LAB Online Exhibition

Operation Manual

knowledge

Action movie

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Table of Contents

Please read these operating instructions carefully before using the **BÜCHI** Digest Automat **K-438**. Keep these instructions in the proximity of the apparatus so that you can consult them immediately whenever necessary.
The apparatus should not be connected to the power supply and turned on until all of the necessary preparations have been completed.
Chapter 2 contains important safety instructions. Read them carefully; they are essential for the safe operation of the apparatus.

en, Version C (26 pages)	**Order No.**
K-438 Operating Instructions	**96766**

1 Scope of delivery

Figure 1: Overview of K-438

Description	Order No.
Versions of the equipment:	
K-438 230 V 50/60 Hz	**38520**

Table1: Versions of the equipment

Standard accessories:	
1 Exhaust unit, complete	**38561**
1 Rack, 20 spaces	**38621**
5 Digestion tubes	**37377**
20 Digestion tubes	**03904**
1 EPDM hose, 1.5 m, 8 mm	**26275**
1 Mains cable of the following types:	
Type CH	**10021**
Type Schuko	**10029**
Type GB	**17833**
Type AUS	**17834**
Type USA	**33756**
1 Operating instructions in one of the following languages:	
German	**96765**
English	**96766**
French	**96767**
Italian	**96768**
Spanish	**96769**
1 Packaging	**35161**

Table 2: Standard accessories

Optional accessories:	
Water jet pump made of plastic	**02913**
Sealing cover	**17396**
PTFE seal for suction tube, set of 20 tubes	**38623**
Retaining plate	**38559**
Stands for racks, 20 spaces	**38639**
Suction tube with condensate brake	**38640**
Kjeldahl tablets (Hg/Se-free), 250 tablets	**28765**
Scrubber B-414 with condenser, 230 V	**37882**
Connecting cable to scrubber B-414	**14738**
Digestion tubes, set of 4 parts	**37377**

Table 3: Optional accessories

2 Safety

The apparatus is manufactured according to state-of-the-art technology and recognized safety regulations. Nevertheless, using this apparatus can lead to certain risks and dangers:

- If the apparatus is used by inadequately trained personnel.
- If the apparatus is not used according to these instructions.

2.1 Symbols

Stop
Information about risks which can lead to extensive property damage or to serious or life-threatening personal injury.

Warning
Information about risks which can lead to personal injury or to property damage.

Reference
Information which refers to technical requirements. Failure to heed these requirements can lead to malfunctions, inefficiency, and production losses.

Warning
Surface temperature exceeds 60°C.

2.2 Requirements for the User

The apparatus may be used only by laboratory personnel or other persons who due to their training or professional experience are capable of recognizing possible dangers which might arise from the use of the apparatus.

2.3 Proper Use

The apparatus was designed and built for laboratory use. Its proper use is the heating of concentrated sulfuric acid for oxidation of organic sample components.

2.4 Improper Use

Any use of the apparatus other than that given above or any use of the apparatus which is not in accordance with the technical data shall be regarded as a misuse. The operator bears the sole responsibility for any and all damage which may result from such misuse.

In particular, the following uses of the apparatus are prohibited:

- Use of the apparatus in rooms which require ex-protected apparatus.
- Preparing samples which can explode or ignite due to a blow, friction, heat, or sparks.

2.5 General Risks

In general, risks can arise from:

- Hot sulfuric acid
- Flammable gases or solvent vapors in the immediate vicinity of the apparatus
- Damaged glass equipment
- Placing the apparatus too close to the wall (see Chapter 4.1, Placement)
- Burns caused by touching hot glass parts.

The removal of covers using standard tools is prohibited except for authorized maintenance personnel.

The apparatus must not be started up glass equipment is damaged.

In order to avoid injuries to the hands and fingers, during the lifting operation the machine may not be manipulated.

After operation the machine can still have temperatures up to 60°C, this is indicated by the blinking “HEAT” LED.

Touching any parts of the apparatus carrying electrical current can result in fatal injury!

2.6 Safety Measures

It is recommended that the apparatus be operated only under a ventilation hood.

Protective clothing such as **goggles**, **gloves**, and **laboratory coats** must be worn during operation of the apparatus. These operating instructions must be regarded as an integral part of the Digestion System K-438 and be available at all times to operating personnel at the place of operation of the apparatus. This also applies to instructions in other languages, which may be ordered separately.

Modifications

Modifications of the apparatus or of spare parts or accessories as well as the use of spare parts or accessories other than those mentioned in these operating instructions is allowed only with the prior written permission of BÜCHI Labortechnik AG.

Responsibility of the Operator

The operator is responsible for the instruction of his personnel. Copies of these operating instructions in various languages can be ordered for this purpose.

The operator shall inform the manufacturer without delay of any safety-related events which might occur during operation of the apparatus.

If safe operation of the apparatus no longer appears possible, the apparatus must be shut down and secured against unintentional operation.

It must be assumed that safe operation is no longer possible

- if there is visible damage to the apparatus;
- if the apparatus is no longer functioning;
- following a long period of storage under unfavorable conditions;
- following transport under difficult conditions.

The apparatus must not be operated with flammable substances.

If it becomes necessary to involve Büchi Service, safety and environmental protection considerations require that dangerous substances (e.g., according to EU Regulations L 360, 1976/79, or VBG 16) on or in the apparatus must be indicated and declared.

3 Function

The K-438 digestion system is suitable for digestion processes with concentrated boiling sulphuric acid. The digesting parameters are listed in the Büchi applications.

