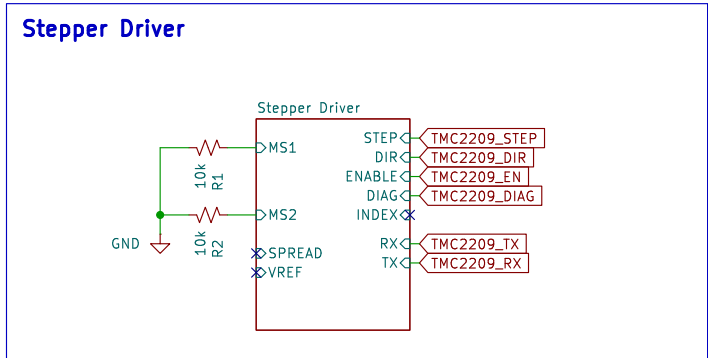
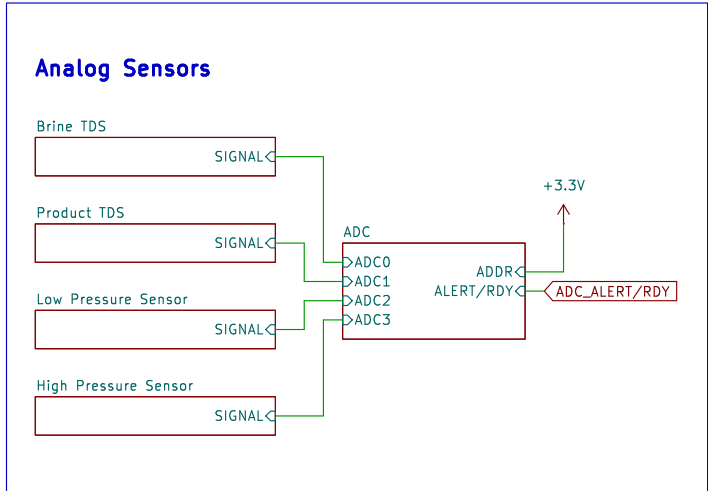


Stepper Driver



The diagram illustrates the ADC module's connections. Four sensors (Brine TDS, Product TDS, Low Pressure Sensor, and High Pressure Sensor) provide signals to the ADC module's inputs (ADC0, ADC1, ADC2, and ADC3). The ADC module is also connected to a +3.3V supply via the ADDR input and to an ADC_ALERT/RDY signal via the ALERT/RDY output.



