

SONICS

Model T202WD *20 kHz* *Ultrasonic* *Pouch Sealer*



USER MANUAL

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All Data and Information Subject to Change without Notice

SAFETY PRECAUTIONS



READ BEFORE INSTALLING OR USING THE EQUIPMENT

Our systems have been designed to assure maximum operator safety. However, no design can completely protect against improper usage. For maximum safety and equipment protection, observe the following warnings at all times and read all applicable instruction manuals carefully before you attempt to operate any equipment.

- High voltage is present in the equipment. Disconnect electrical source before servicing.
- Make sure equipment is properly grounded. Before making electrical source connection, test source outlet for proper earth grounding.
- Never squeeze or grab the vibrating ultrasonic horn.
- Do not modify horn configurations. Any machining done to an ultrasonic horn will alter its resonance frequency and may render it unusable.
- 20 kHz, 30 kHz and 40 kHz ultrasonic welders operate above the normal audible range for most people. Although it is typically not required, some operators may choose to use hearing protection.
- Do not affix any device to any portion of the horn.

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IMPORTANT SERVICE LITERATURE



NOTE: Please read this manual carefully before operating the equipment, then forward to your service department.

The system supplied with this instruction manual is constructed of the finest material and the workmanship meets the highest manufacturing standards. It has been thoroughly tested and inspected before leaving the factory and when used in accordance with the procedures outlined in this manual, will provide you with many years of safe and dependable service.

MANUAL CHANGE INFORMATION

We continually strive to be at the forefront of the latest electronic developments by adding circuit and component improvements to our equipment as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we cannot incorporate these changes immediately into printed manuals. Hence, your manual may contain new change information. Change information, if any, is located in the Appendix.

We reserve the right to make any changes in the design or construction of our equipment at any time, without incurring any obligation to make any change whatsoever in units previously delivered.

The technical data and schematics in the manual are for informational purposes only and may not reflect the current configuration being shipped from our factory. Upon formal request, complete and up-to-date information can be provided from the factory free of charge.

UNPACKING AND INSPECTION



NOTE: We recommend keeping all carton(s) and packing material in case it might be necessary to move the equipment, or to ship it for repair.

Before unpacking the equipment, check the shipping carton for any visible damage. If you see any, be sure to follow the procedures described below under “Visible Loss or Damage.” Otherwise, proceed to remove the equipment from the carton. Before disposing of any packing material, check it carefully for small parts. Then perform a visual inspection of the equipment to detect any evidence of damage which might have occurred during shipment. Check the following:

1. all components against the enclosed packing list,
2. all module plug-in units,
3. all wire plug-in connections.

The equipment was carefully packed and thoroughly inspected before leaving our factory. All units are tested and checked for problems prior to shipping. It is asked that when a problem does occur that all parts and components be inspected for damage (especially when the unit is not in working order when received). Responsibility for safe delivery was assumed by the carrier upon acceptance of the shipment. Claims for loss of damage sustained in transit must therefore be made upon the carrier, as follows:

VISIBLE LOSS OR DAMAGE

Any external evidence of loss or damage must be noted on the freight bill or shipment receipt, and signed by the carrier’s agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier’s refusal to honor a damage claim. The form required to file such a claim will be supplied by the carrier.

CONCEALED LOSS OR DAMAGE

Concealed loss or damage means loss or damage which does not become apparent until the merchandise has been unpacked. The contents might have been damaged in transit due to rough handling even though the container may not show external damage. When damage is discovered upon unpacking, make a written request for inspection by the carrier’s agent within 48 hours of the delivery date. Then file a claim with the carrier since such damage is the carrier’s responsibility. The form required to file such a claim will be supplied by the carrier. Do not destroy packing materials, or move material from one location to another before the carrier makes their inspection.

If the system or any unit is damaged, notify “Sonics.” “Sonics” will arrange for repair or replacement of damaged equipment without waiting for the claim against the carrier to be settled, provided a new purchase order is issued to cover the repair or replacement costs. Should any damage, shortage or discrepancy exist, please notify us immediately.

