Safety & Precaution

Ensure that the product is always used within the specifications

DO NOT use product close to flammable and explosive gas otherwise injury from explosion may occur

NEVER disassemble, modify, or touch any of the internal part to avoid electric shock or malfunctions

Relays can be working with High or Low Voltage. Please **DO NOT** use the relay over their life cycle and **DO NOT** exceed the rated load of the outputs **DO NOT** touch the terminals at least while power is being supplied. Doing so may occasionally result in injury due to electric shock

The board is sold as a DIY standalone component and people buying should take care of connecting and integrating with their own system. The manual connection diagram and short explanations but minimum expertise in electric circuit is needed.

The board is powered by **Low Voltage 12V** by external supply, so you must be very careful and all connections are at your own risk. If you are not familiar with electricity and power please ask a technician to help you. I'm not responsible for any damage or risk you can create

CraftBeerPi Expansion Board V3.0 Manual

Scope and Purpose

The purpose of this document is to describe the features of the board and to allow the correct functionality with the application software called **CraftBeerPi 3.0** or newer versions. The document provide the support to configure the connection outputs with plugin proper or software for all different use cases.

Characteristics

The **CBPi Exp v3.0** board has been designed to work with together with **Raspberry Pi 2.0** board or newer versions, and through Raspian operative system you can load the **CraftBeerPi 3.0** application to have a smart controller, able it to can be programmed and adapted to brewing and fermentation process.

Using a DIN rail or electrical boxes enclosure for the **CBPi Exp v3.0** board, allowing to create a customized panel control.

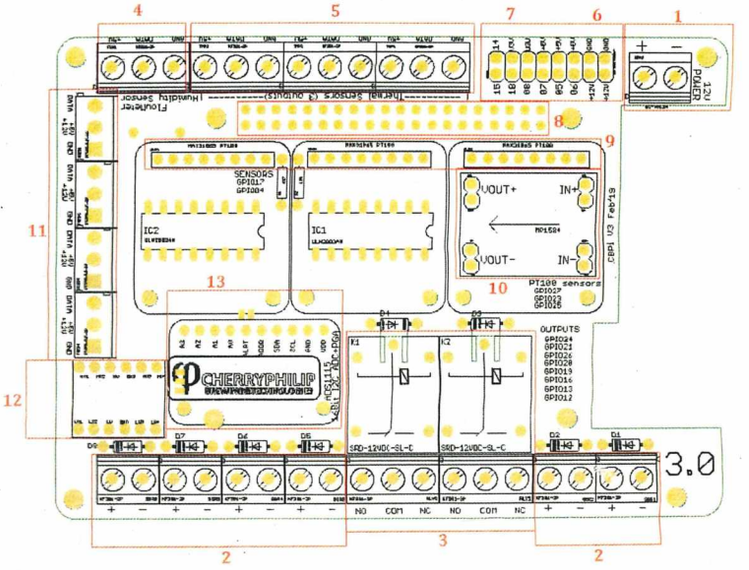
In term of technical characteristic the board provides the following features:

- All Independent channels (PID control, ON/OFF control with hysteresis
- 2x Relays output
- 6x SSR Output
- 4x Generics Purpose Output
- 3x 5V supply Output
- 3x 12V supply Output
- Up to 10x Digital temperature probe input
- 3x PT100 Analog temperature probe input (2,3 or 4 wires)
- 4x Pressure Sensors probe input (12V or 5V voltage supply)
- Up to 10x Flow Meter probe or Humidity sensor input
- Raspberry Pi 2 (or more) connector compatible
- WiFi & Bluetooth connection to remote server
- Buzzer events indication
- Buck converter to 5V for power supply

CraftBeerPi 3.0 can be interfaced by external monitor touch screen or by web socket (smartphone, laptop, desktop, tablet) that allow the user control the brewing/fermentation process.

Identification parts

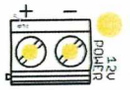
The picture below is explained the identification parts of the new **CBPi Exp v3.0:**



1: Screw terminal for Power Supply input (7V – 24V), 12V recommended
2: Screw terminals for 6x SSRs outputs (work at 12V signal)
3: Screw terminals for 2x Relays outputs (voltage work is reported on top)
4: Screw terminal for flowmeter probe or humidity sensor
5: Screw terminal for Digital temperature probe (Dallas DS18B20)
6: Header pins for 5V supply Output
7: Header pins for Generic Purpose Output
8: Header female pin for Raspberry Pi
9: Header pins for MAX31862 module (PT100 2, 3 or 4 wires)
10: Buck converter module
11: Screw terminals for Pressure sensors (Dallas DS18B20)
12: Logic level converter
13: ADS1115 (Analog/Digital converter)

