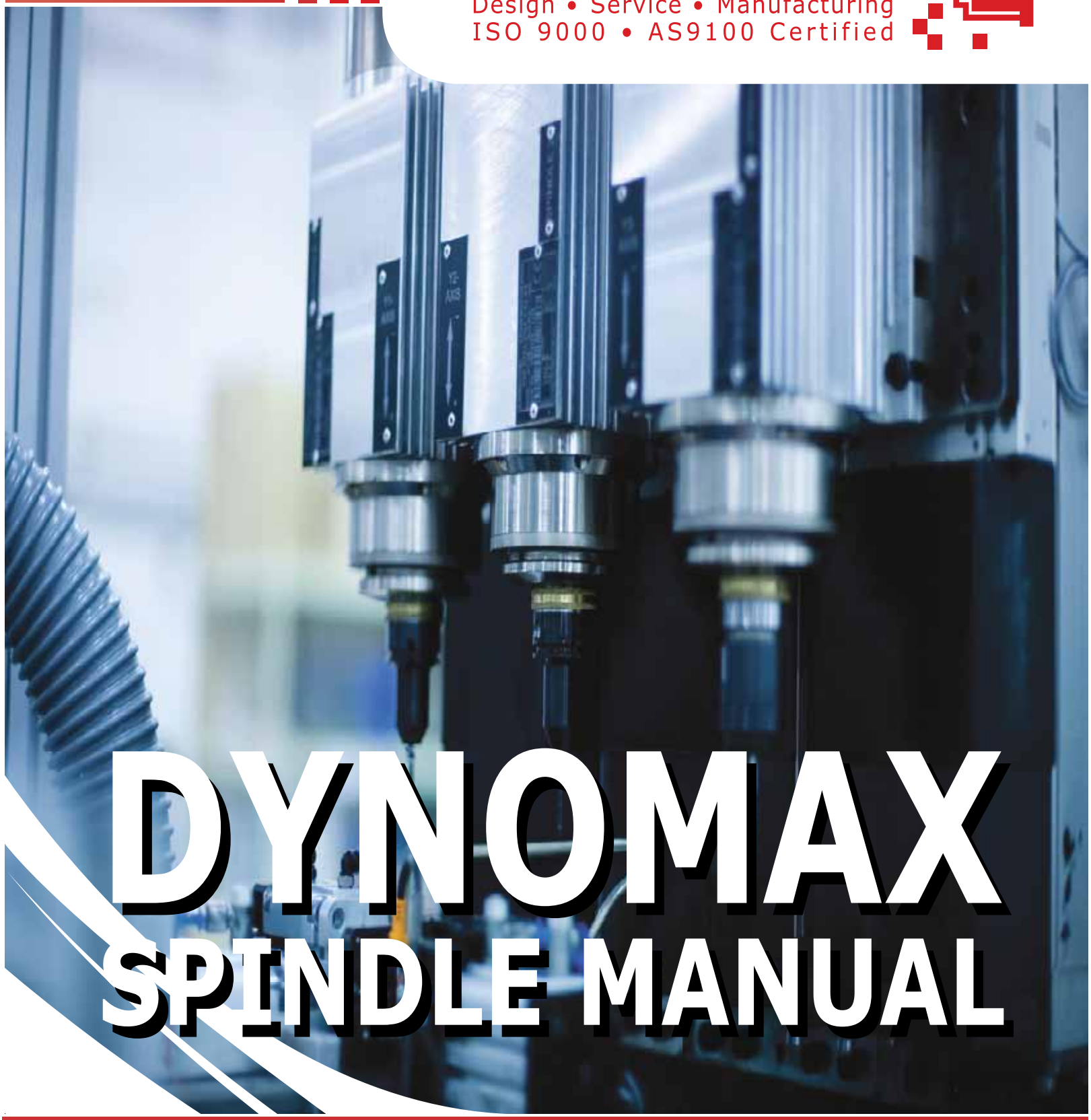
DYNOMAX

Design • Service • Manufacturing

ISO 9000 • AS9100 Certified



DYNOMAX SPINDLE MANUAL

DYNOMAX KNOWS SPINDLES

1.847.680.8833

www.dynospindles.com

PREFACE

Dynomax, Inc. designs and manufactures various types and styles of spindles for a variety of applications. As an ISO 9001:2000 certified company, Dynomax provides spindles that are high performance components manufactured to precision specifications. Dynomax employs quality inspections and checks throughout the manufacturing process to ensure the highest spindle performance when placed into service. Compliance with the recommended care and handling procedures will extend spindle life and reliability.

