REDLINE CNC
PUSH YOUR CNC TO ITS LIMIT

USER MANUAL

Air Cooled Spindles

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Table of Contents

INTRODUCTION

REDLINE CNC Spindles are the most advanced Plug and Play Spindle Kits on the market today. Featuring a sleek and stylish patent pending design, compact all metal enclosure, a high quality custom made Spindle with four ceramic bearings standard.
In addition, it's the only safety approved Plug and Play Spindle kit on the market today. No other Spindle Kit on the market has the quality, reliability and safety that the REDLINE CNC offers !

SAFETY RULES

These operating instructions explain the Redline CNC Spindle and the correct handling of the CNC system. Please read these operating instructions and accompanying documents in their entirety before commissioning of the system in order to become familiar with the characteristics and the operation of the product. The improper operation of the Redline CNC Spindle system can lead to damage to the product and property and can cause serious injuries, electric shock and / or fire. It is imperative to adhere to the safety instructions listed in these operating instructions at all times. Should you have any questions or concerns prior to initial use of the Redline CNC Spindle or the need for further information, do not hesitate to contact us prior to the commissioning of the Redline CNC Spindle system.

Safety Instructions and Protective Measures:
(General Safety Warnings for the Use of Power Tools)

Work Area Safety

NOTICE: Keep work area clean and well lit. Cluttered or dark areas invite accidents.

Caution: Do not operate the power tool in explosive atmospheres, such as in the presence of flammable liquids, gases or dust. Power tools create sparks which may ignite the dust or fumes.

NOTICE: Keep children and bystanders at a distance while operating a power tool. Distractions can cause you to lose control and can result in accidents.

Caution: Operate the spindle only in interior spaces on a solid, horizontal table or workbench.

Electrical Safety:

Warning: Power tool plugs must match the outlet. Never modify the plug in any way. Do not use any adapter plugs with grounded power tools. Unmodified plugs and matching outlets will reduce the risk of electric defects and malfunctions.

Warning: Do not expose power tools to moisture. The power tool is only suitable for indoor use. Water entering a laser tool will increase the risk of electric shocks.

Personal Safety:

Caution: Stay alert, watch what you are doing and use common sense when operating a power tool. Do not use a power tool while you are tired and/or under the influence of drugs, alcohol or medication. A moment of inattention while operating a power tool may result in serious personal injury.

Caution: Use personal protective equipment. Always wear eye protection. Protective equipment, such as a suitable dust mask or ear protection, reduces the risk of injuries.

Caution: This tool is controlled by a computer. During operation, it should not be controlled directly. Lack of caution or expertise as well as program errors can lead to unexpected movements.

Caution: Do not touch the insertion tools or motors as they can heat up significantly during operation.

Caution: Never place any parts of the tool or accessories in the mouth as this can lead to serious injuries.

NOTICE: All persons who operate the power tool must have read and fully understood all relevant safety and operating instructions. Misunderstanding may result in personal injury.

NOTICE: Dress properly. Do not wear loose clothing or jewellery. Pin your hair above your shoulders so that it cannot get caught in the Ball Screws and linear guides or moving parts.

Use of the Power Tool:

Caution: Do not alter or misuse the tool. Any alteration or modification is a misuse and may result in serious personal injury.

Caution: Disconnect the plug from the power source before you make any adjustments, change accessories, or store the tool. Such preventative safety measures reduce the risk of starting the power tool accidentally.

Caution: Store idle power tools out of the reach of children and do not allow persons unfamiliar with the tool or these instructions to operate the power tool. Power tools are dangerous in the hands of untrained users.

Caution: Do not touch the bit or collet after use. After usage bit and collet are too hot to be touched with bare hands.

⚠ **Caution:** When using the end mills, V-bits or cutters, always have the workpiece securely clamped. Never attempt to hold the work piece with your hands while using any accessories. These tools can jam easily in the material, and can kickback, causing loss of control resulting in serious injury.

⚠ **Caution:** If the work piece or bit becomes jammed or bogged down, turn the power tool "OFF" by the switch. Wait for all moving parts to stop and unplug the tool, then free the jammed material. If the switch to the tool is left "ON", the tool could restart unexpectedly causing serious personal injury.

NOTICE: Do not allow familiarity gained from frequent use become commonplace. Always remember that a careless fraction of a second is sufficient to inflict severe injury.

NOTICE: Never use dull or damaged insertion tools. Sharp bits must be handled with care. Damaged bits can snap during use. Dull bits require more force to cut the tool, possibly causing the bit to break.

NOTICE: The speed and feed of the bit when carving, routing or cutting is very important. Always observe the recommended speed and feed for the particular bit.

NOTICE: Do not leave a running tool unattended, turn power off. Only when tool comes to a complete stop and is disconnected from the mains it is safe.

NOTICE: Use the power tools, accessories etc. in accordance with these instructions, taking into account the working conditions and the work to be performed. Use of the power tool for operations different from those intended could result in a hazardous situation with high probability of superficial injury.

NOTICE: Do not reach into the area of the rotating insertion tools. The proximity of the rotating tools to your hand may not always be obvious.

Care of the Power Tool:

NOTICE: Maintain the tools. Check for misalignment or binding of moving parts, breakage of parts and any other conditions that may affect the power tool's operation. If damaged, have the power tool repaired before use. Many accidents are caused by poorly maintained power tools**.**

Additional Safety Instructions

Caution: Depending on the application field of the machine (private or commercial), observe the applicable occupational safety and health, safety and accident prevention and environmental regulations.

Caution: Some dust created by cutting, milling or other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are known to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are: Lead from nonferrous metals with lead content, carbonate from carbon fibre, arsenic and chromium from chemically treated lumber. Your risk from exposures to these varies, depending on how often you perform this type of work. To reduce your exposure to these chemicals, work in a well ventilated area, and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles.

Safely dispose of milling debris — recycle or safely dispose of milling debris and dust, keeping in mind flammability, (potential) spontaneous combustion, and chemical considerations. Even natural materials can have surprising implications for disposing of them, *e.g.*, walnut wood dust is aleopathic (inhibits plant growth) and an irritant to the skin and breathing tract and potentially poisonous to some animals in addition to the typical spontaneous combustion hazard which sawdust poses.

Personal Protective Equipment:

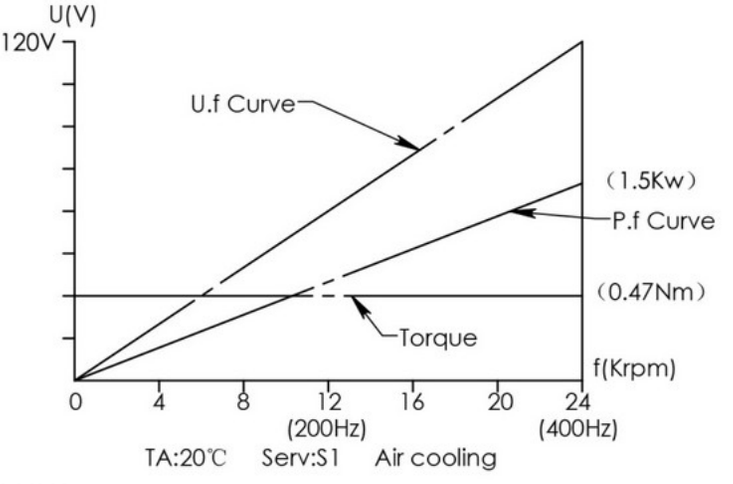
When working with the CNC gantry system, the operator has to wear at least the following personal protective equipment and has to be compliant with the below-mentioned safety aspects:

- **Safety googles** for protecting the eyes against flying chips etc.
- **Ear protection** for protecting the ears against sound and noise.
- No wearing of **clothes which can get caught in the machine**, such as ties, scarves, wide sleeves etc. Additionally, jewellery and especially long necklaces and rings are to be dispensed with.
- Shoulder length or longer hair is to be secured with a **hairnet or a hat** to prevent it from getting caught in the linear guides and / or rotating tools.
- Prior to all adjustments to the machine, its control or system guided tools, such as the Milling Motor, the plug is to be disconnected from the power source.
- Never hold the workpiece to be processed with your hands. It is mandatory that the work piece is securely fixed on the machine table. Otherwise, there exists a high risk of injuries!

SPECIFICATIONS

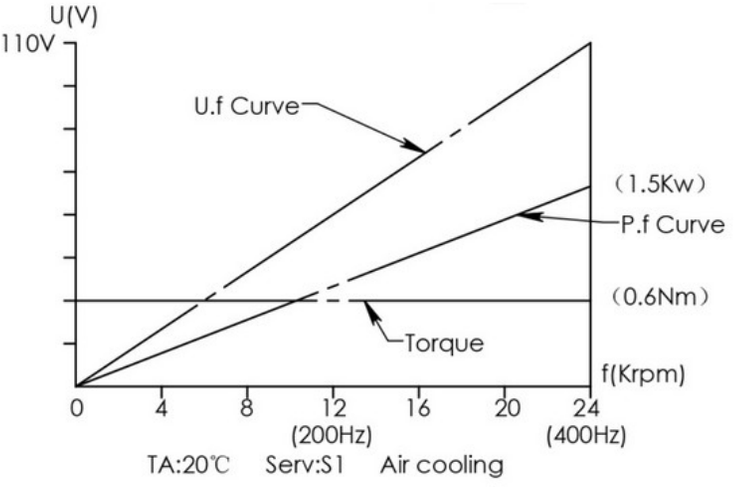
65mm, 1.5kw, Air-Cooled

- Part Number: RL-VFD-1K5-65-Air
- Material: Stainless steel
- Size: Φ65mm x 270mm
- Power: 1.5KW
- Horsepower: 2hp
- Voltage: 110VAC
- Current: 10A
- Frequency: 0 ~ 400Hz
- Speed: 0 ~ 24000RPM
- Cooling: Air cooled
- Bearing Lubrication: Grease
- Collet size: ER11 Collet
- Shank Sizes: 1/8”, 1/4”
- Bearings: Ceramic 2 x 7005, 2 x 7002
- Weight: 2.92kg / 6lbs 7oz



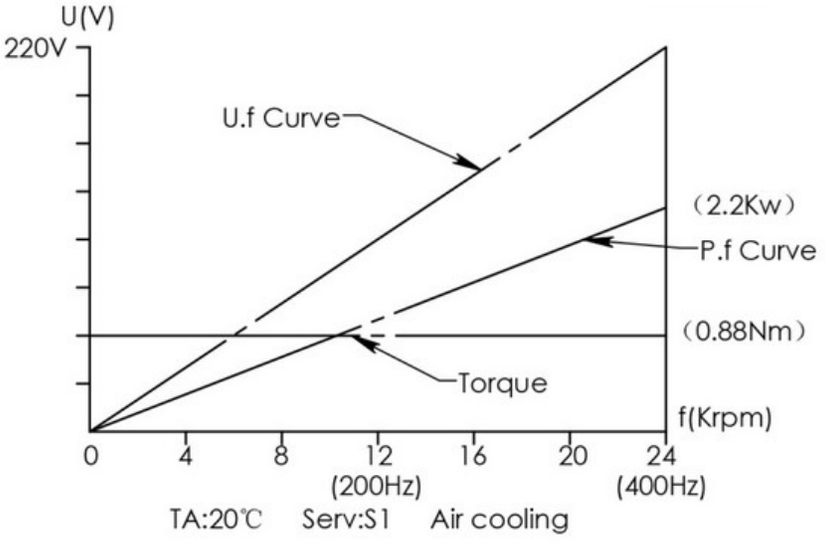
80mm, 1.5kw, Air-Cooled

- Part Number: RL-VFD-1K5-80-Air
- Material: Stainless steel
- Size: Φ80 mm x 195 mm
- Power: 1.5KW
- Horsepower: 2hp
- Voltage: 110VAC
- Current: 10A
- Frequency: 0 ~ 400Hz
- Speed: 0 ~ 24000RPM
- Cooling: Air cooled
- Bearing Lubrication: Grease
- Collet size: ER20 Collet
- Shank Sizes: 1/8”, 1/4”, 3/8”, 1/2’
- Bearings: Ceramic 2 x 7005, 2 x 7002
- Weight: 4.05kg / 8lbs 15oz



80mm, 2.2kw, Air-Cooled

- Manufacturer Part Number: RL-VFD-2K2-80-Air
- Material: Stainless steel
- Size: Ø80x195(Middle body diameter: 80mm, Length:195mm)
- Power: 2.2KW
- Horsepower: 3hp
- Voltage: 220 VAC
- Current: 10A
- Frequency: 0 ~ 400Hz
- Speed: 0 ~ 24000RPM
- Cooling: Air cooled
- Runout off: Less than 0.005mm
- Bearing Lubrication: Grease
- Collet size: ER20 (6mm)
- Shank Sizes: 1/8”,1/4”, 3/8”,1/2”
- Bearings: Ceramic 2 x 7005, 2 x 7002
- Weight: 4.05kg / 8lbs 15oz



FEATURES AND BENEFITS

EMI Shielding:

- All Metal Aluminum Enclosure preventing Electro Magnetic Interference (EMI) traps electrical noise inside of the enclosure.
- All input control signals use shielded cables and input filters for noise free control.
- Shielded Spindle cable with High Frequency noise filter keeps the VFD noise inside the enclosure.
- AC Line filter to keep noise off the power lines.
- Fully wired and programmed VFD with PWM and RS-485 controls
- Some models wired for coolant / vacuum relay
- Remote or Manual speed setting switch to adjust speed.
- Convenient Remote that attaches to your Control monitor.
- Spindle is fully grounded for safety back to the chassis.
- Optional Wall mount or Desktop stand with input dust filter to keep the dust out of you VFD.
- Safe inspected by third party with valid inspection decal.

Ceramic Bearings:

Manufacturers prize ceramic bearings because of their speed advantage over their steel counterparts. This benefit stems from their four main characteristics:

- Reduced rolling resistance
- Reduced weight
- Increased durability
- Increased stiffness
- Reduced rolling resistance mainly results from the ceramic balls' increased smoothness, dimensional stability, and increased uniformity over steel ball bearings.

These properties ensure that applied loads are uniformly distributed over all rolling elements. Additionally, ceramic materials have a significantly lower coefficient of friction (~20–30 times less) than steel ball bearings with standard seals and lubrication. This reduced friction results in reduced rolling resistance and faster rotational speeds.