ESP32-S3 Module

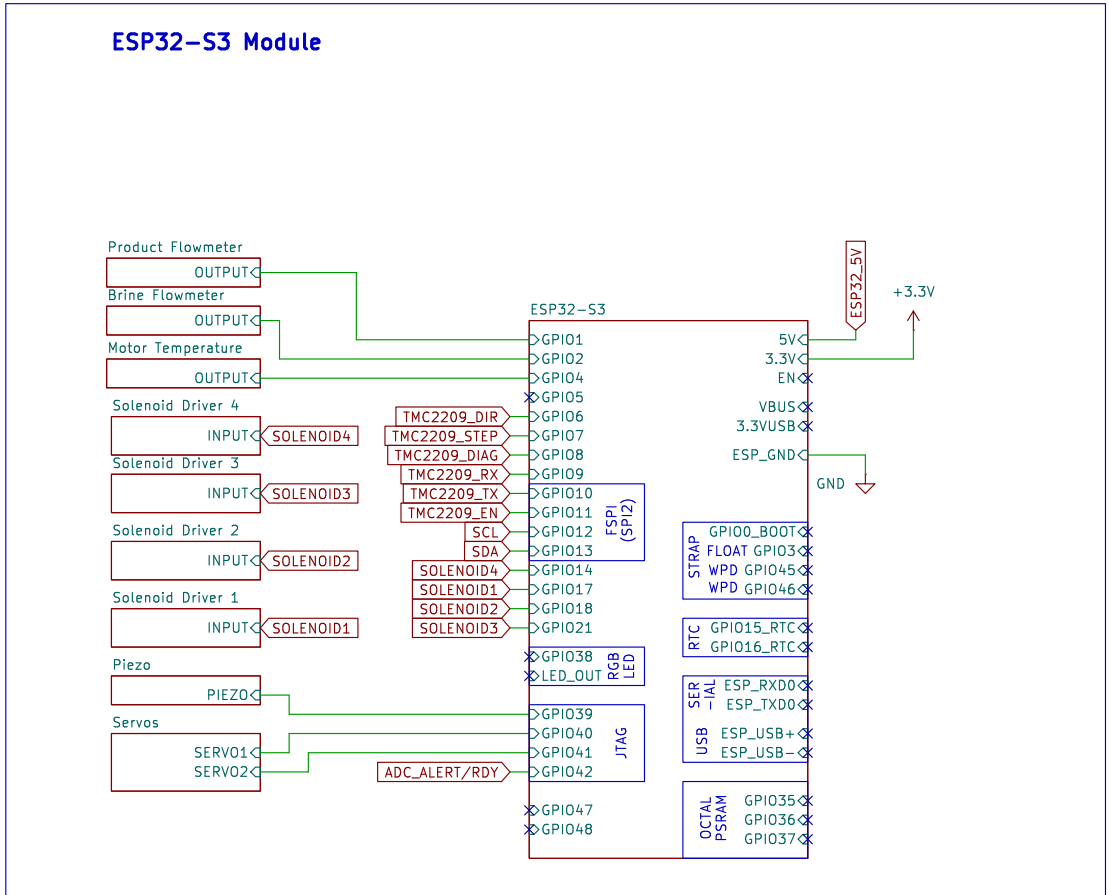
The diagram illustrates the pinout of the ESP32-S3 module, showing connections for various sensors and actuators. The module is labeled "ESP32-S3" in the center. The pins are organized into groups on the left and right sides of the module.

Left Side Connections:

- Product Flowmeter:** OUTPUT pin connected to GPIO1.
- Brine Flowmeter:** OUTPUT pin connected to GPIO2.
- Motor Temperature:** OUTPUT pin connected to GPIO4.
- Solenoid Driver 4:** INPUT pin connected to SOLENOID4, which is connected to TMC2209_DIR.
- Solenoid Driver 3:** INPUT pin connected to SOLENOID3, which is connected to TMC2209_STEP.
- Solenoid Driver 2:** INPUT pin connected to SOLENOID2, which is connected to TMC2209_DIAG.
- Solenoid Driver 1:** INPUT pin connected to SOLENOID1, which is connected to TMC2209_RX.
- Piezo:** PIEZO pin connected to GPIO10.
- Servos:** SERVO1 and SERVO2 pins connected to GPIO39 and GPIO40 respectively.
- ADC_ALERT/RDY:** Connected to GPIO42.

Right Side Connections:

- Power:** +3.3V and GND pins.
- GPIO Pins:** GPIO0 through GPIO48 are shown, with some pins crossed out (e.g., GPIO0, GPIO1, GPIO2, GPIO3, GPIO4, GPIO5, GPIO6, GPIO7, GPIO8, GPIO9, GPIO10, GPIO11, GPIO12, GPIO13, GPIO14, GPIO15, GPIO16, GPIO17, GPIO18, GPIO19, GPIO20, GPIO21, GPIO22, GPIO23, GPIO24, GPIO25, GPIO26, GPIO27, GPIO28, GPIO29, GPIO30, GPIO31, GPIO32, GPIO33, GPIO34, GPIO35, GPIO36, GPIO37, GPIO38, GPIO39, GPIO40, GPIO41, GPIO42, GPIO43, GPIO44, GPIO45, GPIO46, GPIO47, GPIO48).
- FSPI (SPI2):** Connected to GPIO10 through GPIO14.
- RGB LED:** Connected to GPIO38 and LED_OUT.
- JTAG:** Connected to GPIO39 through GPIO42.
- RTC:** Connected to GPIO15_RTC and GPIO16_RTC.
- USB:** Connected to ESP_RXD0, ESP_TXD0, ESP_USB+, and ESP_USB-.
- OCTAL PSRAM:** Connected to GPIO35, GPIO36, and GPIO37.

