

DYI CNC Controller

Attachment to website article UptimFab.com

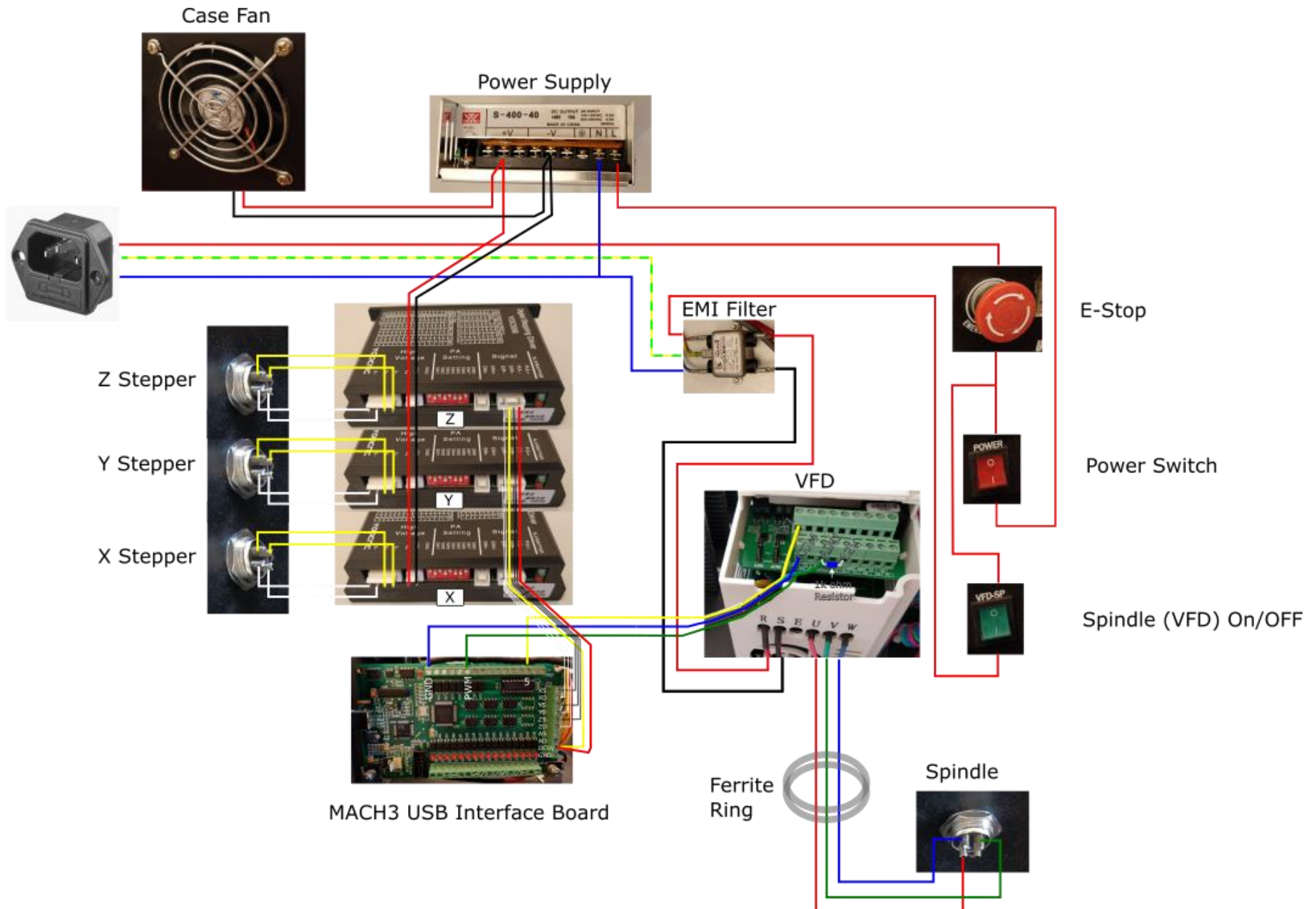
Robin, 10-01-2021

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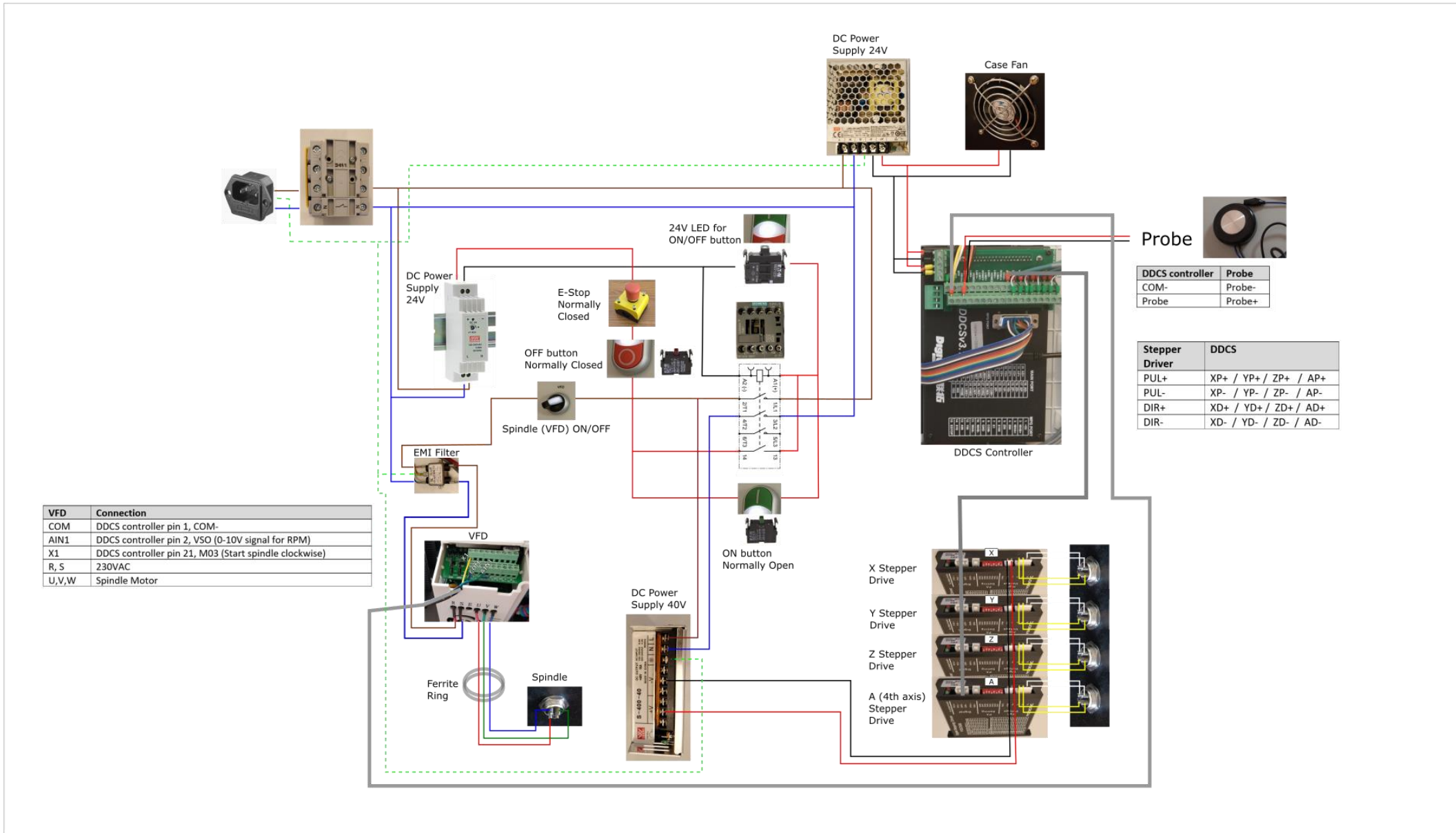
YOO CNC Controller Wiring Diagram

Wiring diagram of the YOO CNC controller as it was supplied from the factory:



DYI controller Wiring Diagram

Wiring diagram of the home made controller as described in this article:

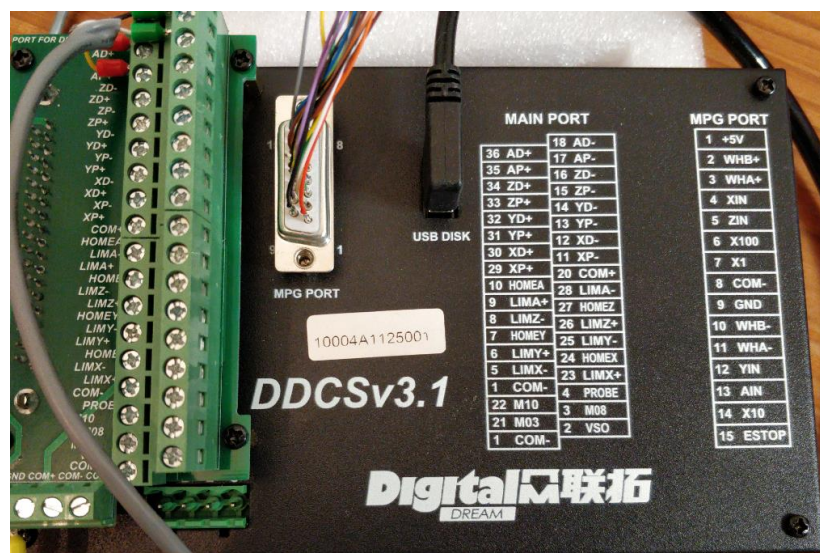


MPG Wiring

In the table below I have listed the pinout for the MPG. Note, that the pin numbering is different between the MPG connector and the connector on the DDCS controller. The colors are however correct, so make sure to look at the colors and to **not** just use the same pin numbers.

I left some wire unconnected, which are marked in grey in the table below.

| Pin# | MPG Manual | | Printed on Controller | DDCS V3.1 Manual | | Soldered |
|------|--------------|--------|-----------------------|------------------|--------------|-----------------------|
| | Color | Signal | | Color | Signal | |
| 1 | Red | 5V | +5V | +5V | Red | Red |
| 2 | Black | 0V | WHB+ | WHB+ | White | White |
| 3 | Green | A | WHA+ | WHA+ | Green | Green |
| 4 | White | B | XIN | XIN | Yellow | Yellow |
| 5 | Purple | /A | ZIN | ZIN | Brown | Brown |
| 6 | Purple/Black | /B | X100 | X100 | Orange | Orange |
| 7 | Green/Black | L+ | X1 | X1 | Grey | Grey |
| 8 | White/Black | L- | COM- | COM- | Orange/Black | Orange/Black |
| 9 | Yellow | X | GND | GND | Black | Black |
| 10 | Yellow/Black | Y | WHB- | WHB- | Purple/Black | Purple/Black |
| 11 | Brown | Z | WHA- | WHA- | Purple | Purple |
| 12 | Brown/Black | 4 | YIN | YIN | Yellow/Black | Yellow/Black |
| 13 | Pink | 5 | AIN | AIN | Brown/Black | Brown/Black |
| 14 | Pink Black | 6 | X10 | X10 | Grey/Black | Grey/Black |
| 15 | Grey | X1 | ESTOP | ESTOP | Blue | Blue |
| 16 | Grey/Black | X10 | | | | |
| 17 | Orange | X100 | | | | |
| 18 | Orange/Black | COM | | | | Control Switch |
| 19 | Blue | C | | | | Emergency Stop Switch |
| 20 | Blue/Black | CN | | | | |
| 21 | Red/Black | / | | | | Spare |