The reduced weight of ceramic bearings also contributes to their overall enhanced performance over steel bearings. Ceramic materials can weigh up to 40% less than comparable steel bearings. This reduced weight translates to decreased centrifugal loads exerted on the outer race as the bearing spins.

This reduction of forces allows ceramic bearings to operate up to 20–40% faster than conventional steel bearings while using considerably less energy to maintain their speed. Ceramic bearings are also harder than steel bearings and therefore are more durable. Studies show that ceramic bearings can last anywhere between 5 and 20 times longer. The smoother surface of the ceramics also significantly reduces the risk of bearing seizure with little to no lubrication. Furthermore, ceramic bearings can operate in harsh environments due to their resistance to corrosion and degradation. Finally, their electrical insulation properties eliminate the risk of electrical erosion and pitting of the rolling elements.

PLUG AND PLAY

Say goodbye to time consuming and complex Spindle Kit set-ups. REDLINE CNC Spindle Kits are plug and play with your CNC. We do the work of ensuring all the wiring is done properly and goes through a thorough inspection process, so you don’t have to.

THREE MOUNTING OPTIONS

REDLINE CNC Spindle Kits were design with convenience in mind, that's why we offer three (3) different VDF mounting options.

- Wall Mount
- Desk Top
- Under Table Mount

COMPONENTS

Redline CNC Spindle Kit by Redline CNC—65mm, 1.5 kW Air Cooled 110V

1x 65mm 1.5kw Air Cooled Spindle
1x All Metal 1.5kw 110v VFD with removable display
1x power cord
1x PWM Data Cable or RS-485 control cable
1x Set DRO Cables (Short)(1x 3-Pin & 1x RJ-45)
1x Set DRO Cables (Long)(1x 3-Pin & 1x RJ-45)
1x Spindle to VFD cable 14 gauge flexible shielded 600v wire (8mm)
1x ER 11 collet nut
1x 1/4” collet
1x 1/8” collet
2x spindle wrenches
1x (choice of mount)

Redline CNC Spindle Kit by Redline CNC—80mm, 1.5 kW Air Cooled 110V

1x 80mm 1.5kw Air Cooled Spindle
1x All Metal 1.5kw 110v VFD with removable display
1x power cord
1x PWM Data Cable or RS-485 control cable
1x Set DRO Cables (Short)(1x 3-Pin & 1x RJ-45)
1x Set DRO Cables (Long)(1x 3-Pin & 1x RJ-45)
1x Spindle to VFD cable 18 gauge flexible shielded 600v wire (8mm)
1x ER 20 collet nut
1x 1/2 collet
1x 3/8 collet
1x 1/4 collet
1x 1/8 collet
2x spindle wrenches
1x (choice of mount)

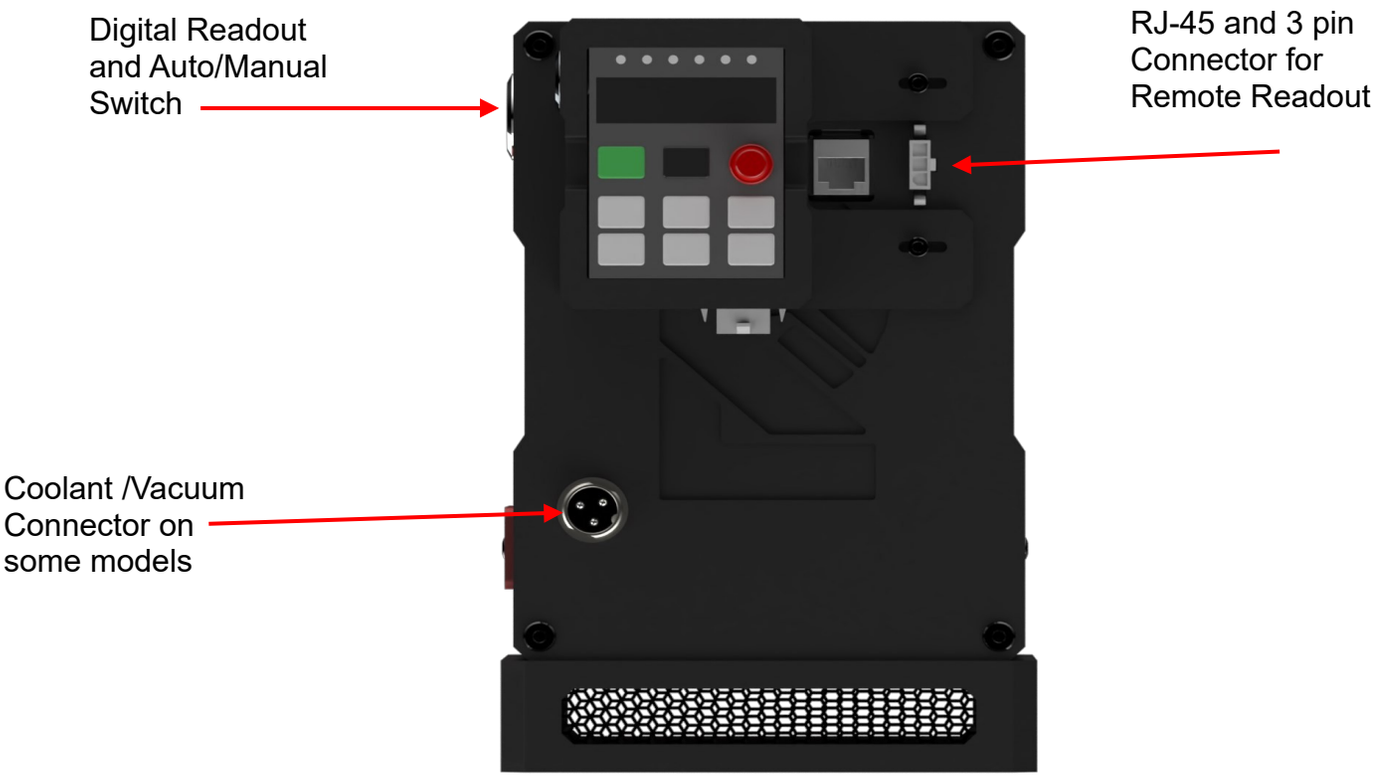
Redline CNC Spindle Kit by Redline CNC—80mm 2.2 kW Air Cooled 220V

1x 80mm 2.2kw Air Cooled Spindle
1x All Metal 2.2kw 220v VFD with removable display
1x power cord with Nema 6/15-p plug for 220v. The VFD requires a 15amp fuse breaker. It's a 3 wire configuration. Single Phase 220.
1x PWM Data Cable or RS-485 control cable
1x Set DRO Cables (Short)(1x 3-Pin & 1x RJ-45)
1x Set DRO Cables (Long)(1x 3-Pin & 1x RJ-45)
1x Spindle to VFD cable 18 gauge flexible shielded 600v wire (8mm)
1x ER 20 collet nut
1x 1/2 collet
1x 3/8 collet
1x 1/4 collet
1x 1/8 collet
2x spindle wrenches
1x (choice of mount)

Buttons and Connections.

FRONT OF VFD

RIGHT SIDE OF VFD



LEFT SIDE OF VFD

Spindle Cable

RS-485 Port
2 pin

PLC/PWM
Port
6 pin

AC Power
Cable

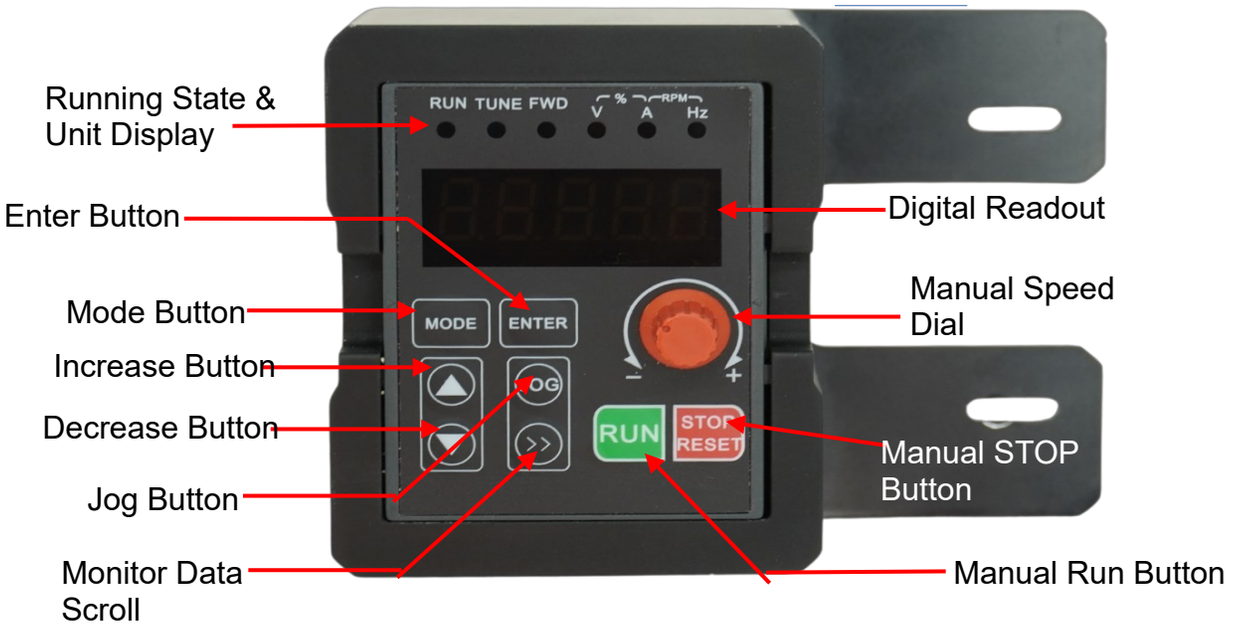
Fuse 5X20 mm

12A Slow 1.5Kw
110V

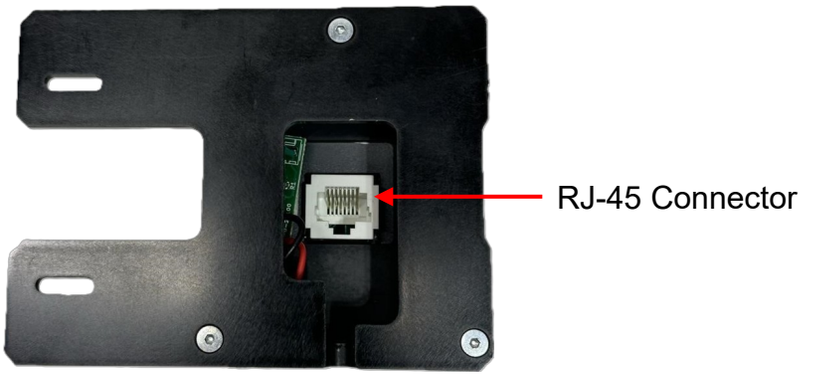
10A Slow 2.2Kw
220V

Digital Readout and Manual Speed Over-ride

Front of the Digital Readout



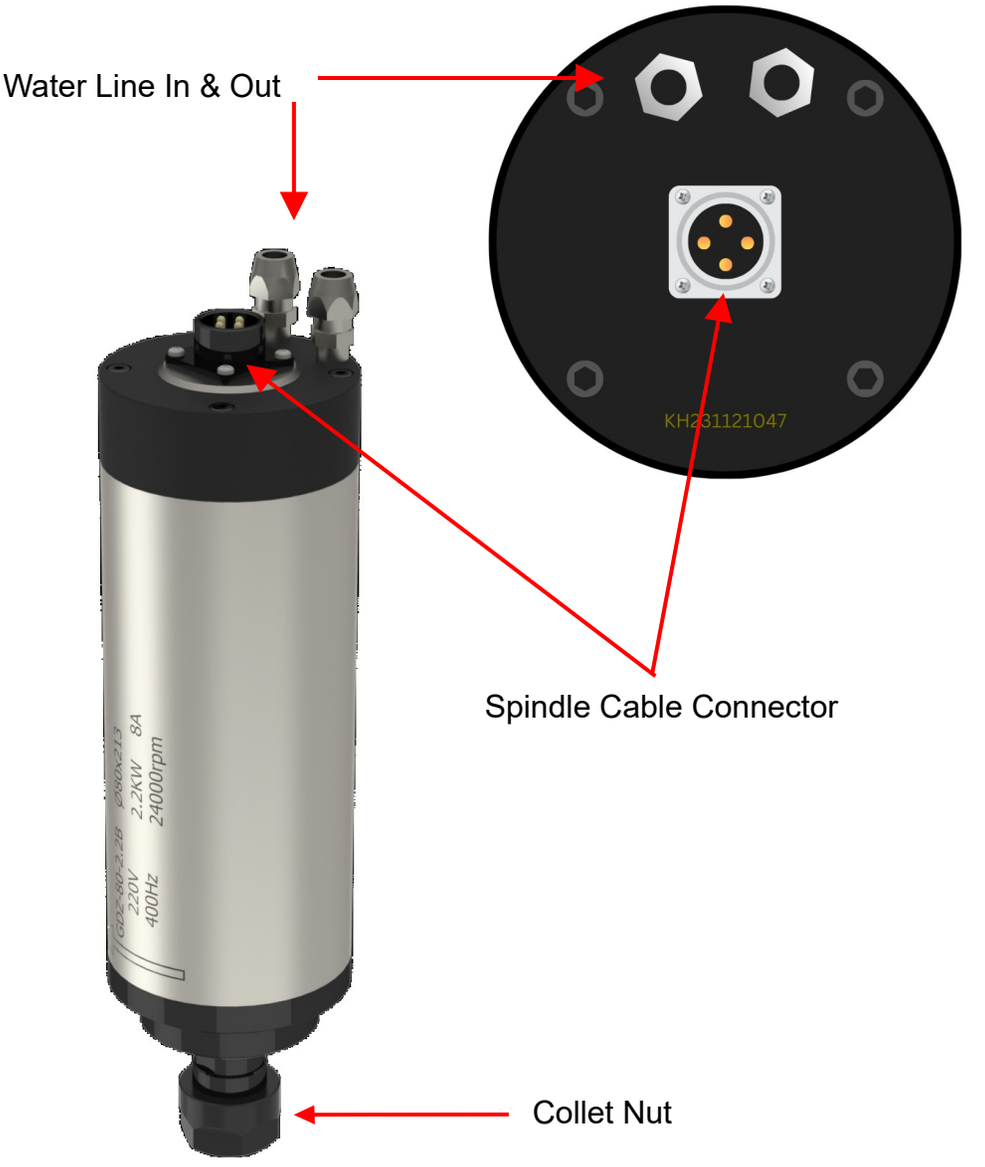
Back of the Digital Readout



COMPONENTS

Spindle Motor and Connections

Water-Cooled



COMPONENTS
Spindle Motor and Connections
Air-Cooled

INSTALLATION

Installing the VFD Fuse


WARNING
REPLACE FUSE WITH SAME TYPE AND RATING 12 A
AVERTISSEMENT
Remplacer par un fusible du même type 12 A
p/n: A-0013
FUSE

