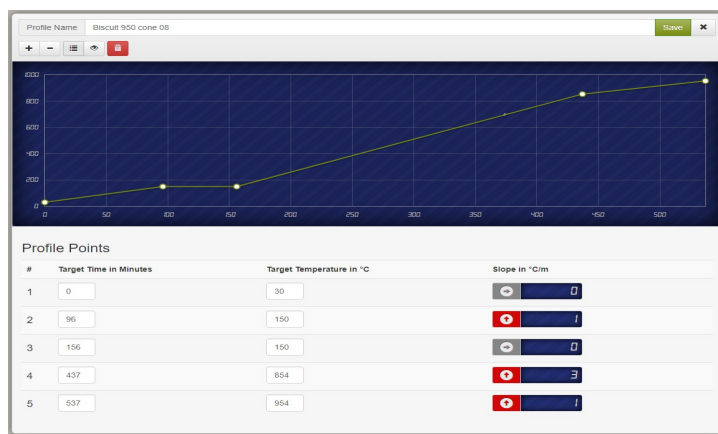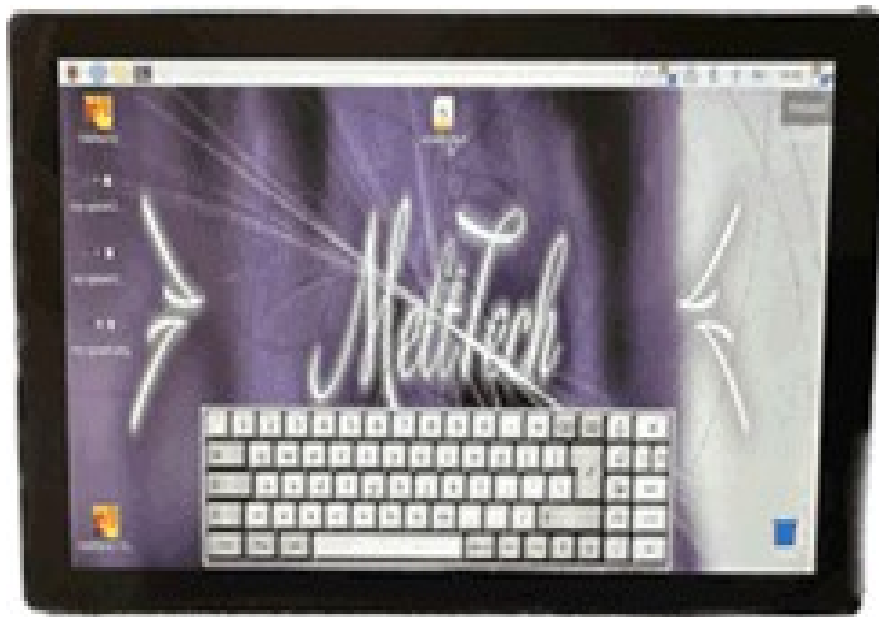# MeltTech

Computer and Temperature Controller Hybrid
Giving Power to the People to Control Hot Stuff.

MeltTech

Manual
2023

MeltTech
INSTRUCTIONS

What is the **MeltTech** 10.1" TouchScreen Hub
The MeltTech is a Personal computer GUI interface using Linux Operating system that can also control heating devices.. You Can Surf The web, Plug it into other phones etc to the screen with the HDMI cable you can also share the MeltTech Screen with other devices it plays music casting youtube etc.

 MeltTech comes in many models in two distinct designs (Sensor Type K Only)

Plug through controller in 10 single phase 240V
Single Zone Type K thermocouple (non grounded type)
This is a controller that you plug into the wall socket, then plug the oven / kiln into controller lead socket. Then set oven/kiln heat switch to high, open web browser enter local address or IP ,bookmark page for future use. Never forget to place thermocouple in oven chamber and suggest a permanent mounting and fix thermocouple in position. WARNING: WILL NOT WORK IF OTHER CONTROLLERS ARE WIRED INTO YOUR HEATING DEVICE. Coming soon 10amp

Or

4 Pin Clipsal plug to suit a 4 pin Clipsal 410 socket installed into equipment .
Single Zone Type K thermocouple (non grounded type).
This is a controller that you plug into the Clipsal 410 socket, plug the oven/kiln into your wall outlet and set kilns heat switch to high. Open web browser, enter local address or IP and bookmark page for future use. Never forget to place thermocouple into oven chamber WARNING WILL NOT WORK IF OTHER CONTROLLERS ARE WIRED IN
Using incorrect Thermocouple sensor type may cause damage to your kiln.
Metal sheathed Thermocouple must be attached to kiln case for Electrical safety.

