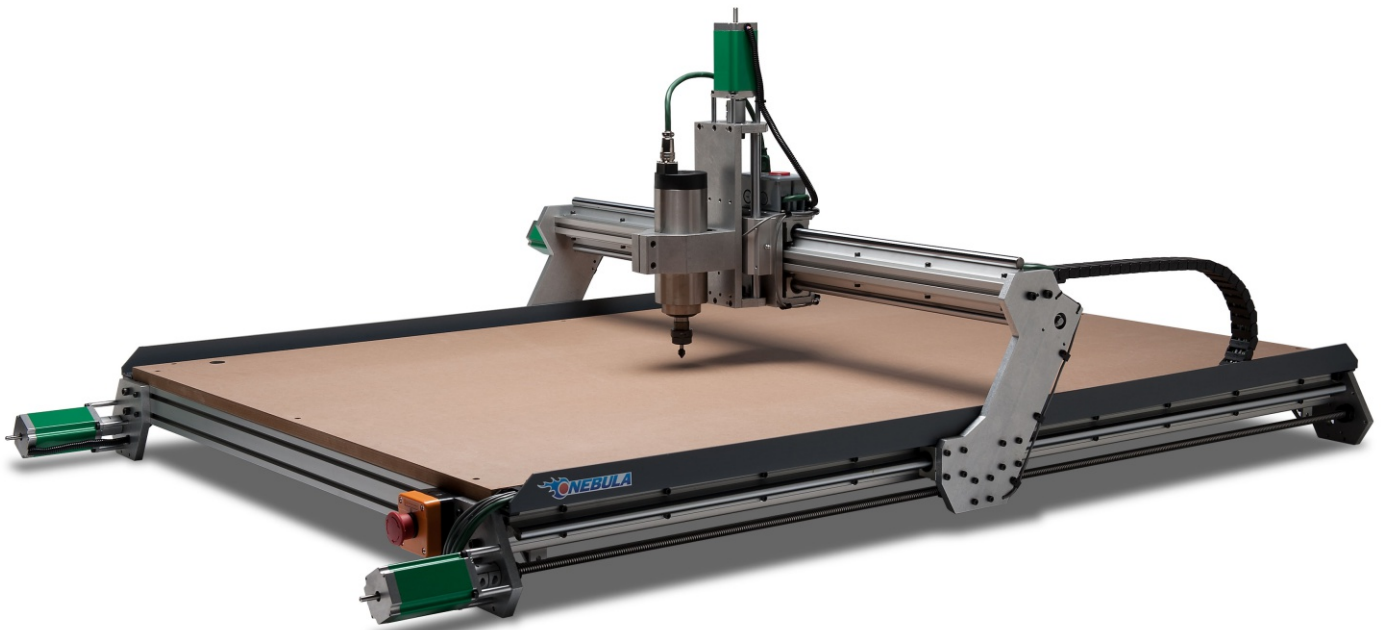




GALAXY SERIES CNC ROUTERS

Quick Start Guide



www.probotix.com

309.691.2643

HOW TO GET HELP

Online Support

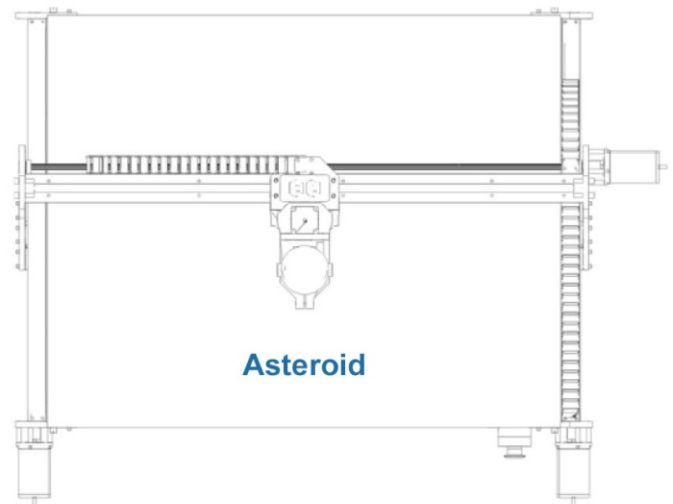
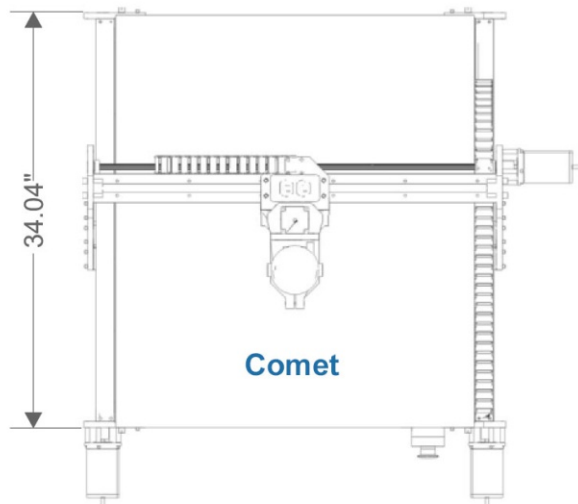
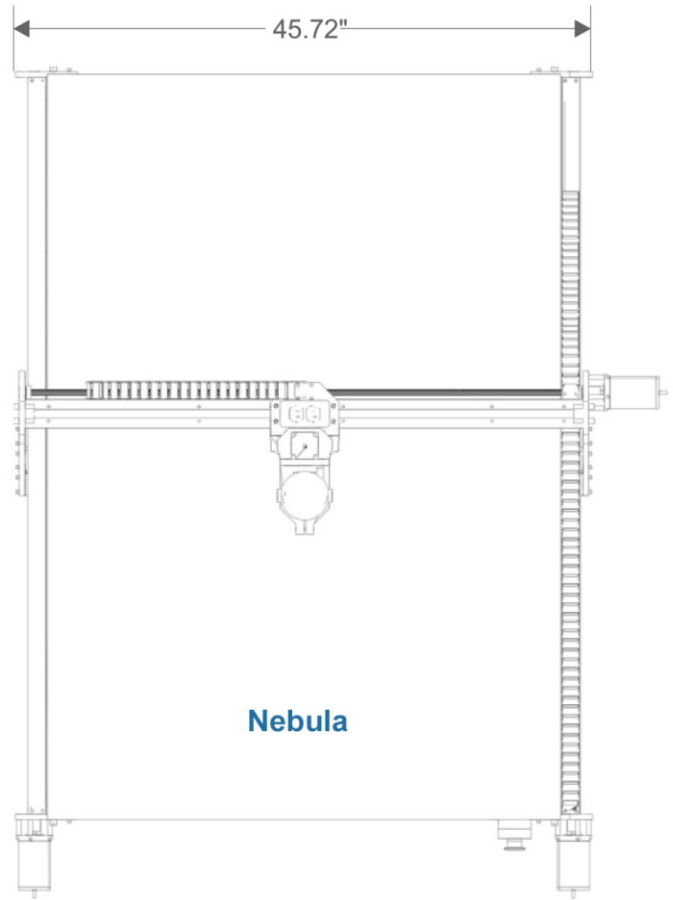
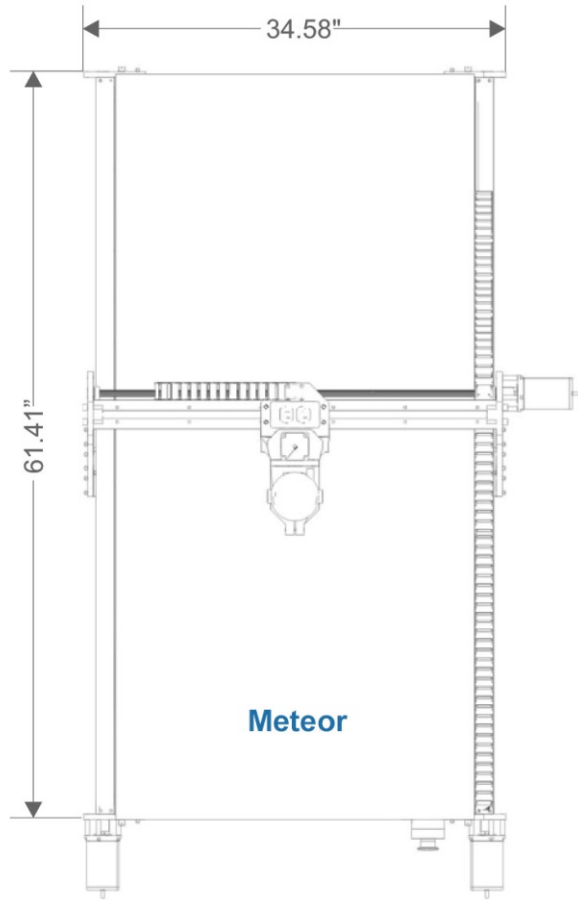
<http://www.probotix.com/wiki/>

