



The Toolroom Company

VT LATHE SERIES FANUC CONTROL

MAINTENANCE MANUAL



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SAFETY INFORMATION- LATHES

READ BEFORE INSTALLING OR OPERATING

***NOTE: THIS MACHINE IS AUTOMATICALLY CONTROLLED
AND MAY START AT ANY TIME.***



All CNC machines contain hazards from rotating parts, belts and pulleys, high voltage electricity, noise, and compressed air. When using CNC machines and their components, basic safety precautions must always be followed to reduce the risk of personal injury and mechanical damage.

It is the machine owner's responsibility to make sure all personnel who are involved in installation and operation of this machine are thoroughly acquainted with the procedures and safety instructions provided herein *BEFORE* they perform any actual work.

Only Fryer factory-trained service personnel should troubleshoot and repair the equipment.

Do not modify or alter this equipment in any way without first consulting Fryer Machine. Any modification or alteration of could lead to personal injury and/or mechanical damage and/or void your warranty.



EMERGENCY STOP (E-STOP) BUTTON

PRESSING THE EMERGENCY STOP BUTTON WILL STOP ALL MOTION OF THE MACHINE, AND THE COOLANT PUMP.

1. Use the emergency stop button to stop all machine motion in the event of an emergency.
2. Use the feed hold button to stop axis movement during normal operation.
3. Before operating switches, always check that they are the right ones.
4. Do not change parameters, voltages and other electrical settings unless directed by an authorized service technician. If such changes are unavoidable follow the directions provided by the technician carefully.
5. The best defense against injuries on a turning machine is to be alert. Never initiate a machine function unless you completely understand what the function will cause the machine to do.

6. Keep machine and area around it clean and well lighted. Never allow chips, coolant, or oil to remain on the floor. Do not leave loose objects on or around machine.
7. Use appropriate eye and ear protection while operating the machine. ANSI-approved impact safety goggles and OSHA-approved ear protection are recommended to reduce the risks of sight damage and hearing loss.
8. Keep all loose clothing, hair, jewelry away from the machine and from contacting the spindle
9. Gloves are easily caught in moving parts. Take them off before turning on the machine.
10. Always wear safety shoes with steel toes and oil-resistant soles.
11. Do not paint, alter, deface, or remove any warning plates from the machine. Replacement plates are available from Fryer Machine Systems.
12. Keep flammable liquids and materials away from the work area and hot chips.
13. Coolant and oils can make surfaces on the machine slippery. They can also present an electrical hazard if the machine has power on. Therefore, do not stand on any part of the machine at any time.
14. Keep material in the spindle from extending beyond the rear edge of the spindle.
15. Check for damaged parts and tools before operating the machine. Any part of a tool that is damaged should be properly repaired or replaced. Do not operate the machine if any component does not appear to be functioning correctly.
16. Improperly clamped parts machined at high speeds/feeds may be ejected and puncture the safety door. Machining oversized or marginally clamped parts is not safe.
17. To avoid turret damage, ensure that tools are properly aligned when loading tools and that boring bars and facing tools do not protrude behind the back of the faceplate.
18. Windows must be replaced immediately if damaged or severely scratched – contact the factory for replacement panels.
19. Do not attempt to operate the machine before all the installation instructions have been completed.
20. Be sure to review the Maintenance section of this manual for instructions to keep your machine running properly.

10.1 Mechanical Safety

1. Always press emergency stop when the machine is not in use.
2. Never operate the machine with any cover or shield open or removed.
3. Never reach into the work area when the spindle is turning or if the machine is in automatic mode.
4. Put the machine in manual mode and be sure last programmed function has been completed before reaching inside of the work area.
5. The functions of the machine make it impossible to eliminate all pinch points. Be particularly aware of the following pinch points:
 - a. Spindle and chuck rotation
 - b. Indexing of turret and tools
 - c. Carriage and cross-slide movement
6. Do not operate machine without axis motor covers or axis way covers in place.
7. Report any loose, worn, or broken parts to your supervisor. The same action should be taken if any unusual noise or machine action occurs.
8. The electric components are protected from normal moisture resulting from humidity, use of water base soluble, such as coolant, etc. **DO NOT**, however, use water hose to clean the machine or the area around it.

9. Never touch a machine control device or electrical component when your hand is wet.
10. Never clean up chips while the machine is running or is in automatic mode.
11. Do not manually deburr workpieces being rotated under power.
12. At the end of the workday the machine should be placed in "EMERGENCY STOP MODE"
13. When restarting a machine after it has been shut down always assume it has been altered. Recheck all phases of the job as though you were running the first piece.
14. Never touch spindle start or spindle jog control until hands, feet, and body are well clear of the work area.
15. Never extend an unsupported bar out of the rear of the spindle or hydraulic cylinder. Doing so can cause the bar to bend or break resulting in damage or injury.
16. If your turning machine has a bar feeder interfaced to it keep yourself and others away from the exit end of the bar feeder when the machine is running.

1.02 Electrical Safety

1. **WARNING:** Electrical enclosures contain high voltage. Disconnect equipment from power source before opening cabinets.
2. Before replacing a fuse, switch off the machine.
3. **Immediately turn off power if:**
 - Power problems develop
 - In the event of electrical storms.
 - Ambient temperatures exceed 105 degrees Fahrenheit (40 degrees C)
4. The electrical power must meet the specifications in this manual. Attempting to run the machine from any other source can cause severe damage and will void the warranty.
5. The electrical panel should be closed and locked at all times except during service
6. When the main circuit breaker is on, there is high voltage throughout the electrical panel and some components operate at high temperatures. Therefore, extreme caution is required.
7. Do not reset a circuit breaker until the reason for the fault is investigated.
8. Never service the machine with the power connected.

2.0 BASIC INSTALLATION

2.1 WHERE TO PLACE YOUR MACHINE

Thank you for choosing Fryer Machine Systems. You have purchased a high quality, custom crafted machine tool designed and built to provide years of trouble-free service. To ensure that your machine is properly installed we ask that you review the following information prior to the shipment of your machine.

2.11 Foundation

Your foundation must be a minimum 6" (150mm) thick concrete slab floor and should be placed on a single slab with no seams. Be sure to leave space around the machine for leveling components and access to the electrical cabinet.

If your floor does not meet these specifications, contact the factory for further recommendations.

Install the machine on the first or second floor. Take the stress of ceiling and foundation into careful consideration to ensure that the machine load can be offset.

2.12 Environmental Conditions

Generally, the machine will be installed in the following conditions. However, these may change over a period of time or in response to seasonal changes.

- Supply voltage: +/- 10% of voltage listed on serial number tag.
- Source frequency: ± 2 Hz of frequency listed on serial number tag
- Temperature effects dimensional accuracy, therefore, ambient temperatures should not exceed 105 degrees Fahrenheit. Also avoid exposing the machine to direct sunlight or heat rays which can change the environmental temperature.
- Relative Humidity: Less than 80% (Temperature changes should not cause condensation)
- Atmosphere: Free from excessive dust, fumes, corrosive gases, and salt
- Avoid exposing the machine to abnormal vibration.

2.2 UNLOADING YOUR MACHINE

Fryer machines are shipped on skids designed for forklift offloading. Be sure your forklift is rated for the proper weight of the machine.

Note: If you are using a crane for offloading, please contact the factory in advance for instructions as damage can occur if supported in the wrong locations.

2.3 RECEIVING YOUR MACHINE

NOTE: If you have a door that is less than 8' wide x 10' high, please contact the factory prior to shipment so that we can make sure your machine is packaged to fit into your door openings.

1. Fryer machines are carefully packed to avoid damage in transit; however, we ask that you **UNWRAP AND INSPECT YOUR MACHINE AS THOROUGHLY AS POSSIBLE PRIOR TO SIGNING THE BILL OF LADING.** If a digital camera is available, pictures should be taken before the machine is moved further. Pictures should be sent to service@fryermachine.com.
2. Place the machine in its location and complete inspection. If there is any damage to your machine, Fryer should be notified immediately. This will enable us to provide replacement parts before the service technician arrives install the machine.
3. If you have any questions about any of these installation instructions or other questions about your new Fryer Machine Systems machine, please call the Fryer Service Department and one of our trained technical staff will be happy to assist you.

2.4 UNPACK AND PLACE YOUR MACHINE

To make certain that your machine installation goes smoothly, it is important that the following items are completed **prior** to the arrival of the Fryer authorized service technician. This will ensure that our technician is able to provide you with the maximum amount of training during his allocated time with you.

1. Have your rigger move the machine to the operating location, remove it from the skid and install on ALL leveling pads.
2. Remove all packaging material and thoroughly clean the machine and inspect for hidden damage.
3. Remove all large assemblies from skids and stage next to machine to facilitate ease of assembly.
4. Install leveling pads and level machine. Level with a precision level, using the leveling screws and pads provided with the machine.

2.5 PRIOR TO THE ARRIVAL OF THE TECHNICIAN

2.51 Installation Safety Instructions

Initial start-up of the machine must be performed by a Fryer Machine Systems authorized service technician.

2.52 Cleaning & Lubricating Machine

All protective coatings (cosmoline) must be removed before using the machine.

Be cautious when selecting a suitable cleaning agent. Paraffin applied with a clean brush will soften the protective coating. The protective coating can then be removed with clean rags.

- WD-40 or a similar product is recommended for cleaning the machine. Do not use gasoline or any other flammable solution to clean the machine.
- Clean all exposed ways of the bed and saddle.

2.53 Line Voltage Check

Line voltage must be $\pm 10\%$ of the voltage listed on the serial number tag.

<p>INITIAL POWER-UP SHOULD ONLY BE PERFORMED BY A FRYER TECHNICIAN OR FACTORY AUTHORIZED REPRESENTATIVE.</p>

2.54 Electrical Precautions

Wiring

1. Ensure that all local electrical codes are met.
2. Do not connect to the power distribution panel any power cables for devices that can cause line noise, such as welders and high frequency quenching machines.

Grounding

You should always refer to your local electrical code to be sure you are grounding to code. Generally, use a grounding wire with a cross section of more than 14 mm and a resistance to ground of less than 100 ohms. This wire size should be greater than AWG (American Wire Gauge) No. 5 and SWG (British Legal Standard Wire Gauge) No.6.

Generally, the machine should be grounded to a separate grounding rod. If an independent ground cannot be provided for the machine, prepare the ground connection as follows:

1. Connect a single conductor to its own grounding terminal. This will avoid possible serious accidents resulting from ground currents that might otherwise flow in the NC machine if a peripheral device should malfunction.
2. Be careful when using concrete reinforcing rods as grounding points. These reinforcing rods often are used to ground equipment because they usually offer a resistance to ground of less than 100 ohms. In doing so, make the connection as follows: (This also applies to connecting ground wires to regular grounding terminals)
3. Do not use the same grounding reinforcing rod or grounding terminal for other devices since this could lead to line noise such as produced electric welders and high frequency quenching machines.
4. Use a grounding terminal with an adequate electrical performance rating and which is durable.
5. A separate grounding wire should be used, one whose length is as short as possible.
6. Check the resistance to ground by actual measurement.
7. This should measure less than 100 ohms if the single device is connected to its own grounding rod.

Desirable Independent Grounding: Earth resistance: Less than 100 ohms **Common Grounds:**

Resistance to ground = $100 / \text{the number of devices connected to the grounding } (\Omega)$

NEVER GROUND EQUIPMENT IN SERIES!

Connection of Power Line

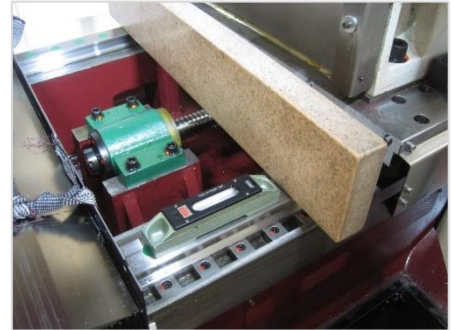
NOTE: Electrical installation should only be completed by a qualified electrician.

1. Make sure that the incoming power is compatible with the requirements of the machine tool (voltage, amperage, phasing). All this information can be found on the machine's serial number tag.
2. Power wires, grounding and over-voltage protection should comply with the local electrical code.
3. **DO NOT** connect if the incoming power is different from the power requirements of the machine. Contact a qualified electrician.

2.6 LEVELING THE MACHINE

Before attempting to use the machine, it will be necessary to accurately level it.

1. Screw the leveling bolts (with nut) into the holes in the base of the machine. Set a leveling pad under.
2. Please prepare the following tools to adjust machine level:
 - Two spirit levels (0.0005"/ft. or 0.013mm/1000mm accuracy)
 - Two adjustable wrenches
3. With covers back, place long 36" granite on top of X-axis linear rail for initial leveling.
4. Place level on top of spindle nose (not chuck or faceplate) and level headstock.