The purpose of this spindle care and handling manual is to guide proper handling, installation, operation and maintenance of the spindle assembly. A thorough background of the precision spindle assembly functionality and the operating parameters of its auxiliary support equipment is strongly recommended prior to putting the spindle into service. Therefore, Dynomax recommends that the precision spindle assembly be maintained and operated by well-trained and qualified personnel.

Failure to comply with the procedures and specifications contained in this document may result in personal injury, spindle failure and/or voiding of the spindle warranty.

DISCLAIMER

The products described in this publication may employ or create hazardous conditions that could, through misuse, inattention or lack of understanding, result in personal injury, damage to shop personnel, the product and/or the equipment. It is crucial, therefore, that personnel responsible for and/or involved in the handling, installation, maintenance, or use of this product read and understand the guidelines set forth in this manual.

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information contained herein does not intend to cover all details or variations of the products, nor to provide for every possible contingency in connection with handling, installation, operation, or maintenance. The conditions of specific use and application of Dynomax products and information (whether verbal, written or by way of production evaluation), including any suggested formulation and recommendations are beyond Dynomax 's control. Therefore, it is imperative that products and information is tested to determine whether guidelines are suitable for specific intended uses and applications. This application specific analysis at least must include testing to determine suitability from a technical, as well as health, safety and environmental standpoint. Dynomax, Inc has not necessarily done such testing.

Dynomax, Inc. disclaims any liability, in negligence or otherwise, incurred in connection with the use of our products and information. Dynomax makes no representation or warranty, expressed, implied or statutory with respect to, and assumes no responsibility for the accuracy, completeness, sufficiency or usefulness of the information contained herein.

All of the information contained in this manual is intended to serve as an overview guide; features may be described which are not present in or on all Dynomax products. Dynomax assumes no obligation of notice to holders of this document with respect to changes subsequently made.

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SAFETY

WHETHER DURING INSTALLATION, ASSEMBLY, USE OR MAINTENANCE, EXTREME CAUTION MUST BE TAKEN, IN ALL FACETS OF SAFETY TO INSURE BOTH THE PEOPLE INVOLVED AND THE PRODUCT ARE PROTECTED. DO NOT OPERATE THE SPINDLE ASSEMBLY AND/OR ITS COMPONENTS UNLESS YOU HAVE READ AND UNDERSTAND THIS ENTIRE DOCUMENT, IT SHOULD BE KEPT FOR FUTURE REFERENCE WITH THE MACHINE.

GENERAL SAFETY

WARNINGS All warnings and instructions on the precision spindle assembly, its components, and operating instructions should be adhered to.

CAUTION Always wear proper protective gear when lifting, transporting and/or operating machinery.

SERVICING Opening or removing covers and/or guards may expose personnel to dangerous hazards. Refer all servicing to qualified service personnel.

POWER To avoid injury, disconnect electrical power when performing ANY mainte nance or service on equipment. Trained personnel should always wait a few minutes after opening of the main disconnect before opening the door of the cabinet.

OPERATING LIMITS Do not overload the precision spindle assembly and/or its components. The spindle assembly and/or its components should be operated within their rated capacity.

ATTACHMENTS & EQUIPMENT Unauthorized changes made to the spindle may result in personal injury, & spindle failure and/or voiding of the warranty. When mounting spindle assemblies and/or its components, personnel should follow the manufacturer's instructions and, when available, should use accessories recommended and approved by the manufacturer.

HANDLING

Do not place the spindle assembly and/or its components on any unstable carts, stands, tripods, brackets, tables or surfaces as they may fall, causing serious personal injury, damage to the spindle assembly and/or its components. Should a spindle assembly and cart combination be used, avoid quick stops, excessive force, and uneven surfaces.

ENVIRONMENT

The technical and toxicological information furnished by the manufacturer of the oil that Dynomax recommends for spindle lubrication makes it possible to exclude harmful effects for man or the environment.

RULES OF USE

To assure correct functioning of the spindle, follow the instructions given below. (Please see drawings for details).

