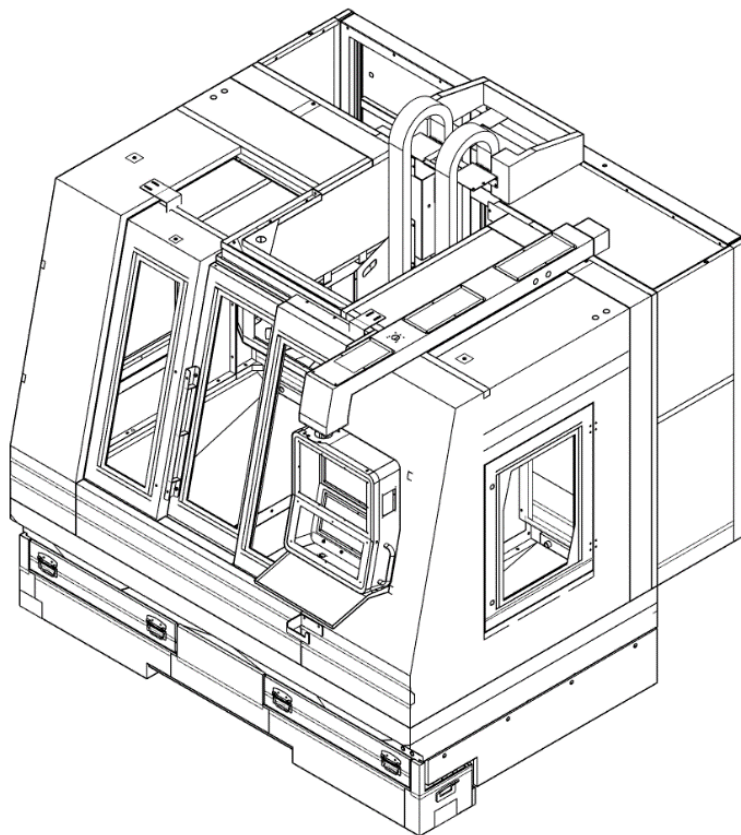




MACHINE MANUAL

MDS 845-8T

CNC Toolroom Mill



Machine Install, Maintenance and Service Manual

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SAFETY INFORMATION

Machine tool owners, operators and others who work around machine tools must pay close attention to safety guidelines. Consult the safety publications below:

- **Safety Requirements for the Construction, Care and Use of Drilling, Milling, and Boring Machines (ANSI B11.8-1983).**

This publication states that the employer is responsible for safeguards. Section 5.1 of this publication says, "it shall be the responsibility of the employer to provide, and ensure the use of, a guard, guarding device, awareness barrier, awareness device, or shield . . ." To obtain a copy, contact:

The American National Standards Institute
1430 Broadway
New York, New York 10018

- **Concepts and Techniques of Machine Safeguarding (OSHA Publication Number 3067).**

This document is meant to help machine owners and operators devise safeguards. To obtain a copy, contact:

The Publication Office – OSHA
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1 SAFETY

1.1 Introduction

The machine tool should be used by machinists who have a proper understanding of the operation of a CNC machines. The operator should have been trained in how a manual and CNC machine operates and has experience in cutting material for manufacturing. Any operator using the machine needs to carry out their own risk assessment of the machine for its intended use.

The safe operation of the DynaPath WinDelta control system depends on its correct use and the operator should ensure that they take all appropriate precautions to prevent injury to themselves and the machine.

1.2 Safety Symbols

Safety symbols are used throughout this publication and on the machine where applicable to display important safety information pertaining to hazardous voltages, currents, temperatures, mechanical harm, or other conditions that can cause personal injury and damage to the machine. **Table 1.2-1 (Safety Symbols)** lists the general safety classifications and its usage.

Table 1.2-1: Safety Symbols

CAUTION! 	CAUTION notices are used in this publication to emphasize that mishandling produces a potentially hazardous situation which, if not avoided, could result in machine equipment damage and moderate or minor injury.
WARNING! 	WARNING notices are used in this publication to emphasize that mishandling would produce a potentially hazardous situation which, if not avoided, could result in machine equipment damage and serious injury.
DANGER! 	DANGER indicates cases where mishandling includes an imminently hazardous situation which, if not avoided, will result in death or severe injury.
NOTE:	NOTE indicates important information requiring special attention or understanding.

The following safety notices and labels are used on machine tools integrated with this class of CNC control to denote hazards and present safety guidelines. They must not be defaced, destroyed, or removed.

1.3 Safety Notices and Labels

The following safety notices and labels are used on machine tools integrated with this class of CNC control to denote hazards and present safety guidelines. They must not be defaced, destroyed, or removed.



