



Working Instructions

for MIHM-VOGT Laboratory Furnaces
with Controller M1



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for

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with controller M1

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Dear customer,

We thank you for your decision to buy a high-quality MIHM-VOGT furnace. It will support you with your work for many years, as it was developed and built using the latest technology.

Nevertheless, improper use and handling can cause damage, therefore we ask you to carefully read through these working instructions and to follow it.



The CE-sign confirms that MIHM-VOGT laboratory furnaces correspond to the governing regulations of the EC guidelines.

1. Delivery form

Each laboratory furnace is delivered with a M1 microprocessor controller, a refractory ceramic tray, a PtRh-Pt thermocouple, and an escape pipe.

Instead of the escape pipe, the furnace can also be equipped with the following accessories:

- Exhaust fan DG2 (Art. N° 7202)
- Catalyzer KN1 (Art. N° 7300)
- Catalyzer for shock-heat investments KN2 (Art. N° 7320)

Spare parts	Item n°:				
	KM	SL	GL	BL	TL
Furnace type:					
Ceramic tray	20020	30020	40020	50020	50020
Thermocouple	20100	30110	40110	50110	60110
Door filling	20351	30301	30301	30301	30301
Heating muffle (without ventil.)	20010	30010	40010	50010	60010
Heating muffle (with ventilator)	20015	30015	40015	50015	60015

2. Use area

The laboratory furnace is used for the elimination of wax and for preheating of dental casting rings. The heating muffle is made of a high-quality ceramic and is heated evenly on four sides. The low electric load guarantees a high lifespan of the heating wire. A high-quality internal insulation ensures a long lifetime.

At the rear of the furnace, two sockets are provided for the connection of an exhaust fan or a catalyzer and a ventilating air hood.

The furnace door is equipped with a safety switch, which interrupts the heating current when opening the door. The M1 controller includes a thermocouple circuit breaker so

that the furnace does not overheat if the thermocouple is defective. The type of the furnace is listed on an identification plate at the rear of the furnace.

3. Technical data

Furnace type:	KM	SL	GL	BL	TL
Outside dimensions w x h x d (cm)	40 x 48 x 40	43 x 58 x 45	48 x 58 x 52	54 x 60 x 55	54 x 65 x 55
	40 x 48 x 45	43 x 58 x 51	48 x 58 x 59	54 x 60 x 62	54 x 65 x 62
Heating chamber: w x h x d (cm)	15 x 10 x 17	18 x 11 x 19	20 x 11 x 25	25 x 11 x 28	25 x 17 x 28
Capacity:	4 pcs. 6x	4 pcs. Ø 8 cm	6 pcs. Ø 8 cm	9 pcs. Ø 8 cm	18 pcs. Ø 8 cm
Max. temperature	1150 °C	1150 °C	1150 °C	1150 °C	1150 °C
	1100 °C	1100 °C	1100 °C	1100 °C	1100 °C
Power rating:	1.6 kilowatts	1.8 kilowatts	2.3 kilowatts	3.5 kilowatts	4.5 kilowatts
	1.6 kilowatts	2.1 kilowatts	2.6 kilowatts	3.7 kilowatts	4.8 kilowatts
Tension:	230 V~	230 V~	230 V~	230/400 V~ (2/N)	230/400 V~ (2/N)
Preheating times:	60 min. 900 °C	60 min. 800 °C	60 min. 800 °C	60 min. 800 °C	60 min. 800 °C
	90 min.s 1050 °C	90 min. 1100 °C	90 min. 1100 °C	90 min. 1100 °C	90 min. 1100 °C
Weight:	32 kg	63 kg	75 kg	90 kg	100 kg
	36 kg	70 kg	80 kg	95 kg	105 kg

 furnaces with circulating air (not recommended for speed investments)



4. Safety warning

- The MIHM-VOGT laboratory furnace is exclusively made for the elimination of wax and for the preheating of casting rings. We are not liable for damages due to another use. The sockets on the rear are to be used exclusively for MIHM-VOGT ventilating air hood, a MIHM-VOGT exhaust fan or a MIHM-VOGT catalyzer.
- The MIHM-VOGT laboratory furnace must be operated exclusively by technicians, who know the content of this manual. Labels and stickers on the laboratory furnace must always be maintained in legible condition. They must not be removed.
- The MIHM-VOGT laboratory furnace should be set up only in dry areas and should not be in contact with liquids. In the area of the furnace, furniture and other objects cannot consist of explosive, combustible or easily inflammable materials. In the installation area of the furnace, no easily inflammable or combustible gases or liquids are allowed to be stored.
- Modifications of the MIHM-VOGT laboratory furnace can only be made after prior written agreement from us. We are not liable for damages caused by your

modifications. Before every maintenance, the appliance is to be turned off and the power-supply plug is to be pulled out.

