

PM4200

PORTABLE MILLING MACHINE OPERATING MANUAL



 **CLIMAX**
Portable Machining & Welding Systems

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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.

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About this manual

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1 INTRODUCTION

1.1 Limited warranty

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1.2 How to use this manual

Alerts

Pay careful attention to the alerts appearing in this manual. Alert types are defined in the following examples.

DANGER

concerns a condition, procedure, or practice that, if not avoided or strictly observed, **WILL** result in injury or loss of life.

WARNING

concerns a condition, procedure, or practice that, if not avoided or strictly observed, **COULD** result in injury or loss of life.

CAUTION

concerns a condition, procedure, or practice that, if not avoided or strictly observed, could result in minor or moderate injury.

NOTICE

concerns a condition, procedure, or practice worthy of special attention.

TIP:

A tip provides additional information that can aid in completion of a task.

1.3 Safety precautions

Climax Portable Machining and Welding Systems leads the way in promoting the safe use of portable machine tools. Safety is a joint effort. You, the machine operator, 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.

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 (PPE) – Always wear the appropriate personal protective gear when operating this or any other machine tool. Eye and ear protection are required when operating or working around the machine. Flame-resistant clothing with long sleeves and legs is recommended when operating the machine, as hot flying chips from the workpiece may burn or cut bare skin.

Work area – Keep the work area around the machine clear of clutter. Keep all cords and hoses away from the work area when operating the machine.

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

Obey warning labels – Obey all 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 manuals or safety decals.

Intended use – Use this machine according to the instructions in this operating manual. Do not use this machine for any purpose other than its intended use as described in this manual.

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.

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 and tidy – Keep all cords and hoses away from moving parts during operation. Do not clutter the area around the machine.

Hazardous environments – Do not use the machine in a hazardous environment, such as a potentially explosive atmosphere, toxic fumes, or a radiation hazard.

Flying chips – Flying metal chips can cut or burn. Do not remove chips until after the machine has been locked out, all power sources are off and the machine has stopped.

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. Do not operate machine outside of recommended temperature ranges for fluids. Temperature ranges of fluids are available on the MSDS sheets for each type.

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 must wear eye protection at all times when working with the machine. Only remove fragments with a brush after the machine has stopped completely. Do not reach into the machine during operation.

Radiation hazards – There are no systems or components on this machine that are capable of producing hazardous EMC, UV or other radiation hazards. The machine does not use lasers nor does it create hazardous materials such as gasses or dust.

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.

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

1.4 Machine-specific safety precautions

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 following sound levels¹:

- Declared Sound Power Level: LWA = 98.3 dBA
- Declared Operator Power Level: LpA = 93.6 dBA
- Declared Bystander Power Level: LpA = 95.2 dBA

1.5 Risk assessment and hazard mitigation

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

Stationery 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. Stationery Machine Tools achieve the rigidity needed to accomplish material-removal operations from the structure that is an integral part of the machine tool.

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 attached to it 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 Machine sound testing was conducted in accordance with European Harmonized Standards EN ISO 3744:2010 and EN 11201:2010

1.6 Risk assessment checklist

Use these checklists as part of your on-site risk assessment and include any additional considerations that may pertain to your specific application.

TABLE 1. RISK ASSESSMENT CHECKLIST BEFORE SET-UP

Before Set-up	
<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 and took inventory of all the items required but not supplied.
<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 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 2. RISK ASSESSMENT CHECKLIST AFTER SET-UP

After Set-up	
<input type="checkbox"/>	I checked that the machine is safely installed and the potential fall path is clear. If the machine is elevated, 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. I followed the Maintenance Intervals with the recommended lubricants.
<input type="checkbox"/>	I checked that all affected personnel have the recommended personal protective equipment, as well as any equipment required by the site or other regulations.
<input type="checkbox"/>	I checked that all affected personnel understand the danger zone and are clear of it.
<input type="checkbox"/>	I evaluated and mitigated any other potential risks specific to my work area.

1.7 Items required but not supplied







The following items are required for correct installation and operation of the machine, but are not supplied with the PM4200 kits:



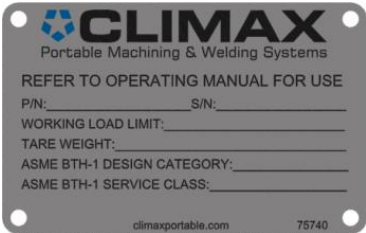






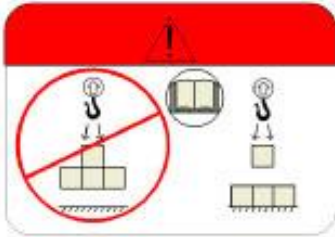


- Torque wrench
- Level
- Dial indicator
- PPE
- Hoisting equipment

1.8 Labels identification

Table 3 lists the warning labels should be on your machine. If any are defaced or missing, contact Climax immediately for replacements.

TABLE 3 WARNING LABELS

	<p>P/N 25979 Danger pinch point</p>		<p>P/N 27462 Warning sticker</p>
	<p>P/N 29152 Mass Plate</p>		<p>P/N 29154 Plate serial year model CE</p>
	<p>P/N 30081 Voltage 230V</p>		
	<p>P/N 32585 Voltage 120V</p>		

 <p>DANGER</p> <p>LIFT POINTS ON THIS PART FOR LIFTING THIS PART ONLY. DO NOT LIFT ENTIRE MACHINE FROM THESE POINTS OR SERIOUS INJURY OR DEATH COULD OCCUR</p> <p>REMOVE ALL LIFTING EYES BEFORE OPERATING MACHINE</p> <p>62888</p>	<p>P/N 62888</p> <p>Danger - part lift point only 2 x 3 do not lift machine remove lifting eye</p>		
 <p>CLIMAX Portable Machining & Welding Systems climaxportable.com</p>	<p>P/N 70226</p> <p>Climax logo</p>		
 <p>CLIMAX Portable Machining & Welding Systems</p> <p>REFER TO OPERATING MANUAL FOR USE</p> <p>P/N: _____ S/N: _____</p> <p>WORKING LOAD LIMIT: _____</p> <p>TARE WEIGHT: _____</p> <p>ASME BTH-1 DESIGN CATEGORY: _____</p> <p>ASME BTH-1 SERVICE CLASS: _____</p> <p>climaxportable.com 75740</p>	<p>P/N 75740</p> <p>Lifting info and serial number</p>	 <p>WARNING</p> <p>READ OPERATING MANUAL BEFORE LIFTING</p> <p>LIFT ENTIRE MACHINE USING THE LIFTING DEVICE PROVIDED, OTHERWISE DEATH, INJURY OR DAMAGE MAY OCCUR</p> <p>75766</p>	<p>P/N 75766</p> <p>warning use lifting device provided</p>
	<p>P/N 77568</p> <p>Label protective earth</p>		<p>P/N 78741</p> <p>Warning crush foot</p>
	<p>P/N 78748</p> <p>Warning - flying debris/loud noise</p>		<p>P/N 78593</p> <p>Warning - electrical shock/electrocution</p>
	<p>P/N 78824</p> <p>Warning - do not expose to water</p>		<p>P/N 79385</p> <p>Warning - lift sub assembly only</p>
	<p>P/N 79848</p> <p>Warning - cutting of fingers or hand rotating blade</p>		<p>P/N 81132</p> <p>Warning - insert safety lock</p>

1.9 Labels placement

The following figures display the location of the labels on the components of the PM4200. For further identification of location placement refer to the exploded views in Appendix B.



FIGURE 1 LABEL LOCATION ON WELDON HSK MOTOR

LABELS: P/N 59037, 59044, 78748, 78741, 78824



FIGURE 2 LABEL LOCATION ON WELDON SPINDLE

LABELS: P/N 79848

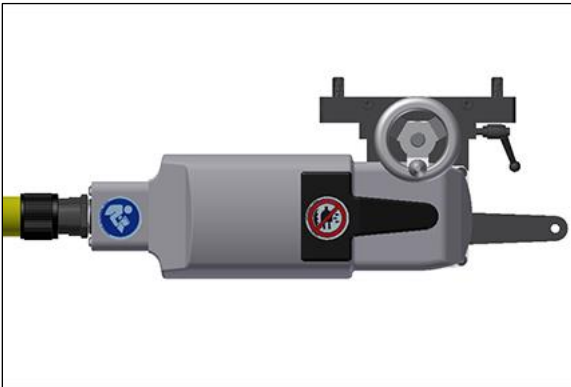


FIGURE 3 ELECTRIC HSK FEED LABEL LOCATIONS

LABELS: P/N 59044, 78824



FIGURE 4 HYDRAULIC MOTOR LABEL LOCATIONS

LABELS: P/N 59044, 78748, 78741

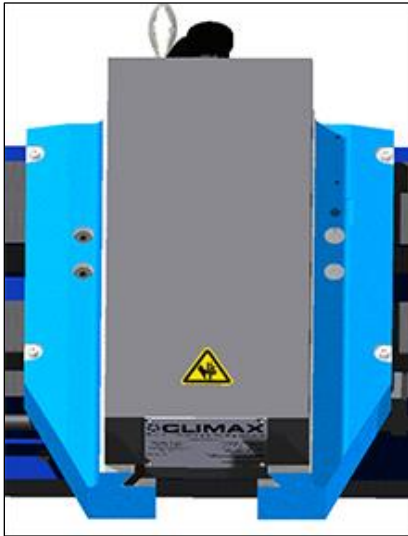


FIGURE 5 BLANK POST LABEL LOCATIONS

LABELS: P/N 29154, 75740

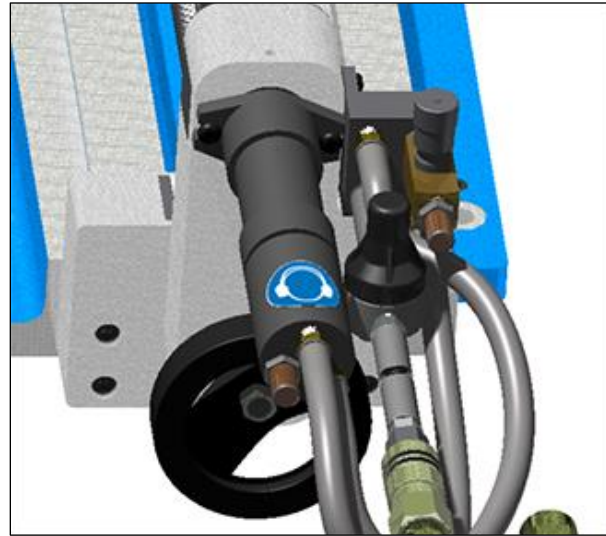


FIGURE 6 PNEUMATIC FEED DRIVE LABEL LOCATIONS

LABELS: P/N 59037

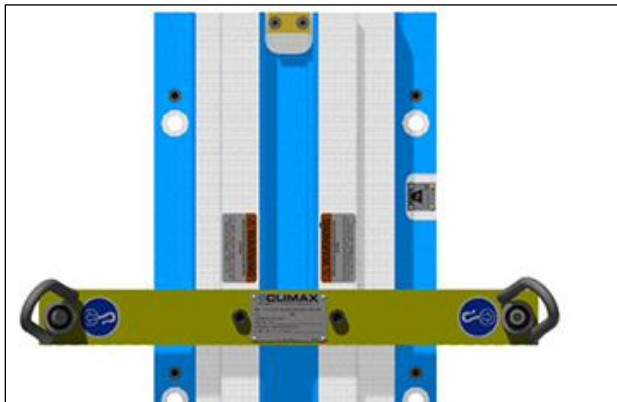


FIGURE 7 HOIST BAR AND BED LABEL LOCATIONS

LABELS: P/N 29152, 59039, 75740, 75766



FIGURE 8 FEED DRIVE LABEL LOCATION

LABELS: P/N 25979



FIGURE 9 RAM LABEL LOCATIONS

LABELS: P/N 27462, 29152, 29154, 59039, 70226, 79385



FIGURE 10 PNEUMATIC CONNECTION LABEL LOCATIONS

LABELS: P/N 34734, 59037



FIGURE 11 PNEUMATIC CONNECTION LABEL LOCATIONS (BACK SIDE)

LABELS: P/N 34734



FIGURE 12 WELDON MILL LABEL LOCATIONS

LABELS: P/N 29152, 59037, 59039, 79385, 79848

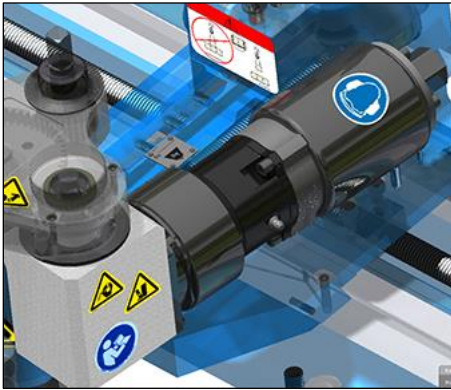


FIGURE 13 PNEUMATIC SPINDLE MOTOR LABEL LOCATIONS

LABELS: P/N 59037, 59044, 78741, 78741

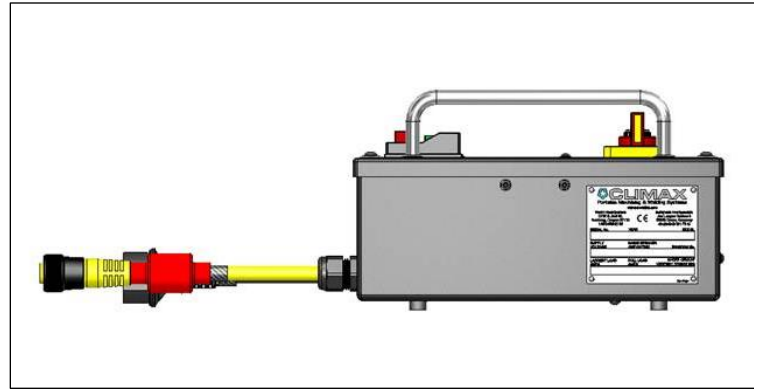


FIGURE 14 WELDON SPINDLE 230V CONTROLLER SIDE LABEL LOCATIONS

LABELS: P/N 41949



FIGURE 15 WELDON SPINDLE 230V CONTROLLER TOP LABEL LOCATIONS

LABELS: P/N 79385, 78824



FIGURE 16 HSK SPINDLE 120V/230V CONTROLLER RIGHT SIDE LABEL LOCATIONS

LABELS: P/N 37576



FIGURE 17 120V/230V CONTROLLER LEFT SIDE LABEL LOCATIONS

LABELS: P/N 30081 OR 32585



FIGURE 18 ELECTRICAL CORD LABEL LOCATIONS (FRONT)

LABELS: P/N 34734



FIGURE 19 ELECTRICAL CORD LABEL LOCATIONS (BACK)

LABELS: P/N 34734

2 OVERVIEW

2.1 General description

This manual contains the instructions for the setup, operation, and maintenance of the PM4200 portable milling machine.

This PM4200 3-axis mill provides precise and versatile on-site milling capabilities. It is designed to be attached either to the work piece or to a fabricated frame. The machine is available in two different spindle types depending on the application, a more flexible HSK 40A spindle for larger jobs, or the compact Weldon shank spindle for smaller jobs. The machine is especially useful for milling large cumbersome parts.

The PM4200 is a highly configurable machine with many options and accessories. The use and operation of all those options are covered in this manual. The machine configuration purchased by a customer may not contain all of the options and accessories detailed herein. If a specific machine application requires additional options or accessories please contact a Climax sales representative for assistance in obtaining the needed components.

2.2 Applications

Many customers use the PM4200 when welding up and re-machining worn parts on production machinery such as stamping presses. Long motor mount slots are easily machined, often without dismantling since the mill can be mounted right on the part. Aluminum smelter plants have used portable mills with fly cutters to quickly face off the pitted surface of beams used as bus bars.

2.3 PM4200 features and options

The PM4200 has been designed to handle the most demanding field machining conditions.

Rigid dovetail system – Precision machined dovetail ways and adjustable gibs provide smooth accurate travel.

Machine base – The base of the machine is a bed and saddle assembly. The flush-mount leadscrew bearings enable installation in areas as small as the length of the bed (with the feed removed). Various bed lengths are available.

Flexible design – The saddle may be removed and flipped to provide machining on either side of the bed without remounting. Additionally an extended ram may be used in conjunction with a larger HSK spindle for larger jobs.

Feed stops – Adjustable feed stops come standard with the machine.

Milling head options – Two different milling head options are available: the 3/4" Weldon shank spindle and the HSK system.

Pneumatic feed – The pneumatic option has a 0.31 hp (0.23 kW) air motor that requires 105 ft³/min (3m³/min) of air at 90 psi (621 kPa). Speed is set by opening or closing the needle valve.

Electric feed – Electric feed option is available in addition to the manual handwheel feed. This feed provides infinitely variable rates from 0 to 20 IPM with push-button rapid traverse. Forward, neutral and reverse modes are controlled by a shift lever. A hand wheel is provided for fine adjustment.

Drive system – Hydraulic, pneumatic, and electric motor options are available to provide the required power for the mill spindle. Systems are displayed in the exploded views section at the back of this manual.

If a specific machine application requires additional options or accessories please contact a Climax sales representative for assistance in obtaining the needed components. Contact Climax for more information on these functions and options.

2.4 Detailed descriptions

2.4.1 Main bed saddle

The saddle holds the ram, top slide, or blank tool slide assemblies, as shown in Figure 20.

The main bed can have one of three types of feed:

- Manual
- Electric
- Pneumatic

For more information on feeds, see Sections 2.4.4 and 2.4.5.

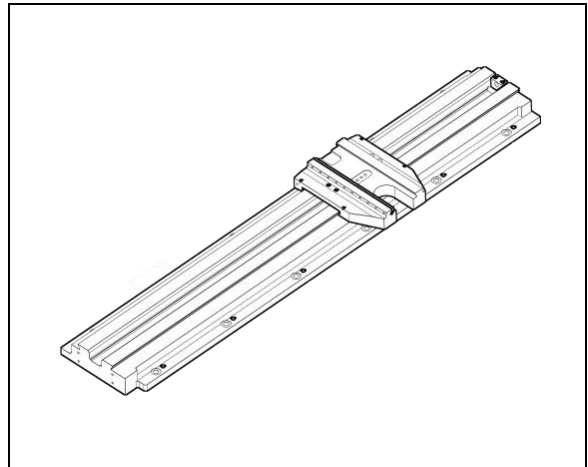


FIGURE 20 SADDLE ON BED ASSEMBLY

2.4.2 Tool attachment methods

There are three tool mount options:

1. An extended ram with mounts on either side for the HSK spindle. This attaches to the saddle in either orientation, see Figure 21.

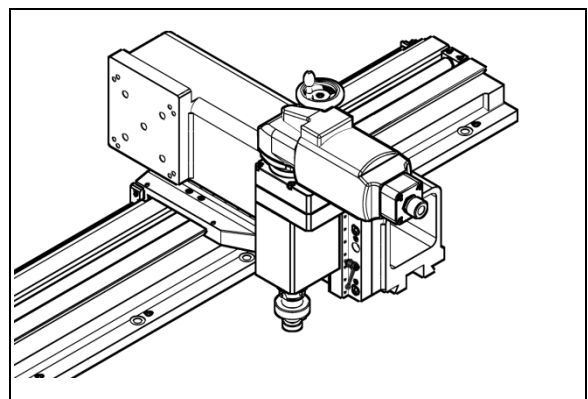


FIGURE 21 EXTENDED RAM

2. A top slide with an integral Weldon spindle (Figure 22).

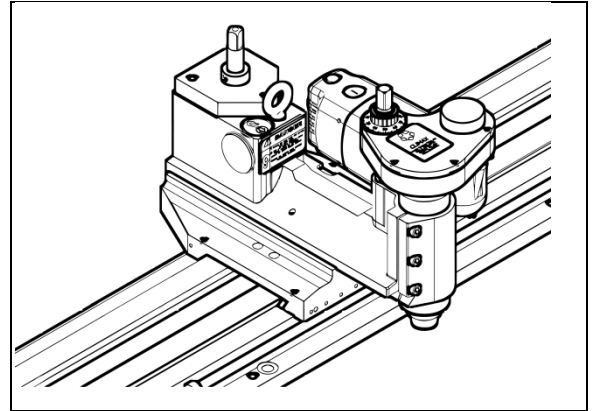


FIGURE 22 SLIDE WITH AN INTEGRAL WELDON SPINDLE

3. A blank tool post (Figure 23).

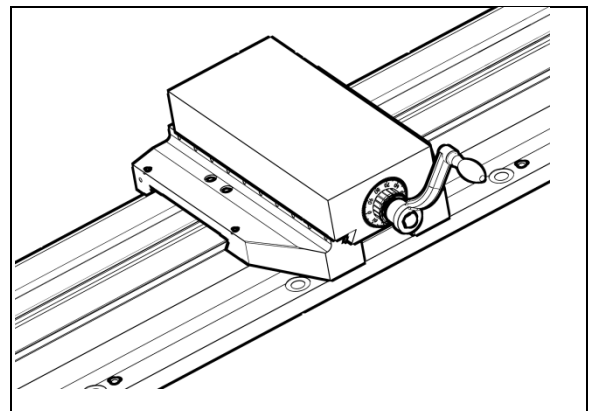


FIGURE 23 BLANK TOOL POST

2.4.3 HSK vertical slide assembly

The HSK vertical slide mounts to the extended ram (Figure 24). The vertical slide can be positioned in 90° increments around the extended ram mount, and on either side of the extended ram. This enables the portable mill to machine top, bottom, and sides of the work piece. The slide has a manual feed and has the option for pneumatic, electric, or hydraulic feed.

2.4.4 Manual feed assemblies

The manual hand wheel mounts to one end of the bed leadscrew.

2.4.5 Electric feed with local control

The 1/8 hp (.09 kW) standard electric feed assembly is available for the X-axis only (Figure 25). Each assembly includes a feed unit, mounting hardware, and limit switch assembly. The feed unit also has a hand wheel for manual feed. The assembly attaches directly to the end of the leadscrew.

The 115-volt single-phase electric feed assembly provides 2:1 reduction feed and operates on 50 or 60 cycles AC. The feed assembly has an ON/OFF switch, a feed direction lever, a feed rate dial, and a rapid-travel push button. Turn the electricity OFF when the feed is not being used.

The feed direction lever has three settings. The center setting is NEUTRAL. In NEUTRAL, you can feed the machine manually. The other two settings feed the mill in the direction the lever is set.

Feed rate is set using the feed rate dial. Because the feed rate is electronically regulated, the feed rate will remain constant regardless of the load.

The hand wheel located on the power feed unit can be used to manually feed the mill. Turn the wheel counterclockwise to feed the milling head toward the feed assembly. The feed assembly includes a limit switch assembly. See Section 4.2 for more information.

The electric feed includes the following features:

- ON/OFF switch
- Feed direction lever
- Feed rate dial
- Rapid travel button
- Handwheel

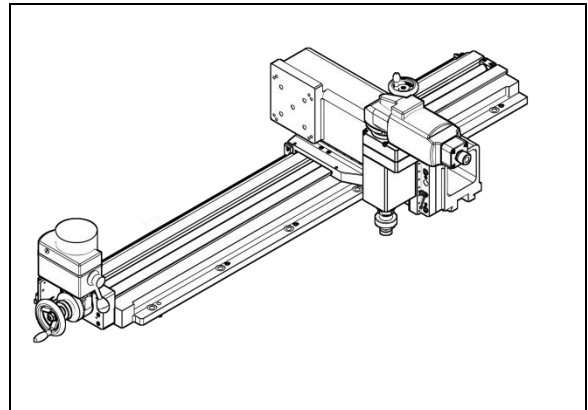


FIGURE 24 HSK VERTICAL SLIDE ASSEMBLY

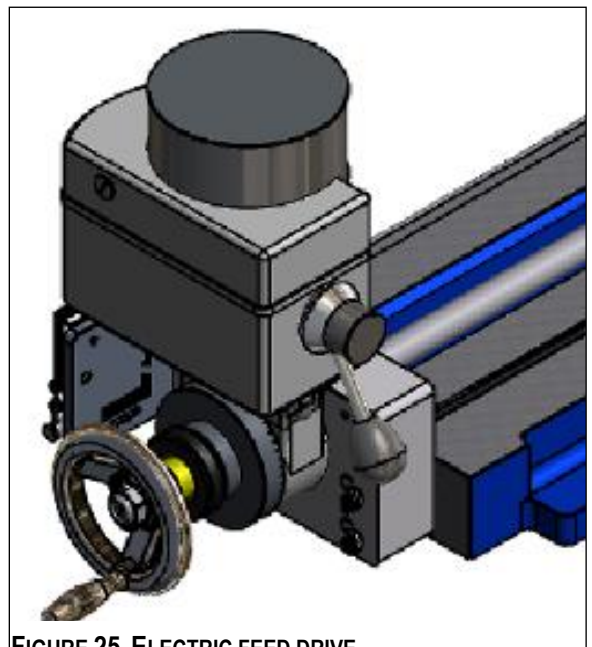


FIGURE 25 ELECTRIC FEED DRIVE

2.4.6 Hydraulic motor (optional equipment)

The high-torque low-speed hydraulic motor mounts directly to the milling head gearbox (Figure 26). Motor fittings are included with the hydraulic power unit. Motor fitting kits can also be purchased separately. Motors with various displacements are available, see Section 5.5.1 for further hydraulic motor specifications.

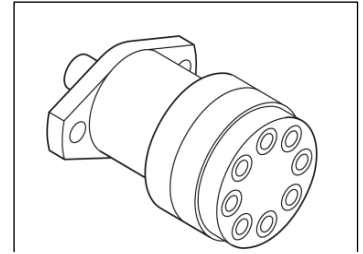


FIGURE 26 HYDRAULIC MOTOR

2.4.7 Hydraulic power unit (optional equipment)

The hydraulic power unit (HPU) is an electrically driven variable displacement piston pump type unit.

Features include:

- Relief valve for overpressure protection
- System pressure gage
- Combination fluid level and temperature gage
- Electric motor starter and motor overload heaters

The hydraulic power unit connects to the hydraulic drive motor with a pair of hoses and quick disconnects fittings. A START/STOP pendant switchbox controls the power unit. The hydraulic motor speed control knob is located on the power unit.

Optional hydraulic power units are available. For power unit information read the operating manual provided with the HPU.

2.5 Components

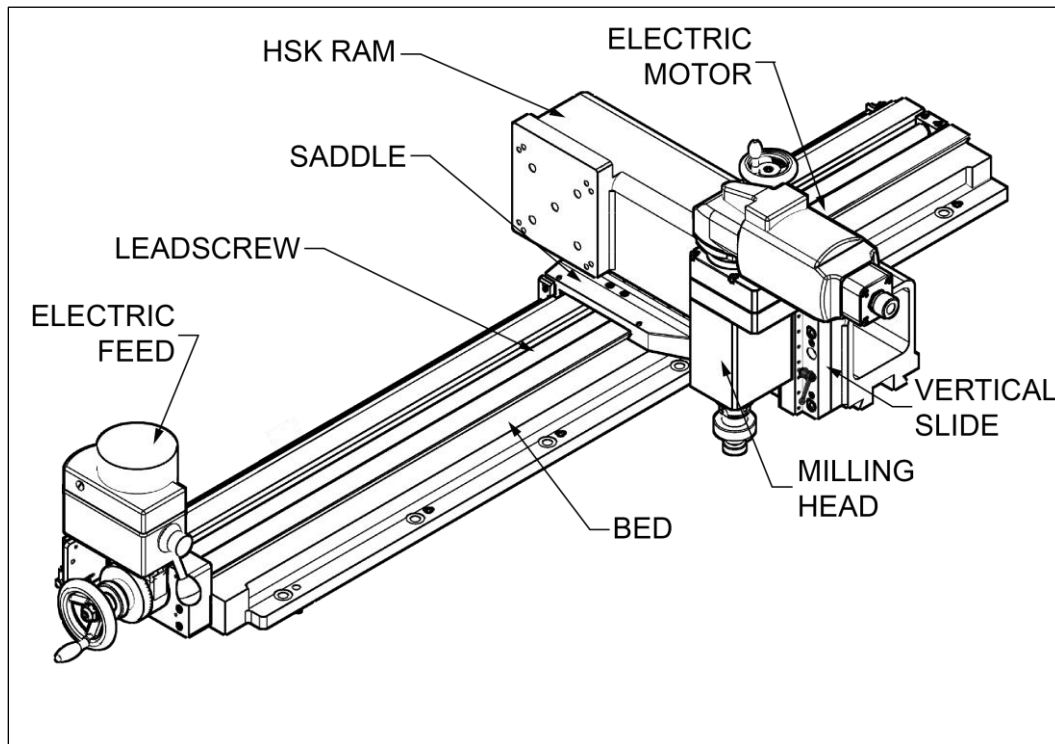


FIGURE 27 PM4200 WITH HSK RAM AND ELECTRIC FEED

Exploded views of the components of the PM4200 are included in Appendix B.

2.6 Specifications

2.6.1 Operating temperatures

The recommended machine operating temperature is -4 °F to 140 °F (-20 °C to 60 °C).

During normal use, the temperature of the machine housing normally increases to about 25 °F (14 °C) above the ambient temperature. It is good practice to make critical final machining cuts after the machine has been running continuously for at least 15 minutes.

⚠ CAUTION

Machining metal raises the temperature of machine components and can generate hot chips that burn. Use caution when changing inserts and handling or adjusting the cutting tool after use.

The advised temperatures for the recommended HPU oils are listed in Table 4. If using a different oil, consult the manufacturer's recommendations.

TABLE 4 HPU OIL TEMPERATURE RANGES

HPU Oil Type	Temperature Range
AW 32	27–155 °F (-3–68 °C)
AW 46	39–172 °F (4–78 °C)

2.6.2 Machine performance ranges

TABLE 5 MACHINE PERFORMANCE RANGES

Machine Performance Ranges	English	Metric
Bed Length	29, 58, and 87 inches	(736.6, 1473.2, and 2209.8 mm)
Bed Travel (X Travel)	20, 49, and 78 inches	(508.0, 1244.6, and 1981.2 mm)
Saddle Travel	8.0 inches (Weldon)	(203.2 mm)
	12 inches (HSK)	(304.8 mm)
Spindle Reach from edge of bed	8.85 inches (Weldon)	(224.8 mm)
	12 inches (HSK)	(304.8 mm)
Axial Tool Head Travel	4 inches (HSK Spindle)	(101.6 mm)
	3 inches (Weldon Spindle)	(76.2 mm)
Milling Head Gearbox Ratio	2.15:1 (Weldon Spindle)	
	6.25:1 (Electric HSK Spindle)	
	1:1 (Hydraulic HSK Spindle)	
	1:1 (Pneumatic HSK Spindle)	

2.6.3 Tooling recommendations

TABLE 6 TOOLING RECOMMENDATIONS FOR HSK 40A

PN	Description
64984	3" (76.2 mm) HSK 40A w/ Inserts
64985	Holder ER-32 Collet HSK 40A Taper (.08-.81) GL 90mm
64986	Collet ER-32 3/4"
47229	Carbide Inserts

2.6.4 Pneumatic pressure and flow

The PM4200 is designed to meet its performance specifications with the pneumatic motor supplied with sufficient air flow at 90 psi (621 kPa).

While the pneumatic motor can operate with an inlet air pressure in the range of 70 psi (483 kPa) to 120 psi (827 kPa), running the motor with an air pressure above or below 90 psi (621 kPa) will result in either a reduction of machine performance or increased motor maintenance. Table 7 lists the flows at maximum power for the spindles and pneumatic feed.

TABLE 7 MAXIMUM FLOWS

Machine part	Maximum flow at 90 psi (621 kPa)	Flow at maximum power
HSK spindle right-angle drive, Weldon spindle	56 scfm (89.6 m ³ /hr)	48 scfm (81.6 m ³ /hr)
HSK spindle direct drive	58 scfm (98.5 m ³ /hr)	46 scfm (78.2 m ³ /hr)
Pneumatic feed	20 scfm (40.0 m ³ /hr)	17.5 scfm (30.0 m ³ /hr)

2.6.5 Hydraulic pressure

The pressure guidelines for the hydraulic drives are as follows:

- Continuous pressure should not exceed 5.5 gal/min at 1,400 psi (9,653 kPa).
- Intermittent pressure should not exceed 6.5 gal/min at 2,030 psi (13,996 kPa).

2.6.6 Electric voltage

The electric operating parameters are listed in Table 8.

