

LIMITED RELEASE USER MANUAL
AUTOSTROKE™ (AST-100-2L)
FOR USE WITH THE ABX-2L



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Andrew Birt Consulting Ltd.
UK

This manual must be used in accordance with all applicable national laws. The manual shall be regarded as a part of the machine and shall be kept for reference until the final dismantling of the machine, as defined by applicable national law(s).

SPECIFICATIONS

AUTOSTROKE (AST-100-2L) Weight:	10 lbs (4.5 kg)
AUTOSTROKE (AST-100-2L) Dimensions:	14" x 10.5"x 7.5" (356mm x 267mm x 191mm)
Hose Force:	0-60 lbs (0-27.2 kg)
Retract Time:	0.05 to 1.1 Seconds

DESCRIPTION OF EQUIPMENT AND INTENDED USE

The AutoStroke AST-100-2L is designed to increase efficiency and simplify the operation of the ABX-2L in applications with plugged heat exchanger tubes.

The AutoStroke AST-100-2L senses when a Banshee nozzle has hit a plug and activates an automatic forward and reverse pecking motion that ensures the head continues to rotate. This action allows the jets to effectively break through obstructions without operator intervention.

By automatically retracting the Banshee tool from the blockage, the AutoStroke AST-100-2L allows the tool to maintain maximum jet rotation to clear the blockage. This produces optimal cleaning and saves wear on your Banshee tools.

KEY FEATURES:

- Modular, lightweight design
- Quick install
- Attaches to CB-ABX Control Box mounting pole
- Runs on common "C" type batteries

WARNING AND SAFETY INSTRUCTIONS

OPERATOR TRAINING

Managers, Supervisors, and Operators **MUST** be trained in Health and Safety Awareness of High-pressure Water Jetting and hold a copy the Water Jetting Association (WJA) Code of Practice, or equivalent (see www.waterjetting.org.uk).

Operators **MUST** be trained to identify and understand all applicable standards for the equipment supplied. Operators should be trained in manual handling techniques to prevent bodily injury.

StoneAge has designed and manufactured this equipment considering all hazards associated with its operation. StoneAge assessed these risks and incorporated safety features in the design. StoneAge **WILL NOT** accept responsibility for the results of misuse.

IT IS THE RESPONSIBILITY OF THE INSTALLER/OPERATOR to conduct a job specific risk assessment prior to use. Job specific risk assessment **MUST** be repeated for each different set up, material, and location.

The risk assessment **MUST** conform to the Health and Safety at Work Act 1974 and other relevant Health and Safety legislation.

Operators **MUST** read, understand, and follow the Operational and Training Requirements (Section 7.0) of WJTA-IMCA's Recommended Practices For The Use Of High-pressure Waterjetting Equipment, or equivalent.

Operators **MUST** read, understand and follow the Warnings, Safety Information, Assembly, Installation, Connection, Operation, Transport, Handling, Storage, and Maintenance Instructions detailed in this manual.

The risk assessment **MUST** consider potential material or substance hazards including:

- Aerosols
- Biological and microbiological (viral or bacterial) agents
- Combustible materials
- Dusts
- Explosion
- Fibers
- Flammable substances
- Fluids
- Fumes
- Gases
- Mists
- Oxidizing Agents

PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Use of Personal Protective Equipment (PPE) is dependent on the working pressure of water and the cleaning application. Managers, Supervisors, and Operators **MUST** carry out a job specific risk assessment to define the exact requirements for PPE. See Protective Equipment for Personnel (Section 6) of WJTA-IMCA's Recommended Practices For The Use Of High-pressure Waterjetting Equipment for additional information.

Hygiene - Operators are advised to wash thoroughly after all waterjetting operations to remove any waterblast residue which may contain traces of harmful substances.

First aid provision - users **MUST** be provided with suitable first aid facilities at the operation site.

PPE may include:

- **Eye protection:** Full face visor
- **Foot protection:** Kevlar® brand or steel toe capped, waterproof, non-slip safety boots
- **Hand protection:** Waterproof gloves
- **Ear protection:** Ear protection for a minimum of 85 dBA
- **Head protection:** Hard hat that accepts a full face visor and ear protection
- **Body protection:** Multi-layer waterproof clothing approved for waterjetting
- **Hose protection:** Hose shroud
- **Respiratory protection:** May be required; refer to job specific risk assessment

WARNING

Operations with this equipment can be potentially hazardous. Caution **MUST** be exercised prior to and during machine and water jet tool use. Please read and follow all of these instructions, in addition to the guidelines in the WJTA Recommended Practices handbook, available online at www.wjta.org. Deviating from safety instructions and recommended practices can lead to severe injury and/or death.

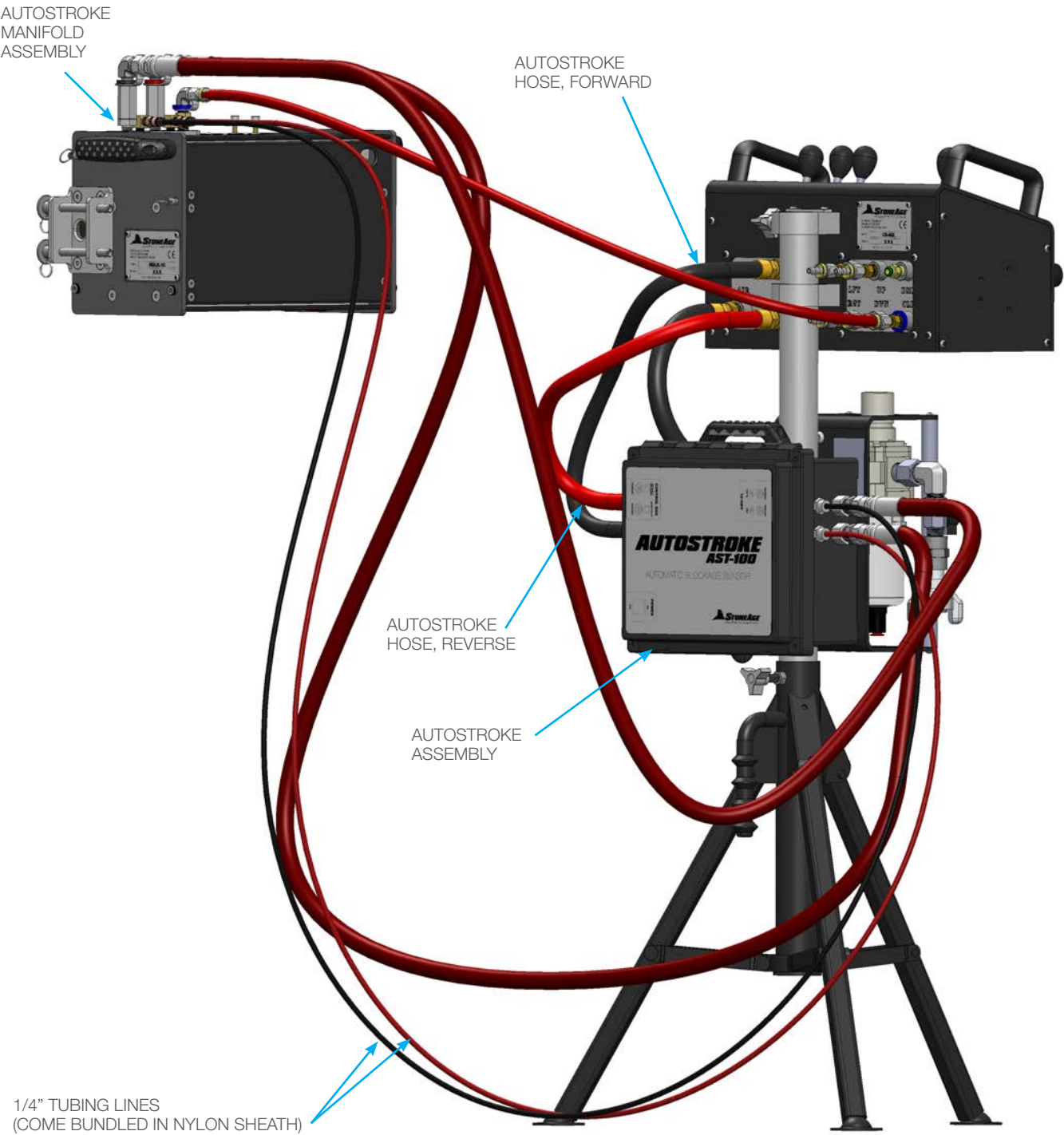
- Do not exceed the maximum operating pressure specified for any component in a system.
- The immediate work area **MUST** be marked off to keep out untrained persons.
- Inspect the equipment for visible signs of deterioration, damage, and improper assembly. Do not operate if damaged, until repaired.
- Make sure all threaded connections are tight and free of leaks.
- The Autostroke (AST-100) is an accessory to the AUTOBOX® ABX-2L. Users of the AUTOBOX® ABX-2L **MUST** be trained and/or experienced in the use and application of high-pressure technology and cleaning, as well as all associated safety measures, according to the WJTA Recommended Practices for the use of High-pressure Waterjetting Equipment.
- The Control Box should be located in a safe location where the Operator has good visibility of the AUTOBOX® ABX-2L. The AUTOBOX® ABX-2L, Autostroke (AST-100), and Control Box **MUST** be supervised at all times and should never be left unattended.
- Test the Control Box before operating the AUTOBOX® ABX-2L and Autostroke (AST-100) with high-pressure water to verify the control valves move the hose in the intended direction, and that the dump valve and hose clamp are working properly. See the "Operation" section of this manual for adjustment settings.
- Always de-energize the system before opening the door to service or replace any parts. Failure to do so can result in severe injury and/or death.

