

WARNING - USE AT YOUR OWN RISK -- This schematic is likely NOT COMPLETE or ACCURATE!!!!

YMD 20 x 40 CNC Router W/ Centroid Acorn Controller

Revised 02/2021 - Added automatic tool change system

Revised 10/2022 - Upgraded system to closed loop steppers

Revised 10/2022 - Added diodes to solenoid valves

**I/O & M-Code Summary
Electrical Schematics**

Title		YMD 20 x 40 CNC Router
Author		Chris DeHut
File		Document
D 20x40 Acorn - Electrical Schematics-10-2022.ds		
Revision	Date	Sheets
1.0	10/2022	22

Input / Output / M-Codes

CNC OUTPUTS:

AXES DRIVES

X Step
X Direction
Y Step
Y Direction
Z Step
Z Direction
A Step
A Direction

SPINDLE

AN Spindle (Analog)

DEVICES

01 ATC Torque Setting Idle (M61/M81)
02 ATC Torque Setting Low (M62/M82)
03 ATC Torque Setting Tighten (M63/M83)
04 ATC Torque Setting Loosen (M64/M84)
05
06
07
08

33 [09]
34 [10]
35 [11] Machine Lamp
36 [12] Air Blow (M7 / M9) (Mist)
37 [13] Dust Collection (M8 / M9) (Flood)
38 [14] 120 VAC external outlet (Vac Clamp M26/M28)
39 [15] Spindle Reset
40 [16] Spindle Forward

41 [17]
42 [18]
43 [19]
44 [20] Stack Light - Red
45 [21] Stack Light - Amber
46 [22] Stack Light - White
47 [23] Mag Close / Open Sol (M57 / M58)
48 [24] Spindle Lock / Unlock Sol (M55 / M56)

CNC INPUTS:

P10 A Axis Encoder (RS422)

01 E-Stop SW
02 X Home/Limit SW
03 Y Home/Limit SW
04 Z Home/Limit SW
05 Probe
06 Feed Hold
07 Cycle Start
08
33 [09]
34 [10]
35 [11] Spindle Drive OK
36 [12]
37 [13]
38 [14]
39 [15]
40 [16]
41 [17] Socket Down SW
42 [18] Mag Open SW
43 [19] Mag Closed SW
44 [20] Spindle Locked SW
45 [21] Spindle Unlocked SW
46 [22]
47 [23]
48 [24]

M CODES

M07 Air Blow On
M08 Dust Collector ON
M09 Dust Collector and Air Blow OFF
M27 Vacuum Clamp ON
M28 Vacuum Clamp OFF
M3 Spindle Forward
M5 Spindle Stop

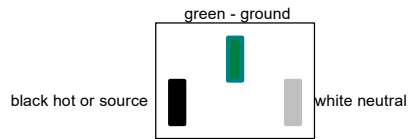
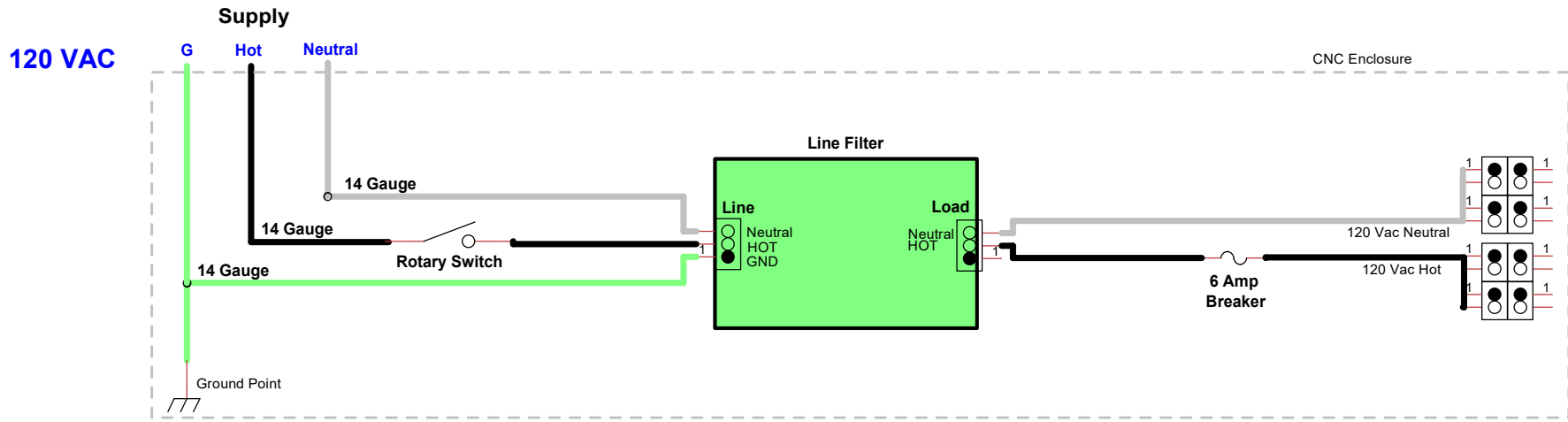
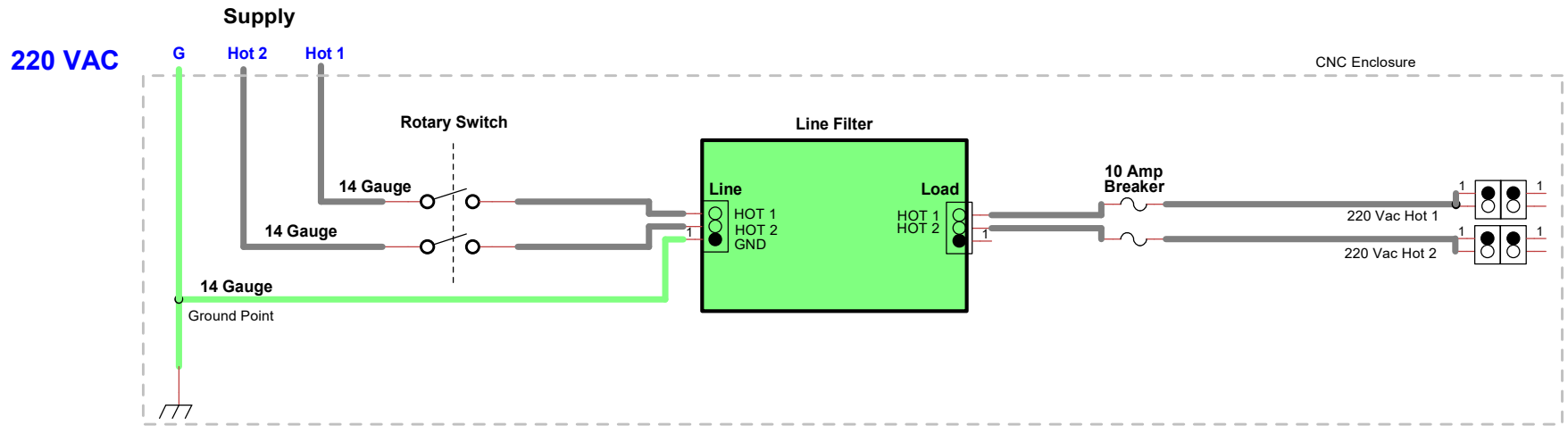
M55 Lock Spindle
M56 Unlock Spindle
M57 Close Magazine
M58 Open Magazine

