Single Vessel all-in-in one brewing system retrofit with

step by step guide

SmartPID CUBE retrofit

SmartPID controller is suitable to retrofit Klarstein, Ace Microbrewery, EasyGrain, HopCat, Easybrew and may other branded mash tun

SmartPID CUBE feature and functions

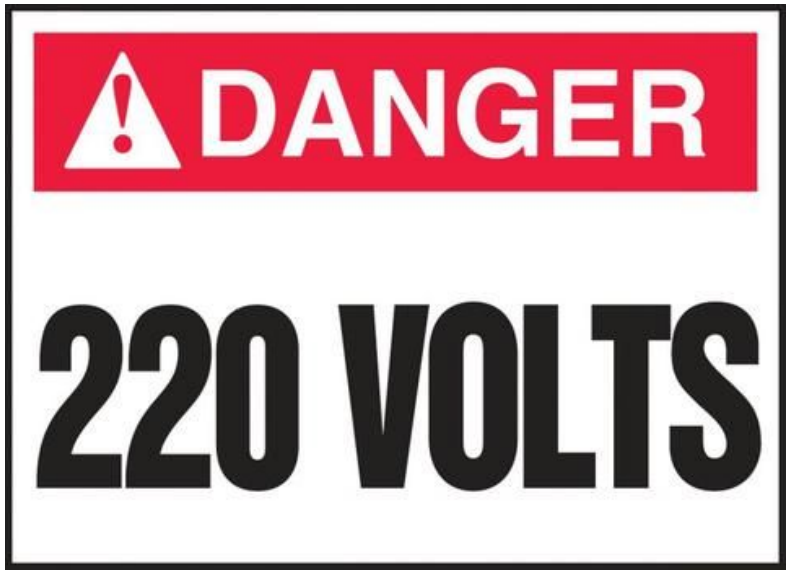
- Full brewing process automation from: step mash, boil,hop addition, whirlpool, cooling
- PID-PWM precise temperature control
- PUMP control
- Auto and manual mode
- Recipe Management
- Delay start
- WiFi connection and remote data monitor
- Android dedicate smartphone app
- OLED graphic display
- USB port for PC connection
- SW upgradable

SmartPID CUBE retrofit disclaimer

The hacking of the commercial product is done at your own risk and under your full responsibility. We don't take care of any damages of the product or warranty lost

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 system is powered by **High Voltage 220/110V** 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



Always perform operations with main power supply disconnected.

SmartPID CUBE retrofit KIT content

- SmartPID CUBE controller with pre-loade last version of smart hombrewing application
- NTC 10K 1% temperature probe M6 replacement
- SSR (solid state relay) 40A with heatsink
- Stainless steel laser cut front panel
- Stainless steel mounting brackets
- 110/220V AC - 12V DC power supply
- Cable connectors
- 3M professional be-adhesive tape

