



LAB Online Exhibition



Operation Manual



knowledge



Action movie

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Read these instructions thoroughly before you use the **BÜCHI** Digestion Unit **K-424**. Store these instructions in the immediate vicinity of the apparatus so that they may be consulted at any time.

The unit must only be connected to the mains and switched on after having completed all necessary preparations.

Chapter 2 contains important safety information. Knowledge of this is imperative for the safe operation of the Digestion unit.

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en, Version B (20 pages)

Order No.

K-424 Operating instructions

96711

1 Scope of delivery

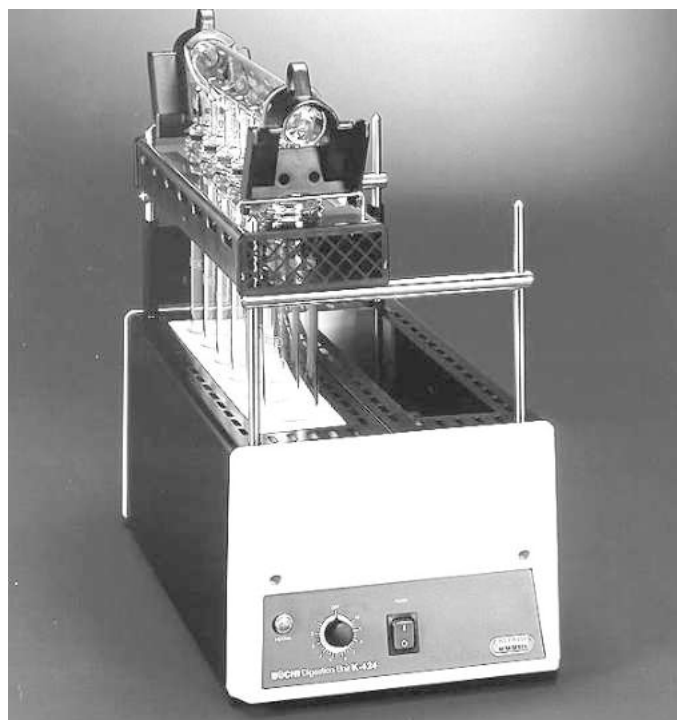


Fig.1: Overview K-424

Description	Order No.
Versions:	
K-424 120 V 50 / 60 Hz	37963
K-424 230 V 50 / 60 Hz	37962

Table 1: Versions

Enclosed parts:	
6 Digestion tubes	03904
1 Rack	26730
1 Upper insulating plate	26736
1 Suction module complete	26842
1 Connection to suction module	26875
1 Digestion tube holder complete	38080
1 EPDM Hose 8mm	26275
1 Mains cables:	
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	96710
English	96711
French	96712
Italian	96713
Spanish	96714
1 Packaging	26799

Table 2: Enclosed parts

Accessories:	
Water jet pump plastic	02913
Glass cap	17396
Gasket PTFE to suction tube	22442
Collection tube for suction tube	27737
Condensation bottle complete	25100
suction module for H ₂ O ₂ disintegration	37399
Büchi B-414 Scrubber	37876
Suction pipe with condensation gutter	26880

Table 3: Accessories

2 Safety

The apparatus has been built in accordance with state-of-the-art technology and recognized safety regulations. Nonetheless risks and dangers can arise from the apparatus:

- If the apparatus is operated by insufficiently trained personnel.
- If the apparatus is not used as directed.

2.1 Symbols



Stop

Information on dangers which can lead to serious damage to property, to severe or life-threatening injuries.



Warning

Information on dangers which can lead to damage to health or property.



Please note

Information on technical requirements. Noncompliance can lead to faults, inefficiency and production losses.

2.2 Requirements for the operator

The unit is only to be used by laboratory and specialist personnel and other persons, who, because of their training or professional experience, are able to assess the dangers which can result while operating the equipment.

2.3 Regulation use

The unit is conceived and built as a piece of laboratory equipment. Its regulation use is the heating of concentrated sulfuric acid used in the oxidation of organic samples.

2.4 Non-regulation use

Any other use than listed as well as any use which does not correspond to the technical data is a misuse. The operator bears sole risk for eventual damage related to such use.

