

ISS-02 ISOLATED SPINDLE SPEED MODULE

For use with UBOB based products (MP3000)

The ISS-02 comes with a CD support disc. If you are setting up an MP3000 and Spindle Speed for the first time you MUST first install the MP3000 drivers and MACH support files before installing the Spindle Speed Drivers..

Run the MP3000-Install.exe file on the CD. Be sure to read the MP3000 setup section of the MP3000 Manual (on the CD) and get all the MP3000 functions working BEFORE you setup the ISS-02. The ISS-02 can be added at anytime.

To add the ISS-02 to an existing MP3000 or to activate the module in an MP3000-SPS product locate the **MP3000-SpindleUpdate_Install.exe** file on the 4.05 (or later) Support CD or download from the Manuals section of the CandCNC Website at www.CandCNC.com/manuals. Run the exe file and it will add the correct profiles, screens and bitmaps to you MACH3 install.

ISS- 02 SPINDLE SPEED SPECS:

ANALOG OUTPUT:

- 0 - 10VDC Low Impedence. >20ma drive capability
- Low ripple (.01%)
- Floating power supply. Isolated from Logic ground.
- Better than 1% linearity over 90% of range
- Extremely linear from 500mv to 9.7volts DC
- usable down to 350Mvolts
- Turn off of voltage below 300mvolts (no creeping when RPM is set to zero)

OUTPUTS:

- Isolated Analog 0-10VDC
- SPDT relay contacts (isolated) for RUN signal (Spindle ON)
- SPDT relay contacts (isolated) for DIRECTION (Reverse)
- Normally OPEN or NORMALLY CLOSED option for both relays
- Common return cross connect for RUN and DIR (option)
- Separate remote VFD Breakout Card with relays and indicators.

INDICATORS

- Power (RED)
- RUN active (GRN)
- DIR active (YEL)

CONNECTOR:

Standard DB9

Up to 25ft cable, connects directly from Spindle Speed Module to VFD Breakout Card

OTHER FEATURES:

- Uses serial interface (not PWM or Step & Dir)
- Custom Plug-in allows better control
- Spin-up (warm-up) profiles for commercial spindles.
- Future tach feedback provisions

REV1 03/20/09

How it works;

The Spindle Speed is a processor based linear 0 -10 VDC isolated analog voltage generator. It takes an RPM command from the MACH speed DRO through a custom plug-in and converts that to a proportional analog control voltage. **To use the Spindle Speed you must have a motor speed control that will take 0-10VDC as an external control voltage.** Most VFD's have the option to use 0-10VDC analog control. Some DC motor speed controls will also take 0-10VDC analog speed control. The output of the ISS0-02 is totally isolated from the control electronics (UBOB) or the PC logic ground. You can use this control on VFD's and Speed Controls with or without isolated control electronics.

The ISS-02 in combination with the UBOB has universal relay outputs for RUN (enable) and DIRECTION (reverse). The ISS-02 connects to the UBOB card via a single 16 pin cable ribbon cable. It is designed to install in the front panel of the MP3000 so the 9Pin cable to the VFD Breakout is exposed. The analog signal, RUN and DIRECTION signals are sent to the VFD Breakout through a DB9 Extension cable (all pins straight through). Cable can be up to 25 ft long (8 meters).

Since all operator controls and feedback is through the MACH screens the ISS-02 and UBOB can be placed anywhere in the control electronics.

It is essential that the serial port on the control PC running MACH be attached to the serial input on the UBOB (MP3000). Since all communication to the ISS-02 is through the UBOB via RS232.

TESTING

The first test it is to hook up the VFD Breakout via a DB9 cable and place it where you can access the Analog + and Analog - screw terminals and see the card. Clip a DVM set on 20V DC Volts scale across the Analog + and Analog - (red lead on +; black lead on -). Power up the UBOB(MP3000) section and you should see a red power light on the VFD Breakout. If you do not have a power light check all of your cables and connections carefully.

Push the TEST button on the front of the ISS-02; release. The test LED should light. The voltage reading on the DVM should be between 4.95 and 5.05 VDC. This tests all of the ISS-02 based circuitry.

Leave the VFD Breakout connected and the DVM attached. Make sure the MP3000 (or UBOB) is attached to the PC parallel and PC serial ports as shown in the MP3000 Manual. Start MACH via the MP3000-Spindle icon (or the MP3000-Spindle profile in MACH Loader). You should see the screen on the next page. Follow the setup (Pulley RPM and number).

Select the "SPINDLE" button (turn on the spindle function) Type in a number in the Spindle Speed Set DRO that is $\frac{1}{2}$ of your max RPM setting for the pulley. (that is the max RPM of your speed control-VFD). You should see 5.00 volts (+ or - 1%)

Example: Max RPM is 10,000RPM . Typing in 5000 in the Spindle Speed Set DRO should send $\frac{1}{2}$ of the max voltage (10VDC) or 5.00 VDC. Typing in 2500 RPM would yield 2.50 volts.

