

EASY KILNS

X

TMCON Control

This is a simplified guide for the TMCON AIFUZZY controller that is included with your kiln.

1. **THE TMCON CONTROLLER** An explanation on the basic operation of the controller.
2. **PROGRAMMING AND USAGE** Next, we will demonstrate how to enter programs into the controller and provide general instructions on using it effectively.
3. **STORED PROGRAMS:** List of preloaded programs, suggestions on modifications and programming approach
4. **ALARM PROGRAMMING** Finally the alarm, hold and jump functions are demonstrated.

If this is your first time using a digital kiln controller, do not worry! While it may seem a little daunting at first I promise it is quite a simple device and you'll be amazed at how quickly you come to appreciate it! If you require more technical info on this controller please the *TMCON technical document* available online at easykilns.com.au.

THE TMCON CONTROLLER

The TMCON controller can store 8 discrete programs each with 10 steps. Once you have entered your desired values for these the controller will remember them until changed so you can keep coming back and just press play to start your firing.

So each of these 8 programs has 10 available *STAGES* with 2 separate *VALUES* you will need to enter.

The *VALUES* are:

1. SP (Set Point) in Degrees C: What temperature you want to go to
2. T (Time) in Minutes: How much time do you want between temperatures?

To program the controller you will give it all the points along the temperature curve you would like, say you want the kiln to go from room temperature to 400c in 2 hours and then STOP. You would program in SP1: 25c (room temp approximation), T1: 120 (2 hours), SP2: 400 (400c), T2: -0.1 (Stop and return to SP1).

Now let's say you want the kiln to hold at a certain temperature for a period of time say 15 minutes and then STOP. You would program that you want it to start this hold at 400c, maintain this temperature for 15 minutes and then stop the hold at 400c.

You would program the controller as follows:

SP1: 25c, T1: 120, SP2: 400, T2:15, SP3:400, T3:-0.1

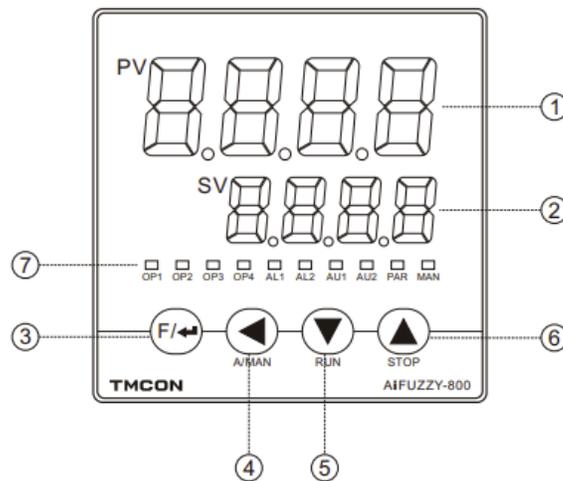
It is the same when you want the kiln to drop back to temperature over a certain time. All you need to do is program in the time you want it to drop over, say 10 hours (600 minutes) and the final temperature to stop at, say room temp of 25c. The program would now look like:

SP1: 25c, T1: 120, SP2: 400, T2:15, SP3:400, T3: 600, SP25, T4:-0.1

In the next chapter we will guide you through how to enter these values into the controller, as well as optional enabling of the built in alarm to alert you to certain points in the program, how to translate different program formats online and provide some sample programs.

PROGRAMMING AND USAGE

When you turn your kiln on there will be a beep and the controller will turn on displaying values on its two screens shown below. The top value will be the measured temperature inside the kiln. The lower values will show the first set point or starting temperature of the current selected profile, followed by the Stop message which means the kiln is currently idling or 'stopped'.



- ① First display window(upper display window) displays the measured value PV, parameter name, etc.
- ② Second display window(The lower display window) displays the given value SV, alarm code, parameter value, etc.
- ③ Set key, used to enter parameter setting status, confirm parameter modification, etc.
- ④ Data shift key (Also as manual/automatic switching and program setup key).
- ⑤ Data decrease key(Also as run key).
- ⑥ Data increase key(Also as stop key).
- ⑦ Output indicator lights, corresponding to module output action indicators.



