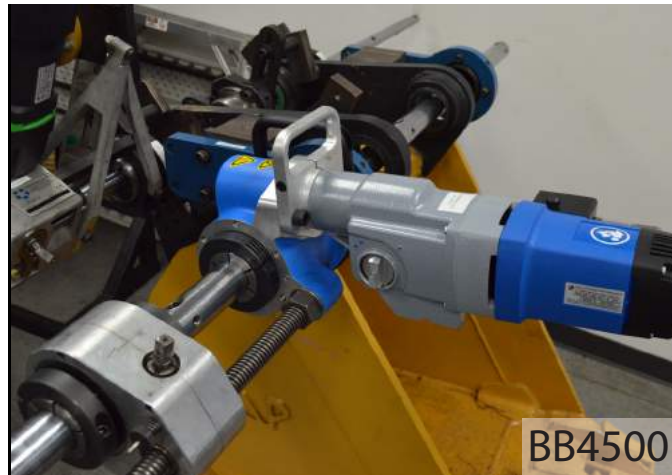




# BB4500- BB5000

## BORING MACHINE OPERATING MANUAL

ORIGINAL INSTRUCTIONS



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Portable Machining & Welding Systems



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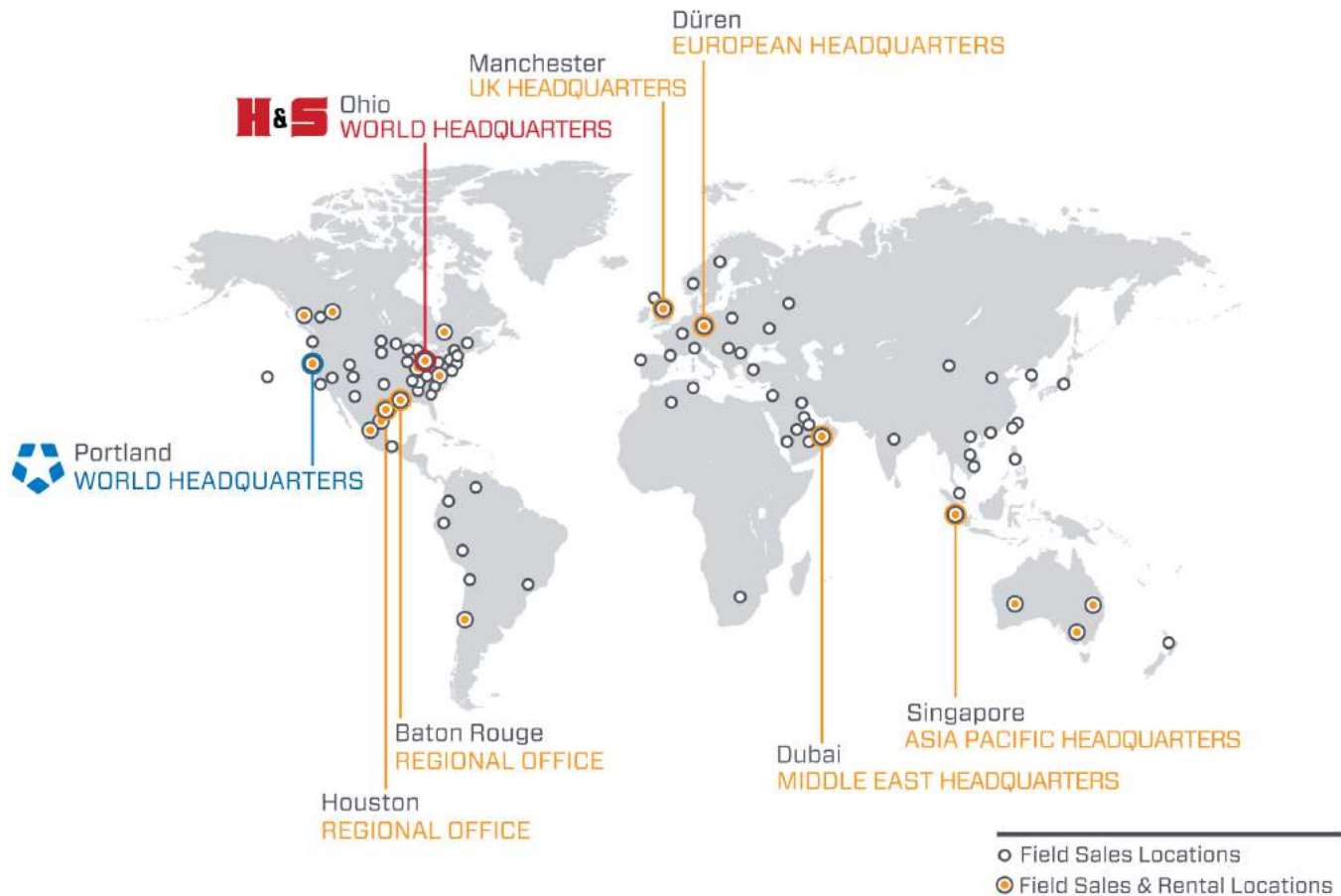
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**2006/42/EC Machine Directive**  
**2014/30/EU EMC Directive**

## Climax Portable Machining And Welding Systems

2712 E Second Street  
Newberg, OR 97132  
USA

### Portable Boring Bar Machine

|                   |                                         |
|-------------------|-----------------------------------------|
| BB4500 and BB5000 | Serial Number Range 160001877 - 2000000 |
|-------------------|-----------------------------------------|

Electric 120V, Electric 230V, Servo 230V,  
Servo 460V,  
Hydraulic Powered and Pneumatic Powered

EN ISO 3744:2010, ISO 4413:2010, BS EN ISO 4414:2010, EN ISO 11201:2010, EN ISO 12100:2010, EN 13128:2001+A2:2009, EN ISO 13732-1:2008, EN ISO 13849-1:2008, EN ISO 13857:2008, EN 60204-1:2006/AC:2010

Climax GmbH  
Am Langen Graben 8  
52353 Duren, Germany

I declare that as the Manufacturer, the above information in relation to the supply / manufacture of this product, is in conformity with the stated standards and other related documents following the provisions of the above Directives and their amendments.

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Position Held: VP of Engineering

Date: 9/11/2019



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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 BB4500-BB5000.

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 BB4500-BB5000 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<sup>1</sup>:



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



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

CLIMAX leads the way in promoting the safe use of portable machine tools and valve testers. 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 CLIMAX 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 CLIMAX 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** – CLIMAX 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.

**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<sup>1</sup> listed in Table 1-1.

TABLE 1-1. SOUND LEVELS

|                          | BB4500 motor | BB5000 motor |
|--------------------------|--------------|--------------|
| Sound power              | 90.0 dBA     | 94.0 dBA     |
| Operator sound pressure  | 91.4 dBA     | 91.4 dBA     |
| Bystander sound pressure | 89.6 dBA     | 89.6 dBA     |

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

**Machine mounting** – Do not operate the machine unless mounted to a workpiece in accordance with this manual. If mounting the machine in an overhead or vertical position, do not remove hoist rigging until the machine is mounted to the workpiece in accordance with this manual.

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.

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, 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 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**

| <b>Before set-up</b>     |                                                                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | I took note of all the warning labels on the machine.                                                                                                        |
| <input type="checkbox"/> | I removed or mitigated all identified risks (such as tripping, cutting, crushing, entanglement, shearing, or falling objects).                               |
| <input type="checkbox"/> | I considered the need for personnel safety guarding and installed any necessary guards.                                                                      |
| <input type="checkbox"/> | I read the machine assembly instructions (Section 3.3) and took inventory of all the items required but not supplied (Section 2.7).                          |
| <input type="checkbox"/> | I created a lift plan, including identifying the proper rigging, for each of the setup lifts required during the setup of the support structure and machine. |
| <input type="checkbox"/> | I located the fall paths involved in lifting and rigging operations. I have taken precautions to keep workers away from the identified fall path.            |
| <input type="checkbox"/> | I considered how this machine operates and identified the best placement for the controls, cabling, and the operator.                                        |
| <input type="checkbox"/> | I evaluated and mitigated any other potential risks specific to my work area.                                                                                |

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

| <b>After set-up</b>      |                                                                                                                                                                                                                               |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | 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. |
| <input type="checkbox"/> | I identified all possible pinch points, such as those caused by rotating parts, and informed the affected personnel.                                                                                                          |
| <input type="checkbox"/> | I planned for containment of any chips or swarf produced by the machine.                                                                                                                                                      |
| <input type="checkbox"/> | I followed the required maintenance checklist (Section 5.1) with the recommended lubricants (Section 5.2).                                                                                                                    |
| <input type="checkbox"/> | I checked that all affected personnel have the recommended personal protective equipment, as well as any site-required or regulatory equipment.                                                                               |
| <input type="checkbox"/> | I checked that all affected personnel understand and are clear of the danger zone.                                                                                                                                            |
| <input type="checkbox"/> | I evaluated and mitigated any other potential risks specific to my work area.                                                                                                                                                 |

## 1.7 LABELS

### 1.7.1 Label identification

The following warning and identification labels should be on your machine. If any are defaced or missing, contact CLIMAX immediately for replacements.

**TABLE 1-4. BB4500-BB5000 LABELS**

|                                                                                     |                                                          |                                                                                      |                                                                        |
|-------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------|
|    | P/N 29154<br>Serial number plate                         |    | P/N 59037<br>Warning label:<br>read the operating manual               |
|   | P/N 59044<br>Warning label:<br>read the operating manual |   | P/N 77568<br>ICE electrical symbol                                     |
|  | P/N 78619<br>Warning label:<br>hot surface               |  | P/N 78735<br>Warning label:<br>hand crush hazard                       |
|  | P/N 78741<br>Warning label:<br>foot crush hazard         |  | P/N 78742<br>Warning label:<br>entanglement hazard with rotating shaft |

TABLE 1-4. BB4500-BB5000 LABELS (CONTINUED)

|                                                                                   |                                                                                            |                                                                                    |                                                                                                       |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
|  | <p>P/N 78748</p> <p>Warning label:<br/>eye protection</p>                                  |  | <p>P/N 78824</p> <p>Warning label: do<br/>not expose the<br/>plug to water;<br/>electrical hazard</p> |
|  | <p>P/N 80207</p> <p>Warning label:<br/>entanglement<br/>danger with<br/>rotating shaft</p> |  | <p>P/N 80510</p> <p>Warning label:<br/>cutting hazard</p>                                             |

### 1.7.2 BB4500-BB5000 label locations

The following figures display the location of the labels on the RDU and AFU. For further identification of location placement, refer to the BB4500 exploded views in Appendix A on page 65 and the BB5000 exploded views in Appendix B on page 83.

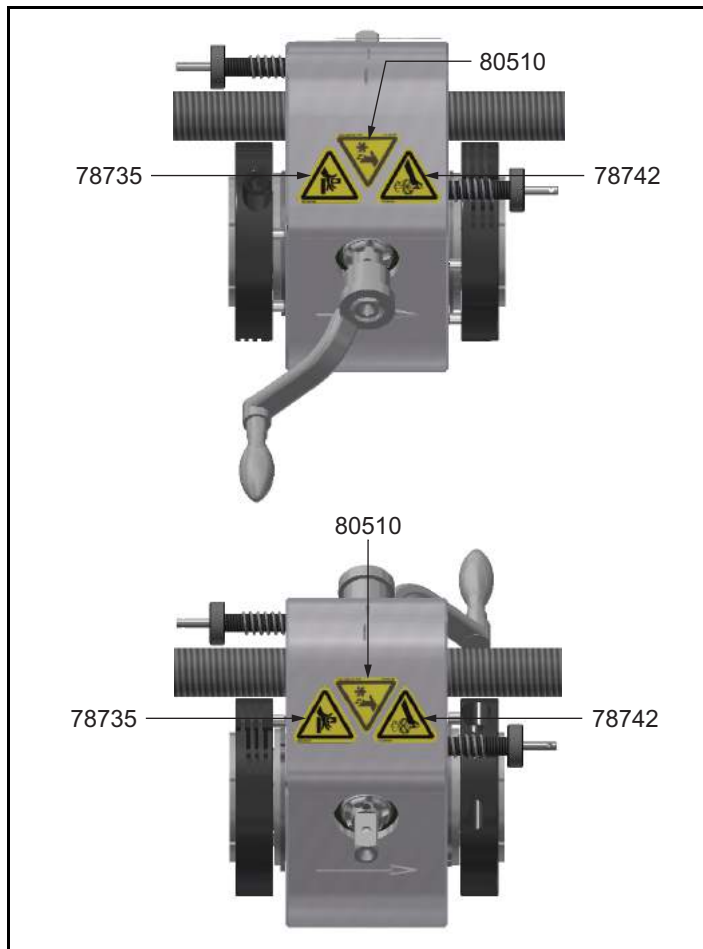


FIGURE 1-1. AFU LABEL LOCATIONS



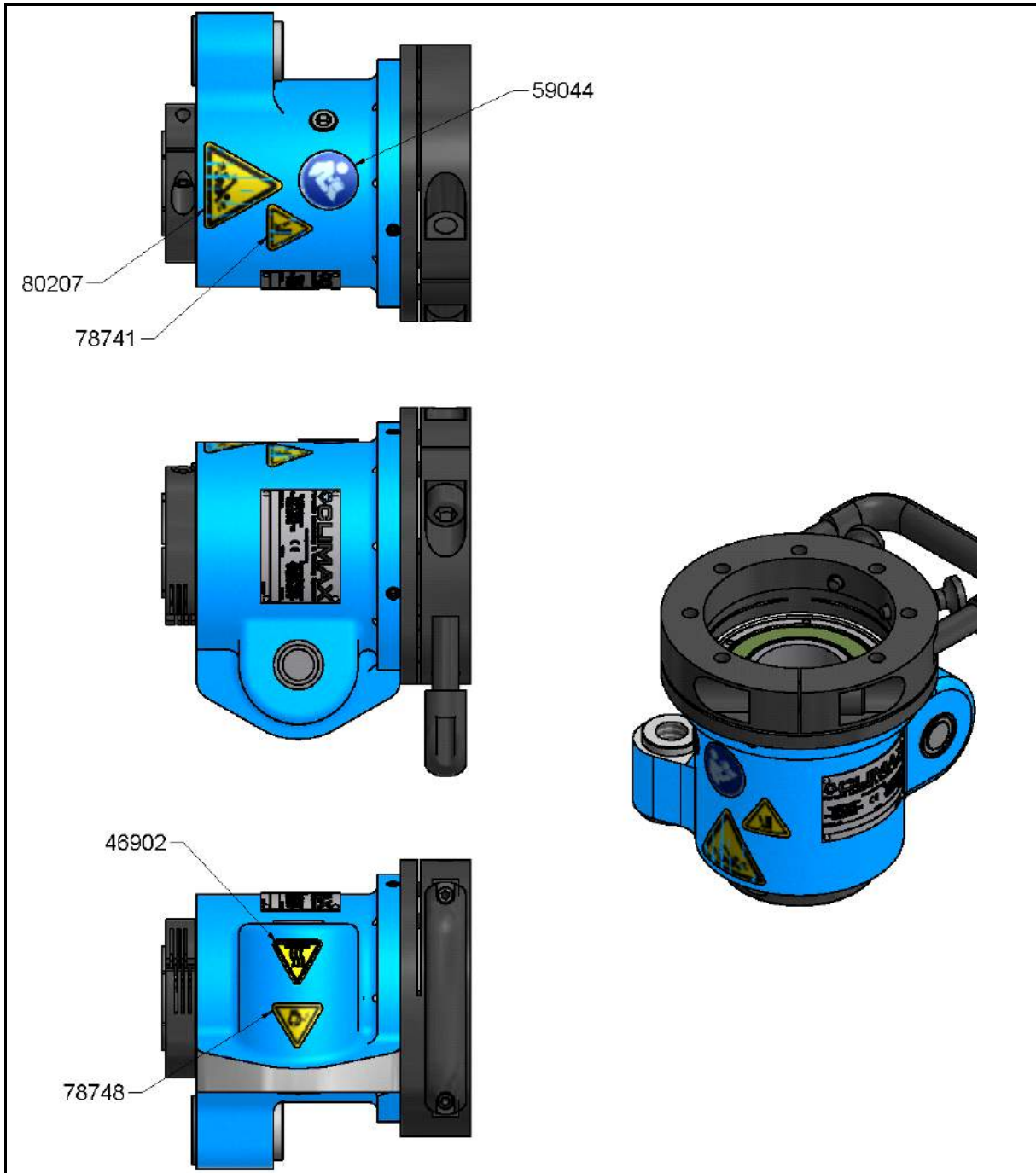


FIGURE 1-2. RDU LABEL LOCATIONS

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## 2 OVERVIEW

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| 2.1 BB4500 FEATURES                             | -12 |
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The BB4500 and BB5000 are similar machines. The BB4500 has a smaller range but the same major components.

The following sections describe the differences between the two machines, as well as the components they have in common.

Figure 2-1 shows the BB4500-BB5000 major components, defined in Table 2-1.

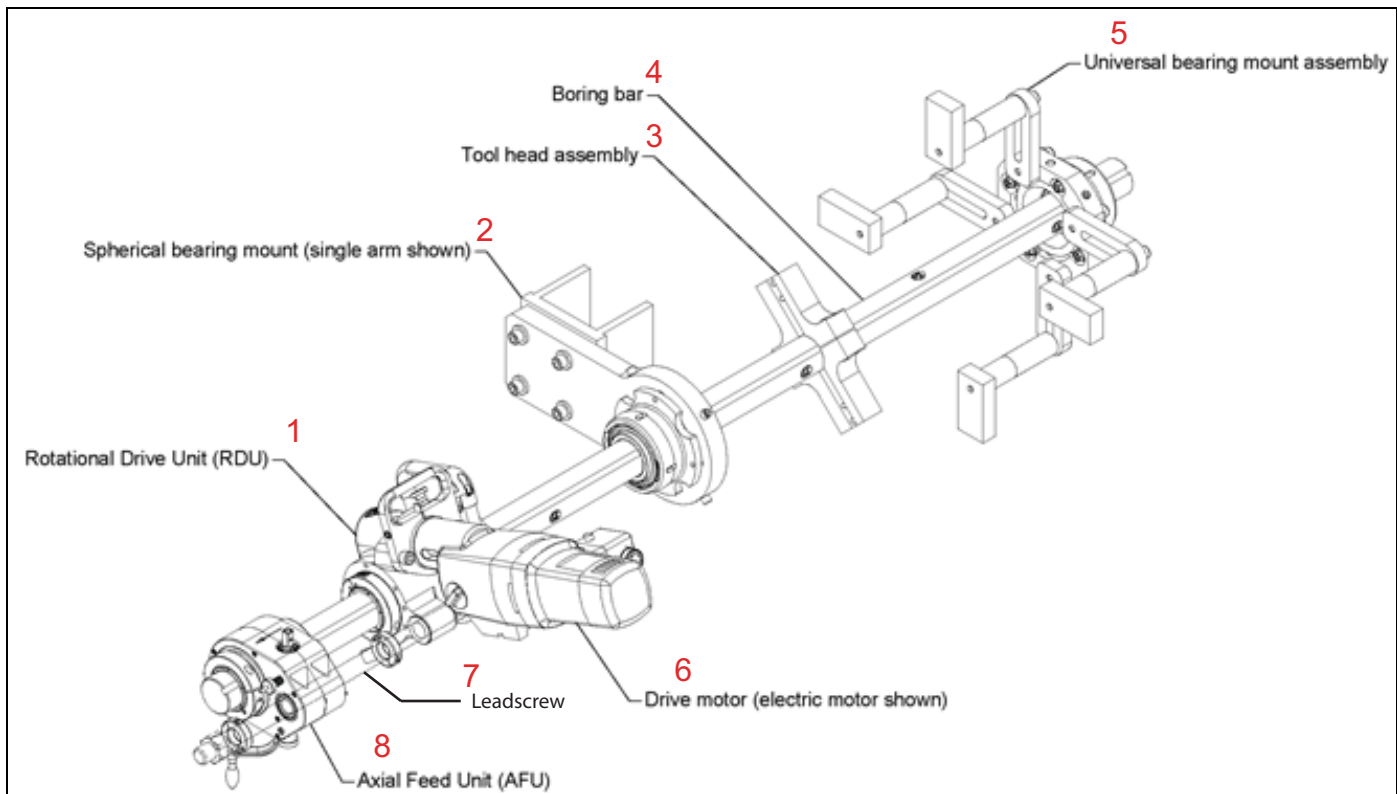


FIGURE 2-1. BB4500-BB5000 COMPONENTS WITH EIBENSTOCK MOTOR (BB5000 SHOWN)

TABLE 2-1. BB5000 COMPONENT IDENTIFICATION

| Number | Component                                     |
|--------|-----------------------------------------------|
| 1      | Rotational drive unit (RDU)                   |
| 2      | Spherical bearing mount (single arm shown)    |
| 3      | Tool head assembly                            |
| 4      | Boring bar                                    |
| 5      | Universal bearing mount assembly              |
| 6      | Drive motor (electric Eibenstock motor shown) |
| 7      | Leadscrew                                     |
| 8      | Axial feed unit (AFU)                         |

## 2.1 BB4500 FEATURES

The BB4500's modular design and diverse setup options offer innovative solutions to difficult on-site maintenance problems. The BB4500 is designed for on-site repair and servicing of heavy equipment at chemical plants, public utilities, mills, mines, power stations, fluid transmission, and distribution systems.

---

## 2.2 BB5000 FEATURES

The BB5000 can be used easily in small workspaces. CLIMAX's mounting components provide the flexibility to handle tough boring jobs. The BB5000's through-bar design allows you to mount the rotational drive and feed unit anywhere along the bar. This flexibility means the BB5000 will complete your job where others would not even fit.

This portable boring machine is a versatile tool. Its broad array of accessories enables the BB5000 for use in blind boring, line boring, drilling, facing, threading, valve repair, and trepanning. A special interface kit allows quick attachment and precise alignment of a welder to the BB5000's mounting fixtures. CLIMAX also offers the industry's broadest range of electric, hydraulic, and pneumatic power options for added flexibility.

The BB5000 is a highly configurable machine with many options and accessories, though this manual only covers the basic assembly components. If a specific machine application requires accessories, contact CLIMAX for more information.

This manual also describes the operation (Section 4 on page 51) and maintenance (Section 5 on page 57) of your BB5000. The machine is designed for on-site maintenance of heavy-duty industrial equipment. All parts meet CLIMAX's strict quality standards. For maximum safety and performance, read the entire manual before operating the machine.

---

## 2.3 COMPONENTS

The BB4500 and BB5000 have the following components.

### 2.3.1 Rotational drive unit

The RDU with sealed lubrication has worm gear reduction and may be mounted anywhere along the bar. A key within the collet drives the boring bar. The clamp ring holds the RDU to the spherical bearing mounting bracket. A clamp collar provides a snug, sliding fit between the RDU and the bar, or it may be clamped tight for facing operations.

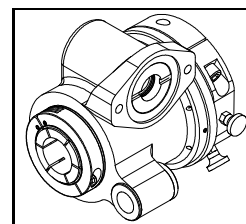


FIGURE 2-2. RDU

---

### 2.3.2 Axial feed unit

The AFU is held in place by two clamp collars and may be secured in any position along the bar. It travels with the bar and tool head axially along a fixed leadscrew.

Select the feed direction by shifting the feed shaft position (see Section 3.4.1 on page 40 for more information).

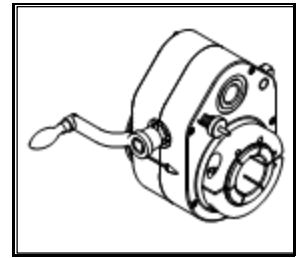


FIGURE 2-3. AFU

### 2.3.3 Leadscrew

The fixed leadscrew may be mounted either to the RDU or to the axial leadscrew-mounting block.

For the BB4500, standard leadscrews have 12" (305 mm) or 24" (610 mm) of travel.

For the BB5000, standard leadscrews have 12" (305 mm), 24" (610 mm), or 36" (914 mm) of travel.

Other lengths are available to suit your requirements. Contact CLIMAX for more information.

### 2.3.4 BB4500 tool heads

For the BB4500, the split-body tool heads may be clamped anywhere along the bar. The set of three tool heads bore 4–10" (102–254 mm) diameter. The tool heads hold tool bits that are 0.5" (12 mm) square.

Boring heads accept 0.5" (12 mm) square tool bits and machine sizes that are 4–10" (102–152 mm), 6–8" (152–203 mm), and 8–10" (203–254 mm) in diameter. They are compatible with either high-speed steel (HSS) or carbide-tipped tool bits.

For boring diameters less than 4" (102 mm), use the broached tooling holes in the bar. For boring diameters less than 2" (51 mm), use the small boring option.

Blank and pre-ground 0.5" (12 mm) tool bits are available for the slotted boring heads.

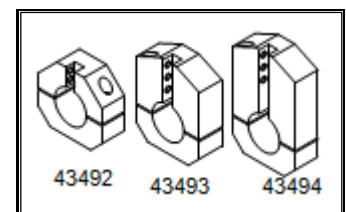


FIGURE 2-4. BB4500 TOOL HEADS

### 2.3.5 BB5000 tool heads

For the BB5000, the split-body tool heads may be clamped anywhere along the bar.

Two sets of tool heads are available:

- One set of five tool heads bore 4.5–12" (114–305 mm) diameter.
- The optional large boring head features a split-body mounting hub and two sets of tool arms that bore 12–24" (305–610 mm) diameter.

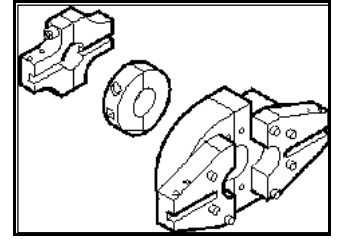


FIGURE 2-5. BB5000 TOOL HEADS

Tool bits are 1/2" (12 mm) square. Other tool head options are discussed in Section 3.3.2 on page 35.

### 2.3.6 BB4500 boring bar

Standard BB4500 bars are 1.75" (44 mm) in diameter and are available in lengths from 4–12 ft (1.2–3.66 m) in 24" (610 mm) increments. Contact CLIMAX for bars of other lengths and diameters.

All bars have 0.5" (12 mm) square tool bit mounting holes spaced at 10" or 6" (254 or 152 mm) intervals. Contact CLIMAX for custom hole spacing patterns.

Do the following to determine the bar length required (see Figure 2-14 on page 26):

1. Determine the workpiece overall dimension + stroke + 27" (686 mm).
2. Round up to the next 24" (610 mm) increment.

### 2.3.7 BB5000 boring bar

Standard BB5000 bars are 2.25" (57 mm) in diameter and are available in lengths from 4–12 ft (1.2–3.66 m) in 24" (610 mm) increments. Contact CLIMAX for bars of other lengths and diameters.

All bars have 0.5" (12 mm) square tool bit mounting holes spaced at 10" or 6" (254 or 152 mm) intervals. CLIMAX offers a drill jig with a tool sleeve kit for cutting intermediate tool bit holes for special applications. Contact CLIMAX for custom hole spacing patterns.

Do the following to determine the bar length required (see Figure 2-14 on page 26):

1. Determine the workpiece overall dimension + stroke + 27" (686 mm).
2. Round up to the next 24" (610 mm) increment.

---

### 2.3.8 Spherical bearing mounts

The spherical bearing mount support brackets hold the bar and machine in place during operation. Each bracket includes a spherical self-aligning bearing for quick, accurate setup. Spacer plates may be tack welded or clamped to the workpiece to secure the brackets in place.

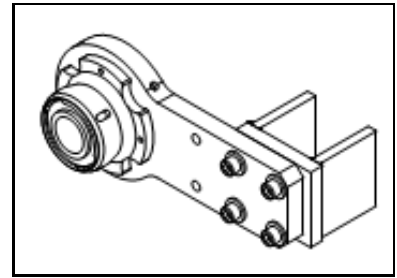


FIGURE 2-6. SINGLE-ARM SPHERICAL BEARING MOUNT

These brackets are available in single-arm, double-arm, and universal styles. The universal mount may also be turned into an inside diameter (ID) mount with the purchase of an optional set of jacking bolts.

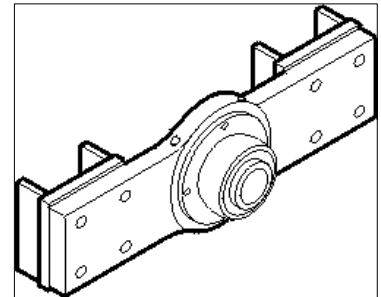


FIGURE 2-7. DOUBLE-ARM SPHERICAL BEARING MOUNT

Double-arm spherical bearing mounting brackets are better for those applications requiring extra support, such as when boring holes exceed 8" (203 mm) in diameter.

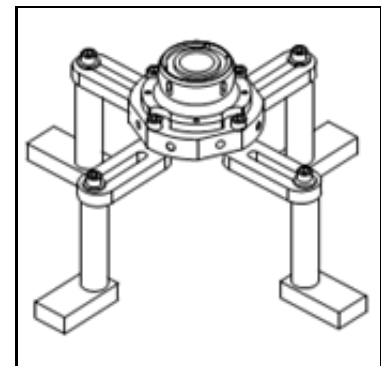


FIGURE 2-8. UNIVERSAL SPHERICAL BEARING MOUNT



## 2.4 CONTROLS

Table 2-2 shows the power options available for the BB4500-BB5000. Please note that only the BB5000 has the servo drive option.

**TABLE 2-2. POWER OPTIONS**

| Power type                 | RPM <sup>1</sup> range                                                                                   | Power            | Reference                |
|----------------------------|----------------------------------------------------------------------------------------------------------|------------------|--------------------------|
| <b>Hydraulic</b>           | 10 hp HPU <sup>2</sup> : 0 – 246 RPM at 60 Hz mains power<br>10 hp HPU: 0 – 200 RPM at 50 Hz mains power | 10 hp (7.4 kW)   | Section 2.4.1 on page 18 |
| <b>Electric</b>            | 8 – 160 RPM                                                                                              | 3.35 hp (2.5 kW) | Section 2.4.3 on page 21 |
| <b>Pneumatic</b>           | 0 – 120 RPM                                                                                              | 3.0 hp (2.2 kW)  | Section 2.4.4 on page 24 |
| <b>Servo (BB5000 only)</b> | 3 – 230 RPM                                                                                              | 4.7 hp (3.5 kW)  | Section 2.4.2 on page 19 |

1. Revolutions per minute (RPM)

2. Hydraulic power unit (HPU)

For more information about using the BB4500-BB5000 controls, see Section 3.5 on page 43.

The RDU used with hydraulic, pneumatic, and electric drives has a 4:1 gear reduction. The servo drive uses 12:1 gear reduction.

**TABLE 2-3. TEST DATA**

|                         |                                  |
|-------------------------|----------------------------------|
| <b>Material:</b>        | A-36 (mild steel)                |
| <b>Bore diameter:</b>   | 23" (584.2 mm)                   |
| <b>Tool bit:</b>        | High speed steel (HSS)           |
| <b>Bearing spacing:</b> | 22" (558.8 mm)                   |
| <b>Bar speed:</b>       | 30 – 40 RPM                      |
| <b>Depth of cut:</b>    | 100" (2,540 mm)                  |
| <b>Feed rate:</b>       | 0.003" (0.076 mm) per revolution |
| <b>Length of cut:</b>   | 2" (50.8 mm)                     |

**TABLE 2-4. SETUP CONES**

|                 | Range                  |
|-----------------|------------------------|
| <b>Standard</b> | 2.75–12" (70–305 mm)   |
| <b>Optional</b> | 1.375–5" (34.9–127 mm) |

## 2.4.1 Hydraulic power unit and hydraulic motors

### **CAUTION**

Operating the hydraulic power unit (HPU) for extended periods of time without connecting the hydraulic motor will overheat the system and may damage the pump.

The high-torque, low-speed hydraulic motor mounts directly to the RDU. To reverse the bar rotation direction, switch the hydraulic hoses at the motor or at the HPU.

Table 2-5 on page 18 shows the available HPUs and their specifications.

**TABLE 2-5. AVAILABLE HPU SPECIFICATIONS**

| 4 Function, 208 - 230 Volts |        |                     |              |       |
|-----------------------------|--------|---------------------|--------------|-------|
| Cordset/hose length         |        | Quick Connect Style |              | P/N   |
| Feet                        | Meters | 60 Series QD        | ISO 16028 CE |       |
| 20                          | 6      | ✓                   |              | 55285 |
| 50                          | 15     | ✓                   |              | 51517 |
| 100                         | 30     | ✓                   |              | 94009 |
| 20                          | 6      |                     | ✓            | 93894 |
| 50                          | 15     |                     | ✓            | 94010 |
| 100                         | 30     |                     | ✓            | 94011 |
| 4 Function, 380 - 415 Volts |        |                     |              |       |
| Cordset/hose length         |        | Quick Connect Style |              | P/N   |
| Feet                        | Meters | 60 Series QD        | ISO 16028 CE |       |
| 20                          | 6      | ✓                   |              | 55279 |
| 50                          | 15     | ✓                   |              | 55856 |
| 100                         | 30     | ✓                   |              | 80909 |
| 20                          | 6      |                     | ✓            | 93927 |
| 50                          | 15     |                     | ✓            | 94012 |
| 100                         | 30     |                     | ✓            | 94013 |
| 4 Function, 575 Volts       |        |                     |              |       |
| Cordset/hose length         |        | Quick Connect Style |              | P/N   |
| Feet                        | Meters | 60 Series QD        | ISO 16028 CE |       |
| 20                          | 6      | ✓                   |              | 51133 |
| 50                          | 15     | ✓                   |              | 51138 |
| 100                         | 30     | ✓                   |              | 81396 |
| 20                          | 6      |                     | ✓            | 94018 |
| 50                          | 15     |                     | ✓            | 94019 |
| 100                         | 30     |                     | ✓            | 94020 |
| 4 Function, 460 Volts       |        |                     |              |       |
| Cordset/hose length         |        | Quick Connect Style |              | P/N   |
| Feet                        | Meters | 60 Series QD        | ISO 16028 CE |       |
| 20                          | 6      | ✓                   |              | 51130 |
| 50                          | 15     | ✓                   |              | 55645 |
| 100                         | 30     | ✓                   |              | 56658 |
| 20                          | 6      |                     | ✓            | 94015 |
| 50                          | 15     |                     | ✓            | 94016 |
| 100                         | 30     |                     | ✓            | 94017 |

If using an HPU not supplied by CLIMAX, the hydraulic requirement is 10 gpm at 2,000 psi (37.85 lpm at 138 bar).

Hydraulic motors with different displacement ratings are available. Please note the following:

- If the HPU runs on 50 Hz, it produces a maximum rate of 8.3 gpm.
- If the HPU runs on 60 Hz, it produces a maximum rate of 10 gpm.

Refer to the correct “Maximum bar RPM” column in Table 2-6 for hydraulic motor performance.

**TABLE 2-6. HYDRAULIC MOTOR SPECIFICATIONS**

| Motor capacity                                  | Maximum bar RPM                    |                                  | Torque at bar           | Part number for motors with 60 series QD fittings | Part number for motors with ISO 16028 QD fittings |
|-------------------------------------------------|------------------------------------|----------------------------------|-------------------------|---------------------------------------------------|---------------------------------------------------|
|                                                 | 8.36 gpm (31.5 L/min) <sup>1</sup> | 10 gpm (37.9 L/min) <sup>2</sup> |                         |                                                   |                                                   |
| 2.2 inch <sup>3</sup> (36 cm <sup>3</sup> )     | 204                                | 246                              | 92 ft-lbs (124.7 Nm)    | 39837                                             | 65384                                             |
| 3.6 inch <sup>3</sup> (59 cm <sup>3</sup> )     | 124                                | 150                              | 159 ft-lbs (215.6 Nm)   | 39843                                             | 63425                                             |
| 5.7 inch <sup>3</sup> (93.4 cm <sup>3</sup> )   | 76                                 | 92                               | 270 ft-lbs (367 Nm)     | 39844                                             | 63429                                             |
| 7.3 inch <sup>3</sup> (119.6 cm <sup>3</sup> )  | 60                                 | 73                               | 342 ft-lbs (463.7 Nm)   | 39845                                             | 69434                                             |
| 8.9 inch <sup>3</sup> (145.8 cm <sup>3</sup> )  | 49                                 | 60                               | 417 ft-lbs (565.4 Nm)   | 39846                                             | 69435                                             |
| 11.3 inch <sup>3</sup> (185.2 cm <sup>3</sup> ) | 40                                 | 49                               | 478 ft-lbs (648.1 Nm)   | 43451                                             | 69436                                             |
| 14.1 inch <sup>3</sup> (231.1 cm <sup>3</sup> ) | 31                                 | 38                               | 652 ft-lbs (884.0 Nm)   | 39847                                             | 39847                                             |
| 17.9 inch <sup>3</sup> (293.3 cm <sup>3</sup> ) | 24                                 | 30                               | 764 ft-lbs (1,035.8 Nm) | 43452                                             | 69439                                             |

1. With 50 Hz mains power.

2. With 60 Hz mains power.

## 2.4.2 BB5000 servo motors

### NOTICE

Never disconnect any cable from this machine without first turning off the mains disconnect switch. Interrupting the connection between the servo amplifier and the servo motor while they are energized may damage the servo amplifier, even if the motor is stopped. Failure to comply with this warning will void the warranty on the control system.

The 4.7 hp servo motor with a 12:1 worm gear reduction RDU provides quiet, reversible and extreme torque for operating the BB5000.

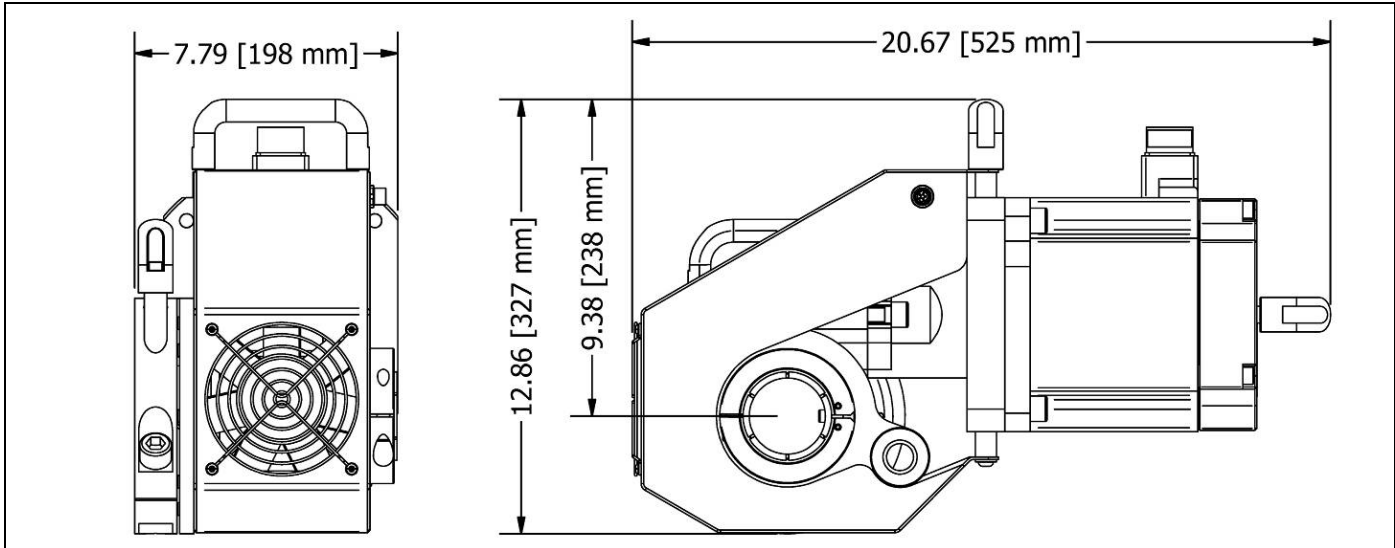


FIGURE 2-9. BB5000 SERVO DRIVE DIMENSIONS

### **WARNING**

Handle cables carefully. Do not pull on them, step on them, or allow them to be kinked. Pelikan cases are water resistant, not water-proof.

Do not turn on the power unless all cables are plugged in. Do not unplug cables unless disconnected from mains power.

Servo drives for the BB5000 are available in 230V (16 amps) or 460V (8.5 amps).

TABLE 2-7. BB5000 SERVO MOTOR SPECIFICATION

|                                                 |                                                  |
|-------------------------------------------------|--------------------------------------------------|
| <b>Input power for the 230V system:</b>         | 200V–240V, 50/60 Hz dual-rated, 16 amp, 3-phase  |
| <b>Input power for the 460V system:</b>         | 380V–480V, 50/60 Hz dual-rated, 8.5 amp, 3-phase |
| <b>Bar</b>                                      |                                                  |
| <b>Bar speed:</b>                               | 3–230 RPM                                        |
| <b>Bar rated torque (continuously running):</b> | 3–167 RPM: 147.9 ft-lbs (200.4 Nm)               |
| <b>Bar maximum torque:</b>                      | 3–230 RPM: 443.7 ft-lbs (600.4 Nm)               |
| <b>Rotation:</b>                                | Variable speed and reversible                    |
| <b>Motor</b>                                    |                                                  |
| <b>Manufacturer:</b>                            | Mitsubishi                                       |
| <b>Speed rated continuous:</b>                  | 2,000 RPM                                        |

TABLE 2-7. BB5000 SERVO MOTOR SPECIFICATION (CONTINUED)

|                                         |                       |
|-----------------------------------------|-----------------------|
| <b>Speed maximum:</b>                   | 3,000 RPM             |
| <b>Speed permissible instantaneous:</b> | 3,450 RPM             |
| <b>Nominal rated full load hp:</b>      | 4.7 hp (3.5 kW)       |
| <b>Motor torque rated:</b>              | 12.3 ft-lbs (16.7 Nm) |
| <b>Motor torque maximum:</b>            | 37.0 ft-lbs (50.1 Nm) |

### 2.4.3 Electric motor

Two electric versions of the BB5000 are available, as described in Table 2-9 on page 22. The motor has an integrated rotation reverse switch, while the pendant controller has an off/off switch, emergency stop, and a speed control knob.

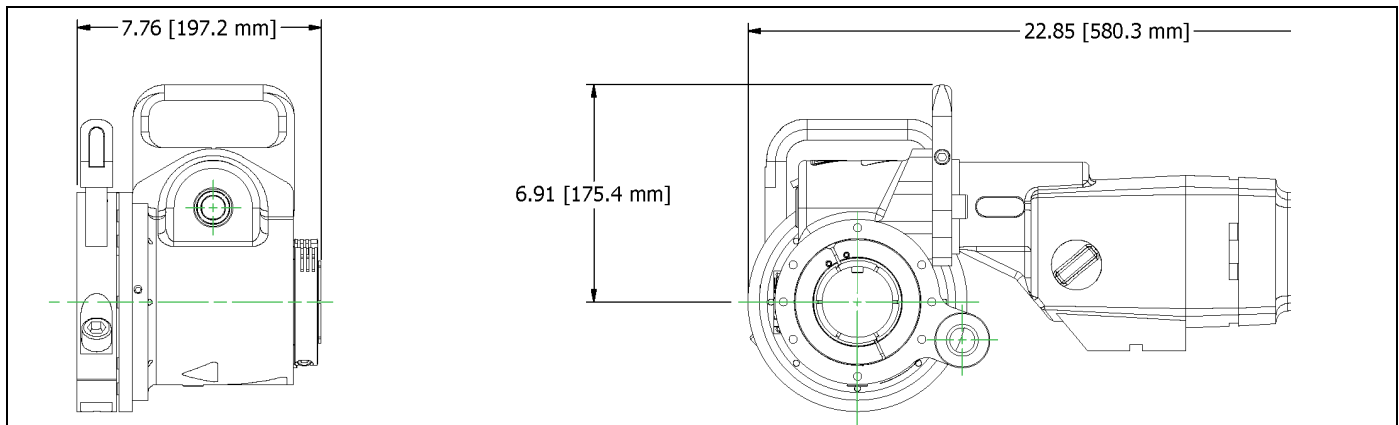


FIGURE 2-10. RDU AND EIBENSTOCK MOTOR DIMENSIONS

## NOTICE

The second-generation Eibenstock motor is incompatible with the third-generation RDU. The second-generation Eibenstock motor requires the fourth-generation RDU.

## NOTICE

Table 2-8 shows the four mains power plugs for the control box that CLIMAX offers. If the plug needed is not included in Table 2-8, the end user must cut off the factory-installed plug and install their own.

TABLE 2-8. CONTROL BOX

|                         |                   |
|-------------------------|-------------------|
| <b>120V Controller:</b> | L5-30P twist-lock |
| <b>120V Controller:</b> | ISO 309/CEE17     |
| <b>230V Controller:</b> | CEE 7/7 Schuko    |
| <b>230V Controller:</b> | 6L-15P twist-lock |

**TABLE 2-9. POWER RATING**

|                    |                                     |
|--------------------|-------------------------------------|
| <b>120V motor:</b> | 3.35 hp (2.5 kW)<br>20 Amps 60 Hz   |
| <b>230V motor:</b> | 3.35 hp (2.5 kW)<br>10.5 Amps 60 Hz |

Both motors have a four-speed gearbox for maximum versatility. Table 2-10 specifies the operating range for each gear.

**TABLE 2-10. SPEED RANGE AND TORQUE PER GEAR**

| Gear | Knobs     | RPM range      | Rated bar speed | Bar torque         |
|------|-----------|----------------|-----------------|--------------------|
| 1    | ● ●       | 8.0–23.0 RPM   | 20 RPM          | 470 ft-lb (637 Nm) |
| 2    | ● ● ●     | 12.5–35.5 RPM  | 30 RPM          | 300 ft-lb (407 Nm) |
| 3    | ● ● ● ●   | 35.5–101.0 RPM | 90 RPM          | 105 ft-lb (142 Nm) |
| 4    | ● ● ● ● ● | 56.5–160.0 RPM | 142.5 RPM       | 65 ft-lb (88 Nm)   |

 **CAUTION**

Before shifting gears, remove the cutting load from the motor and stop the motor rotation. Shifting gears while the machine is under load could damage the motor and gearbox components.

CLIMAX's portable machine tools require a three-wire extension cord. Extension cords of inadequate wire size may cause a significant drop in mains voltage with a consequent loss of power.

As the distance from the supply outlet increases, heavier gauge extension cords are required (see Table 2-11).

