




Operating Manual

redLINE RE Gravity Convection Oven		
Model	Art. no.	
RE 53 (230 V)	9090-0001, 9190-0001	
RE 53-UL (100-120 V)	9090-0002, 9190-0002	
RE 115 (230 V)	9090-0007, 9190-0007	
RE 115-UL (100-120 V)	9090-0008, 9190-0008	
redLINE RF Mechanical Convection Oven		
Model	Art. no.	
RF 53 (230 V)	9090-0003, 9190-0003	
RF 53-UL (100-120 V)	9090-0004, 9190-0004	
RF 115 (230 V)	9090-0009, 9190-0009	
RF 115-UL (100-120 V)	9090-0010, 9190-0010	
redLINE RI Incubator		
Model	Art. no.	
RI 53 (230 V)	9090-0005, 9190-0005	
RI 53-UL (100-120 V)	9090-0006, 9190-0006	
RI 115 (230 V)	9090-0011, 9190-0011	
RI 115-UL (100-120 V)	9090-0012, 9190-0012	

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EC – Declaration of Conformity redLINE RE



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: Trockenschränke mit natürlicher Umluft
Gravity Convection Ovens
Etuves de séchage à circulation d'air naturelle
Typenbezeichnung / Type / Type: RE 53, RE 115

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 2006/95/EG	Richtlinie 2006/95/EG des Europäischen Parlaments und des Rates vom 12. Dezember 2006 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen
Low voltage directive 2006/95/EC	
Directive basse tension 2006/95/CE	Council Directive 2006/95/EC of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits
	Directive 2006/95/CE du Parlement Européen et du Conseil du 12 décembre 2006 concernant le rapprochement des législations des États membres relatives au matériel électrique destiné à être employé dans certaines limites de tension
EMV-Richtlinie 2004/108/EG	Richtlinie 2004/108/EG des Europäischen Parlaments und des Rates vom 15. Dezember 2004 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit und zur Aufhebung der Richtlinie 89/336/EWG.
EMC Directive 2004/108/EC	
Directive CEM 2004/108/CE	Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 98/336/EEC.
	Directive 2004/108/CE du Parlement Européen et du Conseil du 15 décembre 2004 relative au rapprochement des législations des États membres concernant la compatibilité électromagnétique et abrogeant la directive 98/336/CEE.

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.

**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:

EN 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 mesurage, de régulation et de laboratoire – Partie 1 : Prescriptions générales
EN 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 mesurage, de régulation et de laboratoire. Partie 2-010 : Prescriptions particulières pour appareils de laboratoire utilisés pour l'échauffement des matières

EMV / EMC / CEM:

EN 61326-1:2006 + Corr. 2008	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen. Teil 1: Allgemeine Anforderungen. Electrical equipment for measurement, control and laboratory use – EMC requirements. Part 1: General requirements. Matériel électrique de mesure, de commande et de laboratoire – Exigences relatives à la CEM. Partie 1: Exigences générales.
EN 61326-2-2:2006	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen. Teil 2-2: Besondere Anforderungen - Prüfanordnung, Betriebsbedingungen und Leistungsmerkmale für ortsveränderliche Prüf-, Mess- und Überwachungsgeräte in Niederspannungs-Stromversorgungsnetzen. Electrical equipment for measurement, control and laboratory use – EMC requirements. Part 2-2: Particular requirements - Test configurations, operational conditions and performance criteria for portable test, measuring and monitoring equipment used in low-voltage distribution systems. Matériel électrique de mesure, de commande et de laboratoire – Exigences relatives à la CEM. Partie 2-2: Exigences particulières - Configurations d'essai, conditions de fonctionnement et critères d'aptitude à la fonction des matériels portatifs d'essai, de mesure et de surveillance utilisés dans des systèmes de distribution basse tension.

D-78532 Tuttlingen, 22.12.2009

BINDER GmbH



P. M. Binder
Geschäftsführender Gesellschafter
Managing Director
Directeur général



Dr. H. von Both
Leiter F & E
Director R & D
Chef de service R&D

EC – Declaration of Conformity redLINE RF



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: Wärme-/Trockenschränke mit forcierter Umluft
Mechanical Convection Ovens
Etuves universelles à circulation d'air forcée
Typenbezeichnung / Type / Type: RF 53, RF 115

Die oben beschriebenen Produkte sind konform mit folgenden EG-Richtlinien:
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D-78532 Tuttlingen, 22.12.2009

BINDER GmbH



P. M. Binder
Geschäftsführender Gesellschafter
Managing Director
Directeur général



Dr. H. von Both
Leiter F & E
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EC – Declaration of Conformity redLINE RI



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: Brutschränke mit natürlicher Umluft
Incubators with natural convection
Incubateurs à circulation d'air naturelle
Typenbezeichnung / Type / Type: RI 53, RI 115

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D-78532 Tuttlingen, 22.12.2009

BINDER GmbH



P. M. Binder
Geschäftsführender Gesellschafter
Managing Director
Directeur général



Dr. H. von Both
Leiter F & E
Director R & D
Chef de service R&D

UL certificate, valid for redLINE-UL units

RE 53-UL, RE 115-UL, RF 53-UL, RF 115-UL, RI 53-UL, RI 115-UL

Certificate of Compliance

Certificate Number 20100408-E200795
Report Reference E200795-A10-UL-1
Issue Date 2010 April 8

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Issued to: BINDER GMBH

Im Mittleren Oesch 5
Tuttlingen, 78532
Germany

*This is to certify that
representative samples of*

Laboratory Use Electrical Equipment

RI universal laboratory incubators Models: RI 53-UL, RI 53(A)-UL, RI 115-UL
and RI 115(A)-UL

RE universal laboratory warming chambers with natural convection Models: RE
53-UL and RE 115-UL

RF universal laboratory forced convection ovens Models: RF 53-UL and RF 115-
UL

*Have been investigated by Underwriters Laboratories in accordance with
the Standard(s) indicated on this Certificate.*


Standard(s) for Safety:

UL 61010-1, 2nd Edition
CAN/CSA-C22.2 No. 61010-1, 2nd Edition

Additional Information:

See UL On-line Certification Directory at WWW.UL.COM for additional information.

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.

The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with "C" and "US" identifiers:  the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product

William R. Carney
Director, North American Certification Programs

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Dear customer,

For the correct operation of the redLINE chambers, it is important that you read this operating manual completely and carefully and observe all instructions as indicated. Failure to read, understand and follow the instructions may result in personal injury. It can also lead to damage to the unit and/or poor equipment performance

1. Safety

This operating manual is part of the components of delivery. Always keep it handy for reference. The device should only be operated by laboratory personnel especially trained for this purpose and familiar with all precautionary measures required for working in a laboratory. To avoid injuries and damage observe the safety instructions of the operating manual.

	 WARNING
	<p>Failure to observe the safety instructions.</p> <p>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 redLINE chambers.

1.1 Legal considerations

This operating manual is for informational purposes only. It contains information for installing, start-up, operation and maintenance of the product. Note: the contents and the product described are subject to change without notice.

Understanding and observing the instructions in this operating manual are prerequisites for hazard-free use and safety during operation and maintenance. In no event shall BINDER be held liable for any damages, direct or incidental arising out of or related to the use of this manual.

This operating manual cannot cover all conceivable applications. If you would like additional information, or if special problems arise that are not sufficiently addressed in this manual, please ask your dealer or contact us directly by phone at the number located on page one of this manual

Furthermore, we emphasize that the contents of this operating manual are not part of an earlier or existing agreement, description, 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 safety definitions and symbols indicate dangerous situations following the harmonization of ISO 3864-2 and ANSI Z535.6.

1.2.1 Signal word panel

Depending on the probability of serious consequences, potential 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
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious (irreversible) injury

 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 to the product and/or its functions or of a property in its proximity.
















1.2.2 Safety alert symbol



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

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

1.2.3 Pictograms

Warning signs			
 Electrical hazard	 Hot surface	 Explosive atmosphere	 Stability hazard
 Pollution Hazard	 Harmful substances	 Biohazard	 Lifting hazard
Mandatory action signs			
 Mandatory regulation	 Read operating instructions	 Disconnect 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.

1.2.4 Word message panel structure

Type / cause of hazard.

Possible consequences.

- Ø Instruction how to avoid the hazard: prohibition.
- Instruction how to avoid the hazard: mandatory action.

Observe all other notes and information not necessarily emphasized in the same way, in order to avoid disruptions that could result in direct or indirect injury or property damage.

1.3 Localization / position of safety labels on the unit

The following labels are located on the unit:

Pictograms (Warning signs)	
	Hot surface
	Risk of injury (UL units only)



redLINE



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Figure 1: Position of labels on the unit



Keep safety labels complete and legible.

Replace safety labels that are no longer legible. Call up www.binder-redline.com for these replacements.

1.4 Type plate

The type plate is located on the left-hand side of the unit, bottom right-hand.

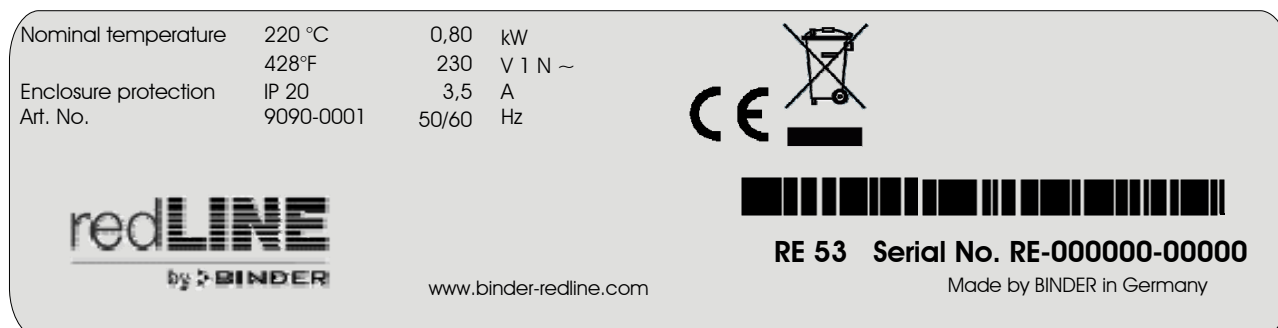


Figure 2: Type plate (example: RE 53)

Indications of the type plate		Information
Nominal temperature	220 °C 428°F	Nominal temperature
Enclosure protection	IP 20	IP type of protection 20 acc. to EN 60529
Art. No.	9090-0001	Article number 9090-0001
0,80 kW		Nominal power 0.80 kW
230 V 1 N ~		Nominal voltage 230 V \pm 10%, single-phase unit
3,5 A		Nominal current 3.5 Amp
50/60 Hz		Power frequency 50/60 Hz
RE 53		Model RE 53
Serial No. RE-000000-00000		Serial No. RE-000000-00000


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 to be disposed of in a separate collection according to directive 2002/96/EC on waste electrical and electronic equipment (WEEE).
(UL units only)	The equipment is certified by Underwriters Laboratories Inc.® according to standards CAN/CSA-C22.2 No. 61010-1, 2 nd Edition, 2004-07 (Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements); UL 61010-1, 2 nd Edition, 2005-07-22 (Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements); IEC 61010-1:2001, 2 nd Edition and IEC 61010-2-10 (Particular Requirements for Laboratory Equipment for the heating of materials).

