Product Manual

X-tra pro 300 / 550 / 800 /1200 / 1600

Ultrasonic Cleaning Line

• English •

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Our ultrasonic cleaning lines are interference-free, tested for electro-magnetic compatibility and comply with the CE marking criteria concerning the low voltage and the EMC directives.

The present documentation is intended for the operator and their staff only.
The contents of the present documentation (text, illustrations, drawings, graphs, diagrams, etc.) or parts thereof shall not be copied, circulated, used for unauthorized purposes of competition or handed over or made available to third party users without our prior written consent.

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On our homepage you will find useful information on our large product range:
www.joke.de

Do you have any queries or suggestions concerning the present equipment, its use or the product manual? Please contact us, we will be glad to assist:

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Overview total documentation

Part 1	**–**	**Product Manual X-tra pro**
Part 2	**–**	**Spare parts list / Maintenance / Circuit diagram**
Part 3	**–**	**Additional documentation by the manufacturers of individual modules**

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1 Introduction

1.1 Preface

Dear customer,
dear operator,

You have purchased an X-tra line cleaning unit / cleaning line and will now want to

- place the unit,
- put it into initial operation,
- operate it,
- service it.

The present product manual has been set up to assist you.

Please read the product manual carefully and take particular attention to the safety warnings!

The delivery volume may contain one or more units; equipment consisting of more than one unit is called a cleaning line. In order to be able to use simple terminology in the following manual we may refer to a cleaning line even when only a single unit is being described!

The ultrasonic cleaning lines are available in many different versions.
The documentations on all versions are subdivided to form a numerical structure.
The present manual contains only the description of the equipment of your individual cleaning line.
Therefore, the numerical order of the sub-divisions in certain sections may show gaps.

If you have any queries concerning your cleaning line please contct us. We will be glad to assist.

joke Technology GmbH

1.2 Symbols used in the manual and their meanings

CAUTION Paragraphs marked **"CAUTION"** warn against an **immediate** danger (mortal danger, serious injuries).
Strictly observe these instructions!

WARNING Paragraphs marked **"WARNING"** warn against a **potential** danger (mortal danger, serious injuries).
Strictly observe these instructions!

ATTENTION Paragraphs marked **"ATTENTION"** warn against a **potential** danger (light injuries, damage to material).
Strictly observe these instructions!

Paragraphs marked with this symbol **contain very important information**, e.g. on the prevention of injuries and of damage to the material!
Strictly observe these instructions!

This symbol refers to paragraphs containing comments or useful information.

- This symbol marks enumerations.

CAUTION

Risk of electric shock

CAUTION

Risk of fire and explosion

CAUTION

Risk of scalding on hot surfaces

CAUTION

Danger due to mechanical movement

CAUTION

Danger due to chemical substances

CAUTION

Risk of pieces falling down

WARNING

Warning against sound emissions

1.3 Delivery volume

Check upon delivery if the delivered equipment is complete. The delivery volume has been defined by placing the order and can be checked by means of the transport documents.

1.4 Incoming inspection

Check upon delivery all parts of the cleaning line for transport damages and physical defects.

1.5 Transport damages

In case of any transport damage claim please contact your forwarder and the manufacturer immediately.

If transportation has been assigned to the manufacturer, all transport damages must immediately be mentioned on the freight bill of the recipient and of the forwarding agent.

The freight bill of the recipient must be made available to the manufacturer for handling the damage.

1.6 Storage

Units and equipment that are not put into operation immediately after delivery must be stored at a safe and vibration-free place.
Cover the equipment carefully to protect it against humidity and dirt.

1.7 Guarantee

Perfect condition and performance of the unit(s) purchased are guaranteed over a period determined in the purchase contract.

Within the guarantee period all parts carrying faults arising from manufacture or materials will be replaced free of charge.

The general guarantee regulations by **joke Technology GmbH** apply**.**

1.8 Storage of product manual

The present product manual i spart of the complete documentation on the cleaning line and must be kept close by the cleaning line at any time to allow immediate access if required.

1.9 Product identification

1.9.1 Validity of documentation

The present product manual refers to an installation consisting of

X-tra pro 300 / 550 / 800 / 1200 / 1600

or of modules, components and individual parts developed and manufactured by **joke Technology GmbH**.

The cleaning lines of the named product series are identical in their functioning; the dimensions of tank capacity and casing and the electric connecting values may differ.

(see also Section 8 „Technical Data“)

1.9.2 Cleaning line data sheet

Type:	X-tra pro 1200 (flex2)
Cleaning line no.:	05 V1204740 12
Year of construction:	05/2012
Order no.:	AE 30102048
Customer:	Coca-Cola HBC Northern Island

For any claims and queries please indicate the data listed above.

1.10 Declaration of conformity

EG-Konformitätserklärung für eine Maschine
Im Sinne der EG Richtlinie 2006/42/EG, Anhang II 1.A

EC declaration of conformity oft he machinery
according to EC directive 2006/42/EC, annex II 1.A

Wir/ We	**joke Technology GmbH**
Anschrift / Adress	**D-51429 Bergisch Gladbach** **Asselborner Weg 14-16**

erklären in alleiniger Verantwortung, dass die Maschine

hereby declare, a tour sole responsibility, that the machinery

Anlage / Equipment	X-tra pro line

allen einschlägigen Bestimmungen dieser Richtlinie und den folgenden Richtlinien:

fulfills all the relevant provisions of this directive and these other directives:

EMV-Richtlinie **guidelines to the EMC**	**04/108/EG**		**15.12.2004**

in der zum Zeitpunkt der Ausstellung gültigen Fassung entspricht.

in accordance with the version in force on the date of issue.

Bergisch Gladbach, den 17.08.2015

Udo Fielenbach
Geschäftsführer / Managing director

Intended use

The present cleaning line has been designed for the following applications only:

sounding of items and liquids and / or

rinsing of items and / or

drying of items!

The aforementioned processes must be carried out in accordance with the safety instructions given in the present manual!

Any use other than described above is regarded as improper use and may cause severe injuries to the operator and damage to the material!

2 Safety warnings

2.1 General

The ultrasonic cleaning line X-tra pro is a quality product designed and manufactured by approved technologies. It was in perfect condition when it left the manufacturer's premises and has passed all safety checks!
However, there is a remaining risk to the operator's health when the cleaning line is being

- transported,
- unloaded,
- placed,
- put into operation,
- operated,
- serviced,
- cleaned,
- put out of operation and
- disposed of.

These risks may lead to injuries or death of the operator or damage to the material

- if they are not taken into consideration,
- if the safety warnings in the present manual are not observed,
- in case of improper repair/maintenance works on the cleaning line or in case of any unintended use of the cleaning line!

Therefore, the manufacturer is obligated to inform the operator and the operating staff on these remaining risks!
We – the manufacturer – fulfil this obligation by the general descriptions in the present manual, in particular by the instructions given in this section!
Read the complete product manual carefully before you carry out any work.
Always observe the instructions – for your own safety!

2.2 Responsibilities

2.2.1 Responsibility of the operator

With a view to the remaining risks the operator of the cleaning line is obligated to ensure the following:

- the building/workshop must be prepared in such a way as to minimize any risk and
- the cleaning line must be operated only by staff who
  - have been correctly and sufficiently instructed for the intended tasks,
  - are thoroughly acquainted with the principal regulations on the safety of labour and the prevention of accidents and have been instructed on the operation of the installation by qualified specialists,
  - have read and comprehended the safety warnings in the present manual.
- all measures necessary have been taken to ensure that no unauthorized person (e.g. children) can entert he danger area of the cleaning line.

In the general interest of all persons involved please observe the following instructions:
In addition to the present documentation allow access to

- general binding regulations, laid down by the law and other authorities, concerning the safety of labour, the prevention of accidents and the protection of the environment, and
- the specific safety warnings and instructions on the use of all operating media to be used in the cleaning line. Insure that the operating staff are sufficiently instructed in the use of these documents!

Ensure that the responsibilities for mounting, putting into operation, loading, operating, setting, servicing, etc. are unequivocally assigned to certain staff members!
Operate the cleaning line with correct protection gear and fully functioning safety devices only!
Check regularly that the operating staff observe all safety instructions!
Take all measures necessary to ensure that the cleaning line is operated only when it is safely possible and all functions are operating correctly!
Carry out the required maintenance works in the intervals indicated in the present manual!
Do not carry out any repair works without prior consultation with the manufacturer! Opening of the unit or cleaning line must be carried out by authorized specialized personnel only.

Do not modify the cleaning line without prior written authorization by the manufacturer!
The manufacturer cannot be held liable for any damage to persons, to the cleaning line or to the cleaned items caused by improper use. The operator is responsible for the correct instruction of the operating staff.

2.2.2 Responsibilities of the operating staff

In addition to the present manual and before starting any work on or with the cleaning line, all persons involved in operating the cleaning line are obligated to

- observe the principal regulations concerning the safety of labour and the prevention of accidents,
- read the safety warnings given in the present manual, and
- read the specific warnings and user instructions for the operaing media to be used in the cleaning line.

In the interest of all persons involved please observe the following:
Do not carry out any work which does not comply with the safety warnings and might cause and unnecessary risk!
Observe all warnings indicated on the cleaning line!
Be informed on, and if required use, the available fire alarm and fire extinction devices and clearly indicate the location and the correct use of fire extinguishing gear!
Wear protection gear suitable for the planned work (e.g. gloves, protective clothing)!
Do not wear long hair loose; do not wear loose clothes; do not wear any jewellery!
Carry out only works for which you have been sufficiently trained and instructed!
Do not carry out any works when the cleaning line is ready for operation and the safety and protection devices have been bridged or removed!

Immediately switch off the cleaning line if the safety can no longer be guaranteed; secure the cleaning line against switch-on and contact the responsible superior or the person in charge immediately!
Do not carry out any repair works!
Do not modify the cleaning line in any way!
Clean, rinse or dry in the cleaning line only materials which have been defined and permitted by the manufacturer.
Do not put any living beings (animals or plants) in the tanks of the cleaning line!

2.3 Safety warnings on unloading, transportation and assembly

2.3.1 General

Transportation of the cleaning line from the manufacturer to the operator is to be effected by a forwarding agent.

DANGER

During unloading of the cleaning line from the transport vehicle there may be a risk of serious injuries for the unloading staff (mortal injuries, fractures, contusions, etc.) by tipping/falling down of the cleaning line or parts thereof, if:

- ***the unloading gear is used improperly;***
- ***the unloading gear is faulty or if its loading capacity is exceeded.***

In order to avoid these risks, please read the following instructions thoroughly and strictly observe them!

Do not use any faulty material or faulty gear for unloading.

Ensure that no one stays in or can enter the danger area during unloading of the cleaning line! If required, install warning signs or instruct a supervisor!

Observe the instructions indicated on the transport packaging.

Use transport devices of sufficient loading capacity (loading capacity min. factor 1.5)!

Do not lift the cleaning line any higher than required for unloading!

If the cleaning line must be transported while lifted, lower it as far as possible and secure the transport route by barriers or through a supervisor!

Move the cleaning line slowly and avoid sudden acceleration or braking!

Do not walk and/or stay under the lifted cleaning line!

Wear suitable protective gear, e.g. helmet, gloves and protective shoes!

Connect the cleaning line to a correctly grounded power socket only!

Connection of the cleaning line to the power supply and initial operation can be carried out by the operator or the manufacturer, according to the specifications of the order!

DANGER

The technical details on the name plate must correspond with the available connection conditions! This applies in particular to the mains voltage and the connected value!

2.3.2 Preconditions for the placing of the cleaning line

Before the cleaning line can be placed and put into operation by the operator all necessary preconditions and fittings in the building must be given!

The operator has been informed on these preconditions before the equipment is delivered.

If it is not possible to mount the equipment immediately upon delivery it must be kept in its original packing and be stored at a dry and equal-tempered place.

2.3.3 Ambient conditions (see also Section 8 Technical Data)

Transport routes	Check if the transport routes to the designated place are suitable for transportation and clear of obstacles (e.g. stairs, elevators). The dimensions of the individual components are indicated on the arrangement plan.
Space requirement	The space required for placing the cleaning line depends on its structure and is indicated on the arrangement plan. The arrangement plan has been submitted to the customer during order processing. In addition, there must be sufficient space left around the cleaning line to allow filling and draining, loading and unloading and service and maintenance works. The cleaning line must be arranged so that escape routes are clear and comply with the valid regulations.
Loading capacity of the floor/ground	The statics of the substructure must allow the additional load of the cleaning line! The weight of the cleaning line, together with other important data, is indicated in the technical data. The weight of a modular cleaning line can be calculated if required.
Condition of the floor/ground	The floor/ground must be even, horizontal, dry and clean.
Vibrations/shock	The cleaning line must be protected agains all kinds of vibrations and shock.
Chips/work pieces	Take suitable measures to prevent dirt or work pieces from accumulating on or inside the cleaning line.
Humidity/liquid	Protect the cleaning line against humidity and entering liquid.
Vapours/gases	Prevent the forming of vapours or aggressive gases.
Heat/cold	Do not expose the cleaning line to heat or extreme cold during storing, transportation and operation. Ensure that the required ambient temperature range is kept during operation. **See also purchase contract and/or operator's direction and Section 8 „Technical data"**
Power supply	Ensure that the customer-provided electric fittings comply with the regulations, and that the safety devices correspond with the power conumption values of the cleaning line. All power supply lines must allow complete switch off!
Laying of supply lines	The laying of supply lines across the floor presents a danger source and is therefore not permitted! Place supply lines inside a cable duct in the ground, along the walls or over a cable bridge to the cleaning line.
Ventilation	Ensure that the workplace is sufficiently ventilated. **See also Section 10.1 „Limitations concerning solvent-containing cleaners"**
Electromagnetic interference sources	The control and the data transmission channels of the cleaning line are largely shielded against electromagnetic interferences; however, very strong interferences may have a negative effect on the functioning. Therefore, do not place any machinery with high power consumption, e.g. electric motors or electric hoisting

magnets etc., or their power supply lines in the immediate vicinity of the installation. The use of wireless telephones may also interfere with the control of the cleaning line.

2.3.4 Initial operation / instruction

Please read the product manual carefully and take particular attention to the safety warnings!

2.4 Safety warnings for the operator

2.4.1 General

Carry out works on and with the cleaning line only if

- you have checked and ensured that the cleaning line is in perfect condition and operates safely!
- you have read and understood the instructions on functions and operation of the cleaning line and on the remaining risk involved indicated in the present manual!

Do not carry out any works on or with the cleaning line if there are any malfunctions or faulty components!

Keep all operating elements and work surfaces clean and dry!

Do not immerse the cleaning line and do not pour any liquid over the cleaning line or parts thereof!

If any liquid has been poured over the cleaning line do not switch it on!