M61/M81 Actuator Idle current ON/OFF
M62/M82 Actuator Low current ON/OFF
M63/M83 Actuator Tighten current ON/OFF
M64/M84 Actuator Loosen current ON/OFF

M76 Load tool, Tighten it, Measure it
M77 Loosen tool, put it in magazine

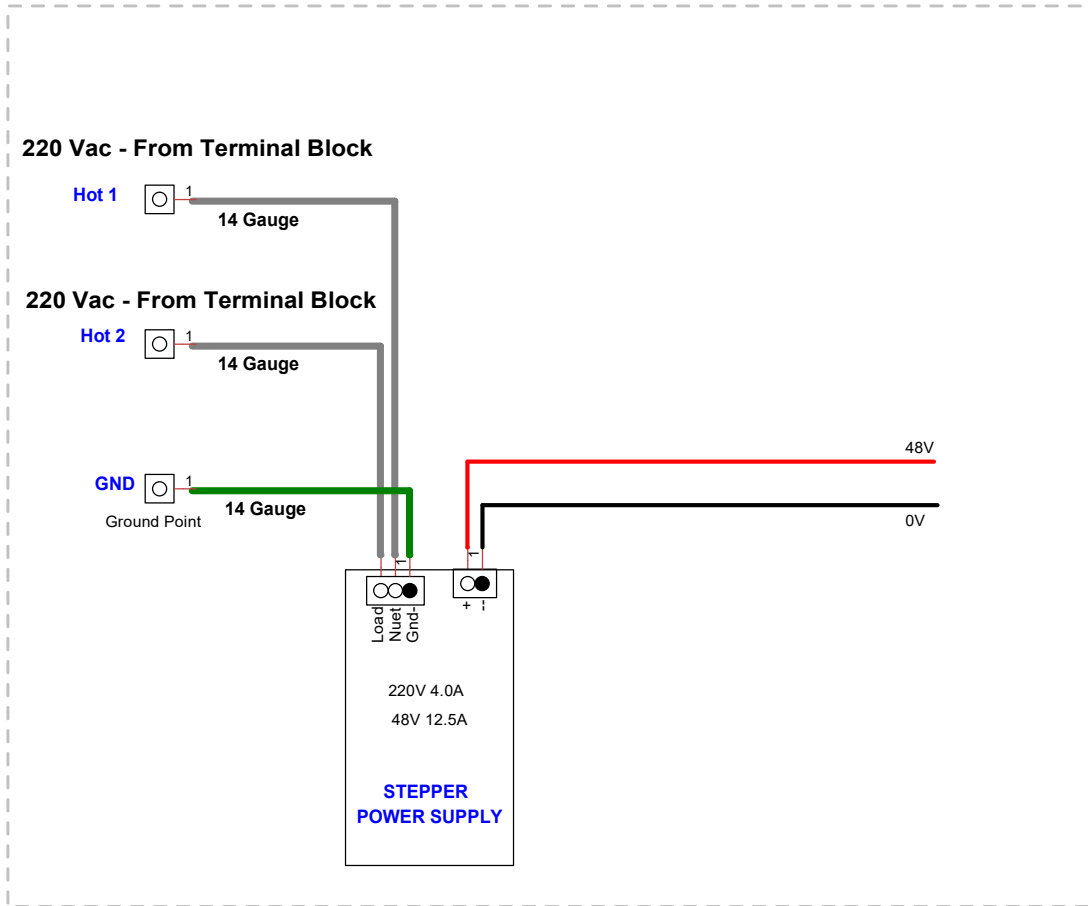
M50 Measure G54 Z

Title I/O & M-Code Summary		
Author		
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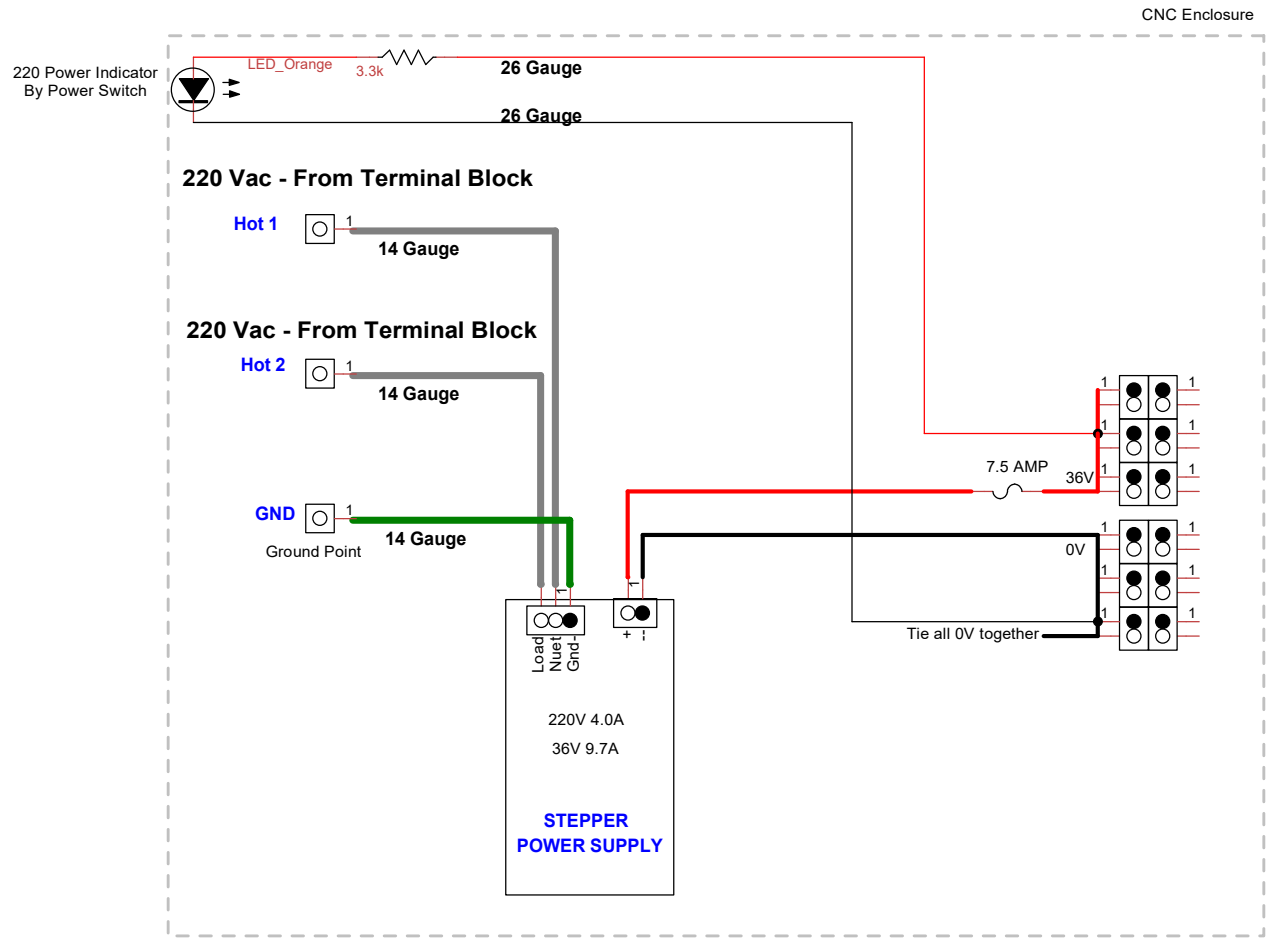


