



**OWNER'S MANUAL FOR
VT36 - PROGRAMMABLE CONTROLLER**





Table of Contents:

	Page
1) Installation	1
2) Key Functions on Display	2
3) Quick Guide to Running a Programme	3
4) Programming Your Controller	3
4.1) General Terms	3
4.2) Programme Progress Graph Indicator	3
4.3) Editing a Programme	4
4.4) To Skip a Step in the Programme	4
4.5) Target Indicators	4
4.6) Display Indicators	5
5) Warning and Error Messages	5
6) Global Parameters	6-10
7) Firing Cycle	10
8) Electrical Connections	10
9) Controller Plug	11
10) Specifications	11
11) Warranty	12
12) Disclaimer	12
13) Quick Reference Chart	12
14) General Ceramic Programmes	13
15) General Glass Programmes	14

Controller Details

Congratulations on buying a Van Tuyl VT36 Programmable Controller!

The VT36 Programmable Controller is one of the best on the market. This kiln controller was developed in South Africa specifically for kiln management and easy operation for our clients.

The VT36 Controllers are “fully fledged” **programmable electronic processors**. They can store up to 36 individual programmes - each with 16 steps per programme.

The controller has a progress graph to track your programme during your firing. It also has useful functions like multiple ramp rates (up and down), and soak times. This allows for complex firing programmes for several applications.

Other useful functions include delayed start, fault finding with warning and error alarms, control of auxiliary equipment, and automatic re-start after power failures.

Please fill in your details for easy reference with manufacturer.

Model: _____

Date of Purchase: _____

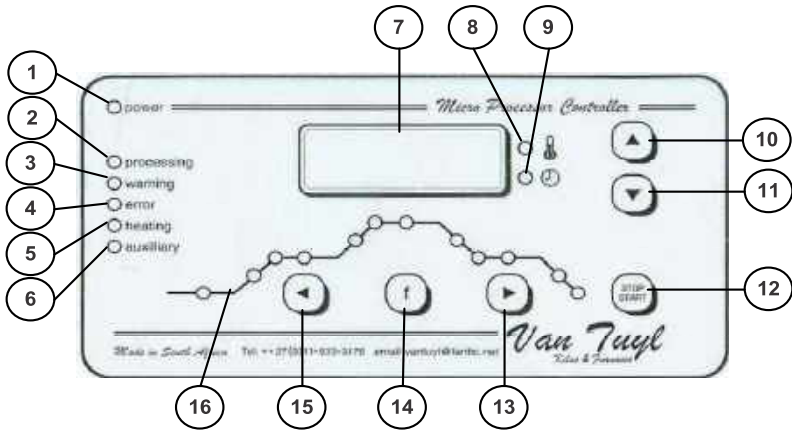
Serial No: _____

1. Installation

- 1.1 **Mounting** – The controller should be mounted on a flat vertical surface away from the kiln (recommended $\pm 200\text{mm}$ away) so that it cannot be affected by the heat radiated from the kiln.
- 1.2 **Connection** – It is important that the electrical installation is done professionally. Depending on the type of kiln, ensure that your controller is set to the correct thermocouple type. The VT36 controller is pre-set to a K-type thermocouple seeing as it's the most common (see Global Parameters, page 6). For the correct electrical connections, please read the section on Electrical Connections (page 10).
- 1.3 **Safety** – Ensure that there is no risk of water entering the controller or its connecting leads. The electrical connections should be done professionally to ensure that the unit is wired correctly and therefore poses no electrical risks.

2. Key Functions on Display

The VT36 Programmable Controller has a well laid out display. This allows you to easily see at what stage the programme is, as well as having some other useful functions.



KEY FUNCTIONS

- 1 **Power Indicator** – The system has power.
- 2 **Processing Indicator** – The programme cycle is running correctly.
- 3 **Warning Indicator** – A minor problem occurred during the firing cycle but the programme can continue. Refer to page 5.
- 4 **Error Indicator** – The firing cycle has been aborted due to a critical error (e.g. Thermocouple failure). Refer to page 5.
- 5 **Element Indicator** – The elements (coils) are currently heating the kiln.
- 6 **Auxiliary Indicator** – The auxiliary is currently on.
- 7 **Display screen** – Main information display.
- 8 **Temperature Indicator** – Temperature value is shown on the display screen (when LED is on).
- 9 **Time Indicator** – Time value is shown on the display screen (when LED is on).
- 10 **Increase Control** – To increase a value (e.g. set temperature, ramp rate, soak time).
- 11 **Decrease Control** – To decrease a value (e.g. set temperature, ramp rate, soak time).
- 12 **Start/Stop** – To Start or Stop a programming cycle.
- 13 **Right Control** – To review the steps in your programme.
- 14 **Function button** – To select controller functions and programmes.
- 15 **Left Control** – To review the steps in your programme.
- 16 **Programme Progress Graph Indicator** – To track your programme's progress through the set steps.