Klarstein retrofit wiring schema

SmartPID CONTROLLER

220 AC

THERMO SWITCH

connector

1800W

700W

Heating Element

DANGER 220 VOLTS

New wires

Power

Pump

faston

faston

NTC 10K

T1

220 AC

PUMP

RL2

SSR 25 AMP

+

DC1

-

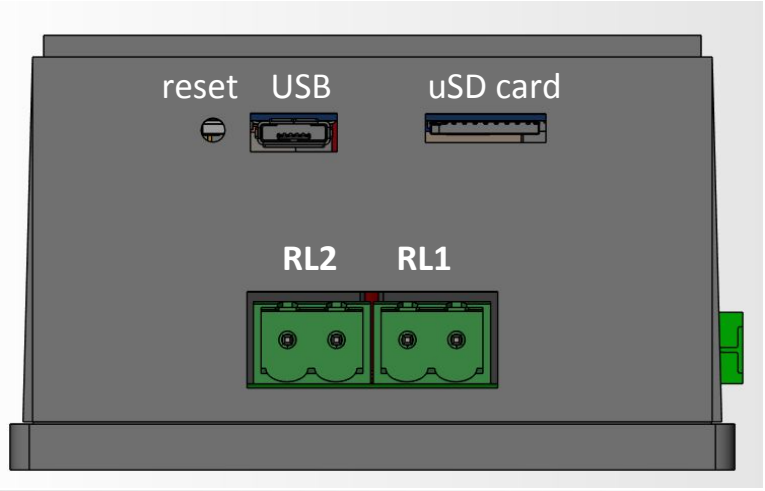
220 AC

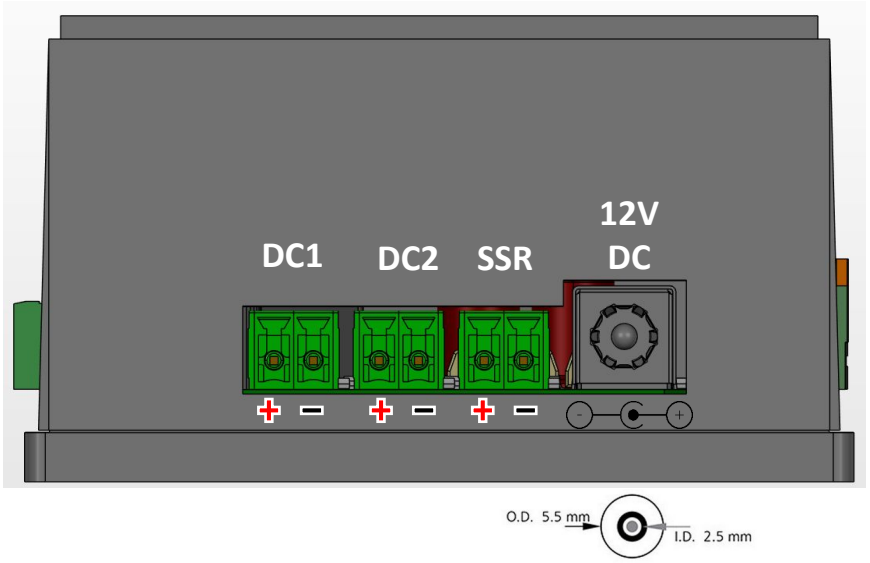
12V DC

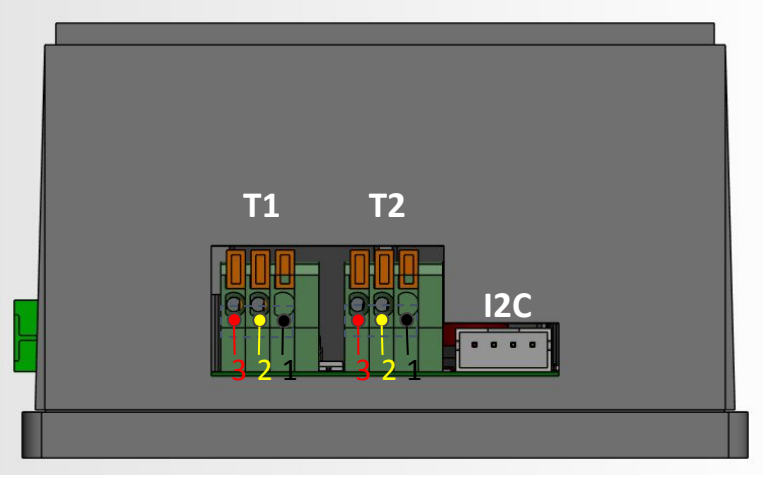
Power supply

SmartPID Cube

SmartPID CUBE connections



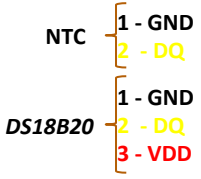




DC power supply →12V – 2A (min 1A)
DC1/DC2/SSR out → 12V 2A max
T1/T2 temperature probe

- DS18B20 1-wire
- NTC 100k
- K-type (with external adapter)