RF Signals large industrial induction motors can cause minor interference, also not using a suppressor cap on your contactor coil as per wiring diagram for electricians. In line filter some times maybe needed to clean up power.

MeltTech
Controller software install

Configuration set-up your controller

All parameters are defined in config.py

Read comments in config file each setting is explained. Keep everything spaced the same as to not corrupt the config file, re-editing can fix.(can be easily downloaded) :)

Config file can be found in file manager   in directory

/home/pi/kiln-controller/config.py double click ,Once modified then reopen/reboot or open kiln controller software to apply new settings. Only needs to be changed if you want to heat as fast as possible but it will also on the fly wait for kiln to catch up used primary for glass kiln programs

Also change emergency temp shutoff if needed for example going to 1280 deg c set it to 1282 deg C at lower temps have a higher number to compensate for any overswings it depends on what you are after.

MeltTech
INSTRUCTIONS

RASPBERRY PI CONNECT Remote Access Now has Cloud
CONNECT TO YOUR MELTTECH VIA THE WEB
SIGN UP ON THE MELTTECH BY CLICKING OR TOUCHING THE RPI CONNECT SYMBOL 4TH ICON TO THE LEFT OF THE TIME TOP RIGHT FOLLOW INSTRUCTIONS TO OPEN A NEW RPI CONNECT ACCOUNT THEN GO TO A PC MAC OR IPHONE OR ANDROID SIGN INTO THE CREATED ACCOUNT ON THT DEVICE NOW YOU SHOULD BE ABLE TO CONNECT TO THE MELTTECH REMOTE/START STOP FULL CONTROL
THE MELTTECH IS THE SERVER AND YOUR DEVICES AE THE CLIENT

WEBSITE LINK
https://connect.raspberrypi.com/devices

THINGS TO BE AWARE OF.

Thermocouple Placement is important 30 to 50mm inside chamber
Inconel thermocouple only minimal bending and minimal splatter.

Always be in attendance as kiln manufactures state.
You are responsible
Monitor your kiln here are the tools to monitor it in many different ways
Every oven or kiln is different
Always do at least 2 Pyrometric Cone tests on your kiln empty as per your kiln manual as each kiln is different.
Supplied Programs are a guide only ,anywhere from a 1 to 30 minute hold maybe needed to be added or subtracted to each program determine this from cone test maybe your kiln will be spot on :)

Nemesis PI Specifications
Powered by Raspberry PI 4

Raspberry Pi 4 specifications
Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz
8GB LPDDR4-3200 SDRAM (depending on model)
2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, Bluetooth 5.0, BLE
Gigabit Ethernet
2 USB 3.0 ports; 2 USB 2.0 ports.
Raspberry Pi standard 40 pin GPIO header (fully backwards compatible with previous boards)
2 × micro-HDMI ports (up to 4kp60 supported)
2-lane MIPI DSI display port
2-lane MIPI CSI camera port
4-pole stereo audio and composite video port
H.265 (4kp60 decode), H264 (1080p60 decode, 1080p30 encode)
OpenGL ES 3.0 graphics
Micro-SD card slot for loading operating system and data storage
5V DC via USB-C connector (minimum 3A*)
5V DC via GPIO header (minimum 3A*)
Power over Ethernet (PoE) enabled (requires separate PoE HAT)
Operating temperature: 0 – 50 degrees C ambient
* A good quality 2.5A power supply can be used if downstream USB peripherals consume less than 500mA in total.

MAX31855 OR 56 Thermocouple-to-Digital Converters
FEATURES
Cold-junction compensation
14-Bit, 0.25°C resolution
Version K-Type thermocouple
Simple SPI-compatible interface (read-only)
Detects thermocouple shorts to GND or VCC
Detects open thermocouple

Plug Through Versions
240Volt 10Amp 2.4Kw
or
4 Pin Adaptor
1.2Kw 5Amp for 4 Pin Version PI Power 5Volt 2.5Amp

