

 **CLEAN ROOM DEVICES, INC.**

**CRD216SS
TIME DELAY HEATED TUBING
EXPANDER**

OPERATIONS MANUAL



VERSION 2.8
LAST EDITED 05.11.2022
cleanroomdevices.com

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1.0 General Product & Safety Information

1.1 Product Information

- The CRD216SS is designed to expand stiffer tubing such as nylon, polyethylene, polypropylene and Teflon tubing. With the heater off, the unit can also expand flexible tubing up to a durometer of Shore A 85 (Shore D 35), including any non-metallic braided materials.
- The minimum/maximum inside tube diameter is .040" – 1/2".
- The unit operates up to a temperature of 350 °F.
- The standard jaw sets are universal and are designed to be used with an inside diameter range of .040" to 1/2". Other jaw sets are available that are optimized for a specific size (see accessories page at www.cleanroomdevices.com or call Clean Room Devices, Inc.).
- The device features simple yet reliable jaw adjustment, which can be made by the operator.
- The device features independently adjustable expansion and interval period adjustments from 0.5-5 seconds, allowing for repeatability of operation.
- The serial number for the device is located on the back of the cover, between the electronics enclosure and the power entry module. **Figure 1.1.1**



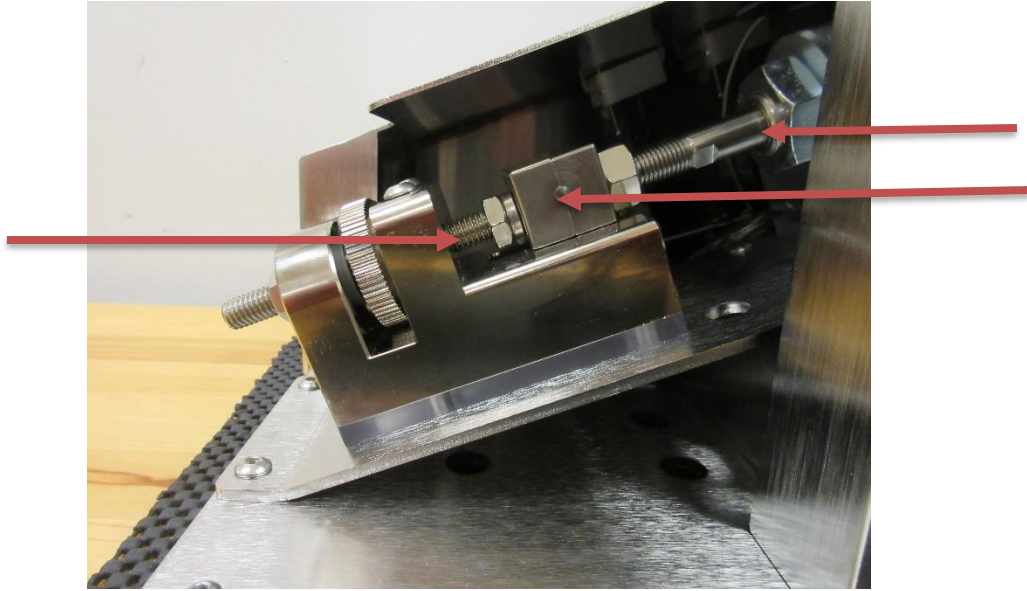
Figure 1.1.1

1.2 Safety Information

- This product uses an air cylinder and foot pedal to pneumatically actuate and expand the jaws. The unit is not intended to expand anything other than flexible tubing.

WARNING

Avoid placing your fingers between the upper jaw block and the air cylinder mounting bracket while operating unit, sufficient pressure exists to cause personal injury.

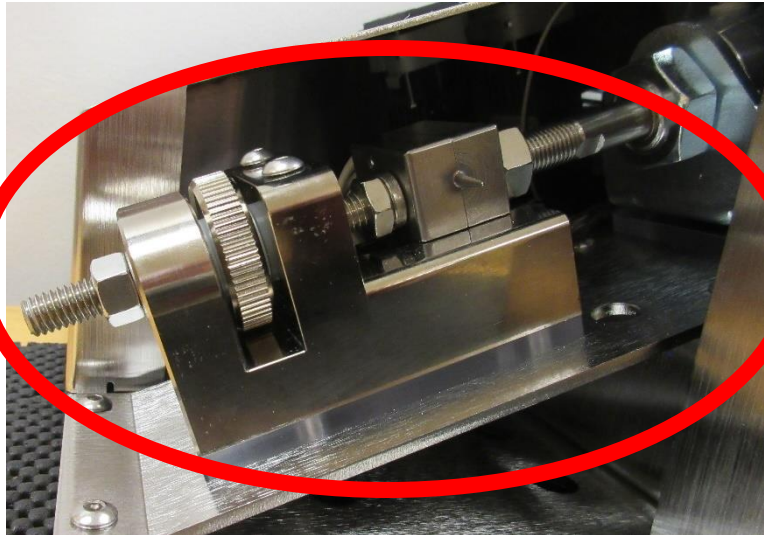


Arrows indicate pinch points

WARNING

- During heating and once the unit reaches operating temperature, the jaws and metallic areas around the jaws will be extremely hot. It is recommended to set the jaw gap *before* beginning the heating cycle. Allow the unit to cool to a safe and or comfortable handling temperature before removing and reinstalling the jaw set.

Avoid direct contact with the jaw set while the heater is on. Surface will be hot enough to cause severe burns.



2.0 Installation

Ensure all five (5) rubber feet are completely stabilized on your work surface prior to applying air pressure to the unit.

2.1 *Air Supply*

- Connect a 1/4" OD air supply hose to the inlet on the pressure regulator. The air supply should be free of moisture and contaminants and provide a minimum of 100 psi.
- The regulator on the unit should be set to 80-120 psi.

2.2 *A/C and DC Power*

- This product uses standard 60Hz alternating current power provided by your local utility. Ensure that you use the correct power supply (120VAC/24VDC) for the type of power in your region. The heaters and digital controllers are powered by the 120VAC power source, and the time-delay circuitry is powered by the 24VDC power source. Both must be present to operate.

2.3 *Connection Setup*

- Connections on the CRD216SS are simple. Refer to **Figure 2.3.1** below when making all connections to the back panel.