5. Adjust the leveling bolts located the bottom of the machine base until the machine is leveled to within 0.001"/ft. (0.08mm/1000mm) in both directions, all leveling pads must have equal pressure.
6. Lock the nuts on the leveling bolts, and re-check to see whether the level of machine is still correct. Repeat as necessary until machine level is obtained with leveling bolts locked.

After initial installation, check the level once a week for the first month, then check monthly thereafter



3.0 GENERAL INFORMATION

3.1 Maintenance Schedule

CAUTION: Always turn the machine off before performing maintenance.

MAINTENANCE ITEM	RECOMMENDED	Daily	Weekly	As Req'd.	6 Mo	Yearly
Check pressure gages for proper readings	90-125 PSI	X				
Check that machine components and sliding parts have proper lubrication		X				
Check condition of covers for damage or excessive gasket wear		X				
At the end of the day, remove and dispose of chips	Use of brush or vacuum is recommended. Do not use air as it can push chips into ways and ballscrews.	X				
Drain air/water separation			X			
Check wipers for damage			X			
Check coolant level			X			
Check headstock oil level			X			
Check turret oil level (if option is installed)	Mobilub HD Plus 80W90 or equivalent oil		X			
Change coolant	Blasocut BC-40 NF-PL or Equivalent oil			X		
Fill lube pump	Mobil Vactra No. 2, Amoco Waytac No. 68 or Equivalent			X		
Fill air regulator oil for auto shift	Mobil Almo Break-Free Synthetic Air Tool oil (5W-10W) or Equivalent			X		
Check servo cabinet & console fans, clean filters	Frequency should be determined by type of material being cut and number of hours the machine is running.			X		
Check machine level					X	
Check ball screw endplay					X	
Check gibs					X	
Check backlash					X	
Check belt / coupling tension						X
Replace servo cabinet and console filters	Purolator A23465					X
Change headstock (spindle) oil	Mobil DTE ISO VG-32 Hydraulic Oil or Equivalent Oil (VG-22 for ET-18 model)					X
Change hydraulic system oil (if option is installed)	Mobil DTE ISO VG-32 Hydraulic Oil or Equivalent Oil					X
Change turret oil (if option is installed)	Mobilub HD Plus 80W90 or Equivalent oil					X

3.2 MACHINE COMPONENTS

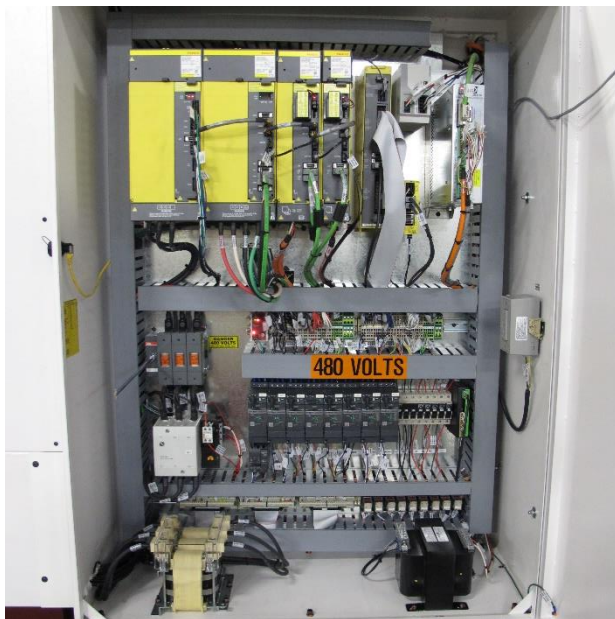
3.2.1 Lubrication System

- The automatic way lube system is controlled by the PLC in the control. The system only pumps way oil when the spindle and axes are moving. If there is no machine movement the pump will not pump unnecessary oil. This method greatly reduces way lube usage and keeps oil out of the machine coolant sump and prevents fouling.



- If the machine has been unused for more than 48 hours press the blue pushbutton on the side of the lube tank for approximately 30 seconds to pump oil to the ways. The pressure gage on the tank will indicate if it is working properly.
- If the system detects low way lube it will display the following message in the control:
A003.0 2000 LOW WAY LUBE

3.2.2 Electrical System



- Schematics (1) – The Electrical and Pneumatic Schematics are inside electrical cabinet
- Cabinet Filter Type (2) – Purolator A23465 or equivalent
- Check Filter Interval - Weekly
- Change Filter Interval – As Required (depending on environment)

3.23 Pneumatic System

- Schematic – See Pneumatic Schematic in electrical cabinet (see previous page)
- Pneumatic List / Pressure Settings
 - Main Supply – 90-125 PSI at 5 CFM
 - Air Gun



- Lubrication Requirements – Mobil Almo break free synthetic air tool oil 5W-10W or equivalent
- Check Lubrication Interval – Weekly – Add as needed

3.24 Spindle

Thermal expansion of the machine components can jeopardize machining accuracy. To prevent this condition always warm the machine up.

SPINDLE WARM UP – Warm up the machine by running it for 10 to 20 minutes at about half or one-third the maximum speed in the automatic operation mode.

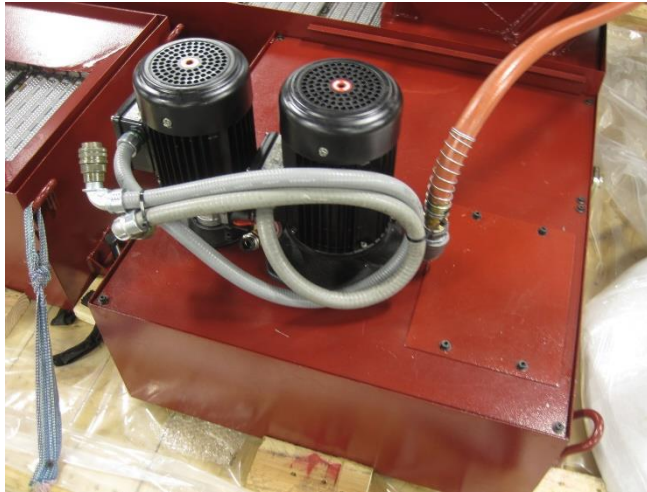
This automatic operation program should cause each machine component to operate allowing you to check their operation.

SPINDLE DUTY RATING – Follow the duty rating outlined below

- If it is required for the spindle to run continuously (24 hours a day), the spindle must not run above 80% of the maximum RPM.
- If it is required for the spindle to run at maximum RPM, the spindle must not run more than 2 hours straight. After 2 hours of run time at maximum RPM, the spindle must be slowed down to 50% of the maximum RPM for at least 30 minutes before running at the maximum RPM again.

3.25 Flood Coolant System

The flood coolant system consists of a pump mounted on the coolant pan of the machine. The flood line runs up the back of the column and through the Z-axis cable track.



The sump can be drained for coolant changes by using a wet vacuum.

3.26 Hydraulic System

Hydraulic system is located in the back of the machine, decals show Main , turret, and C brake pressure settings



3.27 Electrical Plug-ins

Plug - in style connectors for flood may vary (See photo)



3.3 MACHINE PROCEDURES

3.31 Fanuc Machine Reference Procedure after Absolute Encoder Alarm

PROCEDURE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY

This procedure must be followed after the encoder is disconnected or battery for the absolute encoder goes dead or if parameters are reloaded.

The machine normally remembers the position of the table due to the absolute encoder tracking. If this is lost the machine home position is also lost. Each axis should be positioned at the home position and the alignment marks lined up. The home position is always within an inch of the positive travel of each axis. The alignment marks are red or black painted button head screw that is marked as the home position marker and align it with scribed line or pointer on the axis to be set.

Follow the procedure below to reset this home position.

Referencing the axis: The X and Z-axis have battery backed up encoder's, (absolute encoders). The control will give advance notice of a weak battery so it can be changed before position loss occurs. If the encoder is disconnected an error will occur, you will have to reference the axis follow this procedure:

To change parameter, write enable must be in MDI (push MDI hard key).

1. Press-offset setting-parameter-write enable (OFS/SET hard key twice) set parameter bit to a 1 . The "key" needs to be switched to the [0] position, the key cannot be removed, this enables the write capability.
2. Press system (hard key)- type 1815 -press -no. Search (this will find parameter 1815 which is the reference position parameter setting- set APZ bits for axis wishing to reference to 0. If you already have an alarm about lost encoder position the troubled axis will have a zero set in this bit, you can go to step 4.
3. Power down completely.
4. Power up, drives on and jog the axis requiring referencing to align with scribe marks on red painted washer. Be very careful you do not crash the machine!
5. Change 1815 APZ bit to 1 for axis wishing to reference. Change the parameter write enable bit to 0
6. Power down completely.
7. Power up, drives on, the axis display should read 0 and there should be no alarms.

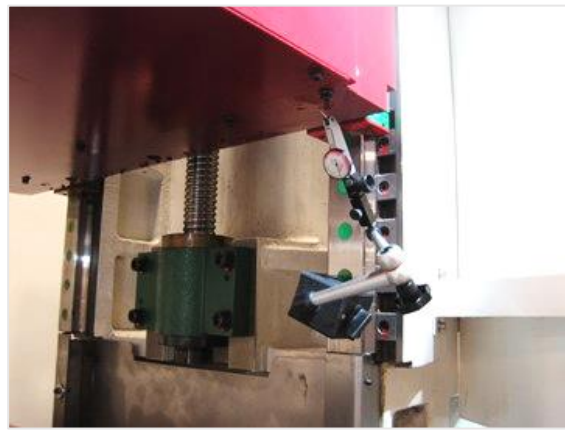
3.32 Check Axis Backlash

Tools Required: 0.0001" resolution dial indicator, control handwheels handwheel

- Set the indicator along the axis which is being measured. The needle should be in contact with a flat machined surface and the base on a stable, fixed point. See the pictures below which illustrate the setup for the X and Z axes.
- Using the remote handwheel, move the axis in one direction either positive or negative until the indicator is loaded by 0.002".
- Zero the indicator.
- Move the axis in the same direction by 0.005".
- Reverse the direction of the axis by 0.005".
- The additional amount that is needed to reach zero after the 0.005" reverse in direction is the backlash measured.
- This shows the loss of motion in the axis from the ballscrew and linear guide rails.



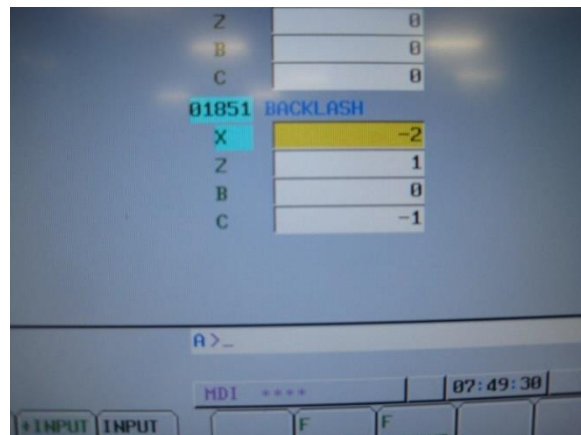
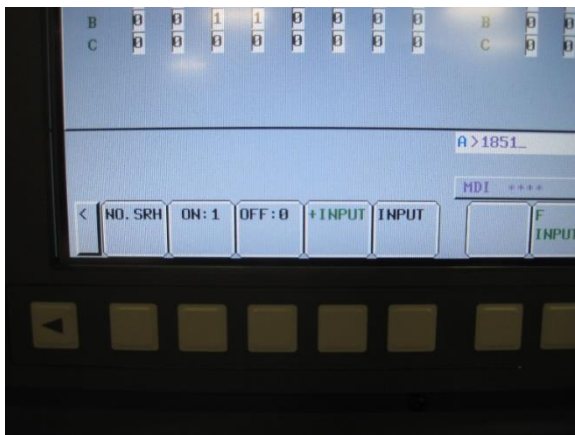
X-AXIS



Z-AXIS

3.33 Adjusting Backlash Compensation

PROCEDURE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY



3.34 Check Spindle Motor Belt

PROCEDURE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY

- Belt tension is adjusted by loosening the slotted motor plate and sliding the motor-plate assembly to tighten or loosen the belt as required. Double check all hardware is properly tightened once the belt tension is correct.
- After the inspection is complete and any adjustments made, re-install the belt covers.



4.0 FANUC CONTROL

4.01 ACCESSING MACHINE PARAMETERS

PROCEDURE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY

WARNING

Malfunctions of the machine as a result of incorrect or changed parameter settings

As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect the parameterization (parameter assignments) against unauthorized access.
- Handle possible malfunctions by taking suitable measures, e.g. emergency stop or emergency off.

