CE

KM4000

KEY MILL MACHINE

OPERATING MANUAL

SERIAL NUMBER RANGE
BEGINNING WITH 14001731

ORIGINAL INSTRUCTIONS

KM4000 Key Mill Machine

CLIMAX
Portable Machining & Welding Systems

P/N 16328
June 2019
Revision 7

CLIMAX | BORTECH CALDER H&S TOOL

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General Safety

The primary challenge for most on-site maintenance is that repairs are often done under difficult conditions.

Climax Portable Machining & Welding Systems leads the way in promoting the safe use of portable machine tools. Safety is a joint effort. As the operator of this machine, you are expected to do your part by scrutinizing the job site and closely following the operating procedures outlined in this manual, your own company rules, and local regulations. Save all warnings and instructions for future reference.

WARNING

For maximum safety and performance, read and understand this entire manual and all other related warnings and safety instructions before using this equipment. Failure to follow the warnings, instructions and guidelines in this manual could cause personal injury, fatalities, electric shock, fire and/or property damage.

QUALIFIED PERSONNEL

Before operating this machine, you must receive training specific to this machine from a qualified trainer. If you are not familiar with the proper and safe operation, do not use the machine.

OBEY WARNING LABELS

Obey all warnings and warning labels. Failure to follow instructions or heed warnings could result in injury, or even be fatal. Proper care is your responsibility. Contact Climax immediately for replacement of damaged or lost manuals or safety decals. 1-800-333-8311

INTENDED USE

Only use the machine according to the instructions in this operating manual. Do not use this machine for any purpose other than the intended use as described in this manual. When using the tools, machine, accessories and/or tool bits, you must determine the proper working conditions and the work to be performed.

STAY CLEAR OF MOVING PARTS

Keep clear of the machine during operation. Never lean toward or reach into the machine to remove chips or to adjust the machine while it is running. Keep bystanders away while operating this machinery.

ROTATING MACHINERY

Rotating machinery can seriously injure an operator. Lock out all power sources before you interact with the machine.

KEEP YOUR WORK AREA CLEAN

Keep all cords and hoses away from moving parts during operation. Do not clutter the area around the machine. Keep the work area clean and well lit.

AMBIENT LIGHTING

Do not operate this machine in ambient lighting that is less than normal intensity.

SECURE LOOSE CLOTHING AND LONG HAIR

Rotating machinery can seriously injure an operator as well as others close by. Don't wear loose fitting clothing or jewelry. Tie back long hair or wear a hat.

HAZARDOUS ENVIRONMENTS

Do not use the machine in a hazardous environment, such as near explosive chemicals, flammable liquids, gasses, toxic fumes, or inappropriate radiation hazards.

HOSES, PENDANT AND ELECTRICAL CABLES

Do not abuse the pendant cable as this can damage the cable and pedant. Never use the cord for carrying, pulling or unplugging. Remove any and all kinks before straightening the cable. Keep cords and hoses away from heat, oil, sharp edges or moving parts. Plugs must match the outlet. Never modify the plugs in any way. Do not use an adapter plug with grounded power tools. Do not expose the machine to rain or wet conditions. Always examine hoses and cables for damage before use. Be cautious and never drop electrical equipment, this will damage the components.

REPETITIVE MOTION

Individuals can be susceptible to disorders of the hands and arms when exposed to tasks that involve highly repetitive motions and/or vibration.

Measured vibration emission value *a*	4.5 m/s^2
Vibration uncertainty value *K*	2.1 m/s^2

STAY ALERT

Stay alert, watch what you are doing and use common sense when operating machinery. Do not operate machinery while you are tired or under the influence of drugs, alcohol or medical.

Safety Practices

All aspects of the machine have been designed with safety in mind. Rotating parts are not always shielded by machine components or by the work-piece. Do not force the machine.

PERSONAL PROTECTIVE EQUIPMENT

Eye and hearing protection must be worn while using the machine. These safety items do not impose constraints to the safe operation of the machine.

OPERATING CONDITIONS

Do not operate the machine if it is not mounted to the workpiece as described in this manual.

TOOLING

The machine is provided with all the tools for the setup and operation of the machine. Remove all adjustment tools before starting the machine.

LIFTING

Most of the machine components are heavy and must be moved or lifted with approved rigging and practices. Climax accepts no responsibility for the selection of lifting equipment. Always follow your plant's procedures for lifting heavy objects. Do not lift heavy objects by yourself as serious injury can result.

CUTTING TOOLS AND FLUIDS

There are no cutting or cooling fluids supplied with this machine. Keep cutting tools sharp and clean.

CONTROLS

The machine controls are designed to withstand the rigors of normal use and external factors. The on-off switches are clearly visible and identifiable. If hydraulic power supply failure occurs, be sure to turn off the supply before leaving the machine.

DANGER ZONE

The operator and other persons can be anywhere in the vicinity of the machine. The operator must ensure there are no other persons in danger from the machine.

METAL FRAGMENT HAZARD

The machine produces metallic fragments during normal operation. You should wear eye protection at all times when working with the machine. Only remove fragments with a brush after the machine has stopped completely.

HAZARDOUS ENVIRONMENTS

Do not use the machine in a hazardous environment, such as near explosive chemicals, toxic fumes, or a radiation hazard.

ADJUSTMENTS AND MAINTENANCE

All adjustments, lubrication and maintenance should be done with the machine stopped, and locked out from all power sources. The shut-off valves should be locked and tagged out before performing any maintenance. Do not operate the machine if moving parts are misaligned, binding or broken. If the machine or parts are damaged, have the machine repaired before use.

WARNING LABELS

Warning labels are already attached to your machine. Contact Climax immediately if replacements are required.

MAINTENANCE

Be sure the machine components are free of debris and properly lubricated prior to use. Have your machine serviced by a qualified repair person using only identical replacement parts

NOISE LEVEL

96 dB(A) – Hearing Protection is required

STORED ENERGY

Hydraulic fluids could still be under pressure! Make sure the HPU is shut off and locked out properly.

MSDS

Material Data Safety Sheets are included in the maintenance manual.

LOCK OUT/TAG OUT

Prevent unintentional starting. Follow your company's procedures before performing maintenance on the machine.

SHARP EDGES

Cutting tools have sharp edges. Keep hands away from the cutting tool during operation. Always wear protective gloves when handling the cutting tool.

Labeling Guidelines

The purpose of product safety signs and labels is to increase the level of awareness to possible dangers.

Safety alert symbols indicate **DANGER**, **WARNING** or **CAUTION**. These symbols may be used in conjunction with other symbols or pictographs. Failure to obey safety warnings can result in serious injury. Always follow safety precautions to reduce the risk of hazards and serious injury:

DANGER

Indicates a hazardous situation that could be fatal or cause serious injury.

WARNING

Indicates a potentially hazardous situation that could be fatal or cause serious injury.

CAUTION

Indicates a potentially hazardous situation that could result in minor to moderate injury, damage to the machine or interruption of an important process.

IMPORTANT

Provides critical information for the completion of a task. There is no associated hazard to people or the machine.

TIP

Provides important information regarding the machine.

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.

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 1-1. RISK ASSESSMENT CHECKLIST BEFORE SET-UP

	Before set-up
☐	I took note of all the warning labels on the machine.
☐	I removed or mitigated all identified risks (such as tripping, cutting, crushing, entanglement, shearing, or falling objects).
☐	I considered the need for personnel safety guarding and installed any necessary guards.
☐	I read the machine assembly instructions.
☐	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.
☐	I located the fall paths involved in lifting and rigging operations. I have taken precautions to keep workers away from the identified fall path.
☐	I considered how this machine operates and identified the best placement for the controls, cabling, and the operator.
☐	I evaluated and mitigated any other potential risks specific to my work area.

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

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

CE Data

Hearing protection is required 

The Declared **Sound Power** Level is:	L_{WA} =	88.8	dBA
The Declared ***Operator*** **Sound Pressure** Level is:	L_{pA} =	89.4	dBA
The Declared ***Bystander*** **Sound Pressure** Level is:	L_{pA} =	84.5	dBA

DECLARATION OF CONFORMITY

2006/42/EC Machine Directive
2004/108/EC EMC Directive

Name of manufacturer or supplier
Climax Portable Machining And Welding Systems

Full postal address including country of origin
2712 E Second Street
Newberg, OR 97132
USA

Description of product
Portable Key Mill Machine

Name, type or model, batch or serial number
KM3000 & KM4000 Serial Number Range 14001731 - 20000000

Standards used, including number, title, issue date and other relative documents
EN ISO 3744:2010, EN ISO 4413:2010, 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 13849-2:2008, EN ISO 13857:2008, EN 55011:2009, EN 60204-1:2006

Name of Responsible Person within the EU Johann Rinnhofer, Managing Director

Full postal address if different from manufacturers
Climax GmbH
Am Langen Graben 8
52353 Duren, Germany

Declaration

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.

Signature of Manufacturer: _____

Position Held: _Engineering Team Leader_____

Date: _13 OCT 2014_

CE

Warning Labels

The following warning labels should be on your machine. If any are defaced or missing, contact Climax immediately for replacements. Machine labels are listed in Table 1. Machine label locations are shown in Figure 1.

Table 1. KM4000 labels

P/N 59037

P/N 78748

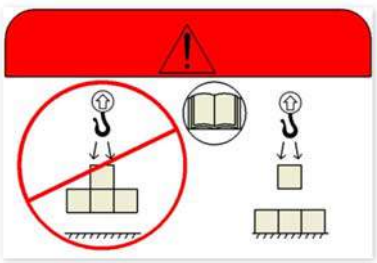
P/N 59039

P/N 78824

P/N 78741

P/N 79575

P/N 59044



P/N 79385

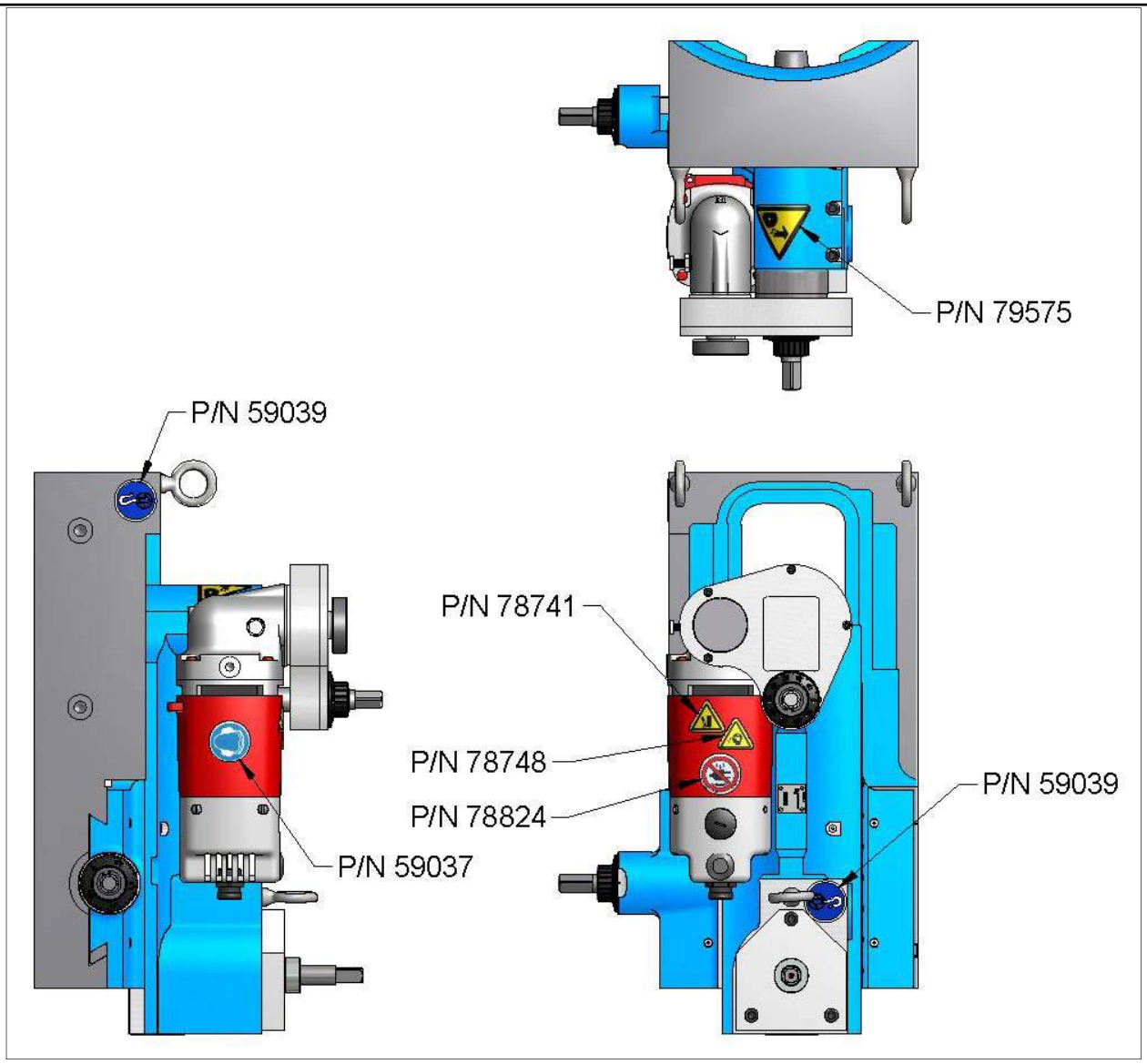


Figure 1 - KM4000 label locations

Limited Warranty

CLIMAX Portable Machine Tools, Inc. (hereafter referred to as “CLIMAX”) warrants that all new machines are free from defects in materials and workmanship. This warranty is available to the original purchaser for a period of one year after delivery. If the original purchaser finds any defect in materials or workmanship within the warranty period, the original purchaser should contact its factory representative and return the entire machine, shipping prepaid, to the factory. CLIMAX will, at its option, either repair or replace the defective machine at no charge and will return the machine with shipping prepaid.

CLIMAX warrants that all parts are free from defects in materials and workmanship, and that all labor has been performed properly. This warranty is available to the customer purchasing parts or labor for a period of 90 days after delivery of the part or repaired machine or 180 days on used machines and components. If the customer purchasing parts or labor finds any defect in materials or workmanship within the warranty period, the purchaser should contact its factory representative and return the part or repaired machine, shipping pre-paid, to the factory. CLIMAX will, at its option, either repair or replace the defective part and/ or correct any defect in the labor performed, both at no charge, and return the part or repaired machine shipping prepaid.

These warranties do not apply to the following:

- Damage after the date of shipment not caused by defects in materials or workmanship
- Damage caused by improper or inadequate machine maintenance
- Damage caused by unauthorized machine modification or repair
- Damage caused by machine abuse
- Damage caused by using the machine beyond its rated capacity

All other warranties, express or implied, including without limitation the warranties of merchantability and fitness for a particular purpose are disclaimed and excluded.

Terms of sale

Be sure to review the terms of sale which appear on the reverse side of your invoice. These terms control and limit your rights with respect to the goods purchased from CLIMAX.

About this manual

CLIMAX provides the contents of this manual in good faith as a guideline to the operator. CLIMAX cannot guarantee that the information contained in this manual is correct for applications other than the application described in this manual. Product specifications are subject to change without notice.

Introduction

The Model KM4000 Portable Key Mill is designed to cut extra wide keyways, stress relief pockets, motor mount slots, and more. Built for rugged duty, the machine features permanently lubricated reduction gears so the machine can be operated at any angle. Anti-friction bearings are used throughout. The dovetail ways are machined to offer smooth movement in both the longitudinal and side travel directions. The universal type motor and triple gear reduction produce plenty of torque for most operations. An electronic speed control offers precision control of spindle speeds. The two-inch side travel allows cutting wide pockets or slots with a single end mill. The Model KM4000 Key Mill will mount on shafts up to 24 inches(609 mm) in diameter (with optional extra chain) and may be used anywhere along the shaft. With the optional shim kit the machine can be used on shafts as small as 4 inches (100 mm) in diameter.

- Compact, rugged, portable milling machine for on-site keyway and other milling jobs.
- Mounts on shafts from 4 to 24 inches (101 to 610 mm) in diameter.
- Cuts new keyways up to 3.25 inches (83 mm) wide and 7.88 inches (200 mm) long in one setup (cut dimensions include the width of the end mill).
- Contoured base is self-aligning with the shaft.
- Triple gear reduction with permanently sealed lubrication.
- Zeroing type adjusting dial for controlling cutter depth.

About this Manual

This Operating Manual provides instructions for the effective use and care of the Model KM4000 Key Mill. Read this entire manual before attempting to setup and operate this precision machine tool.

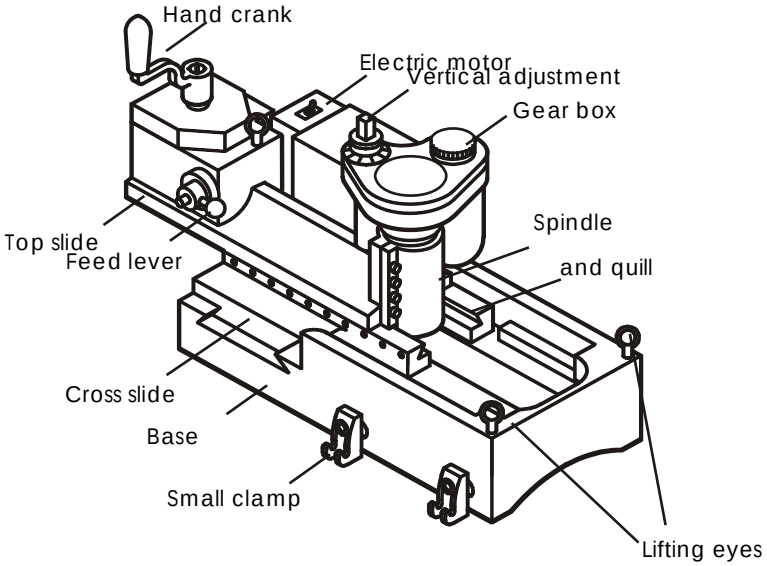


Figure 2 - KM4000 Side Shift Key Mill

Electric Power

The electric version of the KM4000 has a 1 hp (.75 kW), 1750-rpm motor rated at either 115 volt or 230 volt. Check the serial number plate on the motor to find the voltage. The motor operates on either 50 or 60 cycle AC or on DC current.

Spindle speed can be controlled by an in-line speed control. The no-load spindle speed is fully adjustable from 350 to 675 rpm.

	CAUTION
⚠	**Do not use the variable speed control with DC power, as it will damage the unit. The control switch set to FULL when using DC power will bypass the electric circuit.**

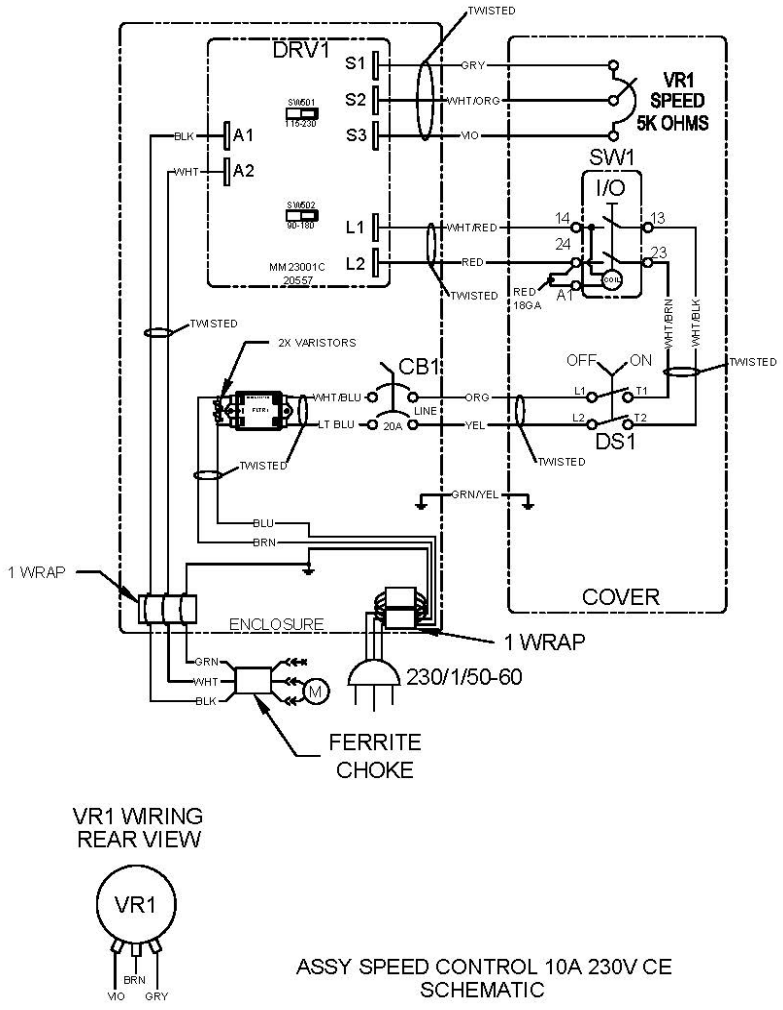


Figure 3 - KM4000 Electrical schematic

Pneumatic Power

The pneumatic version of the KM4000 has a 2 hp (1.49 kW) air motor. Spindle free speed is continuously variable up to 900 rpm and is adjusted by opening or closing the needle valve. The motor requires 105 ft^3/min (1m^3/min) of air at 80 psi.

The air filter and lubricator supplied with the machine must be used or the machine warranty is void. The lubricator should be set to deliver oil at a rate of 20-30 drops per minute at full throttle.

