

# CE

# LM5200

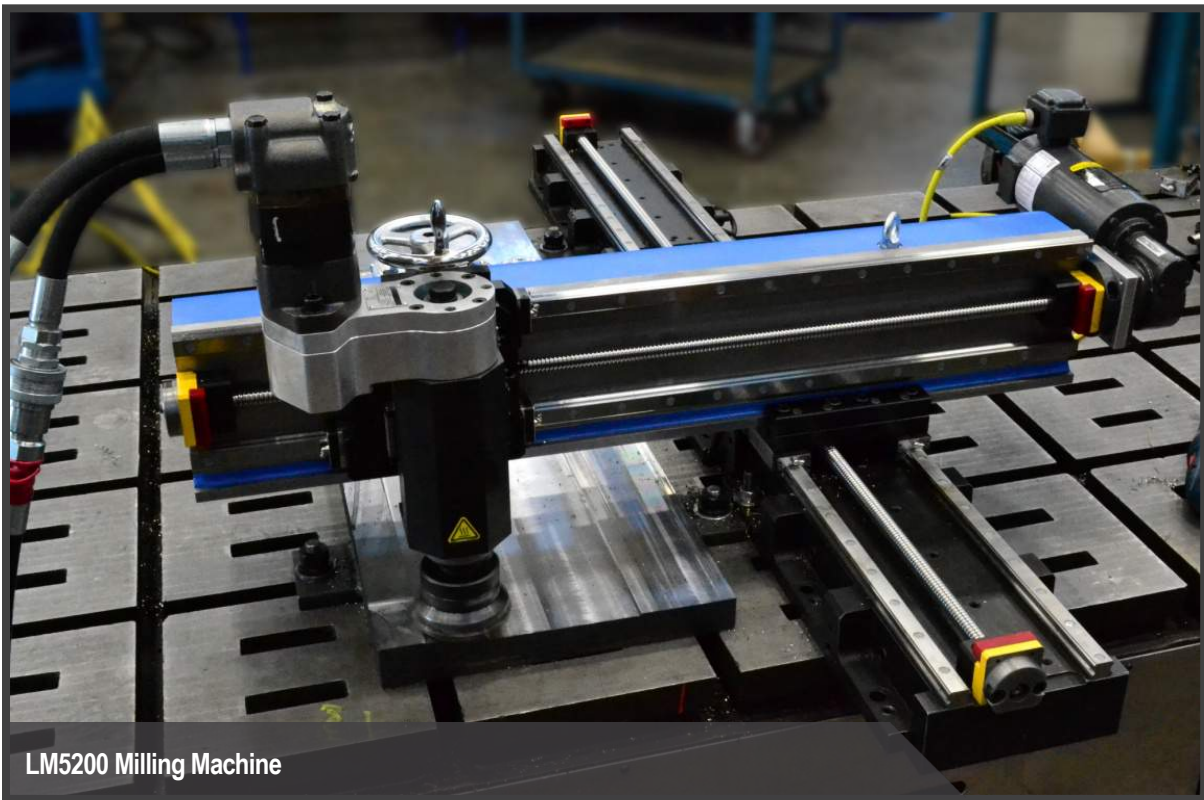
## LINEAR MILLING MACHINE

### OPERATING MANUAL

SERIAL NUMBER RANGE: 11017900 – 15121870

ORIGINAL INSTRUCTIONS

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LM5200 Milling Machine

 **CLIMAX**  
Portable Machining & Welding Systems


P/N 66188  
July 2019  
Revision 5

 |   



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	<b>WARNING</b>
	<p>For maximum safety and performance, read and understand the entire manual and all related safety instructions before using this equipment. Failure to follow the instructions and guidelines in this manual could cause personal injury, fatalities or property damage.</p>

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## Safety Precautions

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

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

### General Safety Practices

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#### QUALIFIED PERSONNEL

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

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#### OBEY WARNING LABELS

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

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#### INTENDED USE

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

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#### STAY CLEAR OF MOVING PARTS

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

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#### ROTATING MACHINERY

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

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#### 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. Keep the work area clean and well lit.

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#### AMBIENT LIGHTING

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

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#### SECURE LOOSE CLOTHING AND LONG HAIR

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

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#### HAZARDOUS ENVIRONMENTS

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

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#### HOSES, PENDANT AND ELECTRICAL CABLES

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

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#### REPETITIVE MOTION

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

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#### STAY ALERT

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

## Machine Specific Safety Practices

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

### **PERSONAL PROTECTIVE EQUIPMENT**

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

### **OPERATING CONDITIONS**

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

### **TOOLING**

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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**

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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**

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

### **CONTROLS**

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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**

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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**

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The machine produces metallic fragments during normal operation. You should wear eye protection at all times when working with the machine. Only

remove fragments with a brush after the machine has stopped completely.

### **RADIATION HAZARDS**

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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**

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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**

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

### **MAINTENANCE**

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

### **NOISE LEVEL**

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85 dB(A) or higher – Hearing Protection is required.

### **STORED ENERGY**

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

### **MSDS**

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Material Data Safety Sheets are included in the maintenance manual.

### **UNINTENTIONAL STARTING**

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Prevent unintentional starting. The machine must be properly locked out and/or shut down before maintenance.

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## Safety Sign and Symbol Guidelines

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

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

	<p style="text-align: center;"><b>DANGER</b></p> <p>Indicates a hazardous situation that could be fatal or cause serious injury.</p>
	<p style="text-align: center;"><b>WARNING</b></p> <p>Indicates a potentially hazardous situation that could be fatal or cause serious injury.</p>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Indicates a potentially hazardous situation that could result in minor to moderate injury, damage to the machine or interruption of an important process.</p>
	<p style="text-align: center;"><b>IMPORTANT</b></p> <p>Provides critical information for the completion of a task. There is no associated hazard to people or the machine.</p>
	<p style="text-align: center;"><b>INFORMATION</b></p> <p>Provides important information regarding the machine.</p>

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## Risk assessment and hazard mitigation

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

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

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



## 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.

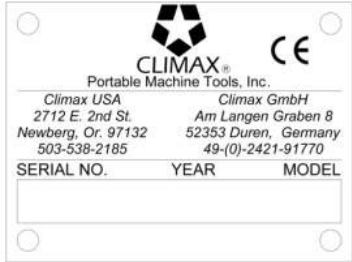


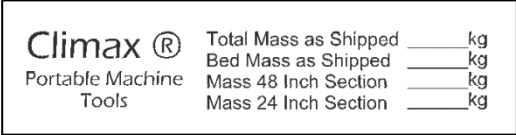
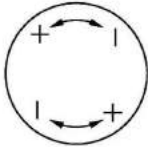


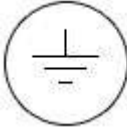


**TABLE 1. RISK ASSESSMENT CHECKLIST BEFORE SET-UP**



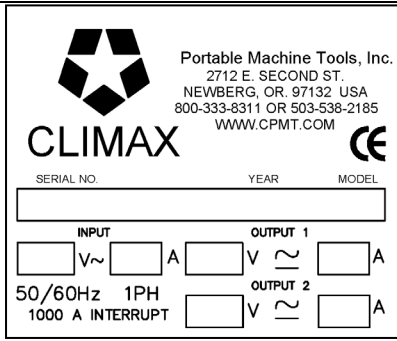





<b>Before Set-up</b>	
<input type="checkbox"/>	I took note of all the warning labels on the machine.
<input type="checkbox"/>	I removed or mitigated all identified risks (such as tripping, cutting, crushing, entanglement, shearing, or falling objects).
<input type="checkbox"/>	I considered the need for personnel safety guarding and installed any necessary guards.
<input type="checkbox"/>	I read the Machine Setup instructions.
<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**

<b>After Set-up</b>	
<input type="checkbox"/>	I checked that the machine is safely installed (according to the Machine Setup section) 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 section 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.

## Labels

													
<p>Part Number 29154 – Machine Nameplate</p>	<p>Part Number 29152 – Mass Tag displays the weight of a group of components or the assembly in Kilos</p>												
	 <table border="1" data-bbox="865 646 1377 779"> <tr> <td>Climax®</td> <td>Total Mass as Shipped</td> <td>_____ kg</td> </tr> <tr> <td>Portable Machine</td> <td>Bed Mass as Shipped</td> <td>_____ kg</td> </tr> <tr> <td>Tools</td> <td>Mass 48 Inch Section</td> <td>_____ kg</td> </tr> <tr> <td></td> <td>Mass 24 Inch Section</td> <td>_____ kg</td> </tr> </table>	Climax®	Total Mass as Shipped	_____ kg	Portable Machine	Bed Mass as Shipped	_____ kg	Tools	Mass 48 Inch Section	_____ kg		Mass 24 Inch Section	_____ kg
Climax®	Total Mass as Shipped	_____ kg											
Portable Machine	Bed Mass as Shipped	_____ kg											
Tools	Mass 48 Inch Section	_____ kg											
	Mass 24 Inch Section	_____ kg											
<p>Part Number 59039 – Designated Lift Point</p>	<p>Part Number 65487 – Mass Tag</p>												
													
<p>Part Number 35772 – Ball Valve Handle</p>	<p>Part Number 27307 – Warning Label</p>												
													
<p>Part Number 61839 – Climax Logo</p>	<p>Part Number 37572 – PE Ground</p>												
													
<p>Part Number 46902 – Warning Hot Surface</p>	<p>Part Number 62888 – Lift Point Only</p>												

 <p><b>CAUTION</b></p> <p>TO AVOID ELECTRIC SHOCK THE POWER CORD PROTECTIVE GROUNDING CONDUCTOR MUST BE CONNECTED TO GROUND. NO OPERATOR SERVICEABLE PARTS INSIDE. DO NOT REMOVE COVERS. REFER SERVICING TO QUALIFIED PERSONNEL.</p>	 <p>Portable Machine Tools, Inc. 2712 E. SECOND ST. NEWBERG, OR. 97132 USA 800-333-8311 OR 503-538-2185 WWW.CPMT.COM</p> <p><b>CLIMAX</b></p> <p>SERIAL NO. YEAR MODEL</p> <p>INPUT OUTPUT 1 V~ A V ~ A 50/60Hz 1PH OUTPUT 2 1000 A INTERRUPT V ~ A</p>
<p>Part Number 37576 – Electrical Warning</p>	<p>Part Number 36094 – Speed Controller Nameplate</p>
 <p>Portable Machine Tools, Inc. 2712 E. SECOND ST. NEWBERG, OR. 97132 USA 800-333-8311 OR 503-538-2185 WWW.CPMT.COM</p> <p><b>CLIMAX</b> </p> <p>SERIAL NO. YEAR MODEL</p> <p>INPUT OUTPUT 1 V~ A V ~ A 50/60Hz 1PH OUTPUT 2 1000 A INTERRUPT V ~ A</p>	 <p><b>230 VOLTS</b></p>
<p>Part Number 41949 – Speed Controller Nameplate CE</p>	<p>Part Number 30081 – 230V</p>
 <p><b>120 VOLTS</b></p>	<p><b>▲ WARNING ▲ WARNING ▲ WARNING ▲ WARNING</b></p> <p> This machine has moving parts that can cause severe bodily injury. For safe operation, always: Keep machine guards in place. Remove all jewelry, watches, and loose clothing before operating machine. <b>Unexpected startup hazard!</b> Disconnect and lock out power before working on machine. <b>Severing hazard!</b> Keep hands clear of machine path.</p> <p> Before unlocking this device, read and understand all cautions, warnings, and dangers listed in the operators manual. Failure to do this could result in serious injury.</p> <p><b>Disconnect and lock out power before working on this machine.</b></p>
<p>Part Number 32585 – 120V</p>	<p>Part Number 34734 – Warning Label</p>

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## Warranty Information

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

Climax warrants that all parts are free from defects in materials and workmanship, and that all labor has been performed properly. This warranty is available to the customer purchasing parts or labor for a period of 90 days after delivery of the part or repaired machine or 180 days on used machines and components.

If the customer purchasing parts or labor finds any defect in materials or workmanship within the warranty period, the purchaser should contact its factory representative and return the part or repaired machine, shipping prepaid, to the factory. Climax will, at its option, either repair or replace the defective part and/ or correct any defect in the labor performed, both at no charge, and return the part or repaired machine shipping prepaid.

For quick and accurate service, please provide your factory representative with your name, shipping address and telephone number, the machine model, serial number, and date of purchase.

THESE WARRANTIES DO NOT APPLY TO THE FOLLOWING:

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

ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED AND EXCLUDED.

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

### DISCLAIMER

Climax Portable Machining & Welding Systems, Inc. (hereafter referred to as "Climax") provides the contents of this manual in good faith as a guideline to the operator. Climax cannot guarantee that the information contained in this manual is correct for applications other than the application described in this manual. Product specifications are subject to change without notice.

All trademarks mentioned in this manual or other documentation provided with your Climax product are trademarks or registered trademarks of their respective holders.

## About this Manual

Climax machines are highly configurable with many options and accessories. This manual covers the use and operation of all of those possible options. The machine configuration purchased by a customer may not contain all of the options and accessories in this manual. If a specific machine application requires additional options or accessories, please contact Climax for assistance in obtaining the needed components.

This manual describes the operation and maintenance of your linear and gantry milling machine. The machine is designed for milling and drilling operations in linear and gantry modes.

All parts meet Climax Portable Machining & Welding Systems' strict quality standards. For maximum safety and performance you must read and understand the entire manual before operating the machine.

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## CE Information

This machine has been tested for European Conformity, and has been designed to strict engineering standards. Risk assessments and safety have been evaluated and adhered to during the design and manufacture of this machine.

Risks and hazards associated with the use of this equipment are clearly marked on the machine or referenced in the operating manual in accordance with International Standards.

If you have any questions or concerns, contact Climax before operating this equipment.

The Declared **Sound Power** Level is:  $L_{WA} = 73.9 \text{ dB(A)}$

The Declared **Operator Sound Pressure** Level is:  $L_{pA} = 76.5 \text{ dB(A)}$

The Declared **Bystander Sound Pressure** Level is:  $L_{pA} = 76.1 \text{ dB(A)}$

**Declaration of Conformity**



Manufacturer Address:  
Climax Portable Machine Tools, Inc.  
2712 E. Second St., P.O. Box 1210  
Newberg, Oregon  
USA 97132-8210  
1-800-333-8311 - www.cpmt.com

EC Authorized Representative:  
Climax GmbH  
Am Langen Graben 8  
52353 Düren / Germany  
Tel.: (+49)(0) - 2421 / 9177 - 0

**Climax GmbH is authorized to compile a technical file for this product.**

**We hereby declare that the machinery described:**

Make: LM5200, LM6200  
Models: Liner Mill  
Serial Numbers: 11016661 - 15128700

**Is in compliance with the following directives:**

2006/42/EC - Machinery

**Compliance with the relevant EHSR of the above directives is by application of the following referenced harmonized standards:**

EN 349, EN 982 + A1, EN 983 + A1, EN 3744, EN 11201, EN 12100-1, EN 12100-2, EN 12840, EN 13732-1, EN 13849-1, EN 14121-1

Original Signed

\_\_\_\_\_  
VP - Engineering  
Climax Portable Machine Tools, Inc.  
2712 E. Second St., Newberg, Oregon  
USA 97132-8210

Signed in Newberg, Oregon 97132-8210 USA on:

Original Dated

\_\_\_\_\_  
DATE

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## General Information

The LM5200 Milling Machine revolutionizes both the capabilities and functionality of portable mills.

- The machine is extremely rigid, with modular bed design
- Innovative configuration options allow setup for both conventional milling and gantry milling in one machine
- Powerful, precise machining

### Rigid, Modular Design

- Modular bed design allows the machine to be lengthened to machine a variety of work piece sizes without losing rigidity
- Bed may be shortened to fit into tight work spaces
- Bed connection system provides the ultimate in rigidity, even when bed is extended by 2 or 3 times the original length

### Flexible Configuration & Operation


- The innovative new design of these milling machines allow them to be configured for traditional linear milling, or simply split the rails lengthwise to configure for gantry milling
- Electric feeds can be mounted on the X, Y and Z-axes
- Machining capabilities include milling, drilling and boring

### Powerful, Precise Machining

- Features heavy duty spindle design and a choice of hydraulic power units
- Milling can be done in any axis, with a milling head that can rotate 90°. An optional attachment allows for 360° rotation.
- Fast, aggressive milling in horizontal, vertical, or inverted applications
- Provides reliable, precise milling to meet tight machining tolerances in both conventional and gantry mill configurations



## Rigging and Lifting

	WARNING
	<p>Falling or uncontrolled swinging of machinery can cause serious injury or be fatal to the operator and bystanders. Lift the machine only by the properly designated lifting eyes. Do not lift the assembled machine by the machining arm.</p>

## Weights and Dimensions

Machine Weights				Overall Dimensions	
<b>Bed (Travel)</b>				<b>Length</b>	Bed Length + 2.5" (63.5mm)
48" (36")	1219mm (914mm)	358 lb	163 kg	<b>Width</b>	Ram Length + 3.7" (93.9mm)
72" (60")	1829mm (1524mm)	506 lb	230 kg	<b>Height</b>	
96" (84")	2438mm (2134mm)	654 lb	298 kg	w/o Handwheel	18.7" (474.9mm)
<b>Ram (Travel)</b>				w/ Handwheel	22.0" (558.8mm)
26" (16")	660mm (406mm)	176 lb	80 kg		
44" (34")	1118mm (864mm)	269 lb	122 kg		
<b>Milling Head</b>					
#40 Taper (w/o motor)		62 lb	28 kg		
HSK 40A Electric (w/o motor)		51 lb	23 kg		
HSK 40A Hydraulic (w/o motor)		45 lb	21 kg		

## Lifting Eyes



Ram ONLY Lift Points

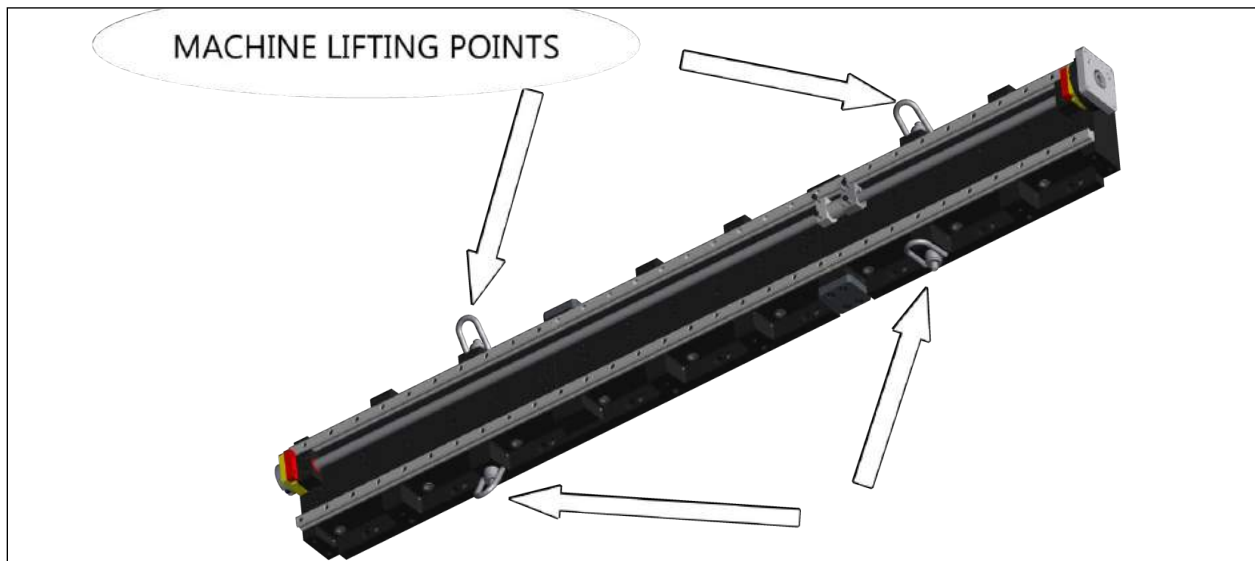


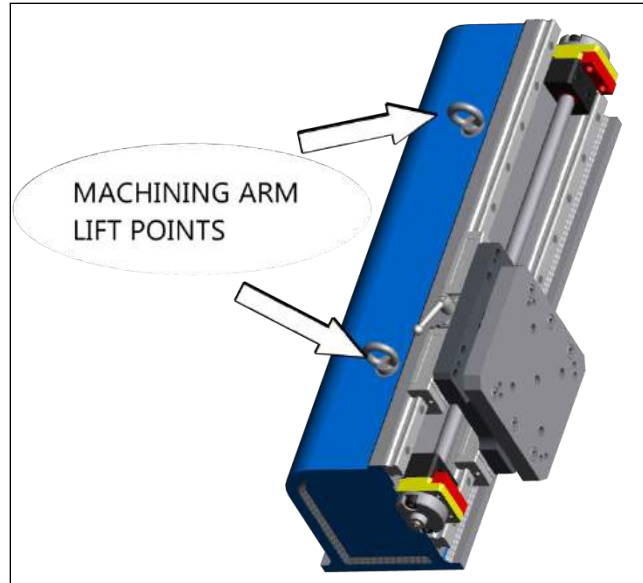
Bed Lifting Eye



Example of Vertical Lifting

## Lifting Points

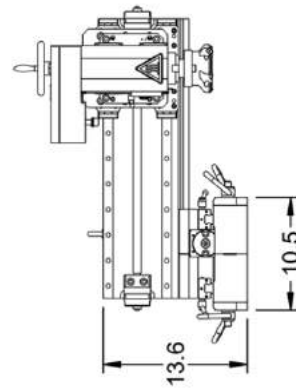
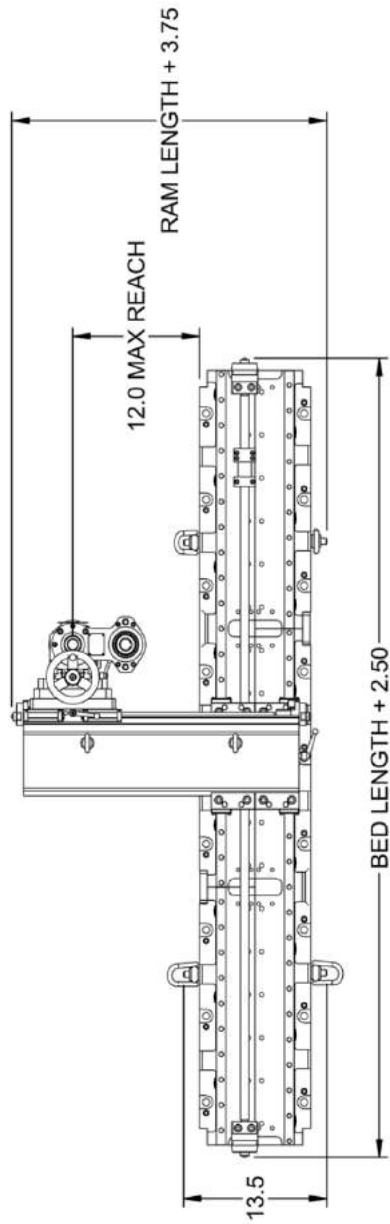




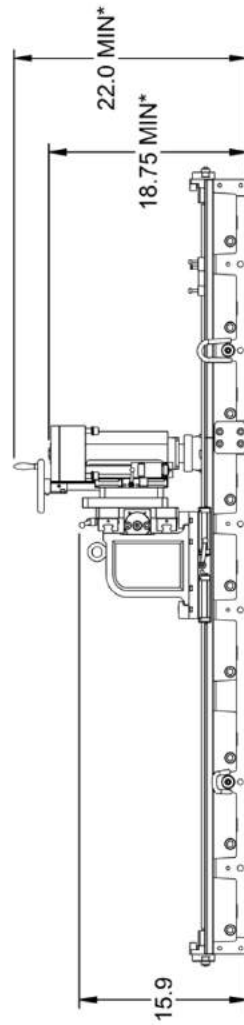
1. To prevent damage to the milling head, carefully remove the milling head with a sling before lifting the ram.
2. Center the machining arm (ram) over the beds before lifting.
3. Test lift slowly and adjust the center of gravity as necessary for controlled lifting.
4. ONLY lift the entire assembled machine from the bed lifting eyes, DO NOT lift the entire machine from the machining arm (ram) lift points
5. Use a sling to install the milling head when the complete machine is mounted in position.

	<b>WARNING</b>
	<b>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 tight and secure.</b>

