Haas Automation, Inc.

Compact Mill

Next Generation Control
Operator's Manual Supplement
96-0210
Revision C
December 2018
English
Original Instructions

Haas Automation Inc.
2800 Sturgis Road
Oxnard, CA 93030-8933
U.S.A. | HaasCNC.com

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LIMITED WARRANTY CERTIFICATE

Haas Automation, Inc.

Covering Haas Automation, Inc. CNC Equipment

Effective September 1, 2010

Haas Automation Inc. (“Haas” or “Manufacturer”) provides a limited warranty on all new mills, turning centers, and rotary machines (collectively, “CNC Machines”) and their components (except those listed below under Limits and Exclusions of Warranty) (“Components”) that are manufactured by Haas and sold by Haas or its authorized distributors as set forth in this Certificate. The warranty set forth in this Certificate is a limited warranty, it is the only warranty by Manufacturer, and is subject to the terms and conditions of this Certificate.

Limited Warranty Coverage

Each CNC Machine and its Components (collectively, “Haas Products”) are warranted by Manufacturer against defects in material and workmanship. This warranty is provided only to an end-user of the CNC Machine (a “Customer”). The period of this limited warranty is one (1) year. The warranty period commences on the date the CNC Machine is installed at the Customer’s facility. Customer may purchase an extension of the warranty period from an authorized Haas distributor (a “Warranty Extension”), any time during the first year of ownership.

Repair or Replacement Only

Manufacturer’s sole liability, and Customer’s exclusive remedy under this warranty, with respect to any and all Haas products, shall be limited to repairing or replacing, at the discretion of the Manufacturer, the defective Haas product.

Disclaimer of Warranty

This warranty is Manufacturer’s sole and exclusive warranty, and is in lieu of all other warranties of whatever kind or nature, express or implied, written or oral, including, but not limited to, any implied warranty of merchantability, implied warranty of fitness for a particular purpose, or other warranty of quality or performance or noninfringement. All such other warranties of whatever kind are hereby disclaimed by Manufacturer and waived by Customer.

Limits and Exclusions of Warranty

Components subject to wear during normal use and over time, including, but not limited to, paint, window finish and condition, light bulbs, seals, wipers, gaskets, chip removal system (e.g., augers, chip chutes), belts, filters, door rollers, tool changer fingers, etc., are excluded from this warranty. Manufacturer's specified maintenance procedures must be adhered to and recorded in order to maintain this warranty. This warranty is void if Manufacturer determines that (i) any Haas Product was subjected to mishandling, misuse, abuse, neglect, accident, improper installation, improper maintenance, improper storage, or improper operation or application, including the use of improper coolants or other fluids, (ii) any Haas Product was improperly repaired or serviced by Customer, an unauthorized service technician, or other unauthorized person, (iii) Customer or any person makes or attempts to make any modification to any Haas Product without the prior written authorization of Manufacturer, and/or (iv) any Haas Product was used for any non-commercial use (such as personal or household use). This warranty does not cover damage or defect due to an external influence or matters beyond the reasonable control of Manufacturer, including, but not limited to, theft, vandalism, fire, weather condition (such as rain, flood, wind, lightning, or earthquake), or acts of war or terrorism.

Without limiting the generality of any of the exclusions or limitations described in this Certificate, this warranty does not include any warranty that any Haas Product will meet any person's production specifications or other requirements, or that operation of any Haas Product will be uninterrupted or error-free. Manufacturer assumes no responsibility with respect to the use of any Haas Product by any person, and Manufacturer shall not incur any liability to any person for any failure in design, production, operation, performance, or otherwise of any Haas Product, other than repair or replacement of same as set forth in the warranty above.