1.5 General safety instructions on installing and operating the redLINE chambers



With regard to operating the redLINE chambers and to their installation location, please observe the guideline BGI/GUV-I on safe working in laboratories (formerly BGR/GUV-R 120 or ZH 1/119 laboratory guidelines issued by the employers' liability insurance association) (for Germany).

The manufacturer is only responsible for the safety features of the unit provided skilled electricians or qualified personnel authorized by the manufacturer perform all maintenance and repair, and if components relating to chamber safety are replaced in the event of failure with original spare parts.



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

	CAUTION
	<p>Danger of overheating. Damage to the unit.</p> <ul style="list-style-type: none"> ⊘ Do NOT install redLINE chambers in unventilated recesses. ➤ Ensure sufficient ventilation for dispersal of the heat.

Do not operate the redLINE chambers in hazardous locations.

	 DANGER
	<p>Explosion hazard. Danger of death.</p> <ul style="list-style-type: none"> ⊘ Do NOT operate redLINE chambers in potentially explosive areas. ➤ KEEP explosive dust or air-solvent mixtures AWAY from the unit.

The redLINE chambers do not dispose of any measures of explosion protection.


	 DANGER
	<p>Explosion hazard. Danger of death.</p> <ul style="list-style-type: none"> ⊘ Do NOT introduce any substance into the redLINE chambers which is combustible or explosive at working temperature. ⊘ NO explosive dust or air-solvent mixture in the inner chamber.

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 must form. The temperature inside the chamber must lie below the flash point or below the sublimation point of the charging material. Familiarize yourself with the physical and chemical properties of the charging material, as well as the contained moisture constituent and its behavior with the addition of heat energy.

Familiarize yourself with any potential health risks caused by the charging material, the contained moisture constituent or by reaction products that may arise during the temperature process. Take adequate measures to exclude such risks prior to putting the unit into operation.

	 DANGER
	Electrical hazard. Danger of death. ☐ The unit must NOT become wet during operation or maintenance.

redLINE chambers were produced in accordance with VDE regulations and were routinely tested in accordance to VDE 0411-1 (IEC 61010-1).

	 CAUTION
	The inner chamber and the outgoing air pipe will become hot during operation. Danger of burning. ☐ Do NOT touch the inner surfaces, the access ports, or the charging material during operation.

1.6 Intended use

Gravity convection ovens RE and **mechanical convection ovens RF** are designed for all standard drying and tempering tasks as well as sterilizing glassware. They are intended for use in biological, chemical, medical, pharmaceutical and physical laboratories.

Incubators RI are designed to cultivate microorganisms at defined temperatures. They can be used e. g. for determining the number of microorganisms through plate count methods or detecting of pathogenic germs, e.g. in product samples. They are intended for use in biological, chemical, medical, and pharmaceutical laboratories.

Any solvent content must not be explosive or flammable. A mixture of any component of the charging material with air must NOT be explosive. The operating temperature must lie below the flash point or below the sublimation point of the charging material.

Other applications are not approved.

Do NOT use redLINE chambers for drying purpose if greater quantities of steam leading to condensation will be set free.



Following the instructions in this operating manual and conducting regular maintenance work (chap. 10) are part of the intended use.

Due to the special demands of the Medical Device Directive (MDD) this ovens are not qualified for sterilization of medical devices as defined by the directive 93/42/EWG.

2. Unit description

Function

Gravity convection ovens **RE** and mechanical convection ovens **RF** are suitable for drying and heat treatment of solid or pulverized charging material, as well as bulk material, using the supply of heat. They are designed for all standard drying and tempering tasks as well as sterilizing glassware. RF permits shorter drying times.

The incubators **RI** are designed for exact temperation of harmless materials. They are designed to cultivate microorganisms at defined temperatures.

Controller

redLINE chambers are equipped with an electronic PID-controller with digital display. The ovens RE and RF have a temperature display and setting with an accuracy of one degree. The incubators RI have a temperature display and setting with an accuracy of a tenth of a degree. The integrated timer can be set to 0-9999 minutes. Also continuous operation is possible.

Interior and housing

The inner chamber, the pre-heating chamber and the inside of the doors are all made of stainless steel. When operating the ovens RE and RF at temperatures above 150 °C / 302°F, the impact of the oxygen in the air may cause discoloration 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 housing is RAL 7035 powder-coated. All corners and edges are also completely coated.

Heating and ventilation

redLINE chambers are heated electrically and ventilated naturally. Mechanical convection ovens RF are ventilated by fan-assisted, forced-air circulation. The direct heating system provides an extremely precise internal temperature. A thermoelement serves to measure the tempering of the interior, which is controlled by the redline controller.

Temperature range: Ovens RE and RF: by 7 °C / 12°F above room temperature up to 220 °C / 428°F. Incubators RI: by 7 °C / 12°F above room temperature up to 70 °C / 158°F.

Temperature safety device

redLINE chambers are equipped with a temperature safety device class 1 according to DIN12880. The temperature fuse is triggered irreversibly if the maximum temperature of 229 °C / 444.2°F (RE, RF) resp. 110 °C / 230°F (RI) inside the chamber is exceeded.

Electrical connection

redLINE chambers are available for a 230 V, redLINE UL chambers for a 100-120 V power supply.

2.1 Scope of delivery

- redLINE gravity convection oven RE, or redLINE mechanical convection oven RF, or redLINE incubator RI
- 2 trays
- Flat assembly bar for stacking (it is vital to keep them, as two flat assembly bars are required to stack two devices, and each device comes supplied with one)

2.2 Equipment overview



Figure 3: redLINE gravity convection oven RE



Figure 4: redLINE mechanical convection oven RF



Figure 5: redLINE incubator RI

(1) Chamber door
(2) Door handle
(3) Controller

(4) Tray
(5) Inner glass door

2.3 Control panel

The control panel with the controller and the main power switch is located on the housing below the door.

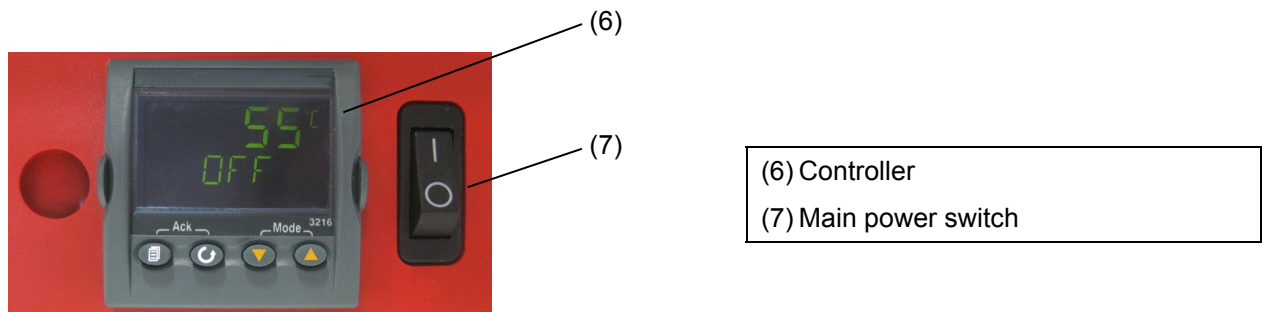


Figure 6: redLINE control panel





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

3.1 Unpacking, and checking equipment and scope of delivery

After unpacking, please check the redLINE chamber and its optional accessories, if any, based on the delivery note for completeness and for transportation damage. If transportation damage has occurred, inform the carrier immediately and have it confirmed on the proof of delivery by the vehicle driver who delivers the equipment.

The final tests of the manufacturer may cause traces of the trays on the inner surfaces. This has no impact on the function and performance of the unit.

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




  	<div style="background-color: yellow; text-align: center; padding: 5px;">  CAUTION </div> <p>Sliding or tilting of the unit.</p> <p>Damage to the unit.</p> <p>Risk of injury by lifting heavy loads.</p> <ul style="list-style-type: none"> Ø Do NOT lift or transport a redLINE chamber using the door handle or the door. ➤ Lift a redLINE chamber from the pallet at its four lower corners with the aid of 2 people.
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In case of warranty please contact www.binder-redline.com.

For disposal of the transport packing, see chap. 12.1.

3.2 Guidelines for safe lifting and transportation

Observe the advice for temporal decommissioning (chap. 9).

  	<div style="background-color: yellow; text-align: center; padding: 5px;">CAUTION</div> <p>Sliding or tilting of the unit.</p> <p>Damage to the unit.</p> <p>Risk of injury by lifting heavy loads.</p> <ul style="list-style-type: none"> ➤ Transport the redLINE chamber in its original packaging only. ➤ Secure the redLINE chamber with transport straps for transport. ⊘ Do NOT lift or transport a redLINE chamber using the door handle or the door. ➤ Lift a redLINE chamber at its four lower corners with the aid of 2 people and place it on a transport pallet with wheels. Push the pallet to the desired site and then lift the unit from the pallet at its four lower corners.
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- Permissible ambient temperature range during transport: -10 °C / 14°F to +60 °C / 140°F.

You can order transport packing and pallets for transportation purposes via www.binder-redline.com.

3.3 Storage


Intermediate storage of the unit is possible in a closed and dry room. Observe the guidelines for temporary decommissioning (chap. 9).

- Permissible ambient temperature range during storage: -10 °C / 14°F to +60 °C / 140°F.
- 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 may form. Wait at least one hour until the oven has attained ambient temperature and is completely dry.

3.4 Location of installation and ambient conditions

Set up the redLINE chamber on a flat, even, and non-flammable surface, free from vibration and in a well-ventilated, dry location and align them using a spirit level. The site of installation must be capable of supporting the unit's weight (see technical data, chap. 14.4). The chambers are designed for setting up inside a building (indoor use). Set up the chamber in such a way that the main power switch (7) is easily accessible and can be turned off immediately in case of danger.

	<div style="background-color: yellow; text-align: center; padding: 5px;">CAUTION</div> <p>Danger of overheating.</p> <p>Damage to the unit.</p> <ul style="list-style-type: none"> ⊘ Do NOT set up redLINE chambers in non-ventilated recesses. ➤ Ensure sufficient ventilation for dispersal of the heat.
---	---

- Permissible ambient temperature range during operation: +18 °C / 64.4°F up to +40 °C / 104°F. At elevated ambient temperature values, fluctuations in temperature can occur.





The ambient temperature should not be substantially higher than the indicated ambient temperature of +25 °C / 77°F to which the specified technical data relate. For other ambient conditions, deviations from the indicated data are possible.

- Permissible ambient humidity: 70 % r.H. max., non-condensing.
- Installation height red LINE: max. 2000 m / 6562 ft above sea level.
- Installation height redline-UL: max. 5000 m / 16,404 ft above sea level.