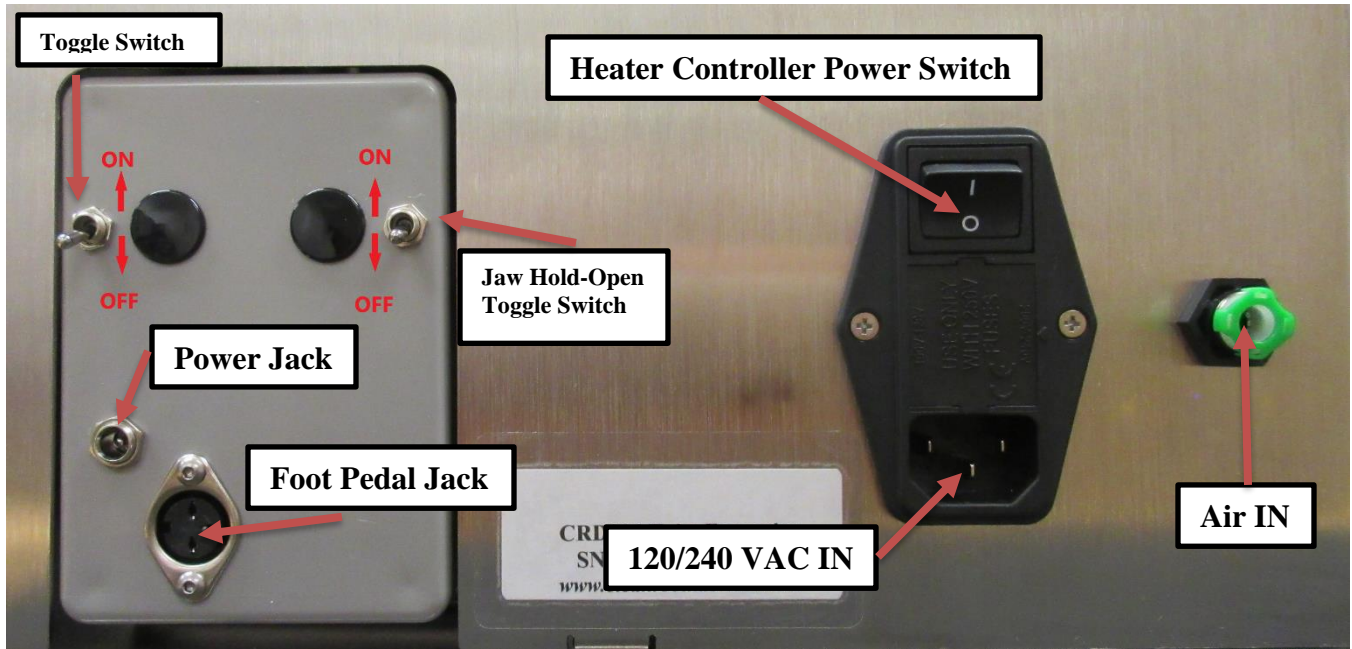


Figure 2.3.1

3.0 Operation

3.1 Jaw Adjustment

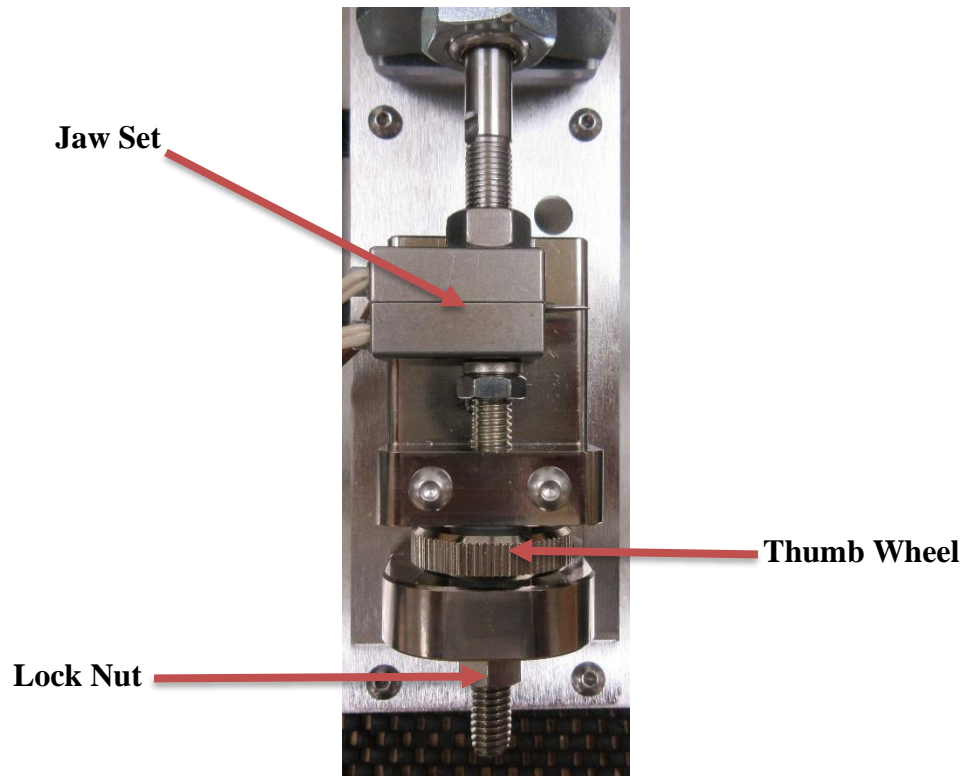


Figure 3.1.1 Jaw Adjustment

CAUTION: THE UNIT CAN BECOME EXTREMELY HOT. CARE MUST BE USED AT ALL TIMES WHEN EXPANDING AND DURING JAW INSTALLATION AND REMOVAL.

- Start by using a 9/16” wrench to loosen the 3/8” hex nut at the bottom end of the lower jaw support block assembly to adjust the unit for the proper tubing size.
- With A/C power and compressed air attached to the expander, actuate the electric foot switch which will activate the expander. Adjust the expander lower jaw to the position you want using the **Thumb Wheel Knob**. Note that the jaws may be set to remain in the “open” position using the toggle switch noted in **Figure 2.3.1**, and triggering the foot pedal. Make sure the toggle switch is returned to the “off” position, or the jaws will remain open.
- Locate the lower expander jaw position for your tubing size using the larger *thumb-wheel*.

(This adjustment may require fine tuning depending on your tubing I.D., O.D., Durometer or material. It is recommended you note or log the jaw gap settings for future applications, or usage.)

3.1.A Using the Jaw Hold-Open Feature

- A Jaw Hold-Open switch has been installed on the tubing expander. This makes setting the gap between the jaws much simpler.
 - 1) With the toggle switch in the “ON” position, flip the jaw hold-open switch to the “ON” position (UP).

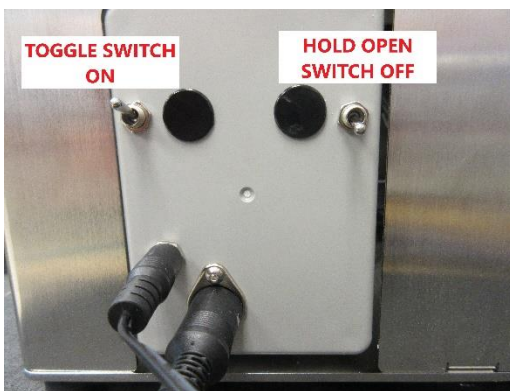


Figure 3.1.A.1

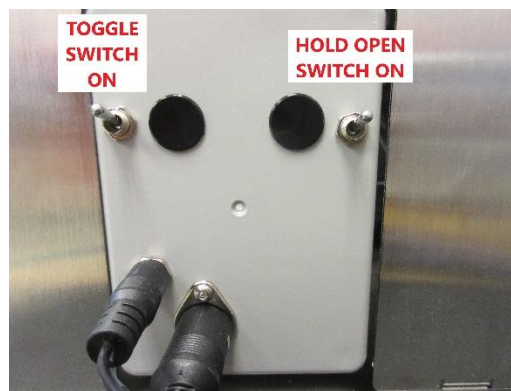


Figure 3.1.A.2

- 2) Use the foot pedal to trigger the cycle. The upper jaw will retract and remain open.

