Fadal

# VMC
# Pre- Installation and Maintenance Guide

**Models: VMC2015HS, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC6032-50, VMC8032, VMC8032-50, VM5ax320**


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BY MACHINISTS.

# Pre-Installation Procedures

**Models: VMC2015HS, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC6032-50, VMC8032, VMC8032-50, VM5ax320**

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# 1: Foundation

**WARNING**

The VMC ***MUST*** be placed on a surface that will support the combined weight of the machine, its options, any fixtures, any tooling, any Rotary Table, etc. Check the Specifications Table for the minimum weights of the various models.

1. It is strongly recommended that the machine be placed on an isolated concrete pad from 6 to 12 inches thick [200-300mm], depending on machine size and weight, to minimize developing cracks later.
2. Position the VMC over a single slab, and not over a crack in the concrete. As the casting weights inside the machine shift during operation, this will minimize dimensional inaccuracies during the machining process.
3. Be aware that the concrete pad is expected to be the full width of the machine to stabilize any shifting and movement of the complete pad.
4. The first rule of preparation before the machine arrives is to assure that the floor can support the weight and can allow the machine to move throughout its limits without lifting or sinking.
5. Inadequate floor preparation can lead to inaccurate parts, and mechanical issues with the machine.

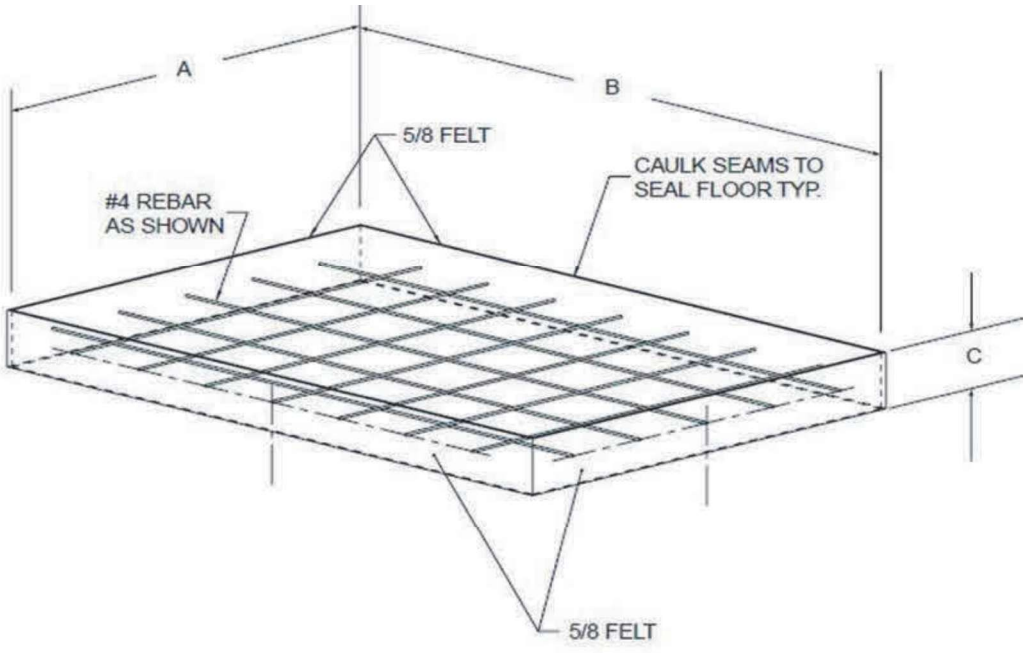


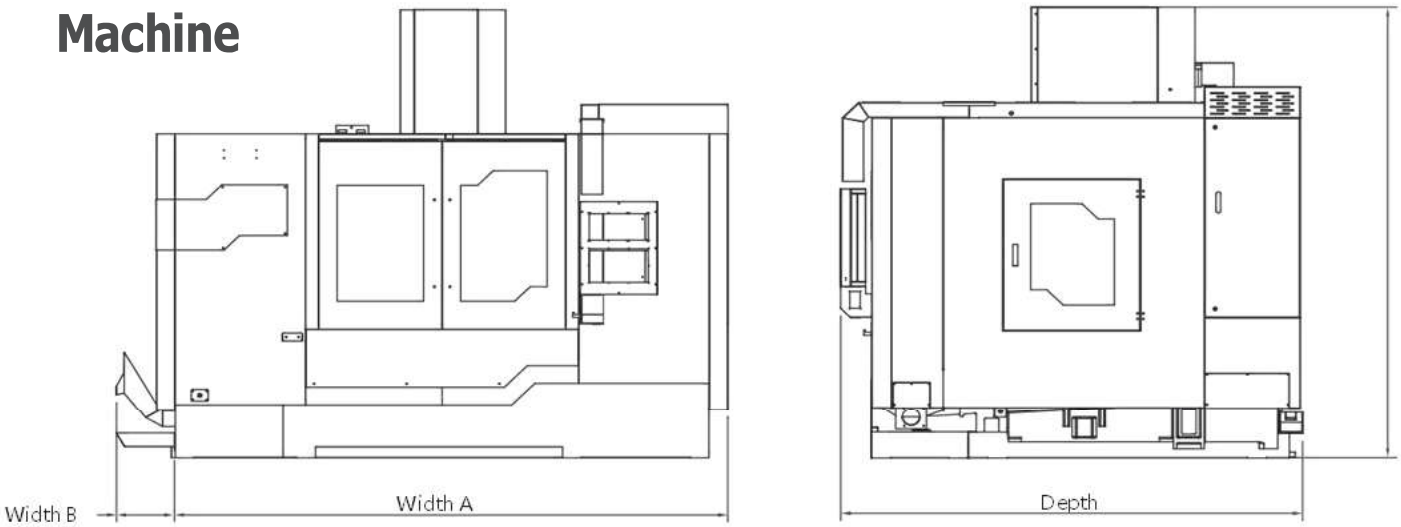

**Figure 2-1** Typical Pad Construction

| MACHINE MODEL | MACHINE WEIGHT mm/in | PAD SIZE: A x B x C (Inch) | PAD SIZE: A x B x C (Metric) |
|---|---|---|---|
| VMC2015HS | 3,000 / 6,614. | 60" x 95" x 6" | 152 x 241 x 15 cm |
| VMC2520 | 4,981 / 10,980. | 96" x 100" x 8" | 244 x 254 x 20 cm |
| VMC2520 (Ext-Z) | 5,171 / 11,400. | 96" x 100" x 8" | 244 x 254 x 20 cm |
| VMC3320 | 5,140 / 11,330. | 96" x 100" x 8" | 244 x 254 x 20 cm |
| VMC3320 (Ext-Z) | 5,353 / 11,800. | 96" x 100" x 8" | 244 x 254 x 20 cm |
| VMC4020 | 5,339 / 11,770 | 96" x 100" x 8" | 244 x 254 x 20 cm |
| VMC4020 (Ext-Z) | 5,534 / 12,200. | 96" x 100" x 8" | 244 x 254 x 20 cm |
| VMC4020-APC | 7,380 / 16,270. | 96" x 175" x 8" | 244 x 445 x 20 cm |
| VMC4022 | 5,500 / 12,126. | 96" x 100" x 8" | 244 x 254 x 20 cm |
| VMC5528 | 9,500 / 20,944. | 110" x 160" x 10" | 280 x 407 x 25 cm |
| VMC6032 | 14,694 / 32,400. | 133" x 173" x 12" | 333 x 500 x 30 cm |
| VMC6032-50 | 16,693 / 36,800. | 133" x 173" x 12" | 333 x 500 x 30 cm |
| VMC8032 | 15,695 / 34,600. | 133" x 173" x 12" | 333 x 500 x 30 cm |
| VMC8032-50 | 17,509 / 38,600. | 133" x 173" x 12" | 333 x 500 x 30 cm |
| VM5ax320 | 7,400 / 16,315. | 85" x 110" x 8" | 216 x 280 x 20 cm |

# 2: Selecting the Machine Location

1. Place the machine so that skylights or air vents are not directly overhead and place it where temperature changes will not impact the machine. In addition, do not place the machine in an area where the machine will be exposed to moisture, standing water, liquid, or rain.
2. Allow enough space behind the machine to fully open the rear cabinet doors. And still allow operators and service technicians to perform their tasks safely.
3. Ensure that there is adequate ceiling clearance for the topmost part of the machine when axis is up at its highest point. See chart below.

## Machine



| Modals | | VMC2015HS | VMC2520 | VMC3320 | VMC4020 | VMC4022 |
|---|---|---|---|---|---|---|
| Width A | mm /in. | 1,624 / 64. | 2,566 / 101. | 3,125 / 123. | 3,125 / 123. | 2,930 / 115.5 |
| Width B Chip . | mm / in. | 1,270 / 50. | 1,270 / 50. | 1,270 / 50. | 1,270 / 50. | e 48. |
| Depth | mm / in. | 2,197 / 86. | 2,440 / 96. | 2,440 / 96. | 2,440 / 96. | 2,420 / 95.5 |
| Depth Ele Doors Open | mm / in. | 889 / 35. | 889 / 35. | 889 / 35. | 889 / 35. | 889 / 35. |
| Height Min | mm / in. | 2,050 / 81 | 2,642 / 104. | 2,642 / 104. | 2,642 / 104. | 2,350 / 92.5 |
| Height Max Standard | mm / in. | 2,480 / 98. | 2,998 / 118. | 2,998 / 118. | 2,998 / 118. | 2,750 / 108.5 |
| Height Max Ex-Z | mm / in. | N/A | 3252 / 128. | 3,252 / 128. | 3,252 / 128. | N/A |
| Weight Standard | kgs / lbs. | 3,000 / 6,614. | 4,981 / 10,980. | 5,140 / 11,330. | 5,339 / 11,770. | 5,500 / 12,126. |
| Weight Ex-Z | kgs / lbs. | N/A | 5,171 / 11,400. | 5,353 / 11,800. | 5,534 / 12,200. | N/A |

| Models | | VMC5528 | VMC6032 | VMC6032-50 | VMC8032 | VMC8032-50 |
|---|---|---|---|---|---|---|
| Width A | mm /in. | 4,000 / 157.5 | 4,166 / 164. | 4,166 / 164. | 5,487 / 216. | 5,487 / 216. |
| Width B | mm / in. | 1,220 / 48. | 1,448/ 57. | 1,448/ 57. | 1,448/ 57. | 1,448/ 57. |
| Depth | mm / in. | 2,750 / 108.5 | 3,048 / 120. | 3,048 / 120. | 3,048 / 120. | 3,048 / 120. |
| Depth Ele Doors Open | mm / in. | 889 / 35. | 889 / 35. | 889 / 35. | 889 / 35. | 889 / 35. |
| Height Min | mm / in. | 2,850 / 112.5 | 3,353 / 132. | 3,353 / 132. | 3,353 / 132. | 3,353 / 132. |
| Height Max | mm / in. | 3,170 / 125. | 3,556 / 140. | 3,658 / 144. | 3,556 / 140. | 3,658 / 144. |
| Weight | kgs / lbs. | 9,500 / 20,944. | 14,694 / 32,400. | 16,693 / 36,800. | 15,695 / 34,600. | 17,509 / 38,600. |

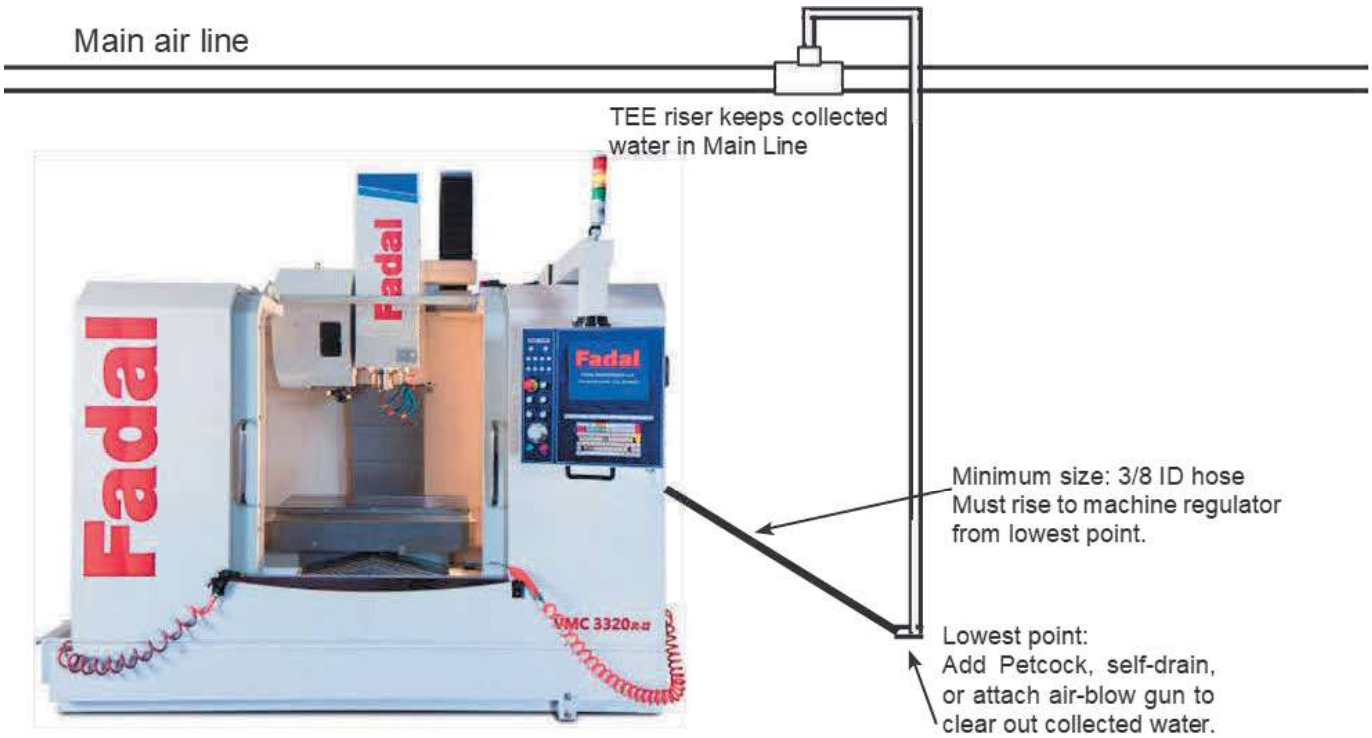
| Models | | VMC4020-APC | VM5ax320. | | | |
|---|---|---|---|---|---|---|
| Width A | mm /in. | 4,395 / 173. | 2,159 / 85. | | | |
| Width B | mm / in. | 1,270 / 50. | 1,270 / 50. | | | |
| Depth | mm / in. | 2,440 / 96. | 2,7,69 / 109. | | | |
| Depth Ele Doors Open | mm / in. | 889 / 35. | 889 / 35. | | | |
| Height Min | mm / in. | 2,642 / 104. | 2,642 / 104. | | | |
| Height Max | mm / in. | 3,252 / 128. | 3,100/ 122. | | | |
| Weight | kgs / lbs. | 7,380 / 16,270. | 7,400 / 16,315. | | | |

# 3: Air Supply For Machine Operation

1. Before the machine regulator, MAXIMUM pressure should be 120 PSI [8 Bar] from building to the machine.
2. After machine regulator, MINIMUM pressure should be 90 PSI [6.2 Bar] and the MAXIMUM pressure should be 110 PSI [7.6 Bar].
3. The air supply must be clean, filtered, and absent of any moisture.
4. The volume of air required during the Tool Change process ranges from 15 SCFM for standard tool changers, to 20 SCFM for Dual Arm Tool Changers. The Tool Change process runs no longer than a few a seconds at a time but requires adequate air volume to be available to complete the process.
5. When considering the main air supply line for a group of machines, consider the distance from the Air Compressor and the needs of the individual machines when selecting the pipe size. Pipe selection may include one of the following, but must follow local plumbing codes and restrictions: Galvanized pipe, Copper tubing, PVC tubing, or High Pressure Hose. Avoid using small bore quick disconnects, as they will restrict airflow supply.

## 3: Air Supply For Machine Operation (Continued)

6. By all means, insert a TEE riser in line to control condensation from entering the machine. The TEE riser should rise above the main line by 6 inches [150mm],then turn back down towards the machine, and at the bottom at the lowest point a petcock, manual drain, or a self-relieving water separator, or the operator's air-blowgun can be attached. First, this will disallow most moisture from entering the machine, and second allow any collected water to be removed.
7. Be certain that the line connecting air to the machine is 3/8 diameter minimum, and that it rises- up higher than the lo w est point shown in the picture below.
8. A refrigerated Air Dryer can be installed on the Air system to inhibit water from reaching the machine.
9. Pipe selection may include one of the following, but must follow local plumbing codes and restrictions: Galvanized pipe, Copper tubing, PVC tubing, or High Pressure Hose. Avoid using small bore quick disconnects, as they will restrict airflow supply.



# 4: Electrical Grounding

1. The importance of proper grounding CANNOT be over-emphasized! Improper grounding can result in a wide range of difficult-to-diagnose problems in internal communications, positioning, unwanted signals, etc.
2. The grounding connector from the machine to the building shall be of copper. The material selected shall be resistant to any corrosive condition existing at the machine installation site or shall be suitably protected against corrosion.
3. Refer to National Electrical Code NEC1990 Article250 Section 81.
4. The grounding conductor shall be AWG-#8 [10mm$^2$] or larger equipment ground conductor, and must be:
    a) Solid or stranded wire.
    b) Insulated, covered, or bare.
    c) Installed in one continuous length without a splice or a joint.
5. Individually covered or insulated grounding conductors shall have a continuous outer finish that is ether green, or green with one or more yellow stripes.
6. AWG-#8 [10mm $^2$] or larger equipment ground conductor and 3-phase power conductors must be contained within one of the following:
    a) Rigid metal conduit or wireway
    b) Intermediate metal conduit
    c) Electrical metallic tubing
7. The ground connector shall be connected between the VMC's ground bus, and the approved ground bus contained within the voltage supply panel board or enclosure.
8. The VMC branch supply conduit, phase conductors and ground conductors must be dedicated to a single VMC. They cannot be used to supply any other loads.

# 5: Supplemental Electrical Grounding

1. Refer to National Electrical Code NEC1990Article 250 Section91.
2. Supplementary grounding electrodes shall be permitted to augment the equipment grounding conductor; however, this is in addition to, and not in place of the sole equipment grounding conductor. 2
3. The supplemental grounding conductor shall be a AWG-#6 [16mm ] or larger copper conductor in the form of a wire, and must be:
    a) Solid or stranded
    b) Insulated, covered, or bare.
    c) Installed in o2ne continuous length without a splice or a joint.
4. An AWG-#6 [16mm ] or larger grounding conductor shall be run within one of the following:
    a) Rigid metal conduit or wireway
    b) Intermediate metal conduit
    c) Electrical metallic tubing or cable armor
5. One end of the supplemental grounding conductor shall be attached to the VMC's ground bus. The other end shall be effectively bonded to a copper cold water pipe that is in direct con-tact with the earth for 10 feet [3M] or more. Be aware that if the cold water pipe or ground rod are located underneath a building or its parking lot, insufficient moisture may be in the ground to conduct any transient voltages to the earth.
6. Connections shall be made so that they are electrically continuous.

# 6: Checking Electrical Grounding Integrity

## A. Specification

1. **MUST** conform to National Electrical Code [NEC].
2. Grounding wire **MUST** be a continuous wire AWG-#8 [10mm$^2$] or larger between the VMC's ground bus and the building power distribution panel serving the VMC.
3. **MUST** be dedicated to a single VMC. The ground and phase conductors cannot be shared with any other equipment.
4. Ground rods and other supplemental grounding may be used in addition to the ground specified above, but not instead of it.

## B. Inspection

1. The ground wire coming into the VMC and going to the building power distribution panel must be AWG-#8 or larger.
2. The ground wire must be connected to the VMC's ground bus bar in the cabinet, not to the screw terminal in the main disconnect switch.
3. The ground wire is to be a continuous wire from the VMC to the building power distribution panel serving the VMC.
4. The conduit or wireway **MUST NOT** be used as the grounding conductor wire. Ground rods and other supplemental grounding may be used in addition, but not instead of the grounding wire specified in step 3.
5. Fadal service technicians are not expected to inspect power distribution panels or building wiring. Refer to an appropriate electrical contractor.

### 6: Checking Electrical Grounding Integrity (Continued)

#### C. Verification

1. Measure the resistance of a length of wire of AWG-#16 or larger wire of sufficient length to connect the VMC ground bus bar to the building power distribution panel. Record the reading in ohms.
2. Attach the first end of the wire to the VMC ground bus bar in the cabinet. The other end will used to measure transient AC and DC voltages at the building power distribution panel.
3. With voltmeter set to AC Volts, and with VMC powered ON, measure and record the AC voltage between the loose end of the wire and a mounting screw or other grounded enclosure of the building power distribution panel. Repeat with meter set to DC volts. AC and DC voltages can range from 0.00V to 0.01V.
4. Now power OFF the VMC, and repeat both tests of step 3, both AC and DC. AC and DC voltages can range from 0.00V to 0.005V with machine OFF.Set voltmeter to Ohms and measure resistance between the loose ground wire and the grounded power distribution enclosure. This resistance measurement should be less than twice the value recorded in step 1. Should there be a positive ground current from step 4, reverse the meter leads and average the two readings.

# 7: Electrical Service Connection

1. A qualified electrician must do electrical installation of machine.
2. If bringing the main power supply in through the bottom of the electrical cabinet is preferred. The following is the approximate distance from the floor to the bottom of each cabinet.

| | | | |
|---|---|---|---|
| VMC2015HS | 66cm / 26" | VMC5528 | 76cm / 30" |
| VMC2520 | 51cm / 20" | VMC6032 | 71cm / 28" |
| VMC3320 | 51cm / 20" | VMC8032 | 71cm / 28" |
| VMC4020 | 51cm / 20" | VM5ax320 | 76cm / 30" |
| VMC4022 | 76cm / 30" | | |

## 7: Electrical Service Connection (Continued)

3. If bringing the main power supply in through the top of the electrical cabinet is preferred, a is provided. The knockout is located at the top, left, front corner of the electrical cabinet.
4. The total connected load should not exceed 75% of the panel rating, allowing for the VMC load. Refer to the Electrical Rating Plaque for full load current.
5. Note that the upper voltage limit for the control, or the Axis Amplifiers, or the Spindle controller is 235VAC, not 240VAC. If the incoming voltage is higher than 235VAC, please arrange for a step-down transformer with sufficient kVA to operate machine. The transformer is ***NOT*** Fadal supplied.
6. The absolute minimum allowable voltage is 208VAC and may be safely run between 208 and 235VAC. The preferred operating range is 210VAC - 230VAC. If the incoming voltage is 208VAC, it is recommended to install a buck-boost transformer to bring the incoming voltage closer to the middle of the acceptable range. Since voltages often fluctuate throughout the day, and if the voltage drops below 208VAC, erroneous alarms, or problems may occur. If the incoming voltage is below 208VAC, a buck-boost transformer MUST be installed to bring the voltage to within the allowable range. It cannot be expressed enough that for the proper operation of your machine, adequate voltage is a MUST.
7. If other CNC equipment, motor controllers, motors, or electric-discharge lighting [fluorescent, mercury vapor, metal-halide, high- or low-pressure sodium] are connected to the same panel, the connected load should not exceed 50% of the Service Panel's rated capacity.
8. Prior to the installation of the VMC, the panel should be measured for average and peak loads across the three phases.

# 8: Power Requirements

| Machine Model | Voltage (VAC) | KVA | Amperage (Breaker Size Main Panel) |
|---|---|---|---|
| VMC2015HS | 208 [MIN] - 235 [MAX} | 15 | 40A |
| VMC2520 or /w ExZ | 208 [MIN] - 235 [MAX} | 23.5 | 70A |
| VMC3320 or /w ExZ | 208 [MIN] - 235 [MAX} | 23.5 | 70A |
| VMC4020 or /w ExZ | 208 [MIN] - 235 [MAX} | 23.5 | 70A |
| VMC4020 (VHT) or /w ExZ | 208 [MIN] - 235 [MAX} | 30 | 80A |
| VMC4020-APC | 208 [MIN] - 235 [MAX} | 25 | 70A |
| VMC4020-APC (VHT) | 208 [MIN] - 235 [MAX} | 30 | 80A |
| VMC4022 | 208 [MIN] - 235 [MAX} | 25 | 70A |
| VMC5528 | 208 [MIN] - 235 [MAX} | 45 | 120A |
| VMC6032 | 208 [MIN] - 235 [MAX} | 45 | 120A |
| VMC6032 (VHT) | 208 [MIN] - 235 [MAX} | 50 | 140A |
| VMC6032-50 | 208 [MIN] - 235 [MAX} | 55 | 150A |
| VMC8032 | 208 [MIN] - 235 [MAX} | 45 | 120A |
| VMC8032 (VHT) | 208 [MIN] - 235 [MAX} | 50 | 140A |
| VMC8032-50 | 208 [MIN] - 235 [MAX} | 55 | 150A |
| VM5ax320 | 208 [MIN] - 235 [MAX} | 25 | 70A |

**WARNING** The VMC cannot t be installed on a panel where the measured surge demand current exceeds the panel's supply amplitude.

Proper main power leads are equally important as a proper ground. A continuous lead from the machine main switch to the electrical panel is highly recommended. Electrical wire nuts should be avoided! See the chart below for matching the adequate wire gauge size to your machine model's amperage draw.

# 9: Wire Size Calculator

| Amperes | 0-4 ft. | 4-7 ft. | 7-10 ft. | 10-13 ft. | 13-16 ft. | 16-19 ft. | 19-22 |
|---|---|---|---|---|---|---|---|
| 250-300 | 4-ga. | 2-ga. | 2-ga. | 1/0-ga. | 1/0-ga. | 1/0-ga. | 2/0-ga. |
| 200-250 | 4-ga. | 4-ga. | 2-ga. | 2-ga. | 1/0-ga. | 1/0-ga. | 1/0-ga. |
| 150-200 | 6 or 4-ga. | 4-ga. | 4-ga. | 2-ga. | 2-ga. | 1/0-ga. | 1/0-ga. |
| 125-150 | 8-ga. | 6 or 4-ga. | 4-ga. | 4-ga. | 2-ga. | 2-ga. | 2-ga. |
| 105-125 | 8-ga. | 8-ga. | 6 or 4-ga. | 4-ga. | 4-ga. | 4-ga. | 2-ga. |
| 85-105 | 8-ga. | 8-ga. | 6 or 4-ga. | 4-ga. | 4-ga. | 4-ga. | 4-ga. |
| 65-85 | 10-ga. | 8-ga. | 8-ga. | 6 or 4-ga. | 4-ga. | 4-ga. | 4-ga. |
| 50-65 | 10-ga. | 10-ga. | 8-ga. | 8-ga. | 6 or 4-ga. | 6 or 4-ga. | 4-ga. |
| 35-50 | 10-ga. | 10-ga. | 10-ga. | 8-ga. | 8-ga. | 8-ga. | 6 or 4-ga. |
| 20-35 | 12-ga. | 10-ga. | 10-ga. | 10-ga. | 10-ga. | 8-ga. | 8-ga. |
| 0-20 | 12-ga. | 12-ga. | 12-ga. | 12-ga. | 10-ga. | 10-ga. | 10-ga. |
| Length in feet | | | | | | | |

## Do Not Power On The Machine!

A qualified Fadal service technician must first confirm the proper voltage before powering up the machine.