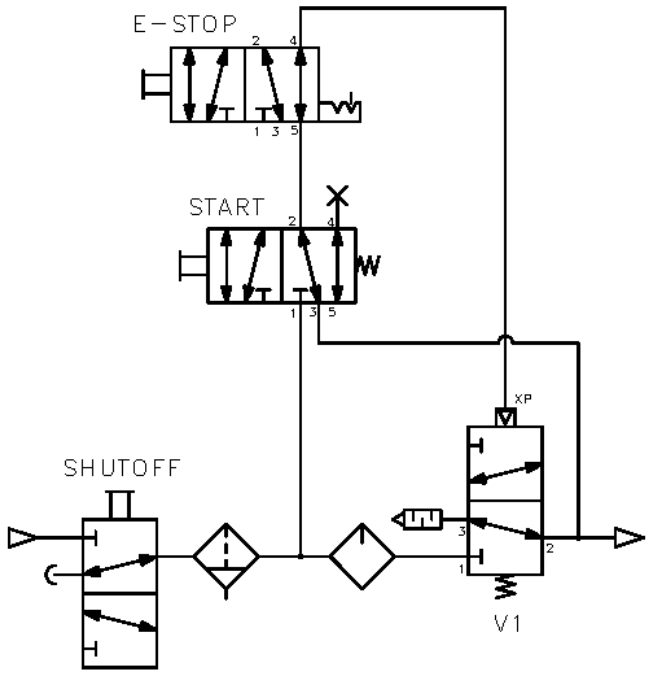


Figure 4 - KM4000 Pneumatic Power Schematic Diagram

Maximum working pressure	90 psi (6.2 Bar)
Working temperature range	27F – 150F (-3C to 65C)
Flow rate	48 SCFM (1.36 m^3/min.)
Maximum allowable motor speed	1100 RPM

	CAUTION
⚠	**Motor must be operated with sufficient load to prevent speed from exceeding maximum allowable speed.**

Adjust the speed by turning the needle valve.

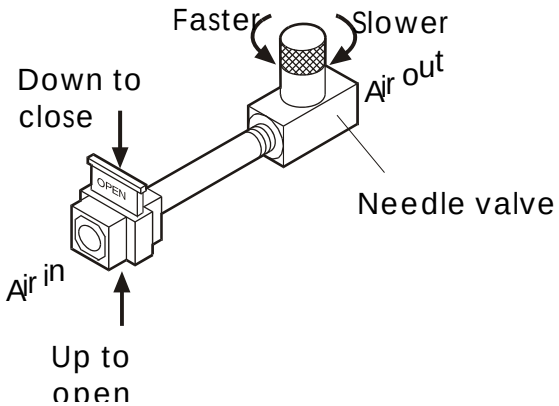


Figure 5 - Air valves

	CAUTION
	Avoid damaging the air motor and voiding your warranty by routing incoming air through the filter and lubricator. **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.**

	CAUTION
	Using air that is not filtered and lubricated can damage the air motor. Avoid damage by routing incoming air through the air filter and lubricator.

Hydraulic Power

A wide variety of hydraulic power options are available. Please contact your Climax sales representative for details.

The table below lists operating specifications of the hydraulically powered version of the KM4000 using standard mineral-based hydraulic oil.

Maximum working pressure	2050 psi (140 Bar)
Working temperature range	-3°C to 68°C
Flow rate	21 L/min

	CAUTION
	A hydraulically powered KM4000 operating with flame retardant, water/glycol-based hydraulic fluid has operating specifications different from those listed below. Consult the hydraulic fluid manufacturer data for operating specifications.

The Hydraulic Power Unit (HPU) is an electrically-driven piston pump with horizontally mounted high-torque motor. Separate documentation detailing the HPU is available with the HPU.

	CAUTION
	To avoid damaging the power unit pump, connect the hydraulic motor to the power unit before turning it on.

The KM4000 hydraulic power schematic drawing is shown in Figure 6.

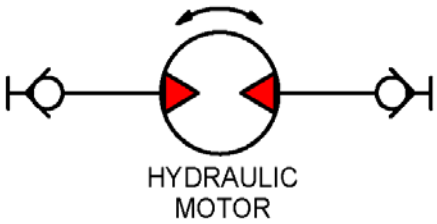


Figure 6 - KM4000 Hydraulic Power Schematic Diagram

The end mill turning direction on a hydraulically powered KM4000 depends on hydraulic line connections. Refer to 7.

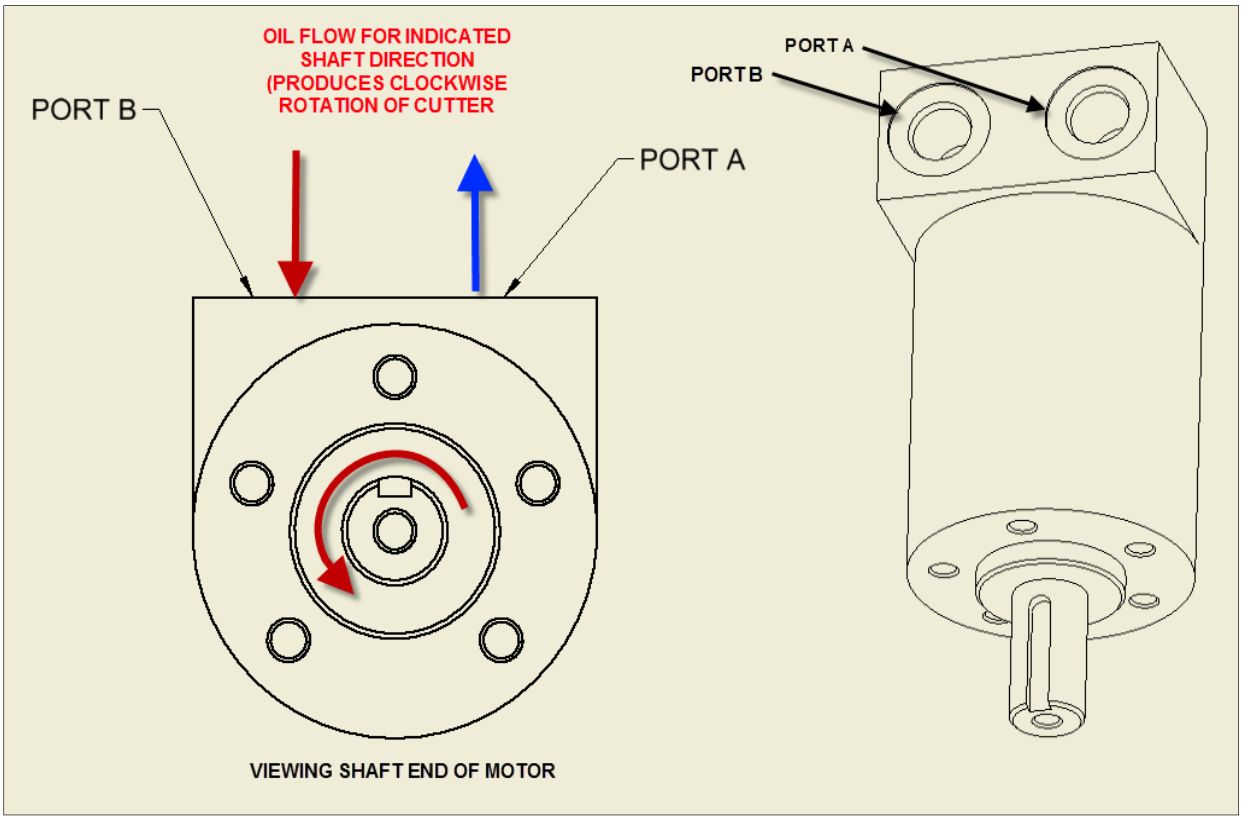


Figure 7 - KM4000 Hydraulic Power Schematic Diagram

Setup

	WARNING
	**When moving the machine and setting it up on the workpiece, support the machine by its lifting eyes with proper rigging. Failure to do so could allow the machine to shift or slip suddenly or fall, resulting in death or severe crushing or pinching injury.**

Pre-start Checks

- Make sure end mills are sharp and free from nicks.
- Lubricate all gibs.
- Check that moving parts move freely.
- Clean chips away from threaded parts.

Electrical Checks

1. Check electrical parts for damage. Repair or replace any damaged parts.
2. Turn the power to OFF before plugging in the unit.
3. Plug the machine into a properly grounded outlet.

	WARNING
	**The electric motor is not rated to run motor in a damp or explosive environment. Keep liquids away from the motor.**

4. When operating spindle with an in-line speed control, connect spindle power unit to speed controller. Make sure speed control on/off switch is set to OFF.

	WARNING
	**To avoid serious bodily injury from moving machinery, turn speed control power switch OFF before connecting the power source.**

5. Connect speed controller to the power source. Set spindle motor on/off switch to ON. Apply power by switching speed controller ON.

	CAUTION
	**Do NOT use on/off switch on spindle motor when speed control is connected. Controller damage may result and void all warranties.**

Pneumatic Checks

1. Fill the air lubricator on the APU with air oil. Use Marvel Air Tool Oil lubricator oil or equivalent.
2. Drain the air filter.
3. Close the ball valve before connecting the key mill to the air supply.
4. Be sure the in-line air pressure is 80 psi. Check that the air lines are not obstructed or damaged.

Hydraulic Checks

1. Turn the hydraulic power unit OFF.
2. Check the reservoir level - fill the reservoir to above the red bar with hydraulic oil or equivalent.
3. Fill the pump case with hydraulic oil. To fill the case, remove the small hex cap (toward the pump motor) on top of the case housing.
4. Be sure the power unit wiring matches the electric source.
5. Be sure the power unit is level.
6. Clean all hydraulic fittings before connecting them.

Tooling setup

CAUTION

Tools are very sharp! Handle with extreme care and follow all safety procedures for dealing with sharp objects.

1. Loosen the quill clamping screws.
2. Crank the gearbox assembly up until the vertical adjustment screw is free of the top slide. Remove the gearbox assembly from the machine.
3. Loosen the end mill socket set screw in the spindle.
4. Insert the end mill into the spindle. Turn the end mill until the flat in the shank is directly under the setscrew. It may be necessary to remove the setscrew to locate the flat. Tighten the setscrew. Before using small end mill collets, degrease the collets with solvent and dry them.

IMPORTANT

Be sure the setscrew seats firmly against the flat on the end mill shank.

5. Place the gearbox assembly on the top slide. Crank the gearbox assembly down until the quill housing is below the bottom quill clamping screw.

6. Adjust the tension of the quill clamping screws:
   - Crank the vertical adjustment leadscrew to raise and lower the quill housing.
   - Adjust the tension on the screws to firmly hold the quill housing without preventing its travel.

WARNING
Never tighten the quill clamping screws if the quill housing is above the bottom screw.

When making a heavy cut, set the end mill to the desired depth BEFORE tightening the quill clamping screws. Remember to loosen the clamping screws before retracting the end mill.

At any time during operation, the gearbox assembly may be removed to sharpen or replace the end mill. Because the end mill is positioned from side-to-side by the top slide and cross slide, the end mill does not have to be repositioned. The depth of the end mill will have to be reset.

Standard Shaft Mounting

WARNING
Support the machine with rigging while securing it to the workpiece. Failure to do so sill allow the machine to fall, causing death or serious crushing injury.

1. Use a hoist to set the key mill on the shaft. Because the key mill has sealed lubrication, it can be mounted in any position.
2. Mount the chain clamp assemblies to the clamp blocks on the side of the base.
3. Secure the key mill to the shaft by tightening first one chain clamp nut and then the other chain clamp nut. Torque the clamp nuts to 60 ft-lb (81 Nm).

WARNING
Under-torquing the chain clamp nuts may allow the machine to slip off of the workpiece, resulting in death or severe crushing injury.

4. Center the cross slide by aligning the zero mark on the back of the slide with the zero mark on the back of the base.
5. Level the machine. Place a level on the machined upper surface of the base to be sure the key mill is level. This is very important when cutting in-line keyways.

IMPORTANT
Careful centering and leveling of the key mill will ensure that all keyways will be in line.

6. Adjust the tension of the cross slide gib screws by cranking the cross slide leadscrew to move the cross slide along the dovetail of the base. When the slide is centered over a gib screw, tighten that screw until there is noticeable drag on the slide. Unscrew the setscrew slightly. Repeat until all gib screws are adjusted.
7. Adjust the tension of the top slide gib screws by cranking the top slide leadscrew to move the top slide along the dovetail of the cross slide. When the slide is centered over a gib screw, tighten that screw until there is noticeable drag on the slide. Unscrew the setscrew slightly. Repeat until all gib screws are adjusted.

Stub end mounting

The Climax KM4000 key mill can be mounted to stub ends as short as 8" (200 mm).

1. Turn the cutter end of the key mill toward the middle of the shaft.
2. Position the machine so that both chains are on the shaft and can be tightened.
3. Set up the machine as described in Steps #2 through #7 in “Standard shaft mounting”.

Large shaft mounting

Using the optional chain clamp assembly, shafts up to 24" (609 mm) in diameter can be machined.

Small shaft mounting

When mounting the KM4000 to shafts less than 7" (178 mm) diameter, an optional shim kit is recommended. Shims are mounted to the base throat with flat-headed cap screws. The shim kit enables the key mill to be mounted to shafts with diameters as small as 4" (100 mm).

If the shaft is disassembled, the key mill may be bench mounted and the shaft clamped to the machine.

Extra long shaft mounting

If the shaft is long enough, V-blocks can be used to secure the shaft. A chain wrench or C-clamp may be used to hold the shaft and V-blocks together. Setup and operation of the key mill is the same as for standard shafts.

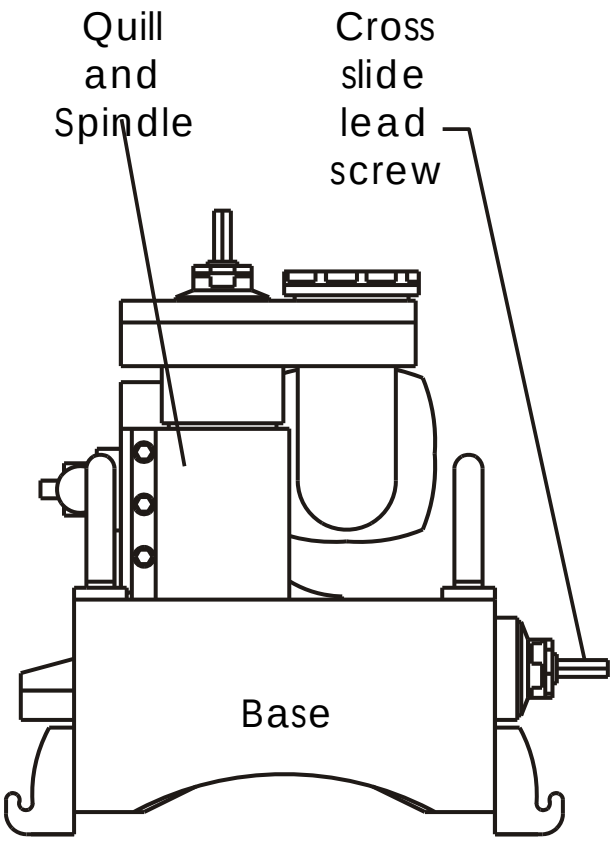
Bench Vise Mounting

The key mill mounted in a bench vise can be used as a stationary milling machine for small parts. Typical applications include:

- Slotting angle iron
- Slotting tubes
- Notching spanner nuts
- Slotting gear pullers

KEY MILL FEED

Hand Feed along the Keyway



1. Set the feed lever to manual feed by turning the lever toward the gearbox end of the machine.
2. Turn the traverse drive shaft with the hand crank. One complete turn of the shaft will move the key mill .067" (1.69 mm).

Power Feed along the Keyway

1. Set the feed lever to Power Feed by turning the lever away from the gearbox end of the machine.
2. Attach a variable-speed drill to the traverse drive shaft protruding from the feed lever housing. Feed the machine by running the drill.

Lateral Feed

Hand crank the cross slide leadscrew. One complete turn of the leadscrew will move the key mill .100" (2.50 mm on metric machines).

End Mill Feed

The vertical adjustment leadscrew adjusts the depth of the end mill. Crank the leadscrew clockwise to move the end mill down. Crank the leadscrew counterclockwise to move the end mill up. One complete turn of the leadscrew will move the tool .100" (2.50 mm on metric machines).

Operation

CAUTION

Always wear eye and ear protection when operating the key mill.

Connect the key mill by following the procedure outlined below.

Electric Power Connection

WARNING

The electric motor is not watertight. To avoid injury by shock or explosion, do not operate electric motors in damp or volatile conditions.

1. Turn off the motor.
2. Check the power cord for damage. Repair or replace the cord if necessary.
3. Connect machine power unit to speed controller. Make sure speed control on/off switch is set to OFF.

WARNING

To avoid serious bodily injury from moving machinery, turn speed control power switch to OFF before connecting it to the power source.

4. Connect speed controller to the power source. Set motor on/off switch to ON. Apply power by switching speed controller ON.

CAUTION

Do NOT use on/off switch on motor when speed control is connected. Controller damage may result and any applicable warranty may be voided.

5. Position the end mill on the shaft.

Air Power Connection

WARNING

Securely mount the key mill to the work piece before connecting the air supply.

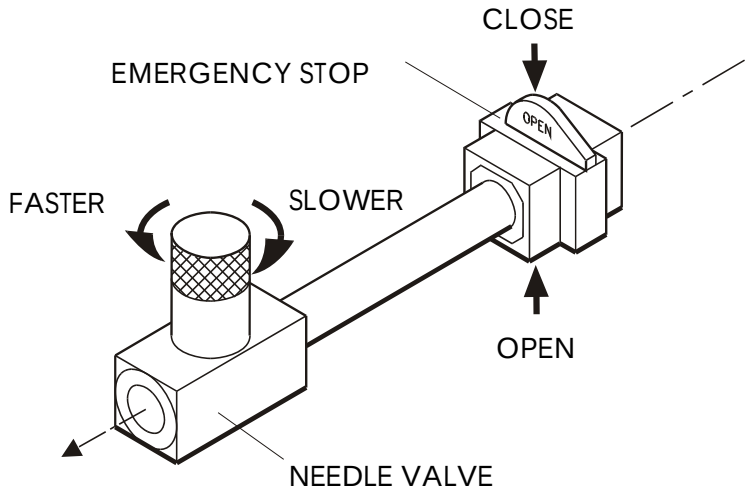
The air filter and lubricator supplied with the machine must be used or the machine warranty is void. Set the lubricator to deliver oil at a rate of 20-30 drops per minute at full throttle.

CAUTION
Using air that is not filtered or lubricated can damage the air motor. Avoid damage by routing incoming air through the filter and lubricator.

The air line should be at least 0.5" in length.

Starting and stopping the Machine

The U.S. style KM4000 is equipped with needle and lockout valves. Use only nonrestrictive fittings on all air lines.



1. Push the emergency stop lever down until the word CLOSED and the lockout can be seen from the bottom of the valve. Be sure the lever is pushed all the way.
2. Turn the needle valve clockwise all the way. You will not be able to see any of the colored bands when the valve is completely closed.
3. Connect the air supply line through the filter and lubricator to the motor.

WARNING
Rotating machinery can seriously injure the operator. Secure the machine to the work piece before connecting the air supply line.

4. Press the emergency stop lever up until the word OPEN can be seen from the top. Be sure the lever is pushed all the way.
5. Slowly turn the needle valve counterclockwise until the desired machine feed is reached. The more colored bands you see on the valve, the faster the machine speed.

WARNING

The gear box knob rotates at up to 875 RPM during operation. Keep fingers away from the gear box knob to avoid entanglement and pinching injury.

To stop the machine:

1. Turn the needle valve clockwise all the way. No colored bands will be visible when the valve is completely closed.
2. Push the emergency stop lever down until the word CLOSED and the lockout can be seen from the bottom of the valve. Be sure the lever is pushed in all the way. Lock out the machine with a padlock.
3. Disconnect the air line supply at the quick disconnects.

Hydraulic Power Connection

1. Clean all fittings. Connect the hydraulic motor to the power unit.

CAUTION

Connect the hydraulic motor to the power unit pump before turning on the power unit. Failure to do so will damage the pump and void all warranties.

2. Jog the motor to be sure the pump is turning in the correct direction. Reverse the hoses if necessary.
3. Turn on the hydraulic power unit by pressing the ON button on the pendant.

Keyway Cutting

1. Position the end mill at the end of the shaft where the keyway will be cut.
2. Turn on the motor and adjust the motor speed.

   For electric motors - Turn the in-line speed control toggle switch to ON and turn the speed control dial to the desired rpm.

   For air motors - Open or close the needle valve to adjust the motor speed.

   For hydraulic motors - Turn the motor on or off using the pendant. Adjust the speed by opening and closing the speed control valve.
3. Lower the end mill by cranking the vertical adjustment leadscrew clockwise until the mill cuts a flat on the shaft equal to the diameter of the end mill. (Cut to the minimum depth that will cut a full-circle in the shaft).
4. Set the depth dial to zero. The dial is calibrated to 0.001" increments. The dial on metric machines is calibrated to .01 mm.
5. Plunge the end mill by cranking the vertical adjustment leadscrew clockwise until the end mill is at the desired depth.
6. Crank the traverse drive shaft until the end mill has cut the desired length keyway. Turn the crank clockwise to move the spindle and end mill toward the base.

	WARNING
	**The cross slide has not built-in stop. Do not allow the cross slide to feed all the way out of the frame. Doing so may result in death or severe crushing injury.**

	WARNING
	**Never use your hands, compressed air, or metal tools to remove chips. Doing so during machine operation could cause severe entanglement or projectile injury.**

7. When the keyway has been cut, crank the vertical adjustment leadscrew counterclockwise to raise the end mill up from the work piece.
8. Crank the gearbox assembly up until the vertical adjustment screw is free of the top slide. Remove the gearbox assembly from the machine.

	WARNING
	**The vertical feed has no built-in top position stop. Do not Do not allow the vertical feed to feed all the way out of the frame. Doing so may result in death or severe crushing injury.**

9. Loosen the end mill socket set screw in the spindle.
10. Remove the end mill from the spindle.
11. Remove the key mill from the shaft.