As viewed from the cord side

Title AC Power Supply		
Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds		Document
Revision 1.0	Date	Sheets 17



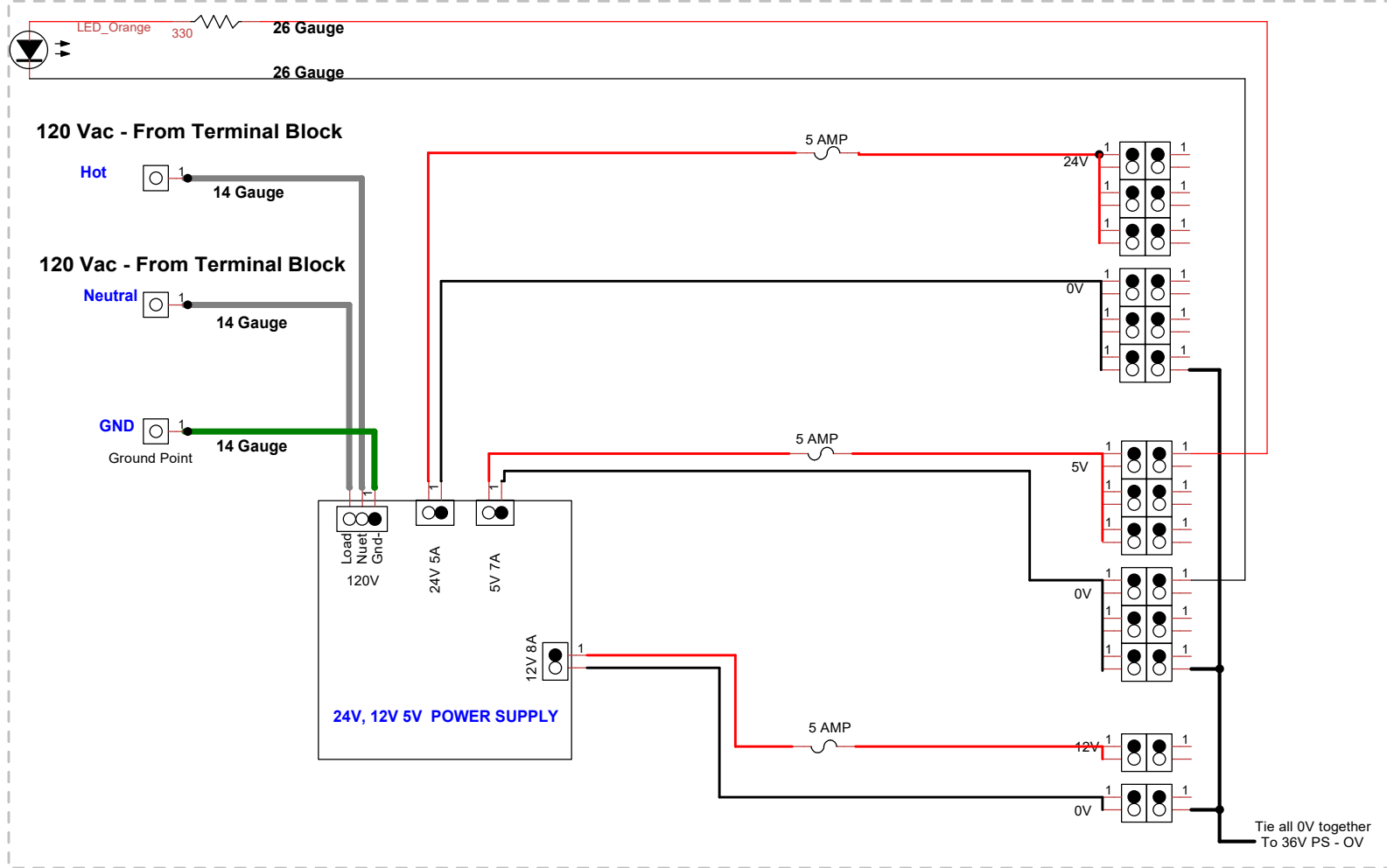
Title 48V Power Distribution		
Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds	Document	
Revision 1.0	Date	Sheets 19



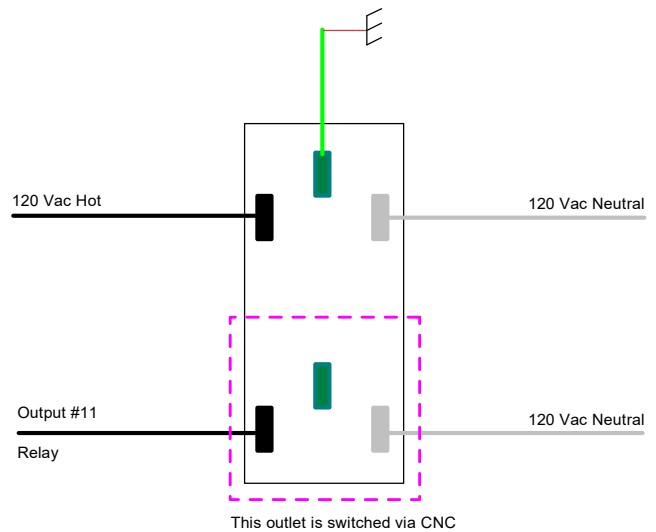
NOTE: Started with a 5 Amp fuse. It eventually blew so upgraded to 7.5 Amps on 5/23/2021

Title 36V Power Dist		
Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds	Document	
Revision 1.0	Date	Sheets 19