OVERVIEW OF ULTRASONIC PLASTIC ASSEMBLY

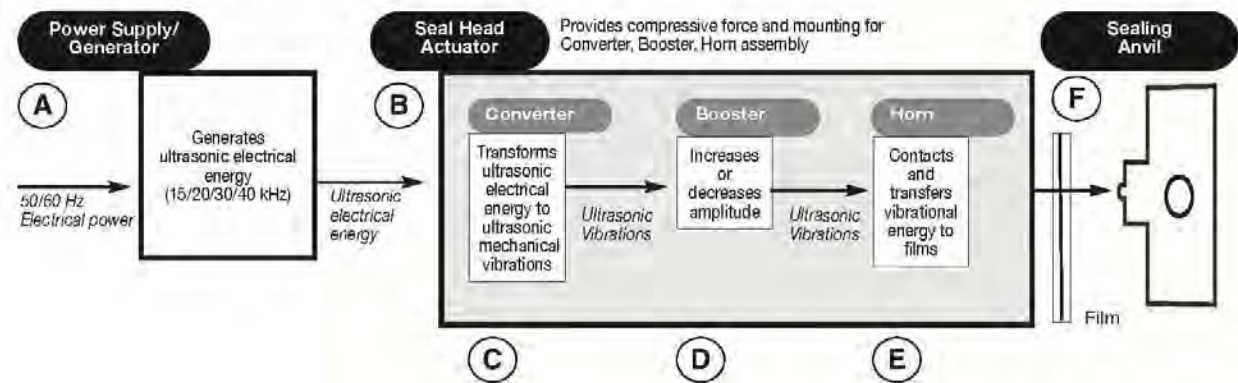
WHAT IS ULTRASONICS?

Ultrasonics refers to vibrational waves with a frequency above the human audible range which is usually above 18,000 cycles per second (Hz).

PRINCIPLE OF ULTRASONIC WELDING

The basic principle of ultrasonic assembly involves conversion of high frequency electrical energy to high frequency mechanical energy in the form of reciprocating motion which, when applied to a thermoplastic film, generates frictional heat at the plastic-to-plastic interface. In ultrasonic welding, this frictional heat melts the plastic, allowing the two surfaces to fuse together.

SONICS ULTRASONIC POUCH SEALING



A. GENERATOR KIT – The solid state ultrasonic generator:

Note: Sonics' kit style generators are intended to mount inside of a NEMA type electrical enclosure and be controlled via a customer supplied PLC with related electronic components.

- 1) Converts the incoming single phase, 230VAC, 50/60 Hz electrical source to a high voltage, 20,000 Hz electrical signal
- 2) Receives a 0-10VDC signal from the PLC to manipulate the vibrational amplitude
- 3) Provides output signals such as Run Frequency and Instantaneous Power
- 4) Provides error signals such as System Overload

B. SEAL HEAD ACTUATOR – The wash-down pneumatic actuator:

- 1) Provides compressive force on the seal jaws
- 2) Provides rigid mounting for the converter, booster, horn (stack) assembly and sealing anvil
- 3) Provides repeatable alignment and parallelism of the seal jaws

OVERVIEW OF ULTRASONIC PLASTIC ASSEMBLY

C. CONVERTER – The wash-down converter:

- 1) Is an electro-mechanical device that converts the high frequency electrical energy supplied by the generator into mechanical vibrations through the use of piezo-electric ceramic crystals
- 2) Is sealed to allow spraying with CIP solutions
- 3) Contains air (in/out) ports for cooling

D. BOOSTER – The booster:

- 1) Is a tuned component of the system
- 2) Transmits and amplifies the mechanical vibrations from the converter to the Horn
- 3) Provides a non-vibrating, rigid clamping point to secure the vibrating components

E. HORN – The horn (Sonotrode):

- 1) Is a tuned component of the system
- 2) Transfers the ultrasonic vibrations from the booster to the pouch, creating frictional heat between the film layers
- 3) Further amplifies the vibrations to a level that will cause the film sealant layer to melt
- 4) May contain features on the face to enhance the seal quality and consistency

F. SEALING ANVIL – The sealing anvil:

- 1) Is a non-vibrating component of the system
- 2) Provides sufficient rigidity and mass to stop the ultrasonic vibrations, creating frictional heat between the film layers
- 3) Provides a means of creating parallelism to the horn face (leveling)
- 4) May contain features on the face to enhance the seal quality and consistency
- 5) Contains connections for customer supplied cooling water



INSTALLATION



WARNING

Do not connect the actuator to an air source supplied by an air compressor lubricated with synthetic oils or oils containing phosphate esters or chlorinated hydro-carbons. This type of lubricant may cause the air filter to malfunction, and the plastic bowl to rupture.

