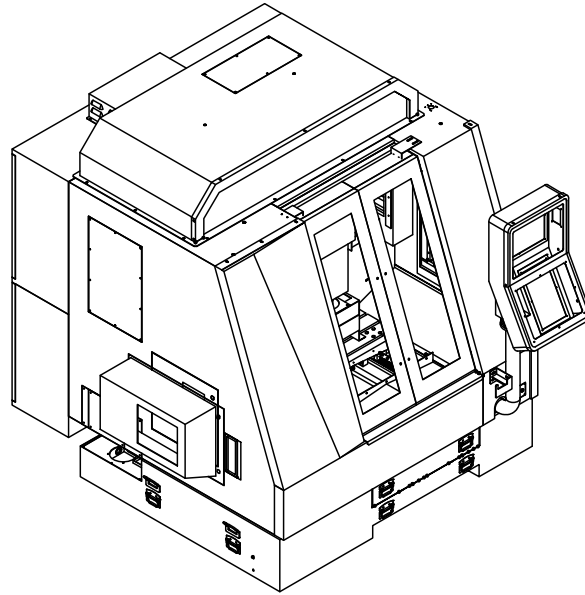


DynaPath
HSM Series
High Speed Milling Machines

MAC-HSM-SVC-A01-EN



Machine Install, Maintenance, and Service Manual

DynaPath Systems Inc.
Revised: 2023-05-15

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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:

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- **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:

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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 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 apply to this CNC machine tool 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

