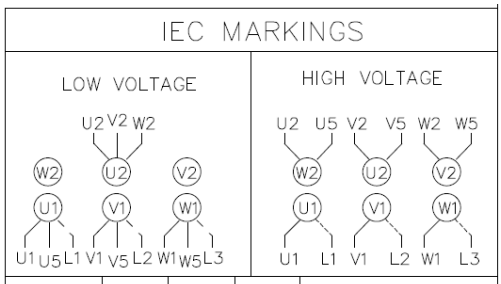
ASSEMBLY DIRECTIONS

PM1236 lathe VFD Schematic with proximity switch.

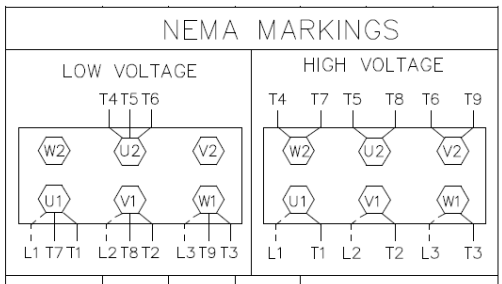
1. You will receive ONE boxes containing the relay control board with cables, wiring harnesses, assembled front panel switches, speed pot/cable, etc. You will also have the proximity stop holder complete assembled with cable and mounting screws for your micrometer stop. The control cable is attached to the control board, so you can see their attachment. The VFD cable is to stay connected to the control board. The front panel 12 lead control cable needs to be disconnected for assembly. All the control cables going to the control board are numbered and attach to the corresponding numbered terminal. Unpack and lay out everything, let me know if you have any questions. If you are unsure, send an email with pictures, or call 520-289-1525

I would like to stress that you are dealing with high voltage (lethal), and that this could have dire consequences if not connected correctly or something shorts out. So you need to proceed at your own risk; you can also have a qualified individual do the installation or check it if you're not comfortable with doing it. I am assisting you with this build, you need to assemble it in compliance with the proper electrical codes/requirements for your area.

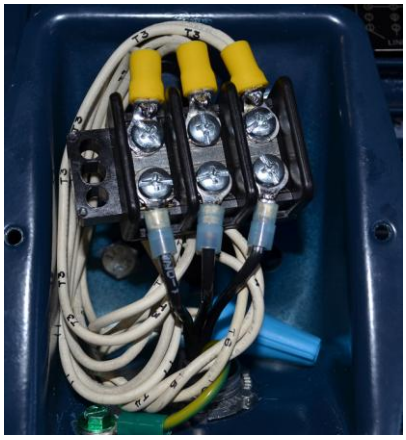
2. The motor power cable has 3 black current leads (wires have the numbers on them one, two, three printed on the insulation), a green ground wire, and a shield ground (outer shield ground is only connected at the VFD end). The shield drain wire and motor ground are already connected at the VFD end, the VFD end should be connected to a star ground post in the enclosure (or the grounding screws on the VFD body if the VFD is grounded to your machiine, metal to metal contact). You should connect the same star ground connection to the ground terminal on the bottom of the VFD (if not grounded through a ground plate). The motor power cable connects to terminals U, V, W at the VFD. At the motor end, the motor cable leads are attached to the first 3 terminals of a 4 terminal connector block, the forth terminal can be used to connect your other motor wires (T4, T5, T6). I recommend using fork or ring crimp terminals, and soldering after crimping and using shrink tube as a strain relief for the motor wires. The block can be mounted in the motor electrical box if space or can be floated. Connect your motor leads in accordance with the motor directions. The connection order of the black motor power wires is not important, if the motor is running in the wrong direction, switch any 2 black wires at the motor terminal after everything is powered down. I like to but a small dab of medium strength lock-tight on the end of the motor terminal studs to prevent the nuts from loosing, please check that they are all tightened. Makes sure the terminal strip clear protective top is snapped into place, you may consider taping it to the terminal block with some black electrical tape. Be sure that all the wires are neatly placed in the motor control box, be sure the wires are not pinched or shorted. The main power cable going to your VFD from the 30A breaker is 12G 600V rated SOOW and terminated with a black and red power lead. The 240V main power to your VFD is connected as shown in the picture on the next page. Please verify all your connections are correct and in accordance with the VFD manual.

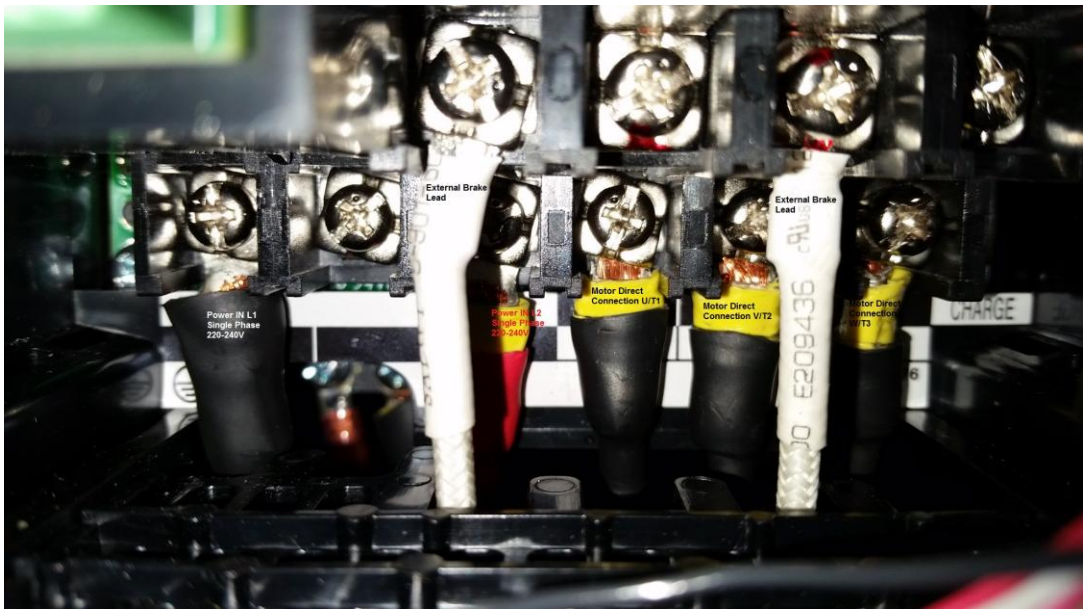


LINE VOLTAGE	L1	L2	L3	JOIN		
TERMINAL	U1	V1	W1	W2	U2	V2
LOW	U1,U5	V1,V5	W1,W5	---	U2,V2,W2	---
HIGH	U1	V1	W1	U2,U5	V2,V5	W2,W5

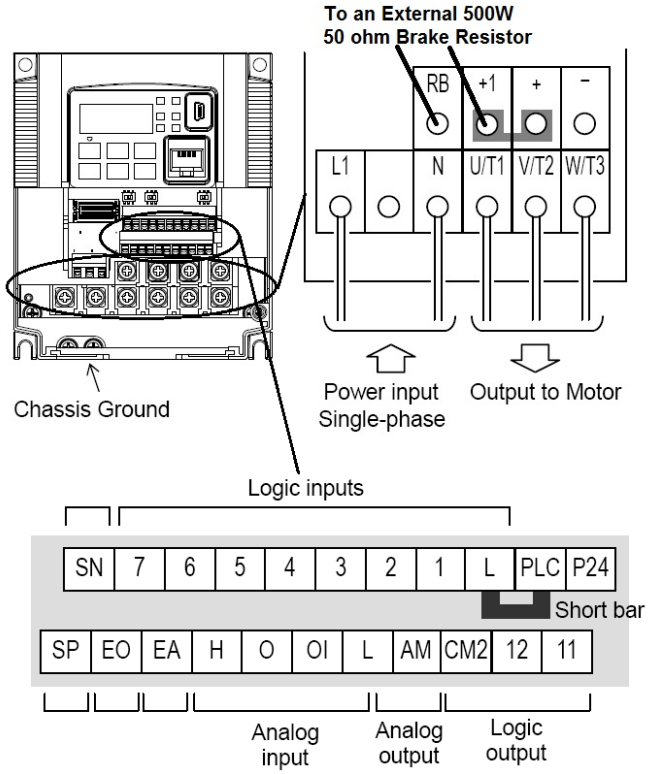


LINE VOLTAGE	L1	L2	L3	JOIN		
TERMINAL	U1	V1	W1	W2	U2	V2
LOW	T1, T7	T2, T8	T3, T9	---	T4,T5,T6	---
HIGH	T1	T2	T3	T4, T7	T5, T8	T6, T9





Single-phase 200V 0.75 to 2.2kW

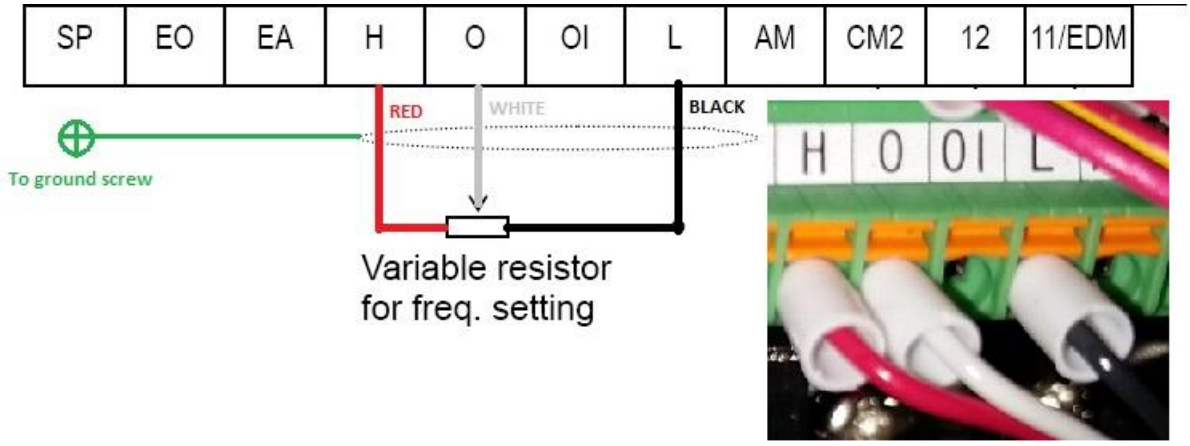


3. Be sure all the power cables are properly connected, you may want to use plastic cable ties or some securing method for the wires in the enclosure. Connect your 50 Ohm braking resistor white braking resistor leads/eyelets to RB and + (or +1 as there is a shorting bar connecting +1 and +, do not remove this shorting bar) on the high voltage VFD terminals. Brake voltages can exceed 380V, so braking resistor/wires need to be rated for these voltages. When operating the VFD, the VFD enclosure should be kept closed, as there is high voltage wires.

4. Pull your lathe front switch panel, and remove all the switches and wiring from it and disconnect the harness at the control box. You will need to drill TWO 1/4" holes (drill a pilot hole and then enlarge with a 1/4" drill) in the panel to mount the TWO mini toggle switches, braking and for the proximity sensor bypass. The Proximity bypass switch is a momentary type, I recommend mounting it so it operates vertically, you press down to bypass, and let go it springs up.

The head of all the 22mm switches remove by pushing down and gently twisting them, you must first unscrew the back mounting screws (these were screwed in for transit, to prevent the switches from coming apart). Take the head of each switch off, place the nameplate on the front of the speed pot, pass through the panel into the switch body, rotate to lock onto the switch block and then evenly tighten the mounting screws, but do not over tighten. The speed pot is oriented so the cable connection block is at the bottom of the switch and the cable swings up and to the back. Put the push button on the proximity bypass switch, make sure all the switches are oriented correctly and are operating correctly. You will need to pass the cable through starin reliefs, pass a few spades through at a time, they should all pass through a 1/2" strain relief. Pull the cable to the back relay control box, use cable ties and cable connectors to secure the cable. Tie the speed pot cable to the main switch cable to the back of the machine, at the control box route the speed pot cable to your VFD.

5. The VFD speed pot is prewired and uses 3 wires with the shorter orange ferrules at the VFD end (picture is mine with white). Route the cable to your VFD, DO NOT tie it to your motor cable, it should stay 4-6" away from the motor cable, but may cross over it at an angle. When you connect the VFD speed cable to the VFD, there is Red wire goes to H (+10V), White to O (variable), and Black to L (low) as shown. Connect the shield drain/ground wire to the ground screw at the bottom of the VFD or the star ground if it is close enough.



It is important that once all that grounds are connected to the star ground post in the VFD enclosure, that you then tighten the nut so all the grounds are securely fastened. The star ground threaded post is securely fastened the enclosure's metal ground plan, the ground wire eyelets securing nut provided has an integrated lock washer.

6. Remove all the wiring (and label with provide wire markers) to your stock relay control box, and then remove the board. I would identify and label the wires for the following systems:

Main coolant power cable wires, should be 240V power and a green ground, this will connect to L1 and L2 on the coolant contactor, the green ground will connect to the control board ground bus.

Spindle direction switch cable, you will need to identify the feed wire going into the switch blocks which needs to be labeled #3, the forward direction wire is labeled #4, the Reverse direction wire #5 and Stop Wire #6. These need to be checked with an open meter, the feed wire is the common.

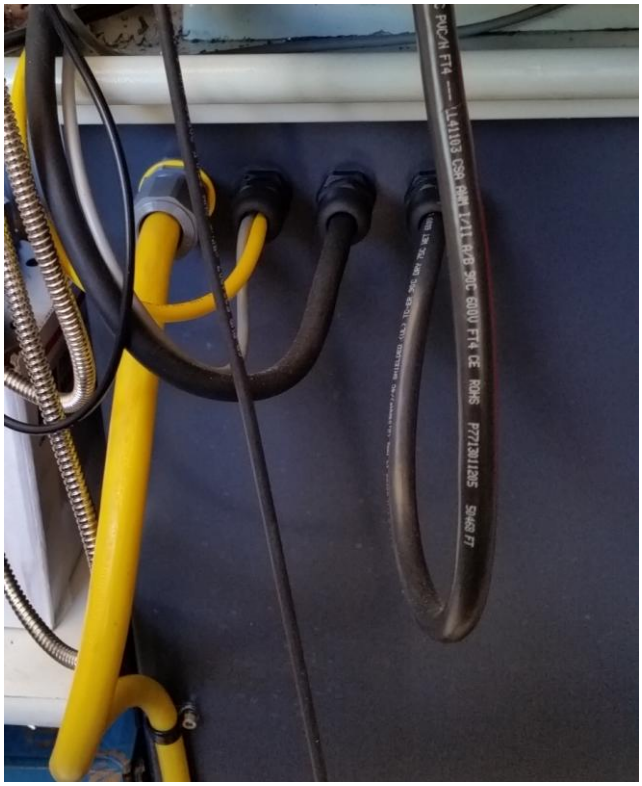
Brake cable wires, label #7 and #8. This switch needs to be configured for NC when the brake is not activated. The mechanical brake needs to be disconnected. If you should decide to use the mechanical brake, the switch would need to be directly connected to the VFD in a NO and wiring configured differently, so it would issue a freewheel command directly to the VFD. If this was the case, the belt guard switch would need to connect to terminal 8.

Belt guard switch guard switch label one terminal side #21 and the other terminal side #22. Connect to this terminal a red wire ~12" labeled on one end #22 connect to the belt guard switch, label the other end of the wire #7 which will connect to the control board terminal block. This switch needs to be configured for NC when the not activated, belt cover is on.

Chuck guard wires label one end #1 and the other end #21. This switch needs to be configured for NC when the not activated, belt cover is on.