Maintain a minimum distance of 250 mm / 9.84 in between each unit. Wall distances: rear 100 mm / 3.94 in, sides 160 mm / 6.30 in.

To completely separate the unit from the power supply, you must disconnect the power plug. Install the unit in a way that the power plug is easily accessible and can be easily pulled in case of danger.

Do not install or operate the unit in hazardous locations.


	 DANGER
	<p>Explosion hazard. Danger of death.</p> <ul style="list-style-type: none"> ⊘ Do NOT operate redLINE chambers in potentially explosive areas. ➤ KEEP explosive dust or air-solvent mixtures AWAY from the vicinity of the unit.

redLINE chambers are not waterproof. Do not install the chamber in locations where water could be sprayed about, e.g. in the vicinity of sinks or safety showers.

	 DANGER
	<p>Electrical hazard. Danger of death.</p> <ul style="list-style-type: none"> ➤ redLINE chambers must NOT become wet during operation or maintenance work

3.5 Stacking

Two redLINE chambers can be piled on top of each other. To ensure that they are safely positioned, both devices should be attached to one another using the flat assembly bars supplied. One flat assembly bar is supplied with each redLINE chamber.

	CAUTION
	<p>Sliding or tilting of the upper chamber. Damage to the chambers.</p> <ul style="list-style-type: none"> ⊘ Never stack more than two redLINE chambers. ➤ Always secure stacked redLINE chambers using both flat assembly bars supplied

- Place the first chamber at the intended location. Leave enough space between the rear panel of the chamber and the wall behind it, so that you can turn screws into the rear panel using a TX20 screwdriver.
- Unscrew two of the screws which fix the upper edge of the rear panel of the lower chamber.
- Fasten two flat assembly bars with these screws at the upper edge of the rear panel.
- Place the second chamber on top of the first.
- Unscrew two of the screws which fix the lower edge of the rear panel of the upper chamber.
- Place the upper chamber in a way that the empty drilling holes overlap the holes in the lower chamber's flat assembly bar.
- Screw the two assembly bars to the rear panel of the upper chamber.

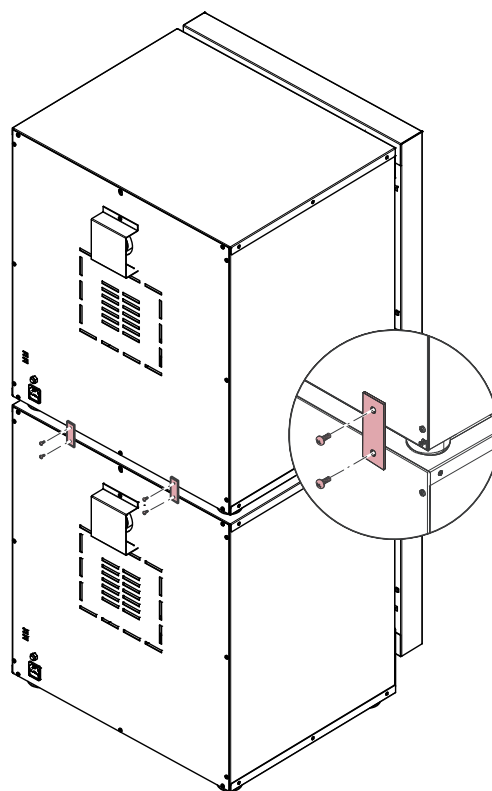


Figure 7: Stacking two redLINE chambers



4. Installation of the equipment

4.1 Electrical connection

- Power supply voltage 230 V (1N~) +/- 10 %, 50/60 Hz. UL-units: 100-120 V (1N~) +/- 10 %, 50/60 Hz
- Power connection: IEC connector plug and cable of 2500 mm / 98.4 in in length
- Plug 230 V units: shockproof plug. Plug UL-units: NEMA 5-15P
- Prior to connection and start-up, check the power supply voltage. Compare the values to the specified data located on the unit's type plate (on the left-hand side of the unit, see 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 power supply voltage. Damage to the equipment.</p> <ul style="list-style-type: none"> ➤ Check the power supply voltage before connection and start-up. ➤ Compare the power supply voltage with the data indicated on the type plate.

See also electrical data (chap. 14.4).

	 WARNING
	<p>Danger by electrical short-circuit.</p> <p>Danger of fire.</p> <p>➤ Only use the chamber connected to a power source fused to at least 10 Amp.</p>
	 DANGER
	<p>Electrical hazard.</p> <p>Danger of death.</p> <p>Ø Do not connect any chamber with a dented or damaged rear panel to the power supply.</p> <p>➤ If the chamber has a damaged power cable or rear panel, withdraw it from use immediately, remove the power plug and contact your dealer to have it repaired.</p>
	<p>To completely separate the unit from the power supply, you must disconnect the power plug. Install the unit in a way that the power plug is easily accessible and can be easily pulled in case of danger.</p>

4.2 Connection to a suction plant (optional)

When directly connecting a suction plant the spatial temperature exactitude, the heating-up and the recovering times and the maximum temperature will be negatively influenced. So no suction plant should be directly connected to the outgoing air pipe.

	<p>Active suction from the oven must only be performed together with extraneous air. Perforate the connecting piece to the suction device or place an exhaust funnel at some distance to the outgoing air pipe.</p>
	 CAUTION
	<p>The exhaust duct and its cover will become hot during operation.</p> <p>Danger of burning.</p> <p>Ø Do NOT touch the exhaust duct and its cover during operation.</p>

5. Start up

Warming chambers may release odors in the first few days after commissioning. This is not a quality defect. To reduce odors quickly we recommend heating up the chamber to its nominal temperature for one day and in a well ventilated location.

5.1 Adjusting the air change

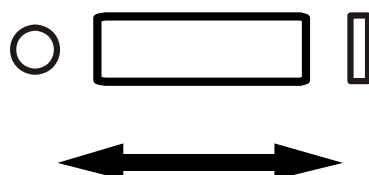
The air flap on top on the inner back wall serves to adjust the air change.

Without connecting a suction plant:

- RI and RE: Fresh air circulation can be elevated using the outgoing air pipe. The air flap in the outgoing air pipe serves to adjust the fresh air entry.
- RF: With the air flap open and the fan operating, fresh air comes in via aeration gaps.



If the air flap is completely open, the spatial temperature accuracy may be negatively influenced.



○ = air flap open
□ = air flap closed

Figure 8: Adjusting the air change RF

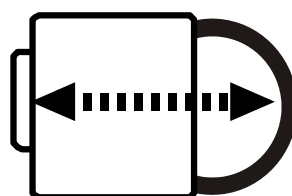


Figure 9: Adjusting the air change RE and RI

Adjust the air flap in a way that no condensation occurs inside the unit.

5.2 Controller overview



Figure 10: redLINE operating panel with controller and main power switch

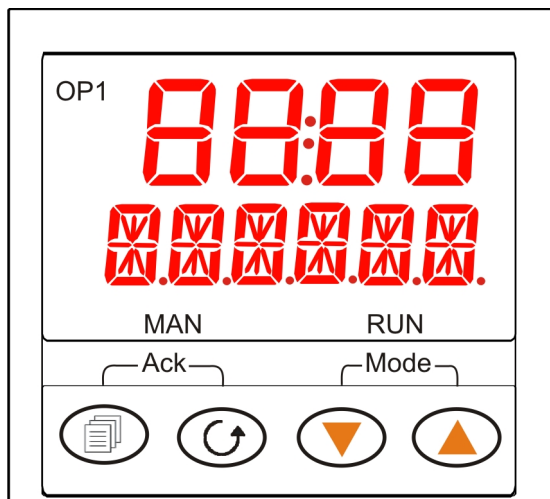


Figure 11: redLINE controller

Buttons and controller displays

	Configuration button (access to the adjusting menu)
	Functional button (access to the setting menus for the temperature set-point, the timer duration, and the temperature unit, and to display of the remaining timer run time)
	Arrow buttons to select parameters and enter values
MAN	Manual Mode (manual control of the heating power)
RUN	Timer operation
OP1	Heating pilot lamp (heating operating)

Text indications

OFF	Operating mode "Standby"
Auto	Operating mode "Automatic Mode"
mAn	Operating mode "Manual Mode"
A-M	Selection of operating mode (Standby / Automatic Mode / Manual Mode)
SP1	Setting menu for the temperature set-point
DWELL	Setting menu for the timer duration
TREMN	Remaining timer run time
UNITS	Setting menu for the temperature unit (°C / °F)
LEv1 LEv2	Levels to access the temperature adjustment menu
CODE	Password request
UCAL	Adjustment menu: selecting the adjustment point
CADJ	Adjustment menu: entering the reference value
H. Lo IDLE rSET	Displays in the adjustment menu

Scrolling messages

e.g. REDLINE RE 53	Chamber type
SETPOINT 1	Setting menu for the temperature set-point
SET TIME DURATION	Setting menu for the timer duration
TIMER RUNNING	Timer operation – Timer running
TIMER HOLD	Timer operation – Timer interrupted
TIME REMAINING	Display of the remaining timer run time
TIMER END	Timer expired, operating mode Standby
DISPLAY UNITS	Setting menu for the temperature unit
SELECT ACCESS LEVEL	Access menus for temperature adjustment
PASSCODE	Password request
USER CALIBRATION	Adjustment menu: selecting the adjustment point
CALIBRATION ADJUST	Adjustment menu: entering the reference value


5.3 Turning on the unit

Insert the plug into a socket (chap. 4.1) and turn on the chamber at its main power switch (7).

RF: The fan is permanently active, as long as the chamber is turned on at the main power switch, independent on the current controller function.

After turning on the chamber, the controller runs a 3 second self-test sequence displaying the software version. Then it shows the main display (actual value display).

During the equilibration phase of an hour after turning on the chamber, undefined temperature conditions occur within the unit. During this phase, do not place any sample materials in the chamber.

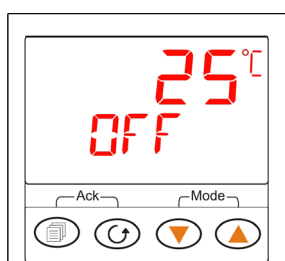
	CAUTION
	<p>Danger of samples being destroyed.</p> <p>➤ Load the chamber only after equilibration of temperature and CO₂.</p>

6. Operating the controller

Controller setting is identical on all redLINE chambers. The temperature controllers only differ in their temperature range and the temperature display and setting accuracy (RE and RF with degree accuracy, RI with accuracy of a tenth of a degree).

After turning on the chamber at the main power switch (7), the controller is in the operating mode “Standby”.

Main menu (Standby)



REDLINE RE53

The display shows the actual temperature value and “OFF”.

The scrolling message (e.g. “REDLINE RE 53”) indicates the chamber type.