# 10: Machine Specifications

| SPECIFICATIONS | VMC2015HS30/40 | VMC2520 | VMC3320 | VMC4020 | VMC4022 |
|---|---|---|---|---|---|
| Travel X-axis (in.) | 20" | 25.5" | 33" | 40" | 40" |
| Travel Y-axis (in.) | 15" | 20" | 20" | 20" | 22" |
| Travel Z-axis (in.) | 15.7" | 20" / 30" * | 20" / 30" * | 20" / 30" * | 22" |
| Table Size (in.) | 25.6" x 15" | 31.5" x 17.75" | 39.37" x 17.7" | 47.25" x 19.7" | 43.3" x 21.6" |
| Max. Weight on Table (lbs.) | 440 | 990 | 1,100 | 1,320 | 1700 |
| Spindle Nose to Table (in.) | 5.9"- 21.6" | 5"- 25" / 5"- 35" | 5"- 25" / 5"- 35" | 5"- 25" / 5"- 35" * | 5.9"- 27,5" |
| Spindle Center to Column (in.) | 16.9" | 21" | 21.25" | 21.25" | 22.5"" |
| T-slots and Dimensions (in.) | (3) .710" x 3.94" x1.25" | (3) .709" x 4.33" x1.25" | (3) .709" x 4.33" x1.25" | (3) .709" x 4.33" x1.25" | (5) .709" x 3.937" |
| Way Construction | Cross Roller Guideway | Cross Roller Guideway | Cross Roller Guideway | Box Guideway | Cross Roller Guideway |
| Cutting Feed Rate (ipm.) | 590 | *590* | 590 | 590 | 590 |
| Rapid Travel Rate X/Y/Z (ipm.) | 1,890 / 1,890 / 1,890 | 1,410 / 1,410 / 1,187 | 1,410 / 1,410 / 1,187 | 1,000 / 1,000 / 1,000 | 1400/ 1400 / 1400 |
| Axis Drive Motor X, Y & Z (hp.) | 1.8 | 2.3 | 2.3 | 2.3 | 2.3 |
| Ballscrew Size (mm.) | 32mm | 40mm | 40mm | 40mm | 40mm |
| Accuracy Positioning - JIS B6338 (in.) | .0002" | .0002" | .0002" | .0002" | .0002" |
| Accuracy Repeatability - JIS B6338 (in.) | .0001" | .0001" | .0001" | .0001" | .0001" |
| Spindle Power Transfer | Direct Drive | 2-Speed Hi/Low Belt | 2-Speed Hi/Low Belt | 2-Speed Hi/Low Belt | Direct Drive |
| Spindle Speed (RPM) | 30T12K/15K* 20K* | 10K / 15K* | 10K / 15K* | 10K / 15K* | 10K / 15K* |
| Spindle Taper | BT30, CAT-40 / BT-40* | CAT-40 / BT-40* | CAT-40 / BT-40* | CAT-40 / BT-40* | CAT-40 / BT-40* |
| Spindle Motor (Horsepower hp / Torque ft-lbs.) Peak | 12k 10 hp / 60 ft-lbs. 15k*/20k*/24k* | 22.5 hp / 220 ft-lbs. | 22.5 hp / 220 ft-lbs. 30 hp / 270 ft-lbs.* | 22.5 hp / 220 ft-lbs. 30 hp / 270 ft-lbs.* | 22 hp / 75 ft-lbs. |
| Spindle Chiller | Standard | Standard | Standard | Standard | Standard |
| Spindle Orientation | Standard | Standard | Standard | Standard | Standard |
| ATC type / ATC tool selection | Dual Arm / Random | Dual Arm / Random | Dual Arm / Random | Dual Arm / Random | Dual Arm / Random |
| Number of Tools | 20 | 24 | 24 / 30* / 40* | 24 / 30* / 40* | 30 / 40* |
| Max Tool Diameter (in.) | 4" | 4.9" | 4.9" | 4.9" | 4.9" |
| W/O Adjacent Tool (in.) | 2.4" | 3.1" | 3.1" | 3.1" | 3.1" |
| Max. Tool Length (in.) | 7.9" | 13.5" | 13.5" | 13.5" | 13.5" |
| Max Tool Weight (lbs.) | 6.6 | 15 | 15 | 15 | 15 |
| Coolant Tank | Standard | 3-Stage Chip Filtration | 3-Stage Chip Filtration | 3-Stage Chip Filtration | 3-Stage Chip Filtration |
| Coolant Pump | Multi-Stage | Multi-Stage | Multi-Stage | Multi-Stage | Multi-Stage |
| Air Pressure Required (PSI / SCFM) | 90 PSI / 20 SCFM | 90 PSI / 20 SCFM | 90 PSI / 20 SCFM | 90 PSI / 20 SCFM | 90 PSI / 20 SCFM |
| Min Power Requirement at 208v to 230v max (KVA) | 15 | 25 | 25 | 25 | 25 |
| Machine Dimensions L x W x H (in.) | 64" x 94" x 94" | 101" x 95" x 104" | 123" x 96" x 104" | 123" x 96" x 104" | N/A |
| Dim. w/ Optional Chip Conveyor (in.) | - | 141" x 96" x 104" | 161" x 96" x 104" | 161" x 96" x 104" | 128.5" x 95.5 x 108.5" |
| Machine Weight (lbs.) | 6,660 | 10,978 | 11,330 | 11,770 | 12,126 |

All specifications are subject to change without notice.

*Optional

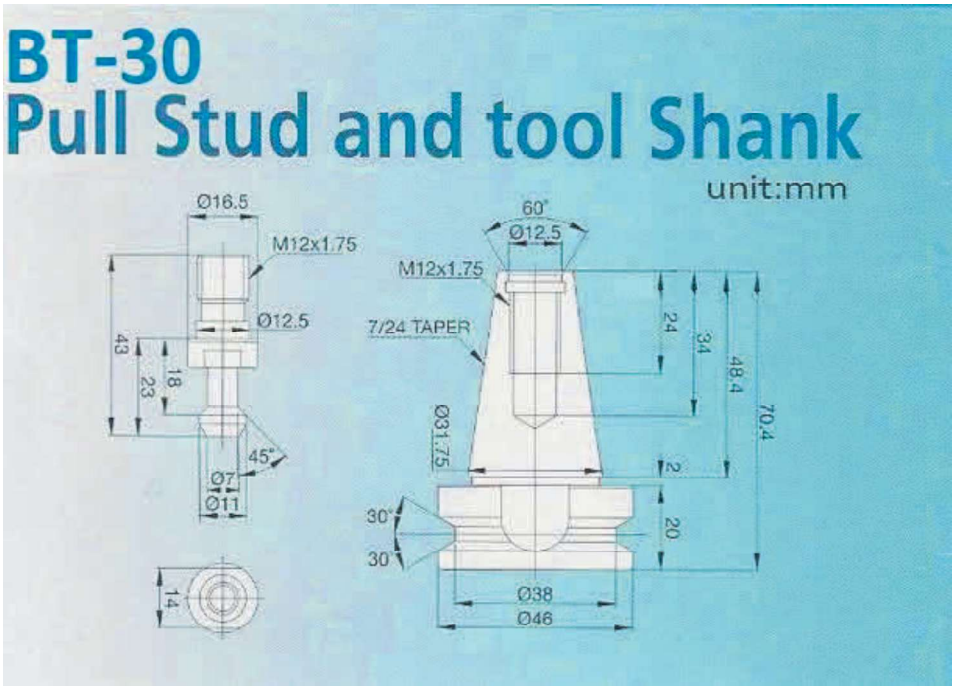
## 10: Machine Specifications (Continued)

| SPECIFICATIONS | VMC5528 | VMC6032-40 | VMC6032-50 | VMC8032-40 | VMC8032-50 |
|---|---|---|---|---|---|
| Travel X-axis (in.) | 55" | 60" | 60" | 80" | 80" |
| Travel Y-axis (in.) | 28" | 32" | 32" | 32" | 32" |
| Travel Z-axis (in.) | 27" | 30" | 30" | 30" | 30" |
| Table Size (in.) | 59."x27.56" | 61"x30" | 61"x30" | 81.5" x 30" | 81.5" x 30" |
| Max. Weight on Table (lbs.) | 3,100 | 4,400 | 4,400 | 4,840 | 4,840 |
| Spindle Nose to Table (in.) | 5.9"- 29.5" | 5"- 35" / 13"- 43" * | 5"- 35" / 13"- 43" | 5"- 35" | 5"- 35" |
| Spindle Center to Column (in.) | 28.5" | 30.2" | 30.2" | 34.375" | 34.375" |
| T-slots and Dimensions (in.) | (6) .709" x 3.937" | (5) .709" x 5.5" x 1.25" | (5) .709" x 5.5" x 1.25" | (5) .709" x 5.5" x 1.25" | (5) .709" x 5.5" x 1.25" |
| Way Construction | Cross Roller Guideway | Box Guideway | Box Guideway | Box Guideway | Box Guideway |
| Cutting Feed Rate (ipm.) | 590 | 590 | 590 | 590 | 590 |
| Rapid Travel Rate X/Y/Z (ipm.) | 1,000 / 1,000 / 1,000 | 787 / 787 / 590 | 787 / 787 / 590 | 787 / 787/ 590 | 787 / 787/ 590 |
| Axis Drive Motor X, Y & Z (hp.) | 2.3 | 4.4 | 4.4 | 4.4 | 4.4 |
| Ballscrew Size(mm.) | 40mm | 50mm | 50mm | 50mm | 50mm |
| Accuracy Positioning - JIS B6338 (in.) | .0002" | .0003" | .0003" | .0003" | .0003" |
| Accuracy Repeatability - JIS B6338 (in.) | .0001" | .00015" | .00015" | .00015" | .00015" |
| Spindle Power Transfer | Direct Drive | 2-Speed Hi/Low Belt | 2-Speed Geared | 2-Speed Hi/Low Belt | 2-Speed Geared |
| Spindle Speed (RPM) | 10K / 15K* | 10K / 15K* | 6K | 10K / 15K* | 6K |
| Spindle Taper | CAT-40 / BT-40* | CAT-40 / BT-40* | CAT50* / BT-50* | CAT-40 / BT-40* | CAT-50* / BT-50* |
| Spindle Motor (Horsepower hp / Torque ft-lbs.) Peak | 24.5 hp 90 ft-lbs. | 22.5 hp / 220 ft-lbs. 30 hp / 270 ft-lbs. | 45 hp / 410 ft-lbs. | 22.5 hp / 220 ft-lbs. 30 hp / 270 ft-lbs.* | 45 hp / 410 ft-lbs. |
| Spindle Chiller | Standard | Standard | Standard | Standard | Standard |
| Spindle Orientation | Standard | Standard | Standard | Standard | Standard |
| ATC type / ATC tool selection | Dual Arm / Random | Dual Arm / Random | Dual Arm / Random | Dual Arm / Random | Dual Arm / Random |
| Number of Tools | 30 / 40* | 24 / 30* / 40* | 32 / 40* | 24 / 30* / 40* | 32 / 40* |
| Max Tool Diameter(in.) | 4.9" | 4.9" | 5.0" | 4.9" | 5.0" |
| W/O Adjacent Tool (in.) | 3.1" | 3.1" | 3.1" | 3.1" | 3.1" |
| Max. Tool Length (in.) | 13.5" | 13.8" | 13.8" | 13.8" | 13.8" |
| Max Tool Weight (lbs.) | 15 | 15 | 35 | 15 | 35 |
| Coolant Tank | 3-Stage Chip Filtration | 3-Stage Chip Filtration | 3-Stage Chip Filtration | 3-Stage Chip Filtration | 3-Stage Chip Filtration |
| Coolant Pump | Multi-Stage | Multi-Stage | Multi-Stage | Multi-Stage | Multi-Stage |
| Air Pressure Required (PSI / SCFM) | 90 PSI / 20 SCFM | 90 PSI / 20 SCFM | 90 PSI / 20 SCFM | 90 PSI / 20 SCFM | 90 PSI / 20 SCFM |
| Min Power Requirement at 208v to 230v max (KVA) | 40 | 45 | 55 | 45 | 55 |
| Machine Dimensions L x W x H (in.) | N/A | 164" x 120" x 132" | 164" x 120" x 132" | 216" x 120" x 132" | 216" x 120" x 132" |
| Dim. w/ Optional Chip Conveyor (in.) | 170" x 109" x 125" | 216" x 120" x 132" | 216" x 120" x 132" | 272" x 120" x 132" | 272" x 120" x 132" |
| Machine Weight (lbs.) | 19,850 | 32,400 | 36,600 | 34,600 | 38,600 |

All specifications are subject to change without notice.

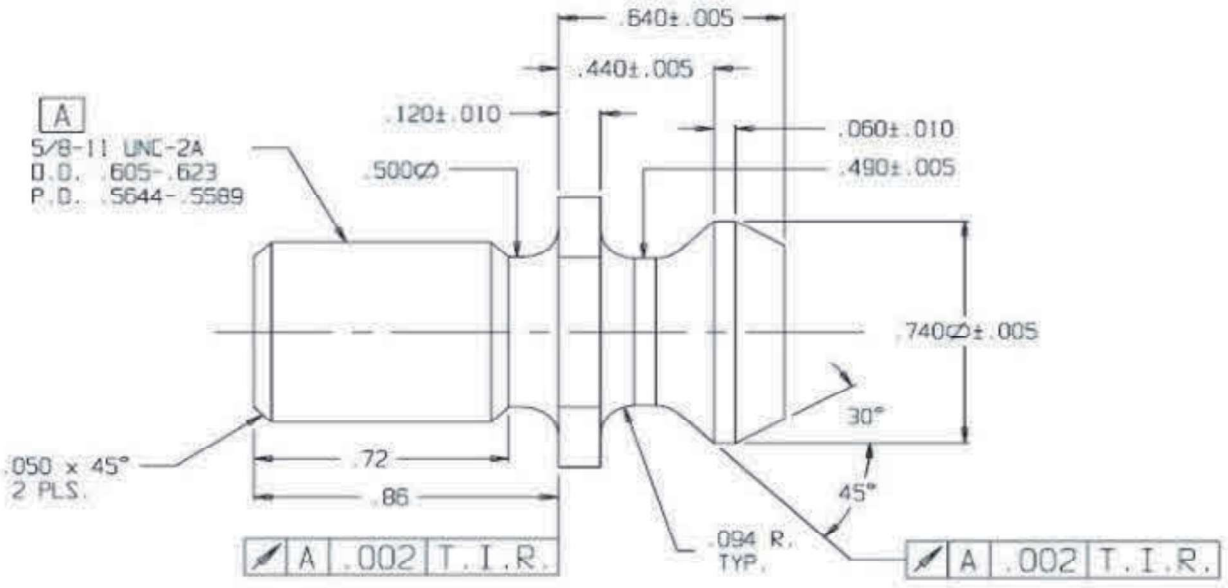
*Optional

# 11: Machine Pull Studs



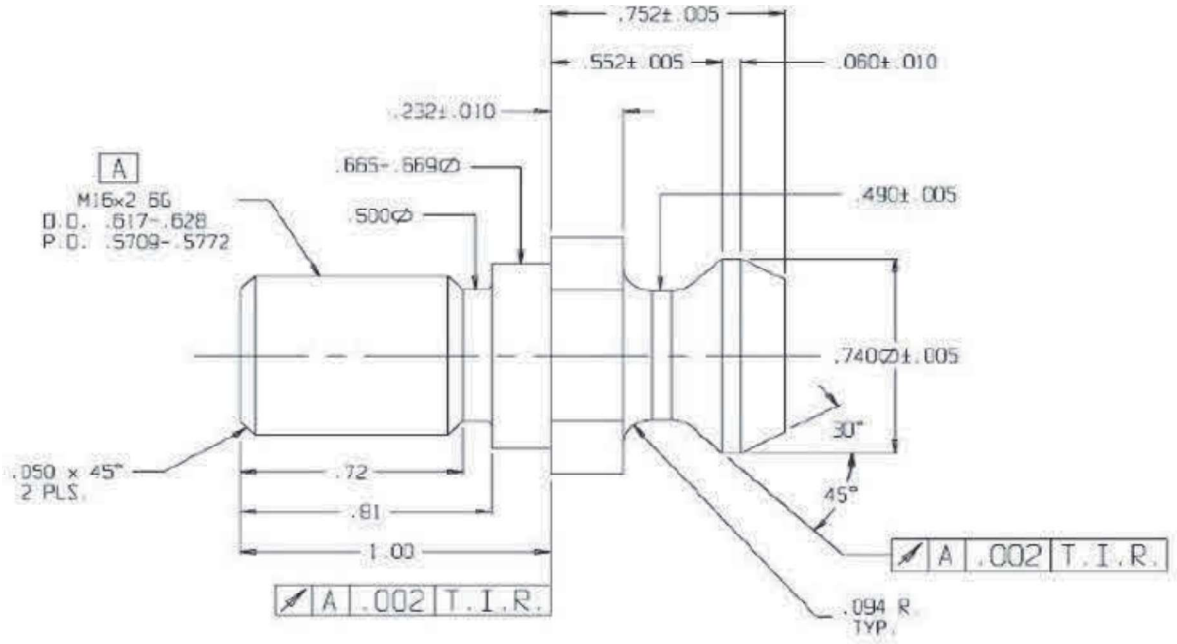

**For Models: VMC2015HS**

**40 TAPER CAT PULL STUD - [Non-Coolant Thru] TOL-02050**



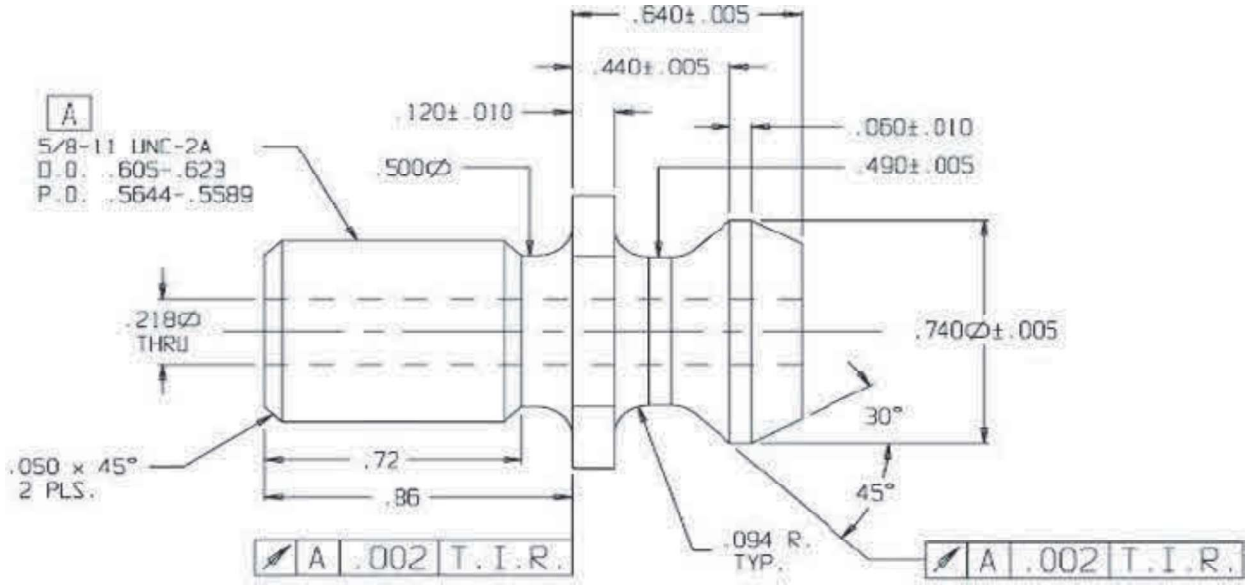
## 11: Machine Pull Studs (Continued)

### 40 TAPER BT PULL STUD - [Non-Coolant Thru] TOL-02051



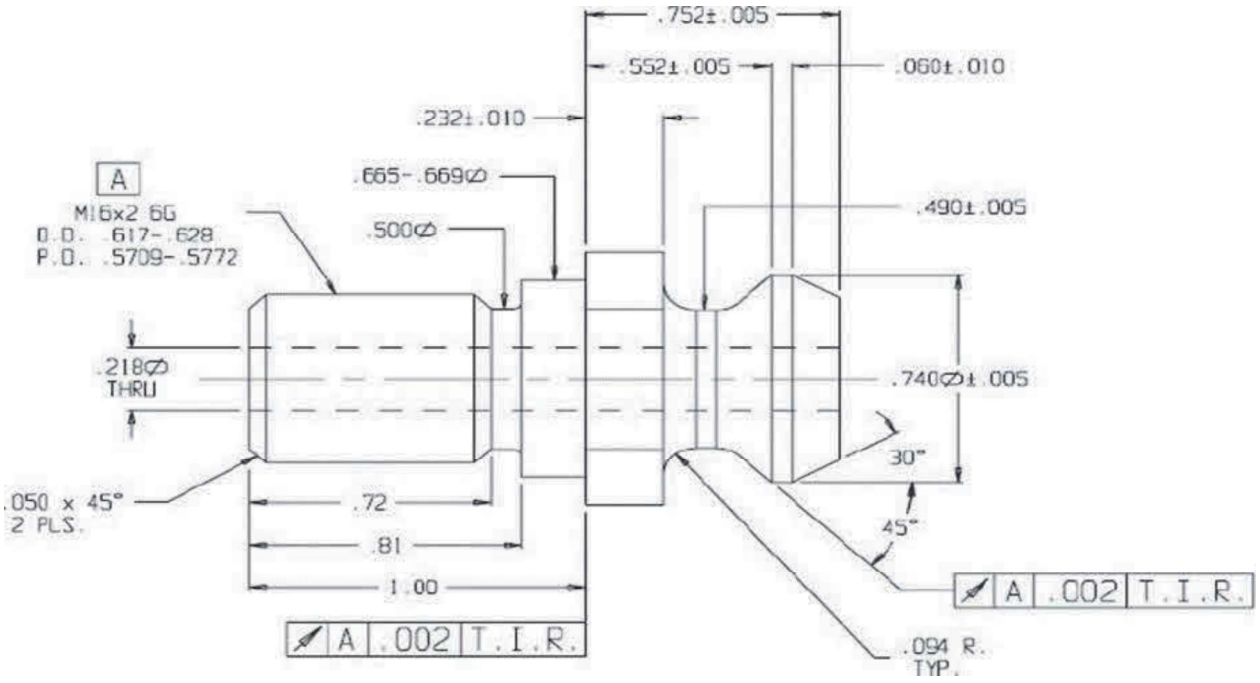

**For Models: VMC2015HS-40, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC8032.**

### 40 TAPER CAT PULL STUD- [Coolant Thru] TOL-02052



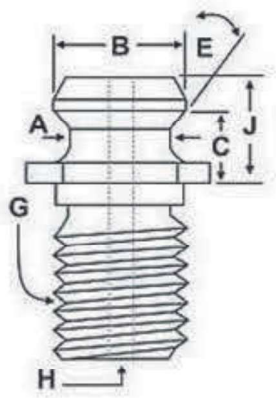
## 11: Machine Pull Studs (Continued)

### 40 TAPER BT PULL STUD - [Coolant Thru] TOL-02053



## 11: Machine Pull Studs (Continued)

**For Models: VMC2520, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC8032.**




### 50 TAPER BT PULL STUD

RETENTION KNOB (SOLID)

| CAT | | Note | ANSI STD NO PILOT |
|---|---|---|---|
| Neck Dia. A | 0.82 (20.8 MM) | Head Dia. B | 1.14 (29 MM) |
| Length C | 0.706 (17.9 MM) | Angle E° | 45 |
| O-Ring | NO | Length to Head J | 1 (25.4 MM) |
| Flange Thick | 0.204 (5.2 MM) | Pilot | N |
| Knob Socket 1/2" drive | RKW-50 | Max Torque ft/lbs | 110 |

RETENTION KNOB (COOLANT THRU)

| CAT | | Note | ANSI STD NO PILOT |
|---|---|---|---|
| Neck Dia. A | 0.82 (20.8 MM) | Head Dia. B | 1.14 (29 MM) |
| Length C | 0.706 (17.9 MM) | Angle E° | 45 |
| O-Ring | NO | Length to Head J | 1 (25.4 MM) |
| Flange Thick | 0.2 (5.1 MM) | Pilot | N |
| Knob Socket 1/2" drive | RKW-50 | Max Torque ft/lbs | 110 |

RETENTION KNOB (SOLID)

| BT | | Note | P50T I 45° PILOT |
|---|---|---|---|
| Neck Dia. A | 0.669 (17 MM) | Head Dia. B | 0.905 (23 MM) |
| Length C | 1.377 (35 MM) | Angle E° | 45 |
| O-Ring | NO | Length to Head J | 1.771 (45 MM) |
| Flange Thick | 0.394 (10 MM) | Pilot | Y |
| Knob Socket 1/2" drive | RKW-50M | Max Torque ft/lbs | 110 |

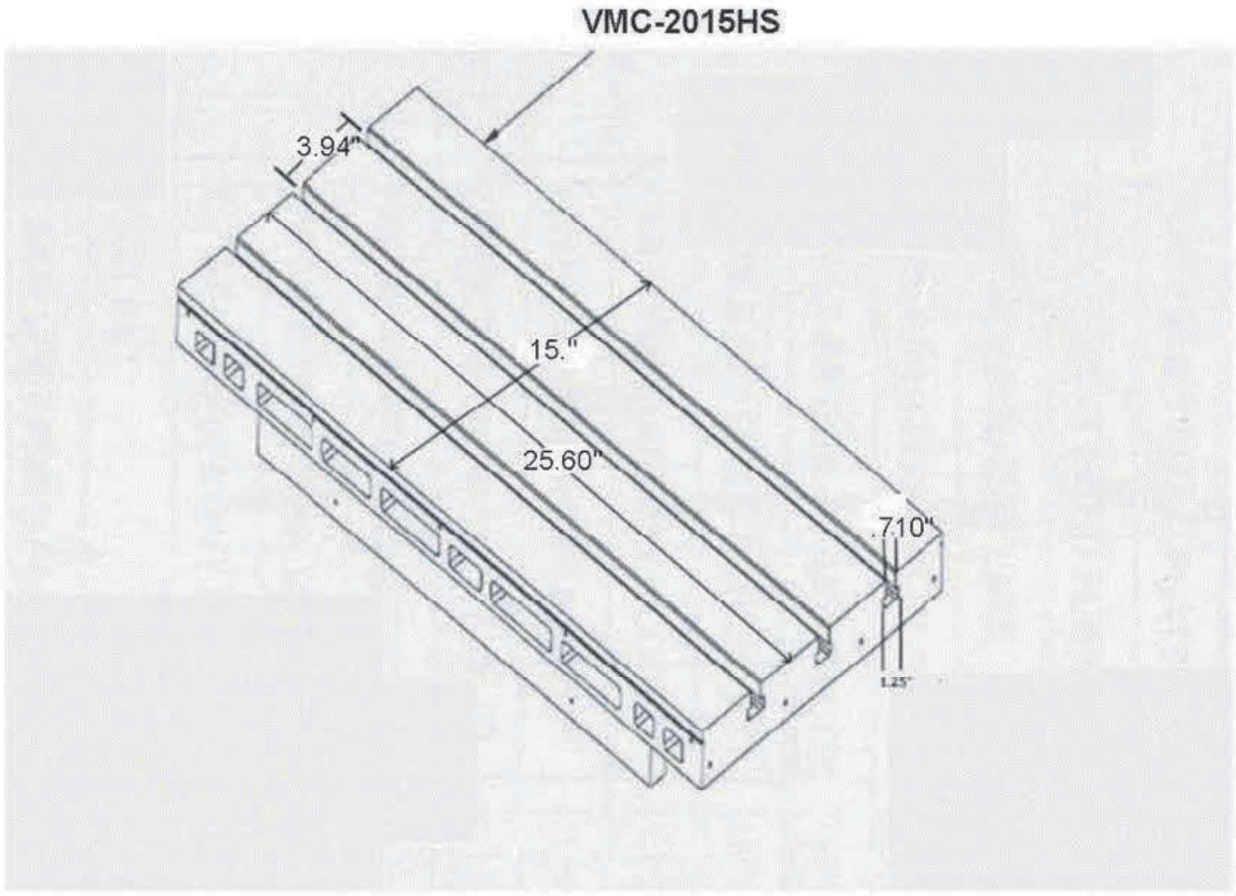
RETENTION KNOBS (COOLANT THRU)

| BT | | Note | P50T I 45° PILOT |
|---|---|---|---|
| Neck Dia. A | 0.669 (17 MM) | Head Dia. B | 0.905 (23 MM) |
| Length C | 1.377 (35 MM) | Angle E° | 45 |
| O-Ring | NO | Length to Head J | 1.771 (45 MM) |
| Flange Thick | 0.394 (10 MM) | Pilot | Y |
| Knob Socket 1/2" drive | RKW-50M | Max Torque ft/lbs | 110 |