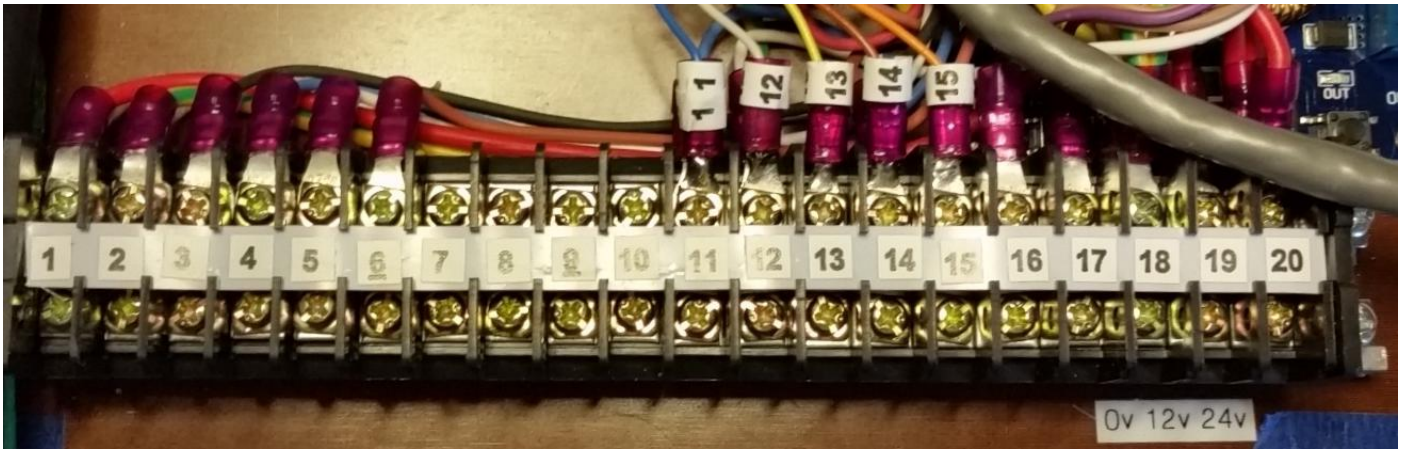
You may consider removing the current control box strain reliefs, and then reinstalling after the new control board is mounted. Check the size of your strain reliefs from your control box to see if the main power and VFD power cable will pass through them, if not, wither bore out two existing holes with a step drill so you can fit 3/4" strain reliefs, or drill to new holes in the cabinet for the power cables.

Since your VFD is mounted in your lathe cabinet, you will need to drill holes in the cabinet to pass the different cables. I recommend plastic type I sent you a link to (and in the picture below), but you can also use traditional metal clamp style. The VFD control input cable and speed pot cable should fit through a 1/2" strain relief, you will most likely need three 3/4" strain reliefs for power in to the main switch, power to the control board and power to the VFD. The motor control cable will need a separate 1/2" strain relief. I would probably recommend VFD input control cable/speed pot cable, power in, power to HV cable going to the control board, VFD HV power and then VFD motor cable. I use SOOW 12G 4 wire cable to my machine, and it has the same electrical specifications as yours.

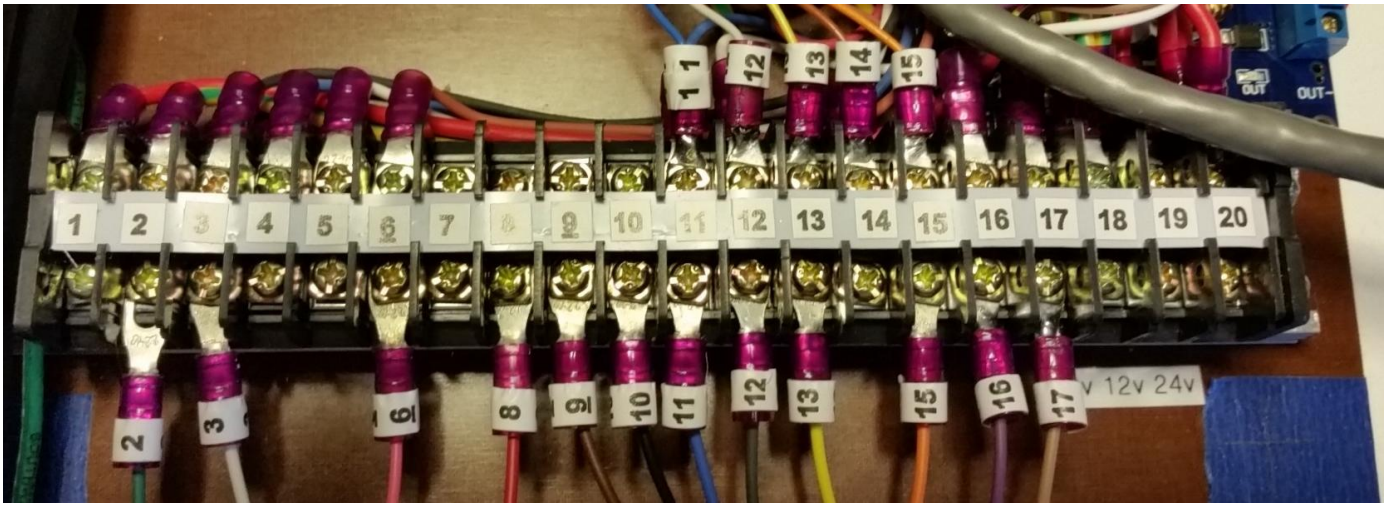


Main control board install: The **lower** terminal strip spades/wires on the control board should be disconnected. You may also need to remove the safety interlock switch on right side of the control box. Dry fit the new control board to the machine metal control box to check where the mounting screw holes are to be drilled. When mounting the new control board, the bottom should be ~1/8" above the bottom of the metal control box bottom, i.e. sufficient room at the top of the box for the high voltage wires to comfortable fit. Drill mounting holes in the new control board from behind the board, use your old board as a template. Mount the control box and control board to your machine. You may need longer mounting screws as the new phenolic control board is 1/4" thick. Put a little thread sealant on the end of the screws when you mount everything. Once mounted, pass the power cables through the strain reliefs. Route this to your switched 240V to and the other cable to your VFD power in. Pass the VFD control cable that is wired to your control board and pass through another strain relief and route to your VFD. Route your spindle cable through a strain relief and secure. The proximity cable should be routed under your splash pan between the cabinets to the back of the machine and route into the control box, should be able to go through the same strain relief as the spindle switch cable.

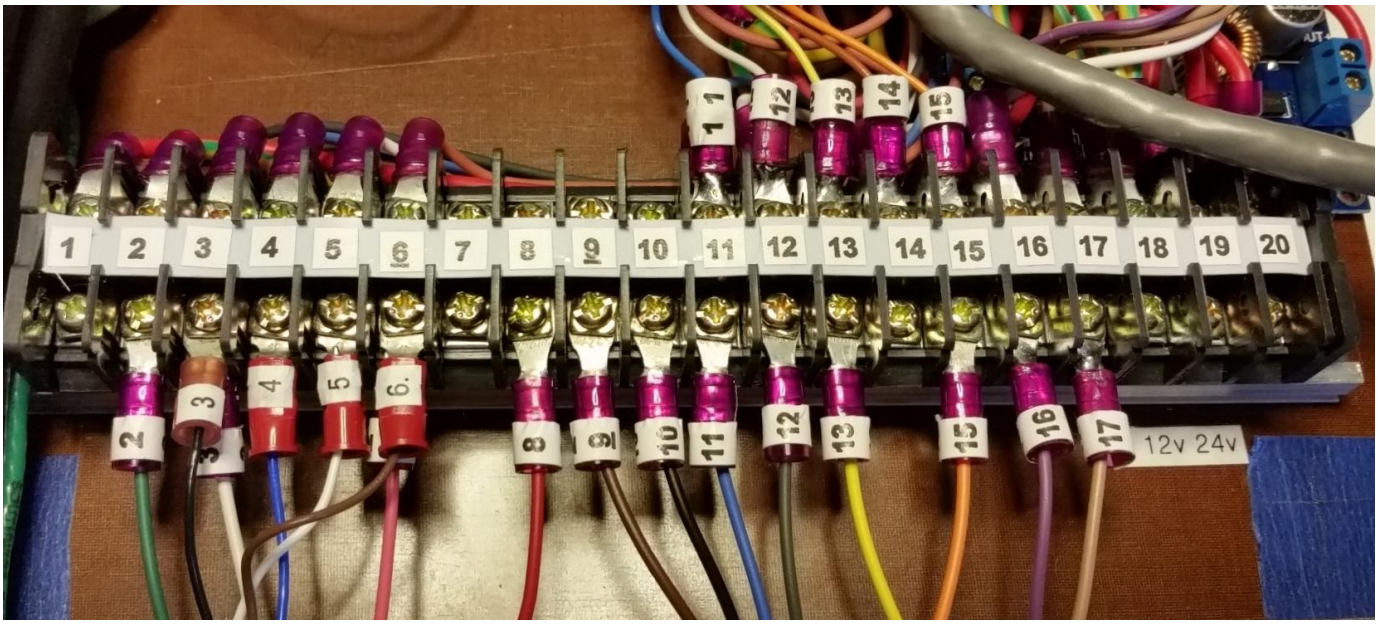
7. Pass the wires from the front panel cable through the main control box hole. You will need to pass a few wire through at a time. Pass the cable through a hole in your control box, then carefully pass the wires through the strain relief mounting nut, a few at a time. Lightly tighten the nut a few turns onto the strain relief, but do not tighten. This allows some movement, when connecting the wire to the terminal strip. Connect the control cable wires to the terminals as indicated by their numbering, note that the numbers should be facing up as shown, spades for the front panel control wiring are mounted are mounted down, so if another terminal is to be attached to that terminal (i.e. the spades are back to back).



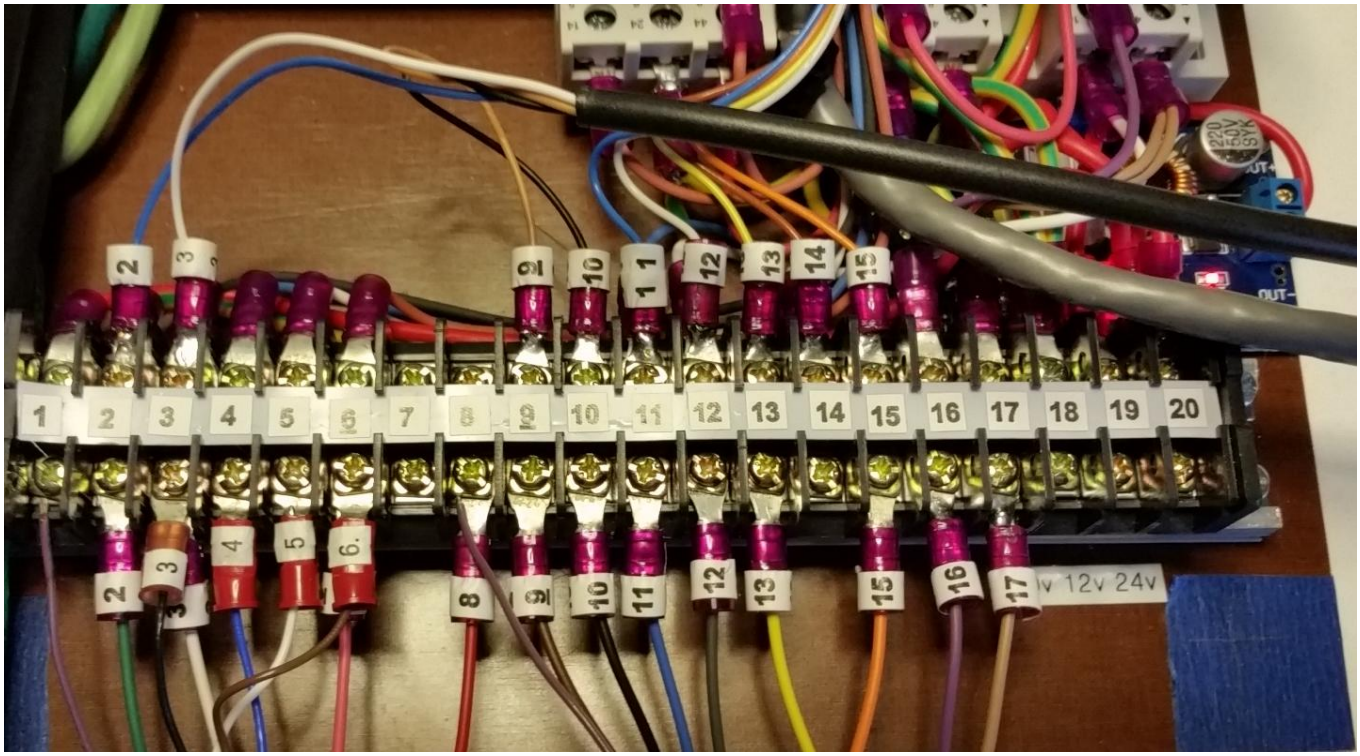
Reconnect lower front panel control wire spades as shown below, once the board is mounted.



8. Connect the spindle control cable wires to terminals 3-6, using the numbers on the spindle control wires matched to the terminal block numbers. Black is terminal 3, blue is terminal 4, white terminal 5 and brown is terminal 6. All the spades should be facing up. Secure all the terminals, you may want to recheck them in a week or two, as the spades can deform a bit. Place the protective plastic barrier over the relay board terminal block after all the connections are done.

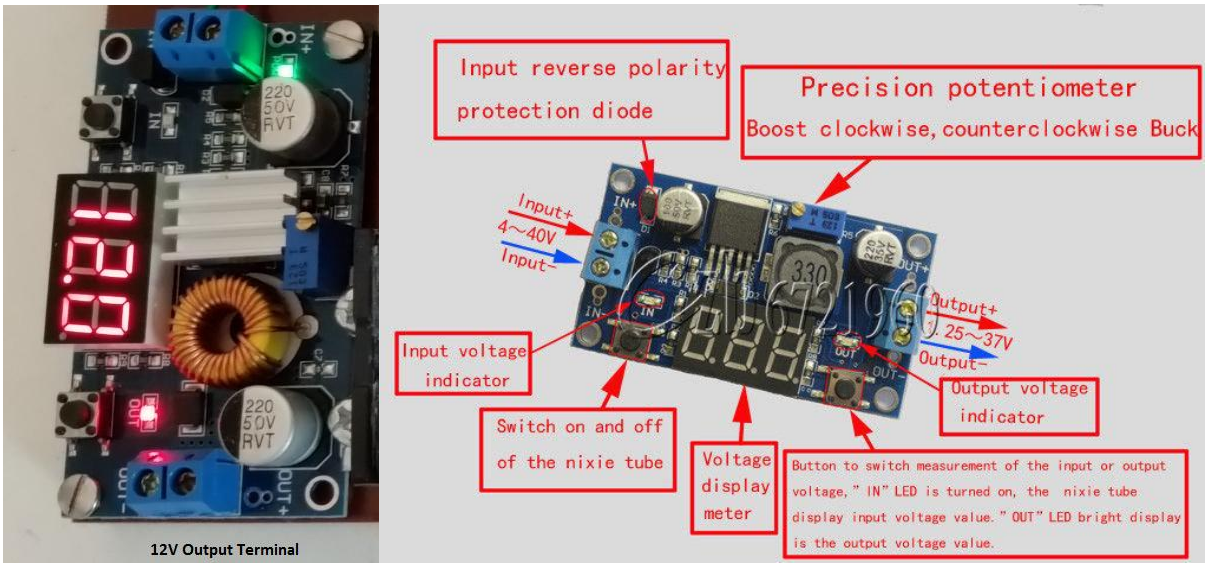


9. Feed the proximity sensor cable through a strain relief and attached the numbered wires (2, 3, 9 and 10) as shown in the next picture. Note: The spade are connected to the top side of the terminal strip (but can be connected to either side)



10. Connection of the Chuck Guard, Belt Guard and Brake Switch; See the schematic for connections, starting with the chuck guard, one end is connected to #1 on the terminal strip, the other end to #21 terminal on the belt guard switch located in the control box. The other belt guard terminal #22 is connected to #7 on the terminal strip, and finally the brake switch is connected to terminal #7 and #8. All these switched in their non-activated state are NC, therefore feeding 24VDC power through them.

