

Operating Manual

APT.line[®] VD

Vacuum Drying Ovens

with microprocessor program controller RD3

BINDER GmbH

Address

Tel.

Fax

Internet

E-mail

Service Hotline

Service Fax

Service E-Mail

Service Hotline USA

Service Hotline Asia Pacific

Post office box 102

D-78502 Tuttlingen

+49 7462 2005 0

+49 7462 2005 93 0

<http://www.binder-world.com>

info@binder-world.com

+49 7462 2005 555

+49 7462 2005 93 555

service@binder-world.com

+1 866 816 8191

+603 6204 2855



EG - KONFORMITÄTSERKLÄRUNG
EC - DECLARATION OF CONFORMITY
CE - DECLARATION DE CONFORMITE

Anbieter / Supplier / Fournisseur: BINDER GmbH
Anschrift / Address / Adresse: Im Mittleren Ösch 5, D-78532 Tuttlingen
Produkt / Product / Produit: Vakuumtrockenschränke mit Programmregelung
Vacuum drying ovens with program control
Etuves de séchage à vide à régulation programmable
Typenbezeichnung / Type / Type: VD 23, VD 53, VD 115

Die oben beschriebenen Produkte sind konform mit folgenden harmonisierten Normen:
The products described above are in conformity with the following harmonized standards:
Les produits décrits ci-dessus sont conformes aux normes harmonisées suivantes:

Sicherheit / safety / sécurité:

IEC/CEI 61010-1:2001

Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte – Teil 1: Allgemeine Anforderungen

Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements

Règles de sécurité pour appareils électriques de mesure, de régulation et de laboratoire – Partie 1 : Prescriptions générales

IEC/CEI 61010-2-010:2003

Sicherheitsbestimmungen für elektrische Meß-, Steuer-, Regel- und Laborgeräte – Teil 2-010: Besondere Anforderungen an Laborgeräte für das Erhitzen von Stoffen

Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-010: Particular requirements for laboratory equipment for the heating of materials

Règles de sécurité pour appareils électriques de mesure, de régulation et de laboratoire. Partie 2-010 : Prescriptions particulières pour appareils de laboratoire utilisés pour l'échauffement des matières

EMV / EMC / CEM:

IEC/CEI 61326:1997 + A1:1998 + A2:2000

Elektrische Betriebsmittel für Leittechnik und Laboreinsatz – EMV-Anforderungen

Electrical equipment for measurement, control and laboratory use – EMC requirements

Matériels électriques de mesure, de commande et de laboratoire – Prescriptions relatives à la CEM

Die oben beschriebenen Produkte sind konform mit folgenden EG-Richtlinien:
The products described above are in conformity with the following EC guidelines:
Les produits décrits ci-dessus sont conformes aux directives CE suivantes:

Niederspannungsrichtlinie
73/23/EWG, Änderung 93/68/EWG
Low voltage directive
73/23/EEC, amended 93/68/EEC
Directive basse tension
73/23/CEE, modifiée 93/68/CEE

Richtlinie 73/23/EWG des Rates vom 19. Februar 1973 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen

Council Directive of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (73/23/EEC)

Directive 73/23/CEE du Conseil, du 19 février 1973, concernant le rapprochement des législations des États membres relatives au matériel électrique destiné à être employé dans certaines limites de tension

EMV-Richtlinie
89/336/EWG, Änderung 93/68/EWG
EMC Directive
89/336/EEC, amended 93/68/EEC
Directive CEM
89/336/CEE, modifiée 93/68/CEE

Richtlinie 89/336/EWG des Rates vom 3. Mai 1989 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility

Directive 89/336/CEE du Conseil du 3 mai 1989 concernant le rapprochement des législations des États membres relatives à la compatibilité électromagnétique

Die oben beschriebenen Produkte tragen entsprechend die Kennzeichnung CE.
The products described above, corresponding to this, bear the CE-mark
Les produits décrits ci-dessus, en correspondance, portent l'indication CE.

D-78532 Tuttlingen, 10.01.2006

BINDER GmbH



P. M. Binder
Geschäftsführender Gesellschafter
Managing Director
Directeur général



Dr.-Ing. V. Kek
Leiter F & E
Head of R & D
Chef de service R&D

Contents

1. SAFETY	6
1.1 Legal considerations	6
1.2 Structure of the safety instructions	6
1.3 Localization / position of safety labels at the unit	8
1.4 Type plate	9
1.5 General safety instructions on installing and operating the vacuum drying oven	10
1.6 Intended use	11
2. WARRANTY	11
3. DESCRIPTION OF THE EQUIPMENT	13
3.1 Overview of the equipment	14
3.2 VD 23 control panel	15
3.3 VD 53 / 115 control panel	15
3.4 Connections at the unit rear	16
4. SCOPE OF DELIVERY, TRANSPORTATION, STORAGE, AND INSTALLATION	17
4.1 Unpacking, and checking equipment and scope of delivery	17
4.2 Advice for safe lifting and transportation	17
4.3 Storage	18
4.4 Location of installation and ambient conditions	18
5. INSTALLATION AND CONNECTIONS	19
5.1 Vacuum expansion racks	19
5.2 Electrical connection	19
5.3 Vacuum connection	20
5.4 Inert gas connection	20
6. START UP	21
6.1 Settings at the RD3 program controller	21
6.2 General indications	22
7. FIXED VALUE ENTRY MODE	23
8. PROGRAM EDITOR	24
8.1 Selecting between set-point ramp and set-point step	24
8.2 Set-point entry for program operation	26
8.3 Program table template	29
8.4 Deleting a program section	30
9. PROGRAM START LEVEL	31
10. USER LEVEL	33
11. BEHAVIOR AT FAILURES	37
11.1 Behavior after power failure	37
11.2 Alarm messages	37
12. SAFETY DEVICE CLASS 2 (DIN 12880, PART 1)	37
13. CHECKING THE TEMPERATURE IN THE INNER CHAMBER	38

14. COMMISSIONING THE VACUUM	39
14.1 Evacuation	39
14.2 Breaking the vacuum (flooding)	39
14.3 Operation with inert gas	40
15. SWITCHING CONTACTS 24V DC VIA OPERATION LINES	40
16. OPTIONS.....	41
16.1 Connection kit (option)	41
16.2 Vacuum module empty (without pump) (option)	42
16.3 Vacuum module with chemical membrane pump	43
16.4 Vacuum module with speed controlled chemical membrane pump and vacuum controller (option).....	45
16.5 Venting combined with speed controlled chemical membrane pump. Program control via APT-COM [®] (option, Art. No. 8012-0233).....	46
16.6 Program controlled venting via operation line 2 (option, Art. no. 8012-0552)	48
16.7 Additional measuring channel for digital object temperature display with flexible Pt 100 temperature sensor (option)	48
16.8 Measuring access port vacuum 9 poles (option)	49
16.9 Digital pressure display (option).....	50
16.10 Extended temperature range up to 250°C (option).....	50
16.11 Communication software APT-COM [®] 3 DataControlSystem (option)	51
16.12 Protocol printer (option)	51
17. MAINTENANCE, CLEANING, AND SERVICE	52
17.1 Maintenance intervals, service.....	52
17.2 Cleaning and decontamination	52
18. DISPOSAL.....	53
18.1 Disposal of the transport packing	53
18.2 Decommissioning.....	54
18.3 Disposal of the unit in the Federal Republic of Germany	54
18.4 Disposal of the unit in the member states of the EC except for the Federal Republic of Germany ..	56
18.5 Disposal of the unit in non-member states of the EC	57
19. TROUBLESHOOTING	57
20. TECHNICAL DESCRIPTION.....	58
20.1 Factory calibration and adjustment	58
20.2 Technical Data	59
20.3 Equipment and Options	60
20.4 Spare parts.....	62
20.5 Dimensions VD 23	63
20.6 Dimensions VD 53	64
20.7 Dimensions VD 115	65
21. CONTAMINATION CLEARANCE CERTIFICATE	66



Dear customer,

For the proper operation of the program controlled vacuum drying oven VD, it is necessary to read this operating manual completely and carefully and to observe the given instructions.

1. Safety

This operating manual is part of the scope of delivery. Always keep it at hand.

To avoid injuries and property damage observe the safety instructions of the operating manual.

	 WARNING
	<p>Failure to observe the safety instructions. Serious injuries and unit damage.</p> <ul style="list-style-type: none"> ➤ Observe the safety instructions in this operating manual. ➤ Carefully read the complete operating instructions of the VD vacuum drying oven.

1.1 Legal considerations

This operating manual contains information necessary for the intended use, correct installation, start-up and operation, and for the maintenance of the unit.

Understanding and observing the instructions in this operating manual are prerequisites for hazard-free use and safety during operation and maintenance.

This operating manual cannot cover all conceivable applications. If you would like additional information, or if special problems arise that you feel are not sufficiently addressed in this manual, please ask your dealer or contact us directly.

Furthermore, we note that the contents of this operating manual are not part of an earlier or existing agreement, promise, or legal relationship, nor do they modify such a relationship. All obligations on the part of BINDER derive from the respective purchase contract, which also contains the entire and exclusively valid statement of warranty administration. The statements in this manual neither augment nor restrict the contractual warranty provisions.


1.2 Structure of the safety instructions

In this operating manual, the following harmonized denominations and symbols indicate dangerous situations following the harmonization of ISO 3864-2 and ANSI Z535.4.

Signal word panel

Depending on seriousness and probability of the consequences, dangers are identified with a signal word, the corresponding safety color, and if appropriate, the safety alert symbol.

 DANGER
<p>Indicates an imminently hazardous situation that, if not avoided, will result in death or serious (irreversible) injury.</p>

 WARNING
<p>Indicates a potentially hazardous situation which, if not avoided, could result in death or serious (irreversible) injury.</p>



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor (reversible) injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage of the product and/or its functions or of a property in its ambience.
















Safety alert symbol



Use of the safety alert symbol indicates **risk of injury**.

Observe all measures that are marked with the safety alert symbol in order to avoid death or injury.

Pictograms

Warning signs			
			
Electrical hazard	Hot surface	Explosive substances	Tipover hazard
			
Inhalation hazard	Pollution Hazard	Harmful substances	Biohazard
Mandatory action signs			
			
Mandatory regulation	Read operating instructions	Pull the power plug	Lift with several persons
			
Environment protection			
Prohibition signs			
			
Do NOT touch	Do NOT spray with water		



Information to be observed in order to ensure optimum function of the product.

Word message panel structure

Type / cause of hazard.



Possible consequences.

- ⊘ Instruction how to avoid the hazard: prohibition
- Instruction how to avoid the hazard: mandatory action

Observe the other notes and information not specially emphasized in the same way, in order to avoid disturbances which could result in direct or indirect injuries or property damage.

1.3 Localization / position of safety labels at the unit

Following labels are located on the unit:

Pictograms (Warning signs)	Service label
 <p>Hot surface</p>	

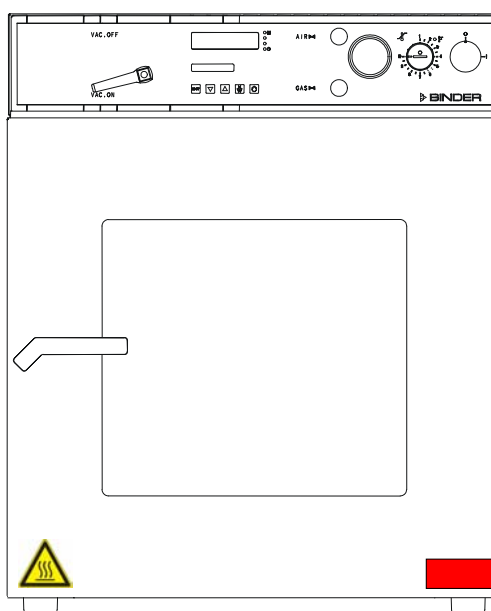


Figure 1: Position of labels at the unit






Keep safety labels complete and legible.


Replace safety labels that are no more legible. Contact the BINDER service.

1.4 Type plate



Figure 2: Position of type plate

Nenntemperatur	200°C 392°F	0,80 kW 230 V 1 N ~	  
Schutzart	IP 20	3,5 A	
Temp. Schutz Klasse	DIN 12880 2.0	50/60 Hz	
Artikel-Nr.	9030-0017	US PATS 4585923 / 5222612 / 5309981	
Projekt-Nr.		5405194 / 5601143 / 5773287 / 6079403	


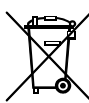


D 78532 Tuttlingen / Germany
Tel. + 49 (0) 7462 / 2005-0
Internet: www.binder-world.com

VD 23 # 00-00000
Made in Germany

Figure 3: Type plate (example of VD 23 regular unit)

Indications of the type plate		Information
Nenntemperatur	200°C 392°F	Nominal temperature
Schutzart	IP 20	IP type of protection 20 acc. to EN 60529
Temp. Schutz	DIN 12880	Temperature safety device acc. to standard DIN 12880
Klasse	2.0	Temperature safety device, class 2
Artikel-Nr.	9030-0017	Art. No. 9030-0017
Projekt-Nr.	---	(Special application acc. to project no.)
	0,80 kW	Nominal power 0,80 kW
	230 V 1 N ~	Nominal voltage 230 V ± 10%, single-phase unit
	3,5 A	Nominal current 3,5 Amp
	50/60 Hz	Mains frequency 50/60 Hz
VD 23		Model VD 23
# 00-00000		Serial No. 00-00000


Symbol on the type plate	Information
	CE conformity marking
	Electrical and electronic equipment manufactured / placed on the market in the EC after 13 August 2005 and be disposed of in separate collection according to the directive 2002/96/EC on waste electrical and electronic equipment (WEEE).

1.5 General safety instructions on installing and operating the vacuum drying oven

With regard to operating the vacuum drying oven VD and to the installation location, please observe the regulations BGR 120 of the German professional association of the chemical industry (formerly ZH 1/119 laboratory guidelines of the employers' liability insurance association) (for Germany).

The BINDER GmbH is responsible for safety-related unit properties only if skilled electricians or qualified personnel authorized by BINDER perform all maintenance and repair, and if components relating to chamber safety are replaced in case of failure with original spare parts.



To operate the unit, use only original BINDER accessories or accessories of third-party suppliers authorized by BINDER. The user is responsible for any risk when using unauthorized accessories.

	CAUTION
	<p>Danger of overheating.</p> <p>Damage of the unit.</p> <ul style="list-style-type: none"> ⊘ Do not install the oven in unventilated recesses. ➤ Ensure sufficient ventilation for carrying-off the heat.

The vacuum drying oven VD must NOT be operated in hazardous locations.



	 DANGER
	<p>Explosion hazard.</p> <p>Danger of life.</p> <ul style="list-style-type: none"> ⊘ Do NOT operate the unit in potentially explosive areas. ⊘ NO explosive dust or air-solvent mixture in the ambience.

The vacuum drying oven VD is regularly equipped with a large-surface area safety valve. The window, manufactured in toughened safety glass, is elastic-mounted and serves as a safety valve in the event of explosion. The additional plastic panel provides splinter protection.



	 DANGER
	<p>Explosion hazard.</p> <p>Danger of life.</p> <ul style="list-style-type: none"> ⊘ Do NOT introduce any substance combustible or explosive at working temperature into the oven. ⊘ NO explosive dust or air-solvent mixture in the inner chamber. ⊘ Do NOT use the vacuum drying oven for drying or heat treatments leading to release of combustible vapors able to form an explosive mixture with air.

Any solvent contained in the charging material must not be explosive or inflammable. I.e., irrespective of the solvent concentration in the steam room, NO explosive mixture with air will form. The drying temperature must lie below the flash point or below the sublimation point of the charging material. Keep informed about the physical and chemical properties of the charging material, as well as the contained moisture constituent and its behavior under addition of heat energy and changes in pressure.

Keep informed about any potential health risks caused by the charging material, the contained moisture constituent or by reaction products that may arise during the drying process. Take adequate measures to exclude such risks prior to putting the vacuum drying oven into operation.

	 DANGER
	Electrical hazard.
	Danger of life. Ø The oven must NOT become wet during operation or maintenance.


The vacuum drying ovens have been produced in accordance to the relevant VDE regulations and are routinely tested in accordance to VDE 0411.

	 CAUTION
	The inner chamber will become hot during operation.
	Danger of burning. Ø Do NOT touch the inner surfaces and the charging material during operation.

In the case of operation with inert gas, the unit is supplied with an oxygen-displacing gas (e.g. N₂). The gas emerging from the system must therefore be removed from the installation area by means of a suitable extraction system (see technical ventilation measures in the regulations BGR 120 of the German professional association of the chemical industry (formerly ZH 1/119 laboratory guidelines of the employers' liability insurance association) (for Germany).

1.6 Intended use

The VD series vacuum drying ovens are suitable for drying and heat treatment of solid or pulverized charging material, as well as bulk material, using the supply of heat under vacuum. The solvent content must not be explosive or flammable. A mixture of any component of the charging material with air must NOT be explosive. The drying temperature must lie below the flash point or below the sublimation point of the charging material.

	Respecting the instructions in this operating manual and conducting regular maintenance work (chap. 17) is part of the intended use.
---	--

2. Warranty

BINDER products are manufactured with great care and checked carefully prior to delivery (VDE-piece checked).

1. Should your BINDER product have a material defect or manufacturing fault, we shall repair it – as long as it is a new BINDER product – free of charge if the defect or fault occurs within 12 months after delivery. This period will be extended to 24 months, starting from delivery, provided that all maintenance and potential repair work within the first 12 months is carried out by us or authorized service stations.
2. Should you discover a defect or fault in your BINDER product within the aforementioned period, please inform the company from which you purchased the BINDER product or BINDER directly.

3. All above-mentioned periods or deadlines shall begin with the delivery of a new BINDER product to the end buyer. Producing the invoice or delivery note shall bring evidence of deadline keeping.
4. In case a BINDER product has a defect or fault, we shall either replace the defective product with a new one or repair the defective product at our discretion (so called supplementary performance – “Nacherfüllung”). All parts replaced in the course of such repair shall become our property. Deadlines mentioned under above number 1 shall not be prolonged by repair work or substitution. In case supplementary performance should fail, usual warranty rights according to German Law (withdrawal from contract or price reduction) shall apply, provided the defect or fault occurs within the first 12 months. Should the 24 month-period be relevant and supplementary performance fail, you shall only be entitled to a price reduction.
5. Should the defect occur within 12 months after delivery, we shall take over all costs necessary for the repair of the defect, especially transportation, travel and labor costs, in so far as there is no cost increase due to the product being brought to another location than the place of delivery. However, we shall decide whether the defect will be repaired at the location where the BINDER product is operating or whether the BINDER product has to be sent to us. In case the 24 month-period should be relevant, please send the defective BINDER product at your expense to BINDER or the company from which you purchased the BINDER product. We shall repair the BINDER product at your premises only if transportation costs are excessively high. The customer shall be liable for any risk of sudden destruction or deterioration.
6. Should you have to send back a BINDER product, the BINDER product will have to be supplied in its original packaging or any similar suitable packaging.
7. All warranty claims as laid down in this document basically become invalid:
 - if the defect or fault is caused by repair or intervention by non-authorized persons. With authorized persons, we mean only Binder service engineers and service engineers of our service partners.
 - the same applies if you have attached non-suitable parts or accessories to the BINDER products, which are not original BINDER spare parts, and if those parts or accessories have caused the defect or fault.
 - parts that become used due to natural wear and tear, e.g. door seals, lamps, lights (enumeration not exhaustive)
 - defects caused by external intervention like e.g. fall or blow
 - defects arising from non-compliance with operating instructions, improper use, abnormal ambient conditions, overload or absence of care/maintenance
 - in the case of devices that were converted or redesigned by non-authorized third parties
 - in case of minor deviations from the set quality that are irrelevant to the value and usability of the device
8. All rights or claims beyond the ones described above, especially concerning the right of compensation for potential damages which might be caused by BINDER products shall be excluded provided that such exclusion is not prohibited by governing law.
9. Should you send a BINDER product to us for repair or any other reasons, we shall only accept the BINDER product upon presentation of a so-called **authorization number** that has previously been issued to you. We shall issue the authorization number after receiving your complaint in writing or via telephone prior to your **sending (back)** the BINDER product to us. The authorization number will be issued following the receipt of the information mentioned below:
 - BINDER product type and serial number
 - Date of purchase
 - Name and address of the dealer from which you bought the BINDER product
 - Exact description of defect or fault
 - Your full address; if possible contact person and availability of that person
 - Exact location of the BINDER product
 - **Contamination clearance certificate** via fax in advance

The authorization number needs to be applied to the packaging in such a way that it can be easily recognized or be recorded clearly in the delivery documents. **For security reasons we cannot accept your delivery if it does not carry an authorization number!**

IMPORTANT NOTICE:

Any warranty repair maintenance or service work may only be carried out by persons or companies being properly authorized by us. If you do not know an authorized service station, please contact us and we will name you our service partner closest to you. Otherwise, we will carry out the necessary work ourselves.