Limitation of Liability and Damages

Manufacturer will not be liable to Customer or any other person for any compensatory, incidental, consequential, punitive, special, or other damage or claim, whether in an action in contract, tort, or other legal or equitable theory, arising out of or related to any Haas product, other products or services provided by Manufacturer or an authorized distributor, service technician, or other authorized representative of Manufacturer (collectively, "authorized representative"), or the failure of parts or products made by using any Haas Product, even if Manufacturer or any authorized representative has been advised of the possibility of such damages, which damage or claim includes, but is not limited to, loss of profits, lost data, lost products, loss of revenue, loss of use, cost of down time, business good will, any damage to equipment, premises, or other property of any person, and any damage that may be caused by a malfunction of any Haas product. All such damages and claims are disclaimed by Manufacturer and waived by Customer. Manufacturer's sole liability, and Customer's exclusive remedy, for damages and claims for any cause whatsoever shall be limited to repair or replacement, at the discretion of Manufacturer, of the defective Haas Product as provided in this warranty.

Customer has accepted the limitations and restrictions set forth in this Certificate, including, but not limited to, the restriction on its right to recover damages, as part of its bargain with Manufacturer or its Authorized Representative. Customer realizes and acknowledges that the price of the Haas Products would be higher if Manufacturer were required to be responsible for damages and claims beyond the scope of this warranty.

Entire Agreement

This Certificate supersedes any and all other agreements, promises, representations, or warranties, either oral or in writing, between the parties or by Manufacturer with respect to subject matter of this Certificate, and contains all of the covenants and agreements between the parties or by Manufacturer with respect to such subject matter. Manufacturer hereby expressly rejects any other agreements, promises, representations, or warranties, either oral or in writing, that are in addition to or inconsistent with any term or condition of this Certificate. No term or condition set forth in this Certificate may be modified or amended, unless by a written agreement signed by both Manufacturer and Customer. Notwithstanding the foregoing, Manufacturer will honor a Warranty Extension only to the extent that it extends the applicable warranty period.

Transferability

This warranty is transferable from the original Customer to another party if the CNC Machine is sold via private sale before the end of the warranty period, provided that written notice thereof is provided to Manufacturer and this warranty is not void at the time of transfer. The transferee of this warranty will be subject to all terms and conditions of this Certificate.

Miscellaneous

This warranty shall be governed by the laws of the State of California without application of rules on conflicts of laws. Any and all disputes arising from this warranty shall be resolved in a court of competent jurisdiction located in Ventura County, Los Angeles County, or Orange County, California. Any term or provision of this Certificate that is invalid or unenforceable in any situation in any jurisdiction shall not affect the validity or enforceability of the remaining terms and provisions hereof, or the validity or enforceability of the offending term or provision in any other situation or in any other jurisdiction.

Customer Feedback

If you have concerns or questions regarding this Operator's Manual, please contact us on our website, www.HaasCNC.com. Use the "Contact Us" link and send your comments to the Customer Advocate.

Join Haas owners online and be a part of the greater CNC community at these sites:

haasparts.com
Your Source for Genuine Haas Parts

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Customer Satisfaction Policy

Dear Haas Customer,

Your complete satisfaction and goodwill are of the utmost importance to both Haas Automation, Inc. and the Haas distributor (HFO) where you purchased your equipment. Normally, your HFO will rapidly resolve any concerns you have about your sales transaction or the operation of your equipment.

However, if your concerns are not resolved to your complete satisfaction, and you have discussed your concerns with a member of the HFO's management, the General Manager, or the HFO's owner directly, please do the following:

Contact Haas Automation's Customer Service Advocate at 805-988-6980. So that we may resolve your concerns as quickly as possible, please have the following information available when you call:

- Your company name, address, and phone number
- The machine model and serial number
- The HFO name, and the name of your latest contact at the HFO
- The nature of your concern

If you wish to write Haas Automation, please use this address:

Haas Automation, Inc. U.S.A.
2800 Sturgis Road
Oxnard CA 93030
Att: Customer Satisfaction Manager
email: customerservice@HaasCNC.com

Once you contact the Haas Automation Customer Service Center, we will make every effort to work directly with you and your HFO to quickly resolve your concerns. At Haas Automation, we know that a good Customer-Distributor-Manufacturer relationship will help ensure continued success for all concerned.

