REDLINE CNC
PUSH YOUR CNC TO ITS LIMIT

USER MANUAL

Air Cooled Spindles

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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 instruc-tions 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 hesitateto 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 mois-ture. The power tool is only suitable for in door use. Water entering a laser tool will increase therisk 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 protec-tion, 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 oraccessories 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 re-sult 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 betouched 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 fre-quent use become commonplace. Always remember that a careless fraction of a second is suffi-cient to inflict severe injury.

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

NOTICE: The speed and feed of the bit when carv-ing, 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 misalign-ment or binding of moving parts, breakage ofparts and any other conditions that may affectthe 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 theapplicable 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:

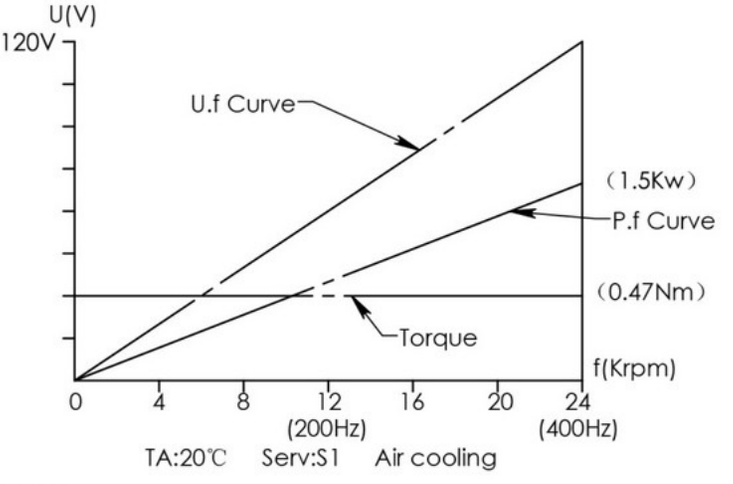
When working with the CNC gantry system, the operator has to wear at least the following personal protective equipment and has to be compliant with the below-mentioned safety aspects:

- **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, jewelry 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. Other-wise there exists a high risk of injuries!

SPECIFICATIONS

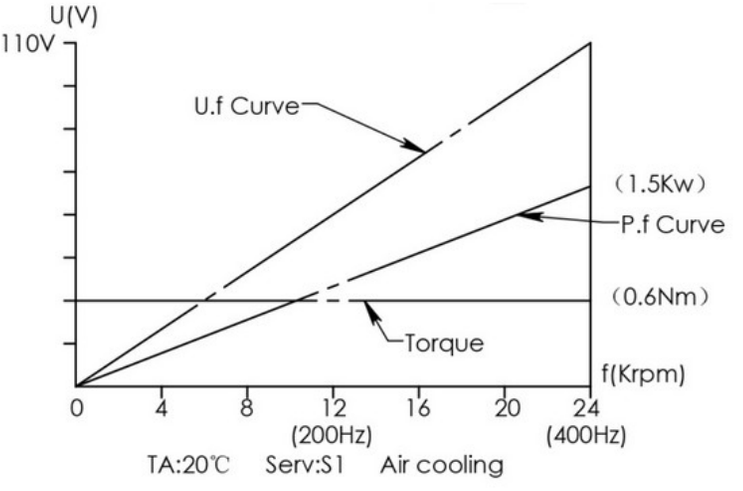
65mm, 1.5kw, Air-Cooled

- 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



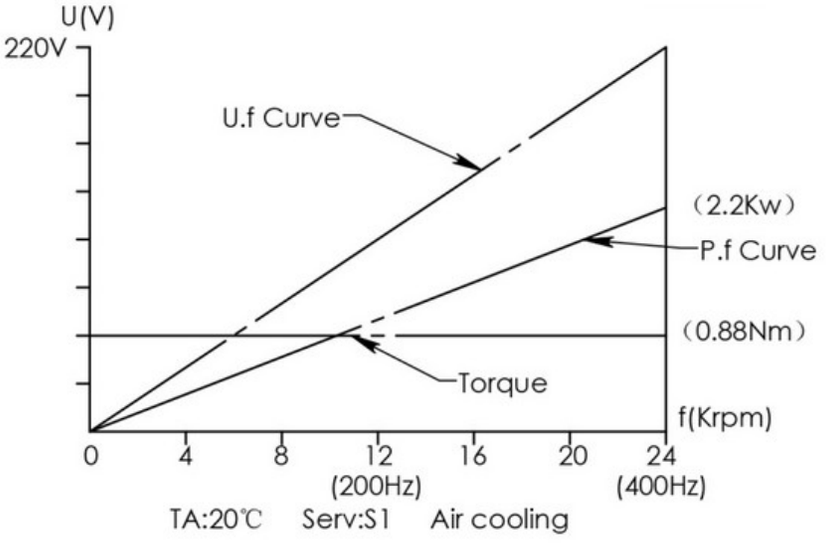
80mm, 1.5kw, Air-Cooled

- 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 inputs 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 full 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 uni-formly 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)