Separate the (operating) cleaning line from the mains supply! Ensure that the cleaning line cannot be put into operation again (e.g. by installing an information sign) and inform your superior!

Switch-on of the filled cleaning line may cause so-called start-up splashes, i.e. there may be drops of liquid splashing out of the tank.

DANGER

Take special care when using corrosive or otherwise dangerous cleaning media.

Step away from the cleaning line and wear suitable protection gear (e.g. helmet, face shield, gas mask, protection clothing, gloves, protection shoes)!

Cleaning lines equipped and operated with heating may produce high temperatures of liquid and tank.

DANGER

Do not touch the tank inside or the carrier baskets when the heating is switched on and operating, as this may cause burnings!

Do not reach inside the tank during ultrasonic operation! Do not touch any sound-carrying parts (tank, basket, cleaning items). Prolonged exposure to ultrasound may damage the cell membranes of the human body!

Fill and drain the tank only when the cleaning line is switched off!

For filling and draining the tank wear protection gear (e.g. helmet, face shield, gas mask, protection clothing, gloves, protection shoues)!

DANGER

Always observe the safety warnings given by the producer of the cleaning media used!

Do not smoke or consume any food in the danger area around the cleaning line!

Do not store any food near the cleaning line!

2.4.2 Warnings on flammable liquids

WARNING

Never use flammable liquids or solvents directly in the ultrasonic cleaning tank! Risk of fire and deflagration!

Ultrasound increases the vapourization of liquids and creates very fine mists which can catch fire on any ignition source.
Explosive substances and flammable solvents of the danger classes (VbF):

- AI, B, AII, AIII or marked according CE directive by symbols and danger signs
- E or R 1, R 2 or R 3 for explosive substances

or

- F+, F or R 10, R 11 or R 12 for flammable substances

must not be filled into the stainless-steel tank of the ultrasonic cleaning unit.

Only the ultrasonic cleaning units 250 LSM and 550 LSM (**AIII**) specifically marked are allowed for operation with flammable solvents of the same or less hazardous danger classes (Vbf).
In compliance with the general regulations on the protection of labour, limited quantities of flammable liquids (max. 1 litre) can be used in an ultrasonic cleaning unit, provided that the unit is sufficiently ventilated and only if a separate vessel (e.g. glass beaker) is used in the stainless-steel tank filled with an inflammable liquid (water with several drops of an interlacing agent).

2.5 Safety warnings for the cleaning line

Ensure that the mains voltage corresponds with the data indicated on the nameplate on the back of the unit(s).

Fill the stainless-steel tank with liquid up to the overflow or to the level sensor before you switch on the installation!

Do not operate the installation without liquid as dry running may cause damage to the material.

Check the filling level regularly, in particular during prolonged operation cycles!

Warnings on aqueous cleaning media

Do not use any aqueous cleaning media with pH values in the acid range (pH value < 7) directly in the stainless-steel tank if fluoride (F), chloride (Cl) or bromide (Br) ions can be entrained by the removed dirt or through the cleaning chemical. These destroy the stainless-steel tank by crevice corrosion within a short period when operated with ultrasound.

Other media which may destroy the stainless-steel tank when used in high concentrations or with high temperatures during ultrasonic operation are: e.g. nitric acid, sulphuric acid, formic acid, hydrofluoric acid (even diluted), potassium hydroxide solution. These media cause stress corrosion cracking of the ultrasonic tank.

The above limitations of use of chemicals in an ultrasonic bath also apply to the entering of the mentioned chemicals into the aqueous bath (particularly distilled water) through entrainment or by the removed dirt.

The limitations of use also apply to the standard household cleaners and disinfectants if these contain the above mentioned compounds**.**

Observe the safety warnings indicated by the producer of the chemicals.

We recommend the use of the joke cleaning chemicals which have been developed specially for the use in ultrasonic cleaning baths.

See Section 10.3 „Recommended cleaning media“

2.6 Safety warnings on special dangers

2.6.1 General

Be aware of the remaining risks attached to the cleaning line, individual components and/or parts when carrying out any works on the cleaning line

- **when it is switched off**
- **when it is ready for operation, and**
- **when it is operating!**

There are

- live parts and components;
- electrometrically driven moving components;
- hot temperatures in tanks.

Depending on the cleaning process carried out, the cleaning line may contain:

- aggressive operating media which may damage the skin or the respiratory organs;
- flammable and/or deflagratory (by atomization) operating media.

- Operation of the cleaning line may cause an increased sound pressure level.

2.6.2 Danger due to electric power

Risk of electric shock or electrocution through touching of live components!

Therefore switch off the cleaning line completely before you carry out any work!

Use a voltmeter to ensure that the cleaning line is dead before you carry out any work!

Install a warning sign to prevent accidental switch-on for the duration of any work on the cleaning line!

Use sufficiently insulated tools for carrying out any work on the electric components of the cleaning line!

Immediately switch off the complete cleaning line in case of any malfunctions of the electric power supply!

Regularly check the electric equipment of the cleaning line! Repair any faults such as loose connections or scorched cables immediately!

If any work should be required to be carried out on live parts instruct a second person to press the emergency switch-off or to actuate the main switch in case of any emergency!

Work on electric parts or components of the cleaning line must be carried out by authorized special staff and according to the electro-technical rules only!

2.6.3 Danger due to mechanical movement

There is a risk of contusion due to gross negligence or wanton actions or due to superior forces.

2.6.4 Danger due to hot temperatures

Risk of scalding due to heated tank insides!
Do not touch the heated tank insides!
Wear protection gloves when working on the heated tank!

Switch off the heating and allow the tank to cool down before you carry out any work on the heated tank!

2.6.5 Danger due to aggressive, flammable or deflagrating operating media

DANGER

Risk of causticization of the skin due to aggressive operating media!
Risk of causticization of the respiratory organs due to inhalation of aggressive vapours!
Wear protection gear when working with these dangerous media (e.g. helmet, face shield, gas mask, protection clothing, gloves, protection shoes)!
Avoid open fire in the danger area around the cleaning line!

2.6.6 Danger due to ultrasound

DANGER

Risk of damage to the cell membranes by reaching inside the tank or touching of ultrasound-carrying parts (e.g. tank, basket, cleaning items) during ultrasonic operation!
Do not reach inside the tank or touch any items in the tank during ultrasonic operation!
Risk of damage to the hearing by remaining near the cleaning line during ultrasonic operation!
Wear your personal ear protection device when working close by the cleaning line during ultrasonic operation!
Ensure that no animals (e.g. dogs, cats, birds) are near the cleaning line during ultrasonic operation!

2.6.7 Warning against sound emissions

DANGER

The average sound level in front of the cleaning line is Lp_{AU} < 70 dB. The wideband sound pressure level is Lp_Z < 110 dB. Wear your personal ear protection device while staying close to the cleaning line over a prolonged period of time.

2.6.8 (Danger) Signs on the cleaning line and their meanings

	***Warning against dangerous electric voltage!***
	***Warning against hot surfaces!***
	***Warning against mechanical movement***
	***Warning against hot fluids and vapours***
	***Caution! Health hazardous substances. Optional (depending on cleaning chemical used)***
	***Caution! Corrosive substances. Optional (depending on cleaning chemical used)***
	***Use eye and ear protection***
	***Use gloves***

Immediately replace any damaged or missing danger signs!

3 Description of the cleaning line

3.1 Components

The cleaning line consists of:

- **Ultrasonic cleaning unit X-tra pro**

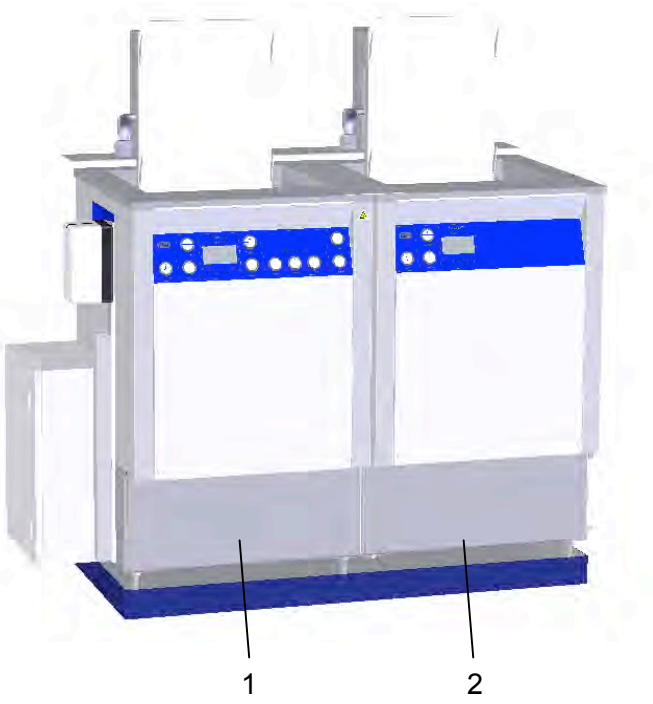


Fig.3.1.1: Components of cleaning line

1 Ultrasonic cleaning unit X-tra pro
2 Rinsing unit X-tra pro

3.2 Product features

3.2.1 Product features –X-tra-pro ultrasonic cleaning unit

- Transducer tank made of special highly cavitation-proof stainless steel (V4A)
- Inclined tank floor to facilitate the draining of cleaning liquid
- Skimming ledge for a surface skimming, e.g. of oils (optional)
- Bottom scouring for the removal of dirt particles (optional)
- Two ultrasonic frequencies in one unit, changeable, (model MF2 25 kHz/45 kHz or model MF3 37 kHz/130 kHz), for either intensive or gentle cleaning
- User-friendly operation via keys and display. 5 display languages available
- Setting and running of up to 5 user-defined cleaning programmes
- Timer for the programming of day controlled or time controlled cleaning start, and user-defined switch-off
- *Sweep* mode activatable, for a continued shifting of the sound pressure maxima, ensure a more homogeneous sound field distribution in the bath
- *Pulse* mode activatable, for an intensified ultrasonic cleaning effect for tenacious contaminations. In addition, it takes less time for the unit to be ready for operation (the unit is ready for operation when the cavitation threshold is reached) after an exchange of the cleaning liquid or when a new basket has been inserted; shorter overall cleaning period
- *Degas* mode activatable, for the efficient degassing of the cleaning liquid and for special laboratory tasks
- Manual setting of the ultrasonic power
- Heating with temperature control (30°C – 80°C)
- Temperature-controlled ultrasound: the ultrasound automatically starts when the preset temperature is reached
- Automatic safety switch-off after 12 h operation to avoid unintended permanent operation

Available optional peripheric equipment:

- Oscillation device
- Oil separator
- Filter-pump aggregate
- Pure water unit
- Shower device
- Drip-off module

3.2.2 Product features – X-tra pro rinsing unit

- Rinsing tank made of stainless steel (V2A)
- Inclined tank floor to facilitate the draining of the liquid
- Skimming ledge for the surface skimming, e.g. of oils (optional)
- Bottom scouring for the removal of dirt particals (optional)
- User-friendly operation via keys and display. 5 display languages available
- Timer for the programming of day controlled or time controlled heating start, and user-defined switch-off
- Heating with temperature control (30°C – 80°C)
- Automatic safety switch-off after 12 h operation to avoid unintended permanent operation
- Level monitoring for the safety switch-off in case of too low filling level
- Casing made of stainless steel V2A
- Drain duct on the unit rear, made of stainless steel V2A
- Connections for feed ducts for the optional connection of peripheric units (e.g. filter-pump system, oil separator)
- Connection for an external control (SPC / PC)

Available optional peripheric equipment:

- Oscillation device
- Central control
- Oil separator
- Filter-pump aggregate
- Pure water unit
- Shower device
- Drip-off module

3.3 Description of the equipment

3.3.1 Unit description – Ultrasonic cleaning unit X-tra pro

Unit components

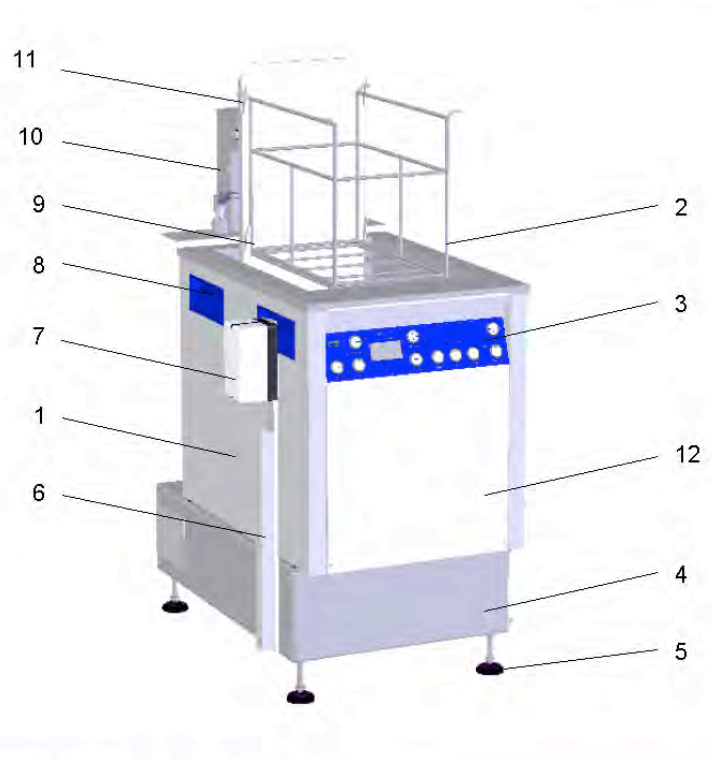


Fig. 3.3.1.1: Ultrasonic cleaning unit X-tra pro

1 Ultrasonic cleaning unit
2 Basket (without mesh)
3 Operating panel for the control of the operating functions
4 Supporting frame
5 Adjustable feet
6 Power supply duct for oscillation device
7 On / Off switch oscillation device
8 Handle
9 Basket support hook (cleaning position)
10 Oscillation device
11 Basket support hook (loading / unlaoding / dripp-off position)
12 Electronic unit with performance electronics (easy to replace if necessary)

