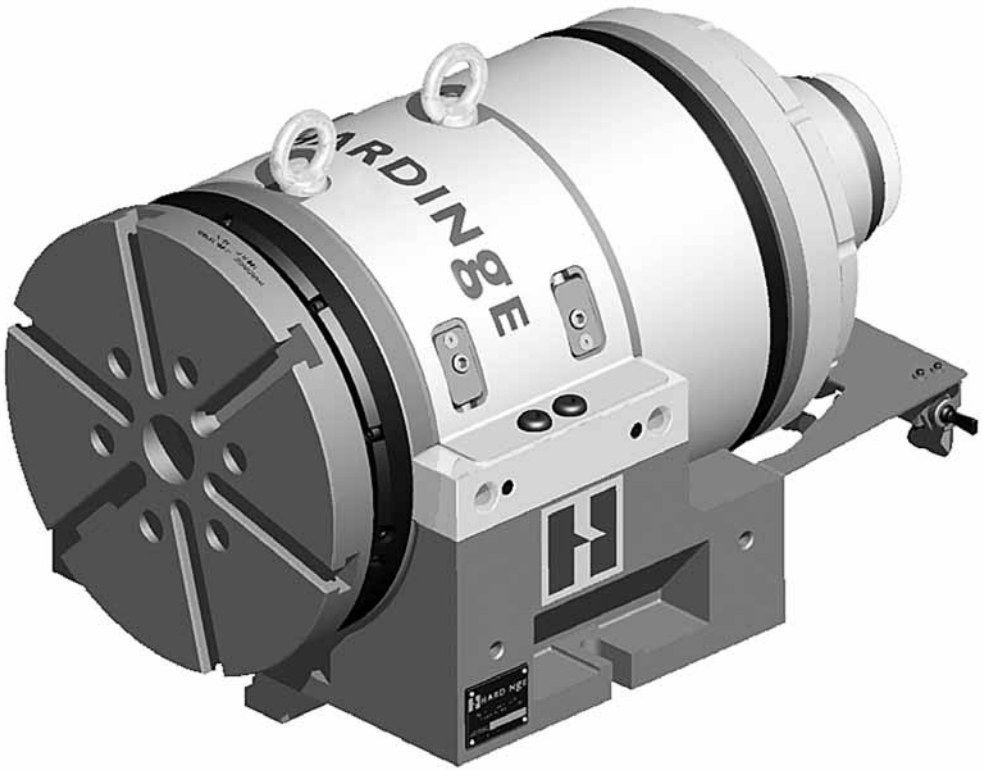

Setup and Operation
for the Hardinge®

DD200 Direct-Drive Rotary Table Indexer

Original U.S.A. Instructions

Part No. BA -0009500-0161

Thank you for purchasing a Hardinge DD200 Direct-Drive Rotary Table Indexer! This User's Manual is provided to assist you with setup procedures and to familiarize you with the features, specifications and maintenance recommendations of your unit.

The mechanical indexing head can be maintained by the customer with proper cleaning and maintenance. Any necessary repairs required during the warranty period will be made at Hardinge Inc., or by a factory authorized representative.

For best workholding results with this rotary table, Hardinge recommends Hardinge brand collets, 16C workholding products, step chucks, and expanding collets.

Hardinge Inc.
One Hardinge Drive
Elmira, New York 14902-1507 U.S.A.
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Part No. BA -0009500-0161

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Safety Recommendations

READ COMPLETE INSTRUCTIONS CAREFULLY BEFORE OPERATING THIS UNIT. Note: Equipment refers to the rotary table indexer and/or machine it is used with.

When this instruction book was printed, the information given was current. However, since we are constantly improving the design of our products, it is possible that the illustrations and descriptions may vary from the system.

- WARNING -

Occupational Safety and Health Administration (OSHA) Hazard Communication Standard 1910.1200, effective May 25, 1986, and various state "employee right-to-know laws" require that information regarding chemicals used with this equipment be supplied to you. Refer to the applicable section of the Material Safety Data Sheets supplied with your unit when handling, storing or disposing of chemicals.

HARDINGE SAFETY RECOMMENDATIONS

Your Hardinge machine is designed and built for maximum ease and safety of operation. However, some previously accepted shop practices may not reflect current safety regulations and procedures, and should be re-examined to insure compliance with the current safety and health standards.

Hardinge Inc. recommends that all shop supervisors, maintenance personnel, and machine tool operators be advised of the importance of safe maintenance, setup and operation of Hardinge-built equipment. Our recommendations are described below.

READ THESE SAFETY RECOMMENDATIONS BEFORE PROCEEDING ANY FURTHER.

ANYONE HAVING ACTIVE IMPLANTS (pacemakers) or having any other ferromagnetic prosthesis is not qualified to work with these kinds of devices, or to approach them. Keep at a safe distance from the motor.

READ THE APPROPRIATE MANUAL OR INSTRUCTIONS before attempting operation or maintenance of the equipment. Make certain that you understand all instructions.

DO NOT ALLOW the operation or repair of equipment by untrained personnel.

CONSULT YOUR SUPERVISOR when in doubt as to the correct way to do a job.

WEAR SAFETY GLASSES AND PROPER FOOT PROTECTION at all times. When necessary, wear respirator, helmet, gloves and ear muffs or plugs.

DON'T OPERATE EQUIPMENT unless proper maintenance has been regularly performed and the equipment is known to be in good working order.

WARNING or INSTRUCTION TAGS are mounted on the unit for your safety and information. Do not remove them or damage them.

DO NOT ALTER THE EQUIPMENT to bypass any interlock, overload, disconnect or other safety device.

DO NOT OPERATE EQUIPMENT if unusual or excessive heat, noise, smoke or vibration occurs. Report any excessive or unusual vibration, sounds, smoke or heat as well as any damaged parts.

LIFTING AND HANDLING OF THE UNIT should be done with full knowledge of the unit weight and using proper procedures.

MAKE CERTAIN that the equipment is properly grounded. Consult National Electric Code and all local codes.

REMOVE POWER from the unit by unplugging the power cord before attempting repair or maintenance. (Where Applicable)

DON'T OPEN THE CONTROL BOX without consulting with Hardinge. (Where Applicable)

DON'T TOUCH ELECTRICAL EQUIPMENT when hands are wet or when standing on a wet surface. (Where Applicable)

REPLACE BLOWN FUSES with fuses of the same size and type as originally furnished. (Where Applicable)

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Safety Recommendations (continued)

ASCERTAIN AND CORRECT the cause of a shutdown caused by overload heaters before restarting the machine. (Where Applicable)

KEEP THE AREA AROUND THE MACHINE well lit and dry.