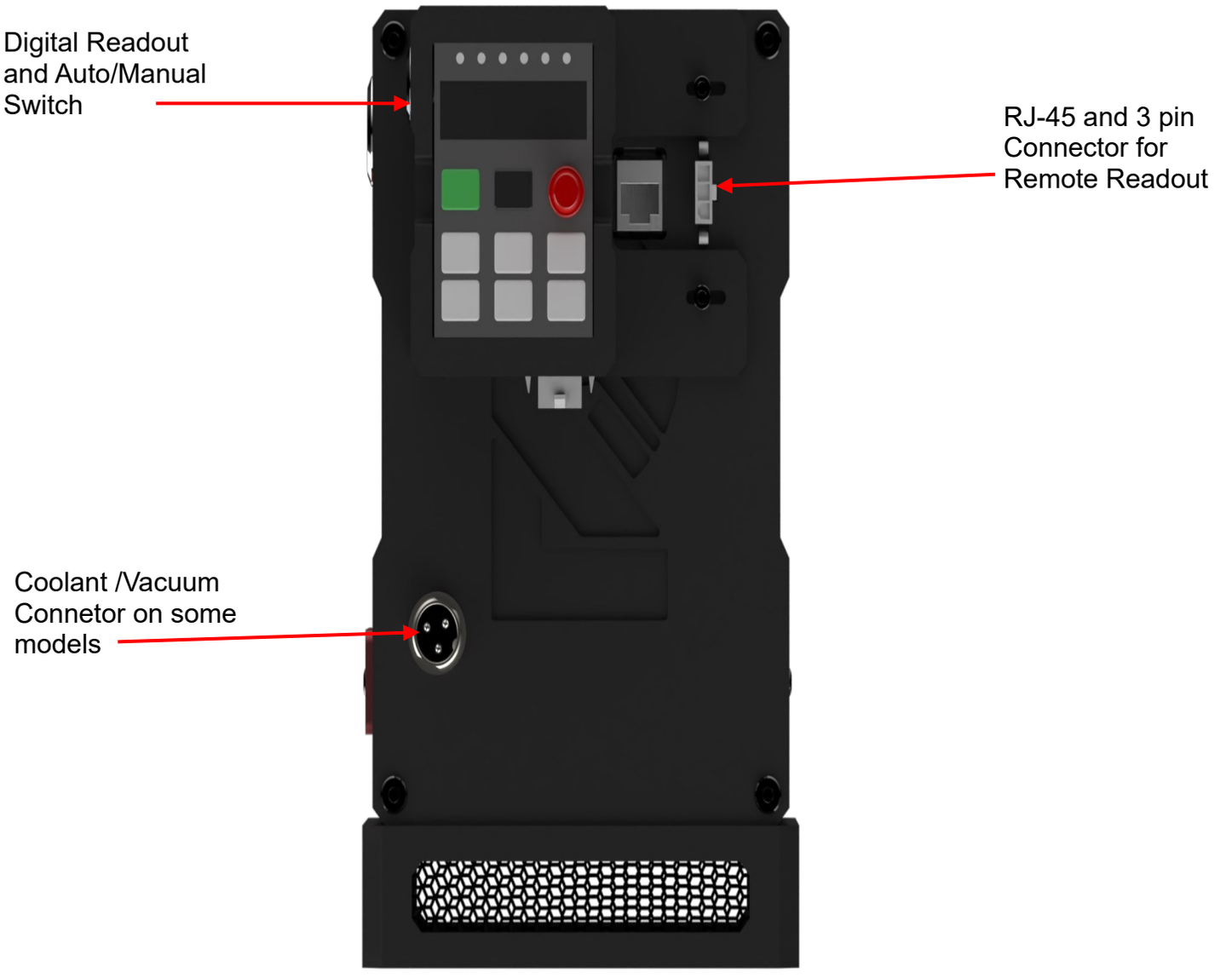
Redline CNC Spindle Kit by Redline CNC—80mm 2.2 kW Air Cooled 220V

