

OPTIMAX

OPTIMAX Mammo

Automated X-ray film processor

Model/ID: 117x-x-x000

User Manual

Ident. Nr. 5170-0-0002





NOTE

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These accompanying documents were created and distributed by the documentation department.
Comments and questions about the documentation, please contact:

PROTEC GmbH & Co. KG

In den Dorfwiesen 14 | 71720 Oberstenfeld
Deutschland

Phone: (+ 49) 7062 – 92 55 0

Fax: (+ 49) 7062 – 22 68 5

E-Mail: protec@protec-med.com

Internet: www.protec-med.com

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**NOTE**

The information contained in this document conforms to the configuration of the equipment as of the date of manufacture. Revisions to the equipment subsequent to the date of manufacture will be addressed in service updates distributed to the PROTEC Technical Service Organization.

Document Effectivity

Revision No.	Date	List of effective pages	Comments
4.0	04/12/2018	all	Revision to 2010 housing, new pumps, new main drive, new document layout
5.0	17/04/2019	20, 46,	Warning hot air new, max. power consumption in processing changed to 2,0.

General Notes

Mechanical – Electric Warning



WARNING!

All of the movable assemblies and parts of this equipment should be operated with care and routinely inspected in accordance with the manufacturer's recommendations contained in the equipment Accompanying Documents. Maintenance and service is only to be performed by Customers authorized by PROTEC GmbH & Co. KG. Live electrical terminals are deadly.

To the User



NOTE

The user of this Document is directed to read and carefully review the instructions, warnings and cautions contained herein prior to beginning operation, installation or service activities.

While you may have previously operated equipment similar to that described in this Document, changes in design, manufacture or procedure may have occurred which significantly affect the present operation.

Although the product was subject to a risk analysis and the design corresponds to the current state of the art, residual risk will remain in clinical use. These are displayed in the following user manual by application limitations, contraindications, warnings and precautions.

The installation and service of equipment described herein is to be performed by authorized, qualified **PROTEC GmbH & Co. KG** Customers.

Assemblers and other Customers not employed by nor directly affiliated with **PROTEC GmbH & Co. KG** technical services are directed to contact the local **PROTEC GmbH & Co. KG** office before attempting installation or service procedures.



NOTE

The usage of the product in combination with accessories which aren't authorized by PROTEC is forbidden.

1 Product description

1.1 Introduction

This user manual describes the special features and operational aspects of the OPTIMAX, knowledge of which are required for efficient and effective use of the radiographic system.

Prior to working with the automated X-ray film processor OPTIMAX, it is required that the user read the Safety Notes as well as the chapter regarding operation.



NOTE

These User Manual also applies to the model OPTIMAX Mammo. Even if only the model OPTIMAX is listed in the text.

1.2 Description

The automated X-ray film processor OPTIMAX is a laboratory device used for the automatic development of X-ray films in human medicine.

The device is equipped with a precise roller transport system that can process sheet films. The automatic movie recording starts as soon as a film is entered into the feeder. The film materials are developed, fixed, watered and dried. With the easy-to-use microprocessor control, the processing conditions can be adapted to a wide variety of films and chemicals. The developer and fixing solutions are regulated in their temperature, circulated and automatically regenerated.

These operating instructions give you important information on the installation, operation and maintenance of the device. Please note the information given to ensure the reliable operation of your OPTIMAX.

Optional accessories

The following optional accessories are available for the automated X-ray film processor

Processor stand 1267-0-0000

1.2.1 Installation

See chapter 3.

Contact information's of persons which are qualified to make installations are request able at:

PROTEC GmbH & Co. KG
In den Dorfwiesen 14 | 71720 Oberstenfeld
Telephone: +49 (0) 7062 – 92 55 0
Fax: +49 (0) 7062 – 22 68 5
E-Mail: protec@protec-med.com
Internet: www.protec-med.com

1.3 Product specific characteristics

- Dosage of replenishment based on integrated film surface measurement
- Anti-oxidation- and anti-crystallisation programs
- Automatic tank filling during warm-up cycle
- Compatible with all common types of film and chemicals

1.4 Intended use

The automated X-ray film processor OPTIMAX is intended for the automatic development of X-ray film in human medicine.

1.5 Indications, Contraindications

As the OPTIMAX automated X-ray film processor has no intended primary effect in or on the human body (patient) but is used as laboratory equipment in a darkroom, no indications or contraindications can be identified for this product.

1.6 Intended user group

The automated X-ray film processor OPTIMAX is exclusively designated for use by professional who are trained, in accordance with the corresponding national regulations, in the use of diagnostic X-Ry equipment and its proper (certified) use in connection with other medical products, objects and accessories.

Suitable users could include the following: Radiologist, radiology assistants, radiology technicians, doctors and other medically trained personnel.

1.7 Conformity



This product is in conformity with the requirements of the European Community Medical Device Directive 93/42/EEC from 06/14/1993 including all current revision standards.

The declaration of conformity is available directly from PROTEC:

PROTEC GmbH & Co. KG
In den Dorfwiesen 14 | 71720 Oberstenfeld
Telephone: +49 (0) 7062 – 92 55 0
Fax: +49 (0) 7062 – 22 68 5
E-Mail: protec@protec-med.com
Internet: www.protec-med.com

2 Safety Instructions

**NOTE**

xxx

Contains information that are relevant to the usage.

**CAUTION!**

xxx

Contains information that can cause damage to properties at non conformity.

**WARNING!**

xxx

Contains information that can cause personal injuries at nonconformity.

Adjustments and calibrations that are described within the user manual must be made, with the aid of The technical description for the system, by the **PROTEC GmbH & Co. KG** customer service department or a PROTEC GmbH & Co. KG authorized service technician.

**NOTE**

Every delivered manual has to be read and the safety notes have to be observed.

**CAUTION!**

The manual contains every safety relevant information's for the commissioning of the OPTIMAX. Operating the device is exclusively for special trained staff. In this context there are on every operating element relevant safety symbols. Further information's are on the delivered document-CD. Those information's count as additional information's and have to be observed.

**NOTE**

Every operating elements are descript in the corresponding manual.

2.1 General safety notice

2.1.1 Requirements for operation

To ensure the safe operation of this processor, installation and use should always conform to the instructions contained in this manual.



WARNING!

Non-diluted chemicals are caustic. For this reason, chemicals should be handled very carefully. Avoid contact with skin, always wear protective clothing, gloves and glasses when handling the chemicals.



WARNING!

Inhalation of chemicals can be dangerous to your health and should be avoided. For this reason, always ensure that the room in which the processor is installed is adequately ventilated.



WARNING!

Also when taking the racks out for cleaning or servicing. In case of chemicals getting into the eyes, rinse eyes immediately with cold, running water for approximately 15 minutes, and contact a doctor afterwards.

The developer and fixer chemicals used in the processor should be handled according to the manufacturer instructions. In general: Non-diluted chemicals are caustic. For this reason, chemicals should be handled very carefully. Avoid contact with skin, always wear protective clothing, gloves and glasses when handling the chemicals - for example, when mixing and refilling. Also when taking the racks out for cleaning or servicing. In case of chemicals getting into the eyes, rinse eyes immediately with cold, running water for approximately 15 minutes, and contact a doctor afterwards. Inhalation of chemicals can be dangerous to your health and should be avoided. For this reason, always ensure that the room in which the processor is installed is adequately ventilated.

Environmental regulations regarding the storage and disposal of waste chemicals should be obtained from the local water authorities and complied with.

Before opening the processor switch off the unit and unplug it from the electrical socket. Service and repairs must be performed by trained service technicians only. Use only manufacturer replacement parts.



WARNING!

**Class I ME device (according EN 60601-1).
To reduce the risk of electric shock, this unit is designated exclusively for connection to a supply network with protective earth.**

2.1.2 Operating of the radiographic system

When having troubles with operating of the OPTIMAX, immediately call the Service of PROTEC or an authorized service and stop the using of the OPTIMAX.

2.1.2.1 Operating type

The automated X-ray film processor is designated for continuous use.

2.1.3 Operating personnel

The OPTIMAX should only be operated by personnel who are trained in accordance with the corresponding national regulations in the use and operation of diagnostic X-Ray systems.



NOTE

Only properly trained and authorized personnel are allowed to work with the automated X-ray film processor OPTIMAX.

The user, as well as the service personnel, must pay attention to the warnings, notices and safety instructions located on the device and in the user manual. Failure to comply with the information provided can lead to injury.



NOTE

Operating personnel are required to acquaint themselves with all warnings (warning signs) located on the device. They serve to ensure the safety of the operator as well as others and set a basis for orderly operation.

2.1.4 Ventilation



WARNING!

Inhalation of chemicals can be dangerous to your health and should be avoided. For this reason, always ensure that the room in which the processor is installed is adequately ventilated.

2.1.5 Interaction with external devices

Unwanted interaction with external devices is not known.

2.1.6 Electromagnetic Environment and the influence of devices

The automated X-ray film processor OPTIMAX is intended for the usage in a professional environment of the medical service (e.g. clinic, surgery centers, physiology offices ...)

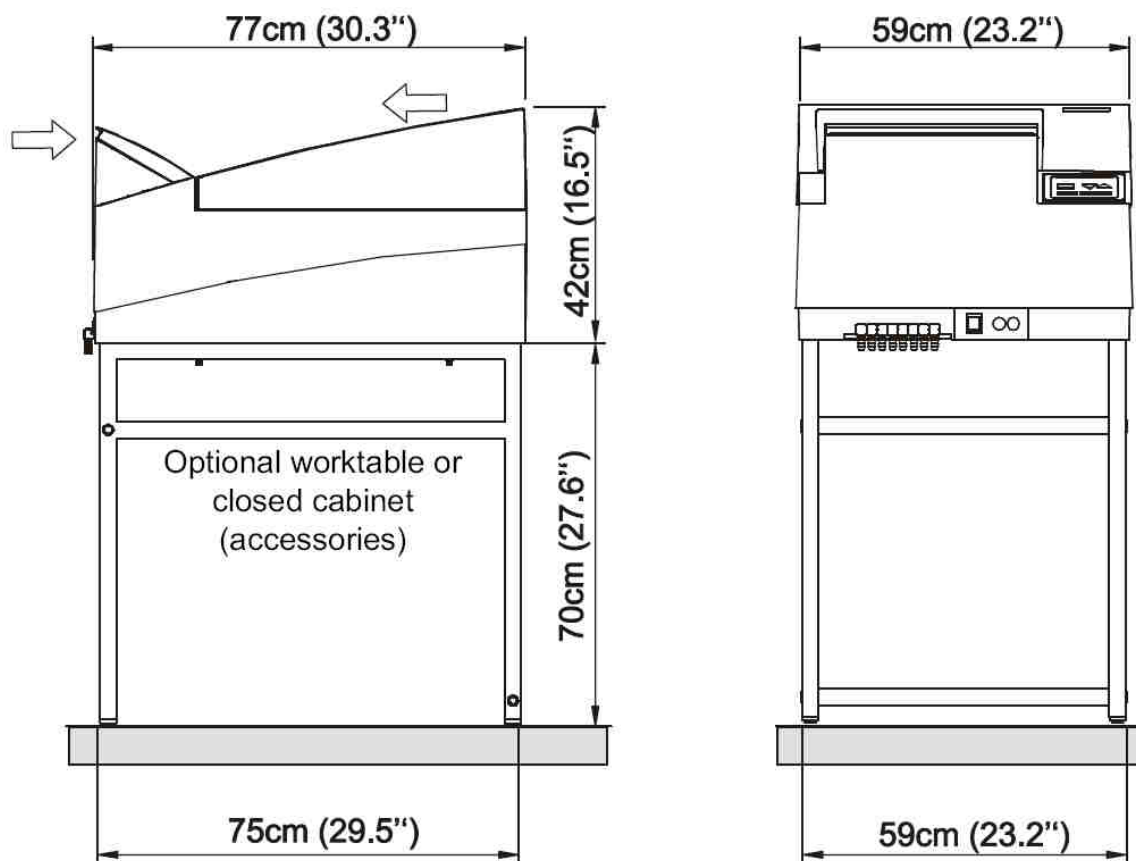
3 Installation



WARNING!

Electrical connections should be carried out according to regulations by an electrician.