International:

Haas Automation, Europe
Mercuriusstraat 28, B-1930
Zaventem, Belgium
email: customerservice@HaasCNC.com

Haas Automation, Asia
No. 96 Yi Wei Road 67,
Waigaoqiao FTZ
Shanghai 200131 P.R.C.
email: customerservice@HaasCNC.com

Declaration of Conformity

Product: Mill (Vertical and Horizontal)*

*Including all options factory- or field-installed by a certified Haas Factory Outlet (HFO)

Manufactured By: Haas Automation, Inc.

2800 Sturgis Road, Oxnard, CA 93030

805-278-1800

We declare, in sole responsibility, that the above-listed products, to which this declaration refers, comply with the regulations as outlined in the CE directive for Machining Centers:

- Machinery Directive 2006/42/EC
- Electromagnetic Compatibility Directive 2014/30/EU
- Additional Standards:
  - EN 60204-1:2006/A1:2009
  - EN 614-1:2006+A1:2009
  - EN 894-1:1997+A1:2008
  - CEN 13849-1:2015

RoHS2: COMPLIANT (2011/65/EU) by Exemption per producer documentation.

Exempt by:

a) Large scale stationary industrial tool.
b) Lead as an alloying element in steel, aluminum, and copper.
c) Cadmium and its compounds in electrical contacts.

Person authorized to compile technical file:

Jens Thing

Address:

Haas Automation Europe
Mercuriusstraat 28
B-1930 Zaventem
Belgium

USA: Haas Automation certifies this machine to be in compliance with the OSHA and ANSI design and manufacturing standards listed below. Operation of this machine will be compliant with the below-listed standards only as long as the owner and operator continue to follow the operation, maintenance, and training requirements of these standards.

- *OSHA 1910.212 - General Requirements for All Machines*
- *ANSI B11.5-1983 (R1994) Drilling, Milling, and Boring Machines*
- *ANSI B11.19-2003 Performance Criteria for Safeguarding*
- *ANSI B11.23-2002 Safety Requirements for Machining Centers and Automatic Numerically Controlled Milling, Drilling, and Boring Machines*
- *ANSI B11.TR3-2000 Risk Assessment and Risk Reduction - A Guideline to Estimate, Evaluate, and Reduce Risks Associated with Machine Tools*

CANADA: As the original equipment manufacturer, we declare that the listed products comply with regulations as outlined in the Pre-Start Health and Safety Reviews Section 7 of Regulation 851 of the Occupational Health and Safety Act Regulations for Industrial Establishments for machine guarding provisions and standards.

Further, this document satisfies the notice-in-writing provision for exemption from Pre-Start inspection for the listed machinery as outlined in the Ontario Health and Safety Guidelines, PSR Guidelines dated April 2001. The PSR Guidelines allow that notice in writing from the original equipment manufacturer declaring conformity to applicable standards is acceptable for the exemption from Pre-Start Health and Safety Review.

All Haas CNC machine tools carry the ETL Listed mark, certifying that they conform to the NFPA 79 Electrical Standard for Industrial Machinery and the Canadian equivalent, CAN/CSA C22.2 No. 73. The ETL Listed and cETL Listed marks are awarded to products that have successfully undergone testing by Intertek Testing Services (ITS), an alternative to Underwriters' Laboratories.

Haas Automation has been assessed for conformance with the provisions set forth by ISO 9001: 2015. Scope of Registration: Design and Manufacture of CNC Machines Tools and Accessories, Sheet Metal Fabrication. The conditions for maintaining this certificate of registration are set forth in ISA's Registration Policies 5.1. This registration is granted subject to the organization maintaining compliance to the noted stardard. The validity of this certificate is dependent upon ongoing surveillance audits.

Original Instructions

User’s Operator Manual and other Online Resources

This manual is the operation and programming manual that applies to all Haas Mills.