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

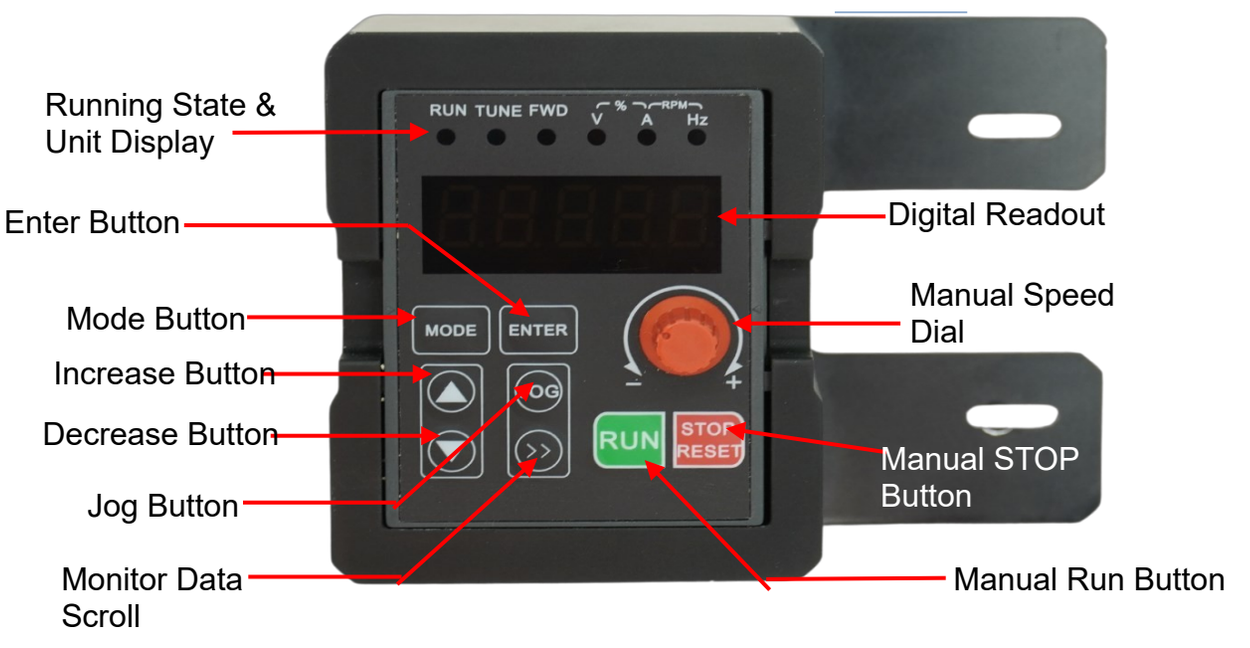
Fuse 5X20 mm

12A Slow 1.5Kw
110V

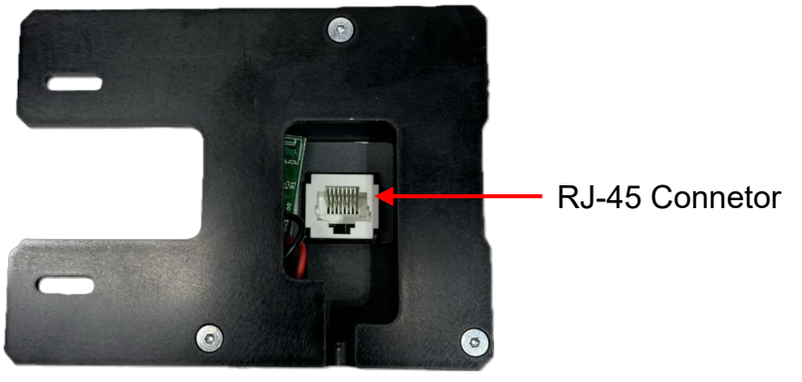
10A Slow 2.2Kw
220V

DIGITAL READOUT AND MANUAL SPEED OVER-RIDE

FRONT OF THE DIGITAL READOUT



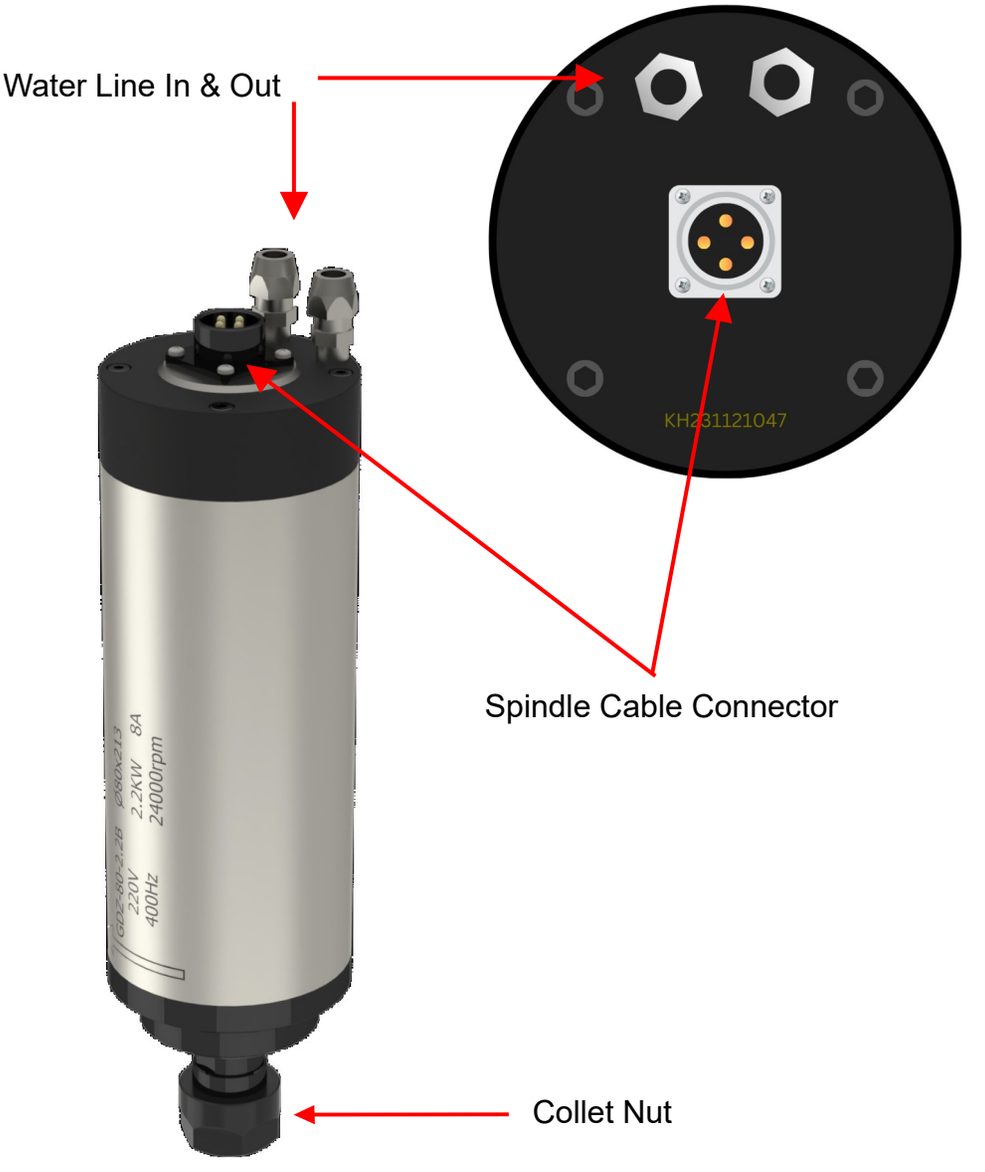
BACK OF THE DIGITAL READOUT



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

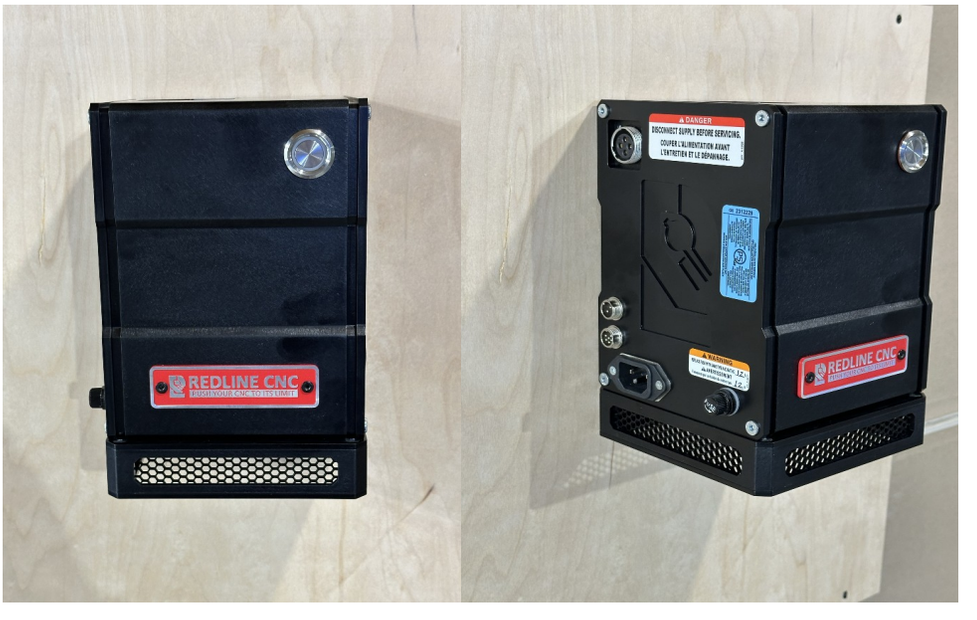
VFD Mounting Bracket
Wall French Cleat

· 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 not 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

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

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

MASSO/PWM – CNC Controller End

MASSO/PWM – VFD End

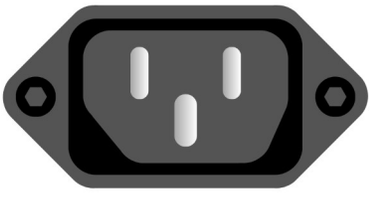
INSTALLATION
Wiring Instructions

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

Buildbotics 25 pin Connector

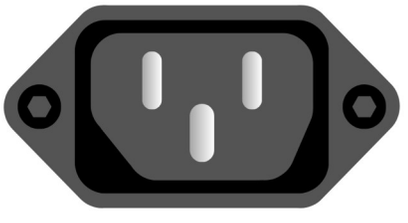
RJ-485 Connection – VFD End

INSTALLATION
Wiring Instructions
VFD AC Power Connection (110V)



INSTALLATION
Wiring Instructions
VFD AC Power Connection (220V)