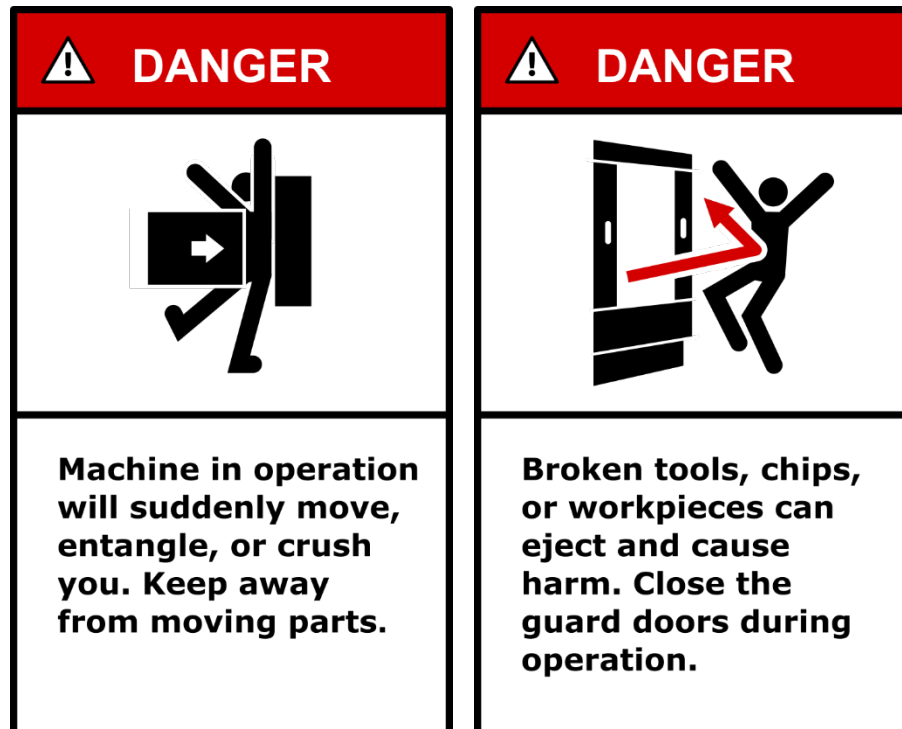


Figure 1.3.3: Safety labels for machine movement and debris

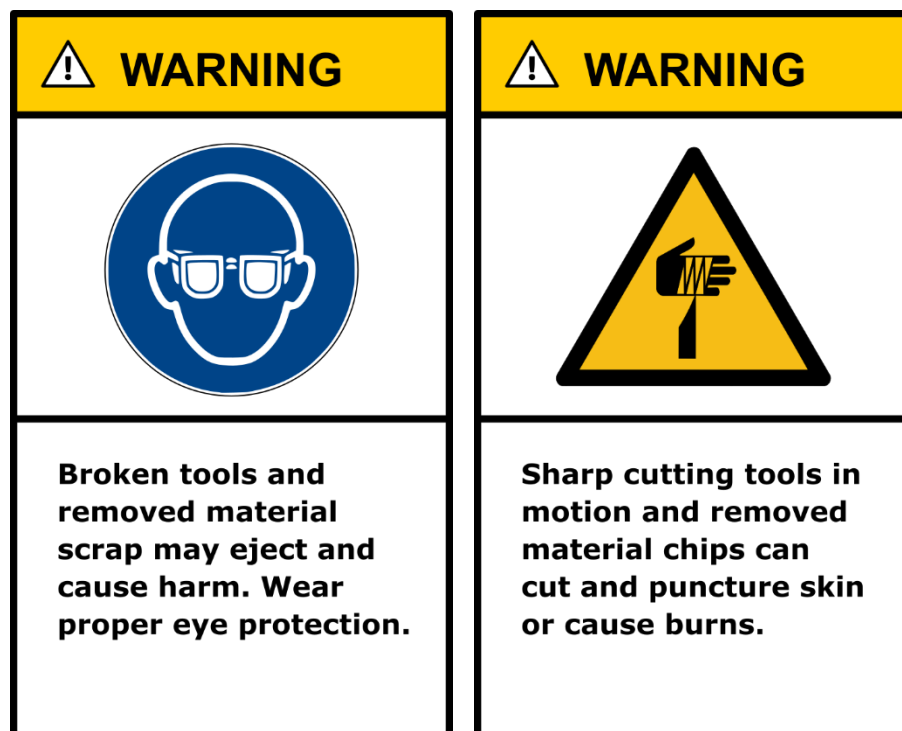


Figure 1.3.4: Safety labels for PPE and bodily injury

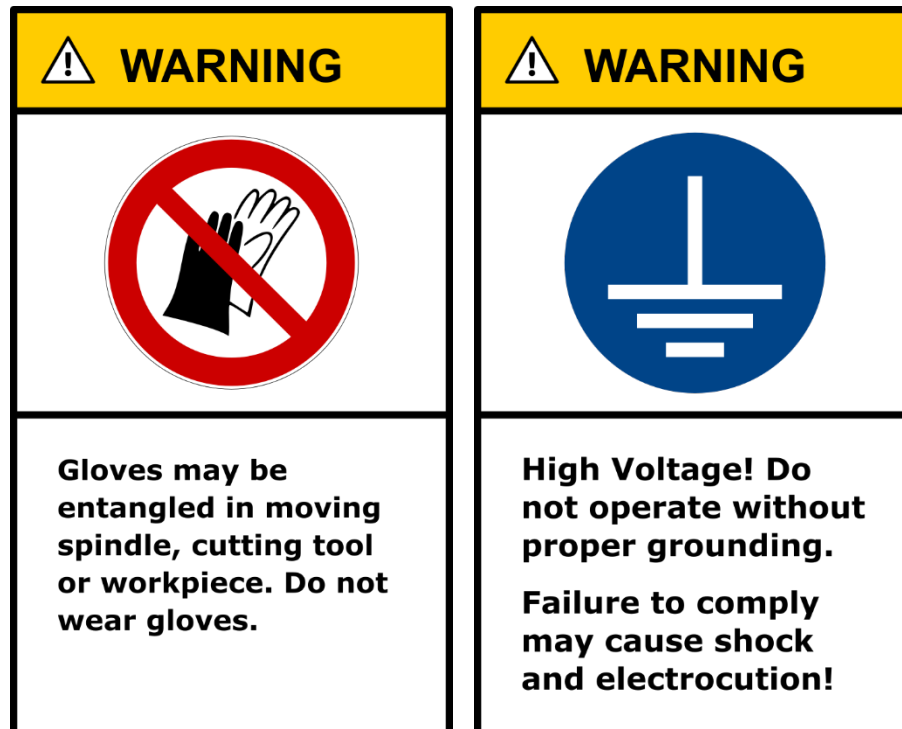


Figure 1.3.5: Safety labels for gloves and high voltage

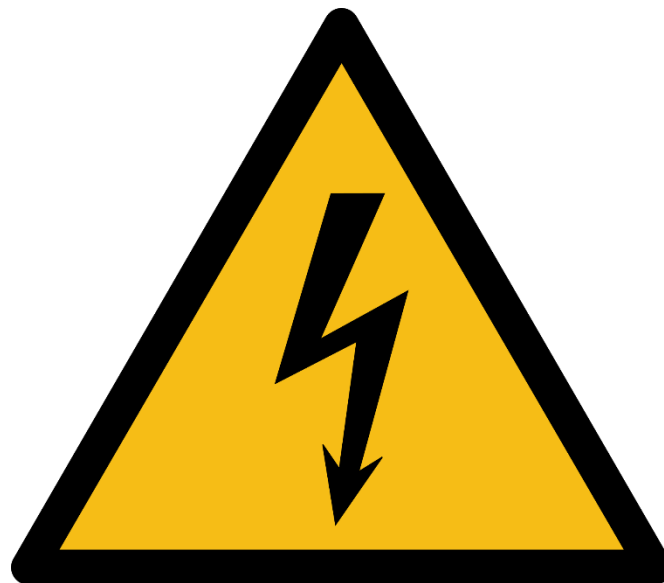
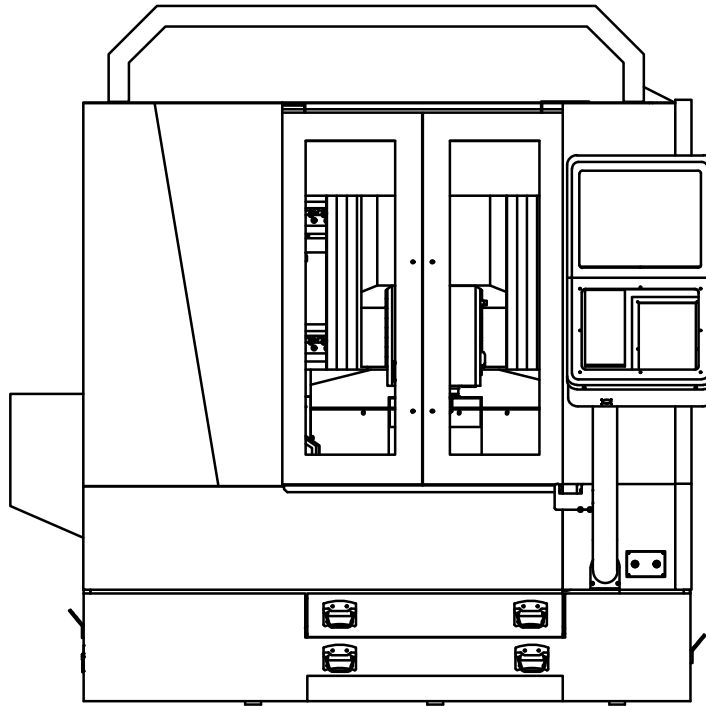


Figure 1.3.6: Safety label for electrical hazard

1.4 Application of Safety Labels and Decals

The location of each safety sign and label is detailed in this section. Make sure each label is applied properly and clearly readable, or it should be cleaned or replaced prior to any usage of the machine.



