LCTech

X-TRACTION

Semi-Automated Low-Pressure Solvent Extraction

User Manual

As of: February 2023, Version 1.3, P/N 19469, Software-Version: 2.1, English

Dear customer,

We are delighted that you have chosen a LCTech product, and would like to thank you for the confidence that you have placed in our company.

We have developed this high-performance device with the most care and manufactured it using high-quality materials and componentry thus making it a reliable asset in support of you and in mastering your daily work load.

Please take time to read this manual completely and observe all the instructions given for both your own safety and to ensure the best possible handling and functionality of the device.

Our LCTech team will be happy to assist you. Please do not hesitate to contact us if you have any questions or require assistance.

We hope that you enjoy using your new X-TRACTION system.

Best wishes,

Your LCTech team

Manufacturer of X-TRACTION

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Content

Important Notes

I) Operating personnel

Persons operating the unit must:

- be familiar with the fundamental regulations concerning workplace safety and accident prevention
- have read and understood this operating manual (and in particular the safety sections and warning notes) and confirmed this with their signature.
- be laboratory personnel, who have an overview of the dangers that can develop during the operation of the system, as a result of professional experience and a proper instruction through the service of LCTech or authorized distributors.

Personnel without such instruction or professional experience should be supervised carefully. This Operation Manual is a basis for instruction.

II) Safety information symbols and messages

Safety information symbols used in this manual and/or on the device	
	Refer to the manual
	General information or tip within manual
	Hint
	Disconnect mains plug from electrical outlet
	Wear protective gloves
	Wear eye protection
	Wear laboratory coat
	Wear safety shoes

	General warning or advice
	Risk of crushing. Keep hands away.
	Electricity hazard
	Sharp element
	Hot surface

This manual contains warnings and precautionary statements that, when properly followed, can prevent personal injury to the operator and/or damage to the X-TRACTION system.

ATTENTION!
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Safety note: Safety symbols (wear safety shoes/gloves/ laboratory coat). Personal protective equipment must comply with all requirements of the supplementary data sheets for chemicals used.

NOTE: Alerts the user to an unexpected result of an action; suggests how to optimize instrument performance.

INFORMATION: Calls attention to certain information.

III) Abbreviations

Materials and chemicals

GF-Filter	Glass-fibre filter
MTBE	Methyl tert-butyl ether
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEEK	Polyether ether ketone
PTFE	Polytetrafluoroethylene
SST-Filter	Stainless steel filter
THF	Tetrahydrofuran

Software/Hardware

CF card	Compact flash card
DC	Direct current
ID	Identification
LED	Light-emitting diode
PC	Personal computer
SP	Syringe pump
USB	Universal Serial Bus

Other

D-EVA	Dioxin-Evaporation
e.g.	for example
esp	extrasensory perception
LPFE	Low pressure fluid extraction
PFE	Pressurized Fluid Extraction

IV) Device instruction

Please read these notes and the user manual before commissioning and using the device. Please follow all instructions provided carefully. Ensure the manual is kept in the immediate vicinity of the device so that you can refer to it at any time.

Ensure that the system is installed and operated on a table with a minimum bearing load of 50 kg!

Any improper operation, application, maintenance or repair may have fatal consequences. These apply to both the user and the system!

The system must NOT be used for:

- Unstable substances
- Substances that might explode upon mechanical impact or temperature elevation without additional air/oxygen supply
- Self-igniting substances or substances with an ignition temperature below 200 °C
- Substances which are ignitable without additional air/oxygen supply
- Solvents that may contain peroxides (e.g. diethyl ether, MTBE, THF)
- Explosives
- Strong acids and bases

This device is not approved for installation and operation in hazardous areas or outdoors.

The system complies with the fundamental requirements regarding design and construction in accordance with the appropriate EC guidelines. These standards determine environmental conditions under which the system can be safely operated.

An operation of the X-TRACTION system at environmental temperatures of +5 °C to + 35 °C and a relative humidity of 5 % up to a maximum of 96 % (non-condensing) is recommended.

The system may be operated at altitudes from sea level up to 2000 m.

The electrical protection class is IP20.

Please ensure adequate ventilation: Sufficient space must surround the device for convection of cooling air. Do not cover the cooling slots!

In case of fire, please use a suitable fire extinguisher.

Improper usage, disregard of safety instructions clearly outlined within this manual, misuse of the system, as well as inappropriate maintenance/repair by non-authorized service personnel or the use of anything other than genuine spare parts and accessories voids any claims against the manufacturer.

The individual components may be connected in the intended way only.

Safety note: Never reach directly into moving machine parts or into gaps that are intended for mechanical movements.

Ensure sufficient personal distance to the system, in particular when

- system is initializing,
- a sample is processed,
- a rinsing step is processed
- or the system is in a service mode.

During operation in aforementioned conditions, no access to the safety area is permitted.
Should you feel unsafe or should any uncontrolled conditions occur, switch off the system with the main switch at the front side of the system.

V) Electrical instruction

ATTENTION: As with all mains powered devices, please observe the following safety precautions:

- Protect the system from any dripping or spilling liquids to avoid risk of short-circuiting or fire (protection class of the power supply is IP20).
- Do not make any inappropriate alterations to the system.
- Switch off the system in emergency cases (de-energized). 
- Operate the system under the given environmental conditions only.
- Operate the system with the rated voltage only: 220-240 Volt AC, 50-60 Hz.
- Where the plug of the Direct Plug-in Adapter is used as the disconnect device, the disconnect device shall remain readily operable.
- Detachable power cords must not be replaced with inadequately rated power cords.
- Replace broken fuses with the same type only.
- Operate the system with a functional ground pin.
- In order to increase your personal safety, an earth leakage circuit breaker with a cut-off current of 30 mA or less must be installed.
- Do not operate the system with broken power cables; the repair of these is mandatory.

VI) Solvents: Handling of solvents and waste disposal

Safety note: When handling chemicals, always wear protective gloves and goggles.

Store the solvents in a suitable container only. The container should be sufficiently vented and utilize the intended, tight-fitting lid.

The waste tube must be tightly fixed to the upper lid of the waste container; the outlet of the tube should sit just beneath the lid in order to guarantee proper function.

Avoid kinks, loops or coiling of the waste tube; the maximum volume of the waste container must be sufficient to collect all solvents, which may be fed into the system as an eluent or cleaning agent.

The waste container must be checked before the start of each sample and completely emptied before the system is refilled with solvents.

When refilling solvents, please ensure that the quality used is suitable for the intended application. The solvent must be free of any particulate matter. Make sure the solvent tubing of the reservoir is free of effervescence.

If necessary, the tube can be vented via the tube-filling function before the device is operated again.

Ensure the open end of the solvent tubes is at the bottom of the solvent supply bottle and not pointed upwards. The use of sinter filters is recommended.

Make sure any solvent supply bottles and waste containers are vented properly in order to prevent any vacuum formation and to ensure correct solvent delivery.

Where appropriate, connect any filter or waste air tubing.

Disposal of waste

Please observe local regulations for the collection and disposal of laboratory waste, as well as the relevant safety data sheets for the cell and the solvents used.

Please note the detailed explanations provided in this user manual in the individual chapters.

This introductory chapter is intended to highlight particular circumstances only. The entire procedure recommended by LCTech is explained subsequently.

1. Intended Purpose

Many different contamination cases (e.g. dioxins, PCBs, pesticides, PAHs …) that have occurred in the food and feed chain over the last few years illustrate the need for fast and high throughput methods to help identify and confirm non-compliant samples, which can then be traced back to the source of contamination.

For this purpose, a highly efficient extraction procedure is required to create raw extracts prior to clean-up and the final analytical separation and quantification.

The X-TRACTION system can be used for semi-automated sample extraction in a variety of matrices such as:

- Food and feed samples
- Environmental samples



In comparison to common extraction techniques – Soxhlet extraction, for example, that requires high amounts of solvent and takes several hours – the X-TRACTION system can reduce these two main factors to a minimum.

This can be achieved by applying a technique called Pressurized Fluid Extraction (PFE), a sample extraction method that employs liquid solvents at elevated temperatures and pressures to prepare samples for analysis. While commonly known extraction systems are using high pressure (100 - 150 bar) for the extraction process, the X-TRACTION system works with low pressure (max. 17 bar; LPFE low pressure fluid extraction). Working in low pressure ranges leads to decreased wear and tear of instrument parts, amplified longevity and easy and safe handling.

The ease of use is further increased by the unique extraction cell-cover-lid locking mechanism.

This system can be upgraded from one to six devices, all of which are able to operate either individually or in parallel, with a different protocol on each device or with the same protocol for all devices. In the mixed mode, some devices can run individual protocols, while the remaining devices still can run the same protocol in parallel.

The system features fast extraction times, easy handling, no cross-contamination and high reproducibility.

2. Environmental Conditions/Technical Data

2.1. Physical Data

Operating temperature:	5 – 35 °C
Operating humidity	5% to 96% relative humidity (noncon-densing)
Operating conditions	For indoor use only
Dimensions W x H x D:	563 x 711 x 530 mm
Dimensions W x H x D: (Add-on system)	350 x 711 x 530 mm
Weight:	48 kg
Altitude:	up to 2000 m

2.2. Electrical Data

Protection class:	IP 20
Overvoltage category	II
Pollution degree	2
Supply voltage:	220-240 Volt AC, 50-60 Hz
Mains connection	3-pole (P, N, E) via power cable
Maximum rating:	600 W
Internal fuse:	2x T4A 5 x 20 mm
Internal blade-type fuse	3A, 2A, 1A
Interface	USB 2.0

2.3. Process Engineering

Maximum pressure:	17 bar (250 psi)
Pressure sensor:	0.1 – 100 bar (1.5 - 1450 psi)
Temperature range (adjustable)	30 – 200°C
Minimum flow rate	0.1 mL/min
Maximum flow rate:	150 mL/min
Max. flow rate in process:	80 mL/min
Wetted parts:	Stainless steel, PTFE, Glass, PEEK
Gas supply:	Nitrogen (3.0 bar ~ 43 psi) supplied by lab
Max. syringe pump volume	10 mL

3. Explanation of System Components

3.1. Configuration

There are two possible configurations of the X-TRACTION system. The X-TRACTION system (P/N 20000, Figure 1 left) is the main system and can be operated as a stand-alone device.

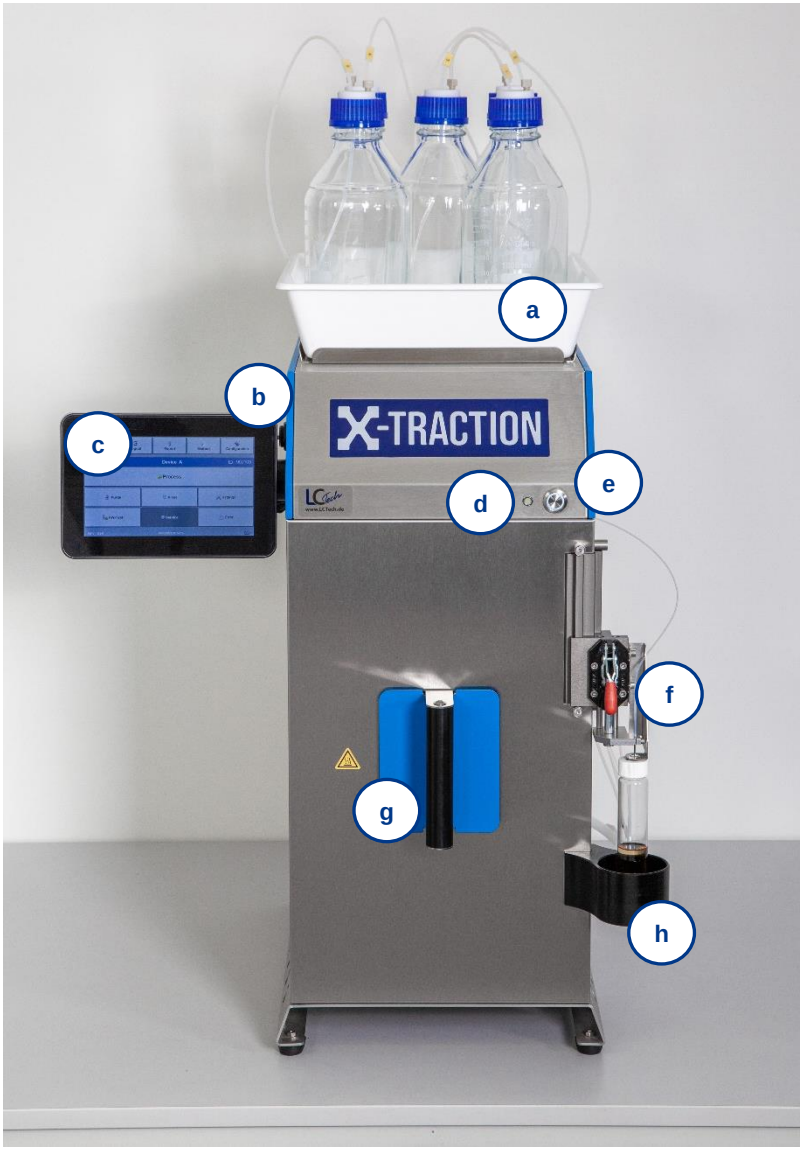
The add-on system (P/N 20001, Figure 1, right) cannot be operated as stand-alone device, only as an additional add-on system (up to five additional add-on systems maximum) to the X-TRACTION main system.

Figure 1: Left, main system and right, add-on system.

All add-on systems are connected via a signal chain with the X-TRACTION main system and are therefore controlled using the same touchscreen. The sole difference of an add-on system is that it is not equipped with a touchscreen.

Exemplary maximum configuration:

3.2. Front of Stand-Alone Device



(a) Solvent supply tray

Up to 5 x 1 L bottles can be placed safely on top of the device in the solvent supply tray. The tray is easily removable and not connected to the device.

(b) USB port

Transfer method data and/or settings of the device to a USB stick. Subsequently, a PDF report for each method can be generated using special software on the USB stick.

(c) Touchscreen

The touchscreen is used to operate the system.

(d) LED

Status display of the instrument.

- Green: waiting/ready
- Orange: in process
- Red, flashing: error/break

(e) Power switch

Power switch for switching the device on and off. If the switch is illuminated (white), the device is switched on, if the switch is not illuminated, the device is switched off.

(f) Needle unit

The needle unit consists of:

- Toggle joint, for moving the two needles up and down (into and out of the vial)
- Needle to transfer the extract into the result vial
- Needle for venting the septum sealed vial during the transfer of the extract
- Distance plate for the two needles
- Spring button, to move the whole needle unit up and down.

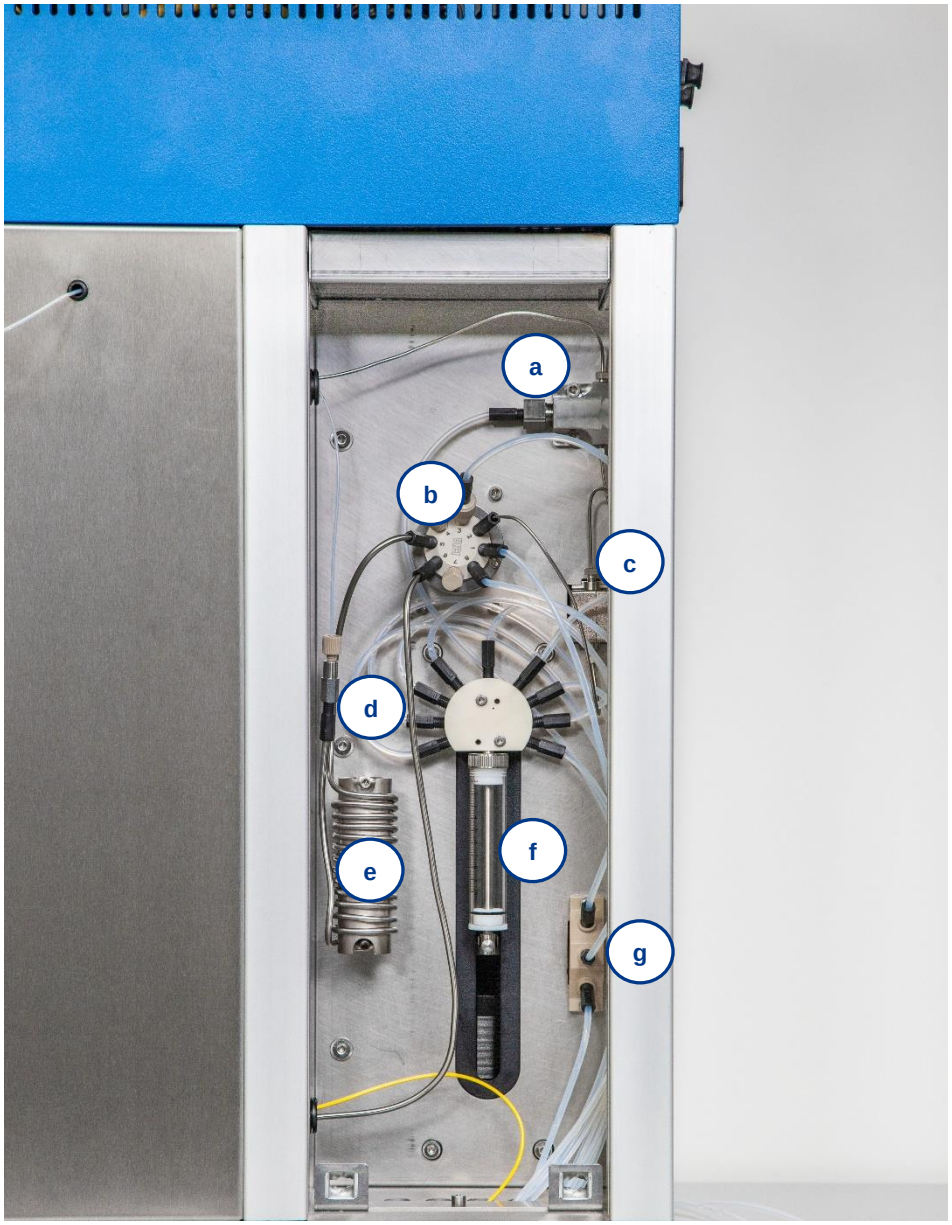
(g) Heating bar compartment

The cell holder, equipped with an extraction cell or rinsing cell, can be inserted here to extract a sample.