NEMA 6-15P

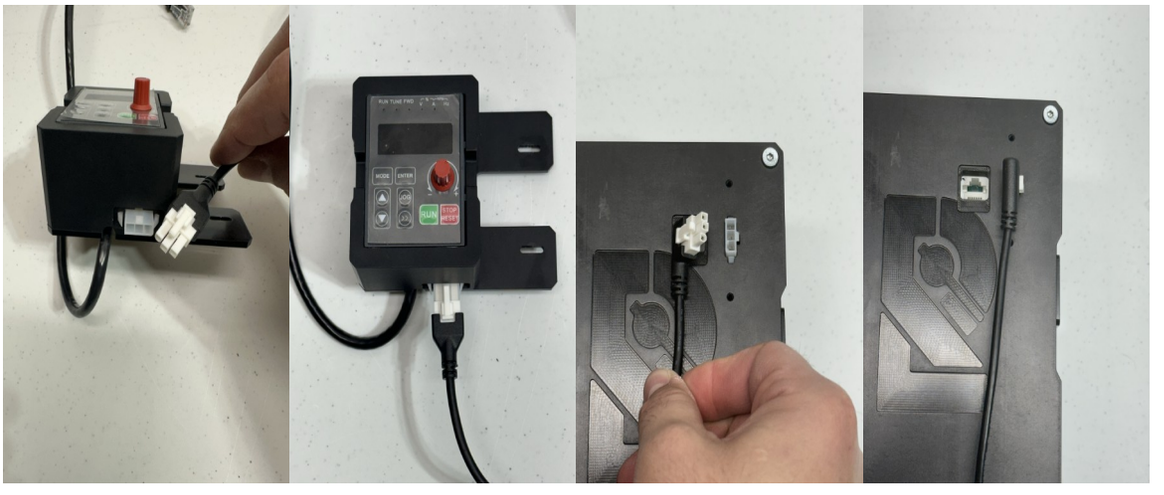


NEMA 6-15R

NEMA 6-15R

INSTALLATION
Wiring Instructions

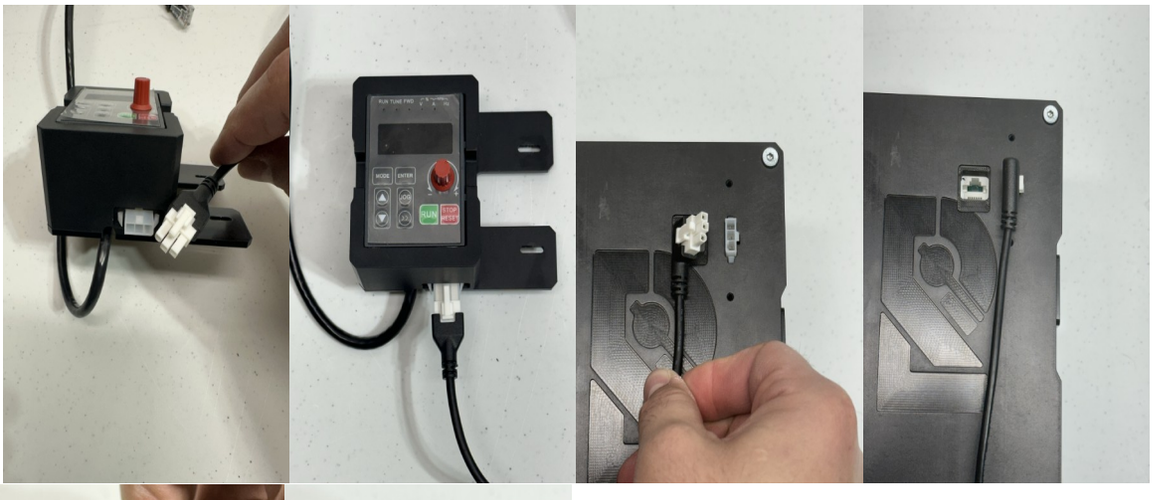
Digital Readout (DRO) Connection / Installation (Connected to VFD)



INSTALLATION
Wiring Instructions

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

RJ-45 Connection / 3-Pin Connection



RJ-45 Connection – VFD End

RJ-45 Connection – DRO End

INSTALLATION
Wiring Instructions

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

INSTALLATION
Wiring Instructions

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

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

VFD SETUP

Programming Codes (MASSO)

DEFAULT CODES:

P0.0.03 = 1 ..... ON/OFF AUTOMATIC COURSE
P0.0.04 = 3 ..... FREQUENCY AUTOMATIC SOURCE
P0.0.05 = 50.0 ..... KEYBOARD FREQUENCY REFERENCE
P0.0.06 = 1 ..... REVERSE MOTOR DIRECTION
P0.0.07 = 04000.0 ..... 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
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
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

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

VFD SETUP

Programming Codes (Buildbotics)

DEFAULT CODES:

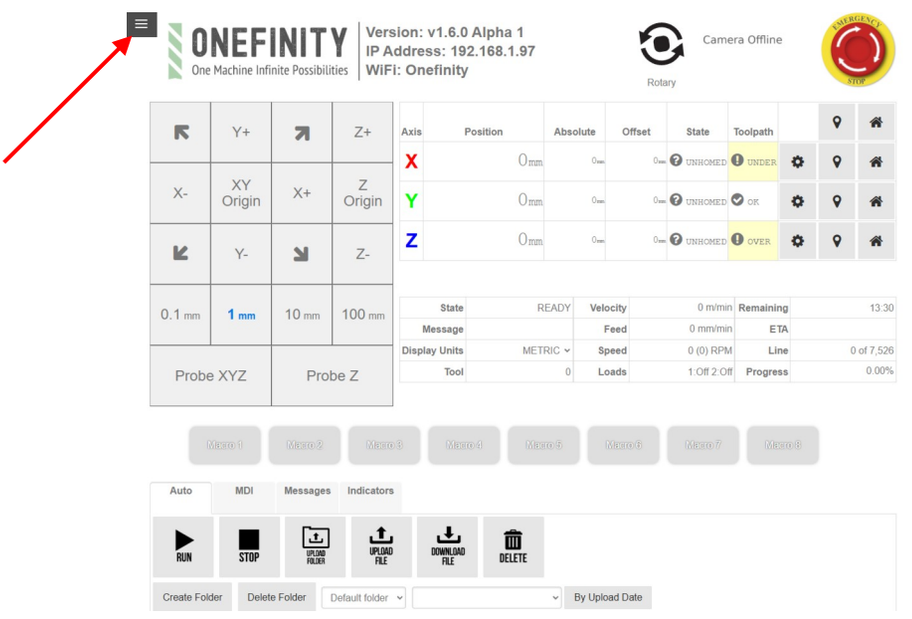
P0.0.03 = 2 ..... ON/OFF AUTOMATIC COURSE
P0.0.04 = 9 ..... FREQUENCY AUTOMATIC SOURCE
P0.0.05 = 50.0 ..... KEYBOARD FREQUENCY REFERENCE
P0.0.06 = 1 ..... REVERSE MOTOR DIRECTION
P0.0.07 = 0400.0 ..... MAX MOTOR FREQUENCY, HZ
P0.0.08 = 0400.0 ..... UPPER MOTOR FREQUENCY, HZ
P0.0.11 = 0006.0 ..... ACCELERATION TIME
P0.0.12 = 0006.0 ..... DECELERATION TIME
P0.0.14 = 0001.5 ..... MOTOR RATED POWER, 1.5KW
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
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