# Operational Dimensions

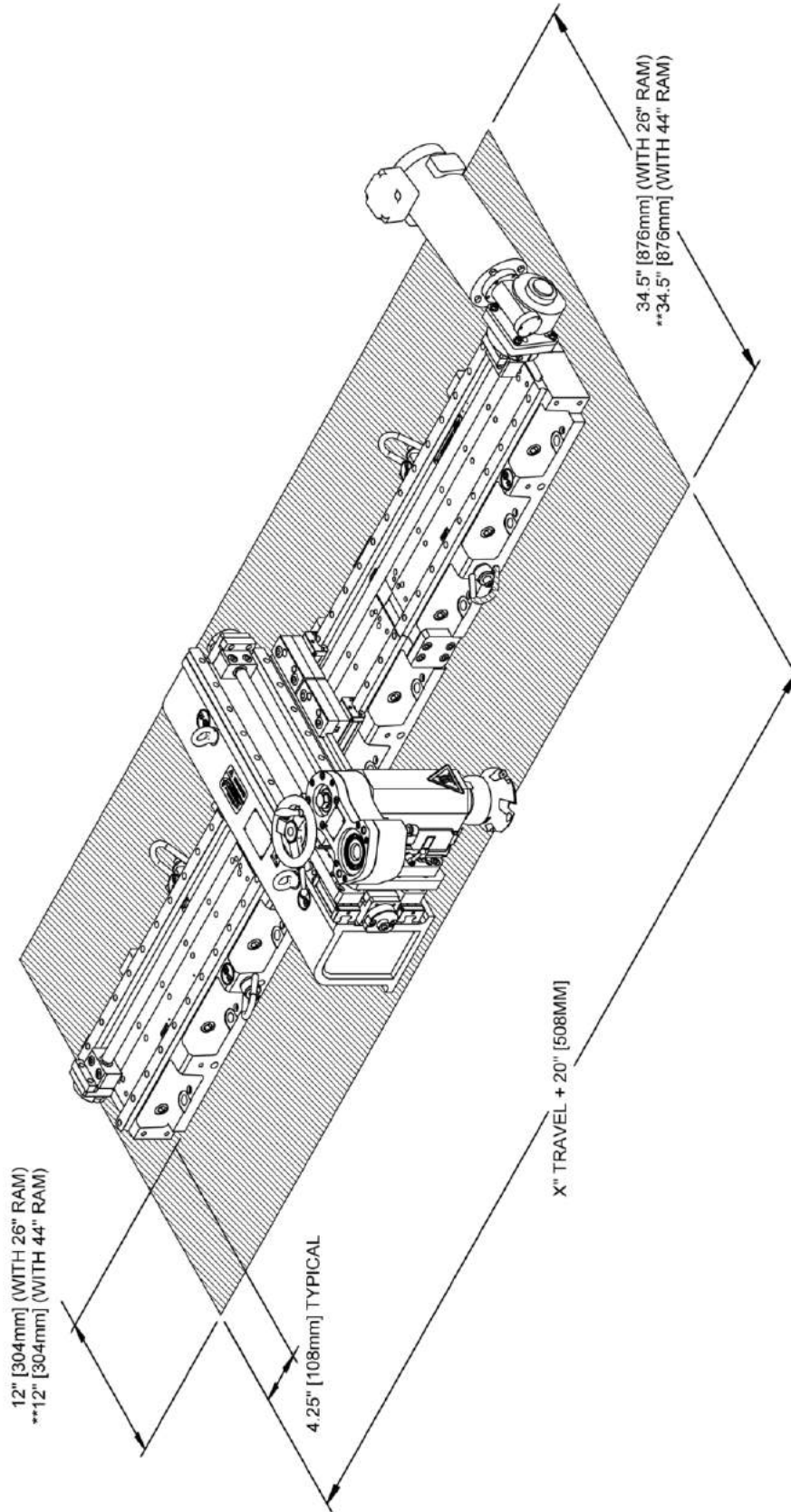


LM5200 OPERATIONAL DIMENSIONS



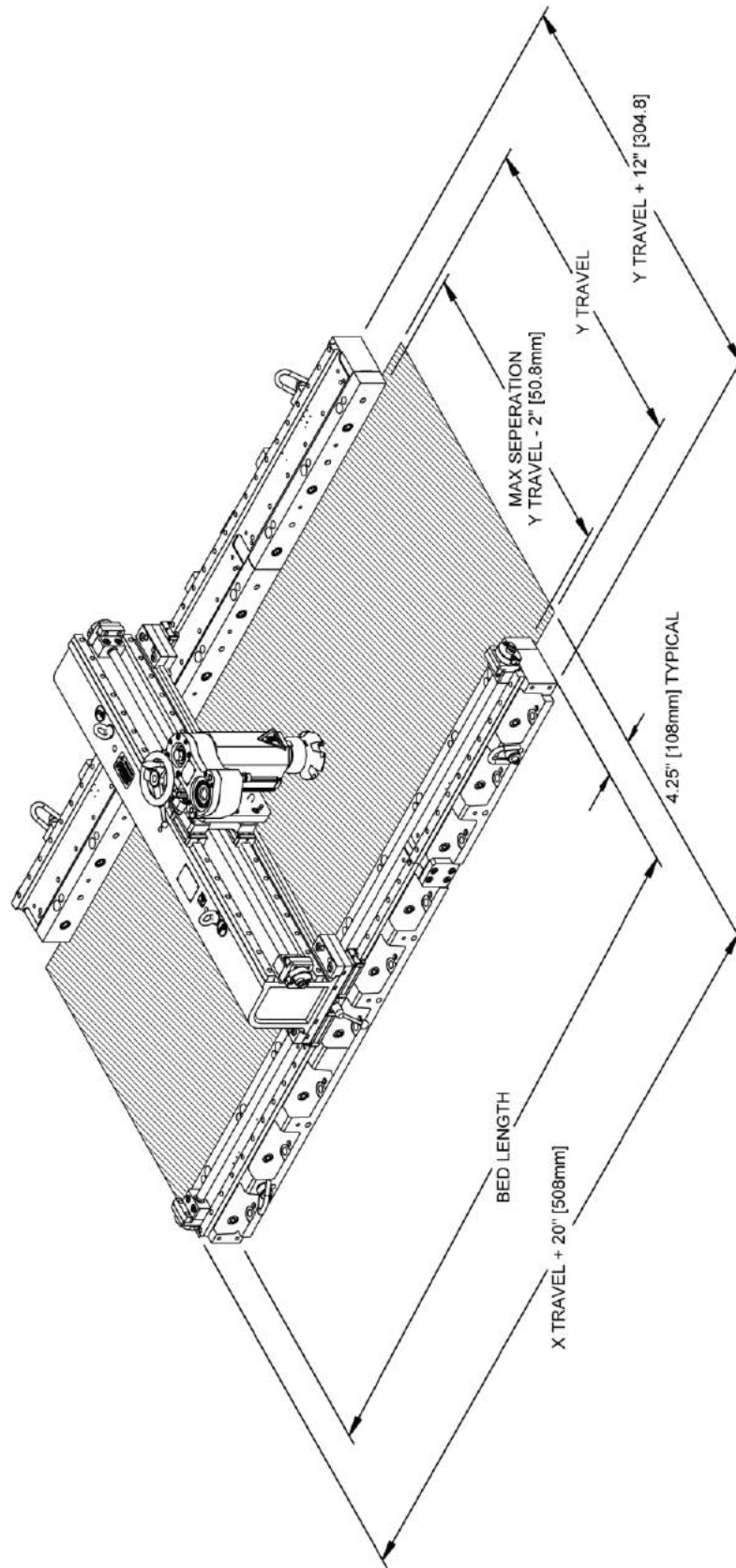
\*MINIMUM DIMENSION TO ALLOW MILLING HEAD WITH CUTTER TO CLEAR MOUNTING SURFACE

Conventional Machining Area

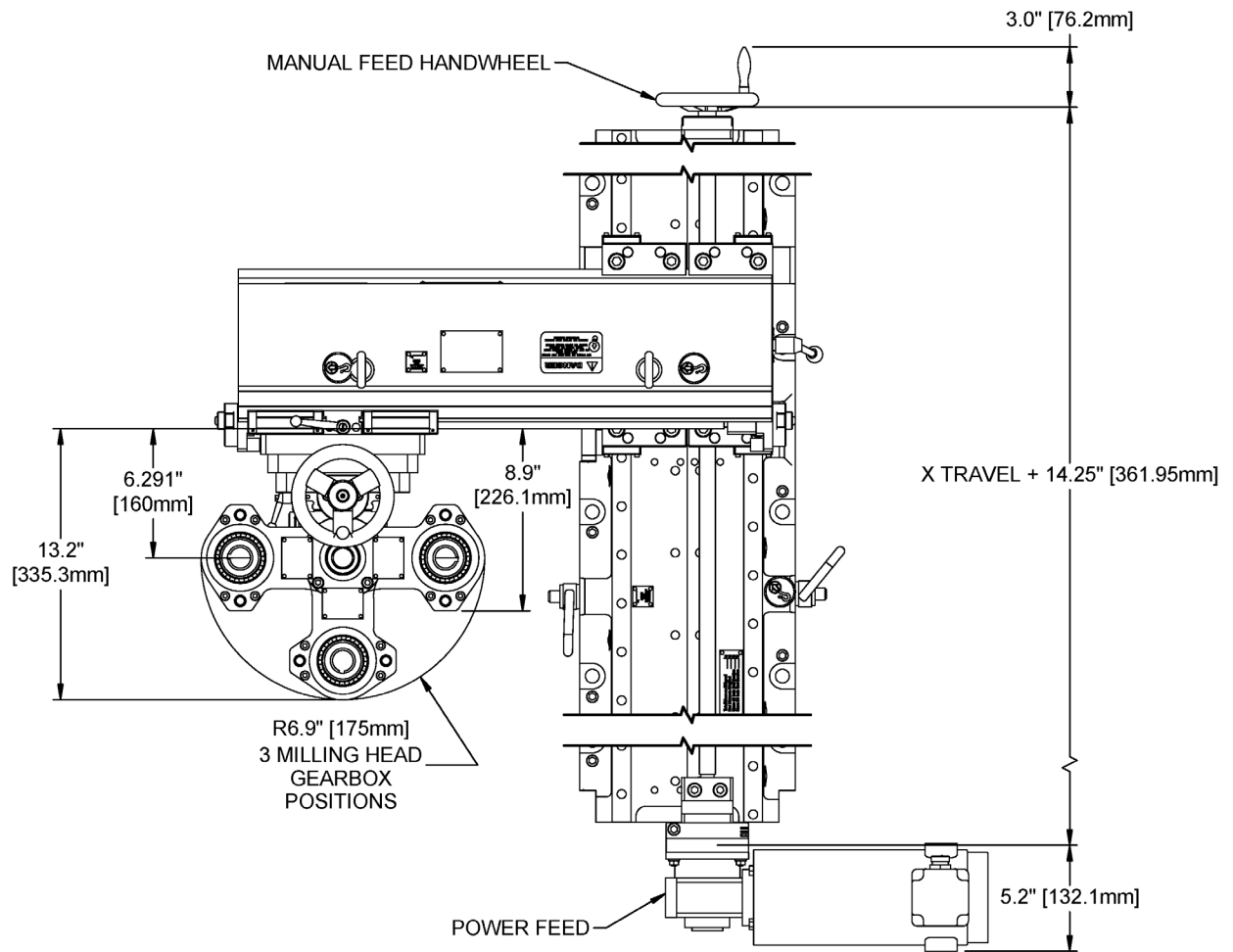


\*\* Ram at Maximum Recommended Offset

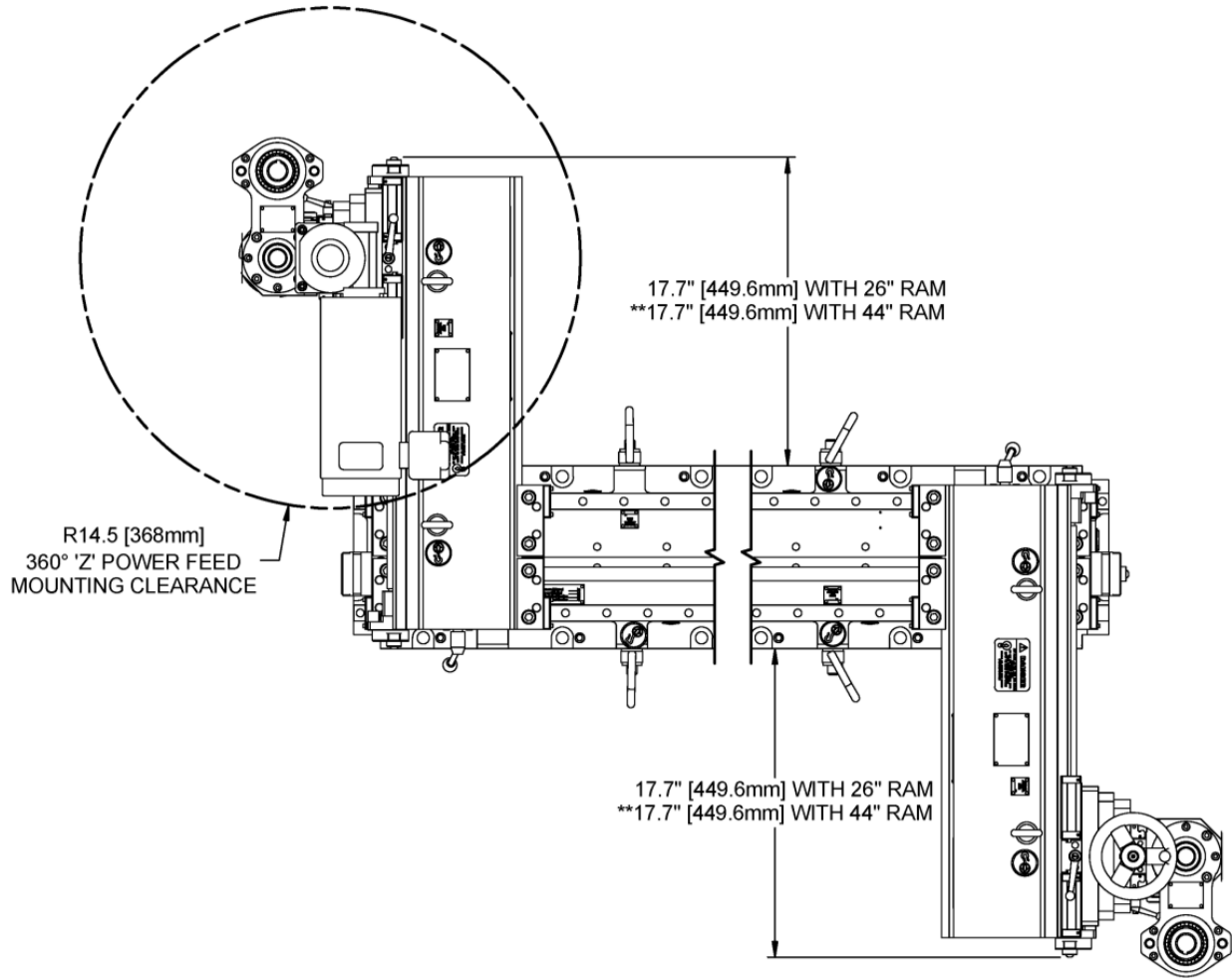
Gantry Machining Area



Overhead View



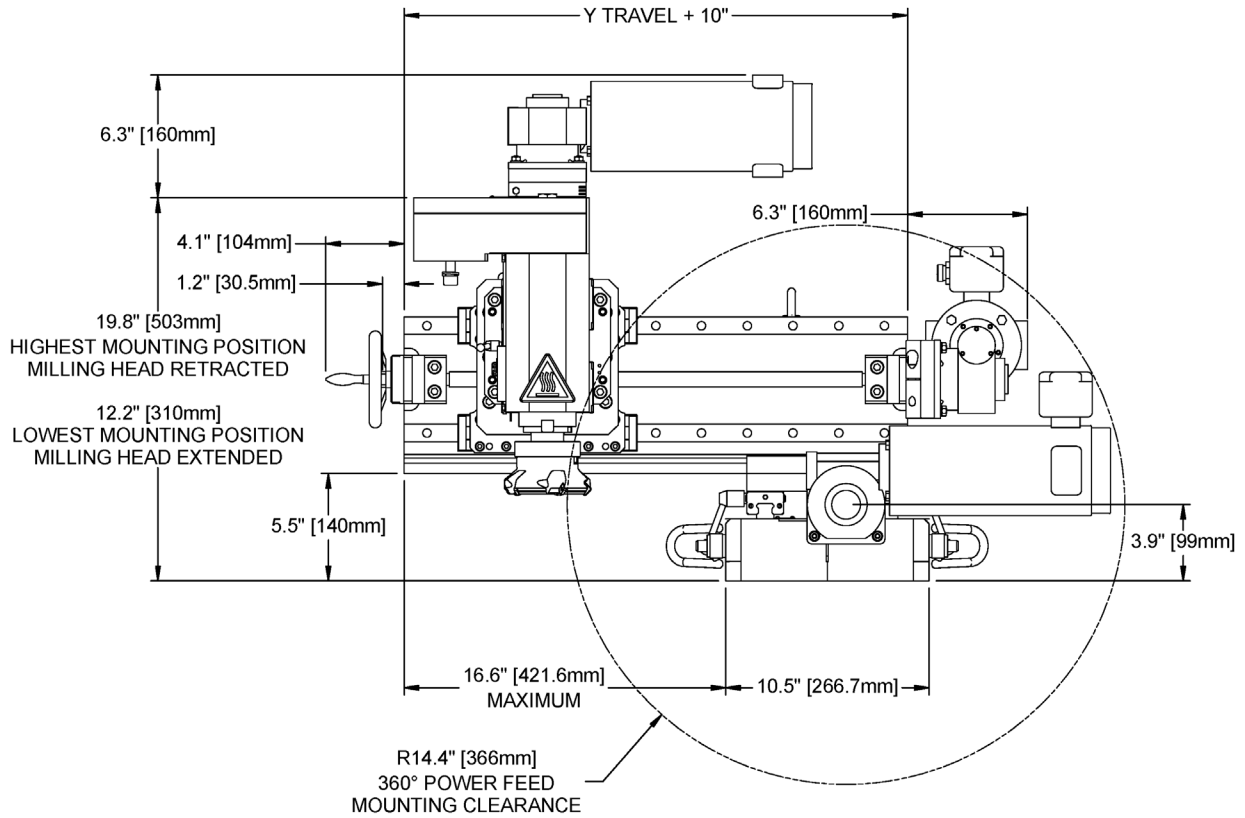
## Overhead View



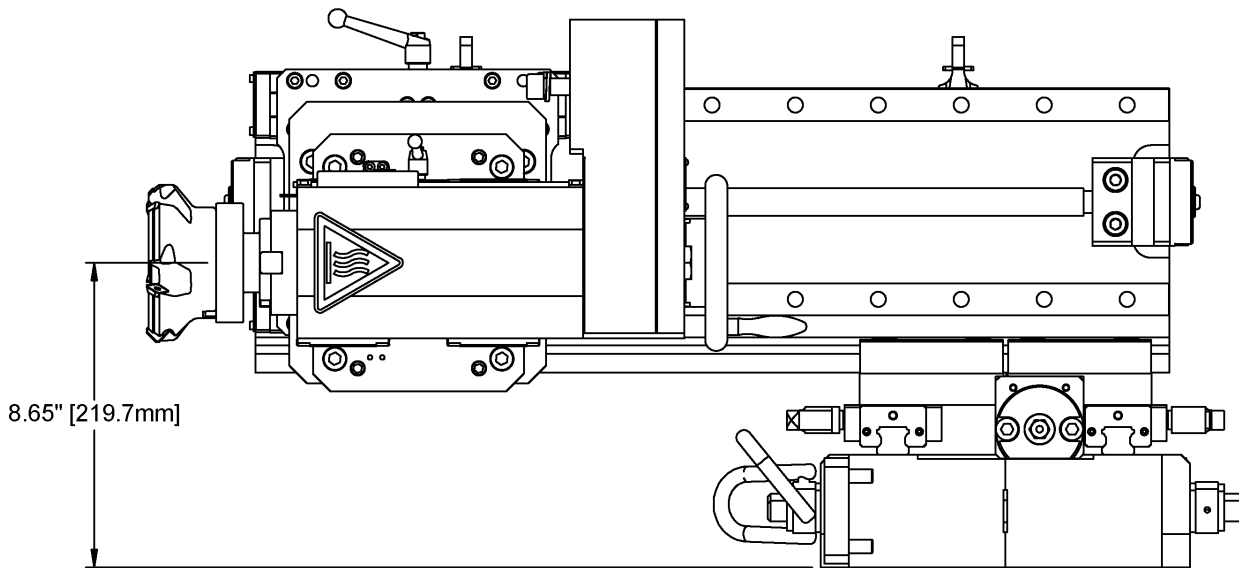
\*\* Ram at Maximum Recommended Offset



**End View**

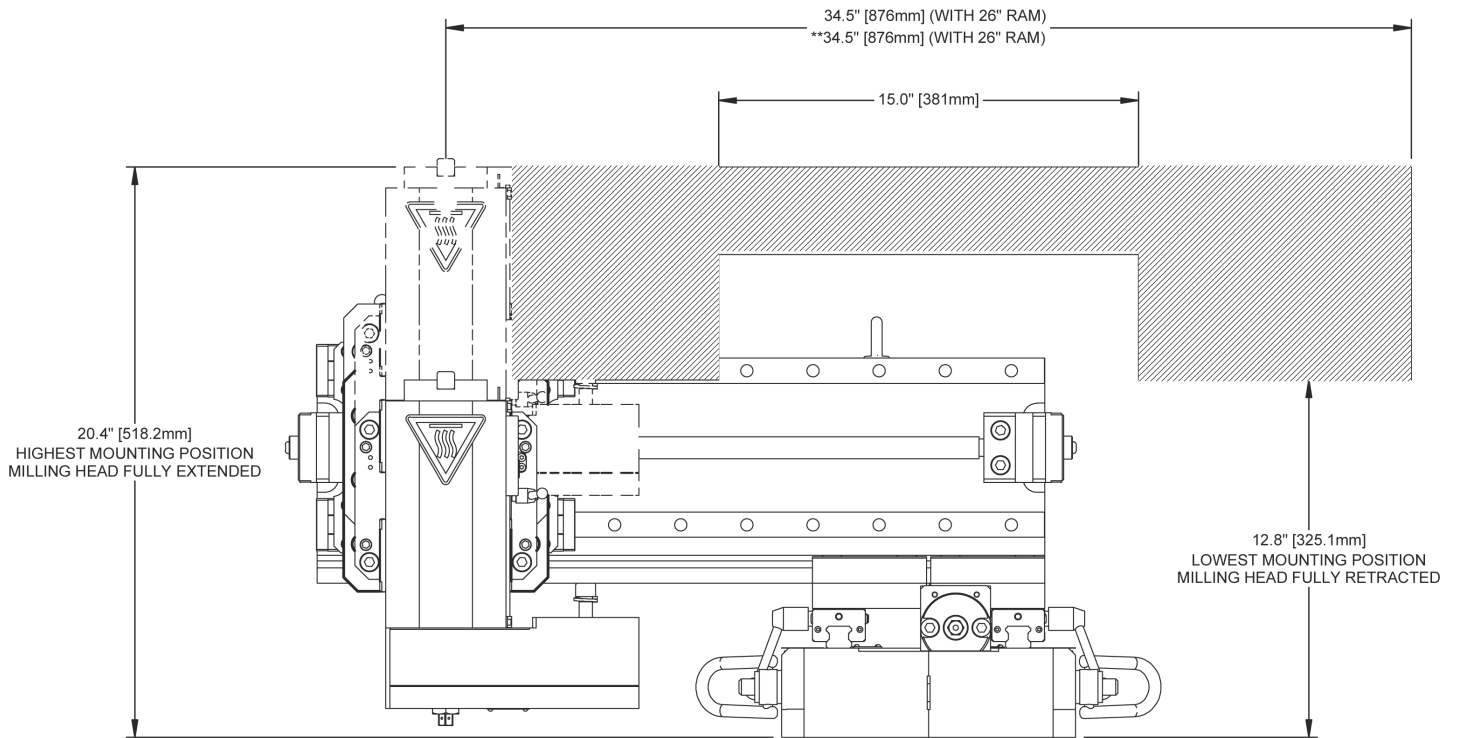


**Side Milling**



EXAMPLE OF SIDE MILLING  
(NO VERTICAL MOVEMENT  
IN THIS CONFIGURATION)

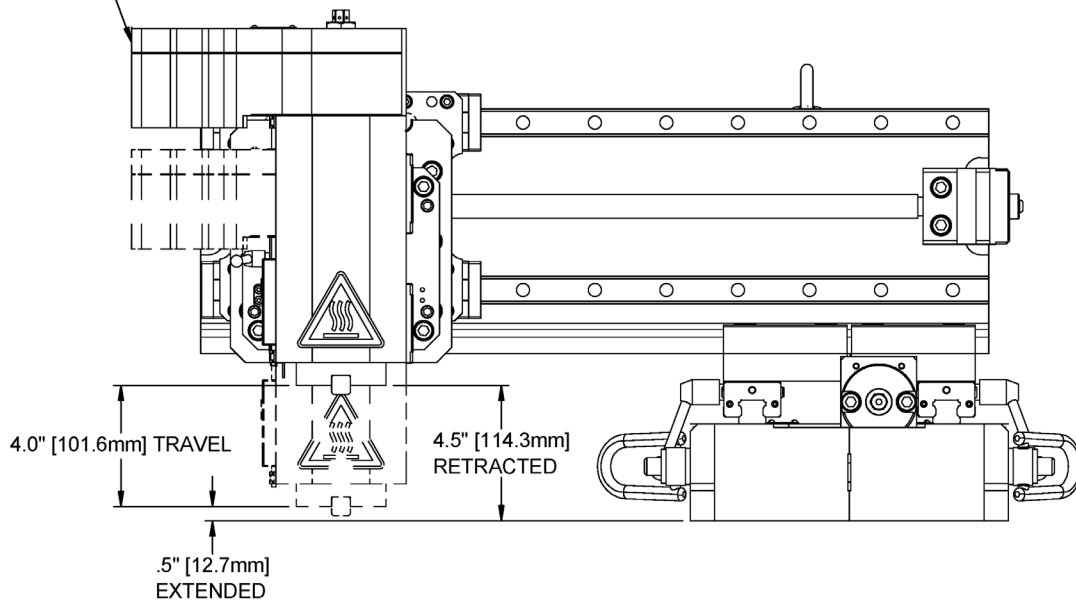
## Overhead Milling



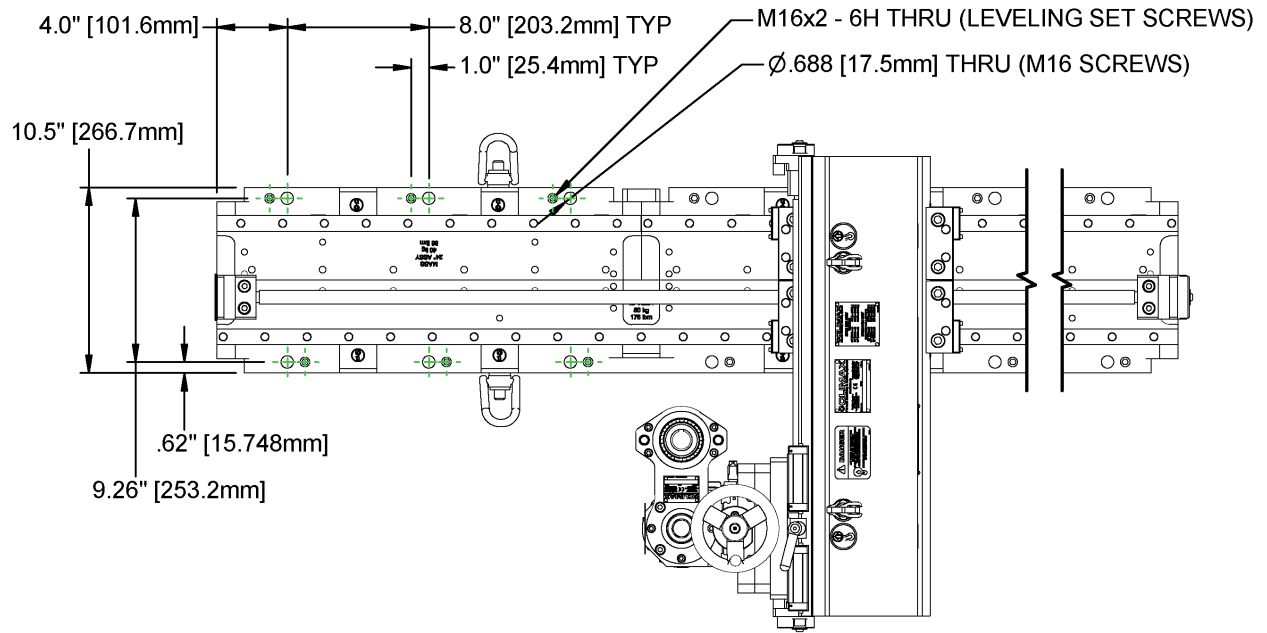
\*\* Ram at Maximum Recommended Offset

## Spindle Travel

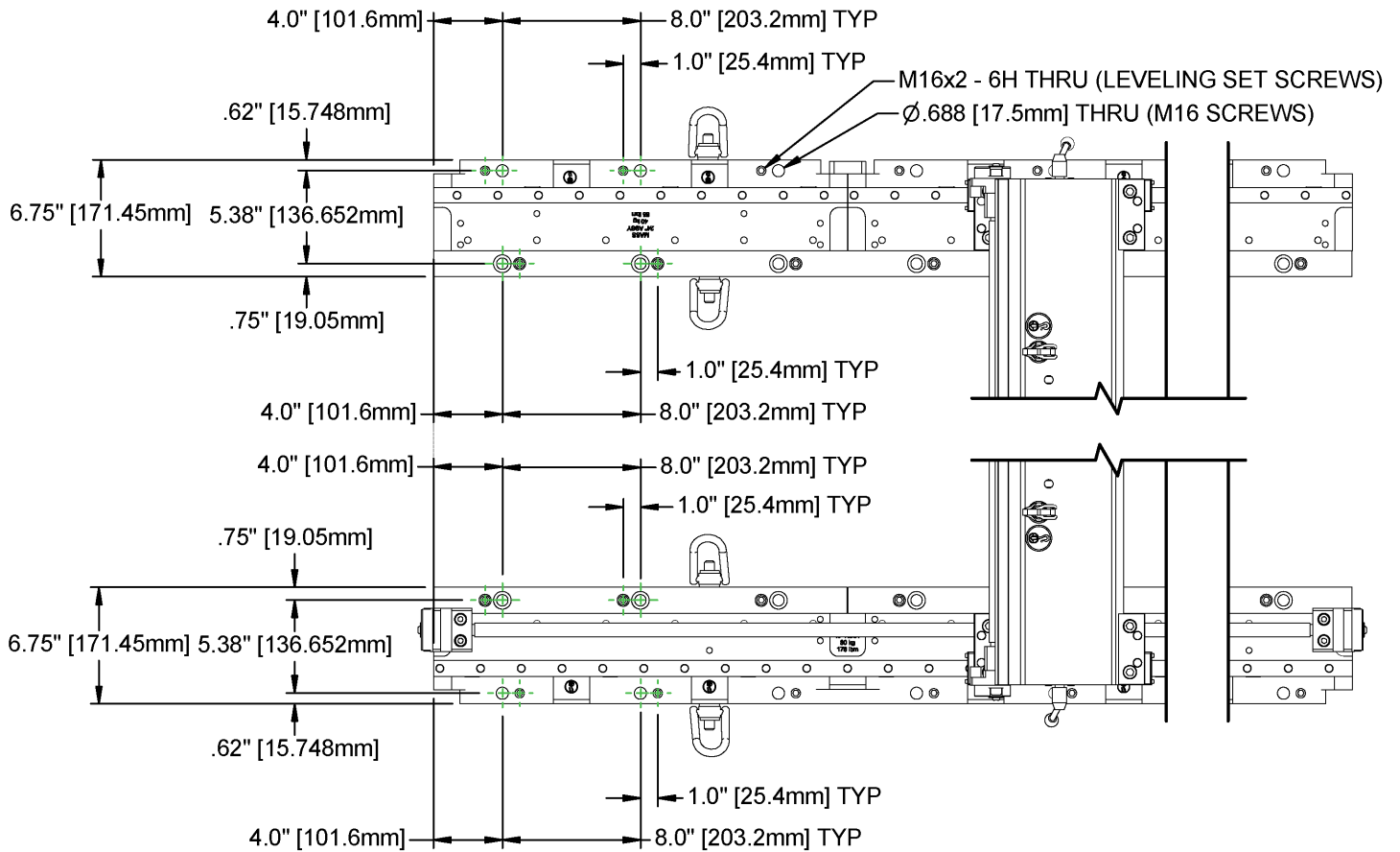
GEARBOX CAN BE ROTATED  
 IN 90° INCREMENTS; MOTOR  
 MAY BE MOUNTED ON  
 ABOVE OR ON UNDERSIDE  
 OF GEARBOX.



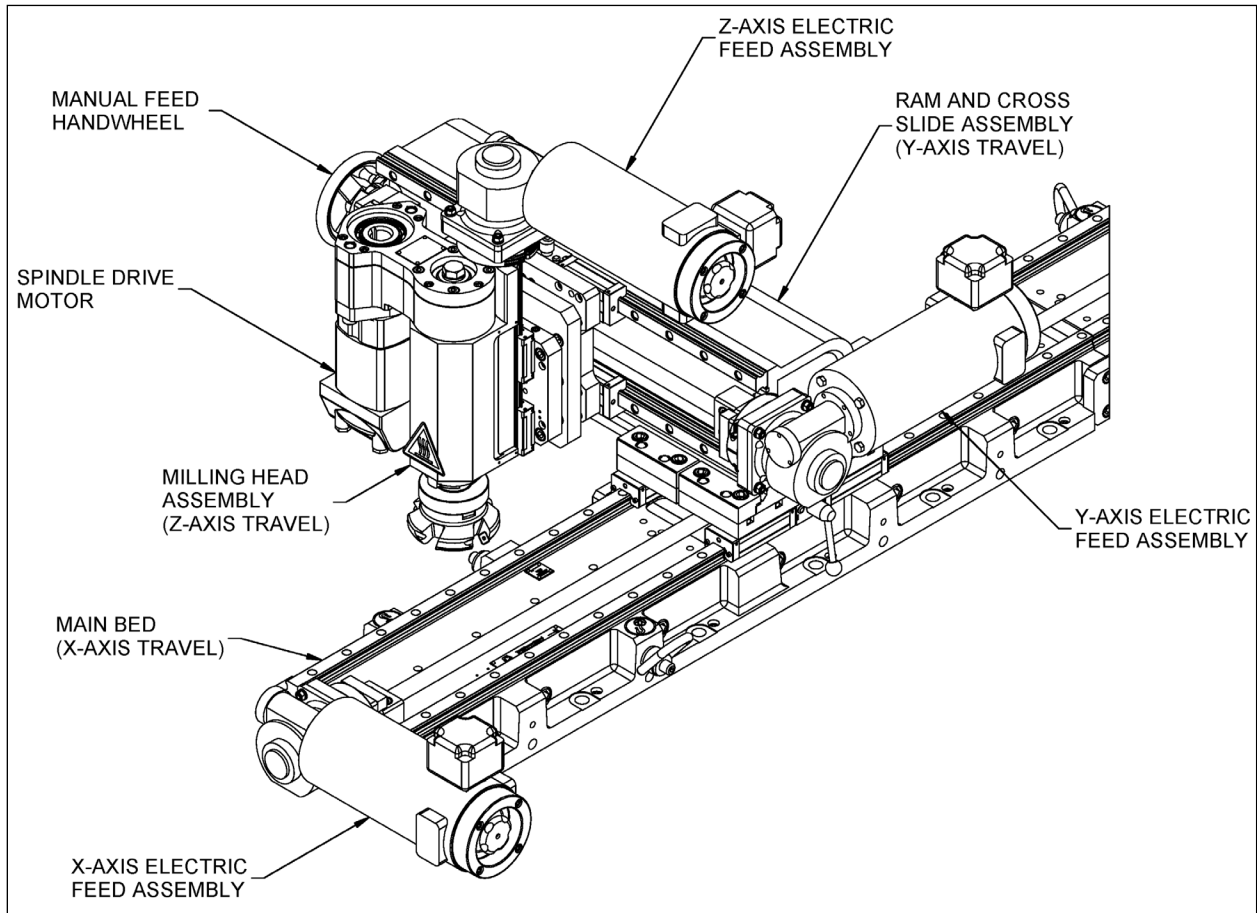
### Standard Mounting Pattern



### Gantry Mounting Pattern



## Components



Control cables are available in 10, 20 or 30 meter lengths

## Accessories

Item ID	Item Name
<b>Additional Ball Screw Assemblies</b>	
66493	ASSY BALLSCREW 36" TRAVEL 48" LONG LM5200
66494	ASSY BALLSCREW 60" TRAVEL 72" LONG LM5200
66495	ASSY BALLSCREW 84" TRAVEL 96" LONG LM5200
<b>Conventional Milling Sub Plates</b>	
66607	ASSY SUB PLATE 48 INCH BED LENGTH CONVENTIONAL LM5200
66608	ASSY SUB PLATE 72 INCH BED LENGTH CONVENTIONAL LM5200
66609	ASSY SUB PLATE 96 INCH BED LENGTH CONVENTIONAL LM5200
<b>Gantry Milling Sub Plates</b>	
66610	ASSY SET SUB PLATES 48 INCH BED LENGTH GANTRY LM5200
66611	ASSY SET SUB PLATE 72 INCH BED LENGTH GANTRY LM5200
66612	ASSY SET SUB PLATE 96 INCH BED LENGTH GANTRY LM5200
<b>Bed Lengthening Kits*</b>	
66665	KIT BED LENGTHEN BY 24" LM5200
66667	KIT BED LENGTHEN BY 24" FOR 48" BED ONLY LM5200
<b>Gantry Kits for Bed Lengthening**</b>	
66687	KIT GANTRY PLATE LENGTHEN BY 24" LM5200
66688	KIT GANTRY PLATES LENGTHEN BY 24" FOR 48" BED ONLY LM5200
<b>Additional Bed Section Alignment Tools</b>	
64744	TOOL ALIGNMENT BED SECTION LM LINE
<b>Extra Length Electric HSK Spindle Cables</b>	
66583	120V ELECTRIC HSK SPINDLE MOTOR CABLE 50 FT
66635	230V ELECTRIC HSK SPINDLE MOTOR CABLE 50 FT
66679	ADAPTER SPINDLE MOTOR CABLE***

\*To convert a 48" bed to a 72" bed use kit 66667  
 To convert a 48" bed to a 96" bed use kit 66665 and 66667  
 To convert a 72" bed to a 96" bed use kit 66665

\*\*Purchase in addition to the bed lengthening kits to be able to use the gantry capability with the extensions.

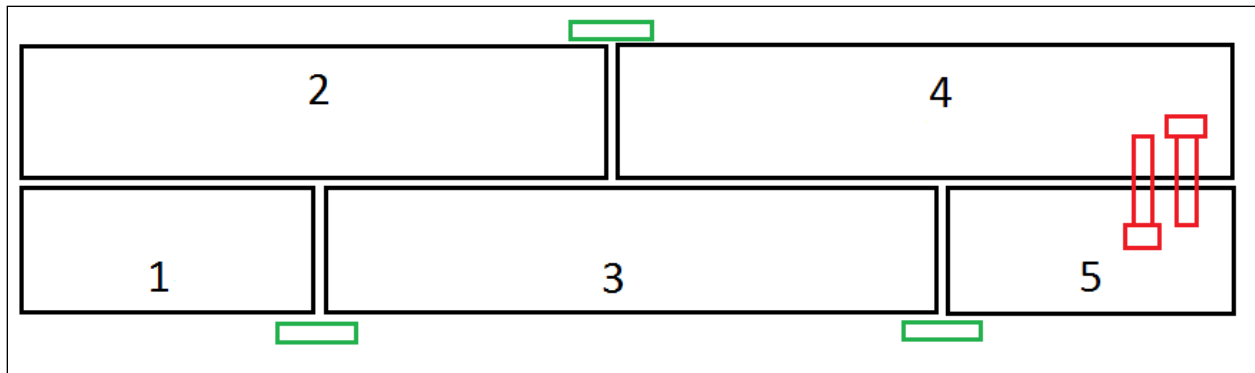
\*\*\*Use adapter to connect two 50 ft cables to make one 100 ft cable.

Do not attempt to connect more than 2 cables together.

## Frequently Asked Questions

### LM5200/6200 FAQ

**Why is the bed segmented?** Segmented beds allow for the mill to be shortened or lengthened easily as well as setup into gantry configuration without a loss in machining ability. The bed sections are staggered as in the diagram below to get maximum rigidity. Only one of the four linear rail blocks passes over a joined section at any given time. The bed segments are either 2 feet (609.6 mm) or 4 feet (1219.2 mm) long. There are bolts that rigidly hold the bed sections together down the whole length of the bed (two of these are shown in red as an example). There are also bolted side plates (green in the diagram) that connect the bed sections lengthwise.



**I don't need the gantry setup or to change the length of the bed, I just want to mill. Is this the right product?** Right out of the box this product comes ready to do linear milling without any bed section alignment required. Just level it to the workpiece and go. The good news is, now that you have such a versatile machine, it can be lengthened, shortened, or go gantry to satisfy a future need you may not have yet. You are now ready for anything that comes your way.

### What is the accuracy of the ballscrew?

LM5200 ram/bed/spindle – Pitch accuracy of +/- .0004 per foot (33  $\mu\text{m}/\text{m}$ )

LM6200 bed – Pitch accuracy of +/- .001 per foot (83  $\mu\text{m}/\text{m}$ )

LM6200 ram/spindle – Pitch accuracy of +/- .0004 per foot (33  $\mu\text{m}/\text{m}$ )

**Is DRO available?** The 40 taper and 50 taper spindles have a DRO for the z-axis travel. There is not a standard DRO option for the bed or ram axis. If a customer has DRO requirements this capability can be explored through the specials process.

**Is air power available?** The LM5200 has air power available as direct drive or right-angle for the HSK spindle, but the LM6200 does not.

**Is an electric spindle available?** The LM5200 has a 1.5 Hp electric option for the HSK spindle, but the LM6200 does not.

**What is the recommended length the bed can be unsupported?** The beds are very rigid and can machine with the bed unsupported but performance will be affected. The use of an optional subplate can increase the rigidity for unsupported distances. As a general recommendation, keep the unsupported distance less than or equal to 1 foot (304.8 mm) without a subplate, and less than or equal to 1.5 feet (457.2 mm) with a subplate.

**What is the maximum length and travel of bed?** The length of bed available varies in 2 feet (609.6 mm) increments. The maximum bed length is based on the maximum ballscrew length available. A shorter ballscrew can be positioned at multiple points down the length of the bed but one end of the ballscrew must be at one end of the bed in order to use the electric feed. The travel available takes into account the width of the saddle and is 12 inches (304.8 mm) less than the bed length for the LM5200, and is 16 inches (406.4 mm) less than the bed length for the LM6200. The max bed length and travel based on the ballscrew and in increments of 2 feet (609.6 mm) is as follows:

LM5200 bed – Max bed length of 96” (2438.4 mm) with 84” (2133.6 mm) travel, longer lengths may be available at additional cost

LM6200 bed – Max bed length of 264” (6705.6 mm) with 248” (6299.2 mm) travel, longer lengths up to 384” (9753.6 mm) may be available at additional cost

**What is the maximum length of ram?** The standard maximum ram lengths of 44 inches (1117.6 mm) for the LM5200 and 116 inches (2946.4 mm) for the LM6200 are based on ballscrew length and machining rigidity. Ram travel for both the LM5200 and LM6200 are 10 inches (254 mm) less than the ram length. If different ram lengths are desired this can be explored through the specials process.