TABLE 8 ELECTRIC OPERATING PARAMETERS

	120V	230V
HSK spindle drives	15 full load amperes	7.5 full load amperes
Weldon spindle drives	12.5 full load amperes	7.0 full load amperes
Electric feed	3.0 full load amperes	1.5 full load amperes
Frequency	50–60 Hz	50–60 Hz
Voltage	±10% of nominal	±10% of nominal

2.7 Weights and dimensions

TABLE 9 MACHINE WEIGHTS

Machine part	Weight
<i>Beds</i>	
29" Weldon	332 lb (151 kg)
29" HSK 40A	381 lb (173 kg)
58" Weldon	544 lb (248 kg)
58" HSK 40A	593 lb (270 kg)
87" Weldon	710 lb (323 kg)
87" HSK 40A	759 lb (345 kg)
<i>Subassemblies</i>	
68467 HSK Air Motor	21.5 lb (9.75 kg)
64643 HSK Spindle	40.8 lb (18.5 kg)
10380 Conditioning Unit	18.6 lb (8.44 kg)
71970 12" Travel Ram	123 lb (55.9 kg)
64655 120V HSK Spindle	22.0 lb (9.98 kg)
65096 3.00 cu in. Hydraulic Motor	8.76 lb (3.97 kg)
65217 Weldon Shank 120V Topslide	60.0 lb (27.2 kg)
65308 Pneumatic Feed	20.8 lb (9.43 kg)
72327 120V Electric Feed	19.6 lb (8.89 kg)
65298 Manual Feed	8.12 lb (3.68 kg)
38167 Blank Tool Post	31.8 lb (14.4 kg)
64717 Cross Slide (Saddle)	3.33 lb (1.51 kg)

TABLE 10 OVERALL DIMENSIONS

Length	Bed Length (Table 5) + 8.8 inches (+223.52 mm)
Width	13.22 - 20.22 inches (335.8-513.6 mm) (Weldon)
	28.5 inches (723.9 mm) (HSK)
Height	13.6 – 16.6 inches (345.44 – 421.64 mm) (Weldon)
	17.6 – 21.6 inches (447.04 – 548.64 mm) (HSK)

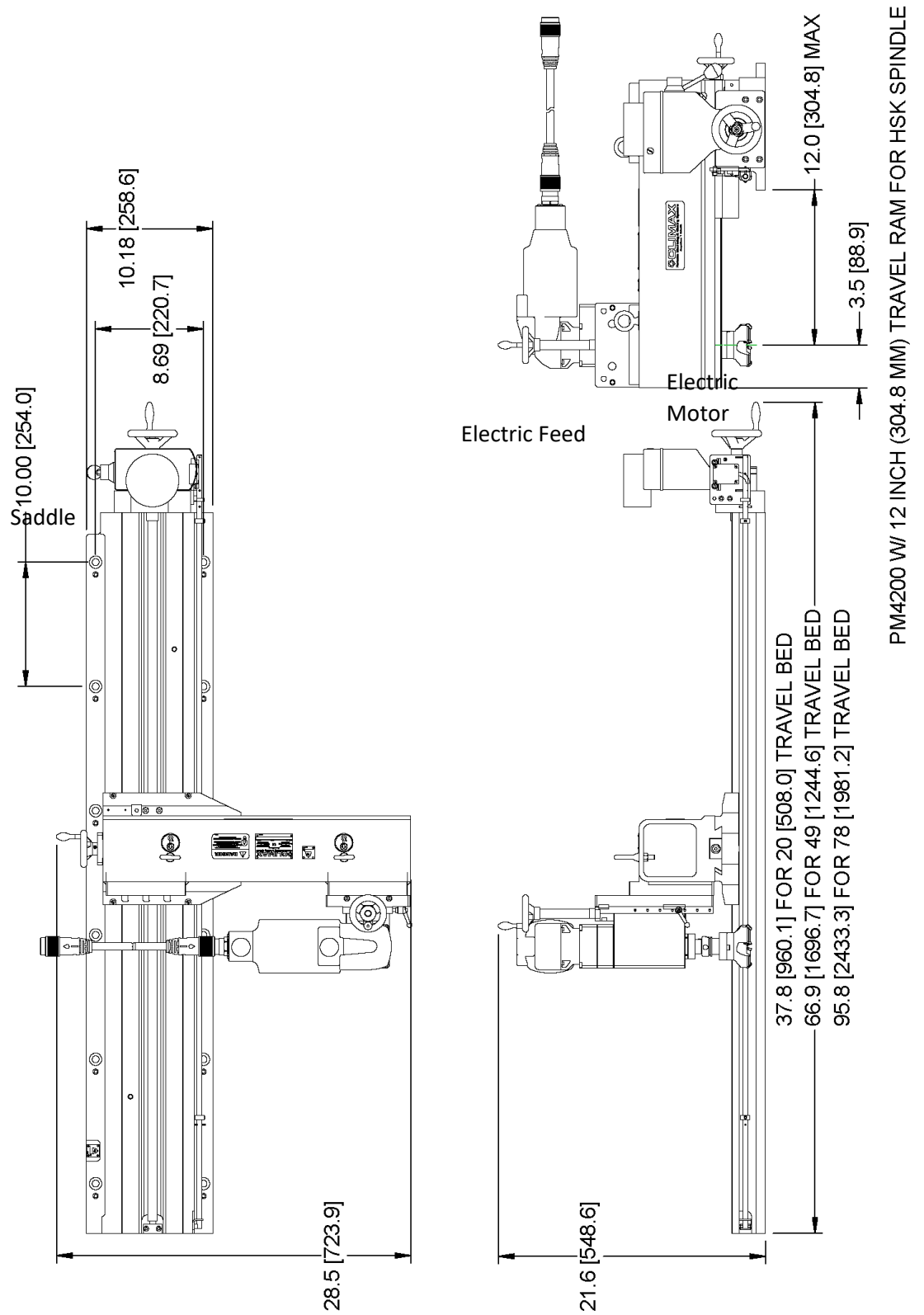


FIGURE 28 DIMENSIONS FOR HSK SPINDLE (INCHES AND MILLIMETERS)

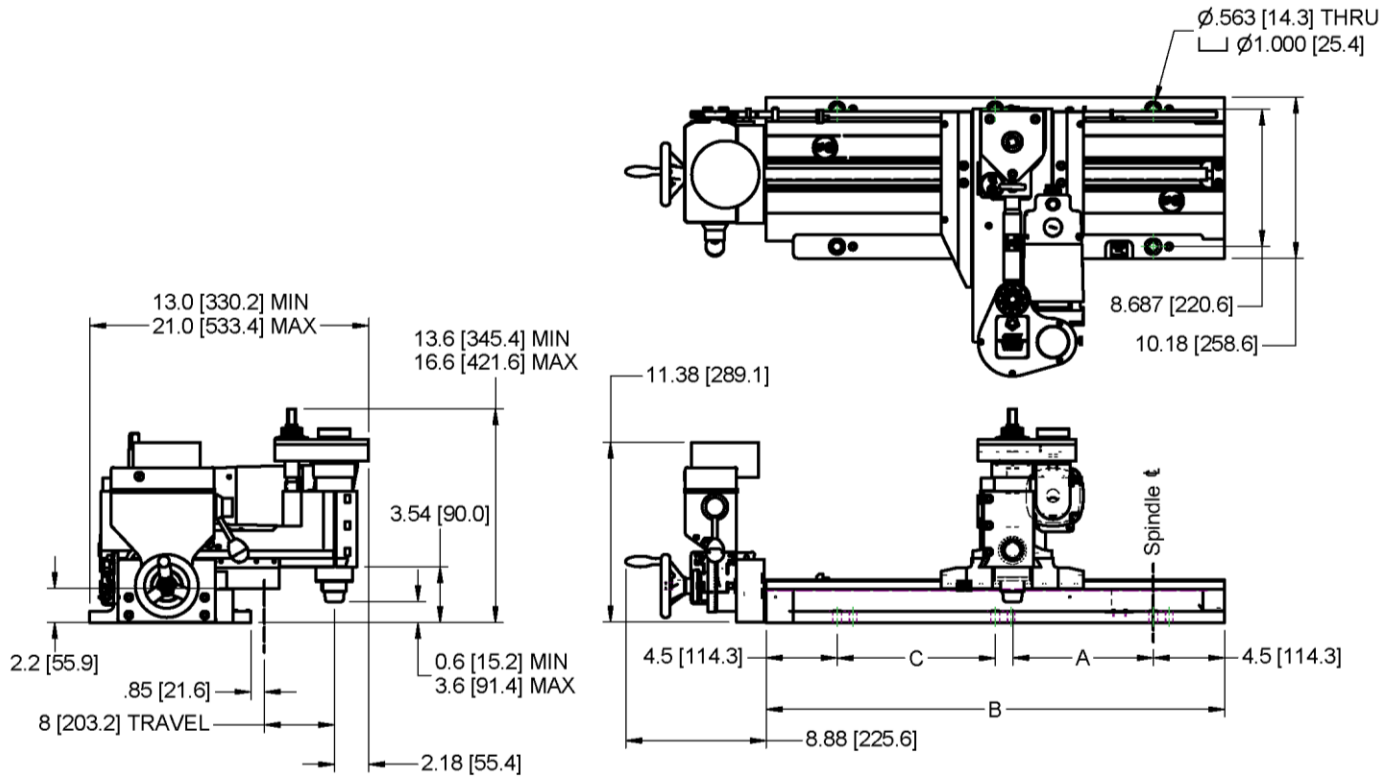


FIGURE 29 DIMENSIONS FOR WELDON SPINDLE (INCHES AND MILLIMETERS)

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3 MACHINE SETUP AND OPERATION

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 container(s) for damage.
2. Check the contents of the shipping container(s) against the included invoice to ensure that all components have been shipped.
3. Inspect all components for damage.

Contact Climax immediately to report damaged or missing components.

3.2 Pre-setup check

The portable mill can be set up and mounted in many ways. Before setting up the mill, check that:

1. The machine assemblies are positioned correctly.
2. There is enough room to position the entire machine on or near the work piece.
3. The surface upon which the machine will be mounted is flat. If it is not, use leveling screws as necessary.
4. All connections are correctly attached.
5. Hoist ring bars are secured to the main bed at the specified torque value.
6. Make sure all components are securely attached to main bed before lifting.

WARNING

Parts can shift and loosen during shipment causing components to fall and drop during rigging causing serious injury or death. Before removing the tool from the shipping container make sure that all tool fasteners / components are secured to the machine.

3.3 Machine setup

3.3.1 Lifting and rigging

DANGER

The fully assembled machine can weigh up to approximately 2,000 lbs (907 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 method.

Each subassembly of the PM4200 has lifting eyes or hoist rings for the purpose of individually lifting the subassemblies. The hoist rings on the hoist ring bars are rated for lifting the assembled machine.

⚠ WARNING

Falling or uncontrolled swinging of machinery can cause serious injury or be fatal to the operator and bystanders. Lift the machine or machine components **ONLY** by the properly designated lifting eyes, identified in Figure 31.



FIGURE 31 LIFTING POINT LABEL 59039

1. If possible, center the ram over the bed before lifting. This will shift the center of gravity toward the center workpiece.
2. Use the 3/8-13 x2" socket head cap screws to attach the hoist ring bars onto the main bed, if they are not already attached. Tighten the bolts to a torque between 12–15 ft-lbs (16–20 Nm) (Figure 32).

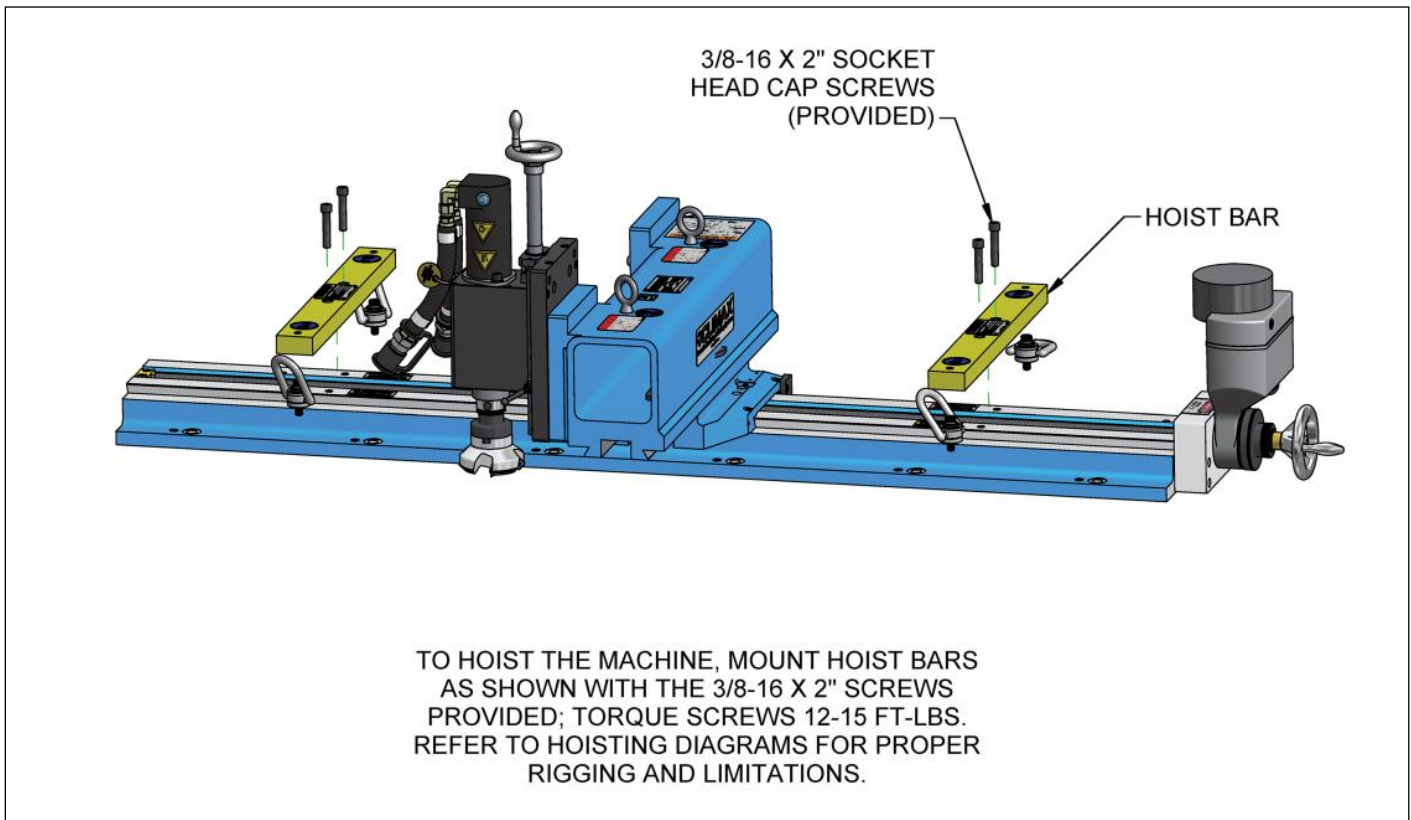


FIGURE 32 HOIST RING BAR INSTALLMENT

For horizontal –flat mounting:

Attach hoist shackles to all four of the hoist rings on the bed, as shown in Figure 33.

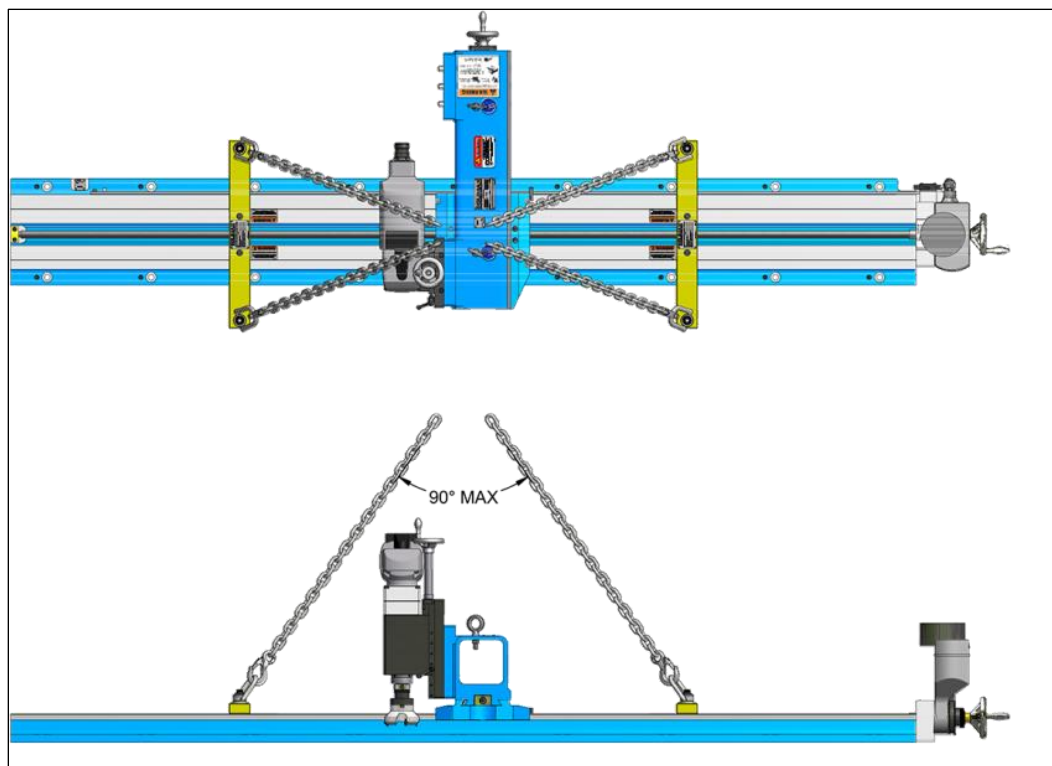


FIGURE 33 FLAT-HORIZONTAL LIFTING

For vertical-horizontal mounting:

Attach hoist shackles to the two hoist rings on the same side of the bed as shown in Figure 34.

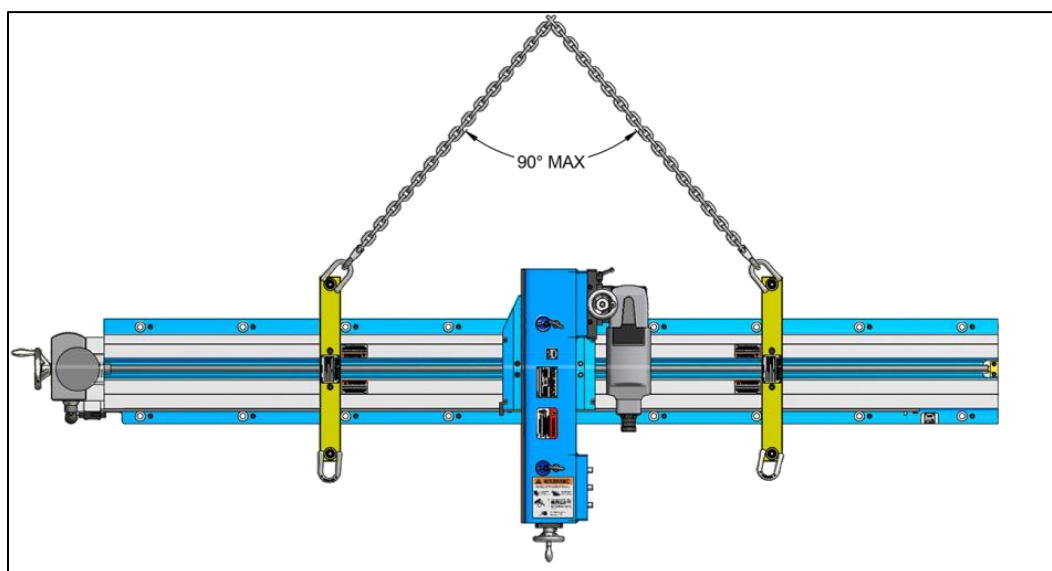


FIGURE 34 VERTICAL-HORIZONTAL LIFTING

For vertical-vertical mounting:

Attach hoist shackles to the two hoist rings on the same end of the bed as shown in Figure 35.

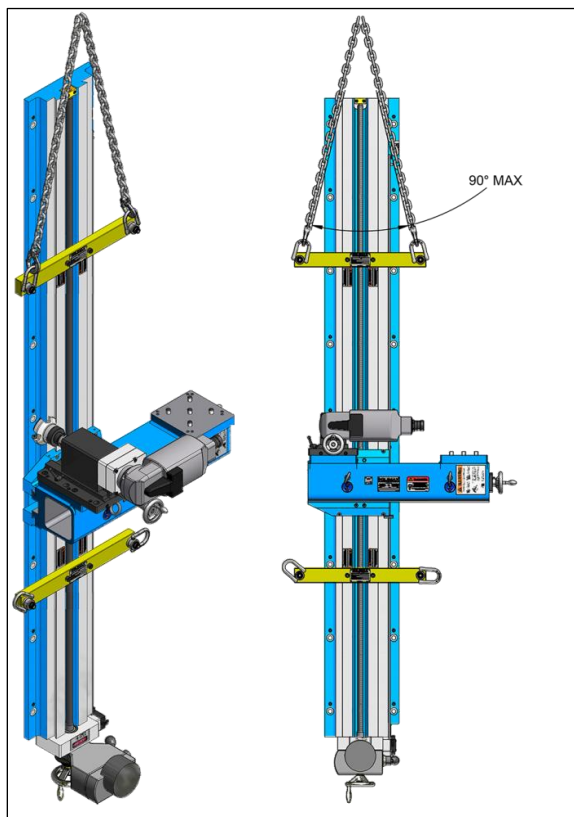


FIGURE 35 VERTICAL-VERTICAL LIFTING

CAUTION

When lifting vertically, make sure that no components will be crushed or bent.

For all mounting orientations:

1. Lift the PM4200 slowly and carefully using the hoist rings on the hoist ring bar (Figure 36). If it is out of balance, lower the machine to the ground.
2. Make adjustments before attempting to lift and maneuver the machine again.
3. Lift the mill into position.

WARNING

The PM4200 can tip or fall over if not correctly lifted or installed. When lifting, make sure that the machine is balanced and will not tilt to one side. Make sure that all the sub-assemblies are correctly centered on the machine to stabilize the machine.

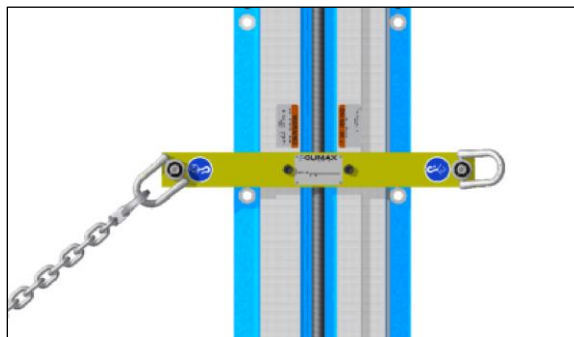


FIGURE 36 LIFT POINTS ON HOIST RING BAR

- Securely bolt the bed to either the work piece or a machining stand. Make sure the bed is flat and not twisted. Use leveling screws, if necessary. See Section 3.3.2 and 3.3.3 for instructions on installing and leveling the bed.
- After the bed is leveled and securely fastened to the workpiece remove the hoist shackles and the hoist ring bars from the main bed.

3.3.2 Bed installment

Depending on the length of the bed, there will be different numbers of mounting holes to attach the machining bed to the workpiece. Figure 37 shows the general spacing of the mounting screw holes on the bed.

Table 11 shows the number of mounting screw holes for each length of bed.

TABLE 11 MOUNTING SCREW HOLE SPECIFICATIONS

Model	Bed length	Mounting holes	Spacing
PM4200-20	29" (736.6 mm)	6	10" (254 mm)
PM4200-49	58" (1473.2 mm)	12	10" (254 mm)
PM4200-78	87" (2209.8 mm)	18	10" (254 mm)

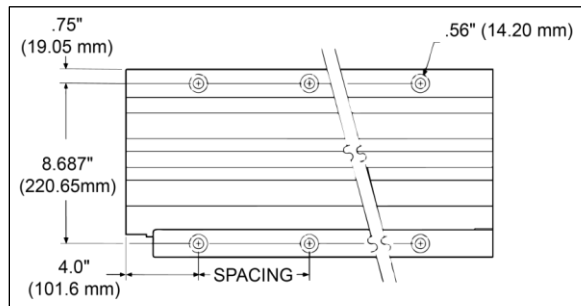


FIGURE 37 MOUNTING SCREW HOLE SPACING

3.3.3 Bed leveling

- Place a level on the bed across the length, and the width. Make sure the bed is flat and level when mounted to the workpiece (Figure 38).

WARNING

Do not remove the rigging from the PM4200 until it is secured to the workpiece. The machine can tip or fall over if not correctly and completely installed onto the workpiece, potentially causing serious injury or death to personell around the machine.

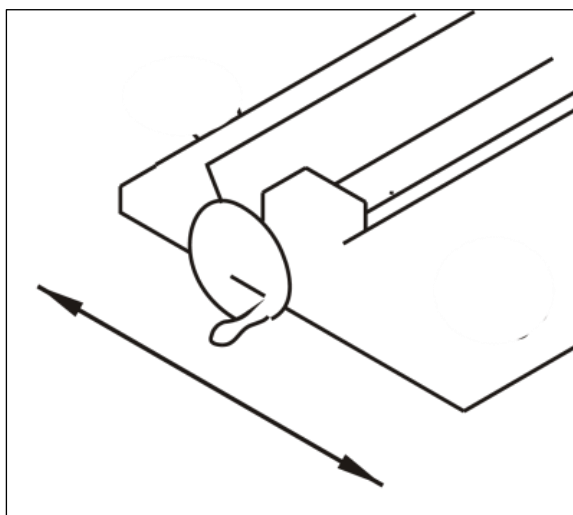


FIGURE 38 LEVEL BED ON WORKPIECE

2. Use leveling screws and shims to raise low spots as necessary, see Figure 39.

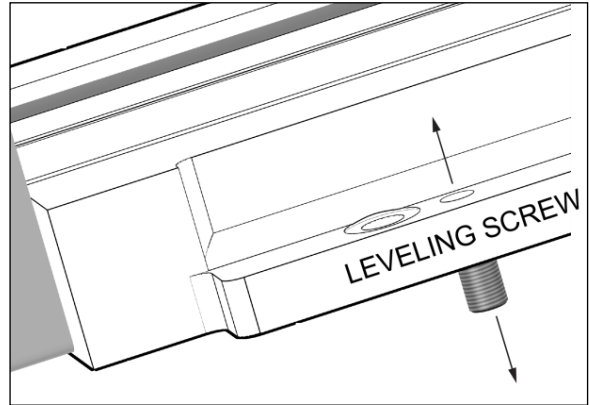


FIGURE 39 LEVELING SCREW

3.3.4 Gib adjustment

The gib screws on the saddle should not need adjusting prior to operation, as they are configured at the factory. After extended use, the gib screws may need to be adjusted to accommodate for wear. The gib screws are located along the dove tail slide on the top of the saddle (Figure 40) and along the slide that secures the saddle to the bed.

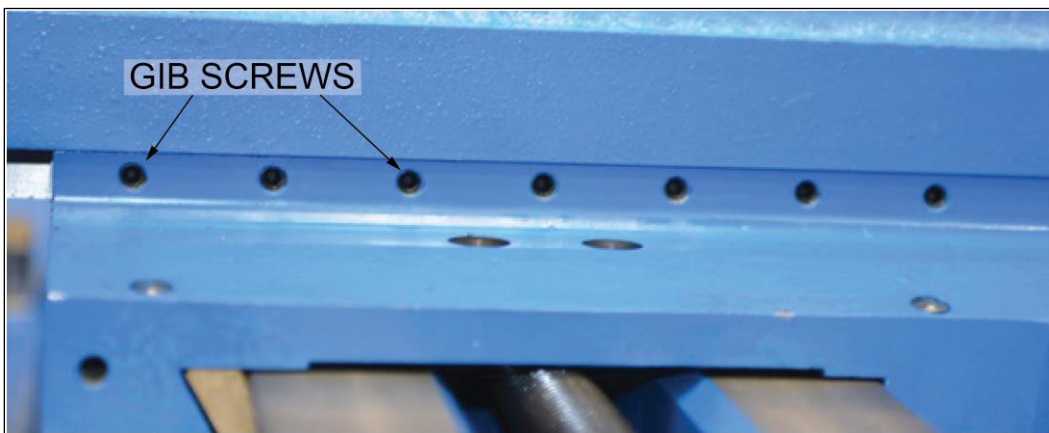


FIGURE 40 GIB SCREWS

To adjust the tension of the gib screws in the main bed and saddle:

1. Turn the leadscrew to move the saddle along the dovetail way.
2. When the saddle is fully engaged with the bed, tighten the gib screws until there is noticeable drag.
3. Loosen the gib screws slightly, and then tighten them to keep the screws in place. Repeat until all gib screws are adjusted.

▲ CAUTION

To avoid machine damage, do not tighten the gib screws to more than 20 in-lbs (2.26 Nm) of torque. Use recommended lubricants.

3.3.5 Saddle orientation

To reverse the saddle orientation:

1. Remove the two screws from the leadscrew nut at the base of the saddle (Figure 41).

NOTICE

When reversing the saddle orientation, make sure that no chips or debris becomes trapped between the saddle and bed.

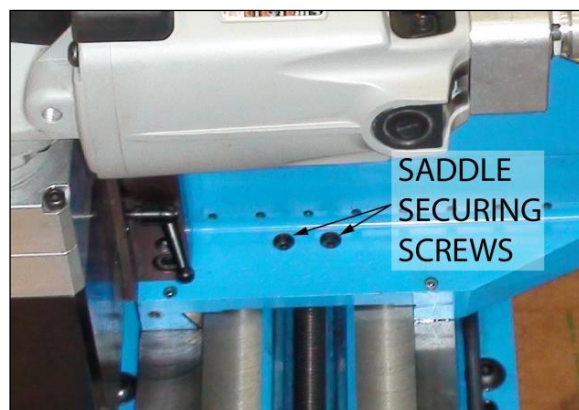


FIGURE 41 SADDLE SECURING SCREWS

CAUTION

Be cautious of pinch points.

DANGER

If the machine is at an elevated position when reversing the saddle orientation, use rigging to help secure machine assemblies to prevent them from falling.

2. Loosen the gib screws that hold the saddle to the base (Figure 42). The saddle should slide freely.
3. Slide the saddle off the end of the bed opposite the feed drive.
4. Reverse the orientation of the saddle.
5. Slide the saddle back onto the bed.
6. Tighten the two screws holding the leadscrew nuts at the base of the saddle.
7. Adjust the gib screws on the side of the saddle, see Section 3.3.4 for instructions.

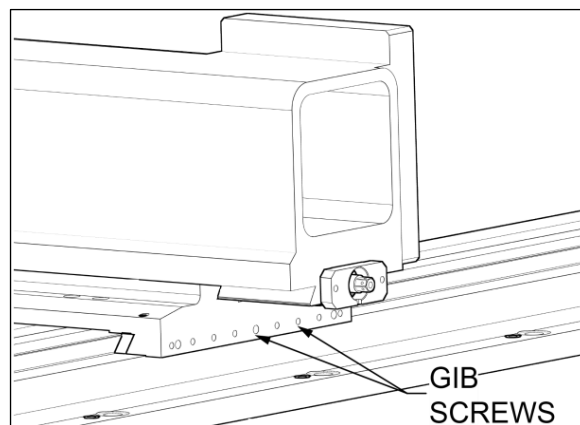


FIGURE 42 GIB SCREWS ATTACHING SADDLE TO BASE

3.4 Checking cutter rotation (hydraulic spindle version)

1. Make sure the cutter is not touching the work piece.
2. Adjust the speed control knob on the hydraulic power unit (or pendant) down to the lowest speed setting.
3. Start the hydraulic power unit.
4. Adjust the speed control until the cutter just starts to turn.

5. If the cutter is turning the wrong way, turn the speed control knob down all the way.
6. Shut off and lock out the power unit.
7. Switch the hoses at the hydraulic motor to reverse the flow direction through the motor.

3.5 Inserting tools in tool holders

The spindles (both HSK and Weldon) may be locked in place using the electric motor lock at the top of the machine.

Push the lock to keep the spindle from rotating, as shown in Figure 43.



FIGURE 43 ELECTRIC MOTOR LOCK

3.6 Removing tooling from tool holders

1. Position the wrench on the tool holder as shown in Section 3.5.
2. Hold the push-lock located on the motor at the top of the machine.
3. Hold the tool firmly.
4. Loosen the retainer.
5. Remove the tool.

CAUTION

To avoid damaging the machine, do not tighten the quill clamping screws if the quill is retracted beyond the location of the lower quill clamping screw. See Figure 44.

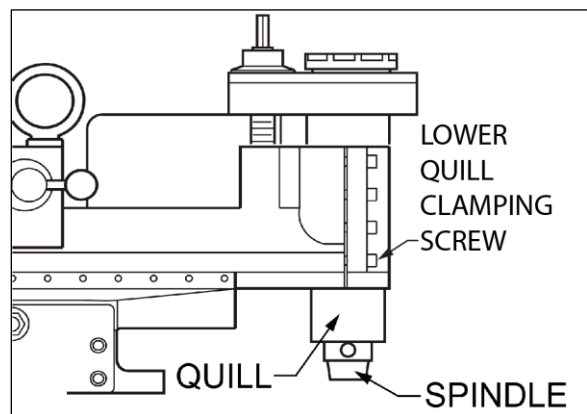


FIGURE 44. LOWER QUILL CLAMPING SCREW LOCATION

3.7 Mounting the milling cutter option

⚠ WARNING

To avoid serious bodily injury, turn off and lock out the power before mounting the milling cutter.

1. Make sure the spindle is completely stopped and the machine power locked out.
2. Clean dirt and chips from the spindle opening.

⚠ CAUTION

Chips or dirt in the spindle opening will cause the milling cutter to seat off-center. Clean the spindle opening before inserting the milling cutter to ensure proper tool position.

3. Make sure the cutter is sharp and free of nicks.
4. Insert the cutter into the spindle. Make sure the cutter is engaged with the receptacle.

3.7.1 Weldon spindle tool setup

1. Loosen the end mill socket set screw in the spindle.
2. Insert an end mill into the spindle. Turn the end mill until the flat in the shank is directly under the set screw (it may be necessary to remove the set screw to locate the flat).
3. Tighten the set screw.

NOTICE

Before using collets for small end mills, degrease with solvent and dry thoroughly.

⚠ CAUTION

Make sure the set screw directly seats against the flat on the end mill shank.

4. Adjust the tension on the quill clamping screws, shown in Figure 45, to securely hold the quill housing without preventing its travel.

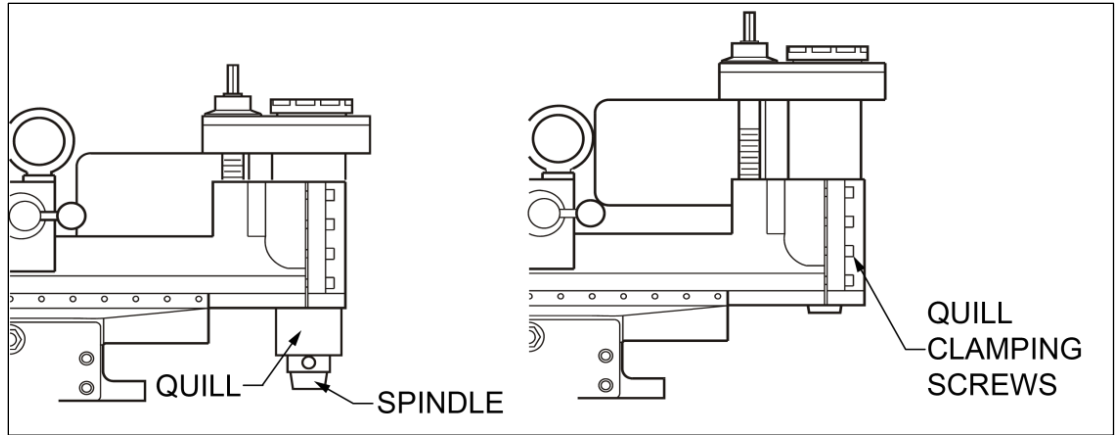


FIGURE 45 WELDON QUILL CLAMPING SCREWS

5. Make sure that the quill is fully engaged by the quill clamping screws.

3.7.2 Switching and installing tools (HSK spindle)

3.7.2.1 Removing tooling

1. Rotate the brass ring to find the access hole to the set screw.
2. Insert the supplied Allen wrench into the hole above the tool in the brass ring and loosen the retaining/locking screw while holding the tool firmly with your other hand, as shown in Figure 46.
3. Loosen slowly until a “pop” sound indicates the tool is released.
4. Remove the tool.



FIGURE 46 REMOVING TOOLING USING ALLEN WRENCH

3.7.2.2 Inserting tooling (HSK spindle)

1. Insert the tool with the deeper notch aligned to the set screw.
2. Tighten in place using the Allen wrench provided (Figure 47).

NOTICE

The depth of the notch at the top of the tool is deeper on one side of the tool.



FIGURE 47 DEEP NOTCH IN ONE SIDE OF TOOL HEAD

3.7.2.3 Installing the HSK end mill collet

While pushing the motor lock, insert the tool and tighten the tool holder using the wrench provided (Figure 48).



FIGURE 48 HSK END MILL COLLET INSTALLATION

3.8 Trimming the milling spindle (optional equipment)

Attach a dial indicator to the milling head (Figure 49) and rotate the spindle to allow the dial indicator to reach at least three positions that are as far from the milling head as possible, while maintaining a clean and rigid reading.

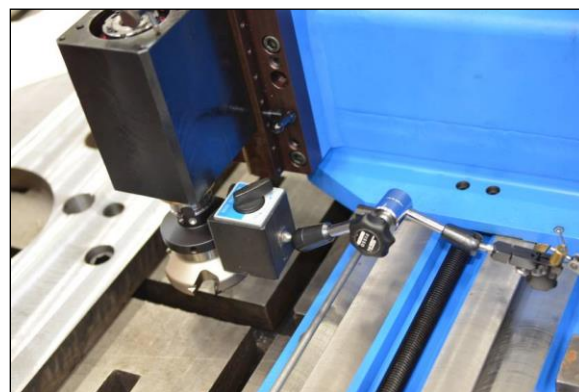


FIGURE 49 DIAL INDICATOR ATTACHED TO MILLING HEAD

The top of the dove tail slide is a convenient datum surface to use when tramming the milling spindle (Figure 50).

Adjustment, tramming screws for the milling head are located on each side of the arm milling head plate, and under the mount by the milling head.

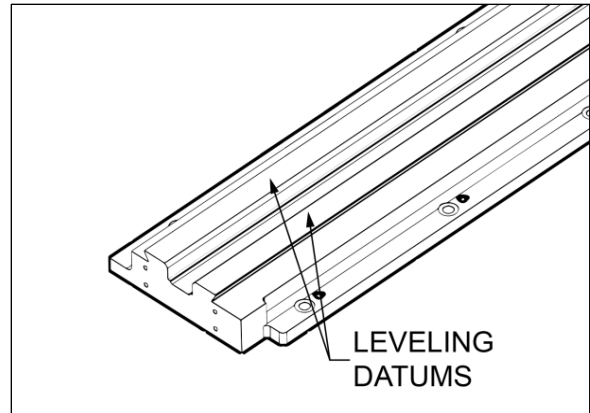


FIGURE 50 MILLING HEAD LEVELING DATUMS

3.9 Positioning the milling head

The milling head assembly can be positioned in 90° increments around the saddle.