OPERATING TEMPERATURE

When using the spindles concerned, refer to the normal operating tem perature of the spindle as indicated on the final inspection report delivered with the spindle. During machining, an increase in temperature T stated on the test certificate of approx. 50°F is allowed.

AIR PURGE

In harsh working conditions products may be fitted with pressurized air sealing systems. In these cases, connect the inlet of the spindle with a filtered compressed air supply.

ELECTRICAL CONNECTIONS

To avoid injury, disconnect electrical power when performing ANY Connections mainte nance or service on equipment. There are high voltage parts on the frequency converters that power the motorized spindles. Some of these are powered with direct current up to 800V and there are capacitors that discharge slowly after they have been switched off. Therefore, trained personnel should always wait a few minutes after opening of the main disconnect before opening the door of the cabinet.

The motorized spindle must be powered and used according to rating data. (Please see drawings for details). If a frequency converter is used to power the spindle, it must be selected according to nominal current, voltage and frequency of the spindle.

AUTOMATIC TOOL CHANGE: PNEUMATIC

When operating a spindle with automatic tool change, one of two systems will be required. In the case of a pneumatic or air actuated drawbar system special considerations must be taken. Always consult the included drawbar system manual for the latest and complete safety and operational instructions. No spindle rotation should take place without a clamped tool. Only tools in good condition and of good repair should be used with the supplied drawbar system. Please remember the drawbar system is under pressure and handle accordingly. In the event of suspected drawbar error or drawbar failure, please contact your Dynomax representative immediately to initiate a repair action.

AUTOMATIC TOOL CHANGE: HYDRAULIC

When a hydraulic drawbar is required, special considerations must be taken. Always consult the included drawbar system manual for the latest and complete safety and operational instructions. Wear proper personal protective equipment when operating hydraulic equipment. Be sure to keep hands and feet clear of cylinder during operation. Never exceed the specified equipment ratings. Never set a relief valve to a setting higher than the maximum rated pressure of the lowest rated component in the system. Avoid sharp turns or kinks in the hydraulic hoses. Be sure to keep hydraulic equipment away from intense heat and flame (65° C or 150° F). In the event of suspected drawbar error or drawbar failure, please contact your Dynomax representative immediately to initiate a repair action.

SPINDLE COOLING: LIQUID SOLUTION

When a liquid based, closed loop spindle cooling system is required, special safety considerations must be taken. Always consult the included chiller manual for the latest and complete safety and operational instructions. Ensure unit is wired and plumbed according to original manufacturer's specifications. Always place the chiller on a flat, level, hard surface. Fill the chiller with the proper cooling fluid and the proper amount. Do not allow the pump to run dry as this will cause damage to the unit. Always keep the chillers main power-disconnect ON even when the chiller is not in use. Dynomax recommends the use of an industrial water/glycol mix to inhibit contamination and prevent freezing. For additional information on chiller installation, operation, maintenance, repair, coolant selection etc. please contact your Dynomax representative.

SPINDLE COOLING: AIR VORTEX SOLUTION

When an air based spindle cooling system is required, special safety considerations must be taken. Always consult the included vortex tube manual for the latest and complete safety and operational instructions. Ensure all compressed air lines are sized properly and avoid using restrictive fittings to prevent pressure drops that could affect cooling and safety. Always use care when handling units under pressurization. In the event of loss of cooling flow, suspected vortex failure, or any other issues or concerns, please contact your Dynomax representative immediately.

ATTACHMENTS & EQUIPMENT

The appliances must be fixed and permanently connected to the system or using a plug/socket for industrial purposes. (Please see drawings for details). The equipment must be connected to the system in one of the following ways:

- High reliability protection conductor (with generously over scaled cross sections or with multiple cables). Monitoring of power conductor continuity (using devices that cut off the power to the converter in the case of interruption of the protection conductor).
- Use of transformers. If the installation is to comply with regulations, a number of simple precautions must be taken when laying the cables.
- The power connection between the converter and the motor must consist of a shielded twisted cable with the shield connected to ground at one end and its path must be as short and straight as possible avoiding interruptions at terminal strips or remote disconnects.
- All signal connections must be made with shielded cables. For proper operation, no ground loops are allowed.
- Keep the power cables separate from signal cables. Use separate trays if needed.
- When connecting the converter, check that the direction of rotation of the spindle matches that indicated on the print. If the direction of rotation is reversed, stop the spindle and invert the position of the two power phases on the converter terminal strip.