- Setting Parameter Write Enable (PWE)
- Make sure drives are enabled (E-stop out)
- Press MDI
- Press "OFF/SET" hard key
- Press "setting" soft key (may have to press "+" softkey to see the soft key button)
- See below screen will appear:
- Change Parameter write =1 (this should be changed back 0 to prevent parameter changes)

ACTUAL POSITION

00002 N00003

ABSOLUTE X -29.5307 Y -9.7928 Z -14.8269 B -2.085 C 28.236		F 0.00 INCH/M PARTS COUNT 2226 JOG F 28.0 RUN TIME 537H23M51S CYCLE TIME 0H 0M 1S	
MODAL G00 G80 G15 F M 16 G17 G98 G40.1 H G90 G50 G25 D G22 G67 G160 T 1 G94 G97 G13.1 S 15000 G20 G54 G50.1 G40 G64 G54.2 G49 G69 G80.5 S1 0 OV100 LM 0		SETTING (HANDY) PARAMETER WRITE=1 (0:DISABLE 1:ENABLE) TV CHECK =0 (0:OFF 1:ON) OUTPUT CODE =0 (0:EIA 1:ISO) INPUT UNIT =1 (0:MM 1:INCH) I/O CHANNEL =17 (0-35:CHANNEL NO.) SEQUENCE NO. =0 (0:OFF 1:ON) PROGRAM FORMAT =0 (0:NO CNV 1:F15) SEQUENCE STOP = 0 (PROGRAM NO.) SEQUENCE STOP = 0 (SEQUENCE NO.)	
< ABSOLUTE RELATIVE ALL		JOG **** --EMG-- 13:20:25 NO. SRH ON: 1 OFF: 0 +INPUT INPUT	

- Getting to the machine parameters
- Press “SYSTEM” Hard key
- Press “+” soft key until “parameter” soft key is visible.
- Press “parameter” soft key
- Press “oprt” soft key
- Type in desired parameter number
- Press “No. SRCH” soft key
- See below screen shot where parameter 1815 is displayed. Cursor can be moved about, and data changed with numeric keys and input button.

PARAMETER 00000 N00003

01851 BACKLASH	01856	0
X 12	01860	680255
Y 28	X	958396
Z 7	Y	62620218
B 1	Z	21305516
C 1	B	1338428906
01852 BACKLASH(RAPID)	C	
X 0	01861	0
Y 0	X	0
Z 0	Y	0
B 0	Z	0
C 0	B	0
01853 BACKLASH RVS PLS TOLERANCE	C	-3
X 0		
Y 0		
Z 0		
B 0		
C 0		

A > ^

MDI ***** 14:06:04

< NO. SRH ON: 1 OFF: 0 +INPUT INPUT F INPUT F OUTPUT +

4.02 Parameter Write Enable + USB

PROCEDURE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY

This procedure will allow editing and copying machine parameters from the USB stick.

Setting Parameter Write Enable (PWE) and USB stick for I/O

1. Make sure drives are enabled (E-stop out)
2. Press MDI
3. Press “OFF/SET” hard key
4. Press “setting” soft key (may have to press + softkey to see the soft key button)
5. See below screen will appear:

6. Change Parameter write =1
7. Change I/O Channel =17 Make a note if there is a different value in there as this how the programs are put into the control could be RS-232, Network, USB, or PCMCIA.

4.03 Saving Parameters to USB

PROCEDURE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY

This procedure will allow the parameter file to be saved a USB stick.

****Before these procedures can be performed make sure Parameter write enable is on and the I/O channel is set to the USB (see 4.72 *Parameter Write Enable + USB*)**

Saving Parameters

1. Reset drives
2. Position machine to machine zero (all axis)
3. Insert USB stick
4. Press edit
5. Press system
6. Press “parameter” soft key
7. Press “opr” soft key
8. Press “+” soft key
9. Press “F output” soft key
10. -press “exec” soft key (output should be flashing on lower right corner of screen)

Now you will have a file called “CNC-PARA.TXT” you should rename this on a pc to another name for future use. **Do not overwrite an existing file on the memory card.**

4.04 Loading Parameters From USB

PROCEDURE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY

This procedure will allow the parameter file to be loaded from a USB stick.

****Before these procedures can be performed make sure Parameter write enable is on and the I/O channel is set to the USB (see 4.72 *Parameter Write Enable + USB*)**

Reloading Parameters

1. Make sure all axes are at machine zero
2. Press EDIT
3. Press system
4. Press “parameter” soft key
5. Press “opr” soft key
6. Press “+” soft key
7. Press “F input” soft key
8. Press “exec” soft key (input will flash in lower right-hand corner of screen)
9. Power down including main disconnect wait 1 minute before powering up again.

Once the drives are turned on you may have to zero return the machine, make sure all axes are at machine zero then change parameter **1815 APZ bit=1 for all axes.**

This can be done with the following keystrokes:

- -param-1815-no.srh, this will get you to edit the correct parameter. Use the arrow keys and the 1 soft key to set the proper bit.

4.05 FANUC PLC Installation Procedures USB

PROCEDURE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY

This procedure will explain how to save the current PLC and install a newer version with a USB stick. If the new PLC is sent to you by e-mail note the name of the file and put on the USB stick.

Important Notes: Make sure your program protect key is off. Make sure your i/o channel=17 to be able to use the USB stick (see screen below, it is set to a 4). If you have the smaller screen, the right arrow may have to be pressed to see the rest of the soft keys available.

4.06 Saving Current PLC:

1. Move the machine to machine zero in all axes. And set the MDI mode
2. Press the E-stop button in
3. Confirm that parameter write enable is on:
 - a. Press "offset/setting" hard key several times (this will scroll you through menus) until you find parameter write enable
 - b. Set this to a 1 to allow editing parameters, use soft keys. Below is the Setting (handy) screen:

The screenshot displays the FANUC 'SETTING (HANDY)' screen. At the top, 'ACTUAL POSITION' shows X: -28.4420, Y: -0.0004, Z: -25.1750. Below this, 'MACHINE' and 'DIST TO GO' sections show similar values. The 'MODAL' section at the bottom left lists various machine modes like G00, G40, G54, etc. The main 'SETTING (HANDY)' area on the right contains several parameters: 'PARAMETER WRITE' is set to 1 (ENABLE), 'TV CHECK' is 0 (OFF), 'PUNCH CODE' is 1 (ISO), 'INPUT UNIT' is 1 (MM), 'I/O CHANNEL' is 4 (0-35: CHANNEL NO.), 'SEQUENCE NO.' is 0 (OFF), 'TAPE FORMAT' is 0 (NO CHN), 'SEQUENCE STOP' is 0 (PROGRAM NO.), and 'SEQUENCE STOP' is 0 (SEQUENCE NO.). The bottom of the screen features a row of soft keys: ABS, REL, ALL, HNDL, OFFSET, SETING, WORK, and <OPRT>.

4. Press "system" hard key.
5. Press "+" soft key on the bottom of the screen which is the > arrow key below it. Until you see the softkey "pmc config"

6. Press "Pmc config" soft key.

PMC CONFIGURATION
RUN ***

05053 N00000

PMC SETTING (GENERAL) (1 / 2)

TRACE START	=	MANUAL / AUTO
EDIT ENABLE	=	NO / YES
WRITE TO F-ROM(EDIT)	=	NO / YES
RAM WRITE ENABLE	=	NO / YES
DATA TBL CNTL SCREEN	=	YES / NO
HIDE PMC PARAM	=	NO / YES
PROTECT PMC PARAM	=	NO / YES
HIDE PMC PROGRAM	=	NO / YES
I/O GROUP SELECTION	=	HIDE / SHOW
KEEP RELAY(SYSTEM)	=	HIDE / SHOW
LADDER START	=	AUTO / MANUAL
ALLOW PMC STOP	=	NO / YES
PROGRAMMER ENABLE	=	NO / YES

A>C

JOG **** --EMG-- 14:38:29

< PREV NEXT

- Press "Setting" softkey. The following screen is what you will have to change in the next step:
- The yellow square is the cursor, navigate using the arrow keys on the keyboard to replicate your screen as above.
- Once the above parameters are set use the left arrow soft key "<" to go back to the PMC soft key menu.(May have to press two times to see the "PMC mainte" soft key)
- Press "PMC mainte" soft key
- Press the + ">" softkey until you see the "I/O" softkey and press it. The screen below will be displayed.

PMC MAINTENANCE
RUN ***

05053 N00000

PMC DATA I/O

PMC = PMC1

DEVICE = MEMORY CARD / USB MEMORY / FLASH ROM / FLOPPY / OTHERS

FUNCTION = WRITE / READ / COMPARE / DELETE

KIND OF DATA = SEQUENCE PROGRAM / PARAMETER / MESSAGE /

TRACE SETTING / I/O CONFIGURATION

FILE NO. =

FILE NAME =

STATUS : USB MEMORY => PMC

A>^

JOG **** --EMG-- 14:42:09

< STATUS I/O PMC I/O (OPRT) +

DEVICE ALARM

4.07 Saving the Existing PLC

1. Insert USB stick(must have new version of PLC on this card)
2. Make sure the following is set correctly on the screen. The values can be changed by scrolling to highlighted field with the arrow keys
 - a. Device: USB Memory
 - b. Function = Write
 - c. Kind of Data = Sequence Program
3. Cursor down to File No. and press softkey "opr"
4. Press soft key "new name" This will enter a file name for the existing PLC loaded into your machine. It will back up your old ladder onto the USB stick in the next step.
5. You can use this if the new PLC does not work.

PMC MAINTENANCE
RUN ***

05053 N00000

PMC DATA I/O

PMC = PMC1

DEVICE = MEMORY CARD / **USB MEMORY** / FLASH ROM / FLOPPY / OTHERS

FUNCTION = **WRITE** / READ / COMPARE / DELETE

KIND OF DATA = **SEQUENCE PROGRAM** / PARAMETER / MESSAGE /

TRACE SETTING / I/O CONFIGURATION

FILE NO. =

FILE NAME = **PMC1.000**

STATUS : WRITING SEQUENCE PROGRAM(PMC1)

COMPLETED

131200 BYTE WRITTEN

A>^

JOG **** 14:45:08

< EXEC LIST NEW NAME INPUT MODE

6. Press "exec" soft key This will output the PLC to the USB stick make a note of the filename.

4.08 Loading the New PLC

1. When the cursor (yellow box) is to the right of File name= Press softkey "list"
2. Scroll and highlight new PLC on USB stick press softkey "input"
3. Move the highlighted cursor to set the following fields
 - a. Device: USB Memory
 - b. Function = Read
 - c. Kind of Data = Sequence Program
 - d. File Name= "new plc e-mailed to you"
4. Press "exec" soft key, this will load the new plc into the machine.
5. Now use the arrow keys to highlight the following fields:

- a. Device: Flash ROM
 - b. Function = Write
 - c. Kind of Data = Sequence Program
6. Press "exec" soft key
7. Now we must turn off the parameters that were enabled to load the new PLC.
8. Press "<" soft key, twice until you see the softkey "pmc config"
9. Press "pmc config" softkey.
10. Press the "setting" soft key, use the cursor keys to reset the fields back to "no" as in the screen shot #2
11. Confirm that parameter write enable is off:
 - a. Press "offset/setting" hard key several times (this will scroll you through menus) until you find parameter write enable
 - b. Set this to a 0 to not allow editing parameters, use soft keys.
12. Re-boot control, you are done. Make sure to save the new PLC in a safe place in case you have to reload it to the machine.

4.1 M-CODES

This listing of m-codes for is for all Fryer lathes equipped with Fanuc controls. Some machines will not have all M-codes available, as these are optional functions.

M00	Program Stop
M01	Optional Program Stop (Button on Panel Must Be On)
M02	End of Program
M03	Spindle Clockwise (In M70-Live Tool CW)
M04	Spindle Counterclockwise (In M70-Live Tool CCW)
M05	Spindle Stop (In M70-Live Tool Stop)
M08	Flood Coolant
M09	Coolant Off (M07 And M08)
M10	Optional Indexer Start with Wait for Completion
M11	Miscellaneous M-Code Function On
M12	Miscellaneous M-Code Function Off
M13	Live Tool Spindle Clockwise
M14	Live Tool Spindle Counterclockwise
M15	Live Tool Spindle Off
M17	Reference Turret to Tool #1
M19	Main Spindle Orient
M20	Main Spindle Collet or Chuck Open (With ID-OD Grip Switch In OD)
M21	Main Spindle Collet or Chuck Close (With ID-OD Grip Switch In OD)
M25	Wireless Part Probe On
M26	Wireless Tool and Part Probe Off
M27	Wireless Tool Probe On
M30	End of Program
M33 / M34	C-axis Brake On / Off
M70 / M71	C-axis On / Off (M70 Allows Live Tool Spindle to Be Programmed)
M86 / M87	Door Open / Close
M88	Thru Tool Coolant and Or High-Pressure Coolant On

4.2 ALARMS

An alarm will be displayed once a fault occurs.