**TABLE 2-11. RECOMMENDED WIRE GAUGE FOR EXTENSION CORDS**

|                | Cord length        |                     |                     |                      |                      |                    |
|----------------|--------------------|---------------------|---------------------|----------------------|----------------------|--------------------|
|                | 25 feet<br>(7.6 m) | 50 feet<br>(15.2 m) | 75 feet<br>(22.9 m) | 100 feet<br>(30.5 m) | 150 feet<br>(45.7 m) | 200 feet<br>(61 m) |
| Nameplate amps | Minimum wire gauge |                     |                     |                      |                      |                    |
| 0–5.0          | 16                 | 16                  | 16                  | 14                   | 12                   | 12                 |
| 5.1–8.0        | 16                 | 16                  | 14                  | 12                   | 10                   |                    |
| 8.1–12.0       | 14                 | 14                  | 12                  | 10                   |                      |                    |
| 12.1–15.0      | 12                 | 12                  | 10                  | 10                   |                      |                    |
| 15.1–20.0      | 10                 | 10                  | 10                  |                      |                      |                    |

Table 2-12 and Table 2-13 list the service parts for both motors.

**TABLE 2-12. 120V SERVICE PARTS**

| <b>Part number</b> | <b>Description</b>  | <b>Quantity</b> |
|--------------------|---------------------|-----------------|
| 83595              | Rotor complete      | 1               |
| 82698              | Carbon brush        | 2               |
| 83593              | PCB / circuit board | 1               |
| 83594              | Stator complete     | 1               |

**TABLE 2-13. 230V SERVICE PARTS**

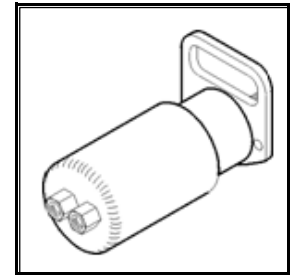
| <b>Part number</b> | <b>Description</b>                 | <b>Quantity</b> |
|--------------------|------------------------------------|-----------------|
| 90776              | Rotor Complete                     | 1               |
| 90778              | Brush Holder                       | 2               |
| 85088              | Carbon Brush                       | 2               |
| 83591              | Anti Parasite Condenser            | 1               |
| 85089              | PCB / Circuit Board                | 1               |
| 82699              | Cap                                | 1               |
| 90779              | Stator Complete                    | 1               |
| 83601              | Grooved Ball Bearing 6201 LUZ      | 1               |
| 90780              | Locking Ring 32x1,2                | 1               |
| 83602              | Shaft Seal Ring 15x21x3 KEIV       | 1               |
| 90238              | Work Spindle                       | 1               |
| 90781              | Shaft Seal Ring 30x42x7            | 1               |
| 90782              | Grooved Ball Bearing 6005 2RS      | 1               |
| 90783              | O-ring 106x2                       | 1               |
| 85494              | Switch Button Long                 | 1               |
| 85493              | Switch Button Short                | 1               |
| 90784              | Connector Socket                   | 1               |
| 90785              | Insert                             | 1               |
| 90786              | Screw 3x10                         | 4               |
| 87279              | Reversing switch                   | 1               |
| 90787              | Connector Pin 2,5 mm <sup>2</sup>  | 3               |
| 90788              | Connector Pin 0.75 mm <sup>2</sup> | 2               |

## 2.4.4 Air motor

The 3 hp (2.24 kW) air motor is reversible and operates under the specifications listed in Table 2-14.

**TABLE 2-14. CONTROL BOX**

|                               |                                                   |
|-------------------------------|---------------------------------------------------|
| <b>Air pressure required:</b> | 90 psi (6.2 bar)                                  |
| <b>Air flow required:</b>     | 95 ft <sup>3</sup> /min (2.7 m <sup>3</sup> /min) |



**FIGURE 2-11. AIR MOTOR**

The available air motor assemblies produce boring bar speeds and torques listed in Table 2-15.

**TABLE 2-15. BAR RPM AND TORQUE AT MAXIMUM HP**

| <b>Air motor part number</b> | <b>Bar RPM</b> | <b>Torque</b>      |
|------------------------------|----------------|--------------------|
| 28614                        | 120 RPM        | 115 ft-lb (156 Nm) |
| 28697                        | 57 RPM         | 234 ft-lb (318 Nm) |

The assembly includes the RDU mounting flange and associated hardware. For a complete air-powered system, order an air motor assembly and connection package. The air connection package contains an air filter and lubricator, and hoses with quick disconnect fittings.

### **CAUTION**

To maintain the air motor and avoid invalidating your warranty, always route incoming air through the pneumatic conditioning unit (PCU).

## 2.4.5 Pneumatic conditioning unit

The PCU (shown in Figure 2-12 on page 25) provides clean dry air and lubrication to the air motor. Install the PCU in the air supply circuit immediately before the BB4500 or BB5000.

### **WARNING**

Always stop the machine and lock out/tag out the PCU before making adjustments to controls or machine components. Failure to follow this safety precaution may result in severe injury.



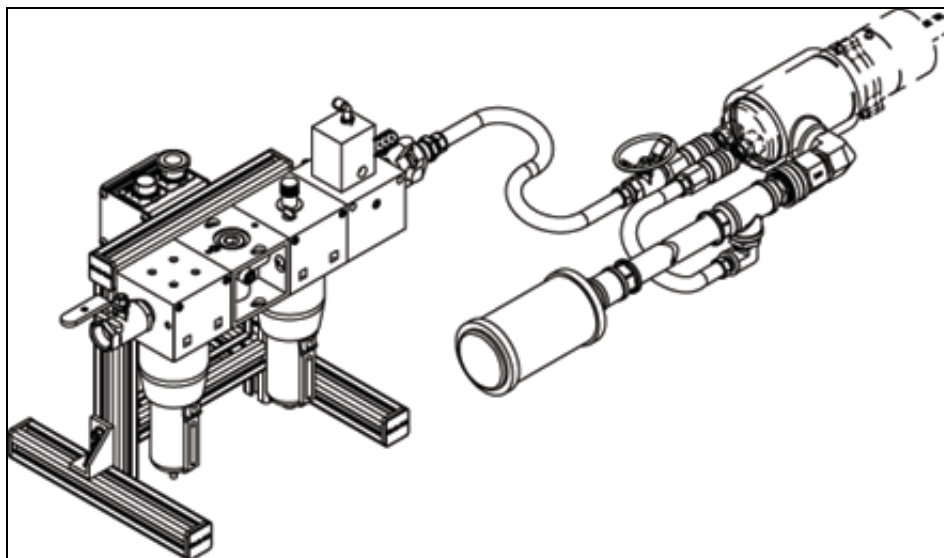


FIGURE 2-12. PNEUMATIC CONDITIONING UNIT

### ***Emergency shutdown***

To stop machine operation immediately, press the emergency stop button on the PCU.

Before restarting the BB4500-BB5000, check the following:

1. Close the speed adjustment valve.
2. Pull the emergency stop button up.
3. Press the START button (repeat step 1 if necessary).

## **2.5 DIMENSIONS**

Table 2-16 shows the BB4500 and BB5000 dimensions.

TABLE 2-16. DIMENSIONS

| Component            | Width x diameter x height                    |
|----------------------|----------------------------------------------|
| Machine              | 52.5" x 27" x 16.5" (1,334 x 686 x 419 mm)   |
| 72" (1,828.8 mm) bar | 74.5" x 6.5" x 7" (1,892 x 165 x 178 mm)     |
| HPU                  | 49.5" x 30.5" x 41" (1,257 x 775 x 1,041 mm) |

The following figures show the BB4500-BB5000 machine and operating dimensions.

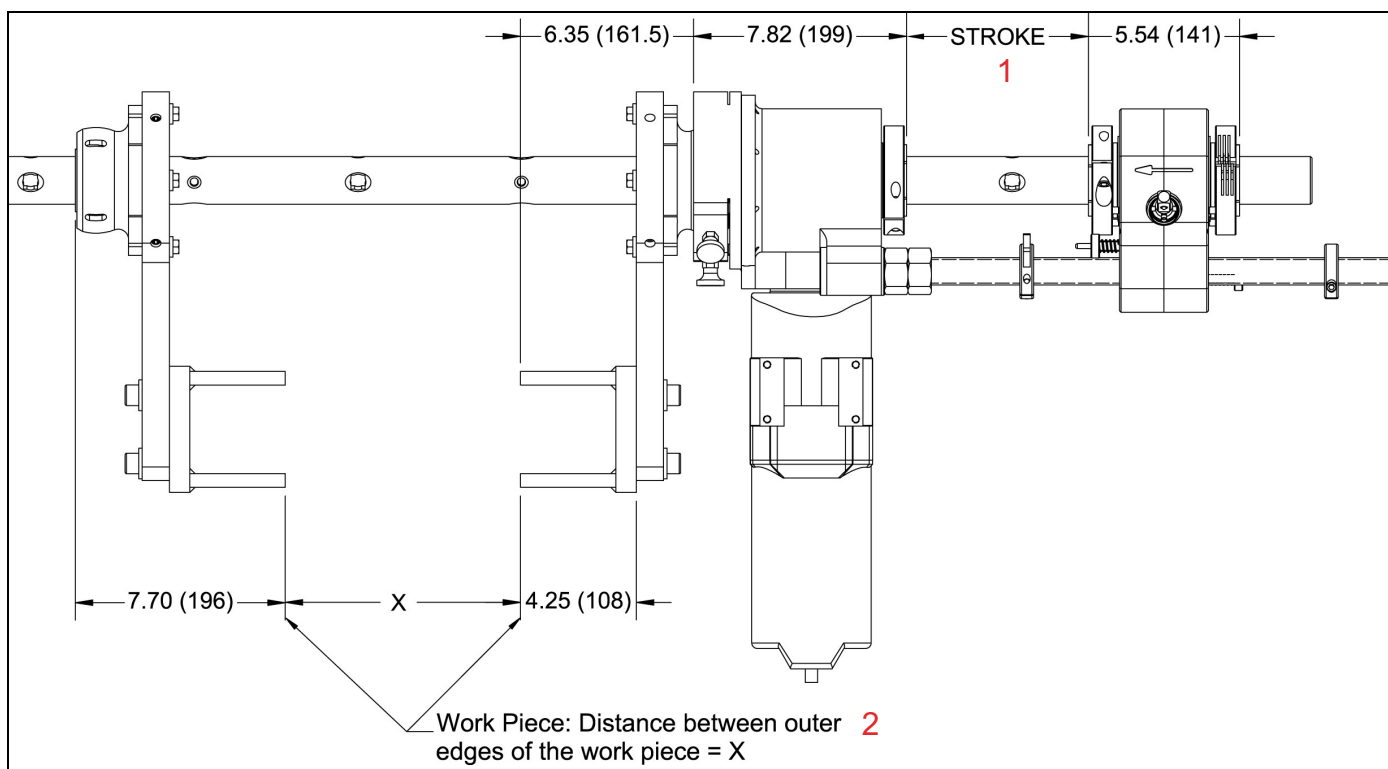


FIGURE 2-13. BB4500 DIMENSIONS

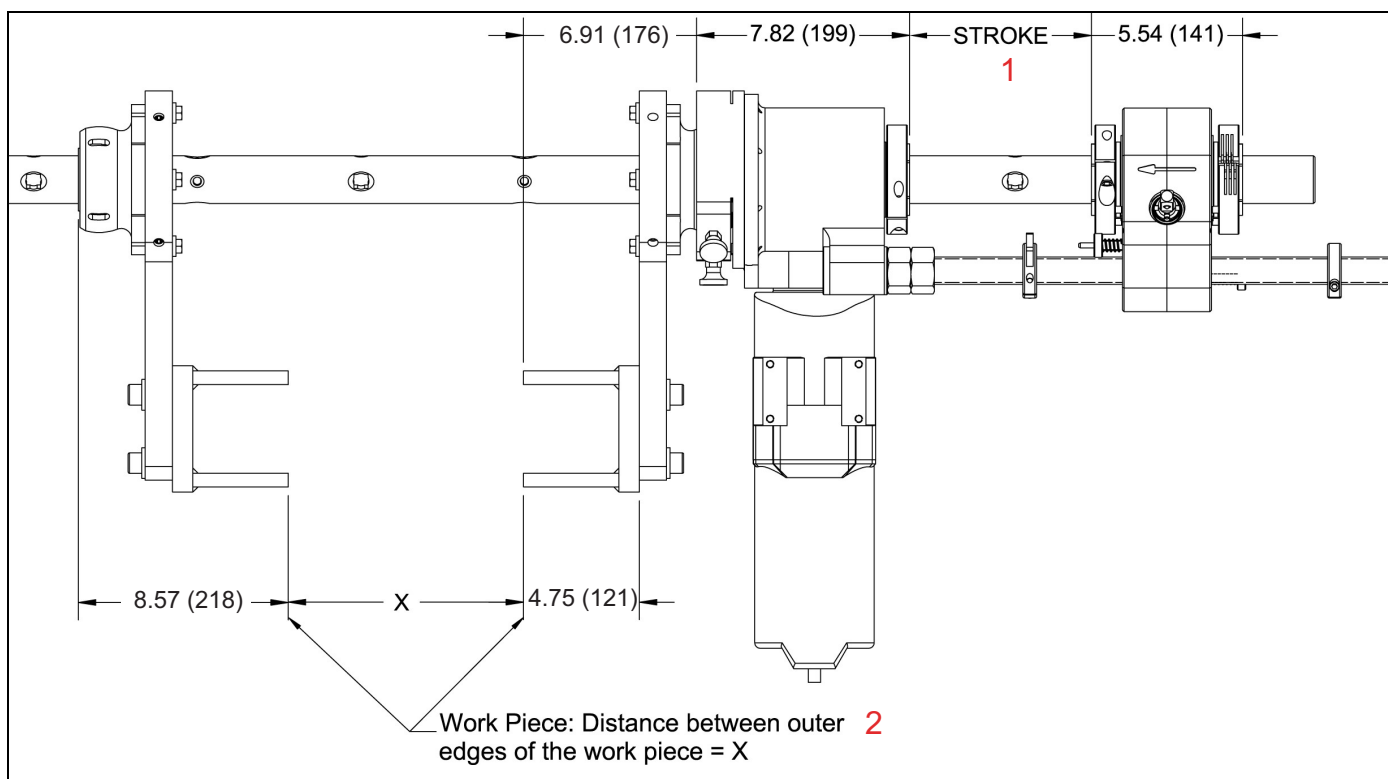


FIGURE 2-14. BB5000 DIMENSIONS

TABLE 2-17. BB4500-BB5000 BORING BAR DIMENSION IDENTIFICATION

| Number | Component                                                    |
|--------|--------------------------------------------------------------|
| 1      | Stroke                                                       |
| 2      | Workpiece: distance between outer edges of the workpiece = X |

## 2.6 SPECIFICATIONS

TABLE 2-18. SUB-COMPONENT MASS

| Component                                                                                    | Mass in lbs (kg)               |
|----------------------------------------------------------------------------------------------|--------------------------------|
| <b>Motor:</b>                                                                                | 43 lbs (20 kg)                 |
| <b>Adapter assembly (P/N 51536):</b>                                                         | 10 lbs (5 kg)                  |
| <b>Rotational drive unit (P/N 53165):</b>                                                    | 31 lbs (14 kg)                 |
| <b>Total for motor, adapter assembly and RDU:</b>                                            | 85 lbs (39 kg)                 |
| <b>Pendant:</b>                                                                              | 4 lbs (2 kg)                   |
| <b>HPU – 10 HP:</b>                                                                          | 695 lbs (315.2 kg)             |
| <b>Machine total weight (including single arm mounts, setup cones, and hydraulic motor):</b> | 444 lbs (201 kg)               |
| <b>Approximate boring bar ship weight (including the metal shipping container):</b>          | 1.48 lbs/inch<br>(0.264 kg/cm) |

TABLE 2-19. BORING SPECIFICATIONS

| Component                              | BB4500 range       | BB5000 range                   |
|----------------------------------------|--------------------|--------------------------------|
| <b>Boring bar diameter (standard):</b> | 1.75" (45 mm)      | 2.25" (57 mm)                  |
| <b>Boring bar diameter (optional):</b> | 1.25" (32 mm)      | 1.75" (45 mm)<br>1.25" (32 mm) |
| <b>Boring diameter (standard):</b>     | 2–10" (51–254 mm)  | 2.5–12" (64–305 mm)            |
| <b>Boring diameter (optional):</b>     | 1.5–5" (38–127 mm) | 1.375–24" (35 – 610 mm)        |
| <b>Boring stroke (standard):</b>       | 12" (305 mm)       | 12" (305 mm)                   |
| <b>Boring stroke (optional):</b>       | 36" (914 mm)       | 24 (610 mm)<br>36" (914 mm)    |

## 2.6.1 Electrical specifications

CLIMAX electrical equipment is suitable for use in the physical environment and operating conditions specified below. When the physical environment or the operating conditions are outside those specified, consult CLIMAX before putting the electrical equipment into service.

TABLE 2-20. ELECTRICAL SPECIFICATIONS

|                                                     |                                                                                 |
|-----------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Mains voltage (AC):</b>                          | ±10% of nominal                                                                 |
| <b>Mains frequency (AC):</b>                        | ±1% of nominal                                                                  |
| <b>Mains harmonics:</b>                             | 10% of RMS volts<br>2nd through 30th harmonic                                   |
| <b>Voltage imbalance (3-phase supplies):</b>        | 2% maximum                                                                      |
| <b>Voltage impulses:</b>                            | 200% of nominal<br>1.5 milliseconds (ms) maximum duration                       |
| <b>Voltage interruption:</b>                        | 3 ms maximum with 1 second between                                              |
| <b>Voltage dip (brownout):</b>                      | 20% of peak volts for 1 second maximum                                          |
| <b>Voltage supplied from batteries:</b>             | ±10% of nominal                                                                 |
| <b>Voltage interruption (DC):</b>                   | 5 ms maximum                                                                    |
| <b>Ambient temperature (operating):</b>             | 41–104°F (5–40°C)                                                               |
| <b>Ambient temperature (transport and storage):</b> | -13–131°F (-25–55°C)                                                            |
| <b>Relative humidity:</b>                           | 20–95% non-condensing                                                           |
| <b>Altitude:</b>                                    | 6,600 ft (2,000 m)                                                              |
| <b>Contaminants:</b>                                | IP54 environment except for some motors and slip ring assemblies that are IP 20 |
| <b>Available fault current:</b>                     | Not greater than that listed on the controls nameplate                          |
| <b>Vibration</b>                                    |                                                                                 |
| <b>Pushbuttons:</b>                                 | 5g at 5–300 Hz                                                                  |
| <b>Relays, contactors, and breakers:</b>            | 2g at 5–300 Hz                                                                  |
| <b>Touchscreen HMI:</b>                             | 1g at 9–150 Hz                                                                  |
| <b>Servo amplifiers and PLC:</b>                    | 1g at 9–150 Hz                                                                  |
| <b>Physical shock (impact)</b>                      |                                                                                 |
| <b>Pushbuttons:</b>                                 | 30g for 18ms                                                                    |
| <b>Relays, contactors, and breakers:</b>            | 6g for 11ms                                                                     |
| <b>Touchscreen HMI:</b>                             | 15g three times in X, Y, and Z                                                  |
| <b>Servo amplifiers and PLC:</b>                    | 1g three times in X, Y, and Z                                                   |

---

## **2.7 ITEMS REQUIRED BUT NOT SUPPLIED**

The only item required but not supplied in your CLIMAX product kit is a welder to weld on the tack plate when mounting the bearings onto the workpiece.

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## 3 SETUP

### IN THIS CHAPTER:

|                                                    |     |
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This section describes the setup and assembly procedures for the BB4500-BB5000 boring machine.

### 3.1 RECEIPT AND INSPECTION

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

When you receive your CLIMAX 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.

5Contact CLIMAX immediately to report damaged or missing components.

#### NOTICE

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

---

The machine ships from CLIMAX with a heavy coating of LPS 3. The recommended cleaner is LPS PreSolve Orange Degreaser. All parts must be cleaned before use.

---

## 3.2 LIFTING AND RIGGING

### **WARNING**

Do not lift the BB4500-BB5000 boring machine when fully assembled, as it can weigh up to 444 lbs (201 kg). To prevent serious injury to yourself and others, always follow the operating procedures outlined in this manual, your own company rules, and local regulations for heavy lifting. Serious injury or fatalities can result from improper lifting methods.

Falling or uncontrolled swinging of machinery can cause serious injury or be fatal to the operator and bystanders.

---

## 3.3 MACHINE ASSEMBLY

A basic setup is described in the following sections, but individual applications may require different setups based on, but not limited to, the following factors:

- The size of the bore
- The number of bores and bearings
- Distance between the bores
- Distance between the bearings
- Style of bearings (single arm, double arm, universal)

Contact CLIMAX for assistance with a custom application.

The BB4500-BB5000's through-bar design allows for mounting the rotational drive unit (RDU) and feed box anywhere along the bar. They do not need to be mounted next to each other. This allows assembly of the BB4500-BB5000 in very restricted spaces. Special setup cones are also available to make it easier to center and stabilize the bar in the workpiece bore.

Exactly attaching and aligning the tack mounting plates is designed to be straightforward. The initial fixture mounting may be 5° or more out of alignment. CLIMAX's spherical mounting system enables the BB4500-BB5000 to align perfectly with the bore.

The BB4500-BB5000 also features four precision alignment screws for precisely dialing into the center of an existing bore or into a bore that is not exactly true.

The BB4500-BB5000 modular design eliminates the problem of lifting heavy, bulky, one-piece machines on the job site. The BB4500-BB5000 quickly assembles and disassembles, one component at a time.



### 3.3.1 Bar and mounting bracket assembly

To roughly align a CLIMAX boring bar in a workpiece, use centering cones. These cones approximately center the bar until bearing supports and brackets are secured with clamps or welds, as appropriate. Cone sets are in two sizes, cover a wide range, and are offered as optional equipment with the BB4500-BB5000.

TABLE 3-1. SETUP CONE IDENTIFICATION

| Number | Component |
|--------|-----------|
| 1      | Cone      |
| 2      | Workpiece |

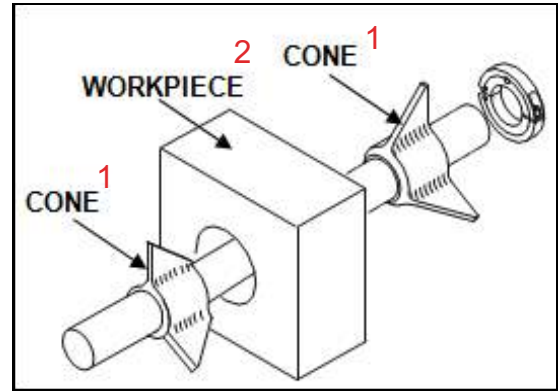


FIGURE 3-1. SETUP CONES

The goal is to support the boring bar in place until clamping or welds on tack plates are completed. Then remove the cones and make precise adjustments to center the bar.

#### **Setup cones (optional equipment)**

Do the following to install the setup cones:

1. Clean the bore and the boring bar to remove grease, oil, and dirt.
2. Carefully slide the boring bar through the holes to be bored (see Figure 3-2).

#### **CAUTION**

To avoid bodily injury or bar damage and to ease setup, lift heavy loads (bars over 72" [1,829 mm]) using a sling.

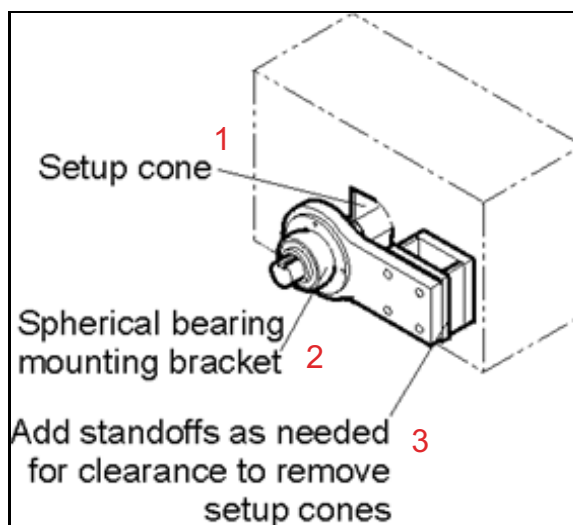


FIGURE 3-2. BORING BAR INSERTION

3. Slide a setup cone (or a substitute device) onto each end of the bar to center the bar in the bore.

**TABLE 3-2. SETUP CONE INSTALLATION IDENTIFICATION**

| Number | Component                                                         |
|--------|-------------------------------------------------------------------|
| 1      | Setup cone                                                        |
| 2      | Spherical bearing mounting bracket                                |
| 3      | Standoffs (add as needed for clearance to remove the setup cones) |



**FIGURE 3-3. SETUP CONE INSTALLATION**

4. Tighten the set screw to secure one of the cones.
5. While pulling on the bar from the opposing end to seat the first cone, slide the second cone snug into place. Tighten the set screw.
6. Mount the clamp collar next to one setup cone. Loosen the set screw in the cone and drive it into the bore using the socket-head jacking screw. Tighten the set screw in the setup cone to hold it securely in place.
7. Repeat step 3 through step 6 until the cones are seated in the bores and there is no bar movement.
8. Center the spherical bearings in the mounting brackets by doing the following:
  - a) Loosen the hex bolts.
  - b) Adjust the four set screws until the bearing is centered.
  - c) Tighten the hex bolts.



**FIGURE 3-4. CENTERING THE SPHERICAL BEARINGS**

TABLE 3-3. SPHERICAL BEARING IDENTIFICATION

| Number | Component                                    |
|--------|----------------------------------------------|
| 1      | Loosen bolts to adjust bearing               |
| 2      | Adjust screws to center bearings in brackets |

9. Mount the tack weld plates to the spherical bearing mounting brackets. If more clearance is required, weld 1" x 1" x 6" (12 mm x 12 mm x 72 mm) the tack weld blocks to the tack weld mounting spacer plates.
10. Temporarily clamp the bracket assemblies to the workpiece. Leave enough room to remove the cones after the brackets are welded in place.
11. Check that the setup cones are still securely in position.
12. Securely weld all standoffs and brackets in place.
13. Remove the temporary clamps.
14. Loosen the set screws in the setup cones.
15. Remove the bar from the brackets and remove the setup cones.
16. Carefully reinstall the bar through the mounting brackets.

If necessary, precisely align the bar by doing the following:

1. Loosen the hex bolts holding the bearing to the bracket.
2. Attach a dial indicator to the bar and touch the stylus to the workpiece ID.
3. Rotating the bar, adjust the set screws to center the bar.
4. Tighten the hex bolts to keep the bearing and the bar in place.

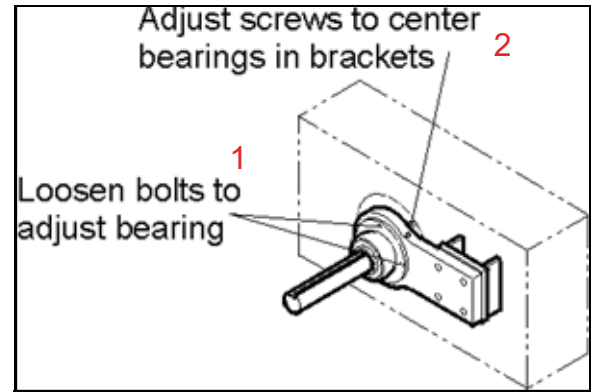


FIGURE 3-5. POSITIONING THE SPHERICAL BEARINGS



FIGURE 3-6. ALIGNING THE BAR

### 3.3.2 Tooling and tool head assembly

These machines are designed to cover a wide range of boring applications. The bar design allows for inserting a tool bit into the bar or clamping a tool head assembly

onto the bar. This gives you multiple positions of the tool bit. CLIMAX has designed these so that you can use a variety of tool bit types.

The cutting speed is primarily determined by the hardness of the metal being machined and the type of tool bit used. Other factors include the power source, feed and depth of cut, and cooling medium being used.

Generally, carbide cutting tools operate at higher RPM than high-speed steel (HSS) tools. For more information, see Section 4.2 on page 52.

### 3.3.2.1 Placing the tool bit into the bar

Do the following to insert the tool bit into the bar:

1. Retract the set screw that is located 90° from the tool slot.
2. Insert the tool bit into the tool slot so that it slides freely into the broached hole (see Figure 3-7).
3. Clamp the tool bit into place by re-tightening the set screw.
4. Set the tool bit to the correct radius for cutting the required diameter. There are multiple ways to set the desired radius (for instance, using a bore measuring tool).

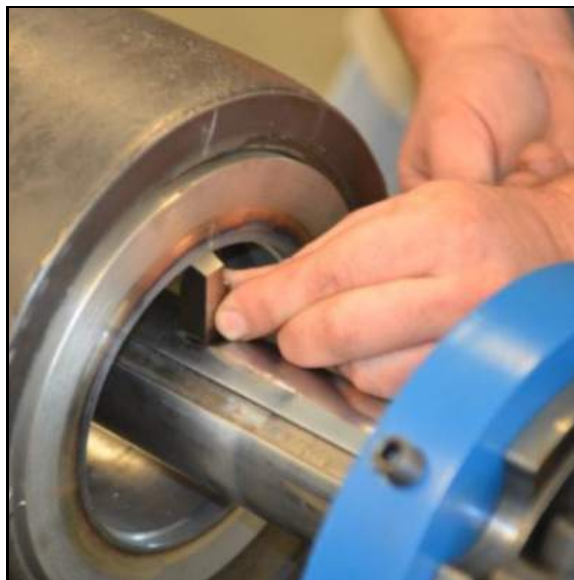


FIGURE 3-7. INSERTING THE TOOL BIT

### 3.3.2.2 Placing the tool head onto the boring head

TABLE 3-4. TOOL HEAD SETUP IDENTIFICATION

| Number | Component                |
|--------|--------------------------|
| 1      | Set screws               |
| 2      | Tool head mounting screw |
| 3      | Tool head                |
| 4      | Boring bar               |
| 5      | Tool bit                 |
| 6      | Cutting direction        |

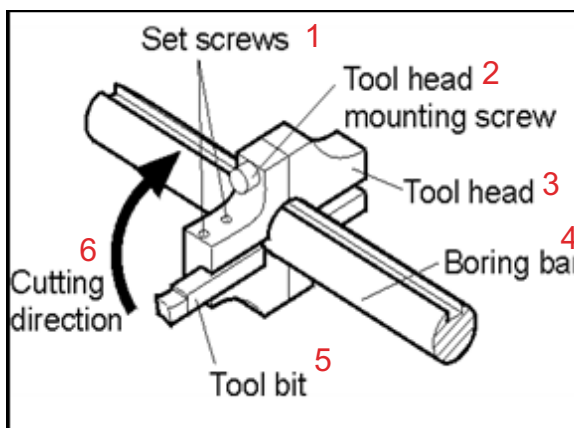


FIGURE 3-8. TOOL HEAD SETUP

Do the following for standard setup, referring to Figure 3-8 on page 36:

1. Using the clamping screw, secure the tool head tightly to the boring bar.
2. Select either a HSS or a brazed carbide tool bit.
3. Position the tool head on the bar with the open side of the tool slot toward the workpiece in the feed direction.
4. Slide the tool bit into the tool head with the cutting face toward the tightening screws. This will position the cutting face at or slightly below the centerline.

### **TIP:**

Tool bits are either right-handed or left-handed. This allows for feeding both directions with the same rotation direction.

5. Use a dial indicator to set the tool bit to achieve the desired depth of cut. The maximum recommended cutting depth is 0.125" (3 mm). Tighten the tool bit mounting screws.

### **TIP:**

CLIMAX offers a bore measuring tool specially built for setting the tool bit height and checking the actual bore diameter. Contact CLIMAX for more information on this tool.

### **3.3.3 RDU and AFU assembly**

The compact RDU may be placed anywhere along the bar.

Before beginning set-up, plan the relationship between the RDU, motor, and axial feed unit (AFU) to allow for enough space.



FIGURE 3-9. POSITIONING THE RDU



The AFU may be set anywhere along the bar. It is not necessary to insert the leadscrew directly into the RDU. The leadscrew may be screwed into the tack weld block that may then be welded or clamped directly to the workpiece.



## CAUTION

Take care not to bend or unduly stress the leadscrew during installation.



FIGURE 3-10. POSITIONING THE AFU

Do the following:

1. Carefully slide the bar through the spherical mounting bearings.

## TIP:

If positioning the AFU between the mounting support brackets, slide it onto the bar at this point rather than in step 10.

2. Insert the bar into the opposing bearing bracket.
3. Install the RDU onto the bar, positioning it against the spherical bearing bracket so that one of the spring pins engages one of the slots in the bearing mount.
4. Tighten the clamp ring to 30 ft-lbs (41 Nm). Slide the bar to see if it is free to move. If it does not move, the clamp ring is too tight. Loosen the clamp ring bolt until the bar has some resistance but moves freely.



## CAUTION

The clamp ring must be tightened before the machine is turned on. Do not rely on the spring pins to hold the rotational torque of the machine.

5. Tighten the clamp collar over the collet, as shown in Figure 3-11 on page 39. Turn the collar screw until the collar is snug, but the bar slides easily through the unit. In most boring applications, this collar can remain loose.

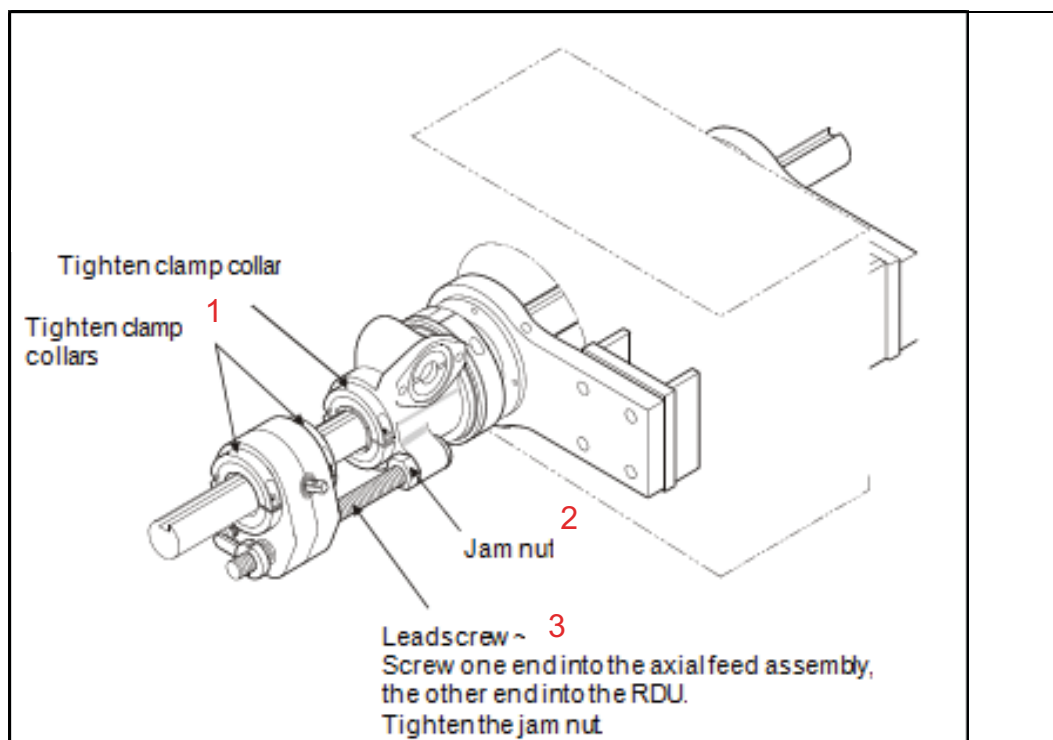


FIGURE 3-11. CLAMP COLLARS ON THE AFU

TABLE 3-5. CLAMP COLLARS INSTALLATION IDENTIFICATION

| Number | Component                                                                                |
|--------|------------------------------------------------------------------------------------------|
| 1      | Tighten the clamp collars                                                                |
| 2      | Jam nut                                                                                  |
| 3      | Leadscrew (Screw one end into the AFU, the other end into the RDU. Tighten the jam nut.) |

6. Hold the motor assembly so that the motor shaft is able to slide into the RDU housing. The key in the motor shaft must align with the keyway in the main drive worm.
7. Push the motor into the housing until the flange is snug against the drive housing face.
8. Tighten the mounting screws.
9. Install the leadscrew into the AFU. Check that the jam nut is on the other end of the leadscrew.
10. Slide the AFU onto the bar, if not already done so to position it between the mounting support brackets.
11. Thread the leadscrew into the RDU housing. Secure the leadscrew by tightening the jam nut snug against the face of the drive housing.

12. If mounting the leadscrew away from the RDU, weld the tack weld block to a fixed object and screw the leadscrew into it. Secure the leadscrew by tightening the jam nut snug against the face of the tack weld block.
13. Position the AFU and bar to achieve the required feed distance and to place a tooling hole in the correct position for machining.
14. Tighten the axial feed clamp collar screws to fasten the collar to the bar.

## 3.4 AXIAL FEED

### 3.4.1 Selecting the feed direction

The feed direction has three positions:

- Forward
- Neutral
- Reverse

Pushing the three-position feed shaft in on one side or the other will feed in the direction indicated by the arrow on that side of the body. Check that the engagement pins are fully engaged. The neutral (middle) position is for no feed.

A shaft under load may require a firm bump to disengage.

If the axial feed box fails to feed the tool head, check the shear pins. Replacement pins are included with the AFU. To replace a pin, see Section 5.3.1 on page 59.

### CAUTION

Feeding the bar into a fixed object could damage the internal feed clutches.

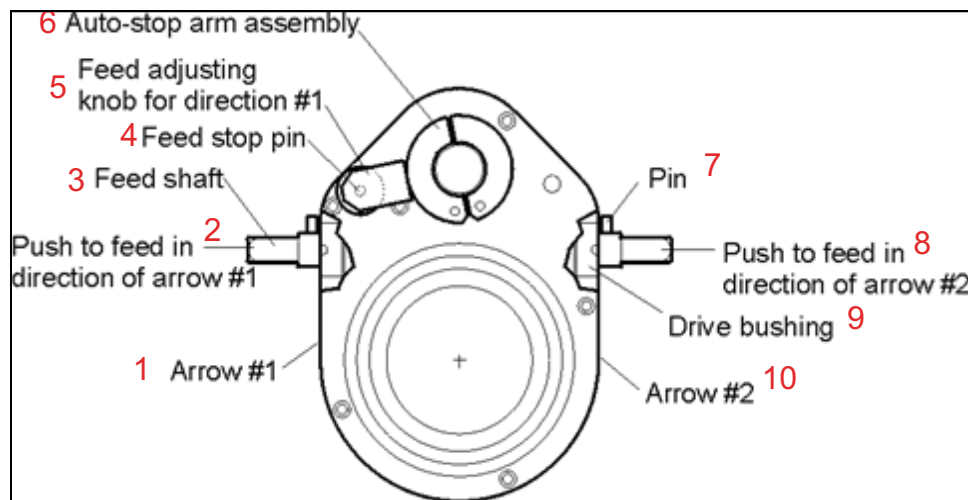


FIGURE 3-12. AFU COMPONENTS



TABLE 3-6. AFU COMPONENT IDENTIFICATION

| Number | Component                             |
|--------|---------------------------------------|
| 1      | Arrow #1                              |
| 2      | Push to feed in direction of arrow #1 |
| 3      | Feed shaft                            |
| 4      | Feed stop pin                         |
| 5      | Feed adjusting knob for direction #1  |
| 6      | Auto-stop arm assembly                |
| 7      | Pin                                   |
| 8      | Push to feed in direction of arrow #2 |
| 9      | Drive bushing                         |
| 10     | Arrow #2                              |

### 3.4.2 Setting the feed rate

The feed rate is adjusted by an adjusting screw. Each feed rate is independent of the other; FORWARD and REVERSE have separate feed adjusting knobs.

TABLE 3-7. FEED BOX ARROW IDENTIFICATION

| Number | Component                                              |
|--------|--------------------------------------------------------|
| 1      | Maximum (feeds in the direction shown on the feed box) |
| 2      | Minimum (feeds in the direction shown on the feed box) |

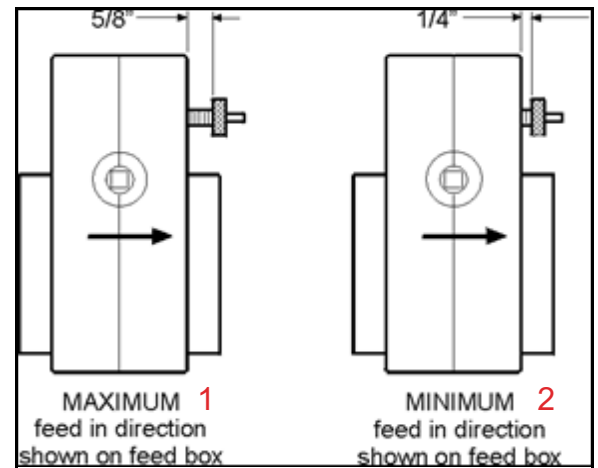


FIGURE 3-13. FEED BOX ARROWS

The feed rate operates by the following rules:

- Turning the knob counter-clockwise (out) increases the feed rate.
- Turning the knob clockwise (in) decreases the feed rate.
- The feed range is up to 0.018" (0.45 mm) per revolution of the bar.
- Maximum feed is reached when the knob is approximately 0.625" (16 mm) away from the feed box.
- Minimum feed is reached when the knob completely collapses the compression spring approximately 0.25" (6 mm).

## **CAUTION**

The AFU will not stop until the pin is pushed in completely. To prevent overfeeding, check that the stop arm is positioned correctly.

### 3.4.3 Automatic feed stop

The automatic feed stop feature (see Figure 3-14) stops the AFU at any point along the leadscrew.

Do the following to use the automatic feed stop:

1. Clamp a stop arm onto the leadscrew at the position intended for the axial feed to stop. (Assemblies are included for stopping in either direction.)
2. Check that the stop arm is positioned to press against the feed stop screw assembly.

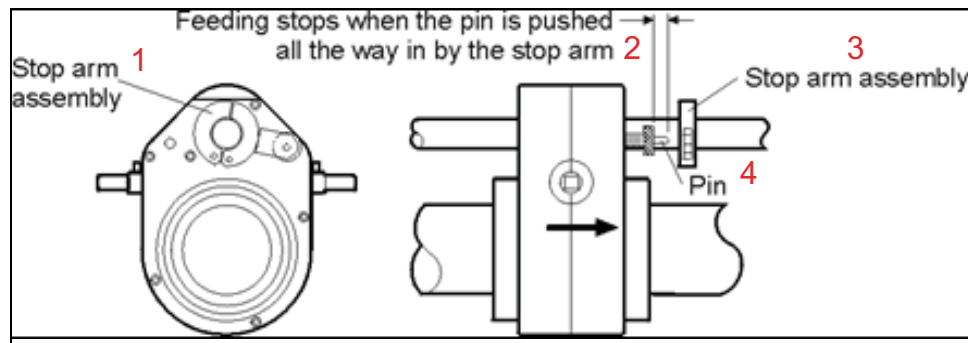


FIGURE 3-14. AUTOMATIC FEED STOP

TABLE 3-8. AUTOMATIC FEED STOP IDENTIFICATION

| Number | Component                                                           |
|--------|---------------------------------------------------------------------|
| 1      | Stop arm assembly                                                   |
| 2      | Feeding stops when the pin is pushed all the way in by the stop arm |
| 3      | Stop arm assembly                                                   |
| 4      | Pin                                                                 |

When the axial feed box nears the stop arm, the stop arm will depress the feed stop screw assembly to stop the axial feed.

Do the following to retract the tool head:

1. Place the feed box in NEUTRAL.
2. Hand crank the tool bit away from the workpiece.

**NOTICE**

To protect tool bits from chipping, place the feed box in **NEUTRAL** before stopping bar rotation.

## 3.5 POWER CONNECTION

### 3.5.1 Hydraulic machines

For the BB4500-BB5000, do the following to connect the hydraulic power:

1. Disconnect the mains power to the HPU.
2. Inspect all electrical cables and check the oil level in the hydraulic reservoir.
3. Inside the electrical enclosure, check that all three phases of mains power (L1, L2, L3), and the safety ground wire are properly connected.

** DANGER**

High voltage in the electrical enclosure can cause serious or fatal injury. Unplug the power unit before servicing the pump motor.

4. Close the electrical enclosure. Connect the power unit to mains power.
5. After checking that all hydraulic hose quick coupler fittings are clean, connect the hydraulic hoses between the HPU and the hydraulic motor on the boring bar. The hose connection may be switched to reverse the bar rotation direction.

#### ***Checking the hydraulic pump rotation direction***

**NOTICE**

Rotating the hydraulic pump in the wrong direction may damage the pump and result in poor performance.

To check the hydraulic pump rotation direction, jog the power unit momentarily. Check that the hydraulic pump is rotating in the direction indicated by the arrow on the pump housing.

If it is not rotating in the direction of the arrow, do the following:

1. Turn off and lock out the electric power to the HPU.
2. Call a qualified person to open the electrical enclosure and identify wires L1, L2, and L3 on the magnetic contactor. Switch any two of these wires. Close the electrical enclosure.

## **CAUTION**

Do not reset the pressure relief valve on the HPU pump. It is factory set to the correct pressure to avoid system damage.

### 3.5.2 BB5000 servo drive machine

## **CAUTION**

Never disconnect any cable from this machine without first turning the main disconnect off. Interrupting the connection between the servo amplifier and the servo motor while energized will damage the servo amplifier, even if the motor is stopped. Failure to comply with this warning will void the warranty on the control system.

For the BB5000 servo drive machines, do the following to connect the servo drive power:

1. Before connecting the servo drive system to mains power, examine all cables for damage. Repair or replace the cable if necessary.
2. Connect the servo motor encoder cable, power cable, and cooling fan power cable.
3. Connect the encoder and operator pendant cable to the main control panel (see Figure 3-15 and Figure C-19 on page 138).
4. Plug the mains power cable into the mains power source.



FIGURE 3-15. SERVO MOTOR MAIN CONTROL PANEL

The MAINS POWER DISCONNECT switch on the control panel is an external emergency stop circuit that ensures operation can be stopped and power switched off immediately.

## **WARNING**

Electrical equipment can shock or cause an explosion if used near wet or flammable materials. Do not operate the motor if it is wet or in a hazardous environment.

### ***Servo motor pendant***

Table 3-9 on page 45 shows the functions of the pendant controls (seen in Figure 3-16 on page 45) used to operate a servo-motor powered machine.