Figure 1.3-1: Safety label for hazardous voltage



Figure 1.3-2: Safety label for guard doors

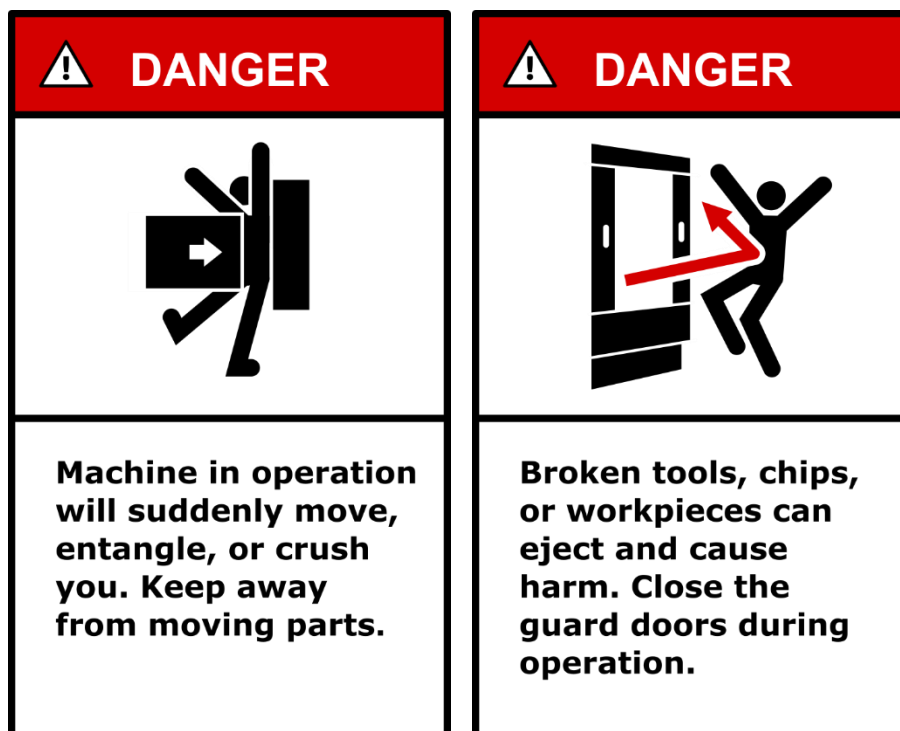


Figure 1.3-3: Safety labels for machine movement and debris

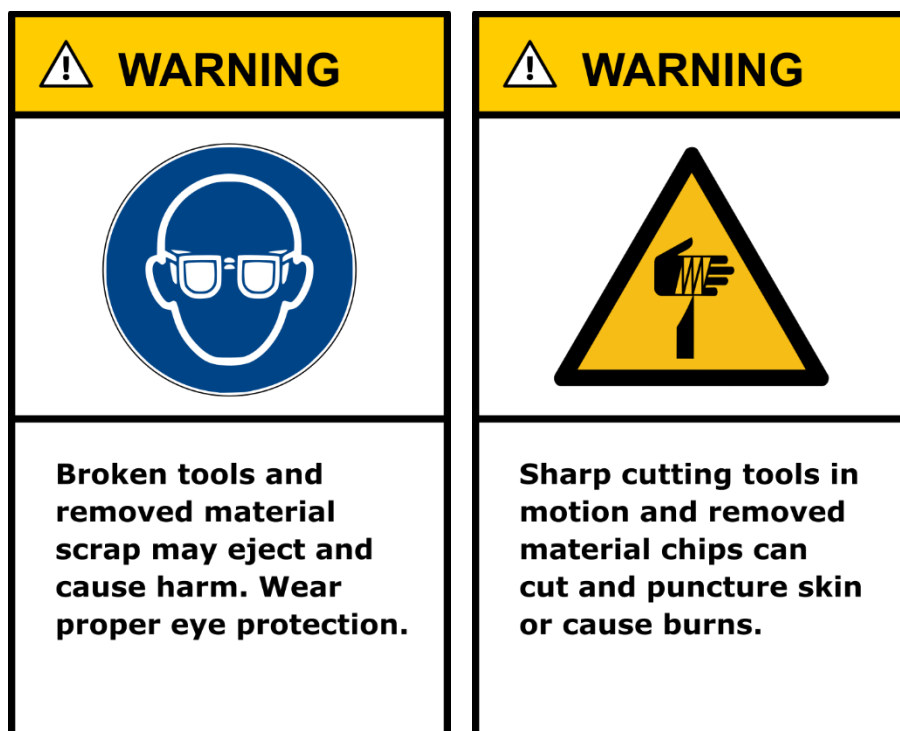


Figure 1.3-4: Safety labels for PPE and bodily injury

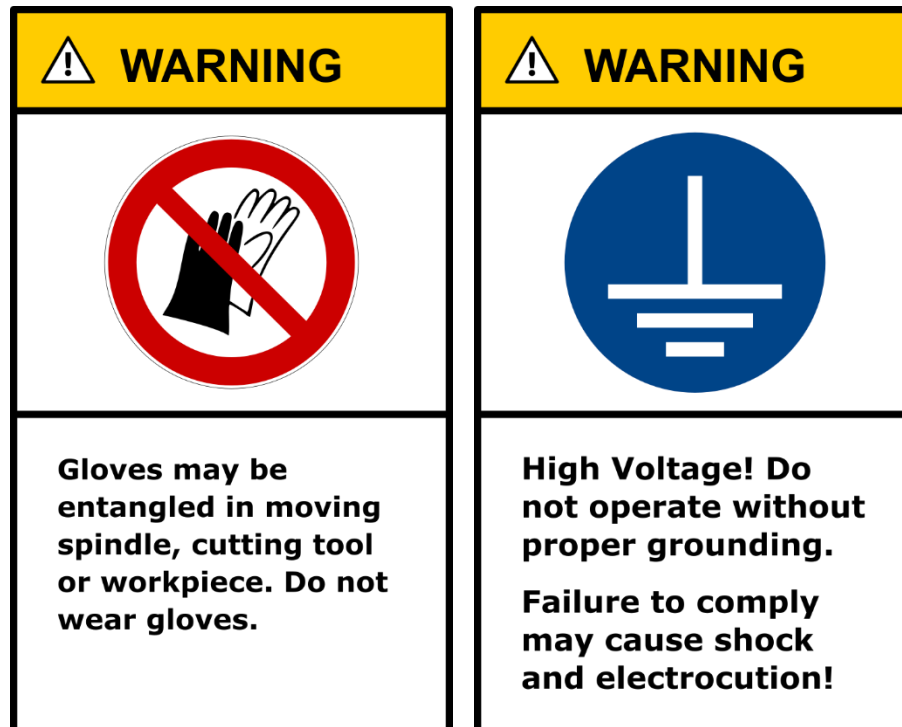


Figure 1.3-5: Safety labels for gloves and high voltage

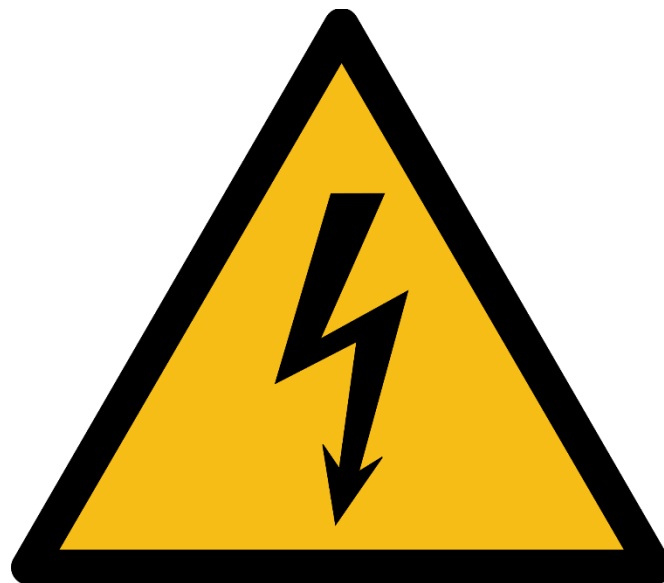


Figure 1.3-6: Safety label for electrical hazard

1.4 Declaration of Conformity

US declaration of conformity:

- **Safety Requirements for the Construction, Care and Use of Drilling, Milling, and Boring Machines (ANSI B11.8-1983).**

This publication states that the employer is responsible for safeguards. Section 5.1 of this publication says, "it shall be the responsibility of the employer to provide, and ensure the use of, a guard, guarding device, awareness barrier, awareness device, or shield . . ." To obtain a copy, contact:

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UKCA/CE declaration of conformity:

- **Machinery Directive 2006/42/EC**
- **Low Voltage Directive (LVD) 2014/35/EU**
- **Electromagnetic Compatibility (EMC) Directive 2014/30/EU**

2 SPECIFICATION

2.1 Machine Specifications

Table 2.1-1: MDS Series Machine Specifications

MDS 845-8T		
	TYPE	Milling Center + 8-Tool ATC
TRAVELS	TRAVEL XYZ	800 x 450 x 450 mm (31.4" x 17.7" x 17.7")
	SPINDLE NOSE TO TABLE	110-520 mm (4.3"-20.4")
	TOOL TO COLUMN	435 mm (17.1")
AXES	AXIS TYPE X/Y/Z	Linear / Linear / Linear
	MOTORS X/Y/Z	0.85 / 0.85 / 1.35 kW Direct Drive
SPINDLE	SPINDLE TAPER	BT40 / CAT40
	SPINDLE DIAMETER	127 mm (5")
	SPINDLE MAX RPM	8000 RPM Standard *12000 RPM Option (with CTS + Chiller)
	SPINDLE MOTOR	7 HP (5.5kW) Belt Drive, Dual Winding *11 HP (7.5kW) Direct Drive for 12K RPM Option
	SPINDLE RATED TORQUE	36 N-m (26.55 ft-lb")
ATC	TOOL CHANGER	8 Stations
SPEED / ACCURACY	MAX RAPID SPEED X/Y/Z	20 m/min (787 IPM)
	POSITIONING ACCURACY	5 µm (0.000197")
	REPEAT ACCURACY	3 µm (0.000118")
TABLE	TABLE SIZE	850 x 420 mm (33.5" x 16.5")
	TABLE SLOTS x OFFSET x WIDTH	4 x 85 mm x 18 mm (4 x 3"11/32 x 45/64)
	MAX TABLE LOAD	200 kgs (440 lbs)
	MACHINE WEIGHT	3800 kg (8360 lbs)
WEIGHT / DIMENSIONS	SHIPPING L x W x H	2300 x 2650 x 2600 mm (87" x 79" x 91")
	FLOOR SPACE L x W x H	2200 x 1600 x 2650 mm (91" x 105" x 103")
CAPACITY	LUBE CAPACITY	2 L
	COOLANT CAPACITY	200 L (52 gal)
INSTALL	AIR REQUIREMENTS	6 kg/cm ² (90 psi)
	POWER REQUIREMENTS	15 kVA, 3 Phase, 220V *External Transformer Optional

2.2 Dimensions

2.2.1 Mechanical Dimensions

Mechanical dimensions of the machine are detailed in the following figures.