To start entering in or modifying an existing program press the < button.



This will show SP1 above and the starting temperature of the program at the bottom. In order to change this value you need to use the 3 arrow keys. The down (run) key will decrease the selected digit, the up (stop) key will increase the selected digits.

To give you an example. If I pressed the down arrow the number would become 19.9 because I have reduced it by 0.1. If I wanted to increase it to 30.0 I would press the < key twice to move onto the 2 digit and press the up arrow to increase this to 3 leaving me with 30.0.

Now if for some reason I wanted the value to be 1230c (the kiln will rise to 1230c as fast as possible) I would press the < key one more time to fill the leftmost empty cell. then I would press the up arrow 12 times which would move the decimal point right. This may seem confusing but it would look like:

30 - (up arrow) - 130 - (up arrow) - 230 - (up arrow) - 330 - (up arrow) - 430 - (up arrow) - 530 - (up arrow) - 630 - (up arrow) - 730 - (up arrow) - 830 - (up arrow) - 930 - (up arrow) - 1030 - (up arrow) - 1130 - (up arrow) - 1230

Once you are happy with the value of SP 1 you can press the **F** button to move onto the first time value.

For the time value it is the same process of using the up down arrows to change each value and the **<** to move across values. In this case **180 minutes** is selected which will correspond with 180 minutes to rise to the SP2 value.

Now press **F** to go to the next temperature value.

***NOTE:** You can program a **HOLD** or **JUMP** (jump from one step to another) using the following commands: for a **HOLD** simply program in 0.1 for the t value, for a **JUMP** simply input the desired location you want the jump to for the t value. If for instance you wanted the program to jump from step eight to step 2 you would input -2.0 for the t-8 value so **t-8: -2.0**.

See below for more specific info:

8.1 Parameter Setting

In the basic display state, press the **F** key and hold for about 2 seconds to enter the field parameter setting state. If you set LOC=800 and press the **F** key, you can enter the function parameter settings. If you set LOC=801 and press the **F** key, you can enter the control parameter settings. Press the **<**, **>**, **↓**, etc. keys to directly modify the parameter values. Press **↓** to decrease the data, press **>** to increase the data. The value waiting to be modified will flash, press and hold, you can quickly increase/decrease the value. You can also press **<** key to move directly to the value bit you want to modify, and the operation is faster. Press the **F** key to save the modified parameter value and display the next parameter. Press the **<** key and hold it for more than 2 seconds to return to the previous parameter. Press the **<** + **F** key to return to the basic display state.

8.2 Set Value Setting

AiFUZZY-819 or 879 use fixed-point control mode (when parameter PrSn=0), when the second display window the basic display state of the given value status (if the second display window displays the output value, press **F** to switch to the given value display), Press **<** to enter the current setpoint status, and then press **<**, **>**, **↓** to directly modify the setpoint.

8.3 Setting up the program

The controller uses the program control mode (when the PrSn \geq 1), in the state that the second display window displays the given value, press the **<** key to enter the program setting state, first display the current running segment program set value, press **F** Key to display next data, each program is arranged in the order of "program set value - time - program set value".

8.4 Run / Hold

In basic display status, if the program is in stop status ("StoP" is alternately displayed on the second display window), press and hold the **↓** key for about 2 sec until the second display window displays the "Run" symbol, the instrument then will start the program.