Mounting the VFD

- Wall Mounting
- Desktop Mounting
- Under Table Mounting

WALL MOUNTING

· Screw VFD Mounting Bracket – Wall French Cleat to the wall in the location you want the VFD. (Screws not provided)
  · Ensure the mount is level
  · Use wall anchors if there is no stud
  · Attach to wall with countersink holes facing away from the wall

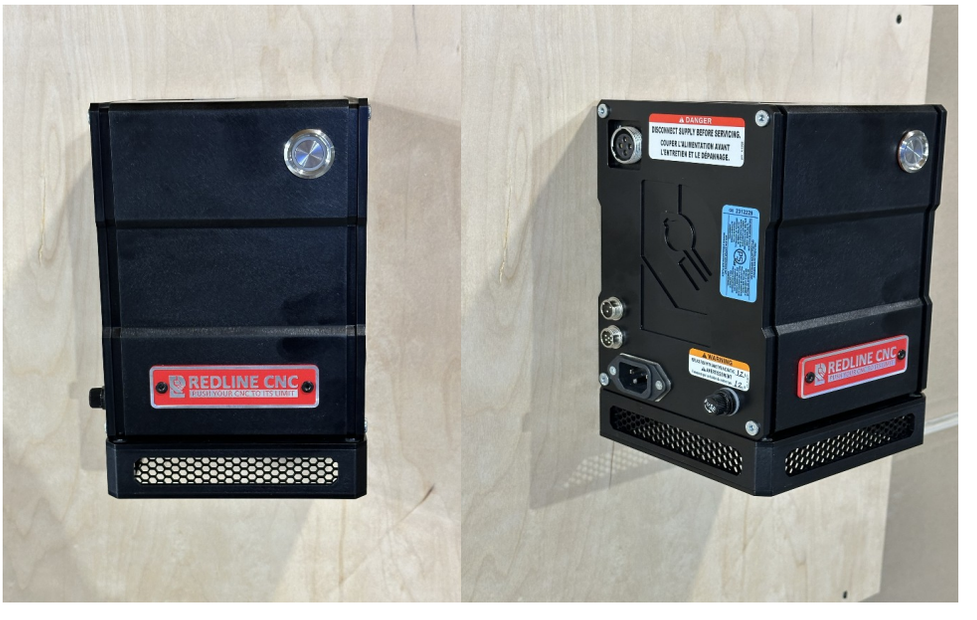
VFD Mounting Bracket
Wall French Cleat

· Screw VFD Mounting Bracket – VFD French Cleat to the back of the VFD using the screws provided. (Screws Provided. 2.5mm Hex Head)
  · Attach to the VFD with countersink holes facing away from the VFD

VFD Mounting Bracket
VFD French Cleat

INSTALLATION
Mounting the VFD

· Slide the VFD onto the Wall French Cleat



INSTALLATION
Mounting the VFD

DESKTOP MOUNTING

· Place the VFD upside down
· Place the Desktop Stand centered on top of the upside down VFD lining up the 4 corner screw holes.
· Insert and tighten 4 mounting screws from underneath. (Screws Provided. 2.5mm Hex Head)

Note: If using the Desktop Mounting method, the Desktop Mount **MUST** be used to allow air flow through the bottom of the VFD.

Desktop Mount

INSTALLATION
Mounting the VFD

UNDER TABLE MOUNTING

· Select a location for the VFD under your table.
· Screw the Under Table Mount to the bottom of your table or QCW. (Screws provided)
· Remove the 2x top corner screws on both sides of the VFD. (3mm Hex Head)

· Attach the 2x VFD Table Mounts to the Left and Right of the VFD with the studs facing inward using the replacement long screws provided. (3mm Hex Head)

INSTALLATION
Mounting the VFD

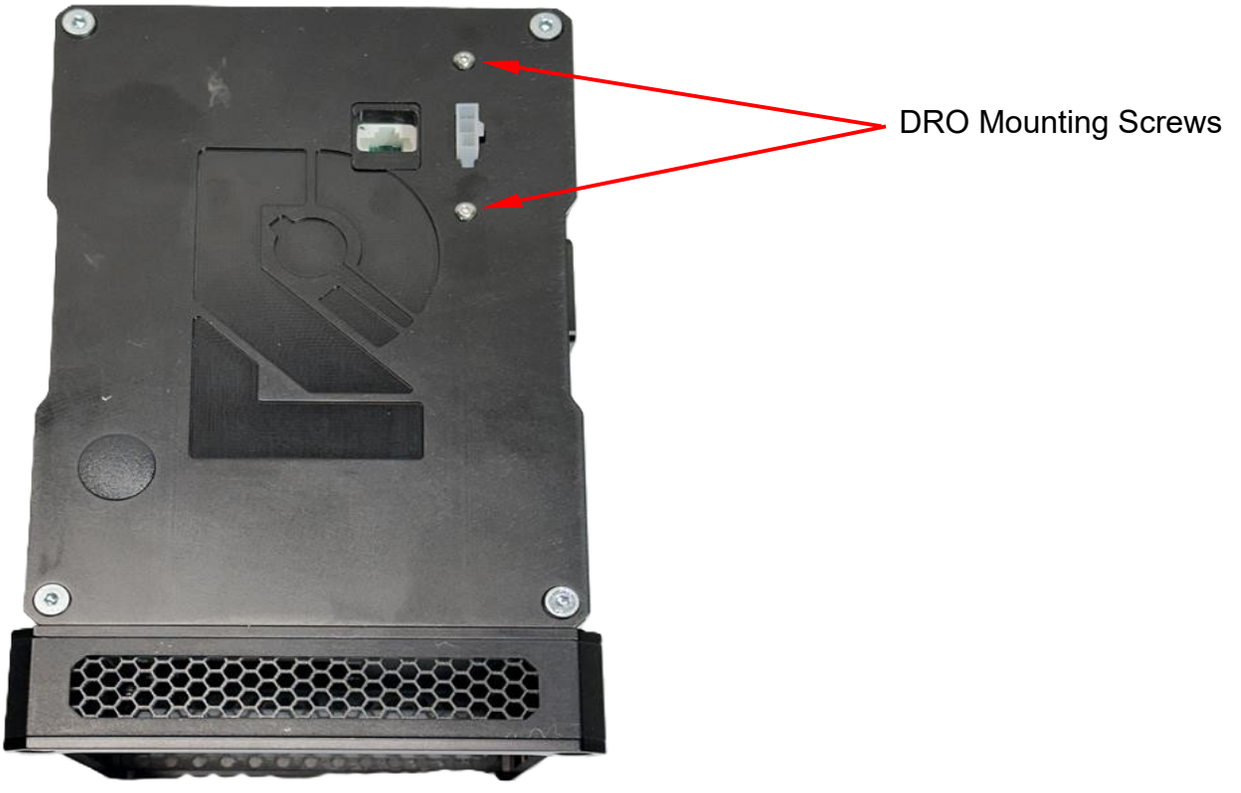
VFD Table Mounting Brackets

Under Table Mount

INSTALLATION

Mounting the DRO

DRO Mounting screws will be pre-installed into the VFD for shipping.



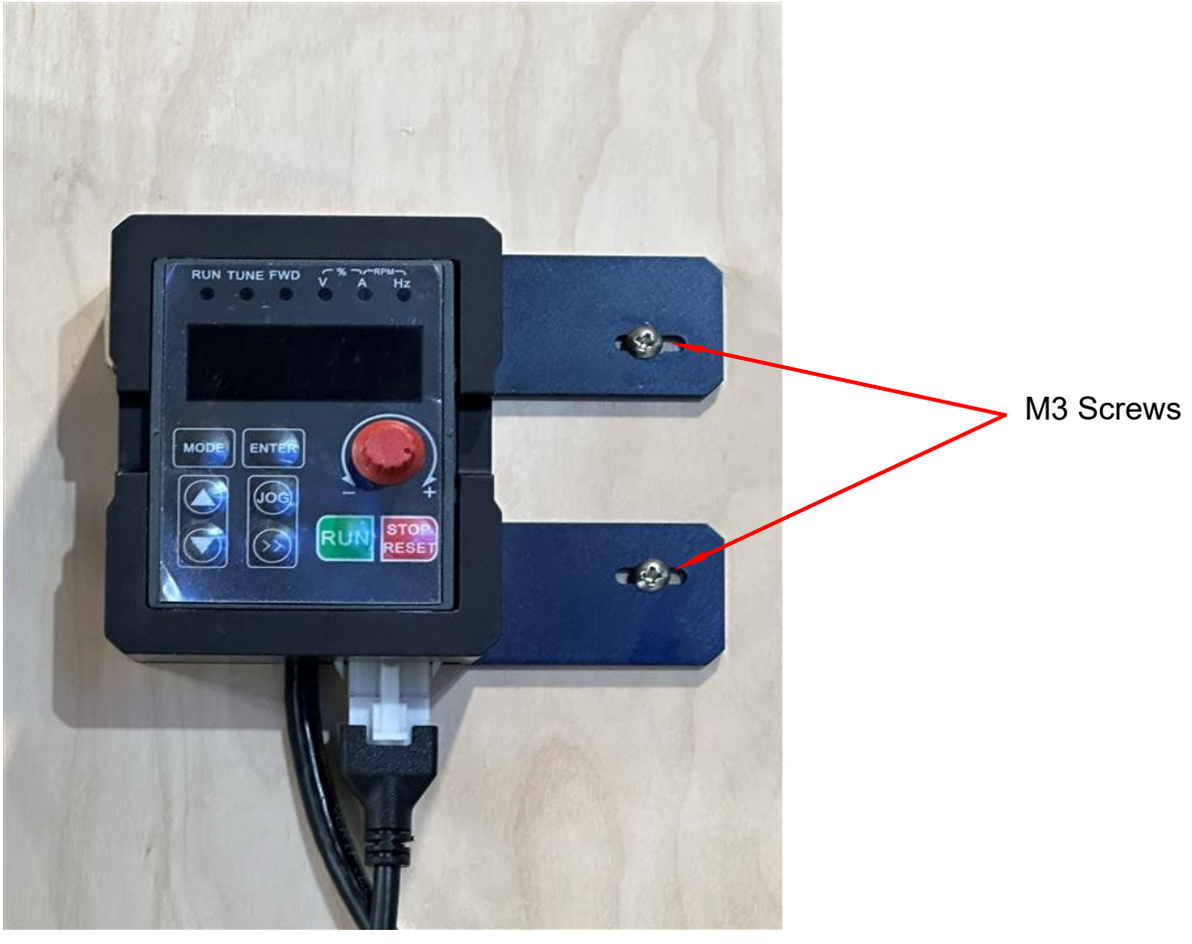
***Use these DRO mounting screws to mount the DRO to either the VFD or on the MASSO Controller**

INSTALLATION
Mounting the DRO
DRO mounted to the VFD

Use the DRO Mounting Screws to secure the DRO to the VFD

INSTALLATION
Mounting the DRO
DRO mounted to the a vertical surface

Use M3 screws (not included) to secure the DRO to a vertical surface



INSTALLATION
Mounting the DRO
DRO mounted to the MASSO Controller

Use the DRO mounting screws to secure the DRO to the MASSO Controller.

INSTALLATION

Wiring Instructions

Wiring The VFD and Spindle to your Machine
Controller Communications Cable (MASSO/PWM)

MASSO/PWM – CNC Controller End

MASSO/PWM – VFD End

INSTALLATION
Wiring Instructions

Wiring The VFD and Spindle to your Machine
Controller Communications Cable (BuildBotics/RS-485)

Buildbotics 25 pin Connector

RJ-485 Connection – VFD End

INSTALLATION
Wiring Instructions
Digital Readout (DRO) Connection / Installation (Connected to VFD)

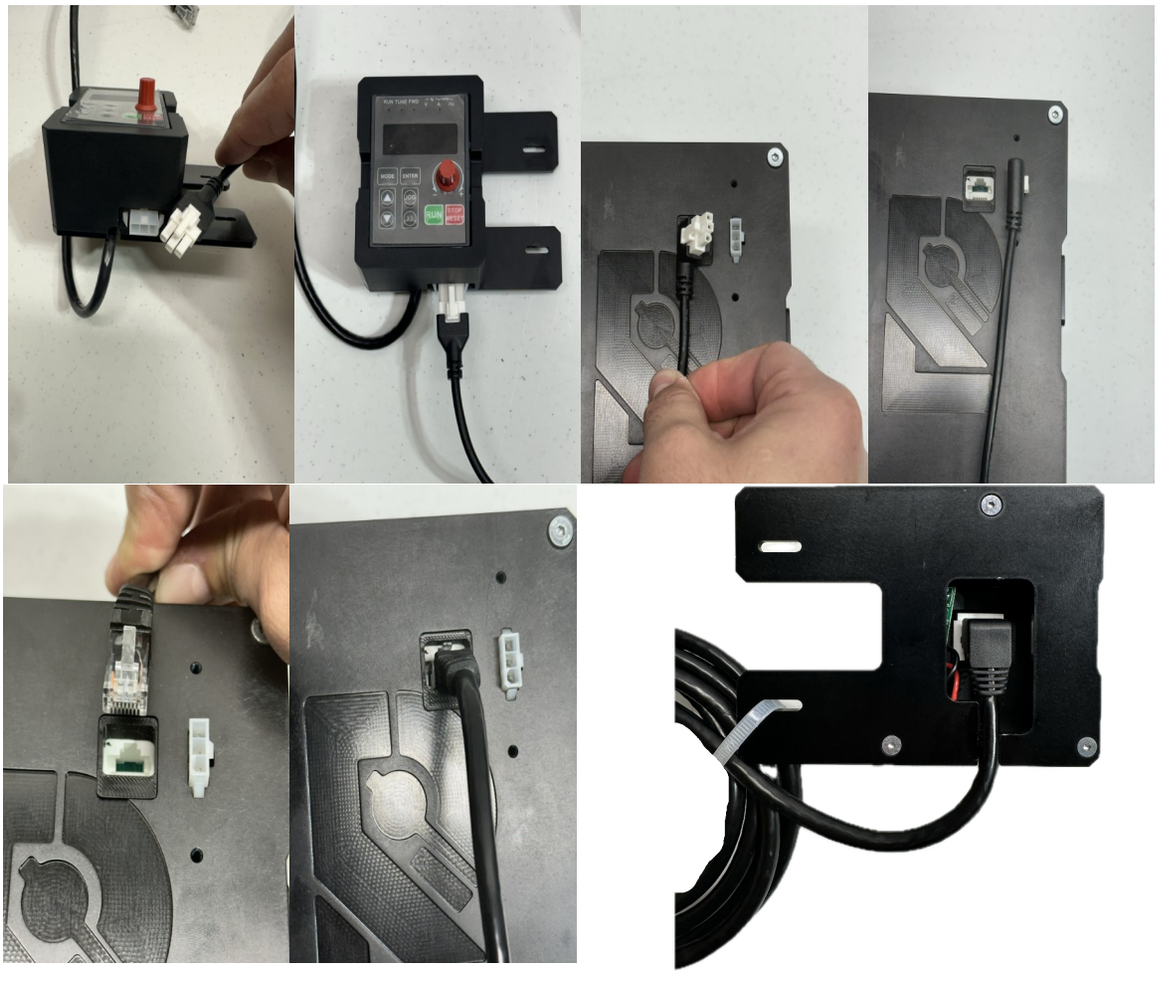
Use the included DRO Short Cables to plug the DRO into the VFD.

