CE

BOILER GUN

BG22 BOILER GUN

OPERATING MANUAL

H&S TOOL
A CLIMAX COMPANY

P/N 100241
December 2023
Revision 2

CLIMAX | BORTECH CALDER H&S TOOL

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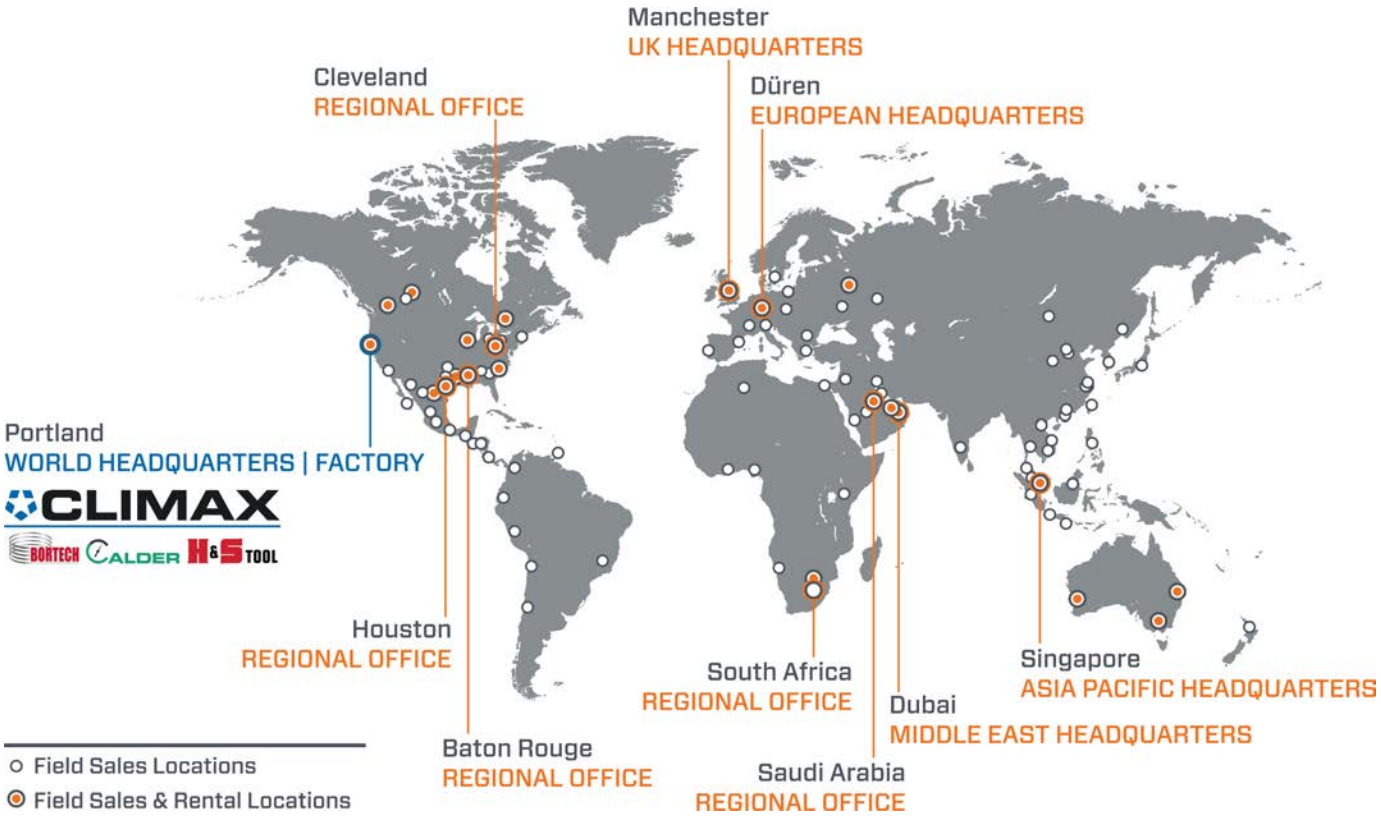

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1 INTRODUCTION

IN THIS CHAPTER:

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1.1 How to use this manual

This manual describes information necessary for the setup, operation, maintenance, storage, shipping, and decommissioning of the BG22 Boiler Gun.

The first page of each chapter includes a summary of the chapter contents to help you locate specific information. The appendices contain supplemental product information to aid in setup, operation, and maintenance tasks.

Read this entire manual to familiarize yourself with the BG22 Boiler Gun before attempting to set it up or operate it.

1.2 Safety alerts

Pay careful attention to the safety alerts printed throughout this manual. Safety alerts will call your attention to specific hazardous situations that may be encountered when operating this machine.

Examples of safety alerts used in this manual are defined here[1]:

DANGER

indicates a hazardous situation which, if not avoided, ***WILL*** result in death or severe injury.

WARNING

indicates a hazardous situation which, if not avoided, ***COULD*** result in death or severe injury.

1. For more information on safety alerts, refer to *ANSI/NEMA Z535.6-2011, Product safety Information in Product Manuals, Instructions, and Other Collateral Materials*.

⚠ CAUTION

indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

indicates a hazardous situation which, if not avoided, could result in property damage, equipment failure, or undesired work results.

1.3 GENERAL SAFETY PRECAUTIONS

H&S leads the way in promoting the safe use of portable machine tools. Safety is a joint effort. You, the end user, must do your part by being aware of your work environment and closely following the operating procedures and safety precautions contained in this manual, as well as your employer's safety guidelines.

Observe the following safety precautions when operating or working around the machine.

Training - Before operating this or any machine tool, you should receive instruction from a qualified trainer. Contact H&S for machine-specific training information.

Risk assessment - Working with and around this machine poses risks to your safety. You, the end user, are responsible for conducting a risk assessment of each job site before setting up and operating this machine.

Intended use - Use this machine in accordance with the instructions and precautions in this manual. Do not use this machine for any purpose other than its intended use as described in this manual.

Personal protective equipment - Always wear appropriate personal protective gear when operating this or any other machine tool. Flame-resistant clothing with long sleeves and legs is recommended when operating the machine. Hot chips from the workpiece may burn or cut bare skin.

Work area - Keep the work area around the machine clear of clutter. Restrain cords and hoses connected to the machine. Keep other cords and hoses away from the work area.

Lifting - Many H&S machine components are very heavy. Whenever possible, lift the machine or its components using proper hoisting equipment and rigging. Always use designated lifting points on the machine. Follow lifting instructions in the setup procedures of this manual.

Lock-out/tag-out - Lock-out and tag-out the machine before performing maintenance.

Moving parts - H&S machines have numerous exposed moving parts and interfaces that can cause severe impact, pinching, cutting, and other injuries.

Except for stationary operating controls, avoid contact with moving parts by hands or tools during machine operation. Remove gloves and secure hair, clothing, jewelry, and pocket items to prevent them from becoming entangled in moving parts.

Sharp edges - Cutting tools and workpieces have sharp edges that can easily cut skin. Wear protective gloves and exercise caution when handling a cutting tool or workpiece.

Hot surfaces - During operation, motors, pumps, HPUs, and cutting tools can generate enough heat to cause severe burns. Pay attention to hot surface labels, and avoid contact with bare skin until the machine has cooled.

1.4 MACHINE-SPECIFIC SAFETY PRECAUTIONS

Eye hazard - This machine produces metal chips during operation. Always wear eye protection when operating the machine.

Hazardous environments - Do not operate the machine in environments where potentially explosive materials, toxic chemicals, or radiation may be present.

Sound level - This machine produces potentially harmful sound levels. Hearing protection is required when operating this machine or working around it. During testing, the machine produced the sound levels[1] listed in Table 1-1.

TABLE 1-1. SOUND LEVELS

	Pneumatic Motor
Average sound pressure	90.6 dBA
Operator sound pressure	91.5 dBA
Bystander sound pressure	89.4 dBA
	Electric Motor
Average sound pressure	85 dBA
Operator sound pressure	85 dBA
Bystander sound pressure	85 dBA

1. Machine sound testing was conducted in accordance with European Harmonized Standards EN ISO 3744:2010 and EN 11201:2010.

1.5 RISK ASSESSMENT AND HAZARD MITIGATION

Machine Tools are specifically designed to perform precise material-removal operations.

Stationary Machine Tools include lathes and milling machines and are typically found in a machine shop. They are mounted in a fixed location during operation and are considered to be a complete, self-contained machine. Stationary Machine Tools achieve the rigidity needed to accomplish material-removal operations from the structure that is an integral part of the machine tool.

In contrast, Portable Machine Tools are designed for on-site machining applications. They typically attach directly to the workpiece itself, or to an adjacent structure, and achieve their rigidity from the structure to which it is attached. The design intent is that the Portable Machine Tool and the structure to which it is attached become one complete machine during the material-removal process.

To achieve the intended results and to promote safety, the operator must understand and follow the design intent, set-up, and operation practices that are unique to Portable Machine Tools valve testers.

The operator must perform an overall review and on-site risk assessment of the intended application. Due to the unique nature of portable machining applications hydrostatic testing, identifying one or more hazards that must be addressed is typical.

When performing the on-site risk assessment, it is important to consider the Portable Machine Tool valve tester and the workpiece as a whole.

1.6 RISK ASSESSMENT CHECKLIST

The following checklist is not intended to be an all inclusive list of things to watch out for when setting up and operating this Portable Machine Tool.

However, these checklists are typical of the types of risks the assembler and operator should consider. Use these checklists as part of your risk assessment:

TABLE 1-2. RISK ASSESSMENT CHECKLIST BEFORE SET-UP

	Before set-up
☐	I took note of all the warning labels on the machine.
☐	I removed or mitigated all identified risks (such as tripping, cutting, crushing, entanglement, shearing, or falling objects).
☐	I considered the need for personnel safety guarding and installed any necessary guards.
☐	I read the machine setup instructions (Section 3.2) and took inventory of all the items required but not supplied (Section 2.5).

TABLE 1-2. RISK ASSESSMENT CHECKLIST BEFORE SET-UP

	Before set-up
☐	I considered how this machine operates and identified the best placement for the controls, cabling, and the operator.
☐	I evaluated and mitigated any other potential risks specific to my work area.