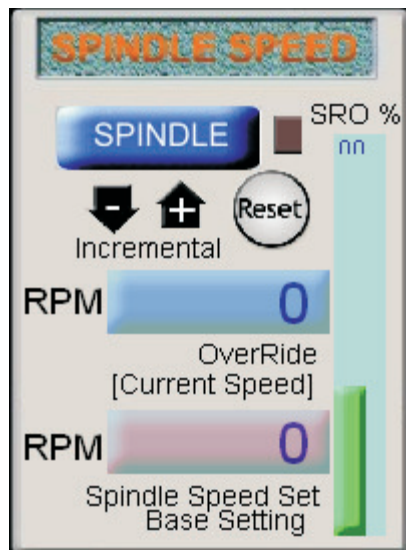
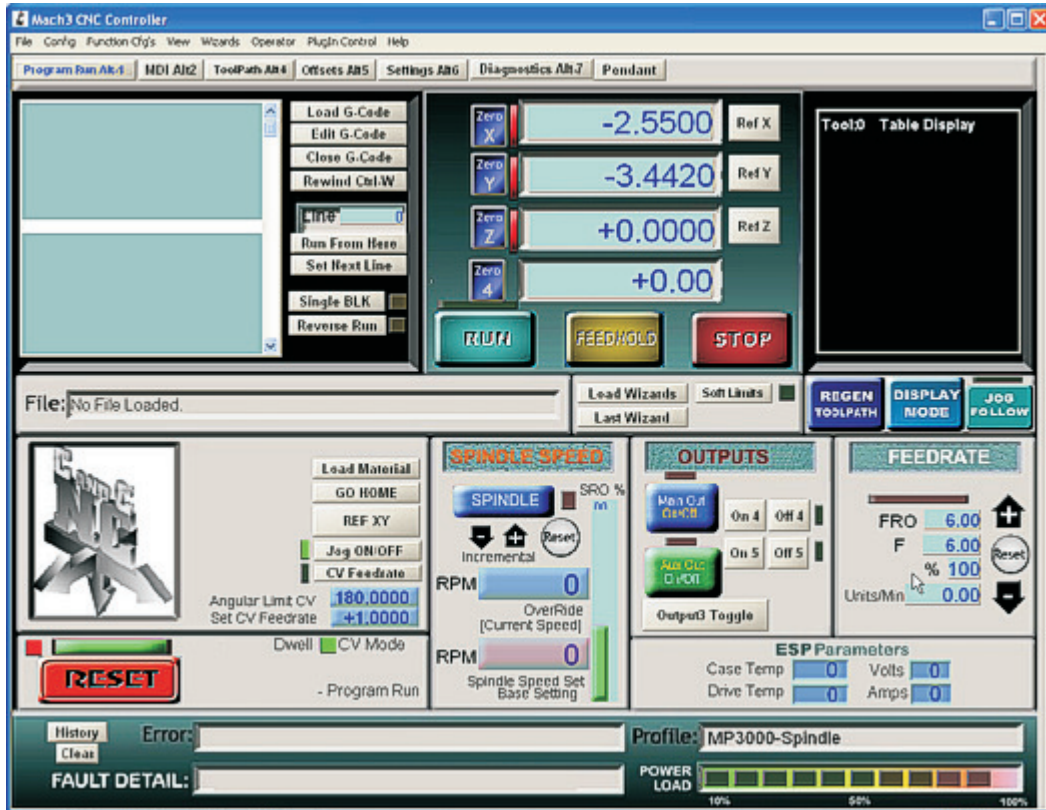
For a final function test, open the MDI Tab and move the cursor to the MDI input box and type the BOLD text followed by an ENTER for each line:

M03 (should turn ON the spindle and RUN Led on the VFD Breakout card)

M04 (should turn on the REVERSE Relay and REV LED. RUN LED will be on too.)

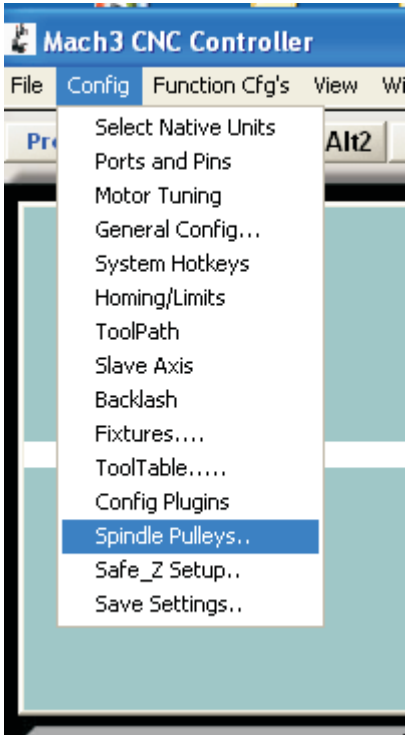
S5000 (should set Spindle Speed Set box to 5000 and change Analog volts to match.)

M05 (should turn off the REV LED if it's on AND the RUN LED)

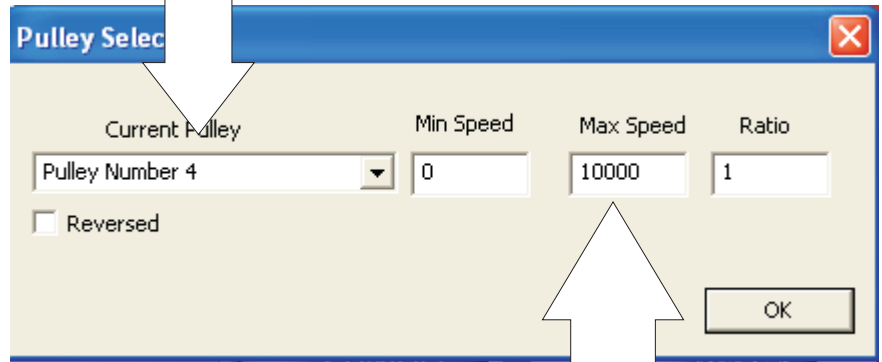


Spindle Speed Screen Controls

- **SPINDLE Button.** Manually turns on the Output that controls the RUN relay on the VFD Breakout LED flashes when on
- **- and + Incremental Arrows.** Moves the value in the Spindle Speed Set by 10 RPM.
- **Reset Button.** Resets Override % to 0 (Cancels override)
- **SRO Slide Bar.** Shows % of Override speed in relation to Base Setting. The bar can be raised/lowered with the mouse to set the override percentage
- **Overide/Current Speed DRO.** Readout of the Current RPM of the Spindle. It is the sum of the Base Setting plus or minus any override percentage. If no override is in effect the DR) will reflect the Spindle Speed Set DRO
- **Spindle Speed Set (Base Setting) DRO.** Displays the current Base RPM setting. To change the Base setting place the mouse cursor over the DRO and left click. The background will change to orange. (edit mode). You may type any number into the DRO. YOU MUST HIT ENTER to save the value or it will revert back to the previous number as soon as you click the mouse out of the DRO. Use this manual edit method to quickly make large changes in the speed. The value in the DRO is also changed by an "S" command in g-code or from an MDI command.



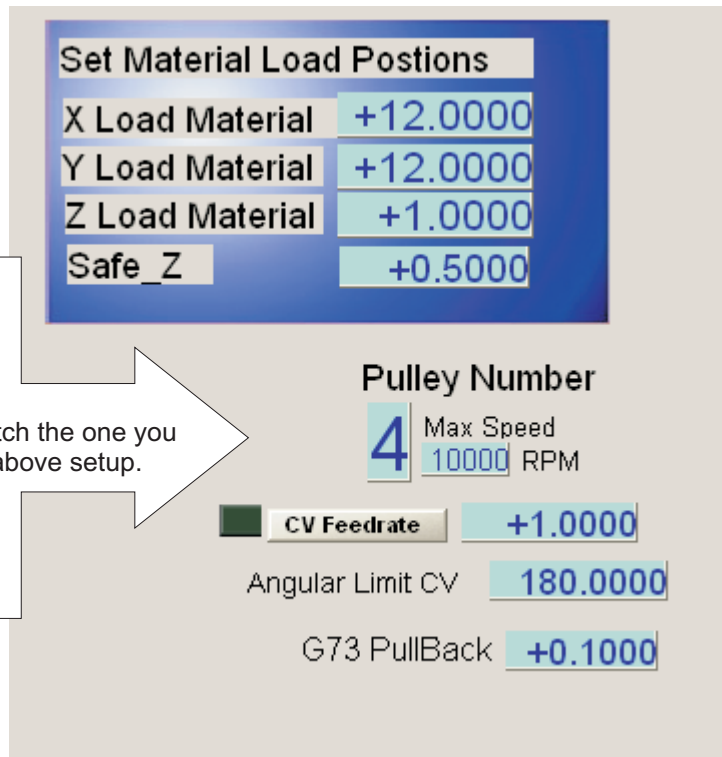
This Pulley number can be any in the list. It is selected by the Pulley Value in the Settings Tab