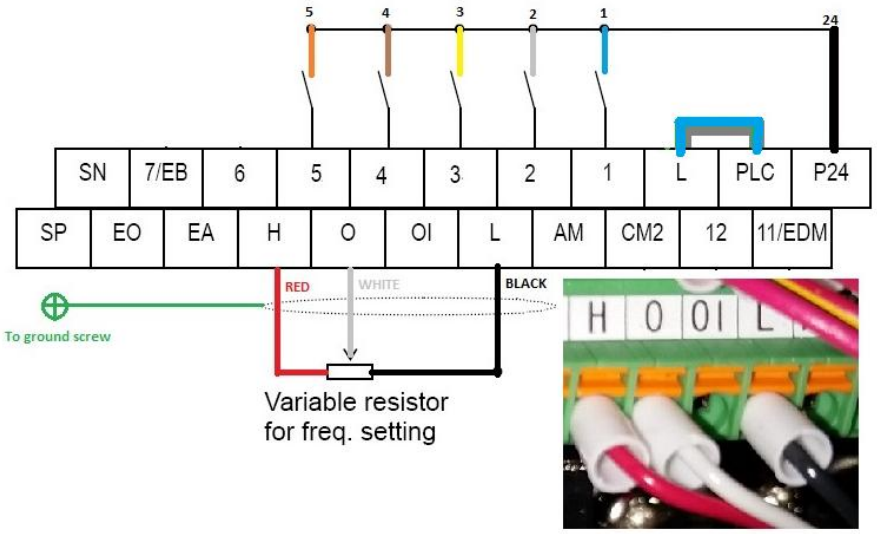
11. Terminals 1 and 2 are 24VDC from the power supply, NOTE Terminal #1 is 24VDC and Terminal #2 is 0V or negative. At the other end of the terminal strip are connections for auxiliary lighting, tachometer, etc. Terminal #18 is 0V or NEGATIVE for both 12 and 24 VDC systems, Terminal 19 is positive for 12V, Terminal 20 is positive for 24VDC. There is an adjustable step down converter on the control board to provide 12VDC to connect your tachometer and/or 12VDC LED lighting. The voltage is adjustable by turning the small pot on the step down converter board. The display is set to indicate the output voltage. The output terminals are on the bottom of the board, note the plus minus polarity, you can up to ~50W total from these terminals. I have already set all the voltages on the system, be careful not to short any of the power supplies outputs.



12. Connect the Coolant power to the coolant contactor on the left side of the control board. Terminals L1 and L2 which carry 240VAC from the 6A breaker. The breaker must be on for the coolant pump to work. The 6A breaker and the 24VDC supply is fed from output of the 30A breaker. So if the 30 A breaker trips it de-energizes the whole system.

8. Route the VFD control cable to your VFD cabinet and to your VFD inputs**. YOU MUST REMOVE THE BLUE JUMPER BAR THAT CONNECTS PLC TO P24** and reconnect to L and PLC. Remove the jumper pin at P24 and flip the wire and connect the pin to L terminal. Connect the pins on the VFD cable to the VFD input logic terminals. BLACK wire labeled 24 to P24, connect the remaining wires to terminals 1 through 5 as shown below and per the wire numbered labels for the respective input. Connect the VFD shield ground cable wire and green wire to the VFD ground screw. There is also a heavy green wire attached to the terminal, this needs to go to your star ground lug (connects to the power ground coming into the VFD control box). Connect the RED wire to the 24VDC + terminal, the GREEN wire to the 24VDC - terminal. Refer to the schematic for color coding and function of each control wire.

Wiring sample of control logic terminal (source logic)



Remove the jumper connecting PLC and P24 by pressing on the little orange tab and pulling on the wire ferule. Relocate the jumper by inserting the pins into L to PLC.

TO

8. Gently loop all excess cable on the back of the lathe (do not coil). It is very important that you keep the control cables away from the motor connection cable when they are run together (at least 4-6" when possible), as the VFD motor cable generates a lot of electrical interference.

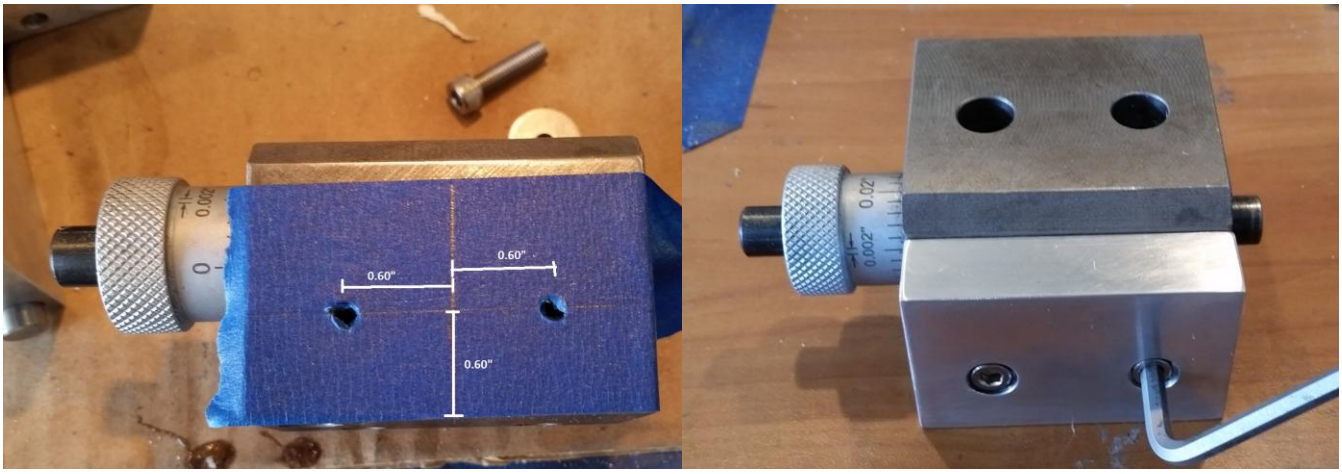
Route and tie cables as shown so they do not interfere with the motor and gears, you may want to tap and add wiring guides as shown above.

MOUNTING THE PROXIMITY SENSOR HOLDER

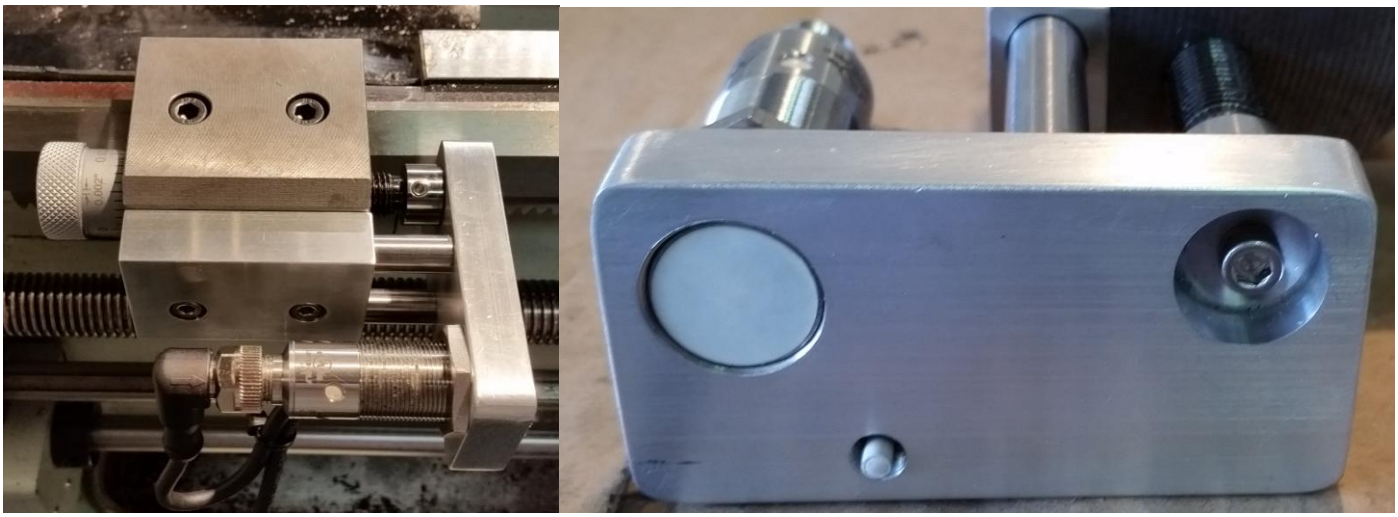
The proximity sensor is not a safety device, and not rated as such. It is to aid in electronically stopping the lathe at a repeatable stop position. Please dry mount the sensor holder to your micrometer stop with a clamp and make sure that the sensor mount moves freely through it stroke once connected to the micrometer piston. If yours is different it may require a different mounting position, or spacer. If there are any problems I can re-machine a new stop if I have the dimensions or you send me your micrometer stop.

1. The proximity holder mechanism is mounted to the micrometer carriage stop with TWO 10-32 x 3/4" cap screws that are provided in the zip-lock bag. This requires drilling and tapping the holes in the stop. There is also a spare 8-32 x 1/8" Allen screw for the micrometer shaft lock.

2. The holes are to be drilled 0.60" from the lower edge of the carriage stop (bottom), and 0.60" inches on either side from the center of the stop as shown in the picture. This is best done on a mill or drill press. There is a slight amount of play in the holes drilled in the aluminum plate to allow minor position adjustment.



3. I used a 5/32 drill and drilled each hole to a depth of 0.60-0.75" for a 10-32 tap. The 0.60"depth is fine for a plug type tap, 0.75" if you are using a taper type. The threaded portion in the stop needs to be ~0.5" deep. Mount the proximity mounting plate as shown, with the lower edge even with the carriage stop base (put both on a flat surface when tightening the screws). Note the aluminum mounting plate is asymmetrical, the holes are 0.6" from the bottom, 0.9" from the top of the block.



4. Slide the proximity sensor into the mount, screw the micrometer shaft out ~0.5" and slide the collar onto the micrometer shaft and tighten the Allen set screw. The sensor holder should move evenly through the stroke of the micrometer without binding**. It is very important the proximity sensor is flush with the front of the holder face mechanism, or just slightly behind (within 1 thread) the plane of the front so the safety stop switch can fully engage. The proximity sensor has a range of ~8 mm, the safety switch engages at about 3 mm from the face. The travel distance of the carriage after the proximity stop has been activated is <1 mm.**

5. Since these are electronic stops, the distance to stop is affected by the feed rate, braking rate/time and momentum (RPM and mass) in the system. You always need to verify the stop position when any of these variables are changed. Once set, the reproducibility to the set stopping position should be better than 0.001" with repeated passes.

6. There are two suggested ways of using the electronic stop. Turning/cutting to a stop, set the electronic stop position, take repeated cutting passes until the stop engages (the machine stops, the green light will go out and the red stop line will go on) and then disengage the carriage feed at the end of each pass and back-up the carriage. **When you back out the carriage the electronic stop will reset, but the spindle switch must always be returned to the stop position for the relay to reset and the green light indicator will go on.**

Metric threading requires that the half nut is not disengaged. Cut a ~ 0.10" grove slightly deeper than your thread depth at the end of your thread (where you want your thread to end), and set the proximity stop so the thread cutter stops about midway in this grove (0.05"). Take a pass with your thread cutter using the tool post slide hand wheel to set the depth of cut, it should be "zeroed" when the threat cutter just scratches the surface of the rod you are threading. The proximity sensor should stop the thread cut when it gets to the grove at the end of the thread. Back out the tool post slide hand wheel about 1/2 turn. Press the proximity bypass switch and reverse the cutting direction. You can release the bypass button about 2-3 seconds after you reverse the chuck/feed direction. Advance tool post slide hand wheel about 2 ticks past your last cut and repeat. It usually takes 6-8 passes to cut a thread. I use a fine sand paper or a file to clean the threads along with a brass brush. It takes a while to learn, watch the videos online.

7. When cutting to a fixed position, single stage braking (toggle switch down) should be set, so the machine stops as quickly as possible. Note that the proximity sensor, its safety stop switch and the E-Stop switch all deactivate the 2 stage braking when triggered. So even if you forget, the braking will always revert to single stage braking. Please note that at high RPMs, there may be too much momentum in the system and you can get an overvoltage error at the VFD even with the braking resistor. I do not advise using the proximity sensor at RPMs over 1000 RPM, or very heavy chucks. It may not be able to stop the momentum in the system quick enough to prevent the carriage from hitting the mechanical stop (i.e. the stopping distance needs to be less than about 7 mm of travel of the carriage).

COOLANT SWITCH

Your coolant switch activates the coolant relay which is on your far right looking at the board. The coolant relay is only activated when the coolant switch is ON, AND the spindle switch is in the forward or reverse position. Coolant is always OFF when the spindle is in the STOP position. The relay specifications can be checked online (782-2C-24D), in general the contacts are rated for ~12-15A AC and Hp loads up to ~1/2Hp. It can also be used to switch DC voltage, so you could use a 12VDC or 24VDC solenoid if you use a fogger or air driven system. Since access to the relay socket terminals is difficult when the control board is mounted, you should connect any wires to the relay terminals before mounting the board. In order to tighten the relay terminals 9 and 12, you will temporary need to disconnect the coil terminal wires A1 and A2.

782 Series Contact Ratings (current)				
Resistive				*Motor Load
Voltage	Nominal	UL	CSA	UL
28VDC	12A	12A	12A	---
120VAC	15A	15A	15A	1/2Hp
277VAC	12A	12A	12A	1Hp

Single Pole Switched
DC or 120VAC

Double Pole Switched
240VAC

PROBLEM SOLVING

1. When you turn on your system, the red light in the stop switch will light as the relay engages. If the red light is not on, then the spindle direction switch is not in the STOP position, a safety switch is activated or the proximity switch is triggered. Reset the spindle

switch to the STOP position and make sure all the guard switches are not activated, the power latch relay should click on and the green light on the relay should activate. If the RED power light on the stop switch still fails to come on, check the proximity safety switch is not engaged or damaged (should be able to hear it click when pushed), check that the proximity switch light in the metal body is not lit. There are also lights at the end in the cable that indicate power to the sensor and its state. If the cable has no indicator lights on, then there is a power supply problem or a safety interlock switch issue. If the lights in the cable are on, press the proximity bypass switch and try engage the spindle switch. If the machine engages, there could be a fault with the proximity sensor.

As a last resort, you can connect a jumper from the 1 position on the terminal strip to terminal 8 position to bypass the safety interlock and brake switches. A jumper wire from terminal #8 to terminal #3 bypasses the proximity sensor and it's safety stop switch completely. If the machine works, then there is a fault in the sensor or mechanical switch.

2. Try the JOG button, with the spindle switch in the stop position. If it works, and either the forward or reverse spindle position does not work, then it could be a bad spindle direction switch.

3. If there is no power, also check that the safety stop switch is not pushed in. Twist the stop switch clock wise to make sure it is disengaged, check the VFD that there are no errors. Try to reset the spindle switch to the stop position. Reset the VFD by powering it down for 30 seconds and then restarting.

4. Please remember that when using the stop or there is a fault in the system (relay opens), the spindle switch most always be cycled through the STOP position for the relay to reset and the lathe functions to operate.

5. The VFD has an elaborate error function system. Should there be a fault or error it is recoded in memory and it will flash an error code that can be checked in the manual. Try to turn it off and back-on to reset.

6. The VFD has a large capacitor supply and the motor provides power back to the VFD when it is stopping, so even after turning off the main power, the VFD will remain on for 20-30 seconds after the main power is disconnected.

READ THIS: If you manually program the WJ200 via the keypad you must first:

1. **Change B037 to "00"** for full display of all functions. You must press both the up and down arrows to access single-digit edit mode since this feature is not accessible in the default basic display. You must change B037 before you can change B031.

AND THEN

2. **Change B031 to "10"**. This unlocks all the high level program functions for editing. Then make the following program changes that are highlighted.

