



LABORATORY FURNACE

30/1300L

Manual instruction

CE

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

1. FUNCTION

Laboratory electric furnace **SNOL 30/1300L** (in the next – “furnace”) is intended for analysis of various materials and stocks heat-treatment in fixed conditions when the temperature is from 50°C to 1300°C.

2. SPECIAL HAZARD

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

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

Operation of the furnace without reliable earthing is absolutely forbidden.

Never operate the furnace with the enclosure removed (even if it had been removed just only one outside’s protective screen).

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 (don’t heat) in the electric furnace unknown materials!

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

Electric furnace SNOL 30/1300L, pc	– 1
Bakestone brick, pc	– 3
Support, pc	– 4
Fuse 1A, pc	– 2
Instruction manual	– 1
Instruction manual of temperature controller	– 1

4. LAYOUTS AND OPERATION

The base of the furnace – metal housing. On the top of it there is heating block installed, made from heat insulation block with heating elements mounted on ceramic tubing. Control panel is in underpart of housing. On the front of housing there is door with heat insulation material fixed.

Working chamber of the furnace consist of heating chamber and door, which are heat-sealed. Working chamber is covered over the preventive screens.

The load is accommodate on the bakestone's plate, which is put on the bottom of the chamber.

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

Air heated by heating elements circulate in the chamber and heats the load.

Electric diagram is attached.

5. EXPLOITATION INSTRUCTIONS

Adequate ventilation must be provided in the room, where the furnace is installed.

Place under the bottom of the electric furnace and railing must be horizontal surface (inequality ± 1 mm on 1 metre) and rigid, non flammable table top.

Ambient temperature should be from $+5^{\circ}\text{C}$ to $+35^{\circ}\text{C}$.

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

Explosion – proof environment free of a considerable amount of conducting dust, water vapour and corrosive gases.

Furnace should be installed in room with exhaust ventilation.

Don't use for light metals.

The furnace shouldn't be swayed of vibration and beats.

Don't pass the nominal temperature.

Variations of electric power pressure should not exceed $\pm 10\%$ rated value.

Take care, the load does not touch the heating chamber borders or heating elements. If the element went off the exploitation time because of load's touch, damage repairs are performed of user account.

In operating time inside the furnace may spring up separate cracks, which have no influence for technical characterization and it couldn't be the reason for reclamation.

Furnace door should be opening, when the temperature isn't higher than 400°C . If it is opening in a higher temperature, there might chap the ceramics because of heat strikes.

6. MOUNTING

Place the furnace in prepared place for using. Put on bakestone bricks. 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 first heating cycle or long unused period the moisture must be expelled from the furnace thermo insulation. To tray up furnace insulation we recommend raise temperature according to following schedule with close door and empty chamber:

- Raise temperature to $150-200^{\circ}\text{C}$;
- Dwell 2-3 hours;

- Raise temperature to 500°C;
- Dwell 2-3 hours;
- Raise temperature to rated;
- Dwell 1-2 hour;

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 SEQUENCE

Open the door. Distribute the samples on bakestone bricks. Do not position the samples too close the walls (at least 1/10 of the chamber working dimensions should be left unloaded). Take care, that thermocouple will not get damaged. Close the door. Switch supply network switch.

According to the instruction of temperature regulator, determine desirable programme and switch on it's performance. After finishing turn off the electric furnace. The light signalizes about actuation or disconnection.

9. MAINTENANCE

The mains plug must be disconnected from the socket.

Door adjustment. To adjust the door:

- Open the door and loose door hinge fastening screws;
- Move the door to chamber and clamp the screw;
- Close the door and check the door position, there must be no gaps between the chamber gasket and the door should close slightly;

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.

Once a year measure isolation's resistance between frame and heating elements. Dray the oven. Bring under control megohmmeter at way out of heating elements and frame. Megohmmeter's showing should be lower than 0,5MΩ.

Electrical connections.

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

Cleaning.

Use a mild soap solution or cleaner and soft cloth to wipe the outer surface and oven control devices. Remove dust deposits from the air vents with a vacuum cleaner.

The user should be assured, that his/her cleaning methods are relevant and will not damage the furnace.

10. STORAGE

The furnace should be stored in indoor premises, following conditions must be satisfy:

- Temperature range plus 5-35°C;
- Maximum relative humidity 80% at the temperature plus 25°C.

Take care the furnace from various strikes.

11. TRANSPORTATION

The furnace can be delivered packed (in transportation container) and only by covered means of transportation (in the wagonload of railways, containerizes, trucks) at an ambient temperature ranging from minus 50°C to plus 50°C. During the carrying over or transportation the user must ensure protection against possible mechanical damage and deflections inside transport. Even transportation packing does not protect the furnace against improper handling.