3.1 Functional Principle

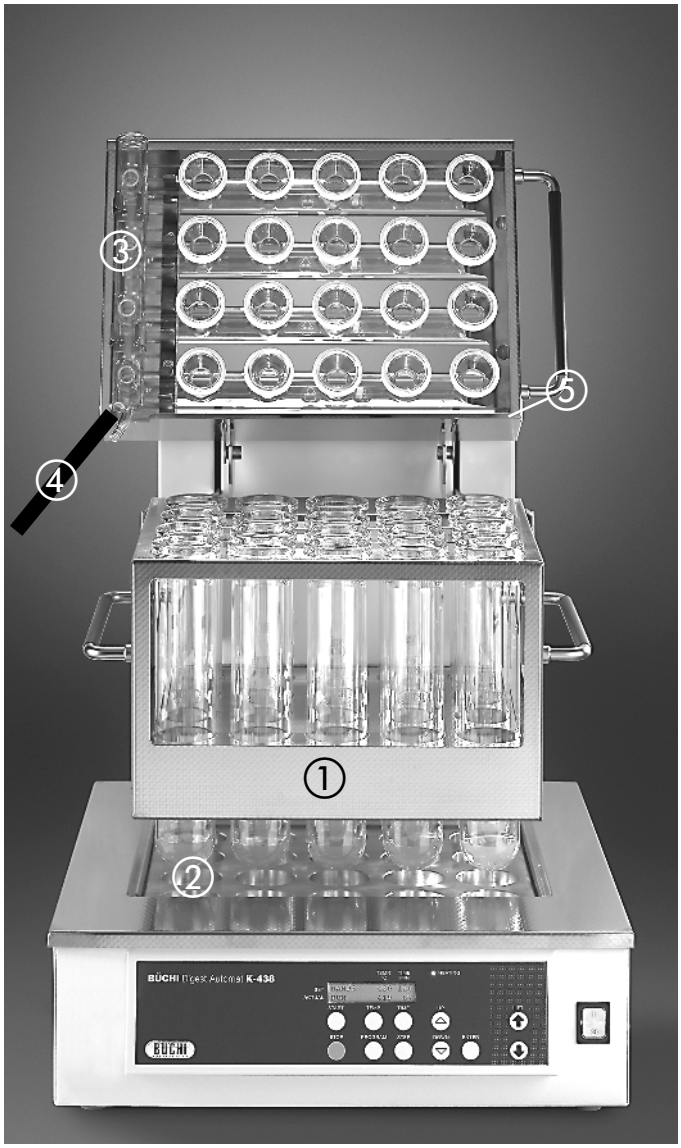


Figure 2: Functional Principle of the K-438

① Rack with digestion tubes	**38621**
② Heating block	
③ Exhaust unit	**38561**
④ Hose for water jet pump or to scrubber B-414	**26275**
⑤ Lift	

4 Installation

4.1 Placement

The apparatus must be set up on a stable, clean, and level surface.
For safety reasons, the lateral clearance of the machine as well as the clearance between the back side of the machine and the wall or between other objects in the vicinity must be at least 5 cm. in each case.

4.2 Unpacking

Keep the original packaging for the event of a later transport.

If the packaging has been damaged, check the apparatus carefully for glass breakage or damage to the casing.

At least two people must be engaged in the manual transport of the machine due to its heavy weight. Watch position of fingers when putting machine down!

Ensure that the voltage of the power outlet corresponds to the voltage given on the apparatus plate. Always connect the apparatus to a grounded outlet. This will avoid risks due to internal defects.

4.3 Connection to Power Supply

Before the K-438 is turned on for the first time, ensure that the power supply voltage corresponds to the voltage given on the apparatus plate.
Then connect the apparatus to the power supply with the apparatus cable.

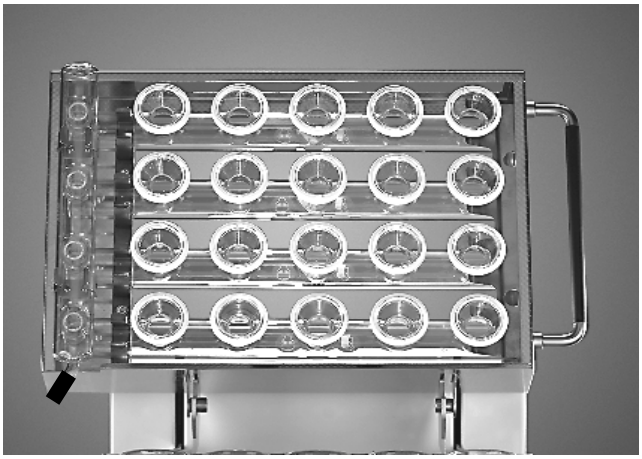


Figure 3: Hose connection, enlarged view

4.4 Hose connection

Fit the EPDM hose to scrubber B-414 or the water jet pump to exhaust the digestion gases. Please ensure here that the hose connections are as short as possible.

When working with a water jet pump, poisonous and caustic gases can escape into the environment if the suction output is not sufficient.

Regarding usage of the Büchi Scrubber B-414, one must ensure that the scrubber is located on the left next to the hydrolysis device. Otherwise the sample tubes cool off too much due to the stream of air from the pump built into the Büchi Scrubber B-414.

If a scrubber is used without condensation step, the condensation that accrues must be caught by means of a Woulff bottle between the hydrolysis unit and the scrubber.

The scrubber B-414 (230 V) can be connected directly on the K-438 using a connecting cable. However, care must be taken to ensure that the voltage of the scrubber is the same as the voltage for the K-438.

5 Operation

5.1 Operator's controls

Figure 4: Controls, front

① Main switch

② Indicator light for heating

Figure 5: Controls, back

③ Mains supply with fuse

④ Mains socket for scrubber B-414

⑤ RS 232 interface

5.2 Keyboard

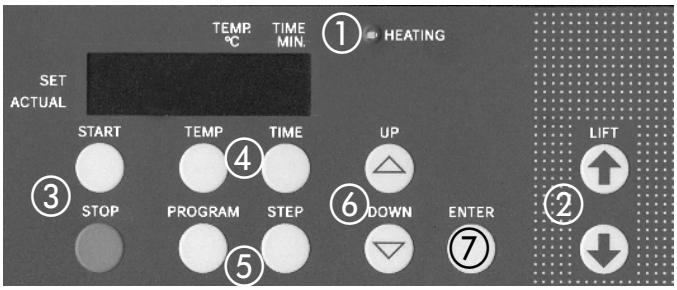


Figure 6: Keyboard

① Indicator light for heating

② Lift

③ Start / Stop

④ Temp / Time

⑤ Program / Step

⑥ Arrow keys

⑦ Enter

5.3 General

It is important that the condensation zone of the sulphuric acid does not rise too high in the digestion tube (maximum of 5 cm below the rim of the tube).

Normally 18 - 20 ml of H_2SO_4 is used for a weighed portion of approx. 1 g of organic material. For weighed portions over and above this, approx. 3 - 5 ml of H_2SO_4 (5 - 10 ml for greases and mineral oils) must be used additionally for each additional gram of organic material.

Hot, caustic sulfuric acid is used for the operation of this apparatus.
For this reason, protective goggles must be worn at all times when using this apparatus or working in its immediate proximity. Close unused connections with plug caps (Art. No. 17396).

