

본 내용은 남아전자산업에 저작물 이므로 무단 복제 . 상업적으로 서면 동의 없이 배포 사용 시 저작물 법에 처벌 될 수 있습니다.

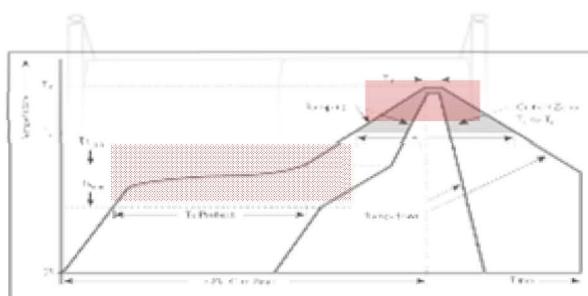
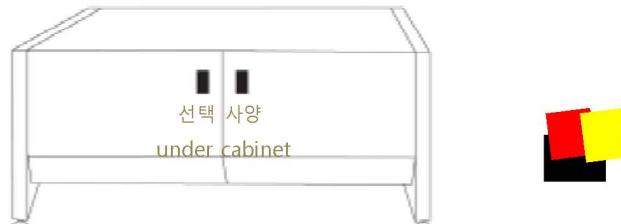
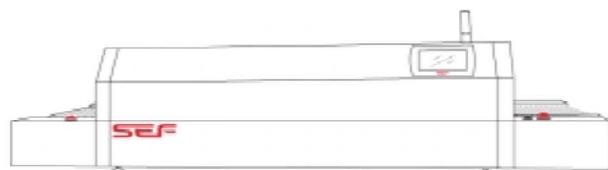
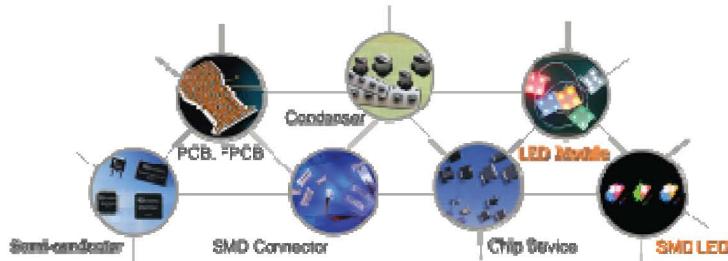
# REFLOW 551-15

Ver 2015\_05\_En+Kr

User & Service

**Manual** [ Eng /한글 ]

## LAB, QC SMD Test & Product Reflow



made  
in  
Germany

본 내용은 SEF GmbH 회사의 Reflow Oven에 대한 영문.한글설명 메뉴얼입니다.

- 장비 사용에 안전, 주기적 정검 요함
- 교육이수자 외 장비 작동을 금 합니다.

**Nama**

Since 1988

[www.namaSMT.com](http://www.namaSMT.com)

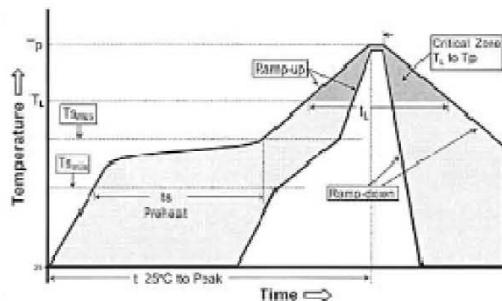




- SEF GmbH 551-15 Reflow 장비 구입에 감사 드립니다.
- 장비시용에 대한 안전 사전 교육을 받은 운영자 혹은 전수교육을 받은 작업자에 한하여 사용 바랍니다.
- 본 Manual은 원본(영문) 표시상 상이 할 수 있으므로 표현에 대한 자세한 내용은 원본을 참고 바랍니다.



551 Series는 Full Air Convection으로 LED, FPCB, 반도체, SMD Connector 소재 부품 신뢰성, 출하검사 및 연구, 개발에 가장 많이 사용하며, 또한 SMD 부품제조, Small, Multi Reflow Soldering 생산공정에 널리 사용하는 장비입니다.



#### 1. 판매자 주소

- 한국판매 : 남아전자산업. [www.namaSMT.com](http://www.namaSMT.com)
- 중국판매 : 남아전자산업. [www.namaSMT.com.cn](http://www.namaSMT.com.cn)

#### 2. 모델명 : 551 Series 전 모델

551-10/15/20 3개 Model

#### 2. 사용용도

##### 548 Series Small . Medium type 위한 Reflow Oven

- 무연 reflow Soldering
- Pb Free 환경 부품 신뢰성
- 소량, Multi SMD Reflow Soldering
- FPCB, 반도체, Switch SMD부품 내구성 시험
- Through Plating Bond 경화
- Solder Resist 마스크 경화
- 부품 건조
- Etc



**Reflow**  
548 Series



BEST "SMD" Device Reliability Reflow

*e Best of The Best Reflow*  
Over 25 Year Product of 548 Series Reflow Hot Air Reflow

LED, Switch, Connector, SMD Parts Test Reflow. The Best of the Best Reflow  
Built in Temperature 1 ch x Profiler, USB Interface Check, Built in



Sin An B/D 1F 51-11, Beong San Dong, Mapo Gu, Seoul, Korea Tel : 82-2-3141-0889 E-mail : [jpark@namasmt.com](mailto:jpark@namasmt.com)



# Operating Manual

- 551.10** *4 heating zones*
- 551.15** *5 heating zones*



**Serial number:**

**Year of manufac-  
turing:**

*Keep this manual for a later use.*

**Manufacturer:**  
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© SEF Systec GmbH, February, 2015  
Translation of original instruction.  
Subject to technical changes.

**1** Preface

**2** Safety instructions

**3** Warranty

**4** Technical data

**5** Transport and installation

**6** Operation and start-up

**7** Profile administration

**8** System settings

**9** Maintenance and service

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**12** Notes

Main



Since 1988' Korea

Printer  
Reflow (small. Medium)  
SMD Pick & Place. LED  
PCB Cleaning  
PCB Coating  
SMD Parts Counter

## SMD Assembly Product Company

Small &amp; Medium Reflow 전문 판매 회사

남아전자산업.주 Korea

본 사용자 Manual에 대하여 이해를 돋고자 Model 명에 대하여 설명 드리겠습니다.SEF GmbH 회사는 Laser 로봇 Welding 전문 생산 회사 입니다. SEF는 Reflow 전문 생산회사로서 48년 된 회사이며, 남아전자 는 1990년 한국 대리점을 시작으로 1995년 부터 " Asia Branch " 승격 되었습니다.

SEF GmbH의 551 Series 장비는 친환경적 장비로 Power Energy을 최대 80% Saving되는 에너지 절약 과 Smart Reflow 장비 입니다. 단열을 위한 불연성 자재가 전혀 없으며, 전기 안전 / 온도 안전에 대하여 CE인증을 7항목을 승인 받은 특별한 친환경 Smart Reflow 입니다.

장비 자체 모니터링 시스템이 기본 탑재 되어 있어, 장비의 문제를 누구나 쉽게 유지관리 가능합니다. Reflow 입니다. Asia 지역의 고객을 위하여 5 Zone으로 공급되며, (유럽은 4 Zone)또한 기본 Power Saving Module. USB Interface 가 기본 구성된 제품으로 공급 됩니다.

- |   |
|---|
| 1) 551-10 .... 4 Zone without under Cabinet         |
| 2) <b>551-15</b> ..... 5 Zone without under Cabinet |
| 3) 551-20 ..... 8 Zone with under Cabinet           |

2015년 고객의 보다 빠른 서비스 대응을 위하여 주문 접수 후 빠른 납기를 최선을 다하겠습니다.

남아전자산업 임직원 일동



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### 12.0 Notes

## 1.0 Preface

**Dear customer,**

congratulations for the purchase of your new reflow soldering system from the SEF series 551. You have now a modern and efficient device available for your reflow process.

It is necessary that you read this operation manual carefully prior to operate the soldering system. It contains important information on how to operate your reflow system properly and safely.

This operation manual has been written for the authorized user. Basic knowledge in SMD soldering methods are assumed.

- | By reading this manual you help to avoid dangers, reduce repair costs and downtimes as well as raise the dependability and life time of the system.
- | Observe the safety instructions.

SEF Systec GmbH won't take any liability for damages or interruptions cause by non-observance of this information.

Use the soldering system only in proper condition, according to the intended use, safety- and danger conscious, and under consideration of all information provided in this operation manual.

This manual belongs to the product and must be kept nearby to provide important information regarding safety and operating to you and all future users.

*For further questions regarding the soldering system or to order spare parts, please contact us.*



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## 1.0 Preface

### Designations in the text

For an easier reading and searching inside this manual we have marked some text parts especially:

- ! To be found before important **informations or explanations** regarding better handling of the system.
- ◆ To be found before general **listings**.
- | To be found before **working or operating steps** to be conducted in the described order.
- \* This symbol indicates information that relate to a **product variant**.
- <Key> These figures mark switches or keys.
- [Display] These figures mark display elements.

## 2.0 Safety instructions

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## 2.0 Safety instructions

### Safety signs

At and inside the device you will find different **warning and additional signs.**      가



Warning of **electrical voltage**



Warning of **high temperatures**



Warning of **entanglement hazard at the inlet and outlet**



**IT IS FORBIDDEN,**

to remove warning notes, safety symbols and designation labels  
or to interfere their clear recognizability.

## 2.0 Safety instructions

### General instructions

This manual is used for the intended and secure work at and with the soldering system.

Improper or unintended use of the device can cause

- ◆ Danger to life
- ◆ damages at the system or other properties of the user as well as
- ◆ interferences to the efficient work of the soldering system or of the user.

Therefore, operate the system only in perfect technical condition, intended and safety-conscious according to all instructions in this manual.

### Safety notes

- | **Observe the safety instructions.**
- | Start your work with caution and safety-conscious.
- | Each person, working with this system, should have read and understood the complete operation manual and especially this chapter.

( 2 )

Not only the **general safety instructions** in this chapter have to be followed but also the **special safety instructions** in the other chapters.

- | Keep this manual always nearby the soldering system.

가

The SEF Systec GmbH indicates to assume no liability for damages or breakdowns which are caused by the non-observance of this manual.

No completeness is claimed with these safety instructions.

*For questions or problems please contact the company SEF Systec GmbH.*

SEF

## 2.0 Safety instructions

### Used norms

Basic for the mechanical and electrical construction and design of the following described controller, mechanics and electrics are:

- ◆ EC machinery directive 2006/42/EC with its addenda and related norms.

For the electrical part of the system is additionally valid:

- ◆ EC low voltage directive 2004/108/EG
- ◆ Directive of electromagnetic compatibility 2006/95/EG.

The following harmonized norms were observed for the design of the reflow oven:

EN 12100	Safety of machinery - General principles for design- Risk assessment and risk reduction
EN 60204-1	Safety of machines - Electrical equipment of machines. Part 1: General requirements
EN 60519-1	Safety in electroheat installations Part 1: general requirements
EN 60519-2	Safety in electroheat installations Part 2: Particular requirements for resistance heating equipment
EN 61000-6-1:	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light industrial environments (IEC 61000-6-1:2005)
EN 61000-6-2	Electromagnetic compatibility - Generic standards Immunity for industrial environments
EN 61000-6-3:	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3:2006)
EN 61000-6-4	Electromagnetic compatibility - Part 6-4 Generic standards - Emission standard for industrial environments

- I Observe and follow the mentioned norms for installation, start-up, programming and operation as well as maintenance and service.

## 2.0 Safety instructions

### Intended use

This **soldering system from series 551** has been designed and constructed according to the latest technology. However, there is a risk of danger if the system is used improperly or not according to the instructions.

**Soldering systems from series 551** are solely designed for the following tasks:

- ◆ Soldering of PCBs with SMD components, curing of chip adhesives, LED-manufacturing, component qualification and processing of shrink hoses. Any other use is not intended! Unauthorised modifications or changes are not allowed.

Operate the system only in perfect technical condition, according to the intended use and safety-conscious according to all instructions in this manual.

Remaining risks are not obvious risks caused by the system. Even if the system is used properly, risks for the life or physical condition of the user or third parties respectively impairment of the system or other material assets, can not be completely excluded.

#### Please observe:

- ◆ The intended use includes also the observance of the prescribed installation and operating conditions, the EMC notes as well as the prescribed maintenance and disposal measures.
- ◆ Only qualified, authorised and trained staff must work at the system. Additionally the operator must inform the staff about possible dangers.
- ◆ The operator must ensure that this manual and especially the chapter "Safety instructions" have been read by all persons working with this system.
- ◆ Interferences which can impact the safety must be eliminated by authorised service staff immediately.
- ◆ One sample of the manual must be kept nearby the system at a designated place.

551.1x

- SMD PCB  
, LED

가

### Remaining risks

3

가

, EMC

가

## 2.0 Safety instructions

### Responsibility of operator and operating staff

<b>Owner</b>	Owner is each natural person or legal entity who has purchased the system.
<b>Operator</b>	Operator is each natural person or legal entity who is using the system on his own or by whose order the system is used.
	<b>The operator respectively his safety representative must assure,</b>
	<ul style="list-style-type: none"> <li>◆ that all relevant regulations, instructions and laws are observed,</li> <li>◆ the system is only used in a safe and functional state,</li> <li>◆ that only <b>qualified staff</b> works at and with the system,</li> <li>◆ that the manual is available for the staff during the respective work,</li> <li>◆ that all manuals and especially the chapter "Safety instructions" have been read and understood,</li> <li>◆ that all safety instructions are trained regularly (once a year),</li> <li>◆ that the operating staff is informed about kind and coverage of the work as well as about possible dangers by the safety representative or within a training,</li> <li>◆ that not qualified persons don't work at the system,</li> <li>◆ that service staff is authorised by a user specific training.</li> </ul>
<b>Skilled and qualified operating staff</b>	<b>Skilled, qualified and briefed are persons who</b>
	<ul style="list-style-type: none"> <li>◆ have sufficient knowledge about the function and the operation of the system due to their technical education, experience and specific training,</li> <li>◆ are familiar with relevant work safety and accident prevention provisions as well as with the generally accepted rules of technique.</li> </ul>
<b>Authorised service staff</b>	Service and maintenance work must be only proceeded by authorised service staff.

## 2.0 Safety instructions

## **Responsibility of operator and operating staff**

- I Check the system before start-up for the observance of user safety regulations, accident prevention regulations and regulations of the professional association.

## **The operator is obliged to**

- ◆ take measures that the system is only operated in a safe and functional state

Each method of operation, which is impacting the personal safety  
must be defaulted

When operating the system or proceeding maintenance work the staff

- ◆ should be in a good health.

The staff should not

- ◆ have taken any medication or other agents decreasing the reaction time.

- | Read also the manuals of external devices or components

Operate the system only with accessories and add-on parts mentioned in the manual. Don't use any external devices or components which are not allowed by SEF explicitly.

SEF

Use only original spare parts.

## **Legal safety requirements**

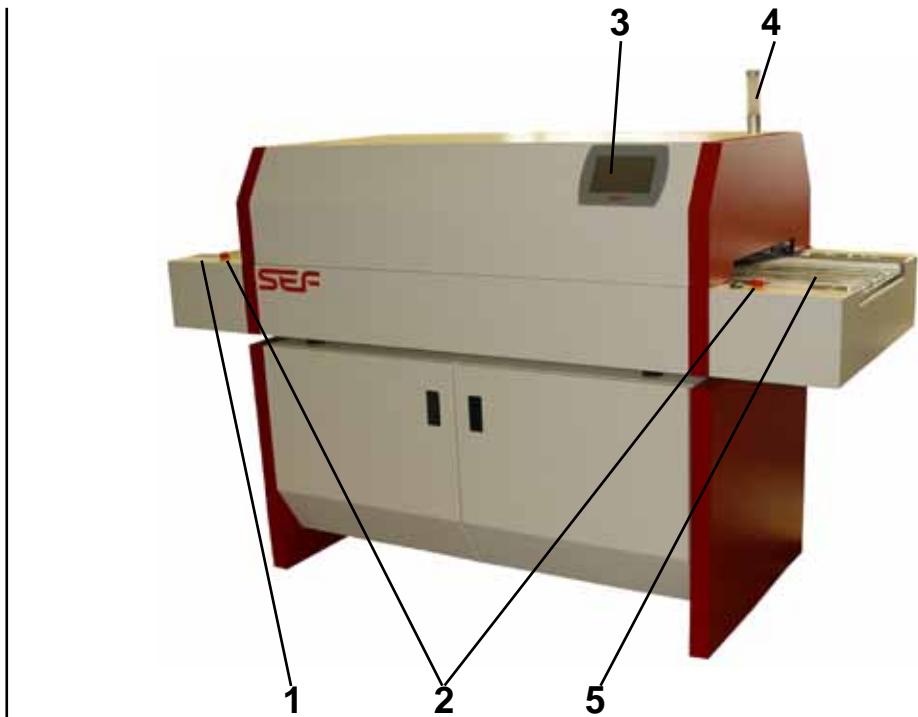
## Personal safety

## **Reference to other suppliers**

## Spare parts

## 2.0 Safety instructions

### Working areas



#### Overview of working areas:

- 1 Charging zone
  - 2 Emergency-stop switch
  - 3 Operating and programming via touch panel
  - 4 Lamp pole (optional)
  - 5 Discharging zone
- 1.
  - 2.
  - 3.
  4. ( )
  - 5.

## 2.0 Safety instructions

### Safety notes for installation and initial start-up

- | Observe the required connection conditions regarding cable cross-section, fuse protection, voltage and frequency.
- | Observe the relevant provisions of your energy provider.

**Connection conditions**



#### **CAUTION** **Risk of stumbling**

- | Install all cables, hoses and connections in a method that to tumbling risks arise.

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**Location**



#### **NOTICE** **Risk of breakage because of high weight**

The soldering system has a weight of approx. **175 kg**.

- | Make sure that the working table is covering at least the outer dimensions of the soldering system and is designed for the weight.

175kg



#### **CAUTION** **Risk of poisoning**

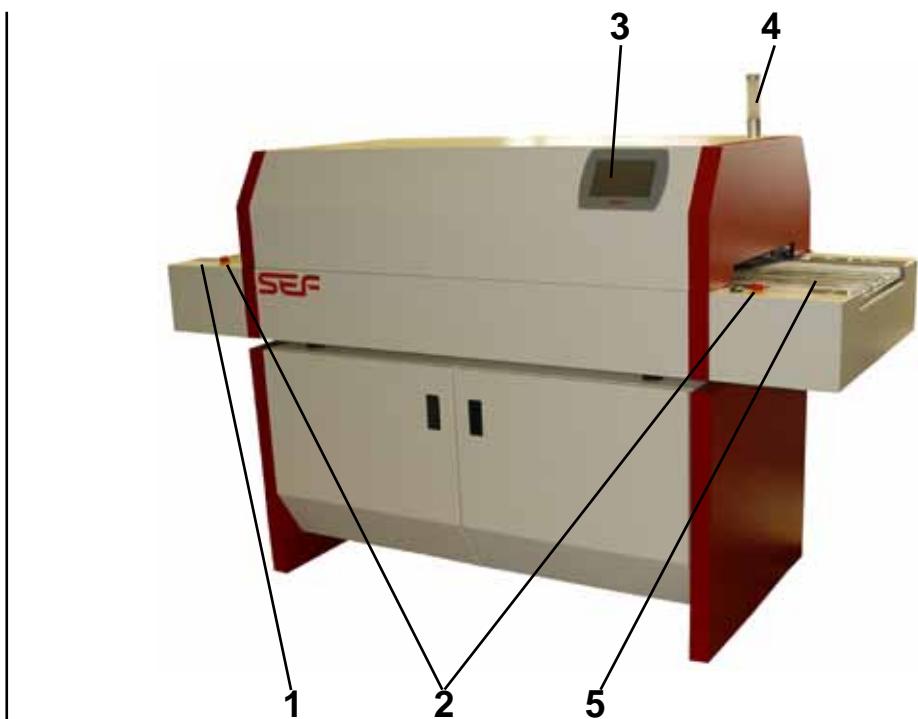
Adhesive- and solder vapours could be harmful to health.

- | Connect the soldering system with your house internal exhaust system or with an air-washer system. The exhaust system must have an minimum capacity of 270m<sup>3</sup>/h.
- | Don't let the vapours escape to the production area.
- | Provide an adequate air ventilation at the place of production.
- | **It is absolutely important to observe the safety and processing notes of the solder paste or adhesive manufacturer.**

**Exhaustion**

## 2.0 Safety instructions

### Working areas



#### Overview of working areas:

- 1 Charging zone
- 2 Emergency-stop switch
- 3 Operating and programming via touch panel
- 4 Lamp pole (optional)
- 5 Discharging zone

## 2.0 Safety instructions

### Safety notes for daily start of operation and automatic operation

- | Before starting the system for daily operation, check all protective devices and other protective measures for function and completeness.
- | Check all system elements for foreign bodies.
- | During operation always observe the safety provisions.  
**Modifications at the protective devices or at other protective measures are not allowed.**

The operator must grant cleanliness and clearness of the working place by corresponding instructions and controls.

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### Safety at the working place

#### Solder paste and chip adhesive



##### CAUTION Risk of poisoning

- | Don't eat and drink at the working place while working with solder paste or chip adhesive.



##### CAUTION Risk of burns due to high temperature

Directly at the outlet of the heating chamber the PCBs can still have temperatures of more than 100°C.

- | Wear heat resistant gloves while working at or with the soldering system.

PCB 100

#### Protective equipment



##### CAUTION Risk of injuries

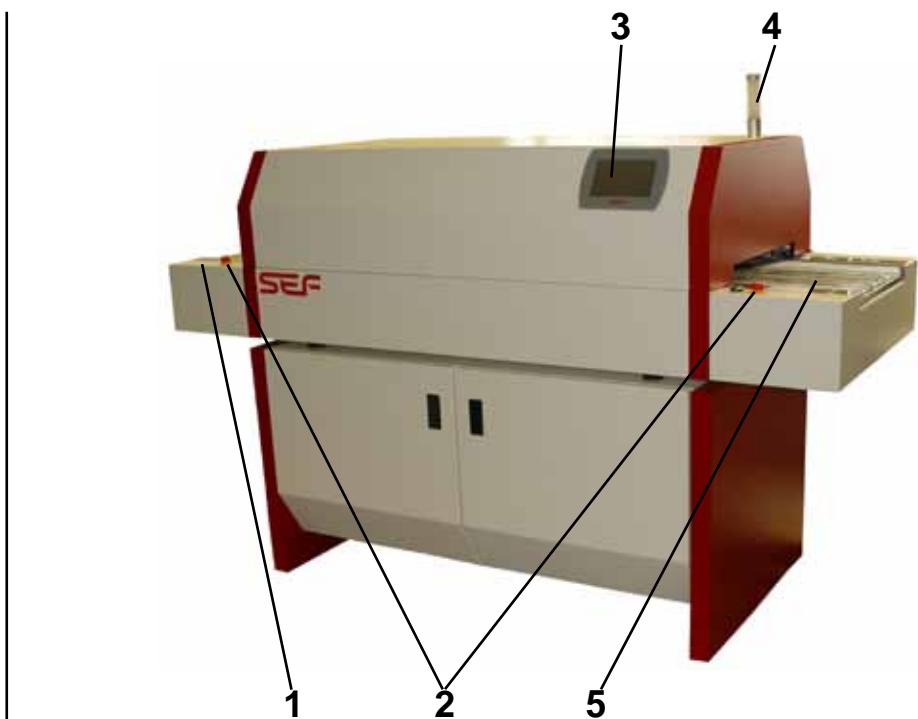
- | Wear the prescribed personal protective equipment. For example heat resistant gloves, hairnets and close-fitting clothes.

) ,

The operator is responsible that personal protective clothes is worn according to the device safety laws. The valid accident prevention provisions give information for which work and working places respectively, personal protective clothes must be worn.

## 2.0 Safety instructions

### Working areas



#### Overview of working areas:

- 1 Charging zone
- 2 Emergency-stop switch
- 3 Operating and programming via touch panel
- 4 Lamp pole (optional)
- 5 Discharging zone

## 2.0 Safety instructions

### Safety notes for daily start of operation and automatic operation

If a failure appears which can cause a risk for persons, system or environment the complete system must be stopped by using the emergency-stop switch.

The users are obliged to inform the operator or owner about appearing changes at the system which might affect the safety of persons or of the soldering system.

- | Secure the system against unintended restart until the failure is eliminated so that no persons or materials are in danger.
- | Don't restart the system before the failure is eliminated and there is no more danger for persons, system or environment.
- | Make notes about the failure, its cause and the elimination.

### Failures

During failures "

- ◆ **emergency-stop pressed** and
- ◆ **internal temperature too high**

the following messages appear on the touch screen:

- ◆ the error message "Emergency-stop ERR", - "Emergency - stop ERR"
- ◆ the machine status is changing to "COOLING". - 가 "COOLING"
- ◆ the virtual red lamp shows the status "not ready". - 가 "not ready"

### Optical signals

If the option "lamp pole" is installed the red lamp also shows the status "not ready".

"not ready"

## 2.0 Safety instructions

### Safety notes for maintenance and service

#### Five safety rules

During maintenance and service work at the system observe always the following **"five safety rules"**.

- ◆ Disconnect
- ◆ Secure against restart
- ◆ Check if system is volt-free
- ◆ Ground and shorting
- ◆ Cover nearby parts which are not volt-free



#### CAUTION

#### Heat accumulation / emission of harmful vapours by switching off to early

- I Don't switch off the soldering system with the main switch and don't disconnect it from the mains supply during the cooling phase. This will switch off the fans, the conveyor and the exhaust box (optional).  
This could cause the emission of harmful solder- or adhesive vapours, a heat accumulation in the heating chamber and thereby damages at the system.



#### DANGER

#### Danger to life due to live parts

- I Before starting any maintenance or service work the system must be switched off and secured against unintended restart with a lock.
- I Remove the mains connector from power supply before processing any service work at the soldering system.



#### WARNING

#### Risk of burns due to high temperatures

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- I Wait until the soldering system is completely cooled down before opening the hood. When hood is opened don't grasp at the heating chamber without personal protective equipment.

## 2.0 Safety instructions



### CAUTION

#### Crushing hazard

- | Don't grasp in the oven while opening or closing the hood.
- | When working with opened hood make sure that the hood rest is snapped and so the hood is protected against unintended lowering.-



### WARNING

#### Risk of injuries due to high weight

The soldering oven 551.1X has a weight of approx. **175 kg.**  
551.10      175kg



### CAUTION

#### Risk of burns due to operating temperatures

The assembly groups of the system reach operating temperatures which can cause burns.

- | Don't process any work at these parts before they have cooled down .



### WARNING

#### Risk of injuries due to missing safety devices

- | Never dismount or suspend any safety devices..

### Dismounting of safety devices

#### Observe the maintenance cycles mentioned in this manual.

If the removal of safety devices is necessary for maintenance or service work

- | set the system out of operation according to the instructions and under observance of all warning notes in this manual
- | and secure the system against unintended restart.
- | Immediately after finishing the maintenance or service work install the safety devices again and check them for function.

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## 2.0 Safety instructions



The system contains materials and operating supplies that might harm the environment when disposed of.

The operator is responsible that these materials and substances are disposed of in compliance with the relevant legal regulations.

### **The following applies to Germany:**

- ◆ How these substances and materials must be disposed, is regulated by federal and provincial law. Especially obligatory surveyed substances and material will not always be disposed of by the local authorities.
- ◆ In these cases the operator is obligated to dispose of the materials by himself in compliance with the relevant legal regulations.
  - I Please consult your environmental protection agency for further information on proper disposal of these substances.
- ◆ Vaporised residues of the solder paste and the chip adhesive may stick on the heating chamber and the conveyor system. Ask the manufacturer of these if a special disposal is required before disposing the parts with the common metal salvaging.

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## 3.0 Warranty

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## 3.0 Warranty

The SEF Systec GmbH hereby grants the customer the right to non-exclusive, non-transferable utilization of the hardware and software (in the following referred to as the "product") supplied to the customer in accordance with the following provisions:

### Rights of use

- ◆ The utilization rights entitle the customer to use the product and the documents which are necessary for its use.
- ◆ The SEF Systec GmbH is holder of all development rights which it has placed at the system. The customer may produce a backup copy for data protection purposes. SEF Systec GmbH reserves the rights especially for publication, processing and exploitation related to the product and the documentation as long as they don't touch the rights of third parties.
- ◆ The warranty applies **ex-works SEF Systec GmbH**, 21379 Scharnebeck and is valid subject to the provisions of our "General terms and conditions".

We will carry out repairs free of charge within a period of 18 months, max. 6000 operation hours after free return of the product. The warranty begins with the day of delivery.

Within the warranty period, we will remedy all product malfunctions which are the result of defective workmanship free of charge, subject to the condition that the system is operated with the specified capacity and is maintained properly.

### Assignment of the rights of use

- ◆ Due to ongoing product support the manufacturer must be informed about present, rental, letting or sale of the product. Otherwise the warranty claim will expire. The rights of use are subject to the law of the Federal Republic of Germany.

### Liability

- ◆ SEF Systec GmbH does not assume any liability for fault-free functioning of the product or the accuracy of the parameters.

### Reshipment

- ◆ Please send us the product or parts of it CIP Scharnebeck in original or equivalent packing and with filled out reshipment papers and an informative error description.

## 3.0 Warranty

- ◆ The SEF Systec GmbH reserves the right to make modifications or improvements at the product at its sole discretion. However the SEF Systec GmbH is not obliged to make these modifications or improvements available unrequested and free of charge.
- ◆ It is prohibited to copy or otherwise reproduce the product and the written documents either in whole or in part in their original or modified form. It is prohibited to modify the delivered product or parts of it.
- ◆ The general terms and conditions of the SEF Systec GmbH apply. The place of jurisdiction and place of fulfilment is Lüneburg.

Excluded from the warranty are:

- ◆ consumables and wearing parts
- ◆ defects or malfunctions resulting from incorrect handling or improper operation
- ◆ Damages which are caused by the non-observance of maintenance work

The warranty claim will expire, if

- ◆ the product or parts of it have been opened or modified by an unauthorized person,
- ◆ the product type sticker has been removed/changed,
- ◆ the entries on the warranty paper have been changed or made illegible,
- ◆ the damages are caused by dismounted EMC protective devices.

**Modifications or improvements of the product**

**Special restrictions**

**General regulations**

**Caveat emptor**

## 3.0 Warranty

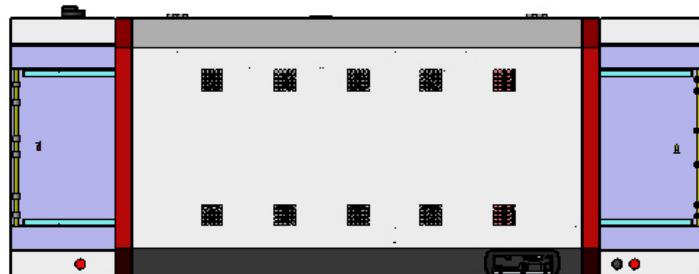
## 4.0 Technical data

### Table of content

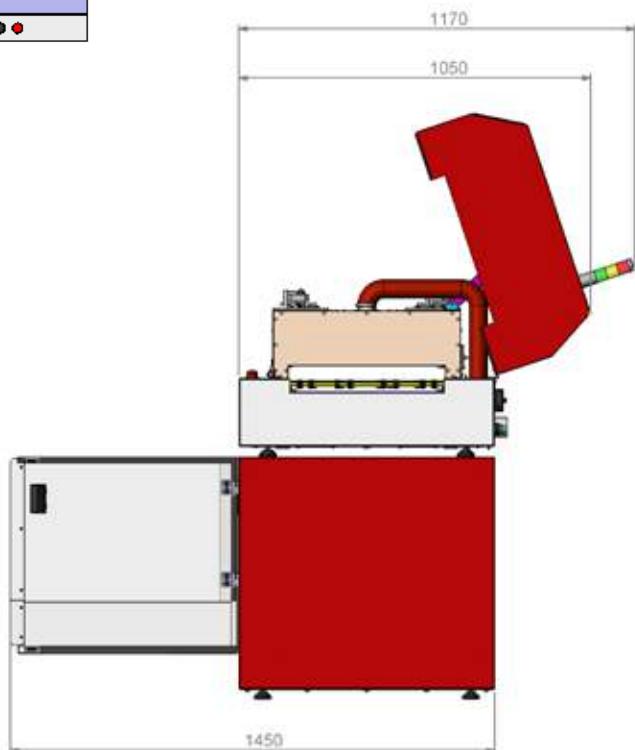
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## 4.0 Technical data

### Dimensions of the soldering system



### Dimensions of the soldering system with opened hood



All dimensions in millimetre (mm).

## 4.0 Technical data

<b>Depth:</b>	785 mm	<b>Dimensions</b>
<b>Width:</b>	2006 mm	
<b>Height:</b>	554 mm	
<b>Depth opened:</b>	1050 mm	
<b>Depth opened (with option lamp pole):</b>	1170 mm	
<b>Height opened:</b>	approx. 1000 mm	
<b>Weight (without options):</b>	175 kg	
<b>Colour:</b>	RAL 9010 pure white RAL 3001 signal red	
<b>Safety class</b>	IP 20	
<b>Continuous sound pressure level:</b>	60dB(A)	
<b>Electric connection:</b>	230/400VAC 50/60Hz 16A CEECON	<b>Electrical connection values</b>
allowed tolerance mains voltage	+6% / -10%	
<b>Max. heatup power:</b>	approx. 11 kW	
<b>Nominal power:</b> <b>(Lead free soldering process)</b>	approx. 5-6 kW <i>(power consumption depends on the soldering profile, PCB size and assembled components)</i>	
<b>Power consumption in standby mode (100°C):</b>	2100 W <i>(at 20°C ambient temperature)</i>	
<b>Ambient temperature</b> during operation:	5° up to 40°C	<b>Allowed climatic demands</b>
<b>Ambient temperature</b> during transport and storage ( <i>DIN EN 60204-1, 4.5</i> ):	-25° up to 55°C	
<b>Maximum allowed air humidity</b> <i>(DIN EN 60204-1, 4.4.4):</i>	50% +40°C 90% +20°C / no condensation	
<b>PCB/component sizes:</b>		<b>Allowed component sizes</b>
Minimum size:	15 x 10 mm	
Working width mesh belt:	440 mm	
Useable working width mesh belt:	405 mm	
Working width pin chain (optional):	35-400 mm	
Maximum assembly height:	45 mm (incl. fixture)	
<b>Maximum reflow temperature:</b>	280 °C	<b>Characteristics</b>
<b>Conveyor speed:</b>	15 - 90 cm/min	
Active chamber length 551.10:	850 mm	
Active chamber length 551.15:	1050 mm	
PCB cooling 551.10:	2 blowers - cooling module zone 5	
PCB cooling 551.15:	3 fans - fan-module in the outlet	
<b>Medium process time:</b>	5-8 min (depending on soldering profile)	
<b>Exhaustions:</b> <i>(emissions within the exhaust air depend on the used solder paste or chip adhesive)</i>	approx. 270 m³/h	<b>Emissions</b>
<b>Exhaust connection piece:</b>	Connection Ø 60 mm <i>(at rear side)</i>	

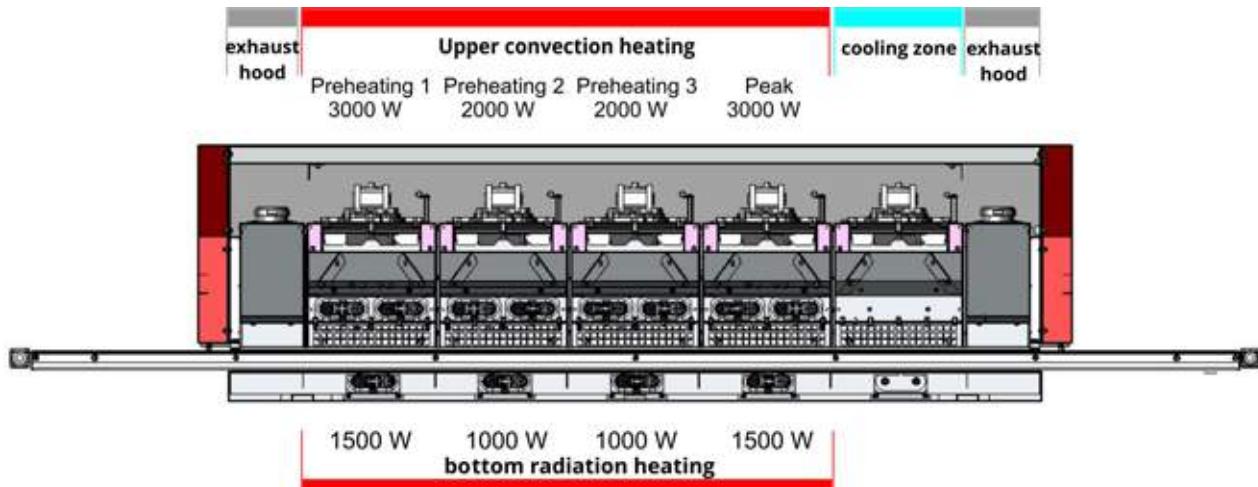
## 4.0 Technical data

### Functional scheme

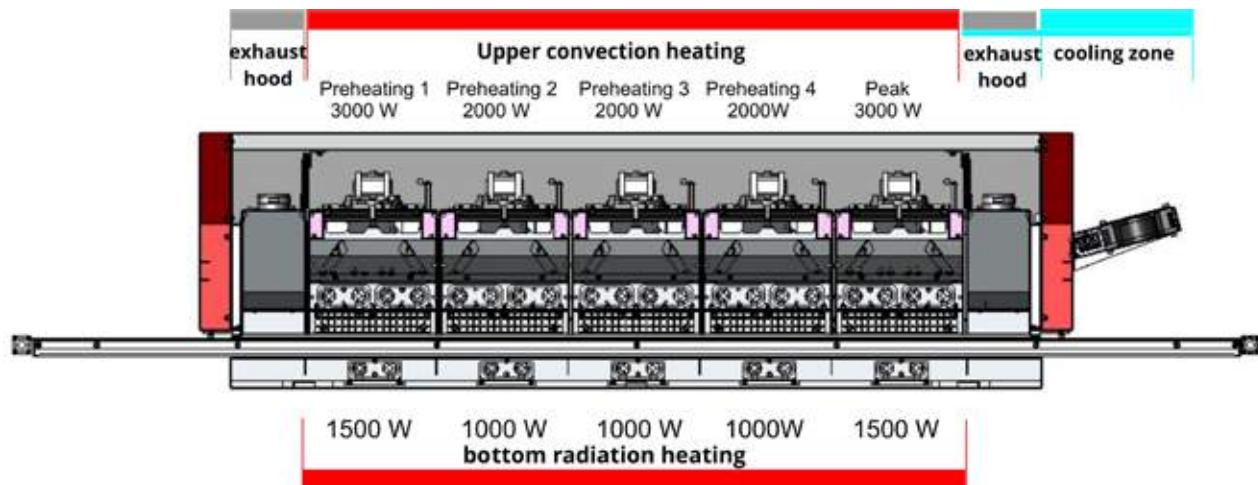
Soldering ovens of the series 551.1X are designed as a desktop unit and modular. The heating chamber can accommodate five zones, which can be designed as either heating or cooling zone.

- ◆ Structure of the heating chamber 551.10 - 4 heating zones + 1 cooling zone
- ◆ Structure of the heating chamber 551.15 - 5 heating zones [*with external cooling zone*]

### Functional scheme 551.10 - 4 heating zones



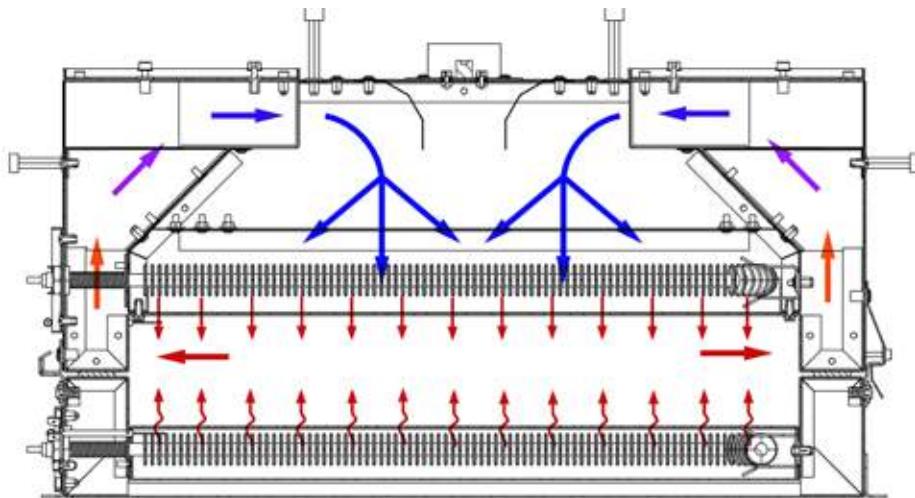
### Functional scheme 551.15 - 5 heating zones



## 4.0 Technical data

### Functional scheme

Each heating zone consists of an upper convection heating and a bottom radiation heating.



### Heating zones

The upper heating areas emit convection heat with the help of hot air fans to the **heating chamber**.

The first preheating zone and the peak zone are equipped with 3000W heating power. For the preheating zones 2, 3 and 4 [only 551.15] 2000W is enough power.

Underneath the bottom cover there are four heating zones with 1000W heating power each. The radiation heat of the bottom heating zones takes care for an equal heating of the PCB and a good soldering result.

- ◆ The temperatures of all heating areas can be set individually.

The maximum heating power of the soldering system **551.1X** is limited to 11 kW by software to avoid an overload of the mains supply. The available 11 kW will be divided to all heating areas in line with demand by an intelligent software control.

The upper part of the heating chamber contains also a **cooling zone** and an **exhaust hood** for the inlet area as well as for the outlet area. About the exhaust hoods soldering and glue fumes are sucked and thus prevents the escape of toxic fumes.

The transport of the PCBs through the heating chamber takes place by a **mesh belt** with 440 mm width (useable working width 405 mm). The maximum assembly height is 45 mm. The conveyor speed is adjustable between 15-90 cm/min and depends on the required soldering profile.

### Cooling zones Exhaust hood

### Transport

## 4.0 Technical data



## 4.0 Technical data

Operating and programming of soldering ovens from **series 551** take place via the 7"-touch panel. The machine status and all process relevant parameters will be displayed on the panel.

The system can be equipped with an additional lamp pole on request.

All entries will be done with the help of a virtual keyboard which will be activated on the touch panel. The touch panel together with the integrated SBCC micro controller form an assembly group.

### Operating panel touch screen 7"

**Display:** 7" touch screen

**Resolution:** 800 \* 480 pixel

**Controller (SBCC-Board):** Processor TI Sitara™ AM3354  
720 MHz ARM® Cortex™-A8  
RAM 256MB DDR3 SDRAM  
ROM 128MB NAND Flash  
RTC DS1339 Real Time Clock

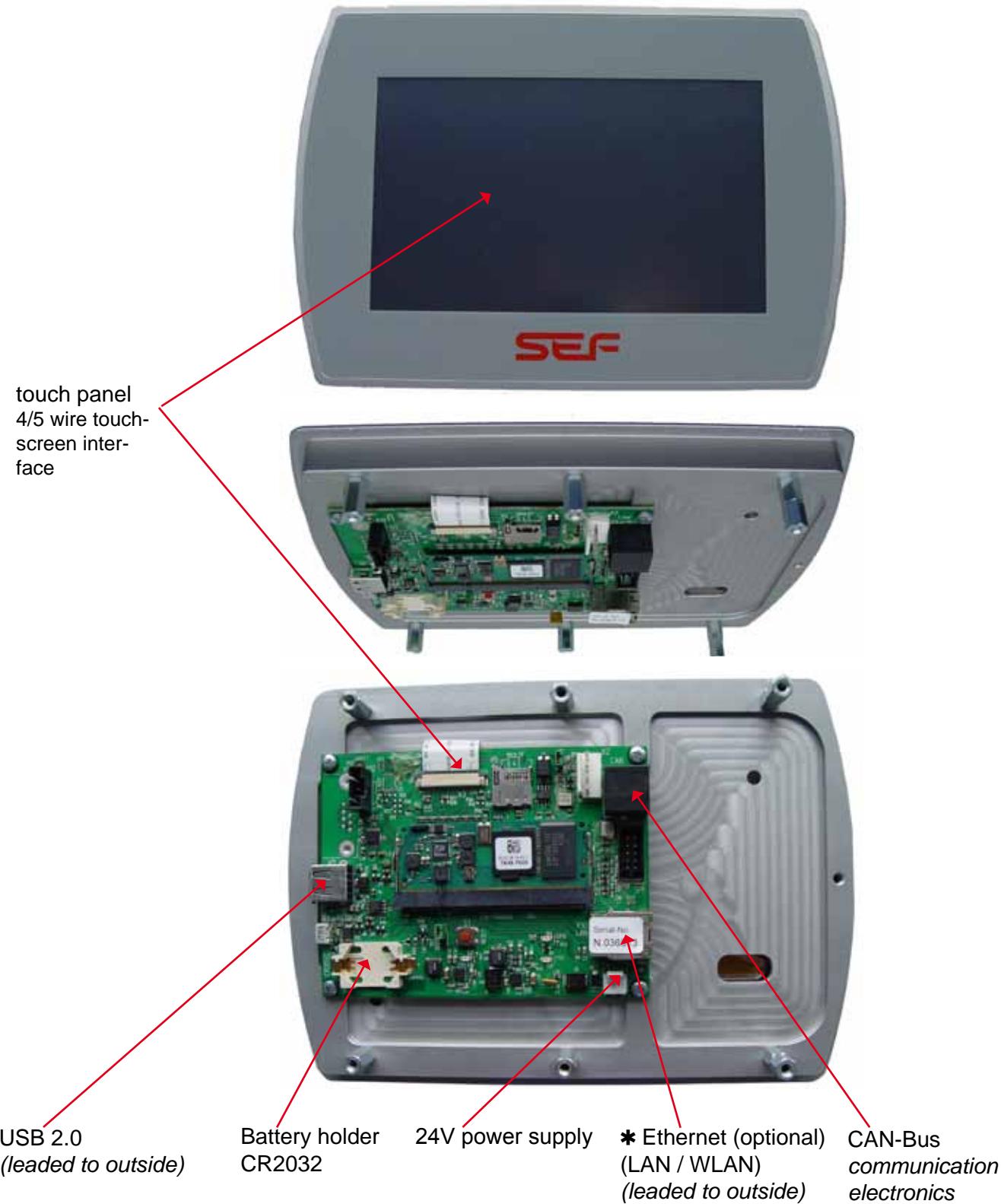
### Controller

**Internal features SBCC:** 10/100Mbps Ethernet  
2x High-Speed USB 2.0 port  
True colour LCD controller  
CAN interfaces  
4/5 wire touch screen interface  
Several peripheral interfaces:  
UART, SD-CARD, I2C, PWM,  
Serial Audio, SPI

**Operating system:** Linux

**External interfaces:** 1x USB2.0 connection,  
for reading and external control of  
the oven  
1x CAN-Bus  
communication with electronics  
\* Ethernet (optional)

## 4.0 Technical data



## 4.0 Technical data

The reflow oven **551.1X** will be operated with a touch screen controller. The touch screen controller with integrated SBCC-processor works as master and provides all control and monitoring tasks. The communication between SBCC processor and electronics takes place via CAN-bus.

The central electronics provide no discrete control functions to minimize the software work.

The configuration of the modules will be done manually but will be checked when switching-on the system.

- ◆ All entries like program loading, editing, saving, profile measurement, setup etc. are done via the touch panel.
- ◆ The program data and measurement results can be saved via the touch screen and printed on a USB printer.