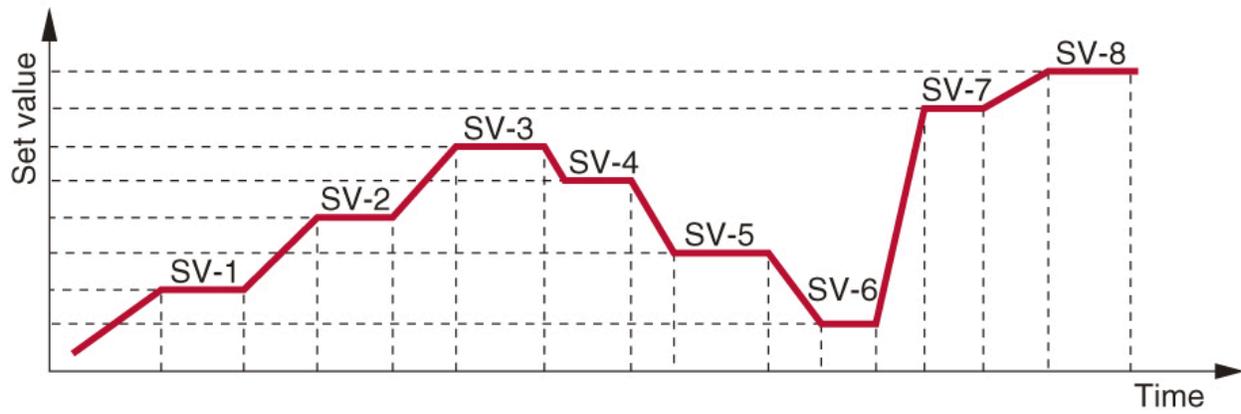
For the 879 instrument, when the F value of parameter PSYS=1, user can hold the **↓** key for about 2 sec, instrument will change to hold status and lower display window displays the "HoLd" symbol. If parameter "PSYS" set F=0, "Hold" status only can activate by parameter setting (Srun).

At Hold status, the program is still executing, and the process value is controlled same as set, but the timer stop working, and the running time and setpoint remains. At Hold status, press and hold the **↓** key for about 2 seconds until the second display window displays the "Run" symbol, the instrument will back to run program.

8.5 Stop

Press and hold the **>** key for about 2 seconds in the basic display status, until the second display window displays the "stoP" symbol, means the stoP operation is executed now, when program stopped, timer will be reset and stop. This operation forces the instrument to stop running, meanwhile, the StEP number will reset to 1, and control output is also stopped.

Ultimately after this programming you will end up with a firing profile that works like this (although likely a bit simpler):



STORED PROGRAMS

The TMCON controller can store 80 steps or 8 programs of 10 steps and comes equipped with pre-programmed generic profiles for ceramics.



You can modify and access these additional programs by pressing the F button for 2 seconds which will show STEP 1 if you want to select a certain step to start from.



If you press the F button again it will show the PROG window where you can select your program from 1 to 8 . You can then press the up arrow key to decide at which point you would like your firing profile to start.

See below for more specific info:

9.1 Field parameter

In the basic display state, press and hold ← key 2 seconds, Enter the field parameters.

Code	Name	Description	Range
StEP (StEP)	Current execution Program segment (applicable only to 879)	<p>Indicating the currently executing program segment number. Modify this parameter, the program will immediately jump, for example: the current StEP=3, represent the program The runs to the third segment. If you set StEP=8, the program immediately jumps to the eighth segment execution.</p> <p>The settings range for StEP is limited by PrGd and PrG, example:PrGd=8, PrG=2, and so on The program is divided into 8 curves. Now the program performs second curves,Now the program executes the 2 curve, executed by the 11-20 segment program, and the StEP set range is limited to 11-20, and After the instrument is stopped running (StoP), the StEP is automatically set to initial segment 11.</p> <p>Another example: PrGd=0, PrG=0, PrSn=80, then the program does not group, then StEP settings range 1-80, and After the instrument is stopped running (StoP), the StEP is automatically set to initial segment 1.</p>	1~80 (Ex-factory Value 1)
PrG (PrG)	Curve group number (applicable only to 879)	<p>Display the currently executing curve group number. When Prgd set curve grouping, you can program multiple curves to deal with different technology to be Seeking, by choosing this parameter to choose to perform the appropriate curve.</p> <p>The PrG setting range is limited by the PrGd parameter: When PrGd = 0, the program is not grouped, PrG can not be set, PrG is fixed at 0. When PrGd = 4, the program is forcibly divided into 4 groups of curves, PrG setting range is 1-4. When PrGd = 8, the program is forcibly divided into 8 groups of curves, PrG setting range is 1-8. When PrGd is forced to group, you can pre program a number of different groups of curves, Then by setting PrG you can quickly and easily choose to execute the appropriate curve.</p> <p>For example: PrGd = 4, PrG = 2, then the program is forced into four groups of curves, the current implementation of the second curve (ie, to implement the procedures in paragraphs 21-40),When the controller implement stop after, StEP is automatically set as the start of the 2nd curve (ie, 21 steps)</p>	0~8 (Ex-factory Value 0)