! Warning: *If you do not heed an alarm that is issued and do not resolve the cause of the alarm, it can present a hazard to the machine, the work piece, the saved settings, and in certain circumstances, may cause injury.*

4.21 Fryer PLC Alarms and Descriptions

These are **FRYER** Machine specific alarms that are for optional equipment installed on the machine. The alarms are listed below:

NO.	ADDRESS	MESSAGE
0015	A001.6	1021 HIGH PRESSURE COOLANT FAULT
0019	A002.2	1023 PROBE ERROR
0020	A002.3	1024 TOOL PROBE ARM OUT OF POSITION
0024	A002.7	2006 PROBE BATTERY LOW
0025	A003.0	2000 LOW WAY LUBE
0026	A003.1	1022 WAY OIL PRESSURE FAULT
0027	A003.2	2007 REAR E-STOP DEPRESSED
0036	A004.3	2004 DOOR OPEN ALARM
0037	A004.4	1005 C-AXIS BRAKE ON
0038	A004.5	1006 SPINDLE 2 DISENGAGE ALARM
0039	A004.6	1007 SPINDLE 2 ENGAGE ALARM
0040	A004.7	1008 TURRET THERMAL ALARM
0041	A005.0	1009 SERVO TURRET FAULT DUPLOMATIC #[I220, D110]
0042	A005.1	1010 STOP TURRET SPINDLE BEFORE INDEXING
0043	A005.2	1011 TURRET TOOL NUMBER OUT OF RANGE
0045	A005.4	1013 HEADSTOCK OIL PRESSURE FAULT
0046	A005.5	1014 LOW AIR PRESSURE FAULT
0047	A005.6	1015 HYDRAULIC PUMP FAULT

4.22 Clearing an Alarm

1. Press **RESET**
2. Certain alarms will require a reboot of the control to clear.

4.3 SET UP THE NETWORK DRIVE IN THE FANUC

! NOTE: *It is recommended that this procedure be performed by an experienced network administrator.*

The transfer of programs can be achieved by mapping a soft- key to a networked computer.

5.0 ALIGNING THE TURRET

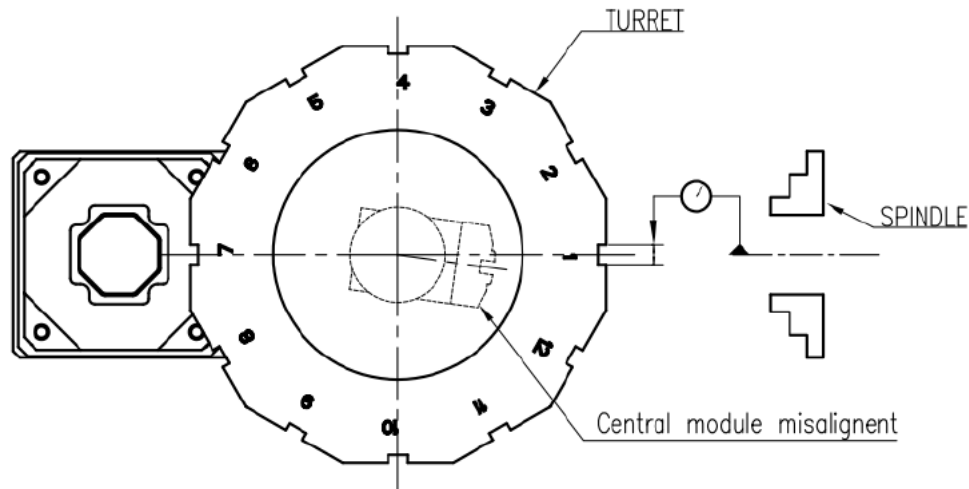
5.1 ALIGNING THE TURRET

PROCEDURE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY

DM-TR-20 - PROCEDURE TO RE-ALIGN THE CENTRAL MODULE

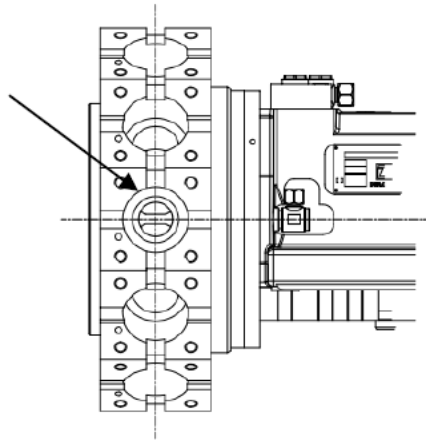
1. Verify the Tool Disc Alignment

- This is the first important point, just to be sure that the disc is not slid compared to the turret and it is correctly aligned with the machine axis.



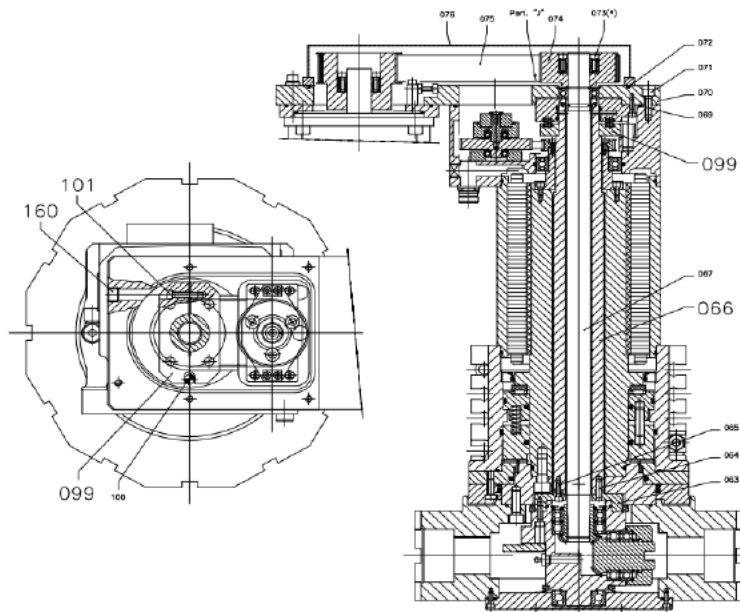
With turret clamped and driven tool motor switch-off:

1. Through the BMT seat, rotate the power intake in horizontal position (parallel to the turret axis).

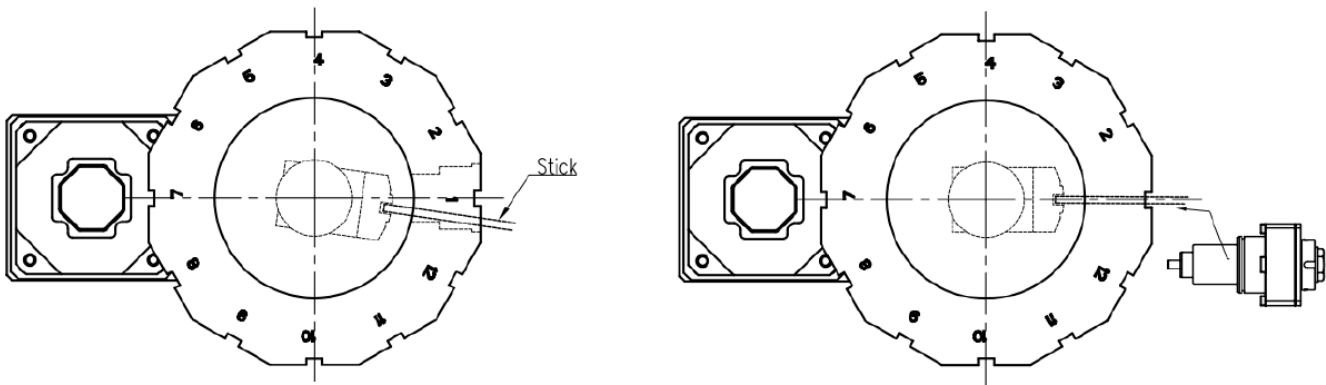


2. Untighten the rotating clamping system (fixed shaft #066 and plate #099), as follows:

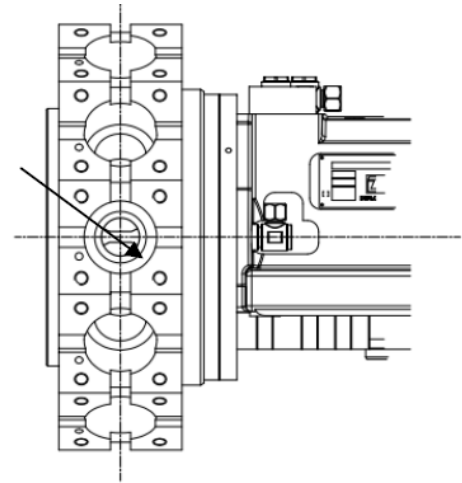
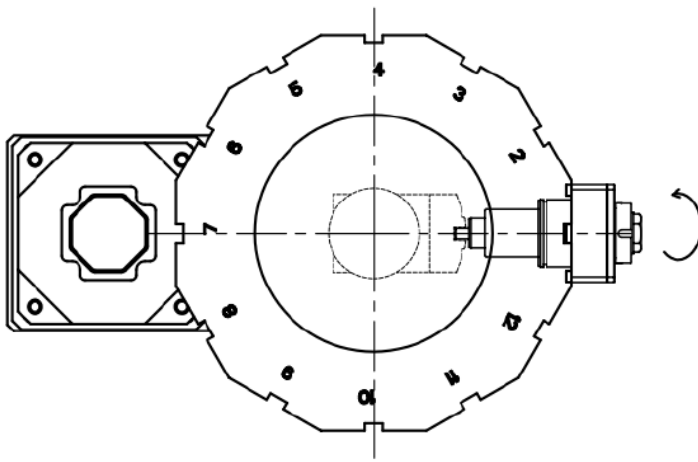
- Remove the plug #160.
- From the hole you can access to the screw #101 that clamp the clamping plate #099. untighten the screw #101 in order to release the fixed shaft.
- At this point all central module, that is fitted to the fixed shaft #066. is free to rotate compared to the tool disc.



3. Through the BMT seat, put something (aluminum or plastic stick), inside the power intake and move back all the central module in the working position, to reach a “rough alignment”.

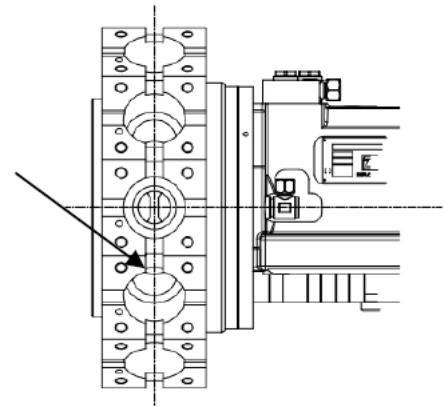


- Put out the stick and insert an axial driven toolholder.
- Manually rotate the toolholder (acting from tool side) for some complete revolutions on both directions (CW/CCW).
- Stop the tenon in horizontal position and close the clamping plate #099 by tightening the screw #101 (M6 with clamping torque C.T. 12Nm)



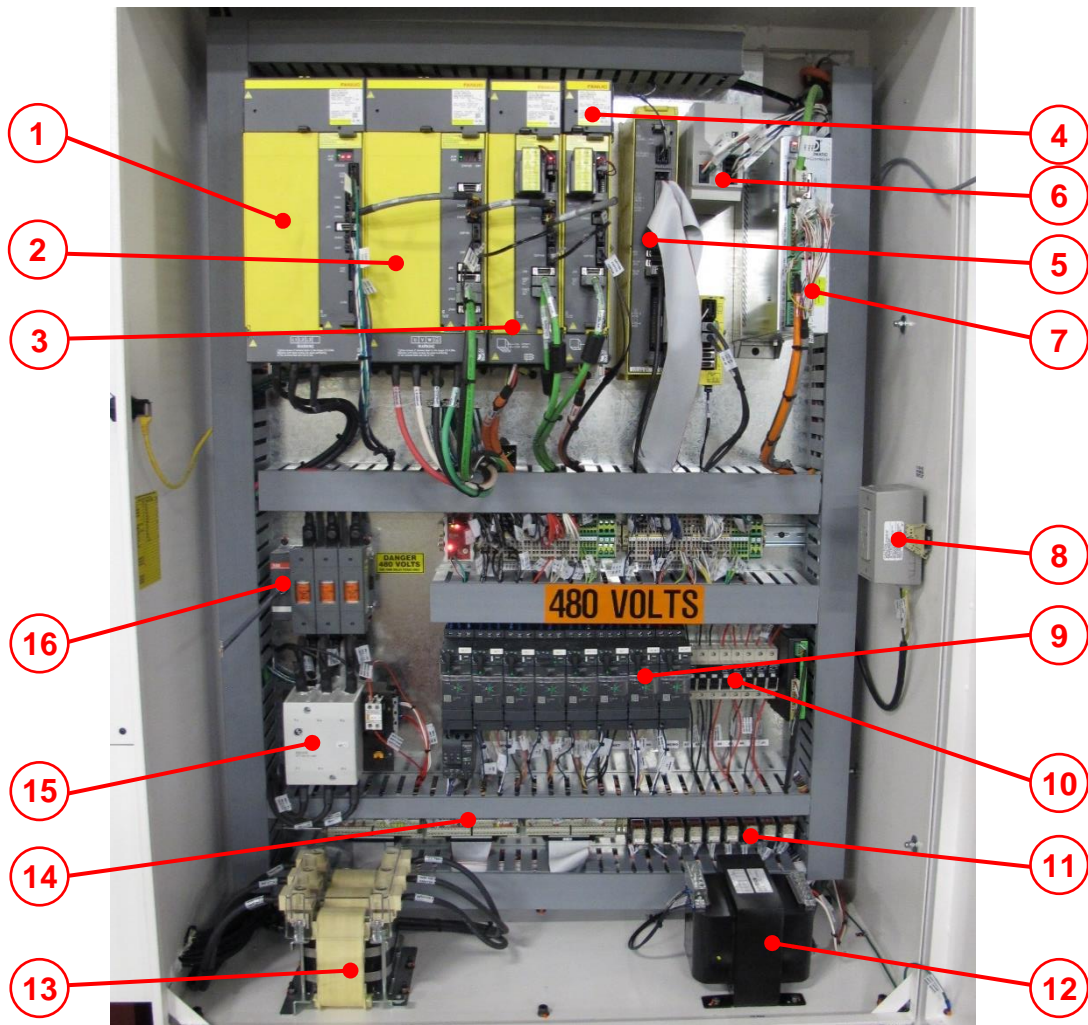
- In this situation, if the alignment is correct, you must have a little backlash (still remaining with the tenon in horizontal position) between the toolholder tenon and power intake.
- If you do not have backlash, you must repeat the alignment.