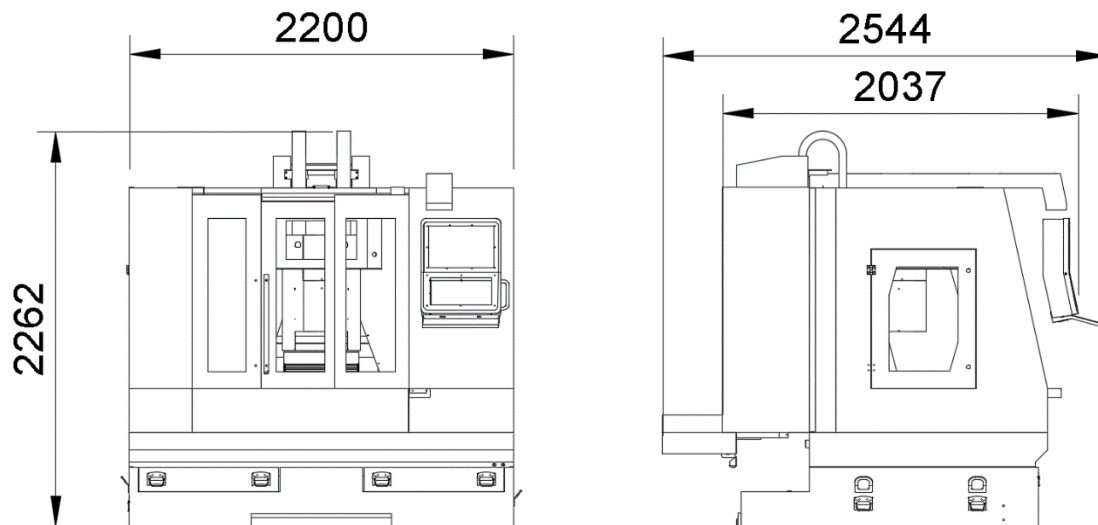


Figure 2.2-1: MDS 845-8T Machine Dimensions (Units in mm)

2.2.2 Floor Space

The required floor space and minimum ceiling height of the machine accounting for space for accessibility is:

- Width: 2300 mm (91")
- Length: 2650 mm (105")
- Height: 2600 mm (103") *Z at top of travel

2.3 Paint Specifications

The machine parts and sheet metal are painted with the following color specifications:

- RAL 7047 / Pantone Cool Gray 2C (White)
- RAL 7021 / Pantone 419 (Black Gray)
- RAL 3020 / Pantone 485 (Traffic Red)

3 INSTALLATION

3.1 Lifting and Moving



CAUTION! Use proper lifting and moving equipment of sufficient capacity greater than the total machine weight. This equipment must be operated by qualified personnel.



CAUTION! Prior to lifting and moving, ensure the table is in a central position, the pendant arm is secured, and any electrical cables or air supply hoses to the machine are removed.

The MDS-series machines can be lifted from underneath by forklift, or from above with straps hooked onto eye bolts attached to four screw holes above the vertical column and in the base casting under the Y-axis by crane. Adhere to the following lifting procedure.

Lifting Procedure:

1. Prepare two 3m or 10 ft. long lifting slings or straps. Its width should be at least 50-100 mm or 2"-4" with a load carrying capacity of at least double the machine weight. A lifting bracket is required to separate the two straps by approximately 1.2m or 50in.
2. Slide away the coolant reservoir away from underneath the machine.
3. Prepare four M20 eye bolts rated for lifting and screw them onto the four lift positions on the casting. Any covering sheet metal will need to be removed.
4. Secure the lifting straps or hooks onto the four eye bolts.
5. Lift and move the machine.
6. Place the leveling pads under the leveling screws prior to setting the machine.