In particular the following uses are not allowed:

- operation in explosion-prone areas
- operation with samples that can explode or ignite due to impact, friction, heat or sparking.

2.5 General hazards

General hazards arise from:

- Hot sulfuric acid
- Combustible gases or vapors in the immediate vicinity of the apparatus
- Damaged glassware
- Location of the apparatus too close to the wall (see section 4.1 Set up location)
- Hot surfaces

Except for authorized repair personnel it is forbidden to remove covers using commercially available tools.

The device must not be put into operation with damaged glass parts.



Contact with electrically live parts presents a danger to life and limb!

2.6 Safety measures



It is recommended that the apparatus be operated exclusively under an exhaust hood.

The wearing of personal safety equipment such as **safety glasses, gloves** and **laboratory coats** is necessary.

As a necessary part of the digestion unit K-424, this instruction manual must at all times be available to the operating personnel at the location where the apparatus is being used. This also applies to the further editions in other languages which may be ordered separately.

Modifications

Any modifications on the apparatus itself or on replacement or accessory parts, and any use of replacement or accessory parts other than those listed in these operating instructions is permissible only with the express written approval of Büchi Labortechnik AG.

Responsibilities of the operator

The operator is responsible for providing proper instruction for his staff. For that purpose, these operating instructions may also be ordered in other languages.

The operator must inform the manufacturer immediately of any and all events relevant to product safety that arise during his operation of the apparatus.

If assuming that a safe operation is not possible any more the unit must be put out of operation and secured against unintended further operation.



It is to be assumed that a safe operation is not possible any more

- if the unit is visibly damaged,
- If the unit is not functioning any more
- after long storage under unfavourable conditions,
- after being transported under difficult conditions.

The unit must not be operated with combustible substances.

If you need the assistance of Büchi Service, it is required to indicate and declare eventually remaining dangerous substances (e.g., as defined in EC guidelines L 360, 1976/79 or VBG 16) in or on the apparatus for reason of on-the-job safety or pollution control.

3 Function

The digestion unit K-424 is suitable for digestions involving concentrated boiling sulfuric acid at a temperature of approximately 370° C.

3.1 Principle of operation

- ① Sample tubes
- ② Heating
- ③ Suction module
- ④ Hose to water jet pump or to Scrubber B-414.

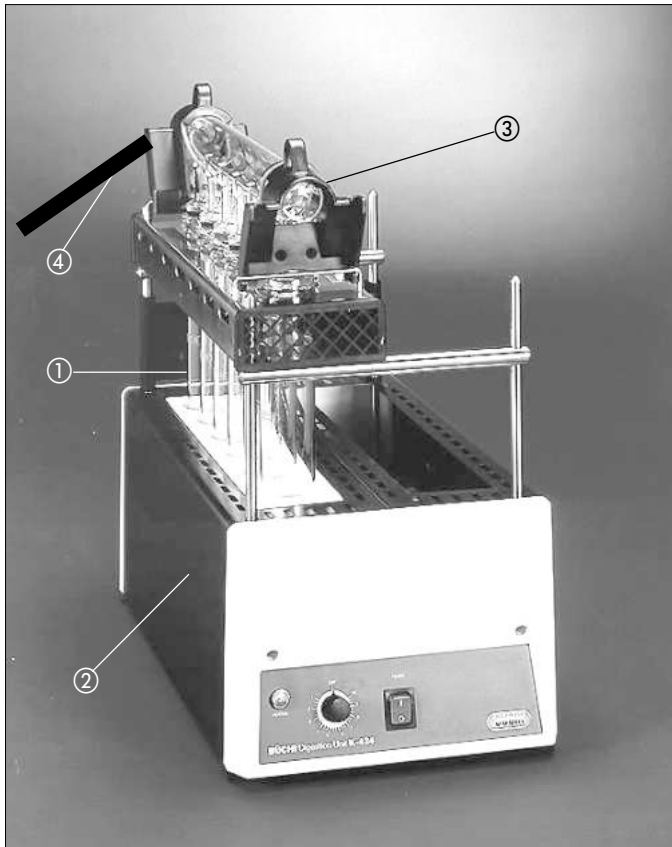


Fig. 2: Principle of operation K-424

4 Putting into operation

4.1 Setup location

The digestion unit must be installed on a stable, clean and flat base.