TABLE 1-3. RISK ASSESSMENT CHECKLIST AFTER SET-UP

	After set-up
☐	I checked that the machine is safely installed (according to Section 3) and the potential fall path is clear. If the machine is installed at an elevated position, I checked that the machine is safeguarded against falling.
☐	I identified all possible pinch points, such as those caused by rotating parts, and informed the affected personnel.
☐	I planned for containment of any chips or swarf produced by the machine.
☐	I followed the required Maintenance Intervals (Section 5.1) with the recommended lubricants (Section 5.2).
☐	I checked that all affected personnel have the recommended personal protective equipment, as well as any site-required or regulatory equipment.
☐	I checked that all affected personnel understand and are clear of the danger zone.
☐	I evaluated and mitigated any other potential risks specific to my work area.

1.7 LABELS

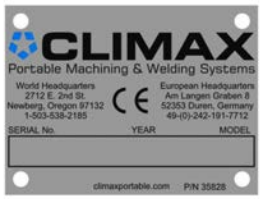
1.7.1 Label identification

The following warning labels should be on your machine. If any are defaced or missing, contact H&S Tool immediately for replacements.

TABLE 1-4. BG22 BOILER GUN LABELS

	P/N 100204 BG22 Boiler gun label		P/N 100199 H&S company label

TABLE 1-4. BG22 BOILER GUN LABELS

<table>
<tr>
<td> 
</td>
<td>P/N 35828
CE serial plate</td>
<td>  </td>
<td>P/N 87271
Warning label: Use eye and ear protection, and read the manual.</td>
</tr>
<tr>
<td> 
</td>
<td>P/N BG22 container label</td>
<td>H&S
TOOL
WEDGE AND PAD CHART
<table>
<tr><th>MACHINE MODEL</th><th>CENTERSHAFT INCHES</th><th>(MM)</th><th>WEDGE SIZE</th><th>ID RANGE INCHES</th><th>(MM)</th></tr>
<tr><td rowspan="14">BG22
BG38LV
BG38HV
BG38PLUS</td><td rowspan="14">0.625</td><td rowspan="14">(15.8)</td><td>B-01</td><td>0.625 – 0.810</td><td>(15.9 – 20.6)</td></tr>
<tr><td>B-02</td><td>0.750 – 0.935</td><td>(19.1 – 23.7)</td></tr>
<tr><td>B-03</td><td>0.875 – 1.060</td><td>(22.2 – 26.9)</td></tr>
<tr><td>B-04</td><td>1.000 – 1.185</td><td>(25.4 – 30.1)</td></tr>
<tr><td>B-05</td><td>1.125 – 1.310</td><td>(28.5 – 33.2)</td></tr>
<tr><td>B-06</td><td>1.250 – 1.435</td><td>(31.7 – 36.4)</td></tr>
<tr><td>B-07</td><td>1.375 – 1.560</td><td>(34.9 – 39.6)</td></tr>
<tr><td>B-08</td><td>1.500 – 1.685</td><td>(38.1 – 42.7)</td></tr>
<tr><td>B-09</td><td>1.625 – 1.810</td><td>(41.2 – 45.9)</td></tr>
<tr><td>B-10</td><td>1.750 – 1.935</td><td>(44.4 – 49.1)</td></tr>
<tr><td>B-11 + B-04</td><td>1.875 – 2.060</td><td>(47.6 – 52.3)</td></tr>
<tr><td>B-12 + B-04</td><td>2.000 – 2.185</td><td>(50.8 – 55.5)</td></tr>
<tr><td>B-13 + B-04</td><td>2.125 – 2.310</td><td>(53.9 – 58.6)</td></tr>
<tr><td>B-14 + B-04</td><td>2.250 – 2.435</td><td>(57.1 – 61.8)</td></tr>
<tr><td rowspan="5">BG38LV
BG38HV
BG38PLUS</td><td rowspan="5">0.625</td><td rowspan="5">(15.8)</td><td>B-15 + B-04</td><td>2.375 – 2.560</td><td>(60.3 – 65.0)</td></tr>
<tr><td>B-16 + B-04</td><td>2.500 – 2.685</td><td>(63.5 – 68.2)</td></tr>
<tr><td>B-17 + B-04</td><td>2.625 – 2.810</td><td>(66.6 – 71.3)</td></tr>
<tr><td>B-18 + B-04</td><td>2.750 – 2.935</td><td>(69.8 – 74.5)</td></tr>
<tr><td>B-19 + B-04</td><td>2.875 – 3.060</td><td>(73.0 – 77.7)</td></tr>
</table>
H&S TOOL 715 Weber Dr. Wadsworth, OH. 44281
PH: 330.336.4550 / FAX: 330.336.9159
WEBSITE: HSTOOL.COM</td>
<td>P/N 100240
Wedge and pad chart</td>
</tr>
</table>

2 OVERVIEW

IN THIS CHAPTER:

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2.2 Controls - - - 8
2.2.1 Pneumatic motor controls - - - 8
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2.1 Features and components

The BG22 Boiler Gun is a portable, gear-driven, inside-diameter (ID)-mounted, single or dual-point beveling and facing machine for use on workpieces with a range of 0.50" (12.7 mm) ID to 2.50" (63.5 mm) outside diameter (OD).

Principle components include the following:

Drive options: Available with either a 1.3 HP pneumatic motor or a 1 HP electric motor.

High Velocity (HV) and Low Velocity (LV) gearing: HV delivers higher cutting speeds to turn specialty carbide inserts. LV is geared for heavy walls and hard alloys.

Mounting systems: Either a wedge or collet mounting system secures the BG22 Boiler Gun to the work-piece. They are both self-centering and adapt to a wide range of pipe sizes.

Figure 2-1. BG22 and shipping container

Tool holders: Available with either fixed or sliding tools holders, in multiple sizes.

Torque free operation: Once securely mounted the BG22 Boiler Gun requires no additional effort to operate aside from feeding the cutting tool.

Wrench feed: Advances the cutting tools in confined areas with a ratcheting system. This system has a smaller footprint.

Speed wheel: Provides a quicker way to advance the locking rod nut before fully tightening with the wrench in confined spaces.

2.2 CONTROLS

Depending on the user's requirements, the BG22 Boiler Gun can be powered by either a pneumatic or electric motor. The controls for each type of motor follow.

⚠ WARNING

Always stop the machine and disconnect any power supply before making adjustments to controls or machine components. Failure to follow this safety precaution may result in severe injury.

2.2.1 Pneumatic motor controls

The pneumatic motor used on the BG22 features a throttle lever.

The safety lock must be disengaged by pressing and holding up while depressing the throttle lever.

The throttle lever actuates the motor; when released, the motor will stop and the safety lock will re-engage.

This is an on or off control only.

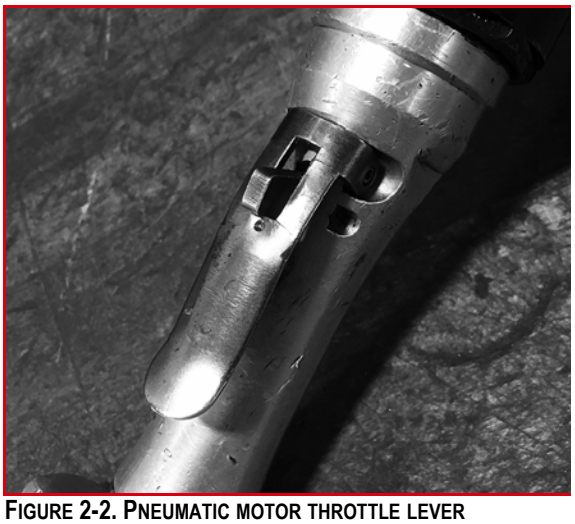

FIGURE 2-2. PNEUMATIC MOTOR THROTTLE LEVER

2.2.2 Electric motor controls

The electric motor controls are similar to a drill or drill driver. The trigger is squeezed to actuate the motor, when released the motor will stop.

This speed is controlled by how far the trigger is pulled in or let out.

The electric motor also has a direction control, which in this application is not used. The direction control should always be set to forward.

FIGURE 2-3. DIRECTION AND TRIGGER CONTROLS

2.2.3 Cordless electric motor controls

To actuate the motor on the cordless electric motor slide the red button up. The motor will run until the button is slid down into the off position.

There is no speed or direction controls on the cordless electric motor.

WARNING

Do not take any measures to lock the throttle or the trigger in the on position. Failure to follow this safety precaution may result in severe injury.

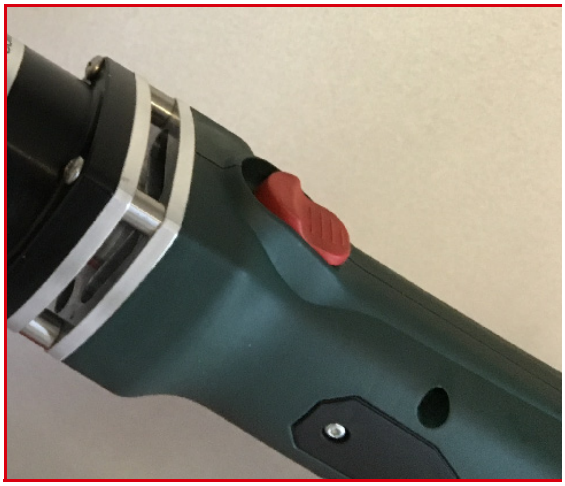

FIGURE 2-4. CORDLESS MOTOR CONTROLS

2.3 DIMENSIONS

Figure 2-5 shows the machine and operating dimensions.