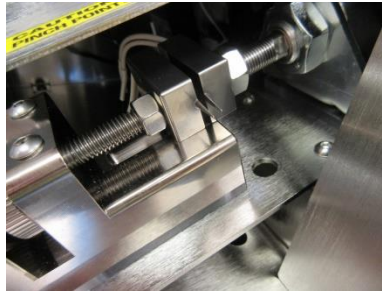


Figure 3.1.A.3

- 3) Flip the jaw hold-open switch to “OFF” position (DOWN) and the upper jaw will return to the non-expanded position.

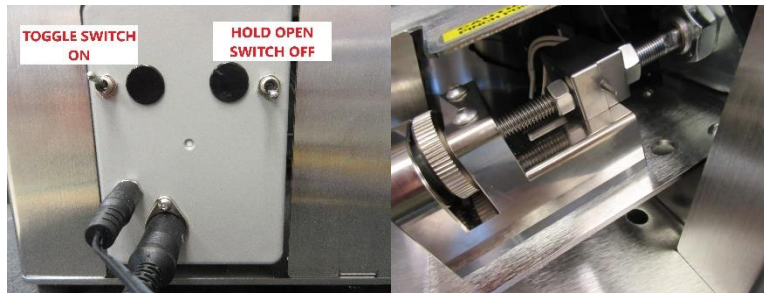


Figure 3.1.A.4

Figure 3.1.A.5

3.2 *Setting the Time Delays*

- The CRD216SS expansion operation is designed to let the operator expand each piece of tubing twice. After the first expansion, the jaws will close and the operator rotates the tube 90 degrees and the jaws will automatically expand again using the sensor. This ensures that the tubing is expanded in a uniform fashion, and not deformed in only one direction. To assist with this 2-step expansion operation, there are two time delay relays on the unit.
 - **Expansion Time** – This setting adjusts the rate (0.5-5.0 seconds) at which the tube expansion occurs. The rate at which the tube is expanded is critical to prevent tearing. Some stiffer tubing might need a longer expansion time, while softer tubing can be expanded rapidly.
 - **Interval Time** – This setting adjusts the time delay rate (0.5-5.0 seconds) at which the jaws will cycle. It is adjusted to allow the operator to rotate the tubing 90 degrees at a comfortable pace between expanding.
- Remove the hole plugs with a screwdriver on the rear cover to gain access to the Time Delay adjustment pots. ***Figure 3.2.1***



Figure 3.2.1 Removing Access Hole Plugs

- Using a small Phillips drive screwdriver adjust the Time Delay relays. *Figure 3.2.2*



Figure 3.2.2 Adjusting the Expansion Time Pot

- *Figure 3.2.3* below shows the CRD216SS with the electronics cover removed, as well as the location of both time delay adjustments on the time delay relay:

Top of unit

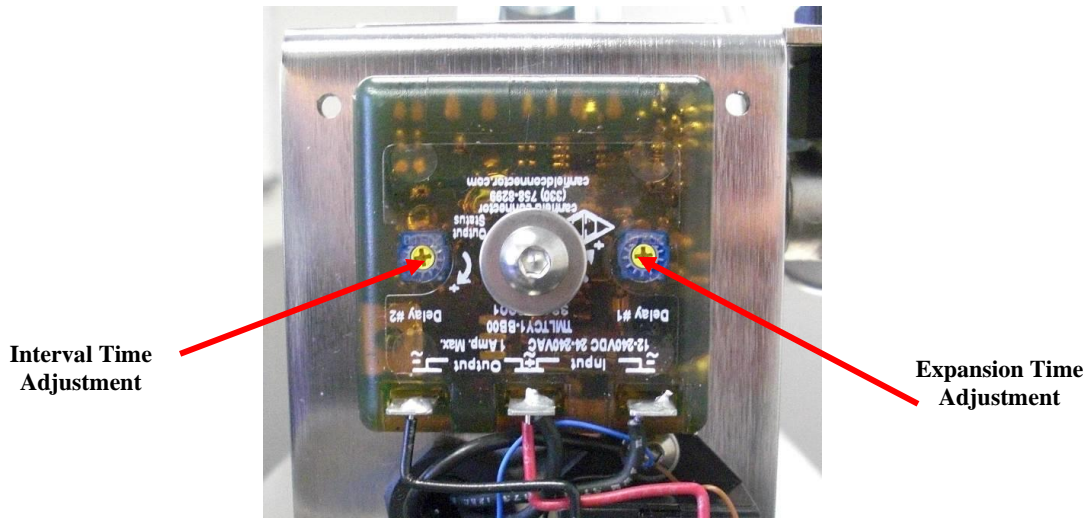


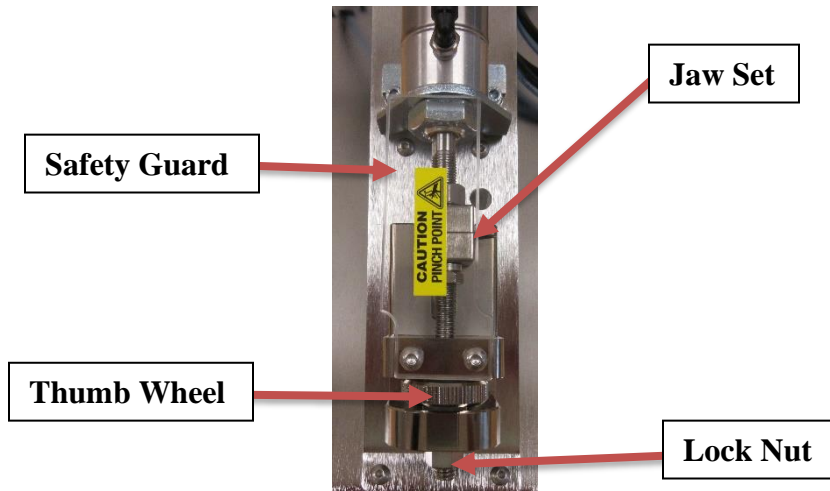
Figure 3.2.3

3.3 Expanding Operation

CAUTION: THE UNIT CAN BECOME EXTREMELY HOT. CARE MUST BE USED AT ALL TIMES WHEN EXPANDING AND DURING JAW INSTALLATION AND REMOVAL.