VFD Settings

| P0 Function Group | | | |
|--|-------------|---|--|
| Parameter | VFD Setting | Description / setting options | Setting |
| Command Source for controlling VFD | P0-000 | 0: Keyboard Control 1: Analog Terminal Control 2: Communication Control | 1: Analog Terminal Control |
| Frequency Source type | P0-001 | 0: Main Frequency Source X 1: Assistant frequency source Y 2: Main Frequency Source X + Assistant frequency source Y 3: max (Main Frequency Source X + Assistant frequency source Y) | 0: Main Frequency Source X |
| Main frequency source | P0-002 | 0: Keyboard potentiometer 1: Keyboard up/down arrow keys 2: AIN1 Analog input terminal AIN1 3: AIN2 Analog input terminal AIN2 | 2: AIN1 Analog input terminal AIN1 |
| Assistant frequency source (not used for this controller) | P0-003 | 4: multi function input terminals 5: PID closed loop running | 2: AIN1 Analog input terminal AIN1 |
| Starting value when using the keyboard for frequency control | P0-004 | Start frequency [Hz] | 400.00 |
| JOG frequency (not used for this controller) | P0-005 | Frequency used when VFD receives JOG command [Hz] | 5.00 |
| Spindle direction | P0-006 | 0: Standard (according to instruction if direction is provided) 1: Reverse direction 2: Reverse prohibited | 0.00 |
| Upper frequency limit | P0-007 | Maximum Output frequency [Hz] | 400.00 |
| Lower frequency limit | P0-008 | Minimum output frequency [Hz] | 0.0 |
| Ramp up time | P0-009 | Acceleration speed time [s] | 8.0 |
| Ramp down time | P0-010 | Deceleration speed time [s] | 8.0 |
| Carrier frequency | P0-011 | [kHz] | 6.0 |
| V/F curve setting | P0-012 | 1: 50Hz 2: 50Hz high starting torque 3: 50Hz, reduced torque 4: 60Hz 5: 60Hz high starting torque 6: 60Hz, reduced torque 7: Factory test | 400.00 (This should go from 1-7 , so 400 does not make sense) |
| Torque boost | P0-013 | 0.0 – 15.0% | 1.0 |
| Automatic torque compensation gain | P0-014 | 0.0 – 250% | 0.0 |
| Automatic slip compensation gain | P0-015 | 0.0 – 250% | 0.0 |
| X1-terminal function | P0-016 | 0: invalid | 1 |
| X2-terminal function | P0-017 | 1: forward run | 24(?) |
| X3-terminal function | P0-018 | 2: reverse run | 25(?) |
| X4-terminal function | P0-019 | 3: wire control | 26(?) |

| | | | |
|---------------------------------------|--------|--|--------|
| | | 4: fault reset 5: Up command (frequency) 6: Down command (frequency) 7: forward jog 8: reverse jog 9: coast to stop 10: external fault input 11: acc/dec speed pause 12: multi step speed terminal 1 13: multi step speed terminal 2 14: frequency source switch | |
| Control mode of terminal | P0-020 | 0: 2-wire mode 1 (see manual for more details) | 0.00 |
| AIN min input | P0-021 | [V] | 0.00 |
| AIN min input corresponding frequency | P0-022 | [Hz] | 0.00 |
| AIN max input | P0-023 | [V] | 10.0 |
| AIN min input corresponding frequency | P0-024 | [Hz] | 400.00 |
| Relay output selection | P0-025 | 0: No output | 1 |
| Y1 output selection | P0-026 | 1: Stop fault occurred in running 2: inverter running 3: run frequency reached set value 4: upper frequency limit warning 5: lower frequency limit warning 6: inverter zero speed running | 3 |
| Analog out AO1 output selection | P0-027 | 0: output frequency 50Hz -> 10V 1: output current. Rated current -> 10V 2: output voltage 500V -> 10V 3: setting frequency 50 Hz -> 10V | 0 |
| Analog Out AO1 gain | P0-028 | Setting range: 0.1 – 10.00 | 1.00 |
| Keyboard DIR/JOG function | P0-029 | 0: switching at running direction 1: jog command, key is a jog command 2: key is invalid | 0 |
| Keyboard STOP key | P0-030 | 0: invalid in analog or serial control mode 1: effective in analog or serial control mode (equivalent to external fault input) | 0 |
| Stop mode | P0-031 | 0: deceleration to stop 1: coast to stop | 0 |
| Start frequency of DC braking | P0-032 | 0.00 – 50.00 Hz | 0 |
| DC braking current | P0-033 | 0.0 – 150.0% | 0 |
| DC braking time | P0-034 | 0.00 – 60.00 sec | 0 |
| Protection current of motor overload | P0-035 | 50.0 – 110.0% | 100.00 |
| Over current protection | P0-036 | Over current protection value when lose speed 110.0 – 200.0% (acceleration speed pause when current limit is reached) | 150.0 |
| Over voltage protection | P0-037 | Over-voltage protection when lose speed 120.0 – 150.0% | 130.0 |