<http://www.probotix.com/forum/>

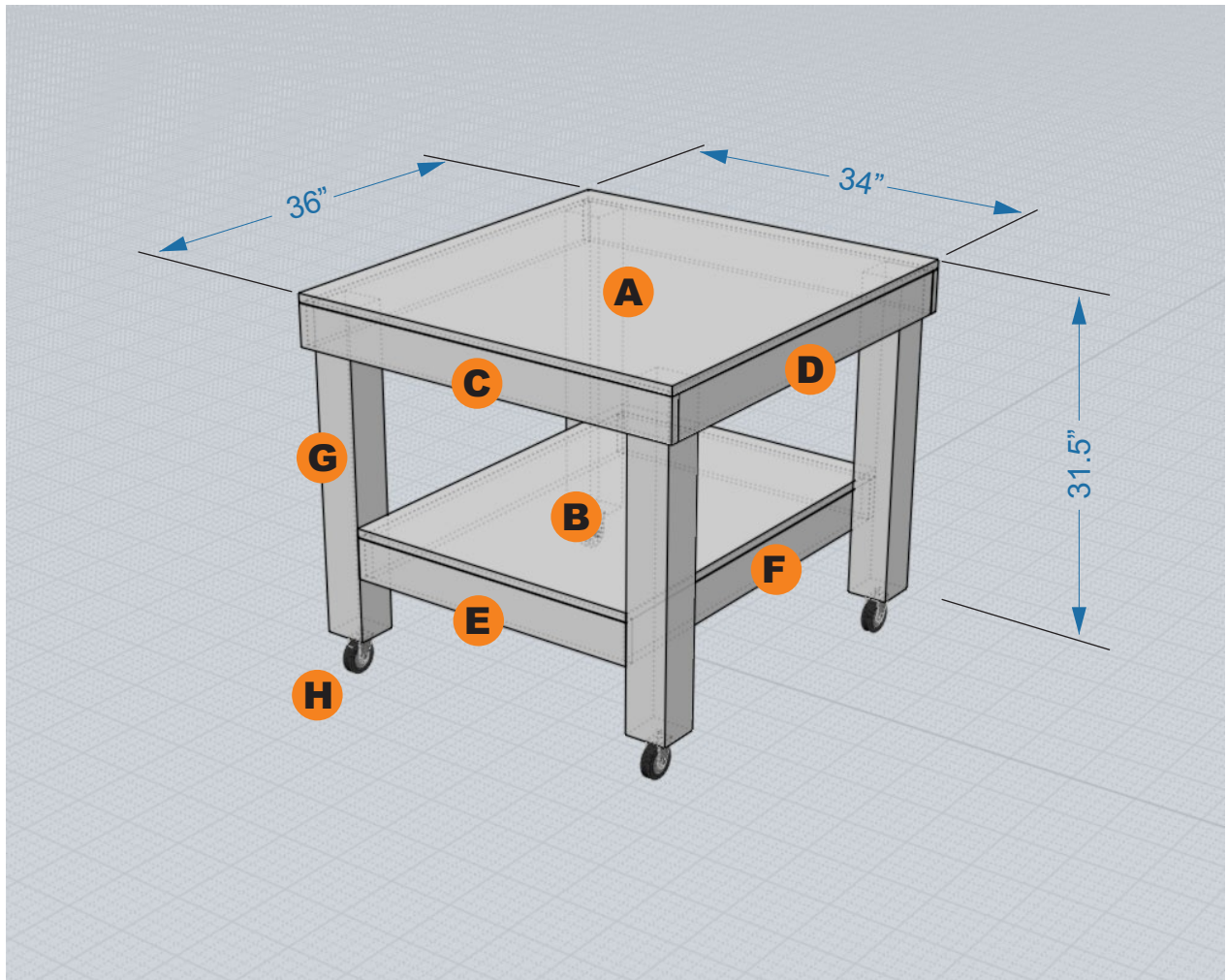
Telephone Support

309.691.2643

MACHINE FOOTPRINTS

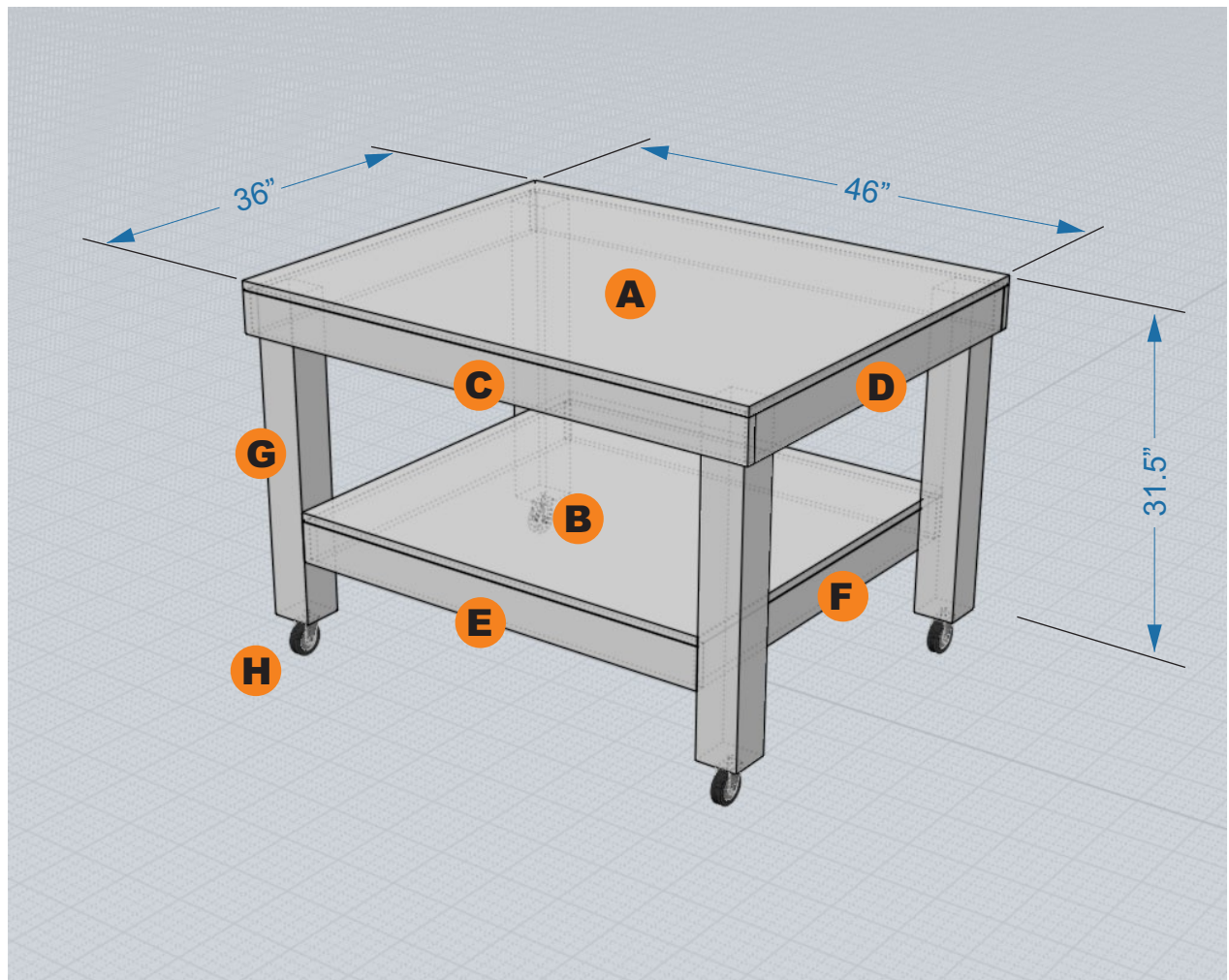


BUILDING A TABLE - COMET



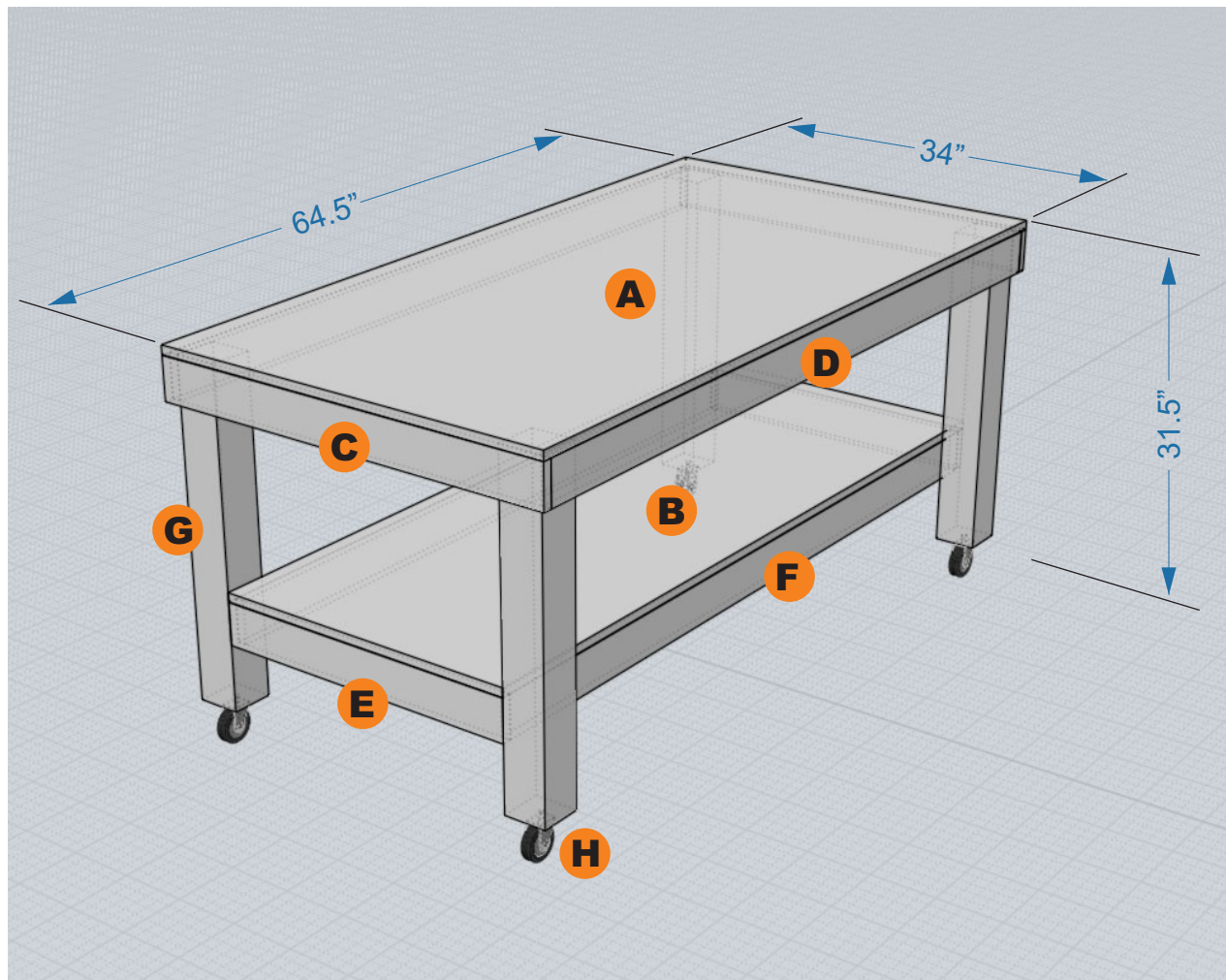
- A** 3/4" MDF or Plywood, 34" x 36"
- B** 3/4" MDF or Plywood, 24.5" x 34.5"
- C** 2pcs 1x4 Pine, 34" Long
- D** 2pcs 1x4 Pine, 34.5" Long
- E** 2pcs 1x4 Pine, 25.5" Long
- F** 2pcs 1x4 Pine, 33" Long
- G** 4pcs 4x4 Pine, 27.25" Long
- H** 4pcs 3.5" Tall Locking Castors