(h) Vial holder

Holder for different vial types (e.g. 60 mL, 250 mL, D-EVA 85 mL (P/N 19342)).

3.3. Side view of the device (removed lid)



(a) Pressure relief valve
To mechanically release overpressure into the waste container. Opening pressure: 17 bar

(b) Distribution valve
Valve unit for distributing solvents, samples and N_2.

(c) Pressure sensor
For monitoring pressure during the extraction process

(d) Solvent lines
The solvent supply lines are marked with numbers.

(e) Cooling loop
For cooling the heated solvent extract.

(f) Syringe pump
The syringe pump is used for the purging of the solvent lines, providing solvent for the extraction, the cleaning of valves, tubes, capillaries and needle.

(g) Nitrogen valve
Valve unit with nitrogen connection for the drying of the extraction cells.

3.4. Rear of Device

(a) Connection for Ethernet cable (data output)
Data output connection of signal chain.

(b) Connection for Ethernet cable (data input – only for expansion device)
Data input connection of signal chain.

(c) Power supply
Power supply of the system with 220-240 Volt AC.

4. Commissioning

4.1. Delivery and Receipt of Goods

The X-TRACTION device is shipped in a single piece cardboard box on a palette. Depending on the size of order, there may be additional boxes. Compare the number of received boxes with the number on the delivery note. Inspect the packaging carefully. Claim any visible damage or signs of improper treatment immediately with the haulier.

Please send information about your claim to LCTech via:

Fax: +49 8082 2717-100
E-mail: service@LCTech.de

4.2. Unpacking

Carefully remove the outer packing material and transport the instrument to its operating location using appropriate transportation equipment. Inspect the X-TRACTION device and accessories for any hidden damages, e.g. broken parts inside the package, and claim them immediately with the haulier.
Please send information about your claim to LCTech via:

Fax: +49 8082 2717-100
E-mail: service@LCTech.de

4.3. Check Scope of Delivery

Please check the delivery according to the delivery note and your order. According to your order there may be additional boxes, these will be declared on your delivery note.

4.4. Installation

- Wait 24 hours following delivery so that the system can adapt to room temperature and to avoid condensation!
- Connect to a power supply (220-240 Volt AC, 50-60 Hz).

Safety note: The operating voltage on the name plate must correspond to the local supply voltage!

Safety note: The system (esp. its rear) must have a minimum distance of 50 mm to the wall or to other items to ensure sufficient cooling.

- Set the pressure for the nitrogen supply connection to 3.0 bar ~ 43 psi.
- Set up solvent bottles (e.g. P/N F1000) on top of the device and connect solvent tubes with the associated solvent bottles.

Safety note: In order to avoid any damage to the syringe pump, you are advised to use solvent filters. These should be cleaned with a suitable solvent (e.g. acetone) prior to use.

- Attach a PTFE tube to the venting needle of the needle unit (see chapter 3.2 c) d) (optional).

NOTE: It is not mandatory to operate the X-TRACTION system within a fume hood, but it is advisable to lead the PTFE tube of the venting needle into it.

- Connect waste tube to waste container.

Safety note: Do not store anything (e.g. chemicals) below or behind the system.

4.5. Checklist Initial Operation

The X-TRACTION system is now ready for initialization:

- Control waste bottle and if necessary, empty the waste bottle.
- Fill all solvent reservoirs.
- Switch on the system and choose the configuration.
- If required, adjust language (English-German) and time/date (Chapter 5.4.1).
- Enter name of used solvent (Chapter 5.4.2).
- Purge the solvent lines of the syringe pump (Chapter 5.6).

NOTE: To make sure that the complete tubings are filled with solvents, the respective purging step must be executed twice.

- Rinse the system (see chapter 5.8).
- Insert a dummy cell for initial rinsing (Chapter 5.8)
- Insert a rinsing vial (e.g. P/N F060) to the vial holder of the system (Chapter 5.8).

- Rinse the system with “Rinse” (Chapter 5.8).
- Remove and empty the rinsing vial.
- Create or edit the desired method (see Chapter 5.5).
- Select the desired method (Chapter 5.7.1).
- Prepare your extraction cell and fill it with sample (see Chapter 5.7.2), put it in the corresponding extraction cell holder and insert your equipped extraction cell holder in the device.
- Insert the sample vial (e.g. P/N F060 or P/N F250) into the vial holder of the system (Chapter 5.7.2)
- Optional: Put in in sample name (Chapter 5.7.3).
- Start the process (Chapter 5.7.4).

ATTENTION!

It is essential to ensure that the operating conditions for the system are kept constant and stable during processing! Otherwise the system could be damaged or the samples may be processed incorrectly.

Only samples suitable for a liquid handling system may be processed, which means they are compatible with the demands of the system regarding viscosity, volatility and chemical stability.

4.5.1 Re-Commissioning after Short-Term Standstill

Check the solvent and waste container levels.
Check the system for leakage after transport or disconnection of tubings.

4.5.2 Re-Commissioning after Prolonged Standstill

After a prolonged standstill, proceed as described under “Initial Operation”.
The storage space must be dust-free, dry and free from excessive temperature fluctuations.

5. Software

The X-TRACTION display (touchscreen) serves as the control interface for the system, allowing for easy and efficient user control.

5.1. Start Screen

The following screen should appear upon switching on the system. The initial operation progress is shown on the blue bar in the lower part of the screen. Initialization of heater bars, syringe pump and the cell tower takes place.

Figure 2: Start screen after switching on the power supply.

Once the start screen is completed, a request (Figure 4) appears asking user for name and password.

Safety note: Please be aware that if an extraction cell is locked in the device it will be released during initialization.

5.2. Password

The system can be operated in two modes: without user login or with user login. Only upon entering the correct password will the screen be unlocked.

5.2.1 Inactive

In general, the system is pre-configured with deactivated user management (see Figure 2). Therefore, when booting is complete, you will see the main menu without having to enter a password. This can be seen in the main menu, where “User” is the active user.

INFORMATION: All software windows in the user manual are based on an inactivated user login.

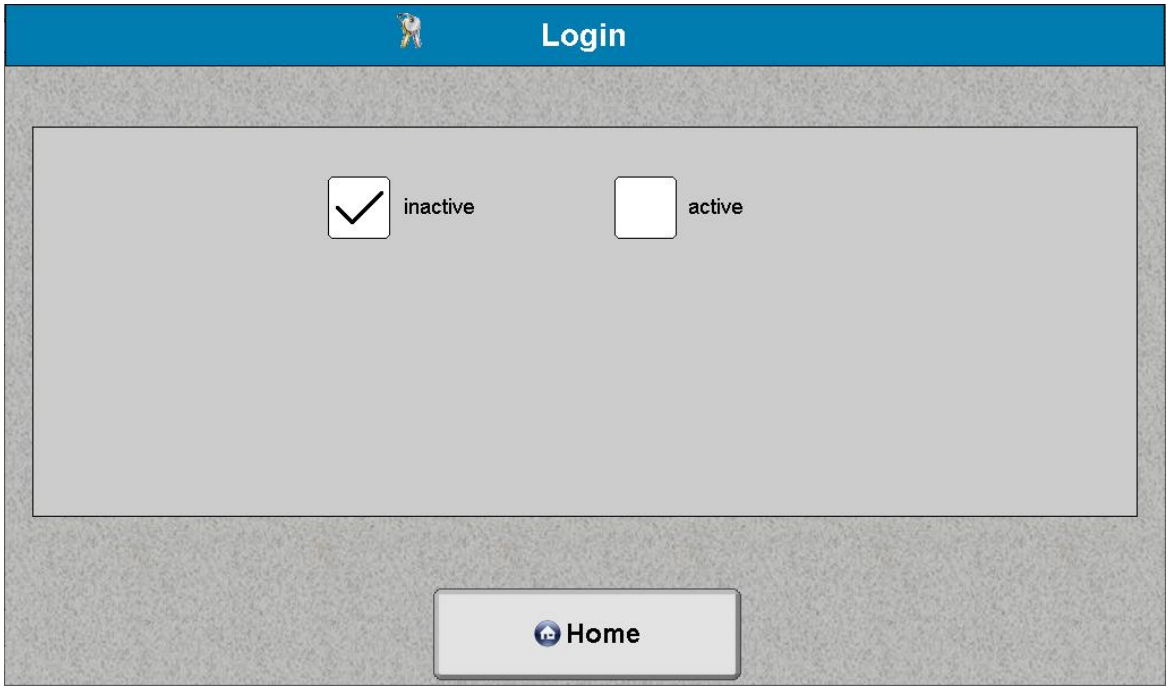


Figure 3: Disabled login function.

5.2.2 Active

Once the start screen is complete, a request (Figure 4) appears asking user for name and password.

Select a username in the drop-down menu and enter the password. Pressing the white box (Figure 5) automatically opens an input screen in which the password can be entered.

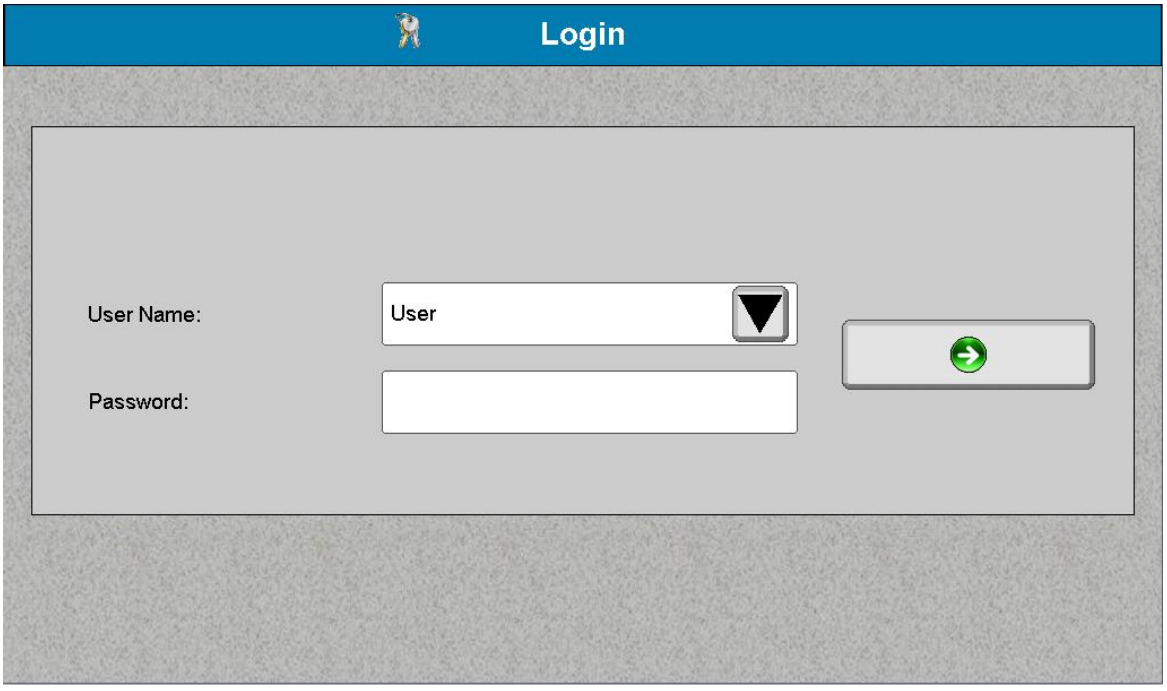


Figure 4: Login window.

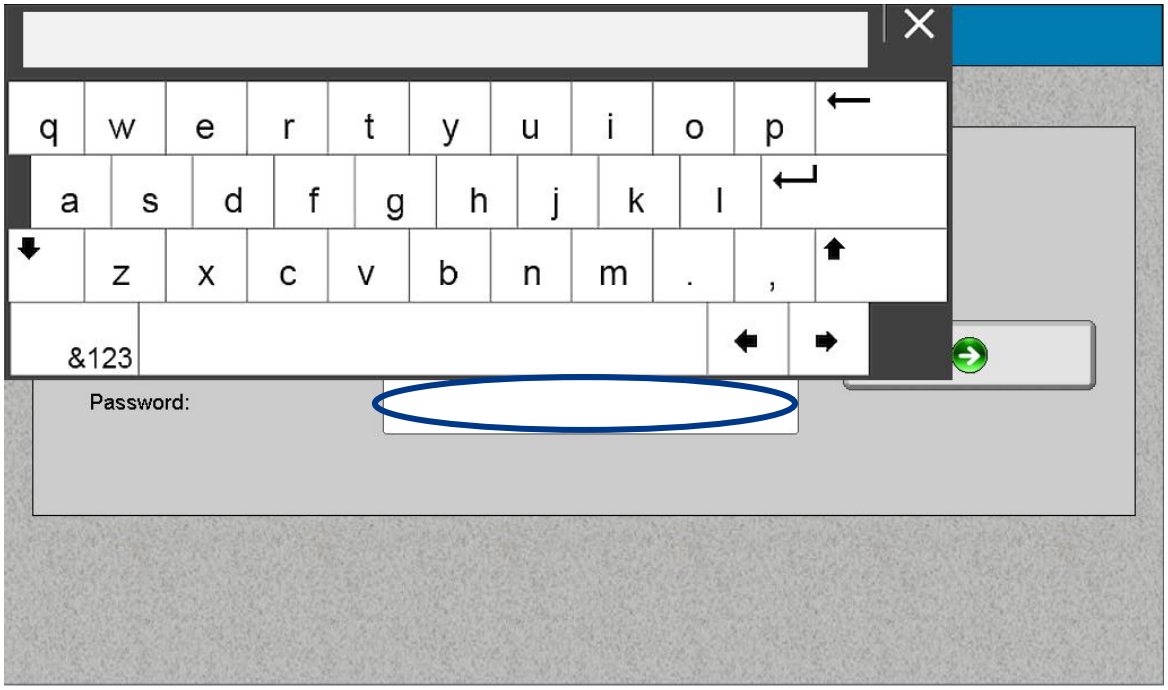


Figure 5: Enter password.

The logged-in user can have different access rights (reading, reading and writing). Depending on access rights, different buttons appear or different fields are writable in the software windows. The password query can be cancelled at any time (see Figure 6) or the user can be changed in the main menu at any time (“Logout” button, see Figure 8).

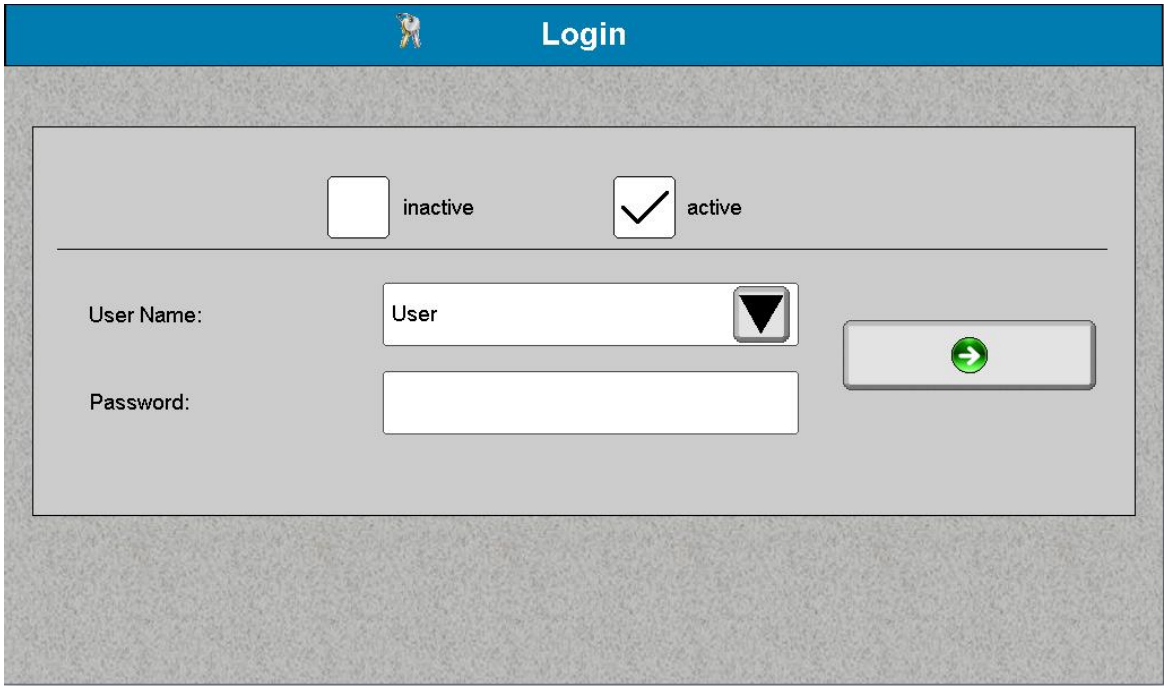


Figure 6: Change state of login.

If the wrong password is entered, the following error message appears on the display.