Date: November 2003

3. Description of the equipment

Vacuum drying is used for special drying problems, for which conventional drying methods cannot offer a solution due to physical limitations.

All functions of the multifunctional program control can be set simply and conveniently via the easy to understand function keypad of the RD3 temperature program controller with touch function keys and a digital display, allowing exact temperature setting and the programming of temperature cycles.

The electro-polished inner chamber, the rack holder, and all of the unit's vacuum connections and valves are made of especially corrosion resistant stainless steel V4A (material no. 1.4571 in Germany). The housing is RAL 7035 powder-coated. All corners and edges are completely coated. When operating the chamber at temperatures above 150°C, influence of the oxygen in the air might cause coloration of the metallic surfaces (yellowish-brown or blue) by natural oxidation processes. These colorations are harmless and will in no way impair the function or quality of the unit.

The vacuum drying ovens in the APT.line® are jacket-heated. The APT.line® preheating chamber technique guarantees a completely homogeneous jacket temperature, ensuring uniform heat transfer into the inner chamber. The low-loss heat transfer to the material uses the patented aluminum vacuum expansion racks (also available in stainless steel as an option). The elastic-mounted safety glass window reliably evens out any overpressure or explosions that may occur. The additional polycarbonate panel ensures proven and effective splinter protection in the event of an implosion.

All VD units have an inert gas connection and a measuring connection for connecting a vacuum controller or a measuring access port.

The vacuum drying ovens are equipped as standard with a large-surface safety valve. The toughened safety glass window is elastic-mounted and in the event of explosion serves as a safety valve. The additional plastic panel provides splinter protection.

The vacuum drying oven VD is equipped with a serial interface RS 422 for computer communication, e.g. via the communication software APT-COM® 3 DataControlSystem (option, chap.16.11). For further options, see chap. 20.3.

All installable items, such as racks and rack holders, can be easily removed. The completely smooth inner chamber with its rounded corners and internally welded seams is easy to clean.

The minimum working temperature of the vacuum drying oven is approx. 5°C above room temperature. The maximum temperature is 200°C; with option extended temperature range (chap. 16.10), it is 250°C.

For the vacuum drying oven VD, vacuum pumps with a suction capacity of 1 m³/h to 30 m³/h are suitable. The permissible end vacuum is 10⁻² mbar.

3.1 Overview of the equipment

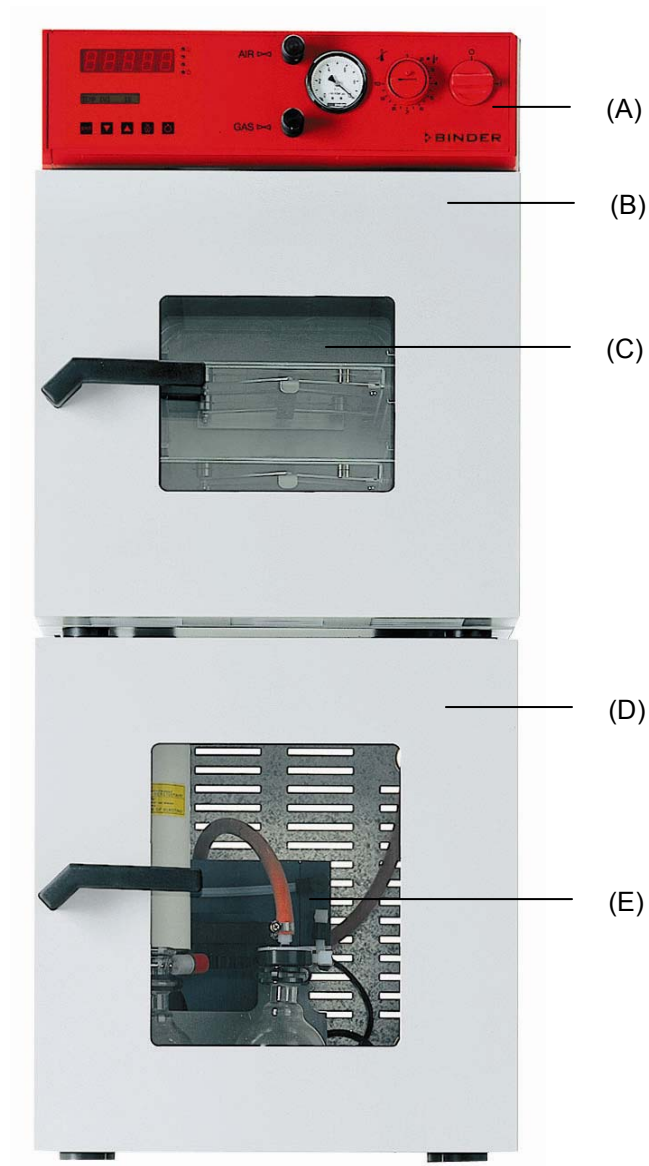


Figure 4: VD 23 with option vacuum module and chemical membrane pump

- (A) Control panel
- (B) Unit door
- (C) Elastic-mounted safety glass window
- (D) Vacuum module (option)
- (E) Chemical membrane pump (option)

3.2 VD 23 control panel

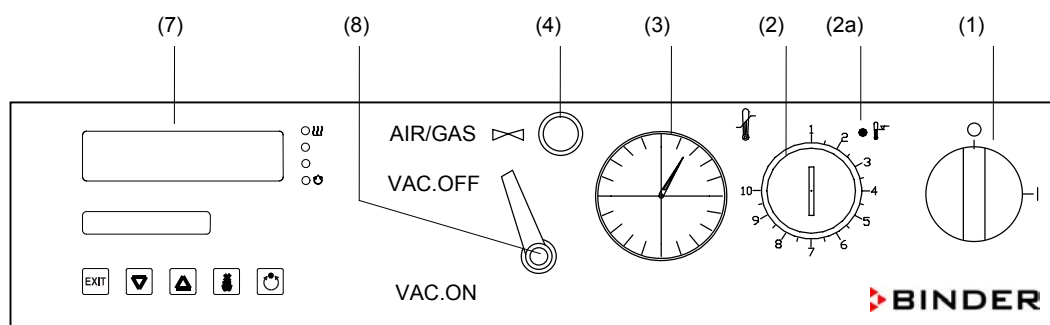


Figure 5: VD 23 control panel

- (1) On/off switch (main switch)
- (2a) Red alarm lamp for safety device
- (2) Safety device class 2
- (3) Manometer (pressure reading)
- (4) Aeration valve (inert gas or ambient air)
- (7) Program controller RD3
- (8) Vacuum shut-off valve

3.3 VD 53 / 115 control panel

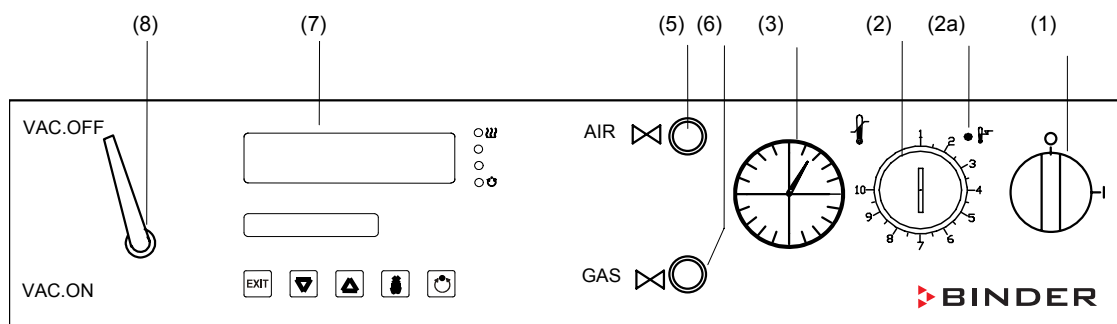


Figure 6: VD 53/115 control panel

- (1) On/off switch (main switch)
- (2a) Red alarm lamp for safety device
- (2) Safety device class 2
- (3) Manometer (pressure reading)
- (5) Aeration valve (ambient air)
- (6) Aeration valve (inert gas)
- (7) Program controller RD3
- (8) Vacuum shut-off valve

3.4 Connections at the unit rear

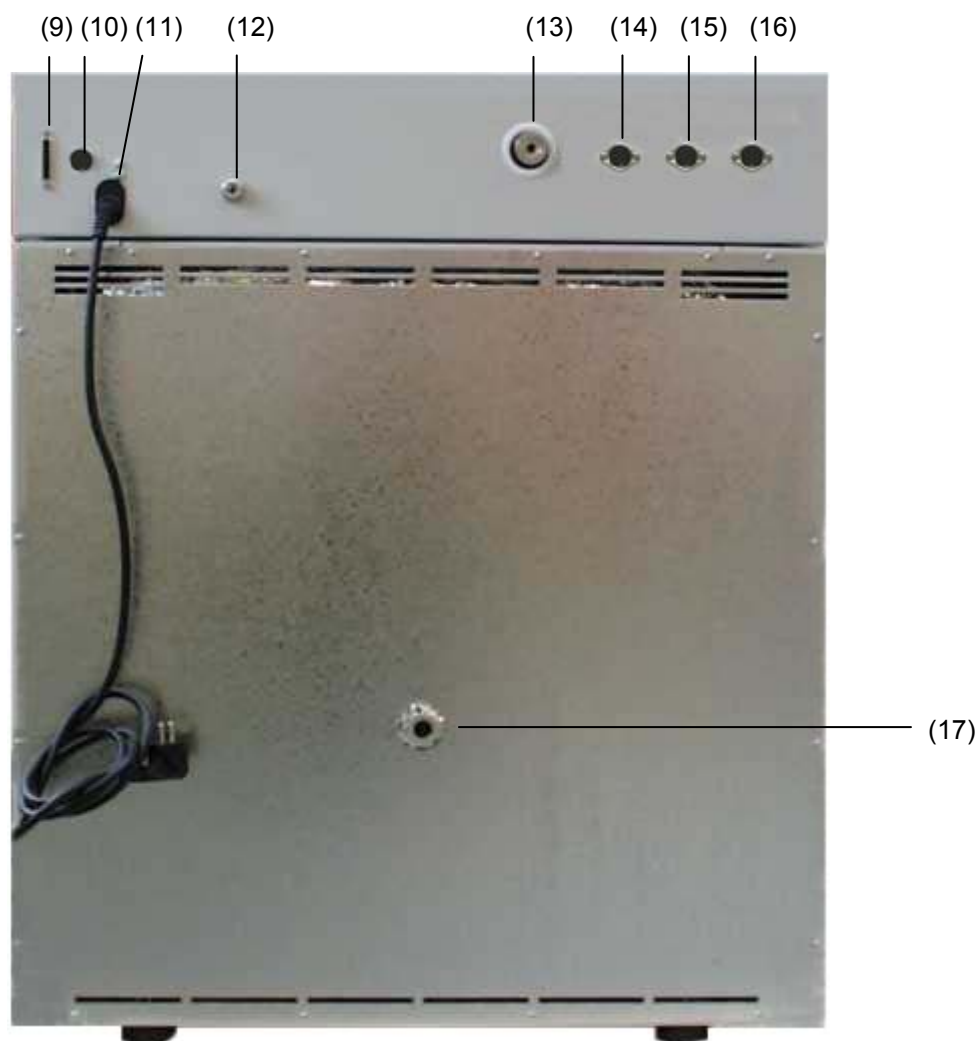


Figure 7: Rear of VD

- (9) RS 422 serial interface
- (10) Miniature fuse
- (11) Mains connection line
- (12) Inert gas connection, adapter with hose olive \varnothing 8 mm
(VD23: also simultaneous fresh air connection)
- (13) Vacuum connection with small flange DN16
- (14) DIN socket for option Object temperature display (optional)
- (15) DIN socket (operation line 2) for option program controlled venting
- (16) DIN socket (operation line 1) for option vacuum module with pump
- (17) Measuring connection with small flange DN16



4. Scope of delivery, transportation, storage, and installation

4.1 Unpacking, and checking equipment and scope of delivery

After having unpacked, please check the unit and its optional accessories, if any, based on the delivery note for completeness and for transportation damage. If transportation damage has occurred, immediately inform the carrier.

The final tests of the manufacturer might cause traces of the racks at the inner surfaces. Please remove the corresponding sticker before commissioning the unit.

Please remove any transportation protection devices and adhesives in / on the unit and at the doors and take out the operating manuals and accessory equipment.

 	<p style="text-align: center;">CAUTION</p> <p>Sliding or tilting of the unit.</p> <p>Damage of the unit.</p> <ul style="list-style-type: none"> Ø Do NOT lift or transport the unit using either the door handle or the door or at the lower housing. ➤ Lift units size 115 near the unit feet from the pallet by aid of 4 persons.
---	--

If necessary to send back the unit, please use the original packing and respect the advice for safe lifting and transportation (chap. 4.2).

For disposal of the transport packing, see chap. 18.1.

With option vacuum module, the unit is supplied completely assembled. The optional chemical membrane pump is delivered in a separate box and must be fitted into the module and connected at the place of installation (see chap. 16.3 and 16.2).



Note on second-hand units (Ex-Demo-Units):

Second-hand units are units that have been used during a short time for tests or exhibitions. They are scrupulously tested before resale. BINDER guarantees the technically flawless state of the chamber.

Second-hand units are marked as such with a sticker on the unit door. Please remove the sticker before commissioning the unit.

4.2 Advice for safe lifting and transportation

Respect the advice for temporal decommissioning (chap. 18.2).

 	<p style="text-align: center;">CAUTION</p> <p>Sliding or tilting of the unit.</p> <p>Damage of the unit.</p> <ul style="list-style-type: none"> ➤ Transport the unit only in its original packaging. ➤ Secure the oven with transport straps for transport. Ø Do NOT lift or transport the unit using either the door handle or the door or at the lower housing. ➤ Lift units size 115 near the unit feet by aid of 4 persons.
---	--

- Permissible ambient temperature range: -10°C to +60°C.

You can order transport packing for transport purpose at the BINDER Service.

4.3 Storage


Intermediate storage of the unit in a closed and dry room. Respect the advice for temporal decommissioning (chap. 18.2).

- Permissible ambient temperature range: -10°C to +60°C.
- Permissible ambient humidity: max. 70 % r.H., non-condensing


If following storage in a cold location the unit is transferred to the installation site for start-up, condensation is possible. Wait at least one hour until the chamber has attained ambient temperature and is completely dry.

4.4 Location of installation and ambient conditions

Set up the vacuum drying oven VD on a plane and non-flammable surface, free from vibration at a well-ventilated, dry location and align it using a spirit level. The site of installation must be capable of supporting the unit's weight (see technical data, chap. 20.2).


	CAUTION
	<p>Danger of overheating. Damage of the unit.</p> <ul style="list-style-type: none"> Ø Do NOT set up units in non-ventilated recesses. ➤ Ensure sufficient ventilation for carrying-off the heat.

- Permissible ambient temperature range: +18°C to +32°C.

	<p>The ambient temperature should not be substantially higher than the indicated ambient temperature of +25°C to which the specified technical data relate. In the case of different ambient conditions, deviations from the indicated data are possible.</p>
---	---

- Permissible ambient humidity: 70 % r.H. max., non-condensing.
- Installation height: max. 2000 m above sea level.

When placing several units of the same size side by side, maintain a minimum distance of 250 mm between each unit. Wall distances: rear 100 mm, sides 135 mm. Spacing above and behind the unit of at least 100 mm must also be accounted for.

	CAUTION
	<p>Danger by stacking. Damage of the units.</p> <ul style="list-style-type: none"> Ø Do NOT place vacuum drying ovens on top of each other.

The vacuum drying oven VD must not be operated in potentially explosive areas.

	 DANGER
	<p>Explosion hazard. Danger of life.</p> <ul style="list-style-type: none"> Ø Do NOT operate the unit in potentially explosive areas. Ø NO explosive dust or air-solvent mixture in the ambience.

For operation with inert gas, the unit is supplied with an oxygen-displacing gas, e.g. N₂. The gas emerging from the system must be removed from the installation area by means of a suitable extraction system (see technical ventilation measures in the regulations BGR 120 of the German professional association of the chemical industry (formerly ZH 1/119 laboratory guidelines of the employers' liability insurance association) (for Germany).

5. Installation and connections

5.1 Vacuum expansion racks


The low-loss heat transfer to the material occurs via the patented aluminum vacuum expansion racks (also available in stainless steel as an option). The strong tension causes the racks to fit tightly against the interior wall and their large-surface contact area ensures rapid and effective heat transfer.

The removable rack holders enable easy positioning.




Figure 8: Using the expansion racks

- Pushing the locking lever: The expansion rack is released and can be removed.
- Pulling the locking lever: The expansion rack is pressed against the inner chamber walls.

	CAUTION
	<p>Invalid calibration.</p> <ul style="list-style-type: none"> ⊘ Do NOT change between aluminum and stainless steel racks ➤ Use the delivered expansion racks only

5.2 Electrical connection

- The vacuum drying oven VD has a fixed mains connection cable 1800 mm in length.
- **VD 23, VD 53, VD 115:**
Shockproof plug, mains voltage 230 V (1N~) +/- 10 %, 50/60 Hz
Unit fuse 10 Amp
- **VD 23 (CUL version), VD 53 (CUL version):**
NEMA plug 5-15P, mains voltage 115 V (1N~) +/- 10 %, 60 Hz
Unit fuse 16 Amp
- **VD 115 (CUL version):**
NEMA plug 5-20P, mains voltage 115 V (1N~) +/- 10 %, 60 Hz
Unit fuse 16 Amp
- Prior to connection and start-up, check the mains voltage. Compare the values to the data specified on the type plate of the unit (unit front behind the door, bottom left-hand, chap. 1.4).
- When connecting, please observe the regulations specified by the local electricity supply company and as well as the VDE directives (for Germany)
- Pollution degree (acc. to IEC 1010-1): 2
- Over-voltage category (acc. to IEC 1010-1): II


	CAUTION
	<p>Danger of incorrect mains voltage.</p> <p>Damage of the equipment.</p> <ul style="list-style-type: none"> ➤ Check the mains voltage before connection and start-up. ➤ Compare the mains voltage to the data indicated on the type plate.

