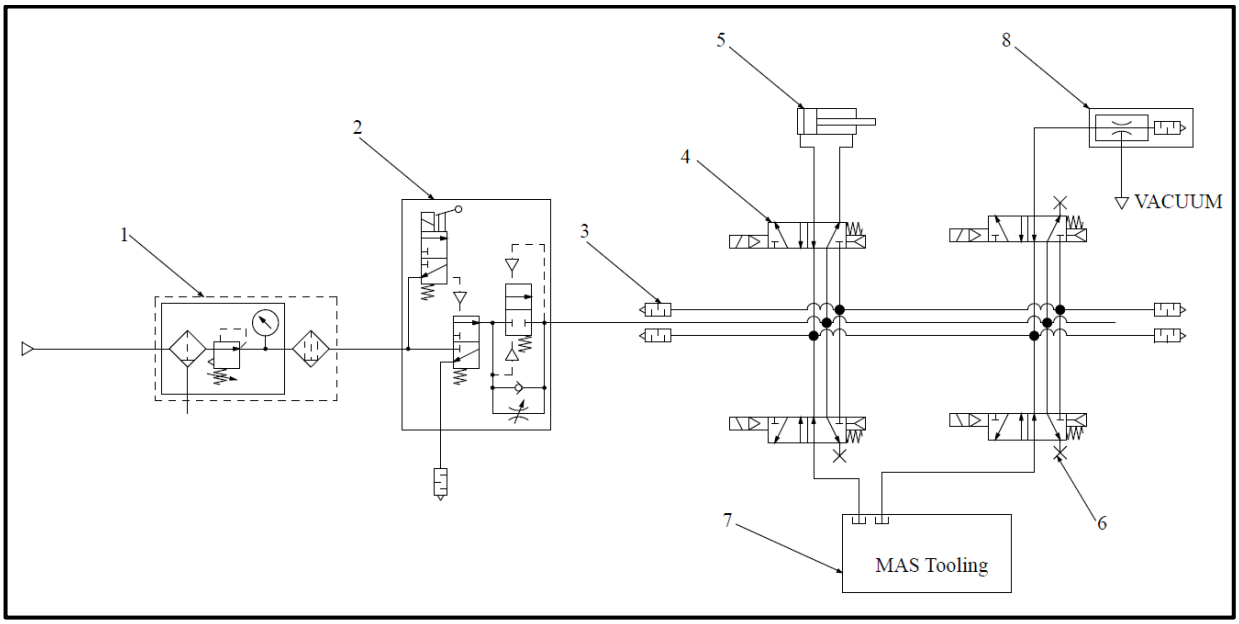
1) Two Φ4 pipes are led out through different air valves on the valve plate, which are connected to the Multi-Module, One is used for single-acting cylinders to realize the dislocation function and blowing and feeding function; the other one is used to make the posture incorrect the riveting product is blown back into the vibrating feed tray.
2) Two Φ1/4 pipe pipelines are led out through the same valve on the valve plate, which are used for the pneumatic sliding table of the Multi-Shuttle.
3) One Φ1/4 pipeline is led out through the valve plate to supply air to the Vacuum Ejector.

Air discharge

Both sides of the pneumatic valve assembly plate are equipped with exhaust holes and are equipped with silencers. According to the action logic needs, the air is discharged from this.