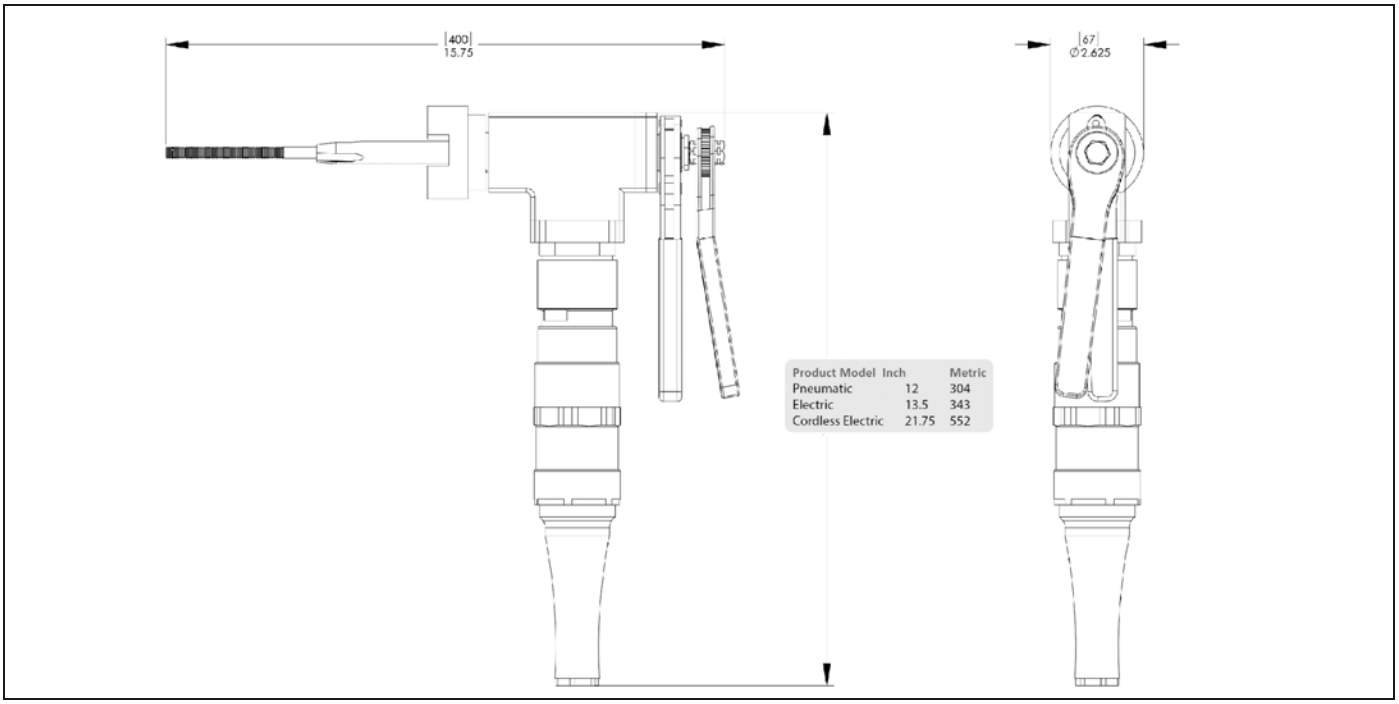

FIGURE 2-5. BG22 BOILER GUN DIMENSIONS

2.4 SPECIFICATIONS

TABLE 2-1. SUB-COMPONENT MASS

P/N	Component	Mass in lbs (kg)
BG22	BG22 Boiler Gun Pneumatic	14 (6.4)
BG22E	BG22 Boiler Gun Electric	11 (5)
BG22C	BG22 Boiler Gun Cordless Electric	16 (7.3)

2.5 ITEMS REQUIRED BUT NOT SUPPLIED

The following items may be required but not supplied in your H&S product kit:

- Tape measure or steel ruler
- Rubber mallet
- Pliers

3 SETUP

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This section describes the setup procedures for the BG22 Boiler Gun.

3.1 Receipt and Inspection

Your H&S product was inspected and tested prior to shipment then packaged for normal shipment conditions. H&S does not guarantee the condition of your machine upon delivery.

When you receive your H&S product, perform the following receipt checks:

1. Inspect the shipping containers for damage.
2. Check the contents of the shipping containers against the included invoice to make sure that all components have been shipped.
3. Inspect all components for damage.

Contact H&S immediately to report damaged or missing components.

NOTICE

Keep the shipping container and all packing materials for future storage and shipping of the machine.

3.2 MACHINE SETUP

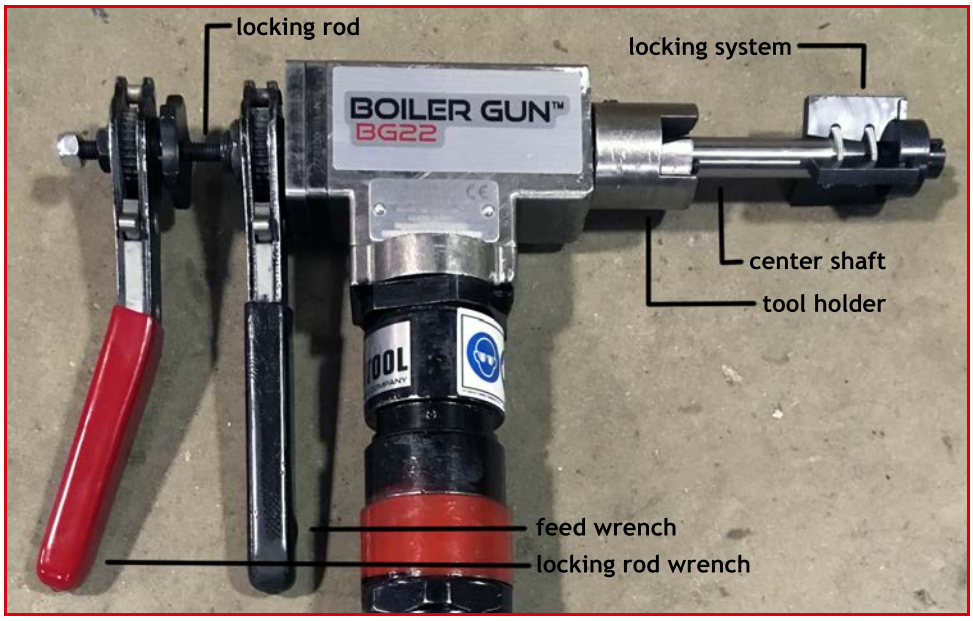

FIGURE 3-1. BG22 BOILER GUN MAIN COMPONENTS

Do the following to set up the BG22 Boiler Gun. :

3.2.1 Wedge locking system

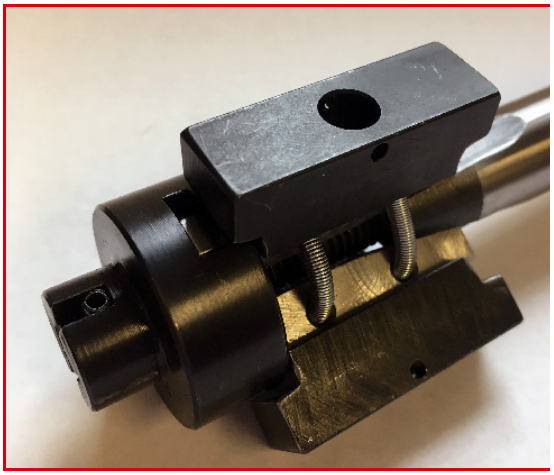

FIGURE 3-2. INSTALLED WEDGE SET WITH EXTENSIONS

1. Complete the risk assessment checklist in Table 1-2 on page 5.
2. Position the machine on a solid support for installation of the wedge set.
3. Measure the ID of the pipe to be machined. Use the chart on the inside lid of the shipping container to determine the size of the base wedge, extension set and locking rod.
4. Install the locking rod from the front of the machine, sliding it through the center shaft.
5. Install the speed wheel/rod wrench on the end of the locking rod and install the lock nut.
6. Slide the base wedge set over the end plate by expanding the springs or band spring.

7. Seat the base wedges in the end plate and align the base wedges with the slots in the center shaft.
8. If installing wedge extensions, secure three of the same size range onto the base wedges with the screws (see Figure 3-2 on page 14).

3.2.1.1 Small ID wedge locking system

The small ID wedge locking system allows the BG22 Boiler Gun to mount on IDs of 0.500-0.625”.

Do the following to setup the small ID wedge locking system.

1. Position the machine on a solid support for installation of the wedge system.
2. Follow the instructions for changing the center shafts, if necessary, in Section 3.2.4.
3. Install three of the same size wedges in the slots of the center shaft with the thinner end facing the threaded portion of the center shaft and the recess for the band spring facing out.
4. Install the band spring across the recess of the three wedges to secure.
5. Slide the wedge rod into the center shaft and turn to advance until the wedges begin to expand.
6. Install the rod wrench and secure with the two retaining clips.

FIGURE 3-3. SMALL WEDGE SET

3.2.2 Collet locking system

1. Complete the risk assessment checklist in Table 1-2 on page 5.
2. Position the machine on a solid support for installation of the collet set.
3. Measure the ID of the pipe to be machined and determine the size of the collet set to be used.
4. Slide a locking rod into the center shaft from the rear of the machine.
5. Thread the required collet set on the end of the locking rod until the collets begin to engage the center shaft.

FIGURE 3-4. INSTALLED COLLET SET

6. Insert a cotter pin through the hole in the locking rod and open the splines to secure.
7. If not present, install the locking rod wrench and secure with the retaining clips.

3.2.3 Tool holders

The BG22 Boiler Gun can be used with tool holders in several different sizes.

Do the following to switch between tool holders:

To remove:

1. Loosen the set screw in the body of the tool holder.
2. The tool holder has an interference fit with the main gear. Strike the back face of the tool holder to remove it towards the front of the machine.
3. The shaft key may come loose from the main gear during removal. Retain it for reuse.

To install:

1. Check that the set screw in the body of the tool holder is backed out or remove it completely.
2. Install the shaft key in the key slot on the main gear.
3. Slide the tool holder onto the main gear, aligning the key way with the shaft key.
4. Tap into place until seated against the shoulder on the main gear.
5. Reinstall or tighten the set screw in the tool holder body until secure.

3.2.4 Center shafts

Depending on the application, the center shaft may need switched out to offer a different size range or locking system.

Do the following to switch out center shafts:

1. Position the machine on a solid support to change the center shafts.
2. Remove the locking rod, rod wrench and wedge or collet locking sets.
3. Remove the two screws in the retaining plate and the lift the retaining plate from the machine body. Be aware of the thrust bearing parts during disassembly
4. Remove the feed nut from the center shaft.
5. The center shaft can now be removed through the front of the machine.
6. Install the other center shaft from the front of the machine threads first.
7. Replace the thrust bearing parts being mindful of the order and orientation.