### Modules/ assembly groups:

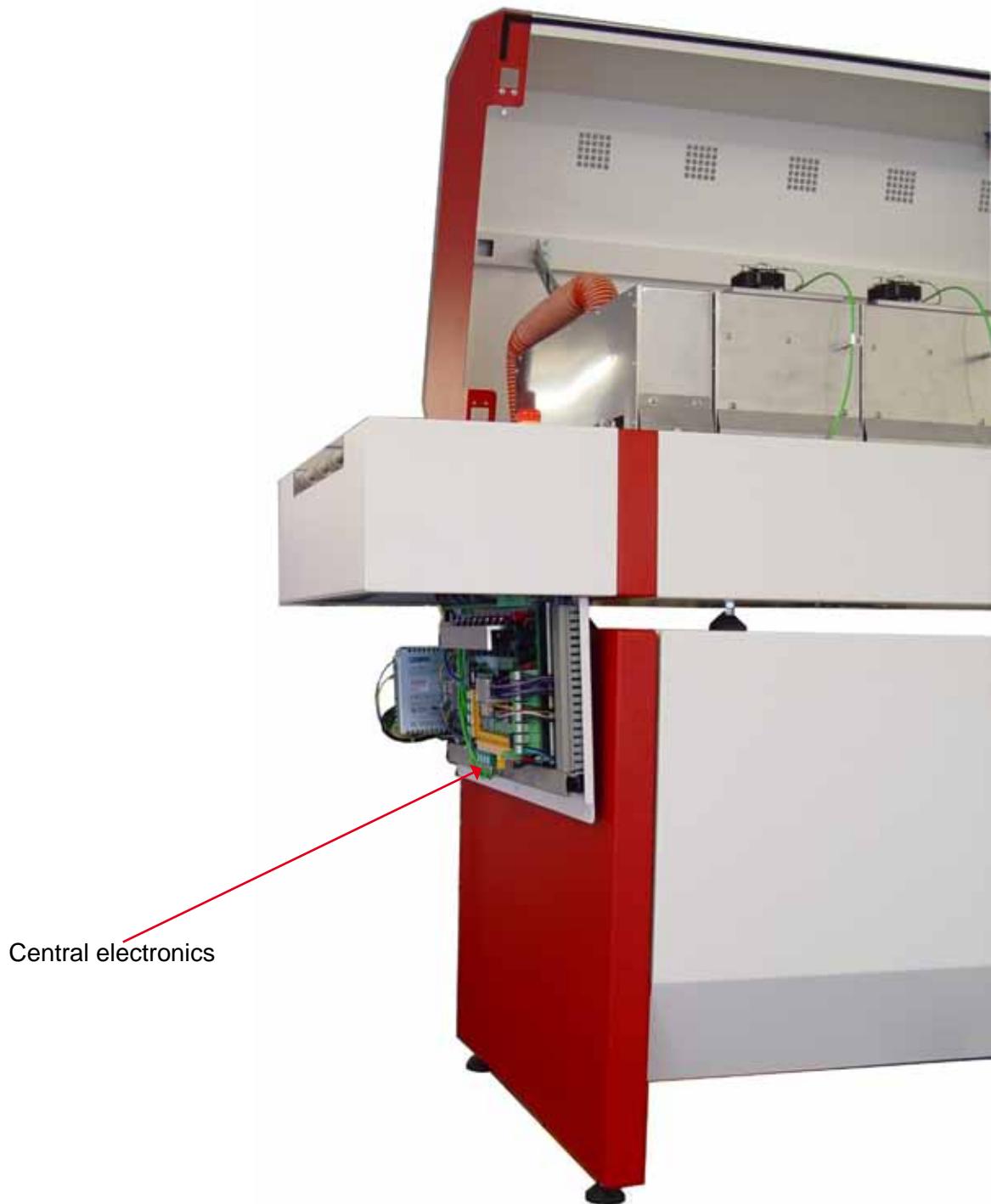
- ◆ touch screen  
(Entry and visualisation)
- ◆ SBCC with TX-module and board  
(operation software, controller software, safety software)
- ◆ Storage options  
(f.e. SD-Card, USB-Stick)
- ◆ \* Optional WLAN

### Controller

### External interfaces:

- ◆ LAN
- ◆ USB
- ◆ CAN
- ◆ \* Optional WLAN

## 4.0 Technical data



## 4.0 Technical data

The central electronics with feed-in, voltage conditioning, controller RO-R2R with power and interface electronics is mounted on an assembly plate underneath the inlet area and good accessible for service purposes.

### Central electronics

- ◆ Power supply for all components  
(Heaters, fans, motor, option lamp pole)
- ◆ Interface to all components and sensors
- ◆ Conditioning of I/O-data and measurement values for the panel controller SBCC
- ◆ Drive of all fans  
(in service mode each single fan can be switched on/off)
- ◆ Drive and control of all tube heaters  
(all heaters can be controlled and switched on/off)
- ◆ Self diagnosis at start  
and/or regularly in operation:
  - Current measurement at all fans  
(*short drive of all fans for error diagnosis*)
  - Current measurement at all heaters  
(*short drive of all heaters for error diagnosis*)
  - Sensor test  
(*Recognition of thermocouples / check for break/damage*)

## 4.0 Technical data



2x Load contactor  
(safe cut-off in case of  
error)

24V power supply

Pre-fuse

Terminals

**Controller  
board  
RO-R2R**

## 4.0 Technical data

### Controller RO-R2R

#### Connected modules / assembly groups:

- ◆ Touch screen controller based on SBCC (CAN-Bus)
- ◆ Load contactor (safe cut-off in case of error)
- ◆ External power supply 24V/10A (5A?)
- ◆ 24V motor with rotary encoder (drive of mesh belt)
- ◆ 4 / 5(551.15) upper heating zones a 2kW / 3kW
- ◆ 4 / 5(551.15) lower heating zones a 1kW / 1,5kW
- ◆ 8 / 10(551.15) convection blowers (heating chamber)
- ◆ 2 blower / 3 cooling fans(551.15) (cooling zone)
- ◆ 4 internal cooling fans
- ◆ 1 light barrier board recognition / belt monitoring
- ◆ 1 thermocouple for internal temperature profiler
- ◆ 8 / 10(551.15) thermocouples for heating zones
- ◆ \* optional lamp pole

#### Controller RO-R2R

#### Interfaces/ connectors:

##### Voltage supply

- ◆ Voltage supply by external power supply 24VDC/5A

##### Communication

- ◆ CAN IN / communication with SBCC-controller
- ◆ CAN OUT / connection of enhancements  
(second central electronics)

##### Drive of mesh belts

- ◆ 24V-gear motor with encoder  
(speed control conveyor via hall sensor / Monitoring mesh belt via light barrier)

##### Blower / Fan 230V

- ◆ 5x blower for upper zones 1-5 (2 per fan per module)
- ◆ 1x fan for internal cooling (4 fans bottom tray)
- ◆ 1x exhaust box (230V socket on device)
- ◆ 1x fan module outlet zone (3 fans)(551.15)

##### Heating

- ◆ 10x output for heaters with 1000 / 1500W

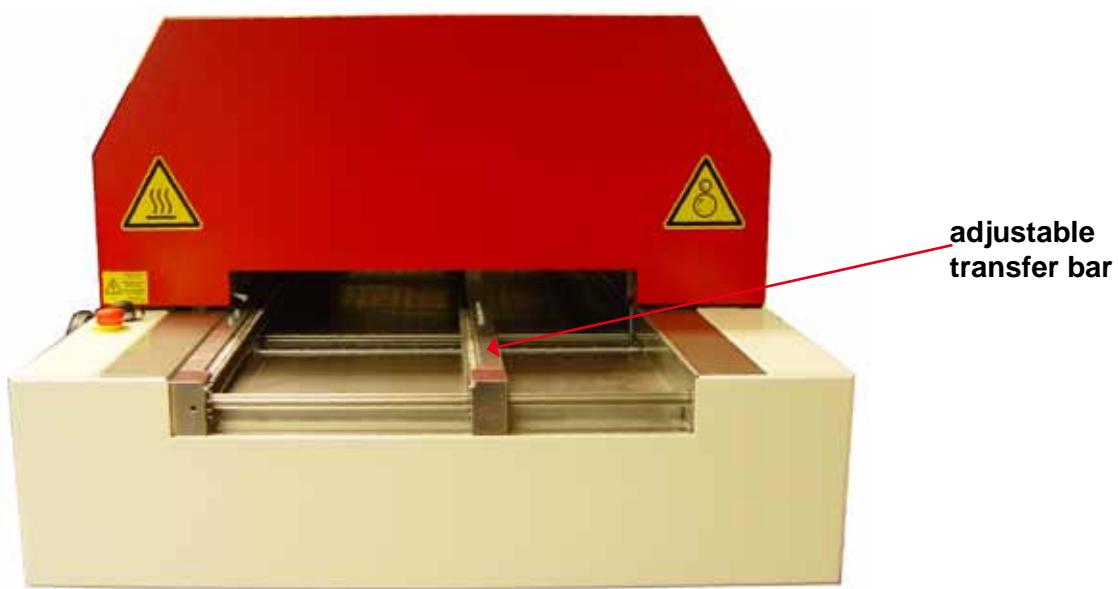
##### Sensor technology

- ◆ Inlet sensor board recognition (SMEMA / power save mode)
- ◆ 15x input thermocouples NiCr/Ni-K / heating zones / profiler / reserve
- ◆ Outlet SMEMA (busy- / board available signal)
- ◆ Inlet SMEMA (busy signal)
- ◆ 3x relay output / Indicating operating mode lamp pole

## 4.0 Technical data



**Hand wheel 1**



## 4.0 Technical data

### \* Option pin chain conveyor for 551.10/.15

Reflow ovens of the series **551** are basically equipped with a mesh belt conveyor.

- \* Optional the conveyor system of the series **551** can be equipped with a pin chain conveyor instead.

In this model the rear transfer bar can be adjusted with the help of a hand wheel to the required working width.

#### PCB / component size (only \* option pin chain conveyor):

Working width pin chain:	35-400 mm
Pin length:	4 mm
maximum assembly height:	45 mm (incl. support)

**maximum reflow temperature:** approx. 280 °C

**Conveyor speed:** 10 - 70 cm/min

#### Allowed component sizes pin chain conveyor

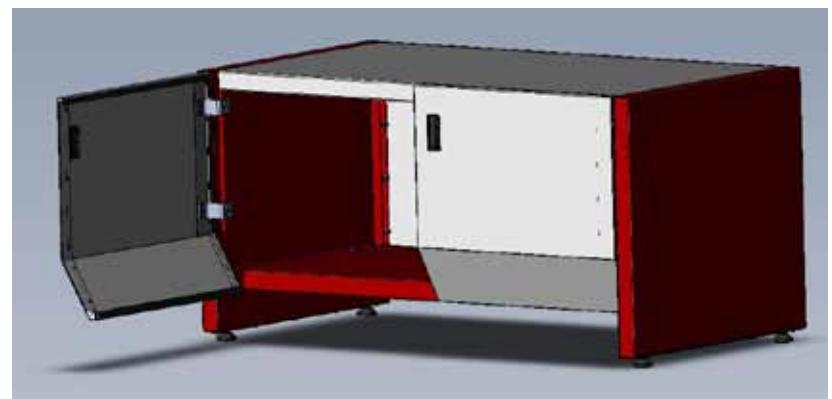
#### Parameters pin chain conveyor

The adjustable rear transfer bar can be moved with the hand wheel **(1)** to the required working width. The front transfer bar is fixed and can't be moved.

#### NOTICE

- I Before adjusting the working width make sure that there are no more PCBs in the soldering system.  
For parking position move the transfer bar with the hand whell to the very back position.

## 4.0 Technical data



## 4.0 Technical data

### \* Option base cabinet 551.10.1

The reflow ovens from **series 551** are designed for desktop use.

- \* Optionally, you can also order a suitable stable unit for safe placement.  
The cabinet has behind his two front doors plenty of storage space for your soldering equipment.

**Depth:** 750 mm

**Depth opened:** 1450 mm

**Width:** 1400 mm

**Height:** 710 mm

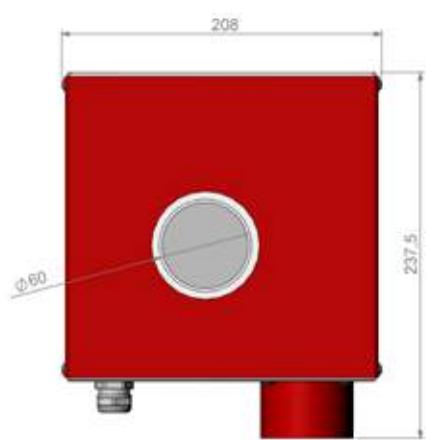
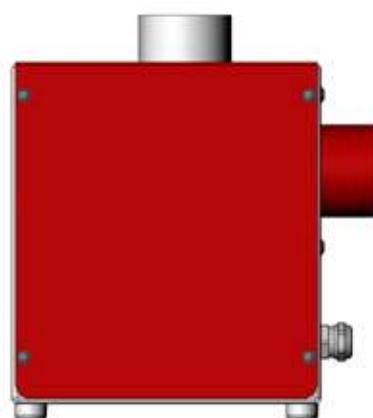
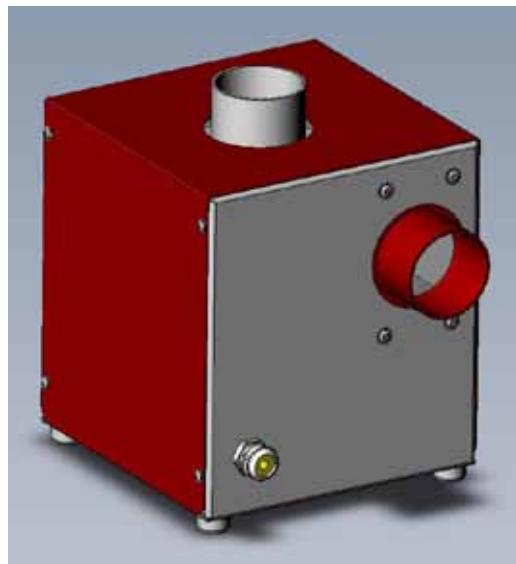
**Weight:** approx. 90 kg

**Colour:** RAL 9010 pure white

                                  RAL 3001 signal red

#### Technical data base cabinet

## 4.0 Technical data



## 4.0 Technical data



### CAUTION

#### Danger of toxication

On a continuous base the arising solder or adhesive vapours are harmful to health.

- | **The machine must necessarily be connected to an exhaust system or an air washing unit.** The exhaust system must have a minimum capacity of 270m<sup>3</sup>/h.  
On the rear side of the system you will find an exhaust air socket for discharging the vapours (diameter 60 mm).
  - | Observe the safety and processing instructions of the solder paste and chip adhesive manufacturer.
- \* If there is no in-house exhaust system or air washing unit available at the place of installation, the oven can be supplied with a fitting exhaust box (230VAC) incl. hose set on request.

<b>Depth:</b>	620 mm	<b>Technical data exhaust box</b>
<b>Width:</b>	862 mm	
<b>Height:</b>	620 mm	
<b>Exhaust air socket:</b>	Connection Ø 60 mm	
<b>Weight:</b>	approx. 7 kg	
<b>Colour:</b>	RAL 9010 pure white RAL 3001 signal red	
<b>Continuous sound pressure:</b>	< 70dB(A)	
<b>Exhaust values:</b>	approx. 180 m <sup>3</sup> /h The emissions in the exhaust air depend on the used solder paste and chip adhesive.	
<b>Electrical connection:</b>	230VAC / 50 Hz (SK1)	

## 4.0 Technical data

## 5.0 Transport and setting up

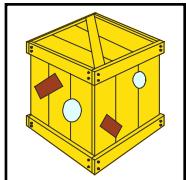
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## 5.0 Transport and setting up

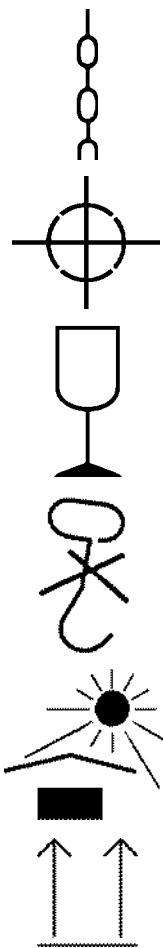
### Transport notes

#### Transport notes on the packaging



The system is delivered by a forwarding agent in assembled conditions in a special packaging.

#### I Please note the instructions on the packaging:



## 5.0 Transport and setting up

### Safety instructions for mounting and dismounting

- ◆ Soldering systems from **series 551.1X** must be mounted or dismounted by qualified and instructed staff only.
- ◆ Observe all instructions in this manual regarding mounting, dismounting, start-up, rearrangement and adaptation.
- ◆ Work at the controller must be only executed by electrically skilled persons.
- ◆ Use only original spare parts and original fuses with the prescribed amperage.



#### **WARNING**

#### **Risk of injuries due to missing safety devices**

- | Generally it is not allowed to dismount any safety installations or to put them out of service.



#### **DANGER**

#### **Danger of life by voltage-carrying parts**

- | Before conducting any mounting or dismounting work at the system or additional installations, they have to be set volt-free.

If the dismounting of safety installations is necessary for service or start-up work, you

- | **must set the system out of operation according to the instructions and under observance of all warning notes**
- | and secure it against unintended restart.
- | After any kind of electrical mounting work all safety installations and EMC protection measures have to be put into operation again immediately and **must be checked for function**.

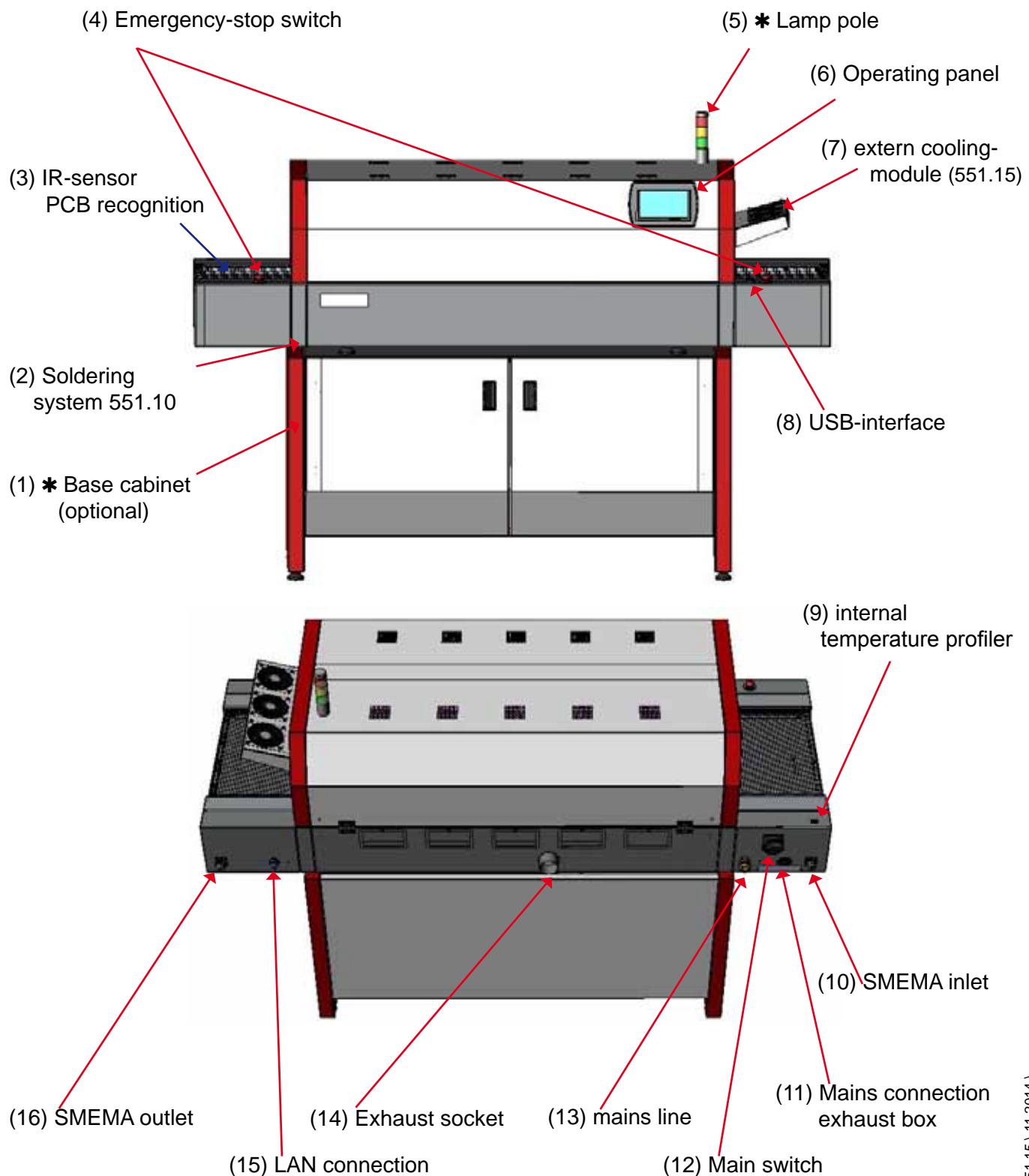
### **Liability**

The operator takes liability for damage to property in case of dismounted EMC protection measures, and the warranty expires. Anyone who is dismounting or changing safety installations of the soldering system is acting grossly negligent and against the valid guidelines.

SEF Systec GmbH won't take any liability for damages to persons or property caused by changed safety installations.

The mounting of additional installations is only allowed after written approval of the manufacturer.

## 5.0 Transport and setting up



## 5.0 Transport and setting up

### Unpacking and checking scope of delivery

You have received the SEF Reflow Soldering System from the **series 551.1X** with according accessories. The delivery is carried out in a special packaging. Please check the delivery note for the scope of delivery.

- | Remove the packaging carefully.



#### **WARNING**

#### **Danger of injuries due to high weight**

The soldering system 551.1X has a weight of approx. **175 kg**.

- | Check immediately if there are any transport damages. If so make a note on the delivery note and contact immediately the forwarder as well as the transport policyholder.
- | Check if the delivery and the delivery note correspond with each other. If not, contact SEF Systec GmbH immediately.

*For transportation or service please keep the packaging.*

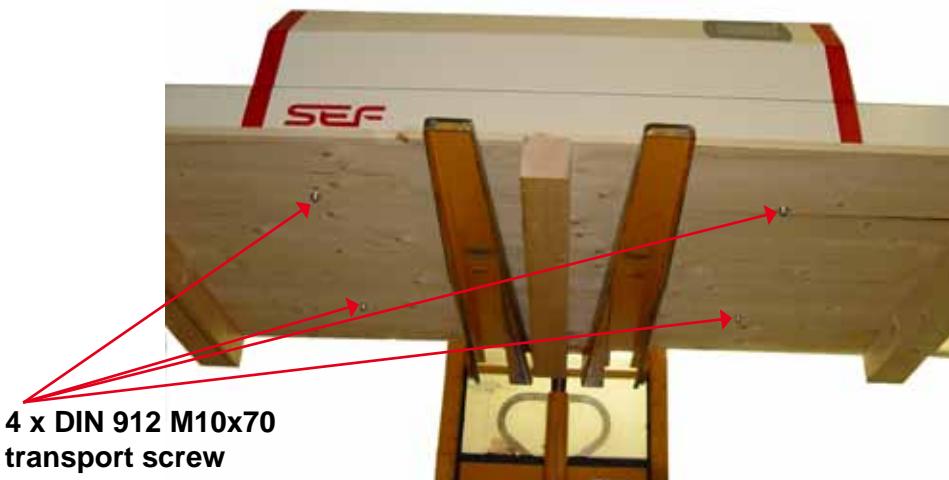
- | After unpacking and checking the faultless condition of the system as well as the scope of delivery you can start to set up.



#### **WARNING**

#### **Danger of injuries due to high weight**

The soldering system 551.1X has a weight of approx. **175 kg**.



### Scope of delivery

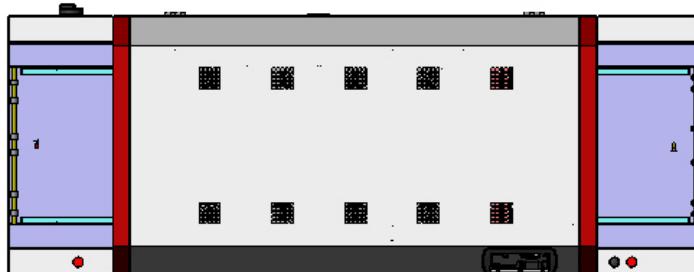
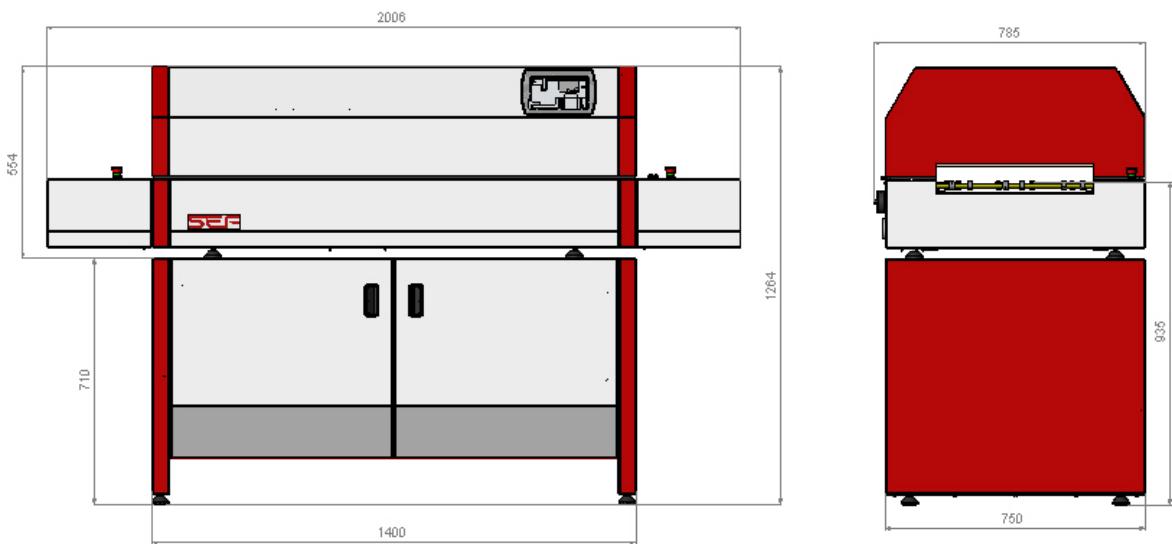
### Unpacking

### Checking scope of delivery

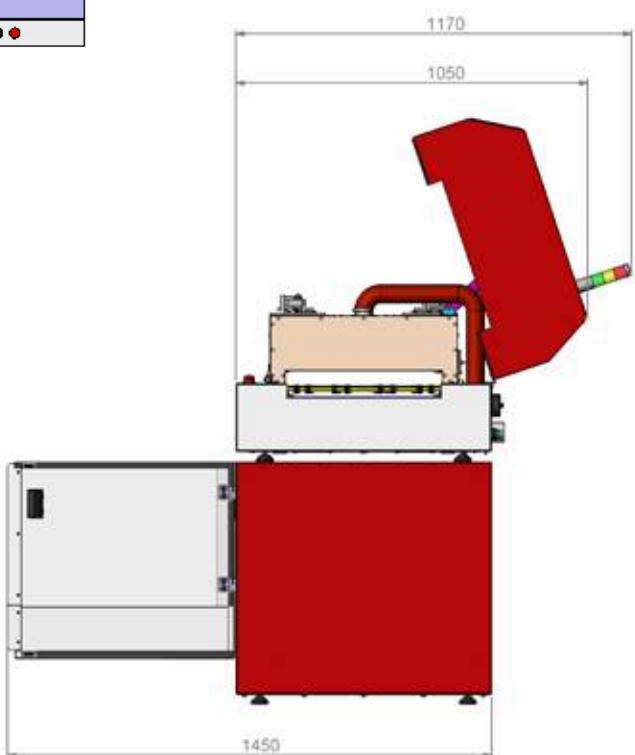
### Transport on pallet

## 5.0 Transport and setting up

### Dimensions and data of the soldering system series 551



All dimensions in millimetre (mm).



<b>System data</b>	
Dimensions	785 x 2006 x 554 mm DxWxH
Dimensions (opened)	1050 x 2006 x 1000 mm DxWxH
Weight	175 kg
Min. PCB size	15 x 10 mm
working width mesh belt	405 mm
Colour	RAL 9010/3001
Max. reflow temperature	approx. 280°C
PCB cooling	551.10 - cooling module zone 5 / 2 blowers 551.15 - cooling module outlet / 3 fans
Continuous sound pressure level	60dB (A)
<b>Power supply</b>	
Connection value	230/400VAC 50Hz, 16A CEECON
P <sub>Nom</sub>	approx. 5000 W
Power standby (100°C)	2100 W
<b>Media supply exhaust air</b>	
Exhaust socket	Connection Ø 60 mm
Necessary exhaust air volume	270 m <sup>3</sup> /h

## 5.0 Transport and setting up

### System setup and alignment

- | Move the soldering system **551.1X** on the transport pallet to the final place of production with an appropriate means of transport, such as hand lift or fork truck.
- | Remove the four securing screws M10x70, which are screwed from underneath through the transport pallet.
- | Now screw the feet instead of the transport locks from the bottom to the soldering oven.  
*(You can do this by lifting the soldering oven at one side and place a squared timber (e. g.) under the bottom of the unit in order to achieve the thread safe.)*

The soldering system **551.1X** is delivered in completely assembled condition

At the place of production you have to conduct the following connection work:

- \* Place the base cabinet (optional) or a comparable stable working desk at the place of production and align it with the help of the machine feet. Make sure that the working desk stands firm as does not jiggle.
- | Set up soldering system **551.1X** on base cabinet or working table and align it horizontally with the help of the machine feet (see below).
- | Lift the soldering system **with a minimum of 4 persons** on the working desk/base cabinet.



#### NOTICE

#### Risk of breakage

The soldering system 551.1X has a weight of approx. **175 kg**.

- | The working table must be capable of the soldering systems weight and the dimensions.

The soldering oven **551.1X** is designed as a desk model. The working table must be stable and capable of the soldering systems weight.

- \* We recommend to use the special designed base cabinet **551.10.1** with a lot of stowage for the safe set up of the soldering system.

### System setup

### Working table

## 5.0 Transport and setting up

### Set up soldering system and connect to the mains supply

#### Align soldering system horizontally



- | Use a 17 wrench to loosen the counter nuts (1).
- | With a 14 wrench you can adjust the height of the feet (2).
- | Use a water level to align the system horizontally.
- | Tighten the counter nuts (1) again and check the firm fit.

#### Mains supply

In standard configuration the system series **551.1X** is equipped with a 400V/16A-CEECON-plug. The power line has a length of 5 m.

- | Establish mains connection 400VAC/N/PE 50 Hz with 16A CEECON.



#### DANGER

- | **Don't mount** the system or **connect** it electrically if there are any recognisable damages.



#### WARNING

- | Before switching on the system, take care that the electrically power and fuses are agreeing with the connection values.
- | The in-house power supply must be fused with 3x16A separately for the soldering system.
- | No other devices must be connected to this circuit.

## 5.0 Transport and setting up

### Connecting soldering system to exhaust system



#### CAUTION

##### Danger of toxication

Soldering vapours on a continuing basis are hazardous to your health.

- | Connect your system to your in-house exhaust air system or to an air washer station with an minimum volume of **270 m<sup>3</sup>/h**.
- | Don't let the vapours escape in the production area.  
On the rear side of the soldering system you will find an exhaust socket with a diameter of 60 mm.
- | Ensure an adequate air ventilation at the place of production.
- | **Observance of the safety and processing instructions of the soldering paste manufacturer is required.**

#### Exhaust connection

- \* If you don't have an in-house exhaust-air system you can use the exhaust box 551.10.2 to exhaust the solder vapours which was especially designed for this purpose.
- | Connect a heat resistant exhaust hose to this socket.
- | Connect the exhaust hose with a suitable airwasher station or with an exhaust system with a minimum volume of **270 m<sup>3</sup>/h**.
- | Switch on the exhaust system.
- | Check if the exhaust air is evacuated correctly from the soldering system and does not escape in the production room.

## 5.0 Transport and setting up

### Connecting soldering system

#### Interfaces

The soldering system is equipped with

- ◆ USB interface for data storage,
- \* RJ45 connector for connection with a network (optional)
- \* SMEMA connectors for the inline integration with other machines at the inlet and outlet (optional).

#### Main switch

You can switch on/off the system centrally with the main switch which is placed on the rear side near the inlet.

For service purposes the main switch can be secured in position "OFF" against unintended restart with a small lock.

- I Turn the main switch to position "ON" to start the system; to position "OFF" to stop the system.

#### Operating the system

The operating of the ovens takes place via the 7"-touch panel with integrated controller.

The touch panel shows all relevant information like oven status, explorer bar to select created profiles and a graphic display of the set temperature profiles at a glance.

#### Profile setting

- ◆ Since it is possible to set the nominal profiles for the four upper and four bottom heating zones as well as the conveyor speed separately, an optimal adjustment of the profile for different PCB assemblies is possible.

#### Integrated temperature profiler

The soldering system **551.10** has an integrated 1-channel temperature profiler. You will find the corresponding socket at the inlet of the oven.

- ◆ With the help of the supplied thermocouple you can measure, save and print the actual temperature profile and display it on the production screen. This allows an optimal comparison between the set profiles and the actual measured profiles on the PCB.

## 5.0 Transport and setting up

### Final checkup

Before turning the system on and starting operation, you should conduct all following final checkups and should be able to answer all questions with "**YES**":

- ◆ Did you read and understand the chapter "2.0 Safety instructions" in this operating manual?
  - ◆ Did you remove the packaging material from the system completely?
  - ◆ Did you place the system on a table capable of the systems weight and dimensions?
  - ◆ Did you connect the exhaust socket of the system to any exhaust air system and did you check whether this connection is tight?
  - ◆ Does the power supply correspond to the requirements as stated on the type plate?
  - ◆ The power supply must be fused with 3x16A separately. Do your in-house fuses comply with the systems requirements?
  - ◆ Are there no other devices connected to the same circuit?
  - ◆ Did you connect the CEECON plug with the power supply?
-  If you were able to answer all questions with "**YES**" then go on to chapter "Function and start-up".
-  If you were **not** able to answer all questions with "**YES**", read this chapter as well as the chapter "2.0 Safety instructions" again and recheck the operating instructions.

## 5.0 Transport and setting up

### Dismounting, storage and preservation

#### Dismounting

For a possible dismounting of the system, e.g. if it has to be moved to another location or prepared for disposal, note and observe the following steps:

- | Turn the main switch to position "OFF".
- | Disconnect the power supply.
- | Loosen and remove the hose clip for the exhaust air connection of the system.
- | Remove the hose from the exhaust socket.
- | Disconnect all connected peripheral devices (USB, network, SMEMA, ...).
- | Now, you can remove the system from the production location.



#### WARNING

#### Danger of injuries by high weight

The soldering oven 551.1X has a weight of approx. **175 kg**, the optional base cabinet has a weight of approx. **90 kg** (empty).

- | Transport the soldering system only with adequate transport means like forklift/ forklift truck.

#### Short-term out-of-operation

To prepare the system for vacation time or for short-term out-of-operation periods, please observe the following:

- | Turn the system off with the main switch.
- | Clean the system as described in chapter "9.0 Maintenance".

#### Preserving

If you are not operating the system for a prolonged period, please note the following:

- | Clean the system as described in chapter "9.0 Maintenance".
- | Store the system at a dry and dust free location.
- | No other preservation methods are required for the storage.



*For erecting the system at another location, please read the section "Set up soldering system" and "Connect soldering system" in this chapter.*



*For disposal of the system please refer to the section "Disposal" in chapter "2.0 Safety instructions".*

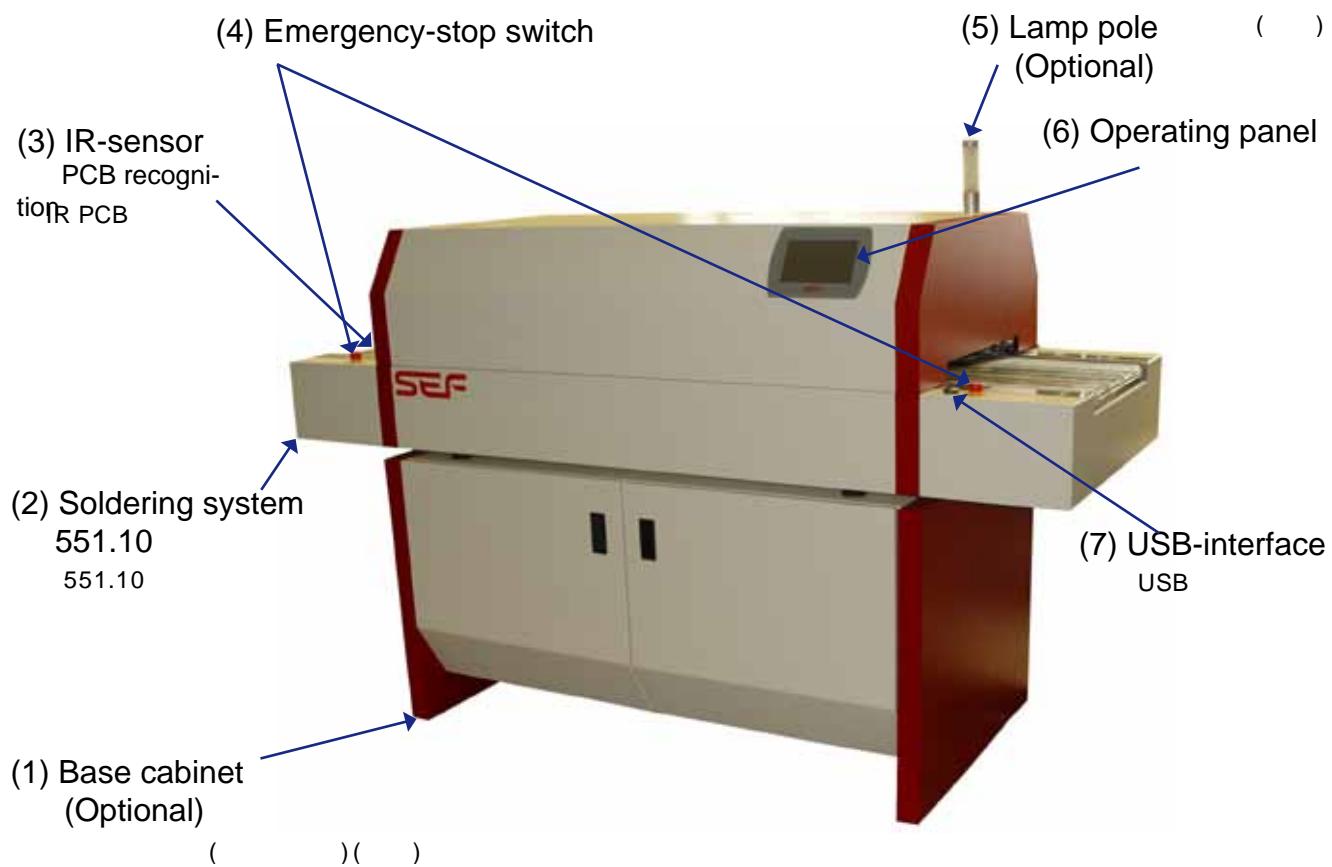
## 6.0 Function and start-up

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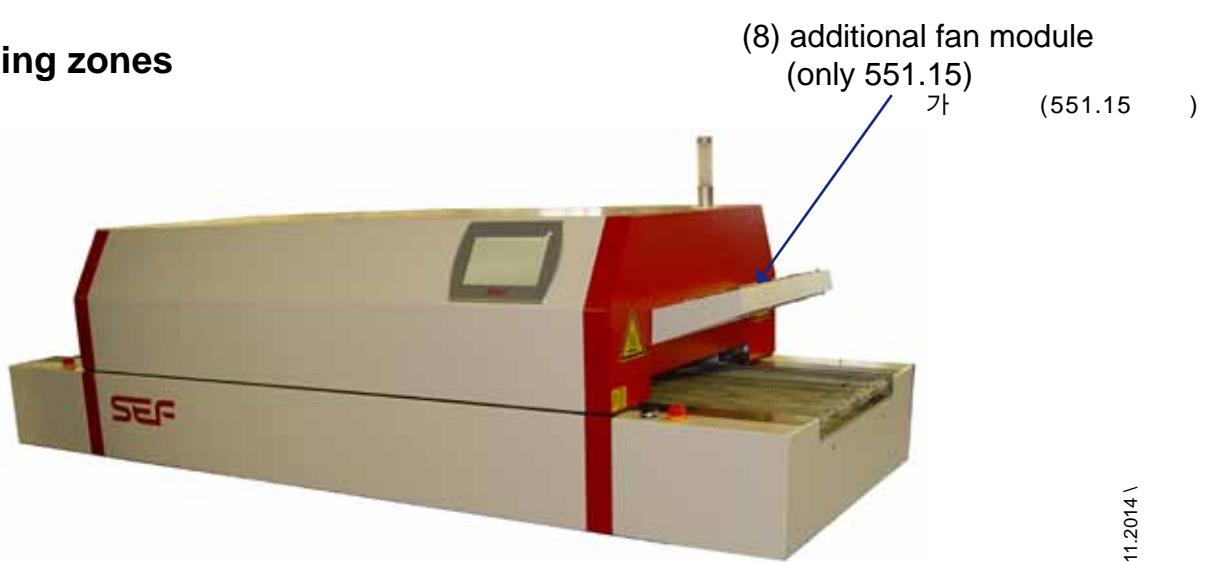
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## 6.0 Function and start-up

### 551.10 - 4 heating zones



### 551.15 - 5 heating zones



## 6.0 Function and start-up

### Functional description

551.10:405mm 850mm

551.1x

.551.15:405mm

1050mm

0.15~0.25m/min

**The soldering oven form series 551.1X is a full convection soldering system of the SEF reflow family for medium serial production.** With 405 mm useable working width, an active chamber length of 850 mm (551.10) or 1050 mm(551.15) and a typical conveyor speed of 0,15 - 0,25 m/min the oven will provide a sufficient throughput, also for bigger PCB sizes.

The soldering oven 551.10 has a heating chamber with four, the execution 551.15 has five heating zones. In each heating zone the temperatures for the upper convection area and the lower radiation area can be set individually.

The upper finned tubular heaters emit convection heat with the help of hot air fans in each heating zone of the heating chamber.

At the upper heating areas the first preheating zone and the peak zone are equipped with 3000W heating power. The preheating zones 2, 3 and 4(551.15) are dimensioned with 2000 W heating power. The air temperature of each zone is controlled to the set temperature with the help of NiCr/Ni-K thermocouples. The thermocouples are measuring the temperatures of the air stream and transfer them to the controller which is setting the power for the heaters correspondingly.

The mechanical design of the heating chamber modules provides a directional airstream guidance and ensures a separation of the modules against each other how it is necessary for setting a soldering or curing profile.

In the embodiment 551.10 zone 5 is designed as a cooling zone in the upper part of the heating chamber. In the version 551.15, this zone is used as an additional heating zone. In the version 551.15 the outlet area of the soldering system is used as a cooling zone by using an additional fan module with three fans.

The upper part of the heating chamber contains also one exhaust hood per inlet and outlet area. The heated air which is maybe contaminated with flux vapours will be removed through exhaust hoods at the inlet and outlet and guided to a connected exhaust system.

The upper heating zones, exhaust hoods and cooling zone are designed modular and can be exchanged easily with the help of a clip seal. They are covered by the machine hood which can be opened manually.

Underneath the bottom cover you will find the lower heating zones which are equipped with 1500 W heating power in the first preheating zone and the peak zone. 1000 W heating power in the second, third and fourth(551.15) preheating zone are sufficient dimensioned. The radiation heat of the lower heating zones will provide an equal heating of the PCBs and a good soldering result, also for PCBs with a bigger heat requirement like multilayer boards.

Therewith you can reach reflow temperatures of up to 280°C on the PCB.

PCB

PCB 가

280

SEF

PCB

551.10 4 551.15 5

### Heating chamber

3000W 가

2,3,4(551.15) 2000W  
가

NiCr/Ni - K

가

### Thermocouples

5 ,551.10

### Cooling zone

,551.15 가

551.15 가 3

### Exhaustion

1

가

가

1500W

2 3

1000W

(551.15 4 ) 가

## 6.0 Function and start-up



## 6.0 Function and start-up

### Functional description

440mm( 가 405mm) 가

0.15~0.9m/min 가

The transport of the solder pieces takes place by a mesh belt with a working width of 440 mm (useable width 405 mm). The conveyor speed can be set between 0,10 - 0,90 m/min.

- \* *On request for double sided assemblies or for inline the soldering oven can be equipped with a pin chain conveyor manufacturing with a pick and placer. The working width of the pin chain conveyor can be set between 50 - 400 mm.*

As in proven SEF tradition the controlling and operating takes place by own developed and manufactured electronics.

A SBCC-panel controller on a SEF mainboard with Linux operating system controls the processes inside the soldering system.

The operating and programming of the oven will be done via a 7" touch panel at the machine's frontside. The machine status and system information will be also shown on the display.

All entries take place via a virtual keyboard which will be activated on the touch screen on request.

The touch panel together with the SBCC-panel controller form an assembly group in the machine front.

The central electronics with feed-in, voltage conditioning, controller RO-R2R with power and interface electronics is mounted on an assembly plate underneath the inlet area and good accessible for service purposes.

The parameter setup is very easy. With the temperatures of eight or ten temperature ranges and the transport speed of the process with a maximum of 11 set values is safe and easy to control.

The entries for operating and controlling the system are reduced to a minimum and are menu guided.

The system display informs about all process relevant values.

These are the machine status, the set and actual temperatures of the heating areas, the actual temperature of the internal temperature profiler and the conveyor speed.

After selection of the according parameters on the system display you can set new must values via the virtual keyboard.

By selecting the according menus on the system screen you can reach the different menu functions for operating and profile setting.

### Mesh belt

가 .  
50~400mm

가 .

SEF

### Operating the system

SEF  
SBCC

7

가 .

SBCC

RO -

R2R

### Machine status

.8or 10  
11

가 .

## 6.0 Function and start-up



## 6.0 Function and start-up

The oven has an integrated temperature profiler to check the soldering profile on the solder piece. The necessary thermocouple is part of the delivery range.

In case of danger the soldering system can be stopped by the emergency-stop switches which are mounted at the inlet and outlet. When pressing the emergency-stop the heating will be switched off and the conveyor will be stopped. Hot air fans and exhaust fan will continue running to avoid danger by trapped heat and poisonous vapours. The communication with the touch panel is also still working.

When pressing the emergency-stop switch the machine safety circuit will be disrupted. Two temperature switches for monitoring the internal device temperature are also part of the safety circuit. When disrupting the machine safety circuit an active soldering or curing process will be stopped. An error message will be displayed on the screen as clear words with red background. If there are several errors at the same time, only the most relevant will be displayed. Before restarting the process all errors must be eliminated and confirmed.

After switching on the oven the controller RO-R2R will run a self diagnosis. At all fans and heaters a current measurement will be conducted, one after another. Therefore these components will be activated shortly and an error diagnosis will be conducted via the current consumption. Additionally all configured thermocouples will be checked for failure or break.

The failure of a component will be shown by marking the component on the display and showing a clear text message. A soldering process can be only started after elimination and confirmation of the failure.