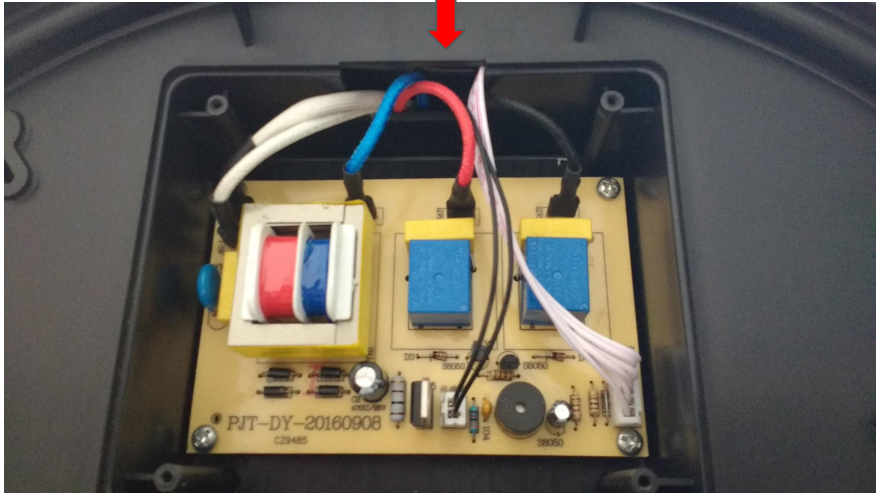
RL1/RL2 relay →220V AC 10A



Step by step guide - disassembling

Unscrew the 3 bottom bolts that keeps the plastic caseback

Remove the 4 screws of bottom plate and access to electronic circuit



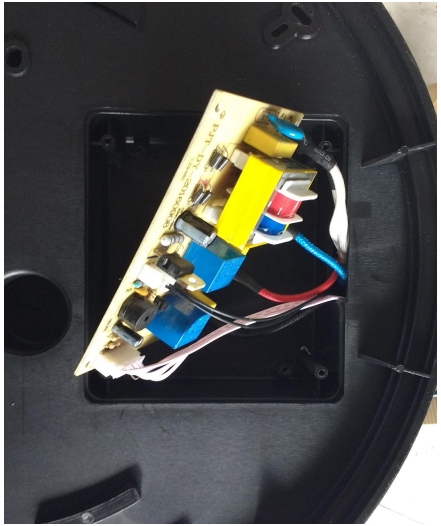
Step by step guide - remove native controller

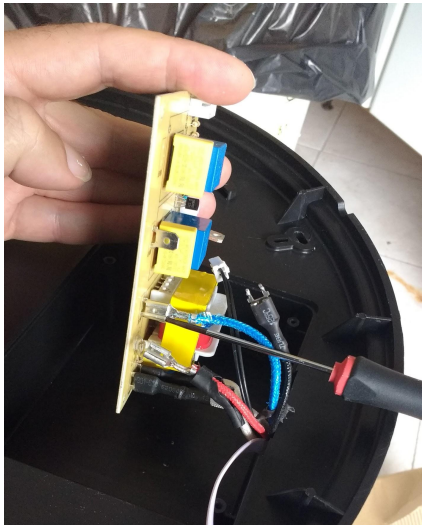
Remove all the connections from the original board

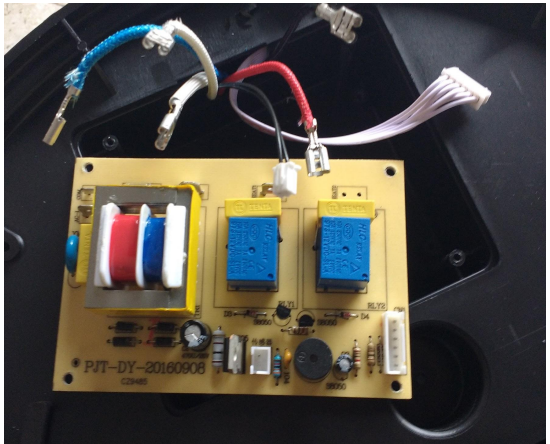
NOTE: faston are very tight, cut the plastic sheath and then lose the faston with a screw driver