An English language version of this manual is supplied to all customers and is marked **"Original Instructions"**.

For many other areas of the world, there is a translation of this manual marked **"Translation of Original Instructions"**.

This manual contains an unsigned version of the EU required **"Declaration Of Conformity"**. European customers are provided a signed English version of the Declaration of Conformity with Model Name and Serial Number.

Besides this manual, there is a tremendous amount of additional information online at: www.haascnc.com under the OWNERS section.

Both this manual and the translations of this manual are available online for machines up to approximately 15 years old.

The CNC control of your machine also contains all of this manual in many languages and can be found by pressing the **[HELP]** button.

Many machine models come with manual supplement that is also available online.

All machine options also have additional information online.

Maintenance and service information is available online.

The online **"Installation Guide"** contains information and check list for Air & Electrical requirements, Optional Mist Extractor, Shipping Dimensions, weight, Lifting Instructions, foundation and placement, etc.

Guidance on proper coolant and Coolant Maintenance is located in the Operators Manual and Online.

Air and Pneumatic diagrams are located on the inside of the lubrication panel door and CNC control door.

Lubrication, grease, oil and hydraulic fluid types are listed on a decal on the machine's lubrication panel.

How to Use This Manual

To get the maximum benefit of your new Haas machine, read this manual thoroughly and refer to it often. The content of this manual is also available on your machine control under the HELP function.

IMPORTANT: Before you operate the machine, read and understand the Operator's Manual Safety chapter.

Declaration of Warnings

Throughout this manual, important statements are set off from the main text with an icon and an associated signal word: "Danger," "Warning," "Caution," or "Note." The icon and signal word indicate the severity of the condition or situation. Be sure to read these statements and take special care to follow the instructions.

Description	Example
Danger means that there is a condition or situation that **will cause death or severe injury** if you do not follow the instructions given.	 ***DANGER:*** *No step. Risk of electrocution, bodily injury, or machine damage. Do not climb or stand on this area.*
Warning means that there is a condition or situation that **will cause moderate injury** if you do not follow the instructions given.	 ***WARNING:*** *Never put your hands between the tool changer and the spindle head.*
Caution means that **minor injury or machine damage could occur** if you do not follow the instructions given. You may also have to start a procedure over if you do not follow the instructions in a caution statement.	 ***CAUTION:*** *Power down the machine before you do maintenance tasks.*
Note means that the text gives **additional information, clarification, or helpful hints.**	 ***NOTE:*** *Follow these guidelines if the machine is equipped with the optional extended Z-clearance table.*

Text Conventions Used in this Manual

Description	Text Example
Code Block text gives program examples.	`G00 G90 G54 X0. Y0.;`
A **Control Button Reference** gives the name of a control key or button that you are to press.	Press **[CYCLE START]**.
A **File Path** describes a sequence of file system directories.	*Service* > *Documents and Software* >...
A **Mode Reference** describes a machine mode.	MDI
A **Screen Element** describes an object on the machine's display that you interact with.	Select the **SYSTEM** tab.
System Output describes text that the machine control displays in response to your actions.	`PROGRAM END`
User Input describes text that you should enter into the machine control.	`G04 P1.;`
Variable n indicates a range of non-negative integers from 0 to 9.	`Dnn` represents `D00` through `D99`.