It is absolutely essential that the seals on the suction pipes be properly installed and fit the glass evenly!

To vaporize larger amounts of water (> 10 ml), it is advisable to use boiling stones (not glass beads) as this will prevent boiling delays. If the distillation temperature is too high, it is likely to cause substantial boiling delays. The starting temperature should not be greater than 250°C.

The digestion time depends on the substance to be digested and information on this can be found in the Büchi applications. If no Büchi application is available, the digestion time must be ascertained by means of experiments. (Once the solution has become clear, continue to boil the solution for approximately a further 30 minutes.) Once the samples have cooled off, the digestion tube can be connected directly to a Büchi distillation unit for distillation.

Due to different contact surfaces between the hydrolysis tubes and the heating block, not all 20 samples boil simultaneously. However, as long as it is ensured that the hydrolysis time and hydrolysis temperatures are sufficient, the differing speeds of boiling have no influence on the results.

If the digested samples are allowed to cool for a long period of time, the sample will occasionally solidify.
Before it can be distilled, the sample must be liquefied again:

- by carefully adding a small quantity of distilled water, or
- by slightly warming it in the Digestion Unit.

To prevent injury to hands and fingers, no adjustments or handling of the machine is to be done during lifting.

After the hydrolysis has ended the machine should remain connected to power for an additional 30 minutes. In this way the machine is further cooled via a built-in ventilator and thus the service life of the built-in display is extended.

If the machine is turned off via the power supply switch or disconnected from power despite a heating block temperature of > 60°C, a switching-off process takes place.
The following message appears in the display
Power Off Delay
- Cooling -

Through the blinking LED “HEAT” the attention is further drawn to the fact that the hot hydrolysis block still represents a risk of injury.

The machine continues to be cooled via the ventilator. If the heating block temperature falls below 60°C, then the machine is automatically switched off.

5.4 Kjeldahl digestion process (manual mode)

- Switch on the unit and preheat to the required temperature.
- Place the digestion tubes in the rack.
- Pour the samples and reagents into the digestion tubes. It is essential to wear protective goggles.
- Fit sealing covers (Order No. 17396) over any vacant rack positions.
- Fit the sample rack into the fixture provided.
- Mount the suction unit, with the seals fitted, onto the digestion tubes.
- If the digestion temperature has been reached (READY appears on the display), fit the sample rack, with the suction unit fitted, into the heating block and press the START button. (The connected scrubber will start automatically.)

- Start up the scrubber or water jet pump before gases can develop.
- After the hydrolysis has ended a beeping sequence is started. This indicates to the user to hang the sample rack with attached suction unit in the cooling position for cooling. The machine beeps for 10 seconds and repeats this an additional two times after a break of 30 minutes each.
- By pressing the STOP button during the beeping this can be stopped.
- If the machine does not beep, the scrubber can be interrupted by STOP.
- The blinking LED “Heat” indicates that the machine is still hot and is being cooled by the ventilator. After hydrolysis is finished the machine should remain connected to power for an additional 30 minutes. In this way the machine is further cooled and thus the service life of the built-in display is extended.
- Repeat the procedure for additional hydrolyses.

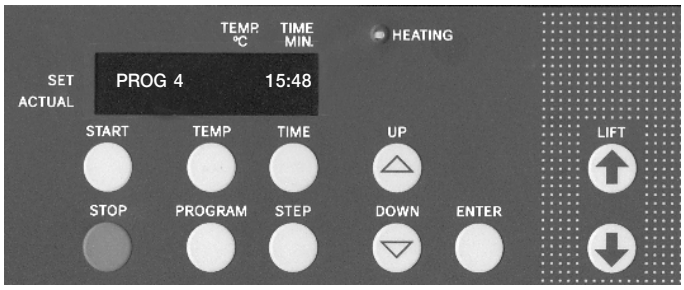
5.5 Kjeldahl digestion process (automatic mode)

- Place the digestion tubes in the rack.
- Pour the samples and reagents into the digestion tubes. It is essential to wear protective goggles.
- Fit sealing covers (Order No. 17396) over any vacant rack positions.
- Fit the sample rack into the fixture provided.
- Mount the suction unit, with the seals fitted, onto the digestion tubes.
- Switch on the unit, select the temperature program required and start digestion using the START button. The digestion process will now be fully automatic. Once the digestion process is complete, you can remove the cooled samples from the K-438 so that the steam distillation procedure can now be undertaken.
- The blinking LED „Heat“ indicates that the machine is still hot, and is being cooled by the ventilator. After hydrolysis is finished the machine should remain connected to power for an additional 30 minutes. In this way the machine is further cooled and thus the service life of the built-in display is extended.
- Repeat the procedure for subsequent digestion processes.

5.6 Operation of the K-438 in manual mode

1. Switching on the K-438

Press the main switch. (Light in switch illuminates green.)
The operating mode most recently selected is displayed.

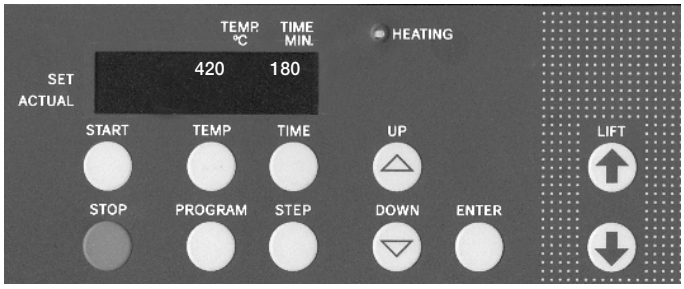


2. Selecting the digestion mode

Press the PROG button. Select the number required by pressing the (∧) or (∨) arrow keys (Prog. No. 0 = Manual mode, Prog. No. 1-9 = Automatic mode).
Confirm the program number by pressing ENTER.

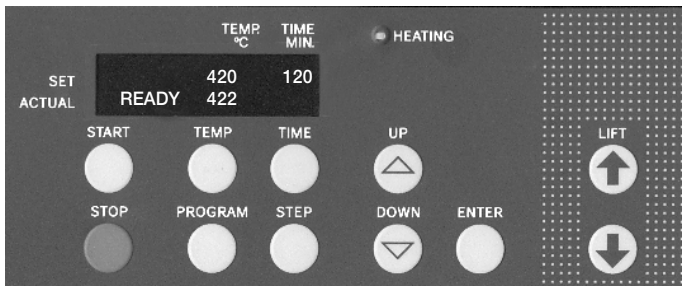
3. Manual mode (=PROG 0)

The temperature and digestion time last selected are shown.