3. Quick Guide to Running a Programme

- Switch the controller on (on the right side). The system will start by showing the version of software (e.g. 2.1) and then the current temperature (Temperature mode) on the display screen (7). If the kiln is cool, this temperature should be around room temperature.
- Press the **f** (14) button to display the programme cycle numbers. This should reflect the last programme used (anything from 01 to 36).
- Press the **▲**(10) and **▼**(11) buttons to select the programme cycle you wish to use. The controller has 12 programmes pre-set in the controller. These programmes can be changed - see section 13 for details.
- Press the **f** (14) button to return to the Temperature mode.
- Press the “STOP/START” (12) button to begin the programme you have selected.

4. Programming Your Controller

While editing a programme, there are a few inputs that you need to consider, including how many heat cycles the programme will require. Typically, a heat cycle has Ramp Ups, Set Temperatures and Soak Times.

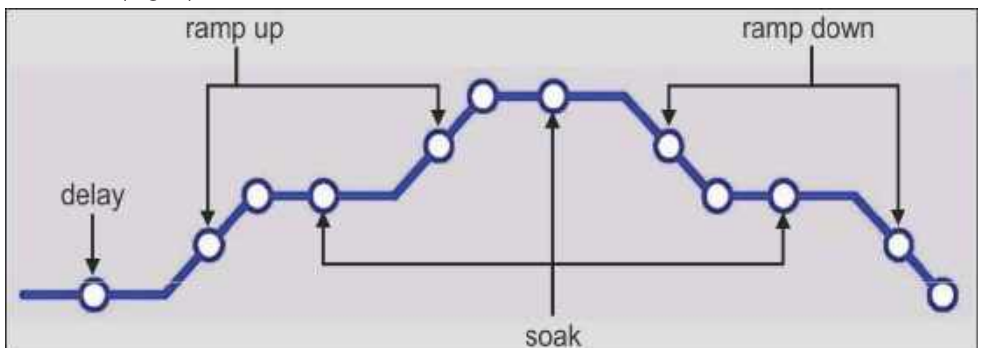
4.1 General Terms

- **Ramp Up Rate** – The rate at which the temperature will increase per hour.
- **Set Temperature** – The temperature you wish to achieve.
- **Soak Time** – How long the kiln should sit at the set temperature.
- **Ramp Down Rate** – The rate at which the temperature will decrease per hour.
- **Delay Start** – This function allows you to start your programme after a delayed time (This function is common in countries that, for example, have cheaper electricity rates at night)

4.2 Programme Progress Graph Indicator

The graph (16) tracks your programmes' progress throughout various steps set within your programme.

(Fig. a)



4.3 Editing a Programme

- To edit a programme, you must first select the programme by pressing the **f** (14) button. Use the **▲**(10) and **▼**(11) buttons select the programme number you wish to use or edit. This will show on the display screen (7).
- When you reach the programme you want to edit, use the **◀**(15) and **▶**(13) buttons to move to the selected step(s) on the graph indicator that you want to edit. As you move through the steps, you should see the LED lights on the Programme Progress Graph Indicator (16) move along the graph.
- If the programme was used before, it will show the last data you used on the display screen (7). If not, it will show **--** (this is zero input on the display screen).
- When you get to the step that you want to edit, the LED light on the Programme Progress Graph Indicator (16) will light up and show the last used data on the display screen (7).
- To edit the selected step, use the **▲**(10) and **▼**(11) buttons to change the value up or down.
- You can use this same process to edit any of the steps.
- When you are finished, use the **◀**(15) and **▶**(13) buttons until the lights on the Programme Progress Graphs (16) has run through the entire programme and the display screen (7) returns to the current temperature. Your programme is now completely edited.
- To start your programme, select the “STOP/START” button (12) to start the firing cycle.

4.4 To Skip a Step in the programme

- To skip a step, the value in the step needs to reflect **----** or **--** which is a Zero input.
- Note that a zero input in any step will not affect any of the other steps that have been programmed.
- Ensure that all steps after the last step being used in the programme reflects **--** (Zero). If not, this will impact your firing cycle.