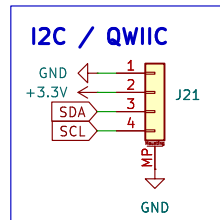


I2C / QWIIC

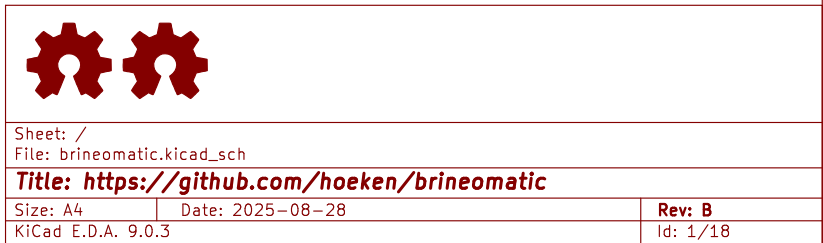
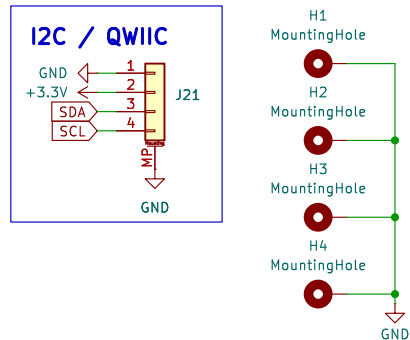
Diagram of the I2C / QWIIC connector J21. The connector has 4 pins. The connections are:


- Pin 1: GND
- Pin 2: +3.3V
- Pin 3: SDA
- Pin 4: SCL


A separate GND pin is also shown.





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Sheet: / File: brineomatic.kicad_sch		
Title: https://github.com/hoeken/brineomatic		
Size: A4	Date: 2025-08-28	Rev: B
KiCad E.D.A. 9.0.3		Id: 1/18

		
Sheet: / File: brineomatic.kicad_sch		
Title: https://github.com/hoeken/brineomatic		
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KiCad E.D.A. 9.0.3		Id: 1/18

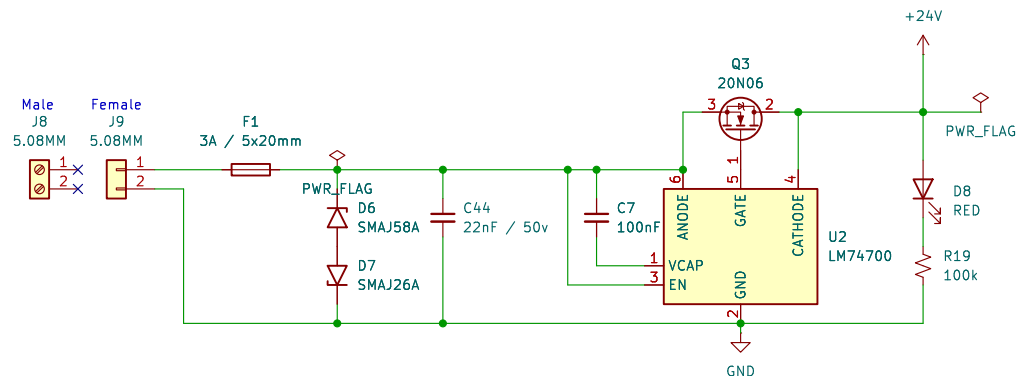
		
Sheet: / File: brineomatic.kicad_sch		
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Size: A4	Date: 2025-08-28	Rev: B
KiCad E.D.A. 9.0.3		Id: 1/18

		
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KiCad E.D.A. 9.0.3		Id: 1/18