Contents

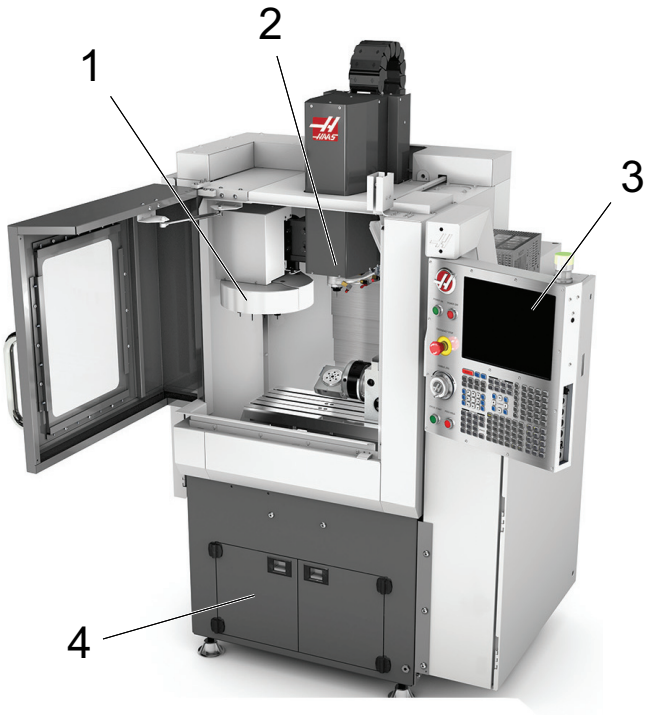
Chapter 1: Introduction

1.1 Overview

This operator's manual supplement describes the unique features and functions of the CM-1. Refer to your Mill Operator's Manual for control operation, programming, and other general mill information.

Specific details about the CM-1 itself, including information that is beyond the scope of this document, can be found at www.HaasCNC.com.

F1.1: CM-1 Compact Mill:



The Haas CM-1 Compact Mill is a small-footprint,? high-accuracy solution for high-volume production and prototyping? of small, high-precision 2D and 3D parts, such as those found in the? communications, aerospace, medical, and dental industries.

he CM-1 is equipped with a Haas-built, 30,000-rpm ISO 20-taper spindle and a 20-pocket automatic tool changer. An optional 50,000-rpm spindle is available.

The CM-1 features a slide-out coolant tank and pump enclosed in the base of the machine.

1.2 CM-1 Specifications

Standard Features
Tool Center Point Control (TCPC), Dynamic Work Offsets (DWO), Remote Jog Handle*, Second Home*, Macros*, Coordinate Rotation and Scaling (COORD)*, TSC-Ready, Wireless Intuitive Probing System (WIPS) *Refer to the Mill Operator's Manual (96-8210) for information on these features.

Travels		
	S.A.E	**Metric**
X Axis	12"	305 mm
Y Axis	10"	254 mm
Z Axis	12"	305 mm
Spindle Nose to Table (~ min.)	~3.25"	~83 mm
Spindle Nose to Table (~ max.)	~15.25"	~387 mm
For detailed machine dimensions, including work envelope information, refer to the CM-1 Machine Layout Drawing on www.haascnc.com.		

Table		
Width	10"	254 mm
Length	20"	508 mm
T-Slot Width	0.438"	11.13 mm
T-Slot Center Distance	3.375"	85.73 mm

Table		
Number of Standard T-Slots	3	
Max. Weight on Table (evenly distributed)	150 lb	68 kg

Spindle		
Type	ISO 20	
Speed	30,000 RPM	
Max Torque	8 ft*lbs @ 3,000 RPM	11 Nm @ 3,000 RPM
Max Rating	5.0 hp	3.7 kW

Optional Spindle		
Type	ISO 20	
Speed	50,000 RPM	
Max Torque	3.7 ft*lbs @ 3,700 RPM	5.0 Nm @ 3,700 RPM
Max Rating	5 hp	3.7 kW

Feedrate		
Max Rapids	757 in/min	19.2 m/min
Max Cutting	500 in/min	12.7 m/min
Max Thrust	1149 lb	5111 N

Tool Changer	
Capacity	20 pockets
Taper	ISO 20

General Requirements		
Air Required	1 scfm, 100 psi	28 L/min, 2.8 - 4.8 bar
Coolant Capacity	13 gal	49 L
Power Requirement, Low Voltage	195-260 VAC / 100A	
Machine Weight	1,500 lb	680 kg

Chapter 2: Installation

2.1 Installation

NOTE: *Use these installation recommendations with those in the Vertical Mill Reference Manual. Information supplied here is given specifically for the Compact Mill*

The following steps are necessary to install an Compact Mill.