⚠ WARNING

Falling or uncontrolled swinging of machinery can cause serious injury or be fatal to the operator and bystanders. Make sure that the machine is balanced and that all the subassemblies are correctly centered on the machine before adjusting the milling head.

3. Position the quill support against the saddle.
4. Tighten the screws.

3.10 Power connection

3.10.1 Hydraulic power connection

The pressure guidelines for the hydraulic drives are in Section 2.6.4.

⚠ CAUTION

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

Do the following to connect hydraulic power:

1. Make sure the power unit is shut off and locked out.
1. Check the reservoir level - fill the reservoir to above the red bar (on the sight/temperature gage) with hydraulic oil.

⚠ CAUTION

To avoid machine damage, use only the recommended fluid listed in Table 13 in Section 5.2.

2. Make sure the power unit wiring matches the electric source.
3. Plug the power unit into a grounded outlet.
4. Make sure all hose fittings are clean.
5. Check the hydraulic hoses between the motor and power unit. Repair or replace the hoses, as necessary.
6. Turn the speed control knob (on the power unit or remote pendant) all the way down (clockwise).
7. Press START on the pendant.
8. Remove the inspection plate and check that the hydraulic power unit motor is rotating the same direction as the arrow indicates. If it is not, rewire the electrical connection.
9. Jog the motor to see which direction the milling head is rotating. To reverse rotation:
 - a. Shut off and lock out the hydraulic power unit.
 - b. Switch the hoses at the motor end.

3.10.2 Electrical power

Operating parameters are described in Table 8 in Section 2.6.6.

⚠ WARNING

Securely mount the portable mill to the work piece before connecting power.

1. Shut off the electric power feed motor.
2. Turn the feed rate knob down all the way.
3. Set the feed direction lever to NEUTRAL.
4. Plug the machine into a properly grounded outlet.

⚠ WARNING

The electric motor is not rated for use in a damp or explosive environment.

5. Before connecting power, make sure speed control On/Off switch is set to OFF. Connect spindle power unit to speed controller.

⚠ WARNING

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

-
6. Connect the 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.

7. Operate the mill as described in the Operations, Section 4.3 and following.

3.10.3 Pneumatic power

The pneumatic pressure guidelines are listed in Section 2.6.4.

⚠ CAUTION

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

1. Route incoming air through a lubricator and air filter.

⚠ CAUTION

To avoid damaging the air motor and voiding your warranty, route incoming air through the air filter and lubricator.

2. Use nonrestrictive air lines and fittings. Check periodically to ensure air pressure is 90 psi (621 kPa).
3. Adjust air motor speed only by resetting the needle valve.

⚠ CAUTION

Do not attempt to adjust air motor speed by changing the air pressure from 90 psi (621 kPa).

4 OPERATION

4.1 Pre-start checks

Do the following before operating the PM4200:

1. Make sure the milling cutter is sharp and free of nicks.
2. Lubricate all gibs (Section 3.3.4).
3. Check that all moving parts move freely.
4. Clean chips away from threaded parts.

⚠ WARNING

To avoid serious injury when operating the power feed, remove any handwheels before operating the machine. See Figure 51.

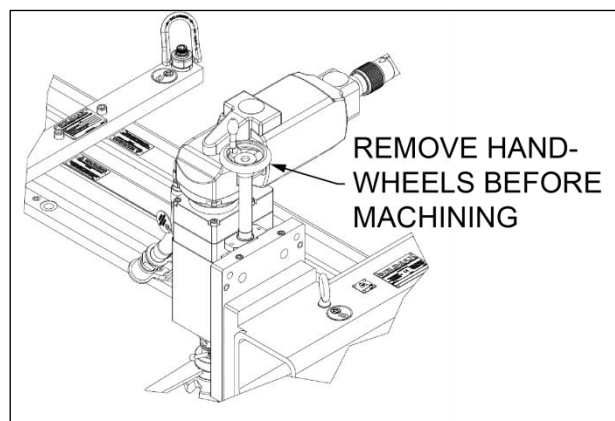


FIGURE 51 HANDWHEEL REMOVAL DURING POWER FEED MACHINING OPERATION

5. Make sure the main bed is level and securely fastened to the work piece.
6. Make sure the milling head is correctly trammed for precise machining.
7. Confirm the spindle will turn in the direction that is required by the type of cutting tool that is installed in the machine.
8. Before powering on the machine, make sure all power switches are in the off position and speed controls are set to the lowest setting.
9. Make sure all units are all units are powered on before performing machining operations.
10. Make sure the hydraulic power unit and electric feed units are plugged into grounded outlets.
11. Visually inspect and review set up area for potentially unsafe conditions such as personnel or objects in the path of rotating parts.

⚠ WARNING

Before machining, the operator is to make a visual inspection and review of the setup area, making sure there are no personnel in the danger zone of any rotating parts. Make sure all necessary steps have been taken to prevent accidental blockage of rotating parts.

4.2 Feed operation

4.2.1 Main bed hand wheel

The main bed manual hand wheel mounts to the end of the main bed leadscrew. The dial is graduated in .010" increments. Feed is .200" (5.08 mm) per revolution. The hand wheel attaches to either end of the bed leadscrew. Turning counterclockwise feeds the end mill (or tool post slide) away from the wheel; clockwise feeds the end mill (or tool post slide) toward the wheel (Figure 52). The end mill (or tool post slide) moves .100" (2.54 mm) per full turn of the hand wheel.

If the leadscrew has an electric feed assembly mounted to it, use that hand wheel. See the following sections for further instructions for operating the manual feed.

To manually feed the main bed saddle:

1. Make sure the machine is shut down and locked out.
2. Insert the hand wheel into the end of the leadscrew.
3. Start the machine.
4. After the spindle begins turning, turn the hand wheel to feed the spindle along the work piece.

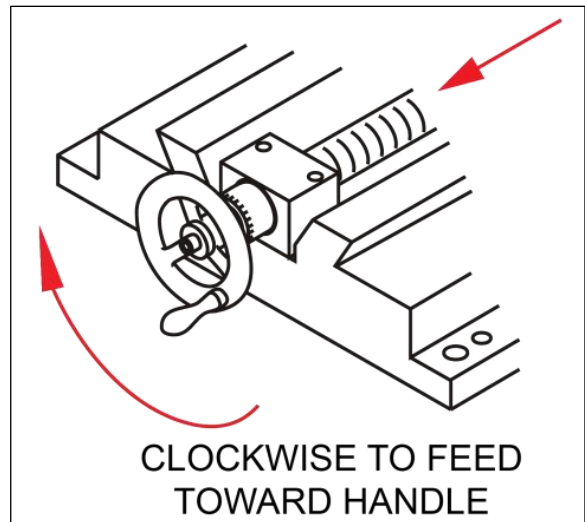


FIGURE 52 MANUAL HAND FEED DIRECTION

CAUTION

Clearance below the hand wheel as it reaches the bottom of the bed is limited. Use caution when turning the hand wheel to avoid pinching and crushing hazard.

4.2.2 Ram saddle hand wheel

The saddle manual hand-wheel mounts to either end of the ram and saddle leadscrew. The dial is graduated in .010" increments. Feed is .200" (5.08 mm) per revolution.

To manually feed the saddle:

1. Make sure the machine is shut down and locked out.
2. Insert the hand wheel into the end of the leadscrew.
3. Start the machine.
4. As the spindle begins turning, turn the hand wheel to feed the spindle across the work piece.

4.2.3 Ram milling head hand wheel

Use the hand wheel on the vertical adjusting screw to manually feed the milling head. The hand wheel dial is graduated in .001" (.0254 mm) increments. It can turn in either direction. Feed is .100" (2.54 mm) per revolution.

Do the following to feed the milling head:

1. Turn the spindle speed control (on the hydraulic power unit) until the cutter is turning at the desired speed.
2. Turn the hand wheel until the milling head just touches the work piece.
3. Set the graduated dial to zero.
4. Move the milling head clear of the work piece.
5. Using the graduated dial, turn the hand wheel until the cutter is at the desired depth.

⚠ CAUTION

Face mills are not to be used for plunge cutting!

4.2.4 Weldon Traverse end mill feed

The top slide conveys the spindle assembly across the bed (Figure 53). To position the top slide, attach and turn the hand crank on top of the traverse drive shaft assembly.

Clockwise moves the spindle and end mill toward the base; counterclockwise moves the spindle and end mill away from the base. The end mill travels .067" (1.69 mm) per full turn of the crank.

4.2.5 Weldon vertical end mill feed

To vertically position the end mill, turn the vertical adjustment leadscrew on the gear box. Counter-clockwise feeds the end mill up out of the work piece; clockwise feeds the end mill down into the work piece (Figure 53). One complete turn of the vertical adjustment screw moves the end mill .100" (2.54 mm).

4.2.6 Manual feed – electric feed hand wheel

Leadscrews with power feed can also be used to manually feed the machine. The power unit hand wheel is graduated in .001" increments. Each full turn of the hand wheel moves the milling head .100" (2.54 mm).

To manually feed the machine:

1. Set the feed direction to NEUTRAL and shut down the power feed unit.

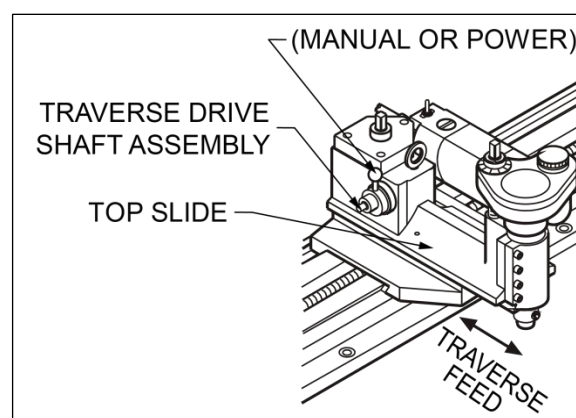


FIGURE 53 TRAVERSE END MILL FEED

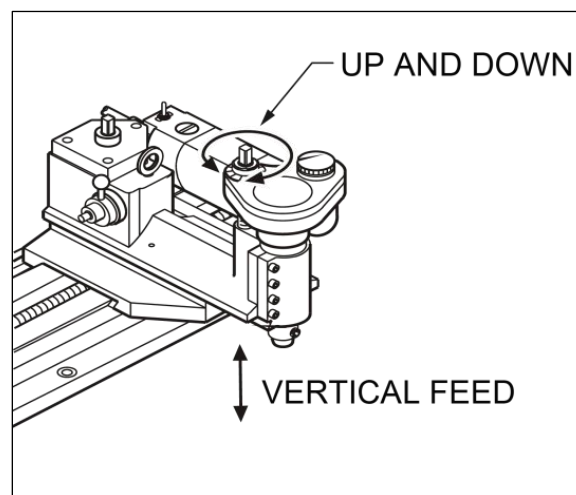


FIGURE 54 VERTICAL END MILL FEED

2. Turn the wheel counterclockwise to feed the milling head away from the electric power feed assembly. Turn the wheel clockwise to feed the milling head toward the electric power feed assembly (Figure 55).

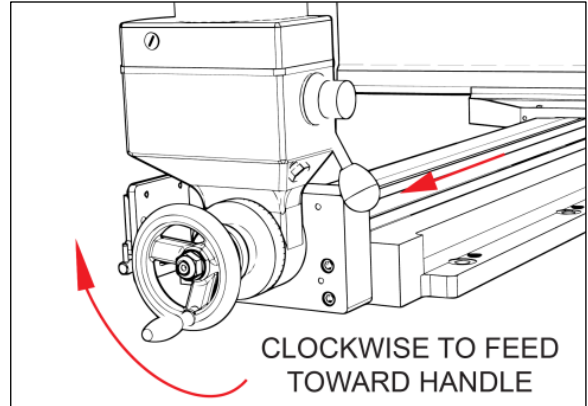


FIGURE 55 ELECTRIC HAND FEED DIRECTION

4.2.7 Electric feed

When electric power is switched ON, a red pilot light will come on. Shut the electric power OFF if the feed is not being used.

⚠ WARNING

To avoid serious bodily injury or damage to the feed unit, turn off the feed unit before using the hand wheel.

The feed direction lever has three settings. The mid setting (straight down) is NEUTRAL. This enables the operator to feed the PM4200 manually.

Longitudinal feed rate is set using the feed rate dial. Feed rate is variable up to 20 inches (508 mm) per minute. Because the feed is regulated electronically, the rate will remain nearly constant regardless of load. Forward and reverse, the other two functions, are engaged by turning the handle to point in those directions.

For faster travel during milling head positioning, press and hold the black rubber rapid travel button on the underside of the feed assembly. The feed rate will temporarily increase to the maximum 20 inches (508 mm) per minute without altering the feed rate setting.

⚠ CAUTION

To avoid damaging the machine or the work piece, do not use fast travel for milling. Fast travel is for positioning purposes only.

4.2.8 Pneumatic feed

⚠ CAUTION

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

The pneumatic feed assembly mounts to the end of the bed to transport the portable milling head automatically or manually along the bed (Figure 56).

To engage the feed belt:

1. Tighten the engagement hub.
2. Loosen the hub to disengage the belt. A motor mounting slot in the drive box provides for adjustment of the feed belt.
3. Adjust the feed speed by opening or closing the needle valve.
4. Change feed direction by reversing the valve handle.

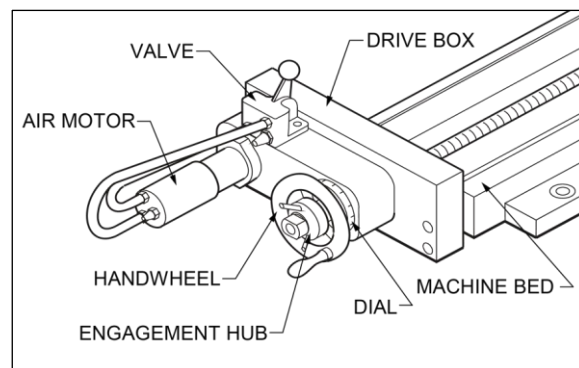


FIGURE 56 PNEUMATIC FEED DRIVE

The hand wheel feeds the mill when the feed belt is disengaged. The feed rate is .100" (2.54 mm) per revolution of the hand wheel.

4.3 Electric machine operation

The electrical control schematics are found in Figure 60, Figure 63, Figure 64, and Figure 66 in Appendix B.

⚠ WARNING

The electric motor is not rated for use in a damp or explosive environment.

1. Shut down the motor.
2. Set the milling speed to stopped, using the speed controller by turning the knob clockwise all the way.
3. Plug the machine into a properly grounded outlet of the correct voltage.
4. Position the end mill at the end of the area to be milled.
5. Set the speed control to the desired spindle rpm.
6. Power on the motor.
7. Lower the end mill by turning the vertical adjustment leadscrew clockwise until the end mill cuts a flat equal to the diameter of the end mill. (Cut to the minimum depth that will produce a full circle.)
8. Set the depth dial to zero. The dial is calibrated in .001" increments. The dial on metric machines is calibrated to 0.1 mm.
9. Plunge the end mill by turning the vertical adjustment leadscrew clockwise until the end mill is at the desired depth.

⚠ WARNING

To avoid serious personal injury from flying chips and excessive noise, wear eye and ear protection while operating the machine.

-
10. Feed the end mill until it has cut the desired area. See Section 4.2 for feed instructions.

⚠ WARNING

To avoid bodily injury from flying chips and moving machinery, do not remove chips until the cutter has stopped moving and rotating.

11. After milling the work piece, turn the vertical adjustment leadscrew counterclockwise to raise the end mill up from the work piece.

4.4 Pneumatic machine operation

The pneumatic control schematic is in Figure 78, in Appendix B.

⚠ CAUTION

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

⚠ CAUTION

To avoid damaging the air motor and voiding your warranty, route incoming air through the air filter and lubricator.

Do the following to operate the pneumatic machine:

1. Make sure the incoming air pressure is 90 psi (621 kPa).
2. Push the emergency stop lever down until the word CLOSED and the lockout can be seen from the bottom of the emergency stop. Be sure the lever is pushed all the way.
3. Turn the needle valve clockwise until it is completely closed. You will not be able to see any of the colored bands when the valve is completely closed.
4. Connect the air supply through the filter and lubricator to the air motor.
5. Position the end mill at the end of the area to be milled.
6. Set the speed control to the desired spindle rpm.
7. Lower the end mill by turning the vertical adjustment leadscrew clockwise until the end mill cuts a flat equal to the diameter of the end mill. (Cuts to the minimum depth that will cut a full circle.)
8. Set the depth dial to zero. The dial is calibrated in .001" increments. The dial on metric machines is calibrated to 0.1 mm.
9. Plunge the end mill by turning the vertical adjustment leadscrew clockwise until the end mill is at the desired depth.
10. Feed the end mill until it has cut the desired area. See Section 4.2 for feed instructions.

⚠ WARNING

To avoid bodily injury from flying chips and moving machinery, do not remove chips until the cutter has stopped moving and rotating.

11. After milling, raise the end mill clear of the work piece.

4.5 Hydraulic machine operation

The hydraulic control schematics are found in the HPU manual provided by the manufacturer.

⚠ CAUTION

To avoid damaging the hydraulic motor, do not run the hydraulic power unit pump faster than 5 GPM (19 L/min).

Do the following to operate the hydraulic machine:

1. Position the end mill at the start of the area to be milled.
2. Turn the motor ON using the pendant switch. Adjust spindle speed with control knob on the power unit. For more information on hydraulic spindle speeds, refer Section 5.5.1.
3. Lower the end mill by turning the vertical adjustment leadscrew clockwise until the end mill cuts a flat equal to the diameter of the end mill. (Cuts to the minimum depth that will produce a full circle.)
4. Set the depth dial to zero. The dial is calibrated in .001" increments. Metric machines are calibrated to 0.1 mm.
5. Plunge the end mill by turning the vertical adjustment leadscrew clockwise until the end mill is at the desired depth.
6. Feed the end mill until it has cut the desired area. See Section 4.2 for feed instructions.

⚠ WARNING

To avoid bodily injury from flying chips and moving machinery, do not remove chips until the cutter has stopped moving and rotating.

7. After milling the work piece, turn the vertical adjustment leadscrew counterclockwise to raise the end mill up from the work piece.

4.6 Disassembly

⚠ WARNING

To avoid serious personal injury from flying chips and excessive noise, wear eye and ear protection while operating the machine.

Moving machinery can seriously injure the operator or bystanders.

Do the following to disassemble the PM4200 from the workpiece:

1. Retract the milling cutter up from the work piece.
2. Turn the spindle speed control (on the hydraulic power unit or pendant) down all the way to stop the motor and spindle.
3. Turn the power feed direction levers to NEUTRAL or BRAKE.
4. Turn off and lock out the hydraulic power unit.
5. Unplug the power unit and feed assemblies from the electrical outlets.
6. Disconnect the hydraulic hoses from the hydraulic motor.

⚠ WARNING

Shut down and lock out the machine before disassembling it.

7. Loosen the spindle draw bolt. Remove the milling cutter.

⚠ WARNING

Falling machinery can seriously injure you and others. Lift the machine by the main bed lifting eyes, NOT by the ram lifting eyes.

8. Using the hoist rings on the hoist ring bar, securely support the machine, see Section 3.3.1 for correct lifting instructions.

⚠ WARNING

Be sure the load is secured and balanced before removing the machine from the workpiece.

9. Loosen all mounting hardware that is holding the machine in place.
10. Remove the machine from the work site.

5 MAINTENANCE

5.1 Part maintenance

Maintenance intervals and their associated tasks are listed in Table 12.

TABLE 12 MAINTENANCE INTERVALS

Interval	Task	Section Reference
Before each use	Clean dove tail ways	5.1.1
Weekly	Lubricate vertical adjustment leadscrew	5.1.4
	Lubricate saddle leadscrew	5.1.5
Periodically	Inspect motor brushes	5.1.6
	Drain the air filter	5.1.7
	Perform HPU maintenance according to manufacturer recommendation	5.1.8, 5.1.10
	Check feed belt for wear	5.1.12
Every 6 months	Repack the gear boxes with grease	5.1.2, 5.1.3

See Table 13 for further maintenance tasks and intervals.

5.1.1 Main bed

Before and after using the machine, clean the dovetail ways and wipe with heavy-medium way oil.

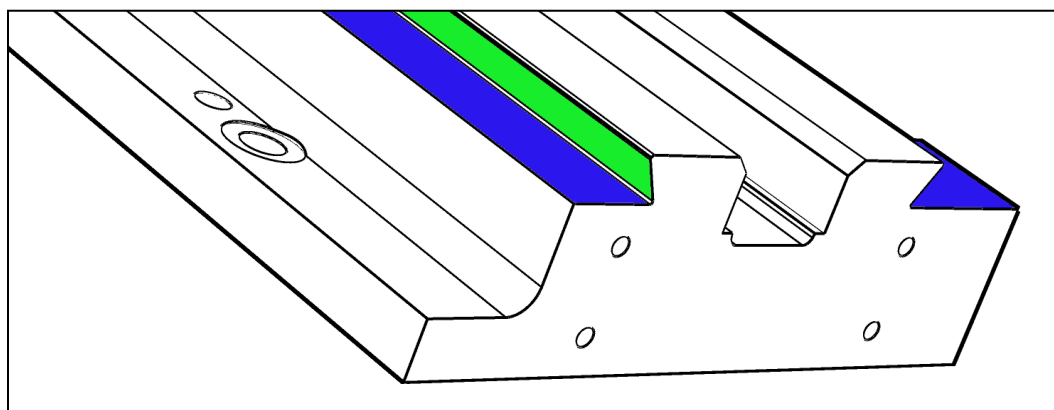


FIGURE 57 CRITICAL FLAT SURFACES

CAUTION

Do not attempt to remove any surface rust on the ground surfaces of the beds using a sander or grinder (Figure 57). These are marked in color above. Sanding and grinding on this surface can destroy the flatness.

⚠ CAUTION

To avoid machine damage, use only recommended way oil in the dovetail ways.

5.1.2 Top slide

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

Lubricate thrust bearings every 6 months or 500 hours with grease.

5.1.3 Gearbox and spindle/quill

The gearbox is packed with grease. Repack the gears every 500 hours. Follow the following procedure to repack the gears:

1. Turn counterclockwise to remove the knob. On electric machines, lock the spindle while you turn the knob.
2. Remove the crank handle.
3. Remove the snap ring, finger spring washer, thrust washer, and dial.
4. Unscrew six socket-head cap screws.
5. Remove the gearbox lid.
6. Clean and repack the gears with new grease.
7. Reassemble in reverse order of above.
8. Before each job, lubricate the quill housing with anti-seize where it slides in the quill clamp.
9. Ball and roller bearings are sealed and lubricated for life.

5.1.4 Vertical adjustment leadscrew

Lightly oil the vertical adjustment leadscrew.

5.1.5 Saddle

Lubricate the saddle leadscrew with light oil.

5.1.6 Electric power

Repack the gear case every six months or 500 hours of use with 1 ounce (30 mL) of gear grease. Remove the gear case, being careful not to dislodge the armature. Do not disassemble the gears.

Periodically inspect the brushes:

1. Remove the brush retainer caps on the motor housing.
2. Pull out the retainer springs and brushes.
3. Replace brushes when they have worn down to .25" (6 mm). Always replace brushes in sets. Before operating the machine, check the power cord for damage. Replace or repair any damaged or worn parts. Use only grounded, properly rated electrical outlets.

5.1.7 Air power

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

1. Fill the lubricator oil cup before each use with tool oil that contains antioxidants and rust inhibitors. The lubricator should deliver oil a rate of 20-30 drops per minute at full throttle.
2. Periodically drain the air filter.

5.1.8 Hydraulic power

Perform maintenance of the HPU every 200 hours of operation by completing the following and any instructions provided by the HPU manufacturer:

1. Replace the filter cartridge
2. Inspect the heat exchanger.
3. Clean the filler/breather.

5.1.9 Hydraulic motor

Hydraulic motors are maintenance-free. Fluid passing through the motor lubricates the internal moving parts. To ensure long life and dependable operation, use only high-quality filters and fluid.

5.1.10 Hydraulic filter and fluid

Although the hydraulic power unit requires little maintenance, timely replacement of the filter and fluid is required for proper operation.

When new, change the filter after the first 72 hours of operation to remove any impurities in the system. From then on, replace the filter every 200 hours.

Use a high-quality filter. Follow the recommendations from the manufacturer for industrial-grade filters. If the filtering system has a change-warning gauge, change the filter as often as the gauge indicates. Clean hydraulic fluid will help keep the power unit and motor running properly.

The hydraulic fluid should be changed in all of the following situations:

- When the oil becomes contaminated
- When the power unit is operated at high temperatures for extended periods
- At least every two years

Fluid level should never drop below the minimum fill mark on the level gauge. Add only clean filtered fluid to the system. Do not return leaked fluid to the unit.

5.1.11 Electric feed assembly

If the circuit breaker trips, do the following:

1. Set the direction lever to NEUTRAL.
2. Wait a few minutes for the motor to cool.
3. Push the red button on the underside of the feed box.

If the electricity repeatedly overloads, reduce the cutting load.

5.1.12 Pneumatic feed assembly

Periodically check the feed belt for wear.

5.2 Approved lubricants

Climax recommends using the following lubricants at the locations indicated. Failure to use the appropriate lubricants at the recommended intervals can result in damage and premature machine wear. Table 13 lists the approved lubricants for maintaining the PM4200.

TABLE 13 APPROVED LUBRICANTS

Application	Lubricant	Biodegradable Lubricant	Viscosity (cSt)	Quantity	Frequency
Cutting Oil	CONOCO AW 32	CONOCO Ecoterra 32	32 @ 40C 5.44 @ 100C	As required	Continued use while cutting
Gearboxes using oil ²	CASTROL Tribol 800-220	CASTROL BioTrans VG220	220 @ 40C	Gearboxes using oil	Refill every use. Replace oil every 2 years ³ .
Rectangular & Dovetail Ways ⁴	CONOCO AW 32	CONOCO Ecoterra 32	32 @ 40C 5.44 @ 100C	Light coating	Daily during machine use
Unpainted surfaces	LPS1 or LPS2	N/A	3.8 @ 25C	As required	Daily during machine use, and before storage
Lead Screws	-NOOK E-100 spray lube -NOOK PAG-1 grease	CASTROL BioTac EP 2	96 @ 40C 11.3 @ 100C	Light coating applied by hand	Weekly during machine use
Ball screws	THK ball screws – THK AFG Grease	CASTROL BioTac EP 2	N/A	Sizes <35 use 0.16 cc per bearing block Sizes ≥35 use 0.24 cc per bearing block	Once per use or weekly for continued use
	NOOK ball screws – NOOK E-900L	CASTROL BioTac EP 2	N/A		
Dovetail	THK Rail – THK AFA Grease ⁵	N/A	32 @ 40C	Sizes <35 use 0.16 cc per	Once per use or weekly for

² Never assume that oil in drums is clean. Always filter oil before filling gearbox (filter paper or 5 micron filter).

³ Never assume that oil in drums is clean. Always filter oil before filling gearbox (filter paper or 5 micron filter).

⁴ Use highly anti-corrosive, refined mineral or synthetic oil that forms a strong oil film and is not easily emulsified or washed away by coolant. Hydraulic oils are typically not suitable for slide way lubrication.

⁵ Use of other lubricants on THK products will void manufacturer's warranty.

Application	Lubricant	Biodegradable Lubricant	Viscosity (cSt)	Quantity	Frequency
	CONOCO PolyTac EP 2	CASTROL BioTac EP 2	129 @ 40C 11.6 @ 100C	bearing block Sizes >=35 use 0.24 cc	continued use
Hydraulic power units	CASTROL Hyspin AWS-46 (summer)	CASTROL BioBar 46 (summer); 32 (winter)	46 @ 40C 6.82 @ 100C	As required to fill reservoir to mid-sight glass level	Refill every use. Replace oil every 2 years ⁶
	CASTROL Hyspin AWS-32 (winter)		32 @ 40C 5.44 @ 100C		
Gearboxes and mechanisms lubricated with grease ⁷	Mobilith SHC 460 N/A	414 @ 40C	47 @ 100C	2cc	Monthly during machine use. Replace grease every 2 years.
Electric motors	See vendor literature	N/A	N/A	See vendor literature	See vendor literature

5.3 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.

5.3.1 The machine isn't feeding or traveling, or does so slowly

If the machine isn't feeding or traveling as it should, check the following:

- The cables and hoses are not damaged or disconnected.
- The machine isn't in contact with a hard stop or the limit switch.
- The gib is not over-tight (Section 3.3.4).
- The feed is engaged (Section 4.2).
- Speed control is set above 1 (Section 3.10).

5.3.2 The spindle isn't turning

If the spindle isn't turning, check the following:

- The main power is on, or the main air supply is functional (Section 3.10).
- The cables and hoses are not damaged or disconnected.
- The spindle is clear of any elements.

⁶ Always replace hydraulic filters when replacing hydraulic oil. Never assume that oil in drums is clean, always pump oil through a 5 micron hydraulic filter before/while filling reservoir.

⁷ While lithium based grease can be used, a calcium based grease allows for greater lubricity while ingesting higher amounts of water (common in portable machine tools).

5.3.3 The machine is cutting poorly

If the machine is cutting poorly, check the following:

- The face mill is tight.
- The inserts in the face mill are not damaged, dull, or loose.
- The brake is set (if applicable) and the gibs are adjusted correctly (Section 3.3.4).
- The lead nut on the lead screw has minimal backlash (i.e., less than .002).
- The setup is rigid.

5.3.4 The machine isn't cutting flat or evenly

If the machine isn't cutting flat, check the following:

- The spindle is trammed (Section 3.8).
- There is tension between the gib on the ram and the bed, so that the gib isn't loose (Section 3.3.4).
- The machine is properly mounted with precision tools (e.g., Brunson scope, laser tracker, or precision level).
- The bed may be under stress, due to improper adjustment of fastening and jacking screws. Redo setup (Section 3).

5.4 Repairs

If machine performance quality becomes unacceptable as a result of excessive component wear or damaged components, contact Climax for repairs information.

5.5 Specifications

5.5.1 Hydraulic specifications

Refer to Figure 58 for the maximum speeds, pressures, and flow rates for the various hydraulic motors. Do not exceed these limits or the limits of the HPU.

⚠ WARNING

Exceeding the designated parameters of the hydraulic system can cause the machine to malfunction, leading to damage to the machine or injury to personnel.

Specification Data — J Motors						
Displ. cm ³ /r [in ³ /r]		8,2 [1.50]	12,9 [.79]	19,8 [1.21]	31,6 [1.93]	50,0 [3.00]
Max. Speed (RPM) @ Continuous Flow		1992	1575	1043	650	393
Flow l/min [GPM]	Continuous	17 [4.5]	21 [5.5]	21 [5.5]	21 [5.5]	21 [5.5]
	Intermittent	21 [5.5]	25 [6.5]	25 [6.5]	25 [6.5]	25 [6.5]
Torque Nm [lb-in]	Continuous	16 [141]	25 [225]	38 [333]	50 [446]	62 [549]
	Intermittent	19 [164]	30 [263]	46 [405]	62 [546]	84 [743]
	Peak	22 [193]	36 [321]	48 [425]	83 [733]	86 [765]
Pressure Δ bar [Δ PSI]	Continuous	140 [2030]	140 [2030]	140 [2030]	121 [1750]	97 [1400]
	Intermittent	165 [2400]	165 [2400]	165 [2400]	150 [2175]	140 [2030]
	Peak	220 [3190]	220 [3190]	220 [3190]	190 [2756]	150 [2175]
Weight kg [lbs]		2 [4.4]	2,1 [4.6]	2,2 [4.8]	2,3 [5.0]	2,4 [5.4]

FIGURE 58 HYDRAULIC MOTOR SPECIFICATIONS

The recommended machine operating temperature is -4– 140 °F (-20–60 °C).

During normal use, the temperature of the machine housing normally increases to about 25 °F (14 °C) above the ambient temperature.

5.5.2 Electrical controller specifications

The HSK and Weldon spindle can be powered electronically. There are 120V or 230V controller options for the 120V and 230V motors, respectively (see Table 8 in Section 2.6.6 for voltage specifications). The controller part numbers are provided in Table 14.

TABLE 14 CONTROLLER PART NUMBERS

Motor	Part Number
Spindle (Weldon)120V	36549 (Metric and Inch)
Spindle (Weldon) 230V	79218 (Metric) 36685 (Inch)
Spindle (HSK) 230V	66573
Spindle (HSK) 120V	66572

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6 STORAGE

The PM4200 is intended to be stored indoors in a temperature and humidity controlled environment. Proper storage will extend the machine's usefulness and prevent undue damage.

Before storing, do the following:

1. Clean the machine with solvent to remove grease, metal chips, and moisture.
2. Drain all liquids from the pneumatic conditioning unit.

Store the PM4200 in its original shipping container. Keep all packing materials for repackaging the machine.

6.1 Short-term storage

Short-term storage is defined as less than or equal to three months. Do the following to prepare for short-term storage:

1. Retract the mill head from the work piece.
2. Remove the tooling.
3. Remove the hose and cable connections.
4. Remove the machine from the work piece.
5. Clean the machine to remove dirt, grease, metal chips, and moisture.
6. Apply a moisture-preventative material to unpainted surfaces (e.g., WD-40) to prevent corrosion.
7. Store the machine in its shipping container, as shown in Figure 59.

6.2 Long-term storage

Long-term storage is defined as longer than three months.

For long-term storage, first complete the directions for short-term storage in Section 6.1, then do the following:

1. Spray all unpainted machine surfaces with LPS-3 to prevent corrosion.
1. Package the machine in its shipping container, as shown in Figure 59.
2. Add a desiccant pouch to the shipping container. Replace the pouch according to the manufacturer's instructions.
3. Store the shipping container out of direct sunlight in an environment where the temperature is between -4–160 °F (-40–70 °C).

6.3 Shipping

The container in which the machine arrived is designed for safe shipment of the machine. Use the crate and packing components that the machine arrived in for repackaging the machine (Figure 59).

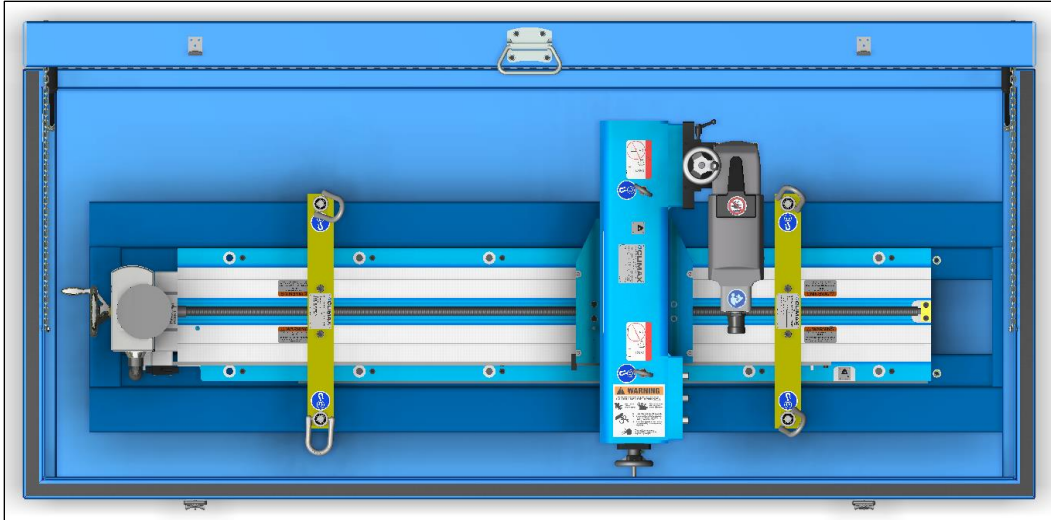


FIGURE 59 SHIPPING CONTAINER FOR PM4200

6.4 Decommissioning

To decommission the PM4200 prior to disposal, remove the gear box, from the electric and pneumatic HSK spindle option, and dispose of them separately from the other components. For the hydraulic motor option, empty the hydraulic lines and dispose of the hydraulic oils according to the MSDS sheet provided in this manual. Dispose of the leadscrew nuts separately from the rest of the machine components.