See also electrical data (chap. 20.2).

5.3 Vacuum connection

Connect the vacuum drying oven to a vacuum pump or to a domestic vacuum system. For this purpose, the vacuum connection (13) with small flange DN16 must be connected to the back of the unit at the top with the vacuum pump or domestic vacuum system via a vacuum suction hose. For connecting to the unit, BINDER recommends the connection kit, Art. no. 8012-0146.



For the option with stainless steel tubing between the vacuum oven and vacuum module, the vacuum connection is already located inside the vacuum module.

	<p>Vacuum pumps with a suction capacity of 1-30 m³/h are suitable for the vacuum drying oven VD. Permissible end vacuum: 10⁻² mbar.</p>
---	---

5.4 Inert gas connection

When operating the vacuum drying oven with inert gas, observe the technical ventilation measures, as described in the regulations BGR 120 of the German professional association of the chemical industry (formerly ZH 1/119 laboratory guidelines of the employers' liability insurance association) (for Germany).

Connect the inert gas supply to the inert gas connection (adapter with hose olive Ø 8 mm) via a pressure reducer. Screw the enclosed adapter with hose olive on the thread (12) at the unit rear. Set the pressure reducer to a pressure slightly above ambient pressure. Ensure that the pressure reducer will certainly open. Do not alter this setting in order to avoid perturbation inside the oven and release of big quantities of inert gas after flooding the VD.

	 WARNING
	<p>Release of inert gas.</p> <p>Danger of poisoning.</p> <ul style="list-style-type: none"> ➤ Ensure technical ventilation measures. ➤ When decommissioning the vacuum drying oven, shut off inert gas valve (4) or (6).

6. Start up

Having connected the supply lines (chap 5), switch on the unit by the main switch (1).

6.1 Settings at the RD3 program controller

After turning the unit on with the main switch (1) the controller is in Normal Display / Fixed value operation mode.

Depending on the temperature value entered before, LED (7a) is lit if the heating is active, or no LED is lit if the actual temperature is equal to or above the set-point.

In Display 1 of the controller the actual temperature value is displayed.

In Display 2 of the controller the temperature set-point is displayed.

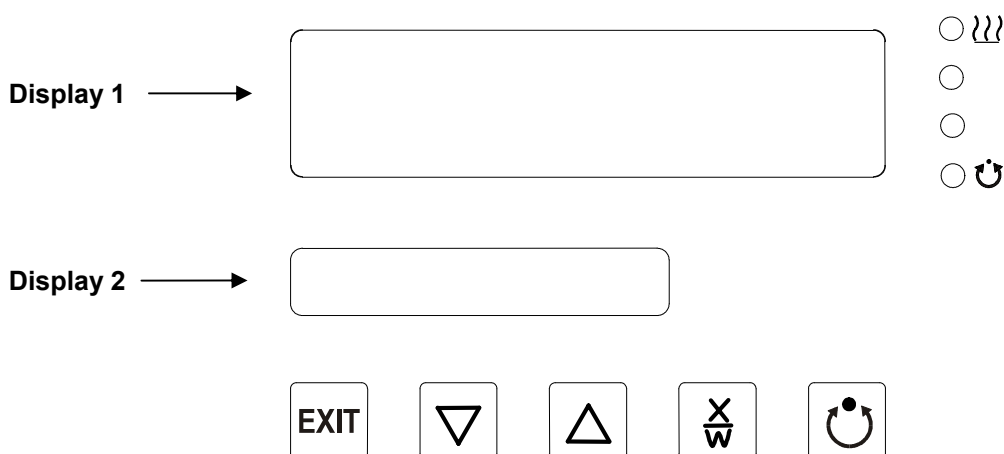






Figure 9: RD3 program controller

LED function indications and their signification:

(7a) (yellow)   Heating active


(7b) (yellow)  Operation line 1 ON

(7c) (yellow)  Operation line 2 ON

(7d) (green)   Illuminates: program operation
Flashes: program interruption due to exceeding of the tolerance limits

The program controller RD3 allows programming temperature cycles.

You can enter two programs with up to 10 sections each or one program with up to 20 sections (setting in the user level, chap. 10).

	When changing from 2 programs to 1 program or vice-versa, existing programs are deleted
---	---

The maximum length of an individual program section can be set to either 99 h 59 min or to 999 h 59 min (setting in the user level, chap. 10). This setting is then valid for all program sections.

Programming can be done directly through the keypad of the controller or graphically through the software APT-COM[®] 3 DataControlSystem (option, chap. 16.11) specially developed by BINDER.

6.2 General indications

The program controller RD3 offers several functional levels:

Normal Display / Fixed value operation:

- Display of the temperature actual value (display 1) and of the actual temperature set-point (display 2).
- The oven is in fixed value operating mode, equilibrating to the entered set-points.

Fixed value entry mode (chap. 9)

- Entry of the temperature set-point in fixed value operating mode

Program editor (chap. 8)

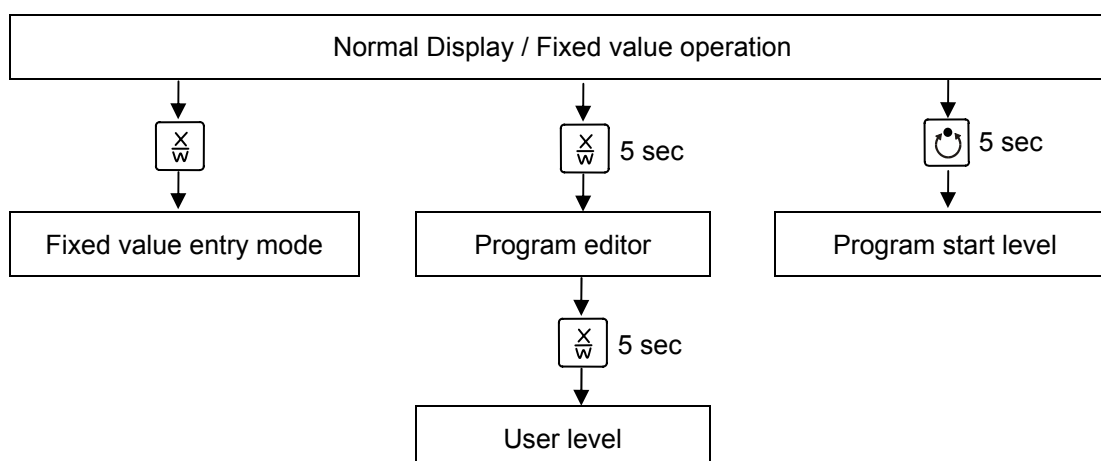
- You can enter two programs with up to 10 sections each or one program with up to 20 sections (selection in the user level, chap. 10). Entry of temperature set-points in all program sections (chap. 8.1).
- Deleting a program section (chap. 8.4)

Program start level (chap. 9)

- Selection of an entered program
- Entry of settings affecting the program course, as start delay time or number of program cycles
- Program start

User level (chap. 10)

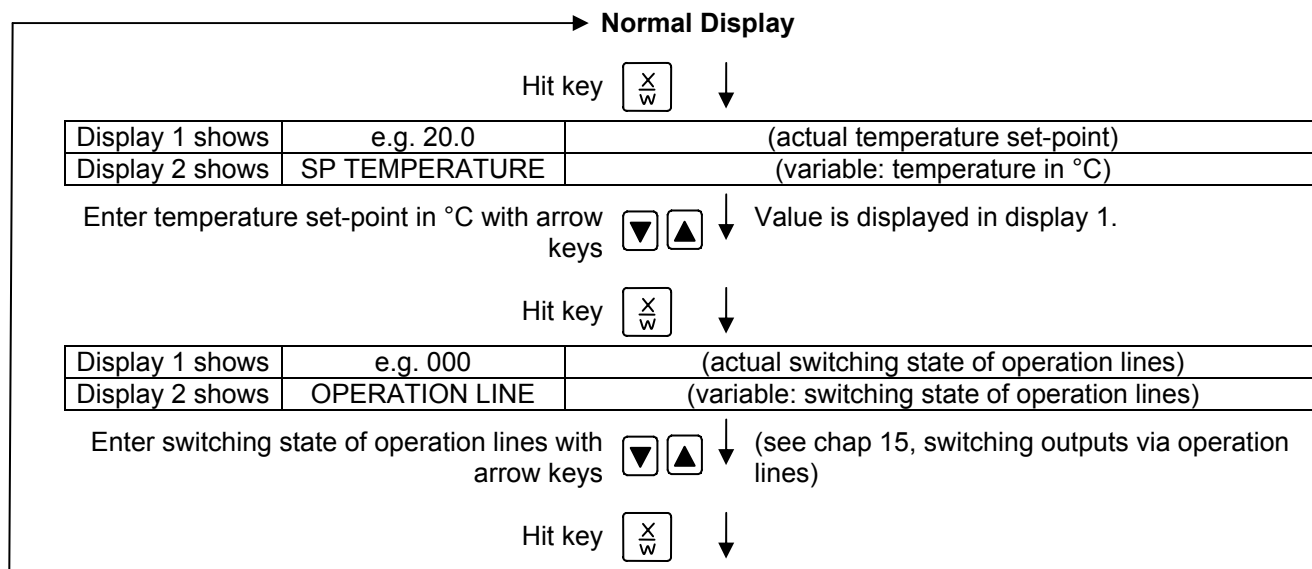
- User specific controller settings




If no button is touched during more than 120 sec., the controller returns from the actual level to Normal Display.

7. Fixed value entry mode

Basic entry principle: Call up the individual parameters with button X/W. Enter the value with the arrow keys. A value flashing once after 2 seconds indicates that it has been adopted by the controller.



If no button is hit during more than 120 sec, or if the EXIT button is hit, the controller changes to Normal Display.

	When changing the set-point, check the setting of the safety device (chap. 12).
---	---

The value entered in fixed-value entry mode is valid after program run-off and is then equilibrated.

8. Program editor

8.1 Selecting between set-point ramp and set-point step

Set-points always refer to the start of a program section, i.e., at the beginning of each program section, the entered set-point is reached. During program section operation, the temperature gradually passes to the set-point entered for the following program section.

By appropriate design of the program section timing, you can program all kinds of temperature transitions:

- **Gradual temperature changes “set-point ramp”**

The set-point gradually moves from one set-point to the one of the following program section during a given interval. The actual temperature value (X) follows the continually moving set-point (W) at any moment.

- **Program sections with constant temperature**

The initial values of two subsequent program sections are identical; therefore the temperature remains constant during the whole time of the first program section.

- **Sudden temperature changes “set-point step”**

Steps are temperature changes (ramps) that occur during a very short interval. Two program sections with an identical set-point are followed by a section with a different set-point. If the duration of this transitional program section is very short (minimum entry 1 min), the temperature change will proceed rapidly in the possible minimum time.

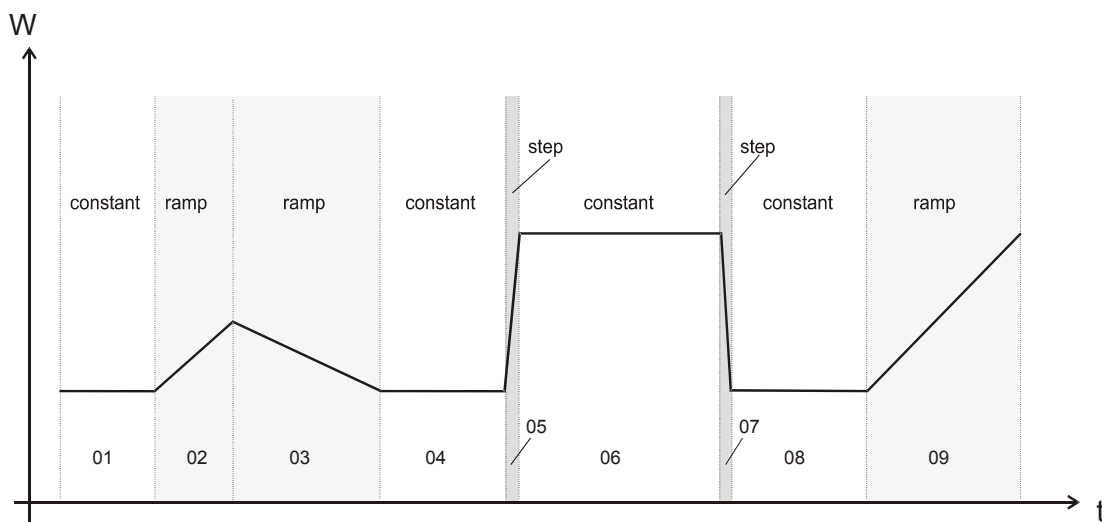
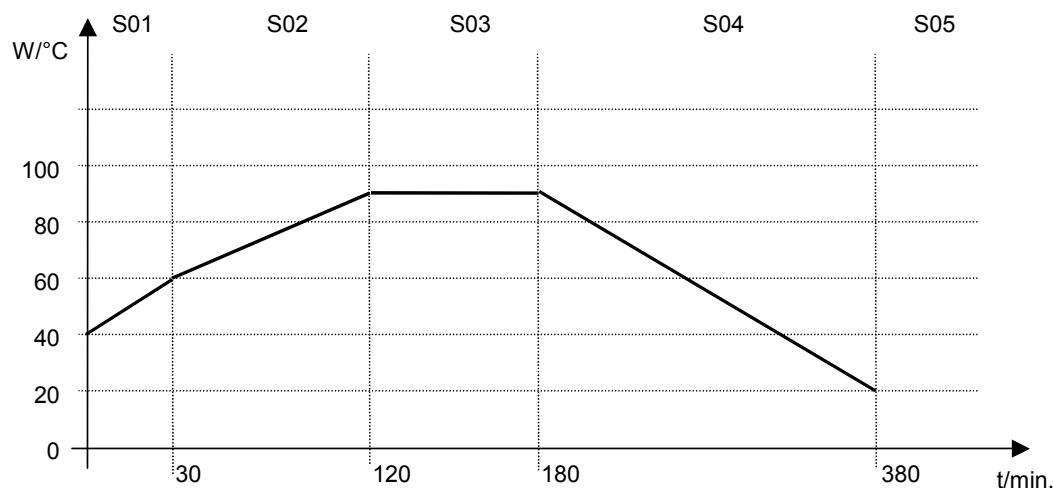


Figure 10: Possible temperature transitions

Program entry as set-point ramp (example):

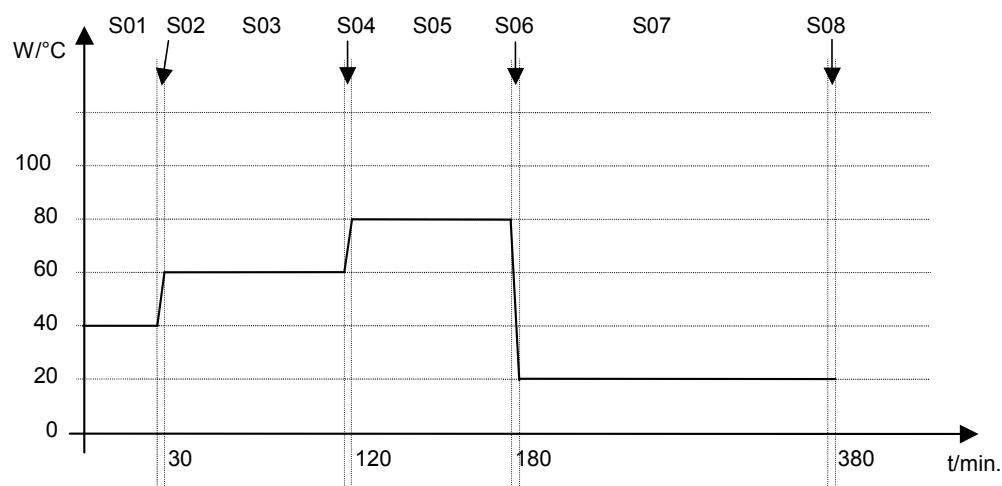


Program table corresponding to the diagram:

Section	Temperature set-point [°C] TEMP	Section length [hh.mm]	Operation lines
SEC		TIME	O.LINE
S01	40	00:30	000
S02	60	01:30	000
S03	90	01:00	000
S04	90	03:20	000
S05	20	00:01	000

You can now enter the values of such a program table to the RD3 program controller (chap. 8.3).

Program entry as set-point step (example):



Program table corresponding to the diagram:

Section	Temperature set-point [°C] TEMP	Section length [hh.mm]	Operation lines
SEC		TIME	O.LINE
S01	40	00:30	000
S02	40	00:01	000
S03	60	01:30	000
S04	60	00:01	000
S05	80	01:00	000
S06	80	00:01	000
S07	20	03:20	000
S08	20	00:01	000

You can now enter the values of such a program table to the RD3 program controller (chap. 8.3).

Advice for the programming of the different temperature transitions:

Program the end point of the desired cycle with an additional section (in our examples S05 for set-point ramp and S08 for set-point step) with a section time of at least one minute. Otherwise the program will stop one section too early because the program line is incomplete.

When exceeding the tolerance limits set in the user level (chap. 10), the program is interrupted until the actual temperature value is again situated within the tolerance range. During this program interruption, LED (7d) flashes. Therefore, the duration of the program might be extended due to the programming of tolerances

The programming is conserved even in case of power failure or after switching off the unit.

After program rundown the controller returns to fixed value operation showing Normal Display and equilibrates to the temperature value previously entered in fixed value entry mode.



Before starting the program, check the set-point value entered in fixed value entry mode. After program rundown temperature will equilibrate to this value.

8.2 Set-point entry for program operation

From Normal Display, press down button X/W for 5 sec to access the program editor. Enter here the set-points one after the other in all program sections of a selected program.

You can enter two programs with up to 10 sections each or one program with up to 20 sections can be entered (setting in the user level, chap. 10).

In order to avoid incorrect programming, we recommend entering the values of the program course into a table (template in chap. 8.3).

Program table (example):


Section	Temperature set-point [°C]	Section length [hh.mm]	Operation lines
SEC	TEMP	TIME	O.LINE
S01	40	00:30	000
S02	60	01:30	000
S03	90	01:00	000
S04	90	03:20	000
S05	20	00:01	000

The values of a program section remain constant during the section length.


You can now enter the values of the program table to one of the program places of the RD3 program controller.

Step 1 – Selecting the program and the first program section to be entered:



Normal Display

Press down key  ↓ for 5 sec.

Display 1 shows	e.g. 0000	
Display 2 shows	PROGRAM EDITOR	(you are in the program editor)

Hit program key  ↓

Display 1 shows	0000	
Display 2 shows	UserCod? 0000	(enter user code)

Enter user code with arrow keys   ↓ e.g. **0001**
(basic setting, adjustable in the user level, chap. 10).
Value is displayed in both displays.


Automatically forward after 2 sec.



↓

Display 1 shows	e.g. 01	(program P01 selected)
Display 2 shows	--- : --- PRG.	(program can be selected)
alternating	CONTINUE X/W	(information: to 1 st program section with X/W)

Select program P01 or P02 with arrow keys   ↓ Value is displayed in display 1.