Relays
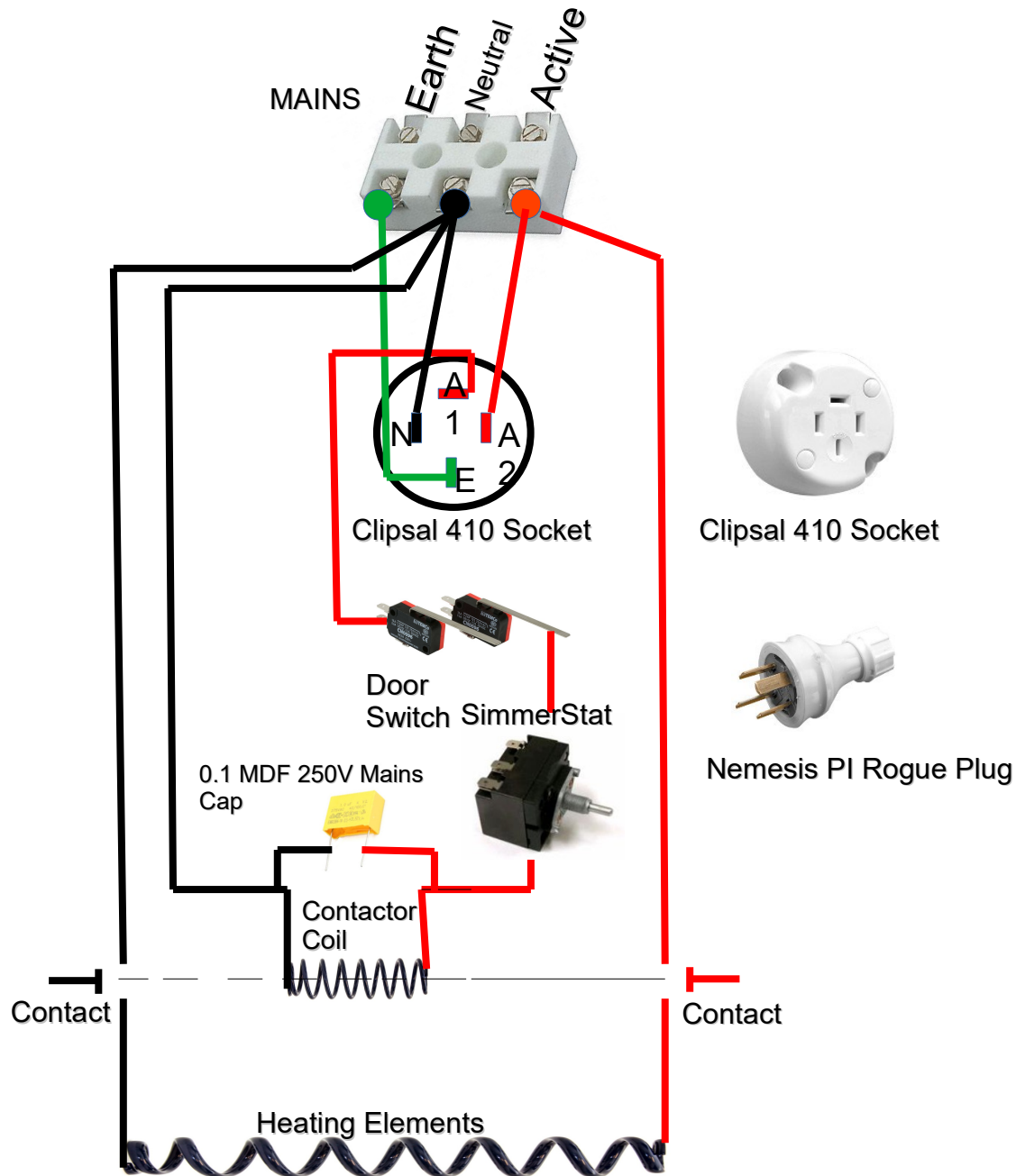10amp 250volt rated meltech uses 5Amp on 4 Pin 10 Amp on plug through

Thing to be aware of
Switching the MeltTech Hub off while doing updates or saving files or copying files it can corrupt the controllers operating system never copy files that will fill the harddrive while operating.shutdown melttech like you would a computer but It can just be switch off if your sure its not saving or updating but best to do proper Operating System shut down via raspberry pi top left of screen.(it can be set to read only mode more info on website install page this fixes problem).you can the switch on or off.
If you just log out of operating system a keyboard is required to log back in and your password you gave melttech Hub entered in.

More Help see our website Help/Install Page for updated information as sometimes raspberry PI OS change things.we are usually on top of things on our side.