1.5 Safety Devices

Safety devices detailed in the following list are installed at the locations illustrated in Figure 1.5.1 and Figure 1.5.2.

- A. Main Door Interlock Switch
- B. Main Door Protective Guard and Window
- C. Emergency Stop and Safety Mode Switch
- D. Alarm Light
- E. Side Door Switch
- F. Main Power Switch

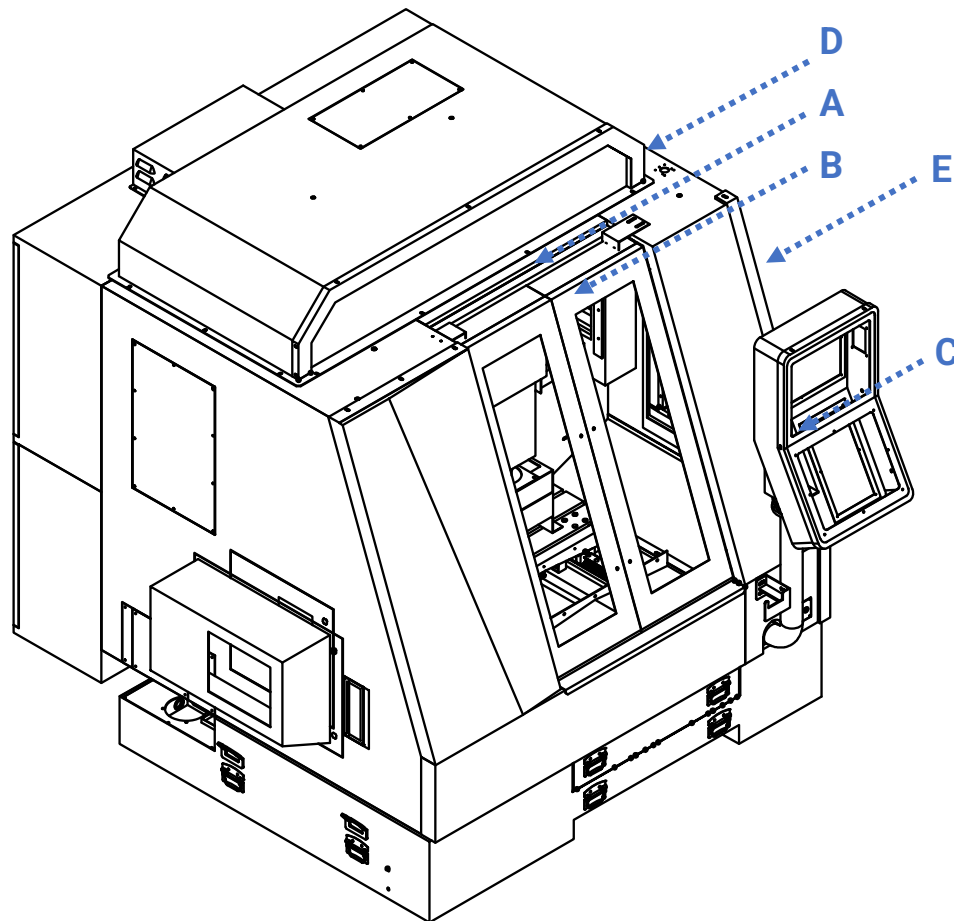


Figure 1.5.1: Safety Devices - Front

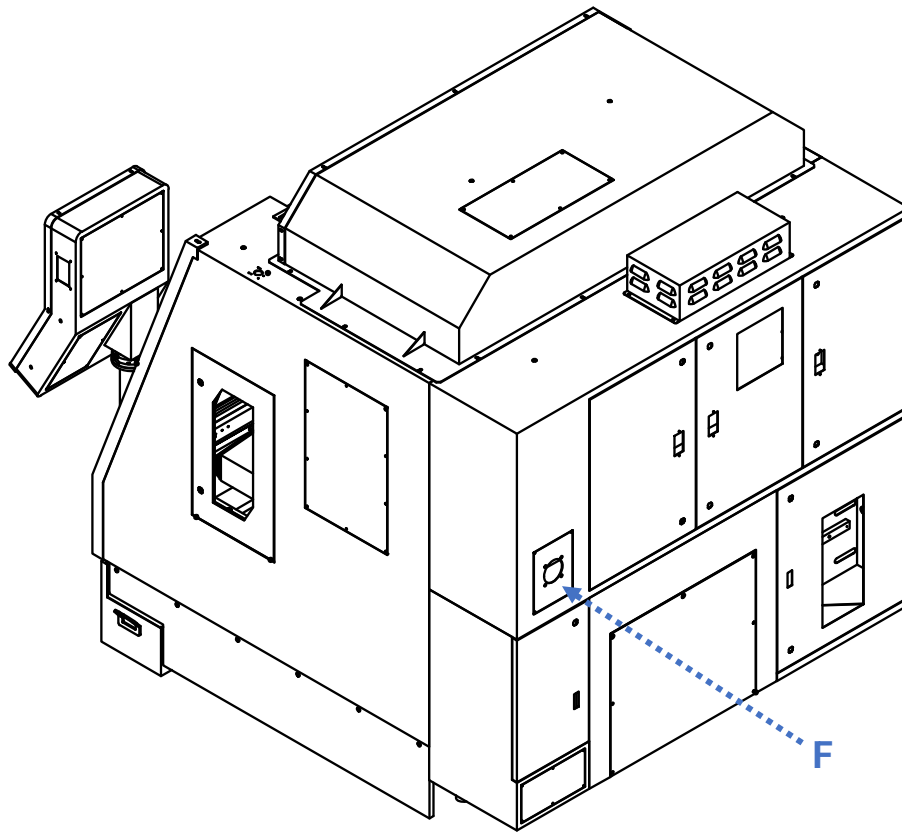


Figure 1.5.2: Safety Devices - Back

1.6 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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CE/UKCA 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: VKT Series Machine Specifications