3.1 Requirements for installation

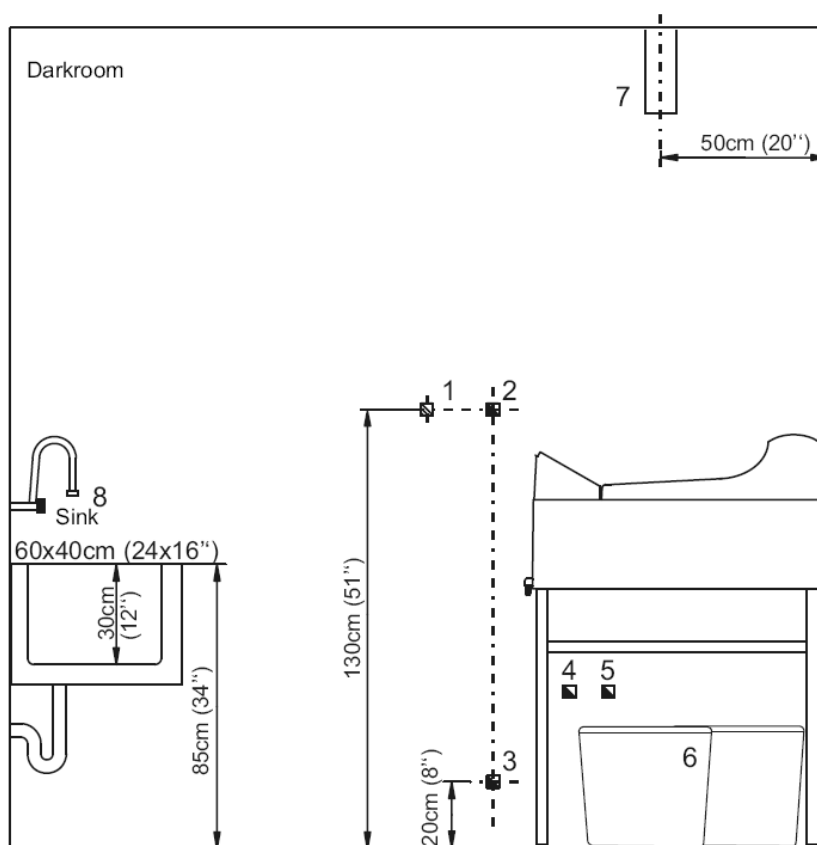


- Fresh water connection: Stop cock with 3/4" outer-thread diameter (washing machine connection), Water pressure 2 - 10 bar (29 - 145 psi).
- Drainage connection: Plastic tube - inner diameter 50 mm (2") or larger. A ventilated syphon which serves as odour preventor should be included in the planning. The drainage tubes should be installed with a fall of minimum 5 %. Local Water Authorities regulations should be complied with.
- Electrical connection: Fused wall socket with earth connection according to electrical data (see technical specifications, see 10). It is also required to install an earth-leakage switch (with 25 A / 30 mA nominal error current).

1. Wall socket
220-240 V, 16 A

model). Power lead should be equipped with Earth-Leakage Switch, 25 A / 30 mA nominal error-current. In addition, a power control switch can be installed.

2. Fresh water connection 3/4" with stop cock, permissible pressure 2-10 bar, water temperature 5-25 °C.
3. Wasserabfluß PVC-Rohr Ø 50 mm (2") mit Siphon.
4. Drainage resp. collecting containers for used developer.
5. Drainage resp. collecting containers for used fixer.
6. Storing space for replenishment tanks: Below machine or externally.
7. Ventilation of darkroom is necessary.
8. Sink with freshwater and flexible hose. Inner dimensions minimum (LxWxH) 60x40x30 cm (24x16x12").



Measures and positions are recommendations

3.2 Transport

Due to the weight and dimensions of the film processor OPTIMAX should always be carried by two persons. To do so, hold the machine at the sides on the bottom (see figure). While putting the machine down, watch the position of the levelling feet to prevent damaging these.



3.3 Installation of processor

Unpack the Processor. Remove cover and transport securing brackets on the sides of the roller racks. Remove roller racks - start with the dryer rack.

In the standard version the OPTIMAX is delivered as a tabletop processor with a two part floor plate. If the machine is upgraded with the optional stand or cabinet, the narrow plastic part has to be removed.

3.3.1 Table-top installation

In the event that the processor is to be installed on a work top or table, the four adjustable feet should be screwed on.



WARNING!

Machine should not be installed on table-top without adjustable feet, as this would block the ventilation openings under the machine and cause overheating.

3.3.2 Installing on processor stand or base cabinet

In the event that the processor is to be installed on the stand or cabinet (optional accessory), the processor will be mounted directly to it. Mount processor according to manual included with stand or cabinet (the adjustable feet inside the accessory bag are not required).

3.4 Finally the processor needs to be levelled:

Place spirit level across the sidewalls of processor and adjust the levelling feet accordingly. Replace the racks into the processor and close the latches.

3.5 Connecting the processor



NOTE

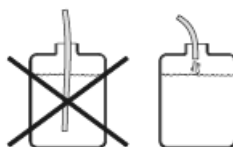
Inform yourself of the local water board regulations regarding drainage. These regulations may differ from information in this manual, but they should be complied with.



WARNING!

Danger of Overflow!

Use the included cable binders (accessory bag) to secure the hoses. Fix all hose ends which guide into syphon or collecting container, so that they do not drop into the liquid.

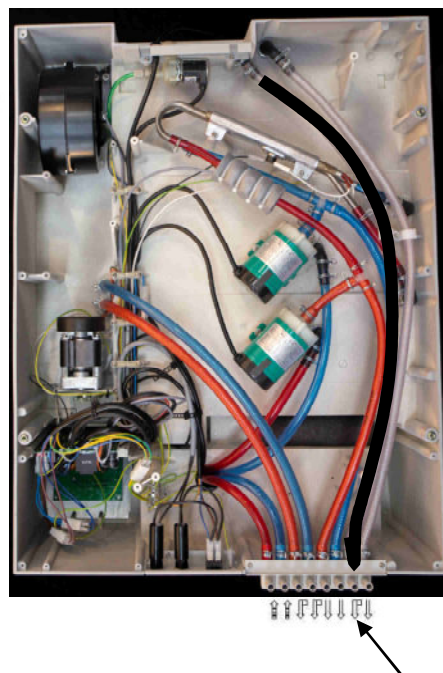
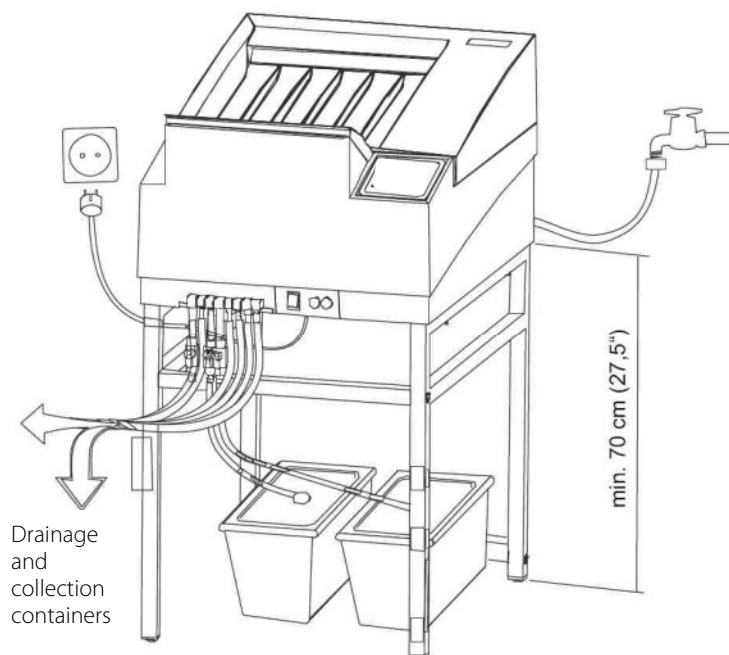
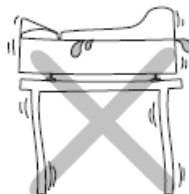


WARNING!

The hose piping should be straight (without the hoses going up and down) with a constant fall. The hoses should be as short as possible and without bends and kinks. This is very important for the water overflow hose. Bad piping work will cause the machine to overflow!

**WARNING!**

If the machine is installed table-top, ensure that the table is stable enough and does not wobble.

**3.5.1 Water connection**

Fit water-inlet hose (grey) at the rear of the machine and connect to the prepared fresh water supply.

3.5.2 Water overflow

The water overflow hose ($\varnothing = 16\text{mm}$) is likewise connected at the rear of the unit. The hose is installed as described in the next section.

There are two options for installation of the water overflow at the front of the unit. Install the pre-assembled hose in the unit and connect it to the overflow outlet at the unit front. Upon delivery this outlet connection is a dummy only (see graphics on the top right).

All other hoses (see graphic 3.5.3). Connect the enclosed hoses according to colour system onto the front of the machine. Put hose clip (enclosed in accessory bag) over hose end, before attaching to connection. Warm up hose end (with hot water or hot-air fan) and push it onto the respective connection. Finally push clip over hose and connection.

Cut hoses to required length. Then integrate the stop cocks into the three drainage hoses in such a position, that they are easy to reach.

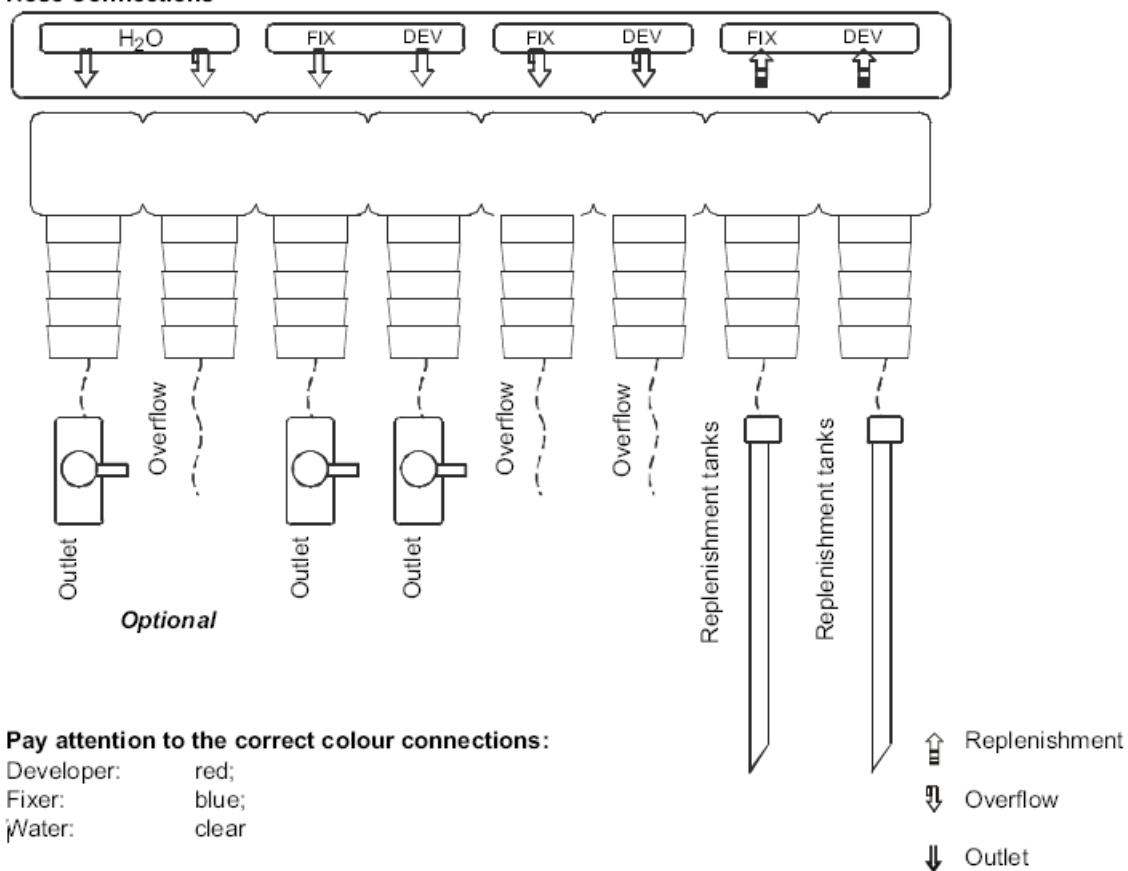
Connect the suction pipes to the hose ends for the replenishment tanks using hose clips. Put suction pipes through cover opening into respective replenishment tanks and snap them in.

The overflow and drainage hoses from the developer and fixer should be guided into their respective collecting containers.

The overflow and the drainage of the water can either be guided into the drainage syphon or into respective collection containers.

3.5.3 Hose Connection

Hose Connections



3.6 Initial Operation

3.6.1 Test run



CAUTION!

Processor should not be run dry!

Upon commissioning and every refilling the pumps must be vented.

- 1 Close the three drainage stop cocks and fill the tanks and replenishment containers with water. Open water inflow tap. Connect electrical socket and switch the machine on. Water now flows into water tank. The circulation pump activates, however the hosing of the machine must be ventilated.
- 2 Ventilation of the replenishment pump: Set temperature dial to position „Manual pumping“. Keep dial to this position until no more air bubbles rise in the tanks.
- 3 Ventilation of the circulation pump: If air is in the circulation pump, a loud running noise can be heard. Switch the machine off again. Open the stop cocks of the developer and fixer for five seconds and then close them again. Then switch the machine on again. Repeat this procedure until no more air bubbles are visible in the developer and fixer baths and until the circulation pump runs quietly.
- 4 Check all hose connections for leakage. Switch machine off and drain water out.

3.6.2 Fill processor with chemicals

Prepare chemicals inside the replenishment containers according to manufacturer instructions.

3.6.2.1 Fill up processor manually

By using a suitable container, pour chemicals into the respective tanks. First the fixer and then the developer. Caution: when filling, be sure that chemicals do no splash from one bath into another. When fixer solution is mixed with developer solution, the developer chemical is destroyed.



CAUTION!

When filling by hand, do not pour chemicals into the slot of the lid switch and on the control panel. This can lead to damage of the parts.

Snap each suction pipe into the respective cover of its replenishment container and close it carefully. Place containers under processor.

3.6.2.2 Using replenishment pump

Filling of processor can also be done by use of the replenishment pump (this takes much more time). The chemicals containers need to be filled manually with at least 1.0 litres of fresh chemicals, to ensure the pumps will not run dry. Snap each suction pipe into the respective cover of its replenishment container and close it carefully. Place containers under processor. Now set the temperature adjusting knob to position „Manual pumping“. Leave the knob in this position until the tanks have been filled. After 20 minutes this function stops automatically - to restart a cycle, turn dial to another position and return to „Manual pumping“. »Limitation: **Limitation:** The function may fill up tanks of developer and fixer to different levels. This may be due to different causes. If this happens, then use a suitable container to fill up the tanks completely.