**Can I use a gantry ram for conventional linear milling?** Yes, though there is a point at which the distance the ram hangs out will greatly affect the machining performance. For maximum rigidity the LM5200 can machine to 12” (304.8 mm) from the side of the bed to the center of the spindle, and the LM6200 can machine to 28” (711.2 mm) from the side of the bed to the center of the spindle.

**What is the maximum metal removal rate and how does this compare to the LM6000?** Metal removable rates of 10 in<sup>3</sup>/min (163.9 cm<sup>3</sup>/min) and potentially greater are possible with the LM5200/6200 and are equal to or greater than what is possible with the LM6000.

**Is the width the gantry can be spread a set distance?** No, the gantry rails are infinitely adjustable and can be spread to any width desired up to the max width appropriate for the length of ram you would like to use.

**Is it ok to only drive the ballscrew on one gantry bed while machining near the other gantry bed?** During testing we were able to machine with acceptable rigidity and performance at the extreme gantry dimensions. Proper alignment, leveling, and setup are very important when machining to the limits of the gantry rams. Maximum metal removal rates will most likely not be possible when pushing the machine to its dimensional limits. Positional accuracy will be greatly reduced as well in the +/- 0.010” (0.25 mm) range.

**Can I tap with the milling head?** Yes, by adding a floating tap head.

**What are the side plates for?** These plates lock the outside of the bed sections together to provide extra rigidity.

**Are the bed sections going to shift if the leveling screws are over torqued?** Measures have been taken to prevent shifting of the beds under unusual loads. There are button head cap screws that overlap onto the mating bed section and prevent shifting from one bed section to another. These scenarios have been thoroughly tested.

**I am afraid that my linear rails may have shifted, is my machine okay?** Extensive testing was done to ensure that the rails will not shift under normal usage or even under significant abusive loads. If you still have concerns contact Climax Engineering. The benefit of the sectioned bed is that in the case that the rail is damaged a single bed section can be sent back for repair or replacement.

---

**Do I need any additional components to shorten my bed?** Yes, you will need to purchase a shorter ballscrew assembly that is the correct length. You may use a ballscrew shorter than the bed as long as one of the ballscrew ends is mounted at the end of the bed, but you cannot use a ballscrew longer than the bed.

**How do I lengthen my bed?** Contact Climax to purchase a bed lengthening kit and a longer ballscrew if necessary. Be sure to let us know if you will need the additional length in Gantry configuration as well. Detailed bed lengthening instructions are available.

**Will the machine clear the bed while overhead milling?** The LM5200 will clear the machine in overhead milling right out of the box. The LM6200 will clear with limited travel in the Z-axis over the bed. Purchase the 5" (127 mm) riser to achieve full travel in overhead configuration.

**Can I power down feed with the milling head?** Yes, with the #40 taper and #50 taper spindles you can use the same feed motor as the X and Y-axes with the addition of the Z-axis feed adapter. Power down feed is not currently available with the HSK spindle for the LM5200.

**Can my LM6000 be converted to gantry?** By using two LM6000 bed assemblies a gantry configuration may be possible. The ballscrew would need to be disconnected and the gibs loosened on one of the bed assemblies. Testing would need to be done to verify performance.



## Receiving the Machine

The machine was run tested and thoroughly inspected before leaving the factory. When leaving the factory, the machine is packaged well for the demands of normal transportation. Climax cannot, however, guarantee the condition upon arrival of the machine.

### Inspecting the Shipment


- Upon receiving your machine inspect the containers for shipping damage.
- Open the containers and inspect the machine for shipping damage.
- Check the items you received against the items listed on the invoice.


	<b>IMPORTANT</b>
	<p>Contact Climax immediately concerning damaged or missing components.</p>

### Unpacking instructions

- When unpacking the machine, take care not to drop or damage the components.
- Use lifting eyes or slings to lift the components out of the shipping crate.
- Save the shipping crate to store the machine when not in use.

### Shipping and Handling Precautions

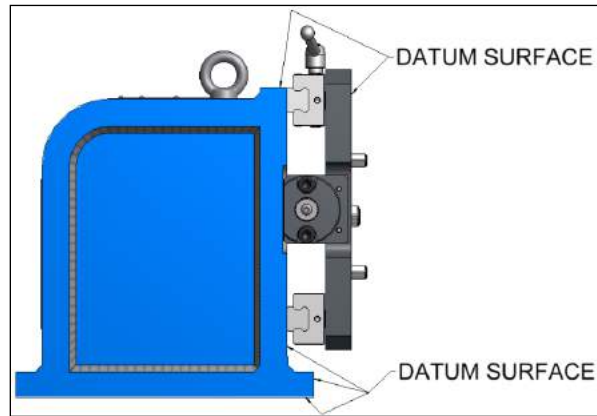
	<b>CAUTION</b>
	<p>The containers are designed to be lifted only with the provided lifting points and with the container fully closed. Do Not lift with the container covers removed.</p>

	<b>INFORMATION</b>
	<p>Surfaces subject to corrosion were sprayed with a rust preventative prior to shipment (and possibly wrapped in oil impregnated paper). The user should exercise caution while handling the components provided since they may be greasy and/or slippery.</p>

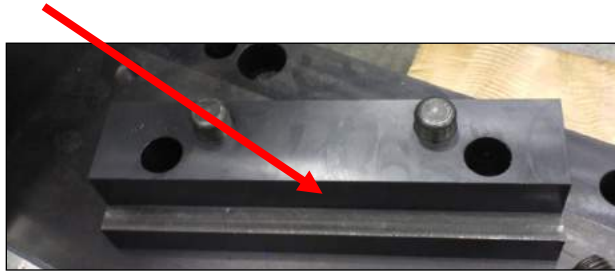
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## Datum Surfaces

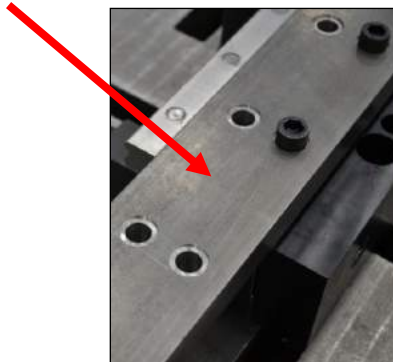
The machine has specially ground surfaces that are available for alignment and setup purposes.



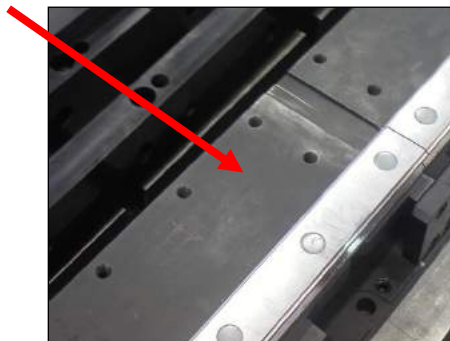
The inside edge of the ram mounting brackets are ground surfaces. This allows precise alignment by pushing the front edge of the ram against the inside edge of the bracket during mounting.



The surface of bed alignment tools have a ground surface.



The top of the bed sections is a ground surface.



## Bed Assembly



### IMPORTANT

Many of the components are precision ground and must be handled with care.

When you receive your machine it will be set up as a standard linear mill in the length which was purchased. The following instructions describe how to assemble and add sections to increase the length of the standard or gantry style beds. The following standard and gantry bed assembly instructions depict a 72 inch long LM6200 bed assembly; the process is the same for the LM5200. Actual bed length may vary.

### Standard Bed Assembly

1. Set up one 24 inch and one 48 inch bed section as shown in Figure 1.
2. Push the two sections together, and install 6 M16 fasteners (Item 3) to hold the sections together. Tighten the fasteners to 10 ft-lb, then loosen them and retighten until they are just touching.
3. Place both bed alignment tools (Item 7) on the sections as shown in Figure 1. Tighten the fasteners on the side with the 48 inch section first to 65 ft lb. Then tighten the fasteners on the 24 inch section to 65 ft-lb.

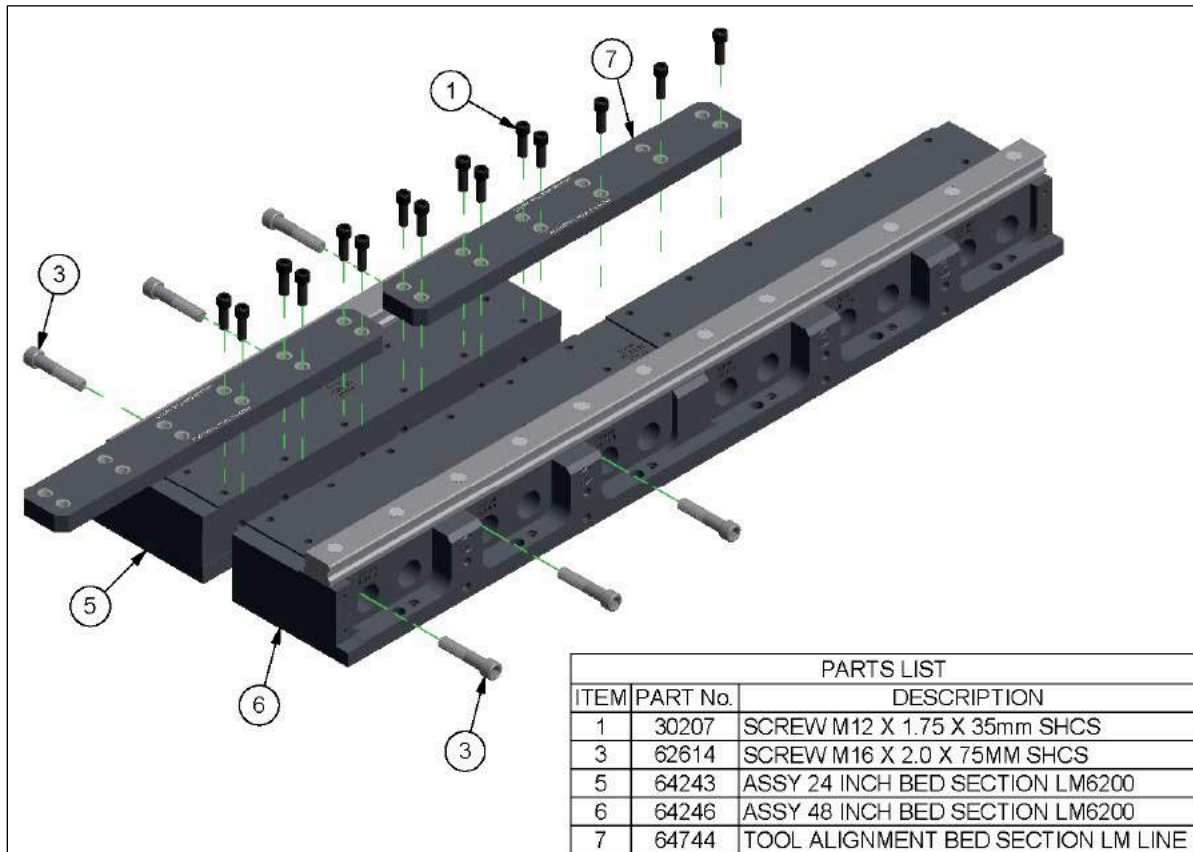
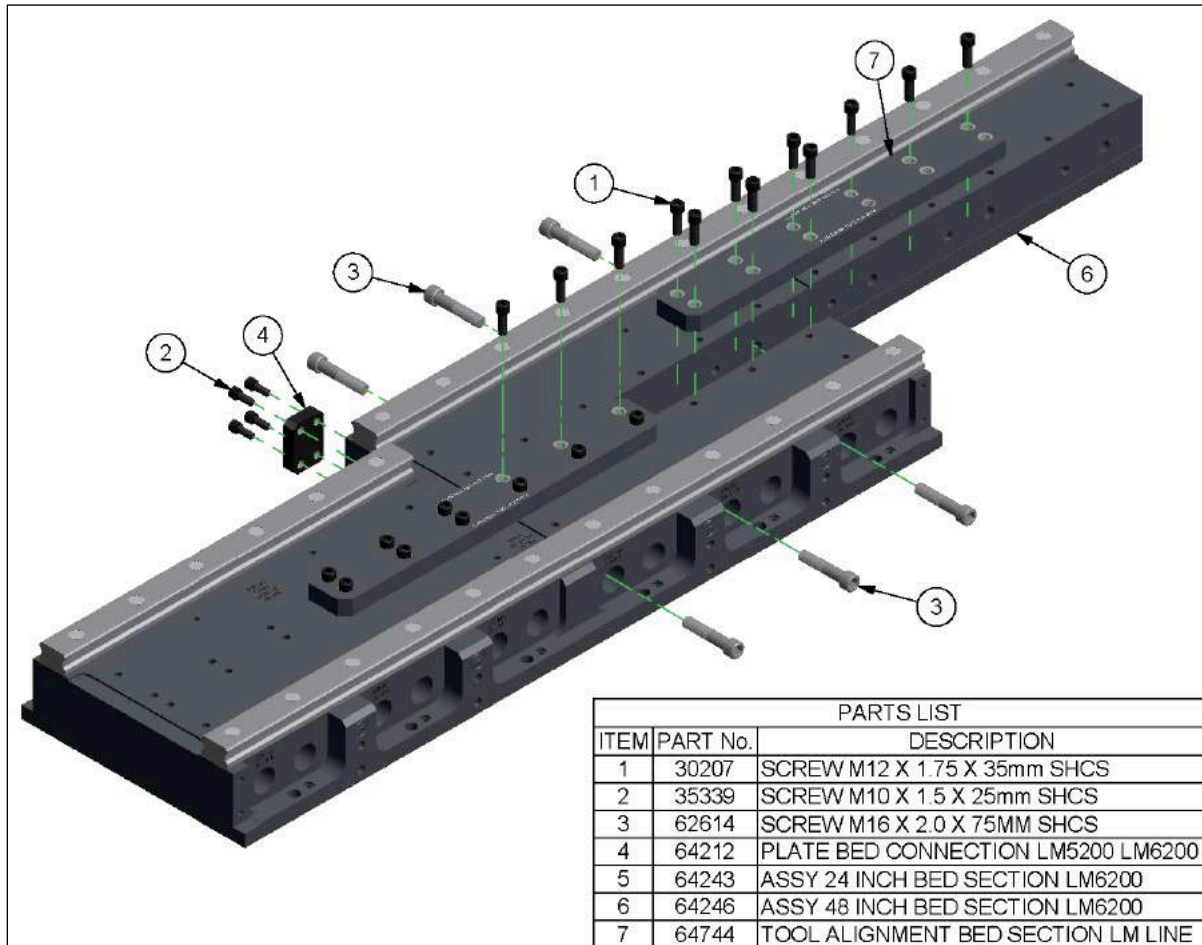


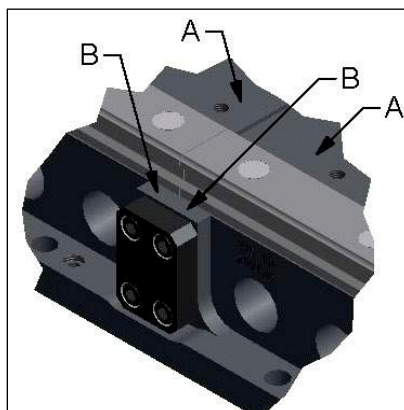
Figure 1

- Tighten the 6 M16 fasteners to 200 ft-lb to hold the sections together.



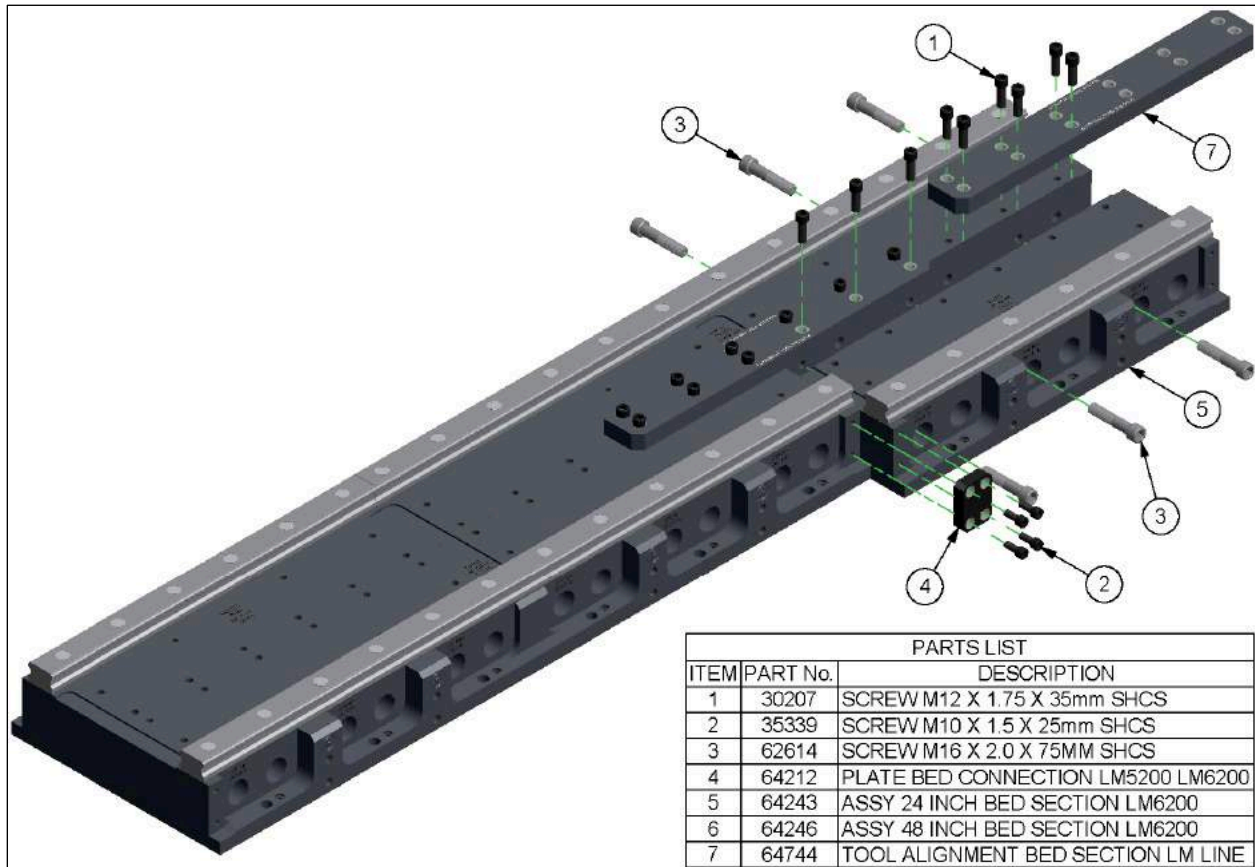
**Figure 2**

- Place the next 48 inch section in position and push it against the other sections as shown in Figure 2. Install 6 M16 fasteners (Item 3) and tighten them to 10 ft-lb. Then loosen them completely and retighten until they are just touching.
- Place the second bed alignment tool (Item 7) on the sections as shown in Figure 2. Tighten the fasteners on the assembled sections first to 65 ft lb. Then tighten the fasteners on the new section to 65 ft-lb.



**Figure 3**

7. Tighten the 6 M16 fasteners to 200 ft-lb to hold the sections together.
8. Install a bed connection plate (Item 4) as shown in Figure 2, and tighten the fasteners to 40 ft-lb.
9. Attach a dial indicator with a magnetic base to one of the linear rails and check the alignment of the two A points, and the two B points as shown in Figure 3. The A points should be within 0.001 inch of each other, and the B points should also be within 0.001 inch of each other. If they are not, repeat steps 5 through 8.
10. Place the next 24 inch section in position and push it against the other sections as shown in Figure 4. Install 6 M16 fasteners (Item 3) and tighten them to 10 ft-lb. Then loosen them completely and retighten until they are just touching.
11. Place the second bed alignment tool (Item 7) on the sections as shown in Figure 4. Tighten the fasteners on the assembled sections first to 65 ft lb. Then tighten the fasteners on the new section to 65 ft-lb.
12. Tighten the 6 M16 fasteners to 200 ft-lb to hold the sections together.



**Figure 4**

13. Install a bed connection plate (Item 4) as shown in Figure 4, and tighten the fasteners to 40 ft-lb.
14. Attach a dial indicator with a magnetic base to one of the linear rails and check the alignment of the two A points, and the two B points as shown in Figure 3. The A points

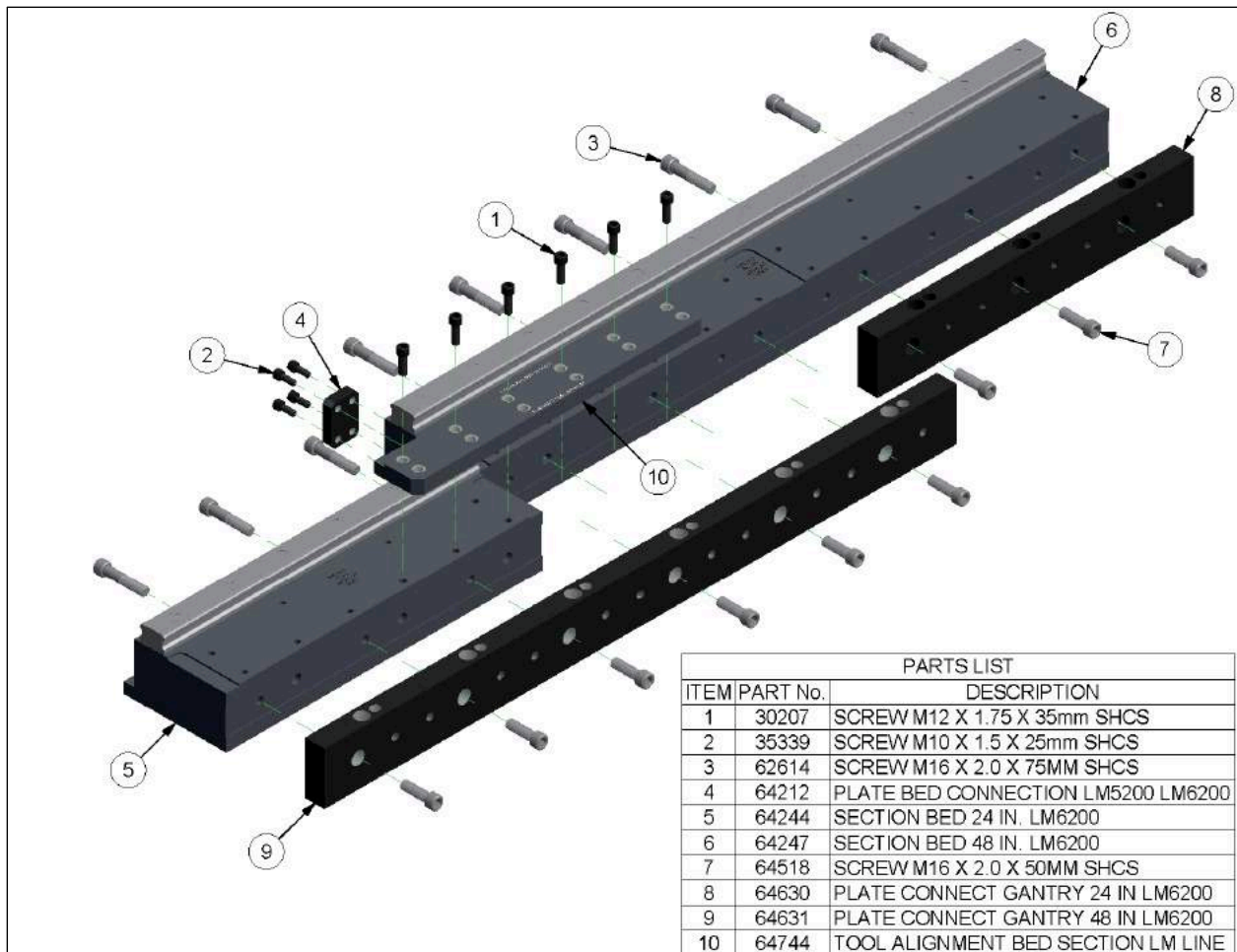
should be within 0.001 inch of each other, and the B points should also be within 0.001 inch of each other. If they are not, repeat steps 10 through 13.

For longer standard bed assemblies, repeat the previous steps adding 48 inch bed sections until the desired bed length is obtained, and then finish with a 24 inch bed section.

## Gantry Bed Assembly

### First Half

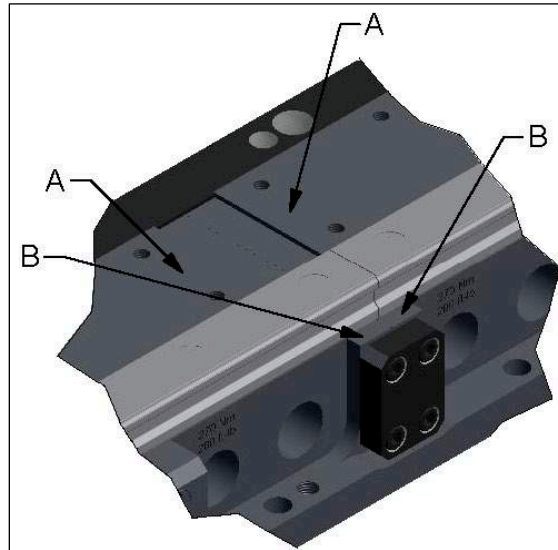
1. Position one 24 inch bed section, one 48 bed section, one 48 inch gantry connect plate, and one 24 inch gantry connect plate as shown in Figure 5.
2. Install 3 M16 fasteners (Item 3), and 3 M16 fasteners (item 7) into the 24 inch bed section and 48 inch gantry plate, and tighten the fasteners to 200 ft-lb.
3. Install 3 M16 fasteners (Item 3), and 3 M16 fasteners (item 7) into the 48 inch bed section and 24 inch gantry plate, and tighten the fasteners to 200 ft-lb.



**Figure 5**

4. Push the bed sections together and install 3 M16 fasteners (item 3), and 3 M16 fasteners (item 7) into the 48 inch bed section and 48 inch gantry plate. Tighten the fasteners to 10 ft-lb, then loosen them and retighten until they are just touching.

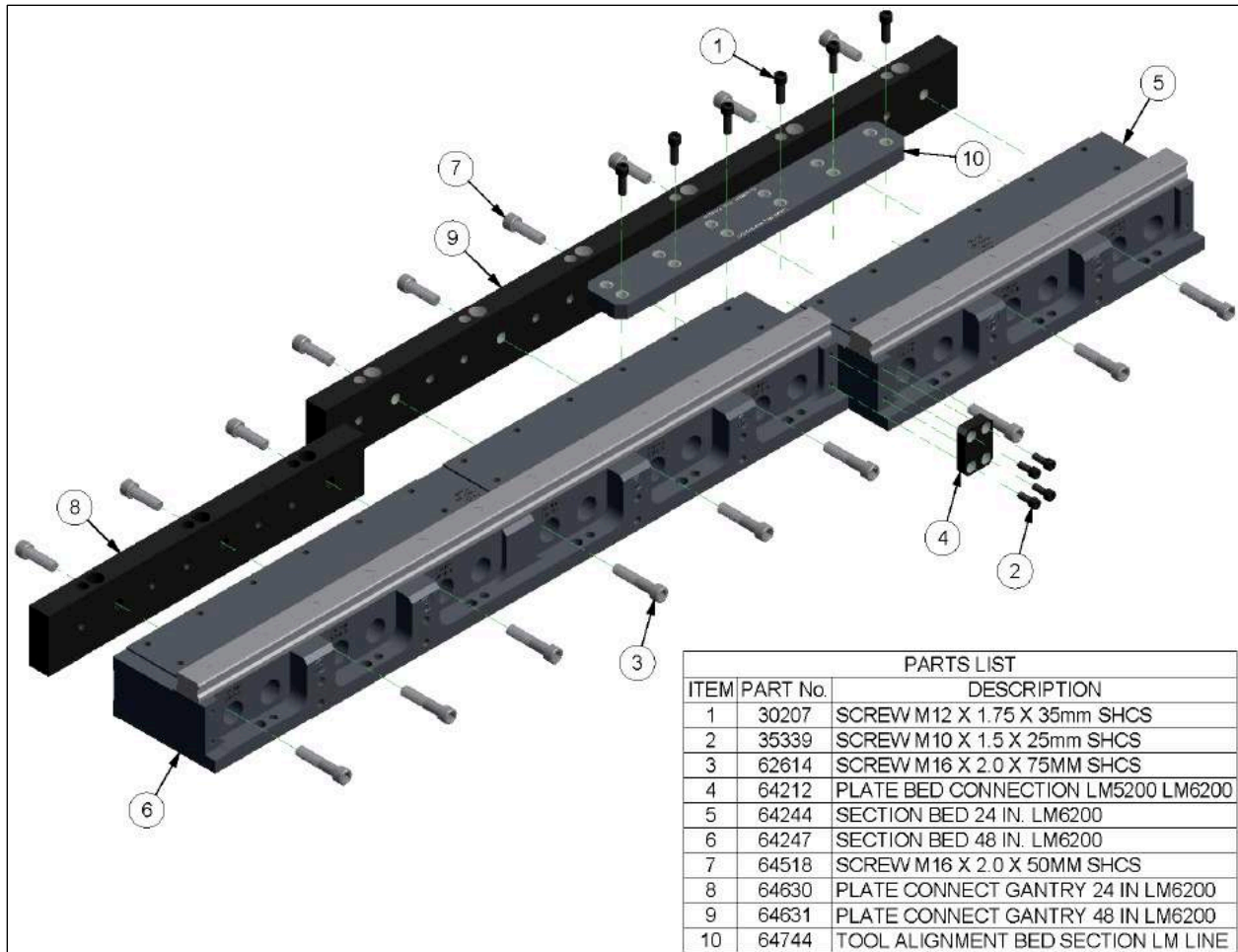
5. Place a bed alignment tool (Item 10) on the sections as shown in Figure 5, and tighten the fasteners to 65 ft-lb.
6. Tighten the 6 M16 fasteners installed in step 4 to 200 ft-lb to hold the sections together.
7. Install a bed connection plate (Item 4) as shown in Figure 5, and tighten the fasteners to 40 ft-lbs.
8. Attach a dial indicator with a magnetic base to one of the linear rails and check the alignment of the two A points, and the two B points as shown in Figure 6. The A points should be within 0.001 inch of each other, and the B points should also be within 0.001 inch of each other. If they are not, repeat steps 2 through 7.



**Figure 6**

### **Second Half**

9. Position one 48 inch bed section, one 24 inch bed section, one 24 inch gantry connect plate, and one 48 inch gantry connect plate as shown in Figure 7.
10. Install 3 M16 fasteners (item 3), and 3 M16 fasteners (Item 7) into the 48 inch bed section, and 24 inch gantry plate, and tighten the fasteners to 200 ft-lb.
11. Install 3 M16 fasteners (Item 3), and 3 M16 fasteners (item 7) into the 24 inch bed section and 48 inch gantry plate, and tighten the fasteners to 200 ft-lb.



**Figure 7**

12. Push the bed sections together and install 3 M16 fasteners (item 3), and 3 M16 fasteners (item 7) into the 48 inch bed section and 48 inch gantry plate. Tighten the fasteners to 10 ft-lb, then loosen them and retighten until they are just touching.
13. Place a bed alignment tool (item 10) on the sections as shown in Figure 7, and tighten the fasteners to 65 ft-lb.
14. Tighten the 6 M16 fasteners installed in step 12 to 200 ft-lb to hold the sections together.
15. Install a bed connection plate (item 4) as shown in Figure 7, and tighten the fasteners to 40 ft-lbs.
16. Attach a dial indicator with a magnetic base to one of the linear rails and check the alignment of the two A points, and the two B points as shown in Figure 6. The A points should be within 0.001 inch of each other, and the B points should also be within 0.001 inch of each other. If they are not, repeat steps 10 through 15.

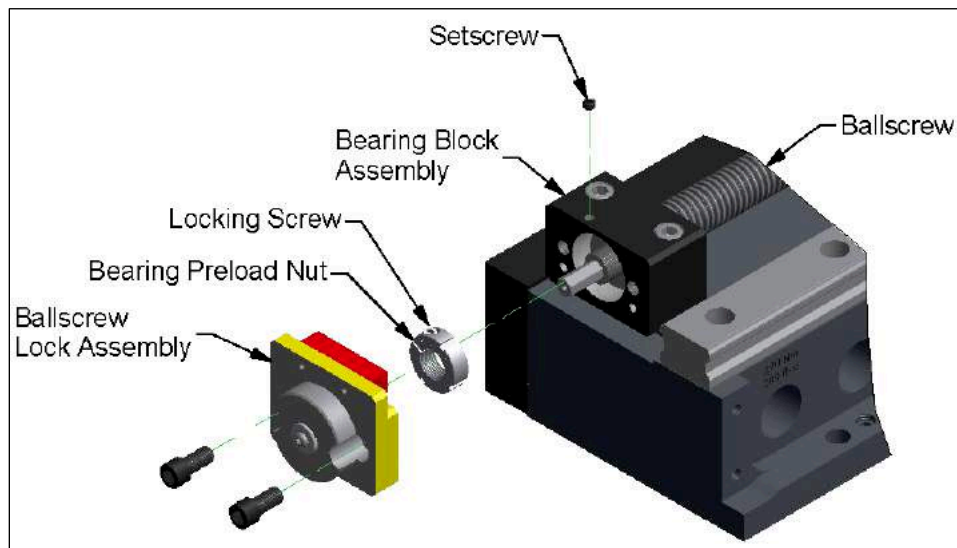
For longer gantry bed assemblies, repeat the previous steps adding 48 inch bed sections until the desired length is obtained, and then finish with a 24 inch bed section. Make sure to always use a 48 inch gantry plate (item 9) to connect two bed sections.



## Ballscrew Assembly

The ballscrew assembly can be placed on either bed half. The following procedure can be used on either end of the ballscrew. Tightening the bearing preload nut on either end of the ballscrew will remove all slack. Once the ballscrew is adjusted, the hex on both ends should be protruding about the same amount. If they are different by more than 1/4 inch, loosen one bearing preload nut and tighten the other to center the ballscrew.