APPENDIX A SPARE PARTS

The table below lists items most frequently replaced due to wear, loss, or damage. You are advised to maintain an inventory of these critical parts.

TABLE 15 ALL PM4200 MODEL OPTIONS SPARE PARTS

P/N	Description	Qty
39632	SCREW INSERT CARBIDE MS1129 T 15	4
39633	WRENCH TORX TT-15 T-HANDLE	1
10661	HANDLE MODIFIED 4IN DIA	1
36747	HANDLE REVOLVING 16MM DIN98-TP TYPE E	1
47229	CARBIDE INSERT .528IC	10

TABLE 16 PM4200 MODEL ELECTRIC MOTOR OPTION SPARE PARTS (120V & 230V)

P/N	Description	Qty
10677	GEAR BRONZE	1
10683	GEAR LEXAN SERVO FEED MOTOR 150 SERIES	1
15482	SET BRUSH ASSY CARBON 120V	1
31769	BRUSH CARBON KM3000/87 MOTOR 230V	2

TABLE 17 PM4200 MODEL PNEUMATIC OPTION SPARE PARTS

P/N	Description	Qty
11875	VANE PACKET SET OF 5	1

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APPENDIX B EXPLODED VIEWS

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 to perform service on the machine.

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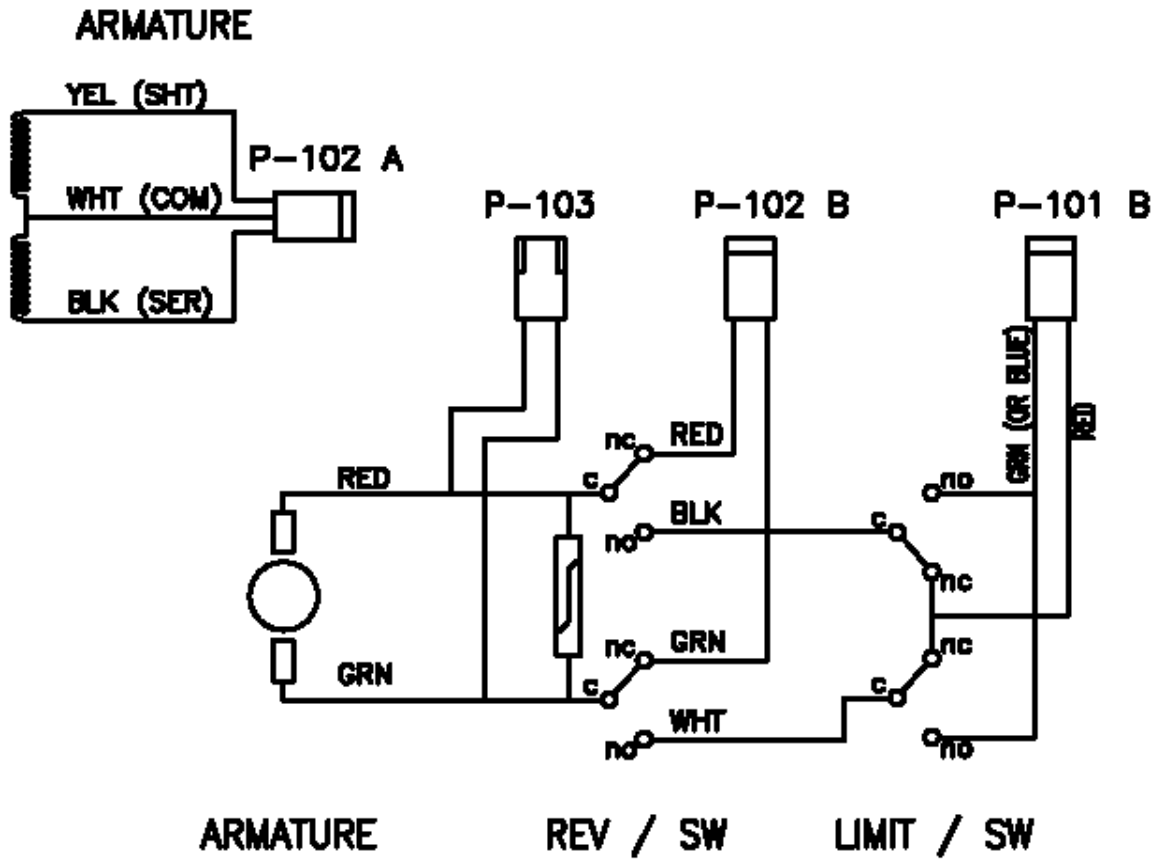
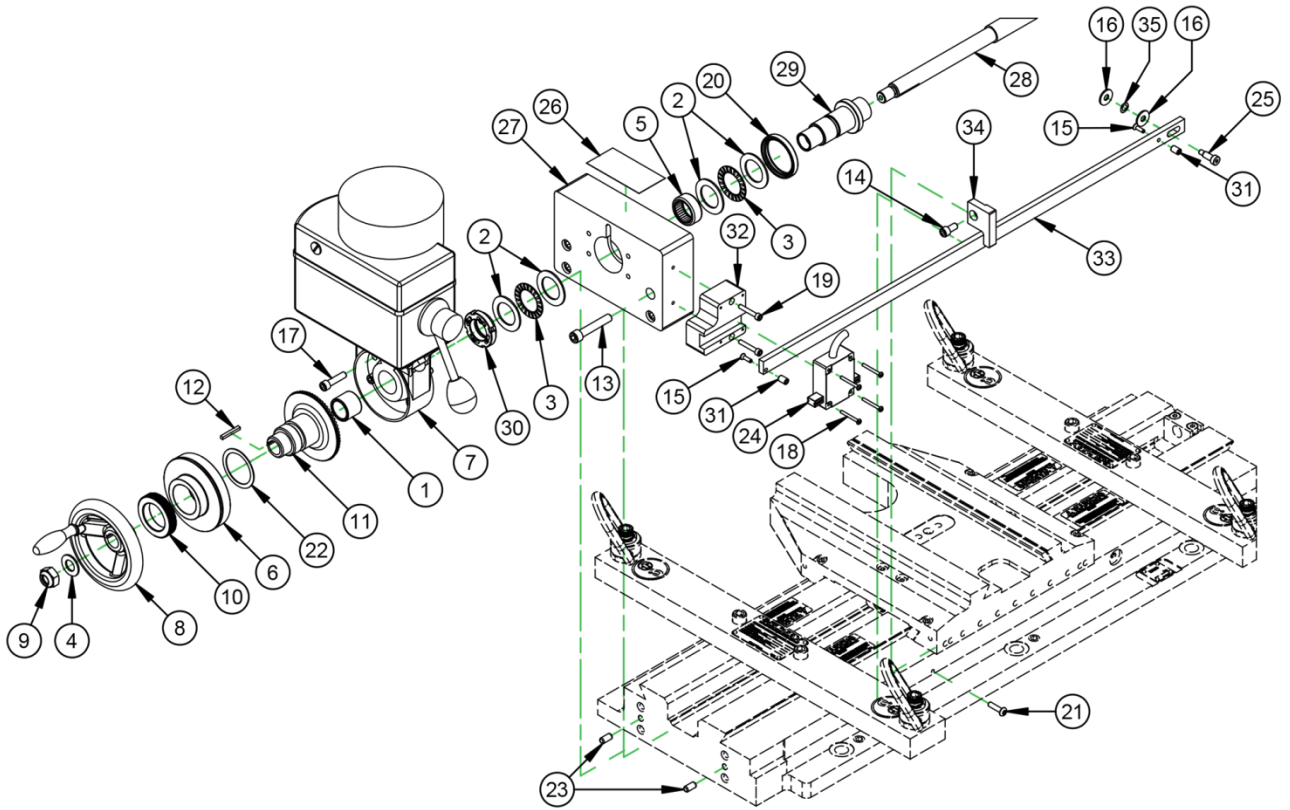


FIGURE 60 120V AND 230V FEED SCHEMATIC P/N 10658



AVAILABLE CONFIGURATION	
P/N:	DESCRIPTION
72057	ASSY FEED 120V 20" TRAVEL W/ LEADSCREW PM4200 3RD
72058	ASSY FEED 120V 49" TRAVEL W/ LEADSCREW PM4200 3RD
72059	ASSY FEED 120V 78" TRAVEL W/ LEADSCREW PM4200 3RD

FIGURE 61 120V FEED ASSEMBLY W/LEADSCREW P/N 72151

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	10112	SP BRG RACE .787 ID X 1.0 OD X .792
2	4	10144	WASHER THRUST 1 ID X 1.562 OD X .060
3	2	10145	BRG THRUST 1.000 ID X 1.562 OD X .0781
4	1	10436	WASHER THRUST .500 ID X .937 OD X .060
5	1	10524	BRG NEEDLE 1 ID X 1-1/4 OD X 1/2 OPEN
6	1	10655	DIAL .100 GRA BRIDGEPORT TYPE
7	1	10658	MOTOR ELEC SERVO 120V DC
8	1	10661	HANDWHEEL MODIFIED 4 DIA
9	1	10674	NUT 1/2-20 JAMNYLOC
10	1	10675	COLLAR RETAINING THREADED 1-1/4-20 UN
11	1	10677	SP BRONZE GEAR
12	1	10678	KEY 1/8 SQ X 1.00 SQ BOTH ENDS
13	4	10684	SCREW 5/16-18 UNC-2B X 1-3/4 SHCS
14	1	10800	SCREW 1/4-20 X 1/2 SHCS
15	2	10824	SCREW 6-32 X 1/2 FHSCS
16	2	11046	WASHER THRUST .250 ID X .687 OD X .060
17	4	11118	SCREW 1/4-20 X 1 SHCS
18	4	12822	SCREW 4-40 X 1 SRHMS
19	2	12880	SCREW 8-32 X 1 SHCS
20	1	15669	SEAL 1.500 ID X 1.874 OD X .250
21	1	18902	SCREW 10-32 X 3/4 BHSCS
22	1	19299	SP SHIM 1.4 ID X 1.75 OD X .032
23	2	20166	PIN DOWEL 1/4 DIA X 1/2
24	1	20654	SWITCH LIMIT & CORD 250V 10A
25	1	20877	SCREW 1/4 DIA X 1/2 X 10-24 SHLDCS
26	1	25979	LABEL WARNING PINCH POINT
27	1	64814	PLATE FEED PM4200 BED
28	1	64822	LEADSCREW 3/4" LH 20 TRAVEL PM4200
		64823	LEADSCREW 3/4" LH 49 TRAVEL PM4200
		64824	LEADSCREW 3/4" LH 78 TRAVEL PM4200
29	1	64825	SLEEVE LEADSCREW BEARING PM4200
30	1	64826	NUT LOCKING TLN-05 FACE LOCKING
31	2	72041	STANDOFF 6-32 x 1/4 OD X 3/8 LG ALUMINUM
32	1	72042	MOUNT ASSY SWITCH CPM
33	1	72043	BAR LIMIT STOP 20 INCH TRAVEL
		72086	BAR LIMIT STOP 49 INCH TRAVEL
		72087	BAR LIMIT STOP 78 INCH TRAVEL
34	1	72045	BRACKET FINGER FLAT FEED STOP PM4200
35	1	72361	WASHER SPRING WAVE .26 ID X .43 OD

FIGURE 62 120V FEED ASSEMBLY W/LEADSCREW P/N 72151

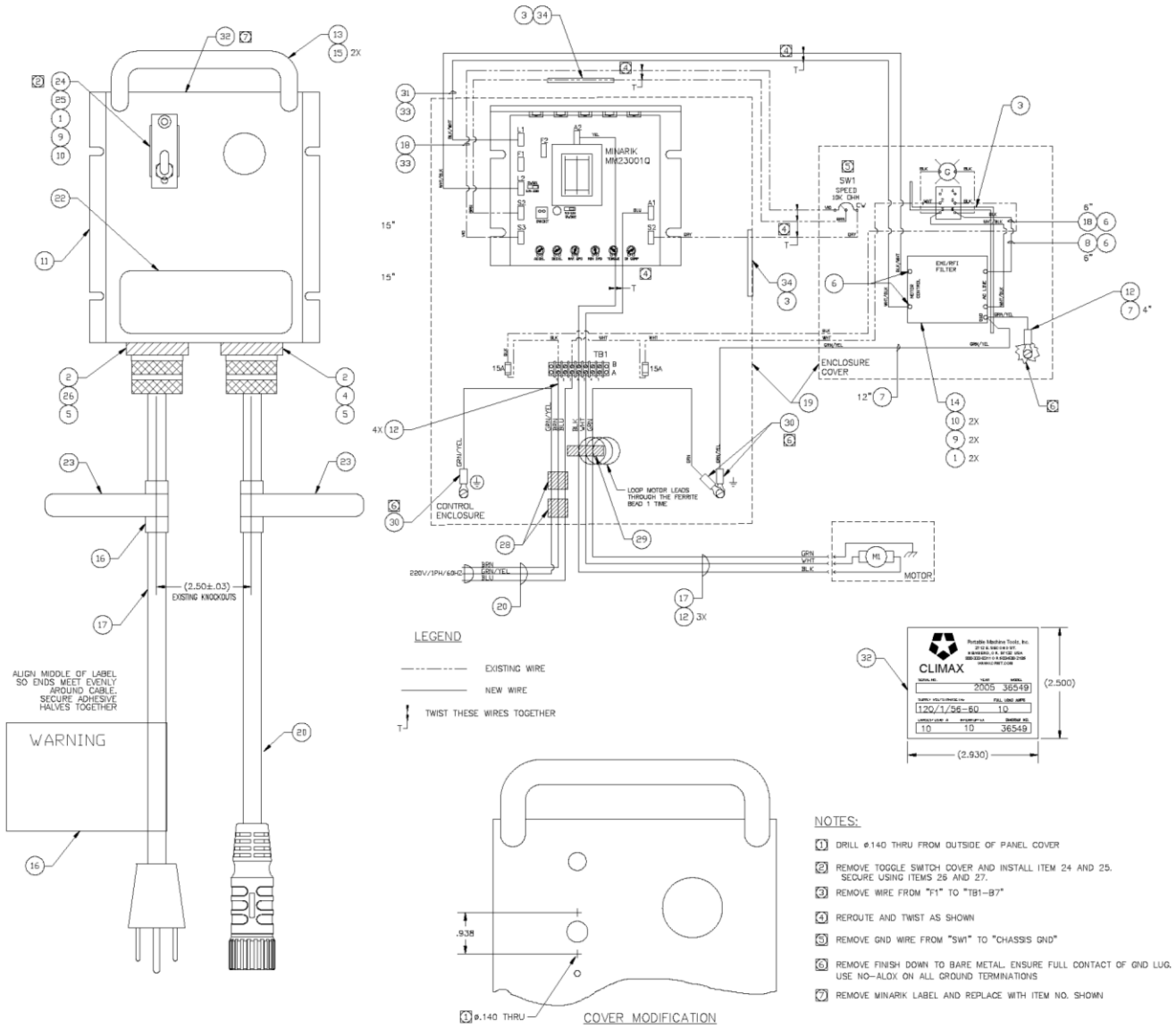


FIGURE 63 120V WELDON SPINDLE SCHEMATIC P/N 36549

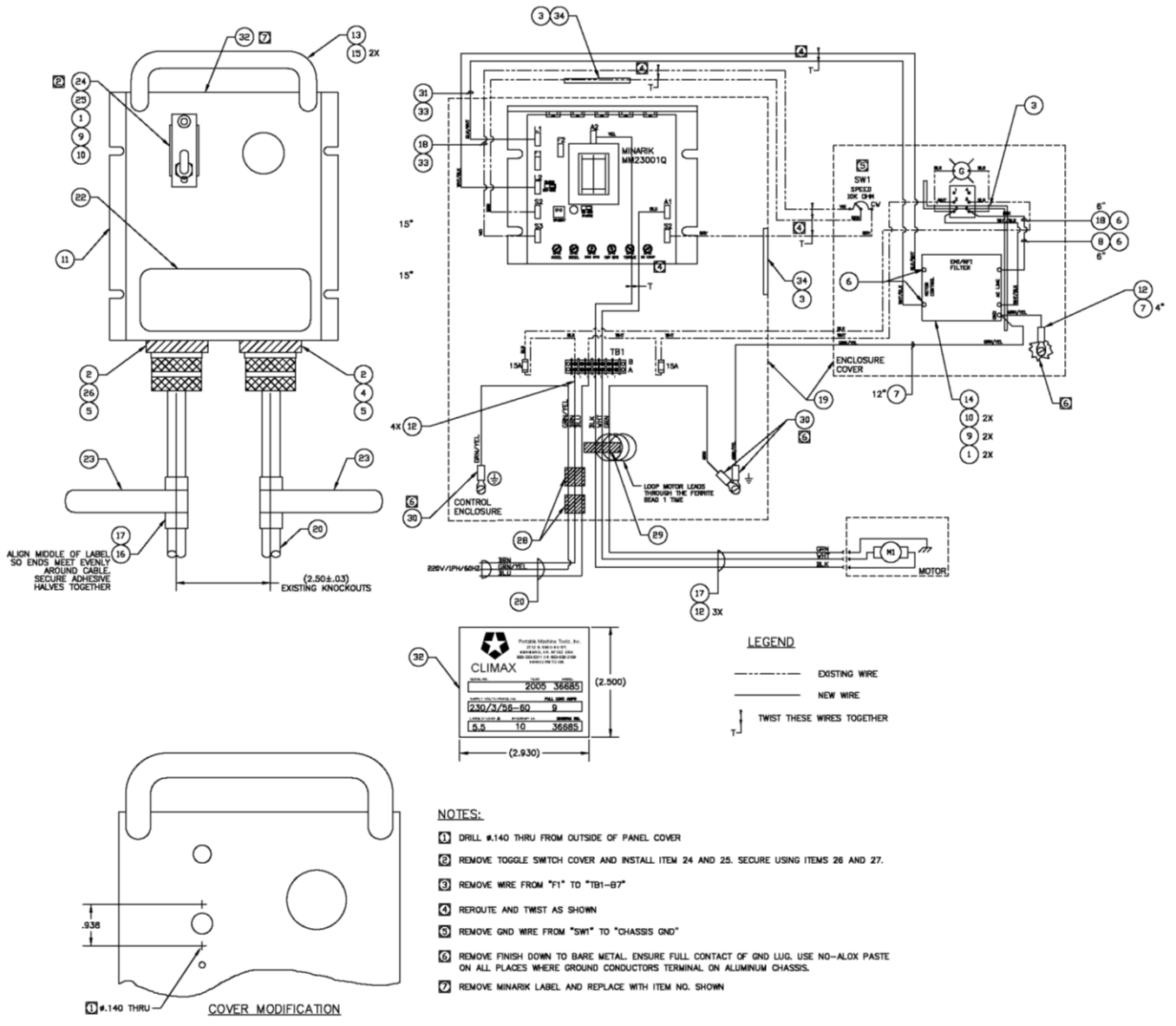
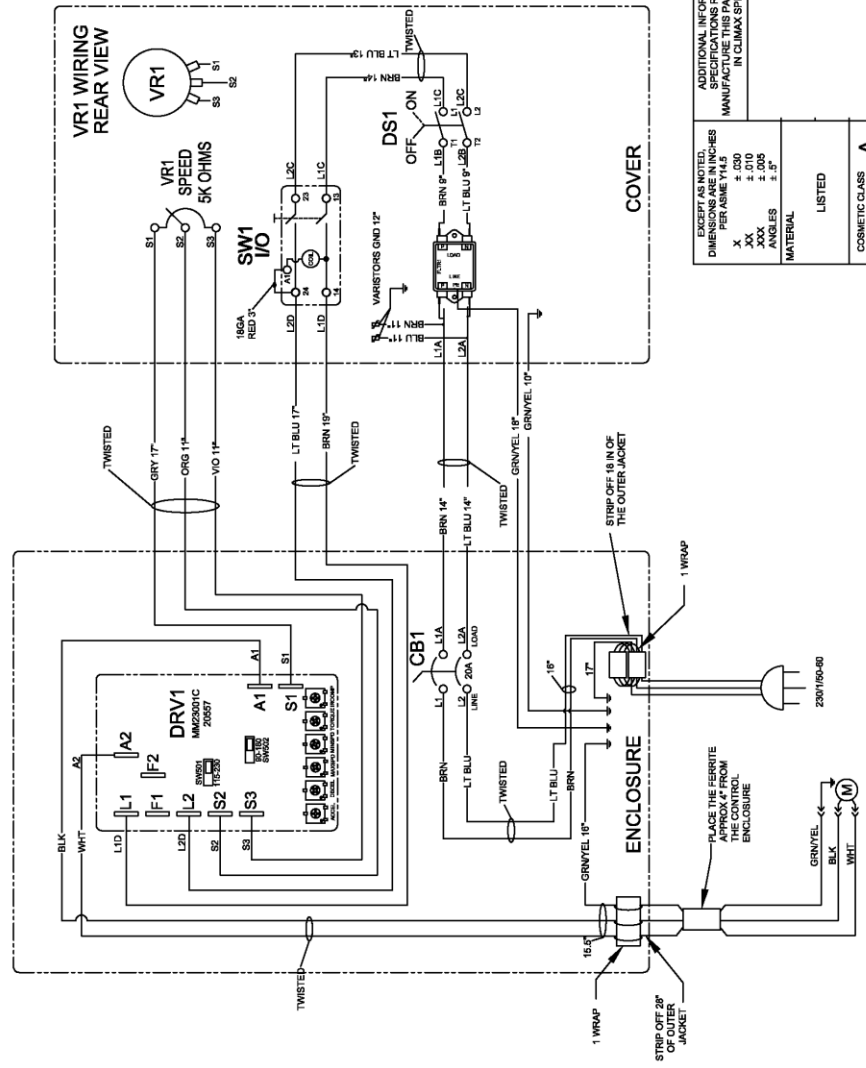
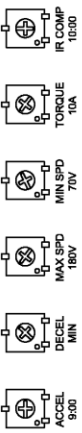


FIGURE 64 230V WELDON SPINDLE SCHEMATIC P/N 36685

TRIM POT SETTINGS



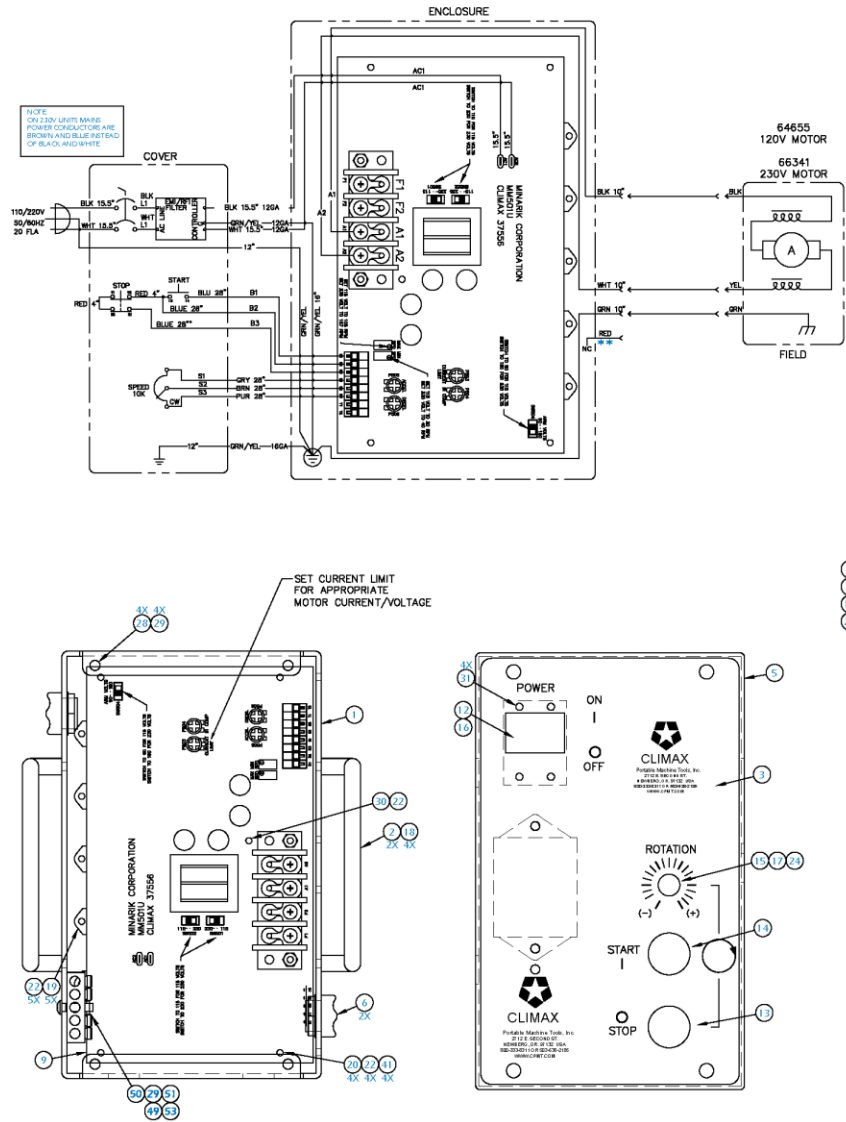
CLIMAX Portable Machining & Welding Systems		Part Number 79218
Version Information Revision 79218-1		Diagram No. 79218-1
Manufacturer CLIMAX		Part No. 79218-1
Material Copper		Quantity 1
Finish Clear		Notes 1.0
Date 10/10/10		Rev. 1.0

NOTES:

1. BUILD IN ACCORDANCE WITH CLIMAX ELECTRICAL STANDARD 38380
2. APPLY HEAT SINK COMPOUND TO THE MOUNTING SURFACE OF THE DRIVE
3. APPLY NO-ALOX TO ALL GROUND TERMINATIONS
4. ALL DEVICES TO BE IDENTIFIED PER PRINT. LABELS TO BE AFFIXED TO PANEL ADJACENT TO THE DEVICE (i.e. VR1, SW1, DS1 ETC.)
5. ALL WIRES TO BE LABELED AT EACH END AS LISTED ON SCHEMATIC
6. SET TRIM POTS AS SHOWN ABOVE, APPLY BLUE SECURITY SEAL ON EACH
7. TWIST ALL WIRE PAIRS, AND VR1 WIRE TRIC. MINIMUM 1 TWIST PER 1-1/2 INCHES.

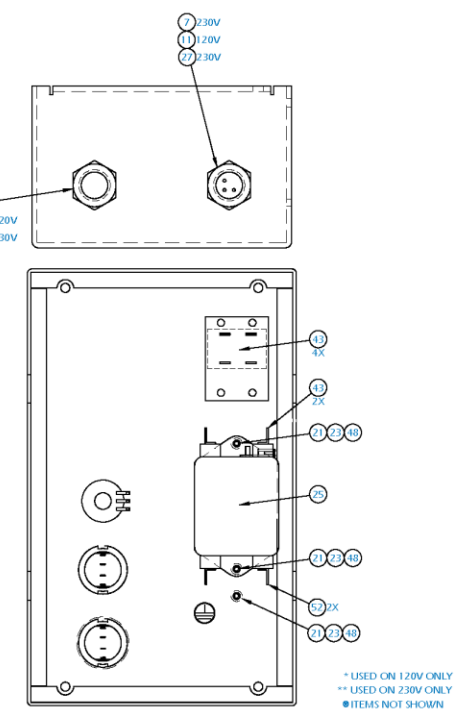
EXCEPT AS NOTED, DIMENSIONS ARE IN INCHES PER ASME Y14.5		ADDITIONAL INFORMATION AND SPECIFICATIONS REQUIRED TO MANUFACTURE THIS PART ARE PROVIDED IN CLIMAX SPEC P100	
XX	±.010	SIZE	CE MULTIPLE MODEL
XXX	±.005	CAGE CODE	15509
XX	±.005	DWG NO.	79218-1
XX	±.005	REVISION	H
MATERIAL LISTED		SCALE	NONE
COSMETIC CLASS EXCEPT AS NOTED		SHEET	1 OF 1
A			

FIGURE 65 SPEED CONTROLLER SCHEMATIC P/N 79218



- NOTES
- 1) APPLY HEATSINK COMPOUND (CLIMAX 31739) TO THE MOUNTING SURFACE OF MINIMAX DRIVE
 - 2) APPLY NONGLOSS TO ALL GROUND WIRE TERMINATIONS
 - 3) TIGHTEN LOCK NUTS AND SEALING NUTS ON SWITCHES AND POTENTIOMETER TO 40-70 INCHES
 - 4) TIGHTEN SET SCREWS ON POTENTIOMETER AN OBT TO 5.7 INCHES
 - 5) ALL WIRES SHALL BE LONG ENOUGH TO ALLOW ENCLASURE COVER TO OPEN 180° TO THE LEFT
 - 6) NAMEPLATE TO BE TAPPED AND RETIRED AT CLIMAX
 - 7) INSTALL ALL CONDUITS SO THAT THE OUTER COVER EXTENDS 1/4 INCH INSIDE THE ENCLOSURE
 - 8) WIRE TO OBTAINING 3600 FOR LABEL PLACEMENT
 - 9) INSTALL PIN TERMINALS ON ALL GROUND CONDUCTORS AT THE GROUND BUS
 - 10) INSTALL THE CIRCUIT BREAKER (ITEMS 12 OR 21) SO THAT ONLY 3/8" OF THE CASE PROTRUSION TO THE OUTSIDE OF THE COVER TRIM 1/8" OFF THE END OF THE BAIT HANDLE AND SMOOTH THE END WITH EMERY CLOTH
 - 11) APPLY LOCKTITE 242 TO 4 SCREWS IN THE CORNERS OF THE DRIVE. DO NOT TIGHTEN ENOUGH TO DEFORM RUBBER FEET
 - 12) SIMILAR TO CLIMAX CHART 6299 (P/N'S 37517 & 37518)

CLIMAX 66572		CLIMAX 66573	
ITEM	QTY	ITEM	QTY
120	30	230	20
15	18	7.5	10
	2.5		5



ITEM	QTY	DESCRIPTION	MFG & P/N
42	8	22351 WIRE 18 AWG RED (QTY IN INCHES)	CLIMAX
43	2	24118 SEALING RING 1/2 CONDUIT OIL TIGHT	CLIMAX
44	1	24115 SEALING RING 1/2 CONDUIT OIL TIGHT	CLIMAX
45	10	36421 WIRE 16 AWG WHITE/BLACK TYPE MTW (QTY IN INCHES)	CLIMAX
46	19	22322 WIRE 16 AWG BLACK TYPE MTW (QTY IN INCHES)	CLIMAX
47	18	36430 WIRE 16 AWG VIOLET TYPE MTW (QTY IN INCHES)	CLIMAX
48	10	36429 WIRE 16 AWG BROWN TYPE MTW (QTY IN INCHES)	CLIMAX
49	18	36428 WIRE 16 AWG GRAY TYPE MTW (QTY IN INCHES)	CLIMAX
50	18	31340 WIRE 12 AWG WHITE TYPE MTW (QTY IN INCHES)	CLIMAX
51	1	37749 WIRE 20 VILCRO 1 LONG	CLIMAX
52	3	32335 TERMINAL PIN 10-12 AWG	CLIMAX
53	2	37521 TERMINAL SPACER (M 25 10-12AWG)	CLIMAX
54	1	38843 GROUND BUS 4 POLE COPPER CE CORNERS	CLIMAX
55	1	28660 NUT TO 32 LOCKING STAR WASHER	CLIMAX
56	1	32304 TERMINAL PIN 16-18 AWG	CLIMAX
57	3	35923 WASHER #8 FLTW NYLON	CLIMAX
58	1	47981 NAMEPLATE ELECTRICAL CONTROL PANELS CE	CLIMAX
59	1	39725 PLATE SERIAL YEAR MODEL ELECTRICAL PANELS 2.75 X 3.13	CLIMAX
60	1	37576 LABEL ELECTRICAL WIRING	CLIMAX
61	1	10580 SCREW DRIVE #2 X 1/4 HOLE DR9 X .25 DIP	CLIMAX
62	1	37572 LABEL FR CIRCUITS TERMINAL	CLIMAX
63	6	38324 TERMINAL SPACER FEMALE (M 25 10-12AWG)	CLIMAX
64	36	35595 SEAL NEOPRENE SPONGE 3/8 X 5/32 ADHESIVE BACK	CLIMAX
65	1	55771 BUMPER 1/2 (30 X 1/4 TALL X 1/8 CENTER HOLE	CLIMAX
66	3	28526 TERMINAL RING 16 16AWG X #8 VENT. NUTS BLUE	CLIMAX
67	1	34726 TERMINAL RING POST 12-10AWG RW/M STUO	CLIMAX
68	1	30081 LABEL VOLTAGE 230V	CLIMAX
69	1	32385 LABEL VOLTAGE 120V	CLIMAX
70	12	32352 WIRE 12 AWG GREEN/YELLOW TYPE MTW	CLIMAX
71	10	27889 WIRE 12 AWG BLACK TYPE MTW (QTY IN INCHES)	CLIMAX
72	14	27571 WIRE 16 AWG GRN/YEL TYPE MTW	CLIMAX
73	18	27467 WIRE 16 AWG BLUE TYPE MTW (QTY IN INCHES)	CLIMAX
74	3	13296 WIRE 18 AWG MOUNTING BASE ADHESIVE BACKED LARGE	CLIMAX
75	6	18243 WIRE 16 MEDIUM 14 X 8	CLIMAX
76	1	29461 WASHER #6 FLTW NYLON	CLIMAX
77	1	11759 SCREW # 32 X 5/8 ROUND HEAD SLOTTED ZINC PLATED	CLIMAX
78	5	35366 SCREW 10-32 X 5/4 BINDING HEAD SLOTTED MS	CLIMAX
79	4	29468 WASHER #10 FLTW NYLON	CLIMAX
80	1	68170 CONNECTOR 4 POLE 24AMP FEMALE 1/2 NPT PANEL MNT	CLIMAX
81	1	34829 CONDUIT POWER SCHUNKO CP FLUG 250V 1A X 7 FT	CLIMAX
82	1	34144 FILTER RIFEM 24AMP 115/230V 50/60HZ	CLIMAX
83	1	32926 SEAL POTENTIOMETER HEADNUT 25 SHAFT 3/8-32 TH	CLIMAX
84	8	28812 NUT #32 LOCKING STAR WASHER	CLIMAX
85	10	29450 NUT # 32 LOCKING STAR WASHER	CLIMAX
86	1	11852 SCREW #32 X 1/2 BR-SSCS	CLIMAX
87	4	39449 SCREW #4 X 3/4 SCS BLACK COGNR	CLIMAX
88	5	11677 SCREW #32 X 3/8 BR-SSCS	CLIMAX
89	8	34481 SCREW M5 X 0.8 X 12MM BRCS ZINC FINISH	CLIMAX
90	1	35766 RING POTENTIOMETER AL .75 DIA. 25 SHAFT	CLIMAX
91	1	42796 PANEL BODY FOR CIR BREAKERS TYPE C1113142	CLIMAX
92	1	39162 POTENTIOMETER 10K LIN 1/4 SHAFT 3/8 BUSHINGS	CLIMAX
93	1	62957 PUSHBUTTON START 23MM 1 N.O. CONTACT GREEN	CLIMAX
94	1	62952 PUSHBUTTON STOP 23MM 2 N.C. CONTACTS	CLIMAX
95	1	42798 CIRCUIT BREAKER 20 AMP DOUBLE POLE	CLIMAX
96	1	42797 CIRCUIT BREAKER 30 AMP DOUBLE POLE	CLIMAX
97	1	37536 RECEPTACLE FEMALE 20 AMP 3 POLE BRONZE MAX	CLIMAX
98	1	37519 CONDUIT 1.50" MAUI 1/2" LOCK 72" 1.83 S/DIOW	CLIMAX
99	1	37556 CONTROLLER MODIFIED CUSTOM MMS1U W/O HEATSINK	CLIMAX
100	1	37739 CORD GRP NONMETALLIC 17-47 DIA X 1/2 NPT	CLIMAX
101	1	28361 CORD GRP ALUMINUM 5-23 1/2 NPT	CLIMAX
102	2	37744 CONDUIT NUT 1/2 NPT NONMETALLIC	CLIMAX
103	7	12974 NUT 1/2 NPT CONDUIT	CLIMAX
104	2	37565 VENT 3/4 ELECTRICAL ENCLOSURE	CLIMAX
105	1	37504 ENCLOSURE COVER BR5000 CONTROLLER	CLIMAX
106	1	34784 LABEL WARNING 3-1/2 X 1 1	CLIMAX
107	1	68917 LEGEND PLATE PM4200 CONTROLLER COVER	CLIMAX
108	2	32353 HANDLE & INCL UNLOCKED OFFSET CHROME	CLIMAX
109	1	37503 ENCLOSURE BR5000 BR5000 CONTROLLER	CLIMAX
110	1	37503 ENCLOSURE BR5000 BR5000 CONTROLLER	CLIMAX