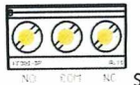
Screw terminal details

To avoid misunderstanding with the labeling. we report the details below:

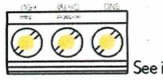


See identification parts chapter (ID 1)

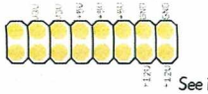
See identification parts chapter (ID 2)



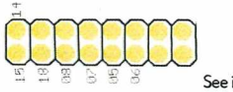
See identification parts chapter (ID 3)



See identification parts chapter (ID 4 & ID 5)



See identification parts chapter (ID 6)



See identification parts chapter (ID 7)

5 General Purpose In/Output Identification

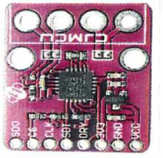
GPIO	ID terminal	Fuction	CBPi Plugin
GPIO12	SSR1	SSR	PID - ON/OFF
GPIO13	SSR2	SSR	PID - ON/OFF
GPIO16	RLY1	Relay	ON/OFF - COMPRESSOR
GPIO19	RLY2	Relay	ON/OFF - COMPRESSOR
GPIO20	SSR3	SSR	PID - ON/OFF
GPIO26	SSR4	SSR	PID - ON/OFF
GPIO21	SRR5	SSR	PID - ON/OFF
GPIO24	SRR6	SSR	PID - ON/OFF
GPIO27	PT1	MAX31865	PT100
GPIO23	PT2	MAX31865	PT100
GPIO25	PT3	MAX31865	PT100
GPIO17	FLW1	FLOWMETER	FLOWMETER
GPIO4	TMP1/2/3	TEMPERATURE	ONE-WIRE
GPIO22	BZR	BUZZER	
GPIO5	05	GENERAL USE	
GPIO6	06	GENERAL USE	
GPIO7	07	GENERAL USE	
GPIO8	08	GENERAL USE	
GPIO14	14	GENERAL USE	
GPIO15	15	GENERAL USE	
GPIO18	18	GENERAL USE	
GPIO24	24	GENERAL USE	

Warning

Please take note that he wiring for MAX31865 module has been done starting from a specific part number, model and specification are reported below:

All module above are compatible with CBPi Exp v3 board.

This module having incorrect pinout order



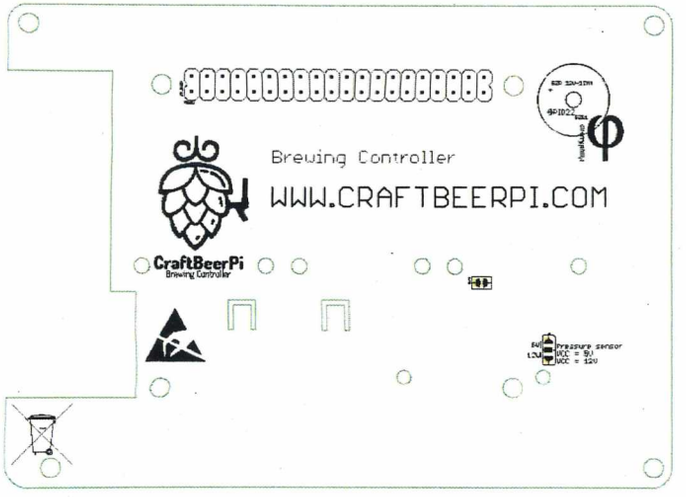
Pressure Sensor

Most pressure level sensors have a normal 3 lines (VCC,GND,SIG) and provide an analog output (SIG 0V to 5V). Raspberry pi does not have any Analog input so you will need an external ADC. You can use ADS1115 because it has 4 ADC channels so you can connect up to 4 sensors to one board. It has inbuilt voltage ref so you don't need any external Vref.

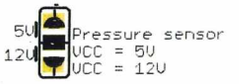
For a better reliable its need to use a shift level between the 3.3 volt Pi and the ADS1115 running at 5 volts (the ADS1115 without a level shifter for the I2C lines but it would be out of spec due to the pull-up resistors present on ADC board). The ADS1115 is a 16bit ADC so your readings will be highly accurate

Some pressure sensors working Voltage up to 5V, others up to 12V/24V.

You can set the properly working voltage through pads solder that you find back side board

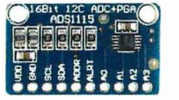


Pads solder details:



Advised modules for pressure sensors:

Analog - Digital converter



Shift Level

Pressure sensor type 1

Pressure sensor type 2