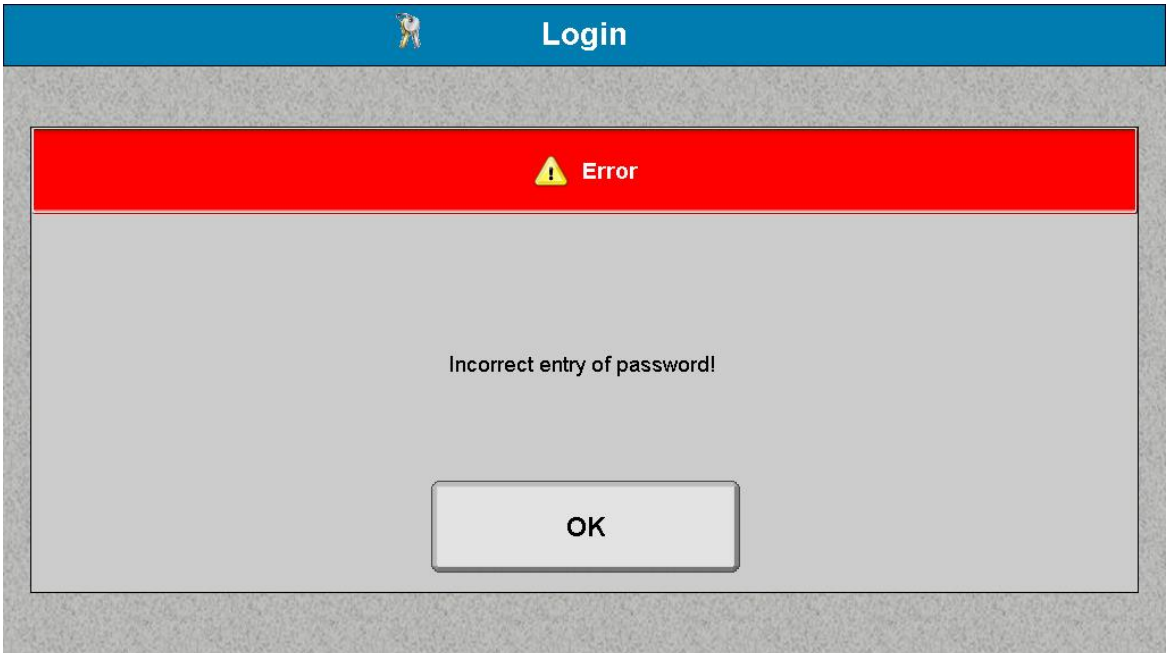


Figure 7: Error message for wrong password.

5.3. Main Menu

5.3.1 Main system without Add-on system(s) (stand-alone operation)

One X-TRACTION system without add-on system(s) is active. If an add-on system is active, the main menu looks different (see chapter 5.3.2).

In the main screen, you will find several options (Figure 8).

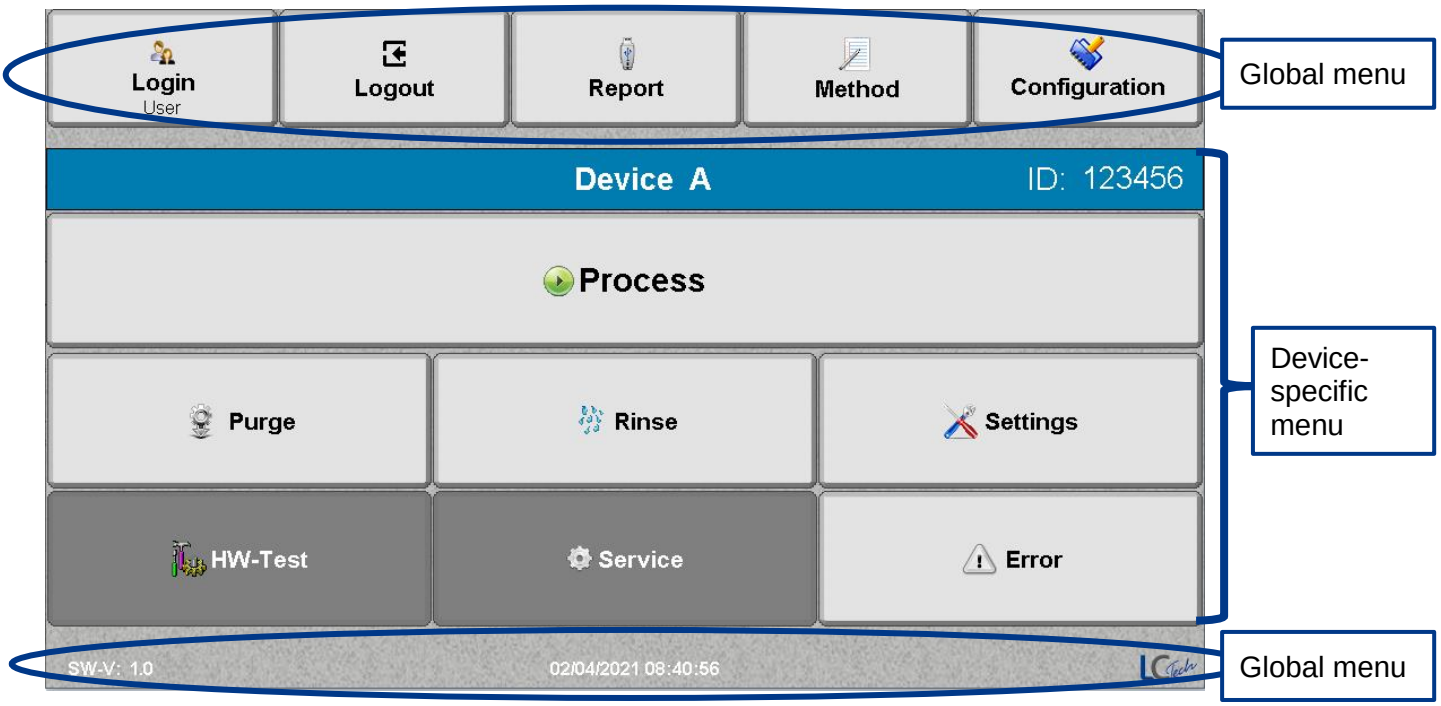


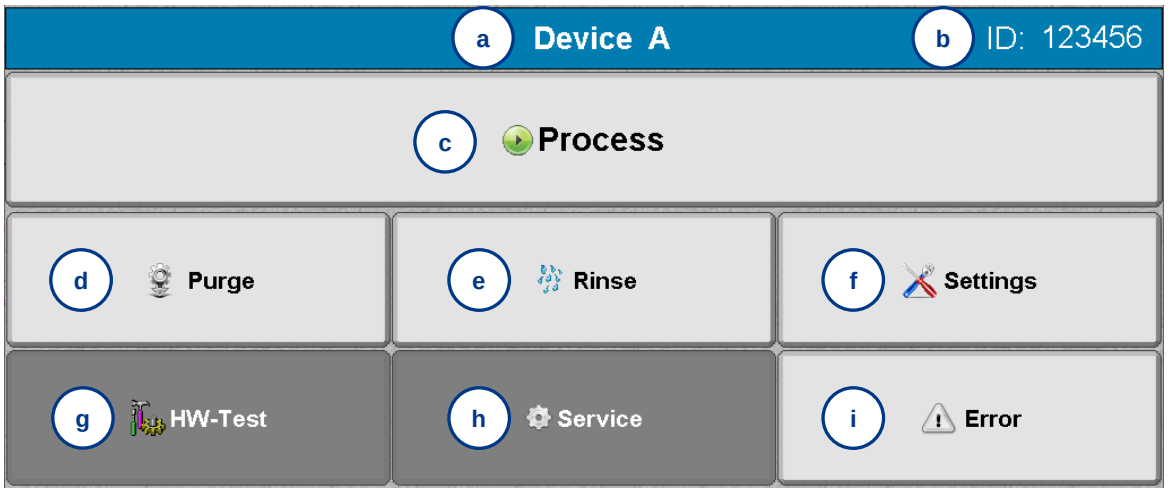
Figure 8: Main window of one X-TRACTION system.

Global menu: Contains cross-device information.

- Login: Button with name of currently logged-in user. Activate/deactivate password function. Login a new user.
- Logout: Logout current user.
- Report: Transfer method data, settings or event list to USB stick.
- Method: Edit or create methods.
- Configuration: Language, date, time, combine device, active device.

Software Version Date/Time

Device-specific menu: Specifically for each individual device.



(a) Device Name
Name of current device.

(b) Device ID
Six-digit identification number.

(c) Process (Chapter 5.7)
Link to sample process.

(d) Purge (Chapter 5.6)
Fill up solvent tubings.

(e) Rinse (Chapter 5.8)
Rinse process.

(f) Settings (Chapter 5.4.2)
Settings of device ID, leak test, solvent name, max. pressure and service.

(g) HW-Test
Test of hardware components.

(h) Service

(i) Error
Display device errors.

5.3.2 Add-on system(s)

One X-TRACTION system with n-add-on systems are active (n = maximum five add-on systems). For example, six devices shown in the following chart.

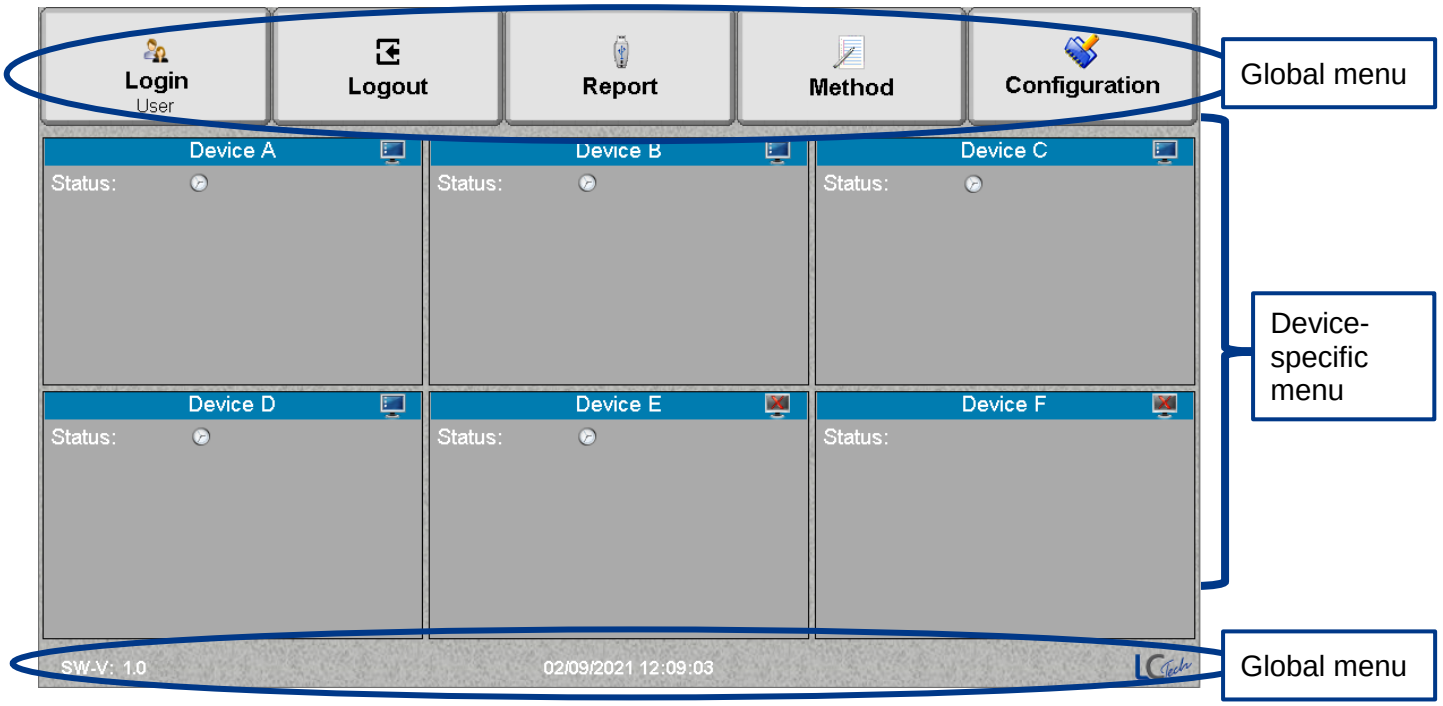
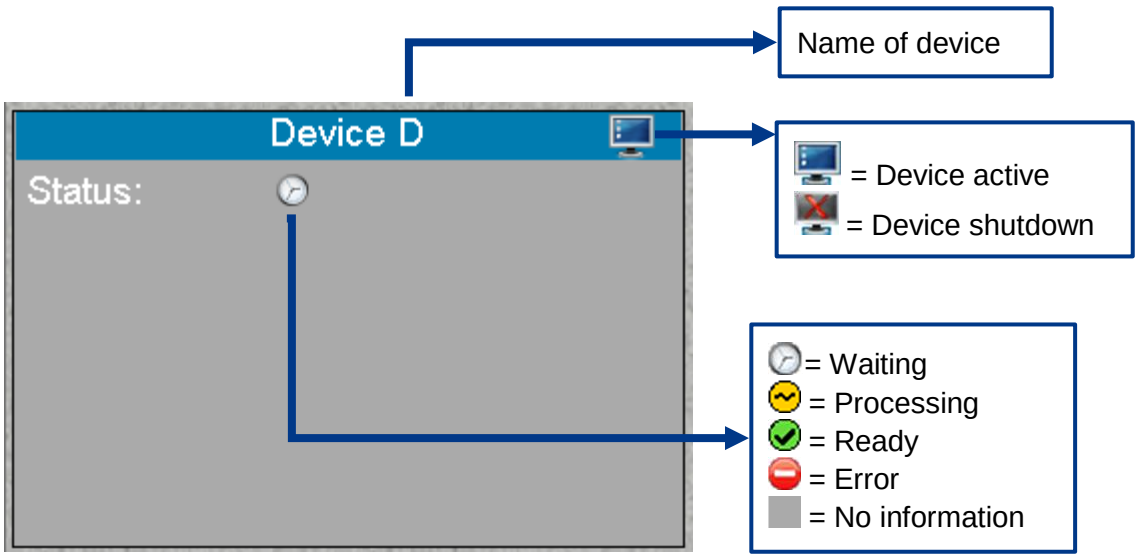


Figure 9: Main window with six X-TRACTION systems.

Global menu: Contains cross-device information. For more information see page 25.

Device-specific menu: Overview of information for each individual device.



To switch to the device submenu, just click on the desired device shown in the chart below. Return to the main menu with the “Home” button.

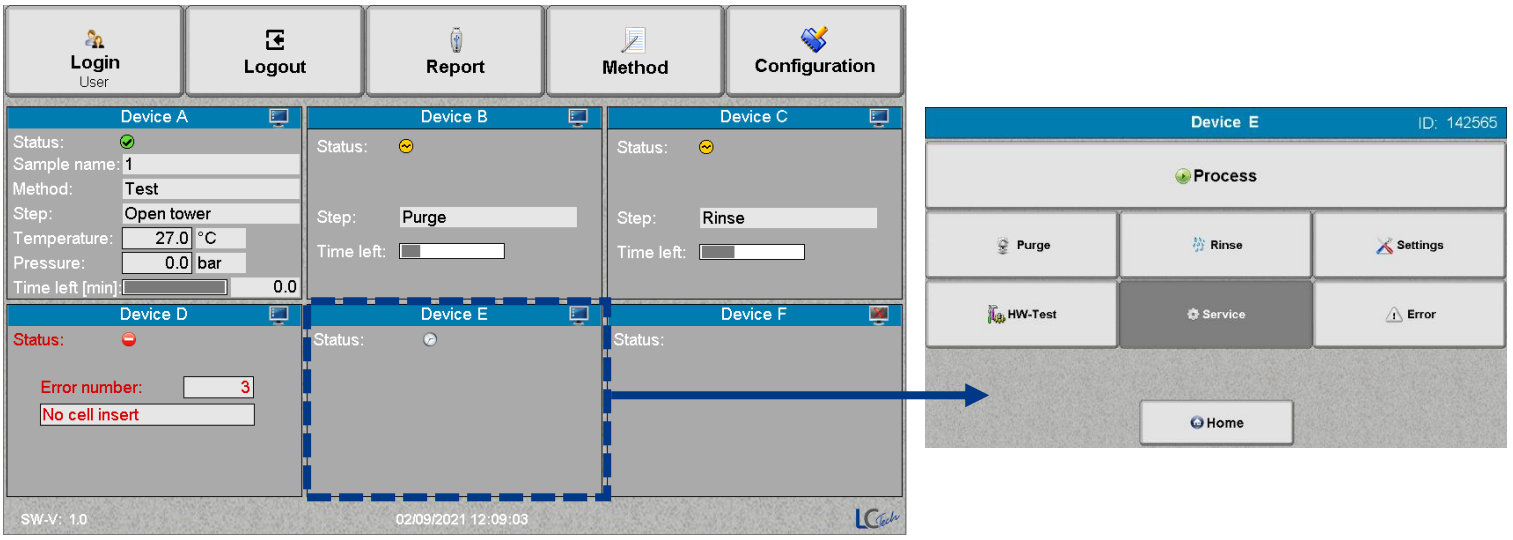


Figure 10: Main menu (left) and submenu (right).

5.4. Device Parameter

There are two configuration possibilities for the X-TRACTION device in the software. One is global configuration, valid for all connected devices, and the other is local configuration, whereby individual parameters for each connected device can be set.

5.4.1 Configuration

On these pages (Figure 11 and Figure 12), general system parameters can be set that are valid for all connected devices.

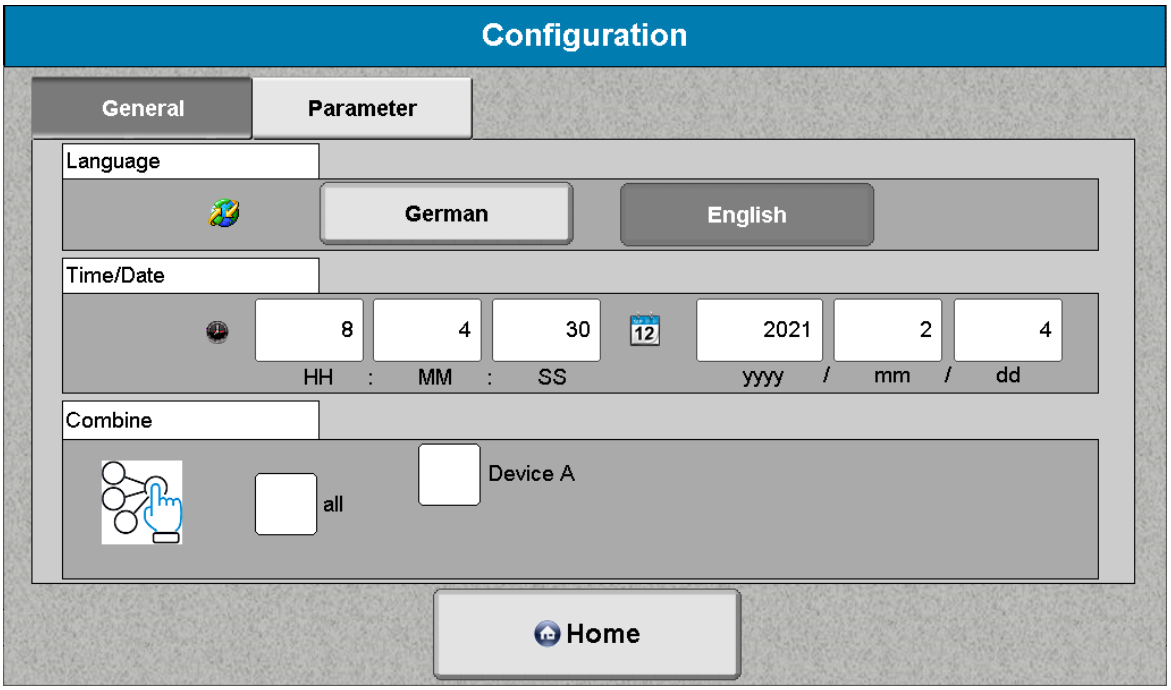


Figure 11: General global configuration.