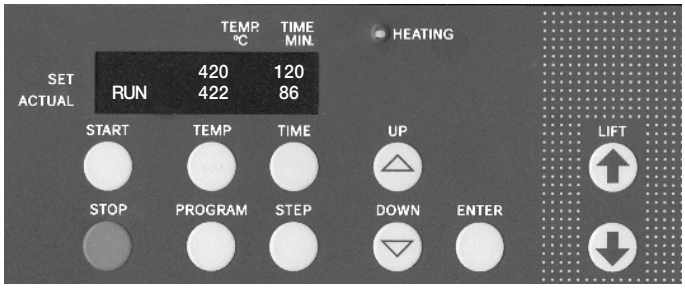
3.1 Editing parameters

The inputs can be changed by pressing the TEMP or TIME buttons. Enter the required temperature or time by pressing the arrow keys (∧) or (∨) and confirm by pressing ENTER. If the “0” is entered for the time, the timer will be switched off and the operator must monitor the digestion time.



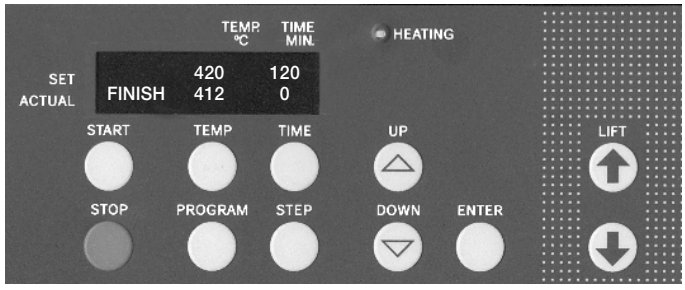
3.2 Starting digestion

Press the START button to start the heating phase. The “READY” indicator on the display shows that the set digestion temperature has been reached. The samples with the suction module fitted can now be moved into the digestion block by pressing the LIFT DOWN button.
The timer is started by pressing the START button again and the remaining digestion time is indicated in the form of a countdown of figures on the display. If the scrubber is connected to the K-438, it is started at the same time as the START button is pressed. If this is not the case, the water jet pump must be started manually.



3.3 Editing the digestion parameters

during the digestion process
The inputs can be changed by pressing the TEMP or TIME buttons. Press ENTER to confirm the changes.



3.4 End of digestion

The heating is switched off at the end of the set digestion time and an alarm sounds to make the operator aware that the digestion procedure has ended. The scrubber continues to operate until the cooling time has ended (see item 3.5) or until such a time as the STOP button is pressed. If “0” is entered for the digestion time, no alarm will sound and the heating will not be switched off. The operator will monitor the

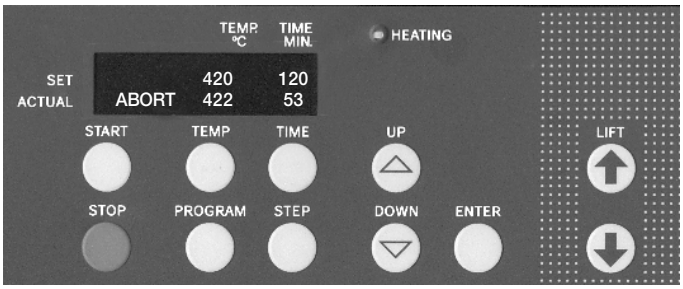
digestion time and, when the procedure has been com pleted, will switch the heating off by pressing the button. The scrubber will continue to operate until the STOP button is pressed for a second time.
(Do not forget to cool off the samples - see item 3.5.)

3.5 Cooling of the digested samples

The LIFT UP button is used to move the sample rack, with the suction module fitted, into the cooling position. (The scrubber or the water jet pump will still continue to operate.) After the cooling phase, the scrubber is switched off by pressing the STOP button.

3.6 Removing the sample rack

Swivel back the suction module and remove the sample rack with the cooled samples.



3.7 Interrupting the digestion

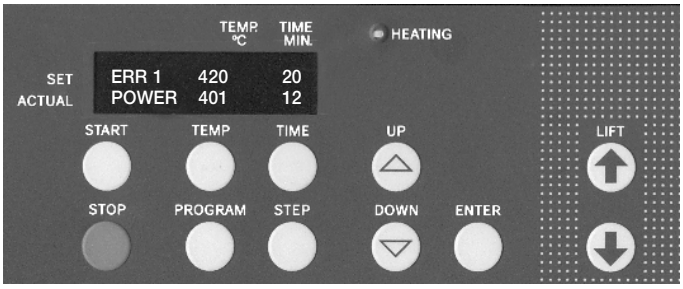
Digestion can be interrupted at any time by pressing the STOP button. In this case, the heating switches it self off and the sample rack moves into the cooling position. The scrubber will continue to operate until the STOP button is pressed for a second time.
(Do not forget to cool off the samples - see item 3.5.
After the hydrolysis has ended the machine should remain connected to power for an additional 30 min utes. In this way the machine is further cooled via a built-in ventilator and thus the service life of the built-in display is extended.

If the machine is turned off via the power supply switch or disconnected from power despite a heating block temperature of > 60°C, a switching-off process takes place.

The following message appears in the display
Power Off Delay
- Cooling -

Through the blinking LED “HEAT” the attention is further drawn to the fact that the hot hydrolysis block still represents a risk of injury.

The machine continues to be cooled via the ventilator. If the heating block temperature falls below 60°C, then the machine is automatically switched off.



3.8 Power failure

The digestion process is interrupted if a power failure occurs. The heating switches itself off and the samples are moved into the cooling position.

5.7 Operation of the K-438 in automatic mode

The most recently selected parameters appear.

1. Enter program

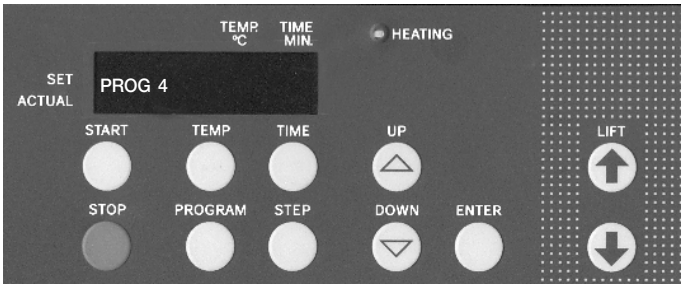
Up to nine temperature programs can be stored.

