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# Colombo Spindle with Yaskawa V1000



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## Introduction

The Colombo spindle and Yaskawa V1000 variable frequency drive (VFD) come preprogrammed and should require only basic wire hookups prior to operation. Refer to the guide from the manufacturer that comes with the Colombo spindle for latest updated instructions. This document applies to Colombo spindles with Yaskawa V1000 3HP & 5HP variable frequency drives for the PRSalpha and PRSstandard control boxes. Be aware that some variants of Colombo Spindle have a 24v spindle fan which requires a 24v power supply.

## **WARNING! Electric Shock Can Kill!**

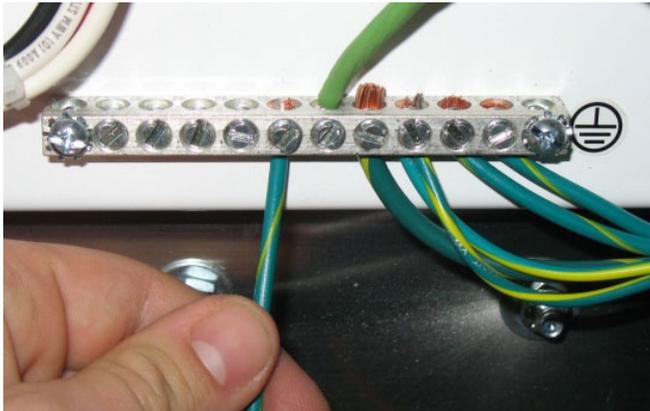
**Use extreme caution when working near electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death. Use extreme caution throughout this installation.**

**These instructions are intended for use by a licensed electrician.**

## Connect Spindle Power Cable

Power to the VFD must be connected to the proper contactor in the ShopBot control box. This is necessary for the safety systems to work correctly if the emergency stop button is pressed. For this installation the Yaskawa VFD supplied by ShopBot has a power cable pre-installed at the factory.

### Route power cable into box and connect ground wire



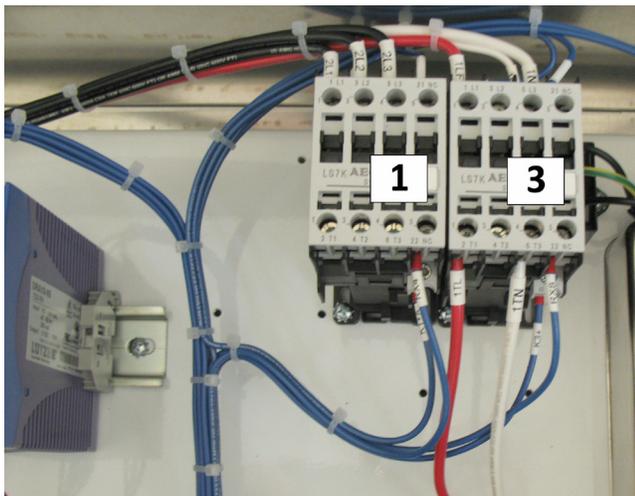
- After the ShopBot control box and the VFD are mounted, run the black power cable from the VFD to a vacant cord grip in the control box. Note that this is not the Roxtec cable window intended for the smaller motor and sensor cables.
- Insert the cable from the VFD into the cable clamp, pushing enough wire into the control box to reach the spindle contactor(s) and the ground bus bar.
- Connect the green wire from the VFD power cable to the ground bus bar, located under the main disconnect in the control box.

## Contactor Configurations

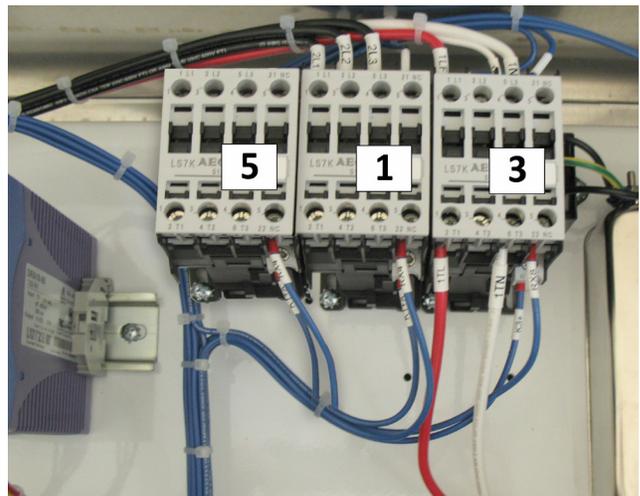
Determine the control box contactor configuration.