COOLANT

The spindle assembly and/or its components are designed to function in moderate coolant applications, unless otherwise specified.

TOOLS & TOOL HOLDERS

The tools used must be balanced. Tighten the tools as short as possible. Check that the tool holders and relative quills are certified both as regards

dimensions and type of material.

CHUCK TOOLS HANG-OVER

Remember that excessive over hang can cause harmful vibrations with negative repercussions on machining precision and safe guarding of the motorized spindle.

INTERLOCKS

Do not by-pass or disable any protective interlocks as it may result in personal injury, spindle failure and/or voiding of the warranty.

OPERATING LIMITS

Do not overload the precision spindle assembly and/or its components. The spindle assembly and/or its components should be operated within their rated capacity. The maximum speed of rotation of the spindle must be within the limits defined by the tool manufacturer. Also, the guard must always be present during functioning of the motorized spindle.

DAMAGE REQUIRING SERVICE

Disconnect all power and refer servicing to qualified service personnel if the Requiring spindle assembly and/or its components:

- Do not operate normally after following the operating instructions.
- Have been dropped or the shipping crate has been damaged.
- Have been wrecked.
- Exhibit a rapid change in performance, operating temperature or vibration level.
- Lock-up and do not rotate.

UNPACKING INFORMATION

Dynomax, Inc. ships each precision spindle assembly in a highly stable shipping container to prevent damage to the spindle assembly during shipment. Stringent standards for quality control are maintained even through the shipping process. High-strength shipping cartons (usually custom-build wooden crates) are used for added protection during the shipping process.

ARRIVAL

Upon receiving the crate:

- Inspect the exterior of the shipping crate for damage.
- Report any damage to Dynomax immediately.
- Document damages with photographs.

CONTENTS

As you carefully uncrate the spindle assembly, check to see the following items are included:

- The precision spindle.
- Documentation: A Dynomax Spindle Manual (this document).

BEFORE REMOVING

Prior to removing the spindle assembly from the shipping crate:

- Visually inspect the spindle assembly for any damage that may have occurred during shipment. If damage to the spindle is evident, immediately notify Dynomax, Inc.
- Make sure, where applicable, the spindle assemblies eyebolts, swivel type hoist rings, or lifting bars are fastened securely and match the outline/assembly drawing.
- To ensure the spindle is not damaged, pad all sharp edges to the spindle assembly that might come into contact with the lifting straps.
- Refer to the spindle drawing for the proper method of lifting the spindle assembly, if applicable verify the rated lifting capacity of the hoisting equipment is greater than the weight of the spindle.
- Note: The spindle weight can be found on the outline drawing or on the shipping container.
- Check the hoisting equipment to be sure it is in good working condition.

REMOVING SPINDLE

Removing spindle from shipping crate:
Improper lifting of a spindle assembly can result in personal injury, damage to the spindle and/or the equipment.

- Never lift or transport spindle assembly by any of its rotating components.
- When moving make sure the spindle is properly supported and balanced.
- Do not carry loads overhead unless absolutely necessary!
- Do not place the spindle assembly and/or its components on any unstable carts, stands, tripods, brackets, tables or surfaces as they may fall, causing serious personal injury, damage to the spindle assembly and/or its components.
- A spindle assembly and cart combination should be used with care avoiding quick stops, excessive force, and uneven surfaces.

FINAL STEPS

Once the spindle is removed:

- Dynomax recommends storing the original custom crate should the spindle need to be transported in the future.
- Store this document for future reference next to or near the spindle.

MOUNTING GUIDELINES

CAUTIONS

The spindle assembly must not be bumped or dropped to avoid damage. The precision spindle assembly is to be carefully mounted onto the machine using chains or lifting straps and hoisting equipment having adequate lifting capacity.

INSTALLATION

Installation of the precision spindle assembly onto the machine must be handled with extreme care.

- Never force a spindle into position. A running or sliding fit is recommended.
- Never force a cartridge spindle into a housing.
- When using power-lifting devices, care should be taken not to bind the spindle.

ASSEMBLY

Tighten the spindle in the spindle-holder body on the machine without drawing up the supports too tightly. Apply a film of Loctite to the threads to guarantee blocking the screws.