PRE-RUN SAFETY CHECK

Refer to WJTA-IMCA's, Recommended Practices For The Use Of High-pressure Waterjetting Equipment and/or The Water Jetting Association's, WJA Code of Practice for additional safety information.

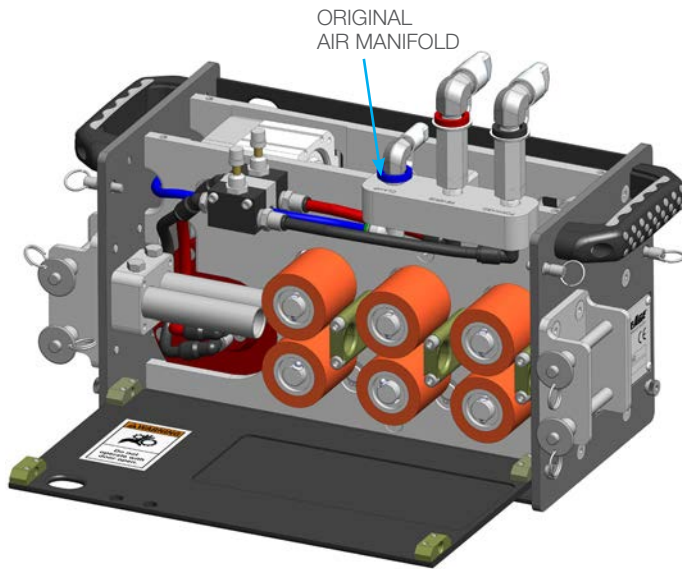
- Complete a job specific risk assessment and act on the resulting actions.
- Adhere to all site specific safety procedures.
- Ensure the waterblasting zone is properly barricaded and that warning signs are posted.
- Ensure the work place is free of unnecessary objects (e.g. loose parts, hoses, tools).
- Ensure all Operators are using the correct Personal Protective Equipment (PPE).
- Check that the air hoses are properly connected and tight.
- Check all hoses and accessories for damage prior to use. Do not use damaged items. Only high quality hoses intended for waterblast applications should be used as high-pressure hoses.
- Check all high-pressure threaded connections for tightness.
- Test the Control Box before operating the AUTOBOX® ABX-2L and Autostroke (AST-100) with high-pressure water to verify the control valves move the hose in the intended direction, and that the dump valve and hose clamp are working properly. See the "Operation" section of this manual for adjustment settings.
- Ensure that Operators never connect, disconnect, or tighten hoses, adaptors, or accessories with the high-pressure water pump unit running.
- Ensure no personnel are in the hydroblasting zone.

AUTOSTROKE UPGRADE KIT FOR ABX-2L
AST-100-2L

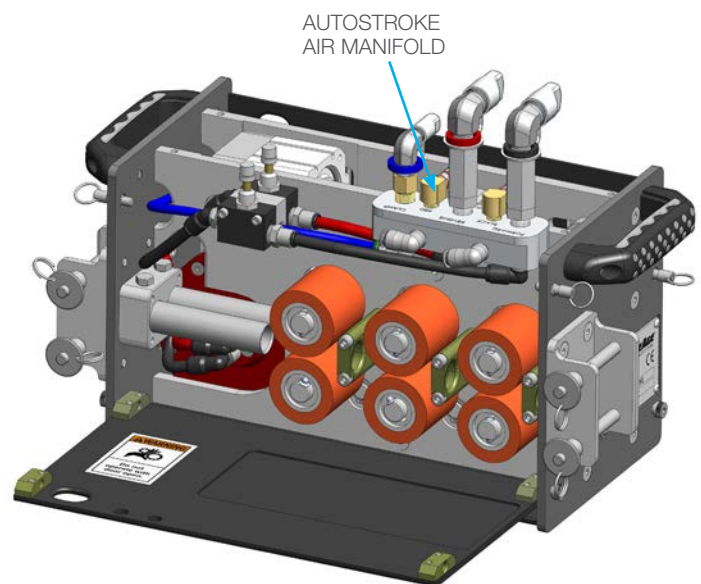


THE AUTOSTROKE AIR MANIFOLD CONVERSION OVERVIEW

This conversion guide describes how to replace the Air Manifold and add T-connections in order to provide necessary air signals from the ABX-2L to the AutoStroke.



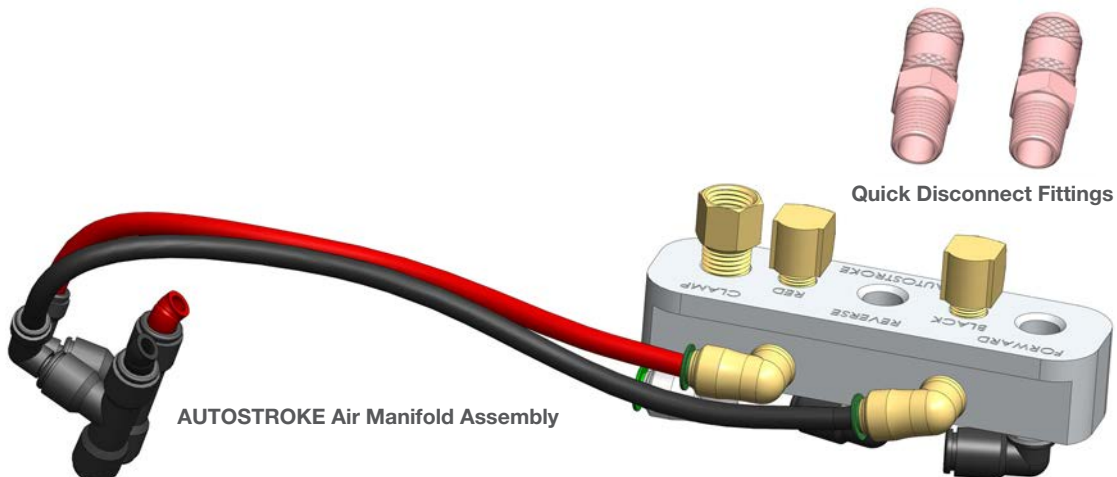
BEFORE



AFTER

THE AUTOSTROKE AIR MANIFOLD CONVERSION PARTS KIT

The parts below are included in the ABX-2L-V2 Autostroke Air Manifold Conversion Kit.