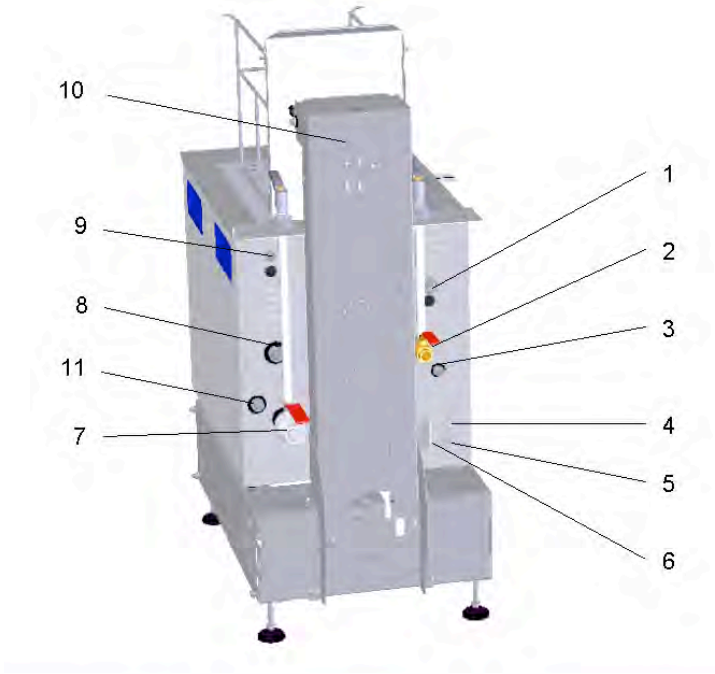


Fig. 3.3.1.2: Connections on the unit rear

1 Drain of overflow collecting basin (connection pure water unit RWA, oil separator ÖA, cascade)
2 2-way ball valve (feed duct fillling)
3 Feed duct bottom scouring
(optional, for the removal of dirt particles settling on the tank floor)
4 Interface (SPC)
5 Interface (SPC)
6 Mains connection
7 2-way ball valve (draining of the tank)
8 Feed duct cascade piping (on modular cleaning lines)
9 Feed duct surface skimming
10 Oscillation device
11 Suction side pump-filter aggregate

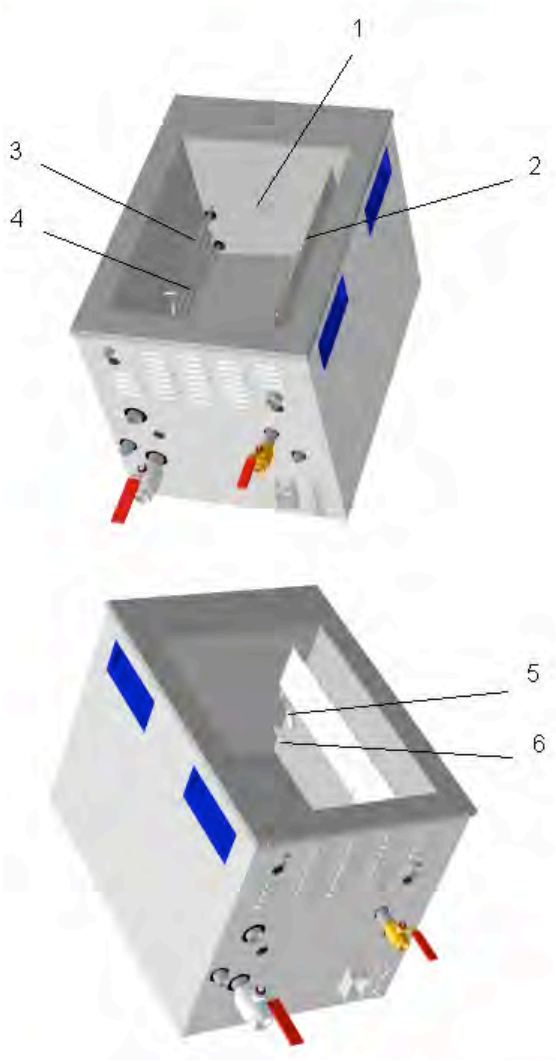


Fig. 3.3.1.3: Ultrasonic tank inside

1 **Ultrasonic tank** made of cavitation-proof stainless steel (V4A).
The transducer disks are mounted to the bottom of the tank. The tank floor is inclined toward the drain duct to facilitate the draining of the tank.

2 **Overflow basin** to collect oil etc. skimmed off the surface of the cleaning bath; with connection to optional peripheric equipment (e.g. filter-pump system, oil separator). The upper edge of the overflow basin also marks the recommended filling level during operation.

3 **Protecting bar for heating element**

4 **Heating element**

5 **Level switch** for cleaning liquid filing level. Switches off the unit when the filling level falls below the minimum.

6 **Temperature sensor**

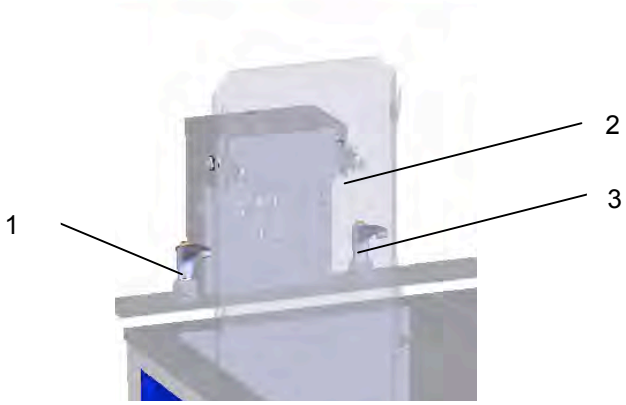


Fig. 3.3.1.4: Handles for opening / shutting of the ball valves

1 Handle for opening / shutting of the ball balve (filling supply)
2 Oscillation device
3 Handle for opening / shutting of the ball valve (tank draining)

Fig. 3.3.1.5: Adjustable hand levers item 1

1 Releasing button

Function (Releasing button):

By lifting the handle and pressing down the release clip is the serrations and the clamping lever can be swung to the ideal clamping position. When, releasing locks "the handle back on automatically.

For open and close the ball valves for drain the cleaning liquides and filling the release knob (item 1) does **not** push!

Description of operating elements (Ultrasonic cleaning unit)

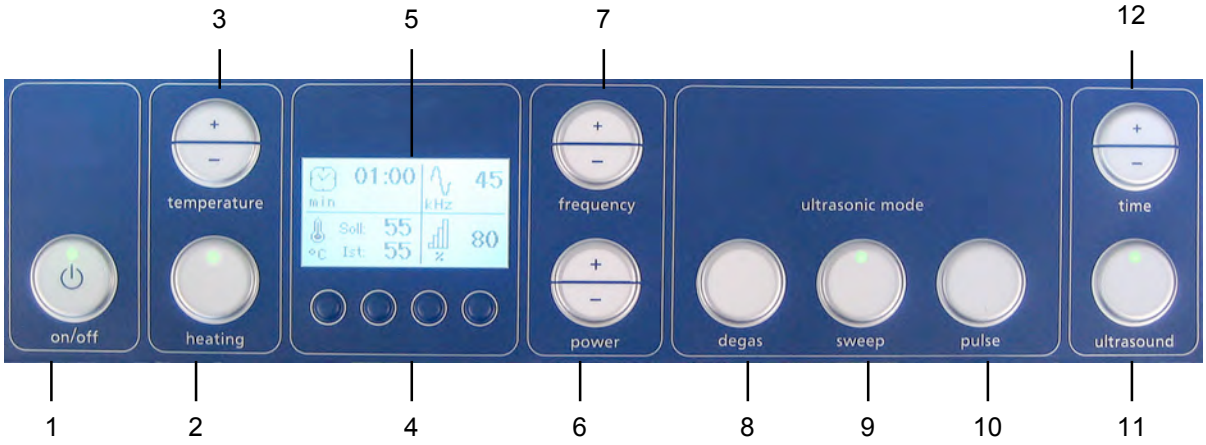


Figure: Operating panel

1 **Key „on/off“:** switches the unit on and off.
When the unit is connected to the mains, the LED in the key lights up red (standby mode).

2 **Key „heating“:** switches on the heating control. The LED in the key lights up green when the heating control is switched on.

3 **Key „temperature“:** setting range between 30° - 80°C in 5°C steps. The set value is indicated in the display.

4 **Navigation keys:** navigate in the display.

5 **Display:** indicates the settings.

6 **Key „power“:** changes the ultrasonic intensity in 10% steps. The set value is indicated in the display.

7 **Key“frequency“:** selects the ultrasonic frequency. Low frequency for intensive cleaning tasks; high frequency for gentle cleaning tasks. The selected frequency is indicated in the display.

8 **Key „degas“:** degasses fresh cleaning liquid. The LED in the key lights up green when this mode is activated. Degas cannot be operated simultaneously with sweep or pulse.

9 **Key „sweep“:** continuously shifts the sound pressure maxima, causes a more homogeneous sound field distribution in the cleaning liquid. The LED in the key lights up green when this mode is activated. Sweep cannot be operated simultaneously with degas or pulse

10 **Key „pulse“:** increases the ultrasonic power for difficult cleaning tasks. The LED in the key lights up green when this mode is activated. Pulse cannot be operated simultaneously with degas or sweep.

11 **Key „ultrasound“:** switches on the ultrasound. The LED in the key lights up green when the ultrasound is switched on (permanent green light with manual start-up; flashing green light with temperature-controlled start-up).

12 **Key “time“:** presets the cleaning time. Possible settings: short-term operation: 1, 2, 3; 10; 15, 20, 25, 60; 70, 80, 90, 120 min (automatic switch-off).
Permanent operation ∞ for continued ultrasonic operation (manual switch-off).
For reasons of safety, the unit automatically switches off after 12 h permanent operation.

Description and functions of the display

Standard display during operation

The display is divided into 4 sections. During operation of the unit, up to 5 parameters are indicated, which can be set by the relevant operating keys.

The 4 navigation keys and the keys *temperature*, *heating*, *frequency* or *power* control the parameters indicated in the display:

The main menu is opened by pressing any navigation key. By pressing the keys *temperature*, *heating*, *frequency* and *power* the respective display section is shown in full screen (context menu). 4 seconds after the last key setting the display automatically turns into the standard display.

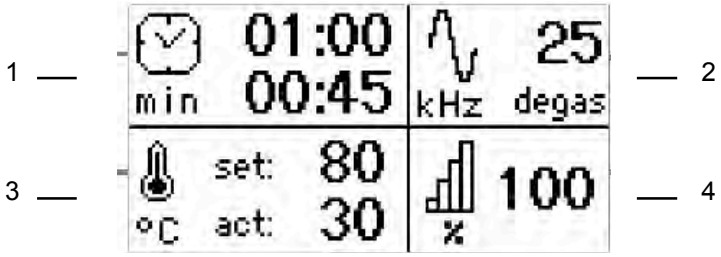


Figure: Standard display

1 Cleaning time: set time (upper value); remaining time (lower value); during permanent operation the display shows ∞.

2 Ultrasonic frequency (upper value); ultrasonic mode sweep, degas, pulse (lower value). The individual mode is only indicated while the respective mode is activated.

3 Set temperature (upper value); actual temperature (lower value)

4 Ultrasonic power in %

How to start the main menu

To start the main menu press one of the navigation keys below the display (*see fig. Operating panel, item 4*).
The following display appears:

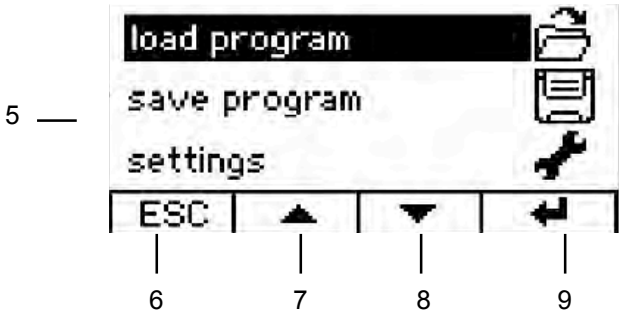


Figure: Main menu

5 The main menu shows 3 functions (submenus) to select from. The activatable function is marked black.

Load programme: starts one of the user-defined programms. Up to 5 cleaning programmes can be set and started (see also Section 6 „Reinigungsbetrieb“).

Save programme: sets and saves a new cleaning programme (see also Section 6 Reinigungsbetr.“).

Settings: changes the following parameters: date/time – timer – display contrast – temperature unit – language - service (for service points only).

How to navigate in the main

To navigate in the main menu press the required navigation key below the display sections „6 – 9“.

6 **Escape:** By pressing the navigation key below this display section you return to the previous operation level.

7 **Up:** By pressing the navigation key below this display section you increase the value of the respective parameter; you also navigate within the present menu.

8 **Down:** By pressing the navigation key below this display section you reduce the value of the respective parameter; you also navigate within the present menu.

9 **Enter:** By pressing the navigation key below this display section you acknowledge the respective setting.

How to enter a submenu

Use the navigation keys below the arrows in the display (Fig. Main Menu *„7/8“*) to select the required option (marked black) and start the selected submenu by pressing the navigation key below the display section *Enter* (Fig. Main Menu *„9“*). The available submenus are listed in the menu structure (Fig. Menu Structure).

30 seconds after the last setting in the main menu the display automatically turns into the standard display.