For reasons of safety, a gap of at least 30 cm must be left open between the back of the machine and the wall or other objects. Never place any containers, chemical products or other equipment behind the digestion unit.



4.2 Unpacking

The original package must be kept for possible later transport.

If the package has been damaged, check the machine carefully for broken glass or damage to the housing.

Make certain that the socket voltage is the same as that shown on the machine nameplate. Always connect the machine to an earthed (grounded) socket. This avoids risks due to an internal defect.

4.3 Connection to the mains

Before switching on the K-424 for the first time check that the voltage on the socket corresponds to the voltage indicated on the apparatus identification plate.

Always connect the apparatus to a grounded (earthed) socket.

External couplings and extension cords must contain a protective conductor (3-pole couplings, cables, and plug-in devices). Any and all interruptions in the protective conductor are forbidden. This avoids risks due to an internal defect.

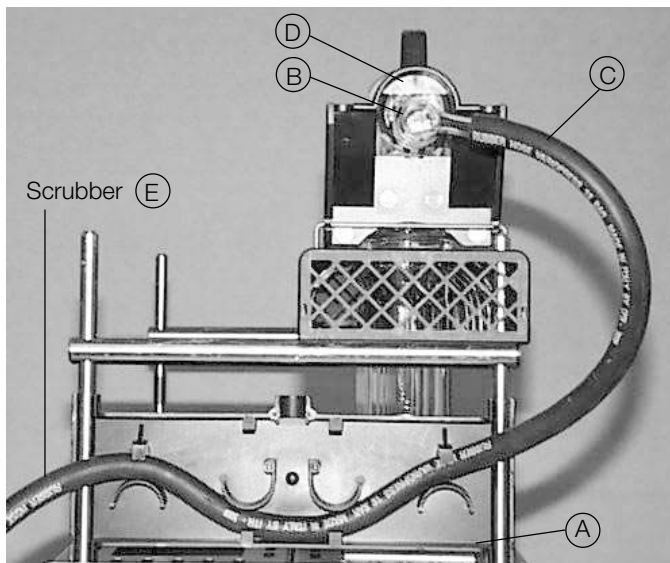


Fig. 3: Hose connections enlarged section

4.4 Hose connections

Mount the safety shield (A) with the fitted hoses on the unit (see photograph).

Assemble the connection to the suction module (B) and install on the hose (C) and on the suction modules (D).

Connect the EPDM hose to the scrubber B-414 or to the water jet pump (e.g. made from plastic) Art. No. 02913.



When working with a water jet pump unpleasant odours may escape into the environment if the suction is not powerful enough.