4. Remove the toolholder, switch on the motor and make a zero setting, verifying that the power intake is the correct aligned vertical position.



6.0 – DRAWINGS AND PARTS LIST PARTS

6.1 FANUC CONTROL ELECTRICAL PANEL LAYOUT & PARTS LIST



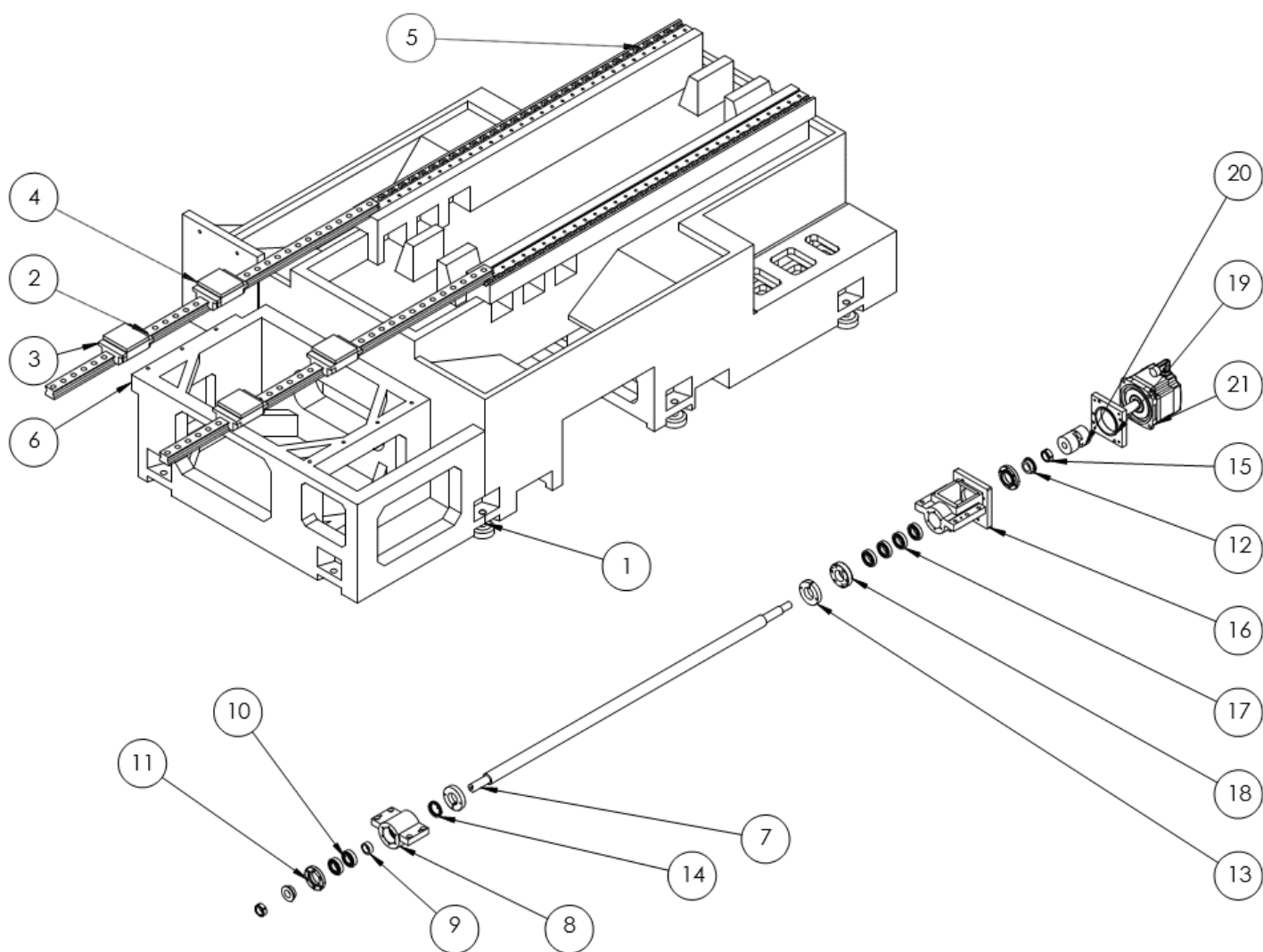
REF	PART NO.	DESCRIPTION	QTY
1	A06B-6252-H045	FANUC POWER SUPPLY	1
2	A06B-6272-H045#H610	FANUC SPINDLE DRIVE	1
3	A06B-6290-H209	FANUC DOUBLE AXIS DRIVE	1
4	A06B-6290-H125	FANUC SINGLE AXIS DRIVE	1
5	A16B-2204-0240/10A	FANUC I/O BOARD	1
6	MSE-2946	POWER SUPPLY 20 AMP	1
7	TMC-14-400-8-20-5.0/11	DUPLOMATIC TORQUE MOTOR CONTROLLER	1
8		110 VOLT POWER OUTLET	1
9	MSE-6620	CONTACTOR	1
10	MSE-6549	SINGLE POLE FUSE HOLDER	1
11	MSE-1185 / MSE-1195	RELAY & BASE	1
12	MSE-1610	3 / 4 KVA TRANSFORMER	1
13	A81L-0001-0191	FANUC REACTOR	1
14	MSE-1330	TERMINAL BLOCK	1
15	MSE-1403	MAIN CONTACTOR	1
16	SWT-5106	DISCONNECT SWITCH	1

6.2 FANUC FRONT CONSOLE LAYOUT & PARTS LIST



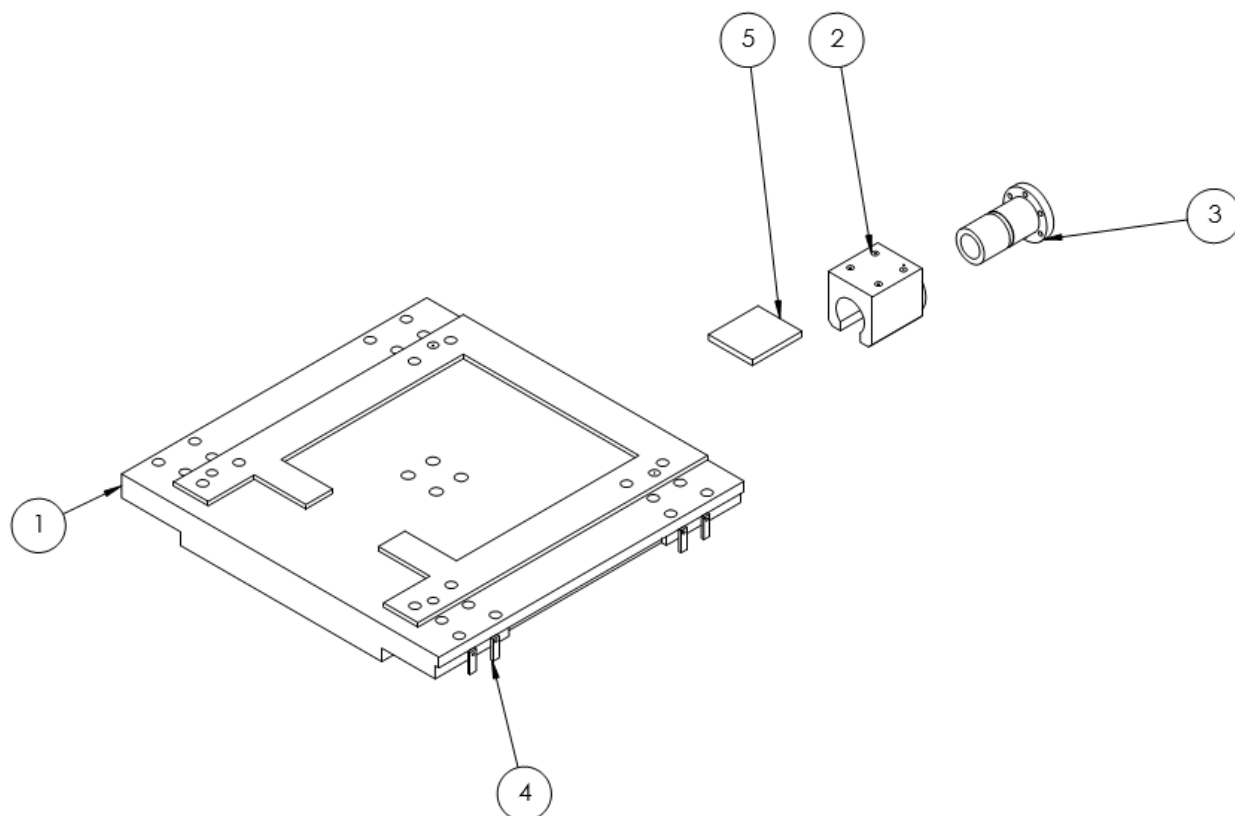
REF	PART NO.	DESCRIPTION	QTY
1	A02B-0338-H140	Oi-F 10.4" COLOR LCD UNIT	1
2	A02B-0323-C125#T	MDI UNIT	1
3	A02B-0338-C243	Oi-F MACHINE OPERATOR PANEL	1
4	A02B-0236-C239	MACHINE OPERATOR'S PANEL – SUB PANEL CCI	
5	A56L-0001-0134#2A2B	E-STOP SWITCH	