# 12: Machine Table T-Slots

## TEE SLOT DIMENSIONS VMC - 2015HS

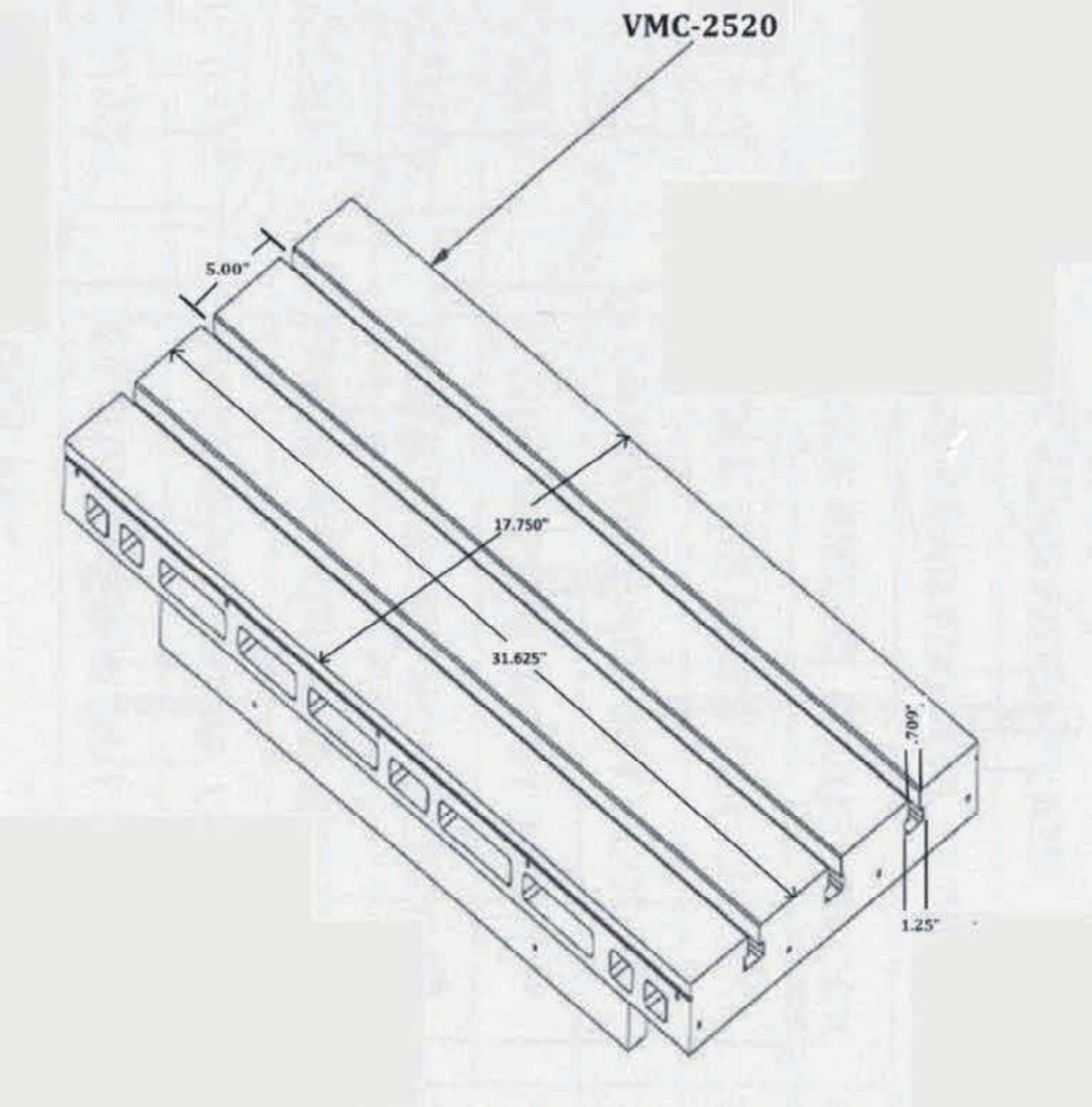
**Spacing = 3.94" (Center to Center)**
**Throat = .710"**
**Key Slot = 1.250"**
**Number of T-Slots = 3**
**Table Length = 25.60" Table Width = 15."**



## 12: Machine Table T-Slots (Continued)

# TEE SLOT DIMENSIONS VMC-2520

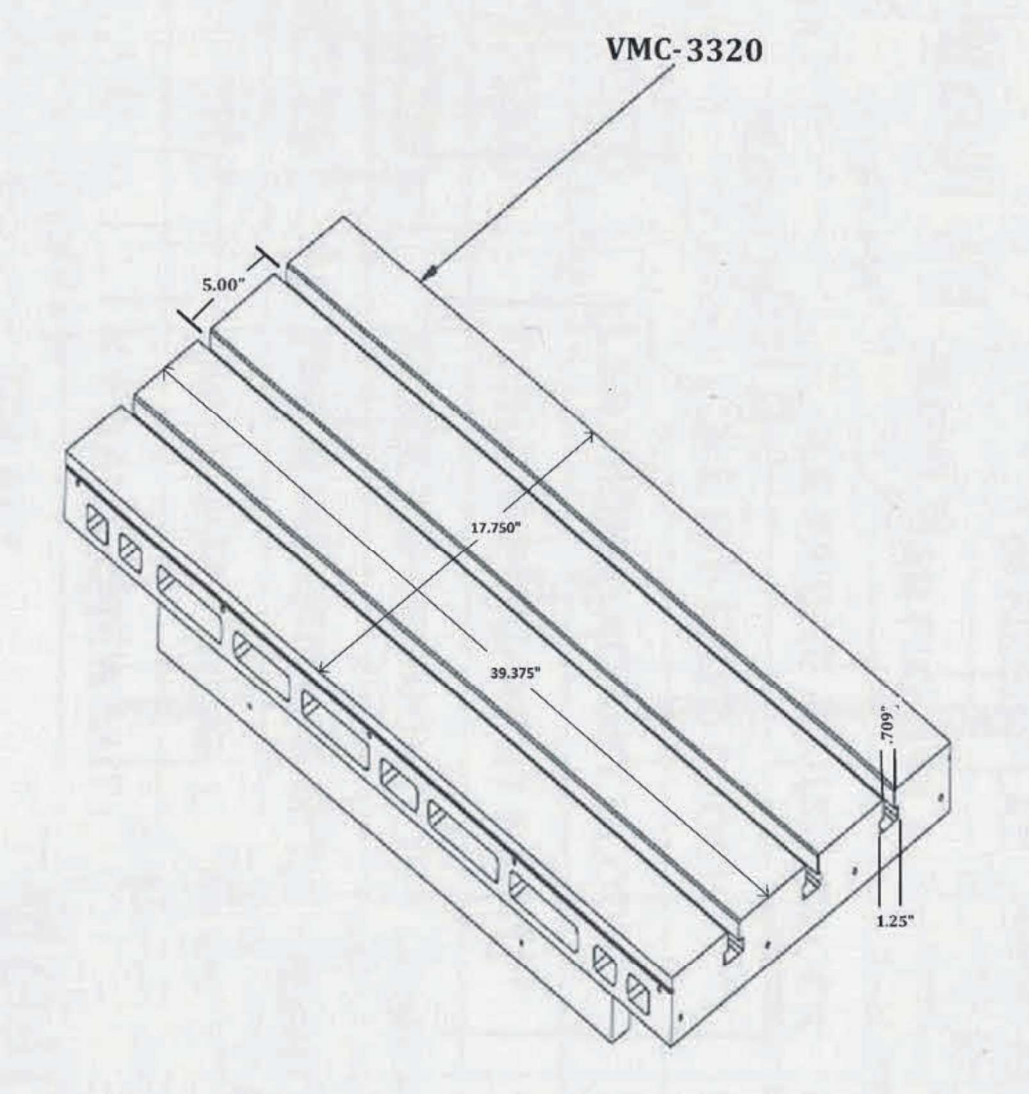
**Spacing = 5.00" (Center to Center)**
**Throat = .709"**
**Key Slot = 1.250"**
**Number of T-Slots = 3**
**Table Length = 31 5/8" Table Width = 17 3/4"**



12: Machine Table T-Slots (Continued)

# TEE SLOT DIMENSIONS VMC-3320

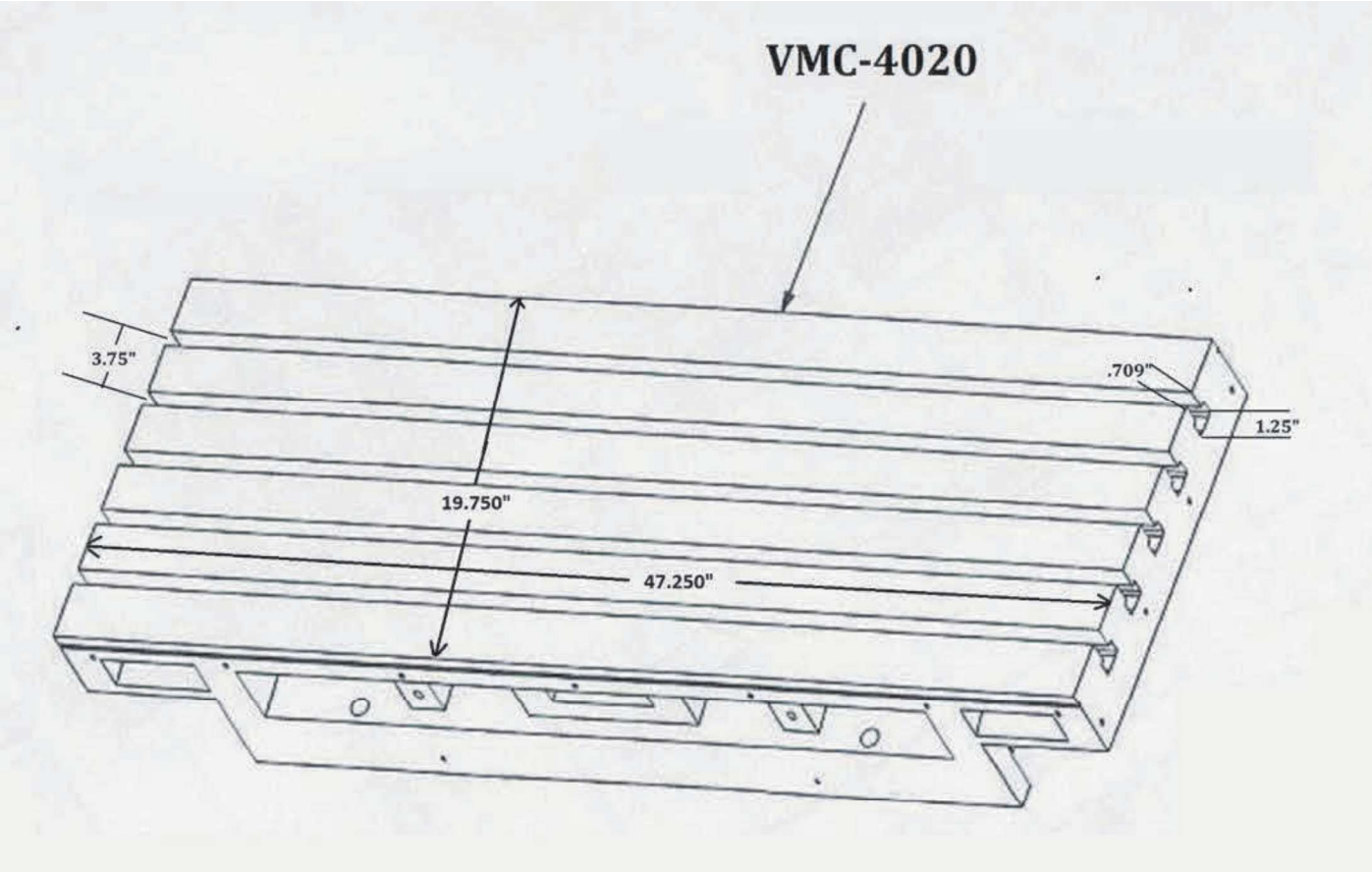
**Spacing = 5.00" (Center to Center)**
**Throat = .709"**
**Key Slot = 1.250"**
**Number of T-Slots = 3**
**Table Length = 39 3/8" Table Width = 17 3/4"**
**Clearance from table back edge to Z-Axis way Cover at Y-Axis limit position = 1 1/8" ***
***Extended Column**



12: Machine Table T-Slots (Continued)

# TEE SLOT DIMENSIONS VMC-4020

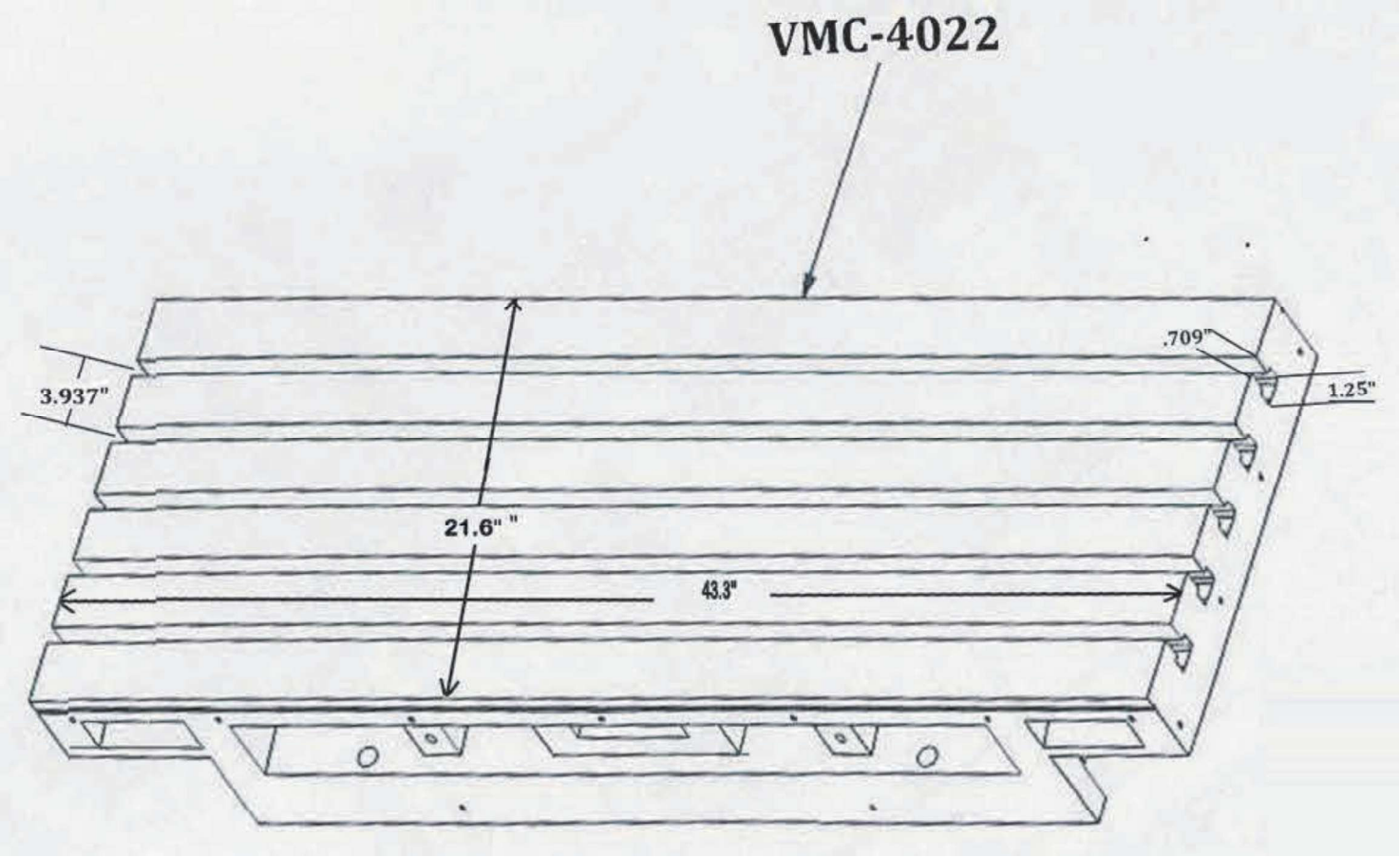
**Spacing = 3.75" (Center to Center)**
**Throat = .709"**
**Key Slot = 1.250"**
**Number of T-Slots = 5**
**Table Length = 47 1/4" Table Width = 19 3/4"**
**Clearance from table back side edge to Z-axis way cover at Y-axis limit = 3/8" ***
***Extended Column**



## 12: Machine Table T-Slots (Continued)

# TEE SLOT DIMENSIONS VMC-4022

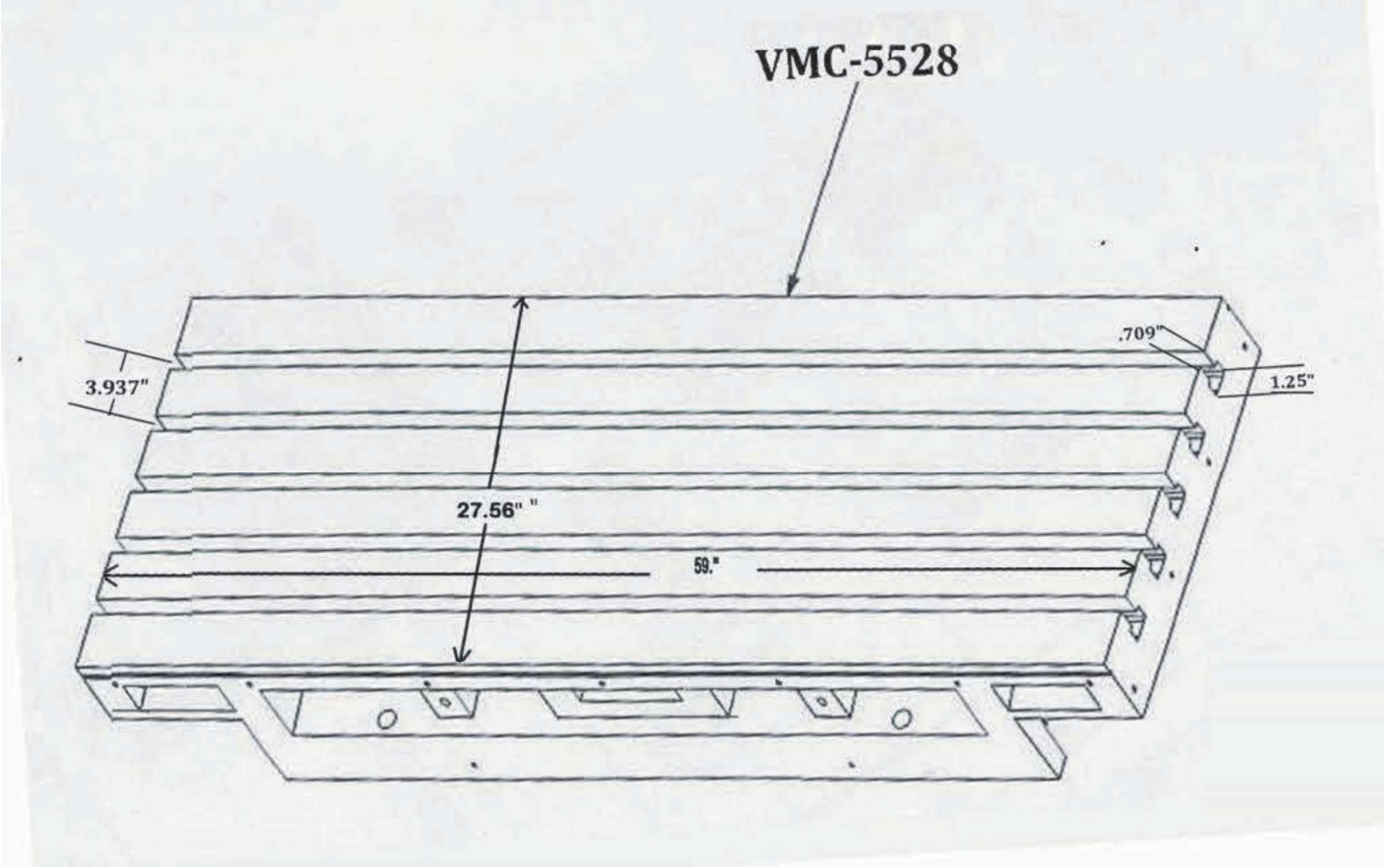
**Spacing = 3.937" (Center to Center)**
**Throat = .709"**
**Key Slot = 1.250"**
**Number of T-Slots = 5**
**Table Length = 43.30" Table Width = 21.60"**



## 12: Machine Table T-Slots (Continued)

## TEE SLOT DIMENSIONS VMC-5528

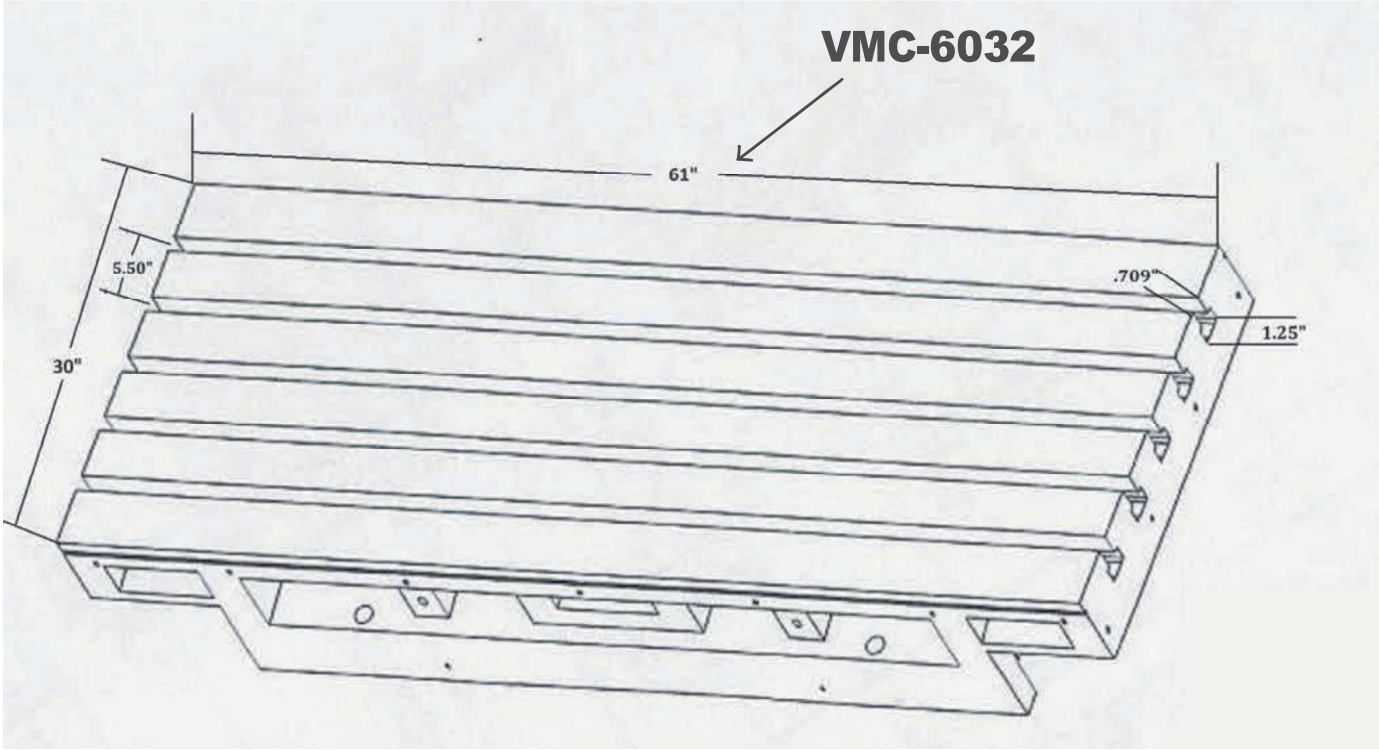
**Spacing = 3.937" (Center to Center)**
**Throat = .709"**
**Key Slot = 1.250"**
**Number of T-Slots = 6**
**Table Length = 59." Table Width = 27.56"**



## 12: Machine Table T-Slots (Continued)

# TEE SLOT DIMENSIONS VMC-6032

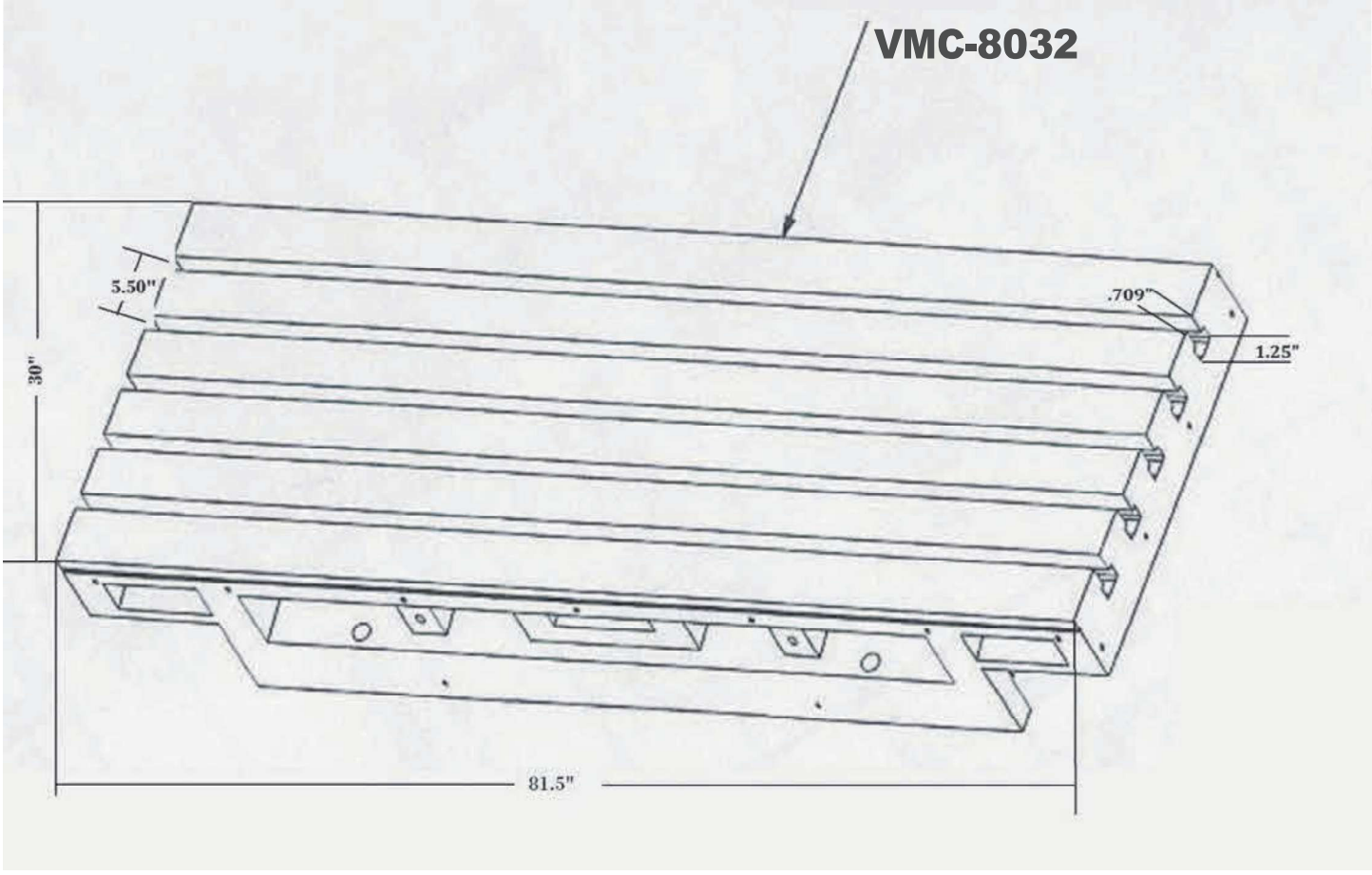
**Spacing = 5.50" (Center to Center)**
**Throat = .709"**
**Key Slot = 1.250"**
**Number of T-Slots = 5**
**Table Length = 61" Table Width = 30"**