Programs are based on the effect of 'Heat Work' which is the combination of heat and time that will turn pieces of clay into their finished ceramic form. This is the Orton Cone Chart which serves as a good reference to the relationship between time and temperature can achieve the same heat work, cones are a good litmus test for what your ceramics pieces are experiencing inside the kiln. As always, we recommend doing your own research and going off the manufacture recommendations for the glaze and clays you are using as these will be the best place to start when choosing your firing schedule. The internet can be an excellent source of information.

Cone	Self Supporting Cones						Large Cones				Small
	Regular			Iron Free			Regular		Iron Free		Regular
	15	60	150	15	60	150	60	150	60	150	300
<i>Heating Rate °C/hour (last 100°C of firing)</i>											
022		586	590				N/A	N/A			630
021		600	617				N/A	N/A			643
020		626	638				N/A	N/A			666
019	656	678	695				676	693			723
018	686	715	734				712	732			752
017	705	738	763				736	761			784
016	742	772	796				769	794			825
015	750	791	818				788	816			843
014	757	807	838				807	836			870
013	807	837	861				837	859			880
012	843	861	882				858	880			900
011	857	875	894				873	892			915
010	891	903	915	871	886	893	898	913	884	891	919
09	907	920	930	899	919	928	917	928	917	926	955
08	922	942	956	924	946	957	942	954	945	955	983
07	962	976	987	953	971	982	973	985	970	980	1008
06	981	998	1013	969	991	998	995	1011	991	996	1023
05½	1004	1015	1025	990	1012	1021	1012	1023	1011	1020	1043
05	1021	1031	1044	1013	1037	1046	1030	1046	1032	1044	1062
04	1046	1063	1077	1043	1061	1069	1060	1070	1060	1067	1098
03	1071	1086	1104	1066	1088	1093	1086	1101	1087	1091	1131
02	1078	1102	1122	1084	1105	1115	1101	1120	1102	1113	1148
01	1093	1119	1138	1101	1123	1134	1117	1137	1122	1132	1178
1	1109	1137	1154	1119	1139	1148	1136	1154	1137	1146	1184
2	1112	1142	1164				1142	1162			1190
3	1115	1152	1170	1130	1154	1162	1152	1168	1151	1160	1196
4	1141	1162	1183				1160	1181			1209
5	1159	1186	1207				1184	1205			1221
5½	1167	1203	1225				N/A	N/A			N/A
6	1185	1222	1243				1220	1241			1255
7	1201	1239	1257				1237	1255			1264
8	1211	1249	1271				1247	1269			1300
9	1224	1260	1280				1257	1278			1317
10	1251	1285	1305				1282	1303			1330
11	1272	1294	1315				1293	1312			1336
12	1285	1306	1326				1304	1324			1355
13	1310	1331	1348				1321*	1346*			N/A
14	1351	1365	1384				1388*	1366*			N/A

Earthenware/Stoneware Bisque (Cone 06) Firing schedule			
Temperature (C)	Time (T)	Step	
25	150		1
250	250		2
880	60		3
980	20		4
980	-121		5

1. Bisque

This is a multi-purpose bisque program for Earthenware, Midfire and Stoneware ceramics pieces. These programs are stored according to their number

Midfire Glaze (Cone 6)			
Temperature (C)	Time (T)	Step	
25	200		1
1000	60		2
1150	80		3
1234	10		4
1234	-121		5

2. Midfire

A generic Cone 6 midfire program that previous users have found success with. Feel free to modify it.