- Language: Select your preferred language (German/English) by pressing the language button.
- Time/Date: Set date and time. Correct settings are important to determine date and time in the event of an occurred error during sample run. There is no automatic changeover from summer time or winter time.
- Combine: Combine connected devices, being able to start the same method on different devices, or to start a rinsing or purging cycle for all connected devices in parallel.

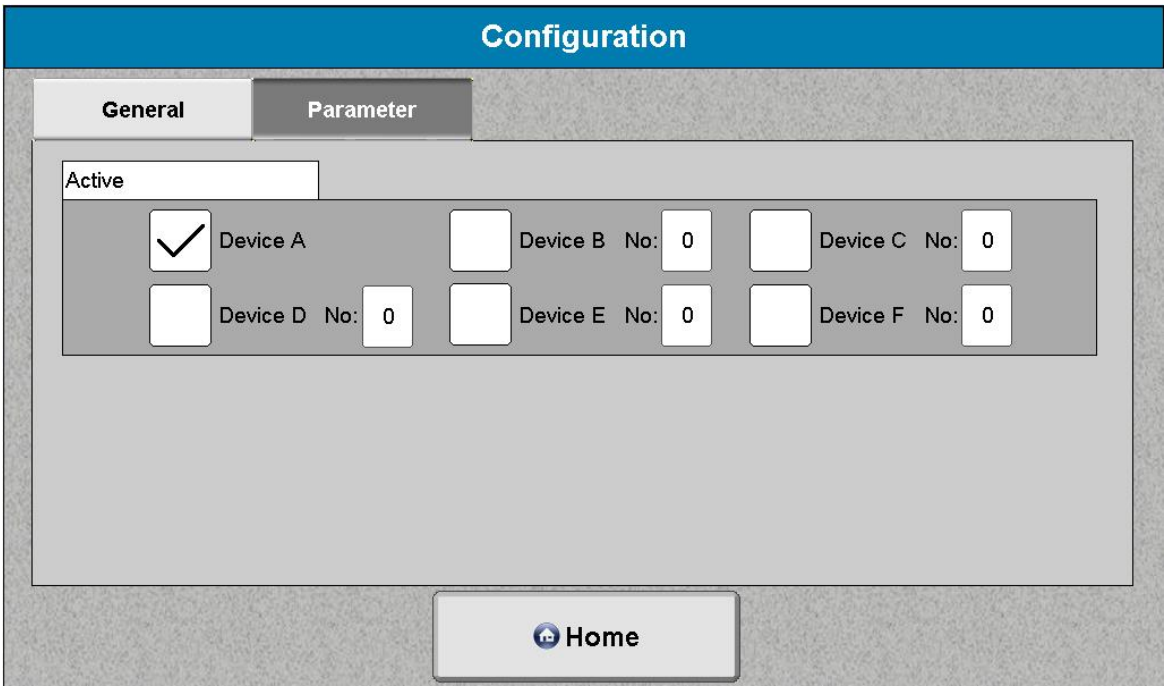


Figure 12: Global configuration parameter.

– Active (checkmark) or inactive (no checkmark) hardware configurations of add-on devices B-F. The numbers indicate, which add-on device is meant, counted from left to right.

  Example 1: Device B has a checkmark and received number 1, which means, that device B is the first add-on device. If device C should also be added (checkmark), it receives number 2, as it is the second add-on device.

  Example 2: Should device B be removed (hardware removed) and device C should remain, the checkmark of device B has to be removed and the number has to be changed to 0. The number of device C has to be changed to 1 instead of 2 and remains active (checkmark).

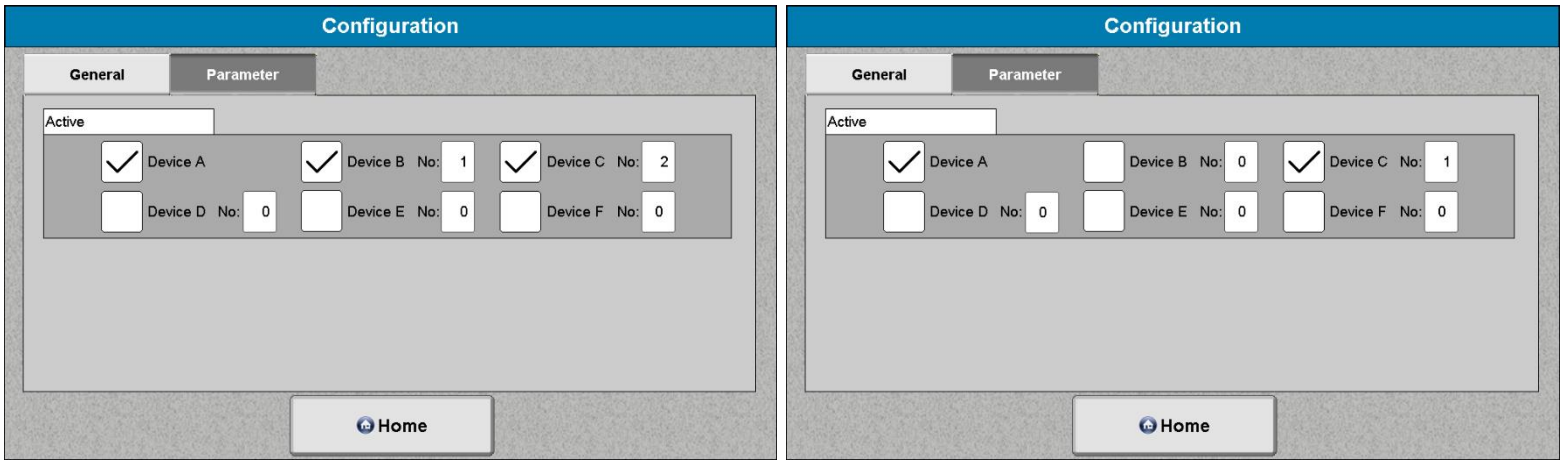


Figure 13: Left example 1 and right example 2.

NOTE: A changing of parameters is only allowed, if no process/rinsing/purging is active. After changing a parameter (checkmarks or numbers) a restart of the device(s) is mandatory.

5.4.2 Settings for each device

Device-specific settings shown in Figure 14 and Figure 15.

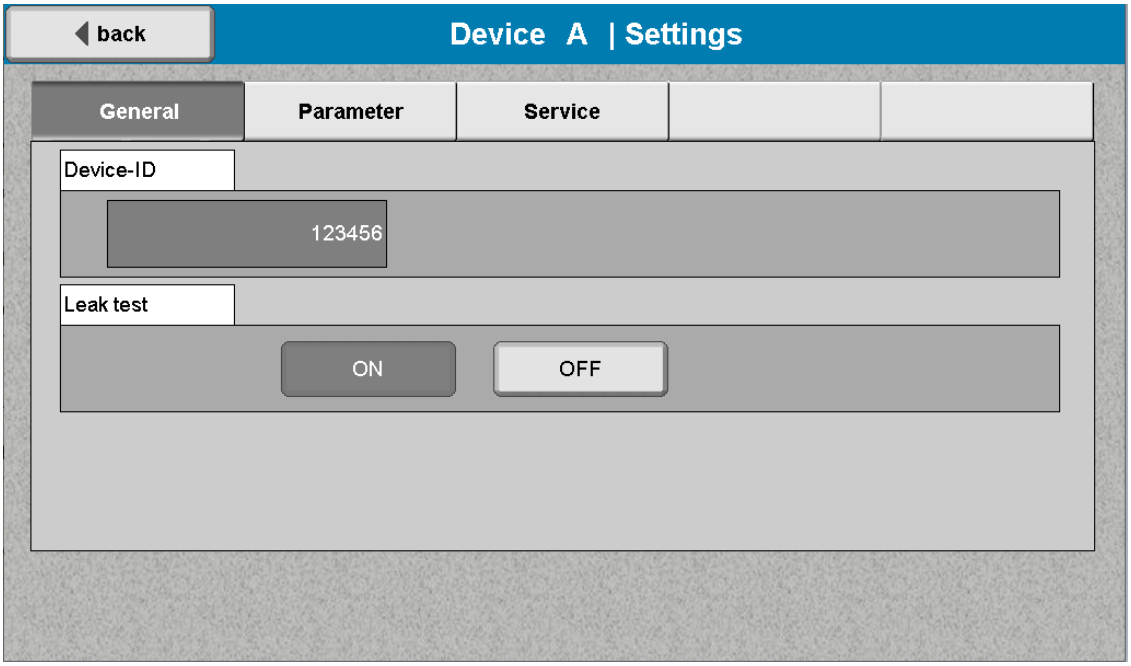


Figure 14: General local settings.

- Device ID: Input of device ID. To change, a level 3 password is required.
- Leak test: Automated leakage test to see if inserted extraction cell is pressure tight. This test will be performed directly after the start of each method with nitrogen. Click on ON/OFF to activate or deactivate this test.

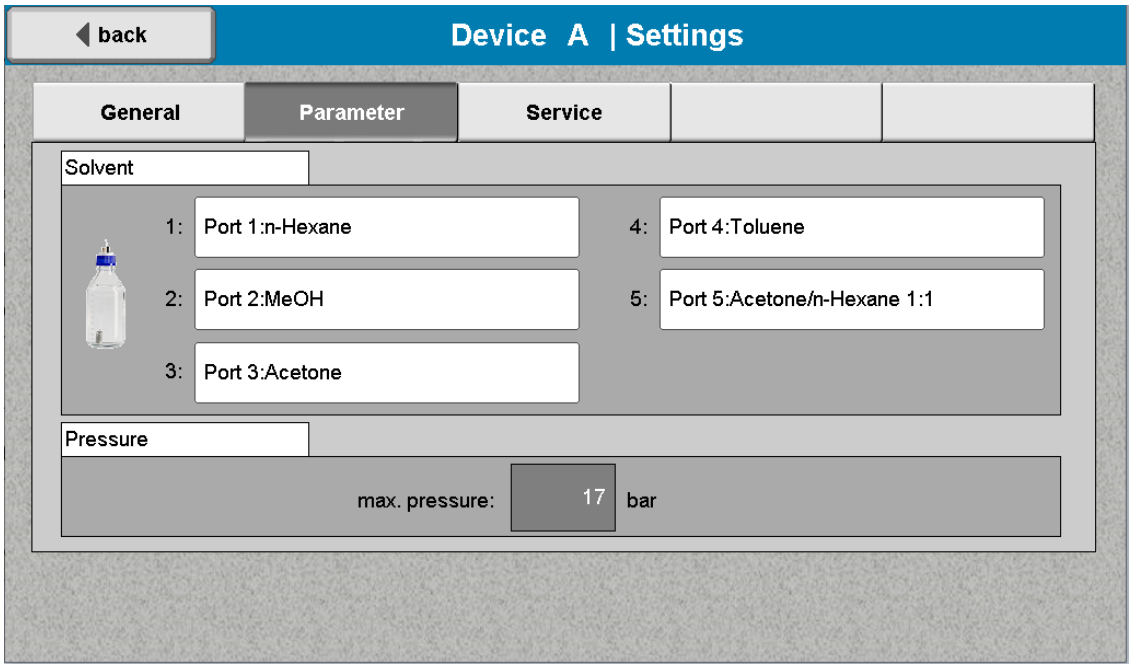


Figure 15: Local parameter settings.

- Solvent: Enter name of used solvent. The numbering 1-5 corresponds to port connections of the syringe pump. Pressing the white box (Figure 16) automatically opens an input screen in which the desired solvent name can be entered.

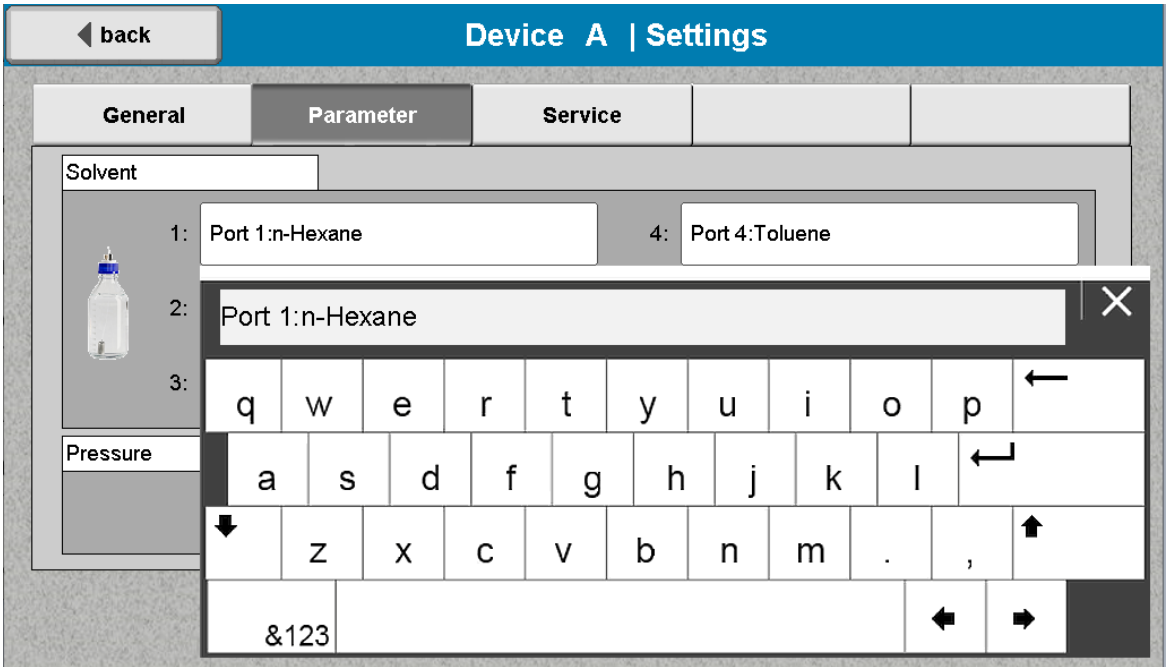


Figure 16: Enter solvent name.

– Max. Pressure: The maximum pressure for the system is set to 17 bar. The maximum pressure value is set for safety reasons and the system will switch off, if the pressure exceeds the maximum set value.

The service area contains maintenance recommendations for the rotor seal of the valve, wearing parts of the heater bar, tower and syringe pump (Figure 17).

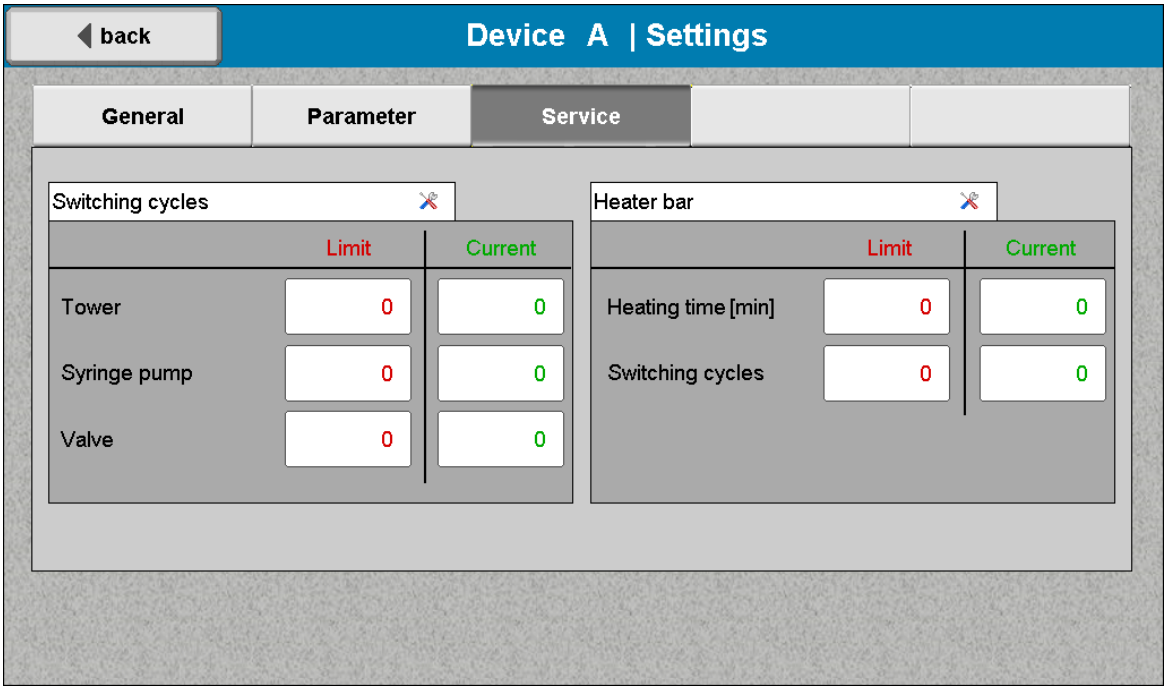


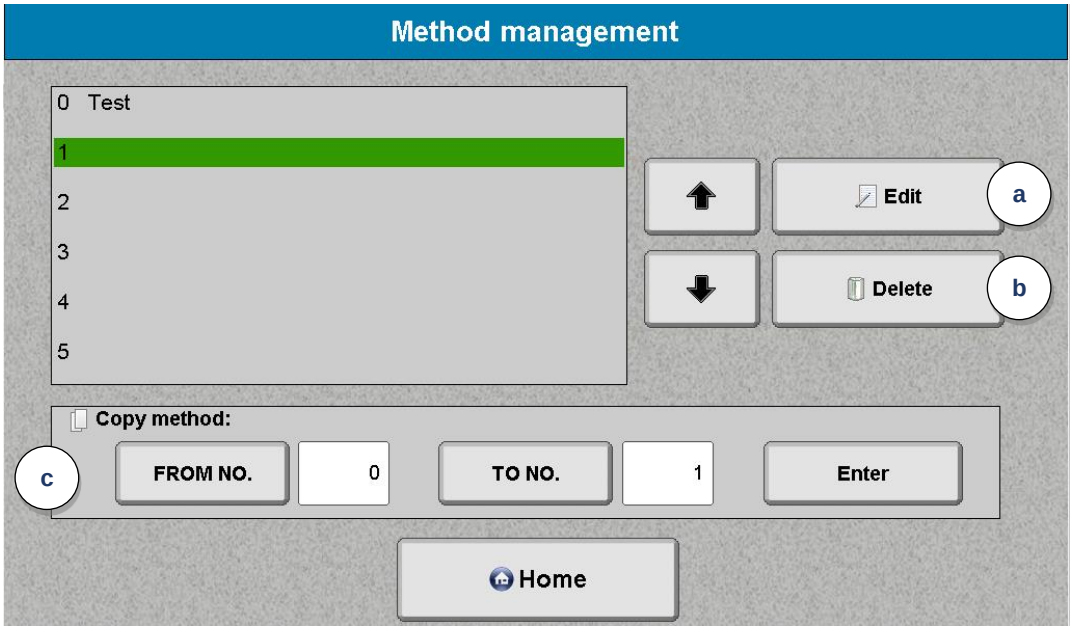
Figure 17: Settings page for service

The “Limit” value corresponds to the recommended value at which a component should be replaced. The "Current" value is the actual measured value of the component. Shown values depict the number of performed tower, syringe pump and valve switches or the number of the heater bar operating minutes and switching cycles.

