

Rotary encoders with push button (Pico)

SW5
RotaryEncoder_Switch

Pin A → GP0
Pin B → GP1
Pin C → GP2
Pin SW → +3.3V
Pin +5V → GND

SW6
RotaryEncoder_Switch

Pin A → GP3
Pin B → GP4
Pin C → GP5
Pin SW → +3.3V
Pin +5V → GND

SW7
RotaryEncoder_Switch

Pin A → GP6
Pin B → GP7
Pin C → GP8
Pin SW → +3.3V
Pin +5V → GND

SW8
RotaryEncoder_Switch

Pin A → GP9
Pin B → GP10
Pin C → GP11
Pin SW → +3.3V
Pin +5V → GND

Push buttons, switches (Pico)

SW9
SW_Push

J15
1 → +3.3V
2 → GP12

SW10
SW_Push

J16
1 → +3.3V
2 → GP13

SW11
SW_Push

J17
1 → +3.3V
2 → GP14

SW12
SW_Push

J18
1 → +3.3V
2 → GP15

SW13
SW_SPST

J19
1 → +3.3V
2 → GP16

SW14
SW_SPST

J20
1 → +3.3V
2 → GP17

SW15
SW_SPST

J21
1 → +3.3V
2 → GP18

SW16
SW_SPST

J22
1 → +3.3V
2 → GP19

* Sliding noise resistors are NOT represented, check ALPS EC11 rotary encoders documentation

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Pin B → GP4
Pin SW → GP5
Pin +5V → +3.3V
Pin C → GND

SW7
RotaryEncoder_Switch

Pin A → GP6
Pin B → GP7
Pin SW → GP8
Pin +5V → +3.3V
Pin C → GND

SW8
RotaryEncoder_Switch

Pin A → GP9
Pin B → GP10
Pin SW → GP11
Pin +5V → +3.3V
Pin C → GND

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1 → +3.3V
2 → GP12

SW10
SW_Push

J16
1 → +3.3V
2 → GP13

SW11
SW_Push

J17
1 → +3.3V
2 → GP14

SW12
SW_Push

J18
1 → +3.3V
2 → GP15

SW13
SW_SPST

J19
1 → +3.3V
2 → GP16
3 → GND

SW14
SW_SPST

J20
1 → +3.3V
2 → GP17
3 → GND

SW15
SW_SPST

J21
1 → +3.3V
2 → GP18
3 → GND

SW16
SW_SPST

J22
1 → +3.3V
2 → GP19
3 → GND

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Pin C → GND

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RotaryEncoder_Switch

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Pin B → GP4
Pin SW → GP5
Pin +5V → +3.3V
Pin C → GND

SW7
RotaryEncoder_Switch

Pin A → GP6
Pin B → GP7
Pin SW → GP8
Pin +5V → +3.3V
Pin C → GND

SW8
RotaryEncoder_Switch

Pin A → GP9
Pin B → GP10
Pin SW → GP11
Pin +5V → +3.3V
Pin C → GND

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2 → GP13

SW11
SW_Push

J17
1 → +3.3V
2 → GP14

SW12
SW_Push

J18
1 → +3.3V
2 → GP15

SW13
SW_SPST

J19
1 → +3.3V
2 → GP16
3 → GND

SW14
SW_SPST

J20
1 → +3.3V
2 → GP17
3 → GND

SW15
SW_SPST

J21
1 → +3.3V
2 → GP18
3 → GND

SW16
SW_SPST

J22
1 → +3.3V
2 → GP19
3 → GND

* Sliding noise resistors are NOT represented, check ALPS EC11 rotary encoders documentation

Toggle switches (MCP)

SW1 SW_SPDT_MSM
SW2 SW_SPDT_MSM
SW3 SW_SPDT_MSM
SW4 SW_SPDT_MSM

J1 J2 J3 J4
J1 J2 J3 J4
J1 J2 J3 J4
J1 J2 J3 J4

R1 330 R2 330 R3 330 R4 330

LEDs (MCP)

