

Service and Maintenance

Caution

- (1) Maintenance shall be performed by qualified personnel.
- (2) Switch off the main power supply before servicing. If power supply is needed, have qualified personnel operate it.
- (3) Use genuine replacement parts and components.

Linear drive component Maintenance

Wipe the linear rails and bearings once a day to assure smooth play free motion.



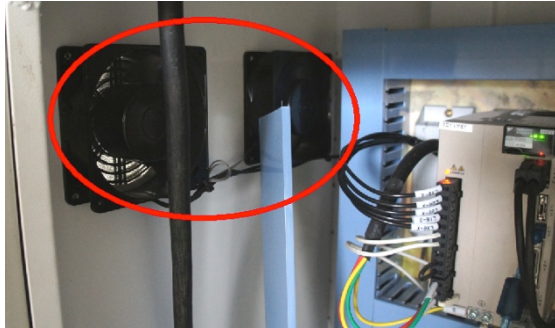
Lubricate the rack and pinion and the ball screw drive once every week so as to ensure longer service life.



When lubricating the z-axis screw, use a grease gun to inject grease into zerk fitting. It is recommended to use Kluber TA 15/2 or PETAMOGY 193 or equivalent.



Electrical Cabinet Maintenance



Caution:

Switch off the main power supply before servicing. If power supply needed, qualified personnel shall operate it.

- (1) Clean the cabinet with dust collector once every week. Be careful not to damage or loosen any wire connections. Compressed air may be used but from at least 4 foot distance.
- (2) Check the fan filters every month. Clean and / or replace if necessary.

Maintenance Intervals on Becker VTLF 250 Series Pumps

Every 50 Hours

- Check to make sure the pump is free of any debris or materials leaning against the pump. 18" perimeter clearance is required for proper ventilation.
- Check and clean air intake filters. Replace if Necessary.
- Clean more often in dirty environments.

9 months to Yearly or after 4,000 hours

- *Check Vanes for **minimum width (41 mm)**. Replace if necessary.
- *Inspect vanes for improper wear (cupping). Replace if necessary.
- *Inspect teflon tube seals in end shield.
If the hollow center shows through, replace them.
- *Wipe grease off rotor shaft before re-installing the end shield.
- ***Grease bearings, Use only Amblygon TA 15/2 Grease, 6 or 7 pumps of the grease gun per fitting. DO NOT OVER GREASE**

Every 3000 to 4000 Hours

- *Inspect motor coupling. Replace if necessary.

Spindle Safety Instructions

NOTE: Refer to spindle manufactures manual for more detailed information. Below is basic tooling maintenance.

Use ISO 30 tool holder

- 1) Warm up spindle each day before use. See spindle manual for details.
- 2) Use original tool holders only.
- 3) The tool holder must be in the upright position during tool changing.
- 4) Air pressure needs to be 85-100 PSI during tool changing. NOTE: For best operation and spindle longevity it is recommended to have a clean drive non fluctuation air source. Air dryer recommended.
- 5) Clear the dust in the spindle regularly.
- 6) Keep the tools sharp and clean. The workpiece needs to be secured tightly on the table otherwise work piece can become loose and create tool vibration.
- 7) Change the filter in the oil-water separator on a monthly basis. Empty the water every 8 hours. Blow air into the middle hole and make sure there is no oil. Warning: water and oil in the air lines can damage the spindles moving parts.
- 8) The air needs to be filtered to be free of moisture, oil mist and dust before entering the spindle.
- 9) ISO30 tool holders and collets should be cleaned weekly. It is recommended to use a rust prohibitor. (Techno p/n: H25XOS-33-21)

Other maintenance

To ensure longer service life, perform regular maintenance of the parts and components:

- (1) Check the overtravel limit switches (both software limit switch and mechanical stops) regularly. Do not let rust accumulate on the limit switches as it seriously affects their

sensitiveness and may fail to give alarm when the machine over travels, which could lead to mechanical crash and damage to the machine. The way to check is to press the switch with hand and see if it gives off alarm. You can also check if the I/O port input signal changes.

- (2) Regularly check the electrical parts. Make sure the plug in devices, cables and cords are well connected. Keep the cabinet door closed when in operation. Opening the cabinet door will not help it cool down. Regularly check and clean the fans and filter nets to ensure proper ventilation.
- (3) You are encouraged to utilize the machine and do not let it stay idle for long, especially in the first year. The more you use the machine, the more likely the machine will be in good condition in the future. If the machine stays idle for too long, the electrical parts are exposed to moisture, heat, etc., thus reducing the service life of the machine. Make sure to power up the machine from time to time (at least once a month). Perform regular check and maintenance. Run the machine for one hour each time and the heat generated will help reduce the humidity. This will also help you to find problems with the machine in advance.