KEEP CHEMICAL AND FLAMMABLE MATERIAL away from electrical or operating equipment.

HAVE THE CORRECT TYPE OF FIRE EXTINGUISHER handy when machining combustible material and keep chips clear of the work area.

DON'T USE a toxic or flammable substance as a solvent cleaner or coolant.

MAKE CERTAIN THAT PROPER GUARDING is in place and that all doors to the primary machine are closed and secured.

DON'T OPEN GUARD DOORS of the primary machine while any machine component is in motion.

MAKE SURE chucks, closers, fixture plates and all other spindle-mounted workholding devices are properly mounted and secured before starting the unit or the machine.

MAKE CERTAIN all tools are securely clamped in position before starting the unit or the machine.

REMOVE ANY LOOSE PARTS OR TOOLS left on the unit or the machine or in the work area before operating the equipment. Always check the machine and work area for loose tools and parts especially after work has been completed by maintenance personnel.

REMOVE CHUCK WRENCHES before starting the unit or the machine.

BEFORE PRESSING THE CYCLE START PUSH BUTTON, make certain that proper functions are programmed and that all controls are set in the desired modes.

KNOW WHERE ALL stop push buttons are located in case of an emergency.

MAKE CERTAIN that all guards are in good condition and are functioning properly before operating the equipment.

INSPECT ALL SAFETY DEVICES AND GUARDS to make certain that they are in good condition and are functioning properly before the cycle is started.

CHECK THE POSITION of any load/unload automation before pressing the Cycle Start push button.

CHECK SETUP, TOOLING AND SECURITY OF THE WORKPIECE if the machine has been OFF for any length of time.

DRY CYCLE a new setup to check for programming errors.

MAKE CERTAIN that you are clear of any "pinch point" created by moving slides before starting the machine.

DON'T OPERATE any equipment while any part of the body is in the proximity of a potentially hazardous area.

DON'T REMOVE CHIPS with hands. Use a hook or similar device and make certain that all machine movements have ceased.

BE CAREFUL of sharp edges when handling a newly machined workpiece.

DON'T REMOVE OR LOAD a workpiece while any part of the equipment is in motion.

DON'T OPERATE ANY EQUIPMENT while wearing rings, watches, jewelry, loose clothing, neckties or long hair not contained by a net or shop cap.

DON'T ADJUST tooling or coolant hoses while the equipment is running.

DON'T LEAVE tools, work pieces or other loose items where they can come in contact with a moving component of the equipment.

DON'T CHECK finishes or dimensions of workpiece near running spindle or moving slides.

DON'T JOG SPINDLE in either direction when checking threads with a thread gage.

DON'T ATTEMPT to brake or slow the equipment with hands or any makeshift device.

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Safety Recommendations (continued)

ANY ATTACHMENT, TOOL OR MACHINE MODIFICATION not obtained from Hardinge Inc. must be reviewed by a qualified safety engineer before installation.

USE CAUTION around exposed mechanisms and tooling especially when setting up. Be careful of sharp edges on tools.

DON'T USE worn or defective hand tools. Use the proper size and type for the job being performed.

USE ONLY a soft-faced hammer on tooling and fixtures.

DON'T USE worn or broken tooling on machine.

MAKE CERTAIN that all tool mounting surfaces are clean before mounting tools.

INSPECT ALL CHUCKING DEVICES daily to make certain that they are in good operating condition. Replace any defective chuck before operating the machine.

USE MAXIMUM ALLOWABLE gripping pressure on the chuck. Consider weight, shape and balance of the workpiece.

DON'T EXCEED the rated capacity of the equipment.

DON'T LEAVE the equipment unattended while it is operating.

DON'T CLEAN the equipment with an air hose.

KEEP TOTE PANS a safe distance from the machine. Don't overfill the tote pans.

DON'T LET STOCK project past the back end of the collet closer or equipment spindle without being adequately covered and properly supported.

UNLESS OTHERWISE NOTED, all operating and maintenance procedures are to be performed by one person. To avoid injury to yourself and others, be sure that all personnel are clear of the equipment when opening or closing the coolant guard door and any access covers.

FOR YOUR PROTECTION - WORK SAFELY

DON'T OPERATE THE EQUIPMENT with damaged or worn electrical cables.

VERIFY that the electrical cables are not restrained or pinched during full travel movement of the machine.

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1. Introduction

1.1 Basic Description

The Hardinge® DD200 Direct-Drive Rotary Table Indexer is ideal for rapid and accurate positioning of medium-sized parts in machining operations such as milling, drilling, tapping, contouring and spiral milling.

The DD200 is a rigid, high-accuracy, programmable, rotary positioning device. The mechanical indexing head holds the workpiece and is controlled by either a machine control as a true 4th axis or by the Hardinge All-Digital Servo Control. Positioning of the workpiece is accomplished by using the appropriate position, preparatory feedrate and "M" codes just like a regular axis. For use as a true 4th axis, see the 4th-axis manual and for use with the Hardinge servo control, see the servo control manual. It can be mounted in the horizontal position or in some cases vertically for face- and end-working applications. A collet closer cannot be used when mounted with the spindle in the vertical position. The rotary table indexer also has a spindle clamp to help assist the motor for off-axis drilling and milling applications while maintaining a fixed position.

Advantages of the 16C DD200 Rotary Table Indexer:

- No Backlash
- High-Resolution Encoder Directly Mounted to Spindle
- Long Life with Low Maintenance
- Optimal repeatability and positioning accuracy

The DD200 is offered with a frameless, wraparound rare-earth permanent magnet torque motor that is manufactured ready to be cabled for a 200 or 400 volt machine and meets the most rigorous industry codes. It has a horizontal spindle centerline of 6.00"/152.4mm similar to the Hardinge 16C Rotary Table Indexer. Cable connectors meet the IP 65 splash code that states that they can be sprayed with coolant. Please note that the system cannot be submerged. The spindle is hardened and ground for accuracy and has a special cross-roller bearing coupled with a rigid cylindrical roller bearing to support heavy cutting forces. The system is designed with a series of appropriate sealing systems including a bearing seal to provide a longer bearing life and a front cap seal with air purge. Positioning of the spindle is accomplished through a wraparound rare-earth permanent magnet torque motor that requires no mechanical gears. This type of motor requires no maintenance and will provide many years of smooth operating performance with zero backlash. The system is fitted with a means of external liquid cooling of the motor to increase the continuous torque. The high-resolution encoder is mounted directly to the DD200 spindle to insure the highest available accuracy. The main encoder ring has 16,384 lines, which times 4 gives a native resolution of 65,536 counts per rev. This can be further interpolated by the subsequent electronics. Dependant upon the control system used, the DD200 system encoder can yield a resolution of up to 16,777,216 counts per revolution.