FIGURE 3-16. SERVO MOTOR PENDANT CONTROLS

TABLE 3-9. SERVO MOTOR CONTROL FUNCTIONS

| Function                  | Action                                                                                                                                                                                                                      |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reset</b>              | Press and hold for three seconds to start the control system on power up, or to reset after an E-Stop.                                                                                                                      |
| <b>Start</b>              | Hold for three seconds to start the spindle rotation.                                                                                                                                                                       |
| <b>RPM</b>                | Controls the rotational bar speed from 3–230 RPM.                                                                                                                                                                           |
| <b>Fault light</b>        | Indicates that the servo drive has stopped due to a fault condition, such as the following: <ul style="list-style-type: none"> <li>• Motor overload</li> <li>• Loss of feedback</li> <li>• Motor is disconnected</li> </ul> |
| <b>E-stop</b>             | Press to immediately stop all machine functions and disconnect the motor from power.                                                                                                                                        |
| <b>Stop</b>               | Press to stop the spindle rotation.                                                                                                                                                                                         |
| <b>Direction</b>          | Turn to change the direction of bar rotation.                                                                                                                                                                               |
| <b>Overload indicator</b> | Warns that a fault condition is imminent unless the load is reduced.                                                                                                                                                        |

## NOTICE

The 230V and 460V units cannot be converted between voltages.

There is no servo drive for the BB4500.

---

### 3.5.3 Electrical machines

#### **WARNING**

Electrical equipment can shock or cause an explosion if used near wet or flammable materials. Do not operate the motor if it is wet or exposed to combustible materials.

#### **CAUTION**

The motor rotation reverse switch must be operated only when the motor is completely stopped. Failure to do so can damage the equipment.

Do the following to connect the electrical power:

1. Check the power cords and plugs for damage. Repair or replace any if necessary.
2. Plug the motor into the control box.
3. Connect the control box mains power cord to a grounded outlet of the correct voltage. 120V motors are rated at 20 amps full load; 230V motors are rated at 11.5 amps full load.

### 3.5.4 Pneumatic machines

For your safety and protection, the BB4500-BB5000 pneumatic system has an air control valve with a brightly colored oval handle (seen in Figure 3-17) clearly indicating the airflow direction.

Quick-disconnects between the incoming air supply and the machine enable the operator to quickly disconnect the machine if necessary.



FIGURE 3-17. AIR CONTROL VALVE HANDLE

The pneumatic conditioning unit (PCU) air filter and lubricator must be used to protect the pneumatic system and maintain the machine warranty. The lubricator is set to deliver oil at a rate of 20–30 drops per minute at full throttle.

#### **CAUTION**

If the machine stops moving unexpectedly, lock out the pneumatic safety valve located at the filter lubricator assembly before performing any troubleshooting.

### 3.6 BB4500-BB5000 WITH SMALL DIAMETER BARS

For the BB4500, boring bars with a diameter of less than 1.75" (44 mm) are easily adapted to accept the standard RDU, AFU, and the spherical bearing mounting brackets (see Figure 3-18).

For the BB5000, boring bars with a diameter of less than 2.25" (57.15 mm) are easily adapted to accept the standard RDU, AFU, and the spherical bearing mounting brackets (see Figure 3-18). This adaptation for the 1.25" (32 mm) boring bar is offered as a CLIMAX small bore kit (P/N 28698).

TABLE 3-10. COLLET IDENTIFICATION

| Number | Component                 |
|--------|---------------------------|
| 1      | Spherical bearing collets |
| 2      | RDU collet                |
| 3      | AFU collet                |

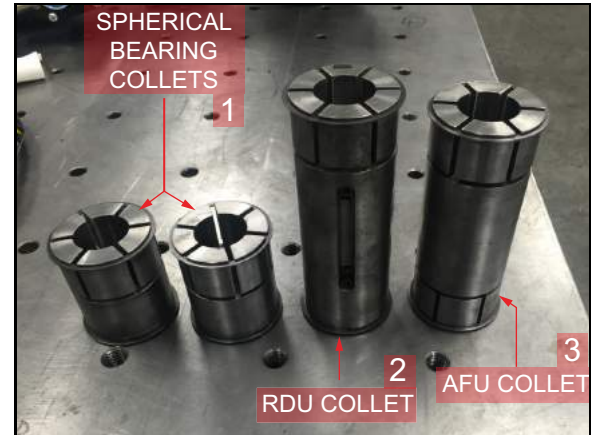


FIGURE 3-18. COLLETS (BB5000 VERSION SHOWN)

#### NOTICE

The small bore kit adapter collets fit into the existing collets. Do not remove existing collets from the RDU and AFU.

The AFU collet is serrated on both ends and has no keyway. The RDU collet is serrated on one end only.

The RDU collet has a keyway milled into the outside diameter with two bolt heads visible (see Figure 3-19 on page 48). Those bolts are for retaining the key in the inner diameter of the collet, which will accept the keyway of the 1.25" boring bar.

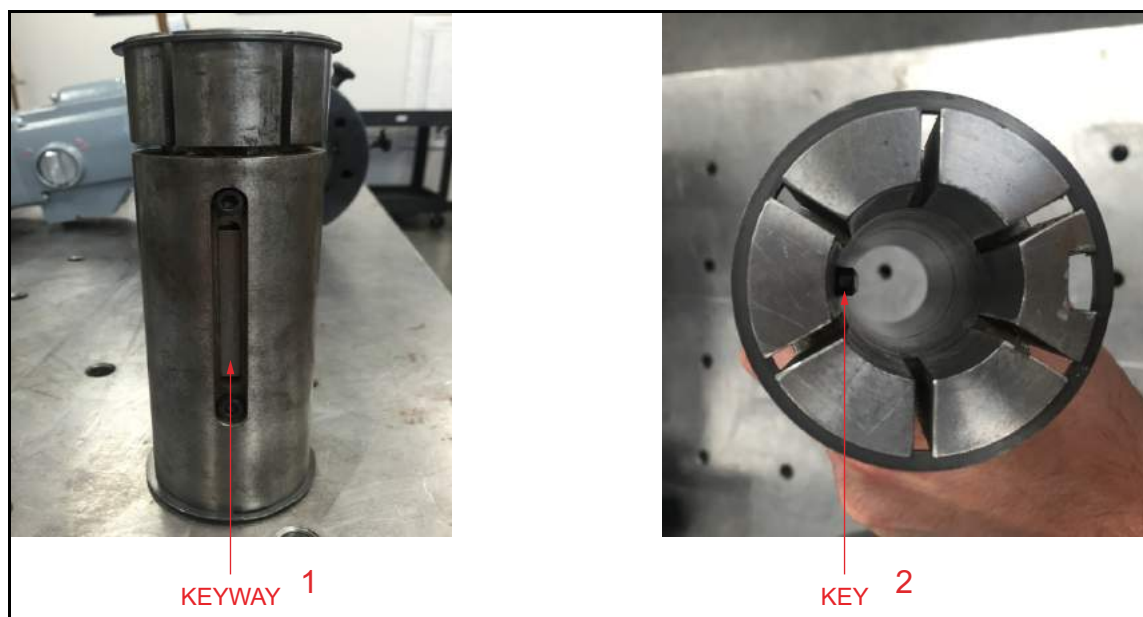


FIGURE 3-19. BB5000 RDU COLLET KEYWAY

TABLE 3-11. RDU COLLET KEYWAY IDENTIFICATION

| Number | Component |
|--------|-----------|
| 1      | Keyway    |
| 2      | Key       |

Do the following to install the small-bore kit, or for installing collets for the RDU, AFU, or spherical bearings:

1. Remove a snap ring from one end of the small bore kit collet.

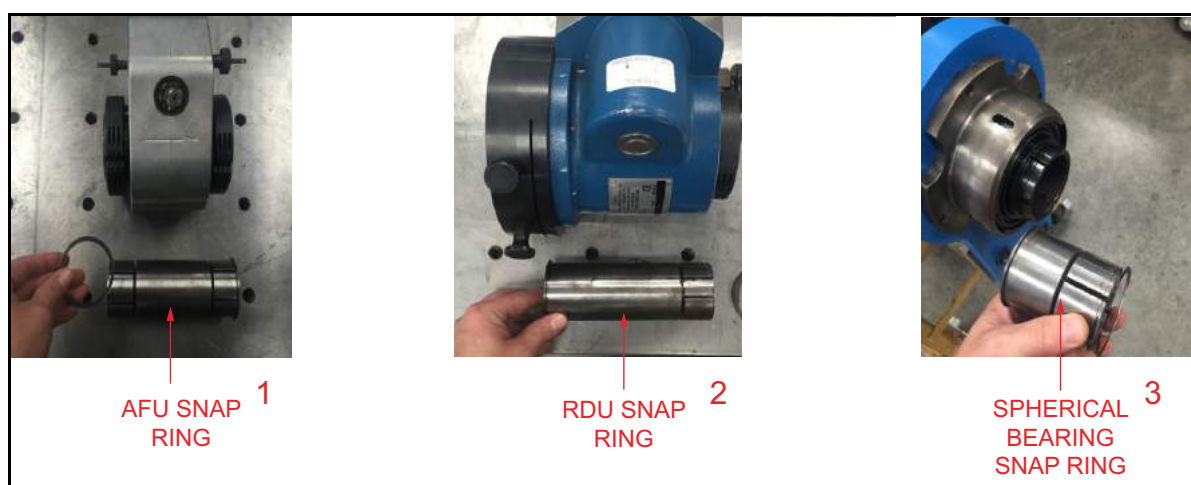


FIGURE 3-20. SNAP RING REMOVAL



TABLE 3-12. SNAP RING REMOVAL IDENTIFICATION

| Number | Component                   |
|--------|-----------------------------|
| 1      | AFU snap ring               |
| 2      | RDU snap ring               |
| 3      | Spherical bearing snap ring |

- Insert the small bore kit adapter 1.25" (32 mm) ID collet into the existing 2.25" (57 mm) ID collet.

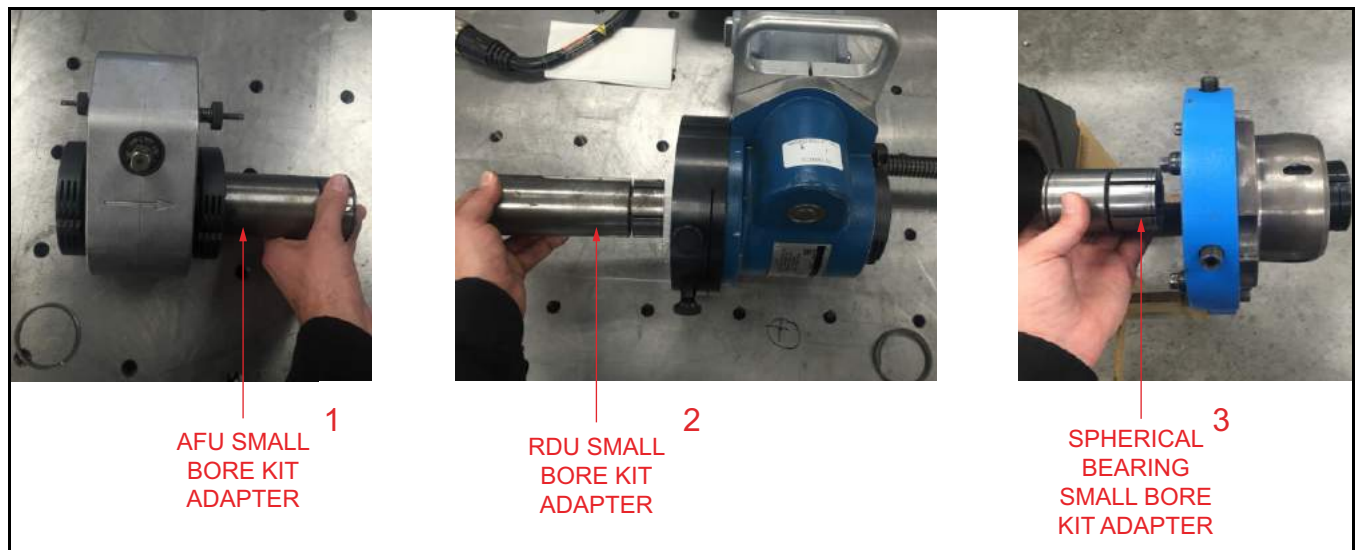


FIGURE 3-21. SMALL BORE KIT ADAPTER INSERTION

TABLE 3-13. SMALL BORE KIT ADAPTER IDENTIFICATION

| Number | Component                                |
|--------|------------------------------------------|
| 1      | AFU small bore kit adapter               |
| 2      | RDU small bore kit adapter               |
| 3      | Spherical bearing small bore kit adapter |

## TIP:

When installing the RDU collet, make sure to line up the keyway to accept the key in the RDU.

- Replace the snap ring and install the 1-1/4" bar (see Figure 3-22 on page 50).

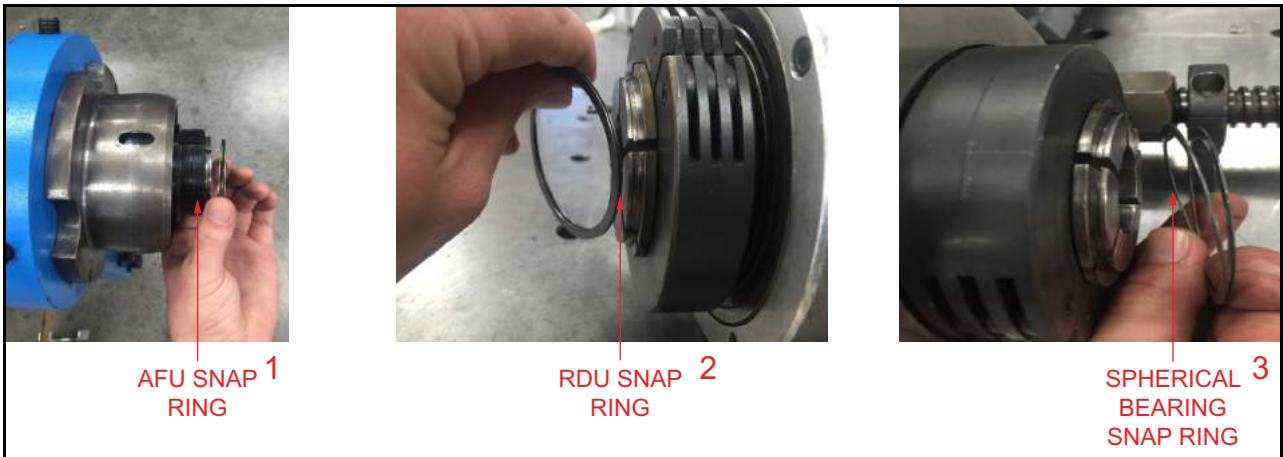


FIGURE 3-22. SNAP RING REPLACEMENT

TABLE 3-14. SNAP RING REPLACEMENT IDENTIFICATION

| Number | Component                   |
|--------|-----------------------------|
| 1      | AFU snap ring               |
| 2      | RDU snap ring               |
| 3      | Spherical bearing snap ring |

## 4 OPERATION

### IN THIS CHAPTER:

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| 4.5 DISASSEMBLY                   | -55 |

Do not operate this machine without adequate training to fully understand the safe setup, operation, and maintenance procedures.



### CAUTION

To avoid serious injury, keep clear of moving machinery during operation. Apply cutting oil with a squirt can.

For machines with air motors, if the machine stops moving unexpectedly, lock out the pneumatic safety valve located at the filter lubricator assembly before performing any troubleshooting.

## 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 all hand tools are removed from inside the machine and the work area.
4. Check that the machine control/observation area will not be in the path of hot flying chips during machine operation.
5. Check the machine is securely mounted to the workpiece.
6. Check that air hoses are routed and secured to avoid tripping, entanglement, damage from hot chips, or other damage should an air hose or connection fail.
7. Check the tool condition and sharpness.
8. Check that power lines and cables are properly connected.
9. Check that all machine parts, including the tool head, tool bit, and collar clamps are secure.

- 
10. Check that the feed direction and rate are correctly set.
  11. Check that all preventive maintenance has been completed.
- 

## **4.2 TOOL BIT SELECTION**

Bar rotation speed is adjustable depending on the power option chosen (electric, hydraulic, pneumatic). The cutting speed is primarily determined by the hardness of the metal being machined and the type of tool bit used. Other factors include the power source, feed and depth of cut, and cooling medium being used.

Generally, carbide cutting tools operate at a higher RPM than high-speed steel (HSS) tools.

If using a HSS tool bit, set the speed shift lever to LOW. Chips should be the color of the base material or no darker than a light straw in color.

When using carbide tool bits, set the speed shift lever to HIGH. These chips should be dark brown to blue.

---

## **4.3 OPERATION**

### **4.3.1 Starting the machine**

Check that the tool bit is installed so that, as the boring bar rotates, it presents its cutting edge to the workpiece. Before machining, lubricate the bore and tool bit with cutting oil.

#### **4.3.1.1 Hydraulic drive**

Do the following to start the hydraulic drive:

1. Turn the HPU to its minimum flow rate (lowest speed).
2. Jog the HPU to verify direction of bar rotation. Do the following to reverse bar rotation:
  - a) Turn off the HPU.
  - b) Reverse the hydraulic hoses.
3. With power switched on, adjust the bar speed by turning the hydraulic speed control knob (located on the control pendant) for one of the following results:
  - Counter-clockwise to decrease RPM.
  - Clockwise to increase RPM.

#### **4.3.1.2 Electrical drive**

Do the following to start the electrical drive:

1. Set the rotation speed on the speed control to minimum.

2. Turn on power at the motor controller.
3. Adjust the bar rotation speed as required by the bore size, tooling, and material requirements.
4. Adjust the feed rate.

The motor has thermal and current overload protections built in. If the motor is pushed beyond its protected range, it will stop. To prevent this, monitor the amp meter on the controller and do not let the reading exceed its rated maximum amperage (10.5 amps for the 230V and 20 amps for the 120V).

This motor is also reversible, allowing it to change the bar rotation direction.

 **CAUTION**

Always stop the motor completely before switching the rotation direction. Failure to do so may damage both the motor and the controller.

 **CAUTION**

Brush wear depends on the load and RPM. Regularly check both brushes for excessive wear and replace if necessary.

#### 4.3.1.3 Pneumatic drive

Do the following to start the pneumatic drive:

1. Using the quick disconnect fittings, connect the pneumatic motor to the pneumatic conditioning unit (PCU).
2. Check that the incoming air pressure is 90-psi (6.2-bar) minimum.
3. Control the boring bar speed by slowly adjusting the air control valve.

**NOTICE**

The 3 hp (2.24 KW) air motor is reversible. Connect the airline so that, as the boring bar rotates, the tool bit presents its cutting edge to the workpiece. If the tool bit is backward, reverse the quick disconnects at the motor to change the bar rotation direction.

 **CAUTION**

If the machine stops moving unexpectedly, lock out the pneumatic safety valve located at the filter lubricator assembly before performing any troubleshooting.

#### 4.3.1.4 Servo drive (BB5000 only)

If using the servo drive with the BB5000, do the following to start the servo drive (see Figure 3-16 on page 45):

1. Pull the E-stop up.
2. Press and hold the RESET button for three seconds, or until the fault light turns off.
3. Select the rotation direction.
4. Press START.

To stop, press the STOP button.

## 4.4 SHUTDOWN

To protect tool bits from chipping, always place the feed box in neutral before stopping the bar rotation.

Do the following to shut down the machine:

1. Disengage the axial feed by pushing the feed shaft until the pins on both sides of the feed box are free of the drive bushings.

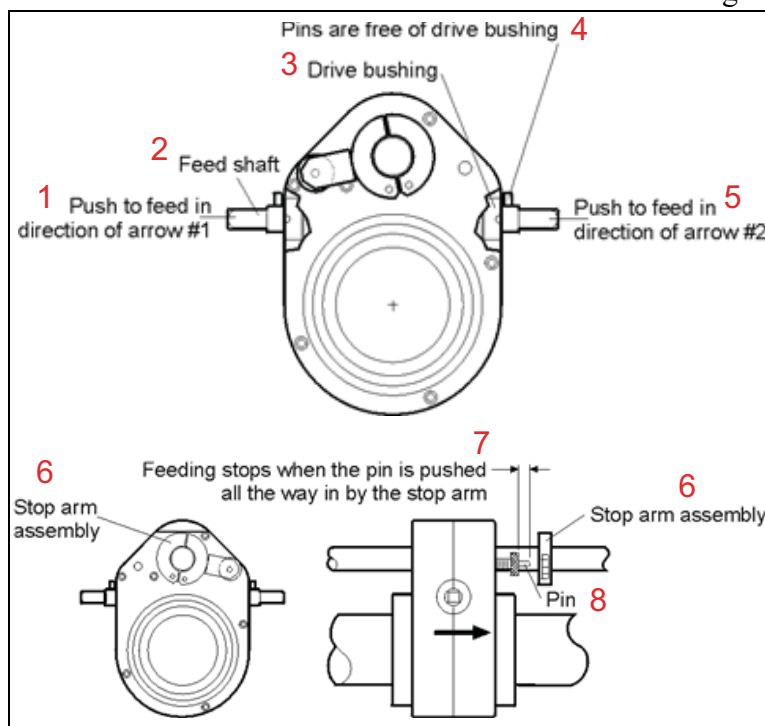


FIGURE 4-1. DISENGAGING THE AXIAL FEED

TABLE 4-1. AXIAL FEED DISENGAGEMENT IDENTIFICATION

| Number | Component                             |
|--------|---------------------------------------|
| 1      | Push to feed in direction of arrow #1 |

TABLE 4-1. AXIAL FEED DISENGAGEMENT IDENTIFICATION

| Number | Component                                                           |
|--------|---------------------------------------------------------------------|
| 2      | Feed shaft                                                          |
| 3      | Drive bushing                                                       |
| 4      | Pins are free of drive bushing                                      |
| 5      | Push to feed in direction of arrow #2                               |
| 6      | Stop arm assembly                                                   |
| 7      | Feeding stops when the pin is pushed all the way in by the stop arm |
| 8      | Pin                                                                 |

2. Turn off and disconnect power to the machine.
3. After the machine is at a complete standstill, use a brush to remove chips.

**CAUTION**

Even with power off, do not use your hands, compressed air, or metal tools to remove chips. Use a brush.

4. Retract the tool from the workpiece.

## 4.5 DISASSEMBLY

Do the following to disassemble the BB4500-BB5000:

1. Turn off and disconnect power to the unit.
2. Remove the tool head.
3. Disconnect the leadscrew from the rotational drive unit (RDU).

4. Loosen the clamp collars holding the axial feed unit (AFU) to the bar (see Figure 4-2 on page 56).

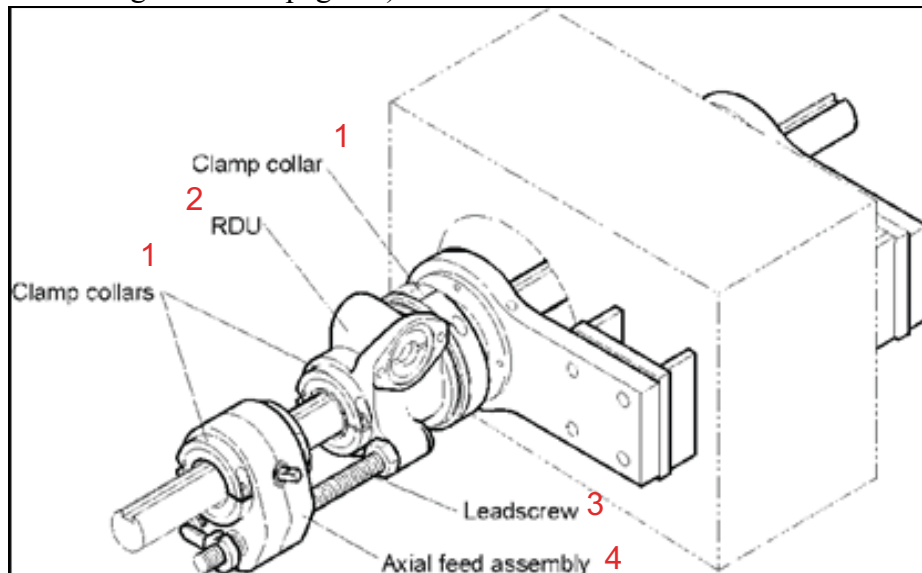


FIGURE 4-2. AFU DISASSEMBLY COMPONENTS

TABLE 4-2. AFU DISASSEMBLY IDENTIFICATION

| Number | Component     |
|--------|---------------|
| 1      | Clamp collars |
| 2      | RDU           |
| 3      | Leadscrew     |
| 4      | AFU           |

5. Slide the AFU off the bar.
6. Loosen the clamp ring holding the RDU to the spherical bearing.
7. Loosen the clamp collar holding the RDU to the boring bar.
8. Remove the RDU.
9. Slide the boring bar from the workpiece.
10. Remove all mounting accessories.



## 5 MAINTENANCE

### IN THIS CHAPTER:

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### 5.1 MAINTENANCE CHECKLIST

Table 5-1 lists maintenance intervals and tasks.

**TABLE 5-1. MAINTENANCE INTERVALS AND TASKS**

| Interval                         | Task                                                                                 | Reference                |
|----------------------------------|--------------------------------------------------------------------------------------|--------------------------|
| <b>Before each use</b>           | Inspect the power cord for damage and replace as necessary.                          | --                       |
|                                  | Fill the lubricator oil cup in the air motor assembly with 6 oz (177.4 mL) of AW 32. | Section 5.3.5 on page 60 |
|                                  | Spray the ACME screw and tool heads with WD-40.                                      |                          |
|                                  | Clean and lightly oil the bar.                                                       | Section 5.3.2 on page 59 |
|                                  | Spray the spherical bearing mounting bracket bearing mounts with WD-40.              | --                       |
| <b>Before and after each use</b> | Remove debris, oil, and moisture from machine surfaces.                              | --                       |

**TABLE 5-1. MAINTENANCE INTERVALS AND TASKS (CONTINUED)**

| Interval            | Task                                                                                                                         | Reference                |
|---------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Periodically</b> | Clean and lightly oil (do not grease) the leadscrew in the axial feed unit (AFU).                                            | Section 5.3.1 on page 59 |
|                     | Every six months, fill the 4:1 servo rotational drive unit (RDU) gearbox with 1 oz (29.5 mL) of Mobil SHC 634 synthetic oil. | Section 5.3.7 on page 61 |
|                     | Every six months, repack the spherical bearings in the spherical bearing mounting bracket with 2 cc's (2 mL) of Jetlube 550. | --                       |
|                     | Every six months or 500 hours, repack the gearbox with one ounce of Mobilith SHC 460 Synthetic gear grease.                  | --                       |
|                     | Every two years, replace the hydraulic oil with AW 32. Fill to the sight glass.                                              | Section 5.3.3 on page 59 |
|                     | Check both brushes for excessive wear and replace if necessary.                                                              | Section 5.3.4 on page 60 |
| <b>Annually</b>     | Check the air system periodically to verify that the air pressure is 90 psi (6.2 bar).                                       | Section 5.3.5 on page 60 |
|                     | Disassemble the AFU to clean, lubricate, and replace the seals.                                                              | Section 5.3.1 on page 59 |
| <b>As needed</b>    | Repack the AFU gearbox with 1 oz (29.6 mL) of Mobilith SHC 460 grease.                                                       | Section 5.3.1 on page 59 |
|                     | Sharpen or replace the tool bits.                                                                                            | --                       |

## 5.2 APPROVED LUBRICANTS

CLIMAX recommends using the following lubricants at the locations indicated.



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

**TABLE 5-2. APPROVED LUBRICANTS**

| Application Area       | Lubricant                  | Quantity       | Frequency      |
|------------------------|----------------------------|----------------|----------------|
| 4:1 RDU                | Mobilith SHC 460 Synthetic | 1 oz           | Every 6 months |
| 12:1 RDU (BB5000 only) | Mobil SHC 634 Synthetic    | 5 oz           | Every 6 months |
| AFU                    | Mobilith SHC 460           | 1 oz           | Yearly         |
| Spherical bearings     | JetLube 550                | 2 cc           | Every 6 months |
| Hydraulic oil          | AW 32                      | To sight glass | Every 2 years  |

TABLE 5-2. APPROVED LUBRICANTS (CONTINUED)

| Application Area                                             | Lubricant    | Quantity    | Frequency                      |
|--------------------------------------------------------------|--------------|-------------|--------------------------------|
| Air motor                                                    | AW 32        | 6 oz        | Per use through the lubricator |
| ACME screw<br>Boring bar<br>Tool heads<br>Unpainted surfaces | WD 40        | As required | Per use by hand                |
| Cutting fluid                                                | DoAll AL2000 | As required | As required                    |
| Long-term rust preventative                                  | LPS-3        | As required | For storage more than 3 months |
| Tool bits, work piece                                        | Koolkut      | As required | Per use by hand                |

## 5.3 MAINTENANCE TASKS

Maintenance tasks are described in the following sections.

### 5.3.1 AFU

Clutch performance may be compromised if the machine has been “crashed,” has seen over a thousand hours of operation, or is operated in a dirty environment.

If the axial feed fails, check that the shear pins are intact. Extra pins are included with the assembly. The pins must be in place (notched end out) to engage the feed.

#### NOTICE

Freezing temperatures may cause the axial feed box to run sluggishly.

### 5.3.2 Boring bar

Check the bar regularly for nicks, cuts, or abrasions. Dress the bar smooth if necessary. A bar with nicks or gouges can damage the bearing supports and RDU beyond repair. Wipe the bar clean with solvent to remove dirt and chips.

### 5.3.3 Hydraulic power system

For information on maintaining the hydraulic power system, see the manufacturer’s documentation for your hydraulic system.

---

### 5.3.4 Electric motor assembly

#### **WARNING**

The handle (PN 75648) clamped onto the motor acts as a torque restraint and only an authorized CLIMAX representative should remove and reinstall it. If the handle needs to be removed, contact CLIMAX. Failure to do this could cause severe damage to the machine or bodily injury.



FIGURE 5-1. ELECTRIC MOTOR WITH HANDLE

Replace or repair any damaged or abraded parts, including brushes.  
Use only grounded, properly rated electrical outlets.

#### **CAUTION**

Brush wear mostly depends on the load and RPM. Depending on operating conditions, periodically check both brush for excessive wear and replace if necessary.

#### **WARNING**

Electrical equipment can shock or cause an explosion if used near wet or flammable materials. Do not operate the motor if it is wet or exposed to combustible materials.

### 5.3.5 Air motor assembly

Do the following to increase the life of the air motor:

- Route the air supply through a lubricator and filter.
- Use nonrestrictive air lines and fittings.
- Set the air motor speed only by adjusting the air control valve.

#### **CAUTION**

Do not attempt to adjust air motor speed by changing the in-line air pressure from 90 psi (6.2 bar).

- Use air oil that has antioxidants and rust inhibitors. The lubricator should deliver oil at a rate of 20-30 drops per minute at full throttle.
- Drain water from the air filter.

### 5.3.6 BB5000 servo motor



Let the surface of the servo cool before handling.

Servo temperatures of less than 140° F (60° C) are expected, as well as the formation of an oil droplet over an eight-hour use period. Replace oil with 5 ounces of Mobil SHC 634 Oil after the first 40 hours and then additionally every 80 hours.

Running at a high RDU temperature of more than 220° F (104° C) for over 30 minutes at a time or reaching an RDU temperature of 260° F (127° C) will limit the life of the RDU and can create oil leakage.

Replace oil with 5 ounces of Mobil SHC 634 Oil every 40 hours.

If the motor does not stop when the speed control knob is turned to zero, see Appendix D on page 141.

### 5.3.7 4:1 RDU gearbox

Improperly packed bearings or improperly torqued bearing nuts will significantly damage the gearbox. Have the gearbox serviced at CLIMAX every six months in order to maintain the warranty.

### 5.3.8 Cutting fluid

Only use water-based cutting fluids with the CLIMAX air mist system. Refill the reservoir with DoAll AL2000 as required.

## 5.4 QUALITY CHECKS

TABLE 5-3. QUALITY CHECKS

| Area                         | Check                                                                                              |
|------------------------------|----------------------------------------------------------------------------------------------------|
| AFU                          | Rotate the collet by hand, checking for free movement.                                             |
|                              | Check the feed engagement pins, feed operation, feed stop pins, and that feed screws are not bent. |
| RDU                          | Manually retract the spring plungers and drive key, checking for free movement.                    |
| Tool heads                   | All hardware is present and in good condition for each tool head.                                  |
| Bearing mounts               | All single-arm mount screws and washers are in good condition.                                     |
| Tack weld plates (P/N 19869) | Welds are ground off and a flat surface is present for welding.                                    |
| Safety devices and labels    | Present and in good condition (see Section 1.7 on page 6).                                         |
| Steel container (P/N 37732)  | In good condition and all packaging materials are new.                                             |

## 5.5 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 CLIMAX.

TABLE 5-4. TROUBLESHOOTING

| Problem                                              | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AFU does not advance the bar</b>                  | <ul style="list-style-type: none"><li>• Fully engage the feed shaft pin in the bushing slot.</li><li>• Check that the pin has not sheared.</li><li>• Clean the leadscrew.</li><li>• Check that the feed rate is not too low.</li><li>• Check that the AFU is clamped tightly to the bar.</li><li>• Check that none of the clamp collars, except those on the AFU, are over tightened.</li><li>• Check that the stop arm has not depressed one of the stop feed screw assemblies.</li></ul>                                                                                                     |
| <b>Tool chatter</b>                                  | <ul style="list-style-type: none"><li>• Sharpen the tool bit.</li><li>• Decrease the nose radius on the tool bit.</li><li>• Increase the feed rate.</li><li>• Increase or decrease the drive motor speed.</li><li>• Change the depth of cut.</li><li>• Add additional support arms or place the existing support arms closer to the workpiece.</li></ul>                                                                                                                                                                                                                                       |
| <b>Machine is unstable</b>                           | Tighten all clamps and hardware. Provide additional support.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>RDU will not rotate</b>                           | <ul style="list-style-type: none"><li>• Check that the HPU is turned on.</li><li>• Check that the HPU pump motor is rotating as indicated by the arrow on the pump body (see Section 3.5.1 on page 43).</li><li>• Check the oil level in the HPU.</li><li>• Check that the speed control is at maximum flow.</li><li>• Check the hydraulic hose connections.</li><li>• On electric powered units, check electrical connections and circuit breakers (see Section 3.5.3 on page 46).</li><li>• Check that the control box on electric motors is plugged into the motor and turned on.</li></ul> |
| <b>Feed is in wrong direction</b>                    | Check the feed shaft position on the AFU (see Section 3.4 on page 40).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>HPU fails to deliver fluid</b>                    | <ul style="list-style-type: none"><li>• Check the fluid level and add more if necessary.</li><li>• Check that the pump motor is turning in the correct direction (see Section 3.5.1 on page 43).</li><li>• Check hydraulic connections for obstructions or leaks.</li></ul>                                                                                                                                                                                                                                                                                                                    |
| <b>HPU motor does not run</b>                        | <ul style="list-style-type: none"><li>• Check that the power unit and electrical supply are compatible.</li><li>• Check that the unit is plugged in.</li><li>• Check for faulty wiring.</li><li>• Check the reset switch in the electrical box.</li><li>• Check the fuses in the electrical box.</li></ul>                                                                                                                                                                                                                                                                                     |
| <b>Servo motor does not stop when turned to zero</b> | See Appendix D on page 141.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## 6 STORAGE AND SHIPPING

### IN THIS CHAPTER:

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| 6.1.2 LONG-TERM STORAGE  | -63 |
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| 6.3 DECOMMISSIONING      | -64 |

## 6.1 STORAGE

Proper storage of the boring machine will extend its usefulness and prevent undue damage.

Before storing, do the following:

1. Clean the machine with solvent to remove grease, metal chips, and moisture.
2. Remove hoses to the HPU. Do not remove the ramp feature hoses.

Store the boring machine in its original shipping container. Keep all packing materials for repackaging the machine.

### 6.1.1 Short-term storage

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

1. Remove the tooling.
2. Lower and support the spindle.
3. Remove the hoses to the HPU. Do not remove the ramp feature hoses.
4. Clean the machine to remove dirt, grease, metal chips, and moisture.
5. Spray all black and bare metal surfaces with LPS-3 to prevent corrosion.
6. Store in a protected area.

### 6.1.2 Long-term storage

For long-term storage (longer than three months), follow the short-term storage instructions, but use LPS-3 instead of LPS-2.

## 6.2 SHIPPING

The boring machine can be shipped in its original shipping container.

---

## **6.3 DECOMMISSIONING**

To decommission the boring machine before disposal, remove the drive assembly from the RDU and dispose of the drive assembly separately from the rest of the machine components. Refer to the BB4500 exploded views in Appendix A on page 65 and the BB5000 exploded views in Appendix B on page 83.



## APPENDIX A BB4500 ASSEMBLY DRAWINGS

### *Drawing list*

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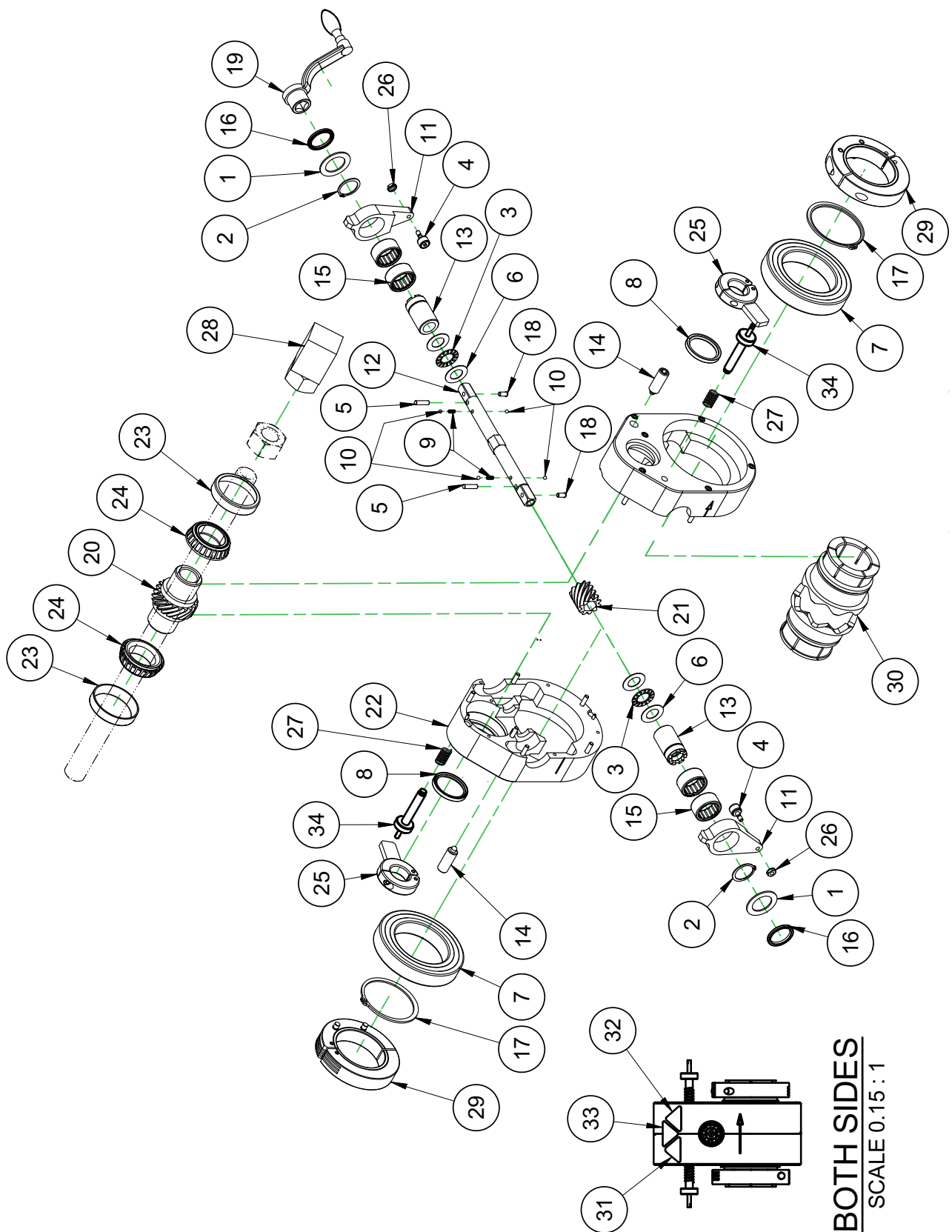
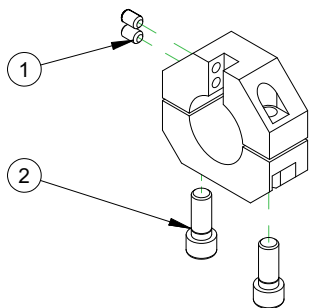


FIGURE A-1. AXIAL FEED UNIT ASSEMBLY (P/N 43378)

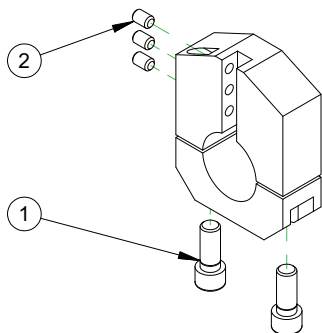
| PARTS LIST |     |       |                                                                                   |
|------------|-----|-------|-----------------------------------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                                                       |
| 1          | 2   | 10144 | WASHER THRUST 1 ID X 1.562 OD X .060                                              |
| 2          | 2   | 10534 | RING SNAP 1 OD                                                                    |
| 3          | 2   | 10538 | BRG THRUST .625 ID X 1.125 OD X .0781                                             |
| 4          | 2   | 10836 | BRG CAM FOLLOW .500 X .344                                                        |
| 5          | 2   | 11763 | PIN DOWEL 3/16 x 3/4                                                              |
| 6          | 4   | 11823 | WASHER THRUST .625 ID X 1.125 OD X .030                                           |
| 7          | 2   | 12388 | BRG BALL 2.7559 X 4.3307 X .7874                                                  |
| 8          | 2   | 16505 | SEAL 1.375 ID X 1.750 OD X .197 (KB)                                              |
| 9          | 2   | 19561 | SPRING COMP .148 OD X .023 WIRE X .50 LONG STAINLESS                              |
| 10         | 4   | 19562 | BALL STEEL 5/32 DIA                                                               |
| 11         | 2   | 25949 | ARM RATCHET                                                                       |
| 12         | 1   | 25950 | SHAFT FEED                                                                        |
| 13         | 2   | 25951 | BUSHING DRIVE                                                                     |
| 14         | 2   | 25955 | SPRING PLUNGER 1/2-13 LIGHT FORCE                                                 |
| 15         | 4   | 25957 | BRG ROLLER CLUTCH 1 X 1.312 X .625                                                |
| 16         | 2   | 25959 | SEAL 1.000 ID X 1.312 OD X .125 HM14 LIP                                          |
| 17         | 2   | 25961 | RING SNAP 2-3/4 BEVELED                                                           |
| 18         | 2   | 26828 | PLUNGER BALL PUSHFIT                                                              |
| 19         | 1   | 26850 | HANDLE CRANK MODIFIED                                                             |
| 20         | 1   | 27197 | LEAD NUT BB4500 BB5000 AXIAL FEED (VMI)                                           |
| 21         | 1   | 27198 | GEAR HELICAL AXIAL FEED BB5000                                                    |
| 22         | 1   | 27199 | ASSEMBLED AXIAL FEED UNIT HOUSING                                                 |
| 23         | 2   | 27203 | BRG CUP 2.328 OD x .470 WIDE                                                      |
| 24         | 2   | 27204 | BRG CONE 1.3775 ID X .6600 WIDE                                                   |
| 25         | 2   | 27222 | STOP ARM ASSY                                                                     |
| 26         | 2   | 28060 | NUT, 10-32 UNF KEPS                                                               |
| 27         | 2   | 28618 | SPRING COMP .48 OD X .051 WIRE X .88                                              |
| 28         | 1   | 28756 | BLOCK TACKWELD BB5000                                                             |
| 29         | 2   | 29552 | CLAMP COLLAR MODIFIED 3RD GEN AFU                                                 |
| 30         | 1   | 43379 | COLLET BB4500                                                                     |
| 31         | 2   | 78735 | LABEL WARNING HAND CRUSH/FORCE                                                    |
| 32         | 2   | 78742 | LABEL WARNING ENTANGLEMENT OF HAND/ROTATING SHAFT                                 |
| 33         | 2   | 80510 | LABEL WARNING CUTTING OF FINGERS/ROTATING BLADE GRAPHIC 1.13 TALL TRIANGLE YELLOW |
| 34         | 2   | 92494 | SCREW ASSY FEED STOP GEN 2                                                        |

FIGURE A-2. AXIAL FEED UNIT ASSEMBLY PARTS LIST (P/N 43378)



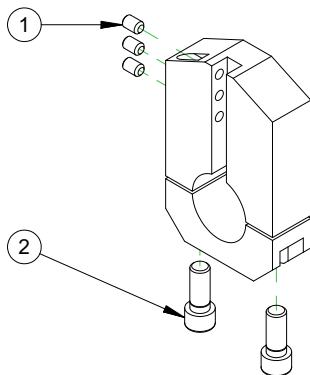
**TOOL HEAD METRIC 4 TO 6 DIA 1-3/4 BAR BB4500**  
**43563**

| PARTS LIST |     |       |                              |
|------------|-----|-------|------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                  |
| 1          | 2   | 35214 | SCREW M8 X 1.25 X 12mm SSSCP |
| 2          | 2   | 40697 | SCREW M12 X 1.75 X 30mm SHCS |