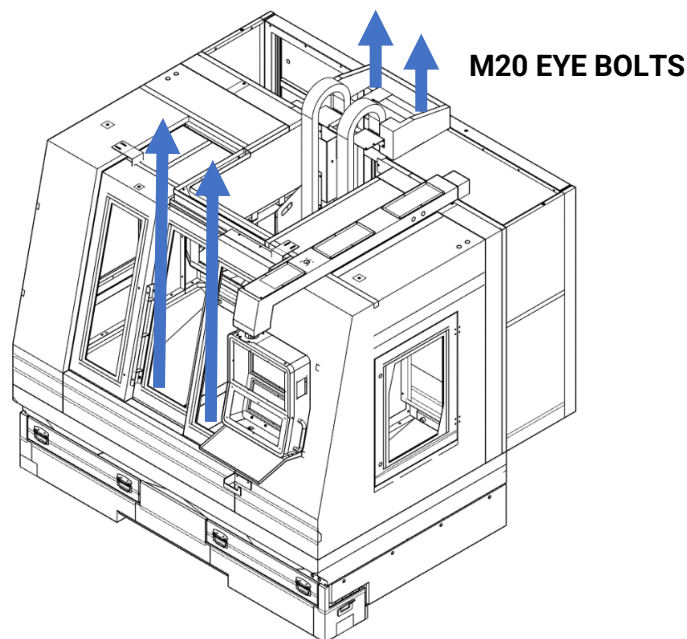


Figure 3.1-1: Lifting Points on the Machine

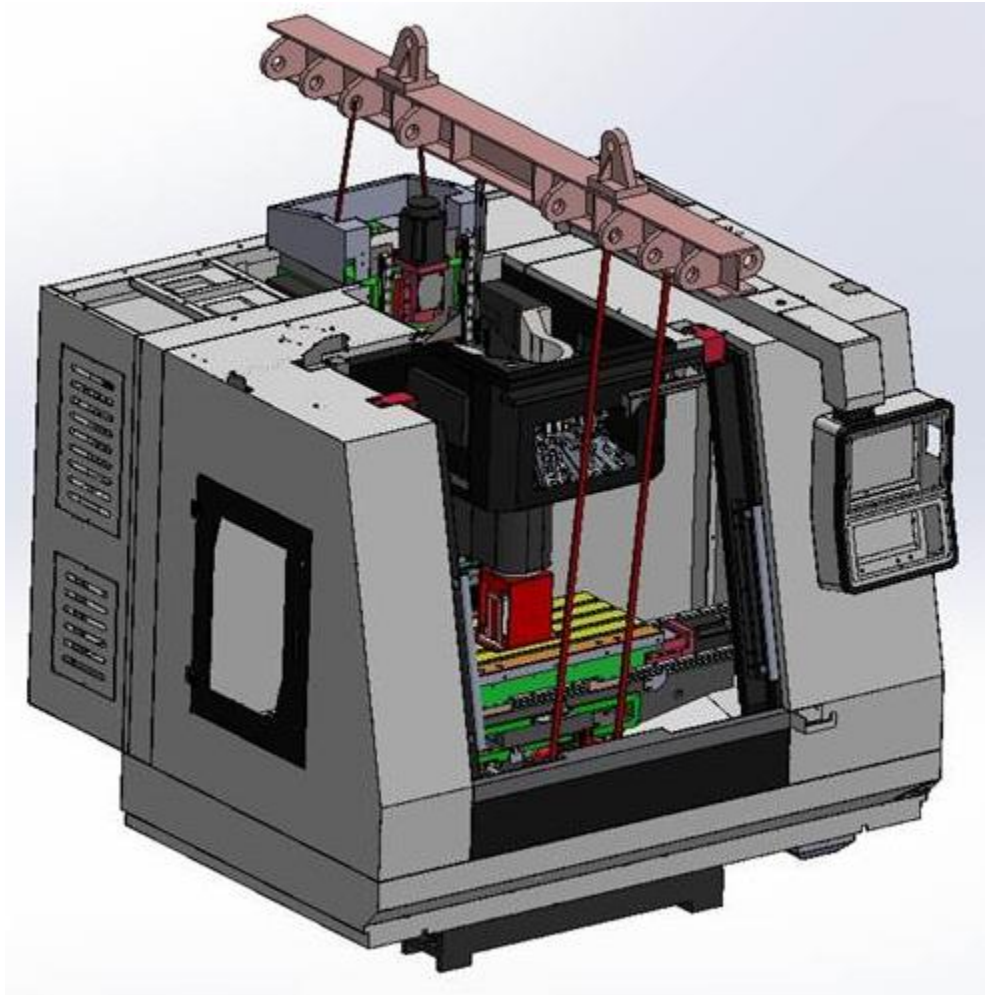


Figure 3.1-2: Machine Lifting Illustration

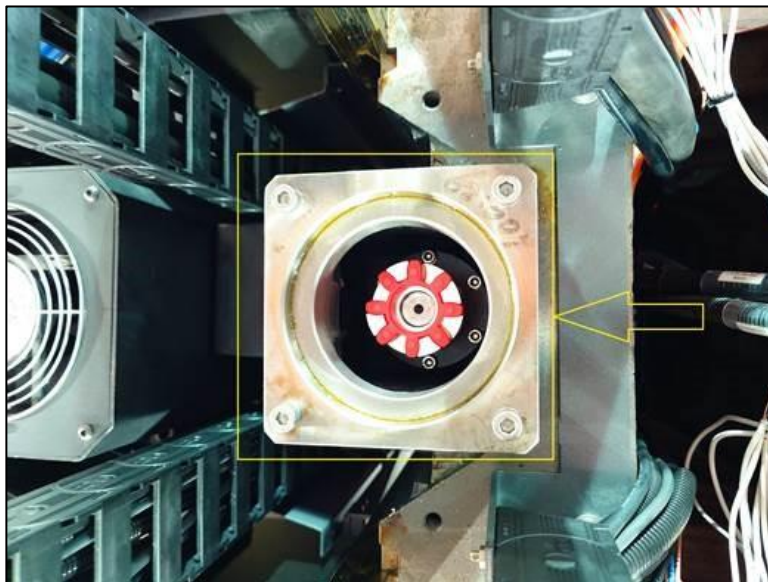
3.2 Mechanical Assembly

To meet certain shipment conditions, some parts of the machine are shipped in a disassembled condition.

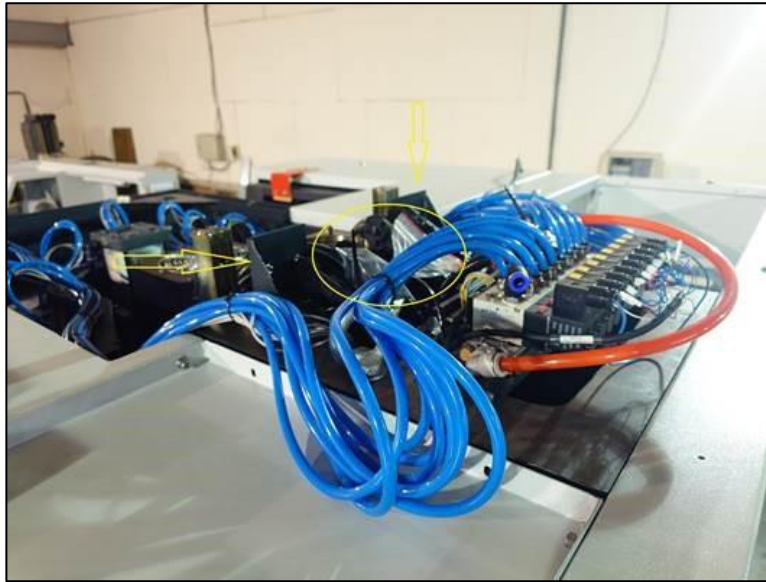
3.2.1 Z-Motor and Head Components Assembly

For machines shipped with lowered height constraints, the components above 220 cm in height will be removed and shipped in a disassembled state. The following procedure details the assembly process.

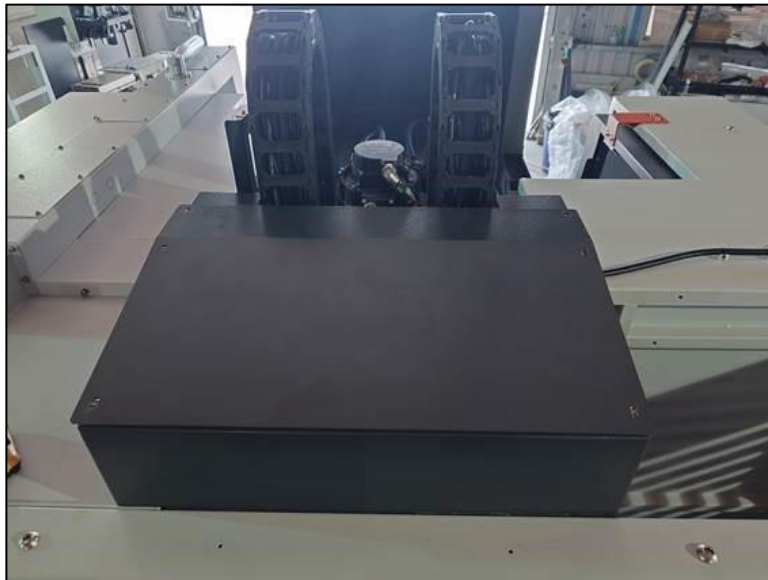
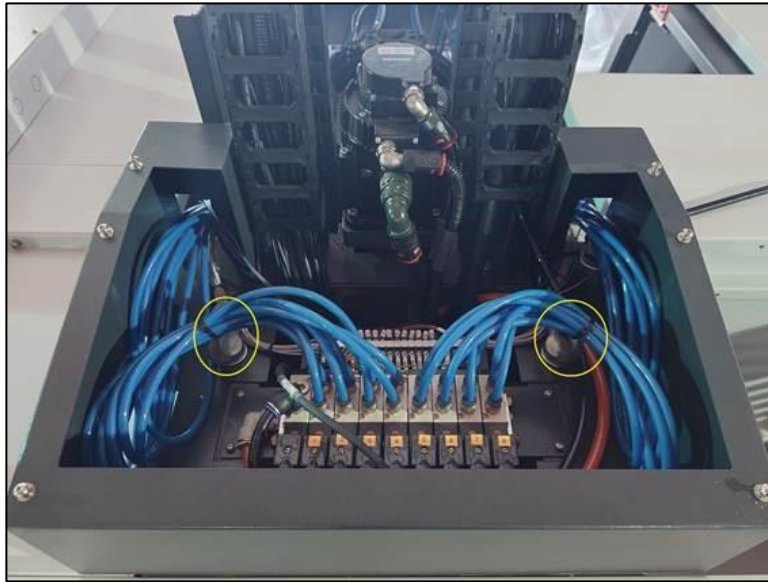
1. Install the Z-axis servo motor using the four bolts. Ensure the orientation is such that the connectors are facing the front of the machine. Reattach the three cables for power, brake, and encoder onto the motor.



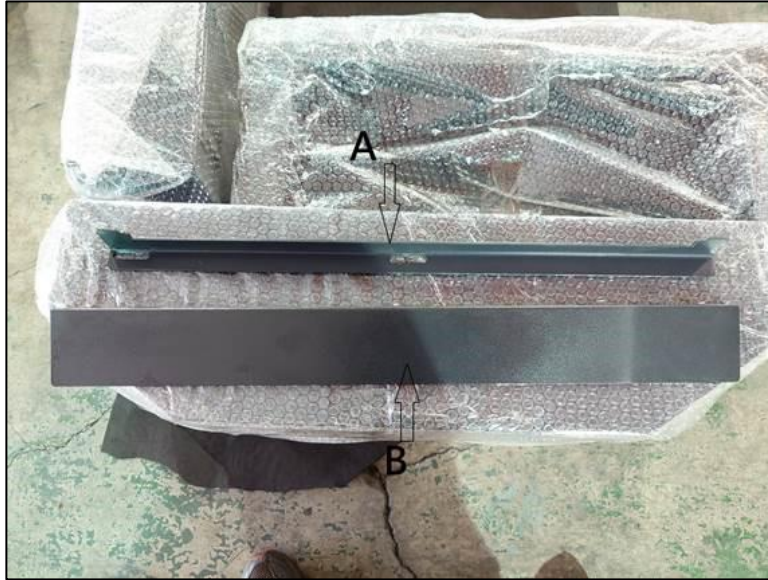
2. Install the two cable guide chains on the head onto the sheet metal fixtures as shown by the arrows in the picture below. Partially remove the plastic fittings and fix them to the location as circled.