1. Unwrap the shipping material and lift the machine from the pallet.
2. Move the Compact Mill to where it will be operating.
3. Remove the shipping brackets.
4. Connect power and air.
5. Rough-Level the Compact Mill.
6. Do a spindle sweep.
7. Run-in the spindle.

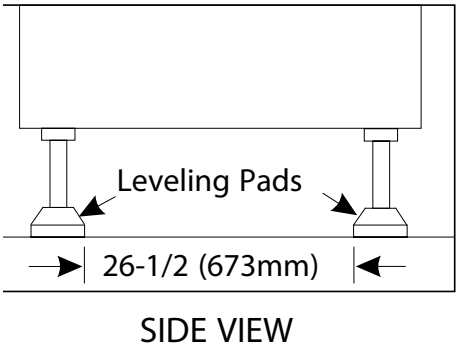
Lift The Machine

Refer to the Vertical Mill Reference Manual for information on machine lifting.

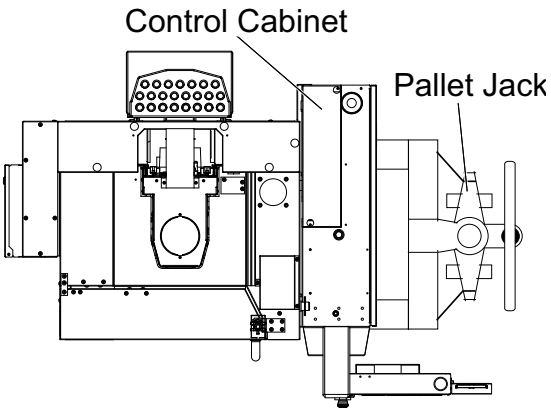
Move the Compact Mill

WARNING: *The Compact Mill has a high center of gravity. Move the machine slowly and carefully to prevent it from falling over.*

1. You will need a pallet jack that has at least 1500lb capacity and forks that will fit in the space between the Compact Mill's leveling pads(26.5",673mm).
2. Lift the Compact Mill from the side with the control cabinet. Carefully move the Compact Mill to its operating location and lower it onto the leveling pads.



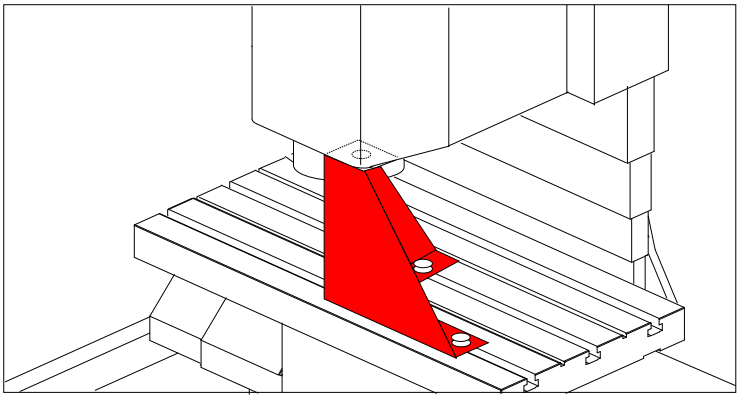
SIDE VIEW



Remove the Shipping Brackets

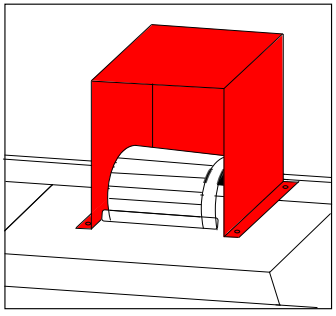
There are three shipping brackets to remove.