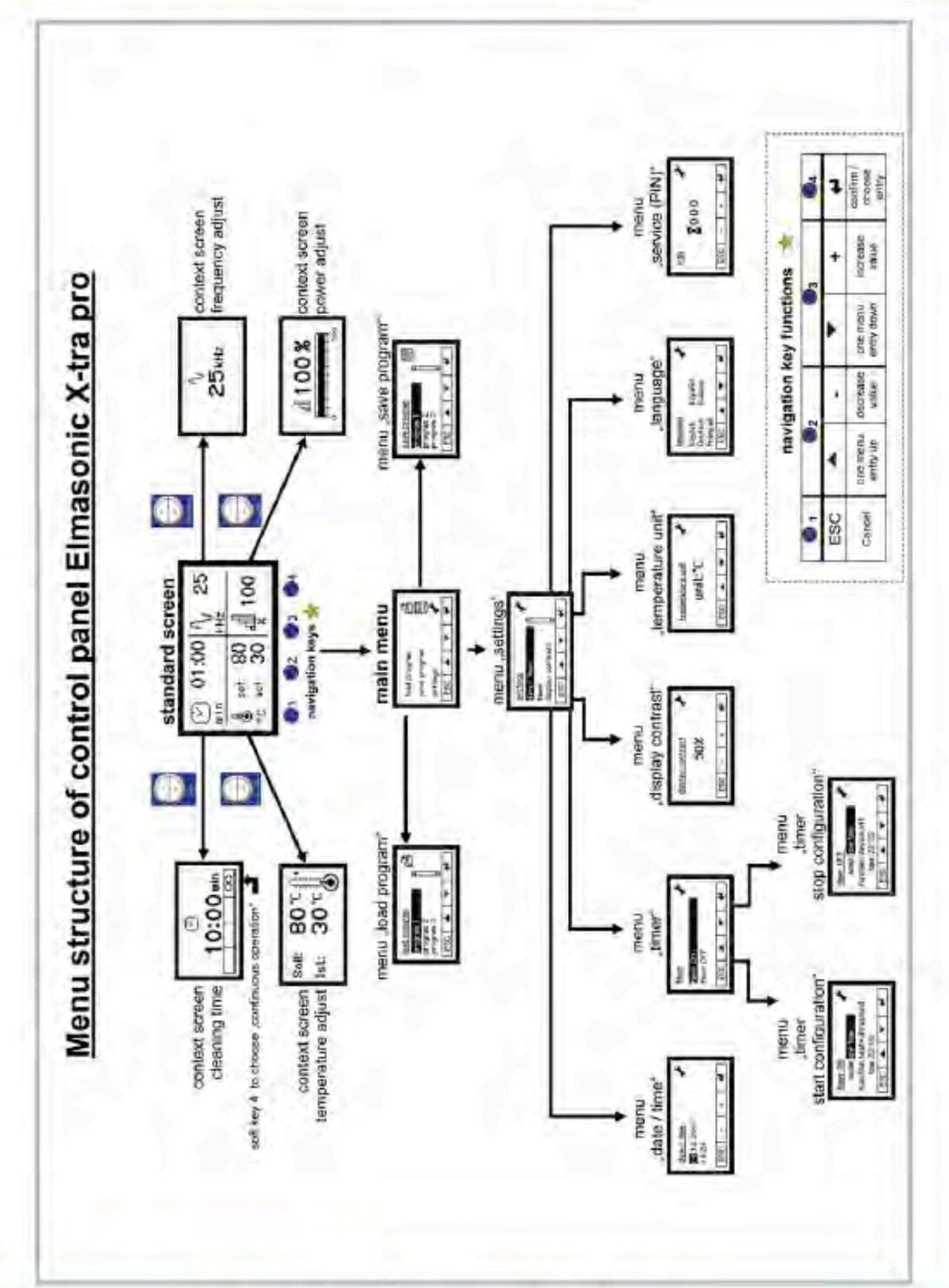


Figure: Menu structure

3.3.2 Unit description – Rinsing unit X-tra pro

Unit components

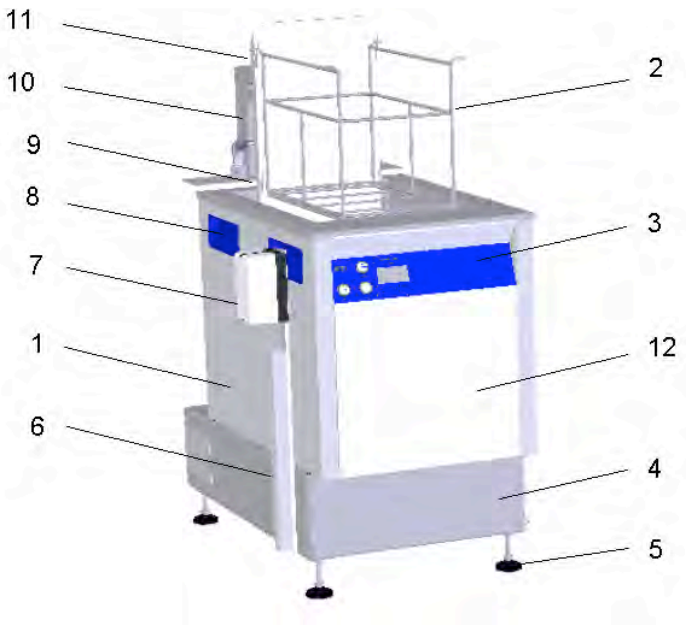


Fig. 3.3.2.1: Rinsing unit X-tra pro

1 Rinsing unit
2 Basket (without mesh)
3 Operating panel for the control of the operating functions
4 Supporting frame
5 Adjustable feet
6 Power supply duct for oscillation device
7 On / Off switch oscillation device
8 Handle
9 Basket support hook (rinsing position)
10 Oscillation device
11 Basket support hook (loading / unloading / drip-off position)
12 Electronic unit with performance electronics (easy to replace if necessary)

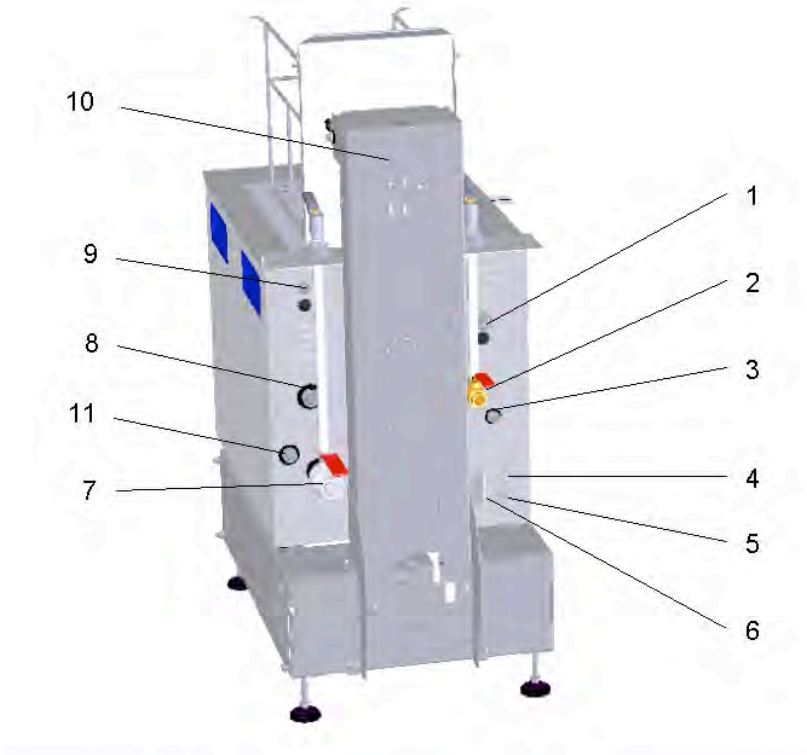


Fig. 3.3.2.2: Connections on the unit rear

1 Drain of overflow collecting basin (connection pure water unit RWA, oil separator ÖA, cascade)
2 2-way ball valve (feed duct filling)
3 Feed duct bottom scouring
(optional, for the removal of dirt particles settling on the tank floor)
4 Interface (SPC)
5 Interface (SPC)
6 Mains connections
7 2-way ball valve (draining of the tank)
8 Feed duct cascade piping (on modular cleaning lines)
9 Feed duct surface skimming
10 Oscillation device
11 Suction side pump-filter aggregate

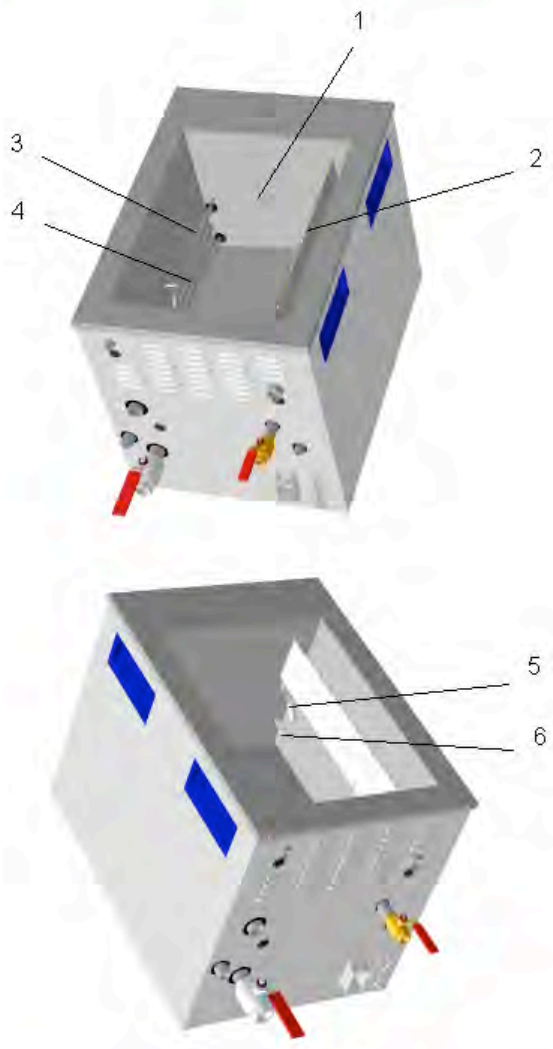


Fig. 3.3.2.3 Rinsing tank inside

1 **Rinsing tank** made of stainless steel (V2A).
The tank floor is inclined toward the drain duct to facilitate the draining of the tank.

2 **Overflow basin** to collect oil etc. skimmed off the surface of the rinsing bath; with connection to optional peripheric equipment (e.g. filter-pump system, oil separator).
The upper edge of the overflow basin also marks the recommended filling level during operation.

3 Protecting bar for heating element

4 Heating element

5 Level switch for rinsing liquid filling level. Switches off the unit when the filling level falls below the minimum.

6 Temperature sensor

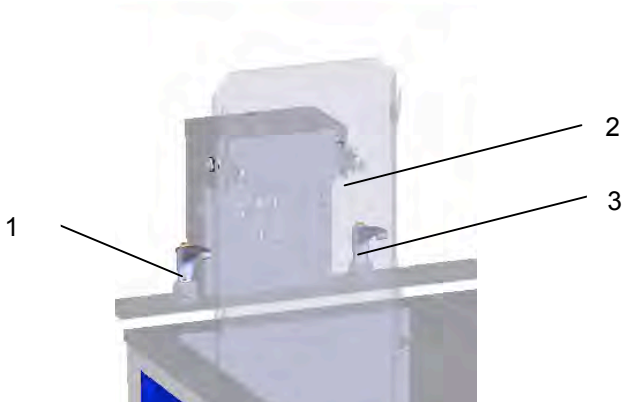


Fig. 3.3.2.4: Handles for opening / shutting of the ball valves

1 Handle for opening / shutting of the ball balve (filling supply)
2 Oscillation device
3 Handle for opening / shutting of the ball valve(tank draining)

Fig. 3.3.2.5: Adjustable hand levers item 1

1 Releasing button

Function (Releasing button):

By lifting the handle and pressing down the release clip is the serrations and the clamping lever can be swung to the ideal clamping position. When, releasing locks "the handle back on automatically.

For open and close the ball valves for drain the cleaning liquides and filling the release knob (item 1) does **not** push!

Description of operating elements

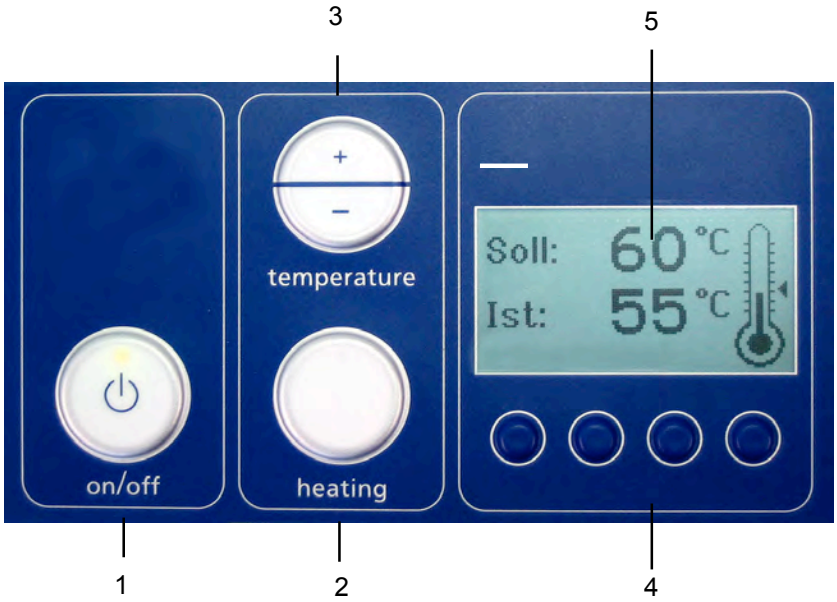


Figure: Operating panel

1 **Key „on/off“:** switches the unit on and off.
When the unit is connected to the mains, the LED in the key lights up red (standby mode).
When the key has been pressed the operating element is activated, the LED in the key lights up green.

2 **Key „heating“:** switches on the heating control. The LED in the key lights up green when the heating control is switched on.

3 **Key „temperature“:** setting range between 30°C – 80°C in 5°C steps. The set value is indicated in the display).

4 **Navigation keys:** navigate in the display

5 **Display:** indicates the settings.

Description and functions of the display

Standard display during operation

The display indicates the set temperature and the actual temperature both as numerical value and graphically as a little thermometer symbol.

The 4 navigation keys and the keys *temperature* and *heating* control the parameters indicated in the display.

Figure: Standard display

1 Set temperature numerical value
2 Set temperature indicated by arrow
3 Actual temperature numerical value
4 Actual temperature indicated by black bar

How to start the main menu

The basic settings and the setting of all operating parameters are carried out in the menu Settings.

To start the menu Settings press one of the navigation keys below the display (see fig. Operating panel, item 4).
The following displays appears:

Figure: Main menu

5 The menu Settings shows 5 functions (submenus) to select from. The activatable function is marked black.

Settings: changes the following parameters: date/time – timer – display contrast – temperature unit – language – service (for service points only).

How to navigate in the main menu

To navigate in the menu *Settings* press the required navigation key below the display sections 6 – 9.

6 **Escape**: By pressing the navigation key below this display section you return to the previous operation level.

7 **Up:** By pressing the navigation key below this display section you increase the value of the respective parameter; you also navigate within the present menu.

8 **Down:** By pressing the navigation key below this display section you reduce the value of the respective parameter; you also navigate within the present menu.

9 **Enter:** By pressing the navigation key below this display section you acknowledge the respective setting.

How to enter a submenu

Use the navigation keys below the arrows in the display (*Fig. Main-Menu**"7/8"***) to select the required option (marked black) and acknowledge with the navigation key below the display section *Enter* (*Fig. Main-Menu**"9"***). The available submenus are listed in the (Fig. Menu structure)

30 seconds after the last setting in the main menu the display automatically turns into the standard display.

