



USER GUIDE

MAGMATHERM HIGH TEMPERATURE FURNACES

MTMo SERIES



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We would like to thank you, because you have chosen MagmaTherm MTMo Series.



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IMPORTANT: BEFORE OPERATING THE FURNACE, OPERATING MANUAL MUST BE READ CAREFULLY.

IMPORTANT: AFTER READING OPERATING MANUAL, DIRECTIONS THAT ARE EXPLAINED IN THE SECTION 8 (FIRST HEATING) SHOULD BE FOLLOWED VERY CAREFULLY, DURING FIRST HEATING/OPERATING PROCESS.



1-DEFINITION

Magmatherm is a laboratory type heating furnace. Heating is performed up to 1750°C directly and/or by stepped control procedure according to selected model.

2-IMPORTANT INSTRUCTIONS

- Read the operating manual carefully before operating the furnace.
- Follow the instruction for the first heating in the 4. section of the operating manual.
- Connect the power cable to a power supply with a proper earth connection.
- Although the furnace heating rate can be set to up to 20°C/min, the user should be aware of the risk to run the furnace with a higher heating rate than 15°C/min because of the faster aging of the heating and insulation materials.
- The user should be aware of the sensitivity of the heating elements and the insulating materials against thermal shocks. The door of the furnace shouldn't open if the furnace temperature is higher than 500°C to prevent the inner body against of the thermal shocks.
- To stop the process does not use the directly on/off button. To stop the process, absolutely use the "stop" button. After the noise of the voltage regulation disappears, the on/off button can be used for turning of the power.

3-SAFETY

Magmatherm heating furnace may harm operating people or surrounding any other materials, unless this operating manual is applied during operating process.

Thus;

- Periodical maintenance should be applied.
- Cautions against accidents should be main concern of operators.



-All operating directives, warnings and recommendations in this operating manual have to be followed and applied carefully.

Unless operating directives, warnings and recommendations in this operating manual is followed and applied, company TETRA ISI SİSTEMLERİ LTD. ŞTİ. is not dedicated for the accidents that may occur.

3.1-PROPER OPERATION

Magmatherm can reach up to 1750°C according to selected model. Thus materials that can stand up to 1750°C can be heated in the chamber. The conditions that should be considered during operating or the points which are the reason no to start operational process are as follows,

- Furnace is not started, if there is any living thing in the chamber.
- Any burning, flammable, exploding, poisoning, (Benzene, LPG, Acetylene etc.) material that may harm when it is heated etc. is not stored or put inside the chamber. These types of materials should be kept away from the furnace.
- Outside case of the furnace may be hot. It should be considered. Especially, when the furnace is heated above 1000°C and if it is kept above this temperature 30 minutes or more, you shouldn't touch to outside case/surfaces without using gloves.
- Instant high heat should be considered, when the front door is open.
- Electronic and/or Electrical components may create induction current or magnetic field. It may harm any electronic equipment surrounding the furnace. Especially cardiac pacemaker users should be away from the furnace.
- It should not be operated in closed environments such as in cupboard etc.
- Furnace should not be operated by multi plug in tools. It should be operated by stationary plugs which are mounted on the wall.



- Explosive, flammable, burning, poisonous materials, don't heat up.

DANGER



- Hot Surface

WARNING



- Instant high temperature, when the front door is opened.

DANGER

3.2-OPERATION IN SAFE CONDITIONS

"Contribute in to SAFETY CAUTIONS in the work shop."

Please obey to safety rules. Please inform responsible person, as soon as you notice any abnormal condition for the furnace.



Please use protective glass or protective gloves, when you are working.



Don't let non-permitted person contact to any electrically alive parts. Possible electrically alive parts should be processed by responsible persons and by experts. Cables should be protected against/away from any heat, oil, oily material, sharp tools and materials. Cables should be kept away from furnace surface. Any cable may kill, if any parts of the cable are broken / damaged or cable touches on to the furnace surface. Any broken cable should be replaced by the new one.



- Danger of life due to electrical shock.

DANGER



- Danger of life due to electrical shock.

DANGER

To touch in to the electrically alive parts may kill, if cable is broken or damaged. Be aware of the environmental affects: Don't use electrical tools, equipment and machines in wet circumstances. Keep light intensity enough to make easier for the working people. Plug off the machine, before any cleaning, repair and maintenance process.

4-FIRST HEATING

Following conditions should be considered, directions must be applied step by step, and the importance of the first heating process should be kept in mind, when Magmatherm Furnace is operated and heated up for the first time.

