

# BringAuto Pi Datasheet



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Detailed documentation:	<a href="https://doc.bringauto.com/">https://doc.bringauto.com/</a>
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## Product identification:

Name:	BringAuto Pi v4
Serial Number:	Part of the BringAuto Pi Watchdog board
Version of product:	4.1
Revision of board:	4.1 rev 2
Dimensions of box:	Length: 158 mm Width: 150 mm Height: 80 mm
Weight:	570g with Raspberry Pi
Number of cores	4
Core frequency	>= 1.5 GHz
Installed RAM	4GB

## Electronic product information:

Nominal voltage and current:	12V / 2.5A DC
Maximum power:	30 W with ventilation on max, USB device plugged in
Protection class:	IP30
Electromagnetic compatibility:	EMC directive 2014/30/EU
Power connector:	Terminal block connector

## Communication product information:

Number of ports	Communication port	Purpose
1	RJ45	Ethernet in
1	Terminal block power connector (2-pin socket)	Power input 12-30 V DC
1	USB-A	Communication with outer devices
1	RS-232	Communication with outer components and devices

# Intended operation and its conditions

The purpose of this device is to serve as a multifunctional computing platform used in industrial environments such as transportation vehicles.

The main advantages of the device are its reliability and competitive price.

The device is based on Raspberry Pi which ensures easy usability and quick integration.

## Hardware functionality

- Possibility to connect serial devices via RS-232 interface (BSub DB9 connector)
- HW Watchdog functionality
- Possibility to connect peripherals via USB-A connector
- USB supply isolation
- Support for supply voltage in the range of 12 - 30 V DC
- Protection against overvoltage and undervoltage
- Built-in fuses for overcurrent protection
- Controlling of cooling fans

## Hardware enclosure

3D printed enclosure made of PETG material, housing all components inside the enclosure.

- DIN rail mounting bracket (not included)
- Ventilation hole for cooling fan
- Brackets in ventilation holes for air filters
- Air filters to avoid excessive dust
- IP30 protection class
- Antistatic finish

Enclosure models are released under CC and are part of the BringAuto GitHub.

## Compute platform

The compute platform consists of a Raspberry Pi 4 computer which is protected by Armor Case and mounted inside the enclosure.

# Watchdog

Watchdog is a support device which supervises the computing unit. It has the ability to:

- reset the device to reestablish the communication in case the device gets frozen
- monitor input voltage and temperature inside the box
- control the cooling fans based on the temperature inside the box

The Watchdog is constantly checking if the supervised device (compute platform) is “alive” and communicating. If the supervised device stops responding, it will be restarted by the watchdog by switching the device’s power supply off and on.

Watchdog is based on the Pi Pico controller. Firmware is available at [BringAuto GitHub](#).

Watchdog is disabled by default. To enable it, pull-off the WD\_DIS jumper from the Watchdog board.

## Detailed description of Watchdog functionality

After the power-up, the Watchdog waits for 90 seconds to receive a communication signal. If the signal from the supervised device is not received, the watchdog powers off the supervised device for 3 seconds and then powers it back on. If the supervised device is powered off, the watchdog waits 90 seconds for a boot-up. The keep-alive signal is triggered and checked in a period of 1 second. If the supervised device stops responding on a keep-alive signal for a period longer than 5 seconds, the Watchdog reboots the device. Watchdog functionality can be disabled with a jumper. There are several signalization LEDs on the Watchdog board allowing the user to track the status of:

- Keep-alive signal (master and slave LEDs)
- Power supply in case the device is powered by insufficient PSU
- 5V output to the supervised device
- I2C communication between the Watchdog and supervised device
- UART communication between the supervised device and the RS-232 interface

The Watchdog board provides an RS-232 serial interface connected to the HW UART of the supervised device. A MAX3232EEUE+ chip provides communication speeds up to 250 kb/s (500 kb/s with use of quality RS-232 cable).

The USB power connector is taken from the board’s 5V power supply to provide more power to the device plugged into the USB port (max. 10W / 2A@5V).