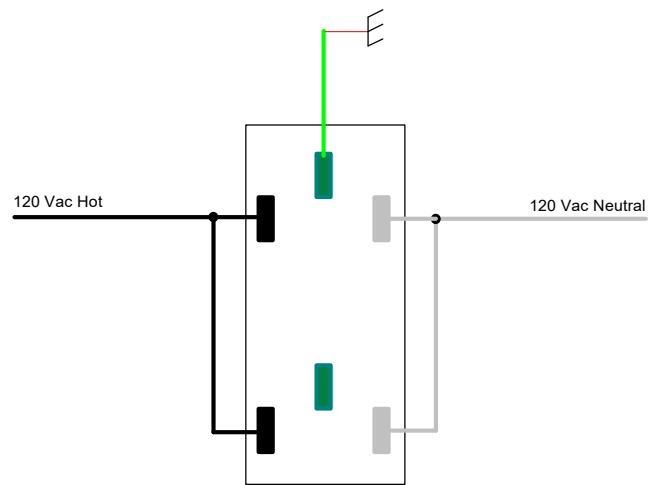
120 Power Indicator
By Power Switch



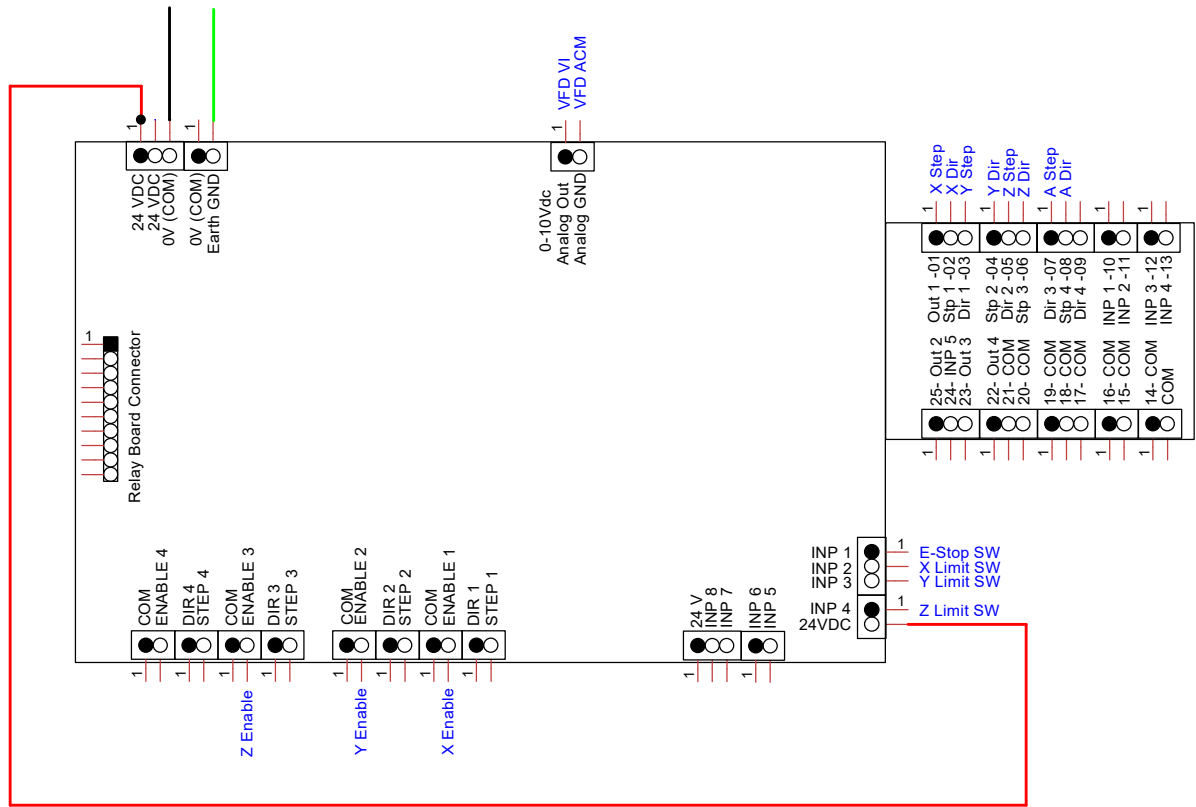
Title 24V, 12V, 5V Power Dist		
Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds	Document	
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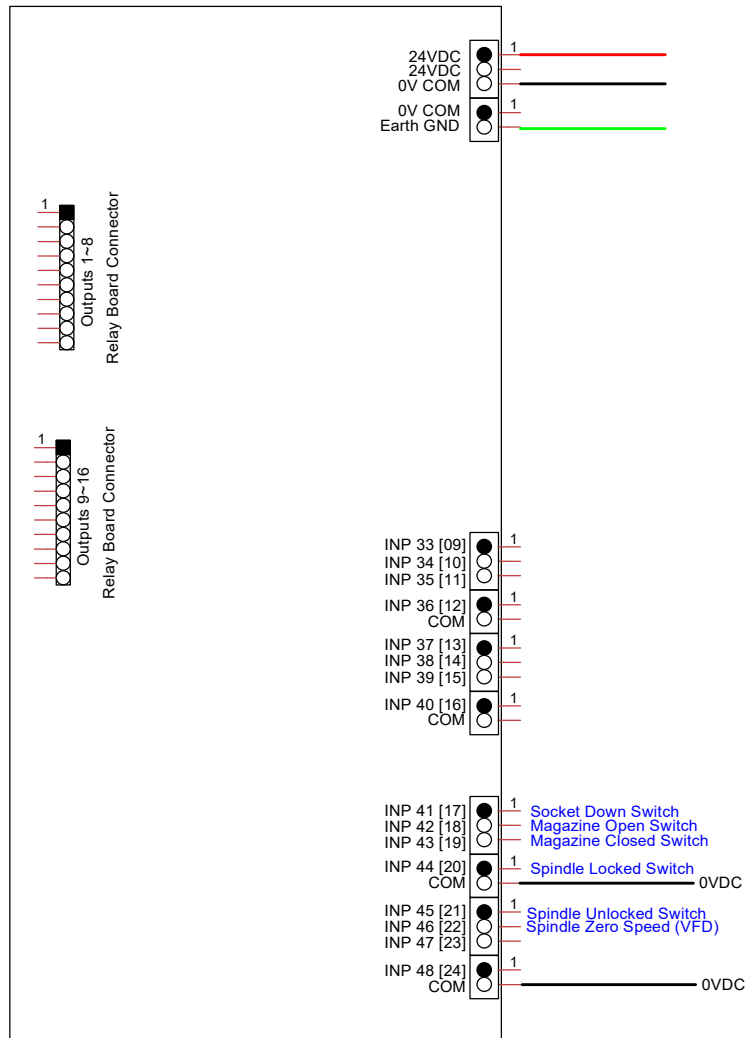
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External Duplex Outlet		
Author		
File		Document
D 20x40 Acorn - Electrical Schematics-10-2022.ds		
Revision	Date	Sheets
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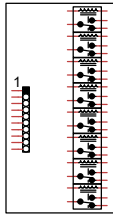
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Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds		Document
Revision 1.0	Date	Sheets 35



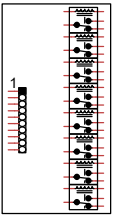
Title Centroid Acorn		
Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds	Document	
Revision 1.0	Date	Sheets 30



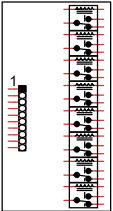
Title		
Ether 1616 I/O Expansion		
Author		
File		Document
D 20x40 Acorn - Electrical Schematics-10-2022.ds		
Revision	Date	Sheets
1.0		31