4.5 Target Indicators

- **Setting an Alarm (AL-1 or ALE-1)**
When editing a step, the alarm setting for that step can be accessed by pressing the **f** (14) button. To activate the alarm at the end of the step, change the alarm setting from **AL--** to **AL-1**. If the buzzer is configured to be activated, it will sound after the step. If the auxiliary is configured to respond to the alarm, it will be turned on after the step. (See parameter number 14 on page 7 for the alarm options).
- **The Auxiliary function** is set per step and is either switched ON (**AU-1**) or OFF (**AU--**) at the beginning of the step. You can access this function by pressing the **f** (14) button until the AU function is reached. The AU and the AUE auxiliary settings will be ignored if the global setting (Global Parameter 14) has been configured to respond to the alarm. While a programme is in progress, and if the step that is edited is the current step, the auxiliary setting will take immediate effect.

- The last target indicator shows alarm end (ALE) and auxiliary end (AUE) instructions. These will turn on the alarm or auxiliary at the end of the programme cycle. If the auxiliary end setting is edited while a programme is not running, the setting will take immediate effect.
- The alarm and auxiliary settings are set per programme. This enables you to store each programme with unique alarm and auxiliary configurations.

4.6 Display Indicators

Function	Setting	Explanation
Step Value	----	Temperature/Rate value is zero and step will be skipped
	--,--	Time value is zero and step will be skipped
Alarm	AL --	Alarm is off
	AL-1	Alarm activates after the step
	ALE -	Alarm not set for the end of firing cycle
Auxiliary	ALE1	Alarm activates at the end of firing cycle
	AU --	Auxiliary will turn off as the step starts
	AU-1	Auxiliary will turn on as the step starts
	AUE -	Auxiliary will turn off as the firing cycle ends
	AUE1	Auxiliary will turn on as the firing cycle ends

5. Warning and Error Messages

The controller is fitted with both Warning and Error messages to help you determine what may have gone wrong during the programme.

5.1 If an Error (E) or Warning (U) light is visible, you can determine where and what error or warning took place.

- On the Display Screen (7) where the temperature is being displayed, press the ◀(15) and ▶(13) buttons simultaneously to get to the error display mode.
- Use the ◀(15) and ▶(13) buttons to move between the steps of the program. On the step where the problem occurred, you will see a “U” or “E” displayed with the number to identify the kind of error or warning. See section 5.2 on page 6 for error codes.
- The system will alternate the display between the errors/warnings if more than one error/warning occurred during any particular step. **In all cases an error will terminate a running programme.**
- **A warning is not a critical problem and will never terminate a programme.** The program can still continue (e.g. your kiln cannot ramp up as fast as you've set, but will go as fast as it can OR there was a power interruption but it continued afterwards).
- To end the error viewing procedure, move the LED lights through the graph in the display screen (7) by using the ▶(13) button until it is past the last target indicator on the display.

5.2 Error Codes

Error Code	Error Detail	Possible Solution
E000	Thermocouple failure	Check the thermocouple and wiring
E001	Thermocouple is reversed	Check the thermocouple wiring
E002	Temperature is out of the thermocouple's range	Contact technical services
E003	CJC low	
E004	CJC high	
E005	Deviation over	
E006	Deviation under	
E007	Power failure	
E008	Flash memory error	Contact technical services
E009	EEPROM memory error	Contact technical services
E010	Programme error	Check the steps of the programme. An illogical value has been programmed into one of the steps.

6. Global Parameters (P-01)

The VT-36 Controller has set Global Parameters that are standard. These can, however, be changed to suit your kiln or type of work.

6.1 To Access Global Parameters (P-01)

- Press the **f** (14) button for 5 seconds to get to the parameter view (P-01). On the Display screen (7) a P-01 will indicate that you are now in Global Parameters.
- Use the **▲**(10) and **▼**(11) buttons to move between the global parameters.
- Use the **▶**(15) button to view the value/default data for the corresponding parameter.
- Press the **▲**(10) and **▼**(11) buttons to alter the values/data of the selected global parameter.
- Use the **◀**(13) button to get back to the list of global parameters.
- Press the **f** (14) button to get back to the Display Screen (7) that will show the temperature.
- Your changes have now been saved.