## 12: Machine Table T-Slots (Continued)

# TEE SLOT DIMENSIONS VMC-8032

**Spacing = 5.50" (Center to Center)**
**Throat = .709"**
**Key Slot = 1.250"**
**Number of T-Slots = 5**
**Table Length = 81.50" Table Width = 30"**



# 13: Machine Lubricants

Due to the Machine options and features. Here is the recommended lubricant for the machines and machine maintenance thru out the year.

| Oil and Lube Points | Procedures | Cycle of Life | Oil or Grease Grade | Exxon Mobil | Shell | Chevron Texaco | Castrol |
|---|---|---|---|---|---|---|---|
| Waylube Pump | Fill tank to full line . | Refill as needed. | ISO V68 | Vactra 2 | Tonna 68V | Waylube D | Magna BD68 |
| Spindle Chiller | Fill tank to full line on cap stem. | 1 year or 2100 hours | ISO VG6-VG32 | DTE 24 | Tellus 32 | Rando Oil HD32 | Hyspin VG32 |
| Hi / Low Idler & Actuators | Fill reservoir and cylinders as needed. | Refill as needed. | Hydraulic 32 | DTE 24 | Tellus 32 | Rando Oil HD32 | Hyspin VG32 |
| Air Oil Spindle Pump | Fill tank to full line . | Refill as needed. | ISO-32 | Mobil DTE 732 | N/A | N/A | N/A |
| Rotary Table | Sight glass should show a minimum of half full. | 1 year or 2100 hours | ISO V68 | Mobilgear 626 | Omala 68 | Meropa 68 | Tribol 1066/150 |
| DATC Gear Box | Sight glass should show a minimum of half full. | 1 year or 2100 hours | ISO VG150-220 | Mobilgear 600 xp220 | Omala S2 GX220 | Meropa 220 | ISOlube 220 |
| Air Regulator Oiler | Fill tank to full line. | Refill as needed. | ISO VG32 | DTE 24 | Tellus 32 | Rando Oil HD32 | Hyspin VG32 |
| DATC Arm Thumb | 2 pumps with grease gun. | Bi-annually | Water-Resistant Grease | N/A | N/A | N/A | N/A |
| DATC Bucket Rail | Spray Grease on Rails. | 1 year or 2100 hours | Lithium Grease Spray | N/A | N/A | N/A | N/A |
| Counter Balance Chain | Spray grease on chains. | Bi-annually | Chain Lubricant Spray | N/A | N/A | N/A | N/A |
| Counter Balance Rail | Spray grease on rail. | Bi-annually | Chain Lubricant Spray | N/A | N/A | N/A | N/A |
| Way Covers | If not running coolant. Wipe with way oil. | Weekly | ISO V68 | Vactra 2 | Tonna 68V | Waylube D | Magna BD68 |
| Tool in/ out Hyd Reservoir | Fill tank to full line. | Refill as needed. | ISO VG32 | DTE 24 | Tellus 32 | Rando Oil HD32 | Hyspin VG32 |

# 14: Shipping Dimensions

| Machine Model # | Machine (Length x Depth x Height) | | Weight |
|---|---|---|---|
| *All Machines ship w/ Z Motor Removed.* **NOTE: Additional 8" w/ Z axis motor installed.* | VMC2015HS to VMC5528 Machines to ship with a Conestoga air ride trailer Only! | VMC6032 to VMC8032-50 Machines to ship with a low-boy air ride trailer Only! | |
| VMC2015HS | 83" x 72" x 88" w/out Pallet | 92" x 91" x 96" w/ Pallet | 7,000 lbs. |
| VMC2015HS-40 | 83" x 72" x 88" (w/out Pallet | 92" x 91" x 96" w/ Pallet | 7,200 lbs. |
| VMC2520 | 86" x 96" x 90" w/out Pallet | 92" x 102" x 97" w/ Pallet | 11,600 lbs. |
| VMC2520 Ext. Z | 86" x 96" x 99" w/out Pallet | 92" x 102" x 107" w/ Pallet | 12,500 lbs. |
| VMC3320 | 114" x 93" x 90" w/out Pallet | 123" x 93" x 97" w/ Pallet | 12,500 lbs. |
| VMC 3320 Ext Z | 114" x 93" x 99" w/out Pallet | 123" x 93" x 107" w/ Pallet | 13,500 lbs. |
| VMC4020 | 114" x 93" x 90" w/out Pallet | 123" x 93" x 97" w/ Pallet | 13,000 lbs. |
| VMC4020 Ext. Z | 114" x 93" x 99" w/out Pallet | 123" x 93" x 107" w/ Pallet | 13,500 lbs. |
| VMC4020-APC | 114" x 93" x 99" w/out Pallet | 123" x 93" x 107" w/ Pallet | 13,000 lbs. |
| VMC4020-APC Pallet Changer (ONLY) | 79" x 64" x 46" w/out Pallet | 79" x 64" x 52" w/Pallet | 3,500 lbs. |
| VMC4022 | 96" x 86" x 93" w/out Pallet | 99" x 90" x 98" w/ Pallet | 12,126 lbs. |
| VMC5528 | 114" x 93" x 99" w/out Pallet | 150" x 90" x 99" w/ Pallet | 19,850 lbs. |
| VMC5528 Tool changer (ONLY) | | 38" x 52" x 52" w/Pallet | 650 lbs. |
| VMC6032 | 167" x 120" x 136" w/out Pallet | 180" x 133" x 144" w/ Pallet | 35,275 lbs. |
| 6032 Coolant Tank | 167" x 42" x 14" w/out Pallet | | 450 lbs. |
| 6032 Chip Trough | 178" x 22.5" x 27" w/out Pallet | | 450 lbs. |
| VMC6032-50 | 167" x 120" x 136" w/out Pallet | 180" x 133" x 144" w/ Pallet | 37,683 lbs. |
| 6032-50 Coolant Tank | 167" x 42" x 14" w/out Pallet | | 450 lbs. |
| 6032-50 Chip Trough | 178" x 22.5" x 27" w/out Pallet | | 450 lbs. |
| VMC8032 | 219" x 120" x 136"w/out Pallet | 224" x 138" x 144" w/ Pallet | 37,480 lbs. |
| 8032 Coolant Tank | 219" x 42" x 14" w/out Pallet | | 450 lbs. |
| 8032 Chip Trough | 225" x 22.5" x 27" w/out Pallet | | 450 lbs. |
| VMC8032-50 | 224" x 120" x 144" w/ Pallet ( | 224" x 138" x 144" w/ Pallet | 39,500 lbs. |
| 8032-50 Coolant Tank | 219" x 42" x 14" w/out Pallet | | 450 lbs. |
| 8032-50 Chip Trough | 225" x 22.5" x 27" w/out Pallet | | 450 lbs. |
| VM5ax320 | 100" x 121" x 122" w/ Pallet | | 16,316 lbs. |

**14: Shipping Dimensions (Continued)**

## Chip Conveyor Dimensions

| Machine Model # | *(Length x Depth x Height)* | Weight |
|---|---|---|
| VMC2015HS | 91" x 59" x 36" w/out Pallet | 600 lbs. |
| VMC2520 | 140" x 23" x 64" w/out Pallet | 574 lbs. |
| VMC3320 | 160" x 23" x 64" w/out Pallet | 620 lbs. |
| VMC4020 | 160" x 23" x 64" w/out Pallet | 620 lbs. |
| VMC4022 | 140" x 24" x 64" w/out Pallet | 620 lbs. |
| VMC5528 | 160" x 30" x 64" w/out Pallet | 620 lbs. |
| VMC6032/6032-50 | 225" x 22.5" x 64" w/out Pallet | 1,120 lbs. |
| VMC8032/8032-50 | 225" x 22.5" x 64" w/out Pallet | 1,120 lbs. |
| VM5ax320 | 140" x 22.5" x 64" w/out Pallet | 850 lbs. |

## Additional Accessories

| Type of Accessory | *(Length x Depth x Height)* | Weight |
|---|---|---|
| Polar Jet Unit | 39.5" x 28" x 44.5" w/out Pallet | 500 lbs. |

All specifications are subject to change without notice.

# VMC MAINTENANCE TABLE OF CONTENTS:

## LUBRICATION PUMP

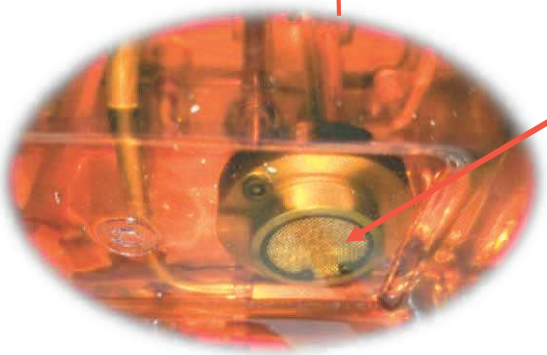

**Pressure Gauge:**
Check each time machine is powered on that pressure increases to 1.5 Mpa (15 Kg/cm2).

**Reservoir:**
Annually, remove tank and clean.

**Fill Strainer:**
Clean strainer as needed.

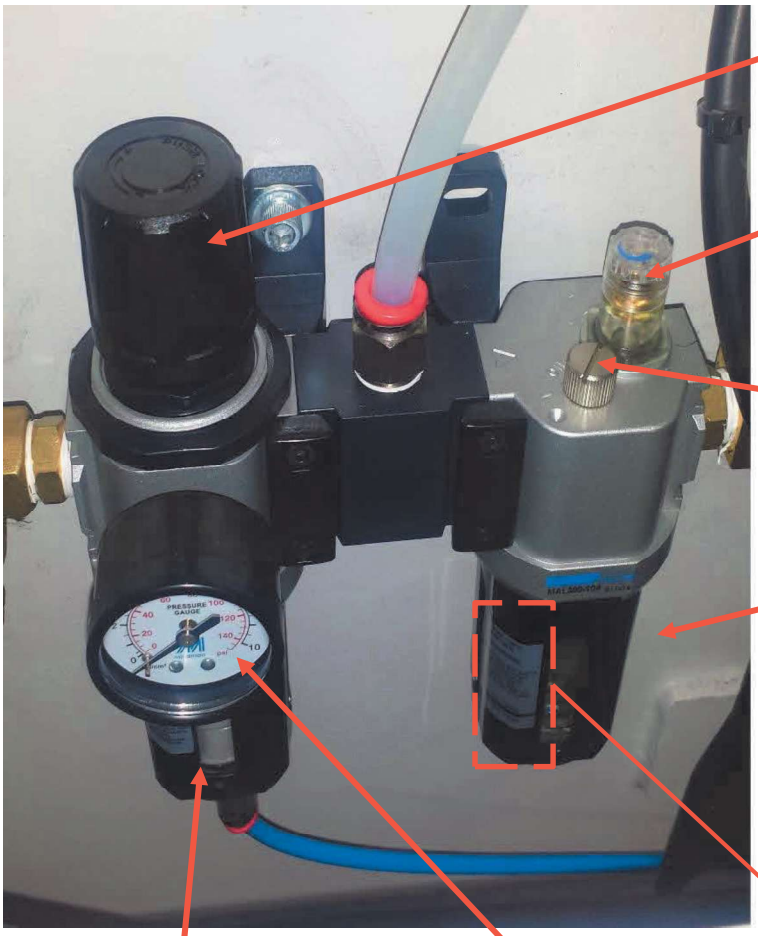
NOTE: NEVER FILL TANK WITH STRAINER REMOVED! Debris can enter tank during refilling.

**Inlet Filter:**
Annually, remove filter and clean with solvent and compressed air.



**Recommended Oil:** Vactra 2 or equivalent.

## AIR REGULATOR



**Air Pressure Adjustment Knob:**

Pressure should be 90 – 120 psi

**Oil Usage Adjustment and Sight Glass:**

Combination sight glass and adjustment knob. Proper setting is approximately 1 drop of oil every 3 – 4 tool changes. CCW increases oil use and CW decreases oil use.

**Oil Fill:**

Oil must be ISO VG32

**Air Lubrication Reservoir:**

Check oil level weekly. See label (below) for proper care and oil level.


**Water Separator:**

Check separator bowl daily. Bowl is designed to drain automatically.
NOTE: If bowl removal is required, air must be shut off first!

**Air Pressure Gauge:**

Check air pressure daily. Pressure should be between 90 – 110 psi

**Oil Level Line:**

Minimum oil level indication.

## SPINDLE CHILLER UNIT

**Display:**
Monitors liquid and ambient temperatures.
Proper settings: PV = 32°C, SV = 1.0°C
Check daily at power up for proper settings and any alarm L.E.D.s displayed.

**Ambient Sensor:**
Clean surface bi-annual.

**Air Filter:**
Clean air flow filter monthly, with soap and warm water. Dry thoroughly, with compressed air prior to re-installing.

Lift tab straight up to remove

**Oil Reservoir Fill Cap:**
Allowable oil is ISO VG6 – VG32

**Drain Plug:**
Drain and replace oil

**Oil Level Line:**
Check oil level daily.

NOTE: Do not fill while unit is on. Spillage will occur when unit is turned off when the machine powered down!

CAUTION: Running unit empty can damage pump.

## Spindle Drawbar, Keys And Compression Spring


**Drawbar:**

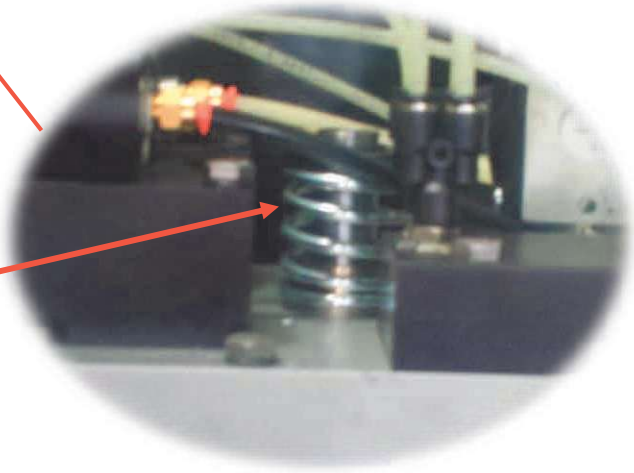
Recommend having drawbar tension tested bi-annual.

Tension should be a minimum of 1500 lb-f.

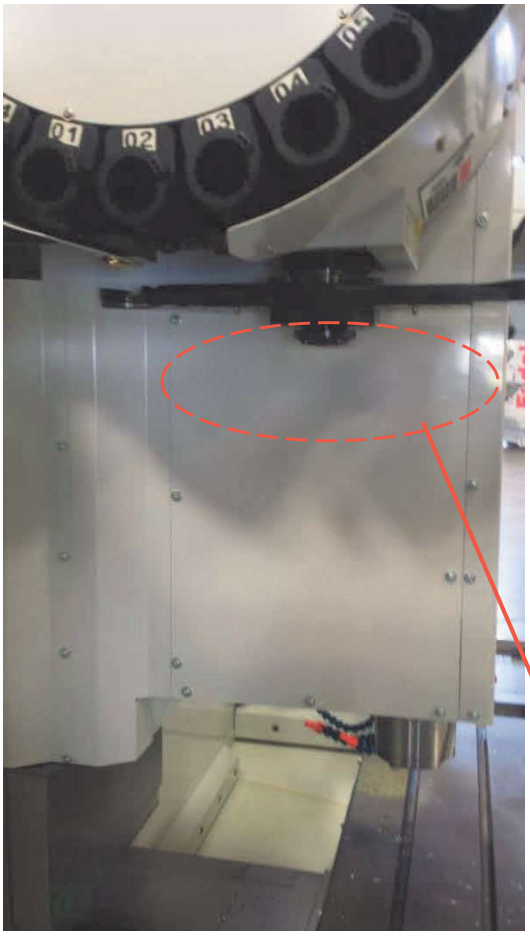
**Spindle Keys:**
Weekly check spindle key mounting bolts to ensure both are tight.

**Piston Compression Spring:**

Inspect spring bi-annual for cracks. Recommend replacing spring every 2 years.



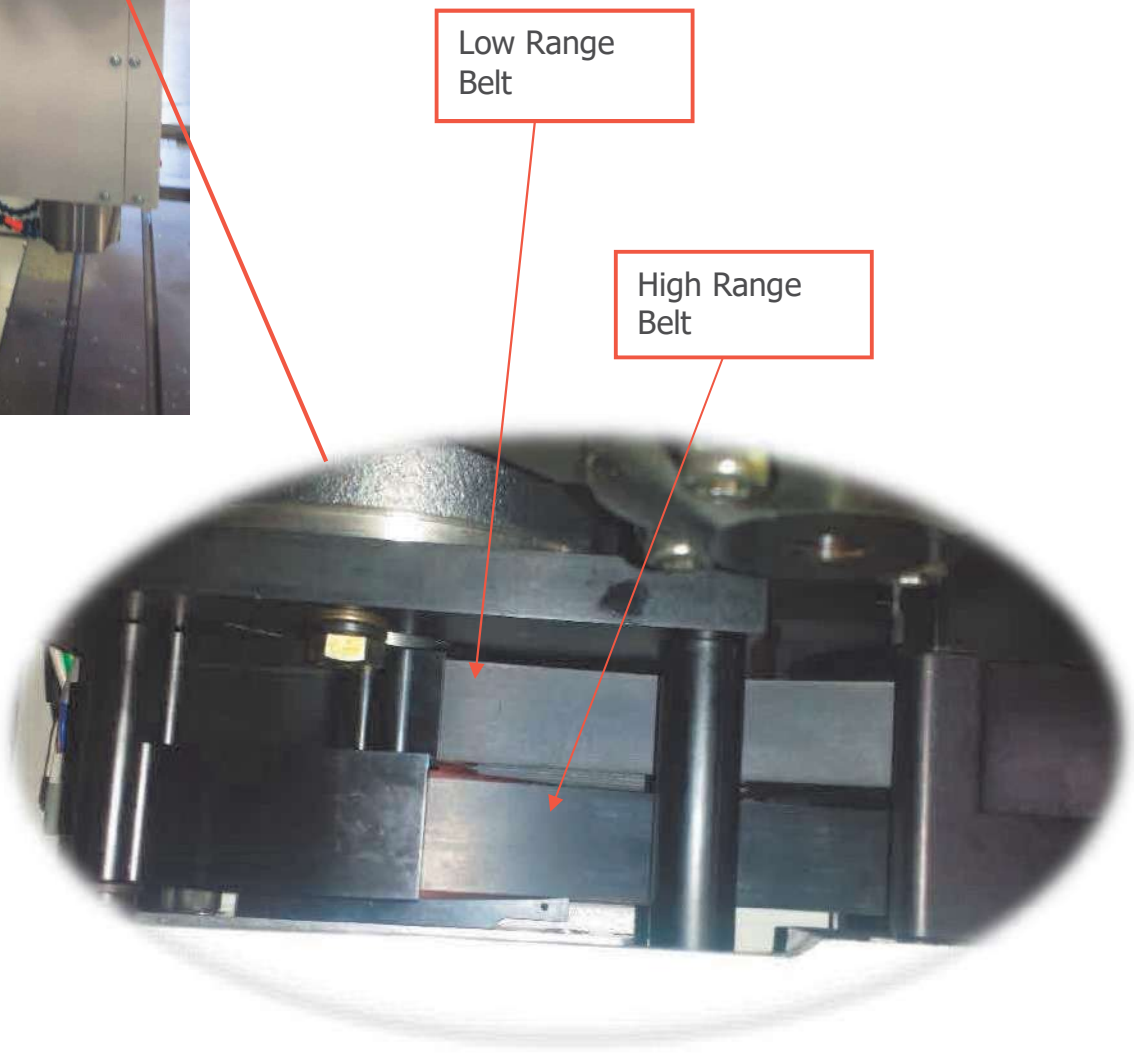
## SPINDLE BELTS




**Belts:**

Check belts bi-annual for signs of wear, deterioration, saturation, distortion, and/or raveling**.**

NOTE: A sign of deterioration or belts breaking down, is an excessive buildup of the belt material on the idler rollers!



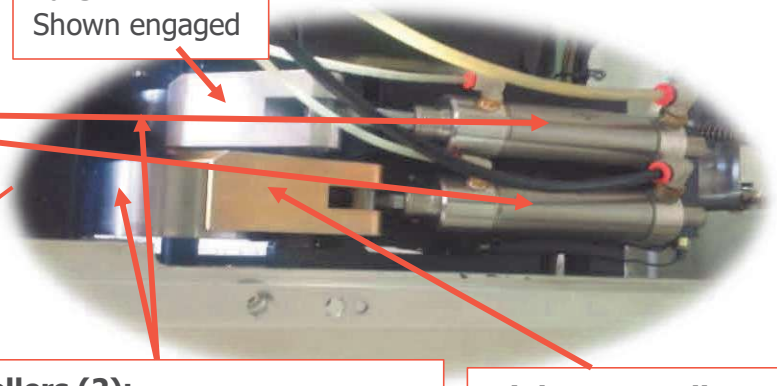
# VMC MAINTENANCE

**Models: VMC2015HS, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC6032-50, VMC8032, VMC8032-50, VM5ax320**

## SPINDLE IDLER ASSEMBLY

**Idler Cylinders (2):**
Check cylinder shafts and fittings bi-annual for signs of leakage.

**Low Range Idler:**
Shown engaged

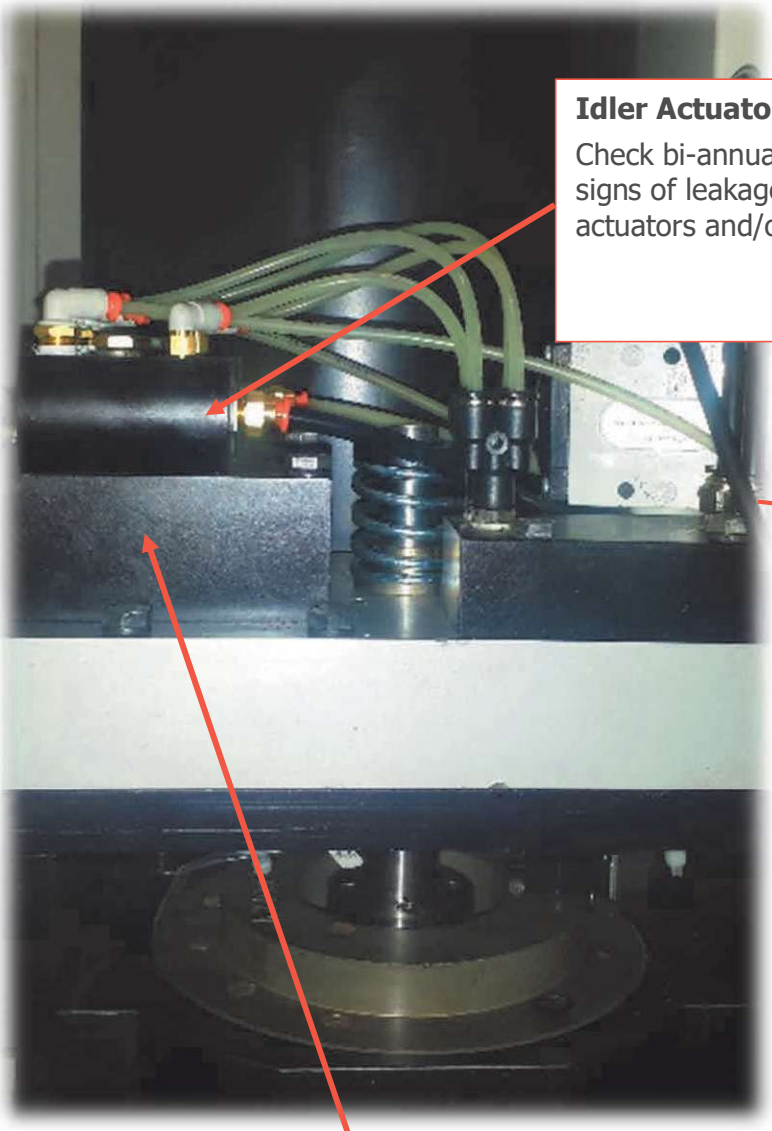


**Idler Rollers (2):**
Check both rollers bi-annual to ensure rollers spin freely by hand when dis-engaged and clean any rubber build up from roller.
CAUTION: Machine must be in the emergency stop condition during this inspection.

**High Range Idler:**
Shown dis-engaged

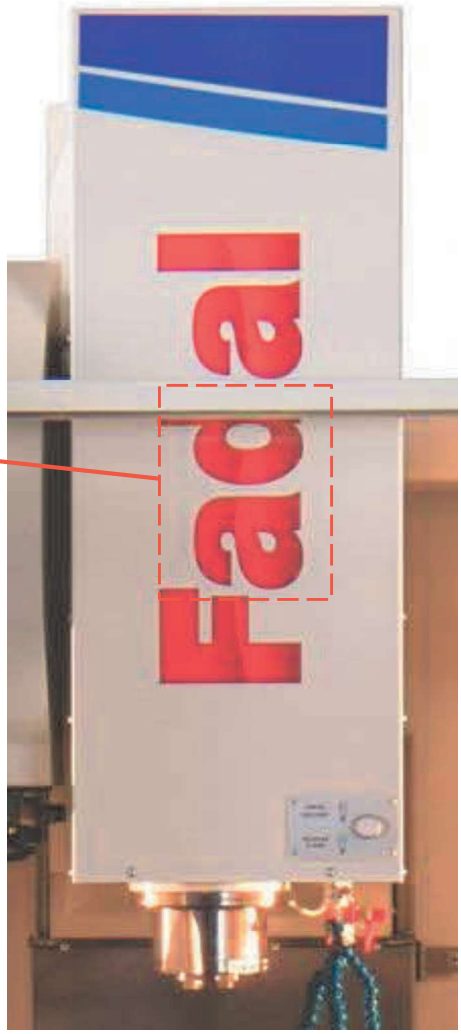
# VMC MAINTENANCE

**Models: VMC2015HS, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC6032-50, VMC8032, VMC8032-50, VM5ax320**



**Idler Actuators (2):**

Check bi-annual for any signs of leakage from actuators and/or fittings.