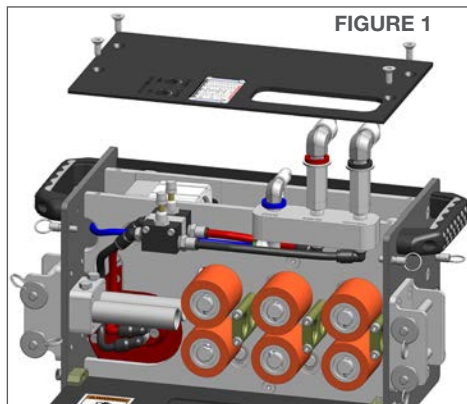


AUTOSTROKE Air Manifold Assembly

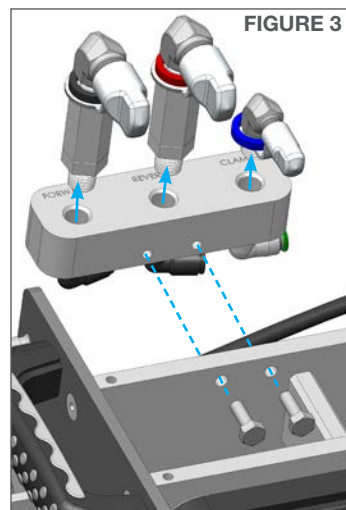
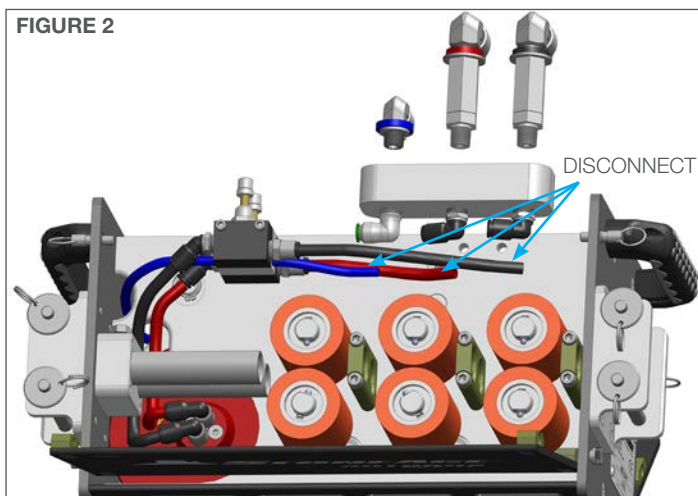
Quick Disconnect Fittings

REMOVING THE ABX-2L AIR MANIFOLD

1. Remove the 4 flat head cap screws from the Top Plate using a 5/32 Allen wrench hex key. Set the Top Plate and screws aside, and open the Side Door. **(FIGURE 1)**

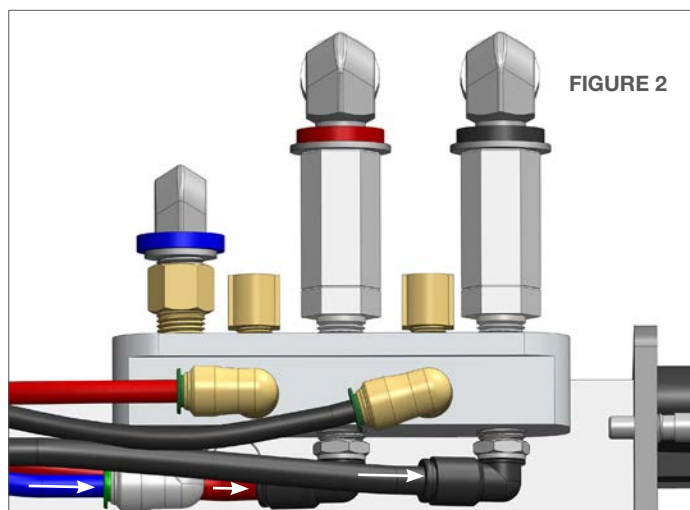
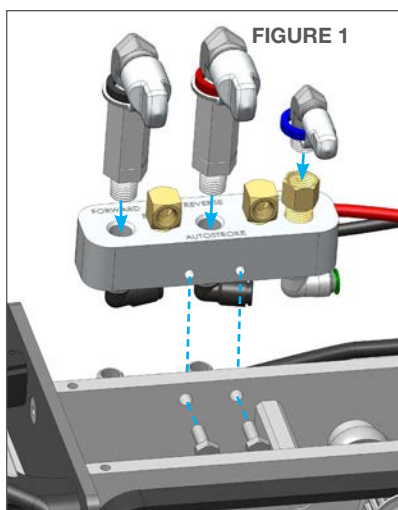


2. Unplug the three tubes from the bottom of the manifold **(FIGURE 2)** and remove the 2 hex head bolts using a 7/16 socket driver or box wrench. Remove and retain the top 3 JIC fitting assemblies, and disconnect the 3 air tubes from the bottom of the Air Manifold. Discard the old manifold. **(FIGURE 3)**



INSTALLING THE AUTOSTROKE AIR MANIFOLD CONVERSION

1. Install the 3 JIC fitting assemblies to the new AutoStroke Air Manifold. Use pipe dope or tape on the NPT tapered threads. Re-attach the air manifold using the 2 hex head bolts that were reserved from the original manifold assembly. **(FIGURE 1)**
2. Reconnect the 3 air tubes (blue, red, and black) to the push-to-connect fittings on the bottom of the air manifold. **(FIGURE 2)**



SPLICING THE TUBING FOR THE T-FITTINGS

1. Disconnect the red and black air tubes from the fittings on the left side of the flow controls. **(FIGURE 1)** Cut exactly 2 inches off the end of the red tube and 3 inches off the black tube. **(FIGURE 2)**

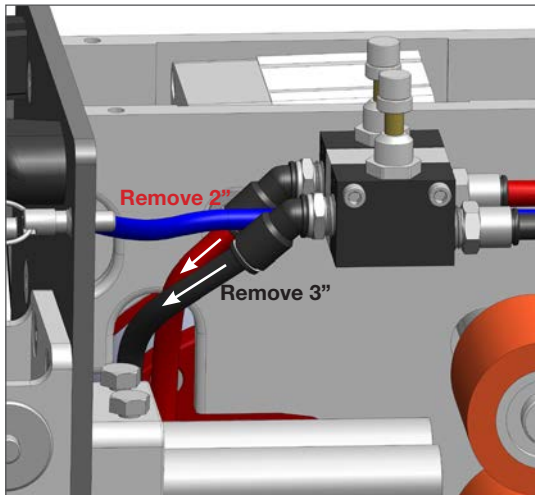


FIGURE 1

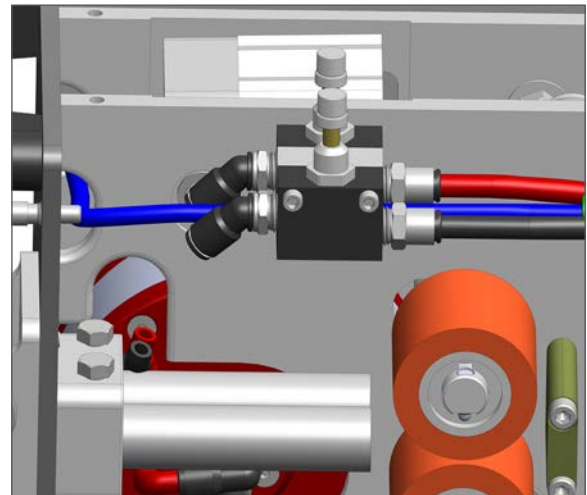


FIGURE 2

2. Connect the red and black tubes with the T-fittings from the manifold to the fittings on the left side of the flow controls. Connect the other end of the T-fittings to the end of the cut tubing. The tubes from the manifold assembly should lie between the flow control knobs. **(FIGURE 3)**
3. Attach the Top Plate and close the Side Door Assembly. **(FIGURE 4)**

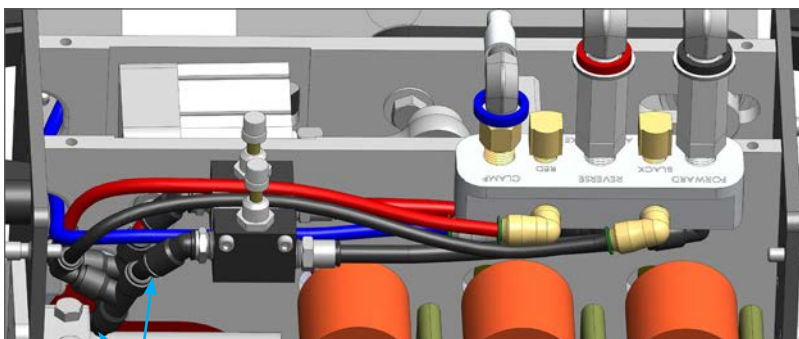


FIGURE 3
CONNECT T-FITTINGS



FIGURE 4

4. Install the two Quick Disconnect Fittings to the brass elbows using pipe dope or tape on the tapered threads. **(FIGURE 5)**

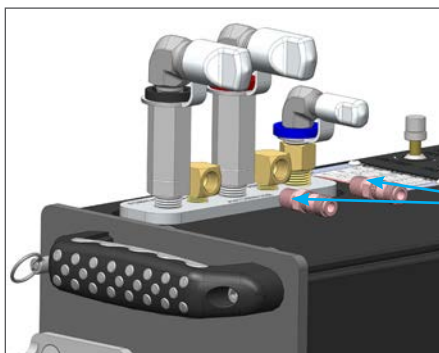


FIGURE 5



AST-100 AUTOSTROKE SET-UP

CONNECTING THE AST-100 AUTOSTROKE TO THE CB-ABX CONTROL BOX

1. Disconnect the air hose from the back of the Control Assembly. Loosen the Thumb Screw on the Pole Mount on the Control Assembly. Carefully lift the Control Assembly off of the Mounting Pole and put aside. **(Figure 1)**
2. Slide the Autostroke Assembly onto the Mounting Pole and hand tighten the Thumb Screw. Then slide the Control Assembly back onto the Mounting Pole. Align the Thumb Screw with the top hole on the Mounting Pole and hand tighten. **(Figure 2)**
3. Connect the air hose from the FRL to the back of the Control Assembly.

