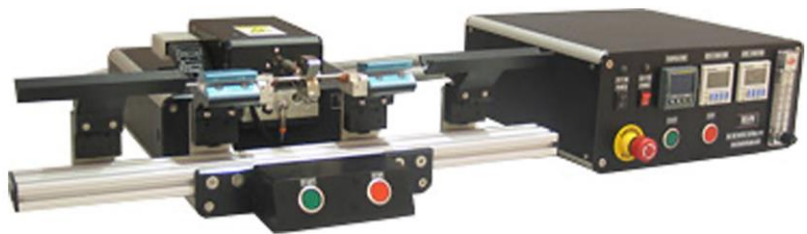


MACHINE SOLUTIONS INC.



USER MANUAL

BEAHM DESIGNS PROCESS AUTOMATION BONDER MODEL MA-280



BEAHM
DESIGNS

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Equipment User Manual

WELCOME

Machine Solutions, Inc. (MSI) would like to take this opportunity to thank you for purchasing your new MA-280, Process Automation Bonder. At MSI, we are dedicated to bringing innovative process development solutions to both medical device and nonmedical organizations. MSI looks forward to helping your organization provide life-improving devices to your customers, today and tomorrow.

MACHINE DESCRIPTION

The Beahm Designs Inc. Model MA-280 is a system for the purpose of thermal bonding or welding thermoplastic components to other materials by means of applying heated air to the materials through a precision nozzle. The system features integrated timed cooling and dual product grips for hands free operation.

SAFETY

- Use of eye protection when working with compressed gases and heated materials is advised.
- The maximum observed Sound Pressure Level is below 70 dB(A).
- Die jaws will become hot during operation and, depending on temperature set-point, can cause severe skin burns if contact occurs.



CAUTION: High voltage. Remove power and use safety precautions when servicing.



CAUTION: Hot surface. Contact may cause burn. Allow to cool before servicing.



CAUTION: Pinch point. Keep hands and body parts clear while in operation.

USER ALERTS

Do not use or otherwise operate the machine in any manner other than that in which it is explicitly intended. Examples: Do not attempt to sit on or climb on the equipment, do not place heavy objects or containers of liquid on the machine, do not to insert any foreign objects into the machine, and do not attempt to bypass any guards.

Note: The equipment is not for use with materials that can decompose or ignite below the maximum operating temperature of the machine. Hazards are materials that outgas hazardous substances and or ignite. (260°C/500°F)

Note: This equipment is not for use in an ATEX environment.

CONTENTS

Included with the system are the following contents:

- Automation Base and Control Unit
- IEC Power Cord
- Compressed Air Supply Hose Assembly

INSTALLATION

1. Place the system on a level, sturdy surface at an ergonomically viable height for the user.
2. Connect the electrical and pneumatic umbilicals to the die base unit.
3. Connect the power cord to the main control unit.
4. Connect the air supply hose assembly to the system and then to a clean, dry, and filtered compressed air source.

SET UP AND CONFIGURATION

Proper sizing of the thermal nozzle and alignment of the tooling are crucial to optimizing process results and repeatability. The following guidelines are the recommended methods. However, all applications vary, and several iterations of tooling process development may be required and may not follow all the recommended guidelines.

Thermal Nozzle Diameter - The nozzle diameter should be .187"-.25" larger than the material to be processed.

Thermal Nozzle Width - The width of the thermal nozzle should be sized equal or slightly greater (approximately 1.0mm) than the length of the overlap of the materials.

Grip/Positioning Nests - This is the most forgiving of the tooling. The included, standard vee configurations are more than adequate for most applications. More important than the guide design and dimensions is alignment with the die heads. Refer to the maintenance section for the alignment procedure.

Customized nests and tooling are available. Contact Machine Solutions sales to review the application and request a quote.

System Options - Many optional accessories are available to enhance the functionality of the system and improve process yield. Contact Machine Solutions sales department or visit our web site www.machinesolutions.com for more information on available accessories and to request a quote.

Examples of available accessories are:

- Vision systems with or without on-screen crosshair line generators.
- Laser line generators.
- Extended product support trays/guides.
- Product grip nests/alignment tooling.

Installation instructions are included with each specific accessory.

SYSTEM CONTROLS AND FEATURES

Located on the front and rear panels are the following controls and/or displays and their function.