Wide Keyways

Extra wide keyways, up to 3.5" (88 mm), can be cut with the KM4000 key mill. For key width measuring, the cross slide leadscrew dial is calibrated in 0.001" increments. For very accurate cutting, the operator may want to verify the measurements with a dial indicator.

To cut wide keyways:

1. Set the cross slide leadscrew dial to zero.
2. Position the end mill by cranking the cross slide leadscrew. See “Lateral feed” for feed information.
3. Operate the key mill as described in “Operation”.

Long Keyways

To cut in-line keyways:

1. Secure the shaft so it will not rotate. V-blocks may be used to hold long shafts. Secure the shaft to the V-blocks with “C” clamps.
2. Mount the key mill to the shaft as described in “Machine setup”.
3. Carefully level the key mill on top of the shaft. A level can be placed on the machined upper surface of the base to check the key mill.
4. Cut the keyway as described in “Operation”.
5. Reposition the machine along the shaft.
6. Again, carefully level the key mill on top of the shaft. If the machine is accurately leveled each time, the keyways will be in line.

Rotated Keyways

To cut keyways 90 degrees apart:

1. Set up the key mill as described in “Machine setup”. Be sure the machine is level. Cut the first keyway.
2. Reposition the machine on the side of the shaft. Place a level on the side of the base to verify that the machine is 90 degrees to the first keyway. Cut the second keyway.

To cut keyways 120 degrees apart:

3. Set up the machine as described in “Machine setup”. Be sure the machine is level. Cut the first keyway.
4. With angle blocks, position the machine 120 degrees from the first keyway. Cut the keyway.
5. With angle blocks, again position the machine 120 degrees from the first keyway. Cut the third keyway.

To cut keyways 180 degrees apart:

1. Set up the key mill on the side of the shaft. Place a level on the side of the base to be sure the machine is flat on its side. Cut the first keyway.
2. Position the machine on the other side of the shaft. Place a level on the side of the base to be sure the machine is again flat on its side. Cut the other keyway.

Maintenance

Lubrication

LUBRICANT	BRAND	WHERE USED
Gear grease	ConocoPhillips Polytac EP 2	Gearbox gears, thrust bearings
Light oil	LPS1™ or LPS2™	Unpainted surfaces
Cutting oil	ConocoPhillips KOOL KUT	Tool bits, workpiece
Air tool oil	Ingersoll-Rand Light oil #10	Air lubricator oil cup
Lubricant	Jet Lube 550	Cutting bit set screw in quill
Way oil	Mobil VACTRA #2 Heavy-Medium Way Oil	Dovetail ways
Hydraulic fluid	Mobil DTE-24	Hydraulic motor
		Quill housing

WARNING

Disconnect the machine from power before servicing the machine.

CAUTION

Avoid damage to the machine and protect your warranty by using only approved lubricants.

IMPORTANT

Before servicing the machine with any of the lubricants above, consult the manufacturer's MSDS.

Top Slide Assembly

The top slide gear and worm gear are packed with soft gear grease. Under normal use, these parts are greased for the life of the machine.

Thrust bearings should be lubricated every 6 months or 500 hours with heavy gear grease.

Always keep chips away from gears, threads, and moving parts of the top slide.

Cross Slide and Base Assembly

Before and after operating the machine, clean the dovetail ways and lubricate with way oil.

Leadscrew Assembly

During operation, frequently clean chips away from the leadscrew with a soft brush. If necessary, lightly oil the leadscrew.

Gear Box Assembly, Spindle and Quill

The gearbox is packed with heavy gear grease. Every 500 hours, repack as follows:

1. Remove the adjustment knob.
2. Remove the crank.
3. Remove the snap ring, finger spring washer, thrust washer, and dial.
4. Unscrew six socket-head cap screws.
5. Lift off gearbox lid.
6. Repack gears with grease.
7. Reassemble in reverse order of above.

Before each job, lubricate the quill housing with lubricant on the section of quill that slides inside the quill clamp.

Ball and roller bearings are sealed and lubricated for life.

Hydraulic hoses and fittings

Prior to operation, inspect all hydraulic hoses and fittings for damage, kinks, leaks, and fit. Replace damaged or suspect components.

	WARNING
	Hydraulic hoses operate under extreme pressure. Operating a hydraulically powered machine using damaged hydraulic hoses or fittings could cause high-velocity leaks of hydraulic fluid, resulting in blindness, fire, or severe cutting or impact injury.

Vertical adjustment leadscrew

Occasionally lubricate the vertical adjustment screw threads with light oil.

Cross Slide Leadscrew

Occasionally lubricate the cross slide leadscrew with light oil.

Electric Motor

Repack the gear case every 6 months or 500 hours with one ounce of gear grease. Remove the gear case, being careful not to dislodge the armature. Do not disassemble the gears.

Periodically inspect the brushes as follows:

1. Unscrew the brush retainer caps on the motor housing.
2. Pull out the retainer springs and brushes.

Replace brushes when worn down to 1/4" (6 mm). Always replace brushes in sets.

Air Motor and Pneumatic Conditioning Unit

To extend the life of the air motor do the following:

- Route the air supply through a lubricator and air filter.
- Use nonrestrictive 1/2" air lines and fittings supplied by Climax. Periodically check the air system to be sure air pressure is adequate.
- Adjust the air motor speed by opening or closing the ball valve. Do not attempt to control motor speed by changing the air line pressure from 90 psi.
- Fill the lubricator oil cup with oil before using the machine. Use high-quality oil with rust inhibitors and emulsifiers such as Marvel Air Tool Oil. The lubricator should oil the air at a rate of 20-30 drops per minute at full throttle.
- Drain the air filter.

Hydraulic motor

For information on hydraulic motor maintenance, see the operating manual for this machine part, supplied by the manufacturer.

Chain Clamp

Periodically check chain links for wear. After using the key mill, spray the links with lubricant.

Storage

Proper storage of the key mill will prevent undue deterioration or damage. Before storing, clean the machine with solvent to remove grease, metal chips, and moisture. Drain the air filter on pneumatic models. Spray the machine with a moisture-protective material to prevent rusting. Store the key mill in the container provided and include desiccant or vapor wrap to absorb moisture.

Spare Parts

Parts listed below include items most frequently replaced due to wear, loss, or damage. To avoid unscheduled down time, you may want to stock any or all parts listed.

PART No	DESCRIPTION	QTY	WHERE USED
10138	Screw 5/16-18 x 1 SHCSPL	3	Top slide assembly
10482	Shaft assembly traverse drive	1	
10189	Screw 1/4-20 x 5/8 SSSHDPPL	3	Cross slide assembly
10189	Screw 1/4-20 x 5/8 SSSHDPPL	3	Base assembly
10443	Brass nut	1	Leadscrew assembly
38119	Leadscrew assembly (complete)	1	
16463	Screw modified 1/2-20	1	Spindle & quill assembly
19492	Vertical adjust screw – inch	1	Vertical adjustment leadscrew assembly
19634	Vertical adjust screw - metric	1	
10449	Brass nut - inch	1	
10450	Brass nut - metric	1	
16253	Cross slide leadscrew - inch	1	
16254	Cross slide leadscrew - metric	1	
15482	Carbon brush assembly	2	Electric motor
12553	Brush screw	2	
31726	Speed control assembly 115V motor	1	
10179	Toggle switch	1	
12546	Intermediate gear assembly	1	
12549	120V armature 3rd	1	
14441	230v armature 3rd	1	
12550	120V Field 3rd	1	
14442	230V Field 3rd	1	
28458	Fuse 12 amp 250V type 3AB fast acting	3	
31746	Speed control assembly 230V motor	1	
31769	Carbon brush assembly	2	
21114	Filter element	1	Hydraulic power unit
10199	1/4" Hex wrench	1	Tool kit
10200	1/8" Hex wrench	1	
10203	Crank	1	
10467	End mill - 3/4" dia. x 3/4" shank	6	
10470	End mill - 20 mm dia. x 20 mm shank	6	

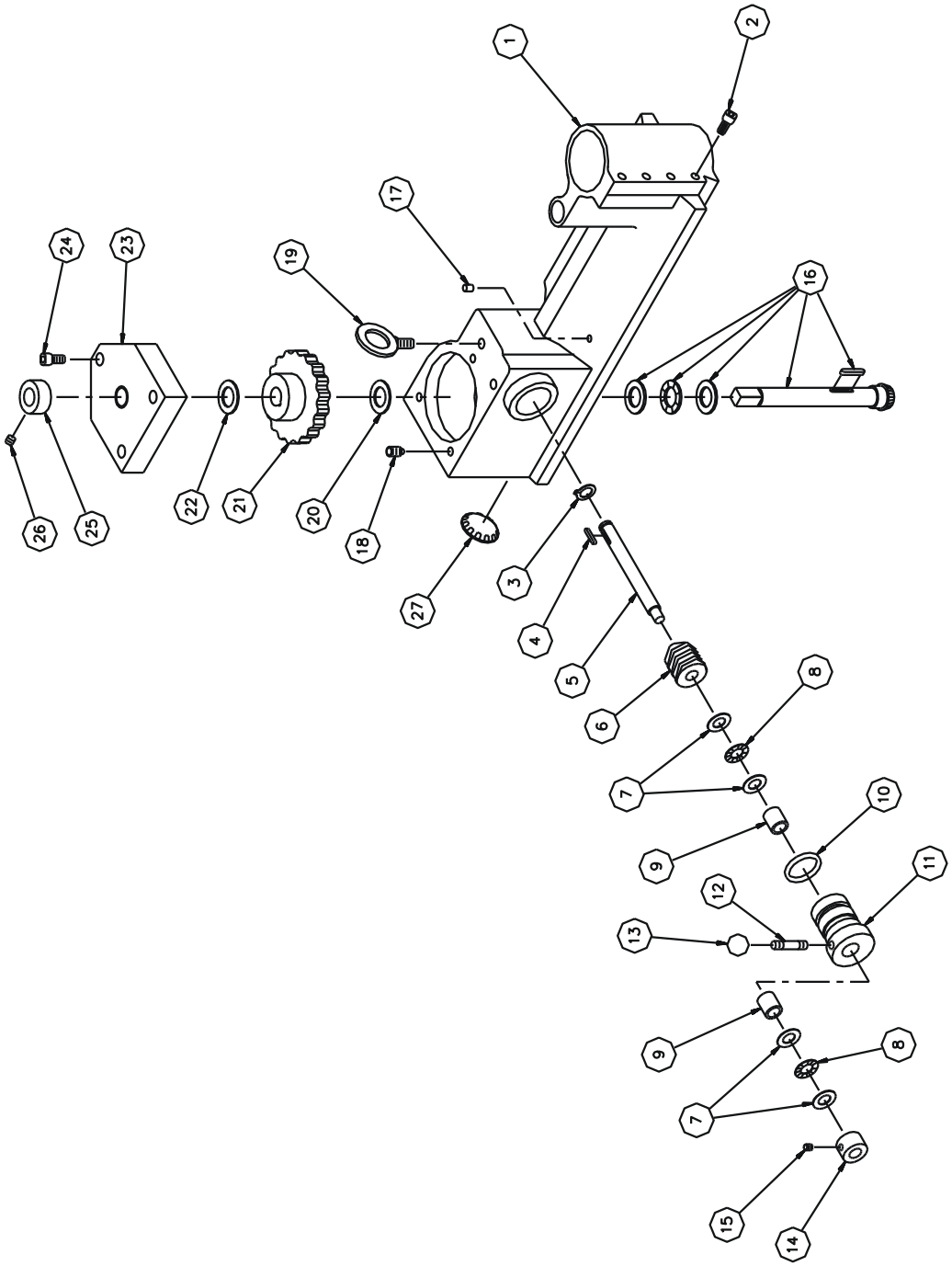
Specifications

	INCH	METRIC
Height min	12.25"	312 mm
Height max	15.25"	388 mm
Vertical spindle travel	3.0"	76 mm
Length min	18.5”	470 mm
Length max	24.5"	622 mm
Longitudinal spindle travel	7.85"	199 mm
Width min	14.0"	356 mm
Width max	16.0"	407 mm
Transverse spindle travel	2.0"	50 mm
Base size	9.0 x 18.5"	229 x 470 mm
Shaft clamping diameter:		
Min (with shim kit)	4.0"	102 mm
Standard min	8.0"	200 mm
Standard max	18.0"	455 mm
Max (opt. chain)	24.0"	609 mm
Minimum stub shaft clamping		
Length:	8.0"	200 mm
Spindle shank required		
(Weldon):	3/4"	20 mm
No load spindle speed:	675 rpm	675 rpm
Min	350 rpm	
Max	675 rpm	
Vertical cutter depth adj.:	.001" increment	.10 mm increment
Transverse slide travel adj.:	.001" increment	.10 mm increment
Metal removal rate (in C1018 Steel):	1 in3/min	16 cm3/min
Keyway possible with one setup (with 1-1/4" dia. mill):	3.25" wide	82 mm wide
	9.25" long	234 mm long
	1.25" deep	31 mm deep
Electric power options: (all 1 hp)	115V, 10a	
	230V, 5a	
Air power:	2 hp	1.49 kW
Hydraulic power options: (Max spindle free speed)	787 rpm	
	515 rpm	
	323 rpm	
Working weight:	195 lbs	89 kg

Exploded Views and Parts

The following diagrams and parts lists are for your reference purposes only. The machine Limited Warranty is void if the machine has been tampered with by anyone who has not been authorized in writing by Climax Portable Machining & Welding Systemsl. to perform service on the machine.

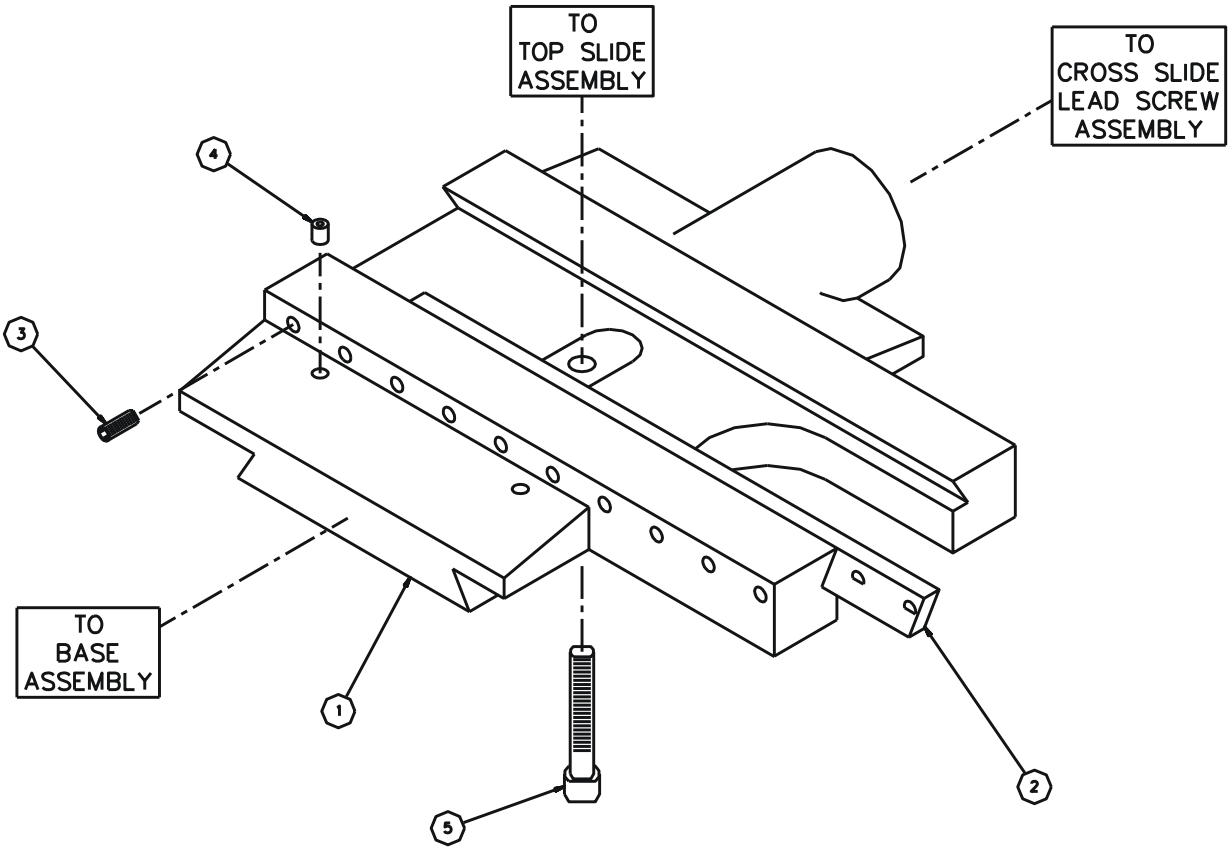
13737 KIT TOOL KM4000	
PART	DESCRIPTION
10203	CRANK HANDLE 1/2 SQUARE
10199	WRENCH HEX ¼ SHORT ARM
10200	WRENCH HEX 1/8SHORT ARM



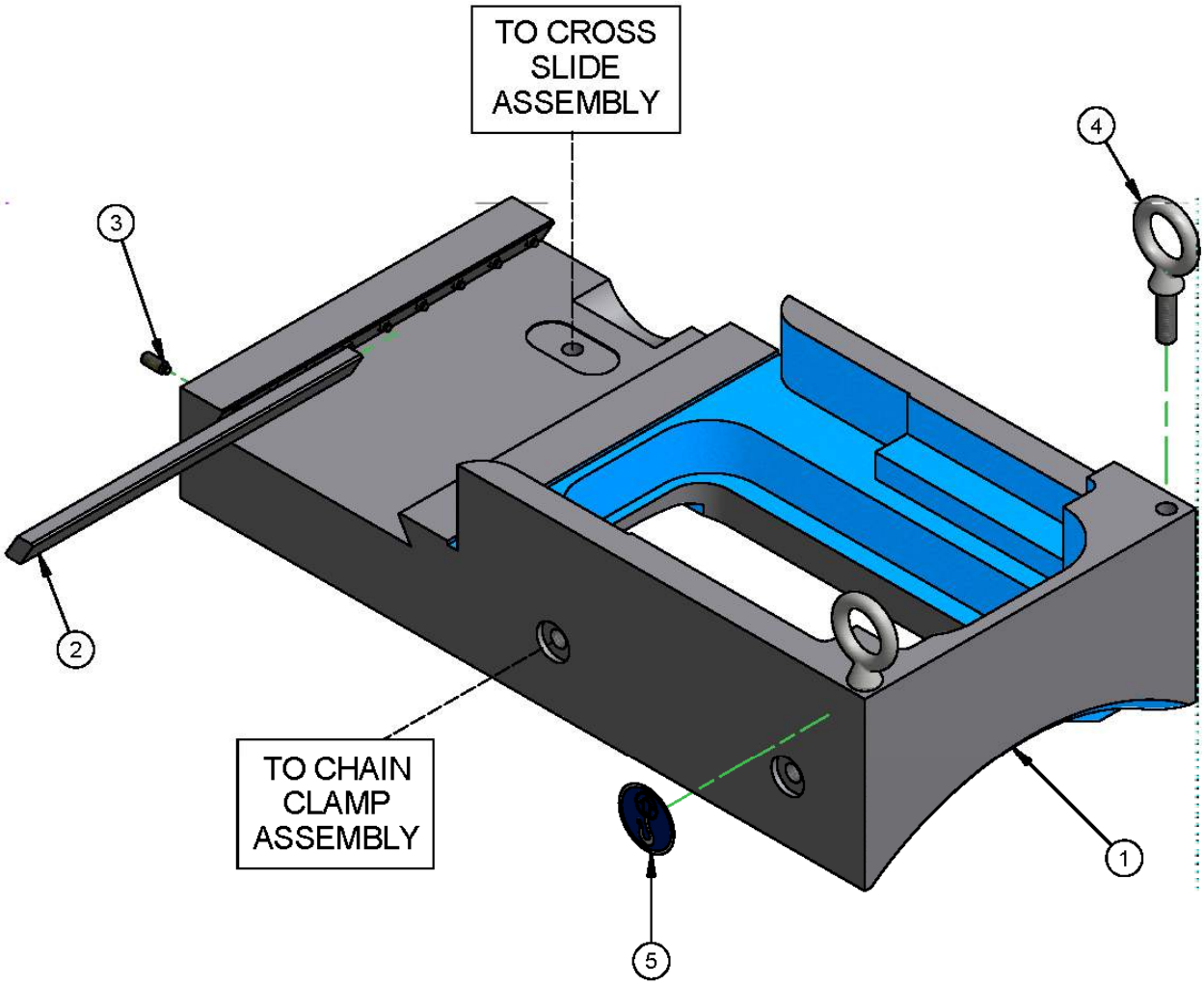
TOP SLIDE ASSEMBLY
(10485 – INCH)
(10486 – METRIC)

10485 SLIDE TOP ASSY INCH KM4000 CPM		
BALLOON	PART	DESCRIPTION
1	10502	TOPSLIDE INCH KM4000 PM2000 PM3000 PM4000
2	10138	SCREW 5/16-18 X 1 SHCSPL
3	10829	RING SNAP 1/2 OD
4	10465	KEY 1/8 SQ X .75 SQ BOTH ENDS
5	16201	SHAFT KM4000
6	10433	GEAR WORM 12DP 1.0 PD RH SINGLE THREAD
7	10436	WASHER THRUST .500 ID X .937 OD X .060
8	10437	BRG THRUST .500 ID X .937 OD X .0781
9	10434	BRG NEEDLE 1/2 ID X 11/16 OD X .750 OPEN
10	10466	RING O 1/8 X 1-3/16 ID X 1-7/16 OD
11	16202	HOUSING CAM
12	10439	STUD 5/16-24 X 5/16-18 X 1-1/2
13	10440	BALL 1 DIA BLACK PLASTIC
14	16220	COLLAR SET 1/2 ID
15	10464	SCREW 1/4-20 X 1/4 SSSCP
16	10482	SHAFT ASSY TRAVERSE DRIVE KM4000 CPM
17	10139	OILER BALL VALVE DRIVE IN
18	10441	DETENT PLUNGER SPRING STUBBY 3/8-16 X .625
20	10136	WASHER THRUST .750 ID X 1.250 OD X .060
21	10429	GEAR KM4000 CPM
22	10198	WASHER THRUST .750 ID X 1.250 OD X .123
23	10500	COVER GEAR BOX ASSY KM4000
24	10431	SCREW 5/16-18 X 1 SHCS
25	10134	COLLAR 11/16 DIA SHAFT WITH 5/16-18 SET SCREW
NOT SHOWN	15999	PLUG HOLE 1-3/4 DIA MODIFIED