1.2 Standard Spindle Clamp

The Hardinge DD200 comes with a fail-safe spindle clamp that is standard from the factory. This clamp allows the spindle to handle cutting forces equal to 275 ft-lb/373 Nm, allowing for greater cutting forces in the non-contouring mode of operation. The unit contains a pressure sensor that will prevent indexing in the event that air pressure drops below 85 psi to the clamp so that damage is prevented. Air is supplied to the clamp through the cable conduit and is either connected to the back of the servo control box or machine air supply in the machine canopy wireway. When equipped with the Hardinge servo control, the clamp can be controlled automatically so that the clamp is engaged when the Rotary Table Indexer arrives at its programmed destination, or it can be controlled with "G" codes. For ease of use, a "C" will appear on the display of the control whenever the clamp is engaged. There is a potential for a drop in air pressure if the air line supplying the Rotary Table Indexer is also supplying something else with air. If you receive a low-pressure alarm, the first thing you should check is the air pressure supplied to the Rotary Table Indexer. Please note that even a momentary drop in air pressure can create an alarm situation.

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CAUTION: Never attempt to defeat the clamp protection logic as this may result in an opportunity for the system to rotate when the clamp is engaged. This will cause an overload fault and repeated attempts to operate in this manner may damage the clamp. The clamp requires a minimum of 85psi with a maximum of 100psi of OF DRY FILTERED AIR to fully release the spindle and must be supplied to the unit even if the clamp is not going to be used.

1.3 High Stiffness Overall System

The DD200 is inherently stiff due to its construction with the robust housing and cross-roller bearing design coupled with a heavy-duty cylindrical roller bearing. Furthermore, the direct-drive motor offers a level of servo stiffness for the spindle that is superior to geared systems due to the elimination of gear backlash and other system compliances. The high servo gains supported by the high-resolution encoder make a powerful combination for heavy contouring applications.

1.4 Machinable Part Size

The DD200 Rotary Table Indexer is designed with a 16C spindle seat similar to the lathe spindle that Hardinge is noted for. The Hardinge DD200 has been designed for those parts that can be conveniently gripped in any of the 16C gripping systems that Hardinge is also noted for. Typical parts are in the range of approximately 2"/50.8mm in diameter and generally not longer than 6"/152.4mm without the use of a tailstock. It is typical to speak in terms of the L/D ratio, which is the length divided by the part diameter. A 2"/50.8mm diameter part 6"/152.4mm long has an L/D ratio of 3:1. Part pieces with larger L/D ratios should be used with a tailstock up to a typical L/D ratio of 6:1.

Larger part sizes than those described above can be handled with additional support (i.e. Tailstock, Trunnion, etc.). When talking about machinable part size, inertia and torque play an important role. Any part and fixture combination should not exceed the maximum inertia of 0.55 $kg.m^2$. This inertia should be calculated about the center of rotation of the DD200 because when a part's mass gets further from the center of rotation, its inertia increases. An unbalanced part should also not require a torque that exceeds the allowable torque of the motor shown in section 1.7 of this document. A part weighing 5 lbs at a distance of 6 inches from the center of the spindle would require 30 in-lbs or 2.5 ft-lbs of torque to rotate. See examples on the following page for light parts that have high inertia.

Note: Larger inertial loads may require changing a few motor parameters to get the unit to run properly. If assistance is needed in calculating inertia, torque, or changing parameters, please contact your local Hardinge representative.

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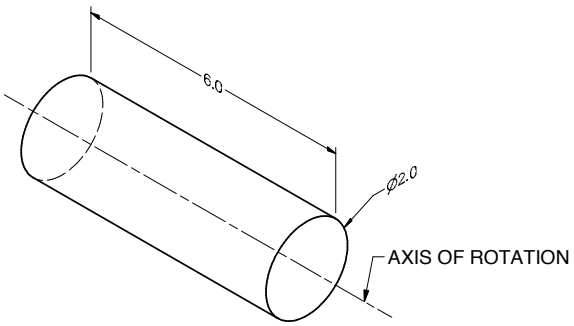
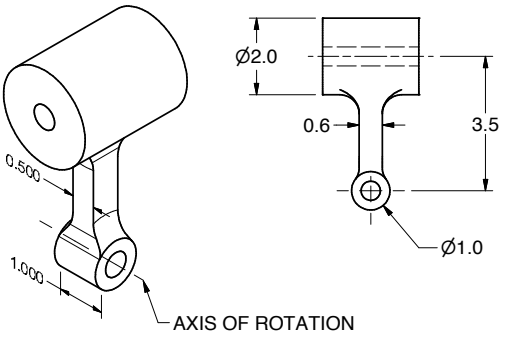
Inertia vs. Weight vs. Required Torque to Spin Part





Example A

Material: Steel
Weight: 5.3 lbs/2.4 kg
Inertia about axis of Rotation: 2.7 lb-in^2 /0.0008 kg-m^2
Torque required to hold Balanced Part in position: N/A (Balanced)

Example B

Material: Steel
Weight: 2.5 lbs/1.1 kg
Inertia about axis of Rotation: 17.8 lb-in^2 /0.008 kg-m^2
Torque required to hold Unbalanced Part in position: 7.5 in-lbs/0.85 Nm

Example A is a balanced part which is approximately twice as heavy as Example B, which is an unbalanced part. Notice that since Example A is balanced, the torque required to hold the part in position is negligible and its moment of inertia is very low. Since Example B is unbalanced, its moment of inertia is about 10 times larger than Example A even though it weighs about half as much. Note that torque is required to hold Example B in position.