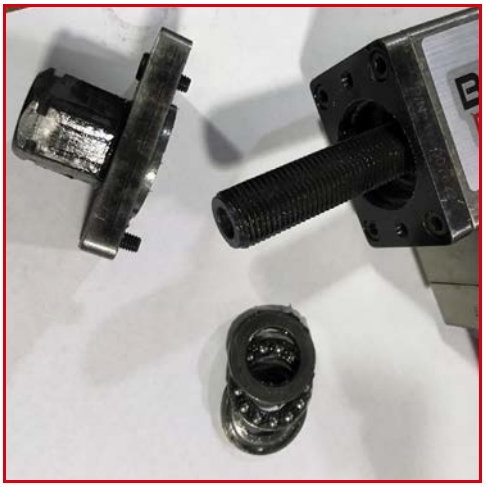

FIGURE 3-5. CHANGING THE CENTER SHAFT

8. Thread the feed nut onto the center shaft until the center shaft is flush with the back of the feed nut.
9. Reinstall the retaining plate and secure with the two screws.

3.3 MACHINE MOUNTING

Do the following to mount the BG22 Boiler Gun on the workpiece:

1. Insert the mounting system end of the BG22 Boiler Gun into the workpiece until there is approximately 0.50” (12.7mm) between the end of the mounting system and the face of the workpiece. This will provide enough material for most procedures.
2. Tighten the mounting system by turning the lock rod clock-wise using either the rod wrench or the speed wheel.

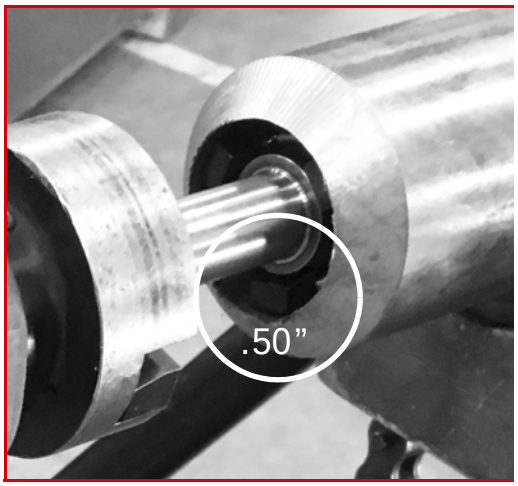

FIGURE 3-6. BG22 BOILER GUN INSTALLED IN WORKPIECE

3. Once snug, verify that the mounting system position in the workpiece has been maintained.
4. Completely tighten the mounting system using the locking rod wrench.

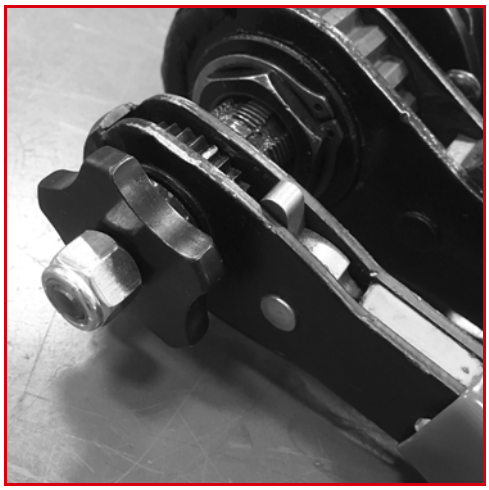

FIGURE 3-7. LOCKING ROD WRENCH WITH SPEED WHEEL

⚠ WARNING

Check that the mounting system has been fully tightened.

After the machine has made 2-3 revolutions during operation, recheck the mounting system for tightness in the workpiece.

If loose, the machine itself could rotate causing severe injury to the operator.

3.4 INSTALLING THE CUTTING TOOLS

Do the following to install the cutting bit(s):

1. Advance the tool holder towards the workpiece to help with alignment of the cutting bits.
2. Loosen the set screws in the blade locks.
3. Slide the cutting bit into the channel with the beveled cutting edge facing the direction of rotation.
4. Align the cutting edge of the tool to cut the full width of the workpiece wall.

FIGURE 3-8. SLIDING TOOL HOLDER

5. Tighten the set screws to secure the cutting bits to the tool holder.

TIP:

While the BG22 Boiler Gun can be operated with one blade. Smoother operation on harder materials or thicker pipe walls will result with the use of two blades.

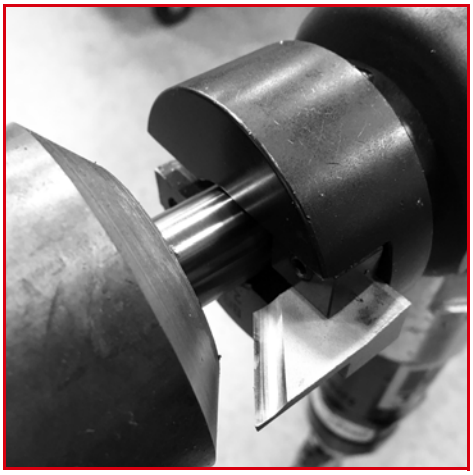

FIGURE 3-9. CUTTING BIT INSTALLED

3.5 MOTORS

The BG22 Boiler Gun is powered by either a pneumatic motor or an electric motor. The following subsections explain how to set up each for operation.

3.5.1 Pneumatic motor

Do the following to prepare the pneumatic motor for use (See Section 2.2 for controls):

1. Connect the air supply line to the in-line oiler/filter end of the air hose assembly with the universal coupler. Secure with the lock pin.
2. Connect the air hose assembly to the pneumatic drive motor using the quick disconnect coupler.

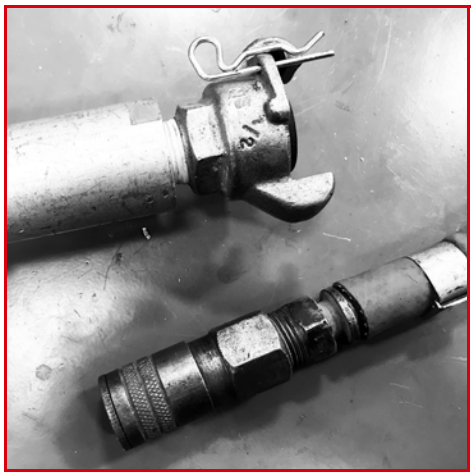

FIGURE 3-10. UNIVERSAL COUPLER (TOP) AND QUICK DISCONNECT (BOTTOM)

3.5.2 Electric motor

Do the following to prepare the electric motor for use (See Section 2.2 for controls):

1. Verify that the direction selector is set to forward.
2. Plug the drive into an OSHA certified power source or consult a licensed electrician for additional power supply options.

FIGURE 3-11. MOTOR DIRECTION CONTROL SET TO FORWARD

3.5.3 Cordless electric motor

Do the following to prepare the cordless electric motor for use (See Section 2.2 for controls)

1. Fully charge the battery packs using the battery charger.
2. Install the battery on the bottom of the motor, fully locking it into place.

4 OPERATION

IN THIS CHAPTER:

4.1 PRE-OPERATION CHECKS -23
4.2 OPERATION -23
4.2.1 PNEUMATIC MOTOR -23
4.2.2 ELECTRIC MOTOR -24

4.1 PRE-OPERATION CHECKS

Do the following checks before operating the machine:

1. Complete the risk assessment checklist in Table 1-3 on page 5.
2. Check that the work area is clear of non-essential personnel and equipment.
3. Check that the machine control/observation area will not be in the path of hot flying chips during machine operation.
4. Check the machine is securely mounted to the workpiece, according to Section 3.3 on page 18.
5. Check that hoses and electric cords are routed and secured to avoid tripping, entanglement, damage from hot chips, or other damage should an air hose or connection fail.
6. Check the cutting tool condition and sharpness.
7. On the in-line air lubricator, verify that oil is present in the sight glass. (See Section 5.3.1 on page 28.)
8. Check that all hand tools are removed from inside the machine and the work area.

4.2 OPERATION

The BG22 Boiler Gun can machine both O.D. and I.D. bevels and face or shorten pipes. Aside from the use of different blades, operation is the same for all the machining processes. See Section 2.2 on page 8 for controls information.

4.2.1 Pneumatic motor

To operate the BG22 Boiler Gun with the pneumatic motor do the following:

1. Actuate the motor by unlocking the safety lock then squeeze and hold the throttle lever.
2. With the other hand turn the feed wrench to advance the cutting tool into the workpiece.

3. Continue to turn the feed wrench until the required machining is complete. Base the feed rate on the motor's feedback, if the RPMs drop or the machine stalls slow the feed rate.
4. Once complete, allow the machine to make a few revolutions without feeding the cutting tool to clean up the machined surface.
5. Release the throttle lever to stop the machine.
6. Reverse the rotation of the feed wrench to back the cutting tool away from the workpiece. This also resets the travel of the machine for the next workpiece.
7. To remove the BG22 from the workpiece do the following:
    a) Turn off the air supply at the source. Disconnect the air hose assembly from the machine.
    b) Turn the locking wrench to loosen the locking system from the workpiece.
    c) Slide the BG22 straight out from the workpiece using the body of the machine to support it's weight.

FIGURE 4-1. HAND POSITIONING DURING BOILER GUN OPERATION

⚠ WARNING

Always pick up and move the BG22 Boiler Gun by body of the machine. Never pick up the BG22 Boiler Gun by the throttle lever section of the air motor, actuation of the motor could occur and lead to severe injury.

Never pick up the BG22 Boiler Gun by the air hose assembly as it could become detached and result in injury or damage to the machine. Do not pick up and move the machine by either of the wrenches as damage to the machine could occur.

4.2.2 Electric motor

To operate the BG22 Boiler Gun with the electric motor do the following:

1. Start the motor by squeezing and holding the trigger.
2. With the other hand turn the feed wrench to advance the cutting tool into the workpiece.
3. Continue to turn the feed wrench until the required machining is complete. Base the feed rate on the machine's feedback, if the RPMs drop or the motor stalls slow the feed rate.