Hit key  ↓

In the selected program P01 or P02, program sections can be selected:

Display 1 shows	e.g. 01	(section S01 selected)
Display 2 shows	P01: --- SEC.	section S01 has already been created.
alternating	CONTINUE X/W	enter new set-points for the individual variables with button X/W

or:

Display 1 shows	e.g. 01	(section S01 selected)
Display 2 shows	P01: --- SEC.	section S01 has not yet been created.
alternating	NEW SEC. X/W	enter set-points for the individual variables with button X/W

Select sections S01 to S10 or to S20 with arrow keys   ↓


If no program section has been entered so far, the display switches back to 01 with all entries > 01, because all sections need to be entered one after the other, and each new section is created as NEWSEC.

If e.g. already three program sections have been entered, the next section to be entered is S04. Before this, no section > S04 can be selected.





Next step – entry of set-points in the desired program sections:

Basic entry principle: Call up the parameters of individual program sections with button X/W one after the other. Enter the values of the individual parameters with the arrow keys. A value flashing once after 2 seconds indicates that it has been adopted by the controller. If several parameters are to be skipped (e.g. in order to change a parameter in a posterior program section), the parameters can be rapidly jumped over by holding pressed down the X/W key. If no button is hit during more than 120 sec the controller switches back to Normal Display. The program entered so far remains stored.

Hit key  ↓

Display 1 shows	e.g. 40.0 ^{°C}	(actual temperature set-point)
Display 2 shows	S01: TEMP 40.0	(variable: temperature in °C)
alternating	CONTINUE X/W	(information: go on with X/W)


Enter temperature set-point of S01 in °C with arrow keys   ↓

Hit key  ↓


Display 1 shows	e.g. 00.30	(actual section length set-point)
Display 2 shows	S01: TIME 00:30	(variable: section length in hh:mm)
alternating	CONTINUE X/W	(information: go on with X/W)




Enter section length set-point of S01 in hh.mm with arrow keys   ↓ Value is displayed in both displays.

Hit key  ↓

Display 1 shows	e.g. 000	(actually set switching state)
Display 2 shows	S01:O.LINE 000	(variable: switching state)
alternating	CONTINUE X/W	(Information: go on with X/W)

Enter switching state of operation lines with arrow keys   ↓ (see chap 15, switching outputs via operation lines)



Hit key  ↓

Selecting the next program sections to be entered



Display 1 shows	e.g. 02	(section S02 selected)
Display 2 shows	P01: --- SEC.	Section S02 has already been created.
alternating	CONTINUE X/W	enter new set-points for the individual parameters with X/W.

or:

Display 1 shows	e.g. 02	(section S02 selected)
Display 2 shows	P01: --- SEC.	Section S02 has not yet been created.
alternating	NEW SEC. X/W	enter set-points for the individual parameters with X/W


Select the next section to be entered with arrow keys   ↓

Display 1 shows	e.g. 60.0°C	(actual temperature set-point)
Display 2 shows	S02:TEMP 60.0	(variable: temperature in °C)
alternating	CONTINUE X/W	(information: go on with X/W)

Enter the temperature set-point of S02 in °C with arrow keys   ↓

Etc.

If all sections up to S10 or up to S20 have been programmed follows again section S01. In order to quit the entry mode hit several times the EXIT button or wait 120 sec → the controller returns to Normal Display.

	When changing the set-point, check the setting of the safety device (chap. 12).
---	---

8.3 Program table template

Program editor	
Program title	
Project	
Program No.	
Date:	

Section	Temperature set-point [°C]	Section length [hh.mm]	Operation lines *
SEC	TEMP	TIME	O.LINE
S01			
S02			
S03			
S04			
S05			
S06			
S07			
S08			
S09			
S10			
S11			
S12			
S13			
S14			
S15			
S16			
S17			
S18			
S19			
S20			


* Switching contacts 24V DC via operation lines, see chap. 15.

8.4 Deleting a program section


A program section is deleted from the program by setting the section duration to Zero.

A program section is deleted from the program by setting the section duration to Zero.



Normal display

Press down Hit key  ↓ for 5 sec.

Display 1 shows	e.g. 0000	
Display 2 shows	PROGRAM EDITOR	(you are in the program editor)

Hit program key  ↓

Display 1 shows	0000	
Display 2 shows	UserCod? 0000	(enter user code)

Enter the user code with arrow keys   ↓ e.g. **0001** (basic setting, adjustable in the user level, chap. 10).
Value is displayed in both displays.

Automatically forward after 2 sec

Display 1 shows	e.g. 01	(program P01 selected)
Display 2 shows	--- : --- PRG.	(program can be selected)
alternating	CONTINUE X/W	(information: to 1 st program section with X/W)


Select the desired program, e.g. P01, with arrow keys   ↓ Value is displayed in display1.

Hit key  ↓

In the selected program P01 or P02, program sections can be selected:


Display 1 shows	e.g. 01	(actual selected section: S01)
Display 2 shows	P01: --- SEC.	(program section can be selected)
alternating	CONTINUE X/W	(information: set-point entry with X/W)

Select desired section, e.g. S03, with arrow keys   ↓ (omitted if section S01 shall be deleted).



Hit key  ↓

Display 1 shows	e.g. 90.0 ^o	(actual temperature set-point)
Display 2 shows	S03:TEMP 90.0	(variable: temperature)
alternating	CONTINUE X/W	(information: go on with X/W)


No entry ↓

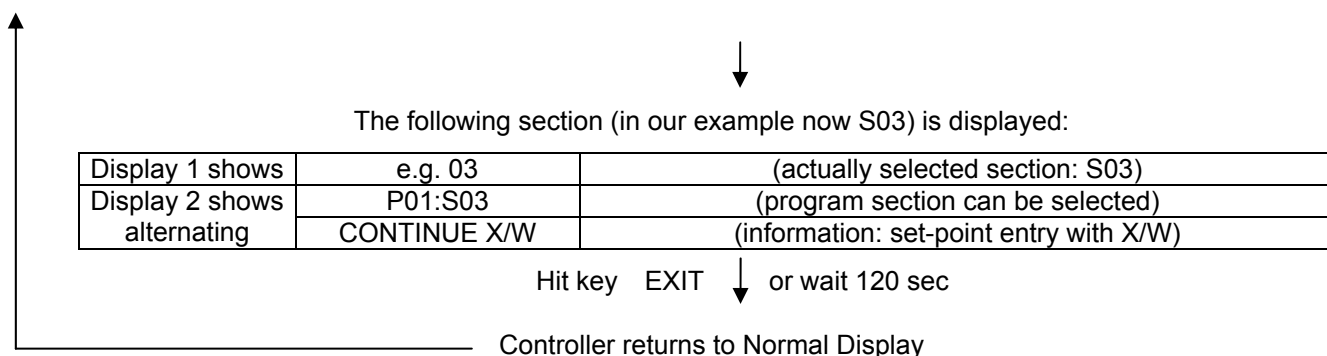
Hit key  ↓


Display 1 shows	e.g. 01.00	(actual section length)
Display 2 shows	S03:TIME 01:00	(variable: section length)
alternating	CONTINUE X/W	(information: go on with X/W)

Enter set-point **Zero** for section length in hh:mm of S03 with arrow keys   ↓ Value is displayed in display 2 or in both displays
(display depends on maximum time setting in the user level chap. 10)

Display 1 shows	e.g. 00.00	(actual section length)
Display 2 shows	S03:TIME 00:00	(variable: section length)
alternating	DELETE SEC. X/W	(information: delete section with X/W)

Hit key  ↓





If you delete a program section which is followed by further sections, those following move up to the place of the deleted section.

In our example section S03 has been deleted. Sections S04, S05, etc., in case they have been programmed earlier, will now receive the preceding sections numbers, i.e., S04 is now called S03 etc.

It is thus not possible to temporarily inactivate a program section, but deletion leads to overwriting the section by the following one. To enter a section later to a program also the sections following the new one must be entered again.

9. Program start level

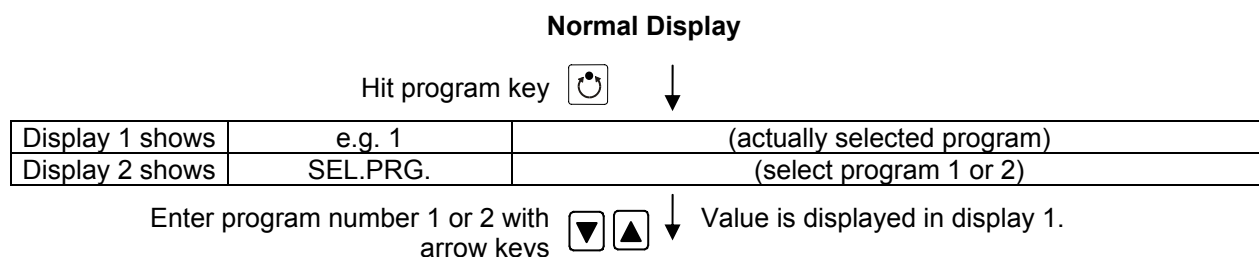
In a first step, select a program. This on condition that a program has been entered previously (chap. 8.2) and that program type “2 programs with 10 sections each” has been selected in the user level (chap. 10).

Then define the settings for the program course. Two parameters can be set:

- Program delay time, i.e. a defined time before program start. It can be entered with precision of 1 min and is max. 99.59 (99 h 59 min). If the value is 00.00, the program will start without any delay.
- Number of program cycles, i.e. the desired number of program repeats. Values from 1 to 99 can be entered. If the program is not to be repeated, enter value 0. For indefinite repeats enter value –1. The program is repeated as a whole, it is not possible to repeat individual sections.

In a last step start the selected program. These steps must be carried out subsequently.

Step 1 – Program selection (only with program type “2 programs” set)



Next step – entry of program course settings

Hit program key 

Display 1 shows	e.g. 00.00	(entered delay time hh.mm)
Display 2 shows	RUN TIME	(enter delay time of program start)

Set delay time in hh.mm with arrow keys   Value is displayed in display 1.

Hit program key 

Display 1 shows	e.g. -1	(actually selected number of program cycles)
Display 2 shows	REPEAT	(enter number of program cycles)

Select number of cycles -1, 0, 1 etc. with arrow keys   Value is displayed in display 1.

Last step – program start

Hit program key 

Display 1 shows	e.g. 1	(selected program)
Display 2 shows	RUN PRG.	(Question: start selected program?)

Hit program key 

Display 1 shows	e.g. 25.5°C	actual temperature value
Display 2 shows	P01:S01 00:29:39 (time running backwards)	(actual program P01, actual section S01, and remaining time of program section S01)


Program is running. The green LED (7d) lights up.


Additionally to the green LED (7d) indicating a running program LED (7a) is lit if the heating is active, or not lit if the actual temperature equals the set-point.




During program course the arrow keys and the EXIT button are not functional.



You can terminate the program course hitting program key .

If you hit button  during program course, the entered set-point of the actually running program section is shown for 5 sec:

Display 1 shows	e.g. 65.5°C	(actual temperature value)
Display 2 shows	P01:S03 00:47:12	(actual program P01, actual section S03, and remaining time of program section S03)

Hit key 

Display 1 shows	e.g. 90	(actual temperature set-point)
Display 2 shows	SP TEMPERATURE	

5 seconds


Display 1 shows	e.g. 000	(actual operation line setting)
Display 2 shows	OPERATION LINE	

After program rundown (and, if appropriate, of the program repeats) the controller returns to fixed value operation showing Normal Display and equilibrates to the temperature value previously entered in fixed value entry mode.

10. User level

In this menu you can set the following parameters (in brackets the corresponding abbreviated information given in display 2):


- **Unit address** (Adress)
Setting of controller address (1 to 255) for operation with the communication software APT- COM®.
- **User code** (User-cod)
Modification of the user code setting (factory setting 0001) for access to the user level and the program editor.

	Keep in mind any modification of the user code. There is no access to these levels without a valid user code.
---	---

- **Decimal point position** (Decimal)
Selection if integer values or one position after the decimal point can be entered. The integer representation is displayed in Display 2 (set-point entry) while the actual value in Display 1 is always displayed with one decimal point.
- **Buzzer** (Buzzer)
Inactive: no acoustic signal (buzzer) in case of an alarm event.
Active: in case of an alarm event (see chap. 11.2) an acoustic signal (buzzer) will run. It can be reset by hitting button EXIT.
- **Selection of controller menu language** (Language)
German, English, or French can be selected.
- **Counter of operating hours** (Oper.hs)
Information about the number of operating hours reached up to now or since the last reset (no setting, display only).
- **Max. number of operating hours** (Op.limit)
Entry of a limit number of operating hours, i.e., the maximal number of operating hours that can be run. Maximum setting: 9999. Reaching the limit has no effect.
- **Reset operating hours** (Op.back)
Reset operating hours to zero.
- **Interface protocol** (Protocol)
„**Modbus**“: The unit interface can be used as a communication interface to connect it to a computer. This serves to control the unit by the communication software APT-COM. It is possible to read and write the values of all parameters.
„**Printer**“: A protocol printer (option) for data printouts can be connected to the unit interface. At the printer the actual temperature value is regularly protocolled with fixed formatting and with adjustable print intervals (see chap. 16.12).
In both cases an interface converter RS 422 / RS 232 is used.
- **Print interval** (Prt.-Inv.)
Setting of the print interval in minutes. Function available only if setting “Printer” has been selected in the previous menu point.
- **Display illumination** (Disp.LED)
Selection between continuous display illumination and limited illumination that will automatically go off 300 sec after the last entry.


- **Program type selection** (PrgSeleC)

Select between entry of two programs with up to 10 sections each or of one program with up to 20 sections.

	When changing from 2 programs to 1 program or vice-versa, existing programs are deleted in the program editor!
---	--

- **Maximum section duration** (Prg.Time)

The maximum length of an individual program section can be set to either 99 h 59 min or to 999 h 59 min. This setting is then valid for all program sections.


	When changing the maximum duration setting, pre-existing programs will be deleted in the program editor.
---	--

- **Tolerance limit range** (Tol.band)


Entry of a tolerance limit value in °C. If the actual value of temperature exceeds the set-point of a program section by more than the entered tolerance limit value, the program is halted (LED (7d) flashes) until the actual temperature value is again situated in the tolerance range

Entry of "0" means tolerance limits off.


Normal Display

Press down key  ↓ for 5 sec



Display 1 shows	e.g. 0000	
Display 2 shows	PROGRAM EDITOR	(you are in the program editor)

Press down key  ↓ for 5 sec

Display 1 shows	0000	
Display 2 shows	USER – LEVEL	(you are in the user level)

Hit program key  ↓


Display 1 shows	0000	
Display 2 shows	UserCod?	0000 (enter user code, display flashes)

Enter the user code with arrow keys   ↓ e.g. **0001** (basic setting, or the valid code in case it has been previously changed in this menu). Value is displayed in both displays.

Automatically forward after 2 sec

Display 1 shows	1	(actual address: 1)
Display 2 shows	Adress 1	(entry of unit address) (actual address: 1)


Enter the unit address with arrow keys   ↓ Address is displayed in both displays.

Hit key  ↓

Display 1 shows	1	(actually valid user code: 1)
Display 2 shows	User-cod	1 (change user code) (actually set: 1)

Enter a new value with arrow keys  

Value is displayed in both displays.

Hit key 



Display 1 shows	0000	(no function)
Display 2 shows	Saf.mode: Limit	(no function)

Hit key 

Display 1 shows	0	(no function)
Display 2 shows	Saf.setp	0 (no function)

Hit key 



Display 1 shows	0000	(no function)
Display 2 shows	Decimal: XXX.X	(setting of decimal point position) (actual setting: XXX.X)

Select decimal point position with arrow keys  

Decimal point position XXX.X or XXXX. is displayed in display 2.

Hit key 



Display 1 shows	0000	(no function)
Display 2 shows	Buzzer : Active	(setting of the alarm buzzer) (actual setting: „Active“)

Select between “Active” and “Inactive” with arrow keys  

Setting is displayed in display 2.

Hit key 

Display 1 shows	0000	(no function)
Display 2 shows	Language :English	(selection of controller language) (actual setting: English)

Select between languages German, English, and French with arrow keys  

Setting is displayed in display 2.

Hit key 

Display 1 shows	e.g. 0004	(unit operating hours)
Display 2 shows	Oper.hs 0004:28	(operating hours up to now hhhh:mm) (actually displayed: 4 hs 28 min)

Hit key 



Display 1 shows	1000	(actual setting: 1000 hs)
Display 2 shows	Op.limit 1000:00	(maximum number of operating hours hhhh:mm (actual setting: 1000 hs)

Set value with arrow keys  

Setting is displayed in both displays.

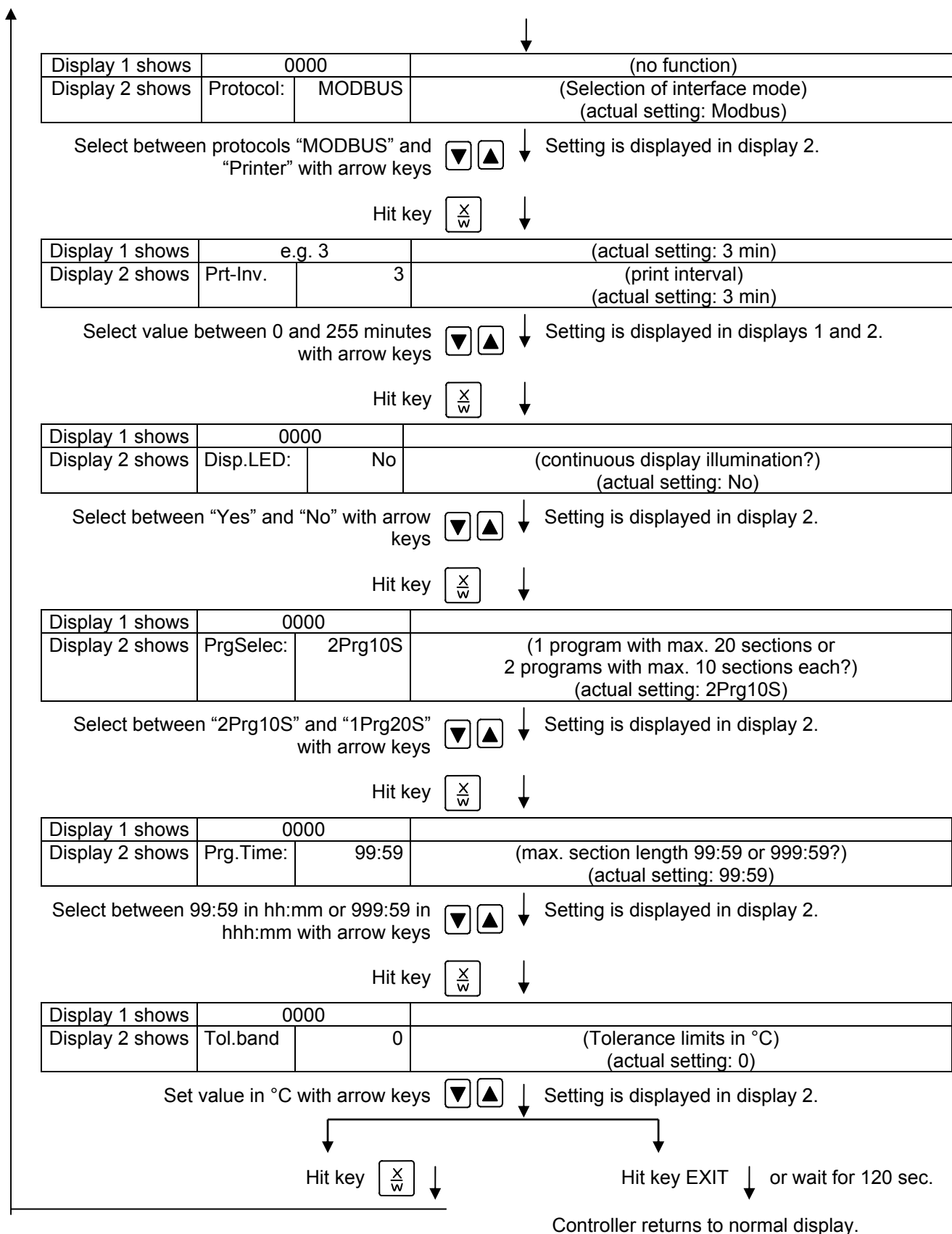
Hit key 

Display 1 shows	0000	(no function)
Display 2 shows	Op.back : No	(reset counter of operating hours ?) (actual setting: No)

Select between “Yes” and “No” with arrow keys  

Setting is displayed in display 2.