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1.5 Features

RIGID DESIGN
Precision cross-roller bearing coupled with a tapered-bore cylindrical roller bearing will support heavy cutting forces on medium or small parts

HARDENED AND GROUND SPINDLE
Typical of the accurate long-life Hardinge lathe spindle

WRAPAROUND RARE-EARTH PERMANENT MAGNET TORQUE MOTOR
For very precise high-speed indexing with no backlash and high repeatability

AUTOMATIC CIRCLE DIVISION (With Hardinge Servo Control)
You can program a step that automatically divides a circle into any number of equal parts between 2 and 999

STOP/FEED-HOLD (With Hardinge Servo Control)
You can use the STOP to feed-hold spindle movement without losing position on restart

INTERFACING (With Hardinge Servo Control)
Most CNC mills can be interfaced quickly and easily by using a spare "M" function which provides a switch-closer as a signal between your mill and the control. The Hardinge servo control will provide a finish set of contacts to send a response back to the mill.

LINEAR & SPIRAL MILLING (With Hardinge Servo Control)
For semi fourth-axis capability

MEMORY (With Hardinge Servo Control)
A nonvolatile memory retains your program even when power is turned OFF (–) and remembers the current spindle position and step number when the Servo is stopped

PROGRAM STORAGE (With Hardinge Servo Control)
Store and recall up to fifty different programs

USER PARAMETERS (With Hardinge Servo Control)
Some of the parameters can be changed by the user to alter a few of the basic features of the servo control.

PROGRAMMING (With Hardinge Servo Control)
Program to rotate the spindle clockwise or counterclockwise with step sizes from .001 to 9999.99 degrees
Using G83 & G84, continuous rotation is allowed. Contact Hardinge for maximum speeds based on duty cycle.

ABSOLUTE OR INCREMENTAL PROGRAMMING (With Hardinge Servo Control)
Up to 1000 different steps can be stored in memory and each step can be repeated (looped) 999 times

RS-232 INTERFACE (With Hardinge Servo Control)
For computer control of sending and receiving programs and controlling indexer via the CNC control of host machine capable of RS-232 communication

RESOLUTION
Standard resolution of .001 degrees

SIMPLE EDITING (With Hardinge Servo Control)
Edit a program by simply writing over existing steps, or inserting or deleting a step (or several steps) with automatic program step renumbering

SUBROUTINES (With Hardinge Servo Control)
Allows repeated sequences up to 999 times, saving programming time and memory space

VARIABLE FEED RATES
Variable from .001 deg./sec. to 2100 deg./sec. with Hardinge Servo Control up to 1500 deg/sec as true 4th axis

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ZERO RETURN (With Hardinge Servo Control)
An "automatic home" position can be programmed to return the spindle to its original starting position from any point

ONE-YEAR WARRANTY
The Hardinge DD200 Rotary Table Indexer is provided with a one-year warranty against any defects in material and workmanship.

1.6 Motor Thermostat

The motor is equipped with a thermostat that monitors the internal temperature in the motor windings. The thermostat is set to open at 85 degrees C. This is done to restrict the electrical components inside the unit.

1.7 Specifications

Spindle	
Clamping Torque (ft-lb/Nm)	275/373
Runout Max. (TIR)	0.0002"
Backlash (arc/sec)	0
Maximum RPM	175 with Servo Control @120 volt single phase 350 with Servo Control @ 220 volt single phase 250 as 4th Axis with 20 amp Fanuc Drive/Amplifier
Rotational speed (degrees/sec)	0.001 to 2100 with Servo Control 0.001 to 1500 as Fanuc 4th Axis
Spindle Nose	A2-5, 16C
Collets	Standard 16C
Horizontal Spindle Height (inch)	6.000" ± 0.001
Indexing	
Accuracy (arc/sec)	±3
Repeatability (arc/sec)	±2
Resolution (arc/sec)	+/- .077
Max Rotation/Step 4th-axis (degree)	9999.99 or Continuous Using G83 or G84 in the Hardinge Servo Control
Motor	
Rare-Earth Permanent Magnet Torque Motor	
Maximum Peak Torque (ft-lb/Nm)	118/160 [2]
Continuous Torque Air Cooled [1] (ft-lb/Nm)	27/37 [2]
Continuous Torque Liquid Cooled [1] (ft-lb/Nm)	56/76 [2]
Operating Specifications	
Duty Cycle	100% at full speed
Operating Temperature (max. ambient)	104°F/40°C
Power Rating	Varies [3]
Oil Requirements	No Oil
Clamp Air Requirements (psi/bar)	85min-100max/5.8min-6.9max dry air
Collet Closer Air Requirements (psi/bar)	100/6.9 Minimum dry air
Weight	
Rotary Indexer (lb/kg)	240/109
Control (lb/kg)	9.54/4.34
Workholding	
Collets-round (max. capacity) in/mm	1 5/8"/41.27
Collets-Hex (max. capacity) in/mm	1 13/32"/35.71
Collets-Square (max. capacity) in/mm	1 9/64"/28.97