4.1-Enough free field, surrounding the furnace should be kept. Recommended distance is minimum 30 cm. This free space will increase the furnace performance because of air circulation. At the same time, any fire or explosion danger which may occur due to any material left around the furnace. Please don't forget, when the furnace reaches to high temperatures, the surface of the furnace reaches to high temperatures too. Any flammable and explosive material which is close to furnace can be a reason for the fire or explosion danger.



4.2-Electricity plug should have proper ground connection and plug should have proper capacity (Cable thickness) according to maximum ampere of the furnace.

4.3-Some gas and fumes due to some chemicals which is used on the electronic parts, in the isolation materials and due to outer furnace surface paint can be harmful if it is breathed directly, during the first heating process. Protective glasses and breathing masks should be definitely used, during first heating and very good air circulation in the working room should be kept.

4.4- During the first heating up process, furnace should be heated up according to following temperature-time table

Heating up to 1100°C

Waiting for 1 hour

This procedure can be completed by Magmatherm Programs easily.

Please don't touch furnace without gloves, especially during first heating process, due to hot surfaces.

5-PID CONTROL UNIT PROPERTIES

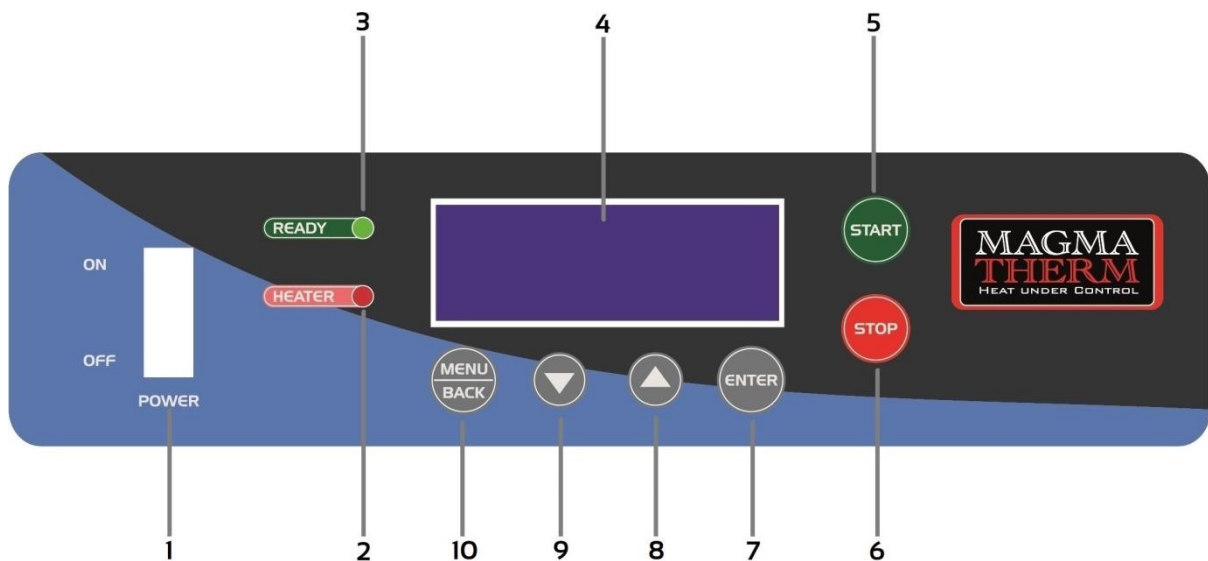
Following properties are included in S16 model. Please check the differences between P - PX- B2 – E4 – U8 – S16 models at the page appendix 2.

- PID control
- Up to 32 stepped heating control
- 1 - 20°C/min heat acceleration control
- Up to 6 memory, easy working via saved process
- Sound warning during step changes & at the end of process
- Remaining time indicator which may be required during the step where temperature is kept at the same level
- Date and time
- Total working time indicator
- Auto start by setting date and time
- Indicator for the temperature of control PCB and warning for the overheating of control PCB
- User friendly control menu by only 6 buttons
- User friendly 4 line display
- First start-warranty time saving mode
- Thermocouple failure warning



- Automatic stop control over 1100-1750°C
- Door switch (Heating is cut off, when the door is open. Optional)
- 2 Years Warranty **without Heating Elements, Thermocouple, Consumables and Freight Cost.**