Hit key 



11. Behavior at failures

11.1 Behavior after power failure

Power failure during fixed-value operation (Normal Display):

The entered parameters remain saved. After power return operation continues with the set parameters.

Power failure during program operation:

After power return program course continues with the set-points that have been reached during program operation.

11.2 Alarm messages

Alarm messages, e.g. "RANGE ERROR CH1" in case of sensor rupture, are displayed in Display 2 only in Normal Display.

A buzzer can be activated / inactivated in the user level (chap. 10). It can be reset by pressing the EXIT button. The alarm text displayed in Normal Display goes off only if the alarm cause does not exist any more.

12. Safety device class 2 (DIN 12880, Part 1)

The safety device protects the vacuum drying oven, its environment and the charging material against impermissible excess temperatures.

Please also observe the regulations BGR 120 of the German professional association of the chemical industry (formerly ZH 1/119 laboratory guidelines of the employers' liability insurance association) (for Germany).

In the event of a fault in the temperature controller, the safety device (2) **permanently** switches off the vacuum drying oven. This status is reported visually by the indicator lamp (2a).

Check the operation of the safety device (2) by moving it slowly anti-clockwise until it is switched off. The safety device cut-off is reported visually by the indicator lamp (2a).

Then release again the safety device by hitting the reset button (2b), and switch on the vacuum drying oven as described.

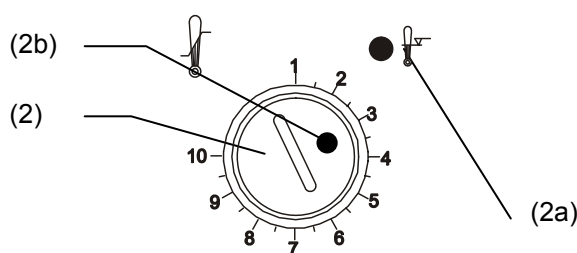


Figure 11: Temperature safety device class 2

Function:

The safety device is functionally and electrically independent of the temperature control device and switches off permanently at all poles.

If you turn the control knob (2) to its end-stop (position 10), the safety device protects the appliance. If you set it to a temperature a little above the set-point temperature, it protects the charging material.

If the safety device has switched off the oven, identifiable by the red alarm lamp (2a) lighting up, proceed as follows:

- Disconnect the oven from the mains
- Have examined and rectified the cause of the fault by an expert
- Release the safety device by pressing reset button (2b)
- Start up the appliance again as described in chapter 6.

Adjustment:

To check the response temperature of the safety device, switch on the chamber and set the desired set point at the temperature controller.

The scale division from 1 to 10 corresponds to the temperature range from 30°C up to 320°C and serves as a setting aid.

- Turn the control knob (2) of the safety device using a coin to its end-stop (position 10) (unit protection).
- When the set point is reached, turn back the control knob (2) until its trip point (turn it anti-clockwise).
- The trip point is identifiable by the red alarm lamp (2a) lighting up; the reset button (2b) jumps forward.
- The optimum setting of the safety device is obtained by turning the knob clockwise by around one graduation mark on the scale.
- Push the reset button (2b) in again.

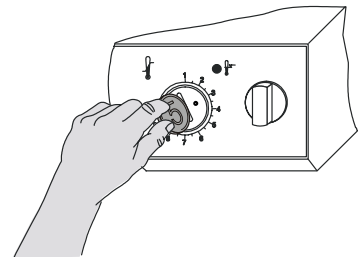




Figure 12: Setting the safety device class 2

	The unit is only active with the reset button (2b) pushed in.
---	---

When the safety device responds, the red alarm lamp (2a) illuminates, the reset button (2b) jumps forward, and the oven is switched off permanently at all poles.

	Check the setting regularly and adjust it following changes of set-point or charge.
---	---

13. Checking the temperature in the inner chamber

The controller display was adjusted in factory to the temperature in the center of the usable volume (chap. 20.1). The sensor probe of the reference measuring device was connected tightly to an expansion rack positioned in the middle of the unit.

Checking the controller display

- Lead the reference sensor into the inner chamber through the measuring port (17). The port must be largely vacuum tight to enable a typical vacuum during the calibration commonly used by the customer. For a high vacuum, use a measuring access port. Usually a silicone plug with a hole for the sensor wire is sufficient.
- Fix the sensor in the center of an expansion rack in the middle of the useable volume with adhesive aluminum tape or thermal conductive paste to ensure sufficient thermal conductivity.
- Perform the measurement in a thermally stable condition with 3 expansion racks and empty oven.
- Equilibrating time: 2 to 4 hours, depending on the test temperature.

Checking the spatial temperature exactitude

- Fix at least 9 sensor probes on 3 racks with adhesive aluminum tape or thermal conductive paste to ensure sufficient thermal conductivity
- The distance of the sensor probes to all inner chamber walls must be at least 10% of the according inner chamber dimension (see DIN 12880 part 2).
- Perform the measurement in a thermally stable condition with 3 expansion racks and empty oven.
- Response time: 2 to 4 hours, depending on the test temperature.



Do NOT use the temperature probe of the reference measurement device without any contact to the expansion rack, i.e., do NOT measure vacuum values!



In case the temperature probe is a thermo element, mount it electrically isolated from the rack.

If you note an excess divergence, please contact the BINDER service to calibrate the temperature controller.

14. Commissioning the vacuum

With regard to operation, observe the regulations BGR 120 of the German professional association of the chemical industry (formerly ZH 1/119 laboratory guidelines of the employers' liability insurance association) (for Germany).

Starting situation: The vacuum source is connected and ready for operation.

For the vacuum module with chemical membrane pump option, see chap. 16.3 and 16.2.

14.1 Evacuation

- VD 23: Close air/gas valve (4).
- VD 53 and VD 115: Close aeration valve (5) and fine dosing valve for inert gas (6).
- Switch on vacuum pump.
- Put the lever of vacuum shut off valve (8) in position ON (valve open).
- Monitor the internal pressure on pressure display (3). The analogue manometer displays the relative pressure inside the inner chamber in relation to the ambient pressure.
- Having obtained the desired end vacuum put vacuum shutoff valve (8) in position OFF (valve closed). The vacuum is maintained.



The permissible end vacuum is 10^{-2} mbar.

14.2 Breaking the vacuum (flooding)

When the drying procedure is complete, the vacuum in the inner container is broken (flooded).



VD 23: open air/gas valve (4)

VD 53 and VD 115: open aeration valve (5) and fine dosing valve for inert gas (6)

Fresh air is led in the lower part of the rear panel of the inner chamber and is evenly distributed in the inner chamber. This supply of fresh air by under-flooding prevents pulverized drying material from being blown.

14.3 Operation with inert gas


When operating the vacuum drying oven with inert gas, observe the technical ventilation measures, as described in the regulations BGR 120 of the German professional association of the chemical industry (formerly ZH 1/119 laboratory guidelines of the employers' liability insurance association) (for Germany).

	 WARNING
	<p>Release of inert gas.</p> <p>Danger of poisoning.</p> <ul style="list-style-type: none"> ➤ Ensure technical ventilation measures. ➤ When decommissioning the vacuum drying oven, shut off inert gas valve (4) or (6).

Install a pressure reducer for inert gas operation. Set the pressure reducer to a pressure slightly above ambient pressure. Ensure that the pressure reducer will certainly open. Do not alter this setting in order to avoid perturbation inside the oven and release of big quantities of inert gas after flooding the VD.

Following evacuation, an inert gas, e.g., nitrogen, is led into the inner chamber via the air/gas valve (4) (VD 23) or the fine dosing valve for inert gas (6) (VD 53, VD 115), until pressure compensation with the atmosphere occurs. Depending on the individual application, a second evacuation can be performed and the inert gas flooding can be repeated.

When the inert gas fine dosing valve is open, a maximum of approx. 0.6 m³/h gas flows into the inner chamber. Inrushing of inert gas by under-flooding in the lower part of the rear panel of the inner chamber and extraction at the inner chamber ceiling enable effective inert gas flushing.

	<p>If the oven is charged to full capacity, depending on the load, deviations from the specified heating up times may occur.</p>
---	--

15. Switching contacts 24V DC via operation lines

Operation lines 1 and 2 are used to switch on and off electrical equipment (operating tension 24 V DC, current consumption max. 0.4 A). The switching contacts are connected to 2 DIN sockets (13) and (14) at the unit rear.

The operation lines allow program controlled switching on and off the switching contacts. They can be programmed in fixed value entry mode (chap. 7) as well as in the program editor (chap. 8.2) via the operation lines (switching state 0 = Off, switching state 1 = On).

Set the positions 100 or 010 or 110 or 000 as follows:

Operation line 1	Operation line 2	Operation line 3 (no function)	
1	0	0	Operation line 1 ON
0	1	0	Operation line 2 ON
1	1	0	Operation lines 1 and 2 ON
0	0	0	Operation line OFF

Switching state ON can be recognized at LED (7b) for operation line 1 and (7c) for operation line 2 lighting up.

The operation lines are designed for the following standard options:

- Operation line 1: Program controlled evacuation (option vacuum module with pump, chap. 16.3)
- Operation line 2: Program controlled venting (option program controlled venting, chap. 16.5)

You can also connect any other device or electrical equipment with a nominal tension of 24 V DC and a current consumption of max. 0.4 A.

Establish the connection via the DIN sockets at the rear of the oven:

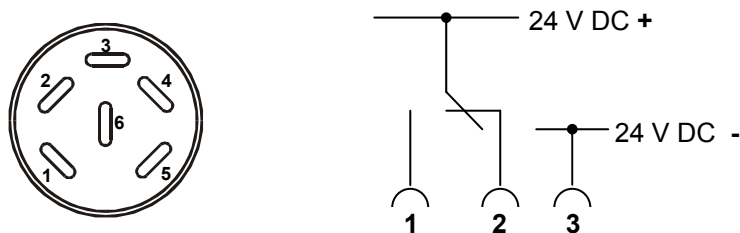


Figure 13: Pin configuration of DIN sockets (15) and (16)

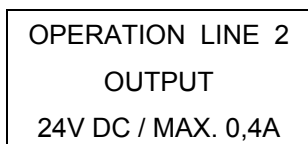


Figure 14: Legend at DIN socket (15)

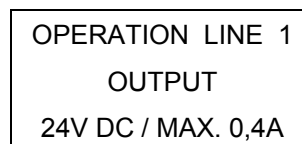



Figure 15: Legend at DIN socket (16)

A suitable DIN plug is enclosed.

Maximum loading capacity of the switching contacts: 0.4 Amp.

	CAUTION
	<p>Overloading the switching contacts.</p> <p>Damage of switching contacts and of connection sockets.</p> <ul style="list-style-type: none"> ⊘ DO NOT exceed the maximum switching load of 0.4 Amp. ⊘ DO NOT connect any device with a higher load. ➤ ONLY connect devices with a nominal tension of 24 V DC.

16. Options

16.1 Connection kit (option)

The VD connection kit (Art. no. 8012-0146) consists of:

- Aluminum straining ring DN10/16
- Outer centering ring DN10/16
- Small flange with hose tulle DN16/8
- 2.5 m caoutchouc hose 6/12 mm
- 2 hose clamps



Figure 16: VD connection kit

16.2 Vacuum module empty (without pump) (option)

The empty vacuum module is delivered ready-mounted to the vacuum drying oven. A switch (18) is located at the front of the vacuum module for switching a vacuum pump via a socket (19) permanently fitted in the vacuum module.



Figure 17: Vacuum module with switch and socket for vacuum pump

(17) Switch for vacuum pump

(18) Socket for vacuum pump

Maximum admissible load of the socket:

Standard	230 V / 50 Hz - 16 A
CUL-version	120 V / 60 Hz - 13 A



With CUL-version, connect only a UL listed vacuum pump with ratings of 120 V AC, 60 Hz, and less or equal 12 Amp, 0.5 HP.


Connection to vacuum source



Connect the vacuum connection (13) (small flange DN 16) at the rear of the unit at the top to a vacuum pump or to a domestic vacuum system via a vacuum hose or a fixed vacuum pipe.

When using a vacuum hose, we recommend using the BINDER connection kit Art. no. 8012-0146. The module has an appropriate hose outlet at the back. With the option including stainless steel tubing between the suction line connection and the vacuum pump, the suction connection is already located inside the module.



Figure 18: VD 53 with option vacuum module

	CAUTION
	<p>Technical defects due to excessive negative pressure.</p> <p>Danger of implosion.</p> <p>Damage of the unit.</p> <ul style="list-style-type: none"> ➤ Install the pump according to the permissible end vacuum or limit the end vacuum via a vacuum controller. ⊘ The end vacuum must NOT fall below the permissible level of 10^{-2} mbar.

	 WARNING
	<p>Release of extracted vapors.</p> <p>Danger of injury.</p> <p>Damage of oven and pump by corrosion.</p> <ul style="list-style-type: none"> ➤ Remove the extracted vapors from the module via a suitable hose into e.g., a fume extractor facility. ➤ Connect the hose to the vacuum pump outlet.

16.3 Vacuum module with chemical membrane pump

The empty vacuum module is delivered ready-mounted to the vacuum drying oven. A switch (18) is located at the front of the vacuum module for switching the vacuum pump via a socket (19) permanently fitted in the vacuum module.

The MZ2C or MD4C membrane pump is located in a separate transport packaging. A suction line is installed from the vacuum connection (13) (small flange DN 16) on the unit to the rear of the vacuum module.

With this option, the unit has 2 leads.

Maximum admissible load of the socket:

Standard	230 V / 50 Hz - 16 A
CUL-version	120 V / 60 Hz - 13 A


	<p>With CUL-version, connect only a UL listed vacuum pump with ratings of 120 V AC, 60 Hz, and less or equal 12 Amp, 0.5 HP.</p>
---	--



Figure 19: Vacuum module with switch and socket for vacuum pump

(18) Switch for vacuum pump

(19) Socket for vacuum pump

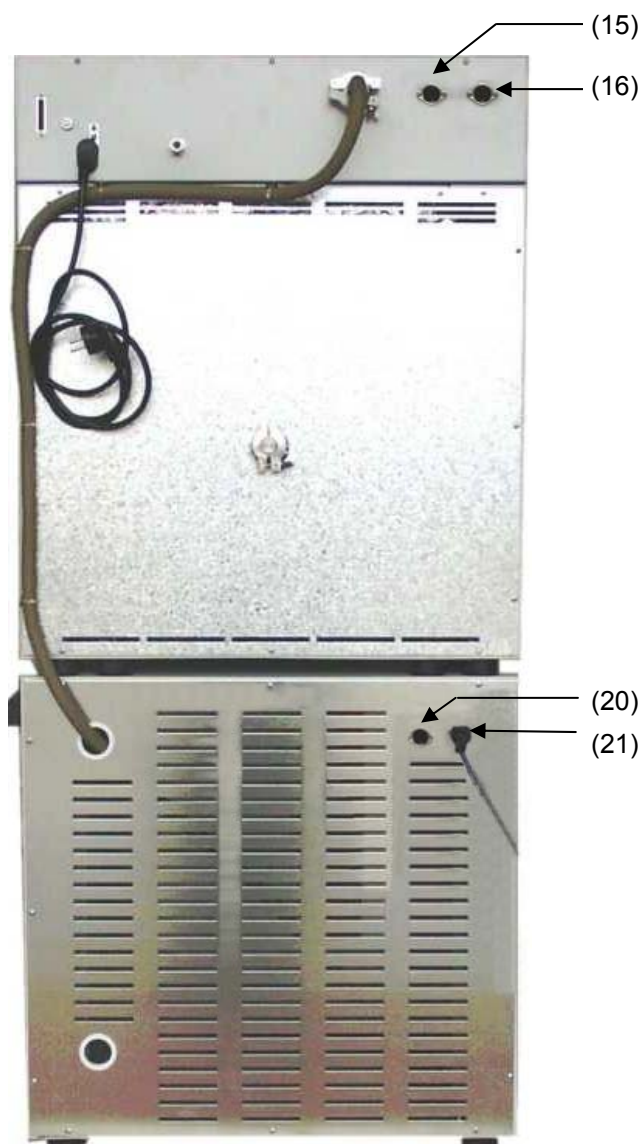




Figure 20: VD 53 with option vacuum module with pump



- (15) DIN socket (operation line 2) for option program controlled venting
- (16) DIN socket (operation line 3) for option vacuum module with pump
- (20) DIN socket at the vacuum module for option vacuum module with pump
- (21) Power supply at vacuum module


Installation of the supplied vacuum pump


- Having removed the pump from the original packaging, place it in the vacuum module.
- Push the pre-installed suction line onto the opening of the vacuum pump (13) hose olive above the suction-side condensate piston).
- Insert the shockproof plug of the vacuum pump into the permanently installed socket (19) in the vacuum module.
- Push a suitable hose for removing the extracted vapors from the module onto the pressure-side connection of the vacuum pump (hose olive at the back of the emission condenser at the top).
- Lead the hose end into an exhaust air unit.
- Connect DIN socket (20) at the vacuum module to DIN socket (16) at the unit rear via the supplied 1.2 m cable.

	As soon as the connection between DIN sockets (16) and (20) is established, it is not possible to manually switch the pump via switch (18).
---	---

	To allow switching on and off the pump via operation line 1, keep switch (18) switched on (position I).
---	---

	 WARNING
	<p>Release of extracted vapors.</p> <p>Danger of injury.</p> <p>Damage of oven and pump by corrosion.</p> <ul style="list-style-type: none"> ➤ Remove the extracted vapors from the module via a suitable hose into e.g., a fume extractor facility. ➤ Connect the hose to the vacuum pump outlet (hose olive at the back of the emission condenser at the top).

	You can connect a laboratory cooling system to the emission condenser of the vacuum pumps MZ2C or MD4C.
---	---


	For operating the chemical membrane pumps MZ2C and MD4C, please refer to the enclosed pump manufacturer's operating manual.
--	---


16.4 Vacuum module with speed controlled chemical membrane pump and vacuum controller (option)


This option consists of:

- Speed controlled chemical vacuum pump MD4C (suction power 3.5 m³/h)
- Vacuum controller CVC2000
- Vacuum module

The chemical vacuum pump and the vacuum controller are delivered ready-assembled as a vacuum pump stand PC2004 Vario in separate transport packaging. For installation and connection, see chap. 16.3.