ELECTRICAL POWER

The actuator is designed using air cylinders to provide the clamping force. The solenoid that drives the pneumatic system is powered by the PLC (24VDC signal, 3 watt max)

AIR SUPPLY

The actuator requires a source of dry, filtered (5 micron), oil-free, compressed air capable of supplying a constant line pressure of up to 85 psig. (625 kPa / 6 bar) at a minimum capacity of 2 CFM.

The selected installation site should be near the electrical power and air supply sources and away from any equipment that generates abnormally high electrical transients. Observe the following additional instructions when installing the system:

T202WD Installation and Setup Instructions

Mechanical Installation:

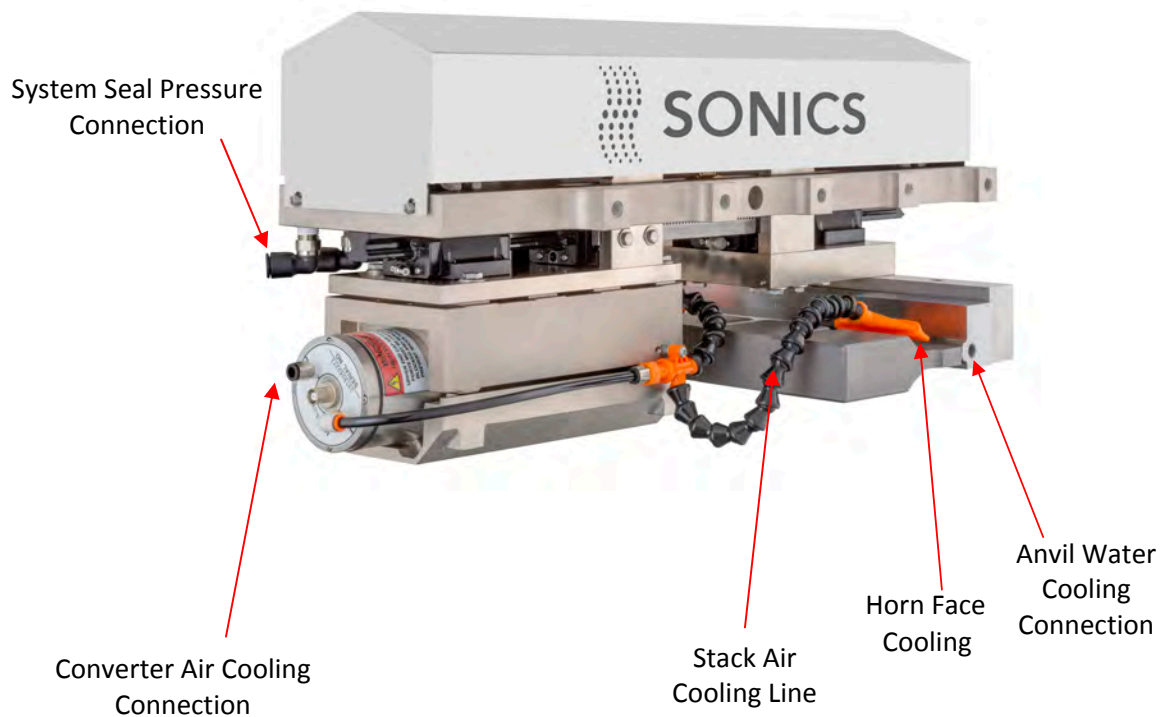
1. Mount the actuator such that the centerline of the tooling seal jaws (horn and anvil) are positioned at the centerline of the required seal location on the pouch.
2. The actuator should be placed or attached to a sturdy structure or bench capable of supporting a minimum of 200 Lbs. (90 kg)
3. Allow at least 4 inches (100 mm) at the rear of the actuator for RF converter cable and compressed air line connections.