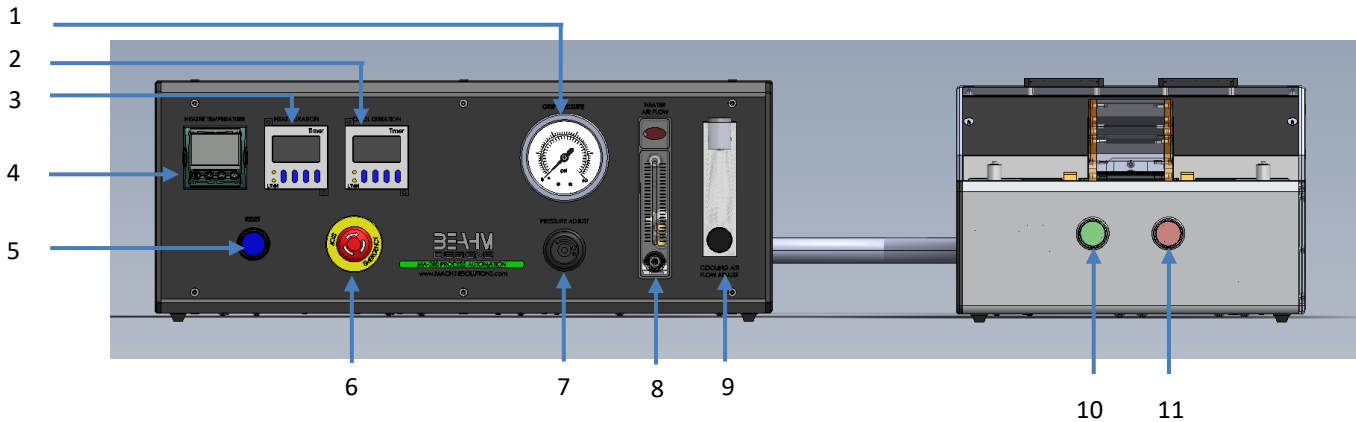


Figure 1: MA-280 Process Automation Bonder Front Panel

Table 1: MA -280 Controls and Functions (Front and Back Panel)

Item	Function
1	Displays the grip pressure
2	Controls the duration the cooling air flows
3	Controls the duration that the die heads are closed and/or in contact with the product
4	Controls the temperature of the thermal nozzle
5	Reengages system power
6	Disrupts power to heaters and internal components Reset the E-stop by rotating the switch clockwise until it pops out again.
7	Regulates the pressure to the product grips
8	Controls heater air flow rate
9	Controls the cooling air flow rate
10	Initiates process sequence
11	Interrupts the process sequence and resets timer
12	Supplies air to machine
13	Thermocouple connection
14	Toggles system power and air on/off
15	Connects to power cord
16	Allows connection to foot pedal