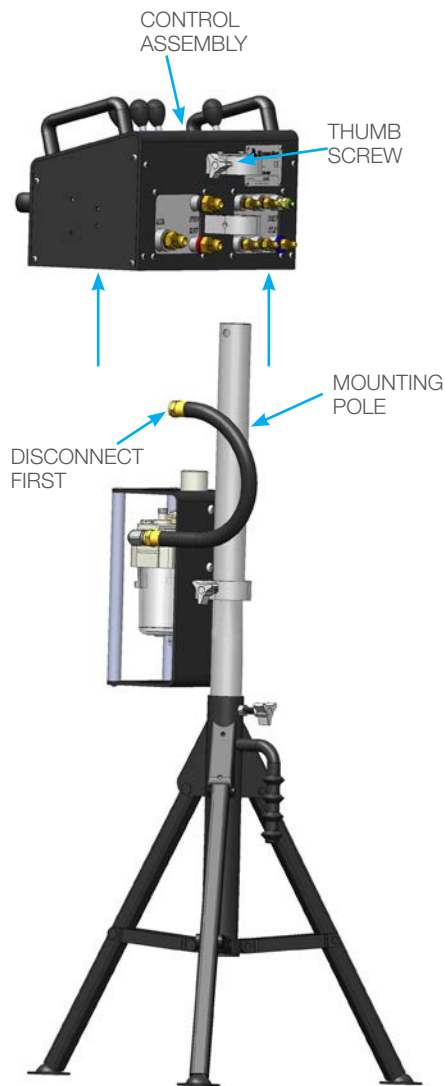


FIGURE 1

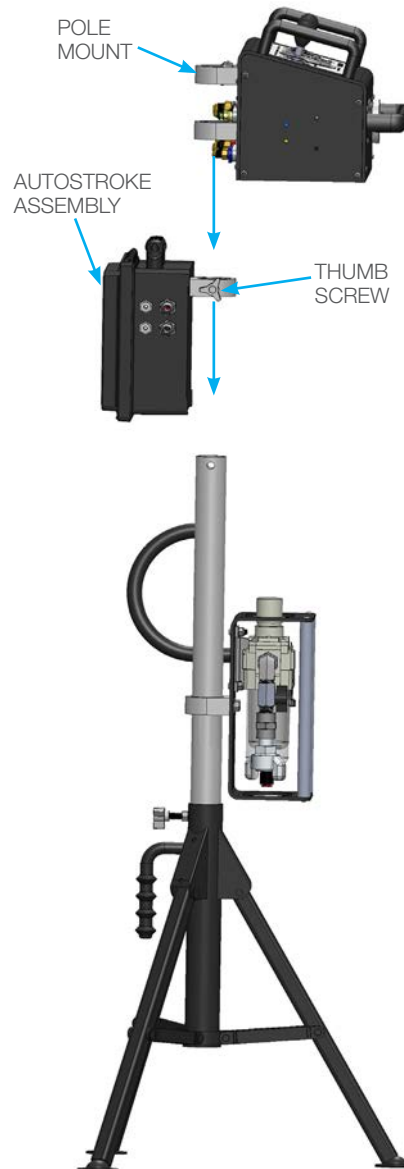


FIGURE 2



FIGURE 3



COMPLETE

HOSE CONNECTIONS

1. Connect the black and red 1/2" lines from the Autostroke "Forward" and "Reverse" connections to the "Forward" and "Reverse" connections on the back of the CB-ABX. (Figure 1)

****NOTE: The Autostroke and the CB-ABX are labelled "Forward" and "Reverse". Make sure the hoses mate to their corresponding labelled connections on both ends.**

2. Insert the ends of the 1/4" black and red tubing into the press lock fittings on the side of the Autostroke. Push the opposite ends of each tube into the color labelled, press lock, fittings on the manifold atop the ABX-2L. (Figure 2 & 3)

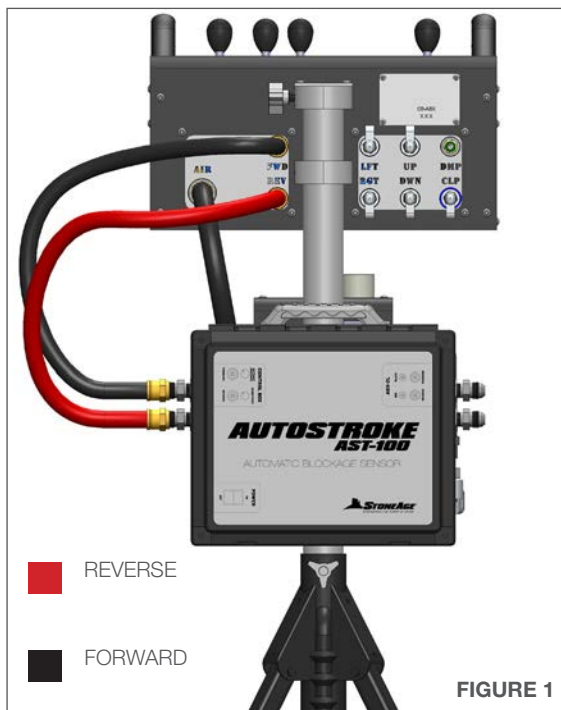


FIGURE 1

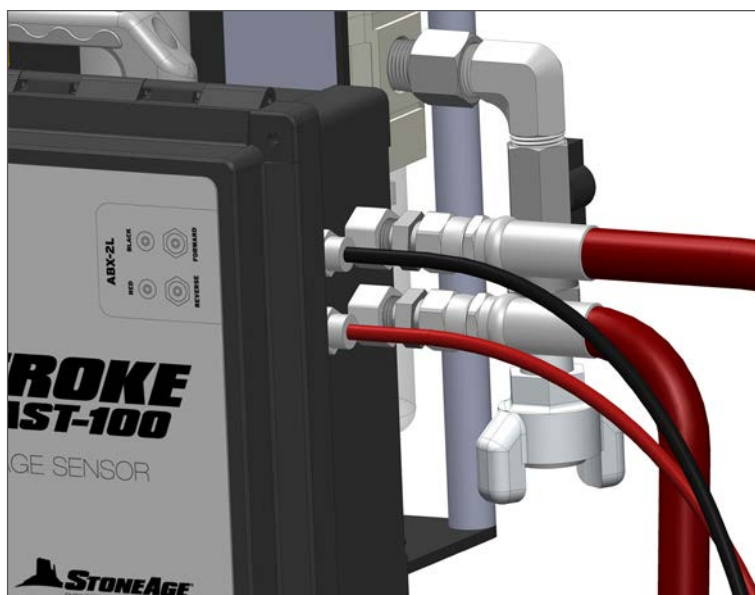


FIGURE 2

3. Connect two 1/2" lines from the right side of the Autostroke "Forward" and "Reverse" connections to the "Forward" and "Reverse" connections on the manifold on top of the ABX-2L. (Figure 3)

****NOTE: The ABX-2L manifold and the Autostroke are labelled "Black", "Red", "Forward", and "Reverse". Make sure the tubing and hoses mate to their corresponding labelled connections on both ends.**