## Power supply protection

The Watchdog is built to work with an input voltage in the range of 12-30 VDC. The power input of the Watchdog has the following protection capabilities:

- undervoltage protection - the device shuts down if the input voltage falls below 11 VDC

- overvoltage protection - the device shuts down if the input voltage exceeds 30 VDC with a tolerance of up to 80 VDC
- reverse voltage protection
- short circuit protection using 3A radial fuse (type TR5)

## Fan control functionality

The Watchdog has two signal PWM channels.

PWM channels have a rotary switch for choosing fan reference voltage (5, 12, Vin or OFF).

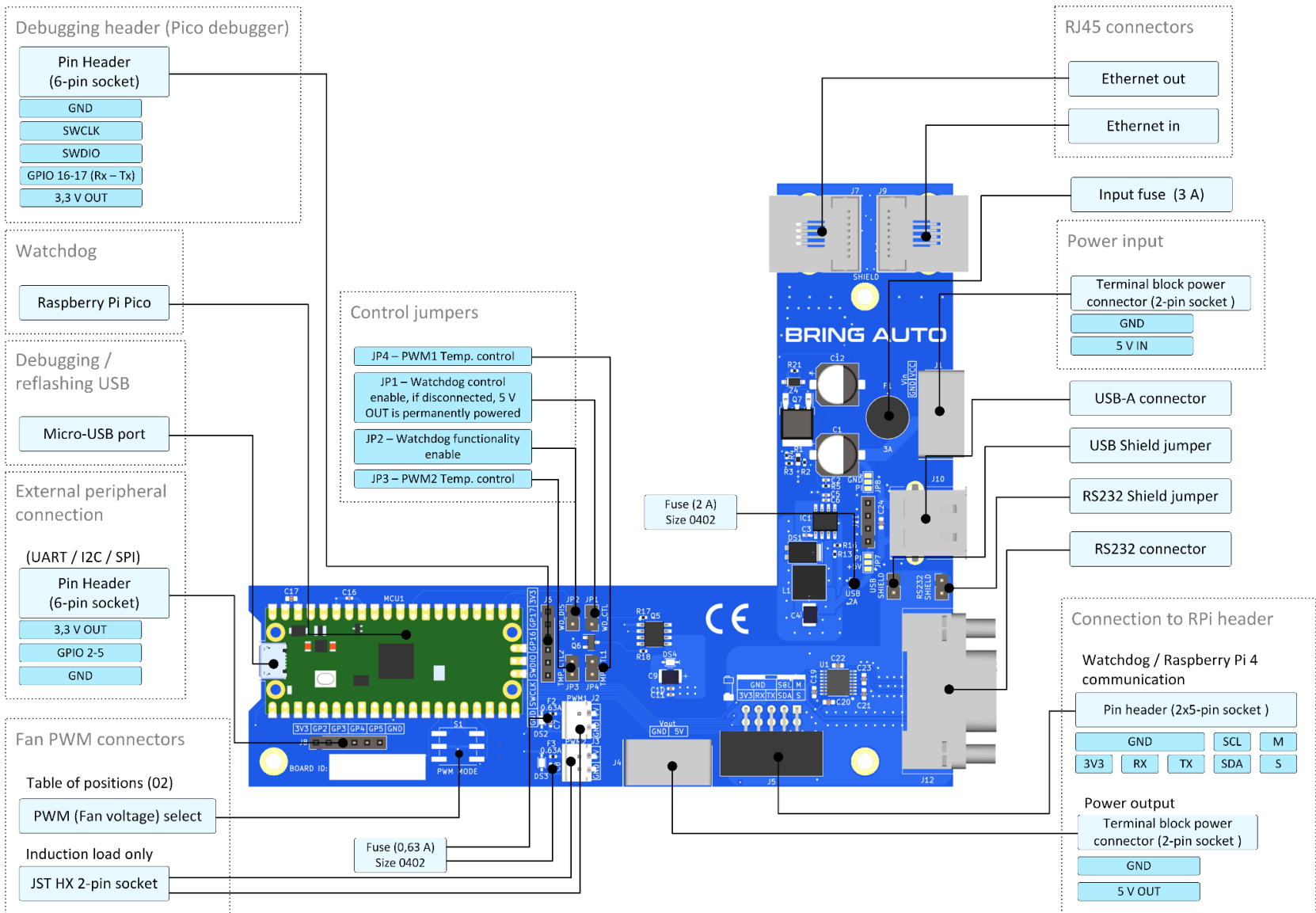
In the default assembly the PWM is used to drive the cooling fan.