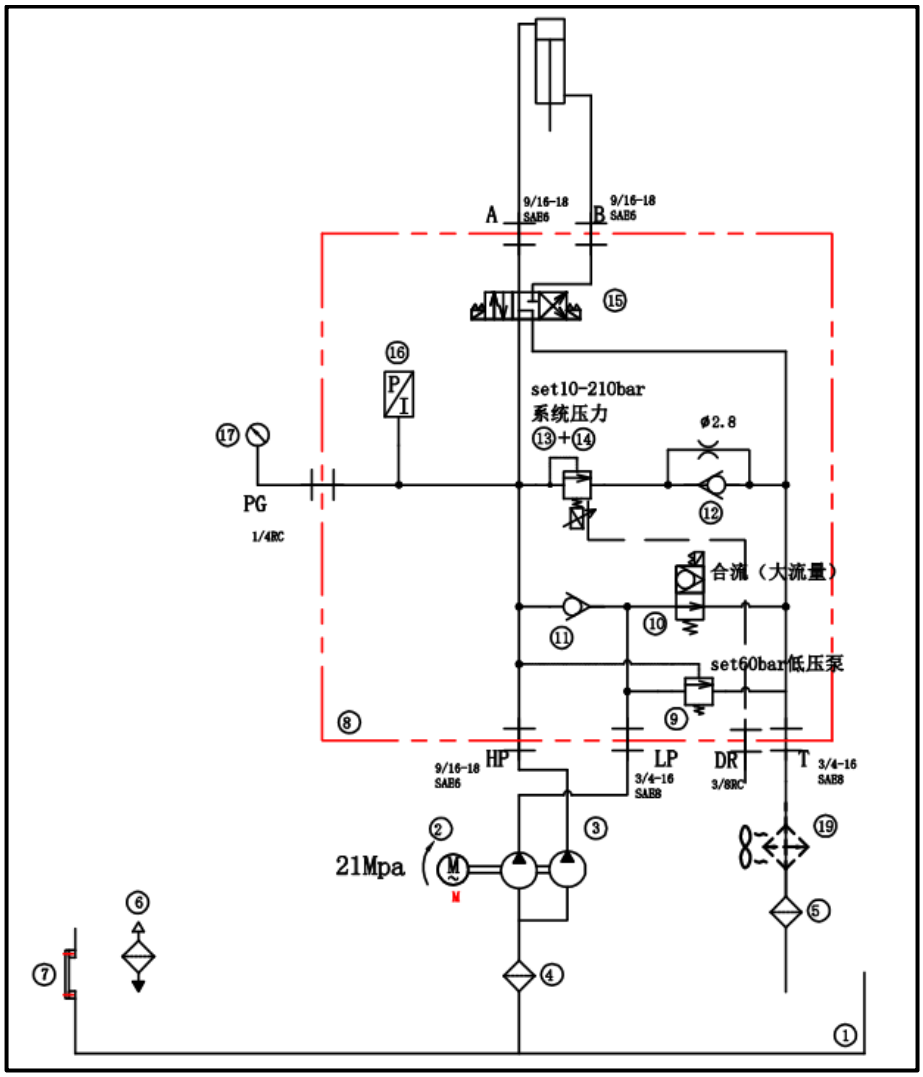
B. Hydraulic system

Provide pressure for pressure riveting to the hydraulic cylinder to complete the pressure riveting process of riveting.



NO.	DESCRIPTION	NO.	DESCRIPTION
1	Modular F.R.L Units	**5**	Pneumatic Sliding Table
2	Soft Start-up Valve	**6**	Plug
3	Silencer	**7**	Multi-Module
4	Single control Solenoid Valve	**8**	Vacuum Ejector

FIGURE 7-1
Pneumatic Schematic



NO.	DESCRIPTION	NO.	DESCRIPTION
1	Hydraulic oil container	**11**	Check valves
2	Motor	**12**	Check valves
3	Pump	**13**	Pressure relief valve
4	Suction Filter	**14**	Proportional pressure relief valve
5	Return Filter	**15**	Solenoid directional valve
6	Breather Filter	**16**	Pressure gauge
7	Oil temperature and fluid gauge	**17**	Pressure Sensor
8	Valve block	**18**	Current amplifier, in the electrical control cabinet
9	Sequence valve	**19**	Cooling fan
10	Two-position two-way solenoid valve (N.C.)		

FIGURE 7-2
Hydraulic Schematic

SECTION 8
ELECTRICAL SYSTEM

WARNING: Device uses high voltage electrical power. Only trained and authorized personnel may attempt to maintain, service, or repair its electrically powered subsystems, components or parts.

The electrical panel enclosure requires a special key to open. The purpose of this feature is to protect the machine from unauthorized persons tampering with the system and to help prevent unauthorized and untrained personnel from receiving an electrical shock. We suggest the key be kept by a manager/supervisor who will properly control its use.

Please refer to the drawing description for details.

AC Power Distribution:
The device is protected by a four-pole main circuit breaker. The orange line means there is still power after the power is off.