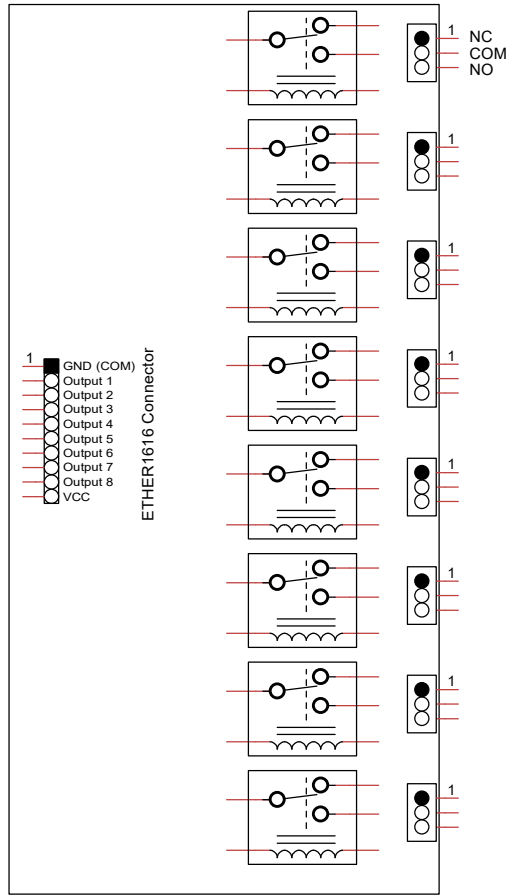
- Out 41 [17]
- Out 42 [18]
- Out 43 [19]
- Out 44 [20] Stack Light-RED
- Out 45 [21] Stack Light-AMBER
- Out 46 [22] Stack Light-WHITE
- Out 47 [23] Mag Close/Open Sol (M57/M58)
- Out 48 [24] Spindle Lock/Unlock Sol [M55/M56]



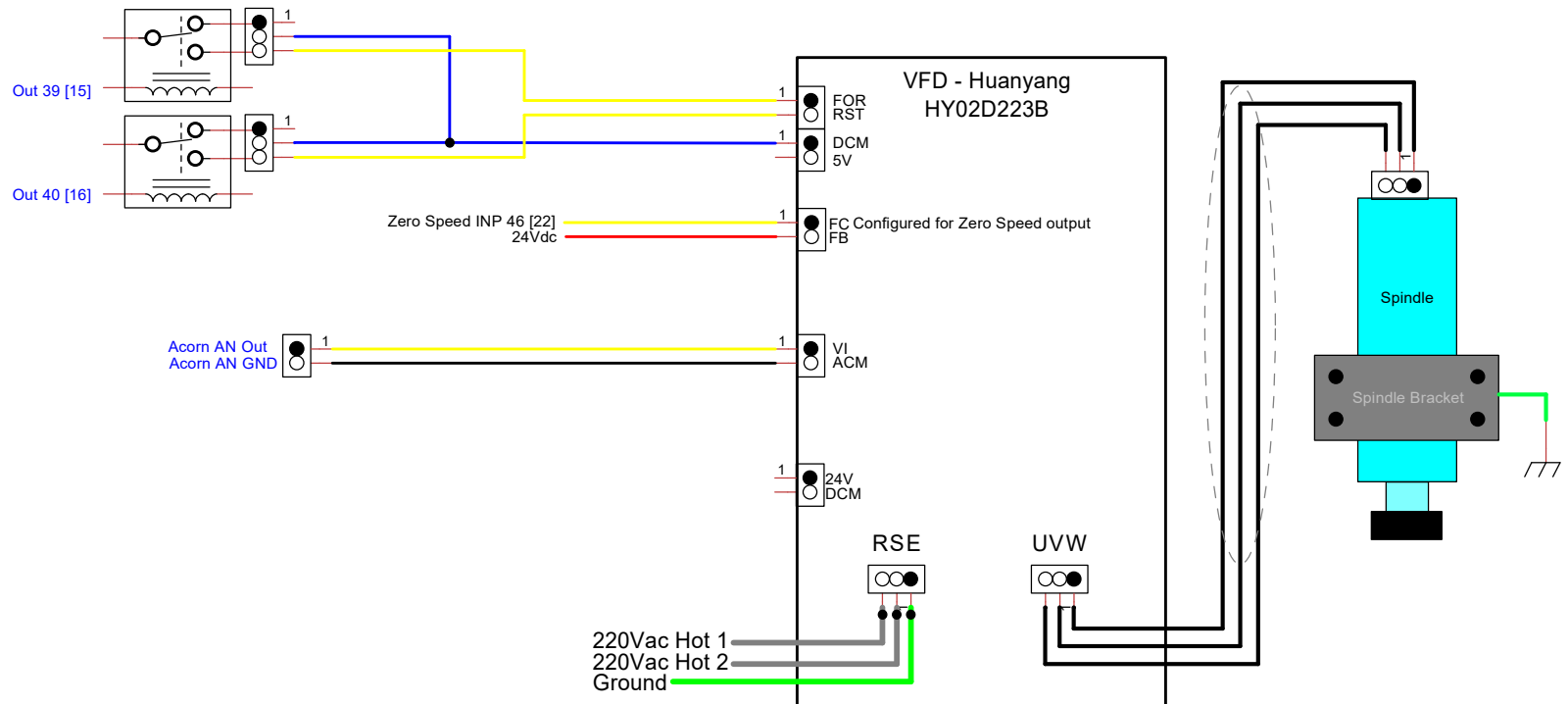
- Out 33 [09]
- Out 34 [10]
- Out 35 [11] Machine Lamp
- Out 36 [12] Air Blow (M7/M9 - Mist)
- Out 37 [13] Dust Collection (M8/M9 - Flood)
- Out 38 [14] 120Vac External Outlet (M26/M28 Vac Clamp)
- Out 39 [15] Spindle Reset
- Out 40 [16] Spindle Forward



- Out 01 ATC Torque Setting Idle (M61/M81)
- Out 02 ATC Torque Setting Low (M62/M82)
- Out 03 ATC Torque Setting Tighten (M63/M83)
- Out 04 ATC Torque Setting Loosen (M64/M84)
- Out 05
- Out 06
- Out 07
- Out 08