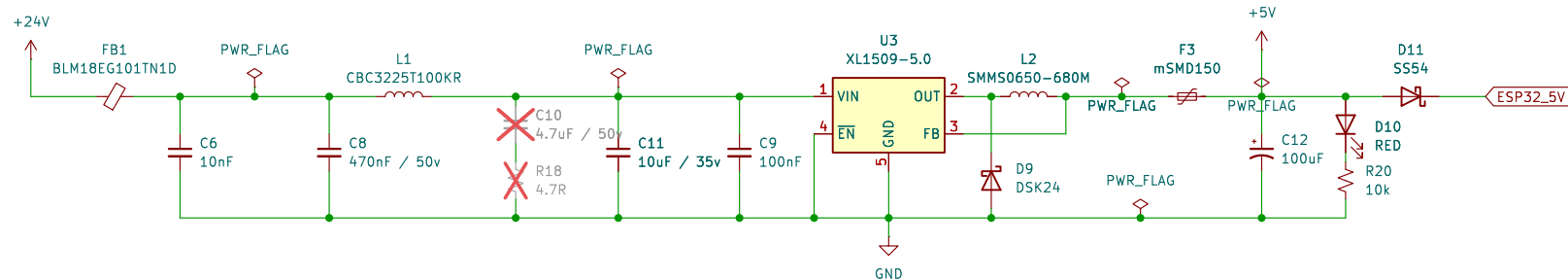
		
Sheet: / File: brineomatic.kicad_sch		
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Size: A4	Date: 2025-08-28	Rev: B
KiCad E.D.A. 9.0.3		Id: 1/18

		
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Size: A4	Date: 2025-08-28	Rev: B
KiCad E.D.A. 9.0.3		Id: 1/18

24v Power Input



24v to 5v Power Supply



Sheet: /Power Supply/
File: power_supply.kicad_sch

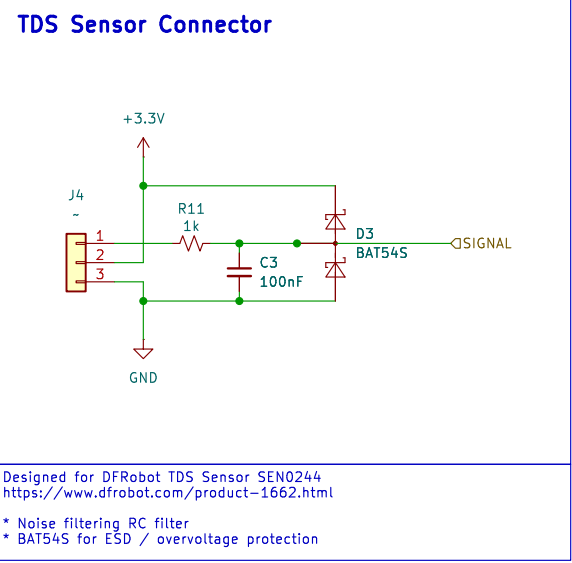
Title: <https://github.com/hoeken/brineomatic>