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

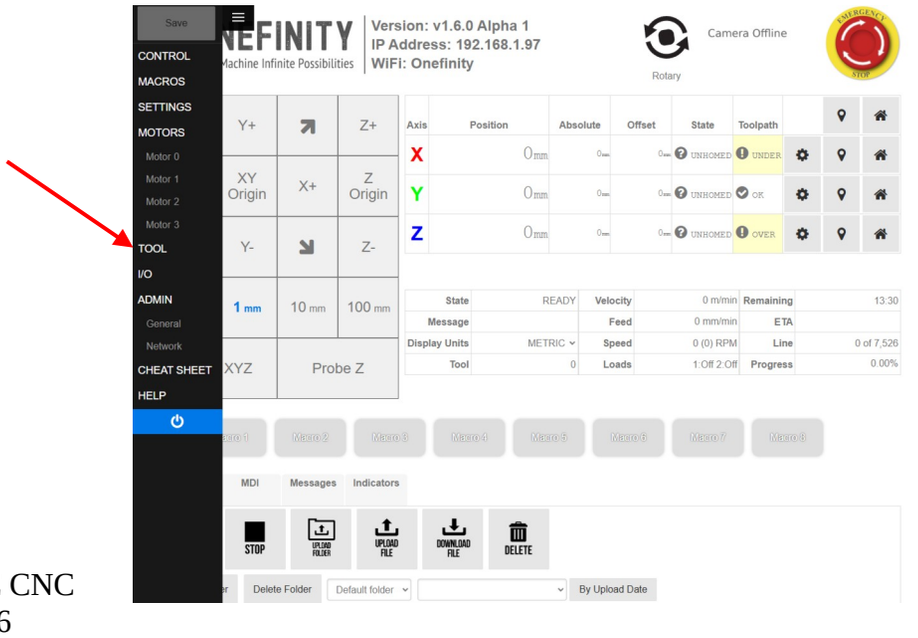
SPINDLE CONTROL METHOD

BuildBotics Controller

Step 1. Click the Flyout Menu

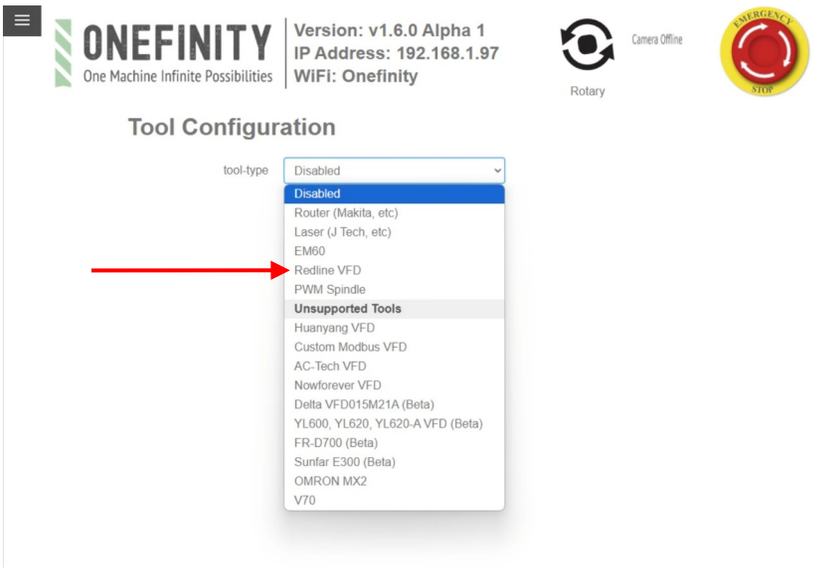


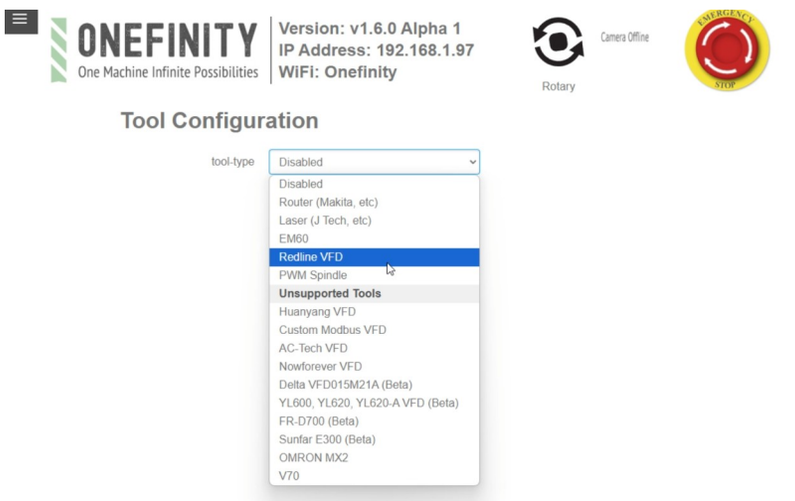
Step 2. Click on Tool



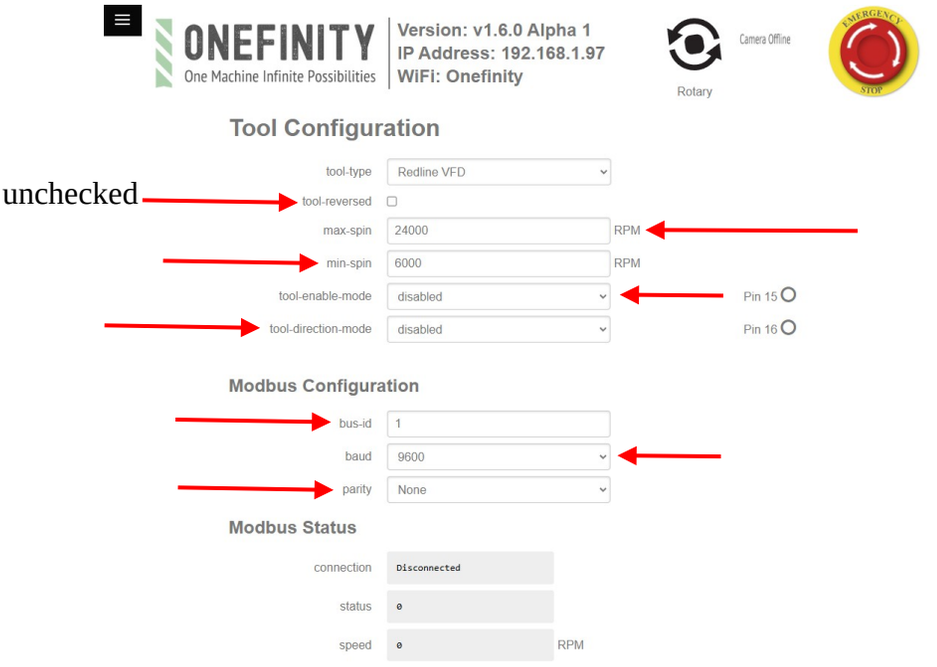
Step 3. Open Tool-Type list

Step 4. Click on Redline VFD