	Do NOT connect DIN sockets (16) and (20) with this option.
---	--

	To allow switching on and off the pump, keep switch (18) switched on (position I).
---	--

	For operating the chemical membrane pump MD4C, please refer to the enclosed pump manufacturer's operating manual.
---	---

Programming of descendant pressure cycles as well as documentation of pressure data are possible via the RS 232 serial interface of this vacuum controller by use of the BINDER communication software APT-COM[®] versions 2.0 or 3.



In combination with the option object temperature measurement a T-formed connection tube adapter (small flange DN16 (Art. No. 6009-0060) NOT included) is necessary to connect the pressure sensor of the vacuum controller to the measuring access port.

16.5 Venting combined with speed controlled chemical membrane pump. Program control via APT-COM® (option, Art. No. 8012-0233)

This option allows venting via an electrovalve that can be precisely controlled via the vacuum controller CVC2000. In combination with option Vacuum module with speed controlled chemical membrane pump (chap. 16.4) and the communication software APT-COM®, you can program cycles of evacuation and venting.

With option “Vacuum module with speed controlled chemical membrane pump and vacuum controller” delivered by BINDER, you can either manually control (fixed value) the delivered vacuum controller CVC2000 at its control panel or via the communication software APT-COM® versions 2.0 or 3 (program control for cycles). In both cases, the vacuum controller controls the venting valve depending on the set-point pressure.



Program controlled venting by venting valve Art. No. 8012-0233 is possible only if the pumping unit have been delivered by BINDER.

Without any further supplement parts, the vacuum pump can only perform descendent pressure cycles, which you can program at the graphical program editor of APT-COM®. When using the venting valve Art. no. Nr. 8012-0233, also ascendant pressure cycles can be automated. This option is especially suitable for automated and reproducible drying processes with alternating pressure conditions. Additionally, this drying process can be accelerated by periodical intermediated venting.

The venting valve connects the measuring access port (17) at the rear side of the vacuum drying oven as shown below (Figure 21). All necessary connection parts are included with Art no. 8012-0233.



Do NOT use the cable with DIN plugs supplied with the vacuum module.

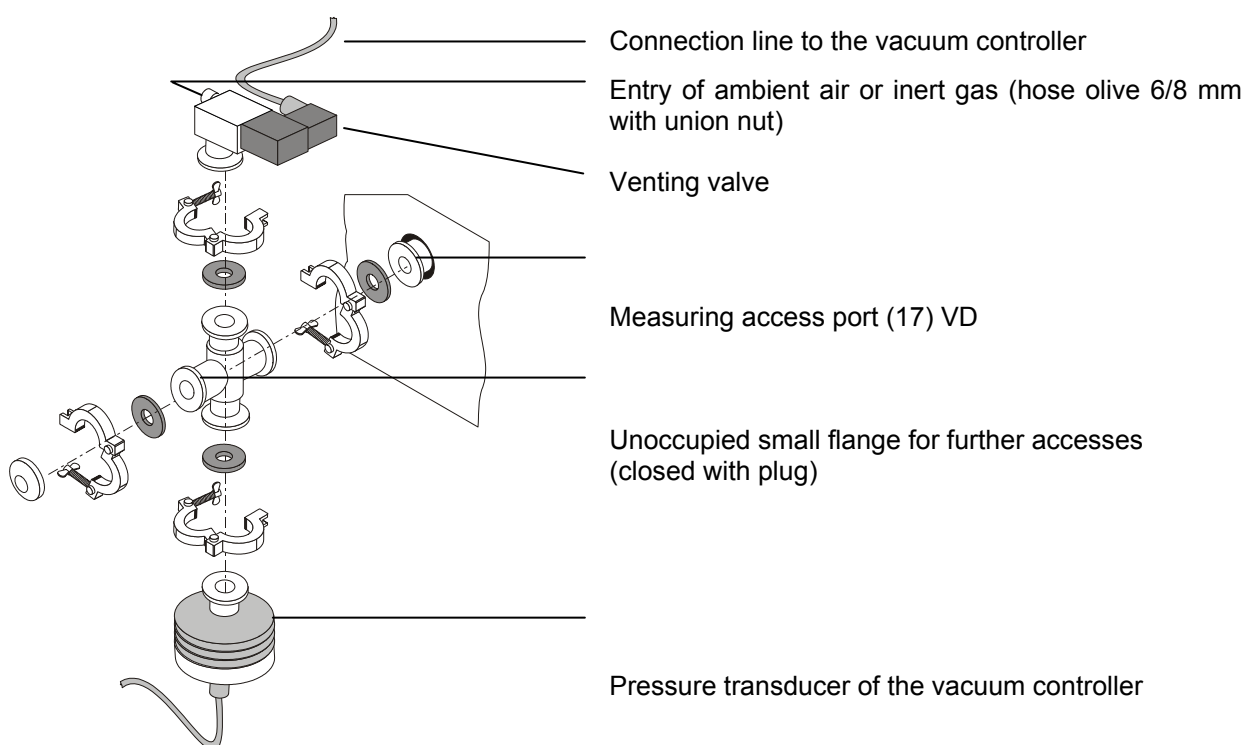


Figure 21: Connection of venting valve (option, Art. No. 8012-0233)



The vacuum controller can no longer be operated manually in this mode.

16.6 Program controlled venting via operation line 2 (option, Art. no. 8012-0552)

This option allows Program controlled venting via an electrovalve that can be precisely controlled via operation line 2 of the RD3 controller. In combination with option Vacuum module with chemical membrane pump (chap. 16.3) you can program cycles of evacuation and venting.

Without any further supplement parts, the vacuum pump can only perform descendent pressure cycles. Using the venting valve allows automating also ascendant pressure cycles. This option is especially suitable for automated and reproducible drying processes with alternating pressure conditions. Additionally, this drying process can be accelerated by periodical intermediated venting.

The controller RD3 controls the venting valve both in Fixed value operation and in Program operation depending on the time.

The venting valve connects the measuring access port (17) at the rear side of the vacuum drying oven as shown below (Figure 23). All necessary connection parts are included with Art no. 8012-0552.

Connect DIN socket (15) with the venting valve.

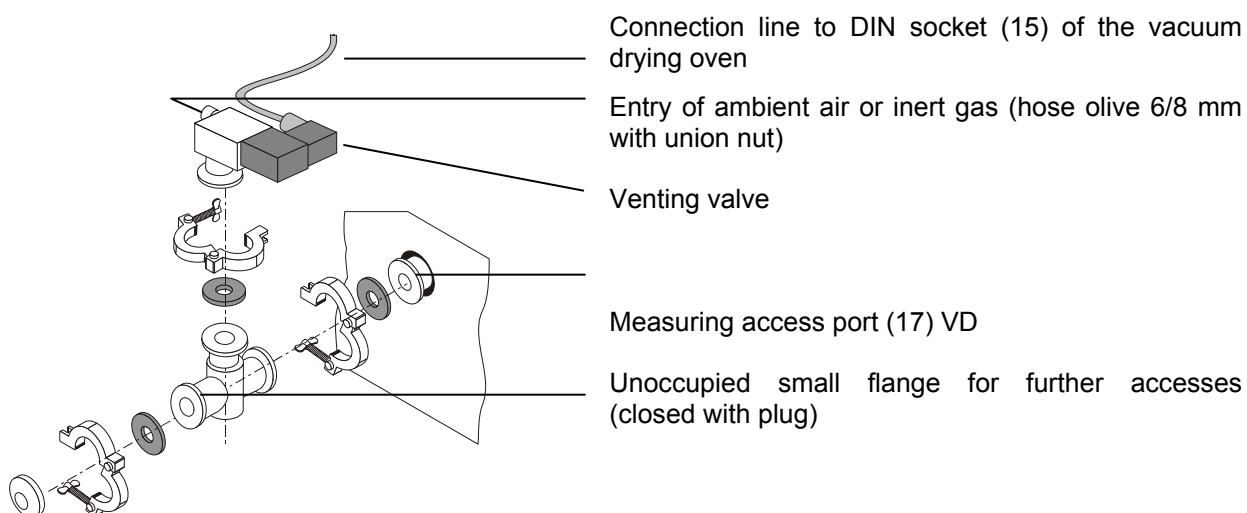


Figure 23: Connection of the venting valve (option, Art. No. 8012-0552)

16.7 Additional measuring channel for digital object temperature display with flexible Pt 100 temperature sensor (option)

The object temperature display allows recording the object temperature directly on or in the drying material. The object temperature is measured via a flexible Pt100 sensor and indicated on Display 2 of the RD3 controller.

The object temperature data are put out together with the temperature data of the temperature controller to the RS 422 interface as a second measuring channel. This allows recording by the BINDER documentation software APT-COM® DataControlSystem (option, chap. 16.11).



With this option the VDE sign becomes invalid.

Assembly and connection of the object temperature recording

- Insert the Pt 100 temperature sensor from the rear through the measuring connection (17) into the inner chamber.
- The 3 contacts of the Pt 100 sensor are conducted outside via a measuring access port. From there, establish the connection to the DIN socket at the top of the rear panel of the unit marked "Pt100".



Figure 24: Measuring connection (17) with measuring access port



Figure 25: Pt100 connection (14) at the rear of the unit

Technical data of the Pt 100 sensor:

- Three-wire technique
- Class B (DIN EN 60751)
- Temperature range up to 300°C
- Stainless steel protective tube 45 mm length, stainless steel material no. 1.4501

16.8 Measuring access port vacuum 9 poles (option)

The measuring access port allows electrical connections for low voltages or sensors between inside and outside of the vacuum drying oven. A 9 poles plug for the outside is included.



With this option the VDE sign becomes invalid.

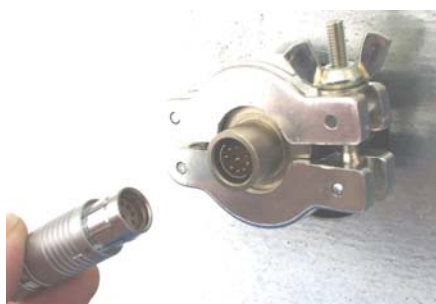




Figure 26: Measuring connection (17) with measuring access port and delivered plug

Connections at the measuring access port

- At the inner side of the measuring access port you can solder up to 9 cables. The inside connections must be isolated against each other and against Earth. Use 300°C solder.
- The 9 contacts are conducted outside via the measuring access port. Here you can connect a device via the delivered plug.

Maximum loading capacity of the switching contacts: 42 V AC/DC - 2A

	<div style="background-color: red; color: white; text-align: center; padding: 5px;">  DANGER </div> <p>Electrical hazard. Danger of life. Damage of switching contacts and connection socket.</p> <ul style="list-style-type: none"> Ø Do NOT exceed the maximum switching load of 42 AC/DC – 2A. Ø Do NOT connect any devices with a higher loading capacity. ➤ Insulate the inside connections against each other and against Earth. Use 300°C solder.
---	--


16.9 Digital pressure display (option)

With this option, a digital display indicates the internal pressure with the accuracy of 1 mbar. The pressure is measured by a fix installed internal pressure sensor.

A service engineer can calibrate and internally adjust the digital pressure display.




Figure 27: Digital display of internal pressure

	<p>With this option the VDE sign becomes invalid.</p>
---	---

16.10 Extended temperature range up to 250°C (option)

With this option, the operation of the unit remains the same as for the standard unit.

Use high temperature resistant silicone door gasket with this option. The standard silicon door gasket and the acid-resistant Viton gasket are permanently temperature-resistant only up to 200°C.

	<div style="background-color: yellow; text-align: center; padding: 5px;"> CAUTION </div> <p>Inadequate gasket type. Damage of the gasket.</p> <ul style="list-style-type: none"> Ø Do NOT use standard silicon or Viton door gaskets. ➤ Only use high temperature resistant silicone door gaskets (Art. No. 8012-0049).
---	---

16.11 Communication software APT-COM® 3 DataControlSystem (option)

The unit is regularly equipped with a serial interface RS 422 (10) to which the BINDER communication software APT-COM® 3 DataControlSystem can be connected. In adjustable intervals, the actual temperature value is put out. Programming can be performed graphically via PC. Up to 30 chambers with RS 422 interface can be cross-linked. For further information, please refer to the operating manual of the BINDER communication software APT-COM 3.



Make sure that the interface mode is correctly set to "Modbus" in the user level (chap. 10).

Pin allocation of the RS 422 interface (9):

pin 2: RxD (+)
pin 3: TxD (+)
pin 4: RxD (-)
pin 5: TxD (-)
pin 7: GND

16.12 Protocol printer (option)

Connect the protocol printer using the VD interface (10) via an interface converter RS422 / RS232.



Make sure that the interface mode is correctly set to "Printer" in the user level (chap. 10).

The actual temperature values are put out regularly with fixed formatting.

Printout: one printed line for each print interval with relative time stamp, temperature value with one decimal point, curve representation (see. "Manual for Setting Matrix Printer Epson LX-300+", Art. No. 7001-0041). In every 5th line the set print interval "Ptime" in minutes is noted. The printer interval is set in the user level (chap. 10).



Figure 28: Protocol printer

Example:

```
Temp.: 34.7      *
Temp.: 35.6      *
Temp.: 32.8      *
Temp.: 30.1      *
Ptime : 001.     *
Temp.: 27.4      *
Temp.: 26.9      *
Temp.: 26.6      *
Temp.: 26.4      *
Ptime : 001.     *
Temp.: 26.2      *
```

In this example the print interval is set to 1 min, i.e., every minute a new temperature value is printed.






In connection with the set print interval, referring to real time can be achieved by noting the start time of the registration.


Interface configuration: Baud rate: 9600
 Stop bit: 1
 Parity: none

17. Maintenance, cleaning, and service

17.1 Maintenance intervals, service

 	<div style="background-color: red; color: white; padding: 5px; text-align: center;">  DANGER </div> <p>Electrical hazard.</p> <p>Danger of life.</p> <ul style="list-style-type: none"> ➤ Put off-circuit the unit before conducting maintenance work. Pull the power plug. ⊘ The unit must NOT become wet during operation or maintenance works. ➤ Have all maintenance work conducted by professional electricians or experts authorized by BINDER.
--	--

Have conducted regular maintenance work at least once a year.





	<p>Change the door gasket in cold condition only. Otherwise the door gasket will be damaged.</p>
---	--

We recommend entering a maintenance agreement. Please consult the BINDER service department.

BINDER telephone hotline:	+49 (0) 7462 2005 555
BINDER fax hotline:	+49 (0) 7462 2005 93555
BINDER e-mail hotline:	service@binder-world.com
BINDER service hotline USA:	+1 866 816 8191 (toll-free in the USA)
BINDER Asia Pacific:	+ 603 6204 2855
BINDER Internet homepage	http://www.binder-world.com
BINDER address	BINDER GmbH, post office box 102, D-78502 Tuttlingen

International customers, please contact your local BINDER distributor.

17.2 Cleaning and decontamination


  	<div style="background-color: red; color: white; padding: 5px; text-align: center;">  DANGER </div> <p>Electrical hazard.</p> <p>Danger of life.</p> <ul style="list-style-type: none"> ⊘ Do NOT spill water or cleaning agents over the inner and outer surfaces. ➤ Put off-circuit the unit before cleaning. Pull the power plug. ➤ Completely dry the appliance before switching it on again.
---	--


Cleaning


Disconnect the oven from the mains before cleaning. Pull the power plug!

Wipe the surfaces with a moistened towel. In addition, you can use the following cleaning agents:

Exterior surfaces inner chamber expansion racks door gaskets	Standard commercial cleaning detergents free from acid or Halogenide. Alcoholic solutions. We recommend using the neutral cleaning agent Art. No. 1002-0016.
Instrument panel	Standard commercial cleaning detergents free from acid or Halogenide. We recommend using the neutral cleaning agent Art. No. 1002-0016.


	<p>For surface protection, perform cleaning as fast as possible.</p> <p>After cleaning completely remove cleaning agents from the surfaces with a moistened towel.</p>
---	--

	<p style="text-align: center;">CAUTION</p> <p>Danger of corrosion.</p> <p>Damage of the unit.</p> <p>Ø Do NOT use acidic or Halogenide cleaning detergents.</p>
---	--

	<p>We recommend using the neutral cleaning agent Art. No. Art. Nr. 1002-0016 for a thorough and mild cleaning.</p> <p>Any corrosive damage that might arise following use of other cleaning agents is excluded from liability by the BINDER GmbH.</p>
---	---

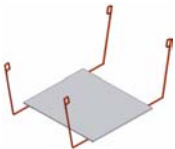
Decontamination:

Vacuum drying ovens VD can be hot air sterilized at 190°C for at least 30 minutes. Remove any inflammable goods from the interior before.

	<p>With every decontamination method, ensure adequate personal safety.</p>
---	--

18. Disposal

18.1 Disposal of the transport packing

Packing element	Material	Disposal
Straps to fix packing on pallet	Plastic	Plastic recycling
Wooden transport box (option) with metal screws	Non-wood (compressed matchwood, IPPC standard)	Wood recycling
	Metal	Metal recycling
Pallet	Solid wood (IPPC standard)	Wood recycling
Transport box with metal clamps	Cardboard	Paper recycling
	Metal	Metal recycling
Wooden sticks for stabilizing and for take out (size 115)	Solid wood (IPPC standard)	Wood recycling
Foamed plastic stuffing (pallet, top cover)	PE foam	Plastic recycling
Top cover	Cardboard	Paper recycling
Take out assistance (size 115) 	Cardboard	Paper recycling
	Plastic	Plastic recycling
Edge protection	Styropor®	Plastic recycling
Protection of doors	PE foam	Plastic recycling
Bag for operating manual	PE foil	Plastic recycling
Insulating air cushion foil (packing of optional accessories)	PE foil	Plastic recycling

If recycling is impossible, all packing parts can also be disposed of in the household waste.

18.2 Decommissioning

- Switch off main switch (1).





When switching off the main switch ON / OFF (1), the stored parameters remain saved.

- Close inert gas supply:

VD23: Close fine dosing valve (4) for inert gas / ambient air supply.

VD53, VD115: Close fine dosing valve (6) for inert gas supply.

Through the open inert gas connection, inert gas can enter the vacuum drying oven and escape into the ambient air.

	 WARNING
<p>Release of inert gas.</p> <p>Danger of poisoning.</p> <p>➤ When decommissioning the vacuum drying oven, shut off inert gas valve (4) or (6).</p>	

- Switch off the vacuum pump. Break the vacuum as described in chap. 14.2
- Disconnect the oven from the mains. Pull the power plug.
- Remove the vacuum connection (chap. 5.3).
- Remove the inert gas connection and the pressure reducer (chap. 5.4).

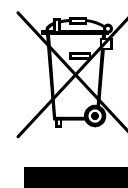
Temporal decommissioning: See indications for appropriate storage, chap. 4.3

Final decommissioning: Dispose of the unit as described in chap. 18.5


18.3 Disposal of the unit in the Federal Republic of Germany

According to directive 2002/96/EC of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE), BINDER devices are classified as "monitoring and control instruments" (category 9) only intended for professional use". They must not be disposed of at public collecting points.


The vacuum drying oven VD bears the symbol for the marking of electrical and electronic equipment manufactured / placed on the market in the EC after 13 August 2005 and be disposed of in separate collection according to the directive 2002/96/EC on waste electrical and electronic equipment (WEEE) and German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG). WEEE marking: crossed-out wheeled bin with solid bar under. An important part of the materials must be recycled in order to protect the environment.