6-DISPLAY & MENU



- | | |
|------------------------------------|---|
| 1-On / off button | 2-Led indicating on going heating process |
| 3-Led indicates that furnace works | 4-Display |
| 5-Heating start | 6-Heating stop |
| 7-Menu process input/enter/change | 8-Menu process selection |
| 9-Menu process selection | 10-Menu options |

7-MENU STRUCTURE

- | | |
|--------------------|---------------|
| START | 10 AUTO START |
| 20 SYSTEM STATUS | 30 PROGRAMS |
| Heating Program -1 | 40 PROGRAMS |



Heating Program -2	50 PROGRAMS
Heating Program -3	60 PROGRAMS
Heating Program -4	90 ERROR LIST

8- OPERATING BY MENU AND STARTING THE FURNACE

8.1-ENTERING MENU

After the furnace is started, if "MENU/BACK" button is pressed, it is possible to reach menu options. "▲" ve "▼" buttons are used to change menu options.



MAIN MENU



DISPLAY FOR MENU OPTIONS

If you see "ENTER" at the right hand corner, it is possible to reach sub menu options via pressing "ENTER" and "▲" ve "▼" buttons are used to change options and "MENU/BACK" button is used come back to top menu.

8.2-TO ENTER & TO CHANGE VALUES

If you see "ENT" at the corner of present menu, value is entered & changed by "ENTER" button.

Changing value is between "> <" signs. "▲" ve "▼" buttons are used to increase and decrease the values. "ENTER" button enables the user to reach options which can be altered.

Altered values are saved, when "> <" signs disappear via pressing "ENTER"

You may come out the present menu and you can reach to top menu by "MENU/BACK" button.



STARTING



When START/STOP button is pressed, following display appears together with 'Beep' sound.

Menu below is traced to change furnace language as soon as the Furnace starts following display appear on the screen.

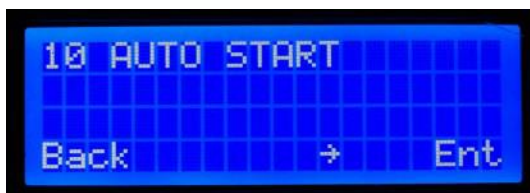


Changing furnace language is enabled by pressing "▲" ve "▼" and "ENTER" buttons.

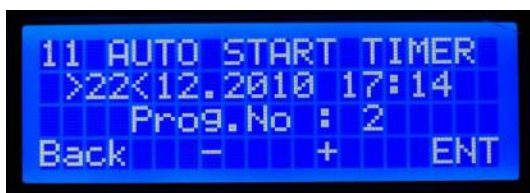


Then, main menu here below appears at the display his is main display to follow menu options and change the values. "MENU/BACK" button enables to enter menu.

10 AUTOMATIC START



AUTOMATIC START is first page on the menu. This option enables the end user to start furnace automatically at the set value of the date and time.



This display is simulation of auto start option which indicates set of the date, time and program including heating receipt of end user.



Value between "< >" signs can be changed and values are saved via "ENTER" button. As soon as "< >" signs disappear on the display, furnace is ready to start heating. If 'START' button is pressed, heating program starts to heat up the furnace.

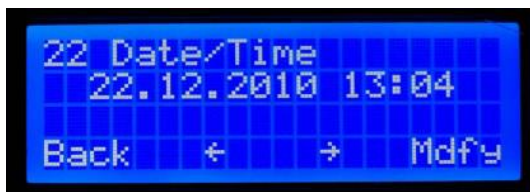
20 SYSTEM STATUS



It's an informative display. You can get short info which explains the status and conditions of furnace. You can see sub menus included in SYSTEM STATUS menu respectively as follows.



Indicating furnace chamber instantaneous temperature and temperature of control PCB.



Menu 22, let's see the date, hour information and enables to change these values.



Furnace language is altered by using "ENTER" button. "▲" ve "▼" buttons enable to change the language and "ENTER" button enables to continue furnace process by set language.



```
24 System Info
Machine: 2 hours
Serial: 101218001
Back  ←  →
```

MENU 24 is to see serial number of furnace and total heating time of the furnace from the first operation of the device.

```
25 SYSTEM INFO
AVERAGE FURNACE
TEMPERATURE : 1023C
BACK  <  >
```

MENU 25 indicates average temperature of cumulative working of furnace life. This data is used to determine extra guaranty period.

```
26 DOOR OPEN ALARM
ALARM: ON
BACK  <  >  ENT
```