1. Remove the ballscrew lock assembly.
2. Remove the setscrew to gain access to the bearing preload nut locking screw.
3. Loosen the locking screw, and remove the bearing preload nut.
4. Install the ballscrew into the bearing block assembly.
5. Hand tighten the bearing preload nut on the end of the ballscrew, and lock into place using the locking screw.
6. Replace the setscrew.
7. Bolt on the ballscrew lock assembly



**Figure 8**

The operational length of the bed can be increased by adding bed sections and a longer ballscrew. See the Accessories section for more information. The ballscrew will be the same length as the bed for normal configurations. In cases where the bed is longer than the ballscrew, the ballscrew will need to be positioned to one end of the bed.

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## Machine Setup

### Quick Setup

- Determine the surface to be machined.
- Determine a level plane to use for mounting the machine.
- Mount and level the bed to the work piece.
- Attach the machining arm.
- Attach the milling head.
- Adjust for flatness.
- Begin machining.

### Standard Linear Mill Setup

Proper setup of the machine will require that you know the plane to be machined in relation to the position the machine will be setup. See the Specifications section of this manual for the applicable range of this machine. Also see the Dimensions section of this manual for the machine dimensions. Since the machine can be setup in sections of varying length, this setup will cover the basics of a short bed setup.

If you have any questions or concerns, please contact Climax.

Determine the level plane for attaching the machine next to the work piece. There are a number of precision surfaces to use as a datum. See the Datum Surfaces section for more information. Take into consideration the vertical travel of the milling assembly, the horizontal travel of the ram, and the bed travel when positioning the machine. See the Operational Dimensions section for more information.

The milling head can be positioned in 90 degree increments, with slight adjustments to the angle of the milling head possible. There is also an optional swivel head available for this machine that increases the flexibility for milling or drilling to 360 degrees.

Once the position for mounting the machine has been determined, survey the mounting position for high spots or other irregularities. Make corrections where necessary.

The bed is equipped with leveling screws for minor adjustments. To use a leveling screw, make sure the bed's fasteners are loose before applying force.



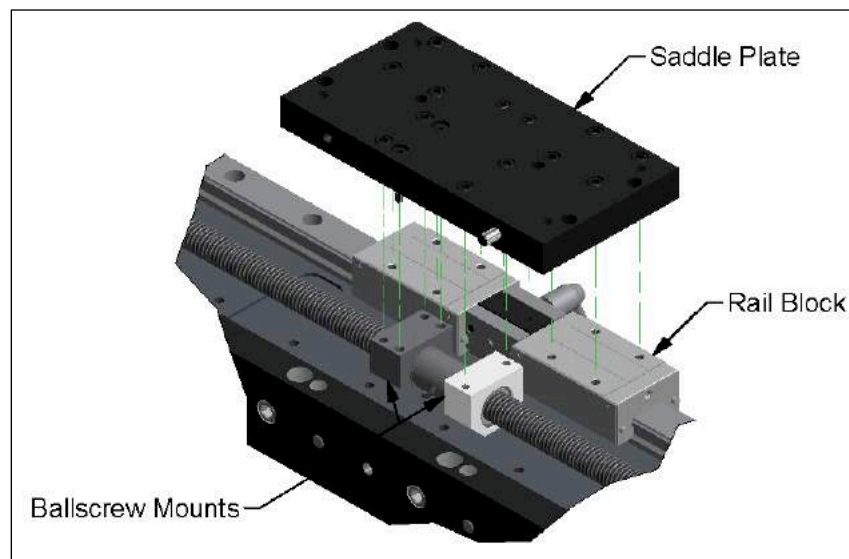
### CAUTION

Be very careful not to over tighten any leveling screws! This could cause the bed to warp. Warping becomes obvious when the saddle binds at the warped point of the rail. Contact Climax immediately if you suspect the bed is warped. **Do not** attempt to straighten the bed or the rails.

Shims can also be used under the bed to assist in leveling. If the setup area is not level, you may need to prepare special mounts that fit your application. There are numerous ways to set up the bed next to the work piece. Rigidity is the most important factor to take into consideration. When securing and leveling the bed to the work piece, use a precision leveling tool on the datum surfaces to verify the bed remains level. Refer to the Standard Bed Assembly section for the procedure on assembling the bed.

## Attaching the Saddle

1. Attach the saddle plate to the rail blocks as shown in Figure 9. The outside edge should be flush with the rail blocks. This aligns the saddle to the bed and in turn aligns the ram to the bed.
2. Check for free movement of the saddle up and down the entire length of the bed. If the saddle shows resistance at any point, stop and check the bed and rails to be sure they are level and straight.



**Figure 9**

3. Attach the saddle to the ballscrew mounts.

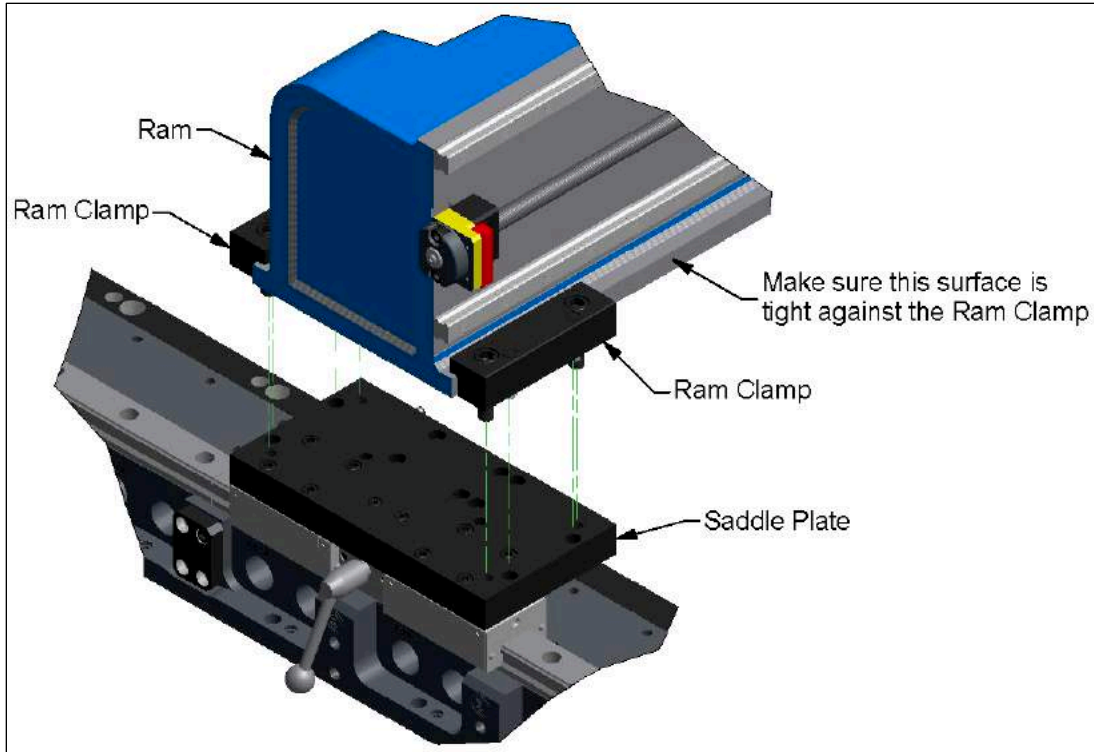
Repeat the previous steps to attach the other half of the saddle to the other side of the bed assembly. Align the second half of the saddle with the first one prior to fastening it down.

	INFORMATION
	<p><b>The saddle can be moved up and down the rail quickly by using a standard electric hand drill with a socket attachment when the ballscrew is installed.</b></p>

## Attaching the Ram

To attach the ram, use the lifting eyes provided on the ram to position it in place.

1. Press the front edge of the ram against the inside of the ram clamp. This aligns the ram perpendicular to the bed. Then attach the ram as shown in Figure 10.



**Figure 10**

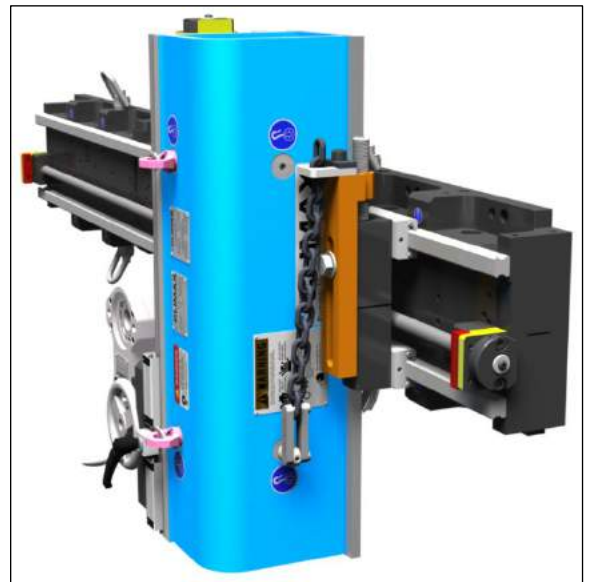
Repeat the previous step for the opposite end of the ram.

## Attaching the Ram Tether Kit


### Ram Tether Kit Installation Overview

This section contains information necessary for installation of the linear mill ram tether kit on the LM5200/6200 linear mill. The ram tether kit should be installed on the Linear Mill whenever the machine is configured with the ram oriented vertically.

A vertical orientation is one in which the long axis of the ram is oriented so that it is perpendicular to the surface of the earth, as shown in Figure 11.



**Figure 11. Ram tether kit in a vertically oriented linear mill**

	<b>WARNING</b>
	Do not orient the ram of the linear mill vertically (Figure 11) without the ram tether kit installed. If the linear mill is used with the ram in a vertical orientation without the ram tether kit properly installed, the ram could slip or shift and potentially cause death or severe crushing injuries.

	<b>IMPORTANT</b>
	If installation of the linear mill ram tether kit cannot be completed on your machine for any reason, contact Climax before operating the machine with the ram in a vertical orientation.

### Ram Hazard Warning Label

Check that the two ram hazard warning labels (P/N 78937, Figure 12) are applied to the ram in the locations identified in Figure 12. Refer to the instructions accompanying the label for application instructions.



Figure 12. Ram hazard warning label and placement

### Installing the Ram Tether Kit

To install the ram tether kit on the linear mill, do the following steps:

1. Support the linear mill ram with rigging.

2. Remove the upper ram clamp block that is located in both of the following positions:
  - a. On the opposite side of the ram from the milling head (see Figure 13 on page 44).
  - b. The upper clamp block, when the ram is oriented vertically.
3. Attach the ram tether kit clamp block in the position of the removed (upper) ram clamp block. Use Table 3 for the fasteners and minimum torque settings of the clamp block for each model.

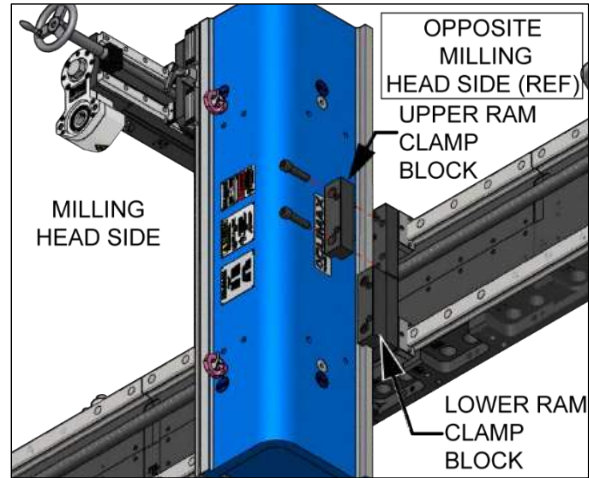
**Table 3. Clamp block screw torque values**

Model	Screw Type	Screw Torque
LM5200	M12	93 ft-lb (126 Nm)
LM6200	M16	230 ft-lb (312 Nm)

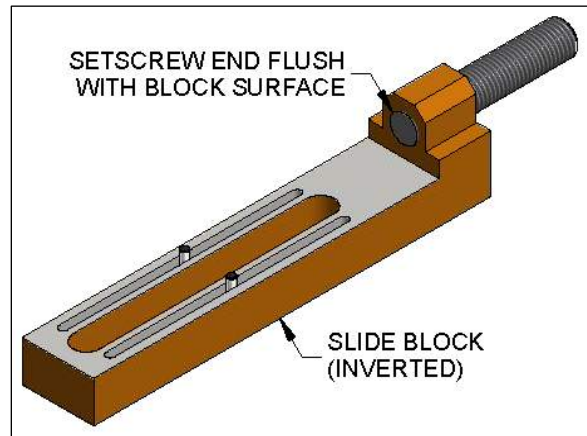
4. On the ram tether kit slide block, turn the setscrew until it is flush with the block inside surface (see Figure 14).
5. Install the slide block assembly on the tether kit clamp block with the supplied M16 hex head screw and washer so that the setscrew will point up when the ram of the linear mill is oriented vertically (Figure 15). Leave the M16 hex head screw loose in the clamp block hole.
6. Install the swivel base lifting eye in the threaded hole on the side of the ram that will be below the elevation of the tether kit clamp block when the ram of the machine is oriented vertically (Figure 15). Use Table 4 for the torque settings of the swivel base lifting eye for each model.
7. Select a tether chain length that will span from the hoist ring to the chain support plate.

**Table 4. Swivel base lifting eye torque values**

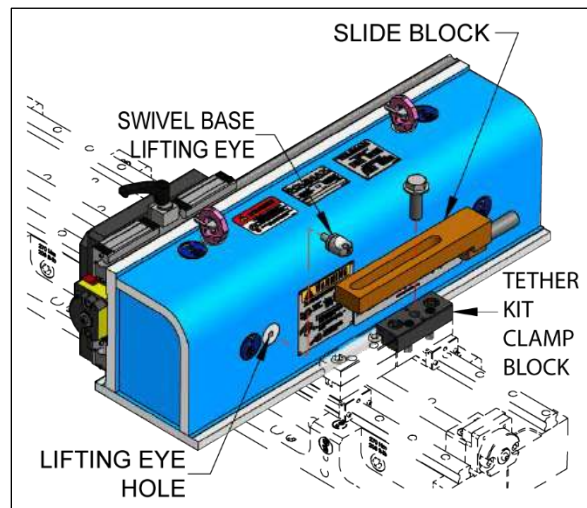
Model	Swivel Base Lifting Eye Torque
LM5200	7 ft-lb (10 Nm)
LM6200	20 ft-lb (27 Nm)



**Figure 13. Upper ram clamp block removal**



**Figure 14. Slide block assembly**



**Figure 15. Slide block and swivel base lifting eye installation**

8. Connect the chain end to the hoist ring shackle on the ram (Figure 17 on page 4645).
9. Install the hoist ring shackle on the swivel base lifting eye (Figure 17 on page 46).
10. Attach one end link of the chain to the shackle (Figure 17 on page 46). Thread both shoulder screws into the hoist ring shackle until the shoulder is seated (Figure 16).

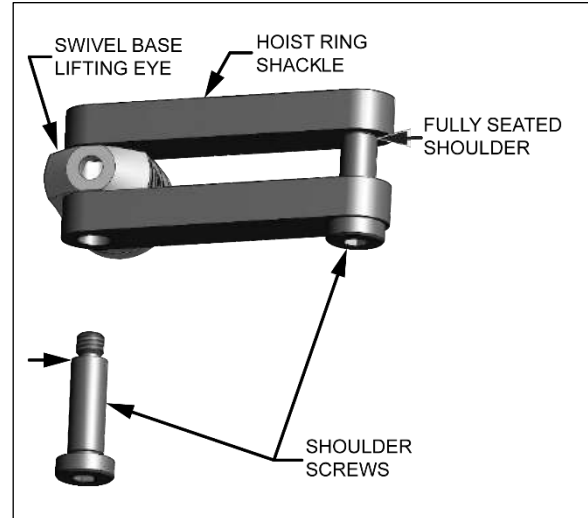



Figure 16. Seated shoulder screws

	WARNING
	<p><b>When connecting the chain to the swivel base lifting eye, thread the shoulder screws completely into the hoist ring shackle. Failure to do so may cause the shackle/chain connection to fail and allow the ram to slip or shift, potentially causing death or serious crushing injury.</b></p>

11. Thread the other end of the chain through the chain support plate (Figure 17 on page 46).
12. Attach the Chain Support Plate to the Slide Block with the supplied rectangle washer and M12 socket head cap screw (Figure 17 on page 46). Torque to 65 ft-lb (88 Nm).

13. Tighten the slide block setscrew against the clamp block until all detectable slack (i.e., clearance between chain links) is removed from the chain.

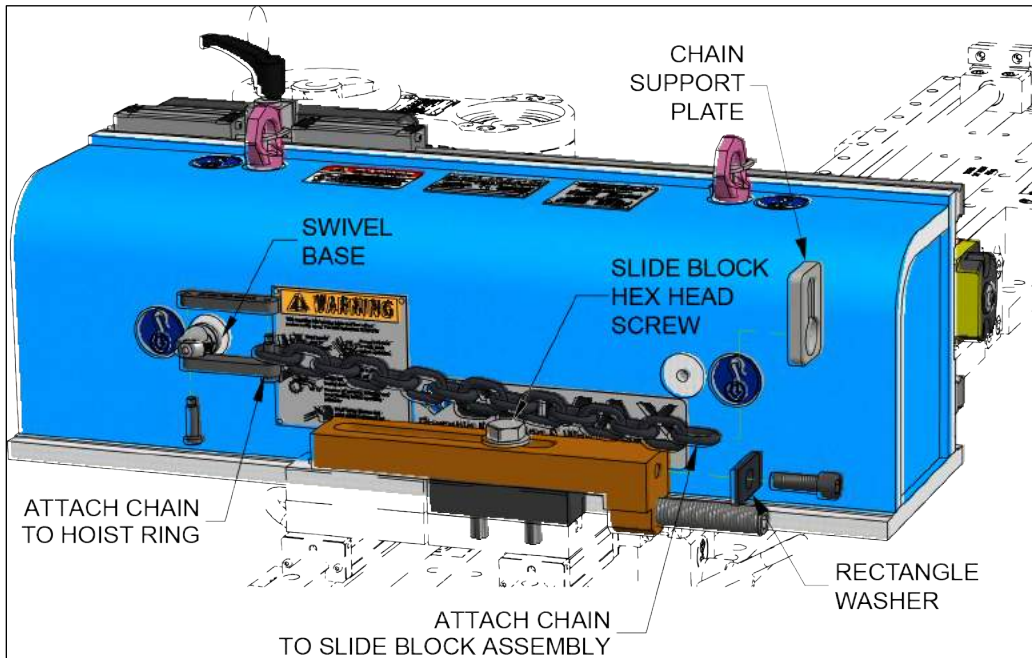


Figure 17. Safety tether chain installation

	<b>WARNING</b>
	<p>If any slack remains in the chain, the ram could slip, shift, or fall during machine operation. Even a very short drop may cause the chain shackle to fail, potentially resulting in death or serious crushing injury.</p>

14. Torque the slide block hex head screw to 150 ft-lb (200 Nm).


### Removing the Ram Tether Kit


	<b>WARNING</b>
	<p>If the ram of the linear mill is oriented vertically, do not remove the ram tether kit without first supporting the ram with rigging. Attempting to do so may cause the ram to slip or fall, potentially causing death or serious crushing injury.</p>

To remove the Ram Tether Kit from the linear mill, complete the following tasks.

1. Do the installation tasks in Section Installing the Ram Tether Kit on page 43 in reverse order.
2. Install the original clamp block on the linear mill bed.



	<b>INFORMATION</b>
	<p>Unless a new machine configuration requires its removal, the ram safety kit clamp block that was installed in Section Installing the Ram Tether Kit on page 43 can remain in place on the machine and function as a regular clamp block.</p> <p>Unless a new machine configuration requires its removal, the swivel base lifting eye that was installed in Section Installing the Ram Tether Kit on page 43 can remain installed on the ram.</p>

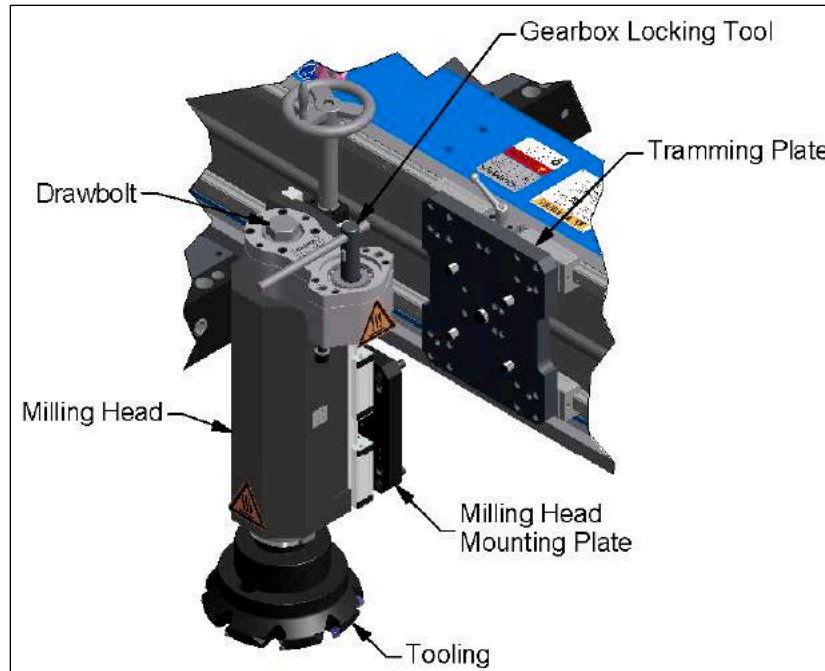
	<b>WARNING</b>
	<p><b>If the ram of the linear mill is oriented vertically, do not remove the supporting rigging from the ram until the ram is removed from the machine or the ram tether kit is reinstalled on the machine. Attempting to do so may cause the ram to slip or fall, causing death or serious crushing injury.</b></p>

### Attaching the Milling Assembly

1. Attach the milling head to the tramming plate on the ram using the mounting screws in each corner of the milling head mounting plate as shown in Figure 11.
2. Attach the tooling to the milling head by using the drawbolt to secure it in position. Use the gearbox locking tool, or the hydraulic motor, to hold the gearbox in place while tightening the drawbolt.

For safety reasons, the gearbox locking tool cannot be used when the hydraulic motor is installed.

	<b>IMPORTANT</b>
	<p><b>Line up the keys on the milling head with the keyways on the tooling before tightening the drawbolt. Make sure the mating surfaces of the milling head and tooling are clean before installation.</b></p>

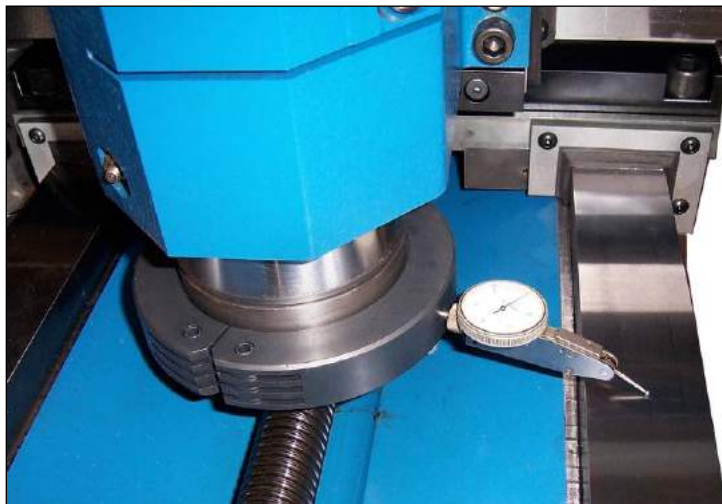


**Figure 18**

## Tramming the Milling Assembly

The tramming plate is precision machined to be parallel to the ram and perpendicular to the bed. In many cases the default X-axis alignment of the milling assembly will be sufficient. If more precision is needed, the milling head mounting plate has been supplied with tramming screws. This allows the mounting plate to be jacked away from the tramming plate to adjust X-axis orientation, and rotated on the tramming plate to adjust Y-axis orientation of the milling assembly.

1. Attach a dial indicator with a magnetic base to the end of the spindle.



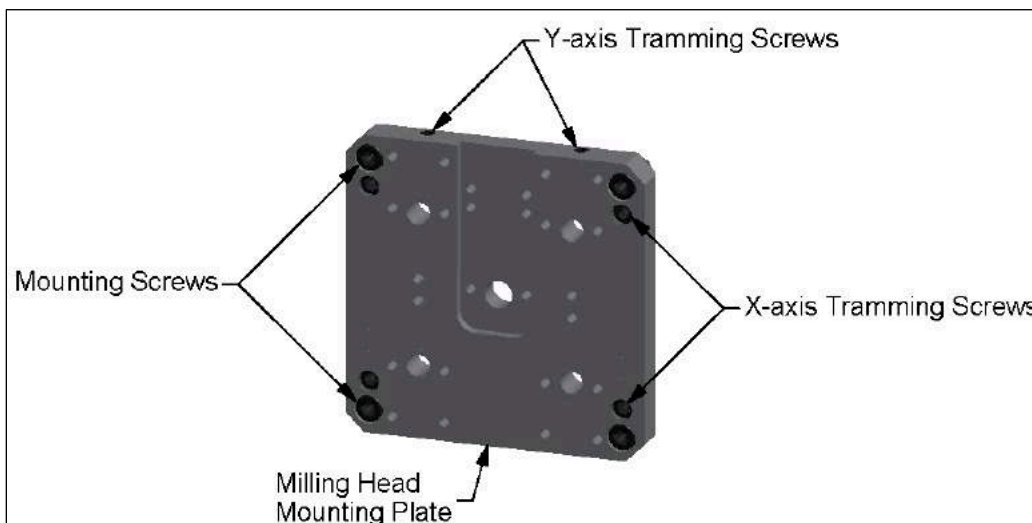
**Example from the LM6000**

2. If the drive motor is installed, remove it from the spindle gearbox to enable easy hand-rotation of the spindle.

3. Position the milling assembly over the bed using the ram feed system.
4. Sweep the top datum surface of the bed with the indicator by rotating the spindle.


	<b>INFORMATION</b>
	<b>The bottom datum surface of the ram can also be used for indicating.</b>

5. Tram the direction along the X-axis by adjusting the trammig screws on the milling head mounting plate as shown in Figure 12. The mounting screws will have to be loosened slightly to make these adjustments.



**Figure 19**

6. Tram the direction along the Y-axis by adjusting the top trammig screws.
7. When both directions are adjusted, tighten the mounting screws.

	<b>IMPORTANT</b>
	<b>Watch the dial indicator while tightening the mounting screws to make sure that the milling assembly does not move. Make adjustments as necessary.</b>

8. Remove the magnetic base and dial indicator, and reinstall the drive motor.

---

## Attaching the Feed Motors



Motor attached to ballscrew on bed



Motor attached to ballscrew on ram

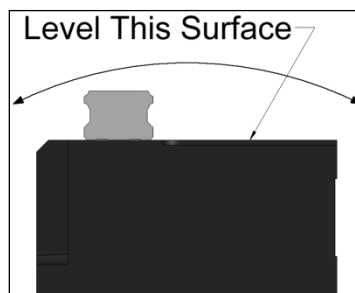
The feed motors are attached by aligning the hex and sliding the feed motor in place then tightening the clamp collar to secure it. Attach the feed motor(s) to the desired ballscrew and connect the control cables. The feed is controlled using the pendant attached to the HPU or stand-alone feed control.

## Gantry Linear Mill Setup

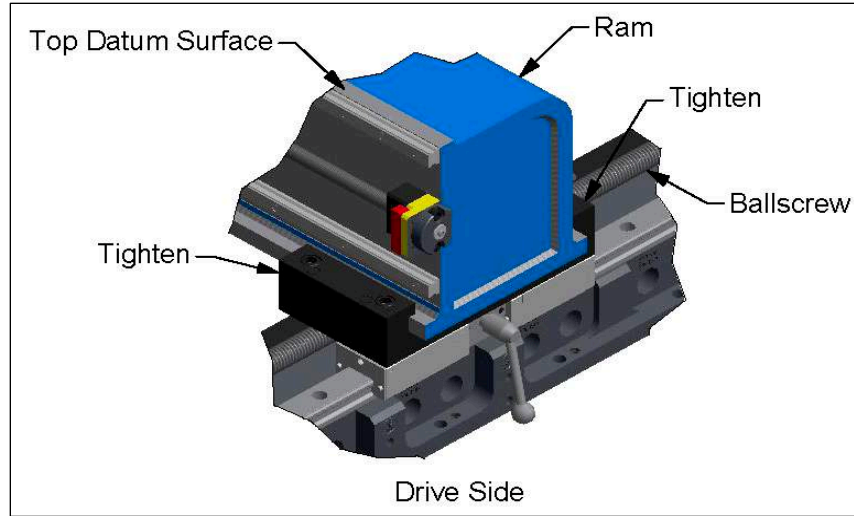
The following is a suggested method of mounting and aligning the gantry style bed. What method is used varies greatly depending on the work piece and the equipment available to assist with setup. The setup described assumes a horizontal work piece. This setup would also work for a vertical work piece with the machine mounted horizontal, and the milling assembly turned 90°. Setting up the machine on a vertical work piece with the bed mounted vertically can be done but it requires more extensive equipment such as a laser plane to ensure the bed sections are co-planar. Refer to the Gantry Bed Assembly section for the procedure on assembling the bed. This procedure assumes the ballscrew and saddle plates are installed.

### Coplanar Setup

1. Position the drive side of the bed. Ensure that when the drive side is leveled, the gantry side is capable of being made coplanar with it.
2. Level the drive side of the bed using a precision leveling tool, and tighten it down.

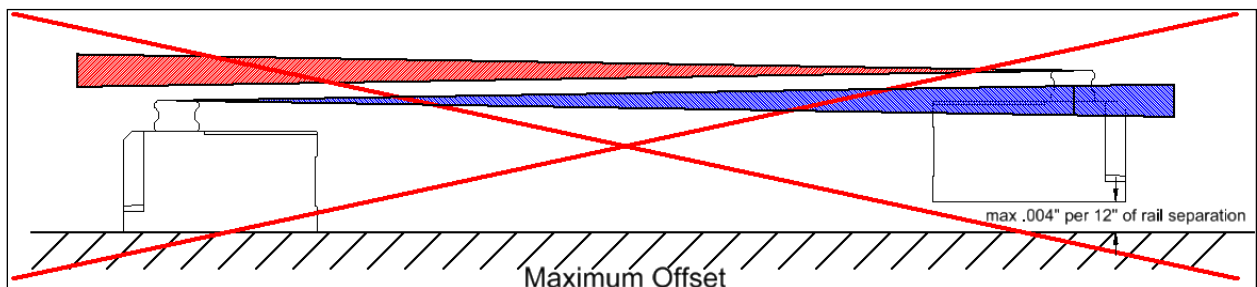
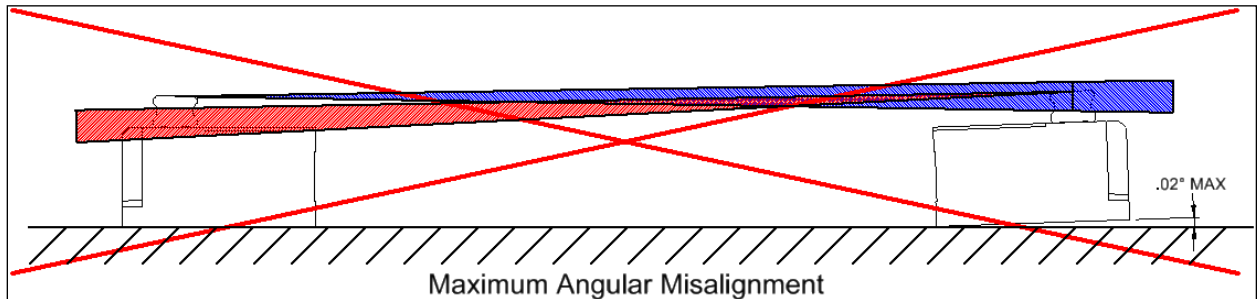
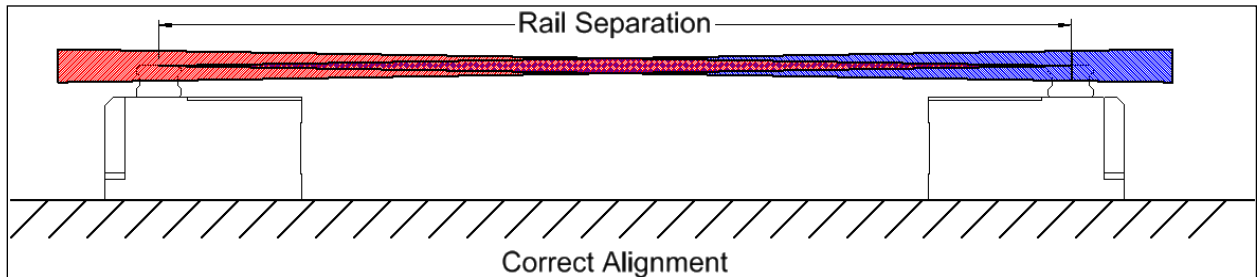


3. Position the gantry side of the bed, and rough align it using a tape measure.
4. Place the ram on the saddle plates, and tighten the ram clamps on the drive side as shown in Figure 13. Leave the ram clamps loose on the gantry side.



