Laboratory Equipment Manufacturer
www.mrclab.com

LABORATORY FURNACE

MSF 12-4

Manual instruction

Satisfy EC directive 2006/95/EC to electrical equipment designed for use within certain voltage limits, directive 2004/108/EC to electromagnetic compatibility

PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION

3, Hagavish st. Israel 58817 Tel: 972 3 5595252, Fax: 972 3 5594529 mrc@mrclab.com

MRC.1.21

1. FUNCTION

Electric laboratory furnace **MSF 12-4** (in the text - “furnace”) is intended for analysis of various materials as well as for different kinds of thermal treatment (see . requirement of point 2) at the temperature up to 1100°C.

2. SPECIAL HAZARD

The furnace may be operated only by persons familiar with service rules for electric equipment up to 1000 V and the furnace safety requirements, design, mounting and service rules.

For the furnace mains connection use only a socket outlet with a grounding contact.

Operation of the oven without reliable earthing is absolutely forbidden.

Never operate the oven with the enclosure removed.

Depending on the furnace temperature and operating time, there is a risk of burning when touching the furnace housing in the door area and during charging and discharging with unprotected limbs. In that case protected means must be used (e.g. gloves).

The manufacture can’t embrace all potential questions in his advises, therefore the estimation of effects to the heating material and it’s reaction as well as testing of all possible risk in the responsibility of the users. This help to avoid possible risk of persons, furnace and testing materials.

Don’t place in the furnace unknown materials!

Combustible or explosive materials, or such which release combustible or explosive substance during heat treatment, may not be proceed in the furnace.

Substances, which release a quantity of oxygen during their decomposition, that causes an explosive gas – oxygen mixture and can be explosive.

The indication of the supplier during materials heat treatment, as limit temperature, melting temperature, decomposition temperature, development of health damaging gases, must be strictly obeyed.

Carry out repairs only with furnace disconnected from mains.

Marks explication:


alternating current


earthing


electric shock danger

3. COMPLEMENT

Furnace **MSF 12-4** ,	1
unit Bottom plate, unit	2
Support, unit	4
Fuse, unit	1
Instruction manual	1
Instruction manual of temperature controller	1

4. LAYOUTS AND OPERATON

The furnace comprises a main frame, housing from sheet steel, working chamber, control panel (pic. 1). Vacuumed fiber chamber is installed in the housing. Heating elements are vacuumed in the fiber around the working chamber. Door with thermo insulation material is mounted in the front section of the frame. The working chamber of furnace consists of the heating element and a door seal. Put the charge on the bottom plate in the chamber. Charge imposing great specific pressure and wear-out effect upon the chamber bottom (metal blanks, ceramic articles, etc.) is located on a bottom plate additionally provided in the chamber.

The furnace has a 230 V power supply, 50 Hz frequency. Temperature control and adjustment is effected by an electronic controller operating in combination with a thermoelectric converter mounted in chamber.

Electric diagram is attached.

5. EXPLOITATION INSTRUCTIONS

The furnace is designed for indoor use and the following environment conditions must be satisfied:

- Firm horizontal surface (inequality ±1mm on 1 metre), rigid and flameproof.
- Temperature range plus 5° C to 35° C.
- Maximum relative humidity 80% at temperature plus 25 °C
- **Explosion – proof environment free of a considerable amount of conducting dust, water vapour and corrosive gases.**
- Don't pass the nominal temperature.
- The supply network voltage fluctuations not to exceed ±10% of the nominal voltage

During the exploitation could appear cracks, which have no influence to the furnace work.

6. MOUNTING

Unpack the furnace, remove the transport fixtures from the inner compartment and remove any dust. Mount dismounted components: attach supports, place a bottom plate.

The voltage quoted on the rating plate (rated voltage) must correspond with the nominal supply network voltage.

Insert a plug into the socket outlet with earthing contact.

7. PREOPERATIONAL PROCEDURE

Before the first heating cycle with load or long unused period the moisture must be expelled from the furnace.

To expel moisture and ensure heating elements long lifetime we recommend temperature raise according to following recommendations with close door and empty chamber:

- raise temperature to 150-200°C dwell 2-3 hours;
- raise temperature to 500°C dwell 2-3 hour;
- raise temperature up to nominal temperature and dwell 1-2 hour;
- switch-off the furnace and cool down.