INSTALLATION
Wiring Instructions

Digital Readout (DRO) Connection / Installation (Removed from VFD)

Use the included DRO Long Cables to connect the DRO to the VFD

RJ-485 Connection / 3-Pin Connection



INSTALLATION
Wiring Instructions

Digital Readout (DRO) Connection / Installation (Removed from VFD - Wall Mounted)

INSTALLATION
Wiring Instructions

Digital Readout (DRO) Connection / Installation (Removed from VFD)
MASSO Mounted

Use the included DRO Long Cables to connect the DRO to the VFD

INSTALLATION
Wiring Instructions

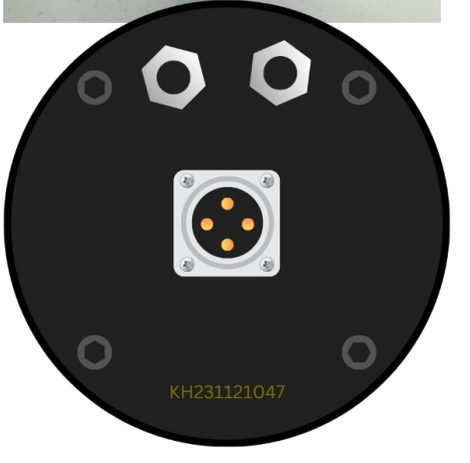
Wiring The VFD and Spindle to your Machine
Spindle Cable Connection

Spindle Cable Connection Points

INSTALLATION
Wiring Instructions

Wiring The VFD and Spindle to your Machine
Spindle Cable Connection

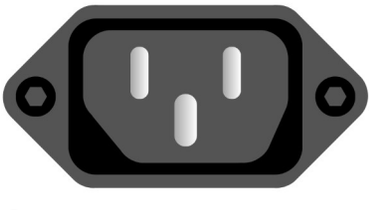
Air-Cooled



Water-Cooled

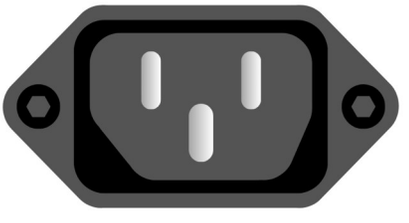
INSTALLATION
Wiring Instructions

VFD AC Power Connection to VFD (110V)



INSTALLATION
Wiring Instructions

VFD AC Power Connection to VFD (220V)



INSTALLATION
Wiring Instructions

VFD AC Power Connection to the Wall (110V)

***NOTE: DO NOT** plug the VFD into the CNC Controller MASSO Power Box marked as Router or Vacuum! Plug into the appropriate wall outlet only!

INSTALLATION
Wiring Instructions

VFD AC Power Connection to the Wall (220V)

***NOTE: DO NOT** plug the VFD into the CNC Controller MASSO Power Box marked as Router or Vacuum! Plug into the appropriate wall outlet only!

NEMA 6-15P

NEMA 6-15R

OR

NEMA 6-20R

VFD SETUP

Digital Readout (DRO) Controls

Running State and Unit Display

RUN = When the frequency inverter is at run status, this lamp will be on.
FWD = The indicator lamp will be on at forward operation and will be off at reverse operation.
V = Indicate voltage
A = Indicate current
Hz = Indicate frequency
V-%-A = Indicate percentage
A-RPM-Hz = Indicate rotation speed

Programming Codes

Your VFD has already been programmed, change the programming only if you have experience with programming VFDs.

· Press the 

Mode button

· This brings you to the Function Code Menu

· The flashing number or letter indicates the field currently selected

· Press the  **Increase** or  **Decrease** buttons to scroll through numbers 0-9

· Press the  **Monitor Data Scroll** button to scroll through the different code locations

· Press the 

Enter button when the correct function code you want to change is displayed

· The number currently showing/flashing is the current setting saved into the VFD

· To change the number press the  **Increase** or  **Decrease buttons** to scroll to the desired number

· If multiple numbers are required, use the  **Monitor Data Scroll** button to scroll through the different code locations

· Press the 

Enter button when the correct function code you want to change is displayed

· At any time press the 

Mode button to go back to the previous menu

*Note:

If the numbers flashing are not 0.0, don't be alarmed, this is normal. When the spindle is not running, it will display whatever units you have selected, ie.. voltage, currency, hertz, etc... In order to change the untis displayed, press the  Monitor Data Scroll button to cycle through the display until the desired units are displayed.

If the displayed numbers do not show the approximate RPMs, press the  Monitor Data Scroll button to cycle through the display until it does.

VFD SETUP

Programming Codes (MASSO)

*If performing a Factory Reset, input Function Code (P_._.__) and Value (=_) in the order below.
** See Factory Reset Video here: https://youtu.be/bN77WXgeAfo

DEFAULT CODES:

P5.0.19 = 107 ..... Factory Reset
P0.0.03 = 1 ..... ON/OFF AUTOMATIC COURSE
P0.0.04 = 3 ..... FREQUENCY AUTOMATIC SOURCE

MASSO SPECIFIC

P0.0.05 = 50.0 ..... KEYBOARD FREQUENCY REFERENCE
P0.0.06 = 1 ..... MOTOR DIRECTION, for 80mm SPINDLE
or
P0.0.06 = 0 ..... MOTOR DIRECTION, for 65mm SPINDLE
P0.0.07 = 0400.0 ..... MAX MOTOR FREQUENCY, HZ
P0.0.08 = 0400.0 ..... UPPER MOTOR FREQUENCY, HZ
P0.0.11 = 0006.0 ..... ACCELERATION TIME
P0.0.12 = 0006.0 ..... DECELERATION TIME
P0.0.14 = 0001.5 ..... MOTOR RATED POWER, 1.5KW
or
P0.0.14 = 0002.2 ..... MOTOR RATED POWER, 2.2KW
P0.0.15 = 0400.0 ..... MOTOR RATED FREQUENCY, HZ
P0.0.17 = 012.00 ..... MOTOR RATED CURRENT, AMPS – 110v
or
P0.0.17 = 010.00 ..... MOTOR RATED CURRENT, AMPS - 220v
P0.0.18 = 24000 ..... MOTOR RATED ROTATING SPEED. RPM
P0.1.00 = 8 ..... TERMINAL CONTROLLED FREQUENCY SOURCE
P0.1.01 = 2 ..... KEYPAD FREQUENCY SOURCE
P1.0.23 = 2 ..... TEMP BASED FAN CONTROL
P2.0.00 = 1 ..... RUN FWD (DEFAULT)
P2.0.01 = 2 ..... REVERSE
P2.0.02 = 21 ..... ENABLE KEYPAD ON/OFF SOURCE
P2.0.03 = 18 ..... ENABLE KEYPAD FREQUENCY SOURCE
P5.0.02 = H.0801 ..... LED RUNNING DISPLAY
P5.0.15 = 5.9790 ..... DISPLAY COEFFICIENT
P5.0.16 = 0 ..... ADJUST RPM's DECIMAL PLACE

VFD SETUP

Programming Codes (Buildbotics)

*If performing a Factory Reset, input Function Code (P_._.__) and Value (=_) in the order below.
** See Factory Reset Video here: https://youtu.be/bN77WXgeAfo

DEFAULT CODES:

P5.0.19 = 107 ..... Factory Reset

P0.0.03 = 2 ..... ON/OFF AUTOMATIC COURSE

P0.0.04 = 9 ..... FREQUENCY AUTOMATIC SOURCE

BUILDBOTICS SPECIFIC

P0.0.05 = 50.0 ..... KEYBOARD FREQUENCY REFERENCE
P0.0.06 = 1 ..... MOTOR DIRECTION, for 80mm SPINDLE
or
P0.0.06 = 0 ..... MOTOR DIRECTION, for 65mm SPINDLE
P0.0.07 = 0400.0 ..... MAX MOTOR FREQUENCY, HZ
P0.0.08 = 0400.0 ..... UPPER MOTOR FREQUENCY, HZ
P0.0.11 = 0006.0 ..... ACCELERATION TIME
P0.0.12 = 0006.0 ..... DECELERATION TIME
P0.0.14 = 0001.5 ..... MOTOR RATED POWER, 1.5KW
or
P0.0.14 = 0002.2 ..... MOTOR RATED POWER, 2.2KW
P0.0.15 = 0400.0 ..... MOTOR RATED FREQUENCY, HZ
P0.0.17 = 012.00 ..... MOTOR RATED CURRENT, AMPS – 110v
or
P0.0.17 = 010.00 ..... MOTOR RATED CURRENT, AMPS - 220v
P0.0.18 = 24000 ..... MOTOR RATED ROTATING SPEED. RPM
P0.1.00 = 8 ..... TERMINAL CONTROLLED FREQUENCY SOURCE
P0.1.01 = 2 ..... KEYPAD FREQUENCY SOURCE
P1.0.23 = 2 ..... TEMP BASED FAN CONTROL
P2.0.00 = 1 ..... RUN FWD (DEFAULT)
P2.0.01 = 2 ..... REVERSE
P2.0.02 = 21 ..... ENABLE KEYPAD ON/OFF SOURCE
P2.0.03 = 18 ..... ENABLE KEYPAD FREQUENCY SOURCE
P5.0.02 = H.0801 ..... LED RUNNING DISPLAY
P5.0.15 = 5.9790 ..... DISPLAY COEFFICIENT
P5.0.16 = 0 ..... ADJUST RPM's DECIMAL PLACE

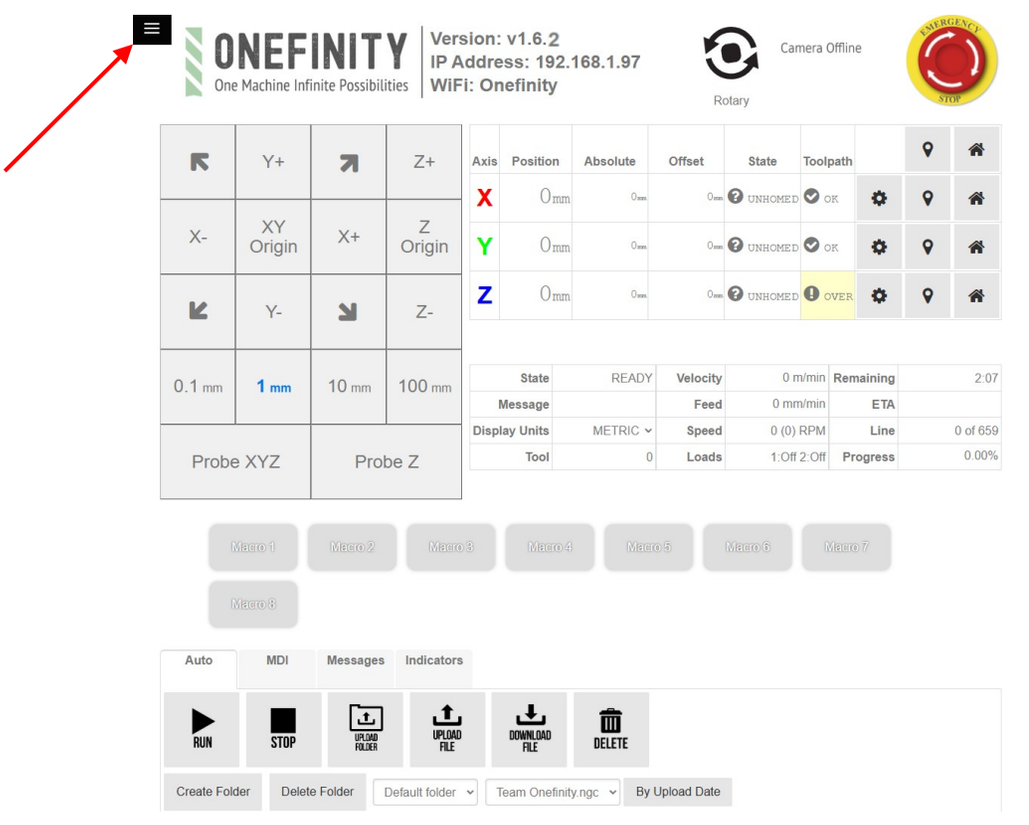
SPINDLE CONTROL METHOD

Onefinity BuildBotics Controller

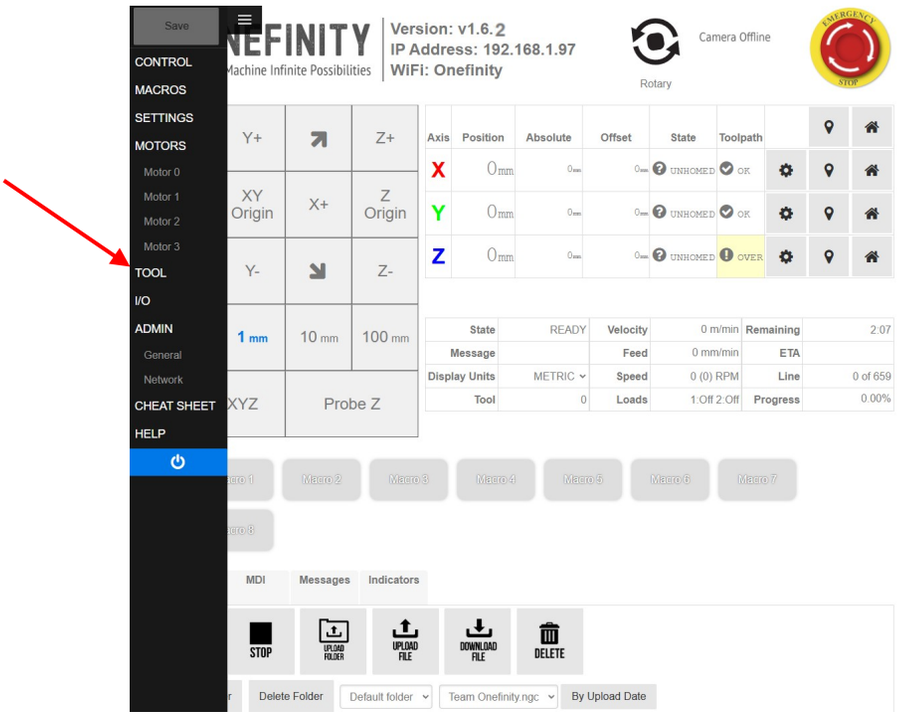
(***Must have firmware version 1.6.2 or later***)
https://forum.onefinitycnc.com/c/firmware/firmware/98