disconnect the flat cable

disconnect the temperature probe cable

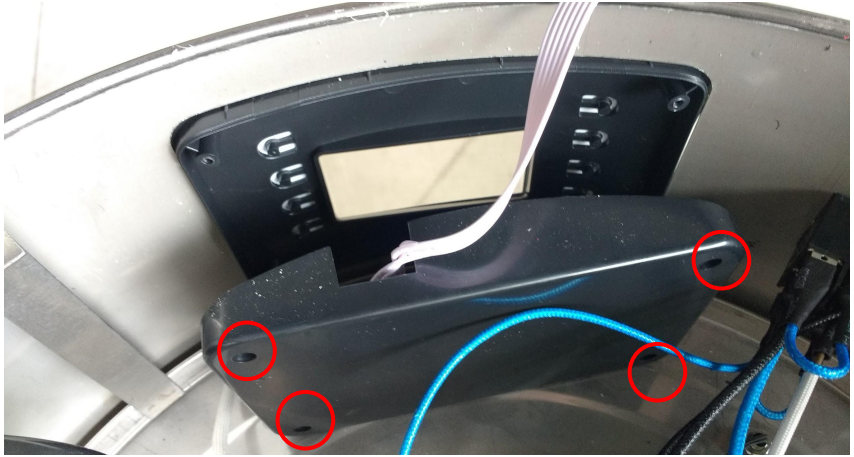


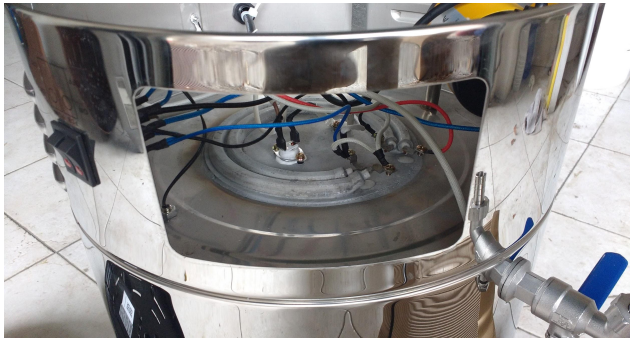




Step by step guide - remove the front unit

Remove the 4 screws from the front control unit and unplug the front panel





Step by step guide - prepare for installation

keep the mash tun upside and should be very easy to access to all wirings and connections

Identify

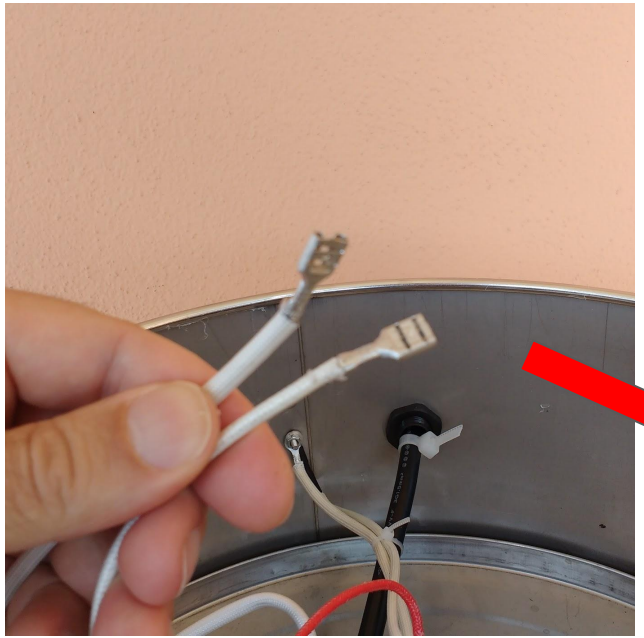
- heating element
- temperature probe
- switch
- pump
- wires disconnected from the original controller

Step by step guide - connect white wires

Select the two white wires disconnected by original controller

connect together

remove faston and use screw connector or mammut



Step by step guide - connect SSR (AC port)