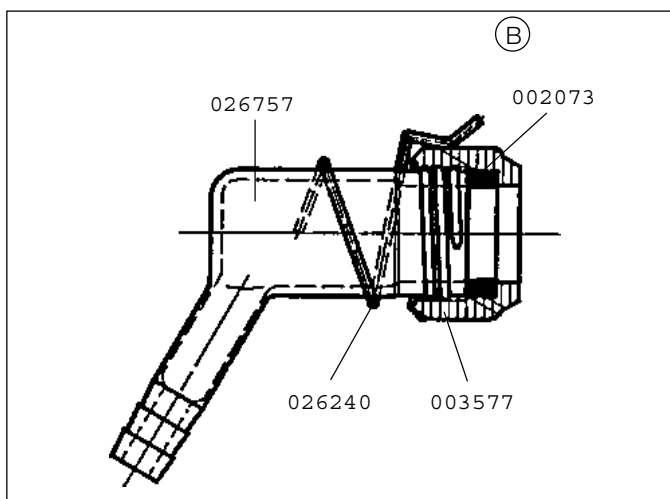


Fig. 4: Connection to fume exhaust

5 Operation

5.1 Operating elements

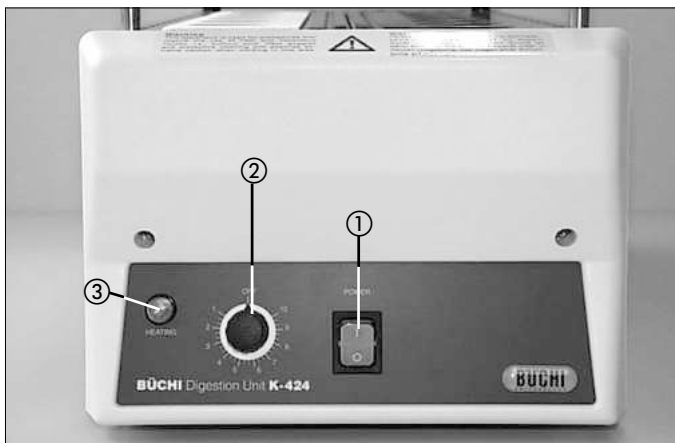


Fig. 5: Arrangement of the control and display elements front

- ① Main switch
- ② Energy regulator
- ③ Heater pilot lamp
- ④ Mains connector

5.2 Operating elements and their function

Main switch ①

Switching the apparatus ON/OFF. In case of a mains load over 12 A a bimetal switch cuts the circuit causing the mains switch switching to OFF. After switch back to ON the apparatus is ready to operate again.

Energy regulator ②

Regulates the heating in stages from 1 -10.



Fig. 6: Arrangement of the control and display elements rear

5.3 General information

The heating process heats the digestion tubes uniformly from the side, leading to good boiling behaviour (no retardation of boiling). Boiling chips are used only when larger quantities of water (>10 ml) are evaporated (no glass beads used).

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

For the digestion of approx. 1 g of organic material, normally 18 - 20 ml H_2SO_4 are used.

For each additional gramm of organic material an addition of 3 - 5 ml (by fat or mineral-oil 5 - 10 ml) H_2SO_4 has to be used.

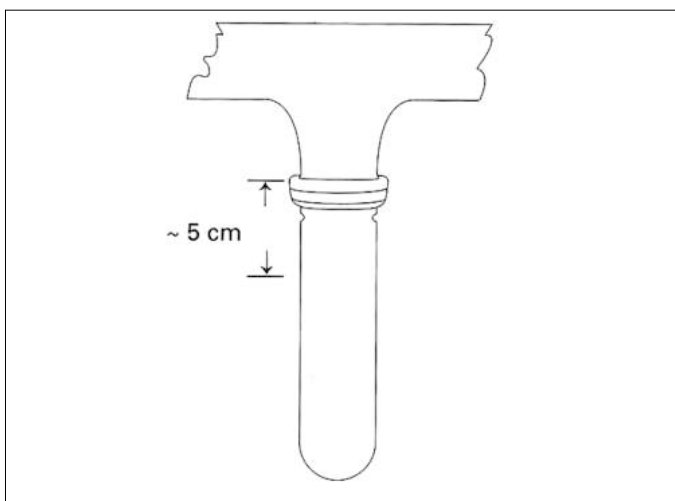


Fig. 7: Condensation zone of the sulfuric acid



This apparatus is used for procedures that require the use of heat and hazardous sulphuric acid. Wear goggles and protective clothing and exercises extreme caution when working in this area.

Seal off unused connecting branches with the glass cap (item n° 17396)

It is essential, that the gaskets are fitted correctly on the suction tube and are leaned symmetrical on the glass!