13736 SLIDE CROSS ASSY KM4000		
BALLOON	PART	DESCRIPTION
1	10454	BASE KM4000
2	10444	GIB KM4000
3	10189	SCREW 1/4-20 X 5/8 SSSHDPNI
4	10139	OILER BALL VALVE DRIVE IN
5	10474	SCREW 3/8-16 X 1-1/2 SHCS

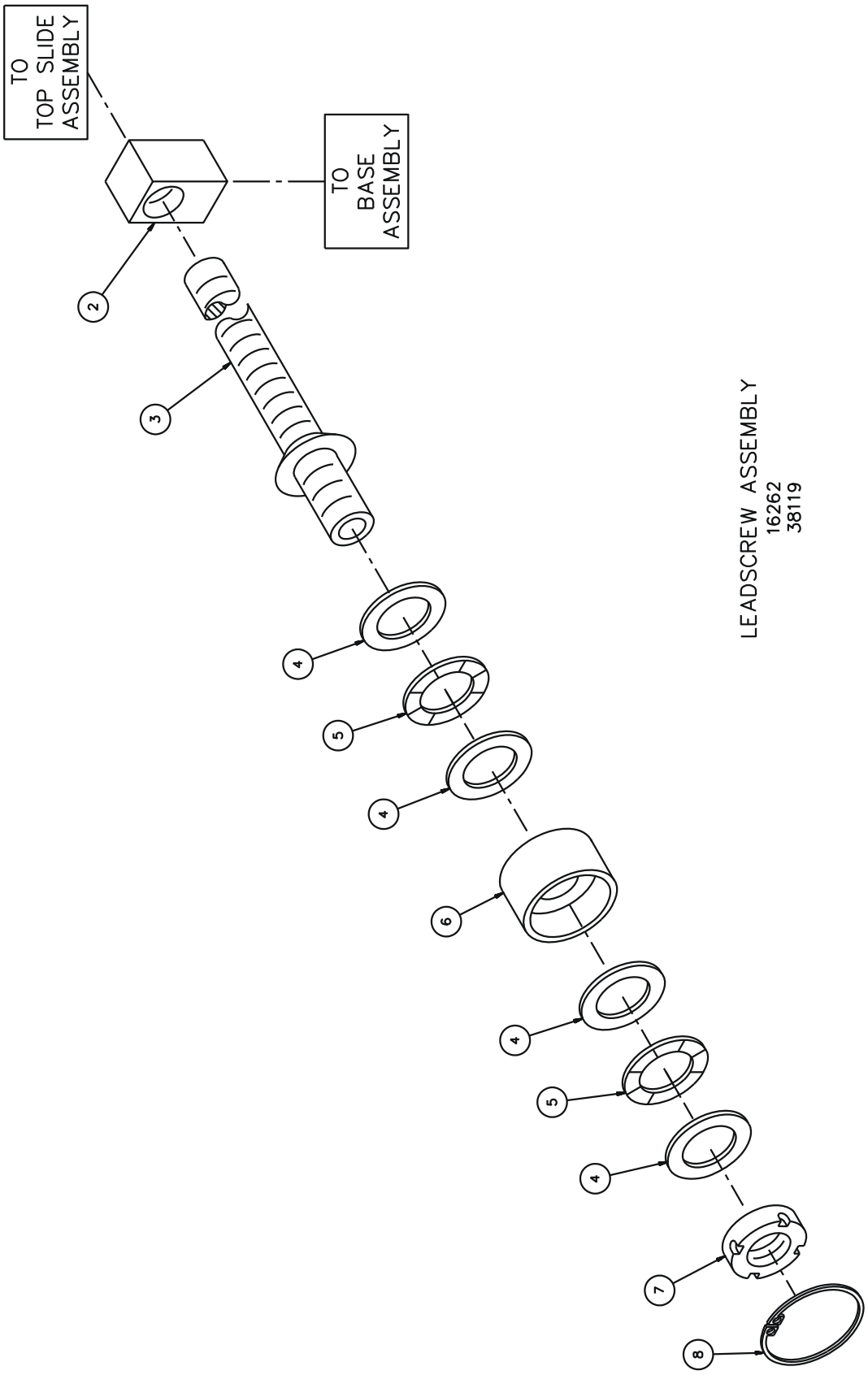


M-72 CROSS SLIDE ASSEMBLY
13736



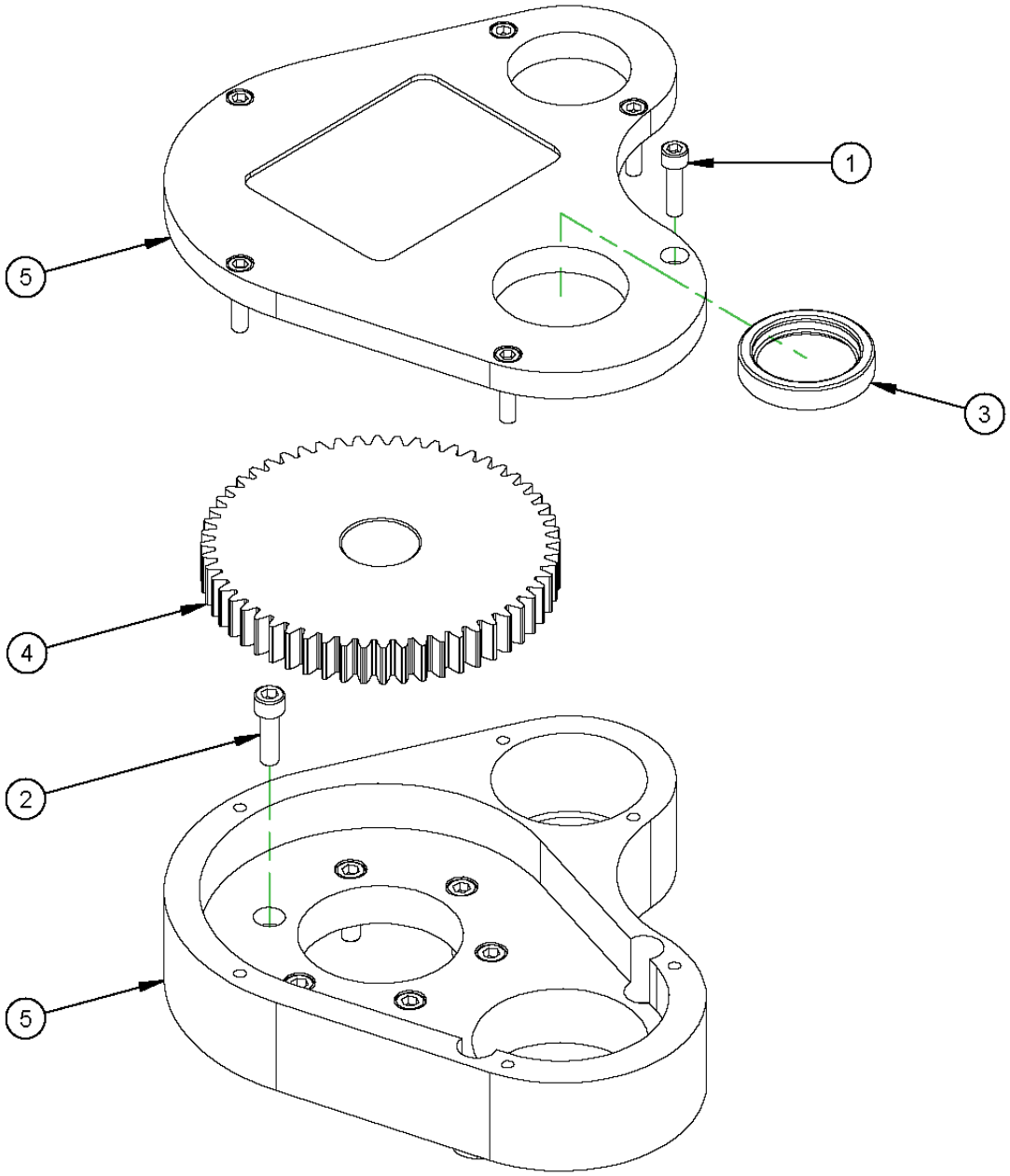
3	9	10189	SCREW 1/4-20 X 5/8 SSSHDPPL
2	1	10452	GIB .615 X .375 X 8.97 0-1 9 SS X 1.0
1	1	10454	BASE KM4000 HYD
4	2	10460	EYE LIFTING 3/8-16 X 1-1/4 THREAD 1300 LBS
5	2	59039	LABEL WARNING LIFT POINT ROUND 1.5"
ITEM	QTY	PART No.	DESCRIPTION
PARTS LIST			

13262 - BASE ASSY KM4000



LEADSCREW ASSEMBLY
16262
38119

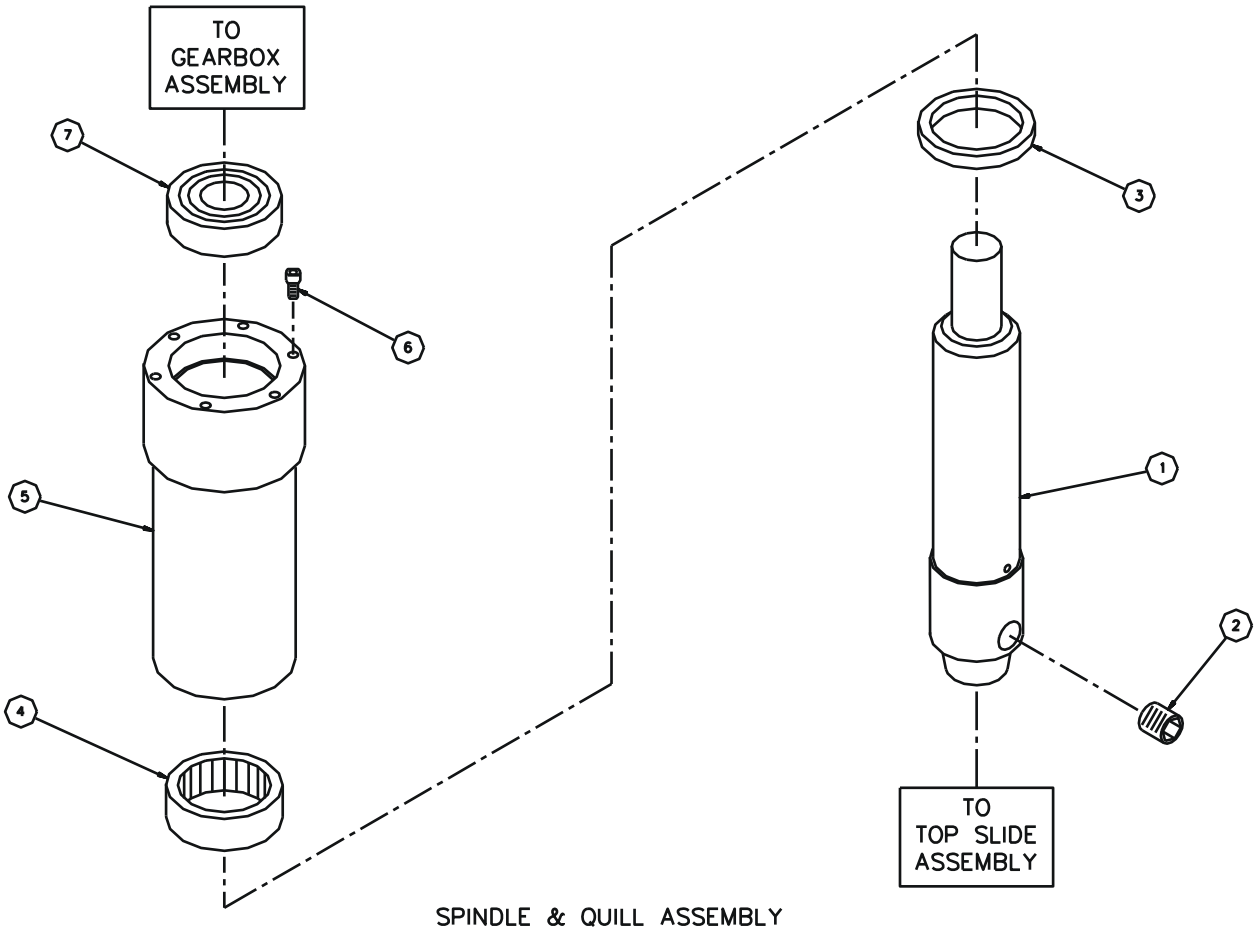
38119 ASSY LEADSCREW TOP SLIDE KM4000 PM2000 PM3000 PM4000		
BALLOON	PART	DESCRIPTION
2	10443	NUT BRASS
3	38117	LEADSCREW TOP SLIDE KM4000 PM2000 PM3000
4	13175	WASHER THRUST .875 ID X 1.437 OD X .060
4	10144	WASHER THRUST 1.000 ID X 1.562 OD X .060
5	13174	BRG THRUST .875 ID X 1.437 OD X .0781
5	10145	BRG THRUST 1.000 ID X 1.562 OD X .0781
6	38116	COLLAR
7	10146	NUT LOCK
7	37981	NUT SELF-LOCKING SIZE AN-04
8	10193	RING SNAP 1-3/4 ID BEVELED



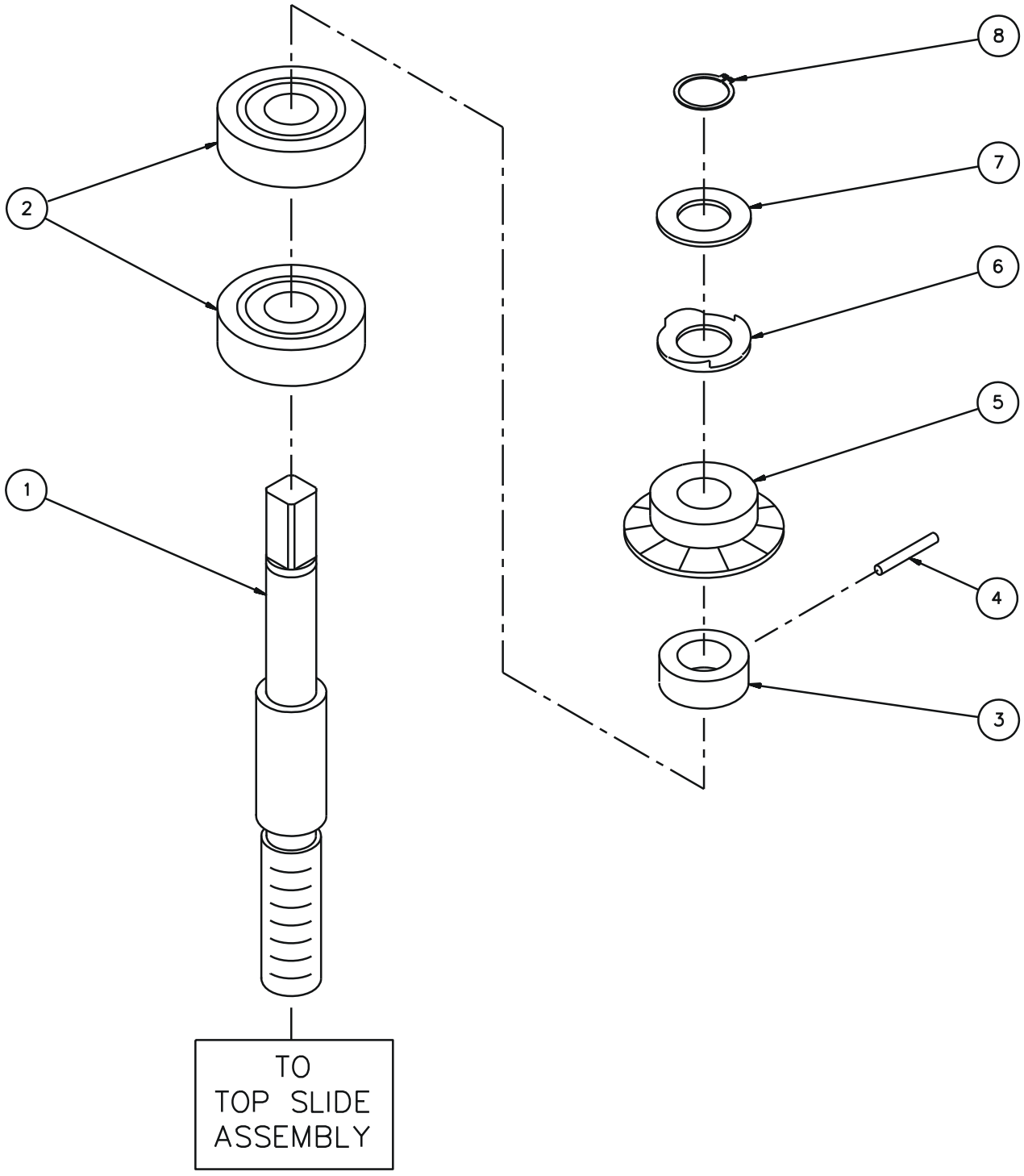
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	6	10156	SCREW 8-32 X 5/8 SHCS
2	6	10157	SCREW 10-32 X 5/8 SHCS
3	1	10167	SEAL 1.000 ID X 1.375 OD X .250
4	1	15517	GEAR SPUR 16DP 56T 20PA .43 X .97LG STEEL
5	1	34404	ASSY GEARBOX KM4000

19645 SPINDLE & QUILL ASSY INCH 3rd KM4000 CPM		
BALLOON	PART	DESCRIPTION
1	19494	SPINDLE INCH 3rd KM4000 CPM
2	16463	OBS USE 37405 (SCREW MODIFIED 1/2-20)
3	15669	SEAL 1.500 ID X 1.874 OD X .250
4	19016	BRG NEEDLE 1-1/2 ID X 1-7/8 OD X .625 OPN GR
5	19493	HOUSING QUILL 3rd KM4000 CPM
7	10150	BRG BALL .7874 ID X 1.8504 OD X .5512 2/SHLDS

19650 SPINDLE & QUILL ASSY METRIC 3rd KM4000 CPM		
BALLOON	PART	DESCRIPTION
1	19635	SPINDLE METRIC 3rd KM4000 CPM
2	16463	OBS USE 37405 (SCREW MODIFIED 1/2-20)
3	15669	SEAL 1.500 ID X 1.874 OD X .250
4	19016	BRG NEEDLE 1-1/2 ID X 1-7/8 OD X .625 OPN GR
5	19493	HOUSING QUILL 3rd KM4000 CPM
7	10150	BRG BALL .7874 ID X 1.8504 OD X .5512 2/SHLDS



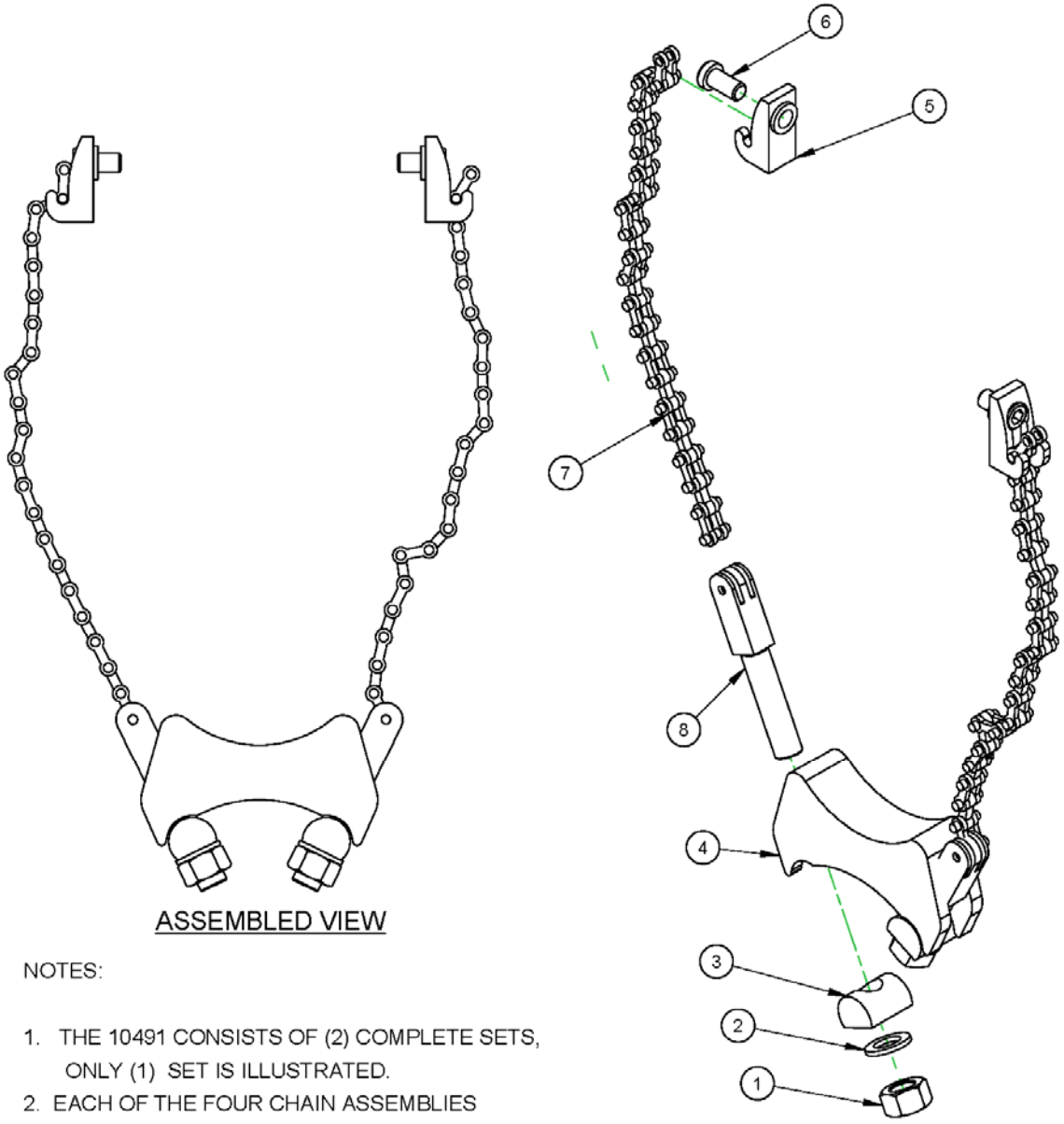
SPINDLE & QUILL ASSEMBLY
(19645 – INCH)
(19650 – METRIC)