4. Once complete, allow the machine to make a few revolutions without feeding the cutting tool to clean up the machined surface.
5. Release the trigger to stop the machine.
6. Reverse the rotation on the feed wrench 2-3 revolutions to back the cutting tool away from the workpiece.
7. To remove the BG22 from the workpiece do the following:
   a) Unplug or disconnect the power supply from drive motor. L ock out/tag out where applicable.
   b) Turn the locking wrench to loosen the locking system from the workpiece.
   c) Slide the BG22 straight out from the workpiece using the body of the machine to support it's weight.

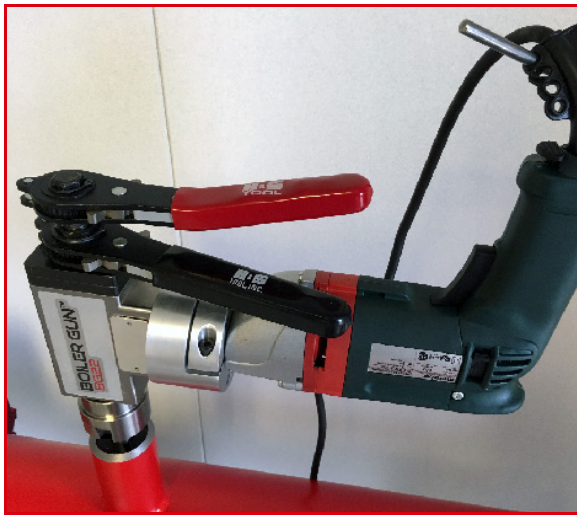

FIGURE 4-2. BG22 WITH ELECTRIC MOTOR

WARNING

Always pick up and move the BG22 Boiler Gun using the body of the machine or combination of the center shaft and machine body.

Never pick up the BG22 Boiler Gun by the handle section of the electric driver, actuation of the motor could occur and lead to severe injury.

Never pick up the BG22 Boiler Gun bythe electrical cord as it could result in damage to the machine. Do not pick up and move the machine by the feed wrench as damage to the machine could occur.

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5 MAINTENANCE

IN THIS CHAPTER:

5.1 MAINTENANCE CHECKLIST -27
5.2 APPROVED LUBRICANTS -27
5.3 MAINTENANCE TASKS -28
5.3.1 CHECKING AND FILLING THE IN-LINE OILER RESERVOIR -28
5.3.2 SERVICING THE FILTER ELEMENT -29
5.3.3 ADJUSTING THE OIL FLOW RATE OF THE IN-LINE OILER -29
5.3.4 TOOL HOLDERS -29
5.3.5 GREASING THE DRIVE AND PINION GEARS -30
5.4 TROUBLESHOOTING -30
5.4.1 THE MACHINE ISN'T TURNING -30
5.4.2 THE MACHINE ISN'T FEEDING -30
5.4.3 THE MACHINE IS PERFORMING POORLY -30

5.1 MAINTENANCE CHECKLIST

Table 5-1 lists maintenance intervals and tasks

TABLE 5-1. MAINTENANCE INTERVALS AND TASKS

Interval	Task	Reference
Before each use	Check that oil is present in the sight glass on the in-line oiler, refill as needed.	5.3.1
	Check air lines for damage and wear.	--
	Check the cutting tool for sharpness. Replace as necessary.	--
	Check and fully charge the batteries on the cordless electric model	--
Before and after each use	Remove debris, oil, and moisture from machine surfaces.	--
Every ten operation cycles	Lubricate center shaft threads.	--
	Adjustment of the oil flow rate	5.3.3
	Filter element service	5.3.2

5.2 APPROVED LUBRICANTS

H&S recommends using the following lubricants at the locations indicated.

Failure to use the appropriate lubricants can result in damage and premature machine wear.

⚠ CAUTION

Avoid damage, premature machine wear, and protect your warranty by using only approved lubricants.

TABLE 5-2. APPROVED LUBRICANTS

Application Area	Lubricant	Biodegradable Lubricant	Viscosity (cSt)	Quantity	Frequency
Threads of the center shaft	WD-40 or light-weight spray lube	N/A		Light coating applied by spray	Daily during machine use
In-line oiler	MOBIL ALMO 525 or 10W SAE oil	N/A	46 @ 40C	Fill oil lubricator body	Each use
Unpainted Surfaces	LPS1 or LPS2	N/A	38 @ 25C	As required	Each use, and before storage
Drive and pinion gears	NOOK PAG-1 grease	N/A	113 @ 100C	Light coating applied by hand	Weekly during machine use

5.3 MAINTENANCE TASKS

Maintenance tasks are described in the following sections.

5.3.1 Checking and filling the in-line oiler reservoir

Do the following to check and fill the in-line oiler:

1. Check sight glass on the oil reservoir for the presence of oil.
2. To refill: Remove the cap, fill the reservoir and replace the cap.

FIGURE 5-1. IN-LINE OILER SIGHT GLASS

5.3.2 Servicing the filter element

See Figure A-10.

Do the following to service the filter element:

1. Remove the filter nut to access the filter element.
2. Slide the filter element out of the filter housing.
3. Clean the filter element with a solvent and compressed air.
4. Reassemble the filter and replace the filter nut.

5.3.3 Adjusting the oil flow rate of the in-line oiler

WARNING

To adjust the oil flow rate the machine must be mounted as if being used. ALL operating and safety precautions must be taken to avoid injuries.

Different lubricants and environments may effect the rate of the in-line oiler.

Do the following to adjust the oil flow rate:

1. Remove the cap and check the oil level. Refill as needed.
2. Set the oiler valve to ‘3’ as a baseline for the flow rate.
3. Replace the cap.
4. Mount and setup the machine (see Section 3.2-3.5)
5. Squeeze and hold the throttle lever to run the machine.
6. Hold a sheet of white paper approximately 4” (101mm) in front of the exhaust ports on the pneumatic motor. If adjusted correctly, there will be a light splatter of oil on the paper after a few seconds of operation.
7. If the oil rate needs adjusted, disconnect the air supply line from the air filter end of the air hose assembly.
8. Repeat Step 1.
9. The larger the number on the oiler valve the higher the oil flow rate. Adjust as required.
10. Replace the cap and retest the machine for corrected oil flow rate.

5.3.4 Tool holders

Do the following to service the tool holders:

1. Monitor and replace as necessary, the o-rings on the I.D. of the tool holder.
2. Monitor and replace as necessary, the key stock between the main gear and the tool holders.

5.3.5 Greasing the drive and pinion gears

Do the following to grease the drive and pinion gears:

1. On either drive type, remove the four screws in the gearbox adapter.
2. Slide the entire motor, gearbox and gearbox adapter out of the machine housing.
3. Both the drive and pinions gears are now accessible to be greased.
4. Reverse steps 1 and 2 to reassemble.

5.4 TROUBLESHOOTING

This section is intended to help you solve basic machine performance problems. For serious maintenance or if you have questions on the following procedures, contact H&S.

5.4.1 The machine isn't turning

If the machine is not rotating, check the following:

1. The air supply line is connected and sufficient air pressure is present (pneumatic motor only).
2. The power source is connected and energized (electric motor only).
3. The battery in the cordless electric machine is charged.

5.4.2 The machine isn't feeding

If the machine isn't feeding properly, check the following:

1. The center shaft is properly installed in the machine and .50" (12.7mm) projects through the back of the feed wrench.
2. The feed wrench is being turned in the wrong direction.
3. The center shaft has been fed too far into the machine and need retracted so .50" (12.7mm) projects through the back of the feed wrench.

5.4.3 The machine is performing poorly

If the machine is performing poorly, check the following:

1. The cutting tool is installed correctly.
2. That the set screw on the tool holder is tight to the center shaft.
3. The machine is tight to the workpiece.
4. The cutting tool or insert is sharp and has the correct geometry for the material and type of cut.
5. Electric motor:
    a) The feed direction is set to forward.
    b) The battery is charged, cordless model only.

6. Pneumatic motor:
    a) There is oil in the in-line oiler.
    b) The air supply to the machine is sufficient in both quantity and pressure. Optimal levels are: 90PSI at 38CFM.

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6 STORAGE AND SHIPPING

IN THIS CHAPTER:

6.1 STORAGE -33
6.1.1 SHORT-TERM STORAGE -33
6.1.2 LONG-TERM STORAGE -33
6.2 SHIPPING -34
6.3 DECOMMISSIONING -34

6.1 STORAGE

Proper storage of the BG22 Boiler Gun will extend its usefulness and prevent undue damage.

Store the BG22 Boiler Gun in its original shipping container. Keep all packing materials for repackaging the machine (see Figure 6-1).

6.1.1 Short-term storage

Do the following for short-term storage (three months or less):

1. Remove the tooling.
2. Remove hoses.
3. Clean the machine to remove dirt, grease, metal chips, and moisture.
4. Drain all liquids from the in-line pneumatic oiler.
5. Spray all unpainted surfaces with LPS-2 to prevent corrosion.
6. Store the BG22 Boiler Gun in its original shipping box (see Figure 6-1).

6.1.2 Long-term storage

Do the following for long-term storage (longer than three months):

1. Follow the short-term storage instructions, but use LPS-3 instead of LPS-2.
2. Add a desiccant pouch to the shipping container. Replace according to manufacturer instructions.
3. Store the shipping container in an environment out of direct sunlight with temperature < 70ºF (21ºC) and humidity < 50%.

6.2 SHIPPING

The BG22 Boiler Gun can be reshipped in its original shipping container, as shown in Figure 6-1.

FIGURE 6-1. BG22 SHIPPING CONTAINER

6.3 DECOMMISSIONING

To decommission the BG22 Boiler Gun prior to disposal, remove the drive motor and dispose of it separately from the rest of the machine components. Refer to Appendix A for component assembly information.