**TOOL HEAD METRIC 6 TO 8 DIA 1-3/4 BAR BB4500**  
**43564**

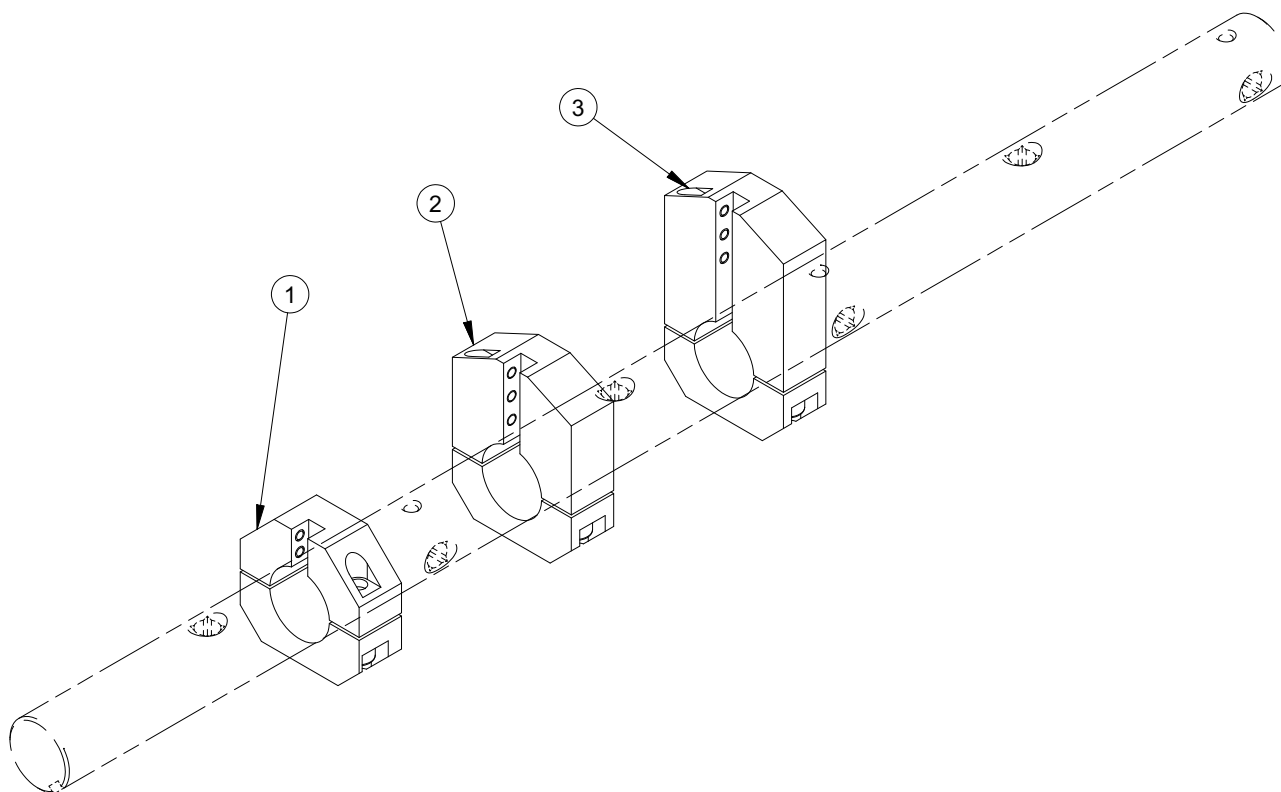
| PARTS LIST |     |       |                              |
|------------|-----|-------|------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                  |
| 1          | 2   | 40697 | SCREW M12 X 1.75 X 30mm SHCS |
| 2          | 3   | 43120 | SCREW M8 X 1.25 X 12 SSSFP   |



**TOOL HEAD METRIC 8 TO 10 DIA 1-3/4 BAR BB4500**  
**43565**

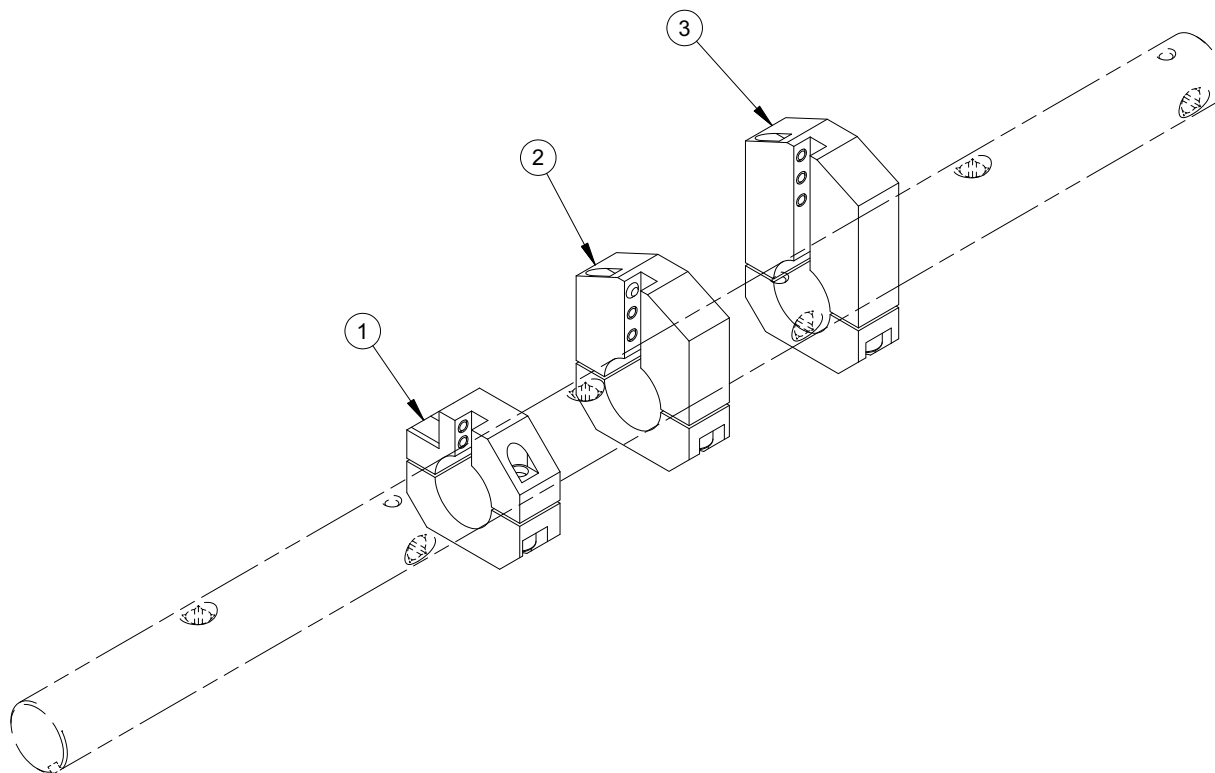
| PARTS LIST |     |       |                              |
|------------|-----|-------|------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                  |
| 1          | 3   | 35214 | SCREW M8 X 1.25 X 12mm SSSCP |
| 2          | 2   | 40697 | SCREW M12 X 1.75 X 30mm SHCS |

**FIGURE A-3. BORING HEADS SET ASSEMBLY (P/N 43576)**



| PARTS LIST |     |       |                                               |
|------------|-----|-------|-----------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                   |
| 1          | 1   | 43563 | TOOL HEAD METRIC 4 TO 6 DIA 1-3/4 BAR BB4500  |
| 2          | 1   | 43564 | TOOL HEAD METRIC 6 TO 8 DIA 1-3/4 BAR BB4500  |
| 3          | 1   | 43565 | TOOL HEAD METRIC 8 TO 10 DIA 1-3/4 BAR BB4500 |

FIGURE A-4. BORING HEADS SET 4–10 METRIC DIAMETER ASSEMBLY (P/N 43576)



| PARTS LIST |     |       |                                       |
|------------|-----|-------|---------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                           |
| 1          | 1   | 43492 | TOOL HEAD 4 TO 6 DIA 1-3/4 BAR        |
| 2          | 1   | 43493 | TOOL HEAD 6 TO 8 DIA 1-3/4 BAR BB4500 |
| 3          | 1   | 43494 | TOOL HEAD 8 TO 10 DIA 1-3/4 BAR       |

**FIGURE A-5. BORING HEADS SET 4–10" DIAMETER ASSEMBLY (P/N 43575)**

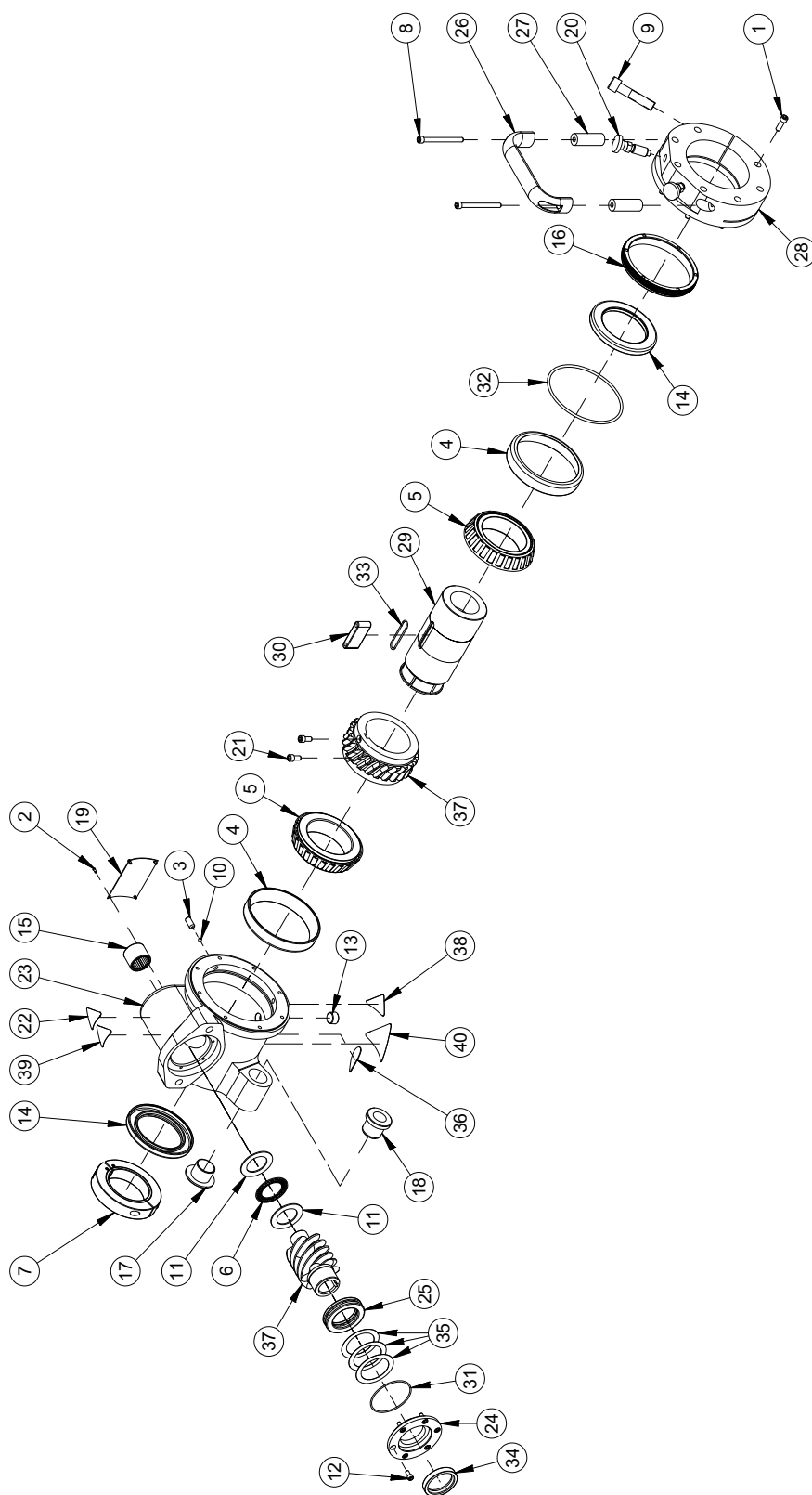
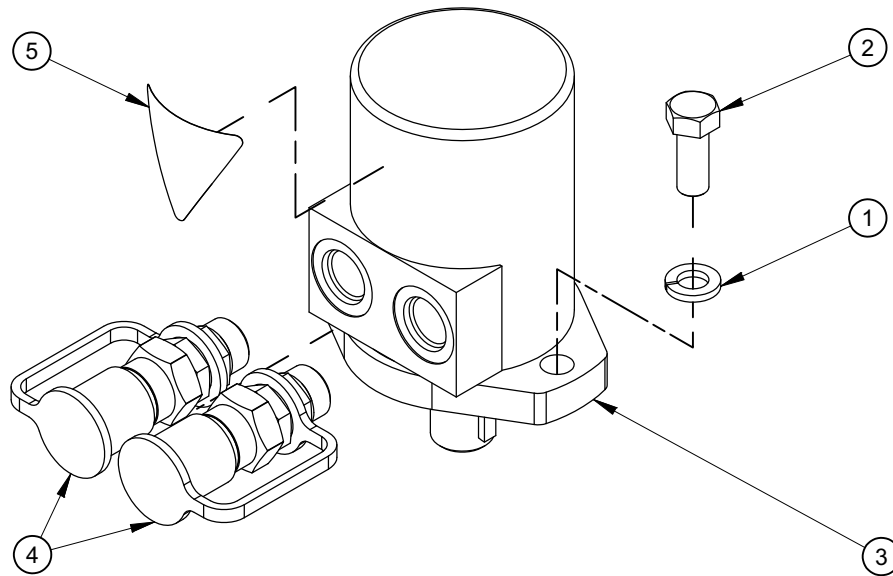


FIGURE A-6. RDU 2ND GEN ASSEMBLY (P/N 53912)

| PARTS LIST |     |       |                                                                               |
|------------|-----|-------|-------------------------------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                                                   |
| 1          | 7   | 10160 | SCREW 1/4-20 X 3/4 SHCS                                                       |
| 2          | 4   | 10588 | SCREW DRIVE #2 x 1/4 HOLE SIZE .089                                           |
| 3          | 2   | 11684 | SCREW 5/16-18 X 3/4 SSSCP                                                     |
| 4          | 2   | 11821 | BRG CUP 4.4375 OD X .750 WIDE                                                 |
| 5          | 2   | 11822 | BRG CONE 2.75 ID X 1.00 WIDE                                                  |
| 6          | 1   | 12387 | BRG THRUST 1.259 ID X 1.937 OD X .0781                                        |
| 7          | 1   | 12395 | CLAMP COLLAR SPLIT HINGED 2-1/2 ID                                            |
| 8          | 2   | 12592 | SCREW 1/4-20 X 2-3/4 SHCS                                                     |
| 9          | 1   | 15212 | SCREW 1/2-20 X 2-1/4 SHCS                                                     |
| 10         | 2   | 16594 | BALL NYLON 3/16 DIA                                                           |
| 11         | 2   | 16666 | WASHER THRUST 1.250 ID X 1.937 OD X .060                                      |
| 12         | 6   | 19232 | SCREW 10-24 X 3/8 SHCS                                                        |
| 13         | 1   | 21956 | FTG PLUG 3/8 NPTM SOCKET                                                      |
| 14         | 2   | 27348 | SEAL 2.750 ID X 4.000 OD X .375                                               |
| 15         | 1   | 27353 | BRG NEEDLE 1 ID X 1-1/4 OD X 1 CLOSED                                         |
| 16         | 1   | 28219 | NUT MAIN BRG PRELOAD                                                          |
| 17         | 1   | 28220 | BUSHING LEADSCREW FLANGED                                                     |
| 18         | 1   | 28589 | BUSHING FLANGED 1 5P ACME THREADED                                            |
| 19         | 1   | 29154 | PLATE SERIAL YEAR MODEL CE 2.0 X 3.0                                          |
| 20         | 2   | 29207 | SPRING PLUNGER HAND RETRACT 1/2 X 13                                          |
| 21         | 2   | 45900 | SCREW 1/4-28 X 1/2 SHCS                                                       |
| 22         | 1   | 46902 | LABEL WARNING HOT SURFACE                                                     |
| 23         | 1   | 49665 | HOUSING RDU BB5000 4TH                                                        |
| 24         | 1   | 49667 | CAP WORM HOUSING BB5000 4TH GEN                                               |
| 25         | 1   | 52307 | BRG BALL THRUST 40 MM ID X 60 MM OD X 13 MM                                   |
| 26         | 1   | 53610 | HANDLE PULL 1/4 CBORE MTG 2.17 X 5.75 X 1.02W COATED                          |
| 27         | 2   | 53613 | SPACER .67 OD X .266 ID X 1.875 LG                                            |
| 28         | 1   | 53910 | CLAMP RING RDU MOUNT BB4500 HD                                                |
| 29         | 1   | 53911 | COLLET MAIN DRIVE BB4500 4TH GEN                                              |
| 30         | 1   | 53913 | KEY MAIN DRIVE BB4500 HD                                                      |
| 31         | 1   | 54920 | RING O 1/16 X 2-1/4 ID X 2-3/8 OD                                             |
| 32         | 1   | 54921 | RING O 4-3/8 ID X 4-5/8 OD X 1/8                                              |
| 33         | 1   | 54922 | RING O 1/16 X 1-3/8 ID X 1-1/2 OD VITON 75 DUROMETER                          |
| 34         | 1   | 55708 | SEAL 1.500 ID X 2.000 OD X .375 HIGH TEMP                                     |
| 35         | A/R | 55784 | SHIM 1.7 ID X 2.3 OD .001 THICK                                               |
| 35         | A/R | 55790 | SHIM 1.7 ID X 2.3 OD .002 THICK                                               |
| 35         | A/R | 55791 | SHIM 1.7 ID X 2.3 OD .005 THICK                                               |
| 36         | 1   | 59044 | LABEL WARNING CONSULT OPERATOR'S MANUAL                                       |
| 37         | 1   | 73954 | SET WORM GEAR 4:1 BB5000 4TH GEN 1PC WORM                                     |
| 38         | 1   | 78741 | LABEL WARNING CRUSH FOOT                                                      |
| 39         | 1   | 78748 | LABEL WARNING FLYING DEBRIS/LOUD NOISE                                        |
| 40         | 1   | 80207 | LABEL WARNING - ENTANGLEMENT/ROTATING SHAFT GRAPHIC 1.95 TALL TRIANGLE YELLOW |

FIGURE A-7. RDU 2ND GEN ASSEMBLY (P/N 53912)

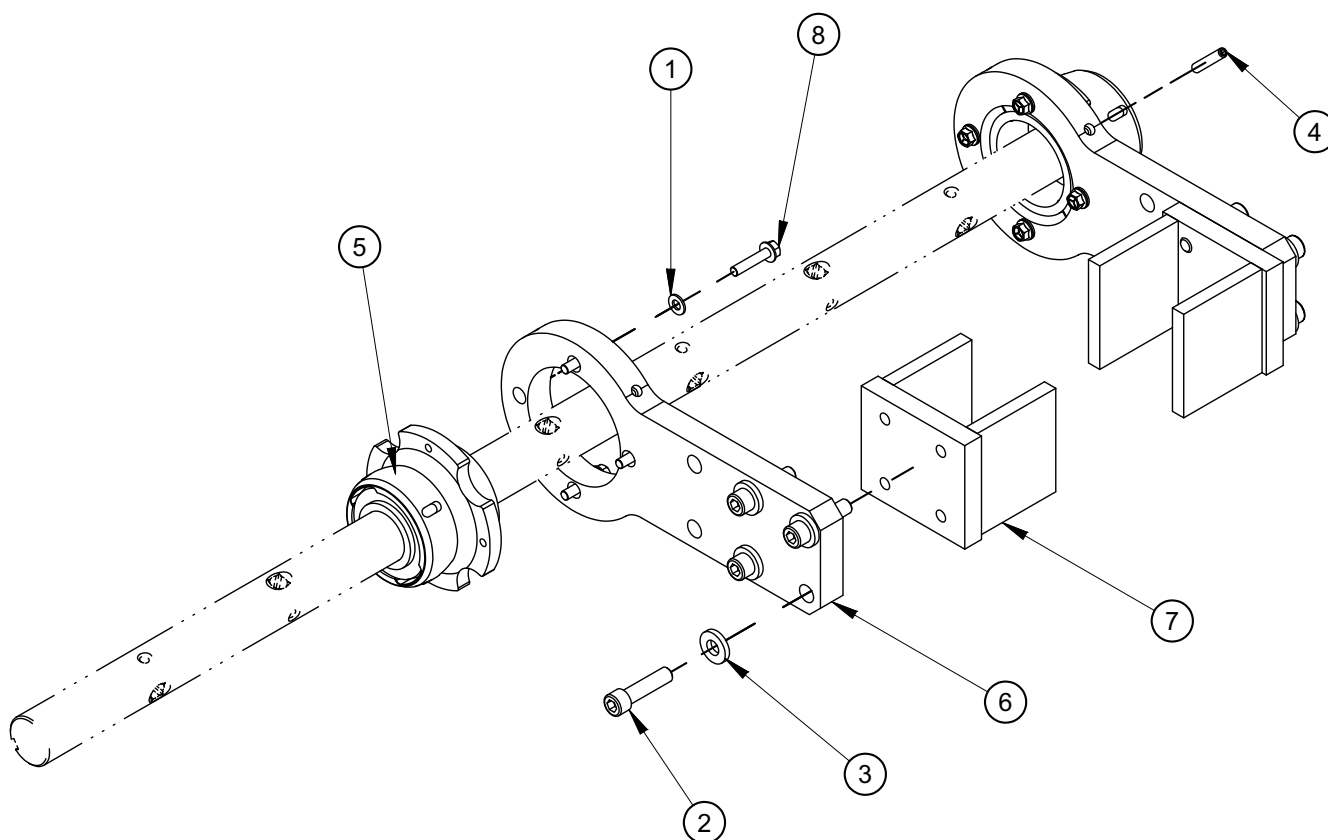




| PARTS LIST |     |       |                                                                   |
|------------|-----|-------|-------------------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                                       |
| 1          | 2   | 11238 | WASHER LOCK 1/2                                                   |
| 2          | 2   | 11826 | SCREW 1/2-13 X 1-1/4 HHCS                                         |
| 3          | 1   | A/R   | SEE CHART                                                         |
| 4          | 1   | 39828 | KIT FTG 1/2 HYD QUICK COUPLERS                                    |
| 5          | 1   | 78619 | LABEL WARNING HOT SURFACE GRAPHIC 1.95" TALL TRIANGLE YELLOW (KB) |

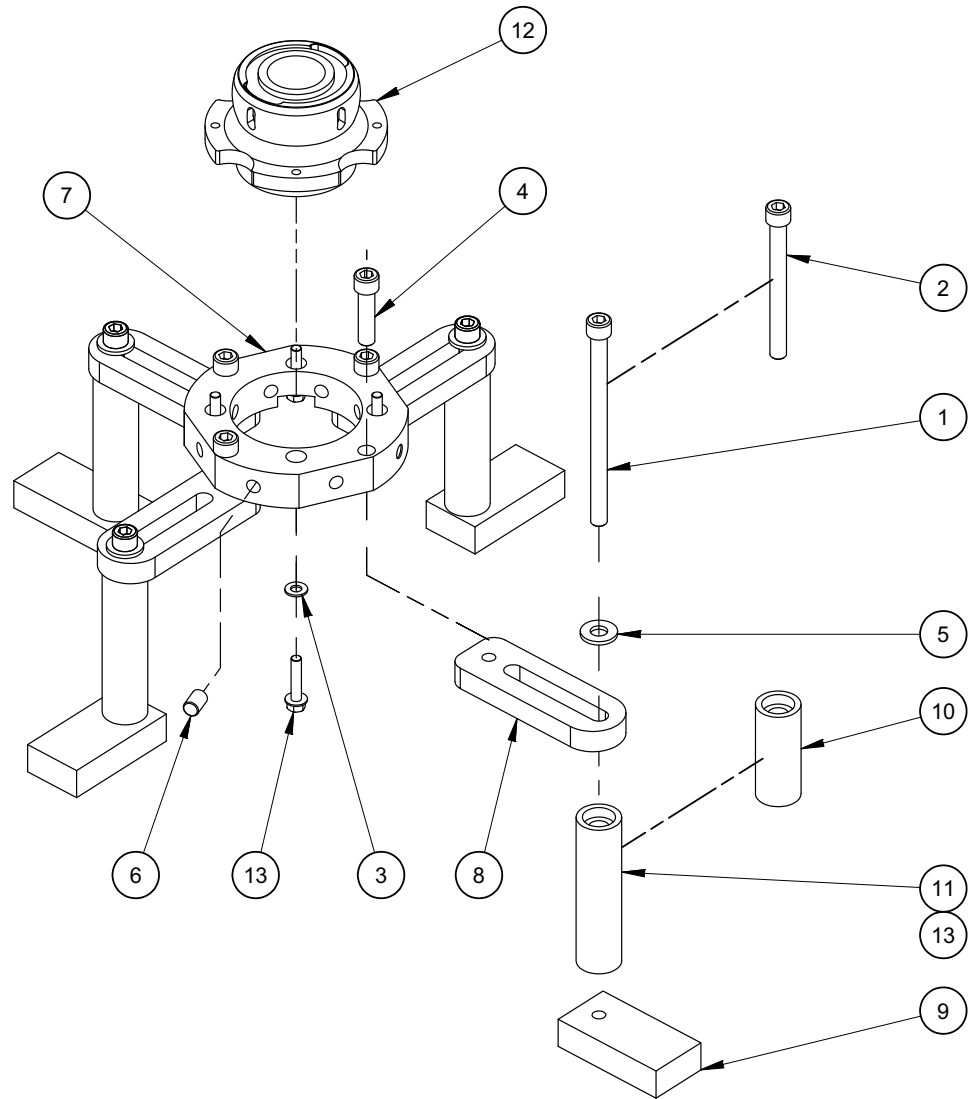
| PART No | DESCRIPTION                                     | MOTOR HYD P/N |
|---------|-------------------------------------------------|---------------|
| 39837   | MOTOR ASSY HYD 2.2 CU IN KEYED 1/2 FTG          | 27477         |
| 39843   | MOTOR ASSY HYD 3.6 CU IN KEYED 1/2 FTG          | 20684         |
| 39844   | MOTOR ASSY HYD 5.7 CU IN KEYED 1/2 FTG S-SERIES | 21530         |
| 39845   | MOTOR ASSY HYD 7.3 CU IN KEYED 1/2 FTG          | 20231         |
| 39846   | MOTOR ASSY HYD 8.9 CU IN KEYED S-SERIES 1/2 FTG | 21531         |
| 39847   | MOTOR ASSY HYD 14.1 CU IN KEYED 1/2 FTG         | 34585         |
| 43451   | MOTOR ASSY HYD 11.3 CU IN KEYED 1/2 FTG         | 21532         |
| 43452   | MOTOR ASSY HYD 17.9 CU IN KEYED 1/2 FTG         | 21534         |
| 43552   | MOTOR ASSY HYD 22.5 CU IN KEYED SHAFT           | 30567         |

FIGURE A-8. HYDRAULIC MOTOR ASSEMBLY (P/N 39848)



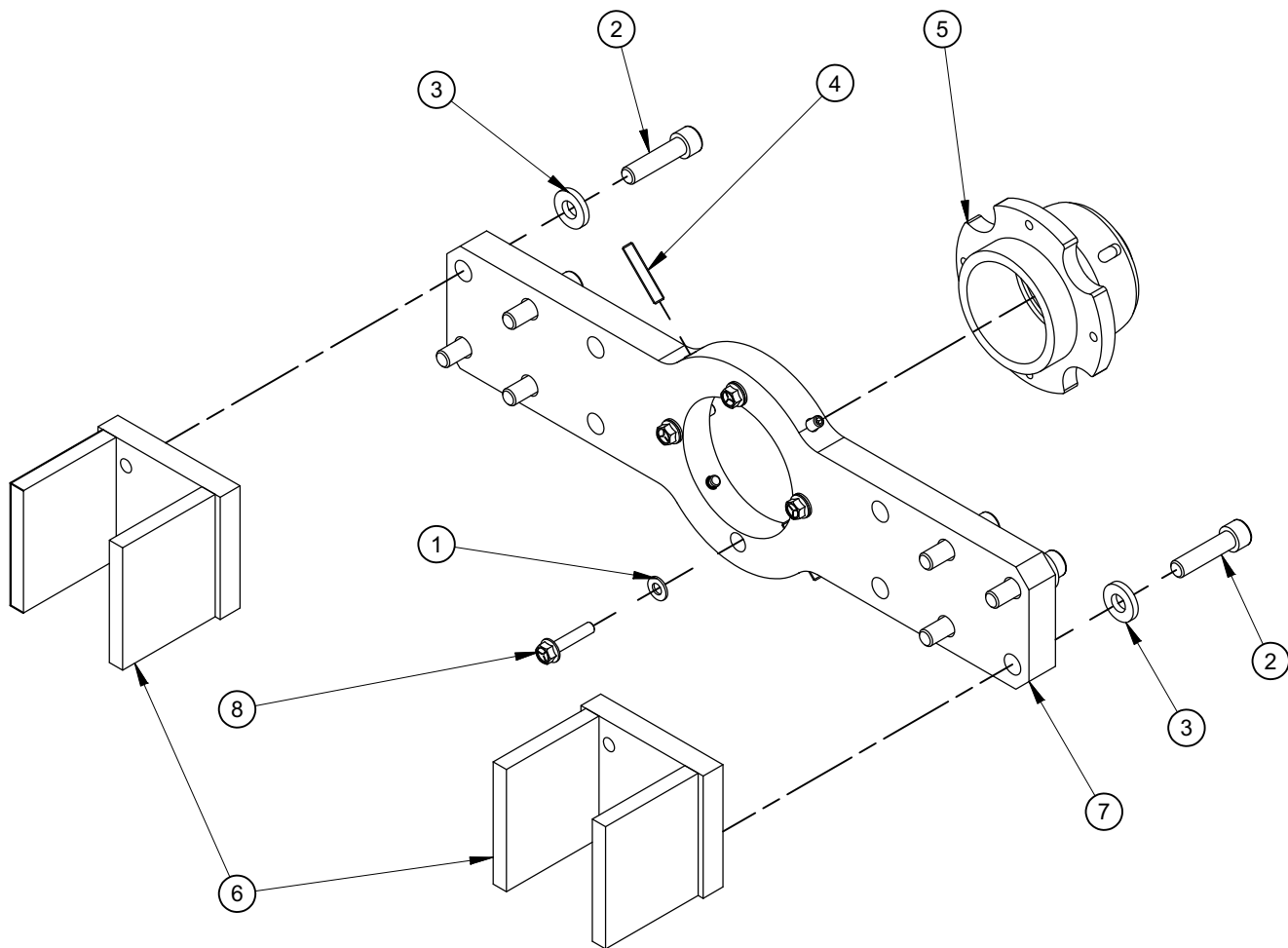
| PARTS LIST |     |       |                                              |
|------------|-----|-------|----------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                  |
| 1          | 8   | 13489 | WASHER 5/16 FLTW SAE                         |
| 2          | 8   | 14036 | SCREW 1/2-13 X 2 SHCS                        |
| 3          | 8   | 17145 | WASHER 1/2 FLTW HARDENED 1-1/8 OD X 3/16 THK |
| 4          | 8   | 20174 | SCREW 5/16-18 X 1-3/4 SSSFP                  |
| 5          | 2   | 43264 | MOUNT BRG SPHERICAL ARM BB45000 STD          |
| 6          | 2   | 43265 | BRACKET MOUNTING ARM                         |
| 7          | 2   | 43266 | PLATE BEARING SCAB                           |
| 8          | 8   | 45365 | SCREW 5/16-24 X 1.500 HHCS FLANGED BLK OX    |

FIGURE A-9. SINGLE-ARM MOUNT ASSEMBLY (P/N 43262)



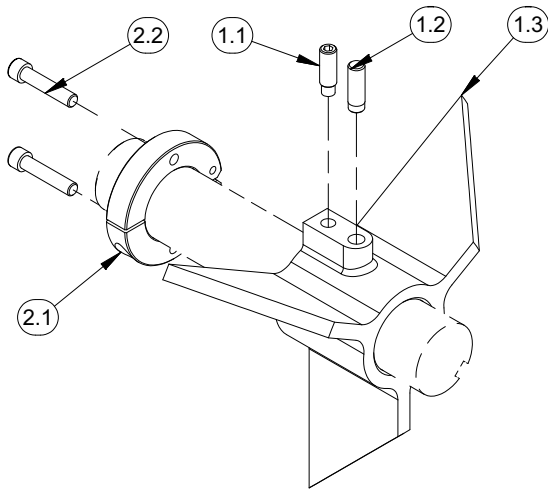
| PARTS LIST |     |       |                                             |
|------------|-----|-------|---------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                 |
| 1          | 4   | 11223 | SCREW 1/2-13 X 7 SHCS                       |
| 2          | 4   | 11879 | SCREW 1/2-13 X 5 SHCS                       |
| 3          | 4   | 13489 | WASHER 5/16 FLTW SAE                        |
| 4          | 4   | 14036 | SCREW 1/2-13 X 2 SHCS                       |
| 5          | 4   | 22662 | WASHER 1/2 FLTW HARDENED 1-1/8 OD X 1/8 THK |
| 6          | 4   | 27273 | SCREW 1/2-20 X 3/4 SSSFP                    |
| 7          | 1   | 36962 | BEARING MOUNT RING 1-3/4                    |
| 8          | 4   | 36965 | EXTENSION ARM MOUNT                         |
| 9          | 4   | 36966 | TACK BLOCK 4 IN                             |
| 10         | 4   | 37598 | ASSY STAND OFF TUBE 3.3 INCH                |
| 11         | 4   | 37599 | ASSY STAND OFF TUBE 5.3 INCH                |
| 12         | 1   | 43264 | MOUNT BRG SPHERICAL 1-3/4 ID W/CLAM STD     |
| 13         | 4   | 45365 | SCREW 5/16-24 X 1.500 HHCS FLANGED BLK OX   |

FIGURE A-10. UNIVERSAL MOUNT ASSEMBLY (P/N 43267)



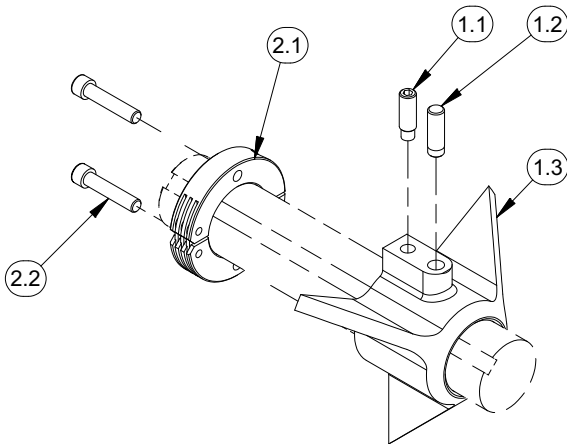
| PARTS LIST |     |       |                                              |
|------------|-----|-------|----------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                  |
| 1          | 4   | 13489 | WASHER 5/16 FLTW SAE                         |
| 2          | 8   | 14036 | SCREW 1/2-13 X 2 SHCS                        |
| 3          | 8   | 17145 | WASHER 1/2 FLTW HARDENED 1-1/8 OD X 3/16 THK |
| 4          | 4   | 20174 | SCREW 5/16-18 X 1-3/4 SSSFP                  |
| 5          | 1   | 43264 | MOUNT BRG SPHERICAL 1-3/4 ID W/CLAM STD      |
| 6          | 2   | 43266 | PLATE BEARING SCAB                           |
| 7          | 1   | 43277 | BRACKET MOUNTING DOUBLE ARM                  |
| 8          | 4   | 45365 | SCREW 5/16-24 X 1.500 HHCS FLANGED BLK OX    |

FIGURE A-11. DOUBLE-ARM BEARING MOUNT ASSEMBLY (P/N 43279)



**SET CONES SETUP 6 TO 10 DIA 1-3/4 KEYED BAR**  
**43384**

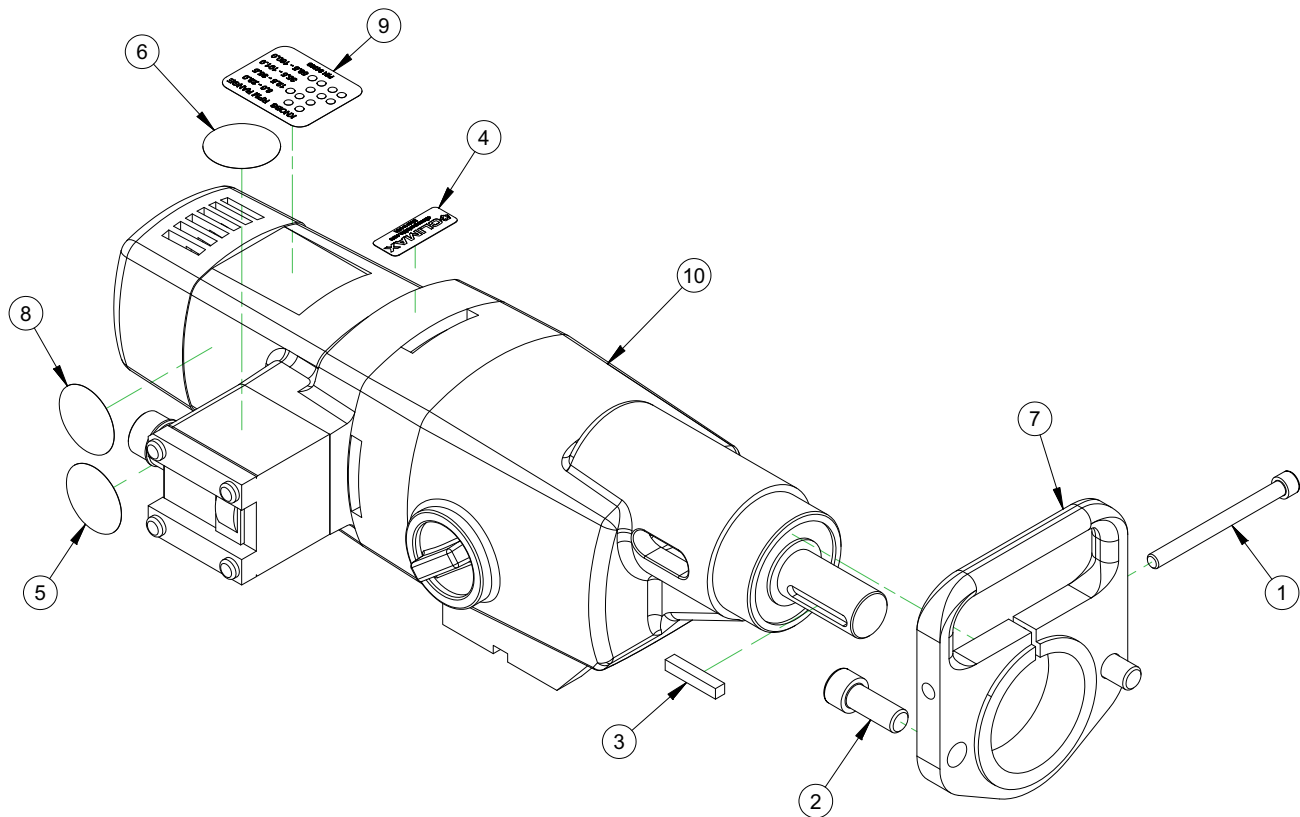
| PARTS LIST |     |       |                                     |
|------------|-----|-------|-------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                         |
| 1          | 1   | 42228 | CONE SETUP 6 TO 10 BB4500 1-3/4 BAR |
| 1.1        | 1   | 29092 | SCREW MOD 3/8-24 X 1-3/16 SSSFD     |
| 1.2        | 1   | 29091 | PIN STOP                            |
| 1.3        | 1   | 42228 | CONE SETUP BB4000 6" TO 10"         |
| 2          | 1   | 42508 | CLAMP COLLAR MODIFIED 1 3/4 ID      |
| 2.1        | 1   | 42508 | CLAMP COLLAR MODIFIED               |
| 2.2        | 2   | 17125 | SCREW 5/16-24 X 1-1/2 SHCS          |



**SET CONES SETUP 2 TO 6 DIA 1-3/4 KEYED BAR**  
**43383**

| PARTS LIST |     |       |                                    |
|------------|-----|-------|------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                        |
| 1          | 1   | 41220 | CONE SETUP 2 TO 6 BB4500 1-3/4 BAR |
| 1.1        | 1   | 29092 | SCREW MOD 3/8-24 X 1-3/16 SSSFD    |
| 1.2        | 1   | 29091 | PIN STOP                           |
| 1.3        | 1   | 41220 | CONE SETUP 2" TO 6" BB4000         |
| 2          | 1   | 42508 | CLAMP COLLAR MODIFIED 1 3/4 ID     |
| 2.1        | 1   | 42508 | CLAMP COLLAR MODIFIED              |
| 2.2        | 2   | 17125 | SCREW 5/16-24 X 1-1/2 SHCS         |

**FIGURE A-12. LARGE AND SMALL SET CONES ASSEMBLY (P/N 49060)**



| AVAILABLE CONFIGURATIONS |                                                               |
|--------------------------|---------------------------------------------------------------|
| PART NO                  | DESCRIPTION                                                   |
| 88008                    | MOTOR ELECTRIC ASSY EIBENSTOCK 120 V 4 SPEED REVERSIBLE GEN 2 |
| 88009                    | MOTOR ELECTRIC ASSY EIBENSTOCK 230 V 4 SPEED REVERSIBLE GEN 2 |

| PARTS LIST |     |       |                                                                               |
|------------|-----|-------|-------------------------------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                                                   |
| 1          | 1   | 11873 | SCREW 5/16-18 X 3-1/2 SHCS                                                    |
| 2          | 2   | 12646 | SCREW 1/2-13 X 1-1/4 SHCS                                                     |
| 3          | 1   | 15724 | KEY 1/4 SQ X 1.37 SQ BOTH ENDS                                                |
| 4          | 1   | 56300 | LABEL CLIMAX LOGO .66 X 1.75                                                  |
| 5          | 1   | 59037 | LABEL WARNING - WEAR EAR PROTECTION                                           |
| 6          | 1   | 59044 | LABEL WARNING - CONSULT OPERATOR'S MANUAL 1.5 DIA                             |
| 7          | 1   | 75648 | FLANGE MOTOR MTG ELEC RDU BB5000                                              |
| 8          | 1   | 78824 | LABEL WARNING - DO NOT EXPOSE TO WATER                                        |
| 9          | 1   | 84393 | LABEL EIBENSTOCK RPM RANGES                                                   |
| 10         | 1   | 88004 | NFIS MOTOR ELECTRIC 4 SPEED REVERSIBLE 120V CE EIBENSTOCK EAU 34/4.3 CB GEN 2 |
|            |     | 88005 | NFIS MOTOR ELECTRIC 4 SPEED REVERSIBLE 230V CE EIBENSTOCK EAU 34/4.3 CB GEN 2 |

FIGURE A-13. EIBENSTOCK MOTOR ASSEMBLY (P/N 88012)

# FOR GENERATION 2 ONLY



**EIBENSTOCK**  
Elektrowerkzeuge

Ersatzteilliste

EAU 34/4.3 CB

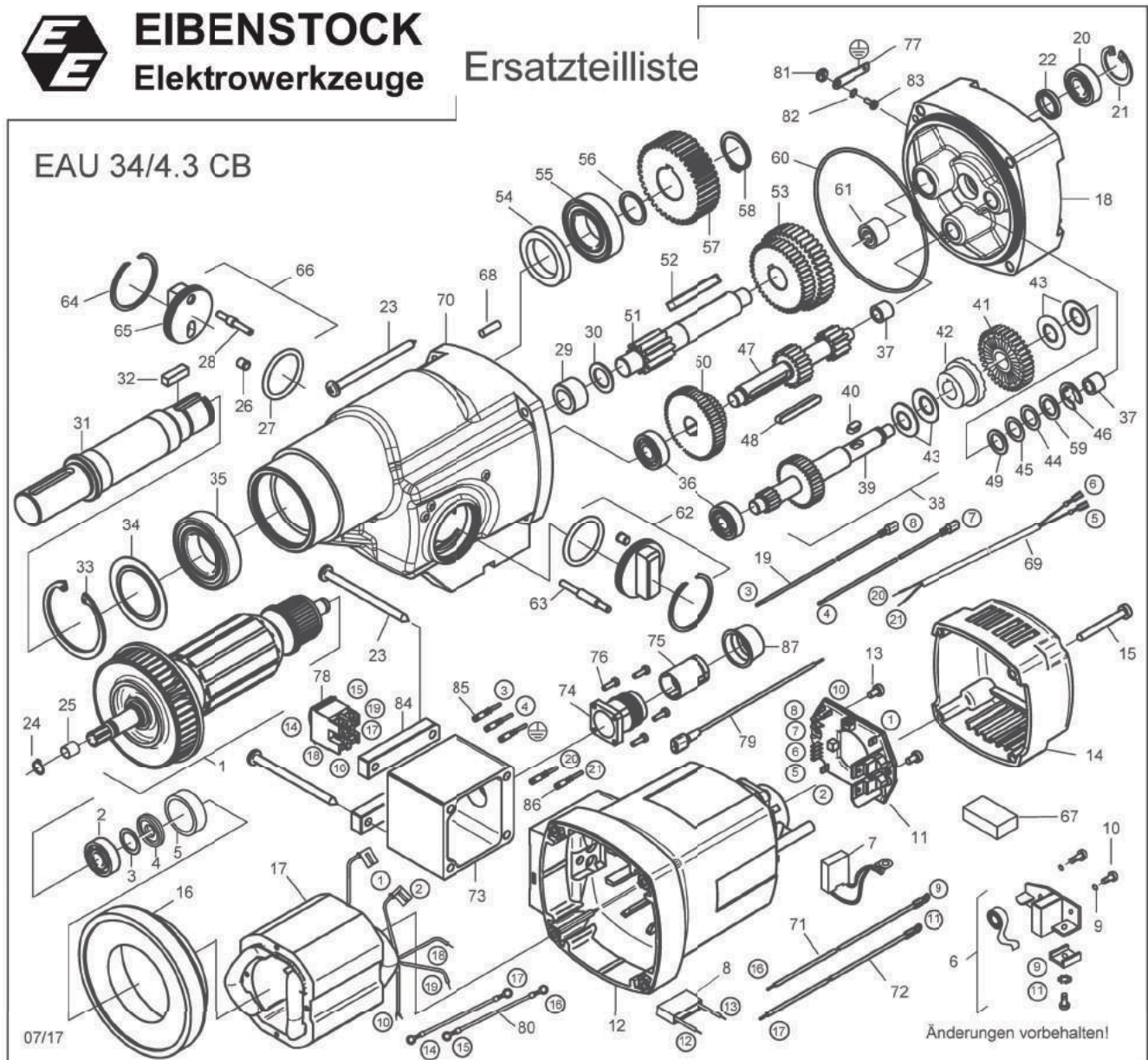


FIGURE A-14. EIBENSTOCK MOTOR ASSEMBLY -- GEN. 2 ONLY



# FOR GENERATION 2 ONLY

## EAU 34/4.3 CB - 230 V

04567000

| No. | Description                   | Order No. | Pcs |
|-----|-------------------------------|-----------|-----|
| 1   | rotor complete                | 7455U100  | 1   |
| 2   | grooved ball bearing 6000 2Z  | 80410021  | 1   |
| 3   | seal ring                     | 83000507  | 1   |
| 4   | magnetic disc                 | 7633J325  | 1   |
| 5   | bearing cap                   | 83000031  | 1   |
| 6   | brush holder                  | 80204515  | 2   |
| 7   | carbon brush                  | 80700070  | 2   |
| 8   | anti parasite condenser       | 80500010  | 1   |
| 9   | lock washer B4                | 80201385  | 4   |
| 10  | self tapping screw CM4x12     | 80201180  | 4   |
| 11  | PCB / circuit board           | 74522280  | 1   |
| 12  | motor housing                 | 7455U201  | 1   |
| 13  | self tapping screw HC 4,2x9,5 | 80201269  | 2   |
| 14  | cap                           | 80900082  | 1   |
| 15  | self tapping screw HC 4,8x45  | 80201267  | 4   |
| 16  | air guiding ring              | 73511141  | 1   |
| 17  | stator complete               | 7455U150  | 1   |
| 18  | end shield of gearing         | 7455U610  | 1   |
| 19  | interconnecting wire          | 74555180  | 2   |
| 20  | grooved ball bearing 6201 LUZ | 80410101  | 1   |
| 21  | locking ring 32x1,2           | 80201351  | 1   |
| 22  | shaft seal ring 15x21x3 KEIV  | 83000042  | 1   |
| 23  | self tapping screw HC 5,5x80  | 80201227  | 4   |
| 24  | locking ring 12/1             | 80201321  | 1   |
| 25  | bearing ring 12x15x12,5       | 80420160  | 1   |
| 26  | spring loaded thrust pad      | 85000157  | 2   |
| 27  | o-ring 36x1,5 NBR             | 83000022  | 2   |
| 28  | switch-actuating wheel short  | 71641532  | 1   |
| 29  | needle bearing RNA 4900       | 80420001  | 1   |
| 30  | disc                          | 71540517  | 1   |
| 31  | work spindle                  | 74565420  | 1   |
| 32  | fitting key B6x6x20           | 80200606  | 1   |
| 33  | locking ring 55/2             | 80201338  | 1   |
| 34  | disc                          | 71540426  | 1   |
| 35  | grooved ball bearing 6006 2RS | 80410071  | 1   |
| 36  | grooved ball bearing 6000     | 80410020  | 2   |
| 37  | needle sleeve HK 0810         | 80420110  | 2   |
| 38  | clutch complete               | 74643493  | 1   |
| 39  | intermediate shaft 1          | 74641490  | 1   |
| 40  | fitting key 5x5x10            | 80200600  | 1   |
| 41  | clutch wheel                  | 74326550  | 1   |
| 42  | coupling half                 | 71540560  | 1   |
| 43  | spring washer 28x12,2x1       | 80200713  | 4   |
| 44  | fitting washer 12/18x0,5      | 80200503  | 1   |

| No. | Description                   | Order No. | Pcs |
|-----|-------------------------------|-----------|-----|
| 45  | fitting washer 12/18x0,2      | 80200502  | 1   |
| 46  | lock washer 9                 | 80201361  | 1   |
| 47  | intermediate shaft 2          | 74641500  | 1   |
| 48  | fitting key 5x5x40            | 80200612  | 1   |
| 49  | pressure washer               | 71540607  | 1   |
| 50  | gear block 1                  | 74641440  | 1   |
| 51  | intermediate shaft 3          | 74641510  | 1   |
| 52  | fitting key 6x6x50            | 80200610  | 1   |
| 53  | gear block 2                  | 74641450  | 1   |
| 54  | shaft seal ring 30x42x7       | 83000071  | 1   |
| 55  | grooved ball bearing 6005 2RS | 80410061  | 1   |
| 56  | fitting washer 25x0,1         | 80200512  | 1   |
| 57  | spindle wheel                 | 74554430  | 1   |
| 58  | locking ring 24/1,2           | 80201326  | 1   |
| 59  | pressure washer               | 71540606  | 1   |
| 60  | o-ring 106x2                  | 83000092  | 1   |
| 61  | needle sleeve HK 1212         | 80420130  | 1   |
| 62  | switch button long            | 71641545  | 1   |
| 63  | switch-actuating wheel long   | 71641542  | 1   |
| 64  | circlip SB42                  | 80201355  | 2   |
| 65  | switch button                 | 71641540  | 2   |
| 66  | switch button short           | 71641535  | 1   |
| 67  | foam filler                   | 80600306  | 1   |
| 68  | notched pin plug 5x16         | 80200580  | 1   |
| 69  | control wire                  | 77314187  | 1   |
| 70  | gearbox housing               | 7455U400  | 1   |
| 71  | brush holder wire 1           | 74555181  | 1   |
| 72  | brush holder wire 2           | 74555182  | 1   |
| 73  | switch box                    | 74567630  | 1   |
| 74  | connector socket              | 80601480  | 1   |
| 75  | insert                        | 80601481  | 1   |
| 76  | screw 3x10                    | 80201600  | 4   |
| 77  | earth connector               | 80601189  | 1   |
| 78  | reverser                      | 80600103  | 1   |
| 79  | ground wire                   | 74567185  | 1   |
| 80  | interconnecting wire          | 80600243  | 2   |
| 81  | locking nut M4                | 73631188  | 1   |
| 82  | tooth lock washer A4,3        | 80200752  | 1   |
| 83  | allen screw M4x8              | 80201451  | 1   |
| 84  | protection hood               | 7455U633  | 2   |
| 85  | connector pin 2,5 mm²         | 80601484  | 3   |
| 86  | connector pin 0,75 mm²        | 80601483  | 2   |
| 87  | cap guard                     | 80601482  | 1   |