6.3 VT-60 / 80 BASE ASSEMBLY DRAWING & PARTS LIST



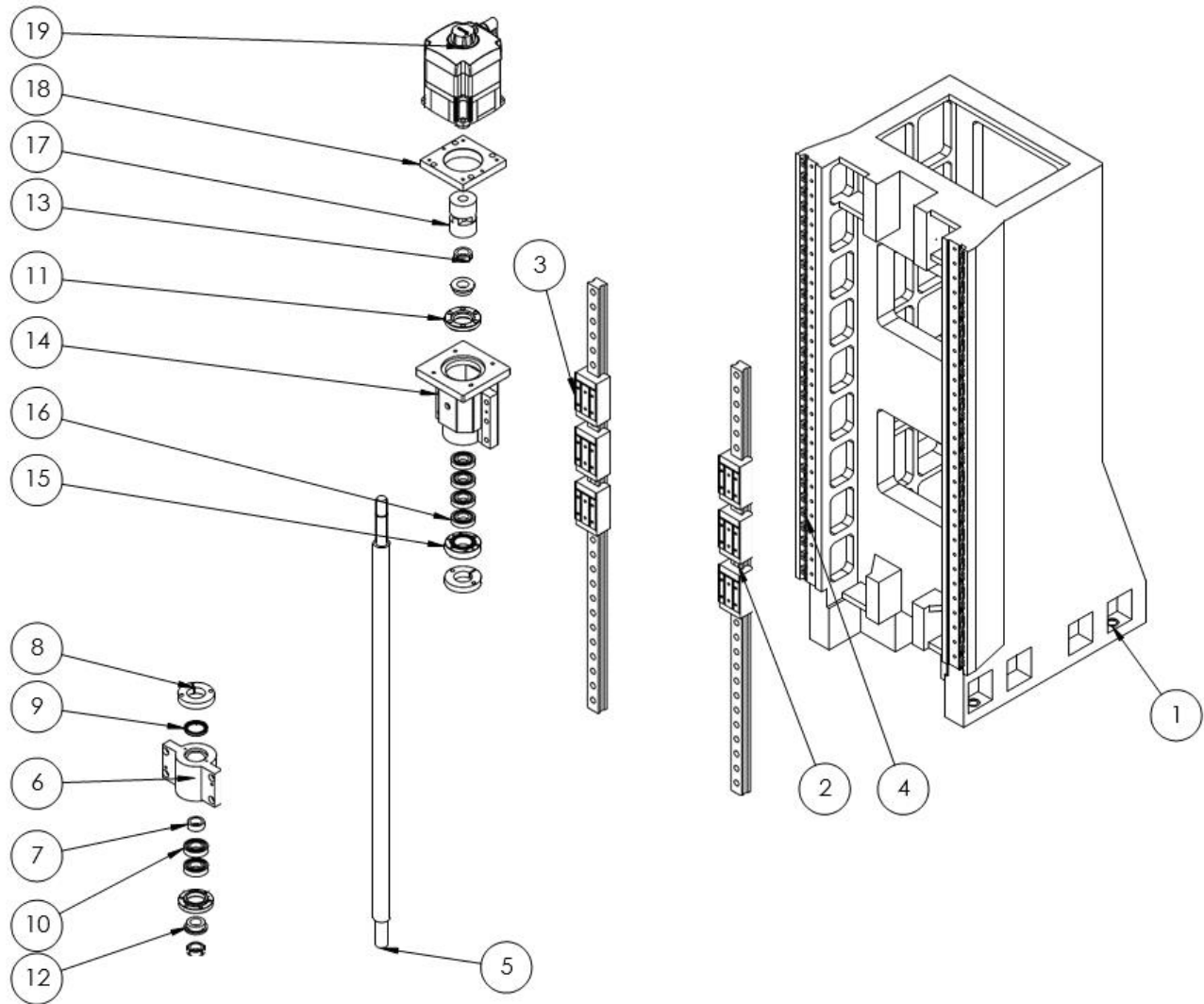
VT-60/VT-80 Base part list					
Item No.	Part Name	Part number	Q'ty	Jointly part VT-60/80	Do not joint part VT-60/80
1	VT-60 Foot pad	VT60B001	8	V	
2	VT-60 X PMI MSR55E rail	VT60B002	2		V
3	PMI MSR55E block	VT60B003	4	V	
4	VT-60 Shim 4	VT60B004	4	V	
5	T3	VT60B005	64	V	
6	VT-60 Base	VT60B006	1		V
7	VT-60 X PMI 50-10-4 FDIC Ballscrew	VT60B007	1		V
8	VT-60 X, Z Fixed Bracket	VT60B008	1	V	
9	VT-60 Collar 4	VT60B009	1	V	
10	Bearing 6207ZZ	VT60B010	2	V	
11	VT-60 bracket cover	VT60B011	2	V	
12	VT-60 Collar 1	VT60B012	2	V	
13	VT-60 Collar 3	VT60B013	2	V	
14	Oil seal 50X68X8	VT60B014	1	V	
15	lock nut YSF M35X1.5	VT60B015	2	V	
16	VT-60 X,Z Ballscrew bracket	VT60B016	1	V	
17	Bearing 35TAC 72B	VT60B017	4	V	
18	VT-60 Collar 2	VT60B018	1	V	
19	VT-60 X,Z motor bracket	VT60B019	1	V	
20	Coupling 80X 28X38	VT60B020	1	V	
21	1FK7101-2AF71-1RG0	VT60B021	1	V	

6.4 VT-60 / 80 SADDLE ASSEMBLY DRAWING & PARTS LIST



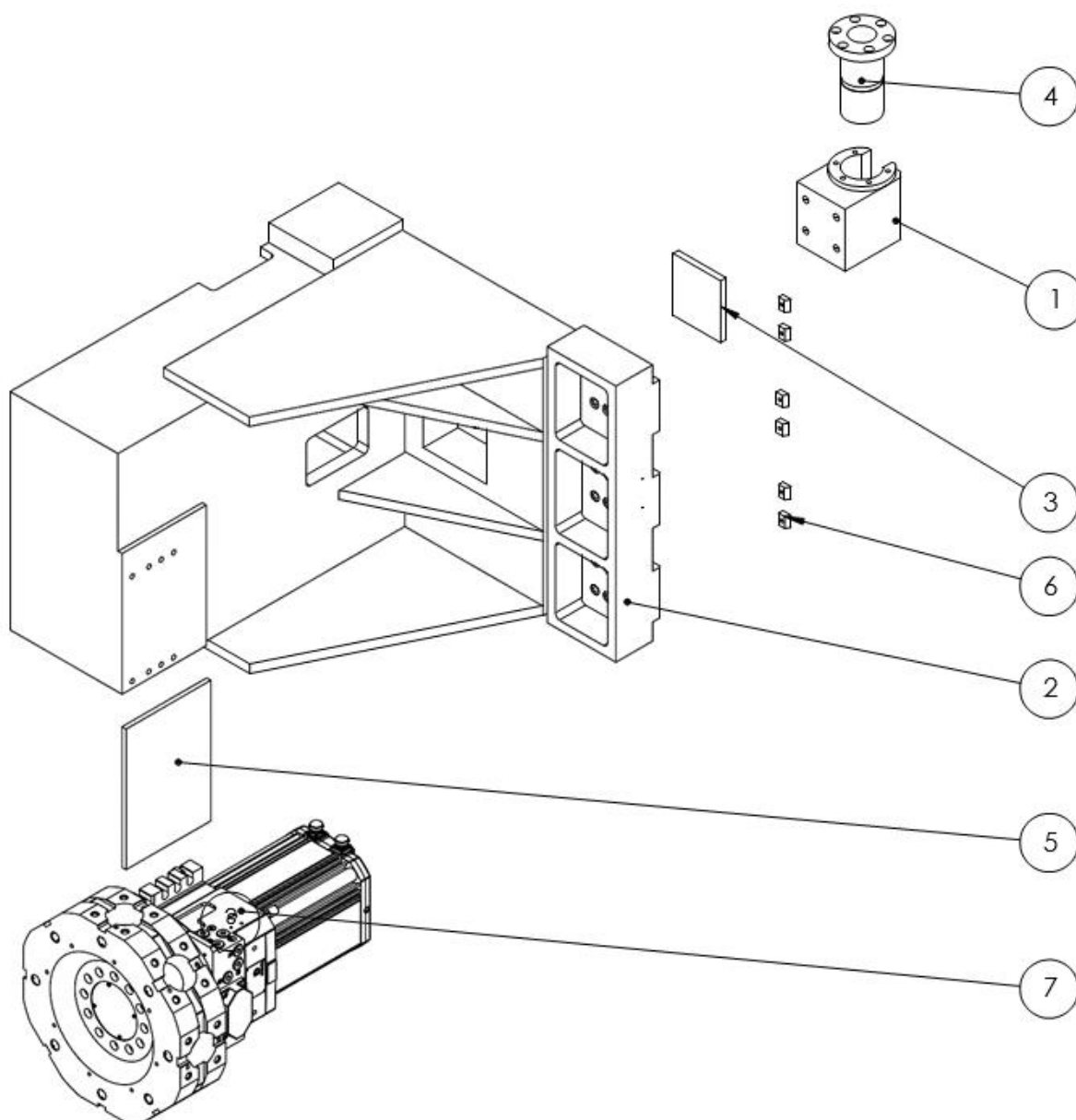
VT-60/VT-80 Saddle part list					
Item No.	Part Name	Part Number	Q'ty	Jointly part VT-60/80	Do not joint part VT-
1	VT-60 Saddle	VT-60S001	1	V	
2	VT-60 X Flage Bracket	VT-60S002	1	V	
3	VT-60 X PMI 50-10-4 FDIC Flage	VT-60S003	1	V	
4	VT-60 Fasten plate 1	VT-60S004	4	V	
5	VT-60 shim 2	VT-60S005	1	V	

6.5 VT-60 / 80 COLUMN ASSEMBLY DRAWING & PARTS LIST



Item No.	Part Name	Part Number	Q'ty	Jointly part VT-60/80	Do not joint part VT-60/80
1	VT-60 Column	VT60C001	1	V	
2	VT-60 Z PMI MSR45S Rail	VT60C002	2		V
3	PMI MSR45S Block	VT60C003	6	V	
4	T2	VT60C004	58	V	
5	VT-60 Z PMI 50-10-4 FDIC Ballscrew	VT60C005	1		V
6	VT-60 X, Z Fixed Bracket	VT60C006	1	V	
7	VT-60 Collar 4	VT60C007	1	V	
8	VT-60 Collar 3	VT60C008	2	V	
9	Oil seal 50X68X8	VT60C009	1	V	
10	Bearing 6207ZZ	VT60C010	2	V	
11	VT-60 bracket cover	VT60C011	2	V	
12	VT-60 Collar 1	VT60C012	2	V	
13	lock nut YSF M35X1.5	VT60C013	2	V	
14	VT-60 X,Z Ballscrew bracket	VT60C014	1	V	
15	VT-60 Collar 2	VT60C015	1	V	
16	Bearing 35TAC 72B	VT60C016	4	V	
17	Coupling 80X 28X38	VT60C017	1	V	
18	VT-60 X,Z motor bracket	VT60C018	1	V	
19	1FK7101-2AF71-1RH0	VT60C019	1	V	

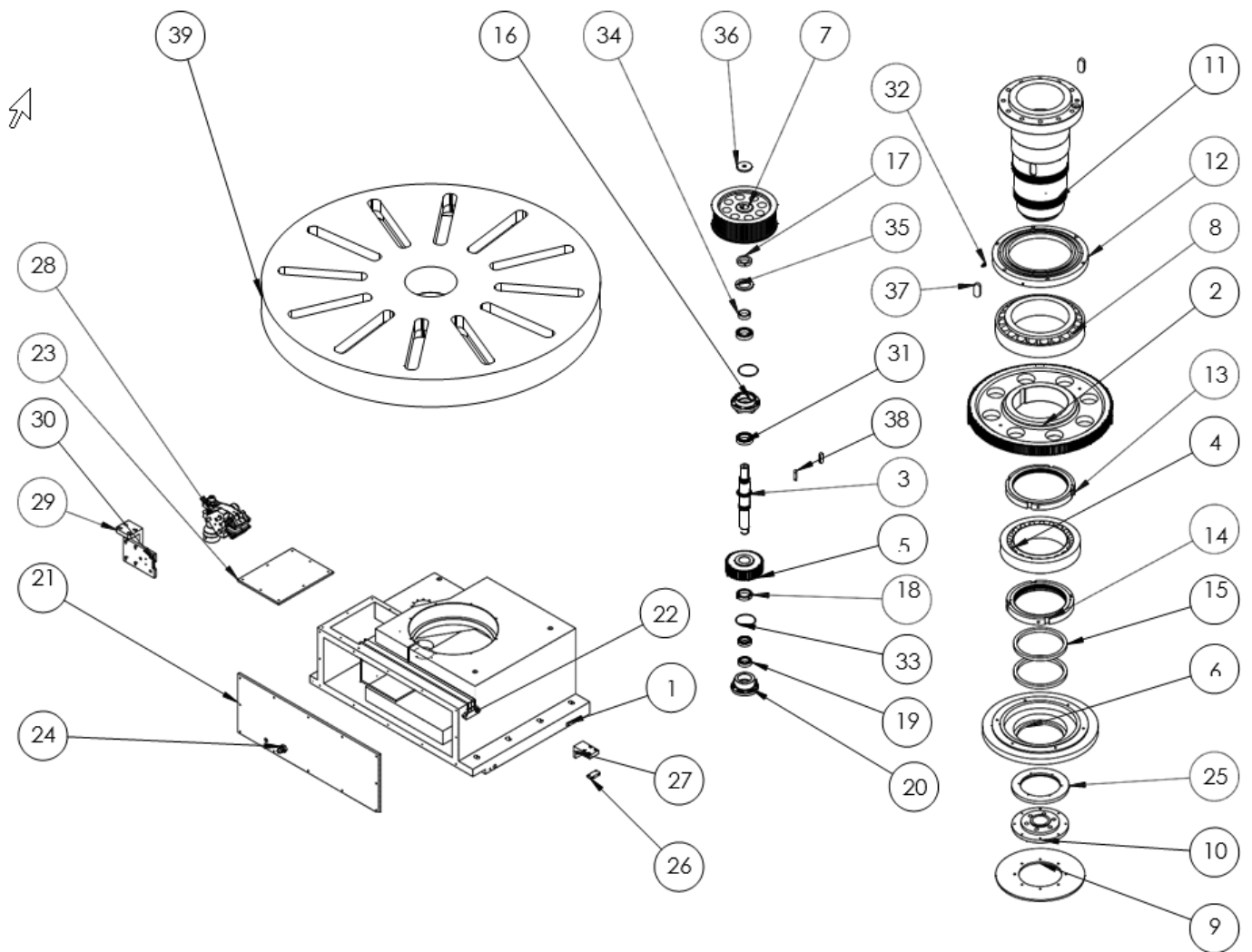
6.6 VT-60 / 80 RAM ASSEMBLY DRAWING & PARTS LIST