		VK-3T	VK-4T
TRAVELS	TYPE	Knee Mill + ATC	Knee Mill + ATC
	TRAVEL XYZ	700 x 310 x 200 mm (27.5" x 12.2" x 7.8")	900 x 340 x 200 mm (35.4" x 13.3" x 7.8")
	KNEE TRAVEL (Z)	350 mm (13.7")	350 mm (13.7")
	SPINDLE NOSE TO TABLE	100-400 mm (3.9-15.7")	100-400 mm (3.9-15.7")
AXES	TOOL TO COLUMN	360 mm (14.2")	360 mm (14.2")
	AXIS TYPE X/Y/Z	Dove / Box / Linear	Dove / Box / Linear
	MOTORS X/Y/Z	0.85 / 0.85 / 0.85 kW Direct Drive	0.85 / 0.85 / 0.85 kW Direct Drive
SPINDLE	SPINDLE TAPER	BT40 / CAT40	BT40 / CAT40
	SPINDLE DIAMETER	120 mm (4.7")	120 mm (4.7")
	SPINDLE MAX RPM	6000 RPM	6000 RPM
	SPINDLE MOTOR	5 HP (3.75kW) Direct Drive, Dual Winding	5 HP (3.75kW) Direct Drive, Dual Winding
	SPINDLE RATED TORQUE	24 N-m (17.70 ft-lb")	24 N-m (17.70 ft-lb")
ATC	TOOL CHANGER	4 Stations	4 Stations
SPEED / ACCURACY	MAX RAPID SPEED X/Y/Z	6000 mm/min (236 IPM)	6000 mm/min (236 IPM)
	POSITIONING ACCURACY	20 um (0.000787")	20 um (0.000787")
	REPEAT ACCURACY	10 um (0.000394")	10 um (0.000394")
TABLE	TABLE SIZE	1270 x 320 mm (50.0" x 12.6")	1470 x 320 mm (57.9" x 12.6")
	TABLE SLOTS x OFFSET x WIDTH	3 x 65 mm x 16 mm (3 x 2"9/16 x 5/8)	3 x 75 mm x 16 mm (3 x 2"61/64 x 5/8)
	MAX TABLE LOAD	220 kgs (484 lbs)	220 kgs (484 lbs)
WEIGHT / DIMENSIONS	MACHINE WEIGHT	1600 kg (3520 lbs)	1800 kg (3960 lbs)
	SHIPPING L x W x H	1800 x 1600 x 2300 mm (71" x 63" x 91")	2000 x 1800 x 2300 mm (79" x 71" x 91")
	MACHINE L x W x H	2400 x 1600 x 2650 mm (95" x 63" x 105")	2600 x 1800 x 2650 mm (103" x 71" x 105")
CAPACITY	LUBE CAPACITY	2 L	2 L
	COOLANT CAPACITY	50 L (13 gal)	50 L (13 gal)
INSTALL	AIR REQUIREMENTS	6 kg/cm ² (90 psi)	6 kg/cm ² (90 psi)
	POWER REQUIREMENTS	7 kVA, 3 Phase, 220V	7 kVA, 3 Phase, 220V

2.2 Dimensions

2.2.1 Mechanical Dimensions

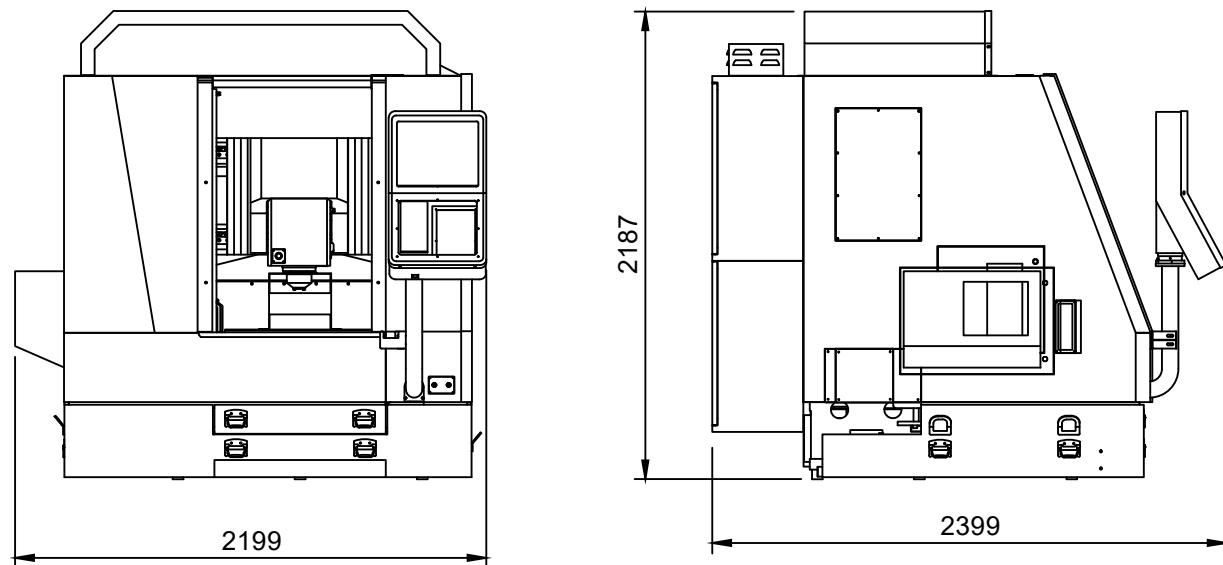


Figure 2.2.1: HSM-650S Machine Dimensions (Units in mm)