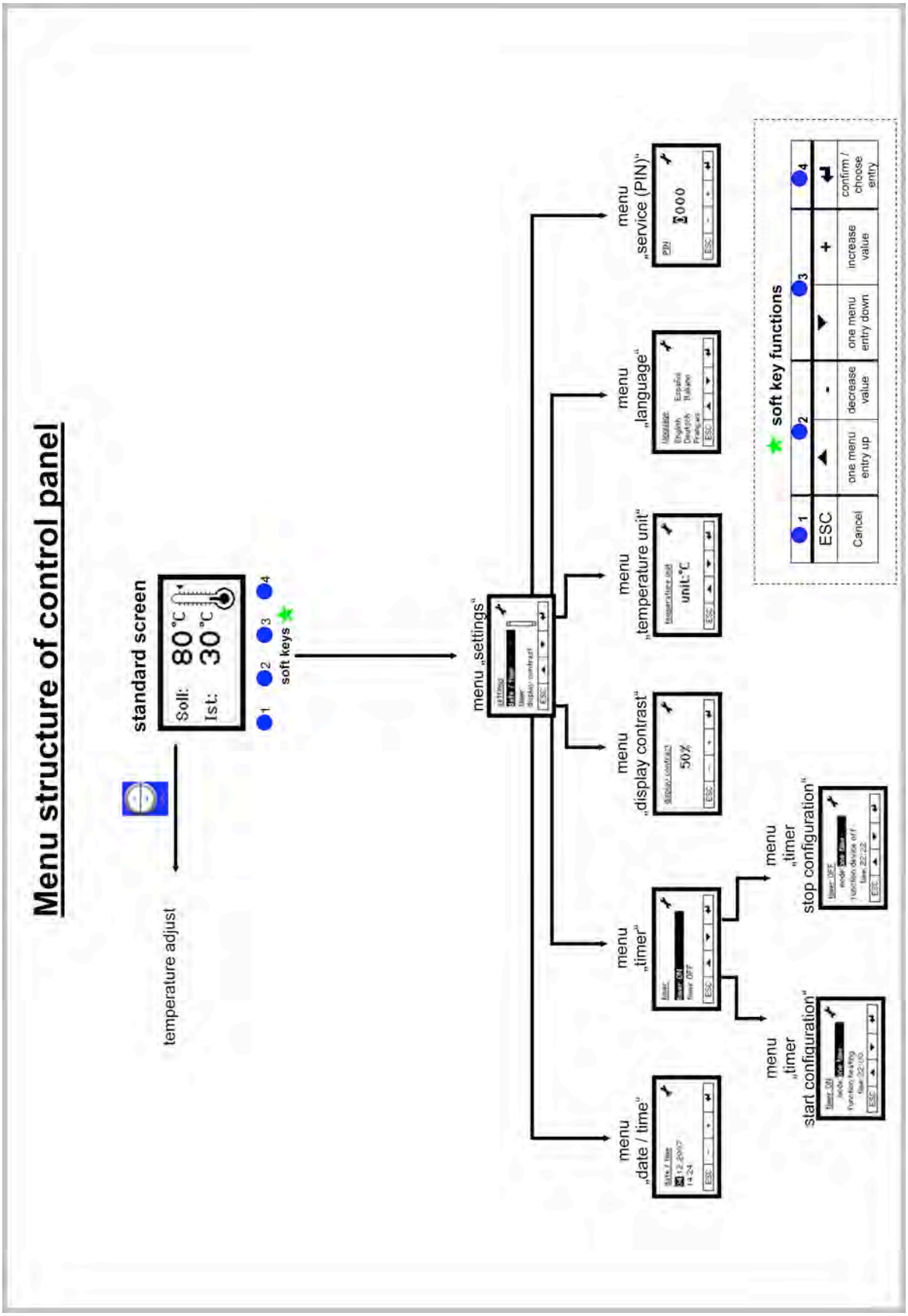


Figure: Menu structure

3.3.3 Unit description – Switch cabinet

Fig. 3.3.3.1: Switch cabinet

1 Main-Switch
2 Oscillation „Start“
3 Oscillation „Stop“

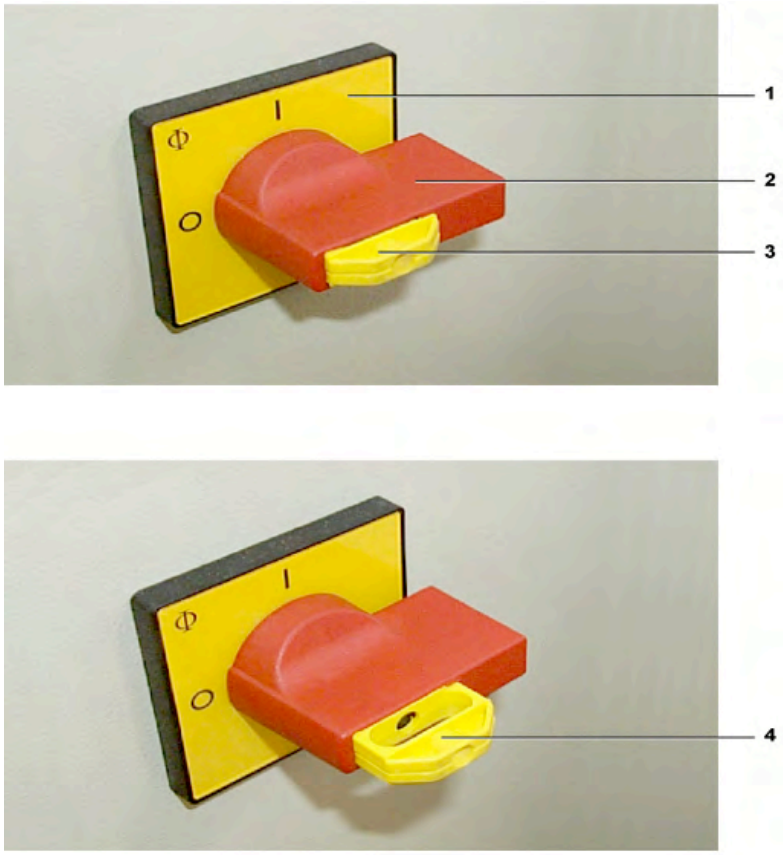


Fig. 3.3.3.2: Main Switch

1 main switch of the cleaning line (on the side of the switch cabinet)

2 switch handle

3 locking device pressed in – in this position the switch can be activated (switch cleaning line on or off)

4 locking device pulled out – in this position the switch cannot be activated

4 Description of the functions

4.1 Process description – X-tra pro ultrasonic cleaning unit

Today, cleaning by ultrasound is the most modern fine cleaning method.

The electric high-frequency energy created by an ultrasonic generator is transformed into mechanical energy by piezo-electrical transducer systems and is then transmitted into the bath.

This process creates millions of tiny vacuum bubbles which implode due to the variations of pressure caused by the ultrasonic activity. Highly energetic liuid jets are created. These jets remove dirt particles from surfaces and even from the smallest grooves and bores.

Basically, the cleaning result depends on four factors:

Physical energy	Ultrasonic energy is probably the most important mechanical factor in the cleaning process. This energy must be transmitted through a liquid medium to the surfaces which are to be cleaned. The present unit is fitted with the innovative sweep technology: electronic oscillation of the sound field (sweep) reduces the formation of zones of low performance in the ultrasonic bath.
Cleaning media	For saponification and removal of the dirt particles a suitable cleaning agent is required. We have a large range of cleaning media on offer.
Temperature	The effect of the cleaning medium is improved by the optimised temperature of the cleaning liquid.
Cleaning time	The cleaning time depends on the degree and the kind of contamination and on the correct selection of ultrasonic energy, cleaning medium and temperature, and on the cleaning process.

4.2 Description of function – Rinsing tank X-tra line

By immersing the parts into the rinsing tank, the chemical substances are rinsed off, which still at the parts from the ultrasonic tank.

The rinsing effect is still improved by the choice of the optimal liquid temperature.

An additional increase of the rinsing effect is reached by the oscillation of the basket in the rinsing tank.

5 Assembly / Disassembly

5.1 General

According to the specifications agreed upon in the purchase contract, the cleaning line is assembled, filled and put into initial operation either by members of the manufacturer or by authorized staff of the operator.

If you carry out assembly and initial operation on your own, please read the following sections carefully first and observe the instructions starting from here.

Section 2 „Safety warnings“

Section 2.3 „Safety warnings on unloading, transportation and assembly“

If the cleaning line is assembled and put into initial operation by the manufacturer, please skip this section and proceed with the next section:

Section 6 „Putting into operation / Taking out of operation“

5.2 Assembly

We assume that the cleaning line has been unloaded from the forwarder's vehicle according to the safety warnings, that the transport packing has been removed and that the cleaning line has been taken to the designated place of assembly.

Place the cleaning line on the designated surface.
Ensure that all units and components are levelled out. If necessary adjust the adjustable feet so that all feet support the unit frames and the overflow edge is levelled out.
If a central filling/discharge system is to be used, install the ducts to the corresponding connections an the rear of the units, or check if the 2-way ball valves are connected.
Connect the (optional) interfaces for SPC, heating control, malfunction alarm indicators, etc. with the respective units.

Connect the units to the customer-provided mains supply system.

The local connection conditions must correspond with the conditions indicated on the nameplate. See also Section 8 „Technical Data“.

5.3 Initial basic settings on the display

Set the following basic settings on the display. Possible later changes can be done likewise. The required basic settings are entered via the menu *Settings*.

5.3.1 How to proceed

1 Switch on the unit (*on/off*): The display shows the standard display (*operating key „1“*).

2 Call up the main menu on the display by pressing any of the navigation keys below the display (*operating key „4“*). The display shows the main menu.

3 Use the navigation keys below the arrows in the display (*operating key „4“*) to select the submenu *Settings* and acknowledte with the key *Enter* (*s. figure*). The display shows the *Settings* display.

5.3.2 Setting of display language

There are 5 display languages available: German – English – French – Spanish – Italian. To change the set display language proceed as follows:

Carry out steps 1 - 3 described in *Section.5.3.1 „How to proceed.*

1 Use the navigation keys to select the submenu Language and acknowledge with Enter.

2 Use the navigation keys to select the requested language and acknowledge with Enter.

3 Use the navigation key ESC to leave the menu.

5.3.2 Setting of date/time

Once the date has been set, it will adjust itself. Observe possible local time differences.

Carry out steps 1 - 3 described in *Section 5.3.1 „How to proceed“*.

1 Use the navigation keys to select the submenu *Date/Time* and acknowledge with *Enter*.

2 The field for the year is activated. Use the +/- keys to change the year if necessary and acknowledge with *Enter*. This automatically activates the field for the month.

3 Set month and time likewise.

4 Use the navigation key ESC to leave the menu.

Should you have set a wrong date or time, leave the menu with ESC and start the setting process again.

5.3.3 Setting of measuring temperature unit (°C / F)

The display can indicate the temperature either in degrees Celsius (°C) or Fahrenheit (°F).

1 Carry out steps 1 - 3 described in *Section 5.3.1 “How to proceed“*.

2 Then use the navigation keys to select the submenu *Temperature unit* and acknowledge with *Enter*.

3 Use the +/- keys to select the required measuring unit and acknowledge with *Enter.*

4 Use the navigation key ESC to leave the menu.

5.3.4 Setting of display contrast

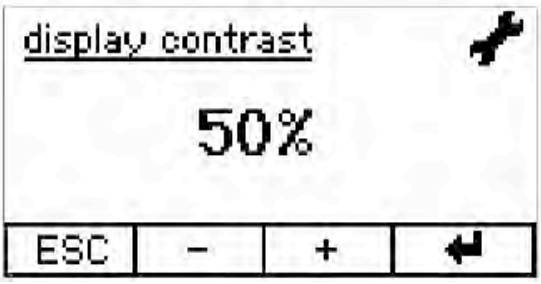
Depending on the ambient lighting conditions it may be required to change the display contrast.

1 Carry out steps 1 - 3 described in *Section 5.3.1 „How to proceed“*.

2 Use the navigation keys to select the submenu *Display contrast* and acknowledge with *Enter*.

3 Use the +/- keys to change the contrast and acknowledge with *Enter*.

4 Use the navigation key below ESC to leave the menu.



5.4 Filling

5.4.1 Filling –X-tra pro ultrasonic cleaning unit

Depending on the danger class of the used cleaning chemical wear suitable protective clothing!

Take the basket out of the tank (if any).

Ensure that the tank is clean and that no items are in the tank.

Shut the drain duct

Shut the drain duct before you fill the tank.

Observe filling level

Fill the tank with a sufficient quantity of a suitable cleaningg liquid before switch-on. The recommended filling level is indicated by the upper edge of the overflow weir (see fig. 3.3.1-4). Take into consideration that the filling level might rise above the upper edge of the overflow weir when large items are placed into the filled tank.

Allowed cleaning media

Fill the cleaning tank with aqueous cleaning media only. When choosing the cleaning chemical ensure that it is suitable for use in an ultrasonic tank and observe the instructions on dosage and material compatibility.

Prohibited cleaning media

All flammable cleaning media are prohibited for use in an ultrasonic cleaning unit. Observe the safety warnings and instructions given in Section 10 (Cleaning media).

DANGER

Risk of fire and explosion!

Never use flammable liquids or solvents directly in an ultrasonic cleaning tank.

Ultrasound increases the vapourization of liquids and creates very fine mists that can catch fire on any ignition source. Observe the instructions on limitations on cleaning media given in Section 10 (Cleaning media).

WARNING

Risk of damage to the transducer tank!

Do not use any acid cleaning agents (pH value < 7) directly in the stainless-steel tank if the cleaning items or the contamination of the cleaning items contain halogenides (fluorides, chlorides or bromides.
The same applies to NaCl solutions.

Use the cleaning media listed in Section 10.4.

The stainless-steel tank can be destroyed by crevice corrosion within a very short period. The substances listed above may be contained in standard household cleaners.
Observe the instructions on limitations on cleaning media given in Section 10.2 / 10.3 (Cleaning media).
If you have any queries please contact the manufacturer or your supplier.

5.4.2 Filling – X-tra pro rinsing unit

Take the basket out of the tank (if any).

Ensure that the tank is clean and that no items are in the tank.

Shut the drain duct

Fill the tank with a sufficient quantity of a suitable rinsing liquid before switch-on.

Observe filling level

The recommended filling level is indicated by the upper edge of the overflow weir (see fig. 3.3.1-4). Take into consideration that the filling level might rise above the upper edge of the overflow weir when large items are placed into the filled tank.

Allowed rinsing media

Fill the rinsing tank with aqueous rinsing media only. When choosing the rinsing chemical observe the instructions on dosage and material compatibility.

The following factors are relevant for the selection of the rinsing medium:

- Which cleaning liquid has been used in the ultrasonic bath and is to be removed from the cleaned items?
- What are the demands on cleanness that must be met?

Prohibited rinsing media

All flammable rinsing media are prohibited for use in a rinsing unit. Observe the safety warnings in Section 10 „Cleaning media“.

DANGER	Risk of fire and explosion! Never use flammable liquids or solvents directly in a rinsing tank. Use the rinsing media listed in Section 10.4.
	Observe the instructions on limitations of use given in Section 10.2/ 10.3 “Cleaning media”
ATTENTION	Risk of damage to the rinsing tank! Do not use any acid rinsing agents (pH value < 7) directly in the stainless-steel tank if the rinsing items or the contamination of the rinsing items contain halogenides (fluorides, chlorides or bromides. The same applies to NaCl solutions. Use the rinsing media listed in Section 10.4.

5.5 Initial operation

5.5.1 Initial operation – X-tra pro ultrasonic cleaning unit

Heating up of the cleaning liquid

Heat up the cleaning liquid depending on the kind and degree of contgamination of the cleaning items to assist the cleaning effect. Te keep the heating period as short as possible and to avoid unnecessary energy losses we recommend to use the cover. You may also switch on the ultrasound to further speed up the heating process.