Electric Kiln Wiring guide to adapt a 4 Pin Socket for the MeltTech to plug into your Kiln

MAINS

Earth   Neutral   Active

A
N   1   A
     E   2

Clipsal 410 Socket

Clipsal 410 Socket

Door Switch   SimmerStat

Nemesis PI Rogue Plug

0.1 MDF 250V Mains Cap

Contactor Coil

Contact   Contact

Heating Elements

Clipsal 410 Socket

0.1 MDF 250V Mains Cap Suppressor helps with contactor noise, will help by filtering making your Melttech more even Stable smooths out the graph spikes also can prevent screen flicker

IF SimmerStat is installed on Kiln it must be set to Full / High / 100% Power

Wiring Must be done by a Qualified Electrician

MeltTech INSTRUCTIONS

Important Information

Always make a back-up of your Operating system.

Remember this is a computer as well as a heating control device shut the MeltTech down as you would a computer so you do not corrupt the operating system , this can happen if saving while turning off. Some times Just wait! Or set it to read only mode to fix this issue

Very Important Never shut down Terminal controller program while operating kiln ,as kiln can stay on high if last signal was a heat signal just remember this if you are installing and setting up yourself before adding auto start/boot of MeltTech controller.

This is not an issue if autoboot is setup as Terminal is hidden.

You can safely open and close web browsers.

If MeltTech reboots kiln will shut down.

Never forget to place Thermocouple in oven chamber and mount with screws

Thermocouple open circuit detection and much more

MeltTech is a Fork or JBruce12000 which is a fork off of picoReflow by [apollo-ng]. It is intended to make it more
versatile (suited for reflow oven or ceramic kiln) by adding several features:

* Automatic PID tuning
* Time and temperature units defined per profile currently in minutes
* Currently set only to minutes

Under construction
* Option to wait for system to reach target temperature before going to next profile stage
* For ceramic kilns, dynamic calculation of end temperature based on heat rate
Not all function are working will be updated we are working hard

This software Perfect for controlling a electric kiln and is works reliably.
The added options make it suitable for a much wider range of thermal controllers than Just a kiln controller.
Never leave a kiln unattended as all kiln manuals state

Never Place MeltTech to close to kiln it will melt.(if on gas strut arm pullout to full extension)
This controller is not a safety Device
Always Control and monitor your kiln! that's why we made this device
Well with this controller it possible to Control and monitor your kiln or furnace or distillery from any where in the world on any Device that has Internet ,WIFI and a Web Browser.

If Furnace Problems Occur having Remote start and stop can help via more monitoring of appliances and ability to remote stop helps reduce the chance of equipment damage.
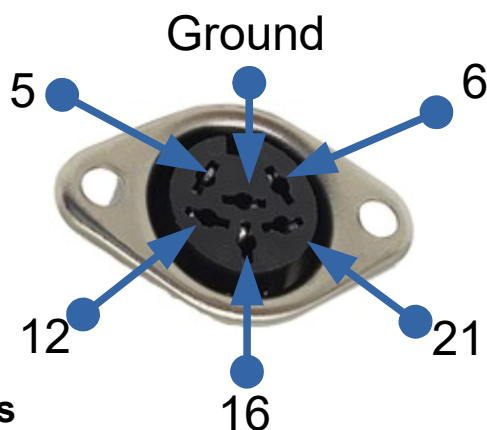**We Do not Warrant against over fires**

MeltTech
Output port

External output Add on Port

Supports 5 extra outputs for Relays to activate Fans , Heaters, blowers and much more!
External devices to be powered externally only!

Out Port Numbers
Change these in MeltTech **config** file
Under section ### Outputs and ### Inputs

Raspberry PI4 pins

Pin Reference
GPIO 5   Signal GPIO
GPIO Ground
GPIO 6   Signal GPIO
GPIO 12   Signal GPIO
GPIO 16   Signal GPIO
GPIO 21   Signal GPIO
External power required for your 5volt devices or built into V2K Power Cube

See online for more information

Error codes and fixes
In Terminal

Short to Vcc = leakage at high temperatures

Short To Ground = Thermocouple has been grounded

Above errors occasional show in Terminal but are filtered out with a simple filter within the temperature program , Program will Filter out most errors controllers graph will show some of these errors

No Connection = Please connect or check your thermocouple or buy a new one check leads and connections are secure and the correct direction   + = yellow wire
- = Red wire
Temp reading 4 = thermocouple line or board issue

Warranty

As kiln manufacturers state Never fire kiln unattended.