Appendix I Daily Maintenance Sheet

No.	Cycle	Part	Requirement
1	Everyday	Table	Sweep clean the table every day. Keep the machine clean and free of other objects.
2	Everyday	Switch	Check and clean all the limit switches.
3	Everyday	Screw	Check the lubricator every day and ensure timely refill.
4	Everyday	Spindle	Check every day to ensure there is enough water in the water tank used for spindle cooling and whether that water tank is functioning.
5	Everyday	Tool	Check each of the tools is in correct position.
6	Everyday	Air compressor	Make sure the air compressor has the right air pressure.
7	Everyday	Water separator and dry	Make sure the filter cup of the water separator and dryer is dry.
8	Everyday	Linear guide	Wipe clean the linear guides and check if they have any scratches or damages.
9	Everyday	Protective cover	Make sure the protective covers on the machines are all intact.
10	Everyday	Cooling fan	Make sure the fan in the electrical cabinet is working and there is no clogging in the air filter net. Clean the filter regularly.
11	Everyday	Others	Make sure the spindle, tool holders and other accessories are in working condition.
12	Regularly	Oiler and oil gun	Replace the liquid when necessary.
13	Monthly	Electrical cabinet	Sweep clean the electrical cabinet when necessary.
14	Monthly	Filter	Clean the filter net regularly, replace with a new one when necessary.
15	Monthly	Wirings and connections	Make sure the wirings and connections are correct.
16	Monthly	Cables, cords and terminals	Check all the cables, cords and terminals are in correct working condition.
17	Semi-annual	Electrical parts	Check if the electrical parts are making strange noises. If they do, replace them.
18	Semi-annual	Backlash	Measure the backlash on all axes every half year. If you find any deviation, make sure to adjust or make compensation.
19	Semi-annual	Electrical parts	Check all the electrical parts and relays to make sure they are working.
20	Semi-annual	Machine bed	Make sure the whole machine is still properly balanced after 6 months of service. If not, adjust the iron pads and tighten the screws.

Appendix II Common Errors and Solutions

Driver Error Codes

Display	Description	32bit-ErrorCode (16bit-ErrorCode + 16bit-Additional Info)
AL001	Overcurrent	2310-0001 _h
AL002	Overvoltage	3110-0002 _h
AL003	Undervoltage	3120-0003 _h
AL004	Motor error	7122-0004 _h
AL005	Regeneration error	3210-0005 _h
AL006	Overload	3230-0006 _h
AL007	Overspeed	8400-0007 _h
AL008	Abnormal pulse control command	8600-0008 _h
AL009	Excessive deviation	8611-0009 _h
AL010	Reserved	0000-0010 _h
AL011	Encoder error	7305-0011 _h
AL012	Adjustment error	6320-0012 _h
AL013	Emergency stop activated	5441-0013 _h
AL014	Reverse limit switch error	5443-0014 _h
AL015	Forward limit switch error	5442-0015 _h
AL016	IGBT temperature error	4210-0016 _h
AL017	Memory error	5330-0017 _h
AL018	Encoder output error	7306-0018 _h
AL019	Serial communication error	7510-0019 _h
AL020	Serial communication time out	7520-0020 _h
AL021	Reserved	Reserved
AL022	Input power phase loss	3130-0022 _h
AL023	Pre-overload warning	3231-0023 _h
AL024	Encoder initial magnetic field error	7305-0024 _h
AL025	Encoder internal error	7305-0025 _h
AL026	Encoder internal error	7305-0026 _h

List of Alarms for VFD

Fault Name	Fault Descriptions	Corrective Actions
OC	Over current Abnormal increase in current.	1. Check if motor power corresponds with the AC motor drive output power. 2. Check the wiring connections to U, V, W for possible short circuits. 3. Check the wiring connections between the AC motor drive and motor for possible short circuits, also to ground.
OCC	IGBT protection (Insulated Gate Bipolar Transistor)	4. Check for loose contacts between AC motor drive and motor. 5. Increase the Acceleration Time. 6. Check for possible excessive loading conditions at the motor. 7. If there are still any abnormal conditions when operating the AC motor drive after a short-circuit is removed and the other points above are checked, it should be sent back to manufacturer.
OV	Over voltage The DC bus voltage has exceeded its maximum allowable value.	1. Check if the input voltage falls within the rated AC motor drive input voltage range. 2. Check for possible voltage transients. 3. DC-bus over-voltage may also be caused by motor regeneration. Either increase the Decel. Time or add an optional brake resistor (and brake unit). 4. Check whether the required braking power is within the specified limits.