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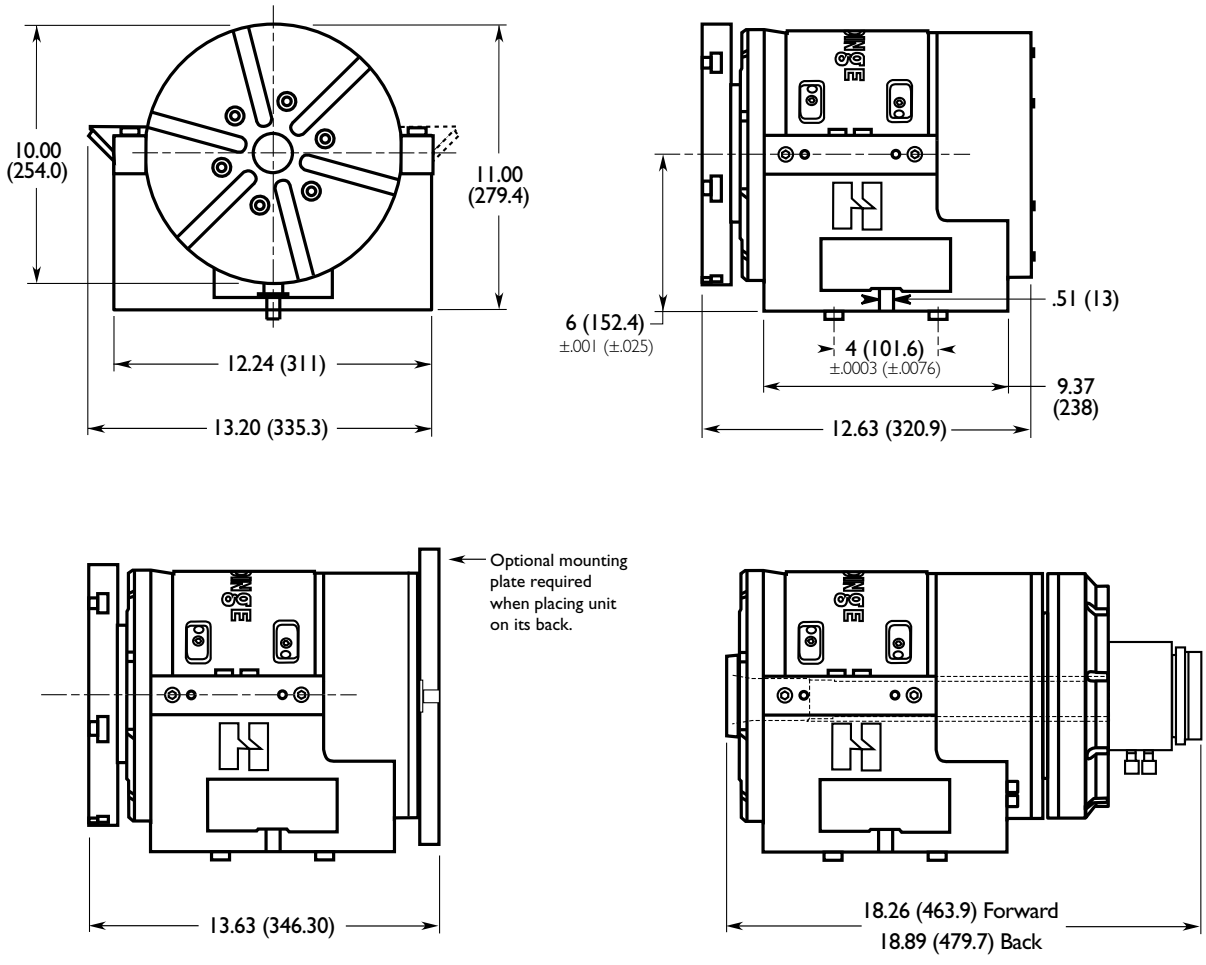
Step Chucks (max. capacity) in/mm	up to 6"/152.40
FlexC® Collet Systems - Style D	2 9/16"/65.00
3-Jaw Chucks (diameter)	5", 6", and 8"
Sure-Grip® Expanding Collets in/mm	1/8" - 4"/3.17 - 101.60
Fixture Plate-Collet Style (diameter)	6 3/8"/161.92
Fixture Plate-Spindle Mount (diameter)	5½"/139.7, 8 7/8"/225.42
Slotted Face Plate (diameter)	8 7/8"/225.42, 10"/254.00
Collet Stops (part positioning)	YES

1 - continuous torque available 24/7, 365 days, 2 - from standard GE Fanuc H104 amplifier
3 - will vary according to motor requirements of the 4th-axis interface

1.8 Dimensions

DD200 Rotary Table Indexer



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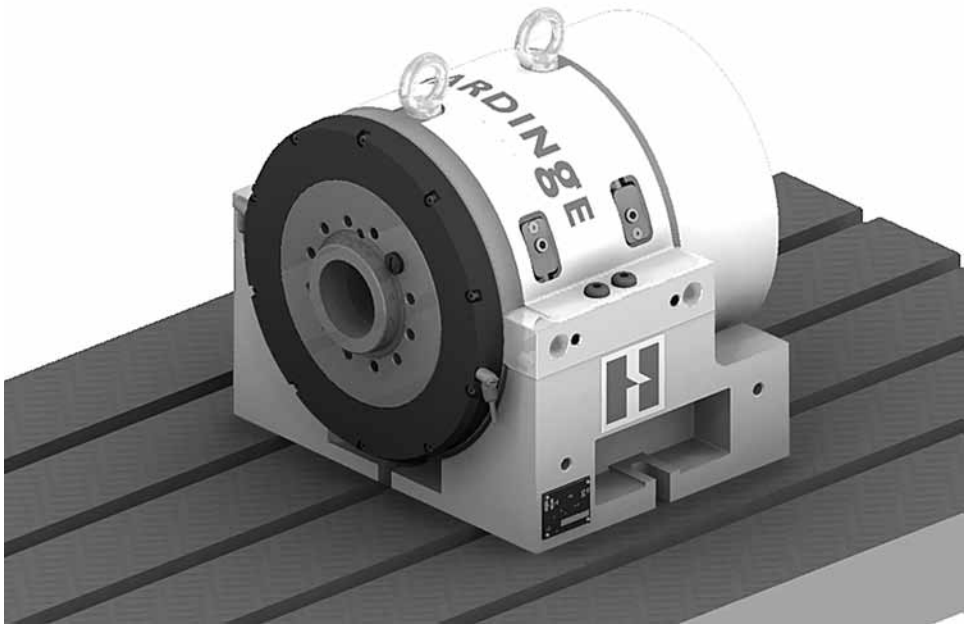
2. Set Up

2.1 General Setup

1. Fill out the warranty information by visiting "www.hardinge.com/rotarywarranty" on the internet.



2. Place the rotary table indexer on the machine. Route the cable from the head so that it avoids tool changers and table edges. Cable slack must be provided for your machine's movements. If the cable is cut, the motor or feed back system could fail prematurely. Replace a damaged cable immediately. Secure the rotary table indexer to the machine's T-slot table as shown (upright or on its back). A special mounting plate will be needed to mount the unit on its back. T-nut packages are available for purchase for various T-slot tables. Kit includes (2) T-nuts, (2) bolts, and (2) flat washers. Check to verify that all clearances are satisfied in full machine axis' movements and that there is no possibility of a collision.

NOTE: End user is responsible for properly routing cable. Hardinge accepts no responsibility for damages in cabling resulting from improper installation.