6.1 Operating modes

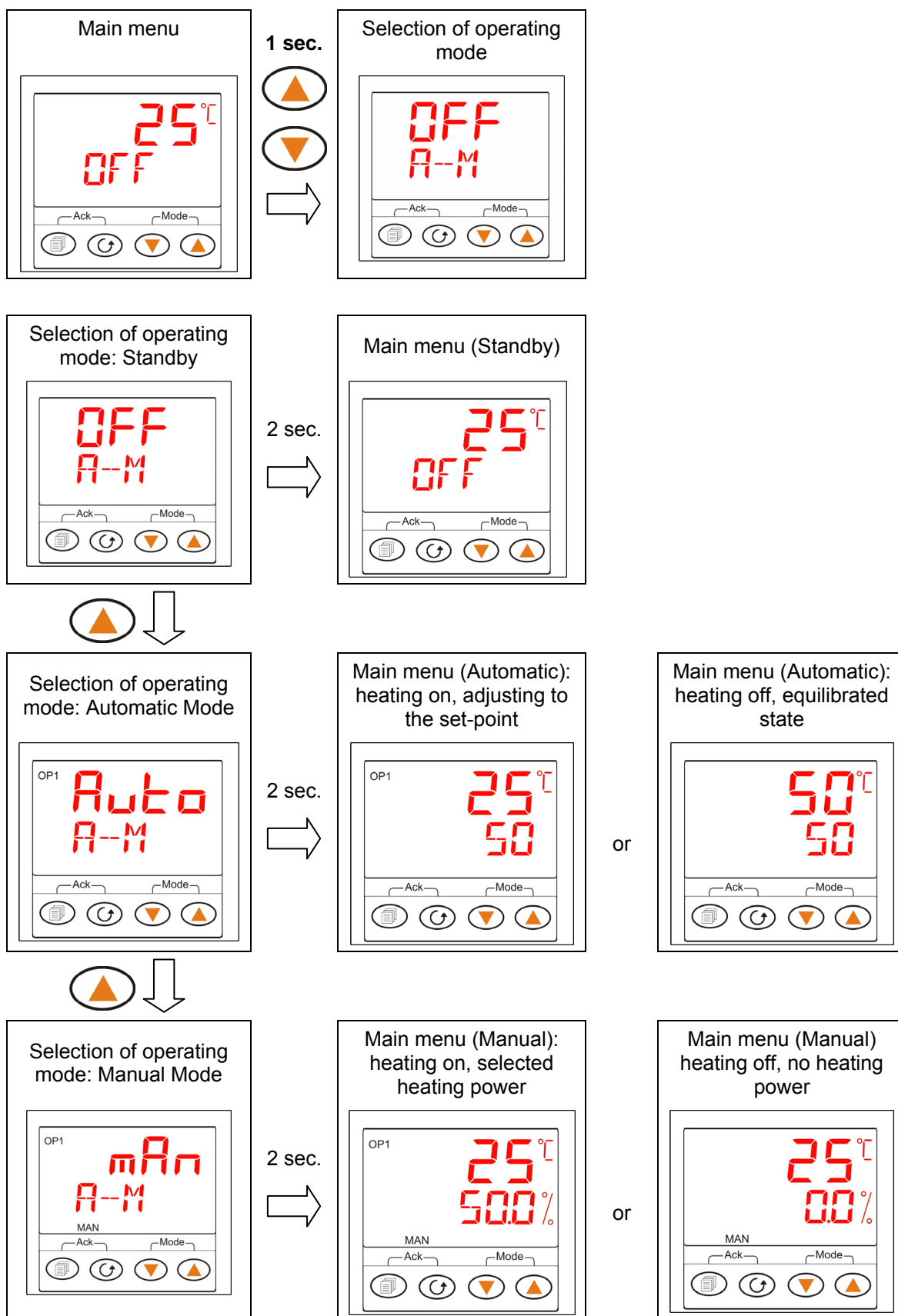
There are the following 3 operating modes:

Standby (Off): The heating is off. The unit approximates ambient temperature.

Automatic Mode (Auto): Normal operation. The unit controls to an entered set-point.

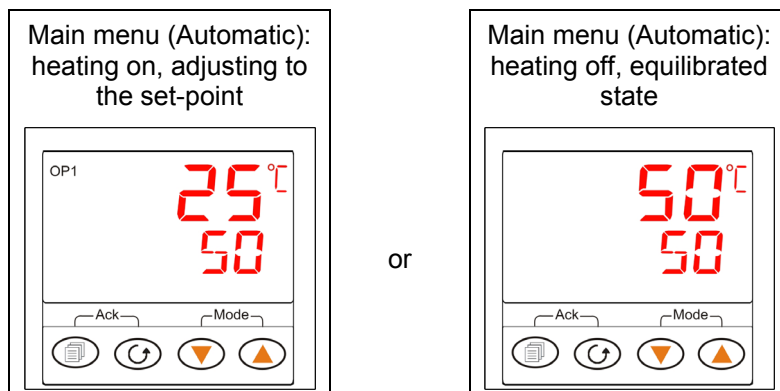
Manual Mode (mAn): Manual control of the heating power in %

To select the operating mode, press simultaneously both arrow keys for at least 1 second and select then the desired operating mode with one of the arrow keys. After 2 seconds, the main menu is displayed in the selected operating mode (figures show sample values).



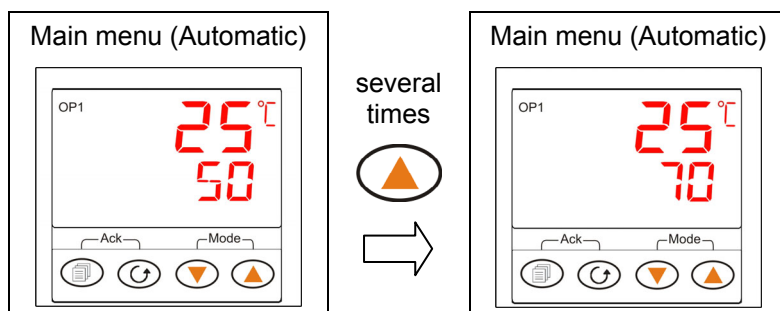
6.2 Operating mode Automatic Mode – entering the set-point

The main menu display indicates on top the actual temperature value and below the temperature set-point. If the set-point is higher then the actual value, the actual value is controlled to the set-point.

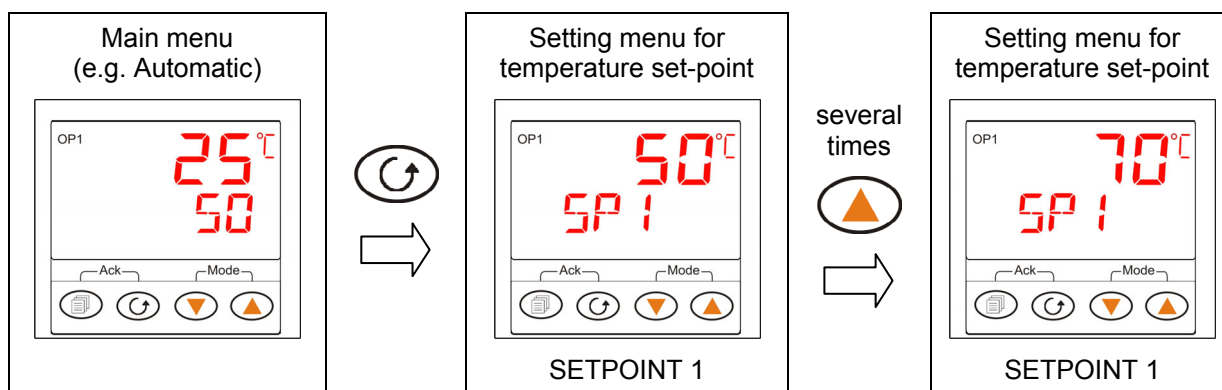


There are two different ways to enter the temperature set-point:

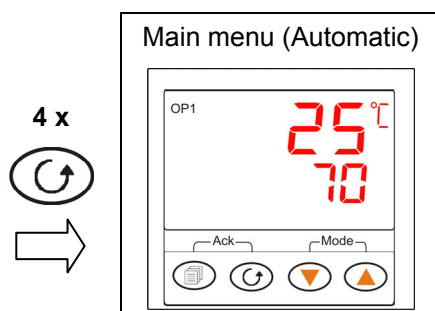
1. In the operating mode “Automatic Mode”, enter the set-point directly in the main menu using the arrow keys.



2. Toggle to the set-point setting menu via the functional button. Enter the set-point using the arrow keys.



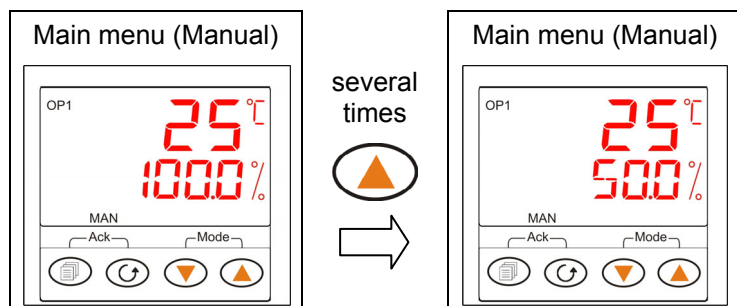
Back to the main menu display: press the functional button 4 times or wait for 1 minute.



Now the controller operates continuously with the entered set-point until cancellation. The heating is active (Heating pilot lamp lit or flashing).

6.3 Operating mode Manual Mode

In the operating mode “Manual Mode” adjust the heating power directly in the main menu using the arrow keys.

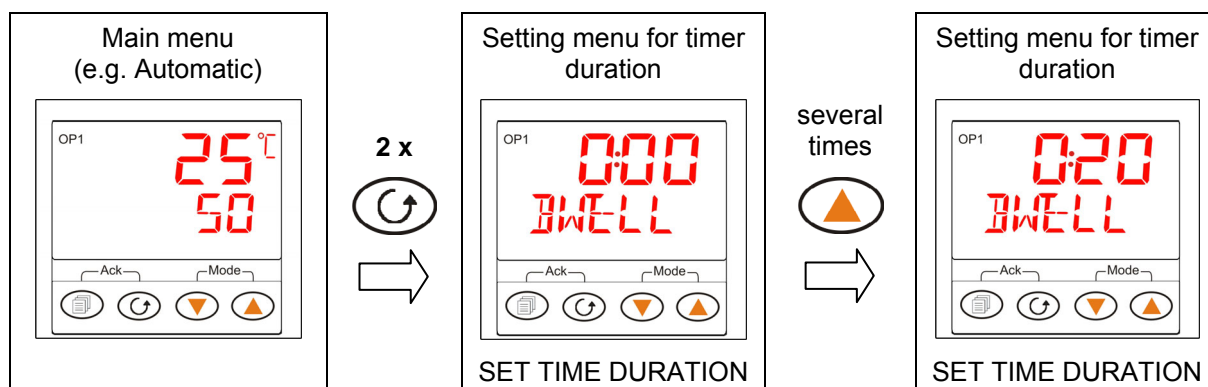


6.4 Timer operation

You can use the timer function to operate the unit's heating for a defined time and turn it off when this time has expired. You can set the timer from 0 up to 9999 minutes.