CORRECT AUTOSTROKE CONNECTION TO ABX-2L

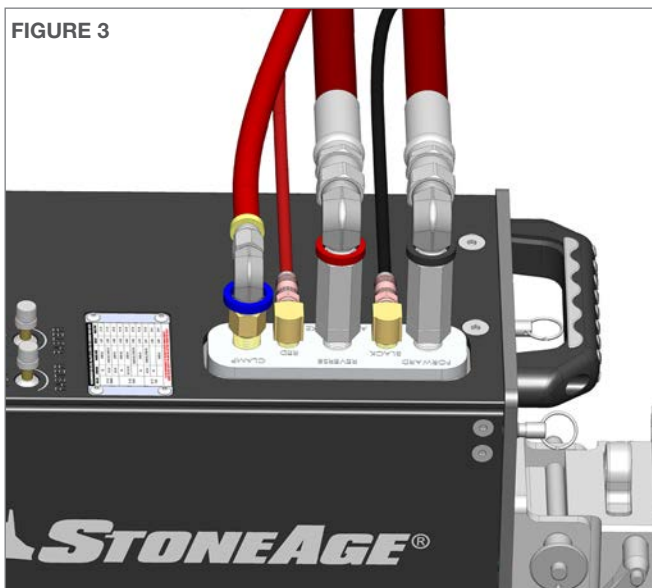


FIGURE 3

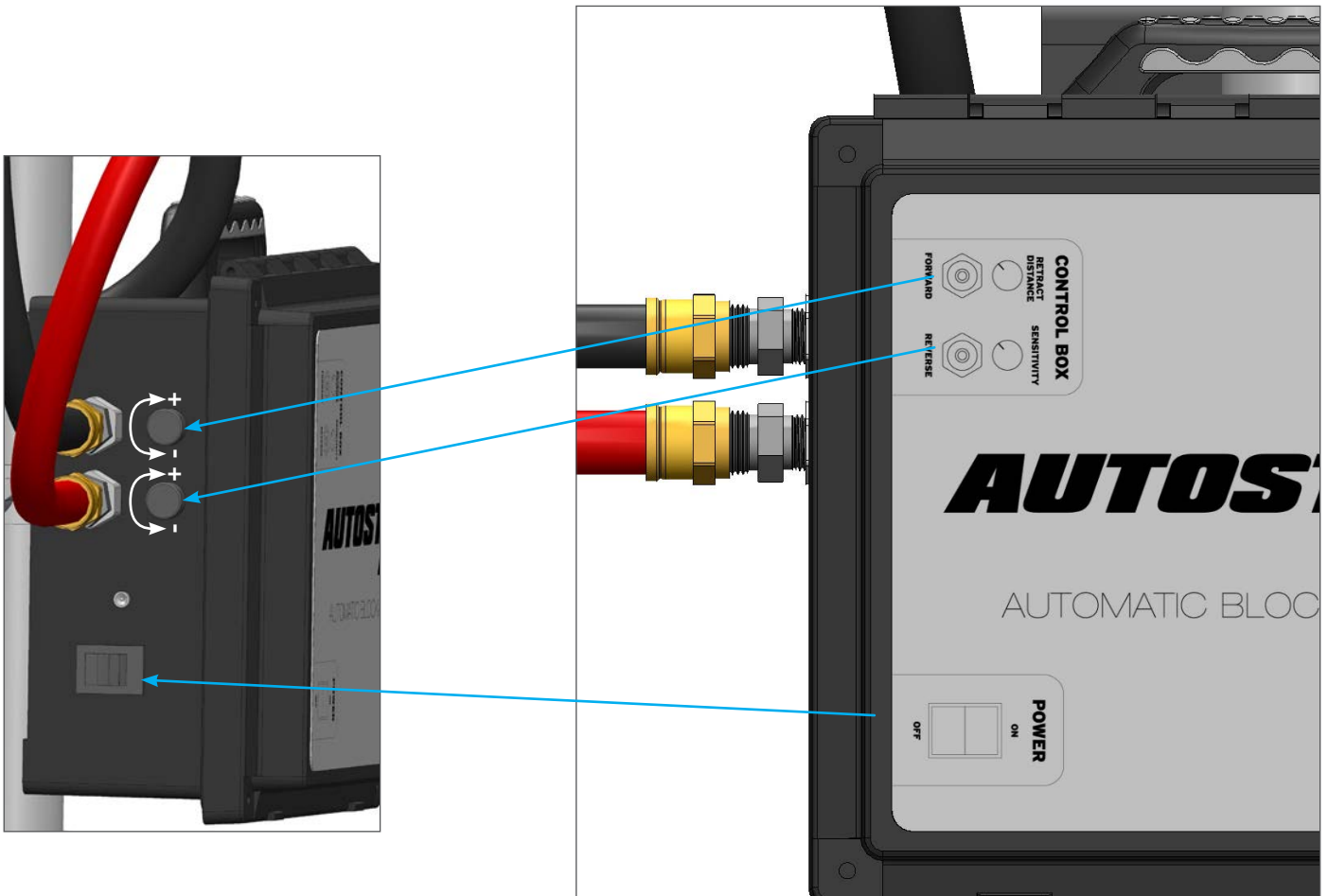
CORRECT AUTOSTROKE CONNECTION TO CONTROL BOX



OPERATION

AUTOSTROKE

- Turn the Autostroke toggle to the **"ON"** Position
- To setup the AutoStroke Turn the **SENSITIVITY** knob counterclockwise as far as it will go. This is the lowest sensitivity position. (Increase turn clockwise, Decrease turn counter-clockwise)
- Next position your ABX-2L so that the nozzles are aimed at the tube sheet face and not lined up with any tubes. Advance the hose until the nozzles stop on the tube sheet.
- While holding the forward feed lever, increase the sensitivity until the nozzle begins to peck at the tub sheet face.
- Adjust the **RETRACT DISTANCE** (Increase turn clockwise, Decrease turn counter-clockwise) until you like how far it is retracting the nozzles.
- The AutoStroke is now operational. It will automatically detect when the nozzles hit a blockage and repeatedly retract the hose to keep the nozzle rotating until the blockage is cleared.



Maintenance Item	Frequency	Maintenance Required
Battery Replacement	When necessary	Lift the top cover to access battery. Remove and replace the 8 C Batteries.

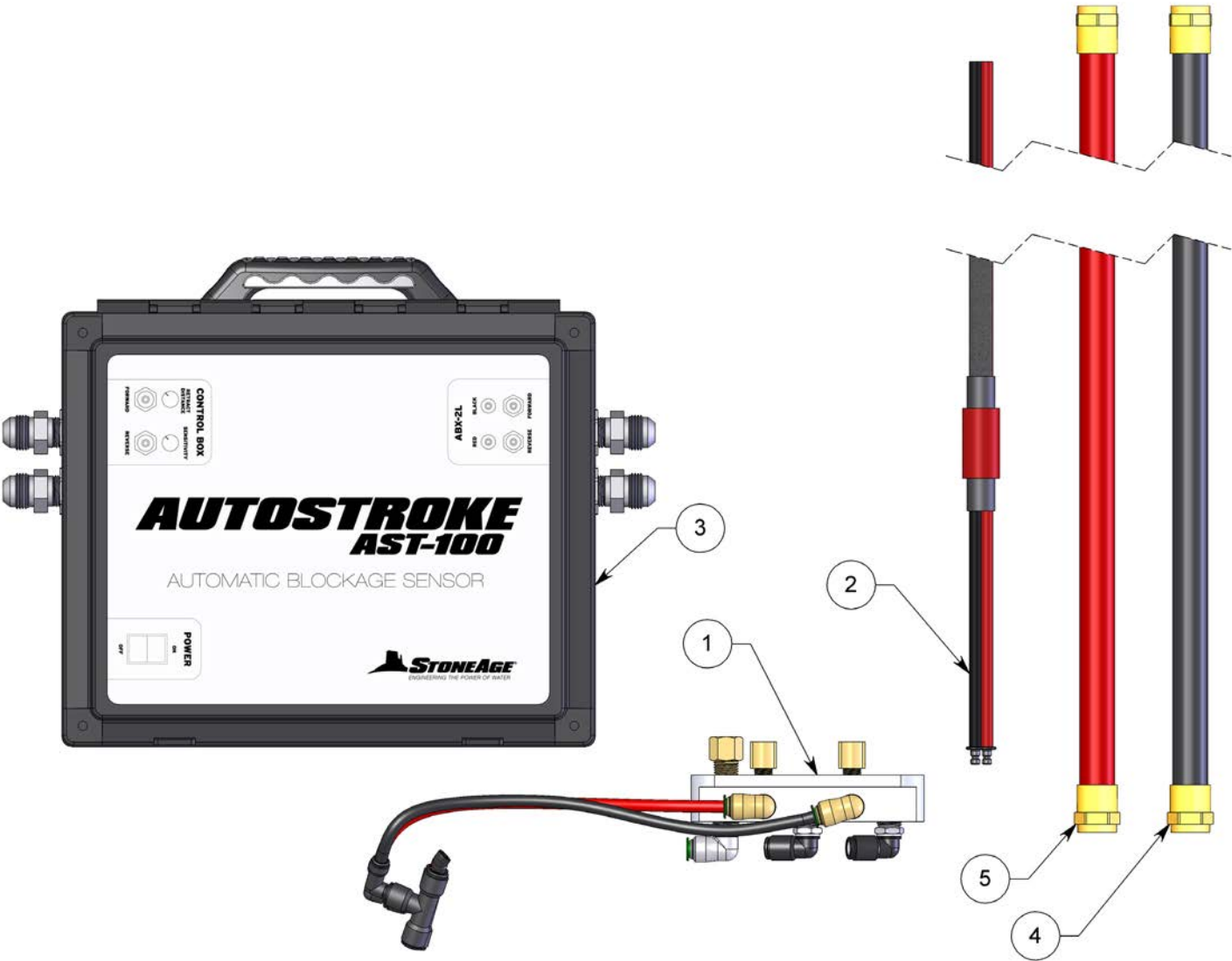
Contact StoneAge for Safety Data Sheets for material usage, a complete list of spare part numbers, and service instructions for the Autostroke™ (AST-100) and Control Box.