**Temperature profiler**

**Emergency-stop**

**Safety circuit**

가

2

가

가

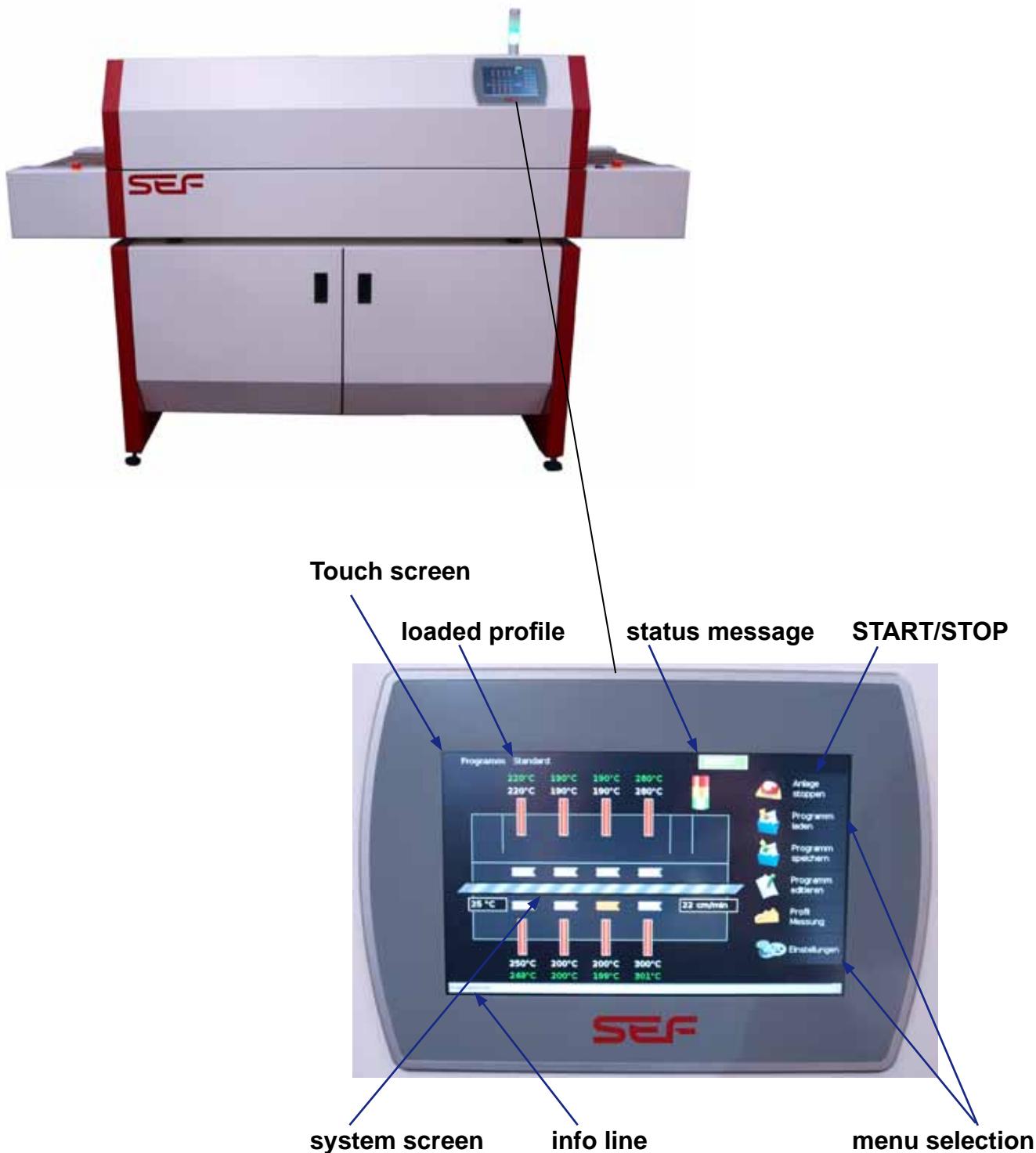
가

가

가

RO - R2R가

## 6.0 Function and start-up



## 6.0 Function and start-up

### The operating panel

The reflow oven 551.1X will be operated with a touch screen controller. This operating panel is assembled user-friendly at the front of the oven. The touch screen controller with integrated SBCC-processor works as master and provides all control and monitoring tasks. The communication between SBCC processor and RO-R2R controller takes place via CAN-bus. The display informs about the system status and all parameters of the soldering profile at a glance.

The following menu functions can be called by selecting the according menus on the touch screen

- ◆ Select program,
- ◆ Save program,
- ◆ Edit program, as well as
- ◆ Profile measurement and
- ◆ System parameter setting

The program data and measurement results can be stored on a USB mass storage and printed on a USB printer.

#### Modules /assembly groups

- ◆ Touch screen  
(Input and visualisation)
- ◆ SBCC-panel controller with TX-module  
(User-, controller- and safety software)
- ◆ Storage options  
(f.e. SD-Card, USB-Stick)

#### Touch screen controller based on SBCC

551.1X

SBCC

SBCC  
RO - R2R  
CAN

#### Interfaces

- ◆ Ethernet -
- ◆ USB - USB
- ◆ CAN - CAN

USB 가  
USB 가

/

( )

- TX SBCC

( - , - , s/w)

-

(SD ,USB)

## 6.0 Function and start-up



## 6.0 Function and start-up

### Turn the soldering system on/off

The main switch for turning the soldering system on/off is situated on the rear side of the machine at the inlet area.

On/Off

- I Turn the main switch to position <ON>.

On

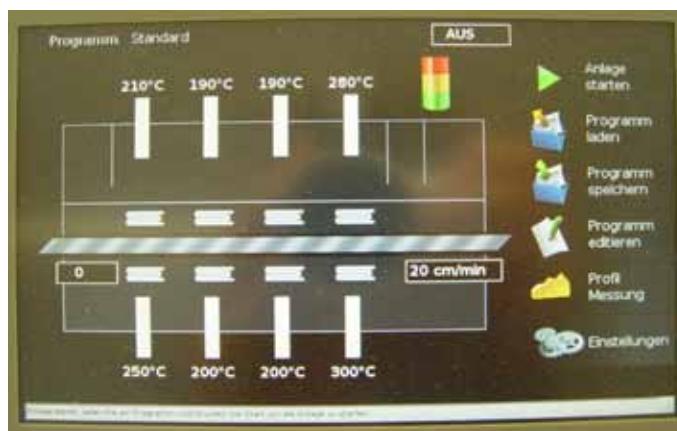
After turning on the Linux operating system will start.

#### Main switch

#### Turn soldering system on



Afterwards the system screen of the 551.1X will be displayed.



#### The system screen

The soldering system starts automatically with the last saved program.

The system is in status off, all heaters and fans are off, the conveyor starts with the set speed.

The start button is highlighted black (off).

가

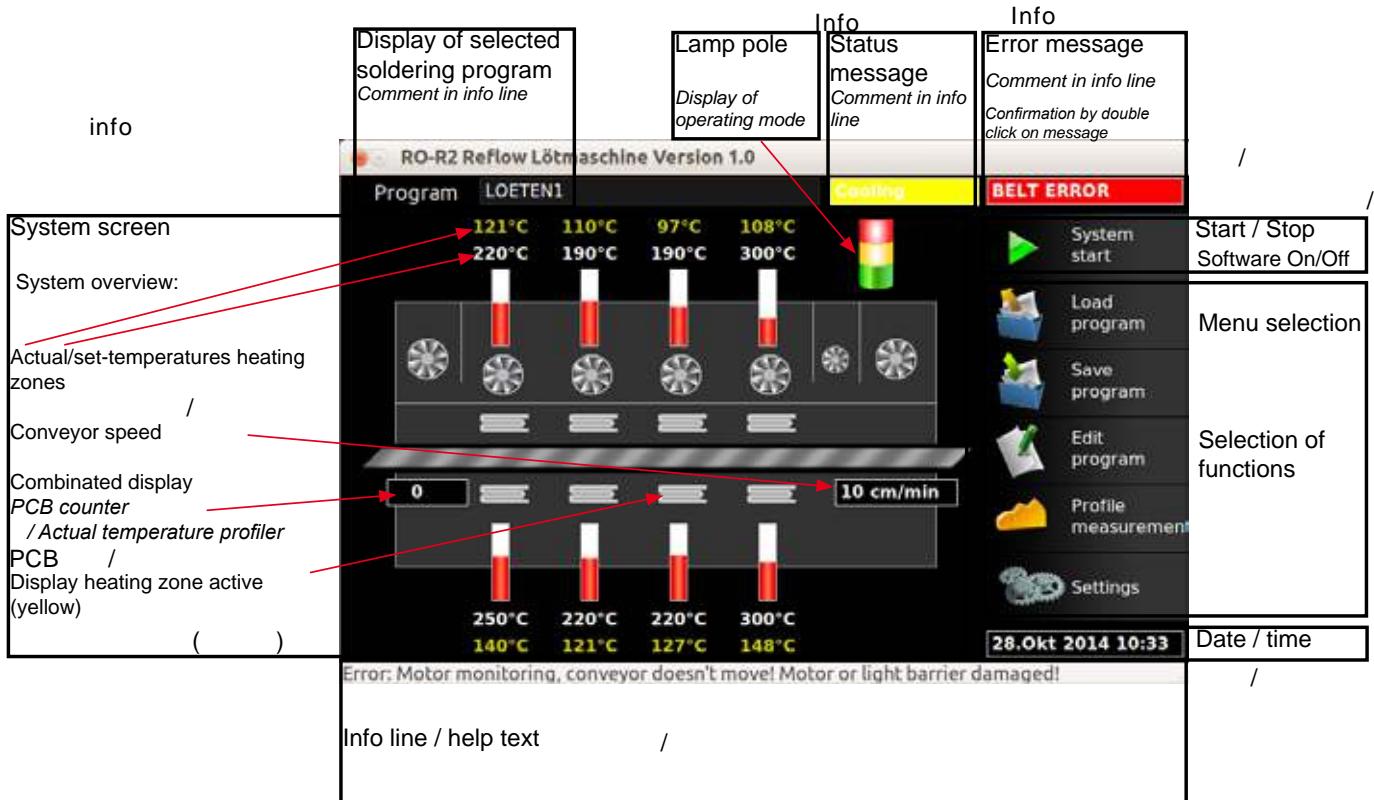
가 OFF , ,

(off).

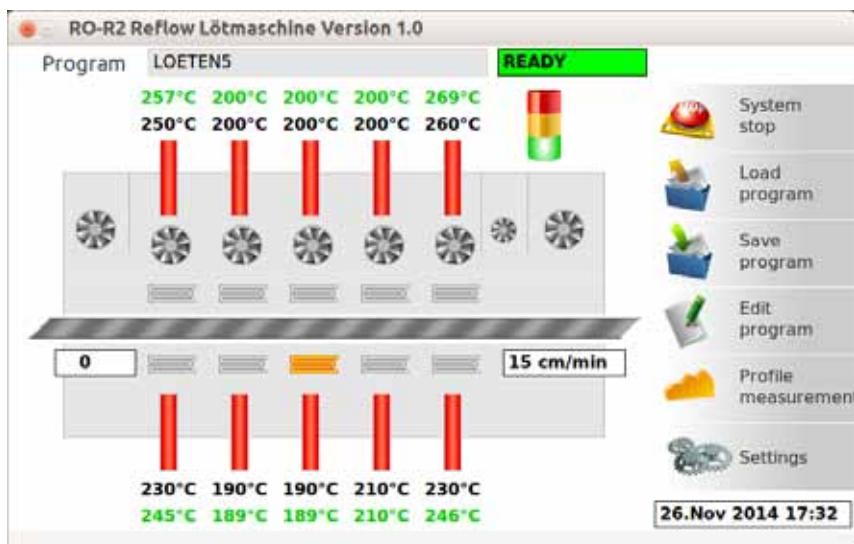
## 6.0 Function and start-up

### Basic structure of screen

#### 551.10 - 4 heating zones



#### 551.15 - 5 heating zones



## 6.0 Function and start-up

### System display

The operating of the soldering system takes place via the touch panel. All relevant informations will be shown on the display.

The screen was separated in different areas to achieve an easy use and a clear design. This basic structure is kept in all menu points.

#### The system screen is separated in the following areas:

- ◆ The system screen which contains information about soldering system's actual status.
- ◆ Display of the selected soldering program
- ◆ Lamp pole for visualisation of operating mode
- ◆ Status message
- ◆ Error message
- ◆ System/Software Start/Stop
- ◆ Menu selection / functions
- ◆ Display of date and time
- ◆ Info line / display of warnings and help texts

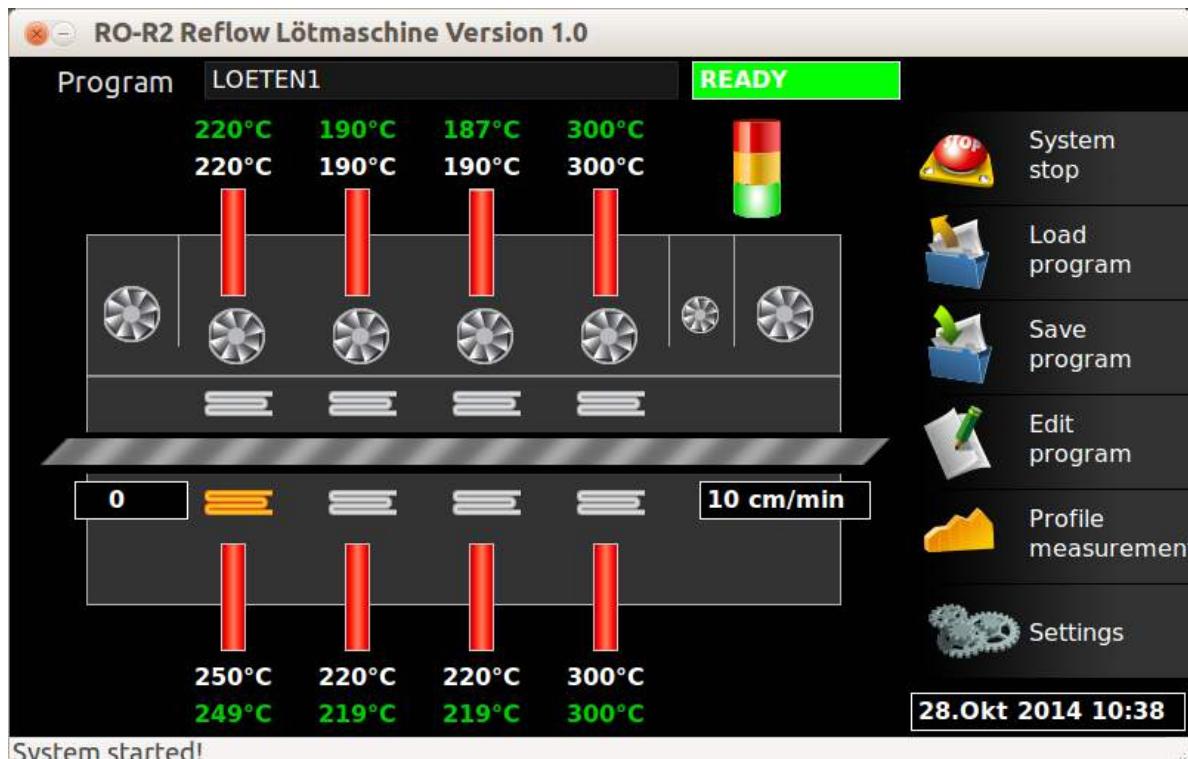
Lamp pole for display of operating modes for soldering systems 551:



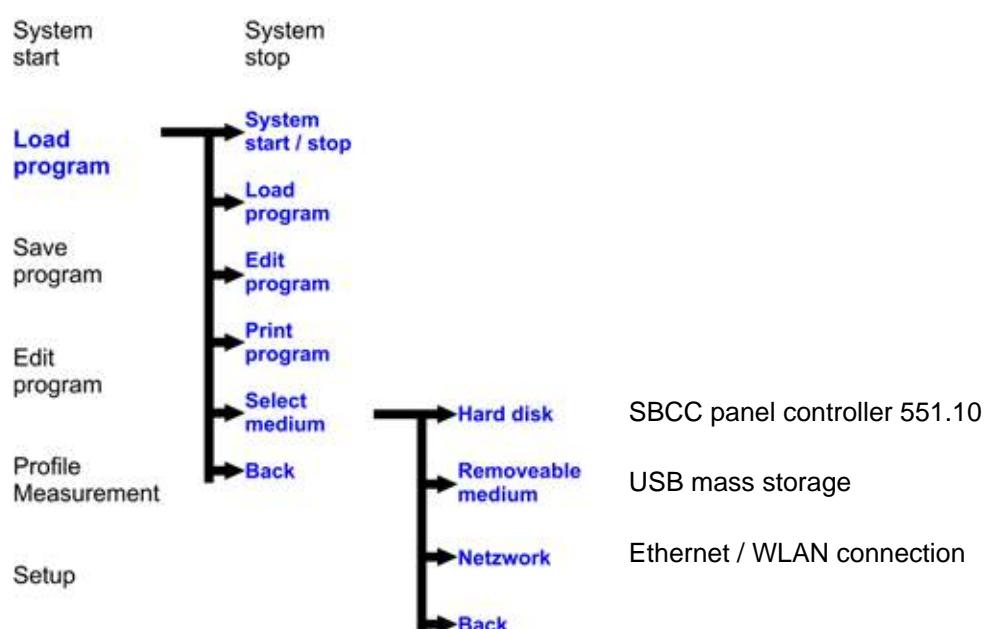
green lighting	green blinking	yellow lighting	yellow blinking	red lighting	red blinking	Operating mode
*						Soldering system ready
	*					Request to place a PCB
		*				Cooling down
			*			Heating up
*			*			Standby
				*		Maschine error
					*	Process error

#### Operating modes of soldering system series 551

## 6.0 Function and start-up



### Menu structure load program



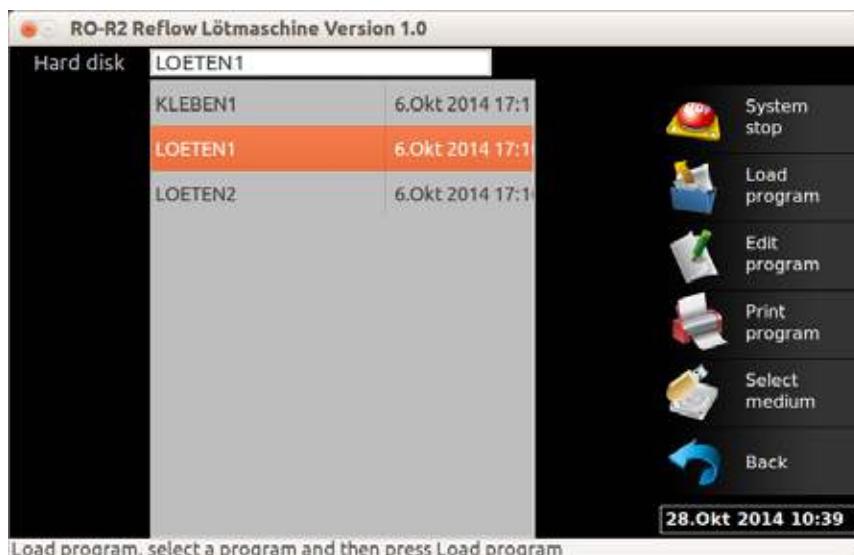
## 6.0 Function and start-up

### Load program

The soldering system will be equipped with two standard soldering- and one curing profile. You can load one of these programs and use it as a basic for your own parameter settings.

- | Tip on the function key **<Load program>** in the system screen.

**<Load Program>**



A file window will open which shows all saved soldering profiles on the hard disk. In case that you want to load soldering profiles from a USB mass storage or network (option):

USB

- | Press function key **<Select medium>** and change to the required drive.
- | Select the required soldering program by marking it. The name will be shown in the top line.
- | Now activate the soldering program by pressing again **<Load program>**. The display will change back to the system screen.
- | By pressing **<Back>** you can quit this menu at any time.

- <Select medium>

-

- <Load program>

- <Back>

2  
1  
1

가

( )

### Select program

### Load program

### Abort

## 6.0 Function and start-up



**Menu structure**  
**Edit program**

System start

System stop

Load program

Save program

**Edit program**

Aktivates input fields for profile parameters in the system screen

Profile measurement

Setup

## 6.0 Function and start-up

### Edit program

There are already two soldering profiles and one curing profile saved on the system which can be used as a basis for your own profile setting. You can load these programs and adapt them to your own requirements or use them immediately for production because they are standard profiles with averaged values.

We recommend to create your own parameter settings because the high amount of different assemblies won't allow an optimal soldering with averaged profiles. Profile creation can be done quick and easy because there are only 9 parameters to set.

- | Tip on the nominal value that you want to change.

In case that the system is password secured:

- | Press on the function key <Edit program> and unlock the system screen by entering your password.  
<Edit program>



The value of the selected nominal value will change to an entry field and a virtual keypad will be displayed.

- | Enter the required value with the keypad and confirm your entry with the return sign.

If you want to abort the entry,

- | Tip on a free area in the system screen. You will abort the entry and the previous value is kept.

### Create soldering or curing profile

2

1 가

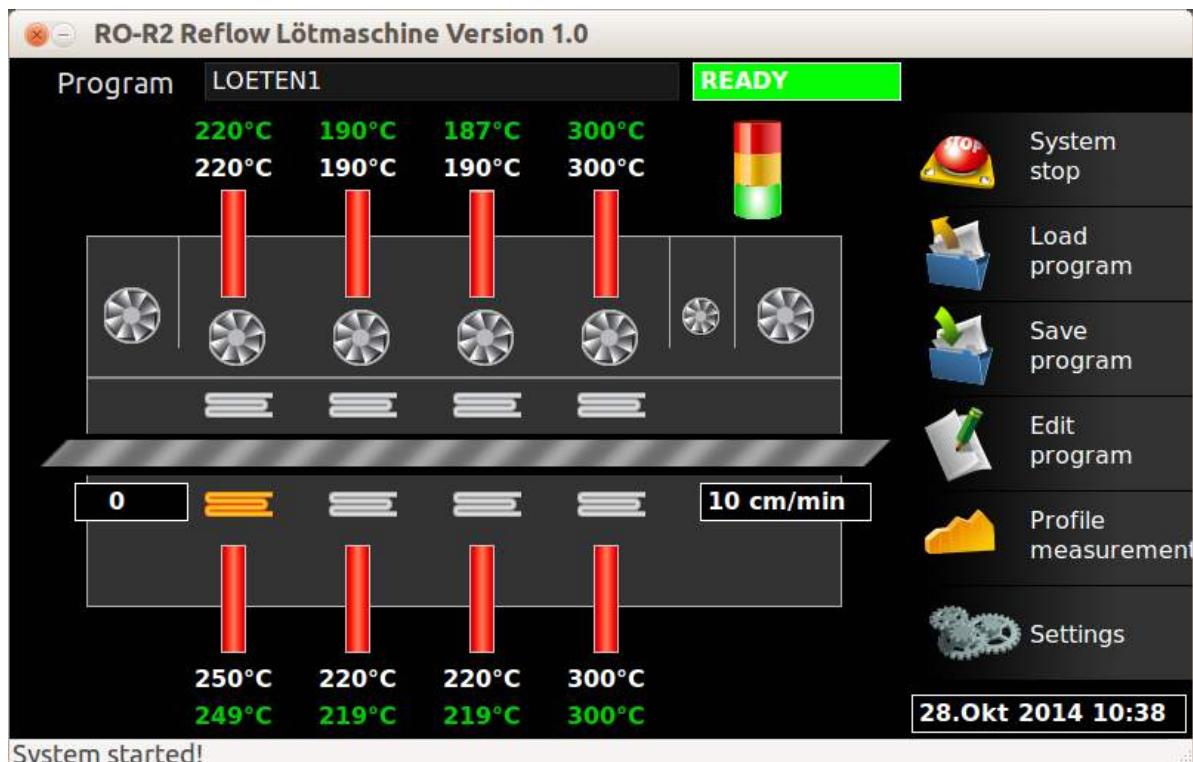
가

9

가

가

## 6.0 Function and start-up



**Menu structure**  
**Save program**

System start

System stop

Load program

Save program  
Edit program  
Profile measurement  
Setup

System start / stop  
Save program  
Delete program  
Print program  
Select medium  
Hard disk  
Removeable medium  
Netzwork  
Back

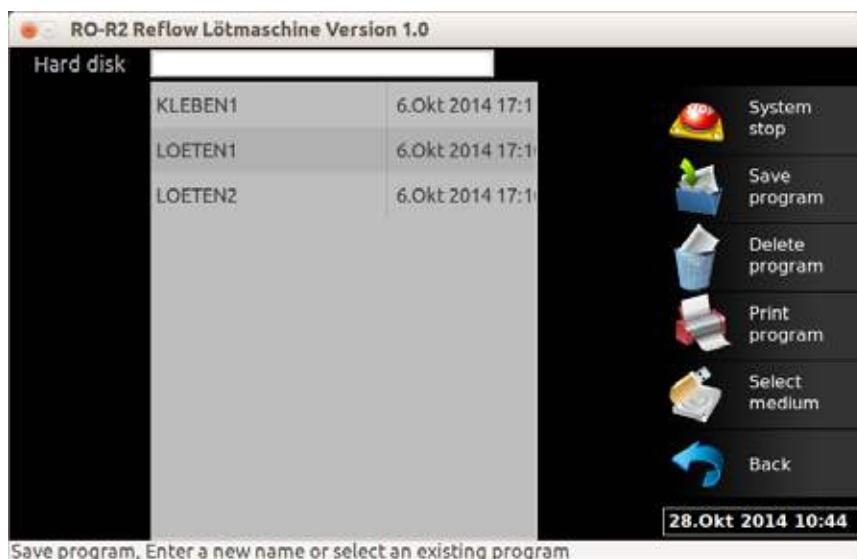
## 6.0 Function and start-up

### Save program

You can save a soldering program on the internal storage, a USB mass storage or optionally via Ethernet/WLAN on an external data storage. Thereby the number of storable programs is nearly unlimited. A soldering program contains the set temperatures of all eight heating areas as well as the conveyor speed. For saving a soldering program

- | In the system screen tip on the function key  
**<Save program>**.

<Save program >



A file window will open which shows all saved soldering profiles on the hard disk. In case that you want to save soldering profiles on a USB mass storage or via network (\* option):

- | Press the function key **<Select medium>** and change to the required drive.

USB

- <select medium>

## 6.0 Function and start-up



- In case that you want to overwrite an existing soldering program, mark it on the touch screen. The file name will be shown in the top line.



- In case that you want to save a new file tip on the top line. The virtual keyboard will be activated.

, 가 가

## 6.0 Function and start-up

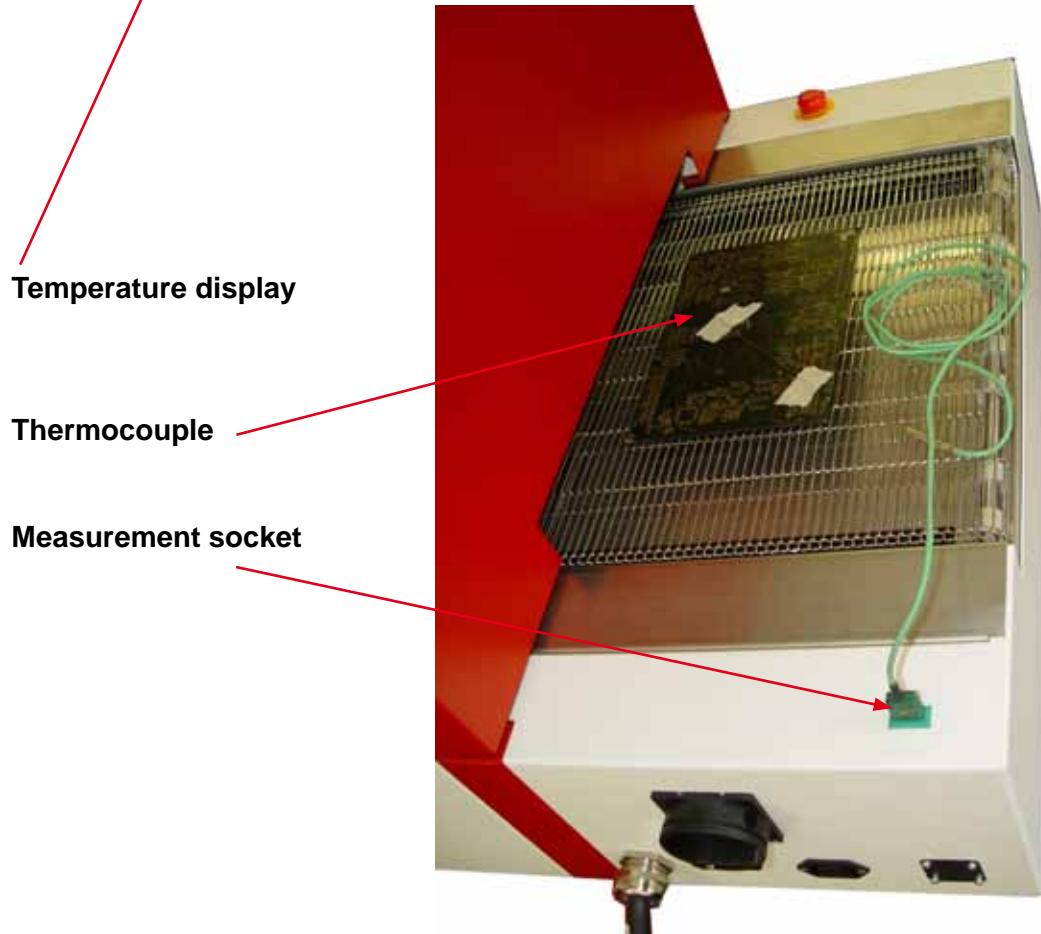
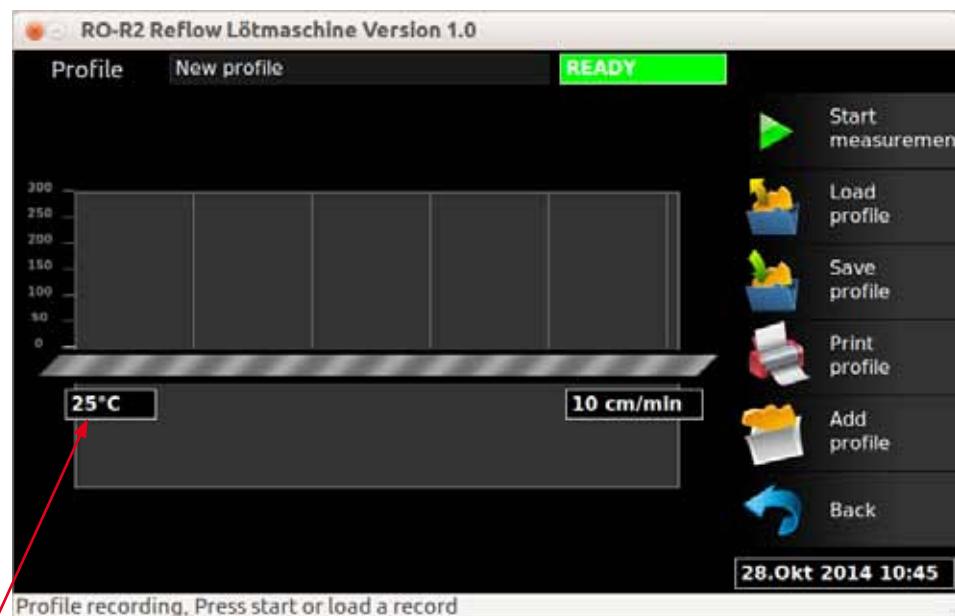


- | Enter the required file name.
- | Finish the entry by tipping again on the function key <**Save program**>. The soldering program will be saved and the display turns back to the system screen automatically.
- | By pressing <**Back**> you can abort this menu at any time.

- <save program>

- <back>

## 6.0 Function and start-up



## 6.0 Function and start-up

### Profile measurement

The oven includes an integrated one-channel temperature profiler to check the adjusted soldering profile on the PCB. The necessary thermocouple is included in the delivery.

Under **<Profile measurement>** the software offers the possibility to record a soldering profile.

<Profile measurement>

- | Place the thermocouple on the required position on your PCB and connect it with the measurement socket at the inlet.

PCB

The measured temperature will be shown in the system screen.

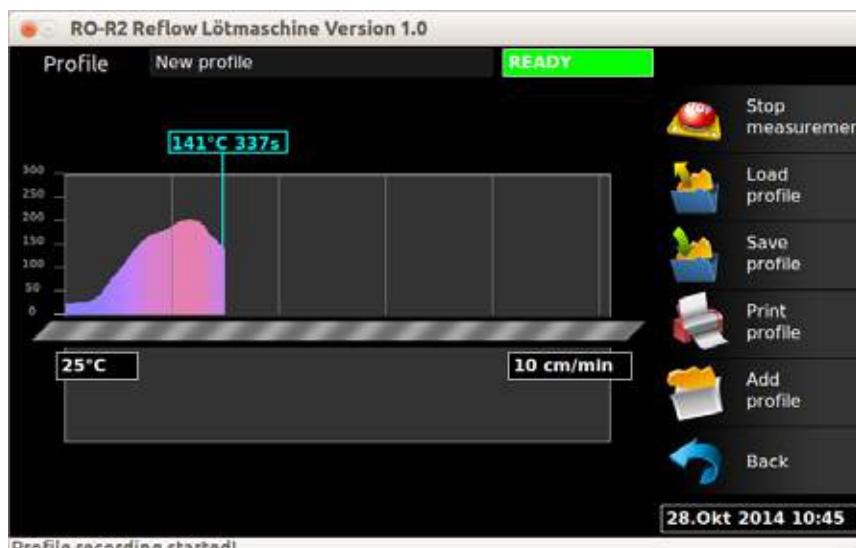
- | Change to the measurement menu by tipping on **<Profile measurement>**.

<Profile measurement>

### Temperature profiler

PCB

1



The oven must be heated up and be in status "Ready" to record a significant profile.

가 "Ready"

- | Start the profile measurement by tipping on the function key **<Start measurement>**.

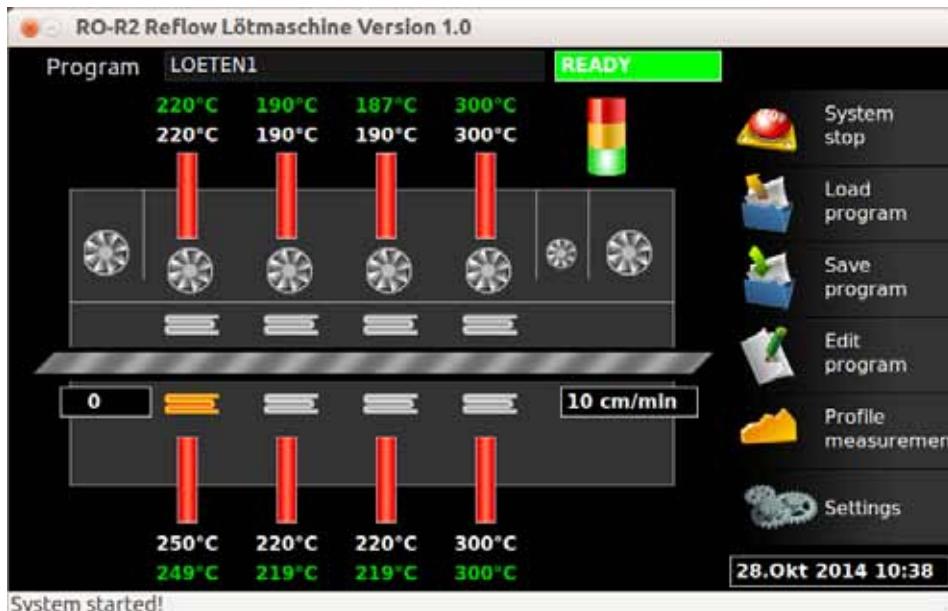
<Start measurement>

The sensor runs through the heating chamber together with the PCB.

The measured temperature will be shown as a graphic on the panel.

PCB

## 6.0 Function and start-up



### Menu structure Profile measurement

System start      System stop

Load program

Save program

Edit program

Profile measurement

Setup

Measurement start / stop

Load profile

Save profile

Print profile

Add profile

Back

Measurement start / stop

Load profile

Print profile

Select medium

Back

Hard disk

Removeable medium

Netzwork

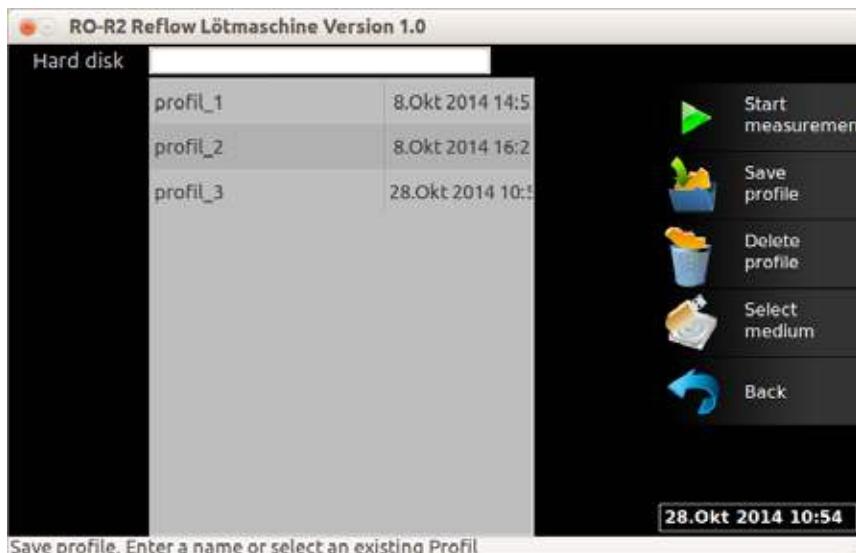
Back

## 6.0 Function and start-up

가

After the sensor has passed the heating chamber and the cooling zone and has reached the outlet, the measurement must be stopped

- | by tipping on the function key **<Stop measurement>**.  
**<Stop measurement>**



The recorded measurement can be printed directly or saved as a graphic as well as a table.

가 가

**<Load profile>** <                >

You can load and view an already saved profile again.

가

**<Save profile>** <                >

allows the storage of measurement data as a graphic and a table under a user defined file name. The procedure is the same as for "Save program".

가

**<Add profile to program>** <                >

allows the storage of measurement data as a graphic and a table.

Thereby a link to a soldering profile will be created in that way that the graphic of the soldering profile is shown on the status screen.

가

**<Back>** <      >

aborts the menu and changes back to system screen..

## 6.0 Function and start-up



### Menu structure Setup

System start      System stop

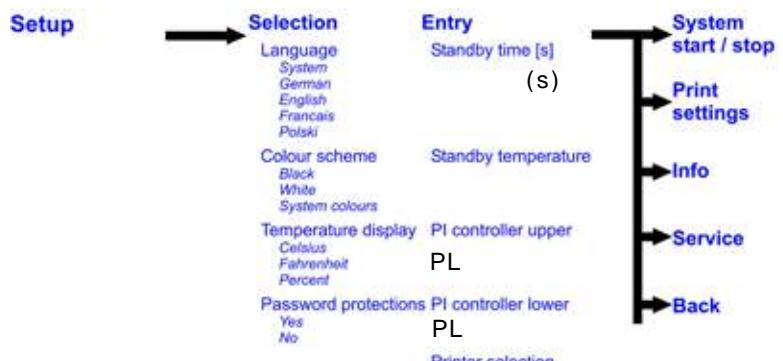
Load program

Save program

Edit program

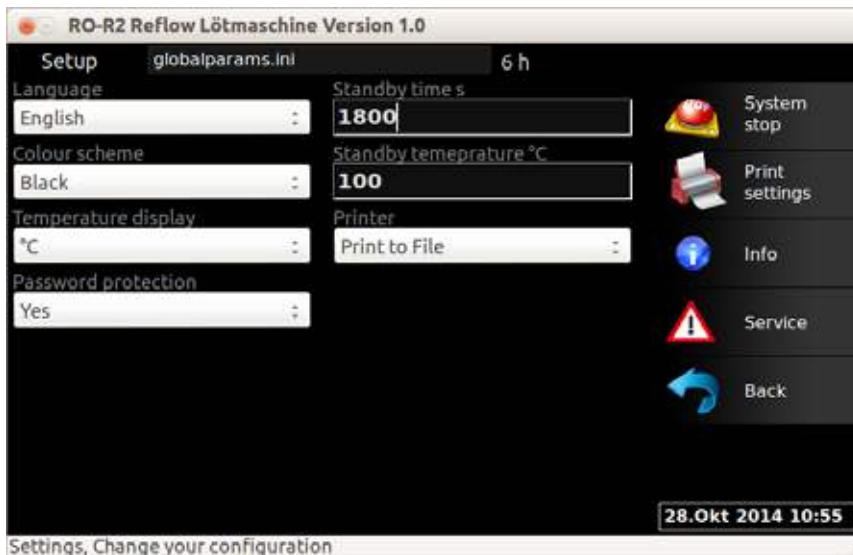
Profile measurement

#### Setup



## 6.0 Function and start-up

### Setup



Here you can enter all specific settings which are not relevant for users in the manufacturing department:

- ◆ Language selection
- ◆ Colour scheme
- ◆ Temperature display °C / F / % / /
- ◆ Password protection
- ◆ Standby time
- ◆ Standby temperature

From this menu you will also attain the service mode

* SMEMA-interface activate/deactivate	- SMEMA	/
* Administration/parametrisation CAN-BUS	- CAN - BUS	/
* Administration/parametrisation LAN	- LAN	/
* Administration/parametrisation WLAN	- WLAN	/
* Administration USB-interface	- USB	
* Printer integration		

You will find further information in chapter 8 system setup.

## 6.0 Function and start-up

## 7.0 Soldering profile management and production

### Table of content

Parameter adjustment .....	7.3
Parameters for temperature profile .....	7.3
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Time above liquidus.....	7.5
Cooling time.....	7.5
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Critical profile parameters	
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Change production .....	7.29
Stop production.....	7.29
Switch system off.....	7.30

## 7.0 Soldering profile management and production

### Reflow soldering profiles

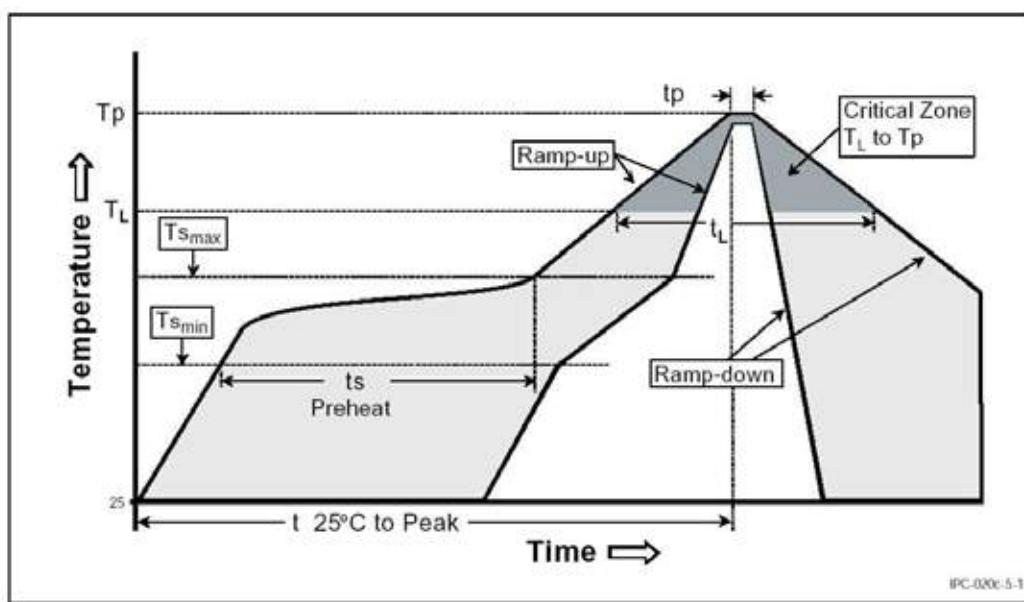
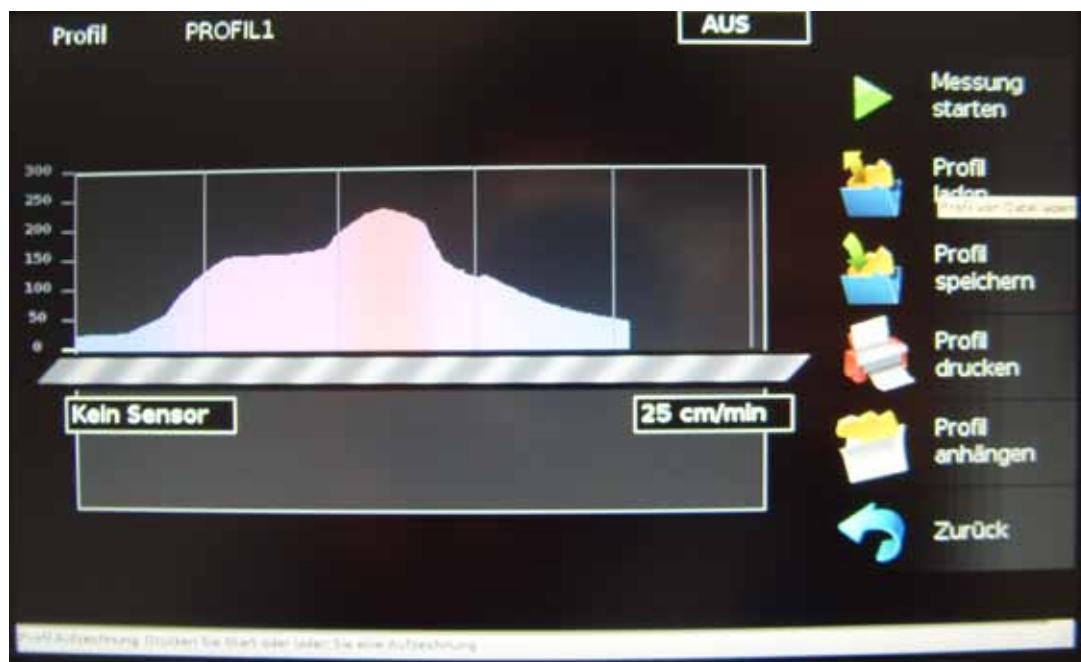


Figure 5-1 Classification Reflow Profile

## 7.0 Soldering profile management and production

### Parameter adjustment

An soldering or curing profile adapted to the assembled PCB is the prerequisite for an optimal soldering result.  
A profile depends on several factors:

- ◆ Temperatures of the single process phases
- ◆ Dwell times
- ◆ Assembly of the PCB

PCB

The manufacturers of the solder pastes provide very detailed information about the temperature-time regime. The component industry mostly gives information about the short-term or long term temperature limits which a component can resist.

In the IPC JEDEC J-STD 020C you will find qualification criteria for electronic components which should be used with soldering processes.