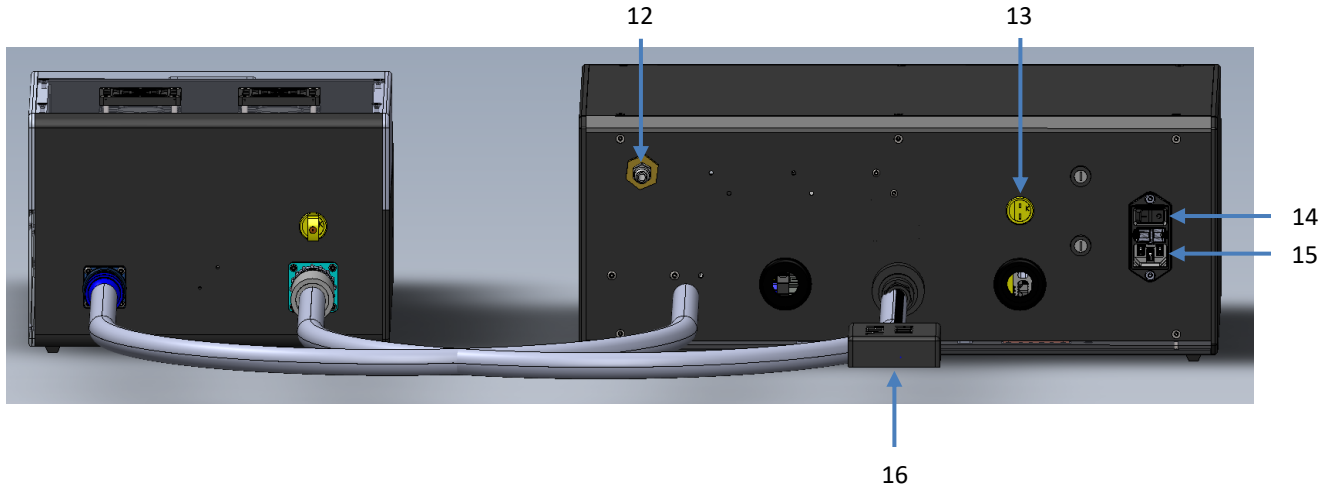


Figure 2: MA-280 Process Automation Bonder Back Panel

PARAMETER SETTINGS

Temperature - Depress and hold the **up** or **down arrow** key of the temperature controller to scroll to the desired temperature. After two seconds the new value will be accepted, and the temperature will ramp to the new set point.

Heat Duration - Depress the upper or lower half of the corresponding time digit to change its value. Depress the **stop/reset** switch to reset the timer to the new value.

Cool duration - Depress the upper or lower half of the corresponding time digit to change its value. Depress the **stop/reset** switch to reset the timer to the new value.

Heater Air Flow - Rotate the flow meter knob clockwise or counterclockwise until the meter displays the desired value.

RUN PROCESS

1. Position the components to be processed between the grip heads and in the tooling nests.
2. Depress the start button or foot switch to initiate the process sequence.
3. Upon completion of the cooling cycle, remove the completed subassembly.

Note: If process needs to be interrupted, press, and hold the red stop button.

Note: If the timer needs to be reset, quickly press, and release the red stop button.

CALIBRATION

IMPORTANT NOTES:

Calibration should be performed by a certified service, preferably with the system in the location of use. Calibration procedures are the domain of these service providers.

Calibration refers to the process of verifying that each of the systems' instruments that controls a process parameter is within specification.

Calibration DOES NOT refer to the process of measuring the temperature at the center of the thermal nozzle and "matching" the value to the temperature controller set point.

The measured value at the thermal nozzle will rarely match the temperature controller set point and the delta will increase towards the center of the nozzle.

For temperature stability verification it is recommended that the air be measured .062"-.093" from the exit point of one of the flow ports. Stability should be +/-2.0 Degrees over one hour or at a minimum over the duration of a typical process cycle (customer/product specific)

Flow meters must be verified vs. calibrated since they cannot be adjusted if out of manufacturers specifications.

- Calibrate the temperature controller annually.
- Calibrate the pressure gauge annually.
- Verify the actuator speed and distance annually.
- Verify the heater air flow meter annually.

TEMPERATURE CONTROLLER (EUROTHERM MODEL 3216E)

Tuning Temperature Controller

Note: Auto-tuning can be performed at any temperature set point within the system operating specifications. This machine needs to be auto tuned at the temperature and air flow that your product will be processed at.

1. Ensure heater power is off and heater is at room temperature.
2. Enter the process temperature setpoint using the ▼ or ▲ buttons.
3. Press ⏸ until **R.TUN** is displayed.
4. Press ▼ or ▲ to select **On**.
5. Press ⏸ **to begin the auto tune process.**
6. **Turn heater power ON.**

Please note, after following this sequence, auto tune can take several minutes to start and complete.

A full description of auto-tune and the purpose of other parameters in the level 2 list is given in the 3200 Manual located online at <https://www.eurotherm.com/download/3200-engineering-manual-ha028651-iss-15/>

Switching from Fahrenheit to Celsius

If the system is equipped with the Eurotherm model 3216, use the following instructions:

1. Press and hold the page button (left most) until Lev 1 appears.
2. Press up arrow to Lev 2 appears.
3. Press scroll to code 0.
4. Press up arrow key for code 2.
5. Press scroll button until units appear.
6. Press up or down arrow key to select C.

MAINTENANCE

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

Note: Perform these steps **ONLY** when the tooling is at room temperature.



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



Caution: hot surface. Contact may cause burn. Allow to cool before servicing.

Cleaning

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

Exchanging Thermal Nozzle

1. Loosen the set screw at the top of the nozzle adapter.
 2. Slide the nozzle while simultaneously removing the thermocouple connector.
 3. Install the replacement nozzle/thermocouple connector.
 4. Tighten the set screw in the adapter.
-

Exchanging Grip Heads

1. Remove the fasteners in each grip head.
 2. Replace the grip head with the alternate.
 3. Re-install the mounting fasteners.
-

Aligning Tooling

Note: Alignment should be performed on a prepared product subassembly.

