Power

File: Power.kicad_sch

DC Motor Control_0

A_IN1
A_IN2
A_PWM
B_IN1
B_IN2
B_PWM
STBY

DC Motor Control_1

A_IN1
A_IN2
A_PWM
B_IN1
B_IN2
B_PWM
STBY

Stepper Module

EN
UART_RX
UART_TX
STEP
DIR
SPREAD

UART0_RX
UART0_TX

File: 0_Adapter_Board_02.kicad_sch

Stepper Module1

EN
UART_RX
UART_TX
STEP
DIR
SPREAD

UART1_TX
UART1_RX

File: 0_Adapter_Board_02.kicad_sch

Hall_Switch_LED

LED1
LED2
HALL_SW_0
HALL_SW_1
HALL_SW_2
HALL_SW_3

File: Level_Shifters.kicad_sch

+5V
Q5
DMG2305UX
3
2
VSYS
1
VBUS

Alternate protection to reduce diode drop if needed
p. 21 of RP Pico documentation

+5V
D4
MBR120VLSFT1G
Same as one in the pico

+3V3
39 VSYS
40 VBUS
36 3V3

RESET 30
RUN
37 3V3_EN

SPI0_RX I2C0_SDA
SPI0_CSn I2C0_SCL
SPI0_SCK I2C1_SDA
SPI0_TX I2C1_SCL
SPI0_RX UART1_TX
SPI0_CSn UART1_RX
SPI0_SCK I2C1_SDA
SPI0_TX I2C1_SCL
SPI1_RX I2C0_SDA
SPI1_CSn I2C0_SCL
SPI1_SCK I2C1_SDA
SPI1_TX I2C1_SCL
SPI1_RX UART0_TX I2C0_SDA
SPI1_CSn UART0_RX I2C0_SCL
SPI1_SCK I2C1_SDA
SPI1_TX I2C1_SCL

UART0_TX 1 GPIO0
UART0_RX 2 GPIO1
4 GPIO2
5 GPIO3
I2C0_SDA 6 GPIO4
I2C0_SCL 7 GPIO5
9 GPIO6
10 GPIO7
GPIO8
UART1_TX 11 GPIO9
UART1_RX 12 GPIO10
14 GPIO11
15 GPIO12
16 GPIO13
17 GPIO14
19 GPIO15
20

GPIO16 21
GPIO17 22
GPIO18 24
GPIO19 25
GPIO20 26
GPIO21 27
GPIO22 29
ADC_VREF 35
GPIO26_ADC0 31
GPIO27_ADC1 32
GPIO28_ADC2 34
AGND 33

GND

3 GND

A1
Raspberry Pi Pico 1

GND
Includes pins 8,13,18,23,28,38

28 input and outputs needed. . . 20 available.
I will need to add configurations for some of them.
Maybe reduce to only on stepper driver.

RESET for RP2040

+3V3
SW1
R25
10k
RESET
GND

Pulls the run pin (Pin 30) low to reset.

PCA9685 Servo Drive (With I2C resistors removed)

I2C0_SDA UART0_TX SPI0_RX
I2C0_SCL UART0_RX SPI0_CSn
I2C1_SDA SPI0_SCK
I2C1_SCL SPI0_TX
I2C0_SDA
I2C0_SCL

+3V3
R3
10k
+3V3
R4
10k
I2C0_SCL
I2C0_SDA

I2C Pull ups
will get moved next to Pico once cleaned up

I2C1_SDA
I2C1_SCL

A2
815

+5V
+7.5V
VCC
V+
VCC_1
V+_1

Do we need control of this?
OE_1
I2C0_SCL SCL_1
I2C0_SDA SDA_1
OE
SCL
SDA

PWM_0 0 1
PWM_1 1 2
PWM_2 2 3
PWM_3 3 4
PWM_4 4 5
PWM_5 5 6
PWM_6 6 7
PWM_7 7 8
PWM_8 8 9
PWM_9 9 10
PWM_10 10
PWM_11 11 1
PWM_12 12 2
PWM_13 13 3
PWM_14 14 4
PWM_15 15 5
6

J6
Conn_01x10

J19
Conn_01x06
Breakout

GND
GND_1
GND

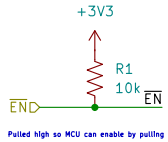
basically

Sheet: /
File: 1_Distribution_Board.kicad_sch

Title: Distribution Board

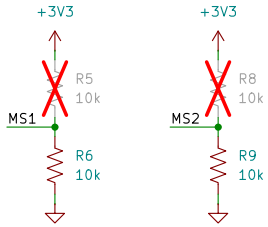
Size: A4
Date: 2026-01-13
Rev: 0.3
KiCad E.D.A. 9.0.6
Id: 1/7

EN (with pull-up)
GND driver enabled
VCC driver disabled

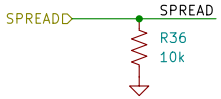


Pulled high so MCU can enable by pulling low.