**Note:** The “domestic” configuration applies to the United States, Canada, and Mexico.

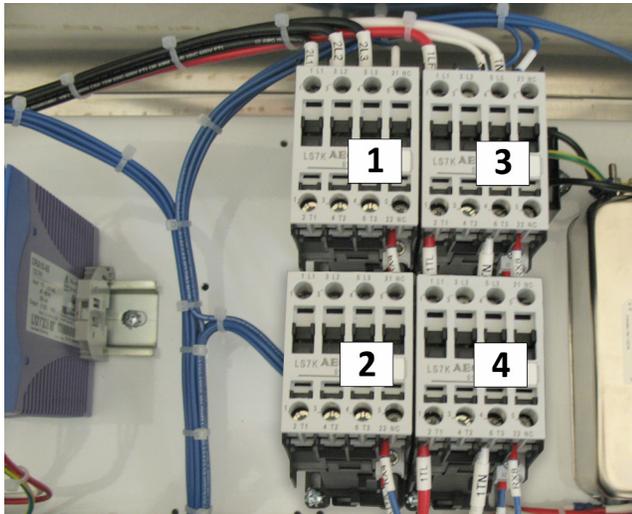
Control boxes for all other countries are shipped with the “international” configuration.



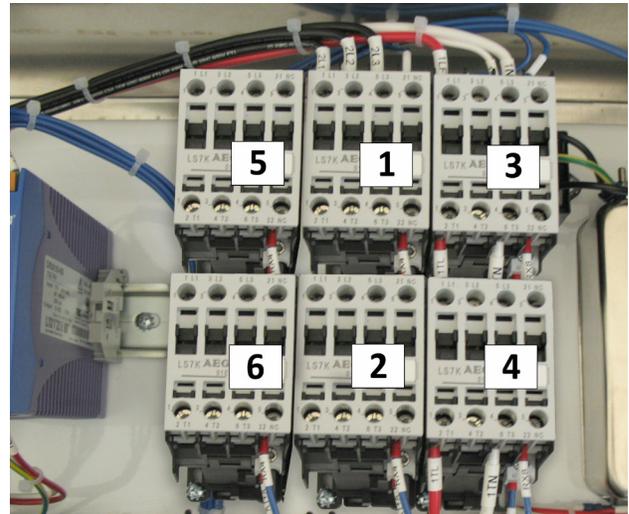
**Domestic - 1 Spindle**  
Connect to #1



**Domestic - 2 Spindles**  
Connect first spindle to #1, second spindle to #5



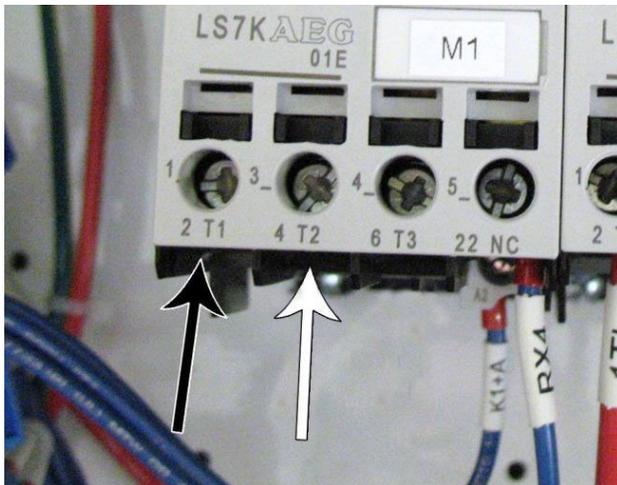
**International - 1 Spindle**  
Connect to #2



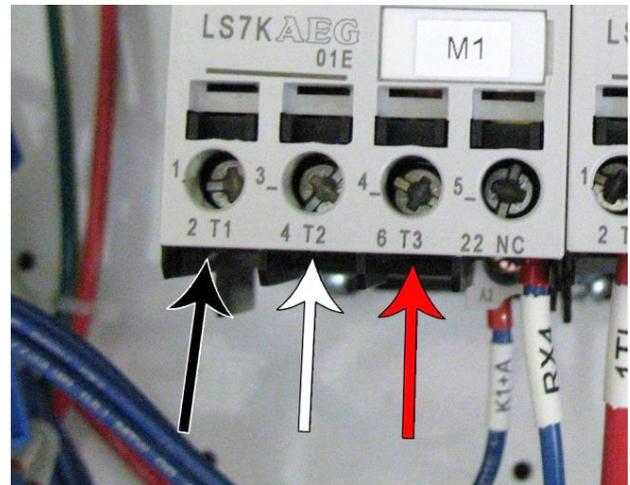
**International - 2 Spindles**  
Connect first spindle to #2, second spindle to #6