APPENDIX A ASSEMBLY DRAWINGS

Drawing list

FIGURE A-1. BG22 BOILER GUN ASSEMBLY (P/N 99871) -36
FIGURE A-2. BG22 BOILER GUN PNEUMATIC ASSEMBLY (P/N BG22-R) -37
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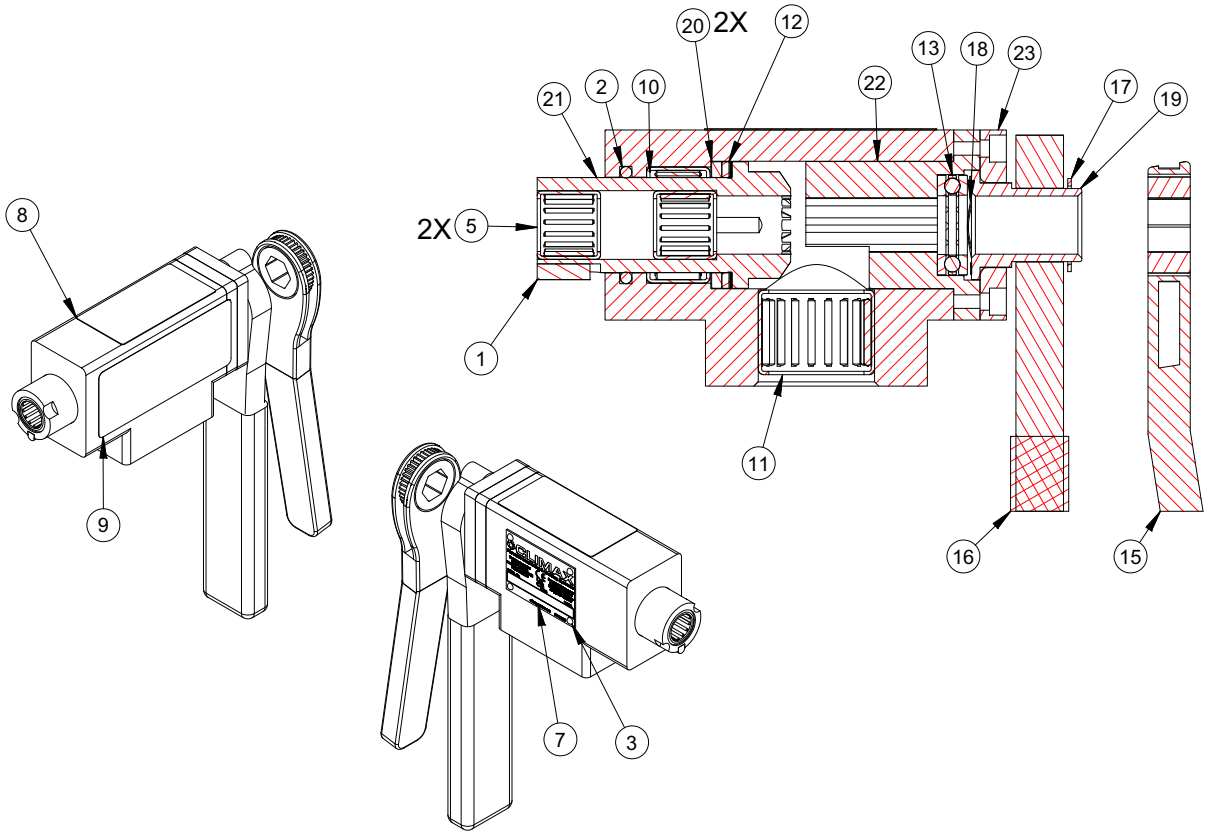
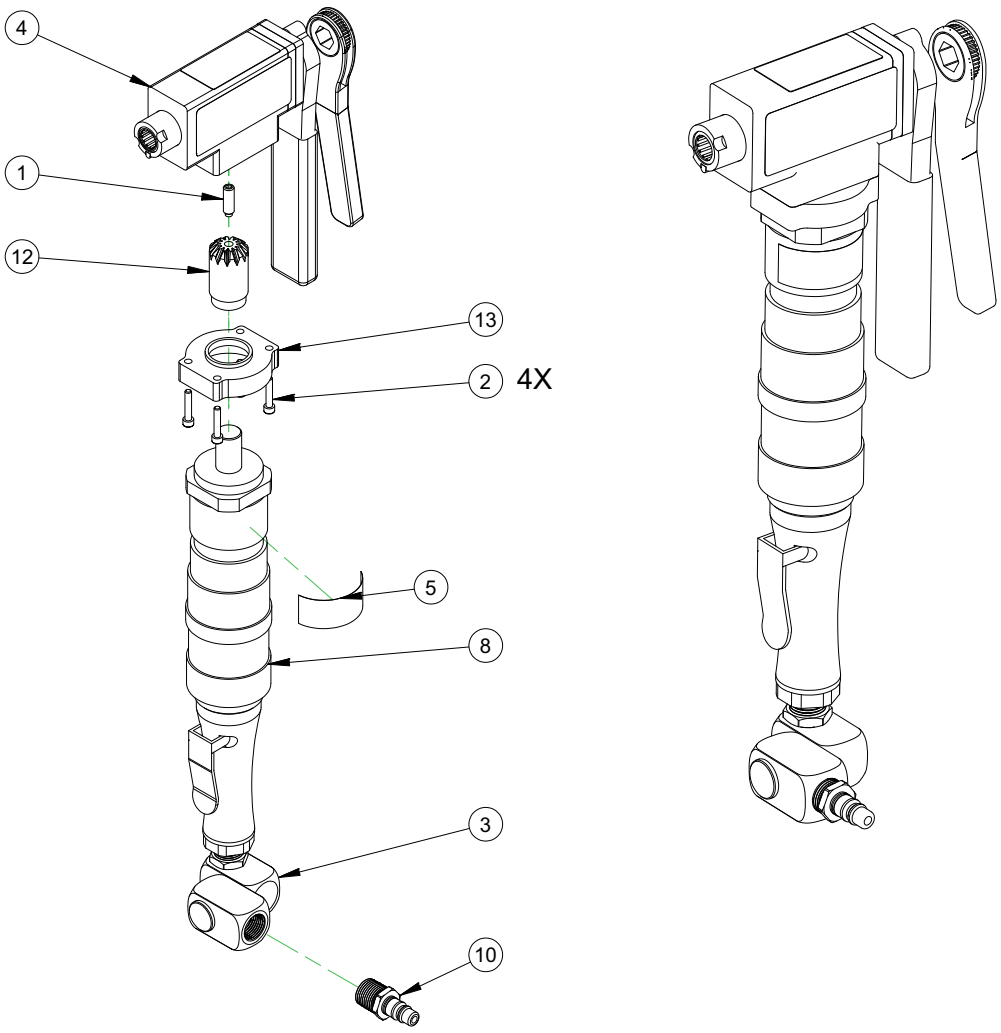
FIGURE A-10. TOOL KIT -44
FIGURE A-11. SHIPPING CONTAINER -44



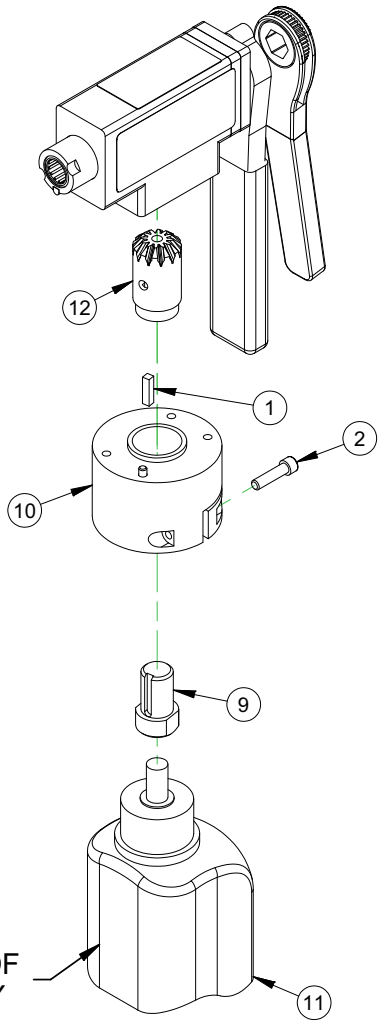
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	911-0005	KEY 3/16 RADIUS ONE SIDE X 5/8 SQ BOTH ENDS
2	1	921-0216	O-RING 216
3	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
4	4	12648	SCREW 10-24 X 3/4 SHCS
5	2	14169	BRG NEEDLE 5/8 ID X 13/16 OD X .750 OPEN B-1012
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
8	1	87271	(NOT SHOWN) LABEL WARNING - EYE EAR MANUAL PROTECTION 1-3/8 X 2-3/4
9	1	100204	LABEL BG22 METALLIC
10	1	102403	BRG NEEDLE 1-1/8 ID X 1-3/8 OD X .750 OPEN B-1812
11	1	102404	BRG NEEDLE 1-1/8 ID X 1-3/8 OD X 1 OPEN B-1816
12	1	102424	KIT SHIM 1.125 ID X 1.500 OD X .005 TO 0.063 TH
13	1	104340	BRG THRUST MODIFIED 17.65MM ID X 30MM OD X 9MM H
14	1	104504	BG22 HOUSING
15	1	23081119900	WRENCH 5/8" HEX
16	1	23259119900	WRENCH 7/8" HEX
17	1	B000100	SNAP RING 1 OD X .042 TH
18	1	B002519	WASHER SPRING WAVE .901 ID X 1.159 OD X .013 THICK
19	1	B002526	FEEDNUT
20	2	T007818	BRONZE THRUST BEARING
21	1	T007821	MAIN GEAR
22	1	T007822	CENTERSHAFT LOCK
23	1	T007826	RETAINER PLATE
6	2	19232	SCREW 10-24 X 3/8 SHCS

FIGURE A-1. BG22 BOILER GUN ASSEMBLY (P/N 99871)



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	11731	SCREW 5/16-18 X 1 SSSHDP
2	4	11926	SCREW 10-24 X 1 SHCS
3	1	98855	SWIVEL DOUBLE AIR 1/2 NPTM X 1/2 NPTF
4	1	99871	NFIS BASE UNIT BG22 BOILER GUN TUBE BEVELER
5	1	100199	LABEL H&S LOGO 1.875 X 1.000
6	1	100241	(NOT SHOWN) OPERATING MANUAL BG22
7	1	100847	(NOT SHOWN) TAG H&S TOOL LOCKING
8	1	104505	MOTOR AIR MODIFIED CML3488
9	1	4101201	(NOT SHOWN) TOOL BOX - #21 - MB / BG44 & TI / BG22
10	1	DCP2504	FTG QUICK COUPLER 3/8B x 1/2 NPTM MALE AIR
11	1	HS50509	(NOT SHOWN) ASSY 1/2" HOSE/IN-LINE OILER PRESSURE FEED
12	1	T007811	PINION GEAR
13	1	T007813	ADAPTER