FIGURE 66 120V AND 230V HSK SCHEMATIC P/N 68926

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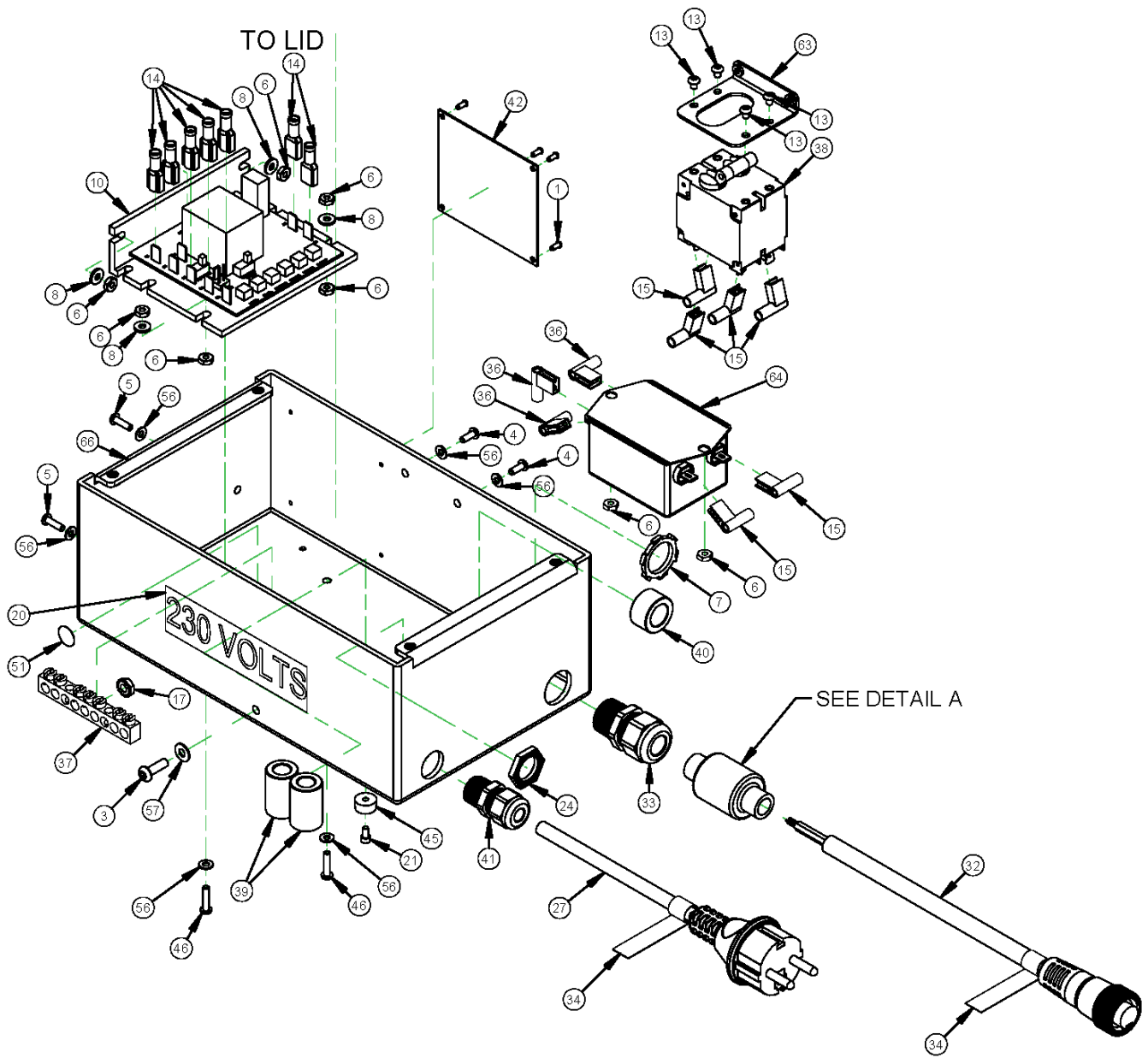
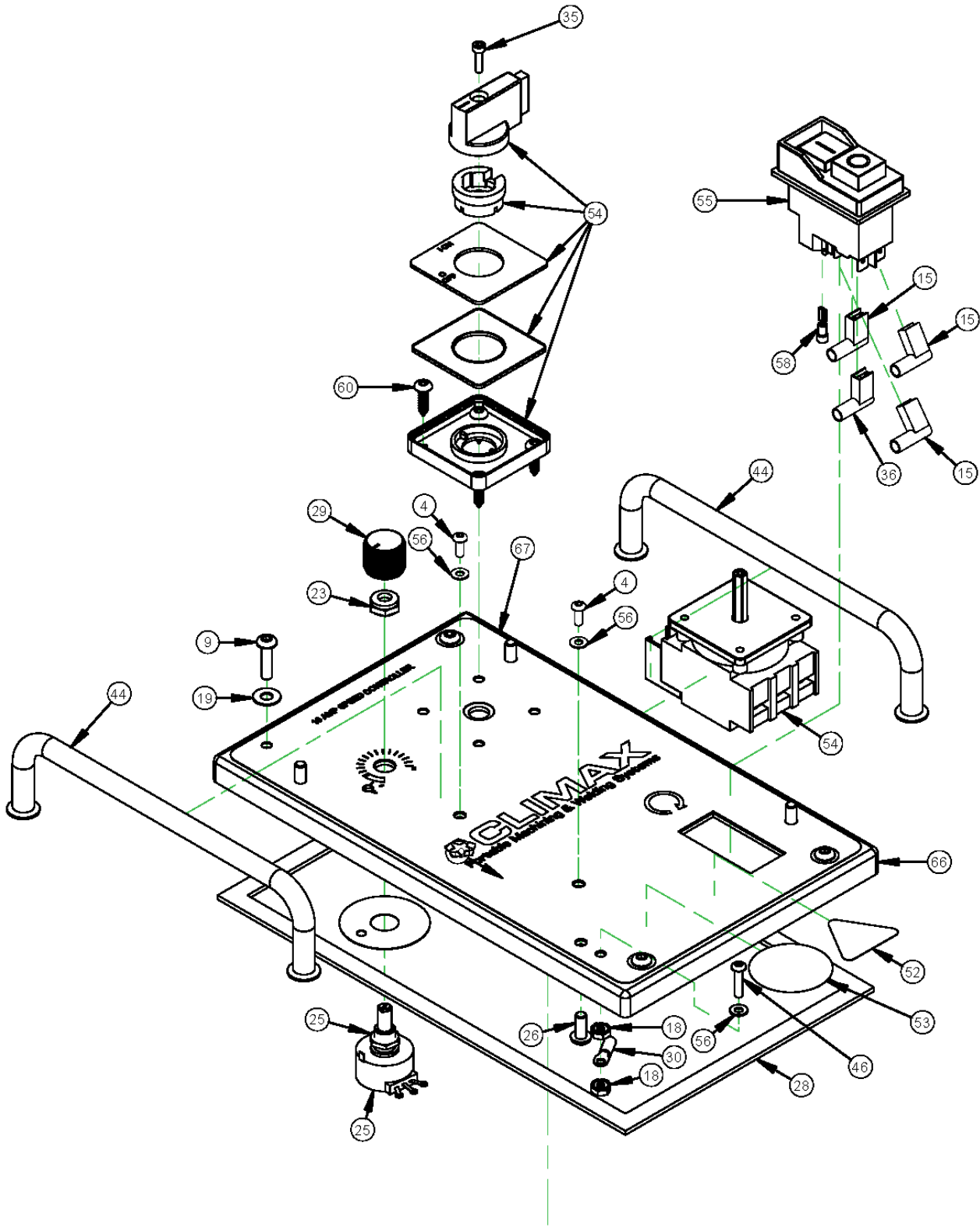


FIGURE 67 CONTROLLER ASSEMBLY P/N 79218



TO ENCLOSURE

FIGURE 68 CONTROLLER ASSEMBLY 2 P/N 79218

PARTS LIST				PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION	ITEM	QTY	P/N:	DESCRIPTION
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089	37	1	38444	GROUND BUSS 7 POLE COPPER CE CERTIFIED
2	10	10673	(NOT SHOWN) WIRE TIE SMALL .09 X 3.5	38	1	42798	CIRCUIT BREAKER 20 AMP DOUBLE POLE
3	1	11674	SCREW #10-32 x 5/8 BHSCS	39	2	45158	FERRITE BEAD TUBULAR .398 ID X .735 OD X 1.125 LG
4	4	11677	SCREW 6-32 X 3/8 BHSCS	40	1	45159	FERRITE BEAD TUBULAR .545 ID X .88 OD X .50
5	2	11686	SCREW 6-32 X 1/2 BHSCS	41	1	46383	CORD GRIP .105-.312 DIA 3/8 NPT
6	8	11687	NUT 6-32 STDN ZINC PLATED	42	1	47981	NAMEPLATE ELECTRICAL CONTROL PANELS CE
7	1	12574	CONDUIT NUT 1/2 NPT	43	1	48778	CHOKE FERRITE 1.02 OD X 0.505 ID X 1.125 125 OHM @25MHZ
8	4	12621	WASHER #6 FLTW SAE ZINC	44	2	52160	HANDLE 180MM X 43MM U-SHAPED CHROME
9	4	18902	SCREW 10-32 X 3/4 BHSCS	45	4	55771	BUMPER 1/2 OD X 1/4 TALL X 1/8 CENTER HOLE
10	1	20557	CONTROL SPEED SCR MM23001C	46	3	62944	SCREW 6-32 X 5/8 BHSCS
11	3	22351	(NOT SHOWN) WIRE 18 AWG 600V RED TYPE MTW	47	3	70657	TUBING HEAT SHRINK .75 ID 2:1 SHRINK RATIO CLEAR 50 FT SPOOL
12	9	22800	(NOT SHOWN) TUBE SHRINK .125 DIA BLACK	48	2	70901	TUBING HEAT SHRINK .19 ID 2:1 SHRINK RATIO
13	4	26468	SCREW 6-32 X 3/16 BHSCS	49	20	71021	(NOT SHOWN) WIRE 18 AWG BLUE TYPE MTW MIN. 600V 0.1 OD
14	7	26629	TERMINAL SPADE 16-14 AWG .250 X .032 FEMALE INSULATED	50	2	73782	(NOT SHOWN) VARISTOR 420VAC RMS 560VDC 4.5KA PEAK CURRENT 14MM DIA
15	9	27377	TERMINAL SPADE 90DEG 16-14AWG .250 FM INSUL	51	1	77568	LABEL PROTECTIVE EARTH 1/2" DIA
16	29	27571	(NOT SHOWN) WIRE 16 AWG GRN/YEL TYPE MTW	52	1	78593	LABEL WARNING - ELECTRICAL SHOCK/ELECTROCUTION 1.13" TRIANGLE
17	1	28060	NUT, 10-32 UNF KEPS	53	1	78824	LABEL WARNING - DO NOT EXPOSE TO WATER
18	2	29450	NUT 6-32 LOCKING STAR WASHER	54	1	78953	DISCONNECT SWITCH DOOR MOUNT IP55 16 AMP RED/YELLOW HANDLE
19	4	29458	WASHER #10 FLTW NYLON .031 THICK	55	1	79231	SWITCH 230V LOW-VOLTAGE DROPOUT
20	1	30081	LABEL VOLTAGE 230V (KB)	56	9	79316	WASHER #6 NYLON .15 ID X .32 OD X .03 BLACK
21	4	30828	SCREW 5-40 X 1/4 SHCS	57	1	79348	WASHER #10 NYLON .19 ID X .44 OD X .03 BLACK
22	4	32304	(NOT SHOWN) TERMINAL PIN 14-16 AWG	58	1	79574	TERMINAL SPADE 22-18 AWG .110 X .032 FEMALE INSULATED RED
23	1	32926	SEAL POTENTIOMETER HEXNUT .25 SHAFT 3/8-32 TH	59	11	79605	(NOT SHOWN) HOLDER CABLE TIE 3/4 X 3/4 3/16 CABLE TIE
24	1	33099	NUT CONDUIT 3/8 STEEL	60	4	79643	SCREW #8 X 5/8 SHEET METAL #2 SQUARE DRIVE
25	1	33182	POTENTIOMETER 10K LIN 1/4 SHAFT 3/8 BUSHING	61	84	79864	(NOT SHOWN) WIRE 14 AWG BRN TYPE MTW
26	4	34481	SCREW M5 X 0.8 X 12 mm BHSCS	62	81	79867	(NOT SHOWN) WIRE 14 AWG LT BLU TYPE MTW
27	1	34829	CORDSET CEE 7/7 STRAIGHT MOLDED PLUG 250V 16AMP 2.5M	63	1	80091	BRACKET CIRCUIT BREAKER CE SPEED CONTROLLER
28	34	35655	SEAL NEOPRENE SPONGE 3/8 X 5/32 ADHESIVE BACK	64	1	80337	FILTER RFI/EMI 16AMP 120/250VAC 50/60HZ
29	1	35766	KNOB POTENTIOMETER AL .75 DIA .25 SHAFT	65	2.5	81002	TUBING HEAT SHRINK 3:1 ADHESIVE 1.1 ID SHRINK TO .38 RED
30	1	35799	TERMINAL RING 22-16 #6/M3.5 STUD	66	1	82961	ENCLOSURE 230V BB3000 PL2000 CONTROLLER CE
31	17	36428	(NOT SHOWN) WIRE 16 AWG GRY TYPE MTW	67	1	82984	LEGEND PLATE BB3000 120/230V SPEED CONTROLLER
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				
36	4	38324	TERMINAL SPADE FEMALE 90 DEG 12-10 AWG				

FIGURE 69 CONTROLLER PARTS LIST P/N 79218

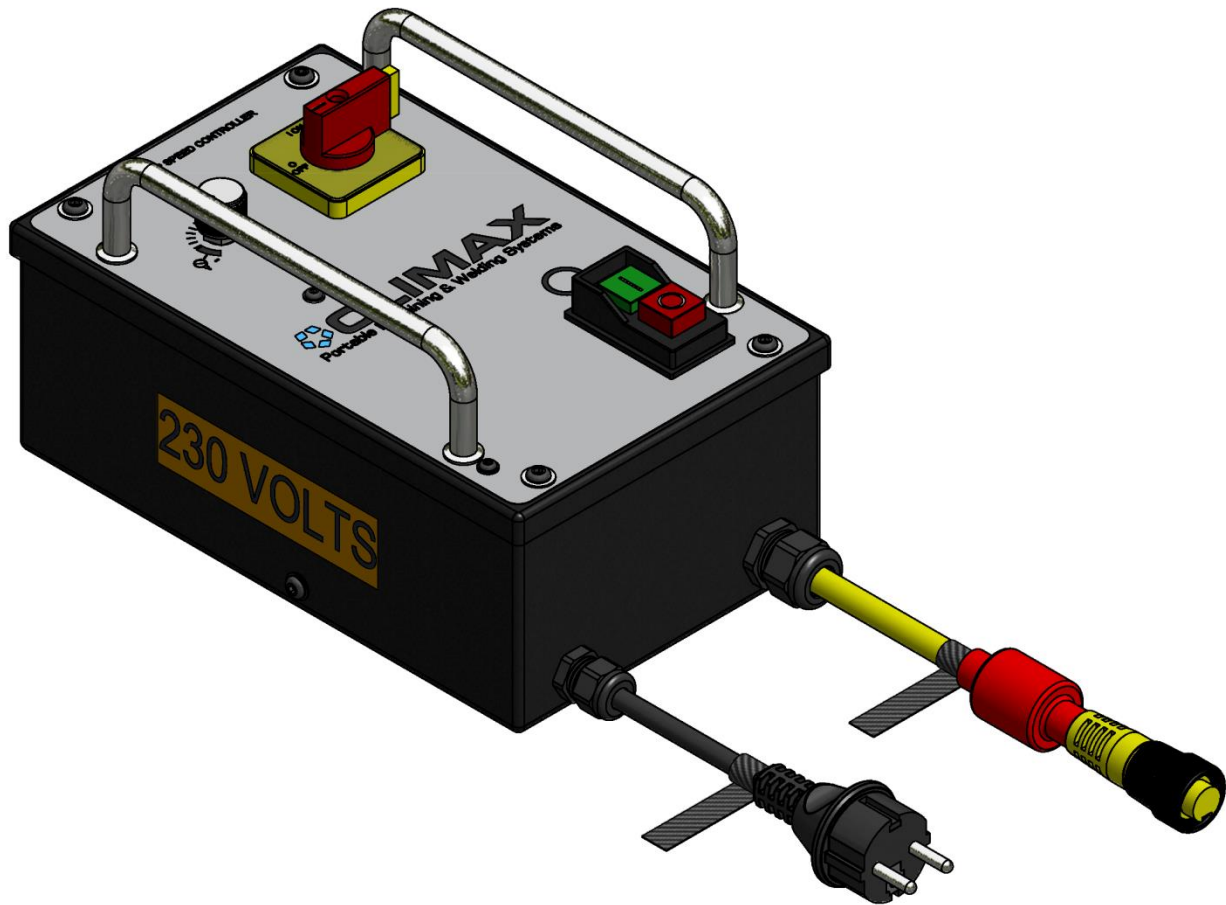
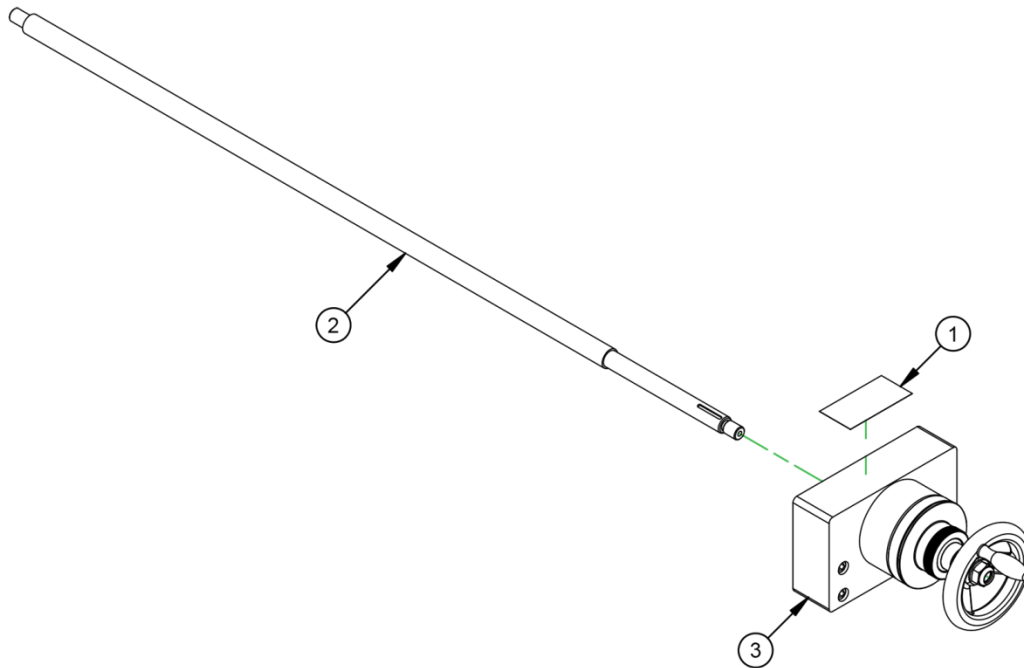


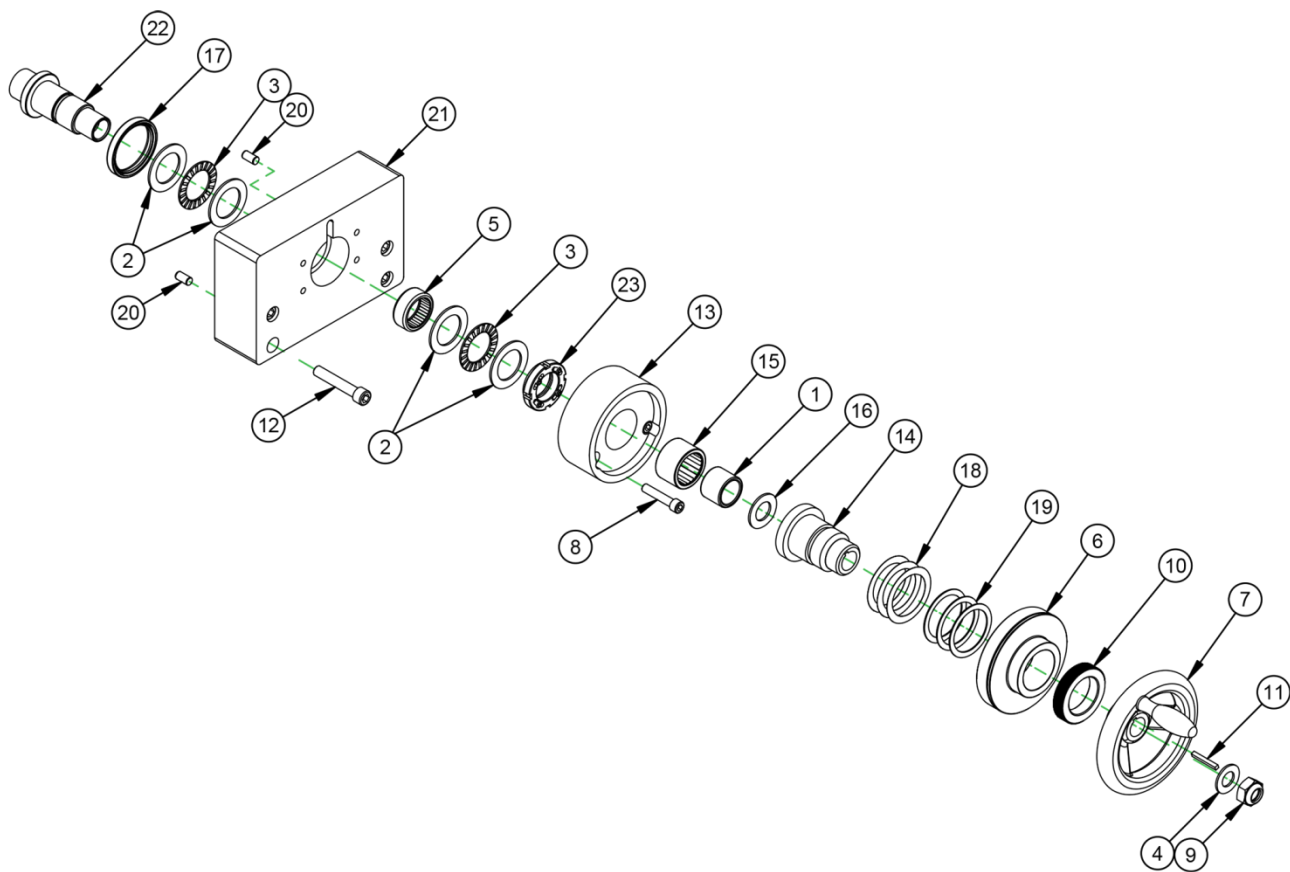
FIGURE 70 CONTROLLER ASSEMBLED P/N 79218



AVAILABLE CONFIGURATIONS	
P/N	DESCRIPTION
65305	ASSY FEED MANUAL 20" TRAVEL W/ LEADSCREW PM4200
65306	ASSY FEED MANUAL 49" TRAVEL W/ LEADSCREW PM4200
65307	ASSY FEED MANUAL 78" TRAVEL W/ LEADSCREW PM4200

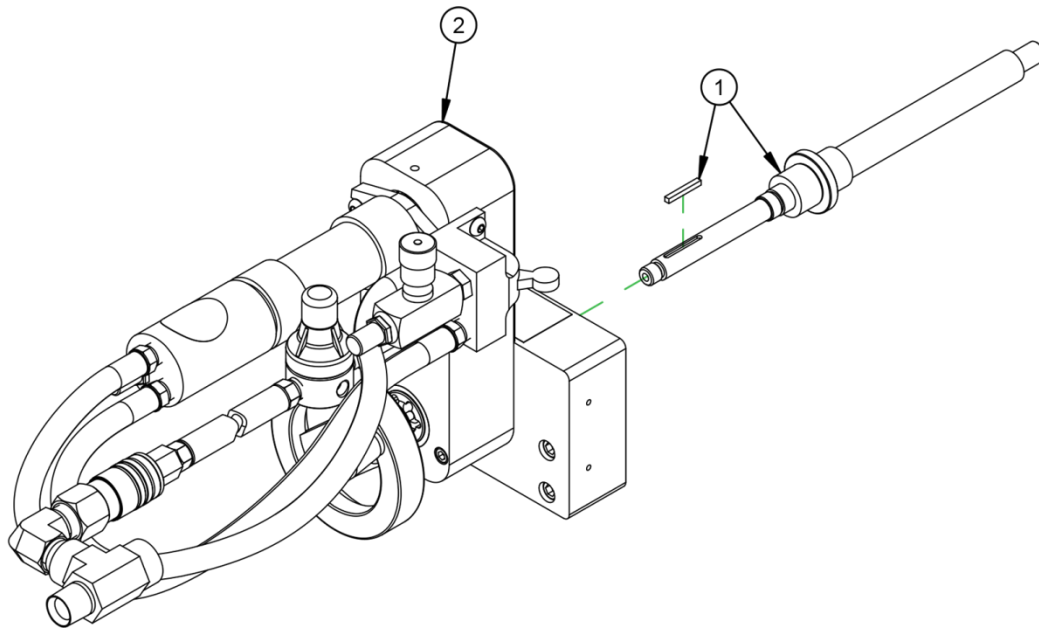
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	25979	LABEL WARNING PINCH POINT
2	1	64822	LEADSCREW 3/4" LH 20 TRAVEL PM4200
		64823	LEADSCREW 3/4" LH 49 TRAVEL PM4200
		64824	LEADSCREW 3/4" LH 78 TRAVEL PM4200
3	1	65298	ASSY FEED MANUAL PM4200

FIGURE 71 FEED ASSEMBLY W/ MANUAL LEADSCREW P/N 75485



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	10112	SP BRG RACE .787 ID X 1.0 OD X .792
2	4	10144	WASHER THRUST 1 ID X 1.562 OD X .060
3	2	10145	BRG THRUST 1.000 ID X 1.562 OD X .0781
4	1	10436	WASHER THRUST .500 ID X .937 OD X .060
5	1	10524	BRG NEEDLE 1 ID X 1-1/4 OD X 1/2 OPEN
6	1	10655	DIAL .100 GRA BRIDGEPORT TYPE
7	1	10661	HANDWHEEL MODIFIED 4 DIA
8	2	10671	SCREW 1/4-20 X 1-1/4 SHCS
9	1	10674	NUT 1/2-20 JAMNYLOC
10	1	10675	SP COLLAR RETAINING THREADED 1-1/4-20 UN
11	1	10678	KEY 1/8 SQ X 1.00 SQ BOTH ENDS
12	4	10684	SCREW 5/16-18 UNC-2B X 1-3/4 SHCS
13	1	10722	SUPPORT BRG CPM
14	1	10723	SUPPORT DIAL
15	1	10724	BRG NEEDLE 1 ID X 1-5/16 OD X .812 OPEN
16	1	11165	WASHER THRUST .625 ID X 1.125 OD X .060
17	1	15669	SEAL 1.500 ID X 1.874 OD X .250
18	3	19298	SP SHIM 1.375 ID X 1.84 OD X .005
19	3	19299	SP SHIM 1.4 ID X 1.75 OD X .032
20	2	20166	PIN DOWEL 1/4 DIA X 1/2
21	1	64814	PLATE FEED PM4200 BED
22	1	64825	SLEEVE LEADSCREW BEARING PM4200
23	1	64826	NUT LOCKING TLN-05 FACE LOCKING

FIGURE 72 FEED ASSEMBLY W/ MANUAL LEADSCREW P/N 65298



AVAILABLE CONFIGURATIONS	
P/N:	Description
65309	ASSY FEED PNEUMATIC 20" TRAVEL W/ LEADSCREW PM4200
65310	ASSY FEED PNEUMATIC 49" TRAVEL W/ LEADSCREW PM4200
65311	ASSY FEED PNEUMATIC 78" TRAVEL W/ LEADSCREW PM4200

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	65302	LEADSCREW 3/4" LH 20 TRAVEL PM4200 PNEU. FEED
		65303	LEADSCREW 3/4" LH 49 TRAVEL PM4200 PNEU. FEED
		65304	LEADSCREW 3/4" LH 78 TRAVEL PM4200 PNEU. FEED
2	1	65308	ASSY FEED PNEUMATIC PM4200

FIGURE 73 FEED ASSEMBLY W/ PNEUMATIC LEADSCREW P/N 72803

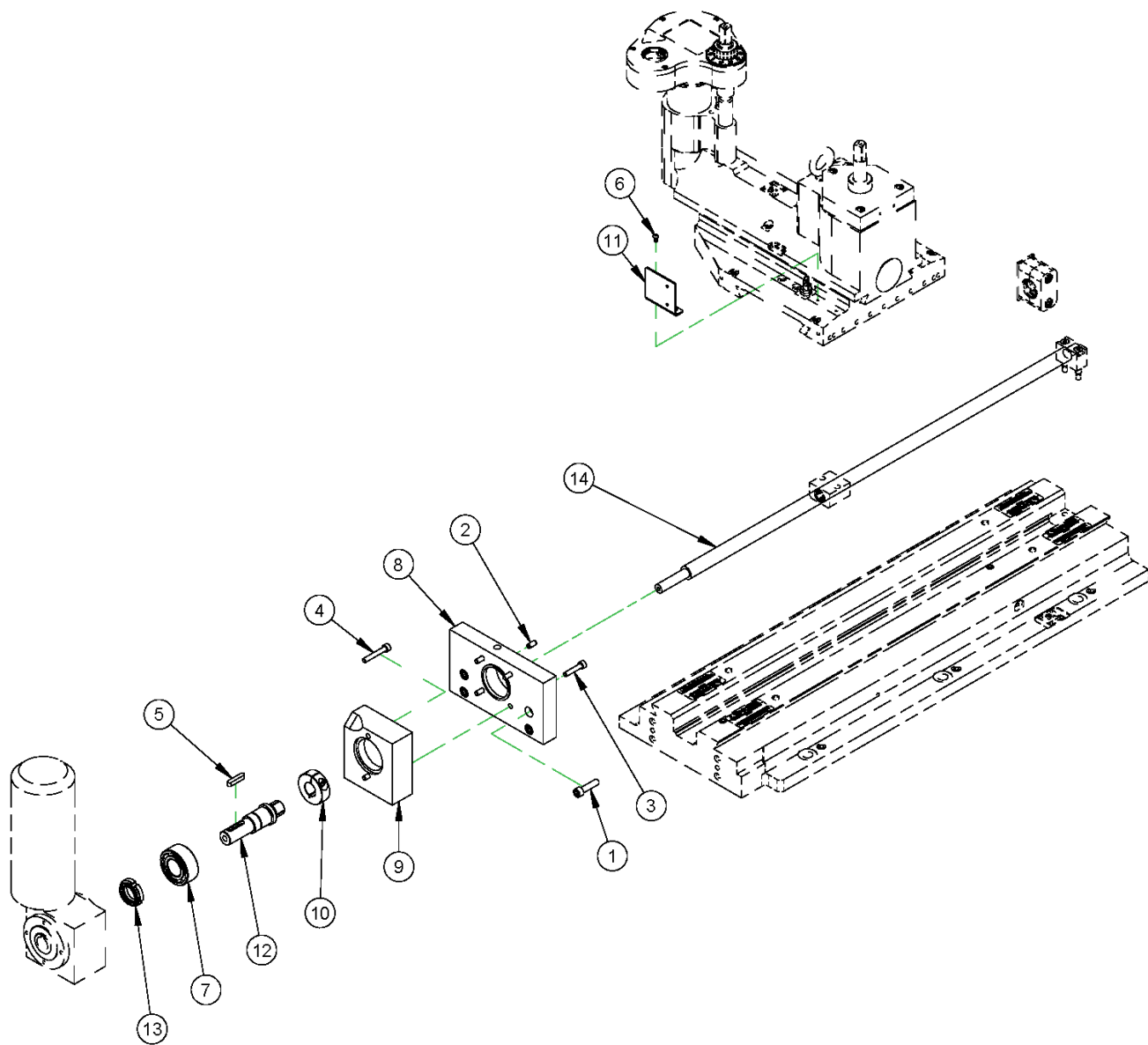


FIGURE 74 BEARING BLOCK ASSEMBLY P/N 82576

82577	ASSY BRG BLOCK 20" TRAVEL EU FEED PM4200	82335
82578	ASSY BRG BLOCK 49" TRAVEL EU FEED PM4200	82336
82579	ASSY BRG BLOCK 78" TRAVEL EU FEED PM4200	82337
PART NO.	DESCRIPTION	ITEM 14 P/N
AVAILABLE CONFIGURATIONS		

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	11735	SCREW 5/16-18 X 1-1/4 SHCS
2	2	20166	PIN DOWEL 1/4 DIA X 1/2
3	4	35505	SCREW M6 X 1.0 X 30 SHCS
4	2	36125	SCREW M6 X 1.0 X 40mm SHCS
5	1	42430	KEY 6mm SQ X 30 mm ROUND BOTH ENDS
6	2	79219	SCREW M4 X 0.7 X 8MM BHSCS
7	1	80384	BRG BALL DOUBLE ROW .9843 ID X 2.0472 OD X .8110
8	1	82397	PLATE MOUNT EU FEED
9	1	82398	PLATE BRG MOUNT EU FEED
10	1	82461	SHAFT COLLAR 20MM ID X 45MM OD X 15MM SLIT
11	1	82466	BRACKET PM42000 EU FEED
12	1	82556	SHAFT MOTOR MOUNT EU FEED
13	1	82689	NUT M25 X 1.5 SELF-LOCKING W/NYLON RING
14	1	CHART	CHART LEADSCREW 3/4" LH PM4200 FOR EU FEED