CONDITIONS

For optimum spindle performance, the mounting surface to which the spindle assembly is to mount must be to the highest quality, including:

- Cleanliness.
- Strength.
- Flatness.
- Surface finish.
- Vibration damping.

Secure the precision spindle assembly to the mounting surface using the appropriate mounting hole locations, bolt sizes (bolts are not supplied by Dynomax) and standard torque values.

MOUNTING BOLTS

Refer to the spindle drawing for the mounting hole locations, size and application specification. ***Do not over-tighten the mounting bolts.*** Over tightening of the mounting bolts will distort the spindle housing resulting in immediate spindle failure and voiding of the spindle warranty.

CONNECTIONS

After mounting is complete, any pneumatic, hydraulic, coolant, or electrical

connections to the spindle should be completed, if required. Refer to the spindle outline/assembly drawing for the required spindle services and the related specifications.

MOUNTING ACCESSORIES

Rotating coolant unions are typically mounted on the rear of the precision spindle assembly to provide coolant through the spindle shaft.

Use the following procedures for installation of the rotating coolant union as a guide. Superseded by rotating coolant union manufacturer's installation instructions.

- Improper use may result in premature leakage or failure of the coolant union.
- Periodically inspect the coolant union for wear and tear, as the seal wears out, the coolant union must be replaced or repaired to avoid the consequence of leakage.
- Keep vent holes clear and non-restricted.
- Should a drain line be required to redirect leakage, contact Dynomax or the manufacturer of the coolant union.
- Secure the rotating coolant union to the spindle shaft by:
  - Insert the male threads of the coolant union into the rear of the spindle shaft.
  - Using the proper tools on the rotor hex, tighten the rotor threads until the male pilot on the rotor seats on the diameter and the face of the spindle shaft. Verify thread form using outline drawing as reference.
- No exterior bracing should be used to prevent the housing of the rotating coolant union from rotating.
- Use only flexible connections. Do not pipe solid.
- Do not install hose taut.
- Avoid operation of coolant union at maximum rated pressure with maximum rated speed. If operating conditions are marginal consult with Dynomax or the coolant manufacturer.
- Rotating coolant unions that are equipped with grease fittings or oil cups require periodic lubrication. Contact the coolant union manufacturer for a lubrication guide.
- Do not run dry.

INITIAL USE

ROTATION

Check direction of rotation at low rpm.

COMPLIANCE

Do not exceed maximum speed. Check that the tools used and their clamping system comply with standards and are compatible with the maximum rotation speed of the spindle.

SUPPLY HOLES

Check that the air, oil, coolant, etc. supply holes are cleaned and not clogged by any type of material. Check that the lubrication outlets (for oil-lubricated spindles) and all the drainage holes are not obstructed.

ADJUSTMENTS

Correct connection of the lubrication unit (if any) and correct setting of the lubrication parameters.

a) Single Lubrication Line:

- Amount of oil supplied to the lubrication unit at each shot: 34 mm3 = 30mg. This value depends on the type of lubrication unit used.
- When using lubrication units other than Dynomax, refer to the user manual of the related lubrication unit to check the amount of oil supplied by the lubrication unit at each shot.
- 1800 mg/h : 30 mg/shot = 60 shots/h
- 1 h = 3600 sec.
- 3600 sec : 60 shots/h = 60sec = time between one shot and the next.

b) Multi Lubrication Lines:

- In this case, the time calculated in point a) must be multiplied by the number of infeeds. Where possible use a fairly long supply pipe to facilitate air-oil mixing.
- The length of the pipes must never be less than 1 meter.
- Power supply and supply of the flow air to the lubrication unit must be guaranteed concurrently to avoid emptying the lubrication pipes.
- The pressure of the air/oil mix measured at the entrance to the spindle must be 0.5% 14.50377 Psi and filtered at 10µm.

c) Correct connection of all hydraulic, electrical, pneumatic connections according to the schematic accompanying the high frequency spindle.

d) Correct positioning of the spindle in its support.

e) Make all connections and drive system adjustments according to the machine documentation.

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BALANCING A vibration of more than 1.2 mm/s for grinding and 5mm/s for chip machining is considered to be harmful for tool mounted spindles

AIR PURGE If the products are equipped with forced sealing air systems, connect the inlet of the motorized spindle (spindle) with a filtered compressed air supply at a pressure of 1 ± 0, 14.50377 Psi.