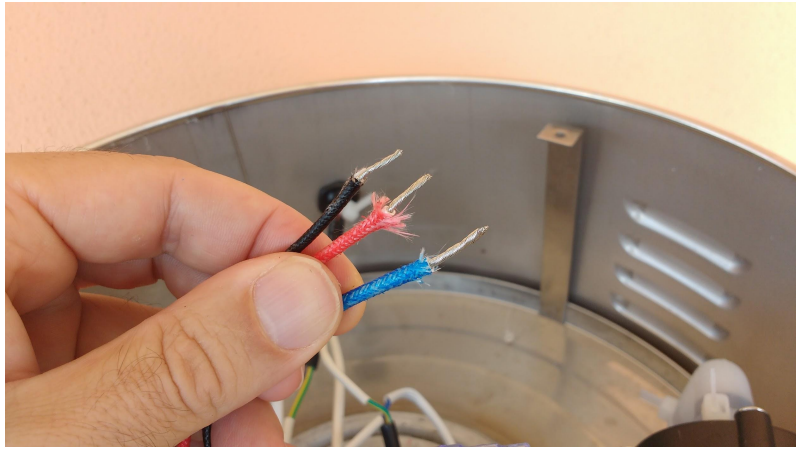
Select the other 3 wires disconnected by the original controller: black, red, blue

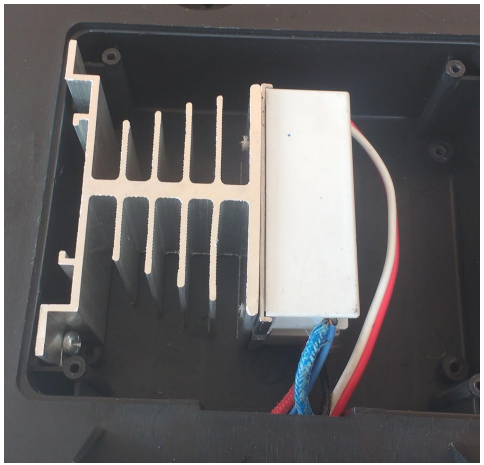
cut the faston

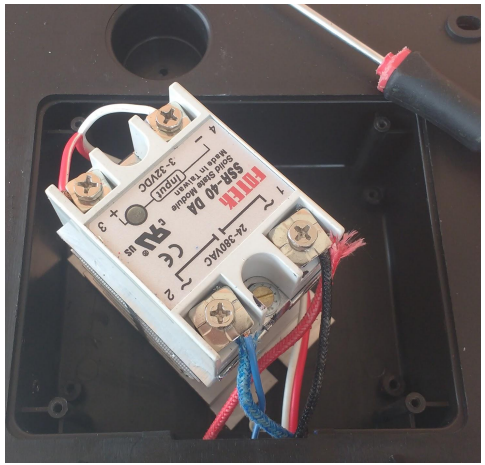
connect to SSR 380VAC Port

- black+red on one terminal
- blue on the other terminal

connect other wires (NEW) with the blue one. Should be long enough to reach the controller (30cm)







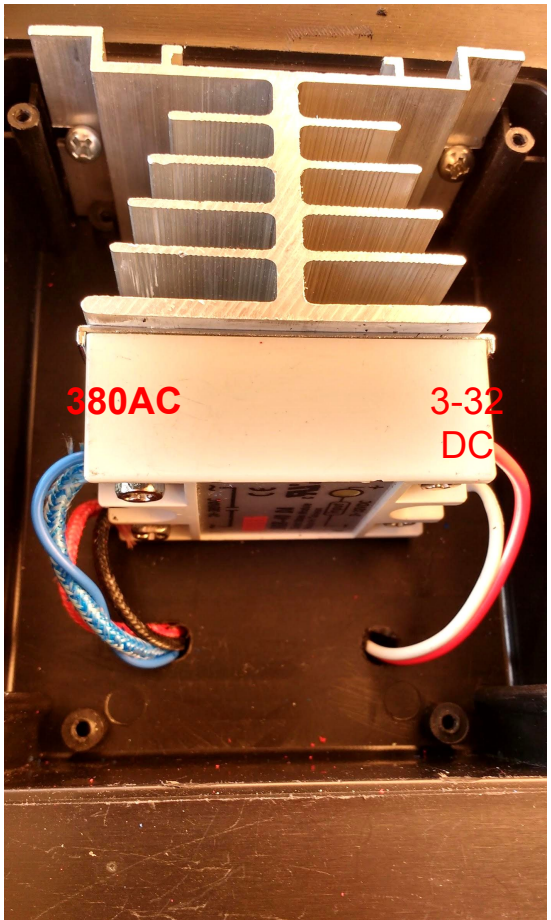
Step by step guide - connect SSR (DC port)