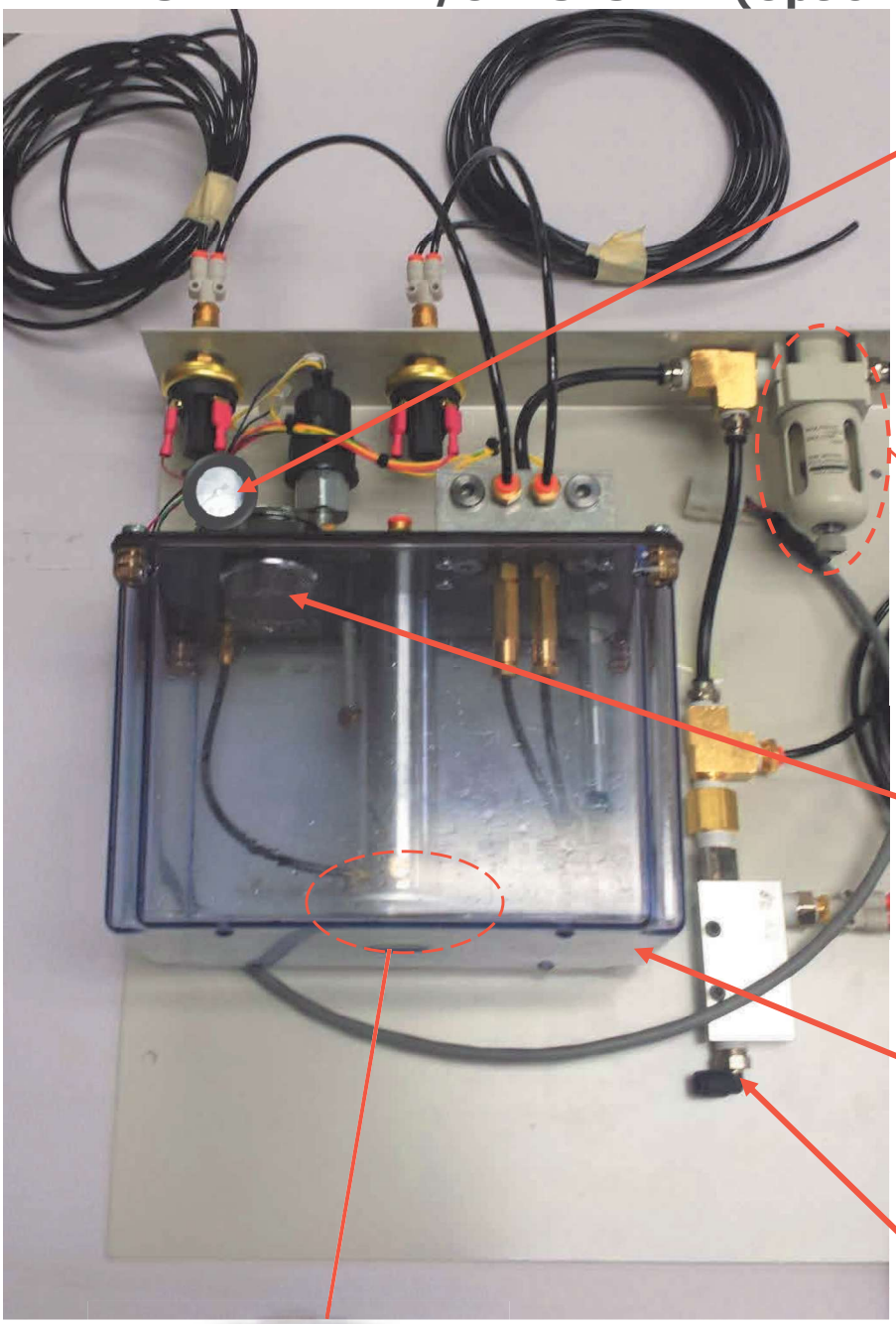

**Hydraulic Oil Reservoir:**
Refill as needed.
NOTE: Refilling requires removal of actuators to access fill port. Must disconnect air to machine and drain the tank in rear.

RECOMMENDED OIL: DTE Light

## SPINDLE MOTOR COOLING FAN

**Spindle Motor Cooling Fan:** Check monthly that fan is clean with good air flow. Air flow should be in a downward direction blowing cool air onto motor.

## SPINDLE AIR/OIL SYSTEM (Optional)



**Pressure Gauge:**
Check daily.
Pressure should be 300 – 400 psi per cycle.
Cycles should be every 19 minutes while spindle is running.

**Water Separator:**
Check daily and drain as needed.
NOTE: Air must be off to drain!

**Drain Plug:**
Rotate knob CCW to drain.

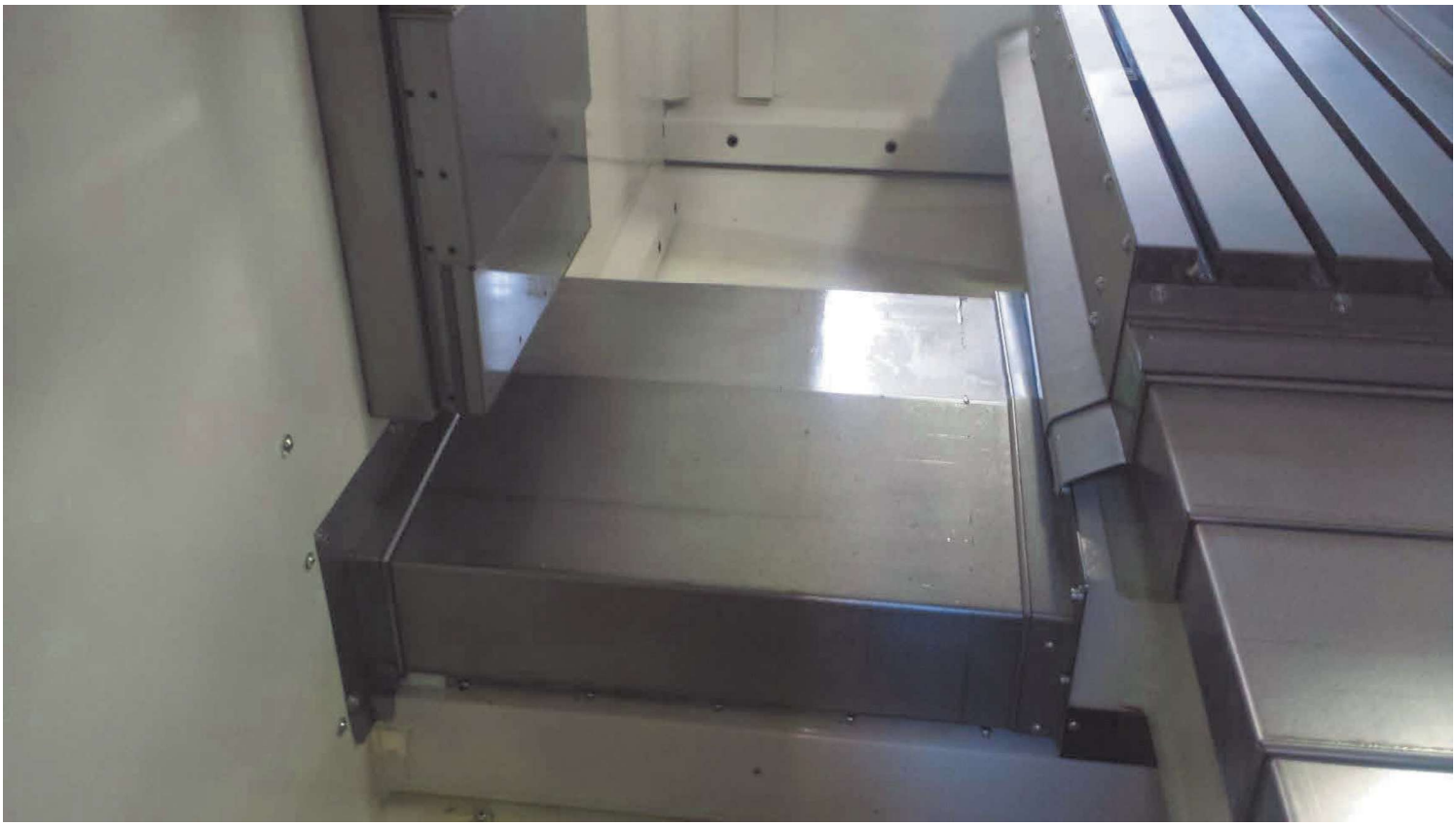
**Oil Fill Strainer:**
NOTE:
NEVER fill tank with strainer removed!

**Oil Reservoir:**
Check oil level daily and refill as needed.
NOTE:
Because this is the supply for the oil MIST, the consumption is very slow.

**Vacuum Fitting:**
Check daily.
Fitting and tubbing attached to it must be free of kinks and/or other obstructions.

**Inlet Filter:**
Inlet oil filter should be removed and cleaned with a mild solvent yearly.

## SLIDEWAY COVERS



**Slideway Covers:**
The way covers are designed to protect the slideways and ballscrews. They are also crucial in keeping chips and other debris from accumulating under the saddle and table assemblies. They are also important for coolant runoff. Keeping the way covers in good condition is critical in extending the overall life of the machine. Visually inspect all covers daily for any dents or distortion.

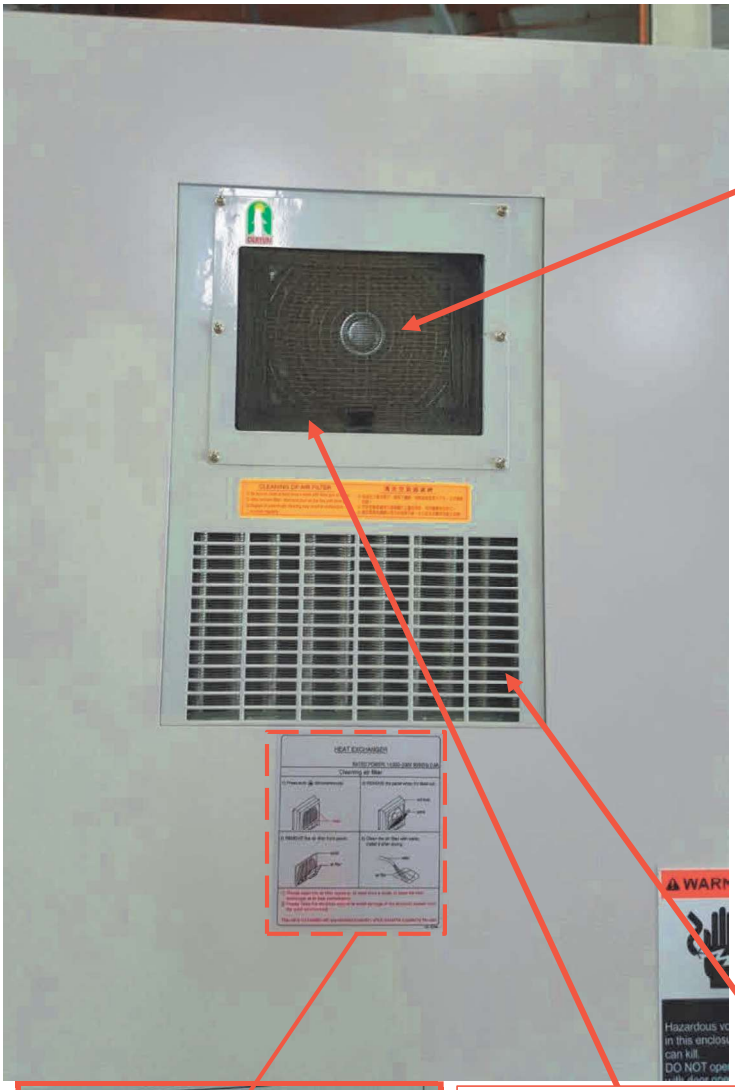
# VMC MAINTENANCE

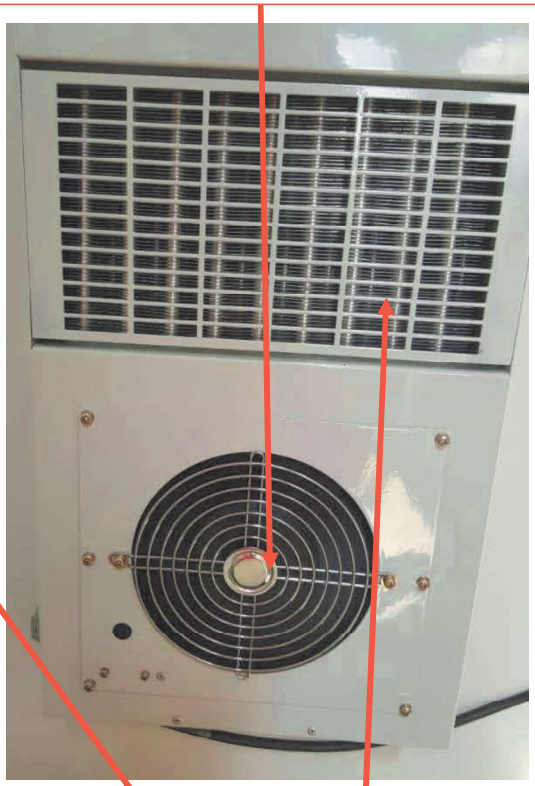
**Models: VMC2015HS, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC6032-50, VMC8032, VMC8032-50, VM5ax320**

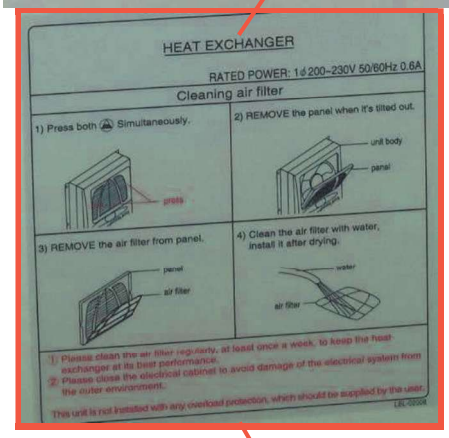
## ELECTRICAL CABINET

- **Heat Exchanger (Cabinet Cooling Unit)**

**Cooling Fans (2):**
Check fans monthly, especially during the warmer months for rotation and proper air flow. The outer fan(above) should blow air inward, pulling air from the outside into the heat exchanger. The inner fan(below) should blow air outward, pulling cooled air from the unit into the cabinet.







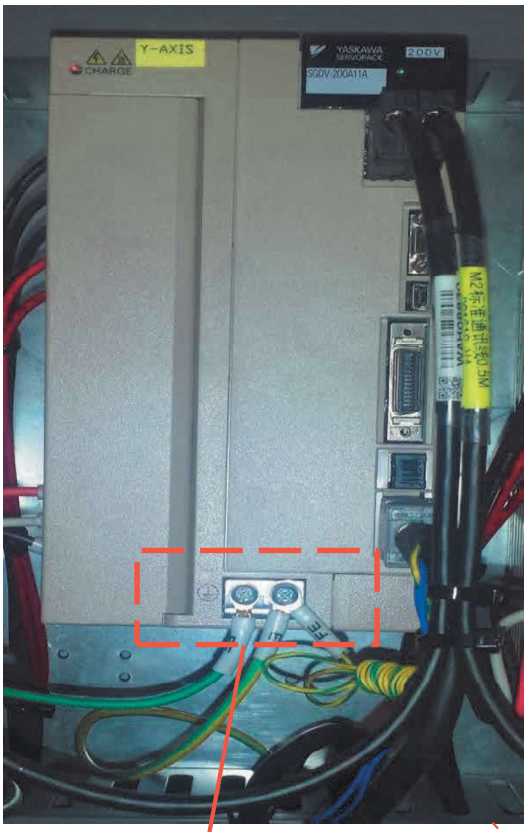

**Air Filter:**
Check filter weekly and clean as needed. Lower tab attached to filter is lifted straight up to remove filter. Use soap and warm water to clean filter. NOTE: Dry thoroughly with compressed air prior to reinstalling!

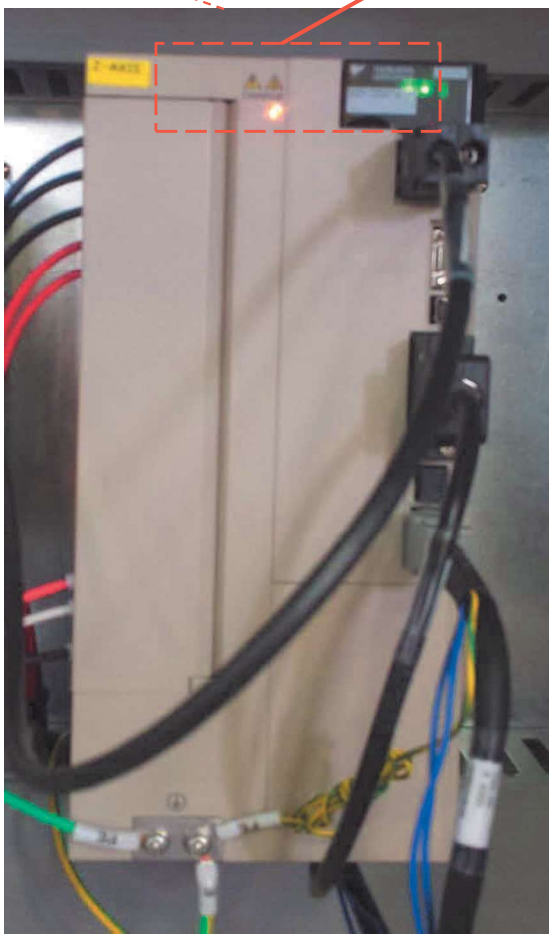
**Air Filter Care Instruction**

**Cooling Fins:**
Check grilles and cooling fins, and clean bi-annual.
NOTE: Good air flow insures that the cabinet stays cool, especially during the warmer months. A cool cabinet, greatly increases the longevity of the electronic components inside!

- **SERVO DRIVE (AMPLIFIER) COOLING FANS**

**Z-Axis Servo Drive:**
Check cooling fan monthly for rotation and proper air flow. Air should flow up, pulling warm air from unit. Clean grill as needed.

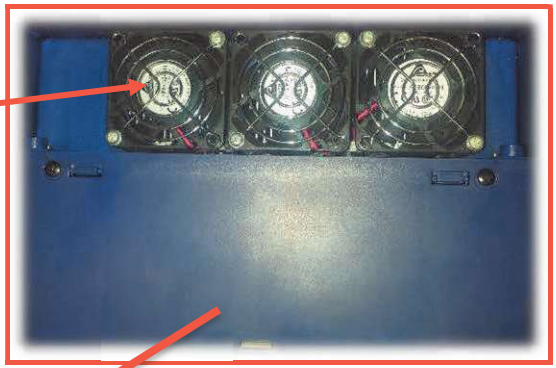


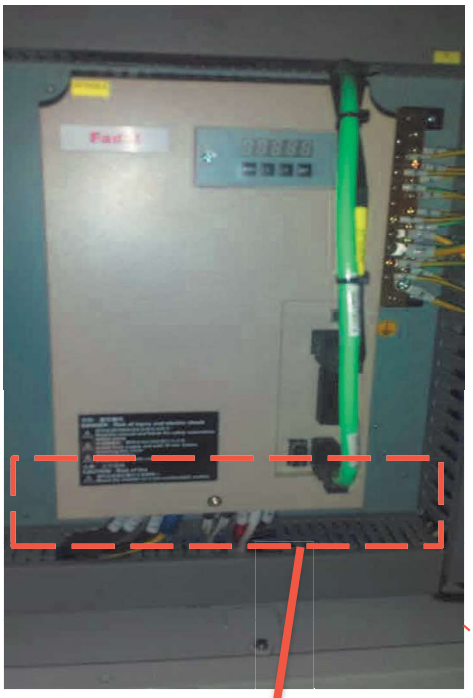



**X & Y Axes Servo Drive:**
**A & B Axes Servo Drive (If applicable):**
Check cooling fan monthly for rotation and proper air flow. Air should flow up, pulling cool air into unit. Clean grill as needed.

- ## Spindle Drive Cooling Fans

**High Torque, 18.5 kW, Spindle Drive Cooling Fans (x3):**
Located at the top of the drive. Check all 3 cooling fans monthly for rotation and proper air flow. Air should flow up, pulling warm air from drive unit.

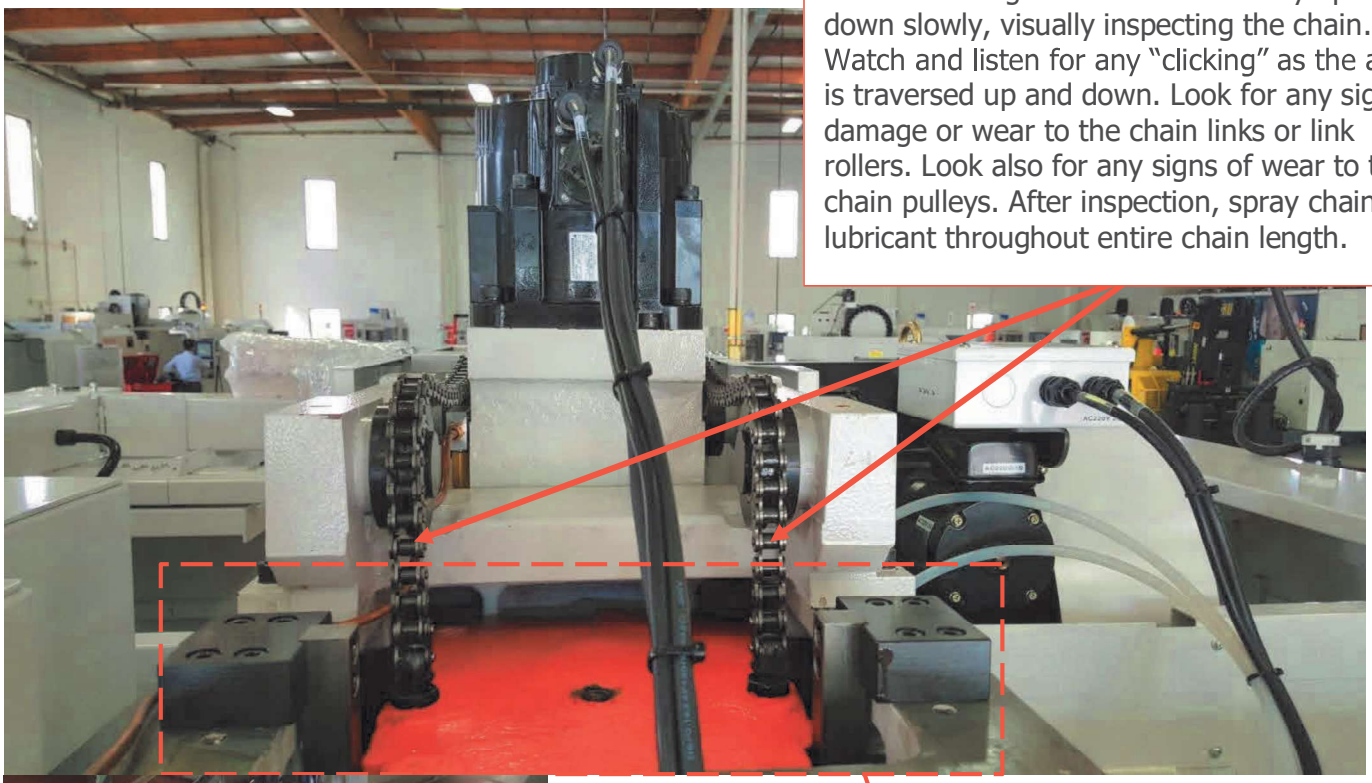




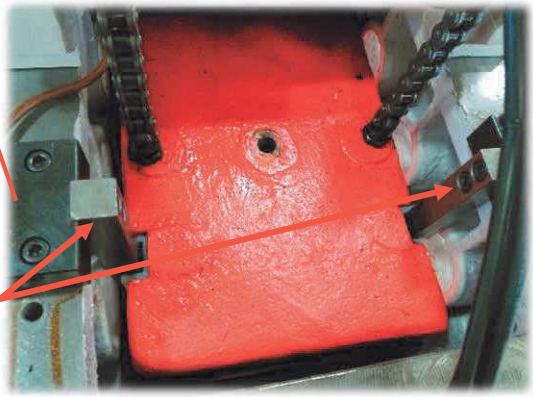

**Standard, 7.5kW, Spindle Drive Cooling Fans (x2):**
Located at the bottom of the drive. Check both cooling fans monthly for rotation and proper air flow. Air should flow up, pulling cool air into the drive unit.

## COUNTERBALANCE

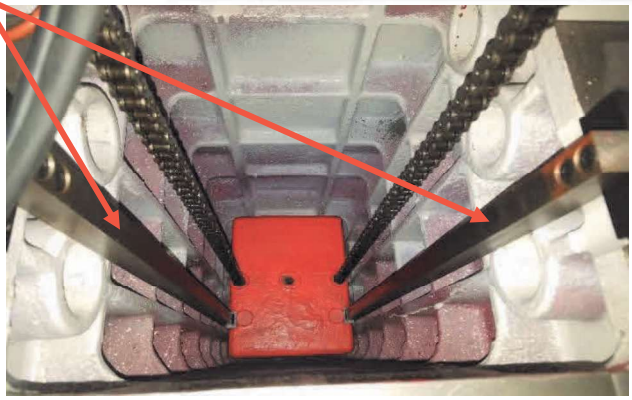
**Counterbalance Chain:**
Bi-annual bring the Z-axis all the way up and down slowly, visually inspecting the chain. Watch and listen for any "clicking" as the axis is traversed up and down. Look for any signs of damage or wear to the chain links or link rollers. Look also for any signs of wear to the 4 chain pulleys. After inspection, spray chain lubricant throughout entire chain length.



Lower portion of guide rails can be accessed from this opening at rear of column.



**Counterweight Guide Rails:**
Grease guide rails bi-annual



## BATTERIES

**Batteries:**
Battery box consists of 3 size D batteries. Fadal recommends replacing the batteries bi-annual.
CAUTION: BATTERIES MUST BE REPLACED WITH THE MACHINE POWER ON OR ALL DATA WILL BE LOST!!
To replace batteries, loosen the 2 screws at each end of the cap to remove cap. The proper loading of the batteries is noted inside the battery box.
**NOTE:** See PROCEDURES section for details on changing the battery replacement reminder.

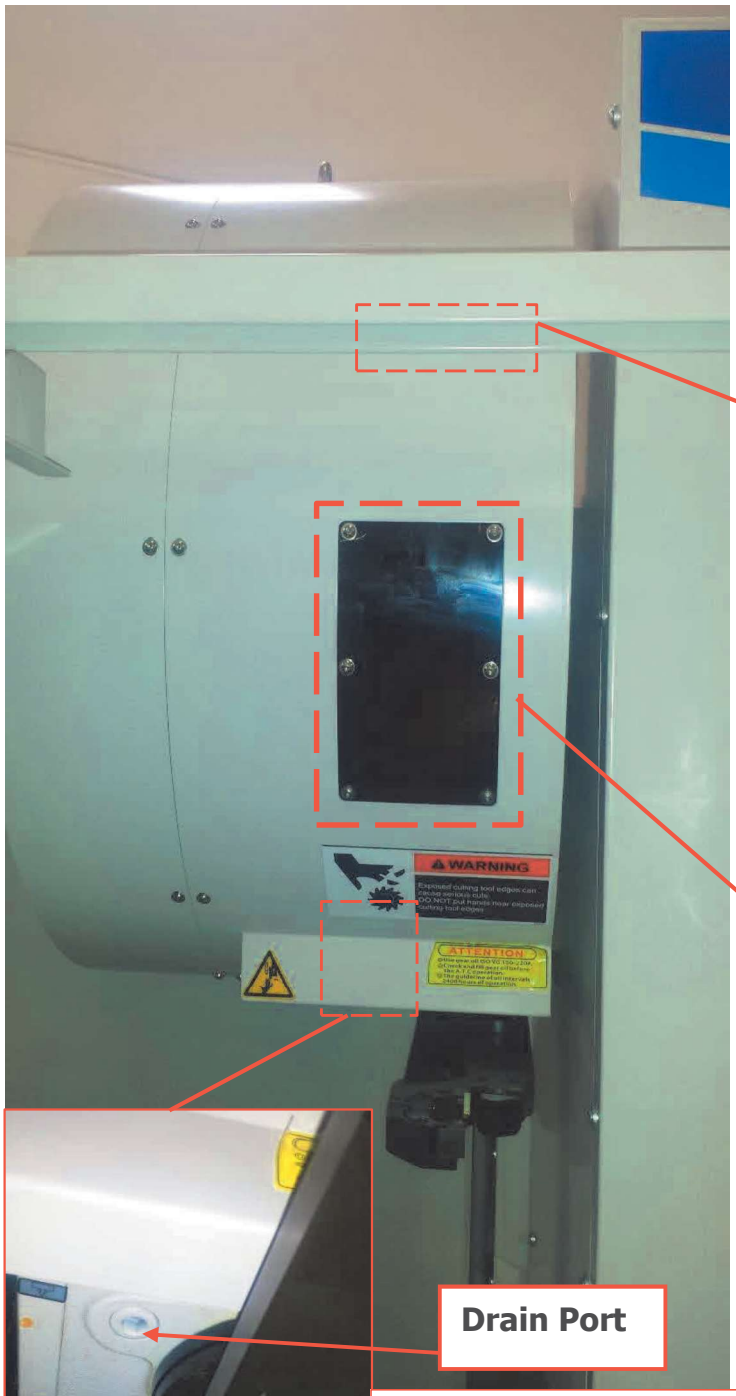
## Automatic Tool Changer (ATC)


To avoid damage to Carousel(magazine) pot, be sure to use proper tool when extracting tool holder directly from ATC.