DOCUMENTATION Make sure all parts of the machine documentation and the machine manufacturer's commissioning protocol are present. Contact the machine manufacturer if operating data or machine documentation is incomplete.

PROGRAMMING Carry out complete commissioning and programming of drive systems and external systems.

POWER Power up all external systems to normal operation according to the machine documentation.

RUN IN When the spindle is used following a long period of storage or machine down time (over 3 months), which may have modified internal distribution of the grease, the spindle must be run in again. See run-in directions on page 15-16.

GREASE LUBRICATED PRODUCTS The spindle must be used in the lubrication conditions for which it has been designed and constructed. Never use oil in products designed for grease lubrication. Refer to the final inspection report for your specific grease type.

Be sure to record the temperature of the spindle during the start-up phase until it has reached steady state speed and store for future reference. This number is needed to determine if the spindle needs to be run-in in the future. See Run-In Procedure, page 13-14 for process details.

OIL LUBRICATED PRODUCTS Be sure to record the temperature of the spindle during the start-up phase until it has reached steady state speed and store for future reference. This number is needed to determine if the spindle needs to be run-in in the future. See Run-In Procedure, page 13-14 for process details.

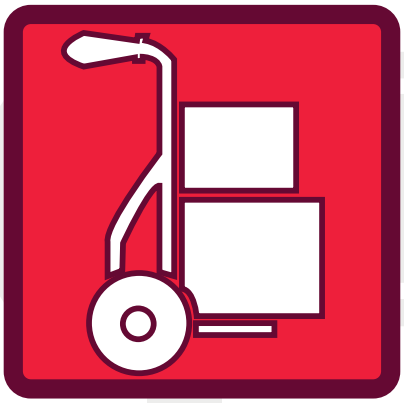
MOVING INFORMATION

Dynomax, Inc. recommends shipping the spindle in its original custom crate with proper precaution taken so damage does not occur during shipment. The original foam casing and crate serve as perfect shipping containers.

Should a new shipping container need to be created, attention needs to be paid to the packaging and crating. The spindle should be securely held within a protective crate in order to prevent damage from the shipping process.

Transporting Below are the guidelines for transporting Dynomax ‘s spindles:

- The spindle assembly must be completely enclosed within the container.
- The container must properly support the weight of the spindle assembly.
- The container must withstand the transporting process.
- Shipper retains liability and ownership of the spindle until it arrives at Dynomax.
- All service ports must be plugged when disconnected to prevent contamination.
- Improper lifting of a spindle assembly can result in personal injury, damage to the spindle and/or the equipment.
- Never lift or transport spindle assembly by any of its rotating components.



RUN-IN PROCEDURE

Although each spindle is run-in at Dynomax prior to shipment, it must further be run-in by the customer prior to being placed in operation. This will ensure proper channeling of the bearing lubrication to prevent excessive bearing temperatures, which could result in immediate bearing failure.

After extended periods of transportation, storage or no-operation, motorized spindles with permanent grease lubrication require a sequence of run-in measures. A run-in period is always required when the bearings are replaced.

Note: If motors are stored for a long time (i.e. spare motors) it is recommended to frequently carry out the run-in sequence in order to maintain the motor operating ability.

DETERMINING WHEN RUN-IN'S ARE NECESSARY

Long storage periods or machine down time may modify internal distribution of the grease, qualified personal should check whether the spindle must be run in again. Refer to recorded temperature of the spindle during the start-up phase, if this temperature does not exceed that indicated on the product test certificate by 50° F, there is no need to repeat the running in process. Start running in at low rpm and then increase the speed only once the temperature has stabilized.

PRIOR CHECKS

Prior to spindle start-up and run-in, a check of any auxiliary systems for proper flows, pressures, and temperatures must occur. All of the information, when required, is defined by Dynomax outline drawing and described in this section.

RUN-IN PROCESS

Should a run-in be required, start running in at a low number of revs. Initially, the temperature will rise and then drop and stabilize at a certain value. Only at this point can the speed of the spindle be increased. Please adhere to the following instructions on the next page.

RUN-IN PROCEDURE

1. Start the heat exchanger, when required, and run coolant through out the motor coolant passages (and bearing passages, if required) until the temperture stabilizes. See pages Dynomax's spindle drawing for bearing and motor cooling operating cautions and parameters if applicable.