12. TECHNICAL DATA

Rated power, kW	4,6
Rated supply voltage, V	230
Rated frequency, Hz	50
Rated temperature, °C	1300
Number of phases	1
Working chamber surroundings	air
Heat – up time (without charge), min not more	150

Furnace temperature stability at rated temperature in thermal steady state without charge not more than ± 2 °C

Range of automatic temperature's regulating, °C 50÷1300

Furnace working chamber dimensions :

Width, mm	200
Length, mm	440
Height, mm	290

Furnace outside dimensions:

Width, mm	640
Length, mm	870
Height, mm	840

Weight not more then, kg 120

13. 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 Solid-state relay is damaged	To change the thermocouple To switch on temperature controller To change the solid-state relay
Heating time is longer than determined	Low voltage of the power supply Door's close is not hermetic	To check the voltage of power supply To regulate tightness of door's close
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

METHODOLOGY FOR ELECTRIC FURNACE PARAMETERS CERTIFICATION

Parameters, needed to assess:

1. Review of rated temperature and temperatures stability without load, when the electric furnace is heated to rated temperature.

EXPERIMENTATIONS METHODS

All of experimentation are performed when the electric furnace is heated to the rated temperature and work in steady temperature mode. That is, when furnace temperature fulfils rated temperature and the variation of the temperature reaches minimum values (e.g. $1300 \pm 2^\circ\text{C}$).

1. Review of rated temperature and temperatures stability without load, when the electric furnace is heated to rated temperature is performed according to the method described further.

When the furnace is cold telltale thermocouple is installed as closer as possible to the working thermocouple. The review period of rated temperature and stability of temperature is 1 hour. Telltale device showings should be registrated e.g. after 10 minutes period.

How to calculate rated temperature:

The sum of all registered values should be devided into such number, how many records were made. The result should be from 1298°C to 1302°C . At the same way, it is measured stability of the temperature. If the result of checked rated temperature is positive, temperature stability fulfils the requirement $\pm 2^\circ\text{C}$.

All devices and thermocouples, which are used in review, should be assessed and passed meteorological revise and not lower class of exactness than first.

Attention!

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

FURNACE TESTING RECORD

Laboratory furnace **SNOL30/1300L** was tested and correspond company standards requirements.