The inline AC power entering the device is routed to the following 2 areas:
- AC power supply
- Maintenance electricity.

DC Power Distribution:
- DC power supply from the main power supply for the programmable controller. Through different sub-circuits, it also supplies power to sensors and other input signals, touch screens, and programmable controllers that are used to control output drive cards for different load (output) switches.
- Light power.
- Motor, driver, Relay, Cylinder.

ELECTRICAL/ELECTRONIC IO

(Note: Most of the items mentioned below are illustrated in section two of this manual.)

PLC Version

INPUT		OUTPUT	
0.00	E-Stop	100.00	UpValve
0.01	FootSwitch Down	100.01	DownValve
0.02	FootSwitch Up	100.02	BypassValve
0.03	Safety Switch	100.03	CantactorCoil
0.04		100.04	Buzzer
0.05	Tooling Contact	100.05	
0.06	Pressure Switch	100.06	
0.07	ContactorNo	100.07	
0.08		101.00	
0.09	VacuumSensor	101.01	
0.10		101.02	
0.11		101.03	
1.00			
1.01			
1.02			
1.03			
1.04			
1.05			

SECTION 9
MAINTENANCE

The most important element of maintaining your PEMSERTER® Hardware Insertion Machine is to ensure that the compressed air supply is clean and dry. Do not use lubricated air. It is necessary to ensure the cleanness of the liquid drawing oil, do not open the filling port, and check the fastness of each pipe joint regularly.

Following the maintenance schedule below will also help maintain your hardware insertion machine in good running order.

IMPORTANT: Only qualified individuals should perform maintenance pocedures. Unless otherwise specified, perform all maintenance with the hardware insertion machine disconnected from air and power. Follow safe practices and obey all local safety regulations.

Daily Inspection

• Safety punch system components.	• Perform safety system check procedures using “Testing the Safety System”.
• Upper Tool Holder.	• Replace Risk of Crushing label if peeling or damaged.
• Check the Multi-Module.	• Check whether there are impurities in the Multi-Module of the vibrating feeding system and whether it needs cleaning.
• Check air pressure.	• Check inlet pressure of 0.6MPa.
• Check the hydraulic oil.	• Check the hydraulic unit has no leakage and the oil level of the oil tank is normal.
• Check the sound of the device working.	• Check the device is running without sound.

Weekly Inspection

• Mechanical Component Inspection	• Check the tightness of all connecting parts, ensuring bolts and nuts are not loose. • Inspect key components, such as the riveting head and dies for damage or excessive wear. • Check the lubrication of all moving parts and add lubricant if necessary.
• Hydraulic System Inspection	• Check the hydraulic oil level to ensure it is within the normal range and add oil if needed. • Inspect hydraulic lines for any signs of leakage. • Check the hydraulic system pressure to ensure it is stable and within the normal range.
• Electrical System Inspection	• Check the electrical connections to ensure they are secure and undamaged. • Test the control panel and buttons to make sure they are functioning correctly, ensuring that all switches and indicator lights are working properly. • Inspect the motor for abnormal noise or overheating.
• Safety Device Inspection	• Check the emergency stop button to ensure it is functioning properly. • Inspect all safety guards to ensure they are intact and provide adequate protection. • Ensure all safety warning labels are clearly visible and undamaged.
• Cleaning Tasks	• Clean the surface of the Hardware Insertion Machine and the surrounding work area to keep the equipment clean. • Ensure there are no obstructions around the equipment, maintaining a safe operating environment.

Monthly Inspection

• Check the Upper Tool Holder	• Check for Proper Lubrication: Apply a small amount of lithium grease (white) between the upper tool holder and the cylinder rod to ensure smooth operation. • Inspect for Wear and Alignment: Ensure the upper tool holder is free from excessive wear or misalignment. Adjust or replace if necessary.
• Check the quality of the hydraulic oil	• Observe the color and smell of the oil, and check for signs of emulsification or deterioration. Replace the hydraulic oil if necessary.
• Inspect hydraulic lines and fittings	• Ensure there are no signs of leakage and check the lines for aging or damage.
• Inspect the motor and drive system	• Observe the operating noise and temperature of the motor to detect any potential issues.