D1 LED D2 LED D3 LED D4 LED D5 LED D6 LED
D1 LED D2 LED D3 LED D4 LED D5 LED D6 LED
D1 LED D2 LED D3 LED D4 LED D5 LED D6 LED
D1 LED D2 LED D3 LED D4 LED D5 LED D6 LED

J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14

R5 270 R6 270 R7 270 R8 270 R9 270 R10 270

GPA1 GPA2 GPA3 GPA4 GPA5 GPA6

* R1 -> R4 are for protecting the MCP

GND GND

Toggle switches (MCP)

SW1 SW_SPDT_MSM
SW2 SW_SPDT_MSM
SW3 SW_SPDT_MSM
SW4 SW_SPDT_MSM

J1 J2 J3 J4
J1 J2 J3 J4
J1 J2 J3 J4
J1 J2 J3 J4

R1 330
R2 330
R3 330
R4 330

LEDs (MCP)

D1 LED
D2 LED
D3 LED
D4 LED
D5 LED
D6 LED

J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14

R5 270
R6 270
R7 270
R8 270
R9 270
R10 270

GPA1 GPA2 GPA3 GPA4 GPA5 GPA6

GND

* R1 -> R4 are for protecting the MCP GND

Toggle switches (MCP)

SW1 SW_SPDT_MSM
SW2 SW_SPDT_MSM
SW3 SW_SPDT_MSM
SW4 SW_SPDT_MSM

J1 J2 J3 J4
J1 J2 J3 J4
J1 J2 J3 J4
J1 J2 J3 J4

R1 330
R2 330
R3 330
R4 330

LEDs (MCP)

D1 LED
D2 LED
D3 LED
D4 LED
D5 LED
D6 LED

J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14
J9 J10 J11 J12 J13 J14

R5 270
R6 270
R7 270
R8 270
R9 270
R10 270

* R1 -> R4 are for protecting the MCP GND

Power cable for Raspberry Pi Pico (optional, not in the BOM)

The diagram illustrates a power cable for the Raspberry Pi Pico, which is optional and not included in the Bill of Materials (BOM). The cable connects a PC USB Connector (J30) to a Raspberry Pi Pico USB Connector (J31). The cable has five pins: 1 (VBUS), 2 (D-), 3 (D+), 4 (GND), and 5 (Shield). A power switch (SW17, SW_SPST) is connected to the VBUS line. The switch is controlled by a +5V signal and a PWR_FLAG signal. A power LED (LED D7) is connected in series with the switch. A 270 ohm resistor (R19) is connected to the LED. The Raspberry Pi Pico USB Connector (J31) has pins 1 (VBUS), 2 (D-), 3 (D+), 4 (GND), and 5 (Shield). The diagram is labeled with component names and pin numbers.

Raspberry Pi Pico

MCU RP2040 limitations :
 Maximum current sourced per GPIO pin : < 12mA
 Maximum total current output by ALL pins combined : < 250mA

The diagram illustrates the wiring for a Raspberry Pi Pico. It shows two headers, J26 and J27, and their connections to the Pico's pins and external components.

J26 Header Connections:

- GP0 (1), GP1 (2), GP2 (3), GP3 (4), GP4 (5), GP5 (6), GP6 (7), GP7 (8), GP8 (9), GP9 (10), GP10 (11), GP11 (12), GP12 (13), GP13 (14), GP14 (15), GP15 (16)
- GND (17), GND (18), GND (19), GND (20)

J27 Header Connections:

- VBUS (1), VSYS (2), GND (3), 3V3_EN (4), 3V3_OUT (5), ADC_VREF (6), ADC2-GP28 (7), GND (8), ADC1-GP27 (9), ADC0-GP26 (10), RUN (11), GP22 (12), GND (13), GP21 (14), GP20 (15), GP19 (16), GP18 (17), GND (18), GP17 (19), GP16 (20)

Power Connections:

- PWR_FLAG (J27 pin 1)
- GND (J27 pin 3)
- +3.3V (J27 pin 5)

Raspberry Pi Pico

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J26 Header Connections:

- GP0 (1), GP1 (2), GP2 (3), GP3 (4), GP4 (5), GP5 (6), GP6 (7), GP7 (8), GP8 (9), GP9 (10), GP10 (11), GP11 (12), GP12 (13), GP13 (14), GP14 (15), GP15 (16)
- GND (17), GND (18), GND (19), GND (20)

J27 Header Connections:

- VBUS (1), VSYS (2), GND (3), 3V3_EN (4), 3V3_OUT (5), ADC_VREF (6), ADC2-GP28 (7), GND (8), ADC1-GP27 (9), ADC0-GP26 (10), RUN (11), GP22 (12), GND (13), GP21 (14), GP20 (15), GP19 (16), GP18 (17), GND (18), GP17 (19), GP16 (20)

Power Connections:

- PWR_FLAG (J27 pin 1)
- GND (J27 pin 3)
- +3.3V (J27 pin 5)

GPIO expander MCP23017

MCP23017 limitations :
Maximum current sourced per GPIO pin : < 25mA
Maximum total current output (VSS) by ALL pins combined : < 150mA
! Less than 10mA per pin if ALL 16 pins out combined !
Default I2C address is '0x20'

MCP23017 limitations :
Maximum current sourced per GPIO pin : < 25mA
Maximum total current output (VSS) by ALL pins combined : < 150mA
! Less than 10mA per pin if ALL 16 pins out combined !
Default I2C address is '0x20'

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Circuit Diagram:

- Power Supply:** +3.3V and GND.
- I2C Interface:** J29 (SDA) and J28 (SCL) are connected to pins 13 and 12. Pull-up resistors R11 and R12 are connected to +3.3V.
- Reset:** A network of resistors R13, R14, R15, and R16 is connected to pins 19 (INTB), 20 (INTA), and 18 (RESET). The network is pulled up to +3.3V and pulled down to GND.
- GPIO Pins:**
 - GPB0-GPB7 (pins 1-8) and GPA0-GPA7 (pins 21-28) are shown as outputs.
 - GPB7 and GPA7 are marked as "(free)*".

* Pins GPA7, GPB7 are OUTPUT only

Free connectors (not in the BOM)

J23

1	→ ADC_REF	(Pico)
2	→ ADC2	
3	→ ADC1	
4	→ ADC0	

J24

1	→ GPA7	GPA7, GPB7 are OUTPUT only (MCP)
2	→ GPB7	

J25

1	→ GP22	(Pico)
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Free connectors (not in the BOM)

J23

1	→ ADC_REF	(Pico)
2	→ ADC2	
3	→ ADC1	
4	→ ADC0	

J24

1	→ GPA7	GPA7, GPB7 are OUTPUT only (MCP)
2	→ GPB7	

J25

1	→ GP22	(Pico)
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Free connectors (not in the BOM)

J23

1	→ ADC_REF	(Pico)
2	→ ADC2	
3	→ ADC1	
4	→ ADC0	

J24

1	→ GPA7	GPA7, GPB7 are OUTPUT only (MCP)
2	→ GPB7	

J25

1	→ GP22	(Pico)
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Free connectors (not in the BOM)

J23

1	→ ADC_REF	(Pico)
2	→ ADC2	
3	→ ADC1	
4	→ ADC0	

J24

1	→ GPA7	GPA7, GPB7 are OUTPUT only (MCP)
2	→ GPB7	

J25

1	→ GP22	(Pico)
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For Raspberry Pi Pico only		
Main project : https://github.com/Mick3DIY/MultiPicoBox		
Sheet: /		
File: MultiPicoBox.kicad_sch		
Title: MultiPicoBox V2		
Size: A4	Date: 2026-02-09	Rev:
KiCad E.D.A. 8.0.9		Id: 1/1

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