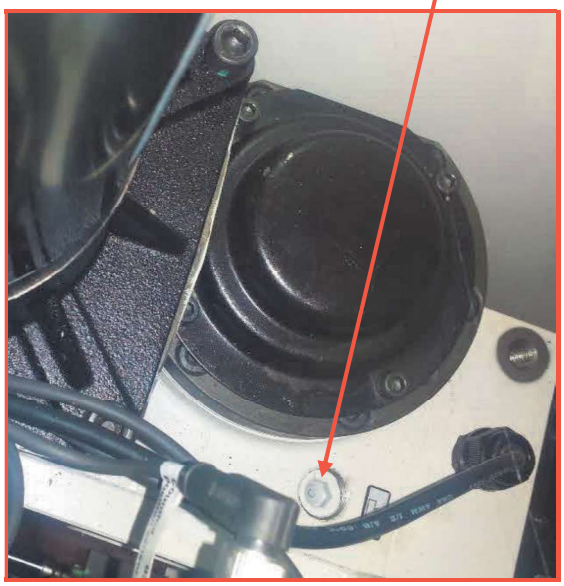
# VMC MAINTENANCE

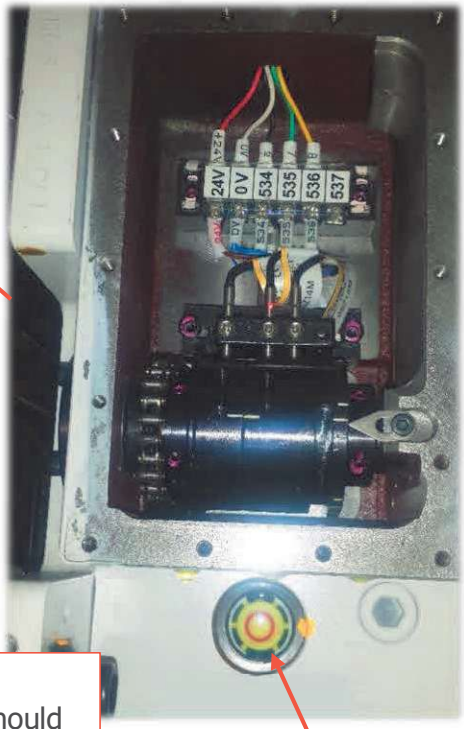
**Models: VMC2015HS, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC6032-50, VMC8032, VMC8032-50, VM5ax320**

## Automatic Tool Changer (ATC)




Fill Port





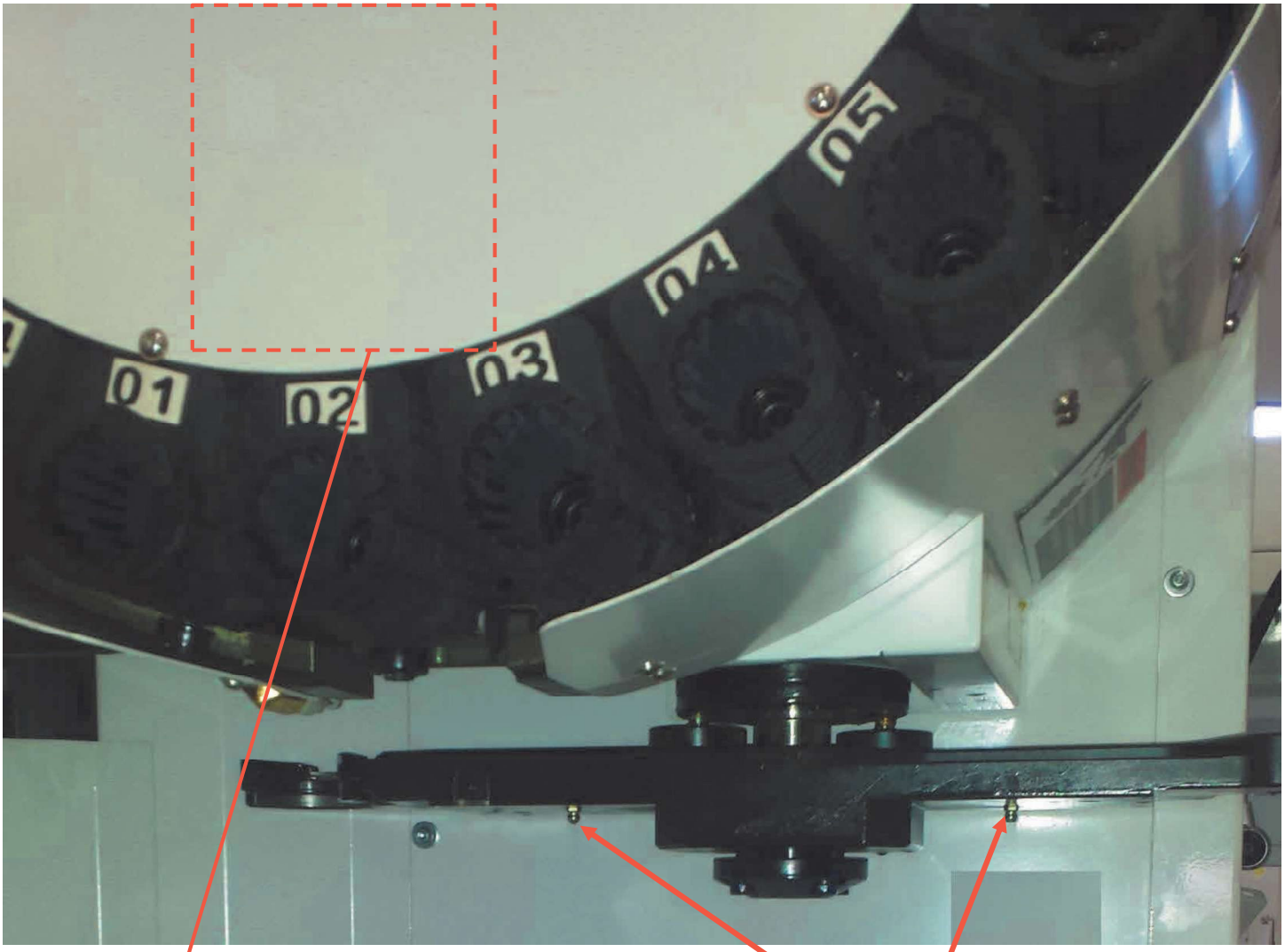

Sight Glass

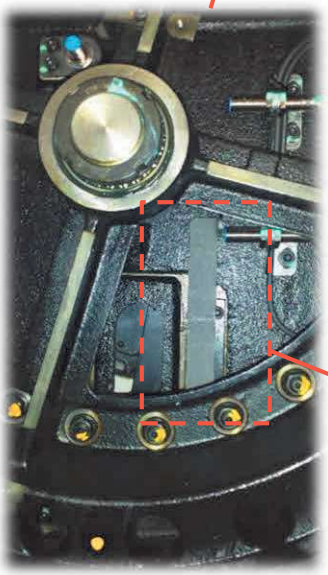


Drain Port

**ATC Oil:**
Check oil level bi-annual. Sight glass should show a minimum of half full. Fadal recommends changing the oil annually, or every 2400 hours of operation, whichever comes first.
RECOMMENDED OIL: ISO VG 150 - 220

## Automatic Tool Changer (ATC)



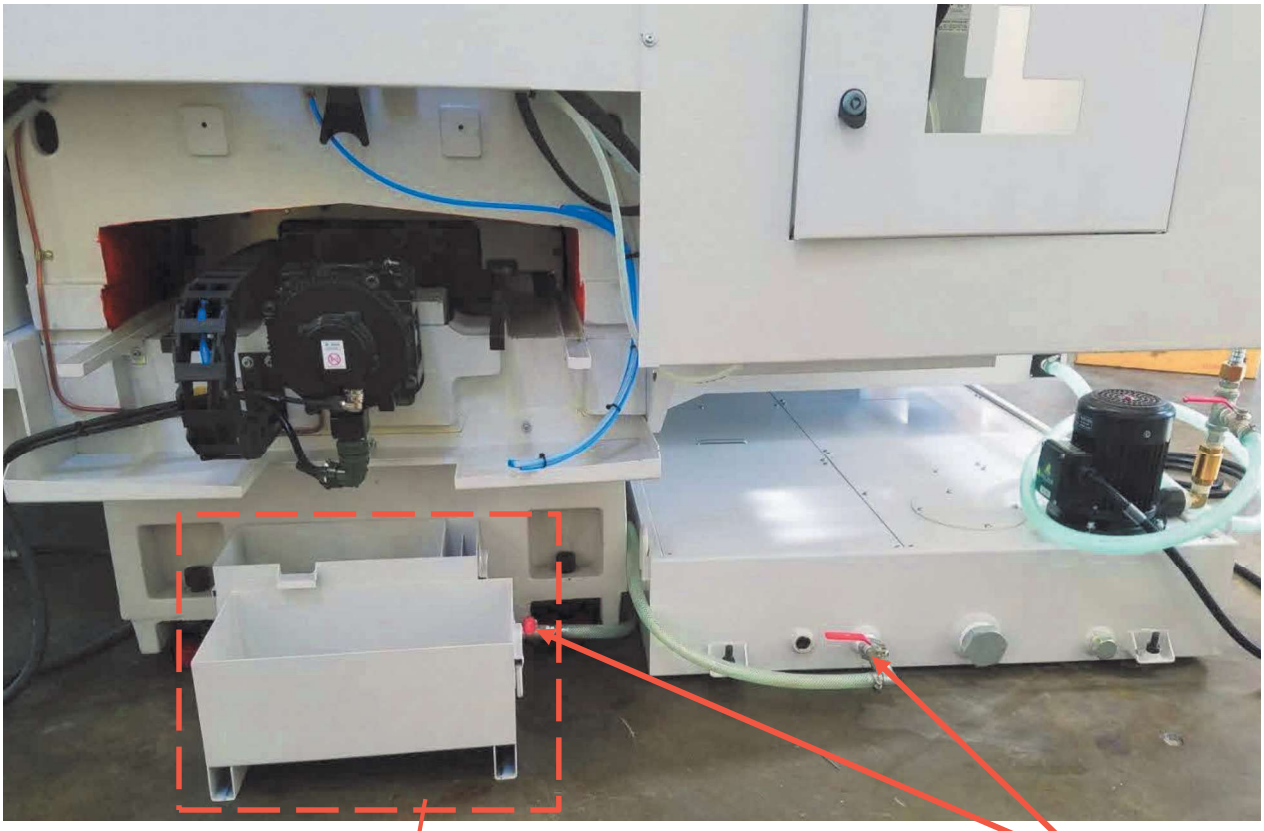



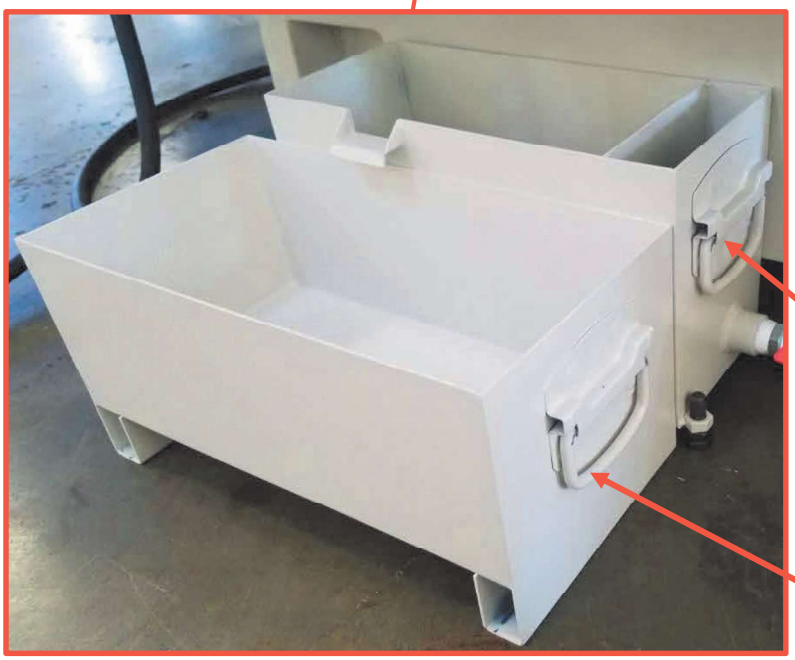
- **Grease**

**Grease Gun:**
Bi-annual grease both zerk fittings. A water-resistant grease is recommended. 1-2 pumps are sufficient.

**Grease:**
Bi-annual grease mechanism for raising and lowering waiting pot (bucket). Lithium grease is recommended.

## Oil Separator





**Ball Valves (2):**
Shown closed.
Turn red handle in-line with valve body to open valve.

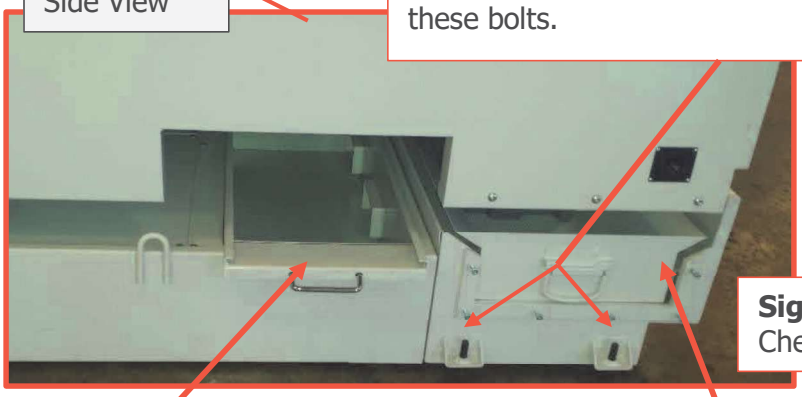
**Oil Separator Tank:**
The tank is designed to maintain coolant level with the main coolant tank. As the waste oil accumulates on top of the coolant, it runs over the spillway into the waste oil reservoir.
Fadal recommends cleaning this tank bi-annual to clear any coolant that may have coagulated along the bottom of the tank.
**NOTE**: Both ball valves must be closed

**Waste Oil Reservoir:**
Check daily and empty as needed.

## Coolant Tanks


**Leveling Bolts (4):**
Located at each end of front tank and used in conjunction with side tank leveling bolts. Adjust as needed.
**NOTE:** Tanks can be raised and/or leveled using these bolts.

Side View

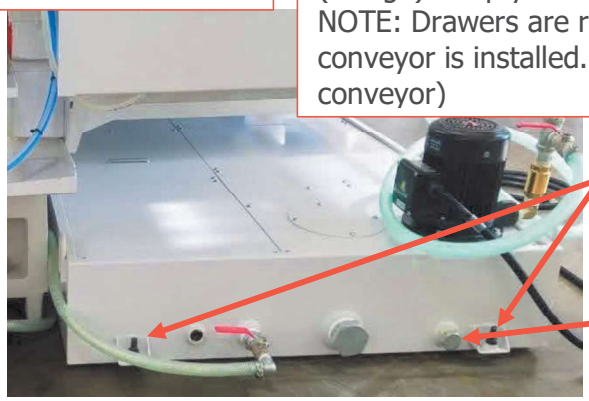



**Sight Glass:**
Check daily and add coolant as

**Chip Strainer Drawer:**
Empty as needed

**Chip Drawers (2):**
Drawers located at each end of front coolant tank (trough). Empty as needed when full.
NOTE: Drawers are removed when optional chip conveyor is installed. (Not included with chip conveyor)

**End Plates:**
End plates only installed with optional chip



***Fadal recommends annually pulling coolant tanks (and optional conveyor, if applicable) and cleaning inside tanks.***

**Leveling Bolts (2):**
Used in conjunction with the front tank leveling bolts. Level as needed.

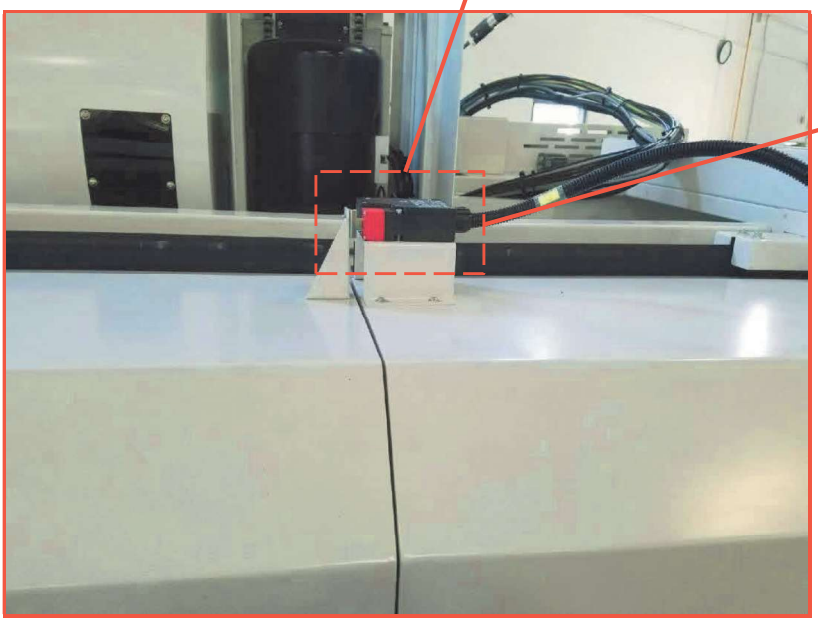
**Drain Plug**

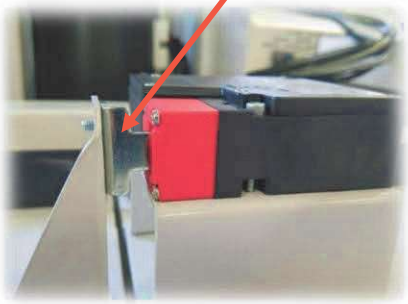
# VMC MAINTENANCE

**Models: VMC2015HS, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC6032-50, VMC8032, VMC8032-50, VM5ax320**

## DOOR INTERLOCK


**Interlock Key**





**Front Operator's Door Interlock:**
Daily check door interlock to ensure key aligns properly to receiver and unit functions properly.
CAUTION: *IT IS UNSAFE TO OPERATE MACHINE WITHOUT A FUNCTIONING DOOR INTERLOCK!*

# VMC MAINTENANCE

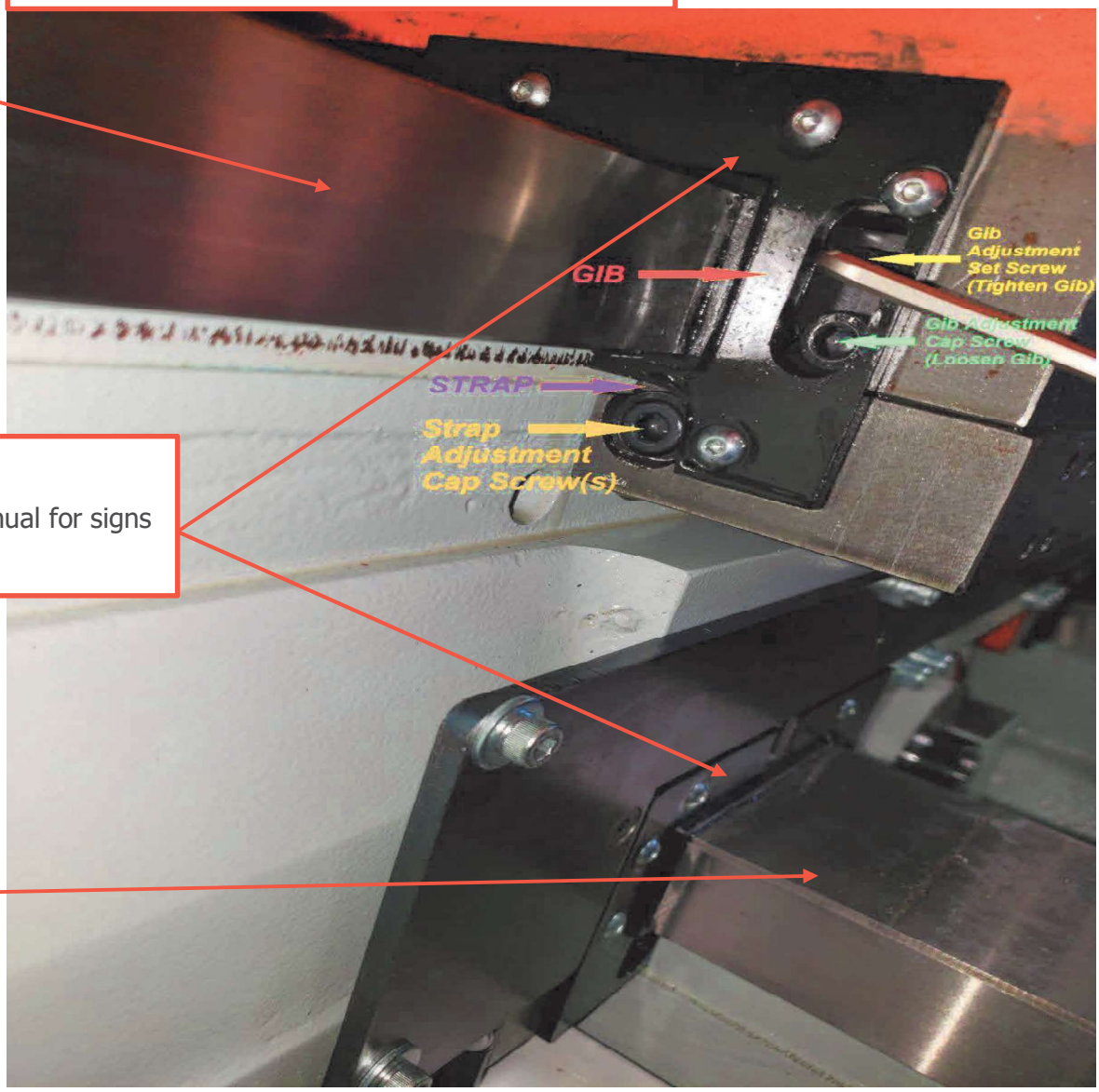
**Models: VMC2015HS, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC6032-50, VMC8032, VMC8032-50, VM5ax320**

## GIBS-BOX WAY ONLY

**NOTE**: The gibs of the box way design on the Fadal is set at the factory and will rarely require readjustment providing the lube system is inspected and maintained regularly. Only adjust if there is evidence of lateral play. It is recommended that a qualified technician adjust the gibs.