2.2.2 Floor Space

The required floor space and minimum ceiling height of the machine allowing for access into all doors and panels is:

- Width: 2400 mm (97")
- Length: 2500 mm (81")
- Height: 2200 mm (105")
- *Spindle chiller placed on left side
- *Coolant reservoir and chip tray accessed from front of machine

3

INSTALLATION

4.1 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 control pendant is secured, and any electrical cables or air supply hoses to the machine are removed.

The HSM-series machines can be lifted with fork-lift under the machine or by overhead crane. Adhere to the following lifting procedures.

Fork-lift Procedure:

1. Remove the coolant reservoir and coolant tray from underneath the machine.
2. Remove lower side panels on the left and right of the machine.
3. Insert forks under the machine. Lift no more than 10cm (3 in) to ensure stability and weight distribution.
4. Lift and move the machine.
5. Prior to setting the machine, place the leveling pads under the leveling screws.

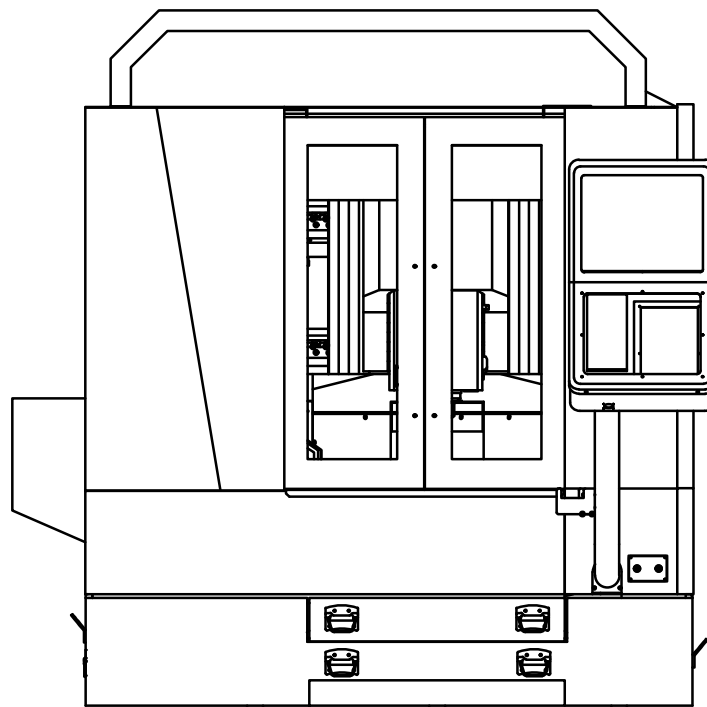


Figure 4.1.1: Lifting the Machine

4.2 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.

4.3 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. Locations of transit fixtures are illustrated in the following figure.