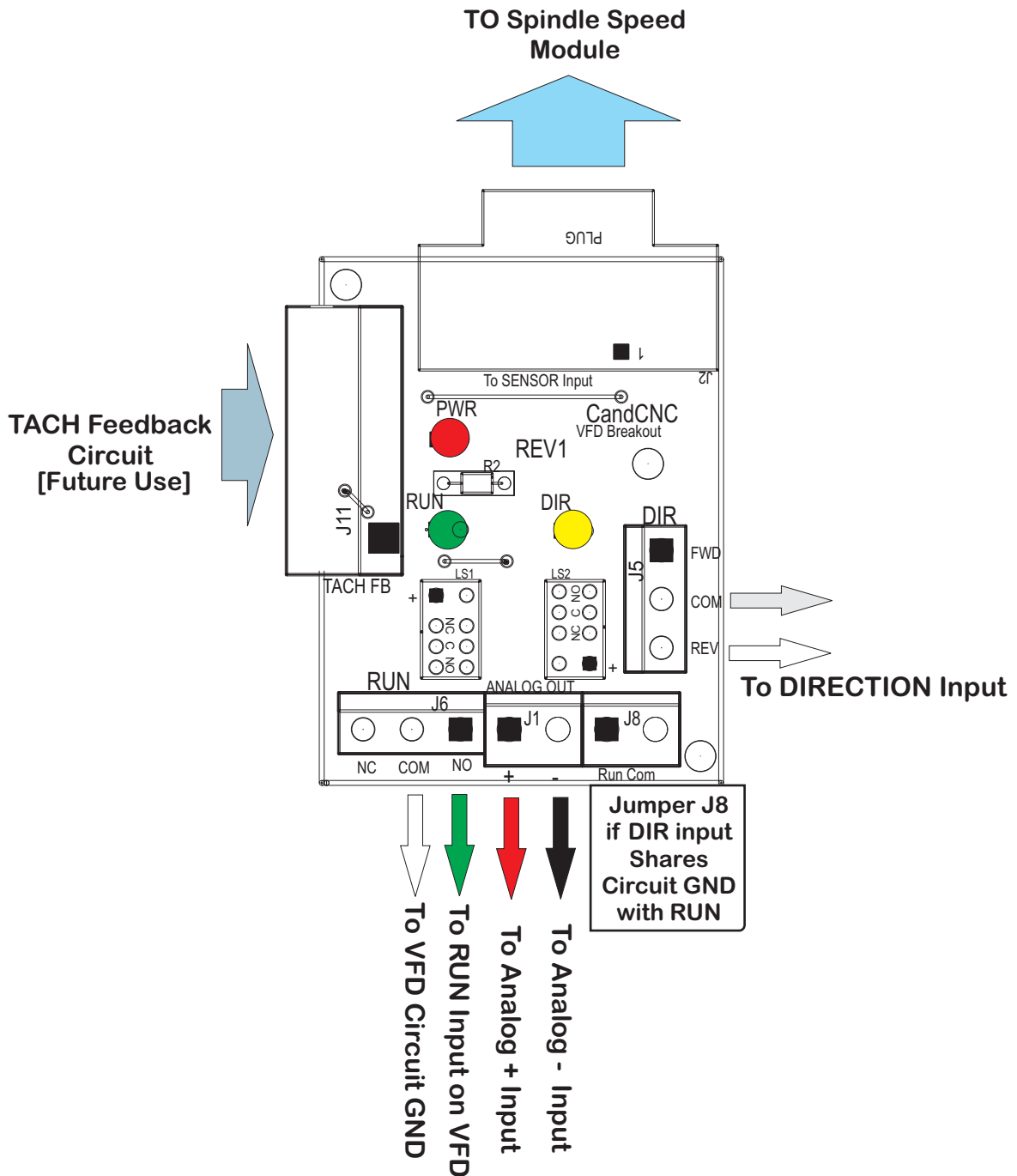
Set MAX Speed of your Motor/VFD here
This is the RPM the motor will spin at with it's control voltage at +10VDC. (Full Speed)

To setup and calibrate the Spindle Speed open the SPINDLE PULLEYS setting from the Config Menu (top of screen). You will see the Pulley Selection Box appear. See next page for settings.