## EAU 34/4.3 CB - 110 V

04568000

|   |                |          |   |        |    |                     |          |   |       |
|---|----------------|----------|---|--------|----|---------------------|----------|---|-------|
| 1 | rotor complete | 7455V100 | 1 | 150,00 | 11 | PCB / circuit board | 7451I280 | 1 | 68,75 |
| 7 | carbon brush   | 80700077 | 2 | 5,81   | 17 | stator complete     | 74644150 | 1 | 68,75 |

FIGURE A-15. EIBENSTOCK MOTOR ASSEMBLY PARTS LIST -- GEN. 2 ONLY



TABLE A-1. BB4500 RECOMMENDED SPARE PARTS

| Component                           | Part number | Description                                    | Quantity |
|-------------------------------------|-------------|------------------------------------------------|----------|
| Rotational drive unit               | 12395       | Clamp collar                                   | 2        |
| Leadscrew assembly                  | 12436       | Leadscrew                                      | 1        |
|                                     | 27356       | 1-5 Acme Nut                                   | 2        |
| Axial feed box assembly             | 29552       | Clamp collar                                   | 2        |
|                                     | 27015       | Shear pin                                      | 2        |
|                                     | 25957       | Clutch                                         | 4        |
|                                     | 27197       | Lead nut                                       | 2        |
|                                     | 92494       | Screw assembly, feed stop                      | 2        |
|                                     | 26850       | Crank                                          | 1        |
| Boring head/ bar                    | 11734       | Screw 3/8-16 X 3/4 SSSCP                       | 4        |
|                                     | 13356       | Screw 5/8-11 X 2-1/2 SHCS                      | 4        |
|                                     | 11691       | Screw 1/2-13 X 1.5 SHCS                        | 2        |
|                                     | 10191       | Screw 3/8-16 X 1 SHCS                          | 2        |
| Spherical bearing mounting brackets | 14036       | Screw 1/2-13 x 2 SHCS                          | 8        |
|                                     | 22662       | Washer 1/2                                     | 8        |
|                                     | 26250       | Screw 5/16-24 x 2 HHCS                         | 4        |
|                                     | 21798       | Washer 5/16                                    | 4        |
|                                     | 26252       | Screw 1/2-20 x 2 SSSFP                         | 4        |
| HPU                                 | 29840       | Hydraulic oil – 76 Unax AW 32 anti-wear fluid  | NA       |
|                                     | 20273       | Key                                            | 1        |
| Electric motor assembly             | 82698       | SP brush carbon pair for Eibenstock EAU 34/4.1 | 2        |
|                                     | 26845       | 3/8 short arm ball driver hex wrench           | 1        |

TABLE A-2. TOOL KIT

| Part number | Description      | Quantity |
|-------------|------------------|----------|
| 11920       | 1/2" Hex wrench  | 1        |
| 10199       | 1/4" Hex wrench  | 1        |
| 11082       | 3/16" Hex wrench | 1        |

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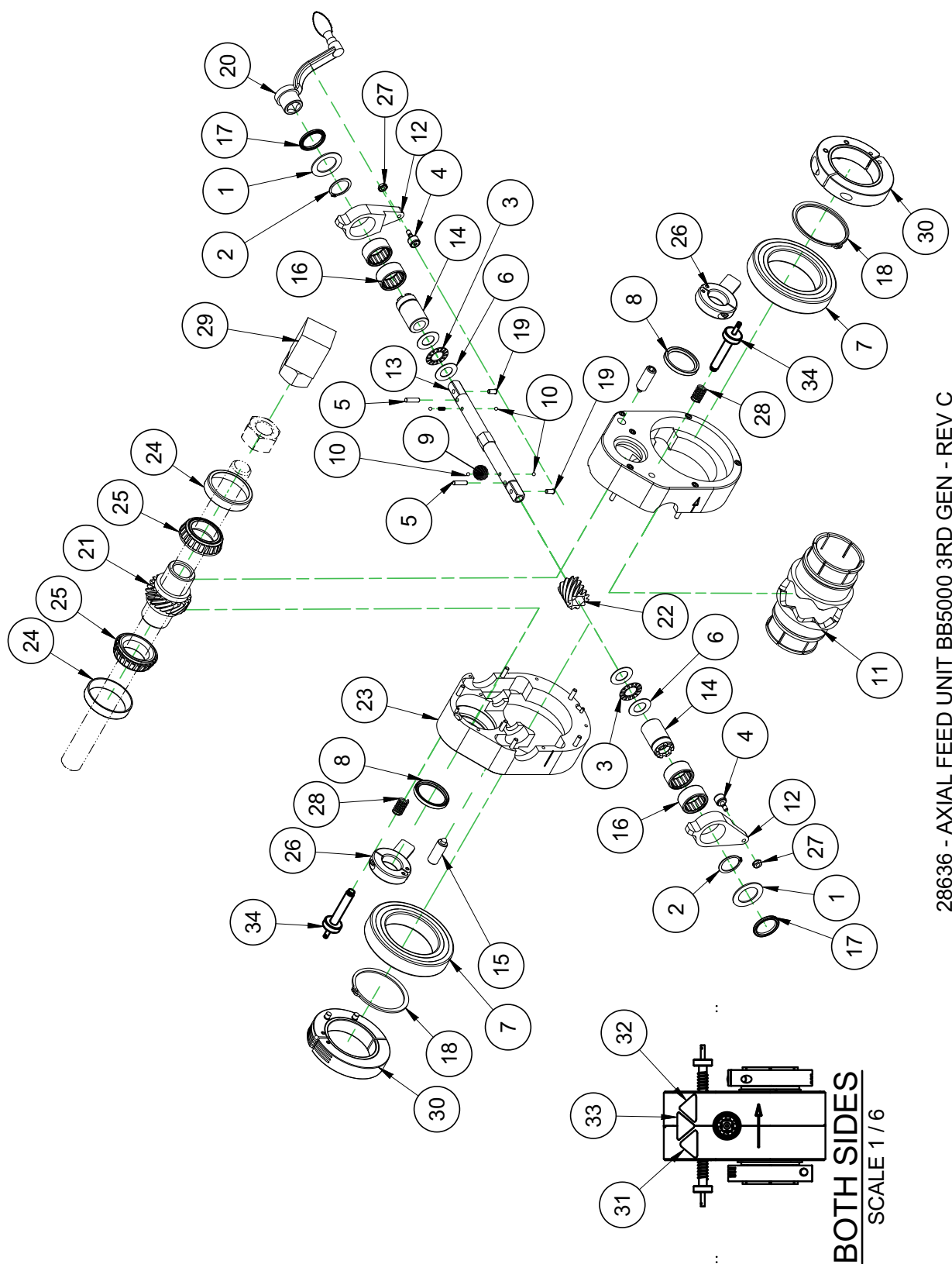
**TABLE A-2. TOOL KIT (CONTINUED)**

| <b>Part number</b> | <b>Description</b>              | <b>Quantity</b> |
|--------------------|---------------------------------|-----------------|
| 11919              | 3/8" Hex wrench                 | 1               |
| 10601              | 5/16" Hex wrench                | 1               |
| 10600              | 5/32" Hex wrench                | 1               |
| 25710              | Tool bit HSS 1/2 sq x 4"        | 3               |
| 43697              | Operating Manual                | 1               |
| 82949              | Bag tool 14 x 5.5 x 6 polyester | 1               |
| 39099              | Filter element replacement      | 1               |

## APPENDIX B BB5000 ASSEMBLY DRAWINGS

### Drawing list

|                                                                    |     |
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28636 - AXIAL FEED UNIT BB5000 3RD GEN - REV C

FIGURE B-1. AXIAL FEED UNIT ASSEMBLY (P/N 28636)

| PARTS LIST |     |       |                                                                                   |
|------------|-----|-------|-----------------------------------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                                                       |
| 1          | 2   | 10144 | WASHER THRUST 1 ID X 1.562 OD X .060                                              |
| 2          | 2   | 10534 | RING SNAP 1 OD                                                                    |
| 3          | 2   | 10538 | BRG THRUST .625 ID X 1.125 OD X .0781                                             |
| 4          | 2   | 10836 | BRG CAM FOLLOW .500 X .344                                                        |
| 5          | 2   | 11763 | PIN DOWEL 3/16 x 3/4                                                              |
| 6          | 4   | 11823 | WASHER THRUST .625 ID X 1.125 OD X .030                                           |
| 7          | 2   | 12388 | BRG BALL 2.7559 X 4.3307 X .7874                                                  |
| 8          | 2   | 16505 | SEAL 1.375 ID X 1.750 OD X .197 (KB)                                              |
| 9          | 2   | 19561 | SPRING COMP .148 OD X .023 WIRE X .50 LONG STAINLESS                              |
| 10         | 4   | 19562 | BALL STEEL 5/32 DIA                                                               |
| 11         | 1   | 25945 | COLLET AFU BB5000 2-1/4 BAR                                                       |
| 12         | 2   | 25949 | ARM RATCHET                                                                       |
| 13         | 1   | 25950 | SHAFT FEED                                                                        |
| 14         | 2   | 25951 | BUSHING DRIVE                                                                     |
| 15         | 2   | 25955 | SPRING PLUNGER 1/2-13 LIGHT FORCE                                                 |
| 16         | 4   | 25957 | BRG ROLLER CLUTCH 1 X 1.312 X .625                                                |
| 17         | 2   | 25959 | SEAL 1.000 ID X 1.312 OD X .125 HM14 LIP                                          |
| 18         | 2   | 25961 | RING SNAP 2-3/4 BEVELED                                                           |
| 19         | 2   | 26828 | PLUNGER BALL PUSHFIT                                                              |
| 20         | 1   | 26850 | HANDLE CRANK MODIFIED                                                             |
| 21         | 1   | 27197 | LEAD NUT BB4500 BB5000 AXIAL FEED (VMI)                                           |
| 22         | 1   | 27198 | GEAR HELICAL AXIAL FEED BB5000                                                    |
| 23         | 1   | 27199 | ASSEMBLED AXIAL FEED UNIT HOUSING                                                 |
| 24         | 2   | 27203 | BRG CUP 2.328 OD x .470 WIDE                                                      |
| 25         | 2   | 27204 | BRG CONE 1.3775 ID X .6600 WIDE                                                   |
| 26         | 2   | 27222 | STOP ARM ASSY                                                                     |
| 27         | 2   | 28060 | NUT, 10-32 UNF KEPS                                                               |
| 28         | 2   | 28618 | SPRING COMP .48 OD X .051 WIRE X .88                                              |
| 29         | 1   | 28756 | BLOCK TACKWELD BB5000                                                             |
| 30         | 2   | 29552 | CLAMP COLLAR MODIFIED 3RD GEN AFU                                                 |
| 31         | 2   | 78735 | LABEL WARNING HAND CRUSH/FORCE                                                    |
| 32         | 2   | 78742 | LABEL WARNING ENTANGLEMENT OF HAND/ROTATING SHAFT                                 |
| 33         | 2   | 80510 | LABEL WARNING CUTTING OF FINGERS/ROTATING BLADE GRAPHIC 1.13 TALL TRIANGLE YELLOW |
| 34         | 2   | 92494 | SCREW ASSY FEED STOP GEN 2                                                        |

FIGURE B-2. AXIAL FEED UNIT ASSEMBLY PARTS LIST (P/N 28636)

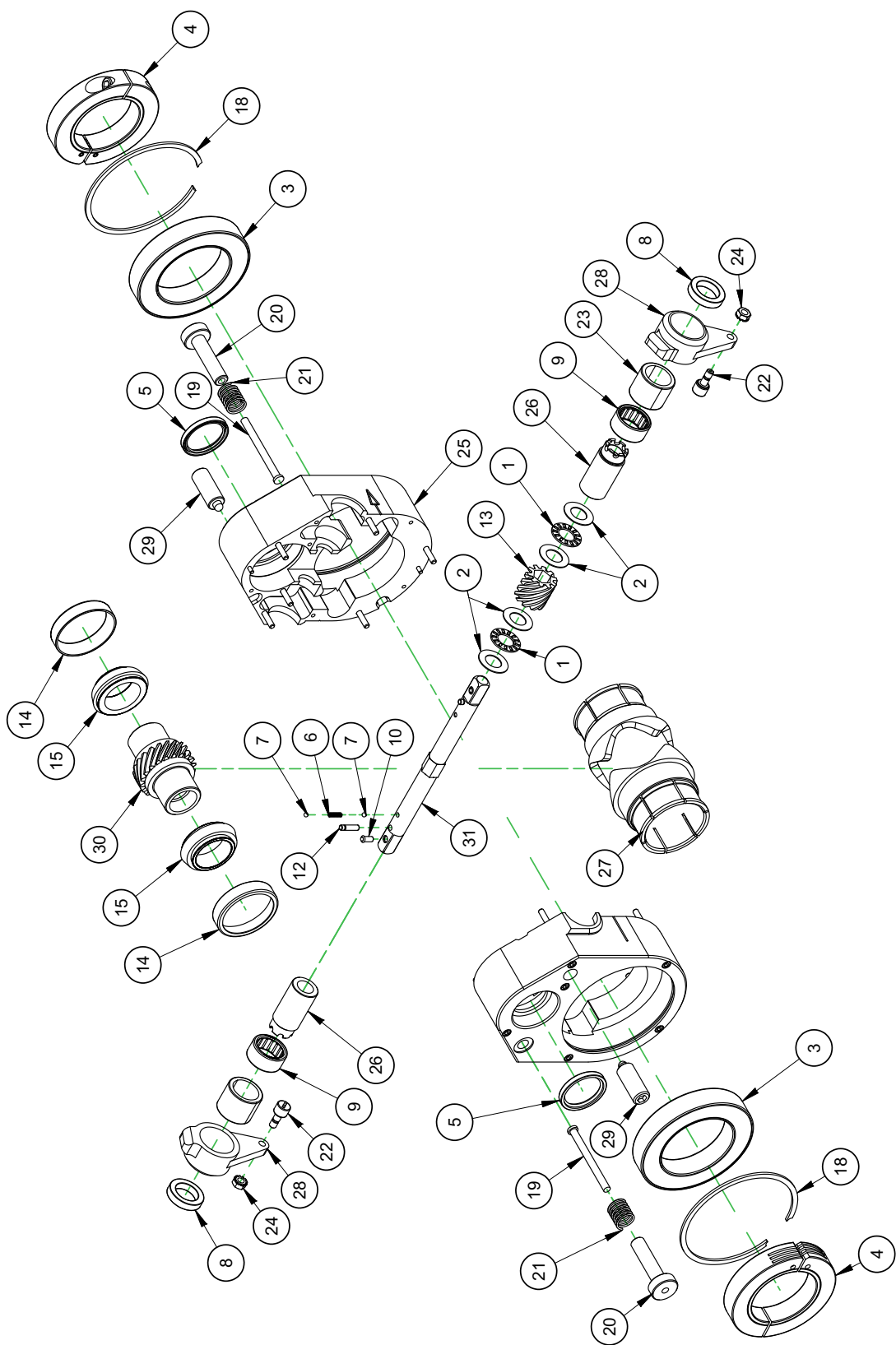
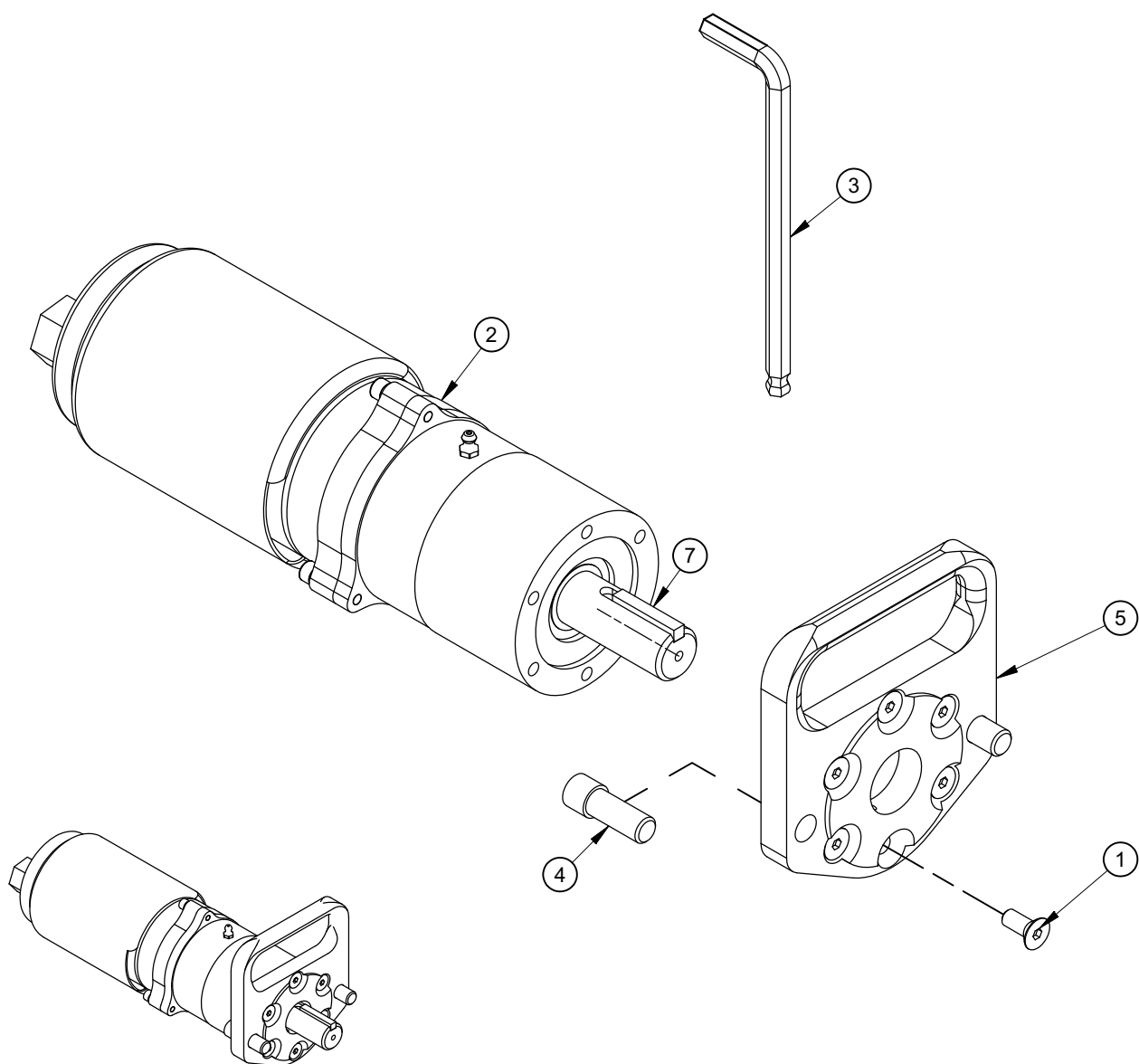


FIGURE B-3. HD AXIAL FEED UNIT ASSEMBLY (P/N 91518)

| PARTS LIST |     |       |                                                       |
|------------|-----|-------|-------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                           |
| 1          | 2   | 10538 | BRG THRUST .625 ID X 1.125 OD X .0781                 |
| 2          | 4   | 11823 | WASHER THRUST .625 ID X 1.125 OD X .030               |
| 3          | 2   | 12388 | BRG BALL 2.7559 X 4.3307 X .7874                      |
| 4          | 2   | 12395 | CLAMP COLLAR SPLIT HINGED 2-1/2 ID                    |
| 5          | 2   | 16505 | SEAL 1.375 ID X 1.750 OD X .197 (KB)                  |
| 6          | 2   | 19561 | SPRING COMP .148 OD X .023 WIRE X .50 LONG STAINLESS  |
| 7          | 4   | 19562 | BALL STEEL 5/32 DIA                                   |
| 8          | 2   | 20890 | BRG BALL .8750 ID X 1.3125 OD X .281                  |
| 9          | 2   | 25957 | BRG ROLLER CLUTCH 1 X 1.312 X .625                    |
| 10         | 2   | 26828 | PLUNGER BALL PUSHFIT                                  |
| 11         | 1   | 26850 | (NOT SHOWN) HANDLE CRANK MODIFIED                     |
| 12         | 2   | 27015 | PIN MODIFIED 3/16 x 3/4 GROOVED                       |
| 13         | 1   | 27198 | GEAR HELICAL AXIAL FEED BB5000                        |
| 14         | 2   | 27203 | BRG CUP 2.328 OD x .470 WIDE                          |
| 15         | 2   | 27204 | BRG CONE 1.3775 ID X .66 WIDE                         |
| 16         | 1   | 27222 | (NOT SHOWN) STOP ARM ASSY                             |
| 17         | 1   | 28756 | (NOT SHOWN) BLOCK TACKWELD BB5000                     |
| 18         | 2   | 43982 | RING SNAP 4.331 ID METRIC 110                         |
| 19         | 2   | 49696 | CLEVIS STOP PIN                                       |
| 20         | 2   | 49697 | SCREW 1/2-13 X 3 KHS MOD BB5000 4TH GEN FEED STOP     |
| 21         | 2   | 49699 | SPRING COMP .72 OD X .063 WIRE X .88 LONG             |
| 22         | 2   | 52347 | BRG CAM FOLLOWER .500 OD X .375 WIDE W/ 1/4-28 STUD   |
| 23         | 2   | 54712 | BRG ROLLER CLUTCH 1 ID X 1-5/16 OD X 1.063 SS SPRINGS |
| 24         | 2   | 56301 | NUT 1/4-28 LOCKING STAR WASHER                        |
| 25         | 1   | 56307 | HOUSING AXIAL FEED BB5000 4TH GEN                     |
| 26         | 2   | 56308 | BUSHING DRIVE BB5000 4TH GEN                          |
| 27         | 1   | 56309 | COLLET AFU BB5000 2-1/4 BAR 4TH GEN                   |
| 28         | 2   | 56310 | ARM RATCHET BB5000 4TH GEN                            |
| 29         | 2   | 56314 | SPRING PLUNGER 5/8-11 X 1.5 FORCE 3.5 TO 10.5 LBS     |
| 30         | 1   | 56349 | NUT LEAD BB5000 AXIAL FEED                            |
| 31         | 1   | 56380 | SHAFT FEED BB5000 4TH GEN PROTOTYPE                   |

FIGURE B-4. HD AXIAL FEED UNIT ASSEMBLY PARTS LIST (P/N 91518)

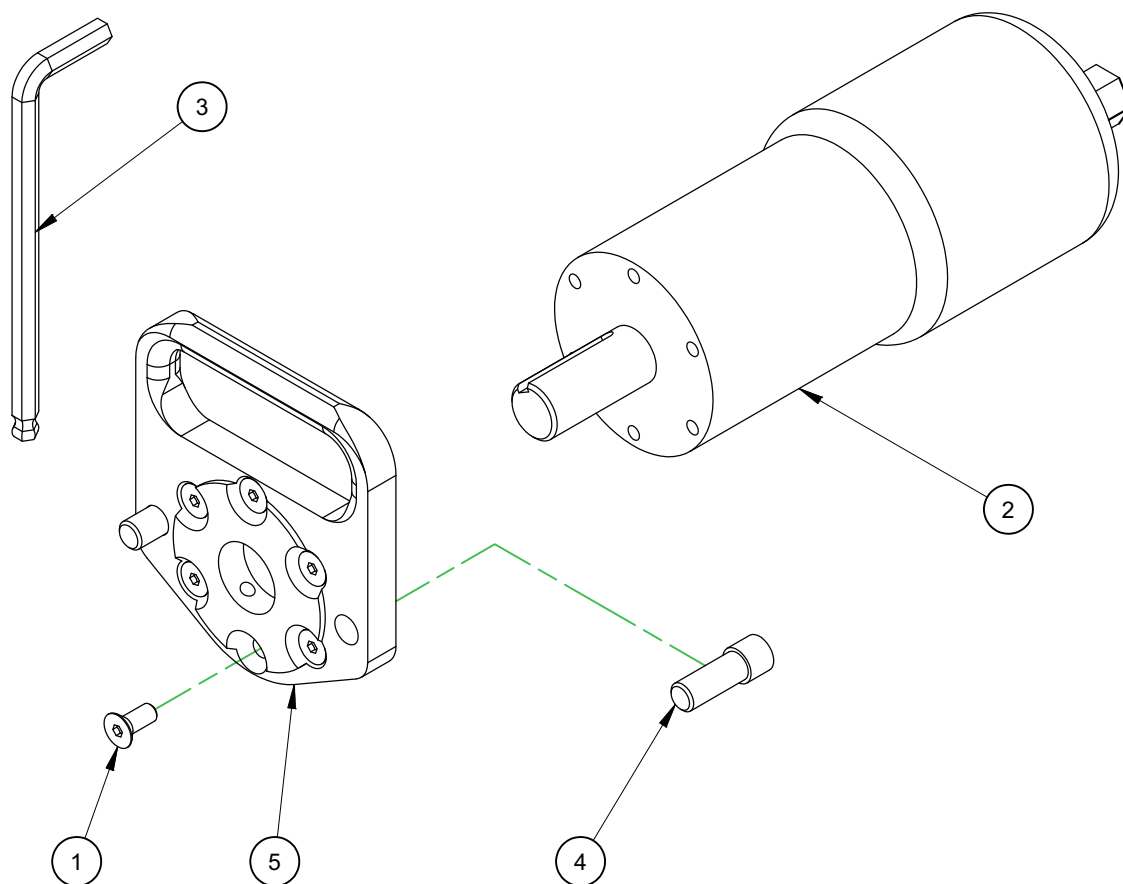


**ASSEMBLED**

| PARTS LIST |     |       |                                             |
|------------|-----|-------|---------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                 |
| 1          | 6   | 10516 | SCREW 5/16-18 X 3/4 FHSCS                   |
| 2          | 1   | 15087 | MOTOR AIR 3HP 475 RPM FS 228 RPM MAX 93TQ   |
| 3          | 1   | 26845 | WRENCH HEX 3/8 SHORT ARM BONDHUS BALLDRIVER |
| 4          | 2   | 28611 | SCREW 1/2-13 X 1-1/4 SHCS MODIFIED          |
| 5          | 1   | 28612 | FLANGE MTG AIR MOTOR BB5000                 |

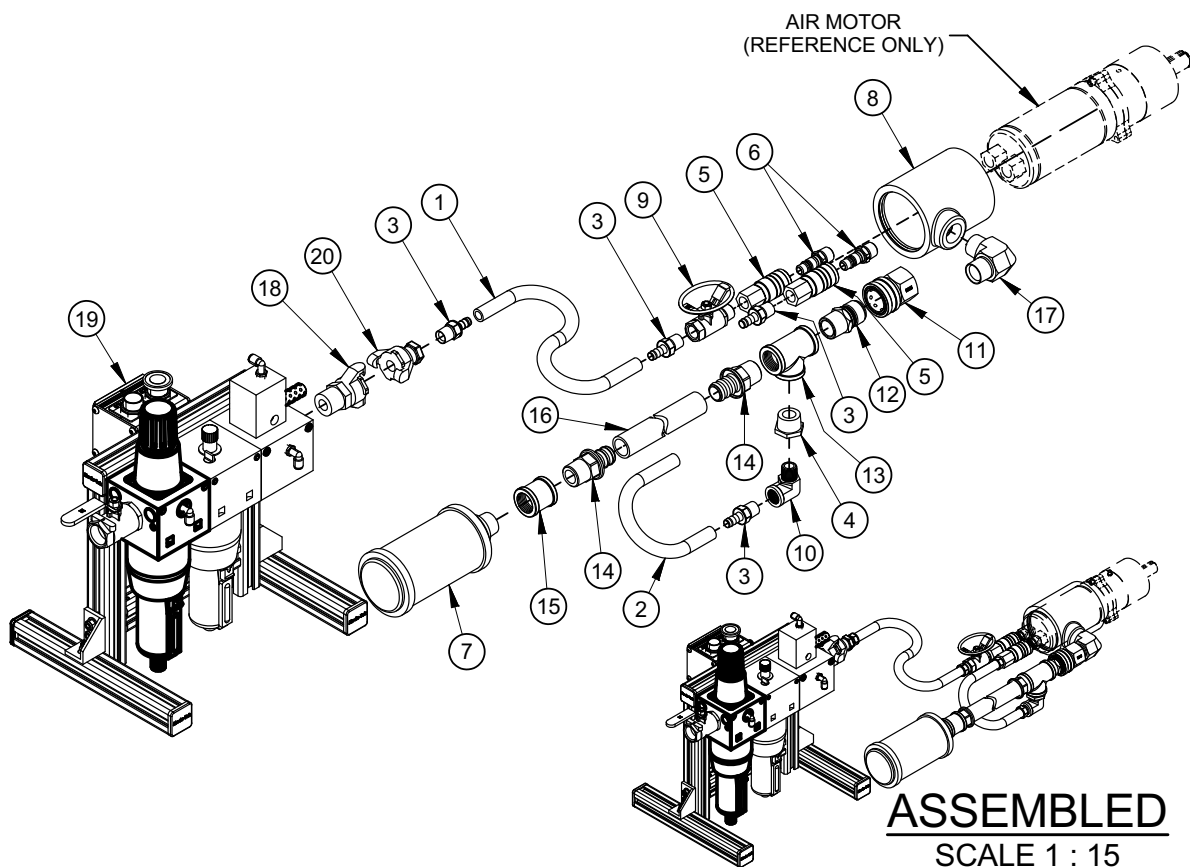
**FIGURE B-5. AIR MOTOR CE ASSEMBLY (P/N 28697)**





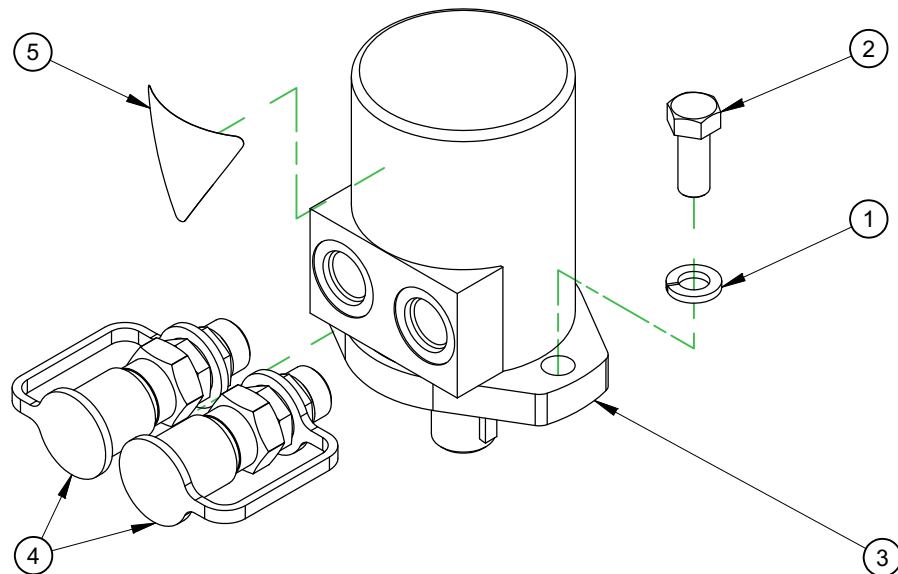
| PARTS LIST |     |       |                                               |
|------------|-----|-------|-----------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                   |
| 1          | 6   | 10516 | SCREW 5/16-18 X 3/4 FHSCS                     |
| 2          | 1   | 15109 | MOTOR AIR 3.2HP 975 RPM FS 485 RPM MAX 47.3TQ |
| 3          | 1   | 26845 | WRENCH HEX 3/8 SHORT ARM BONDHUS BALLDRIVER   |
| 4          | 2   | 28611 | SCREW 1/2-13 X 1-1/4 SHCS MODIFIED            |
| 5          | 1   | 28612 | FLANGE MTG AIR MOTOR BB5000                   |

FIGURE B-6. AIR MOTOR CE ASSEMBLY (P/N 28614)



| PARTS LIST |      |       |                                                                 |
|------------|------|-------|-----------------------------------------------------------------|
| ITEM       | QTY  | P/N:  | DESCRIPTION                                                     |
| 1          | 70IN | 10310 | HOSE 801 SERIES PUSHLOK 1/2                                     |
| 2          | 16IN | 10310 | HOSE 801 SERIES PUSHLOK 1/2                                     |
| 3          | 4    | 10311 | FTG BARB 1/2 NPTM X 1/2 HOSE                                    |
| 4          | 1    | 10321 | FTG REDUCER BUSHING 1 NPTM X 1/2NPTF                            |
| 5          | 2    | 13208 | FTG QUICK COUPLER 1/2B 1/2NPTF FEMALE AIR                       |
| 6          | 2    | 13209 | FTG QD NIPPLE 1/2B 1/2 NPTM PNEUMATIC                           |
| 7          | 1    | 15243 | MUFFLER AIR MOTOR                                               |
| 8          | 1    | 19730 | EXHAUST DEFLECTOR                                               |
| 9          | 1    | 35667 | VALVE BALL 1/2 NPTM X 1/2 NPTF OVAL HANDLE                      |
| 10         | 1    | 35692 | FTG ELBOW 1/2 NPTM X 1/2 NPTF ST 90 DEG BRASS                   |
| 11         | 1    | 55800 | FTG QUICK COUPLER 1B 1 NPTF FEMALE AIR BRASS                    |
| 12         | 1    | 55801 | FTG QUICK COUPLER 1B 1 NPTM MALE AIR NON-VALVED BRASS           |
| 13         | 1    | 55802 | FTG TEE 1 NPTF (3) BRASS                                        |
| 14         | 2    | 55803 | FTG BARB 1 NPTM X 1 HOSE BRASS                                  |
| 15         | 1    | 55804 | FTG CONNECTOR 1 NPTF X 1NPTF BRASS                              |
| 16         | 60IN | 55805 | HOSE PUSH LOK 801 X 1 GREY                                      |
| 17         | 1    | 55832 | FTG ELBOW 1 NPTM X 1 NPTM 90 DEG                                |
| 18         | 1    | 58380 | FTG QUICK COUPLER UNIVERSAL 1 NPTM                              |
| 19         | 1    | 59248 | PNEUMATIC CONDITIONING UNIT 1 IN W/ L.P. DROP OUT AND E-STOP CE |
| 20         | 1    | 62564 | FTG QUICK COUPLER UNIVERSAL 1/2 NPTF                            |

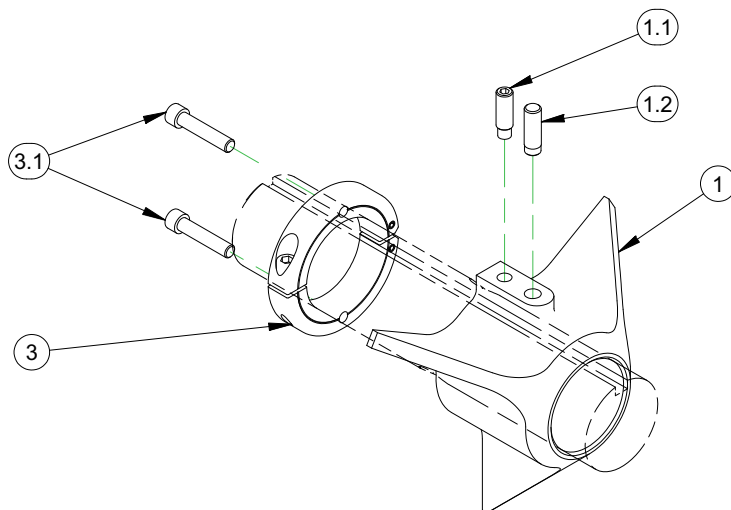
FIGURE B-7. PNEUMATIC CONNECTION ASSEMBLY (P/N 15088)



| PARTS LIST |     |       |                                                                   |
|------------|-----|-------|-------------------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                                       |
| 1          | 2   | 11238 | WASHER LOCK 1/2                                                   |
| 2          | 2   | 11826 | SCREW 1/2-13 X 1-1/4 HHCS                                         |
| 3          | 1   | A/R   | SEE CHART                                                         |
| 4          | 1   | 39828 | KIT FTG 1/2 HYD QUICK COUPLERS                                    |
| 5          | 1   | 78619 | LABEL WARNING HOT SURFACE GRAPHIC 1.95" TALL TRIANGLE YELLOW (KB) |

| PART No | DESCRIPTION                                     | MOTOR HYD P/N |
|---------|-------------------------------------------------|---------------|
| 39837   | MOTOR ASSY HYD 2.2 CU IN KEYED 1/2 FTG          | 27477         |
| 39843   | MOTOR ASSY HYD 3.6 CU IN KEYED 1/2 FTG          | 20684         |
| 39844   | MOTOR ASSY HYD 5.7 CU IN KEYED 1/2 FTG S-SERIES | 21530         |
| 39845   | MOTOR ASSY HYD 7.3 CU IN KEYED 1/2 FTG          | 20231         |
| 39846   | MOTOR ASSY HYD 8.9 CU IN KEYED S-SERIES 1/2 FTG | 21531         |
| 39847   | MOTOR ASSY HYD 14.1 CU IN KEYED 1/2 FTG         | 34585         |
| 43451   | MOTOR ASSY HYD 11.3 CU IN KEYED 1/2 FTG         | 21532         |
| 43452   | MOTOR ASSY HYD 17.9 CU IN KEYED 1/2 FTG         | 21534         |
| 43552   | MOTOR ASSY HYD 22.5 CU IN KEYED SHAFT           | 30567         |

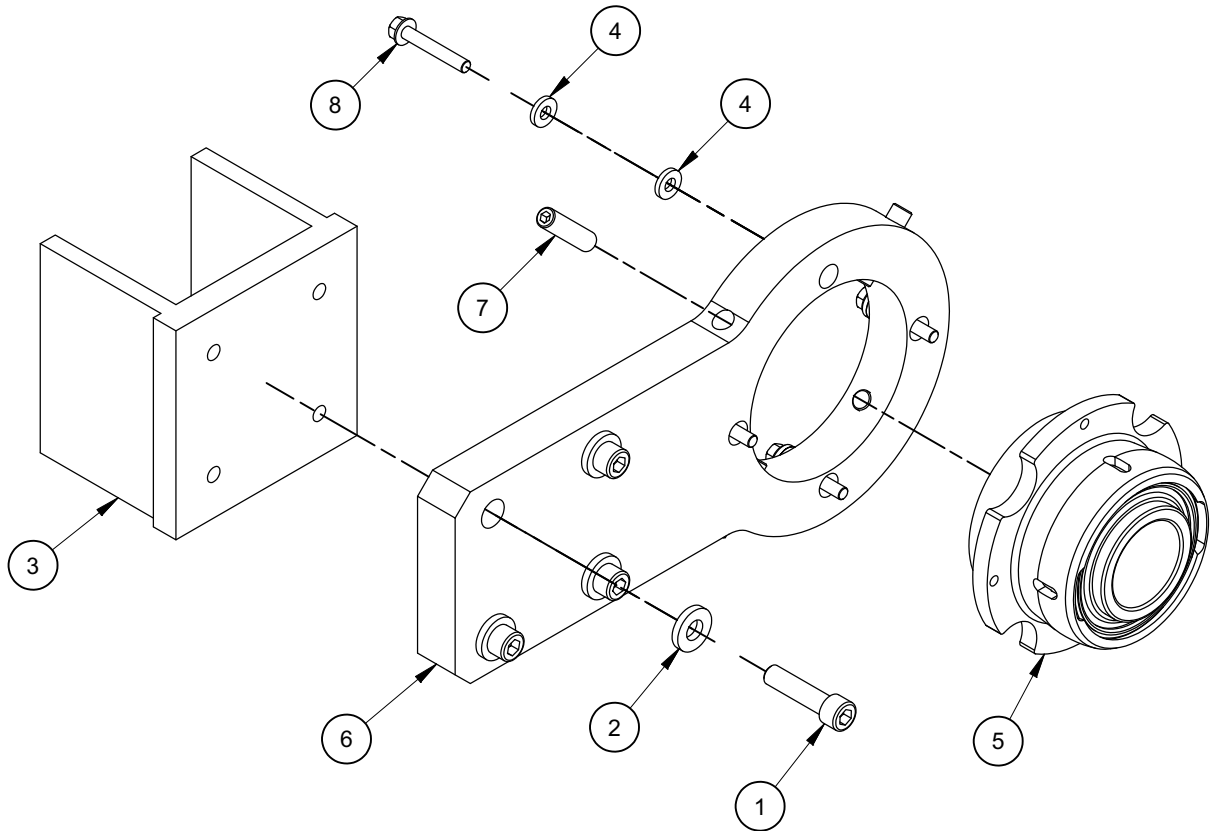
**FIGURE B-8. HYDRAULIC MOTOR ASSEMBLY (P/N 39848)**



| PARTS LIST |     |       |                                  |
|------------|-----|-------|----------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                      |
| 1          | 1   | 26380 | CONE SETUP Ø2.75 TO Ø8.37 BB5000 |
| 1.1        | 1   | 29092 | SCREW MOD 3/8-24 X 1-3/16 SSSFD  |
| 1.2        | 1   | 29091 | PIN STOP                         |
| 3          | 1   | 29095 | CLAMP COLLAR MODIFIED            |
| 3.1        | 2   | 17125 | SCREW 5/16-24 X 1-1/2 SHCS       |