(*If using any other Buildbotics Controller other than Onefinity, screen will not look the same and these steps DO NOT apply)

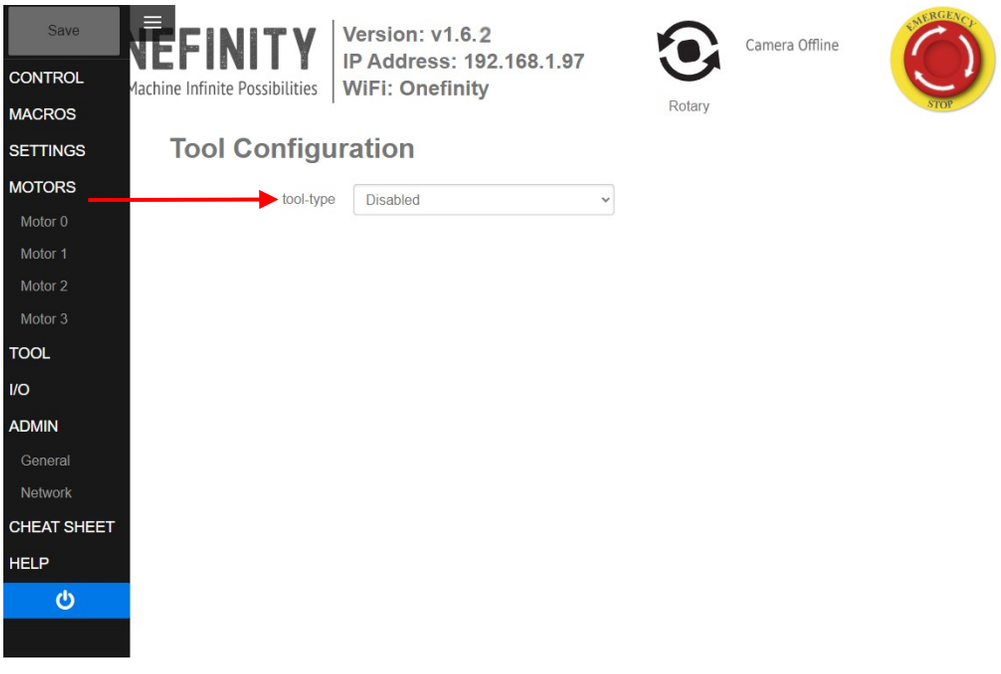
Step 1. Click the Flyout Menu



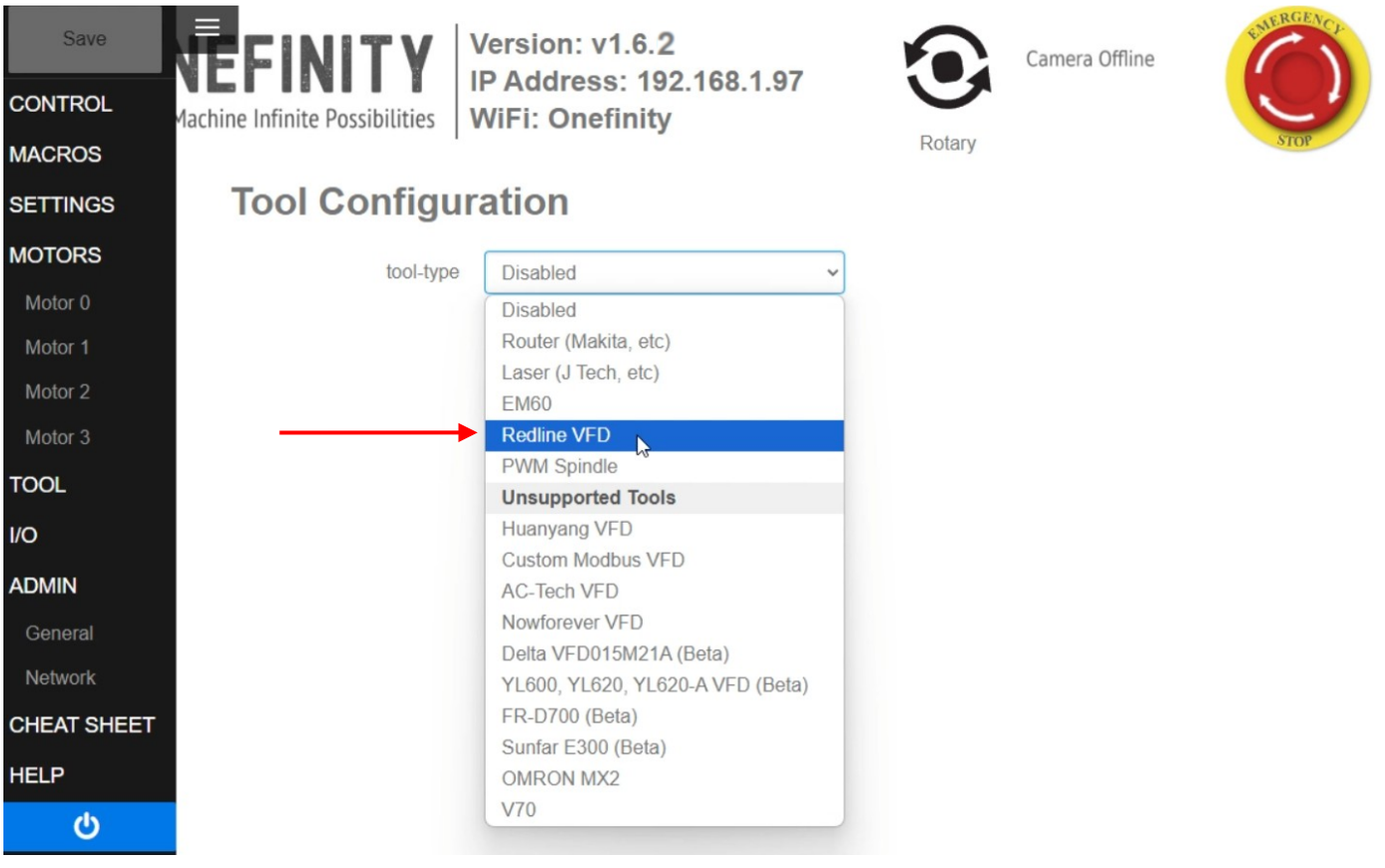
Step 2. Click on Tool



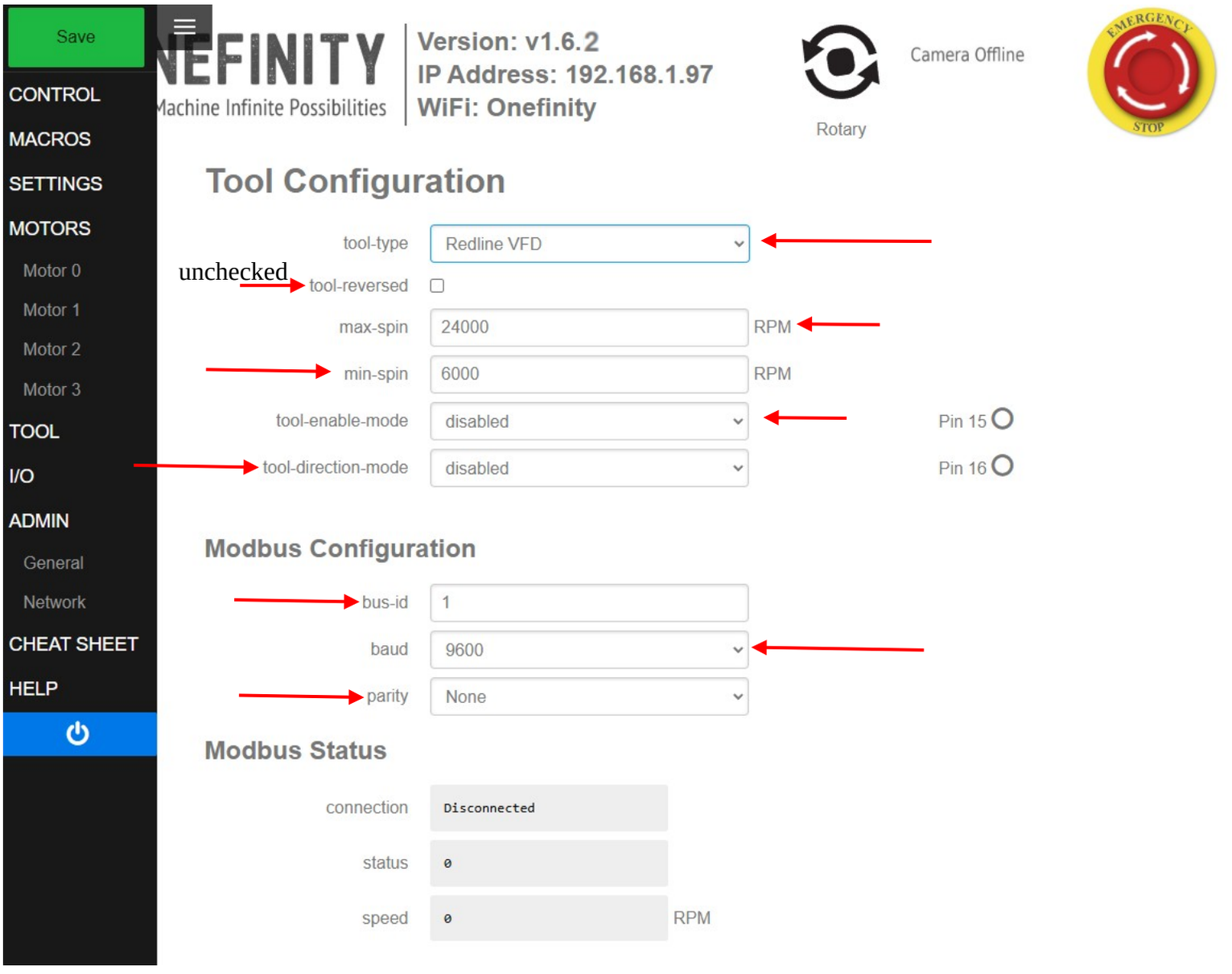
Step 3. Open Tool-Type list



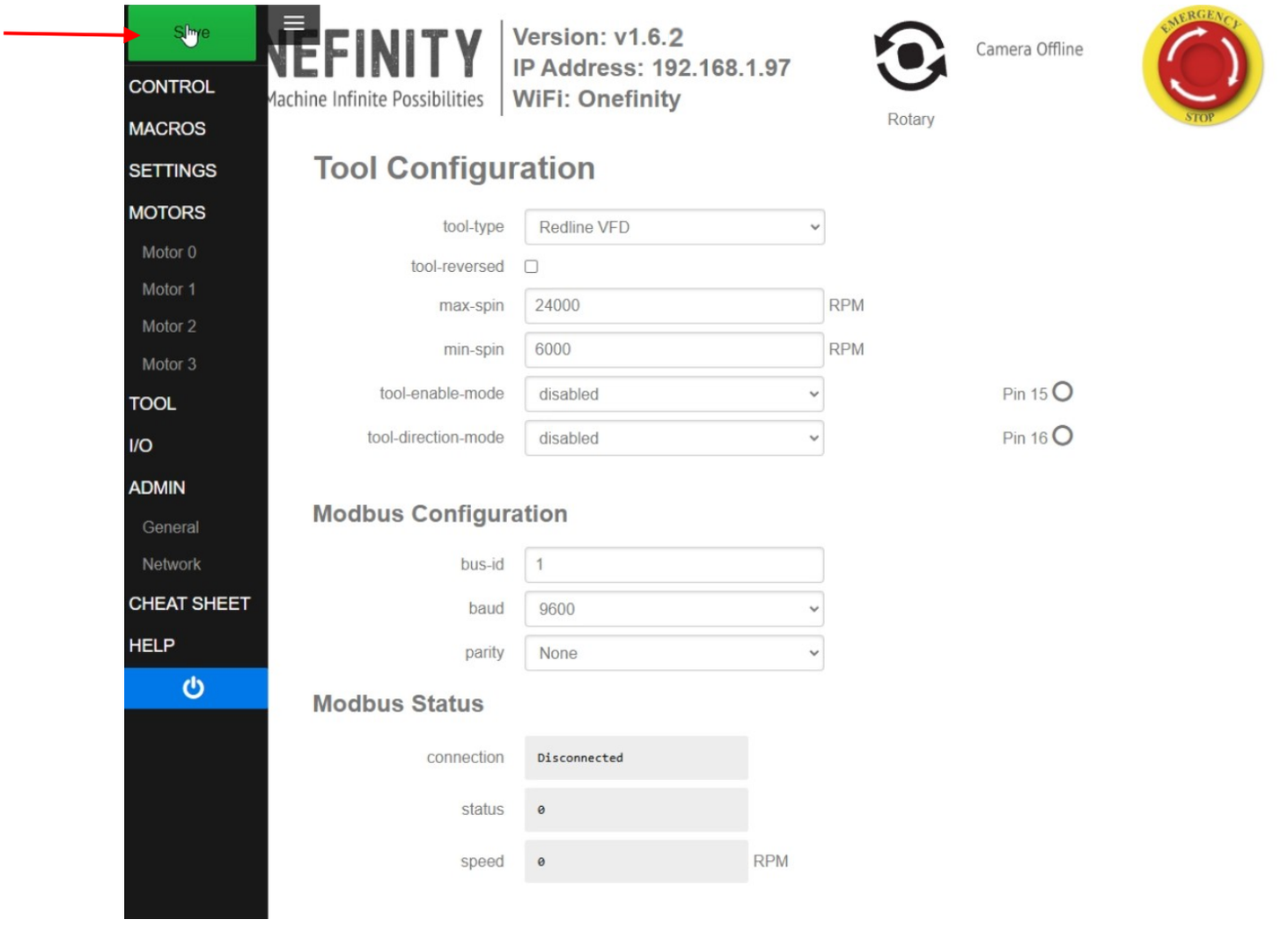
Step 4. Click on Redline VFD



Step 5. Ensure the below information matches



Step 6. Press Save



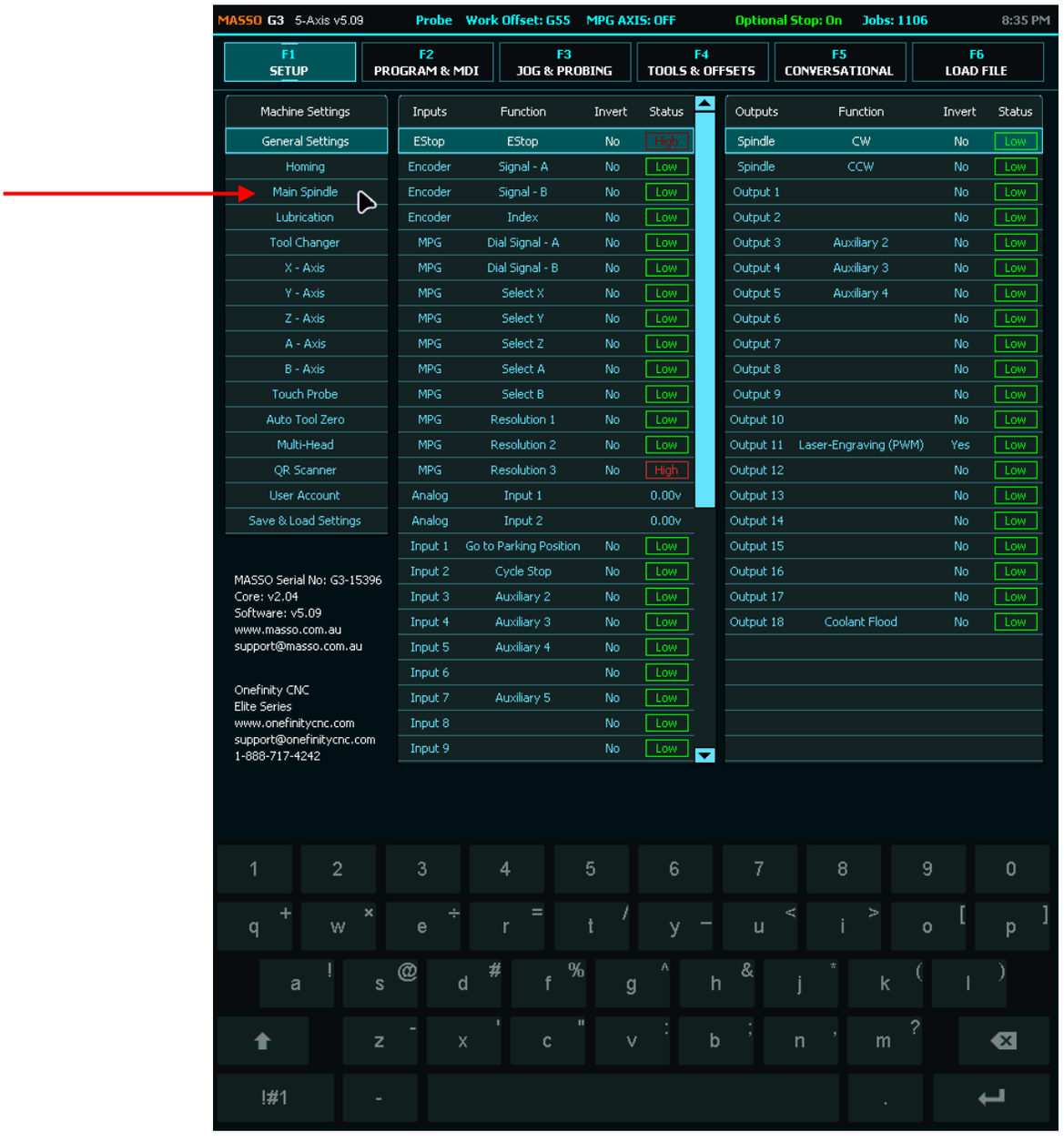
Onefinity MASSO Controller

Step 1. Go to F1 Screen

- When prompted for a password just hit the Enter key

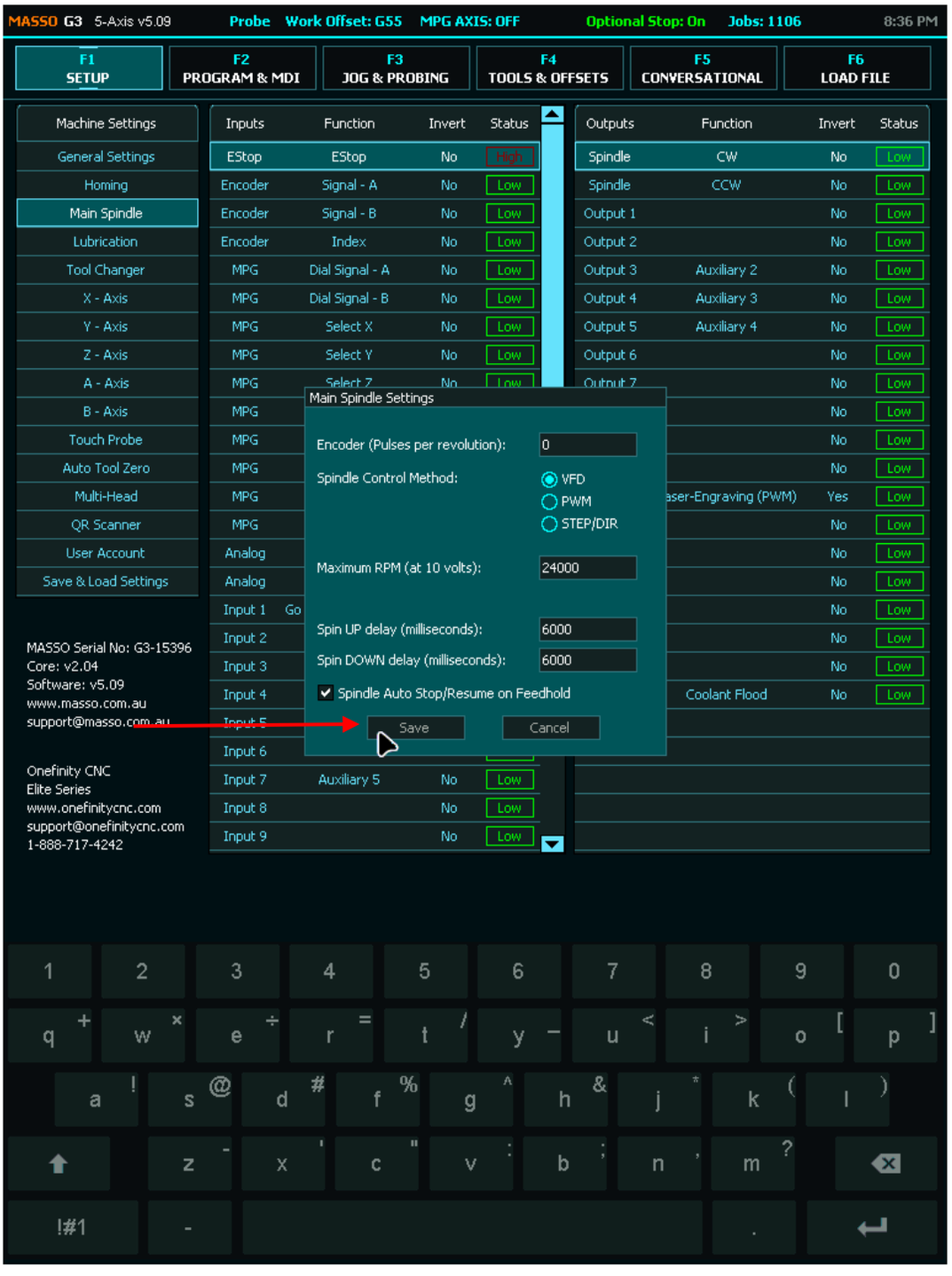
Enter Key

Step 2. Double Click on Main Spindle



Step 3. Ensure the following Information matches:

Step 4. Click on Save



BEFORE START-UP

Confirm Spindle Rotation

Manual Mode

· Power On the VFD by pressing the **VFD Power** button

· Ensure the VFD is in manual mode by pressing the **Manual Mode** button on the left side of the DRO and ensure the light around the Manual Mode button is **lit up Green**

· The spindle is now in Manual Mode.

· How to ensure Stop/Reset Mode

  · The numbers should be blinking, indicating that the spindle is in Stop/Reset mode

· How to adjust RPMs with Manual Speed Dial

  · Turn the **Manual Speed Dial** located just below the numbers. This dial is used to control the RPMs.

  · Use the Green **"Run"** button to start the spindle motor.

  · Use the Red **"Stop/Reset"** button to stop the spindle motor.

· Conduct a Simple Test

  · Rotate the **Manual Speed Dial** counterclockwise all the way.

  · Press the Green **"Run"** button.

  · Slowly rotate the **Manual Speed Dial** clockwise until the spindle starts spinning very slowly.

  · Check the rotation of the spindle and ensure it is rotating Clockwise (CW). For easy reference, there is an arrow printed on the bottom of the spindle. Ensure the spindle is spinning in the direction of the arrow.

    *** If not spinning clockwise (CW), contact Technical Support @ support@redlinecnc.com

Spindle Break-In Procedure

Before First Use

Upon receiving your spindle, it is essential to complete the break-in procedure before engaging in any cutting operations. This step is crucial to ensure optimal performance and longevity. If the spindle is to be used in extreme climate conditions (it is recommended to use the spindle in a climate-controlled environment for the best performance), you may need to perform the break-in process again. Extreme temperature fluctuations can affect bearing lubrication, resulting in reduced performance or unusual sounds from the spindle.

Break-In Steps

After installing the spindle on your CNC router, remove the collet, collet nut, and any installed bits. Position the CNC gantry so that the spindle is in a safe location, avoiding potential hazards while running the break-in cycle.

The break-in procedure can be performed manually or using G-code commands.

Break-In Procedure:

1. Operate at 6,000 RPM for 20–30 minutes.
2. Increase the speed to 9,000 RPM and run for another 20–30 minutes.