- To adjust the jaws for the size tubing to be expanded you need to loosen the **3/8” hex nut (Lock Nut.)**
- With A/C power and compressed air attached to the expander, actuate the electric foot switch which will activate the expander. Adjust the expander lower jaw to the position you want using the **Thumb Wheel Knob**. Note that the jaws may be set to remain in the “open” position using the toggle switch noted in **Figure 3.3.1**, and triggering the foot pedal. Make sure the toggle switch is returned to the “off” position, or the jaws will remain open.
- Turning the **Thumb Wheel** clockwise will increase the jaw expansion size, counter clockwise will decrease the jaw expansion size. This adjustment may require fine tuning depending on your tubing I.D., O.D., durometer and/or material.
- Once you have the expansion size you want tighten the **Lock Nut** to secure the adjustment.
- Place the tube over the ends of **both** expander jaws and hold firmly in place.
- Actuate the Tube Expander by pressing the electric foot switch.
- Rotate the tubing 90 degrees on the jaws and actuate the Tube Expander by pressing the electric foot switch again. **Failure to do so may result in uneven expansion and/or damaged tubing!**

Note: Several expanding actions may be necessary to effectively expand the end of the tube for the fitting/connector to slide in. Each time you expand the tubing remember to rotate the tubing 90 degrees on the jaws.



3.4 *Jaw Installation and Removal*



CAUTION: THE UNIT CAN BECOME EXTREMELY HOT. CARE MUST BE USED AT ALL TIMES WHEN EXPENDING AND DURING JAW INSTALLATION AND REMOVAL.

- Tools required are 3/8", 9/16" and 11/16" open ended wrenches, 2mm, 2.5mm, 3mm, 4mm and 3/32nds hex wrenches.

- Remove the two 4x8mm screws attaching the Thermocouples to the upper and lower jaw using a 2.5mm hex wrench. **Figure 3.4.1 and 3.4.2** *Note:* Be sure to label each thermocouple and/or heater cartridge as to its position, upper or lower, and be sure to replace them in the correct positions. The unit will not operate correctly otherwise.

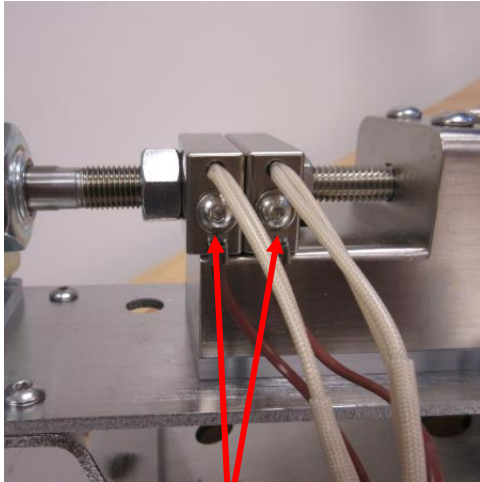


Figure 3.4.1

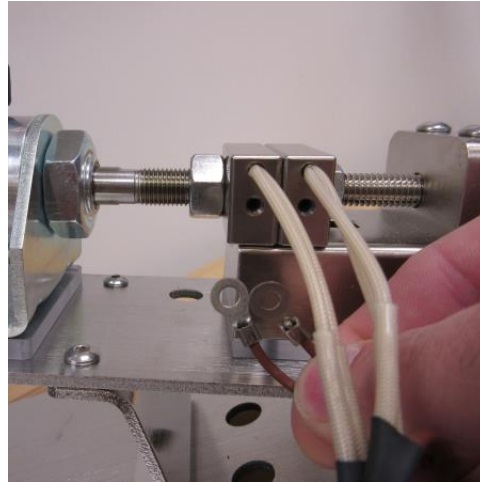


Figure 3.4.2

- Turn the thumb wheel clockwise until the cylinder shaft is fully extended in the jaw block channel to remove force from cylinder shaft. **Figure 3.4.3**

Cylinder shaft shown fully extended in jaw block channel

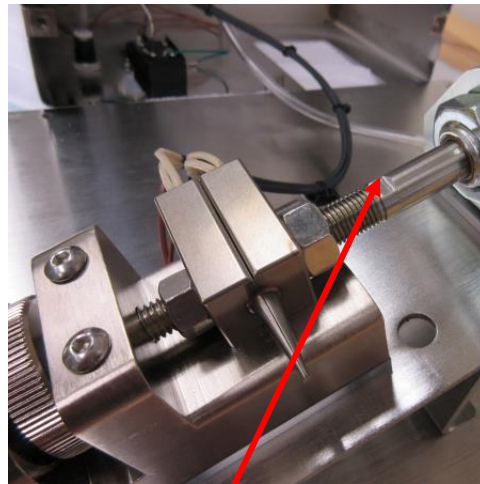


Figure 3.4.3

- Using a 3/8" open end wrench to hold the flats on the cylinder shaft and an 11/16" open end wrench on the hex nut, break the upper jaw nut loose by turning it counter clockwise. **Figure 3.4.4**
- Using a 9/16 open end wrench break the lower jaw nut loose by turning it clockwise. **Figure 3.4.5**

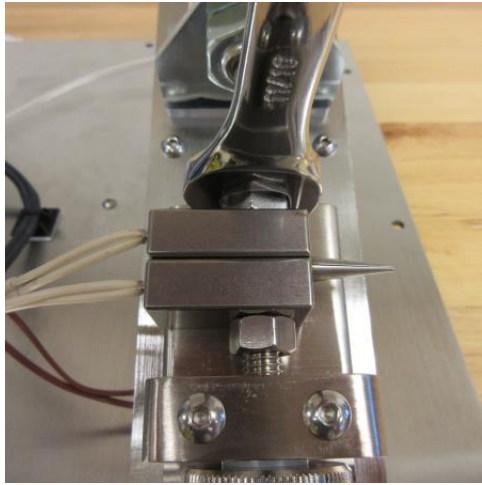


Figure 3.4.4

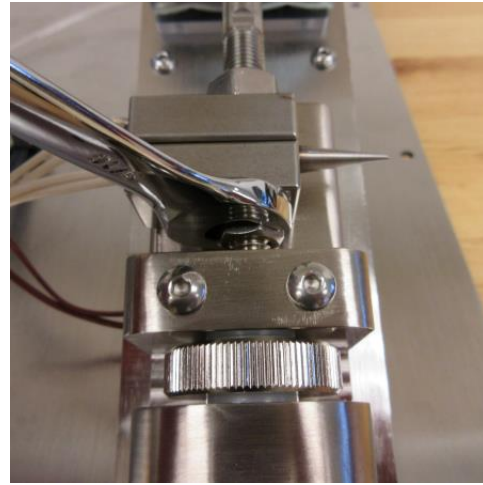


Figure 3.4.5

- Now remove the two 5x20mm screws holding the front cylinder mount bracket using a 4mm hex wrench. *Figure 3.4.6.*