3. Place the rotary table indexer in an area free from chips and coolant where air can circulate freely. Do not let chips pile up over the motor enclosure, as this would prevent proper cooling.
4. Connect the DD200 Rotary Table Indexer using one of the techniques as described in the Hardinge servo control or Hardinge 4th axis manual, which will be included with the mechanical unit.
5. If adding a rotary table indexer to a Hardinge mill using a remote CNC cable or as a true 4th axis, refer to the instructions in the Hardinge 4th-axis manual or call your Hardinge service representative.
6. If using the Hardinge servo control, secure it in its required placement. Do not cover any surface of the control, as it will quickly overheat. Do not place the unit on top of other hot electronic controls.

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a. The DD200 is wired directly to the Hardinge servo control. For control box placement and cable routing, the cable will need to be disconnected and reconnected according to the instructions in the Hardinge Servo control manual.

CAUTION: Never connect or disconnect these cables with the power on. Instant failure will result.

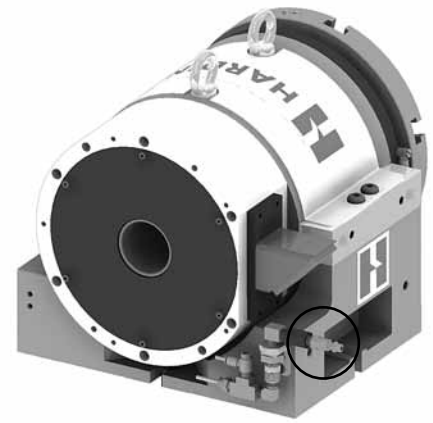
b. Connect the AC line cord to a 120V AC grounded receptacle. The cord is a three-wire ground type and the ground must be connected. Power is 120VAC. The power service must supply a minimum of 15 amps continuously. Conduit wire must be 12 gauge or larger and fused for at least 20 amps. If an extension cord is to be used, use a three-wire ground type and the ground line must be connected. Avoid outlets that have large electric motors connected to them. Use only heavy-duty 12 gauge extension cords capable of 20 amp load. Do not exceed a length of 30 feet. Permanent installations should be hard-wired or installed with locking plugs.

c. Semi-Fourth Axis: Connect the remote interface cable. See separate Hardinge Servo Control manual.

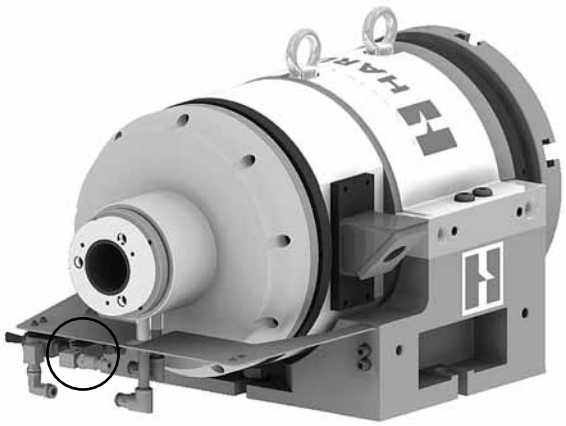
7. Connect 85psi minimum - 100psi maximum of dry filtered air to the quick disconnect fitting on the back of the control box or in the machine wireway. This will supply air to the air purge on the nose cap as well as to the spindle clamp.

CAUTION! Never attempt to operate the DD200 without the 85psi minimum - 100psi maximum of dry filtered air connected to the air fitting or mechanical damage will occur!

QUICK DISCONNECT FITTINGS



Back of DD200 without Collet Closer



Back of DD200 with Collet Closer

8. Connect air to the quick disconnect fitting on the back of the rotary table if unit is equipped with a pneumatic collet closer.

9. Connect air to the quick disconnect fitting on the cable side of the rotary table indexer if unit is not equipped with a pneumatic collet closer.

10. Save the packing materials in case you need to ship the unit.

11. At the end of the workday or shift, it is important to clean the rotary table. The rotary table indexer should be free of any chips or grime. Clean with a chip brush and apply a coat of rust preventative.

CAUTION! Do not use an air gun around the front or rear seals. Chips may damage the seal if blown in with an air gun.

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NOTE: Prior to powering on the unit, read and understand the entire servo control or 4th-axis manual.

12. Initialization and homing of the unit is explained in the servo control and the 4th-axis manuals.

2.2 Use of Collets, Sure-Grip® Expanding Collets, Sure Grip® 3-Jaw Power Chucks and Face Plates

The unit accepts standard Hardinge 16C collets, step chucks, ID gripping collets, chucks and face plates. When inserting the collet, align the keyway on the collet with the key inside the spindle. Push the collet in and turn the collet closer drawbar clockwise until proper collet tightness is obtained.

Chucks and face plates utilize the A2-5 spindle nose on the Rotary Table Indexer. Always make sure that the spindle and chuck or face plate are free of dirt and chips. Align the chuck draw tube keyway with the spindle collet key and slide the chuck onto the spindle. Turn the collet closer drawtube to engage the chuck. Push the chuck tight to the spindle and tighten the chuck mounting bolts to the proper torque indicated in your chuck installation manual. Use the collet closer drawtube to adjust the chuck for proper stroke required for ID and OD gripping. Since the A2-5 spindle nose is such a tight tapered fit, a face plate or 3-jaw chuck may be difficult to remove from the spindle even after the bolts are removed. If this happens, support the face plate or 3-jaw chuck with a hoist and lightly strike the outside diameter of the face plate or 3-jaw chuck with a piece of brass, a plastic hammer or a rubber hammer so that nothing is damaged.

Note: A hoist may be required to mount a 3-jaw chuck depending on the size of the chuck.