6.2 Global Parameters Table

No	Parameter	Range	Default Setting
P-01	Kiln temperature limit	0-2000	1300°C
P-02	Thermocouple type	1 = K-Type 2 = R-Type 3 = S-Type	1
P-03	Thermocouple offset	-150 to 150	0
P-04	Screen brightness	1-7	2
P-05	Firing strategy (refer 6.4, note 1)	1 = PID 2 = Reactive PID	1
P-06	Hysteresis	0-255	1
P-07	Interval	5-254	20
P-08	Derivative	0-9999	90
P-09	Integral	0-9999	20
P-10	Gain	0-9999	7
P-11	Recovery (refer 6.4, note 2)	1 = Best 2 = Last 3 = Stop	1
P-12	Alarm over fire (refer 6.4, note 3)	0-255	20°C
P-13	Alarm under fire (refer 6.4, note 3)	0-255	20°C
P-14	Alarm options (refer 6.4, note 4)		
P-15	Mimic iterations (refer 6.4, note 5)	1 = 8 steps 2 = 16 steps	1

6.3 View Functions

No	View Functions	Explanation
16	View CJC	Cold Junction Temperature
17	View Integral	Integral Value – current or last firing
18	View On time	"On" time of the current or last interval
19	View Fire count 1	Firing Count x10 000
20	View Fire count 2	Firing Count
21	View time (days) 1	Total running time of cycles in days x10 000
22	View time (days) 2	Total running time of cycles in days
23	View time (hr:min)	Total running time of cycles in hours and minutes
24	View On time (days) 1	Total "On" time of coils in days x10 000
25	View On time (days) 2	Total "On" time of coils in days
26	View On time (hr:min)	Total "On" time of coils in hours and minutes
27	View interim temperature	Ideal temperature
28	View max. thermocouple temperature	Maximum thermocouple value of current or last cycle
29	View max. above	Maximum deviation above ideal temperature of current or last firing
30	View max. below	Maximum deviation below ideal temperature of current or last firing
31	View current time	Duration of the current or last firing
32	View current On time	Duration of coil "On" time of current or last firing
33	Reserved	

6.4 Notes on Global Parameters

Note 1: This is the firing strategy of the system. There are two types of strategies:

- **PID** – The system learns about the conditions of the kiln and pre-empts the ON time of the coils. The system generally reacts at the end of the interval period. The standard industry PID algorithm is used. The interval period can be set in the range of 5 - 254.
- **Reactive** – The system reacts to the conditions of the kiln according to the sensitivity set by the hysteresis.

The default setting is a hysteresis of 1. The hysteresis can be set between 0 - 255.

Note 2: Recovery takes place after the unit has lost power and a programme is in progress. There are 3 settings for recovery:

1. BEST (default)

The unit looks at the current temperature and tries to start as close to the last step as possible.

A hysteresis of 10°C prevents a restart after a short power failure (e.g. 1 second) and a soak of 2 hours has already taken place.

2. LAST

The unit continues at the last step before the power failure.

3. STOP

The unit stops the programme due to power failure. The programme will not recover.

Note 3: If the alarms are set for over or under or both, the alarm will sound if the deviation set under Global parameters 12 and 13 is exceeded.

Note 4 - Alarm Option:

Option	Function
0	Not used.
1	Not used.
2	Not used.
3	Not used.
4	Not used.
5	Buzzer will sound when a warning occurs.
6	Buzzer will sound when an error occurs.
7	Buzzer will sound when an error or warning occurs.
8	Not used.
9	Auxiliary will be activated when a warning occurs. Normal auxiliary settings are disabled.
10	Auxiliary will be activated when an error occurs. Normal auxiliary settings are disabled.
11	Auxiliary will be activated when an error or warning occurs. Normal auxiliary settings are disabled.
12	Not used.
13	Buzzer will sound and Auxiliary will be activated when a warning occurs. Normal auxiliary settings are disabled.
14	Buzzer will sound and Auxiliary will be activated when an error occurs. Normal auxiliary settings are disabled.
15	Buzzer will sound and Auxiliary will be activated when an error or a warning occurs. Normal auxiliary settings are disabled.

Note 5: This global parameter (P-15) is a KEY function, as this is where you can change your programme to run the full 16 steps. The default setting is only 8 steps. Note that you cannot ramp up on a down ramp and vice versa.

P-15 = 1 Consists of 8 steps. The first step is a delay (which can be set between 0 - 99:59 hours)

P-15 = 2 Consists of 16 steps. The second set of 8 steps starts with a soak. The second set of 8 steps can be identified by a dot after the last digit in the main display.