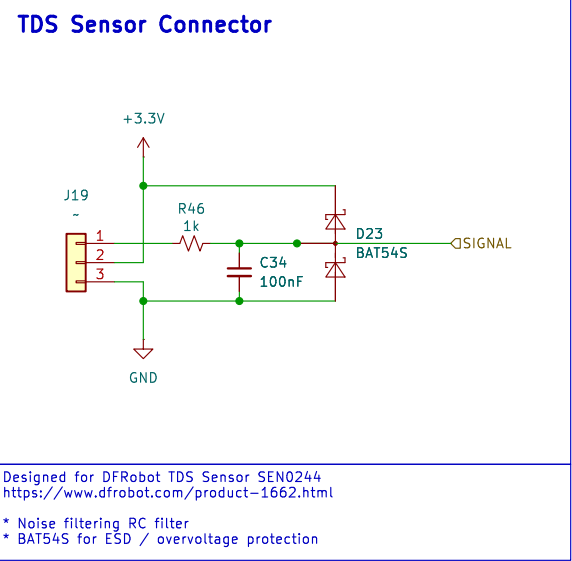
Size: A4 Date: 2025-08-28

KiCad E.D.A. 9.0.3

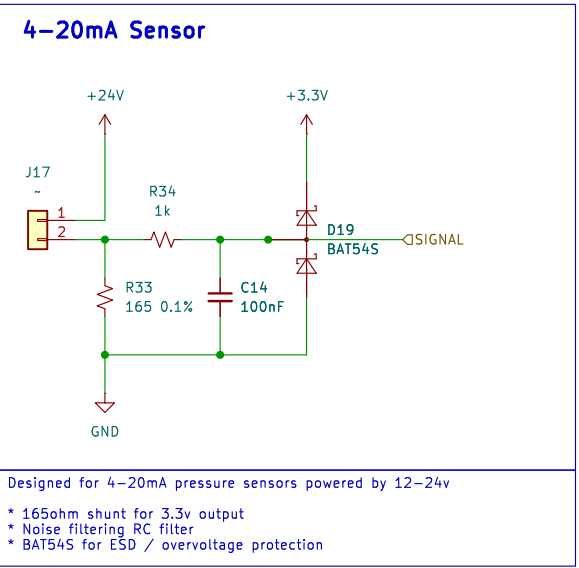
Rev: B

Id: 10/18



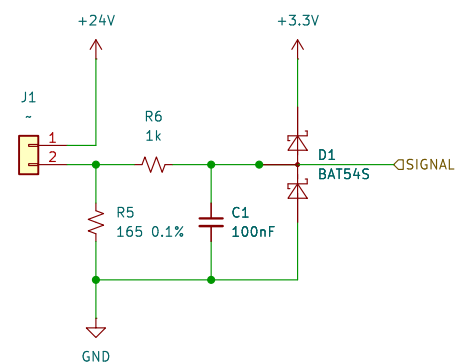


Sheet: /Product TDS/ File: tds.kicad_sch		
Title: https://github.com/hoeken/brineomatic		
Size: A4	Date: 2025-08-28	Rev: B
KiCad E.D.A. 9.0.3	Id: 17/18	



Sheet: /Low Pressure Sensor/ File: pressure_sensor.kicad_sch		
Title: https://github.com/hoeken/brineomatic		
Size: A4	Date: 2025–08–28	Rev: B
KiCad E.D.A. 9.0.3	Id: 15/18	

4–20mA Sensor



Designed for 4–20mA pressure sensors powered by 12–24v

- * 165ohm shunt for 3.3v output
- * Noise filtering RC filter
- * BAT54S for ESD / overvoltage protection