Fault Name	Fault Descriptions	Corrective Actions
oH	Overheating Heat sink temperature too high	1. Ensure that the ambient temperature falls within the specified temperature range. 2. Make sure that the ventilation holes are not obstructed. 3. Remove any foreign objects from the heatsinks and check for possible dirty heat sink fins. 4. Check the fan and clean it. 5. Provide enough spacing for adequate ventilation.
Lu	Low voltage The AC motor drive detects that the DC bus voltage has fallen below its minimum value.	1. Check whether the input voltage falls within the AC motor drive rated input voltage range. 2. Check whether the motor has sudden load. 3. Check for correct wiring of input power to R-S-T (for 3-phase models) without phase loss.
oL	Overload The AC motor drive detects excessive drive output current. NOTE: The AC motor drive can withstand up to 150% of the rated current for a maximum of 60 seconds.	1. Check whether the motor is overloaded. 2. Reduce torque compensation setting in Pr.7-02. 3. Take the next higher power AC motor drive model.
oL1	Overload 1 Internal electronic overload trip	1. Check for possible motor overload. 2. Check electronic thermal overload setting. 3. Use a higher power motor. 4. Reduce the current level so that the drive output current does not exceed the value set by the Motor Rated Current Pr.7-00.
oL2	Overload 2 Motor overload.	1. Reduce the motor load. 2. Adjust the over-torque detection setting to an appropriate setting (Pr.06-03 to Pr.06-05).
HPF.1	GFF hardware error	Return to the factory.
HPF.2	CC (current clamp)	
HPF.3	OC hardware error	
HPF.4	OV hardware error	
cE-	Communication Error	1. Check the RS485 connection between the AC motor drive and RS485 master for loose wires and wiring to correct pins. 2. Check if the communication protocol, address, transmission speed, etc. are properly set. 3. Use the correct checksum calculation. 4. Please refer to group 9 in the chapter 5 for detail information.

Fault Name	Fault Descriptions	Corrective Actions
ocR	Over-current during acceleration	1. Short-circuit at motor output: Check for possible poor insulation at the output lines. 2. Torque boost too high: Decrease the torque compensation setting in Pr.7-02. 3. Acceleration Time too short: Increase the Acceleration Time. 4. AC motor drive output power is too small: Replace the AC motor drive with the next higher power model.
ocd	Over-current during deceleration	1. Short-circuit at motor output: Check for possible poor insulation at the output line. 2. Deceleration Time too short: Increase the Deceleration Time. 3. AC motor drive output power is too small: Replace the AC motor drive with the next higher power model.
ocn	Over-current during steady state operation	1. Short-circuit at motor output: Check for possible poor insulation at the output line. 2. Sudden increase in motor loading: Check for possible motor stall. 3. AC motor drive output power is too small: Replace the AC motor drive with the next higher power model.
EF	External Fault	1. Input EF (N.O.) on external terminal is closed to GND. Output U, V, W will be turned off. 2. Give RESET command after fault has been cleared.
$EF1$	Emergency stop	1. When the multi-function input terminals MI1 to MI8 are set to emergency stop (setting 19 or 20), the AC motor drive stops output U, V, W and the motor coasts to stop. 2. Press RESET after fault has been cleared.
$cF1$	Internal EEPROM can not be programmed.	Return to the factory.
$cF2$	Internal EEPROM can not be read.	Return to the factory.
$cF33$	U-phase error	Return to the factory.
$cF34$	V-phase error	
$cF35$	W-phase error	
$cF36$	OV or LV	
$cF37$	Current sensor error	
$cF38$	OH error	
$CCoDE$	Software protection failure	Return to the factory.
$PCoDE$	Password is locked.	Keypad will be locked. Turn the power ON after power OFF to re-enter the correct password. See Pr.00-07 and 00-08.
cFR	Auto accel/decel failure	1. Check if the motor is suitable for operation by AC motor drive. 2. Check if the regenerative energy is too large. 3. Load may have changed suddenly.