The ultrasonic energy is transformed physically into heat. Therefore, low preset temperatures may be exceeded during ultrasonic operation.

In order to avoid unintended heating over the required temperature due to the additional ultralsonic energy, set the temperature at the lowest possible value for the cleaning task at hand.

ATTENTION

- High temperatures! Risk of burning and scalding!

Cleaning liquid, ultrasonic tank, casing, cover, basket and cleaning items may heat up considerably depending on the temperature inside the bath.

Do not reach inside the bath!
Wear protective gloves to handle the unit and basket!

How to proceed Setting at the operating panel

1 Press the key „***on/off“*** (operating element *„1“*), the green LED in the key is lighted.

2 Use the +/- keys „***temperature***“ (operating element „3“) to set the required cleaning temperature (set value). The display shows the set temperature as numerical value (see fig. below, item 1), and in addition by a small black arrow (see fig. below, item 3). The actual temperature is also indicated as numerical value (see fig. below, item 2), and by a small black bar (see fig. below, item 4).

3 Press the key „***heating***“ (operating element „2“), the green LED in the key is lighted.

4 The unit starts heating immediately.

5 As soon as the set temperature is reached the heating automatically switches off.

Figure: Display temperature setting (example)

The ultrasonic energy can heat up the cleaning liquid over the set temperature. Particularly low set temperatures (e.g. 30°C or 40°C) can easily be exceeded.

Degassing of liquids

Freshly mixed cleaning liquids are saturated with air which reduces the cleaning effect of the ultrasonic activity. Operating the ultrasound over a period of several minutes before the cleaning process will eliminate the tiny air bubbles in the liquid.

How to proceed Setting at the operating panel

1. Press the key „***ultrasound"*** (operating element *„11"*) to start the ultrasound. The green LED in the key is lighted.
2. Press the key „**degas**" (operating element „8"). The green LED in the key is lighted. The display indicates the degas mode (see fig. below, item 2).
3. Use the +/- keys at the key „**frequency**" (operating element „7") to select either the 37 kHz frequency (on MF3 units) or the 45 kHz frequency. The display indicates the selected frequency (see fig. below, item 1).
4. Press the key „**ultrasound**" (operating element „11") to start the ultrasound.

Figure: Display ultrasonic operating mode and frequency (example)

When the cleaning liquid has been degassed, switch off the ultrasound.
You can carry out the degassing during the heating up process.

Settting of ultrasonic frequency

The present unit can be operated at 2 different ultrasonic frequencies.
The following frequencies are available:

25 kHz or 37 kHz — For the removal of coarse and tenacious contaminations, and for the precleaning of robust surfaces.

45 kHz or 130 kHz — For the fine cleaning, and for the removal of contaminations from sensitive surfaces.

How to set the ultrasonic frequency — Press **+** or **–** at the key „***frequency"*** (operating element *„7"*). The display shows the set frequency (see fig. above, item 1).

Cleaning in ultrasonic mode sweep

This operating mode causes a permanent shifting of the sound pressure maxima and therefore leads to a more homogeneous sound field distribution within the cleaning bath.

We recommend to activate this mode e.g. if the cleaning items fill the complete tank and/or if the cleaning basket carrying the cleaning items is not connected to a manual or automatic oscillation device.

How to activate the sweep mode

Press both the key „ultrasound“ (operating element „11“) and the key „sweep“ (operating element „9“). The green LED in the key indicates that the unit is operating in sweep mode.

The display indicates sweep mode.

The sweep mode cannot be activated simultaneously with degas or pulse.

Cleaning in ultrasonic mode pulse

The operating mode *pulse* intensifies the ultrasonic cleaning effect. This is particularly useful for the removal of tenacious contaminations.

In addition, it takes less time for the unit to be ready for operation after an exchange of the cleaning liquid or when a new basket has been inserted (the unit is ready for operation when the cavitation threshold is reached so that the ultrasonic effect within the cleaning liquid is greatest).

There are certain operating phases with a reduced ultrasonic cleaning effect due to physical reasons.

In particular when the cleaning liquid has been exchanged or when a new basket with cleaning items has been inserted the cleaning effect is temporarily reduced. An efficient ultrasonic cleaning cannot be guaranteed during these phases.

The *pulse* mode keeps these phases to a minimu, which leads to an optimum usability even with high throughput rates.

How to activate the pulse mode

Press both the key „ultrasound“ (operating element “11“) and the key “pulse“ (operating element „10“). The green LED in the key indicates that the unit I operating in pulse mode. The pulse mode can be switched on or off as required during ultrasonic operation.

The display indicates pulse mode.

The pulse mode cannot be activated simultaneously with degas or sweep.

ATTENTION

Cleaning items with sensitive surfaces may be adversely affected by a combination of pulse and 25 kHz. Please treat sensitive items at 25 kHz plus pulse for short periods only. It may be recommendable to carry out a cleaning test.

The sound-giving surface of the cleaning tank is subject to a higher degree of cavitational erosion.

Setting of ultrasonic power

How to change the ultrasonic power

For the cleaning of sensitive surfaces we recommend to reduce the ultrasonic power. You can adjust the ultrasonic power by 10% steps.

Press **+** or **–** at the key „***power***“ (operating element *„6“*).

The display shows the set ultrasonic power (see figure below).

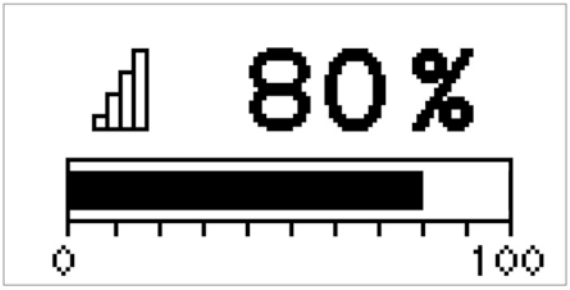


Figure: Display ultrasonic power (example)

5.5.2 Initial operation – rinsing unit X-tra line

- **Heating of the rinsing liquid**

Heat up the rinsing liquid depending on the kind and degree of residual contamination of the cleaned items to assist the rinsing effect.

To keep the heating period as short as possible and to avoid unnecessary energy losses we recommend to use the cover.

CAUTION	• High temperatures! Risk of burning and scalding! Rinsing liquid, rinsing tank, casing, cover, basket and rinsing items may heat up considerably depending on the temperature inside the bath. Do not reach inside the bath! Wear protective gloves to handle the unit and basket!

How to proceed setting at the operating panel

1	Press the key „***on/off***“ (operating element *„1“*), the green LED in the key is lighted.
2	Use the **+/-** keys „***temperature***“ (operating element *„3“)* to set the required rinsing temperature (set value). The display shows the set temperature as numerical value (*see figure below, item 1*), and in addition by a small black arrow (*see figure below, item 3*). The actual temperature is indicated as numerical value (*see figure below, item 2*) and by a small black bar (*see figure below, item 4*).
3	Press the key „***heating***“ (operating element *„2“*), the green LED in the key is lighted.
4	The unit starts heating immediately.
5	As soon as the set temperature is reached the heating automatically switches off. The green LED in the key „***heating***“ remains on.

6 When the measured actual temperature falls below the set value, the heating is automatically switched on again (hysteresis approx. 3°C).

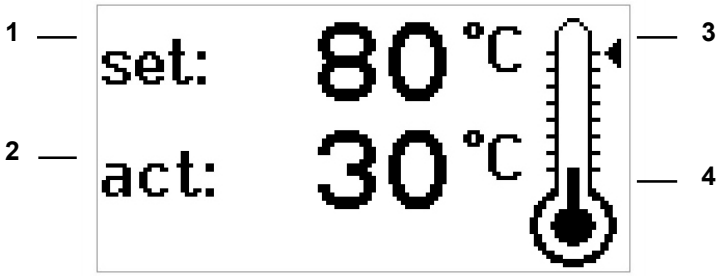


Figure: Display temperature setting (example)

6 Operation

6.1 Ultrasonic cleaning process

There are several ways to start the cleaning process (*see Section 6.1 – 6.3*).

Please observe the following instructions before you start the ultrasonic cleaning process.

 **CAUTION**	Risk of sclading by hot surfaces and cleaning liquid! Ultrasonic energy is physically transformed into heat. The unit and the cleaning liquid in the tank heat up during ultrasonic operation even when the heating is switched off. During permanent operation with cover temperatures exceeding 60°C can be reached. During permanent operation with cover and heating temperatures exceeding 80°C can be reached. Do not reach inside the bath! If necessary wear protective gloves to handle unit and basket!
 **CAUTION**	Ultrasonic units can produce annoying sounds. Wear personal ear protection devices when working close to an ultrasonic unit which is operated without cover.
 **ATTENTION**	Sensitive surfaces may be adversely affected by ultrasound during prolonged periods of ultrasonic treatment, in particular at lower frequencies. Ensure that sensitive surfaces are exposed to ultrasonic activity for a suitable period only. If in doubt check the cleaning progress regularly and observe the state of the surface material.
 **ATTENTION**	Ultrasonic energy is physically transformed into heat. The unit and the cleaning medium in the tank heat up during ultrasonic operation even when the heating is switched off. During permanent operation with cover temperatures exceeding 60°C can be reached. For the cleaning of temperature-sensitive items please take into consideration that the cleaning medium is heated.

The operator is responsible for the inspection of the cleaning result and for the continuous inspection of the cleaning items during ultrasonic treatment to prevent damages from the cleaning items.

6.1.1 Immediate start-up of ultrasonic cleaning process

Set the cleaning period

Use the +/- key “power” (operating element “6”) to set the required cleaning time.

Fig.: Display cleaning time (example)

Short period operation

For short period operation set the cleaning period between 1 and 120 min using the +/- key „time“ (operating element „12“). The display indicates the set cleaning time in minutes / seconds (see fig. below, item 1). Once the unit is operating, the remaining cleaning time is indicated in minutes / seconds (see fig. below, item 2).

Fig.: Standard display (example)

Continued operation

As soon as the preset period has run down the ultrasound is automatically switched off.
For longer periods of ultrasonic treatment select the continued operation mode (∞).
The display shows ∞.
In this operating mode there is no automatic switch-off. The ultrasound must be switched off manually by pressing the key “ultrasound” (operating element “11”).

Switch on the ultrasound

Start the ultrasonic activity by pressing the key „ultrasound“ (operating element „11“).

For reasons of safety (unintended permanent operation), the unit is automatically switched off after 12 h of permanent operation. The unit can be switched back on immediately.

Caution! During continued operation the ultrasound may heat up the medium to temperatures exceeding the set value even when the heating is not switched on.

In order to prevent unnecessary heating of the cleaning medium by ultrasound, particularly with low preset temperatures, switch on the ultrasound during the cleaning process only (exceptions are degassing and stirring of the cleaning bath during heating up).

6.1.2 Temperature-controlled ultrasonic cleaning with automatic start-up

Functioning

X-tra pro units are equipped with an activatable temperature-controlled cleaning function. The cleaning process is automatically started as soon as the required bath temperature is reached.

How to proceed

1. Press the key „on/off“ (operating element „1“), the green LED in the key is lighted.
2. Use the +/- key „temperature“ (operating element „3“) to set the required cleaning temperature.
3. Press the key „heating“ (operating element „2“), the green LED in the key is lighted.
4. Use the +/- key „time“ (operating element „12“) to set the required cleaning period.
5. Keep the key “ultrasound” pressed (> 2 sec.) (operating element „11“). The unit starts heating.

The display indicates the set time as blinking value (not during continued operation). The green LED in the key “ultrasound” flashes.
As soon as the set temperature is reached the ultrasound is switched on and keeps operating over the preset cleaning period.

6.1.3 Ultrasonic cleaning by user-defined cleaning programmes

You can save and start up to 5 user-defined cleaning programmes. The programmes are saved and activated from the main menu. Saving a new programme stores the cleaning parameters that are set in the operating panel at the time.

How to save a cleaning programme

1. Select the requested cleaning parameters (frequency, cleaning time, etc.) that you want to save.
2. Press any one of the navigation keys below the display (operating element „4“) to start the main menu. The display shows the main menu.
3. Use the navigation keys below the arrows in the display (see fig. below) to select the menu task save programme and acknowledge with Enter (see fig. below). The display now shows save programme.
4. Use the navigation keys to select the requested programme space (1-5).
5. Press Enter to save the programme.
6. The display now shows programme has been saved.

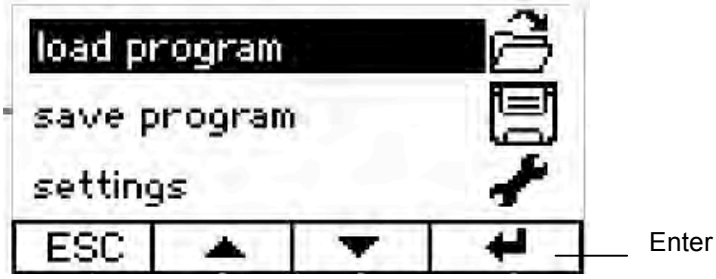


Fig.: Main menu

How to start a saved cleaning programme

Saved user-defined cleaning programmes can be started as follows:

1. Press any one of the navigation keys below the display (operating element „4“) to start the main menu. The display shows the main menu.
2. Use the navigation keys below the display (see fig. above) to select the menu task load programme and acknowledge with *Enter* (see fig. above).
   The display shows load programme.
3. Use the navigation keys to select the requested programme (1-5).
4. Press *Enter* to select the programme.
5. The display shows the saved parameters.
6. Press the key „***ultrasound***“ *(operating element „11“)* to start the programme.

How to rewrite saved cleaning programmes

Saved programmes can be replaced (rewritten) by new programmes as often as required.

1. Select the requested cleaning parameters (e.g. frequency, cleaning time, etc.) that you want to save.
2. Proceed as described above in the section „***How to save a cleaning programme***“.

6.1.4 Timer-controlled ultrasonic cleaning

You can define times and dates for the start-up and/or termination of cleaning processes.

Before you set the timer, ensure that date and time are correctly set in the menu *Settings* > *Date/Time*, as these values serve as reference data (see Section 5.3.2).

If the set termination time is more than 12 h after the start-up time, the unit is automatically switched off after 12 hours of continued operation (safety switch-off).

6.1.4.1 Setting of the timer start-up configuration

Set the requested parameters in the menu *settings* > *timer*.

How to proceed

1 Use the navigation keys below the arrows in the display (operating element “4”) to select the menu task *settings* and acknowledge with *Enter*.
The display shows *settings*.
2 Use the navigation keys to select the menu task *timer* and acknowledge with *Enter*.
3 Use the navigation keys to select *start configuration* and acknowledge with *Enter*.

Fig. : Timer menu

Set the mode

Set the operating mode in which you want the unit to start. The following options are available:

OFF The start configuration is disabled.

one time The start configuration is carried out one time as soon as the set time is reached; then it is set to „OFF“.