NB: If you change a programme to 16 steps (Global parameter P-15), all programmes will revert to 16 steps cycle. However, all programmes set to 8 steps will operate as usual.

7. Firing Cycle

During a firing cycle, all the functions are accessible and editable - even the global parameters. This allows you to adjust your programme during the process.

Press the **f** (14) button during a firing to reveal how long the current step has taken. This is a useful function to see, for example, how far along you are in a soak cycle.

8. Electrical Connections

If a pre-wired cable and plug is not fitted, the system can be wired to the kiln as shown below. The instrument is fitted with 2-part connectors to facilitate wiring. The maximum wire size is 2.5mm².

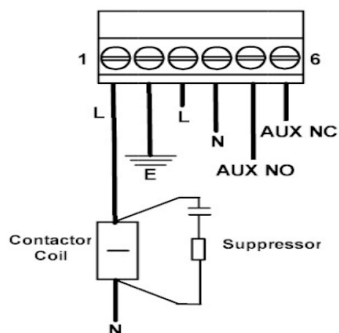
The auxiliary connections can either be wired as **normally open** (AUX NO) or as **normally closed** (AUX NC).

All input wiring to the thermocouple should be the correct compensating cable for the thermocouple type with the correct polarity maintained throughout.

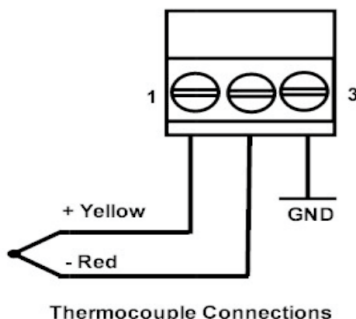
A suitable five-core cable can be used to power the device and to feed live to the contactor coil, as illustrated in Figures b and c.

NB: The controller should never be used to drive the kiln elements directly.

(Fig. b)



(Fig. c)



9. Controller Plug

9.1 Most Van Tuyl kilns are fitted with a VT36 controller. The controller can either be:

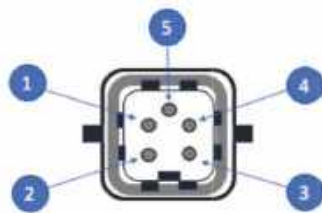
- a) **Hard wired into the kiln** – Wired directly into the electronics of the kiln
or
- b) **A 5-PIN PLUG is fitted** to the controller with a socket on the kiln. **This is standard for Van Tuyl Front Loading Kilns.** The advantage of this is that the controller can be used on multiple kilns and be easily put away after use.

9.2 A Controller that is fitted with a PLUG

The plug has a 5-pin assignment and is fitted with a pre-wired cable as follows:

(Fig. d)

Plug (male connection) pin configuration (looking towards the plug).



Plug wiring:

Pin No.	Wire use	Wire colour
1	Control output (phase)	Purple
2	Power supply (phase) - Live 240 volts	Brown
3	Neutral	Blue
4	Thermocouple -	Black
5	Thermocouple +	Yellow & Green

Note: The above wiring details may change from time to time, so please check with your installer.

10. Specifications

Size	190mm x 110mm x 56mm
Electricity Supply	220-240V 50Hz
Thermocouple	K - Expected range (-150°C to 1372°C) R - Expected range (-50°C to 1768°C) S - Expected range (-50°C to 1768°C)
Programmes	36 Programmes
Steps per programme	16 Steps
Temperature Display Resolution	1°C
Temperature Accuracy	0.2% ± 1 digit
Ambient Temperature	-10°C to 60°C

11. Warranty

11.1 Your VT36 Controller has been fully tested in the factory before being dispatched.

11.2 Your Controller has a 1 year guarantee against faulty workmanship and component failure. This is, however, an electrical unit and we cannot guarantee against power surges, incorrect installation, or a faulty kiln resulting in any damage.

12. Disclaimer

Under no circumstances shall Van Tuyl Kilns and Furnaces be liable for any incidental, special or consequential damages that may result from the use or the inability to use the software, hardware, or related documentation – even if Van Tuyl Kilns and Furnaces have been advised of the liability.

13. Quick Reference Chart

Selecting a Programme

- Press the **f** (14) button to display the selected programme number.
- Change the programme by using the ◀(15) or ▶(13) buttons.
- Press the **f** (14) button to go back to the main display

Editing a Programme

- Press the ◀(15) buttons until the parameter is shown to be edited.
- Edit the parameter value using the ▲(10) and ▼(11) buttons.
- Press the ▶(13) button until beyond the last step to end editing.