Remove two 5x20mm screws

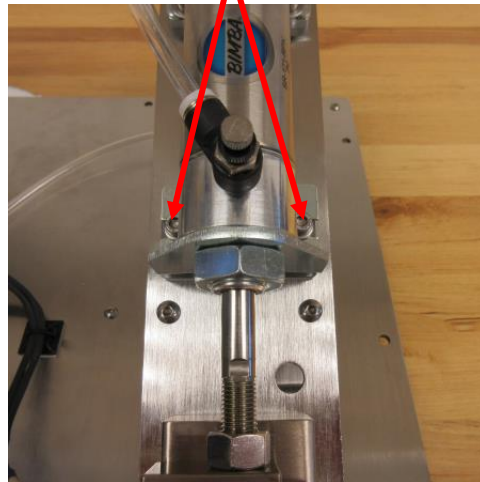


Figure 3.4.6

- Place two fingers under the cylinder shaft and lift until the upper jaw clears the lower jaw. *Figure 3.4.7 and 3.4.8*

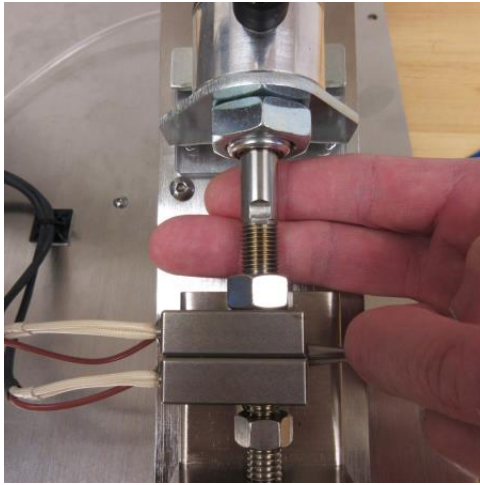


Figure 3.4.7

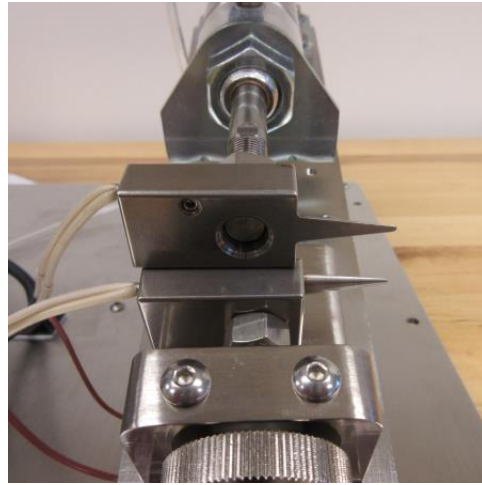


Figure 3.4.8

- Use a 2mm hex wrench to loosen the set screws in each jaw and then remove the heating element probes. **Figure 3.4.9 and 3.4.10** **Note:** The set screws may be located on either the inner or outer faces of the jaws.

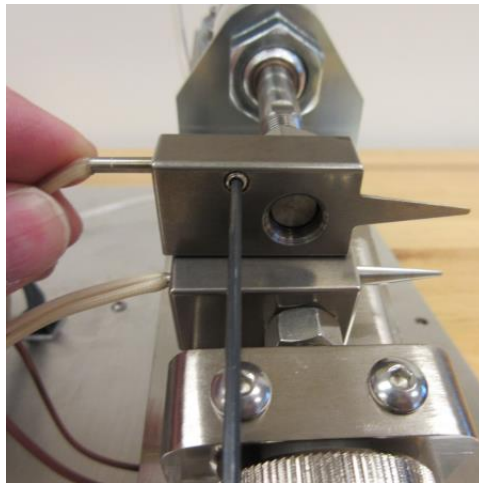


Figure 3.4.9

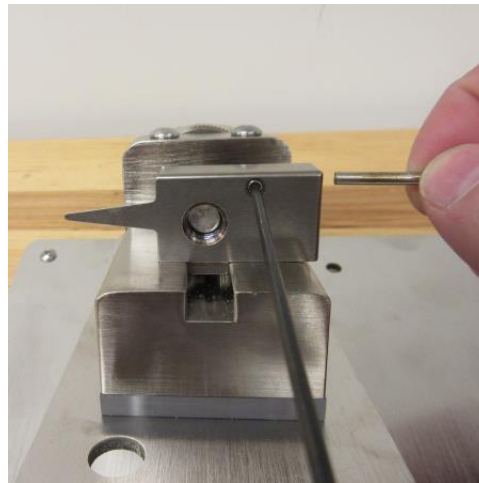


Figure 3.4.10

- Flip the cylinder backwards until it stops. **Figure 3.4.11**



Figure 3.4.11

- Rotate the upper jaw by hand turning it counter clockwise until the jaw can be removed.
- **Important note:** when screwing upper jaw onto cylinder shaft it is important to only screw the jaw 2/3 to 3/4 of the way on. Any farther and the jaw may slip off the jaw block when the cylinder is retracted.

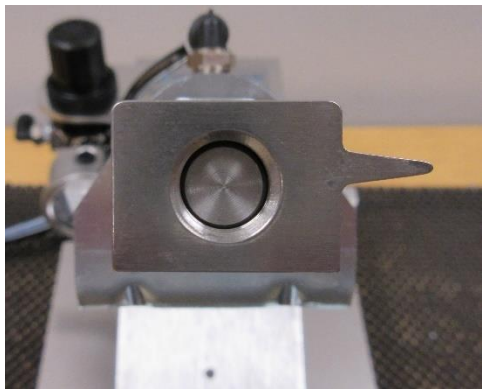


Figure 3.4.12 Jaw threaded 2/3-3/4 onto shaft



Figure 3.4.13 Jaw threaded on too far
And has slipped off jaw block.

- Remove the *locking hex nut* and turn threaded rod by hand and rotate threaded rod counter clockwise while holding the lower expander jaw until the jaw is removed. *Figure 3.4.14*

Rotate rod while holding lower jaw

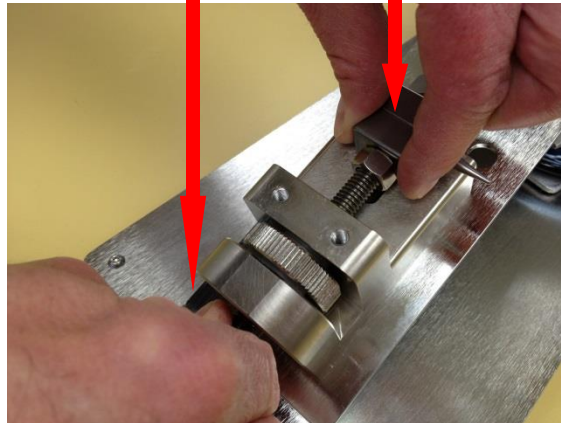


Figure 3.4.14

- Select replacement jaw set and assemble them in the reverse order of previous operations. Be sure to replace the thermocouples and heater cartridges in the correct positions. The unit will not operate correctly otherwise.
- **Note:** If the UP/DOWN alignment of the jaws are incorrect the cylinder shaft won't retract when trying to be cycled. The adjustment of both set screws on the front cylinder mount bracket will need to be adjusted. To make the adjustment you must first loosen the two 5x20mm screws using a 4mm hex wrench (*Figure 3.2.13*) and then by adjusting the two set screws using a 3/32nd hex wrench. *Figure 3.2.14*. Now tighten the two 5x20mm screws and assure jaw alignment.