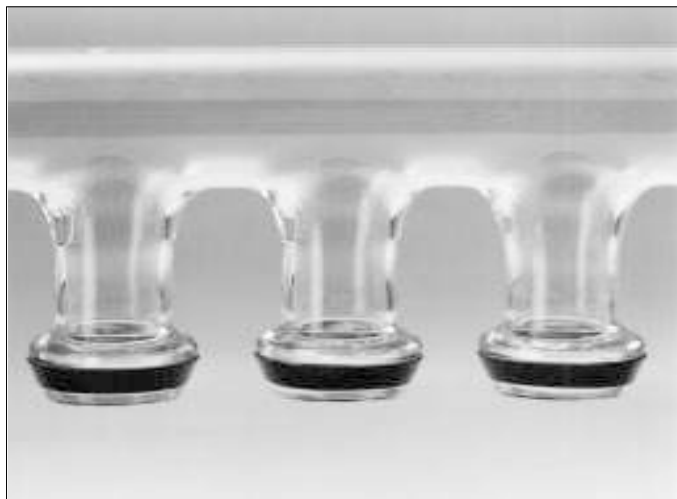


Fig. 8: Gaskets

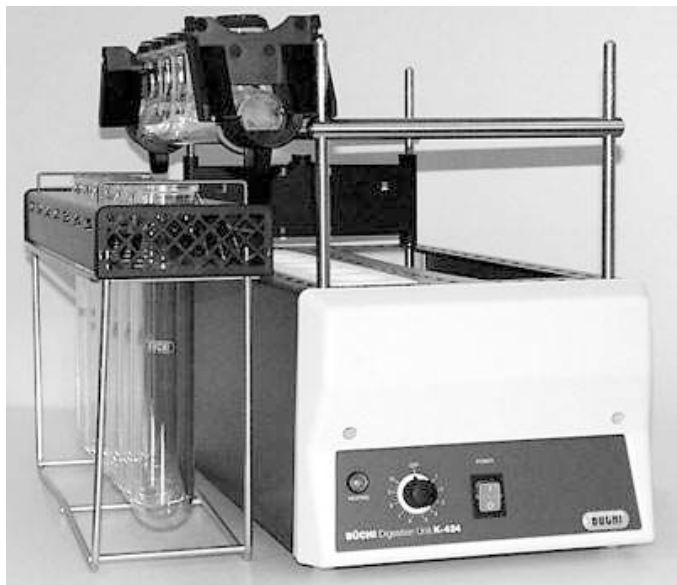


Fig. 9: K-424

Regulation of the heating power depends on a variety of factors such as the quantity to be digested, the types of reagents, etc.

To carry out the digestion in the minimum time, the samples are digested at full power.

The digestion time depends on the material to be digested and must be determined by experiment. (Continue boiling for about 15 minutes after the solution has become clear.) After the sample has cooled, the digestion tube can be connected direct to a Büchi Distillation Unit for carrying out the distillation.



If a digested sample takes a relatively long time to cool, it may solidify. Before it is distilled, the sample must be liquefied again:

- by the careful addition of a small quantity of distilled water, or
- by gentle heating in the Digestion Unit.

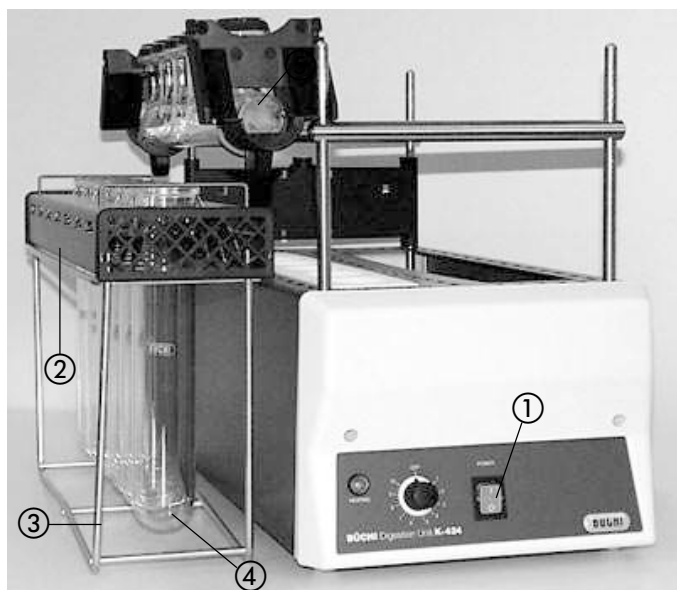


Fig. 10: Operation of the K-424

5.4 Carrying out the Kjeldahl digestion

- Switch the unit on ① and preheat for approx. 5 minutes on stage 10.
- Wear protective goggles!
- Place the digestion tubes in the digestion tube holder ② on the rack ③ .
- Introduce the sample and reagents into the digestion tubes ④ .
- Seal off unused connecting branches with the glass cap (item No. 17396) .



Never install empty digestion tubes!