For the quantifying of a soldering profile the following criteria will be examined (see Figure 5-1 - classification reflow profil):

Increase gradient / maximum ramp-up  $dT/dt$   
 Preheating time  $t_s$   
 Peak temperature  $T_p$   
 Time to peak  $t_p$   
 Time above melting temperature (*liquidus*)  $t_L$   
 Decrease gradient / maximum ramp-down  $-dT/dt$

IPC JEDEC J - STD 020C

### Parameters for temperature profile

The following sections give information about the single profile characteristics:

#### Preheating

Contrary to standard IPC/JEDEC J-STD-020C the preheating time often is defined as time between an individual start temperature (e.g. 25°C, start of the process) and the achievement of the melting temperature (*liquidus*) of the solder (e.g. for Sn63Pb is  $T = 183^\circ\text{C}$ ). In standard JEDEC J-STD-020C the preheating time  $t_s$  is given as time from reaching  $T_{s_{\min}}$  and the achievement of  $T_{s_{\max}}$ . This time must be optimised under the observance of the following influences. Resins are the active part of the flux in the solder paste. The melting points are in the range between 70°C and 120°C which means in the range of the preheating temperature. It is reasonable to keep the preheating time short because at higher temperatures the permanent accumulation of oxide on the metal surfaces of the join partners will consume flux con-

#### Preheating time

IPC/JEDEC J - STD - 020C  
 ,  
 (e.g. 25 ° C, start of the  
 process) (e.g. for Sn63Pb  
 is  $T = 183^\circ\text{C}$ )  
 ( )  
 JEDEC J - STD - 020C  
 $T_s$   $T_s$

## 7.0 Soldering profile management and production

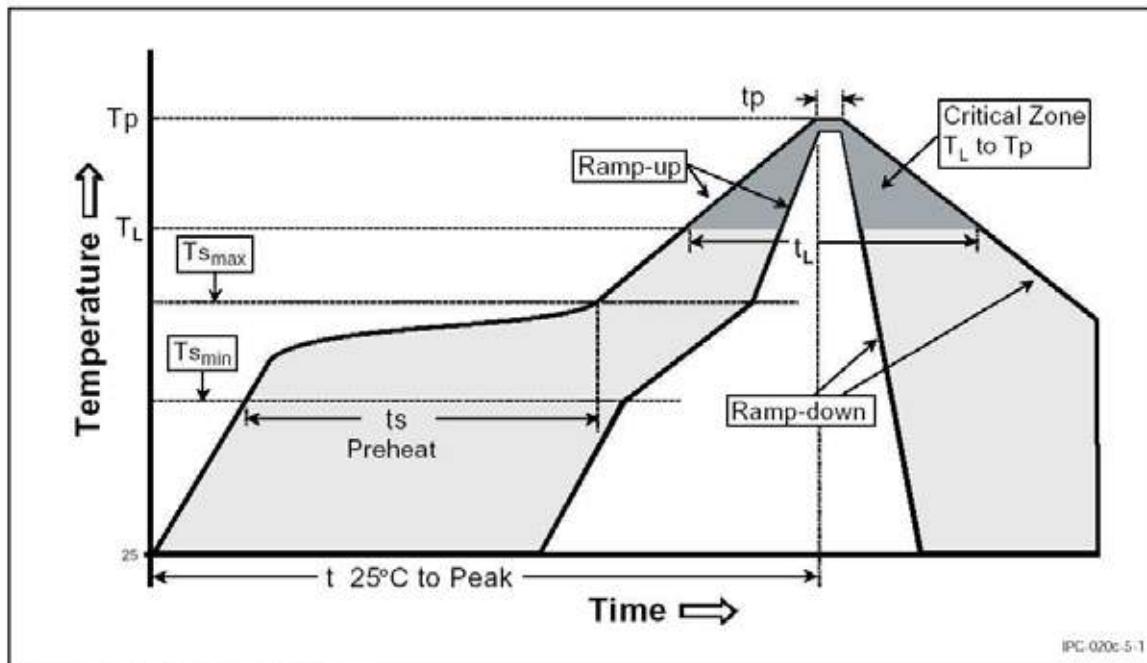


Figure 5-1 Classification Reflow Profile

### Critical profile parameters

Example component thickness < 1,6 mm (small components)

	IPC/JEDEC J-STD-020C	IPC/JEDEC J-STD-020C
<b>Profile Feature</b>	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-Up Rate ( $T_{s\max}$ to $T_p$ )	< 3K/s	< 3K/s
Preheat Temperature Min ( $T_{s\min}$ )	100°C	150°C
Temperature Max ( $T_{s\max}$ )	150°C	200°C
Time ( $t_{s\min}$ to $t_{s\max}$ )	60-120 s	60-180 s
Time maintained above: Temperature ( $T_L$ )	60-150 s	60-150 s
Time ( $t_L$ )	>183°C	>217°C
Peak/Classification Temp ( $T_p$ )	240°C +0 / -5°C	260°C
Time within 5°C of actual Peak Temperature (tp)	10-30 s	20-40 s
Time 25°C to Peak Temperature	< 6 min	< 8 min
Ramp-Down Rate	< 6K/s	< 6K/s

Source: IPC/JEDEC J-STD-020C, July 2004

## 7.0 Soldering profile management and production

( ) PCB  
125 ~250

stantly. Otherwise the flux could be already exhausted before the entry of the PCB in the peak zone (melting zone). However next to the active parts the flux contains also a not small amount of solvents, thixotropy agents and so on, which boiling points are in the range between 125°C and 250°C. These agents are not necessary for the soldering process itself and must be vaporised before the entry in the peak zone. Otherwise they can cause reflow errors like solder balls or voids. Solder balls emerge by the explosively evaporation of solvents in the solder paste and the resulting skidding of paste grains out of the solder paste. Voids are bubbles / blow holes in the solder joint due to vapour locks cause by flux elements which were not displaced out of the solder joint. So it is necessary to observe the requirements of the solder paste for the optimization of the preheating time, which means the preheating should also be not too short. It is also important to observe the max. heating gradients during the preheating phase for all components of the PCB.  $\leq 2,5$  K/s are the generally accepted gradients for the reflow process.

### Time above liquidus

The time above liquidus  $t_L$  above the melting point of the solder. The time above liquidus should be adjusted in that way, that on one hand all solder joints are melted, that there is enough time for the wetting, which means the formation of a seam of intermetallic phases and the liquid solder volume can fill the crack between component and PCB as well as can form the meniscus. On the other hand this time should not be chosen too long, to prevent the accelerated growth of intermetallic phases under the influence of temperature and to limit the leaching. According to experience a time of up to 1 minute is optimal.

### Cooling time

The cooling time is the time between the solidification point of the solder (intersection of the soldering profile with the liquidus line  $T_L$ ) and the achievement of an individual end temperature (e.g. 50°C, end point of the data measurement). The cooling time should be minimised but it is necessary to observe the max. allowed cooling gradient to avoid damages at all components of the assembly. A cooling gradient which is too high can cause microcracks in the package. Aim of a short cooling time is the avoidance of dealloying effects and the undisturbed growth of the intermetallic phase. At the same time a short cooling time will reduce the stay time at

, PCB

2,5 K/s

$t_L$

### Time above liquidus

wetting

PCB

가

### 1 Cooling time

( $T$ )

(eg.50)

가

## 7.0 Soldering profile management and production

### Critical profile parameters

#### Example component thickness 1,6 mm - 2,5 mm (small components)

1.6mm - 2.5mm ( )	IPC/JEDEC J-STD-020C	IPC/JEDEC J-STD-020C
Criteria	Leaded	Lead free
Increase gradient in the preheating zone	< 3K/s	< 3K/s
Temperature in the preheating zone and soaking time	100-150°C 60-120 s	150-200°C 60-180 s
Time above melting temperature of solder	60-150 s >183°C	60-150 s >217°C
max. peak temperature Tolerance Soaking time	235°C 0 ...-5°C 10-30 s	260°C 0 ...-5°C 20-40 s
Time to peak	< 6 min	< 8 min
Decrease gradient in the cooling zone	< 6K/s	< 6K/s

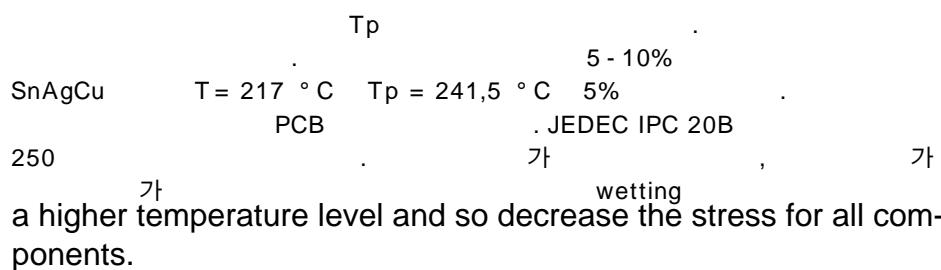
### Critical profile parameters

#### Example component thickness > 2,5 mm (small components)

	IPC/JEDEC J-STD-020C	IPC/JEDEC J-STD-020C
Criteria	Leaded	Lead free
Increase gradient in the preheating zone	< 3K/s	< 3K/s
Temperature in the preheating zone and soaking time	100-150°C 60-120 s	150-200°C 60-180 s
Time above melting temperature of solder	60-150 s >183°C	60-150 s >217°C
max. peak temperature Tolerance Soaking time	220°C 0 ...-5°C 10-30 s	250°C 0 ...-5°C 20-40 s
Time to peak	< 6 min	< 8 min
Decrease gradient in the cooling zone	< 6K/s	< 6K/s

Source: IPC/JEDEC J-STD-020C, July 2004

## 7.0 Soldering profile management and production



### Maximum temperature

The maximum temperature  $T_p$  of a reflow profile is also called peak temperature. Higher temperatures decrease the surface tension of the liquid solder and enhance the flow behaviour. Experiences in the praxis have shown, that an overheating of 5-10% above the melting point is advantageously. For SnAgCu with  $T = 217 \text{ }^{\circ}\text{C}$  and an overheating of 5% a  $T_p = 241,5 \text{ }^{\circ}\text{C}$  is advisable.

The limitative factors for the max. temperature are the max. allowed stress temperatures and times for the components and the PCB. The JEDEC IPC 20B [5] recommends a max. temperature of  $250 \text{ }^{\circ}\text{C}$  (10 - 30s) for the lead free process, for which the components should be qualified. To decrease the potential for possible damages, lower temperature levels are advantageously. Nevertheless it is necessary to secure that the solder paste was completely remelted and a good wetting of the join partners was achieved. For this always the temperature at the "coldest" solder joint must be observed.

### Heating-up and cooling down gradient

The temperature gradients  $dT/dt$  should be small in each phase of the soldering profile (especially for the preheating), e.g.  $dT/dt < 3 \text{ K/s}$ . On one hand the thermal stress for the complete assembly (components and PCB) will be limited by this way, and on the other hand errors, caused by steep gradients will be avoided.

These errors are:

Solder balling - caused by the explosively evaporation of solvents in the solder paste and the resulting skidding of paste grains out of the solder paste.

Tombstoning - because of different melting times of the both solder depots at two pole components, the wetting force of the already liquid solder causes an erecting of the component.

Wicking effect - because of a too quick heat input in the component contact, the solder of the joint will be pulled away from the solder pad and flows upwards to the component contact.

Popcorn effect - because of a too quick heat input in the component it is possible that enclosed humidity (caused by improper

### Peaktemperature

"가"    가

    가/

    가

    dT/dt

    가

    .(    )

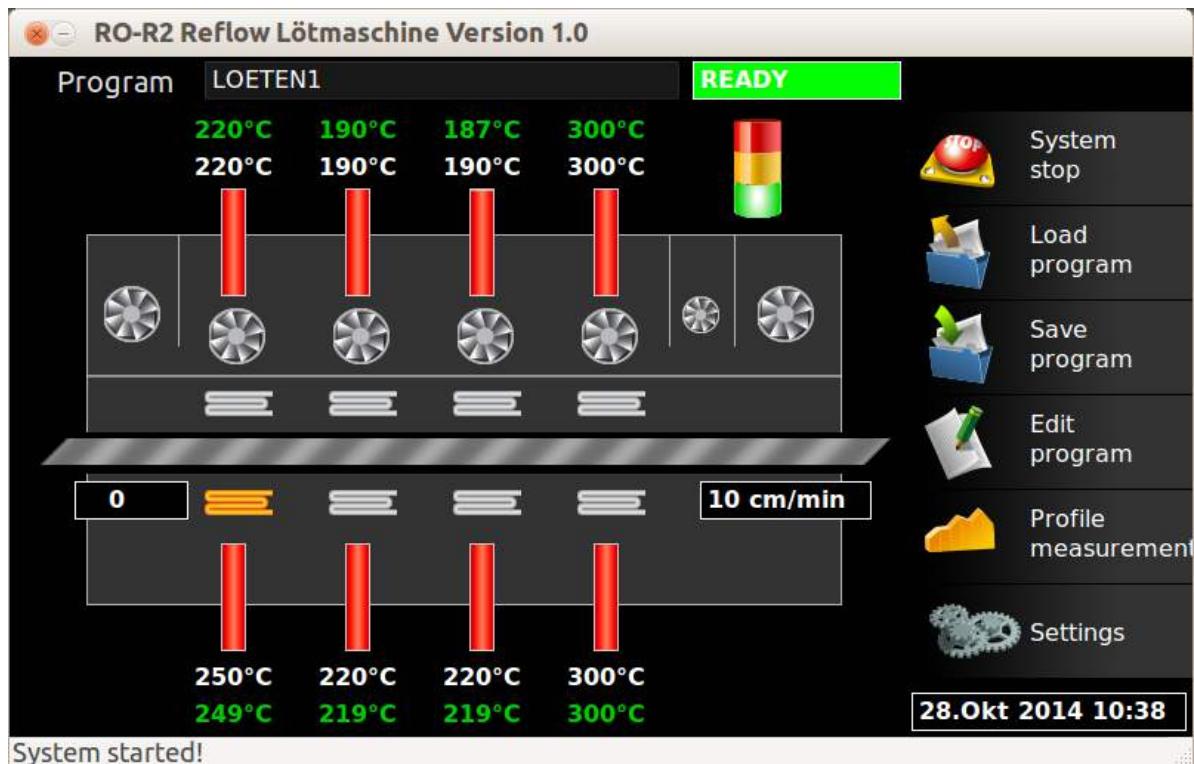
    .dT/dt < 3K/s.

PCB    ,    가

### Ramp-up / Ramp-down gradient

1. -
  2. -
  3. -
  4. -
- ,    가
- ,    가
- ,    가
- ,    가

## 7.0 Soldering profile management and production



## 7.0 Soldering profile management and production

storage) will blast the plastic case.

Too low heating-up gradients are also not advisable, because they will cause an elongation of the assembly's dwell time in the reflow process. By this way the manufacturing cycle times will be elongated as well as the long-term stress situation of the assembly. During the cooling down the temperature gradient should be limited, too, even if a quicker cooling is less critical regarding possible process errors. The JEDEC IPC 20B requires a minimal gradient of  $-6\text{K/s}$  for components.

For the reflow soldering of electronic assemblies temperature gradients of  $\pm 2,5\text{K/s}$  are generally accepted.

As a basis for your own profile creation several soldering and curing profiles are stored on the system. You can load the profiles and change them according to your requirements or you can start the production immediately because the profiles are average profiles.

Because of the low number of parameters which must be adjusted, a quick changing of the soldering profile according to your requirements is possible. With only 9 parameters you can optimise the soldering profile which contain the nominal temperatures for the eight heating areas and the conveyor speed.

You can load one of the saved programs and use it as a basis for the creation of a new program.

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가	가	가
가	,JEDEC IPC20B	
$-6\text{K/s}$	$+/ - 2,5\text{K/s}$	

가

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## 7.0 Soldering profile management and production

### Load program



- | Tip on the function key **<Load program>** in the system screen.

< Load Program >



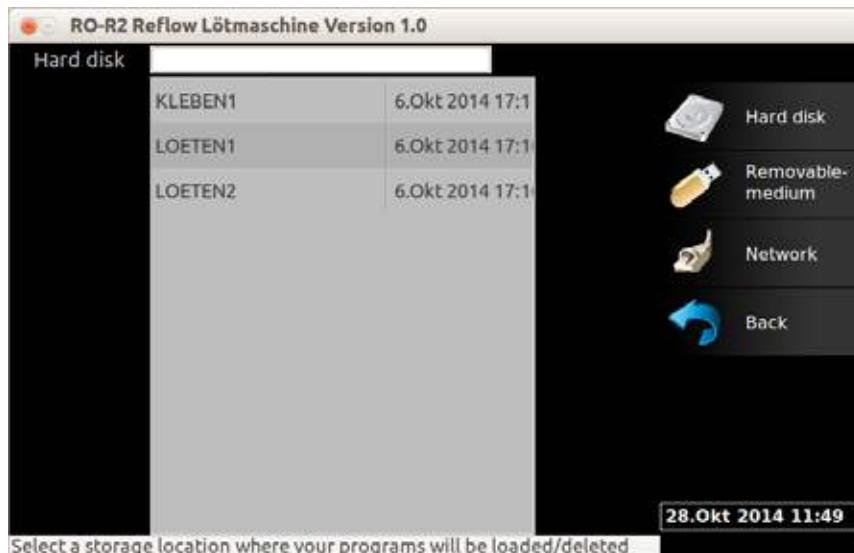
A file window opens showing all solder programs stored on the hard disk. In case that you want to load solder programs from a USB mass storage or network (option):

- | Press function key **<Select medium>**.

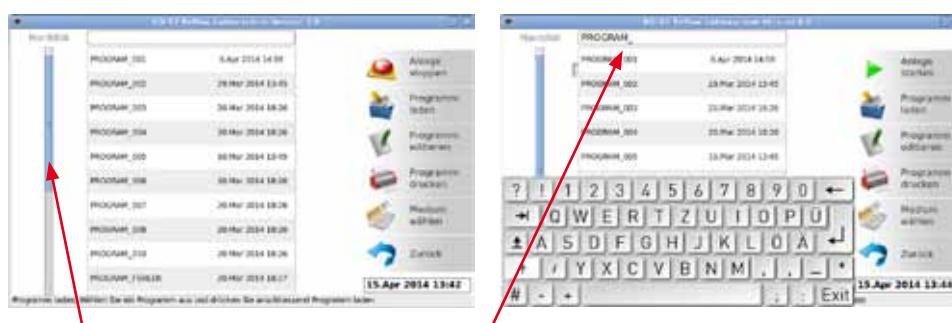
USB  
- <select medium>

( )

## 7.0 Soldering profile management and production



- | Change to the required drive and select the required solder program by marking it on the touch screen. The file name will be shown in the top line.



Scroll bar

automatic search function

- | In case that the directory contains more solder programs as can be shown in the window you can use the scroll bar on the left side or you can activate the automatic search function by entering the initial letters in the top edit line.
- | Now activate the selected solder program by pressing again the function key <Load program>. The display changes to system screen automatically.
- | By pressing <Back> you can abort this menu at any time.

<back>

가

### Select program

가

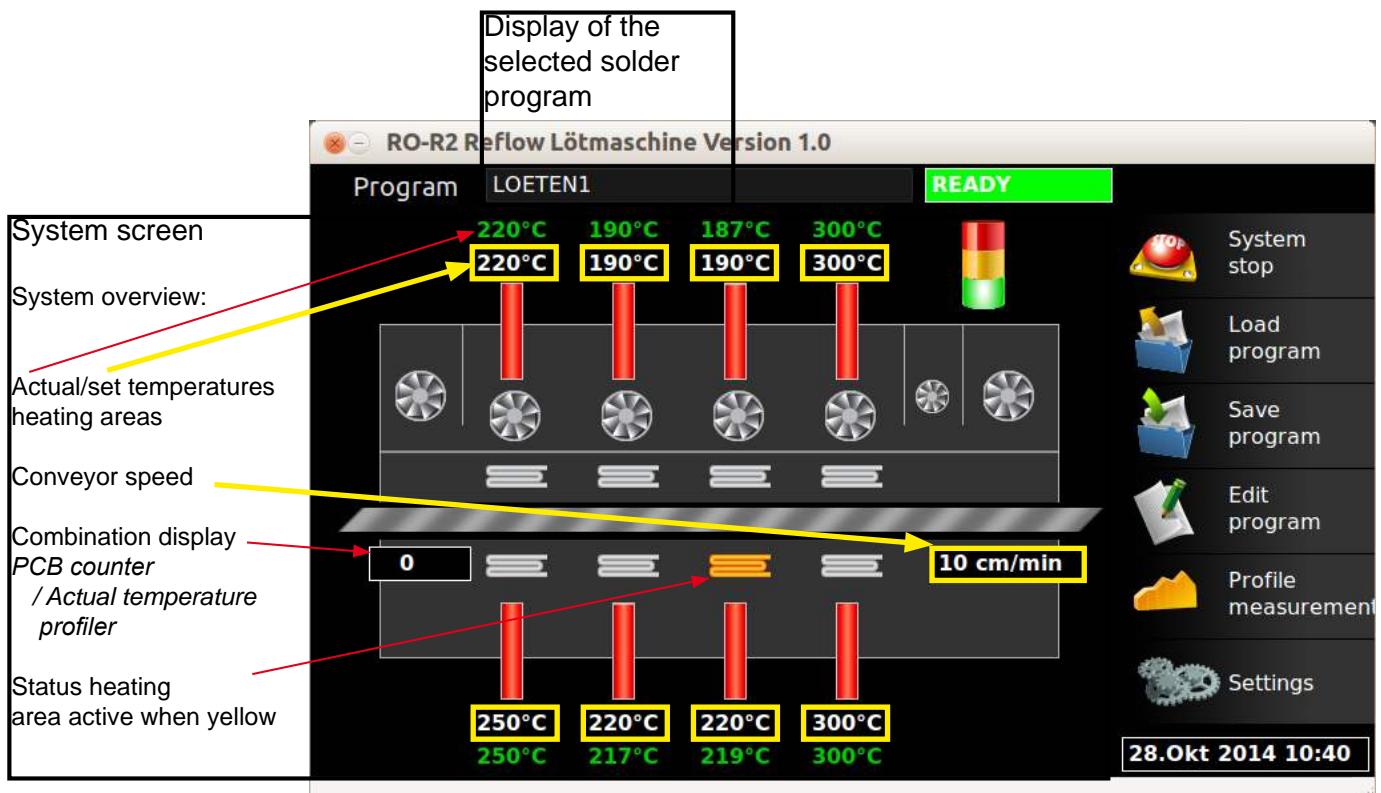
### Load program

가

<Load program>

### Abort

## 7.0 Soldering profile management and production



## 7.0 Soldering profile management and production

### Edit program

You can use the loaded program as a basis to create your own program. The setting of the nominal values takes place by direct selection and entry in the system screen.

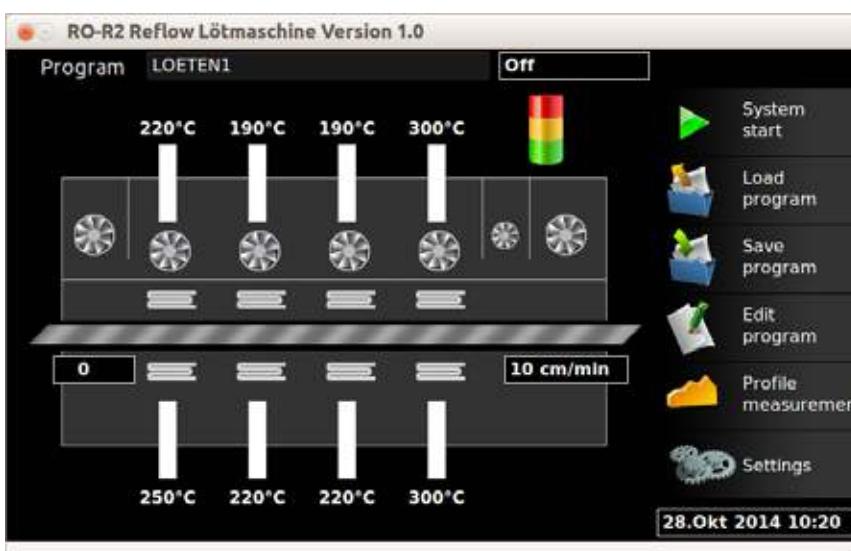
We recommend to divide the different assemblies in three categories each for lead-free and leaded soldering and curing:

- Category 1:** slight assembled PCBs (small components)
- Category 2:** medium assembled PCBs (mix of small and big components)
- Category 3:** dense assembled PCBs (many big components, few small components or multilayer boards)

PCBs of category 2 can usually be soldered or cured with the already stored programs supplied by SEF. For category 1 you will probably need a profile with less heat input. The temperatures of the different zones can be set lower. For category 3 you will need higher temperatures because the big components will need more heat energy.

It takes only a short time to adjust a profile because there are only a few parameters to set.

- I In the system screen tip on the nominal value of the temperature that you want to adjust.



### Create soldering or curing profile

가

3

1 :	PCB
( )	
2:	PCB
( )	
3:	PCB
( , )	

### Adjust nominal temperature

2 PCB  
SEF 가

1

가

3

가

## 7.0 Soldering profile management and production

In case the system is password protected.

- | Press the function key <Edit program> and unlock the system screen by entering the password.  
<Edit program>



When tipping on the selected nominal value its display will change to an input field and a virtual keypad will be shown on the touch panel.

- | Enter the required nominal value via the keypad and confirm it with the return sign.
- | If you want to abort the entry,
  - | Tip on a free area in the system screen. The entry will be aborted and the old value will be kept.
  - | If necessary enter new values for all eight nominal temperatures, one after another.

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## 7.0 Soldering profile management and production

If required you can adjust the conveyor speed. When changing the parameter "conveyor speed" you will also change the process time, defined as soaking time in the heating chamber. This causes also a change of the profile parameters preheating time, time above liquidus and cooling time.

A slower conveyor speed will extend the process time.

### Adjust conveyor speed

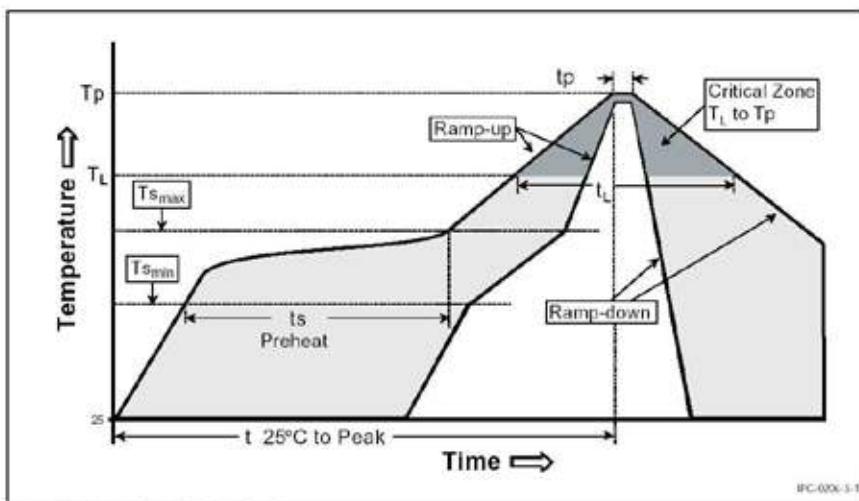


Figure 5-1 Classification Reflow Profile

The process time can be calculated by the following formula:

$$\text{Process time} = \frac{140 \text{ cm}}{\text{Speed}}$$

In the following table you will find the process times for different conveyor speeds.

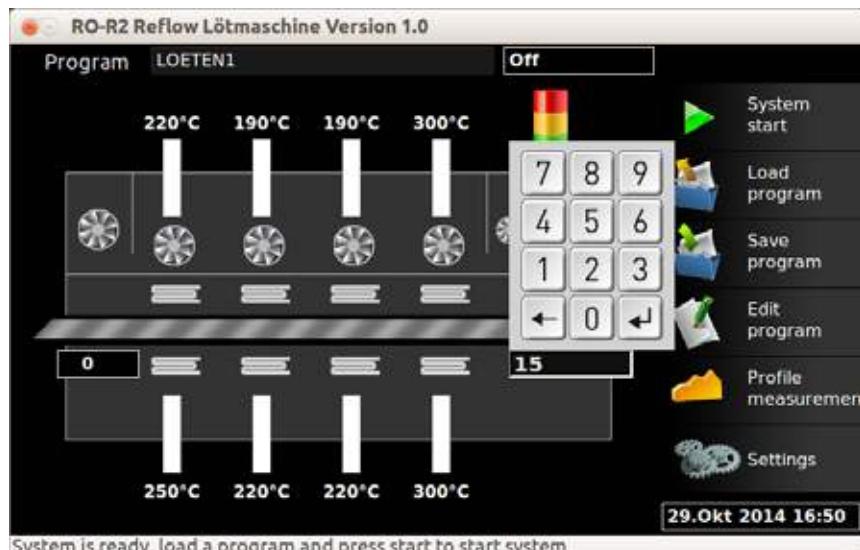
Process time:	Conveyor speed:
approx. 1:33 min	90 cm/min
approx. 2:20 min	60 cm/min
approx. 2:48 min	50 cm/min
approx. 3:30 min	40 cm/min
approx. 4:40 min	30 cm/min
approx. 7:00 min	20 cm/min
approx. 9:20 min	15 cm/min
approx. 14:00 min	10 cm/min

## 7.0 Soldering profile management and production

, 가 가

- | If you want to change the conveyor speed, tip on the nominal value shown in the system screen.

The display of the nominal conveyor speed will change to an input field and a virtual keypad will be shown on the touch panel 



- | Enter the required value via the keypad and confirm it with the return sign.

If you want to abort the entry,

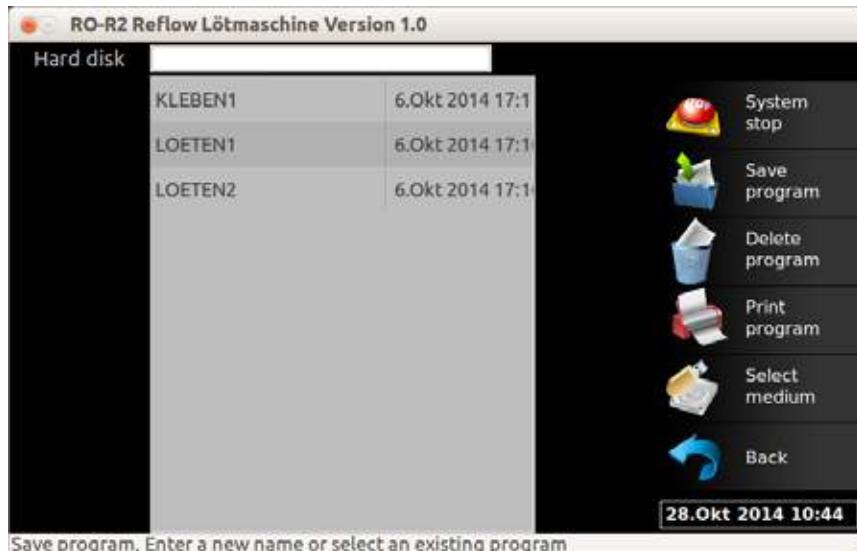
- | Tip on a free area in the system screen. The entry will be aborted and the old value will be kept.

## 7.0 Soldering profile management and production

### Save program

After setting all required parameters you can save the new soldering program on the internal storage. If requested you can also save the program on a USB mass storage or optionally via Ethernet/WLAN on an external data storage. Thereby the number of storable files is nearly unlimited. The soldering program contains the nominal temperatures of all heating zones as well as the conveyor speed. For saving the soldering program:

- | Tip on the function key **<Save program>** in the system screen.  
**<Save Programm>**



A file window opens which shows all already saved soldering programs on the hard disk.

If you want to save soldering programs on a USB mass storage or external via network (option):

- | Press function key **<Select medium>** and change to the required drive.

USB

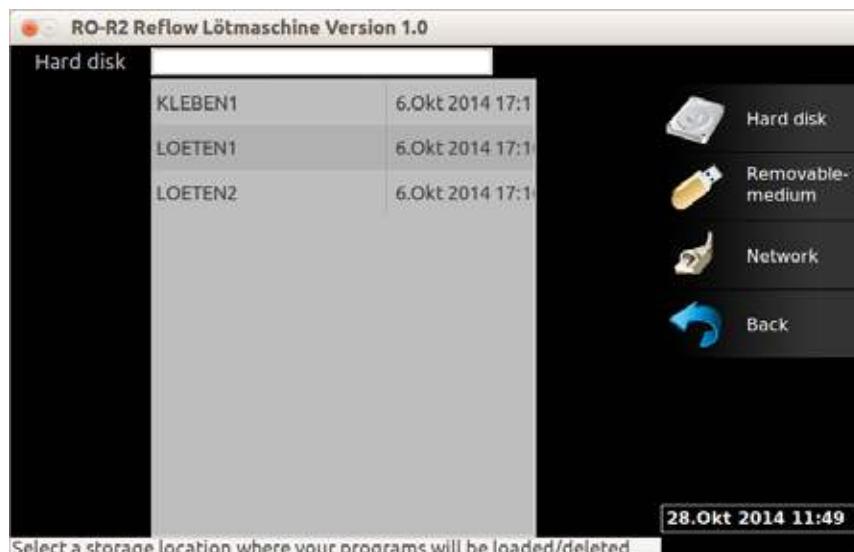
- <Select medium>

( )

### Save program

가  
USB  
/WLAN  
가  
가

## 7.0 Soldering profile management and production



### Overwrite program

- If you want to overwrite a soldering program mark in on the touch screen. The file name will be shown in the top line.



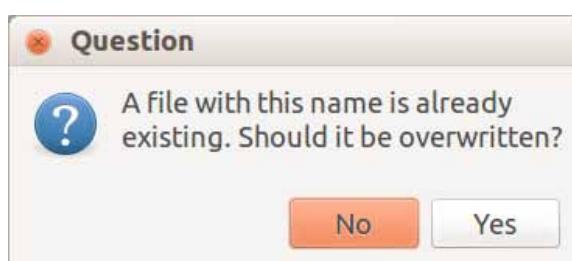
- If you want to save a new file tip on the top line. This will activate the virtual keyboard.

가 가

## 7.0 Soldering profile management and production



- | Enter the required file name.
- | Finish the entry by pressing again the function key <Save program>. The soldering program will be saved and the display changes back to the system screen automatically.



- | If the file name does already exist and you want to overwrite it you have to confirm the following security query with <Yes>. When tipping on <No> you can enter a new file name.
- | By pressing <Back> you can abort this menu at any time.

### Save program

- <save program>

\*

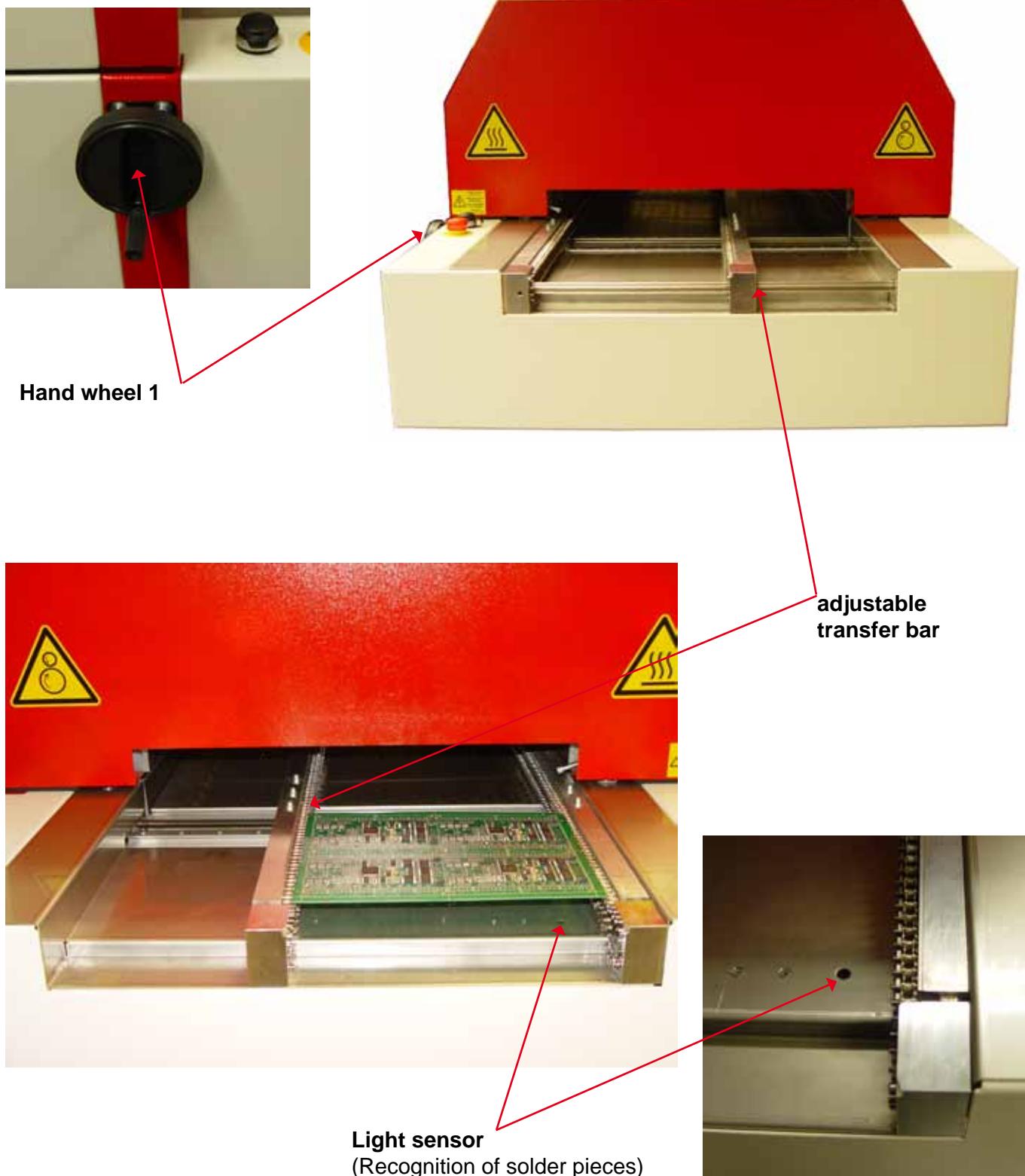
?

YES

No

- <back>

## 7.0 Soldering profile management and production



## 7.0 Soldering profile management and production

### \* Option pin chain conveyor for 551.10/.15

If the transport system of your soldering system is equipped with a pin chain conveyor, the adjustable rear transfer bar must be set to the required working width with the hand wheel (1) before starting the production.

The front transfer bar is fixed and can't be moved.

In systems with pin chain conveyor the light sensor for the recognition of solder pieces is not mounted in the middle of the inlet but approx. 30 mm left of the fixed transfer bar.

- | Adjust the required working width with the help of the hand wheel.  
Turn the wheel clockwise to decrease the working width or counterclockwise to increase the working width.

#### Adjust working width of pin chain conveyor

#### NOTICE

- | Before adjusting the working width make sure that there are no more PCBs inside the soldering system.  
For parking position move the adjustable transfer bar to the very back position.

## 7.0 Soldering profile management and production

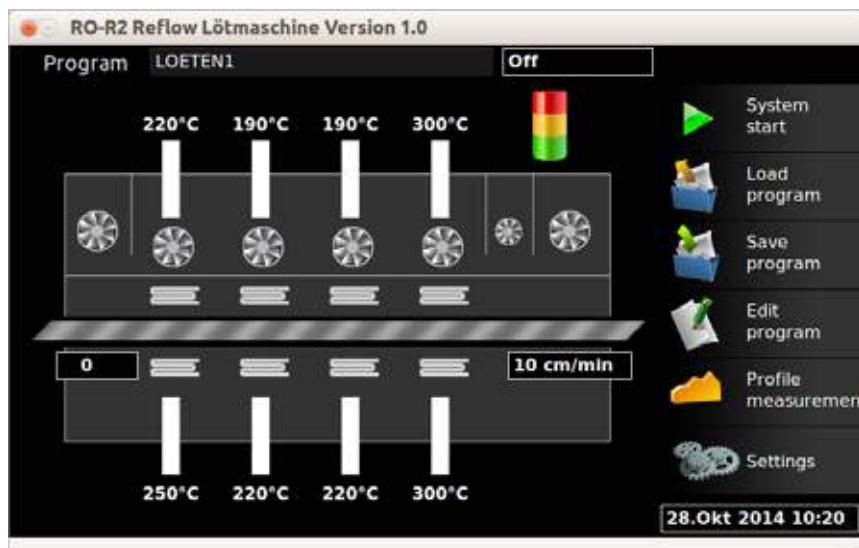
### Start production

After adjusting a suitable soldering or curing profile you can prepare the production.

The following requirements must be fulfilled to start the production:

- ◆ a suitable soldering or curing profile is loaded,
- ◆ The working width of the pin chain conveyor is adjusted (option)
- ◆ the system has heated up,
- ◆ the ready status is shown on the display.

| Turn on the soldering system with the main switch. After turning on the system will load the last used soldering program automatically. If you don't want to use this program then load another stored program.



### Start system

| Press the key <Start system>. <start system>

### Heat-up phase

Starting the system will turn on the heating, the motor for the conveyor and the PCB detection by light reflex scanner at the inlet. The operating status will change to HEATING and will be shown in the status message on the system screen.

The system screen shows additionally a signal light which lights yellow during the heat-up phase.

PCB      가      가

가

가

## 7.0 Soldering profile management and production



The soldering system will need approx. 15 - 20 min heat-up phase to heat-up the oven from room temperature to operating temperature for the soldering process and to reach ready state.

This time depends on the loaded soldering or curing profile.



You should place no PCBs on the conveyor during heat-up phase because if the PCB is recognized by the light reflex scanner the conveyor will stop until ready state is reached. This will cause an uneven warming of the mesh belt and may result in no smooth running.



PCB  
PCB

가

## 7.0 Soldering profile management and production

### Start production

#### Fill the oven

When reaching all of the operating temperatures given in the soldering profile the operating status of the soldering system will change from HEATING to READY. This will be shown in the status message on the panel and the signal light will change to green. Now you can start the soldering or curing process:

- | Place your PCB at the inlet of the oven approx. centered on the mesh belt.

PCB



#### CAUTION

#### Risk of burns due to operating temperatures

There are temperatures up to 500°C in the heating chamber:  
500

Wear heat resistant gloves for any work at or with the soldering system.



#### Start soldering or curing process

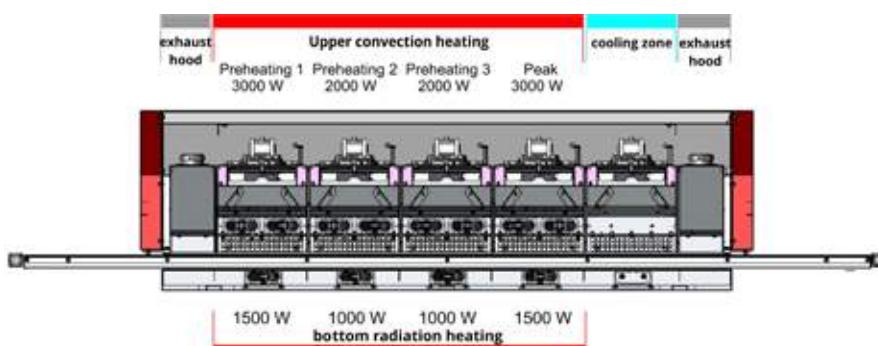
- | The conveyor now transfers the PCBs through the four heating zones of the oven. While passing through the heating zones the soldering process will run automatically with the soldering profile of the loaded program.

PCB

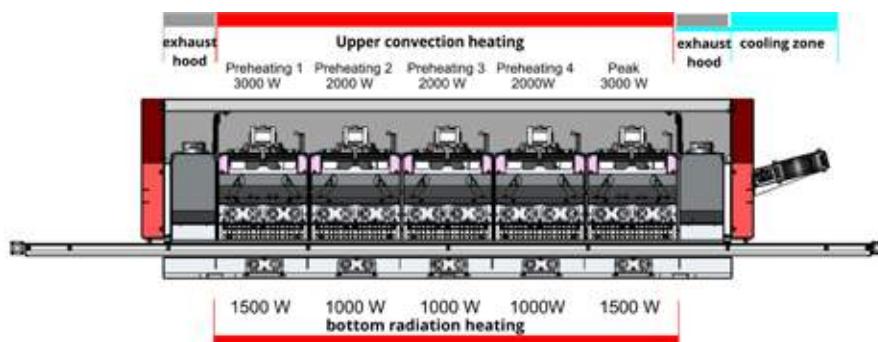
4

## 7.0 Soldering profile management and production

When reaching the last zone in the oven the cooling down process will start. Two blowers integrated in the cooling zone will cool down the PCB. After leaving the heating chamber the soldering process in this version 551.10 is almost complete.



When running the 551.15 cooling phase begins when reaching the short exhaust zone. The essential part of the cooling phase starts instead after leaving the heating chamber. By the three fans in the fan module solder is cooled sufficiently in the outlet area the soldering oven.



### CAUTION

#### Risk of burns due to high temperature

Directly after exiting the heating chamber the PCBs, depending on the size, placement and configuration of the oven may still have temperatures of far more than 100 °C.

- Wear heat resistant gloves while working at or with the soldering system.

After a short cooling at ambient air can you pick up your PCB from the mesh belt. - The process is now complete.

PCB

### Cooling down phase 551.10

2

PCB

, 551.10

### Cooling down phase 551.15

551.15

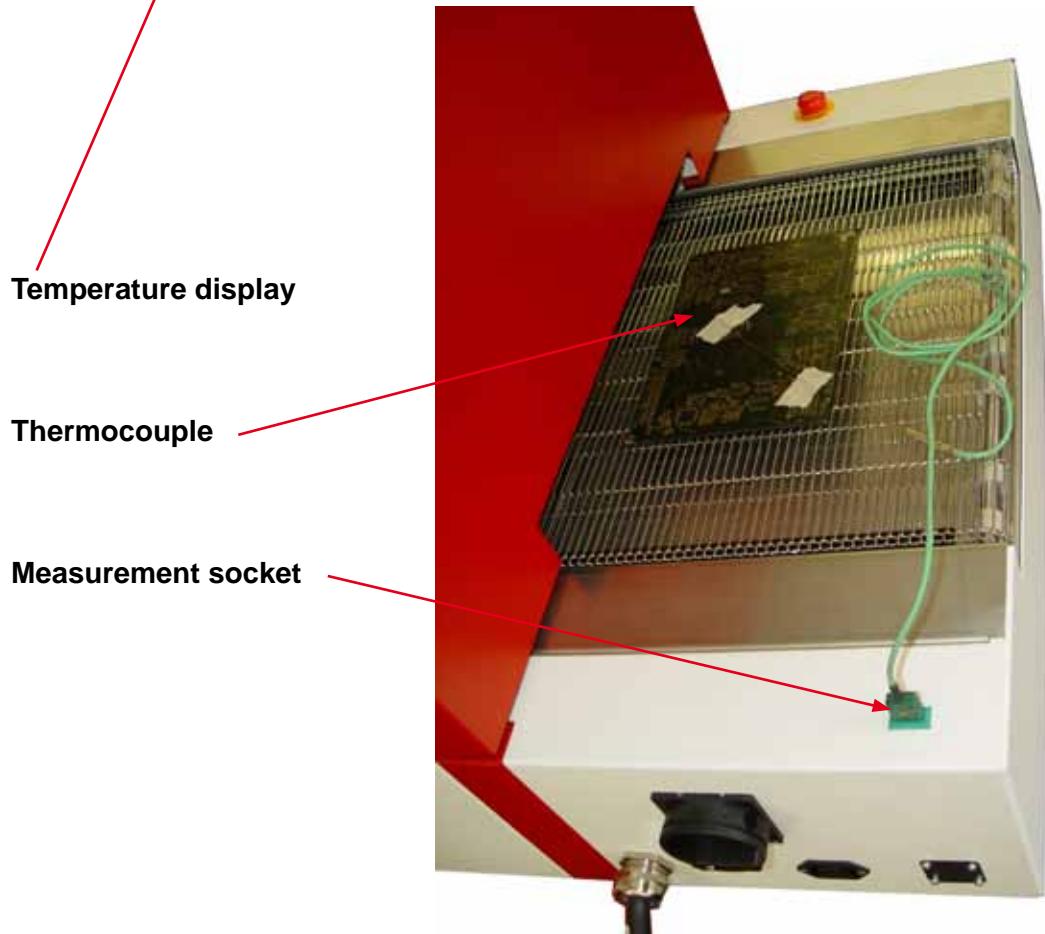
3

PCB가

100

### Finish process

## 7.0 Soldering profile management and production



## 7.0 Soldering profile management and production

### Profile measurement

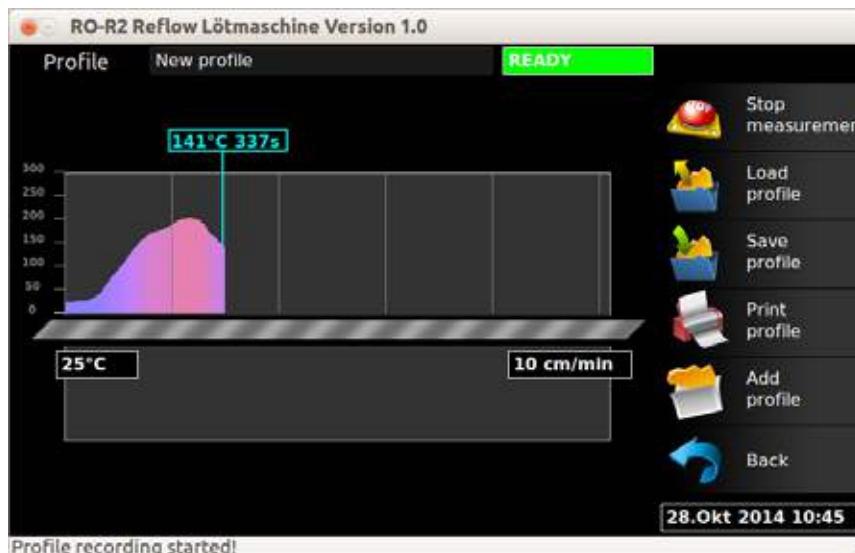
For monitoring the programmed soldering profile a 1-channel temperature profiler is integrated in the oven. The necessary thermocouple is part of the delivery.