During this process, smoke can appear, which however, has no influence for furnace operating. After this drying process the furnace is fully functional.

8. OPERATION

Open the door.

Place the samples on the bottom plate. Do not position the samples too close the walls (at least 1/10 of the chamber working dimensions should be left unloaded).

Close the door.

Switch supply network switch / circuit breaker into position ON.

Set the desirable operating conditions by following attached controller instruction.

The furnace should not be switched ON essentially longer then needed for the heating cycle.

9. MAINTENANCE

Furnace should be disconnected from mains.

Door adjustment:

open the door and loose door hinge fastening screws. In the case if there are the gaps repeat the procedure.

Electrical connections:

At least once six months the user must check visual wiring and electrical connections. If it's necessary the contact screws must be tighten.

Fuse replacement:

To replace the fuse:

- press fuse holder convex, turn it counter-clockwise against clock direction and take out fuse holder convex with fuse;
- replace the burned fuse by the new one;
- repeat the procedure in reverse sequence.

10. STORAGE

The furnace should be stored in indoor premises and packed in a box, following conditions must be satisfied:

Temperature range plus 5-35° C;

In an environment saturated with sulphur gas and salt chloride of a concentration 0,13mg/m^3 and 0,3 mg/m^2 per day respectively;

Maximum relative humidity could be 80% at the temperature plus 25°.

11. TRANSPORTATION

The furnace can be delivered only by a covered means of transportation at an ambient temperature ranging from minus 50° C to plus 50° C.

9. GUARANTEE PERIOD

The manufacture declares that the electric furnace **MSF 12-4** meets the requirements of the company standard. The guaranteed operating period is 12 months after sales, under condition that the user follows the rules of storage and transportation and operation instructions. But not more than 24 months from the date of the furnace manufacture.

The defects that appear during the warranty period through the manufacturer's fault shall be eliminated at manufacturer's expense.

13. TECHNICAL DATA

Rated power, kW	1.8
Rated supply voltage, V	230
Rated frequency, Hz	50
Number of phases	1
Rated temperature, °C	1100
Working chamber surroundings	air
Heat – up time (without charge), min	50
Furnace temperature stability at rated temperature in thermal steady state without charge not more then ±°C	2
Furnace temperature uniformity at rated temperature in thermal steady state without charge not more then ±°C	10
Furnace working chamber dimensions:	
width, mm	200
depth, mm	300
height, mm	133
Furnace outside dimensions:	
width, mm	440
depth, mm	620
height, mm	510
Weight net not more than, kg	28

! In the line of continuous improvement insignificant design amendments may be introduced without notice in this publication.

14. THE MORE OCCURRED FAILURES AND REMOVAL METHODS

Failure	Reason	Removal method
The furnace can't turn on.	There is no rated power supply voltage The fusion is burnt out	To check the power supply To change the fusion
The furnace can't heat.	Thermocouple is mechanically damaged The temperature controller is not switched on Heating element is damaged	To change the thermocouple To switch on temperature controller To change heating element
Heating time is longer than determined	Low voltage of the power supply Door's close is not hermetic Solid-state relay is damaged	To check the voltage of power supply To regulate tightness of door's close To change the Solid-state relay
There is no exact automatic temperature regulation.	Temperature's regulator is not regularized	To switch on automatic selection of parameter (look to temp. regulation instruction for users) select the programme and switch on it's performance