INSTALLATION

Air and Cooling Installation:

- Two regulated air supply lines are required (customer supplied).
 - (1) System seal pressure air should be dry, filtered to 5 microns and regulated between 20-100 psi.
Note that system seal pressure regulator should be easily accessible as seal force is a commonly adjusted sealing parameter.
 - (1) Cooling air is connected to the port on the back of the converter and should be dry, filtered to 5 microns and regulated between 10-30 psi. The air that exits the converter is then routed to additional cooling lines on the system.
- The actuator has two flow controls to adjust sealing jaw open and close speed. Rotate the respective flow control clockwise to limit speed and counterclockwise to increase speed.
- Customer supplied cooling water should be connected to the fittings on the anvil to prevent the tools from overheating and keep the sealing process stable. Temperature and flow is dependent on the application requirements.

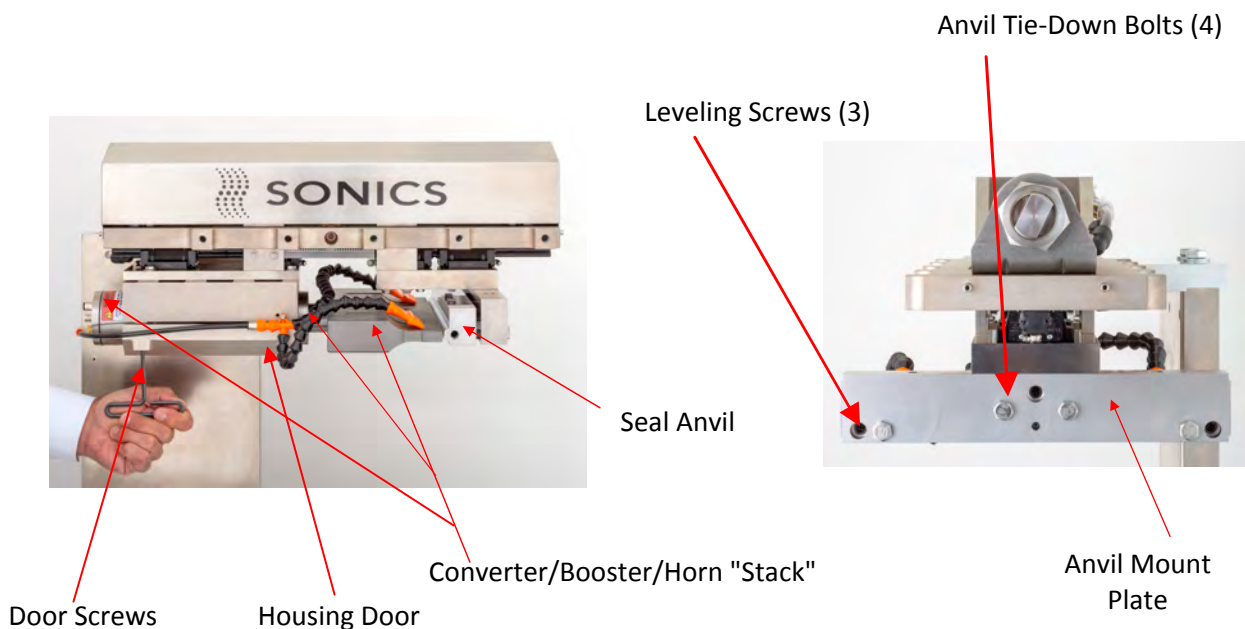


WARNING

Clean and dry air service is critical to equipment performance and operation. **Routinely check the incoming air regulator filter bowl** for any moisture and/or condensation, and drain as necessary. Allowing any moisture to enter the converter will damage electronic components and is not covered by warranty.