SETTINGS TAB

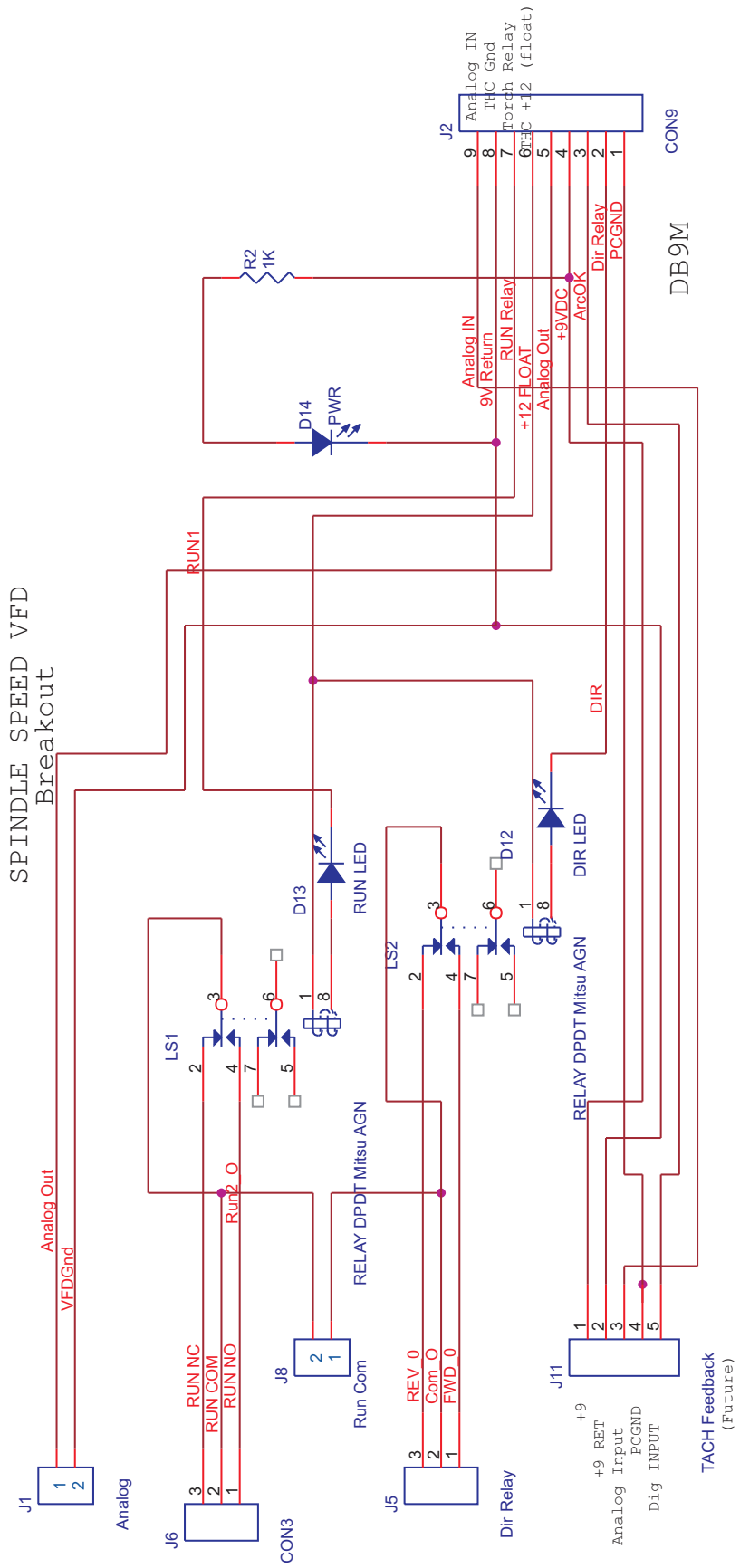


Select Pulley Number to match the one you used in the above setup.

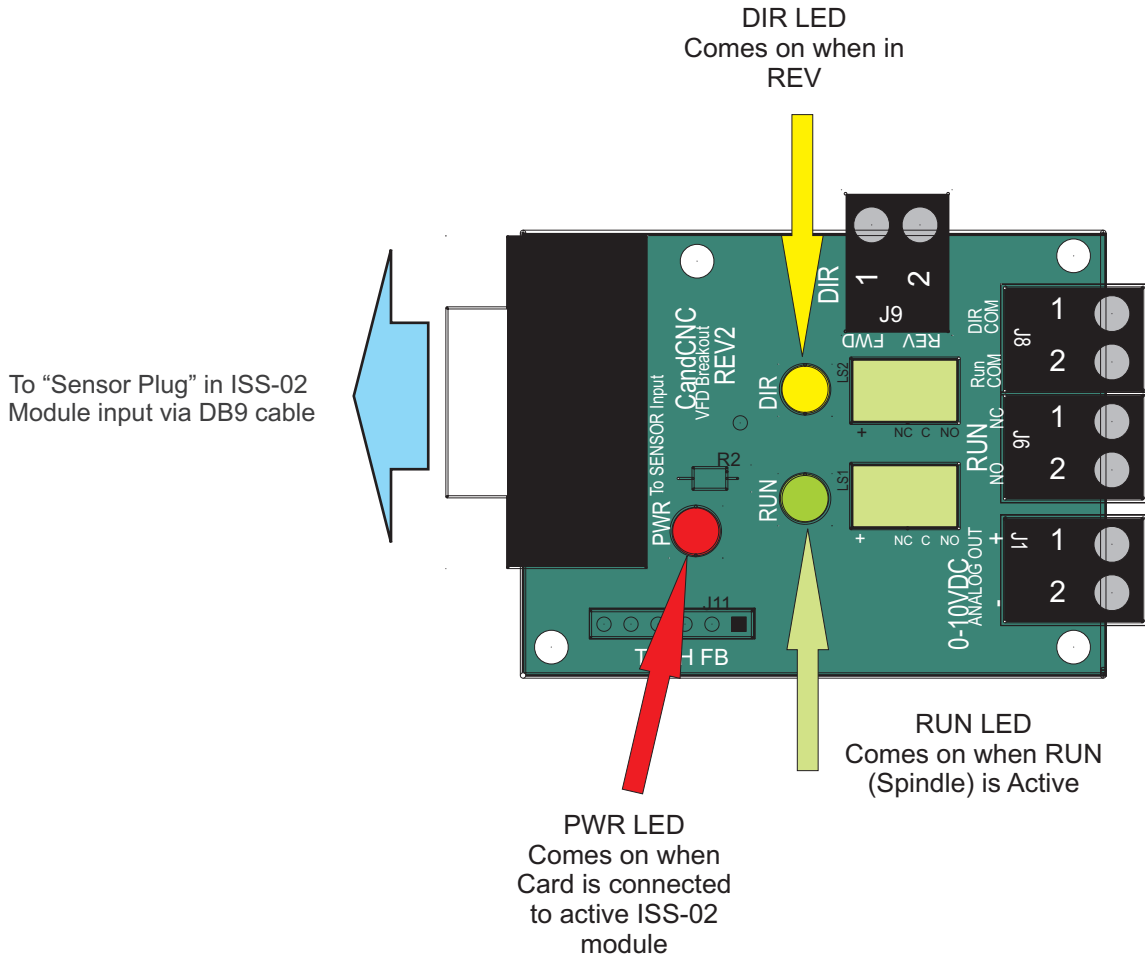
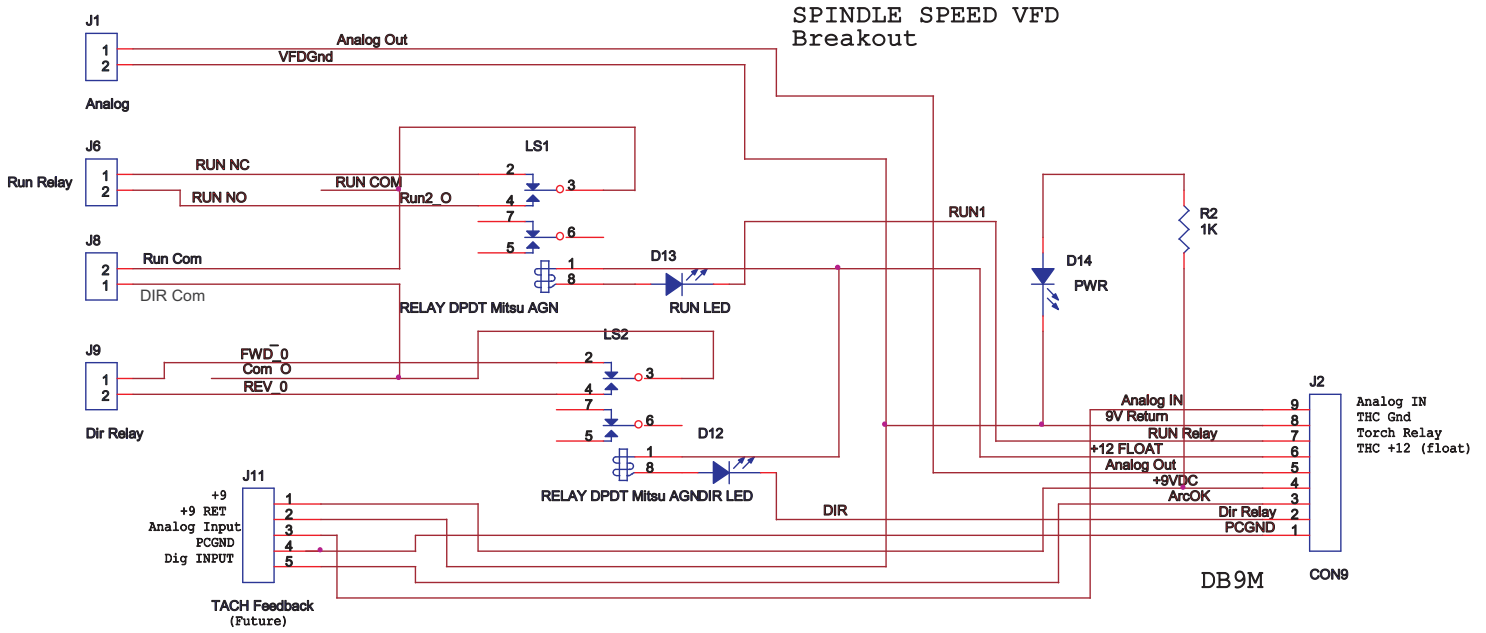