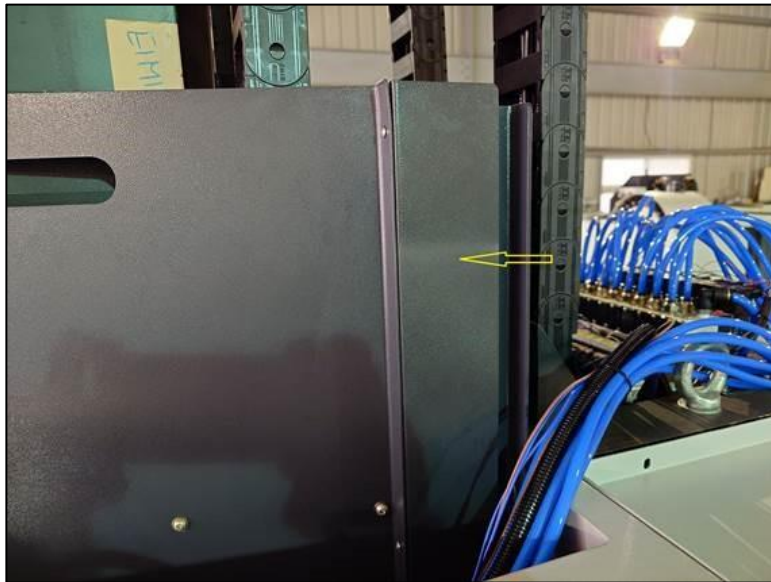


3. Install the two-piece protective sheet metal housing with cover around and over the air hose and solenoid valve lines.



4. Install and adjust the Z-axis limit switch assembly. This step requires the machine to be switched with the servos on and in the MPG mode to control the Z-axis. The two parts to install are A and B in the picture shown below. Move the Z-axis up while measuring the distance between the upper side of the slide block and the top of the column pictured below. When this distance is approximately 15mm, this location is the Z-axis Machine Zero position. Install part A such that the Z-axis limit switch is just touching and not pressed down or triggered. Then install part B to cover the limit switch assembly.





5. Install the head cover on the front side of the machine above the spindle motor and tool changer.



6. **Note:** After assembly of these components, the Spindle orientation for each tool position and the Z-axis tool change height must be checked and re-calibrated as needed. For detailed instructions, reference the section on servicing the Automatic Tool Changer.

3.3 Transit Fixtures

Prior to operating the machine, mechanical transit fixtures in the form of mechanical screws should be removed. These fixtures secure parts of the machine to prevent movement during transport.

Transit Fixtures:

1. Table-top spindle support bracket should be bolted onto the table with four screws and the Z-axis lowered onto it.
2. Doors are secured by L-brackets above and below each door. Machine is shipped with doors open.
3. X and Y-axes are secured by brackets bolted onto the base frame and onto the saddle respectively.

3.4 Electrical and Air Supply

Air pressure is required for this machine to perform tool changes, as each tool station is driven by air cylinders controlled by air solenoid valves. Power

Table 3.4-1: Electrical and Air Requirements

AIR REQUIREMENTS	6 kg/cm ² (90 psi)
POWER INPUT – 220V	3 Phase, 220V, 60 Hz
• MAX CURRENT	60 A

• MAX LOAD	10 kVA
POWER INPUT – 415V	3 Phase, 415V, 50 Hz
• MAX CURRENT	32 A
• MAX LOAD	23 kVA

3.5 Leveling

Leveling of the machine is necessary for proper operation of the machine. The machine is levelled by adjusting the screws on the four leveling pads.

Leveling Procedure:

1. Set the machine on its levelling pads on a solid, level floor.
2. Put two precision levels on the center of the table perpendicular to each other, directly under the spindle, along the X-axis and Y-axis.
3. Adjust the levelling screws on each pad until the machine is level to within 0.01 mm over 2500 mm distance along each axis.
4. When the machine is leveled, lock the levelling screws in place with the hex nuts.

3.6 Lubrication System

Check the auto lubrication system and that it provides oil to all axis ways. The suggested lubrication interval and pumping duration are detailed in the following table.

Table 3.6-1: Lubrication Interval and Duration

LUBE INTERVAL	90 minutes
LUBE PUMP DURATION	12 seconds

3.7 Installation Checklist

The following is a general verification checklist to be completed during a machine install.

Table 3.7-1: Installation Checklist

#	Item	Verified
1	Machine is unpackaged	
2	Table, knee fixtures and Spindle support removed	
3	Machine is leveled	
4	Electrical power supplied and measured	
5	Air pressure supplied and verified	
6	Power ON normal	
7	E-Stop disengage is normal	

8	RESET enables servo ON	
9	Lubrication system engages on first power ON and RESET	
10	Home and OT limit switch inputs verified	
11	Home each axis individually	
12	Verify spindle run and rotation	
13	Flood coolant motor rotation (3-phase supply) is correct	
14	MPG or electronic handwheels are operational	
15	Measure and verify backlash	
16	Safety guards and locks operational	
17	Verify quill axis direction and operation	
18	Verify tool change operation	

4 MAINTENANCE

4.1 Lubrication and Oil Maintenance

The following maintenance table details the lubrication and coolant oils used by each component and the recommended check-up and top-off intervals under a general usage profile of 8 hours per day.

Table 4.1-1: Lubrication and Oil Maintenance

Oil Part	Check-up	Quantity	Lubrication					Remark
			CPC	Mobil	Shell	Exxon	Gulf	
Auto lubrication	1-2 weeks	1.75 L	Way lub 68	Vectra 2	Tonna oil 68	Febis 68	Gulfway 68	Check oil mirror, and add if necessary
Air filter regulator	2 weeks	0.1 L	Circulation oil R-32	D.T.E oil light	Turbo oil T32	Teresso 32	Harmony 32	Add oil if necessary
Tool clamp air cylinder	1 month	0.2 L						
Spindle oil cooler	1 month	As needed						

4.2 Accuracy Compensation Inspection

Regular inspections of accuracy can provide a good snapshot of the overall health of the machine. Accuracy inspection tests are detailed in the following table. An every six-month or yearly accuracy inspection scheduled with the factory or distributor is generally recommended to detect potential unexpected wear and tear and to preserve machine longevity.

Table 4.2-1: Accuracy Inspection Maintenance

Accuracy Test	Check-up Interval	Nominal Values
Repeatability with dial indicator	1/month	Positional Accuracy < 0.005 mm Repeatability < 0.003 mm
Backlash with dial indicator	1/month	X-axis < 0.005 mm Y-axis < 0.005 mm Z-axis < 0.005 mm
Ball-Bar Test	1/month	Matches installation values
Lead Screw Laser Compensation	1/year	X, Y, Z axes < 0.002 mm

5 SERVICING

5.1 Air System

The MDS-series machines require compressed air for tool clamping, unclamping, and automatic tool changing. The compressed air enters an air filter-regulator-lubrication (FRL) unit and is then distributed via air hoses and junction blocks to the tool clamp assembly inside the spindle as well as to each individual tool station piston.

General operation requirements:

1. The air pressure for the machine needs to be over 650 kPa or 90 PSI.
2. Each tool station air cylinder has two individual pressure adjustment knobs to control the extension and retraction speed for each tool arm. These should be adjusted such that each tool station moves in and out smoothly while minimizing the impact on the arms.

Service notes:

1. The air filter regulator contains a lubrication reservoir that needs to be refilled with normal air filter regulator oil to ensure the proper working condition of valves and junctions.
2. The tool clamp and unclamp air cylinder has a separate oil lubrication reservoir built onto its side. This needs to be refilled with R32 oil or way lubricant.

5.2 Way Lubrication System

The automatic way lubrication system periodically distributes lubrication oil to each axes way surfaces and ball screws. Lubrication is necessary to reduce frictional wear and tear on the ball screws, ball nuts, rollers, and way surfaces due to mechanical movement of the machine. The lubrication unit consists of a pump and reservoir. This unit is powered through a relay in the control cabinet that is activated and deactivated by a PLC output on the main control system. The lubrication system activation interval and pump duration are both set in the control system PLC parameters.