FIGURE 75 BEARING BLOCK ASSEMBLY PARTS LIST P/N 82576

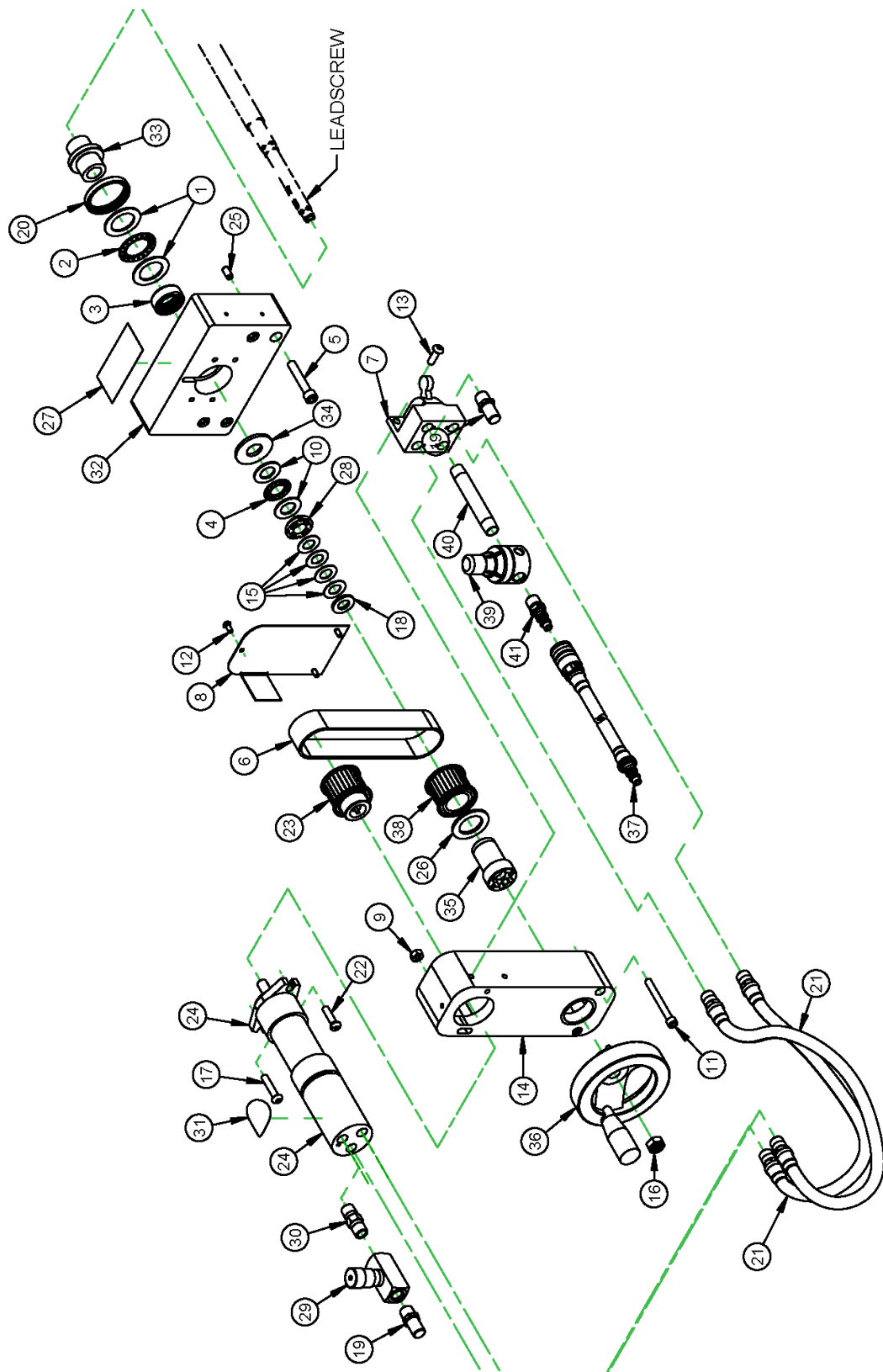


FIGURE 76 PNEUMATIC FEED ASSEMBLY P/N 65308

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	10144	WASHER THRUST 1 ID X 1.562 OD X .060
2	1	10145	BRG THRUST 1 ID X 1.562 OD X .0781
3	1	10524	BRG NEEDLE 1 ID X 1-1/4 OD X 1/2 OPEN
4	1	10538	BRG THRUST .625 ID X 1.125 OD X .0781
5	4	10684	SCREW 5/16-18 UNC-2B X 1-3/4 SHCS
6	1	10691	BELT DRIVE COGGED 150L100
7	1	10693	VALVE MANUAL 4-WAY AIR
8	1	10715	GUARD DRIVE BOX
9	1	10716	NUT HEX 1/4 STDN
10	2	11165	WASHER THRUST .625 ID X 1.125 OD X .060
11	2	11358	SHCS 1/4-20 X 2-1/4
12	3	11359	SCREW 8-32 X 3/8 BHSCS
13	2	11365	SCREW 1/4-20 X 3/4 BHSCS
14	1	11368	BOX DRIVE ASSY
15	4	11736	WASHER THRUST .500 ID X .937 OD X .030
16	1	11883	NUT 7/16-20 NYLON INSERT
17	1	12584	SCREW 1/4-20 X 1-1/4 BHSCS
18	1	13227	WASHER THRUST .500 ID X .937 OD X .092
19	2	13641	FTG MUFFLER 1/4 NPTM
20	1	15669	SEAL 1.500 ID X 1.874 OD X .250
21	2	16347	HOSE ASSY 801 1/4 X 1/4 NPTM X 1/4 NPTMS X 16
22	1	19042	SCREW 1/4-20 X 1 BHSCS
23	1	19501	PULLY AIR MOTOR CPM FEED
24	1	19504	MOTOR AIR .31HP MODIFIED
25	2	20166	PIN DOWEL 1/4 DIA X 1/2
26	1	22402	WASHER THRUST 1.000 ID X 1.562 OD X .095
27	1	25979	LABEL WARNING PINCH POINT
28	1	48629	NUT LOCKING TLN-02
29	1	48726	VALVE NEEDLE 1/4 NPTF
30	1	52239	FTG ADAPTER 1/4 NPTM X 1/4 NPTM HEX NIPPLE
31	1	59037	LABEL WARNING - WEAR EAR PROTECTION
32	1	64814	PLATE FEED PM4200 BED
33	1	65314	SLEEVE LEADSCREW BEARING PM4200
34	1	65315	BACKING WASHER FOR THRUST WASHER
35	1	65316	BUSHING PULLEY FEED ENGAGE
36	1	65317	ASSY HANDWHEEL 4" OD
37	1	65321	HOSE ASSY 1/4 QD COUPLER X 1/4 QD NIPPLE X 72 LG
38	1	65327	PULLEY LEADSCREW PNEUMATIC FEED PM4200
39	1	76548	REGULATOR PRESSURE NONADJUSTABLE AIR, FIXED AT 40 PSI
40	1	76560	FTG LONG NIPPLE 1/4 X 3.5
41	1	96822	FTG QD NIPPLE 1/4B X 1/4 NPTM PNEUMATIC

FIGURE 77 PNEUMATIC FEED ASSEMBLY P/N 65308

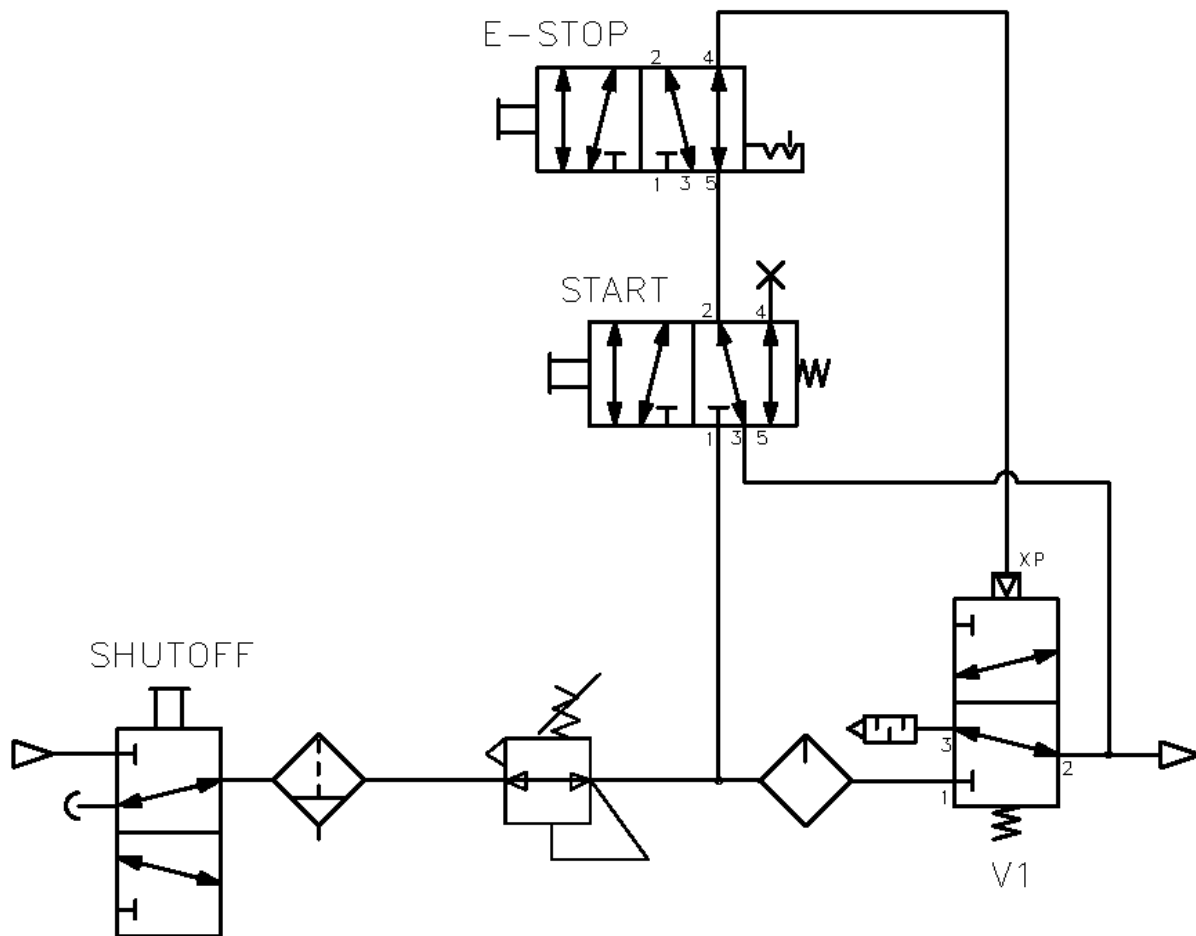
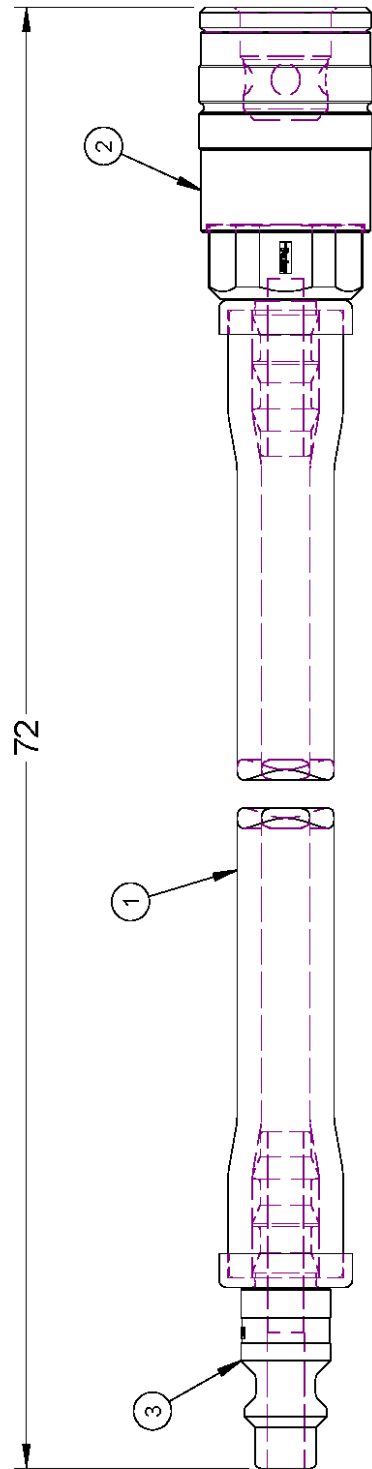


FIGURE 78 PNEUMATIC CONDITIONING UNIT CONTROL SCHEMATIC P/N 78264



PARTS LIST	
ITEM	DESCRIPTION
1	HOSE 1/4 ID X 72 LG (PARKER PUSH-LOK 801-4-YEL-RL)
2	FTG COUPLER QD 1/4 X 1/4 PUSH LOK HOSE BARB (PARKER B20-3BP)
3	FTG NIPPLE QD 1/4 PUSH LOK HOSE BARB (PARKER BH8CP)

FIGURE 79 HOSE ASSEMBLY P/N 65321

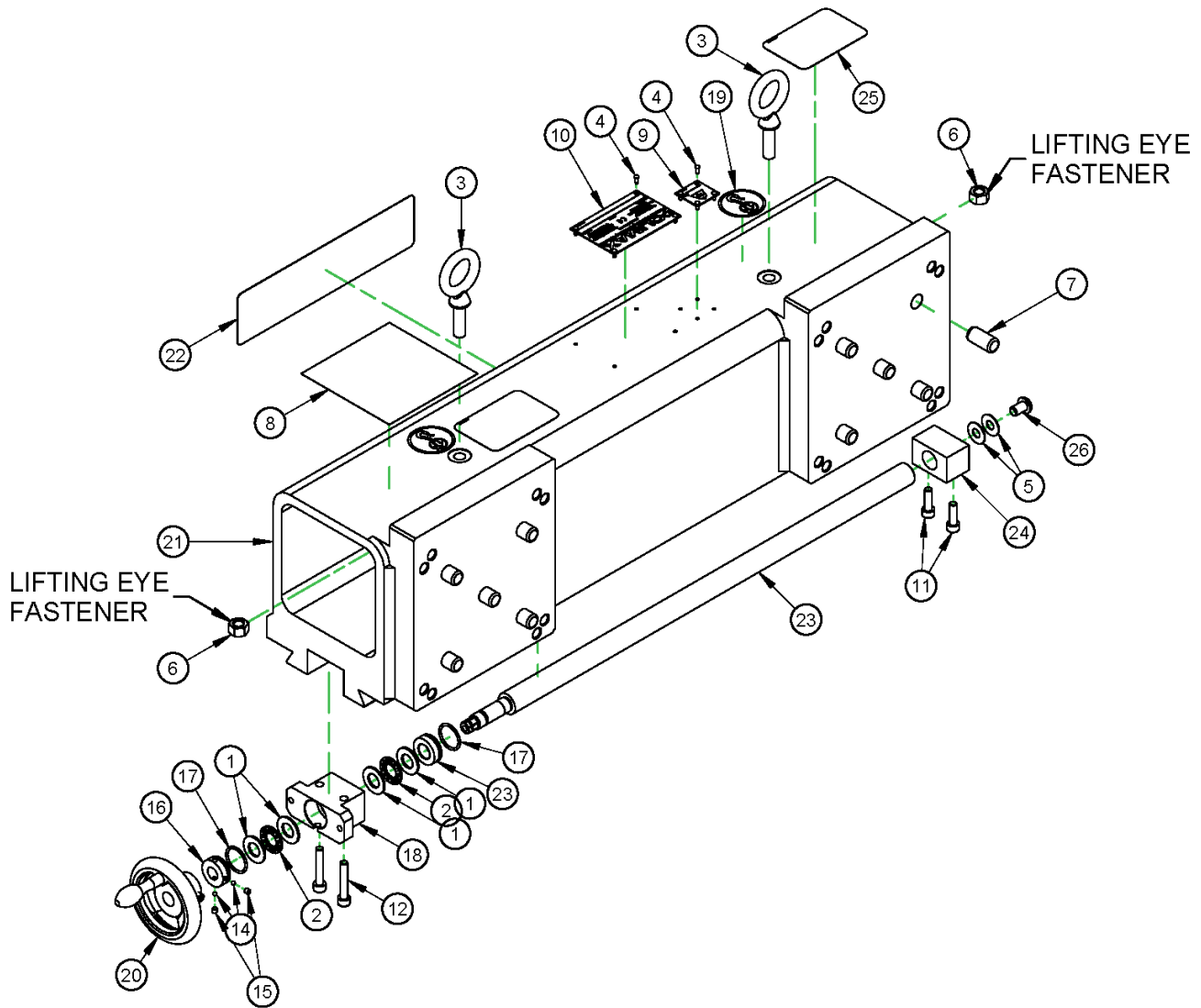


FIGURE 80 RAM ASSEMBLY, 12 INCH, RH LEADSCREW P/N 71970

PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	4	10436	WASHER THRUST .500 ID X .937 OD X .060
2	2	10437	BRG THRUST .500 ID X .937 OD X .0781
3	2	10460	EYE LIFTING 3/8-16 X 1-1/4 THREAD 1300 LBS
4	8	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
5	2	10770	WASHER THRUST .75 OD X .312 ID X .03
6	2	13987	NUT 3/8-16 STDN ZINC PLATED
7	10	20398	PIN DOWEL 1/2 DIA X 1
8	1	27462	LABEL WARNING STICKER SINGLE POINT MACHINES
9	1	29152	PLATE MASS CE
10	1	29154	PLATE SERIAL YEAR MODEL CE 2.0 X 3.0
11	2	35009	SCREW M6 X 1.0 X 20 SHCS
12	2	35504	SCREW M6 X 1.0 X 35mm SHCS
13	1	38678	(NOT SHOWN) WRENCH HEX SET 1.5-10MM BONDHUS BALL END
14	2	43489	BALL NYLON 1/8 DIA
15	2	53365	SCREW M4 X 0.7 X 4 mm SSSFP
16	1	57214	BRG RETAINING NUT AXIAL FEED LEADSCREW
17	2	57320	RING O 1/16 X 13/16 ID X 15/16 OD
18	1	57793	BEARING BLOCK LEADSCREW
19	2	59039	LABEL WARNING LIFT POINT ROUND 1.5"
20	1	63678	HANDWHEEL 3.0 IN MODIFIED 3/8 HEX
21	1	64754	RAM MACHINED 12 INCH TRAVEL PM4200
22	1	70227	LABEL CLIMAX LOGO 2 X 8
23	1	71960	LEADSCREW RH RAM 12 IN TRAVEL PM4200
24	1	71961	NUT LEADSCREW ACME RH FF LINE
25	2	79385	LABEL WARNING - LIFT SUB ASSY ONLY GRAPHIC 2 X 3
26	1	87433	SCREW 5/16-24 X 1/2 BHSCS

FIGURE 81 RAM ASSEMBLY, 12 INCH, RH LEADSCREW P/N 71970

AVAILABLE CONFIGURATIONS				
PART NO.	DESCRIPTION	ITEM 20 PART NO	ITEM 21 PART NO	ITEM 30 PART NO
65221	ASSY TOPSLIDE WELDON SHANK INCH HYD PM4200	19645	19648	65023
65222	ASSY TOPSLIDE WELDON SHANK METRIC HYD PM4200	19650	19649	65024

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	1	10203	CRANK HANDLE 1/2 SQUARE
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	1	10672	SCREW 3/8-16 X 3/4 SHCS
10	2	10770	WASHER THRUST .75 OD X .312 ID X .03
11	3	11735	SCREW 5/16-18 X 1-1/4 SHCS
12	2	12418	SCREW 1/4-20 X 5/8 SHCS
13	1	12647	SCREW 1/4-28 X .75 SHCS
14	3	12853	SCREW 1/4-28 X 5/8 FHSCS
15	2	13174	BRG THRUST .875 ID X 1.437 OD X .0781
16	4	13175	WASHER THRUST .875 ID X 1.437 OD X .060
17	1	15618	SHAFT ASSY 2ND KM3000
18	1	15999	PLUG HOLE 1-3/4 DIA MODIFIED
19	1	19239	LIFTING EYE MODIFIED 3/8-16 X 1-1/4 1 ID 1-11/16 OD 3.219 OAL 10460
20	0	19650	SPINDLE & QUILL ASSY METRIC 3RD KM4000 CPM
20	1	SEE CHART	SPINDLE & QUILL ASSY 3RD KM4000 CPM
21	0	19649	ASSY LEADSCREW VERT ADJ METRIC 3RD KM4000 CPM
21	1	SEE CHART	ASSY LEADSCREW VERT ADJ 3RD KM4000 CPM
22	1	20379	GEAR SPUR MOTOR 16DP 1.625PD SPECIAL HYD MOTOR
23	1	29152	PLATE MASS CE
24	1	34403	ASSY GEAR BOX SPINDLE DRIVETOP
25	1	35003	FLANGE MOTOR MTG HYD 4TH GEN GEARBOX
26	1	37981	NUT SELF LOCKING BRG ADJ SZ 4
27	1	38116	COLLAR LEADSCREW BEARING
28	1	38117	LEADSCREW TOP SLIDE KM4000 PM2000 PM3000
29	1	46759	PLATE SERIAL YEAR MODEL CE 2.0 X 2.63
30	1	59039	LABEL WARNING LIFT POINT ROUND 1.5"
31	0	65024	TOPSLIDE METRIC PM4200 KM4000
31	1	SEE CHART	TOPSLIDE PM4200 KM4000
32	1	79385	LABEL WARNING - LIFT SUB ASSY ONLY GRAPHIC 2 X 3
33	1	79575	LABEL WARNING - CUTTING OF FINGERS OR HAND ROTATING BLADE GRAPHIC 1.95 TALL TRIANGLE YELLOW
34	1	87433	SCREW 5/16-24 X 1/2 BHSCS

FIGURE 83 TOPSLIDE ASSEMBLY, WELDON SHANK P/N 83541

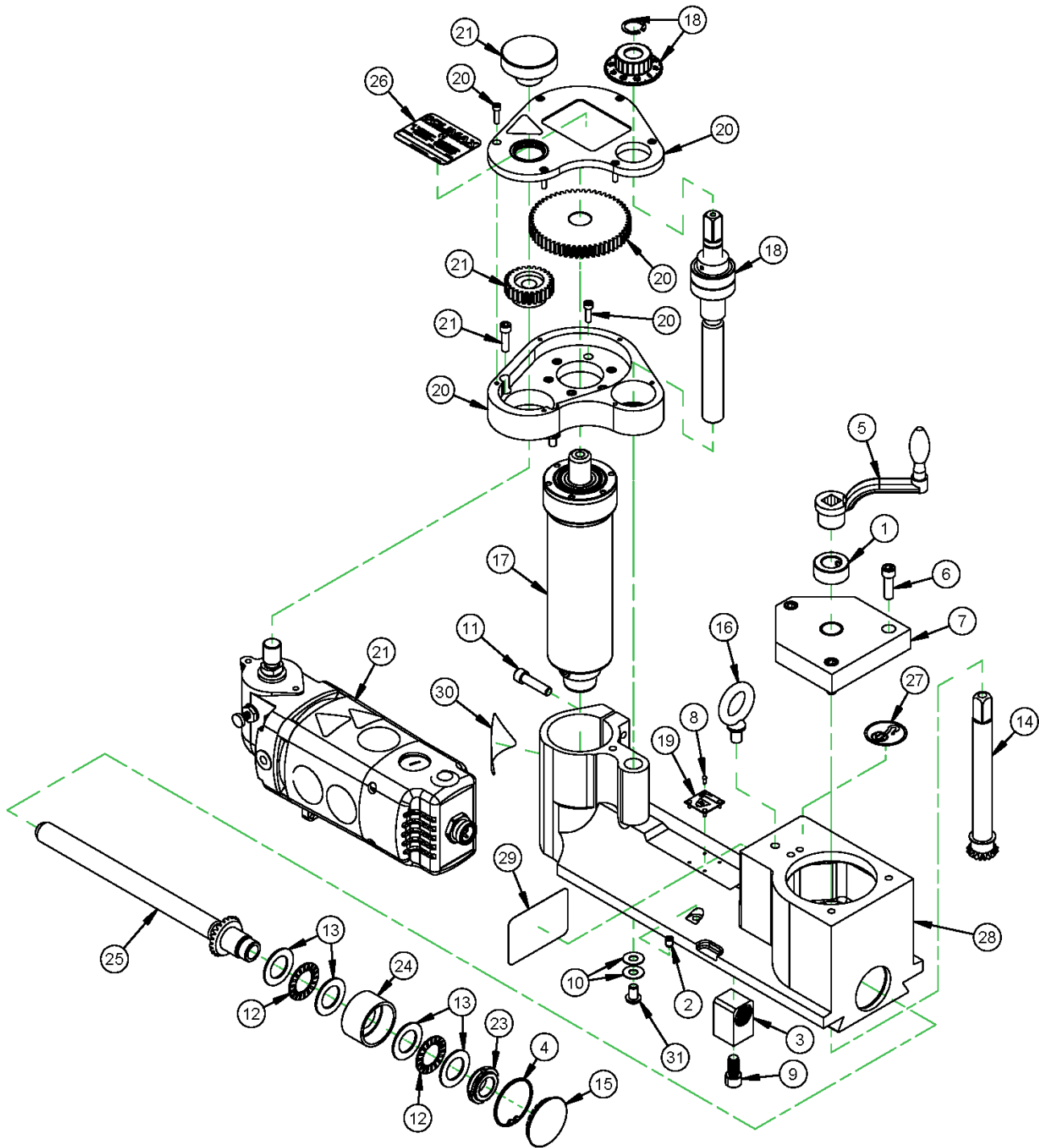
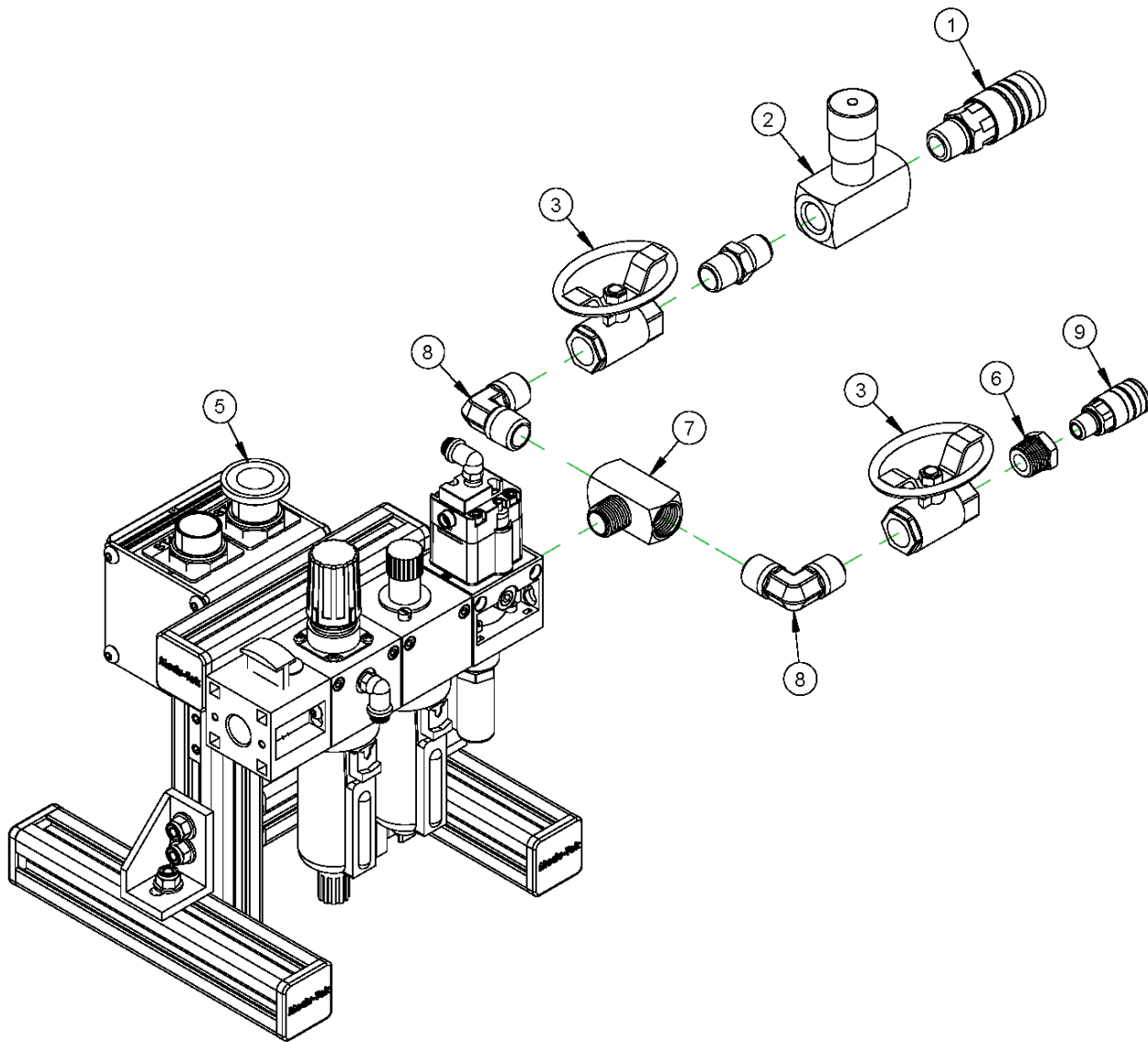


FIGURE 84 TOPSLIDE ASSEMBLY, WELDON SHANK, ELECTRIC P/N 83526

AVAILABLE CONFIGURATIONS						
P/N	DESCRIPTION	ITEM 17 P/N	ITEM 18 P/N	ITEM 21 P/N	ITEM 22 P/N	ITEM 28 P/N
65217	ASSY TOPSLIDE WELDON SHANK 120V INCH	19645	19648	36987	36549	65023
65218	ASSY TOPSLIDE WELDON SHANK 120V METRIC	19650	19649	36987	36549	65024
65219	ASSY TOPSLIDE WELDON SHANK 230V INCH	19645	19648	36684	79218	65023
65220	ASSY TOPSLIDE WELDON SHANK 230V METRIC	19650	19649	36684	79218	65024

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	1	10203	CRANK HANDLE 1/2 SQUARE
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	1	10672	SCREW 3/8-16 X 3/4 SHCS
10	2	10770	WASHER THRUST .75 OD X .312 ID X .03
11	3	11735	SCREW 5/16-18 X 1-1/4 SHCS
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	LIFTING EYE MODIFIED 3/8-16 X 1-1/4 1 ID 1-11/16 OD 3.219 OAL 10460
17	1	SEE CHART	SPINDLE & QUILL ASSY INCH 3RD KM4000 CPM
18	1	SEE CHART	ASSY LEADSCREW VERT ADJ 3RD KM4000 CPM
19	1	29152	PLATE MASS CE
20	1	34403	ASSY GEAR BOX SPINDLE DRIVETOP
21	1	SEE CHART	MOTOR ASSY ELECTRIC 4TH GEN
22	1	SEE CHART	SPEED CONTROLLER ASSEMBLY
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	46759	PLATE SERIAL YEAR MODEL CE 2.0 X 2.63
27	1	59039	LABEL WARNING LIFT POINT ROUND 1.5"
28	1	SEE CHART	TOPSLIDE PM4200 KM4000
29	1	79385	LABEL WARNING - LIFT SUB ASSY ONLY GRAPHIC 2 X 3
30	1	79575	LABEL WARNING - CUTTING OF FINGERS OR HAND ROTATING BLADE GRAPHIC 1.95 TALL TRIANGLE YELLOW
31	1	87433	SCREW 5/16-24 X 1/2 BHSCS

FIGURE 85 TOPSLIDE ASSEMBLY, WELDON SHANK, ELECTRIC P/N 83526 PARTS LIST



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	16610	FTG QUICK COUPLER 1/2B 1/2 NPTM FEMALE AIR
2	1	22229	VALVE NEEDLE 1/2 IN.
3	2	36328	VALVE BALL 1/2NPTF OVAL HANDLE
4	1	77786	FTG NIPPLE 1/2 NPTM X 1/2 NPTM BRASS HEX
5	1	78264	PNEUMATIC CONDITIONING UNIT 1/2 IN LOW PRES. DROPOUT
6	1	83135	FTG BUSHING 1/2 NPTM x 1/4 NPTF BRASS
7	1	86615	FTG TEE 1/2 NPTM X 1/2 NPTF(2) BRANCH BRASS
8	2	96897	FTG ELBOW 1/2 NPTM X 1/2 NPTM 90 DEG PIPE
9	1	96911	FTG QUICK COUPLER 1/4B 1/4 NPTM MALE AIR