Sheet: /High Pressure Sensor/
File: pressure_sensor.kicad_sch

Title: <https://github.com/hoeken/brineomatic>

Size: A4

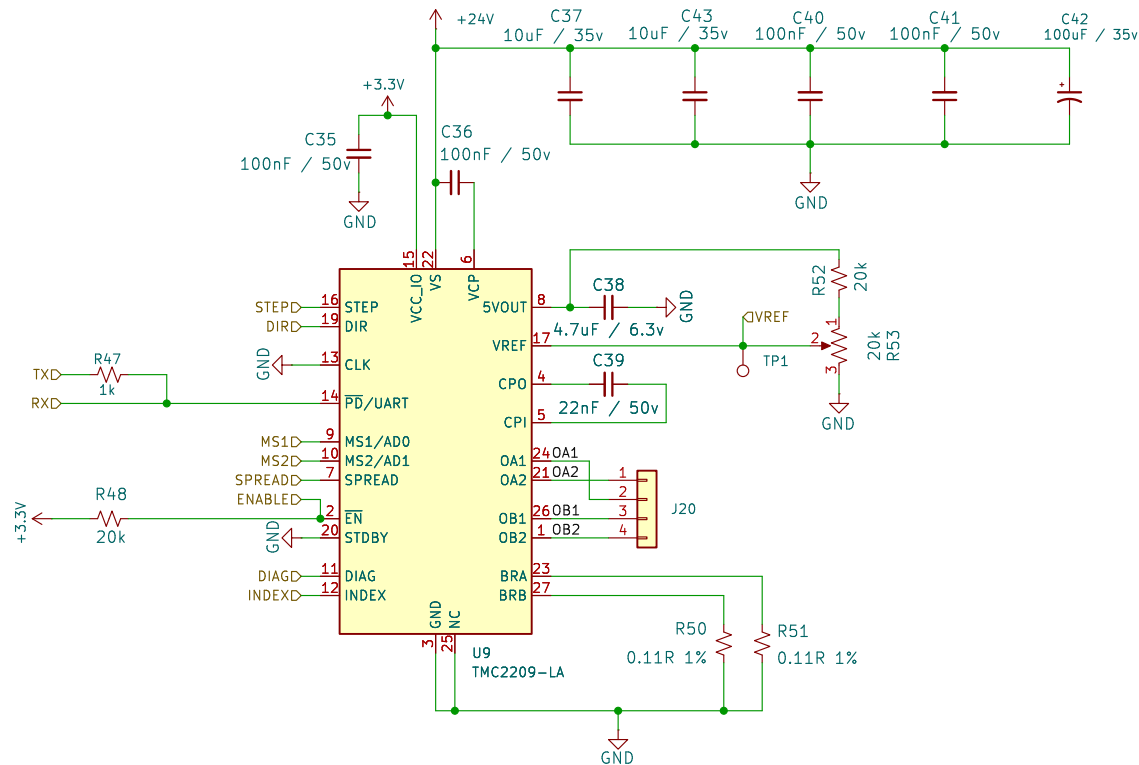
Date: 2025–08–28

Rev: B

KiCad E.D.A. 9.0.3

Id: 2/18

TMC2209 Stepper Driver



Configuration

VRef 0...2.5V (0.11 Ohm sense resistor)
 >=2.50V 100% - 1.77A RMS
 1.25V 50% - 0.88A RMS
 0.50V 20% - 0.35A RMS

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

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

MS1	MS2	Steps	Interpolation
GND	GND	8	Yes to 256
VIO	GND	32	Yes to 256
GND	VIO	64	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.

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Designed by Stephan Watterott (Watterott electronic)
 Re-drawn by Zach Hoeken

Sheet: /Stepper Driver/
 File: tmc2209.kicad_sch

Title: <https://github.com/hoeken/brineomatic>

Size: A4 Date: 2025-08-28

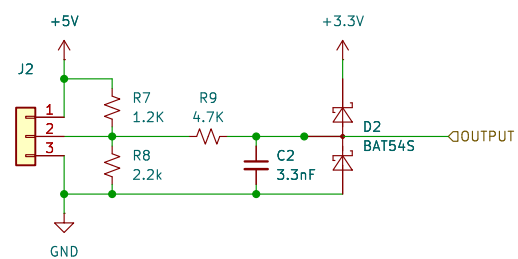
KiCad E.D.A. 9.0.3

Rev: B

Id: 17/18

Rev: B
Id: 8/18

Flowmeter Connection



Designed for flowmeters powered by 5v with open collector output.

- * 5v to 3.3v voltage divider as pullup on the input.
- * Noise filtering RC filter
- * BAT54S for ESD / overvoltage protection

Sheet: /Product Flowmeter/
File: pulse_counter.kicad_sch

Title: <https://github.com/hoeken/brineomatic>

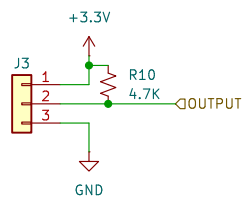
Size: A4 Date: 2025-08-28

KiCad E.D.A. 9.0.3

Rev: B

Id: 3/18

Temperature Connection



Simple connector for a DS18B20 temperature sensor.