The VFD will need to be programmed to accept commands from the terminal inputs and to set all the parameters. It will not operate until this is done. Load the Hitachi software and driver to your computer. Remove the little rubber port and connect the USB cable to the port on the WJ200, . Do not connect the USB cable to the computer yet, you must first power up the WJ200 and the computer, then connect the cable to your computer. It should show the USB driver is loaded under your devices. See the WJ200 manual for the specific programming parameters and directions, these are recommendations only.

http://www.hitachi-america.us/ice/inverters/products/ac_variable_speed_drives/wj200/
Software is available at no cost from the Hitachi website site:
http://www.hitachi-america.us/ice/inverters/support_service_sales/software_dloads
Programming guidelines for installing and using the ProDriveNext software.
You must install BOTH the Then ProDriveNext (2.1.1) AND the USB driver software. The USB driver must be installed before connecting a computer to the VFD. With the WJ200 turned on and the USB cable connected to your computer, check in Windows under "Devices and Printers" the your Hitachi shows up in the pop up window. Then run the ProDriveNext software program.
1. The software in NOT intuitive until you have used it for awhile. When you load the software, click on the "File" tap at the top menu, then select "New Solution" each time when connecting to the VFD. Otherwise it tries to load old saved VFD files that are saved on your computer. There may be a way to edit them and download back to the VFD, but haven't been able to do this.
2. In the window tab "Add device" check the lower two check boxes, "Read Items:....", then click the "Online&Read" button below. A pop-up screen should indicate that the VFD is on-line and connected, hit the OK button, and this will start the download of the VFD programmed parameters to the computer program.
3. In the left Toolbox pane you will see the VFD is connected. Click on the Parameter Data, a series of tabs and screen should come up in the right viewing pane. Note the series if Taps for each Parameter Group (F, A B, C, H and P). Each Group Tab is a separate list of programmable functions, so you need to click on that tab to see the parameter group.
4. On any one Group Page, you can modify each parameter by clicking on the "Set Value" cell and entering the new numerical value. The parameter line will be highlighted with any changes you make, you can do one or many changes on multiple lines. Note: the value is not changed in the VFD memory until you either hit the "Program" tab at the top and select "Download (PC->Device), or you can place your cursor over the changed parameter, hit the "right " mouse key, and a pop-up menu will give you the same options. I recommend changing a few parameters, downloading them to the VFD and checking that everything is working. Then doing a few more within a group. Also for tweaking values once you get familiar with the effects.
5. There is a software Auto-tune motor function, used to determine your motor's parameters H031-H034 and then enter in the fields H031-H034. When you run

it to optimize your motor parameters, write down the values and then enter your motor values in H031-H034. If control block terminals stop to function after autotune, check A001 and A002 are set to "01". They sometimes change when you run the VFD from the "Device Status" tab functions. like the "Basic inverter operation / IO status monitor" menu button.

6. The WJ200 may need to be programmed before it will work using the terminal commands and external speed control. Some of the software operated motor controls may change some of the VFD programming and it may stop responding to command (they change A001 and A002, so recheck these if the terminal block commands and external pot speed control stop working). Keep a hard copy of the program changes so you make. Be sure that the "Logic input" wiring connections match up with their assigned programmed functions "C001-C007".

WJ200 **ProDriveNext**

Type: Parameter Set **Version:2.3.1.0**

KEY: ———— Not applicable unless you have 2 motors

Changes made to default VFD values

High Importance

BOLD/RED - Important to note.

F Group						
Data ID	***Data Name***	***Set value***	***Unit***	***Default value***	***Range***	***Comments***
F001	Output frequency setting	0	Hz	0	0.00, 0.50 ... 80.00	Set by VFD
F002	**Acceleration time (1)**	**5**	**s**	**10**	**0.01 ... 3600.00**	**Acceleration time of 5 seconds with an S acceleration curves works well**
F202	Acceleration time (1),2nd motor	10	s	10	0.01 ... 3600.00	
F003	**Deceleration time (1)**	**1**	**s**	**10**	**0.01 ... 3600.00**	**Requires external 50ohm 500W brake resistor for 0.5-2 second stop times, decreasing time may trip the overvoltage error, increase the time as needed to prevent this. I use 0.5 seconds with a braking resistor.**
F203	Deceleration time (1),2nd motor	10	s	10	0.01 ... 3600.00	
F004	Keypad RUN key routing	00:(Forward)		00:(Forward)		
A Group						

Data ID	Data Name	Set value	Unit	Default value	Range	***Comments***
A001	**Frequency source**	**01:(Control terminal)**		**02:(Function F001 setting)**		**THIS MUST BE SET TO "01" IF YOU USE AN EXTERNAL POT CONNECTED TO TERMINALS "H, O & L" TO SET YOUR RPM SPEED CONTROL.**
~~A201~~	~~Frequency source,2nd motor~~	~~02:(Function F001 setting)~~	-	~~02:(Function F001 setting)~~	-	
A002	**Run command source**	**01:(Control terminal)**		**02:(Run key on keypad, or digital operator)**		**THIS MUST BE SET TO "01" IF YOU USE COMMANDS SENT TO THE VFD VIA CONTROL BLOCK TERMINAL "1-7", THIS MAY GET RESET TO "02" WHEN YOU DO THE MOTOR AUTOTUNE AND THE VFD WILL NO LONGER RESPONDS TO THE TERMINALS, SO MAY NEED TO BE RESET BACK TO "02". WHEN SET TO "01" VFD RUN KEY WILL NOT WORK, ONLY STOP KEY.**
~~A202~~	~~Run command source,2nd motor~~	~~02:(Run key on keypad, or digital operator)~~	-	~~02:(Run key on keypad, or digital operator)~~	-	
A003	**Base frequency**	**60**	**Hz**	**60**	**30.0 ... 80.0**	**SET TO MOTOR BASE FREQUENCY ON NAME PLATE, DEFAULT =60**
~~A203~~	~~Base frequency, 2nd motor~~	~~60~~	~~Hz~~	~~60~~	~~30.0 ... 60.0~~	
A004	**Maximum frequency**	**90**	**Hz**	**60**	**60.0 ... 400.0**	**Recommend 90 Hz for motors with a base frequency of 60 Hz. The maximum RPM when depend on the pulley ratio, I would not exceed 2000RPM.**
~~A204~~	~~Maximum frequency, 2nd motor~~	~~60~~	~~Hz~~	~~60~~	~~60.0 ... 400.0~~	
A005	[AT] selection	00:(Select between [O] and [OI] at [AT] (ON=OI, OFF=O))		00:(Select between [O] and [OI] at [AT] (ON=OI, OFF=O))		
A011	[O] input active range start frequency	0	Hz	0	0.00 ... 400.00	
A012	[O] input active range end frequency	0	Hz	0	0.00 ... 400.00	
A013	[O] input active range start	0	%	0	0 ... 100	

	voltage					
A014	[O] input active range end voltage	100	%	100	0 ... 100	
A015	[O] input start frequency enable	01:(Use 0Hz)		01:(Use 0Hz)		
A016	**Analog input filter**	**31**		**8**	**1 ... 30, 31**	**It is strongly recommend this is set to "31" if you use an external speed control, such as a wired speed pot. When set to "31" the VFD averages the pot readings and only allows changes above a 0.1Hz threshold. This reduces noise spikes picked up in the wiring going to the pot which cause RPM fluctuations when the pot is set to a fixed RPM setting.**
A017	EzSQ selection	00:(disabling)		00:(disabling)		
A038	Jog frequency	6	Hz	6	0.50 ... 9.99	
A039	Jog stop mode	04:(Controlled deceleration (valid during run))		04:(Controlled deceleration (valid during run))		
A041	**Torque boost select**	**01:(Automatic torque boost)**		**00:(Manual torque boost)**		
~~A241~~	~~Torque boost select, 2nd motor~~	~~00:(Manual torque boost)~~	-	~~00:(Manual torque boost)~~	-	
A042	Manual torque boost value	1	%	1	0.0 ... 20.0	
A242	Manual torque boost value, 2nd motor	1	%	1	0.0 ... 20.0	
A043	Manual torque boost frequency	5	%	5	0.0 ... 50.0	
A243	Manual torque boost frequency,2nd motor	5	%	5	0.0 ... 50.0	
A044	**V/f characteristic curve**	**03:(Sensorless vector (SLV))**		**00:(Constant torque)**		**IMPORTANT TO SET TO "03" Sensorless Vector for best performance**
~~A244~~	~~V/f characteristic curve,2nd motor~~	~~00:(Constant torque)~~	-	~~00:(Constant torque)~~	-	
A045	V/f gain	100	%	100	20 ... 100	
~~A245~~	~~V/f gain, 2nd motor~~	~~100~~	~~%~~	~~100~~	~~20 ... 100~~	
A046	Voltage compensation gain for automatic torque boost	100		100	0 ... 255	

~~A246~~	~~Voltage compensation gain for automatic torque boost, 2nd motor~~	~~100~~	~~-~~	~~100~~	~~0 ... 255~~	
A047	Slip compensation gain for automatic torque boost	100		100	0 ... 255	
~~A247~~	~~Slip compensation gain for automatic torque boost, 2nd motor~~	~~100~~	~~-~~	~~100~~	~~0 ... 255~~	
A051	DC braking enable	00:(Disable)		00:(Disable)		**DO NOT CHANGE THIS, IT APPLIES TO A ELECTRO-MECHANICAL BRAKE**
A052	DC braking frequency	0.5	Hz	0.5	0.00 ... 60.00	
A053	DC braking wait time	0	s	0	0.0 ... 5.0	
A054	**DC braking force for deceleration**	**80**	**%**	**50**	**0 ... 100**	**If set too high will get overvoltage error due to braking regeneration**
A055	**DC braking time for deceleration**	**0**	**s**	**0.5**	**0.0 ... 60.0**	
A056	DC braking / edge or level detection for [DB] input	01:(Level detection)		01:(Level detection)		
A057	DC braking force at start	0	%	0	0 ... 100	
A058	DC braking time at start	0	s	0	0.0 ... 60.0	
A059	**Carrier frequency during DC braking**	**8**	**kHz**	**5**	**2.0 ... 15.0**	
A061	**Frequency upper limit**	**90**	**Hz**	**0**	**0.00 ... 80.00**	**Upper limit range is = A004, Maximum Frequency, use 90Hz**
~~A261~~	~~Frequency upper limit,2nd motor~~	~~0~~	~~Hz~~	~~0~~	~~0.00 ... 60.00~~	
A062	Frequency lower limit	0	Hz	0	0.00, 0.50 ... 80.00	
~~A262~~	~~Frequency lower limit,2nd motor~~	~~0~~	~~Hz~~	~~0~~	~~0.00, 0.50 ... 60.00~~	
A063	Jump freq. (center) 1	0	Hz	0	0.00 ... 400.00	
A064	Jump freq. width (hysteresis) 1	0.5	Hz	0.5	0.00 ... 10.00	
A065	Jump freq. (center) 2	0	Hz	0	0.00 ... 400.00	

A066	Jump freq. width (hysteresis) 2	0.5	Hz	0.5	0.00 ... 10.00	
A067	Jump freq. (center) 3	0	Hz	0	0.00 ... 400.00	
A068	Jump freq. width (hysteresis) 3	0.5	Hz	0.5	0.00 ... 10.00	
A069	Acceleration hold frequency	0	Hz	0	0.00 ... 400.00	
A070	Acceleration hold time	0	s	0	0.0 ... 60.0	
A071	PID enable	00:(PID Disable)		00:(PID Disable)		
A072	PID proportional gain	1		1	0.00 ... 25.00	
A073	PID integral time constant	1	s	1	0.0 ... 3600.0	
A074	PID derivative time constant	0	s	0	0.00 ... 100.00	
A075	PV scale conversion	1		1	0.01 ... 99.99	
A076	**PV source**	**01:([O] terminal (voltage in))**		**00:([OI] terminal (current in))**		**This is the source of your Hz (rpm) adjustment, i.e. external speed pot**
A077	Reverse PID action	00:(PID input = SP-PV)		00:(PID input = SP-PV)		
A078	PID output limit	0	%	0	0.0 ... 100.0	
A079	PID feed forward selection	00:(Disabled)		00:(Disabled)		
A081	AVR function select	02:(AVR enabled except during deceleration)		02:(AVR enabled except during deceleration)		
A281	AVR function select,2nd motor	02:(AVR enabled except during deceleration)		02:(AVR enabled except during deceleration)		
A082	**AVR voltage select**	**02:(230)**	**V**	**00:(200)**		**SET TO YOUR MOTOR NAMEPLATE VOLTAGE, 220, 230, 240V. Leeson motor should be 230V, but check. a +/-5% is fine**
~~A282~~	~~AVR voltage select,2nd motor~~	~~00:(200)~~	~~V~~	~~00:(200)~~		
A083	**AVR filter time constant**	**1**	**s**	**0.3**	**0.000 ... 10.000**	**Longer voltage sampling time decreases overvoltage fault error**

A084	AVR deceleration gain	100	%	100	50 ... 200	
A085	Energy-saving operation mode	00:(Normal operation)		00:(Normal operation)		Normal operation No Energy Saving Needed
A086	**Energy-saving mode tuning**	**0**	**%**	**50**	**0.0 ... 100.0**	
A092	**Acceleration time (2)**	**5**	**s**	**10**	**0.01 ... 3600.00**	**When 2 stage acceleration used, adjust as needed**
~~A292~~	~~Acceleration time (2),2nd motor~~	~~10~~	~~s~~	~~10~~	~~0.01 ... 3600.00~~	
A093	**Deceleration time (2)**	**3**	**s**	**10**	**0.01 ... 3600.00**	**When 2 stage braking used, this is the second stage braking time added to the 1 stage time. Adjust as needed, suggest 1-3 seconds. But need to adjust as needed.**
~~A293~~	~~Deceleration time (2),2nd motor~~	~~10~~	~~s~~	~~10~~	~~0.01 ... 3600.00~~	
A094	Select method to switch to Acc2/Dec2 profile	00:(2CH input from terminal)		00:(2CH input from terminal)		
~~A294~~	~~Select method to switch to Acc2/Dec2 profile, 2nd motor~~	~~00:(2CH input from terminal)~~	~~-~~	~~00:(2CH input from terminal)~~	~~-~~	
A095	Acc1 to Acc2 frequency transition point	0	Hz	0	0.00 ... 400.00	
~~A295~~	~~Acc1 to Acc2 frequency transition point, 2nd motor~~	~~0~~	~~Hz~~	~~0~~	~~0.00 ... 400.00~~	
A096	Dec1 to Dec2 frequency transition point	0	Hz	0	0.00 ... 400.00	
~~A296~~	~~Dec1 to Dec2 frequency transition point, 2nd motor~~	~~0~~	~~Hz~~	~~0~~	~~0.00 ... 400.00~~	
A097	Acceleration curve selection	01:(S-curve)		01:(S-curve)		Acceleration is default S curve, seems to work well
A098	**Deceleration curve selection**	**00:(linear)**		**01:(S-curve)**		**Deceleration is linear. S curve may be more likely to trip the overvoltage error.**
A101	[OI] input active range start frequency	0	Hz	0	0.00 ... 400.00	
A102	[OI] input active range end frequency	0	Hz	0	0.00 ... 400.00	
A103	[OI] input active range start current	20	%	20	0 ... 100	
A104	[OI] input active range end	100	%	100	20 ... 100	

	current					
A105	[OI] input start frequency select	00:(Use offset (A101 value))		00:(Use offset (A101 value))		
A131	Acceleration curve constant	2		2	1 ... 10	
A132	Deceleration curve constant	2		2	1 ... 10	
A141	A input select for calculate function	02:(Terminal [O] input)		02:(Terminal [O] input)		
A142	**B input select for calculate function**	**02:(Terminal [O] input)**		**03:(Terminal [OI] input)**		**MUST be set to "02" which is speed adjust base on voltage "O" terminal, "03, Terminal OI" is current which is not used**
A143	Calculation symbol	00:(ADD (A input + B input))		00:(ADD (A input + B input))		
A145	ADD frequency	0	Hz	0	0.00 ... 400.00	
A146	ADD direction select	00:(Plus (adds A145 value to the output frequency setting))		00:(Plus (adds A145 value to the output frequency setting))		
A150	Curvature of EL-S-curve at the start of acceleration	10	%	10	0 ... 50	
A151	Curvature of EL-S-curve at the end of acceleration	10	%	10	0 ... 50	
A152	Curvature of EL-S-curve at the start of deceleration	10	%	10	0 ... 50	
A153	Curvature of EL-S-curve at the end of deceleration	10	%	10	0 ... 50	
A154	Deceleration hold frequency	0	Hz	0	0.00 ... 400.00	
A155	Deceleration hold time	0	s	0	0.0 ... 60.0	
A156	PID sleep function action threshold	0	Hz	0	0.00 ... 400.00	
A157	PID sleep function action delay time	0	s	0	0.0 ... 25.5	
A161	[VR] input active range start frequency	0	Hz	0	0.00 ... 400.00	
A162	[VR] input active range end frequency	0	Hz	0	0.00 ... 400.00	