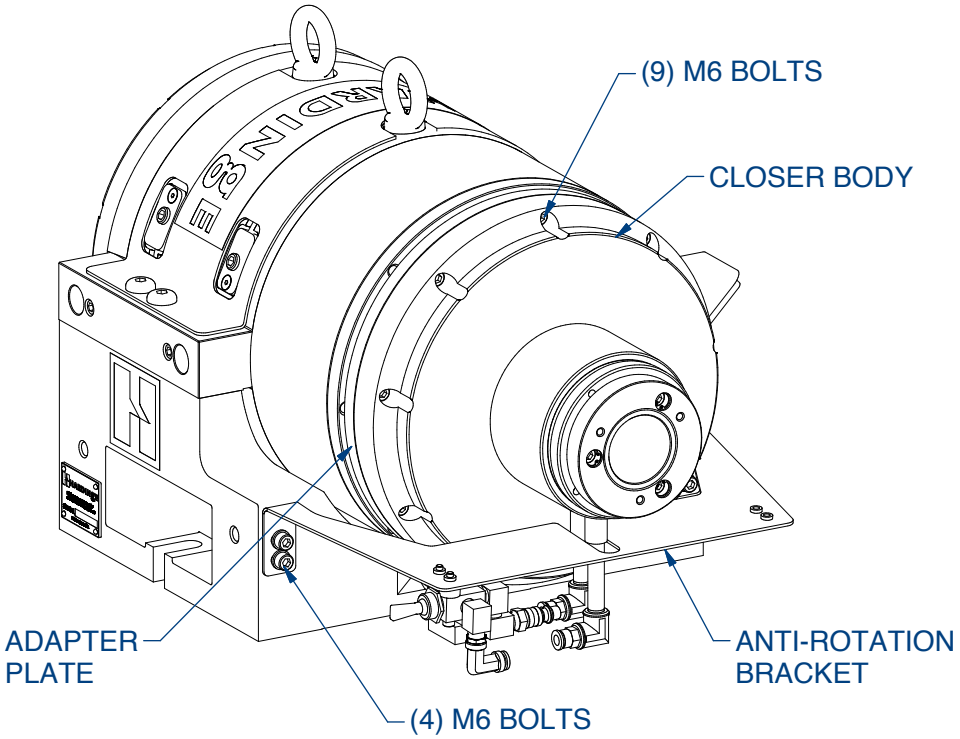
2.3 DD200 Collet Closer (Optional)

The DD200 collet closer has a 1.687"/42.8mm through-hole design with pneumatic open and close. The through-hole can be used for through-spindle coolant or for holding long parts. The pneumatic closer has .625"/15.87mm of stroke which allows the use of power chucks. With the collet closer installed, the unit cannot be mounted in the vertical position. The air pressure can be adjusted to achieve different drawbar forces out of the collet closer as shown in the chart.

NOTE: Do not supply the collet closer with more than 100 psi of air pressure

DD200 Collet Closer FORCE CHART	
Air Pressure (psi)	**Drawbar Force (lbs)**
10	**413**
20	**826**
30	**1239**
40	**1653**
50	**2066**
60	**2479**
70	**2892**
80	**3305**
90	**3718**
100	**4132**

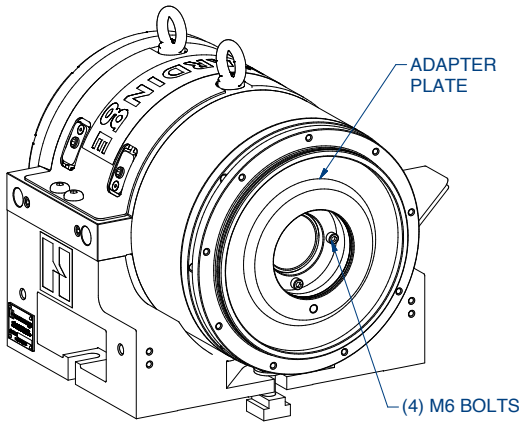
Part No. BA -0009500-0161



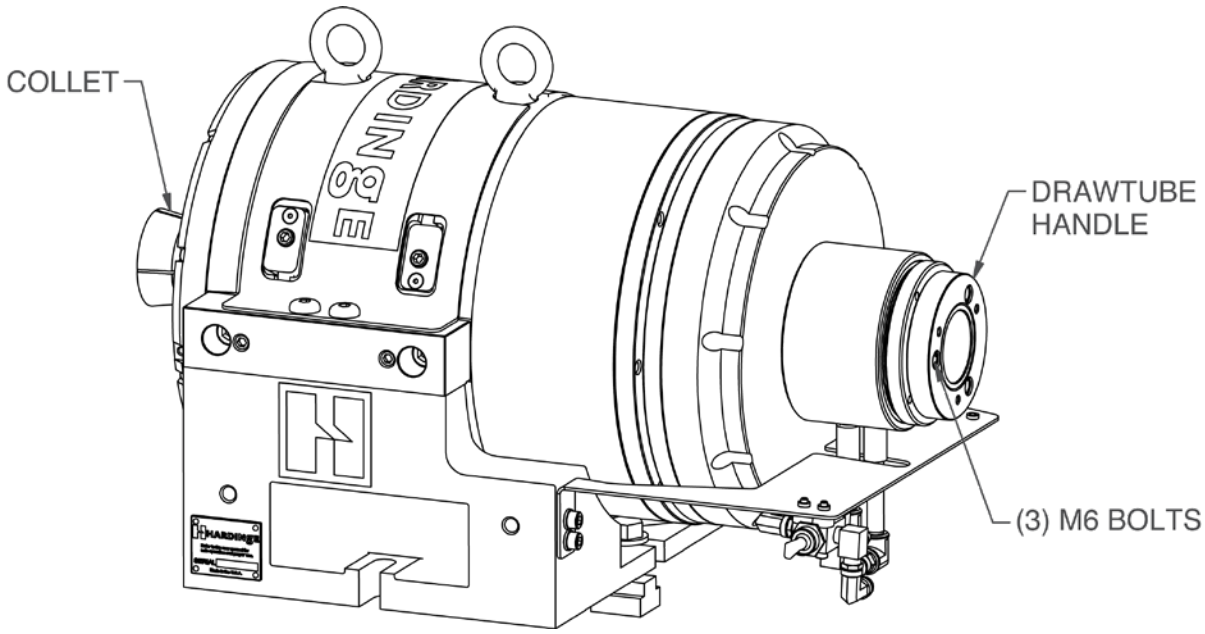
2.4 Removing the DD200 Collet Closer

Air collet closers fitted at the factory are not intended to be removed. However, if servicing is required, the following instructions can be used to remove the collet closer. First, remove all workholding from the unit spindle. Disconnect the air to the closer and cycle valve to relieve internal pressure, Then remove the four (M6) bolts on the back of the bolster that hold the sheet metal anti-rotation bracket in place. Remove the nine (M6) bolts that go through the collet closer body which hold the closer to the unit. Stick a brass rod down the center of the spindle from the front of the unit and locate the end of the brass rod on the end of the collet closer drawtube. Lightly tap the end of the brass rod while moving it around the face of the drawtube until the closer is fully disengaged from the adapter plate at which time it can be removed from the unit. A second person may be required to support the closer while this is being done. Once removed from the unit, the closer piston will be visible. Be sure not to allow any chips or debris to get in the piston area of the collet closer. If access to the rear of the DD200 is needed, remove the four (M6) bolts that hold the adapter plate to the spindle and carefully remove the adapter plate.