- The furnaces type KM, SL, GL must always be connected to a plug protected by a 16 Amp fuse. The furnaces type BL and TL are to be connected to a CEKON plug (230 / 400 V, AC).
- The hot furnace door should only be touched at the grip, the hot muffles should only be grabbed with sufficiently long tongs. Because of the wax fumes and the steam from the investments, the furnace should be equipped with an exhaust fan or catalyzer and placed under a ventilating air hood. The fumes are to be extracted outside.
- The ceramic tray should always be used to protect the heating muffle.
- The transportation protection from the heating muffle must be taken off before the first use.

5. Installation and electrical connection

The laboratory furnace is to be positioned in a dry area in accordance with the safety warnings and is to be connected to a separate circuit secured with 16 Amp. The transportation protection must be removed from the heating muffle. The laboratory furnaces type KM, SL and GL are to be connected to an earthed plug 230 V. The laboratory furnaces type BL and TL are to be connected to a CEKON plug 230/400 V AC. If required, the exhaust fan DG2 or the catalyzer KN / KN2 are installed at the furnace rear (see point 7.7). For their connection, the socket marked "Gebläse" is used.

6. Operation

6.1 Start-up

Prior to the first use, the muffle must be heated up to 1050°C. Hold this temperature for 1.5 hours (= 90 minutes). This way, the necessary oxide layer is formed on the heating wire.

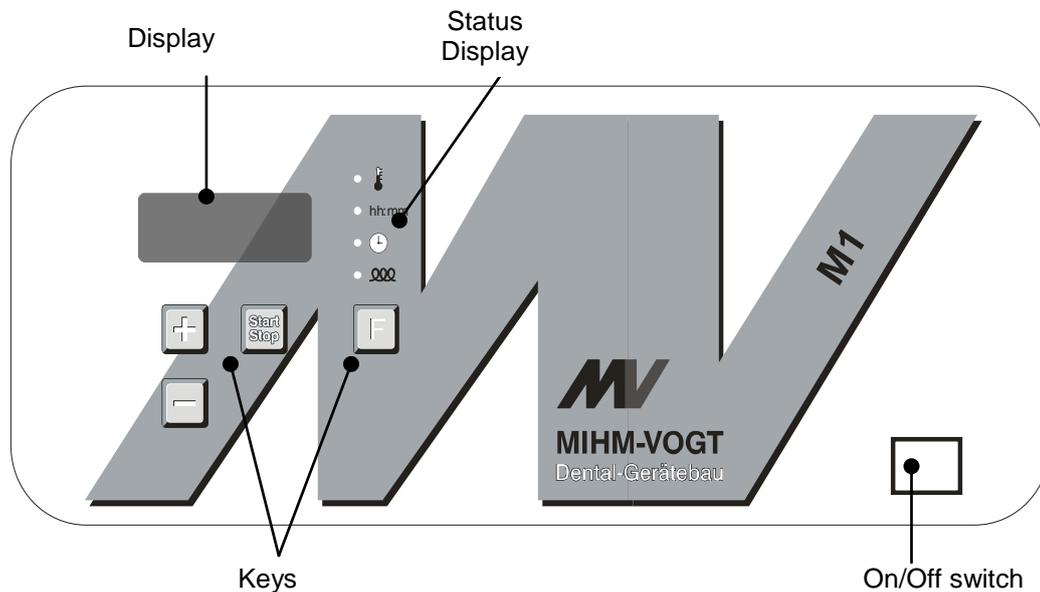
6.2 Loading

The casting muffles are to be put on the ceramic tray. Metallic muffle rings should not come in contact with the heating chamber walls.

6.3 Operation of the electronics

The regulator is equipped with the most modern electronics allowing that the heating process goes through the heating curves with high precision. The furnace is

programmed on a menu-driven keyboard with LED indicators. The following functions are available:



6.3.1 Basic keys

-   increases / decreases the value
-  starts / stops the current program
-  Function key

6.3.2 Display functions

-  is illuminated when the temperature (°C) is indicated in the display
- hh:mm is illuminated when the holding time / delay is indicated in the display
-  is illuminated when the night time clock / casting time clock is activated
-  is illuminated when the furnaces heats up

6.3.3 Setting temperature and holding time / delay

After switching on, the display shows the actual temperature of the furnace, and the temperature sign  lights up. The  or  keys are used to enter the temperature desired. Confirm this value by pressing the  key. Then, the holding time / delay (hh:mm) can be entered by means of the  and  keys and is confirmed by pressing the  key. Now the furnace is started with the  key.