Six months Inspection

• Shuttle Jaws of Multi-Shuttle.	• Inspect Springs and change out if they appear weak.
• Flight Tubes	• Inspect and change out if damaged.
• In-Depth Mechanical Component Inspection	• Conduct a comprehensive inspection and maintenance of all mechanical components, especially key parts like the riveting head, dies, and guideposts; replace or repair them as needed. • Calibrate the precision of the Hardware Insertion Machine to ensure accuracy during operation. • Recheck the tightness of all fasteners (e.g., bolts, nuts) to prevent mechanical failures due to loosening.
• In-Depth Hydraulic System Maintenance	• Replace the hydraulic oil, if necessary, based on its condition and manufacturer recommendations, and clean or replace the hydraulic oil filter. • Inspect the hydraulic cylinders for seal integrity and operational condition to ensure there are no leaks or pressure instabilities. • Conduct a thorough pressure test of the hydraulic system to ensure it operates normally under all working conditions.
• In-Depth Electrical System Inspection	• Thoroughly inspect all electrical circuits for insulation issues to prevent short circuits or electrical leaks; check all terminals and connection points for tightness. • Maintain the control system by updating and optimizing the software (if applicable) and inspecting the working condition of all electrical components, such as relays, contactors, and sensors. • Perform maintenance on the motor, including cleaning and lubrication, and conduct an insulation resistance test if needed to ensure proper operation.
• Comprehensive Safety Device Testing	• Test all safety switches and emergency stop devices to ensure they function correctly in case of emergencies. • Inspect and maintain all safety guards to ensure operator safety. • Check the safety of the operating environment to eliminate potential hazards.

• Equipment Cleaning and Maintenance	• Clean the external surfaces of the equipment thoroughly, removing oil, dust, and debris. • Clean internal structures, especially hard-to-reach areas prone to dust accumulation. • Lubricate and apply anti-rust treatment to all necessary parts and exposed metal surfaces.

Annual Maintenance

• Clean Air Valves (optional)	• If contaminant build up occurs, clean the pneumatic valves annually. • If wear is serious, replace the pneumatic valve.
• Change Oil (optional)	• If contaminants enter the oil system, flush and change the oil annually.
• Replace the oil filter.	• Change the filter element regularly once for one year.
• Check the condition of oil tank in hydraulic station	• Ensure that the main power supply is disconnected. Check the hydraulic station to make sure that all joints are free from oil leakage and damage. If there is oil leakage, tighten it with tools first, wipe it clean and observe for half an hour. If it is confirmed that there is still oil leakage, please contact the manufacturer to replace the corresponding parts.

SECTION 10
TROUBLESHOOTING

Note: If an internal PLC problem should develop, call a PennEngineering® service technician, please call +86 (512) 5726-9310.		
SYMPTOMS	**DIAGNOSTICS & PROBABLE CAUSE(S)**	**PROBABLE SOLUTION(S)**
A. Whole System Malfunctions		
1. The machine will not start. (OFF light not lit) The machine will not start. (ON light is lit)	a. Electrical disconnect turned off. b. No power to the machine. c. DC Power Supply failure.	a. Turn on the power. b. Check main fuses. c. Check DC Power supply, replace if faulty.
	a. OFF button is “open”. b. ON button is not closing. c. MCR (Main Control Relay) system failure.	a. Check button, replace if faulty. b. Check the wiring continuity, replace if faulty.
2. The machine will not cycle.	a. Safety sensor inputs are on. b. Start button is not making the proper PLC input.	a. Check the wiring of the sensor b. Check the wiring of the start button. If it is faulty, it should be replaced.