### Connect Power Conductors

Connect the line conductors from the VFD to the proper contactor using the following terminals:



**Single Phase Spindles**  
2T1 - Black Wire  
4T2 - White Wire



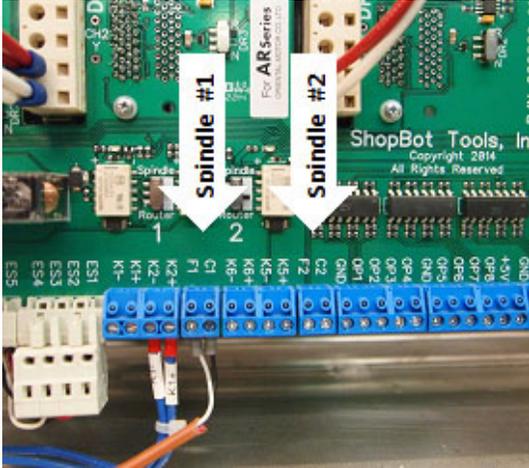
**Three Phase Spindles**  
2T1 - Black Wire  
4T2 - White Wire

After all power wires are in place, tighten the cord grip nut.

## Connect the VFD to the Control Board

The VFD receives start and stop instructions from the ShopBot control box using a small brown or grey cable. This cable will be factory installed at the VFD end and must be attached to the control board.

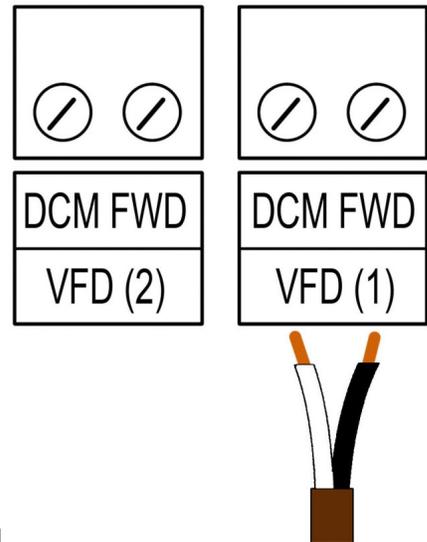
### PRSalpha control box (built after 6/2014)



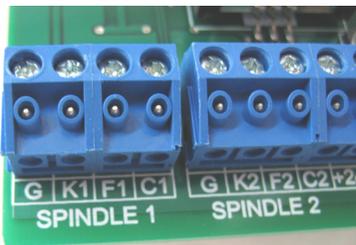
- Strip back approximately 1/4” (6mm) of insulation from both the black and white. The red wire is not used and should be clipped back.
- Route the cable through the Rextec cable window.
- Connect the white wire to the F1 position (F2 if spindle 2).
- Connect the black wire to the C1 position (C2 if spindle 2).

### PRStandard control box (built before 6/2014)

- Connect the two-conductor cable labeled “VFD”, included with the control box, into the VFD terminals on the control board labeled “VFD1”. For a second spindle use the terminals labeled “VFD2”. Connect the black wire to the “FWD” terminal and the white (or green) wire to the “DCM” terminal.
- Make sure that the VFD and control box are OFF before continuing. Run the brown cable from the VFD through the Rextec cable window on the right side of control box.
- Connect the black and white wires from this cable into the terminal blocks on the control board labeled VFD(1). For a second spindle, use the terminal labeled VFD(2). These terminal blocks are located near the lower left corner of the control board.
- Connect the black wire to the FWD terminal and the white wire to the DCM terminal. The red wire is not used and should be clipped back.



### PRStandard control box



Route the brown cable from the VFD into the control box. Locate the terminal block marked “Spindle 1” on the corner of the control board.

Connect the black wire to F1, and the white wire to C1.

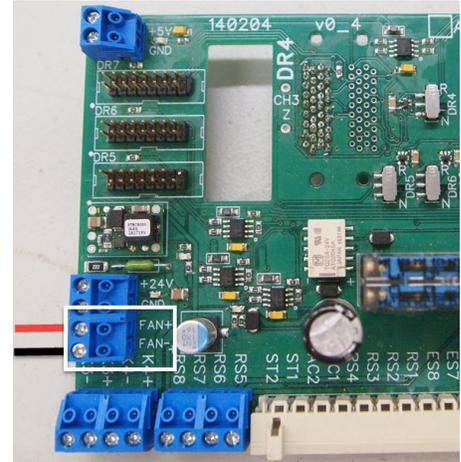
## Connect 24V Spindle Fan

Some Colombo spindles also have a cooling fan that runs with 24 volt power. If it does, there will be a small grey cable labeled “24 volt” coming from either the spindle or the VFD. There will be two wires (red and black) in this cable which must be attached to a 24 volt power source in the control box. All PRSAlpha and PRSstandard models released after 9/5/07 come with a 63/24v power supply in the control box. The 63 volt side powers the drivers and the 24 volt side powers spindle fans and relay boards. If the tool does not have a 24 volt power supply, it will be necessary to add one.