It is possible to set a temperature control on/off for any of the two PWM channels using onboard jumpers TMP\_CTL1, TMP\_CTL2.

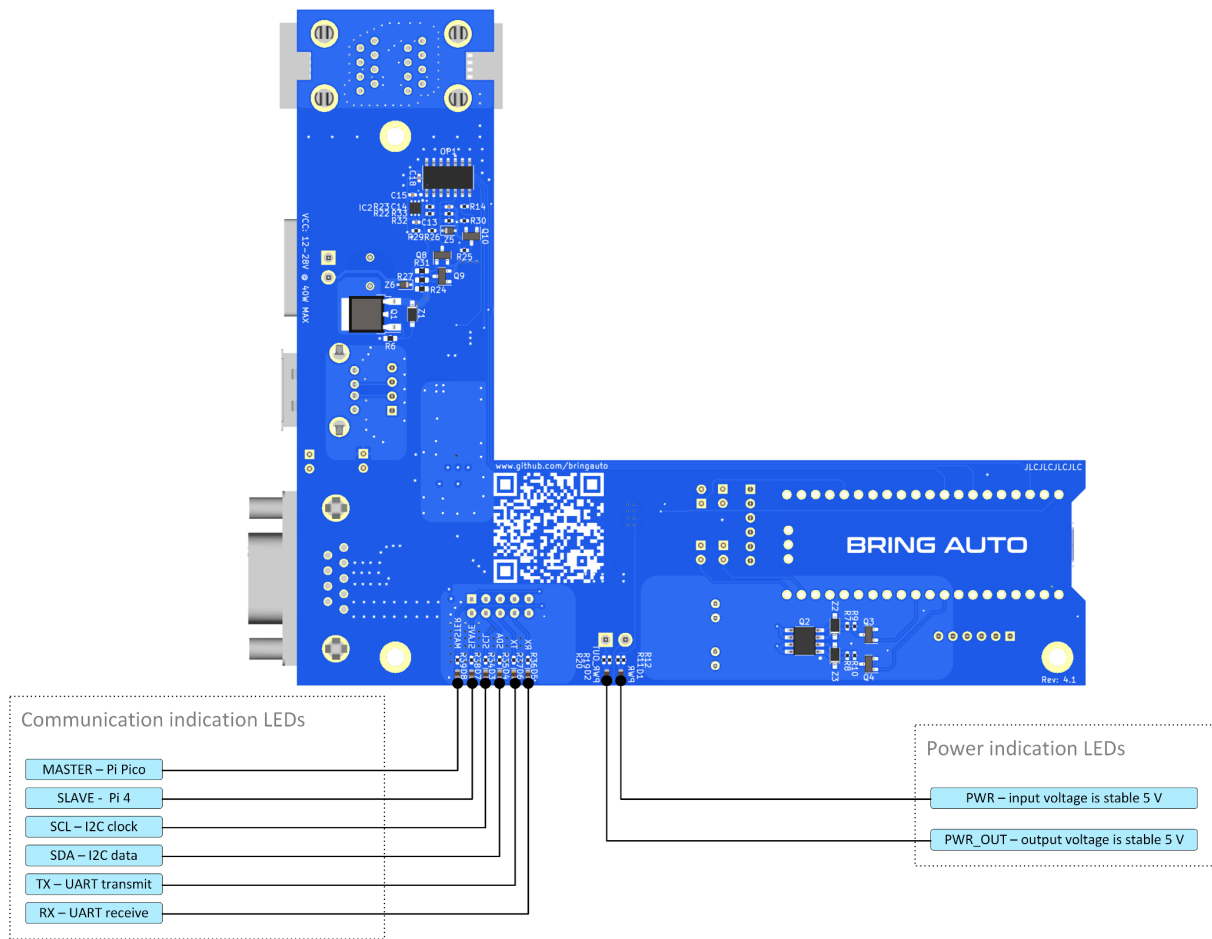
## Power supply parameters

A power supply is not provided with the device; the reason being that the device can be deployed in numerous different machines that can