With the help of this sensor the software offers the possibility to record the temperature profile of the selected soldering program under **<Profile measurement>**.

- | Place the thermocouple on the required position on the PCB and connect it with the measurement socket at the inlet.

The measured temperature will be shown in the system screen.

- | Change to the measurement menu by pressing the function key **<Profile measurement>**.



The oven must be heated up and in READY state to receive a significant profile measurement.

- | Start the profile measurement by tapping on **<Start measurement>**.

The thermocouple moves with the sample through the heating chamber. The current temperature is displayed on the panel. The measured during temperature is represented as a graph on the panel.

### Temperature profiler

1

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<Profile meas

urement>

- PCB

- <Profile measurement>

- <Start measurement>

### Start measurement

## 7.0 Soldering profile management and production

, <Stop measurement>

### Stop measurement

After the thermocouple has passed the heating zones, the cooling zone and has reached the outlet the measurement must stopped by pressing the function key < Stop measurement>.



< >

The measured temperature profile can be printed directly or saved as a graphic as well as a table.

#### <Load profile>

An already saved profile can be loaded and viewed again.

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#### <Save profile>

allows the storage of measurement data as a graphic or a table under a user defined file name.

Proceeding is the same as „Save program“.

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#### <Add profile to program>

allows the storage of measurement data as a graphic and a table. Thereby a link to a soldering profile will be created in that way that the graphic of the soldering profile is shown on the status screen.

< >

#### <Back>

aborts the menu and changes back to system screen.

## 7.0 Soldering profile management and production

### Stop or change production

PCB 가  
PCB 가

After you have soldered or cured the PCBs with your program you can load a new program and go on with the production of different PCBs.

- | If you have loaded a new program, wait as long as the system was adjusted to the new parameters.  
As soon as the system has reached "Ready" status und the green signal light is on you can go on with the production.

For stopping the production please observe the following instructions:

- | Finish your last process regularly and take the PCBs from the mesh belt.
- | Stop the production by pressing the function key **<Stop system>**.



By stopping the system the heating will be switched off. The fans and the conveyor are still running to avoid a heat accumulation and an unequal warming of the drive. The operating status is changing from READY to COOLING and is shown in the status message of the system screen.

Additionally the signal light is changing from green to yellow.

### Change production

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가

### Stop production

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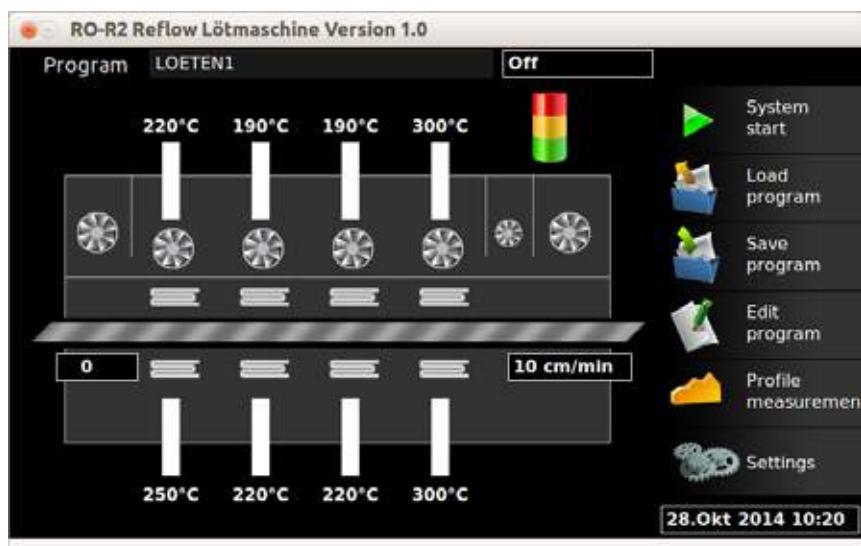
## 7.0 Soldering profile management and production

가



Never disconnect the soldering system from the mains supply during the cooling phase. This will stop the fans, the mesh belt and if applicable the exhaust box. this can result in the emission of harmful solder or adhesive vapours, in a heat accumulation in the heating chamber and thereby can cause damages at the system.

50  
The cooling phase stops when all temperatures measured in the system have fallen below 50°C. Depending on the soldering program this can last up to 90 min. Then the system will stop, all fans and the conveyor drive will be switched off. The operating status changes to OFF.  
90  
가  
off



**Switch system off**

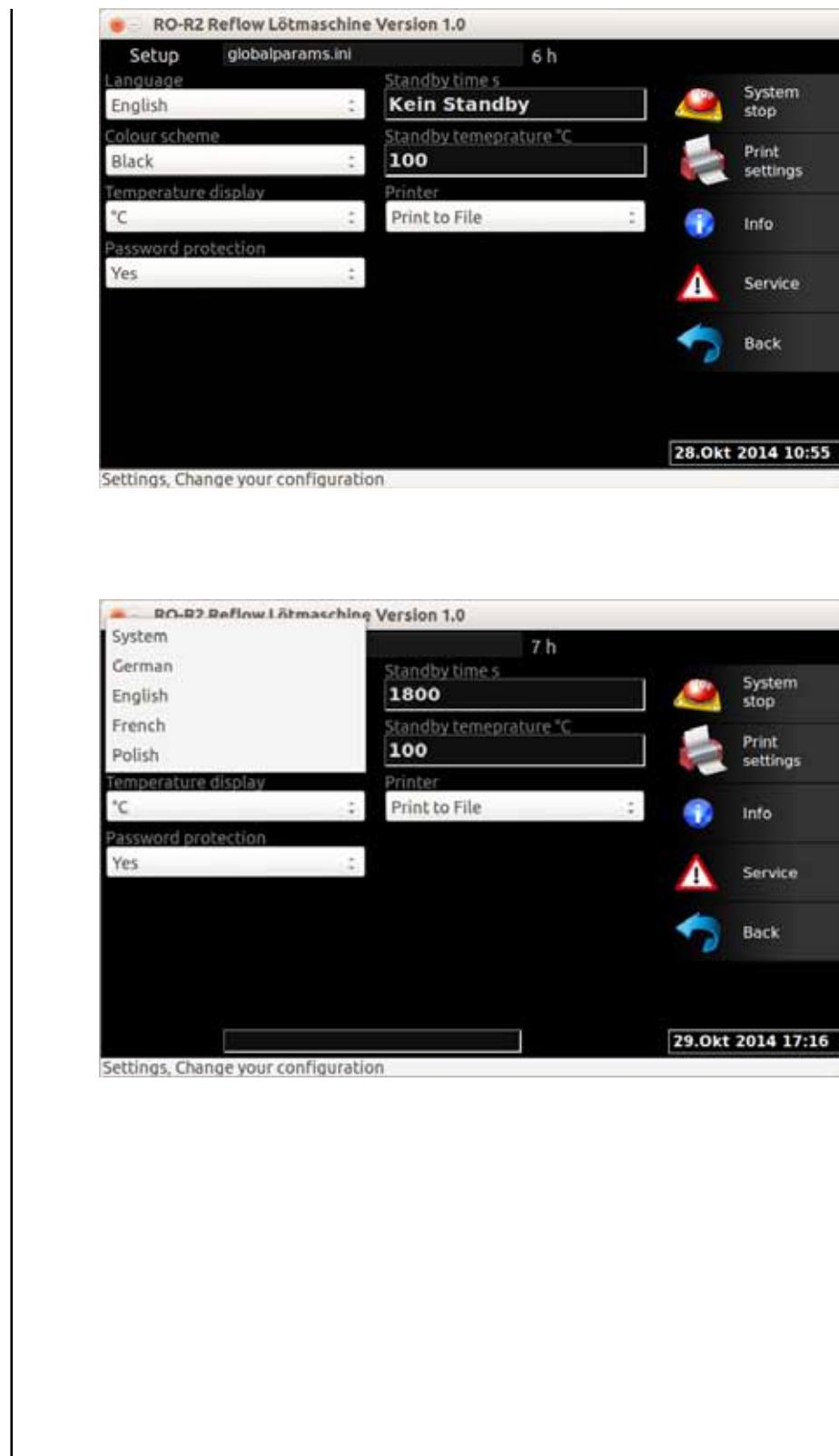
Now you can switch off the soldering system with the main switch.

## 8.0 System settings

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## 8.0 System settings



## 8.0 System settings

### Language selection

In the menu "Set up" the system offers the possibility to select different, already implemented languages.

Further languages can be implemented on request.

Additional to the original language German the languages English and Polish are already implemented.

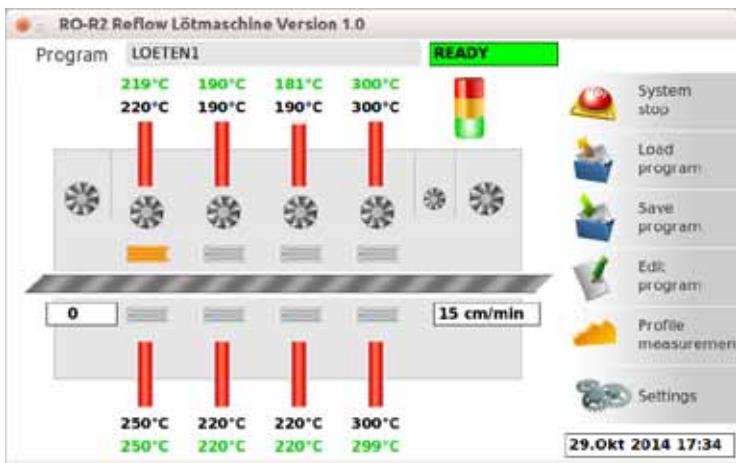
#### Set language

- | Tip on the function key **<Set up>** in the system screen.
- | Under **<Language>** select the requested setting.
- | With **<Back>** you can change back to the system screen.  
All displays, error and help messages will now be shown in the selected language.

## 8.0 System settings



**Colour scheme white**



**Colour scheme black**



## 8.0 System settings

### Colour scheme

In the menu "Set up" the system offers the possibility to select between three different colour schemes.

The colour scheme **<System colours>** uses the settings of the Linux operating system. This offers various adjustments.

- | Tip on the function key **<Set up>** in the system screen.
- | Under **<colour scheme>** select the requested setting.
- | With **<Back>** you can change back to the system screen.

### Select colour scheme

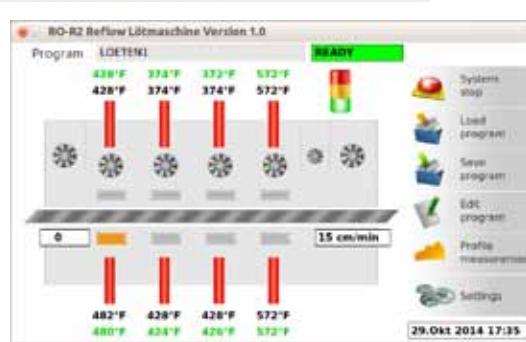
## 8.0 System settings



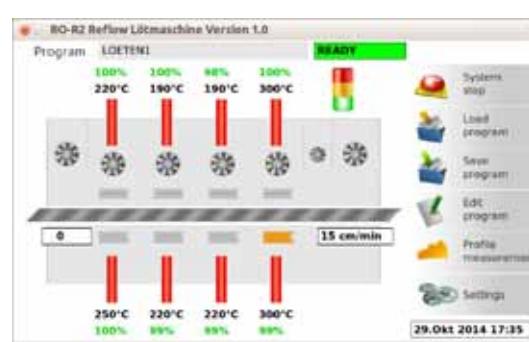
Temperature display °C



Temperature display °F



Temperature display %



## 8.0 System settings

### Temperature display

The system offers the option to select between 3 different temperature displays.

With selected temperature display in percent the set temperatures must be entered in °C.

- | Tip on the function key **<Set up>** in the system screen.
- | Under **<Temperature display>** select the requested setting.
- | With **<Back>** you can change back to the system screen. The values of the temperatures will now be shown in the selected unit.

### Select temperature display

## 8.0 System settings

**Activate password protection**



**Save program with password protection**



**Edit program with password protection**



## 8.0 System settings

### Activate password protection for programs

The adjusted soldering programs can be protected with a password.

If the password protection is activated with **<Yes>** in the system settings, an individual password is required when saving a program. The profile parameters temperature and conveyor speed of a password protected program can be only edited after entering the password again.

- | Tip on the function key **<Set up>** in the system screen.
- | For activation select **<Yes>** under **<Password protection>**.
- | With **<Back>** you can change back to the system screen.

From now on an individual password is required when saving a program. Therefore no special character length or character string is defined.

If you don't want to enter a password for the program you can stop the entry by pressing Return.

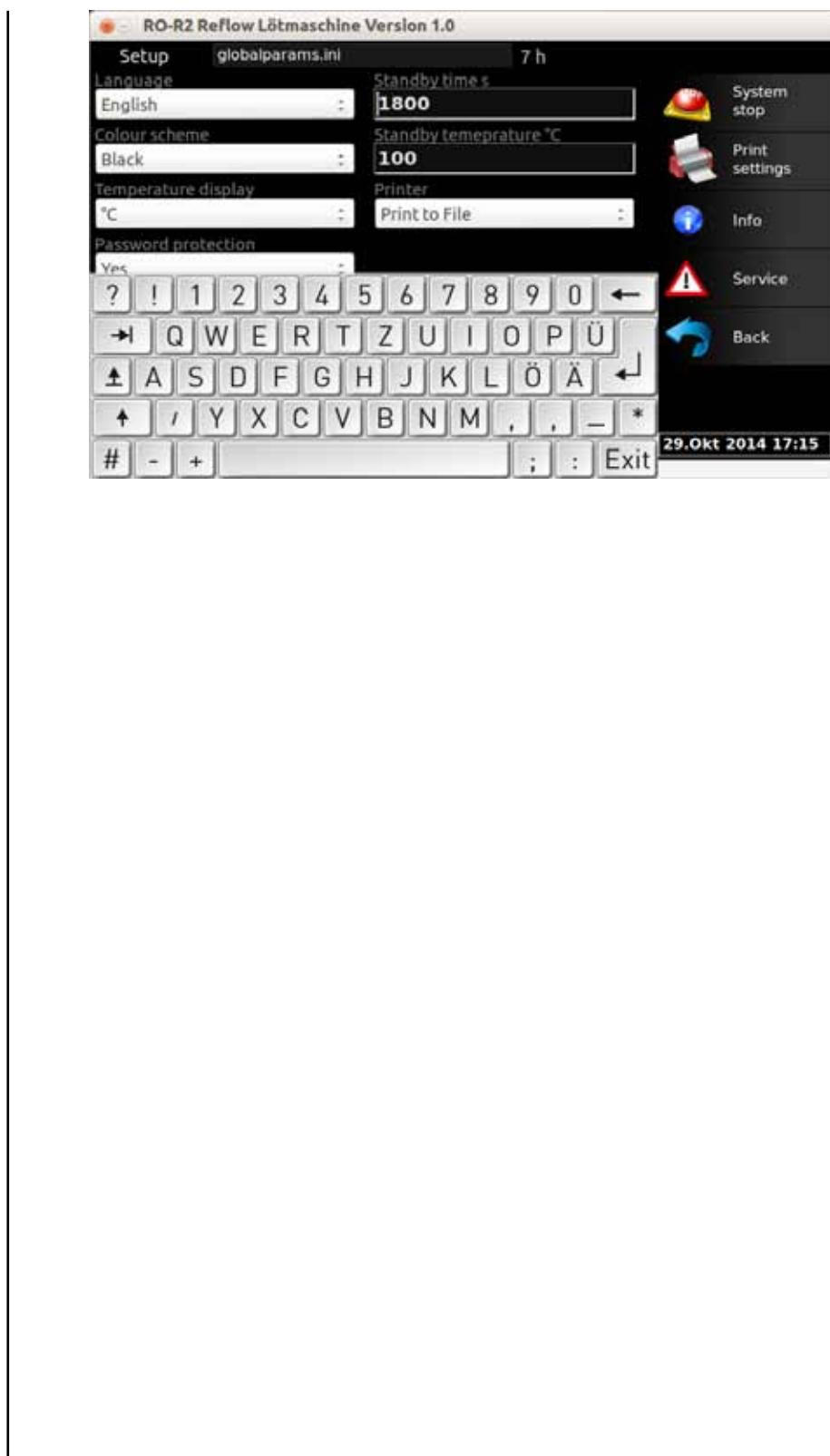
If you want to change the parameters of a password protected program you can enable the editing of all parameters by a one-time entry of the password.

- | Tip on the function key **<Edit program>** in the system screen.
- | After demand enter the password. Now a changing of the parameters in the system screen is possible.

The enabling is active until a new saving or loading of a program.

### Activate password protection

## 8.0 System settings



## 8.0 System settings

### \* Standby parameters

Soldering systems which are equipped with the **option "Power Save Package"**, will change to standby mode after a defined time in no-load operation.

As no-load time a time is defined in which the PCB sensor recognises no PCB at the inlet. In standby mode the system cools down to the defined standby temperature.

As soon as the sensor recognises a new PCB the conveyor stops until the system has heated up again to the set temperatures defined in the soldering profile. After the system has reached the "Ready" status again the production goes on automatically.

- | Tip on the function key **<Set up>** in the system screen.
- | Under **<Standby time>** enter the maximum requested no-load time in seconds.  
[1 hour = 3600 s].
- | Under **<Standby temperature>** enter the requested reduced temperature.
- | With **<Back>** you can change back to the system screen.

From now on the standby mode will be activated if no PCB is recognised by the PCB sensor within the set standby time.

As a first step the system will change to mode "cooling" until the temperature is reached which is set as standby temperature in all heating zones. Now the mode "Standby" will be shown.

- | By placing a PCB on the sensor or by pressing **<System stop>** and immediately pressing **<System start>** you can change to heating operation and make the system "ready".

### \* Option "Power Save Package"

#### Set standby time

#### Set standby temperature

## 8.0 System settings



## 8.0 System settings

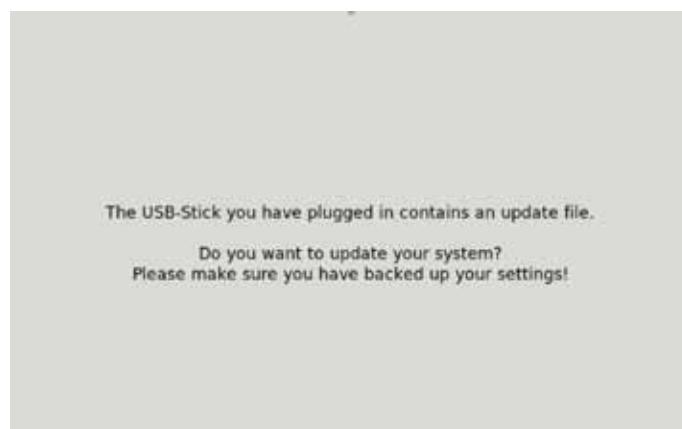
### Software-Update

Via the USB interface at the front of the machine a software update of the user and controller software can be made.

The update can be supplied on a USB-stick or sent as an e-mail.

- | If you have received the update for the soldering system as an e-mail, copy the file with the name RO-R2\_Software\_rev\_XX.YY.tar.gz in the root directory of an USB data medium. The USB data medium must have only one partition. The file name must not be changed.
- | Save all not saved programs and switch-off the soldering system with the main switch.
- | Connect the USB data medium with the USB-interface at the soldering system.
- | Switch-on the soldering system with the main switch again.
- | The routine to update the soldering system starts automatically. Follow the further instructions.

If the USB data medium encloses only one update the following message appears:



- | Confirm the question with <OK> to install the update.

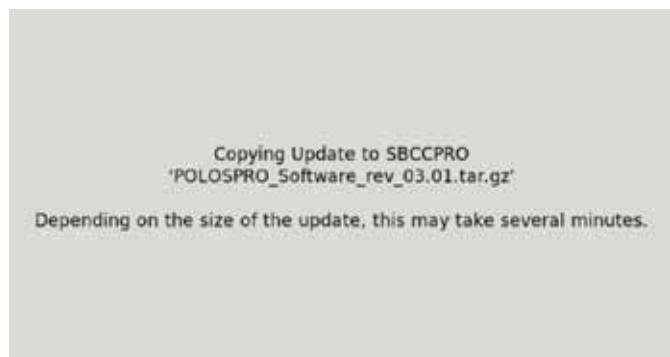
### Install update

## 8.0 System settings

- | If there are several update revisions on the USB data medium, all available revisions will be offered for selection. The newest revision is preselected.



- | Select the requested revision and confirm with <OK> to install the revision. The system starts with the installation of the new software.



- | Depending on the size of the update the installation can take several minutes. During the further process several messages will be shown automatically.

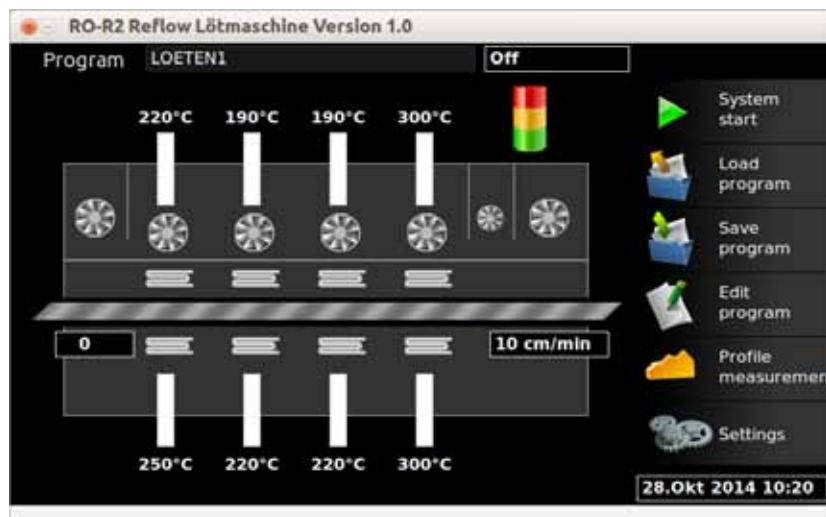
## 8.0 System settings

- | As soon as the update was installed successfully the system reports the completion of the work.



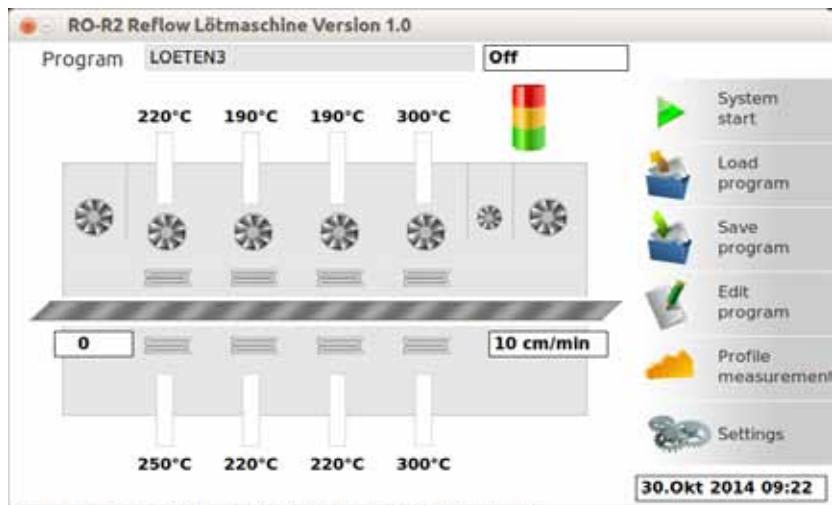
- | Now remove the USB data medium and confirm with <OK>

The soldering oven starts and will show the system screen.



## 8.0 System settings

You can view the actual installed revision.



System is ready, load a program and press start to start system

| Tip on the function key <Set up> in the system screen.



Settings, Change your configuration

| Select <Info>, to receive more information about the installed software revision.



| Confirm with <Yes> and with <Back> you can change back to the system screen.

## 9.0 Maintenance and service

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## 9.0 Maintenance and service

### General safety instructions

#### Service and maintenance work

Only qualified, instructed and briefed staff is allowed to assemble, disassemble and maintain the soldering system. For all work concerning assembly, disassembly, initial operation, movement, maintenance and adjustment the "5 safety rules" and the instructions of this manual must be observed.

Only staff specialised in electronics is allowed to work at the controller. Only original spare parts and fuses with the required amperage must be used.

The system or additional installations must be set volt-free before making any maintenance or service work. After the electrical assembly all used safety devices and EMC protection measures must be checked for function.

Generally it is not allowed to dismount any safety devices or to set them out of operation. If the dismounting of safety devices is necessary for assembly or initial operation they have mounted again immediately after this work is finished.

For damages to property in consequence of dismounted EMC protection measures the warranty claim will expire.



**Anybody who is changing or dismounting safety devices of the curing oven, is acting grossly negligent and against the guidelines of the professional association. In case of damages to persons or property, the manufacturer and the professional association will assume no liability. The assembly of any additional devices is only allowed after written acceptance of the manufacturer.**

## 9.0 Maintenance and service

### Safety instructions for opening and closing the hood

For cleaning work inside the heating chamber you have to switch off the soldering oven and open the machine hood.

- | Stop the production and remove all PCBs from the conveyor.
- | Press the button <Stop system>. The soldering system starts with the cooling phase.

#### Set system out of operation



#### CAUTION

##### Heat accumulation / emission of harmful vapours by switching off to early

- | Don't switch off the soldering system with the main switch and don't disconnect it from the mains supply during the cooling phase. This will switch off the fans, the conveyor and the exhaust box (optional).  
This could cause the emission of harmful solder- or adhesive vapours, a heat accumulation in the heating chamber and thereby damages at the system.
- | After the cooling phase is finished and the soldering system has changed to status "Off" you have to switch off the system with the main switch, secure it against unintended restart and disconnect the mains plug.



#### WARNING

##### Risk of burns due to high temperatures

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Wait until the soldering system is completely cooled down before opening the hood. When hood is opened don't grasp at the heating chamber without personal protective equipment.

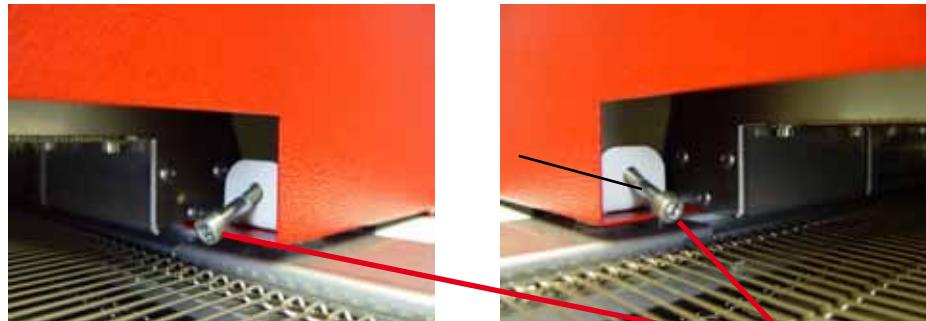


#### WARNING

##### Risk of injuries due to high weight

The soldering oven 551.1X has a weight of approx. **175 kg**.

## 9.0 Maintenance and service



### Opening the hood

- | Loosen the hexagon socket screws (inlet and outlet) with a 5mm socket wrench to open the hood.
- | Lift the hood slowly and carefully and open it completely until you feel the limit stop of both hood rests. The locking against unintended lowering is activated automatically. You can now unhand the hood.



#### **CAUTION** **Crushing hazard**

- | Don't grasp in the oven while opening or closing the hood.
- | When working with opened hood make sure that the hood rest is snapped and so the hood is protected against unintended lowering.



## 9.0 Maintenance and service



### **WARNING**

#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct cleaning work only with cooled down heating chamber.
- | Wear heat resistant gloves.
- | The locking of the hood rests must be loosened to close the hood. Therefore close the hood slowly until you feel a resistance. Then open it again completely. The locking is now loosened. Close the hood slowly and carefully.

### **Closing the hood**



Hood rest

- | Secure the hood against illegal opening with both hexagon socket screws.  
(Inlet and outlet side).

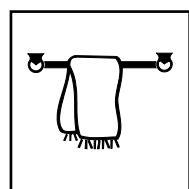


Hood lock outlet side

## 9.0 Maintenance and service

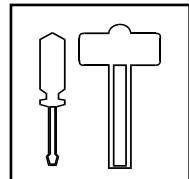
### Cleaning and maintenance intervals

#### Cleaning



What	Whereby	When
Operating panel	humid cloth	as necessary
Machine body	Soap water / spiritus	as necessary
Reflected-light barrier	Cotton bud with spiritus / brush	as necessary
Blower for heating chamber / exhaustion	Brush / vacuum cleaner	as necessary
Fans bottom tray	Brush / vacuum cleaner	as necessary
Heating chamber, cooling chamber and exhaust hoods	Soap water / spiritus	as necessary
Mesh belt / chamber floor	Soap water / spiritus	as necessary
Guiding rails transport system	Soap water / spiritus	as necessary

#### Maintenance



What	Whereby	When
Functions control of 8 blowers in heating chamber / 2 blowers for cooling	Hand control for free-wheeling	quarterly, but latest after 500 operating hours
Functions control of 4 fans in bottom tray	Hand control for free-wheeling	quarterly, but latest after 500 operating hours
Control of exhaust hoses and cables for damages	Optical control	quarterly, but latest after 500 operating hours
Control of drive pinion	Optical control for friction and wear	quarterly, but latest after 500 operating hours
Control of the mesh belt run	Optical control for smooth running	quarterly, but latest after 500 operating hours

## 9.0 Maintenance and service

What	Whereby	When
* Pin chain of the transport system (optional)	KLÜBEROIL YF 100 or comparable	Check min. 1x per week lubricate as necessary

### Lubrication

- \* The **pin chain conveyor** must be maintained. Check the pinion drive and the guiding rails for friction regularly and lubricate them as necessary.  
If worn out the pinion drive or the guiding rails must be exchanged by a service technician.

The mesh belt conveyor is maintenance free. The guiding rails for the mesh belt are covered with a wear resistant coating.

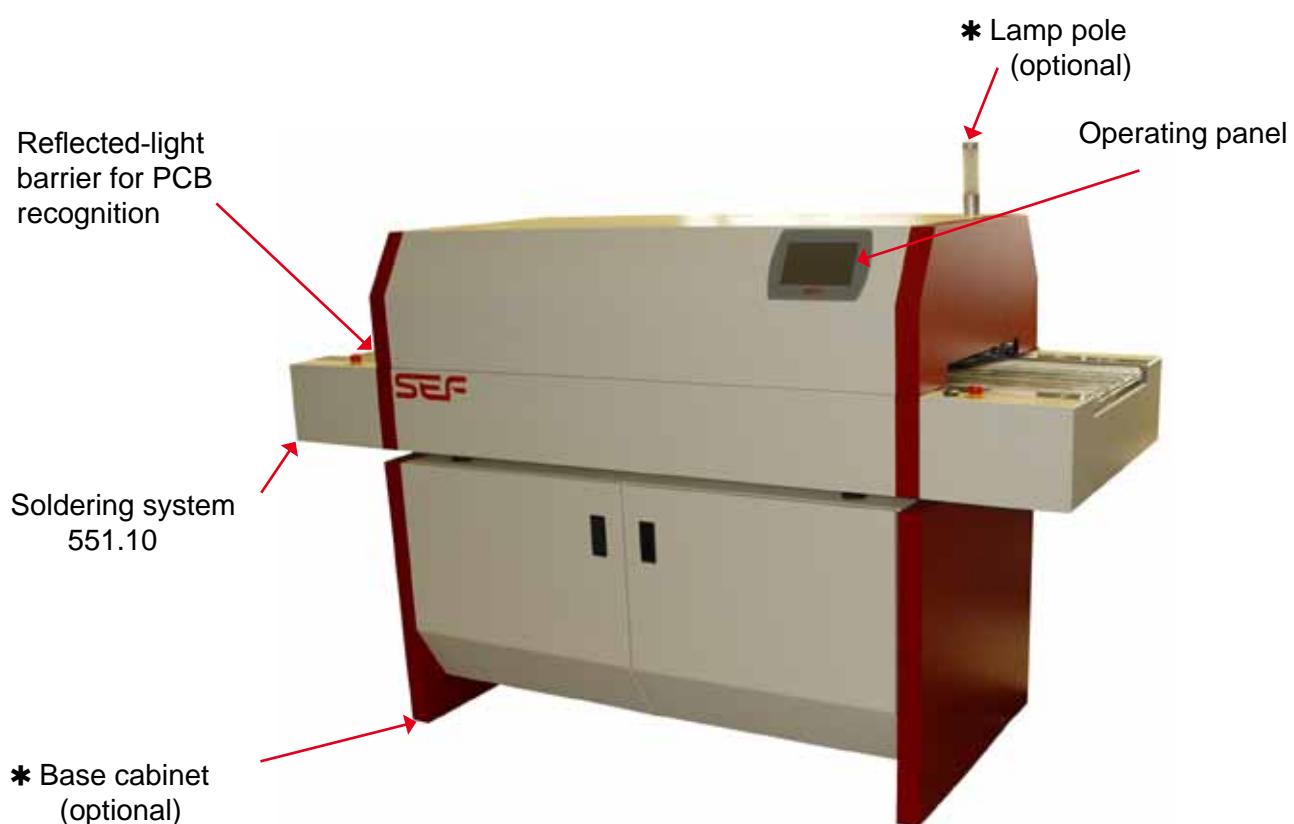
A lubrication of the guiding rails for the mesh belt is only necessary if there are extreme noises during operation.

- I **Therefore use only an oil containing solid lubricants, suitable for the lubrication of chains operating at very high temperatures.**

After a high number of operating hours an elongation of the mesh belt is possible. In this case the mesh belt should be shortened or exchanged by a service technician.

In case of an observable friction of the pinion drive this should be also exchanged by a service technician in time.

## 9.0 Maintenance and service



## 9.0 Maintenance and service

### Cleaning work



#### **WARNING**

##### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood.



#### **WARNING**

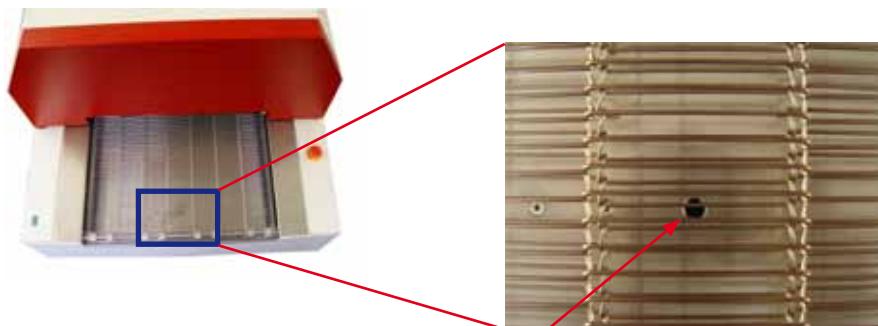
##### **Risk of burns due to high temperatures**



Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct cleaning work only with cooled down heating chamber.
- | Wear heat resistant gloves.
- | Don't use any harsh detergents for the cleaning.
- | Make sure that no humidity is getting inside the oven through the fan grids.
- | Clean the operating panel and the lamp pole with a humid cloth and soap water.
- | Clean the machine body and the base cabinet with a humid cloth and soap water or with spiritus in case of rough dirt.

In the chamber floor there is a reflected-light barrier for the recognition of PCBs. There could be malfunctions due to contamination with dust or solder vapours.

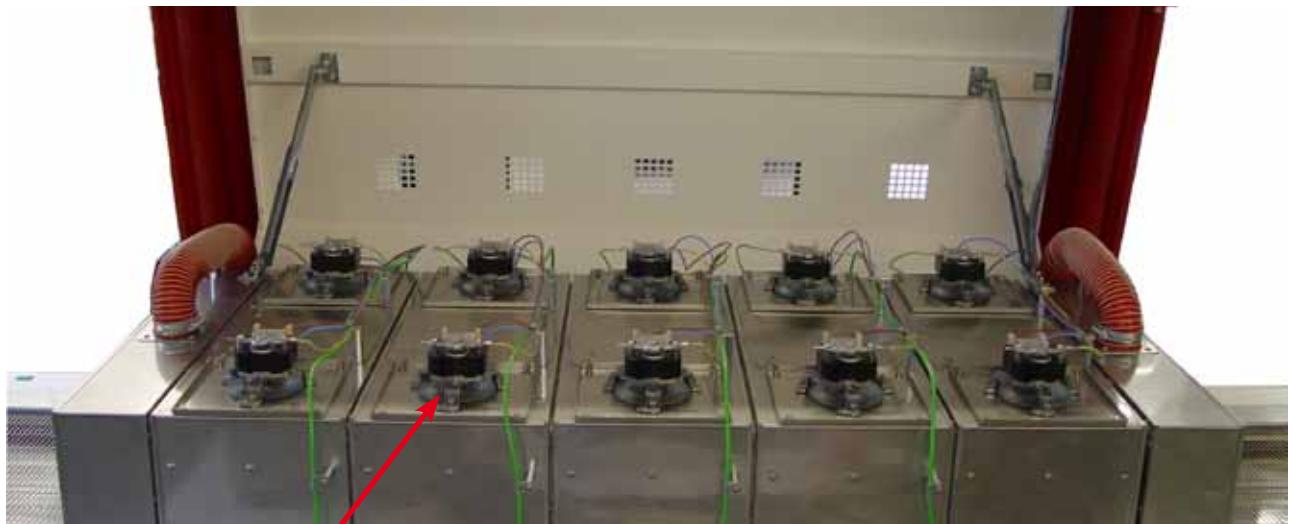


- | Clean this light barrier with a small brush or with a cotton bud and spiritus in case of rough contaminations.

### **Cleaning work at the outer machine body**

### **Cleaning of the reflected-light barrier**

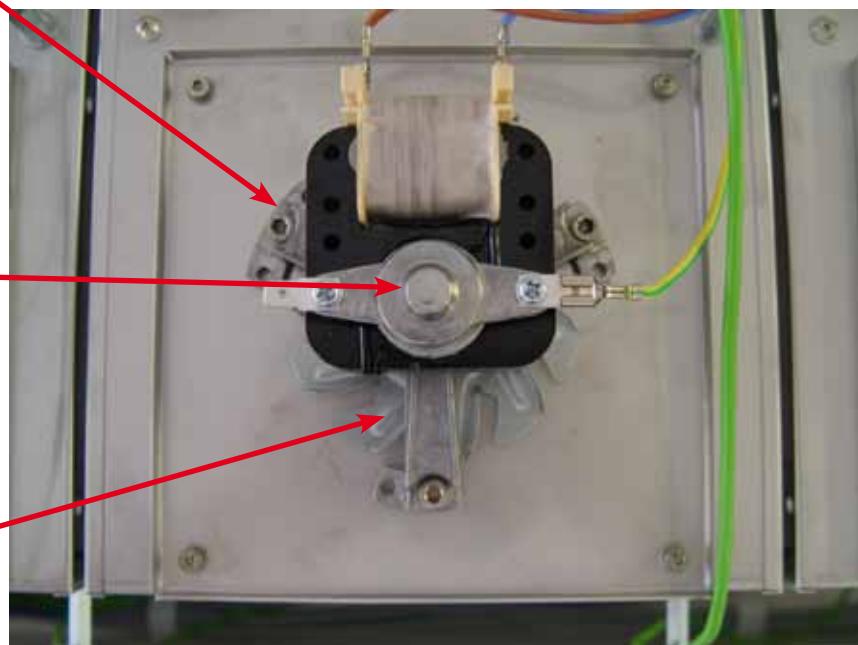
## 9.0 Maintenance and service



Blower upper part

Motor shaft

Outer blower wheel



## 9.0 Maintenance and service

### Cleaning work at blowers



#### **WARNING**

##### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood.



#### **CAUTION**

##### **Crushing hazard**

- | When working with opened hood make sure that the hood rest is snapped and so the hood is protected against unintended lowering..



#### **WARNING**

##### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct cleaning work only with cooled down heating chamber.
- | Clean the 8 heating chamber blowers and the 2 cooling zone blowers with a little brush and a vacuum cleaner. Remove especially all visible contaminations and deposits in the area of the motor shaft and outer blower wheels.
- | After finishing the cleaning work check the blowers for free-wheeling. The inner and outer blower wheels must not rub against the case.
- | After cleaning and checking the blowers you can close the hood again carefully. Therefore loosen the locking of the hood rests by opening the hood completely again. Then close the hood slowly and carefully.
- | Secure the hood against illegal opening with both hexagon socket screws.

### **Cleaning of the blowers**

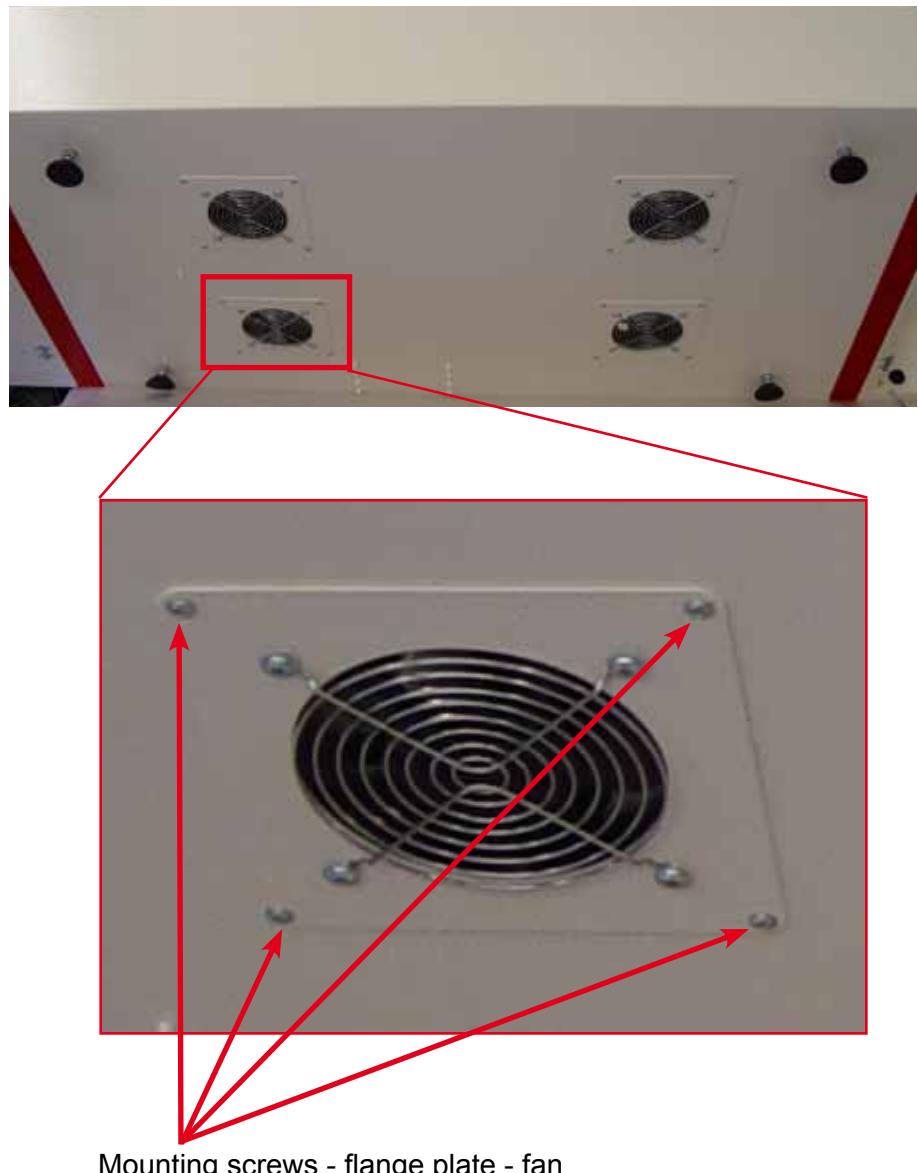
## 9.0 Maintenance and service

### Cleaning work at fans

In the bottom tray you will find 4 fans which generate air circulation inside the oven to avoid heat accumulation.

- I Check these fans regularly for dust and dirt and clean them as necessary.

The fans are mounted on flange plates which are fixed in the bottom tray.



## 9.0 Maintenance and service

### Cleaning work at fans

In case of breakdown or rough contamination the fans can be dismounted and cleaned by loosening the 4 mounting screws incl. flange plate and connecting cable.



#### **WARNING**

#### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood.



#### **WARNING**

#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct cleaning work only with cooled down heating chamber.
- | Place the oven on rectangular blocks of wood with a min height of 20 cm or lift the oven in a similar way to get access to the bottom tray.



#### **WARNING**

#### **Risk of injuries due to high weight**

The soldering oven 551.1X has a weight of approx. **175 kg**.

- | Lift the oven with min. 4 persons or use a forklift or crane and place the rectangular blocks of wood under the machine feet.
- | Clean the 4 fans in the bottom tray with a brush and a vacuum cleaner.
- | In case of rough contamination you can dismount the fans. Remove the 4 screws of the flange plate and also the connecting cable.
- | Clean and check the dismounted fan.
- | Mount the cleaned fan in reverse order again and place the soldering system at the place of production again.