- Place the suction module ⑤ with the fitted gaskets on the digestion tube holder.
- Turn on scrubber or water jet pump bevor any gases can develop.

5.5 Malfunctions

Malfunction	Possible cause	Remedy
Heating elements do not heat up	1. Mains plug not plugged in 2. Unit switched OFF 3. Energy regulator in position „0“ 4. Energy regulator faulty 5. Heating elements faulty	- Connect unit to the mains - Switch ON - Set to position "10" - Replace regulator - Replace heating element
Lamp does not light up (H 1)	Lamp faulty	Replace lamp

Table 4: Malfunctions

6 Maintenance

6.1 General information



The housing of the digestion unit K-424 is made of metal and is coated with an acid-resistant material.

In order to avoid damage to this synthetic coating, any drops of acid which might fall on it should be wiped off with a damp cloth.

Absolutely avoid any scratching of the surface whatsoever.

6.2 Upkeep

daily:

- Check glass parts for damage
- Clean the plastic parts with a damp cloth.

The glass parts are cleaned.

6.3 Gaskets

The gaskets are subject to wear and must be replaced when damaged or at loss of closeness.

Inspection and maintenance duty

All specifications and regulations aimed at maintaining the digestion unit K-424 in a proper working condition must be followed.

This includes periodic cleaning and checking for damage. After any repair work the operator must check the proper function before putting back into operation.

6.4 Replacing the insulation



To avoid contact with live parts, components may only be replaced when the apparatus has been isolated from all supply points.

Electrical and electronic components are to be replaced by skilled engineers.

No components may be replaced when the apparatus is warm or hot. Allow the apparatus to cool down!

Replacing upper insulating plate

This insulation is freely accessible and can be replaced without tool.

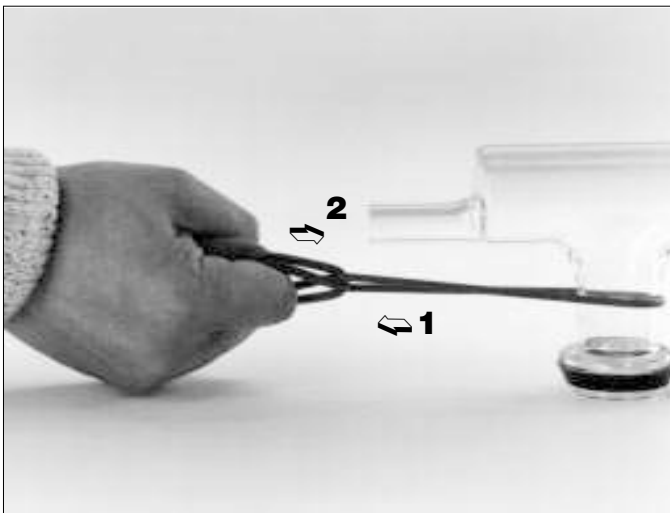


Fig. 11: Replacing the O-rings

6.5 Replacing the O-rings

- Cut damaged O-ring with a knife or a scalpel
- Remove tube holder
- Fit new O-ring over the suction module (see Fig. 11)
- Insert tube holder and fix with O-ring.

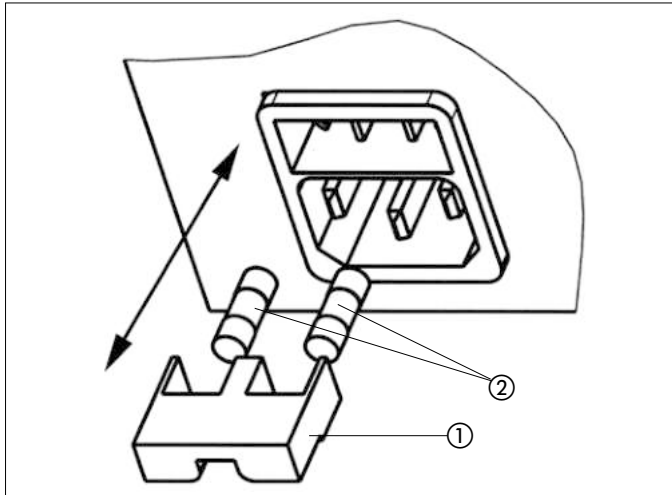


Figure 12: Device plug, inserted

6.6 Main fuses

Please change the main fuses as follows:

- Pull out mains cables
- Pull out fuse holders ①
- Replace the defective mains fuse by a new one with same performance ②:
 - 230V: T 5A L250V
 - 120V: T10A L250V
- Insert again fuse holders

6.7 Customer service

Any intervention on or in the apparatus may only be carried out by authorized service technicians. These are persons with a sound technical training and knowledge of the dangers which result from not observing safety regulations. Authorized Büchi service centers have available to them a special service manual for this apparatus. That manual can only be obtained by authorized personnel.