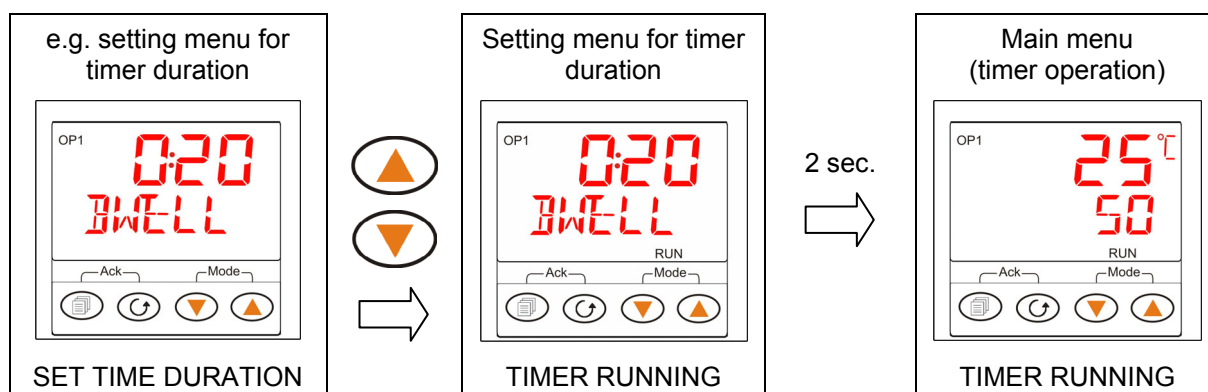
You can start the timer from any controller level. The controller always adjusts to the set-point, which has been entered in the operating mode “Automatic Mode”, i.e. the timer always runs in Automatic Mode.

Setting the timer: In the main menu (Standby or Automatic Mode or Manual Mode), press the functional button 2 times until the setting menu of the timer duration “DWELL” appears. Enter the timer duration in the format hh:mm using the arrow keys.

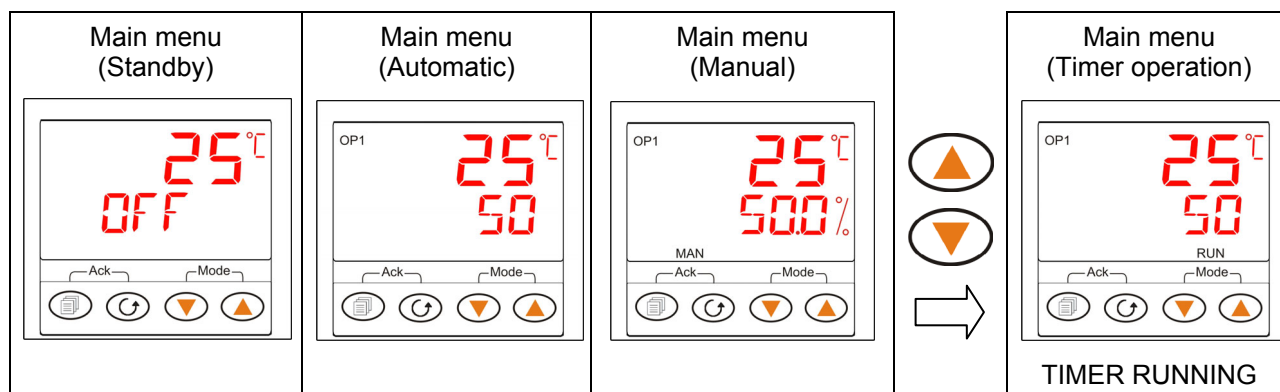


Now you can toggle back to the main menu display (press the functional button 3 times or wait for 1 minute) or start the timer.

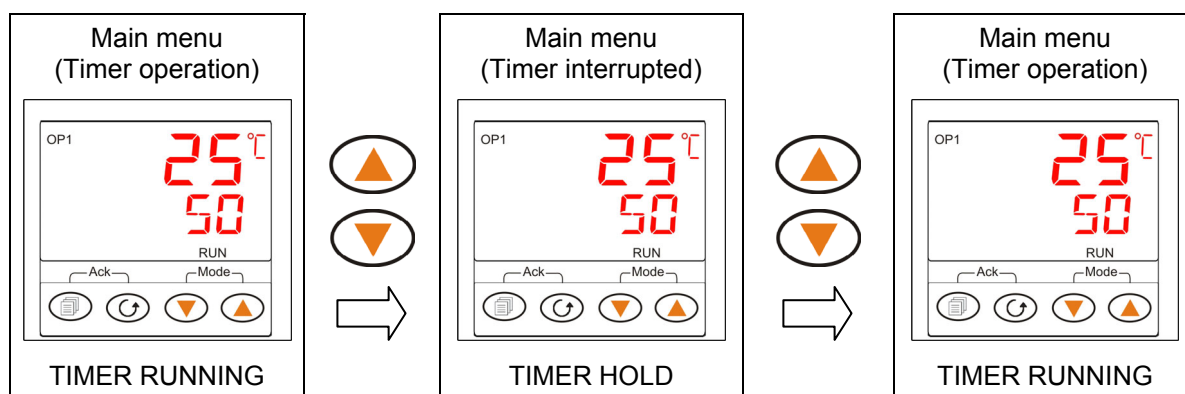
Starting the timer: Press both arrow keys simultaneously shortly. The indication “RUN” lights up.



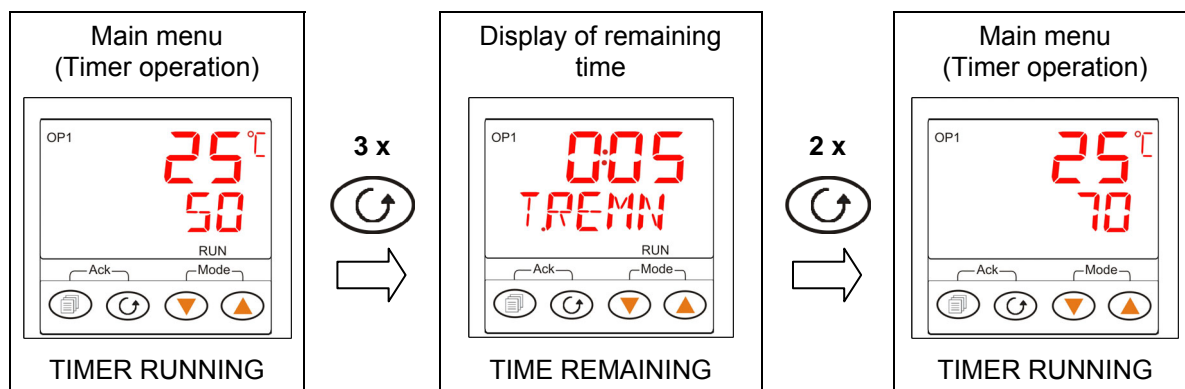
The timer can be started from any level:



Interrupting timer operation: Press both arrow keys simultaneously shortly. The indication “RUN” flashes. If you press again both arrow keys simultaneously shortly, timer operation continues.



Checking the remaining timer run time: press the functional button 3 times, until the display of the remaining timer run time “T.REMN” appears.



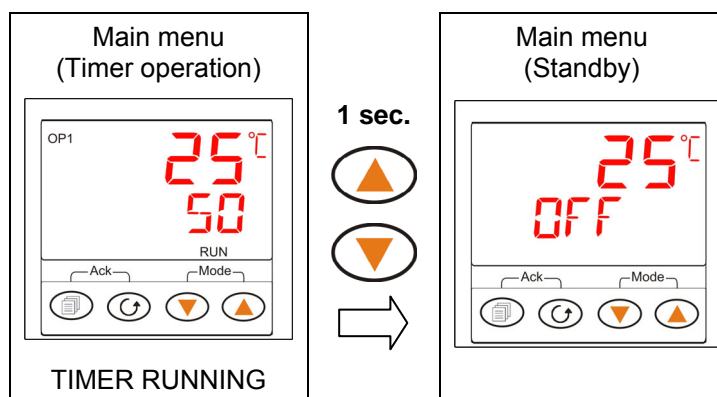
Back to the main menu display: press the functional button 2 times or wait for 1 minute.

The timer counts down towards zero.

During timer operation you can increase or decrease the timer duration “DWELL” in the setting menu for the timer duration according to the demands of the process. And you can change to the actual value display and modify the set-point value without interrupting timer operation.

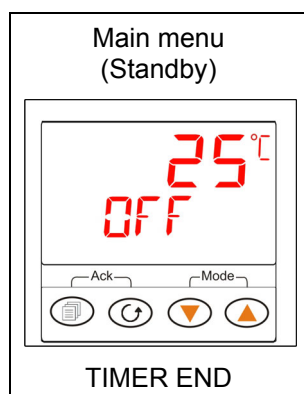
If you to set the timer duration “DWELL” in the setting menu for the timer duration to zero during timer operation, this will terminate timer operation.

Cancelling timer operation: Press both arrow keys simultaneously for at least 1 second.



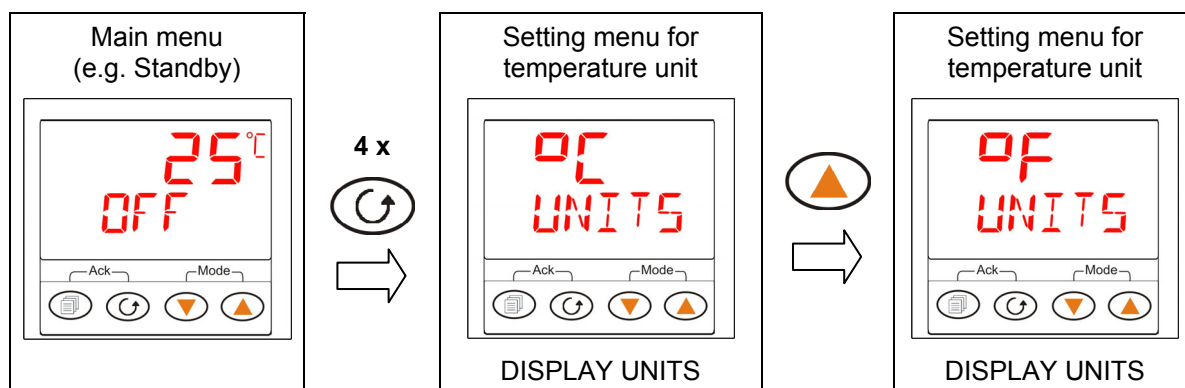
If you to set the timer duration “DWELL” in the setting menu for the timer duration to zero during timer operation, this will also terminate timer operation.

Timer expired: After the expiry of the timer run time, the controller changes to operating mode “Standby”. The heating is off, i.e. the chamber will cool down. The scrolling message “TIMER END” remains until there is a new entry.



6.5 Setting the temperature unit

In the main menu (Standby or Automatic Mode or Manual Mode) press the functional button 4 times, until the setting menu for the temperature unit “UNITS” appears. Select the desired unit °C or °F with the arrow keys.