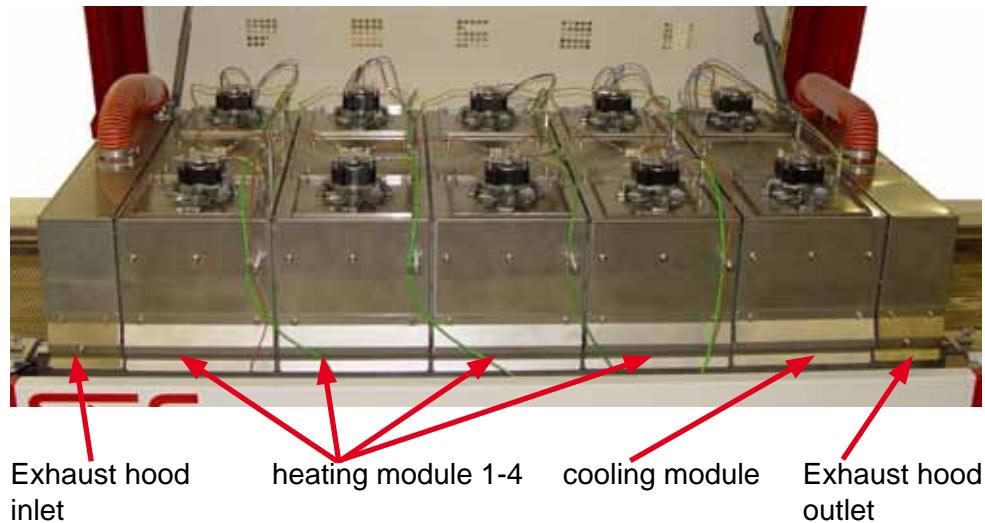
### Cleaning of the fans

## 9.0 Maintenance and service

### Cleaning work at the heating modules

After some time solder-, flux- or adhesive vapours can settle inside the heating chamber.

- | These contaminations must be removed regularly. Due to the modular assembly the components can be cleaned one after another.



#### **WARNING** **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood.



#### **WARNING** **Risk of burns due to high temperatures**

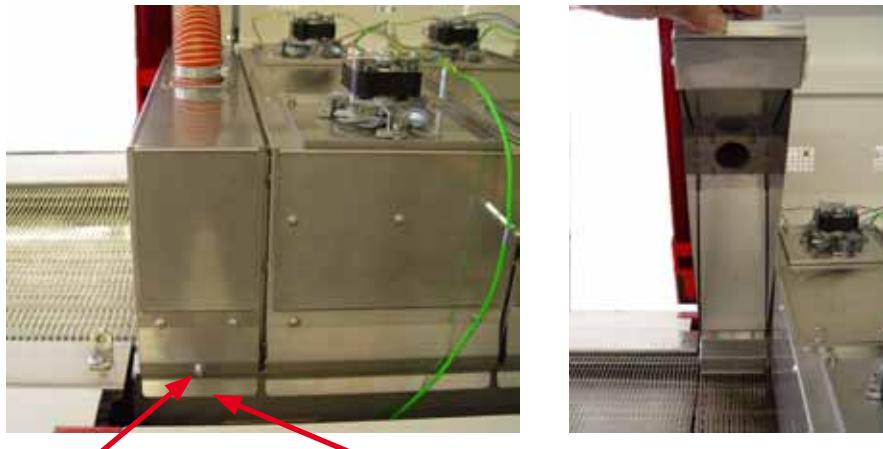
Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct cleaning work only with cooled down heating chamber.

The hood rests are fixed at the exhaust hoods at the inlet and outlet of the heating chamber. Hence these modules are fixed with an additional holding screw.

## 9.0 Maintenance and service

### Cleaning work at the heating modules



Holding screw  
exhaust hood      terminal holder

- | Loosen the hexagon socket screw at the exhaust hood "inlet with a M3 socket wrench.
- | Release the exhaust hood by strong pulling at the terminal holder and lift the exhaust hood carefully. Pay attention to the hood rest and the exhaust hose.
- | Clean the module with a cloth and soap water. You can also use spiritus in case of rough contamination.
- | Place the module again and make sure that the terminal holder snapped in.
- | Secure the exhaust hood with the screw.
- | Pay attention to the correct fitting and placement of the exhaust hose.



The distance bolt is used as a guidance for the exhaust hose. The hose must not be placed on the distance bolt.

#### CAUTION

#### Risk of injuries by tilting of the hood.

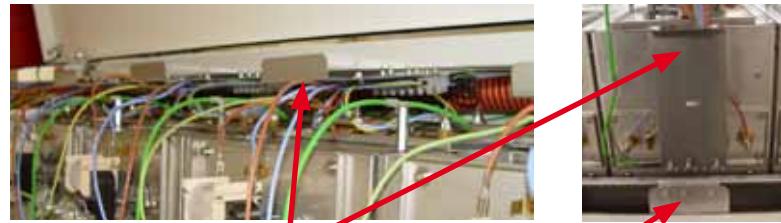
- | Never loosen the holding screws of **both** exhaust hoods at the **same time**. Due to the weight of the hood the exhaust hoods can be loosened out of the terminal holder and the hood can tilt together with the exhaust hoods.

## 9.0 Maintenance and service

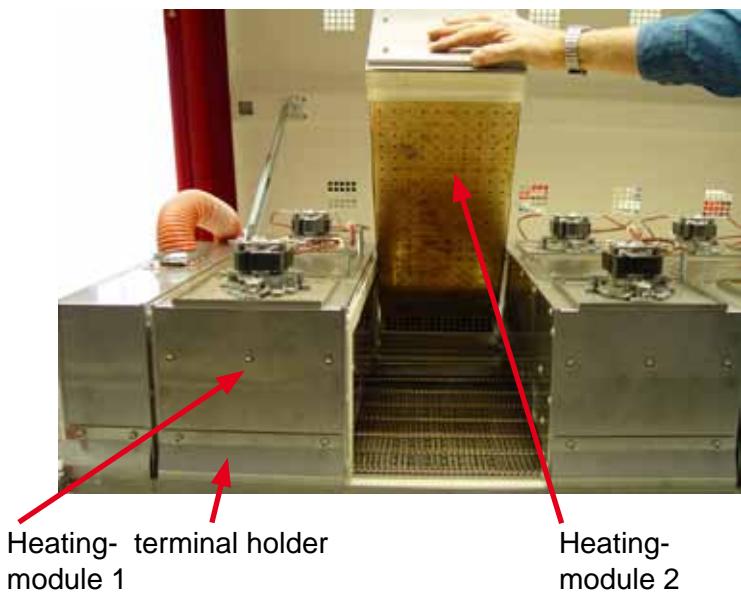
### Cleaning work at the heating modules

At the rear side of the heating and cooling modules you will find the electrical connection of the modules.

- | Before working at the modules you must loosen the plug-in connection.



- | Pull the connector angle out of the plug connector. Thereto lean above the heating chamber and look behind the module (possibly use a step).



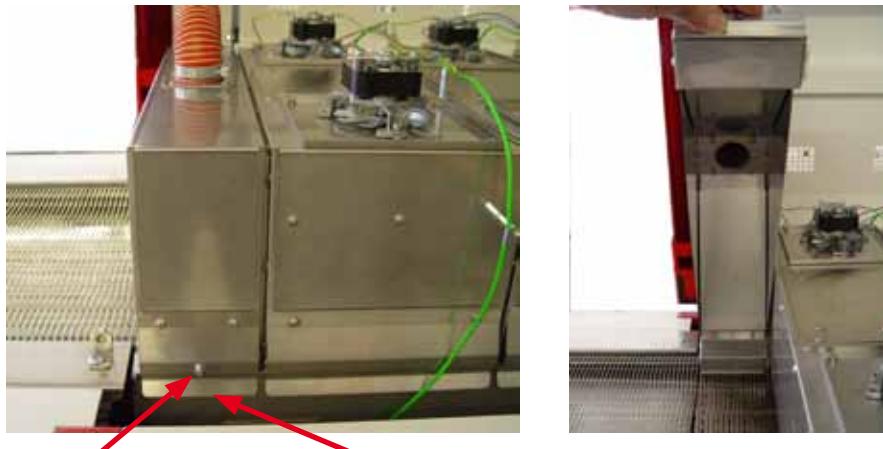
#### Cleaning of heating module

- | Release the first heating module by strong pulling at the terminal holder and lift the module carefully.
- | Clean the module with a cloth and soap water. You can also use spiritus in case of rough contamination.
- | Place the module again and make sure that the terminal holder snapped in.
- | Connect the connector angle with the plug-in connector again. Pay attention to the correct fitting.
- | Clean all 4 heating modules and the cooling module in the same way, one after another.

#### Cleaning of cooling module

## 9.0 Maintenance and service

### Cleaning work at the heating modules



Holding screw exhaust hood      terminal holder

- | Loosen the hexagon socket screw at the exhaust hood "outlet with a M3 socket wrench.
- | Release the exhaust hood by strong pulling at the terminal holder and lift the exhaust hood carefully. Pay attention to the hood rest and the exhaust hose.
- | Clean the module with a cloth and soap water. You can also use spiritus in case of rough contamination.
- | Place the module again and make sure that the terminal holder snapped in.
- | Secure the exhaust hood with the screw.
- | Pay attention to the correct fitting and placement of the exhaust hose.



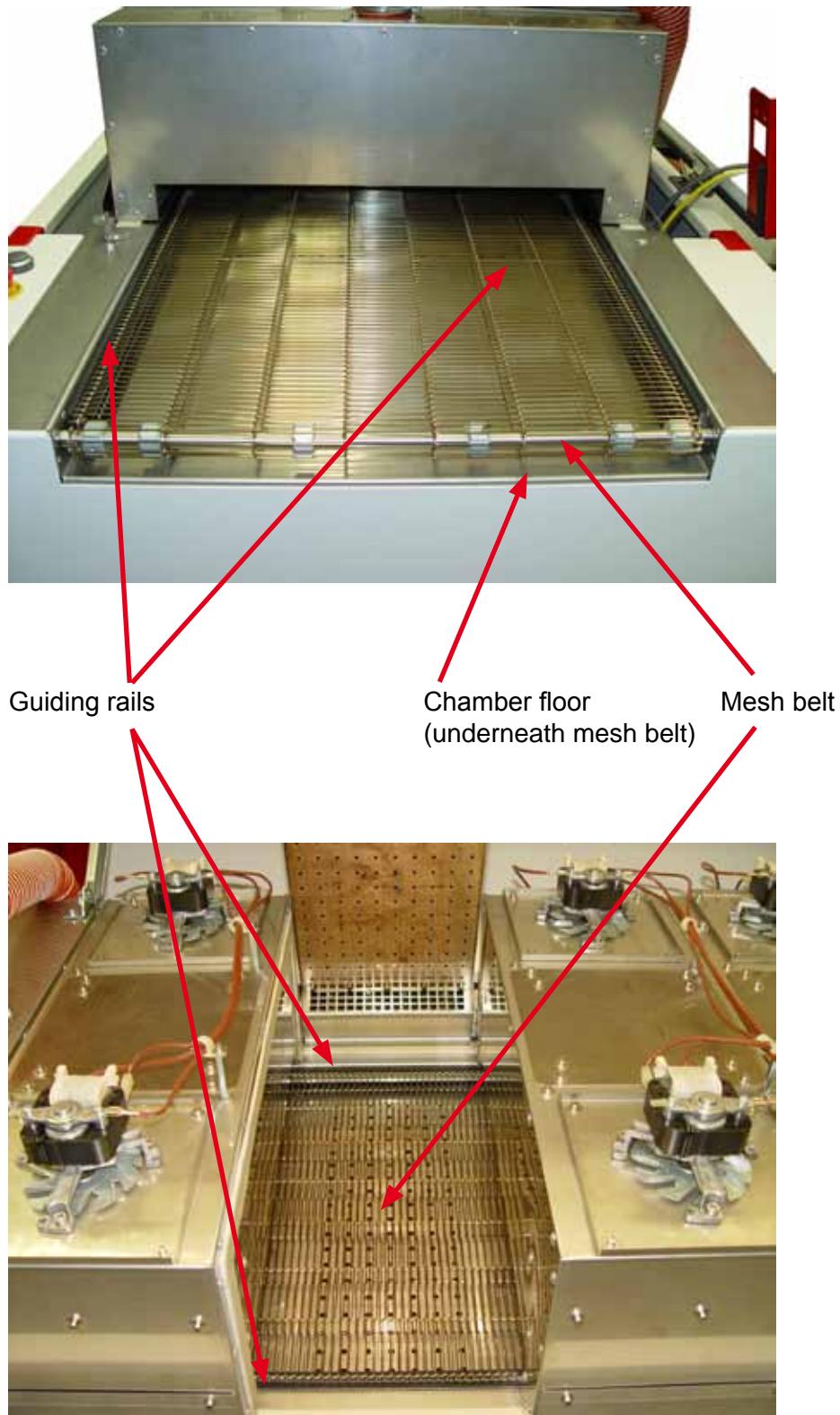
The distance bolt is used as a guidance for the exhaust hose. The hose must not be placed on the distance bolt.

#### CAUTION

#### Risk of injuries by tilting of the hood.

- | Never loosen the holding screws of **both** exhaust hoods at the **same time**. Due to the weight of the hood the exhaust hoods can be loosen out of the terminal holder and the hood can tilt together with the exhaust hoods.

## 9.0 Maintenance and service



## 9.0 Maintenance and service



### **WARNING**

#### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood.



### **WARNING**

#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct cleaning work only with cooled down heating chamber.



It makes sense to clean the chamber floor, guiding rails and mesh belt together with the heating modules.

- | Therefore lift all modules on after another as described before to get access to the components underneath.
- | Clean the guiding rails, the chamber floor and the mesh belt with a brush and a vacuum cleaner. All accessible parts can be cleaned with a cloth and soap water or spiritus in case of rough contaminations.
- | After cleaning and checking all components you can close the hood carefully again.  
Therefore loosen the locking of the hood rests bei opening the hood completely again. Then close the hood slowly and carefully.
- | Secure the hood against unallowed opening with the hexagon socket screws.

#### **Cleaning of the guiding rails**

#### **Cleaning of the chamber floor**

#### **Cleaning of the mesh belt**

## 9.0 Maintenance and service

### Error diagnosis

Soldering system can't be switched on.	◆ Mains voltage available?	Check mains voltage.
	◆ Main switch switched on?	Switch on main switch.
	◆ Mains fuses okay?	Check fuses and exchange as necessary.
	◆ Not repairable.	Call SEF-Service.
Soldering system doesn't heat or doesn't heat correctly.	◆ "Standby mode" activated?	Place PCB on sensor or press <System stop> and <System start> .
	◆ Wrong program selected?	Load the correct program.
	◆ Wrong parameters adjusted?	Adjust the correct parameters.
	◆ Not repairable.	Call SEF-Service.
Soldering system doesn't reach "ready" status	◆ Set wrong or too high values?	Adapt set values
	◆ Temperature sensor okay?	Check temperature sensors and exchange as necessary.
	◆ Heaters are working?	Check heaters and exchange as necessary
	◆ Is the actual value of the heating temperature "0" or "557"?	Exchange temperature sensor.
	◆ Not repairable.	Call SEF-Service.

**Service SEF Systec GmbH:**  
**Tel.: +49 (0) 4136 / 909-0**  
**Fax: +49 (0) 4136 / 909-22**  
**Mail: [service@sef.de](mailto:service@sef.de)**

## 9.0 Maintenance and service

Measurement value recording is not possible.	◆ Temperature sensor connected?	I Connect temperature sensor.
	◆ Temperature sensor damaged?	I Check temperature sensor and exchange as necessary.
	◆ Not repairable.	I Call SEF-Service.

Data export not possible.	◆ USB mass storage has been recognised?	I Connect and check USB device.
	◆ Not repairable.	I Call SEF-Service.

## 9.0 Maintenance and service

### Check and exchange fuses

The engine electronics with power supply, power conditioning and controller RO-R2R is easily accessible for service mounted on a mounting plate below the inlet zone.

In case of breakdown of a component the mounting plate can be opened by removing the 3 holding screws.



#### **WARNING**

#### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug

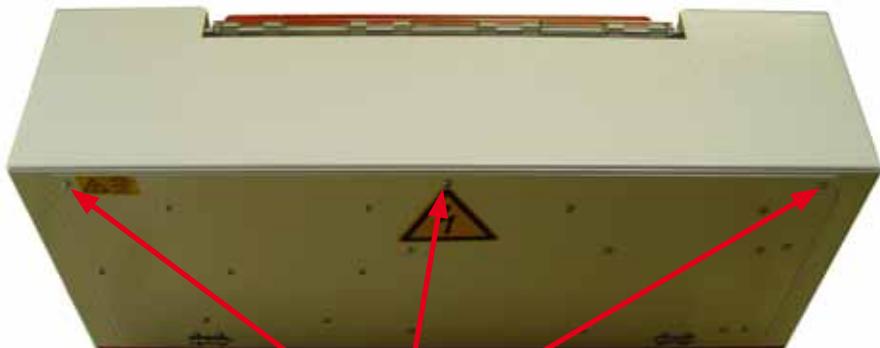


#### **WARNING**

#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct service and maintenance work only with cooled down oven.

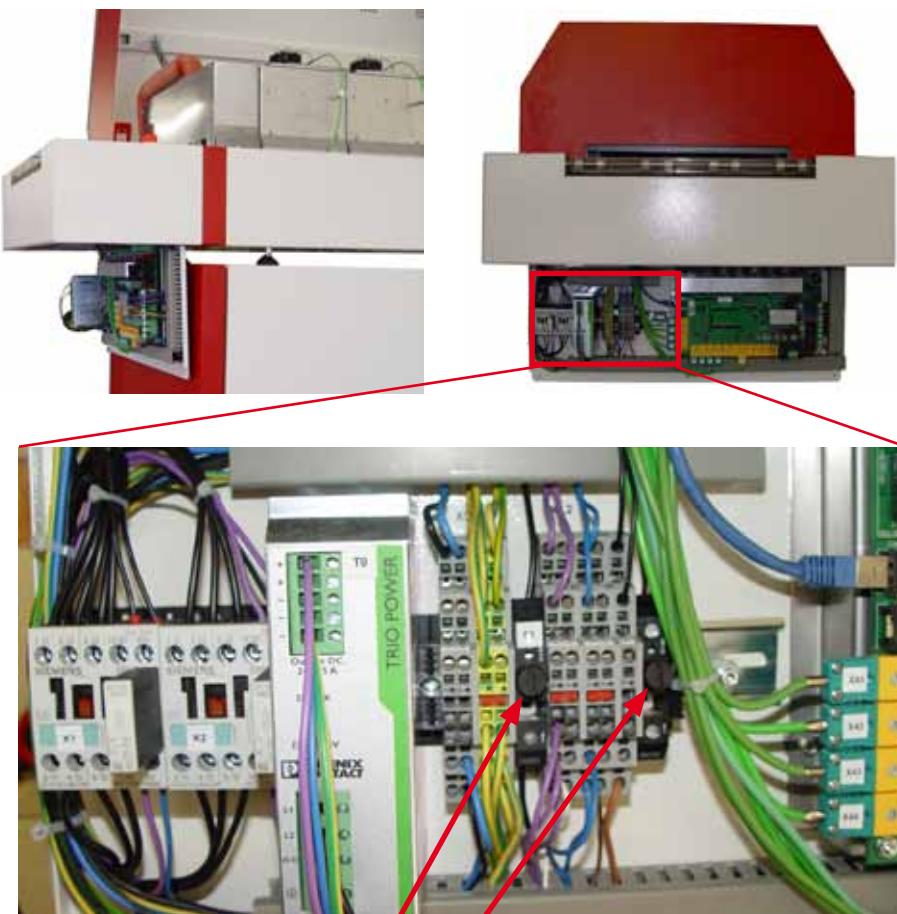


3 x holding screw M4x10

- | Place the soldering system so that you have access to the mounting plate underneath the inlet.
- | Loosen and remove the 3 rounded head screws M4x10 ISO 7380 with a 2,5mm socket wrench. Keep the plate pressed to the top so that it doesn't swing up uncontrolled.
- | Swing up the mounting plate carefully.

## 9.0 Maintenance and service

### Check and exchange fuses



F1 fine fuse 5x20 1AT  
Power socket exhaust box

F10 fine fuse 5x20 1AT  
Option WLAN

- | Unscrew the related screw from the holder.
- | Check the fuse and exchange it with a new one if necessary.

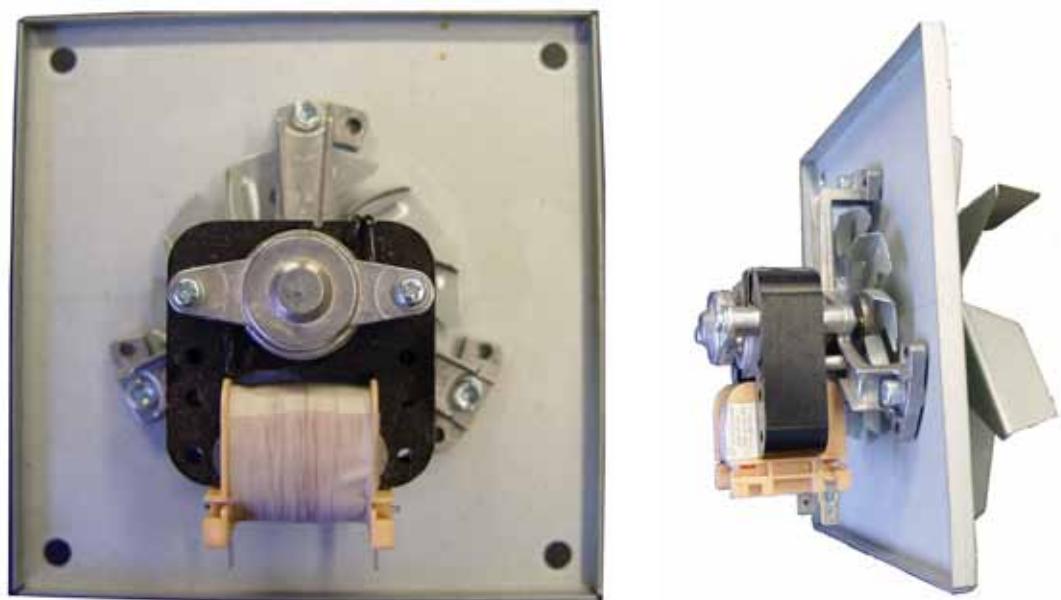
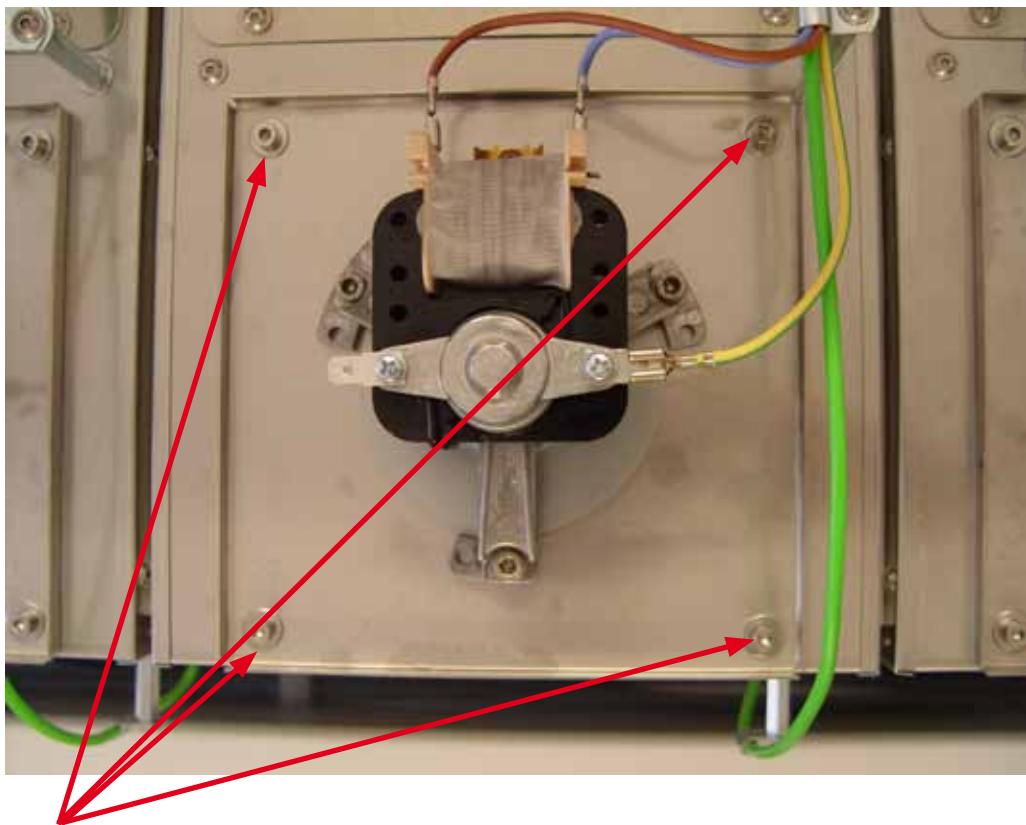
**Only use fuses with the same value.**

- | Close the mounting plate and fix it with the 3 rounded head screws M4x10.
- | Connect the system with the mains supply and switch it on again.

**Exchange damaged fuse**

## 9.0 Maintenance and service

### Exchange blower



## 9.0 Maintenance and service

### Exchange blower



#### **WARNING**

##### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood.



#### **CAUTION**

##### **Crushing hazard**

- | When working with opened hood make sure that the hood rest is snapped and so the hood is protected against unintended lowering.



#### **WARNING**

##### **Risk of burns due to high temperatures**

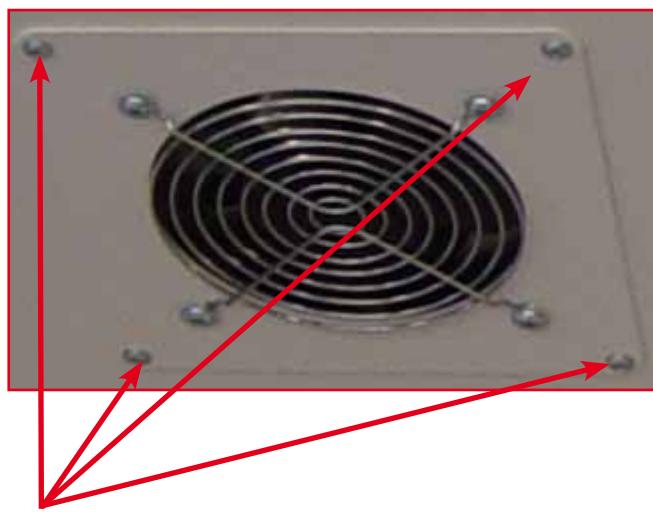
Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct service and maintenance work only with cooled down oven..
- | Disconnect the 3 connection cables with the 6,3mm connectors from the blower.
- | Loosen and remove the 4 screws DIN 912 M4x12 incl. washer with a 3mm socket wrench.
- | Lift the blower together with the mounting plate carefully from the module. Pay attention that the inner big blower wheel doesn't twist.
- | The spare blower will be shipped incl. mounting plate. Place the new blower in the module.
- | Fix the blower with the 4 screws M4x12 and the belonging washers.
- | Connect the 3 connection cables again.
- | At last check the new blower for free-wheeling.
- | After finishing the work you can close the hood again. Therefore loosen the locking of the hood rests by opening the hood completely again. Then close the hood slowly and carefully.
- | Secure the hood against unallowed opening with the hexagon socket screws.

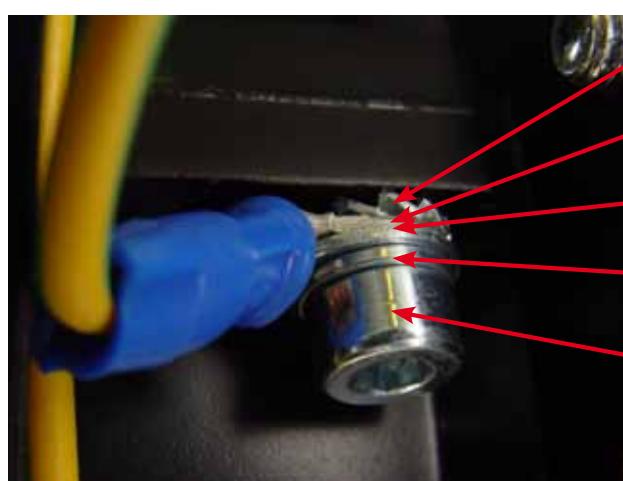
### Dismount blower

## 9.0 Maintenance and service

### Exchange fan



4 holding screws ISO 7380 M4x10



## 9.0 Maintenance and service

### Exchange fan

In the bottom tray you will find 4 fans which generate air circulation inside the oven to avoid heat accumulation. The fans are mounted on flange plates which are fixed in the bottom tray. In case of breakdown the fans can be dismounted and exchanged by loosening the 4 mounting screws incl. flange plate and connecting cable.



#### **WARNING**

#### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood.



#### **WARNING**

#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct service and maintenance work only with cooled down oven.
- | Place the oven on rectangular blocks of wood with a min height of 20 cm or lift the oven in a similar way to get access to the bottom tray.



#### **WARNING**

#### **Risk of injuries due to high weight**

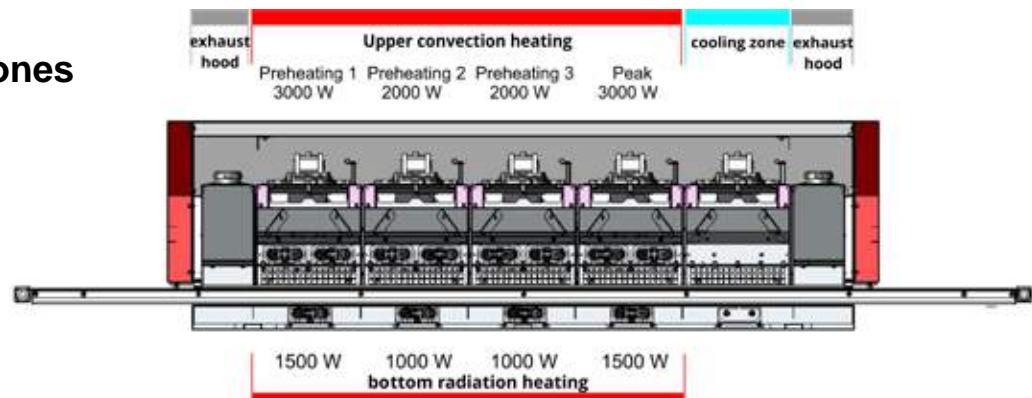
The soldering oven 551.1X has a weight of approx. **175 kg**.

- | Lift the oven with min. 4 persons or use a forklift or crane and place the rectangular blocks of wood under the machine feet.
- | Loosen and remove the 4 holding screws ISO7380 M4x10 of the flange plate with a 2,5mm socket wrench.
- | Disconnect the connection plugs and unscrew the PE cable with a 3mm socket wrench.
- | Unscrew the flange plate together with the fan grid from the damaged fan and mount these parts with the 4 screws at the new fan.
- | Mount the new fan again in reversed order. Pay attention to the correct mounting of the PE-connection.
- | Replace the soldering system again at place of production.

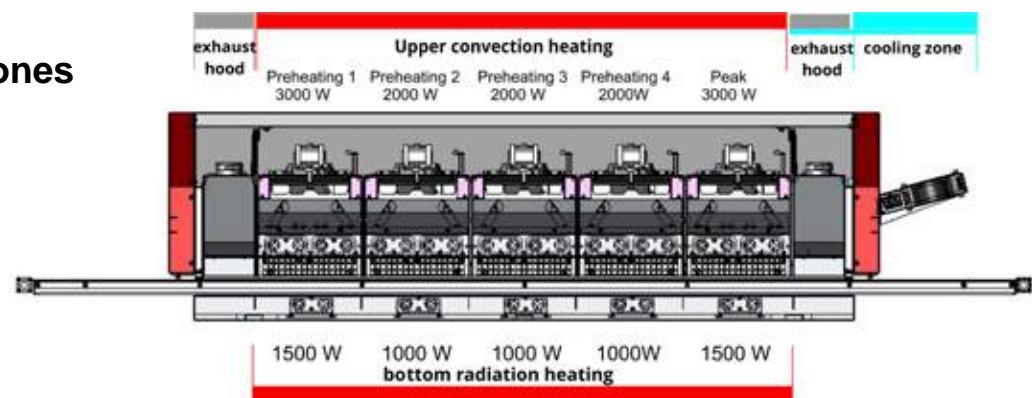
### Dismount fan

## 9.0 Maintenance and service

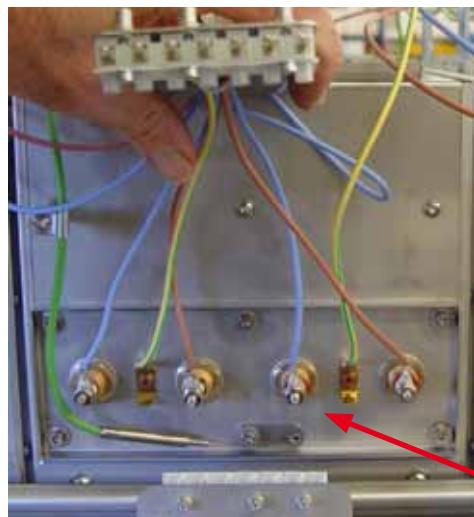
### 551.10 4 heating zones



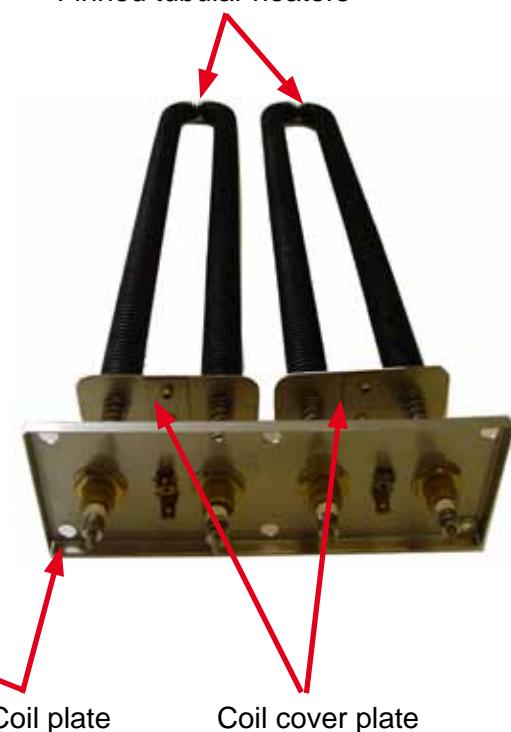
### 551.15 5 heating zones



Heating element  
upper heating zones  
2000W oder 3000W  
(identical design)



Finned tubular heaters



## 9.0 Maintenance and service

### Exchange heating elements of the upper heating modules

In the soldering oven 551.1X you will find finned tubular heaters with 1000W as well as 1500W heating power. In the upper heating modules the heaters are fixed in pairs on a coil plate with 2 coil cover plates. In the lower heating zones the heaters are used single. Spare parts will be supplied pre-assembled.

For the exchange of a heating element in a upper heating module this module must be dismounted.



#### **WARNING**

#### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood..



#### **CAUTION**

#### **Crushing hazard**

- | When working with opened hood make sure that the hood rest is snapped and so the hood is protected against unintended lowering.



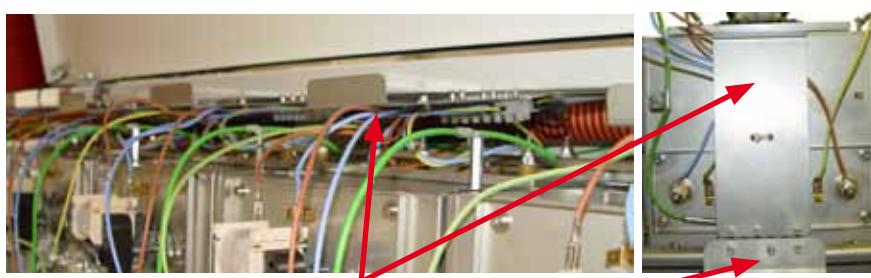
#### **WARNING**

#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct service and maintenance work only with cooled down oven.

You will find the electrical connection of the modules at the rear side of the heating chamber.



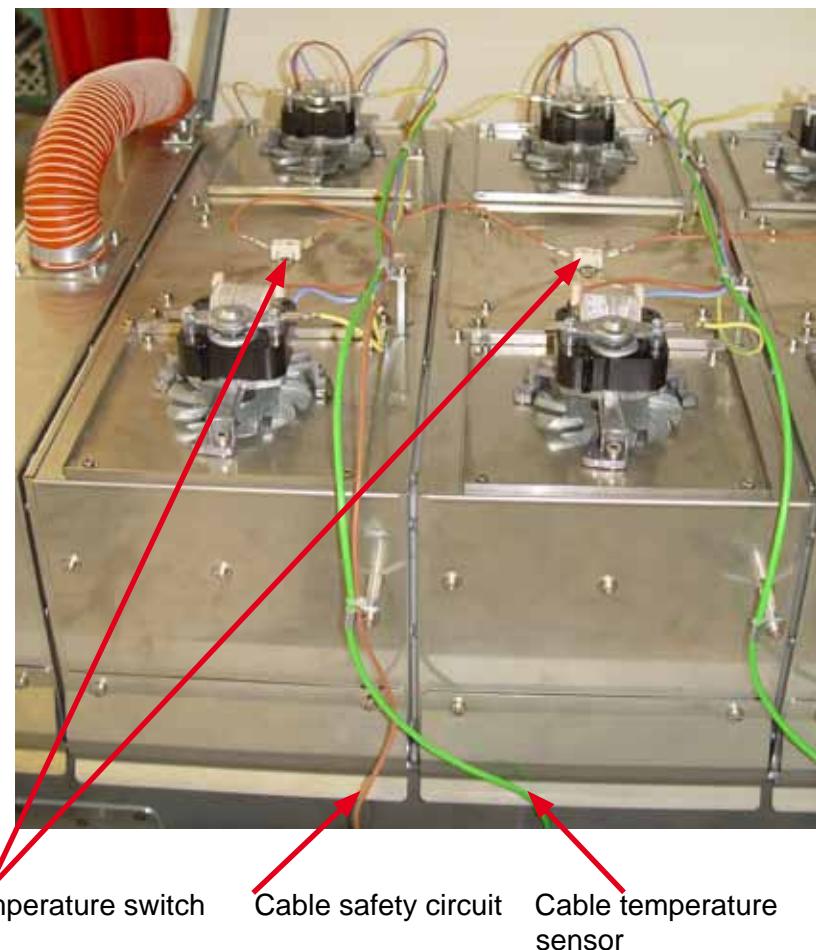
- | Pull the connector angle out of the plug connector. Thereto lean above the heating chamber and look behind the module (possibly use a step).

#### **Dismount heating module**

## 9.0 Maintenance and service

In the middle of the heating modules the temperature switches are placed.

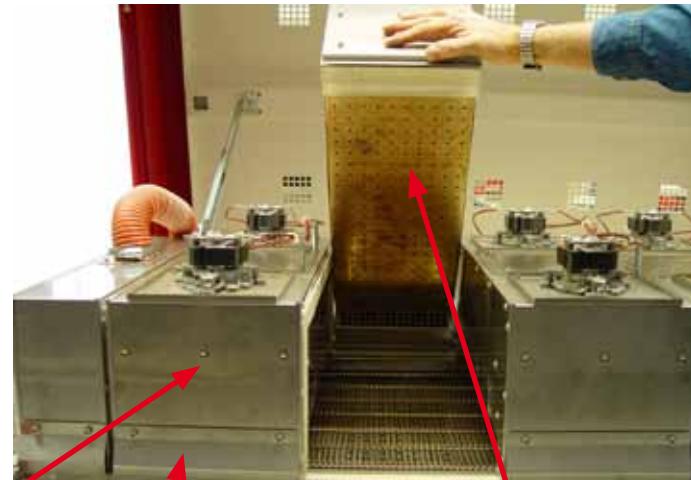
The green cables of the temperature sensors are guided from the front over the modules. Additionally the brown wires of the safety circuit are guided on the modules of the first preheating zone and the peak zone. With the help of distance bolts the wires are kept away from the hot surface. When dismounting a module pay attention that those wires won't be damaged. If necessary remove the cable straps for fixing the wires and after remounting fix them again with new cable straps.



- | Disconnect both brown wires with the 6,3mm connectors from the temperature switches.

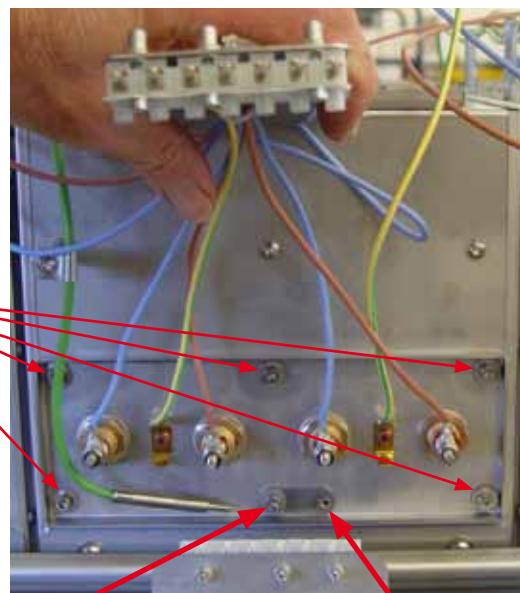
## 9.0 Maintenance and service

### Exchange heating elements of the upper heating modules



Heating- module 1                          Terminal holder                          Heating- module 2

- | Release the related heating module by strong pulling at the terminal holder and lift the module carefully. Pay attention to the green cable of the temperature sensor.
- | Place the heating module on a working surface in front of the oven so that you can access the connections and screws on the coil plate easily.

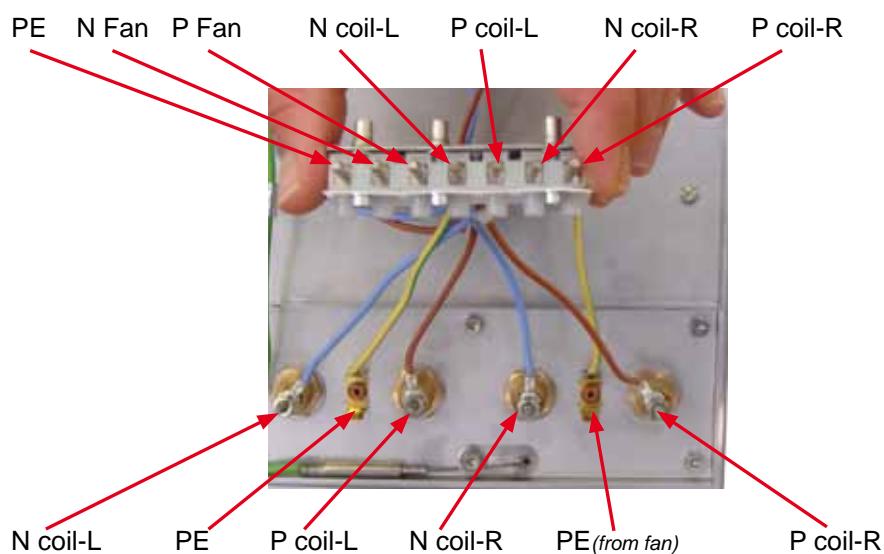


Screw                                  Screw with washer                          Temperature sensor

## 9.0 Maintenance and service

### Exchange upper heating element

- | First loosen and remove the screw with washer of the temperature sensor and pull out the small tube incl. sensor from the module.
- | Disconnect both PE-cables with the 6,3mm connectors from the connection at the coil plate.
- | Loosen the M4 nuts of the connecting cables with a 8mm ring spanner and remove the ring terminals.
- | Loosen and remove the 5 remaining screws with washers from the coil plate.
- | Pull out the complete heating unit carefully from the heating module.
- | Insert the new heating unit carefully into the heating module. Pay attention that the finned tubular heaters don't twist and won't be damaged.
- | Fix the coil plate with the 5 screws and washers.
- | Insert the temperature sensor with the small tube into the heating module and fix the sensor under the washer. Fix the screw only slightly so that you don't damage the sensor.

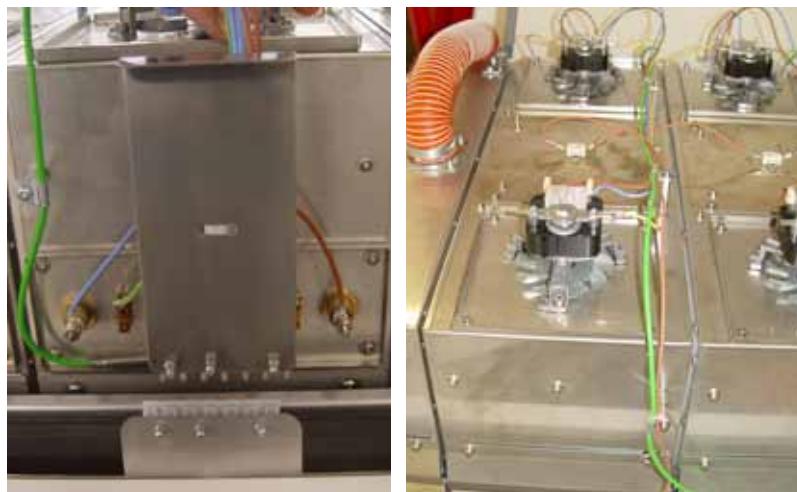


## 9.0 Maintenance and service

### Exchange heating elements of the upper heating modules

- | Connect the PE-cables with the 6,3mm connectors and the connection cables of the heating coils with the M4 nuts again.
- | Place the module again and make sure that the terminal holder snapped in.
- | Connect the connector angle with the plug-in connector again. Pay attention to the correct fitting.

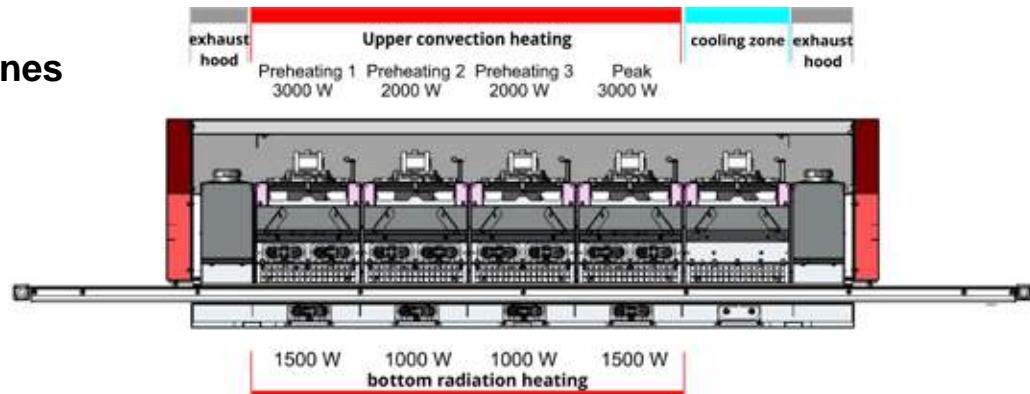
#### Mount upper heating module



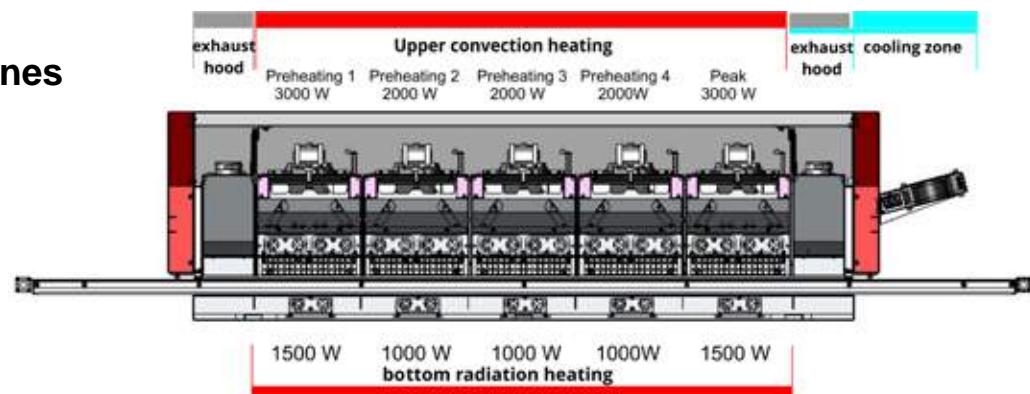
- | Connect the brown wires with the 6,3mm connectors with the temperature switches again.
- | Fix possibly loosen cables with cable straps in the correct position. The wires must not touch the case of the heating modules.
- | After finishing the work you can close the hood again. Therefore loosen the locking of the hood rests by opening the hood completely again. Then close the hood slowly and carefully.
- | Secure the hood against unallowed opening with the hexagon socket screws.