**Figure 20**

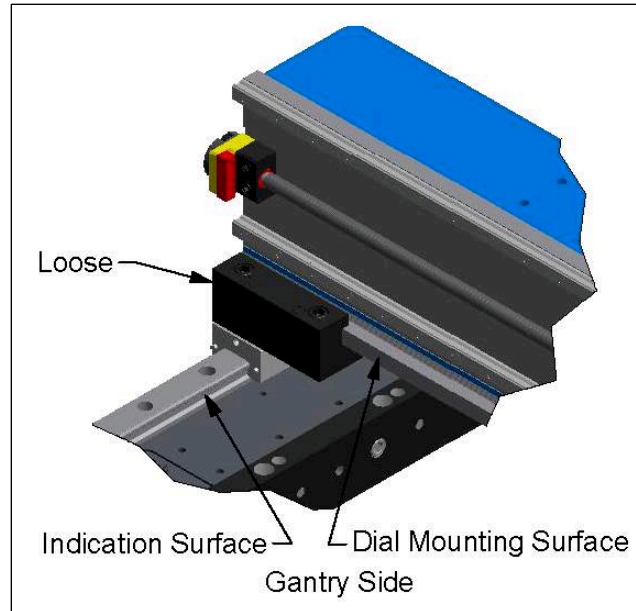
5. Use a precision leveling tool on the top datum surface of the ram to adjust the gantry side of the bed until it is coplanar with the drive side. The beds must be within 0.004 inch for every 12 inches the rails are separated. The following diagrams show the correct alignment, maximum angular misalignment, and maximum offset allowed.



## Parallel Setup

### Option 1

1. Move the ram to one end of the bed, and mount a dial indicator between the ram and the gantry rail as shown in Figure 14.



**Figure 21**

2. Use the feed motor on the bed to drive the ram from one end of the bed to the other. Adjust the gantry side of the bed as you go and align with the drive side so that the rails are parallel within 0.002 inch.
3. Repeat until there is no more adjustment needed, and then tighten down the bed and ram clamps on the gantry side.

	<p style="text-align: center;"><b>IMPORTANT</b></p> <p><b>When changing direction there may be significant movement of the indicator as the machine loads to move in the opposite direction.</b></p>
---	--


### Option 2

1. Remove the feed motor from the drive side of the bed.
2. Manually push the ram along the full length of the bed several times while tightening down the gantry side as you go.
3. Use a precision leveling tool and a dial indicator, as described previously, to check for spots that are out of alignment. Make adjustments as necessary.
4. Tighten down the ram clamps on the gantry side when no more adjustment is needed.

When complete, the ram should glide smoothly along the full length of the bed. A tight spot indicates an area that is out of alignment.

## Operation

	<b>WARNING</b>
	<p>To avoid serious personal injury, do not reach inside the machine, and keep clear of moving parts while it is operating.</p>

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

### HPU (Hydraulic Power Unit)

Each HPU will have a control pendant and an E-Stop (Emergency Stop) button on the control panel cover. Read the manual included with your HPU, and follow the instructions before operating.

### Pre-Start Checks

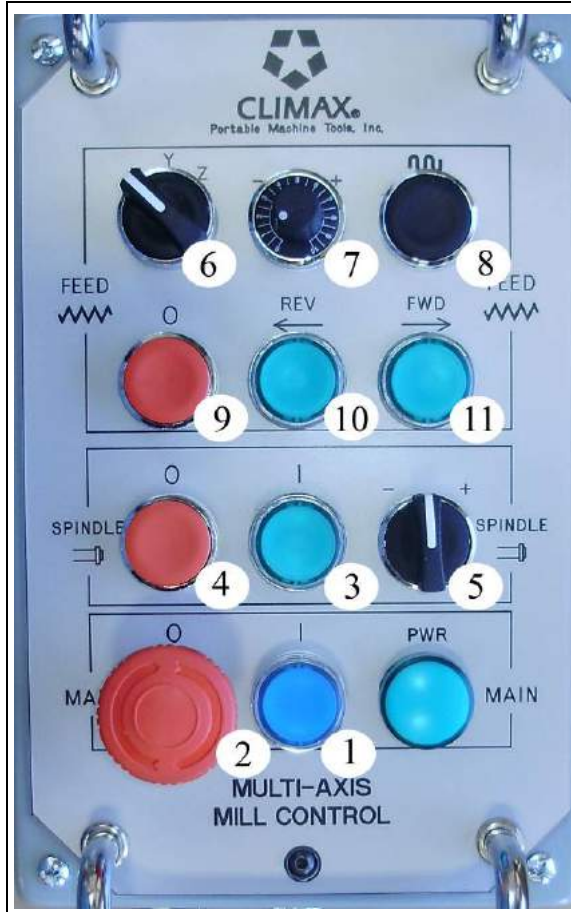
Before starting the machine always check for the following items:

- All energy supplies are OFF.
- Lines are properly connected.
- All machine parts are secure.
- The machine is securely mounted to the work piece.
- All handles and tools are removed from the machine.
- Cables and hoses are away from moving machine parts.
- Hydraulic fluid reservoir is full. (Consult the HPU manual for capacity and specification.)

### Quick Steps for Operating

- Extend the spindle to touch the surface.
- Take a skim cut to test the settings.
- Check the finish.
- Adjust as necessary.

## Controls



### Main Power

**Power on (1):** Turns main power on to the HPU

**E-Stop (2):** Push to stop everything, twist to release and enable the system reset.

### Spindle Controls

**Spindle Start (3)**

**Spindle Stop (4)**

**Flow Control (5):** Faster/Slower momentary selector: controls hydraulic spindle speed.

### Feed Controls

**Axis Selector Switch (6):** Selects which feed axis is active. Bed (X-axis), Ram (Y-axis), or the Milling Head (Z-axis).

**Rapid Traverse (8):** Momentary Override of the feed speed selector and increases feed speed to maximum while the button is pressed. When released feed speed will return to that indicated on the feed speed selector knob.

**Feed Speed Control Knob (7):** Increases and decreases feed speed.

**Feed Stop (9)**

**Feed Start Reverse (10)**

**Feed Start Forward (11)**



## WARNING

Rotating machinery can cause serious injury to the operator and bystanders. Turn off and lock out the machine before making the pre-start checks. When operating the machine, always be aware of the location of all people in the vicinity of the machine.

## Before Machining

- Be sure the machine is secured to the work piece or fixture, and that it has been leveled or aligned to the job's requirements.
- Verify that the rigging has been removed from the machine. Do not remove the lifting eyes.
- Ensure setup tools are removed.
- Verify that the machine can move the full length without collisions.
- Ensure the milling head is properly setup.



- Ensure the milling cutter is securely mounted.
- Verify the feed direction and milling rate are set correctly.
- Check that all fasteners are tight.
- Verify that any turning or other movable parts are clear of obstructions.
- Ensure that all cables and hoses are secure and not in the path of moving parts.
- Test the E-Stop button before operation.

## Machining

- Connect electrical power to the HPU.
- Ensure the system reset button is released.
- Turn on the main power.
- Turn the feed to minimum.
- Before putting the cutter near the work piece, test the travel direction of all axes to ensure that the settings match the direction you want to machine.
- Turn on the spindle. Verify the rotation direction of the cutter. If it is rotating in the incorrect direction, turn off the spindle. Press the E-Stop button. Lock out the HPU. Switch the hydraulic hoses at either the motor end or at the HPU to correct the rotation.
- Move the machine axes to the desired starting location.
- Advance the cutter to the desired cutting depth, and lock in place.
- Turn on the spindle and adjust the speed to the desired cutting rate.
- Turn the feed to minimum.
- Engage the feed and adjust the feed speed for the desired cut.
- Keep chips clear of moving parts.
- Do not step on hoses or cables. Metal chips can be forced through the cable jacket and damage cabling causing machine malfunction and unwanted down-time.



### INFORMATION

A pair of drag brakes are located on opposite sides of the Milling Head leadscrew bearing block. See Figure 15. This applies drag to the rotation of the leadscrew in conjunction with the brake to prevent the Milling Head from settling due to the influence of gravity. A 4mm hex wrench is required to adjust the drag brakes.

## Adjusting the Drag Brakes

The drag brakes should be tightened until the torque required to turn the leadscrew clockwise (downward feed) is 25 in-lb.

- Remove the hand wheel and place a torque wrench equipped with a 1/2" socket on the end of the leadscrew.
- Using a 4mm hex wrench, tighten the drag brakes in an alternating pattern while checking the leadscrew resistance between each adjustment. Continue to tighten the drag brakes until the torque resistance is 25 in-lb.

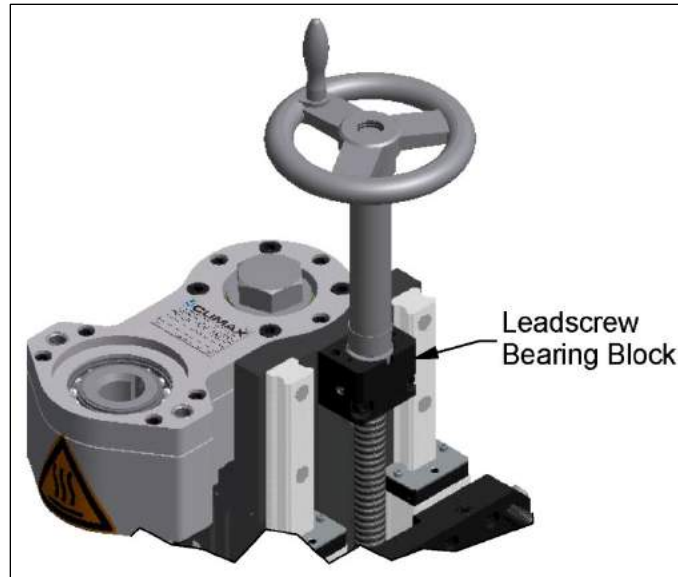


Figure 22

## After Machining

- When the milling is complete, reduce the feed speed to minimum and stop the feed.
- Retract the milling head from the work piece, and stop the spindle.
- Press the E-stop button.
- Lockout the HPU before removing the cutter, replacing inserts, or performing maintenance.



### CAUTION

Do not stop the spindle when the feed is running or broken inserts will result.

## Maintenance

	<b>CAUTION</b>
	<p><b>Failure to properly maintain the machine will result in premature wear or damage to the machine. Damaged caused by improper or inadequate machine maintenance is not covered by the machine limited warranty.</b></p>

## Cleaning and Lubrication

- Clean the machine after each use to remove dirt, grease, metal chips, and moisture.
- Wipe dry with clean materials.

Proper lubrication accomplishes the following:

- Minimizes friction to prevent seizure and reduce wear.
- Forms an oil film on metal surfaces to decrease friction and pressure acting on the surface.
- Prevents oxidation and corrosion of metal surfaces.

	<b>CAUTION</b>
	<p><b>Avoid damage, premature machine wear, and protect your warranty by using only approved lubricants.</b></p>

### \* Approved Lubricants

Application	Lubricant	Biodegradable Lubricant	Viscosity (cSt)	Quantity	Frequency
Rectangular & Dovetail Ways <sup>1</sup>	ExxonMobil Vactra No. 2S	N/A	67.78 @ 40C 8.6 @ 100C	Light coating applied by hand	Daily during machine use
Gearboxes and mechanisms lubricated with grease <sup>2</sup>	CONOCO PolyTac EP 2	CASTROL BioTac EP 2	129 @ 40C 11.6 @ 100C	2 cc	Monthly during machine use. Replace grease every 2 years.
Gearboxes using oil	CASTROL Tribol 800-220	CASTROL BioTrans VG220	220 @ 40C 34 @ 100C	Fill to fill plug or mid-sight glass	Refill every use. Replace oil every 2 years <sup>3</sup> .

<sup>1</sup> 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.

<sup>2</sup> 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).

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

Application	Lubricant	Biodegradable Lubricant	Viscosity (cSt)	Quantity	Frequency
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	N/A	Not Available	Sizes < 32 mm use 0.16 cc per nut Sizes >=32 mm use 0.24 cc per nut	1x per use or weekly for continued use
	NOOK ball screws – NOOK E-900L	CASTROL BioTac EP 2	Not Available		
Linear & curved rail	THK Rail – THK AFA Grease <sup>4</sup>	N/A	32 @ 40C	Sizes <35 use 0.16 cc per bearing block Sizes >=35 use 0.24 cc per bearing block	1x per use or weekly for continued use
	CONOCO PolyTac EP 2	CASTROL BioTac EP 2	129 @ 40C 11.6 @ 100C		
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 <sup>5</sup>
	AWS-32 (winter)		32 @ 40C 5.44 @ 100C		
Electric motors	See vendor literature	N/A	N/A	See vendor literature	See vendor literature
Tapping & Drilling	STETCO Tap Magic XTRA-FOAMY	-STETCO Tap Magic Protap -Chesterton 388	Not Available	As required	Per hole tapped or drilled
Cutting Oil	CONOCO AW 32	CONOCO Ecoterra 32	32 @ 40C 5.44 @ 100C	As required	Continued use while cutting

\* If an approved lubricant cannot be used, contact Climax for an equivalent alternative.

## Lubrication for THK Railing

THK, manufacturer of the rail assembly, recommends the rail block be lubricated every **65 hours** of operating time with 2.6cc of AFA grease.

	<b>IMPORTANT</b>
	<p><b>Use of other lubricants on THK products will void manufacturer's warranty.</b></p>

<sup>4</sup> Use of other lubricants on THK products will void manufacturer's warranty.

<sup>5</sup> 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.

## Disassembly and Storage

- Retract the milling head from the work piece.
- Remove the tooling.
- Remove hoses.
- Remove the milling head using a sling. (Not required, the milling head and ram can be stored assembled if required.)
- Remove the ram from the bed and place in storage container.
- Remove the feed motor and install brakes on the ends of the ballscrews.
- Attach lifting equipment to the beds using the supplied hoist rings.
- Remove the machine from the work piece.
- Clean the machine to remove dirt, grease, metal chips, and moisture.
- Apply LPS lubricant to unpainted surfaces to prevent corrosion.
- Store in the container provided.
- Place desiccant bags or vapor wrap around the machine to absorb moisture.

Climax advises changing the desiccant bags in the storage crate every 18 months.

## Specifications

### Operating Ranges

Bed		Ram	
Travel	Length	Travel	Length
36 inches (914.4 mm)	48 inches (1219.2 mm)	16 inches (406.4 mm)	26 inches (660.4 mm)
60 inches (1524.0 mm)	72 inches (1828.8 mm)	34 inches (863.6 mm)	44 inches (1117.6 mm)
84 inches (2133.6 mm)	96 inches (2438.4 mm)		
US		METRIC	
Spindle Assembly (Z-axis)			
Milling Head Spindle with #40 Taper	NMTB or CATV or optional HSK		
Spindle Drive	Hydraulic, Optional Electric with HSK		
Axial Tool Head Travel	4 or 8 inches	101.5 or 203 mm	
Milling Head Gearbox Ratio	1 : 1	1 : 1	
Tool Head Position	90° increments (infinite 360° position w/ optional swivel plate)		
Gearbox Position Adjustment	180° in 90° increments (3 positions)		
Electric Feed			
Drive Power	Modified Baldor GP3303 1/2 HP DC gear motor		
Gearbox Reduction	20 : 1		
Feed Rate	1-24 in/min	25.4-609.6 mm/min	
Power Input Requirements	0.37 kW @ 120V or 230V		
Manual Feed			
Feed Per Revolution of Motor	0.01 in/rev	0.254 mm/rev	
Hydraulic Motor	Speed		
	Max Machine RPM @20gpm	Min Machine RPM @2gpm	
62407 (4.9 CU IN 2000 SERIES)	890	87	
53457 (8.0 CU IN 2000 SERIES)	564	55	
47394 (14.9 CU IN 2000 SERIES)	300	25	
47395 (18.7 CU IN 2000 SERIES)	239	22	
47396 (24.0 CU IN 2000 SERIES)	188	17	
47221 (29.8 CU IN 2000 SERIES)	149	9	

## Exploded Views and Parts Lists

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 not authorized in writing by Climax to perform service on the machine.

### Tool Kit P/N 64202

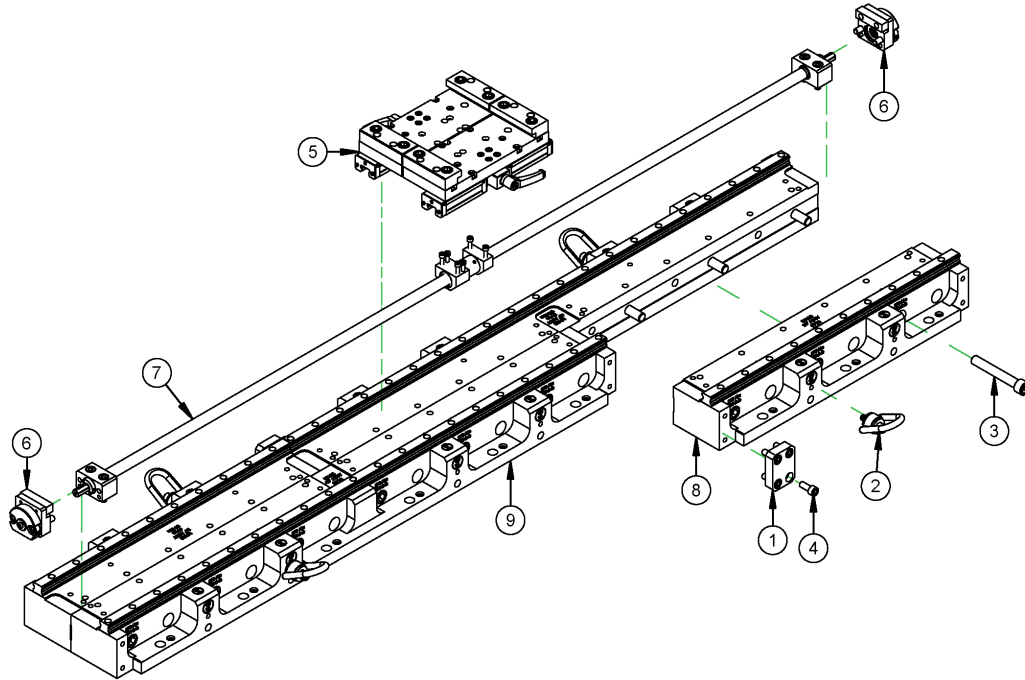
PART NO.	DESCRIPTION	QTY	UoM
14818	WRENCH RATCHET 1/2 DRIVE	1	Piece
19700	CONTAINER SHIPPING FLAT ROOF 20 X 8.75 X 10.5	1	Piece
35215	SCREW M12 X 1.75 X 40MM SHCS	24	Piece
35516	HAMMER DEAD BLOW 1-3/4 DIA HEAD (KB)	1	Piece
37691	WRENCH HEX 8MM X 11.2 T-HANDLE BALL END	1	Piece
38678	WRENCH HEX SET 1.5 - 10MM BONDHUS BALL END (KB)	1	Piece
46249	WRENCH HEX BIT SOCKET 14MM X 1/2	1	Piece
64744	TOOL ALIGNMENT BED SECTION LM LINE	2	Piece
65284	HANDWHEEL 5 IN. DIA 1/2" HEX CAST IRON DISHED W/ REVOLVING HANDLE	1	Piece
66188	MANUAL INSTRUCTION LM5200	1	Piece

### Drawing List

- |  |  |
|--|--|
| 64203 – Bed & Saddle Assembly              | 77909 – Motor Assembly, 120V                 |
| 81673 – Saddle Assembly                    | 77910 – Motor Assembly, 230V                 |
| 84313 – Saddle assembly with zimmer brakes | 68455 – Milling Head, HSK 40, Rt. Angle, Air |
| 64405 – Ballscrew Lock Assembly            | 68467 – Motor Assembly, Rt. Angle, Air       |
| 66494 – Ballscrew Assembly                 | 68584 – Milling Head, HSK 40, Air            |
| 64513 – Bearing Block Assembly             | 72839 – Mill Face Assembly, #40 Taper        |
| 64624 – Gantry Kit Assembly                | 64984 – Mill Face Assembly, HSK 40           |
| 72642 – Ram Assembly                       | 64684 – Feed Assembly, 120V                  |
| 72837 – Milling Head Assembly              | 66660 – Feed Motor Assembly, 120V            |
| 72634 – Milling Head, #40 Taper            | 64743 – Feed Assembly, 230V                  |
| 72838 – Hydraulic Motor Assembly           | 95349 – Feed Motor Assembly, 230V            |
| 65262 – Milling Head, HSK 40, Hyd.         | 78863 – Ram safety tether kit assembly       |
| 65096 – Hydraulic Motor Assembly           | 80553 – Hoist ring assembly                  |
| 64667 – Milling Head, HSK 40, 120V         |  |
| 66342 – Milling Head, HSK 40, 230V         |  |
| 64643 – Spindle Assembly, HSK 40           |  |
| 64649 – Gearbox Assembly, HSK 40           |  |

### Optional Parts Drawings

- 66217 – Milling Head Swivel Assembly
- 64856 – Milling Head Z-Axis Mount Assembly



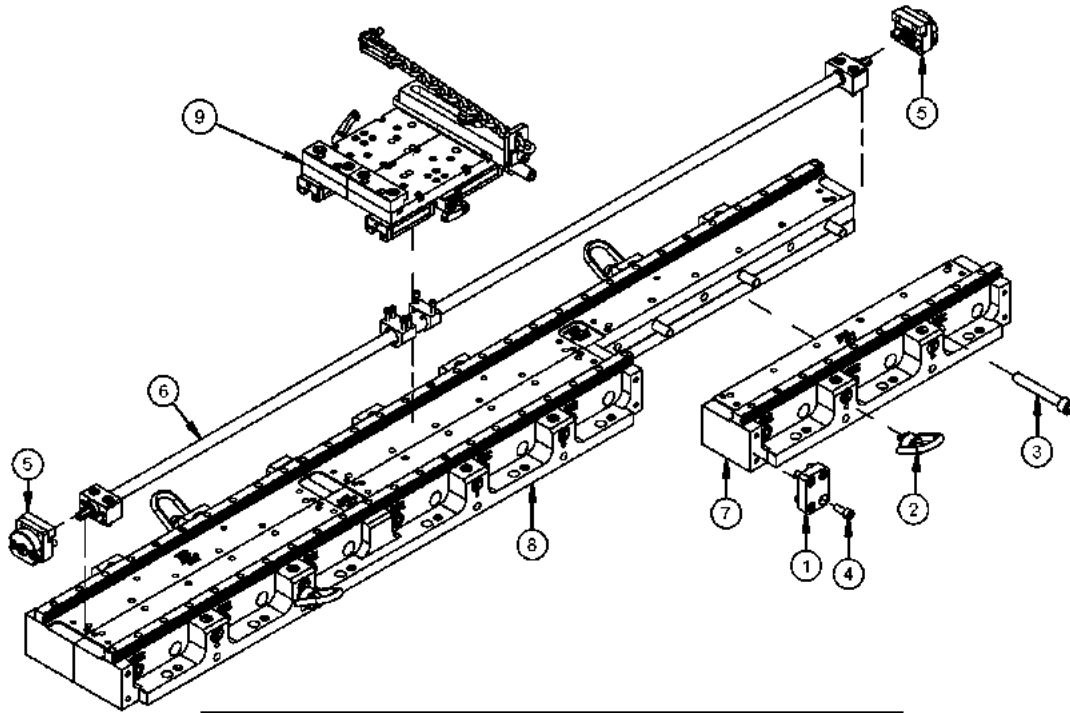
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	VARIES	64212	PLATE BED CONNECTION LM5200 LM6200
2	4	58311	RING HOIST M10 X 1.5 X 82MM 450KG
3	VARIES	45878	SCREW M16 X 2.0 X 110mm SHCS
4	VARIES	35339	SCREW M10 X 1.5 X 25mm SHCS
5	1	72650	ASSY SADDLE LM5200
6	2	64405	ASSY BALLSCREW LOCK 20MM
7	1	66493	ASSY BALLSCREW 36" TRAVEL 48" LONG LM5200 (FOR 64970)
		66494	ASSY BALLSCREW 60" TRAVEL 72" LONG LM5200 (FOR 64203)
		66495	ASSY BALLSCREW 84" TRAVEL 96" LONG LM5200 (FOR 64971)
8	VARIES	64204	ASSY BED SECTION 24 IN LM5200
9	VARIES	64209	ASSY BED SECTION 48 IN LM5200

ASSY BED & SADDLE 36" TRAVEL (48" LONG) LM5200	64970
ASSY BED & SADDLE 60" TRAVEL (72" LONG) LM5200 (SHOWN)	64203
ASSY BED & SADDLE 84" TRAVEL (96" LONG) LM5200	64971

  
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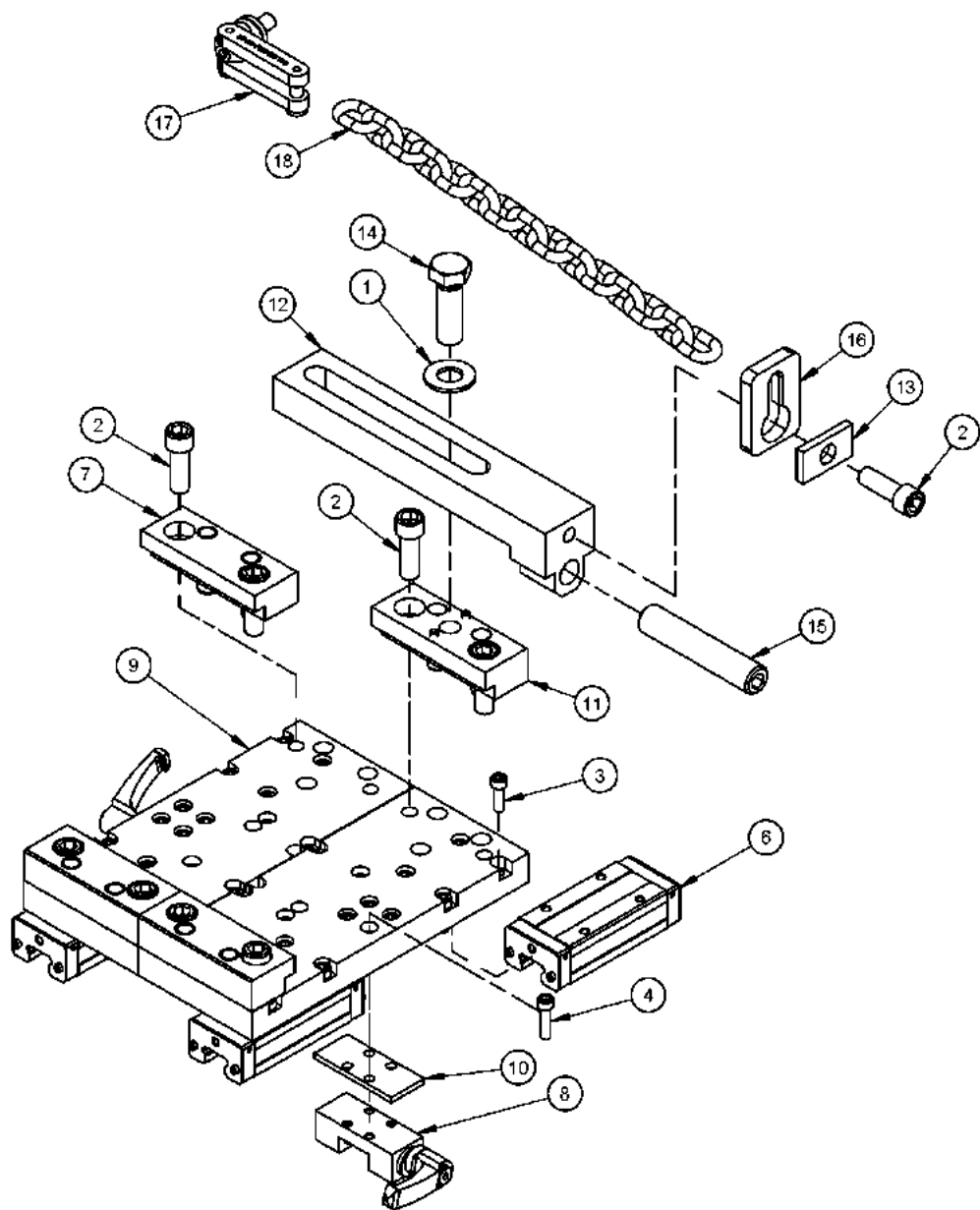




AVAILABLE CONFIGURATIONS	
DESCRIPTION	PART NO.
ASSY BED & SADDLE 36" TRAVEL (48" LONG) LM5200	64970
ASSY BED & SADDLE 60" TRAVEL (72" LONG) LM5200	64203
ASSY BED & SADDLE 84" TRAVEL (96" LONG) LM5200	64971

PARTS LIST				
ITEM	QTY	P/N:	DESCRIPTION	
1	VARIABLES	64212	PLATE BED CONNECTION LM5200 LM6200	
2	4	58311	RING HOIST M10 X 1.5 X 82MM 450KG	
3	VARIABLES	45878	SCREW M16 X 2.0 X 110mm SHCS	
4	VARIABLES	35339	SCREW M10 X 1.5 X 25mm SHCS	
5	2	64405	ASSY BALLSCREW LOCK 20MM	
6	1	66493	ASSY BALLSCREW 36" TRAVEL 48" LONG LM5200 (FOR 64970)	
		66494	ASSY BALLSCREW 60" TRAVEL 72" LONG LM5200 (FOR 64203)	
		66495	ASSY BALLSCREW 84" TRAVEL 96" LONG LM5200 (FOR 64971)	
7	VARIABLES	64204	ASSY BED SECTION 24 IN LM5200	
8	VARIABLES	64209	ASSY BED SECTION 48 IN LM5200	
9	1	84313	ASSY SADDLE LM5200 W / ZIMMER BRAKES AND RAM TETHER	

**81673 -CHART ASSY BED & SADDLE LM5200 - REV B**  
**FOR REFERENCE ONLY**



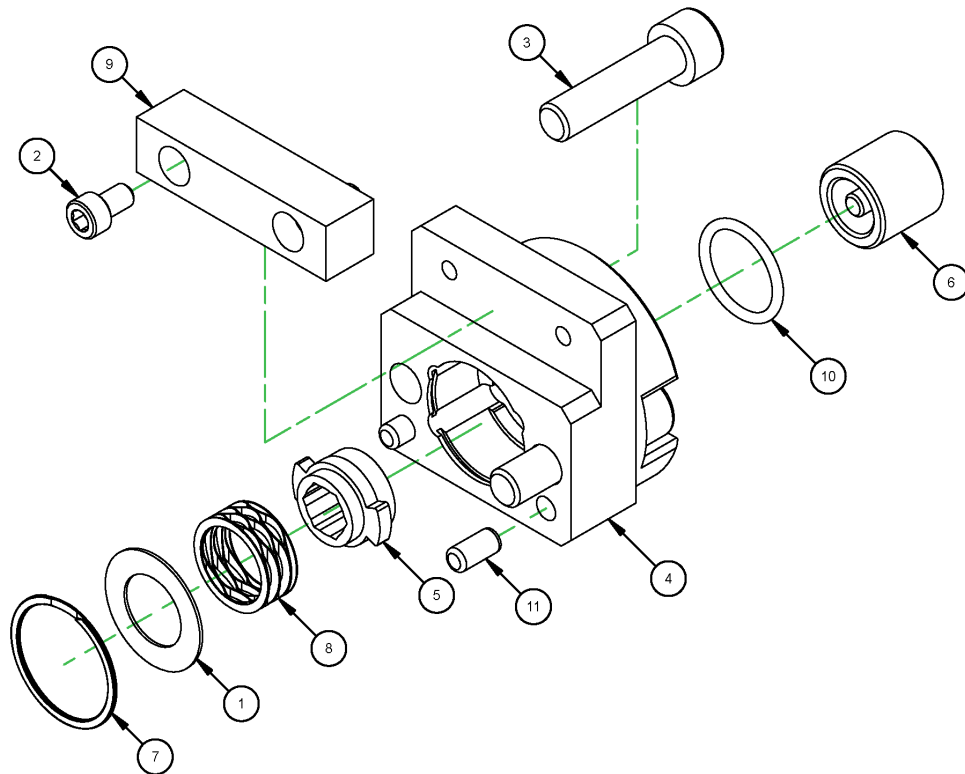
**84313 - ASSY SADDLE LM5200 W / ZIMMER BRAKES AND RAM TETHER - REV -**

FOR REFERENCE ONLY

PARTS LIST			
ITEM	QTY	P/N.	DESCRIPTION
1	1	15206	WASHER 5/8 SAE FLTW HARDENED
2	9	30207	SCREW M12 X 1.75 X 35mm SHCS
3	16	35009	SCREW M6 X 1.0 X 20 SHCS
4	8	35652	SCREW M6 X 1.0 X 25 SHCS
5	4	37749	(NOT SHOWN) WIRE TIE VELCRO 11 LONG
6	4	64274	BLOCK THK SHS25LV PRELOADED METAL SCRAPERS
7	3	64480	ASSY CLAMP RAM LM5200
8	2	72262	ZIMMER BRAKE 25mm RAIL
9	1	72851	SET PLATE SADDLE LM5200
10	2	72869	ADAPTER BRAKE 25mm RAIL 4mm THICK
11	1	78878	CLAMP RAM TETHER LM5200
12	1	78879	BLOCK SLIDE RAM TETHER LM
13	1	79905	WASHER RECTANGLE 14 MM ID X 45MM W X 25MM H X 6MM T
14	1	80530	SCREW M16 X 2.0 X 50MM HHCS
15	1	80532	SCREW M20 X 2.5 X 100MM SSSFP
16	1	80533	PLATE CHAIN SUPPORT
17	1	80553	HOIST RING M10 X 1.5 995 LBS SWIVEL ASSY
18	1	80567	CHAIN 1/4 X 12 IN 3500 LBS LOAD
19	1	80744	(NOT SHOWN) CHAIN 1/2 X 36 IN 3500 LBS LOAD
20	1	80745	(NOT SHOWN) CHAIN 1/4 X 48 IN 3500 LBS LOAD

**84313 - ASSY SADDLE LM5200 W / ZIMMER BRAKES AND RAM TETHER - REV -**

FOR REFERENCE ONLY



PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	1	11739	WASHER THRUST .750 ID X 1.250 OD X .0312
2	2	57281	SCREW M6 X 1.0 X 10MM SHCS
3	2	64339	SCREW M10 X 1.5 X 40MM SHCS
4	1	64407	HOUSING BALLSCREW LOCK 20MM
5	1	64409	SLEEVE ENGAGEMENT BALLSCREW LOCK
6	1	64410	CAP OVERRIDE BALLSCREW LOCK
7	1	64412	RING SNAP 1-5/16 ID SPIRAL MEDIUM DUTY .085 THICK
8	1	64414	SPRING WAVE 1.00 OD X .086 FLAT WIRE X .417
9	1	64416	BUMPER 2-1/2 X 5/8 X 5/8 POLYURETHANE 80A RED
10	1	66522	RING O 3/32 X 7/8 ID X 1-1/16 OD
11	2	20166	PIN DOWEL 1/4 DIA X 1/2