BUILDING A TABLE - ASTEROID



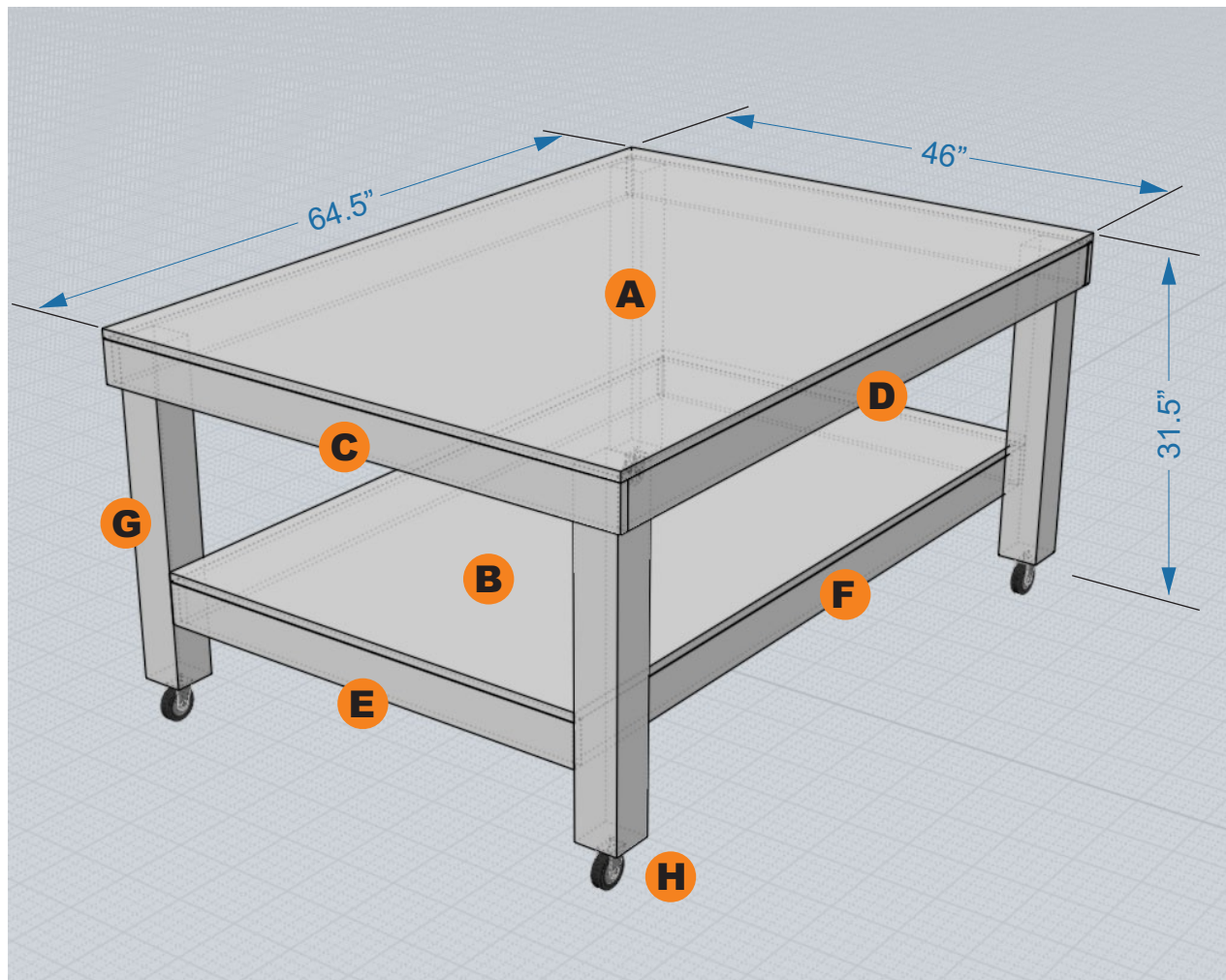
- A** 3/4" MDF or Plywood, 46" x 36"
- B** 3/4" MDF or Plywood, 37.5" x 34.5"
- C** 2pcs 1x4 Pine, 46" Long
- D** 2pcs 1x4 Pine, 34.5" Long
- E** 2pcs 1x4 Pine, 37.5" Long
- F** 2pcs 1x4 Pine, 33" Long
- G** 4pcs 4x4 Pine, 27.25" Long
- H** 4pcs 3.5" Tall Locking Castors

BUILDING A TABLE - METEOR



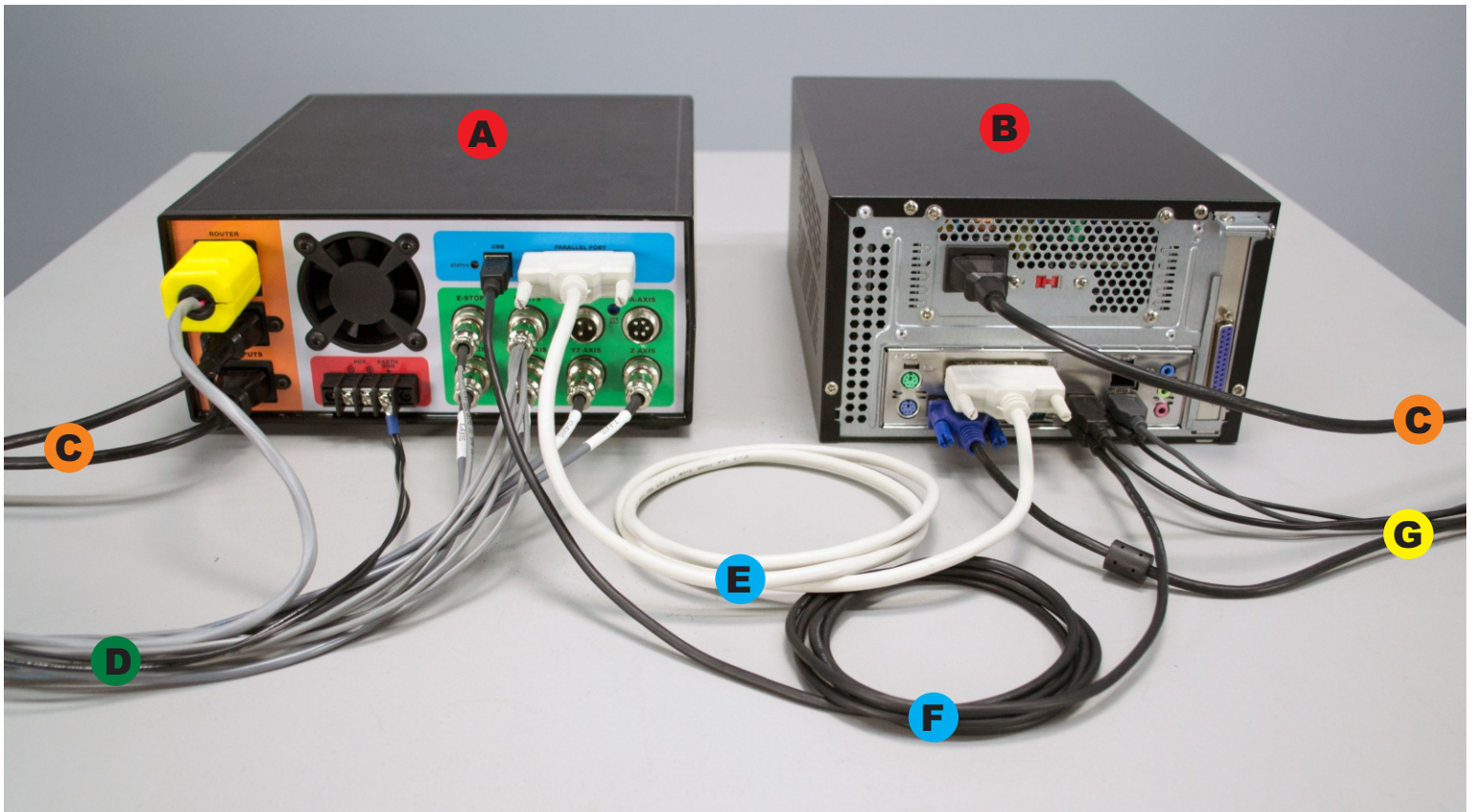
- A** 3/4" MDF or Plywood, 34" x 64.5"
- B** 3/4" MDF or Plywood, 25.5" x 63"
- C** 2pcs 1x4 Pine, 34" Long
- D** 2pcs 1x4 Pine, 63" Long
- E** 2pcs 1x4 Pine, 25.5" Long
- F** 2pcs 1x4 Pine, 61.5" Long
- G** 4pcs 4x4 Pine, 27.25" Long
- H** 4pcs 3.5" Tall Locking Castors