-ξ

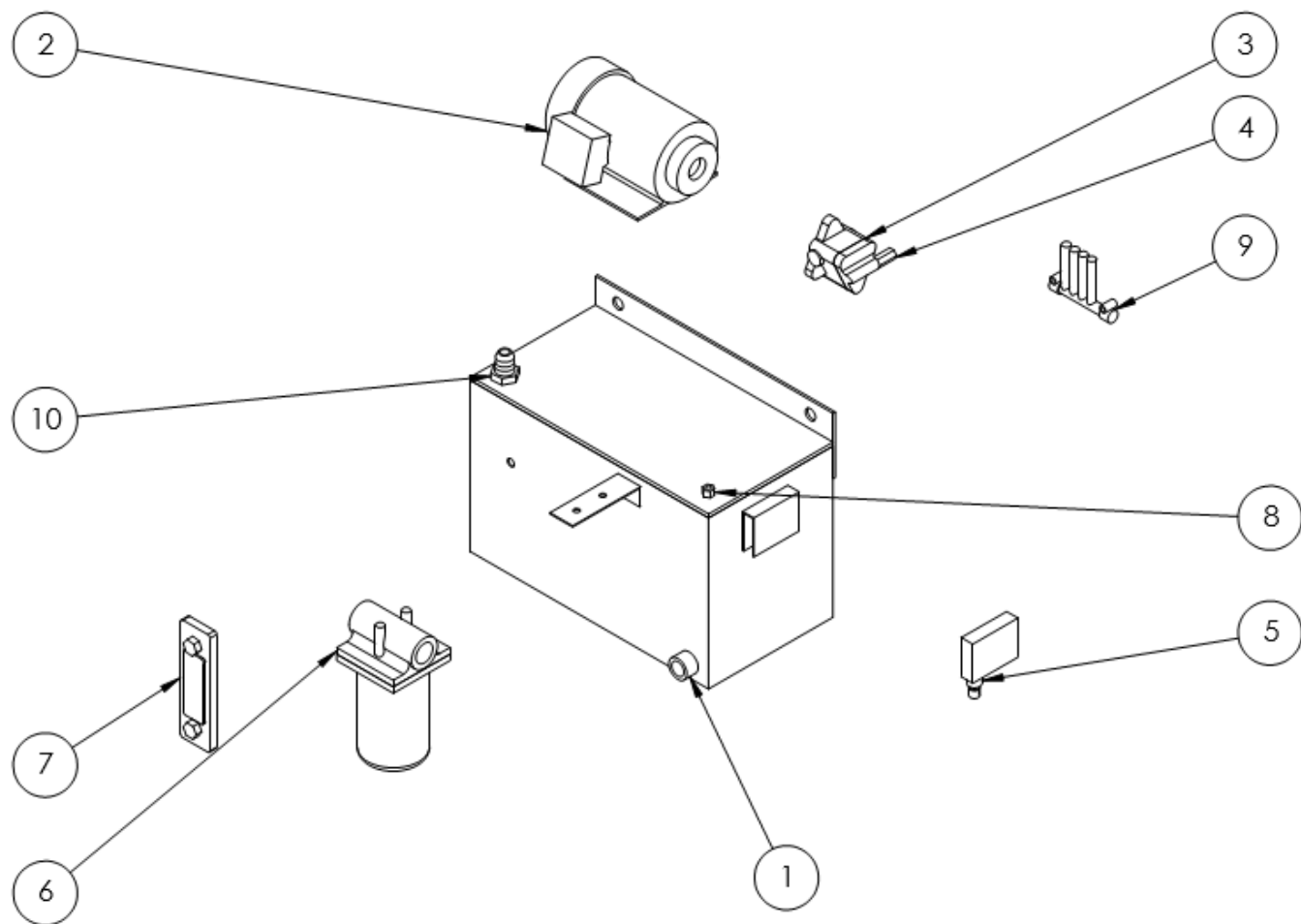
Item No.	Part Name	Part Number	Q'ty	Jointly part VT-60/80	Do not joint part VT-60/80
1	VT-60 Z Flange Bracket	VT60R001	1	V	
2	VT-60 Ram	VT60R002	1		V
3	VT-60 shim 2	VT60R003	1		V
4	VT-60 Z PMI 50-10-4 FDIC Flange	VT60R004	1	V	
5	VT-60 Spacer	VT60R005	1		V
6	T2	VT60R006	6	V	
7	Turret	VT60R007	1		V

6.7 VT-60 / 80 HEADSTOCK ASSEMBLY DRAWING & PARTS LIST



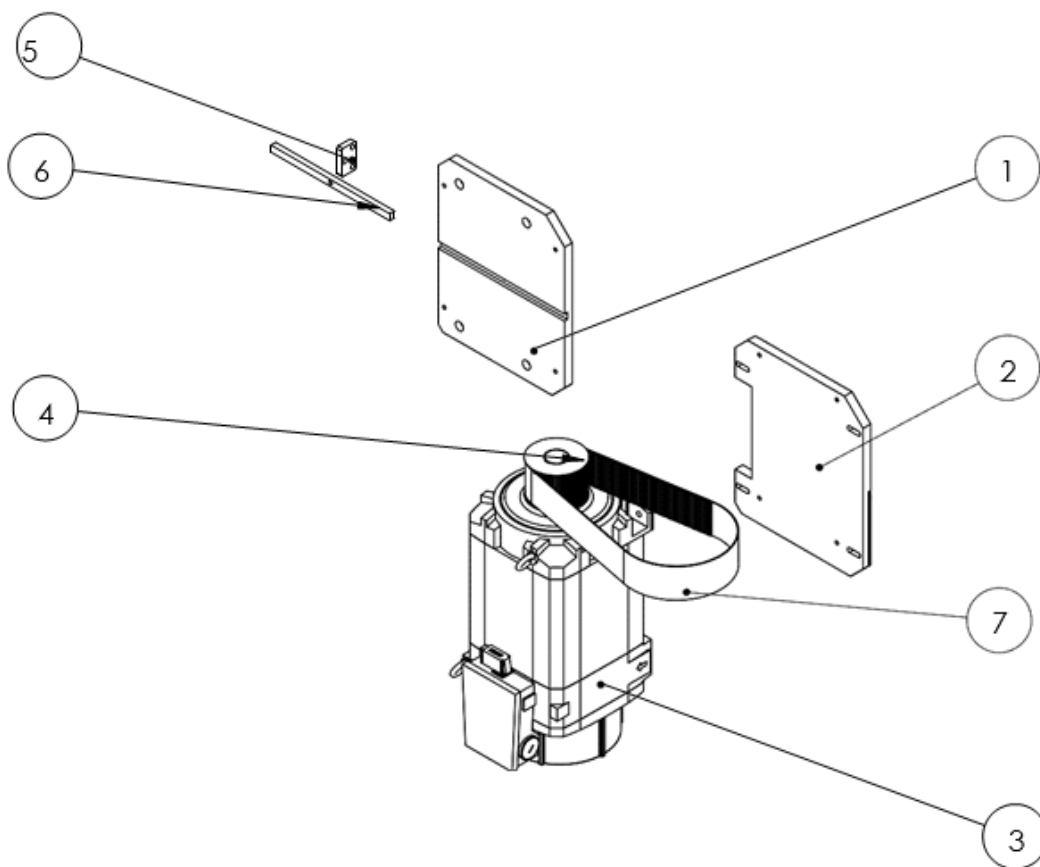
Item No.	Part Name	Part Number	Q'ty	Jointly part VT-60/80	Do not joint part VT-60/80
1	VT-60 Headstock	VT60H001	1	v	
2	VT-60 Spindle gear 160T-M4	VT60H002	1	v	
3	VT-60 A Shaft	VT60H003	1	v	
4	Bearing 32048X	VT60H004	1	v	
5	VT-60 Gear 40T -M4	VT60H005	1	v	
6	VT-60 spindle cover	VT60H006	1	v	
7	Pulley HTD-8M-112T	VT60H007	1	v	
8	Bearing 32052X	VT60H008	1	v	
9	VT-60 Disc Brake Rotor	VT60H009	1	v	
10	SIN -S 150 Adapter	VT60H010	1	v	
11	VT-60 Spindle A1-15	VT60H011	1	v	
12	VT-60 Head front cover	VT60H012	1	v	
13	Lock nut M250P2.0	VT60H013	1	v	
14	Lock nut M240P2.0	VT60H014	1	v	
15	Oil seal TC 210X240X15	VT60H015	2	v	
16	VT-60 A Shaft cover 1	VT60H016	1	v	
17	lock nut YSR M45X1.5	VT60H017	1	v	
18	lock nut YSR 50X1.5	VT60H018	1	v	
19	Bearing 6007ZZ	VT60H019	2	v	
20	VT-60 A Shaft cover 2	VT60H020	1	v	
21	VT-60 Headstock plate 1	VT60H021	1	v	
22	AB-4-8-6 Distributor	VT60H022	1	v	
23	VT-60 Headstock plate 2	VT60H023	1	v	
24	PIP32320	VT60H024	1	v	
25	Encoder ERM200--180	VT60H025	1	v	
26	VT-60 Spindle Encoder Mount	VT60H026	1	v	
27	VT-60 Spindle Encoder Mount Upper	VT60H027	1	v	
28	A2686(Brake)	VT60H028	1	v	
29	VT-60 Brake bracket upper	VT60H029	1	v	
30	VT-60 Brake bracket	VT60H030	1	v	
31	Bearing 7009	VT60H031	2	v	
32	PD-601 <u>set</u> (PA6+PB6+PD601)	VT60H032	1	v	
33	O-Ring G85	VT60H033	2	v	
34	VT-60 RING (SPACER)	VT60H034	1	v	
35	Oil seal 55X80X8	VT60H035	1	v	
36	VT-60 Step washer	VT60H036	1	v	
37	VT-60 Spindle Key	VT60H037	2	v	
38	VT-60 Shaft key	VT60H038	2	v	
39	VT-60 Face plate 60 in	VT60H039	1	v	

6.8 VT-60 / 80 LUBRICATION SYSTEM DRAWING & PARTS LIST



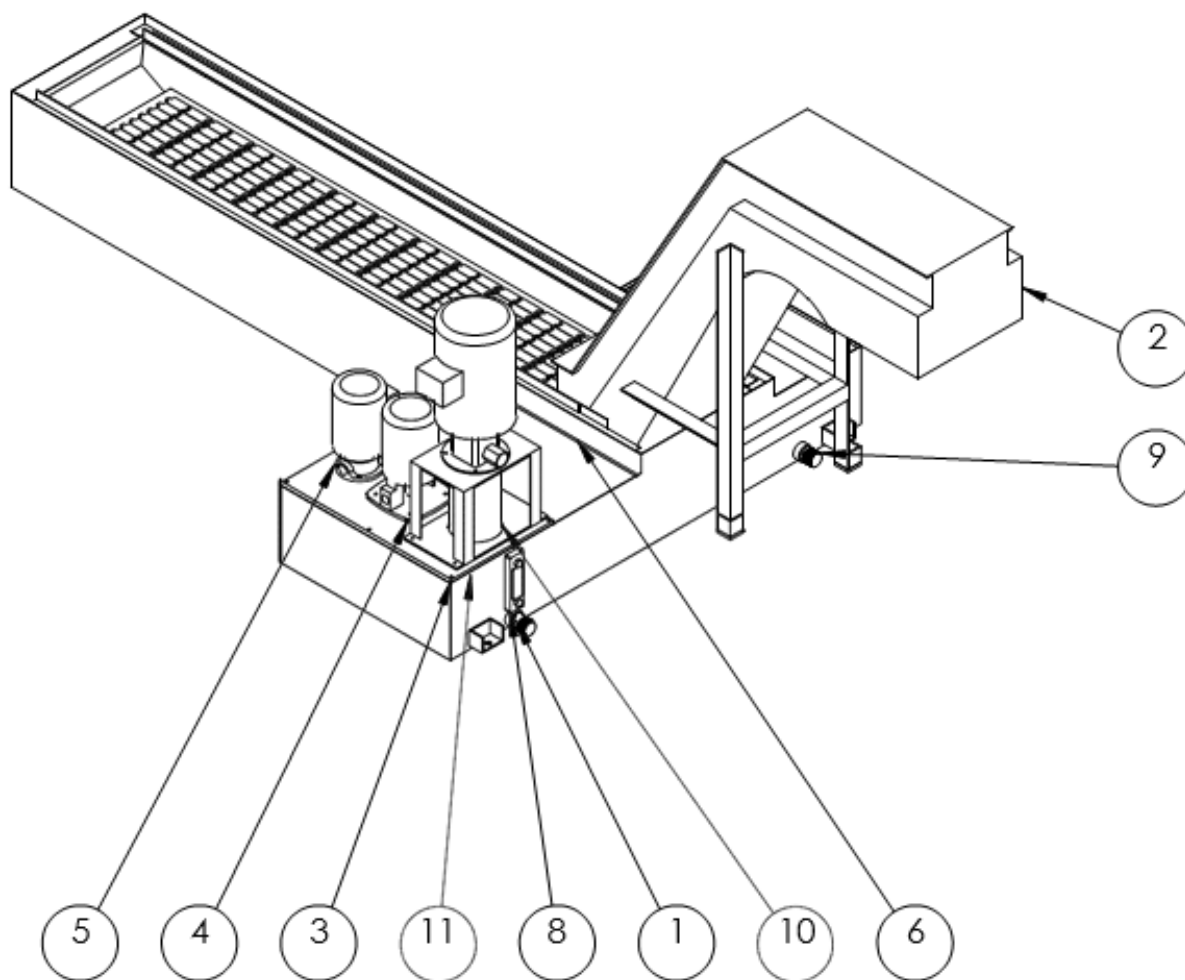
Item No.	Part Name	Part Number	Q'ty	Jointly part VT-60/80	Do not joint part VT-60/80
1	VT-60 Oil tank	VT60P001	1	V	
2	PMO-0-02-E-3-1 Oil motor	VT60P002	1	V	
3	CYP-12A Oil pump	VT60P003	1	V	
4	CYP-AV Valve for Oil pump	VT60P004	1	V	
5	M21041 Pressure switch	VT60P005	1	V	
6	PFPAM10E0 Oil Cleaner	VT60P006	1	V	
7	Oil Window	VT60P007	1	V	
8	Pipe Adapter	VT60P008	1	V	
9	AB-4-8-6 Distributor	VT60P009	1	V	
10	PIP32320	VT60P010	1	V	