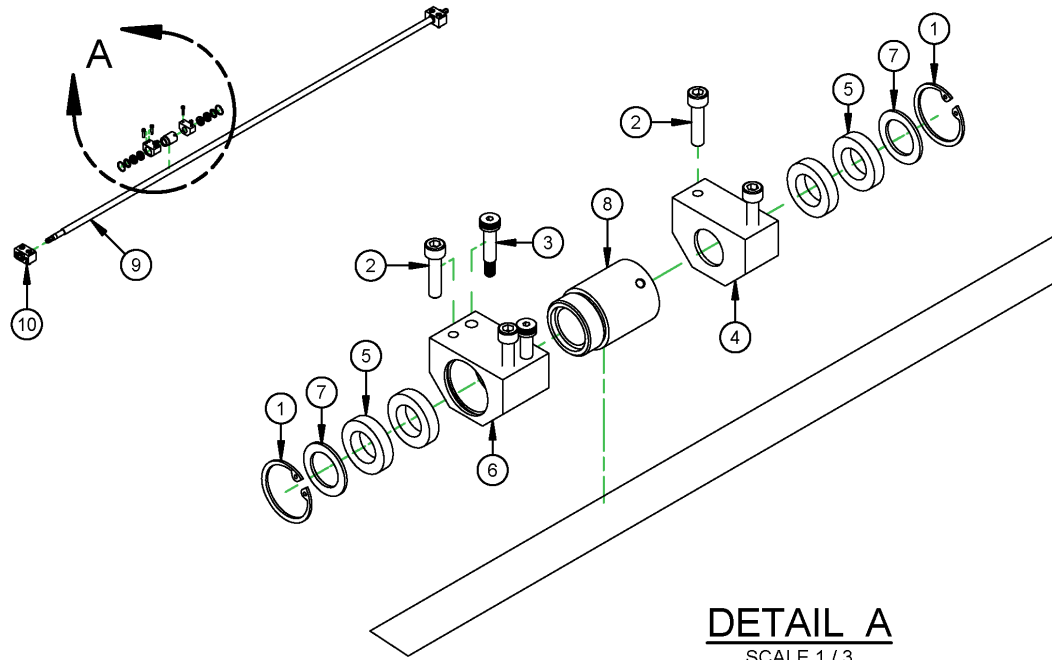
### ASSY BALLSCREW LOCK 20MM

64405



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**DETAIL A**  
SCALE 1 / 3

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	33777	RING SNAP 1-3/16 ID (30MM)
2	4	35652	SCREW M6 X 1.0 X 25 SHCS
3	2	58588	SCREW 6MM DIA X 20MM X M5 X 0.8 SHLDCS
4	1	62321	HOLDER FELT WIPER MILLING HEAD
5	4	62379	SEAL FELT 16MM BALL SCREW 1.015 OD MILLING HEAD
6	1	62423	MOUNT BALL NUT MILLING HEAD
7	2	62903	WASHER SHIM .75 ID 1.125 OD .062 THICK STEEL
8	1	62960	BALL SCREW NUT 20MM X 5MM LEAD LEFT HAND 33 MM OD EICHENBERGER ROUND
9	1	64457	BALLSCREW 20MM X 5 LM 48" LENGTH (FOR 66493)
		64503	BALLSCREW 20MM X 5 LM 72" LENGTH (FOR 66494)
		64505	BALLSCREW 20MM X 5 LM 96" LENGTH (FOR 66495)
10	2	64513	ASSY BRG BLOCK 20MM

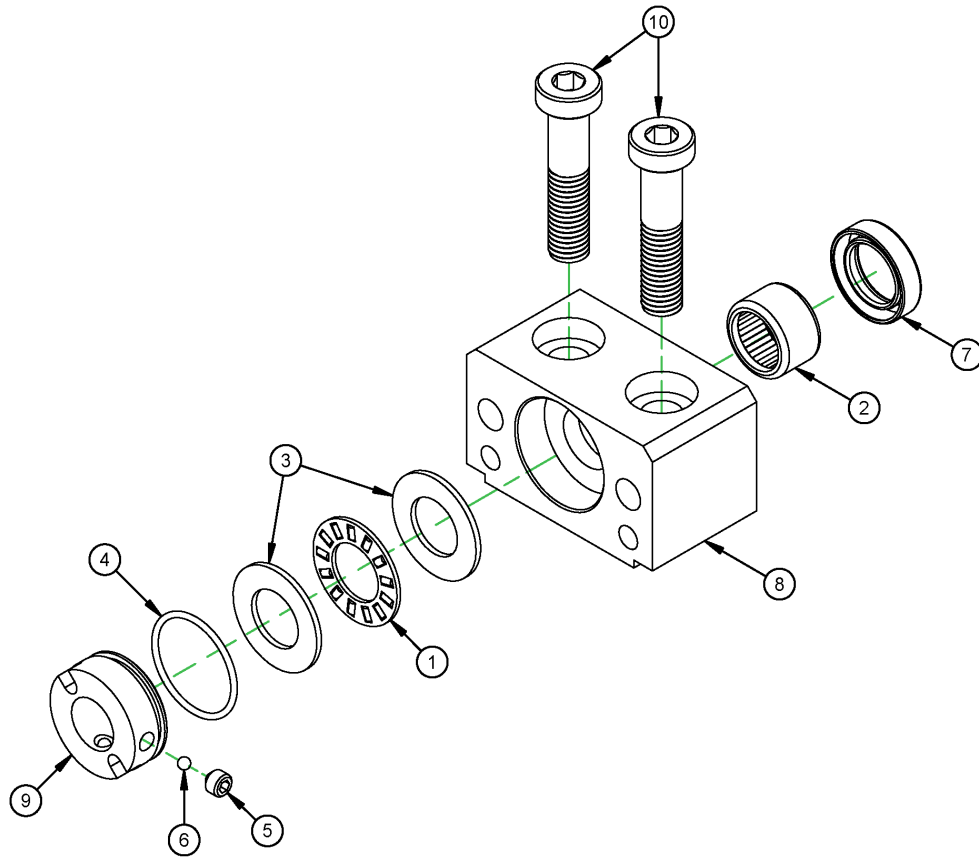
ASSY BALLSCREW 36" TRAVEL 48" LONG LM5200	66493
ASSY BALLSCREW 60" TRAVEL 72" LONG LM5200	66494
ASSY BALLSCREW 84" TRAVEL 96" LONG LM5200	66495

ASSY BALLSCREW 60" TRAVEL 72" LONG LM5200

66494



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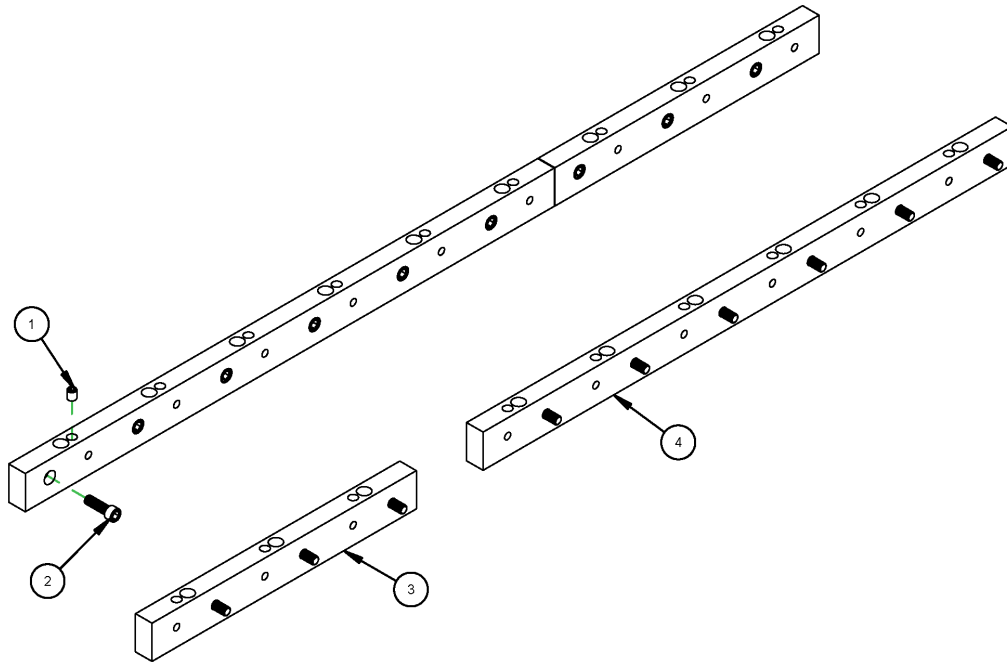
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	10538	BRG THRUST .625 ID X 1.125 OD X .0781
2	1	11026	BRG NEEDLE 5/8 ID X 13/16 OD X .500 OPEN
3	2	11165	WASHER THRUST .625 ID X 1.125 OD X .060
4	1	15731	RING O 1/16 X 1 ID X 1-1/8 OD
5	2	36903	SCREW M6 X 1.0 X 5mm SSSCP
6	2	43489	BALL NYLON 1/8 DIA
7	1	58237	SEAL .625 ID X .987 OD X .250
8	1	64440	BLOCK BEARING BALLSCREW 20MM LM LINE
9	1	66441	BRG RETAINING NUT 5/8-18 O-RING SEAL M6 SETSCREW LOCK
10	2	72441	SCREW M10 X 1.5 X 45MM LHSCS GRADE 10.9 BLACK OXIDE

## ASSY BRG BLOCK 20MM

64513



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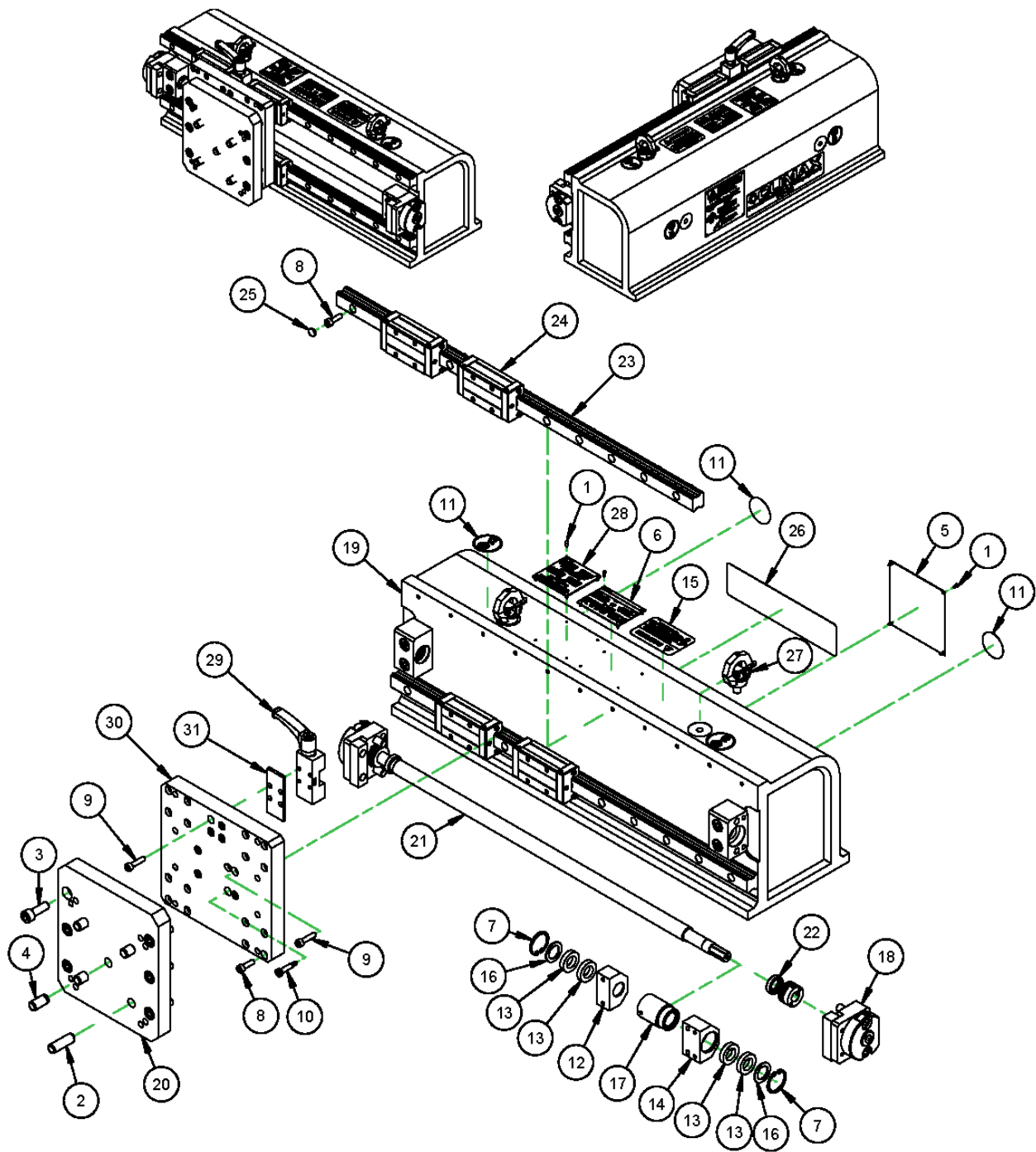
PARTS LIST					
ITEM	PART No.	DESCRIPTION	64978	64624	64979
1	46212	SCREW M16 X 2 X 20mm SSSFP	12X	18X	24X
2	64518	SCREW M16 X 2.0 X 50MM SHCS	12X	18X	24X
3	64536	PLATE CONNECT GANTRY 24 IN LM5200	0X	2X	2X
4	64537	PLATE CONNECT GANTRY 48 IN LM5200	2X	2X	3X

ASSY GANTRY KIT 48 INCH LM5200 64978  
 ASSY GANTRY KIT 72 INCH LM5200 64624  
 ASSY GANTRY KIT 96 INCH LM5200 64979



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PART NUMBER	DESCRIPTION
72642	ASSY RAM 16" TRAVEL (26" LONG) LM5200 (SHOWN)
72643	ASSY RAM 34" TRAVEL (44" LONG) LM5200

RAM ASSEMBLIES LM5200

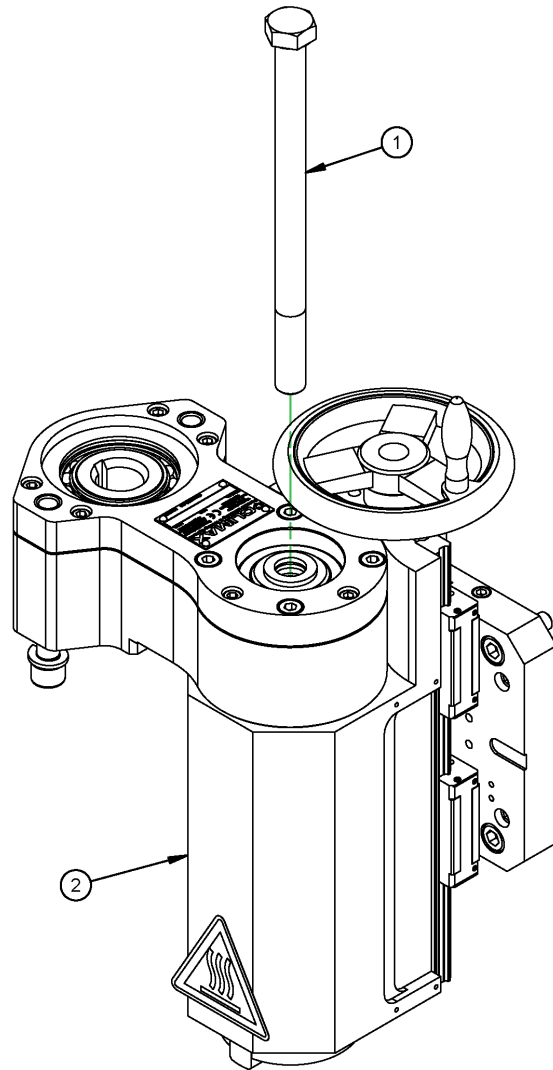


PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	12	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
2	4	11832	PIN DOWEL 1/2 DIA X 1-1/2
3	6	18214	SCREW M10 X 1.5 X 30mm SHCS
4	1	20398	PIN DOWEL 1/2 DIA X 1
5	1	27307	LABEL WARNING FACE MILL MACHINES
6	1	29154	PLATE SERIAL YEAR MODEL CE 2.0 X 3.0
7	2	33777	RING SNAP 1-3/16 ID (30MM)
8	VARIABLES	35009	SCREW M6 X 1.0 X 20 SHCS (38X FOR 72642, 54X FOR 72643, 70X FOR 72644)
9	8	35652	SCREW M6 X 1.0 X 25 SHCS
10	2	58588	SCREW 6MM DIA X 20MM X M5 X 0.8 SHLDCS
11	4	59039	LABEL WARNING LIFT POINT ROUND 1.5"
12	1	62321	HOLDER FELT WIPER MILLING HEAD
13	4	62379	SEAL FELT 16MM BALL SCREW 1.015 OD MILLING HEAD
14	1	62423	MOUNT BALL NUT MILLING HEAD
15	1	62888	LABEL DANGER PART LIFT POINT ONLY 2 X 3
16	2	62903	WASHER SHIM .75 ID 1.125 OD .062 THICK STEEL
17	1	62960	BALL SCREW NUT 20MM X 5MM LEAD LEFT HAND 33 MM OD EICHENBERGER ROUND
18	2	64405	ASSY BALLSCREW LOCK 20MM
19	1	64419	RAM MACHINED 26 INCH LENGTH 16 INCH TRAVEL LM5200 (72642)
		64421	RAM MACHINED 44 INCH LENGTH 34 INCH TRAVEL LM5200 (72643)
		71114	RAM MACHINED 62 INCH LENGTH 52 INCH TRAVEL LM5200 (72644)
20	1	64482	PLATE TRAMMING LM5200
21	1	64500	BALLSCREW 20MM X 5 LM 26" LENGTH (72642)
		64502	BALLSCREW 20MM X 5 LM 44" LENGTH (72643)
		71109	BALLSCREW 20MM X 5MM 62" LONG (72644)
22	2	64513	ASSY BRG BLOCK 20MM
23	2	64540	RAIL THK SHS25 660MM LG (72642)
		64541	RAIL THK SHS25 1117MM LG (72643)
		71108	RAIL THK SHS25 1574 MM LG (72642)
24	4	64542	BLOCK THK SHS25V PRELOADED METAL SCRAPERS
25	VARIABLES	68501	CAP RAIL 25MM METAL THK SHS (22X FOR 72642, 38X FOR 72643, 54X FOR 72644)
26	1	70227	LABEL CLIMAX LOGO 2 X 8
27	2	70483	LIFTING EYE SWIVEL M10 X 1.5 X 15MM 25 ID 47 OD 60 OAL 881 LBS 400 KG
28	1	71154	TAG MASS LM5200 CONFIGURATIONS
29	1	72262	ZIMMER BRAKE 25mm RAIL
30	1	72645	PLATE RADIAL TRAVEL LM5200
31	1	72869	ADAPTER BRAKE 25mm RAIL 4mm THICK

RAM ASSEMBLIES LM5200



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AVAILABLE ASSEMBLIES	
PART No.	DESCRIPTION
62399	MILLING HEAD 2 BRG 4.1 STROKE #40 TAPER INCH NMTB
62654	MILLING HEAD 2 BRG 4.1 STROKE #40 TAPER METRIC NMTB
62732	MILLING HEAD 2 BRG 4.1 STROKE #40 TAPER INCH V-FLANGE
62733	MILLING HEAD 2 BRG 4.1 STROKE #40 TAPER METRIC V-FLANGE

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	62648	DRAWBOLT MILLING HEAD 2" BRG 40 TAPER INCH NMTB (62399 ONLY)
		62444	SCREW M16 X 2.0 X 230 HHCS (62654 ONLY)
		62847	DRAWBOLT MILLING HEAD 2" BRG 40 TAPER INCH V-FLANGE (62732 ONLY)
		62848	SCREW M16 X 2.0 X 250 HHCS (62733 ONLY)
2	1	72634	MILLING HEAD 2.00 BRG 4.1 STROKE #40 TAPER

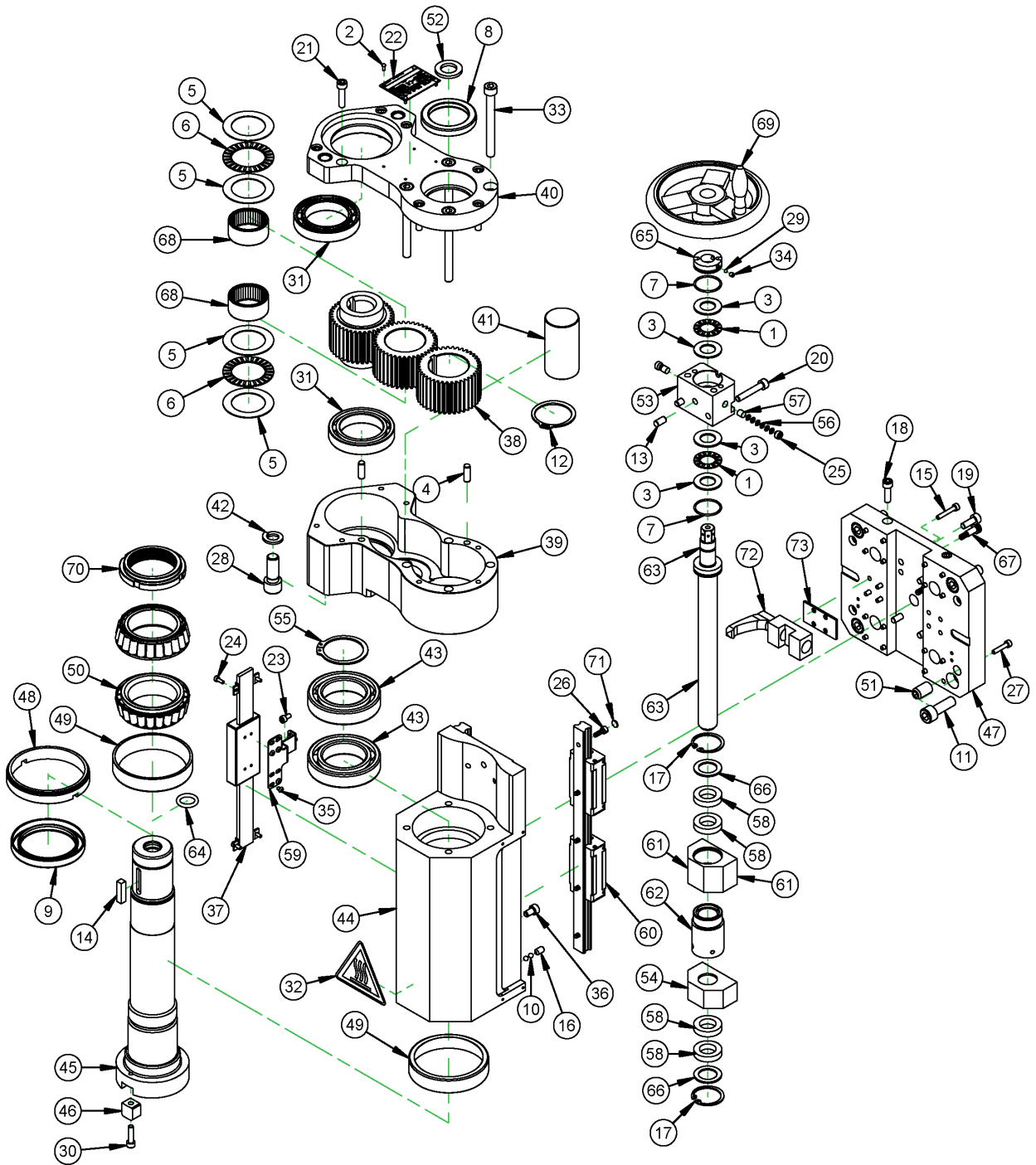
CHART MILLING HEAD 2 BRG 4.1 STROKE #40 TAPER

72837

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MILLING HEAD 2.00 BRG 4.1 STROKE #40 TAPER

72634



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PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	10538	BRG THRUST .625 ID X 1.125 OD X .0781
2	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
3	4	11165	WASHER THRUST .625 ID X 1.125 OD X .060
4	2	11729	PIN DOWEL 1/4 DIA X 3/4
5	4	15326	WASHER THRUST 1.375 ID X 2.062 OD X .030
6	2	15327	BRG THRUST 1-375 ID X 2.062 OD X .0781
7	2	15731	RING O 1/16 X 1 ID X 1-1/8 OD
8	1	15768	SEAL 1.625 ID X 2.250 OD X .313
9	1	16107	SEAL 2.250 ID X 3.000 OD X .375
10	4	16594	BALL NYLON 3/16 DIA
11	4	18214	SCREW M10 X 1.5 X 30mm SHCS
12	1	19505	RING SNAP 1-5/8 OD .062 WIDE
13	1	20166	PIN DOWEL 1/4 DIA X 1/2
14	1	20273	KEY 1/4 SQ X 1.00 SQ BOTH ENDS
15	4	22572	SCREW M4 X 0.7 X 25mm SHCS
16	2	33715	SCREW M6 X 1.0 X 10 mm SSSCP
17	2	33777	RING SNAP 1-3/16 ID (30MM)
18	2	35009	SCREW M6 X 1.0 X 20 SHCS
19	4	35014	SCREW M6 X 1.0 X 16mm SHCS
20	2	35504	SCREW M6 X 1.0 X 35mm SHCS
21	7	35652	SCREW M6 X 1.0 X 25 SHCS
22	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
23	2	35910	SCREW M4 X 0.7 X 8MM SHCS
24	4	35994	SCREW M3 X 0.5 X 8mm SHCS
25	2	36087	SCREW M8 X 1.25 X 6MM SSSFP
26	10	36233	SCREW M4-0.7 X 12 mm SHCS
27	16	38061	SCREW M4 X 0.7 X 20 SHCS
28	2	40697	SCREW M12 X 1.75 X 30mm SHCS
29	2	43489	BALL NYLON 1/8 DIA
30	2	43730	SCREW M5 X 0.8 X 20mm SHCS
31	2	46352	BRG BALL 1.7717 ID X 2.6772 OD X .4724 W/ 2 SEALS
32	1	46902	LABEL WARNING HOT SURFACE GRAPHIC 2.25 TRI
33	4	52936	SCREW M8 X 1.25 X 80MM SHCS
34	2	53365	SCREW M4 X 0.7 X 4 mm SSSFP
35	4	54024	SCREW M3 X 0.5 X 4MM BHSCS
36	1	57281	SCREW M6 X 1.0 X 10MM SHCS
37	1	57774	SCALE DIGITAL 4 INCH VERTICAL MOUNT

MILLING HEAD 2.00 BRG 4.1 STROKE #40 TAPER

72634



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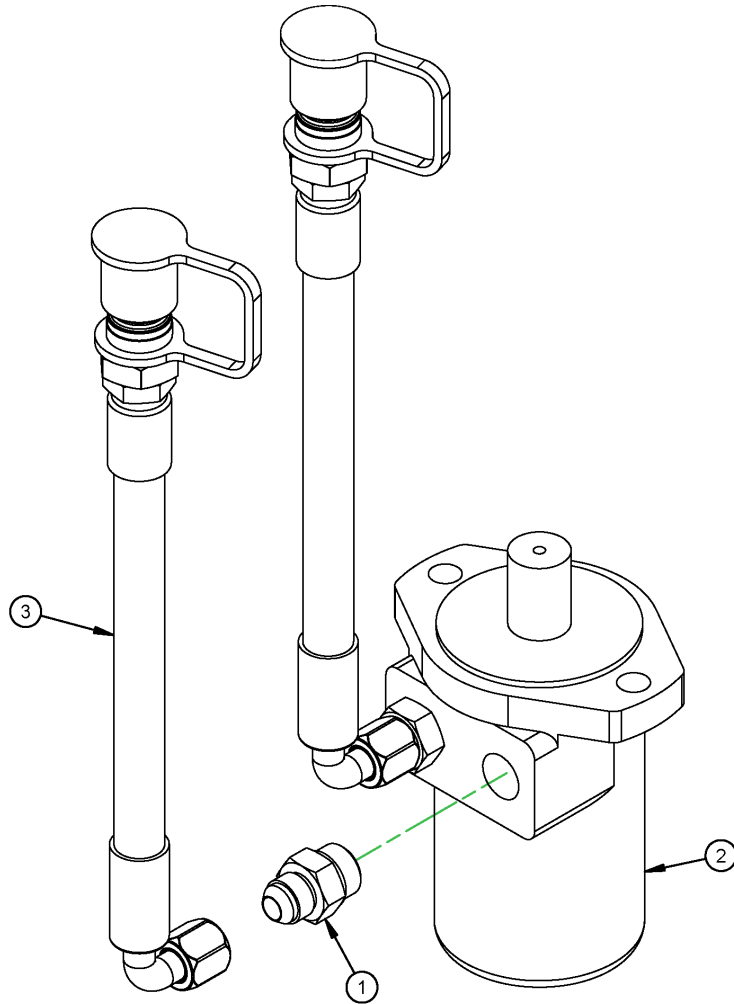
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
38	1	60467	GEAR SET 40T 16DP 2.5PD THREE GEARS BLOCK SPINDLE 2.75 BRG
39	1	60468	HOUSING GEARBOX BLOCK SPINDLE 2.75 BRG
40	1	60469	COVER GEARBOX BLOCK SPINDLE 2.75 BRG
41	1	60470	SHAFT GEAR BLOCK SPINDLE 2.75 BRG
42	2	60702	WASHER SPLIT LOCK M12
43	2	60793	BRG BALL 1.7717 ID X 2.9528 OD X .6299
44	1	61090	HOUSING SPINDLE 2.00 BRG 4.1 STROKE
45	1	61091	SPINDLE BLOCK 2.00 BRG 4.5 STROKE #40 TAPER
46	2	61093	LUG DRIVE #40 TAPER BLOCK SPINDLE
47	1	72638	PLATE MOUNTING BLOCK SPINDLE 2.00 BRG
48	1	61095	NUT 3 3/8-16 BRG PRELOAD EXTERNAL THREADS
49	2	61102	BRG CUP 3.25 OD X .6500 WIDE
50	2	61103	BRG CONE 2.000 ID X .850 WIDE
51	4	61175	SCREW M12 X 1.25 X 20mm SSSFP
52	1	61546	WASHER M16 FLTW 28MM OD 3MM THICK
53	1	62281	BEARING BLOCK BALLSCREW 20MM
54	1	62321	HOLDER FELT WIPER MILLING HEAD
55	1	62322	RING SNAP 1.771 OD (45MM)
56	12	62376	WASHER SPRING BELLEVILLE 1/8 ID X 1/4 OD X .013 THK
57	2	62378	ROD POLYURETHANE 1/4 DIA X 1/4 LENGTH 95 SHORE A
58	4	62379	SEAL FELT 16MM BALL SCREW 1.015 OD MILLING HEAD
59	1	62411	BRACKET DRO BLOCK SPINDLE 2.00 BRG
60	2	62419	SLIDE RAIL THK SHS15 280MM LG PRELOADED METAL SCRAPERS 2 BLOCKS
61	1	62423	MOUNT BALL NUT MILLING HEAD
62	1	62426	BALL SCREW NUT 20MM X 5MM LEAD 33 MM OD EICHENBERGER ROUND
63	1	62432	BALL SCREW MILLING HEAD 2.00 BRG 4.1" STROKE
64	1	62445	RING O 1/8 X 5/8 ID X 7/8 OD
65	1	62898	BRG RETAINING NUT 5/8-18 O-RING SEAL SETSCREW LOCK
66	2	62903	WASHER SHIM .75 ID 1.125 OD .062 THICK STEEL
67	2	62909	SCREW 6MM DIA X 12MM X M5 X 0.8 SHLDCS
68	2	63437	BRG NEEDLE 1-3/8 ID X 1-5/8 OD X .750 OPEN
69	1	63469	HANDWHEEL MODIFIED 5 DIA 1/2" HEX
70	1	67394	NUT LOCKING 1.967-18 FLEXIBLE INSERT LOCKING MODIFIED
71	10	68500	CAP RAIL 15MM METAL THK SHS
72	1	72636	ZIMMER BRAKE 15MM RAIL
73	1	72637	ZIMMER ADAPTER 15MM RAIL

MILLING HEAD 2.00 BRG 4.1 STROKE #40 TAPER

72634



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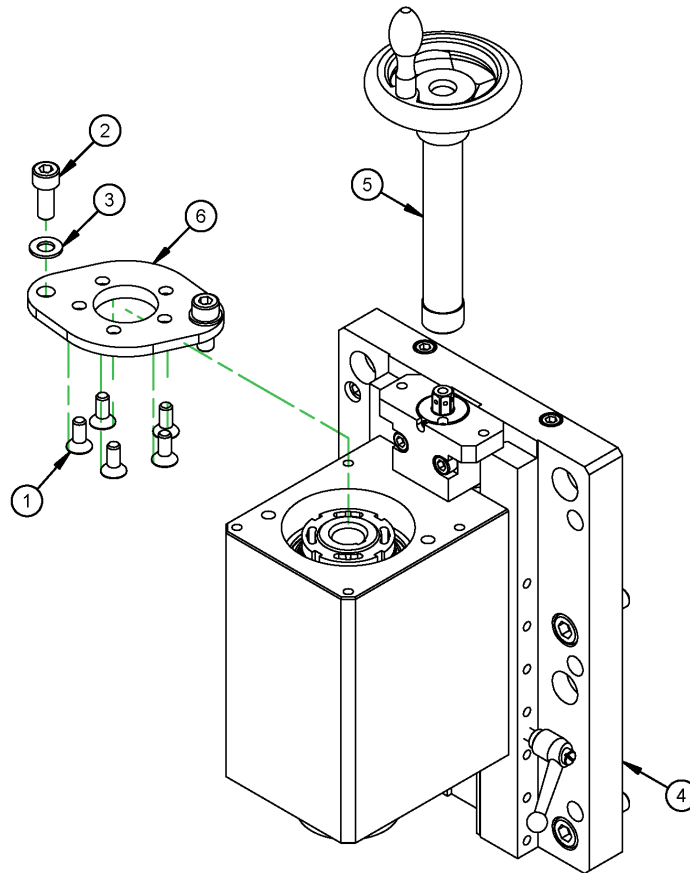