Micro Step Setting

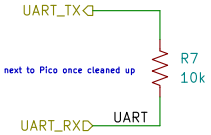


MS1	MS2	Steps	Interpolation
GND	GND	8	Yes to 256
VIO	GND	2	Yes to 256
GND	VIO	4	Yes to 256
VIO	VIO	16	Yes to 256



SPREAD (with pull-down)
GND stealthChop
VIO SpreadCycle

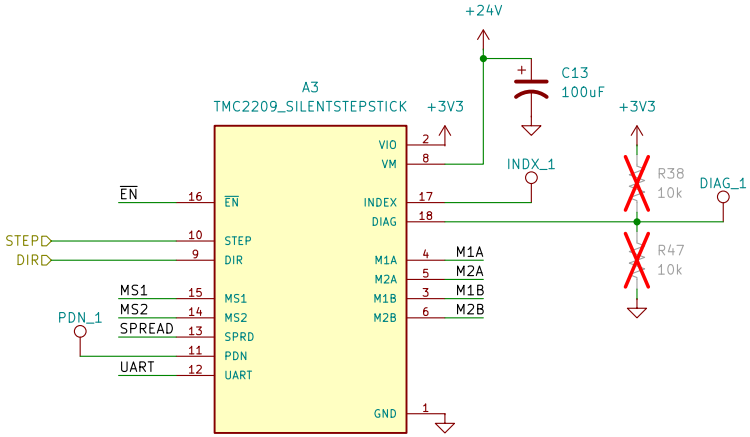
To access all other modes you have to use the UART interface.



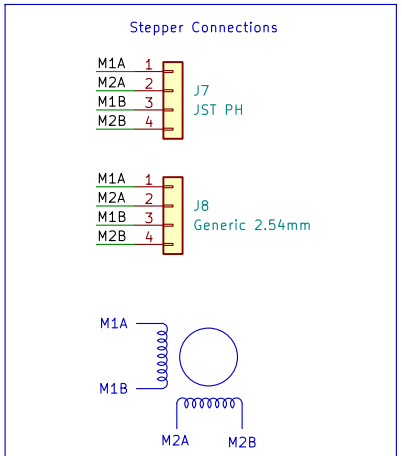
will get moved next to Pico once cleaned up

Pg. 20 TMC2209 Datasheet REV1.09
Necessary for single wire UART

PDN/UART (with pull-down)
GND automatic standstill current reduction
VCC automatic standstill power down disable
optional UART interface



design for the largest current possible in this trinamic socket.



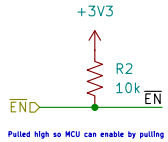
basically

Sheet: /Stepper Module/
File: 0_Adapter_Board_02.kicad_sch

Title: Distribution Board

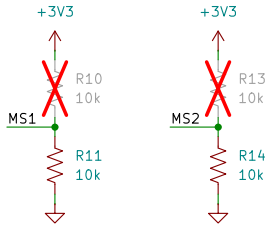
Size: A4	Date: 2026-01-13	**Rev: 0.3**
KiCad E.D.A. 9.0.6		Id: 2/7

EN (with pull-up)
GND driver enabled
VCC driver disabled

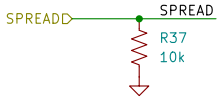


Pulled high so MCU can enable by pulling low.

