Nabertherm GmbH · Bahnhofstr 20 · 28865 Lilienthal/Bremen

Electrically heated muffle furnace

L-series with flap door

LT-series with lift door

The furnace is equipped with either a flap door (L) or lift door (LT) at no extra charge.

O F F E R No. 326338 /31

1. Scope of Supply

   - Electrically heated muffle furnace with
     - Controller B510
     - Integrated process documentation

2. Defined Application

   - The furnace had been designed for preheating or ashing in air.
   - Only materials with known characteristics and melting temperatures may be used. Check the material safety data sheets if necessary.
   - Use of the furnace for any other purpose whatsoever such as processing products other than those intended or handling hazardous substances or substances posing a health hazard constitutes improper use and must be agreed upon with Nabertherm.
   - Operating the furnace with explosive gases or mixtures, including explosive gases or mixtures created as a result of heating/drying, is prohibited.
   - This furnace features no safety technology for processes which produce combustible mixtures, for example debinding. If the furnace is still used for such processes despite this fact, the concentration of organic gas mixtures in the furnace must never exceed 3% of the lower explosion limit (LEL). This pre-requisite applies not only to normal operation but, in particular, to exceptional situations such as process disruptions (caused, for example, by the failure of a power unit). You must ensure that the furnace is adequately ventilated and vented.
   - Do not open the furnace when it is hot. If the furnace must be opened at high temperatures reduce this time to the minimum possible. Wear protective clothing and provide sufficient room ventilation.
   - Discolourations may occur on the stainless steel housing (especially when the hot furnace is opened); these, however, do not affect the function.
   - Furnaces of this series can be used for burning out dental wax. For this application the safety data sheets of the wax manufacturer must be considered.

3. Applied norms and specifications

   3.1. General Norms and Directives

   - EN 61010-1
   - EN 61000-6-1, EN 61000-6-3
   - RoHS directive 2011/65/EU

   3.2. Customer's specifications

   - Not considered

4. Technical specifications

Inner dimensions (wxdxh):	250 x 340 x 170 mm
Work space[1] (bxtxh):	180 x 270 x 120 mm
Outer dimensions[2] (WxDxH):	530 x 625 x 630 + 350 mm
Temperature Uniformity:	+/- 5 K with closed air inlet in the empty workspace according to DIN 17052-1 at working temperatures > 800°C
Volume:	15 liter

Weight:	70 kg
Power rating:	3,5 kW
Supply voltage:	220-240 V, 1/N/PE (2PE) 50/60 Hz
Max. operating temperature[3]:	1300 °C
Heat-up time (without load):	70 min. to Tmax – 100 K (if connected at 230 V, 1/N/PE)

1 Defined space inside furnace where the temperature uniformity is valid.

2 Outer dimensions may vary depending on additional equipment and accessories. Exact dimensions on request.

3 Continuous operation at maximum temperature can lead to increased wear of the heating elements, thermocouples or isolation. We recommend operation at approx. 50 °C below the maximum temperature.

5. Customized furnace design

- Housing manufactured from high grade structured stainless steel
- Dual shell housing
- Exhaust air outlet in the furnace rear wall
- Switching of the heating elements by electronic relay
- Adjustable air inlet in the door
- Door opening supported by springs
- Lift-door with hot surface facing away from the operator
- Multi-layer non-classified insulation with robust lightweight refractory bricks in the furnace chamber
- Heating elements on support tubes ensure free heat radiation and a long service life
- Thermocouple type S

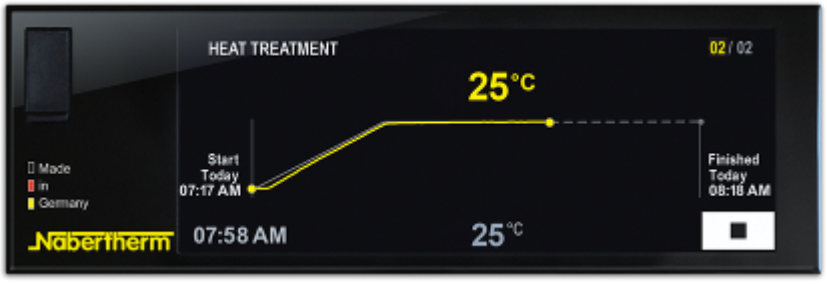
6. Additional equipment in the scope of supply