### PRSSalpha control box (built after 6/2014)

The updated PRSSalpha control card for AR style motors has 24 volt power available specifically for the spindle fan.

- Strip back approximately 1/4” (6mm) of insulation from both the red and black wires at the loose end of the cable from the fan connection plug.
- Run the cable through the Roxtec cable window.
- Connect the red wire to the position labeled “FAN+”.
- Connect the black wire to the position labeled “FAN-”.



### PRSSalpha control box (built before 6/2014)

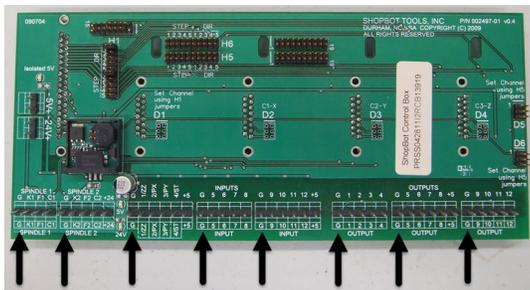
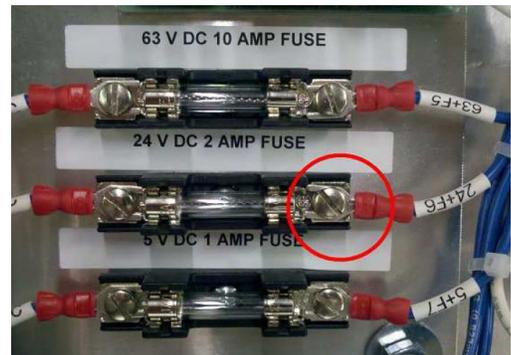


- Earlier PRSSalpha control boxes have a 24 volt power supply, but no dedicated position on the control board. The fan cable will get power directly from the 24 volt power supply.
- Strip back approximately 1/4 inch (6mm) of insulation from both the red and black wires at the loose end of the cable from the fan connection plug.
- Run the cable through the Roxtec cable window.
- Connect the red wire to an available positive (+) terminal.
- Connect the black wire to an available negative (-) terminal.

## PRStandard control box

PRStandard control boxes get power from a toroid transformer. The positive power will come from the 24 volt fuse and the ground will be at an available ground passion on the control board.

- Locate the 24v fuse and an available control board ground terminal (labeled “G”).
- Strip back approximately 1/4 inch (6mm) of insulation from both the red and black wires at the loose end of the cable from the fan connection plug.
- Route the cable inside the control box.
- Connect the red wire to the right side of the fuse marked “24 V DC” circled at left.



- Connect the black wire to any empty ground (G) connection on the control board. Ground positions are indicated at left with arrows.

## Testing and troubleshooting

### Test the spindle fan

Before running the first test cut, verify that the spindle fan is running properly. This is very important for the safe operation of the spindle!

To test:

- Turn on control box.
- Check that all emergency stop switches are disengaged (twist counter-clockwise to release).
- On PRStandard tools, press the blue RESET button on the 3-button pendant.

The spindle fan should now be running. If not, ensure it is connected to the proper 24 volt power source and ground location.

## Engage the interlock switch



The spindle lockout switch on the front of the control box (All PRS models built after 2012) must be set to ENGAGED in order for the spindle to run. Use the key that came attached to one of the collet wrenches.

To change bits, turn the key to DISENGAGED and remove it. If the spindle is wired through the control box properly, this prevents any chance of the spindle powering on while changing the bit.

## Using the ShopBot keypad with the Colombo spindle

The ShopBot control keypad can also be used to run the spindle(s) when warming up the spindle or performing diagnostics:

- Open the keypad from the ShopBot control software using the [K]eyboard command.
- Click on Output #1 to run spindle #1 and/or Output #2 to run spindle #2 (light turns green). Note that #1 or #2 can also be activated with the ALT-1 or ALT-2 keystrokes.
- On the PRSalpha, push the green START button to run the spindle.
- On the PRSstandard, push OK on the software spindle start prompt.
- When the keypad is closed, the FWD signal from the ShopBot control box to the spindle will be cut off and the spindle will stop. The keypad will time out after a few minutes.

