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** Digestion Unit **K-435**. 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 (20 pages)	Order code
K-435 Operating Instructions	**96721**

1 Scope of delivery

Figure 1: K-435

Description			**Order code**
Gerätevarianten:			
K-435	230 V	50 / 60 Hz	**38130**

Table1: Apparatus models

Enclosed parts:		
12	Digestion glasses	**03904**
2	Racks	**26730**
2	Upper insulation plate	**26736**
2	Suction module, complete	**26842**
2	Connections to suction module	**26875**
2	Digestion glass holders, complete	**38080**
1	Contact guard, pre-mounted	**26878**
1	Power cable of the following types:	
	Type CH	**10021**
	Type Schuko	**10029**
	Type GB	**17833**
	Type AUS	**17834**
	Type USA	**33756**
1	Set of operating instructions in one of the following languages:	
	German	**96720**
	English	**96721**
	French	**96722**
	Italian	**96723**
	Spanish	**96724**
1	Packaging	**34447**

Table 2: Enclosed parts

Optional Accessories:	
Water jet pump made of plastic	**02913**
Cover	**17396**
Seal PTFE to suction pipe	**22442**
Collection basin for suction pipe	**27737**
Condensate flask, complete	**25100**
Suction module for H_2O_2 digestion	**37399**
Suction pipe with condensate control	**26880**
Connecting cable to Scrubber B-414	**14738**
Control cable to B-436	**26849**
Büchi Scrubber B-414	**37876**

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.

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.

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 Unit K-435 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 Digestion Unit K-435 is suitable for digestions using boiling concentrated sulfuric acid within a temperature range of up to approximately 370° C.

3.1 Functional Principle

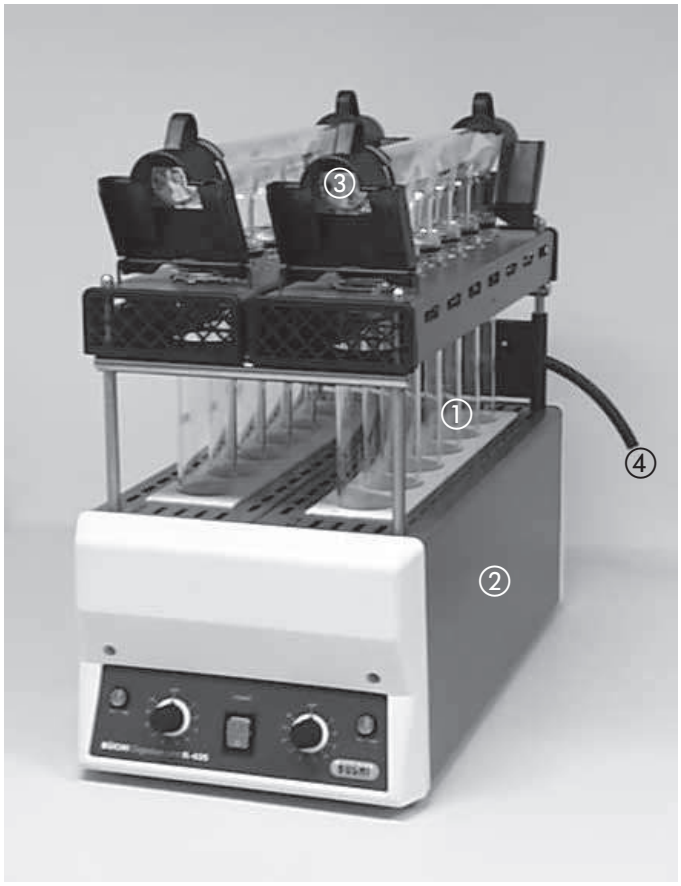

Figure 2: Functional Principle of the K-435

① Digestion glasses

② Heating

③ Suction module

④ Hose for water jet pump or to Scrubber B-414

4 Installation

4.1 Placement

The apparatus must be set up on a stable, clean, and level surface.
The apparatus must be placed with its back at a minimum of 30 cm from walls and other objects in order to prevent damage. Containers, chemicals, or other apparatus may not be placed behind the unit.

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.

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-435 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.