4 Control elements and device displays

4.1.1 Control elements and device displays

LED displays

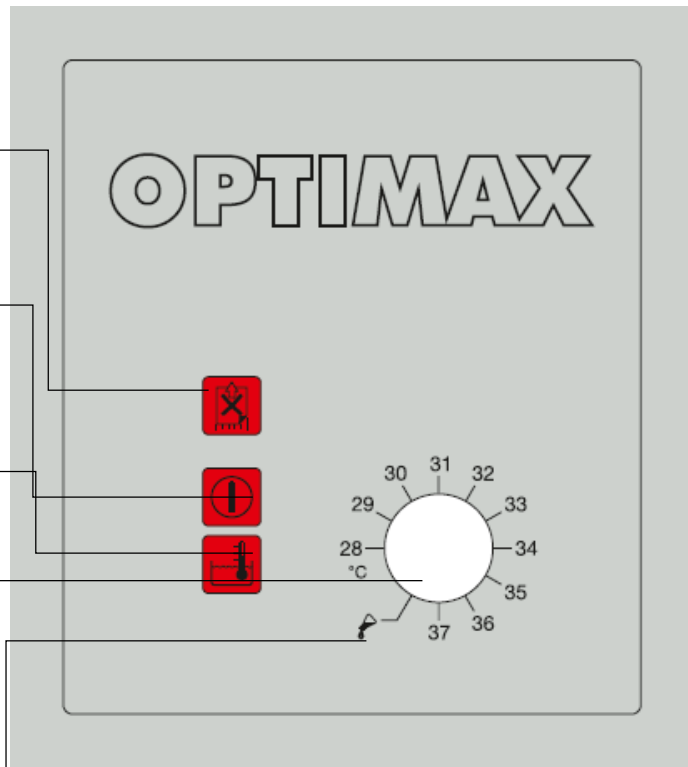
Infeeding film
Wait with the next film until light goes off.

Power
When power is on the LED lights up.

Bath temperature
Flashes when temperature is not reached.

Temperature dial

Manual pumping



NOTE

Safety function stops film transportation when cover is removed.
Therefore keep cover placed on the machine when processing films.

5 Handling / Operation



CAUTION!

Upon first operation and each refilling of a developer check the function of the circulation pump and vent the pump if required (see 3.6.1 / 2)



CAUTION!

Never start the machine up unless it is filled with liquid!



CAUTION!

Do not place any object on the processor.



NOTE

High or low room temperature may influence the function of the film processor machine.



WARNING!

Hot air can escape when opening the light protection cover!
Surface film feed tray (sheet) can be hot!

5.1 Operation

5.1.1 Before use

- 1 Close water-drainage stop cock
- 2 Open water tap
- 3 Switch processor on
- 4 Check liquid level in replenishment and drainage collecting containers
- 5 Wait until the developer temperature is reached. If the temperature has not been reached, the bath temperature light is flashing
- 6 Run cleaning films through processor

5.1.2 Working procedure

- 7 Processing films:
Open light protection cover. Important: Put film first on *left* side of infeed tray and then feed in.
During processing films please watch the display „Infeeding film“.
-



NOTE

Put the film first on left side of infeed tray and then feed in.



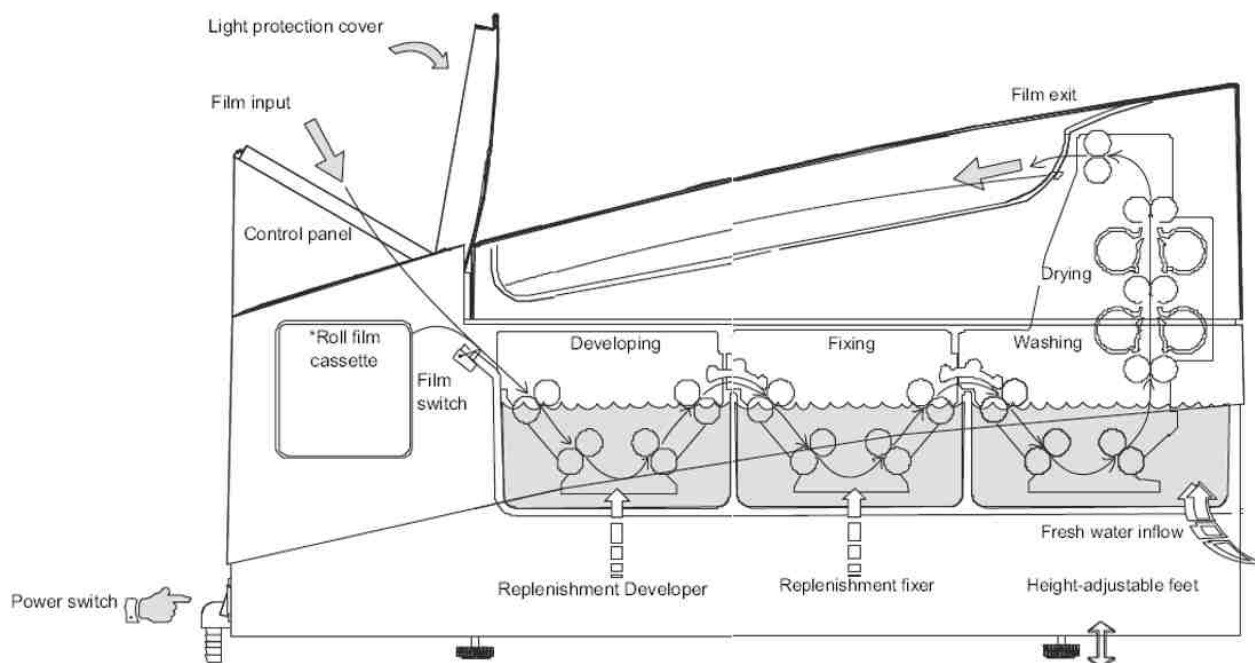
CAUTION!

During processing films not the display „Infeeding film“

If this is lit, wait until it goes off again and an acoustic signal can be heard, before inserting the next film.

5.1.3 After work

- 8 Switch processor off
- 9 Close water tap
- 10 Open water-drainage stop cock and drain water out of the machine.



5.2 Function of the automated X-ray film processor

5.2.1 Stand-by mode

When no film is being processed, the machine switches to Stand-by. The chemicals remain at a constant temperature. The film transport and water inflow activate at intervals to avoid crystallization of the chemicals on the transport rollers. Entry of the next film is possible at any time.

5.2.2 Switching on the machine

The processor is switched on at the main switch on the front side. After switching on, the water tank will be filled up and a replenishment cycle will be carried out. The developer bath will be heated up. If the temperature has not been reached, the bath temperature light is flashing. When the machine is ready and the developer temperature has been reached, a long signal sound is heard.

5.2.3 Bath temperature

The processor heats up the chemicals automatically to the dial-set temperature. When this temperature is reached for the first time after switching on the machine, a long signal tone can be heard. This is also the case when the temperature is changed by the dial switch. If the difference between actual and dial-set temperature is more than 1 °C, the bath temperature LED will flash. If a film has been fed in and the temperature is not reached, a warning sound will be heard.

5.2.4 Display "In feeding film"

If films are fed into the processor without clearance one after another, then this may cause a film jam. The light „In feeding film“ is on during in feeding a film. After the film has been fed in completely the light goes off. Additionally an acoustic signal indicates that the next film can be fed in.

5.2.5 Manual pumping



NOTE

Both chemical pumps - fixer and developer - are driven parallel by only one motor and therefore they run always together.

The function „Manual pumping“ activates the replenishment pump. It pumps chemicals into the tanks in addition to automatic replenishment. To do so, turn the temperature dial to the position „Manual pumping“. This function is available only in standby mode (when there is no film in the unit). If the dial is left in this position, the pumping function is stopped automatically after 20 minutes. To restart a cycle turn dial to a temperature and return to „Manual pumping“.

Please note: Films cannot be processed when dial is set to „Manual pumping“. Also bath temperature is set automatically to 28 °C during „Manual pumping“. After ending the manual pumping the temperature must be set again by turning the dial. It takes some time until the temperature is reached (look at the bath temperature display).

5.2.6 Anti-crystallization function

During the stand-by mode, the film transport, the dryer ventilation, the dryer heating and the water inflow are activated every 20 minutes for a period of 20 seconds. This prevents the build-up of crystals on the rollers.

5.2.7 Time replenishment (Anti-oxidation function)

Also during the stand-by, the developer chemicals are subject to change which causes their deterioration. By means of the time replenishment, a replenishment cycle is activated after 60 minutes without replenishment. The pump runs for 15 seconds. With this function, the quality of the developer chemicals are maintained even when standing idle for long periods.

5.2.8 Automatic replenishment

Depending on the processed amount of films the chemicals are replenished automatically. This is done by pumping chemicals from the replenishment containers. By means of the film detection switch at the film-infeed, the surface of the processed films is calculated and after approx. 0.25 m² a replenishment cycle is automatically activated for 40 seconds. The replenishment volume per cycle (with pump set at 100 %) is 150 ml. The table below shows the replenishment volume in ml per m² film surface, dependent on the film width and the pump setting.

Replenishment Rate		
Film width	Setting of replenishment pump*	
	100% (85%)**	75% (62%)
35 cm	600ml/m ²	450ml/m ²
24 cm	870ml/m ²	650ml/m ²
18 cm	1150ml/m ²	875ml/m ²

*Setting at 50 Hz current resp. settings at 60 Hz current are in brackets

**Standard setting

5.3 Problems and Solutions

5.3.1 Advice on Film Defects

Your processor has been constructed for long term use. If however irregularities might occur, you will find help to locate the problem below. Please check the listed points, before calling your service-technician.

5.3.1.1 Films do not have enough density

- Bath temperature is too low
- Developing time too short
- Exposure time is too short
- Replenishment rate of developer too low
- Developer chemicals are exhausted or too strong diluted: Renew

- Fixer solution has been mixed into developer: Renew. Clean and rinse bath well before refilling
- Circulation is broken down

5.3.1.2 Too high a density

- Bath temperature too high
- Developing time too long
- Exposure time is too long
- Replenishment rate of developer too high
- Developer chemicals are too high diluted: Renew
- After renewing chemicals: Starter is missing
- Circulation is broken down

5.3.1.3 Films will not dry

- If warm air comes out of the air channel in the dryer, chemicals and film type should be checked
- Fixer solution is exhausted or diluted

5.3.1.4 Film has a yellow-green surface

- Not fixed correctly. Check the film type and fixer chemistry
- Fixer solution is exhausted or diluted. Replenishment rate of fixer is too low

5.3.1.5 Scratches, pressure marks, dirt on film

- Prior to processing films, run cleaner films through the processor
- Pressure marks caused by careless handling, finger nails etc
- Rollers are polluted. Clean tanks and roller racks

5.3.1.6 Cloudy film

- Level in developer is too low
- First guide bar of fixer rack is dirty (condensate or crystals). Clean roller racks
- Developer is old or circulation not working
- Try processing films by infeeding them with emulsion side up

5.3.2 Advice on Machine Errors

5.3.2.1 Machine does not switch on

- Ensure that electrical plug is firmly inserted into socket. Ensure that electrical socket has power supply by testing with an appliance (e.g. table light)

5.3.2.2 Film will not feed in but the dryer fan works

Place cover firmly on machine, ensuring that the cover switch on the right front side has been activated.

5.3.2.3 Machine does not start automatically

Film switch left side at the infeed has not been pressed down. Feed in the film to activate the switch.

5.3.2.4 Developer temperature too low

The temperature dial is set between two positions.

5.3.2.5 Replenishment pump does not pump

- Check whether the replenishment containers are full and that the end of the suction pipe is positioned under the liquid level.
- Check whether there is air in the replenishment pipes. If this is the case, then check the pipe connections.

5.3.2.6 Rinsing water does not flow

- Open water inflow tap
- Water pressure in the water system is too low: Minimum pressure 2 bar (29 psi)

5.3.2.7 Water tank overflows

- Water drainage hose (overflow) is bent. The hose end should be positioned above the drainage level in the syphon (see diagram on page 12)
- Check water drainage in the tank and hose for blockage and pollution. The drainage hoses should have a constant fall

5.3.2.8 The film does not transport correctly

- Film is fed in and gets caught in the machine: Check the positioning of the racks in the machine and make sure that the latches are closed.

**CAUTION!**

Ensure correct seating of roller racks; keep the lock closed at all times.

Don't operate processor with empty replenishment tanks.

After a long machine shut down check bath level and refill if necessary.

6 Safety and Maintenance



WARNING!

Caution Electrocution hazard!

Prior to cleaning or disinfection, switch of the automated X-ray film processor. As a result, the processor will be disconnected from power and the danger of electric shock is eliminated.

6.1 Introduction

In this chapter, you will find details regarding safety and maintenance, which is required to ensure the correct and reliable function of the radiographic system following initial installation.

6.2 Cleaning and disinfection



NOTE

The colour changes in the baths is normal; it is caused by the properties of the chemicals!



CAUTION!

Do not use alcohol containing solvents to clean the machine!

Pay attention that, during cleaning and/ or disinfection, no fluids find their way into the main housing of the radiographic table. This reduces the risk of short circuits and corrosion.



CAUTION!

Do not let any liquid drop inside the processor or run over the control. Liquids may cause damage to the processor.

6.2.1 Cleaning

The cleaning of the automated X-ray film processor is very easy due to the very good surface coating. This is usually done only with a dry cloth.

Do not use corrosive, solvent or abrasive cleaning agents that can damage the surfaces of the device or the paint.

Clean the outer surfaces of the unit and all painted components using a damp towel and a mild – light alkaline cleaning agent (e.g. RBS* Neutral T). Dry the components off following cleaning.