Sheet: /Motor Temperature/
File: DS18B20.kicad_sch

Title: <https://github.com/hoeken/brineomatic>

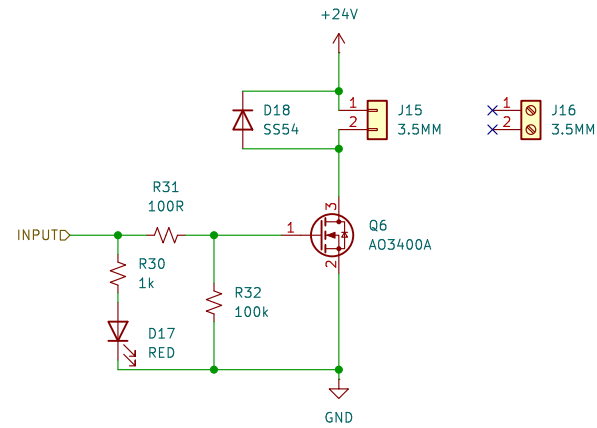
Size: A4 Date: 2025-08-28

KiCad E.D.A. 9.0.3

Rev: B

Id: 4/18

Solenoid / Relay Driver



Designed to control small solenoids, relays, fans, and other small DC loads.
Max 3A per channel, total based on fuse installed.

Sheet: /Solenoid Driver 4/
File: solenoid_driver.kicad_sch

Title: <https://github.com/hoeken/brineomatic>

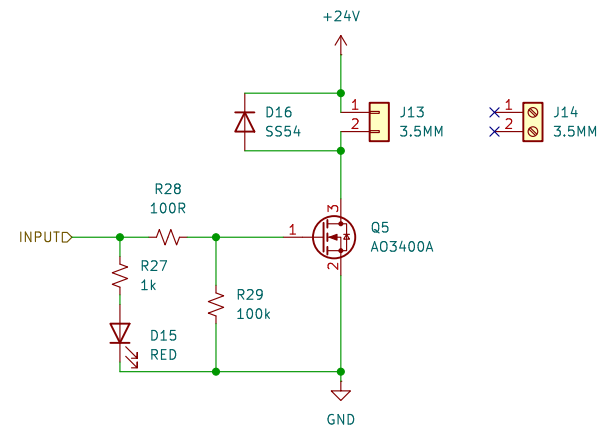
Size: A4 Date: 2025-08-28

KiCad E.D.A. 9.0.3

Rev: B

Id: 14/18

Solenoid / Relay Driver



Designed to control small solenoids, relays, fans, and other small DC loads.
Max 3A per channel, total based on fuse installed.

Sheet: /Solenoid Driver 3/
File: solenoid_driver.kicad_sch

Title: <https://github.com/hoeken/brineomatic>

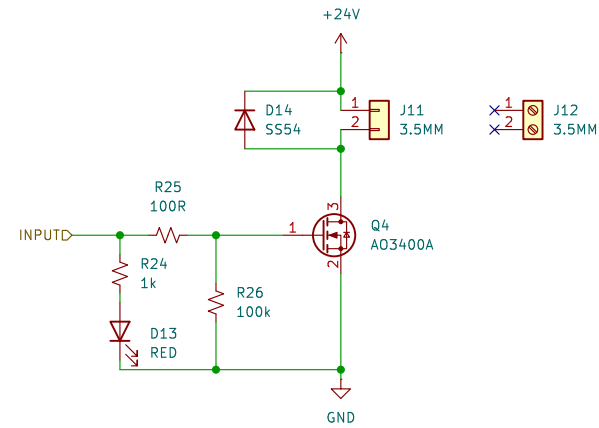
Size: A4 Date: 2025-08-28

KiCad E.D.A. 9.0.3

Rev: B

Id: 13/18

Solenoid / Relay Driver



Designed to control small solenoids, relays, fans, and other small DC loads.
Max 3A per channel, total based on fuse installed.

Sheet: /Solenoid Driver 2/
File: solenoid_driver.kicad_sch

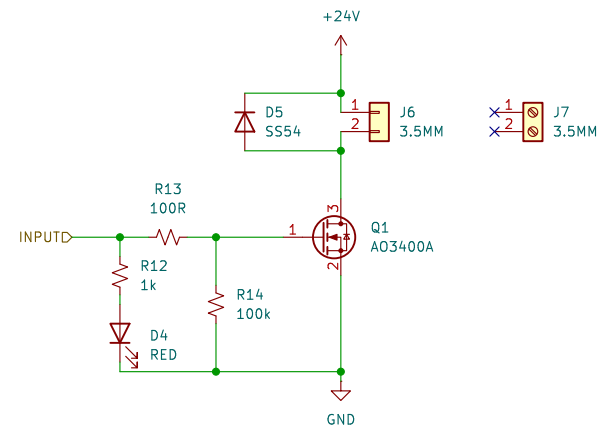
Title: <https://github.com/hoeken/brineomatic>