! Attention:

- When setting the temperature (🌡️) or the holding time / delay (hh:mm), the corresponding LED is **blinking**.
- When the actual temperature (🌡️) or the actual holding time / delay (hh:mm) is indicated, the corresponding LED is **illuminated**.
- The heating mode is started and stopped with the  key. When the furnace is in the heating mode, the corresponding LED (🔌) is illuminated.

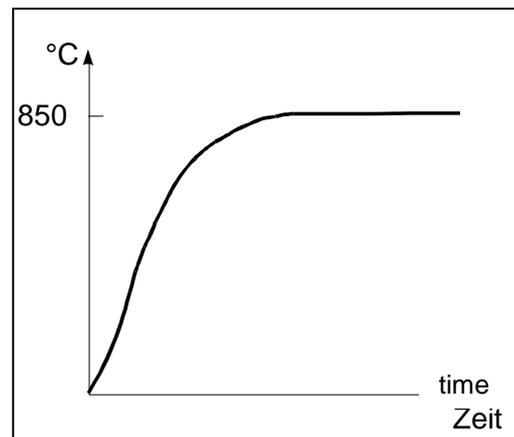
Example: Setting temperature and delay :

Temperature: 850 °C
 Delay: 30 minutes

After switching on, the actual temperature is indicated:

21

- 🌡️
- hh:mm
- 🕒
- 🔌



Now the temperature desired (850°C) can be set by means of the keys  and :

850

- 🌡️
- hh:mm
- 🕒
- 🔌

While setting the temperature, the display and the LED 🌡️ are blinking. Use the  key to confirm the value entered. If no other settings are made within 10 seconds, the controller automatically takes over the value given.

By pressing the  key, the display also switches over to the delay field:

00 : 00

- 🌡️
- hh:mm
- 🕒
- 🔌

The delay desired is set by means of the keys  and :

00 : 30

- 🌡️
- hh:mm
- 🕒
- 🔌

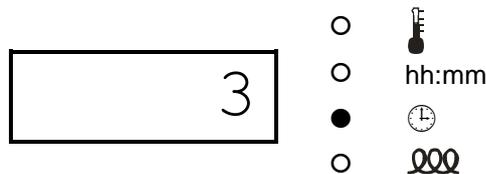
While setting the delay, the display and the LED hh:mm are blinking. Use the  key to confirm the value entered. If no other settings are made within 10 seconds, the controller automatically takes over the value given.

The furnace starts heating up as soon as the  key is pressed. The LED  is illuminated. The display indicates the actual temperature and delay, respectively. An acoustic signal indicates that the heating process is finished. Opening the door stops the sound.

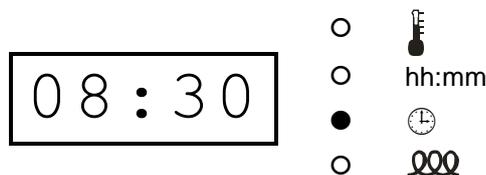
The heating mode is quit by pressing the  key.

6.3.4 Starting a program with the casting time / finishing time feature

A **long push** on the  key activates the casting time / finishing time feature. At first, the day of casting (Monday = 1, Tuesday = 2, ... Sunday = 7) is chosen by means of the  and  keys (example: Wednesday = 3):



Pressing the  key confirms the setting and changes over to the time field where first the hour (hh:--) is entered, and after another push of the  key, the minutes (--:mm) of the desired casting time / finish time are entered (example: 08:30 am):



Another push of the  key completes the settings of the delay start feature. The controller automatically calculates the starting time of the furnace.

This function can be deactivated by a **long push** on the  key.

7. Special functions

7.1 Display at the beginning when switching on

When switching on the furnace, the display indicates the version number of the software for 3 seconds.

7.2 Setting the actual time

The electronics needs to know the actual day and the actual time to correctly calculate the starting time of the furnace for the casting time / finish time feature. The time is preset at the factory but must be adapted if used in a different time zone or when the summer time / winter time changes. Pressing the  key and switching on the main

switch at the same time opens the actual time field. First enter the actual day (1 = Monday, 2 = Tuesday, ... 7 = Sunday) (example: Thursday = 4):

4	○
	○ hh:mm
	●
	○

Then press the **[F]** key to enter the actual hour. After another push of the **[F]** key, the actual minute can be entered (example: 16:53 - use the 24-hour clock!):

16:53	○
	○ hh:mm
	●
	○

Press the **[F]** key to complete the settings and to save the actual time in the electronics.