6.2.2 Daily care

Before use

- Remove dirt and dust from film-infeed with soft cloth
- Run 2 - 3 cleaner films through processor to remove all accumulated dirt and dust from the rollers
- Check the liquid level in the replenishment containers and if necessary refill

After use

- When work has been completed at the end of the day, drain water out of the machine. This avoids the growth of algae in the water

6.2.3 Weekly Care



CAUTION!

When removing the Rinsing / Drying roller-rack, ensure that no water gets into the film dryer air channel.

The developer chemicals cause residue build up in the machine. This residue has a negative effect on the developing process of the film material. For this reason the processor should be regularly cleaned. Proceed as follows:

- 1 Switch machine off and remove cover.
- 2 Loosen the securing latches (red, blue and beige) of the drive shafts of each roller rack at the right side.
- 3 Remove the roller-racks. First of all remove the large dryer-rack (beige). The racks are easier to remove and insert when they are slightly tilted. Then remove the fixer (blue) and developer (red) racks in sequence.
- 4 Rinse all racks thoroughly under warm running water and then leave to drain off. Use a soft sponge (do not use scouring-pad, as this would scratch the rollers!) and remove the pollution from the rollers.
- 5 Replace the racks: Red = Developer, Blue = Fixer. Beige = Washing/Drying. Ensure that the racks are firmly installed and do not forget to close the securing latches on the drive shafts.
- 6 Replace machine cover and ensure it is securely closed.
- 7 Clean processor outer shell with damp cloth. Do not use aggressive cleaners or solvents.

6.2.4 Thorough Cleaning

Every 3 - 6 months (maybe earlier) a thorough cleaning is necessary, depending on the quantity of films processed. Tank cleaners are available for developer and water baths. The fixer bath is cleaned with water. When preparing chemical tank cleaners, follow manufacturer instructions explicitly.

How to proceed:

- Switch the machine off and empty all tanks by opening the stop cocks
- Remove machine cover. When all tanks are emptied, close stop cocks again. Now fill the fixer-tank with water. Prepare cleaner solutions for developer and water baths and fill into respective tanks
- Remove suction pipes from the replenishment containers and place them in a water filled bucket. Attention: Do not add chemical cleaners here!
- Close machine cover and switch machine on
- Start film transportation and keep running for 10 to 20 minutes. Place a film in the infeed so that it activates the film switch but will not be pulled into the processor. During the operation with water, the installed roller racks will be cleaned.



NOTE

After completion of tank cleaning, the tank should be rinsed thoroughly with clean water. To do this, fill the machine with fresh water twice and each time, let the machine run for a 10 minute period. Empty the tanks and reclose the stop cocks.

- Take out the roller-racks and rinse them thoroughly with running water. Remove remaining dirt from the rollers by using a sponge and clean thoroughly. Doing this, the rollers can be turned by turning the drive shaft. Remove the sheet metal covers from the dryer rack and clean the rack with soap (dishwashing liquid). Reinstall the roller-racks in the machine.
- Refill the tanks with respective chemicals. Replace the suction pipes into the replenishment containers. In certain circumstances the circulation system must be ventilated: see 3.6.1, item 3.
- For quality check, process test films.

6.2.5 Before you go on holiday or longer than 2 weeks not use

If the automated X-ray film processor will not be in use for longer than two weeks, all the chemicals have to be emptied out of the tanks. In case you don't want to do a complete tank cleaning at once, then fill the tanks after emptying, with water.

6.3 Check-up and maintenance



WARNING!

It's forbidden to make any check-up or maintenance services while the automated X-ray film processor is in use with a patient! Any check-up or maintenance services can only be done by people who got trained or authorized by PROTEC.



CAUTION!

Never start the machine up unless it is filled with liquid!

6.3.1 Recommended Maintenance Work

- 1 Functional check
film intake / film transport / replenishment / bath heating / dryer heating / water supply
- 2 Cleaning
 - 2.1 Switch off machine, remove cover
 - 2.2 Empty all three tanks
 - 2.3 Close drain cocks and fill tanks with water
 - 2.4 Install cover, switch machine on
 - 2.5 Fill two additional vessels with water, put suction pipes into these vessels and activate replenishment for at least two minutes (to remove residues of chemicals from replenishing hoses)
 - 2.6 Switch machine on for a few minutes
 - 2.7 Switch machine off
 - 2.8 Empty all tanks
 - 2.9 Prepare tank cleaning agent for developer and water tank according to manufacturer instructions



CAUTION!

Do not use chlorine containing cleaning agents.

- 2.10 Fill developer and water tank with tank cleaning agent **(do not use the replenishment pump to do so)**
- 2.11 Fill fixer tank with water
- 2.12 Place suction pipes into empty tanks
- 2.13 Install cover, switch machine on
- 2.14 Wait until the operating temperature is reached, approx. 30 °C (observe information concerning temperature, time, cleaning procedure contained in the datasheet of the tank cleaning agent)
- 2.15 Activate the transport (activate film intake switch)
- 2.16 After approx. 15 minutes (observe information concerning temperature, time, cleaning procedure contained in the datasheet of the tank cleaning agent) switch film transport off
- 2.17 Remove cover, neutralise developer tank (observe information concerning temperature, time, cleaning procedure contained in the datasheet of the tank cleaning agent)
- 2.18 Switch machine off
- 2.19 Empty all three tanks
- 2.20 Fill machine with water and switch it on
- 2.21 Put suction pipes into vessels with water

- 2.22** Activate regeneration pumps for at least five minutes
 - 2.23** Check all pumps for tightness
 - 2.24** Switch machine off
 - 2.25** Drain tanks
 - 2.26** Fill tanks 3/4 with water
 - 2.27** Switch machine on
 - 2.28** Activate replenishment pumps manually until tanks overflow
 - 2.29** Activate film transport for a few minutes
 - 2.30** Switch machine off and drain all three tanks
 - 2.31** Repeat item 2.20 to 2.30 if required (observe information e. g. concerning temperature, time and cleaning procedure outlined in tank cleaner datasheet)
 - 2.32** Remove roller racks from the machine and remove dirt under flowing water using a soft rag or sponge
 - 2.33** Remove residual dirt particles from the tanks
 - 2.34** Clean all toothed gear wheels, axles, bearings and rollers, check them for damage (replace if required)
 - 2.35** Remove light protection flap and wipe its underside using a soft rag
 - 2.36** Clean inlet plate using a soft rag
 - 2.37** Reinstall light protection flap
 - 2.38** Align roller racks and re-insert them in machine
 - 2.39** Fill machine with chemicals
 - 2.40** Switch machine on
 - 2.41** Adjust bath temperature to previously adjusted value
 - 2.42** Feed cleaning film (approx. 4 pieces)
 - 2.43** Check function as described under item 1.
 - 2.44** Approx. 15 minutes after reaching of the bath temperature, check it by measuring and recalibrate if required (see 7.4.5)
 - 2.45** Perform sensitometric test
- 3** Perform constancy tests based on the applicable national standards (e.g. IEC61223-2-1 and DIN 6868-2).

6.3.2 Maintenance

Required maintenance must be performed at 3-6 month intervals, depending on the film throughput, by PROTEC Service or specific authorized service provider to ensure the safe and reliable operation of the equipment.

In the event that scheduled maintenance is not performed, PROTEC GmbH & Co. KG will not be responsible for damages incurred by the user or third parties if such damages are the result of improper or omitted maintenance.

Prior to operation, the operator must ensure that all Safety related mechanisms, indicators and/or switches described within the user manual are fully functional and that the unit is overall operationally ready.

See Technical Description of the system and of all integral components.

Only original spare parts are to be used in situations requiring component replacement.

6.3.3 Maintenance Protocol

Installation

Name:	Machine type:	Serial number:
Technician:	Training:	by:
Telephone:	Date:	Guarantee until:

Parameters Set

Developer temp:	Dryer temp:	Cycle time:
Dev.reg. volume:	Dev.reg. volume:	Anti oxidation:
Changed by:	Date:	Film type:

Developer temp:	Dryer temp:	Cycle time:
Dev.reg. volume:	Dev.reg. volume:	Anti oxidation:
Changed by:	Date:	Film type:

Developer temp:	Dryer temp:	Cycle time:
Dev.reg. volume:	Dev.reg. volume:	Anti oxidation:
Changed by:	Date:	Film type:

Maintenance work performed

Maintenance work performed	Maintenance work performed	Maintenance work performed	Maintenance work performed
Date	Date	Date	Date
Name	Name	Name	Name
Next maintenance:	Next maintenance:	Next maintenance:	Next maintenance:
Maintenance work performed	Maintenance work performed	Maintenance work performed	Maintenance work performed
Date	Date	Date	Date
Name	Name	Name	Name
Next maintenance:	Next maintenance:	Next maintenance:	Next maintenance:
Maintenance work performed	Maintenance work performed	Maintenance work performed	Maintenance work performed
Date	Date	Date	Date
Name	Name	Name	Name
Next maintenance:	Next maintenance:	Next maintenance:	Next maintenance:

6.4 Warranty



NOTE

The current conditions of guarantee are deposited in the order papers or in the valid pricelist to the time of purchase.

All repairs and replacement of components because of misuse and/or incorrect operation are excluded from the warranty.

Only authorized technicians may do service and maintenance work.

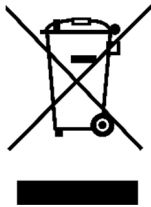
6.5 Product life time

The automated X-ray film processor has an expected product life of 7 years when used in accordance with the product specifications/ limitations and provided that maintenance through the PROTEC service department or a **PROTEC** authorized service provider has been completed. After reaching the life span the further usage of the device happens on own risk.

6.6 Further Information

Further information's to the chapters and for a safe usage, transport or storage are in this user manual.

6.7 Disposal



Used machine contains valuable materials that should be recycled and turned over for proper treatment. Please be sure to turn used machines over to approved recycling centers.

7 Trouble Shooting

7.1 Algae

7.1.1 Excessive algae growth in water tank

Algae growth inside the water tank is not only annoying, it causes increased cleaning work and leaves residue on the films. When algae growth increases, countermeasures are in demand:

- When work has been completed at the end of the day, drain water out of the machine
- Clean dryer-water rack regularly. Use soft sponge and soap to remove residue from the rollers
- Install a particle filter system in the fresh water supply for the processor
- If water tank overflows due to algae growth blocking the overflow hose, then the overflow hose can directly be connected to the connection at the water tank inside the machine
- If no other solutions can be found, then usage of Anti-Algae-Agents can be a great improvement (automatic dispensers work the best). However, it is known that cleaning agents containing chlorine may corrode rubber rollers and high-grade steel in the tank area (check before use)

7.2 General

7.2.1 Unit does not switch on

- Ensure that electrical socket has power supply
- Check machine fuse in main switch
- While power switch is on, check the following components: Voltage on contact of main switch
- if no voltage: - change main switch. Check input voltage at electronics. If the voltage is normal, exchange the electronics. if no voltage: check the cable wiring harness



CAUTION!

Please use as replacement fuses only the PROTECs. These fuses are optimized for use under existing conditions.

7.3 Drive

7.3.1 Film transport does not run, fan runs

- When placing processor cover on, the cover switch should be activated, readjust if necessary
- Cover switch has no current passage when activated: Replace
- Check screwing of chain wheel on motor- and driveshaft

7.3.2 Machine does not start automatically

- Film switch is not correctly positioned or operator wire is bent. Re-adjust film switch and operator wire
- Check following parts: Film switch, wiring of film switch and electronic
- Check wiring from electronic to the connections of components (motor, fan, dryer heating, solenoid valve). If the connections have no fault then electronic is possibly defective

7.3.3 Machine doesn't stop automatically

- Display „Infeeding film“ is permanently illuminated: Wire band of film switch is jammed. Readjust wire
- Check following parts: Film switch, wiring of film switch and electronic

7.3.4 Drive motor does not run

- Check cover switch
- Check drive motor: If voltage can be detected on motor, then motor is defective
- Dryer fan runs but no voltage on motor: Interruption in the wiring

7.3.5 Machine stops before film comes out

The cycle time is the processing time which runs off after a film has passed the film switch. Activate the switch in the infeed tray with a film and remove the film. Measure the time until the processor stops automatically.

Following times can be measured (+/- 5%):

Standard machine:	125s	Jumper 2-3
Mammography:	155s	Jumper 1-2
Optional type:	190s	Jumper removed

Change cycle time if necessary. This can be accomplished by changing the position of the jumper on the upper side of the electronics.

7.3.6 Relation between processing time and developer temperature

The following chart demonstrates guide value relations between developer temperatures and processing times. Variations are possible depending on the various films and chemicals. Changing the transport speed see 7.3.7.

Processing time „Dry to Dry“	Developer temperature
105s	32°C – 34°C
118s	32°C – 34°C
135s	31°C – 33°C
143s	30°C – 32°C
167s	30°C – 32°C

7.3.7 Changing the transport speed

The processing speed can be changed by changing the gear wheels. To do this the tanks need to be emptied and the machine be turned over. After removing the drive motor the chain gears can be changed. Please note that the jumper on the PCB needs to be placed to the indicated position.