5.2.1 Lubrication Duration and Interval

The key parameters for the lubrication system are the LUBE PUMP DURATION which specifies the length of time each lubrication cycle lasts, and the LUBE INTERVAL which specifies the length of time interval between each lubrication cycle. The LUBE PUMP DURATION is set based on the duration required to ensure even distribution of oil to all lubrication line destinations. After powering on the machine, the control system will actively lubricate the machine based on the set LUBE INTERVAL according to the following rules:

1. On Power ON, after E-STOP is released and RESET is engaged, the first lubrication cycle is executed after five minutes.
2. On CYCLE START, the PLC checks if the machine had been lubricated within the past lubrication interval. If not, a lubrication cycle is performed.

3. At any given time while the machine is in a RUN status, the timer for lubrication accumulates. When this timer exceeds the set LUBE INTERVAL, a lubrication cycle is automatically performed, and the timer is reset to zero.

LUBE INTERVAL	90 minutes
LUBE PUMP DURATION	12 seconds

5.2.2 Lubrication Oil Specification

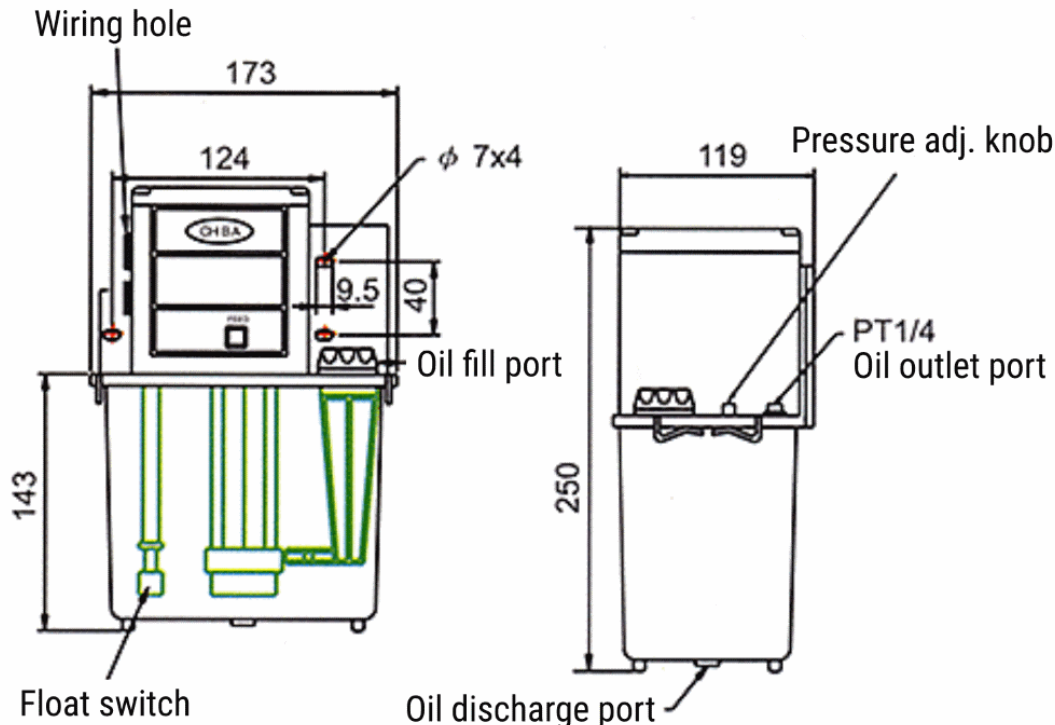
The ISO Viscosity Grade 68 specification for lubrication oil is required for the lubrication of machine ways. Reference for several brands of oil that can be used to refill the lubricator reservoir:

- CPC Way Lube 68
- Mobil Vactra Oil No. 2
- Shell Tonna 68
- Exxon Febis K68
- Gulf Way 68
- Chevron Way Oil Vistac ISO 68

5.2.3 Lubricator Unit

The Chiba TM-3F type lubricator unit has a 2L capacity oil reservoir. It is powered by 110V or 220V depending on the model. The pump will activate upon power on for a preset interval set in the control. A pressure adjustment knob to the right of its display can be used to tune and overcome the resistance in the tubing for proper distribution of lubricant to the farthest ways and screws (typically the furthest outlets are on the Z-axis). When filling the reservoir, do not overfill above the high limit.

Table 5.2-1: Chiba TM-3F Lubricator Unit



5.3 Spindle System

The spindle system includes the spindle head, motor, inverter, tool clamp assembly, and all associated linkages, fasteners, and cabling between these components.

The spindle belt used for each spindle configuration is listed as follows:

- 8,000 RPM Spindle: **5GT-830-40 Timing Belt**
- 10,000 RPM Spindle: Direct drive (no belt used)
- 12,000 RPM Spindle: Direct drive (no belt used)

5.3.1 Direct Drive Spindle

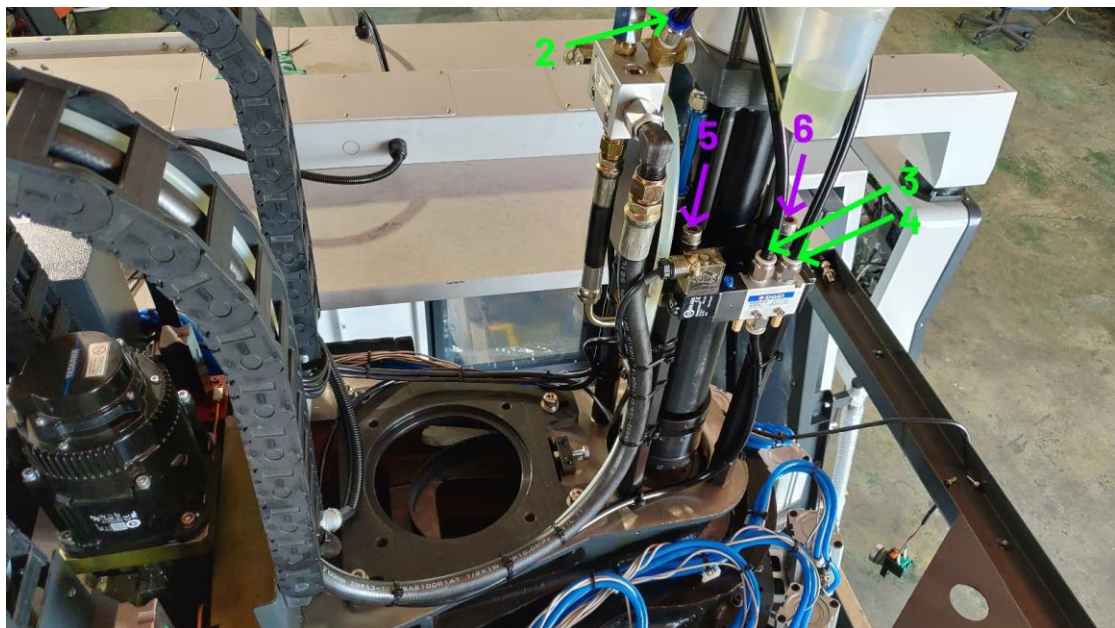
The following list contains direct drive spindle components:

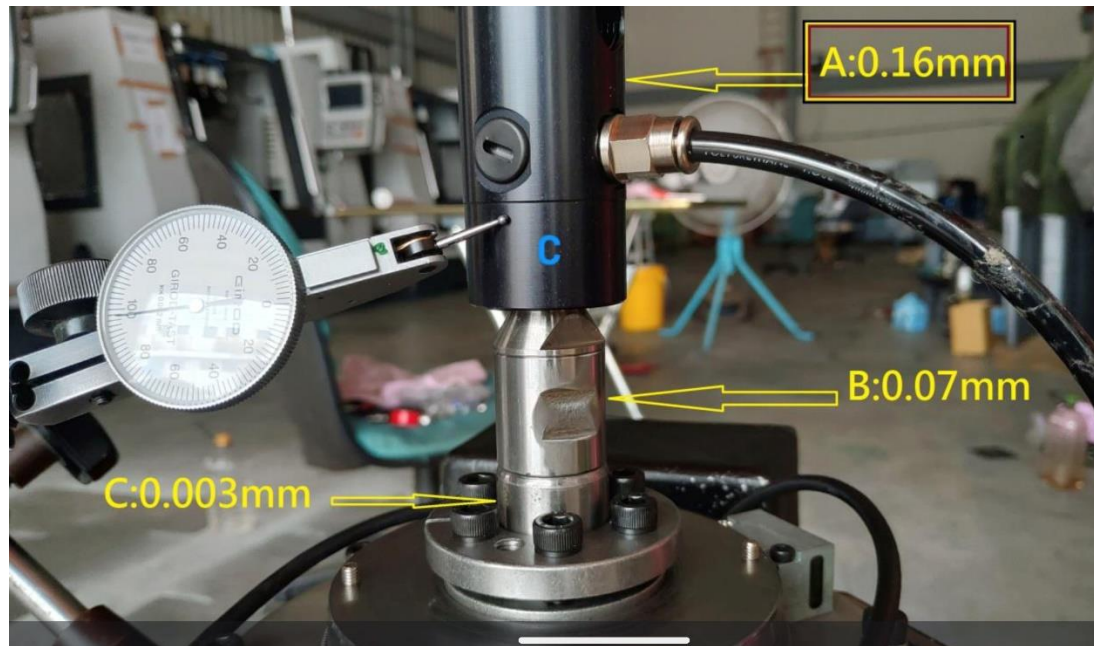
- A. Tool Clamp/Unclamp Air Cylinder
- B. Tool Clamp/Unclamp Limit Switches and Actuator
- C. Coolant Through Spindle Rotating Injector

Procedure for disassembly:

1. Unscrew nut at coolant inlet block (1)
2. Pull out air hoses (2, 3, 4)
3. Unscrew air cylinder bolts x4 (5, 6)

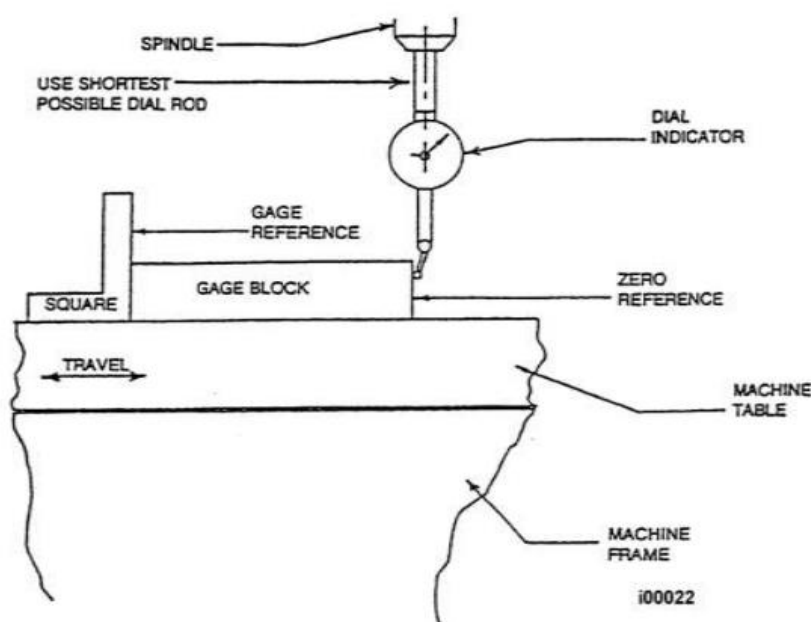
4. Unscrew rotating injector (C) clockwise to remove it.





5.4 Backlash Compensation

Every axis drive assembly has at least some backlash or lost motion during direction reversal, thus backlash compensation is also referred to as reversal compensation. The lost motion is due to gaps in the parts of the drive train and the accumulation of bending or elasticity of these parts while under load. The control system can compensate for this lost motion or backlash by applying an additional distance movement to each axis upon axis reversal. The backlash compensation values are initially set by the factory and may need to be adjusted periodically as the machine wears over time.



Follow these instructions to set the machine backlash compensation:

1. Turn off all backlash compensation values on the control and reboot. The backlash parameters are 2156A to 2158A.
2. Set a dial indicator capable of finer than 0.002 mm resolution on the spindle or head assembly and use the MPG to travel in one direction to load the indicator against a clean, rigid surface such as the edge of a vise without reversing. Once loaded, zero out the RELATIVE coordinate display on the control.
3. Use the MPG at x1 increments to reverse the axis until the dial indicator shows the first sign of movement. Upon any indication of movement of the dial, stop moving.
4. The distance travelled on the screen in RELATIVE coordinates is the backlash value for that axis.
5. Enter this value into the control (parameters 2156A to 2158A), then reboot and home the machine to verify if the backlash compensation is correct.

5.5 Lead Screw Compensation

***Note:** The WinDelta CNC System uses a bi-directional lead screw compensation scheme which accounts for backlash at each location, therefore any backlash previously set will no longer take effect when lead screw compensation is active.

The lead screw compensation function is performed dynamically by the control system to offset position errors due to any deviation between the maintained position in the control against the actual physical position as measured along each axis by a highly accurate measurement device such as a laser interferometer.

The lead screw compensation table is stored in the control system as a text file named "ptch_tbl.dat". This file can be exported and imported by booting up the control with the WinDelta USB Utility and executing the EXPORT MOT PARAMS and IMPORT MOT PARAMS functions. This file contains information on the number of axes to compensate and the compensation data for each axis. Note that this control system uses a bi-directional compensation scheme, thus two sets of offset data exist for each axis, one in the forward direction and one in the reverse direction. When the lead screw compensation is active, then the backlash settings for each axis are consequently ignored. All units are in microns.

The format for the lead screw compensation text file is described as follows:

PTCH_TBL.DAT File Format:

```
<Total number of axes to compensate>
<Axis number, starts at 0> <Number of compensation points> <Scaling>
Positions:
<Forward measured> <Commanded> <Reverse measured> <Commanded>
```

PTCH_TBL.DAT Example:

```
3
0      5      1.0
0      0      7      0
25004  25000  25011  25000
50008  50000  50015  50000
75012  75000  75019  75000
100016 100000 100022 100000
1      5      1.0
-100024 -100000 -100006 -100000
-75023  -75000  -75005  -75000
-50023  -50000  -50003  -50000
-25025  -25000  -25002  -25000
-27     0      0      0
2      5      1.0
-100006 -100000 -99999  -100000
-75005  -75000  -74998  -75000
-50006  -50000  -49998  -50000
-25008  -25000  -24999  -25000
-10     0      0      0
```

5.6 Automatic Tool Changer

The MDS-Series is equipped with an air pressure driven independent arm type tool changer. Ensure the supplied air pressure is stable and tool change I/O are in proper working condition before attempting a tool change.

5.6.1 Tool Change Sequence

The tool change sequence is detailed in Table 2.1-1.

Table 5.6-1: ATC Sequence and Troubleshooting

Step	Action	Alarm & Troubleshooting
1	Tool change action commanded by M6T_ or CALL TOOL function	Program Compile Error: Check tool change macro 09001.
2	Spindle stops	Spindle Inverter Alarm: Check spindle inverter alarm code.
3	Spindle orients to empty tool pocket	Check if tool pocket orientation angle is correct and standby pocket is empty.
4	Z rapids to tool change height	Check if tool change height is correct.
5	Arm extends to collect spindle tool	Check if air cylinder position sensors are working.
6	Spindle unclamps to release tool	Check tool clamp air cylinder mechanism and stroke for clean release.
7	Z rapids to clearance height	Check if tool change clearance height is correct.
8	Spindle orients to target tool pocket	Check if tool pocket orientation angles are correct on ATC troubleshooting screen.
9	Arm with target tool extends	Check tool clamp air cylinder mechanism and stroke for clean release.
10	Z rapids to tool change height	Check if tool change height is correct.
11	Spindle clamps to hold tool	Check tool clamp air cylinder mechanism and stroke for proper tool clamping.
12	Arm retracts	Check if air cylinder position sensors are working.
13	Spindle stops, finish tool change	Spindle Inverter Alarm: Check spindle inverter alarm code.