DOOR OPEN sensor is optional for Magmatherm furnaces. In quartz tubes placed resistances are not a cause of short circuit or electrical danger as bare resistances do. If your furnace includes this optional sensor, MENU 26 is displayed in SYSTEM STATUS title. If you set this alarm as 'ON' and if the door is open, heating resistances are shut down. Red heater led is turned off. You are warned by a sound sensor; if the door is open more than 120 seconds. When the door is closed, heating program continuous.

```
27 CALIBRATION
FURNACE TEMP: 29C
CORRECTION : 0C
BACK  <  >  ENT
```

Magmatherm Furnaces are calibrated by Martel TC 100 Precision Thermocouple Calibrator. But if you need to calibrate your furnace by a certified calibrator, MENU 27 enables you to correct any temperature diffraction between +- 10oC. And you can keep absolute temperatures which you want to work.



30 PROGRAMS

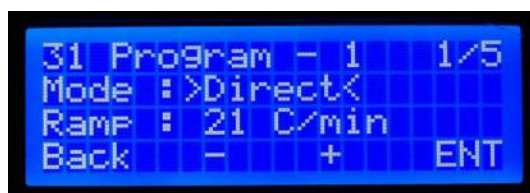
HEATING PROGRAM-1

Chamber temperature, temperature heating rate, temperature waiting steps, waiting times can be set by this menu option. Programs which are called 40, 50, and 60 are similar options for other program settings.



Values can be set, as it was explained in title; 'OPERATING BY MENU'.

'MOD' is character of heating process that means 'DIRECT' or 'STEPPED' heating. 'RAMP' is to determine the heating rate which specifies the time to let your furnace reach to set maximum temperature of the steps of the heating programs.



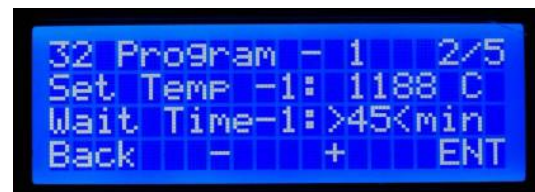
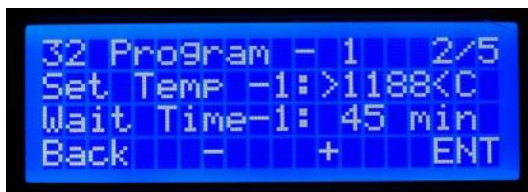
Heating rate can be selected between 10°C/min-20°C/min. If you tend to choose higher value than 20°C/min, 'Maximum' appears on the display. On this mode, furnace heating rate is set maximum value automatically.



"Temp-1" indicates the first step where temperature is kept stable/constant for the stepped program. If "Direct heating" is set, 'Temp-1' is target temperature for a continuous heating without any waiting step. "Waiting Time" is time to keep the temperature of furnace stable at the set value. Depending on the set values, furnace heating continues to reach the next target temperature, after the step temperatures time is ended.



If "Direct Heating" program is chosen, "Temp-1" is the value to keep the furnace stable at the set temperature, as soon as target temperature is reached for the program. If waiting temperature is tended to be decreased after value 1 is reached, waiting temperature is set as 'Infinite'. In this mode, heating program can be stopped manually.



Menu 33, 34 ve 35 options can be processed, if stepped program is chosen. If you would like to skip any step, step temperature should be set as '0'. For example, if you need to use 3 step program ending at 965°C, you should set your third step temperature as 965°C and fourth step temperature as 0. When the third step is over, fourth step is not considered and all heating program is ended after the third step.

90 ALARM LIST



It is informative menu if some failure occurs such as thermocouple failure, PCB overheating.



Temperature sensing system has problem. Most probably thermocouple has a defect. If you have this message, please get in touch with your distributor or TETRA ISI directly.



Control unit protected against overheating by a sensor. If the control unit is overheated, heating power is cut off. This automatic system is directed by control board sensor. You get this message, if this sensor has a defect and if you have this message on the display, please get in touch with your distributor or TETRA ISI directly.



This message is displayed, if actual time (Date and time) circuit has any problem.



If the heating chamber exceeds continuous working temperature of the furnace.



If the heating chamber exceeds maximum temperature of the furnace. Menu 95 is displayed and sound warning starts to warn you.



If the PCB temperature exceeds 65°C, this message is followed by sound warning and heating power is cut off. When the PCB is cooled down and if 55°C is kept, heating program starts to continue.



If the furnace is heated up faster than set value, this message is displayed and sound warning starts to work.



The furnace time is powered by a battery in the control unit. If you see this message on the display, battery should be replaced.