Other selections in this menu are non-functional.

Back to the main menu display: press the functional button or wait for 1 minute.

7. Calibrating and adjusting the temperature controller

Check the temperature controller for accuracy every year (calibration) and, if necessary, adjust it (adjustment).

7.1 Required measuring equipment

An electronic measuring and display device with a valid calibration certificate and which has been approved by a recognized standards or calibration authority or regulatory body.

RE / RF: Measuring range: $\geq 20\text{ }^{\circ}\text{C}$ / 68°F up to $250\text{ }^{\circ}\text{C}$ / 482°F

RI: Measuring range: $\geq 20\text{ }^{\circ}\text{C}$ / 68°F up to $70\text{ }^{\circ}\text{C}$ / 158°F at 10 % r.H. to 70 % r.H.

The sensor should be connected to the display instrument via a slim cable that can be placed over the door gasket of the redLINE chamber without this causing a leak.

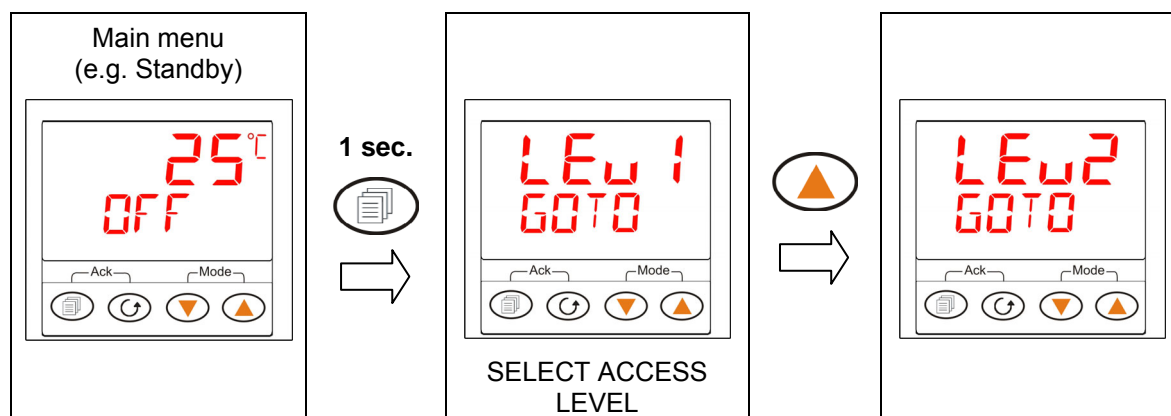
7.2 Check (calibration)

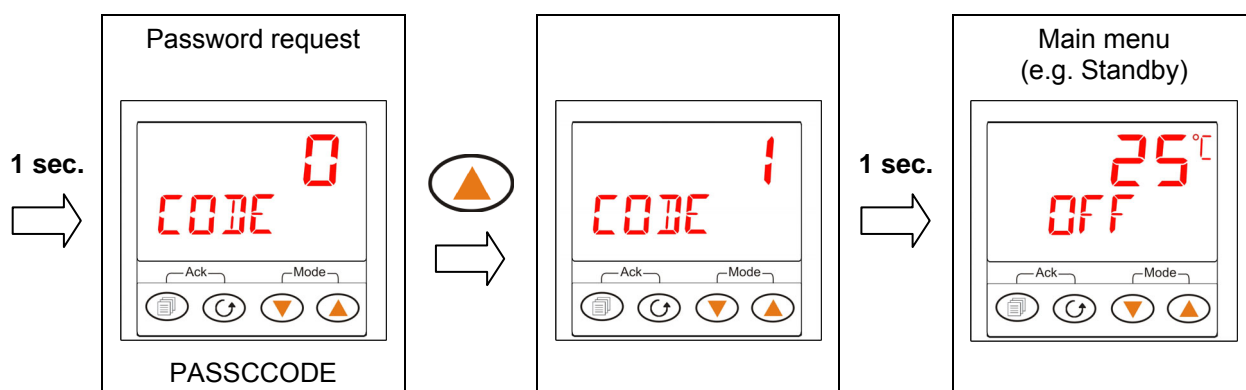
- Attach the temperature sensor of the reference measuring device to a tray in the center of the usable volume and place the sensor cable over the door gasket in a way that it is possible to close the glass door (RI) and the chamber door. Close the glass door (RI) and the chamber door.
- Turn on the redLINE chamber and set the lower adjustment temperature. Wait for 60 minutes after the interior temperature has first reached the set-point to permit equilibrating.
- Compare the temperature displayed on the controller display to the reading of the reference measuring device. Note down the value of the reference measuring device and the difference to the value shown on the controller.
- Then set the upper adjustment temperature. Wait for 60 minutes after the interior temperature has first reached the set-point to permit equilibrating.
- Compare the temperature displayed on the controller display to the reading of the reference measuring device. Note down the value of the reference measuring device and the difference to the value shown on the controller.

Adjusting the temperature controller is necessary if the temperature displayed on the controller deviates by more than $\pm 1\text{ K}$ (RE / RF) resp. $\pm 0.5\text{ K}$ (RI) from the temperature shown by the reference measuring device.

7.3 Two-point adjustment procedure

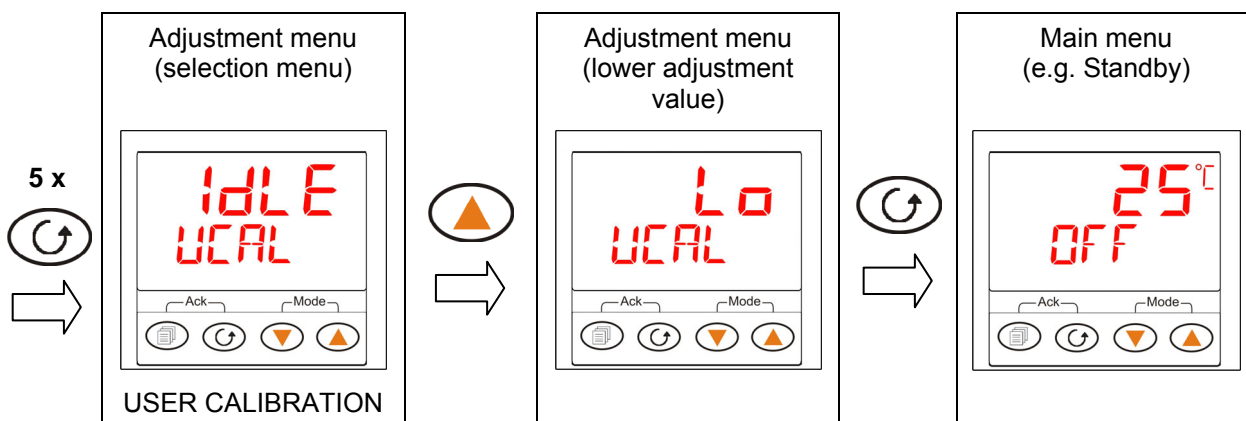
Press the configuration button for at least one second to enter the access menu "Level 1". With the arrow-up key toggle to "Level 2" and enter the password "1" in the "Code" display. Afterwards the controller reverts automatically to the main menu.





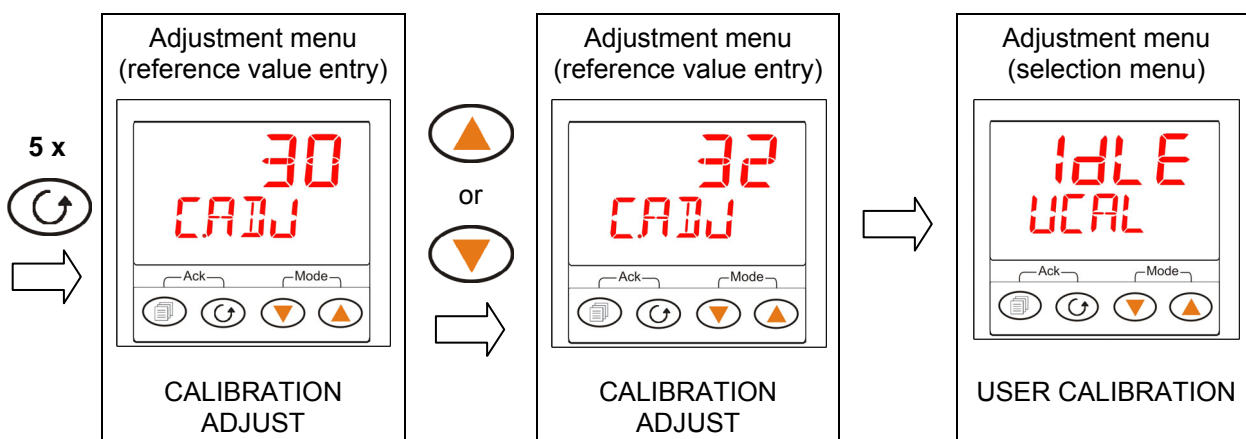
Entering the adjustment values (reference values)

Now you can call up the adjustment menu via the functional button to select adjustment values, and then the lower adjustment value using the arrow keys. If you want to enter a reference value for the lower adjustment value, press the functional button. The display automatically reverts to the main menu.

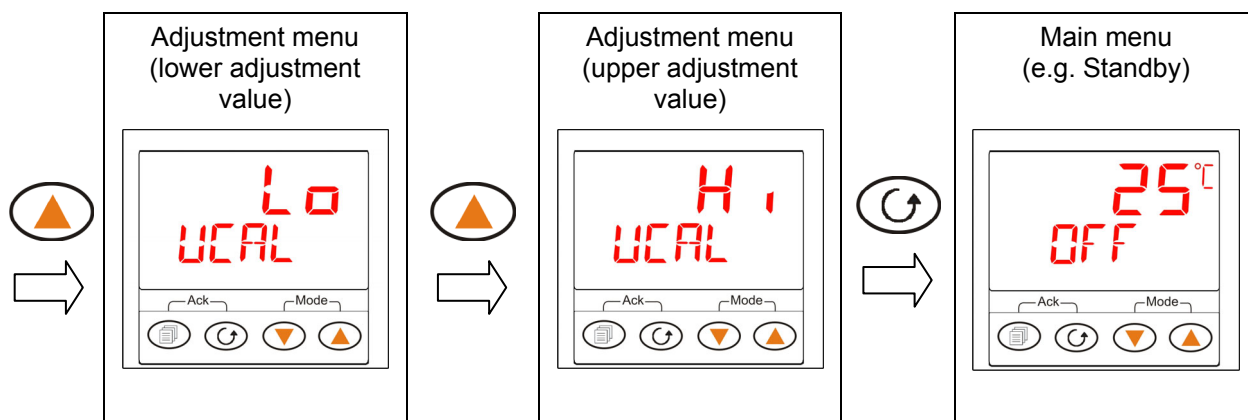


Call up again the adjustment menu. "C.ADJ" is displayed. Enter the value, which has been measured with the reference measuring device at the lower adjustment value, using the arrow keys. The controller takes over the value and shows again the adjustment menu (selection menu).