| | | | |
|---------------------------------------|--------|---|-------|
| | | (deceleration speed pause at over-voltage) | |
| Dynamic breaking voltage value | P0-038 | 110 – 140% | 125.0 |
| Auto reset times | P0-039 | 0 - 3times Number of times to reset after issue (0.5 sec interval). Clears after 60 seconds of normal operation | 0 |
| Restart after power off instantaneous | P0-040 | 0: disabled 1: enabled. Start running automatically after under voltage | 0 |
| Multi step speed 0 | P0-041 | 0.00 – 600.00Hz | 0.00 |
| Multi step speed 1 | P0-042 | | 0.00 |
| Multi step speed 2 | P0-043 | | 0.00 |
| Multi step speed 3 | P0-044 | | 0.00 |
| Setting channels selection | P0-045 | 0: keyboard digital setting (by P0-046) 1: Keyboard potentiometer (0 – 10V) 2: AIN1: 0 – 10V 3: AIN1: 4 – 20mA 4: AIN2: 0 – 10V 5: AIN2: 4 – 20mA 6: serial communication | 0 |
| PID keyboard digital setting | P0-046 | 0.00 – 10.00V | 3.00 |
| PID feedback channel selection | P0-047 | 0: AIN1: 0 – 10V 1: AIN1: 4 – 20mA 2: AIN2: 0 – 10V 3: AIN2: 4 – 20mA 4: keyboard potentiometer | 0 |
| Proportional gain P | P0-048 | 0.00 – 10.00 | 1.00 |
| Integral time I | P0-049 | 0.00 – 100.00s | 2.00 |
| Differential time D | P0-050 | 0.00 – 100.00s | 0.00 |
| Traverse amplitude | P0-051 | 0.0 – 100% relative to setting frequency | 0.0 |
| Jitter frequency | P0-052 | 0.0 – 50.0% relative to traverse amplitude | 0.0 |
| Rise time of traverse | P0-053 | 0.1 – 3200.0s | 15.0 |
| Fall time of traverse | P0-054 | 0.01 – 3200.0s | 15.0 |
| Local address | P0-055 | 1 – 31: address of slave inverter 32: address of master inverter | 1 |
| Baud rate | P0-056 | 0: 2400bps 1: 4800bps 2: 9600bps 3: 19200bps 4: 38400bps | 2 |
| Data format | P0-057 | 0: 1 start bit, 8 data bits, no parity check, 1 stop bit 1: 1 start bit, 8 data bits, even parity check, 1 stop bit 2: 1 start bit, 8 data bits, odd parity check, 1 stop bit | 0 |
| PLC run mode | P0-058 | 0: single run cycle 1: continuous cycle 2: running at multi step speed 15 | 0 |
| PLC step speed 0 | P0-059 | 0.00 – 600.00Hz | 0.00 |