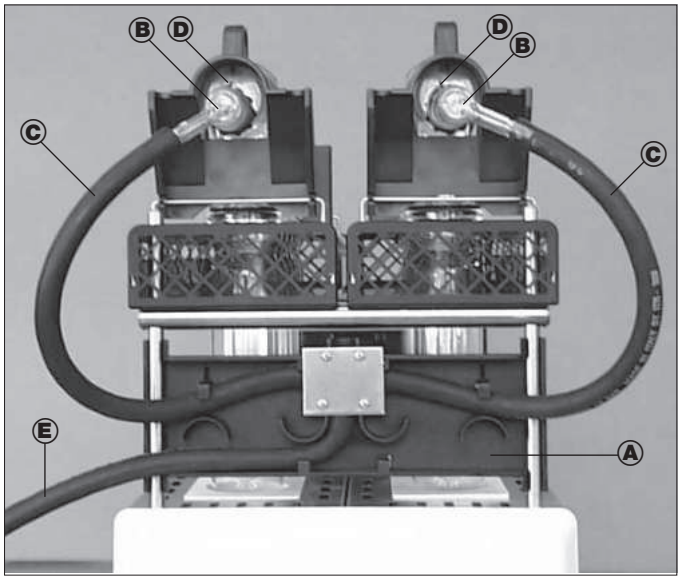

Figure 3: Hose connections, enlarged view

4.4 Hose Connections

Place the contact guard (A) with the pre-mounted hoses on the apparatus as shown in the photo.

Assemble the connection to the suction module (B) and mount it on the hose (C) and on the suction module (D).

To exhaust the digestion gases, connect the EPDM hose (E) to the Scrubber B-414 or a water jet pump (e.g., one made of plastic, Article No. 02913). Please note that the shortest possible hose connections should be used.

When a water jet pump is used, unpleasant odors can escape into the immediate surroundings if the suction is inadequate.

If only a suction module (D) is used, the unused hose (C) must be closed with a rubber stopper.

The Scrubber B-414 220 V, 240 V can be connected directly to the K-435 with a connecting cable (Art. No. 14738). However, care must be taken that the voltage of the scrubber corresponds to the voltage of the K-435.

If the apparatus is operated without remote control, the control of the scrubber B-414 is regulated by the main switch on the Digestive Unit, or in other cases with the Control Unit B-436.

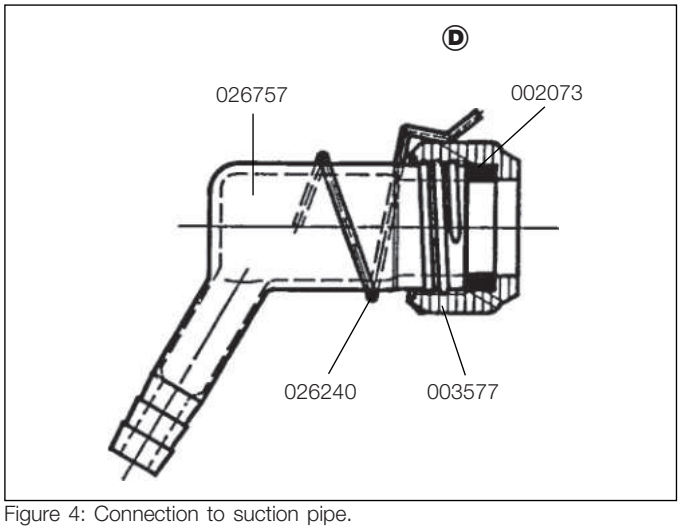

Figure 4: Connection to suction pipe.

5 Operation

Figure 5: Placement of controls and operational elements on the front

5.1 Operational features

① Main switch

② Heat regulator

③ Warning light for heating

④ Power supply connection with fuse

⑤ Power socket for Scrubber B-414

⑥ Connection for B-436

Figure 6: Placement of the controls and operational elements on the back

5.2 Operational features and their function

Main switch ①
Turns the apparatus on and off.

Heat regulator ②
Regulates the heat in stages from 1-10.

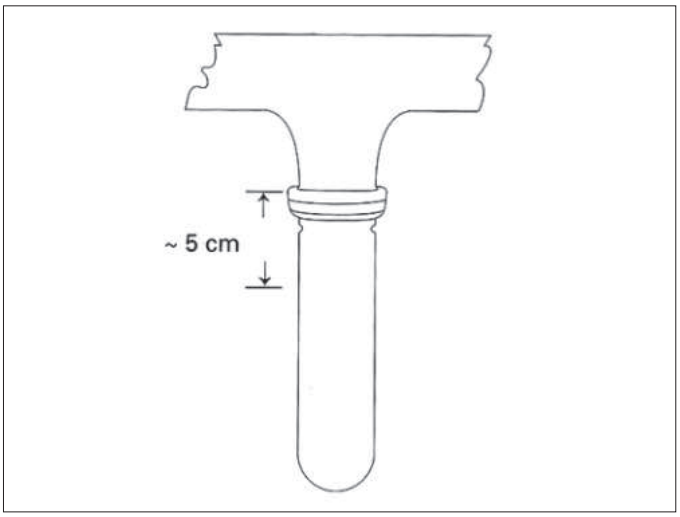

Figure 7: Condensation zone for sulfuric acid

5.3 General

The heating process causes the digestion glasses to be heated evenly from all sides, ensuring good distillation characteristics (no retardation of ebullition). Ebullition beads are needed only for the evaporation of quantities of water greater than 10 ml (do not use glass beads).