2. Verify that all required auxiliary systems are operating properly.

   Air/oil lubrication must be started a minimum of 15 minutes prior to starting the spindle assembly and must remain on for a minimum of 5 minutes after the spindle has stopped and the coolant has stopped flowing.

3. Run the spindle at 25% of the rated speed (as shown on the nameplate) for approximately ½ hour.

   Monitor the temperature of the front and rear bearings. This can be done by taking temperature reading with a pyrometer at various locations around the front and rear housing. If the temperature does not reach 130 degrees F move to the next step.

4. If the bearing temperature reaches 130 degrees F or higher at any time during the run-in procedure, or the temperature increases more than 5 degrees F in (1) minute, immediately shut the spindle off and allow it to cool to room temperature. Once at room temperature, re-start the run-in procedure at the step at which it was shut down.

5. Increase the operating speed of the spindle to 50% of the rated speed for approximately ½ hour and repeat the temperature check.

6. Increase the operating speed of the spindle to 75% of the rated speed for approximately ½ hour and repeat the temperature check.

7. Increase the operating speed of the spindle to the full rated speed for approximately ½ hour and repeat the temperature check.

8. Run-In Complete

MAINTENANCE

DANGEROUS MOVEMENTS! DANGER TO LIFE AND RISK OF INJURY OR EQUIPMENT DAMAGE BY MACHINE MOVEMENTS!

CAUTIONS

Stop machine operation and keep moving parts in secure position before carrying out maintenance or troubleshooting procedures.

Refer to machine documentation for instructions.

Trained and qualified personnel should carry out serious motor maintenance and repair. However, some on-site preventative measures can be performed to enhance reliability and spindle life. Dynomax Inc. is not liable for any on-site maintenance or troubleshooting actions that are carried out by users or the machine manufacturer.

Refer to the maintenance plan provided by the machine manufacturer. Record all maintenance actions in the machine protocol and keep protocol available for further records.

ACTION	INTERVAL
Clean the spindle	Daily
Clean the taper	Daily
HSK collet lubrication	Daily
Check air pressure	Weekly
Check oil levels	Weekly
Check water seperator and filters	Weekly
Check rotating union	Weekly
Check motor manually for smooth run and vibration free operation	Weekly
Check all filter for concentration	Monthly
Check coolant level	Monthly
Check hoses	Monthly
Run-In's on stored spindles	Every 3-6 months
Install new air filter (5 µm)	Every 6 months or every 2,000 hrs of operation
Install new filter for oil-water seperator	Every 6 months or every 2,000 hrs of operation
Install new filter for motor cooling circuit (100 µm)	Every 6 months or every 2,000 hrs of operation

The following operations should be carried out in order to preserve functional and safety characteristics in time.

CLEANING SPINDLE

Clean the spindle regularly with a clean cloth. In the case of spindles with automatic tool always leave a tool inserted in the taper. This reduces the risk of dirt penetrating inside the spindle and protects the taper. Do not blow compressed air on the spindle. Dirt could penetrate through the front labyrinth seal or lubricant drainage holes and damage the bearings.

CLEANING TAPER

After cleaning the machine and spindle, extract the tool holder from the taper and clean it. Check the tool holder taper for any signs of rust or marks ascribable to vibrations during machining. Replace damaged tool holders immediately. Clean the tool holder and re-insert it in the taper. Never leave the spindle without a tool inserted as dirt could penetrate into the spindle from the taper.

HSK COLLET LUBRICATION

To maintain the tool clamping force, it is good practice to spray the attachment cone with grease such as METAFLUX 7082 or METAFLUX MOLY SPRAY every 20,000 release operations or 2,000h of operations. It is advisable to replace the HSK collet every 2,000,000 release operations.

CHECK AIR PRESSURE

Check the gauges of the service unit in regards to air and oil and adjust pressure again if necessary.

CHECK OIL LEVELS

Check the level of the oil in the lubrication unit and fill to proper levels. To properly fill the lubrication unit clean the oil-filling plug, then unscrew the plug and fill to the proper level with oil. Clean the plug again and the housing of the seal before re-closing it.

CHECK WATER SEPERATOR & FILTER

Check whether the separators have collected water and empty them if necessary. Check the filters, if necessary replace them.

CHECK ROTATING UNION

Visually check area to insure coolant is not leaking. Replace per manu facturers recommendations.