Micro Step Setting

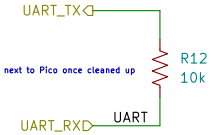


MS1	MS2	Steps	Interpolation
GND	GND	8	Yes to 256
VIO	GND	2	Yes to 256
GND	VIO	4	Yes to 256
VIO	VIO	16	Yes to 256



SPREAD (with pull-down)
GND stealthChop
VIO SpreadCycle

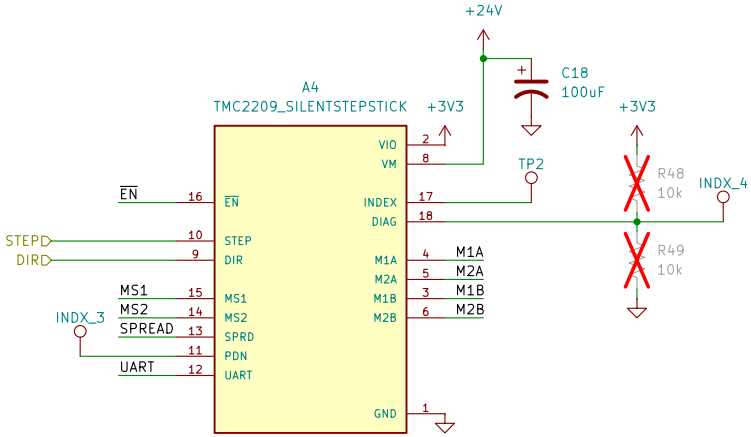
To access all other modes you have to use the UART interface.



will get moved next to Pico once cleaned up

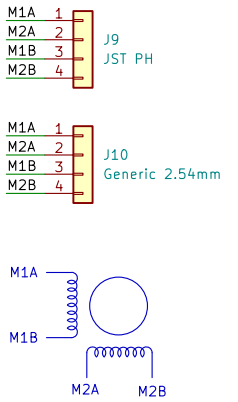
Pg. 20 TMC2209 Datasheet REV1.09
Necessary for single wire UART

PDN/UART (with pull-down)
GND automatic standstill current reduction
VCC automatic standstill power down disable
optional UART interface



design for the largest current possible in this trinamic socket.

Stepper Connections



Reference Stepper Datasheet for Wiring

basically

Sheet: /Stepper Module1/
File: 0_Adapter_Board_02.kicad_sch

Title: Distribution Board

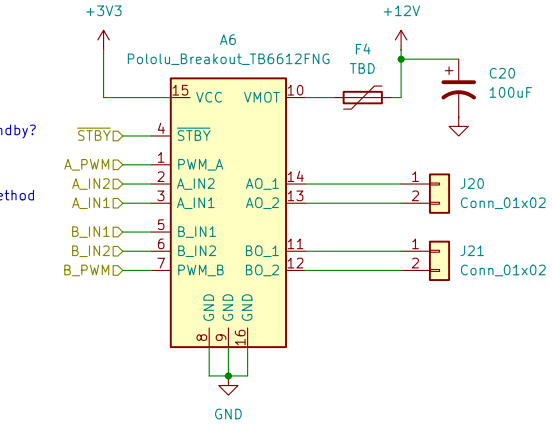
Size: A4	Date: 2026-01-13	**Rev: 0.3**
KiCad E.D.A. 9.0.6		Id: 3/7

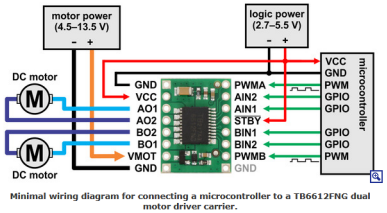
Polyfuse for lock rotor condition

1A should be enough?

Default STBY? If RP2040 isn't working unit is in standby?

Need to add info on control method





Minimal wiring diagram for connecting a microcontroller to a TB6612FNG dual motor driver carrier.

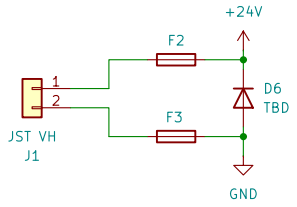
basically

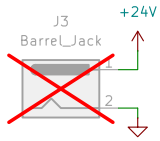
Sheet: /DC Motor Control_0/
File: untitled.kicad_sch

Title: Distribution Board

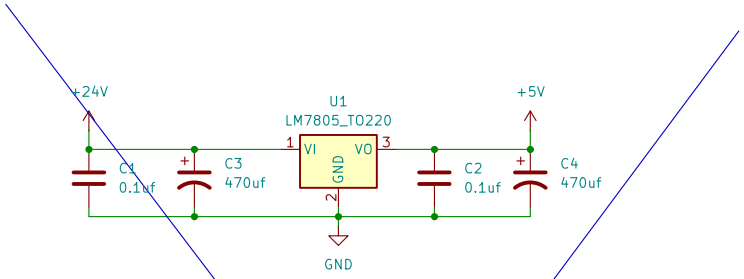
Size: A4	Date: 2026-01-13	**Rev: 0.3**
KiCad E.D.A. 9.0.6		Id: 4/7