BUILDING A TABLE - NEBULA



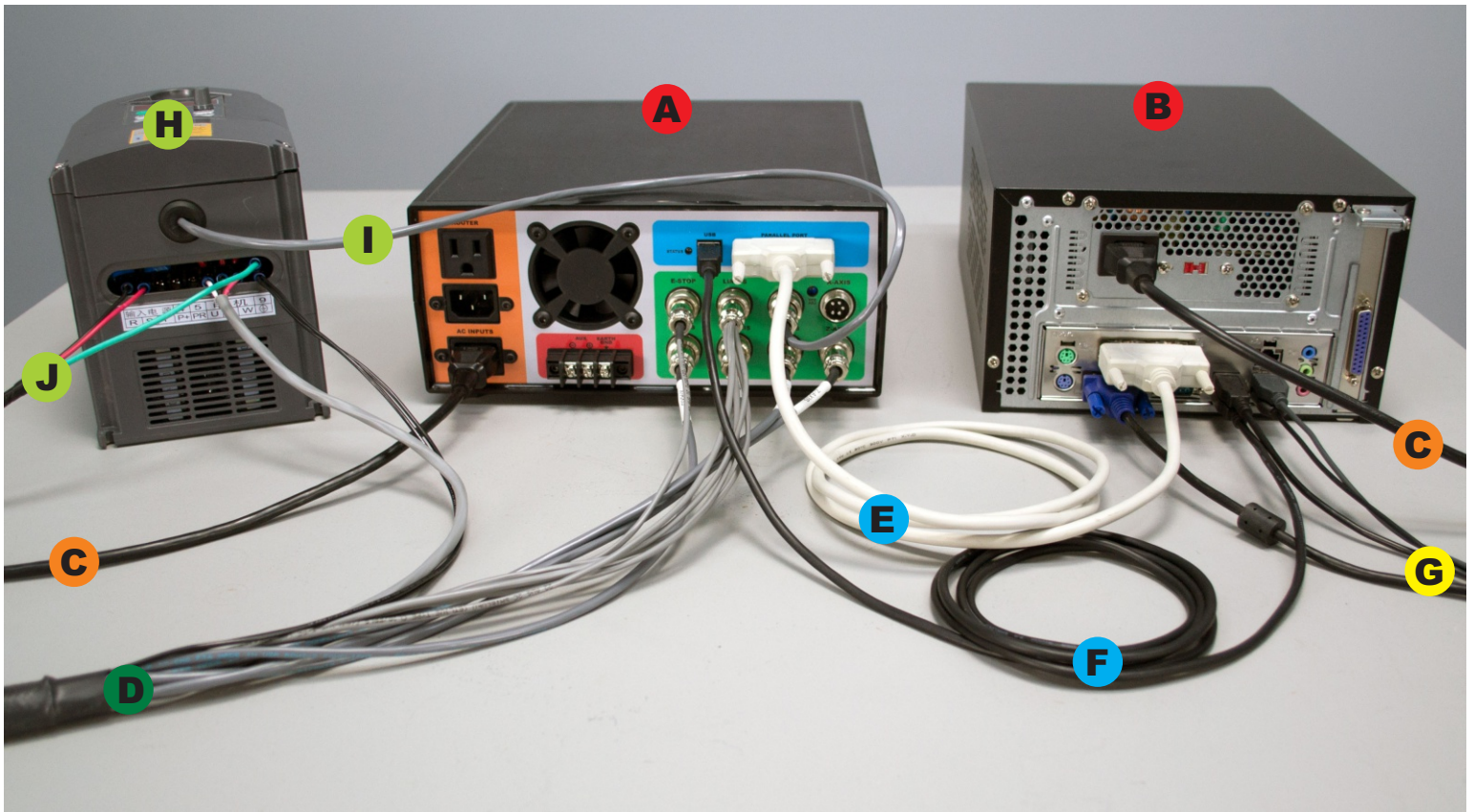
- A** 3/4" MDF or Plywood, 46" x 64.5"
- B** 3/4" MDF or Plywood, 37.5" x 63"
- C** 2pcs 1x4 Pine, 46" Long
- D** 2pcs 1x4 Pine, 63" Long
- E** 2pcs 1x4 Pine, 37.5" Long
- F** 2pcs 1x4 Pine, 61.5" Long
- G** 4pcs 4x4 Pine, 27.25" Long
- H** 4pcs 3.5" Tall Locking Castors

CONNECTION DIAGRAM (ROUTER)



- A** UNITY CONTROLLER
- B** COMPUTER
- C** 110VAC POWER
- D** MACHINE HARNESS
- E** PARALLEL CABLE
- F** USB CABLE
- G** KEYBOARD, MOUSE, MONITOR, JOG PENDANT

CONNECTION DIAGRAM (VFD SPINDLE)



- A** UNITY CONTROLLER
- B** COMPUTER
- C** 110VAC POWER
- D** MACHINE HARNESS
- E** PARALLEL CABLE
- F** USB CABLE
- G** KEYBOARD, MOUSE, MONITOR, JOG PENDANT
- H** VFD
- I** VFD CONTROL CABLE
- J** 220VAC

UNITY CONTROLLER PORTS



A: AC INPUT - Primary power input for power supply.

B: AC INPUT - Power input here is switched by relay to the (C) ROUTER output.

C: ROUTER - Connect to the green power cable from the machine harness. On-screen spindle controls, as well as M3/M5 g-codes will control this output. When a VFD spindle is used instead of a router, this outlet can be used with for a shop vac and is controlled by M8/M9.

D: USB - Connect to USB connector on PC.

E: PARALLEL PORT - Connect to the primary (built onto the motherboard) DB-25 connector on the PC.

F, G, H, I, J: MOTOR CONNECTIONS - Connect to each of the labeled motor connections from the machine harness.

J: A-AXIS - For optional rotary axis.