After the end of utilization have the device disposed of according to the German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG) from 23 March 2005, BGBl. I p. 762 or contact the BINDER service who will organize taking back and disposal of the unit according to the German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG) from 23 March 2005, BGBl. I p. 762.

	<h2 style="text-align: center; background-color: yellow;">CAUTION</h2>
	<p>Violation against existing law.</p> <ul style="list-style-type: none"> Ø Do NOT dispose of BINDER devices at public collecting points. ➤ Have the device disposed of professionally at a recycling company which is certified according to the German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG) from 23 March 2005, BGBl. I p. 762. <li style="text-align: center;"><i>or</i> ➤ Instruct the BINDER Service to dispose of the device. The general terms of payment and delivery of the BINDER GmbH apply, which were valid at the time of purchasing the unit.

Certified companies disassemble waste BINDER equipment in primary substances for recycling according to directive 2002/96/EC by. In order to exclude any health hazard for the employees of the recycling companies, the devices must be free from toxic, infectious or radioactive substances.

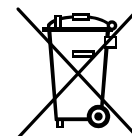
	<p>It is the user's responsibility that the unit is free from toxic, infectious or radioactive substances prior to handing it over to a recycling company.</p> <ul style="list-style-type: none"> – Prior to disposal clean the unit from all introduced or sticking toxic substances. – Prior to disposal disinfect the unit from all sources of infection. Be aware of the fact that sources of infection might be located as well outside the inner chamber. – If you cannot safely free the unit from toxic substances and sources of infection, dispose of it as special waste according to national law. – Fill out the contamination clearance certificate (chap. 21) and enclose it with the unit.
---	--

 	<h2 style="text-align: center; background-color: orange;">  WARNING </h2>
	<p>Contamination of the device with toxic, infectious or radioactive substances.</p> <p>Danger of intoxication.</p> <p>Danger of infection.</p> <ul style="list-style-type: none"> Ø NEVER lead a unit with sticking toxic substances or sources of infection to recycling according to directive 2002/96/EC. ➤ Prior to disposal, free the unit from sticking toxic substances or sources of infection. ➤ Dispose of a unit which you cannot safely free from all toxic substances or sources of infection as special waste according to national law.


18.4 Disposal of the unit in the member states of the EC except for the Federal Republic of Germany

According to directive 2002/96/EC of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE), BINDER devices are classified as "monitoring and control instruments" (category 9) only intended for professional use". They must not be disposed of at public collecting points.


The vacuum drying oven VD bears the symbol for the marking of electrical and electronic equipment manufactured / placed on the market in the EC after 13 August 2005 and be disposed of in separate collection according to the directive 2002/96/EC on waste electrical and electronic equipment (WEEE). WEEE marking: crossed-out wheeled bin with solid bar under.






After the end of utilization, notify the distributor who sold you the device, who will take back and dispose of the unit according to the directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE).



	<div style="background-color: yellow; text-align: center; padding: 5px;">CAUTION</div> <p>Violation against existing law.</p> <ul style="list-style-type: none"> Ø Do NOT dispose of BINDER devices at public collecting points. ➤ Have the device disposed of professionally at a recycling company which is certified according to conversion of the directive 2002/96/EC into national law. <li style="text-align: center;"><i>or</i> ➤ Instruct the distributor who sold you the device to dispose of it. The agreements apply that were reached with the distributor when purchasing the unit (e.g. his general terms of payment and delivery). ➤ If your distributor is not able to take back and dispose of the unit, please contact the BINDER service.
---	--

Certified companies disassemble waste BINDER equipment in primary substances for recycling according to directive 2002/96/EC by. In order to exclude any health hazard for the employees of the recycling companies, the devices must be free from toxic, infectious or radioactive substances.

	<p>It is the user's responsibility that the unit is free from toxic, infectious or radioactive substances prior to handing it over to a recycling company.</p> <ul style="list-style-type: none"> – Prior to disposal clean the unit from all introduced or sticking toxic substances. – Prior to disposal disinfect the unit from all sources of infection. Be aware of the fact that sources of infection might be located as well outside the inner chamber. – If you cannot safely free the unit from toxic substances and sources of infection, dispose of it as special waste according to national law. – Fill out the contamination clearance certificate (chap. 21) and enclose it with the unit.
---	--

 	<div style="background-color: orange; text-align: center; padding: 5px;"> WARNING</div> <p>Contamination of the device with toxic, infectious or radioactive substances.</p> <p>Danger of intoxication.</p> <p>Danger of infection.</p> <ul style="list-style-type: none"> Ø NEVER lead a unit with sticking toxic substances or sources of infection to recycling according to directive 2002/96/EC. ➤ Prior to disposal, free the unit from sticking toxic substances or sources of infection. ➤ Dispose of a unit which you cannot safely free from all toxic substances or sources of infection as special waste according to national law.
--	---


18.5 Disposal of the unit in non-member states of the EC

 	<p style="text-align: center;">CAUTION</p> <p>Alteration of the environment.</p> <ul style="list-style-type: none"> ➤ For final decommissioning and disposal of the vacuum drying oven, please contact the BINDER service. ➤ Observe the regulations under public law for appropriate disposal protecting the environment.
---	--

The main board of the vacuum drying oven includes a lithium cell. Please dispose of it according to the national regulations.

19. Troubleshooting

Fault description	Possible fault cause	Required measures
Heating		
Set-point temperature is not reached after specified time.	Unit door not properly closed.	Completely close unit door.
	Door gasket defective.	Replace door gasket,
	Controller not adjusted.	Calibrate and adjust controller.
Chamber heating permanently, set-point not held.	Controller defective.	Contact the BINDER service.
	Pt 100 sensor defective.	
	Semiconductor relay defective	
	Controller not adjusted.	Calibrate and adjust controller.
Chamber doesn't heat up. LED (7a) "Heating active" lit.	Heating element defective.	Contact the BINDER service.
	Semiconductor relay defective.	
Chamber doesn't heat up. LED (7a) "Heating active" not lit.	Safety device has switched off the oven.	Let cool down the oven and press down RESET button. Check temperature set-point and setting of safety device (chap. 12). If appropriate, select suitable limit value.
	Semiconductor relay defective.	Contact the BINDER service.
Unit permanently switched off.	Controller defective.	
	No power supply.	Check connection to power supply.
	Wrong voltage.	Check power supply for voltage of 115V or 230V.
	Unit fuse has responded.	Check unit fuse.
	Safety device has switched off the oven.	Let cool down the oven and press down RESET button. Check temperature set-point and setting of safety device (chap. 12). If appropriate, select suitable limit value.
	Safety device defective.	Contact the BINDER service.
	Controller defective.	
Deviations from the indicated heating-up times.	Oven fully loaded.	Charge the oven less or consider longer heating-up times.
Deviations from the temperature set-point in equilibrated state.	Invalid calibration	Use the delivered expansion racks only. Do NOT change between aluminum and stainless steel racks


Fault description	Possible fault cause	Required measures
Wrong temperature value measured during calibration.	Reference temperature sensor has insufficient contact to expansion rack.	Fix the reference temperature sensor with thermal conductive paste or adhesive aluminum tape.
	Leakage current when using a thermo element not electrically isolated.	Mount a thermo element electrically isolated from the rack.
Vacuum		
Vacuum not held.	Door gasket defective.	Replace door gasket,
	Safety glass panel defective.	Replace safety glass panel.
	Gaskets of small flange connections (universal eccentric ring) defective.	Replace gaskets of small flange connections.
	Inner tube connection leaky.	Contact the BINDER service.
Controller		
Program duration longer than programmed.	Inappropriate tolerances have been programmed.	For rapid transition phases, do NOT program tolerance limits in order to allow maximum heating speed.
Program stops one section too early.	Program line is incomplete.	When programming, define the end value of the desired cycle by adding an additional section with a section time of at least one minute.
Programs have been deleted.	Change from 2 programs to 1 program or vice-versa	When changing, ensure that the programs are no more needed.
The controller returns to Normal Display from any level.	No button was hit for more than 120 sec.	Repeat entries, enter the values rapidly.
Message RANGE ERROR CH1 in Normal Display in Display 2	Sensor rupture between sensor and controller	Contact the BINDER service.
 Have repairs performed only by experts authorized by BINDER. Repaired units must comply with the quality standard specified by BINDER.		

20. Technical description

20.1 Factory calibration and adjustment

This unit was calibrated and adjusted in factory. Calibration and adjustment were performed using standardized test instructions, according to the QM-system of DIN EN ISO 9001 applied by BINDER (certified since December 1996 by TÜV CERT under registration number 70 100 M 926). All test equipment used is subject to the administration of measurement and test equipment that is also constituent part of the BINDER QM-systems of DIN EN ISO 9001. They are controlled and calibrated in relation to a DKD-Standard on regular intervals.

Adjustment in factory in the center of the usable volume: at 100°C under vacuum conditions. Sensor fixed in the center of an expansion rack ensuring sufficient thermal conductivity. Measurement in thermally stable condition.

	CAUTION
	Invalid calibration. Ø Do NOT change between aluminum and stainless steel racks. ➤ Use the delivered expansion racks only.

20.2 Technical Data

Unit Size			23	53	115
External dimensions					
Width	mm / inch		515 / 20.28	634 / 24.96	740 / 29.13
Height (incl. feet)	mm / inch		654 / 25.75	771 / 30.35	899 / 35.39
Height of vacuum module (option)	mm / inch		622 / 24.49	622 / 24.49	622 / 24.49
Total height with option vacuum module	mm / inch		1276 / 50.24	1393 / 54.84	1518 / 59.76
Depth	mm / inch		500 / 19.69	550 / 21.65	670 / 26.38
Plus door handle, connections	mm / inch		100 / 3.94	100 / 3.94	100 / 3.94
Wall clearance at the back	mm / inch		100 / 3.94	100 / 3.94	100 / 3.94
Wall clearance at the side	mm / inch		135 / 5.31	135 / 5.31	135 / 5.31
Internal dimensions					
Width	mm / inch		285 / 11.22	400 / 15.75	506 / 19.92
Height	mm / inch		285 / 11.22	400 / 15.75	506 / 19.92
Depth	mm / inch		285 / 11.22	330 / 12.99	450 / 17.72
Interior volume	l / cu.ft.		23 / 0.8	53 / 1.9	115 / 4.1
Number of expansion racks (aluminum)	regular / max		2/4	2/5	2/6
Distance between the racks	mm / inch		53 / 2.09	62 / 2.44	68 / 2.68
Usable space per rack (width x depth)	mm / inch		234 x 280 / 9.21 x 11.02	349 x 320 / 13.74 x 12.60	455 x 440 / 17.91 x 17.32
Permissible load per rack	Kg / lbs		20 / 44	20 / 44	20 / 44
Permissible total load	Kg / lbs		35 / 77	45 / 99	65 / 143
Weight (empty)	Kg / lbs		63 / 139	80 / 177	150 / 331
Temperature data					
Temperature range approx. 5°C above room temperature up to	°C / °F		200 / 392	200 / 392	200 / 392
Spatial temperature variation ¹⁾ (with option 250°C)	at 100°C	± °C	2	2	3
	at 200°C	± °C	4	4	6
	at 250°C	± °C	5	6	8
Temperature fluctuation		± °C	0.4	0.4	0.4
Heating up time ^{1) 2)} (with option 250°C)	to 100°C	min	80	***	***
	to 200°C	min	110	***	***
	to 250°C	min	140	***	***
Vacuum data					
Vacuum connection with small flange	DN mm		16	16	16
Measuring access port with small flange	DN mm		16	16	16
Inert gas connection with flow-limiter					
Adapter with hose olive	Ø mm		8	8	8
Permitted end vacuum	mbar		1x10 ⁻²	1x10 ⁻²	1x10 ⁻²
Leak rate	bar/h		1x10 ⁻²	1x10 ⁻²	1x10 ⁻²
Electrical data					
IP protection type according to DIN 40050			IP 20	IP 20	IP 20
Nominal voltage (±10%) 50/60 Hz	V		230	230	230
Nominal power	W		800	1200	1900
Unit fuse 5 x 20 mm / 250V / middle-time-lag (M)	A		10	10	16
Mains plug			shock proof plug		
Mains plug vacuum module (option)			shock proof plug		
Empty value	at 100°C	W	140	250	280
	at 200°C	W	330	550	800
	at 250°C	W	440	800	1120
Over-voltage category acc. to IEC 1010-1			II	II	II
Pollution degree acc. to IEC 1010-1			2	2	2

Electrical connection data CUL-version (for the USA and Canada)

Unit Size		23	53	115
Electrical data				
Nominal voltage ($\pm 10\%$) 60 Hz / 1N	V	115	115	115
Nominal power	kW	0.80	1.20	1.70
Nominal current	A	7.0	10.5	14.8
Unit fuse 6.3 X 32 mm / 250V / super-time-lag TT	A	16	16	16
Mains plug	NEMA	5-15P	5-15P	5-20P
Mains plug vacuum module (option)	NEMA	5-15P	5-15P	5-20P
Over-voltage category acc. to IEC 1010-1		II	II	II
Pollution degree acc. to IEC 1010-1		2	2	2


Legend:

- 1) Values only in combination with aluminum racks
- 2) Time to reach 98% of the set point temperature
- *** Values not yet determined

All technical data are specified for units with standard equipment at an ambient temperature of +25°C and a mains voltage fluctuation of ± 10 . The temperature data are determined in accordance to DIN 12880, part 2, referring to the usable volume of the chamber.

All indications are average values, typical for units produced in series. We reserve the right to alter technical specifications at all times.


20.3 Equipment and Options

	To operate the vacuum drying oven VD, use only original BINDER accessories or accessories of third-party suppliers authorized by BINDER. The user is responsible for any risk when using unauthorized accessories.
---	--

Regular equipment
Microprocessor program controller RD3 with LED display
Safety device cl.2 according to DIN 12880, Part 1
RS 422 printer and communication interface with adjustable printing intervals
Fine-dosing aeration valve
Inert gas connection with fine-dosing valve
Analogue manometer (not with option digital pressure display)
Measuring connection, rear
Safety glass panel
2 switching contacts 24V DC via operation lines

Options / accessories		
Expansion racks, aluminum or stainless steel 1.4571		
Extended temperature range to 250°C		
Viton door gasket (temperature resistant up to 200°C) (NOT for option Extended temperature range 250°C)		
High temperature resistant silicone door gasket for option Extended temperature range 250°C		
Additional measuring channel for digital object temperature display with flexible Pt 100 temperature sensor		
Digital pressure display (adjustable)		
Protocol printer for numeric and graphic temperature documentation		
2-channel pen recorder, external		
Communication software APT-COM		
Connection kit with various small flange parts		
Measuring access port vacuum 9 poles		
Vacuum module empty (without pump)		
Vacuum module with chemical membrane pump MZ2C with separator and emission condenser, ready for connection		
• Ready to connect: Suction power (acc. to DIN 28432)	m ³ /h	1.7/2.0
• End vacuum	mbar	9
• Electrical connection (50-60 Hz)	V	230
Vacuum module with chemical membrane pump MD4C with separator and emission condenser, ready for connection		
• Ready to connect: Suction power (acc. to DIN 28432)	m ³ /h	3.0/3.5
• End vacuum	mbar	2
• Electrical connection (50-60 Hz)	V	230
Vacuum module with speed controlled chemical membrane pump MD4C with separator and emission condenser including all necessary connection parts		
Digital vacuum controller CVC 2000 (measuring accuracy of ≤ 1mbar) for accurate control of vacuum, with interface RS232 for APT-COM [®] software from version 2.0 on.		
• Suction power (acc. to DIN 28432)	m ³ /h	3.8
• End vacuum	mbar	2
• Electrical connection (50-60 Hz)	V	230
Program controlled venting		
Factory calibration certificate		
Extension to factory calibration certificate (additional value)		
Factory calibration certificate for digital object temperature display		
Factory calibration certificate for digital pressure display		
Extension to factory calibration certificate for digital pressure display (additional pressure)		
Qualification folder		
Evaporating dish with rim, small or large		
Stable table on wheels with castors and locking brakes		

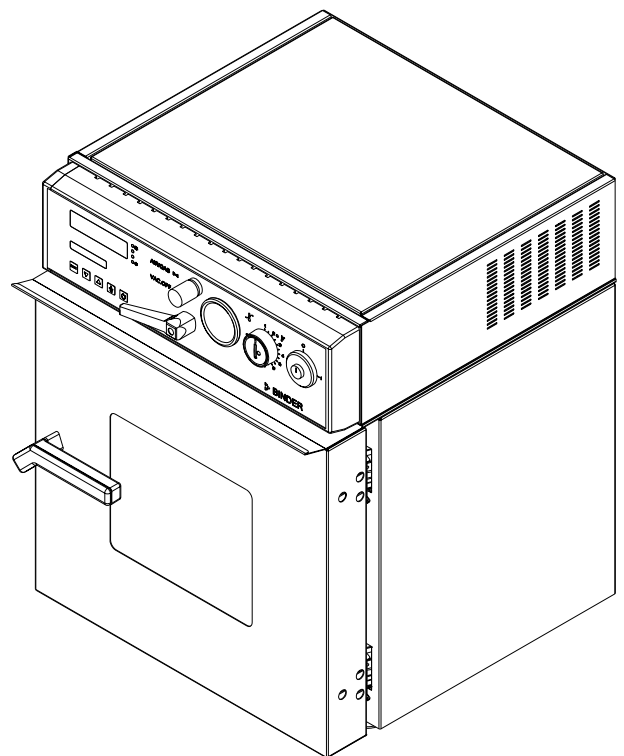
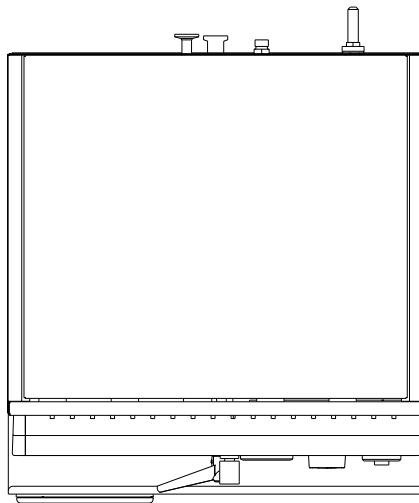
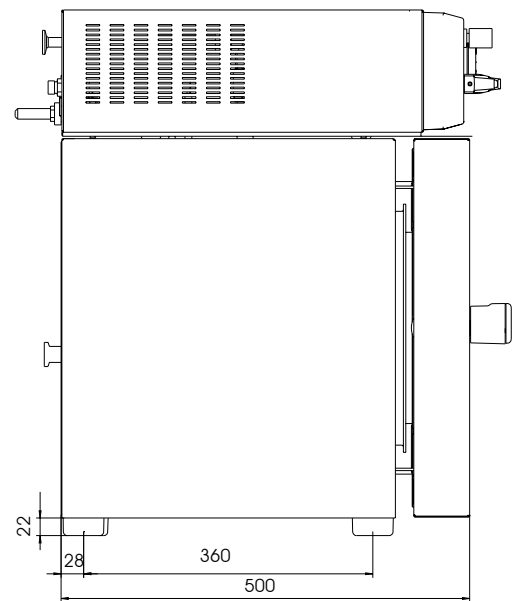
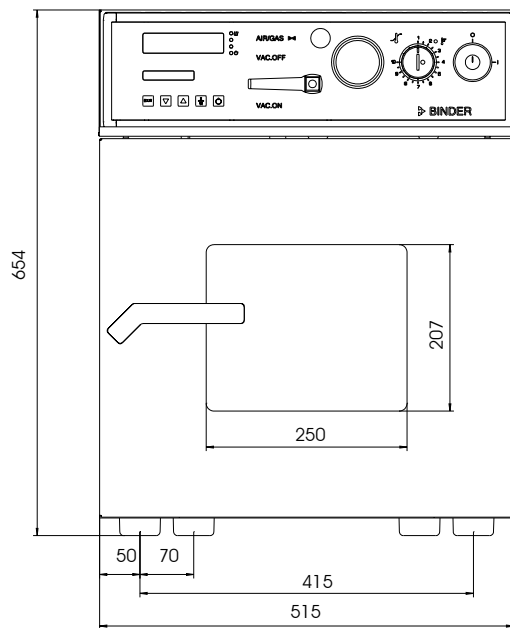
20.4 Spare parts