Power Input

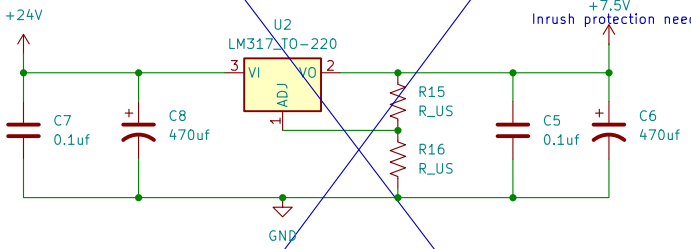




Alternate DC Input Jack



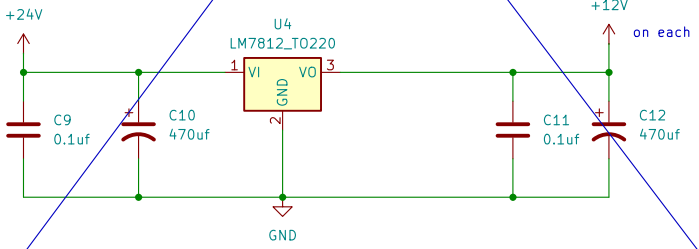
Do we need these to be switching? Can the To-220 handle the power?



Inrush protection needed for the stack rail

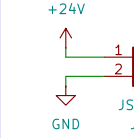
Still need 12V, 7812?

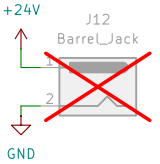
Do we need a 3V3 power rail? Planning on using jsut what comes off the RP



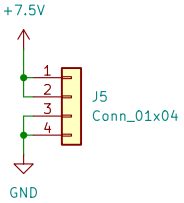
on each motor line for lock rotor condition

Power Output





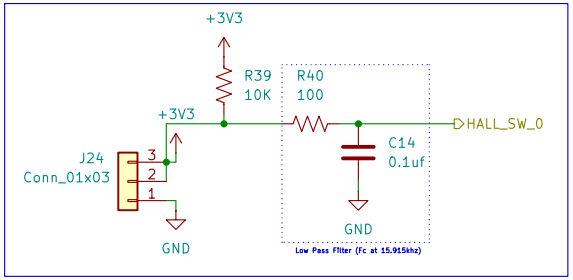
Alternate DC Input Jack

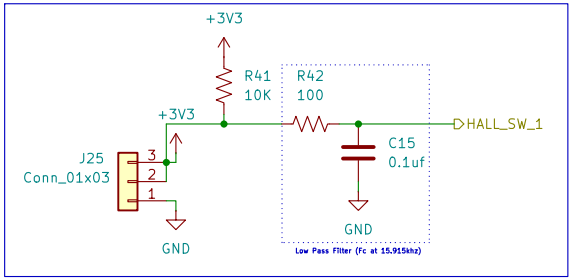


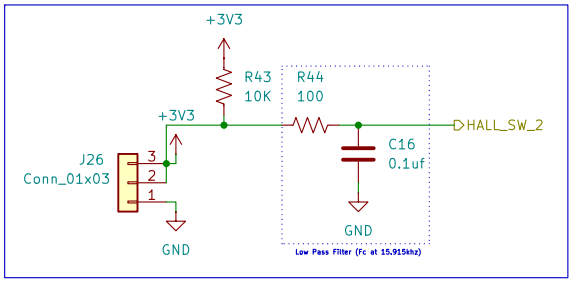
basically

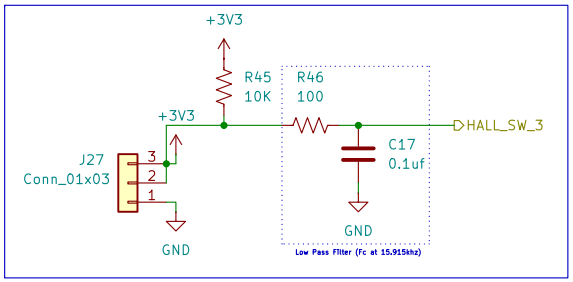
Sheet: /Power/		
File: Power.kicad_sch		
Title: Distribution Board		
Size: A4	Date: 2026-01-13	**Rev: 0.3**
KiCad E.D.A. 9.0.6		Id: 5/7

For the Switch, wire the switch as Normally Closed between pins 1 and 2.
For the HALL Sensor, insure signal is on pin 2.