EarthenWare Glaze (Cone 3)			
Temperature (C)	Time (T)	Step	
25	250		1
980	60		2
1080	20		3
1080	-121		4

3. Earthenware

A generic Cone 3 Earthenware program that previous users have found success with. Feel free to modify it.

StoneWare/Porcelain Glaze (Cone 9)			
Temperature (C)	Time (T)	Step	
25	260		1
1000	60		2
1160	60		3
1260	10		4
1260	-121		5

4. Stoneware

This is a cone 9 stoneware firing program. Please note all listed schedules here are quite fast given the smaller size of the kiln.

ALARM PROGRAMMING

Your **Easy Kiln** comes fitted with an alarm that is activated by the controller when certain conditions in your program are met. There are an array of alarm settings that can be adjusted. The main ones are 'HIAL' for high alarm limit which is the high temperature at which the alarm is activated. 'LoAL' is the low alarm limit for the low temperature at which the alarm is activated. There are also temperature deviation conditions, Control loop breakoff where the output exceeds a specified among (100% of kiln power meaning 'short').

By default the alarm is not active. In order to access the **Alarm** hold down the **F** button for 2 seconds.

You will see the STEP parameter, press again for the PrG, then for the random and then LOC where you will need to enter 800 to unlock further settings. Once past this you can access the below settings for modification.