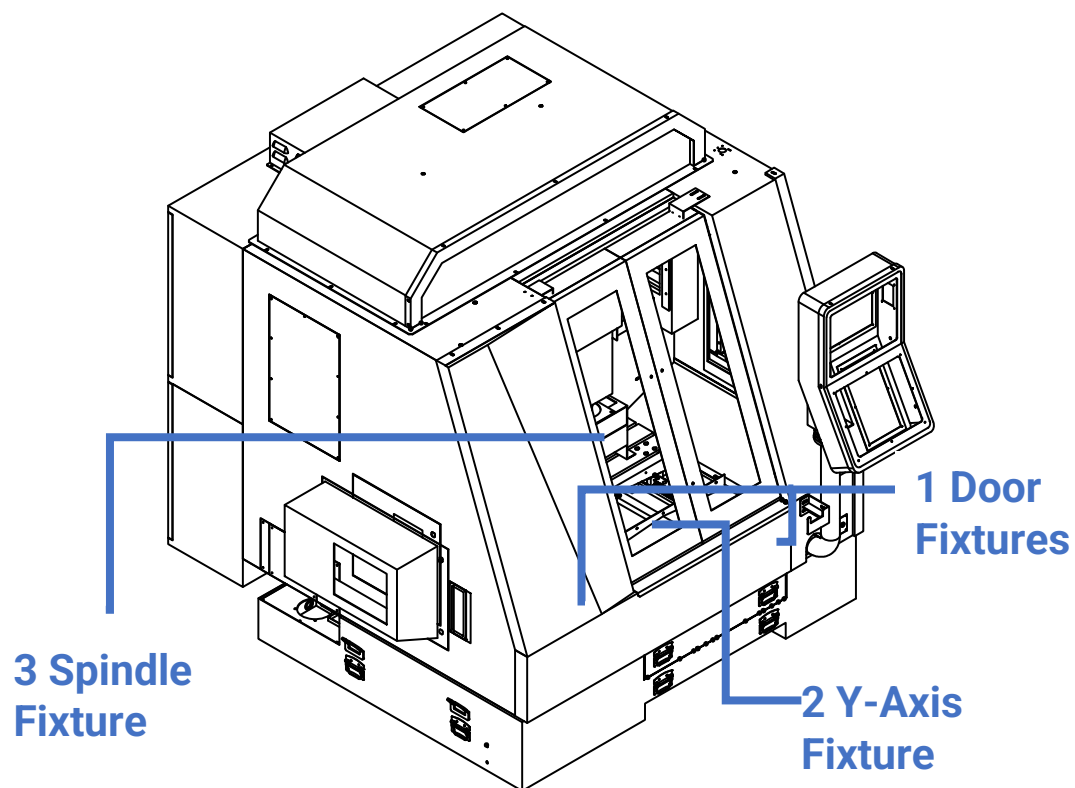


Figure 4.3.1: Transit Fixtures

4.4 Electrical and Air Supply

Table 4.4.1: Electrical and Air Requirements

AIR REQUIREMENTS	6 kg/cm ² (90 psi)
POWER REQUIREMENTS	30 kVA, 3 Phase, 220V

4.5 Lubrication System

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

Table 4.5.1: Lubrication Interval and Duration

LUBE INTERVAL	90 minutes
LUBE PUMP DURATION	12 seconds

Table 4.5.2: Grease Lubrication Interval and Duration

LUBE INTERVAL	5 hours
LUBE PUMP DURATION	20 seconds

4.6 Installation Checklist

Table 4.6.1: 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	

5 MAINTENANCE

5.1 Routine Maintenance

Oil Part	Time	Quantity	Lubrication					Remark
Auto lubrication (Grease)	2-4 weeks	1.75 L	Divinol Lithogrease 000					For HSM Graphite type
Auto lubrication (Oil)	1-2 weeks	1.75 L	CPC	Mobil	Shell	Exxon	Gulf	Check oil level, and add if necessary
			Way lub 68	Vectra 2	Tonna oil 68	Febis 68	Gulfway 68	
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
Pneumatic booster cylinder	Lower than 50%	80%						
Oil cooler	Lower than 0°C scale	40°C scale						

6 **SERVICING**

6.1 Air System

The HSM-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 the tool magazine door.

1. Air pressure supplied to the machine should be 600 to 750 kPa, or 90 to 110 PSI.

6.2 Lubrication System

The automatic 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.

6.2.1 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	4-5 hours (14400 to 18000 seconds)
LUBE PUMP DURATION	15 seconds

6.2.2 Lubrication Oil Specification

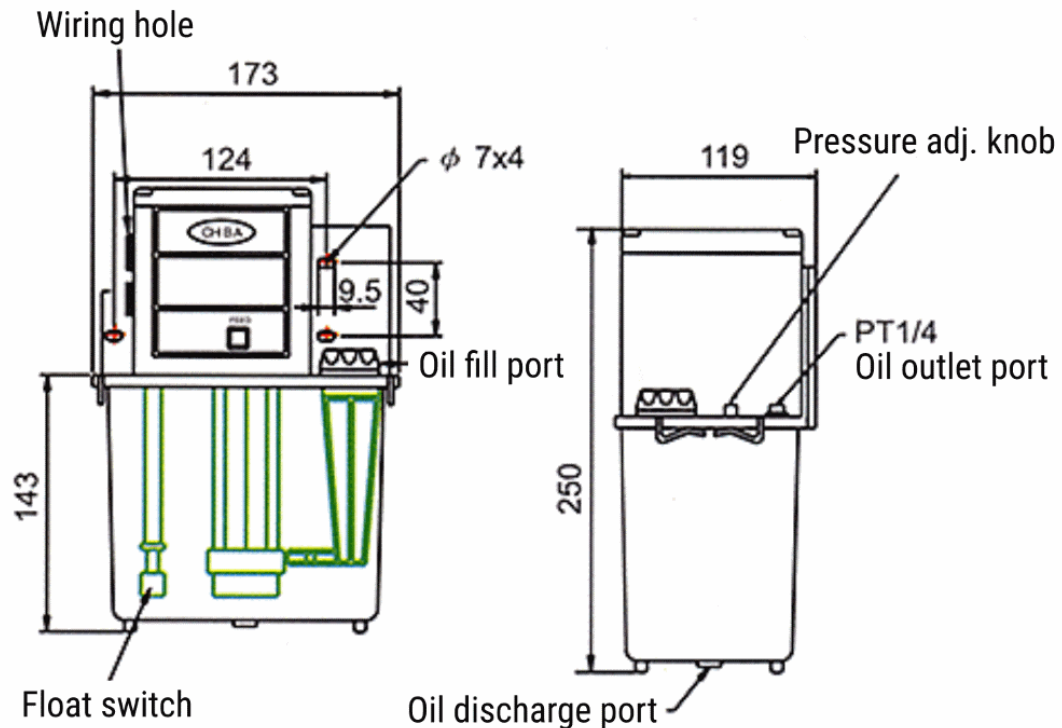
The lubrication oil recommended for the lubrication of machine ways is lithium type grease. Reference for several brands of grease that can be used to refill the lubricator reservoir:

- Divinol Lithogrease 000

6.2.3 Lubricator Unit

The lubricator unit has a 2L capacity oil reservoir. It is powered by single phase 110V or 220V depending on the model. Pumping of lubrication will commence upon the supply of power to the unit. A pressure adjustment knob to the right of its display should 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 6.2.1: Lubricator Unit



6.3 Lead Screw Compensation

The lead screw compensation 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.

All HSM machines have lead screw compensation activated on the control. The lead screw compensation values were measured at the factory during final verification using laser interferometer instrumentation to ensure machine accuracy. The lead screw compensation is measured in both directions on each axis and thus contains backlash compensation.