VERTICAL ADJUSTMENT SCREW ASSEMBLY
(19648 – INCH)
(19649 – METRIC)

19648 LEADSCREW VERT ADJ ASSY INCH 3rd KM4000 CPM		
BALLOON	PART	DESCRIPTION
1	19492	LEADSCREW VERT ADJ INCH 3rd KM4000 CPM
2	10365	BRG BALL .6693 ID X 1.5748 OD X .4724 2 SEALS
3	10165	COLLAR
4	10166	PIN ROLL 1/8 DIA X 1
5	10169	DIAL INCH
6	15667	WASHER SPRING FINGER .688 ID X 1.164 OD
7	15666	WASHER THRUST .669 ID X 1.181 OD X .030
8	15668	RING SNAP 43/64 OD INVERTED

19649 LEADSCREW VERT ADJ ASSY METRIC 3rd KM4000 CPM		
BALLOON	PART	DESCRIPTION
1	19634	LEADSCREW VERT ADJ METRIC 3rd KM4000 CPM
2	10365	BRG BALL .6693 ID X 1.5748 OD X .4724 2 SEALS
3	10165	COLLAR
4	10166	PIN ROLL 1/8 DIA X 1
5	10170	DIAL METRIC
6	15667	WASHER SPRING FINGER .688 ID X 1.164 OD
7	15666	WASHER THRUST .669 ID X 1.181 OD X .030
8	15668	RING SNAP 43/64 OD INVERTED



ASSEMBLED VIEW

NOTES:

1. THE 10491 CONSISTS OF (2) COMPLETE SETS, ONLY (1) SET IS ILLUSTRATED.
2. EACH OF THE FOUR CHAIN ASSEMBLIES CONTAINS 20" OF CHAIN

PARTS LIST			
ITEM	QTY	P/N.	DESCRIPTION
1	4	10197	NUT 3/4-10 STDN ZINC PLATED
2	4	10198	WASHER THRUST .750 ID X 1.250 OD X .123
3	4	10206	ROCKER CHAIN CLAMP
4	2	10462	CLAMP BAR
5	4	15504	CASTING BLOCK CLAMP SMALL
6	4	15670	SCREW 1/2-13 X 1 LHSCS
7	80IN	27366	CHAIN WRENCH 3/4 PITCH .240 DIA PIN (VMI)
8	4	27385	BOLT - CHAIN CLAMP

10491 - CLAMP ASSY CHAIN KM4000 - REV B

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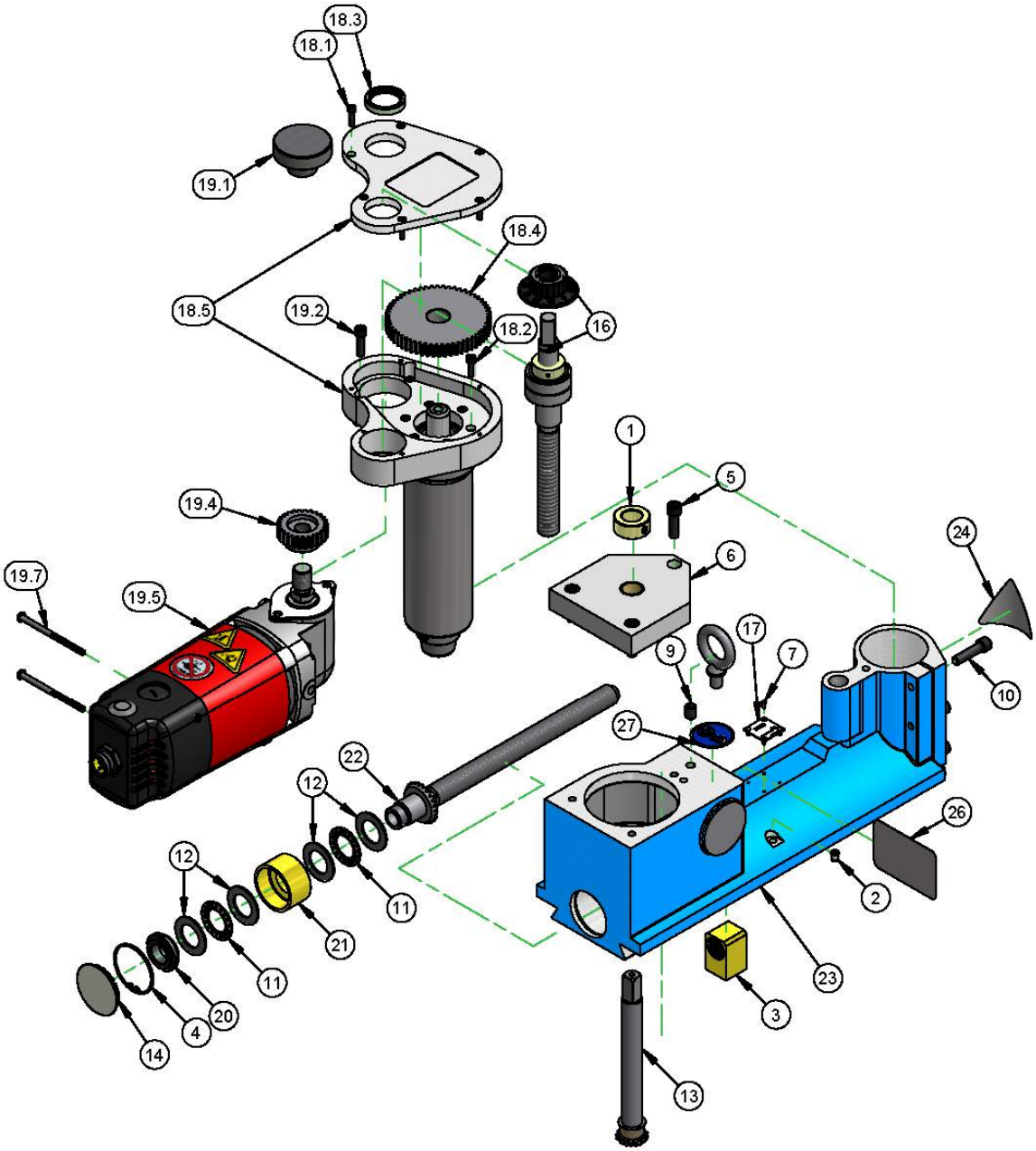
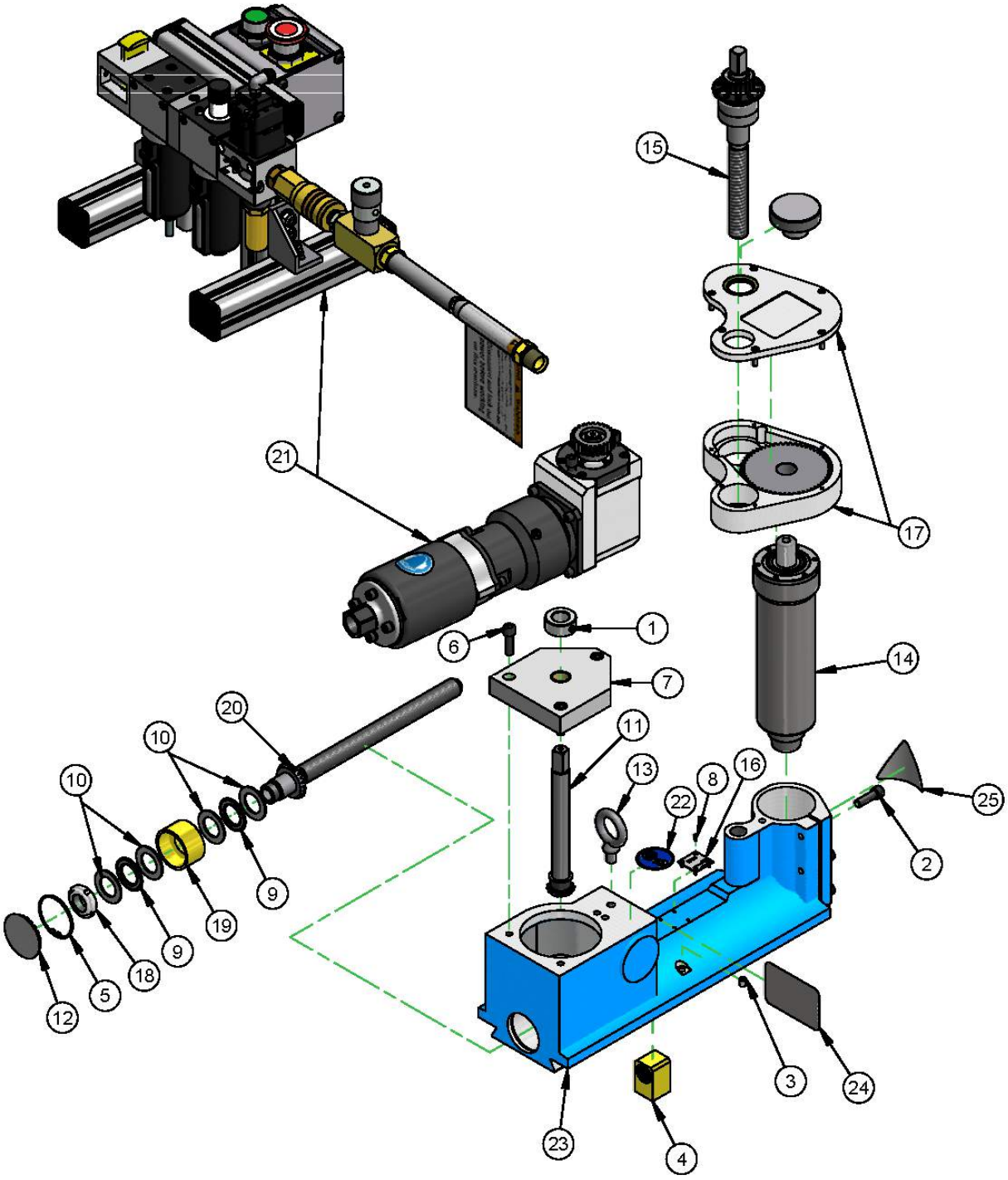


Table	
P/N	DESCRIPTION
65217	ASSY TOPSLIDE WELDON SHANK INCH 120V
65218	ASSY TOPSLIDE WELDON SHANK METRIC 120V
65219	ASSY TOPSLIDE WELDON SHANK INCH 230V
65220	ASSY TOPSLIDE WELDON SHANK METRIC 230V

ASSY TOPSLIDE WELDON SHANK PM4200 65217

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	10134	COLLAR 11/16 DIA SHAFT WITH 5/16-18 SET SCREW
2	2	10139	OILER BALL VALVE DRIVE IN
3	1	10190	LEADNUT BRASS 3/4-10 ACME
4	1	10193	RING SNAP 1.75 ID BEVEL LEADSCREW
5	3	10431	SCREW 5/16-18 X 1 SHCS
6	1	10500	COVER GEAR BOX ASSY KM4000
7	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
9	1	11722	SCREW 3/8-16 X 1/2 SSSCP
10	3	11735	SCREW 5/16-18 X 1-1/4 SHCS
11	2	13174	BRG THRUST .875 ID X 1.437 OD X .0781
12	4	13175	WASHER THRUST .875 ID X 1.437 OD X .060
13	1	15618	SHAFT ASSY 2ND KM3000
14	1	15999	PLUG HOLE 1-3/4 DIA MODIFIED
15	1	19645	SPINDLE & QUILL ASSY INCH 3RD KM4000 CPM
16	1	19648 19649	LEADSCREW VERT ADJ ASSY INCH 3RD KM4000 LEADSCREW VERT ADJ ASSY METRIC 3RD KM4000
17	1	29152	PLATE MASS CE
18	1	34403	ASSY GEAR BOX SPINDLE DRIVETOP
18.1	6	10156	SCREW 8-32 X 5/8 SHCS
18.2	6	10157	SCREW 10-32 X 5/8 SHCS
18.3	1	10167	SEAL 1.000 ID X 1.375 OD X .250
18.4	1	15517	GEAR SPUR 16DP 56T 20PA .43 X .97LG STEEL
18.5	1	34404	BOX GEAR ASSY
19	1	36780 36684	MOTOR ASSY ELECTRIC 120V 4TH 2-POLE CONNECTOR MOTOR ASSY ELECTRIC 230V 4TH 2-POLE CONNECTOR
19.1	1	10168	KNOB ADJUSTMENT 2 INCH KNURLED
19.2	2	17131	SCREW 1/4-20 X 7/8 SHCS
19.3	1	34142	CAP MOTOR END ASSY W/ 2-POLE CONNECTOR 120V
19.4	1	34653	GEAR SPUR 16DP 26T 20PA .437 X .78LG STEEL
19.5	1	34662 36688	MOTOR ELEC 120V 4TH MODIFIED MOTOR ELEC 230V 4TH MODIFIED
19.7	2	42724	SCREW 10-24 X 3 SRHMS
19.8	1	59037	LABEL WARNING - WEAR EAR PROTECTION
19.9	1	78824	LABEL WARNING - DO NOT EXPOSE TO WATER
19.10	1	59044	LABEL WARNING - CONSULT OPERATOR'S MANUAL
19.11	1	78741 65217	LABEL WARNING CRUSH FOOT
19 12	1	78748	LABEL WARNING FLYING DEBRIS/LOUD NOISE
20	1	37981	NUT SELF LOCKING BRG ADJ SZ 4
21	1	38116	COLLAR LEADSCREW BEARING
22	1	38117	LEADSCREW TOP SLIDE KM4000 PM2000 PM3000
23	1	65023	TOPSLIDE INCH PM4200 KM4000
24	1	79575	LABEL WARNING - CUTTING OF FINGERS OR HAND ROTATING BLADE GRAPHIC 1.95 TALL TRIANGLE YELLOW
25	1	19239	EYE LIFTING 3/8 MODIFIED
26	1	79385	LABEL WARNING - LIFT SUB ASSY ONLY GRAPHIC 2 X 3
27	1	59039	LABEL WARNING LIFT POINT ROUND 1.5"

ASSY TOPSLIDE WELDON SHANK PM4200 65217

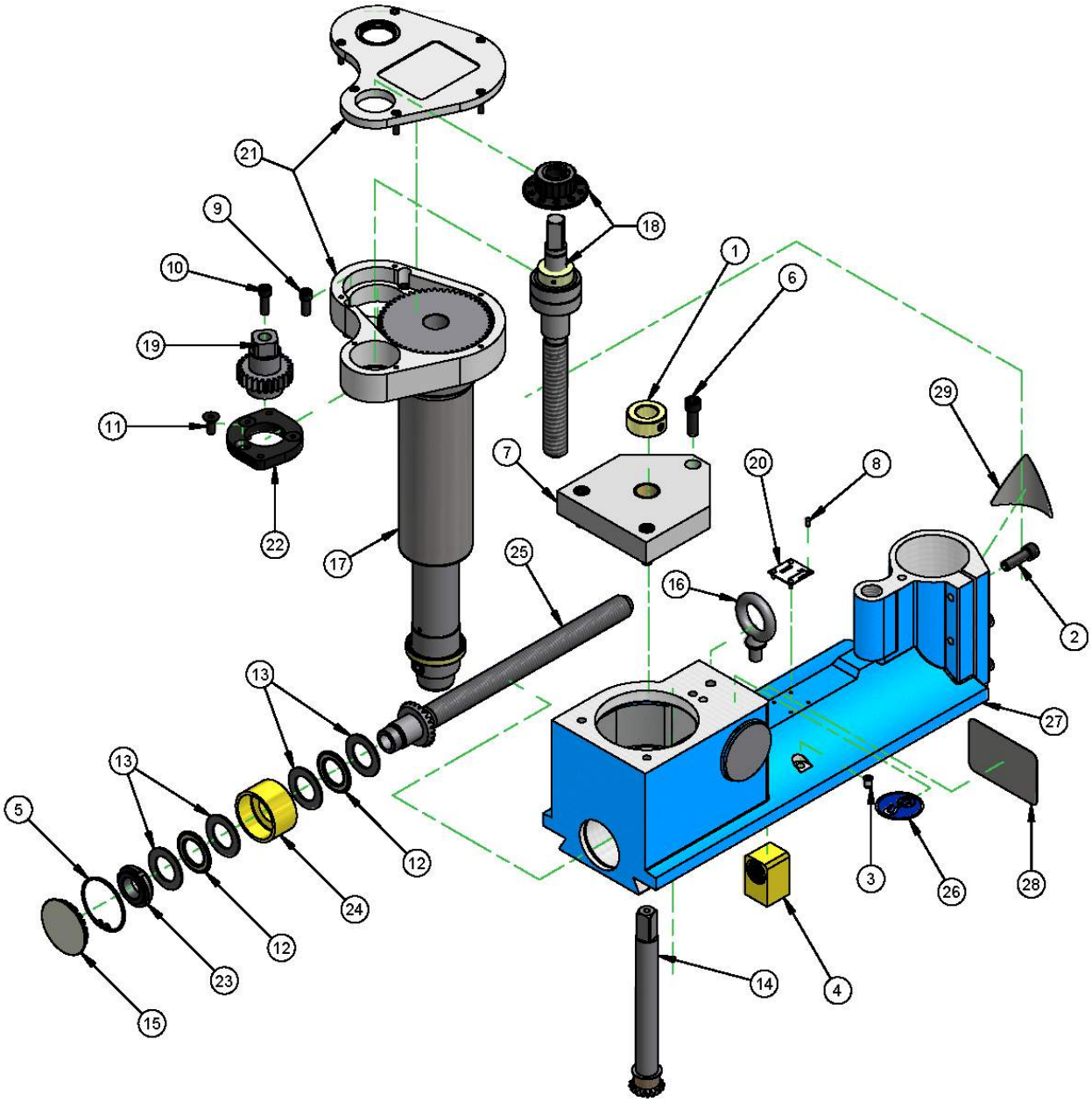


AVAILABLE CONFIGURATTIONS		
DESCRIPTION	P/N	
ASSY TOPSLIDE WELDON SHANK INCH PNEUMATIC	65223	SHOWN
ASSY TOPSLIDE WELDON SHANK METRIC PNEUMATIC	65224	

CHART DRAWING 76245

PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	1	10134	COLLAR 11/16 DIA SHAFT WITH 5/16-18 SET SCREW
2	3	10138	SCREW 5/16-18 X 1 SHCSPL
3	2	10139	OILER BALL VALVE DRIVE IN
4	1	10190	LEADNUT BRASS 3/4-10 ACME
5	1	10193	RING SNAP 1.75 ID BEVEL LEADSCREW
6	3	10431	SCREW 5/16-18 X 1 SHCS
7	1	10500	COVER GEAR BOX ASSY KM4000
8	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
9	2	13174	BRG THRUST .875 ID X 1.437 OD X .0781
10	4	13175	WASHER THRUST .875 ID X 1.437 OD X .060
11	1	15618	SHAFT ASSY 2ND KM3000
12	1	15999	PLUG HOLE 1-3/4 DIA MODIFIED
13	1	19239	EYE LIFTING 3/8 MODIFIED
14	1	19645	SPINDLE & QUILL ASSY INCH 3RD KM4000 CPM
15	1	19648	LEADSCREW VERT ADJ ASSY INCH 3RD KM4000
16	1	29152	PLATE MASS CE
17	1	34403	ASSY GEAR BOX SPINDLE DRIVETOP
18	1	37981	NUT SELF LOCKING BRG ADJ SZ 4
19	1	38116	COLLAR LEADSCREW BEARING
20	1	38117	LEADSCREW TOP SLIDE KM4000 PM2000 PM3000
21	1	38777	DRIVE AIR ASSY KM4000 PM4200
22	1	59039	LABEL WARNING LIFT POINT ROUND 1.5"
23	1	65023	TOPSLIDE INCH PM4200 KM4000
24	1	79385	LABEL WARNING - LIFT SUB ASSY ONLY GRAPHIC 2 X 3
25	1	79575	LABEL WARNING - CUTTING OF FINGERS OR HAND ROTATING BLADE GRAPHIC 1.95 TALL TRIANGLE YELLOW

CHART DRAWING 76245



AVAILABLE CONFIGURATIONS	
DESCRIPTION	P/N
ASSY TOPSLIDE WELDON SHANK INCH HYD PM4200	65221
ASSY TOPSLIDE WELDON SHANK METRIC HYD PM4200	65222