Mon - Fri The start configuration is carried out from Monday till Friday.

daily The start configuration is carried out every day.

4 Use the navigation keys to select *mode* and acknowledge with *Enter*.
The selector automatically moves to *function.*

Fig.: Start configuration menu (example)

Set the function Now select the function(s) that you want to start.

heating Only the heating is switched on.

heat + ultrasound Heating and ultrasound are switched on.

ultrasound Only the ultrasound is switched on.

5 Use the navigation keys to select *function* and acknowledge with *Enter*.
The selector automatically moves to *time*.

Set the time Now set the start time:

6 Use the navigation keys to select the start hour and acknowledge with *Enter.*

7 Use the navigation keys to select the start minute and acknowledge with *Enter.*
The selector automatically moves back into the menu *timer*.
Continue by setting the stop configuration (from Stepp 3 in Section *„Start-up configuration“*).

or

8 Use the navigation key below ESC to leave the menu.

6.1.4.2 Setting of the timer stop configuration

Set the requested parameters in the menu *settings* > *timer*.

How to proceed

1 Use the navigation keys below the arrows in the display (operating element “4”) to select the menu task *settings* and acknowledge with *Enter*.
The display shows *settings*.

2 Use the navigation keys to select the menu task *timer* and acknowledge with *Enter*.

3 Use the navigation keys to select *Stop configuration* and acknowledge with *Enter*.

Set the mode Select when you want the unit to switch off. The following options are available:

OFF The stop configuration is disabled.

one time The stop configuration is carried out one time as soon as the set time is reached; then it iss et to „OFF“.

Mon - Fri The stop configuration is carried out from Monday till Friday.

daily The stop configuration is carried out every day.

4 Use the navigation keys to select *mode* and acknowledge with *Enter*.
The selector automatically moves to *function.*

Set the function The function for the stop configuration is always „device off“.

5 Acknowledge the selection with *Enter*.

Set the time Set the switch-off time:

6 Use the navigation keys to select the switch-off hour and acknowledge with *Enter.*
7 Use the navigation keys to select the switch-off minute and acknowledge with *Enter.*
The selector automatically moves back into the menu *timer*.
8 Use the navigation key below ESC to leave the menu.

6.1.5 Placement of the cleaning items

Caution! Ultrasonic units are intended for the treatment of liquids and items submerged therein. Do not treat living beings or plants in an ultrasonic unit!

 NOTE	Do not reach inside the tank during ultrasonic operation! Cell walls may be damaged by prolonged exposure to ultrasonic activity; this applies particularly to the cells of the skeleton and joints.

No cleaning items on the tank floor Do not place any cleaning items directly onto the floor of the ultrasonic tank as this may cause damage to the ultrasonic cleaning unit and/or of the cleaning items.

Use cleaning basket Place the cleaning items in the stainless-steel cleaning basket (accessory equipment).

6.1.6 After the cleaning

Follow-up treatment of cleaning items Generally, the cleaned items must be rinsed and dried when the cleaning process is finished.

The choice of the rinsing medium or media depends on the type of cleaning medium that has been used, and on the cleanness requirements for the cleaned items. In certain cases it may be recommended to rinse the items in an ultrasonic bath.

Draining of the unit Drain the tank when the cleaning liquid is contaminated to such a degree that it will no longer produce satisfying cleaning results, or when the unit is not operated over a prolonged period of time (certain residues and contaminations may damage the stainless-steel tank).

Use the quick-drain duct to drain the cleaning tank. The floor of the ultrasonic tank is inclined toward the drain duct to facilitate draining.

Cleaning of the ultrasonic tank

For instructions on the cleaning of the ultrasonic tank after draining please see Section 9.1, Maintenance and care.

6.2 Rinsing process

6.2.1 Timer-controlled heating of the rinsing liquid

You can define times and dates for the start-up and/or termination of the heating process.

Before you set the timer, ensure that date and time are correctly set in the menu *settings* > *date / time*, as these values serve as reference data. If they are incorrect, set the correct date and time first.

If the set termination time is more than 12 h after the start-up time, the unit is automatically switched off after 12 hours of continued operation (safety switch-off).

6.2.2 Setting of the timer start-up configuration

Set the requested parameters in the menu *settings* > *timer*.

How to proceed

1. Use the navigation keys below the arrows in the display (see Operating panel Section 3, item 4) to select the menu task *settings*.
2. Use the navigation keys to select the menu task *timer* and acknowledge with *Enter*.
3. Use the navigation keys to select *Start configuration* and acknowledge with *Enter*.

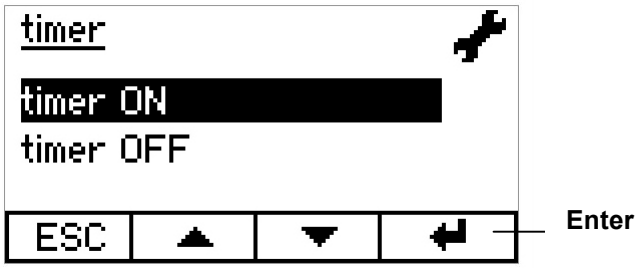


Fig. : Timer menu

Set the mode Set the operating mode in which you want the unit to start. The following options are available:

OFF The start configuration is disabled.

One-time The start configuration is carried out one time as soon as the set

time is reached; then it is set to „OFF“.

Mon - Fri The start configuration is carried out from Monday till Friday.

daily The start configuration is carried out every day.

4 Use the navigation keys to select *mode* and acknowledge with *Enter*.
The selector automatically moves to *function*.

Fig.: Start configuration menu (example)

Set the function **The function of the start configuration is always *heating*.**

5 Use the navigation keys to select *function* and acknowledge with *Enter*.

6 The selector automatically moves to time.

Set the time Set the start time**:**

7 Use the navigation keys to select the start hour and acknowledge with Enter.

8 Use the navigation keys to select the start minute and acknowledge with Enter.
The selector automatically moves back into the menu timer.
Continue by setting the stop configuration (from step 3 in Section „Stop configuration”)

or

9 Use the navigation key below ESC to leave the menu.

6.2.3 Setting of the timer stop configuration

Set the requested parameters in the menu *settings* > *timer*.

How to proceed

1 Use the navigation keys below the arrows in the display (operating element “4”) to select the menu task *settings*.

2 Use the navigation keys to select the menu taskl *timer* and acknowledge with *Enter*.

3 Use the navigation keys to select Stop configuration and acknowledge with Enter.

Set the mode Select when you want the unit to switch off. The following options are available:

OFF The stop configuration is disabled.

One-time The stop configuration is carried out one time as soon as the set time is reached; then it is set to “OFF”.

Mon - Fri The stop configuration is carried out from Monday till Friday.

daily The stop configuration is carried out every day.

4 Use the navigation keys to select *mode* and acknowledte with *Enter*.
The selector automatically moves to *function.*

See the function The function for the stop configuration is always „*device off*“.

5 Acknowledge the selection with *Enter.*

Set the time Set the switch-off time.

6 Use the navigation keys to select the switch-off hour and acknowledge with *Enter.*

7 Use the navigation keys to select the switch-off minute and acknowledge with *Enter.*
The selector automatically moves back into the menu *timer*.

8 Use the navigation key below ESC to leave the menu.

6.2.4 Placement of the rinsing items

 **NOTE**	The rinsing unit is intended for the treatment of items only!

No rinsing items on the tank floor Do not place any rinsing items directly onto the floor of the rinsing tank as this may cause damage to the unit and/or to the rinsing items.

Use cleaning basket Pleace the rinsing items in the stainless-steel cleaning basket (accessory equipment).

6.2.5 After the rinsing

Follow-up treatment of rinsing items Generally, the rinsed items must be dried when the rinsing process is finished.

For drying we recommend to use a suitable dryer, e.g. WLT by joke.

Drain the unit Drain the tank when the rinsing liquid is contaminated to such a degree that it will no longer produce satisfying rinsing results, or when the unit is not operated over a prolonged period of time (certain residues and contaminations may damage the stainless-steel tank).

Use the quick drain duct to drain the rinsing tank. The floor of the rinsing tank is inclined toward the drain duct to facilitate draining.

Cleaning of the For instructions on the cleaning of the rinsing tank after draining

rinsing tank please see Section 9.1 “Maintenance and care“.

7 Maintenance

7.1 General

Always pull the mains plug before you carry out any maintenance or service works.

7.2 Maintenance

Check the following components on a regular basis:

- Check the casing and the mains cable for damage.
- Check the correct functioning of all electric devices, such as switches, lamps, controls, motors, heating elements, etc.
- Check the ducts for leaks.
- Check the correct functioning of the (optional) oscillation device.

Have all damages repaired by authorized staff immediately, or contact the manufacturer.

7.3 Care

7.3.1 Care of casing

Wipe off any remains of cleaning / rinsing liquids with a wet cloth using a household cleaner or decalcifier. Do not submerge the cleaning line!

7.3.2 Care of tanks

Remove lime deposits from the stainless-steel tank(s), e.g. with joke clean 60or joke clean 115C (operate the unit with concentrate + water).

7.4 Disinfection

If the cleaning line is used in the medical and sanitary sector, disinfect the tank(s) regularly for hygienic purposes (use household surface disinfectants).
See also Section 10 „Cleaning media“

7.5 Service life of the transducer tank

The transducer tank and particularly the sound-giving surfaces are wear parts. The changes on the surfaces that occur after a certain operating period are visible first as gray areas and later on as material abrasions, the so-called cavitation erosion.

The units are made of a highly cavitation-proof special steel. To prolong the service life of your ultrasonic unit even more we recommend to observe the following instructions:
Regularly remove any cleaning residues, in particular metal particles and rust films.
Use suitable cleaning chemicals, with particular caution concerning the kind of removed contamination.

See Section 10 “Cleaning media”

Exchange the cleaning medium before it is too heavily contaminated.
Do not operate the ultrasound unnecessarily; switch it off after the cleaning process.
Limit 25 kHz operation to the required minimum, operate the higher frequencies when possible.

7.6 Repair

7.6.1 General

DANGER

Repair and maintenance works which require the unit to be connected and opened must be carried out by authorized and specialized personnel only.

Risk of electrocution due to live parts in an opened and connected unit!

Pull the mains plug before you open the unit!

In case of a break-down of the cleaning line please contact the manufacturer or your supplier.

7.6.2 Adjustment / Correction of oscillation

Due to the ageing process of the stell cable (e.g. extended length) which transmits the oscillation stroke from the drive motor to the basket support, the oscillation stroke must be readjusted.
The length extension becomes apparent when the oscillation device hits the tank floor when going down.

WARNING

Risk of contusion due to sudden oscillation moves on the operative cleaning line!
Therefore, switch off the cleaning line and separate it from the mains before you carry out any repair works!
Take the basket(s) out of the tank(s).

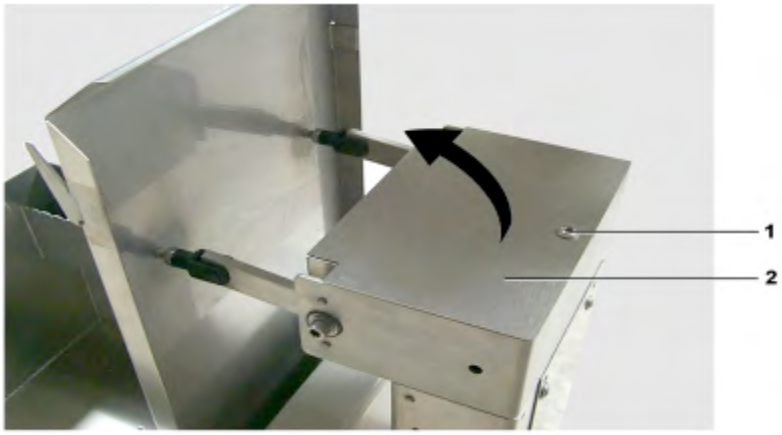


Figure 7.6.1
Remove the screw (1), lift the cover (2) as indicated by the arrow and then remove it from the unit.

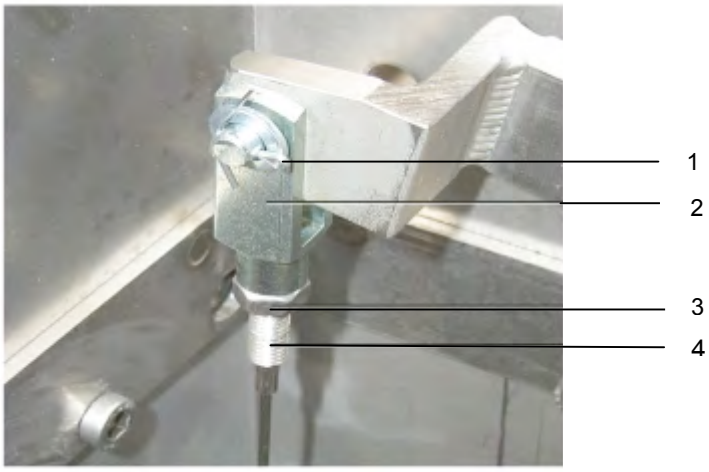


Figure 7.6.2

Remove the fork head by taking out the splint pin (1).
Loosen the locknut (3) at the fork head (2) of the tackle line and turn the locknut down.
Now screw the threaded rod (4) into the fork head as far as necessary for the required adjustment.
Retighten the locknut (3).
Put the fork head (2) into its proper position and secure it with the splint pin (1).
Fasten the basket to the basket support hook.

WARNING

Ensure that nobody stays in the area around the cleaning line and do not reach inside the open oscillation device.
Switch on the oscillation and check if the oscillation stroke is carried out correctly.

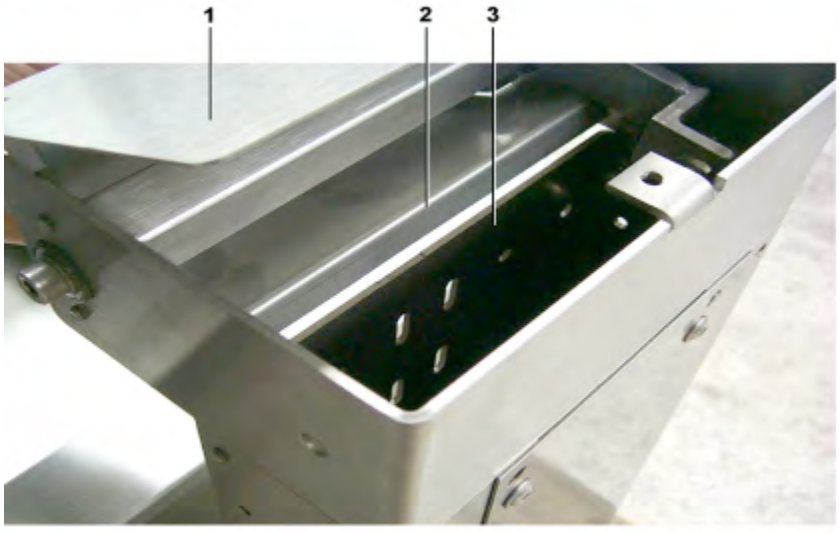


Figure 7.6.3

When you have finished the correction, insert the cover (1) so that the off-set surface (2) is placed inside the front side (3).
Fasten the cover with the screw.