Warranty

This limited warranty is given only to the immediate purchaser of the MeltTech Computer/Heating control Device/Retro Gaming system
The limited warranty is not transferable. MeltTech warrants the controller for 12 Months to be in good working
order under normal operating conditions for a period of 1 year from the date of purchase. 90 days For Businesses

If the MeltTech to be not in good working order at any time during the 1 year period, MeltTech at it's discretion repair or replace faulty part or parts.
The liability of MeltTech is limited to replacement and/or repair at its workshop/Premesis
All replaced parts or products become the property of MeltTech.

Limited warranty services may be obtained by delivering Posting your MeltTech during the warranty
period to your MeltTech to MeltTech Head Quarters (see website for contact information)

You must provide proof of purchase and a description of the defect or issue but please contact us before returning
product as it may not be a fault or it can be remedied with patches or updates.
Buyer will be responsible for shipping and handling incurred by MeltTech in returning the MeltTech
to the Buyer.
MeltTech units returned for service where no warranted defect is found will be subject to
service and shipping fees.

This warranty does not apply to any damage to the MeltTech resulting from...
Over firing (melting of materials being fired) regardless of the cause of the over firing.
Operation beyond electrical rating unit is designed for.
Improper or inadequate maintenance by Buyer.
Parts or equipment not supplied by MeltTech.
Unauthorised modification or misuse. Designed for the MeltTech.
Operation outside environmental specifications.
Improper installation and connecting to damaged equipment.
Other sources including, but not limited to, chemicals, heat abuse and improper care. Never place controller on top of kiln or in direct sunlight. Avoid External heat sources place at minimum 500mm from kiln or furnace.
No warranty on overclocking
Do not operate with ambient temperature above 48 Deg C.

Each controller is tested prior to sale through our quality control Process.
Relays not covered by warranty

ANY INCIDENTAL, CONSEQUENTIAL OR OTHER DAMAGES OF ANY KIND WHATSOEVER, WHETHER A

CLAIM IS BASED UPON THEORY OF CONTRACT, NEGLIGENCE OR TORT.

Buyer shall determine suitability of the MeltTech for it's intended use and assume all risk and liability therewith.

Heating devices such as High Temperature Kilns should be Never fired unattended. As per manuals of kilns an other heating equipment.
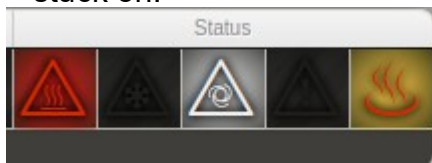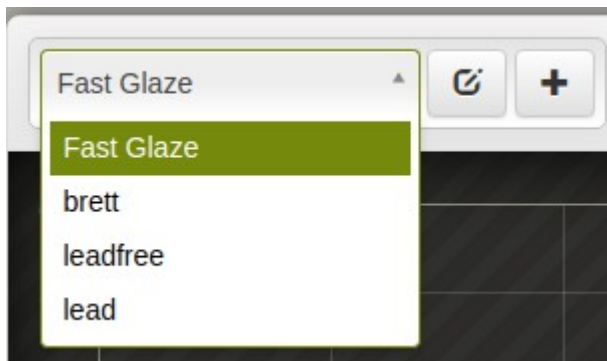
MeltTech
## Temperature Controller Basic Guide

Below is the main Bar
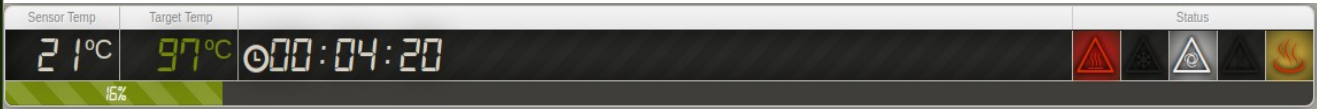
Main Bar shows current Sensor Temp / Program Set Point Target Temp
Time remaining to shut off also icons to tell you when your device is
Heating / *Cooling / Fan* / Warning / Power. Warning light is currently
stuck on.

Main Bar shows Heating / *Cooling / Fan* / Warning / Power.