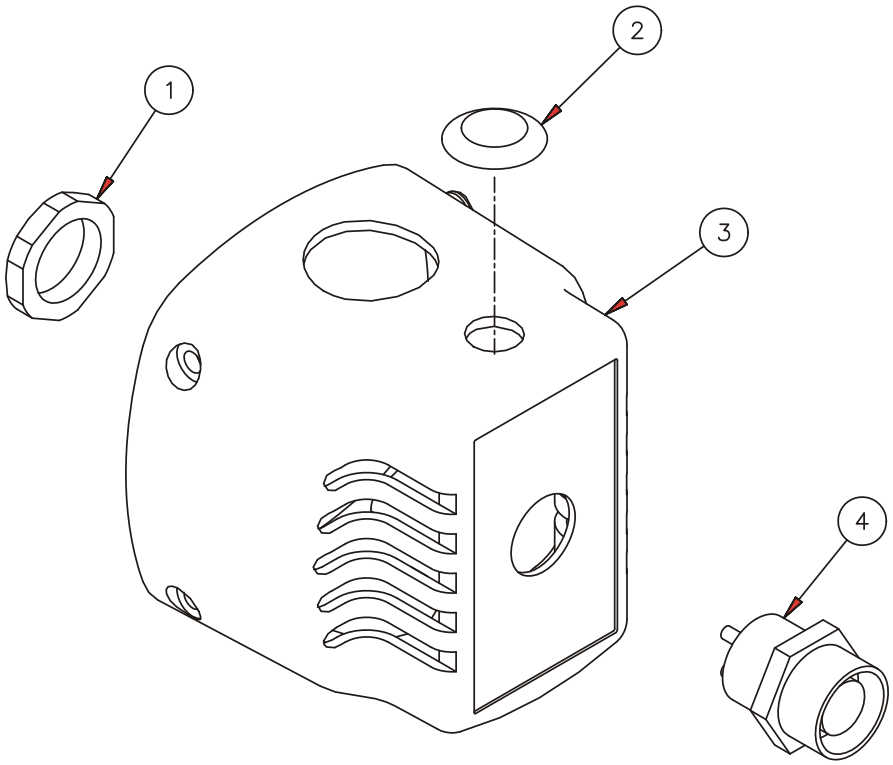
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	10134	COLLAR 11/16 DIA SHAFT WITH 5/16-18 SET SCREW
2	3	10138	SCREW 5/16-18 X 1 SHCSPL
3	2	10139	OILER BALL VALVE DRIVE IN
4	1	10190	LEADNUT BRASS 3/4-10 ACME
5	1	10193	RING SNAP 1.75 ID BEVEL LEADSCREW
6	3	10431	SCREW 5/16-18 X 1 SHCS
7	1	10500	COVER GEAR BOX ASSY KM4000
8	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
9	2	12418	SCREW 1/4-20 X 5/8 SHCS
10	1	12647	SCREW 1/4-28 X .75 SHCS
11	3	12853	SCREW 1/4-28 X 5/8 FHSCS
12	2	13174	BRG THRUST .875 ID X 1.437 OD X .0781
13	4	13175	WASHER THRUST .875 ID X 1.437 OD X .060
14	1	15618	SHAFT ASSY 2ND KM3000
15	1	15999	PLUG HOLE 1-3/4 DIA MODIFIED
16	1	19239	EYE LIFTING 3/8 MODIFIED
17	1	19645 19650	SPINDLE/QUILL ASSY INCH KM4000 SPINDLE/QUILL ASSY METRIC KM4000

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
18	1	19648 19649	LEADSCREW VERT ADJ INCH KM4000 LEADSCREW VERT ADJ METRIC KM4000
19	1	20379	GEAR SPUR MOTOR 16DP 1.625PD SPECIAL HYD MOTOR
20	1	29152	PLATE MASS CE
21	1	34403	ASSY GEAR BOX SPINDLE DRIVETOP
22	1	35003	FLANGE MOTOR MTG HYD 4TH GEN GEARBOX
23	1	37981	NUT SELF LOCKING BRG ADJ SZ 4
24	1	38116	COLLAR LEADSCREW BEARING
25	1	38117	LEADSCREW TOP SLIDE KM4000 PM2000 PM3000
26	1	59039	LABEL WARNING LIFT POINT ROUND 1.5"
27	1	65023 65024	TOPSLIDE INCH PM4200 KM4000 TOPSLIDE METRIC PM4200 KM4000
28	1	79385	LABEL WARNING - LIFT SUB ASSY ONLY GRAPHIC 2 X 3
29	1	79575	LABEL WARNING - CUTTING OF FINGERS OR HAND ROTATING BLADE GRAPHIC 1.95 TALL TRIANGLE YELLOW

ASSY RAM WELDON SHANK KM4000

34142 CAP MOTOR END ASSY W/ 2-POLE CONNECTOR 120V		
BALLOON	PART	DESCRIPTION
1	12574	CONDUIT NUT 1/2 NPT
2	31734	PLUG 1/2 DIA PLASTIC
3	31736	BOX CORD ENTRANCE REMOTE SPEED CONTROL
4	34255	CONNECTOR 2-POLE 13AMP MALE 1/2 NPT PANEL MT
NOT SHOWN	15022	CONNECTOR PLUG FEMALE SNAP BULLET 16-14 GA
NOT SHOWN	10313	CONNECTOR PLUG MALE SNAP BULLET 16-14 GA
NOT SHOWN	29435	TUBE SHRINK .375 DIA BLACK

35973 CAP MOTOR END ASSY W/ 3-POLE CONNECTOR 230V		
BALLOON	PART	DESCRIPTION
1	12574	CONDUIT NUT 1/2 NPT
2	31734	PLUG 1/2 DIA PLASTIC
3	31736	BOX CORD ENTRANCE REMOTE SPEED CONTROL
4	33929	CONNECTOR 3-POLE 10AMP MALE 1/2 NPT PANEL MT
NOT SHOWN	15022	CONNECTOR PLUG FEMALE SNAP BULLET 16-14 GA
NOT SHOWN	10313	CONNECTOR PLUG MALE SNAP BULLET 16-14 GA
NOT SHOWN	29435	TUBE SHRINK .375 DIA BLACK



MOTOR ENDCAP ASSEMBLY
34142 - 120 V
35973 - 230 V

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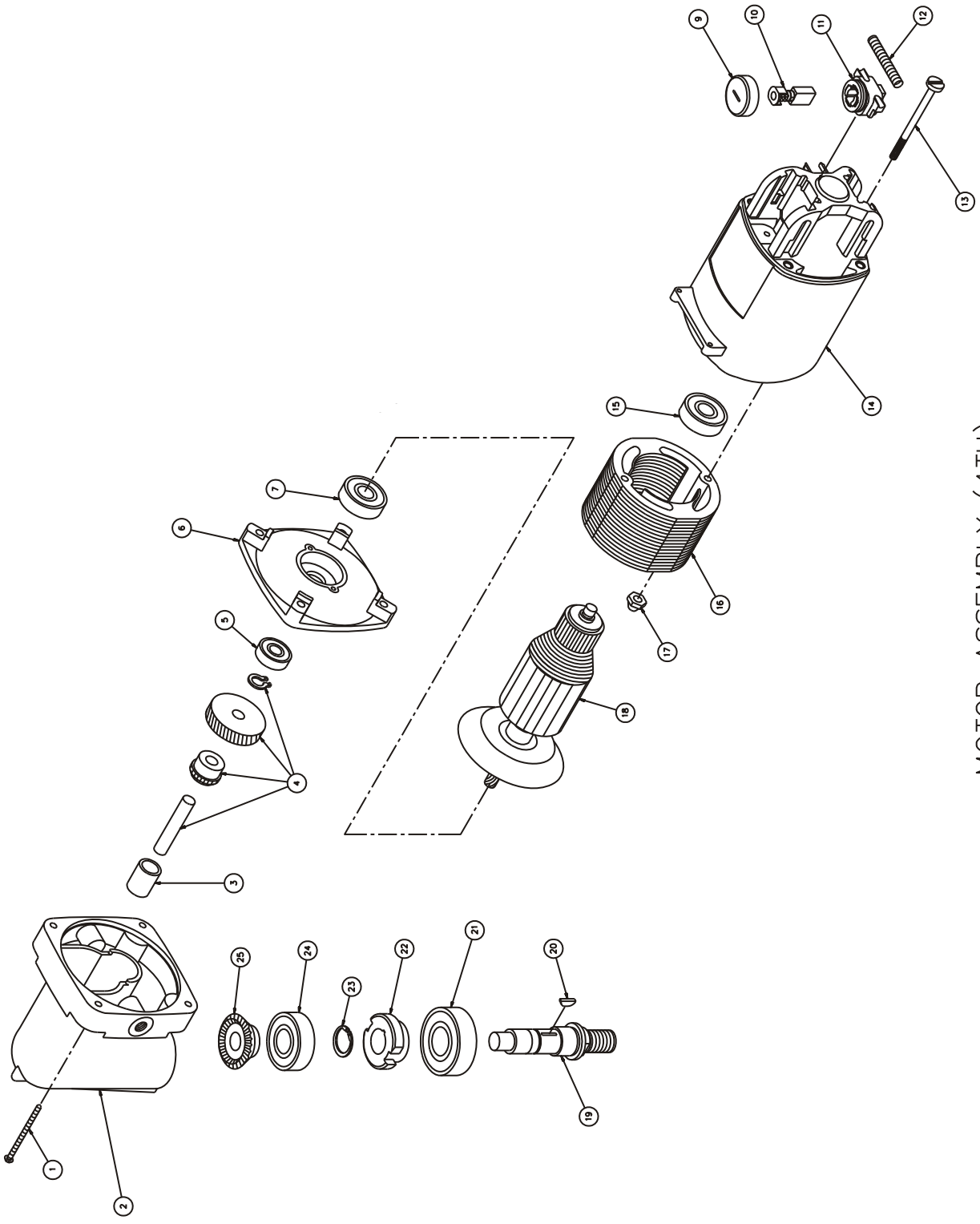
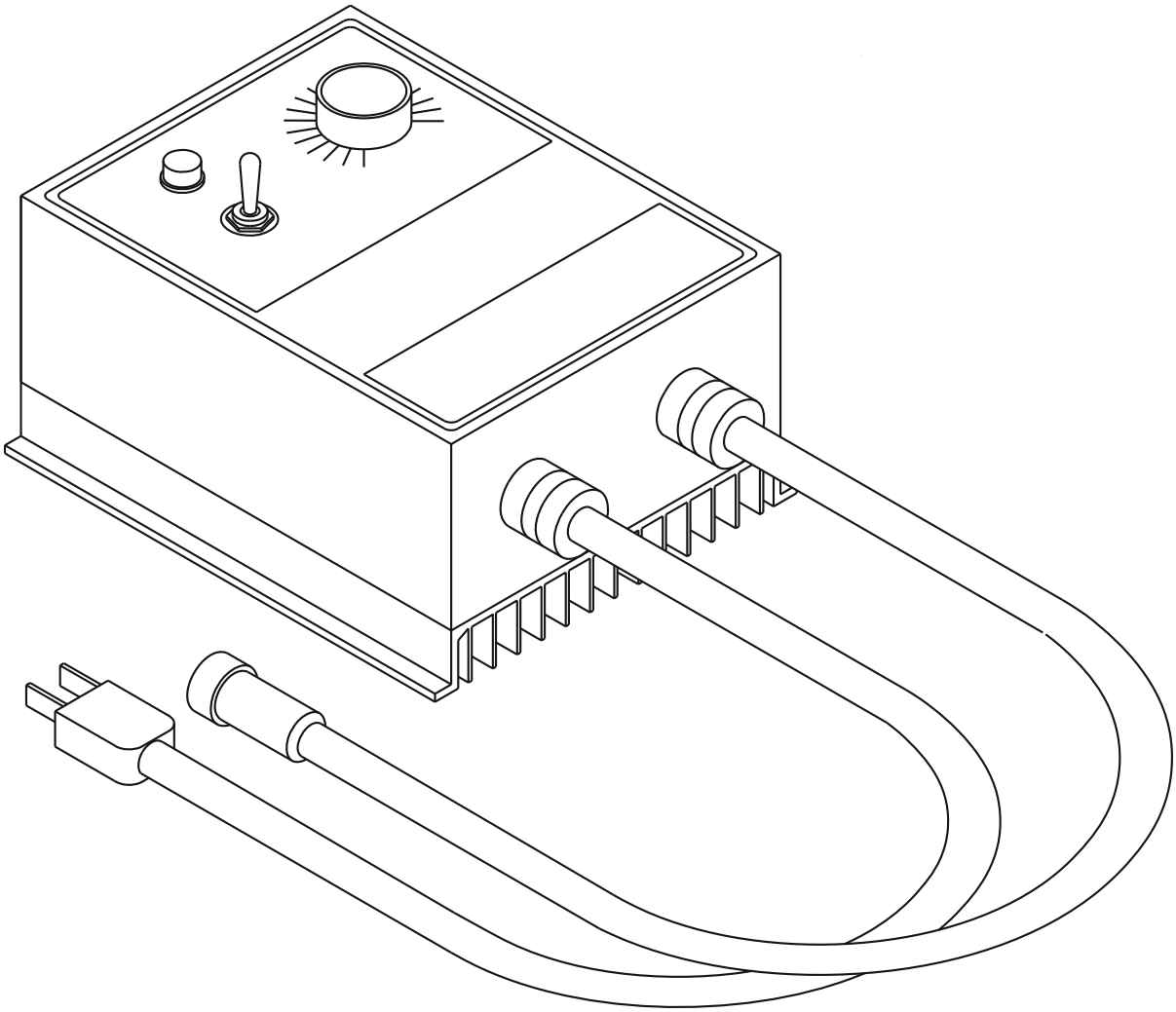
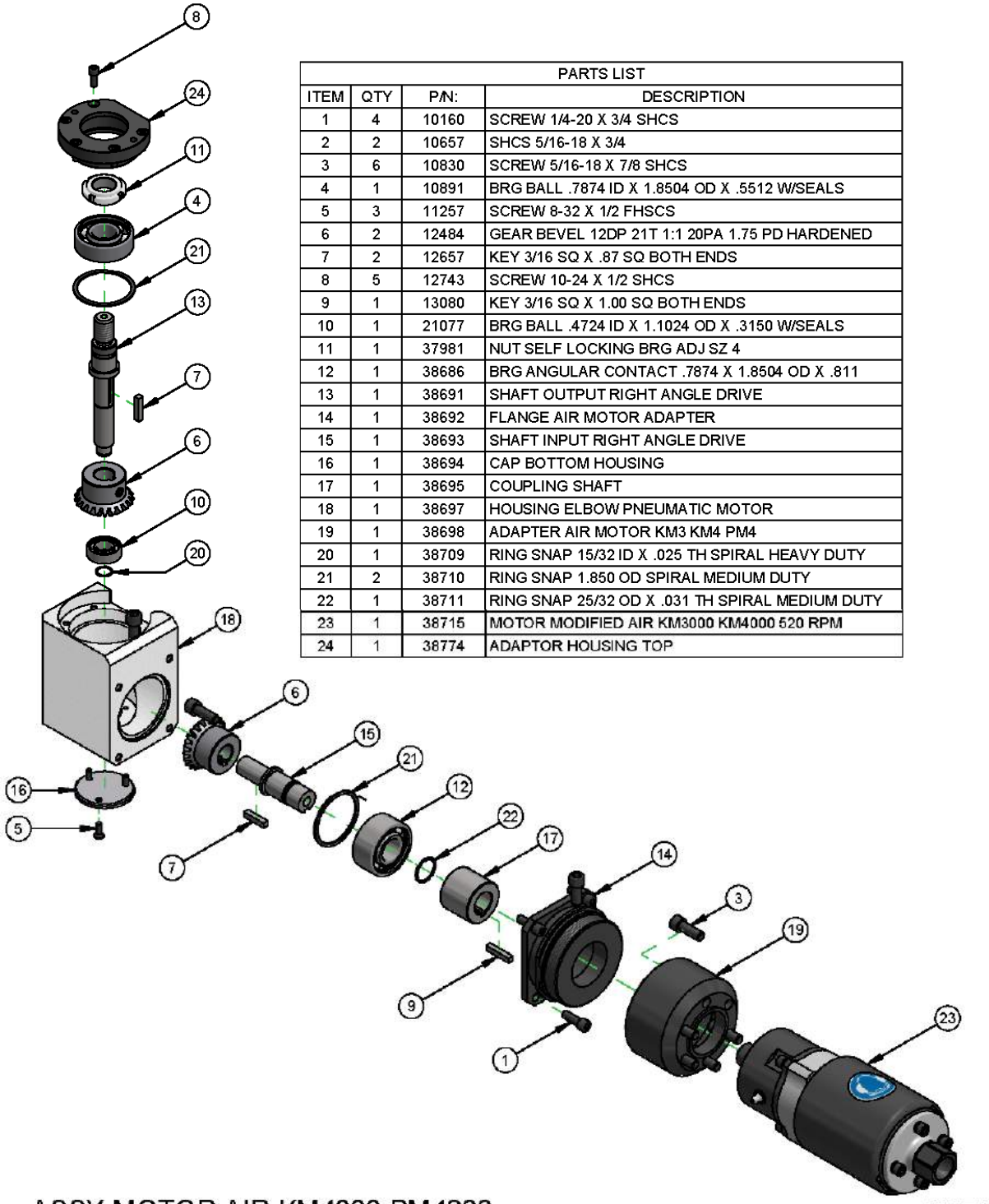

MOTOR ASSEMBLY (4TH)
(11895 – 120V)
(35783 – 230V)

11895 MOTOR ELECTRIC 120V MILWAUKEE 5455		
BALLOON	PART	DESCRIPTION
1	12543	SP SCREW 3rd
2	12544	SP BOX GEAR MODIFIED 3rd
3	12545	SP BRG NEEDLE 3rd
4	12546	SP GEAR INTERMEDIATE ASSY 3rd
5	10233	SP BRG BALL 1st 2nd & 3rd
6	12547	SP DIAPHRAGM 3rd
7	12548	SP BRG BALL MILWAUKEE 5455 ARMATURE UPPER
9	12553	SP SCREW BRUSH RETAINING 3rd
10	15482	SP BRUSH ASSY CARBON 3rd
11	12555	SP HOLDER BRUSH ASSY 3rd
12	12556	SP SPRING HOLDER BRUSH 3rd
13	10353	SP SCREW 2nd & 3rd
14	12552	SP HOUSING MOTOR 3rd
15	12551	SP BRG BALL MILWAUKEE 5455 ARMATURE LOWER
16	12550	SP FIELD 120 VOLT 3rd
17	10355	SP NUT HEX LOCKING 2nd & 3rd
18	12549	SP ARMATURE 3rd 120V
19	12539	SP SHAFT SPINDLE 3rd
20	12538	SP KEY WOODRUFF 3rd
21	10358	SP BRG BALL 2nd & 3rd
22	10367	SP COG LOCK 2nd & 3rd
23	12540	SP RING RETAINER 3rd
24	10365	BRG BALL .6693 ID X 1.5748 OD X .4724 2 SEALS
25	12542	SP GEAR BEVEL 3rd
NOT SHOWN	38200	SP 1-1/4 OZ TYPE G GREASE MILWAUKEE
NOT SHOWN	10368	SP KEY WOODRUFF 2nd & 3rd
NOT SHOWN	34791	SP PLATE BEARING RETAINING
NOT SHOWN	10357	SP SCREW BRUSH HOLDER 2nd & 3rd
NOT-SHOWN	16501	SP SPINDLE LOCK ASSY
NOT-SHOWN	16500	SP WASHER FLAT

35783 MOTOR ELECTRIC 230V MILWAUKEE 5455		
BALLOON	PART	DESCRIPTION
1	12543	SP SCREW 3rd
2	12544	SP BOX GEAR MODIFIED 3rd
3	12545	SP BRG NEEDLE 3rd
4	12546	SP GEAR INTERMEDIATE ASSY 3rd
5	10233	SP BRG BALL 1st 2nd & 3rd
6	12547	SP DIAPHRAGM 3rd
7	12548	SP BRG BALL MILWAUKEE 5455 ARMATURE UPPER
9	12553	SP SCREW BRUSH RETAINING 3rd
10	15482	SP BRUSH ASSY CARBON 3rd
11	12555	SP HOLDER BRUSH ASSY 3rd
12	12556	SP SPRING HOLDER BRUSH 3rd
13	10353	SP SCREW 2nd & 3rd
14	12552	SP HOUSING MOTOR 3rd
15	12551	SP BRG BALL MILWAUKEE 5455 ARMATURE LOWER
16	12550	SP FIELD 120 VOLT 3rd SP FIELD 120 VOLT 3rd
17	10355	SP NUT HEX LOCKING 2nd & 3rd
18	12549	SP ARMATURE 3rd 120V
19	12539	SP SHAFT SPINDLE 3rd
20	12538	SP KEY WOODRUFF 3rd
21	10358	SP BRG BALL 2nd & 3rd
22	10367	SP COG LOCK 2nd & 3rd
23	12540	SP RING RETAINER 3rd
24	10365	BRG BALL .6693 ID X 1.5748 OD X .4724 2 SEALS
25	12542	SP GEAR BEVEL 3rd
NOT SHOWN	38200	SP 1-1/4 OZ TYPE G GREASE MILWAUKEE
NOT SHOWN	10368	SP KEY WOODRUFF 2nd & 3rd
NOT SHOWN	34791	SP PLATE BEARING RETAINING
NOT SHOWN	10357	SP SCREW BRUSH HOLDER 2nd & 3rd
NOT-SHOWN	16501	SP SPINDLE LOCK ASSY
NOT-SHOWN	16500	SP WASHER FLAT