## Troubleshooting

### If the spindle is rotating the wrong direction

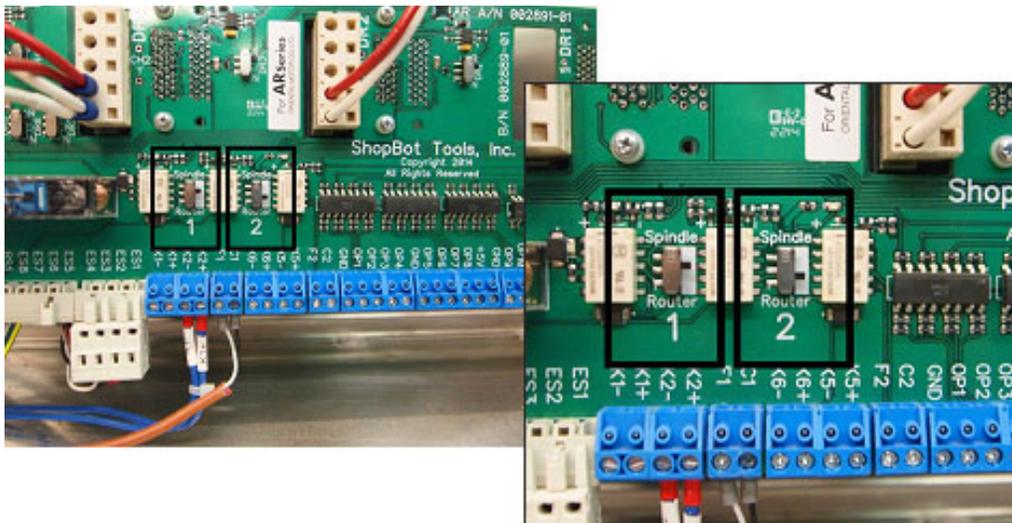
**WARNING!! Spinning the spindle in reverse can cause serious damage to tooling, spindles, and machine which can result in the collet nut loosening and causing tooling failure and personal injury. Do not operate spindle in reverse.**

- Disconnect power to control box and VFD.
- Carefully remove the VFD face and disconnect data cable connecting the face to the body.
- Reverse wiring (on any two legs) going to the spindle. These are labeled T1 (U), T2 (V), or T3 (W). Any two of them can be switched to reverse the direction of rotation.
- Reconnect data cable and replace the VFD face.

### If there is no power to the VFD

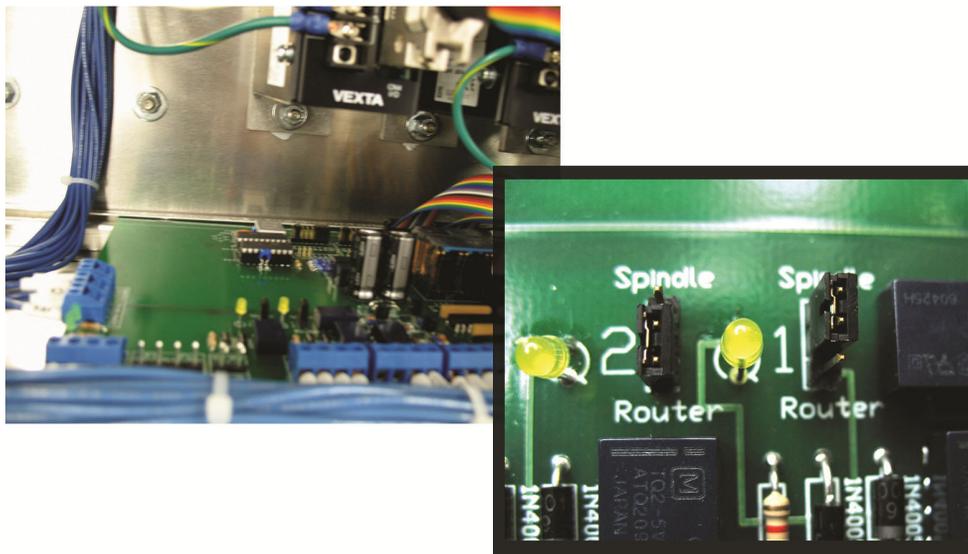
- Check that the power disconnect for the spindle is on.
- Check that the spindle/router settings on the control board are set to the spindle side.

### PRSalpha control box (built after 6/2014)



Locate the spindle/router switches near the middle of the control board. The close-up shows switch #1 set for spindle operation and switch #2 set to router operation.

### PRSalpha control box (built before 6/2014)



Locate the spindle/router jumpers on the control board next to the yellow LED lights. The close-up shows jumper #2 set for router operation and jumper #1 set for spindle operation.