Above Menu selection for different saved Programs other buttons are Edit
Program and add a New program button
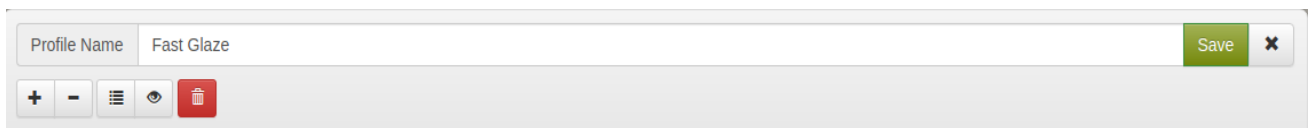
Above Menu selection for a saved Program Fast Glaze

Above Menu selection + - buttons will add Stages to your Program
Next Button brings up Edit Menu
Eye Button Live "Camera"
Trash can = Delete Program

NEW FEATURE UPDATES FOR CONTROLLER CHECK ON WEBSITE TO SEE
UPDATES

Tip Programming on the local intranet on a phone or tablet or pc is easier
You can monitor/Control on many devices at once using ip addresses

MeltTech
Temperature Controller Basic Guide

Profile Name	Fast Glaze		Save
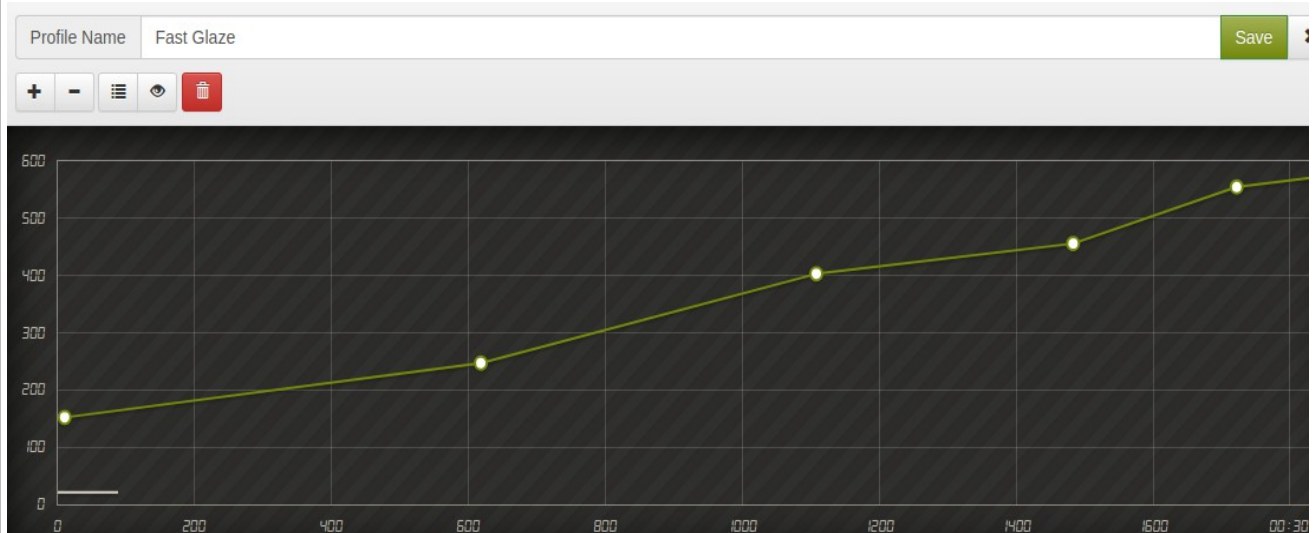
Above the Graph Plotting, you can program your controller just using the graph each white dot added is another a stage click and drag these.(Touch not working on this yet)
Temperature is on the Displayed Left
Time On the bottom

Profile Points

#	Target Time in Minutes	Target Temperature in °C	Slope in °C/m
1	0	152	0
2	10	247	9
3	18	403	19

Above Menu is accessed by clicking the icon with 4 lines next to the eye you can now adjust Time and Temperatures here using keyboard this also displays slope in minutes.

Save ✖

Above is the Program save button click this once your done saving file if a new file it will appear in program menu
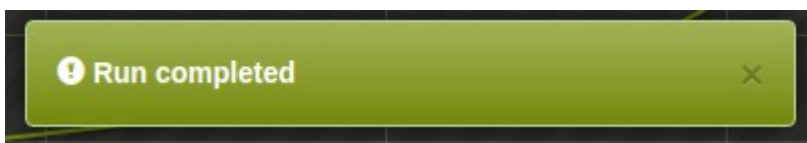
⊘ **Run completed** ✕

Above is the Program Message once your program has completed it's saved program
Start and stop button well it will start or stop the program ,Refresh Browser if in active or displaying wrong profile