AVAILABLE ASSEMBLIES	
PART No.	DESCRIPTION
62627	ASSY MOTOR HYD 3.6 CU IN STRAIGHT KEYED SAE O-RING W/ 12 QD MALE
62628	ASSY MOTOR HYD 5.7 CU IN STRAIGHT KEYED SAE O-RING W/ 12 QD MALE
62629	ASSY MOTOR HYD 7.3 CU IN STRAIGHT KEYED SAE O-RING W/ 12 QD MALE
62630	ASSY MOTOR HYD 8.8 CU IN STRAIGHT KEYED SAE O-RING W/ 12 QD MALE

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	16047	FTG ADAPTER SAE-10M X JIC-8M STRAIGHT
2	1	20684	MOTOR HYD 3.6 CU IN STRAIGHT KEYED SAE O-RING S-SERIES (62627 ONLY)
		21530	MOTOR HYD 5.7 CU IN STRAIGHT KEYED SAE O-RING S-SERIES (62628 ONLY)
		20231	MOTOR HYD 7.3 CU IN STRAIGHT KEYED SAE O-RING S-SERIES (62629 ONLY)
		21531	MOTOR HYD 8.8 CU IN STRAIGHT KEYED SAE O-RING S-SERIES (62630 ONLY)
3	2	62622	ASSY 1/2 HOSE JIC-8 ELBOW X 60 SERIES Q.D. MALE X 12

CHART ASSY MOTOR HYD STRAIGHT KEYED SAE O-RING W/ 12 QD MALE

72838



PARTS LIST		
ITEM	PART No.	DESCRIPTION
1	12853	SCREW 1/4-28 X 5/8 FHSCS
2	50458	SCREW M8 X 1.25 X 20mm SHCS
3	59432	WASHER M8 FLTW 16MM OD 1.6MM THICK
4	64643	ASSY SPINDLE HSK 40 4" STROKE
5	64745	HANDWHEEL ASSY Z-AXIS 3" OD 3/8 HEX 4-1/2" EXTENSION
6	65092	PLATE 2 BOLT FLANGE FOR CHAR LYNN J SERIES

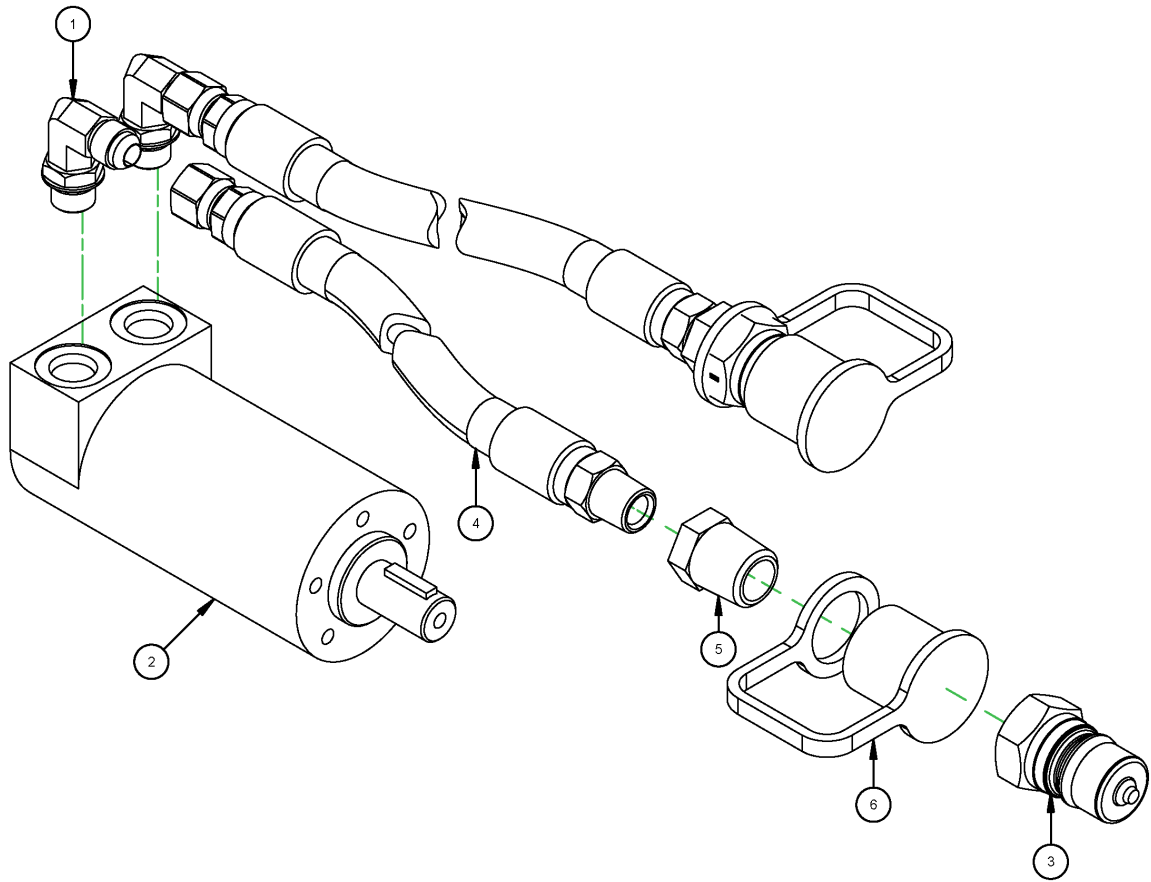
## ASSY HSK 40 MILLING HEAD HYD

65262

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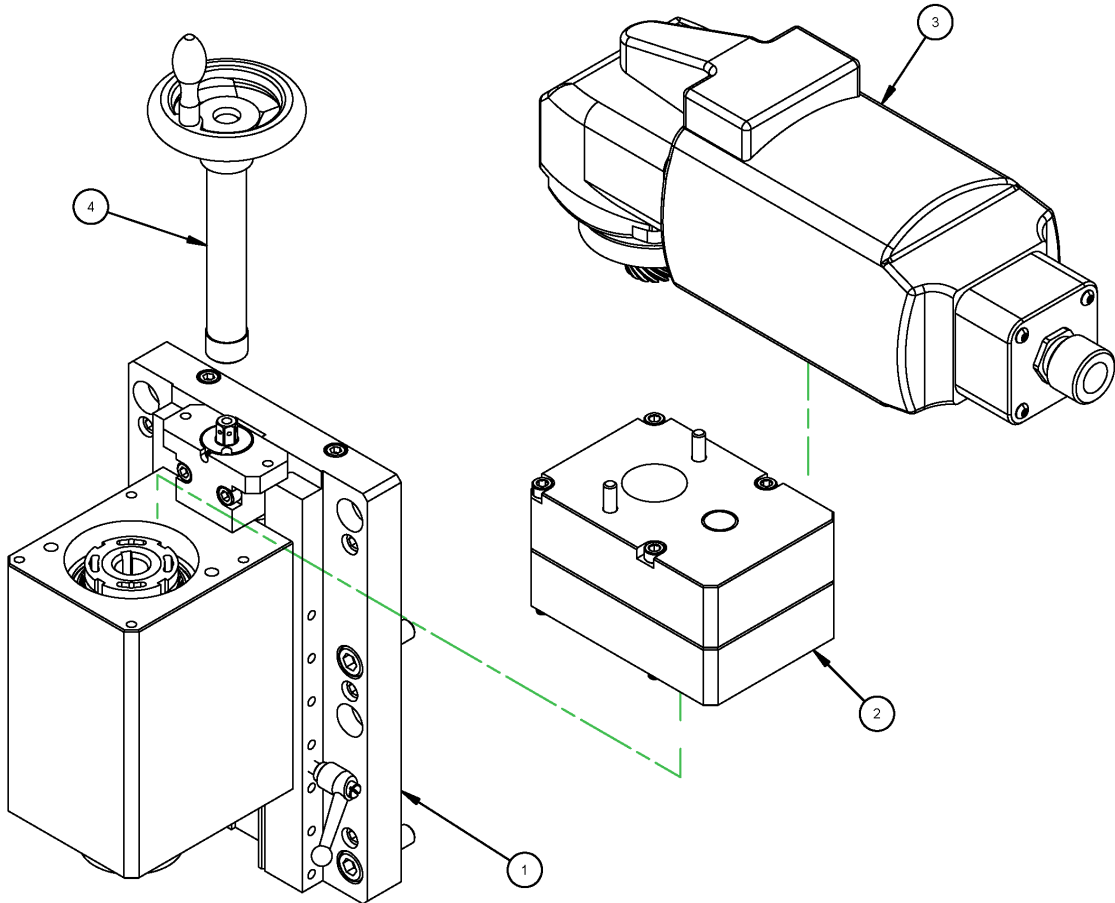
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PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	2	12849	HOSE ASSY 520N 3/8 X 3/8 NPTM X 9/16 JICF X24
2	1	14261	MOTOR HYD .79 CU IN 5/8 STRIAGHT SAE O-RING (65263)
		21025	MOTOR HYD 1.21 CU IN 5/8 STRIAGHT SAE O-RING (65094)
		20371	MOTOR HYD 1.93 CU IN 5/8 STRIAGHT SAE O-RING (65095)
		65089	MOTOR HYD 3.00 CU IN 5/8 STRIAGHT SAE O-RING (65096)
3	2	16154	FTG QUICK COUPLER 1/2B 1/2 NPTF MALE HYD
4	2	20701	HOSE ASSY 520N 3/8 X 3/8 NPTM X 9/16 JICF X24
5	2	23349	FTG REDUCER BUSHING 3/8 NPTF X 1/2 NPTm
6	2	27978	FTG DUST CAP 1/2 MALE QUICK COUPLING

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 (SHOWN) 65096



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	64655	ASSY MOTOR 120V HSK SPINDLE
4	1	64745	HANDWHEEL ASSY Z-AXIS 3" OD 3/8 HEX 4-1/2" EXTENSION

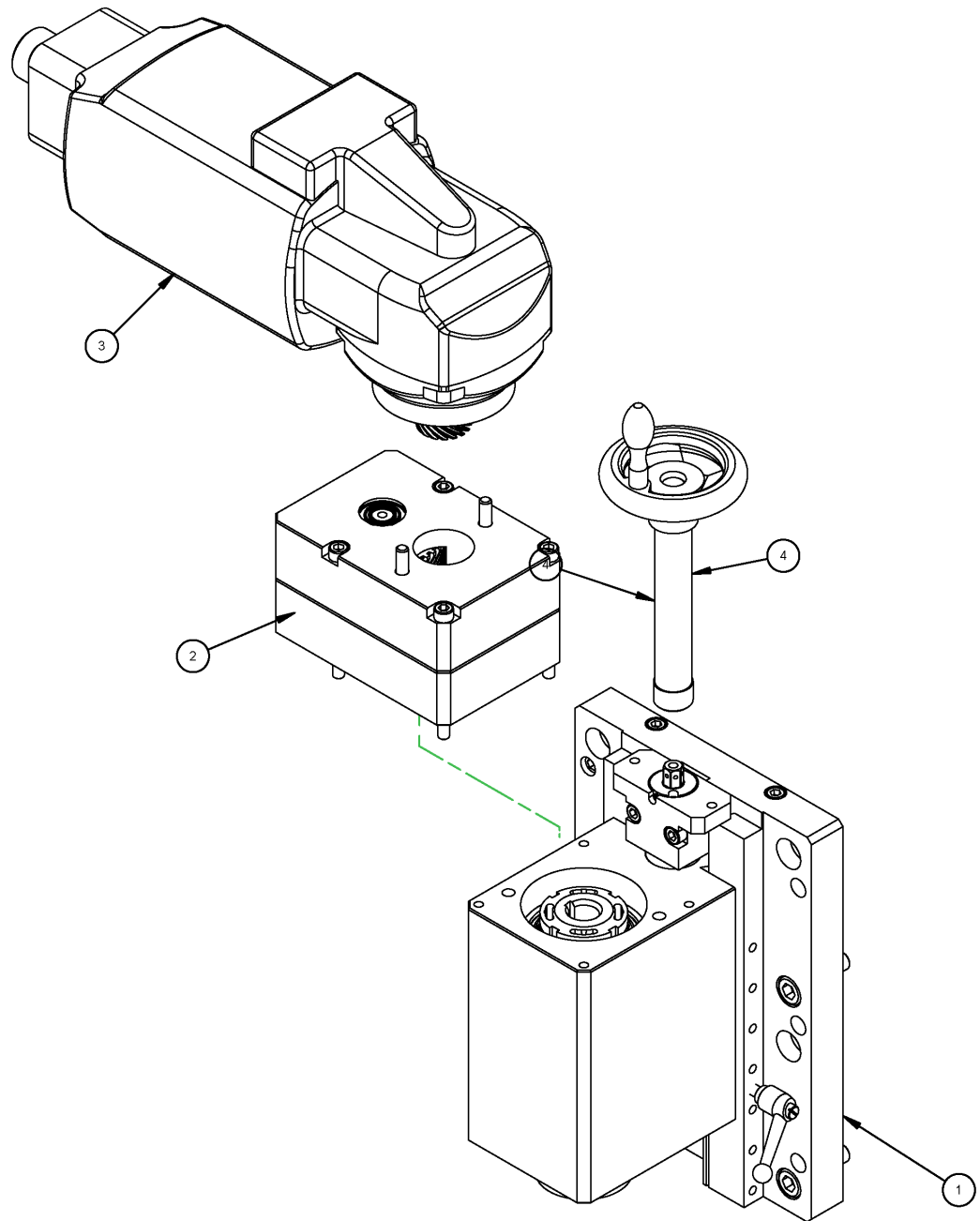
**ASSY HSK 40 MILLING HEAD 120V ELECTRIC**

64667



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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	66341	ASSY MOTOR 230V HSK SPINDLE
4	1	64745	HANDWHEEL ASSY Z-AXIS 3" OD 3/8 HEX 4-1/2" EXTENSION

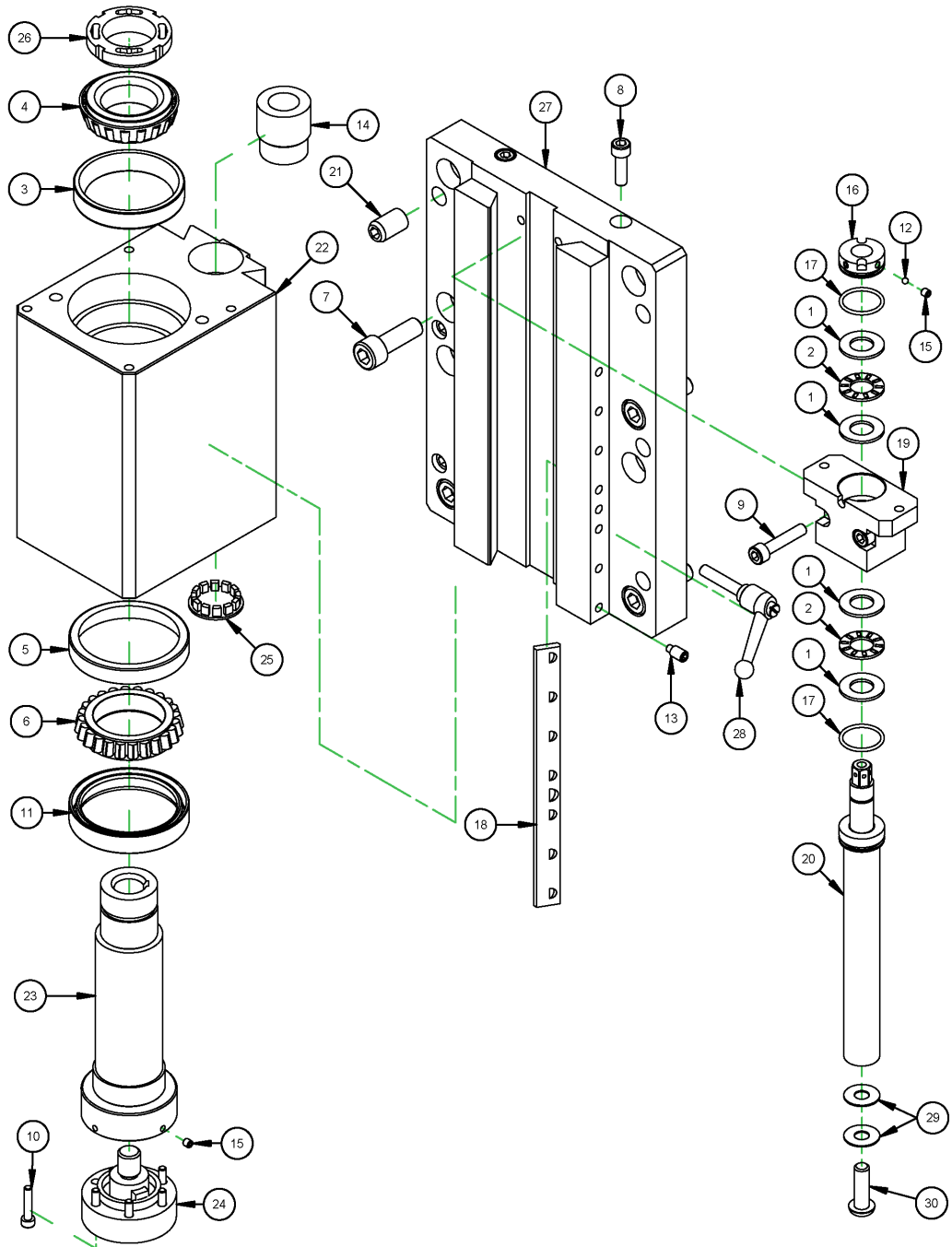
**ASSY HSK 40 MILLING HEAD 230V ELECTRIC**

66342



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ASSY SPINDLE HSK 40 4" STROKE

64643



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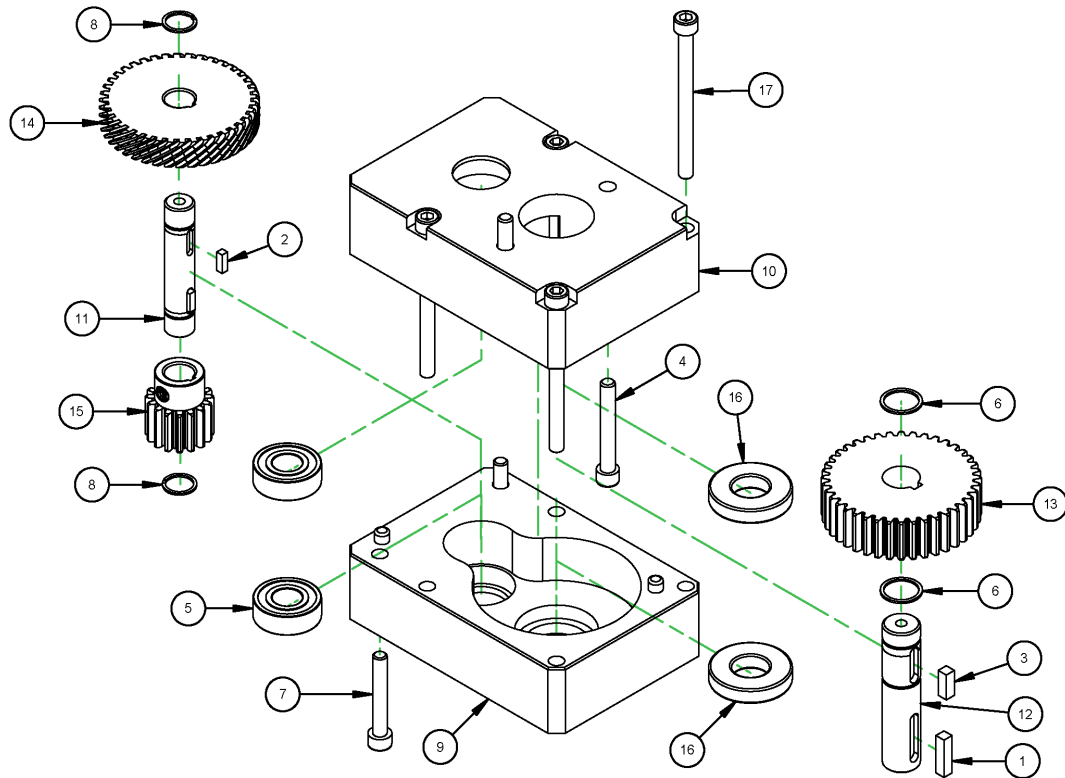
PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	4	10436	WASHER THRUST .500 ID X .937 OD X .060
2	2	10437	BRG THRUST .500 ID X .937 OD X .0781
3	1	10826	BRG CUP 2.3125 X .4219 WIDE
4	1	10827	BRG CONE 1.1875 ID X .5937 WIDE
5	1	10997	BRG CUP 2.5000 OD X .3750 WIDE
6	1	11077	BRG CONE 1.5000 ID X .4688 WIDE
7	4	18214	SCREW M10 X 1.5 X 30mm SHCS
8	4	35009	SCREW M6 X 1.0 X 20 SHCS
9	2	35505	SCREW M6 X 1.0 X 30 SHCS
10	6	38061	SCREW M4 X 0.7 X 20 SHCS
11	1	41835	SEAL 2.000 ID X 2.500 OD X .438
12	2	43489	BALL NYLON 1/8 DIA
13	7	45034	SCREW M6 X 1.0 X 12MM SSSDPPL
14	1	48526	NUT LEADSCREW ACME 3/4-10 BRONZE LH
15	6	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	57784	GIB TOOL HEAD FF LINE
19	1	57793	BEARING BLOCK LEADSCREW
20	1	57912	LEAD SCREW AXIAL FEED FF LINE
21	6	61175	SCREW M12 X 1.25 X 20mm SSSFP
22	1	64637	HOUSING SPINDLE 1.500 BRG 4" STROKE
23	1	64638	SPINDLE HSK40 4" STROKE
24	1	64639	ADAPTER SPINDLE SHORT HSK40
25	1	64641	PLUG HOLE 1" DIA NICKEL PLATED STEEL
26	1	64642	NUT LOCKING TLNKM-06 FACE LOCKING
27	1	64666	PLATE MOUNTING HSK 40 SPINDLE
28	1	64865	HANDLE ADJUSTABLE M6 X 1 X 30MM
29	2	10770	WASHER THRUST .75 OD X .312 ID X .03
30	1	10527	5/16-18 X 1 BHSCS

ASSY SPINDLE HSK 40 4" STROKE

64643



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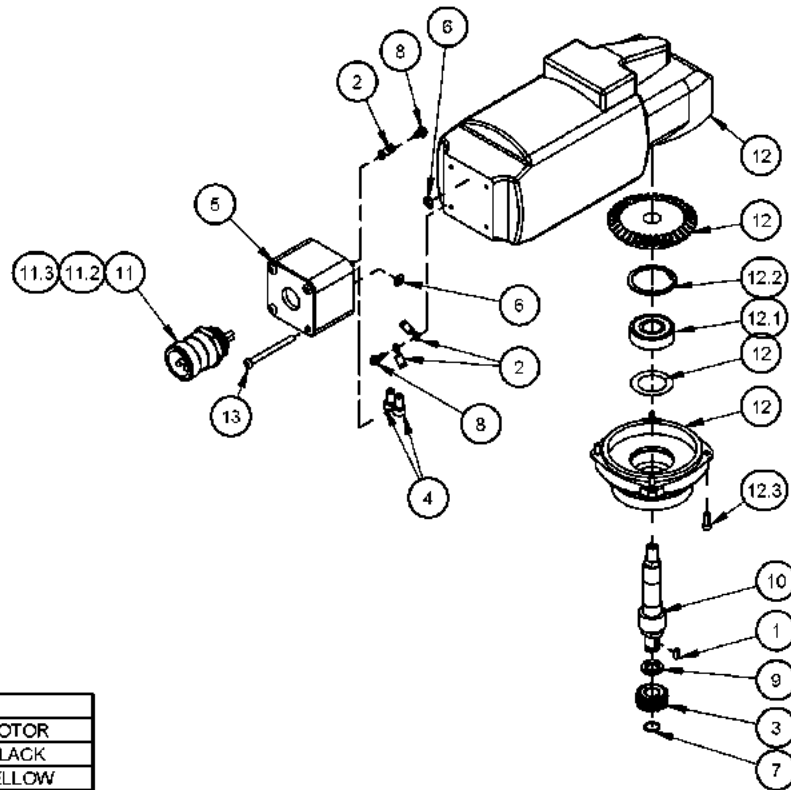
PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	1	10217	KEY 3/16 SQ X .75 SQ BOTH ENDS
2	2	12360	KEY 1/8 SQ X .37
3	1	12361	KEY 3/16 SQ X .50 SQ BOTH ENDS
4	2	13252	SCREW 1/4-20 X 1-3/4 SHCS
5	2	14956	BRG BALL .500 ID X 1.125 X .375
6	2	29181	RING SNAP 5/8 OD SPIRAL HEAVY DUTY
7	2	36125	SCREW M6 X 1.0 X 40mm SHCS
8	2	38648	RING SNAP 1/2 OD SPIRAL HEAVY DUTY
9	1	64650	HOUSING LOWER GEARBOX HSK 40 SPINDLE
10	1	64651	HOUSING UPPER GEARBOX HSK 40 SPINDLE
11	1	64652	SHAFT GEAR HSK 40 SPINDLE GEARBOX
12	1	64653	SHAFT OUTPUT HSK 40 SPINDLE GEARBOX
13	1	64654	GEAR SPUR MOD 16DP 40T 20PA .75 STEEL
14	1	64656	GEAR HELICAL 16DP 40T 14.5PA 45HA RH .5 STL H
15	1	64658	GEAR SPUR 16DP 16T 20PA .75 X 1.25LG STEEL
16	2	64659	BRG BALL .6250 ID X 1.3750 OD X .281
17	4	66850	SCREW M6 X 1.0 X 75mm SHCS

**ASSY GEARBOX HSK 40 SPINDLE**

64649



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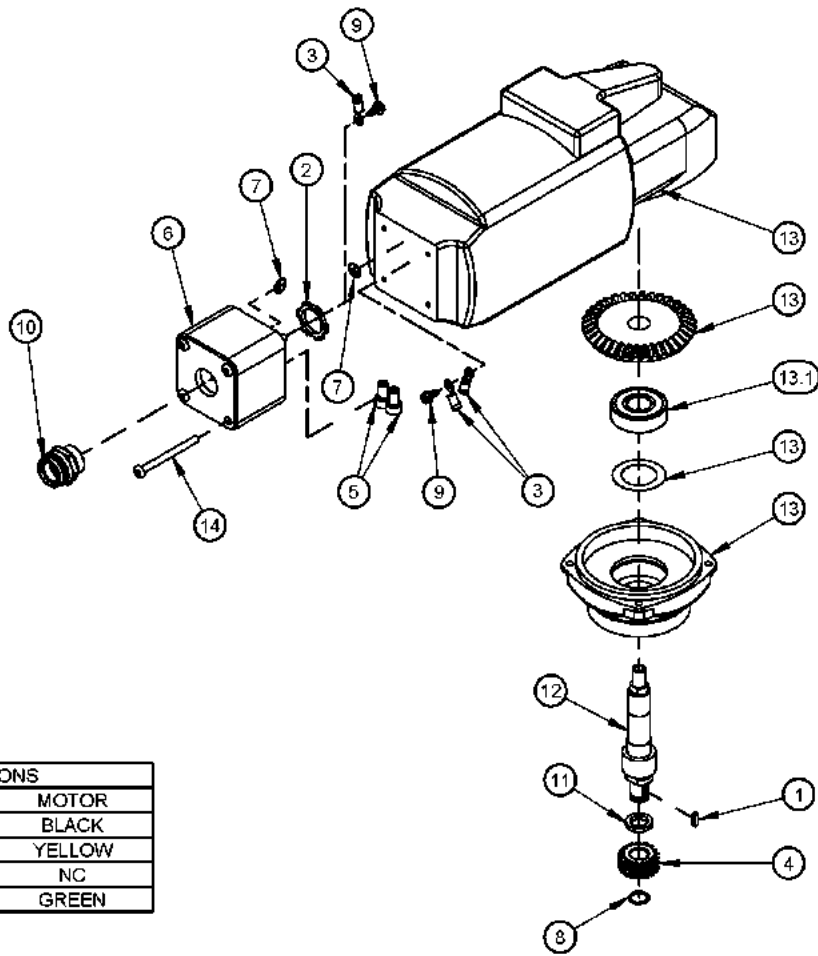


WIRE CONNECTIONS		
PIN #	CONNECTOR	MOTOR
1	BLACK	BLACK
2	WHITE	YELLOW
3	GREEN	GREEN

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	64661	WASHER SHIM .500 ID X .750 OD X .125 THICK
10	1	64664	SHAFT OUTPUT MODIFIED ELECTRIC MOTOR MILWAUKEE 6065
11	1	66560	RECEPTACLE MALE 3 POLE 25A 1.375-16UN X 1/2 NPT 1M LEADS
11.2	0	12574	CONDUIT NUT 1/2 NPT
11.3	0	24115	RING SEALING 1/2 CONDUIT
12	1	79188	MOTOR 120V 15A 5000 RPM MILWAUKEE
12.1	0	10365	(SP) BRG BALL .6693 ID X 1.5748 OD X .4724 2 SEALS
12.2	0	10521	(SP) RING SNAP 1.575 ID (40MM) .062 TH
12.3	0	11845	(SP) SCREW 8-32 x 1/2 SHCS
13	4	84293	SCREW 10-24 X 2-1/4 BHSCS SS

**77910 - ASSY MOTOR 120V HSK SPINDLE - REV A**

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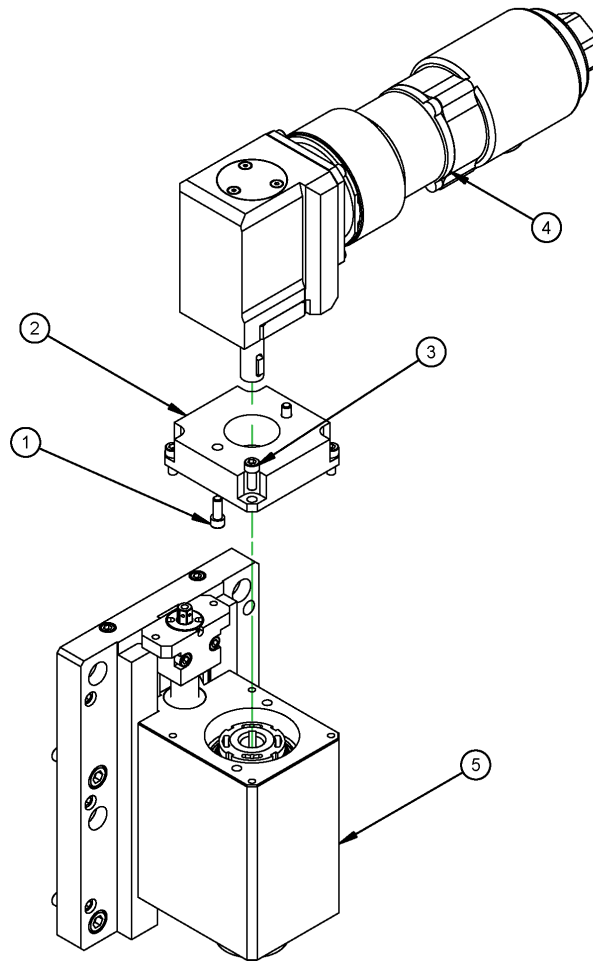
WIRE CONNECTIONS		
PIN #	CONNECTOR	MOTOR
1	BLACK	BLACK
2	WHITE	YELLOW
3	RED	NC
4	GREEN	GREEN

PARTS LIST			
ITEM	QTY	P/N.	DESCRIPTION
1	1	12380	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	63370	CONNECTOR 4-POLE 10AMP MALE 1/2NPS PANEL MT
11	1	64661	WASHER SHIM .500 ID X .750 OD X .125 THICK
12	1	64664	SHAFT OUTPUT MODIFIED ELECTRIC MOTOR MILWAUKEE 6065
13	1	79904	MOTOR REWOUND 230V 7.5A 5000 RPM MILWAUKEE 7.5A
13.1	1	10365	BRG BALL .6693 ID X 1.5748 OD X .4724 2 SEALS
14	4	84293	SCREW 10-24 X 2-1/4 BHSCS SS

**77909 - ASSY MOTOR 230V HSK SPINDLE - REV A**

FOR REFERENCE ONLY





PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	12418	SCREW 1/4-20 X 5/8 SHCS
2	1	68463	PLATE ADAPTER HSK PNEUMATIC
3	4	35014	SCREW M6 X 1.0 X 16mm SHCS
4	1	68467	ASSY MOTOR AIR HSK LM5200 PM4200
5	1	64643	ASSY SPINDLE HSK 40 4" STROKE