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 exists 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
```

6.4 Automatic Tool Changer

The HSM-Series is optionally equipped with an automatic tool changer system consisting of a motor driven tool magazine and a tool door mechanism. Proper set up of the tool changer for operation includes checking the supplied air pressure is sufficient and stable, tool change heights are set properly, and tool change related sensors, actuators, and I/O are all working properly. This section details the set up and troubleshooting of the automatic tool changer.

6.4.1 Tool Change Sequence

The tool change sequence is detailed in the following table.

Table 6.4.1: ATC Sequence and Troubleshooting

Step	Action	Possible Error Conditions
1	Tool change commanded (M6 T_ or CALL TOOL function)	No action: Review ATC Table screen, spindle tool number, standby tool, standby pocket values should match. Program Compile Error: Check tool change macro 09001.
2	Z rapid move to machine zero	Check if OT is triggered.
	Y rapid move to machine zero	Check if OT is triggered.
3	Spindle stops (M5)	Spindle Inverter Alarm: Check spindle inverter alarm code if alarm exists.
4	Magazine door open (M40)	Check if air pressure is adequate. Check output signal is actuating the magazine door air solenoid valve. Check input signal for Mag Door Open is activated on open.
5	X rapid moves to position adjacent to magazine	Should not be over the standby magazine pocket. Standby pocket should not contain any tool.
6	Z rapid move down to tool change height	Check if tool change height is correct.
7	X move into magazine to return tool into pocket	Feed move into pocket should be at a proper speed to smoothly guide the tool into the standby pocket. This feed rate can be adjusted in the parameters.
8	Spindle unclamps to release tool (M44)	Check tool clamp air cylinder mechanism and stroke for clean release.
9	Z rapids to clearance height	Check if tool change clearance height is correct. It should be high enough to avoid

		collision when magazine rotates to the next tool.
10	Magazine rotates to the target tool	If target tool or pocket is incorrect, check ATC table for duplicate or misplaced tools.
11	Arm with target tool extends	Check tool clamp air cylinder mechanism and stroke for clean release.
12	Z lowers to tool change height	Check if tool change height is correct.
13	Spindle clamps tool (M45)	Check tool clamp air cylinder mechanism and stroke for proper tool clamping.
14	X rapid moves to position adjacent to magazine	
15	Z rapid move to machine zero	
16	X rapid return to location where initial tool change was called	

6.4.2 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 6.4.1 and Figure 6.4.2 show the ATC trouble shooting screen and the tool change positions table respectively.

DynaPath JOG TC DIAGNOSTICS mm 2020-1-29 18:40:49

ATC STANDBY

TROUBLE SHOOTING OFF

SPINDLE TOOL 5

STANDBY TOOL 1

STANDBY POCKET 1

TROUBLE SHOOTING START

SPINDLE ORIENTATION

MAGAZINE DOOR CLOSE(M21)

MAGAZINE DOOR OPEN(M20)

IGNORE Z AXIS TC HEIGHT

MAGAZINE CW

MAGAZINE CCW

TOOL CLAMP

TOOL UNCLAMP

Tool Trouble Shooting

MESSAGE: STATUS: IDLE

ATC TABLE TL Change Position BACK

Figure 6.4.1: SYSTEM / MAINTENANCE / TROUBLESHOOTING Screen

DynaPath JOG TOOL POSITION mm 2020-1-29 18:40:53

Tool Change Position Setting

	Position 1	Position 2	Position 3	Position 4	Position 5	Position 6
X	0.000	0.000	0.000	0.000	0.000	0.000
Y	0.000	0.000	0.000	0.000	0.000	0.000
Z	-133.267	0.000	-133.267	0.000	0.000	0.000

POSITION DEFINITION

Tool Setter / Breakage Detecting

X 0.000 Max Measure Length: (mm/min) 0.000

Y 0.000 Base Tool Length: 0.000

Z 0.000

Feedrate 1 0.000 (mm/min)

Feedrate 2 0.000 (mm/min)

TL Length Mode (0:-, not 0:+) 0.000

MACHINE ABSOLUTE

X	116.200	40.000
Y	36.200	-40.000
Z	-71.429	2.026
4th	0.000	0.000

Set ATC and Tool Setter Postions

MESSAGE: STATUS: IDLE

BACK

Figure 6.4.2: ATC Tool Change Positions Table Screen

Instructions on setting up the ATC using these set up screens are detailed in Table 6.4.2.

Table 6.4.2: ATC Set Up Procedure

#	STEPS	INSTRUCTIONS
1.	Troubleshooting Start	To begin setting up or performing diagnosis on the tool changer or ATC, start by toggling the TROUBLESHOOTING START button until it remains lit. This bypasses ATC related alarms for manual independent operation for each tool change step.
2.	Set Up Spindle Orientation	* This step is only necessary for spindles equipped with encoders. The correct spindle orientation angle is set up on the Spindle Drive by inputting an orientation angle offset parameter. Pressing the SPINDLE ORIENTATION button will output a signal from the control to the Spindle Drive for it to perform and hold orientation, then a return signal from the drive notifies the control that orientation has been completed, enabling this on-screen button to remain ON. To cancel spindle orientation, press RESET.
3.	Magazine Door Open / Close	Verify the magazine door open and close functions. The physical mechanism begins with an output signal from the control to an air solenoid valve that opens the magazine door using air pressure. When the door is fully opened, a limit sensor will return a signal to the control to confirm the door is open. For magazine door close, another output signal is output by the control to control to turn on another air solenoid valve (and turn off the previous valve). Similarly, another limit sensor will detect and return to the control that the door has been closed. To manually perform magazine open or close, toggle the MAGAZINE DOOR CLOSE or MAGAZINE DOOR OPEN buttons on the screen. *Door open or close can also be commanded by using M-code commands M20 (door open) and M21 (door close) in MDI.