1. Remove the bolts that attach the shipping bracket to the spindle head.

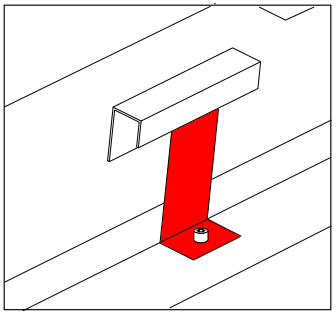


Spindle Head Shipping Bracket

2. Remove the four bolts that attach the cable carrier shipping bracket to the top of the Compact Mill and remove the bracket.
3. Open the doors at the front of the machine base. Remove the bolt that attaches the coolant tank shipping bracket and remove the bracket. Reinstall the bolt.



Cable Carrier Shipping Bracket



Coolant Tank Shipping Bracket

Level the Compact Mill

NOTE: *Refer to the Vertical Mill Reference Manual for machine leveling instructions.*

Only rough leveling is necessary. Fine leveling will not effect the cutting performance of the machine.

Spindle Sweep

Make sure the machine is properly leveled for the spindle sweep adjustment to be accurate.

1. Place a .0005" indicator on a suitable holder, then place it on the spindle nose. Jog the Z-axis in the negative (-) direction far enough that you can adjust the indicator to sweep a 4" radius from the center of X and Y axes' travels. Slowly jog the Z-axis in the negative (-) direction to zero out the indicator.
2. Find a reference zero at the rear of the table. Sweep the three remaining points (left, front, and right) and record the readings.
3. Shim the spindle, if necessary, to correct the spindle sweep to specifications.
4. Recheck the sweep. It must be within .0005".

Connecting Electrical Power

Refer to local code requirements before wiring machines.

- AC input power is three phase Delta or Wye power, except that the power source must be grounded. (e.g. leg or center leg for delta, neutral for Wye)
- The allowable frequency range is 47-63Hz
- Line voltage must not fluctuate more than +/-5%
- Harmonic distortion must not exceed 10% of the total RMS voltage

For power specifications refer to diy.haascnc.com

Connecting Air

CAUTION: *Make sure all pressure is removed from the air line before you connect or disconnect it. Pressurize the air line only when it is connected to the machine.*

1. Refer to the procedure given in the Installation section of the Service manual to connect air to the Compact Mill.
2. Set the incoming air pressure to between 75 and 150 psi. Set the air regulator on the machine to 60 psi (0.4 mPa).

Chapter 3: Spindle

3.1 Spindle

30K, ISO20 Spindle Features

- 5HP (3.7 KW) peak power, 3HP (2.2KW) continuous duty spindle power.
- Spindle speed range of 0-30,000 rpm, infinitely variable.
- Precision (ABEC 7) angular contact bearings, grease lubricated.
- Automatic tool changing system, featuring ISO20 tooling, without drive slots. ER16 collet chucks with precision collets are recommended.
- Rigid tapping standard for 30K spindle: limitations based upon horsepower and absence of drive dogs.
- Spindle Orientation is included with the 30K spindle option and intended for use with the Visual Quick Code Probing System. This Spindle Orientation option should not be used for high accuracy indexing.

Spindle Operating Guidelines

- Check the pullstud torque before the pullstud is loaded into the spindle.
- Roughing operations should use 3/8" diameter or smaller tools.
- Roughing operations should be at 10,000 rpm or higher.
- Roughing depth of cut should be 20% or less of tool diameter.
- Roughing width of cut should be 25% or less of tool diameter.
- Finishing operations require appropriate G codes. The program must provide enough data points and arcs for the desired path, using ultra-fine (0.00005'' or smaller) tolerance limits in the CAD/CAM process.
- All tools should be as short as possible.
- All tools must be balanced to G2.5 at 30,000 rpm.

CAUTION: *Heavy tool weights should be distributed evenly in the tool changer. This means heavy tools should be located across from one another, not next to each other. Ensure adequate clearance between tools in the tool changer.*

Spindle General Precautions and Safety

- The 30K option is for high rpm/low torque applications.
- Do not operate the spindle at any time without a tool holder in the spindle taper.
- Use only specified ISO20 tooling without drive slots.