K: VFD - Connect to 3-pin VFD pigtail for speed control of a VFD spindle.

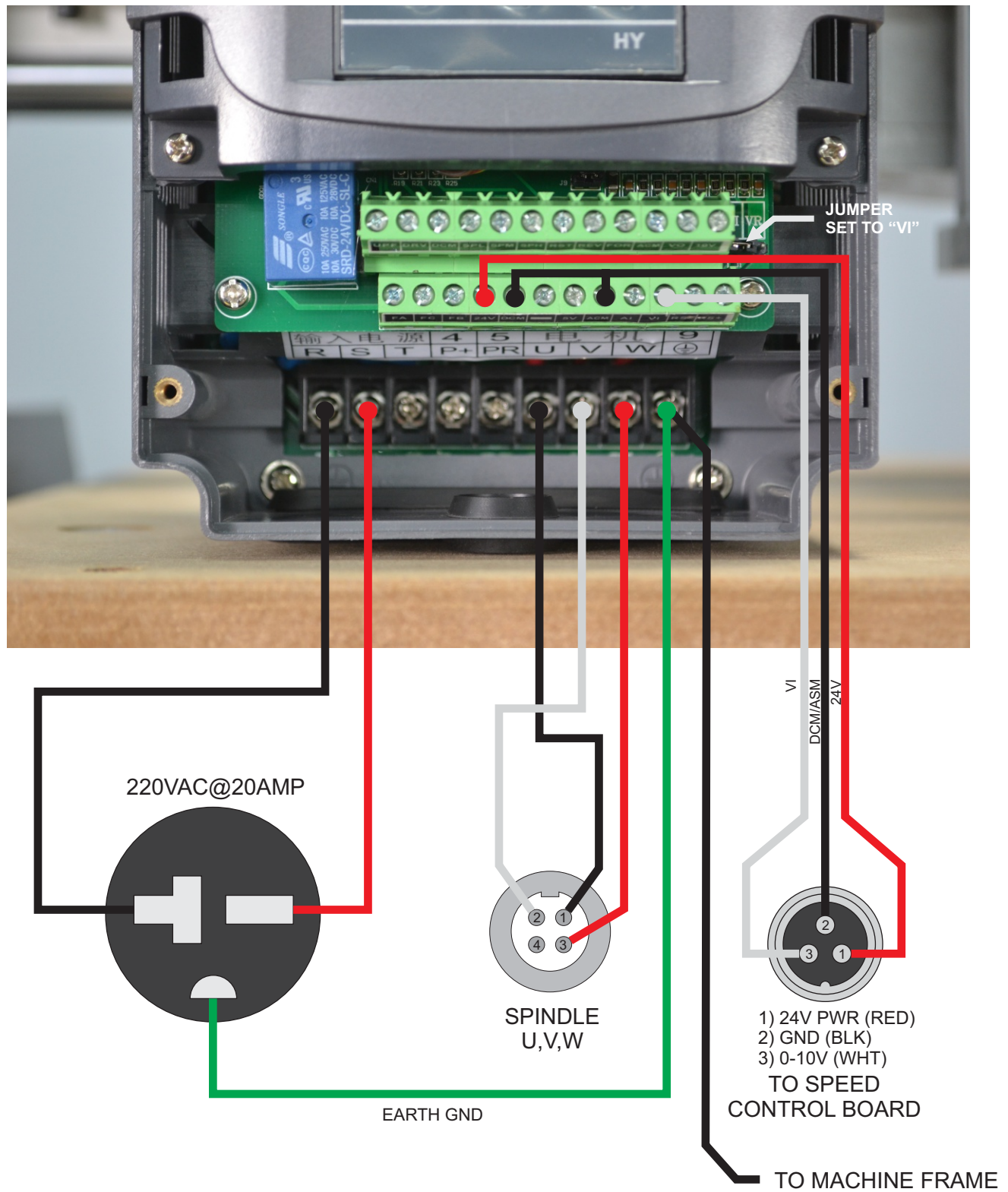
L: LIMITS - Connect to the 8-pin limit switch connector from the machine harness.

M: E-STOP - Connect to the 2-pin e-stop connector from the machine harness.

N: EARTH GND - It is recommended that the machine is grounded to earth. Connect the two black wires from the machine harness to this connection. If using a VFD, ground the machine frame to the VFD earth ground terminal instead. Additional earth grounding may be necessary when working with certain spindles or certain types of materials that may cause excess EMI or static electricity.

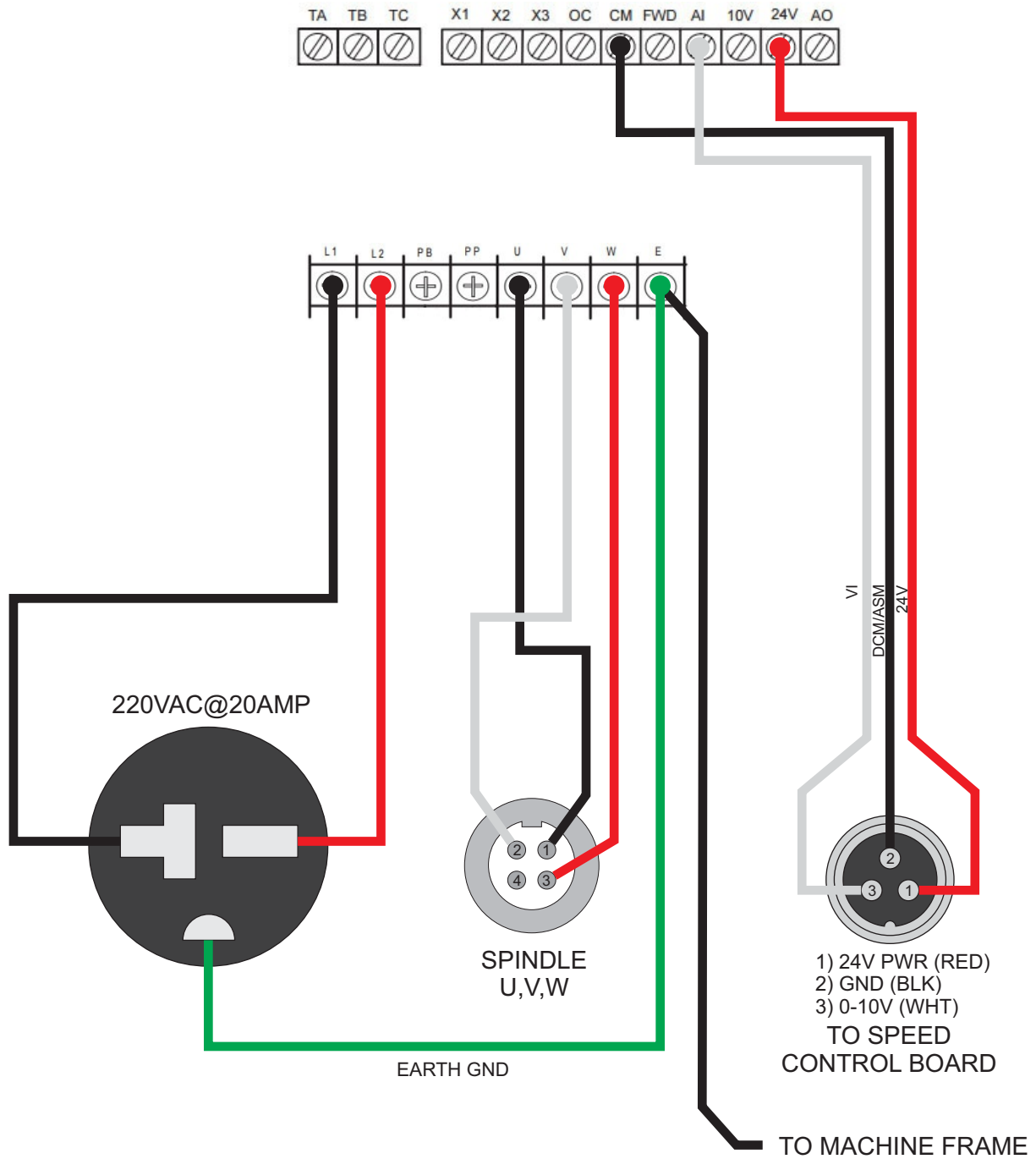
O: AUX - This is a 5V logic level signal that can be connected to a PowerSwitch Tail or other 5V@20mA relay circuit. This signal is controlled by the flood coolant controls in the software (M8/M9). Do not use if running a VFD spindle.