CHECK MOTOR MANUALLY

Listen for excessive motor or bearing nose, note any smells, specifically check for a heavy, burnt metal smell that signals an overheating/short of

	the motor. Look carefully for belt fraying, misalignment or excessive wear where applicable.
CHECK FILTERS	Check for contamination. Depending on the type of filter, empty and clean condensation vial; replace or wash particle filter.
CHECK COOLANT LEVELS	Check the level of the coolant in the tank and fill to proper level if necessary.
CHECK HOSES	Check hoses and cables. Check the hoses for their entire length; they must not be crushed at any point. Make sure that the coolant, oil and air reach the spindle without any obstacles.
RUN-IN STORED SPINDLES	Refer to Run-In Procedure detailed on pages 15 & 16.
INSTALL NEW AIR FILTER	Depending on type of filter, perform normal maintenance. For reusable filters, wash and re-install. Single use filters should be replaced.
INSTALL NEW OIL-WATER FILTER	Refer to manufacturers procedures for complete instructions. Replace according to recommendations for optimal performance.
INSTALL NEW MOTOR COOLING CIRCUIT FILTER	Refer to manufacturers procedures for complete instructions. Replace according to recommendations for optimal performance.

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TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
The spindle does not start.	Phases are not connected correctly.	Check electrical connection.
The spindle overheats.	The amount of lubricant is not that prescribed, causing heating of the bearings. Set correct values.	Set correct values.
	The air and oil pressure is not correct.	Set correct values.
	The hoses are obstructed.	Adjust or replace.
	The spindle operates constantly in a situation of overload.	Check that removal efficiency (equal to milling width divided by depth and feed) for each KW of power of the spindle does not exceed: Aluminum - 60cm3/min Metal alloys - 40cm3/min Steel - 10÷20cm3/min
	Worn bearings.	Replace the bearings.
The spindle rotates with difficulty or stops.	Tool holder cone not inserted.	Insert a tool holder cone. The spindle must not start without a tool holder cone inserted.
	The bearings are damaged.	Send the spindle to be re-paired. First drain the cooling channels using compressed air, dry the spindle thoroughly and grease it to protect if against rust.

PRODUCT SUPPORT

Dynomax, Inc. manufactures high quality spindles and spindle systems, designed to stand up to today's toughest manufacturing environments. Should, however, a question or concern arise regarding one of our products, please do not hesitate to contact us. In order to ensure we are best able to help you, please gather the following information before contacting Dynomax:

- Description of question or concern.
- Spindle information - such as machine spindle is used with, speed, horsepower, torque, configuration and size requirements - found in final inspection report.
- Dynomax serial number - found on the nameplate.
- Preventative maintenance history.

PRODUCT SERVICES OVERVIEW

- Belt and Gear Spindles
- Motorized Spindles
- Spindle Accessories
- Custom Spindle Manufacturing
- Spindle Repair & Rebuild
- Spindle Retrofit
- Spindle Remanufacturing
- Spindle Enhancement
- New Slide Products
- Application Consulting
- Design

CONTACT INFORMATION

FOR QUESTIONS OR CONCERNS CONTACT **DYNOMAX INC.** AT **847.680.8833**

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MAINTENANCE LOG

DAILY

- Clean the spindle
- Clean the taper
- HSK Collet Lubrication

WEEKLY

- Check Air Pressure
- Check Oil Levels
- Check Water Separator & Filters
- Check Rotating Union
- Check Motor Manually-smooth run & vibration.

MONTHLY

Check Filters for Contamination				Check Coolant Levels				Check Hoses			
INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE

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MAINTENANCE LOG

MONTHLY

Check Filters for Contamination				Check Coolant Levels				Check Hoses			
INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE

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MAINTENANCE LOG

MONTHLY

Check Filters for Contamination				Check Coolant Levels				Check Hoses			
INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE

DYNOMAX
Design • Service • Manufacturing
ISO 9000 • AS9100 Certified

MAINTENANCE LOG

EVERY 6 MONTHS OR 2,000 HRS OF OPERATION

Perform Run-In's on Stored Machines				Install New Air Filter (5 µm)				Install New Filter for Oil-Water Seperator				Install New Filter for Motor Cooling Circuit (100 µm)			
INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE	INITIAL	DATE