SYMPTOMS	DIAGNOSTICS & PROBABLE CAUSE(S)	PROBABLE SOLUTION(S)
B. Electrical/Electronic Malfunctions		
1. The touch screen will not work but the power button is lit.	a. The circuit breaker is open.	a. Analyze and repair the touch screen related circuitry then replace the fuse. b. Replace the touch screen if faulty.
2. The lights of the programmable controller are not on.	a. Check to see if the PLC power supply is receiving 24 volts. b. Check the fuse in the PLC power supply. c. Check to see if the PLC power supply has failed.	a. If not receiving power check breaker. b. Replace the breaker in the power supply. c. Replace the power supply.
3. The sensors are not functioning.	a. Check to see if breaker is open. b. Check all sensors to see if one has a "short." c. Check the DC input module.	a. If open, investigate the circuitry and replace fuse three. b. Repair the "short" problem and/or replace the sensor. c. If faulty, replace the DC input module.
4. The DC power supply is not functioning.	a. Check the main power breaker. b. Check for line voltage at the supply terminals.	a. Replace if blown. b. Check the wiring between the power inlet module and the supply. c. Replace the power supply.
5. The machine will not power-up.	a. Check to see if there is in-coming power. b. Check to see if the main disconnect is shut off. c. Check MCR's wiring.	a. Provide the power. b. Turn to the ON position.
7. The machine will not power-down.	a. Check to see if the OFF button is faulty. b. check MCR's /wiring.	a. Replace if faulty.
8. There is no voltage at the solenoid valve.	a. Check for a shorted coil. b. Check the related PLC output voltage.	a. Repair or replace. b. Replace the output card if faulty.

SYMPTOMS	DIAGNOSTICS & PROBABLE CAUSE(S)	PROBABLE SOLUTION(S)
C. Pneumatic/Hydraulic System Malfunctions		
1. Hydraulic fluid (oil) does not come up to the fill lines on the tanks.	a. Check for fluid leaks.	a. Repair any leaks.
D. Tooling Malfunctions		
1. The Multi-Module is jammed.	a. A fastener is jammed.	a. Clear the fastener.
2. Fastening and riveting products are not normally sucked out from the Multi-Shuttle tooling by the vacuum pressure rod.	a. Multi-Shuttle tooling uncalibrated center。	a. Recalibrate Multi-Shuttle tooling.
3. The long lengths of studs are jamming in the tube.	a. Bends in tube are too tight.	a. Redress tube to bend toward the frame and then through the tube clips on the frame.
E. Vibratory Bowl System Malfunction		
The bowl does not vibrate.	a. Check whether the circuit breaker of the vibrating plate drive controller is intact. b. Check whether the output signal light of the programmable controller is on. c. Check whether the internal circuit of the feeding drive controller is normal.	a. Check whether the solenoid coils at both ends are short-circuited. If there is a short-circuit, replace the coil, and then replace the circuit breaker of the feeding drive controller. b. If a failure occurs, replace and reprogram the programmable controller. c. If necessary, parts or controllers should be replaced.

SECTION 11
SPARE PARTS

PART DESCRIPTION	PFT PART NUMBER	QTY	MANUFACTURER	MANUFACTURER'S PART NUMBER
Mechanical Spare Parts				
HYDRAULIC OIL, ISO 32 VISCOSIT	10-01259	40L	EXXON	Humble Hydraulic H32
ASSY, Safety punch (Haeger, double NO)	MDS101220001	1 Set	PEM	
6T Hydraulic Cylinder	PS210721	1 EA	PEM	
Oil return filter element (20μm)	MDS012530006	2 EA	LEEMIN	
AIR REGULATOR, 1/8 NPT PORT (Optional)	15-03684	1 EA	SMC	
Slide Table (Optional)	15-01870	1 EA	SMC	
Vacuum Generator (Optional)	15-03611	1 EA	SMC	
AIR FILTER, VACUUM GENERATOR (Optional)	15-03703	1 EA	SMC	
2-color Display High-Precision Digital Pressure Switch (Optional)	PS210784	1 EA	SMC	
Multi-Shuttle (Select according to the type of riveting products)		1 EA	PEM	

PART DESCRIPTION	PFT PART NUMBER	QTY	MANUFACTURER	MANUFACTURER'S PART NUMBER
Electrical Spare Parts				
MDS024830051	PLC Control	1	Omron	
MDS024930006	10 Inch HMI	1	WEINVIEW	
8017946	relay	2	Schneider	
8017945	Relay Bracket	2	Schneider	
PS180513	24V to 5V	1	Fengbin	
10-00616	6V DC RELAY W/ DIODE	1	FINDER	

Appendix
Electrical Schematic

See corresponding drawings for details