6.9 VT-60 / 80 MOTOR ASSEMBLY DRAWING & PARTS LIST



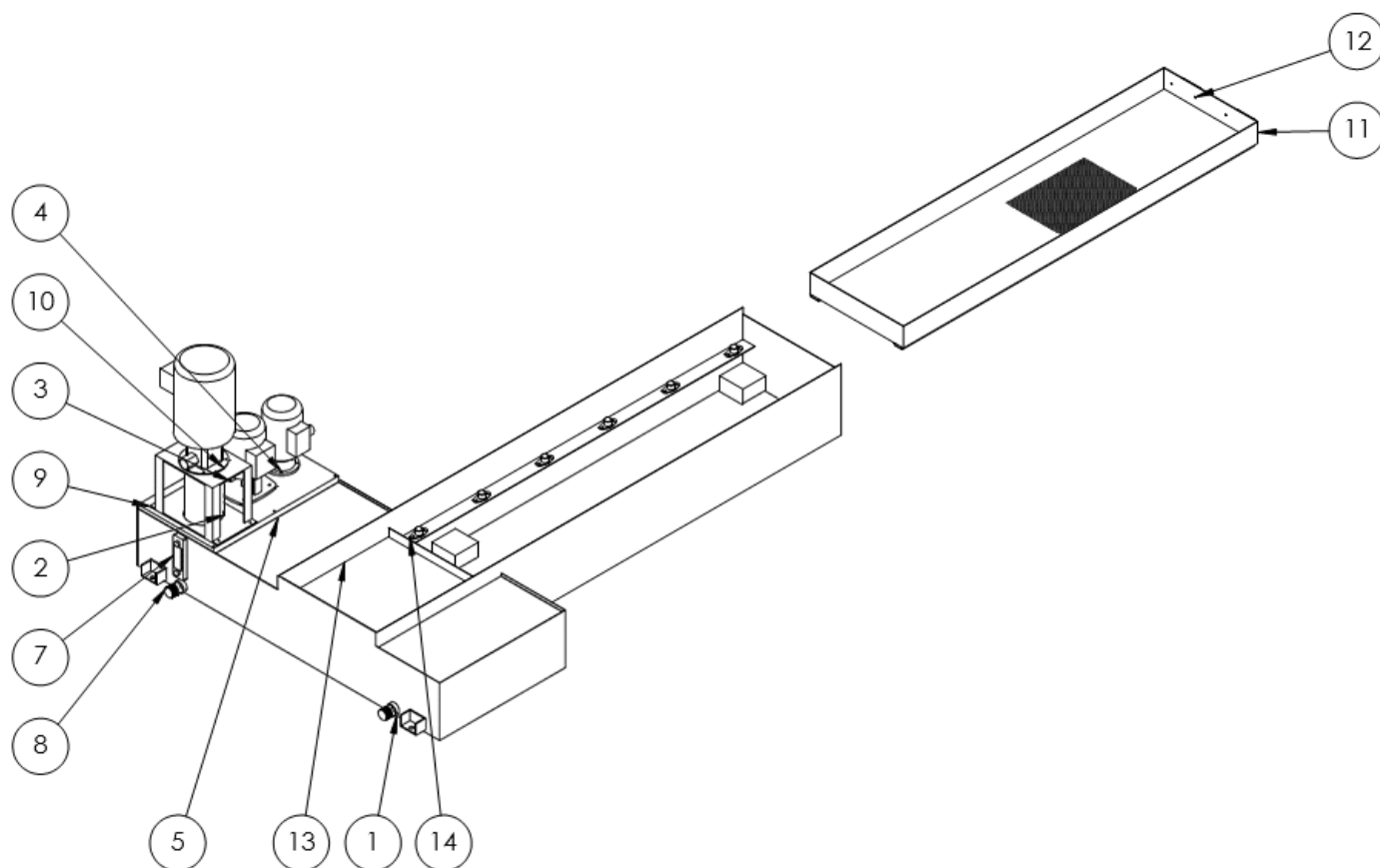
Item No.	Part Name	Part Number		Jointly part VT-60/80	Do not joint part VT-
1	VT-60 Motor plate 1	VT60M001	1	V	
2	VT-60 Motor plate 2	VT60M002	1	V	
3	1PH8165-1DD00-1DA1	VT60M003	1	V	
4	Pulley HTD-8M-56T	VT60M004	1	V	
5	VT-60 Motor adjuster	VT60M005	1	V	
6	VT-60 Key -motor plate	VT60M006	1	V	
7	Belt 1480-8M-3.75"	VT60M007	1	V	

6.10 VT-60 COOLANT TANK ASSEMBLY DRAWING & PARTS LIST



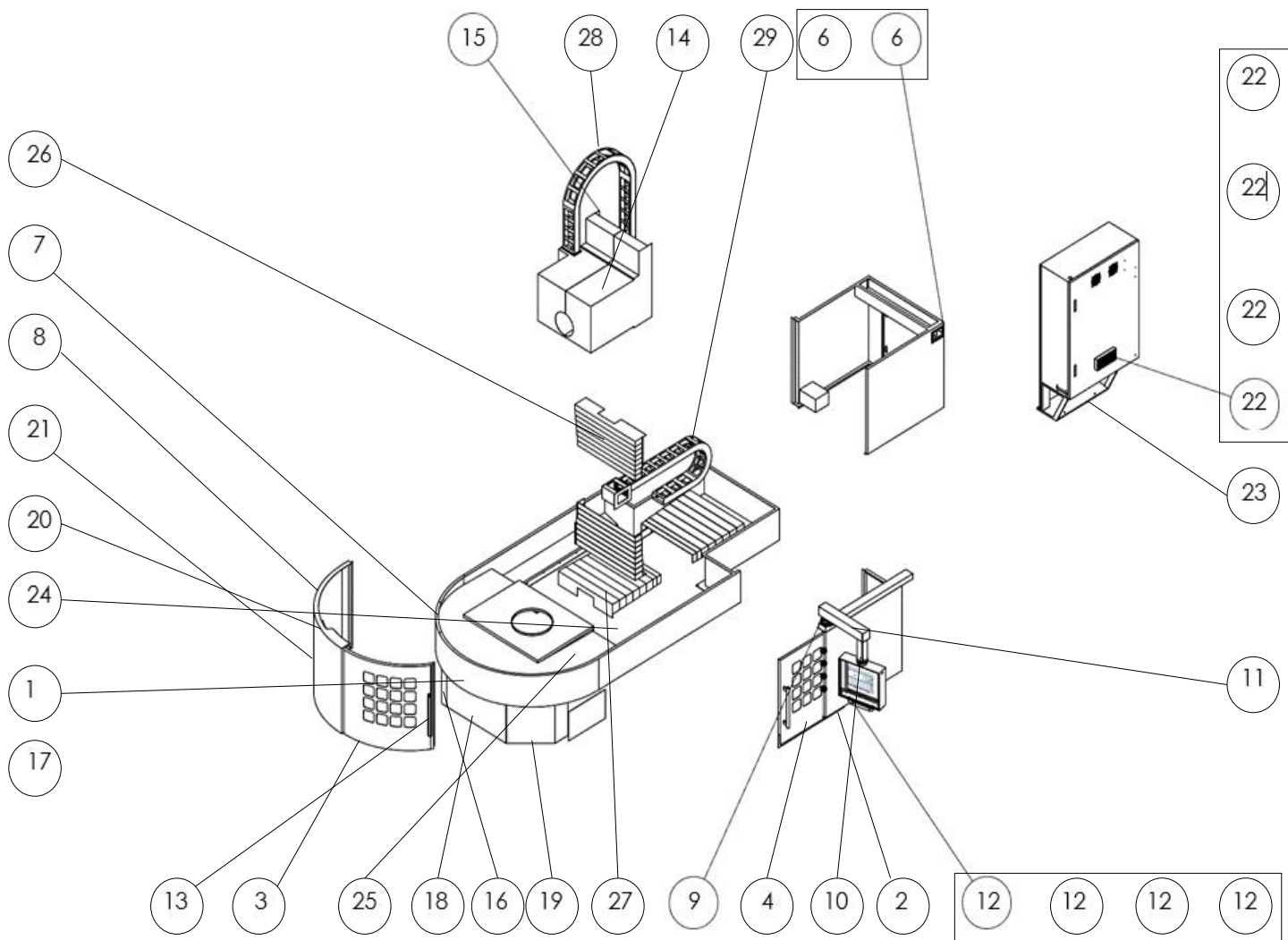
Item	Part Name	Part Number	Q'ty
1	VT-60 Coolant tank	VT60 T001	1
2	VT-60 Chip conveyor	VT60T002	1
3	VT-60 Coolant cover 1	VT60T003	1
4	TPAK-8-25 Washdown pump	VT60T004	1
5	TPK2T5-5 Flood pump	VT60T005	1
6	VT-60 Coolant cover 2	VT60T006	2
7	Caster	VT60T007	8
8	Coolant Fluid level	VT60T008	1
9	Plug	VT60T009	2
10	TPCK2T 20-20 Bracket	VT60T010	1
11	TPCK2T 20-20	VT60T011	1

6.11 VT-80 COOLANT TANK ASSEMBLY DRAWING & PARTS LIST



Item	Part Name	Part Number	Q'ty
1	VT-80 Coolant tank	VT80T001	1
2	VT-60 Coolant cover 1	VT80T002	1
3	TPAK-8-25 Washdown pump	VT80T003	1
4	TPK2T5-5 Flood pump	VT80T004	1
5	VT-60 Coolant cover 2	VT80T005	2
6	Caster	VT80T006	8
7	Coolant Fluid level	VT80T007	1
8	Plug	VT80T008	2
9	TPCK2T 20-20 Bracket	VT80T009	1
10	TPCK2T 20-20	VT80T010	1
11	VT-80 Chip Tray	VT80T011	1
12	MF-20.120.01 (handle)	VT80T012	2
13	VT-80 Coolant cover 1	VT80T013	1
14	1" Ball Transfer	VT80T014	12

6.12 VT-60 / 80 SHEET METAL DRAWING & PARTS LIST



Item No.	Part Name	Part Number	Q'ty	Jointly part VT-60/80	Do not joint part VT-
1	VT-60 Front pan	VT60E001	1		V
2	VT-60 Right panel	VT60E002	1		V
3	VT-60 Front door	VT60E003	1		V
4	VT-60 Right Side door	VT60E004	1		V
5	VT-60 Left pan 2	VT60E005	1		V
6	VT-60 Rear panel	VT60E006	1		V
7	VT-60 Left pan 1	VT60E007	1		V
8	VT-60 Left door 1	VT60E008	1		V
9	VT-60 Steel Bar 3	VT60E009	1		V
10	VT-60 Console rotor	VT60E010	1	V	
11	VT-60 Console arm	VT60E011	1	V	
12	VT-60 Console box	VT60E012	1	V	
13	VT-60 Door Handle	VT60E013	2	V	
14	VT-60 Turret cover 1	VT60E014	1		V
15	VT-60 Turret cover 2	VT60E015	1		V
16	VT-60 Head Right cover	VT60E016	1		V
17	VT-60 Head Left cover	VT60E017	1		V
18	VT-60 Head Front plate	VT60E018	1		V
19	VT-60 Right plate	VT60E019	1		V
20	VT-60 Track plate 2	VT60E020	1		V
21	VT-60 sheet metal 6	VT60E021	1		V
22	VT-60 Electrical Cabinet	VT60E022	1	V	
23	VT-60 Electrical Cabinet	VT60E023	1		V
24	VT-60 Chip panel cover	VT60E024	1	V	
25	VT-60 Chip panel	VT60E025	1		V
26	VT-60 Z Waycover	VT60E026	2		V
27	VT-60 X Waycover	VT60E027	2		V
28	VT-60 Track 1	VT60E028	1		V
29	VT-60 Track 2	VT60E029	1		V