A163	[VR] input active range start	0	%	0	0 ... 100
A164	[VR] input active range end	100	%	100	0 ... 100
A165	[VR] input start frequency select	01:(Use 0Hz)		01:(Use 0Hz)	
B Group					
Data ID	Data Name	Set value	Unit	Default value	Range
b001	Restart mode on power failure / under-voltage trip	00:(Alarm output after trip, no automatic restart)		00:(Alarm output after trip, no automatic restart)	
b002	Allowable under-voltage power failure time	1	s	1	0.3 ... 25.0
b003	Retry wait time before motor restart	1	s	1	0.3 ... 100.0
b004	Instantaneous power failure / under-voltage trip alarm enable	00:(Disable)		00:(Disable)	
b005	Number of restarts on power failure / under-voltage trip events	00:(Restart 16 times)		00:(Restart 16 times)	
b007	Restart frequency threshold	0	Hz	0	0.00 ... 400.00
b008	Restart mode on over voltage / over current trip	00:(Alarm output after trip, no automatic restart)		00:(Alarm output after trip, no automatic restart)	
b010	Number of retry on over voltage / over current trip	3	times	3	1 ... 3
b011	Retry wait time on over voltage / over current trip	1	s	1	0.3 ... 100.0
b012	Level of electronic thermal	100	%	100	20.0 ... 100.0
b212	Level of electronic thermal, 2nd motor	100	%	100	20.0 ... 100.0
b013	Electronic thermal characteristic	01:(Constant torque)		01:(Constant torque)	

Comments

~~b213~~	~~Electronic thermal characteristic, 2nd motor~~	~~01:(Constant torque)~~	~~-~~	~~01:(Constant torque)~~	~~-~~	
b015	Free setting, electronic thermal frequency (1)	0	Hz	0	0	
b016	Free setting, electronic thermal current (1)	0	%	0	0.0 ... 100.0	
b017	Free setting, electronic thermal frequency (2)	0	Hz	0	0	
b018	Free setting, electronic thermal current (2)	0	%	0	0.0 ... 100.0	
b019	Free setting, electronic thermal frequency (3)	0	Hz	0	0 ... 400	
b020	Free setting, electronic thermal current (3)	0	%	0	0.0 ... 100.0	
b021	Overload restriction operation mode	01:(Enabled for acceleration and constant speed)		01:(Enabled for acceleration and constant speed)		
b221	Overload restriction operation mode, 2nd motor	01:(Enabled for acceleration and constant speed)		01:(Enabled for acceleration and constant speed)		
b022	**Overload restriction level**	**160**	**%**	**150**	**20.0 ... 200.0**	**Set a little higher overload parameter depending on needs.**
~~b222~~	~~Overload restriction level, 2nd motor~~	~~150~~	~~%~~	~~150~~	~~20.0 ... 200.0~~	
b023	Deceleration rate at overload restriction	1	s	1	0.1 ... 3000.0	
~~b223~~	~~Deceleration rate at overload restriction, 2nd motor~~	~~1~~	~~s~~	~~1~~	~~0.1 ... 3000.0~~	
b024	**Overload restriction operation mode 2**	**00:(Disabled)**		**01:(Enabled for acceleration and constant speed)**		
b025	Overload restriction level 2	150	%	150	20.0 ... 200.0	
b026	Deceleration rate 2 at overload restriction	1	s	1	0.1 ... 3000.0	
b027	OC suppression selection	01:(Enabled)		01:(Enabled)		
b028	Current level of active	100	%	100	20.0 ...	

	freq.matching				200.0	
b029	**Deceleration rate of active freq. matching**	**0.5**	**s**	**0.5**	**0.1 ... 3000.0**	**Slightly longer sampling duration decreases overvoltage tripping of device.**
b030	Start freq. of active freq. matching	00:(freq at previous shutoff)		00:(freq at previous shutoff)		
b031	**Software lock mode selection**	**10:unlock high level program parameters**		**01:(all parameters except B031 and output frequency F001 are locked when [SFT] terminal is ON)**		**Must be set to 10 to program by keyboard, must set B037 to "00" first**
b033	**Motor cable length parameter**	**5**		**10**	**5 ... 20**	**Specify motor cable length, in most cases it will be short = 5M (or under 15')**
b034	Run/power ON warning time	0	hr	0	0 ... 65535	
b035	Rotation direction restriction	00:(No restriction)		00:(No restriction)		
b036	Reduced voltage start selection	2		2	0 ... 255	
b037	**Function code display restriction**	**00:(Full display)**		**04:(Basic display)**		**Allows full display access, no need to limit display.**
b038	Initial display selection	001:(d001)		001:(d001)		
b039	Automatic user parameter registration	00:(Disable)		00:(Disable)		
b040	Torque limit selection	00:(Quadrant-specific setting mode)		00:(Quadrant-specific setting mode)		
b041	Torque limit 1 (fwd/power)	200	%	200	0 ... 200, 255	
b042	Torque limit 2 (rev/regen.)	200	%	200	0 ... 200, 255	
b043	Torque limit 3 (rev/power)	200	%	200	0 ... 200, 255	
b044	Torque limit 4 (fwd/regen.)	200	%	200	0 ... 200, 255	
b045	Torque LAD STOP selection	00:(Disable)		00:(Disable)		
b046	Reverse run protection	01:(Reverse rotation is protected)		01:(Reverse rotation is protected)		
b049	Dual Rating Selection	00:(CT mode)		00:(CT mode)		
b050	**Controlled deceleration on**	**01:(Decelerates to a**		**00:(Trips)**		**Permits some braking to stop, even with**

	power loss	**stop)**				**power loss**
b051	DC bus voltage trigger level of ctrl. decel.	220	V	220	0.0 ... 1000.0	
b052	Over-voltage threshold of ctrl. decel.	360	V	360	0.0 ... 1000.0	
b053	Deceleration time of ctrl. decel.	1	s	1	0.01 ... 3600.00	
b054	Initial freq. drop of ctrl. decel.	0	Hz	0	0.00 ... 10.00	
b060	Maximum-limit level of window comparators O	100	%	100	0 ... 100	
b061	Minimum-limit level of window comparators O	0	%	0	0 ... 100	
b062	Hysteresis width of window comparators O	0	%	0	0 ... 10	
b063	Maximum-limit level of window comparators OI	100	%	100	0 ... 100	
b064	Minimum-limit level of window comparators OI	0	%	0	0 ... 100	
b065	Hysteresis width of window comparator OI	0	%	0	0 ... 10	
b070	Operation level at O disconnection	255	%	255	0 ... 100, 255	
b071	Operation level at OI disconnection	255	%	255	0 ... 100, 255	
b075	Ambient temperature	40	C	40	-10 ... 50	
b078	Watt-hour clearance	00:(OFF)		00:(OFF)		
b079	Watt-hour display gain	1		1	1 ... 1000	
b082	Start frequency	0.5	Hz	0.5	0.10 ... 9.99	
b083	**Carrier frequency**	**12**	**kHz**	**2**	**2.0 ... 15.0**	**Higher carrier Khz = less motor wine. But can increase motor heat high loads. Try 12, if too much whine go to 14 or 15.**
b084	Initialization mode (parameters or trip history)	00:(Initialization disabled)		00:(Initialization disabled)		
b085	Country for initialization	00:(Standard)		00:(Standard)		
b086	**Frequency scaling conversion factor**	**29**		**1**	**0.01 ... 99.99**	**Permits motor RPM to be displayed if desired on VFD, scales Hz to RPM.**

b087	STOP key enable	00:(Enabled)		00:(Enabled)		
b088	Restart mode after FRS	00:(Restart from 0Hz)		00:(Restart from 0Hz)		
b089	Automatic carrier frequency reduction	01:(Enabled, depending on the output current)		01:(Enabled, depending on the output current)		
b090	**Dynamic braking usage ratio**	**10**	**%**	**0**	**0.0 ... 10.0**	**When using an external 50ohm 500W resistor, duty "ON' cycle is 0-10%**
b091	Stop mode selection	00:(DEC (decelerate to stop))		00:(DEC (decelerate to stop))		
b092	**Cooling fan control**	**01:(Fan is ON during run, OFF during stop (5 minute delay from ON to OFF))**		**01:(Fan is ON during run, OFF during stop (5 minute delay from ON to OFF))**		**Otherwise 02:(Fan is temperature controlled). Use 01 in cabinet without a cooling fan.**
b093	Clear elapsed time of cooling fan	00:(Count)		00:(Count)		
b094	Initialization target data	00:(All parameters)		00:(All parameters)		
b095	Dynamic braking control (BRD) selection	01:(Enable during run only)		01:(Enable during run only)		
b096	**BRD activation level**	**360**	**V**	**360**	**330 ... 380**	**factory default, try 340V if one gets overvoltage VFD error when stopping**
b097	**BRD resistor value**	**50**	**Ohm**	**50**	**50.0 ... 600.0**	**This is set automatically when you add an external brake resistor**
b100	Free-setting V/F freq. (1)	0	Hz	0	0	
b101	Free-setting V/F volt. (1)	0	V	0	0.0 ... 800.0	
b102	Free-setting V/F freq. (2)	0	Hz	0	0	
b103	Free-setting V/F volt. (2)	0	V	0	0.0 ... 800.0	
b104	Free-setting V/F freq. (3)	0	Hz	0	0	
b105	Free-setting V/F volt. (3)	0	V	0	0.0 ... 800.0	
b106	Free-setting V/F freq. (4)	0	Hz	0	0	
b107	Free-setting V/F volt. (4)	0	V	0	0.0 ... 800.0	

b108	Free-setting V/F freq. (5)	0	Hz	0	0	
b109	Free-setting V/F volt. (5)	0	V	0	0.0 ... 800.0	
b110	Free-setting V/F freq. (6)	0	Hz	0	0	
b111	Free-setting V/F volt. (6)	0	V	0	0.0 ... 800.0	
b112	Free-setting V/F freq. (7)	0	Hz	0	0 ... 400	
b113	Free-setting V/F volt. (7)	0	V	0	0.0 ... 800.0	
b120	Brake control enable	00:(Disable)		00:(Disable)		
b121	Brake Wait Time for Release	0	s	0	0.00 ... 5.00	
b122	Brake Wait Time for Acceleration	0	s	0	0.00 ... 5.00	
b123	Brake Wait Time for Stopping	0	s	0	0.00 ... 5.00	
b124	Brake Wait Time for Confirmation	0	s	0	0.00 ... 5.00	
b125	Brake release freq.	0	Hz	0	0.00 ... 400.00	
b126	Brake release current	100	%	100	0.0 ... 200.0	
b127	Braking frequency	0	Hz	0	0.00 ... 400.00	
b130	**Deceleration overvoltage suppression enable**	**01:(Enabled)**		**00:(Disabled)**		
b131	**Decel. overvolt. suppress level**	**390**	**V**	**380**	**330 ... 395**	**Set higher to prevent VFD error from regenerative overvoltage when braking**
b132	Decel. overvolt. suppress const.	1	s	1	0.10 ... 30.00	
b133	**Decel. overvolt. suppress proportional gain**	**1**	**times**	**0.2**	**0.00 ... 5.00**	**Set higher to prevent VFD error from regenerative overvoltage when braking**
b134	Decel. overvolt. suppress integral time	1	s	1	0.0 ... 150.0	
b145	GS input mode	00:(No trip (Hardware shutoff only))		00:(No trip (Hardware shutoff only))		
b150	Display ex.operator connected	d001		d001		
b160	1st parameter of Dual Monitor	d001		d001		
b161	2nd parameter of Dual Monitor	d002		d002		
b163	Freq. set in monitoring	00:(Freq. set disabled)		00:(Freq. set disabled)		

b164	Automatic return to the initial display	00:(Disable)		00:(Disable)		
b165	Ex. operator com. loss action	02:(Ignore)		02:(Ignore)		
b166	Data read/write selection	00:(R/W enable)		00:(R/W enable)		
b171	Inverter mode selection	00:(Disabling)		00:(Disabling)		
b180	Initialization trigger	00:(Initialization disable)		00:(Initialization disable)		
C Group						
Data ID	Data Name	Set value	Unit	Default value	Range	***Comments***
C001	Input [1] function	**00:(FW:FORWARD Run/Stop)**		00:(FW:FORWARD Run/Stop)		"OO" TERMINAL OR "INPUT 1" IS FORWARD
C002	Input [2] function	**01:(RV:Reverse Run/Stop)**		01:(RV:Reverse Run/Stop)		"01" TERMINAL "INPUT 2" IS REVERSE
C003	**Input [3] function**	**06:(JG:Jogging)**		**02:(CF1:Multi-speed Select,Bit 0 (LSB))**		**"02" TERMINAL "INPUT 3" IS REPROGRAMMED FOR JOGGING**
C004	**Input [4] function**	**13:(USP:Unattended Start Protection)**		**03:(CF2:Multi-speed Select,Bit 1)**		**"03" TERMINAL OR "INPUT 4" IS IF YOU USE A STOP COMMAND, OVERIDES ALL OTHER COMMANDS. CAN USE WITH E-STOP (SEPARATE NO SWITCH BLOCK), WHEN E-STOP PRESSED 2ND NO SWITCH CLOSES AND ACTIVETS THIS COMMAND WHEN BUTTON PUSHED**
C005	**Input [5] function**	**09:(2CH:2-stage Acceleration and Deceleration)**		**09:(2CH:2-stage Acceleration and Deceleration)**		**Can use this function to control 2 step deceleration, may be needed for high RPM braking to prevent overvoltage error, i.e. longer total deceleration time. Can be controlled by manual switch, can also be controlled by E-stop or any series switch going to this input.**
C006	Input [6] function	18:(RS:Reset Inverter)		18:(RS:Reset Inverter)		

C007	Input [7] function	05:(CF4:Multi-speed Select,Bit 3 (MSB))		13:(USP:Unattended Start Protection)	
C011	Input [1] active state	00:normally open [NO]		00:normally open [NO]	
C012	Input [2] active state	00:normally open [NO]		00:normally open [NO]	
C013	Input [3] active state	00:normally open [NO]		00:normally open [NO]	
C014	Input [4] active state	00:normally open [NO]		00:normally open [NO]	
C015	Input [5] active state	00:normally open [NO]		00:normally open [NO]	
C016	Input [6] active state	00:normally open [NO]		00:normally open [NO]	
C017	Input [7] active state	00:normally open [NO]		00:normally open [NO]	
C021	Output [11] function	01:(FA1:Frequency Arrival Type 1-Constant Speed)		01:(FA1:Frequency Arrival Type 1-Constant Speed)	
C022	Output [12] function	00:(RUN:Run Signal)		00:(RUN:Run Signal)	
C026	Alarm relay function	05:(AL:Alarm Signal)		05:(AL:Alarm Signal)	
C027	[EO] terminal selection(Pulse/PWM output)	07:(LAD frequency (PWM))		07:(LAD frequency (PWM))	
C028	[AM] terminal selection(Analog voltage output 0...10V)	07:(LAD frequency)		07:(LAD frequency)	
C030	Digital current monitor reference value	100	%	100	20.0 ... 200.0
C031	Output [11] active state	00:normally open [NO]		00:normally open [NO]	
C032	Output [12] active state	00:normally open [NO]		00:normally open [NO]	