The VFD you are connecting to must be programmed for analog speed control (0-10VDC). Most VFD and motor speed controls will designate a pin as “Common” or “Return” for an input. Some models use “Ground” (circuit Ground) as the common for all of the inputs. The VFD establishes the ground return for the Breakout Card. Relays are activated by isolated voltage from the Spindle Speed. There is no electrical connection between the relay drive voltage and the VFD RUN and DIR control lines. The Analog voltage is 0-10VDC with an output proportional to the RPM selected in the Spindle Speed Screen in MACH (or via software). To Test analog voltage connect a DVM (Digital Voltmeter) across Analog + and Analog - with both disconnected from the VFD. The output voltage should be proportional to the speed you set based on the max RPM of Pulley Four in MACH. ½ the max RPM should equal 5 volts.

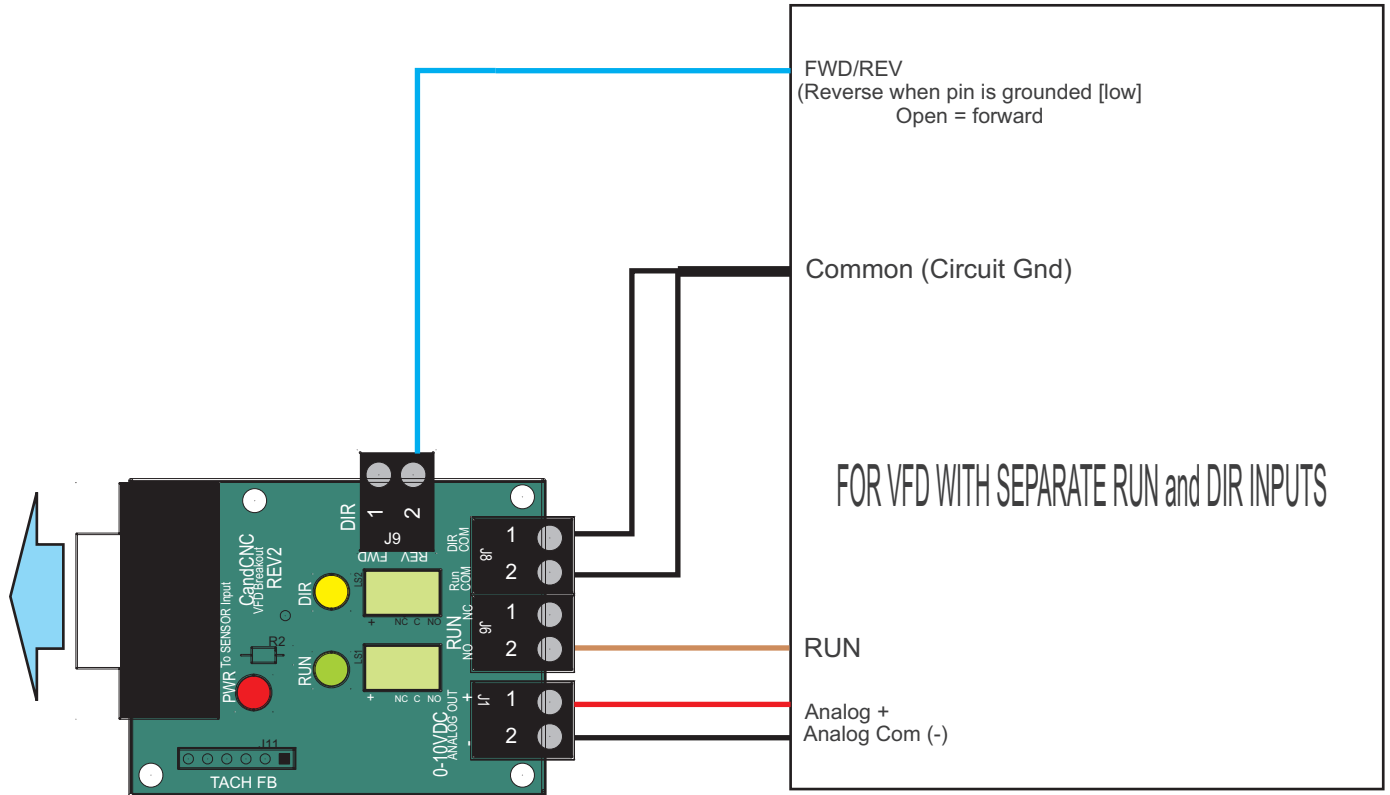
The RUN output is basically a switch (relay contacts) that are typically hooked up Normally OPEN. The circuit closes between the COM and NO when the RUN relay is active (RUN LED ON). The VFD should have two connections to the RUN input.