Following gear combinations are available:

220-240V, 50Hz versions						220-240V, 60Hz versions 220-240V, 60Hz versions for 110V operation					
t	Gm	Gs	Jumper-position	Developer time (s)	Infeed speed (cm/min)	t	Gm	Gs	Jumper-position	Developer time (s)	Infeed speed (cm/min)
105	t=17	t=16	2-3	29	48	105	t=16	t=18	2-3	29	48
118	t=16	t=17	1-2	32	43	118	t=14	t=17	1-2	32	43
135	t=14	t=17	1-2	37	37	135	t=12	t=17	1-2	37	37
143	t=14	t=18	removed	39	35	143	t=12	t=18	removed	39	35
167	t=12	t=18	removed	46	30	167	t=10	t=18	removed	46	30

t = Processing time in seconds

Gm = Chain gear on motor shaft

Gs = Chain gear on drive shaft

7.4 Baths

7.4.1 No circulation in bath

- Circulation pump works but no circulation in bath: Air lock in heating and circulation system. Ventilate pump (see 3.6.1/ 3)
- Particles in the pump chamber. The pump chamber can be easily opened by removing the four clips. When closing again ensure that the rubber seal is positioned correctly and not damaged
- Check connection of pump, circulation pump possibly defective.

7.4.2 Developer temperature to high

- Check attachment of temperature sensor. This should be firmly positioned on tube and completely covered with foam rubber.
- Check sensor: Check voltage between pin 3 (brown) and pin 2 (white) between 0.1 and 0.5 V
- If the sensor has no fault then electronic is defective.

7.4.3 Developer temperature to low

- Check circulation pump. Air lock in the circulation pump: Ventilate pump (see 3.6.1 / 3). If no circulation can be detected: Check wiring of circulation pump, pump possibly defective
- Bath is not heated: Check temperature safety switch on heat-exchanger. Check heating element: impedance across the element should reach approx. 66 W
- Check temperature sensor (see 7.4.2)
- If no error can be found then electronic is possibly defective.

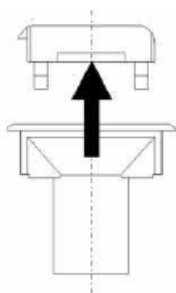
7.4.4 Developer temperature too low, fixer temperature too high

- Air lock in the circulation pump: Ventilate circulation (see 3.6.1/ 3)



CAUTION!

Only remove the electronics when the turning knob has been removed.

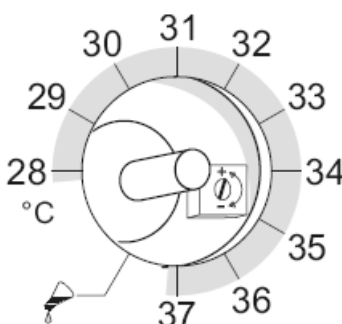


7.4.5 Removing the turning knob

- Using flat pliers pull the lever from the knob, while holding the bottom part (knob) down with the other hand
- Open the screw of the collet (Attention: don't open completely) and pull the knob out
- When reinstalling the knob turn axis on PCB to end position counter clockwise. Fix the knob in that the pointer is at position of „Manual pumping“.

7.4.6 Calibration of the developer temperature

- Temperature deviations of $\pm 1.5^\circ\text{C}$ can be compensated for by adjusting the potentiometer on the control board. It can be reached after removing the turning knob (see page on right hand side) from above. Turning clockwise decreases the temperature



7.5 Film defects

7.5.1 Films will not dry

- No air comes out of air channel: Check wiring of dryer fan, fan is possibly defective
- Cold air comes out of air channel: Check wiring of heating element in the air channel, heating element possibly defective
- Hot air comes out of air channel, but the film is still not dried to satisfaction. Check chemicals and film type. If this leads to no solution then the transport speed of the machine can be reduced (see 7.3.7)

7.5.2 The film does not transport correctly

- Check the positioning of the racks in the machine and make sure that the latches are closed
- Check the roller racks: Position of the guide elements, rollers are in correct position and are not loose, flat springs are not bent, all gears are in place
- Motor runs: The worm gear of the drive shaft should be secured with a splint to avoid twisting. Check the screws and positioning of the chain and chain wheel

7.5.3 Scratches, pressure marks, dirt on film

- Straight scratches in the infeed direction indicate faulty guide elements. Check each rack and straighten up the guide elements. If mechanically damaged, replace the guide elements
- Pressure marks caused due to polluted or damaged rollers. Check rollers for visible damage. Rubber rollers sometimes swell up. Exchange defective rollers

7.6 Replenishment

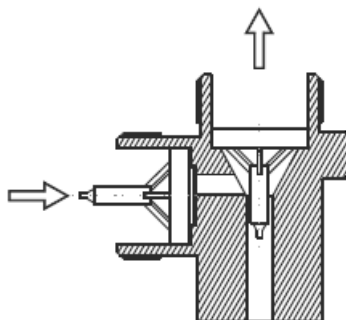
7.6.1 Replenishment pump does not work or works insufficiently

- Check the switch position on the pump
- Clean valves inside connection tube of pump



CAUTION!

Install valve-insert correctly: Pay attention to flow-through direction!



- Check filter in the suction pipe (repl. container) and clean it if necessary
- Replenishment pump sucks air in. Check hoses and connections
- Check eccentric position. Flow rate reads 240 ml/min at maximum eccentric position 100%
- (60 Hz: 240 ml/min at 85 %)
- Activate the „Manual pumping“ and while on, check the voltage of connection X2 on the power PCB. If no voltage can be registered - exchange power PCB

7.6.2 Replenishment rate to high or low

- The replenishment rate can be changed by adjusting the stroke of the pump. To do this, the eccentric on the replenishment pump must be adjusted. Maximum pump capacity is 240 ml/min (100 %).

7.6.3 Adjust replenishment pump

- For the adjustment of the eccentric first open the inbus screw on the big eccentric with the red line. If screw is not reachable, then start the „Manual pumping“ (dial switch) for a short time. If the screw is reachable fastly turn back the dial switch on a temperature position
- Turn the eccenter so that the red line will be at the desired position and fasten again the inbus screw



CAUTION!

Minimum setting must not be below 75 %.

7.7 Dryer

7.7.1 Dryer fan does not run or runs with too low speed

- Check the correct connecting of the fan cables: bl = blue; bk = black; br = brown
- If the fan is connected improperly, then the fan runs only half power

7.8 Water

7.8.1 Rinsing water does not flow

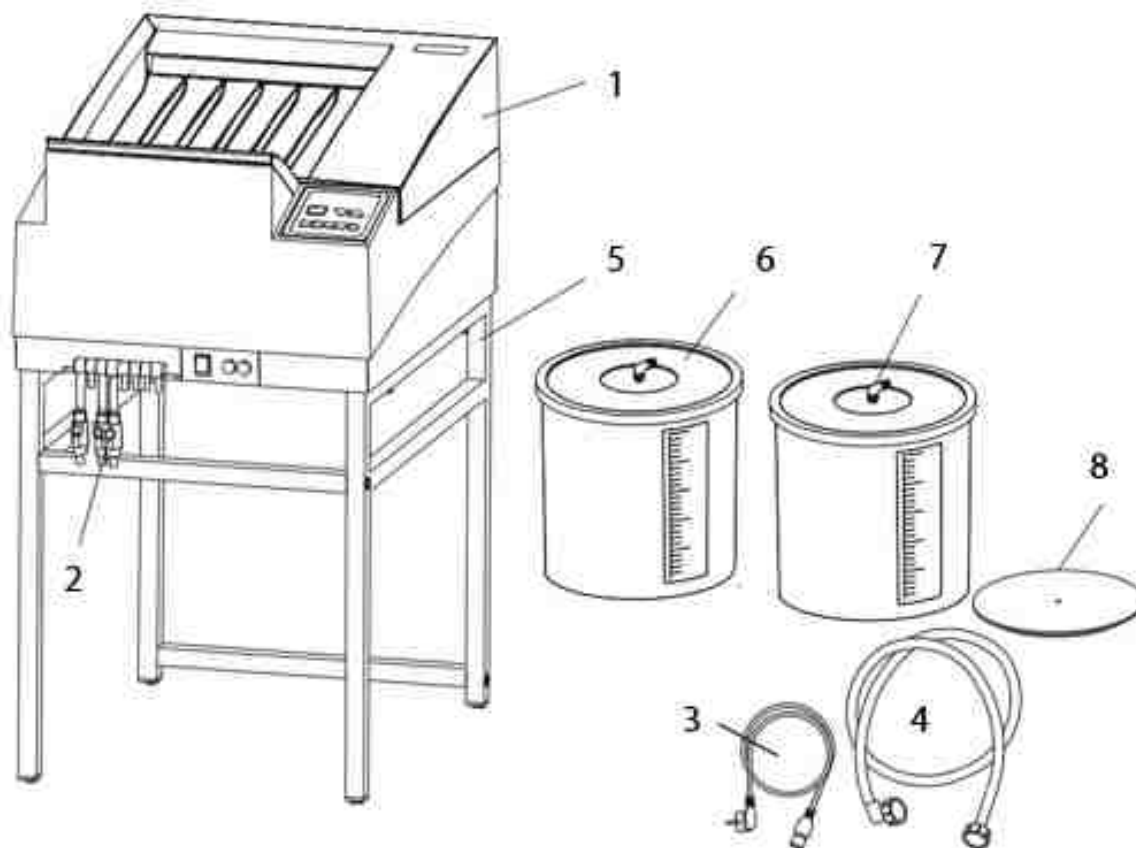
- Water pressure in the water system is too low: Minimum pressure 2 bar (29 psi)
- Valve activates, no flow passage - filter at inflow is blocked
- Check green water inlet hose inside the machine.

7.8.2 Water tank overflows

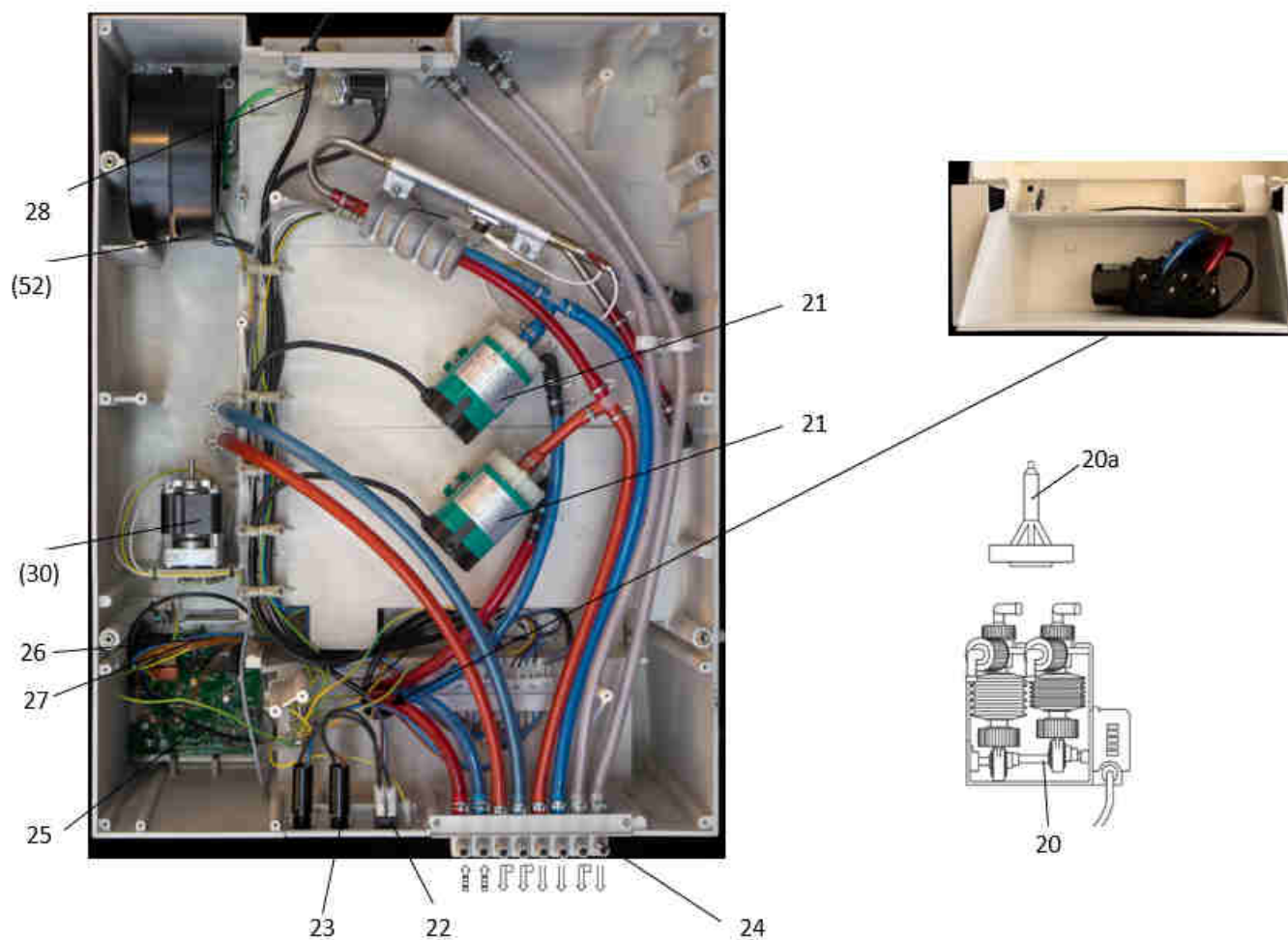
- Water drainage hose (overflow) should have a constant fall. The hose end should be positioned above the drainage level in the syphon
- Check water drainage in the tank and hose for blockage and pollution
- When extreme algae growth is registered, the overflow can be connected directly to the fitting of the water tank