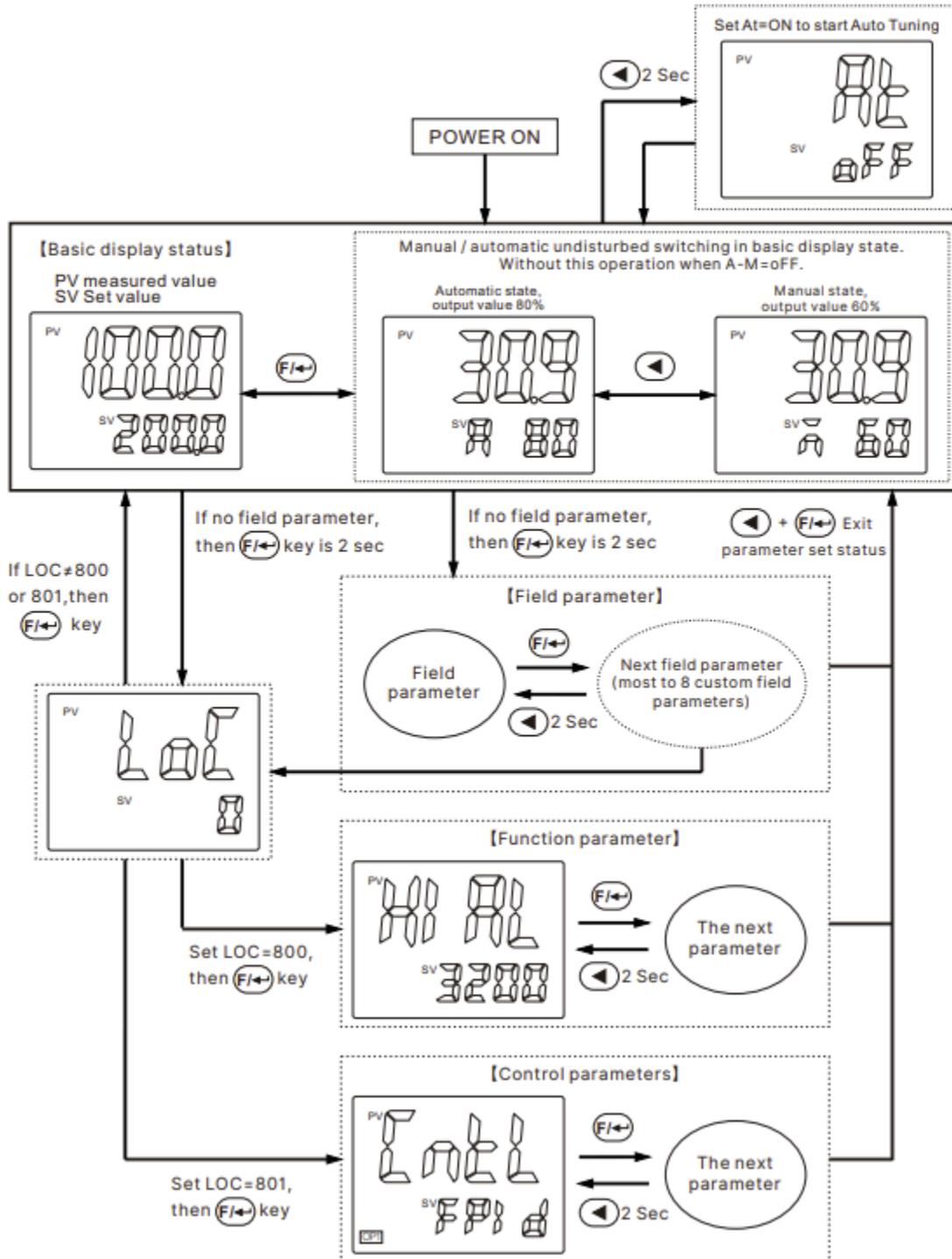
9.2 Function parameter

In the field parameters, set Loc=800, Then press the $\text{F} \rightarrow$ key to enter the function parameters.

Code	Name	Description	Range
<i>Hi RL</i>	High limit alarm	Alarm on when PV>HIAL Alarm off when PV<HIAL-AHYS, When the value set to Max. will disable this function Alarm output action can be defined by parameter ALtd.	-999~3 200 [-9990~ 3200]
<i>Lo RL</i>	Low limit alarm	Alarm on when PV<LoAL; Alarm off when PV>LoAL+AHYS When the value set to Min. will disable this function	(<i>Hi RL</i> Ex-factory Value 3200) (<i>Lo RL</i> Ex-factory Value -999)
<i>Hd RL</i>	Deviation high alarm	Alarm on when PV-SV>HdAL; Alarm off when PV-SV<HdAL-AHYS When the value set to Max. will disable this function	(<i>Hd RL</i> Ex-factory Value 3200)
<i>Ld RL</i>	Deviation low alarm	Alarm on when PV-SV<LdAL; Alarm off when PV-SV>LdAL+AHYS When the value set to Min. will disable this function HdAL and LdAL can also be used as high limit and low limit alarms when needed. (Refer to the description of parameter SSCo)	-999~ 3200 [-9990~ 3200] (Ex-factory Value - 999)
<i>Lb R</i>	Control loop break off / shorted Alarm	When the instrument control output is equal to otL or otH, and the continuous time is greater than LBA setting time, And the PV measurement does not exceed 2 °C change, then determine the control loop failure, the output alarm. The time unit of LBA is second and the alarm port output is defined by ALtd. When LBA = 0, cancel the LBA Alarm function.	0~9999 sec (Ex-factory Value 0)

7. Operation Flow Chart

7.1 display status and basic operation flow chart



Additional info and troubleshooting

If you would like further clarification or detailed technical info on your Easy Kiln and Maxwell controller please look at the included Maxwell Technical Manual which should have been provided with your kiln. All manuals and technical documents are also available on our website at

easykilns.com.au

If you are at all confused with any of the instructions for your Easy Kiln please don't hesitate to contact us by phone, email or messenger.

Easy Kilns Pty Ltd

6 Traill st Northcote, VIC, 3070,

Phone: 0484264395

Web: EasyKilns.com.au

Email: support@easykilns.com.au