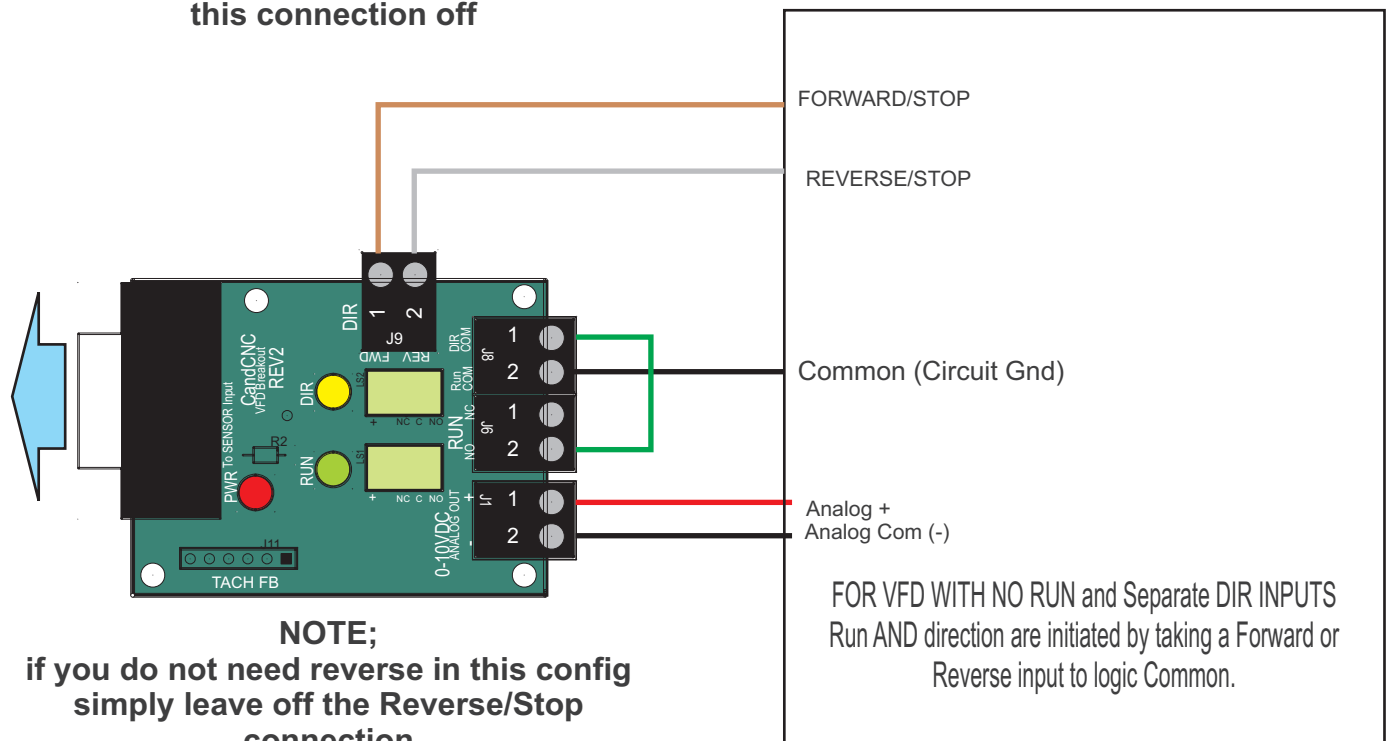
Spindle Speed VFD Breakout Card REV2



TYPICAL CONNECTIONS FOR VFD's. Connection functions and names vary from one brand of VFD to another. Below are the two most common.



FWD/REV connection is OPTIONAL.
If you do not need REVERSE leave
this connection off



NOTE;
if you do not need reverse in this config
simply leave off the Reverse/Stop
connection

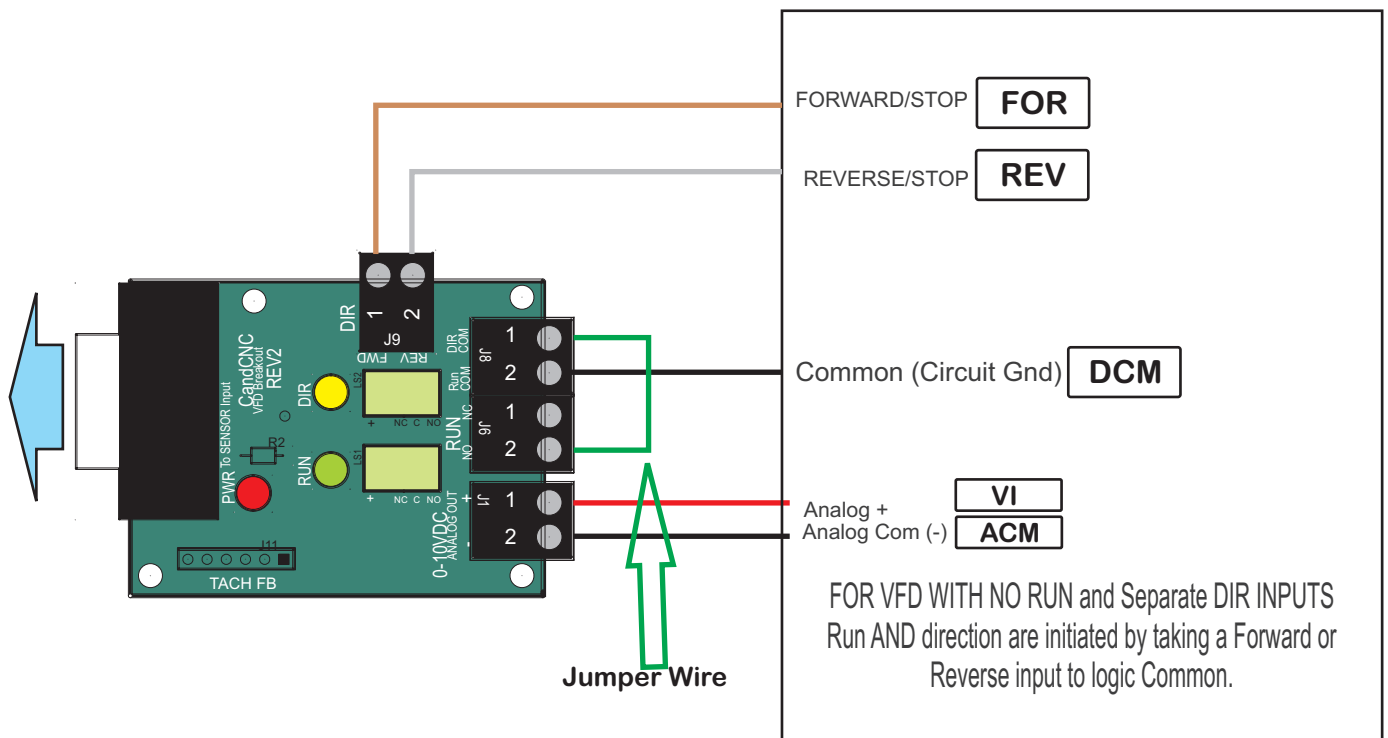
CONNECTION PINOUT FOR CHINESE INVERTERS sold by Keling and others:

NOTE: These connections are taken from the Manual provided by a Keling Customer and may not reflect the unit you have. Check the documentation that came with your Inverter and confirm the pin Names and locations.