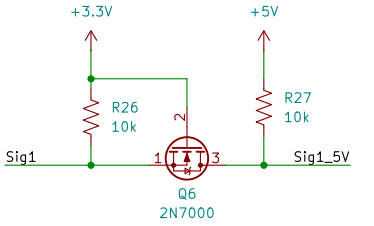


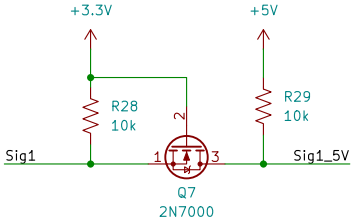


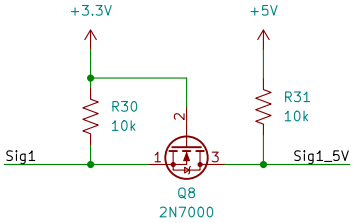


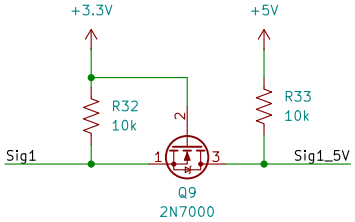
Start of level shift but probably can't use it since low IO on RP2040

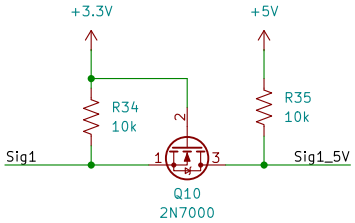
Not done and not sure if I'm keeping it.



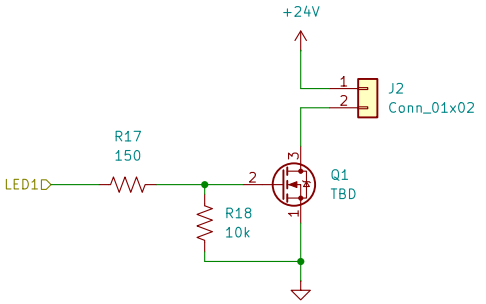


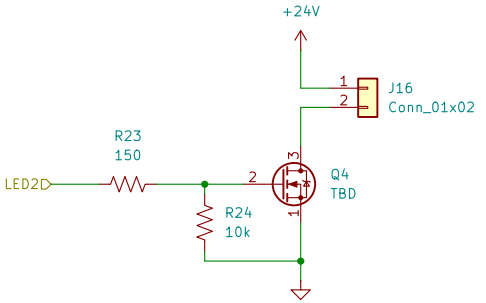






LED Control





basically

Sheet: /Hall_Switch_LED/
File: Level_Shifters.kicad_sch

Title: Distribution Board

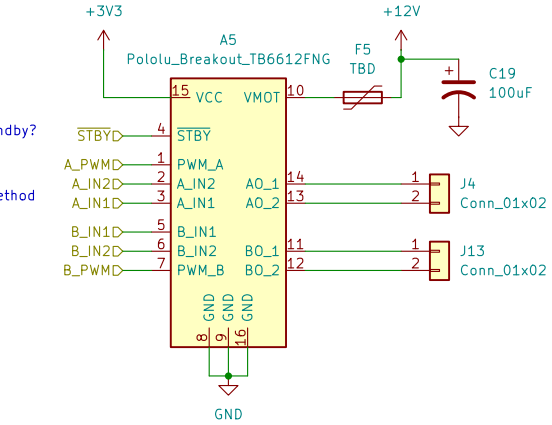
Size: A4	Date: 2026-01-13	**Rev: 0.3**
KiCad E.D.A. 9.0.6		Id: 6/7

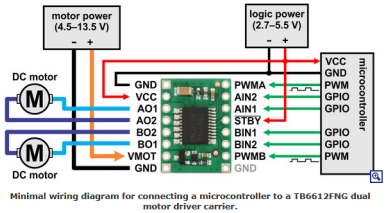
Polyfuse for lock rotor condition

1A should be enough?

Default STBY? If RP2040 isn't working unit is in standby?

Need to add info on control method





Minimal wiring diagram for connecting a microcontroller to a TB6612FNG dual motor driver carrier.

basically

Sheet: /DC Motor Control_1/
File: untitled.kicad_sch

Title: Distribution Board

Size: A4	Date: 2026-01-13	**Rev: 0.3**
KiCad E.D.A. 9.0.6		Id: 7/7