9-START AND STOP PROGRAM



You should reach this menu to be able to start heating. If "ENTER" button is pressed, 'HEATING' option is activated and heating program selection appears on the display.



Any heating program can be selected by "▲" ve "▼" buttons and program starts by pressing green color 'START' button and heating is activated.



When heating is activated, the process can be followed by this screen. Continuing program, chamber temperature, waiting time (if the process is at the waiting level) can be observed by this screen.

While furnace is working, program can be stopped by pressing 'STOP' button. You should press 'START' to continue Double pressing 'STOP' lets you come out from the program.



APPENDIX-1 Technical Specifications

1500°C							
STEP 2 Choose Your Volume							
	1 Liter	3 Liter					
Inner Chamber Dimensions [mm] WxHxD	100x125x106	115x150x175					
Product Outer Dimensions [mm] WxHxD	432x826x530	467x920x634					
Net Weight [kg]	73	81					
Power [W]	1.900	3.780					
Max. Current [A]	9	16					
Electrical Connection	1 Phase	1 Phase					
Heating Element	MoSi2	MoSi2					
Thermocouple Type	S Type	S Type					
Heating Element Placement	Vertically aligned next to the side walls	Vertically aligned next to the side walls					
Inner Insulation Material	Ceramic Fibre Board	Ceramic Fibre Board					
Front Face Insulation Material	Insulating Fire Brick	Insulating Fire Brick					
Door Insulation Material	Ceramic Fibre Board	Ceramic Fibre Board					
Housing Material	Steel Sheet	Steel Sheet					
Housing Coating	Epoxy powder coating	Epoxy powder coating					
Chimney	Standard without fan	Standard without fan					
Lockable Door Handle	Sidewards	Sidewards					
Gross Dimensions [mm] WxLxD	492x886x690	527x980x794					
Gross Weight [kg]	90	101					
1600°C							
STEP 2 Choose Your Volume							
	1 Liter	3 Liter	6 Liter	9 Liter	16 Liter	30 Liter	60 Liter
Inner Chamber Dimensions [mm] WxHxD	100x125x106	115x150x175	150x185x220	170x205x260	200x255x315	250x310x390	320x420x450
Product Outer Dimensions [mm] WxHxD	432x826x530	467x920x634	502x955x679	522x975x869	532x981x889	582x310x390	652x1146x1024
Net Weight [kg]	73	96	110	136	150	170	185
Power [W]	1.900	3.780	8.200	8.200	8.600	10.700	14.700
Max. Current [A]	16	16	2x20	2x22	3x24	3x30	3x41
Electrical Connection	1 Phase	1 Phase	2 Phase	2 Phase	2 Phase	2 Phase	2 Phase
Heating Element	MoSi2	MoSi2	MoSi2	MoSi2	MoSi2	MoSi2	MoSi2
Thermocouple Type	S Type	S Type	S Type	S Type	S Type	S Type	S Type
Heating Element Placement	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls
Inner Insulation Material	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board
Front Face Insulation Material	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick
Door Insulation Material	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board
Housing Material	Steel Sheet	Steel Sheet	Steel Sheet	Steel Sheet	Steel Sheet	Steel Sheet	Steel Sheet
Housing Coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating	
Chimney	Standard without fan	Standard without fan	Standard without fan	Standard without fan	Standard without fan	Standard without fan	Standard without fan
Lockable Door Handle	Sidewards	Sidewards	Sidewards	Sidewards	Sidewards	Sidewards	Sidewards
Gross Dimensions [mm] WxLxD	492x886x690	527x980x794	562x1015x839	582x1035x1029	592x1041x1049	642x1096x1049	712x1206x1184
Gross Weight [kg]	90	116	133	162	180	204	224