3. Increase the speed to 12,000 RPM for 20–30 minutes.
4. Increase the speed to 18,000 RPM for 20–30 minutes.
5. Finally, operate at 24,000 RPM for 20–30 minutes.

For ease of use, the following G-code procedure is provided for input via MDI or as part of a G-code file:

MASSO

M3; spindle rotate CW

S6000; speed 6k RPM

G4 P1200000; pause 20 minutes (20 x 60,000 milliseconds)

S9000; speed 9k RPM

G4 P1200000; pause 20 minutes

S12000; speed 12k RPM

G4 P1200000; pause 20 minutes

S18000; speed 18k RPM

G4 P1200000; pause 20 minutes

S24000; speed 24k RPM

G4 P1200000; pause 20 minutes

M5; spindle stop

Each line will look as follows:

M3 S6000 G4 P1200000
S12000 G4 P1200000
S18000 G4 P1200000
S24000 G4 P1200000
M5

BUILDBOTICS

M3; spindle rotate CW

S6000; speed 6k RPM

G4 P1200; pause 20 minutes (20 x 60 seconds)

S9000; speed 9k RPM

G4 P1200; pause 20 minutes

S12000; speed 12k RPM

G4 P1200; pause 20 minutes

S18000; speed 18k RPM

G4 P1200; pause 20 minutes

S24000; speed 24k RPM

G4 P1200; pause 20 minutes

M5; spindle stop

Each line will look as follows:

M3 S6000 G4 P1200
S12000 G4 P1200
S18000 G4 P1200
S24000 G4 P1200
M5

START-UP

Spindle Warm-Up Procedure

Spindle warm-up differs from the break-in process. While the break-in is generally a one-time operation, the warm-up should be performed at the start of each CNC operation day. This ensures proper lubrication distribution and brings the spindle to optimal operating temperature, enhancing both performance and lifespan. The warm-up duration may vary depending on environmental conditions and user requirements.

Recommended Warm-Up Procedure:

1. Operate at 6,000 RPM for 10 minutes.
2. Increase to 12,000 RPM for 7 minutes.
3. Increase to 18,000 RPM for 3 minutes.

For convenience, the following G-code warm-up procedure is provided:

MASSO

M3; spindle rotate CW

S6000; speed 6k RPM

G4 P600000; pause 10 minutes (10 x 60,000 milliseconds)

S12000; speed 12k RPM

G4 P420000; pause 7 minutes

S18000; speed 18k RPM

G4 P180000; pause 3 minutes

M5; spindle stop

Each line will look as follows:

```
M3 S6000 G4 P600000
S12000 G4 P420000
S18000 G4 P180000
M5
```

BUILDBOTICS

M3; spindle rotate CW

S6000; speed 6k RPM

G4 P600; pause 10 minutes (10 x 60 seconds)

S12000; speed 12k RPM

G4 P420; pause 7 minutes

S18000; speed 18k RPM

G4 P180; pause 3 minutes

M5; spindle stop

Each line will look as follows:

M3 S6000 G4 P600
S12000 G4 P420
S18000 G4 P180
M5

START-UP

Normal Operation

***NOTE:** The MASSO controller from Onefinity CNC is **NOT** prewired for Counter Clockwise (CCW) operations. CCW should only be used with the Rapid Change ATC. Refer to Onefinity Rapid Change ATC manual for instructions on wiring for CCW operations.

Automatic Mode

Power On the VFD by pressing the **VFD Power** button

- Ensure the VFD is in automatic mode by ensuring the **Manual Mode** button on the left side of the DRO is **NOT** lit up
- The spindle will now function automatically based on the g-code you set in your CAD (Computer Automated Design) software or by using MDI commands.