have various power output options for peripherals. However, it is possible to use any CE-certified power supply with output voltage in the range of 12-30 VDC and output power of at least 30 W.

# Watchdog pinout

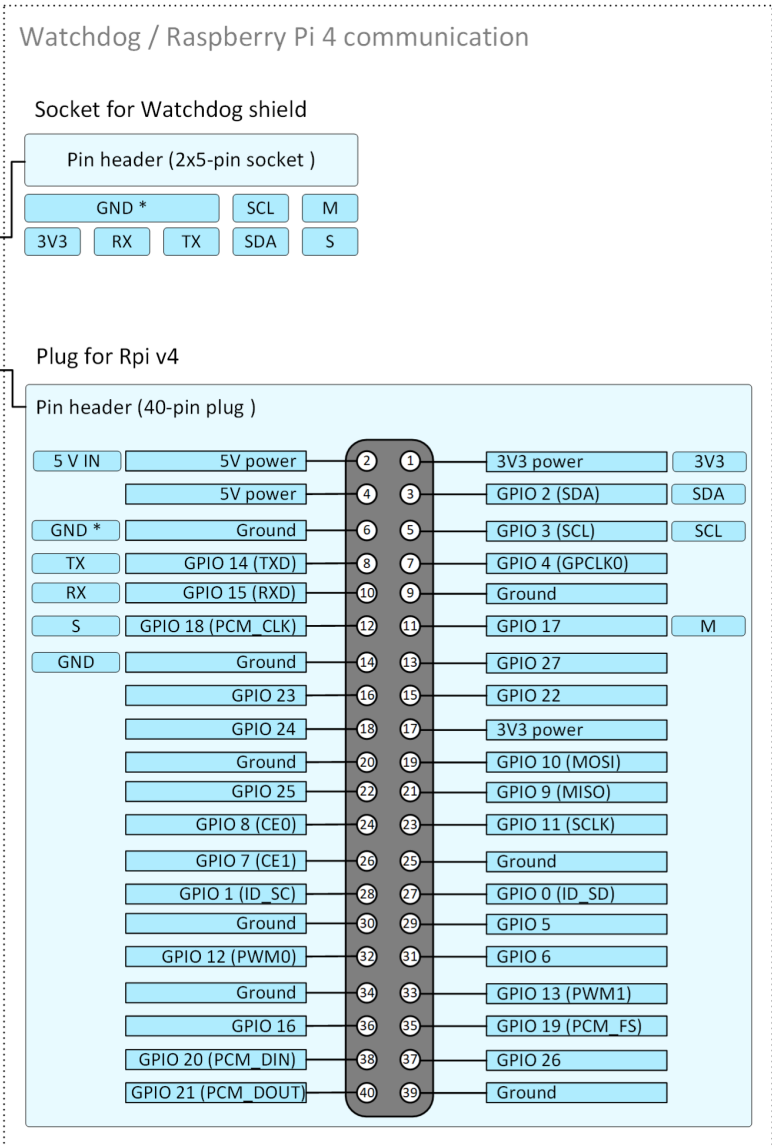
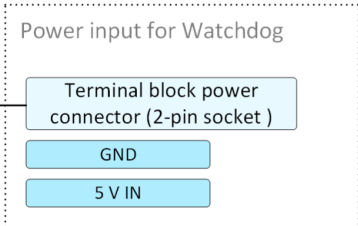
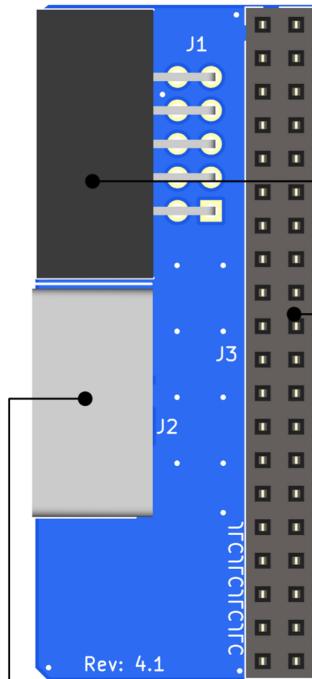