TOOLING SET-UP AND LEVELING

1. The tooling opening can be adjusted for up to 2" (50.8 mm) of travel, 1" (25.4 mm) of horn travel and 1" (25.4 mm) of anvil travel. Note: reducing the tooling travel can enhance the cycle rate.
2. Assemble the converter/booster/horn "stack" as shown below.
3. Open the hinged stack housing door and install the converter/booster/horn assembly into the stack housing.
 - Before fully tightening the door screws, rotationally align the horn face to match the sealing anvil.
4. Disconnect the system air pressure and manually close the seal jaws to ensure that the rotational alignment between the horn and anvil is precise.
5. To self-level, re-connect air pressure and send a signal from the PLC to the pneumatic valve solenoid to close the seal jaws without a pouch in place. **Note that ultrasonic vibrations ARE NOT TO BE APPLIED at this time.**
6. Adjust the seal pressure regulator to the required level. This will be determined by trial and error to optimize the settings for each particular pouch. 30 PSI (2 Bar) is a good starting point.
7. With the jaws closed and the tools clamped under pressure, loosen the four leveling screws and four anvil tie-down bolts on the back side of the anvil.
8. The anvil will pivot on the ball in the anvil mounting base and automatically become parallel with the horn face.
9. Next, lightly screw the Allen leveling screws inward until they make contact with the anvil mounting block.
10. To secure the anvil, tighten the four hex head anvil tie-down bolts to 25 ft-lb (35 Nm)
 - Once the horn and anvil are aligned, tighten the stack housing door screws to 5 ft-lb (7 Nm).



OPERATING PROCEDURES

Once all electrical and air connections have been made, you are now ready to power up the actuator and set your weld parameters.

WELD MODE

Sonics kit generators are capable of providing several methods to control the weld process and monitor weld quality. Depending upon the sophistication of the PLC programming the control modes can include time or energy based weld modes.

Time is the duration of vibration being applied during the weld cycle. Typical pouch sealing weld times are between 0.100 seconds and 1.000 seconds.

PRESSURE (FORCE)

The actuator air cylinder provides compressive weld force (in/lbs.) at a mechanical advantage of approximately 4.9 times the actuator's air regulator setting (psig).

Pressure can be increased to produce welds in a shorter cycle time.

A weld pressure setting of 30 PSI is a recommended starting pressure.

AMPLITUDE

Amplitude is the microscopic distance that the face of the weld tool vibrates. It should be set as a percentage of the available amplitude via the PLC interface.

As with pressure, amplitude can be increased to produce welds in a shorter cycle time.

A weld amplitude setting of 80% is a recommended starting point.



NOTE: While increasing pressure and/or amplitude can reduce weld time, these increases can also impede ultrasonic vibration start and cause an overload condition in the system.

T202WD Sequence of Operation:

1. A filled pouch is indexed into position between the seal jaws and a pouch sensing device (customer supplied) sends a signal to the PLC confirming the presence of a pouch between the tools.
2. Via customer supplied pneumatic valve, compressed air must then be provided to close the seal jaws.
3. The PLC then initiates the Ultrasonic Delay Time (typically 100-200 ms) which allows the pouch to be compressed prior to the application of ultrasonic energy. The delay time may need to be adjusted for each particular application and should be considered a frequently used setup parameter.
4. After the Ultrasonic Delay Time is complete, The PLC then initiates the Weld Time by sending a timed contact closure (typically between 150-300 ms) to the generator kit to initiate ultrasonic vibration for the set duration. Note that Weld Time will be the primary weld parameter that the operator will use to increase or decrease the degree of seal. Weld Time may need to be adjusted often and should be considered a frequently used setup parameter.
5. After the Weld Time is complete, the PLC opens the contact to the generator and the ultrasonic vibrations cease.

OPERATING PROCEDURES

6. The PLC maintains the jaws in the closed position for the Hold Time to allow the pouch to cool (typically about 200 ms). Hold Time may need to be adjusted frequently and should be considered a frequently used setup parameter.
7. Via customer supplied pneumatic valve, compressed air should then be diverted to open the seal jaws.

Initial application setup:

1. To start, set the Air Pressure to 30 psi (less for pouches under 4" wide, more for pouches over 6" wide).
2. If less weld is desired, reduce Amplitude, Weld Time and/or Sealing Force.
3. If more weld is desired, increase Amplitude, Weld Time and/or Sealing Force.
4. If the seal is heavier on one side of the pouch than the other, re-level the tools as described above.

Electrical Installation:

1. Electrical connections to the generator are detailed in the separate Generator Kit manual that accompanied this manual.