FIGURE 86 PNEUMATIC 1/2" CONTROL ASSEMBLY P/N 96762

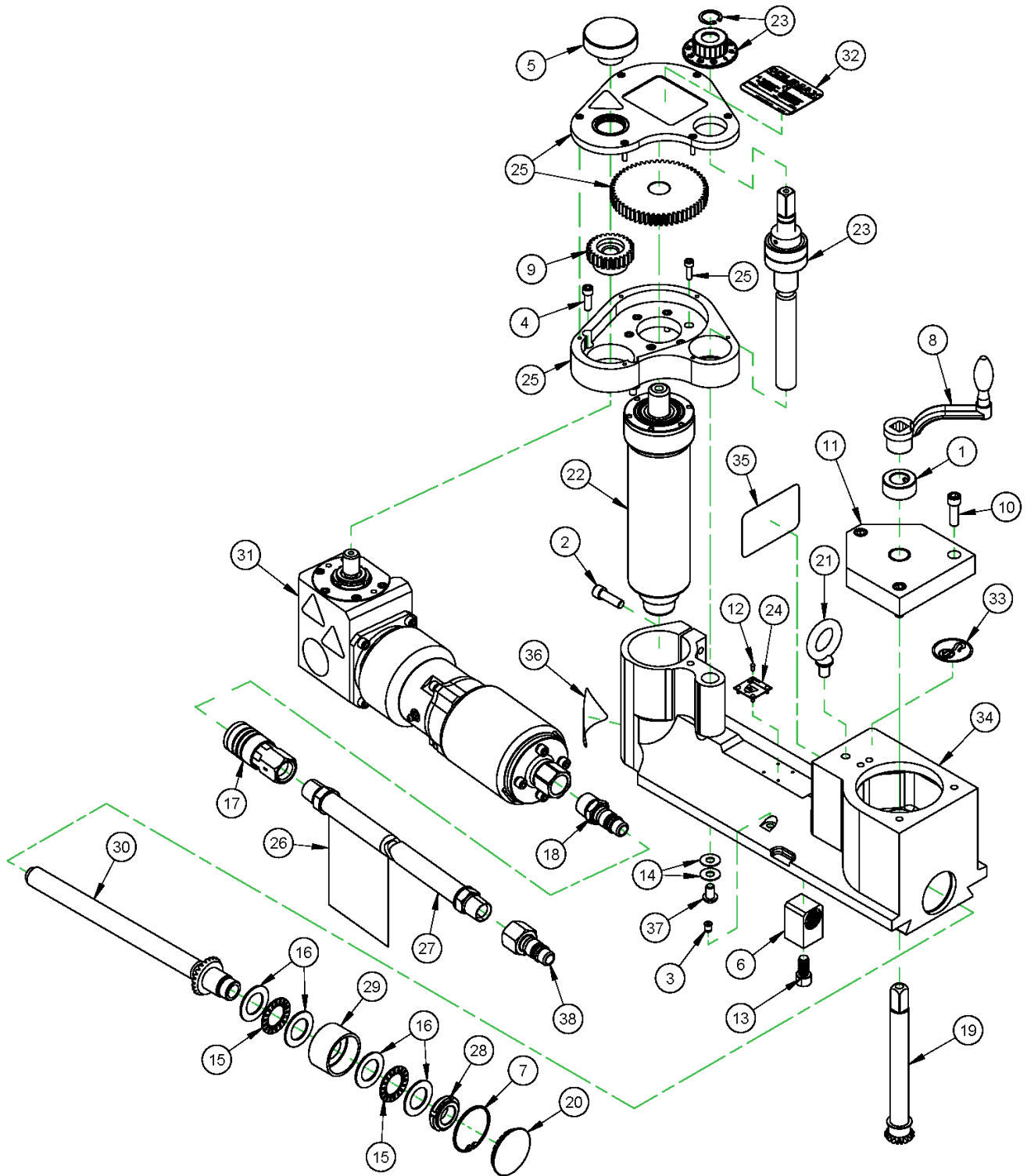


FIGURE 87 TOPSLIDE ASSEMBLY, WELDON SHANK, PNEUMATIC P/N 76245

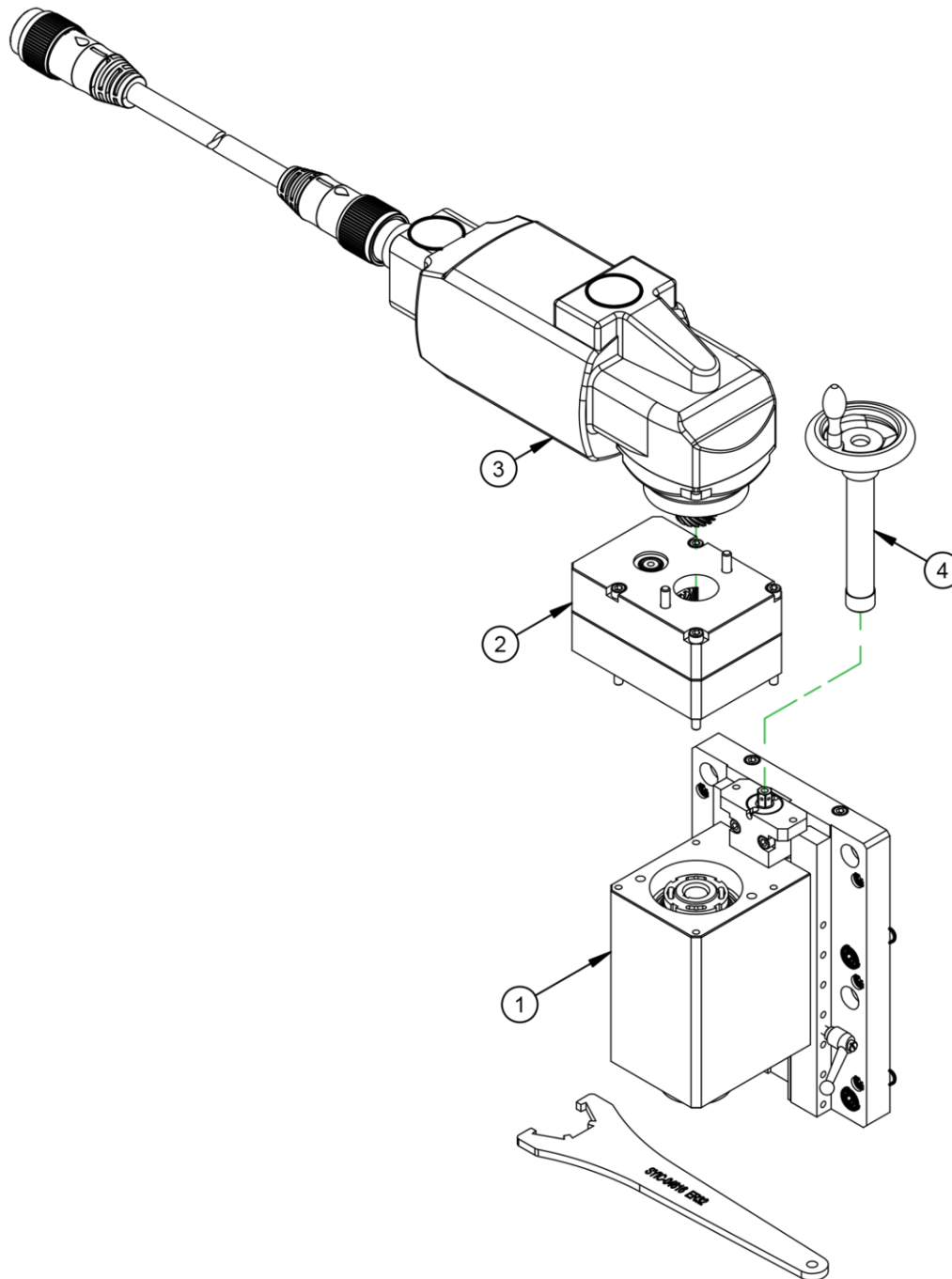
AVAILABLE CONFIGURATIONS				
PART NO.	DESCRIPTION	ITEM 22 P/N	ITEM 22 P/N	ITEM 34 P/N
65223	ASSY TOPSLIDE WELDON SHANK INCH PNEUMATIC PM4200	19645	19648	65023
65224	ASSY TOPSLIDE WELDON SHANK METRIC PNEUMATIC PM4200	19650	19649	65024

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	2	10160	SCREW 1/4-20 X 3/4 SHCS
5	1	10168	KNOB ADJUSTMENT 2 INCH KNURLED
6	1	10190	LEADNUT BRASS 3/4-10 ACME
7	1	10193	RING SNAP 1.75 ID BEVEL LEADSCREW
8	1	10203	CRANK HANDLE 1/2 SQUARE
9	1	10326	GEAR SPUR 26T 16DP 1.625PD
10	3	10431	SCREW 5/16-18 X 1 SHCS
11	1	10500	COVER GEAR BOX ASSY KM4000
12	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
13	1	10672	SCREW 3/8-16 X 3/4 SHCS
14	2	10770	WASHER THRUST .75 OD X .312 ID X .03
15	2	13174	BRG THRUST .875 ID X 1.437 OD X .0781
16	4	13175	WASHER THRUST .875 ID X 1.437 OD X .060
17	1	13208	FTG QD COUPLER 1/2B 1/2 NPTF PNEUMATIC
18	1	13209	FTG QD NIPPLE 1/2B 1/2 NPTM PNEUMATIC
19	1	15618	SHAFT ASSY 2ND KM3000
20	1	15999	PLUG HOLE 1-3/4 DIA MODIFIED
21	1	19239	LIFTING EYE MODIFIED 3/8-16 X 1-1/4 1 ID 1-11/16 OD 3.219 OAL 10460
22	1	SEE CHART	SPINDLE & QUILL ASSY INCH 3RD KM4000 CPM
23	1	SEE CHART	ASSY LEADSCREW VERT ADJ INCH 3RD KM4000 CPM
24	1	29152	PLATE MASS CE
25	1	34403	ASSY GEAR BOX SPINDLE DRIVETOP
26	1	34734	LABEL WARNING 3-1/2 X 11
27	1	37008	HOSE ASSY 801 1/2 X 1/2 NPTM X 1/2 NPTMS X 96
28	1	37981	NUT SELF LOCKING BRG ADJ SZ 4
29	1	38116	COLLAR LEADSCREW BEARING
30	1	38117	LEADSCREW TOP SLIDE KM4000 PM2000 PM3000
31	1	38776	ASSY MOTOR AIR KM4000 PM4200
32	1	46759	PLATE SERIAL YEAR MODEL CE 2.0 X 2.63
33	1	59039	LABEL WARNING LIFT POINT ROUND 1.5"
34	1	SEE CHART	TOPSLIDE INCH PM4200 KM4000
35	1	79385	LABEL WARNING - LIFT SUB ASSY ONLY GRAPHIC 2 X 3
36	1	79575	LABEL WARNING - CUTTING OF FINGERS OR HAND ROTATING BLADE GRAPHIC 1.95 TALL TRIANGLE YELLOW
37	1	87433	SCREW 5/16-24 X 1/2 BHSCS
38	1	96762	(NOT SHOWN) ASSY CONTROL 1/2" PNEUMATIC FOR PM4200
38	1	96910	FTG QUICK COUPLER 1/2B 1/2 NPTM FEMALE AIR

FIGURE 88 TOPSLIDE ASSEMBLY, WELDON SHANK, PNEUMATIC PARTS LIST 76245

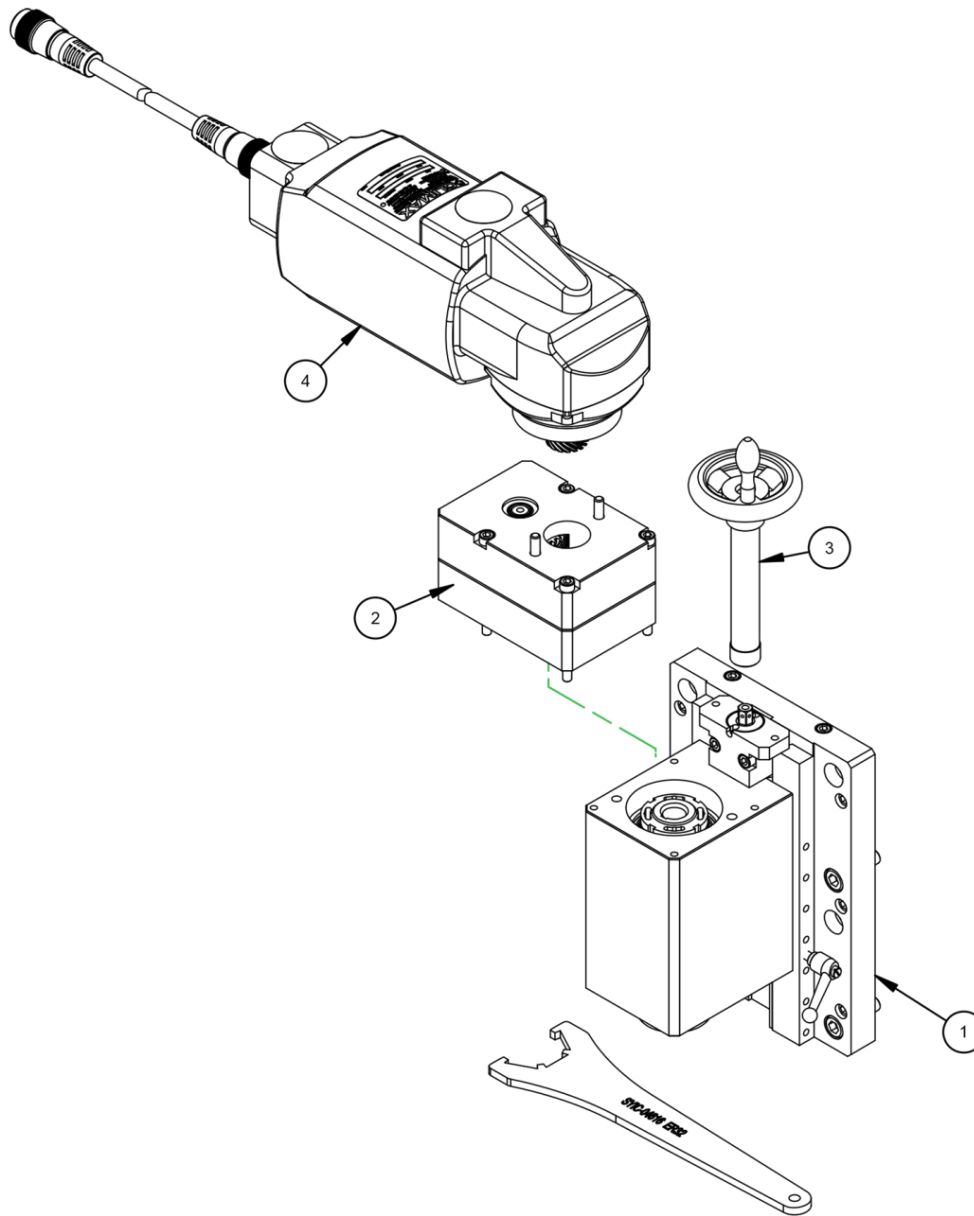
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	10169	DIAL INCH
2	1	10193	RING SNAP 1.75 ID BEVEL LEADSCREW
3	1	10203	CRANK HANDLE 1/2 SQUARE
4	1	10443	NUT BRASS
5	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
6	1	10672	SCREW 3/8-16 X 3/4 SHCS
7	2	13174	BRG THRUST .875 ID X 1.437 OD X .0781
8	4	13175	WASHER THRUST .875 ID X 1.437 OD X .060
9	1	15666	WASHER THRUST .669 ID X 1.181 OD X .039
10	1	15667	WASHER SPRING FINGER .688 ID X 1.164 OD
11	1	15668	RING SNAP .672 OD X .035 THICK INVERTED
12	1	17361	SLIDE TOOL POST BLANK PM4000
13	1	18279	(NOT SHOWN) EXTENSION 1/2 DRIVE X 6 IN.
14	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
15	1	46350	NUT LOCKING TLN-04 FACE LOCKING
16	1	59042	LABEL WARNING - HAND CRUSH/MOVING PARTS
17	1	86506	COLLAR LEADSCREW BEARING
18	1	92306	LEADSCREW SLIDE ASSY

FIGURE 90 SLIDE ASSEMBLY, BLANK BOM 38167



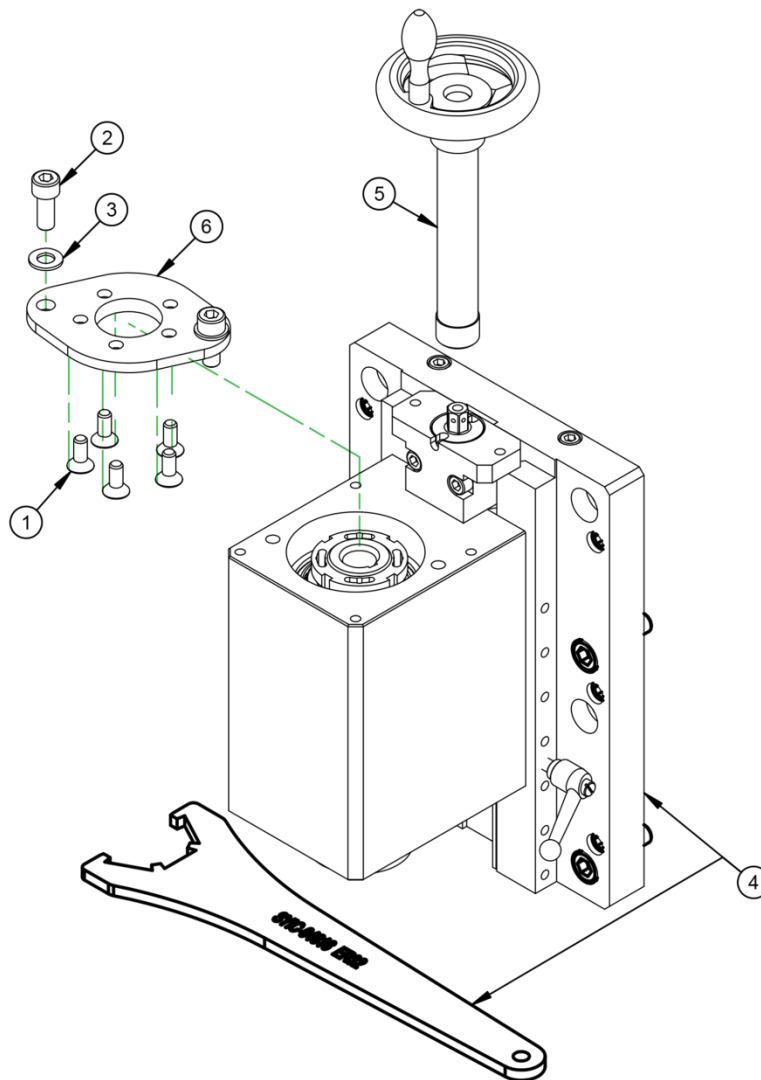
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	64643	ASSY SPINDLE HSK 40 4" STROKE
2	1	64649	ASSY GEARBOX HSK 40 SPINDLE
3	1	64655	ASSY MOTOR 120V HSK SPINDLE
4	1	64745	HANDWHEEL ASSY Z-AXIS 3" OD 3/8 HEX 4-1/2" EXTENSION
5	1	66572	(NOT SHOWN)CONTROLLER 120V 15A HSK SPINDLE

FIGURE 91 MILLING HEAD ASSEMBLY, HSK 40, 120V 64667



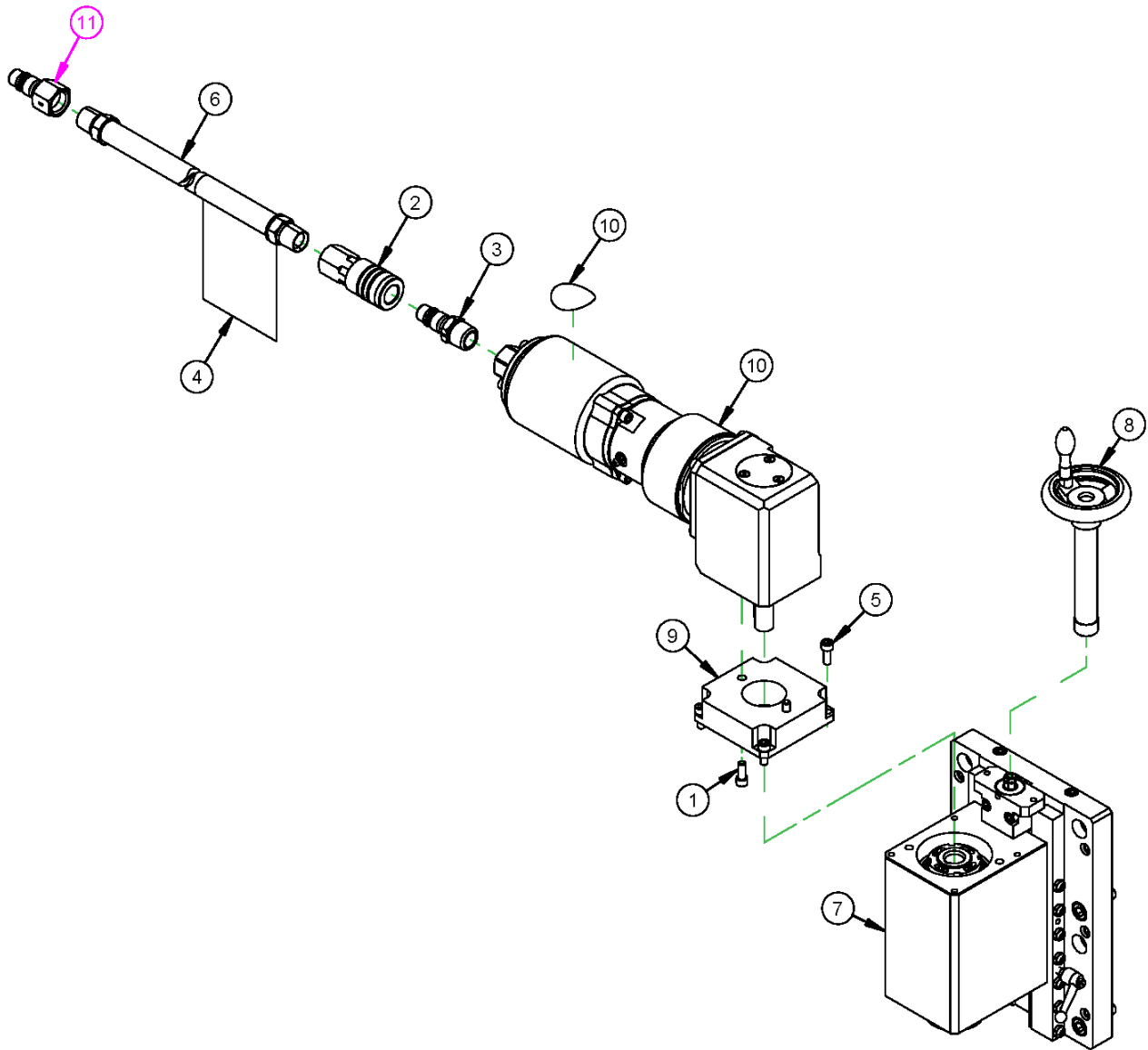
PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	1	64643	ASSY SPINDLE HSK 40 4" STROKE
2	1	64649	ASSY GEARBOX HSK 40 SPINDLE
3	1	64745	HANDWHEEL ASSY Z-AXIS 3" OD 3/8 HEX 4-1/2" EXTENSION
4	1	66341	ASSY MOTOR 230V HSK SPINDLE
5	1	66573	(NOT SHOWN) CONTROLLER 230V 7.5A HSK SPINDLE

FIGURE 92 MILLING HEAD ASSEMBLY, HSK 40, 230V 66342



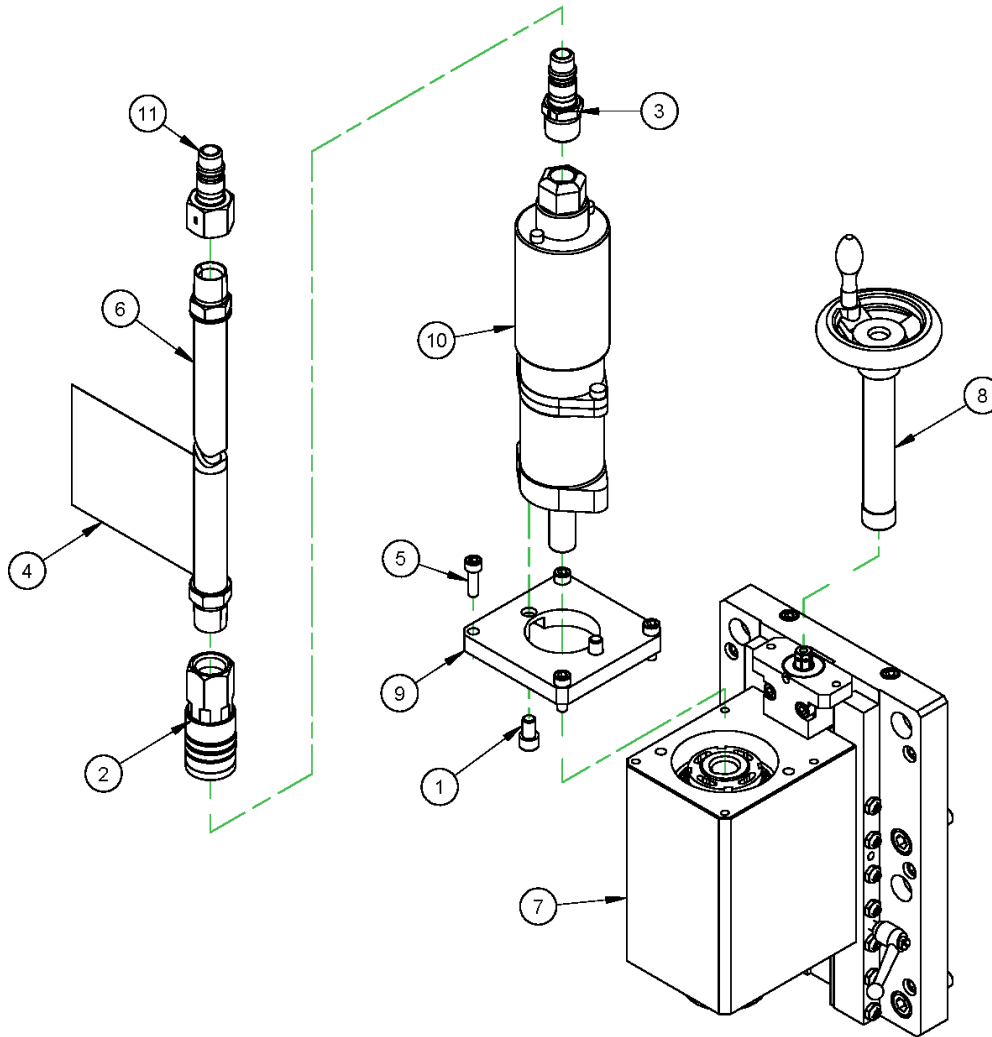
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	5	12853	SCREW 1/4-28 X 5/8 FHSCS
2	2	50458	SCREW M8 X 1.25 X 20mm SHCS
3	2	59432	WASHER M8 FLTW 16MM OD 1.6MM THICK
4	1	64643	ASSY SPINDLE HSK 40 4" STROKE
5	1	64745	HANDWHEEL ASSY Z-AXIS 3" OD 3/8 HEX 4-1/2" EXTENSION
6	1	65092	PLATE 2 BOLT FLANGE FOR CHAR LYNN J SERIES

FIGURE 93 MILLING HEAD ASSEMBLY, HSK 40, HYDRAULIC 65262



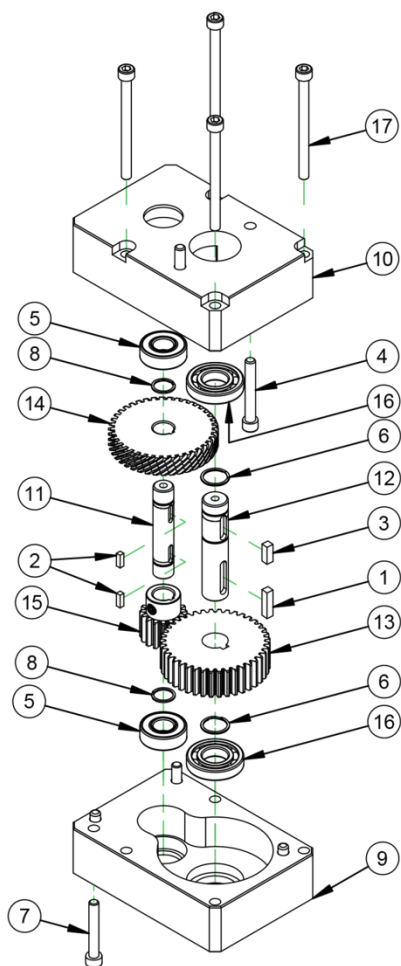
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	12418	SCREW 1/4-20 X 5/8 SHCS
2	1	13208	FTG QD COUPLER 1/2B 1/2 NPTF PNEUMATIC
3	1	13209	FTG QD NIPPLE 1/2B 1/2 NPTM PNEUMATIC
4	1	34734	LABEL WARNING 3-1/2 X 11
5	4	35014	SCREW M6 X 1.0 X 16mm SHCS
6	1	37008	HOSE ASSY 801 1/2 X 1/2 NPTM X 1/2 NPTMS X 96
7	1	64643	ASSY SPINDLE HSK 40 4" STROKE
8	1	64745	HANDWHEEL ASSY Z-AXIS 3" OD 3/8 HEX 4-1/2" EXTENSION
9	1	68463	PLATE ADAPTER HSK PNEUMATIC
10	1	68467	ASSY MOTOR AIR HSK LM5200 PM4200
11	1	96762	(NOT SHOWN) ASSY CONTROL 1/2" PNEUMATIC FOR PM4200
11	1	96910	FTG QUICK COUPLER 1/2B 1/2 NPTM FEMALE AIR

FIGURE 94 MILLING HEAD ASSEMBLY, HSK 40, PNEUMATIC, RIGHT ANGLE 68455



PARTS LIST		
ITEM	PART No.	DESCRIPTION
1	10615	SCREW 5/16-18 X 1/2 SHCS
2	13208	FTG QD COUPLER 1/2B 1/2 NPTF PNEUMATIC
3	13209	FTG QD NIPPLE 1/2B 1/2 NPTM PNEUMATIC
4	34734	LABEL WARNING 3-1/2 X 11
5	35009	SCREW M6 X 1.0 X 20 SHCS
6	37008	HOSE ASSY 801 1/2 X 1/2 NPTM X 1/2 NPTMS X 96
7	64643	ASSY SPINDLE HSK 40 4" STROKE
8	64745	HANDWHEEL ASSY Z-AXIS 3" OD 3/8 HEX 4-1/2" EXTENSION
9	68583	PLATE ADAPTER HSK PNEUMATIC DIRECT DRIVE
10	68589	MOTOR AIR 1.35HP 1050FS 500MAX RPM 17.2TQ
11	96762	(NOT SHOWN) ASSY CONTROL 1/2" PNEUMATIC FOR PM4200
11	96910	FTG QUICK COUPLER 1/2B 1/2 NPTM FEMALE AIR

FIGURE 95 MILLING HEAD ASSEMBLY, HSK 40, PNEUMATIC, DIRECT DRIVE 68584



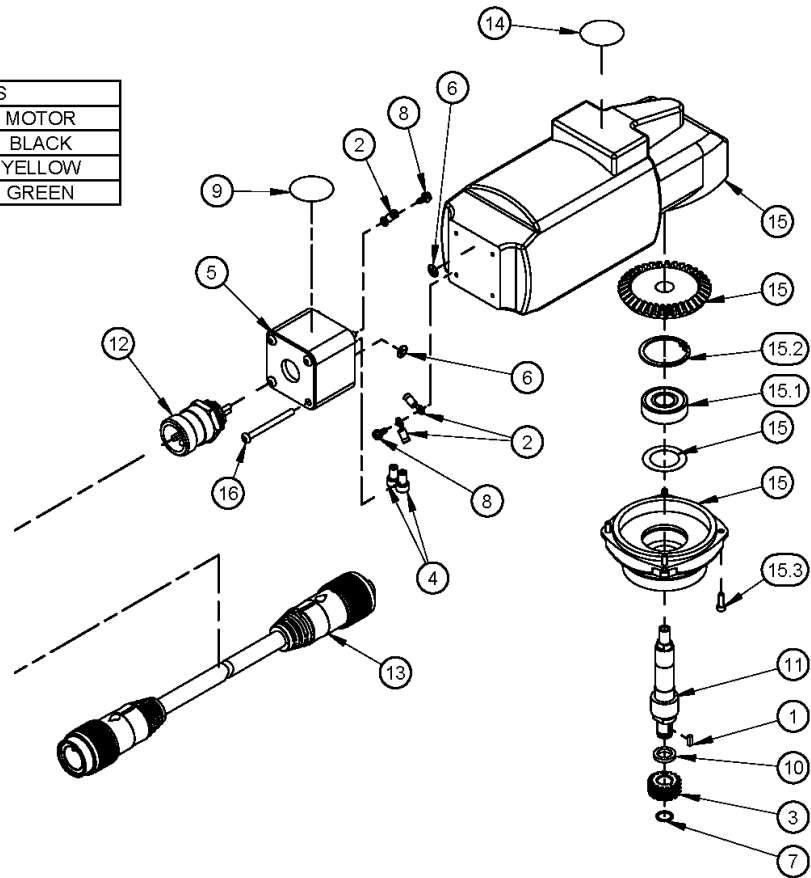
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
10	1	64651	HOUSING UPPER GEARBOX HSK 40 SPINDLE
16	2	64659	BRG BALL .6250 ID X 1.3750 OD X .281
6	2	29181	RING SNAP 5/8 OD X .035 TH SPIRAL HEAVY DUTY
14	1	64656	GEAR HELICAL 16DP 40T 14.5PA 45HA RH .5 STL H
13	1	64654	GEAR SPUR MOD 16DP 40T 20PA .75 STEEL
2	2	12360	KEY 1/8 SQ X .37
3	1	12361	KEY 3/16 SQ X .50 SQ BOTH ENDS
9	1	64650	HOUSING LOWER GEARBOX HSK 40 SPINDLE
12	1	64653	SHAFT OUTPUT HSK 40 SPINDLE GEARBOX
11	1	64652	SHAFT GEAR HSK 40 SPINDLE GEARBOX
4	2	13252	SCREW 1/4-20 X 1-3/4 SHCS
7	2	36125	SCREW M6 X 1.0 X 40mm SHCS
15	1	64658	GEAR SPUR 16DP 16T 20PA .75 X 1.25LG STEEL
5	2	14956	BRG BALL .500 ID X 1.125 X .375
8	2	38648	RING SNAP 1/2 OD SPIRAL HEAVY DUTY
17	4	66850	SCREW M6 X 1.0 X 75mm SHCS
1	1	10217	KEY 3/16 SQ X .75 SQ BOTH ENDS

FIGURE 96 GEARBOX ASSEMBLY, HSK 40 SPINDLE 64649

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	10436	WASHER THRUST .500 ID X .937 OD X .060
2	2	10437	BRG THRUST .500 ID X .937 OD X .0781
3	2	10770	WASHER THRUST .75 OD X .312 ID X .03
4	1	10826	BRG CUP 2.3125 X .4219 WIDE
5	1	10827	BRG CONE 1.1875 ID X .5937 WIDE
6	1	10997	BRG CUP 2.5000 OD X .3750 WIDE
7	1	11077	BRG CONE 1.5000 ID X .4688 WIDE
8	4	18214	SCREW M10 X 1.5 X 30mm SHCS
9	4	35009	SCREW M6 X 1.0 X 20 SHCS
10	2	35505	SCREW M6 X 1.0 X 30 SHCS
11	6	38061	SCREW M4 X 0.7 X 20 SHCS
12	1	41835	SEAL 2.000 ID X 2.500 OD X .438
13	2	43489	BALL NYLON 1/8 DIA
14	7	45034	SCREW M6 X 1.0 X 12MM SSSDPPL
15	1	48526	NUT LEADSCREW ACME 3/4-10 BRONZE LH
16	6	53365	SCREW M4 X 0.7 X 4 mm SSSFP
17	1	57214	BRG RETAINING NUT AXIAL FEED LEADSCREW
18	2	57320	RING O 1/16 X 13/16 ID X 15/16 OD
19	1	57784	GIB TOOL HEAD FF LINE
20	1	57793	BEARING BLOCK LEADSCREW
21	1	57912	LEAD SCREW AXIAL FEED FF LINE
22	6	61175	SCREW M12 X 1.25 X 20mm SSSFP
23	1	64637	HOUSING SPINDLE 1.500 BRG 4" STROKE
24	1	64638	SPINDLE HSK40 4" STROKE
25	1	64639	ADAPTER SPINDLE SHORT HSK40
26	1	64641	PLUG HOLE 1" DIA NICKEL PLATED STEEL
27	1	64642	NUT LOCKING TLNKM-06 FACE LOCKING
28	1	64666	PLATE MOUNTING HSK 40 SPINDLE
29	1	64865	HANDLE ADJUSTABLE M6 X 1 X 30MM
30	1	69517	WRENCH SPANNER COLLET ER-32
31	1	87433	SCREW 5/16-24 X 3/4 BHSCS

FIGURE 98 SPINDLE ASSEMBLY, HSK 40BOM 64643

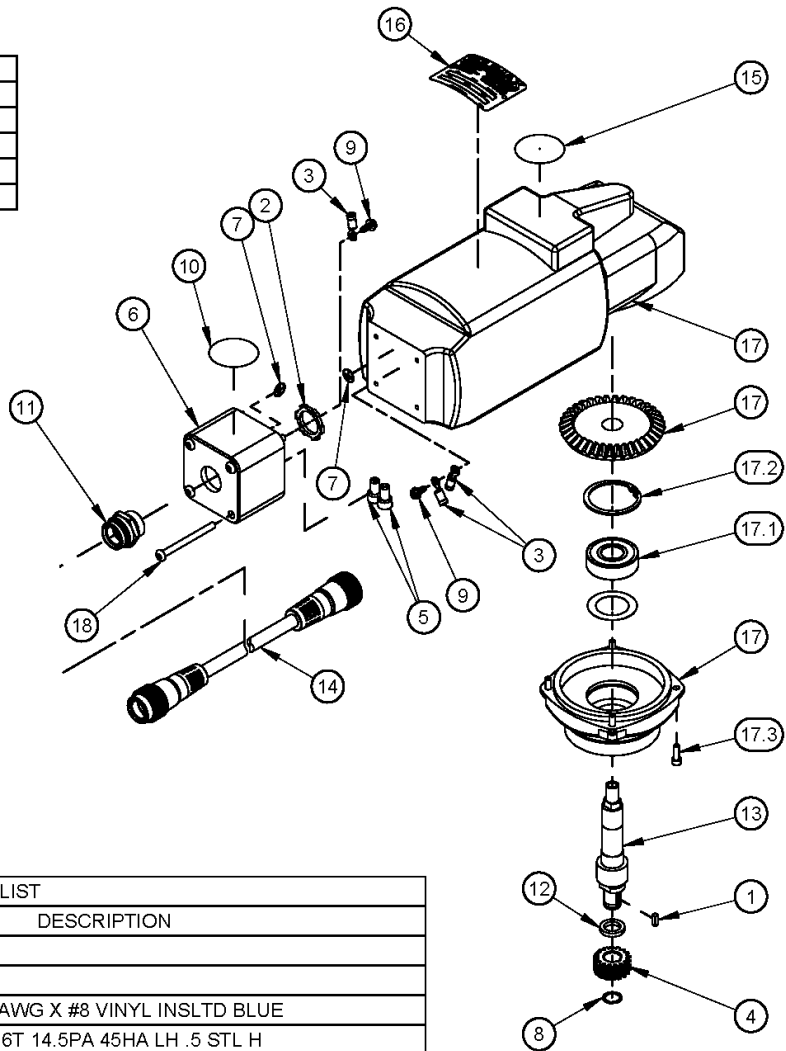
WIRE CONNECTIONS		
PIN #	CONNECTOR	MOTOR
1	BLACK	BLACK
2	WHITE	YELLOW
3	GREEN	GREEN