CODE	FUNCTION	Factory Setting	For SPINDLE SPEED SET TO	NOTES
PD001	Sets Source of OPERATION commands (internal or External)	0	1	Operation Commands are set by multi-input pins (External terminals)
PD001	Sets Source of Frequency commands (internal or External)	0	1	Frequency (Speed) is set to use VI input
PD070	Sets type of input for VI input	0	0	Set to ANALOG 0-10VDC (default)

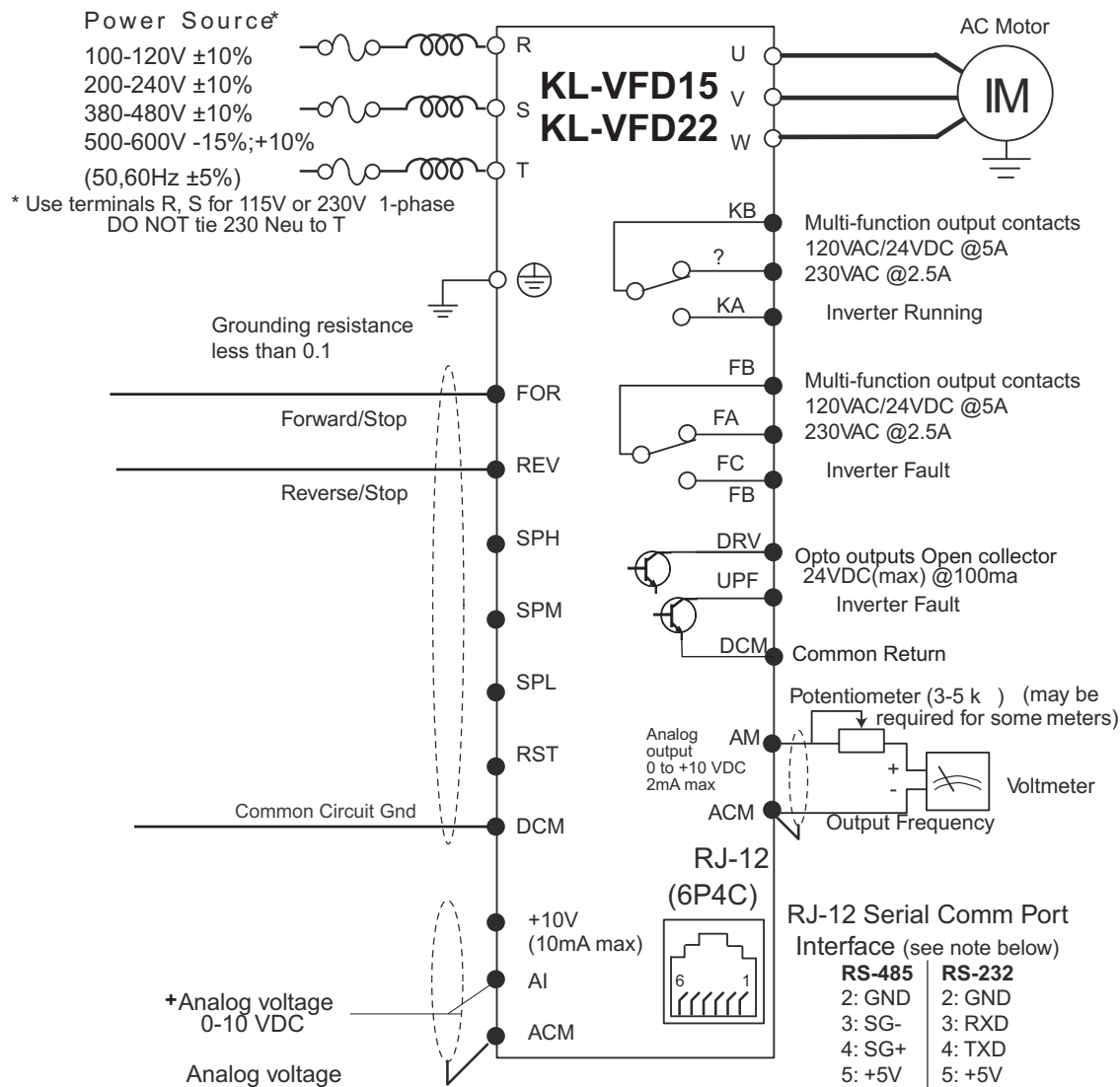
**Program Settings for
Use with ISS-02 Spindle Speed**

Note: There are dozens of other settings (with multiple options) covered in the Manual. The default factory settings will work for most applications but some may need to be changed to better match the type 3P motor you are using. Follow the vendors suggestions for the best settings for the motor/spindle you purchased. We cannot help with other VFD settings



Other common inputs like for the AC line and the motor connections are NOT shown above and cover ONLY the VFD connections for RUN DIRECTION and FREQUENCY/SPEED Control inputs. Use the VFD manual to connect AC and Motor. Other inputs like Multi-Input 3 - 6 (RST, SPH, SPM, SPL) are not used for any interface to the VFD Interface card or for RUN, DIR or Speed Control. There may be inputs (and/or outputs) recommended to be used by the Spindle/Motor vendor. Follow their instructions for use of other inputs or outputs or leave then connections open (no connection).

**CONNECTION PINOUT FOR CHINESE INVERTERS sold by
Keling and others:**



Note certain VFD Faults can be used to trigger the outputs (see manual). You could elect to use any of them back to an INPUT on the CandCNC Table I/O card and map it as a LIMIT (shutdown all motion and outputs. Inputs at the Table I/O are Opto isolated with a floating voltage source. Any connection to/From the VFD to any control or the PC needs to be through isolated lines or a open set of relay contacts. **DO NOT MAKE CONNECTIONS** if you are not sure what you are doing.