2. Switch on K-438

Press main switch (switch light is green). The most recently selected mode of operation appears.

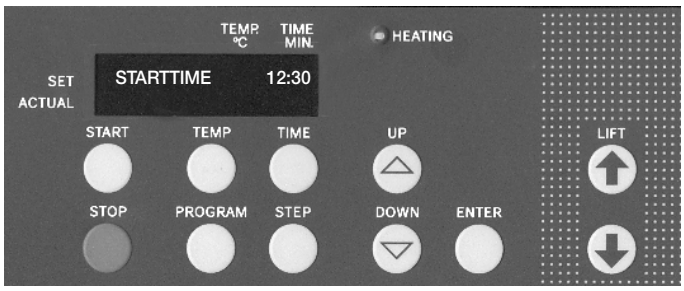
3. Select hydrolysis mode

Select hydrolysis mode Press (PROG) button. With the arrows (∧) or (∨) select the desired number (Prog. No. 1-9 = automatic mode).
Confirm program number with (ENTER).



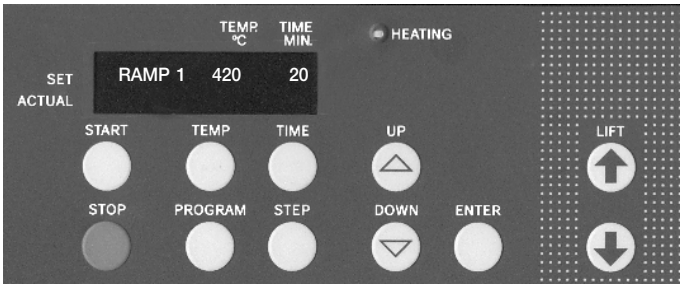
3.1 Accessing the program

Press the PROG button and the arrow keys (∧) or (∨) to access the program number. Press the ENTER but ton to confirm. It is possible to scroll through the pro grams accessed using the STEP button. This allows the parameters accessed to be checked and edited, where required.



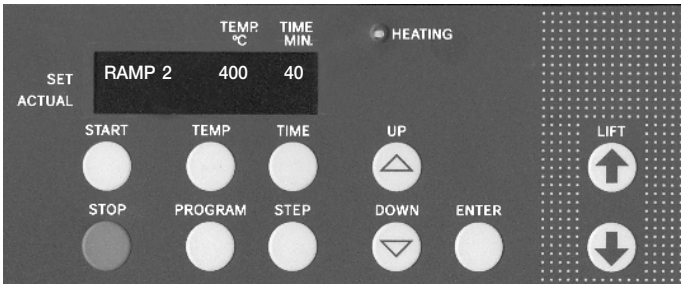
3.1.1 Entering the start time

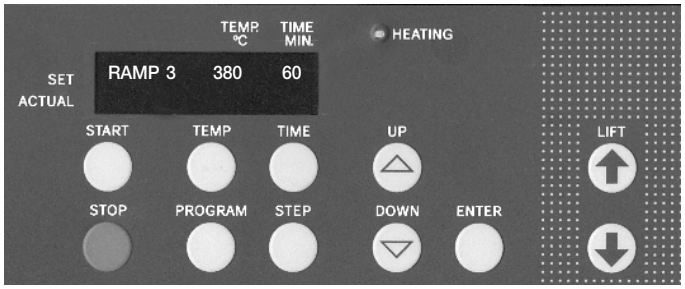
If a delayed switch-on time is required, the required start time is entered by pressing the TIME button and the arrow keys (∧) or (∨) Confirm by pressing the (ENTER) key. Pressing the (STEP) key brings you to the next parameter.

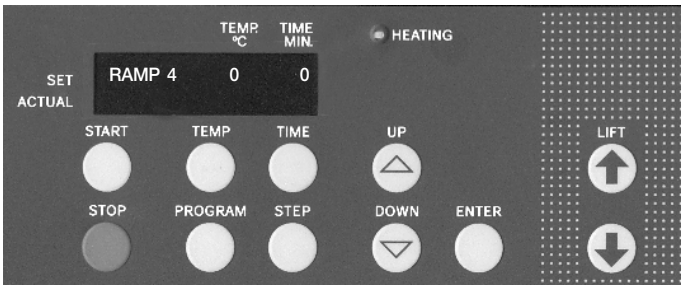


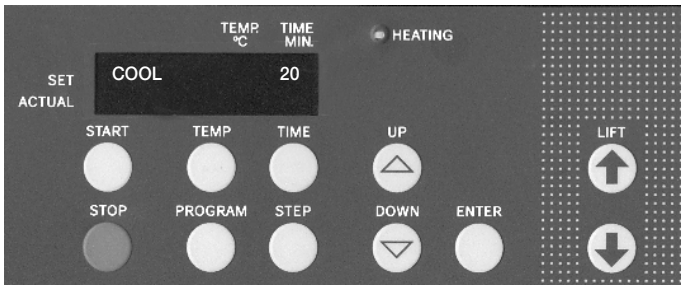
3.1.2 Entering the digestion temperature of the first ramp

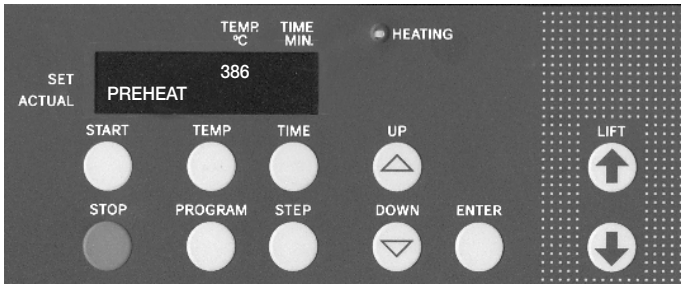
Press the TEMP button and arrow keys (∧) or (∨) to enter the digestion temperature of the first ramp. Press ENTER to confirm. Use the STEP button to move to the next parameter.











3.1.3 Entering the digestion time of the first ramp

Press the TIME button and the arrow keys (∧) or (∨) to enter the digestion time of the first ramp. Press ENTER to confirm. Use the STEP button to move to the next parameter.

Not all ramps have to be used. The temperature and time are set to zero for any unused ramps. Consequently, these ramps will be skipped.

Repeat procedures 4.1.3 and 4.1.4 for ramps 2, 3 and 4.