5.6.2 ATC Set Up and Diagnosis

The ATC must be set up and verified at the factory prior to machine deployment in the field, then checked again on-site prior to test operation. To set up the ATC, use the SYSTEM / MAINTENANCE / TROUBLESHOOTING screen on the control system to set the tool change clearance height, tool change height, and spindle orientations for each tool pocket. Figure 5.6-1 and Figure 5.6-2 show the ATC Set Up and Diagnostics screen and the Tool Change Positions Table screen respectively.

DynaPath JOG TC DIAGNOSTICS mm 2020-2-15 20:31:12

MACHINE		SPINDLE INFO		SPINDLE TOOL:	
X	190.054	ENC-POS(SMAC):	0.00	STANDBY TOOL:	1
Y	-45.056	ABSOLUTE:	0.00	STANDBY POCKET:	1
Z	-66.547	RELATIVE (0-360):	0.00	T.C. HEIGHT:	-109.208
4th	0.000	S-ENC PULSE:	0	SAFE HEIGHT:	0.000
		S-CMD PULSE:	0		
		SPINDLE RPM:	0.0		

TROUBLE SHOOTING START ODEG ORIENT SIGNAL FILTER (100ms): 6 T-CODE: 0

ORIENT ANGLE SETTING SPINDLE 0 DEG ORIENTATION **ENABLE ANGLE SETUP** **RECORD ENC-POS (SMAC) TO:** T 1

PISTON NO: 1 **BACK (M561)** **OUT (M581)** **TOOL NO:** 1 **ORIENT (M516)** **CALL TOOL**

UNCLAMP (M554) **CLAMP (M555)** **PISTON BACK**

OUTPUT INPUT **BACK/ OUT**

	BACK	OUT
PISITON1	☐	☐
PISITON2	☐	☐
PISITON3	☐	☐
PISITON4	☐	☐
PISITON5	☐	☐
PISITON6	☐	☐
PISITON7	☐	☐
PISITON8	☐	☐

MESSAGE: **STATUS: IDLE**

ATC TABLE **TL Change Position** **JOG** **MPG** **BACK**

Figure 5.6-1: SYSTEM / MAINTENANCE / TROUBLESHOOTING Screen

DynaPath JOG TOOL POSITION mm 2020-2-15 20:31:34

Tool Change Position Setting

	Position 1	Position 2	Position 3	Position 4	Position 5	Position 6
X	0.000	0.000	-8.395	-228.820	0.000	0.000
Y	0.000	0.000	-58.315	0.000	0.000	0.000
Z	-109.208	0.000	-179.165	0.000	0.000	0.000

POSITION DEFINITION

Tool Setter / Breakage Detecting

	Value	Unit
X	0.000	Max Measure Length: (mm/min)
Y	0.000	Base Tool Length: (mm/min)
Z	0.000	(mm/min)
Feedrate 1	0.000	(mm/min)
Feedrate 2	0.000	(mm/min)
TL Length Mode (0:-, not 0:+)	0.000	

MACHINE ABSOLUTE

	Machine	Absolute
X	190.054	170.086
Y	-45.056	39.936
Z	-66.547	23.552
4th	0.000	0.000

Set ATC and Tool Setter Postions

MESSAGE: **STATUS: IDLE**

BACK

Figure 5.6-2: ATC Tool Change Positions Table Screen

Instructions on setting up the ATC using these set up screens are detailed in Table 5.6-2.

Table 5.6-2: ATC Set Up Procedure

#	STEPS	INSTRUCTIONS
1.	Check Inputs and Outputs	Each air cylinder or PISTON is equipped with two sensors, one to detect if the cylinder is extended or arm is OUT, and another to detect if the cylinder is retracted or arm is BACK. The status for each tool piston is displayed on screen and each input must be verified for proper functionality: 1. MPG or JOG to lift Z-axis above and away from the tool arms. 2. Enter PISTON Number = 1 and press the PISTON OUT button. 3. Check if arm 1 is extended and PISTON 1 OUT is active. 4. Press the PISTON BACK button. 5. Check if arm 1 is retracted and PISTON 1 BACK is active. 6. Repeat and verify this for every tool arm.
2.	Set Z-axis Clearance Height	This sets the clearance height or the machine position value for Z-axis where it is safe to extend a tool arm with a tool inside the pocket. This is normally set to machine zero and stored into the TL Change Position Table under column "Position 2" and row "X".
4.	Set Spindle Orientation for Each Pocket	This sets the spindle orientation angles necessary to align the keys on the spindle to fit into the notches on each tool pocket when its arm is extended. 1. MPG or JOG to lift Z-axis above and away from the tool arms. 2. Press the SPINDLE 0 DEGREE ORIENTATION button. 3. Press the ENABLE ANGLE SETUP button. 4. Enter PISTON Number = 1 and press the OUT button. 5. Adjust the spindle orientation by hand and use the MPG to lower the key into the extended tool pocket. 6. Record the SMAC value, taking the average of two extremes, and save it to the TL Change Position Table under column "Position 3", row "X". 7. Repeat this for every tool pocket.
3.	Set Z-axis Tool Change Height	This sets the actual tool change height where the Z-axis is lowered onto an extended arm with a tool inside the pocket, such that the spindle can clamp onto the tool. 1. MPG or JOG to lift Z-axis above and away from the tool arms. 2. Enter a PISTON Number and press OUT to extend its arm. 3. Place the tool into the extended pocket. 4. Enter a TOOL Number and press ORIENT to orient the spindle. 5. Press the UNCLAMP button to open the internal tool gripper. 6. Use the MPG to lower the Z-axis and spindle onto the tool. 7. Record the Z-axis machine value when the spindle contacts the tool. 8. Press CLAMP and then PISTON OUT to transfer the tool to the spindle, and then press RESET to release the spindle orientation. 9. Store the recorded Z-axis machine value into the TL Change Position Table under column "Position 1" and row "Z".

5.6.3 Conditions for Tool Change

If the ATC was set up for the first time, or if an ATC fault has previously occurred, the following conditions should be reviewed and maintained for a proper tool change.

****IMPORTANT* Standard Conditions for Tool Change:***

1. Air pressure supplied to the machine is 600 to 750 kPa, or 90 to 110 PSI.
2. All inputs and outputs to the ATC have been verified.
3. Machine homing has been completed.
4. The OFFSET / ATC TABLE screen displays all the variables and registers used by the tool change macro program O9001. These are normally maintained by the control as it performs tool changes, however if a fault has occurred, these values must be corrected:
 - a. Every Pocket Number on the left most column should contain the correct intended Tool Number on the second column,
 - b. The Spindle Tool contains the current spindle tool number. If this tool number exists in any of the physical pockets on the ATC, then that pocket must be empty since the tool was obtained from that pocket. Otherwise, if that pocket still contains the tool, possibly due to a previous unfinished tool change or a system fault, then this Spindle Tool number needs to be set to some outside tool number so that the next tool change will prompt for removal of the spindle tool first.
 - c. The Standby Tool, and Standby Pocket fields normally contain the last tool pocket to reach out to the spindle and the tool number it contained. However, if there was a previous tool change fault, then set the Standby Pocket to 1, and set the Standby Tool to the tool number assigned to pocket 1. This will allow the tool change macro program to search for the target tool beginning from the first tool.

DynaPath 		JOG	ATC TABLE	mm	2020-2-15 20:31:28
NO.	TOOL	TYPE	MAG. INFO.	FORMAT TABLE	
01	1	4	MAX TOOL		
02	2	1	4		
03	3	4	SPINDLE TOOL		
04	4	4	1		
05	5	0	STANDBY TOOL		
06	6	0	1		
07	7	0	STANDBY POCKET		
08	8	0	1		
09	9	0	T CODE		
10	10	0	0		
Tool Table				STATUS: IDLE	
MESSAGE:		PgDn	JOG	MPG	BACK

Figure 5.6-3: ATC Table Screen



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