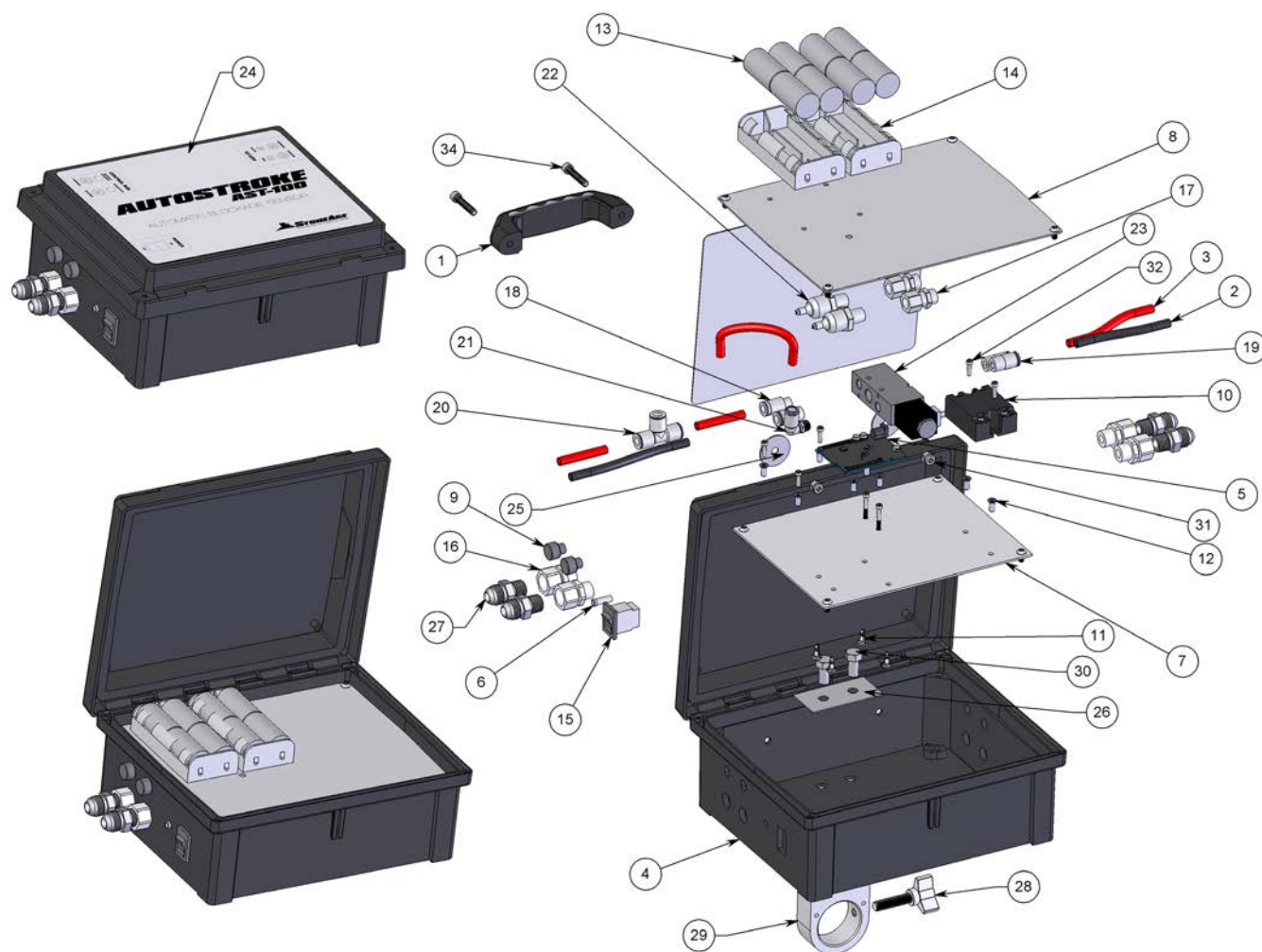
STORAGE, TRANSPORTATION, AND HANDLING

The AUTOSTROKE™ (AST-100) should be stored in a dry location between jobs. Before storing the unit, use compressed air to blow out any debris and moisture. Use mild soapy water to clean the machine in order to remove corrosive materials. Apply a small amount of air tool oil directly into the forward and reverse fittings. Install the dust caps onto all three fittings to keep moisture and dirt out.

AUTOSTROKE™ (AST-100-2L)
UPGRADE KIT



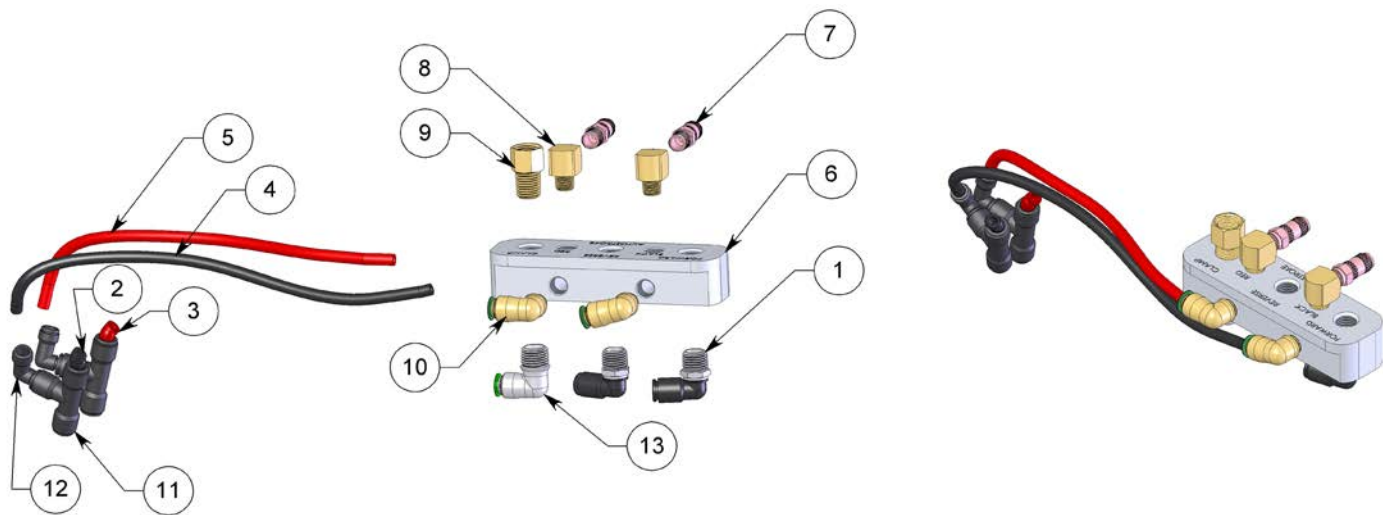
#	DESCRIPTION	QTY
1	AST 275 MANIFOLD ASSEMBLY, AUTOSTROKE	1
2	AST 277 UMBILICAL ASSEMBLY	1
3	AST-100 AUTOSTROKE	1
4	CB 057-BK-26 AUTOSTROKE HOSE	1
5	CB 057-RD-26 AUTOSTROKE HOSE	1

AUTOSTROKE™ (AST-100)
AUTOSTROKE ASSEMBLY
**NOTE:**

1. APPLY LOCTITE THREADSEALANT 567 OR EQUIVALENT TO
2. APPLY BLUE LOCTITE 242 OR EQUIVALENT TO THREADS OF ALL THREADED FASTENERS UNLESS NOTED OTHERWISE.
3. LISTED MATERIAL OR EQUIVALENT ROHS COMPLIANT MATERIAL TO BE USED FOR ALL ITEMS.