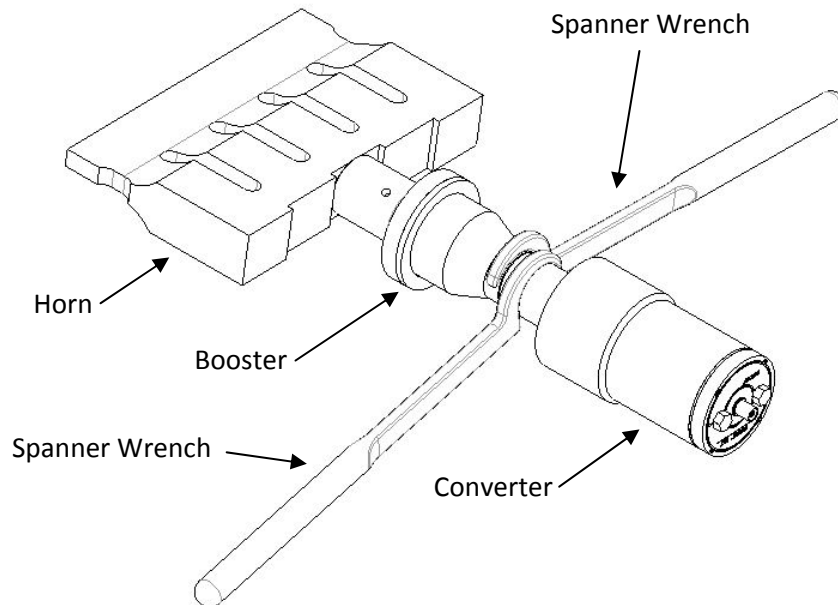
WARNING

A pouch presence sensing device (typically optical) must be installed prior to running the pouch sealing system. It is extremely important that the pouch presence sensor communicate with the PLC to prohibit activating the ultrasonic energy when the tools are closed without a pouch in place. Activating the ultrasonic tools under pressure without a pouch in place can cause severe damage to the converter, generator and tooling. Failures resulting from cycling the system without a pouch in place are considered abuse and may not be covered under warranty.

ULTRASONIC STACK ASSEMBLY

If the converter, booster, and horn are not already assembled, follow these instructions:

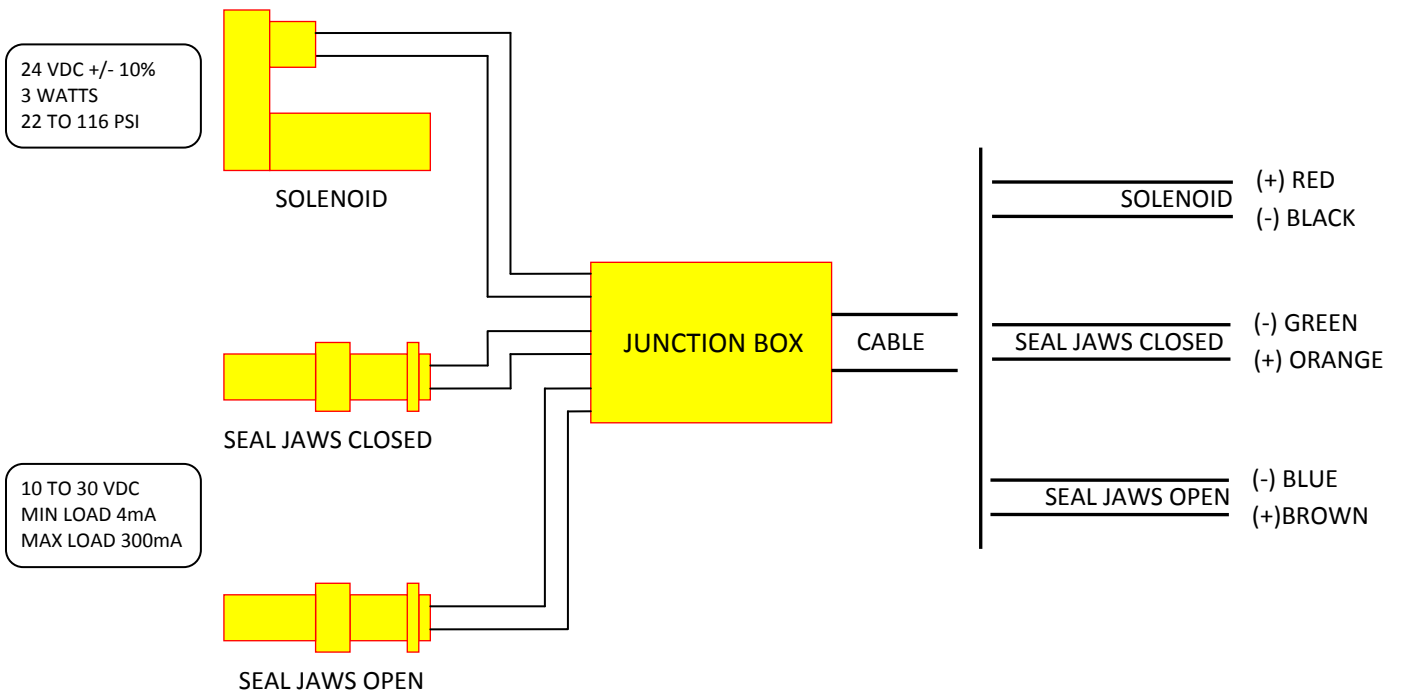
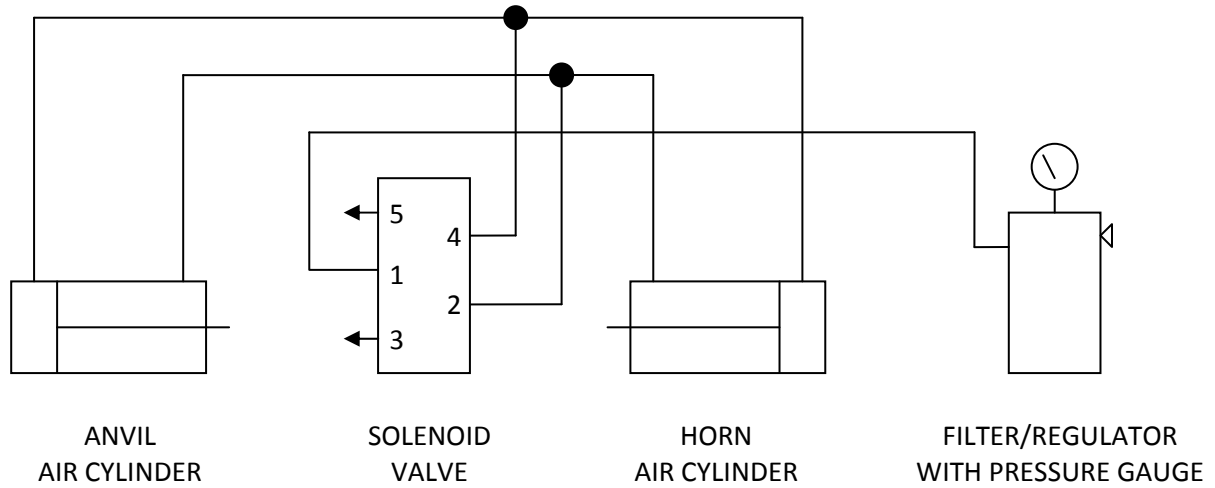
1. Clean the mating surfaces of the converter and booster, as well as the threaded stud and hole. Check that the stud is tight to the torque specification below.
2. Hand assemble the converter and booster together. Using spanner wrenches as shown below, tighten until snug. Then, using a torque wrench, tighten to the torque specification below.
3. Clean the mating surfaces of the booster and horn, as well as the threaded stud and hole. Check that the stud is tight to the torque specification below.
4. Hand assemble the horn to the booster. Using a spanner wrench for the booster and a wrench to secure the horn, tighten until snug. Then, using a torque wrench, tighten to the torque specification below.



RECOMMENDED TORQUE SPECIFICATIONS

Component	Foot-Lbs.	Newton-Meters
Converter / Booster	50	70
Booster / Horn	50	70
Stud	10	15

PNEUMATIC DIAGRAM



MAINTENANCE



NOTE: If packing unit for return shipment, DO NOT use Styrofoam “peanuts.”

REPAIRS / SERVICE

If problems are encountered, contact our Service Department as follows:

Phone: 1-800-745-1105 • 1-203-270-4600 Ext. 343 or 366

Fax: 1-203-270-4610

E-Mail: service@sonics.com

It is suggested that a system in need of repair be sent back to the factory, with a written description pertaining to the nature of the problem.

Always contact the factory for return authorization before shipping any instrument. Include date of purchase, model number, and serial number. For units not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay. Care should be exercised to provide adequate packing to insure against possible damage in shipment. The system must be sent with all transportation charges prepaid and return method of shipment indicated.