7.3 Programming of exhaust blowers, catalyzers and/or fume extraction hoods

The sockets for an exhaust blower, a catalyzer, or a fume extraction hood are located on the rear of the furnace. They were programmed at the factory to shut off at a temperature of 600 °C. It is required, however, to reprogramm them especially, when using shock-heat investments. Pressing the **[Start/Stop]** key and switching on the main switch at the same time activates the programming mode of the sockets.

1 6 0 0	○
	○ hh:mm
	●
	○

1 = socket for blower/catalyzer
2 = socket for fume hood

shut-off temperature
of the sockets

The first figure shows the socket used. Figure "1" stands for the socket named "Gebläse" (blower or catalyzer), and figure "2" stands for the socket named "Dunst" (fume hood). At the factory, the turn-off temperature is set to 600 °C. This temperature can be changed to a temperature between 200 °C and 999 °C by pressing the **[+]** and **[=]** keys. If the socket needs to run throughout the complete process, it has to be set to the following indication by pressing the **[+]** or **[=]** keys:

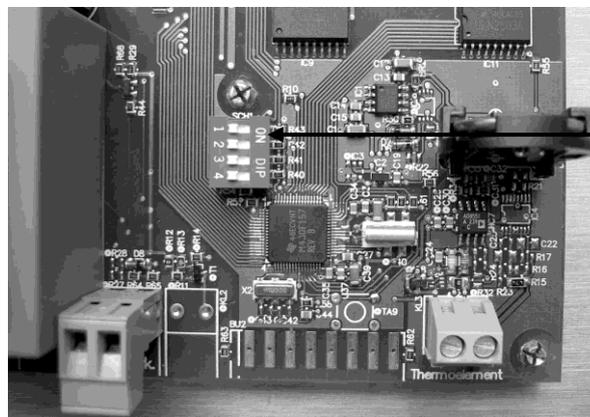
1 0n	○
	○ hh:mm
	●
	○

Then press the **[F]** key to switch over to socket "2" which is reprogrammed in the same way. Leave the programming mode of the sockets by another push of the **[F]** key.

! **ATTENTION:** If a blower, a catalyzer, or a fume extraction hood are connected and used together with shock-heat investments, please set the shut-off temperatures of socket 1 ("Gebläse") and socket 2 ("Dunst") to a 20 °C higher temperature than the final temperature of the shock-heat investments or let them run permanently (= 0n).

7.4 Industrial function

In case the furnace is **not** used in the dental field, it might be necessary that the furnace shuts off directly after the holding time. If so, bring the DIP switch No. 1 on the circuit board in ON position.



DIP switch:
1: industrial function
2: service function
3: free
4: free

Therefore, remove the operating electronics (6 screws). The DIP switch is located on the rear in the area of the processor (see picture above).

7.5 Service function

In case the furnace does not heat up although the program has been entered correctly, a control function of the heating may be added by means of DIP switch No. 2 (see picture in chapter 7.4). The colon in the center of the display shows the following functions:

- lower point: is lit when the heating is activated
- upper point: is lit when the heating is activated and electrical power reaches the heating.

Both points lit but the furnace remains cold means that the heating is defective and has to be replaced. Otherwise the electronics must be replaced. Please call the customer service if necessary.

7.6 Controller initialization

In order to guarantee an optimal performance with the various laboratory furnaces, different parameters are preset. The controller is reset to factory settings with the following keystroke, and the respective parameters are activated:

 +  + SWITCHING ON control parameters for furnace types KM1

 +  + SWITCHING ON control parameters for furnace types SLM1 ... TLM1

! **ATTENTION:** The controller parameters may **not** be altered without agreement of MIHM-VOGT in Stutensee/Germany!

7.7 How to connect exhaust blowers, catalyzers and/or fume extraction hoods

a.) Connection of an exhaust blower:

The exhaust blower type DG2 is inserted into the designated space at the back and fixed at the rear sheet metal with the corresponding screws. If an exhaust pipe is connected, this has to be removed. Connect the plug at the rear socket marked 'Gebläse'.

If required, the exhaust blower can be extended up to approx. 3 - 5 m using conventional metal pipes (with a diameter of 80 mm at least). Please see to it that the air resistance is kept low (make only a few angles and do not use flaps) since otherwise the air flow in the blower might change its direction and, thus, suction stops.

In case of shock-heat investments, please ensure that the blower runs throughout the complete preheating process of the casting muffles. If required, the shut-off temperature of the sockets have to be changed (see point 7.3)

b.) Connection of a catalyzer:

The adapter supplied for the catalyzer type KN or KN2 is inserted into the designated space at the back and fixed at the rear sheet metal using the according screws. If an exhaust pipe is connected, this has to be removed. The suction pipe of the catalyzer has to be attached to the adapter and secured with the counter screw. Connect the plug at the rear socket marked 'Gebläse'.