- Optional equipment and accessories are mentioned under point 10

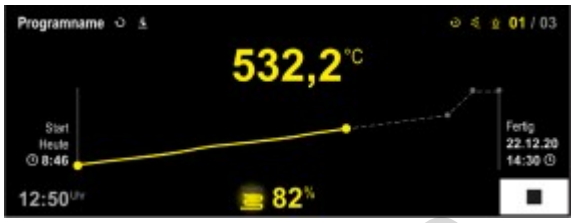
7. Controls, switchgear and process documentation

7.1. Nabertherm Controller Series 500

- The Controller Series 500 offers a unique range of features and intuitive operation. In combination with the free smartphone app "MyNabertherm", the operation and monitoring of the furnace becomes even easier and more powerful than ever before.
- Operation and programming by a high-contrast, large touch panel that displays exactly the information that is relevant at that particular moment.
- Transparent, graphical display of temperature curves
- Clear display of process data



7.2. Controller B510



Controller B510

- Colorful, high-contrast 6.8-inch touch display
- Convenient data input on large touch screen
- Graphic and tabular display of the program
- Detailed information menu with:
  - Time and date
  - Program run times (run time, remaining run time)
  - Operating hours counter
  - Integrated kWh counter (energy counter)
  - Error messages in plain text display
  - Display of controller setting values
- Language switching, available in the following languages:
  - DE, EN, FR, IT, ES, RU, DA, NL, PL, PT, SE, CZ, HU, TR, RO, NO, EE, FI, HR, LV, LT, SK, SL, CN
- Input of the ramps as
  - gradient (e. g. 100 K/h to 600 °C)
  - by time and temperature (e. g. in 6 hours up to 600 °C)
- Input of temperatures and times in steps of 1° and 1 min
- Delayed start time of the furnace adjustable via real-time clock
- PID control parameter input in freely selectable temperature steps
- Temperature unit changeable: °C / °F
- Controller interlock with password lock to protect against operating errors
- Copy and delete function for programs
- 5 programs with 4 segments each can be stored
- Program favorite list for quick access
- Filtering of the program list according to self-created categories
- Control of one heating zone
- Measurement range calibration option with up to 10 selectable supporting points
- Measuring accuracy ± 1 °C, smallest possible rate 1°C/h
- Self-optimization function for single-zone furnaces
- Up to two segment-wise, switchable functions e. g. relays for flaps, gassing systems, cooling fan, etc., depending on furnace equipment
- Extra functions can be named in plain text = flap, gassing etc.
- Extra functions can remain switched on even after program end (e. g. cooling fan)
- Six alarms with adjustable behavior
  - Alarm trigger: [BAND / MAX / MIN / program end] and external input
  - Adjustable monitoring ranges (ramp, hold time, etc.)
  - Reaction to alarm may require additional equipment such as signal lamp, acoustic alarm, relay, etc.
- Skip function for segment jump in a running program

Intuitive touch screen

Easy program entry and control

Precise temperature control

- Program start also possible at current furnace temperature
- Adjustable modes for power failure behavior
  - Continuation of program on power recovery without consideration of duration of power failure or temperature drop
  - Continuation of program in case of power failure < 2 min., otherwise abort
  - Continue of program, if temperature drop less than 50 K, otherwise abort
  - Program stop without consideration of duration of power failure or temperature drop
- User administration with three levels and different access rights for increased process reliability
  - Operator = basic functions for starting/stopping the furnace
  - Supervisor = additional rights for program input/modification
  - Admin = additional system-relevant access rights to parameters, etc.
- Wi-Fi interface for status monitoring with mobile end devices via the MyNabertherm app.
- Internal overtemperature protection with automatic shutdown if the set target temperature is exceeded by 30 °C for three minutes
- Integrated gradient monitoring with adjustable trigger values (temperatures and deviations): when the setpoint temperature is exceeded in the heating ramp, the furnace heating switches off
- NTLog: USB interface for recording process data, evaluation via NTGraph possible
- Import and export function via USB port for simplified service checks or program import (see description NT-Edit)

- Online tutorials available: www.nabertherm.com/tutorials/controller

7.3. MyNabertherm App

- Powerful and free digital add-on for Nabertherm 500 Series Controllers.
- Monitor the process progress of your Nabertherm furnaces easily online from the office, the workshop, on the road or wherever you are. With the app, you always keep in touch.
- The app functions for Nabertherm - furnace monitoring at a glance:
  - Convenient, simultaneous monitoring of multiple Nabertherm furnaces.
  - Total overview of all furnaces (dashboard)
  - Individual overview
  - Display of active / inactive furnaces
  - Operating status
  - Selection of current process data
- Display options for each furnace
  - Overview of program progress
  - Display of furnace name, program name, segment number