#	PART NUMBER	QTY.	11	AST 212 SNAP IN STANDOFF	4	23	AST 235 SOLENOID VALVE	1
1	ABX 215 PULL HANDLE RUBBER GRIP GREY	1	12	AST 213 RIVET NUT, 6-32	8	24	AST 250 AUTOSTROKE GRAPHIC	1
2	ABX 268-BK BLACK TUBE 8MM	1	13	AST 214 C BATTERY	8	25	AST 251 FENDER WASHER	2
3	ABX 268-R RED TUBE 8MM	1	14	AST 215 BATTERY HOLDER	2	26	AST 252 WASHER PLATE	1
4	AST 205 HINGED ENCLOSURE	1	15	AST 216 ROCKER SWITCH	1	27	CB 122 FITTING, OUTLET P6J8	4
5	AST 206 MICROCONTROLLER	1	16	AST 220 BULKHEAD PL5 P6F	4	28	CB 314 3-LOBE KNOB	1
6	AST 207 LED INDICATOR	1	17	AST 221 BULKHEAD PL4 P4F	2	29	CB 328 POLE MOUNT	1
7	AST 208 BACK PANEL	1	18	AST 223 FTG, ROUND BODY, P2M PL5	1	30	GB 337-03 BOLT, HEX .37-16 X .75 SS	2
8	AST 209 FRONT PANEL	1	19	AST 224 FTG, ROUND BODY, P4M PL5	3	31	GN 325-L NYLOK NUT SS (TB 044.1)	2
9	AST 210 ROTARY POTENTIOMETER	2	20	AST 225 FTG, TEE PL5	1	32	GS 313-02 SHCS .138-32 X .50 SS	6
10	AST 211 SOLID STATE RELAY	1	21	AST 226 FTG, ELBOW P2M PL5	1	33	GS 313-05 SHCS .138-32 X 1.25 SS	2
			22	AST 230 PRESSURE TRANSDUCER	2	34	GS 325-05 SHCS .25-20 X 1.25 SS	2

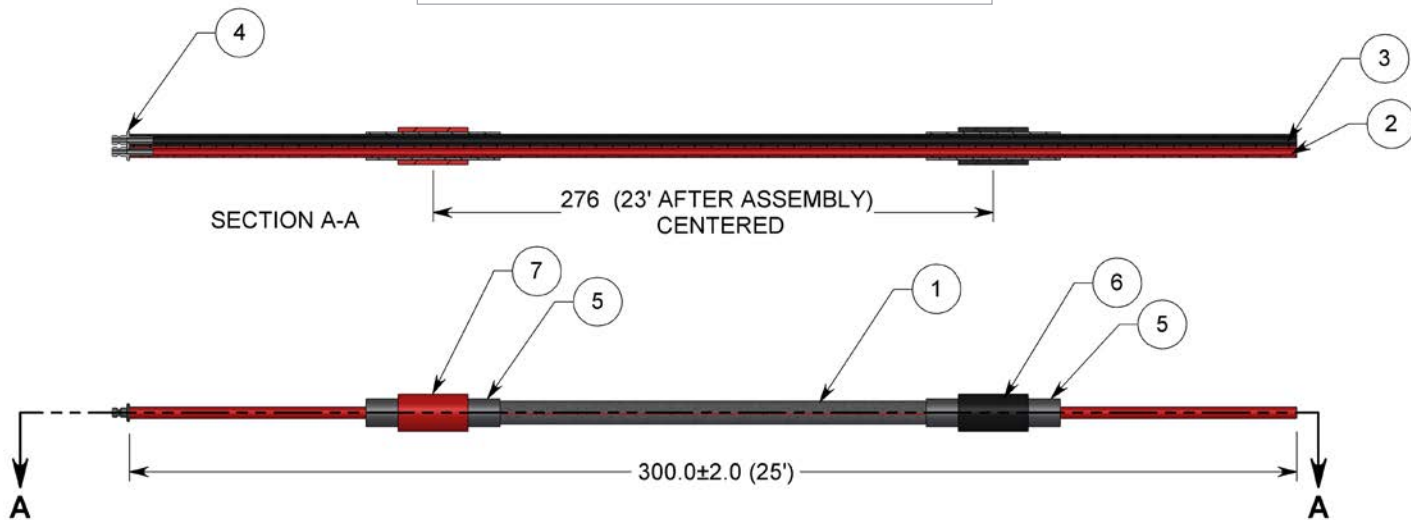
**AUTOSTROKE™ (AST 275)
MANIFOLD ASSEMBLY**



#	PART NUMBER	QTY.
1	ABX 260 FTG, P4M X PL8MMF 90° ELBOW	2
2	ABX 268.1 AST TUBE, BK, 8MM	1
3	ABX 268.2 AST TUBE, RD, 8MM	1
4	ABX 270.1 AST TUBE, BK, .250	1
5	ABX 270.2 AST TUBE, RD, .250	1
6	AST 276 ABX-2L MANIFOLD AUTOSTROKE	1

7	AST 278 FTG P2M QUICK DISCONNECT	2
8	AST 279 FTG P2MP2F ELBOW BRASS	2
9	AST 280 FTG P2MP2F	1
10	AST 281 FTG P2PL4 BRASS	2
11	AST 282 FTG PL8MML6MM REDUCING TEE	2
12	AST 283 FTG PL4 TO STEM ELBOW	2
13	CB 558 FTG, ELBOW P4PL4	1

**AUTOSTROKE™ (AST 277)
UMBILICAL ASSEMBLY**



#	PART NUMBER	QTY.
1	AST 277.1 POLYESTER TUBE UMBILICAL SLEEVE	1
2	AST 277.2 UMBILICAL TUBE, RED	1
3	AST 277.3 UMBILICAL TUBE, BLACK	1

4	AST 277.4 PLUG QUICK DISCONNECT	2
5	AST 277.5 UMBILICAL TAPE	2
6	AST 277.6 UMBILICAL HEAT SHRINK BLACK	1
7	AST 277.7 UMBILICAL HEAT SHRINK RED	1

TERMS AND CONDITIONS

1. Acceptance of Terms and Conditions. These Terms and Conditions shall operate as Seller's acceptance of Buyer's purchase order, and such acceptance is made expressly conditional on assent by Buyer to the Terms and Conditions. Such assent shall be deemed to have been given unless written notice of objection to any of such Terms and Conditions (including inconsistencies between Buyer's purchase order and this acceptance) is given by Buyer to Seller promptly on receipt hereof.

Seller desires to provide its Buyer with prompt and efficient service. However, to negotiate individually the terms of each sales contract would substantially impair Seller's ability to provide such service. Accordingly, products furnished and services rendered by Seller are sold only on the Terms and Conditions stated herein. Notwithstanding any Terms or Conditions on Buyer's order, Seller's performance of any contract is expressly made conditional on Buyer's agreement to Seller's Terms and Conditions of sale unless otherwise specifically agreed to in writing by Seller. In the absence of such agreement, commencement of performance, shipment and/or delivery shall be for Buyer's convenience only and shall not be deemed or construed to be an acceptance of Buyer's Terms and Conditions. **PRODUCTS SOLD BY SELLER ARE DESIGNED AND INTENDED TO BE USED AT HIGH PRESSURES AND SPEEDS, AND MAY BE DANGEROUS IF OPERATED IMPROPERLY OR WITHOUT THE USE OF APPROPRIATE SAFETY DEVICES AND GUARDS. BUYER IS CAUTIONED TO CAREFULLY READ AND UNDERSTAND THESE TERMS AND CONDITIONS, AS THEY HAVE IMPORTANT LEGAL CONSEQUENCES.**

2. Payment/Prices. Unless other arrangements have been made in writing between Seller and Buyer, payment for product delivered shall be made upon receipt of invoice. The prices shown on the face hereof are those currently in effect. Prices invoiced shall be per price list in effect at the time of shipment. Prices are subject to increase for inclusion of any and all taxes which are applicable and which arise from the sale, delivery or use of Seller's products or services and for the collection of which Seller is or may be responsible to any governmental authority unless acceptable exemption certificates are provided by Buyer in accordance with law. Buyer shall pay all charges for transportation and delivery and all excise, order, occupation, use or similar taxes, duties, levies, charges or surcharges applicable to the equipment or services being purchased, whether now in effect or hereafter imposed by any governmental authority, foreign or domestic.