It is recommendable to operate the catalyzer under a fume extraction hood exhausting the fumes either into a chimney or to the outside. The catalyzer may be extended in the same way as a blower; then an additional ventilator (type ZL, order No. 73010, or type ZL2, order No. 73210) must be installed on top of the catalyzer. With this measure, the catalyzer's pipe may be extended up to approx. 3 - 5 m (diameter for KN 120 mm at least, diameter for KN2 150 mm at least). Please see to it that the air resistance is kept low (make only a few angles and do not use flaps) since otherwise the air flow in the blower may change its direction.

In case of shock-heat investments, please ensure that the blower runs continuously throughout the complete preheating process of the casting muffles. If required, the shutoff temperature of the sockets has to be changed (see point 7.3)

In dental technology, gases of burnt wax (= organic hydrocarbons) are the main components which are emitted when heating investments or casting muffles. These gases are burnt again in the catalyzer and split into carbon dioxide (CO₂) and water steam (H₂O). In case of higher temperatures, some investments may release also ammonia gases which the catalyzer transforms into different nitrogen oxides (NO_x). As not all manufacturers of investments and waxes give complete information on additional components, it is impossible to name all remainders of other contents released and their composition.

c.) Connection of a fume extraction hood:

A fume extraction hood used together with the laboratory furnace can be controlled via the socket marked 'Dunst'. Using shock-heat investments requires continuous operation of the fume extraction hood during the complete preheating process of the casting muffles. The shut-off temperature of the rear sockets might have to be altered (see point 7.3).

If the fume extraction hood is controlled by several furnaces, a furnace adapter / relay connection must be used:

MIHM-VOGT furnace adapter:	furnace control only	with switch: <i>furnace control / mains control</i>
Connection of up to 3 furnaces:	OA3, Art. No.: 7453	OA31, Art. No.: 7455
Connection of up to 4 furnaces:	OA4, Art. No.: 7454	OA41, Art. No.: 7456

8. Error signals

8.1 Error messages of the electronics

Error signals:	Cause:	Elimination:
Er01	Thermocouple defective, loose connection of the thermocouple, booster electronics for the thermocouple defective.	Replace thermocouple, tighten thermocouple connections, exchange controller, call customer service if required.
Er04	Thermocouple is incorrectly attached (connected the wrong way round).	Shift thermocouple connections.
Er08	Temperature surrounding the furnace is too cold or too hot (-20°C ... +75 °C).	Install furnace in another place. Call customer service if required.

8.2 Miscellaneous errors and their causes

Error:	Cause:	Elimination:
Controller shows wrong time.	Controller was set to a wrong time.	Correct time in accordance with point 7.2
Heating has not started although autostart was programmed.	Long power failure during the night.	Check power connection, if required, and make sure that it is not connected to an external time switch.
Controller shows "--:--" in the time display (door open) when door is shut.	Door switch sticks or is defective.	Check door switch. Call customer service if necessary.
Light-emitting diode at the controller indicates heating, but furnace does not heat.	Heating muffle is defective (check the electrical power at the heating muffle - see point 7.5 - or measure the resistance with an ohmmeter). [R _{o.k.} =18 .. 30 Ω]	Heating muffle is defective. Replace it. Call customer service if necessary.
	Controller is defective.	Replace the controller. Call customer service if necessary.
	Power element (Type: BLM1, TLM1) is defective.	Replace the power element. Call customer service if necessary..
Controller "forgets" the heating data stored.	Controller is defective.	Replace the controller. Call customer service if necessary.
Controller "forgets" the time	Controller is defective.	Replace the controller. Call customer service if necessary.
Display does not work. Yellow pilot light of On/Off switch is on.	Protection fuse of the furnace is defective.	Turn off the furnace, wait for 30 seconds, switch on again. If this does not help, replace the controller. Call customer service if necessary.
Display is not working. Yellow pilot light of On/Off switch is off.	No mains voltage.	Check fuses in the circuit breaker box, check connection management. Call customer service if necessary.

9. Maintenance and care

9.1 Care

- The chamber area should be kept clean. The ceramic tray must be used .
- The muffles are to be put into the furnace so that no contact with the walls exists.
- The furnace is to be heated up empty on 1050 °C before the first use; this temperature is to be held for 1.5 hours (= 90 minutes). This process should be repeated, especially if the furnace is used to burn out wax, every 2 weeks in the first three months of operation. Later, repeat this process every four weeks.
- If the furnace is used to burn out wax, we recommend to use an exhaust unit or a catalyzer to evacuate the wax steams.

9.2 Maintenance

Warning:



Turn off the furnace and pull out the power-supply plug before doing maintenance work!