8 Spare Parts and schematics

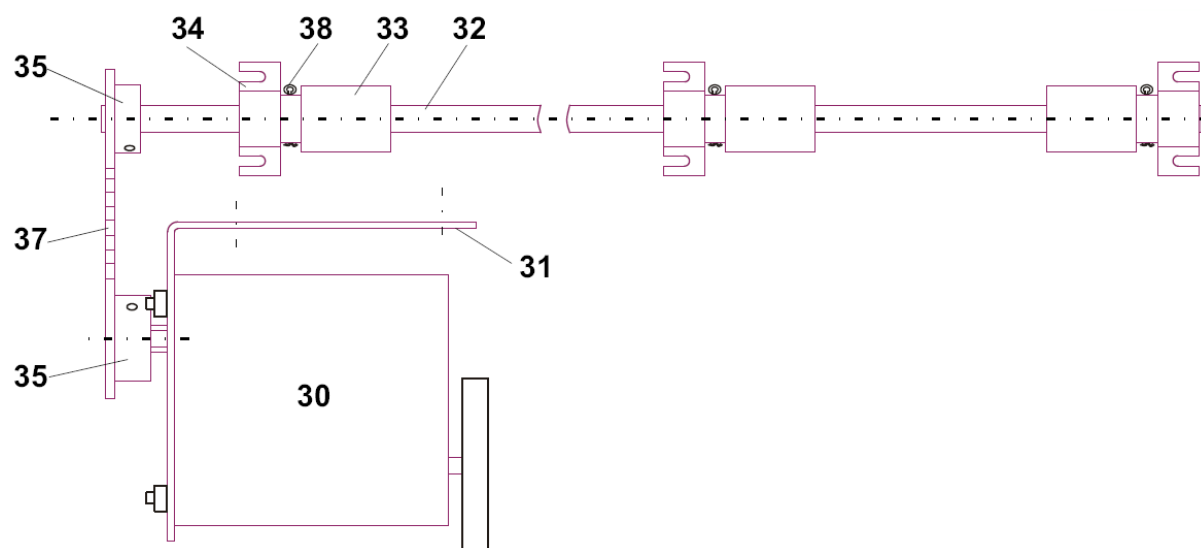
8.1 Spare Parts



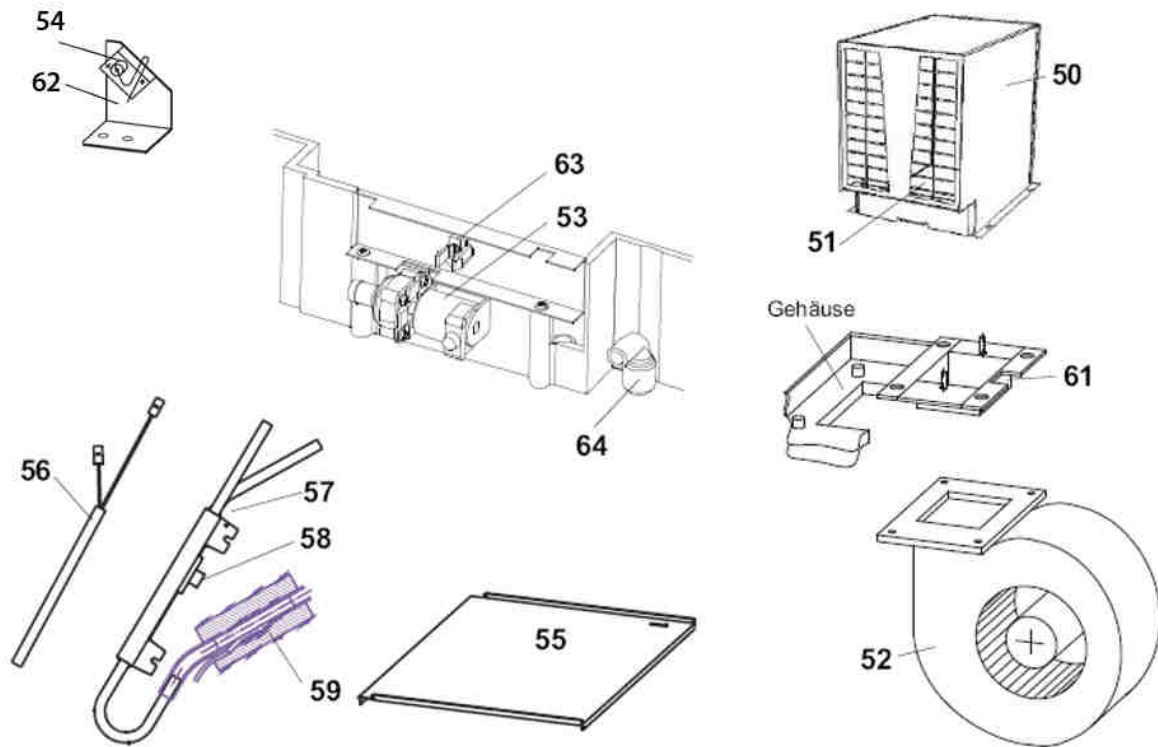
Pos.	Order No.	Description
1	1160-0-0280	Cover complete
2	2006-0-0005	Drain stop cock 10 mm
3	2004-0-0010	Electrical power lead 220-240V
4	2018-0-0001	Water inlet tube
5	1267-0-0000	Processor stand
6	1101-0-2000	Replenishment tank 25l E
	1101-0-2100	Replenishment tank 25l F
7	1101-0-1700	Intake manifold w. Filter for 25l tank
8	1101-0-4100	Floating cover developer
-	2018-0-0012	Hose 10 x 2 mm, clear, reinforced
-	2018-0-0009	Hose 10 x 2 mm, blue, reinforced
-	2018-0-0008	Hose 10 x 2 mm, red, reinforced
-	2018-0-0005	Hose 4 x 1 mm, green
-	2018-0-0021	Hose 9 x 2 mm, red, clear
-	2018-0-0022	Hose 9 x 2 mm, blue, clear
-	2022-0-0014	Tube clamp Snap
-	2022-0-0019	Wire tube clamp
-	2022-0-0026	Wire tube clamp
-	2022-0-0028	Wire tube clamp
-	1101-0-4600	Floating balls, 300 pcs.
-	1101-0-4800	Floating balls, 200 pcs.



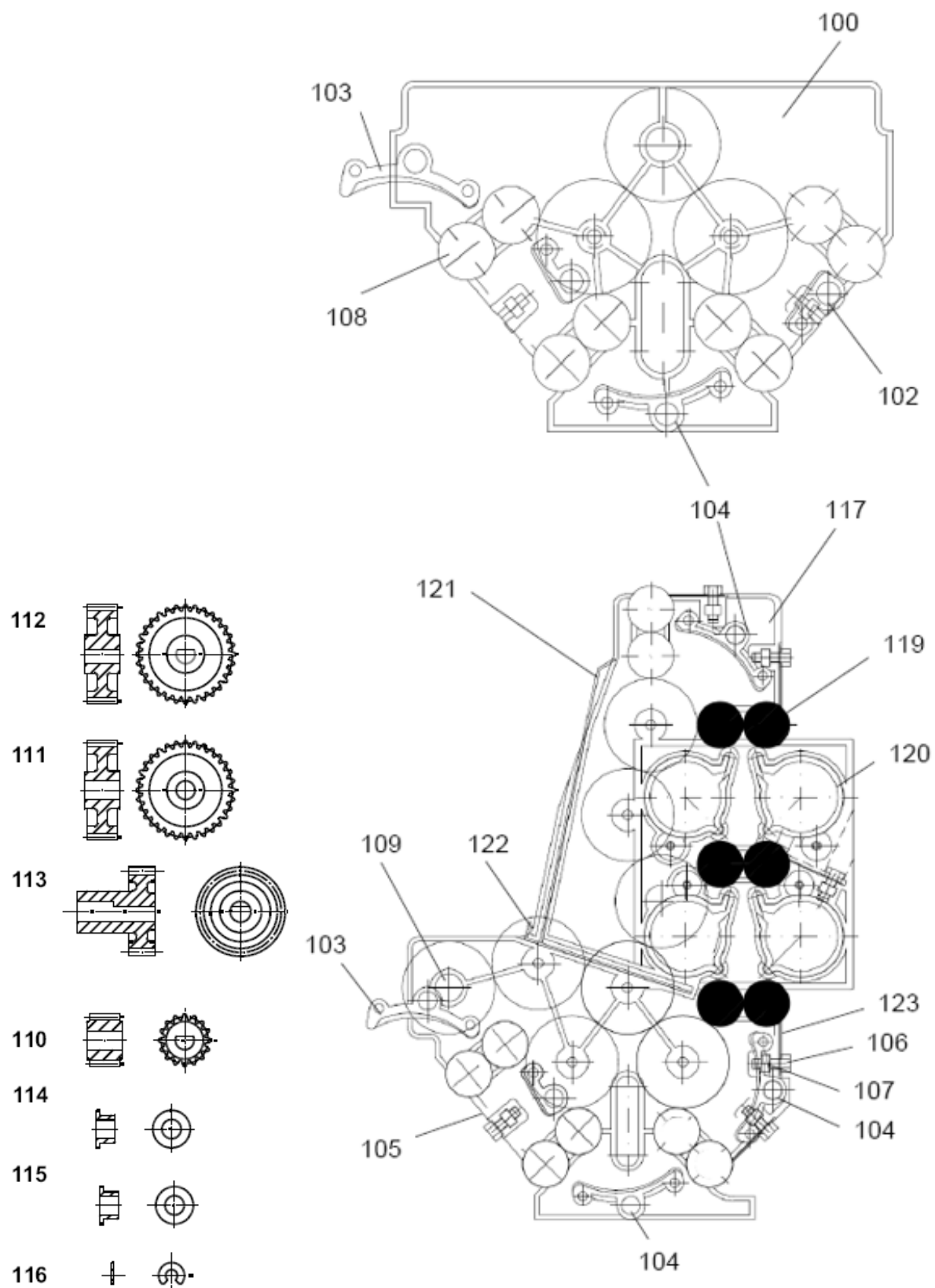
Pos.	Order No.	Description
20	1160-0-2350	Double Replenishment pump 2x232ml
20a	0002-5-0019	Cone valve for Pos. 20
21	0202-5-0022	Circulation pump 5,5l/min.
22	2028-0-0023	Main switch 220-240V
23	2010-0-0004	Fuse holder
-	2010-0-0010	Fusible, gold,T 10A/250V
-	2007-0-0004	Cover for fuse holder
24	1170-0-0702	Angle connection
25	1170-5-1300	Control unit 230V
26	0170-0-2400	Micro switch with operator (cover)
27	2007-0-0010	Operator for micro switch
28	2021-0-0001	Screw in connector
-	1170-0-1260	Wiring harness 230V



Pos.	Order No.	Description
30	2001-9-0020	Main drive motor
31	1170-0-1121	Motor bracket
32	1170-0-1501	Drive shaft worm gear
33	1170-0-1503	Worm gear
34	1170-0-1502	Supporting bock
35	1170-0-1506	Chain wheel t=12
	1170-0-1504	Chain wheel t =14
	1170-0-1505	Chain wheel t =16
	1170-0-1102	Chain wheel t =17
	1170-0-1507	Chain wheel t =18
37	2037-0-0002	Chain 6mm with coupler link
38	3000-9-4013	Splint 2,0x20 mm

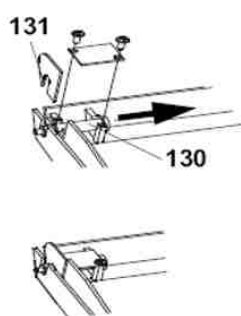


Pos.	Order No.	Description
50	1170-0-1301	Air channel
51	0170-0-1300	Heating element 230V, 1100W, standard
	0170-5-1300	Heating element 230V, 1000W, Mammo
52	2008-5-0007	Dryer van 220-240V, 50/60Hz
53	1160-5-1900	Solenoid valve 220-240V, 50/60Hz
54	0170-0-0800	Micro-rotary-switch for film-detection with operator
55	1160-0-0105	Film feed tray
56	2003-5-0002	Cartridge heater 230V, 800W, standard
	2003-5-0012	Cartridge heater 230V, 400W, 60Hz/230V for 110V operation
57	1130-0-2101	Heat exchanger
58	2005-0-0005	Temperature safety switch mounted on heat exchanger
59	0190-0-2200	Temperature sensor
61	1170-0-1302	Channel dryer heating
62	1160-0-0804	Bracket for micro-rotary-switch OPTIMAX
63	2027-0-0021	Strain relief
64	1160-0-0710	Hose nozzle rubber