Connect 2 NEW wires on the 3-32V DC port

The wires should respect the polarity + and -

Make two sides holes to pass the wires to the bottom

Fix the aluminium heatsink with two screw

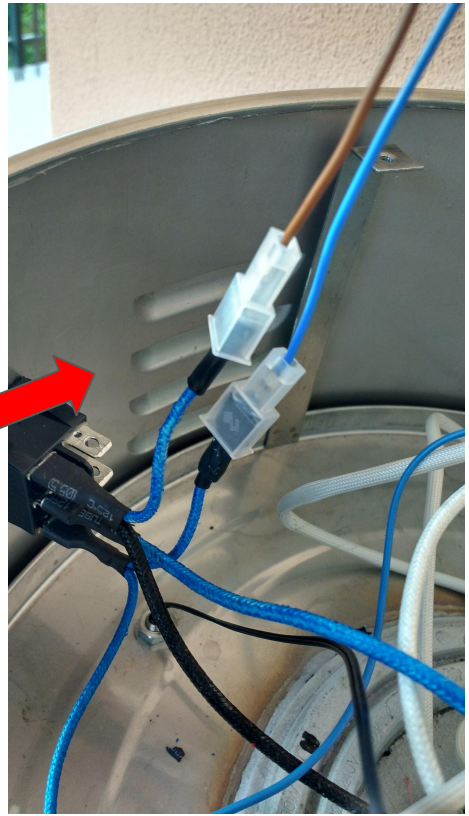


Step by step guide - connect power & pump wires

Disconnect all fastons from the pump switch

Add two NEW 20cm wires to the the faston connected to the main switch

top one is connected to RL1 port (pump) bottom one to smartPID 220v AC power



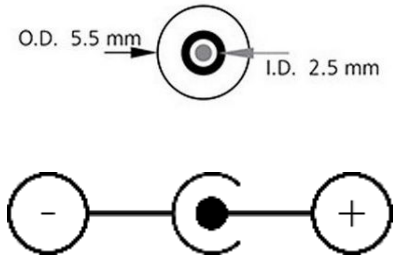
Step by step guide - replace the temp probe

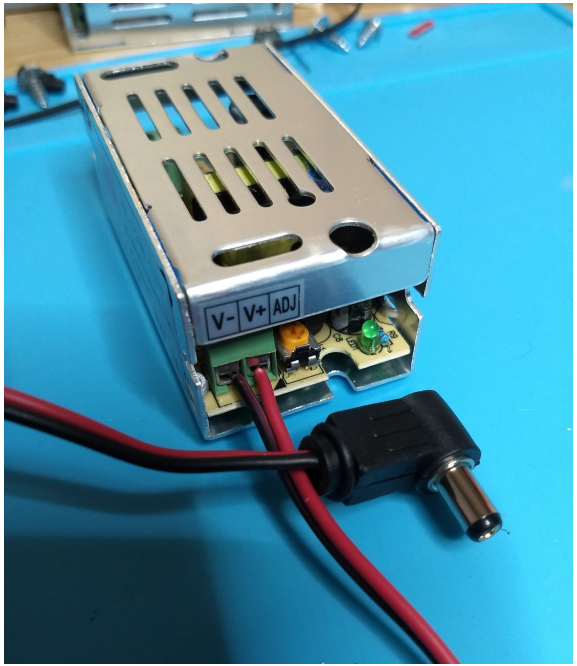
Unscrew the M6 bolt and remove the existing temperature probe