C036	Alarm relay active state	01:normally closed [NC]		01:normally closed [NC]	
C038	Output mode of low current detection	01:(During constant speed only)		01:(During constant speed only)	
C039	Low current detection level	100	%	100	0.0 ... 200.0
C040	Output mode of overload warning	01:(During constant speed only)		01:(During constant speed only)	
C041	Overload warning level	115	%	115	0.0 ... 200.0
C241	Overload warning level, 2nd motor	115	%	115	0.0 ... 200.0
C042	Frequency arrival setting for acceleration	0	Hz	0	0.00 ... 400.00
C043	Frequency arrival setting for deceleration	0	Hz	0	0.00 ... 400.00
C044	PID deviation level	3	%	3	0.0 ... 100.0
C045	Frequency arrival setting 2 for acceleration	0	Hz	0	0.00 ... 400.00
C046	Frequency arrival setting 2 for deceleration	0	Hz	0	0.00 ... 400.00
C047	Pulse train input/output scale conversion	1		1	0.01 ... 99.99
C052	PID FBV output high limit	100	%	100	0.0 ... 100.0
C053	PID FBV output low limit	0	%	0	0.0 ... 100.0
C054	Over-torque/under-torque selection	00:(Over-torque)		00:(Over-torque)	
C055	Over/under-torque level(Forward powering mode)	100	%	100	0 ... 200
C056	Over/under-torque level(Reverse regen. mode)	100	%	100	0 ... 200
C057	Over/under-torque level(Reverse powering mode)	100	%	100	0 ... 200
C058	Over/under-torque level(Forward regen. mode)	100	%	100	0 ... 200
C059	Signal output mode of Over/under-torque	01:(During constant speed only)		01:(During constant speed only)	
C061	Electronic thermal warning level	90	%	90	0 ... 100

C063	Zero speed detection level	0	Hz	0	0.00 ... 100.00
C064	Heat sink overheat warning	100	C	100	0 ... 110
C071	Communication speed	05:(9600bps)		05:(9600bps)	
C072	Modbus address	1		1	1 ... 247
C074	Communication parity	00:(No parity)		00:(No parity)	
C075	Communication stop bit	01:(1bit)		01:(1bit)	
C076	Communication error select	02:(Disable)		02:(Disable)	
C077	Communication error time-out	0	s	0	0.00 ... 99.99
C078	Communication wait time	0	ms	0	0 ... 1000
C081	O input span calibration	100	%	100	0.0 ... 200.0
C082	OI input span calibration	100	%	100	0.0 ... 200.0
C085	Thermistor input (PTC) span calibration	100	%	100	0.0 ... 200.0
C091	Debug mode enable	00:(Disable)		00:(Disable)	
C096	Communication selection	00:(Modbus-RTU)		00:(Modbus-RTU)	
C098	EzCOM start adr. of master	1		1	1 ... 8
C099	EzCOM end adr. of master	1		1	1 ... 8
C100	EzCOM starting trigger	00:(Input terminal(485RUN))		00:(Input terminal(485RUN))	
C101	Up/Down memory mode selection	00:(Clear last frequency (return to default frequency F001))		00:(Clear last frequency (return to default frequency F001))	
C102	Reset selection	00:(Cancel trip state at input signal ON transition, stops inverter if in Run Mode)		00:(Cancel trip state at input signal ON transition, stops inverter if in Run Mode)	
C103	Restart mode after reset	00:(Start with 0 Hz)		00:(Start with 0 Hz)	
C104	UP/DWN clear mode	00:(0Hz)		00:(0Hz)	
C105	EO gain adjustment	100	%	100	50 ... 200

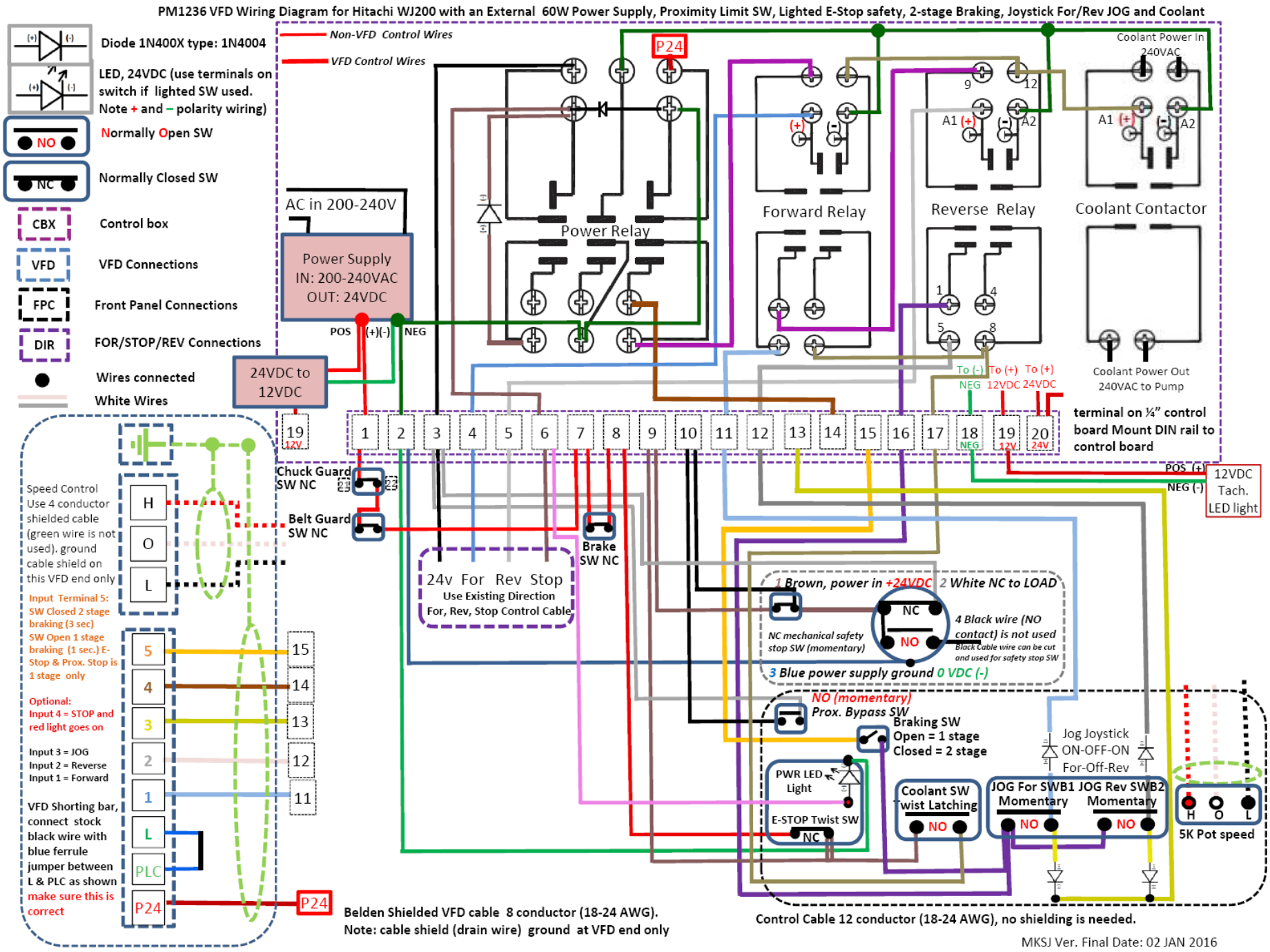
C106	AM gain adjustment	100	%	100	50 ... 200
C109	AM bias adjustment	0	%	0	0 ... 100
C111	Overload warning level 2	115	%	115	0.0 ... 200.0
C130	Output [11] on delay	0	s	0	0.0 ... 100.0
C131	Output [11] off delay	0	s	0	0.0 ... 100.0
C132	Output [12] on delay	0	s	0	0.0 ... 100.0
C133	Output [12] off delay	0	s	0	0.0 ... 100.0
C140	Relay output on delay	0	s	0	0.0 ... 100.0
C141	Relay output off delay	0	s	0	0.0 ... 100.0
C142	Logic output 1 operand A	00:(RUN:Run Signal)		00:(RUN:Run Signal)	
C143	Logic output 1 operand B	00:(RUN:Run Signal)		00:(RUN:Run Signal)	
C144	Logic output 1 operator	00:([LOG] = A AND B)		00:([LOG] = A AND B)	
C145	Logic output 2 operand A	00:(RUN:Run Signal)		00:(RUN:Run Signal)	
C146	Logic output 2 operand B	00:(RUN:Run Signal)		00:(RUN:Run Signal)	
C147	Logic output 2 operator	00:([LOG] = A AND B)		00:([LOG] = A AND B)	
C148	Logic output 3 operand A	00:(RUN:Run Signal)		00:(RUN:Run Signal)	
C149	Logic output 3 operand B	00:(RUN:Run Signal)		00:(RUN:Run Signal)	
C150	Logic output 3 operator	00:([LOG] = A AND B)		00:([LOG] = A AND B)	
C160	Input [1] response time	1		1	0 ... 200
C161	Input [2] response time	1		1	0 ... 200
C162	Input [3] response time	1		1	0 ... 200
C163	Input [4] response time	1		1	0 ... 200
C164	Input [5] response time	1		1	0 ... 200
C165	Input [6] response time	1		1	0 ... 200
C166	Input [7] response time	1		1	0 ... 200
C169	Multistage speed/position	0		0	0 ... 200

	determination time				
H Group					
Data ID	Data Name	Set value	Unit	Default value	Range
H001	Auto-tuning selection	00:(Disabled)		00:(Disabled)	
H002	Motor constant selection	02:(Auto tuned data)		00:(Hitachi standard motor)	
~~H202~~	~~Motor constant selection, 2nd motor~~	~~02:(Auto tuned data)~~	~~-~~	~~00:(Hitachi standard motor)~~	~~-~~
H003	Motor capacity	06:(1.5)	kW	06:(1.5)	ASSUMES 2HP
~~H203~~	~~Motor capacity,2nd motor~~	~~06:(1.5)~~	~~kW~~	~~06:(1.5)~~	~~-~~
H004	Motor poles setting	01:(4P)		01:(4P)	
~~H204~~	~~Motor poles setting,2nd motor~~	~~01:(4P)~~	~~-~~	~~01:(4P)~~	~~-~~
H005	Motor speed response constant	100	%	100	1 ... 1000
~~H205~~	~~Motor speed response constant, 2nd motor~~	~~100~~	~~%~~	~~100~~	~~1 ... 1000~~
H006	Motor stabilization constant	100		100	0 ... 255
~~H206~~	~~Motor stabilization constant, 2nd motor~~	~~100~~	~~-~~	~~100~~	~~0 ... 255~~
H020	Motor constant R1 (Hitachi motor)	1.477	Ohm	1.477	0.001 ... 65.535
~~H220~~	~~Motor constant R1, 2nd motor (Hitachi motor)~~	~~1.477~~	~~Ohm~~	~~1.477~~	~~0.001 ... 65.535~~
H021	Motor constant R2 (Hitachi motor)	0.801	Ohm	0.801	0.001 ... 65.535
~~H221~~	~~Motor constant R2, 2nd motor (Hitachi motor)~~	~~0.801~~	~~Ohm~~	~~0.801~~	~~0.001 ... 65.535~~
H022	Motor constant L (Hitachi motor)	12.8	mH	12.8	0.01 ... 655.35
~~H222~~	~~Motor constant L, 2nd motor (Hitachi motor)~~	~~12.8~~	~~mH~~	~~12.8~~	~~0.01 ... 655.35~~
H023	Motor constant I0 (Hitachi motor)	4.16	A	4.16	0.01 ... 655.35
~~H223~~	~~Motor constant I0, 2nd motor (Hitachi motor)~~	~~4.16~~	~~A~~	~~4.16~~	~~0.01 ... 655.35~~

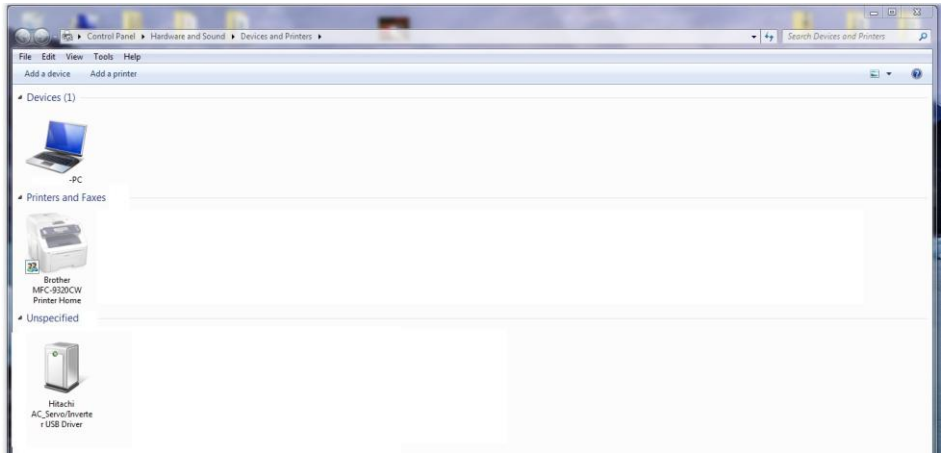
Comments

Use the autotune feature to determine your motor's parameters H031-H034 and then enter in the fields below. I run the autotune feature through the software. Write down the values and then enter your motor values in H031-H034. If control block terminals stop to function after autotune, check A001 and A002 is set to "01"

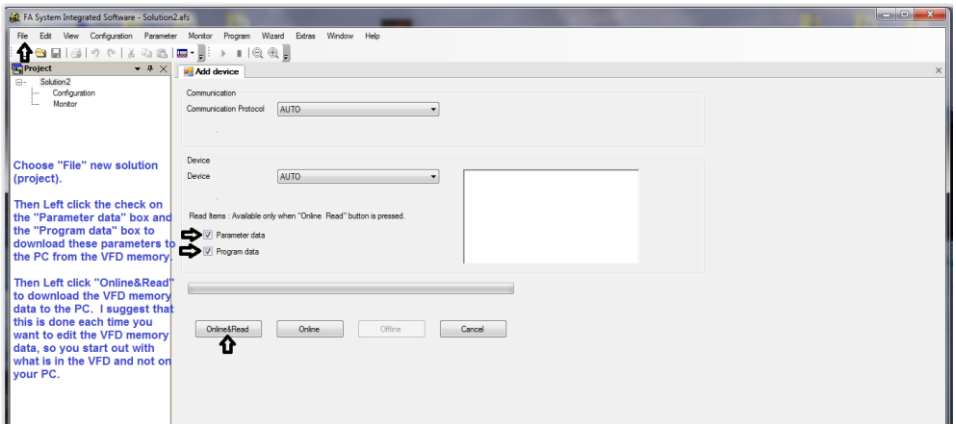
H024	Motor constant J (Hitachi motor)	0.017	kgm2	0.017	0.001 ... 9999.000
~~H224~~	~~Motor constant J, 2nd motor (Hitachi motor)~~	~~0.017~~	~~kgm2~~	~~0.017~~	~~0.001 ... 9999.000~~
H030	Motor constant R1 (Auto tuned data)	1.477	Ohm	1.477	0.001 ... 65.535
~~H230~~	~~Motor constant R1, 2nd motor (Auto tuned data)~~	~~1.477~~	~~Ohm~~	~~1.477~~	~~0.001 ... 65.535~~
H031	Motor constant R2 (Auto tuned data)	0.801	Ohm	0.801	0.001 ... 65.535
~~H231~~	~~Motor constant R2, 2nd motor (Auto tuned data)~~	~~0.801~~	~~Ohm~~	~~0.801~~	~~0.001 ... 65.535~~
H032	Motor constant L (Auto tuned data)	12.8	mH	12.8	0.01 ... 655.35
~~H232~~	~~Motor constant L, 2nd motor (Auto tuned data)~~	~~12.8~~	~~mH~~	~~12.8~~	~~0.01 ... 655.35~~
H033	Motor constant I0 (Auto tuned data)	4.16	A	4.16	0.01 ... 655.35
~~H233~~	~~Motor constant I0, 2nd motor (Auto tuned data)~~	~~4.16~~	~~A~~	~~4.16~~	~~0.01 ... 655.35~~
H034	Motor constant J (Auto tuned data)	0.017	kgm2	0.017	0.001 ... 9999.000
~~H234~~	~~Motor constant J, 2nd motor (Auto tuned data)~~	~~0.017~~	~~kgm2~~	~~0.017~~	~~0.001 ... 9999.000~~
H050	Slip compensation P gain for V/f control with FB	0.2	times	0.2	0.00 ... 10.00
H051	Slip compensation I gain for V/f control with FB	2	s	2	0 ... 1000