## 9.0 Maintenance and service

### 551.10 4 heating zones



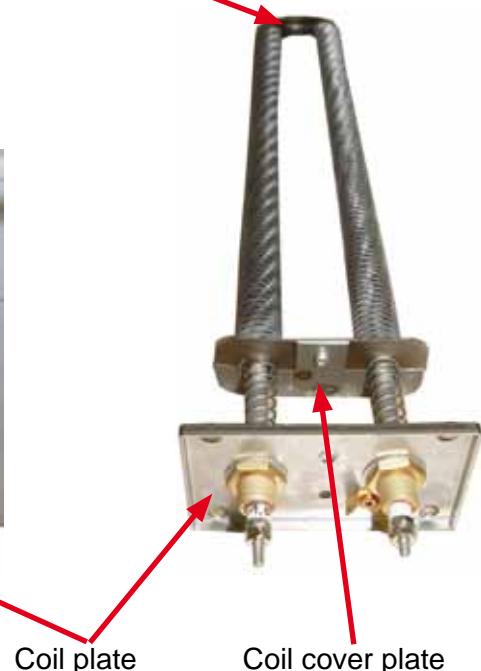
### 551.15 5 heating zones



**Heating element  
lower heating zones  
1000W or 1500W  
(identical design)**



Finned tubular heater



## 9.0 Maintenance and service

### Exchange heating elements of lower heating zones

In the soldering oven 551.1X you will find finned tubular heaters with 1000W as well as 1500W heating power. The heating elements will be supplied pre-assembled on a coil plate with coil cover plate.



#### **WARNING**

#### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.



#### **WARNING**

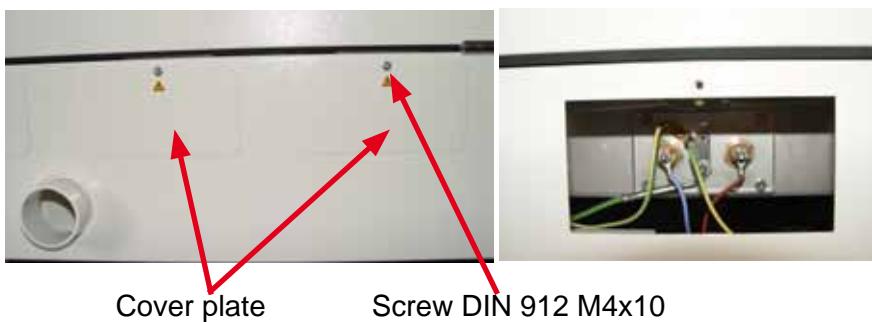
#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.



- | Conduct service and maintenance work only with cooled down oven.

For the exchange of a heating element in the lower heating zones you have to dismount the related cover plate on the rear side of the soldering system.

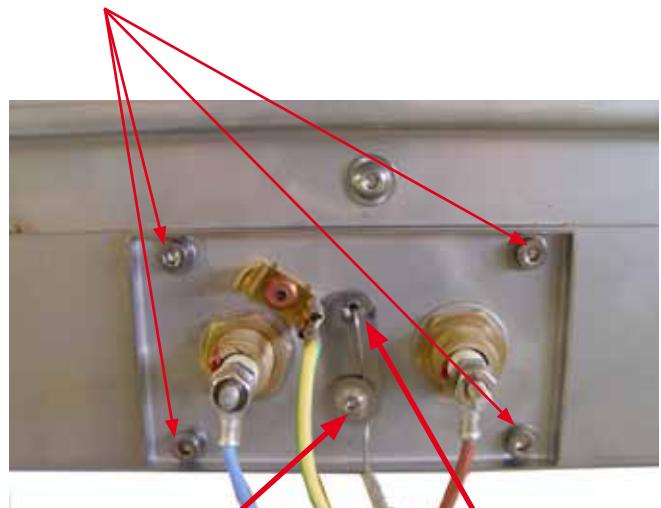


- | First loosen the screw M4x10 of the related cover plate with a 3mm socket wrench. Remove the cover plate with screw and washer.

#### **Dismount lower heating element**

## 9.0 Maintenance and service

Screw DIN 912 M4x10



Screw with washer      Temperature sensor

### Exchange lower heating element

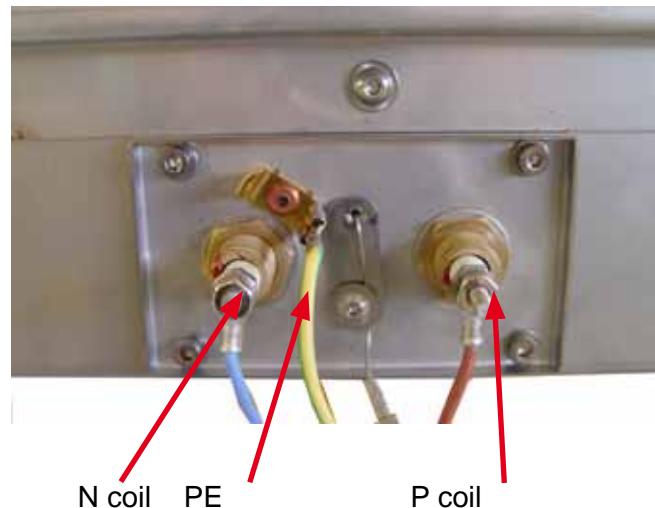
- | First loosen and remove the screw with washer of the temperature sensor and pull out the small tube incl. sensor out of the chamber.
- | Disconnect both PE cables with the 6,3mm connectors from the connections on the coil plate.
- | Loosen the M4 nuts of the connecting cables with a 8mm ring spanner and remove the ring terminals.
- | Loosen and remove the remaining 4 holding screws with washer of the coil plate.
- | Pull out the complete heating unit from the heating zone carefully.
- | Insert the new heating unit carefully into the heating module. Pay attention that the finned tubular heaters don't twist and won't be damaged.
- | Fix the coil plate with the 4 holding screws and washers.
- | Insert the temperature sensor with the small tube into the heating module and fix the sensor under the washer. Fix the screw only slightly so that you don't damage the sensor.

### Mount lower heating element

## 9.0 Maintenance and service

### Exchange heating elements of lower heating zones

- | Connect the connection cables with the ring terminals again and fix the M4 nuts with a 8mm ring spanner.
- | Connect the PE cable with the 6,3mm connector again.

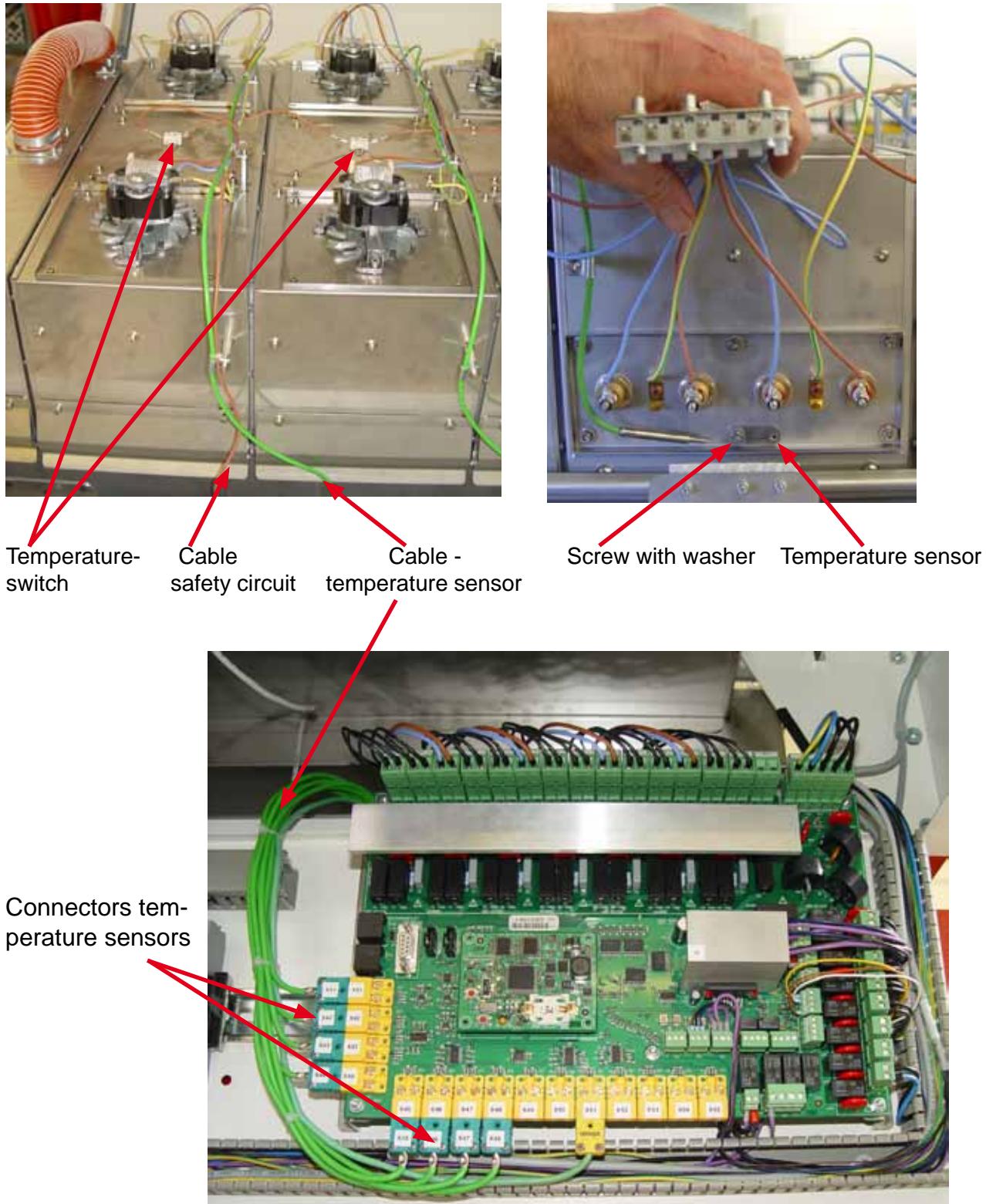


- | Close the aperture with the cover plate again and fix it with the screw M4x10 and washer.



- | After finishing the work you can close the hood again. Therefore loosen the locking of the hood rests by opening the hood completely again. Then close the hood slowly and carefully.
- | Secure the hood against unallowed opening with the hexagon socket screws.

## 9.0 Maintenance and service



## 9.0 Maintenance and service

### Exchange temperature sensors in the upper heating modules

In the soldering system 551.1X NiCr-Ni temperature sensors type K are used for the temperature control.

For the exchange of a temperature sensor in a upper heating module this module must be dismounted.



#### **WARNING**

#### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood.



#### **CAUTION**

#### **Crushing hazard**

- | When working with opened hood make sure that the hood rest is snapped and so the hood is protected against unintended lowering.



#### **WARNING**

#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct service and maintenance work only with cooled down oven.

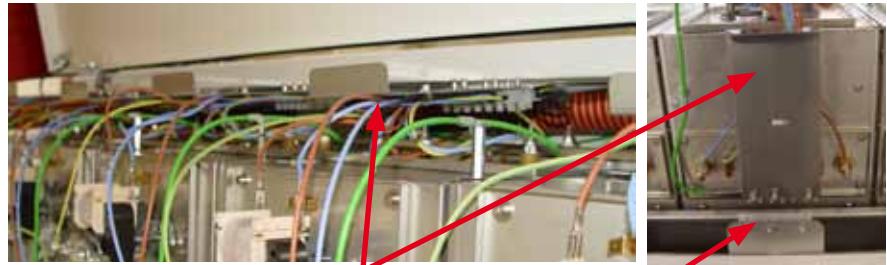


3 x mounting screws M4x10

- | Place the soldering system so that you have access to the mounting plate underneath the inlet.
- | Loosen and remove the 3 rounded head screws M4x10 ISO 7380 with a 2,5mm socket wrench. Keep the plate pressed to the top so that it doesn't swing up uncontrolled.
- | Swing up the mounting plate carefully.

## 9.0 Maintenance and service

You will find the electrical connection of the modules at the rear side of the heating chamber.

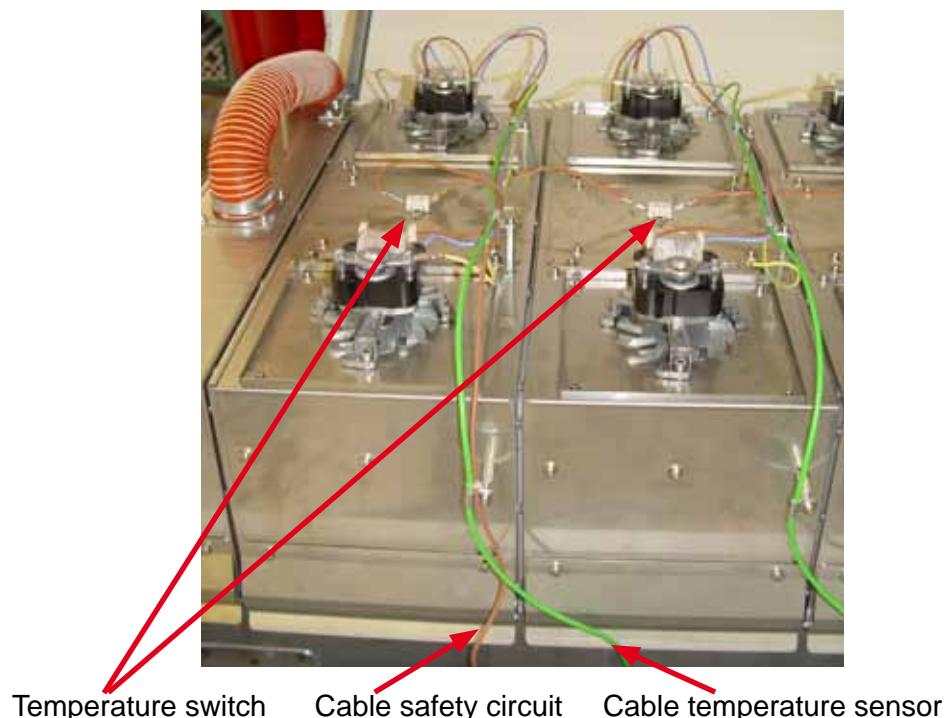


- I Pull the connector angle out of the plug connector. Thereto lean above the heating chamber and look behind the module (possibly use a step).

### Dismount upper heating module

In the middle of the heating modules the temperature switches are placed.

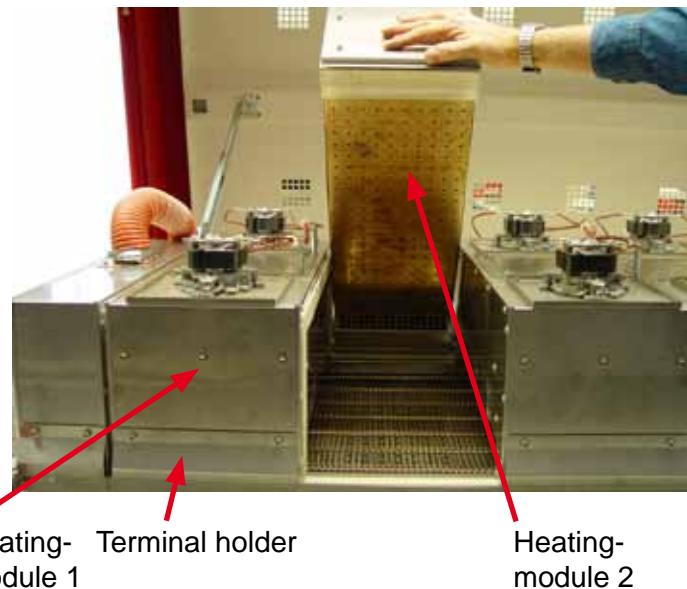
The green cables of the temperature sensors are guided from the front over the modules. Additionally the brown wires of the safety circuit are guided on the modules of the first preheating zone and the peak zone. With the help of distance bolts the wires are kept away from the hot surface. When dismounting a module pay attention that those wires won't be damaged. If necessary remove the cable straps for fixing the wires and after remounting fix them again with new cable straps.



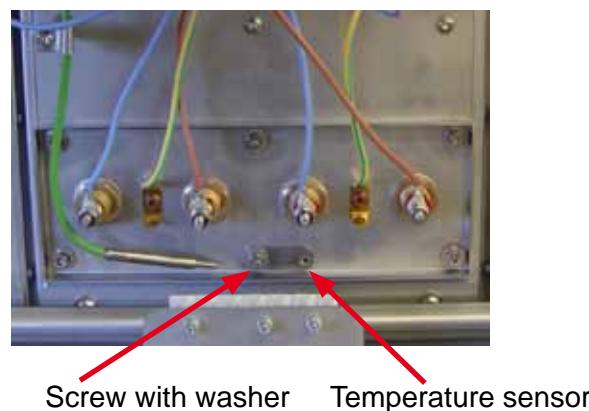
## **9.0 Maintenance and service**

## **Exchange temperature sensors in the upper heating modules**

- | Disconnect both brown wires with the 6,3mm connectors from the temperature switches.



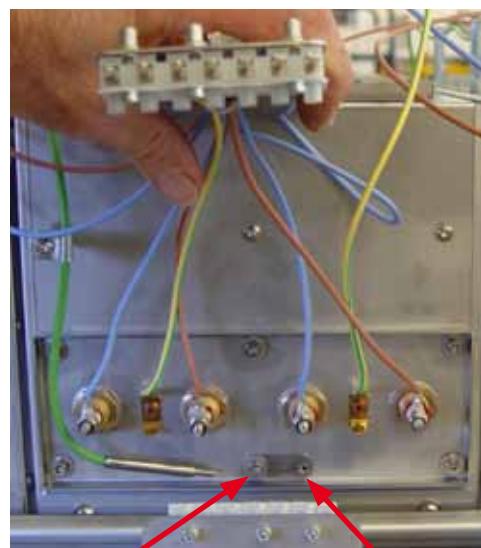
- | Release the related heating module by strong pulling at the terminal holder and lift the module carefully. Pay attention to the green cable of the temperature sensor.
  - | Place the heating module on a working surface in front of the oven so that you can access the connections and screws on the coil plate easily.



## 9.0 Maintenance and service

### Exchange upper temperature sensor

- | Loosen the holding screw with washer of the temperature sensor.
- | Pull out the sensor of the small tube.
- | Loosen all cable clips of the sensor cable on the heating module and remove the clips from the cable.
- | Now follow the cable till the controller board RO-R2, remove possible cable straps carefully and pull out the connector from the board.
- | Now remove the complete mantle thermocouple from the soldering system.
- | Insert a new temperature sensor in the small tube inside the heating module and fix the sensor under the washer. Fix the screw only slightly so that you don't damage the sensor.
- | Guide the sensor cable over the heating module and fix it again with the cable clips on the distance bolts.



Screw with washer      Temperature sensor

### Mount upper heating module

- | Insert the module again and make sure that the terminal holder snapped in.
- | Connect the connector angle with the plug-in connector again. Pay attention to the correct fitting.

## 9.0 Maintenance and service

### Exchange temperature sensors in the upper heating modules

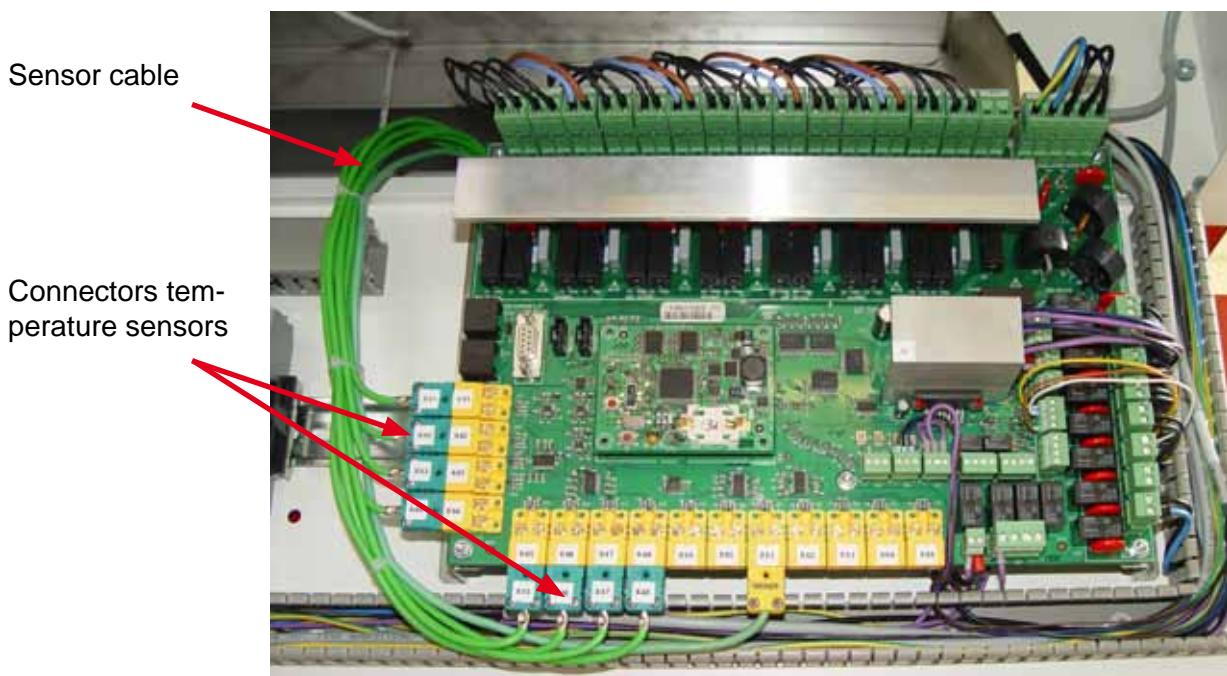
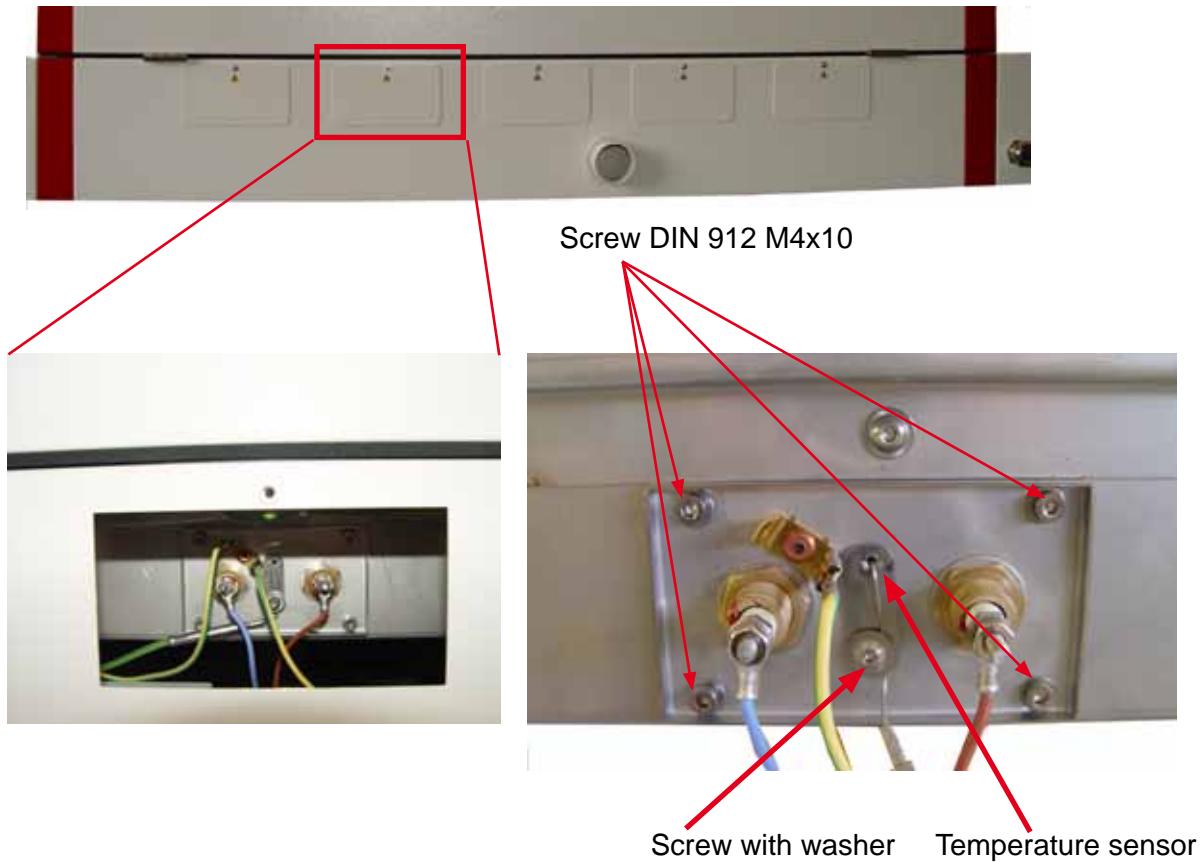


- | Connect the brown wires with the 6,3mm connectors with the temperature switches again.
- | Fix possibly loosen cables with cable straps in the correct position. The wires must not touch the case of the heating modules.
- | Run the green sensor cable in the bottom tray to the controller board RO-R2R and plug-in the connector in the board.
- | Fix the cables again with cable straps as a cable bundle.



- | Close the mounting plate and fix it with the 3 screws ISO 7380 M4x10.
- | After finishing the work you can close the hood again. Therefore loosen the locking of the hood rests by opening the hood completely again. Then close the hood slowly and carefully.
- | Secure the hood against unallowed opening with the hexagon socket screws.

## 9.0 Maintenance and service



## 9.0 Maintenance and service

### Exchange temperature sensor in lower heating zone

In the soldering system 551.1X NiCr-Ni temperature sensors type K are used for the temperature control.

For the exchange of a temperature sensor in a lower heating zone the related cover plate must be opened on the rear side of the oven.



#### **WARNING**

#### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood.



#### **WARNING**

#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

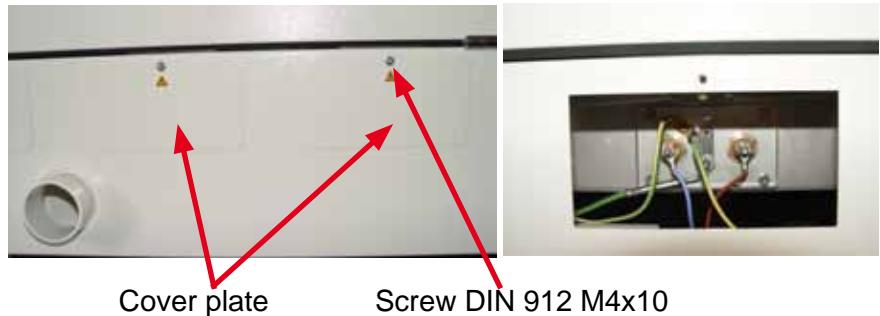
- | Conduct service and maintenance work only with cooled down oven



3 x holding screw M4x10

- | Place the soldering system so that you have access to the mounting plate underneath the inlet.
- | Loosen and remove the 3 rounded head screws M4x10 ISO 7380 with a 2,5mm socket wrench. Keep the plate pressed to the top so that it doesn't swing up uncontrolled.
- | Swing up the mounting plate carefully.

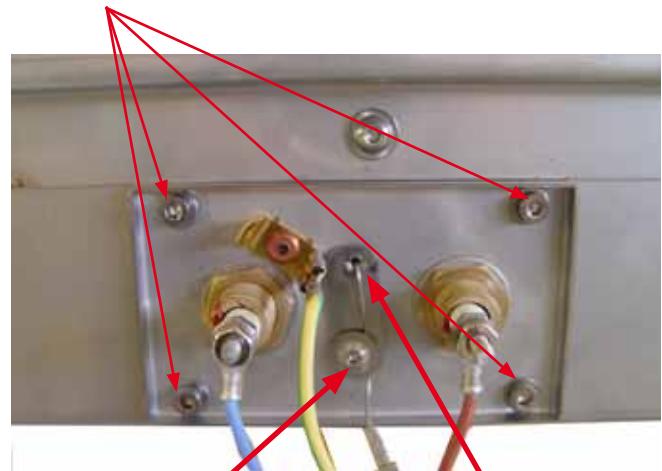
## 9.0 Maintenance and service



### Exchange lower temperature sensor

- | First loosen the screw M4x10 of the related cover plate with a 3mm socket wrench. Remove the cover plate with screw and washer.
- | Open also all cover plates to the right side of the damaged sensor to get access to the sensor cable.

Screw DIN 912 M4x10



Screw with washer      Temperature sensor

- | Loosen the holding screw with washer of the temperature sensor.
- | Pull out the sensor of the small tube.
- | Now follow the cable till the controller board RO-R2, remove possible cable straps carefully and pull out the connector from the board.
- | Now remove the complete mantle thermocouple from the soldering system.

## 9.0 Maintenance and service

### Exchange temperature sensor in lower heating zone

- | Insert a new temperature sensor in the small tube inside the heating module and fix the sensor under the washer. Fix the screw only slightly so that you don't damage the sensor.
- | Run the green sensor cable in the bottom tray to the controller board RO-R2R and plug-in the connector in the board.
- | Fix the cables again with cable straps as a cable bundle.

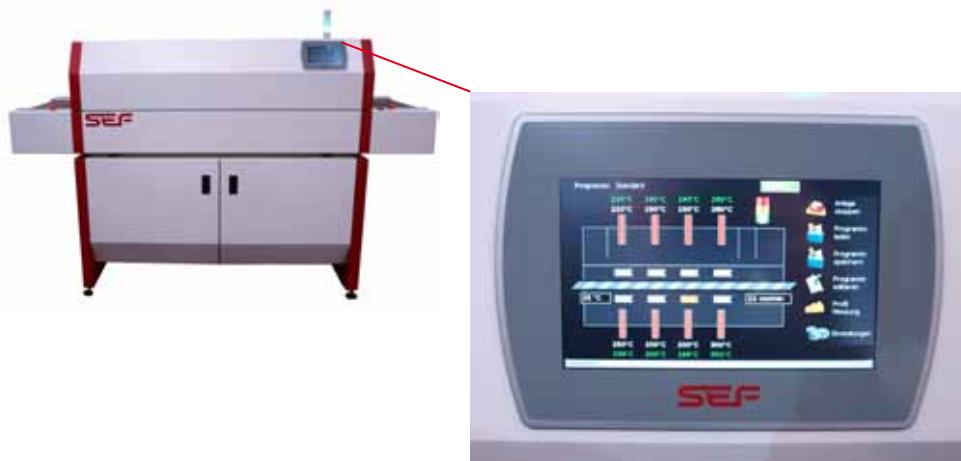


- | Close the mounting plate and fix it with the 3 screws ISO 7380 M4x10.
- | Close all opened apertures with the cover plates and fix them with the screws DIN 912 M4x10 and washers.



## 9.0 Maintenance and service

The operating panel in the machine front is a unit out of touch panel and SBCC-micro controller. In case of breakdown the complete unit can be exchanged easily.



### WARNING

#### Risk of injuries due to electricity / rotating fans

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.
- | Then you can open the machine hood.



### CAUTION

#### Crushing hazard

- | When working with opened hood make sure that the hood rest is snapped and so the hood is protected against unintended lowering.



### WARNING

#### Risk of burns due to high temperatures

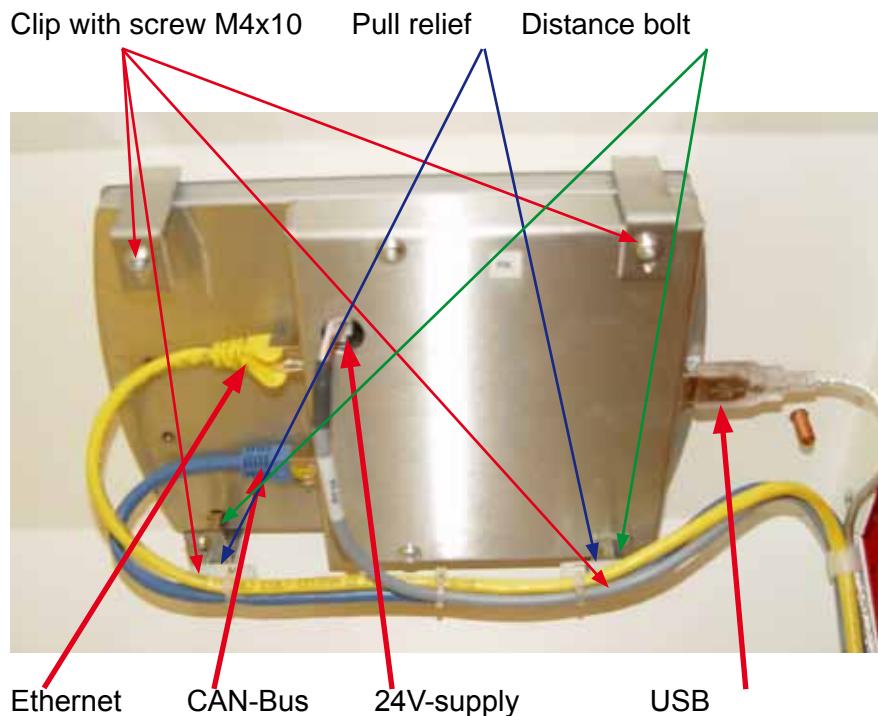
Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct service and maintenance work only with cooled down oven.
- | Disconnect the connection cables from the panel.
- | Loosen the 4 screws M4x10 of the retaining clips with a 3mm socket wrench and remove the screws and retaining clips and the pull relief respectively.
- | Now unscrew the distance bolts and remove the 2 remaining clips.

### Dismount operating panel

## 9.0 Maintenance and service

### Exchange operating panel



- | Lift the damaged panel out of the oven from the front side.
- | Insert the new panel in the machine hood and fix the retaining clips with distance bolts and pull relief again.
- | Connect the cables with the panel again.

#### Mount operating panel



- | After finishing the work you can close the hood again. Therefore loosen the locking of the hood rests by opening the hood completely again. Then close the hood slowly and carefully.
- | Secure the hood against unallowed opening with the hexagon socket screws.

## 9.0 Maintenance and service

The engine electronics with power supply, power conditioning and controller RO-R2R is easily accessible for service mounted on a mounting plate below the inlet zone.

In case of breakdown of a component the mounting plate can be opened by removing the 3 holding screws.



### **WARNING**

#### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.



### **WARNING**

#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct service and maintenance work only with cooled down oven



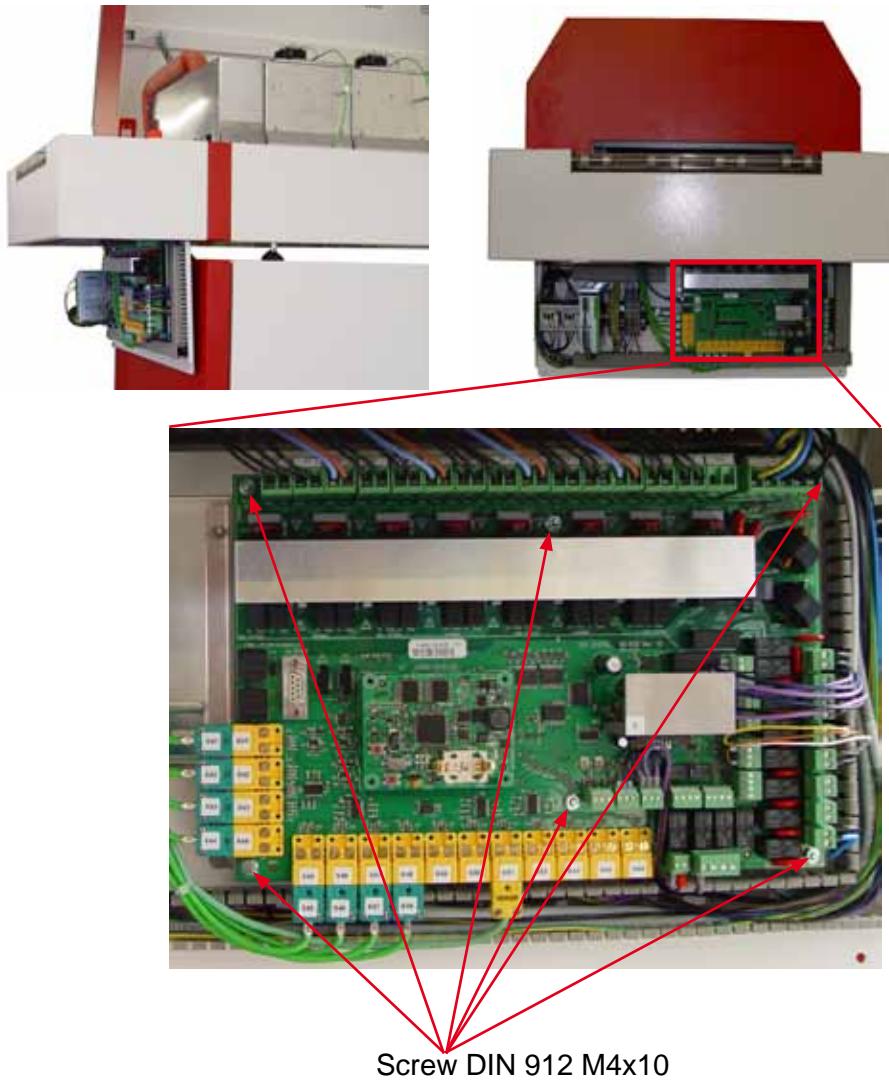
3 x holding screws M4x10

### **Dismount control- ler RO-R2R**

- | Place the soldering system so that you have access to the mounting plate underneath the inlet.
- | Loosen and remove the 3 rounded head screws M4x10 ISO 7380 with a 2,5mm socket wrench. Keep the plate pressed to the top so that it doesn't swing up uncontrolled.
- | Swing up the mounting plate carefully.

## 9.0 Maintenance and service

### Exchange controller board RO-R2R



- | Disconnect all connectors from controller RO-R2R.
- | Loosen and remove the 6 M4-nuts with a 7mm socket wrench and remove the washers.
- | Remove the damaged controller from the holding bolts and place a new controller.
- | Fix the board with the 6 screws and washers and connect all connectors again.
- | Close the mounting plate and fix it with the 3 screws ISO 7380 M4x10.
- | Connect the system with the mains supply again and switch it on.

## 9.0 Maintenance and service

The drive of the conveyor is mounted underneath the outlet zone, covered with a mounting plate and easily accessible for service purposes. In case of breakdown of the motor or drive belt the mounting plate can be opened by loosening and removing the 3 holding screws.



### **WARNING**

#### **Risk of injuries due to electricity / rotating fans**

- | For service and maintenance work you have to switch off the oven according to the instructions and to disconnect the mains plug.



### **WARNING**

#### **Risk of burns due to high temperatures**

Some parts inside the soldering system can reach temperatures up to 500°C during operation.

- | Conduct service and maintenance work only with cooled down oven.

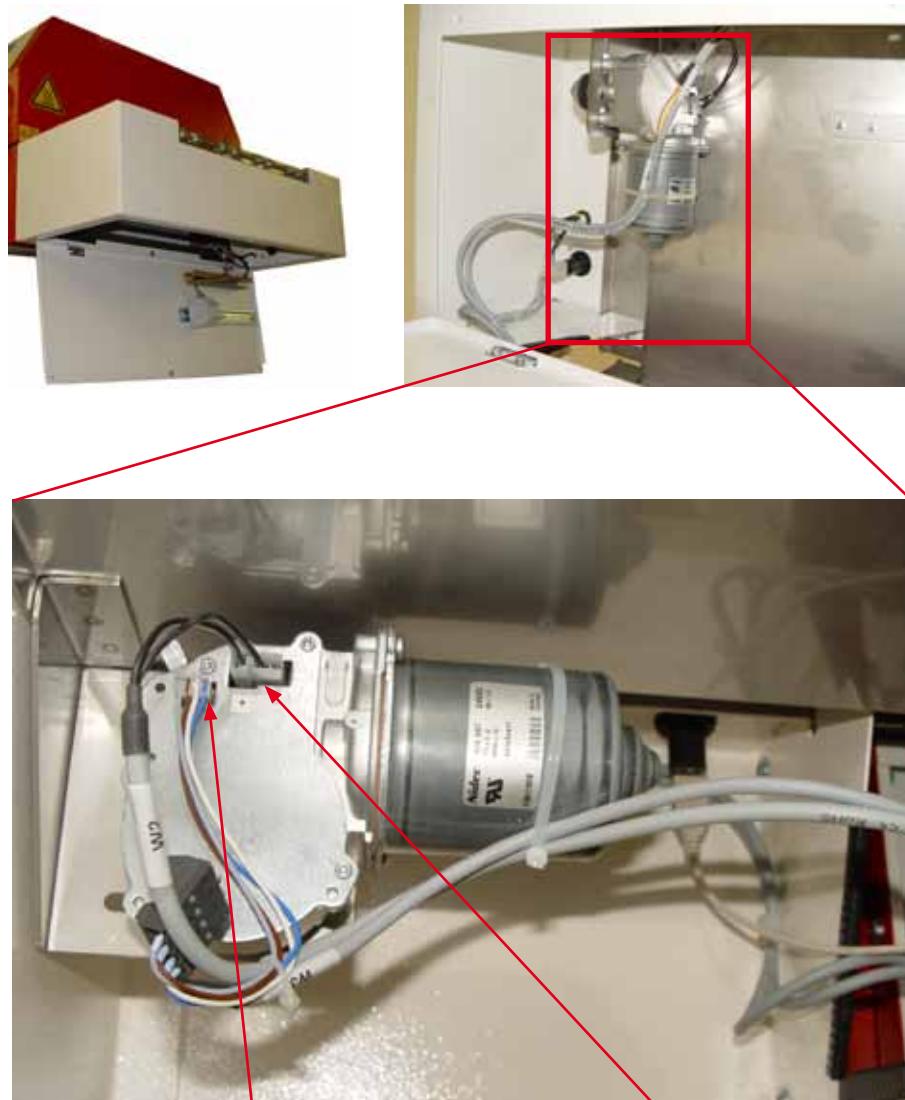


3 x holding screw M4x10

- | Place the soldering system so that you have access to the mounting plate underneath the inlet.
- | Loosen and remove the 3 rounded head screws M4x10 ISO 7380 with a 2,5mm socket wrench. Keep the plate pressed to the top so that it doesn't swing up uncontrolled.
- | Swing up the mounting plate carefully.

## 9.0 Maintenance and service

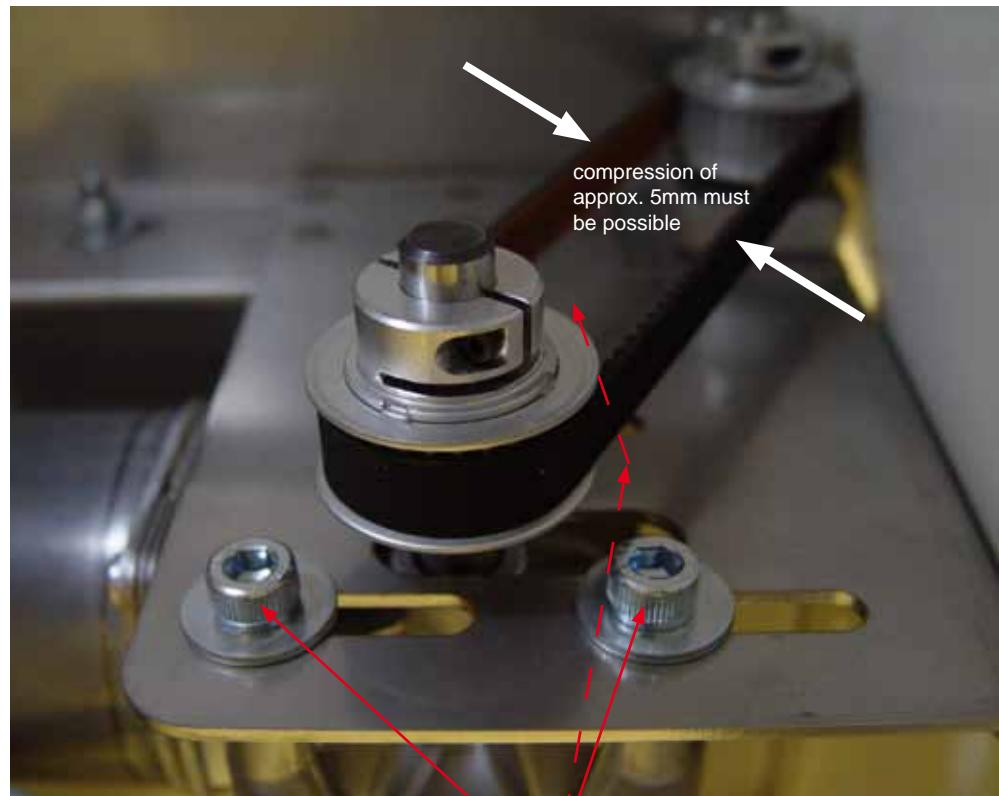
### Exchange motor / drive belt



- | Disconnect both connectors for power supply end encoder from the motor.

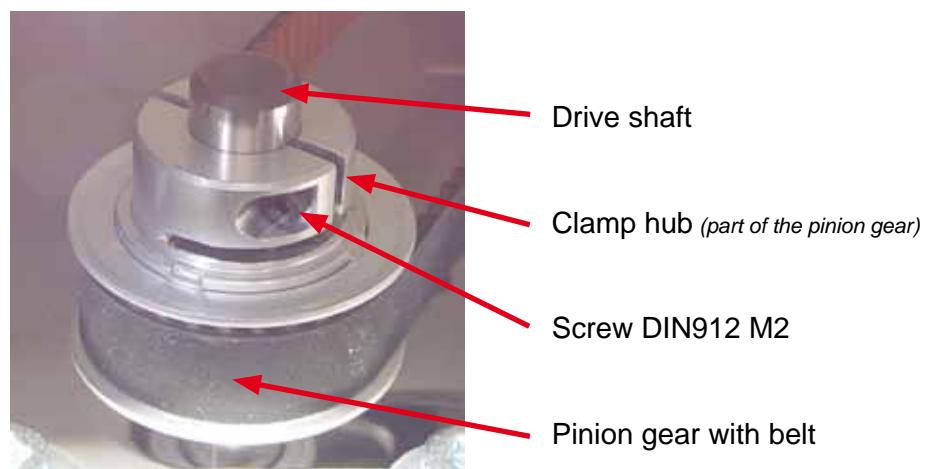
#### Dismount motor

## 9.0 Maintenance and service



- | Loosen the 3 M6 screws DIN 912 with a 5mm socket wrench as far as it is possible to relieve the belt when sliding the motor within the long holes. Don't unscrew the screws completely.
- | Remove the drive belt.