15. FURNACE TESTING RECORD

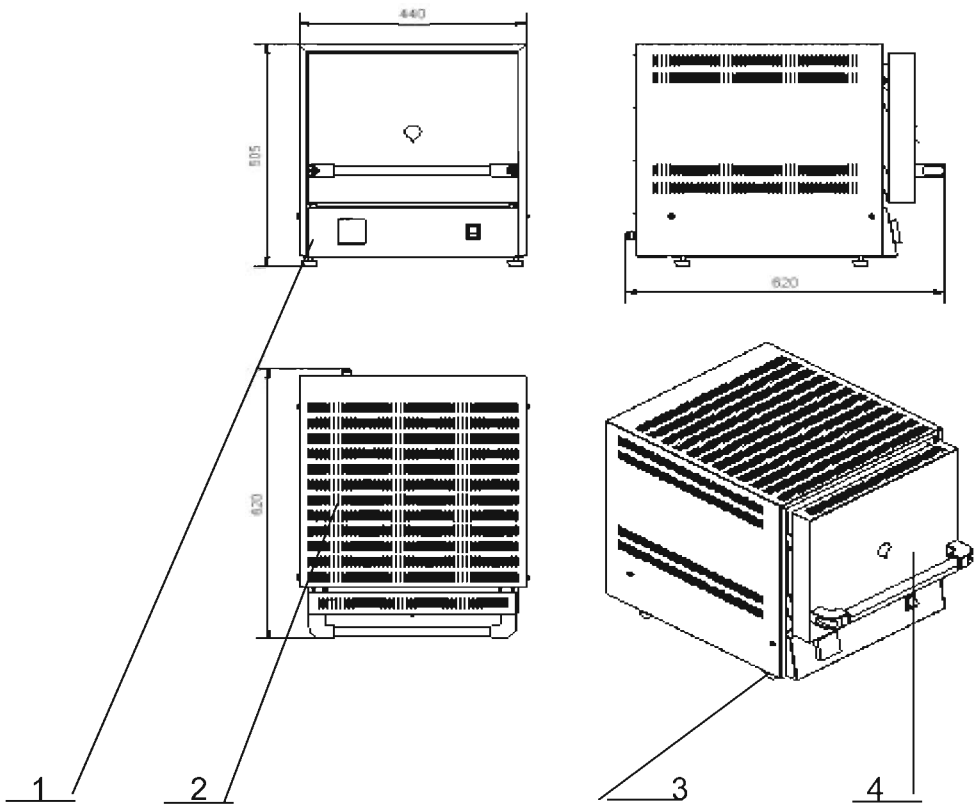
The furnace **MSF 12-4** was tested and satisfy company standards requirements.