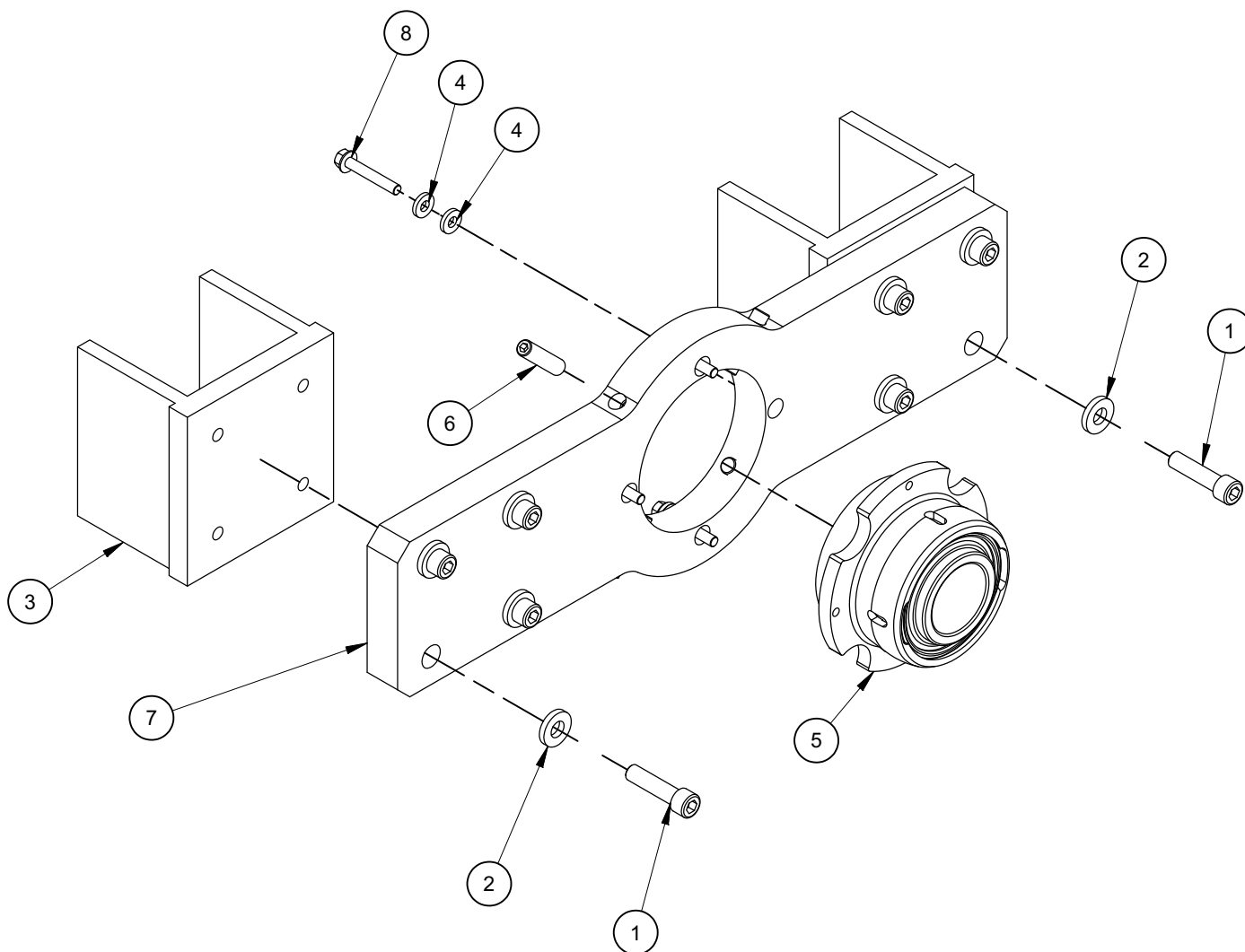
26507  
SET CONE SETUP 2.75 TO 8.37 DIA BB5000

FIGURE B-9. SETUP CONE ASSEMBLY (P/N 26383)



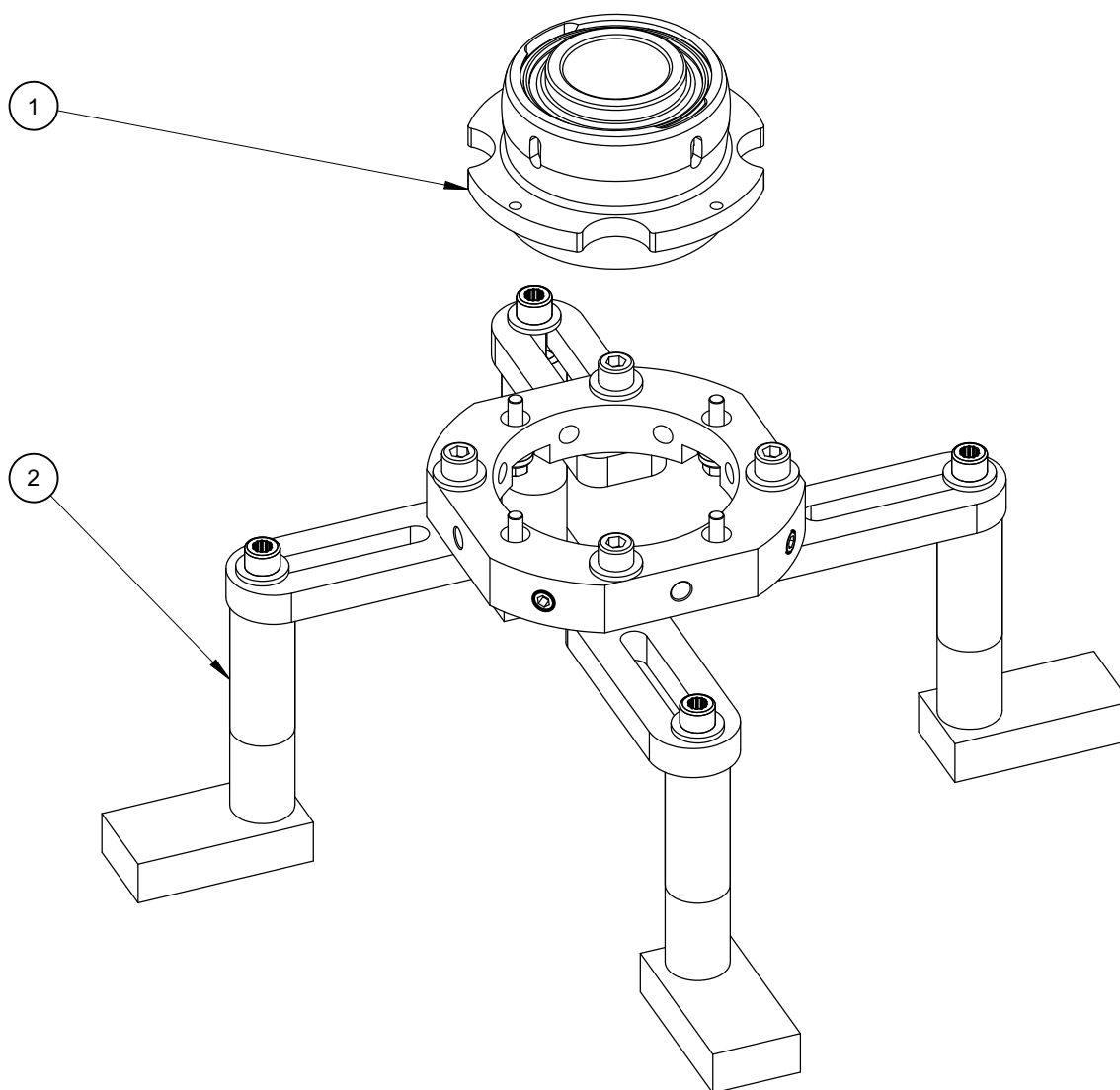
| PARTS LIST |     |       |                                              |
|------------|-----|-------|----------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                  |
| 1          | 4   | 14036 | SCREW 1/2-13 X 2 SHCS                        |
| 2          | 4   | 17145 | WASHER 1/2 FLTW HARDENED 1-1/8 OD X 3/16 THK |
| 3          | 1   | 19869 | PLATE SPACER TACK WELD MTG                   |
| 4          | 8   | 21798 | WASHER 5/16 FLTW HARDENED                    |
| 5          | 1   | 26248 | ASSY BRG SPHERICAL 2-1/4 ID W/ CLAMP COLLAR  |
| 6          | 1   | 26251 | BRACKET MTG SPHERICAL BRG 1-ARM              |
| 7          | 4   | 26252 | SCREW 1/2-20 X 2 SSSFP                       |
| 8          | 4   | 45364 | SCREW 5/16-24 X 2 HHCS FLANGED BLK OX        |

FIGURE B-10. SINGLE-ARM MOUNT ASSEMBLY (P/N 37472)



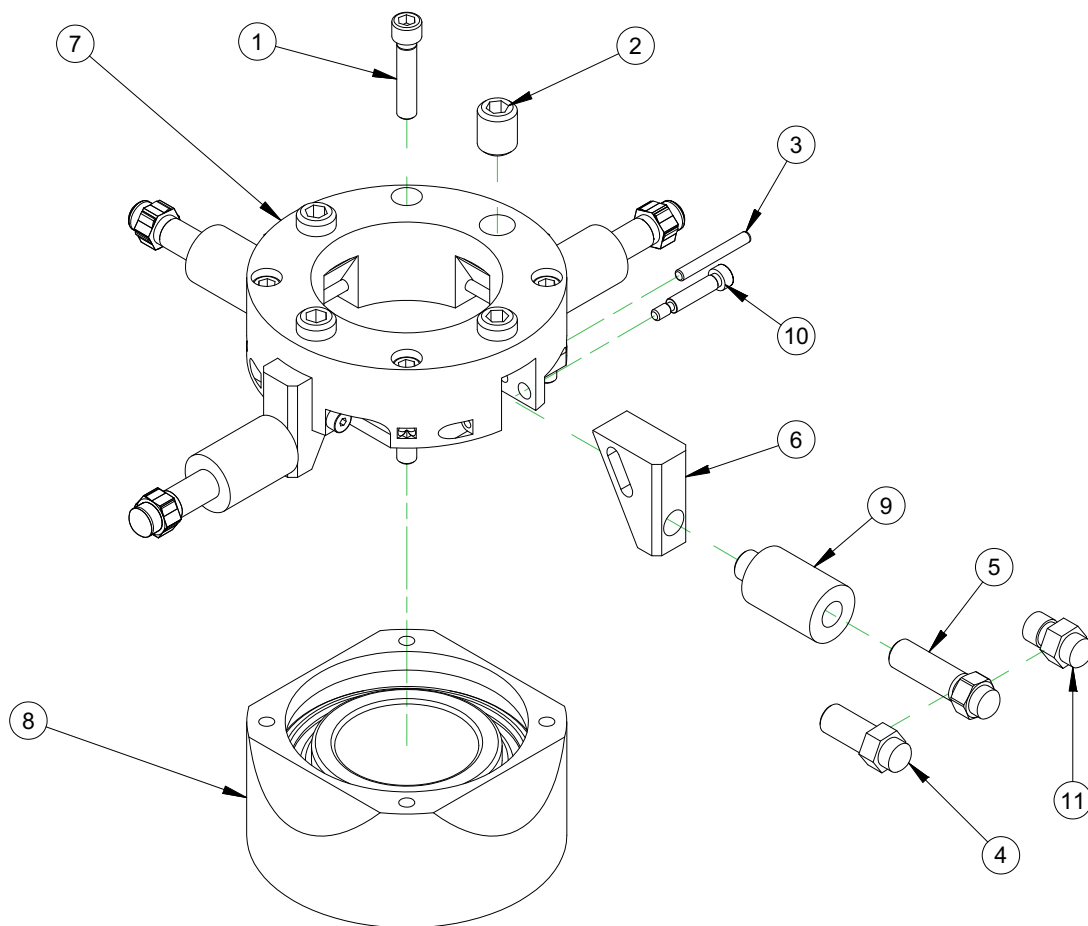
| PARTS LIST |     |       |                                              |
|------------|-----|-------|----------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                  |
| 1          | 8   | 14036 | SCREW 1/2-13 X 2 SHCS                        |
| 2          | 8   | 17145 | WASHER 1/2 FLTW HARDENED 1-1/8 OD X 3/16 THK |
| 3          | 2   | 19869 | PLATE SPACER TACK WELD MTG                   |
| 4          | 8   | 21798 | WASHER 5/16 FLTW HARDENED                    |
| 5          | 1   | 26248 | ASSY BRG SPHERICAL 2-1/4 ID W/ CLAMP COLLAR  |
| 6          | 4   | 26252 | SCREW 1/2-20 X 2 SSSFP                       |
| 7          | 1   | 26517 | MTG BRACKET SPHERICAL BRG 2-ARM              |
| 8          | 4   | 45364 | SCREW 5/16-24 X 2 HHCS FLANGED BLK OX        |

**FIGURE B-11. DOUBLE-ARM MOUNT ASSEMBLY (P/N 37473)**



| PARTS LIST |     |       |                                               |
|------------|-----|-------|-----------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                   |
| 1          | 1   | 26248 | ASSY BRG SPHERICAL 2-1/4 ID W/ CLAMP COLLAR   |
| 2          | 1   | 41514 | MOUNT UNIVERSAL BORING BARS BB5000 NO BEARING |

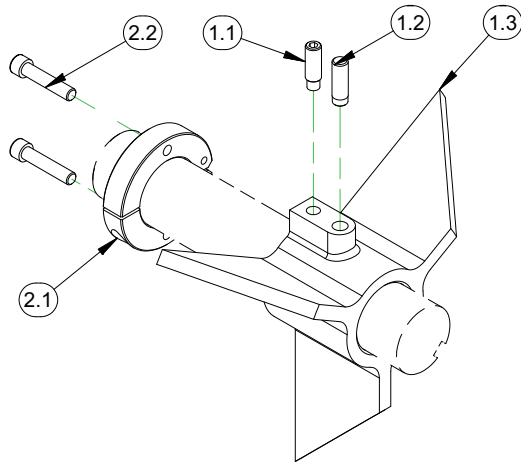
FIGURE B-12. AIR MOTOR CE ASSEMBLY (P/N 36959)



| PARTS LIST |     |       |                                                        |
|------------|-----|-------|--------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                            |
| 1          | 4   | 11741 | SCREW 5/16-18 X 1-1/2 SHCS                             |
| 2          | 4   | 12563 | SCREW 5/8-18 X 3/4 SSSFP                               |
| 3          | 4   | 35600 | PIN DOWEL 3/16 DIA X 1-1/2                             |
| 4          | 4   | 37618 | BOLT JACKING 1 ID BRG MOUNT                            |
| 5          | 4   | 37619 | BOLT JACKING 1/2-20 X 1-1/2 ID BEARING MOUNT           |
| 6          | 4   | 46216 | 30 DEGREE SLIDE                                        |
| 7          | 1   | 46218 | PLATE FACE ADJUST                                      |
| 8          | 1   | 46219 | HOUSING MOUNT ID BRG BB5000                            |
| 9          | 4   | 46227 | 1.5 INCH CHUCK JAW (KB)                                |
| 10         | 4   | 46294 | SCREW 1/4 DIA X 1 X 10-24 SHLDCS                       |
| 11         | 4   | 46303 | BOLT JACKING 1/2 ID BRG MOUNT                          |
| 12         | 1   | 46589 | (NOT SHOWN) MANUAL INSTRUCTION BB5000 ID BEARING MOUNT |

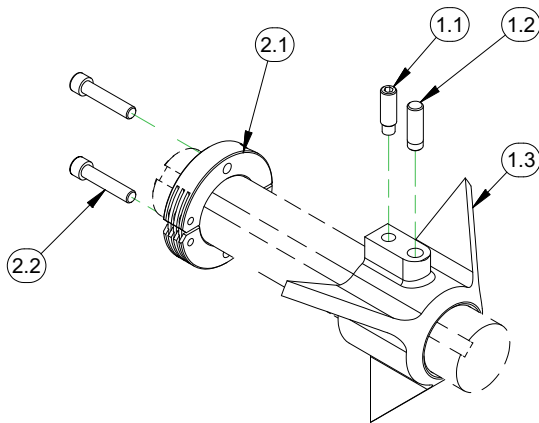
**FIGURE B-13. ID BEARING MOUNT ASSEMBLY (P/N 46293)**





**SET CONES SETUP 6 TO 10 DIA 1-3/4 KEYED BAR**  
**43384**

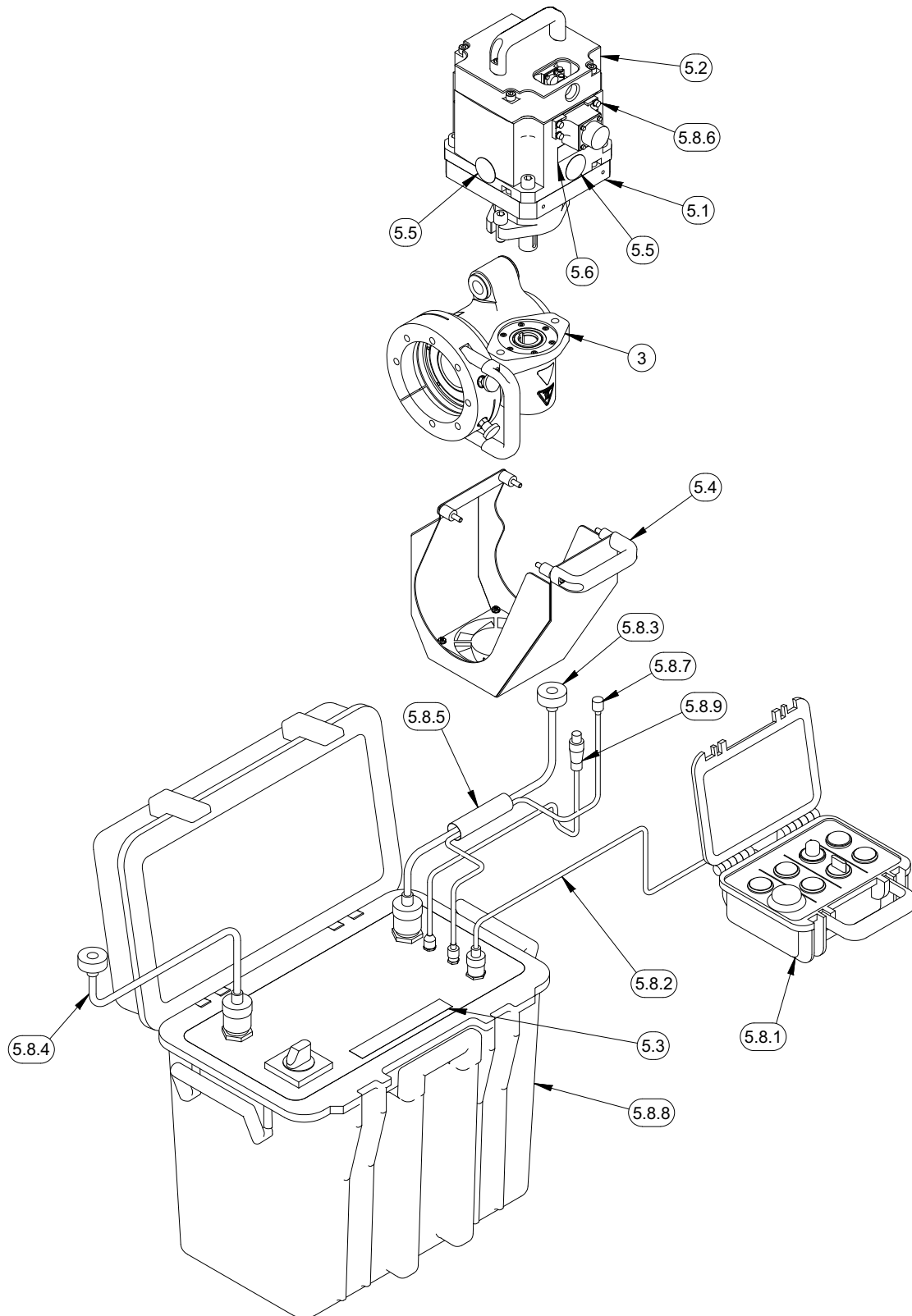
| PARTS LIST |     |       |                                     |
|------------|-----|-------|-------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                         |
| 1          | 1   | 42228 | CONE SETUP 6 TO 10 BB4500 1-3/4 BAR |
| 1.1        | 1   | 29092 | SCREW MOD 3/8-24 X 1-3/16 SSSFD     |
| 1.2        | 1   | 29091 | PIN STOP                            |
| 1.3        | 1   | 42228 | CONE SETUP BB4000 6" TO 10"         |
| 2          | 1   | 42508 | CLAMP COLLAR MODIFIED 1 3/4 ID      |
| 2.1        | 1   | 42508 | CLAMP COLLAR MODIFIED               |
| 2.2        | 2   | 17125 | SCREW 5/16-24 X 1-1/2 SHCS          |



**SET CONES SETUP 2 TO 6 DIA 1-3/4 KEYED BAR**  
**43383**

| PARTS LIST |     |       |                                    |
|------------|-----|-------|------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                        |
| 1          | 1   | 41220 | CONE SETUP 2 TO 6 BB4500 1-3/4 BAR |
| 1.1        | 1   | 29092 | SCREW MOD 3/8-24 X 1-3/16 SSSFD    |
| 1.2        | 1   | 29091 | PIN STOP                           |
| 1.3        | 1   | 41220 | CONE SETUP 2" TO 6" BB4000         |
| 2          | 1   | 42508 | CLAMP COLLAR MODIFIED 1 3/4 ID     |
| 2.1        | 1   | 42508 | CLAMP COLLAR MODIFIED              |
| 2.2        | 2   | 17125 | SCREW 5/16-24 X 1-1/2 SHCS         |

**FIGURE B-14. SET CONES SETUP ASSEMBLY (P/N 49060)**



**FIGURE B-15. SERVO DRIVE 460 CE ASSEMBLY (P/N 52876)**

| PARTS LIST 3RD GEN |     |       |                                                                         |
|--------------------|-----|-------|-------------------------------------------------------------------------|
| ITEM               | QTY | P/N:  | DESCRIPTION                                                             |
| 1                  | 1   | 26845 | (NOT SHOWN) WRENCH HEX 3/8 SHORT ARM BONDHUS BONDHUS 10914 BALLDRIVER   |
| 2                  | 1   | 52188 | (NOT SHOWN) ASSY SHIPPING CASE WITH CUT FOAM FOR BB5000 SERVO PACKAGE   |
| 3                  | 1   | 53165 | RDU 12:1 BB5000 4TH GEN                                                 |
| 4                  | 1   | 55583 | (NOT SHOWN) LAMINATED PENDANT INSTRUCTION                               |
| 5                  | 1   | 56027 | SERVO DRIVE MOTOR ASSEMBLY 460V                                         |
| 5.1                | 1   | 51536 | ADAPTER BB5000 RDU TO SERVO MOTOR                                       |
| 5.2                | 1   | 52937 | GUARD ASSY BB5000 SERVO MOTOR                                           |
| 5.3                | 1   | 53483 | LABEL WARNING VOLTAGE CABLE                                             |
| 5.4                | 1   | 56773 | SHROUD FAN BB5000 SERVO ASSY                                            |
| 5.5                | 2   | 53464 | LABEL WARNING HOT HAND                                                  |
| 5.6                | 1   | 53482 | LABEL WARNING VOLTAGE                                                   |
| 5.7                | 1   | 45331 | (NOT SHOWN) MANUAL INSTRUCTION BB5000 SUP SERVO FEED                    |
| 5.8                | 1   | 91811 | ASSY BB5000 SERVO DRIVE 460VAC CONTROLS MOTOR AND CABLES CE 3RD GEN     |
| 5.8.1              | 1   | 53263 | PENDANT BB5000 SERVO DRIVE                                              |
| 5.8.2              | 1   | 53266 | CORDSET OPERATOR PENDANT BB5000 SERVO DRIVE 5M LONG                     |
| 5.8.3              | 1   | 66909 | ASSY CABLE BB5000 SERVO POWER CABLE 90 DEG CONN 6M LONG 2ND GEN         |
| 5.8.4              | 1   | 66908 | ASSY CORDSET BB5000 SERVO INCOMING POWER CABLE 90 DEG CONN LONG 2ND GEN |
| 5.8.5              | 120 | 56269 | SLEEVE WELD COVER 1" DIA STRAIGHTLINE W/VELCRO CLOSURE (10 FT)          |
| 5.8.6              | 1   | 91716 | SERVO MOTOR MODEL HG-SR 3.5 kW 2000 RPM 400V KEYED SHAFT                |
| 5.8.7              | 1   | 64425 | ASSY ENCODER CABLE BB5000 SERVO DRIVE 6 M LONG                          |
| 5.8.8              | 1   | 91813 | ASSY CONTROLLER SERVO DRIVE BB5000 460/3/50-60 CE 3RD GEN               |
| 5.8.9              | 1   | 57016 | ASSY CABLE FAN BB5000 SERVO DRIVE 242 IN LONG                           |
| 6                  | 1   | 84310 | (NOT SHOWN) MANUAL INSTRUCTION BB5000 BORING BAR                        |

| PARTS LIST 2ND GEN |     |       |                                                                         |
|--------------------|-----|-------|-------------------------------------------------------------------------|
| ITEM               | QTY | P/N:  | DESCRIPTION                                                             |
| 1                  | 1   | 26845 | (NOT SHOWN) WRENCH HEX 3/8 SHORT ARM BONDHUS BONDHUS 10914 BALLDRIVER   |
| 2                  | 1   | 52188 | (NOT SHOWN) ASSY SHIPPING CASE WITH CUT FOAM FOR BB5000 SERVO PACKAGE   |
| 3                  | 1   | 53165 | RDU 12:1 BB5000 4TH GEN                                                 |
| 4                  | 1   | 55583 | (NOT SHOWN) LAMINATED PENDANT INSTRUCTION                               |
| 5                  | 1   | 56027 | SERVO DRIVE MOTOR ASSEMBLY 460V                                         |
| 5.1                | 1   | 51536 | ADAPTER BB5000 RDU TO SERVO MOTOR                                       |
| 5.2                | 1   | 52937 | GUARD ASSY BB5000 SERVO MOTOR                                           |
| 5.3                | 1   | 53483 | LABEL WARNING VOLTAGE CABLE                                             |
| 5.4                | 1   | 56773 | SHROUD FAN BB5000 SERVO ASSY                                            |
| 5.5                | 2   | 53464 | LABEL WARNING HOT HAND                                                  |
| 5.6                | 1   | 53482 | LABEL WARNING VOLTAGE                                                   |
| 5.7                | 1   | 45331 | (NOT SHOWN) MANUAL INSTRUCTION BB5000 SUP SERVO FEED                    |
| 5.8                | 1   | 64524 | ASSY BB5000 SERVO DRIVE 460VAC CONTROLS MOTOR AND CABLES CE 2ND GEN     |
| 5.8.1              | 1   | 53263 | PENDANT BB5000 SERVO DRIVE                                              |
| 5.8.2              | 1   | 53266 | CORDSET EXTENSION MULTIFAST 19 CONDUCTOR SHIELDED 20 FT LONG            |
| 5.8.3              | 1   | 66909 | ASSY CABLE BB5000 SERVO POWER CABLE 90 DEG CONN 6M LONG 2ND GEN         |
| 5.8.4              | 1   | 66908 | ASSY CORDSET BB5000 SERVO INCOMING POWER CABLE 90 DEG CONN LONG 2ND GEN |
| 5.8.5              | 120 | 56269 | SLEEVE WELD COVER 1" DIA STRAIGHTLINE W/VELCRO CLOSURE                  |
| 5.8.6              | 1   | 51448 | SERVO MOTOR 3.5 kW 2000 RPM 400V                                        |
| 5.8.7              | 1   | 64425 | ASSY ENCODER CABLE BB5000 SERVO DRIVE 6M LONG (2ND GEN BLACK)           |
|                    |     | 54161 | ASSY ENCODER CABLE BB5000 SERVO DRIVE 6M LONG (1ST GEN TURQUOISE)       |
| 5.8.8              | 1   | 64427 | ASSY CONTROLLER BB5000 SERVO DRIVE 460/3/50-60 CE 2ND GEN               |
| 5.8.9              | 1   | 57016 | ASSY CABLE FAN BB5000 SERVO DRIVE 242 IN LONG                           |
| 6                  | 1   | 84310 | (NOT SHOWN) MANUAL INSTRUCTION BB5000 BORING BAR                        |

FIGURE B-16. SERVO DRIVE 460 CE ASSEMBLY PARTS LIST (P/N 52876)

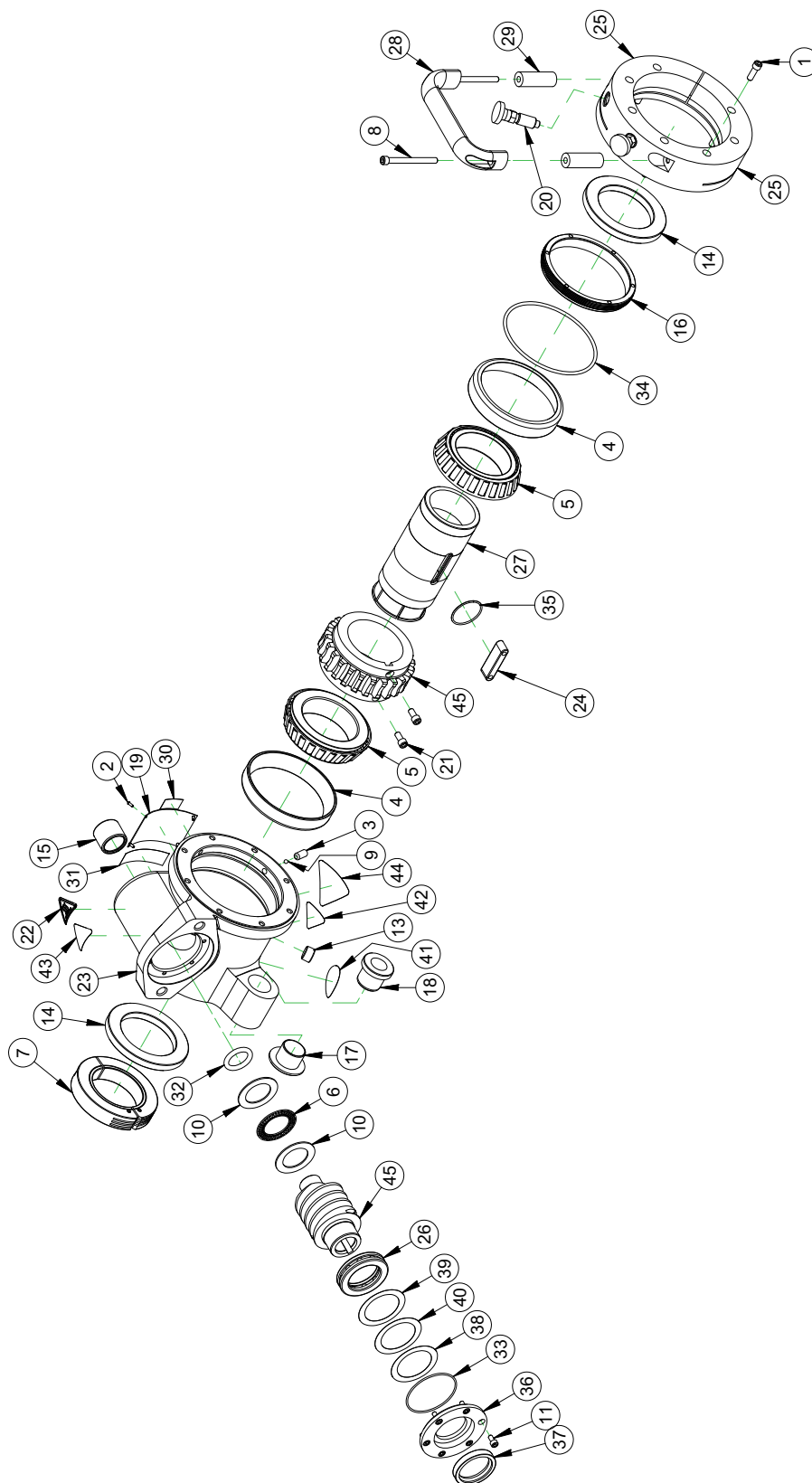


FIGURE B-17. RDU 12:1 ASSEMBLY (P/N 53165)

| PARTS LIST |     |       |                                                                               |
|------------|-----|-------|-------------------------------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                                                   |
| 1          | 7   | 10160 | SCREW 1/4-20 X 3/4 SHCS                                                       |
| 2          | 4   | 10588 | SCREW DRIVE #2 x 1/4 HOLE SIZE .089                                           |
| 3          | 2   | 11684 | SCREW 5/16-18 X 3/4 SSSCP                                                     |
| 4          | 2   | 11821 | BRG CUP 4.4375 OD X .750 WIDE                                                 |
| 5          | 2   | 11822 | BRG CONE 2.75 ID X 1.00 WIDE                                                  |
| 6          | 1   | 12387 | BRG THRUST 1.259 ID X 1.937 OD X .0781                                        |
| 7          | 1   | 12395 | CLAMP COLLAR SPLIT HINGED 2-1/2 ID                                            |
| 8          | 2   | 12592 | SCREW 1/4-20 X 2-3/4 SHCS                                                     |
| 9          | 2   | 16594 | BALL NYLON 3/16 DIA                                                           |
| 10         | 2   | 16666 | WASHER THRUST 1.250 ID X 1.937 OD X .060                                      |
| 11         | 6   | 19232 | SCREW 10-24 X 3/8 SHCS                                                        |
| 12         | 1   | 19610 | SCREW 5/8-18 X 2-1/4 SHCS                                                     |
| 13         | 1   | 21956 | FTG PLUG 3/8 NPTM SOCKET                                                      |
| 14         | 2   | 27348 | SEAL 2.75 X 4.00 X .375                                                       |
| 15         | 1   | 27353 | BRG NEEDLE 1 ID X 1-1/4 OD X 1 CLOSED                                         |
| 16         | 1   | 28219 | NUT MAIN BRG PRELOAD                                                          |
| 17         | 1   | 28220 | BUSHING LEADSCREW FLANGED                                                     |
| 18         | 1   | 28589 | BUSHING FLANGED 1 5P ACME THREADED                                            |
| 19         | 1   | 29154 | PLATE SERIAL YEAR MODEL CE 2.0 X 3.0 (KB)                                     |
| 20         | 2   | 29207 | SPRING PLUNGER HAND RETRACT 1/2 X 13                                          |
| 21         | 2   | 45900 | SCREW 1/4-28 X 1/2 SHCS                                                       |
| 22         | 1   | 46902 | LABEL WARNING HOT SURFACE GRAPHIC 1.13" TALL                                  |
| 23         | 1   | 49665 | HOUSING RDU BB5000 4TH GEN                                                    |
| 24         | 1   | 49666 | KEY MAIN DRIVE BB5000 4TH GEN                                                 |
| 25         | 1   | 52303 | CLAMP RING RDU MOUNT BB5000 4TH                                               |
| 26         | 1   | 52307 | BRG BALL THRUST 40 MM ID X 60 MM OD X 13 MM                                   |
| 27         | 1   | 53168 | COLLET MAIN DRIVE BB5000 4TH GEN                                              |
| 28         | 1   | 53610 | HANDLE PULL 1/4 CBORE MTG 2.17 X 5.75 X 1.02W COATED                          |
| 29         | 2   | 53613 | SPACER .67 OD X .266 ID X 1.875 LG                                            |
| 30         | 1   | 54131 | LABEL "12:1"                                                                  |
| 31         | 1   | 54133 | LABEL OIL RDU                                                                 |
| 32         | 1   | 54916 | RING O 3/16 X 1 ID X 1-3/8 OD VITON 75 DUROMETER                              |
| 33         | 1   | 54920 | RING O 1/16 X 2-1/4 ID X 2-3/8 OD                                             |
| 34         | 1   | 54921 | RING O 4-3/8 ID X 4-5/8 OD X 1/8                                              |
| 35         | 1   | 54922 | RING O 1/16 X 1-3/8 ID X 1-1/2 OD VITON 75 DUROMETER                          |
| 36         | 1   | 55090 | CAP WORM HOUSING 12:1 RDU BB5000                                              |
| 37         | 1   | 55708 | SEAL 1.500 ID X 2.000 OD X .375 HIGH TEMP                                     |
| 38         | A/R | 55784 | SHIM 1.7 ID X 2.3 OD .001 THICK                                               |
| 39         | A/R | 55790 | SHIM 1.7 ID X 2.3 OD .002 THICK                                               |
| 40         | A/R | 55791 | SHIM 1.7 ID X 2.3 OD .005 THICK                                               |
| 41         | 1   | 59044 | LABEL WARNING - CONSULT OPERATOR'S MANUAL                                     |
| 45         | 1   | 78688 | SET WORM GEAR 12:1 BB5000 4TH GEN 1PC WORM                                    |
| 42         | 1   | 78741 | LABEL WARNING CRUSH FOOT                                                      |
| 43         | 1   | 78748 | LABEL WARNING FLYING DEBRIS/LOUD NOISE                                        |
| 44         | 1   | 80207 | LABEL WARNING - ENTANGLEMENT/ROTATING SHAFT GRAPHIC 1.95 TALL TRIANGLE YELLOW |

FIGURE B-18. RDU 12:1 ASSEMBLY PARTS LIST (P/N 53165)

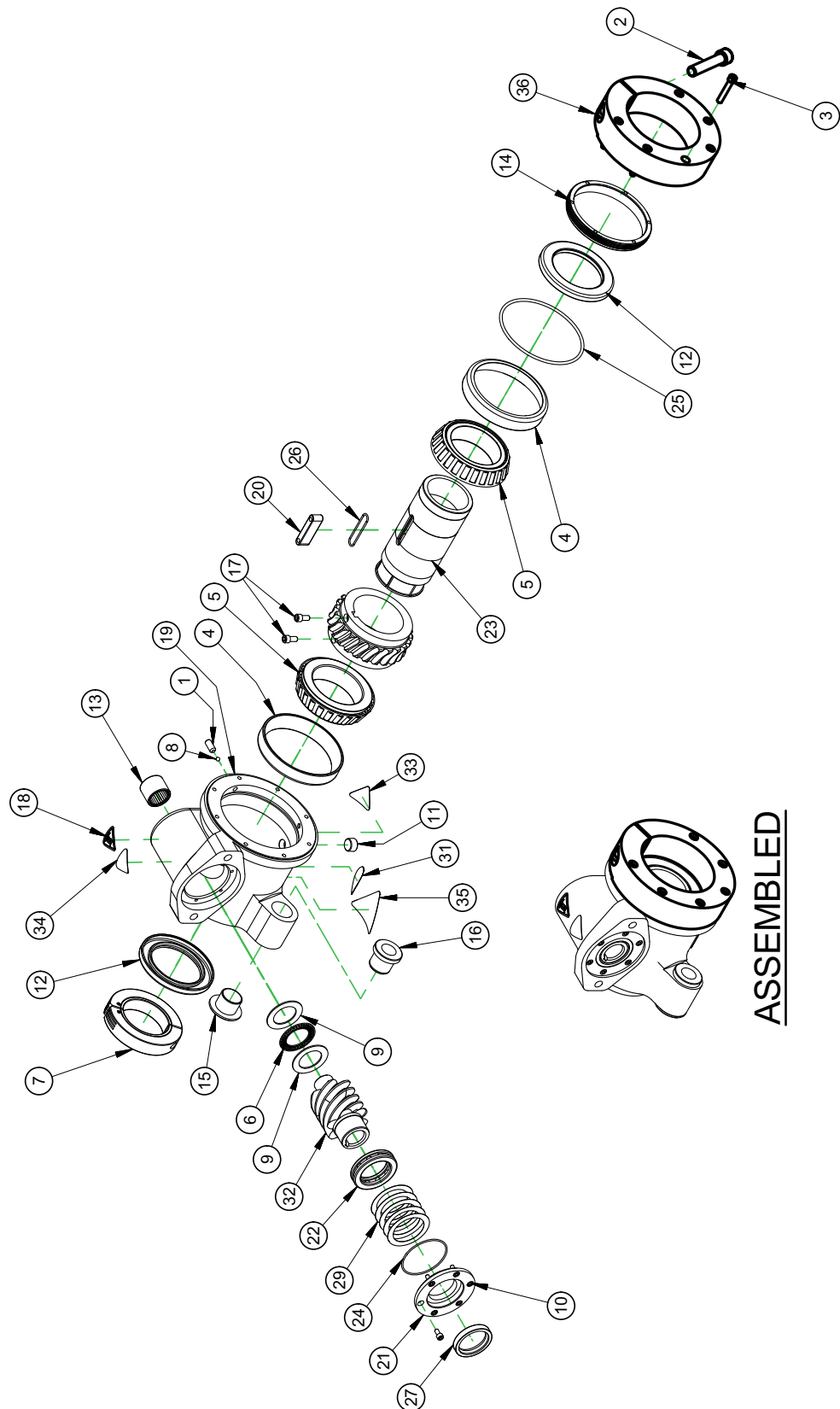


FIGURE B-19. RDU NO MOUNT MODIFIED ASSEMBLY (P/N 93090)

| PARTS LIST |     |       |                                                                               |
|------------|-----|-------|-------------------------------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                                                   |
| 1          | 2   | 11684 | SCREW 5/16-18 X 3/4 SSSCP                                                     |
| 2          | 1   | 11694 | SCREW 1/2-13 X 2-1/2                                                          |
| 3          | 6   | 11777 | SCREW 1/4-20 X 1-1/2 SHCS                                                     |
| 4          | 2   | 11821 | BRG CUP 4.4375 OD X .750 WIDE                                                 |
| 5          | 2   | 11822 | BRG CONE 2.75 ID X 1.00 WIDE                                                  |
| 6          | 1   | 12387 | BRG THRUST 1.259 ID X 1.937 OD X .0781                                        |
| 7          | 1   | 12395 | CLAMP COLLAR SPLIT HINGED 2-1/2 ID                                            |
| 8          | 2   | 16594 | BALL NYLON 3/16 DIA                                                           |
| 9          | 2   | 16666 | WASHER THRUST 1.250 ID X 1.937 OD X .060                                      |
| 10         | 6   | 19232 | SCREW 10-24 X 3/8 SHCS                                                        |
| 11         | 1   | 21956 | FTG PLUG 3/8 NPTM SOCKET                                                      |
| 12         | 2   | 27348 | SEAL 2.750 ID X 4.000 OD X .375                                               |
| 13         | 1   | 27353 | BRG NEEDLE 1 ID X 1-1/4 OD X 1 CLOSED                                         |
| 14         | 1   | 28219 | NUT MAIN BRG PRELOAD                                                          |
| 15         | 1   | 28220 | BUSHING LEADSCREW FLANGED                                                     |
| 16         | 1   | 28589 | BUSHING FLANGED 1 5P ACME THREADED                                            |
| 17         | 2   | 45900 | SCREW 1/4-28 X 1/2 SHCS                                                       |
| 18         | 1   | 46902 | LABEL WARNING HOT SURFACE GRAPHIC 1.13" TALL                                  |
| 19         | 1   | 49665 | HOUSING RDU BB5000 4TH                                                        |
| 20         | 1   | 49666 | KEY MAIN DRIVE BB5000 4TH GEN                                                 |
| 21         | 1   | 49667 | CAP WORM HOUSING BB5000 4TH GEN                                               |
| 22         | 1   | 52307 | BRG BALL THRUST 40 MM ID X 60 MM OD X 13 MM                                   |
| 23         | 1   | 53168 | COLLET MAIN DRIVE BB5000 4TH GEN                                              |
| 24         | 1   | 54920 | RING O 1/16 X 2-1/4 ID X 2-3/8 OD                                             |
| 25         | 1   | 54921 | RING O 4-3/8 ID X 4-5/8 OD X 1/8                                              |
| 26         | 1   | 54922 | RING O 1/16 X 1-3/8 ID X 1-1/2 OD VITON 75 DUROMETER                          |
| 27         | 1   | 55708 | SEAL 1.500 ID X 2.000 OD X .375 HIGH TEMP                                     |
| 28         | A/R | 55784 | SHIM 1.7 ID X 2.3 OD .001 THICK                                               |
| 29         | A/R | 55790 | SHIM 1.7 ID X 2.3 OD .002 THICK                                               |
| 30         | A/R | 55791 | SHIM 1.7 ID X 2.3 OD .005 THICK                                               |
| 31         | 1   | 59044 | LABEL WARNING - CONSULT OPERATOR'S MANUAL                                     |
| 32         | 1   | 73954 | SET WORM GEAR 4:1 BB5000 4TH GEN 1PC WORM                                     |
| 33         | 1   | 78741 | LABEL WARNING CRUSH FOOT                                                      |
| 34         | 1   | 78748 | LABEL WARNING FLYING DEBRIS/LOUD NOISE                                        |
| 35         | 1   | 80207 | LABEL WARNING - ENTANGLEMENT/ROTATING SHAFT GRAPHIC 1.95 TALL TRIANGLE YELLOW |
| 36         | 1   | 94857 | CLAMP RING FOR RDU 6001-S2                                                    |

FIGURE B-20. RDU NO MOUNT MODIFIED ASSEMBLY PARTS LIST (P/N 93090)