- Display of start time, program run time, remaining run time and approximate time of program end.
- Status of extra functions such as fresh air fan, exhaust air flap, gassing, etc.
- Operating modes

Convenient monitoring of one or multiple Nabertherm furnaces simultaneously

- Push notifications in case of error messages
  - Push notification on the lock screen
  - Display of fault messages with fault text in the individual overview and the current message list
- Service contact
  - Store furnace data and get fast support
- Available in the following languages:
  - DE, EN, FR, IT, ES, RU, DA, NL, PL, PT, SV, CS, HU, TR, RO, NO, EE, FI, HR, LV, LT, SK, SL, CN
- Requirements
  - The furnace must be able to be connected on site via WLAN and must be connected to the Internet. Appropriate settings may need to be set up on site.
  - For cell phones with Android (from version 9) and IOS (from version 13)

Display of program progress for each furnace

- Download Google Playstore: MyNabertherm – Google Playstore
- Download Apple Appstore: MyNabertherm - Apple Appstore

7.4. Freeware NTEdit for program editing on a PC

- Clearly structured editing of programs on a PC
- Transfer to the controller via customer's USB stick
- Import function of programs via customer's USB stick
- Graphical overview of the set program on a PC
- Language selection of: DE/EN/FR/IT/SP/RU/ZN/PT
- Download is provided at http://www.nabertherm.com/download/
- Use of MS Excel required
- For PCs with Microsoft Office 2007/2010/2013 and Office 365

  for Windows (32/64Bit)

7.5. NTLog/NTGraph for Nabertherm controllers

Process documentation by means of data recording on customer's USB flash drive


USB-Port

- Data stored in CSV format, evaluation via spreadsheet program (e. g. MS Excel for Windows) possible
- Recorded data: time difference, segment number, temperature set points, actual temperatures, power outputs, control functions
- Checksums to protect against accidental data manipulation. For enhanced requirements with respect to unforgeable documentation according to ISO 9000 et seqq. as well as for long time documentation Nabertherm offers other professional solutions.
- Easily accessible USB port

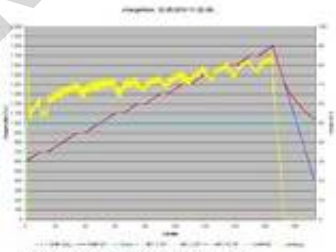
- Storage volume, depending on controller type:
  - B500/510, C540/550, P570/580:
    Up to 130.000 sets of data in up to 16 files
  - B400 / 410, C440 / 450, P470 / 480:
    Up to 80,000 sets of data in up to 16 files
  - P300 / 310/330 B130 / 150/180 C280, all from version 3.0:
    Up to 16,000 sets of data in up to 8 files

  When saving further sets of data, the eldest file is overwritten.
- Simultaneous use of NTLog and Controltherm MV is not possible. With the 400 series controllers, the use of VCD software and NTLog is possible.

Overview NT-Graph

Visualization of Process Data with NTGraph (freeware)

- Software tool NTGraph to visualize the data in MS Excel for Windows (versions 2003/2010/2013/ Office 365) available free of charge
- Data displayed as a diagram, in a table or a simple report
- 8 different pre-set designs for the curve design available (color, scaling or naming), individually adaptable
- Prepared in 8 languages (DE/EN/FR/IT/SP/IT/CH/RU), adaptation of texts in other languages possible. Excel reports of the Russian and Chinese version in English, description of the data sets in English or German
- This charge-free tool is excluded from warranty; there is no entitlement to support. In case NTGraph is not compatible to your PC system another spreadsheet program can be used for data evaluation.



Process cycle diagram

8. Supplied documents

- Operating instructions for controller and furnace including:
  - Installation
  - First-time operation
  - Parts list
  - Operating instructions, maintenance and cleaning description
  - CE- declaration of conformity according to Low voltage regulation
  - All documents in English

9. To be provided by customer

- Despite good insulation, the furnace radiates heat from its external surfaces. The operator must ensure that this heat is conducted away.
- Should gases or vapors escape from the charge, then sufficient air supply and ventilation at the installation location or an appropriate exhaust gas line must be provided.
- The size and design of the exhaust air system must be laid out by a ventilation expert. The accident prevention regulations applicable in the country where the furnace is installed must be considered.

Made in Germany