VFD WIRING DETAIL



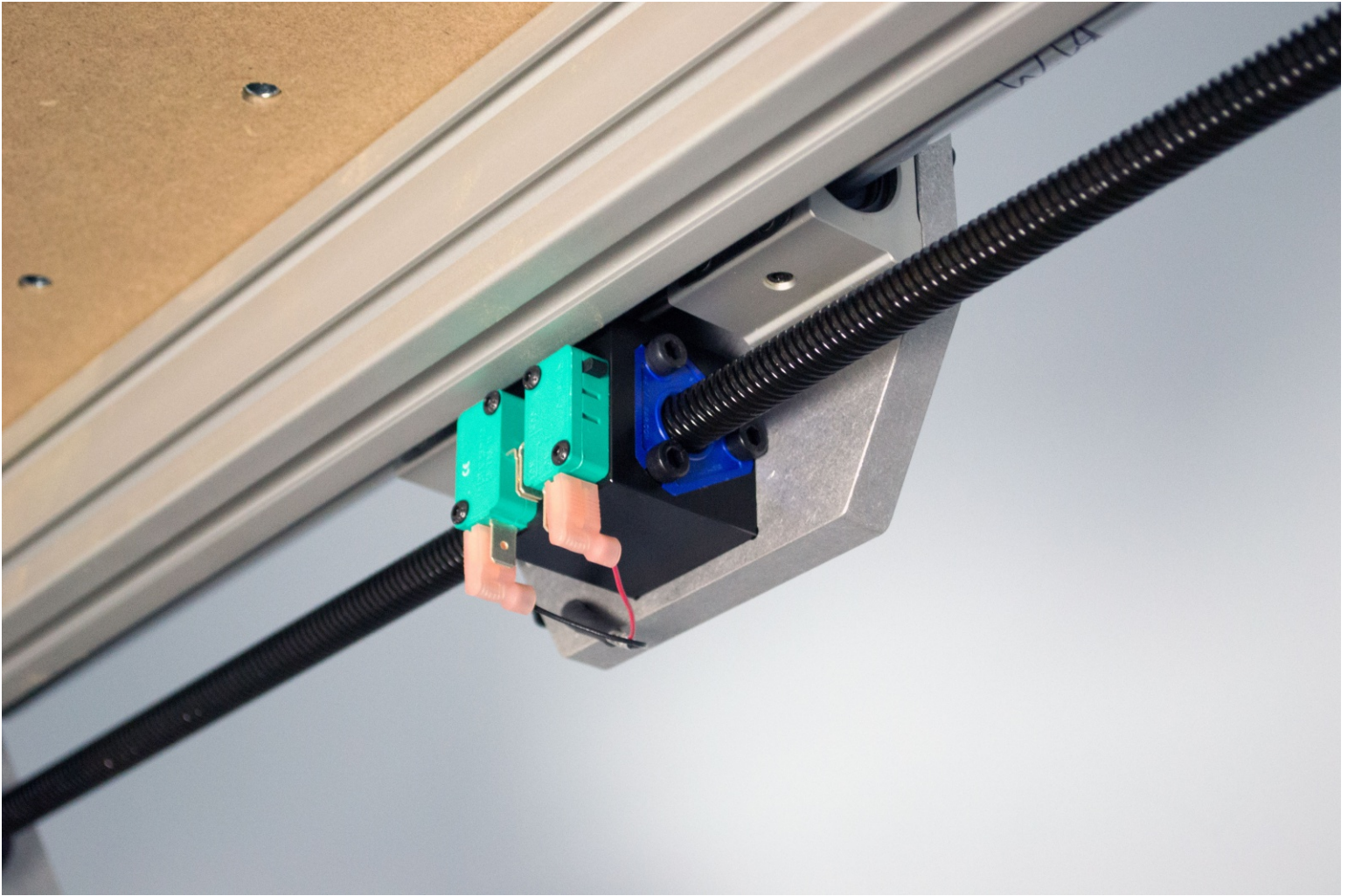
NOTE: Internal wiring of Chinese spindles is not consistent. If spindle spins in reverse, swap U & V

VFD WIRING DETAIL (SUNFAR)

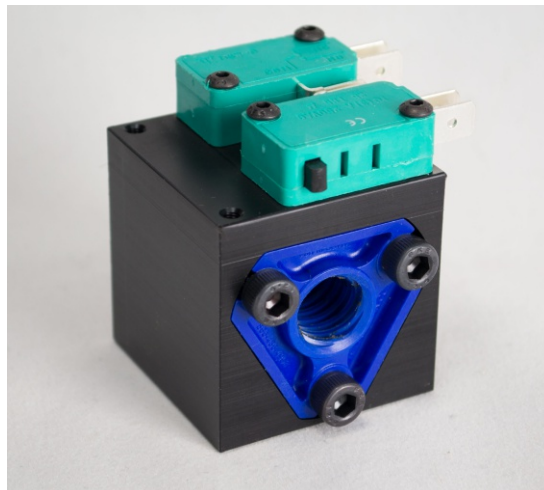


NOTE: Internal wiring of Chinese spindles is not consistent. If spindle spins in reverse, swap U & V

LIMIT SWITCHES

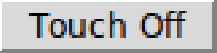


The Y1 and Y2 limit switches have been removed to protect them during transport. Reinstall them as seen above before running the machine.



GETTING STARTED

Start Up Procedure:

- Start computer
- Launch LinuxCNC from icon on desktop 
- Turn power on Unity Controller
- Verify red E-Stop indicator follows physical e-stop 
- Click orange Machine Power button 
- Click the Home All button 
- Click folder icon to open g-code file 
- Load tool into spindle or router
- Mount stock on the table
- Jog machine to place tool on origin of part
- Perform touch-off sequence (all 3 axis) 
- Verify spindle power switch is on 
- Hit the Run button 
- Watch in awe

MAINTENANCE

Daily Use:

Put a couple of drops of 3-in-1 oil on each of the six linear rails before homing the machine each day. This will allow a tiny amount of oil to be sucked up into the bearing housings before cutting any parts.