The addresses of the official Büchi service centers are shown on the last cover page of these operating instructions. Please contact these service centers whenever you have a malfunction, technical questions, or problems in using the equipment.

Büchi's customer service is prepared to offer the following services:

- Replacement part service
- Repair service
- Maintenance service
- Technical consultation.

7 Taking out of operation



In order to avoid the risk of endangering people with hazardous substances the unit must be emptied and cleaned thoroughly before taking out of operation.

7.1 Storage/Transport

The unit has to be stored and transported cleaned and its original packaging.

7.2 Disposal

To ensure as ecologically sound a disposal of the apparatus as possible, the Appendix in Chap. 9 contains a list of the materials used in its most important parts.

This makes it possible for you to separate the parts and to send them on for recycling.

For disposal of electronic parts, we refer you to official regulations governing such action. In addition, all pertinent regional and local laws must be observed.

8 Replacement parts

Only original Büchi accessories and replacement parts guarantee safe use and reliable operation of the apparatus. The use of other than Büchi replacement parts and accessories is only allowed with the permission of the manufacturer. Replacement parts may be used only for purposes of assembly and disassembly in connection with Chapter 6, Maintenance. Their production using 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
Fuses T10A L250V (10 pcs)	16952
Fuses T5A L250V (10 pcs)	33703

Table 5: Replacement parts

9 Appendix

9.1 Technical data

Dimensions (Width x Height x Depth)	275 x 600 x 570 mm
Nominal voltage	230 V, 50/60 Hz 120 V, 50/60 Hz
Connected load	1100 W
Power consumption	5 A
Weight (net)	approx. 13,5 kg
Ambient Temperature	5... 40° C
Overvoltage category	II
Pollution degree	2

Table 6: Technical data

9.2 Materials used

Part	Material	Material code
Housing front and rear panels	Polyurethane	PUR
side panels	Stainless steel / Perfluoralkoxy	1.4435 / PFA
Glass parts	Borosilicate glass 3.3	DIN/ISO 3585
Safety shield	Polyphenylensulfrole	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, pursuant 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 likely 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 réglementations FCC et à la réglementation des radio-interférences du Canadian Department of Communications. Ces limites sont destinées à fournir une protection adéquate contre les interférences néfastes 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 susceptible d'engendrer des interférences 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 néfastes, auquel cas l'utilisateur sera amené à prendre les dispositions utiles pour remédier aux interférences à ses propres frais.

9.4 Declaration of conformity

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

declare in general responsibility that the
BÜCHI Digestion unit K-424

to which this declaration refers is in conformity with the following standards:

EN 292-1:1991

Safety of machines: Basic terminology method

EN 292-2:1991

Safety of machines: Technical basic principals 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)

Maximum permissible values and measurement methods for radio interference from industrial, scientific and medical high-frequency devices

EN 50081-1:1992

Electromagnetic compatibility - Basic standard interference emission: HOME, business and commercial areas as well as light industry

EN 61000-3-2: 1995/1996

Limits for harmonic current emissions

EN 61000-3-3: 1995

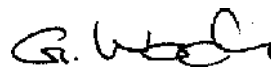
Limitation of voltage fluctuations and flicker

In accordance with the regulations of the EU guidelines:
89/392/EEG Machine guideline

Flawil, 12.12.2000

BÜCHI Labortechnik AG
Meierseggstrasse 40
9230 Flawil
Schweiz

Tel +41 (0)71 394 63 63
Fax +41 (0)71 394 65 65
buchi@buchi.com
www.buchi.com



Guido Worch
Qualitymanager