4.	Magazine CW / CCW	The magazine is rotated from station to station by a motor that rotates each station per click of the MAGAZINE CW or CCW button. Each press of the MAGAZINE CW button should increase the pocket number by one until makes one full revolution and starts over at one. If this is physically showing a reversed rotation, shut off the machine and swap two legs on the three-phase input power to the machine and try again. If the magazine is driven by a servo motor, each station is set on the drive via parameter settings, and the current station position is returned to the control via an encoding of 3 to 6 digital inputs depending on the magazine capacity.
5.	Tool Clamp / Unclamp	Tool clamp and unclamp are each initiated by one output from the control, and each confirmed by one input wired to each of the clamp and unclamp limit switches. Use the physical push button next to the spindle or press the TOOL CLAMP or UNCLAMP on-screen buttons to test tool clamping.
6.	Set Up Tool Change Positions	Once each of the previous functionality is verified, physically use a tool gage or actual tool to measure the proper tool change height, standby position, and clearance height. When obtained, these values need to be input into the ATC Tool Change Positions Table.

6.4.3 Conditions for Tool Change

Before normal tool changing can be performed, the ATC table must be managed and verified, otherwise incorrect tool retrieval or tool collisions may occur.

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

1. Air pressure supplied to the machine is sufficient at 600 to 750 kPa, or 90 to 110 PSI.
2. Machine homing has been completed. This step is not necessary for machines equipped with absolute encoders.
3. E-STOP is released, control is RESET, and all alarms are cleared.
4. On the OFFSET / ATC TABLE screen, manage the following and edit if necessary:
 - a. Spindle Tool displays the current tool number in the spindle,
 - b. Standby Tool is the current tool number in the pocket adjacent to the spindle,
 - c. Standby Pocket is the pocket number in the position adjacent to the spindle,
 - d. Every Tool Number is physically located in each corresponding Pocket Number up to the max capacity of the ATC. The T-Code can be 0, it indicates the current commanded standby tool, and is only used when a tool change is initiated.

DynaPath 

JOG

ATC TABLE

mm

2020-2-15 20:31:28

NO.	TOOL	TYPE	MAG. INFO.
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

MESSAGE:

STATUS: IDLE

PgDn

JOG

MPG

BACK

Figure 6.4.3: ATC Table Screen

Note: If the spindle has a tool in it, its corresponding Spindle Tool Pocket must be empty, otherwise a crash may occur due to the Spindle Tool being returned to the pocket during tool change! For example, if the spindle contains tool 3, the Spindle Tool field should display tool 3, the ATC Table Pocket Number 3 should display tool 3, and physically in the tool magazine pocket 3 must empty of any tool.

6.5 Drives and Motors

6.5.1 Absolute Encoder Set Up

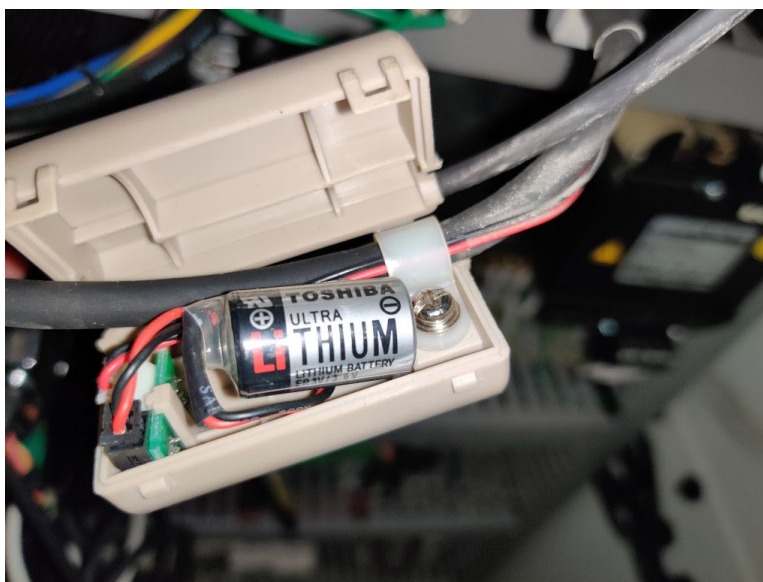
HSM-series machines equipped with absolute encoders do not require homing or referencing upon power on. These drives are equipped with battery powered circuitry that store the turn count of the encoders when the machine is powered off. Upon initial install, and when the battery has been removed or has run out of power, the position of the axis will no longer be remembered, thus requiring a reset of the absolute encoder position. This can be done with the following procedure.

Yaskawa Mechatrolink-II/III Drives

For Yaskawa Mechatrolink-II/III drives and motors equipped with absolute encoders, the alarm A.810 will show on the drive display when the absolute encoder requires a reset. The replacement battery specification for reference is Toshiba ER3V/3.6V.

Method 1, Performed on Control:

1. With machine powered off install the battery on the drive. It is typically housed in a plastic casing on the encoder cable connector on the drive.



2. Power on the machine.
 3. Go to SYSTEM / MAINTENANCE / ABS ENC SETTING.
 4. Reset the absolute encoder for each axis, then cycle power to the machine.
 5. This resets the HOME location for each axis. If this is the correct HOME position for the machine, this procedure is complete, otherwise continue to the next step.
 6. If machine is NOT currently in the HOME location, please power on the machine, use MPG to move the machine to the desired HOME location for each specific axis, and perform steps 3 and 4 again.
- *In the situation where software travel limits are preventing movement to the

HOME location for each axis, the parameters for software travel limits will need to be modified for each limited axis, then reboot to allow moving the axes to the desired HOME location. After setting absolute HOME location, the software travel limits will need to be changed back to acceptable safe ranges based off the new HOME location.