Example for lower adjustment value: controller shows 30 °C, reference measuring device shows 32 °C.

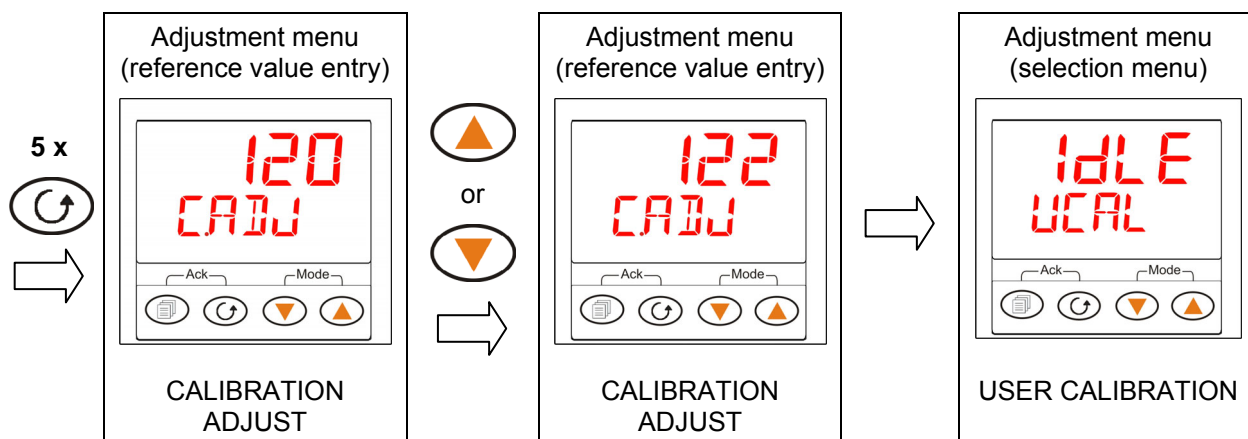


Press the arrow key until you call up the upper adjustment value. If you want to enter a reference value for the upper adjustment value, press the functional button. The display automatically reverts to the main menu.



Call up again the adjustment menu. "C.ADJ" is displayed. Enter the value, which has been measured with the reference measuring device at the upper adjustment value, using the arrow keys. The controller takes over the value and shows again the adjustment menu (selection menu).

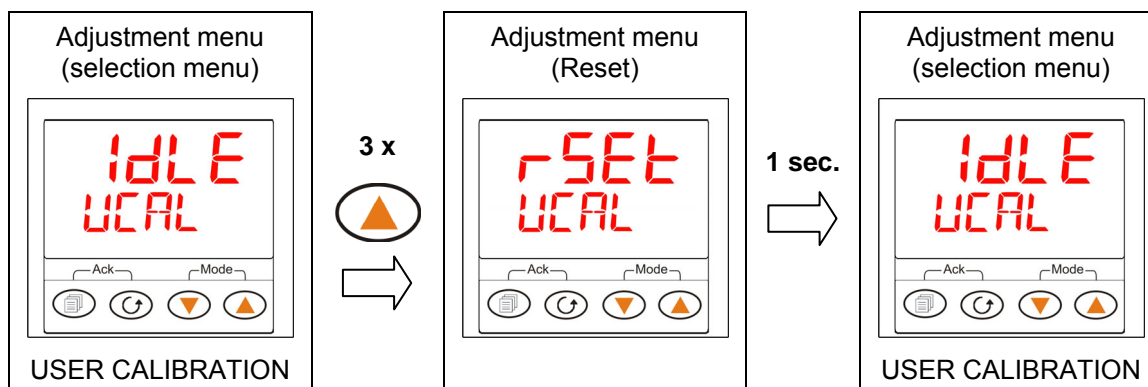
Example for upper adjustment value: controller shows 120 °C, reference measuring device shows 122 °C.



Back to the main menu display: press the functional button or wait for 1 minute.

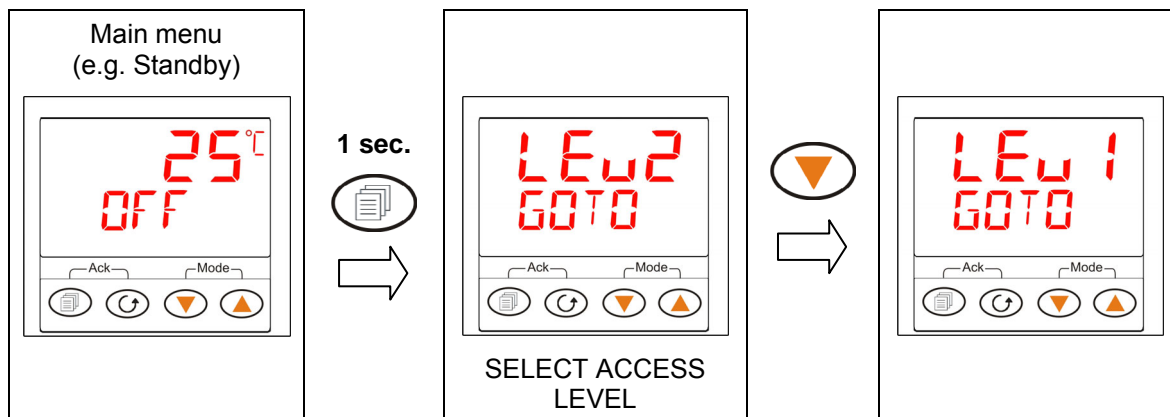
The temperature controller of your redLINE chamber has now been adjusted.

Resetting the adjustment:






Releasing the controller for standard operation (no access to the adjustment menu):

Press the configuration button for at least one second to enter the access menu "Level 2". Use the arrow-down key to toggle to "Level 1". Afterwards the controller reverts automatically to the main menu. Without a new password entry, access to the adjustment menu is now no longer possible.



8. Cleaning and decontamination


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


8.1 Cleaning

Disconnect redLINE chambers from the power supply before cleaning. Disconnect the power plug.

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

Exterior surfaces, inner chamber, trays, door gaskets, glass door (RI)	Standard commercial cleaning detergents free from acid or halogenides. Alcoholic solutions.
Instrument panel	Standard commercial cleaning detergents free from acid or halogenides.


	<p>For surface protection, perform cleaning as quickly as possible. After cleaning completely remove cleaning agents from the surfaces with a moistened towel.</p>
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	<p>Soapsuds may contain chlorides and must therefore NOT be used for cleaning.</p>
---	--


Thoroughly remove all residues of cleaning agents from the interior with sterile (RI), deionized water.

RI: Use sterile cloths to dry off any residual water adhering to the interior of the incubator and the inside of the glass door.

If necessary, ventilate the interior thoroughly.

	<div style="background-color: yellow; text-align: center; padding: 5px;">CAUTION</div> <p>Danger of corrosion. Damage to the chamber.</p> <ul style="list-style-type: none"> Ø Do NOT use acidic or chlorine cleaning detergents.
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	<p>Any corrosive damage that may arise following use of other cleaning agents is excluded from liability by the manufacturer.</p>
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	<div style="background-color: yellow; text-align: center; padding: 5px;">CAUTION</div> <p>Residual cleaning agents. Danger of samples being disturbed.</p> <ul style="list-style-type: none"> Ø Any residual cleaning agents in the chamber may pollute the samples.
---	--

8.2 Decontamination

Disconnect redLINE chambers from the power supply prior to decontamination. Pull the power plug.

You can use the following disinfectants:

Inner chamber	Standard commercial surface disinfectants free from acid or halogenides. Alcoholic solutions.
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In case of contamination of the interior by biologically or chemically hazardous material, there are three possible procedures depending on the type of contamination and charging material.

- The ovens RE and RF can be hot air sterilized at 190 °C / 374°F for at least 30 minutes. All inflammable goods must be removed from the interior before.
- Spray the inner chamber with an appropriate disinfectant.

Before start-up, redLINE chambers must be absolute dry and ventilated, because explosive gases may form during the decontamination process.



With every decontamination method, always use adequate personal safety controls.

Thoroughly remove all residues of disinfecting agents from the interior with sterile (RI), deionized water.

If necessary, ventilate the interior thoroughly.



CAUTION

Residual disinfecting agents.

Danger of samples being disturbed.

Ø Any residual disinfecting agents in the chamber may pollute the samples.

9. Decommissioning




Turn off the redLINE chamber at the main power switch (7). Disconnect the chamber from the power supply.



When turning off the main power switch (7), the stored parameters remain saved.

- Clean the redLINE chamber and its trays and dry them completely.
- Temporal decommissioning: See indications for appropriate storage, chap. 3.3.
- Final decommissioning: Dispose of the unit as described in chap. 12.2 to 12.3.

10. Maintenance

 	 DANGER
<p>Electrical hazard. Danger of death.</p> <ul style="list-style-type: none"> Ø redLINE chambers must NOT become wet during operation or maintenance work. Ø Do NOT remove the rear panel of the unit. ➤ Disconnect the chamber before conducting maintenance work. Disconnect the power plug. ➤ Ensure all maintenance work is conducted by licensed electricians or experts authorized by the manufacturer. 	

10.1 Maintenance plan

Weekly


- Dust the housing.
- Check the power cable for damage

Following use

- Clean and, if necessary, disinfect the chamber (chap. 8)
- Check the chamber for mechanical damage and corrosion
- Check the door gaskets for proper fit and mechanical damage

Annually

- Check the temperature controller and, if necessary, adjust it (chap. 7)

	<p>Replace the door gasket only when cold. Otherwise, the door gasket may become damaged.</p>
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11. Technical service

Web resources

Visit the website www.binder-redline.com for:

- Complete technical service contact information
- Access to the online catalogue, and information about accessories and related products.
- Additional product information and special offers

Contact us

For information or technical assistance contact your local distributor or visit www.binder-redline.com.

12. Disposal

12.1 Disposal of the transport packing

We recommend keeping the transport packing for transport purpose.

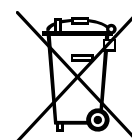
Packing element	Material	Disposal
Straps to fix packing on pallet	Plastic	Plastic recycling
Pallet (size 115) with foamed plastic stuffing	Solid wood (IPPC standard)	Wood recycling
	PE foam	Plastic recycling
Transport box with metal clamps	Cardboard	Paper recycling
	Metal	Metal recycling
Edge protection	Styropor® or PE foam	Plastic recycling
Protection of doors and trays	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 not possible, all packing parts can also be disposed of with normal waste.

12.2 Disposal of redLINE chambers in the member states of the EC

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


redLINE chambers bear 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.






At the end of the device's service life, 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).



	CAUTION
	<p>Violation against existing law.</p> <ul style="list-style-type: none"> Ø Do NOT dispose of redLINE chambers at public collecting points. ➤ Have the redLINE chambers disposed of professionally at a recycling company that is certified according to conversion of the directive 2002/96/EC into national law. <i>or</i> ➤ Instruct the distributor who sold you the redLINE chambers 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).