CAUTION! The DD200 Collet Closer relies on air pressure to maintain clamping force and is released upon the removal of the air pressure.



Part No. BA -0009500-0161



2.5 Use of Collets With the Hardinge Collet Closer

NOTE: All collets must be free from burrs and in good condition.

Collet Installation in the Collet Closer

To install a collet, first make sure that the closer is in the forward position. Loosen the three (M6) bolts on the back of the drawtube handle until they are fully disengaged from the closer piston. These bolts will not fall out of the drawtube as there is a snap ring in the counter bore of each clearance hole. Next, align the collet keyway with the spindle key and insert the collet while turning the draw tube handle to engage the collet. Turn the draw tube handle until the collet grips the part and then back off approximately ¼ turn. This will be a good starting point for fine-tuning the grip range. The collet should be adjusted with the drawtube handle as shown in the graphic above. Once properly adjusted, tighten up the three (M6) bolts on the back of the handle to 10 ft-lbs before actuating the closer.

CAUTION! The DD200 Collet Closer relies on air pressure to maintain clamping force and is released upon the removal of the air pressure.

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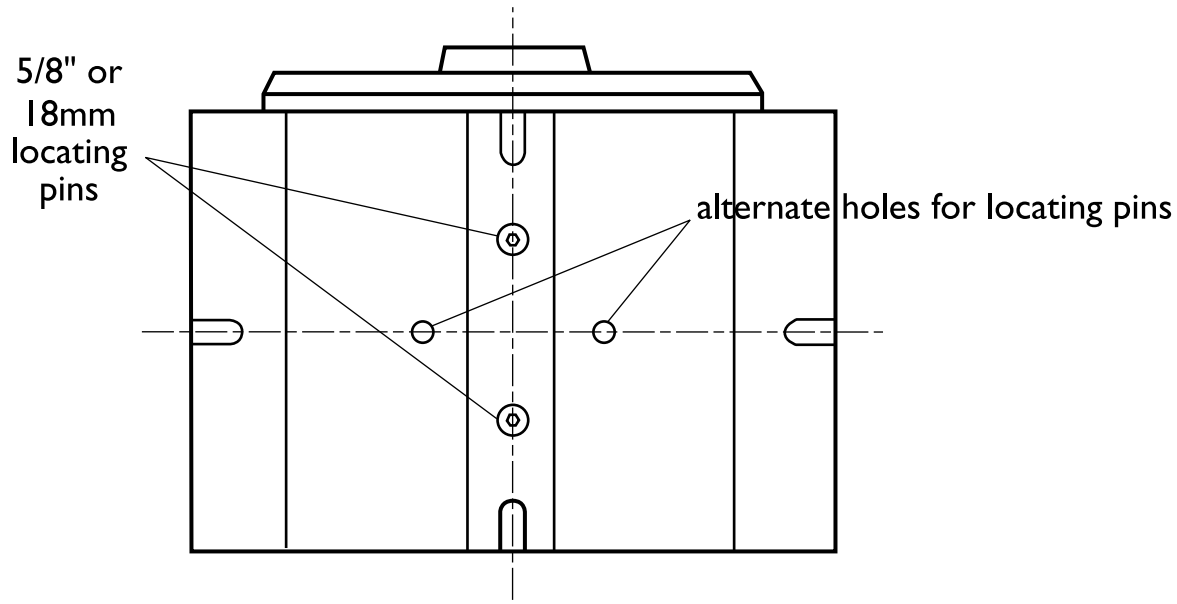
If the Collet is Sticking

NOTE: To prevent excessive wear and collet sticking, make sure collets are in good condition and free from burrs. A light coat of Molybdenum grease on the collet wear surfaces will extend the life of the spindle and/or collet and help prevent sticking, especially when operating dry. Emergency collets are soft and are not recommended for long production runs. These collets will stick after prolonged use.

2.6 Tooling Locations

The DD200 is equipped with tooling points on the underside of the unit in order to speed setups. One of the most time-consuming procedures in setup operations is aligning the head with the table. On the mounting surfaces, there are two 0.500"/12.7mm bored holes on 4.000"/101.6mm centers. The holes on the bottom surface are parallel to the spindle within 0.001"/0.025mm per 6 inches/152.4mm. Locating buttons are bolted in the holes and used for alignment in the slots of the machine table. This will give quick parallel alignment that will be adequate for most jobs.



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3. Routine Maintenance

3.1 Use of Oil- and Water-Soluble Coolants

For the use of oil- and water-soluble coolants, the following guidelines should be observed:

- DO NOT SUBMERGE THE UNIT IN COOLANTS. To the extent possible, direct the coolant lines to the workpiece as opposed to directly upon the spindle seal area. Avoid high-pressure coolant applications where the pressure is above 200 psi. Some machining centers provide flood coolant at enormous rates so that the head is practically submerged. Throttle the flow back to appropriately match the application.
- Inspect the cables and gaskets regularly for cuts or swelling. Damage must be repaired immediately.

3.2 Clean Up

At the end of the workday or shift, it is important to clean the rotary table indexer. The head should be free of any chips or grime. Clean with a chip brush and apply a coat of rust preventative. Do not use an air gun around front or rear seals. Chips may damage the seals if blown in with an air gun.

3.3 Collet Key Replacement

Remove the set screw in the collet key access hole located on the spindle and then remove the old collet key from the face of the spindle with a 3mm Allen wrench. Replace the collet key with Hardinge P/N CJ-000028416C only using pipe sealant or thread Loctite #242 when installing. Screw the collet key into the spindle until it begins to protrude into the inside diameter of the spindle and turn until the flat on the bottom of the key is parallel to the spindle centerline. Place a new Hardinge collet into the spindle to test if key depth is adequate. Remove collet and adjust key until a proper fit is achieved.

NOTE: When using collet type workholding, never run the spindle without the collet key having been properly installed. Failure to do this may cause the collet to rotate in the spindle and possibly cause some level of damage.

4. One-Year Limited Warranty

The Hardinge DD200 Direct-Drive Rotary Table Indexer is provided with a one-year warranty against any defects in material and workmanship. Specific details of the warranty can be found in the Hardinge Terms and Conditions document associated with the purchase agreement.

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