DISCLAIMER: CandCNC and it's resellers make no guarantee as to the accuracy of these instructions, charts or notes for you specific VFD model. Models change, instructions from the vendor can be wrong or nomenclature may vary. CandCNC accepts no liability or responsibility for any damages or injuries to any equipment or persons resulting from following the information on these pages. **ALL CONNECTIONS TO ANY THIRD PARTY EQUIPMENT IS DONE AT THE RISK OF THE USER or PERSON MAKING THE CONNECTIONS.** If in Doubt contact the vendor of your VFD

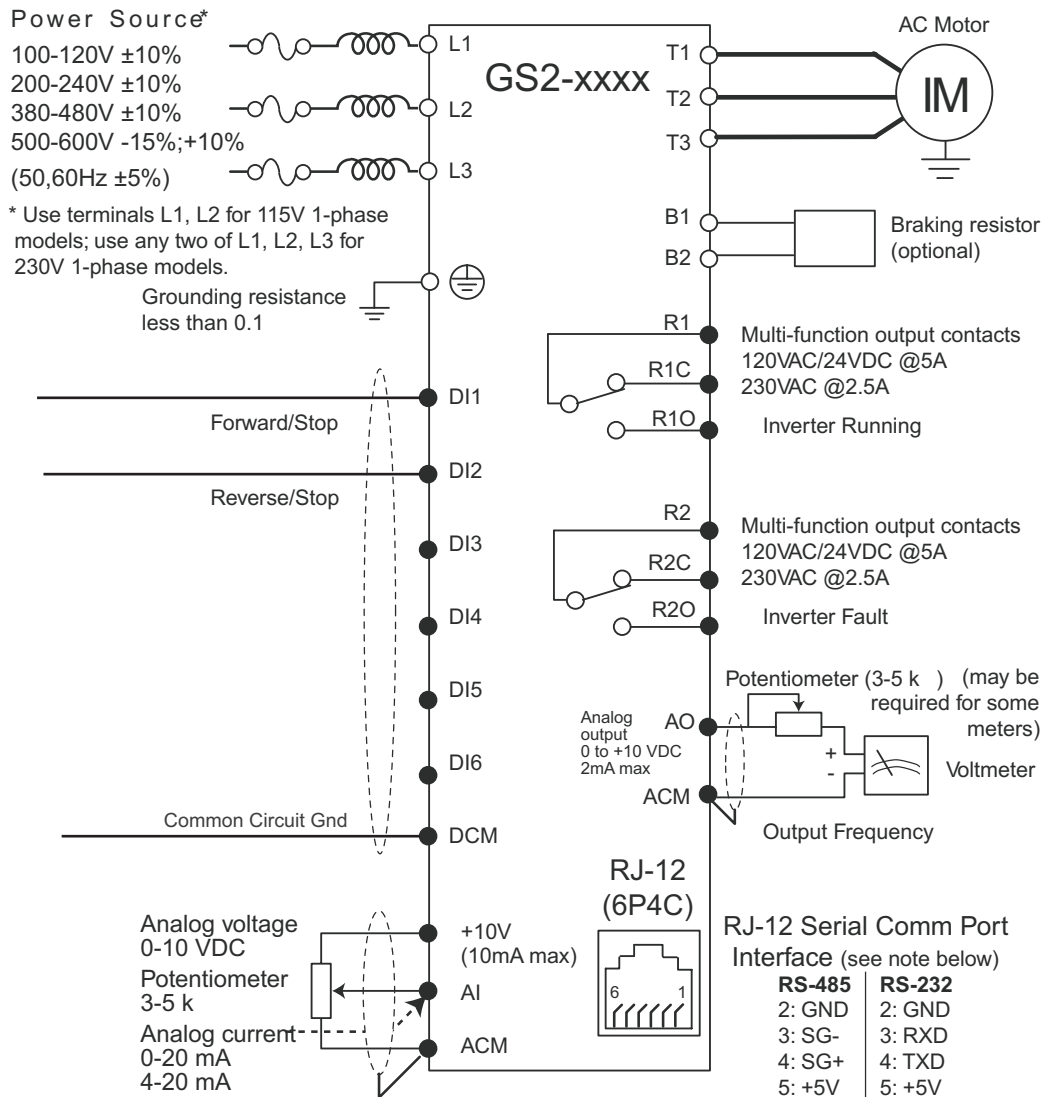
EXCERPT from GS2 AC Drive from Automation Direct FOR EXAMPLE ONLY

Chapter 2: Installation and Wiring

Basic Wiring Diagram



Note: Users must connect wiring according to the circuit diagram shown below.



Factory default setting

Factory default source of frequency command is via the keypad potentiometer

○ Main circuit (power) terminals ● Control circuit terminal ⚡ Shielded leads



WARNING: Do not plug a modem or telephone into the GS2 RJ-12 Serial Comm Port, or permanent damage may result. Terminals 2 and 5 should not be used as a power source for your communication connection.

Chapter 3: Keypad Operation and Quickstart

P 3.00 Source of Operation Command Setting: 02

Default Setting: 00

- | | | |
|----------|----|--|
| Settings | 00 | Operation Determined by Digital Keypad |
| | 01 | Operation determined by external control terminals. Keypad STOP is enabled. |
| | 02 | Operation determined by external control terminals. Keypad STOP is disabled. |
| | 03 | Operation determined by RS-232/RS-485 interface. Keypad STOP is enabled. |
| | 04 | Operation determined by RS-232/RS-485 interface. Keypad STOP is disabled. |

The AC drive operation will be determined by external control terminals and the keypad stop will be disabled.

P 4.00 Source of Frequency Command Setting: 02

Default: 00

- | | | |
|-----------|----|--|
| Settings: | 00 | Frequency determined by keypad potentiometer |
| | 01 | Frequency determined by digital keypad up/down |

- 02 Frequency determined by 0 to +10V input on AI terminal. Switch, SW1 must be set to AVI.



← Switch SW1 must be set to AVI in order to use a 0 to +10V input

- 03 Frequency determined by 4 to 20mA input on AI terminal. Switch SW1 must be set to ACI.



← Switch SW1 must be set to ACI in order to use a 4 to 20mA input

- 04 Frequency determined by 0 to 20mA input on AI terminal. Switch SW1 must be set to ACI.



← Switch SW1 must be set to ACI in order to use a 0 to 20mA input

- 05 Frequency determined by RS-232/RS-485 communication interface (RS-232 or RS-485 communication selected by switches SW2 and SW3. Refer to CHAPTER5 for details.)

The frequency of the AC drive will be determined by an external