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	12360	KEY 1/8 SQ X .37
2	3	28546	TERMINAL RING 16-14AWG X #8 VINYL INSLTD BLUE
3	1	32631	GEAR HELICAL 16DP 16T 14.5PA 45HA LH .5 STL H
4	2	36363	TERMINAL SPLICE 16-10AWG CLOSED END
5	1	36974	BOX CORD CONNECTOR
6	2	37572	LABEL PE GROUND TERMINAL
7	1	38648	RING SNAP 1/2 OD SPIRAL HEAVY DUTY
8	2	43590	SCREW 8-32 X 3/8 HHMS SLOTTED SELF TAPPING
9	1	59044	LABEL WARNING - CONSULT OPERATOR'S MANUAL
10	1	64661	WASHER SHIM .500 ID X .750 OD X .125 THICK
11	1	64664	SHAFT OUTPUT MODIFIED ELECTRIC MOTOR MILWAUKEE 6065
12	1	66560	RECEPTACLE MALE 3 POLE 25A 1.375-16UN X 1/2 NPT 1M LEADS
13	1	66581	CORDSET EXTENSION QUICK CHANGE 3 COND 25 AMPS 20 FT LONG
14	1	78824	LABEL WARNING - DO NOT EXPOSE TO WATER
15	1	79188	MOTOR 120V 15A 5000 RPM MILWAUKEE
15.1	0	10365	(SP) BRG BALL .6693 ID X 1.5748 OD X .4724 2 SEALS
15.2	0	10521	(SP) RING SNAP 1.575 ID (40MM) .062 TH
15.3	0	11845	(SP) SCREW 8-32 x 1/2 SHCS
16	4	84293	SCREW 10-24 X 2-1/4 BHSCS SS

FIGURE 99 MOTOR ASSEMBLY, HSK SPINDLE, 120V 64655

WIRE CONNECTIONS		
PIN #	CONNECTOR	MOTOR
1	BLACK	BLACK
2	WHITE	YELLOW
3	RED	NC
4	GREEN	GREEN



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	12360	KEY 1/8 SQ X .37
2	1	12574	CONDUIT NUT 1/2 NPT
3	3	28546	TERMINAL RING 16-14AWG X #8 VINYL INSLTD BLUE
4	1	32631	GEAR HELICAL 16DP 16T 14.5PA 45HA LH .5 STL H
5	2	36363	TERMINAL SPLICE 16-10AWG CLOSED END
6	1	36974	BOX CORD CONNECTOR
7	2	37572	LABEL PE GROUND TERMINAL
8	1	38648	RING SNAP 1/2 OD SPIRAL HEAVY DUTY
9	2	43590	SCREW 8-32 X 3/8 HHMS SLOTTED SELF TAPPING
10	1	59044	LABEL WARNING - CONSULT OPERATOR'S MANUAL
11	1	63370	CONNECTOR 4-POLE 10AMP MALE 1/2NPS PANEL MT
12	1	64661	WASHER SHIM .500 ID X .750 OD X .125 THICK
13	1	64664	SHAFT OUTPUT MODIFIED ELECTRIC MOTOR MILWAUKEE 6065
14	1	68156	CORDSET EXTENSION 4 POLE 6M LENGTH
15	1	78824	LABEL WARNING - DO NOT EXPOSE TO WATER
16	1	79803	LABEL MOTOR DATA PLATE REWOUND MILWAUKEE 66340
17	1	79904	MOTOR REWOUND 230V 7.5A 5000 RPM MILWAUKEE 7.5A
17.1	0	10365	BRG BALL .6693 ID X 1.5748 OD X .4724 2 SEALS
17.2	0	10521	RING SNAP 1.575 ID (40MM) .062 TH
17.3	0	11845	SCREW 8-32 x 1/2 SHCS
18	4	84293	SCREW 10-24 X 2-1/4 BHSCS SS

FIGURE 100 MOTOR ASSEMBLY, HSK SPINDLE, 230V 66341

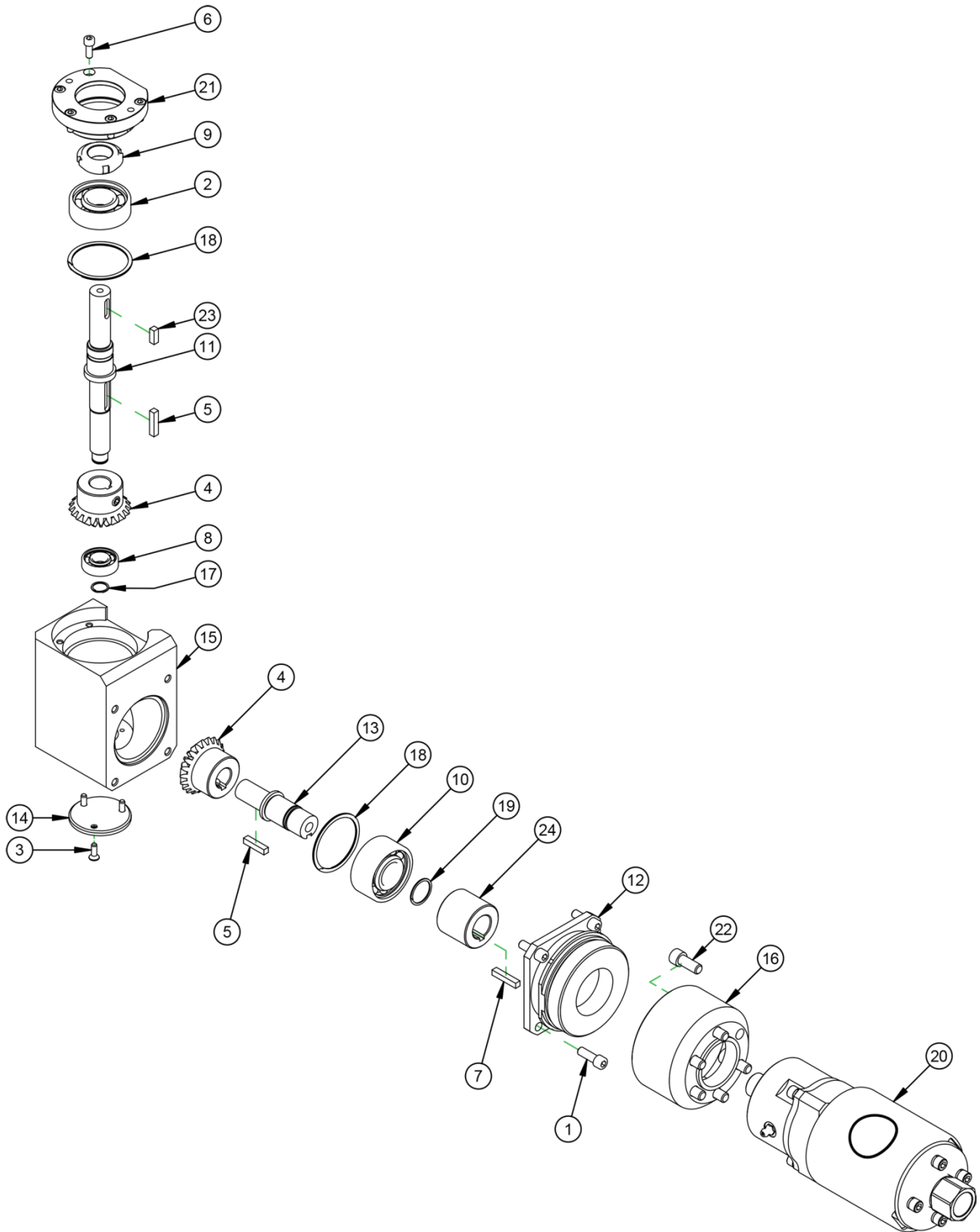
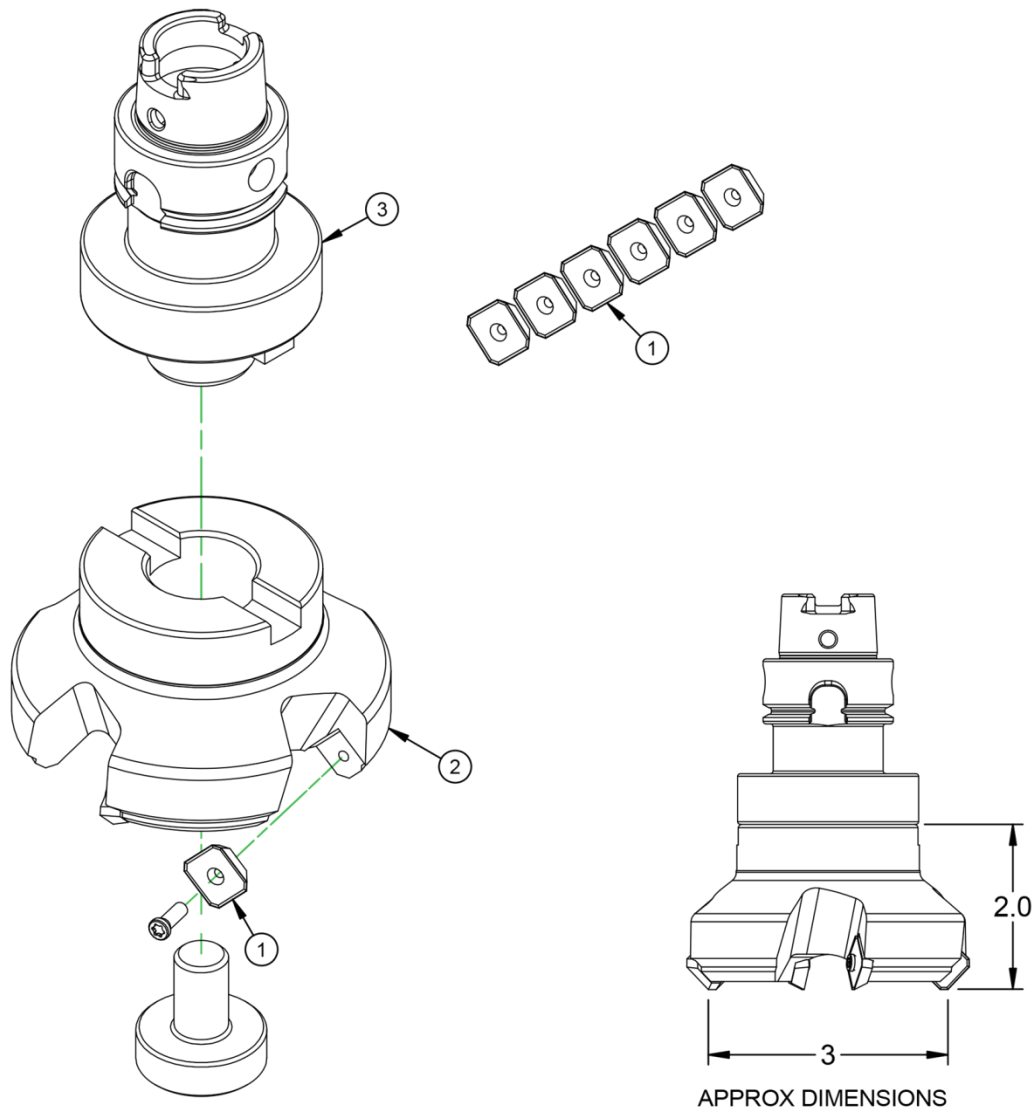


FIGURE 101 HSK AIR MOTOR ASSEMBLY 68467

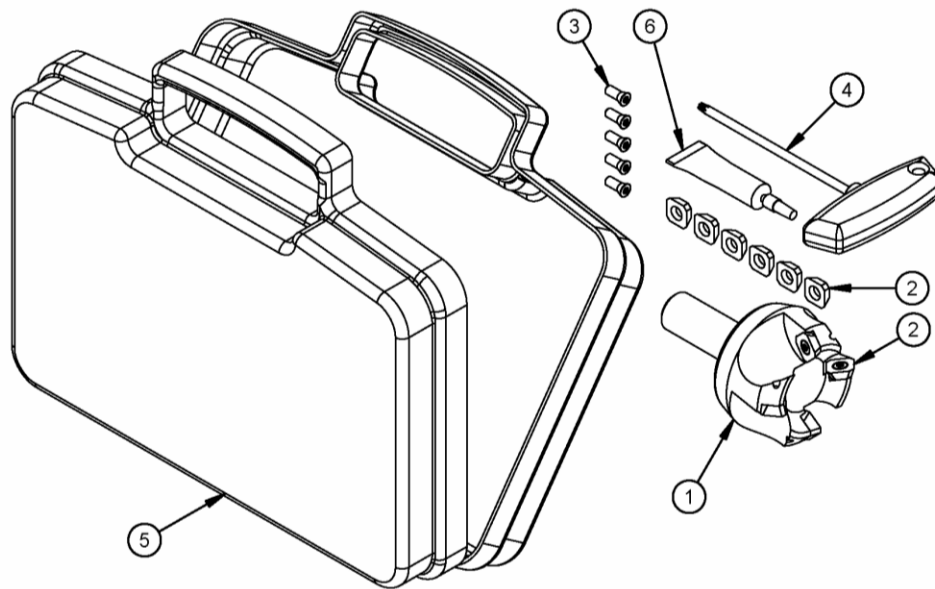
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	10160	SCREW 1/4-20 X 3/4 SHCS
2	1	10891	BRG BALL .7874 ID X 1.8504 OD X .5512 W/SEALS
3	3	11257	SCREW 8-32 X 1/2 FHSCS
4	2	12484	GEAR BEVEL 12DP 21T 1:1 20PA 1.75 PD HARDENED
5	2	12657	KEY 3/16 SQ X .87 SQ BOTH ENDS
6	5	12743	SCREW 10-24 X 1/2 SHCS
7	1	13080	KEY 3/16 SQ X 1.00 SQ BOTH ENDS
8	1	21077	BRG BALL .4724 ID X 1.1024 OD X .3150 W/SEALS
9	1	37981	NUT SELF LOCKING BRG ADJ SZ 4
10	1	38686	BRG ANGULAR CONTACT .7874 X 1.8504 OD X .811
11	1	68464	SHAFT OUTPUT HSK 40 SPINDLE GEARBOX PNEUMATIC
12	1	38692	FLANGE AIR MOTOR ADAPTER
13	1	38693	SHAFT INPUT RIGHT ANGLE DRIVE
14	1	38694	CAP BOTTOM HOUSING
15	1	38697	HOUSING ELBOW PNEUMATIC MOTOR
16	1	38698	ADAPTER AIR MOTOR KM3 KM4 PM4
17	1	38709	RING SNAP 15/32 ID X .025 TH SPIRAL HEAVY DUTY
18	2	38710	RING SNAP 1.850 OD SPIRAL MEDIUM DUTY
19	1	38711	RING SNAP 25/32 OD X .031 TH SPIRAL MEDIUM DUTY
20	1	38715	MOTOR MODIFIED AIR KM3000 KM4000 520 RPM
21	1	38774	ADAPTOR HOUSING TOP
22	6	10657	SHCS 5/16-18 X 3/4
23	1	12361	KEY 3/16 SQ X .50 SQ BOTH ENDS
24	1	38695	COUPLING SHAFT

FIGURE 102 HSK AIR MOTOR ASSEMBLY 68467



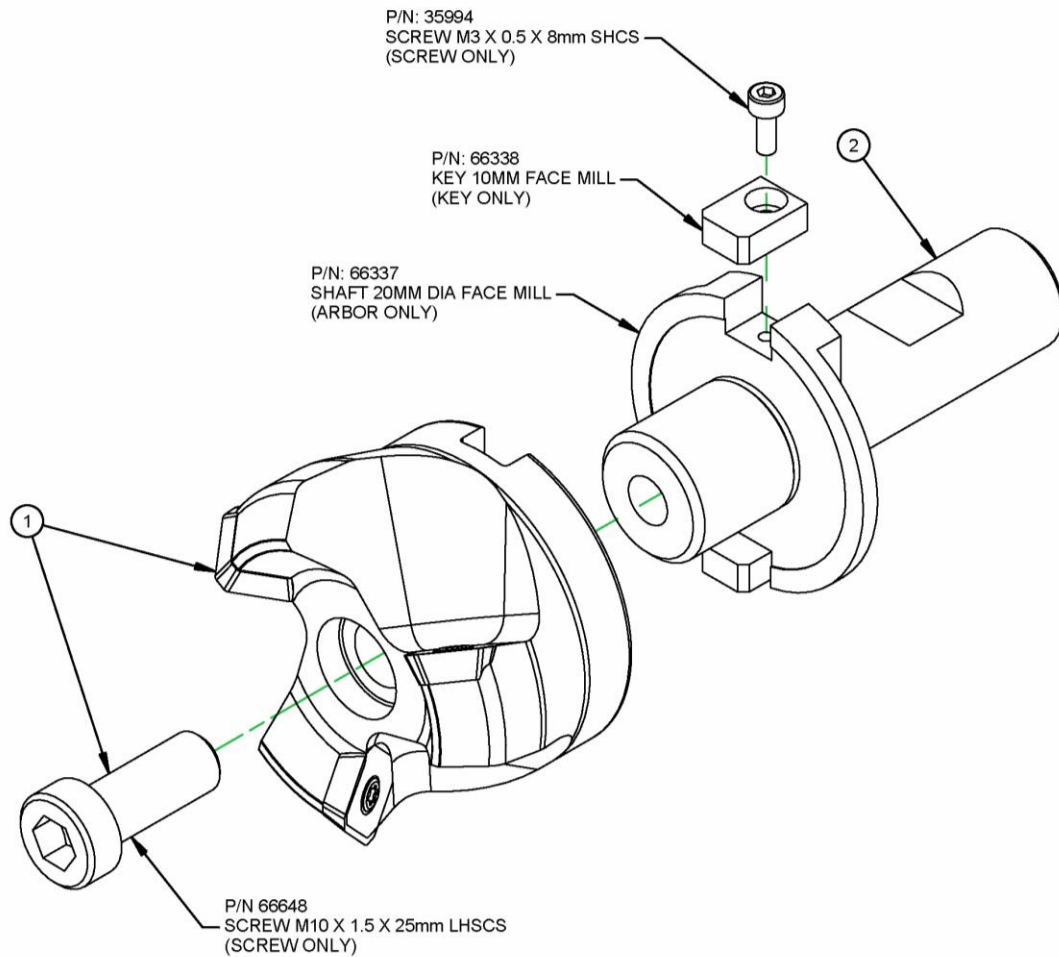
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	10	47229	INSERT CARBIDE SQUARE .528 IC SEMT13T3AGSN-JM
2	1	64981	MILL FACE 3 DIA 45 DEG POS POS MITSUBISHI
3	1	64982	HOLDER TOOL FACE MILL HSK 40A TAPER 1"

FIGURE 103 MILL FACE ASSEMBLY, HSK 40, 3 INCH 64984



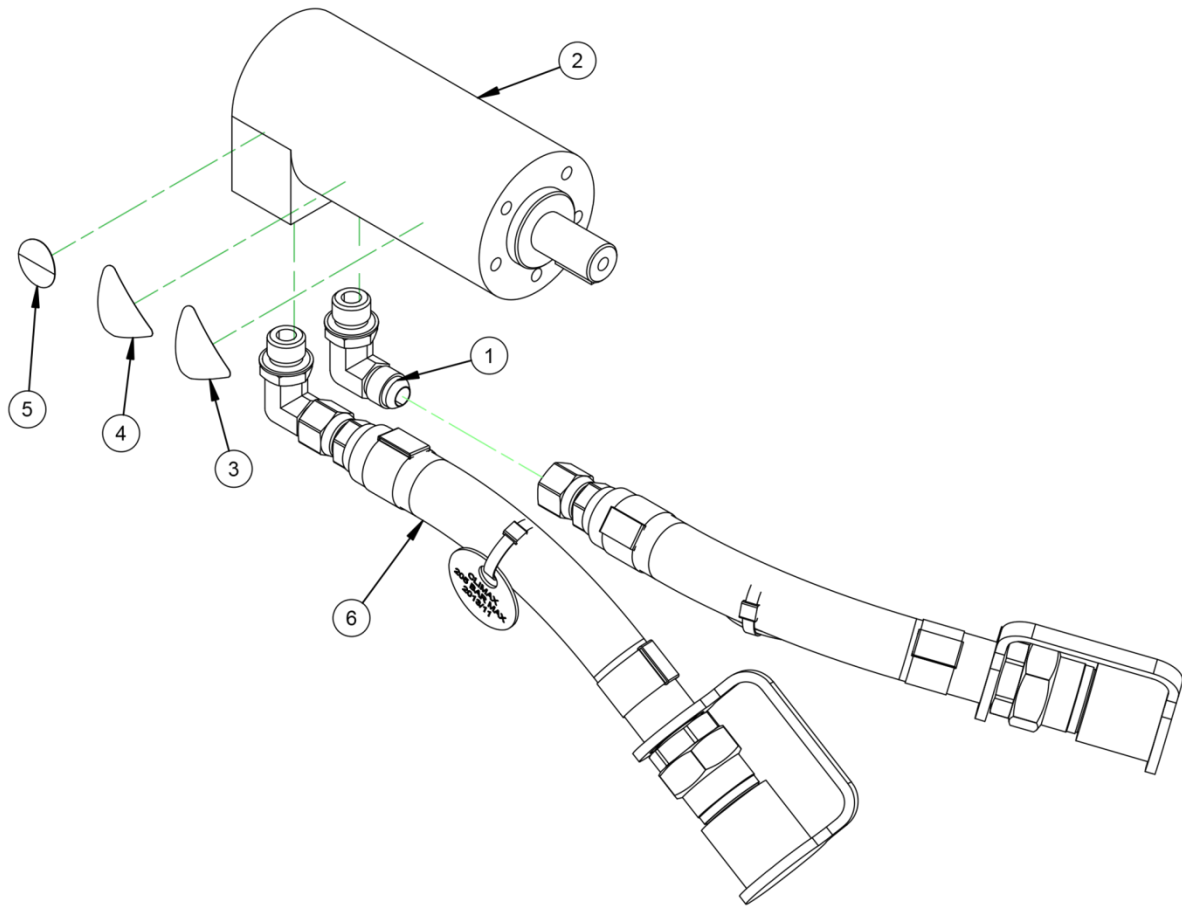
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	39602	MILL FACE 2 X 3/4 SHANK PM4000
2	10	39631	INSERT CARBIDE KENNAMETAL SEHW1204AFN KC725M
3	9	39632	SCREW INSERT CARBIDE MS1129 T 15
4	1	39633	WRENCH TORX TT-15 T-HANDLE
5	1	42045	CASE REPLACEMENT 2 IN FACE MILL KIT
6	1	71081	ANTI-SEIZE COMPOUNT KENNAMETAL

FIGURE 104 MILL FACE KIT, 2 X 3/4 SHANK 39634



PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	1	66332	MILL FACE 50MM DIA 45 DEG SHELL
2	1	66354	ASSY ARBOR 20MM WELDON SHANK W/ KEYS

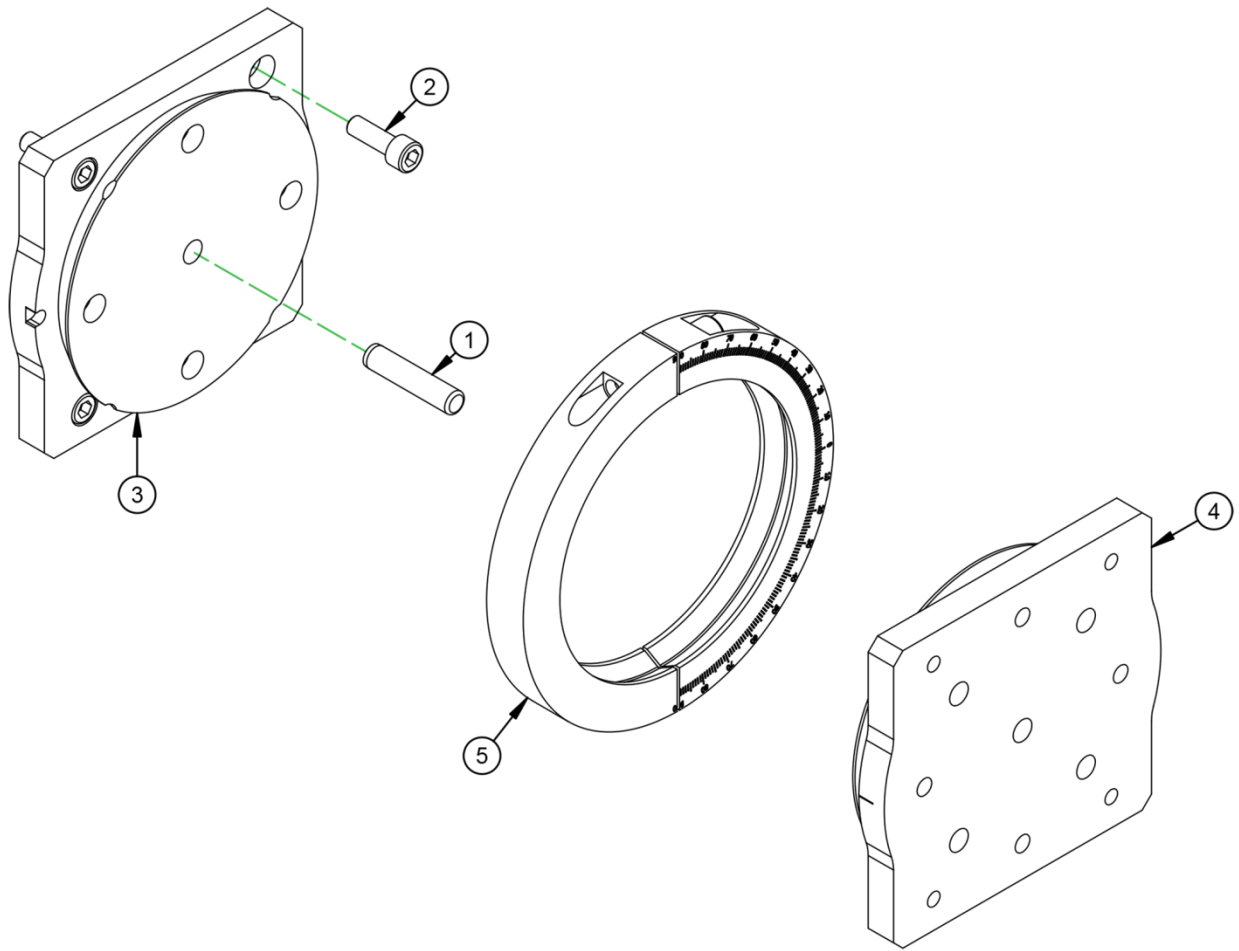
FIGURE 105 MILL FACE, 2 X 20MM SHANK 45068



AVAILABLE CONFIGURATIONS	
DESCRIPTION	PART NO.
ASSY MOTOR HYD .79 CU IN. J SERIES W/ 24" QD MALE	65263
ASSY MOTOR HYD 1.21 CU IN. J SERIES W/ 24" QD MALE	65094
ASSY MOTOR HYD 1.93 CU IN. J SERIES W/ 24" QD MALE	65095
ASSY MOTOR HYD 3.00 CU IN. J SERIES W/ 24" QD MALE	65096

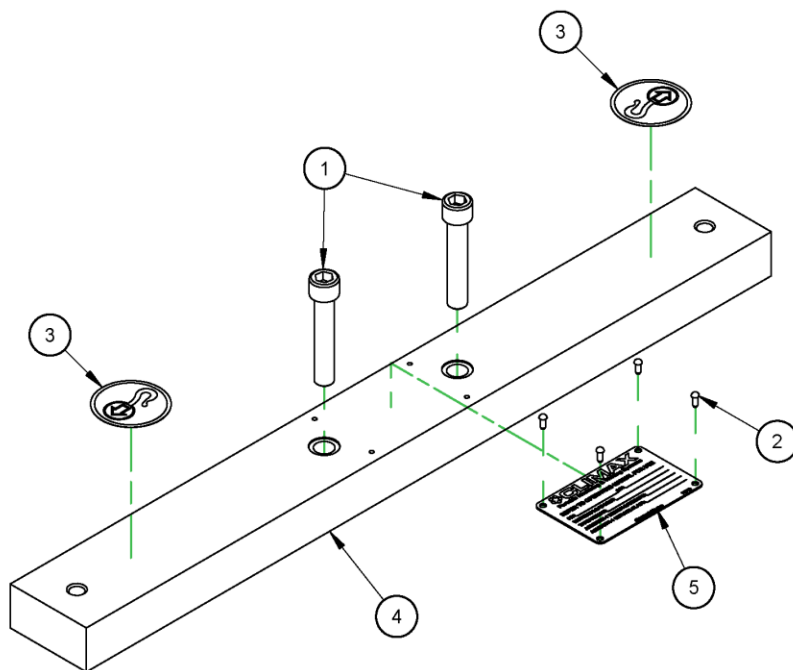
PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	2	12849	FTG ELBOW SAE-6 MALE X #6 JIC MALE 90 DEG
2	1	14261	MOTOR HYD .79 CU IN 5/8 STRIAGHT SAE O-RING (65263)
		21025	MOTOR HYD 1.21 CU IN 5/8 STRIAGHT SAE O-RING (65094)
		20371	MOTOR HYD 1.93 CU IN 5/8 STRIAGHT SAE O-RING (65095)
		65089	MOTOR HYD 3.00 CU IN 5/8 STRIAGHT SAE O-RING (65096)
3	1	78741	LABEL WARNING CRUSH FOOT
4	1	78748	LABEL WARNING FLYING DEBRIS/LOUD NOISE
5	1	79328	LABEL WARNING - CONSULT OPERATOR'S MANUAL GRAPHIC .75 DIA
6	2	80041	ASSY HOSE 3/8 X 1/2 QD MALE X #6 JICF X 24 CE

FIGURE 106 MOTOR ASSEMBLY, HYDRAULIC 81702



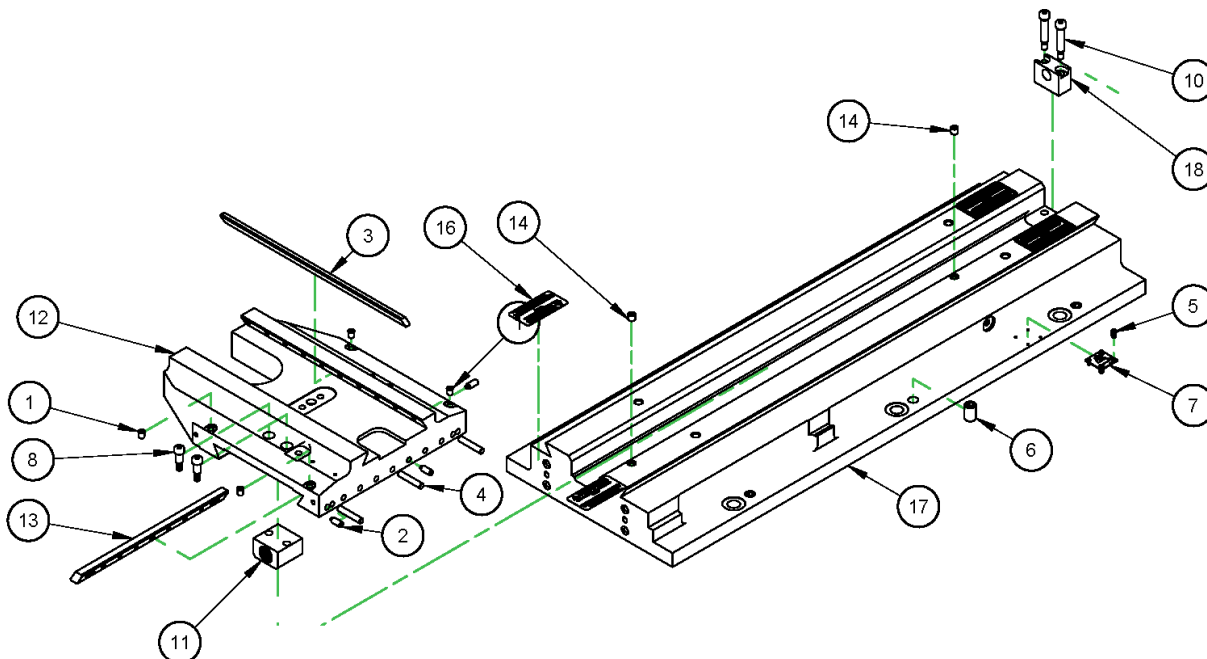
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	16664	PIN DOWEL 1/2 DIA X 2-1/4
2	4	18214	SCREW M10 X 1.5 X 30mm SHCS
3	1	66214	PLATE SWIVEL RAM SIDE #40 TAPER
4	1	66215	PLATE SWIVEL MILL SIDE PM42 LM52
5	1	66216	RING CLAMP SWIVEL PLATE #40 TAPER

FIGURE 107 SWIVEL ASSEMBLY, MILLING HEAD 66217



REPLACEMENT COMPONENTS			
ITEM	QTY	P/N:	DESCRIPTION
1	2	10557	SCREW 3/8-16 X 2 SHCS
2	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
3	2	59039	LABEL WARNING LIFT POINT ROUND 1.5"
4	1	75693	HOIST BAR PM4200
5	1	75740	TAG BELOW THE HOOK LIFTING INFO AND SERIAL NUMBER 1.75 X 2.75

FIGURE 108 ASSEMBLY HOISTING ATTACHMENT 75752



AVAILABLE CONFIGURATIONS			
PART NUMBER	DESCRIPTION	ITEM 16 P/N	ITEM 6 (27273)QTY
72054	ASSY BED 20 IN TRAVEL W/O LEADSCREW PM4200 FLAT FEED STOP	76527	6
72055	ASSY BED 49 IN TRAVEL W/O LEADSCREW PM4200 FLAT FEED STOP	76528	12
72056	ASSY BED 78 IN TRAVEL W/O LEADSCREW PM4200 FLAT FEED STOP	76529	18

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	10139	OILER BALL VALVE DRIVE IN
2	18	10189	SCREW 1/4-20 X 5/8 SSSHPPL
3	1	10444	GIB .56 X .235 X 11.1
4	3	85264	PIN DOWEL 1/4 DIA X 1-3/8
5	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
6	A/R	27723	SCREW 1/2-20 X 3/4 SSSFP
7	1	29152	PLATE MASS CE
8	2	39475	SCREW 5/16 DIA X 1/2 X 1/4-20 SHLDCS
9	4	41471	(NOT SHOWN) HOIST RING 3/8-16 X .56 1.3 ID 2.18 OD 3.79 OAL 1000 LBS SWIVEL
10	2	41843	SCREW 5/16 DIA X 1-1/4 X 1/4-20 SHLDCS
11	1	64636	LEAD NUT BRONZE PM4200 LH THREAD
12	1	64717	CROSS SLIDE PM4200
13	1	64734	GIB BED PM4200
14	2	75408	SCREW M8 X 1.25 X 8MM SSSFP
15	2	75752	(NOT SHOWN) ASSY HOISTING ATTACHMENT PM4200 WITH CERT TAG
16	4	75766	LABEL WARNING USE LIFTING DEVICE PROVIDED 1.25 X 2.5
17	1	76528	BED-PM4200 49 INCH TRAVEL 3RD GEN
18	1	76545	SUPPORT LEADSCREW PM4200 3RD GEN

FIGURE 109 ASSEMBLY BED CHART 72150

APPENDIX C SDS

Contact CLIMAX for the current list of Safety Data Sheets.



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