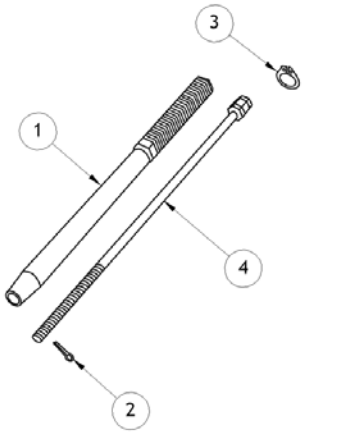
FIGURE A-2. BG22 BOILER GUN PNEUMATIC ASSEMBLY (P/N BG22-R)



AVAILABLE CONFIGURATIONS		
PART NO.	DESCRIPTION	ITEM 10
BG22E120-R	MODEL BG22 BOILER GUN ELEC 120V 1 HP	EB002615
BG22E220-R	MODEL BG22 BOILER GUN ELEC 220V 1 HP	EOD005504
BG22C120-R	MODEL BG22 BOILER GUN CORDLESS ELEC 120V	103054
BG22C220-R	MODEL BG22 BOILER GUN CORDLESS ELEC 220V	103055

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	10217	KEY 3/16 SQ X .75 SQ BOTH ENDS (KB)
2	1	11118	SCREW 1/4-20 X 1 SHCS
3	4	11926	SCREW 10-24 X 1 SHCS
5	1	99871	NFIS BASE UNIT BG22 BOILER GUN TUBE BEVELER
6	1	100241	(NOT SHOWN) OPERATING MANUAL BG22
7	1	100847	(NOT SHOWN) TAG H&S TOOL LOCKING
11	1	SEE CHART	CHART DRILL METABO 750W
8	1	103109	(NOT SHOWN) ASSY SHIPPING CRATE BG22
9	1	EB002614	ELECTRIC DRIVE SHAFT
10	1	ET005508	TI ELECTRIC MOTOR ADAPTER
12	1	T007811	PINION GEAR
4	1	44811	SCREW 5/16-18 UNC X 3/4 SSSDP

FIGURE A-3. BG22 BOILER GUN ELECTRIC ASSEMBLY (P/N 103086)



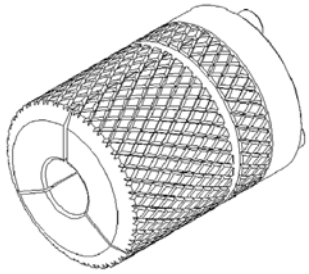
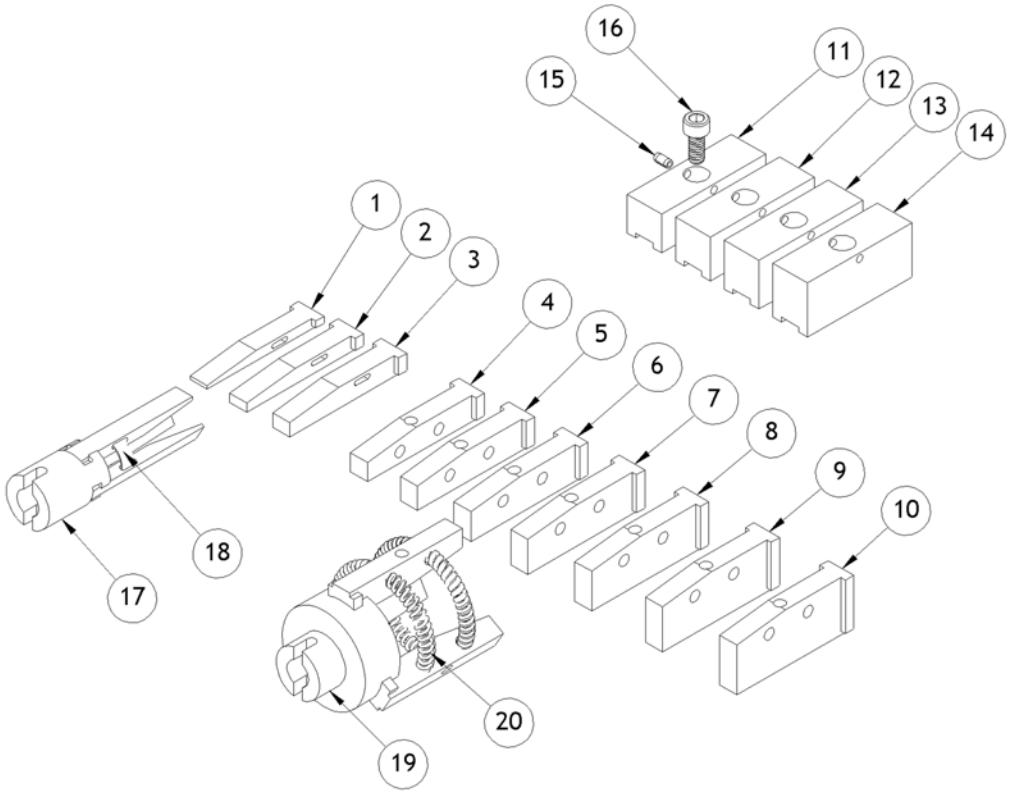
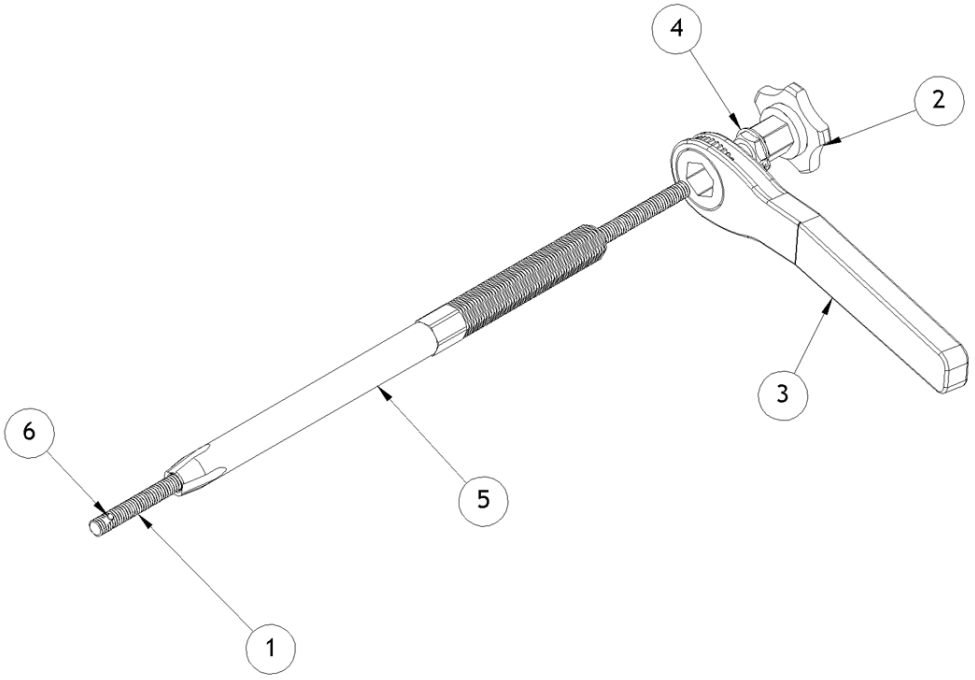


FIGURE A-4. COLLET COMPONENTS AND COLLETS



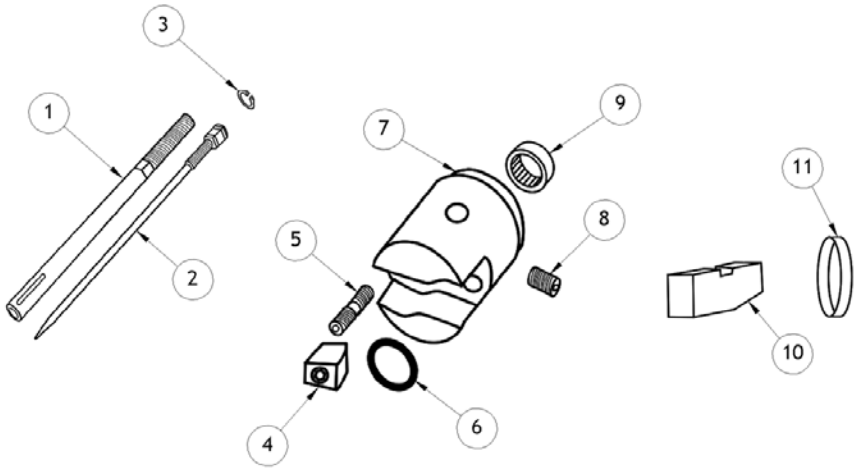
10	WEDGE SET B-10 (1.750-1.935")	100225	20	WEDGE EXTENSION SPRING	100246
9	WEDGE SET B-09 (1.625-1.810")	100224	19	WEDGE GUIDE (B-06 - B-14)	100214
8	WEDGE SET B-08 (1.500-1.685")	100223	18	WEDGE BAND SPRING	100245
7	WEDGE SET B-07 (1.375-1.560")	100222	17	WEDGE GUIDE (B-01 - B-05)	100213
6	WEDGE SET B-06 (1.250-1.435")	100221	16	8-32 X 5/16" SOCKET HEAD CAP SCREW	100270
5	WEDGE SET B-05 (1.125-1.310")	100220	15	3/32 x 3/16" SPRING PIN	100269
4	WEDGE SET B-04 (1.000-1.185")	100219	14	WEDGE EXTENSION B-14 (2.250-2.435')	100229
3	WEDGE SET B-03 (.875-1.060")	100218	13	WEDGE EXTENSION B-13 (2.125-2.310")	100228
2	WEDGE SET B-02 (.750-.935")	100217	12	WEDGE EXTENSION B-12 (2.000-2.185")	100227
1	WEDGE SET B-01 (.625-.810")	100216	11	WEDGE EXTENSION B-11 (1.875-2.060")	100226
ITEM NO.	**PART NAME**	**PART NUMBER**	**ITEM NO.**	**PART NAME**	**PART NUMBER**