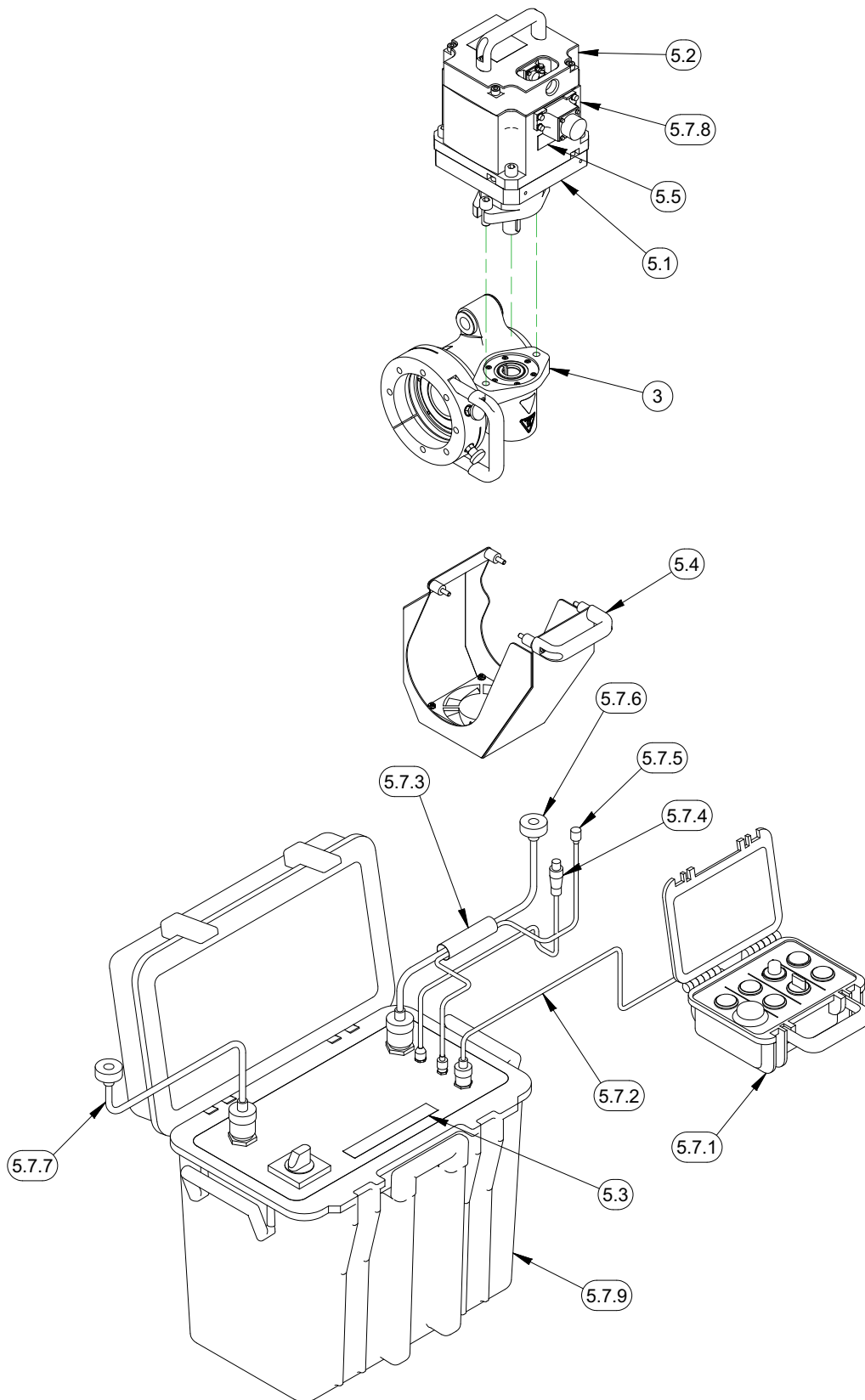


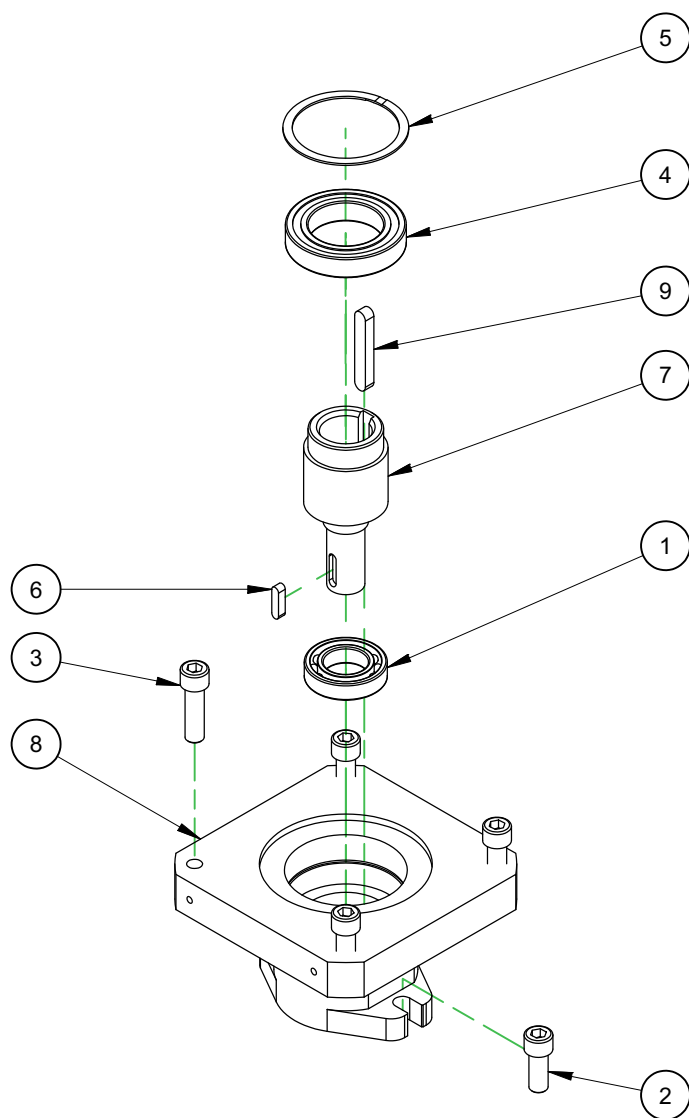
FIGURE B-21. SERVO DRIVE 230V CE ASSEMBLY (P/N 54321)



| PARTS LIST 3RD GEN |     |       |                                                                         |
|--------------------|-----|-------|-------------------------------------------------------------------------|
| ITEM               | QTY | P/N:  | DESCRIPTION                                                             |
| 1                  | 1   | 26845 | (NOT SHOWN) WRENCH HEX 3/8 SHORT ARM BONDHUS BONDHUS 10914 BALLDRIVER   |
| 2                  | 1   | 52188 | (NOT SHOWN) ASSY SHIPPING CASE WITH CUT FOAM FOR BB5000 SERVO PACKAGE   |
| 3                  | 1   | 53165 | RDU 12:1 BB5000 4TH GEN                                                 |
| 4                  | 1   | 55583 | (NOT SHOWN) LAMINATED PENDANT INSTRUCTION                               |
| 5                  | 1   | 56026 | SERVO DRIVE MOTOR ASSEMBLY 230V                                         |
| 5.1                | 1   | 51536 | ADAPTER BB5000 RDU TO SERVO MOTOR                                       |
| 5.2                | 1   | 52937 | GUARD ASSY BB5000 SERVO MOTOR                                           |
| 5.3                | 1   | 53483 | LABEL WARNING VOLTAGE CABLE                                             |
| 5.4                | 1   | 56773 | SHROUD FAN BB5000 SERVO ASSY                                            |
| 5.5                | 1   | 53482 | LABEL WARNING VOLTAGE                                                   |
| 5.6                | 1   | 45331 | (NOT SHOWN) MANUAL INSTRUCTION BB5000 SUP SERVO FEED                    |
| 5.7                | 1   | 91812 | ASSY BB5000 SERVO DRIVE 230VAC CONTROLS MOTOR AND CABLES CE 3RD GEN     |
| 5.7.1              | 1   | 53263 | PENDANT BB5000 SERVO DRIVE                                              |
| 5.7.2              | 1   | 53266 | CORDSET OPERATOR PENDANT BB5000 SERVO DRIVE 5M LONG                     |
| 5.7.3              | 120 | 56269 | SLEEVE WELD COVER 1" DIA STRAIGHTLINE W/VELCRO CLOSURE (10 FT)          |
| 5.7.4              | 1   | 57016 | ASSY CABLE FAN BB5000 SERVO DRIVE 242 IN LONG                           |
| 5.7.5              | 1   | 64425 | ASSY ENCODER CABLE BB5000 SERVO DRIVE 6 M LONG                          |
| 5.7.6              | 1   | 66909 | ASSY CABLE BB5000 SERVO POWER CABLE 90 DEG CONN 6M LONG 2ND GEN         |
| 5.7.7              | 1   | 66908 | ASSY CORDSET BB5000 SERVO INCOMING POWER CABLE 90 DEG CONN LONG 2ND GEN |
| 5.7.8              | 1   | 91717 | SERVO MOTOR MODEL HG-SR 3.5 kW 2000 RPM 200V KEYED SHAFT                |
| 5.7.9              | 1   | 91814 | ASSY CONTROLLER SERVO DRIVE BB5000 230/3/50-60 CE 3RD GEN               |
| 6                  | 1   | 84310 | (NOT SHOWN) MANUAL INSTRUCTION BB5000 BORING BAR                        |

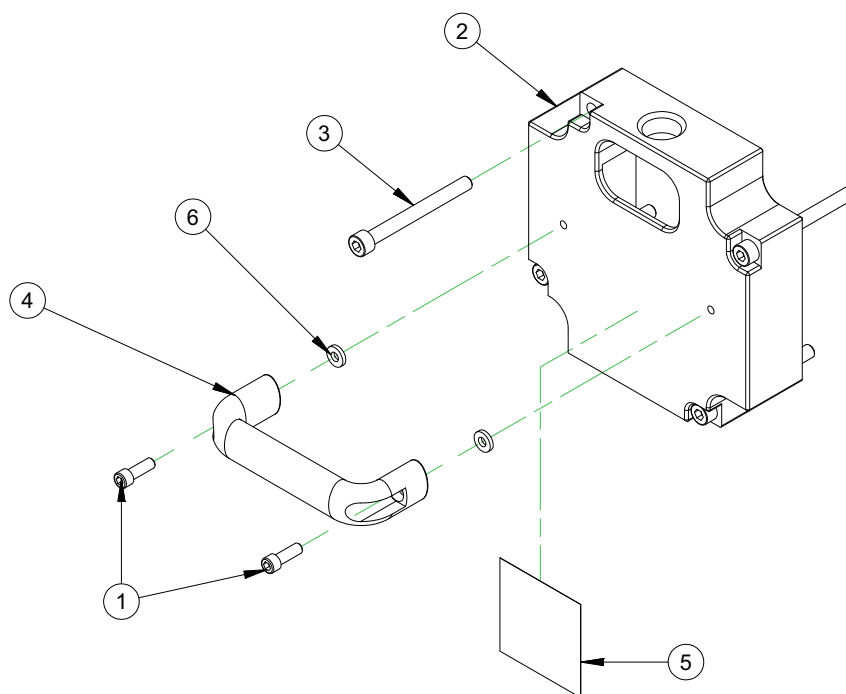
| PARTS LIST 2ND GEN |     |       |                                                                         |
|--------------------|-----|-------|-------------------------------------------------------------------------|
| ITEM               | QTY | P/N:  | DESCRIPTION                                                             |
| 1                  | 1   | 26845 | (NOT SHOWN) WRENCH HEX 3/8 SHORT ARM BONDHUS BONDHUS 10914 BALLDRIVER   |
| 2                  | 1   | 52188 | (NOT SHOWN) ASSY SHIPPING CASE WITH CUT FOAM FOR BB5000 SERVO PACKAGE   |
| 3                  | 1   | 53165 | RDU 12:1 BB5000 4TH GEN                                                 |
| 4                  | 1   | 55583 | (NOT SHOWN) LAMINATED PENDANT INSTRUCTION                               |
| 5                  | 1   | 56026 | SERVO DRIVE MOTOR ASSEMBLY 230V                                         |
| 5.1                | 1   | 51536 | ADAPTER BB5000 RDU TO SERVO MOTOR                                       |
| 5.2                | 1   | 52937 | GUARD ASSY BB5000 SERVO MOTOR                                           |
| 5.3                | 1   | 53483 | LABEL WARNING VOLTAGE CABLE                                             |
| 5.4                | 1   | 56773 | SHROUD FAN BB5000 SERVO ASSY                                            |
| 5.5                | 1   | 53482 | LABEL WARNING VOLTAGE                                                   |
| 5.6                | 1   | 45331 | (NOT SHOWN) MANUAL INSTRUCTION BB5000 SUP SERVO FEED                    |
| 5.7                | 1   | 66369 | ASSY BB5000 SERVO DRIVE 230VAC CONTROLS MOTOR AND CABLES CE 2ND GEN     |
| 5.7.1              | 1   | 53263 | PENDANT BB5000 SERVO DRIVE                                              |
| 5.7.2              | 1   | 53266 | CORDSET EXTENSION MULTIFAST 19 CONDUCTOR SHIELDED 20 FT LONG            |
| 5.7.3              | 1   | 66909 | ASSY CABLE BB5000 SERVO POWER CABLE 90 DEG CONN 6M LONG 2ND GEN         |
| 5.7.4              | 1   | 66908 | ASSY CORDSET BB5000 SERVO INCOMING POWER CABLE 90 DEG CONN LONG 2ND GEN |
| 5.7.5              | 120 | 56269 | SLEEVE WELD COVER 1" DIA STRAIGHTLINE W/VELCRO CLOSURE                  |
| 5.7.6              | 1   | 55606 | SERVO MOTOR 3.5 kW 2000 RPM 200V                                        |
| 5.7.7              | 1   | 64425 | ASSY ENCODER CABLE BB5000 SERVO DRIVE 6M LONG (2ND GEN BLACK)           |
|                    |     | 54161 | ASSY ENCODER CABLE BB5000 SERVO DRIVE 6M LONG (1ST GEN TURQUOISE)       |
| 5.7.8              | 1   | 64426 | ASSY CONTROLLER SERVO DRIVE BB5000 230/3/50-60 CE 2ND GEN               |
| 5.7.9              | 1   | 57016 | ASSY CABLE FAN BB5000 SERVO DRIVE 242 IN LONG                           |
| 6                  | 1   | 84310 | (NOT SHOWN) MANUAL INSTRUCTION BB5000 BORING BAR                        |

FIGURE B-22. SERVO DRIVE 230V CE ASSEMBLY (P/N 54321)



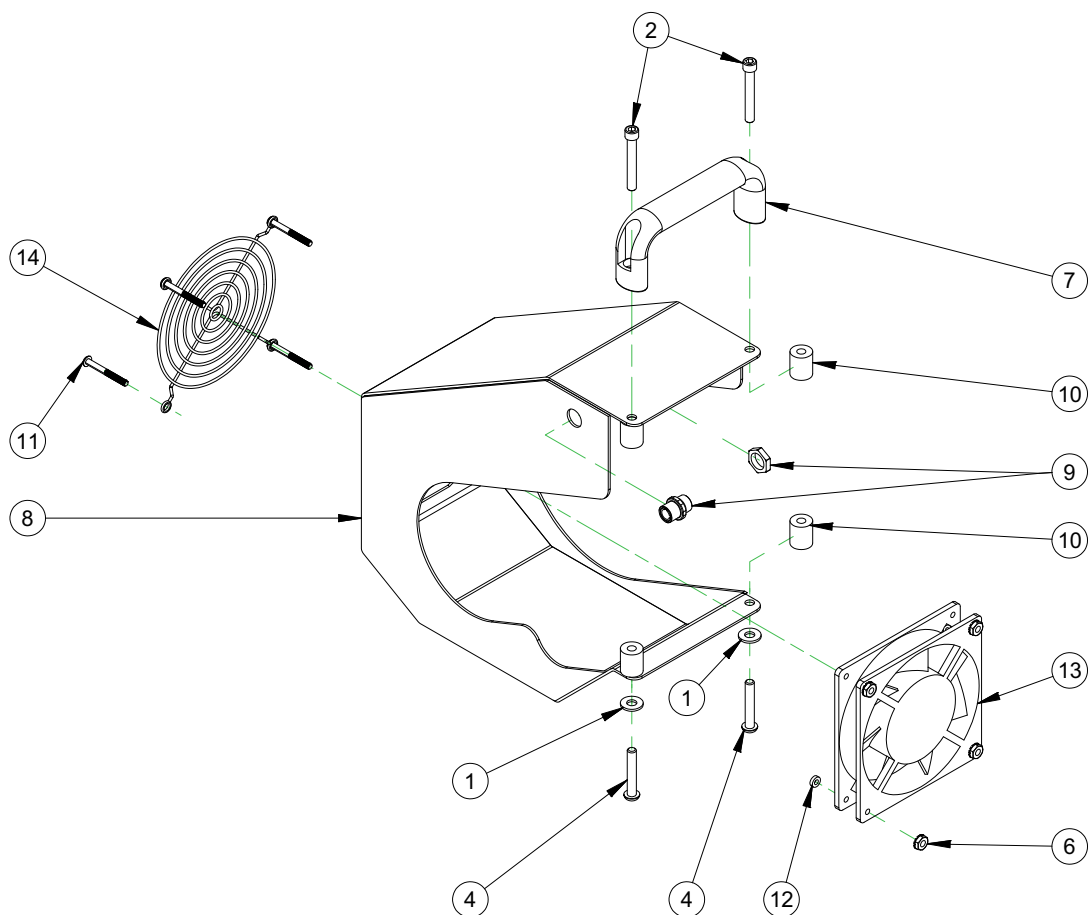
| PARTS LIST |     |          |                                               |
|------------|-----|----------|-----------------------------------------------|
| ITEM       | QTY | PART No. | DESCRIPTION                                   |
| 1          | 1   | 12524    | BRG BALL 1.1811 ID X 2.1654 X .50             |
| 2          | 2   | 12646    | SCREW 1/2-13 X 1-1/4 SHCS                     |
| 3          | 4   | 20534    | SCREW 1/2-13 X 1-3/4 SHCS                     |
| 4          | 1   | 22575    | BRG BALL 1.9685 ID X 3.1496 OD X .6299        |
| 5          | 1   | 39131    | RING SNAP 3.149 ID (80mm) SPIRAL MED DUTY     |
| 6          | 1   | 48909    | KEY 1/4 X 1/4 X 1.00 RAD BOTH ENDS            |
| 7          | 1   | 51530    | SHAFT BB5000 RDU TO SERVO                     |
| 8          | 1   | 51531    | HOUSING ADAPTER BB5000 RDU INPUT TO PLANETARY |
| 9          | 1   | 53195    | KEY 10mm x 8mm x 2.5 LONG RADIUS BOTH END     |

**FIGURE B-23. SERVO MOTOR RDU ADAPTER ASSEMBLY (P/N 51536)**



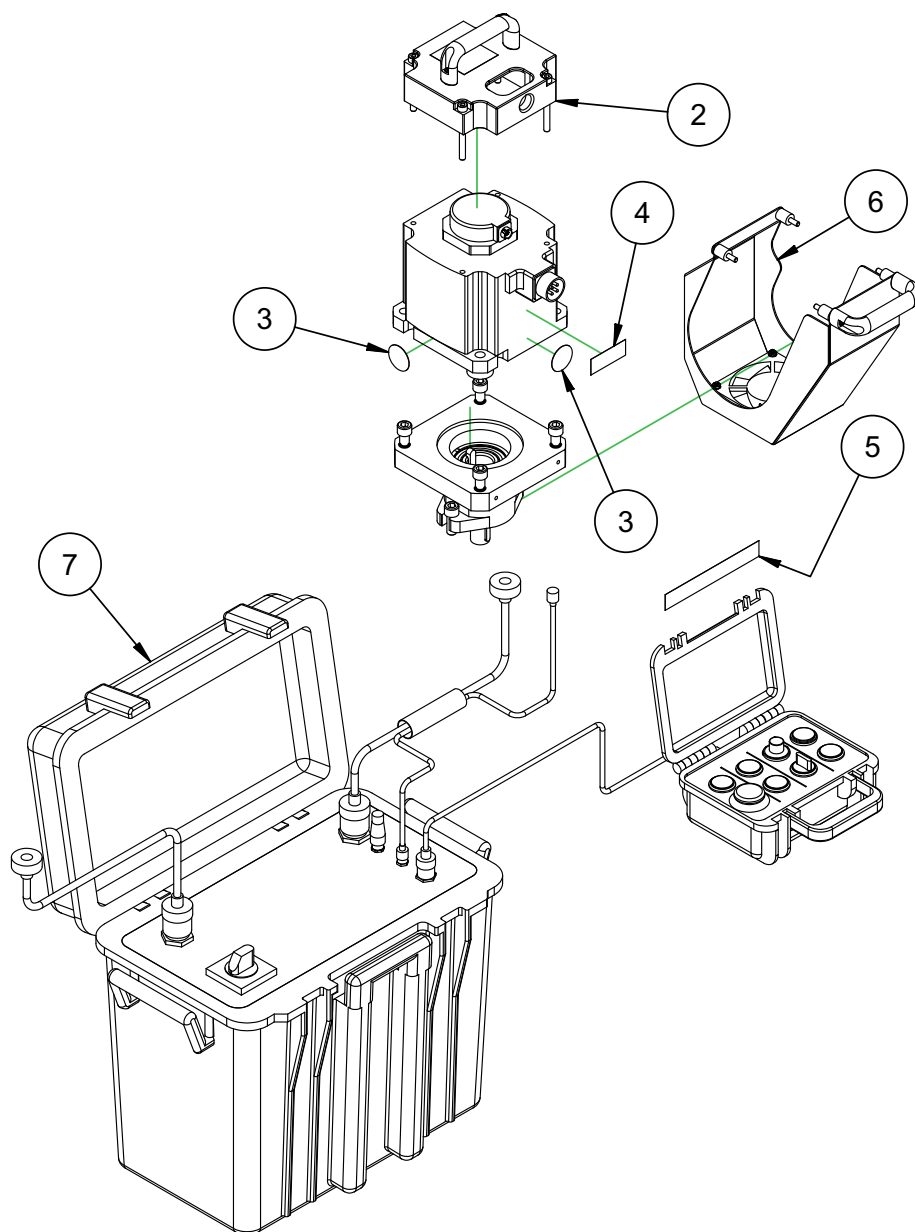
| PARTS LIST |     |       |                                                             |
|------------|-----|-------|-------------------------------------------------------------|
| ITEM       | QTY | P/N:  | DESCRIPTION                                                 |
| 1          | 2   | 10160 | SCREW 1/4-20 X 3/4 SHCS                                     |
| 2          | 1   | 52916 | GUARD SERVO MOTOR REAR PLATE                                |
| 3          | 4   | 52936 | SCREW M8 X 1.25 X 80MM SHCS                                 |
| 4          | 1   | 53462 | HANDLE PULL 1/4 CBORE MTG 2.0 X 5.12 X 1.02W PLASTIC COATED |
| 5          | 1   | 53484 | LABEL "HANDLE WITH CARE"                                    |
| 6          | 2   | 56079 | WASHER RUBBER 1/4 X 1/2 X .093                              |

**FIGURE B-24. SERVO MOTOR GUARD ASSEMBLY (P/N 52937)**



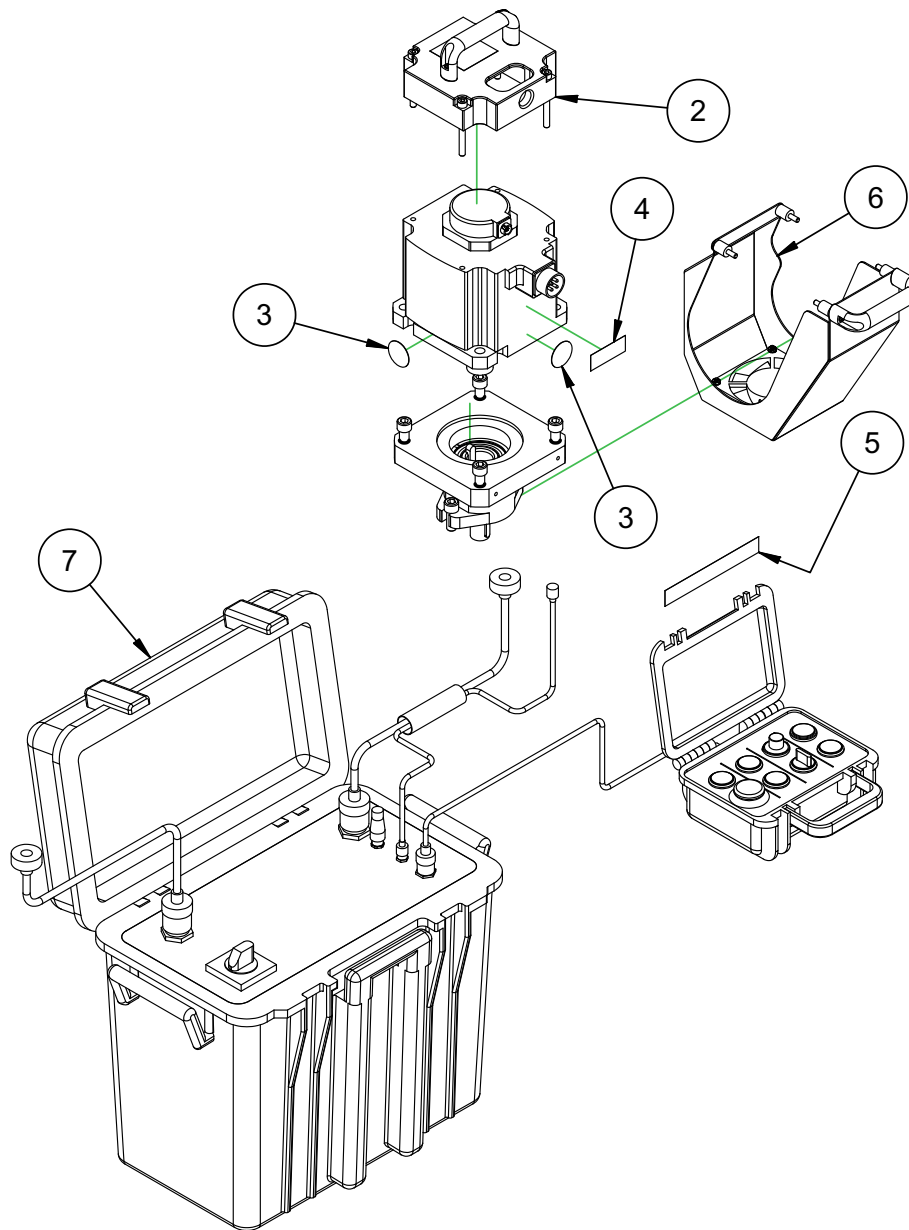
| PARTS LIST |      |       |                                                                   |
|------------|------|-------|-------------------------------------------------------------------|
| ITEM       | QTY  | P/N:  | DESCRIPTION                                                       |
| 1          | 2    | 10702 | WASHER 1/4 FLTW SAE                                               |
| 2          | 2    | 13252 | SCREW 1/4-20 X 1-3/4 SHCS                                         |
| 3          | 1    | 13296 | (NOT SHOWN) MOUNTING BASE WIRE TIE ADHESIVE BACKED LARGE          |
| 4          | 2    | 19001 | SCREW 1/4-20 X 1-1/2 BHSCS                                        |
| 5          | 2 IN | 22800 | (NOT SOWN) TUBE SHRINK .125 DIA BLACK                             |
| 6          | 4    | 28617 | NUT 8-32 LOCKING STAR WASHER                                      |
| 7          | 1    | 53462 | HANDLE PULL 1/4 CBORE MTG 2.0 X 5.12 X 1.02W PLASTIC COATED       |
| 8          | 1    | 56587 | SHROUD FAN BB5000 RDU SERVO                                       |
| 9          | 1    | 56757 | RECEPTACLE MICROFAST 3 POLE MALE 1/4 NPT THD 0.5M LONG CONDUCTORS |
| 10         | 4    | 56767 | SPACER ROUND .252 ID X .625 OD X .75 ALUMINUM                     |
| 11         | 4    | 56771 | SCREW 8-32 X 1-1/2 BHSCS                                          |
| 12         | 4    | 56772 | WASHER #8 FLTW RUBBER .93 THICK                                   |
| 13         | 1    | 56774 | FAN 4.69" SQUARE X 1" 24 VDC 80CFM                                |
| 14         | 1    | 56775 | GUARD FAN STEEL WIRE 4.13" SQUARE BOLT PATTERN                    |

**FIGURE B-25. SERVO SHROUD FAN ASSEMBLY (P/N 56773)**



| PARTS LIST |          |                                                                         |
|------------|----------|-------------------------------------------------------------------------|
| ITEM       | PART No. | DESCRIPTION                                                             |
| 1          | 51536    | ADAPTER BB5000 RDU TO SERVO MOTOR                                       |
| 2          | 52937    | GUARD ASSY BB5000 SERVO MOTOR                                           |
| 3          | 53464    | LABEL WARNING HOT HAND                                                  |
| 4          | 53482    | LABEL WARNING VOLTAGE                                                   |
| 5          | 53483    | LABEL WARNING VOLTAGE CABLE                                             |
| 6          | 56773    | SHROUD FAN BB5000 SERVO ASSY                                            |
| 7          | 71068    | ASSY BB5000 SERVO DRIVE 230VAC CONTROLS MOTOR AND CABLES NOT CE 2ND GEN |

FIGURE B-26. SERVO DRIVE MOTOR 230V NON-CE ASSEMBLY (P/N 71071)



| PARTS LIST |          |                                                                            |
|------------|----------|----------------------------------------------------------------------------|
| ITEM       | PART No. | DESCRIPTION                                                                |
| 1          | 51536    | ADAPTER BB5000 RDU TO SERVO MOTOR                                          |
| 2          | 52937    | GUARD ASSY BB5000 SERVO MOTOR                                              |
| 3          | 53464    | LABEL WARNING HOT HAND                                                     |
| 4          | 53482    | LABEL WARNING VOLTAGE                                                      |
| 5          | 53483    | LABEL WARNING VOLTAGE CABLE                                                |
| 6          | 56773    | SHROUD FAN BB5000 SERVO ASSY                                               |
| 7          | 71067    | ASSY BB5000 SERVO DRIVE 460VAC CONTROLS MOTOR AND CABLES<br>NOT CE 2ND GEN |

FIGURE B-27. SERVO DRIVE MOTOR 460V NON-CE ASSEMBLY (P/N 71072)



# FOR GENERATION 2 ONLY



**EIBENSTOCK**  
Elektrowerkzeuge

Ersatzteilliste

EAU 34/4.3 CB

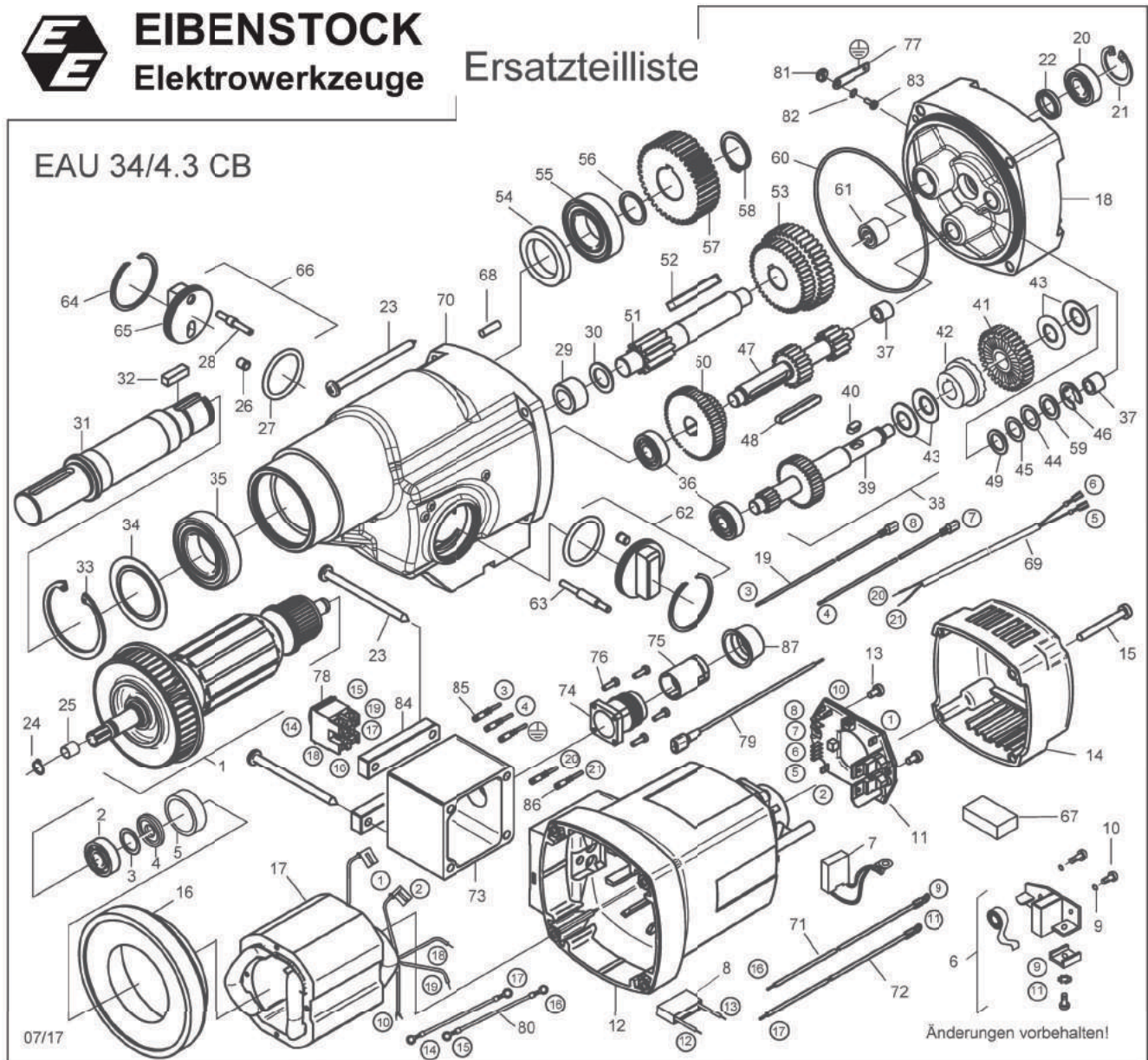


FIGURE B-28. EIBENSTOCK MOTOR ASSEMBLY -- GEN. 2 ONLY

# FOR GENERATION 2 ONLY

## EAU 34/4.3 CB - 230 V

04567000

| No. | Description                   | Order No. | Pcs |
|-----|-------------------------------|-----------|-----|
| 1   | rotor complete                | 7455U100  | 1   |
| 2   | grooved ball bearing 6000 2Z  | 80410021  | 1   |
| 3   | seal ring                     | 83000507  | 1   |
| 4   | magnetic disc                 | 7633J325  | 1   |
| 5   | bearing cap                   | 83000031  | 1   |
| 6   | brush holder                  | 80204515  | 2   |
| 7   | carbon brush                  | 80700070  | 2   |
| 8   | anti parasite condenser       | 80500010  | 1   |
| 9   | lock washer B4                | 80201385  | 4   |
| 10  | self tapping screw CM4x12     | 80201180  | 4   |
| 11  | PCB / circuit board           | 74522280  | 1   |
| 12  | motor housing                 | 7455U201  | 1   |
| 13  | self tapping screw HC 4,2x9,5 | 80201269  | 2   |
| 14  | cap                           | 80900082  | 1   |
| 15  | self tapping screw HC 4,8x45  | 80201267  | 4   |
| 16  | air guiding ring              | 73511141  | 1   |
| 17  | stator complete               | 7455U150  | 1   |
| 18  | end shield of gearing         | 7455U610  | 1   |
| 19  | interconnecting wire          | 74555180  | 2   |
| 20  | grooved ball bearing 6201 LUZ | 80410101  | 1   |
| 21  | locking ring 32x1,2           | 80201351  | 1   |
| 22  | shaft seal ring 15x21x3 KEIV  | 83000042  | 1   |
| 23  | self tapping screw HC 5,5x80  | 80201227  | 4   |
| 24  | locking ring 12/1             | 80201321  | 1   |
| 25  | bearing ring 12x15x12,5       | 80420160  | 1   |
| 26  | spring loaded thrust pad      | 85000157  | 2   |
| 27  | o-ring 36x1,5 NBR             | 83000022  | 2   |
| 28  | switch-actuating wheel short  | 71641532  | 1   |
| 29  | needle bearing RNA 4900       | 80420001  | 1   |
| 30  | disc                          | 71540517  | 1   |
| 31  | work spindle                  | 74565420  | 1   |
| 32  | fitting key B6x6x20           | 80200606  | 1   |
| 33  | locking ring 55/2             | 80201338  | 1   |
| 34  | disc                          | 71540426  | 1   |
| 35  | grooved ball bearing 6006 2RS | 80410071  | 1   |
| 36  | grooved ball bearing 6000     | 80410020  | 2   |
| 37  | needle sleeve HK 0810         | 80420110  | 2   |
| 38  | clutch complete               | 74643493  | 1   |
| 39  | intermediate shaft 1          | 74641490  | 1   |
| 40  | fitting key 5x5x10            | 80200600  | 1   |
| 41  | clutch wheel                  | 74326550  | 1   |
| 42  | coupling half                 | 71540560  | 1   |
| 43  | spring washer 28x12,2x1       | 80200713  | 4   |
| 44  | fitting washer 12/18x0,5      | 80200503  | 1   |

| No. | Description                   | Order No. | Pcs |
|-----|-------------------------------|-----------|-----|
| 45  | fitting washer 12/18x0,2      | 80200502  | 1   |
| 46  | lock washer 9                 | 80201361  | 1   |
| 47  | intermediate shaft 2          | 74641500  | 1   |
| 48  | fitting key 5x5x40            | 80200612  | 1   |
| 49  | pressure washer               | 71540607  | 1   |
| 50  | gear block 1                  | 74641440  | 1   |
| 51  | intermediate shaft 3          | 74641510  | 1   |
| 52  | fitting key 6x6x50            | 80200610  | 1   |
| 53  | gear block 2                  | 74641450  | 1   |
| 54  | shaft seal ring 30x42x7       | 83000071  | 1   |
| 55  | grooved ball bearing 6005 2RS | 80410061  | 1   |
| 56  | fitting washer 25x0,1         | 80200512  | 1   |
| 57  | spindle wheel                 | 74554430  | 1   |
| 58  | locking ring 24/1,2           | 80201326  | 1   |
| 59  | pressure washer               | 71540606  | 1   |
| 60  | o-ring 106x2                  | 83000092  | 1   |
| 61  | needle sleeve HK 1212         | 80420130  | 1   |
| 62  | switch button long            | 71641545  | 1   |
| 63  | switch-actuating wheel long   | 71641542  | 1   |
| 64  | circlip SB42                  | 80201355  | 2   |
| 65  | switch button                 | 71641540  | 2   |
| 66  | switch button short           | 71641535  | 1   |
| 67  | foam filler                   | 80600306  | 1   |
| 68  | notched pin plug 5x16         | 80200580  | 1   |
| 69  | control wire                  | 77314187  | 1   |
| 70  | gearbox housing               | 7455U400  | 1   |
| 71  | brush holder wire 1           | 74555181  | 1   |
| 72  | brush holder wire 2           | 74555182  | 1   |
| 73  | switch box                    | 74567630  | 1   |
| 74  | connector socket              | 80601480  | 1   |
| 75  | insert                        | 80601481  | 1   |
| 76  | screw 3x10                    | 80201600  | 4   |
| 77  | earth connector               | 80601189  | 1   |
| 78  | reverser                      | 80600103  | 1   |
| 79  | ground wire                   | 74567185  | 1   |
| 80  | interconnecting wire          | 80600243  | 2   |
| 81  | locking nut M4                | 73631188  | 1   |
| 82  | tooth lock washer A4,3        | 80200752  | 1   |
| 83  | allen screw M4x8              | 80201451  | 1   |
| 84  | protection hood               | 7455U633  | 2   |
| 85  | connector pin 2,5 mm²         | 80601484  | 3   |
| 86  | connector pin 0,75 mm²        | 80601483  | 2   |
| 87  | cap guard                     | 80601482  | 1   |

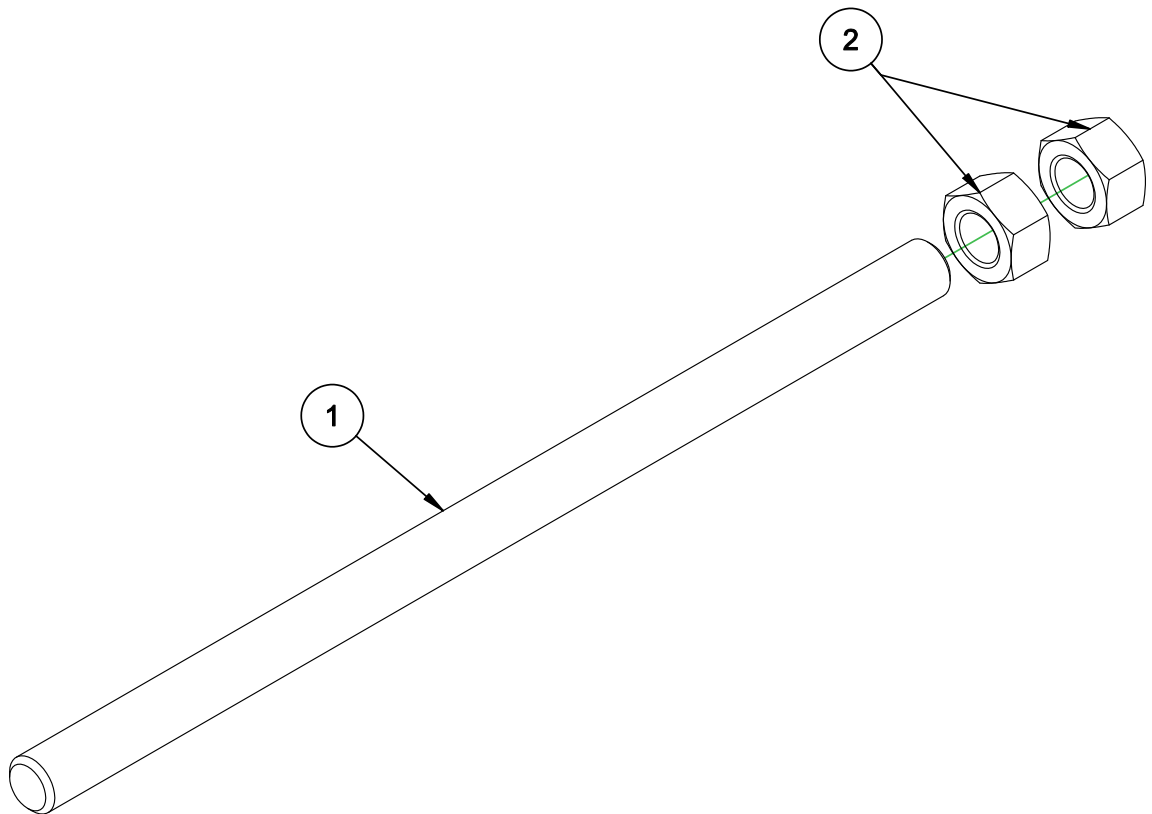
## EAU 34/4.3 CB - 110 V

04568000

|   |                |          |   |        |    |                     |          |   |       |
|---|----------------|----------|---|--------|----|---------------------|----------|---|-------|
| 1 | rotor complete | 7455V100 | 1 | 150,00 | 11 | PCB / circuit board | 7451I280 | 1 | 68,75 |
| 7 | carbon brush   | 80700077 | 2 | 5,81   | 17 | stator complete     | 74644150 | 1 | 68,75 |

FIGURE B-29. EIBENSTOCK MOTOR ASSEMBLY PARTS LIST -- GEN. 2 ONLY





|            |     |          |                             |
|------------|-----|----------|-----------------------------|
| 2          | 2   | 27356    | HEX NUT 1-5 ACME FINISHED   |
| 1          | 1   | 28654    | LEADSCREW ASSY 12 INCH FEED |
| ITEM       | QTY | PART No. | DESCRIPTION                 |
| PARTS LIST |     |          |                             |

FIGURE B-30. LEADSCREW ASSEMBLY (P/N 28654)

**TABLE B-1. BB5000 RECOMMENDED SPARE PARTS**

| <b>Component</b>                                    | <b>Part number</b> | <b>Description</b>                                           | <b>Quantity</b> |
|-----------------------------------------------------|--------------------|--------------------------------------------------------------|-----------------|
| 2 Rotational Drive Unit & 2 Axial Feed-box Assembly | 12395              | CLAMP COLLAR SPLIT HINGED 2-1/2 ID                           | 4               |
| Axial Feed-box Assembly                             | 25957              | BRG ROLLER CLUTCH 1 ID X 1.312 OD X .625                     | 4               |
|                                                     | 26850              | HANDLE CRANK MODIFIED                                        | 1               |
|                                                     | 27015              | PIN DOWEL MODIFIED .187 DIA X .75 GROOVED                    | 2               |
|                                                     | 27197              | LEAD NUT BB4500 BB5000 AXIAL FEED                            | 2               |
|                                                     | 92494              | SCREW ASSY FEED STOP GEN 2                                   | 2               |
| Boring Head / Bar                                   | 10191              | SCREW 3/8-16 X 1 SHCS                                        | 2               |
|                                                     | 11691              | SCREW 1/2-13 X 1-1/2 SHCS                                    | 2               |
|                                                     | 11734              | SCREW 3/8-16 X 3/4 SSSCP                                     | 4               |
|                                                     | 13356              | SCREW 5/8-11 X 2-1/2 SHCS                                    | 4               |
| Electric Motor Assembly                             | 20273              | KEY 1/4 SQ X 1.00 SQ BOTH ENDS                               | 1               |
|                                                     | 26845              | WRENCH HEX 3/8 SHORT ARM BONDHUS BALL-DRIVER                 | 1               |
|                                                     | 82698              | SP BRUSH CARBON PAIR FOR EIBENSTOCK EAU 34/4.1 BB4500 BB5000 | 2               |
| Leadscrew Assembly                                  | 27356              | NUT 1-5 ACME 7/8 TALL 1-1/2 HEX FINISHED                     | 2               |
| Servo Motor Assembly                                | 48909              | KEY 1/4 SQ X 1.00 RADIUS BOTH ENDS                           | 1               |
|                                                     | 53195              | KEY 10mm X 8mm X 2.05 LONG RADIUS BOTH END                   | 1               |
| Spherical Bearing Mounting Brackets                 | 14036              | SCREW 1/2-13 X 2 SHCS                                        | 8               |
|                                                     | 21798              | WASHER 5/16 FLTW HARDENED 1/8 THK BLK OX                     | 4               |
|                                                     | 22662              | WASHER 1/2 FLTW HARDENED 1-1/8 OD X 1/8 THICK                | 8               |
|                                                     | 26250              | SCREW 5/16-24 X 2 HHCS                                       | 4               |
|                                                     | 26252              | SCREW 1/2-20 X 2 SSSFP                                       | 4               |

**TABLE B-2. LEADSCREW SPARE PARTS**

| <b>Part number</b> | <b>Description</b>          | <b>Quantity</b> |
|--------------------|-----------------------------|-----------------|
| 28654              | ASSY LEADSCREW 12 INCH FEED | 1               |

TABLE B-2. LEADSCREW SPARE PARTS (CONTINUED)

| Part number | Description                 | Quantity |
|-------------|-----------------------------|----------|
| 28687       | ASSY LEADSCREW 24 INCH FEED | 1        |
| 28688       | ASSY LEADSCREW 36 INCH FEED | 1        |