Display Errors or Warnings

- Press ◀(15) and ▶(13) buttons simultaneously. Mimic LED will be flashing.
- Use ◀(15) button to view all the steps of the programme.
- Press ◀(15) button until beyond the last step of mimic to end mode.

Start a Programme at a certain step

- Press ◀(15) until the step is highlighted on the Progress Graph Indicator (16) from where the programme should start.
- Press Start/Stop (12).

Viewing routing of current step

- Press **f** (14) while the firing cycle is running.
- Press **f** (14) to end this display mode.

14. General Ceramic Programmes

Ceramic Programmes - pre-loaded in the VT-36 Controller.

No.	Definition	Programme Circuit 1-8 step	Delay	1st Ramp		2nd Ramp		1st Ramp		2nd Ramp		Soak	
				Up	Temp.	Up	Temp.	Down	Temp.	Down	Temp.	Time	Temp.
				Per/Hour	Deg. C	Per/Hour	Deg. C	Per/Hour	Deg. C	Per/Hour	Deg. C	Hour:Min	hh:mm
1	Low Bisque	1 - 8 Step	---	150°C	200°C	250°C	870°C	---	---	---	---	---	---
2	Medium Bisque	2 - 16 Step	---	100°C	600°C	250°C	1000°C	---	---	---	---	---	---
3	High Bisque		---	100°C	600°C	250°C	1160°C	---	---	---	---	---	---
4	Stoneware		---	100°C	200°C	250°C	1260°C	---	---	---	---	---	---
5	Porcelain		---	100°C	200°C	250°C	1290°C	---	---	---	---	---	---
6	Low Glaze		---	150°C	500°C	250°C	960°C	---	---	---	---	---	---
7	Medium Glaze		---	150°C	500°C	250°C	1070°C	---	---	---	---	---	---
8	High Glaze		---	150°C	500°C	250°C	1120°C	---	---	---	---	---	---
9	Lustre		---	125°C	750°C	---	---	---	---	---	---	---	---
10	Crystalline Glaze 1	2	---	150°C	600°C	350°C	1288°C	---	---	600°C	1093°C	2.00	---
11	Crystalline Glaze 2	1	---	---	---	---	---	---	---	600°C	1010°C	0.45	---
12	Crystalline Glaze 3	1	---	150°C	600°C	350°C	1288°C	---	---	600°C	1049°C	2.00	---
36	Test Programme	1	---	150°C	600°C	350°C	1288°C	---	---	600°C	1124°C	0.45	---

15. General Glass Programmes

Glass Programmes Guide - not loaded in the VT-36 Controller.

No.	Definition	Programme Circuit 1-8 step	Delay	1st Ramp Up		2nd Ramp Up		Soak		1st Ramp Down		2nd Ramp Down		Target Temp.	
				Per/Hour	Deg. C	Per/Hour	Deg. C	Hour:Min	hh:mm	Per/Hour	Deg. C	Per/Hour	Deg. C	Per/Hour	Deg. C
1	Window Glass/Full (fusing 30cm or less)	1	--:--	290°C	600°C	365°C	845°C	0:05	90°C	350°C	--:--	--:--	--:--	--:--	--:--
2	Window Glass/Full (fusing 30cm or more)	1	--:--	240°C	625°C	330°C	845°C	0:05	90°C	350°C	--:--	--:--	--:--	--:--	--:--
3	Window Glass Slumping	1	--:--	180°C	625°C	300°C	725°C	0:05	90°C	350°C	--:--	--:--	--:--	--:--	--:--
4	Kiln Carving Spectrum Glass	1	--:--	240°C	625°C	330°C	790°C	0:05	90°C	350°C	--:--	--:--	--:--	--:--	--:--
5	Bulls Eye - Slump	1	--:--	145°C	625°C	330°C	680°C	0:05	90°C	350°C	--:--	--:--	--:--	--:--	--:--
6	Bulls Eye - Full Fuse	1	--:--	140°C	625°C	320°C	810°C	0:05	90°C	350°C	--:--	--:--	--:--	--:--	--:--
7	Fibre Paper Burnout	1	--:--	Full	600°C	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--
8	Drying Kiln Shelves	1	--:--	Full	250°C	--:--	0:05	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--

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