Manual Mode

- Power On the VFD by pressing the **VFD Power** button
- Ensure the VFD is in manual mode by pressing the **Manual Mode** button on the left side of the DRO and ensure the light around the Manual Mode button is **lit up Green**
- The spindle is now in Manual Mode.
- Ensure Stop/Reset Mode
    - The numbers should be blinking, indicating that the spindle is in Stop/Reset mode
- Adjust RPMs with Manual Speed Dial
    - Turn the **Manual Speed Dial** located just below the numbers. This dial is used to control the RPMs.
    - Use the Green RUN **"Run"** button to start the spindle motor.
    - Use the Red STOP RESET **"Stop/Reset"** button to stop the spindle motor.

· Conduct a Simple Test

  · Rotate the  **Manual Speed Dial** counterclockwise all the way.

  · Press the Green  **"Run"** button.

  · Slowly rotate the  **Manual Speed Dial** clockwise until the dot indicator is pointing straight up (half way position). This position indicates approximately 12,000 RPMs.

Note:

If the displayed numbers do not show approximately 12,000 RPMs, press the  **Monitor Data Scroll** button to cycle through the display until it does.

The VFD operates by sending the frequency in Hz to your motor. Higher Hz results in a faster motor speed.

The motor is programmed to recognize that 200Hz equals 12,000 RPMs, which can be displayed by pressing the  **Monitor Data Scroll** button.

Stop Spindle Motor

· Press the red **"Stop/Reset"** button to stop your spindle motor
· Observe the digital display until it shows 0.0 and is flashing.
· Once the display reads 0.0 and is flashing and the bit physically stops rotating, you can safely reach towards the bit area.

DRO Displayed Units

The VFD has 2 States. Idle State and Running State

In Idle State you have a choice of what units are displayed.

V=Voltage

A=Current

Hz=Frequency (hertz)

To change which unit is displayed, click the  (Monitor Data Scroll) Button and the led dot under the different units will change to which is showing.

Note: Even though the Spindle is off, your unit may show a number here. This is normal as it is showing a voltage, current, or frequency going through the system, but since the Spindle is off, it doesn't effect the spindle until the spindle is turned on by manual mode or gcode.

In Running State the display will only show Hz or RPM's.

To change which unit is displayed, click the  (Monitor Data Scroll) Button. RPM's will range from 200-24000 and Hz will range from 0-400. RPM's displayed are not exact but close. Exact RPM's would require additional tools and devices that increase the cost of the unit significantly.

INSTALLING A CUTTING BIT

· Ensure the Spindle is OFF
· Use the included spindle wrench and collet nut wrench to loosen the collet nut from the spindle
· Ensure you have the correct collet installed for the diameter shank cutting bit you are using and it is pressed so it clicks in place on the collet nut.
· Insert the cutting bit shank end first to the indicator mark the manufacturer has placed on the shaft. If there is no indicator mark:
    ¨ Insert the bit shank until it reaches the full depth of the collet's gripping area
    ¨ After fully inserting the bit, pull it back a small amount (usually 1/8 to 1/4 inch) to prevent the bit from being fully seated
    ¨ This small gap ensures the collet can securely clamp onto the shank without excessive pressure or potential damage

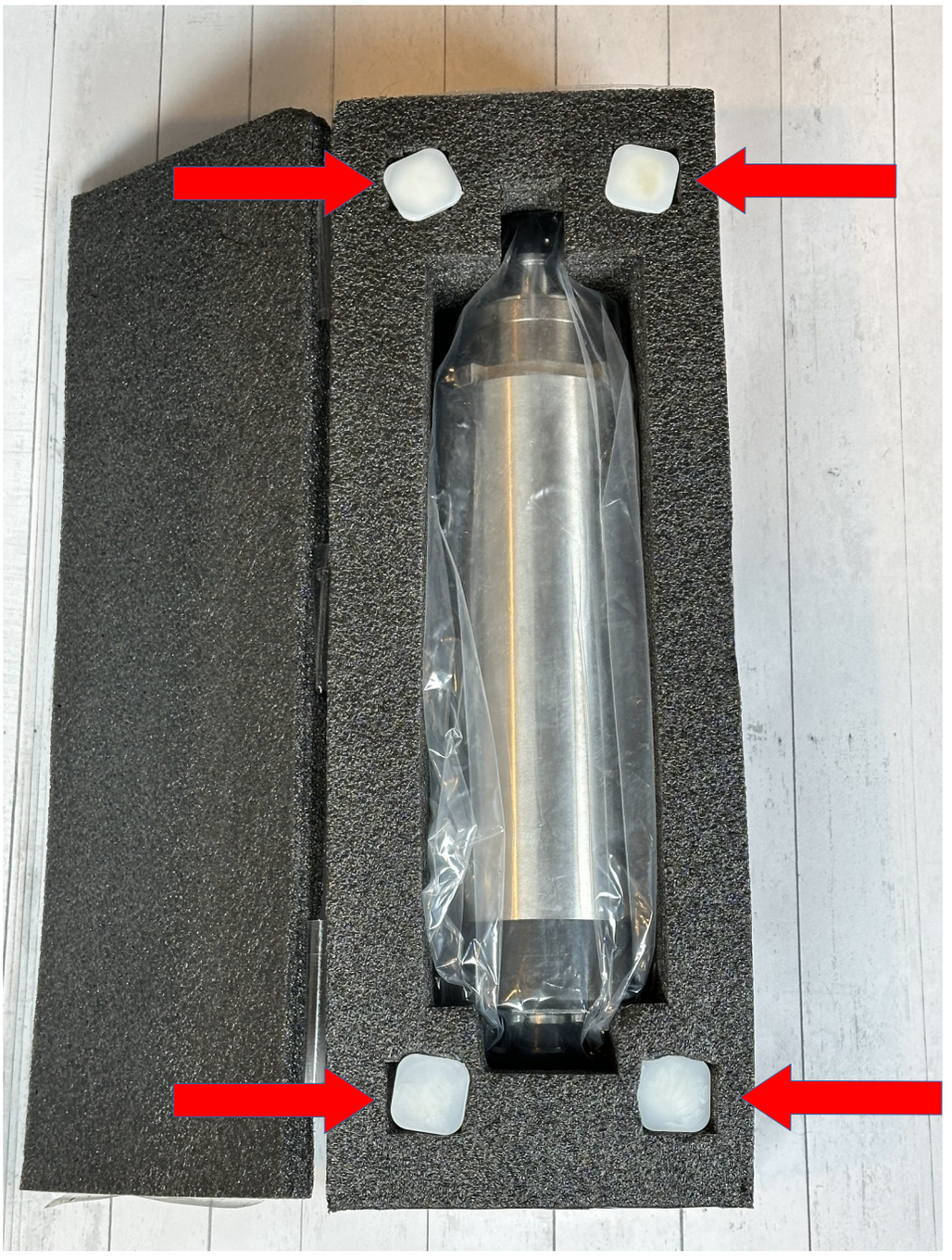
· Use the included spindle wrench and collet nut wrench to tighten the collet nut onto the spindle

Note: A collet nut should be tightened firmly, but not excessively so; good rule of thumb is to tighten if you feel a solid resistance, then add just a little more pressure with your hand, essentially a "firm hand squeeze" without over doing it; over tightening can damage the collet or bit shank.

Note: Your collet nut may have some drill marks on it. This is normal and is done to balance the nut.

Note: Do not use pliers or any other tool to grip the spindle post. This can cause damage to the threads leading to issues with properly tightening the collet nut. Use the provided Spindle Wrenches **only**. If you are encountering issues with your provided Spindle Wrenches, contact Technical Support at support@redlinecnc.com

- Spindle Collets are located here (see picture below) in your packaging. If you don’t see them in these locations, check deep in the hole to make sure they aren’t at the bottom of the hole.



MAINTENANCE

Spindle Motor

Keeping a 65mm or 80mm air-cooled spindle for woodworking in top shape ensures its durability and efficiency. Here's a guide to maintaining it:

Key Maintenance Areas

Regular Cleaning:

- Woodworking produces fine dust that can penetrate the spindle and cause problems. Regular cleaning is crucial.
- Use compressed air to blow away dust from the spindle's exterior and cooling vents, but be cautious with the air pressure to avoid forcing dust into the bearings.
- Do not blow compressed air directly into the air flow inlet at the top of the spindle. This can result in damaged interior parts and or cooling fan blades.
- Occasionally wipe down the spindle with a clean, dry cloth. For tougher residues, a slightly damp cloth with a mild, non-corrosive cleaner can be used. Make sure the spindle is completely dry afterwards.
- Avoid using harsh solvents that could damage the spindle's seals or coatings.

Bearing Maintenance:

- The lifespan of bearings is essential. Air-cooled spindles usually have grease-lubricated bearings.
- Bearing life depends on factors such as spindle speed, cutting forces, operating temperature, and contamination.
- Redline spindle motor bearings are sealed and do NOT require user lubrication.
- Signs of bearing wear include increased vibration, excessive noise, and a rise in spindle temperature.

Cooling System:

- Ensure the cooling fan and air vents are unobstructed.
- Verify that the fan is functioning correctly.
- Overheating is a major cause of spindle failure. Monitor the spindle's temperature during operation.
    - Ambient Temperature: The ideal working environment temperature for a spindle motor is generally specified as being between -10°C and 40°C (14°F and 104°F)
    - Surface Temperature: While the ambient temperature is important, the surface temperature of the motor itself is also a key indicator of its health. The surface temperature should ideally not exceed 110°C (230°F)
    - Signs of Overheating: Excessive noise, vibration, decline in accuracy, chatter, or poor surface finish can be signs of overheating

Operational Checks:

- Before each use, check for any unusual vibrations or noises.
- Ensure that cutting tools are properly balanced to reduce stress on the spindle bearings.
- Avoid excessive side loads on the spindle.

Cleaners and Lubricants:

Cleaning:

- Compressed air
- Dry cloths
- Mild, non-corrosive cleaners

Lubricants:

- Lubrication is not required due to sealed bearings.

Important Considerations:

- **Operating Environment:** A clean and dry environment is crucial for spindle longevity.
- **Spindle Warm-up:** Before running the spindle at high speeds, allow it to warm up gradually. This helps distribute the bearing grease and prevents premature wear.

By following these maintenance practices, you can ensure the long and reliable operation of your 65mm or 80mm air-cooled spindle.

Collet and Collet Nut

Key Maintenance Practices for ER16 and ER20 Collets and Collet Nuts

Regular Cleaning:

- Dust, resin, and debris can accumulate and affect clamping force and precision.
- Clean collets and collet nuts after each use or tool change.
- Use compressed air to blow away loose debris.
- For a deeper clean, use a brass brush or a specialized collet cleaning brush.
- Wipe down the spindle's inside taper and the collet's and collet nut's outside taper.
- Avoid abrasive cleaners that could damage the precision surfaces.

Inspection:

- Regularly check collets for signs of wear or damage, such as cracks or deformation.
- Inspect collet nuts for damaged threads or wear.
    - Note: Your collet nut may have some drill marks on it. This is normal and is done to balance the nut.
- Replace any damaged collets or collet nuts immediately.

Proper Storage:

- Store collets and collet nuts in a clean, dry place to prevent corrosion.
- Consider using a collet rack or storage case for protection.

Lubrication:

- Keep the collet clean and dry where it contacts the tool shank.
- Lightly lubricate the collet nut threads with light machine oil or a specialized lubricant.

- Avoid getting oil inside the collet where the cutting tool is held.

Proper Assembly:

- Ensure the collet is properly seated in the collet nut before inserting the tool.
- Tighten the collet nut to the manufacturer’s recommended torque.
- Avoid over-tightening to prevent damage.

Important Considerations:

- **Runout:** If you are experiencing less than desirable results, consider replacing your Collet Nut and Collets
- **Quality:** Use high-quality collets from reputable manufacturers.
- **Tool Shank:** Ensure tool shanks are clean and undamaged.
- **Spindle Taper:** Keep the spindle taper clean for proper collet seating.

By adhering to these practices, you can extend the life of your ER16 or ER20 collets and collet nuts and maintain the accuracy of your CNC machining operations.

VFD (Variable Frequency Drive)

- Remove Dust from VFD
- Remove any buildup of residue from around the VFD fan
- Check connections to insure tight and no buildup of dust
- Check cables to ensure there is no damage to cables
- Ensure the VFD has proper ventilation at the bottom, The unit circulates air from the bottom. Do not place on a surface without the desktop mount installed.

TROUBLESHOOTING

VFD Error Codes

Error 1:

Description: Over-current at constant speed - The output current exceeds the over-current value while the frequency inverter is running at a constant speed

Troubleshooting:

- Check cables to ensure they are properly connected
- Check your wall outlet voltage to see if it's low or high
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 2:

Description: Over-current at acceleration - When the frequency inverter accelerates, output current exceeds over-current

Troubleshooting:

- Check cables to ensure they are properly connected
- Check your wall outlet voltage to see if it's low or high
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 3:

Description: Over-current at deceleration - When the frequency inverter decelerates, output current exceeds over-current

Troubleshooting:

- Check cables to ensure they are properly connected
- Check your wall outlet voltage to see if it's low or high

- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 4:

Description: Over-voltage at constant speed - When the frequency inverter runs at constant speed, DC voltage of the main circuit exceeds this set value. Detected DC over-voltage value: Level T2 : 400V

Troubleshooting:

- Check cables to ensure they are properly connected
- Check your wall outlet voltage to see if it's high
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 5:

Description: Over-voltage at acceleration - When the frequency inverter runs at constant speed, DC voltage of the main circuit exceeds this set value. The detected over-voltage value is the same as above.

Troubleshooting:

- Check cables to ensure they are properly connected
- Check your wall outlet voltage to see if it's high
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 6:

Description: Over-voltage at deceleration - When the frequency inverter runs at constant speed, DC voltage of the main circuit exceeds this set value. The detected over-voltage value is the same as above.