TABLE B-3. HYDRAULIC METRIC SPARE PARTS

| Part number | Description                                   | Quantity |
|-------------|-----------------------------------------------|----------|
| 10191       | SCREW 3/8-16 X 1 SHCS                         | 2        |
| 11691       | SCREW 1/2-13 X 1-1/2 SHCS                     | 2        |
| 11734       | SCREW 3/8-16 X 3/4 SSSCP                      | 4        |
| 13356       | SCREW 5/8-11 X 2-1/2 SHCS                     | 4        |
| 14036       | SCREW 1/2-13 X 2 SHCS                         | 8        |
| 21798       | WASHER 5/16 FLTW HARDENED 1/8 THK BLK OX      | 4        |
| 22662       | WASHER 1/2 FLTW HARDENED 1-1/8 OD X 1/8 THICK | 8        |
| 25957       | BRG ROLLER CLUTCH 1 ID X 1.312 OD X .625      | 4        |
| 26250       | SCREW 5/16-24 X 2 HHCS                        | 4        |
| 26252       | SCREW 1/2-20 X 2 SSSFP                        | 4        |
| 26850       | HANDLE CRANK MODIFIED                         | 1        |
| 27015       | SP PIN DOWEL MODIFIED .187 DIA X .75 GROOVED  | 2        |
| 27197       | LEAD NUT BB4500 BB5000 AXIAL FEED             | 2        |
| 92494       | SCREW ASSY FEED STOP GEN 2                    | 2        |
| 27356       | NUT 1-5 ACME 7/8 TALL 1-1/2 HEX FINISHED      | 2        |
| 29207       | SPRING PLUNGER HAND RETRACT 1/2 X 13          | 2        |
| 33999       | WRENCH HEX SET .050 - 3/8 BONDHUS BALL END    | 1        |
| 34571       | BIT TOOL HSS 12MM X 4.0 LH FINISH SINGLE TC   | 4        |
| 34572       | BIT TOOL HSS 12MM X 2.5 LH FINISH SINGLE TC   | 4        |
| 34573       | BIT TOOL HSS 12MM X 1.8 LH FINISH SINGLE TC   | 4        |
| 34576       | BIT TOOL HSS 12MM X 4.0 LH ROUGHING SINGLE    | 4        |
| 34577       | BIT TOOL HSS 12MM X 2.5 LH ROUGHING SINGLE    | 4        |
| 34578       | BIT TOOL HSS 12MM X 1.8 LH ROUGHING SINGLE    | 4        |
| 34642       | SCREW M16 X 1.5 X 8 SSSFP                     | 24       |
| 38678       | WRENCH HEX SET 1.5 - 10MM BONDHUS BALL END    | 1        |

**TABLE B-3. HYDRAULIC METRIC SPARE PARTS (CONTINUED)**

| <b>Part number</b> | <b>Description</b>                          | <b>Quantity</b> |
|--------------------|---------------------------------------------|-----------------|
| 53670              | ELEMENT FILTER 5/10HP HPU 10 MICRON         | 1               |
| 63533              | TOOL HOLDER SET 12MM                        | 2               |
| 63543              | INSERT 80 DEG DIAMOND 3/8 IC .015 R KC-5010 | 24              |
| 64446              | OIL HYDRAULIC 5 GALLON 76 UNAX AW 32        | 2               |

**TABLE B-4. BB5000 TOOL KIT**

| <b>Part number</b> | <b>Description</b>                           |
|--------------------|----------------------------------------------|
| 14650              | WRENCH END 1/2 COMBINATION LONG              |
| 29661              | WRENCH HINGE HANDLE 1/2 DRIVE 17 IN HANDLE   |
| 34573              | BIT TOOL HSS 12MM X 1.8 LH FINISH SINGLE TC  |
| 34572              | BIT TOOL HSS 12MM X 2.5 LH FINISH SINGLE TC  |
| 13052              | WRENCH HEX BIT 1/2 DRIVER X 1/2 DRIVE SOCKET |
| 34568              | WRENCH HEX 5MM SHORT ARM                     |
| 33999              | WRENCH HEX SET .050 - 3/8 BONDHUS BALL END   |
| 25550              | WRENCH HEX 5/16 X 11.4 BALLDRIVER T-HANDLE   |
| 54033              | VIDEO BB5000 SETUP AND OPERATION DVD         |
| 34578              | BIT TOOL HSS 12MM X 1.8 LH ROUGHING SINGLE   |
| 29660              | WRENCH HEX BIT 5/16 DRIVER X 1/2 DRIVE       |
| 35340              | WRENCH HEX 8MM SHORT ARM                     |
| 16794              | WRENCH HEX BIT 3/8 DRIVER X 1/2 DRIVE        |
| 55923              | WRENCH TEE 1/4 HEX                           |
| 34579              | BIT TOOL HSS 12MM X 1.0 LH ROUGHING SINGLE   |
| 34574              | BIT TOOL HSS 12MM X 1.0 LH FINISH SINGLE TC  |
| 37528              | PRINT LAYOUT BB5000 PACKAGING                |
| 34577              | BIT TOOL HSS 12MM X 2.5 LH ROUGHING SINGLE   |
| 29652              | WRENCH HEX 3MM SHORT ARM                     |
| 55924              | WRENCH TEE 3/8 HEX                           |
| 34116              | LABEL ACCESSORY BAG #1 BB5000                |
| 33785              | WRENCH TORX T-45                             |
| 14251              | WRENCH TEE 3/16 HEX                          |

**TABLE B-4. BB5000 TOOL KIT (CONTINUED)**

| <b>Part number</b> | <b>Description</b>                 |
|--------------------|------------------------------------|
| 29199              | WRENCH HEX 1/2 LONG ARM            |
| 35516              | HAMMER DEAD BLOW 1-3/4 DIA HEAD    |
| 29041              | WRENCH END 1-1/2 (SINGLE OPEN END) |
| 82949              | BAG TOOL 14 X 5.5 X 6 POLYESTER    |

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## APPENDIX C SCHEMATICS

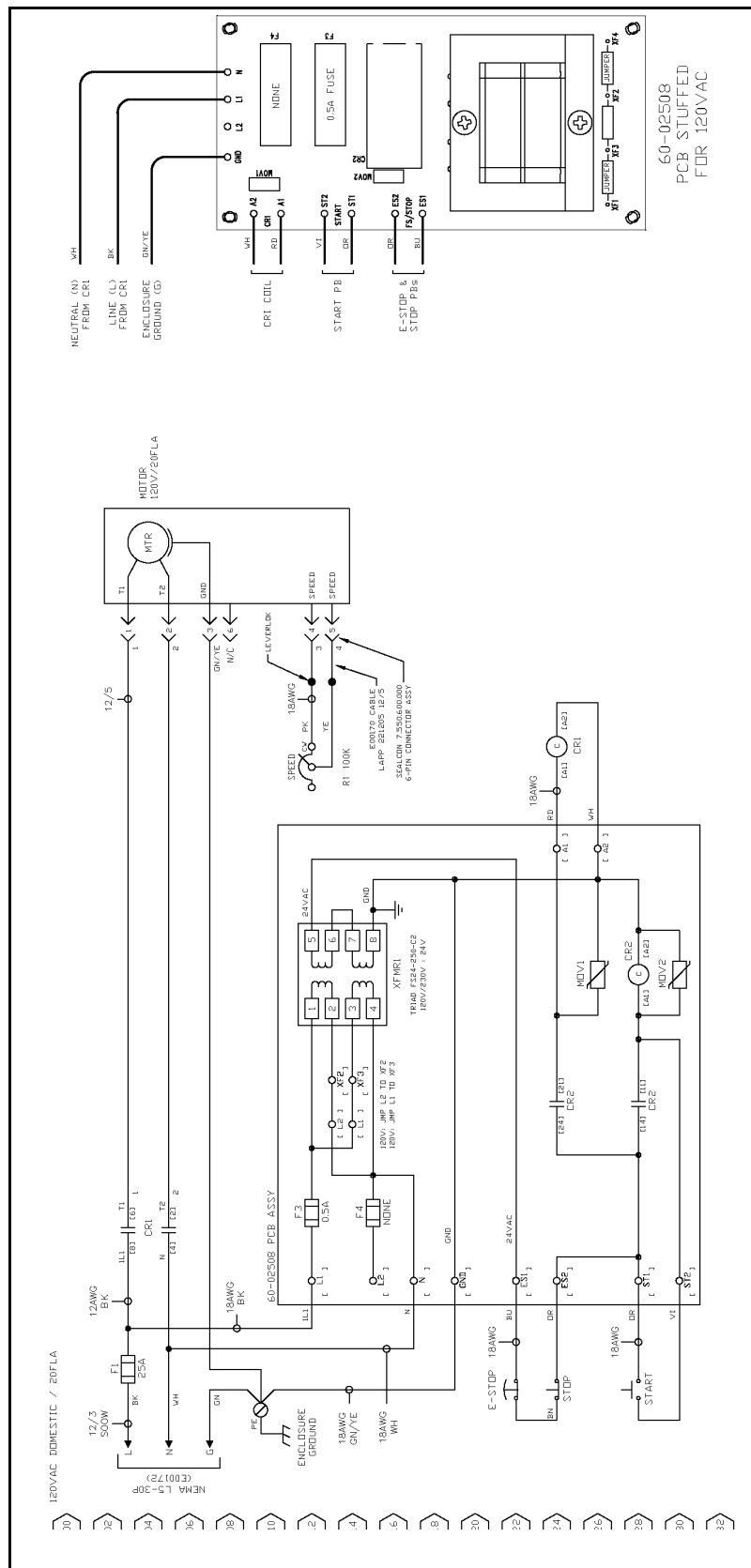
### *Schematic list*

|                                                                                                                          |     |
|--------------------------------------------------------------------------------------------------------------------------|-----|
| FIGURE C-1. BB4500-BB5000 EIBENSTOCK CONTROLLER 2ND GEN 230V 50-60 HZ CE SCHEMATIC (P/N 88035 C00467) - - - - -          | 120 |
| FIGURE C-2. BB4500-BB5000 EIBENSTOCK CONTROLLER 2ND GEN 230V 50-60 HZ DOMESTIC ASSEMBLY (P/N 88036 C00468) - - - - -     | 121 |
| FIGURE C-3. BB4500-BB5000 EIBENSTOCK CONTROLLER 2ND GEN 120V DOMESTIC ASSEMBLY (P/N 88037 C00465) - - - - -              | 122 |
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| FIGURE C-16. BB4500-BB5000 EIBENSTOCK CONTROLLER 2ND GEN 120V DOMESTIC ASSEMBLY (P/N 88037 B00365) - - - - -             | 135 |
| FIGURE C-17. BB4500-BB5000 EIBENSTOCK CONTROLLER 2ND GEN 120V CE ASSEMBLY (P/N 88038 B00366) - - - - -                   | 136 |
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| FIGURE C-19. BB5000 EIBENSTOCK CONTROLLER 2ND GEN 120V DOMESTIC ASSEMBLY (P/N A00100) - - - - -                          | 138 |
| FIGURE C-20. BB5000 SERVO PENDANT ASSEMBLY (P/N B00024) - - - - -                                                        | 139 |





**FIGURE C-2. BB4500-BB5000 EIBENSTOCK CONTROLLER 2ND GEN 230V 50-60 HZ DOMESTIC ASSEMBLY (P/N 88036 C00468)**



**FIGURE C-4. BB4500-BB5000 EIBENSTOCK CONTROLLER 2ND GEN 120V CE ASSEMBLY (P/N 88038 C00466)**

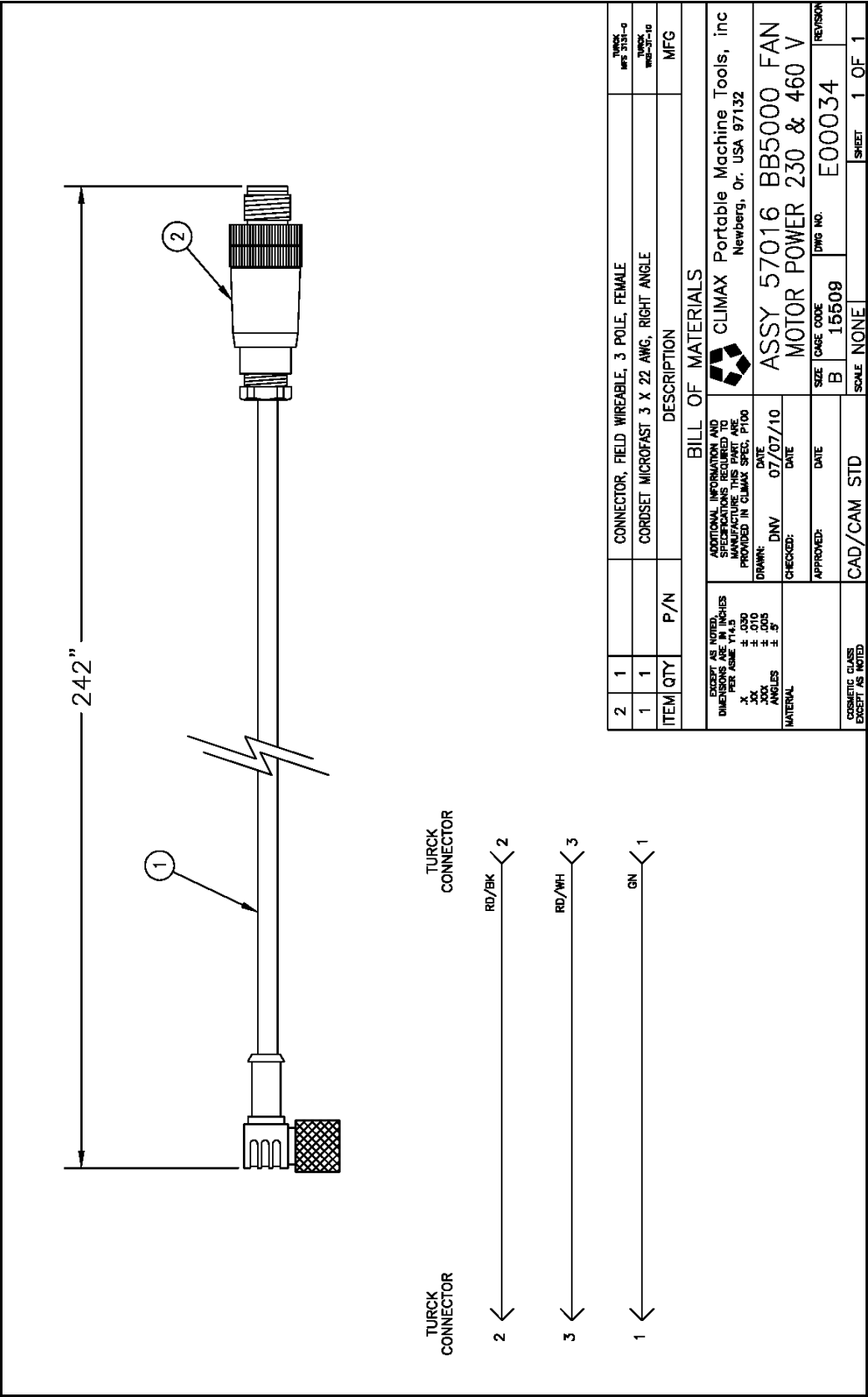


FIGURE C-5. BB5000 MOTOR 230V AND 460V FAN ASSEMBLY (P/N 91811 E00034)

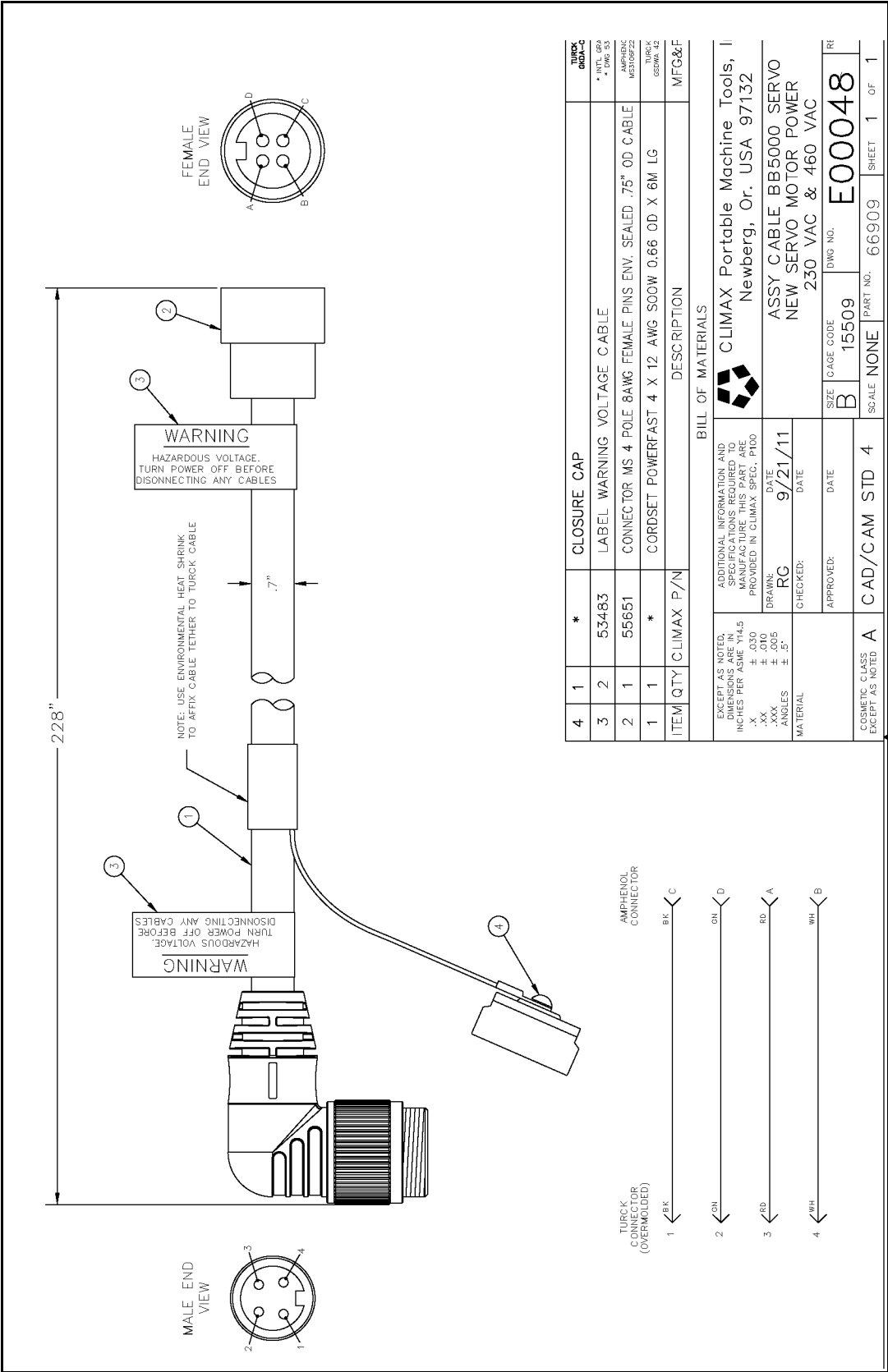
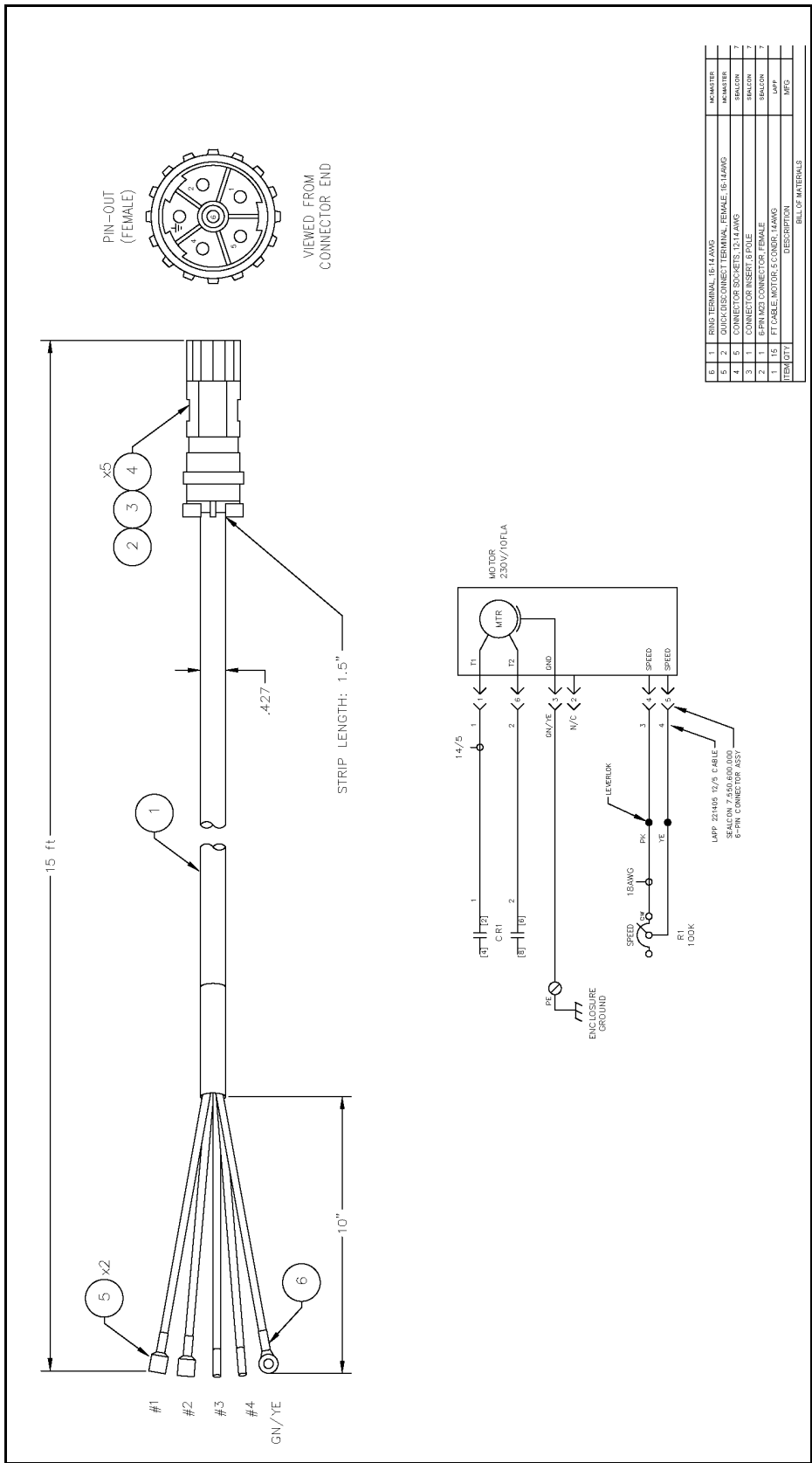


FIGURE C-6. BB5000 SERVO MOTOR 230VAC AND 460VAC POWER CABLE ASSEMBLY (P/N 91811 E00048)









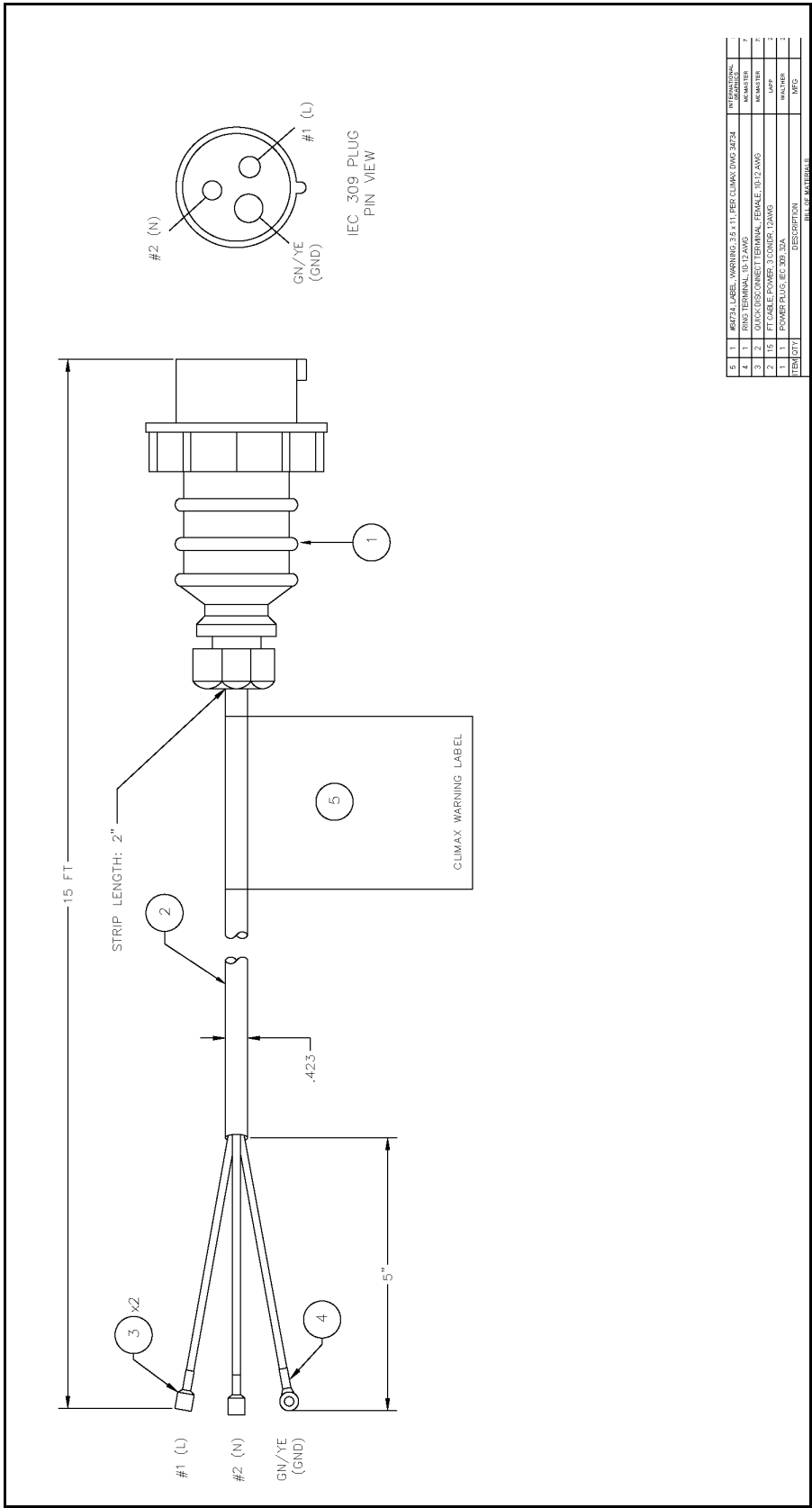


FIGURE C-10. BB5000 EIBENSTOCK POWER CABLE ASSEMBLY 2ND GEN 120V CE 332P4W PIN/SLEEVE PLUG (P/N 88653 E00173)

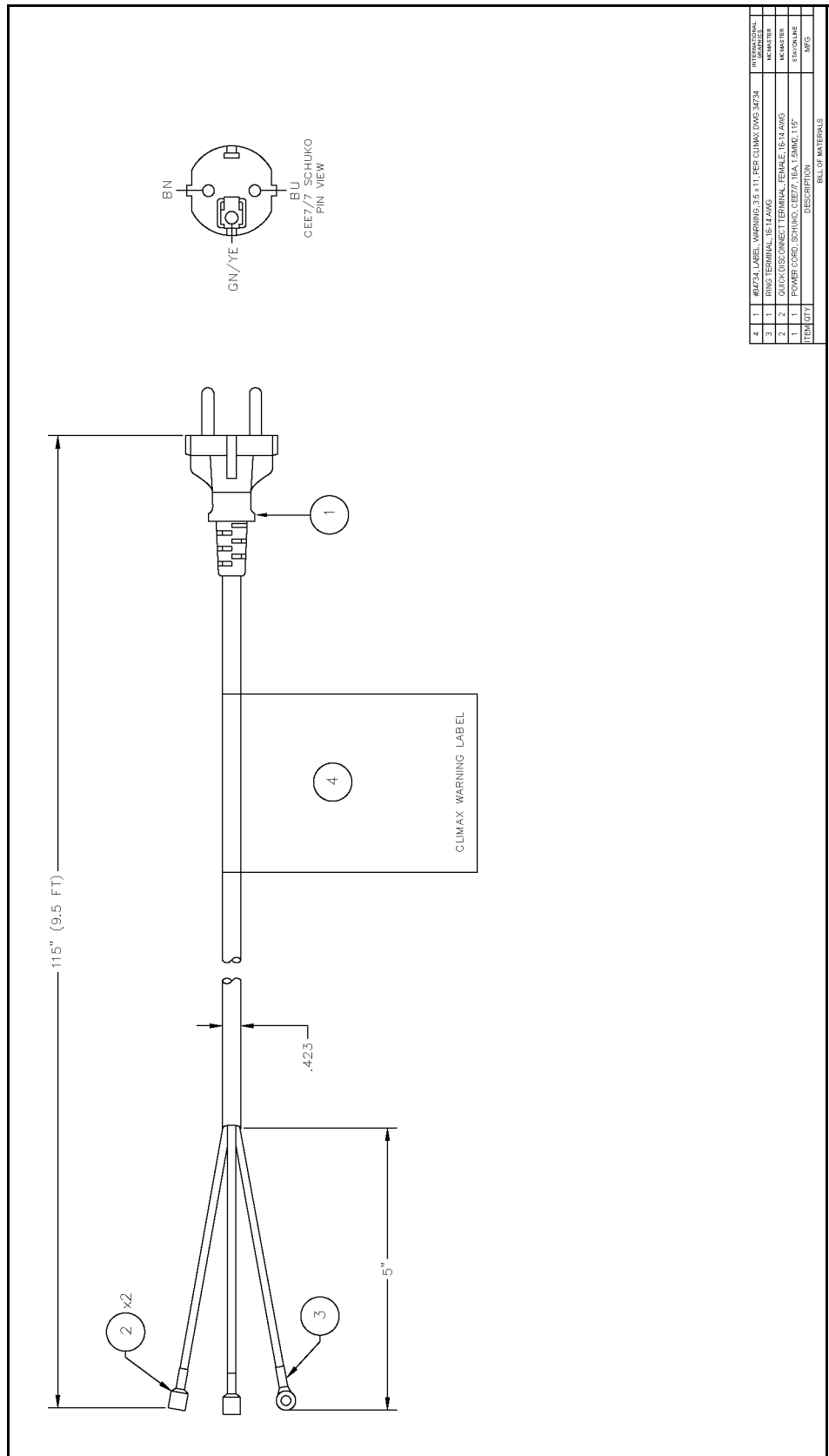


FIGURE C-11. BB5000 EIBENSTOCK POWER CABLE ASSEMBLY 2ND GEN 230V CE CEE7/7 SCHUKO PLUG (P/N 88654 E00174)



**FIGURE C-12. BB5000 EIBENSTOCK POWER CABLE ASSEMBLY 2ND GEN 230V DOMESTIC L6-15P PLUG (P/N 88655 E00175)**

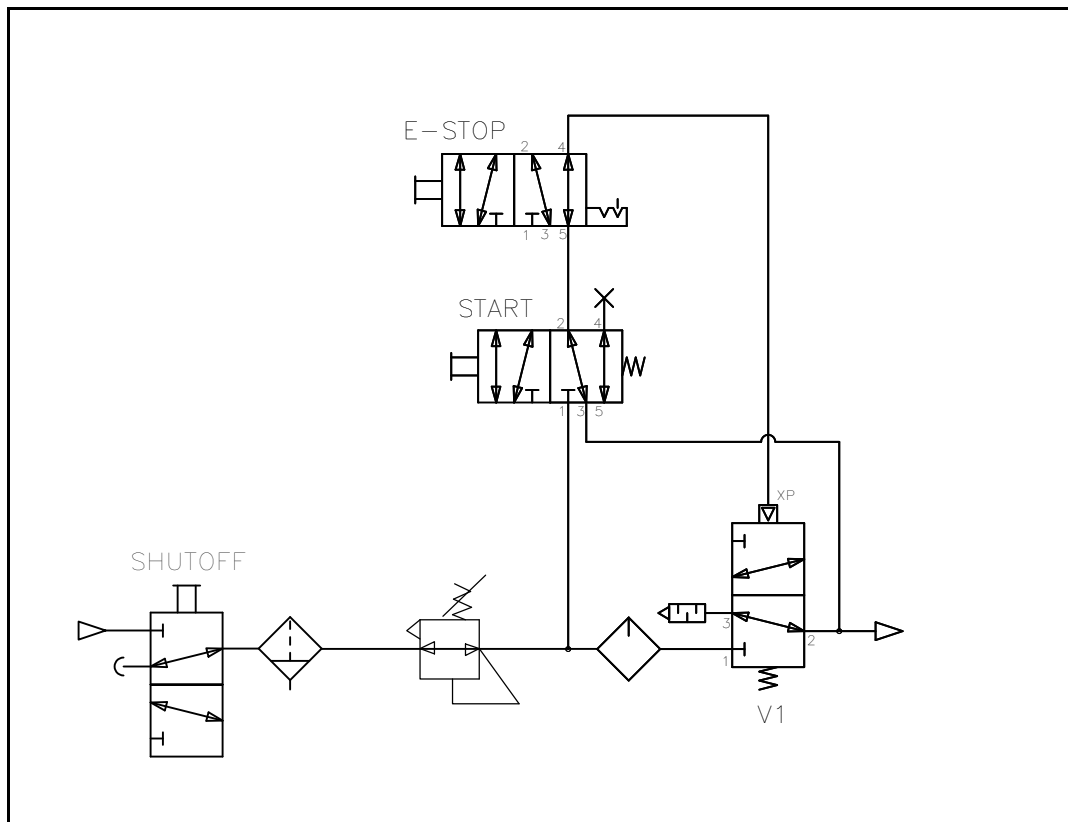


FIGURE C-13. PNEUMATIC CONDITIONING UNIT SCHEMATIC (P/N 59248)

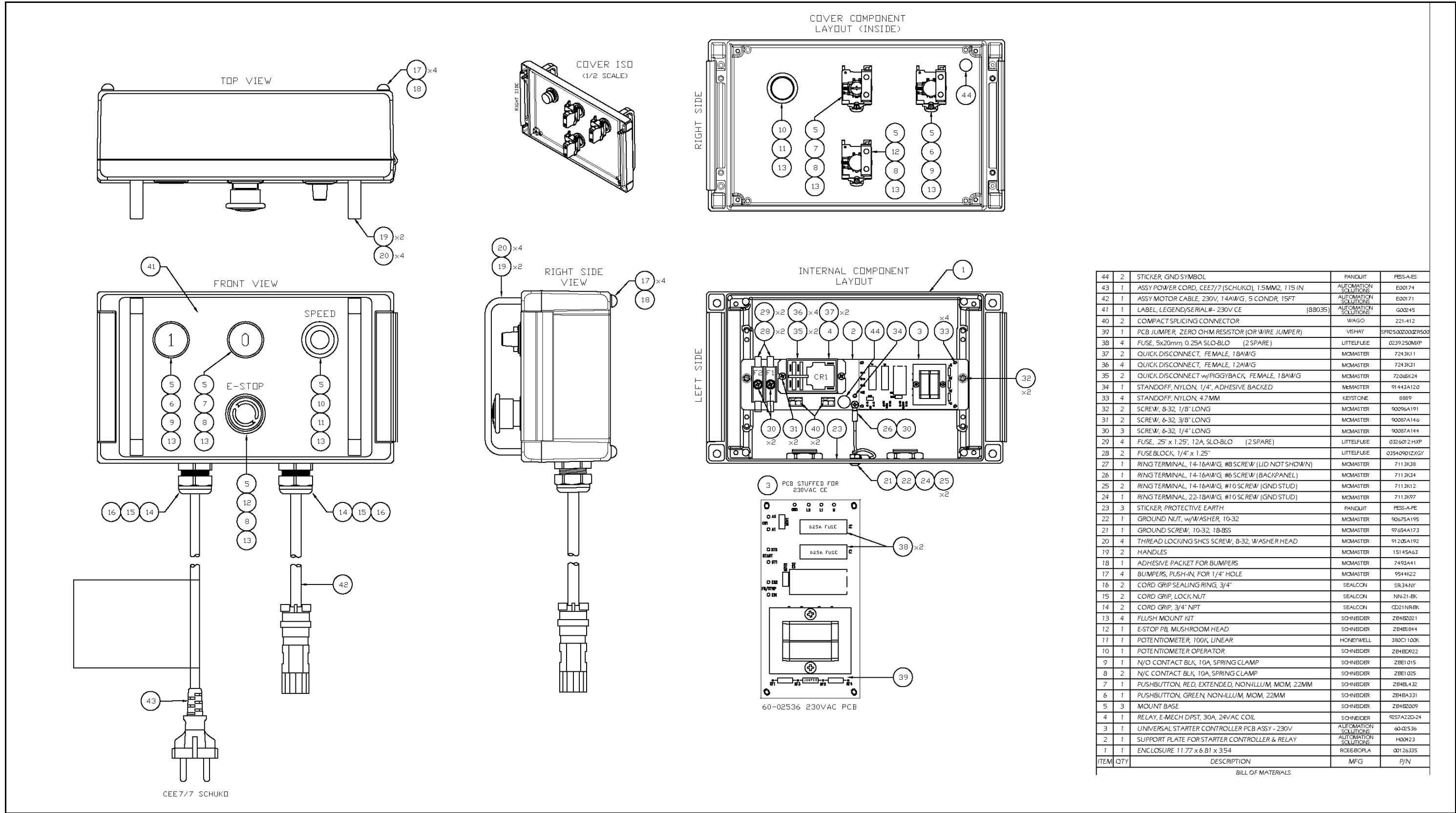


FIGURE C-14. BB4500-BB5000 EIBENSTOCK CONTROLLER 2ND GEN 230V 50-60 HZ CE ASSEMBLY (P/N 88035 B00367)



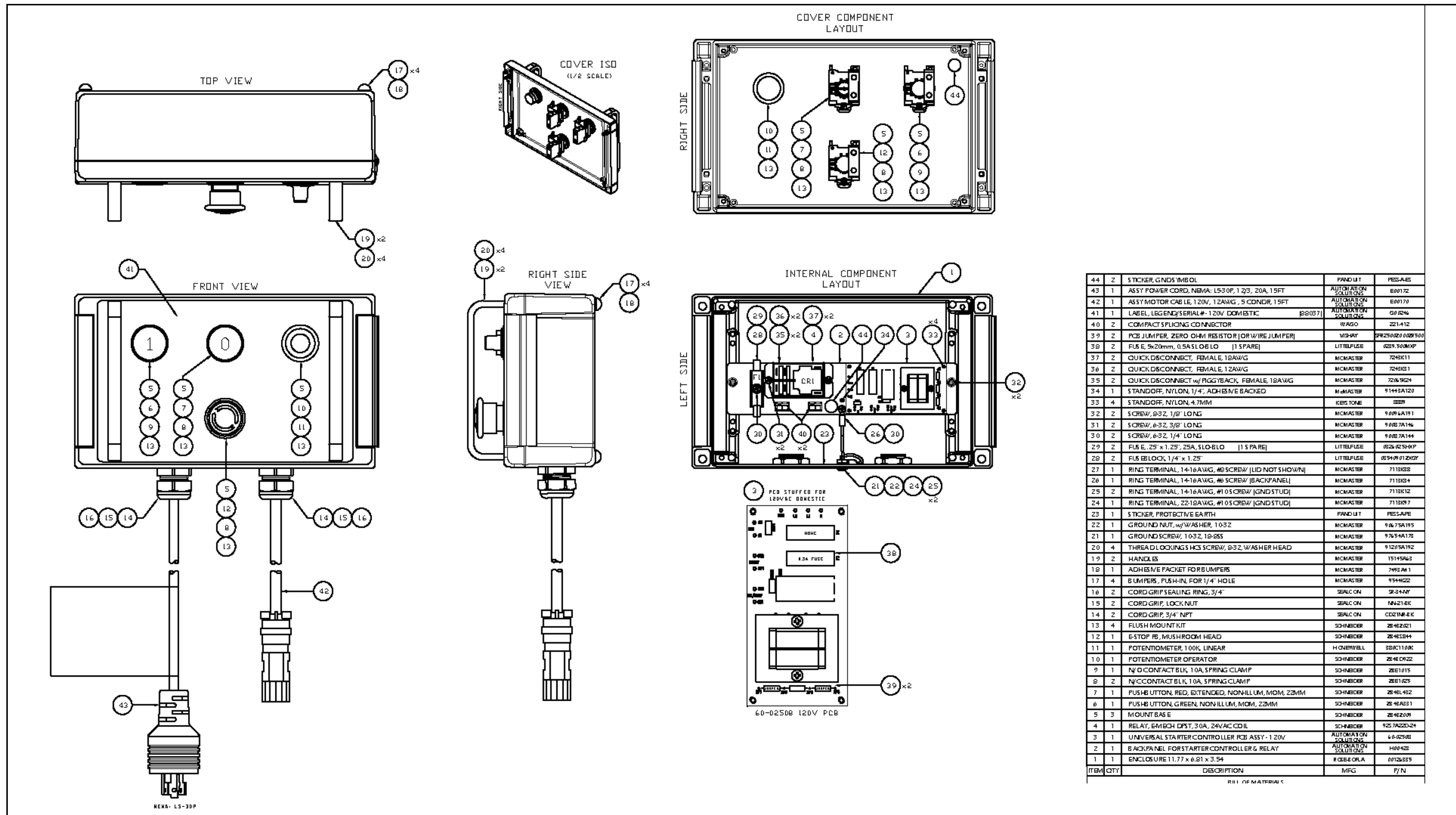


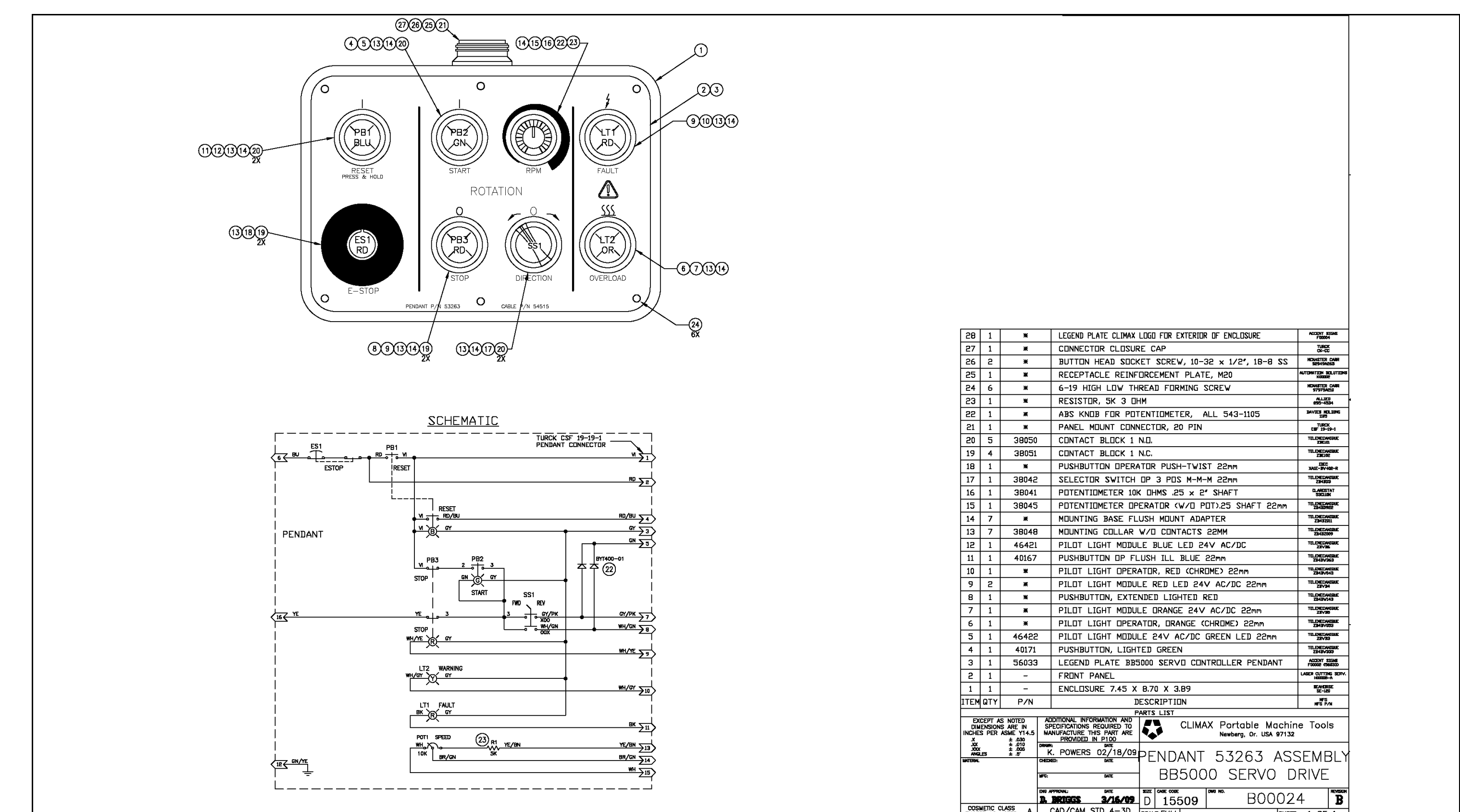
FIGURE C-16. BB4500-BB5000 EIBENSTOCK CONTROLLER 2ND GEN 120V DOMESTIC ASSEMBLY (P/N 88037 B00365)











**FIGURE C-20. BB5000 SERVO PENDANT ASSEMBLY (P/N B00024)**

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## APPENDIX D SERVO CONTROLS ADJUSTMENT

This procedure applies only to the BB5000 servo controls (MR-J3), for the purpose of manually adjusting the parameter in order to reset the motor zero speed.

When a new servo amplifier has been installed and the motor does not stop when the speed control knob is turned to zero, do the following:

1. Carefully connect the system components (such as the pendant cable and pendant, motor cables, and servo motor).
2. Remove the top cover of the main control box.

### NOTICE

Leave the servo motor assembly on the ground or work bench. Do not install it on the boring bar.

3. Connect the main control box to power and turn on the system.
4. Select the rotation direction for the motor and press the START button.
5. Increase the motor speed to full speed by turning the speed knob clockwise on the operator pendant.
6. Reduce speed to zero by turning the knob fully counter-clockwise.
7. Open the cover to access the function keys on the servo amp. See Figure D-1.
8. Press the mode button repeatedly until the display reads P.C01.
9. Press the UP button repeatedly until the display reads P.C37.
10. Press the SET button twice. The current setting for P.C37 will be flashing. Adjust up or down by 4 points, then press the SET button once more.
11. Recheck the motor speed with the speed control knob set to zero.
  - If the motor shaft is not moving and the stop button on the pendant is illuminated, no further adjustment is necessary.
  - If the motor is still moving slowly in either direction, repeat step 5 in small increments until the motor remains stopped when the speed control is turned down to zero. The final setting on the display may be as much as  $\pm 12$  when the motor finally stops with the speed control knob turned to zero.
12. Switch off the mains power and secure the top plate of the main control box by reinstalling the screws.



FIGURE D-1. SERVO AMP FUNCTION KEYS

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## APPENDIX E    SDS

Contact CLIMAX for the current Safety Data Sheets.

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 **CLIMAX**

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 **BORTECH**  **CALDER** **H&S** **TOOL**