Standard roller racks

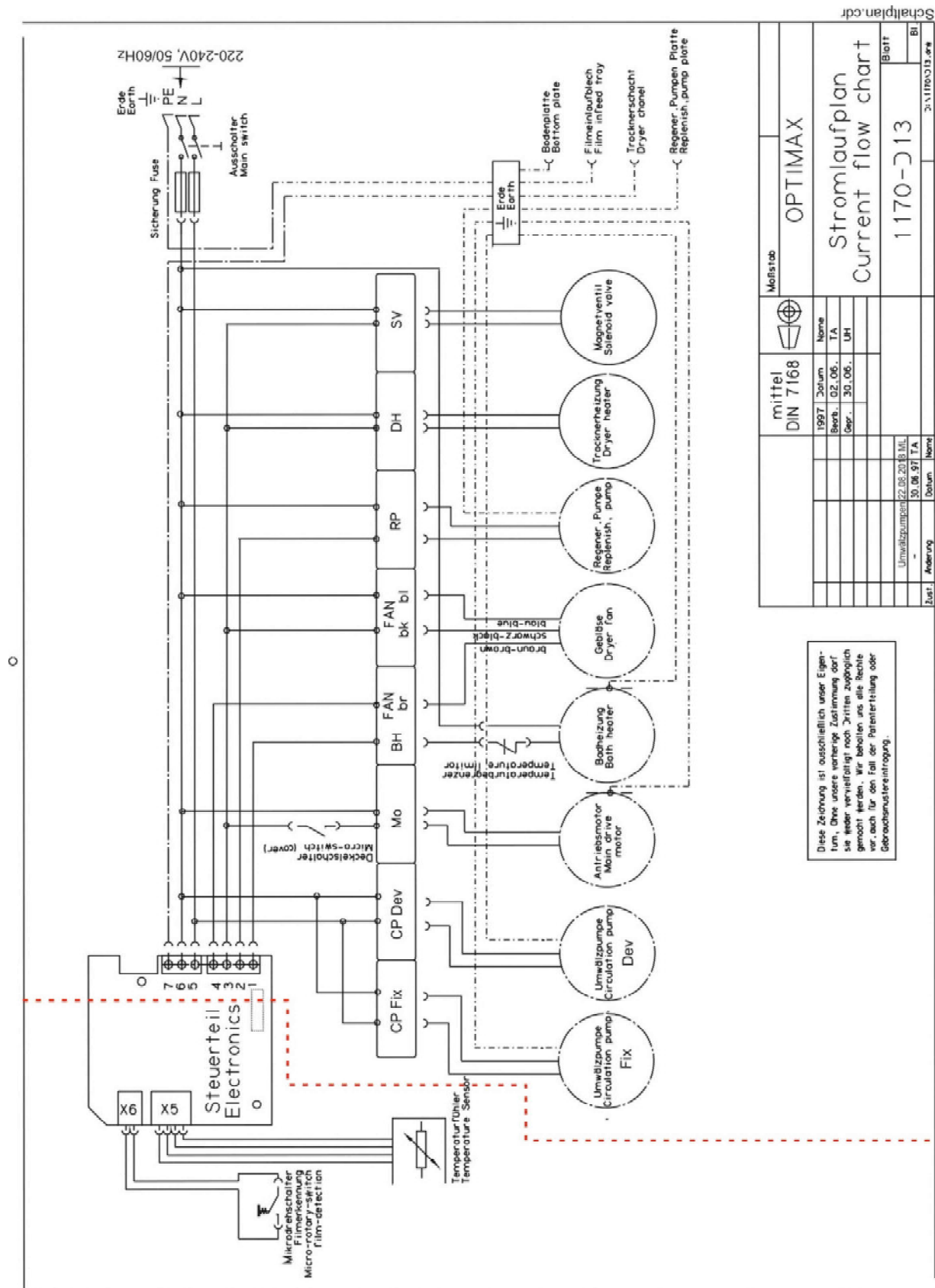
Pos.	Order No.	Description
Mammography X-ray film processor		
-	1171-0-0600	Roller rack, dryer
Standard X-ray film processor		
-	1170-0-0300	Roller rack, developer
-	1170-0-0400	Roller rack, fixer
-	1170-0-0600	Roller rack, dryer
100	0170-0-0301	Side plate developer with shafts (left)
	1170-0-0301	Side plate developer (right)
	0170-0-0401	Side plate fixer with shafts (left)
	1170-0-0401	Side plate fixer (right)
102	1140-0-3800	Guide bar straight, short
103	1140-0-4500	Guide bar with nose
104	1140-0-3700	Guide bar, curved
105	1170-0-0304	Flat spring 55
106	3079-8-5013	Screw M4x10, A4
107	3009-3-4023	Hexagonal nut M4, A4
108	1140-0-0301	PU-roller 35 ground
109	1170-0-0310	Driver shaft Rack
110	1101-0-0302	Chain gear t = 16 D-hole
111	1101-0-0304	Chain gear t = 32 round hole
112	1101-0-0303	Chain gear t = 32 D-hole
113	1170-0-0302	Worm gear
114	1101-0-0305	Bushing without clearance
115	1101-0-0317	Bushing big, black
116	2014-0-0001	Circlip
117	0170-0-0601	Side plate dryer with shafts (left)
	1170-0-0602	Side plate dryer (right)
119	1140-0-0302	Rubber roller 35
120	1140-0-0605	Air jet (35)
121	1170-0-0604	Dryer plate, large
122	1170-0-0603	Dryer plate, small
123	1170-0-0303	Flat spring 35



The light protection cover can be removed. This is necessary to gain access to the film detection switches and the developer level switch. To remove it, pull off the blind (131) on the right side (!) of the cover and then pull the indexing bolt (130) from the support toward the inside. The cover can now be removed to the top. Remark: The left indexing bolt remains completely installed.

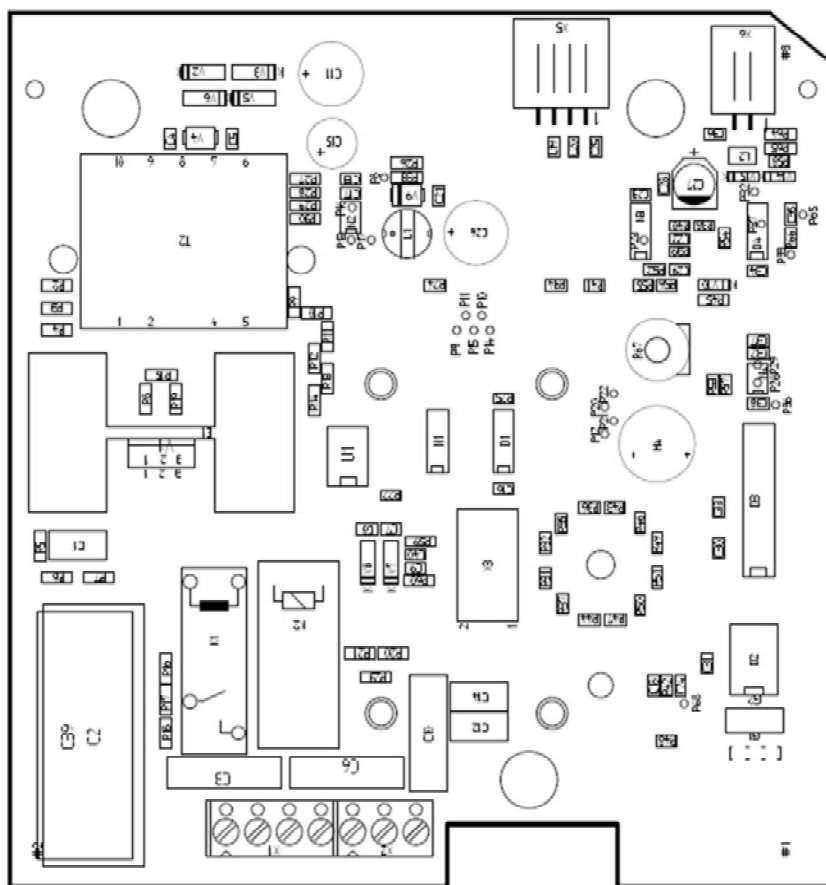
Pos.	Order No.	Description
130	1160-0-3103	Indexing bolt
131	1160-0-3106	Blind for light protection cover

8.2 Schematics



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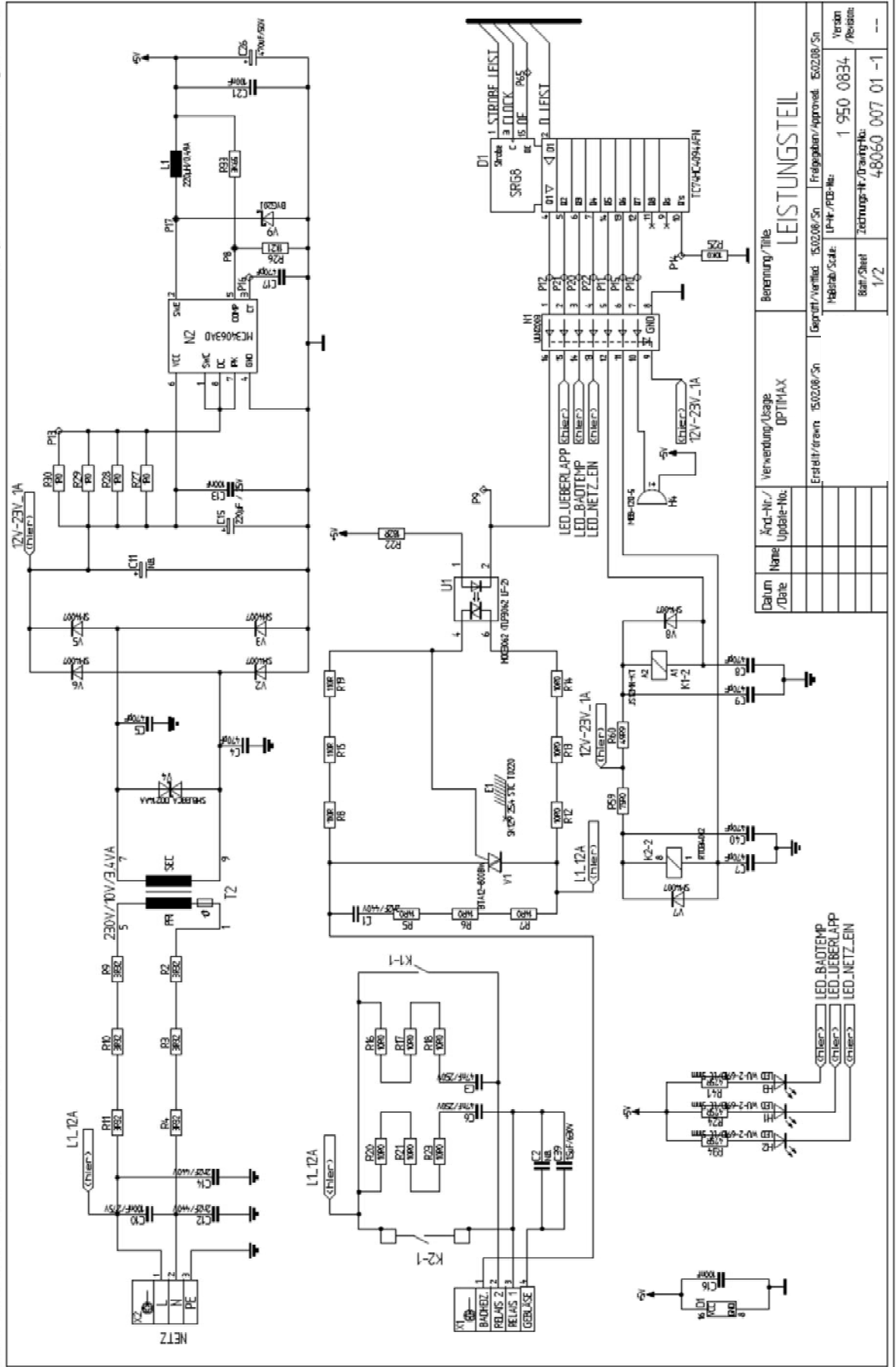


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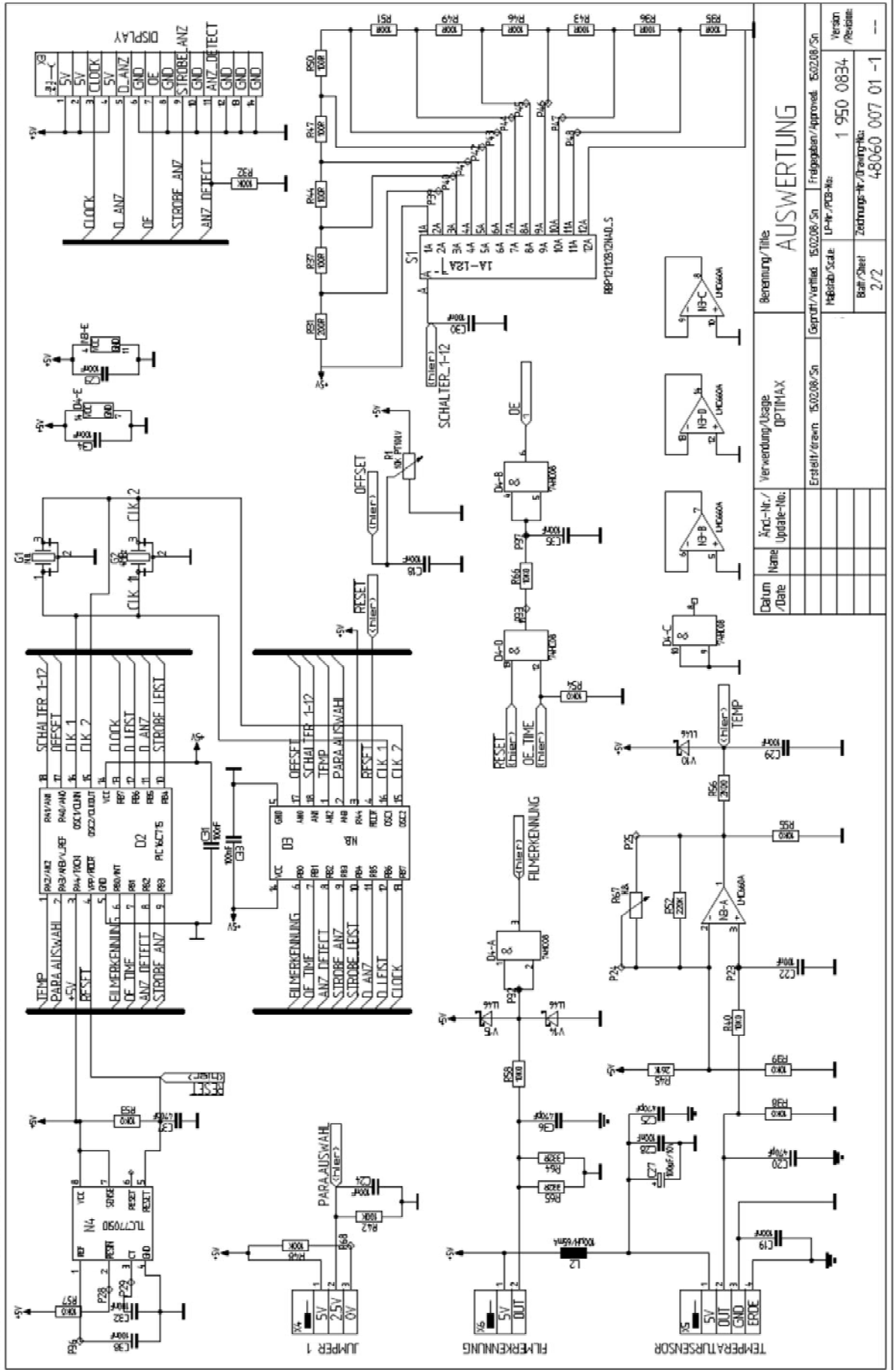
[illegible]

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9 Power Supply

9.1 Electrical connections

Electrical specifications are indicated on model nameplate.