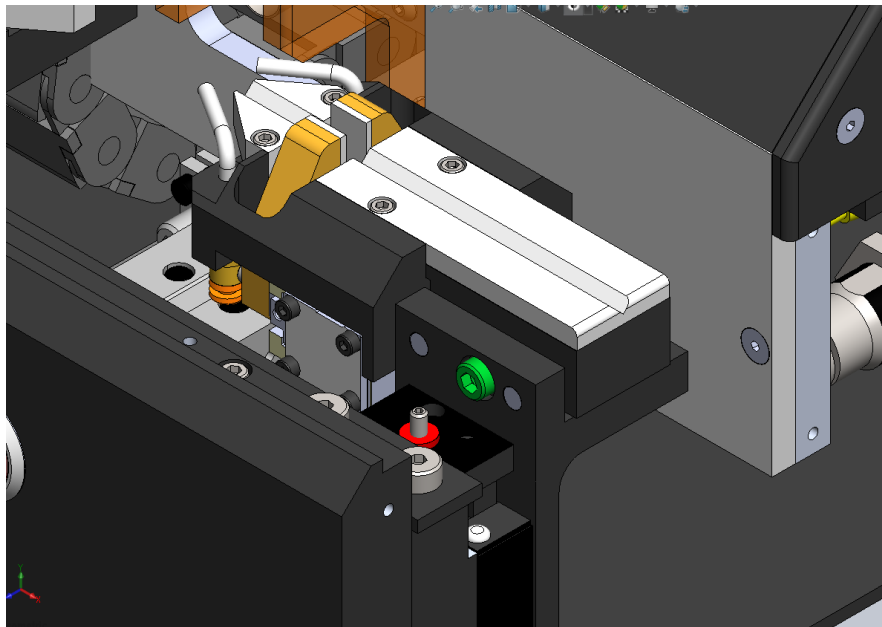
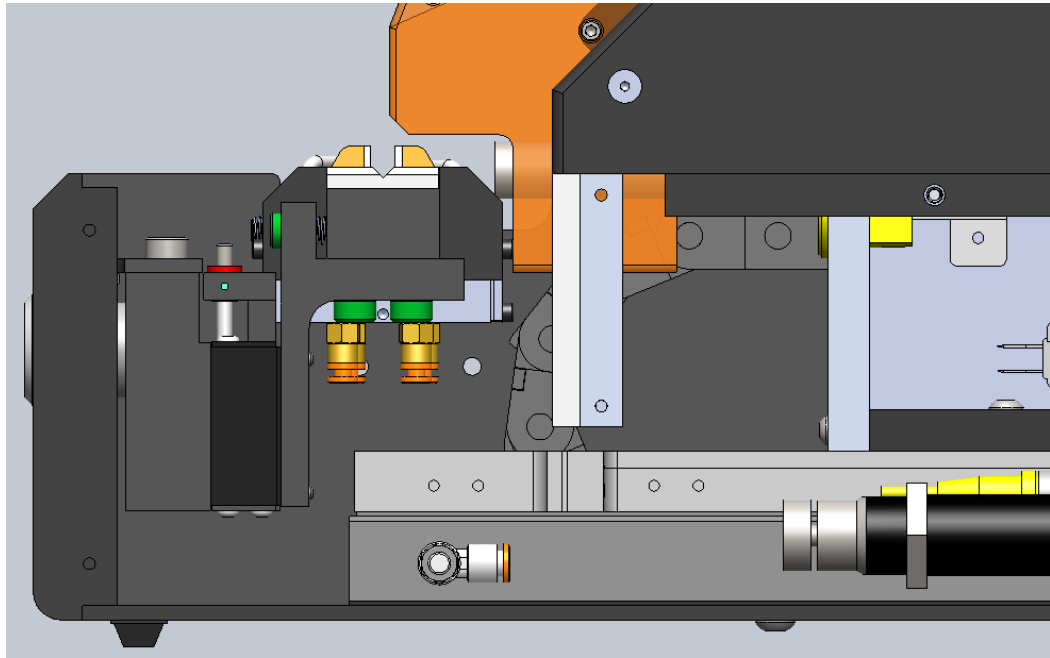
Alignment MUST be performed with system power off.