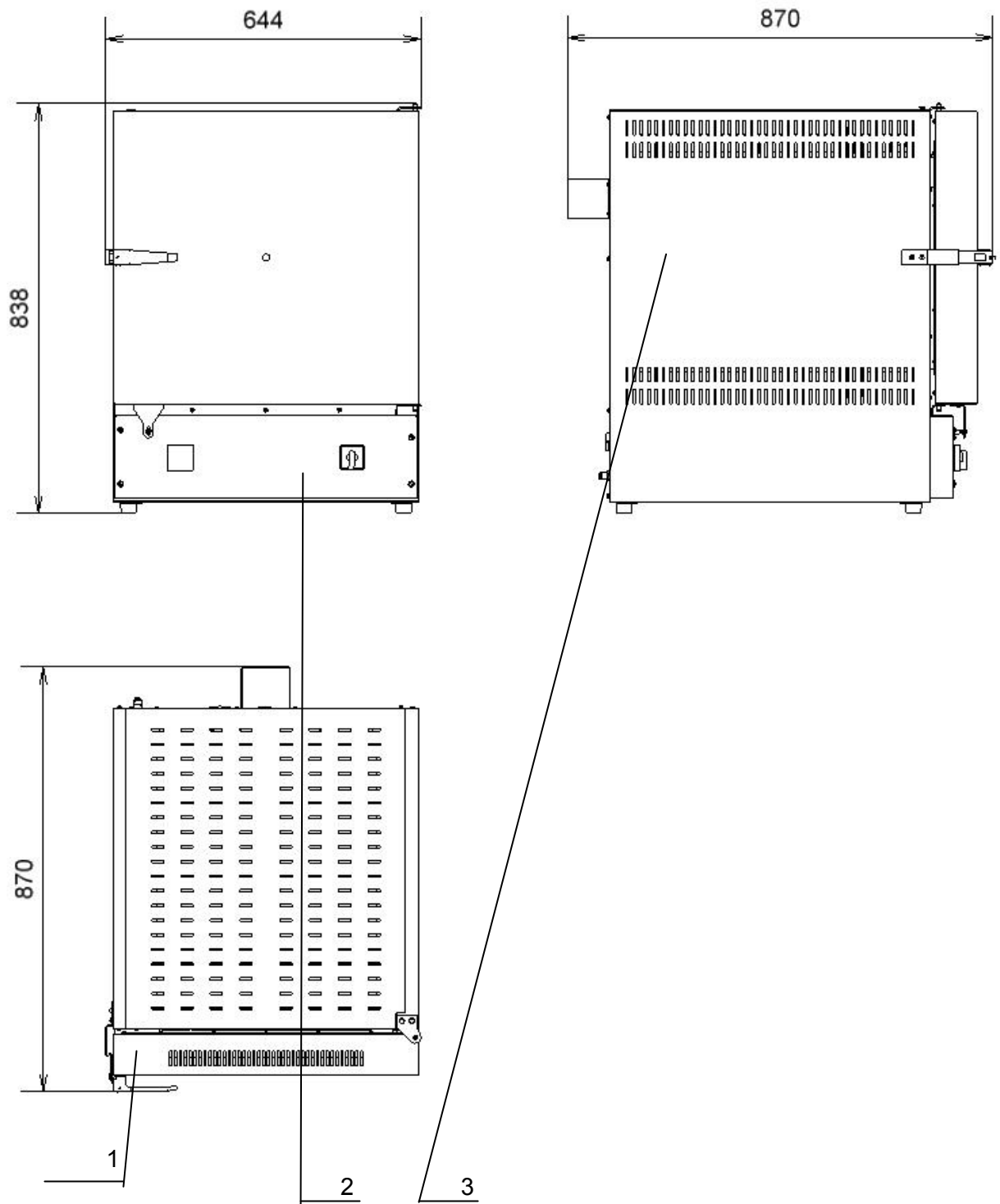
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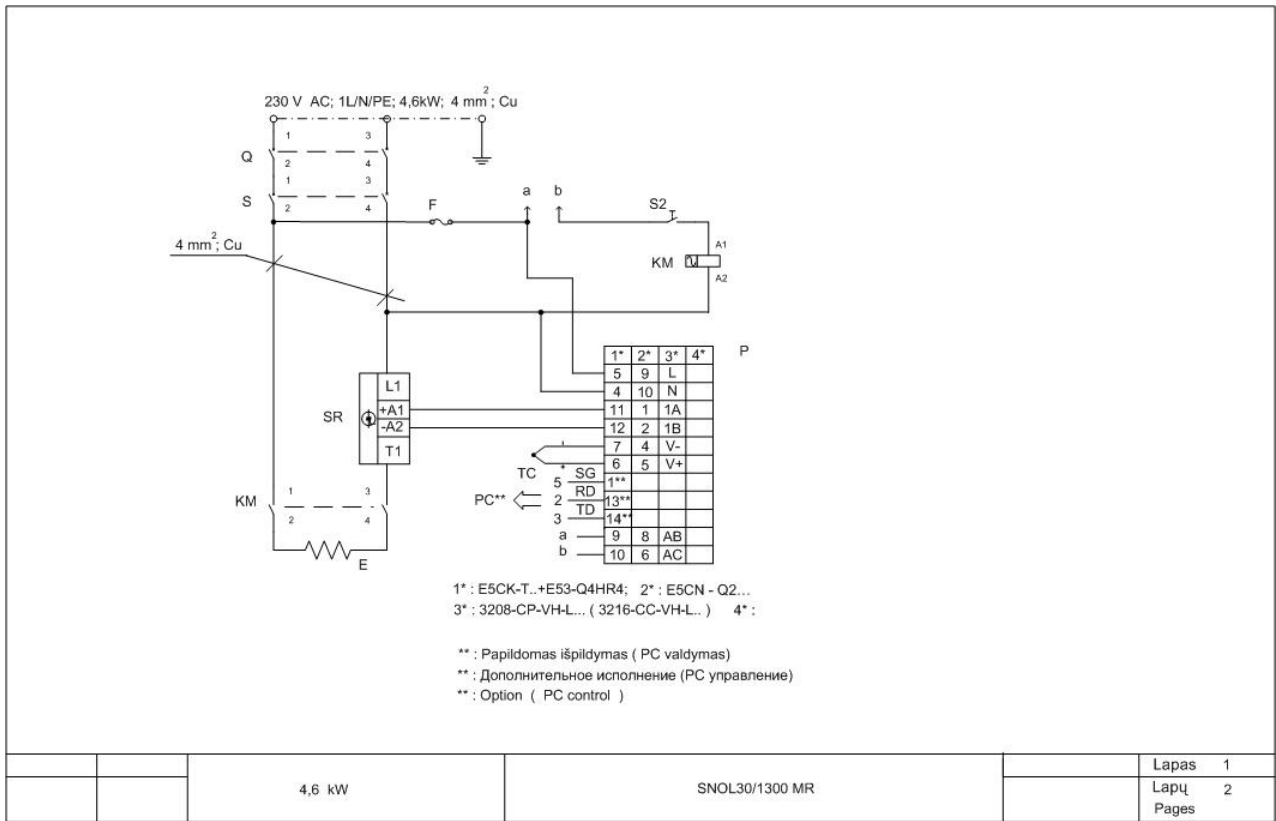
Furnace Article No . _____

SNOL 30/1300L



- 1 Door
- 2. Control panel
- 3. Housing

ELECTRIC DIAGRAMME



Name of component	Qty	Article identification	Type	Manufacturer	Remark
Q	1	Circuit breaker	S262-B32	ABB	
KM	1	Contactor	A16-30-10	ABB	
SR	1	rélė/ Solid-state relay	G3PB245BV D1224DC		
P	1	Temperature controller	E5CK-T(E5CN;3208;3216)	OMRON, Eurotherm	
F	1	1A Fuse			
TC	1	Thermocouple	TC-MO(S)	Thermo-Est	
S2	1	Switch	D2D-3104	Omron	
E	1	Heating element			
S	1	Switch	OT25ET3	ABB	