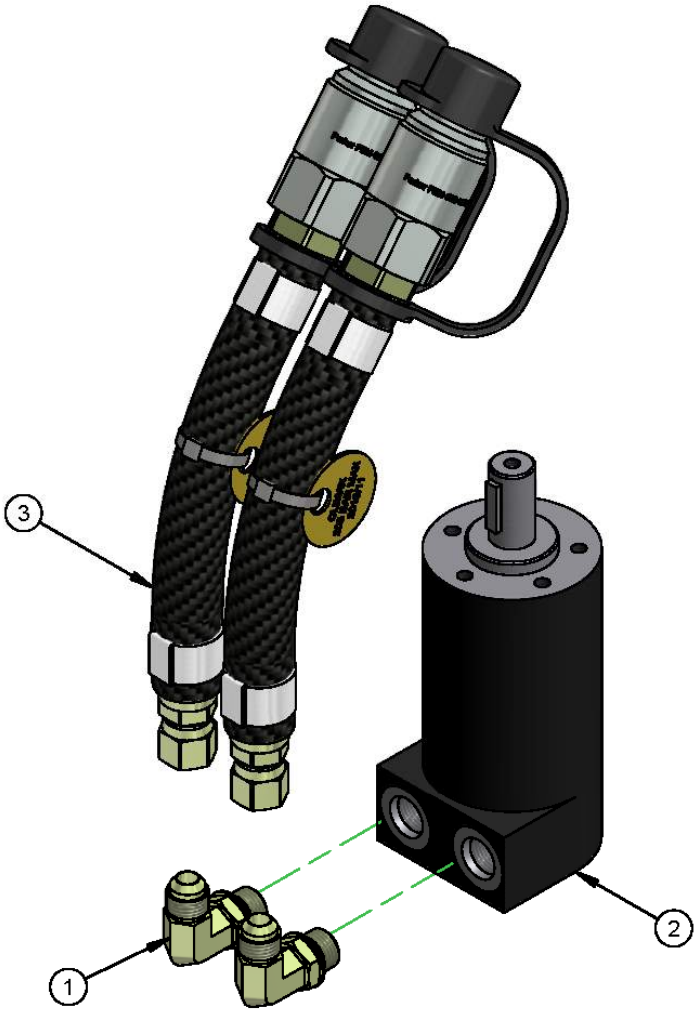


120V SPEED CONTROL
36549 120V
36781 120V CE
36685 230V CE



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	10160	SCREW 1/4-20 X 3/4 SHCS
2	2	10657	SHCS 5/16-18 X 3/4
3	6	10830	SCREW 5/16-18 X 7/8 SHCS
4	1	10891	BRG BALL .7874 ID X 1.8504 OD X .5512 W/SEALS
5	3	11257	SCREW 8-32 X 1/2 FHSCS
6	2	12484	GEAR BEVEL 12DP 21T 1:1 20PA 1.75 PD HARDENED
7	2	12657	KEY 3/16 SQ X .87 SQ BOTH ENDS
8	5	12743	SCREW 10-24 X 1/2 SHCS
9	1	13080	KEY 3/16 SQ X 1.00 SQ BOTH ENDS
10	1	21077	BRG BALL .4724 ID X 1.1024 OD X .3150 W/SEALS
11	1	37981	NUT SELF LOCKING BRG ADJ SZ 4
12	1	38686	BRG ANGULAR CONTACT .7874 X 1.8504 OD X .811
13	1	38691	SHAFT OUTPUT RIGHT ANGLE DRIVE
14	1	38692	FLANGE AIR MOTOR ADAPTER
15	1	38693	SHAFT INPUT RIGHT ANGLE DRIVE
16	1	38694	CAP BOTTOM HOUSING
17	1	38695	COUPLING SHAFT
18	1	38697	HOUSING ELBOW PNEUMATIC MOTOR
19	1	38698	ADAPTER AIR MOTOR KM3 KM4 PM4
20	1	38709	RING SNAP 15/32 ID X .025 TH SPIRAL HEAVY DUTY
21	2	38710	RING SNAP 1.850 OD SPIRAL MEDIUM DUTY
22	1	38711	RING SNAP 25/32 OD X .031 TH SPIRAL MEDIUM DUTY
23	1	38715	MOTOR MODIFIED AIR KM3000 KM4000 520 RPM
24	1	38774	ADAPTOR HOUSING TOP

ASSY MOTOR AIR KM4000 PM4200 38776



79699 ASSY MOTOR HYD 1.93 CU IN. J SERIES W/ 24" QD MALE CE
79701 ASSY MOTOR HYD 1.21 CU IN. J SERIES W/ 24" QD MALE CE
79702 ASSY MOTOR HYD .79 CU IN. J SERIES W/ 24" QD MALE CE

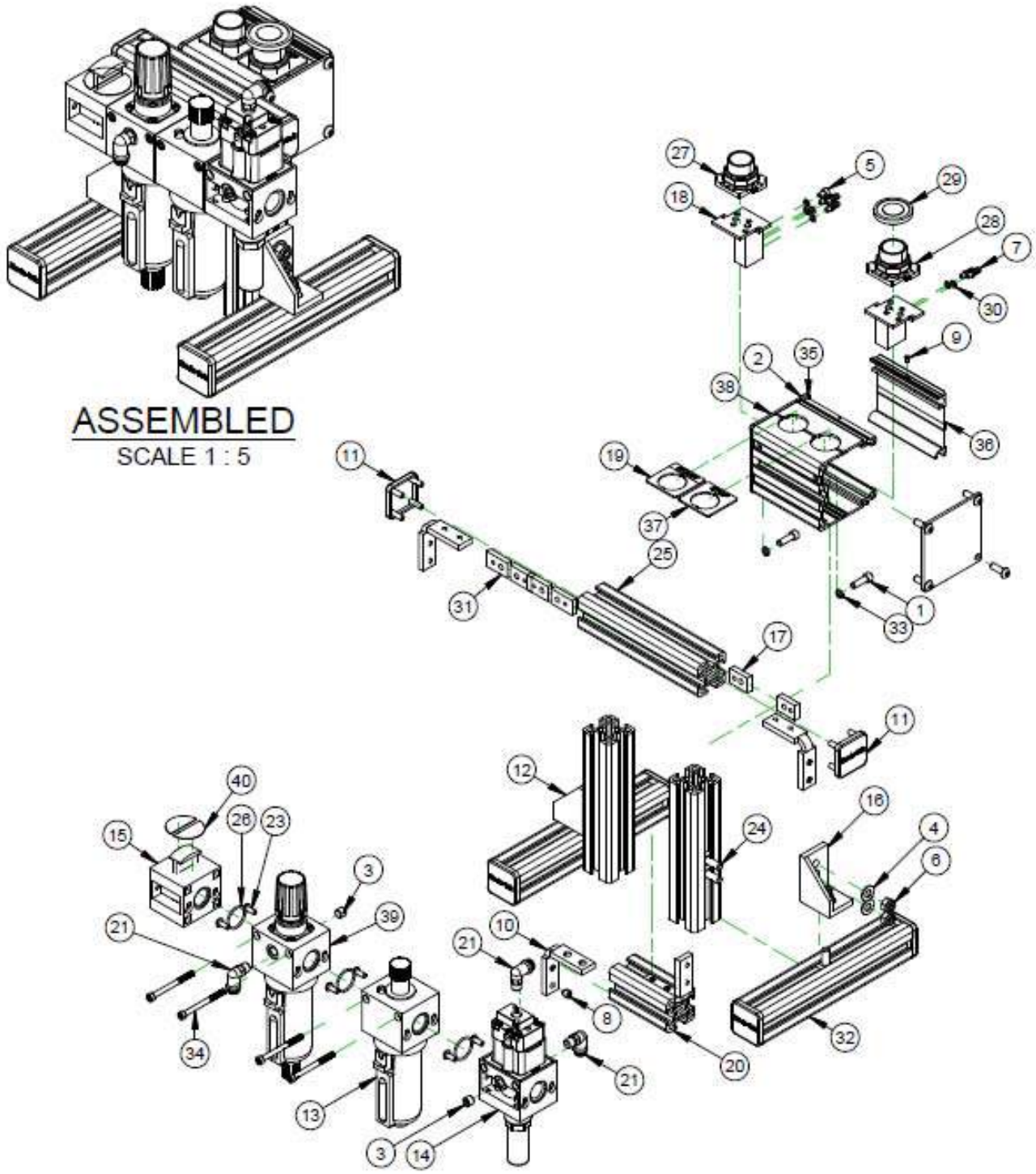
PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
3	2	75151	ASSY HOSE 3/8 X 1/2 FEM QD MALE X #6 JICF X 24 CE
2	1	21025	MOTOR HYD 1.21 CU IN 5/8 STRAIGHT SAE O-RING SIDE PORTS
2	1	20371	MOTOR HYD 1.93 CU IN 5/8 STRIAGHT SAE O-RING SIDE PORTS
2	1	14261	MOTOR HYD .79 CU IN 5/8 STRAIGHT SAE-6F SIDE PORTS
1	2	12849	HOSE ASSY 520N 3/8 X 3/8 NPTM X 9/16 JICF X24

CHART ASSEMBLY MOTOR HYDRAULIC KM4000 79800

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	10160	SCREW 1/4-20 X 3/4 SHCS
2	8	11365	SCREW 1/4-20 X 3/4 BHSCS
3	2	12616	FTG PLUG 1/8 NPTM SOCKET
4	6	13489	WASHER 5/16 FLTW SAE
5	1	14726	SCREW 10-32 X 1/4 SHCS
6	6	19729	NUT 5/16-18 NYLON INSERT LOCKNUT
7	5	22235	FTG BARB #10-32 X 1/8 HOSE
8	16	27895	SCREW 5/16-18 X 5/16 SSSFP
9	1	35857	SCREW 4-40 X 1/4 FHSCS
10	4	46761	BRACKET 90DEG JOINER MODU-TEK
11	6	46764	ENDCAP 1 X 1 FOR 1.63SQ MODU-TEK EXTRUSION
12	1	46765	BRACKET 1X2 SLOT HALF WEB LEFT MODU-TEK
13	1	46768	LUBRICATOR AIR 1/2 NPTF 3.8oz BOWL W/SIGHT
14	1	46769	VALVE EXHAUST QUICK PILOT 1/2NPTF MUFFLER
15	1	46777	VALVE SHUT OFF VS22 SERIES
16	1	46783	BRACKET 1X2 SLOT HALF WEB RIGHT MODU-TEK
17	2	46784	NUT SQUARE 5/16-18 AND 1/4-20
18	2	46785	VALVE PUSHBUTTON 5 PORT PNEUMATIC
19	1	46797	LEGEND PLATE START 10250 SERIES
20	1	46802	1.63 X 1.63 X 3.375L MODU-TEK EXTRUSION
21	3	48648	FTG ELBOW 1/8 NPTM X 1/4 TUBE PRESTOLOK
22	60	48650	TUBING 1/4 OD POLYURETHANE (INCH) (NOT SHOWN)
23	6	53617	SCREW M5 X 0.8 X 12MM BHCS BLACK FINISH
24	6	59436	SCREW 5/16-18 X 3/4 T-BOLT
25	3	59437	1.63 X 1.63 X 7.00L MODU-TEK EXTRUSION
26	3	59442	O-RING 2mm X 23mm ID X 25mm OD
27	1	59458	PUSHBUTTON GREEN FLUSH
28	1	59459	PUSH BUTTON PUSH PULL MAINTAINED (M-M)
29	1	59462	PUSH BUTTON OPERATOR RED 1-5/8
30	6	59480	WASHER #10 FLTW PLASTIC .32 OD .025 THICK
31	4	59705	NUT PLATE M5 X .08 AND 5/16-32 .75 X 1.25 X .25
32	2	59739	EXTRUSION 1.63 X 1.63 X 8.75 MODU-TEK
33	2	59745	WASHER 1/4 LOCW .37 OD .07 THICK
34	4	59754	SCREW M5 X 0.8 X 40MM SHCS
35	1	59820	ENCLOSURE PNEUMATIC CONTROL VALVE 3.38 X 3.435 X 3.9
36	1	59821	COVER PNEUMATIC CONTROL VALVE ENCLOSURE 3.38 X 3.435 X 3.9
37	1	59825	LEGEND PLATE STOP 10250SERIES YELLOW BACKGROUND
38	2	68644	PLATE COVER EXTRUDED WIREWAY
39	1	78054	FILTER/REGULATOR PARTICULATE 1/2NPTF METAL BOWL GLASS
40	1	78067	LABEL WARNING - INSERT SAFETY LOCK

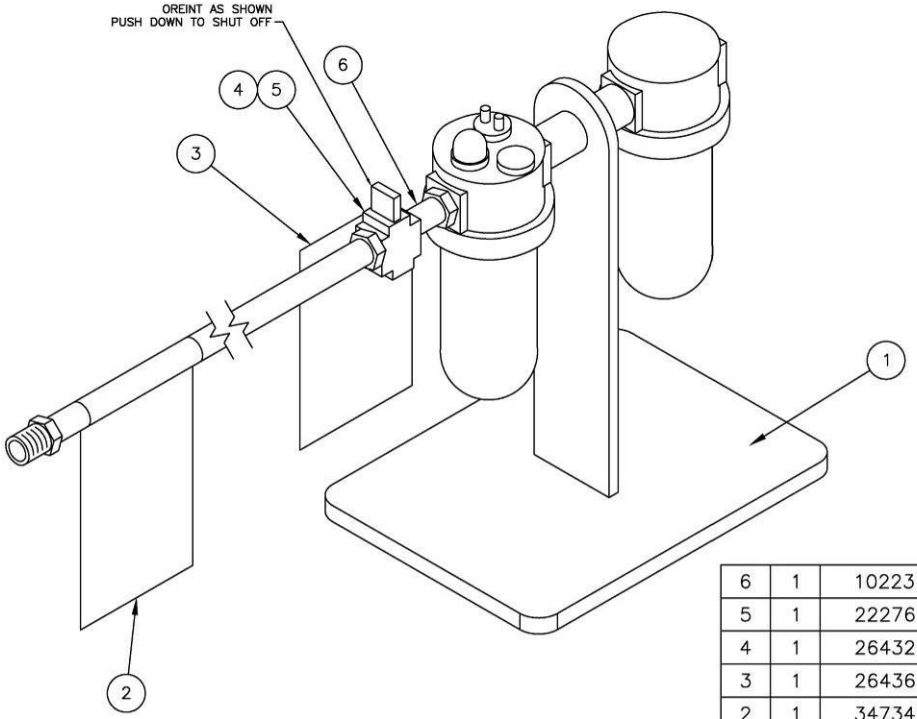
PNEUMATIC CONDITIONING UNIT 1/2 IN LOW PRES. DROPOUT

78264



PNEUMATIC CONDITIONING UNIT 1/2 IN LOW PRES. DROPOUT

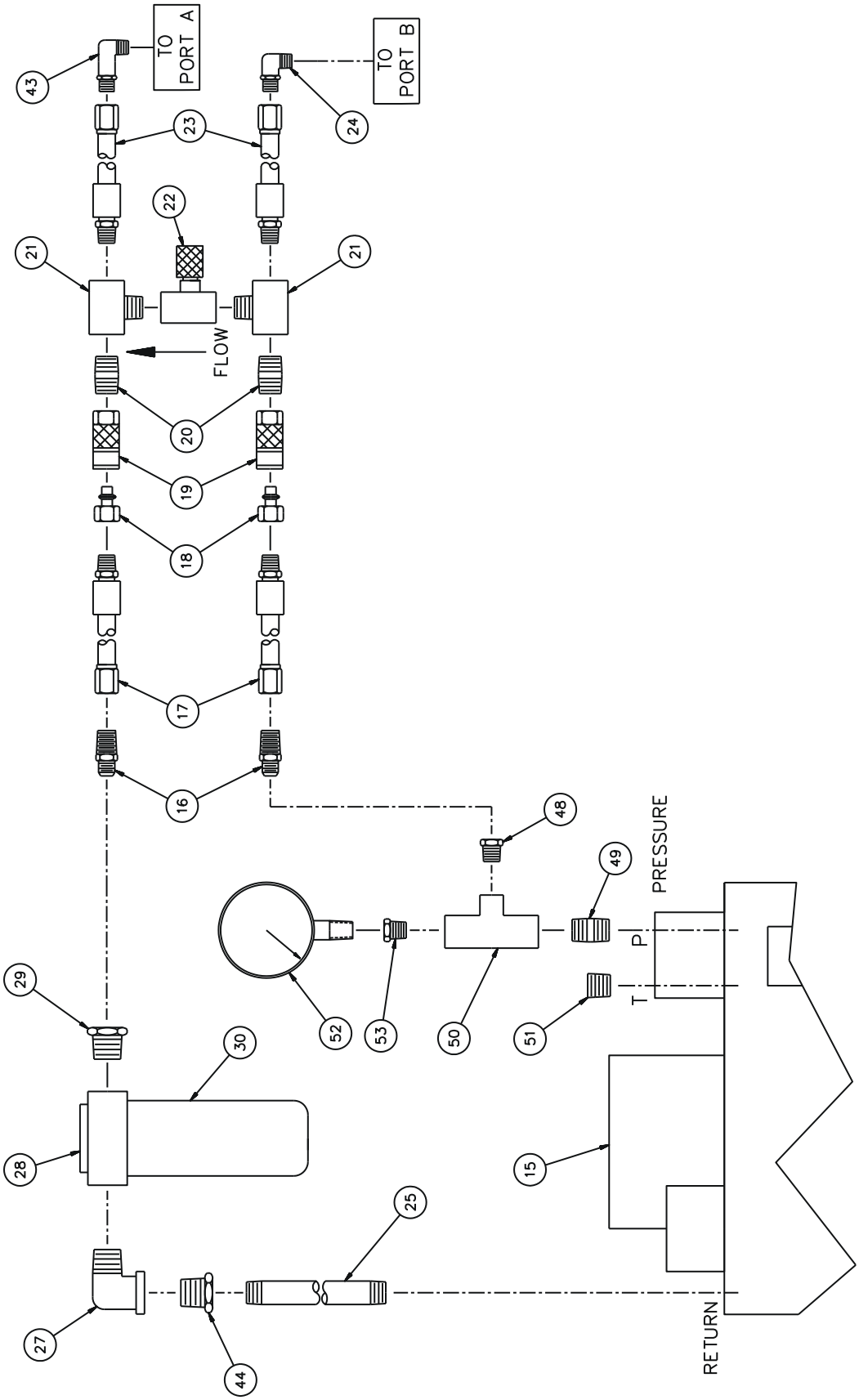
78264



FIND NO.	QTY	PART NO.	DESCRIPTION	MANUFACTURER PART NO.
6	1	10223	FITTING NIPPLE 1/2 NPTM CLOSE BLACK	
5	1	22276	VALVE SHUTOUT WITH LOCKOUT	
4	1	26432	PADLOCK 9/32 SHACKLE X 3/4 (NOT SHOWN)	
3	1	26436	LABEL LOCKOUT TAG	
2	1	34734	LABEL WARNING 3-1/2 X 11	
1	1	10416	STAND PNEUMATIC CONDITIONING UNIT	

PNEUMATIC CONDITIONING UNIT

CLIMAX


HYDRAULIC POWER UNIT
12843
TO PORT A
TO PORT B
FLOW
PRESSURE
RETURN
P
T
43
24
23
22
21
21
20
19
18
17
16
48
49
52
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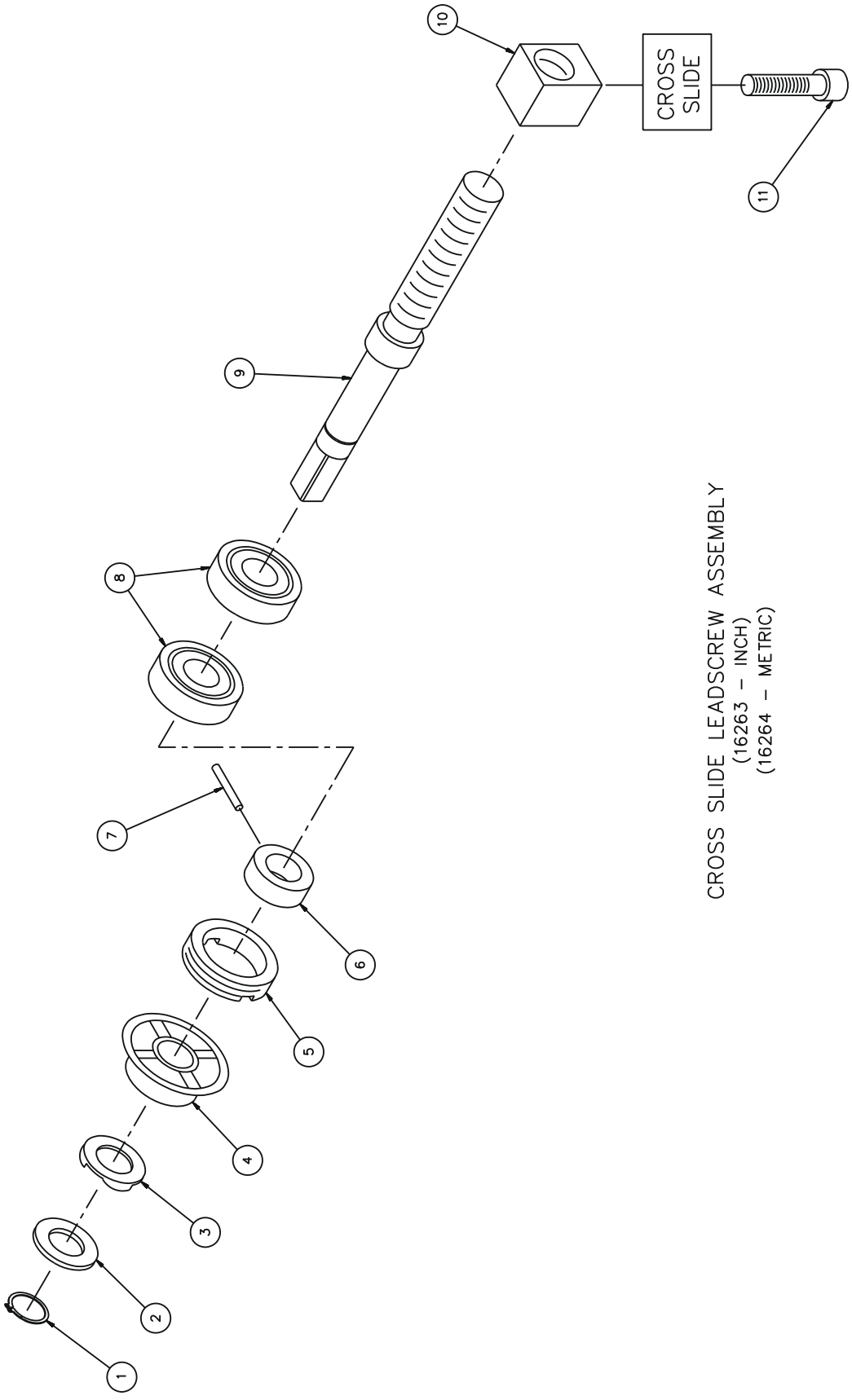
27
44
15