Attention:



The laboratory furnace insulation (lining) contains ceramic fibre / aluminium silicate fibre particles. According to the EU classification of December 5, 1997, this fibre must be declared as "carcinogen category 2 according to EU Directive 97/69/EC" (substances to be regarded as carcinogenic for humans). Animal experiments have shown that high exposure to dust can cause diseases of the lung or pleura in the form of fibrosis or cancer. These findings have **not** been confirmed in human studies. Critical health impairment is unlikely if the recommended instructions for use and valid limits are observed.

Examples for European limits:

Country	Limit	Origin
Germany	0.5 F/ml	TRGS 900
France	0.6 F/ml	Circulaire DRT nr. 95-4 du 12.01.95
Great Britain	2.0 F/ml	HSE - EH40, maximum exposure limit

It is unlikely that these limit values will be reached during servicing of the laboratory furnace. It is nevertheless recommended that respiratory masks type FFP2 are worn on a voluntary basis.

9.2.1 How to change the thermocouple

- **Pull the power-supply plug out!**
- Only for furnaces with circulating air: unscrew the protection covering the motor of the ventilator.
- Loosen the connections of the thermocouple head. Unscrew the thermocouple from the rear wall and take it out.
- Insert the new thermocouple and fix it with screws on the rear wall. Connect the new thermocouple correctly: red cable at +, white cable at -!

9.2.2 How to change the heating chamber

- **Pull the power-supply plug out!**
- For furnaces with circulating air only: unscrew the protection covering the motor of the ventilator. Remove the air circulation fan as described in chapter 9.2.6.
- Unscrew the upper and lower rear panels. Loosen the connection of the heating wires in the lower switchbox.

- Remove the insulation at rear with care. Carefully pull out the heating chamber backwards.
- Put in the new heating muffle (IMPORTANT: for furnace type BL, put the ceramic tray in the heating chamber before inserting the heating chamber!). Connect the new heating chamber.
- Put the insulation material back and fix the upper and lower wall again.
- For furnaces with circulating air only: install the air circulation fan as described under 9.2.6. Screw on the protective cover of the ventilator motor.

9.2.3 How to change the door stone

- Loosen the cross-recessed screw and remove the hold sheet metal. Take out the door-stone.

9.2.4 How to replace the controller

- **Pull the power-supply plug out!**
- Loosen the cross-recessed screws from the front electronic (controller component) and remove the controller.
- Remove plugs and plug-in strips at the controller. Loosen the thermocouple connection wire. Proceed accordingly in reverse order to put in the new front electronic unit. Do not mix up the thermocouple connections (red = "+", white = "-").

9.2.5 How to replace the power element of the 2nd heating circuit (only for furnace types: BL, TL)

- **Pull the power-supply plug out!**
- Take the ceramic tray out of the heating chamber or safe it, respectively (BL), put the furnace on its side, unscrew the metalplate at the bottom.
- Remove the plug-in strips from the power element and unscrew it.
- Proceed accordingly in reverse order for reassembly.

9.2.6 How to change the air circulation fan

- **Pull the power-supply plug out!**

Laboratory furnace type KM:

- Unscrew the cover of the fan.
- Unscrew the mounting sheet metal with the fan motor from the rear wall. Take those and the heating chamber out.
- Reverse the procedure to reassemble the air circulation fan. Propeller should not be overtightened; it must be able to run freely. File the aperture if necessary.

Laboratory furnace type SL... TL:

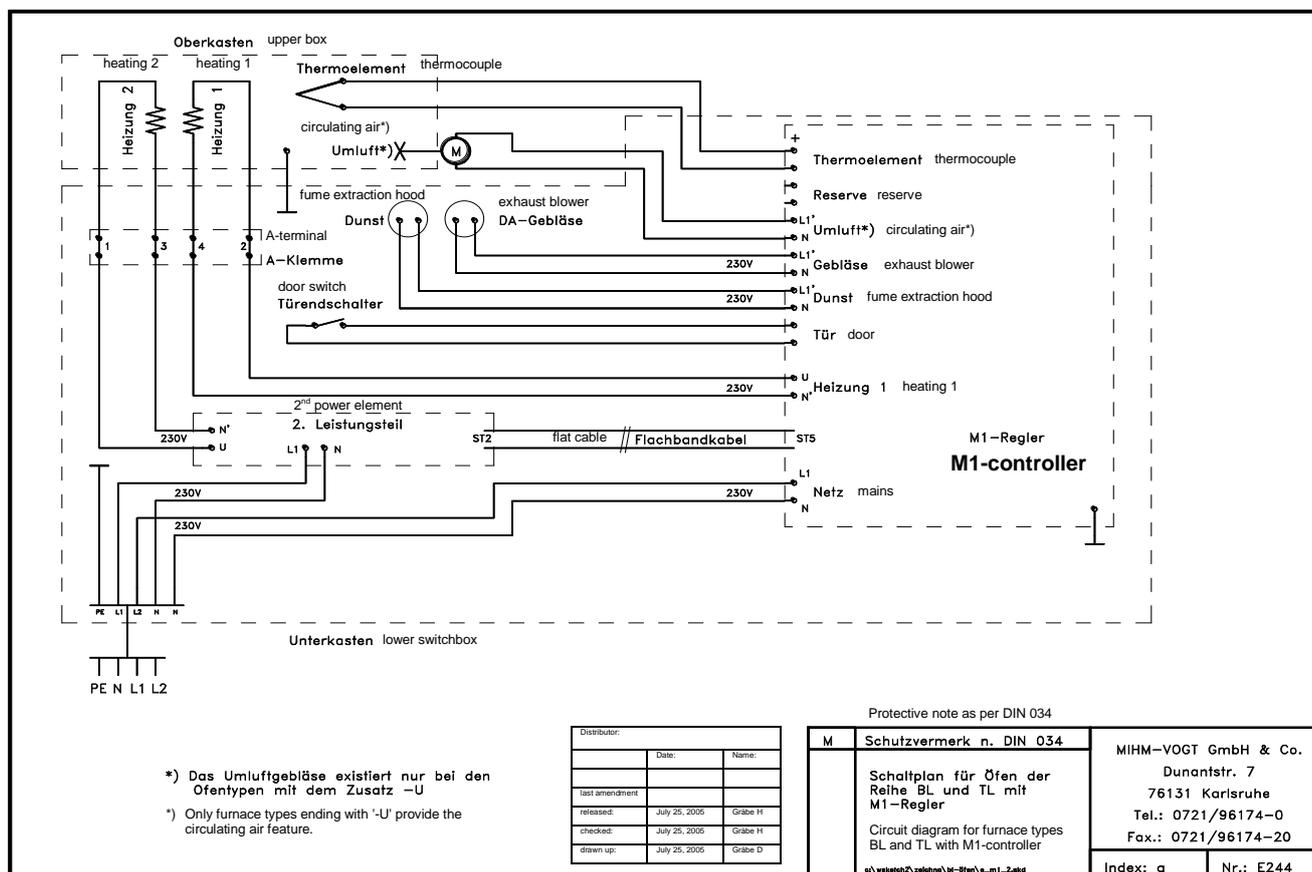
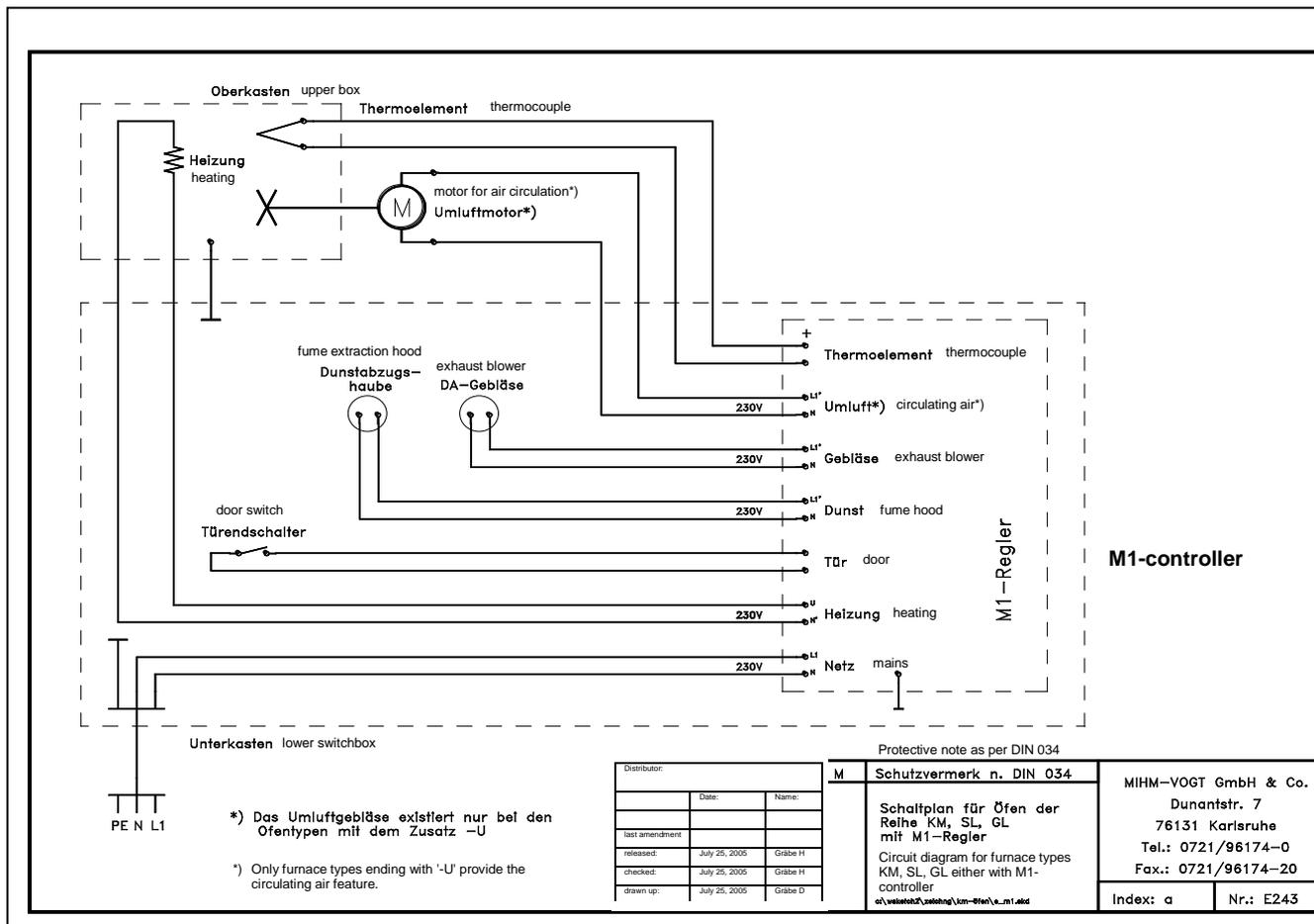
- Unscrew the cover of the ventilator. Extract the protection basket in the heating chamber.
- Hold tightly the motor of the ventilator and unscrew the propeller in the heating muffle from the motor axle. **WARNING: anti-clockwise threads!** If Propeller axle should be stuck, spray it with penetrating oil and let work. Call customer service if necessary.
- Unscrew the ventilator motor at rear.
- Reverse the procedure to reassemble the air circulation fan. Propeller should not be overtightened. It must be able to run freely. File the aperture if necessary.