Once the digestion time for the fourth ramp has been completed, the samples will be moved into the cooling position and the heating will switch itself off.

3.1.4 Entering the cooling time

Press the TIME button and the arrow keys (∧) or (∨) to enter the cooling time. During this time the scrubber will continue to operate. Press ENTER to confirm. Once the cooling time has ended, digestion is complete and the scrubber is switched off.

3.2 Accessing the program

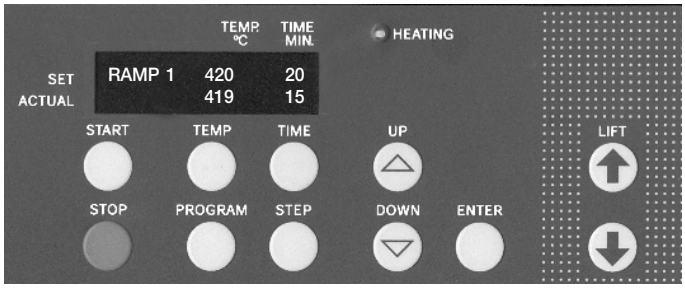
Press the PROG button and the arrow keys (∧) or (∨) to access the program number. Press the ENTER button to confirm. It is possible to scroll through the programs accessed using the STEP button. This allows the parameters accessed to be checked and edited, where required.

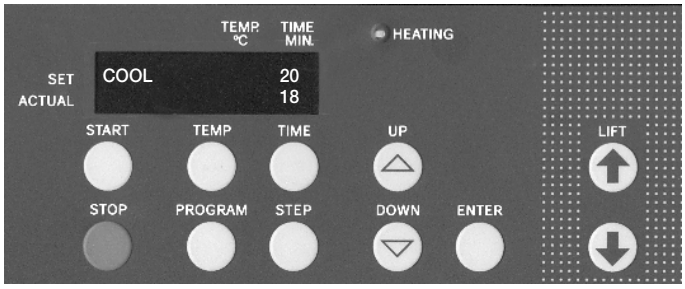
3.3 Editing the program

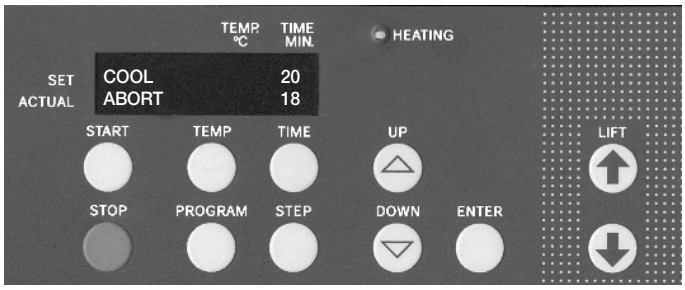
Use STEP to select the required parameters and, depending on whether the value concerned is a time or a temperature, change to edit mode by pressing the TIME or TEMP button. The value is changed using the arrow keys (∧) or (∨) and confirmed by pressing ENTER.

3.4 Starting “Automatic mode = Programs 1-9”

Insert the sample rack with the samples in situ into the K-438, fit the suction module in position and start the required program by pressing the START button. Once the digestion temperature has been reached, the samples are moved automatically into the digestion block and the digestion process is run fully automatically in accordance with the program settings.







3.5 Editing the digestion parameters

during the digestion process
It is not possible to edit the digestion parameters dur ing a digestion process in automatic mode.

3.6 End of the digestion process

The heating is switched off at the end of the set di gestion time and the sample rack moves into the cool ing position. The scrubber will continue to operate until the cooling period has finished.

3.7 Removing the sample rack

Swivel back the suction module and remove the sam ple rack with the cooled samples in situ.

3.8 Interrupting the digestion process

Digestion can be interrupted at any time by pressing the STOP button. In this case, the heating switches itself off and the sample rack moves into the cooling position. The scrubber will continue to operate until the STOP button is pressed for a second time.

After the hydrolysis has ended the machine should remain connected to power for an additional 30 min utes. In this way the machine is further cooled via a built-in ventilator and thus the service life of the built-in display is extended.

If the machine is turned off via the power supply switch or disconnected from power despite a heating block temperature of > 60°C, a switching-off process takes place.

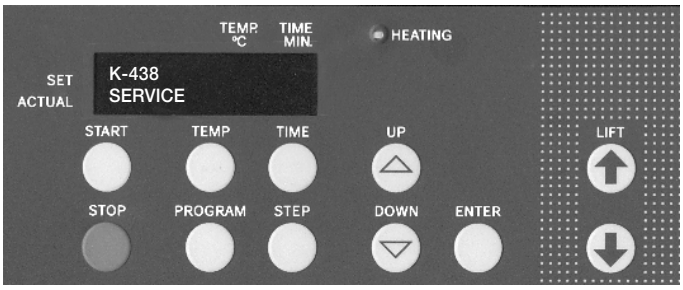
The following message appears in the display
Power Off Delay
- Cooling -

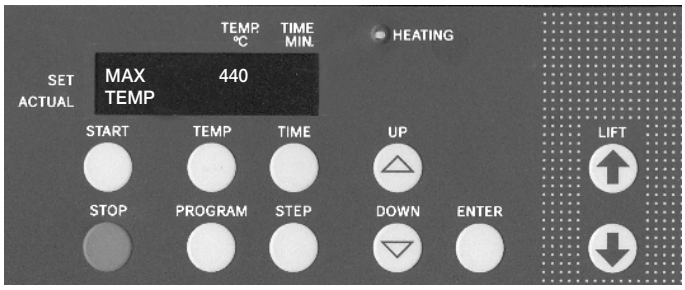
Through the blinking LED “HEAT” the attention is fur ther drawn to the fact that the hot hydrolysis block still represents a risk of injury.

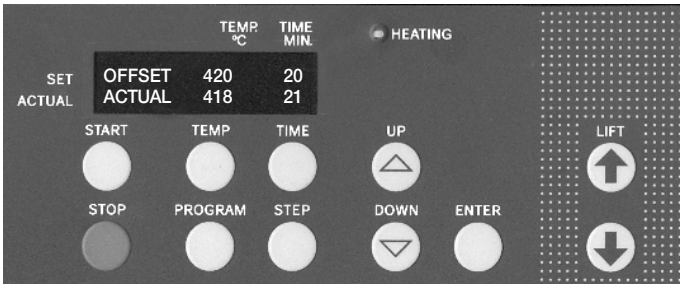
The machine continues to be cooled via the ventilator. If the heating block temperature falls below 60°C, then the machine is automatically switched off.