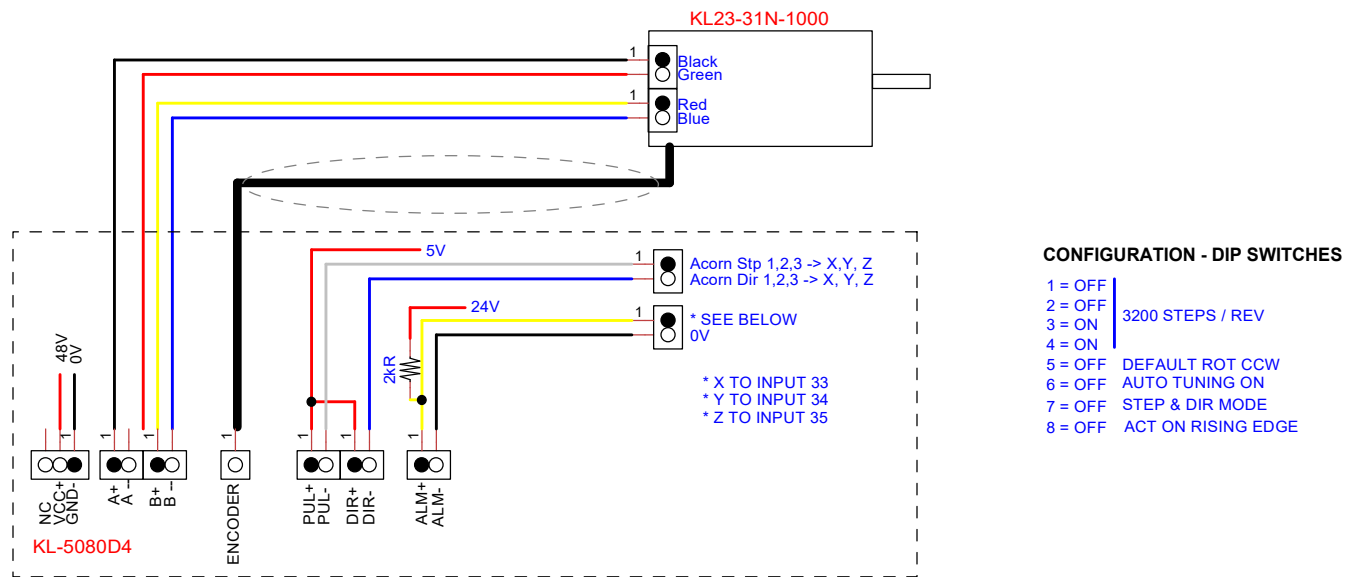
Title Relay Board		
Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds		Document
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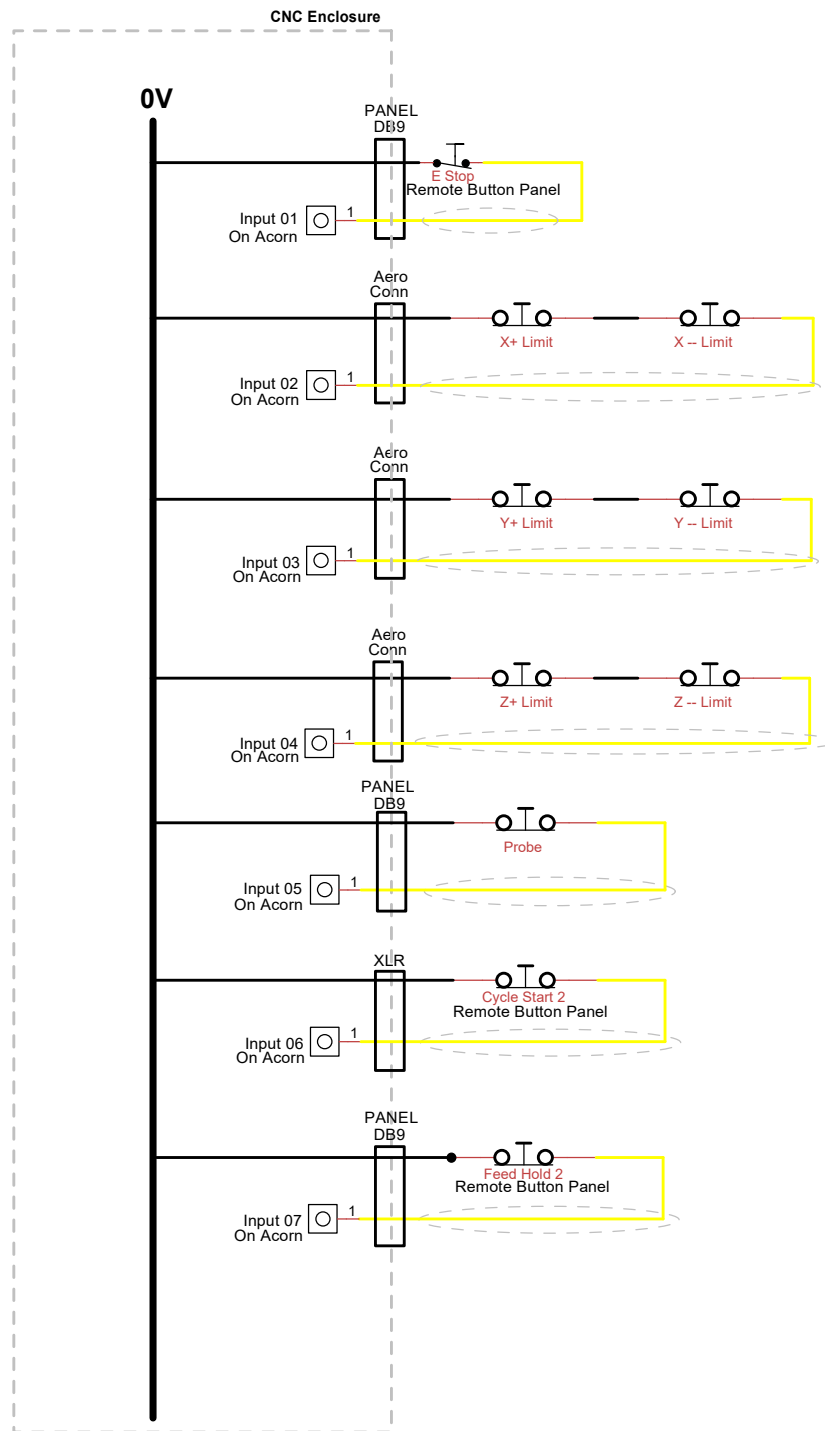
Title Huan Yang VFG / 2.2 Kw Spindle		
Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds	Document	
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48V 0V