Type 117x-1-x000	230 V ~ +/-10%, 8,8A, 50Hz
Type 117x-2-x000	230 V ~ +/-10%, 8,8A, 60Hz
Type 117x-9-x000	230 V ~ +/-10%, 7.1A, 60Hz for 110V Operation

Machine tested for overvoltage category II according to IEC 1010 (EN 61010, VDE 0411).

9.2 System protection

IP 20

9.3 Power consumption

Stand-by	0.12kWh
Processing	2.0 kWh



WARNING!

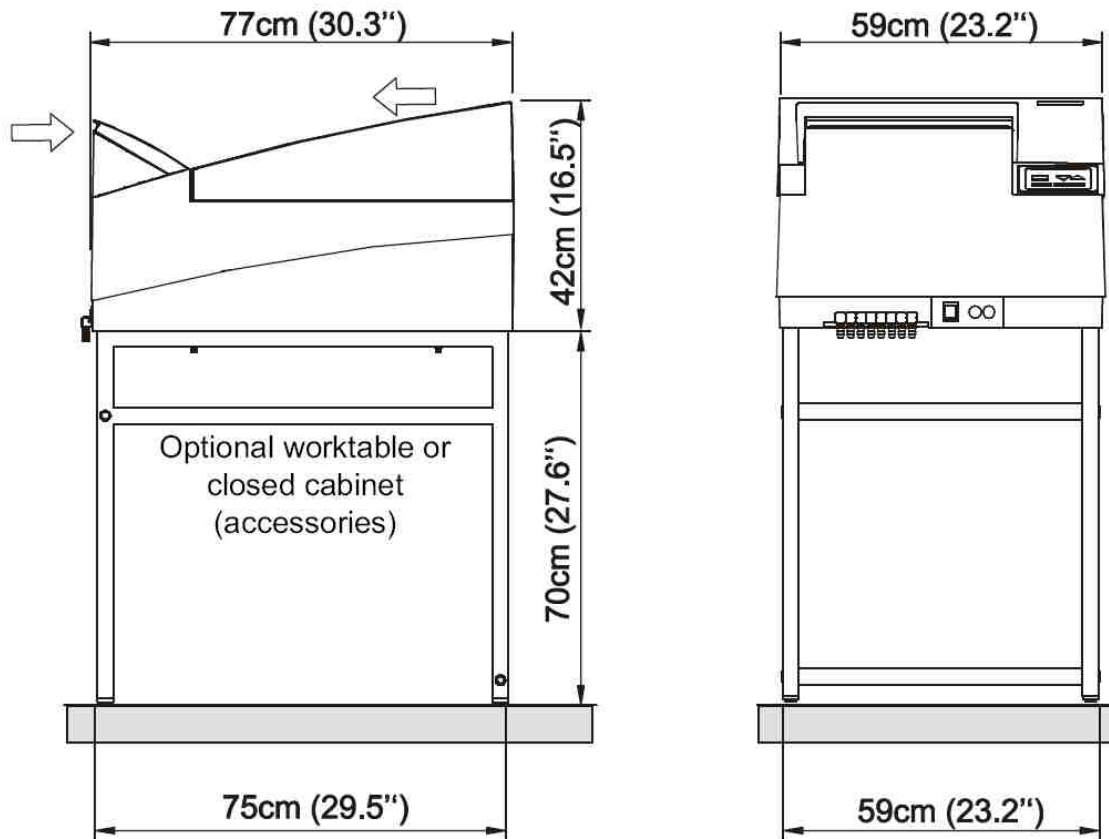
To lower the risk of an electrical shock, the device can only be run on a power supply with a protective conductor.

10 Technical specifications

Film transport	Continuous roller transport system
Film formats	In general: sheet films up to max. 35.8cm(14.1 ") width; Smallest film format 10x10 cm (4x4 ").
Processing capacity	129 films 24x30 cm (10x12 ") per hour (standard model, film fed in crosswise)
Processing time	Standard 90 s Mammography 135 s *Option 167 s
Linear speed	Standard 56 cm/min (22 in/min) Mammo 37 cm/min (14.5in/min) *Option 30 cm/min (11.8 in/min)
Developer time	Standard 25s Mammography 37s *Option 46s
Tank capacities:	Developer, Fixer and water tank, 5 litres each (1.3gal)
Circulation system	Developer and fixer are continuously circulated by a circulation pump
Replenishment	Automatic replenishment by film detection, in relation to film length
Developer temperature	Adjustable 28 - 37 °C (82.4 - 98.6 °F)
Fixer temperature	Adjusted to developer temperature by heat exchanger
Water connection	Permissible water pressure 2 - 10 bar (29 - 145 psi), permissible water temperature 5 - 30 °C (41 - 86 °F)
Water consumption	1.9 litres per minute (0.5 gal/min) when processing
Drain capacity	7 litres per minute (1.85 gal/min)
Noise level	Less than 58 dB(A)
Heat emission	Stand-by: 0.1 kJ/s Processing: 1.4 kJ/s
Pollution degree	2
Weight (processor)	Empty 35 kg (77 lbs) Filled 50 kg (110 lbs)
Dimensions (LxWxH)	77x59x42 (** 112) cm 30.3x23.2x16.5 (** 44.1)"
Floor space required	0.45 m ² (4.8 sqft)

* Depending on machine type and used gears processors have different speeds.

** Height incl. optional working table resp. base cabinet.



10.1 Protection Art and Protection Class

The automated X-ray film processor consistent with a protection class 1.

10.2 Environmental

10.2.1 Environmental conditions during operation




















Use	Only indoor
Ambient Temperature	Temperature 18 - 40 °C (51.6 - 104 °F), ventilated room, room temperature should be lower than set bath temperature.
Relative humidity	Relative humidity lower than 80% up to 31 °C (80 °F), linear decreasing to 50% at 40°C (104°F)
Atmospheric pressure	Height above sea level less than 2000 m (6666 ft.)






10.2.2 Environmental Conditions for Shipping and Storage

Ambient Temperature	- 10°C to + 70°C
Relative humidity	10% to 95% (non-condensing)
Atmospheric pressure	500 hPa to 1060hPa

11 Description of symbols, labels and abbreviations

11.1 Symbols

	Limitation atmospheric pressure
	Limitation temperature
	Limitation humidity
	Keep dry
	Fragile, Handle with care
	This way up
	Attention, consult accompanying documents
	CE-Mark
	Manufacturer
	Trade name
	Order number
	Serial number
	Date of manufacture
 www.protec-med.com/download	With this symbol we point out that Usage instructions of the corresponding product is on our Homepage
	Notes on disposal; WEEE , Waste of Electrical and Electronic Equipment
	Protective ground (Earth)
	Warning of electrical voltage
	Warning in front of hot surface
	Symbol bath temperature

	Symbol Processing time
	Symbol in operation
	Replenishment
	Overflow
	Drain

11.2 Identification label

OPTIMAX X-Ray Film Processor

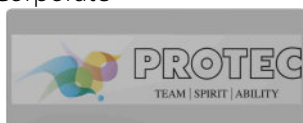
REF 1170-1-8000
SN 117018-xxxx-xxxxx
 Power Rating: 220-240V~, 8.8A, 50Hz

 PROTEC GmbH & Co. KG
 In den Dorfwiesen 14, 71720 Oberstenfeld
Made in Germany

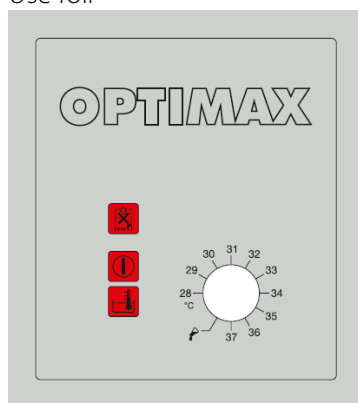
 Achtung! Zweipolig abgesichert.
 Attention! Both phases are fused.
www.protec-med.com/download


11.3 Labels

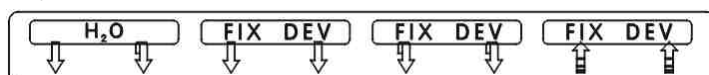
Corporate



Use foil



Designation hose connections



Description of the fuse

2x T / sb
10A 250V

Sticker water pressure

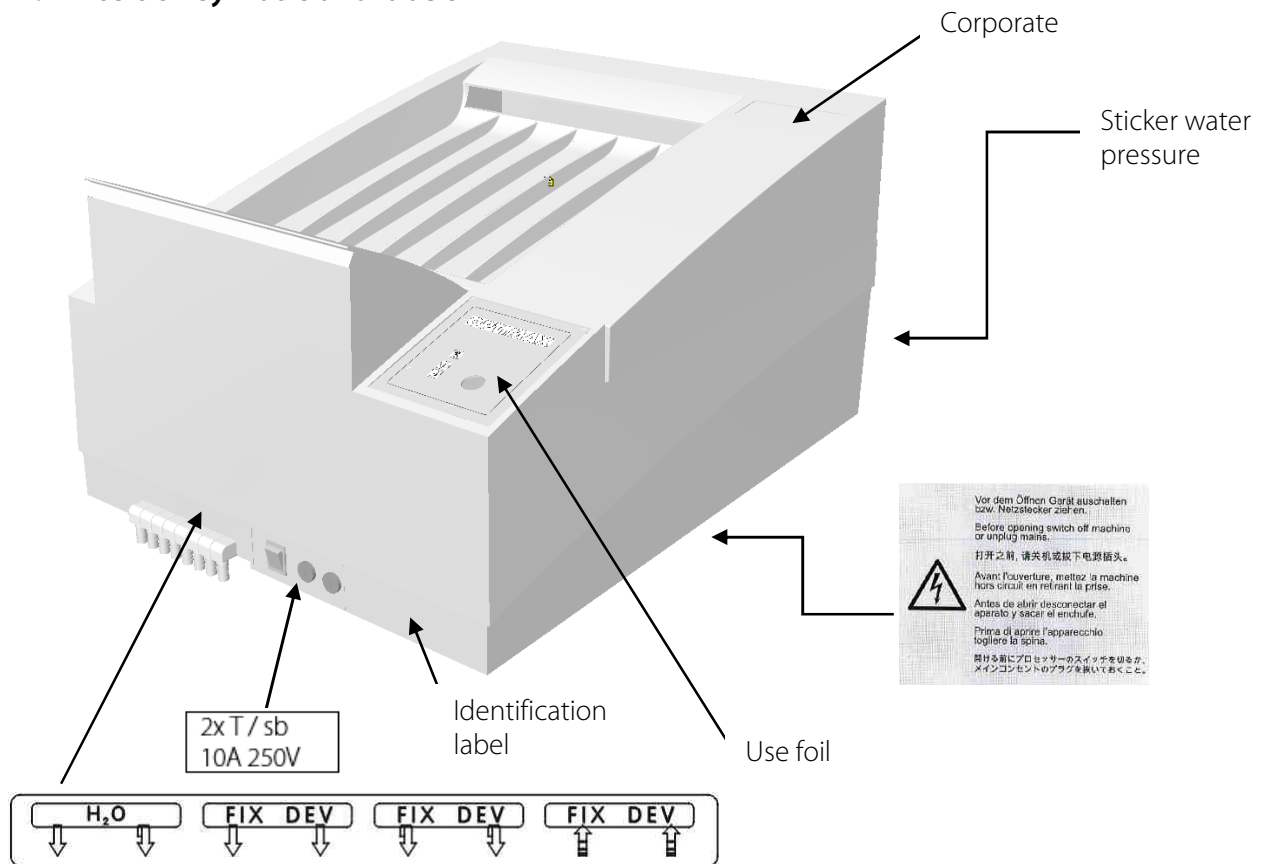
Wasseranschluß:	Zulässiger Wasserdruck 2-10 bar
Water connection:	Permissible water pressure 2-10 bar
Arrivée d'eau:	Pression nécessaire de 2 à 10 bars
Conexión de agua:	Presión admisible del agua: 2-10 bares
Connessione acqua:	Pressione ammissibile dell' acqua: 2-10

Sticker on the floor plate



Pull plug

11.4 Position symbols and labels



11.5 Abbreviations

mm	Millimeter
cm	Centimeter
lb.	Pound
kg	Kilogram
°C	Degree -Celsius
hPa	Hectopascal
DIN	German Industry Standard
EN	European Standard
CE	CE-Mark
Hz	Hertz
ED	Duty cycle
A	Ampere
SN	Serial number