5.5. Menu Method

This chapter explains method handling.

NOTE: To change or delete a method, a level 1 password is required. If the selected method is currently being used in the process, parameterization is not possible.



(a) Edit/Create **(5.5.1)**

(b) Delete **(5.5.2)**

(c) Copy **(5.5.3)**

Figure 18: Method management.

NOTE: A method is only selected if it is shown with a green background (see Figure 18).

5.5.1 Editing

You can store up to 40 different methods.

In this mode (Figure 19), it is possible to set up a new method or change an existing method. It is possible to change cycles, heating, duration, volume, flow rate, time and the solvent. The number of cycles can only be changed within “1. Cycle”. For each cycle, all parameters can be set individually. If the amount of cycles is being increased, the last parameterized cycle will be used as a template for all following cycles.

Upon pressing the input box, it is possible to name the method or change the name of a pre-existing one. To confirm the newly created method, press the “save” button.

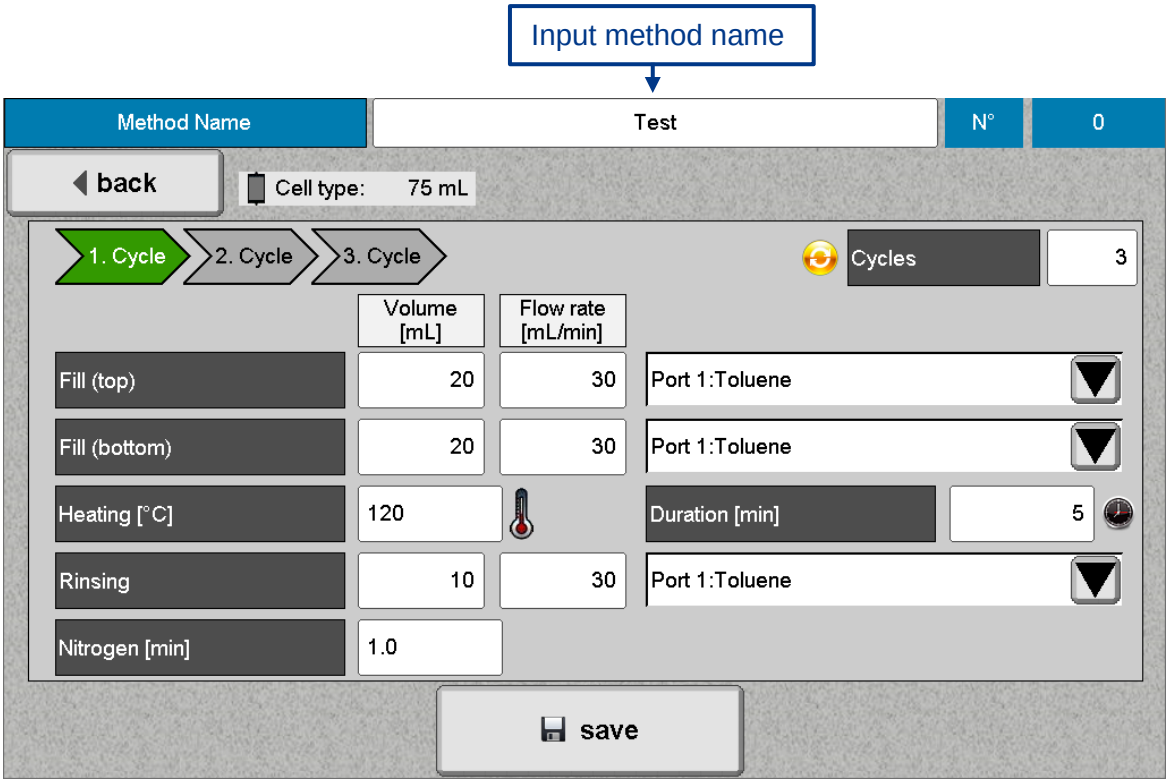


Figure 19: Method editing.

Figure 20 shows a warning window that opens when the entered fill (top) and fill (bottom) volume exceeds the defined maximum cell volume, which is dependent on the cell type. This window cannot be exited unless the volume has been adjusted.

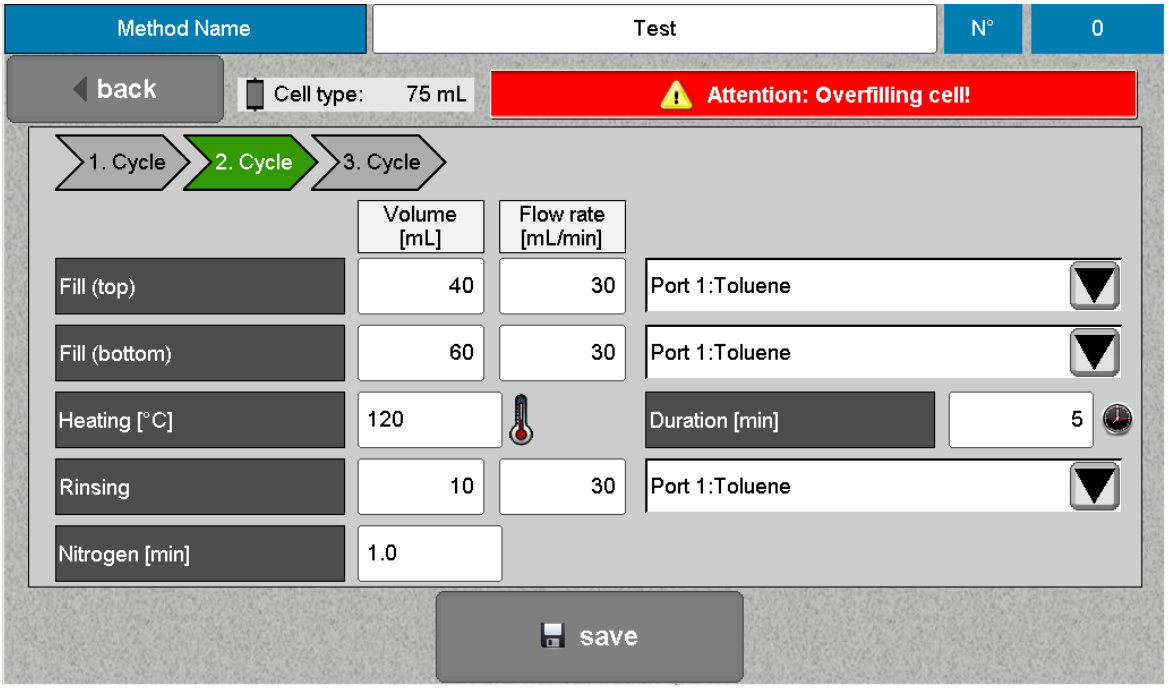


Figure 20: Warning: fill volume exceeds cell capacity.

INFORMATION: To ensure correct functionality, the fill volume of the cell should be smaller than the entered cell type in the method.

For example: Entered fill volume (top) = 40 mL, fill volume (bottom) = 60 mL

40 mL + 60 mL = 100 mL → Cell type 75 mL

Maximum volume cell type: 75 mL → 50 mL

In the event of a method being changed and the memory button was not pressed, an additional query will appear asking if the method should be saved (see Figure 21).

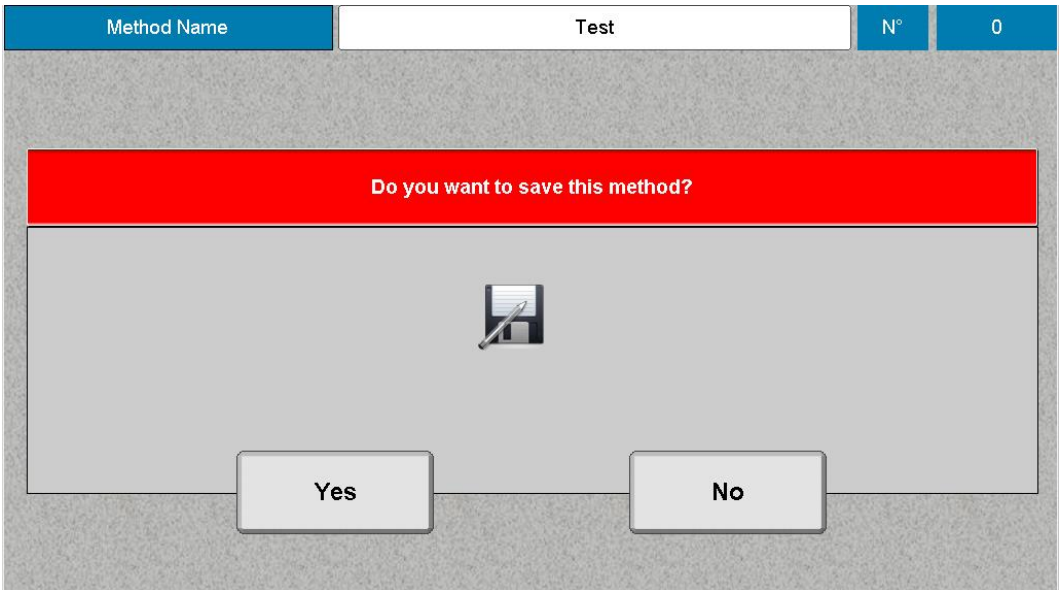


Figure 21: Request to save method.

Possible sequence of steps within the method:

Step	Explanation
Fill (top):	Fill cell from top side
Fill (bottom):	Fill cell from bottom side
Heating:	Heating cell
Duration:	Holding temperature for X minutes
Rinsing:	Rinsing cell into vial
Nitrogen:	Drying cell
Cycles:	Amount of parameterized cycles

5.5.2 Delete

If more space is required or you want to delete a method, select the respective method and press delete (see Figure 18, b). Confirm deletion of chosen method by pressing the “Yes” button (Figure 22).

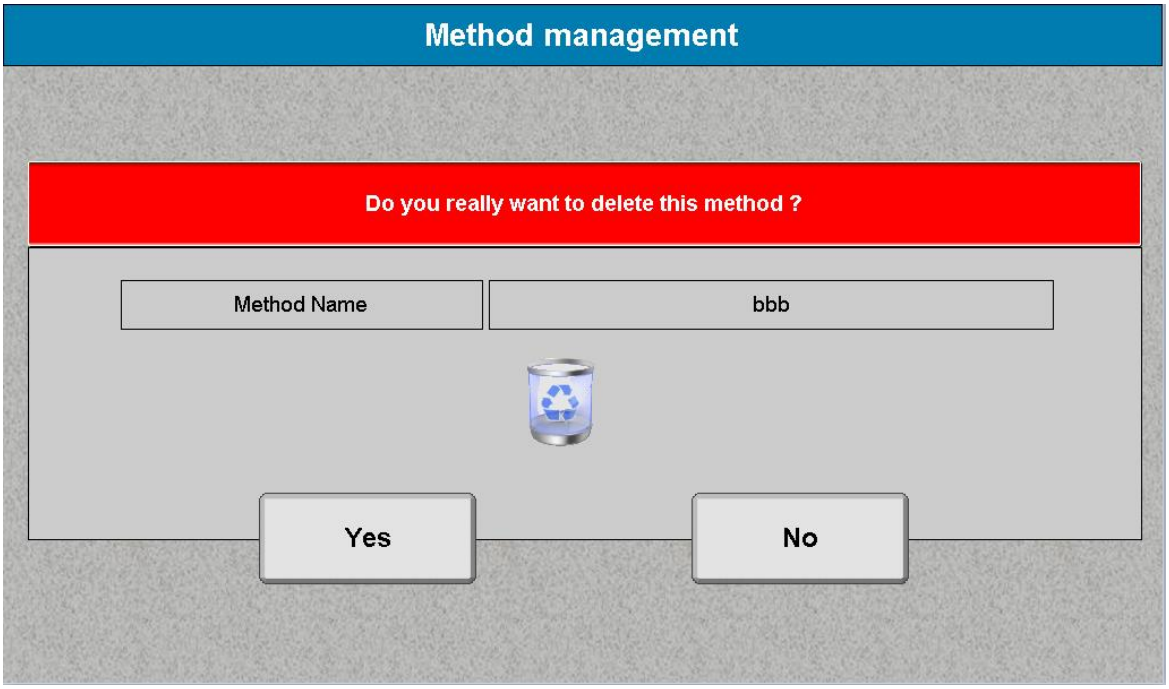


Figure 22: Confirmation prompts for method deletion.

5.5.3 Copy Existing Method

Please follow the sequence of steps described below to copy a method. The copied method will automatically be named with the word “COPY” at the end.

> Explanation on how to change the name: Chapter 5.5.1 Edit.

Order:

1. Select the method you want to copy and press “FROM NO.” button – Figure 23.

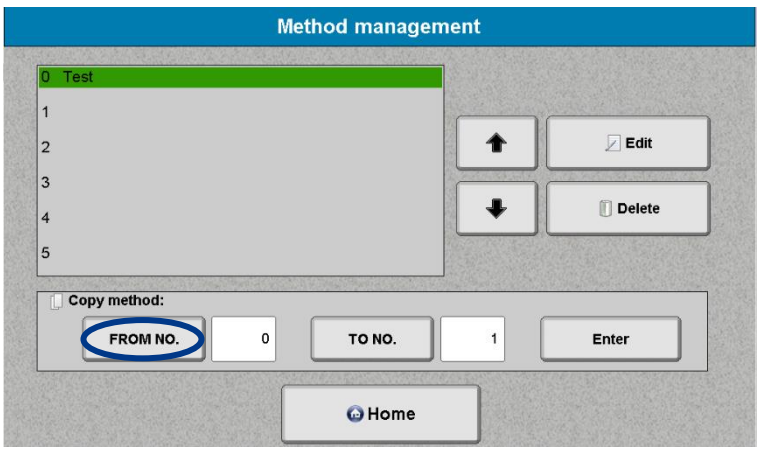


Figure 23: Selected method (green).

2. Select a free space in the dropdown menu (max. 40 methods) and press “TO NO.” button – Figure 24

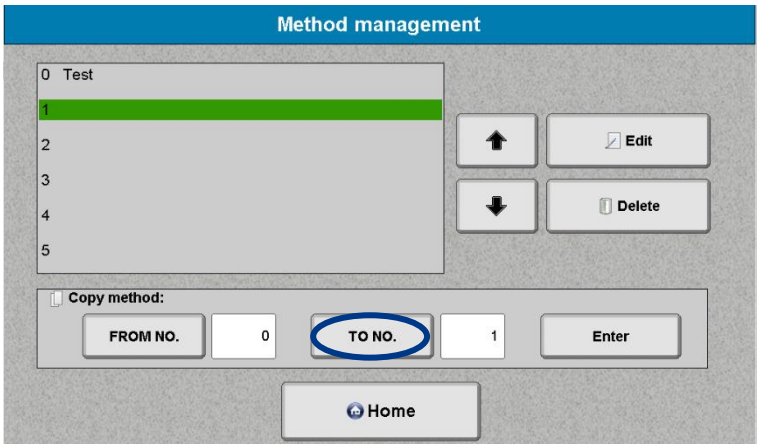


Figure 24: Determine destination.

3. Confirm with “Enter” - Figure 25

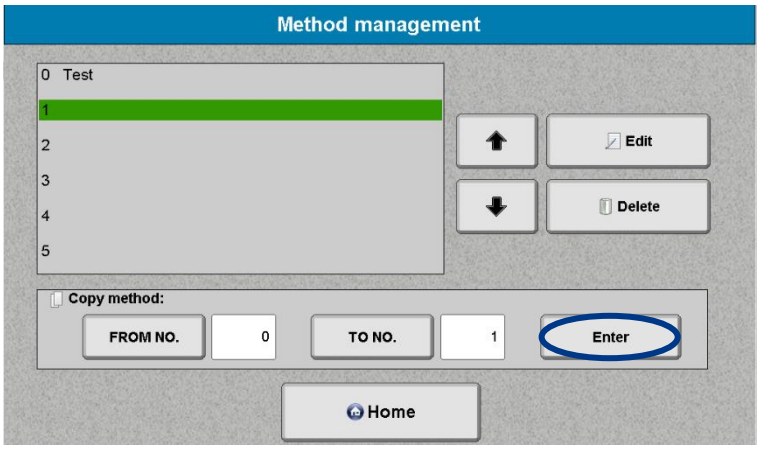


Figure 25: Confirmation.

If the copy process was successful, the new entry will be denoted with “COPY” at the end of the method name (Figure 26, example “TestCOPY”).