PM1236 VFD Wiring Diagram for Hitachi WJ200 with an External 60W Power Supply, Proximity Limit SW, Lighted E-Stop safety, 2-stage Braking, Joystick For/Rev JOG and Coolant
Non-VFD Control Wires
VFD Control Wires
Diode 1N400X type: 1N4004
LED, 24VDC (use terminals on switch if lighted SW used. Note + and – polarity wiring)
Normally Open SW
Normally Closed SW
Control box
VFD Connections
Front Panel Connections
FOR/STOP/REV Connections
Wires connected
White Wires
AC in 200-240V
Power Supply IN: 200-240VAC OUT: 24VDC
POS (+)(-) NEG
24VDC to 12VDC
Power Relay
Forward Relay
Reverse Relay
Coolant Contactor
Coolant Power In 240VAC
Coolant Power Out 240VAC to Pump
terminal on ¼" control board Mount DIN rail to control board
12VDC Tach. LED light
Chuck Guard SW NC
Belt Guard SW NC
Brake SW NC
24v For Rev Stop
Use Existing Direction For, Rev, Stop Control Cable
1 Brown, power in +24VDC
2 White NC to LOAD
NC mechanical safety stop SW (momentary)
4 Black wire (NO contact) is not used
Black cable wire can be cut and used for safety stop SW
3 Blue power supply ground 0 VDC (-)
NO (momentary) Prox. Bypass SW
Braking SW Open = 1 stage Closed = 2 stage
PWR LED Light
E-STOP Twist SW
Coolant SW Twist Latching
JOG For SWB1 Momentary
JOG Rev SWB2 Momentary
Jog Joystick ON-OFF-ON For-Off-Rev
5K Pot speed
Speed Control Use 4 conductor shielded cable (green wire is not used). ground cable shield on this VFD end only
Input Terminal 5: SW Closed 2 stage braking (3 sec) SW Open 1 stage braking (1 sec.) E-Stop & Prox. Stop is 1 stage only
Optional: Input 4 = STOP and red light goes on
Input 3 = JOG
Input 2 = Reverse
Input 1 = Forward
VFD Shorting bar, connect stock black wire with blue ferrule jumper between L & PLC as shown make sure this is correct
Belden Shielded VFD cable 8 conductor (18-24 AWG).
Note: cable shield (drain wire) ground at VFD end only
Control Cable 12 conductor (18-24 AWG), no shielding is needed.
MKSJ Ver. Final Date: 02 JAN 2016

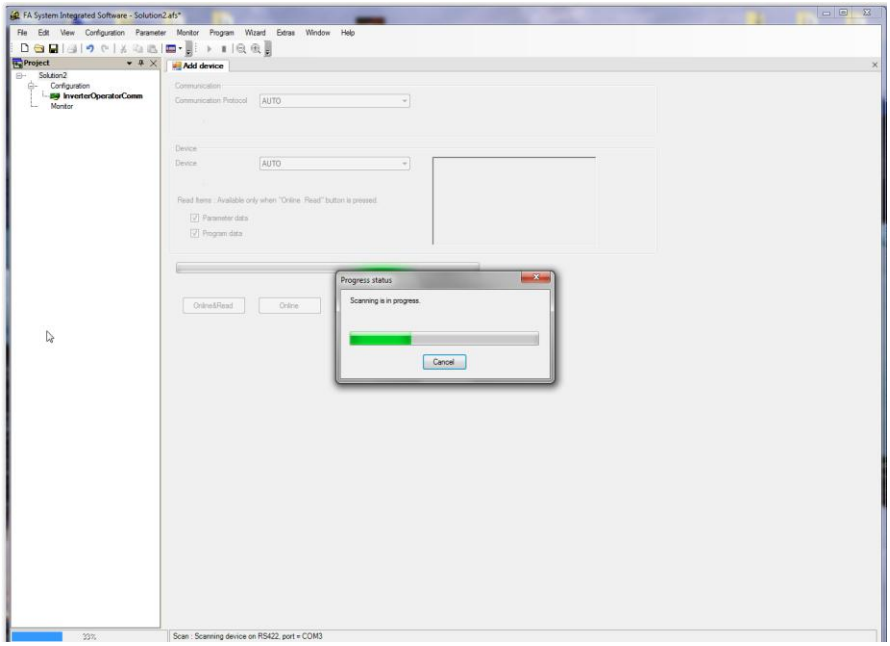
Programming the WJ200 via the computer. Load Hitachi VFD Software AND USB Driver first before connecting the VFD. Turn on VFD and connect to PC, verify USB Driver is working as shown.



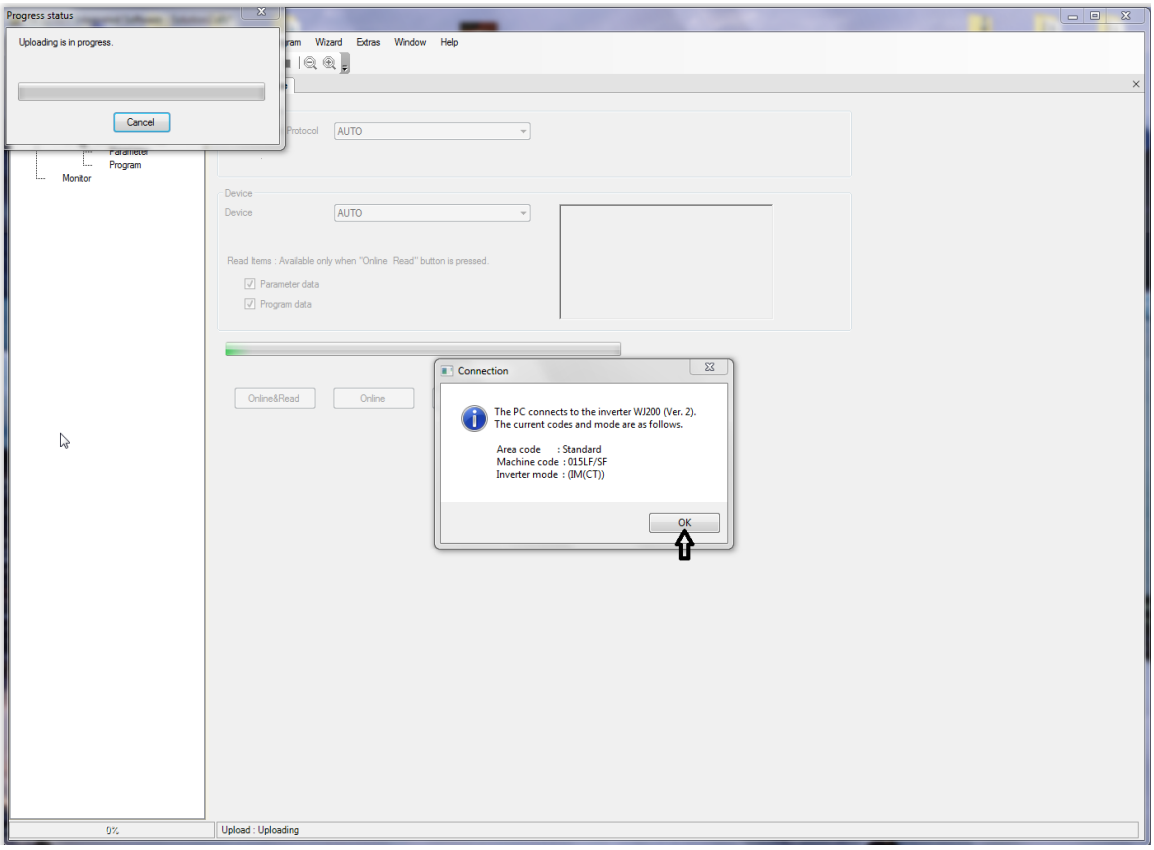
Run Hitachi VFD Software program, click on File and choose new project. Click to download Parameter and Program data and then click on Online&Read.



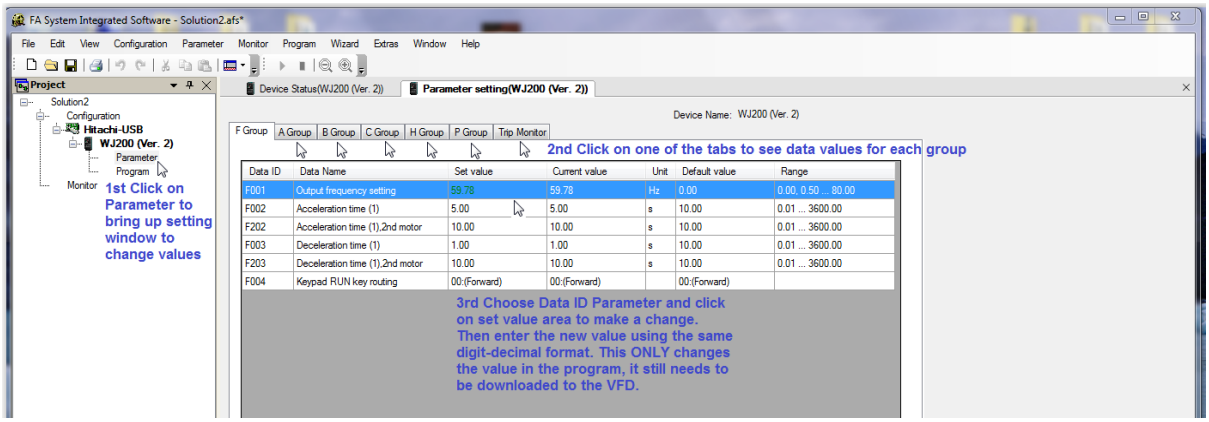
Indicates it is looking for the VFD and Data



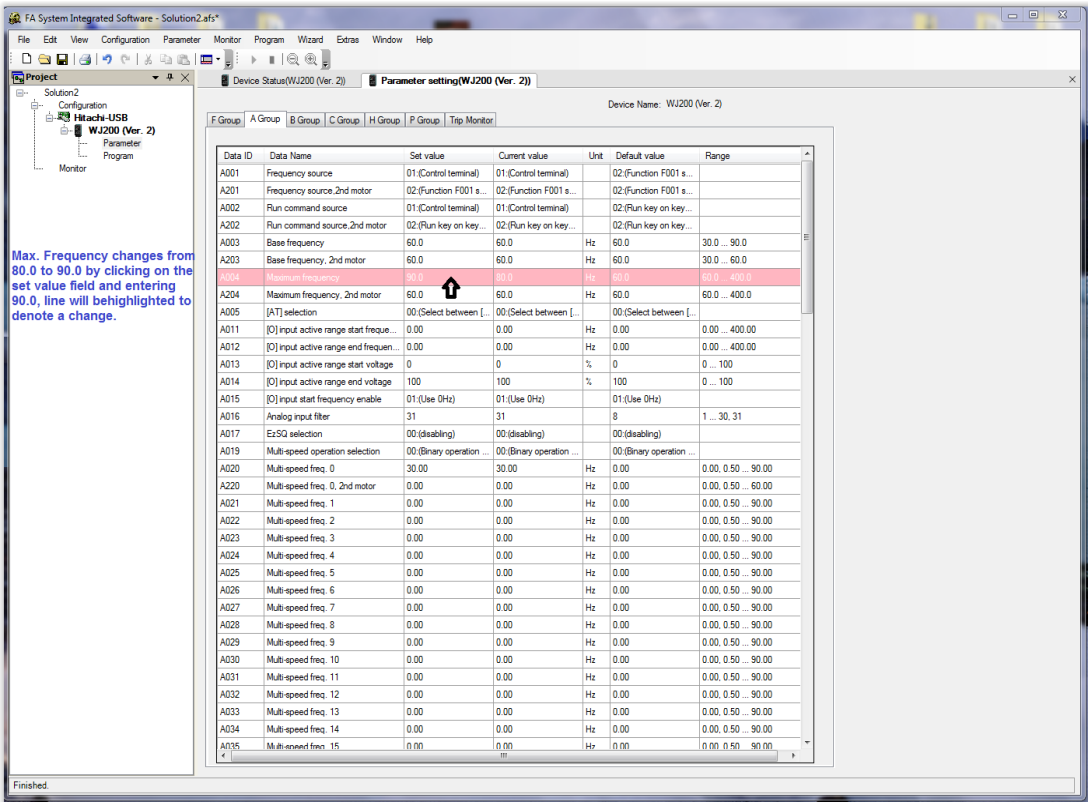
Verifies that it is connected to the WJ200 VFD, click n OK to continue and upload parameters to your PC.



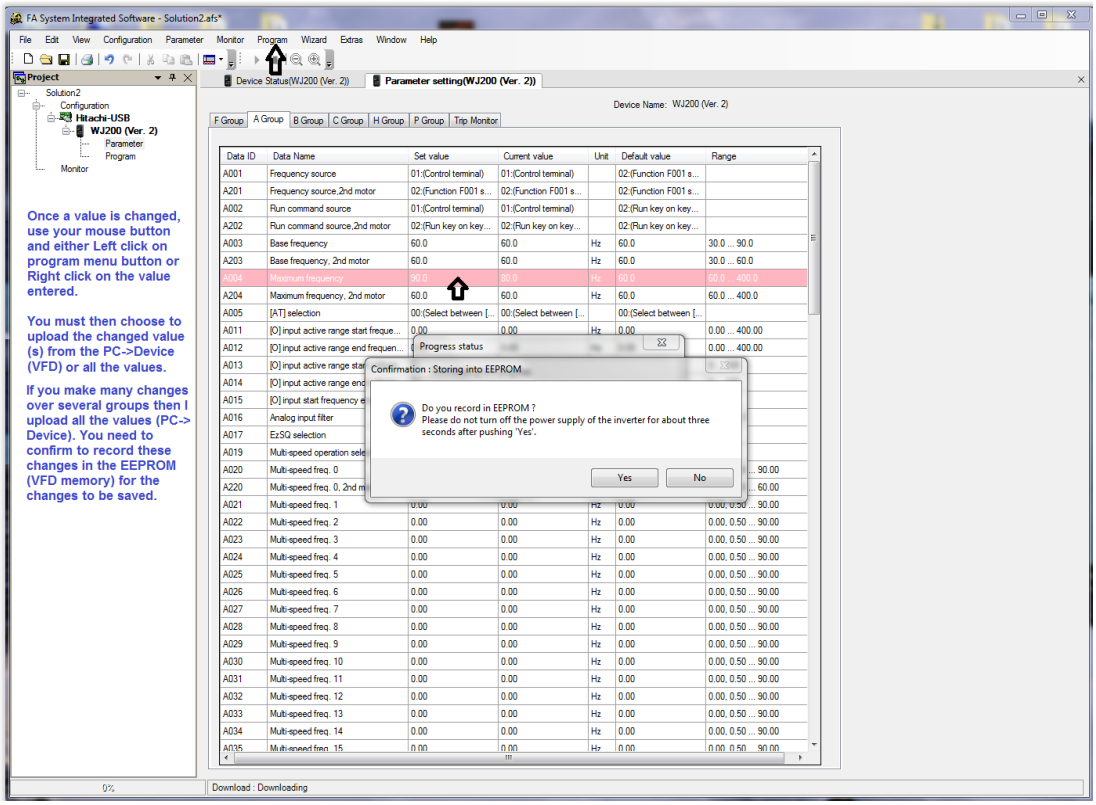
Click on Parmater as shown to pull up Parameter setting WJ200 window. Click on Group tab you want to edit.