Certified companies disassemble waste (used) redLINE chambers in primary substances for recycling according to directive 2002/96/EC. The devices must be free from toxic, infectious or radioactive substances in order to eliminate any health hazards to the employees of the recycling companies.

	<p>Prior to handing the unit over to a recycling company, it is the user's responsibility that it is free from toxic, infectious or radioactive substances.</p> <ul style="list-style-type: none"> • Prior to disposal, clean all introduced or residual toxic substances from the chamber. • Prior to disposal, disinfect the chamber from all sources of infection. Be aware that sources of infection may also be located outside the inner chamber. • If you cannot safely remove all sources of infection and toxic substances from the unit, dispose of it as special waste according to national law.
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 	<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 take redLINE chambers contaminated with toxic substances or sources of infection for recycling according to directive 2002/96/EC. ➤ Prior to disposal, remove all toxic substances and sources of infection from the chamber. ➤ Dispose of redLINE chambers from which all toxic substances or sources of infection cannot be safely removed as special waste according to national law. ➤ A redLINE chamber from which all toxic substances or sources of infection cannot be safely removed must be considered as "special" waste according to national law. Dispose of it accordingly
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12.3 Disposal of redLINE chambers in non-member states of the EC

 	<div style="background-color: yellow; text-align: center; padding: 5px;"> CAUTION </div> <p>Alteration of the environment.</p> <ul style="list-style-type: none"> ➤ Follow the statutory regulations for appropriate, environmentally friendly disposal.
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The main board of the oven includes a lithium cell. Please dispose of it according to national regulations.

13. Troubleshooting

Fault description	Possible cause	Required measures
Unit without function.	Unit turned off	Turn on the unit at the main power switch (7).
	No power supply.	Check connection to power supply.
	Wrong voltage.	Check power supply for voltage of 100-120V or 230V.
	Unit fuse has responded.	Check unit fuse and replace it if appropriate. If it responds again, contact a service technician (for qualification see Service Manual).
	Controller defective.	Contact a service technician (for qualification see Service Manual).
Set-point temperature is not reached after specified time.	Unit door not properly closed.	Close unit door properly.
	Door gasket defective.	Replace door gasket.
	Controller not adjusted, or adjustment interval exceeded.	Calibrate and adjust controller.
Chamber heating permanently, set-point not held.	Controller defective.	Contact a service technician (for qualification see Service Manual).
	Temperature sensor defective.	
	Semiconductor relay defective.	
	Controller not adjusted, or adjustment interval exceeded.	Calibrate and adjust controller.
Chamber doesn't heat up. Heating pilot lamp OP1 is lit.	Heating element defective.	Contact a service technician (for qualification see Service Manual).
	Semiconductor relay defective.	
Chamber doesn't heat up. Heating pilot lamp OP1 is not lit. Controller shows the actual value and the set-point value. The set-point is higher than the actual value.	Semiconductor relay defective.	Contact a service technician (for qualification see Service Manual).
	Controller defective.	
Chamber doesn't heat up. Heating pilot lamp OP1 is not lit. Controller shows the actual value and "OFF". Scrolling message "TIMER END".	Timer expired. Controller in operating mode stand-by.	Repeat timer programming / start or change to different operating mode.
Chamber doesn't heat up. Heating pilot lamp OP1 is not lit. Controller shows the actual value and "OFF".	Controller in operating mode stand-by.	Change to different operating mode.
Deviations from the indicated heating-up times.	Chamber fully loaded.	Charge the oven less or consider longer heating-up times.
The controller returns to the main menu from any level.	No button was hit for more than 1 minute.	Repeat entries, enter the values rapidly.



Only qualified service personnel with electrotechnical training must perform repair. Repaired units must comply with the manufacturer's quality standards.

14. Technical description

14.1 Factory calibration and adjustment

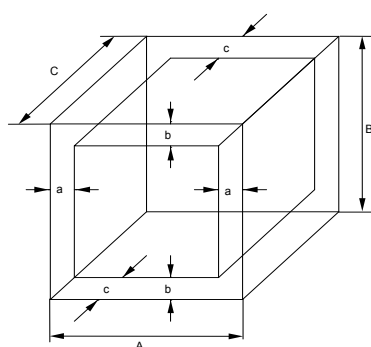
redLINE chambers were calibrated and adjusted in the factory. Calibration and adjustment were performed using standardized test instructions, according to the QM DIN EN ISO 9001 system applied by the manufacturer (certified since December 1996 by TÜV CERT). All test equipment used is subject to the administration of measurement and test equipment that is also constituent part of the manufacturer's QM DIN EN ISO 9001 systems. They are controlled and calibrated to a DKD-Standard at regular intervals.

14.2 Over current protection

redLINE chambers are protected by a miniature fuse against over current, accessible from the outside. The miniature fuse is located at the rear of the chamber below the strain relief of the power cord. The fuse holder is equipped with a fuse clip 5mm x 20 mm (UL units 6,3x32 mm). The fuse may be replaced only with a substitute of the same ratings. Refer to the technical data of the respective device type.

14.3 Definition of usable volume

The usable volume illustrated below is calculated as follows:



A, B, C = Internal dimensions (W, H, D)

a, b, c = Wall clearances

$$a = 0.1 \times A$$

$$b = 0.1 \times B$$

$$c = 0.1 \times C$$

$$V_{USE} = (A - 2a) \times (B - 2b) \times (C - 2c)$$

Figure 12: Determination of the useable volume

The technical data refers to the defined usable volume.



Do NOT place samples outside this usable volume.

Do NOT load this volume by more than half to enable sufficient airflow inside the chamber.

Do NOT divide the usable volume into separate parts with large area samples.

Do NOT place samples too close to each other in order to permit circulation between them and thus obtain a homogenous distribution of temperature.

14.4 redLINE technical data

Chamber type		RE 53	RE 115	RF 53	RF 115	RI 53	RI 115
Exterior dimensions							
Width	mm	600	800	600	800	600	800
	inch	23.62	31.50	23.62	31.50	23.62	31.50
Height (incl. feet)	mm	680	760	680	760	680	760
	inch	26.77	29.92	26.77	29.92	26.77	29.92
Depth	mm	620	660	620	660	620	660
	inch	24.41	25.98	24.41	25.98	24.41	25.98
Wall clearance rear	mm	100	100	100	100	100	100
	inch	3.94	3.94	3.94	3.94	3.94	3.94
Wall clearance side	mm	150	150	150	150	150	150
	inch	5.91	5.91	5.91	5.91	5.91	5.91
Interior dimensions							
Width	mm	401	600	401	600	401	600
	inch	15.79	23.62	15.79	23.62	15.79	23.62
Height	mm	400	480	400	480	400	480
	inch	15.75	18.89	15.75	18.89	15.75	18.89
Depth	mm	330	400	330	400	330	400
	inch	12.99	15.75	12.99	15.75	12.99	15.75
Interior volume	l	53	115	53	115	53	115
	cu.ft.	1.9	4.1	1.9	4.1	1.9	4.1
Number of trays (regular / max.)		2/4	2/4	2/4	2/4	2/4	2/4
Load per tray	Kg	10	15	10	15	10	15
	lbs	22	33	22	33	22	33
Permitted total load	Kg	35	45	35	45	35	45
	lbs	77	99	77	99	77	99
Weight (with 2 trays)	Kg	41	63	41	63	41	63
	lbs	90	139	90	139	90	139
Temperature data							
Temperature range, by 7 °C / 12 °F above ambient up to		°C °F	220 428	220 428	220 428	220 428	70 158
Temperature fluctuation	at 37 °C / 98.6 °F	± K	-	-	-	-	0.3
	at 150 °C / 302 °F	± K	0.4	0.3	0.2	0.3	-
Temperature uniformity (variation) 1)	at 37 °C / 98.6 °F	± K	-	-	-	-	0.8
	at 150 °C / 302 °F	± K	3.6	3.5	3.5	3.0	-
Heating up time *	to 37 °C / 98.6 °F	min.	-	-	-	-	46
	to 150 °C / 302 °F	min.	45	60	28	36	-
Recovery time after door was opened for 30 sec *	at 37 °C / 98.6 °F	min.	-	-	-	-	10
	at 150 °C / 302 °F	min.	18	25	10	10	-
Electrical data							
IP system of protection acc. to EN 60529		IP	20	20	20	20	20
Nominal voltage (±10 %) 50/60 Hz		V	230 1N~	230 1N~	230 1N~	230 1N~	230 1N~
Nominal power		kW	0.8	1.0	0.8	1.0	0.2
Unit fuse 5 x 20 mm 230V / 10A / middle-time-lag (M)		Amp	10 external	10 external	10 external	10 external	10 external
Power plug		shock proof plug					
Installation category acc. to IEC 61010-1			II	II	II	II	II
Pollution degree acc. to IEC 61010-1			2	2	2	2	2


Electrical connection data redLINE UL units (for USA and Canada):

Chamber type		RE 53-UL	RE 115-UL	RF 53-UL	RF 115-UL	RI 53-UL	RI 115-UL
Electrical data							
Nominal voltage ($\pm 10\%$) 50/60 Hz	V	100-120 V 1N~	100-120 V 1N~	100-120 V 1N~	100-120 V 1N~	100-120 V 1N~	100-120 V 1N~
Nominal power	kW	0.8	1.0	0.8	1.0	0.25	0.3
Nominal current	Amp	6,7	8,3	6,7	8,3	2,1	2,5
Power plug	NEMA	5-15P	5-15P	5-15P	5-15P	5-15P	5-15P
Unit fuse 5 x 20 mm 250V / time-lag T	Amp	10 external	10 external	10 external	10 external	10 external	10 external
Temperature fuse class 1 (DIN 12880)		internal	internal	internal	internal	internal	internal


* up to 98 % of the set value

All technical data is specified for units with standard equipment at an ambient temperature of $+25^{\circ}\text{C}$ / 77°F and a power supply voltage fluctuation of ± 10 . The temperature data is determined in accordance to factory standard following DIN 12880, observing the recommended wall clearances of 10 % of the height, width and depth of the inner chamber.

All indications are average values, typical for units produced in series. We reserve the right to change technical specifications at any time.

	If the chamber is fully loaded, the specified heating up times may vary according to the load.
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14.5 Equipment

	To operate redLINE chambers, use only original accessories or accessories / components from third-party suppliers authorized by the manufacturer. The user is responsible for any risk arising from using unauthorized accessories.
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Chamber type	RE	RF	RI
Standard equipment			
Microprocessor temperature controller with LED display	x	x	x
Integrated timer, adjustable 0-9999 minutes	x	x	x
Temperature safety device class 1 acc. to DIN12880	x	x	x
Stainless steel interior equipped with 2 chrome-plated trays	x	x	x
Inner glass door	--	--	x
Exhaust duct, internal diameter 50 mm / 1.97 inches, with adjustable ventilation slide	x	x	x

Manufacturer:

BINDER GmbH

Postfach 102

D-78502 Tuttlingen

Germany

Internet: www.binder-redline.com

Made in Germany

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