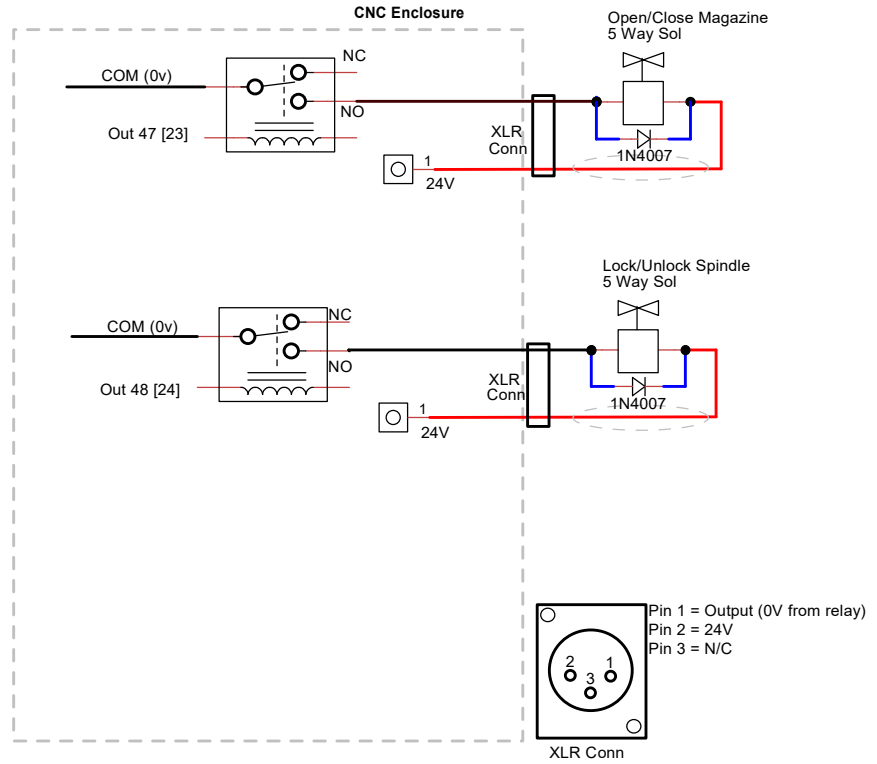
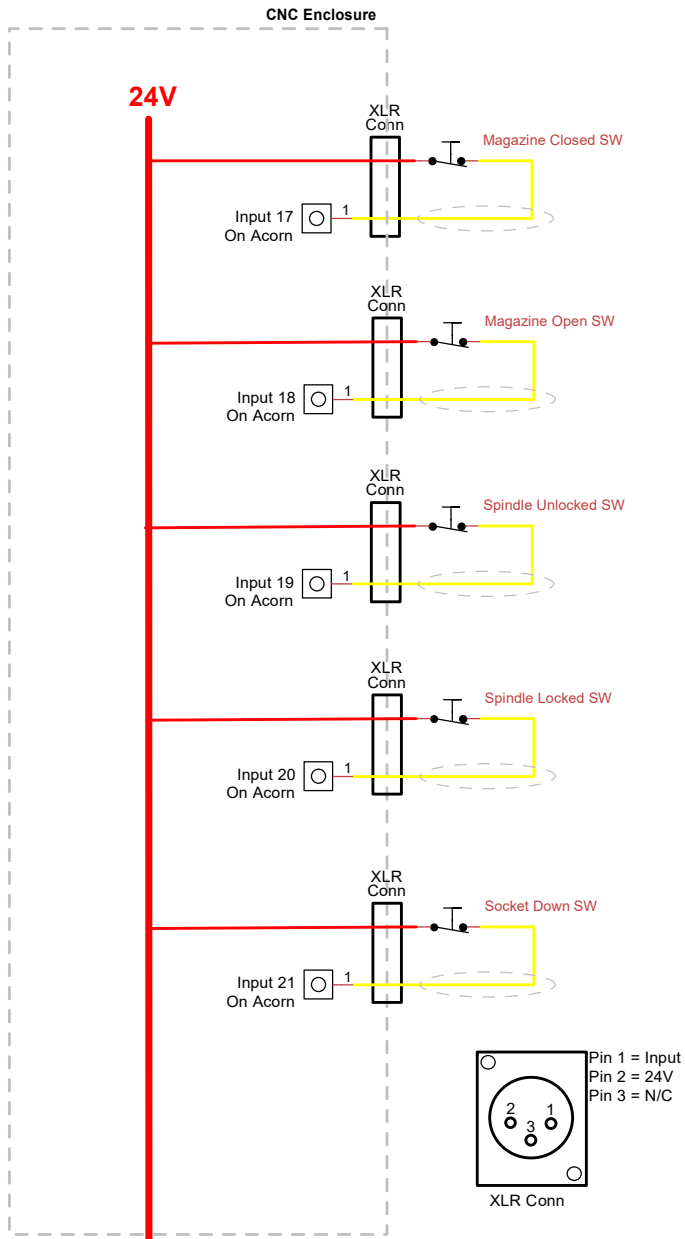
<https://www.automationtechnologiesinc.com/products-page/nema23-closed-loop-stepper-motor-system-hybrid-servo-kit/nema-23-closed-loop-stepper-motor-system-hybrid-servo-kit-439oz-in>



Title Axes Stepper Drives		
Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds		Document
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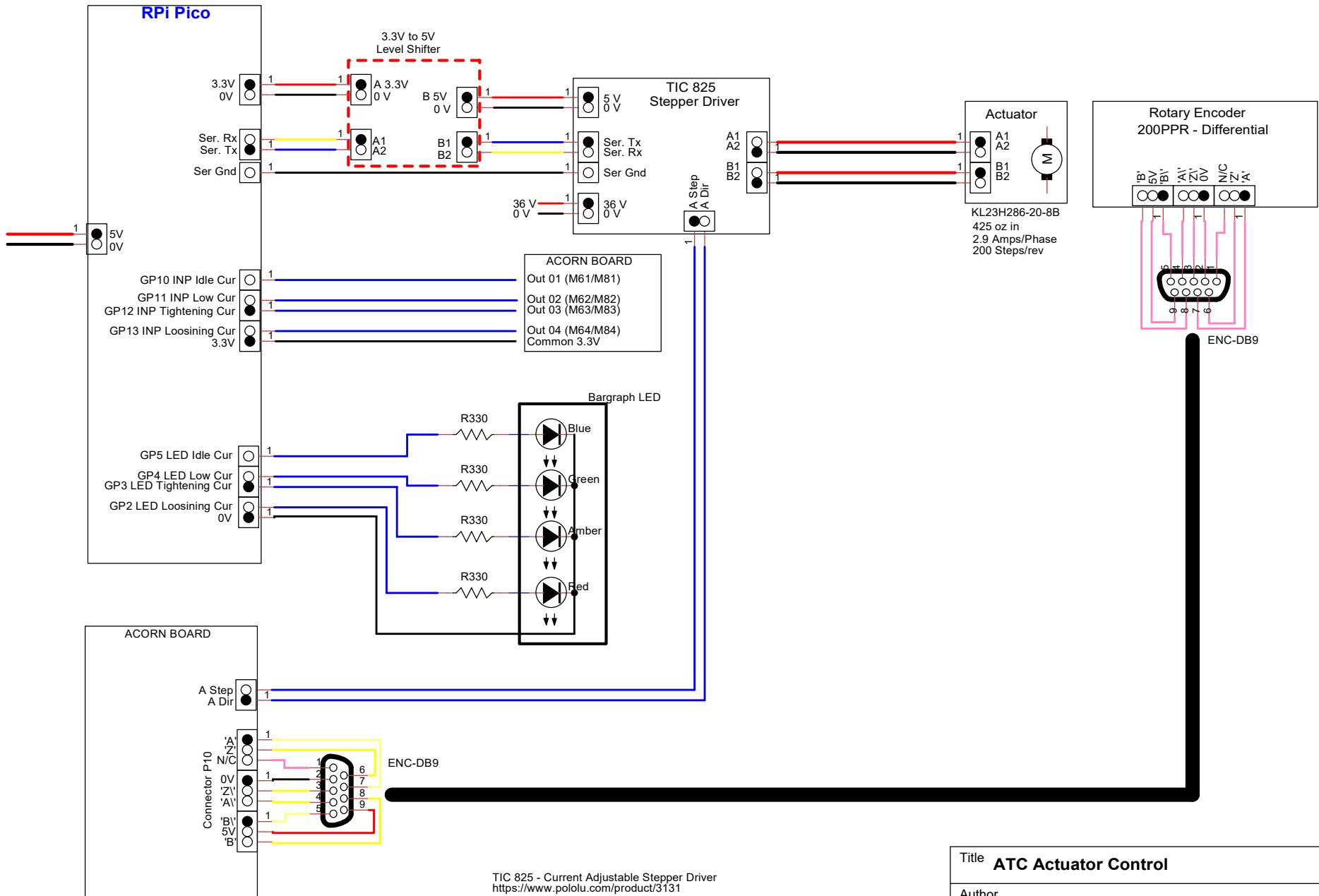