5x20mm screws

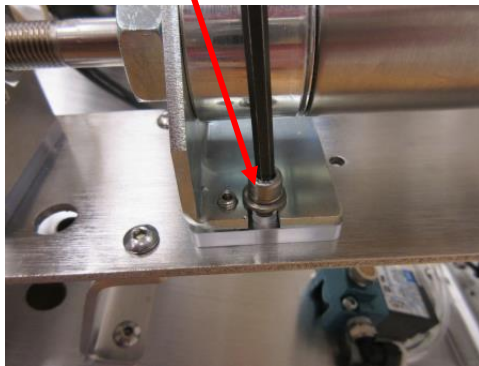


Figure 3.4.15

Set Screw (One per side)

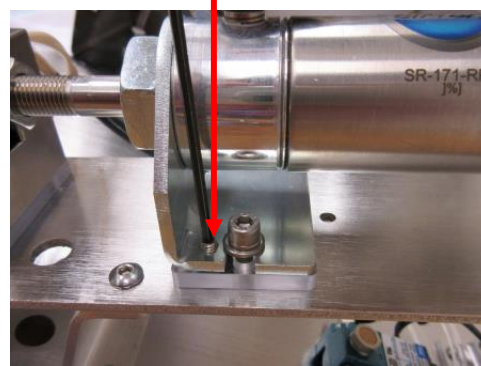
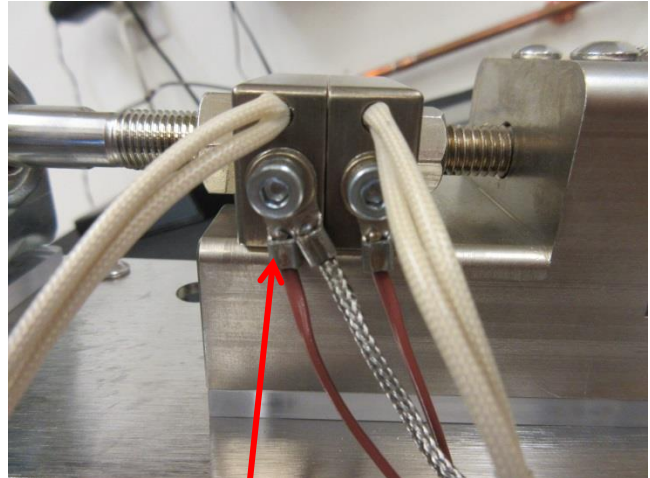
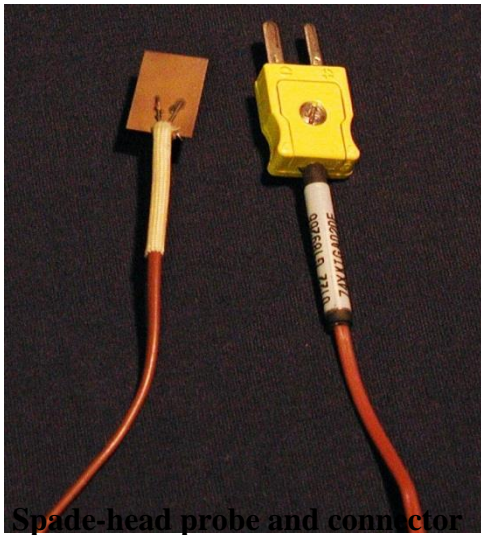


Figure 3.4.16

4.0 Maintenance

4.1 Verifying Temperature

- To verify the operational temperature, place a ring terminal measuring probe between the thermocouple and the upper jaw, as shown below:



Probe placed between thermocouple & jaw

4.2 Periodic Cleaning (annually)

- Wipe down outer surfaces with alcohol, septihol or mild detergents as required.
- Ensure the control box does not have a significant amount of dust or debris buildup within it.

4.3 Heater calibration for TEMPCO TEC-220 Temperature Controller

- Adjusting the temperature on the TEMPCO controls is a simple task.
- Press the “Function” key so the display shows “SP1” then press the down arrow to display the current set temperature. Next, use the up and down arrows to set the desired temperature. Once the desired temperature is displayed, press the “Function” key again to save. *Figure 4.3.1*

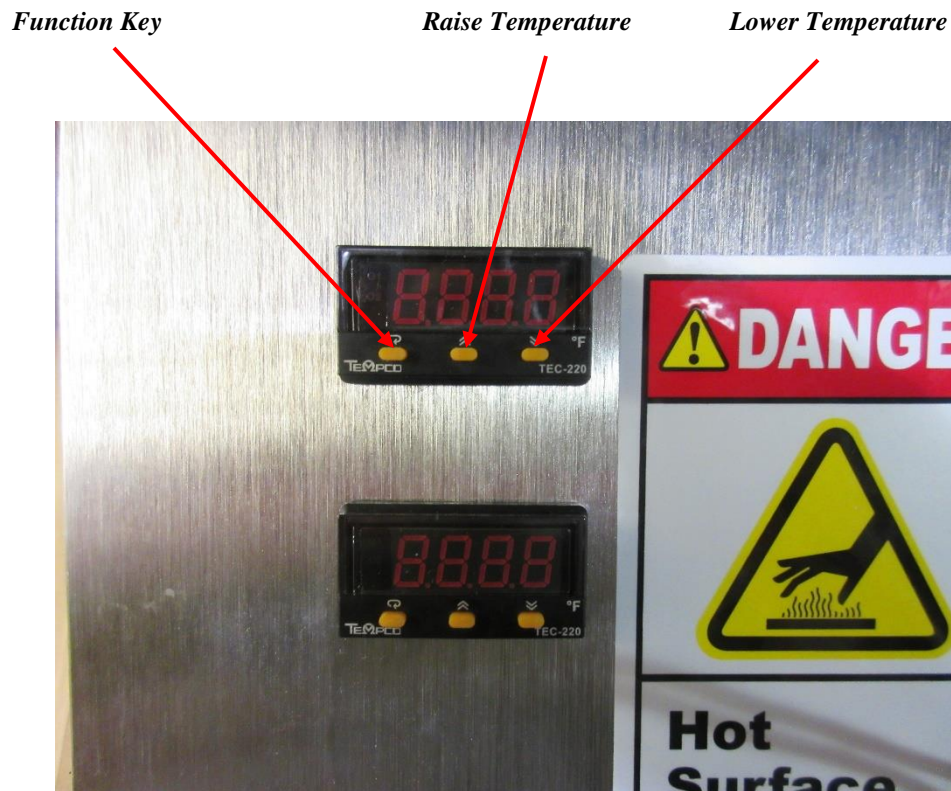
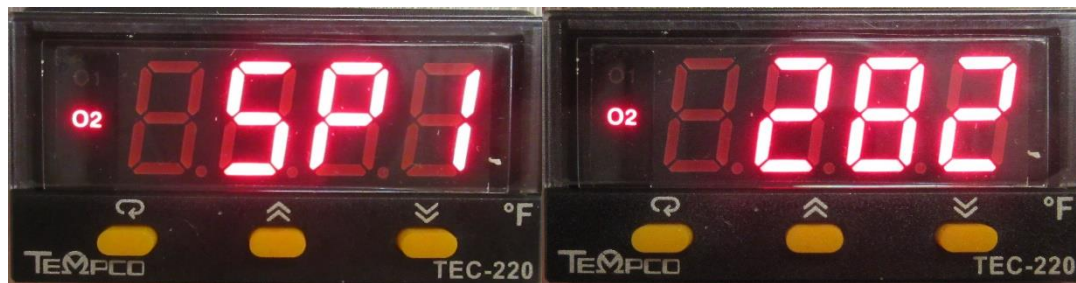