It is important that the condensation zone of the sulfuric acid in the digestion glass not rise too high (maximum of 5 cm under the edge of the glass).

As a rule, 18-20 ml H2SO4 will be used for a sample weight of approximately 1 g of organic material.

If the sample weight is higher, approximately 3-5 ml H2SO4 (for fats and mineral oils, 5-10 ml) must be used for every 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!

Figure 8: Seals

Figure 9: K-435

The proper heat setting is dependent on various factors such as the digestion quantity, the type of reagents, etc.

Normally digestion of the samples will be conducted at the full setting in order to minimize the amount of time needed for the procedure.

The digestion time depends on the material being digested and must be determined by actual practice (continue boiling the solution for approximately 15 minutes after it has become clear). After the sample has cooled, the digestion glass can be connected directly to a Büchi Distillation Unit for distilling.

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.

Figure 10: Operation of K-435

5.4 Conducting Kjeldahl Digestion

- Turn on the apparatus ① and preheat it at Setting 10 for approx. 5 minutes.
- Wear protective goggles!
- Place the digestion glasses in the digestion glass holder ② on the rack ③.
- Add the sample and the reagents to the digestion glasses ④.
- Close the unused connecting pieces with plug caps (Art. No. 17396).

Never operate the apparatus with empty digestion glasses!

- Place the suction module ⑤ with the mounted seals over the digestion glass holder..
- Turn on scrubber or water jet pump before any gases form.

5.5 Conducting Kjeldahl Digestion in Remote Control Operation

- Connect the Büchi Control Unit B-436 to the Digestion Unit and turn on the apparatus.
- Enter the parameters on the B-436.
- Set the regulator on the Digestion Unit at Setting 0.
- Place the digestion glasses in the digestion glass holder on the rack.
- Add the samples and the reagents to the digestion glasses.
- Close the unused connecting pieces with plug caps (Art. No. 17396).

Never operate the apparatus with empty digestion glasses!

- Place the suction module ⑤ with the mounted seals over the digestion glass holder.
- Begin digestion by pressing the START button on the Control Unit B-436 (Scrubber B-414 starts automatically; manually start the water jet pump before any gases form).

5.6 Malfunctions

Malfunction	Possible Cause	Correction
Heating elements do not heat	1. Apparatus is not connected to power supply	- Connect the apparatus to the power supply
	2. Apparatus is turned off	- Turn off apparatus
	3. Heat regulator is at setting „0“	- Set to setting "10"
	4. Heat regulator is defective	- Replace regulator
	5. Heating elements are defective	- Replace heating elements
Light does not come on (H 1)	Light is defective	Replace light

Table 4: Malfunctions

6 Maintenance

6.1 General

The casing of the Digestion Unit K-435 is made of metal and covered with an acid-resistant coating.

To avoid damage to this synthetic 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 parts for damage.
- Clean synthetic parts with a damp cloth.

The glass parts are cleaned.

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 Replacing Insulation

Before changing any components of the apparatus, disconnect the apparatus from all power sources in order to prevent possible electric shocks.

Electric and electronic components must be replaced by authorized personnel only.
Do not attempt to replace any components when the apparatus is still hot or warm. Allow it to cool first!

Upper Insulation Plate

This insulation can easily be reached and can be replaced without using any tools.

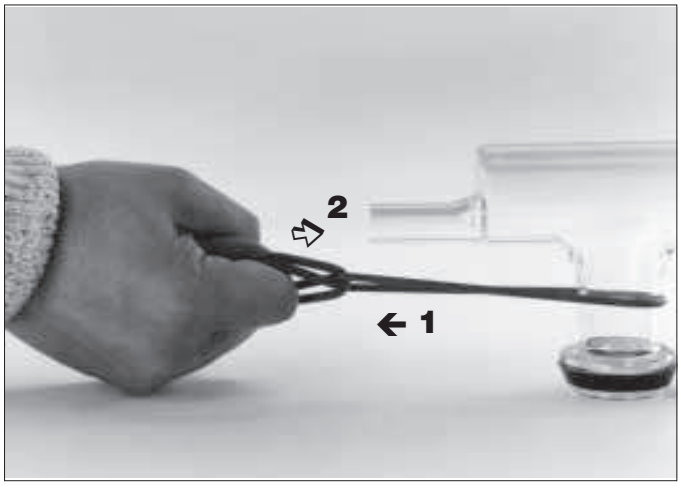

Figure 11: Changing O-Rings

6.5 Changing O-Rings

- Cut through the damaged washer with a knife of scalpel
- Remove the glass holder
- Draw the new washer over the suction module (cf. photo)
- Replace glass holder and secure with washer