Replace with the new one using the original bolt

Step by step guide - 12V DC cable preparation

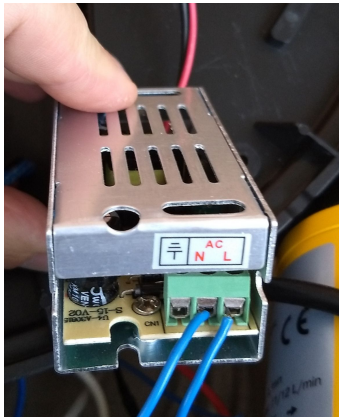
Prepare 10cm black/red cable and connect to the 5.5x2.5mm barrel plug included in the KIT

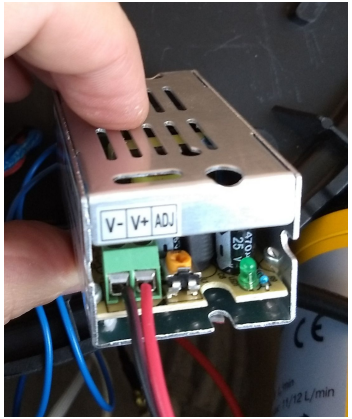




Step by step guide - Connect AC/DC power supply

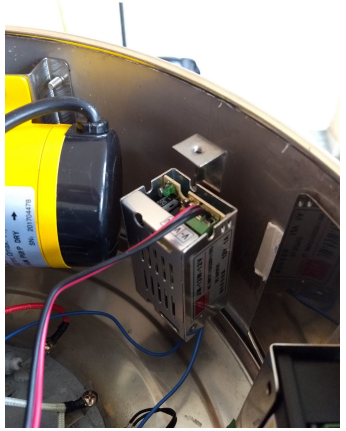
Connect the two 220V AC blue wires to the AC input of the power supply





Connect 12C DC output to the cable to the 5.5mm power plug

Fix the power supply to the bottom support bracket using the bihadesive tape



Step by step guide - connect SmartPID CUBE

Connect the wires to smartPID CUBE using the connectors included in the kit

12V DC power supply

- 5.5mm plug

PUMP (RL1 port)

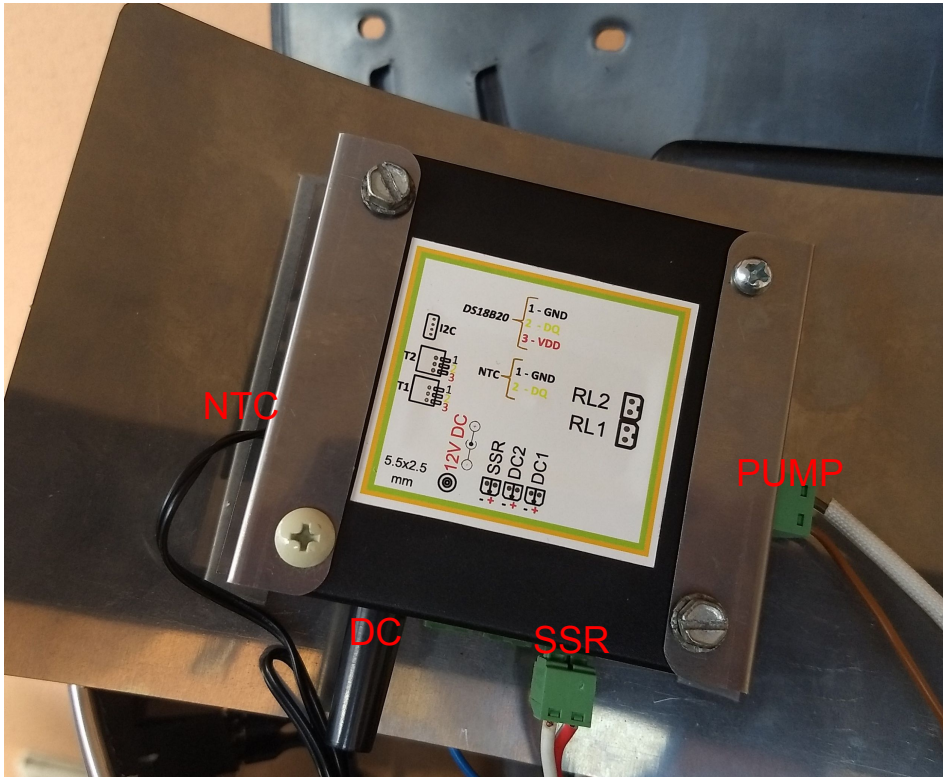
- one wire from power switch
- one wire from the pump switch (brown)