	<p>The BINDER GmbH is responsible for safety-related unit properties only if skilled electricians or qualified personnel authorized by BINDER perform all maintenance and repair, and if components with relating to chamber safety are replaced in case of failure with original spare parts. The user is responsible for any risk when using unauthorized accessories.</p>
---	--

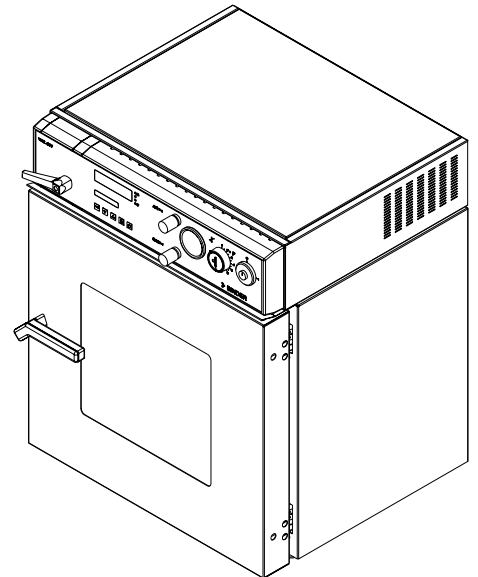
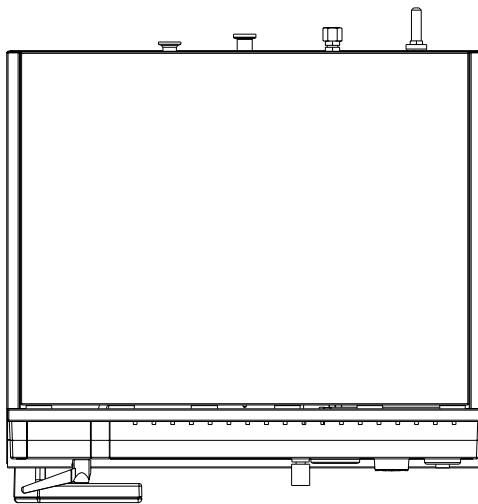
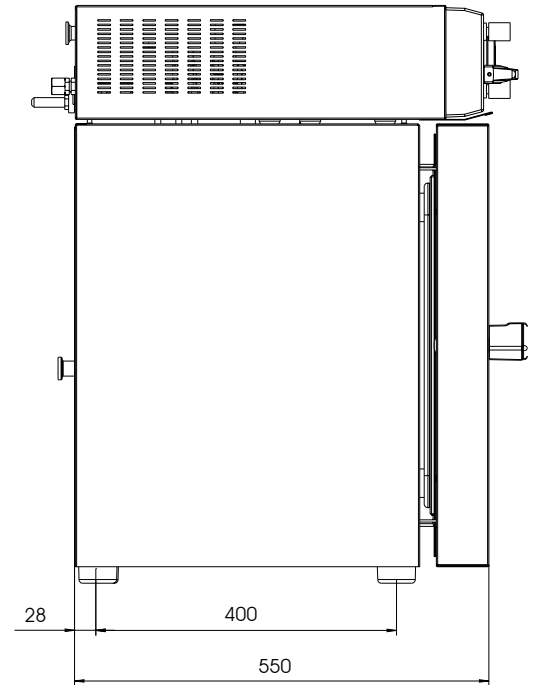
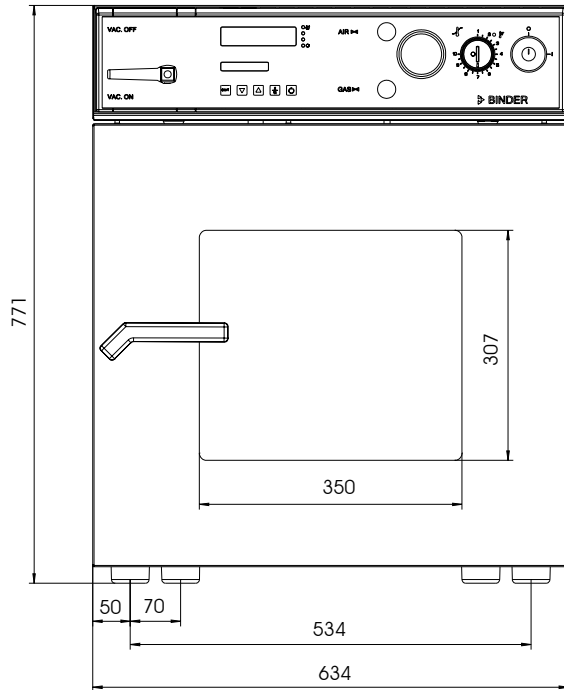
Accessories and spare parts:

Unit size	23	53	115
Description	Art. No.		
Expansion rack aluminum	8009-0098	8009-0099	8009-0100
Expansion rack stainless steel	8009-0101	8009-0102	8009-0103
Door gasket silicon (temperature-resistant up to 200°C)	6005-0015	6005-0016	6005-0018
Door gasket Viton (temperature-resistant up to 200°C)	6005-0044	6005-0045	6005-0046
Door gasket silicon (for option Extended temperature range 250°C)	6005-0049	6005-0050	6005-0051
Unit fuse 5x20mm / 250V / 10Amp semi time lag (M)	5006-0012	5006-0012	--
Unit fuse 5x20mm / 250V / 16Amp semi time lag (M)	--	--	5006-0013
Safety glass panel	6012-0007	6012-0008	6012-0015
Rack holder	4005-0071	4005-0072	4005-0073
Housing cover	6002-0067	6002-0016	6002-0016
Housing	6002-0017		
Universal sealing ring	6009-0048		
Centering ring	6009-0009		
Blind flange	6009-0010		
Handle	6002-0002		
Thermostat class 2 30° to 320°C	5006-0008		
Turning knob for thermostat class 2	8009-0004		
Temperature sensor Pt 100	5002-0022		
Protocol printer	8012-0418		
2-channel pen recorder, external	8012-0153		
Manometer	6013-0009		
Controller RD3	5014-0081		
Mains supply unit	5020-0026		
Stable table on wheels with castors and locking brakes	9051-0018		
Factory calibration certificate	8012-0031		
Extension to factory calibration certificate (additional value)	8012-0044		
Factory calibration certificate for digital object temperature display	8012-0442		
Factory calibration certificate for digital pressure display	8012-0440		
Extension to factory calibration certificate for digital pressure display (additional pressure)	8012-0441		
Qualification folder	8012-0422		
Evaporating dish, small	4022-0125		
Evaporating dish, large	4022-0126		
Neutral cleaning agent, 1 kg	1002-0016		

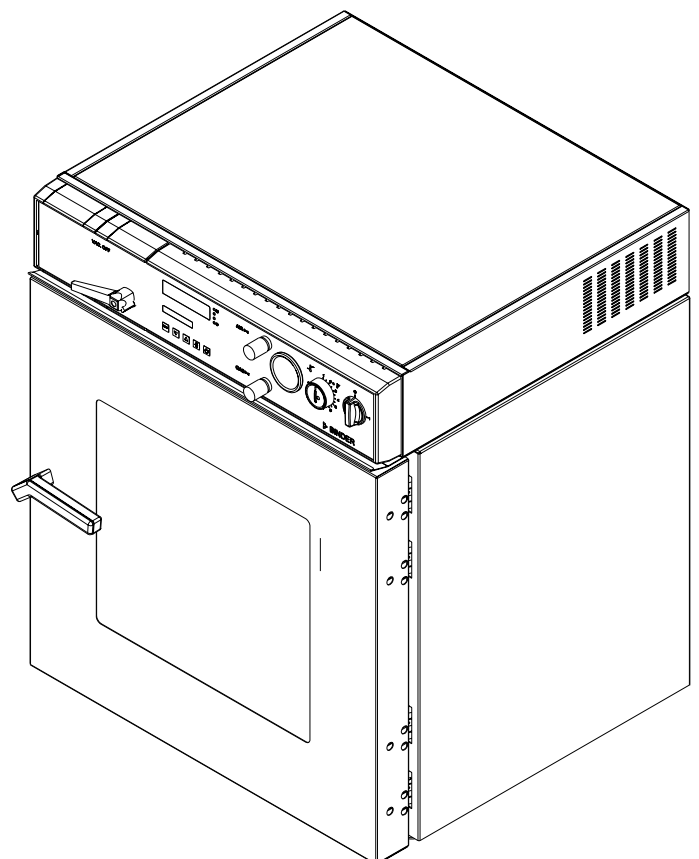
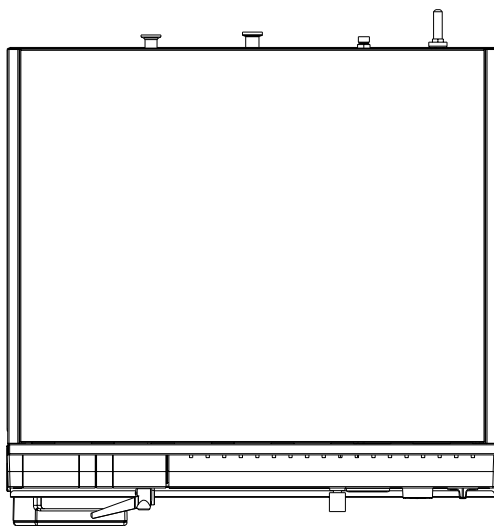
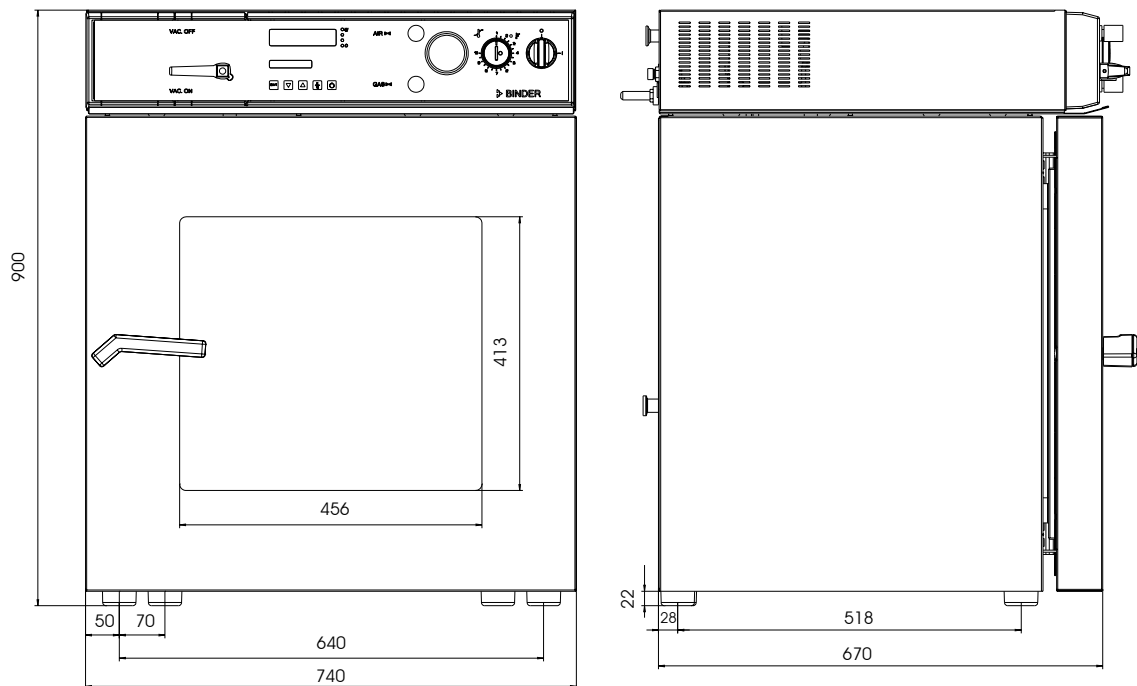
20.5 Dimensions VD 23



20.6 Dimensions VD 53



20.7 Dimensions VD 115



21. Contamination clearance certificate

Unbedenklichkeitsbescheinigung

Declaration of harmlessness with regard to safety and health

Erklärung zur Sicherheit and gesundheitlichen Unbedenklichkeit

The German Ordinance on Hazardous Substances (GefStofV), and the regulations regarding safety at the workplace, require that this form be filled out for all products that are returned to us, so that the safety and health of our employees can be warranted.

Die Sicherheit und Gesundheit unserer Mitarbeiter, die Gefahrstoffverordnung GefStofV und die Vorschriften zur Sicherheit am Arbeitsplatz machen es erforderlich, dass dieses Formblatt für alle Produkte, die an uns zurückgeschickt wird.



In the absence of a completely filled out form, repair is not possible.
Ohne Vorliegen des vollständig ausgefüllten Formblattes ist eine Reparatur nicht möglich.

- A completely filled out form should be transmitted by Fax (+49 (0) 7462 2005 93555) or by letter in advance to us, so that this information is available before the equipment/component part arrives. A second copy of this form should accompany the equipment/component part. Eventually the carrier should be informed.

Eine vollständig ausgefüllte Kopie dieses Formblattes soll per Telefax (Nr. +49 (0) 7462 2005 93555) oder Brief vorab an uns gesandt werden, so dass die Information vorliegt, bevor das Gerät/Bauteil eintrifft. Eine weitere Kopie soll dem Gerät/Bauteil beigelegt sein. Ggf. ist auch die Spedition zu informieren.

- Incomplete information or non-conformity with this procedure will inevitably lead to substantial delays in processing. We hope you will have understanding for this measure, which lies outside of our area of influence, and that you will help us to speed up this procedure.

Unvollständige Angaben oder Nichteinhalten dieses Ablaufs führen zwangsläufig zu beträchtlichen Verzögerungen in der Abwicklung. Bitte haben Sie Verständnis für Maßnahmen, die außerhalb unserer Einflussmöglichkeiten liegen und helfen Sie mit, den Ablauf beschleunigen.

- Please fill out this form completely.**

Bitte unbedingt vollständig ausfüllen!

1.	Unit/ component part / type: / Gerät / Bauteil / Typ:
2.	Serial No./ Serien-Nr.:
3.	Details about utilized substances / biological substances / Einzelheiten über die eingesetzten Substanzen/biologische Materialien:
3.1	Designations / Bezeichnungen:
a)	_____
b)	_____
c)	_____
3.2	Safety measures required for handling these substances / Vorsichtsmaßnahmen beim Umgang mit diesen Stoffen:
a)	_____
b)	_____
c)	_____

3.3	Measures to be taken in case of skin contact or release into the atmosphere / Maßnahmen bei Personenkontakt oder Freisetzung: a) _____ b) _____ c) _____ d) _____
3.4	Other important information that must be taken into account / Weitere zu beachtende und wichtige Informationen: a) _____ b) _____ c) _____
4.	Declaration on the risk of these substances (please checkmark the applicable items) / Erklärung zur Gefährlichkeit der Stoffe (bitte Zutreffendes ankreuzen) : <input type="checkbox"/> 4.1 For non toxic, non radioactive, biologically harmless materials / für nicht giftige, nicht radioaktive, biologisch ungefährliche Stoffe: We herewith guarantee that the above-mentioned unit / component part... / Wir versichern, dass o.g. Gerät/Bauteil... <input type="checkbox"/> Has not been exposed to or contains any toxic or otherwise hazardous substances / weder giftige noch sonstige gefährliche Stoffe enthält oder solche anhaften. <input type="checkbox"/> That eventually generated reaction products are non-toxic and also do not represent a hazard / auch evtl. entstandene Reaktionsprodukte weder giftig sind noch sonst eine Gefährdung darstellen. <input type="checkbox"/> Eventual residues of hazardous substances have been removed / evtl. Rückstände von Gefahrstoffen entfernt wurden. <input type="checkbox"/> 4.2 For toxic, radioactive, biologically harmful or hazardous substances, or any other hazardous materials / für giftige, radioaktive, biologisch bedenkliche bzw. gefährliche Stoffe oder anderweitig gefährliche Stoffe. We herewith guarantee that ... / Wir versichern, dass ... <input type="checkbox"/> The hazardous substances, which have come into contact with the above-mentioned equipment/component part, have been completely listed under item 3.1 and that all information in this regard is complete / die gefährlichen Stoffe, die mit dem o.g. Gerät/Bauteil in Kontakt kamen, in 3.1 aufgelistet sind und alle Angaben vollständig sind. <input type="checkbox"/> That the unit /component part has not been in contact with radioactivity / das Gerät/Bauteil nicht mit Radioaktivität in Berührung kam
5.	Kind of transport / transporter / Transportweg/Spediteur: Transport by (means and name of transport company, etc.) Versendung durch (Name Spediteur o.ä.) _____ _____ Date of dispatch to BINDER GmbH / Tag der Absendung an BINDER GmbH: _____

We herewith declare that the following measures have been taken / Wir erklären, dass folgende Maßnahmen getroffen wurden:

- ☐ Hazardous substances were removed from the unit / component part, so that no hazard exists for corresponding persons in the handling or repair of these items / das Gerät/Bauteil wurde von Gefahrstoffen befreit, so dass bei Handhabung/Reparaturen für die betreffenden Person keinerlei Gefährdung besteht
- ☐ The unit was securely packaged and properly identified / das Gerät wurde sicher verpackt und vollständig gekennzeichnet.
- ☐ Information about the hazardousness of the shipment (if required) has been provided to the transporter / der Spediteur wurde (falls vorgeschrieben) über die Gefährlichkeit der Sendung informiert.

We herewith commit ourselves and guarantee that we will indemnify BINDER GmbH for all damages that are a consequence of incomplete or incorrect information provided by us, and that we will exempt BINDER GmbH from eventual damage claims by third parties./ Wir versichern, dass wir gegenüber BINDER für jeden Schaden, der durch unvollständige und unrichtige Angaben entsteht, haften und BINDER gegen eventuell entstehende Schadenansprüche Dritter freistellen.

We are aware that, in accordance with Article 823 of the German Civil Code (BGB), we are directly liable with regard to third parties, in this instance especially the employees of BINDER GmbH, who have been entrusted with the handling / repair of the unit / component. / Es ist uns bekannt, dass wir gegenüber Dritten – hier insbesondere mit der Handhabung/Reparatur des Geräts/des Bauteils betraute Mitarbeiter der Firma BINDER - gemäß §823 BGB direkt haften

Name: _____

Position: _____

Date / Datum: _____

Signature / Unterschrift: _____

Company stamp / Firmenstempel:



Equipment that is returned to the factory for repair must be accompanied by a completely filled out contamination clearance certificate. For service and maintenance works on site, such a contamination clearance certificate must be submitted to the service technician before the start of the works. No repair or maintenance of the equipment is possible, without a properly filled out contamination clearance certificate.