Figure 4.3.1



4.4 TEMPCO Temperature Controller

- To set the controller to “Auto Tune” Mode:
 1. Press the “Function” key four times. The unit should display “A--t”.
 2. Press and hold the “Function” key until the display flashes.
 3. If the “Function” key is pressed again, the unit will return to the normal temperature/set display screen – it will no longer be in Auto Tune Mode.
 4. The unit will Auto Tune the controllers. The heat level will go up and down, until the unit calibrates and stabilizes. The procedure will take about 10-15 minutes.

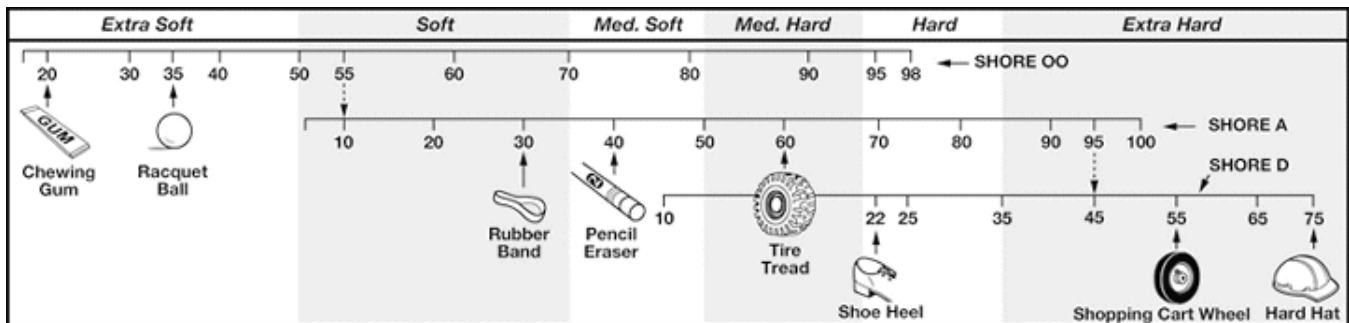
5.0 Troubleshooting

Operating Error	Action
Unit does not operate.	<ol style="list-style-type: none"> 1. Check the facility air connection. 2. Check all air hose connections on the unit.
Flexible tubing is splitting/tearing.	<ol style="list-style-type: none"> 1. Ensure the tubing being expanded does not exceed the recommended durometer. 2. Ensure the lower jaw has been adjusted correctly for the tubing inside diameter (I.D.). 3. Verify facility air supply psi or unit pressure adjustment.
Heaters are not operational or are operating at too low/high a temperature	<ol style="list-style-type: none"> 1. Check the connectivity of the thermocouples and heating elements. 2. Verify that the control unit has power. 3. Calibrate the heater controllers (see previous pages)

6.0 Product Specifications

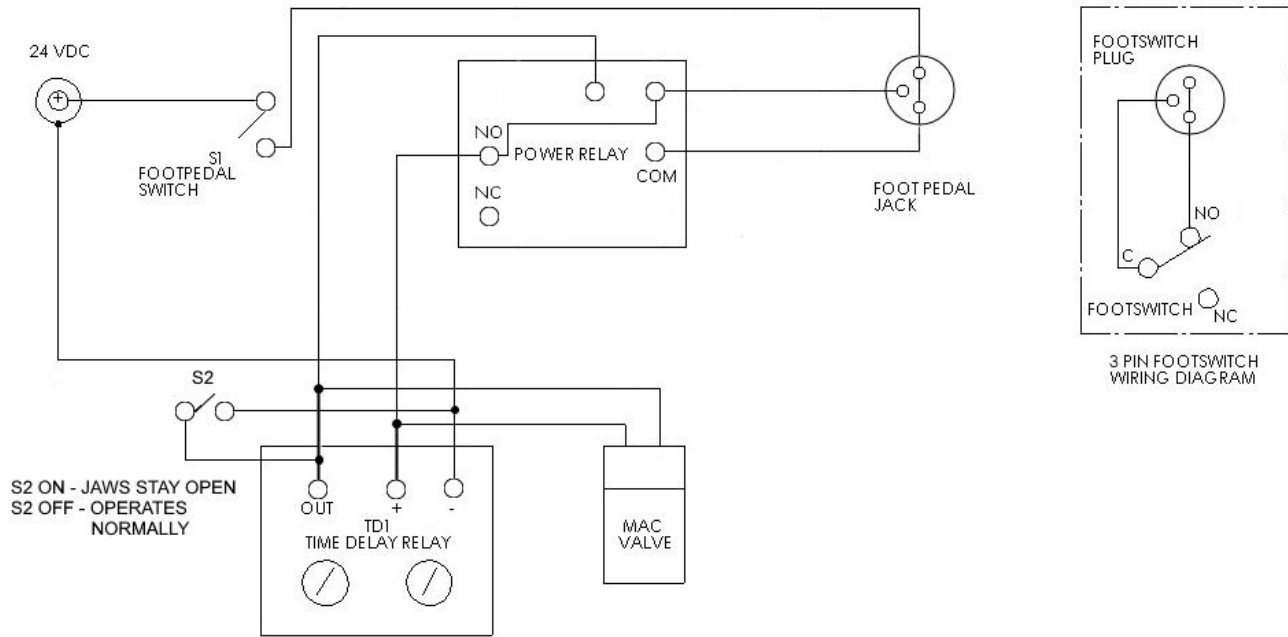
Unit Weight	21 LBS / 9.5 KG
Overall Dimensions	14.5 in. lg. x 12 in. w. x 9 in. ht.
Minimum Facility Air Supply	100 PSI
Unit Air Regulator Setting	80-120 PSI