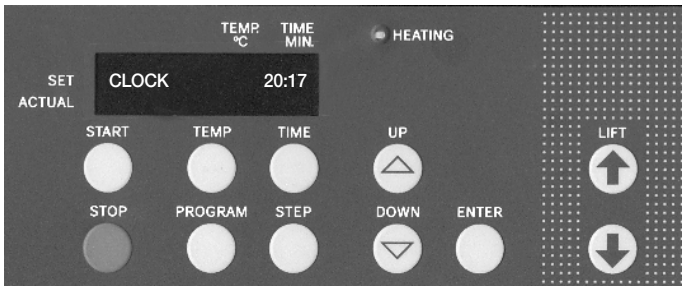
4. Switching off the K-438

Press the main switch. (Light in switch will go out.)









5.8 Service Menu

1. Accessing the service menu

Press the STOP button for approx. 3 seconds. The service menu will be displayed. In each case, use the STOP button to move to the next submenu.

2. Contrast

The contrast is corrected by using the arrow keys or by (v).

3. Maximum temperature

For reasons of safety, the maximum temperature ex works is limited to 420°C. If a lower or higher digestion temperature is required, this can be changed here within a range of between 100°C minimum and 450°C maximum.

Warning:

Digestion temperatures of over 420°C may result in a loss of nitrogen. If digestion times exceed 180 minutes, the rise in the temperature at the rack may result in the seals being damaged.

4. Temperature calibration

If the actual temperature measured is different from the specified temperature, use the arrow keys (^) or (v) to correct this.

5. Setting the time

The real time clock is adjusted using the arrow keys (^) or (v) and the time set is confirmed by pressing ENTER.

5.9 Error messages

ERR 1 Power

The hydrolysis process is interrupted through an interruption of power.
The heat is turned off.
If the interruption of power is remedied, the error message can be deleted from the display by pressing “STOP”.

ERR 2 Temperatures

The current heating block temperature exceeds the programmed temperature by more than 10°C.
The hydrolysis is automatically stopped and the heat switched off.

ERR 3

Due to a blocked or defective ventilator the internal temperature of the machine exceeds 60°C. The machine must be switched off as fast as possible. Please contact Büchi Service.

6 Maintenance

6.1 General

The housing of the Digestion Unit K-438 is made of metal and covered with an acid-resistant coating.

To avoid damage to this coating, any acid drops should be wiped away with a damp cloth.
Avoid any scratching of the coating whatsoever!

6.2 Upkeep

Daily care:

- Check glass components for damage.
- Clean housing components with a damp cloth.

The glass components are clean.

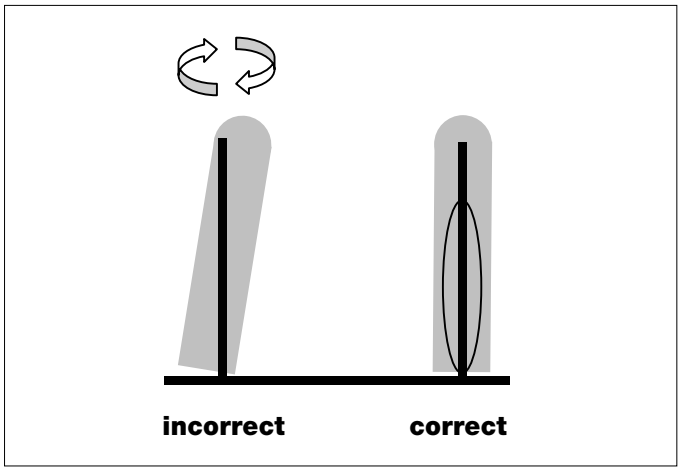


Figure 7: Cleaning the digestion tubes

Cleaning the digestion tubes

If individual digestion tubes are not washed correctly in the laboratory washing machine, the inside of the tubes may be scratched. Digestion tubes which have sustained such damage may break during digestion. An optional retaining plate (No. 38559) is available which will allow the digestion tubes together with the sample rack to be washed in the laboratory washing machine. This procedure will prevent the tubes from being damaged.

Procedure

- Mount the retaining plate on the rack at the points provided.
- Position with rack in the laboratory washing machine with the openings on the tubes pointing downwards.
- Remove the retaining plate after washing. The digestion tubes are ready for the next time they are used.

Cleaning the exhaust unit

The exhaust unit can be cleaned under running water or in the laboratory washing machine.

6.3 Seals

The seals are expendable material and must be replaced if they are damaged or no longer seal properly.

Inspection and Maintenance Requirements

Observe all guidelines which aim at maintaining the apparatus in operable condition. This includes regular cleaning and inspection for possible damage.
The operator shall carefully check the apparatus for proper operation following every repair.

6.4 Power Supply Fuse

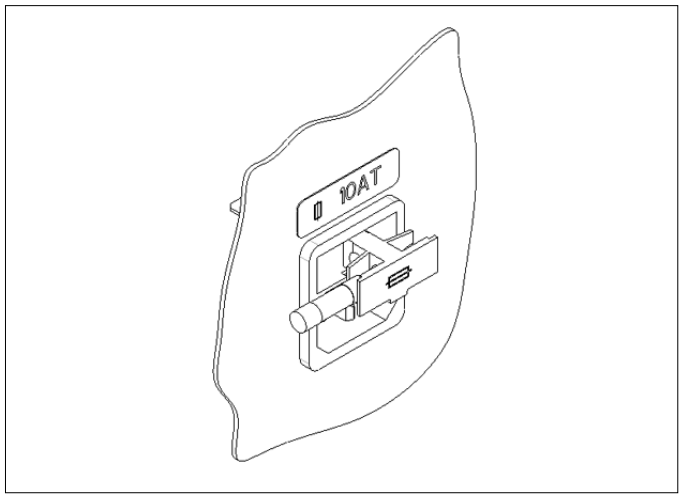


Figure 8: Apparatus plug, built-in

Proceed as follows to change the fuse:

- Pull out the power supply cable
- Remove the fuse holder
- Replace the fuse with a new fuse of the same values:
  - 230V: T 10A L 250V
- Replace the fuse holder

6.5 Customer Service

Work on or in the apparatus may be carried out only by authorized service personnel. These are people with sound technical vocational training and knowledge of the risks which result when safety measures are disregarded. BÜCHI customer service offices have service manuals specific to the various apparatus; these manuals can be obtained only by authorized personnel.