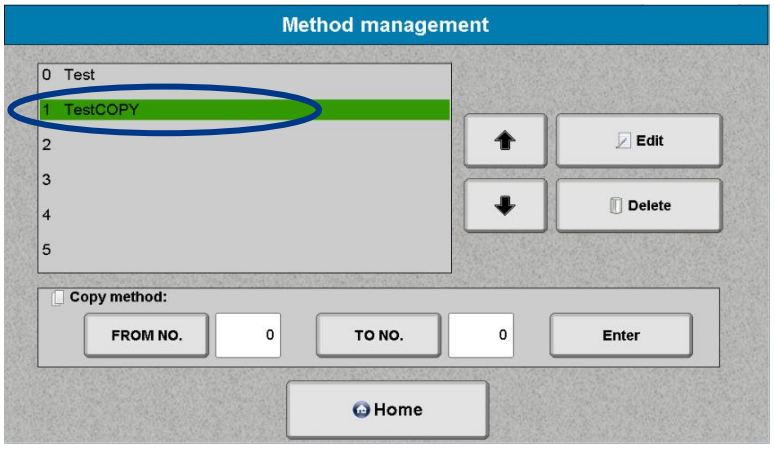


Figure 26: Method list with copied method "TestCOPY" at list number 1.

NOTE: If the original storage location is identical with the target location, the following message will be shown on the display.

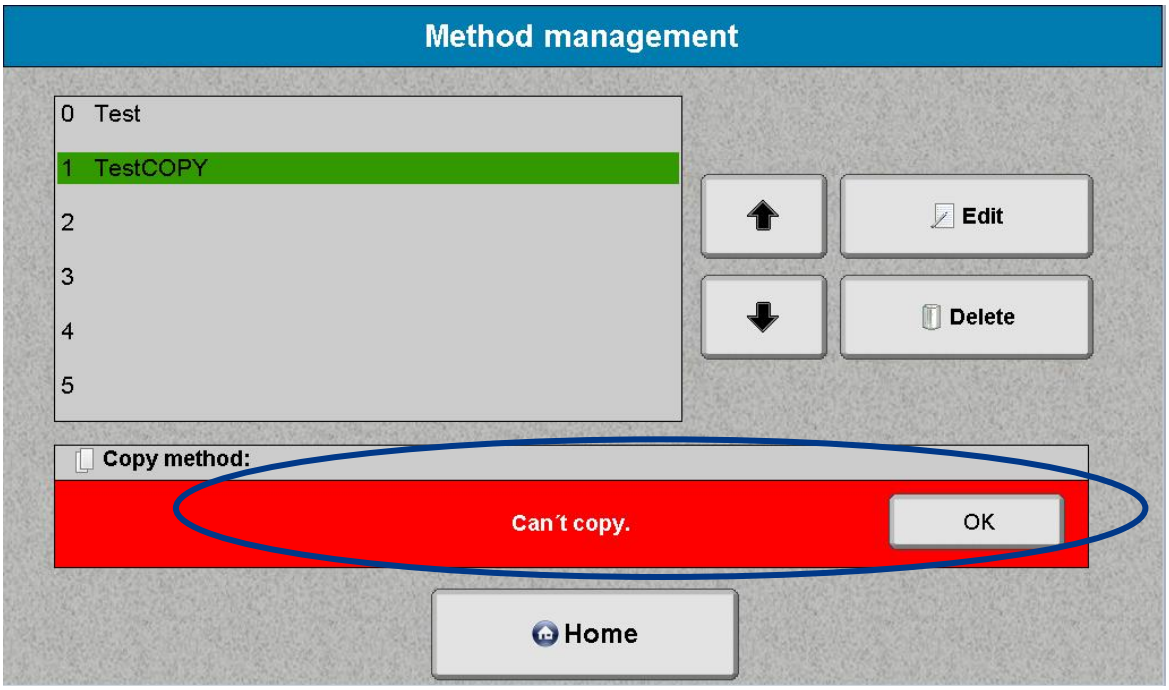


Figure 27: Error method cannot be copied. Selected method "TestCOPY" should be copied from number 1 to number 1.

NOTE: If you copy a method to an already occupied location, then this method will be automatically deleted and replaced by the copied method.

5.6. Purge

The system must be purged to enable fill-up of the solvent lines and to remove potential effervescence from the lines. All solvents used are diverted directly to the waste. Each of the shown parameters can be adjusted individually by setting the checkmarks (see Figure 28).

INFORMATION: Please purge the solvent supply tubings of syringe pump if they have not been used in a while. Control waste bottle and, if necessary, empty the waste bottle.

Disposal
Please observe local regulations for collection and disposal of laboratory waste.

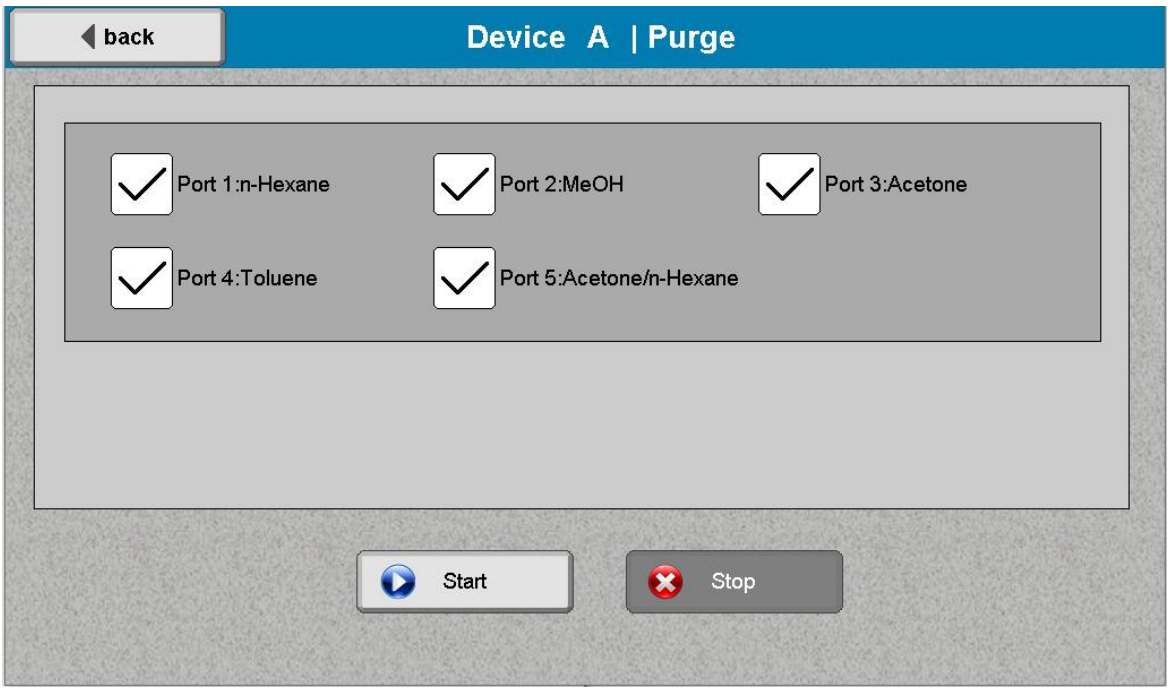


Figure 28: Purging menu.

Legend:

☐	Not selected	☑	Selected
	Wait		Finish
	Processing		Error

To start the purge process, select the solvents and press the “Start” button.

The purging for each solvent consists of the following steps:

1) The solvent is drawn into the syringe pump.
2) The syringe pump ejects the solvent into the waste.

While the system purge process is running, all input fields and buttons on main menu are inactive except the “Stop” button (see Figure 29 and Figure 30).

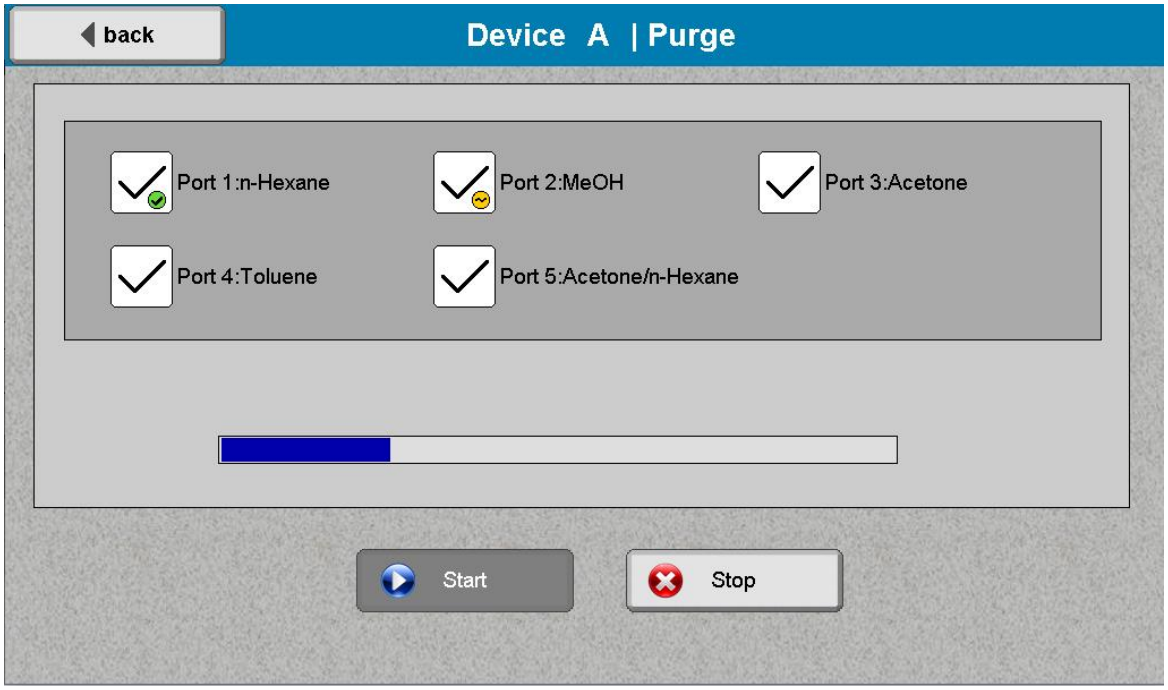


Figure 29: Active system purge.

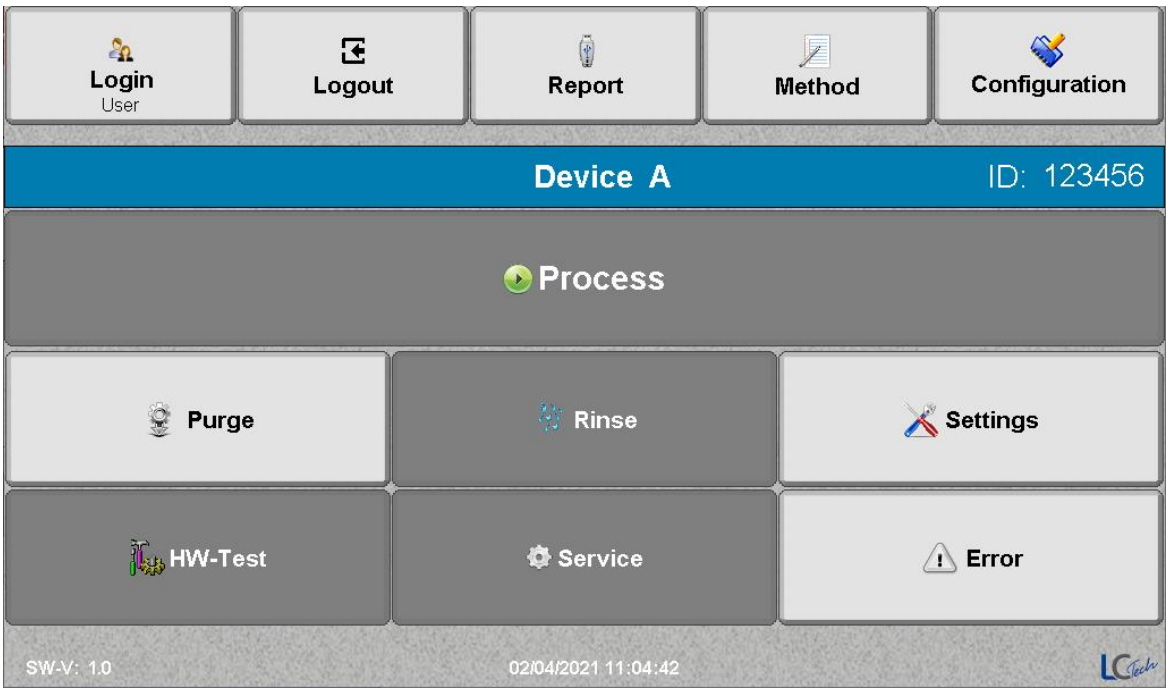


Figure 30: Locked buttons on main menu.

The process can be interrupted by pressing the “Stop” button at any time (Figure 31).

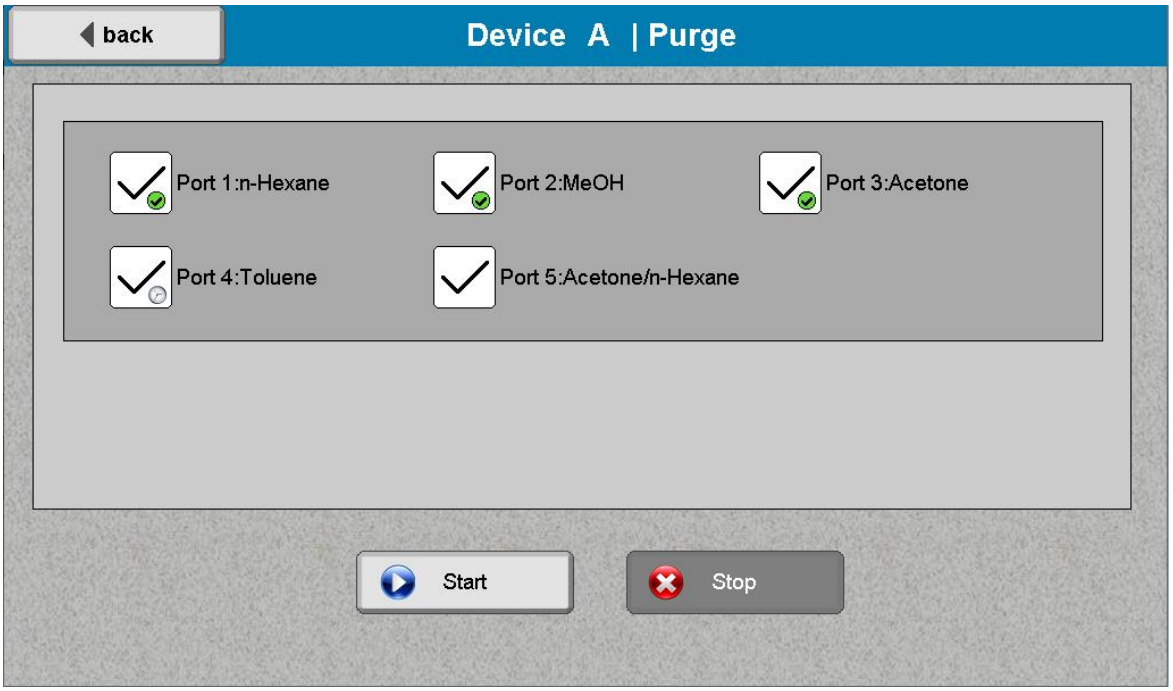


Figure 31: Stopped purge process.

After the purging process, as illustrated in the figure below, the solvent line should be completely filled with solvent. If air remains in the line, the process must be repeated.

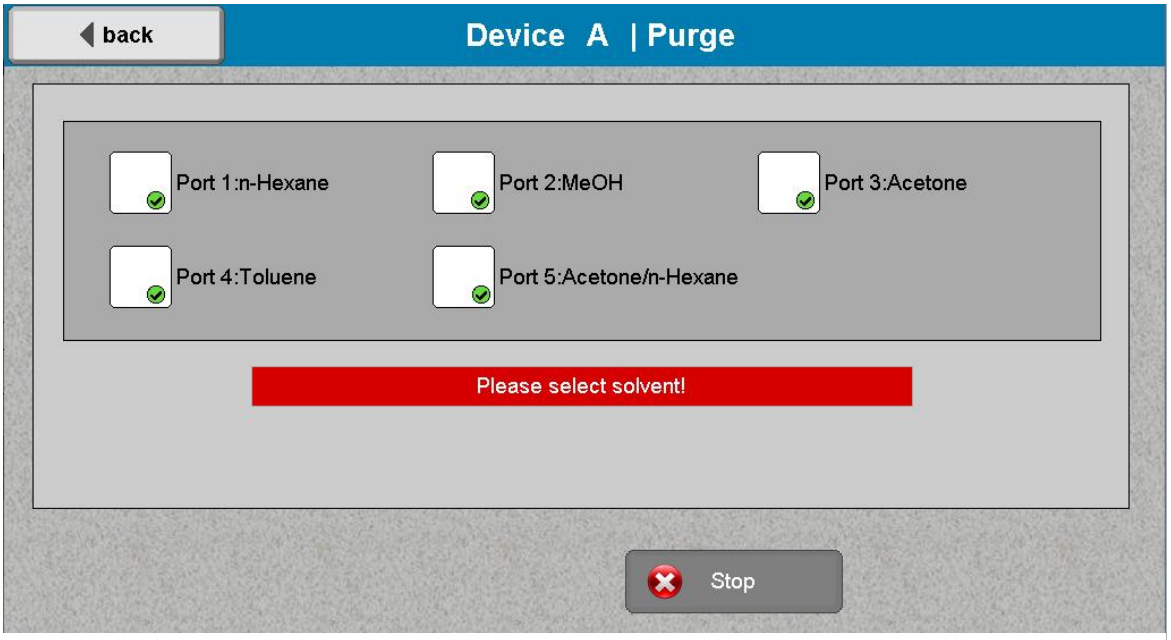


Figure 32: Completed purge process.

If an error occurs during venting, the system will be immediately stopped and put into pause mode. The triggering fault is then displayed in a separate window.