7.0 Durometer Scale



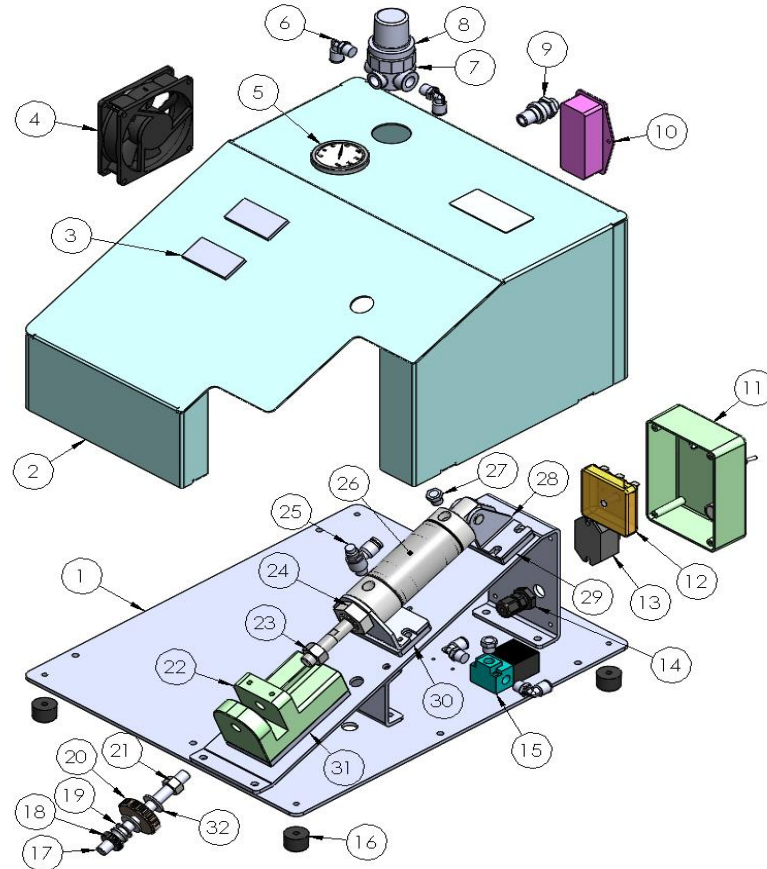
8.0 Electrical Diagrams

Note: Schematic drawings are provided for troubleshooting only—
not for modifying the machine in any way!



WIRING DIAGRAM
CRD 216

9.0 Parts List



Item No.	Part No.	Description
1	216-001	Base
2	216-004	Cover
3	P00088	TEMPERATURE CONTROLLER
4	P00490	FAN, COOLING, 3.15 SQ X 1.00 DP, MCM 1976K910
5	P00111	PRESSURE GAUGE, PANEL MOUNT, 0-160 PSI
6	P00063	FITTING, AIR, 90 DEG. ELBOW, 1/4 TUBE, 1/8NPT
7	P00066	REGULATOR, AIR, 1/8 NPT
8	P00067	NUT, REGULATOR, PANEL MOUNT
9	P00094	CORD GRIP, LIQUID-TIGHT, NYLON
10	P00092	POWER ENTRY MODULE
11	CD202-008	MODIFIED COVER, ELECTRONICS Part#J-6850AR1*01
12	P00264	RELAY, TIME DELAY
13	P00265	RELAY, PANEL MOUNT, SPNO 25A 24VDC
14	P00094	CORD GRIP, LIQUID-TIGHT, NYLON
15	P00108	SOLENOID VALVE, 3 WAY
16	P00026	RUBBER FOOT - MCMMASTER PN 9540K56
17	P00057	THREADED ROD, .375-16 X 4, 18-8 SS
18	P00059	HEX NUT, .375-16, 18-8 SS

19	P00056	WASHER, .375, 300 SS
20	CD002-137	KNOB, THUMB
21	P00059	HEX NUT, .375-16, 18-8 SS
22	CD002-138	BLOCK SUPPORT LONG
23	P00058	HEX NUT, .438-20, 18-8 SS
24	P00085	HEX NUT, 3/4-16, ZINC-PLATED STEEL
25	P00141	FLOW VALVE, 1/8" NPT, 1/4" TUBE OD, METER IN
26	P00620	AIR CYLINDER, 1.5 BORE X 1.0 STROKE
27	P00022	EXHAUST MUFFLER, 1/8 NPT
28	P00027	PIVOT BRACKET, .375 PIN
29	210-006	INSULATOR, CYLINDER PIVOT
30	210-007	INSULATOR, CYLINDER NOSE
31	210-005	INSULATOR, SUPPORT BLOCK
32	P00086	WASHER, NYLON, .39 ID X .75 OD

10.0 Warranty

10.1 Warranty

The manufacturer warrants the product manufactured by it, when properly installed, operated, applied and maintained in accordance with the procedures and recommendations outlined in the manufacturer's operation manual, to be free from defects in material or workmanship for a period as specified below, provided such defect is discovered and brought to the manufacturer's attention within the stated warranty period.

The manufacturer will repair or replace any product or part determined to be defective by the manufacturer within the warranty period, provided such defect occurred in the normal service and not as a result of misuse, abuse, neglect or accident. Normal maintenance items requiring routine replacement are not warranted. The warranty covers parts and labor for the warranty period unless otherwise specified. Repair or replacement shall be made at the factory or the installation site, at the sole discretion of the manufacturer. Any service performed on the product by anyone other than the manufacturer must first be authorized by the manufacturer.

Unauthorized service voids the warranty and any resulting charge or subsequent claim will not be paid. Products repaired or replaced under warranty shall be warranted for the unexpired portion of the warranty applying to the original product.

The foregoing is the exclusive remedy of any buyer of the manufacturer's product. The maximum damages liability for the manufacturer is the original purchase price of the product or part.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR STATUTORY, AND IS EXPRESSLY IN LIEU OF THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. THE MANUFACTURER SHALL NOT BE LIABLE FOR LOSS OR DAMAGE BY REASON OF STRICT LIABILITY IN TORT OR ITS NEGLIGENCE IN WHATEVER MANNER INCLUDING DESIGN, MANUFACTURE OR INSPECTION OR THE EQUIPMENT OR ITS FAILURE TO DISCOVER, REPORT, REPAIR, OR MODIFY LATENT DEFECTS INHERENT THEREIN.

THE MANUFACTURER, HIS REPRESENTATIVE OR DISTRIBUTOR SHALL NOT BE LIABLE FOR LOSS OF USE OF THE PRODUCT OR OTHER INCIDENTAL OR CONSEQUENTIAL COSTS, EXPENSES, OR DAMAGES INCURRED BY THE BUYER, WHETHER ARISING FROM BREACH OF WARRANTY, NEGLIGENCE OR STRICT LIABILITY IN TORT.

The manufacturer does not warrant any product, part, material, component, or accessory manufactured by others and sold or supplied in connection with the sale of manufacturer's products.

10.2 Warranty Period

Parts and labor are for ninety (90) days from the date of shipment from the factory. Freight to the factory on units that the manufacturer requests to be returned shall be paid by the purchaser, all return freight to be paid by the manufacturer; means of transportation to be specified by the manufacturer.

For additional information contact: www.cleanroomdevices.com

Clean Room Devices, Inc.
10855 Dover Street, Suite 100
Westminster, CO 80021
303-438-0853