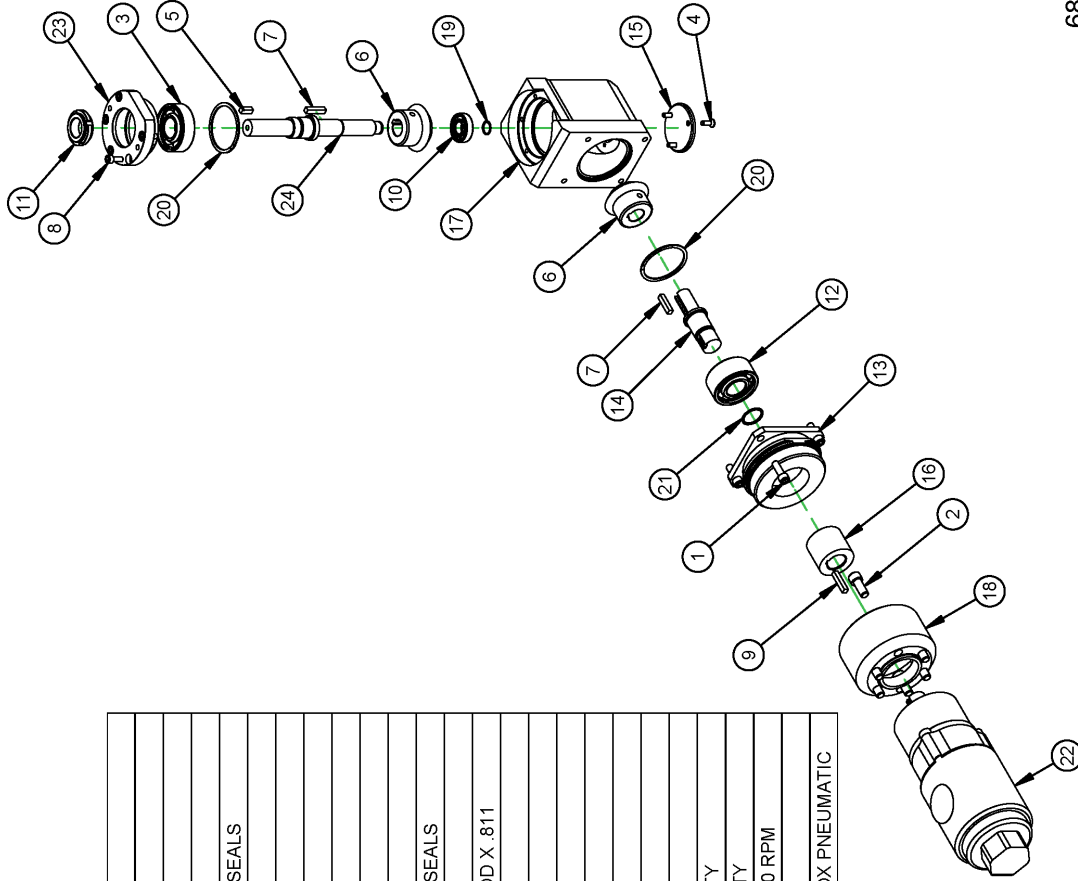
**ASSY MOTOR AIR KM4000 PM4000**

68455



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PARTS LIST		
ITEM	QTY	P/N: DESCRIPTION
1	4	10160 SCREW 1/4-20 X 3/4 SHCS
2	6	10657 SHCS 5/16-18 X 3/4
3	1	10891 BRG BALL .7874 ID X 1.8504 OD X .5512 W/SEALS
4	3	11257 SCREW 8-32 X 1/2 FHSCS
5	1	12381 KEY 3/16 SQ X .50 SQ BOTH ENDS
6	2	12484 GEAR MITER
7	2	12657 KEY 3/16 SQ X .87 SQ BOTH ENDS
8	5	12743 SCREW 10-24 X 1/2 SHCS
9	1	13080 KEY 3/16 SQ X 1.00 SQ BOTH ENDS
10	1	21077 BRG BALL .4724 ID X 1.1024 OD X .3150 W/SEALS
11	1	37981 NUT SELF LOCKING BRG ADJ SZ 4
12	1	38686 BRG ANGULAR CONTACT .7874 X 1.8504 OD X .811
13	1	38692 FLANGE AIR MOTOR ADAPTER
14	1	38693 SHAFT INPUT RIGHT ANGLE DRIVE
15	1	38694 CAP BOTTOM HOUSING
16	1	38695 COUPLING SHAFT
17	1	38697 HOUSING ELBOW PNEUMATIC MOTOR
18	1	38698 ADAPTER MOTOR
19	1	38709 RING SNAP 15/32 ID SPIRAL HEAVY DUTY
20	2	38710 RING SNAP 1.850 OD SPIRAL MEDIUM DUTY
21	1	38711 RING SNAP 25-32 OD SPIRAL MEDIUM DUTY
22	1	38715 MOTOR MODIFIED AIR KM3000 KM4000 520 RPM
23	1	38774 ADAPTOR HOUSING TOP
24	1	68464 SHAFT OUTPUT HSK 40 SPINDLE GEARBOX PNEUMATIC

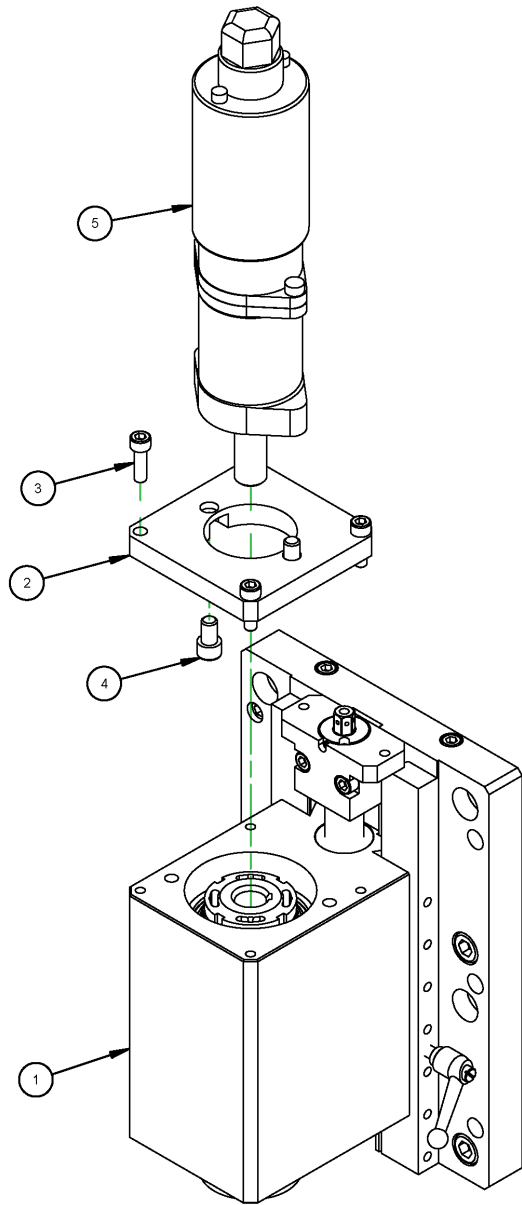


ASSY MOTOR AIR HSK LM5200 PM4200

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68467

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5	1	68589	MOTOR AIR 1.35HP 1050FS 500MAX RPM 17.2TQ
4	2	10615	SCREW 5/16-18 X 1/2 SHCS
3	4	35009	SCREW M6 X 1.0 X 20 SHCS
2	1	68583	PLATE ADAPTER HSK PNEUMATIC DIRECT DRIVE
1	1	64643	ASSY SPINDLE HSK 40 4" STROKE
ITEM	QTY	PART No.	DESCRIPTION
PARTS LIST			

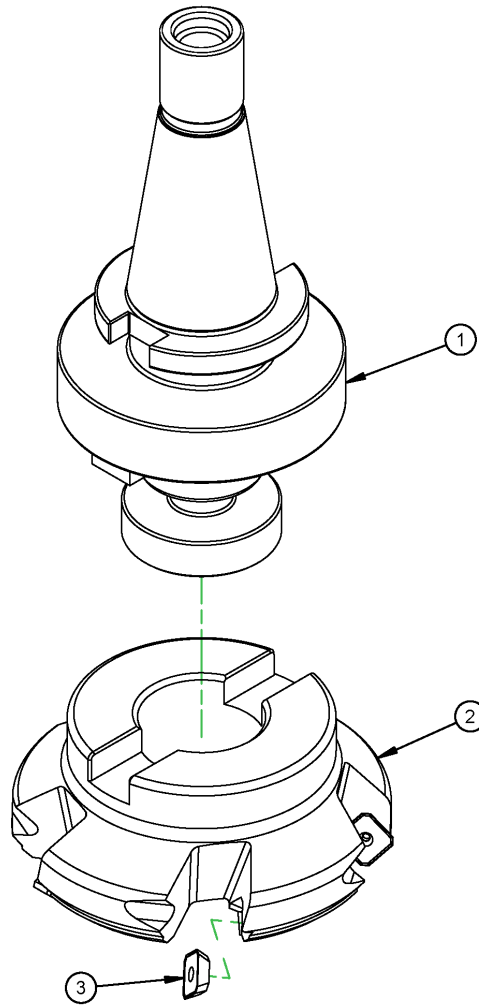
**ASSY HSK 40A MILLING HEAD PNEUMATIC DIRECT DRIVE**

68584



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AVAILABLE ASSEMBLIES	
PART No.	DESCRIPTION
47380	MILL FACE 4 DIA ASSY #40 TAPER W/ INSERTS
47381	MILL FACE 5 DIA ASSY #40 TAPER W/ INSERTS
47382	MILL FACE 6 DIA ASSY #40 TAPER W/ INSERTS

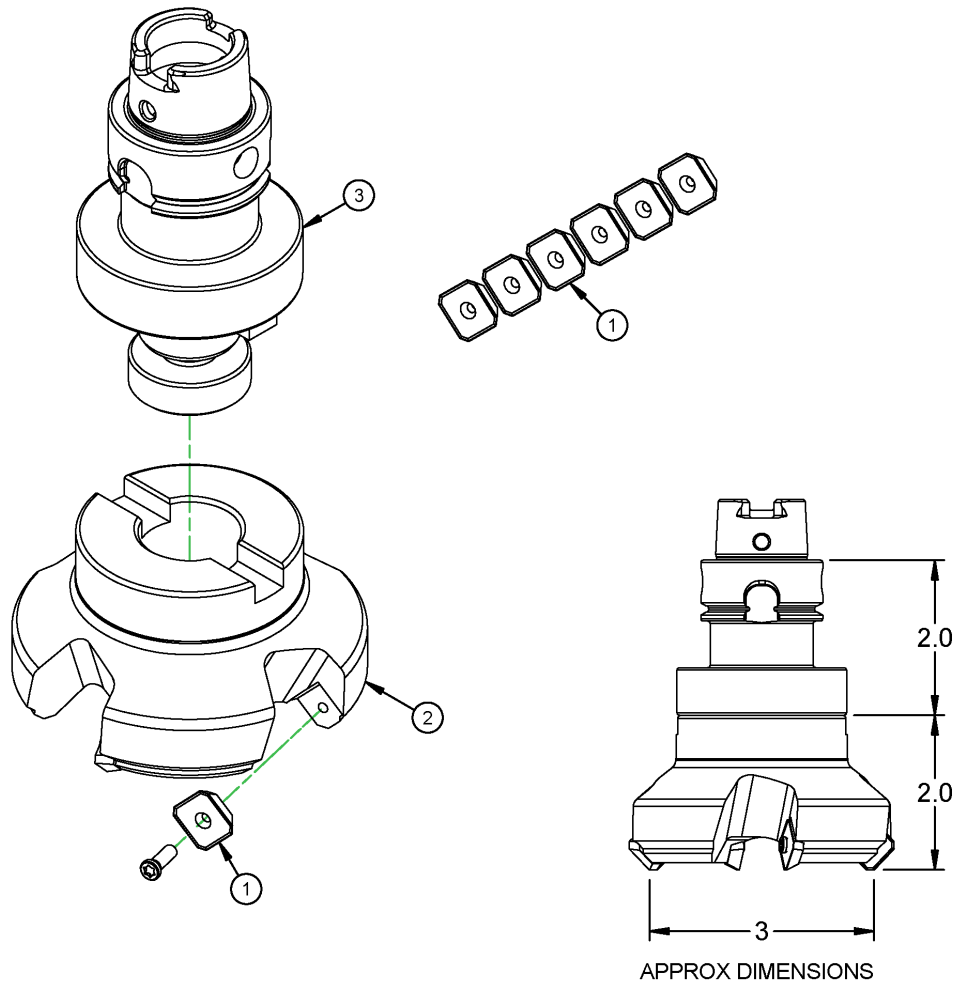
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	27010	HOLDER TOOL FACE MILL #40 TAPER NMTB 1-1/2
2	1	47223	MILL FACE 4 DIA 45 DEG POS POS MITSUBISHI (47380 ONLY)
		47224	MILL FACE 5 DIA 45 DEG POS POS MITSUBISHI (47224 ONLY)
		47226	MILL FACE 6 DIA 45 DEG POS POS MITSUBISHI (47226 ONLY)
3	5	47229	INSERT CARBIDE SQUARE .528 IC SEMT13T3AGSN-JM

CHART MILL FACE ASSY #40 TAPER W/ INSERTS

72839

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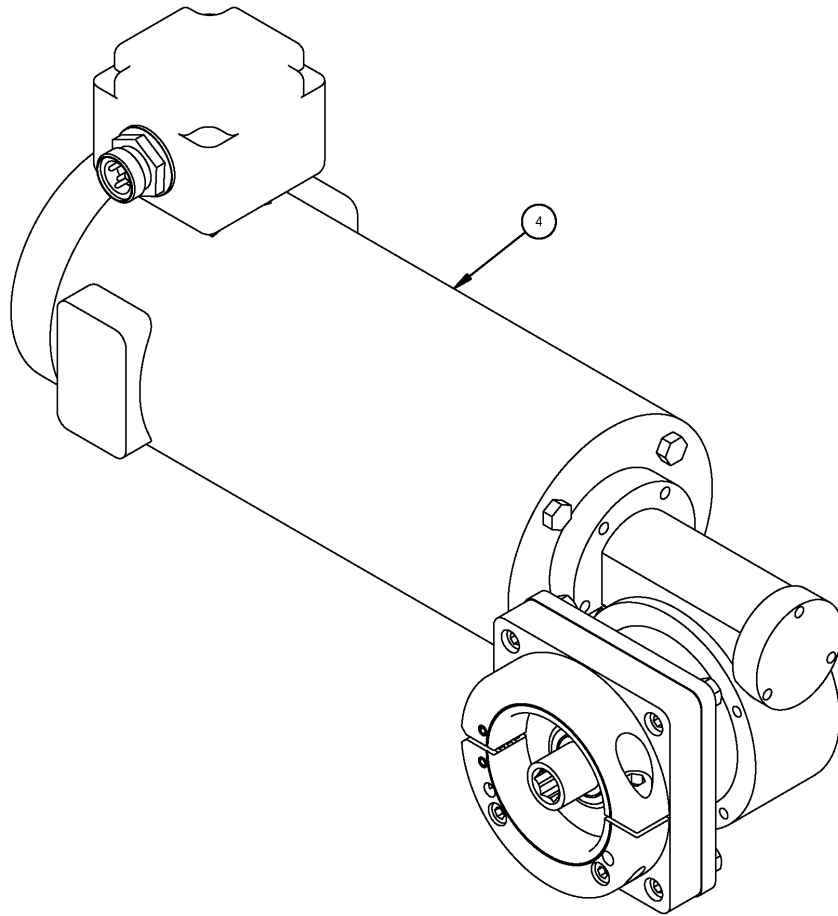
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	10	47229	INSERT CARBIDE SQUARE .528 IC SEMT13T3AGSN-JM
2	1	64981	MILL FACE 3 DIA 45 DEG POS POS MITSUBISHI
3	1	64982	HOLDER TOOL FACE MILL HSK 40A TAPER 1"

**MILL FACE 3 DIA ASSY HSK 40A TAPER W/ INSERTS**

64984



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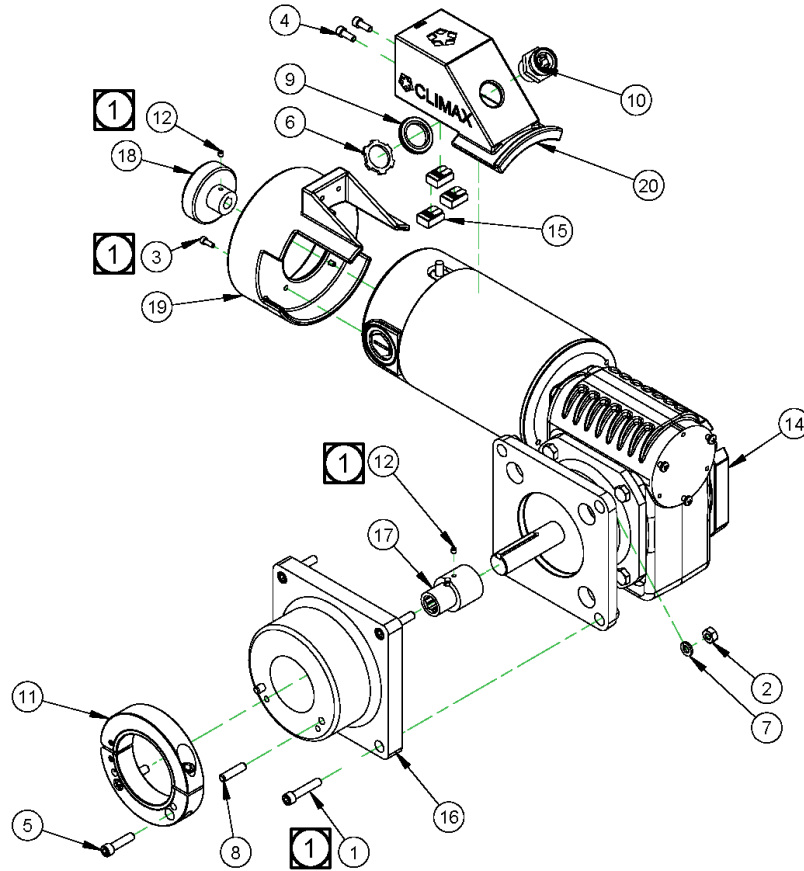


PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	1	53254	CORDSET 3 COND X 20FT 16AWG 8AMP SOOW .42 OD (USED WITH 64684)
2	1	53255	CORDSET 3 COND X 50FT 16AWG 8AMP SOOW (USED WITH 66310)
3	1	53256	CORDSET 3 COND X 100FT 16AWG 8AMP SOOW (USED WITH 66311)
4	1	66660	ASSY ELECTRIC FEED 120V 1/2 HP LM LINE

64684 ASSY ELECTRIC FEED 120V 1/2 HP W/ 20 FT CABLE LM LINE  
 66310 ASSY ELECTRIC FEED 120V 1/2 HP W/ 50 FT CABLE LM LINE  
 66311 ASSY ELECTRIC FEED 120V 1/2 HP W/ 100 FT CABLE LM LINE



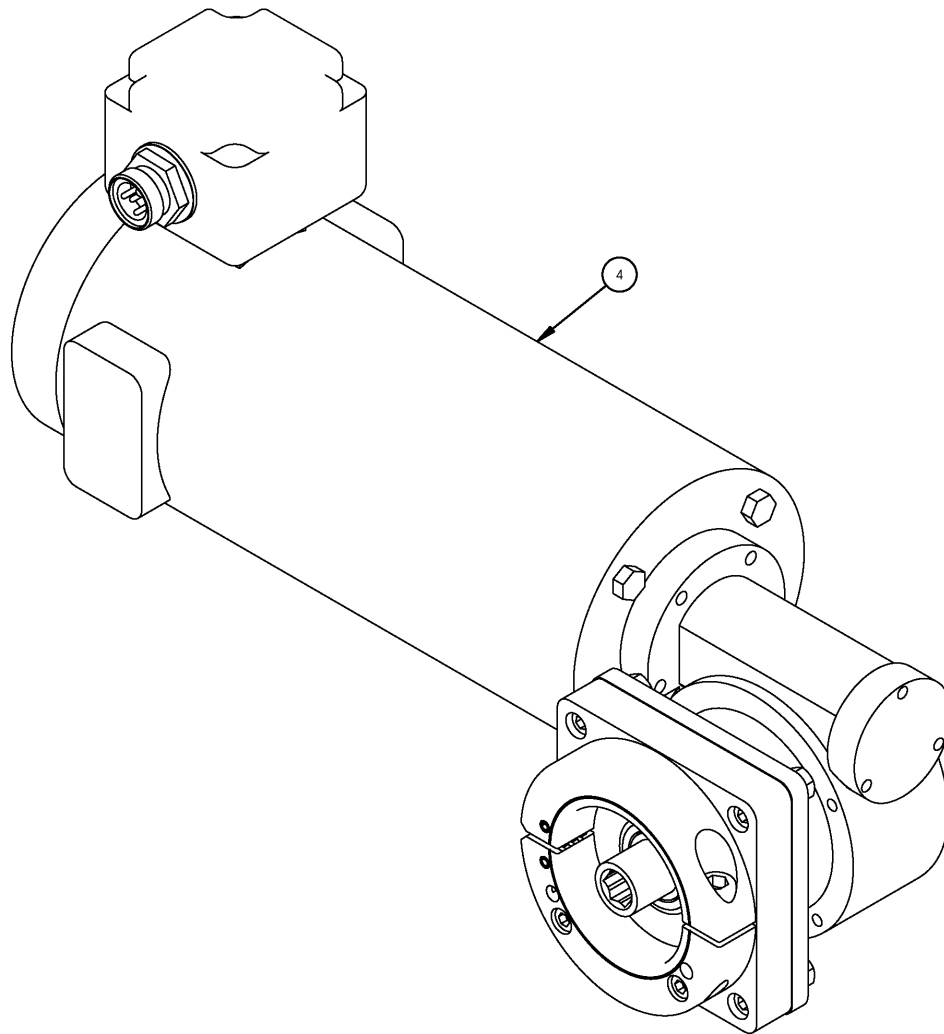
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PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	10671	SCREW 1/4-20 X 1-1/4 SHCS
2	4	10716	NUT HEX 1/4 STDN
3	4	10838	SCREW 6-32 X 3/8 SHCS
4	2	10877	SCREW 10-32 X 1/2 SHCS
5	2	11118	SCREW 1/4-20 X 1 SHCS
6	1	12574	CONDUIT NUT 1/2 NPT
7	4	12738	WASHER 1/4 LOCW
8	2	17152	PIN DOWEL 1/4 DIA X 1
9	1	24115	RING SEALING 1/2 CONDUIT
10	1	33929	CONNECTOR 3-POLE 10AMP MALE 1/2 NPT PANEL MT
11	1	46067	CLAMP COLLAR SPLIT HINGED 2-1/2 ID MOD
12	2	53365	SCREW M4 X 0.7 X 4 mm SSSFP
13	1	73776	WIRE TIE 20.5" LONG (NOT SHOWN)
14	1	92142	MOTOR GEARMOTOR 130 VDC 140 RPM OUTPUT 124 IN/LBS TORQUE 7/16 HP FLANGE MOUNT ACCESSORY SHAFT
15	3	92275	LEVER NUT TERMINAL 221 SERIES 2 POLE 28-12 AWG 450V
16	1	92943	PLATE ADAPTER MOTOR FEED LM LINE
17	1	94910	SLEEVE MOTOR FEED LM LINE 7786-S1
18	1	95303	HANDWHEEL 2 IN DIA 1/4 BORE
19	1	95305	GUARD AND COVER FEED MOTOR
20	1	95326	WIRE COVER FEED MOTOR
21	1	95403	( NOT SHOWN ) TOOL BOX W/ TRAY, GREY STRUCTURAL FOAM, 20 X 9.75 X 12.75

**92945 - ASSY ELECTRIC FEED 120V 1/2 HP LM LINE (BODINE MOTOR) - REV B**

FOR REFERENCE ONLY



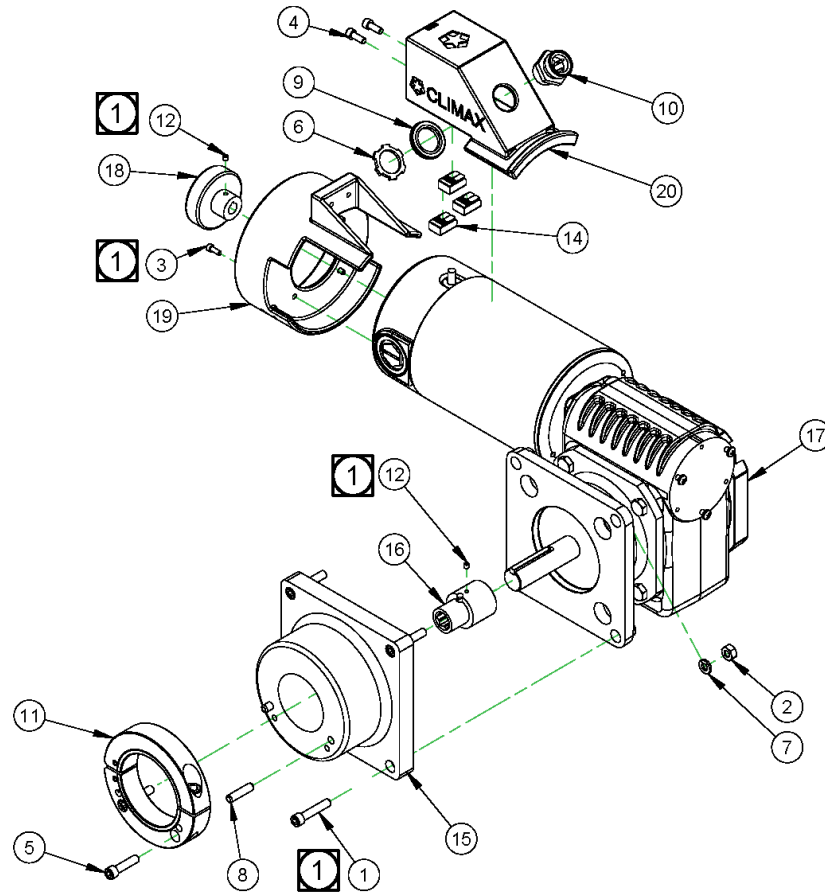
PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	1	53254	CORDSET 3 COND X 20FT 16AWG 8AMP SOOW .42 OD (USED WITH 64743)
2	1	53255	CORDSET 3 COND X 50FT 16AWG 8AMP SOOW (USED WITH 66312)
3	1	53256	CORDSET 3 COND X 100FT 16AWG 8AMP SOOW (USED WITH 66313)
4	1	66661	ASSY ELECTRIC FEED 230V 1/2 HP LM LINE

64743 ASSY ELECTRIC FEED 230V 1/2 HP W/ 20 FT CABLE LM LINE  
 66312 ASSY ELECTRIC FEED 230V 1/2 HP W/ 50 FT CABLE LM LINE  
 66313 ASSY ELECTRIC FEED 230V 1/2 HP W/ 100 FT CABLE LM LINE



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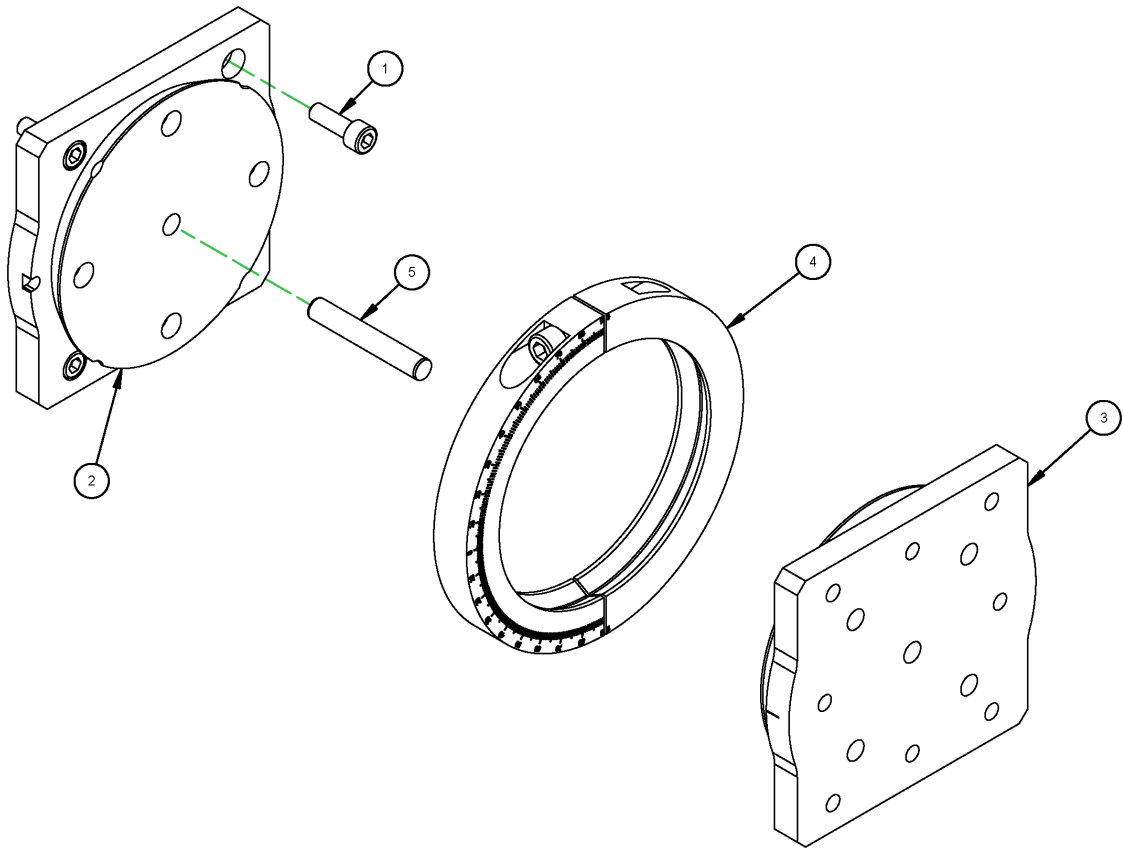




PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	10671	SCREW 1/4-20 X 1-1/4 SHCS
2	4	10716	NUT HEX 1/4 STDN
3	4	10838	SCREW 6-32 X 3/8 SHCS
4	2	10877	SCREW 10-32 X 1/2 SHCS
5	2	11118	SCREW 1/4-20 X 1 SHCS
6	1	12574	CONDUIT NUT 1/2 NPT
7	4	12738	WASHER 1/4 LOCW
8	2	17152	PIN DOWEL 1/4 DIA X 1
9	1	24115	RING SEALING 1/2 CONDUIT
10	1	33929	CONNECTOR 3-POLE 10AMP MALE 1/2 NPT PANEL MT
11	1	46067	CLAMP COLLAR SPLIT HINGED 2-1/2 ID MOD
12	2	53365	SCREW M4 X 0.7 X 4 mm SSSFP
13	1	73776	WIRE TIE 20.5" LONG (NOT SHOWN)
14	3	92275	LEVER NUT TERMINAL 221 SERIES 2 POLE 28-12 AWG 450V
15	1	92943	PLATE ADAPTER MOTOR FEED LM LINE
16	1	94910	SLEEVE MOTOR FEED LM LINE 7786-S1
17	1	95095	MOTOR GEARMOTOR 180 VDC 140 RPM OUTPUT 124 IN/LBS TORQUE 7/16 HP FLANGE MOUNT ACCESSORY SHAFT
18	1	95303	HANDWHEEL 2 IN DIA 1/4 BORE
19	1	95305	GUARD AND COVER FEED MOTOR
20	1	95326	WIRE COVER FEED MOTOR
21	1	95403	( NOT SHOWN ) TOOL BOX W/ TRAY, GREY STRUCTURAL FOAM, 20 X 9.75 X 12.75

**95349 - ASSY ELECTRIC FEED 230V 1/2 HP LM LINE (BODINE MOTOR) - REV A**

FOR REFERENCE ONLY



PARTS LIST		
ITEM	PART No.	DESCRIPTION
1	18214	SCREW M10 X 1.5 X 30mm SHCS
2	66214	PLATE SWIVEL RAM SIDE #40 TAPER
3	66215	PLATE SWIVEL MILL SIDE #40 TAPER
4	66216	RING CLAMP SWIVEL PLATE #40 TAPER
5	66223	PIN DOWEL 1/2 DIA X 3-1/4

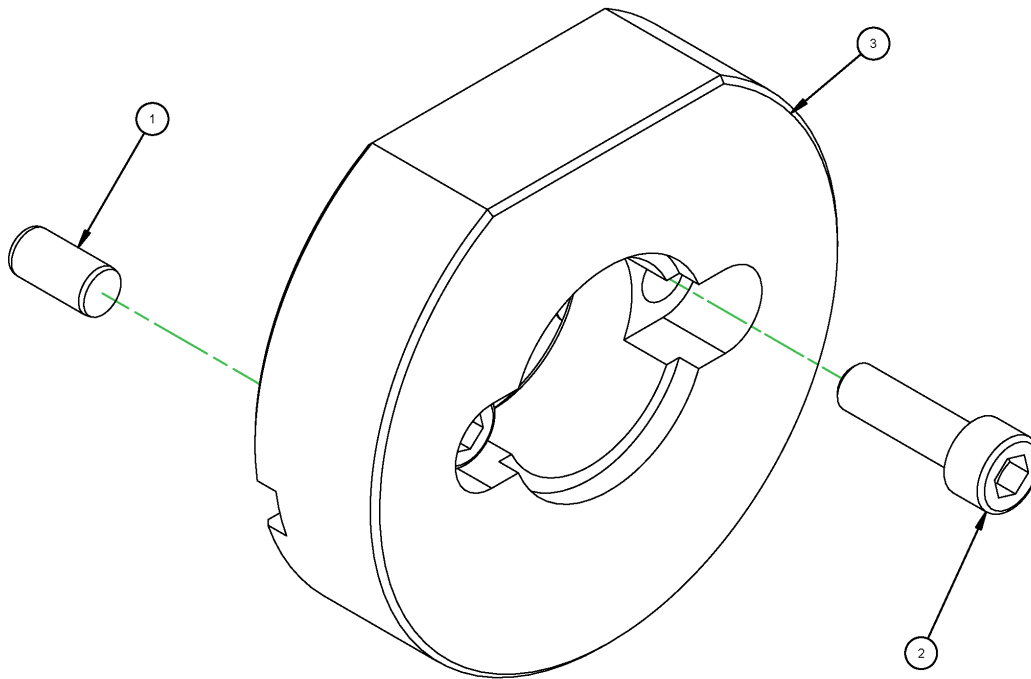
**ASSY SWIVEL MILLING HEAD #40 TAPER**

66217



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PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	2	20166	PIN DOWEL 1/4 DIA X 1/2
2	2	35009	SCREW M6 X 1.0 X 20 SHCS
3	1	64852	PLATE MOUNT Z AXIS FEED MILLING

**ASSY Z-AXIS MOUNT MILLING HEAD**

64856



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