Use the included linear motion grease on the leadscrews. A light coating is enough, as Delrin is self-lubricating. You can use WD-40 and an air nozzle to remove debris from the screw. Be sure to dry the screw of the WD-40 before re-applying grease as WD-40 is a solvent and will dissolve the grease.

The Grease Zerk on the z-axis bearings are not used.

All of the other bearings are sealed. The most important thing is to keep any dust cleaned off of the machine, especially if you are cutting abrasive materials such as MDF, fiberglass, or carbon fiber.

High Humidity Environments & Storage:

If you use your machine in a high humidity environment, ie in a shed or other non-airconditioned environment, or if you plan to store it without use, rust can form on the linear rails, leadscrews, and the black-oxide machine fasteners. Coat these surfaces with grease or WD-40 often. Again, be sure to dry the screws and rails of the WD-40 before re-applying grease and oil before use. The black-oxide machine fasteners will not need to be wiped dry.

Bearing Replacements:

Depending on the amount of use and the loads on the machine for your application, the linear bearings and leadscrew ball bearings will need to be replaced eventually. You will notice excess slop, marks on the rails, or jerky motion on the affected axis. Replace them annually for worry free operation.

Anti-backlash Nuts:

The Delrin anti-backlash nuts are designed to wear and may need to be replaced periodically, depending upon the amount of use and abuse your machine receives. When they fail, you will notice backlash on the affected axis. You can check them by pulling and pushing on each axis and observing slop between the leadscrew and the drive nuts. To replace them, you will need to remove the leadscrews. Replace them annually for worry free operation.

LINUXCNC KEYBOARD SHORTCUTS

ESCAPE	E-STOP
F1	TOGGLE E-STOP
F2	TOGGLE MACHINE POWER
F3	MANUAL MODE
F4	AUTO MODE
F5	MDI MODE
F6	RESET INTERPRETER
F7	TOGGLE MIST
F8	TOGGLE FLOOD
F9	TOGGLE SPINDLE FORWARD
F10	TOGGLE SPINDLE REVERSE
F11	DECREASE SPINDLE SPEED
F12	INCREASE SPINDLE SPEED
X	SELECT X-AXIS
Y	SELECT Y-AXIS
Z	SELECT Z-AXIS
LEFT/RIGHT ARROW	JOG X-AXIS
UP/DOWN ARROW	JOG Y-AXIS
PAGE UP/DOWN	JOG Z-AXIS
HOME	HOME SELECTED AXIS
END	TOUCH-OFF SELECTED AXIS
</>	DECREASE/INCREASE JOG SPEED
C	SELECT CONTINUOUS JOGGING
I	SELECT INCREMENTAL JOGGING AND TOGGLE BETWEEN INCREMENTS
1-9,0	FEED OVERRIDE 10%-90%, 0 IS 100%
@	TOGGLE COMMANDED/ACTUAL POSITION DISPLAY
#	TOGGLE ABSOLUTE/RELATIVE POSITION DISPLAY
O	OPEN A PROGRAM
R	RUN THE OPENED PROGRAM
P	PAUSE PROGRAM
S	RESUME PAUSED PROGRAM
A	STEP ONE LINE IN PAUSED PROGRAM
B	TAKE SPINDLE BREAK OFF
ALT-B	PUT SPINDLE BRAKE ON
ALT-S	START LOGGING
ALT-P	PAUSE LOGGING
ALT-F	SAVE LOG FILE
CTRL-P	PRINT LOG FILE (ONLY WITH XGRAPH)

G-CODE QUICK REFERENCE

Motion		
G0		Rapid motion
G1		Coordinated motion ("Straight feed")
G2, G3	I J K or R	Coordinated helical motion ("Arc feed") CW or CCW
G38.2		Straight Probe
G80		Cancel motion mode
G81	R L P	Drilling Cycle
G82...G89	R L P Q	Other canned cycles
G33	K	Spindle-synchronized motion
G33.1	K	Rigid Tapping
G76	P Z I J R K Q H L E	Multipass lathe threading cycle
Plane Selection (affects G2, G3, G81...G89, G40...G42)		
G17		Select XY plane
G18		Select XZ plane
G19		Select YZ plane
Distance Mode		
G90		Absolute distance mode
G91		Incremental distance mode
Feed Rate Mode		
G93		Inverse time feed rate
G94		Units per minute feed rate
G95		Units per revolution
Units		
G20		Inches
G21		Millimeters
Cutter Radius Compensation		
G41, G42	D	Start cutter radius compensation left or right
G41.1, G42.1	D L	Start cutter radius compensation left or right, transient tool
G40		Cancel cutter radius compensation
Tool Length Offset		
G43	H	Use tool length offset from tool table
G43.1	I K	Use specified tool length offset for transient tool
G49		Cancel tool length offset
Return Mode in Canned Cycles		
G98		Retract to R position
G99		Retract to prior position
Path Control Mode		
G61		Exact Path mode
G61.1		Exact Stop mode
G64	P	Continuous mode with optional path tolerance
Stopping		
M0		Pause Program
M2		End Program
M1, M30, M60		Other stop codes
Spindle Control		
M3, M4	S	Turn spindle clockwise or counterclockwise
M5		Stop spindle
G96	D S	Constant surface speed mode (foot/minute or meter/minute) with top speed
G97		RPM mode
Coolant		
M7		Turn mist on
M8		Turn flood on
M9		Turn all coolant off
Other Modal Codes		
F		Set Feed Rate
S		Set Spindle Speed
T		Select Tool
M50...M53	P0 (off) or P1 (on)	Feed Override, Spindle Override, Adaptive Feed, Feed Hold
G54...G59, G59.1...G59.3		Select coordinate system
Flow-control Codes		
O ...	sub/endsub, while/endwhile, if/else/endif, do/while, call, break/continue/return	
Non-modal Codes		
M6	T	Change tool
G4	P	Dwell (seconds)
G10 L2	P X Y Z A B C	Coordinate system origin setting
G28		Return to home
G30		Return to secondary home
G53		Motion in machine coordinate system
G92	X Y Z A B C	Offset coordinate systems and set parameters
G92.1		Cancel offset coordinate systems and set parameters to zero
G92.2		Cancel offset coordinate systems but do not reset parameters
G92.3		Apply parameters to offset coordinate systems
M101...M199	P Q	User-defined M-codes
(...)		A comment "..." to the user
(MSG,...)		Display the message "..." to the user (e.g., in a popup)
(DEBUG,...#123...#<foo>)		Display the message (with variables substituted) like MSG
(PRINT,...#123...#<foo>)		Display the message (with variables substituted) to stderr

Table 1. Coordinate System

P Value	Coordinate System	G code
0	Active	n/a
1	1	G54
2	2	G55
3	3	G56
4	4	G57
5	5	G58
6	6	G59
7	7	G59.1
8	8	G59.2
9	9	G59.3