3. Warranty. Subject to the limitations and conditions hereinafter set forth, Seller warrants to the original Buyer that its products are free from defects in workmanship and material for a period of one (1) year from shipment date. Seller's obligation under this warranty shall be limited to repairing, replacing or issuing a credit for, at Seller's option, any products or services it finds to be defective in material or workmanship. In no event shall Seller be liable for any incidental, consequential or indirect damages of any kind. **THIS WARRANTY SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY FOR MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.** No statement or recommendation made by Seller or its representative to Buyer or User shall constitute a warranty by Seller or a waiver or modification to any of the provisions hereof or create any liability for Seller. All warranty claims are subject to the exclusions and limitations set forth below:

a. The warranty shall not apply if the product or service (1) has been subject to misuse, negligence or accident; (2) has not been installed or operated in accordance with Seller's recommendations; (3) has been operated under more severe conditions than those specified for the particular product or service; (4) has been operated beyond the rated capacity of the product; or (5) has been repaired or altered outside Seller's facilities or in any way so as, in Seller's judgment, to affect its stability or reliability.

b. Products that Seller furnishes, but does not manufacture, carry only the warranty of the Manufacturer of such products. Where other Manufacturers' or Suppliers' products used in Seller's products or services prove defective, Seller's liability shall exist only to the extent that Seller is able to recover from such Manufacturers or Suppliers for such defects.

c. Any warranty granted by Seller to the Buyer shall be deemed void if any goods covered by such warranty are used for any purpose not recommended or permitted. In addition, the Buyer shall indemnify Seller and hold Seller harmless from and against any and all claims, damages, losses, costs, expenses and other liability of whatever nature that Seller suffers or incurs by reason of any such unintended use.

d. Notice of defective product or service must be given in writing to Seller by Buyer or User within fifteen (15) business days following receipt of goods. Buyer or User shall keep such products or services in an unaltered condition for examination by Seller's representative. No goods may be returned for credit or adjustment without prior written permission from Seller.

4. Product Liability. Buyer specifically acknowledges that the products being purchased may be operated at high speeds and/or pressures, and that as such they may be inherently dangerous if not used correctly. Buyer shall be solely responsible for the safe operation of the products at all times and for determining the safety devices and guards that may be required for the safe operation of the products. Buyer shall undertake to specify and order all safety devices and guards necessary for the safe operation of the equipment covered. All safety devices and guards offered in Seller's quotations are recommended for purchase. Seller may provide necessary safety devices and guards not offered in this quotation at an extra price in accordance with the specifications of Buyer. Buyer shall at all times use and require its contractors to use all necessary and appropriate safety devices, guards and proper safe operating procedures. Buyer shall ensure that proper Operator training is provided. Buyer shall not remove or modify any such devices, guards or warning signs and shall insist on safe operating practices on the part of its personnel. In no event shall Seller be responsible for any injuries to persons or property caused by defects in any equipment, including by way of illustration and not limitation, any pumps, compressors, fittings, connections, components, piping or hoses up to the point that same are connected to the product. Buyer agrees to indemnify and to save Seller harmless from any and all liability or obligation incurred by or against Seller, including costs and attorneys' fees, to or by any persons injured directly or indirectly in the operation of the equipment furnished under the following conditions:

- a. if Buyer fails to purchase and use necessary and appropriate safety devices and guards as determined and/or recommended by Seller;
- b. if Buyer fails to maintain in good working order such safety devices and guards as are purchased from Seller;
- c. if Buyer adds, omits, repairs, modifies, replaces or substitutes any components on the equipment without permission from Seller;
- d. if Buyer exceeds at any time the maximum safe loads, pressures or speeds recommended by Seller for the equipment furnished hereunder without the specific written consent of Seller; or
- e. if Buyer otherwise fails to operate the product or equipment in accordance with Seller's printed instructions or otherwise negligently operates the equipment.

5. Delivery. Seller is not obligated to make delivery by a specified date, but will always use its best efforts to make delivery within the time requested. All deliveries are based on F.O.B. Seller's factory, unless specifically agreed otherwise, and Buyer shall pay all shipping costs and insurance from that point. Seller, in its sole discretion, will determine and arrange the means and manner of transportation of the products. Responsibility of Seller shall cease and Buyer assumes all risk of loss or damages upon Seller's delivery to and receipt by a common carrier. Carriers shall be responsible for goods lost or damaged in transit and Buyer shall immediately notify the carrier in writing of such loss or damage. At Buyer's request Seller will offer its assistance. THE PROPOSED SHIPMENT DATE IS AN ESTIMATE. UNDER NO CIRCUMSTANCES SHALL SELLER HAVE ANY LIABILITY WHATSOEVER FOR LOSS OF USE OR FOR ANY DIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM DELAY REGARDLESS OF THE REASON(S). Shortages or errors must be reported within fifteen (15) business days from receipt of shipment to secure adjustment. No merchandise may be returned without securing written approval from Seller. Seller will notify Buyer promptly of any material delay and will specify the revised delivery date as soon as practicable. Seller shall not be liable for any delay in delivery or performance, or for any failure to manufacture, deliver or perform due to (a) any cause beyond its reasonable control; (b) any act of God, act of Buyer, act of civil or military authority, governmental priority, strike or other labor disturbance, flood, epidemic, war, riot, delay in transportation or car shortage; or (c) inability on account of any cause beyond the reasonable control of Seller to obtain necessary materials, components, services or facilities. In the event of any such delay, the date of delivery or of performance shall be extended for a period equal to the time lost by reason of the delay.

6. Technical Advice. All technical advice, recommendations and services of Seller are intended for use by persons having adequate skill, at their own risk, and Seller assumes no responsibility, and Buyer hereby waives all claims against Seller, for results obtained or damages incurred from the use of Seller's advice, recommendations and services.

7. Modification. These Terms and Conditions are intended by Seller and Buyer to constitute a final, complete and exclusive expression of agreement and cannot be supplemented or amended without Seller's prior written approval. Seller's waiver of any breach, or failure to enforce any of the Terms and Conditions at any time, shall not in any way affect,

limit or waive Seller's right thereafter to enforce and compel strict compliance with every Term and Condition thereof. If any provisions of these Terms and Conditions are held to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the other portions hereof.

8. Disputes. Buyer and Seller shall attempt in good faith promptly to resolve any dispute arising under these Terms and Conditions by negotiations between representatives who have authority to settle the controversy. If unsuccessful, Buyer and Seller shall further attempt in good faith to settle the dispute by nonbinding third-party mediation, with fees and expenses of such mediation apportioned equally to each side. Any dispute not so resolved by negotiation or mediation may then be submitted to a court of competent jurisdiction in accordance with the terms hereof. These procedures are the exclusive procedures for the resolution of all such disputes between the parties. All sales, agreements for sale, offers to sell, proposals, acknowledgments and contracts of sale, including, but not limited to, purchase orders accepted by Seller, shall be considered a contract under the laws of the State of Colorado and the rights and duties of all persons, and the construction and effect of all provisions hereof shall be governed by and construed according to the laws of such state. A state or federal court located within the State of Colorado shall have sole and exclusive jurisdiction over any litigation concerning any such matters as well as any alleged defects of any products or equipment covered thereby or damages sustained as a result of such alleged defects. If any litigation is commenced between Seller and Buyer, or their personal representatives, concerning any provision hereof, the party prevailing in the litigation shall be entitled, in addition to such other relief that is granted, to a reasonable sum as and for their attorneys' fees and costs in such litigation or arbitration.

STONEAGE TRADEMARK LIST

View the list of StoneAge's trademarks and service marks and learn how the trademarks should be used. Use of StoneAge trademarks may be prohibited, unless expressly authorized.

<http://www.StoneAgetools.com/trademark-list/>

STONEAGE PATENT DATA

View the list of StoneAge's current U.S. patent numbers and descriptions.

<http://www.sapatents.com>



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