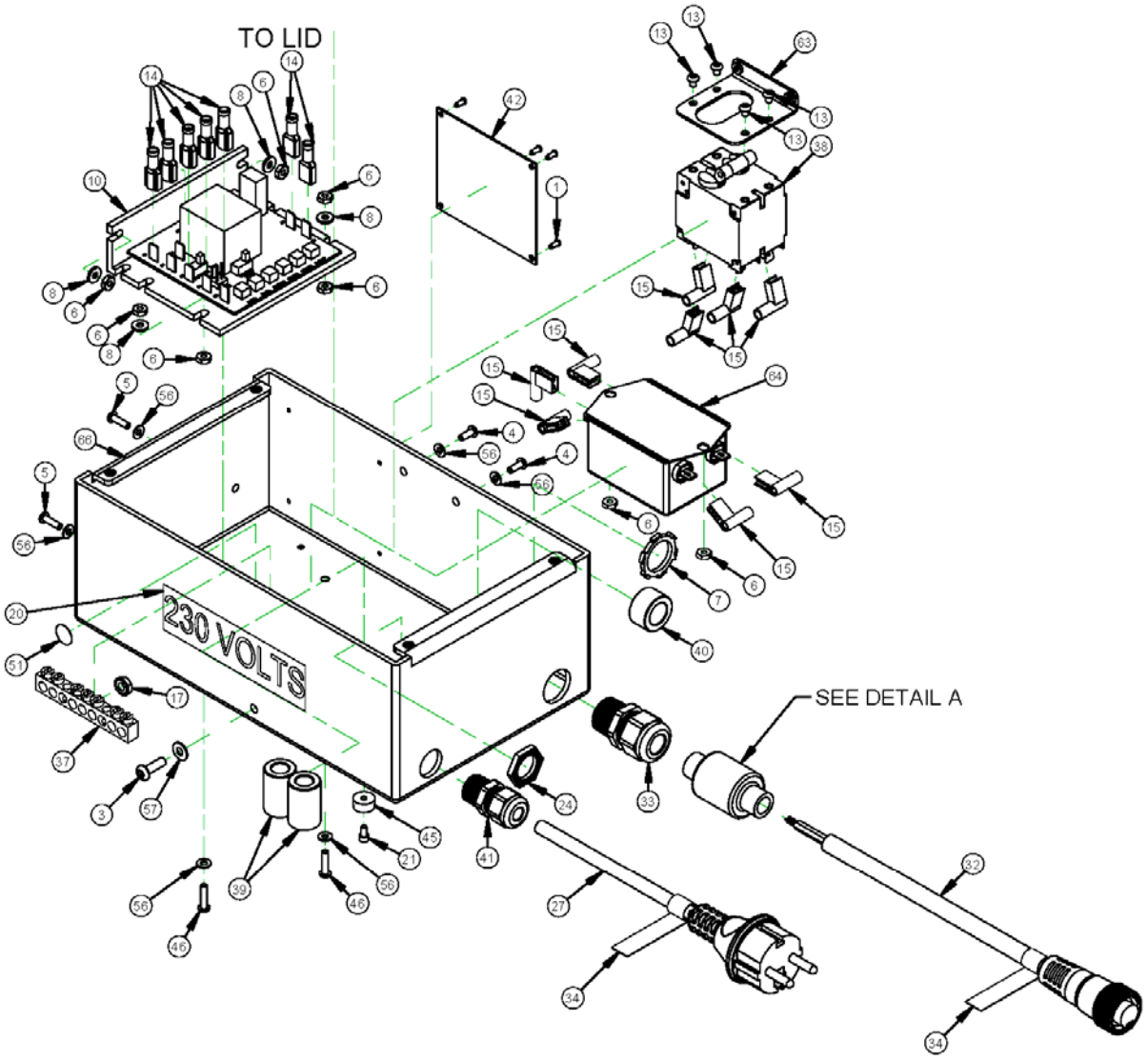
12843 POWER UNIT HYD & 20 FT HOSES		
BALLOON	PART	DESCRIPTION
15	12848	POWER UNIT HYDRAULIC 5 GPM
16	12833	FTG ADAPTER 3/8 NPTM X 9/16 JICM
17	12844	HOSE ASSY 560H 3/8 X 3/8 NPTM X 9/16 JICFX240
18	12845	FTG QUICK COUPLER 3/8B 3/8 NPTF MALE
19	12846	FTG QUICK COUPLER 3/8B 3/8 NPTF FEMALE
20	10593	FTG NIPPLE 3/8 NPTM X 3/8 NPTM
21	12854	FTG TEE 3/8 NPTM X 3/8 NPTF (2) BRANCH
22	12847	CONTROL SPEED HYD MOTOR
23	12850	HOSE ASSY 560 3/8 X 9/16 JICM X 3/8 NPTM X 24
24	12849	FTG ELBOW 9/16 SAEM ORING X 9/16 JICM 90 DEG
25	12873	FTG NIPPLE 1/2 NPTM X 8
27	12872	FTG ELBOW 3/4 NPTM X 3/4 NPTF STREET 90 DEG
28	12874	FILTER HYD W/ CANISTER 6 GPM
29	12877	FTG REDUCER BUSHING 3/4 NPTM X 3/8 NPTF
43	12891	FTG ELBOW 9/16 SAEM ORING X 9/16 JICM 90 LONG
44	12876	FTG REDUCER BUSHING 3/4 NPTM X 1/2 NPTF
48	12918	FTG NIPPLE 3/8 NPTM X 1/2 NPTM
49	10223	FTG NIPPLE 1/2 NPTM BLACK PIPE
50	12917	FTG TEE 1/2 NPTF (3)
51	12579	FTG PLUG 1/2 NPTM SOCKET
52	12919	GAGE HYD PRESSURE
53	12920	FTG REDUCER BUSHING 1/2 NPTM X 1/4 NPTF



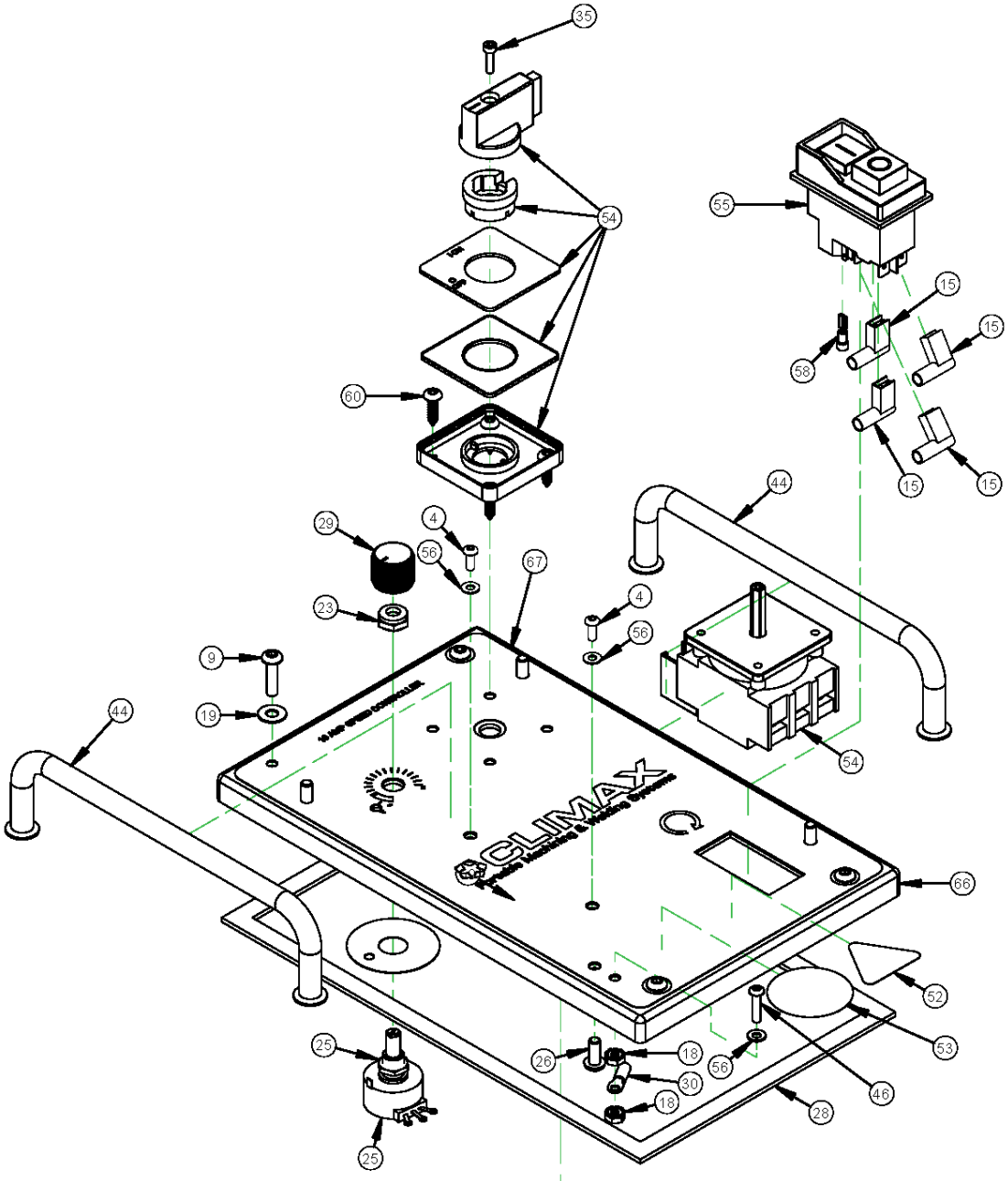
CROSS SLIDE LEADSCREW ASSEMBLY
(16263 – INCH)
(16264 – METRIC)

16263 LEADSCREW ASSY CROSS SLIDE INCH KM4000		
BALLOON	PART	DESCRIPTION
1	15668	RING SNAP 43/64 OD INVERTED
2	15666	WASHER THRUST .669 ID X 1.181 OD X .030
3	15667	WASHER SPRING FINGER .688 ID X 1.164 OD
4	10169	DIAL INCH
5	10451	NUT
6	10165	COLLAR
7	10166	PIN ROLL 1/8 DIA X 1
9	16253	LEADSCREW CROSS SLIDE INCH 2nd KM4000
10	10449	NUT BRASS INCH
11	10453	SCREW 3/8-16 X 1-1/4 SHCS

16264 LEADSCREW ASSY CROSS SLIDE METRIC KM4000		
BALLOON	PART	DESCRIPTION
1	15668	RING SNAP 43/64 OD INVERTED
2	15666	WASHER THRUST .669 ID X 1.181 OD X .030
3	15667	WASHER SPRING FINGER .688 ID X 1.164 OD
4	10170	DIAL METRIC
5	10451	NUT
6	10165	COLLAR
7	10166	PIN ROLL 1/8 DIA X 1
9	16254	LEADSCREW CROSS SLIDE METRIC 2nd KM4000
10	10450	NUT BRASS METRIC
11	10453	SCREW 3/8-16 X 1-1/4 SHCS



79218 - CONTROLLER BB3000 230V 50/60 HZ CE - REV C



79218 - CONTROLLER BB3000 230V 50/60 HZ CE - REV C

FOR REFERENCE ONLY

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
2	10	10673	(NOT SHOWN) WIRE TIE SMALL .09 X 3 5
3	1	11674	SCREW #10-32 x 5/8 BHSCS
4	4	11677	SCREW 6-32 X 3/8 BHSCS
5	2	11686	SCREW 6-32 X 1/2 BHSCS
6	8	11687	NUT 6-32 STDN ZINC PLATED
7	1	12574	CONDUIT NUT 1/2 NPT
8	4	12621	WASHER #6 FLTW SAE BLACK OXIDE
9	4	18902	SCREW 10-32 X 3/4 BHSCS
10	1	20557	CONTROL SPEED SCR MM23001C
11	2	22351	(NOT SHOWN) WIRE 18 AWG 600V RED TYPE MTW
12	9	22800	(NOT SHOWN) TUBE SHRINK .125 DIA BLACK
13	4	26468	SCREW 6-32 X 3/16 BHSCS
14	7	26629	TERMINAL SPADE 16-14 AWG .250 X .032 FEMALE INSULATED
15	13	27377	TERMINAL SPADE 90DEG 16-14 AWG .250 FM INSUL
16	29	27571	(NOT SHOWN) WIRE 16 AWG GRN/YEL TYPE MTW
17	1	28060	NUT, 10-32 UNF KEPS
18	2	29450	NUT 6-32 LOCKING STAR WASHER
19	4	29458	WASHER #10 FLTW NYLON .031 THICK
20	1	30081	LABEL VOLTAGE 230V (KB)
21	4	30828	SCREW 5-40 X 1/4 SHCS
22	4	32304	(NOT SHOWN) TERMINAL PIN 14-16 AWG
23	1	32926	SEAL POTENTIOMETER HEXNUT .25 SHAFT 3/8-32 TH
24	1	33099	NUT CONDUIT 3/8 STEEL
25	1	33182	POTENTIOMETER 10K LIN 1/4 SHAFT 3/8 BUSHING
26	4	34481	SCREW M5 X 0.8 X 12 mm BHSCS
27	1	34829	CORDSET CEE 7/7 STRAIGHT MOLDED PLUG 250V 16AMP 2 5M
28	34	35655	SEAL NEOPRENE SPONGE 3/8 X 5/32 ADHESIVE BACK
29	1	35766	KNOB POTENTIOMETER AL .75 DIA .25 SHAFT
30	1	35799	TERMINAL RING 22-16 #6/M3.5 STUD
31	11	36428	(NOT SHOWN) WIRE 16 AWG GRY TYPE MTW
32	1	36718	CORDSET 3-POLE 13A FEMALE CONNECTOR 144 IN
33	1	37739	CORD GRIP NONMETALLIC .17-.47 DIA X 1/2 NPT
34	2	37749	WIRE TIE VELCRO 11 LONG
35	1	37817	SCREW M3 X 0.5 X 12mm SHCS
37	1	38444	GROUND BUSS 7 POLE COPPER CE CERTIFIED
36	2	38324	(NOT SHOWN) TERMINAL SPADE FEMALE 90 DEG 12-10 AWG

PARTS LIST			
ITEM	QTY	P/N.	DESCRIPTION
38	1	42798	CIRCUIT BREAKER 20 AMP DOUBLE POLE
39	2	45158	FERRITE BEAD TUBULAR .398 ID X .735 OD X 1.125 LG
40	1	45159	FERRITE BEAD TUBULAR .545 ID X .88 OD X .50
41	1	46383	CORD GRIP .105-.312 DIA 3/8 NPT
42	1	47981	NAMEPLATE ELECTRICAL CONTROL PANELS CE
43	1	48778	CHOKE FERRITE 1 02 OD X 0 505 ID X 1 125 125 OHM @25MHZ
44	2	52160	HANDLE 180MM X 43MM U-SHAPED CHROME
45	4	55771	BUMPER 1/2 OD X 1/4 TALL X 1/8 CENTER HOLE
46	3	62944	SCREW 6-32 X 5/8 BHSCS
47	3	70657	TUBING HEAT SHRINK .75 ID 2 1 SHRINK RATIO CLEAR 50 FT SPOOL
48	2	70901	TUBING HEAT SHRINK .19 ID 2:1 SHRINK RATIO
49	20	71021	(NOT SHOWN) WIRE 18 AWG BLUE TYPE MTW MIN. 600V 0.1 OD
50	2	73782	(NOT SHOWN) VARISTOR 420VAC RMS 560VDC 4 5KA PEAK CURRENT 14MM DIA
51	1	77568	LABEL PROTECTIVE EARTH 1/2" DIA
52	1	78593	LABEL WARNING - ELECTRICAL SHOCK/ELECTROCUTION 1.13" TRIANGLE
53	1	78824	LABEL WARNING - DO NOT EXPOSE TO WATER
54	1	78953	DISCONNECT SWITCH DOOR MOUNT IP55 16 AMP RED/YELLOW HANDLE
55	1	79231	SWITCH 230V LOW-VOLTAGE DROPOUT
56	9	79316	WASHER #6 NYLON .15 ID X .32 OD X .03 BLACK
57	1	79348	WASHER #10 NYLON .19 ID X .44 OD X .03 BLACK
58	1	79574	TERMINAL SPADE 22-18 AWG .110 X .032 FEMALE INSULATED RED
59	11	79605	(NOT SHOWN) HOLDER CABLE TIE 3/4 X 3/4 3/16 CABLE TIE
60	4	79643	SCREW #8 X 5/8 SHEET METAL #2 SQUARE DRIVE
61	80	79864	(NOT SHOWN) WIRE 14 AWG BRN TYPE MTW
62	80	79867	(NOT SHOWN) WIRE 14 AWG LT BLU TYPE MTW
63	1	80091	BRACKET CIRCUIT BREAKER CE SPEED CONTROLLER
64	1	80337	FILTER RFI/EMI 16AMP 120/250VAC 50/60HZ
65	2 5	81002	TUBING HEAT SHRINK 3 1 ADHESIVE 1.1 ID SHRINK TO 38 RED
66	1	82961	ENCLOSURE 230V BB3000 PL2000 CONTROLLER CE
67	1	82984	LEGEND PLATE BB3000 120/230V SPEED CONTROLLER

79218 - CONTROLLER BB3000 230V 50/60 HZ CE - REV C

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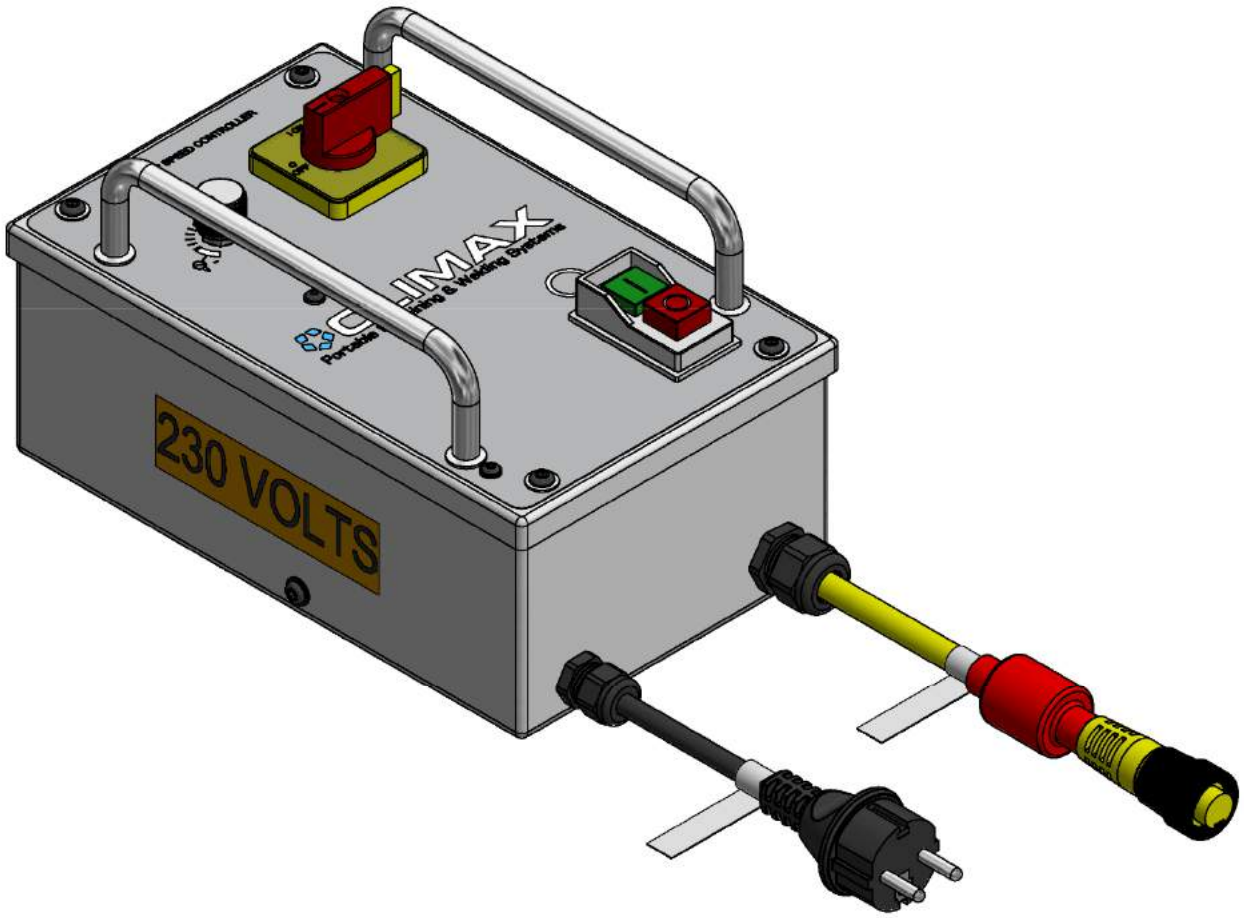
ZONE	REV	DESCRIPTION	DATE	ECN	REV'D.	APPR.
	A	REVISION CONTROL	12/18/14	–	KIM	DMB
	B	ASSEMBLY REDESIGNED WITH NEW ENCLOSURE AND LEGEND PLATE	08/21/15	15483	GEP	DMB
	C	REMOVED P/N 82035	3/29/18	17105	JJS	PDM



CLIMAX Portable Machining & Welding Systems

DESCRIPTION:
CONTROLLER 10 AMP 230V 50/60 HZ CE MULTIPLE MODEL

DWG NO.
79218

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SDS

Contact CLIMAX for the current Safety Data Sheets.


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BORTECH
CALDER
H&S TOOL