Alignment MUST be performed with heads at ambient temperature.

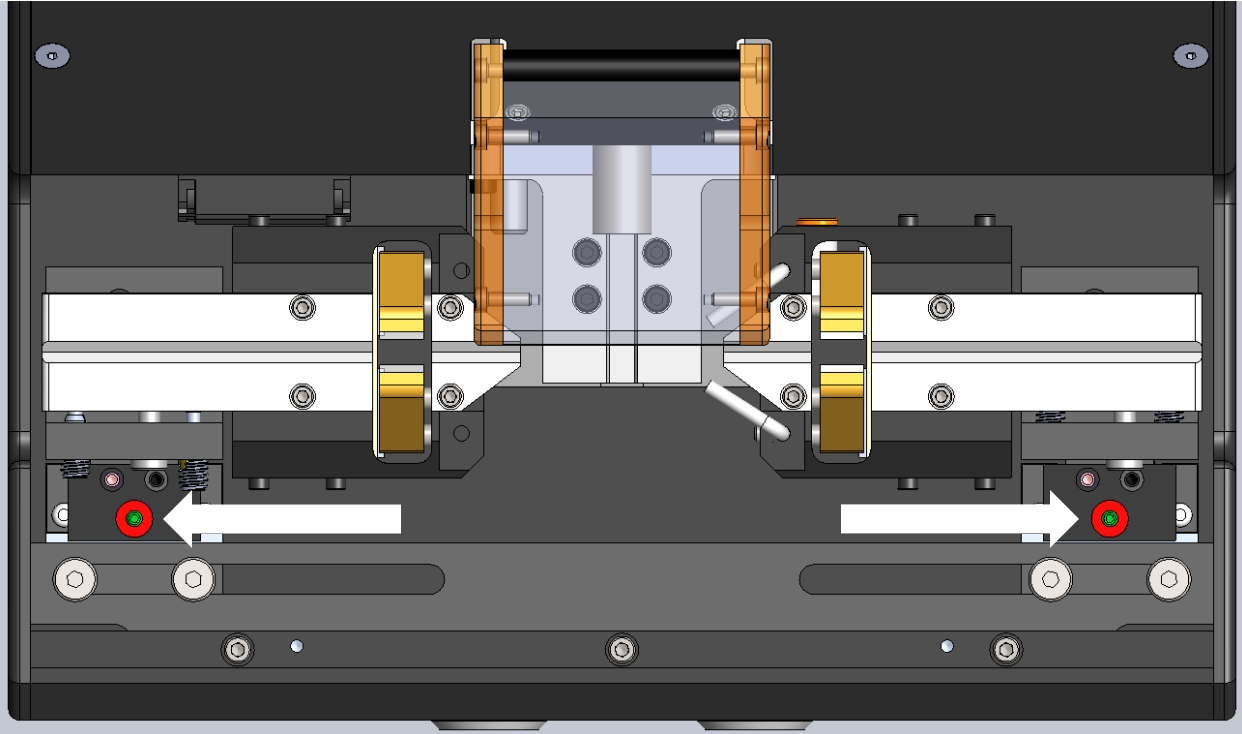
Alignment MUST be performed on a flat and reasonably level surface.

1. Remove the front shield base plate.
 2. Prepare an assembly.
 3. Position the assembly within the Vee guide/grip assemblies.
 4. Set the heater temperature to $\leq 100^{\circ}$.
 5. Set the heat duration to 9999 seconds.
-

6. Adjust the Z-axis of each grip assembly as required such that the subassembly is centered within the thermal nozzle diameter.
 - a. Remove one side plate at a time. Loosen the two screws underneath the grip assembly. Adjust the Z-axis using the screw in front of the grip assembly (shown in green). Re-attach the side plate then adjust the grip assembly. (Refer to pictures on the following pages.)



7. Adjust the Y-axis of each grip assembly until the product is centered with the nozzle diameter.
 - a. Turn green set screws to adjust the Y-axis (Y-axis top view shown below).