# Watchdog backside pinout





# Watchdog Header pinout



## List of internal connectors

These connectors are internally available on the board of Watchdog and its header, as shown in previous images.

**Table 01**

ID	On board connector	Counterpart	Functionality
J1	Molex 39506-1002	Molex 39504-0002	Input voltage port
J2, J3	JST B2B-XH-A	JST XHP-2*	PWM1 & PWM2 fan output
J4	Molex 39506-1002	Molex 39504-0002	5V output to the supervised device
J5	WE 61201021721	WE 61201023021	Communication between Watchdog and RPI4, RPI4 and RS-232 interface
J6	Socket Header 1x6 positions, 2.54 mm pitch	Pin Header 1x6 positions, 2.54 mm pitch	Debug connector of RPi Pico
J7, J9	Molex 85503-5001 (RJ45 Socket)	RJ45 Plug	Ethernet connection - ethernet in, ethernet out**
J8	Socket Header 1x6 positions, 2.54 mm pitch	Pin Header 1x6 positions, 2.54 mm pitch	External peripheral connection UART / I2C / SPI
J10	Molex 67643-0910 (USB-A Socket)	USB-A Plug	USB 2.0 connector
J11	JST B3B-XH-A	JST XHP-3*	Internal USB-A connection
J12	TE 5747844-6 (D-Sub DB9 socket)	D-Sub DB9 Plug)	RS-232 interface

\* Connectors usually come without contacts. Don't forget to buy them as well.

(JST XH series female crimp contact, e.g. SXH-001T-P0.6)

\*\* Watchdog has only one ethernet connector available. J7 & J9 are linked together and are used only as a lead-through.

## Positions for PWM mode

**Table of positions 02** (Switch S1 - PWM MODE)

Position	PWM1	PWM2	Position	PWM1	PWM2
<b>0</b>	0 V	0 V	<b>7</b>	0 V	12 V
<b>1</b>	5 V	0 V	<b>8</b>	12 V	12 V
<b>2</b>	12 V	0 V	<b>9</b>	0 V	0 V
<b>3</b>	0 V	5 V	<b>A</b>	0 V	0 V
<b>4</b>	5 V	5 V	<b>B</b>	0 V	0 V
<b>5</b>	12 V	5 V	<b>C</b>	0 V	0 V
<b>6</b>	0 V	12 V	<b>D</b>	0 V	0 V

# References

All Datasheets and support documentation can be found at online [Documentation](#) or [BringAuto GitHub](#) account



Documentation



GitHub

# Safety notice

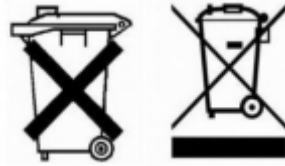
Installation, operation, or maintenance of this product by non-skilled and unauthorized persons is prohibited.

Do not cover the fan vent!

Do not cover filter vents!

## Electronics disposal

Unusable electronics (e.g. internal motherboard) should be handed to the relevant authorities in accordance with local regulations. A crossed-out rubbish bin indicates that the product should be disposed of separately and not as household waste.



It is obligatory to return used electronics. It is forbidden to dispose of used electronics in household waste.



# Product images