- Use only tooling that has been balanced as an assembly (G1.0 or better, per ANSI S2.19/ISO 1940). Tooling should be re-balanced every time the tool is changed or moved in the tool holder.
- The Maximum collet size is 3/8".
- Tool lengths should be under 10 times the diameter from the gauge line with tooling above 1/4" diameter.
- Maximum tap size is 1/4-20 x 1/4" depth in aluminum, 10-32 x 1/4" depth in steel.
- Run the Daily Warm-Up program before running the spindle.
- Use only ER16 collet type toolholders.

Spindle Run-in

You must run the spindle run-in program before any machining use (especially when the machine is first installed or transported). The spindle can overheat and fail if it is not run-in.

Make sure a balanced ISO20 toolholder is in the spindle, then run program #O02025 (SPINDLE RUN-IN). The program will take approximately six hours to complete.

Spindle Warm-Up Programs

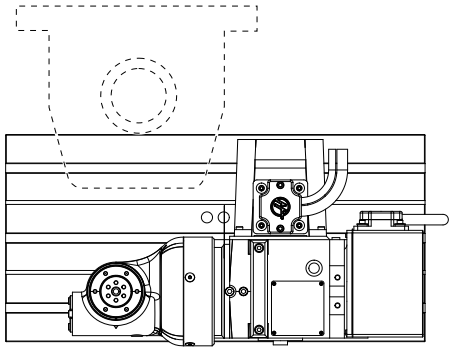
Program #O02024 20 MIN SPINDLE WARM-UP is supplied with the machine. It slowly increases spindle speed over 20 minutes to distribute spindle lubricant and thermally stabilize the spindle. You must run this program prior to machine use if the machine has been off or idle for more than two hours. The machine control shows a reminder each day to warm up the spindle.

Chapter 4: Operation

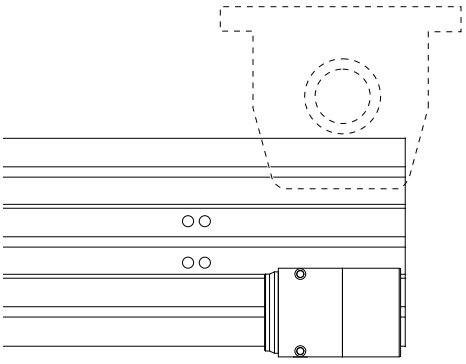
4.1 Operation

Work Envelope with Rotary Products

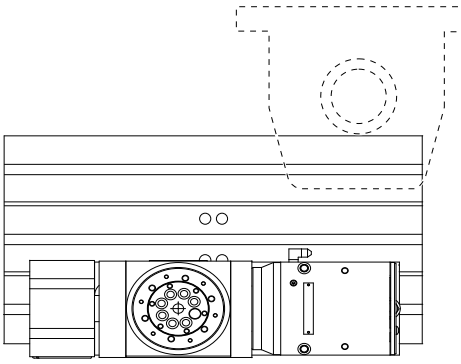
You can use HA5C indexers with AC-25 or AC-125 air collet closers, or an HRT100, HRT110, TR110, or TRT70 rotary table with your Compact Mill. Rotary products have a full range of travel only when mounted in the mill table front T-Slot. Also, the TR110 and TRT70 rotary tables may only be mounted with the length of the unit parallel to the X-axis of the mill.



Compact Mill with TRT70 Rotary Table



Compact Mill with HRT110 Rotary Table



Compact Mill with TR110 Rotary Table

The rotary table can be mounted in other T-slots or in other orientations (HRT); however, check clearances and cable routing before running a part. The rotary table and workpiece may collide with tooling or the interior of the machine.

Chapter 5: Maintenance

5.1 Maintenance

General

Refer to the maintenance section of the Mill Operator's Manual for maintenance procedures.

Tool Changer

Lubricate the extractor flanges of the tool changer every month. Use a synthetic grease with an NLGI grade of 1.5 or 2.

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