SSR (DC1 port)

- two new wires + and -

TEMP probe (T1 port)

- two black wires from the probe



Step by step guide - mount the front panel

Insert SmartPID CUBE in the stainless steel front panel. Fix with the brackets with bi-adhesive

Clean very carefully the internal part of the mash tun on the window sides

Remove the surface tape from adhesive

Center the panel on the window and press very strongly

Be very careful: the bi-adhesive is very strong so will be very difficult to detach

Step by step guide - Power ON

Double check all connections and wires !!

Power ON SmartPID CUBE, if all is ok you should hear the BEEP of the boot and se menu on display

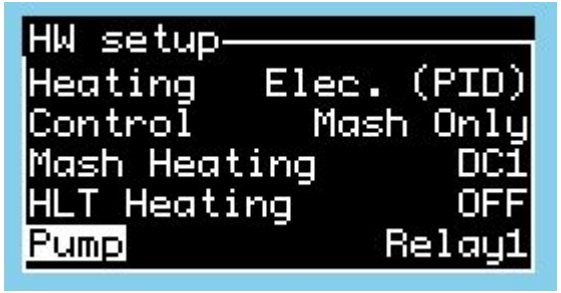
In case of problem immediately disconnect the power

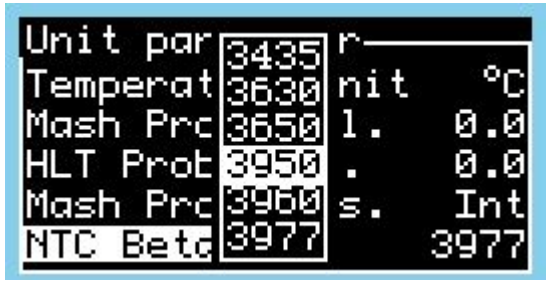
SmartPID CUBE configuration

please refer to installation and configuration manual and to user manual for the generic configuration.

Few specific parameter for the single vessel mash tun please consider above configuration

- configure heating → Electric
- configure control mode→ Mash Only
- assign Mash heating to DC1
- leave HTL heating OFF
- Assign Pump to Relay 1
- Configure mash probe as NTC
- Leave HLT probe OFF
- Configure NTC beta 3950





PID tuning

Tuning the pid requires some patience and method with few iteratives steps. For details refer to wikipedia page

https://en.wikipedia.org/wiki/PID_controller

Start with Kp=25 and Ki,Kd=0 and fill the mash tun with water and put set point to 50C

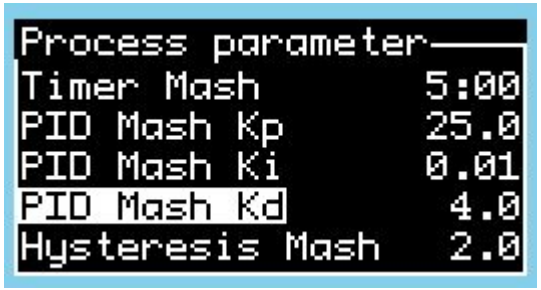
Verify that temperature reaches set point, overshoots and oscillation around set point

Increase Kd in case there is excessive overshoot

Increase slightly Ki in case temperature don’t reach the set point and there is a permanent error

Connect smartPID to wifi and Help yourself with log data available on thingspeak.com

suggested tuning values



Enjoy your smartPID and have nice brew day !

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