Size: A4 Date: 2025-08-28

KiCad E.D.A. 9.0.3

Rev: B
Id: 12/18

Solenoid / Relay Driver



Designed to control small solenoids, relays, fans, and other small DC loads.
Max 3A per channel, total based on fuse installed.

Sheet: /Solenoid Driver 1/
File: solenoid_driver.kicad_sch

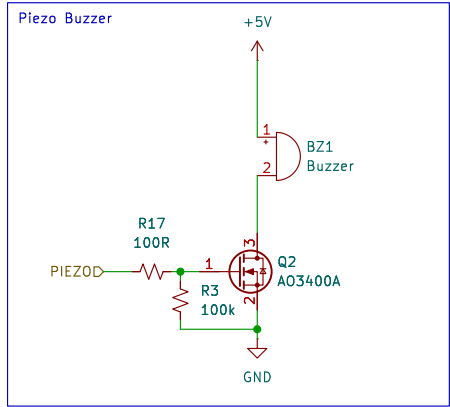
Title: <https://github.com/hoeken/brineomatic>

Size: A4 Date: 2025-08-28

KiCad E.D.A. 9.0.3

Rev: B

Id: 7/18



Sheet: /Piezo/
File: piezo.kicad_sch

Title: <https://github.com/hoeken/brineomatic>

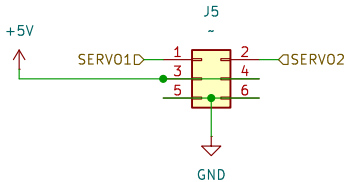
Size: A4 Date: 2025-08-28

KiCad E.D.A. 9.0.3

Rev: B

Id: 9/18

Servo Connectors



Standard 3 pin servo motor connector
Max 2A total output.

The diagram illustrates the electrical connections for a USB Type-C connector and its ESD protection circuit. On the left, a yellow box represents the USB Type-C connector, showing a USB symbol and a shield. The connector pins are labeled as follows:

- VBUS:** A4
- CC1:** A5
- CC2:** B5
- D-:** A7
- D+:** B7
- SBU1:** A8
- SBU2:** B8

The connector is connected to a PCB. The VBUS line is connected to a 5V supply through a 1N5819WS diode (D20) and a 5.1k resistor (R38). The CC1 and CC2 lines are connected to a 5.1k resistor (R39) and then to the ESP_GND pin. The D- and D+ lines are connected to the USB_D- and USB_D+ pins. The SBU1 and SBU2 lines are connected to the S1 and A1 pins. The shield is connected to the ESP_GND pin. The ESD protection circuit consists of two diodes (D20 and D21) connected to the VBUS line, and two diodes (D22 and D23) connected to the USB_D+ and USB_D- lines. The diodes are connected to the ESP_GND pin. The ESD protection circuit is labeled "ESD Protection" and "U5 USBLC6-2SC6".

CH334F

V5
V33
RESET/CDP
OVCCR
PWRREN
PSELF
D+U
D-U
XIN
XOUT
GND

LED1
D+1
D-1
LED2
D+2
D-2
LED3/SCL
D+3
D-3
LED4/SDA
D+4
D-4

UART_D+
UART_D-
QESP_USB+
QESP_USB-
13
8
7
21
6
5

C20
1uF
C21
1uF
Y1
12Mhz
C19
15pF
C23
15pF
R40
1k
Q3.3VUSB
HUB_D+
HUB_D-
QESP_GND

Note: the CH334F datasheet claims only a crystal is required and no capacitors or series resistor, but this portion of the schematic is based on the Waveshare ESP32-S3 dev board.

U8
CH343P

[illegible]

3.3V

5.1k R41

RED D22

GND

Id: 16/18