### Dismount drive belt



## 9.0 Maintenance and service

### Exchange motor / drive belt

- | Loosen the screw of the clamp hub with a 1,5mm socket wrench as far as you can remove the pinion gear from the motor.
- | Now unscrew and remove the 3 M6 screws from the motor completely and pull the motor from the motor carrier.
- | Position the new motor with 3 washers and screws at the motor carrier. Don't tighten the screws completely at this point.
- | Place the pinion gear on the motor shaft and tighten the screw of the clamping hub with a 1,5mm socket wrench.
- | Place the (new) drive belt on both pinion gears.
- | Tension the belt by sliding the motor as far as the belt can compressed by hand for approx. 5 mm. Don't tension too tight.
- | Now tighten the M6 screws holding the motor.
- | Connect both connection cables with the motor again.
- | Close the mounting plate and fix it with the 3 screws M4x10.
- | Connect the system with the mains supply and switch it on.

#### Tension drive belt

## 9.0 Maintenance and service

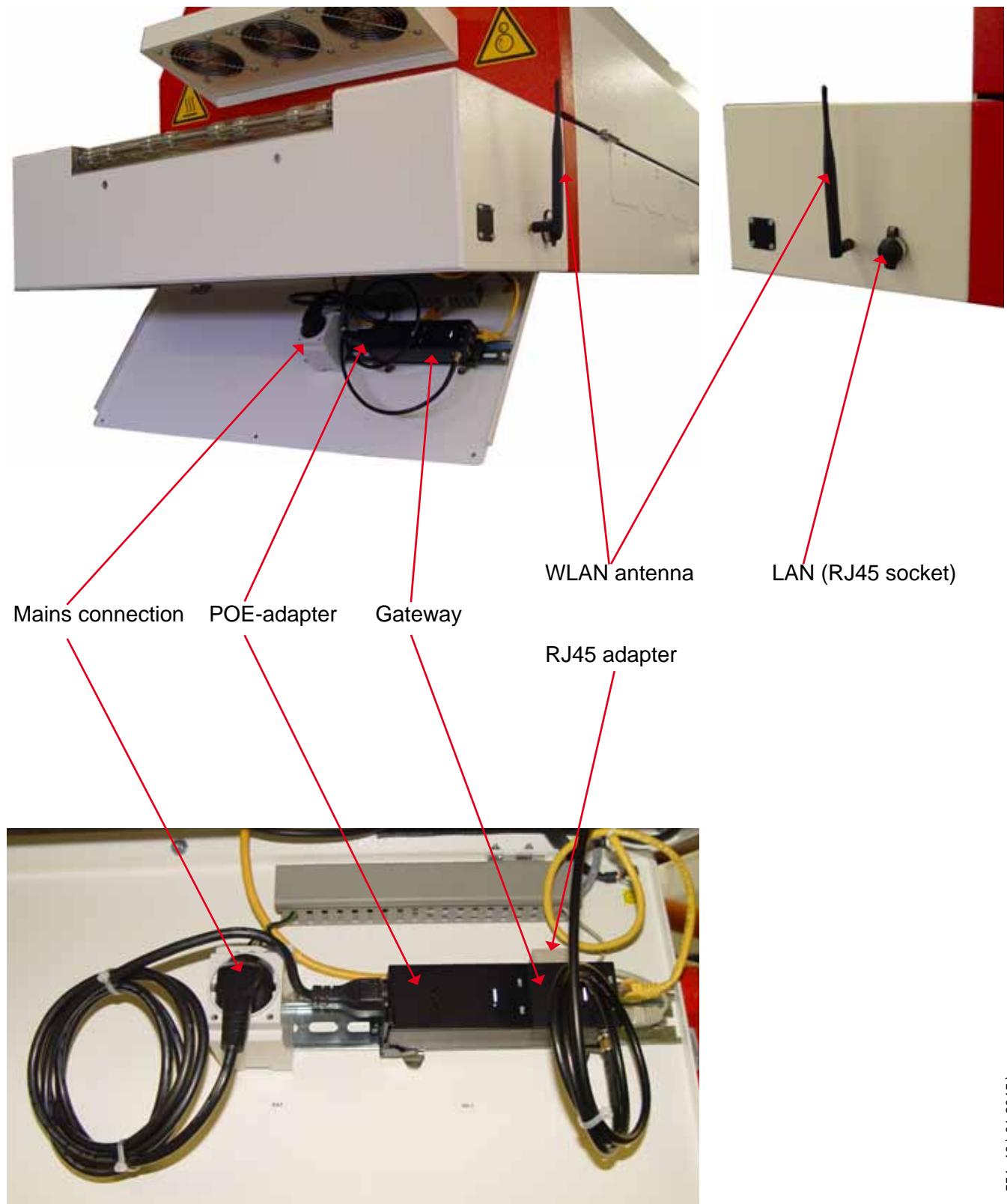
## 11.0 Options and spare parts

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## 11.0 Options and spare parts

### Hardware for the network connection



## 11.0 Options and spare parts

### \* Option Communication Package

The additional upgrade of a soldering oven 551.xx with the option Communication Package allows a network connection of the soldering system via WLAN and LAN.

The necessary hardware is mounted on the mounting plate at the outlet and consists of:

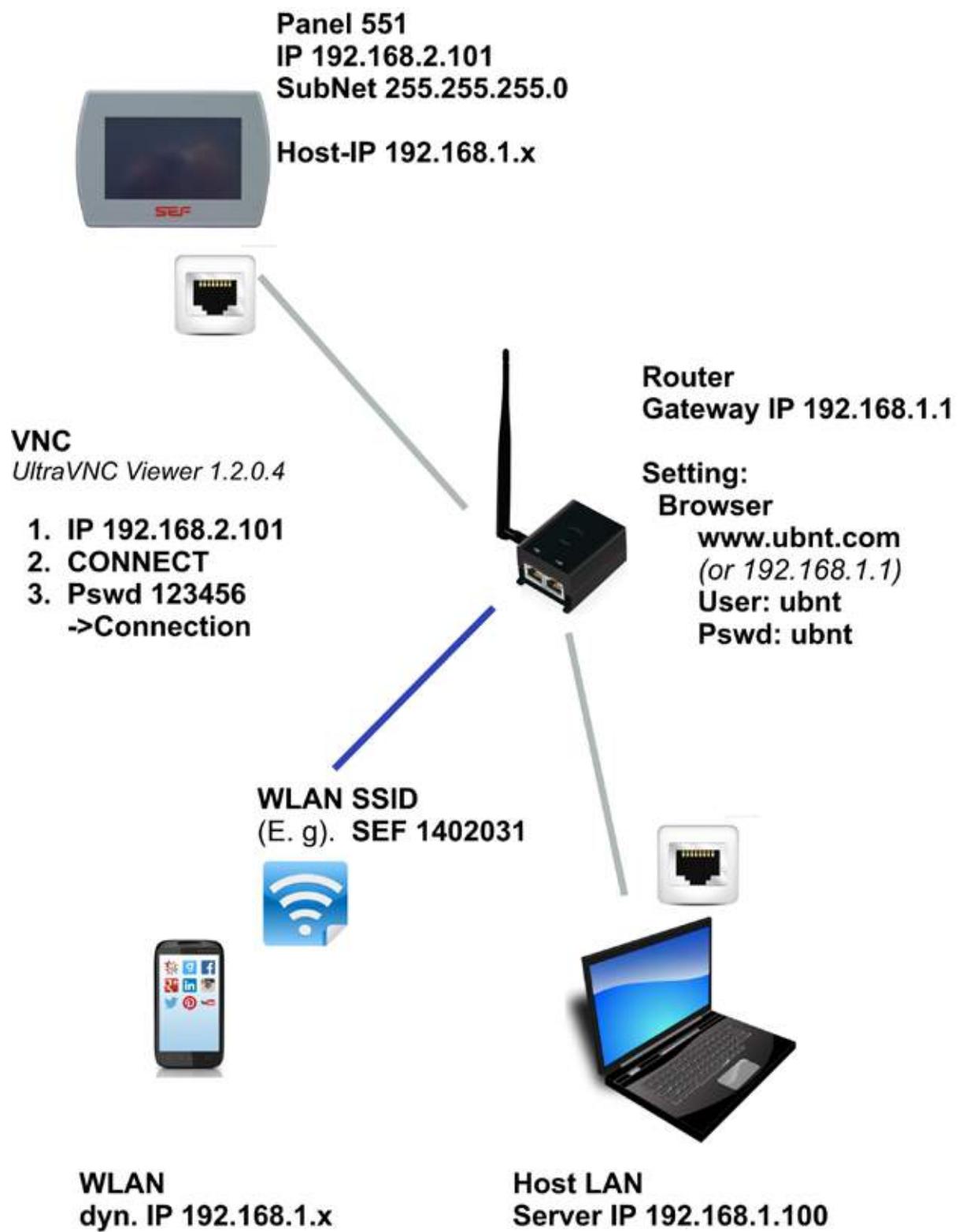
- ◆ Socket for mains connection
- ◆ Power supply for router (POE-adapter)
- ◆ Router (Gateway)
- ◆ WLAN-antenna
- ◆ LAN connection (RJ45-socket)
- ◆ RJ45-adapter (obligatory necessary)
- ◆ Wiring

#### NOTICE

- | Never connect non-PoE devices (Touchpanel 551, Laptops) directly with the PoE-port. Non-PoE devices could be damaged by the voltage applied at the port. Always use the RJ45-adapter.

## 11.0 Options and spare parts

### Network structure of SEF soldering system 551.xx



## 11.0 Options and spare parts

### \* Option Communication Package

Main part of the option Communication Package is an Indoor Access Point with external WLAN-antenna from Ubiquitti Networks.

The operating panel of the soldering system with integrated micro-controller is connected via a network cable with the router.

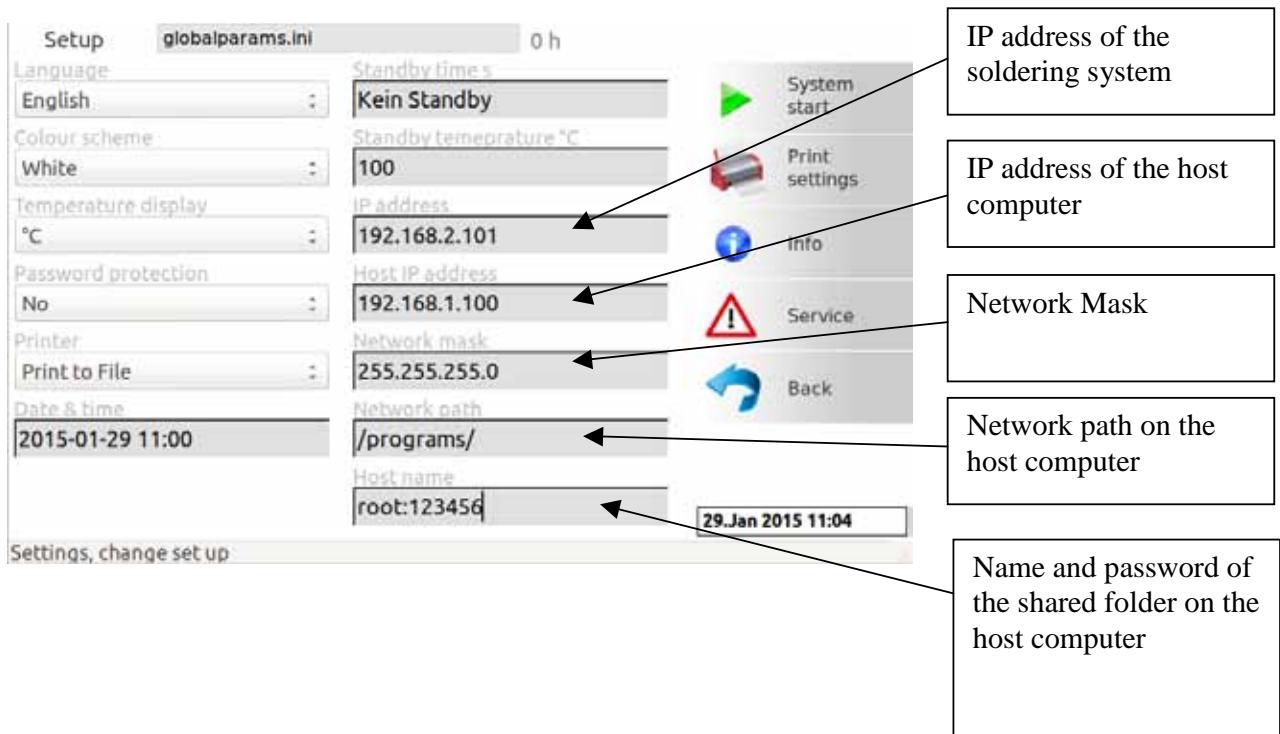
Via the RJ45-socket at the rear side of the machine a connection with a host (Laptop, external server) can be established with the help of a server software to save and load soldering programs.

The soldering system can be also operated via an external server by using an additional VNC-software.

An operation of the soldering system via WLAN by using the VNC-Software is also possible with most of WLAN-capable devices (Smartphone, Laptop, Netbook,...).

## 11.0 Options and spare parts

### Default settings of network configuration at delivery



## 11.0 Options and spare parts

Default settings of the network configuration for soldering system 551.xx at delivery:

**Default settings  
network configura-  
tion**

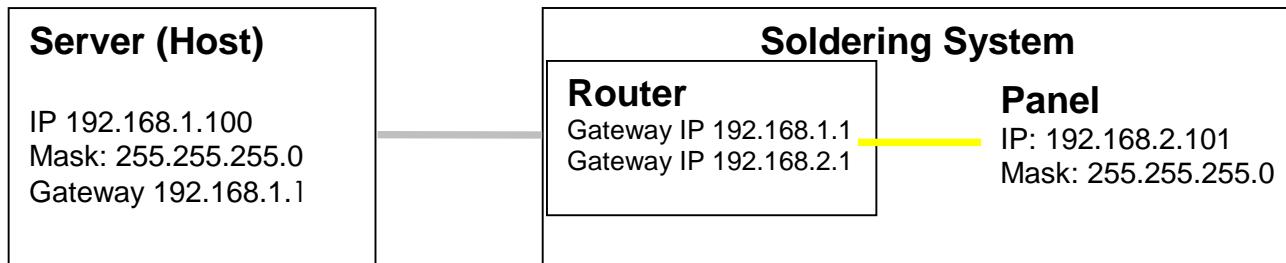
Netzwork configuration	
<b>Soldering system IP:</b>	<b>192.168.2.101</b>
<b>Host (Server IP):</b>	<b>192.168.1.100</b>
<b>Network mask:</b>	<b>255.255.255.0</b>

Router configuration	
<b>Gateway IP:</b>	<b>192.168.1.1</b>

## 11.0 Options and spare parts

### Network setup

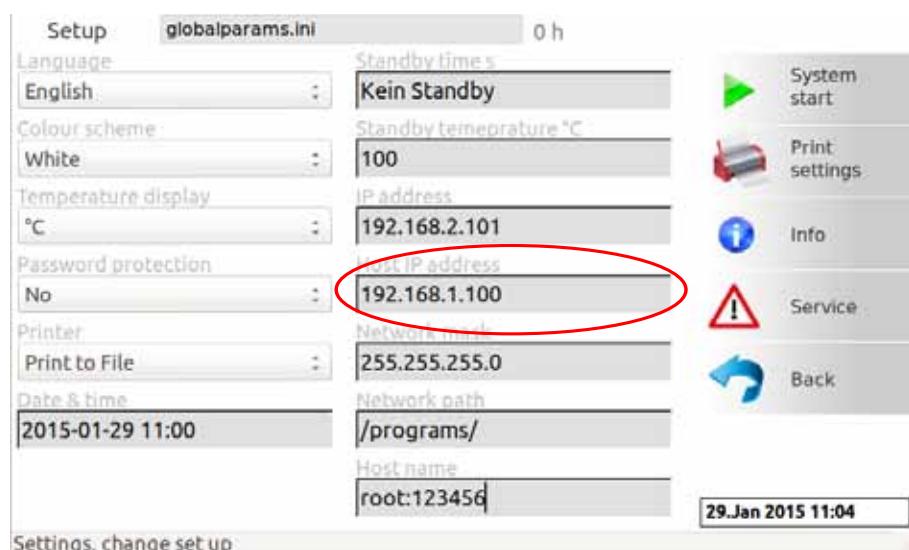
#### Network configuration



#### Windows control panel - network



#### Soldering system software RO-R2 - settings



## 11.0 Options and spare parts

### \* Option Communication Package - network setup

Required equipment:

- ◆ **Windows computer**  
(with operating system Windows 7 or higher and ethernet network interface card,  
further named as network computer)
- ◆ **1 Patch cable**
- ◆ **Server software** e.g. Filezilla Server

Network configuration:

- | Establish a network connection connection between soldering system and network computer with the help of a patch cable.
- | Now enter the network configuration at the server computer. The following entries must be set in the Windows network configuration:

**Host (Server IP):** 192.168.1.100  
**Network mask** 255.255.255.0  
**Gateway IP** 192.168.1.1

The network configuration can be set in the Windows control panel, menu item network.

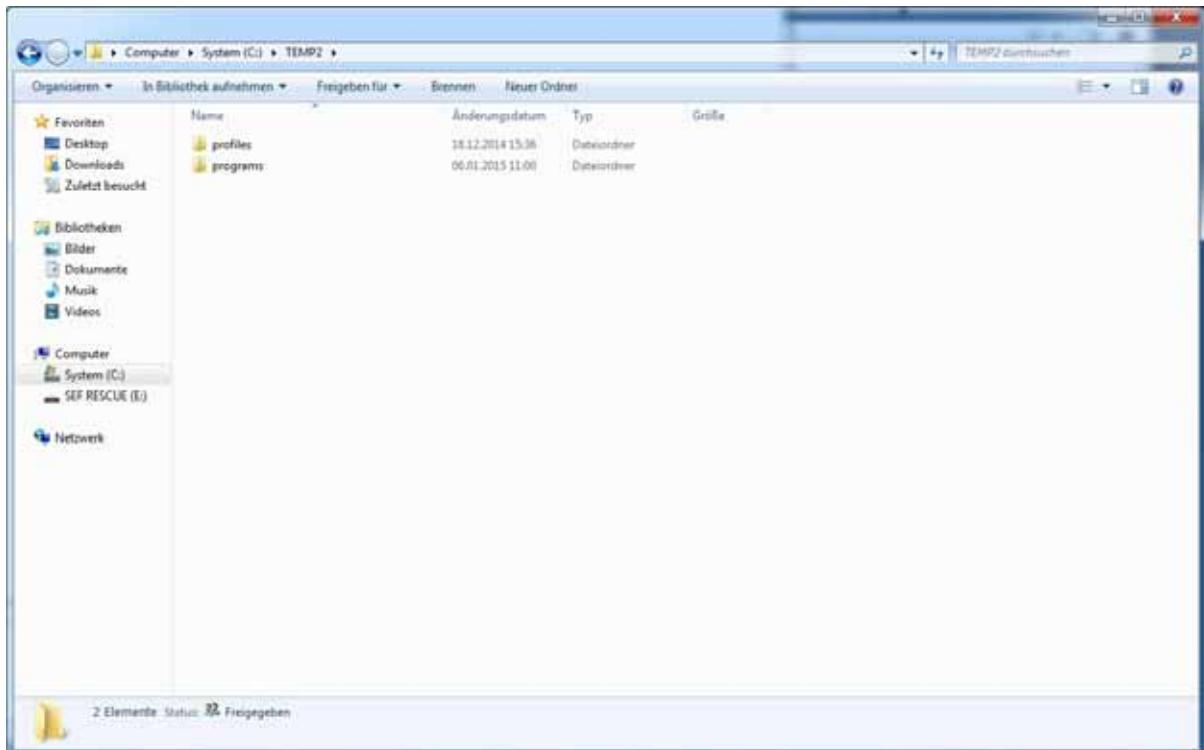
**Network configura-tion**

The IP address of the server computer must correspond with the host IP address set in the soldering system software.

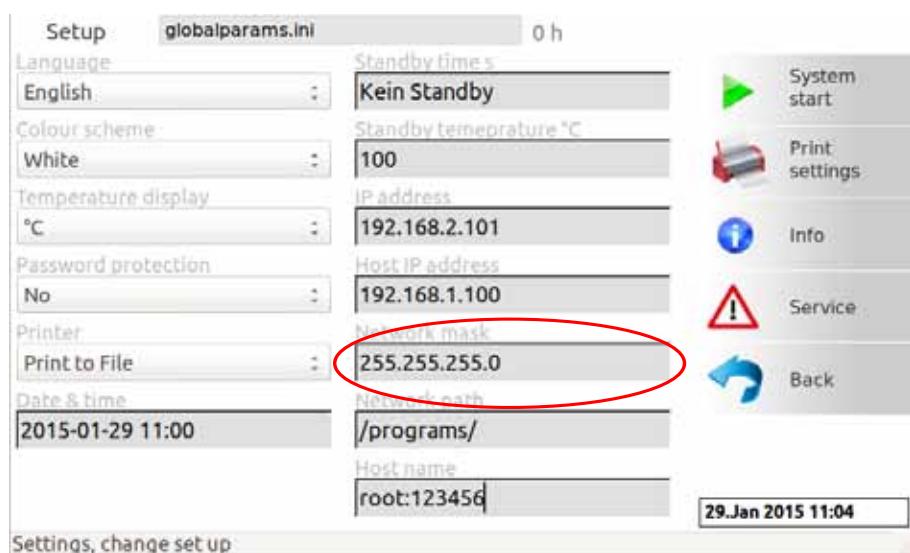
## 11.0 Options and spare parts

### Create directories

#### Server computer - directories



### Soldering system software RO-R2 - settings



## 11.0 Options and spare parts

### \* Option Communication Package - network setup

It is necessary to create special directories on the server computer to get access to the data on the server computer.

- | Create a special home directory for the data of the soldering system 551.xx on your server computer.  
The data of the soldering system can be saved in this home directory.  
In the example shown on the left side this is the directory **temp2**.
  
- | In this directory you have to create two sub-directories with the following names:

**profiles**  
**programs**

It is important to name the two sub-directories exactly in this way otherwise the soldering system software won't find this directories and can't save or load any data!

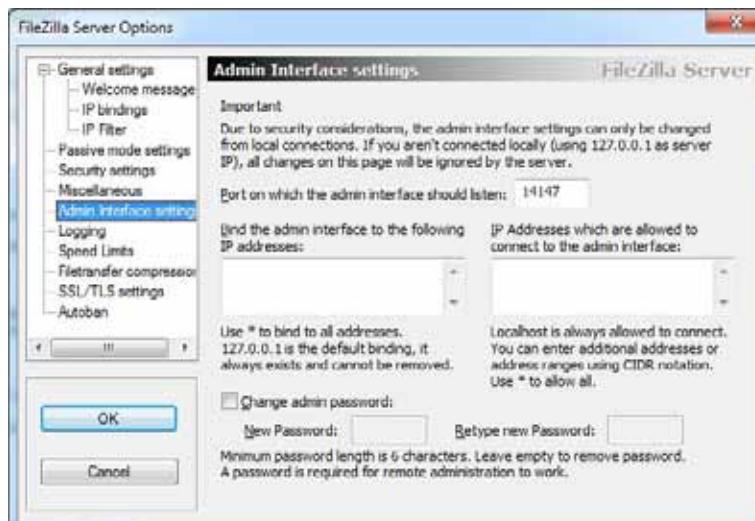
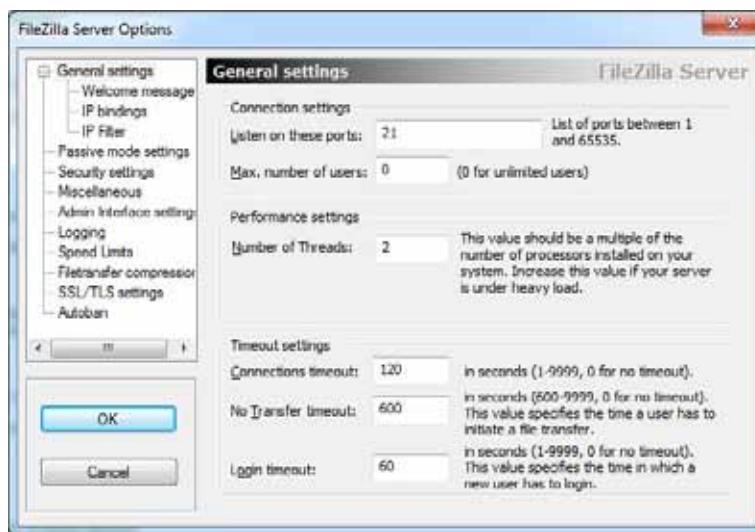
- | Now enter the directory name **/programs/** in the soldering system in menu item "setup".  
The entry must include a slash before and after programs.

#### Create directories

#### Enter directory name in soldering system

## 11.0 Options and spare parts

### Server software setup



## 11.0 Options and spare parts

### \* Option Communication Package - network setup

Setup of the server software

Following the server setup is shown with the software Filezilla Server exemplarily. It's also possible to use a server software from other suppliers.



The soldering system software is using Port 21 for the data exchange with the server. This must be set in the server software.

**Server software port setup**

- | Set **Port 21** in the server software under general settings.

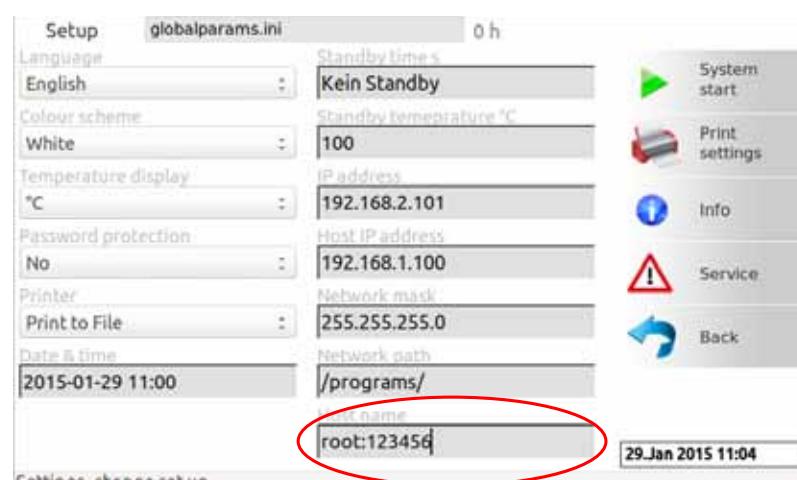
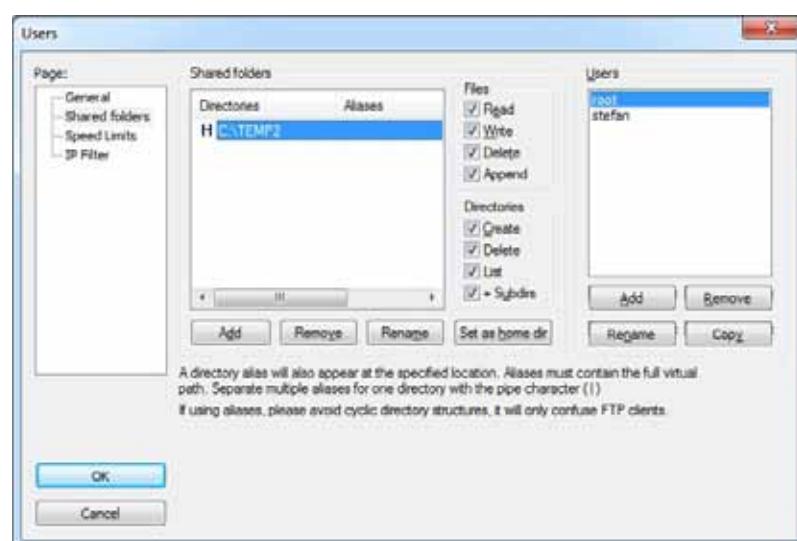
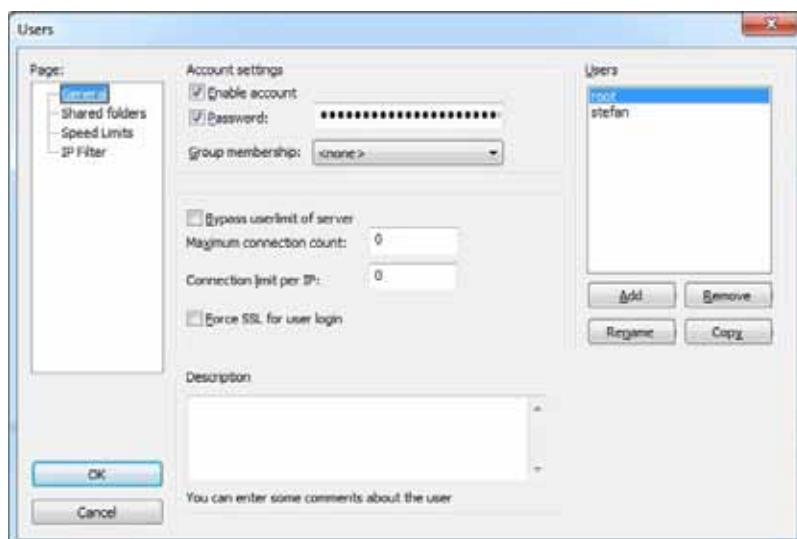
Admin interface settings

**Server software Set admin interface**

- | Set **Admin Interface Port 14147** in the server software under Admin interface settings.

## 11.0 Options and spare parts

### Create user



## 11.0 Options and spare parts

### \* Option Communication Package - network setup

You have to create a user with password in the server software.

#### Create user

- | Create a **User** and enter the required **Password**

in the server software under Account settings.

In this example it is the user root with password 123456

Afterwards the created home directory with the sub-directories programs and profiles must be assigned to the user.

#### Assign directory

- | Link the created user with the in the server software under Shared folders.  
In the show example this is the user **root** with directory **temp2**.

In this example the directory c:\TEMP2 is assigned to the user root. Now it is important to define the access rights too. On the right side next to the directory you can define the access rights.

- | Activate all rights to get full access to the data.

The user and the password must be also entered and checked in the soldering system software.

- | Under **Host Name** enter at first the user name, then a colon followed by the password.  
Syntax host name:  
**<User>:<Password>**

## 11.0 Options and spare parts



The screenshot shows the FileZilla Server interface with two sessions. Session 1 (top) is connected to port 21 with user root and password 123456. Session 2 (bottom) is connected to port 21 with user root and password 123456. Both sessions show a log of file transfers, including files like 'lötten123' and 'lötten123'. The log also includes various server commands such as USER, PASS, CWD, EPSV, and TYPE.

```

FileZilla Server (::1)
File Server Edit ?
FileZilla Server version 0.9.48 beta
Copyright 2001-2014 by Tim Kosse (tim.kosse@filezilla-project.org)
Https://filezilla-project.org/
Connecting to server [:1]14147...
Connected, waiting for authentication
Logged on
Retrieving account settings, please wait...
Done retrieving account settings
(000043)12.01.2015 08:09:03 - (not logged in) (192.168.2.101)> Connected on port 21, sending welcome message...
(000043)12.01.2015 08:09:03 - (not logged in) (192.168.2.101)> USER root
(000043)12.01.2015 08:09:03 - (not logged in) (192.168.2.101)> PASS 123456
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> 230 Logged on
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> PWD
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> 257 "/" is current directory.
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> CWD programs
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> 250 CWD successful. "/programs" is current directory.
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> EPSV
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> 229 Entering Extended Passive Mode ((|49390|)
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> TYPE A
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> 200 Type set to A
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> NLST
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> 150 Opening data channel for directory listing of "/programs"
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> 226 Successfully transferred "/programs"
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> QUIT
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> 221 Goodbye
(000043)12.01.2015 08:09:03 - root (192.168.2.101)> disconnected.
(000044)12.01.2015 08:09:03 - (not logged in) (192.168.2.101)> Connected on port 21, sending welcome message...
(000044)12.01.2015 08:09:03 - (not logged in) (192.168.2.101)> USER root
(000044)12.01.2015 08:09:03 - (not logged in) (192.168.2.101)> 331 Password required for root
(000044)12.01.2015 08:09:03 - (not logged in) (192.168.2.101)> PASS 123456
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> 230 Logged on
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> PWD
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> 257 "/" is current directory.
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> CWD programs
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> 250 CWD successful. "/programs" is current directory.
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> EPSV
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> 229 Entering Extended Passive Mode ((|49391|)
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> TYPE A
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> 200 Type set to A
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> NLST
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> 150 Opening data channel for directory listing of "/programs"
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> 226 Successfully transferred "/programs"
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> QUIT
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> 221 Goodbye
(000044)12.01.2015 08:09:03 - root (192.168.2.101)> disconnected.
(000045)12.01.2015 08:09:11 - (not logged in) (192.168.2.101)> Connected on port 21, sending welcome message...
(000045)12.01.2015 08:09:11 - (not logged in) (192.168.2.101)> USER root
(000045)12.01.2015 08:09:11 - (not logged in) (192.168.2.101)> 331 Password required for root
(000045)12.01.2015 08:09:11 - (not logged in) (192.168.2.101)> PASS 123456
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> 230 Logged on
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> PWD
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> 257 "/" is current directory.
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> CWD programs
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> 250 CWD successful. "/programs" is current directory.
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> EPSV
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> 229 Entering Extended Passive Mode ((|49392|)
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> TYPE I
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> 200 Type set to I
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> SIZE lötten123
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> 213 581
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> RETR lötten123
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> 150 Opening data channel for file download from server of "/programs/lötten123"
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> 226 Successfully transferred "/programs/lötten123"
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> QUIT
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> 221 Goodbye
(000045)12.01.2015 08:09:11 - root (192.168.2.101)> disconnected.

```

## 11.0 Options and spare parts

### \* Option Communication Package - Network setup

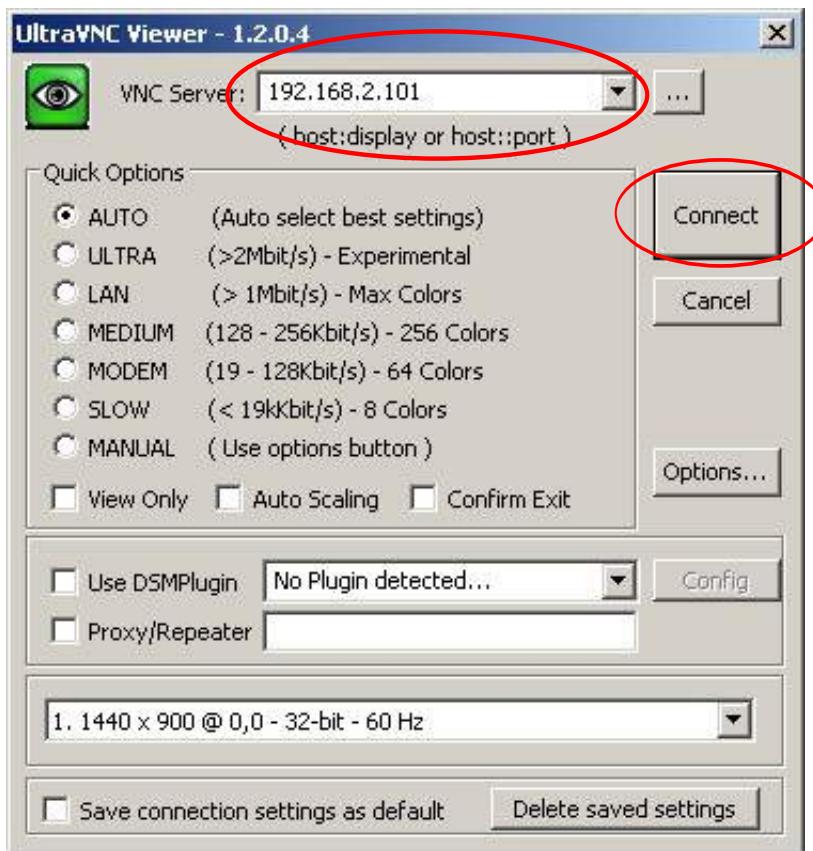
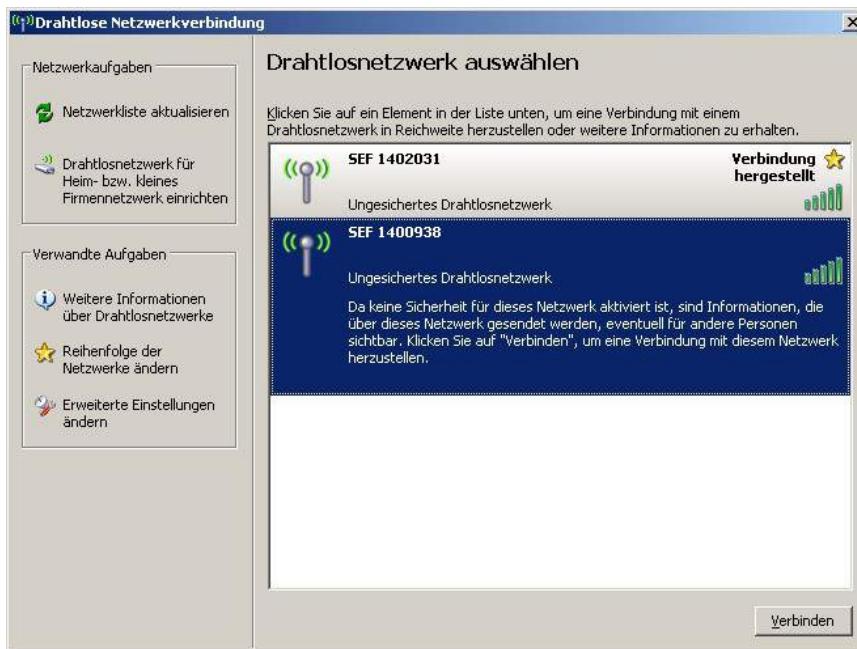
The server is now set and can be used.

Via the soldering system software RO-R2 soldering programs or soldering profiles can be load or saved to the connected server.

At the server computer you can view the interactions between soldering system and server computer. In the protocol for example is shown when the soldering system is connected with the server and which data will be exchanged.

## 11.0 Options and spare parts

### Set up external operation



## 11.0 Options and spare parts

### \* Option Communication Package - external operation

Necessary equipment:

- ◆ **external operating device with LAN / WLAN function**  
(Smartphone, PC, Server,...)
- ◆ **VNC-Software** e.g. UltraVNC Viewer - 1.2.0.4

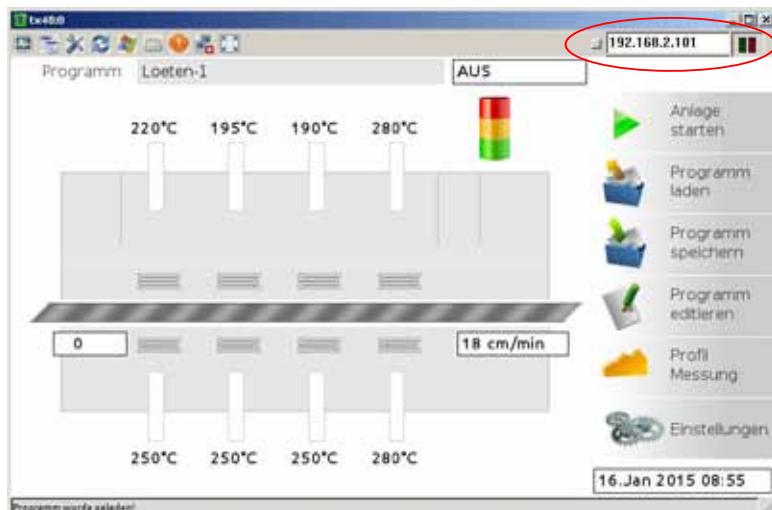
Configure VNC:

- | Establish a network connection between soldering system and server computer with the help of a patch cable or via WLAN.
  - | Now set the network configuration in the VNC software of your operating device (*PC, Smartphone, ..*).
- VNC Server IP: 192.168.2.101**
- | Now establish the connection by clicking on **Connect**.
  - | In the following step enter the password in the authentication window:



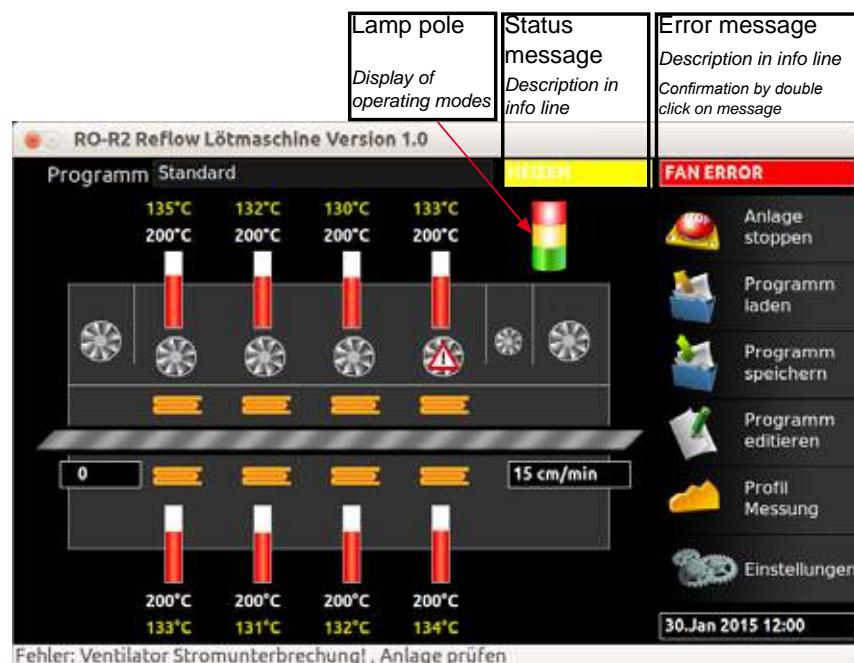
**Password VNC Authentication: 123456**

In the VNC window of your operating device the graphic of the operating panel is now shown and the system can be now operated via your external device.



### Configure VNC

## 11.0 Options and spare parts



## 11.0 Options and spare parts

### \* Option lamp pole for soldering systems 551.10/15/20

The **system screen** informs about all process relevant values of the system. These are the machine status, error messages, set and actual temperatures of all heating areas, the actual temperature of the internal temperature profiler and the conveyor speed.

The operating mode of the reflow ovens series **551** is shown in the display via a signal light.

- \* Optionally the reflow ovens of the series 551 can be equipped with a lamp pole on the hood of the soldering system.  
The lamp pole uses red/yellow/green lamps to show the operating mode of the soldering system and is visible from a far distance.

Display of the operating modes of the soldering system series 551:



green lighting	green blinking		yellow blinking	red lighting	red blinking	Operating mode
*						Soldering system ready
	*					Request to place a PCB
		*				Cooling down
			*			Heating up
*			*			Standby
				*		Machine error
					*	Process error

**Operating mode of the soldering system series 551**

## 11.0 Options and spare parts

## 11.0 Options and spare parts



**570.77 A** Temperature profiler (MESY)  
The measurement takes place in storage mode.

Part no. **95.170.079**

**MESY 570.77 A**  
**Temperature pro-**  
**filer**



**571.77** MESY Thermo insulating box  
With the optional thermo insulating box the MESY can be used inside reflow soldering systems.

Part no **95.170.078**

**MESY 570.77**  
**Insulating box**



**570.80 A** MESY Profiler set  
The thermo insulating box 571.77 and the MESY 570.77 A are also available as a set.

Part no. **95.170.081**

**MESY 570.80 A**  
**Profiler set**



- 571.50** Thermocouple sensor 50 cm length  
Part no. **95.171.050**  
**571.52** Thermocouple sensor 200 cm length  
Part no. **95.171.052**  
**571.53** Thermocouple sensor 300 cm length  
Part no. **95.171.053**

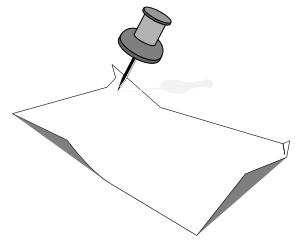
**Thermocouples**

## 11.0 Options and spare parts

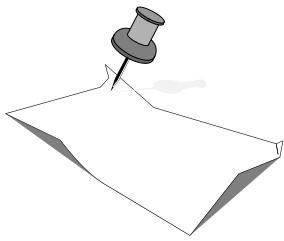
### Spare part list soldering system 551.10 / 551.15

<b>Spare part list soldering system 551.10 / 551.15</b>	
Part no.	Description
	<b><i>Electronic components</i></b>
99148500	Controller Board RO-R2_Rev. 1.0 complete with CPU for 551.xx
99148502	Power supply unit Trios PS 3xAC/24DC/5
94503415	Load contactor 3RT1015-1BB41
	<b><i>Operating elements</i></b>
99148510	Operating panel complete
99148511	Emergency-stop switch complete
	<b><i>Lighting elements</i></b>
99148515	Signal lamp K37cl sr 24VAC/DC (optional)
	<b><i>Bottom tray</i></b>
99174556	Fan NMB4715MS-23T-B30-A00 230V (for machine cooling)
	<b><i>Heating chamber components</i></b>
99148520	Heating element 3000W 230V pre-assembled with 2 elements 1500W (Inlet-and outlet zone top)
99148521	Heating element 2000W 230V pre-assembled with 2 elements 1000W (middle heating zones top)
99148522	Heating element 1500W 230V pre-assembled with 1 elements 1500W (Inlet-and outlet zone bottom)
99148523	Heating element 1000W 230V pre-assembled with 1 elements 1000W (middle heating zones bottom)
99148524	Mantle thermocouple NiCr-Ni (Typ K) 1KV10 - 100 mm - complete with cable 3000 mm
99148525	Hot air fan YJ61-20
99148526	Bi-metal switch 270°C
	<b><i>Drive elements</i></b>
99148530	Gear motor for 551.xx type DCK31 24V
99148531	Mesh belt 440 mm width/ 4,1 m length
99148533	Drive belt FFF-PTBN306P3M-100
99148534	Pinion gear HTCPA30-S3M100-8
99148532	Reflected-light barrier S51-PR-2-C10-PK incl. connection cable
	<b><i>Others</i></b>
94503413	Main switch TO-2-1
99148542	USB-connector for 551.xx complete
99133004	Exhaust fan 2GTA15120/62R (only for option exhaustion)
99148545	Silicon hose for exhaust box 2m, diameter 63mm

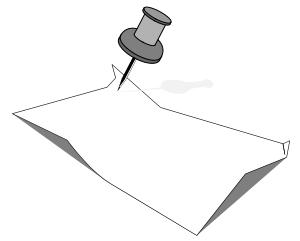
## 12.0 Notes



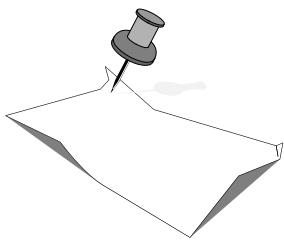
## **12.0 Notes**



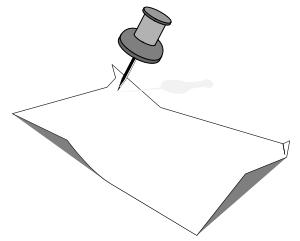
## 12.0 Notes



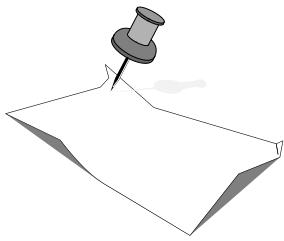
## 12.0 Notes



## 12.0 Notes



## 12.0 Notes



SMD 환경 Reflow 시험장비 최대장비 판매업체

### **SMD Device for "Quality" & "Reliability"**



### **Smart Reflow**

- Wifi, WLAN 환경에서 어떠한 장소에서 Reflow Monitoring, 제어 Control
- Up to 80% Power Saving Reflow
- Heating Module type으로 빠른 유지보수.
- Reflow 문제 발생 시, 부품 이상 유무 인식 알림
- PCB Detection기능으로 Reflow 자동 제어.
- Touch panel extra By USB interface

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- Vapor (증기) Reflow New!
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- Semi Auto Pick & placer (반자동)
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- PCB Coating Machine (PCB 코팅기)
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