Possible error messages during venting:

- Overpressure SP (page 110)
- Error Init SP (page 110)
- Error initialization SP (page 111)
- Error SP Valve overload (page 111)
- Error SP plunger move (page 112)
- Timeout SP (page 112)
- Positioning valve (page 116)

5.7. Process

To prepare processing, various steps need to be undertaken, including insertion of the cell into the tower, selection of the desired method etc. Each step will be explained in the following chapters.

5.7.1 Select Method

The first step in starting the extraction of a new sample is to select a stored method. You can choose any stored method on the system. Select a method by pressing the name of the method (a green bar with the method name appears). Afterwards, press the “OK” button to go to the next step (see Figure 33).

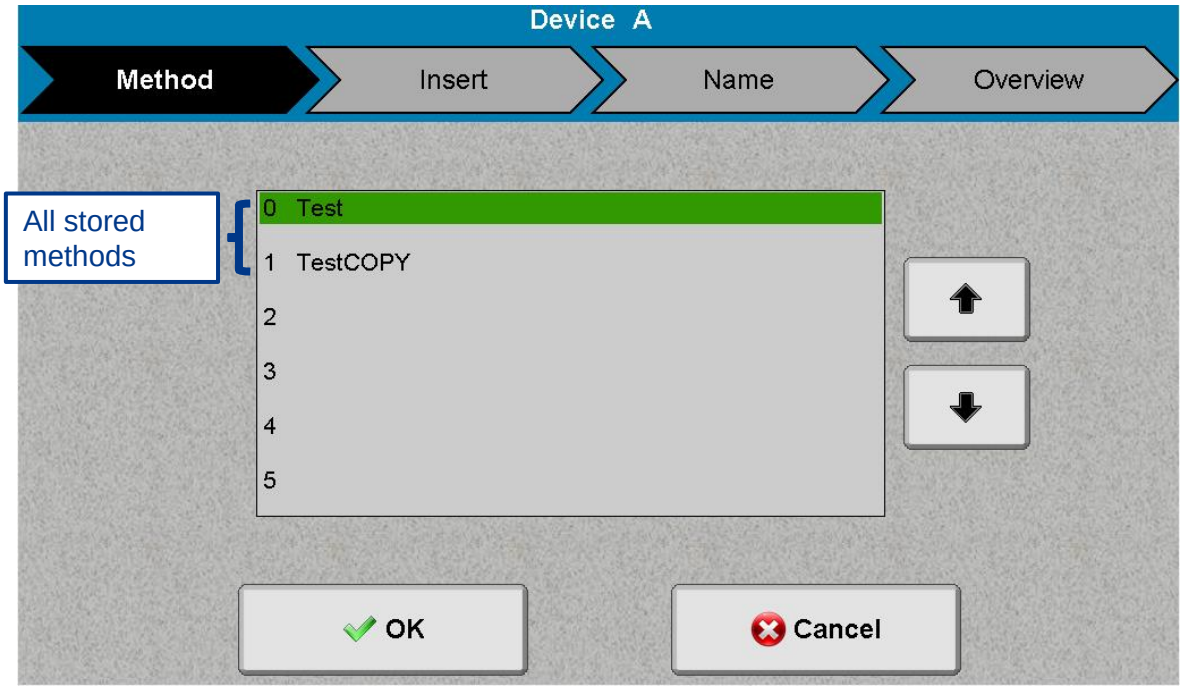


Figure 33: Method selection.

NOTE: A method is only selected if its name has a green background (see Figure 33).

5.7.2 Insertion of Cell into Tower

The next step is to insert the 75 mL extraction cell (P/N: 19700) into the tower (see Figure 34).

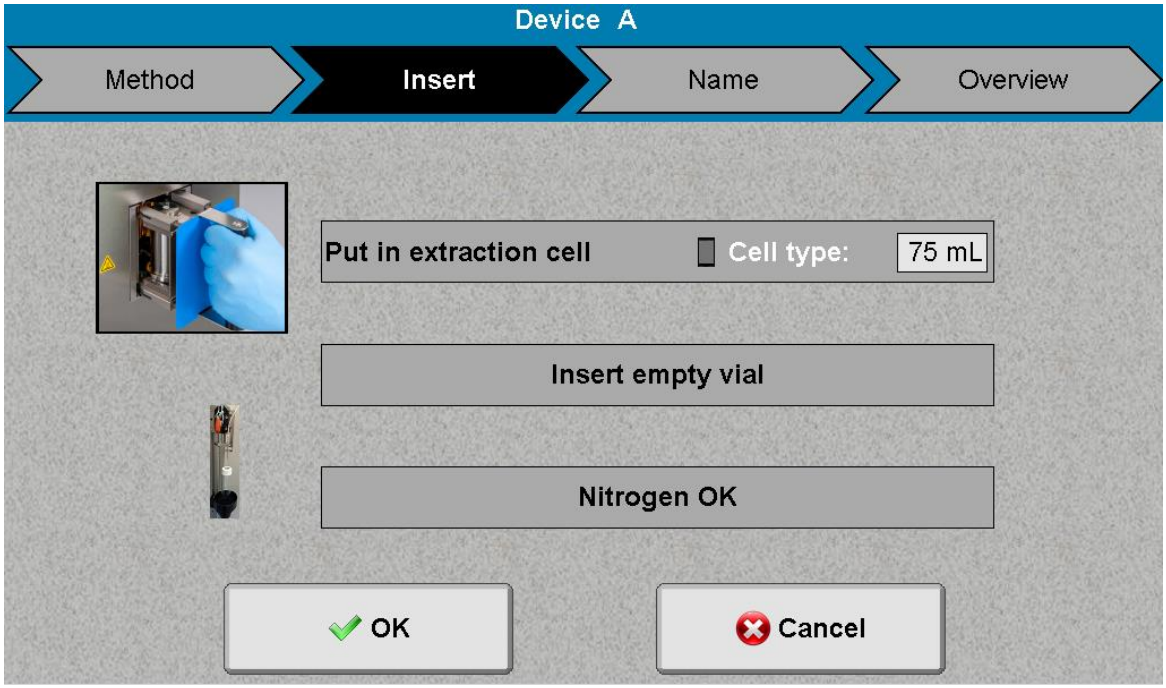


Figure 34: Preparation of the process. Insert cell, empty vial and check nitrogen.

Insert the filled extraction cell into the cell holder. To fill the cell see chapter 7.1. For insertion, it is important that the extraction cell is fitted in its correct place within the cell holder (clicked in, see Figure 35, left). You will hear a clicking sound when the extraction cell is inserted correctly in the cell holder (see chapter 7.2). Thereafter, insert cell holder, equipped with an extraction cell, into heating bar compartment (see chapter 7.3). Here you will hear a clicking sound when the cell holder is inserted correctly. This should look as per Figure 35, right. If not inserted correctly, the system will not close properly. The cell tower is opened and closed automatically via the software.

Figure 35: Left: cell with cell holder; middle and right: insertion of cell holder into heating bar compartment.

ATTENTION: Never put your hand in moving mechanical parts or in gaps intended for mechanical movements!

Afterwards, as seen in Figure 36, provide a proper collection vial for the extract, as defined in your method in the vial holder of the extraction system.

Please choose the volume of the collection vial according to the parameters in your extraction method (see Figure 19). To choose the right vial, add the volumes of “Fill (top)”, “Fill (bottom)” and “Rinsing” and multiply with the number of chosen cycles.

The default vial holder is compatible with 60 mL vials (P/N: F060) and 250 mL vials (P/N: F250).

After providing the right vial in the vial holder, please push down the needle compartment while pulling out the button on the side of the vial holder (see Figure 36, left), until the position is nearest to the septum (see Figure 36, middle). Then move the red lever to the down position to push the needles through the septum of the vial (see Figure 36, right). Please ensure that both needles (one for the extract, one for venting) have pierced the septum.

To remove the vial once the process is finished, move the red lever to the upward position and push up the needle compartment while pulling out the button on the right side of the vial holder, until the position is high enough to remove the vial.

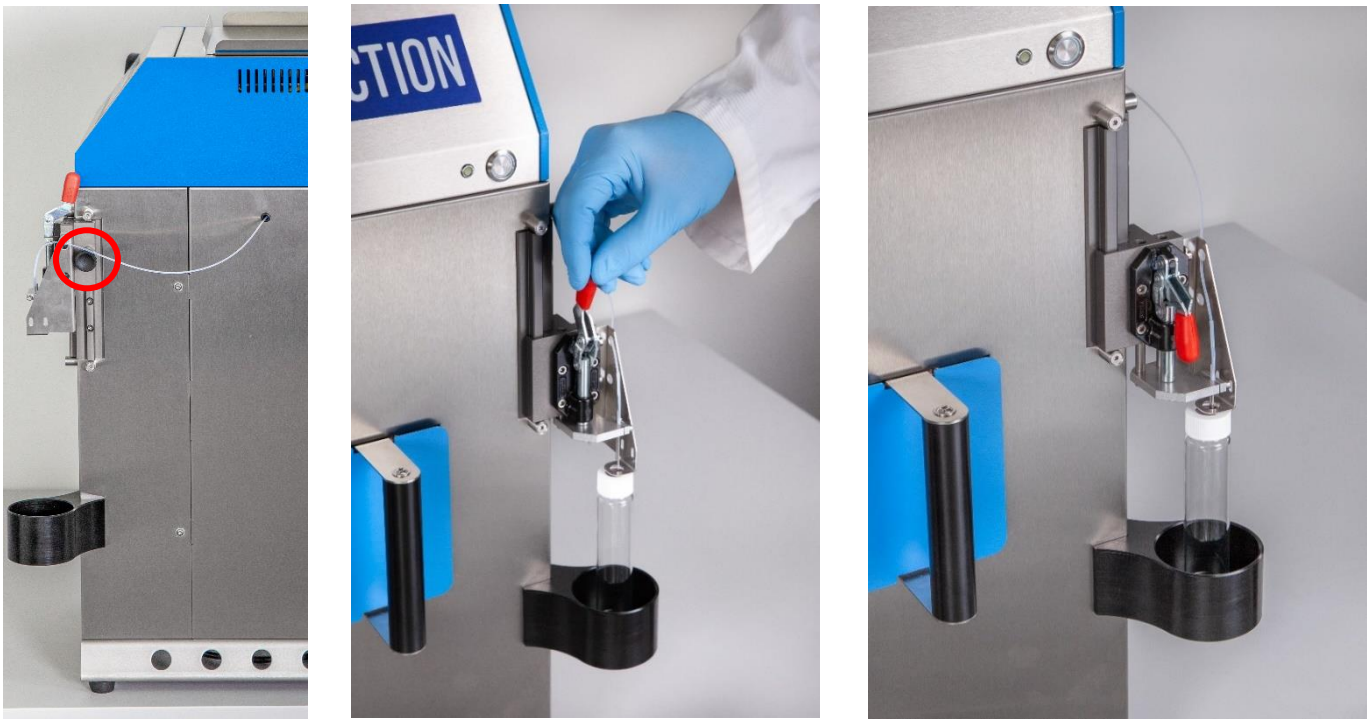


Figure 36: Vial holder.

ATTENTION: Sharp elements. Please do not touch the needles. Always leave the red lever in the upwards position when the vial holder is not equipped with vial to prevent injuries.

Afterwards, please check nitrogen supply.

5.7.3 Sample Name and User

Optionally a sample name can be assigned here (without any special characters), otherwise each sample is marked with a sample ID in the system (Figure 37). Pressing the white box automatically opens an input screen in which the desired sample name can be entered. The currently logged in user is automatically entered as the user.

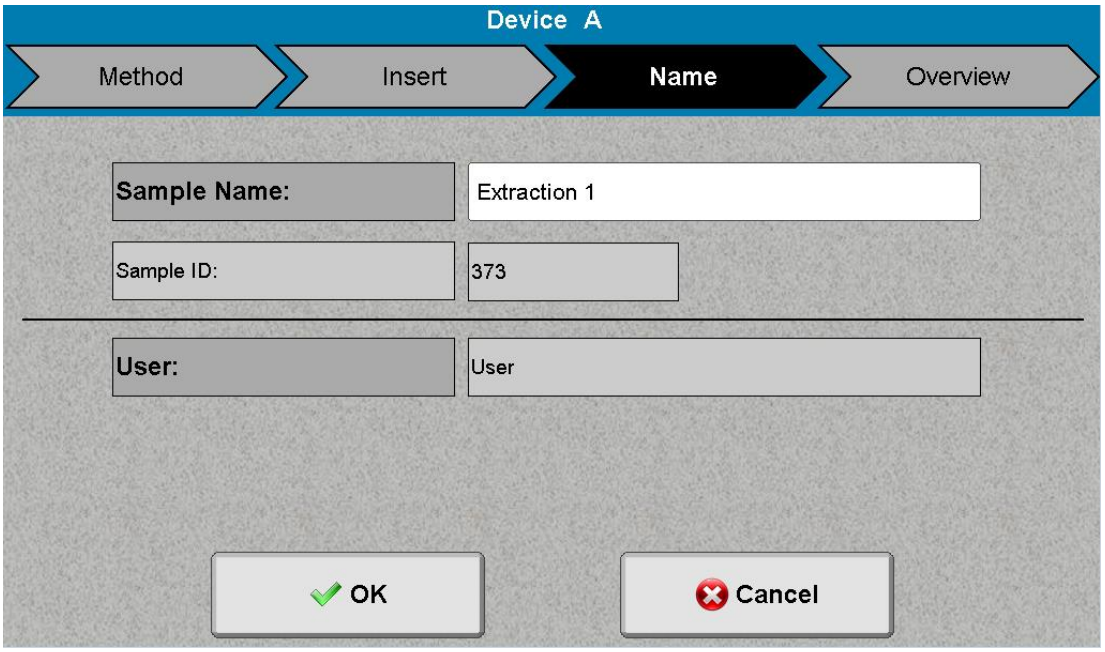


Figure 37: "Name" window.

5.7.4 Overview

The “Overview” window shows all important data (method, sample name, user, duration and cell type) of the sample (Figure 38). After the parameter check, the extraction can be started with the “Start” button.

INFORMATION: You can jump back to any earlier step by pressing the desired button (Figure 38) with the respective heading. To abort the process preparation, the “Cancel” button can also be activated in each window.

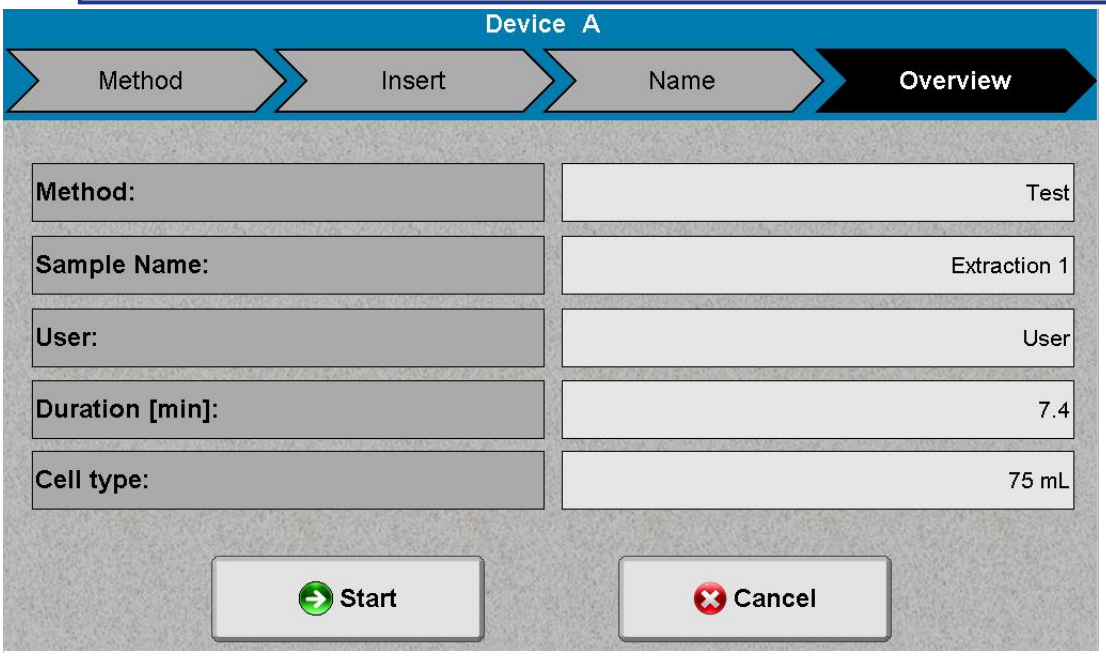


Figure 38: Overview.

5.7.5 Process

The progress of the method is monitored and visualized on the process screen (see Figure 37 with explanations):

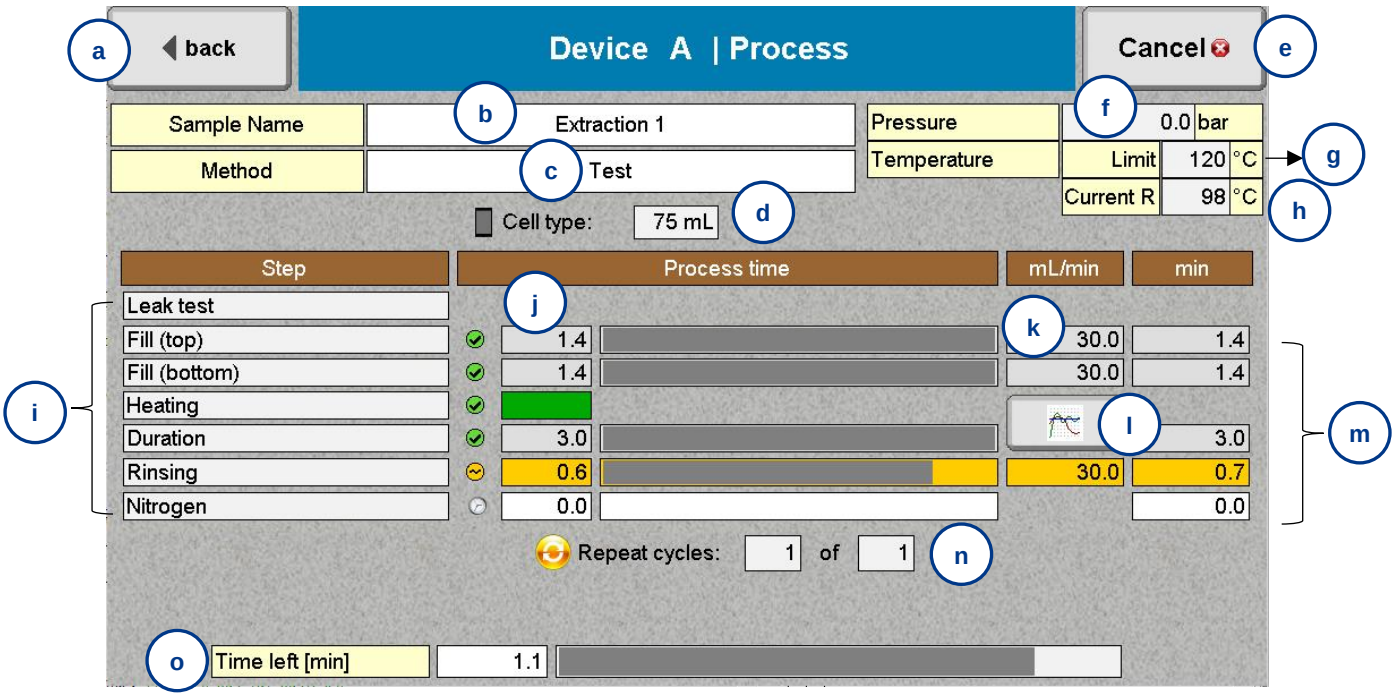


Figure 39: Process screen.