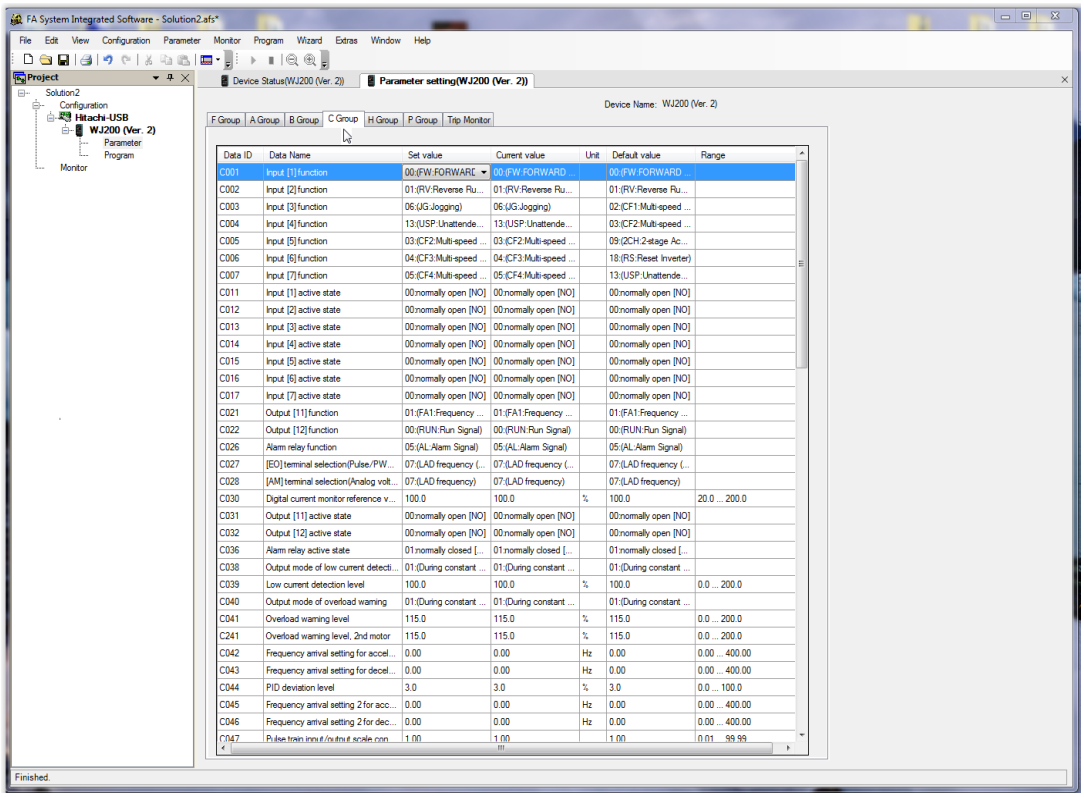
You make changes in the 'Set value" Column, the line(s) will be highlighted to indicate a change(s). The change(s) must then be sent to the VFD.



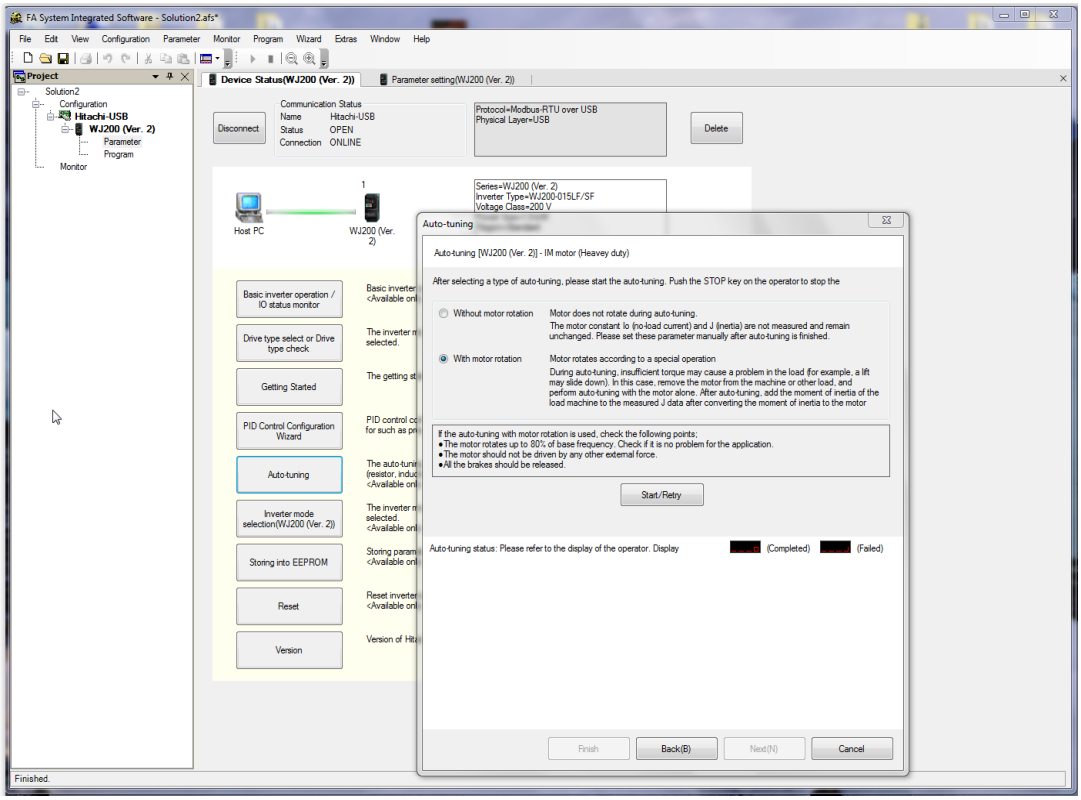
Program variable changes must be sent from the PC to the VFD, either Left click on the "Program" pull down menu tab, or Right click on the highlighted parameter to pull up the menu.

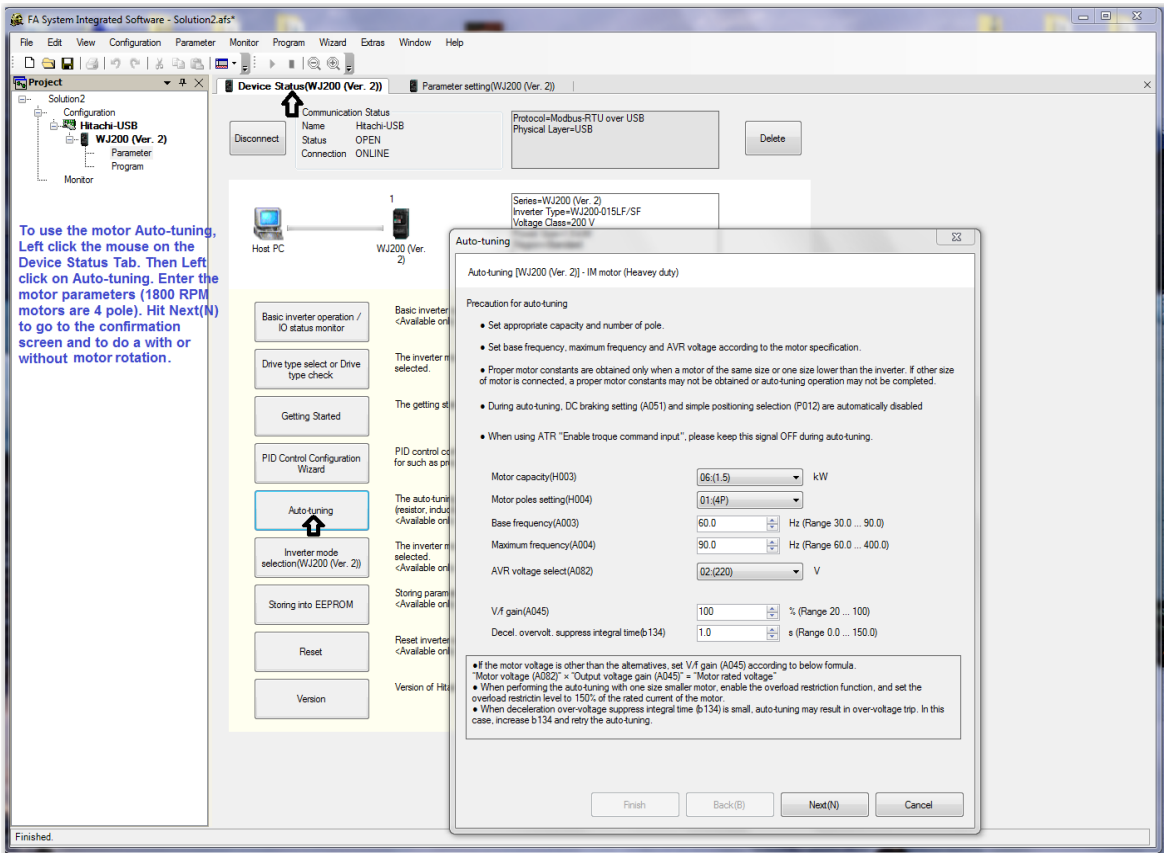


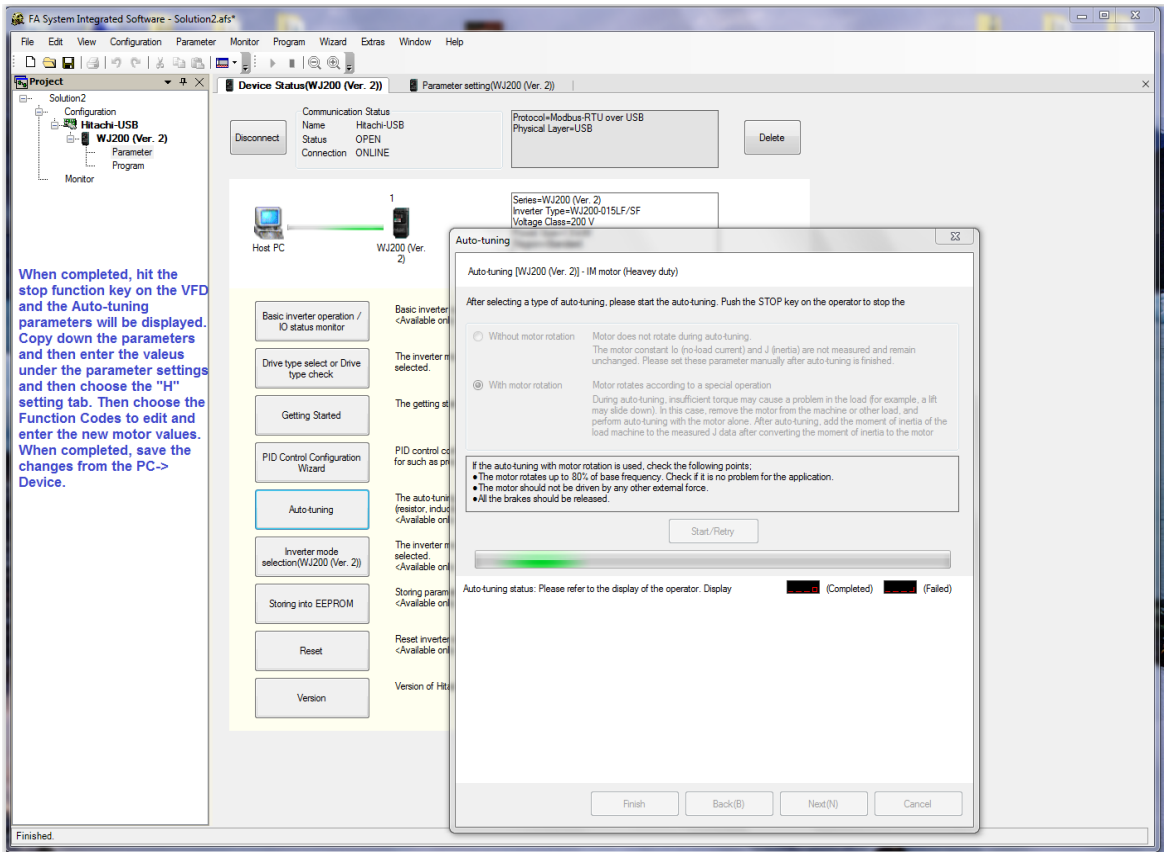
C Group Tab pulls up the program variables for the Input functions



Motor Auto-tune determines your motors actual operating parameters, which can be enetered in the VFD program variables




FA System Integrated Software - Solution2.afs*
File Edit View Configuration Parameter Monitor Program Wizard Extras Window Help
Project
Solution2
Configuration
Hitachi-USB
WJ200 (Ver. 2)
Parameter
Program
Monitor
Device Status(WJ200 (Ver. 2))
Parameter setting(WJ200 (Ver. 2))
Communication Status
Name Hitachi-USB
Status OPEN
Connection ONLINE
Disconnect
Protocol=Modbus-RTU over USB
Physical Layer=USB
Delete
Host PC
WJ200 (Ver. 2)
Series=WJ200 (Ver. 2)
Inverter Type=WJ200-015LF/SF
Voltage Class=200 V
Basic inverter operation / IO status monitor
Drive type select or Drive type check
Getting Started
PID Control Configuration Wizard
Auto-tuning
Inverter mode selection(WJ200 (Ver. 2))
Storing into EEPROM
Reset
Version
To use the motor Auto-tuning, Left click the mouse on the Device Status Tab. Then Left click on Auto-tuning. Enter the motor parameters (1800 RPM motors are 4 pole). Hit Next(N) to go to the confirmation screen and to do a with or without motor rotation.
Auto-tuning
Auto-tuning [WJ200 (Ver. 2)] - IM motor (Heavey duty)
Precaution for auto-tuning
• Set appropriate capacity and number of pole.
• Set base frequency, maximum frequency and AVR voltage according to the motor specification.
• Proper motor constants are obtained only when a motor of the same size or one size lower than the inverter. If other size of motor is connected, a proper motor constants may not be obtained or auto-tuning operation may not be completed.
• During auto-tuning, DC braking setting (A051) and simple positioning selection (P012) are automatically disabled
• When using ATR "Enable troque command input", please keep this signal OFF during auto-tuning.
Motor capacity(H003) 06:(1.5) kW
Motor poles setting(H004) 01:(4P)
Base frequency(A003) 60.0 Hz (Range 30.0 ... 90.0)
Maximum frequency(A004) 90.0 Hz (Range 60.0 ... 400.0)
AVR voltage select(A082) 02:(220) V
V/f gain(A045) 100 % (Range 20 ... 100)
Decel. overvolt. suppress integral time(b134) 1.0 s (Range 0.0 ... 150.0)
•If the motor voltage is other than the alternatives, set V/f gain (A045) according to below formula.
"Motor voltage (A082)" × "Output voltage gain (A045)" = "Motor rated voltage"
• When performing the auto-tuning with one size smaller motor, enable the overload restriction function, and set the overload restrictin level to 150% of the rated current of the motor.
• When deceleration over-voltage suppress integral time (b134) is small, auto-tuning may result in over-voltage trip. In this case, increase b134 and retry the auto-tuning.
Finish
Back(B)
Next(N)
Cancel
Finished.


FA System Integrated Software - Solution2.afs*
File Edit View Configuration Parameter Monitor Program Wizard Extras Window Help
Project
Solution2
Configuration
Hitachi-USB
WJ200 (Ver. 2)
Parameter
Program
Monitor
Device Status(WJ200 (Ver. 2))
Parameter setting(WJ200 (Ver. 2))
Communication Status
Name Hitachi-USB
Status OPEN
Connection ONLINE
Disconnect
Protocol=Modbus-RTU over USB
Physical Layer=USB
Delete
Host PC
WJ200 (Ver. 2)
Series=WJ200 (Ver. 2)
Inverter Type=WJ200-015LF/SF
Voltage Class=200 V
Basic inverter operation / IO status monitor
Drive type select or Drive type check
Getting Started
PID Control Configuration Wizard
Auto-tuning
Inverter mode selection(WJ200 (Ver. 2))
Storing into EEPROM
Reset
Version
When completed, hit the stop function key on the VFD and the Auto-tuning parameters will be displayed. Copy down the parameters and then enter the valeus under the parameter settings and then choose the "H" setting tab. Then choose the Function Codes to edit and enter the new motor values. When completed, save the changes from the PC-> Device.
Auto-tuning
Auto-tuning [WJ200 (Ver. 2)] - IM motor (Heavey duty)
After selecting a type of auto-tuning, please start the auto-tuning. Push the STOP key on the operator to stop the
Without motor rotation
Motor does not rotate during auto-tuning.
The motor constant Io (no-load current) and J (inertia) are not measured and remain unchanged. Please set these parameter manually after auto-tuning is finished.
With motor rotation
Motor rotates according to a special operation
During auto-tuning, insufficient torque may cause a problem in the load (for example, a lift may slide down). In this case, remove the motor from the machine or other load, and perform auto-tuning with the motor alone. After auto-tuning, add the moment of inertia of the load machine to the measured J data after converting the moment of inertia to the motor
If the auto-tuning with motor rotation is used, check the following points;
• The motor rotates up to 80% of base frequency. Check if it is no problem for the application.
• The motor should not be driven by any other external force.
• All the brakes should be released.
Start/Retry
Auto-tuning status: Please refer to the display of the operator. Display
(Completed)
(Failed)
Finish
Back(B)
Next(N)
Cancel
Finished.