DIAGNOSTICS AND TROUBLESHOOTING

Table 2: Diagnostics and Troubleshooting

Issue	Possible Causes	Solution
Temperature not stable	<ul style="list-style-type: none"> • Thermal Nozzle replaced • Thermocouple loose 	<ul style="list-style-type: none"> • Auto-tune • Re-install thermocouple(s)
S.br	<ul style="list-style-type: none"> • Sensor Break • Thermocouple not installed 	<ul style="list-style-type: none"> • Determine break and repair • Install thermocouple
.Err code in display	<ul style="list-style-type: none"> • Temperature controller • Software failure 	<ul style="list-style-type: none"> • Replace temperature controller
System will not power on	<ul style="list-style-type: none"> • Emergency stop switch depressed • IEC power cord not fully connected 	<ul style="list-style-type: none"> • Rotate switch knob to engage • Verify installation

SPECIFICATIONS

Table 3: System Specifications

Description	Range	Resolution	Accuracy
Temperature	250-750° F	1.0 deg.	+/- .25% F.S.
Heat Duration	1-9999 seconds	1.0 sec.	+/-0.1 sec.
Cool Duration	1-9999 seconds	1.0 sec.	+/-0.1 sec.
Heater Air Flow	25-50 SCFH	5.0 SCFH	+/- 6% F.S
Cooling Air Flow	3-30 SCFH	5.0 SCFH	+/- 5% F.S

Facility Requirements

- Voltage: 120-240 VAC 50/60 Hz.
- Wattage: 500 max.
- Compressed Air: 60-125 psi, 0.5 CFM, filtered 50 micron or greater, oil and water free.

CRITICAL PARTS

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

Table 4: Critical Spare Parts

Part Number	Description	Quantity
1330445-003	4-WAY VALVE 24 VDC	2
1348043-001	GRADE A GAUGE	1
1343250-001	2-way pneumatic valve	2
1131433-001	Solid state relay	1
1143303-001	Timer	2
1145619-001	4 PDT Relay	1
119106-001	1 PDT Relay	2
1150440-001	Temperature Controller	1
110254-001	Heating element	1
1145600-001	Contactator	1
110103-001	2 PDT Relay	1



Equipment User Manual

CUSTOMER SUPPORT AND SATISFACTION

Machine Solutions Inc. is proud of the advanced engineering and quality construction of each piece of equipment that we build. It is our goal to provide equipment that exceeds the expectations of the customer. By implementing the highest standards and applying our experience to provide a quality product, we maintain an ongoing, positive working relationship with all our customers.

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

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WARRANTY AND LIMITATIONS

General Warranty

Machine Solutions Inc. (MSI) warrants its products to be free from defects in material and workmanship in normal everyday use and service for a period of one year from the date of shipment from the factory in Flagstaff, Arizona. MSI's obligation under this warranty shall be limited to the repairing or replacing of the product or parts thereof which upon MSI's inspection reveals them to be defective. MSI reserves the right and option to refund the purchase price in lieu of repair or replacement upon evaluation of the returned original part. Modifications, misuse, attempted repairs by others, improper calibration or operation shall render this guarantee null and void. MSI MAKES NO OTHER WARRANTY REGARDING THIS PRODUCT, INCLUDING ANY EXPRESS OR IMPLIED WARRANTY. SPECIFICALLY, THERE IS NO WARRANTY OF MERCHANTABILITY OF THIS PRODUCT OR OF THE FITNESS OF THE PRODUCT FOR ANY PURPOSES. THE SUITABILITY OF THIS PRODUCT FOR ANY PURPOSE PARTICULAR TO THE CUSTOMER IS FOR THE CUSTOMER, IN ITS SOLE JUDGEMENT, TO DETERMINE. MACHINE SOLUTIONS, INC. ASSUMES NO RESPONSIBILITY FOR THE SELECTION OR USE OF THIS PRODUCT BY CUSTOMER. This product has not been tested or approved by the U.S. Food and Drug Administration or any other agency of the U.S. government. This product is not a consumer product as that term is defined in the Magnuson-Moss Warranty – Federal Trade Commission Improvement Act, 15 U.S.C. § 2301 et seq.

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In addition, you agree that the equipment will not be used to manufacture anything other than products in which you hold intellectual property rights free of infringement of others. You may not use the equipment to manufacture any product infringing on another's patented rights. By accepting and using the equipment, you agree to defend and indemnify Machine Solutions, Inc., its officers, directors, employees, and agents, from and against any claims of infringement as a result of your use of the equipment.

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All equipment validations, product validation, final product QC testing and other testing required by the U.S Food and Drug Administration are the sole responsibility of the customer. Machine Solutions, Inc. shall have no responsibility or liability for the performance of any interventional product on which this equipment is used.