Troubleshooting:

- Check cables to ensure they are properly connected
- Check your wall outlet voltage to see if it's high
- Change Programming Code P0.0.12 from 0006.0 to 0008.0
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 7:

Description: Module fault - External fault has triggered automatic module protection

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 8:

Description: Under-voltage - Under-voltage in the main circuit, check the electric level: Detected DC under-voltage value: Level T2 : 190V

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual

- Contact Technical Support at support@redlinecnc.com

Error 9:

Description: Frequency inverter overloaded - Motor and current exceed the rated load

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 10:

Description: Motor overload - Motor and current exceed the rated current

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 11:

Description: Missing phase - Error of missing phase or unbalanced three phases

Troubleshooting:

- Check cables to ensure they are properly connected
- Check wall circuit voltage for missing phase or unbalanced three phases
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 12:

Description: Output Default Failure - Output Default Failure or 3-phase Imbalance Fault

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 13:

Description: External Fault - Fault caused by External Control Circuits

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 14:

Description: Abnormal Communication - Abnormity for communication of frequency inverter and other equipment

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 15:

Description: Frequency inverter Overheat - Radiator temperature ≥ oh Detection Value (about 80℃, from temperature switch)

Troubleshooting:

- Check cables to ensure they are properly connected
- Check to ensure spindle motor fan is running
- Check whether the surrounding temperature is too high and cooling measures are required
- Clear dirt, dust, debris from the air intake on the top of the spindle motor
- Contact Technical Support at support@redlinecnc.com

Error 16:

Description: Hardware Fault of Frequency inverter - In case of over-current or over-voltage existed in frequency inverter, it is judged as hardware fault

Troubleshooting:

- Check cables to ensure they are properly connected
- Check your wall outlet voltage to see if it's low or high
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 17:

Description: Motor-to-ground short circuit - Motor-to-ground short circuit

Troubleshooting:

- Check cables to ensure they are properly connected

- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 18:

Description: Motor Identification Error - When conducting the parameter identification, the fault occurs in motor

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 19:

Description: Motor Off-load - Refer to the value of running current less than off-load current P6.1.19 and duration of P6.1.20

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 20:

Description: PID Feedback Loss Refer to the value of PID feedback value less than value of P4.0.18 and duration of P4.0.19

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 21:

Description: User-Defined Fault 1 - Fault 1 Signal given by the users through multi-functional terminals or PLC Programming Function

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 22:

Description: User-Defined Fault 2 - Fault 2 Signal given by the users through multi-functional terminals or PLC Programming Function

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 23:

Description: Accumulative Power-on Time Arrival - Refer to the time given by accumulative power-on time arrival P5.1.01 of the frequency inverter

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 24:

Description: Accumulative Running Time Arrival - Refer to the time given by accumulative power-on time arrival P5.1.00 of the frequency inverter

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 25:

Description: Encoder Fault - The frequency inverter is unable to identify the data of the encoder

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 26:

Description: Parameter Read-Write Abnormity - Damage of EEPROM Chip

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 27:

Description: Motor Overheat - Detection on excessive temperature of the motor

Troubleshooting:

- Check whether the temperature of the motor is too high
- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 28:

Description: Larger Speed Deviation - Refer to the value of speed deviation larger than P6.1.23 and duration of P6.1.24

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 29:

Description: Motor Over-speed Refer to the value of motor speed over P6.1.21 and duration of P6.1.22

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual

- Contact Technical Support at support@redlinecnc.com

Error 30:

Description: Initial Position Error - Large deviation between motor parameters and actual parameters

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 31:

Description: Current Detection Fault - Circuit fault after current detection

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 32:

Description: Contactor Abnormal power supply of driver board caused by the fault of the contactor

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 33:

Description: Abnormity of Current Detection - Circuit fault after current detection leads to abnormal current detection value

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 34:

Description: Fast Current-limiting Timeout - The running current of the frequency inverter continues to be larger, which exceeds allowable current–limit time

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 35:

Description: Motor Switch at Running - Conduct motor switch in the running process of the frequency inverter

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual

- Contact Technical Support at support@redlinecnc.com

Error 36:

Description: Power Fault - External 24V power supply is short circuit or the load of External 24V power supply is too large

Troubleshooting:

- Check cables to ensure they are properly connected
- Contact Technical Support at support@redlinecnc.com

Error 37:

Description: Driving Power Supply Fault - Driving Power Supply Fault for Model G250T4 and above

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Error 38:

Description: Output short circuit - 3-phase output inter-phase short circuit

Troubleshooting:

- Check cables to ensure they are properly connected
- Check insulation of spindle cable
- Contact Technical Support at support@redlinecnc.com

Error 40:

Description: Buffer Resistance - The bus voltage fluctuates strongly

Troubleshooting:

- Check cables to ensure they are properly connected
- Conduct VFD Programming Factory Reset and manually input programming codes found in Redline CNC Spindle Kit User Manual
- Contact Technical Support at support@redlinecnc.com

Common Problems:

Spindle turns on in Manual Mode but not in Automatic Mode:

- Check VFD Program Codes P0.0.03 and P0.0.04
  - If you have a BuildBotics controller (Pro or Original), they should be:
    - P0.0.03 = 2
    - P0.0.04 = 9
  - If you have a MASSO controller (Elite), they should be:
    - P0.0.03 = 1
    - P0.0.04 = 3
- If they don't match with the corresponding controller type, change to correct value.
  - * See Reprogram VFD to Buildbotics video here: https://youtu.be/jZ00ziXw9ZI
  - * See Reprogram VFD to MASSO video here: https://youtu.be/gZboLTYh44k
- If that doesn't work, conduct a Factory Reset and manually input values associated with controller type. Information can be found on page 44 & 45.
- If that doesn't work, contact technical support at support@redlinecnc.com

DRO (Digital Readout) does not have power:

- Check that the DRO cables are attached correct and securely
- If using short DRO cables test with long cables

Or

- If using long DRO cables test with short cables
- If that doesn't work, contact technical support at support@redlinecnc.com

Spindle spins backwards:

- Change Program Code P0.0.06 from 1 to 0
- If that doesn't work, contact technical support at support@redlinecnc.com

Spindle showing disconnected in Buildbotics Tool Configuaration

- Check your cables to ensure they are properly plugged in
- Ensure you have setup the Spindle Control Method
- Re-upload latest firmware update, even if it's the same version you currently have
- If that doesn't work, contact technical support at support@redlinecnc.com

VFD Fan not working:

- * The VFD fan is temperature activated and will only turn on when needed
- If the VFD fan is not turning on at all, even when the VFD is hot, contact technical support at support@redlinecnc.com
- If the VFD fan is not turning off and just runs all the time, contact technical support at support@redlinecnc.com

ADDITIONAL RESOURCES

Delixi VFD Manual:

Redline uses an EM60 VFD Engine the full Manual is located here

WARRANTY

REDLINE CNC PRODUCTS WARRANTY DETAILS

1. **Redline CNC Inc.** (“**Redline**”, “**us**”, “**we**”, “**our**”) warrants the Redline CNC Spindle Kits and other Electronics and Electrics (“**Redline Products**”) will conform in all respects to the Redline Products’ stated specifications and will be free from defects, latent or otherwise, in workmanship and materials for a period of twelve (12) months from the original shipment date for all Controls and 6 months for all spindle and motor products.

2. **Removing/Installing Redline Products**. We are not liable for, and do not cover under warranty, any costs associated with removing or installing the Redline Products. The end user’s/customer’s, or any other entity’s, rights under this Warranty commence from the original shipment date of the Redline product to the original purchaser.

3. **Warranty Repairs**. We will, at our sole discretion, either repair or replace any part of the Redline Product that proves defective by reason of improper workmanship or materials. Warranty repairs may require you to install a replacement part provided by us or, at our sole discretion, require you to return the Redline Product for warranty service. The Redline Limited Warranty (“**Warranty**”) is limited to the repair of the Redline Products that proves defective by reason of improper workmanship or materials. Repaired parts or replacement products will be provided by us on an exchange basis, and will be either new or refurbished to be functionally equivalent to new. When applicable and at our sole discretion, we may exchange your warranted Redline Product for a new or refurbished Redline Product of equal or greater value.

4. **Proper Use**. This Warranty is contingent upon proper use of Redline Products, in accordance with the Redline Product Owner’s Manual, in applications for which the Redline Products were intended and does not cover Redline Products that were subjected to physical, chemical, mechanical or electrical stress that the Redline Products were not originally designed for.

5. **Verification and Return**. Warranty repairs or replacements are subject to verification of the defect or malfunction and proof of purchase as confirmed by a dated original sales receipt. End users/customers shall have no claim for warranty service without the aforementioned proof of purchase. If we conclude shipping is necessary, we will provide you with a shipping label. You are solely responsible for all shipping and handling fees as well as VAT, import duties, any applicable taxes, and other related fees (collectively "**Import Costs**") you may be required to pay when shipping the Redline Products to us, and we will not assume any responsibility for any payments relating thereto (including but not limited to brokerage fees, storage fees, etc.). You are solely responsible for any damage to the Redline Products during shipping, so please ensure packaging of the Redline Products follows the instructions provided in "Returns", of our Shipping and Returns Policy. Any additional costs incurred for transportation or removal of your Redline Products are not covered by this Warranty. For all valid warranty repairs, we will pay for return shipping to you, to the original destination country the Redline Product was originally shipped, excluding any Import Costs. If your Product does not qualify for warranty repair, then you will be required to pay for all shipping related costs to and from us, including any Import Costs.

6. **WARRANTY LIMITATIONS.** This Warranty does not cover repairs for
    - Redline Products used for commercial purposes or used in any manner for which the products were not intended, such as use in rental contract trade;
    - Redline Products damaged as a result of incorrect or inadequate maintenance or care;
    - Damages resulting from misuse, abuse, negligence, accidents;
    - Damages that are the result of normal wear and tear;
    - Damages incurred during transportation;
    - Damages incurred due to not been handled or packaged correctly;
    - Damages incurred during assembly or maintenance;
    - Damages incurred from improper installation, abuse, misuse, natural disaster, abnormal mechanical or environmental conditions; and

- Damages that are determined to be from repairs or modifications made by parties unauthorized by us.

Without limiting the generality of the foregoing, this Warranty will be void and no warranty coverage will be provided if you do any of the following:

- Install any firmware in the Redline Products which is not specifically issued or authorized by us;
- Make any change or modification to the electronics or computer components of the Redline Products;
- Attach any peripheries or accessories to the electronics or computer components of the Redline Products that have not been specifically issued or authorized by us;
- Use or attempt to use the Redline Products and/or its electronics or computer components to control or move any device or object not specifically issued or authorized by us; or
- If the Redline Products original serial number/identification information has been altered, obliterated or removed.

7. **Obtaining Service**. To obtain warranty service, first email Redline CNC at support@redlinecnc.com and include your order number, contact info along with a brief explanation of the issue you are having. Once your email is received someone on our team will contact you by email to conduct a warranty diagnosis. You may be required to provide pictures and/or video of the claimed defect. If we cannot determine from the warranty diagnosis whether your Redline Products qualify for warranty repair, we may require you to return the Redline Products to us for further evaluation.

8. **Voiding Warranty**. This Warranty shall not apply to any Redline Products that (i) has been tampered with or otherwise altered by an end user/customer or any unauthorized third party (collectively "**Third Party**"); (ii) has been subjected to misuse, negligence, malice or accident by a Third Party; or (iii) has been stored, handled or used by a Third Party in a manner contrary to the Redline CNC Owner's Product Manual, which can, among others, define the manner in which the Redline Products may be used.

9. **No Consequential Damages**. ACCEPTANCE OF THE EXCLUSIVE REPAIR AND REPLACEMENT REMEDIES DESCRIBED HEREIN IS A CONDITION OF THE CONTRACT FOR THE PURCHASE OF THE REDLINE PRODUCTS. IF YOU DO NOT AGREE TO THIS CONDITION, YOU SHOULD NOT PURCHASE THE PRODUCT. IN NO EVENT SHALL WE, OUR DIRECTORS, OFFICERS, EMPLOYEES, AGENTS, CONSULTANTS, LICENSORS AND THIRD PARTY SUPPLIERS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, OR FOR ANY COSTS, ATTORNEY FEES, EXPENSES, LOSSES OR DELAYS ALLEGED TO BE AS A CONSEQUENCE OF ANY DAMAGE TO, FAILURE OF, OR DEFECT IN ANY REDLINE PRODUCTS INCLUDING, BUT NOT LIMITED TO, ANY CLAIMS FOR LOSS OF PROFITS HOWEVER CAUSED, ON ANY THEORY OF LIABILITY OR BREACH OF WARRANTY, WHETHER IN CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY, OR OTHERWISE INCLUDING LOSS OF PROFITS OR REVENUE, DELAYS, OR CLAIMS OF THE END USER/CUSTOMER, OR ANY OTHER ENTITY, FOR SUCH OR OTHER DAMAGES, WHETHER OR NOT WE HAVE BEEN ADVISED ON THE POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE FOREGOING LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE AND PROVINCE TO PROVINCE. OUR CUMULATIVE LIABILITY TO END USER/CUSTOMER, OR ANY OTHER ENTITY, FOR ALL CLAIMS RELATING TO THE REDLINE PRODUCTS AND THIS WARRANTY, INCLUDING ANY CAUSE OF ACTION BASED ON ANY THEORY OF CONTRACT, TORT, OR STRICT LIABILITY, SHALL NOT EXCEED THE PURCHASE PRICE PAID BY THE ORIGINAL PURCHASER FOR THE REDLINE PRODUCTS PURCHASED.

10. **Implied Warranties**. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES, WRITTEN OR ORAL. TO THE EXTENT PERMITTED BY LAW, WE DISCLAIM ANY IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR

USE OR PURPOSE. THE WARRANTY AND REMEDY SET FORTH IN THIS WARRANTY, ARE EXCLUSIVE AND ALL OTHER WARRANTIES, GUARANTEES OR REPRESENTATIONS, EXPRESS OR IMPLIED, BY US WITH RESPECT TO THE REDLINE PRODUCTS INCLUDING, WITHOUT LIMITATION, ANY OTHER OBLIGATION OR LIABILITY OF US TO ANY END USER/CUSTOMER, OR ANY OTHER ENTITY, WITH RESPECT TO THE REDLINE PRODUCTS, ARE HEREBY EXCLUDED. SOME STATES AND PROVINCES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU, TO THE EXTENT SUCH DISCLAIMER IS NOT PERMITTED BY LAW, SUCH IMPLIED WARRANTIES ARE LIMITED TO THE DURATION OF THE APPLICABLE EXPRESS WARRANTY AS DESCRIBED IN THIS WARRANTY.

11. **Changes to This Warranty**. To the extent permitted by law, we reserve the right to change the terms of this Warranty at any time and without prior notice.