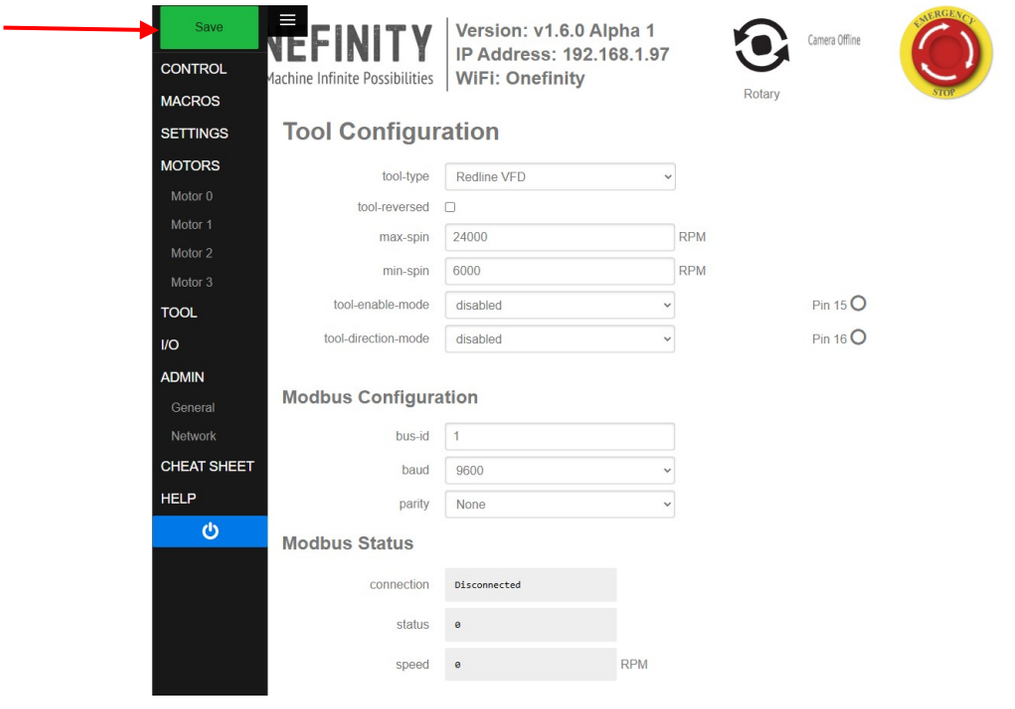




Step 5. Ensure the below information matches

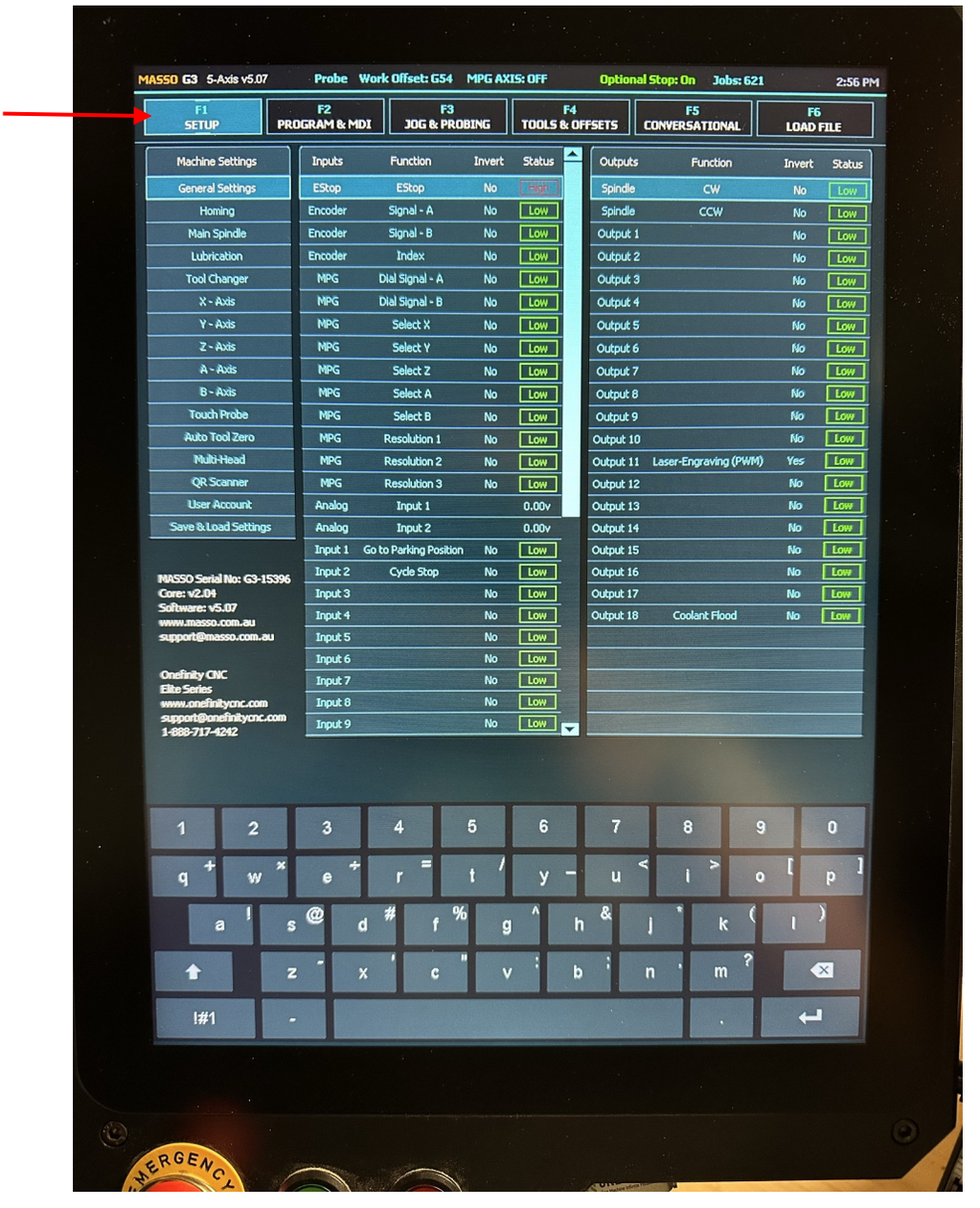


Step 6. Press Save

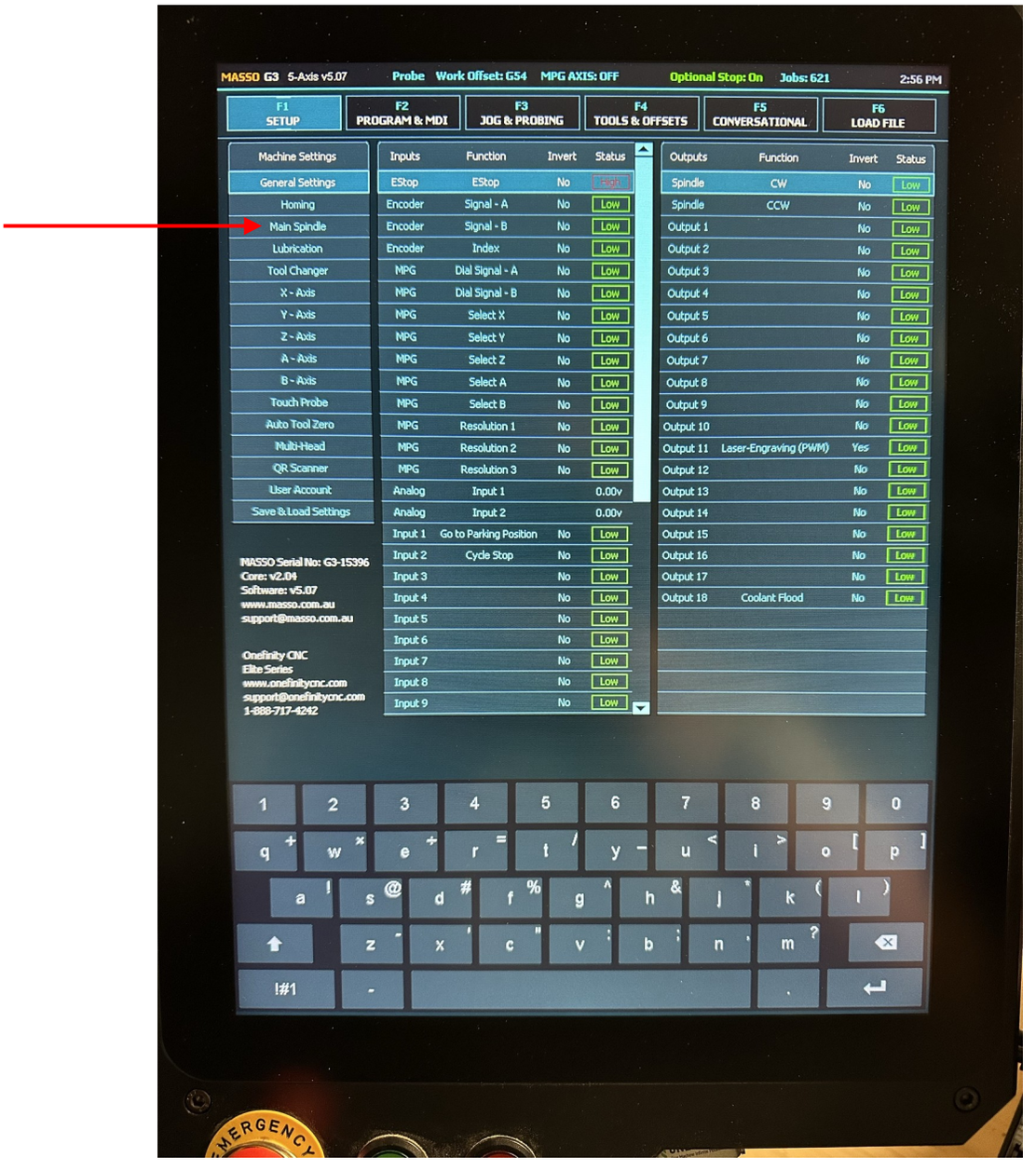


MASSO Controller

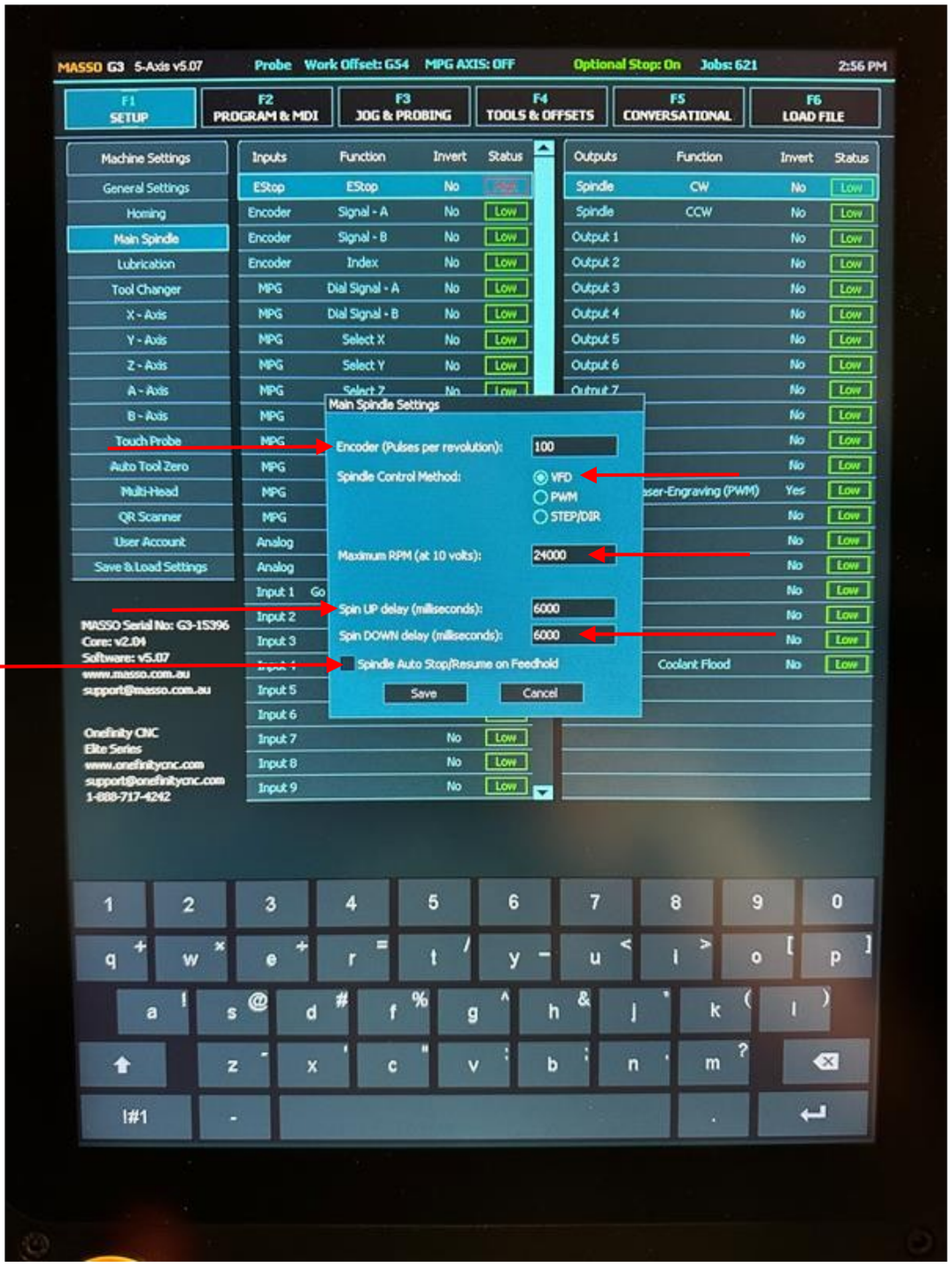
Step 1. Go to F1 Screen



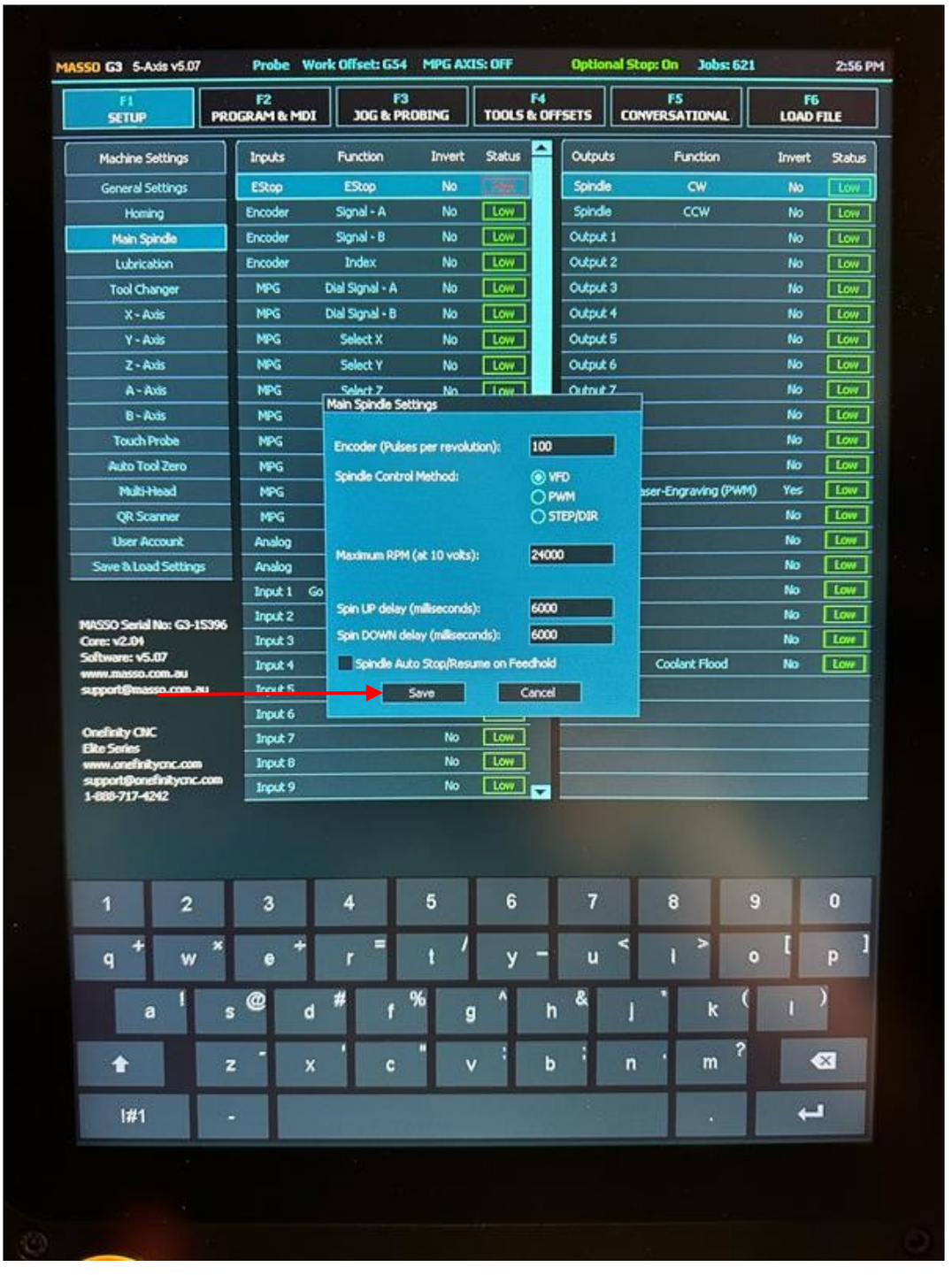
Step 2. Double Click on Main Spindle



Step 3. Ensure the following Information matches:



Step 4. Click on Save



START-UP

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:

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

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:

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

START-UP

Normal Operation

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.

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”** 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 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 bysending 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, you can safely reach towards the bit area.

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.

ADDITIONAL RESOURCES

Delixi VFD Manual:

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