9.3 Warranty

1. Mihm-Vogt guarantees, under the following conditions, that its dental appliances are free of defects in accordance with the latest technological findings for the appliance in question for a period of 12 months from delivery of the appliance by the specialist dealer, provided that this occurs no later than six months after delivery from the factory.
2. The warranty covers only the repair of the dental appliance free of charge by a Mihm-Vogt specialist dealer. The parts incorporated in the appliance during the repair will be subject to the same warranty as that of the appliance itself until expiry of said warranty in accordance with No. 1. Replaced parts will become the property of Mihm-Vogt.
3. Guarantee claims are to be submitted with the invoice to a Mihm-Vogt specialist dealer who will carry out the repair.
4. Wear and tear, particularly to wear parts such as heating elements, bulbs, fans, and thermo-elements, are not covered by the warranty.
5. Guarantee claims will not be accepted if a defect is connected with
 - a) the effect of external mechanical or chemical influences on the appliance
 - b) improper or excessive use of the appliance
 - c) repair, maintenance or servicing by a third party whom the end user knows not to be a Mihm-Vogt specialist
 - d) incorporation in the appliance of parts whose use has not been approved by Mihm-Vogt or which change the appliance in a way not approved by Mihm-Vogt
 - e) failure to observe the instructions by Mihm-Vogt on the handling, servicing and care of the appliance (e.g. operating instructions), in particular if the scheduled services are not carried out
 - f) failure by the end user to notify a defect and have it repaired as described in No. 3 immediately in the case of defects that were apparent at the time of delivery of the appliance or immediately on detection in the case of defects that became apparent later.
6. Recommendations for use, irrespective of whether they are given orally, in writing or during practical instruction, are based on experience and tests by Mihm-Vogt and can therefore be regarded as guidelines only. Mihm-Vogt products are subject to further development. Mihm-Vogt therefore reserves the right to make changes in design and composition.
7. All guarantee claims expire at the end of the warranty period defined in No. 1. For claims made but not rectified during the warranty period, the expiry date is extended until the defect has been rectified. In this case the warranty expires two months at the latest after the last repair or statement by the Mihm-Vogt specialist dealer that the defect has been remedied or did not exist.
8. Claims by the purchaser against the supplying dealer are unaffected by this warranty.

MIHM-VOGT GmbH & Co. KG
October 2008

9.4 Circuit diagrams



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