The addresses of the official BÜCHI customer service offices are listed on the last cover page of these operating instructions. If malfunctions arise or if you have technical questions or problems in operating the apparatus, please consult these offices.

BÜCHI's customer service provides the following services:

- Spare parts service
- Repair service
- Maintenance service
- Technical consulting

7 Taking out of operation

Any dangerous substances must be removed and the apparatus must be cleaned thoroughly. This avoids any risk that persons could be injured by contact with dangerous substances.

7.1 Storage/Transport

After it has been cleaned, return the apparatus to the original packaging for storage and transport.

7.2 Disposal

Chapter 9, Appendix, Table 6 contains a list of the materials used in the manufacture of the most important parts of the apparatus so that it can be disposed of in accordance with environmental regulations. This ensures that the various parts can be separated and recycled properly. Dispose of electronic components in accordance with the applicable regulations. Please observe the valid regional and local statutes in disposing of the apparatus.

8 Spare parts

Only original accessories and spare parts from BÜCHI guarantee that the apparatus will function properly and safely. Spare parts and accessories from other manufacturers may be used only with the express permission of the manufacturer. The above-mentioned spare parts may be used in assembling or dismantling the apparatus only as described in Chapter 6 of these operating instructions. It is forbidden to allow third parties to view or possess this manual; production of the apparatus based on this manual is forbidden.

8.1 Spare parts

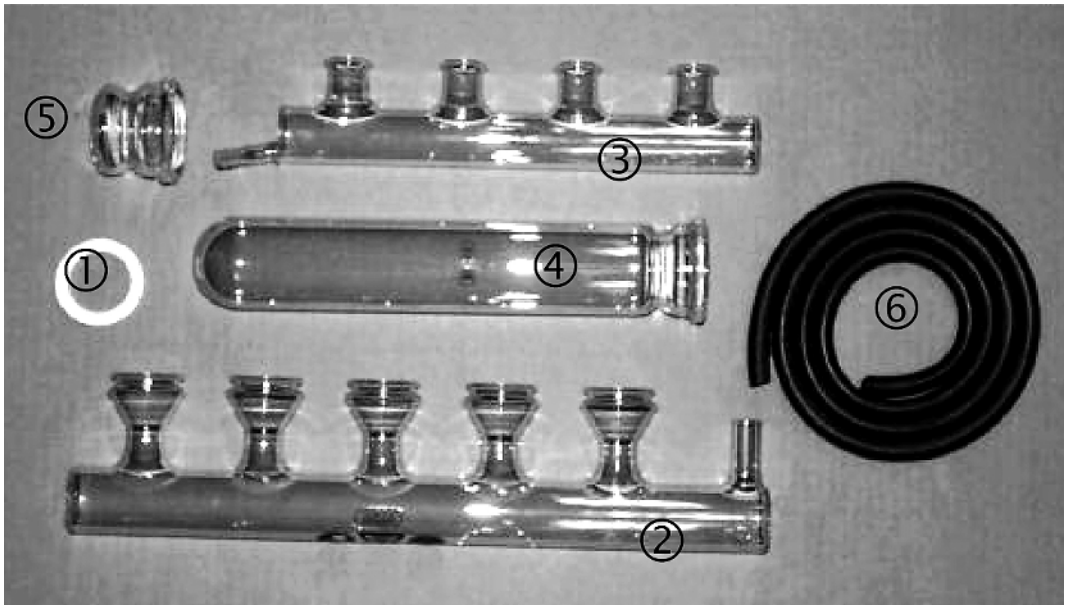


Figure 9: Spare parts K-438

No.	Description	Order No.
①	PTFE seal, set of 20 seals	**38623**
②	Suction tube	**38527**
③	Vapour collection tube	**38530**
④	Digestion tube, set of 4 tubes	**37377**
	Rack, 20 spaces, complete	**38621**
⑤	Sealing cover	**17396**
⑥	EPDM hose, 1.5 m, 8 mm	**26275**
	Fuse, set of 10 fuses	**16952**

Table 4: Spare parts

9 Appendix

9.1 Technical Data

Measurements (width x height x depth)	435 x 558 x 771 mm
Voltage	230 V, 50/60 Hz
Connected value	2200 Watt
Power input	10 Ampère
Weight (net) (incl. 20 digestion tubes)	41 kg
Overvoltage category	II
Pollution degree	2
Ambient temperature	5 – 40°C
Humidity	< 90 %
Temperature range	50 C° to 420 C° (450°C)
Temperature drift	+/- 5°C

Table 5: Technical data

9.2 Materials used

Part	Material	Material code
Housing	Sheet steel DC01 + EVZ	DIN17162
Coating	Polyester/epoxy	PEP 31
Lift guide	Polyethylene	PE ST 250
Heating block	Aluminium AlMgSi 1	DIN 3.2315
Insulation	Thermal Ceramiks 800	X-607
Rack	Sheet steel, stainless	1.4301
Glass components	Borosilicate 3.3	DIN/ISO 3585
Hose	Ethylene/propylene terpolymer rubber	EPDM

Table 6: Materials used

9.3 Declaration of confirmity

We **Büchi** Labortechnik AG
Postfach, CH-9230 Flawil
Switzerland

do hereby declare on our responsibility that the product:
BÜCHI Digest Automat **K-438**

which is the object of this certification, is in accordance with the following norms:

EN 292-1:1991
Safe operation of machines; basic terminology; methodology

EN 292-2:1991
Safe operation of machines; technical rules and specifications

EN 60335-1:1988 (~IEC 335-1 VDE 0700-1 SEV 1054-1)
Safety regulations for household appliances

EN 55011:1991/B (~VDE 0875/B VDE 0871/B)
Limits and measuring procedures for radio interference by industrial, scientific, and medical high-frequency apparatus

EN 50081-1:1992
Electromagnetic compatibility – technical basic norm for interference broadcast in residential zones, business zones, and small industry

EN 61000-3-2: 1995/1996
Limits for harmonic current emissions
EN 61000-3-3: 1995
Limitation of voltage fluctuations and flicker

In accordance with the regulations of the EU guidelines
89/392/EWG machine guidelines

Flawil, 08.01.2001

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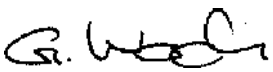

Guido Worch
Qualitymanager