| | | | |
|---------------------------|--------|----------------------|--------|
| PLC step speed 1 | P0-060 | | 250.00 |
| PLC step speed 2 | P0-061 | | 150.00 |
| PLC step speed 3 | P0-062 | | 350.00 |
| PLC step speed 4 | P0-063 | | 100.00 |
| PLC step speed 5 | P0-064 | | 300.00 |
| PLC step speed 6 | P0-065 | | 200.00 |
| PLC step speed 7 | P0-066 | | 400.00 |
| PLC step speed 8 | P0-067 | | 8.00 |
| PLC step speed 9 | P0-068 | | 9.00 |
| PLC step speed 10 | P0-069 | | 10.00 |
| PLC step speed 11 | P0-070 | | 11.00 |
| PLC step speed 12 | P0-071 | | 12.00 |
| PLC step speed 13 | P0-072 | | 13.00 |
| PLC step speed 14 | P0-073 | | 14.00 |
| PLC step speed 15 | P0-074 | | 15.00 |
| Unit of PLC run times | P0-075 | 0: second 1: hour | 0 |
| 0th step running time | P0-076 | 0.0 – 6553.5sec | 0.0 |
| 1st step running time | P0-077 | | 0.0 |
| 2nd step running time | P0-078 | | 0.0 |
| 3rd step running time | P0-079 | | 0.0 |
| 4th step running time | P0-080 | | 0.0 |
| 5th step running time | P0-081 | | 0.0 |
| 6th step running time | P0-082 | | 0.0 |
| 7th step running time | P0-083 | | 0.0 |
| 8th step running time | P0-084 | | 0.0 |
| 9th step running time | P0-085 | | 0.0 |
| 10th step running time | P0-086 | | 0.0 |
| 11th step running time | P0-087 | | 0.0 |
| 12th step running time | P0-088 | | 0.0 |
| 13th step running time | P0-089 | | 0.0 |
| 14th step running time | P0-090 | | 0.0 |
| 15th step running time | P0-091 | 0.0 | |
| PLC Acc/Dec time setting1 | P0-092 | 0 - 65535 | 0.0 |
| PLC Acc/Dec time setting1 | P0-093 | | 0.0 |
| PLC Acc time 0 | P0-094 | 0.1 – 3200.0 sec | 15.0 |
| PLC Dec time 0 | P0-095 | | 15.0 |
| PLC Acc time 1 | P0-096 | | 15.0 |
| PLC Dec time 1 | P0-097 | | 15.0 |
| PLC Acc time 2 | P0-098 | | 15.0 |
| PLC Dec time 2 | P0-099 | | 15.0 |
| PLC Acc time 3 | P0-100 | | 15.0 |
| PLC Dec time 3 | P0-101 | 15.0 | |
| PLC run direction setting | P0-102 | 0 - 65535 | 0 |

Note: I found that in my VFD settings P0-103 up to and including P0-110 also exist, but there is no information on these settings in the user manual, so they are also not included in this overview.

| P1 Function Group | | | |
|---------------------------|--------|---|---|
| Function write protection | P1-000 | 0: P0 functions can be modified 1: P0 functions cannot be modified | 0 |

| | | | |
|--------------------------------|--------|---|---|
| Factory reset of P0 parameters | P1-001 | 0: no action 1: reset all P0 parameters to factory default | 0 |
|--------------------------------|--------|---|---|

DDCSV3.1 Parameters

Below are the values I have changed from the default value.

Motor parameters:

| No. | Parameter Name | Factory Value | Unit | My Value | |
|-----|----------------------------|---------------|-------------|----------|---|
| 34 | X axis pulse equivalency | 640.000 | Pulses/unit | 400.000 | X,Y, Z axis pulse setting: Stepper setting 2000 pulses per revolution Ball screw 5mm pitch $2000/5 = 400$ steps per revolution |
| 35 | Y axis pulse equivalency | 640.000 | Pulses/unit | 400.000 | |
| 36 | Z axis pulse equivalency | 640.000 | Pulses/unit | 400.000 | |
| 38 | A axis pulse equivalency | 640.000 | Pulses/unit | 33.333 | 4-th axis pulse setting: Small pulley 10 tooth Large pulley 60 tooth Stepper setting 2000 pulses per revolution With 6:1 ratio this means $2000 * 6 = 12000$ steps per revolution $12000/360 = 33.33$ steps per degree |
| 68 | Tool Setting Function Mode | 0 | Selection | 2 | Mode 0, mode 1, mode 2. Couldn't find explanation on this in manual. However, mode 2 was the only mode that worked as intended (add thickness of tool sensor to measured value) |
| 76 | Default operational speed | 3000.000 | Unit/min | 1000.000 | This is the standard continuous jog speed. Decreased because machine moved too fast for my linking when pressing jog keys |

Stepper cable connectors GX16, 4pin



Pin number and connection to stepper motor cable:

| Pin# | Color stepper motor cable | Stepper Driver | Shielded cable (arbitrarily chosen) |
|------|---------------------------|----------------|-------------------------------------|
| 1 | Blue | B+ | White |
| 2 | Yellow | B- | Yellow |
| 3 | Red | A- | Brown |
| 4 | Green | A+ | Green |