1700°C

STEP 2 Choose Your Volume

	3 Liter	6 Liter	9 Liter	16 Liter	30 Liter	60 Liter
Inner Chamber Dimensions [mm] WxHxD	115x150x175	150x185x220	170x205x260	200x255x315	250x310x390	320x420x450
Product Outer Dimensions [mm] WxHxD	467x920x634	502x955x679	522x975x869	552x1025x924	602x1080x999	672x1190x1059
Net Weight [kg]	96	110	136	165	185	195
Power [W]	5.200	8.900	10.000	9.200	14.300	19.500
Max. Current [A]	2x12	2x20	2x23	3x26	3x39	3x54
Electrical Connection	2 Phase	2 Phase	2 Phase	2 Phase	2 Phase	2 Phase
Heating Element	MoSi2	MoSi2	MoSi2	MoSi2	MoSi2	MoSi2
Thermocouple Type	B Type	B Type	B Type	B Type	B Type	B Type
Heating Element Placement	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls
Inner Insulation Material	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board
Front Face Insulation Material	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick
Door Insulation Material	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board
Housing Material	Steel Sheet	Steel Sheet	Steel Sheet	Steel Sheet	Steel Sheet	Steel Sheet
Housing Coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating
Chimney	Standard without fan	Standard without fan	Standard without fan	Standard without fan	Standard without fan	Standard without fan
Lockable Door Handle	Sideways	Sideways	Sideways	Sideways	Sideways	Sideways
Gross Dimensions [mm] WxLxD	527x980x794	562x1015x839	582x1035x1029	612x1085x1084	662x1140x1159	732x1250x1219
Gross Weight [kg]	116	133	162	195	219	234



1750°C

STEP 2 Choose Your Volume

	3 Liter	6 Liter	9 Liter	16 Liter	30 Liter	60 Liter
Inner Chamber Dimensions [mm] WxHxD	115x150x175	150x185x220	170x205x260	200x255x315	250x310x390	320x420x450
Product Outer Dimensions [mm] WxHxD	467x920x634	502x955x679	522x975x869	552x1025x924	602x1080x999	672x1190x1059
Net Weight [kg]	96	110	136	165	185	195
Power [W]	6.200	10.000	11.000	11.700	14.500	19.900
Max. Current [A]	2x14	2x22	2x25	3x22	3x27	3x37
Electrical Connection	2 Phase	2 Phase	2 Phase	3 Phase	3 Phase	3 Phase
Heating Element	MoSi2	MoSi2	MoSi2	MoSi2	MoSi2	MoSi2
Thermocouple Type	B Type	B Type	B Type	B Type	B Type	B Type
Heating Element Placement	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls	Vertically aligned next to the side walls
Inner Insulation Material	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board
Front Face Insulation Material	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick	Insulating Fire Brick
Door Insulation Material	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board	Ceramic Fibre Board
Housing Material	Steel Sheet	Steel Sheet	Steel Sheet	Steel Sheet	Steel Sheet	Steel Sheet
Housing Coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating	Epoxy powder coating
Chimney	Standard without fan	Standard without fan	Standard without fan	Standard without fan	Standard without fan	Standard without fan
Lockable Door Handle	Sideways	Sideways	Sideways	Sideways	Sideways	Sideways
Gross Dimensions [mm] WxLxD	527x980x794	562x1015x839	582x1035x1029	612x1085x1084	662x1140x1159	732x1250x1219
Gross Weight [kg]	116	133	162	195	219	234



APPENDIX-2 Control Unit Features

Models Features	Primary P	Primary Px	BASIC B2	EXTENDED E4	ULTIMATE U8	SCIENTIFIC S16
Software based PID Control	YES	YES	YES	YES	YES	YES
Display	7 Segment	7 Segment	4 lines	4 lines	4 lines	4 lines
Heating Program with	2 steps	4 steps	4 steps	8 steps	16 steps	32 steps*
Custom Preset Program	1	2	2	4	6	5
Heating Rate °C/min.	5-25	5-25	1-20	1-20	1-20	1-20
Date & Time	NO	NO	YES	YES	YES	YES
Auto Start at Certain Date	NO	NO	NO	YES	YES	YES
Show Remaining Waiting Time	NO	NO	NO	YES	YES	YES
Skip the Waiting Step	NO	NO	NO	YES	YES	YES
Temperature Calibration via Menu (±10°C)	NO	NO	NO	YES	YES	YES
Sound Warnings at Step Changes	NO	YES	YES	YES	YES	YES
Sound Warning at the End of the Program	YES	YES	YES	YES	YES	YES
Total Working Hour Counter	NO	NO	YES	YES	YES	YES
Calculator for Average Working Temperature	NO	NO	YES	YES	YES	YES
Instantaneous Energy Consumption Indicator	NO	NO	YES	YES	YES	YES
Over Heating Cut Off	YES	YES	YES	YES	YES	YES
Open Door Sensor	NO	NO	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
PC Connection Kit	NO	NO	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
Warranty Period	2 Years	2 Years	2 Years	2 Years	2 Years	2 Years
* Only 5th memory supports 32 levels **Independent for each level						

Magmatherm Laboratory Furnaces - Tetra Isı Sistemleri Sanayi Ticaret Limited Şirketi

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