7.7 Trouble-shooting

The following warnings and malfunctions can be indicated on the display:

Malfunction	Display	Repair
Filling level below minimum *US unit / rinsing unit*	Filling level low !	Add liquid. The unit automatically starts operating after filling.
Temperature of liquid > 90°C *US unit / rinsing unit*	Temperature limit exceeded!	Let liquid cool down or replace by cold liquid. As soon as the temperature of the liquid is < 80°C the unit automatically starts operating.
Unit has been operating > 12h in permanent operation without any user input *US unit / rinsing unit / hot air dryer*	12h Safety switch-off !	Press navigation key 4 to reset the fault indication. The unit can be restarted by hand immediately.
Fan motor overloaded *Hot air dryer*	Motor protection switch fault!	Check if the fan wheel is blocked. Contact the manufacturer.

The following fault indications can be indicated on the display:

Fault	Display	Repair
Fault of temperature measuring *US unit / rinsing unit / hot air dryer*	Temperature fault, check sensor!	Switch unit off and on. If the fault indication is repeated: contact the manufacturer.
Switch-off temperature of safety temperature limiter has been exceeded *Hot air dryer*	Fault - Safety temperature limiter!	
No feedback from ultrasonic generator	Communication fault generator!	
Fault of ultrasonic generator	Generator fault status !	

If one of the above faults occurs, all keys except the on/off key are inoperable.Heating and ultrasound are switched off with each of the above faults.

7.8 Exchange of the electronic unit

If there is a fault in the electronic unit, the complete unit is exchanged (plug & play component).

Exchange of the electronic unit is easy. Proceed as follows:

Exchange of the electronic unit must be carried out by specialized electrical staff only!

How to proceed Required tool: Allan key 3 mm. All electric wires are fitted with plug-in connectors.

1. Use the Allan key to remove the 2 cylinder head screws (see Figure 9.5.1.)
2. Remove the electronic unit.
3. Pull the electric plug-in connectors off the faulty electronic unit:

1 HF connection (do not interchange the plug-in connectors!)
2 2 x BUS Interface
3 Mains connection
4 Temperature sensor + level sensor
5 Heating connection

4. Connect the plug-in connectors to the new electronic unit.
5. Insert the new electronic unit into the unit.

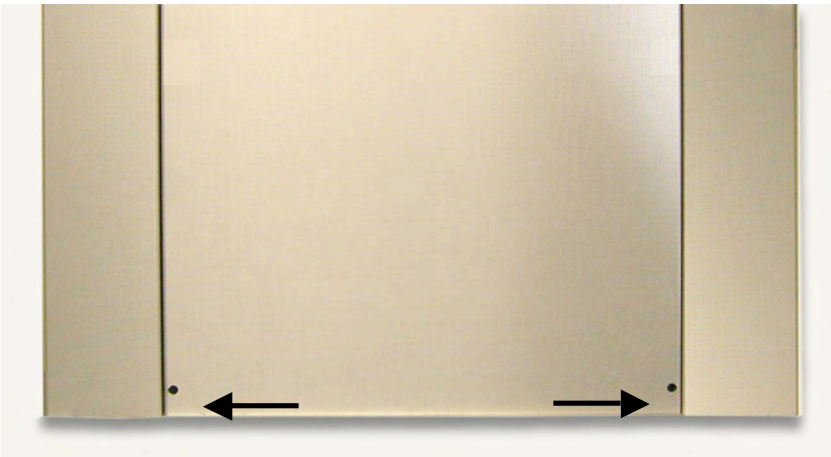


Figure 9.5.1. Position of the 2 hexagon socket cylinder head screws

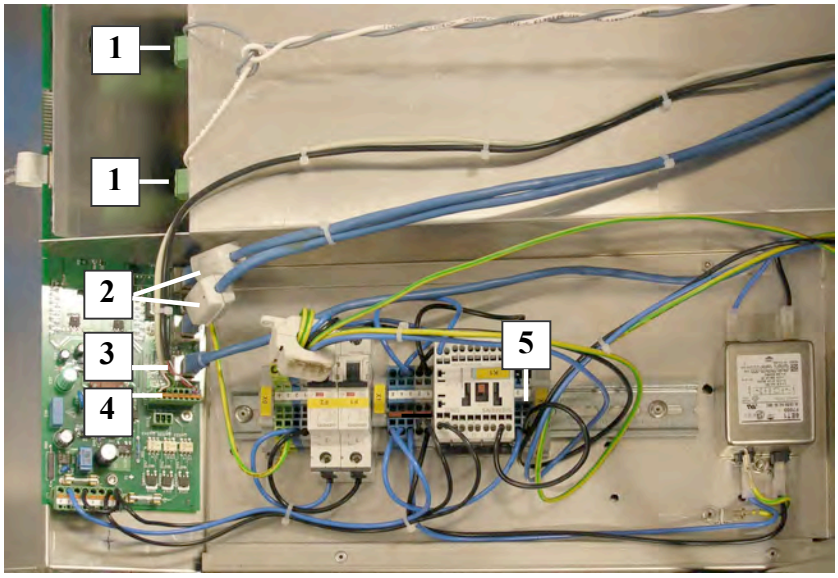


Figure 9.5.2. Position of the plug-in connections

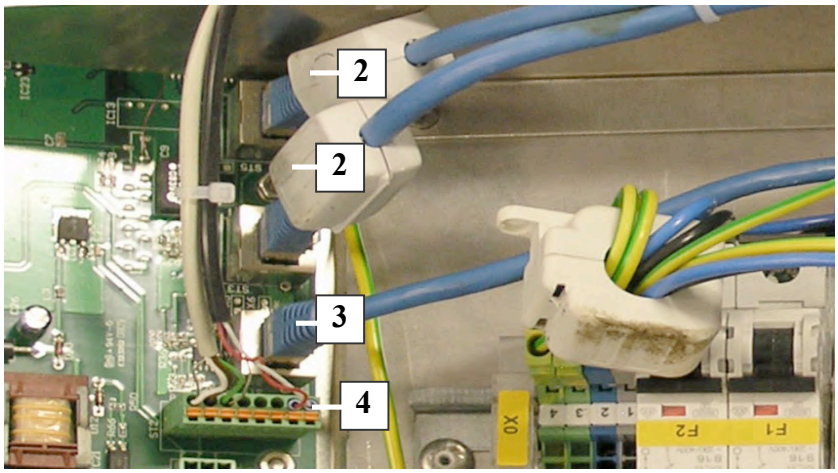


Figure 9.5.3. Detail, position of the plug-in connections

8 Technical Data

	X-tra 300	X-tra 550	X-tra 800	X-tra 1200	X-tra 1600
Tank filling capacity max. (litre)	39	67	96	133	189
Tank service capacity (litre)	32	55	84	110	167
Tank internal dimensions W x D x H (mm)	377 x 332 x 313	377 x 501 x 358	377 x 501 x 508	600 x 600 x 370	600 x 600 x 525
Tank service dimensions W x D x H (mm)	296 x 332 x 264	296 x 501 x 309	296 x 501 x 459	519 x 600 x 321	519 x 600 x 476
Unit external dimensions W x D x H (mm)	497 x 522 x 568	497 x 691 x 568	497 x 691 x 718	720 x 790 x 568	720 x 790 x 718
Material tank / casing	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Drain duct (inch) Ball valve	1“ 2-way	1“ 2-way	1“ 2-way	1 “ 2-way	1 “ 2-way
Feed duct (inch) Ball valve	1/2“ 2-way	1/2“ 2-way	1/2“ 2-way	3/4“ 2-way	3/4“ 2-way
Weight ca. (kg)	37	51	59	80	95
Basket internal dimensions W x D x H (mm)	245 x 255 x 165	244 x 424 x 204	244 x 424 x 340	438 x 524 x 210	438 x 524 x 360
Basket mesh size (mm)	9 x 1	9 x 1	9 x 1	9 x 1	11 x 1.6
Basket loading max. (kg)	ca. 15 kg incl. basket	ca. 15 kg incl. basket	ca. 15 kg incl. basket	ca. 35 kg incl. basket	ca. 35 kg incl. basket
Mains voltage (Vac)	230 – 240 V N/PE	3 x 400 V / N/PE 3 x 200-208 V /PE	3 x 400 V / N/PE 3 x 200-208 V /PE	3 x 400 V / N/PE 3 x 200-208 V /PE	3 x 400 V / N/PE 3 x 200-208 V /PE

	X-tra 300	X-tra 550	X-tra 800	X-tra 1200	X-tra 1600
Mains frequency (Hz)	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60
Power consumption total (W)	2310	3910	6810	9320	9520
Ultrasonic frequency (kHz) changeable	25/45 37/130	25/45 37/130	25/45 37/130	25/45 37/130	25/45 37/130
Ultrasonic power effective (W)	600	1000	1000	1800	2000
Ultrasonic peak power max. (W)	2400	4000	4000	7200	8000
Heating powerg (W)	1 x 1700	1 x 2900	2 x 2900	3 x 2500	3 x 2500
Sound pressure level (LpAU) *	83 dB	87 dB	87 dB	86 dB	90 dB
Sound pressure level (LpAU) **	< 70 dB				
Ultrasonic level (LpZ) **	< 110 dB				

* Maximum sound pressure level measured without basket and cover at a distance of 1 m
** Ultrasonic level measured with basket and cover at a distance of 1 m

9 Disposal

After taking out of operation and draining of the tank(s) the unit components can be taken to metal and electronics recycling stations.

The media of the cleaning chambers must never be discharged into public sewer system. Please remember to use that information in safety data sheets of the cleaners.

10 Cleaning media

10.1 General

When choosing the cleaning chemicals ensure that the product is suitable for use in an ultrasonic bath; products that are not suitable may cause damage to the transducer tank and/or injure the operating staff.

10.2 Limitations on solvent-containing cleaners

DANGER

Ultrasound increases the volume of vapourization of liquids and creates a very fine mist that can catch fire on any ignition source at any time.

Do not fill potentially explosive substances or flammable solvents

- of the danger classes according to the Ordinance Regulating Flammable Liquids: AI, B, AII, AIII;
- or marked in compliance with the EC directives by symbols and safety warnings E or R 1, R 2;
- or marked R 3 for potentially explosive substances;
- or marked F+, F or R 10, R 11 or R 12 for flammable substances

into the stainless-steel tank of the ultrasonic unit!

Exception In compliance with the general regulations on the protection of labour, certain limited volumes of flammable liquids (max. 1 litre) can be used in an ultrasonic cleaning unit, under the following conditions:
These liquids must be filled into a suitable separate vessel (e.g. glass beaker) with sufficient ventilation; this vessel can then be put into the stainless-steel tank which is filled with non-flammable liquid (water with a few drops of interlacing agent).
Should you have any queries please contact the manufacturer or your supplier.

10.3 Limitations on aqueous cleaners

	Do not use aqueous cleaning media with pH values in the acid range (pH < 7) directly in the ultrasonic tank if fluoride (F), chloride (Cl) or bromide (Br) ions can be taken in by the removed dirt or through the cleaning chemical. These can destroy the stainless-steel tank through crevice corrosion within a very short period of ultrasonic operation.
Acids and alkaline solutions	Other media which can destroy the stainless-steel tank when used in high concentrations or with high temperatures during ultrasonic operation are: nitric acid, sulphuric acid, formic acid, hydrofluoric acid (even diluted). (Completeness of list not guaranteed.).
KOH	Potassium hydroxide solution can cause stress corrosion cracking of the ultrasonic tank. Examples: Treatment with hydrochloric acid or hydrofluoric acid, or salts of acid solutions Removal of fluoride, chloride or tetrafluoroborate-containing fluxing agents from soldered metal items or electronic components Decalcifying of medical systems which are contaminated with physiological salt solution in solution containing citric acid Ultrasound-assisted rinsing of items which have been etched with hydrofluoric acid or ammonium bifluoride
Entrainment	The above limitations for the use of chemicals in an ultrasonic bath also apply to the entering of the mentioned chemicals into the aqueous (particularly distilled water) bath through entrainment or from the removed dirt.
Acid-resistant tank	For the ultrasonic treatment with the above mentioned media use an acid-resistant tank. Please contact your supplier for the available equipment.
Disinfectants	The limitations of use also apply to the standard cleaners and disinfectants if these contain the above mentioned compounds.
Safety regulations	Observe the safety warnings indicated by the manufacturer of the chemicals (e.g. goggles, gloves, R and S phrases).

10.4 Recommended cleaning media

	joke offers a large range of suitable cleaning products which have been developed and produced by chemical engineers in the laboratory.
Environment-friendly products	The organic detergents contained in the joke clean products are biode-gradable. Product information and safety data sheets are available from the manufacturer.
tec clean A1	Alkaline cleaning concentrate for electronics and fine optics: removes light oil, grease, fluxing media, dust, finger prints, etc
tec clean A2	Intensive alkaline cleaner with brightening effect for nonferrous heavy metals and precious metals: removes abrasive, polishing and lapping media, grease, oil, etc.
tec clean A3	Alkaline cleaner for iron and precious metals: removes punching oil, drawing grease, soot, forge scales, abrasive and polishing media, high-performance cooling lubricants, etc.
tec clean A4	Universal alkaline cleaner: removes oil, grease, soot, coking, forge scales, dust, finger prints, etc.
tec clean A5	Powerful alkaline cleaner for iron and light metals: removes scaled and gummed oil and grease, abrasive and polishing media, residues of lacquer and colours, wax, etc.
tec clean N1	Neutral cleaner: removes oil, grease, abrasive and polishing media, dust, sweat, finger prints, etc.
tec clean S1	Mild alkaline cleaner: removes rust, lime, oxide films (e.g. verdigris), grease, oil, etc.
tec clean S2	Strong acid cleaner: removes mineral contamination such as lime, rust and other oxides, deposits that can be removed with corrosives, etc.
clean 60	Acid cleaning concentrate for instruments made of stainless steel, glass and plastic. Removes corrosion, rust films and mineral deposits.
clean 115C	Liquid, mildly acid concentrate for cleaning of nonferrous & light metals, stainless steel, glass, plastics and for passivation of chromium-containing steels. Removes polishing media, mineral grease & oil, oxide layers (e.g. verdigris), rust and lime. The passivating action is based on the removal of iron atoms by dissolution from the surface and the increase of relative chromium content at the surface.
	*Please contact your supplier for further suitable cleaning media.*