FIGURE A-5. WEDGE SETS AND WEDGE EXTENSIONS



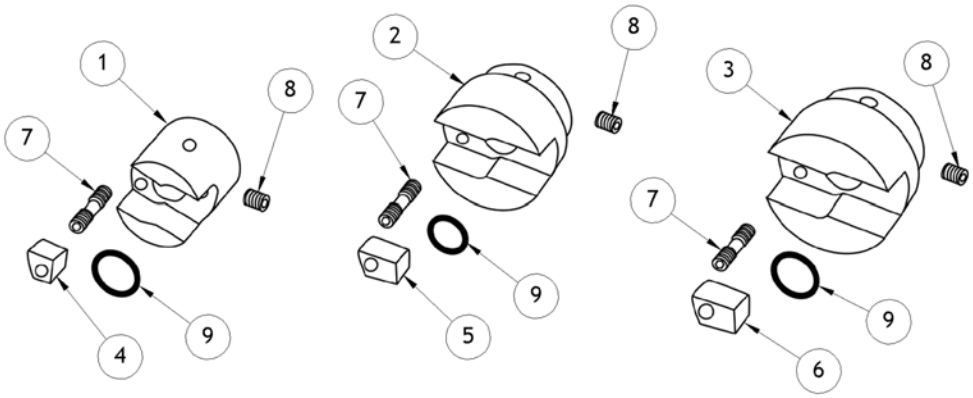
Item #	Qty	Part name	Part number	Item #	Qty	Part name	Part number
1	1	Wedge expansion rod	T007850	4	1	Retaining clip	921-1001
2	1	Speed wheel	100211	5	1	Wedge center shaft	100215
3	1	Locking wrench	23081119900	6	1	Spring pin	923-1001
				7	1	Locking nut	BF005219

FIGURE A-6. WEDGE SET COMPONENTS



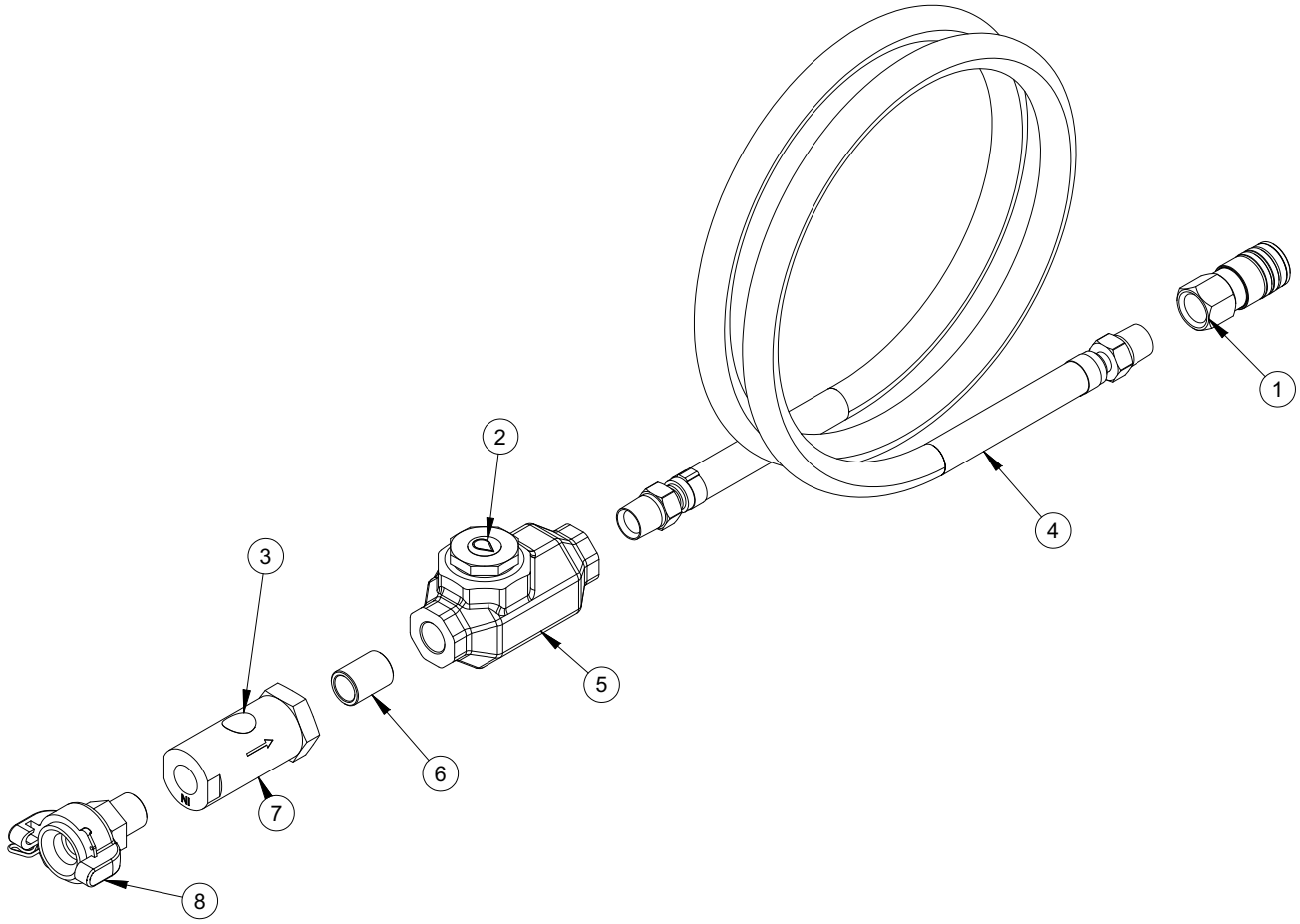
6	1	O-RING	TI007815	11	1	SPRING BAND	100245
5	2	DIFFERENTIAL SCREW	9150006	10B	3	BB WEDGE	TI007871
4	2	BLADE LOCK	TI007813	10A	3	AA WEDGE	TI007870
3	2	ROD WRENCH RETAINER RING	9211001	9	1	NEEDLE BEARING	9150007
2	1	EXPANSION ROD	TI007851	8	1	SET SCREW	1816
1	1	CENTER SHAFT	TI007850	7	1	1.6" TOOL HOLDER	9210216
ITEM NO.	QTY.	PART NAME	PART NUMBER	ITEM NO.	QTY.	PART NAME	PART NUMBER

FIGURE A-7. SMALL WEDGE SET COMPONENTS



5	2	BLADE LOCK 2.0"	TI007846				
4	2	BLADE LOCK 1.6"	TI007841	9	1	O-RING	9210114
3	1	TOOL HOLDER 2.5"	9211001	8	1	SET SCREW	1816
2	1	TOOL HOLDER 2.0"	TI007851	7	2	DIFFERENTAL SCREW	9170001
1	1	TOOL HOLDER 1.6"	TI007843	6	2	BLADE LOCK 2.5"	TI007848
ITEM NO.	QTY.	PART NAME	PART NUMBER	ITEM NO.	QTY.	PART NAME	PART NUMBER

FIGURE A-8. TOOL HOLDERS



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	19297	FTG QUICK COUPLER 3/8B 1/2 NPTF FEMALE AIR
2	1	95056	LABEL ROUND 3/4" OIL FLUID
3	1	95087	LABEL ROUND 3/4" FILTER
4	1	2152030	ASSY HOSE 7094 1/2 ID X 1/2 NPTM X 1/2 NPTM X 72"
5	1	HS50512	LUBRICATOR INLINE 1/2 NPTF X 1/2 NPTF
6	1	HS50517	FTG NIPPLE CLOSE 1/2 NPTM SCH 40
7	1	HS50518	SCREEN INLINE 40 MICRON 1/2 NPTF X 1/2 NPTF
8	1	HS50524	FTG COUPLER 1/2 NPTM X CHICAGO W/ SAFETY PIN & LANYARD

FIGURE A-9. AIR HOSE ASSEMBLY AND PARTS LIST (P/N HS50509)

Item #	Part name	Part number
1	5/32” HEX KEY, LONG ARM	05471107
1	1/8” Hex key, long arm	ODWR
2	Fold up key set 5/64-1/4”	100093
3	Retaining clip pliers	SNAP
4	(2) Set screw 5/16-18-5/16	
5	(2) Key	911-0005
6	(4) Snap ring	921-1001
7	Plastic case	TK

FIGURE A-10. TOOL KIT

4	FOAM INSERT, MAIN WITH CUTOUTS	100092
3	FOAM INSERT, BOTTOM	100090
2	FOAM INSERT, LID	100089
1	BG38 SHIPPING CONTAINER	100235
ITEM NO.	PART NAME	PART NUMBER

FIGURE A-11. SHIPPING CONTAINER

APPENDIX B SDS

Contact CLIMAX for the full list of Safety Data Sheets.

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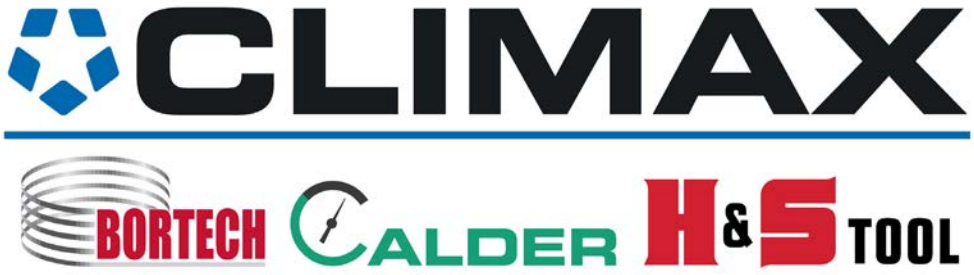
CLIMAX
BORTECH
CALDER
H&S TOOL