**PICTURE FROM LEFT SIDE UNDER TABLE**

**X AXIS WAY**

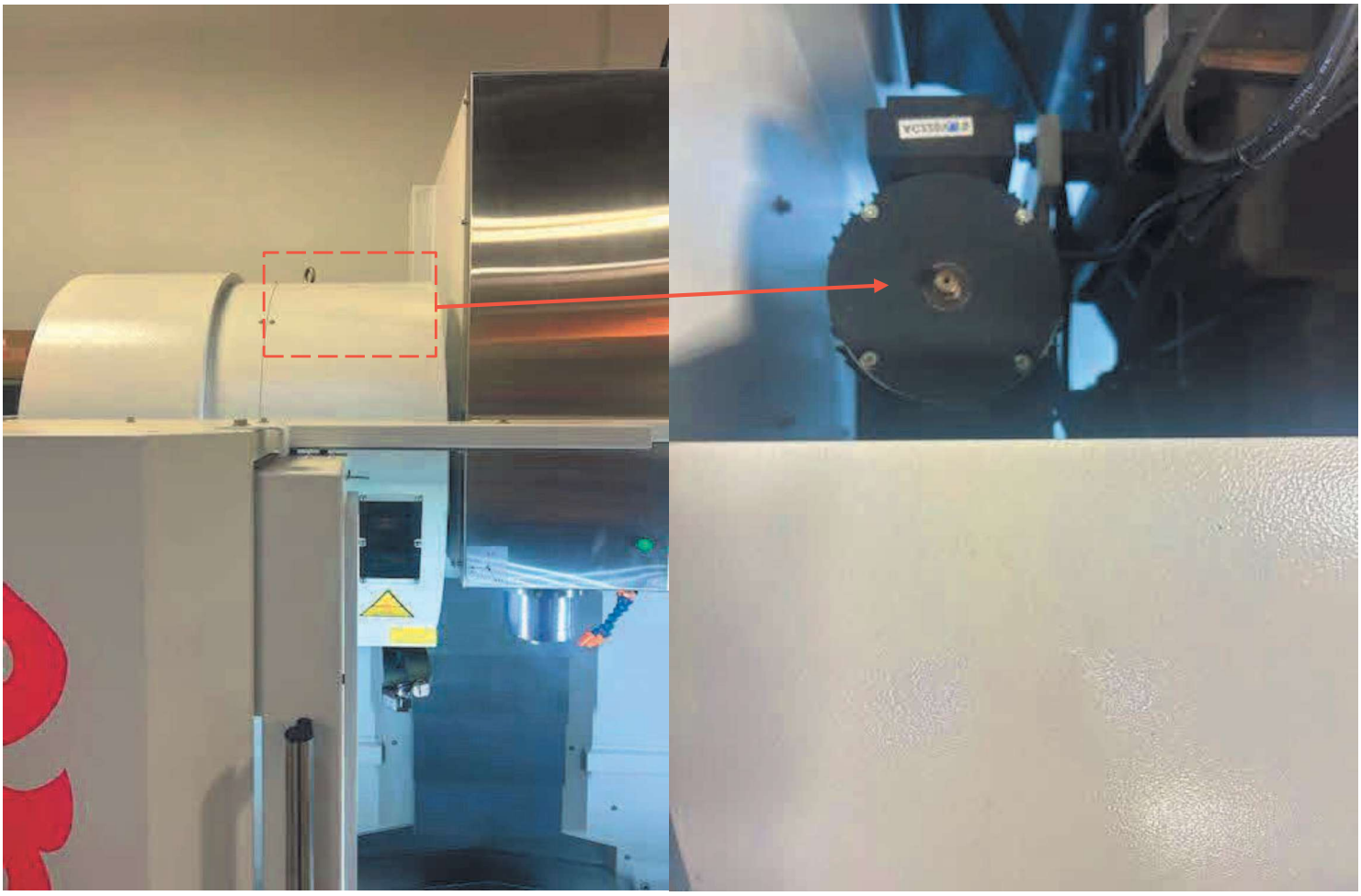



**Wiper Bracket**
Clean and inspect bi-annual for signs of wear.

**Y AXIS WAY**

# PROCEDURES

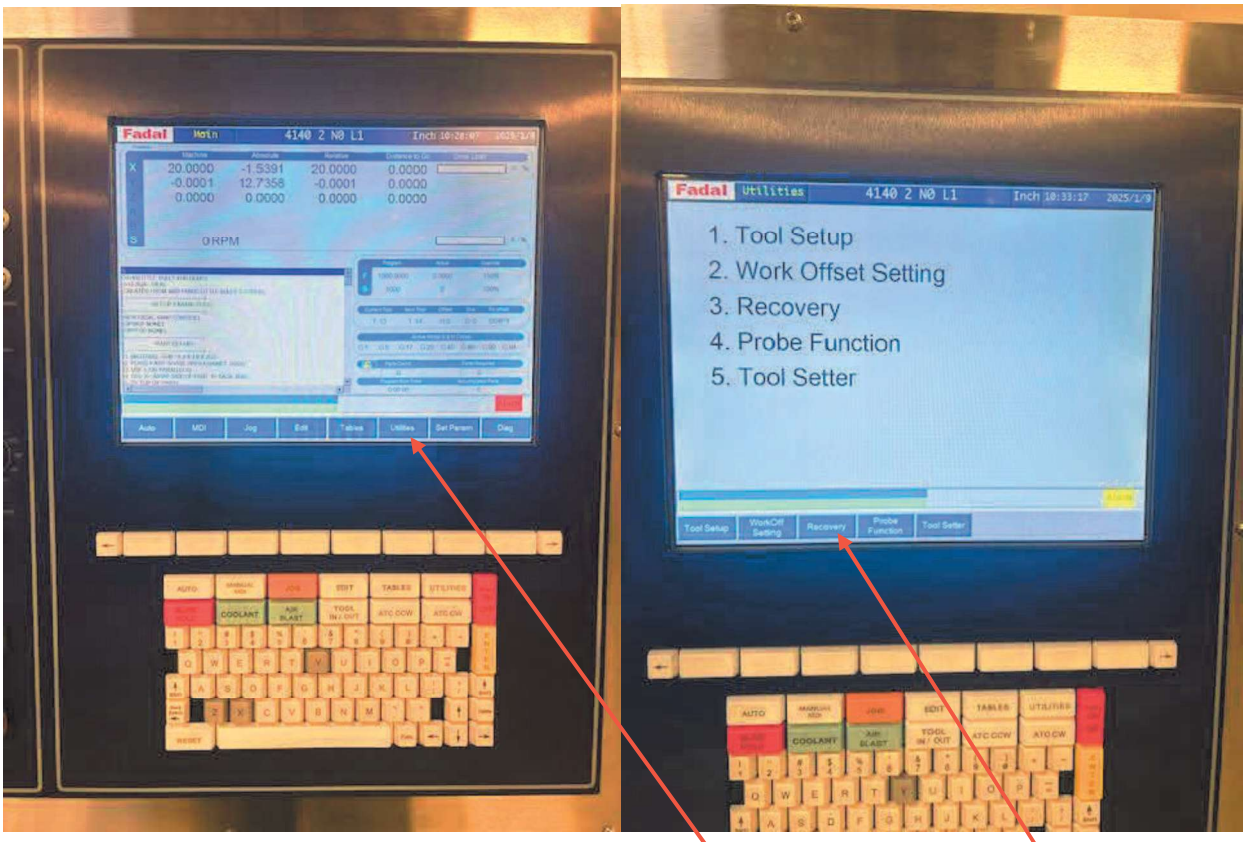
## ATC HANG UP RECOVERY PROCEDURE



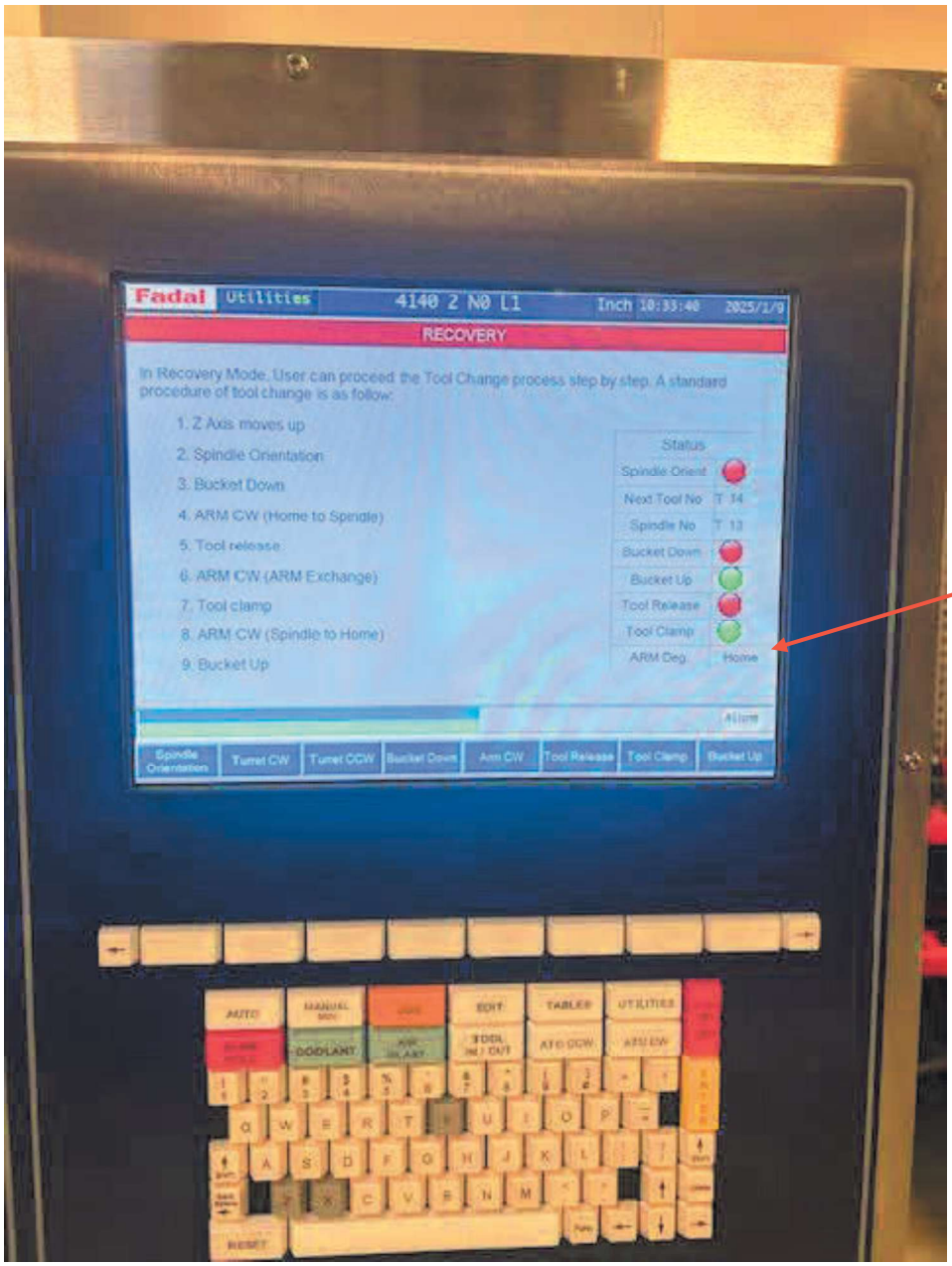
Tools needed; 12mm socket and ratchet or 12mm wrench

1. Press Emergency Stop Button
2. Climb onto the machine to reach the ARM motor and place socket onto 12mm hex on top of the motor.

3. Turn ratchet in the direction that starts rotating the arm back to its Home position. (If Arm tends to tighten up and seems to be going to a downward motion continuing its tool change motion, change direction that you are ratcheting.)
4. Once the arm is in Home position the rotation will stop.
5. Confirm home location by aligning marker to center hash mark on cam. This can be viewed through the rectangular window on the front of the ATC.
6. **Remove the tool in the spindle, release Emergency Stop and rotate ATC turret to an empty bucket before continuing. **




7. Go to main menu and select Utilities then Recovery on the soft keys




**When cranking arm motor back home. Turn until display reads "Home" then an additional 1-2 cranks. Then push and release E-stop button**

8. Proceed with recovery by starting with Spindle orientation key followed by Bucket Down, Arm CW, Tool Release, Arm CW, Tool Clamp, Arm CW, Bucket Up. Then Left arrow out of Recovery press Emergency stop and release Emergency stop.

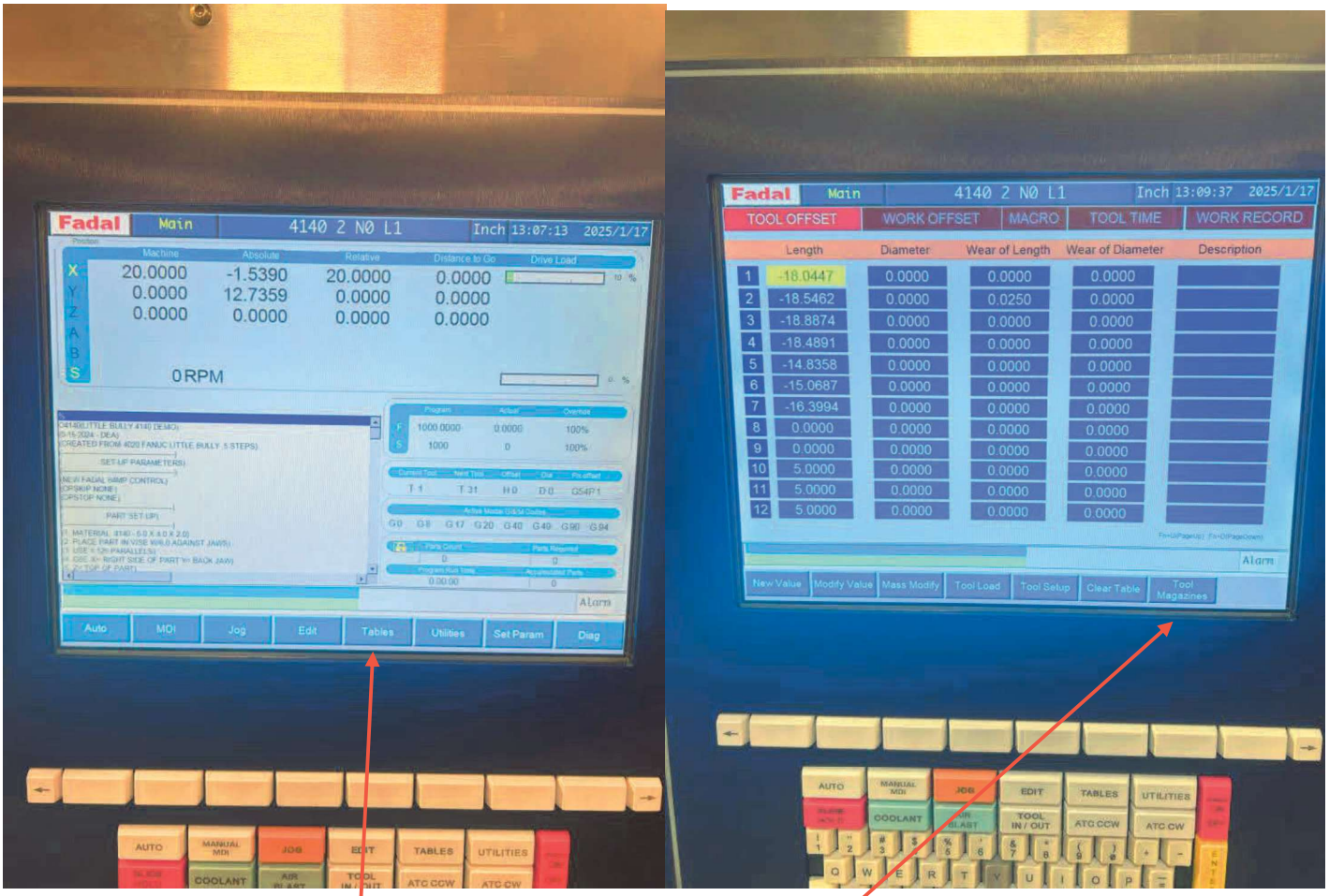
**NOTE:**
If an alarm of Arm not at Home or Arm not at Spindle comes up after the first Arm CW motion in Recovery mode. Follow the next steps.

- **a.** Left arrow out of Recovery
- **b.** Go into Recovery
- **c.** Arm CW
- **d.** Left arrow out of Recovery
- **e.** Go into Recovery
- **f.** Arm CW
- **g.** Left arrow out of Recovery
- **h.** Press Emergency Stop to Reset recovery mode and release E-Stop.
- **i.** Proceed with the Recovery procedure in step number 8.

**Verify tool change operation throuigh MDI**
**Verify tool order in turret before running unattended, it is common for the active tool to get mixed up in the hang up process.**

## Resetting DATC order

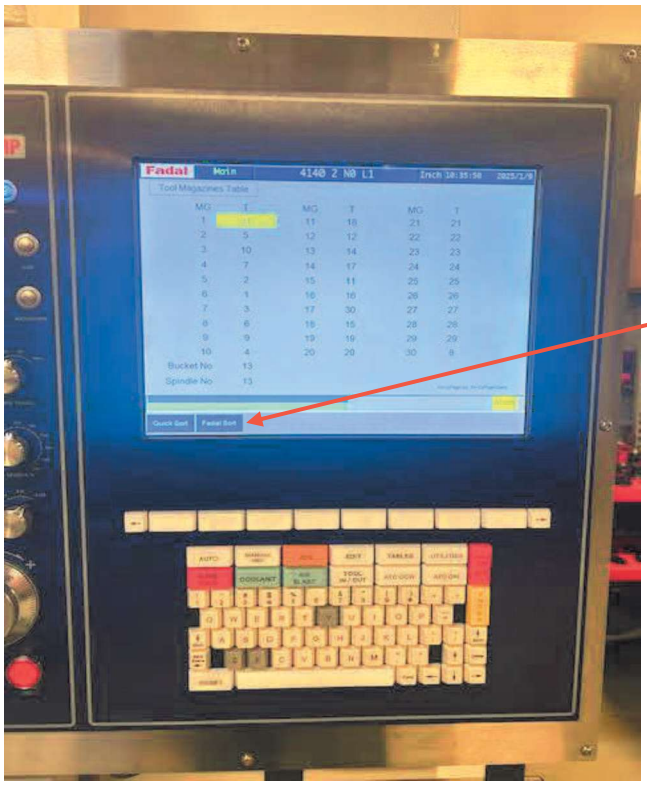
Sometimes is it necessary to reorder the turret, usually after stepping through the recovert process.




Press Tables Button
Press Tool Magazine Button

# VMC MAINTENANCE

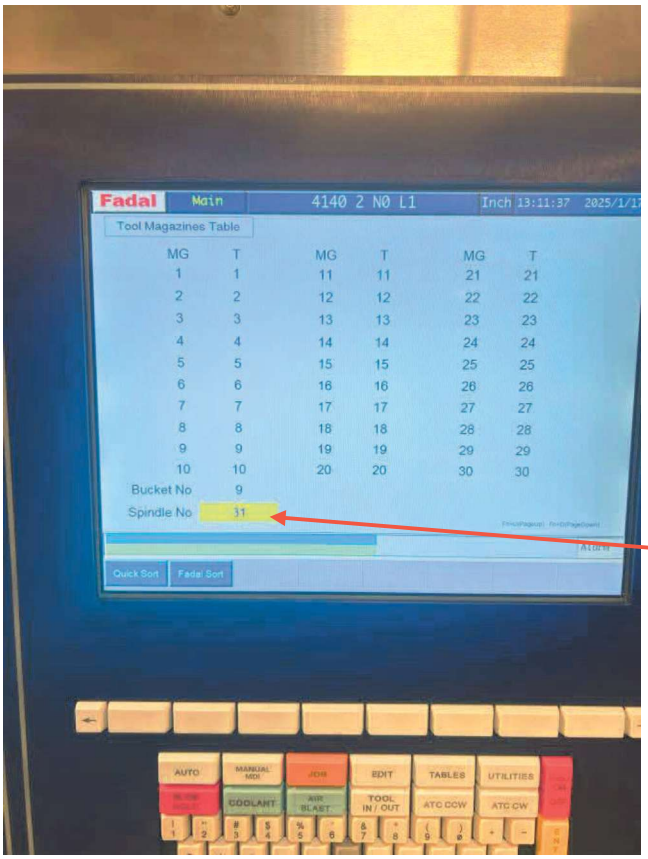
**Models: VMC2015HS, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC6032-50, VMC8032, VMC8032-50, VM5ax320**




Close Machine doors and press Fadal Sort. This will attempt to put all the tools back to numerical order to match the MG (pocket) locations.

**CAUTION** Machine will perform multiple tool changes. Keep doors closed until it completes.

NOTE: The "ghost" tool should be set as 1 more than the turret capacity to function properly.




Once Fadal sort is completed Tool 1 must be put back into spindle. Simply through MDI execute a T1M6 command.

## Formatting the "A" disk

Before formatting the "A disk" please Zero Return the machine in all axis. This will make resetting absolute homes easier (formatting the A disk will lose Programs, offsets, and absolute home position)

With the control Off push and hold both Right and Left arrow keys down (these are the keys at the bottom right of the keyboard next to the Func. Key). Power on the control while holding both of these keys down. (may need to use a remote USB keyboard)

When the control boots up to the "System Agent" page release the Left and Right arrow keys
Curser down to "System Functions"
Press the soft key menu right arrow key "next"
Cursor down to "Format Disk A
Press the soft key menu right arrow key "next"
Press the next soft key again

This should format the A disk and a message should appear "Formatting Disk A Process has finished"

Press the next softkey again to go back to the system agent page

Press the left arrow softkey "exit"

Press enter

Now the control will reboot

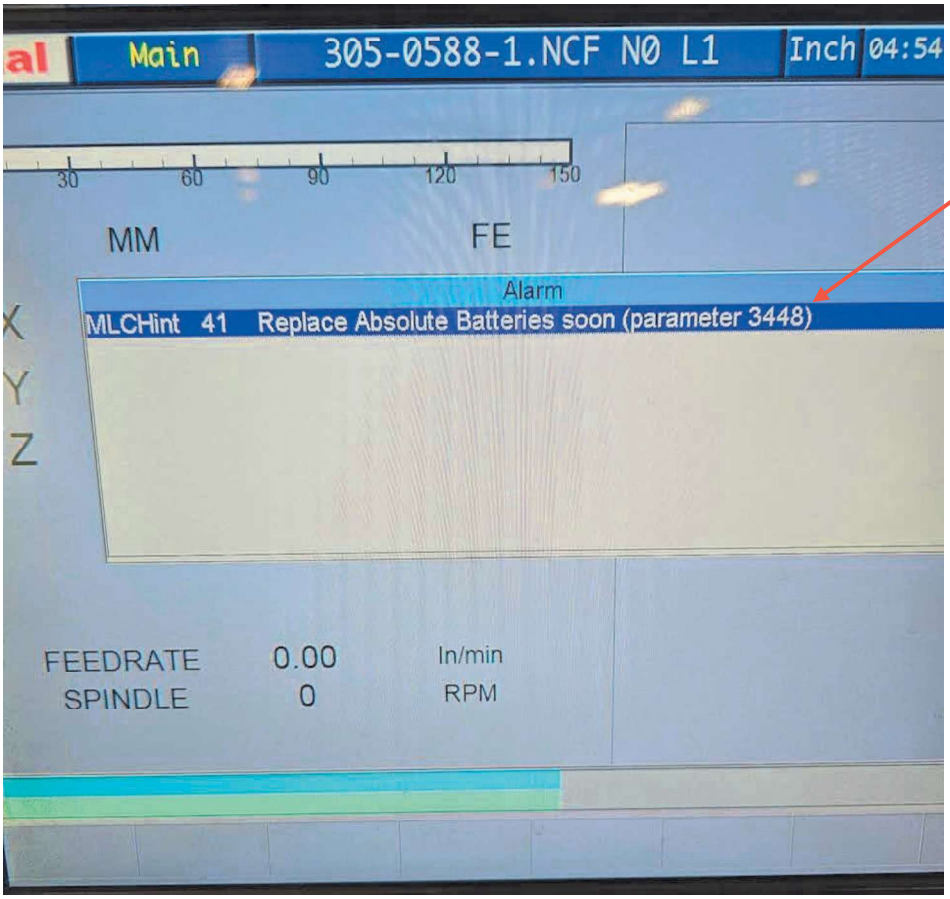
If the control powers up with a "OP-23" message simply power off the control and power back up

The Absolute home positions will need to be reset.

Network settings and probe calibrations will need to get reset.

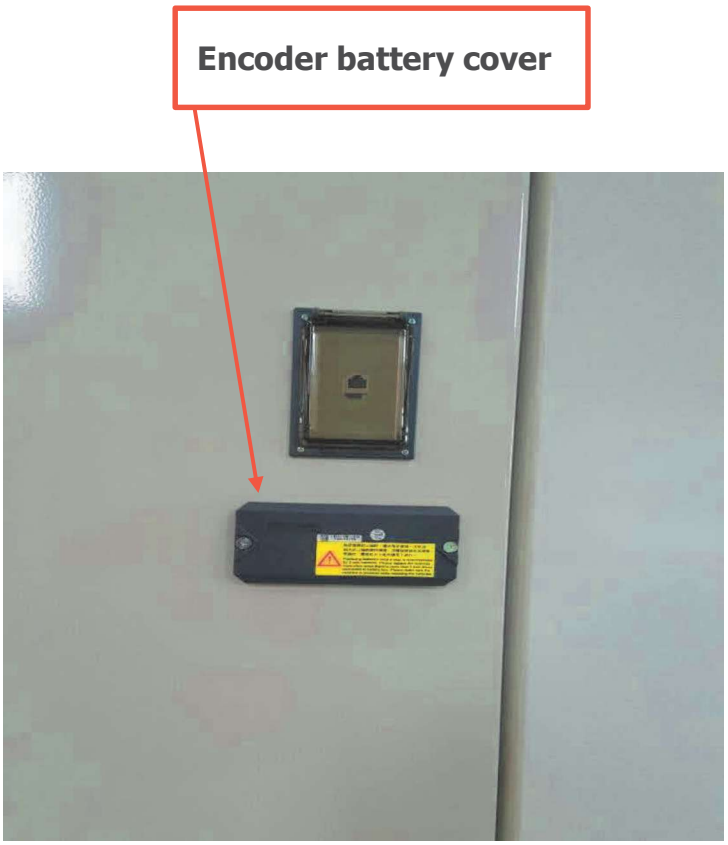
## Replacing Absolute Batteries

Most VMC were set up with a replace bettery reminder.
When this message pops up it is recommended to replace the 3 D-cell batteries following the steps below.



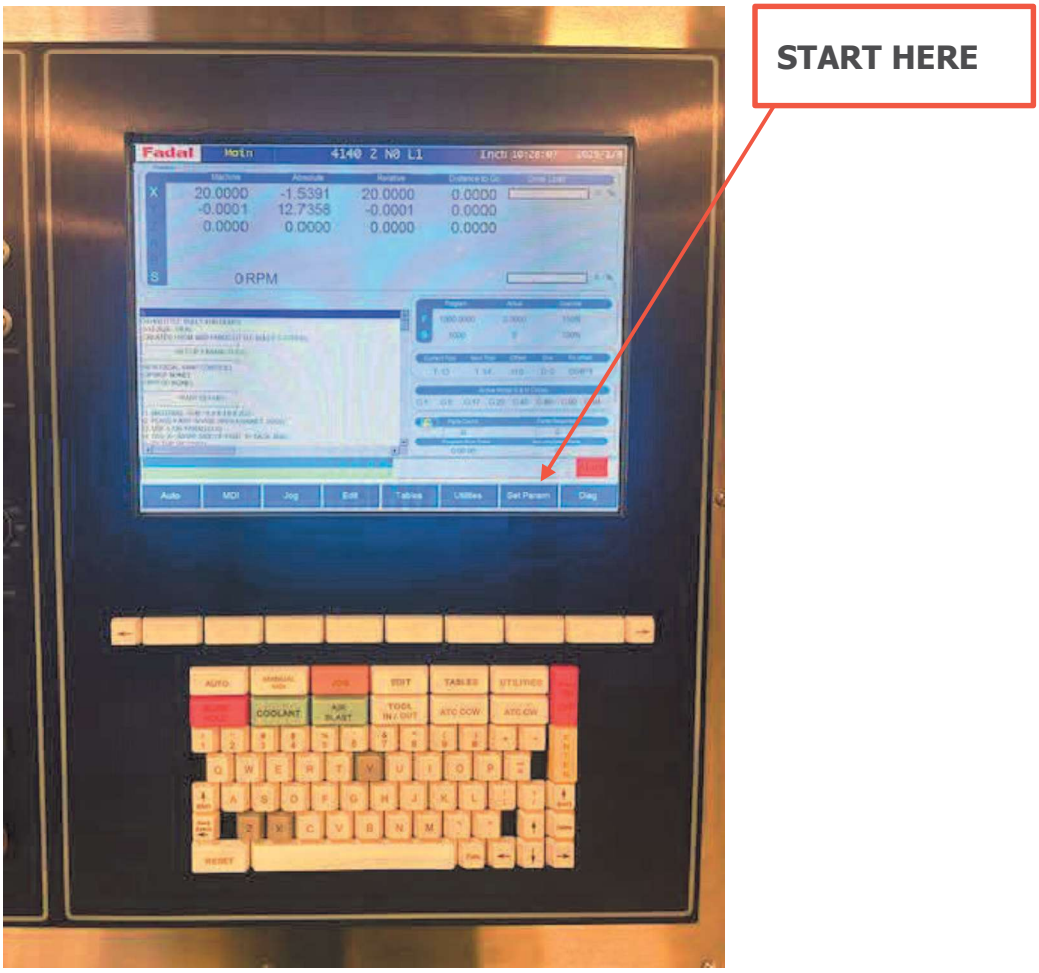

**This warning message will pop up at power on when parameter 3448 reaches the desired reminder date.**

1. Through Jog screen Send ALL axis to the **HOME** position.
2. Press Emergency Stop button in. **DO NOT POWER MACHINE OR CONTROL OFF!**
3. Locate battery cover on side or back of machine.




4. Remove scrwes and plate.
5. Take note of battery orientation.
6. Clean and adjust copper tabs if needed.
7. Install fresh D-cell batteries.
8. Reinstall cover.
9. Go to control, release E-stop and press reset. Any encoder related alarms should go away. If encoder alarm are still present remove battery cover and check battery orientation and that the tabs are making good contact. **DO NOT POWER OFF UNTIL ENCODER LOSS MESSAGES RESET**.

Change the battery reminder date by going into:




SET PARAM>MAKER PARAMETERS>PW IS 520>GO TO PAREMETER 3448
EDIT DATE TO ONE YEAR LATER.  Eg. 20250423 for April, 23, 2025

After entering new date the prompt will come up for the password again.  Press 520, press ENTER and the box on the right should update to the desired reminder date.

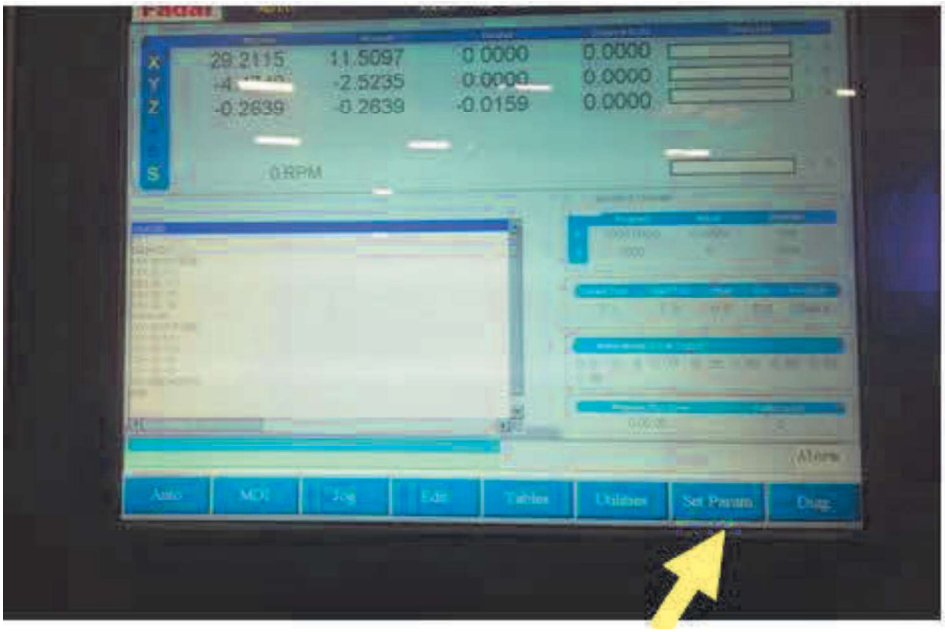
# RESETTING AXIS HOME POSITIONS

To reset an Axis Home Position due to battery disconnect, motor encoder disconnect, Alarm 34, or failed battery, follow these procedures:

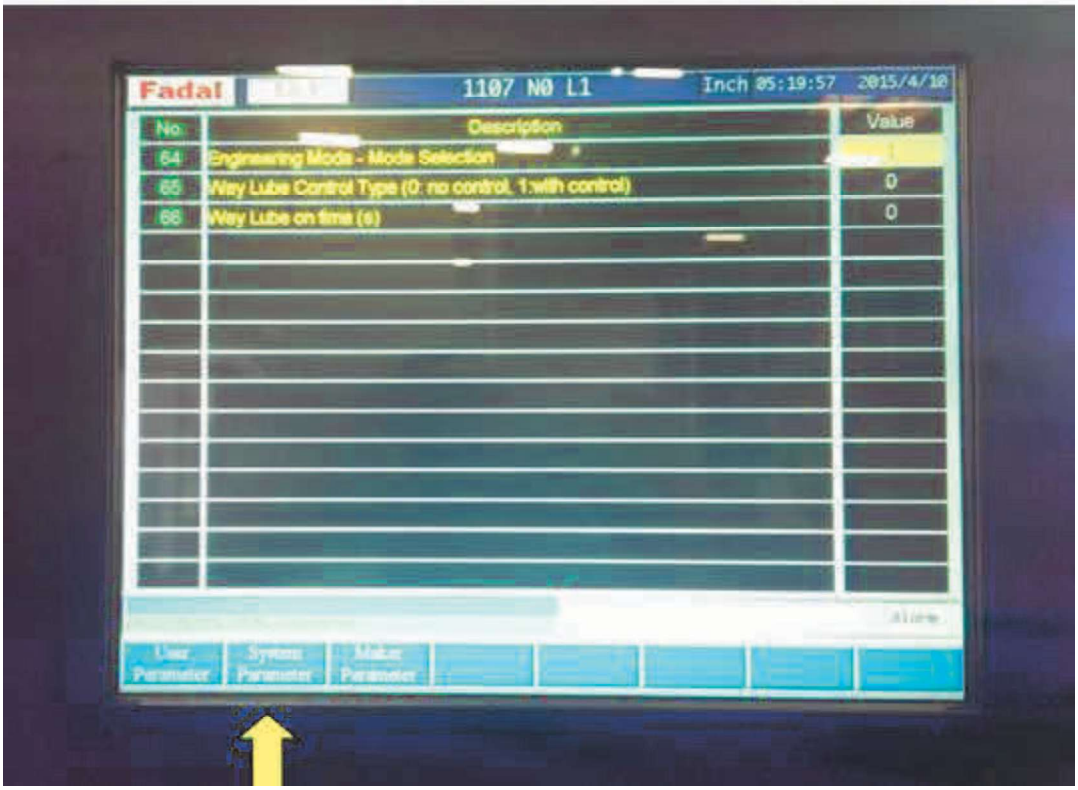
1. Do not JOG axes beyond travel limits without disconnecting way covers, or they will be damaged.