Serial No. _____

Produced on _____

Control department mark _____

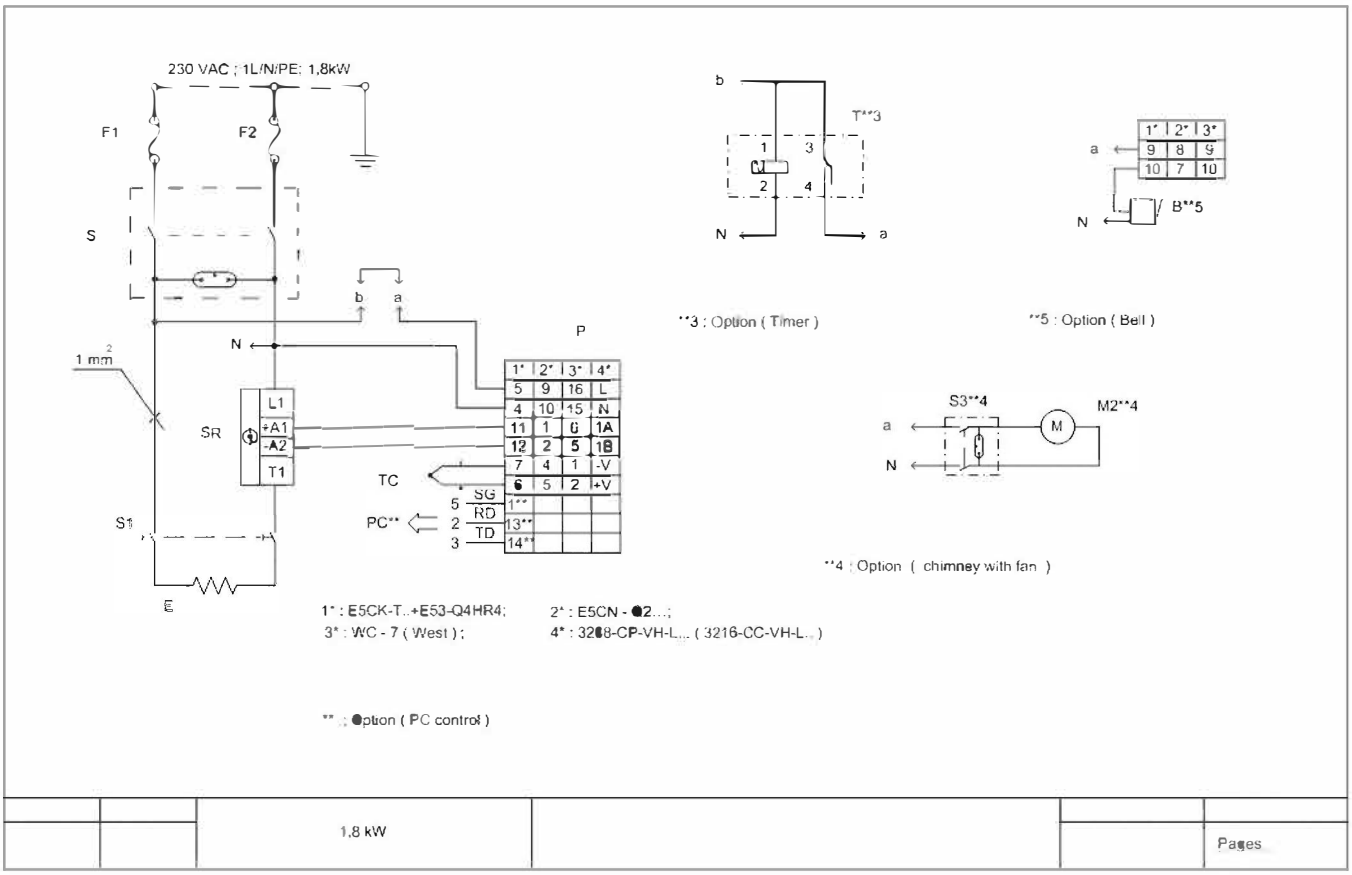
Furnace Article No _____



1. Control panel
2. Housing
3. Support
4. Door

pic 1

ELECTRIC DIAGRAM

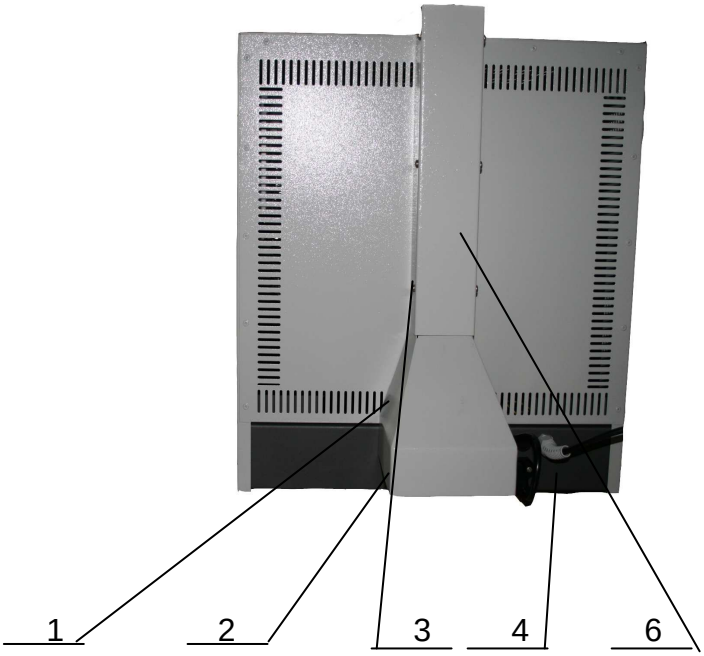


Name of component	Qty	Article identification	Type	Manufacturer	Remark
F1, F2	2	Fuse, 12,5A, M;			
S,S3**4	1	Switch	R595KMET2F		
P	1	Temperature controller	E5CK-T (E5CN; 33208; 3216)	Omron, Eurotherm	
SR	1	Solid-state relay	G3PB225BVD 1224DC		
S1	1	Switch 10A, 250V	D2D-3104	Omron,	
TC	1	Thermocouple, “K”	TC-Y1 (K)	Thermo-Est	
E	1	Heating element			
T**3	1	Timer	MIL72E/1digi20	Omron	
B**5	1	Bell			
M1**4	1	Ventiliator	DP200A		

ADDITIONAL OPTION

MSF 12-4 is designed for ashing process. Chimney permits to eliminate smokes from chamber. Ventiliator of chimney starts to work after turning the swich on.On purpose to take a furnace cover out, first of all it needs to take the chimney out. In order to take the chimney out , following steps must be done:

1) Unscrew six screw pos. 3, remove component pos. 6
2) Unscrew ceramic tube fixing screw and take the ceramic tube out.
3) Disconnect connector pos. 4
4) Remove the furnace cover.



1- chimney
2- ventilator
3- screw
4- plug
5- screw for fixing a ceramic tube
6- detail of chimney