Title INPUTS: E-Stop, Limit, Start, Hold, Probe		
Author		
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Note: 1N4007 added because solenoid operation caused monitor to black out momentarily in 10/2022.

Title		
ATC Magazine I/O		
Author		
File		Document
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TIC 825 - Current Adjustable Stepper Driver
<https://www.pololu.com/product/3131>

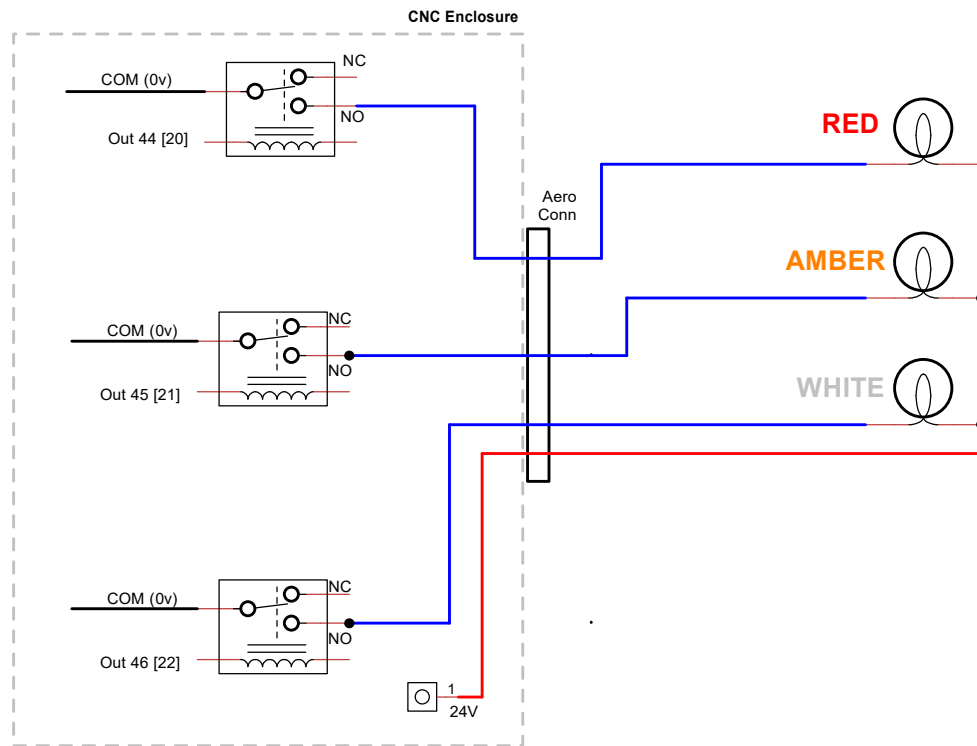
Rotary Encoder - Differential - 200 PPR
https://www.amazon.com/dp/B01EWK93MY?psc=1&ref=ppx_yo2_dt_b_product_details

Bar Graph
https://www.amazon.com/dp/B07ZLP36ZF?psc=1&ref=ppx_yo2_dt_b_product_details

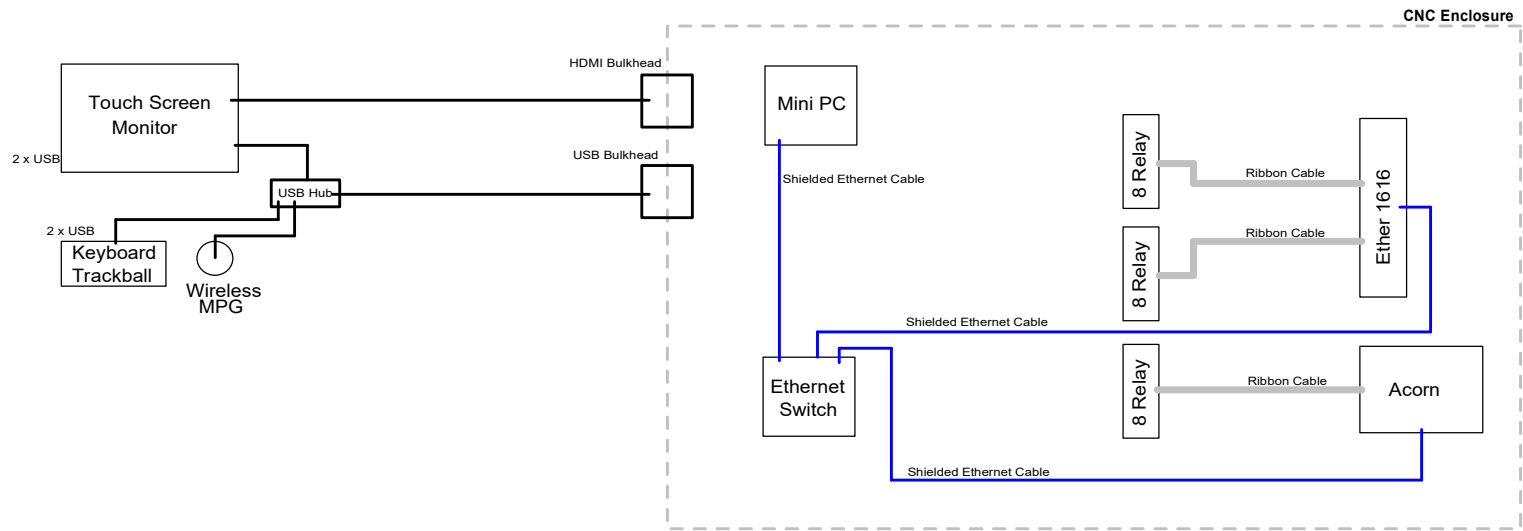
Level Shifter
https://www.amazon.com/dp/B088LMJR5K?psc=1&ref=ppx_yo2_dt_b_product_details

KL23H286-20-8BNema 23 - Dual shaft Stepper Motor
<https://www.automationtechnologiesinc.com/products-page/nema-23/kl23h286-20-8b>

Title ATC Actuator Control		
Author		
File	Document	
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Title Stack Light		
Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds		Document
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Title Control System Overview		
Author		
File D 20x40 Acorn - Electrical Schematics-10-2022.ds		Document
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