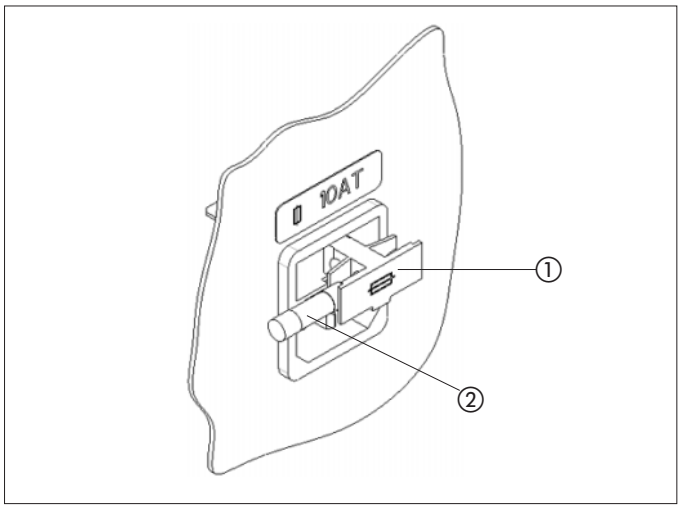

Figure 12: Apparatus plug, built-in

6.6 Power Supply Fuses

The power supply fuses can be changed by following these steps:

- Pull out the power supply cable
- Remove the fuse holder ①
- Replace the fuse ② with a new fuse of the same values:
  - 230V: T 10A L 250V
- Replace the fuse holder

6.7 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 7 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 Replacement 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 Replacement parts

No.	Description	Order code
①	Connection to suction pipe, complete	**26875**
②	Seals Viton Standard (6 seals)	**38122**
	Seal PTFE	**22442**
③	O-Ring	**26785**
④	Suction pipe	**26755**
⑤	Glass holder set for suction pipe, including 2 O-rings (26785)	**26877**
⑥	Upper insulation plate	**26736**
⑦	Contact guard	**26797**
⑧	Digestion glass holder, complete	**38080**
⑨	Cap for digestion glass holder	**26791**
⑩	Flat spring (12 springs)	**38123**
⑪	Plug cap	**17396**
⑫	Digestion glass (4 glasses)	**37377**
⑬	Rack	**26730**
	EPDM hose 8 mm	**26275**
	T-connection Ø 10mm	**26835**
	Fuses T10A L250V (10 pieces)	**16952**

Table 5: Replacement parts

9 Appendix

9.1 Technical Data

Measurements (width x height c depth)	275 x 600 x 570 mm
Voltage	230 V ± 10%, 50/60 Hz
Connected value	2200 Watt
Power input	10 Ampère
Weight (net)	approx.. 20,9 kg
Overvoltage category	II
Pollution degree	2
Ambient conditions	for indoor use only, below 2000 m.s.l. maximum relativ humidity 80% for temperatures up to 30°C, temperature 10 - 40°

Table 6: Technical data

9.2 Materials used

Description		**Materials**	**Material code**
Housing	Front- and rearside	Polyurethane	PUR
	Side panels	Stainless steel / Perfluoralkoxy	1.4435 / PFA
Glass parts		Borosilikat-Glas 3.3	DIN/ISO 3585
Contact guard		Polyphenylensulfrol	PPS
Insulation			
Metals		Stainless steel	
Hoses		Polytetrafluorethylene	PTFE

Table 7: Materials used

9.3 FCC requirements (for USA and Canada)

English:

This equipment has been tested and found to comply with the limits for a Class A digital device, pusuant to both Part 15 of the FCC Rules and the radio interference regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is like to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Français:

Cet appareil a été testé et s'est avéré conforme aux limites prévues pour les appareils numériques de classe A et à la partie 15 des règlementation FCC à la règlementation des radio-interférences du Canadian Department of communications. Ces limites sont destinées à fournir une protection odéquate contre les interférences nétastes lorsque l'appareil est utilisé dans un environnement commercial.

Cet appareil génère, utilise et peut radier une énergie à fréquence radioélectrique, il est en outre susceprible d'engendrer des interferences avec les communications radio, s'il n'est pas installé et utilisé conformément aux instructions du mode d'emploi. L'utilisation de cet appareil dans les zones résidentielles peut causer des interférences nèfastes, auquel cas l'exploitant sera amené à prendre les dispositions utiles pour polier aux interférences à ses propres frais.

9.4 Declaration of confirmity

We

BÜCHI Labortechnik AG
Postfach, CH-9230 Flawil, Switzerland

do hereby declare on our responsibility that the product:

BÜCHI Digestion Unit **K-435**

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

In accordance with the regulations of the EU guidelines
80/392/EWG machine guidelines

Flawil, 02. February 2000

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