2. For model 4020B, align the Spindle to the center of the table in X-axis, and to the center Tee slot in Y-axis. Then jog to Y+10.000 and X-20.000 to set the encoder positions. For other models, follow a similar procedure.

3. For Z-axis, JOG Z-axis to tool change position so that Arm Gripper Key is at least 0.010 inch [0.25mm] below Spindle Key.




4. In MAIN mode, press SET PARAM softkey to modify Parameters.



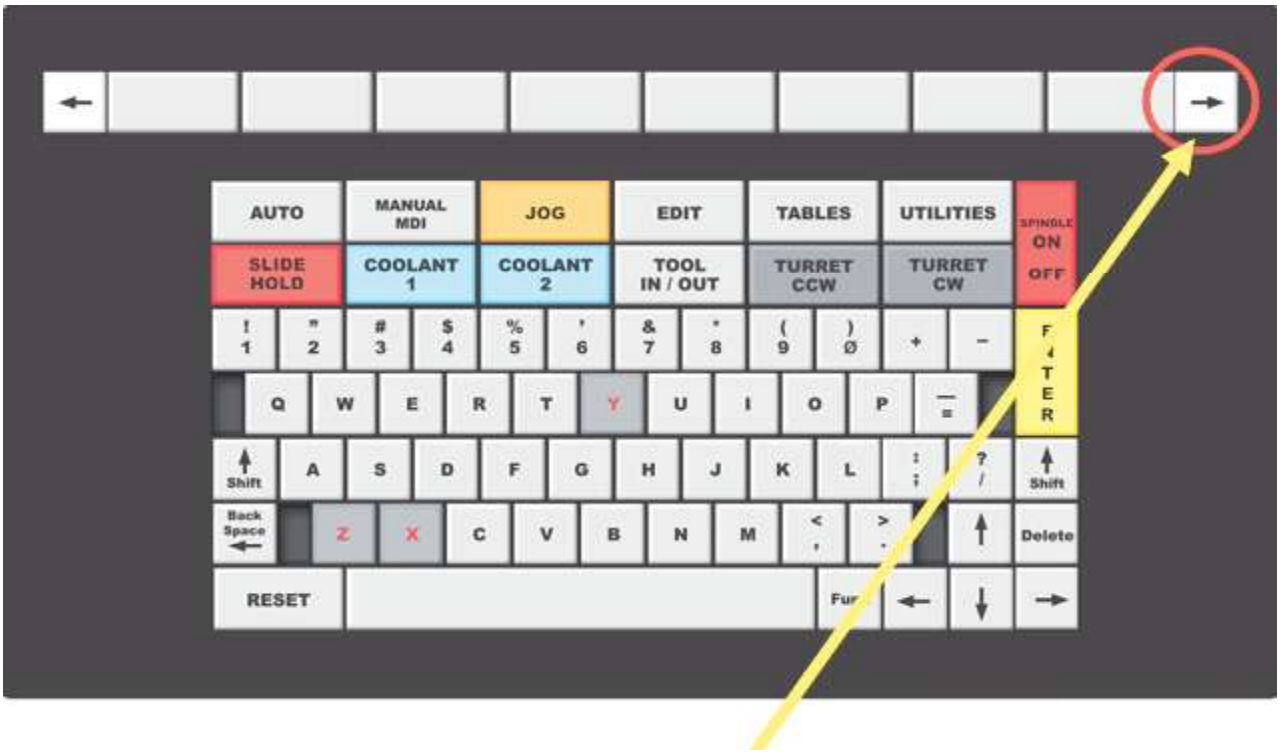

5. Then, press System Parameter softkey, for access to the System Parameter pages.

6. To Page Down, press the "FUNC" and "DOWN ARROW" keys together. Proceed until Parameter number 64 "Engineering Mode is displayed. Change value by overtyping "1" and pressing ENTER.

7. Press RESET on keyboard once system has entered Engineering Mode. Then press both "M" and "7" keys together, and the system will change display of EDIT to HOME in mode box at top of screen. This will switch mode to allow changes, and mode box will have white background to remind you that values can be changed.

8. Press MAKER PARAMETER in order to present Password Access screen.

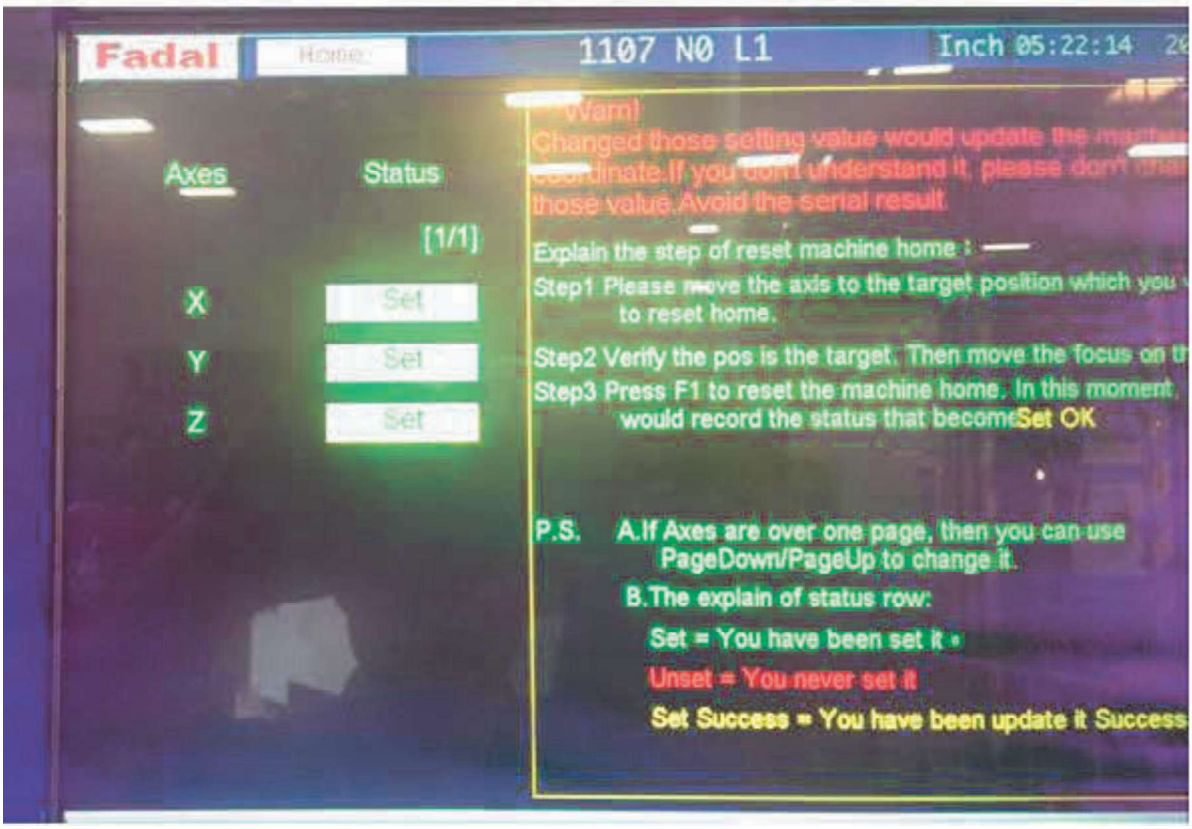
9. Enter Password "520" for access.




10. Press right-arrow in softkey bar to select next range of softkeys, and select SERIAL TUNING softkey.


11. Again enter password "520".

12. Select softkey SET ABS HOME and the following screen will be presented.




13. The UP and DOWN arrows can be used to select the axis that needs its HOME position reset, and the boxes are marked with a yellow line around the box to indicate which axis is about to be reset.

14. AFTER the axis has been positioned to the new ABSOLUTE HOME position, then the current position can be saved by pressing the SET MACHINE HOME softkey.

15. SET indicates that the Axis Home was previously set.

16. UNSET indicates that currently no value for Absolute Home is set for that Axis.

17. SET SUCCESS indicates that a new value has been saved successfully. 16. Press the LEFT ARROW in the softkey bar until you have backed out until viewing Parameter 64 as in step 4.

18. Change the value in Parameter 64 back to 0 in order to exit Engineering Mode, and press RESET and return to MAIN home page.

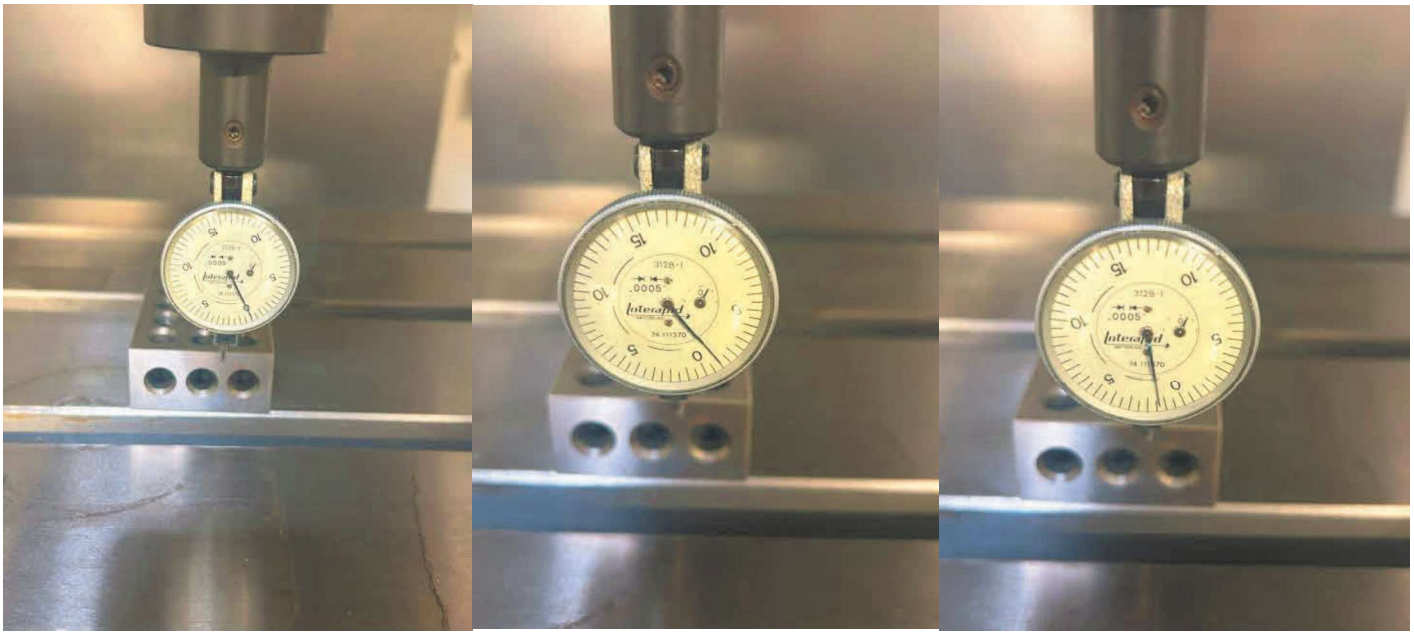
19. Verify Battery output voltage is 4.5 VDC by measuring at the wiring on the back, and if less, replace the batteries.

20. Inspect inside the Battery Box cover while the machine is powered up [so the absolute positions won't be lost again], and bend the battery contact tangs to add some spring tension and hold the battery circuit up.

# BACKLASH

If axis repeatability becomes a question, a simple way to check and adjust axis backlash as follows.

1. Place a dial indicator in the spindle.
2. Jog to zero on indicator.
3. Once zeroed on indicator, click + in x10 mode on selector switch.
4. Click back to zero.
5. Click – one click.
6. Click back to zero.

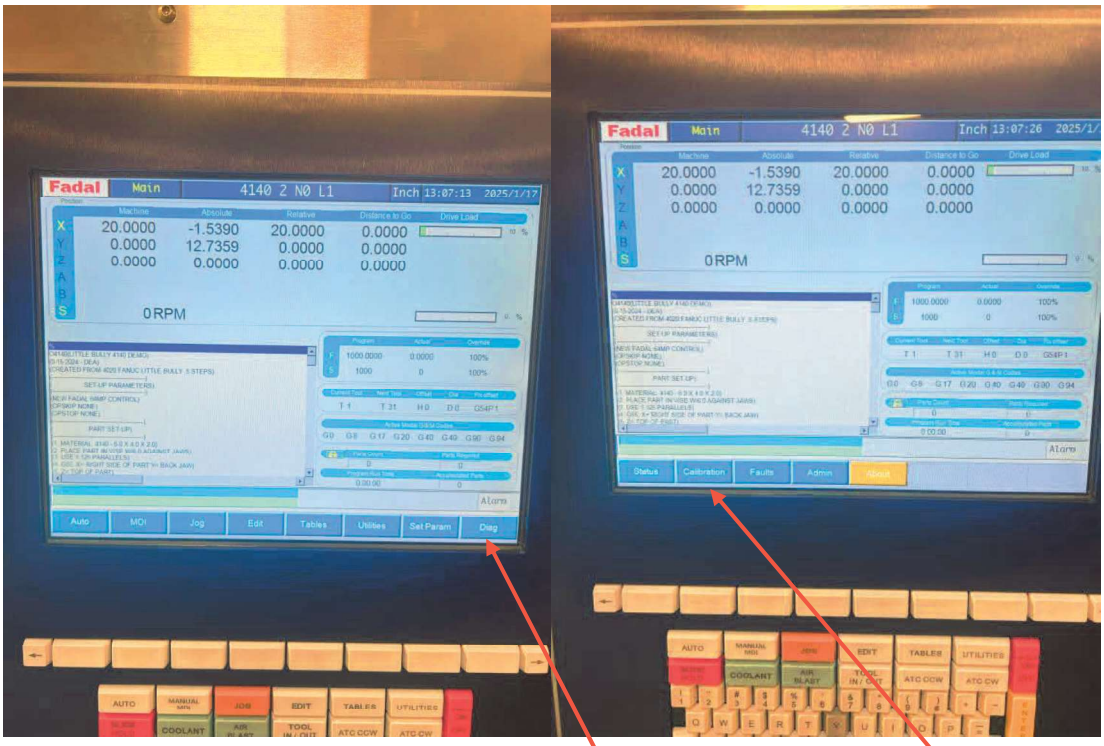


Perform this for all 3 axis and take note of the amount of over or under shoot.

# VMC MAINTENANCE

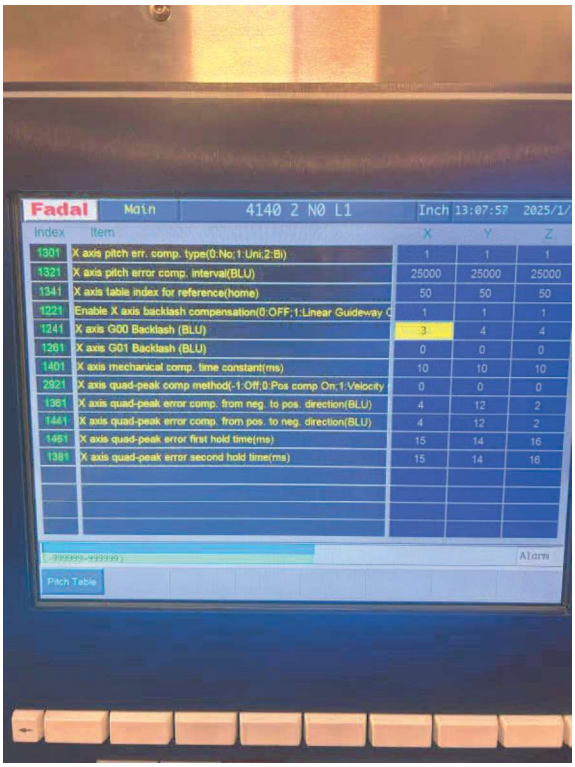
**Models: VMC2015HS, VMC2520, VMC3320, VMC4020, VMC4022, VMC5528, VMC6032, VMC6032-50, VMC8032, VMC8032-50, VM5ax320**

If an axis is under shooting or over shooting the backlash can be adjusted as descrebed below.




Press Diag Button

Press Calibration Button




Use arrow keys to highlight each axis backlash box.
These units are in .001mm.
Raising each value increases the axis reversal amount while lowering each value decreases the reversal amount.

If Prompted for a password, enter 520

Parameter # 1241, 1242 and 1243 affect ALL axis backlash in AUTO, MDI or JOG Modes.

**DO NOT CHANGE ANY OTHER VALUES ON THIS PAGE!**

## REFILLING FLUIDS

Please refill fluids as follows:

Spindle Chiller unit: Mobil DTE24 Hydraulic Fluid or equivalent

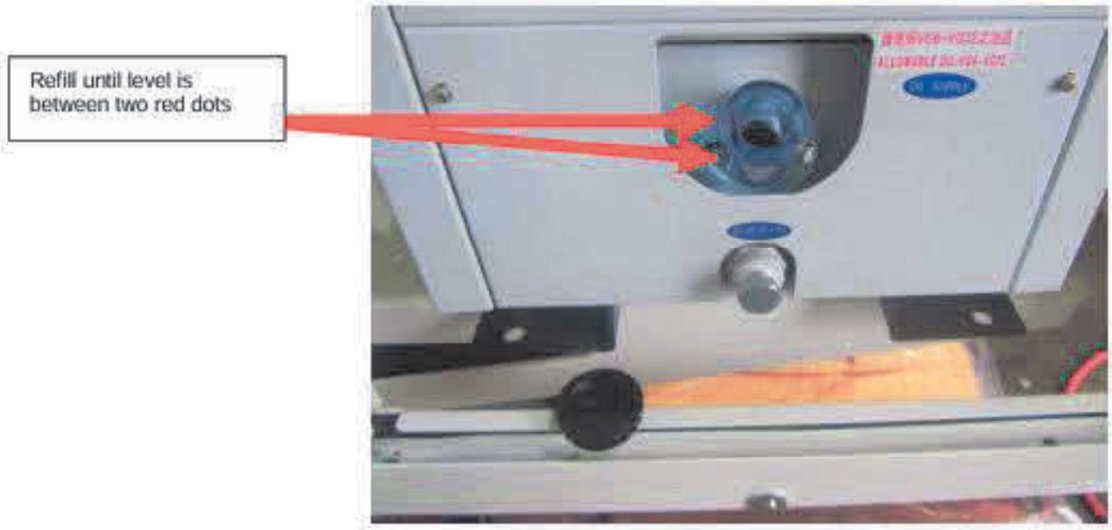
Hydraulic Actuators: Mobil DTE24 Hydraulic Fluid or equivalent

Air-Oil Spindle [BLUE Spindle Pump: Mobil Steam Turbine Oil DTE732

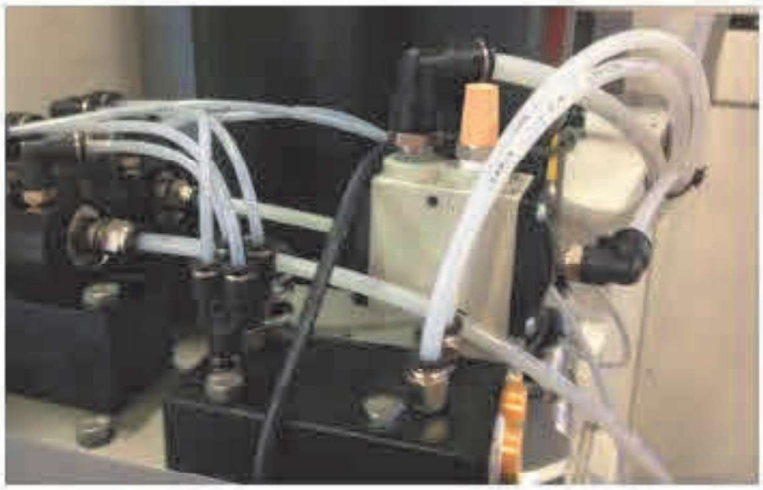
WayLube Pump [BLACK]: Mobil Vactra #2 or equivalent

To refill Chiller unit:

1. Unscrew cap as shown in picture.
2. Refill fluid until level appears between the two red dots on filler neck.

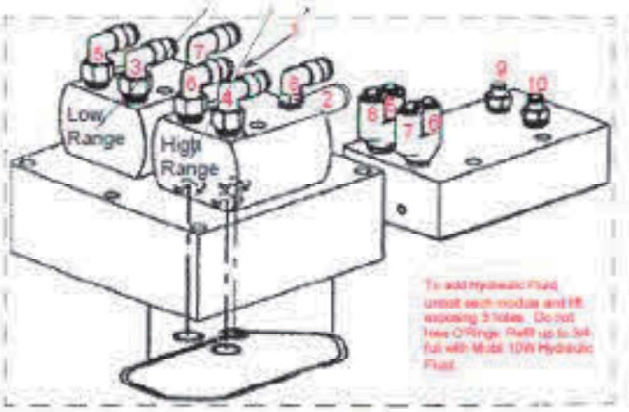



To refill Hydraulic Actuators:



1. **One at a time, remove top actuators without dropping or losing O'Rings underneath. Refill DTE24 into open port at least ¾ full, without overfilling.**
2. **Reinstall Actuator.**

1 to 1 LowRange Extend
2 to 2 HighRange Extend
3 to 3 HighRange Return to LR Reservo
4 to 4 LowRange Return to HR Reservo
5 to 5 HR Separator to LR Retract
6 to 6 LR Separator to HR Retract
7 to 7 LR Activate
8 to 8 HR Activate
9 LowRange Air Supply
10 HighRange Air Supply




HDW-0179 Small O'Ring (6) HDW-1375 Large O'Ring (2)

# Backing Up Machine Files (MB BACKUP)

1) Diag.
2) Admin (password 520)
3) System Admin (password 520
4) Back up System
5) Advanced
6) Next
7) Select folder on USB for file to be saved to
8) Next
9) Next
10) Next
11) OK

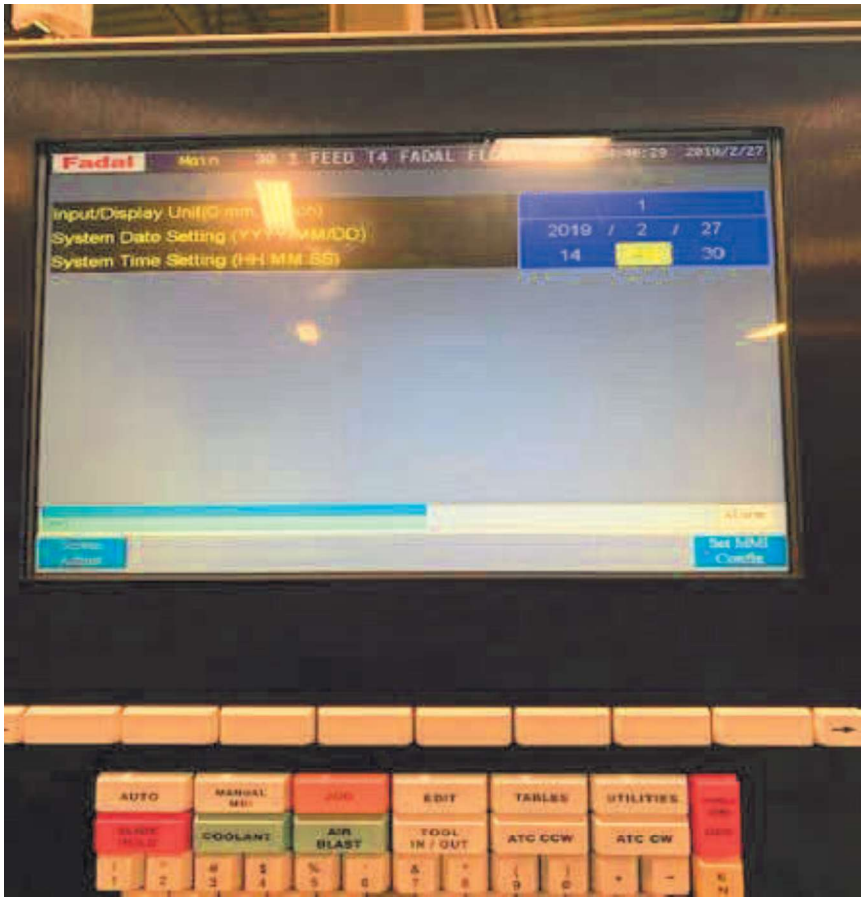
When complete message will appear "Backup Successful"

# Backing Up System Files (SB BACKUP)

1) Diag.
2) Admin (password 520)
3) System Admin (password 520
4) Back up System
5) Advanced
6) Select Syntec Backup
7) Next
8) Select folder on USB for file to be saved to
9) Next
10) Next
11) Next
12) OK

## SETTING CLOCK

1. From main page press the set param button
2. In set param press the Maker Parameter button
3. Type Password ( 520 ) press the OK button
4. Press the right arrow button
5. Press the System Setting button
6. Cursor over with the enter button to set time and date with the yellow highlighted box




7. After setting time and date use the TOP left arrow button to back all the way out.

## CHECKING MACHINE HOURS

PLC Register:

1011: cycle time (sec)
1012: Power on time (sec)
1013: Total power on time (sec)
1014: Total cycle time (hrs)

The aforementioned maintenance recommendations are based upon maintaining peak performance of the machine as well as increased longevity of the machine's lifespan. The frequency of the recommended maintenance is based upon running the machine for a single 8 - 10 hour shift per day. Adjustments would obviously have to be made when additional shifts are added to the machine's total run time. These guidelines are also based upon a clean environment, and again, would have to be modified based upon your own facility's conditions.

CAUTION:
All work performed within the machines interior, should be performed with the machine in the emergency stop condition. Any repair service performed on the machine should be done so by a qualified Fadal CNC Service Technician. Any modifications to the machine outside of Fadal's assembly, is at the customer's risk. Any options installed by other than the Fadal factory, or authorized Fadal dealer, is also at the customer's risk.