(a) Back
Go back to main menu during processing.

(b) Name of sample

(c) Name of method

(d) Cell type

(e) Cancel
Abort session.

(f) Pressure monitoring
Display of current system pressure.

(g) Temperature limit
Shows temperature limit of the system.

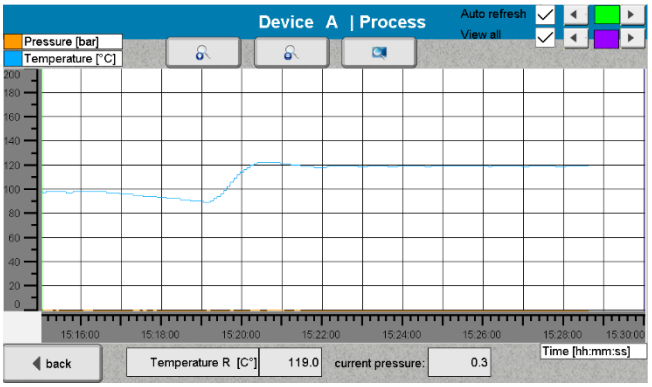
(h) Temperature monitoring
Display of current temperature of the system. Heater bar left (L) and right (R).

(i) Method steps
List of all method steps.

(j) Current time

(k) Flow rate
Value of the selected method.

(l) Show heating and pressure diagram



(m) Adjust time

Calculated time of the selected method.

(n) Repeat cycle

Replay all steps.

(o) Time left

The amount of time left to reach processing end.

Status display: Announcement of current state of the process segment.

	Wait
	Processing
	Finish
	Error
	Inactive

Colour coding of the progress bar:

Non-activated step

Already processed step

Current processing step (the grey bar defines the real time progress)

5.7.6 Incidents during Processing

I. Back

During the process, it is possible to return to the main window at any time in order to check on the current status/overview of other devices. During the process the buttons: Purge, Rinse, HW-Test on the main window are locked (Figure 40).

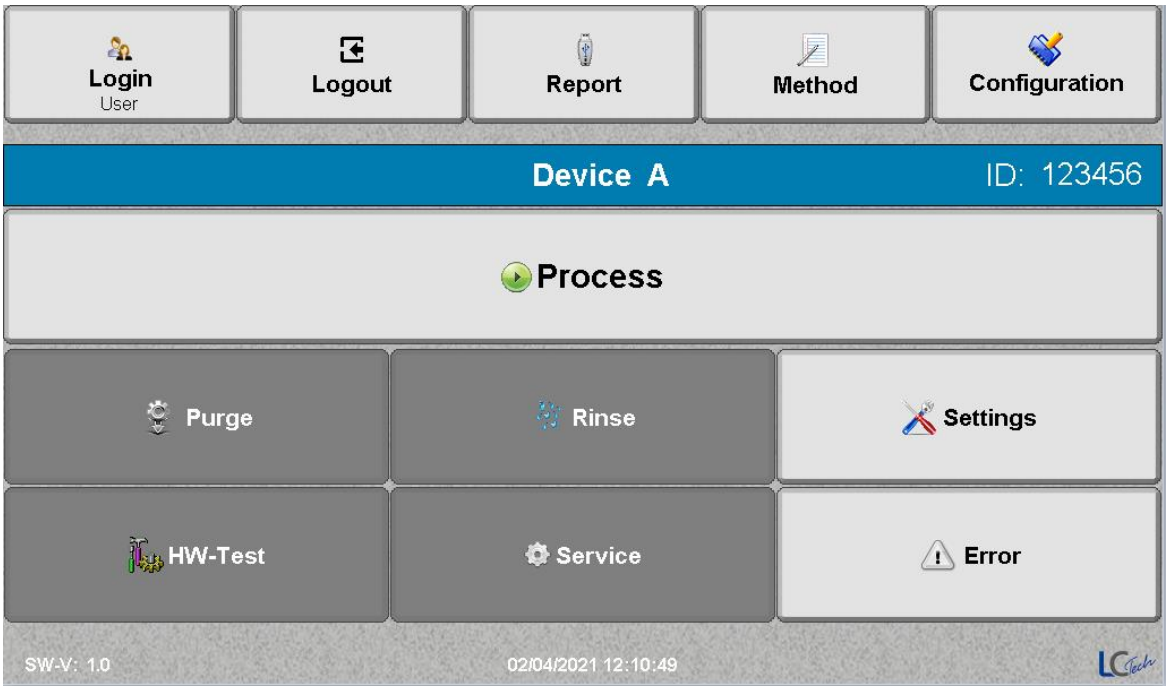


Figure 40: Locked main menu during the process.

II. Error

If an error occurs during the process, the system is immediately stopped and put into "Break" mode. The triggering error is displayed in the window indicating the current step and the interruption time. In addition, the current temperature and pressure of system are displayed.

For more information about error messages see Chapter 9 Troubleshooting/FAQ (Frequently Asked Questions).

III. Cancel

Select the "Cancel" button in the process window. Before the process is terminated, the user will be asked whether the process is to be cancelled (see Figure 41). Confirmation with “NO" will stop the sample and "YES" will return to the original process and the sample run will continue.

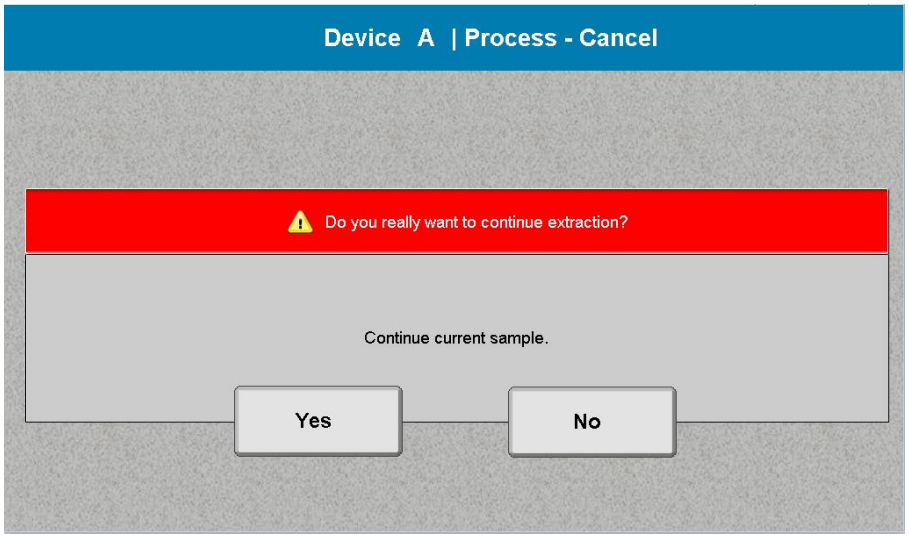


Figure 41: Query window for process cancellation.

NOTE: The process can only be resumed if the cell has not yet been filled with solvent. Otherwise only a process abort is possible.

After the process is terminated, automatic error management takes place. For more information see chapter 5.9 Error Management .

IV. Power Failure

After a power cut, a window will appear with the return of the power supply (Figure 42). The message depends on the step during which the interruption of the process happened.

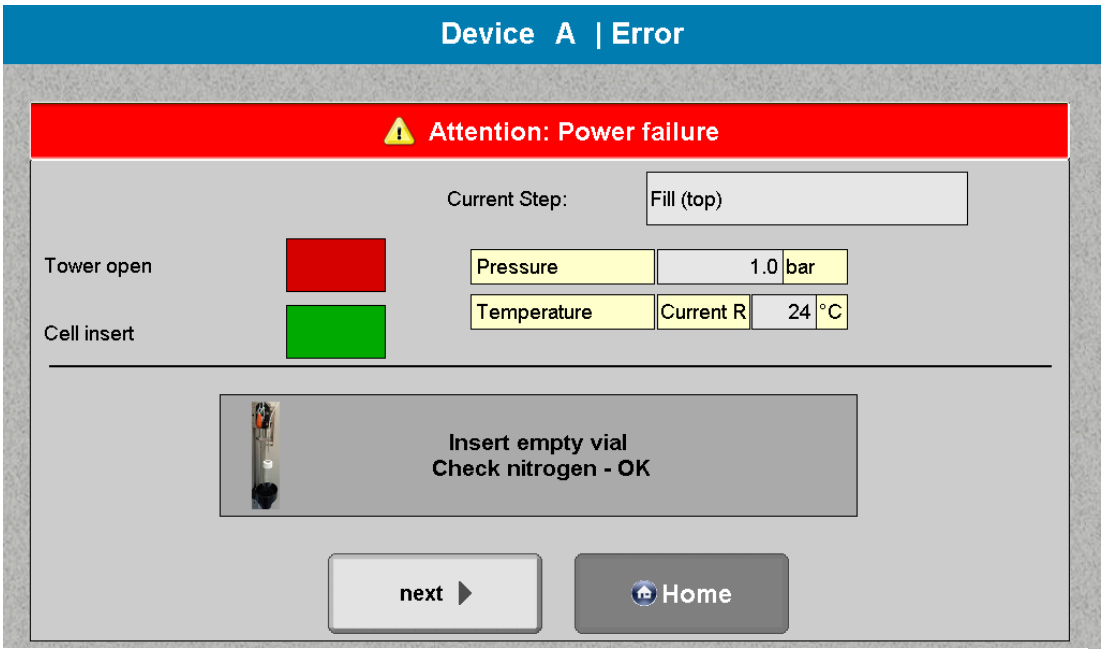


Figure 42: Restart window during extraction step fill top.

Generally, the process cannot be continued. The user must cancel the entire process. For more detailed information, please refer to Chapter 9.2.17 Power Failure .

V. Finished

When a sample is complete, the “Finished” window will appear (Figure 43) with the option to show a heating and pressure diagram. Confirm the window with “OK” and the system will proceed with the rinsing step (see Chapter 5.8).

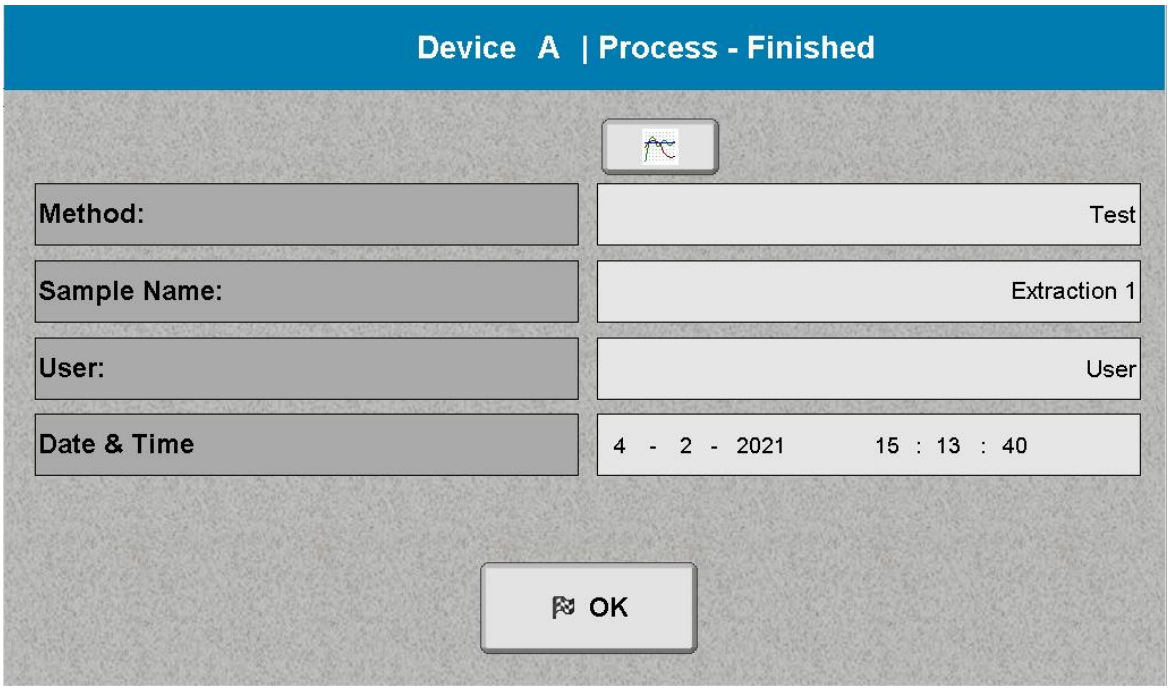


Figure 43: Finished screen.

The cell tower opens after pressing the “OK” button. Remove extraction cell and extract vial. For emptying cells see chapter 7.2 .

Safety note: When replacing the cell with a dummy cell, solvent may leak out in an uncontrolled manner. Please use hand and eye protection.

ATTENTION: Do not touch heating bars within the device after removing extraction cell as they may still be hot.

5.8. Rinse

This chapter explains the cleaning of the X-TRACTION system.

5.8.1 System

Every extraction process is automatically followed with a short rinse (Figure 44). This rinse is recommended but not mandatory. If no rinse is desired, just press “back” on the left upper corner of the window to return to the main menu. To reach the rinse window manually, select the “Rinse” button in the main window. The system rinses the whole fluidic path of a regular extraction process into an empty glass with final drying via nitrogen. There is the option to open the heater bar manually with the button “Heater bar – OPEN”.

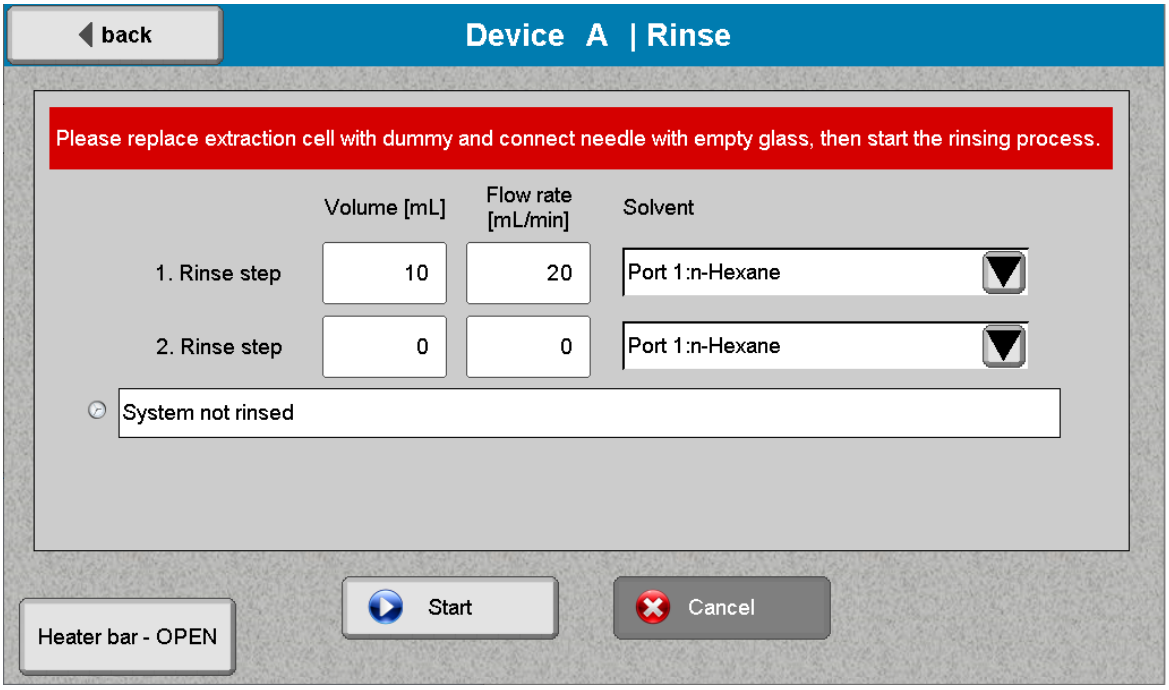


Figure 44: Rinse window.

Preparations for rinsing of the system:

For rinsing, the extraction cell needs to be replaced with a rinsing cell (see chapter 7.2 and Figure 45).

Place the rinsing cell (P/N: 19263) into the cell holder. Afterwards, insert the cell holder into heating bar compartment (see chapter 7.3). Otherwise the system will not close properly. The cell tower opens and closes automatically via software.

Figure 45: Left: cell with cell holder; middle and right: insertion of cell holder into heating bar compartment.

Safety note: When replacing cell with rinsing cell, drops may leak out on the bottom end. Please use hand and eye protection.

Enter flow rate, volume and solvent to rinse the system. Connect needle with empty glass and check nitrogen.

The rinsing process is launched by clicking "Start" (Figure 46) and begins with closing the cell tower.

ATTENTION: Never put your hand in moving mechanical parts or in gaps intended for mechanical movements!

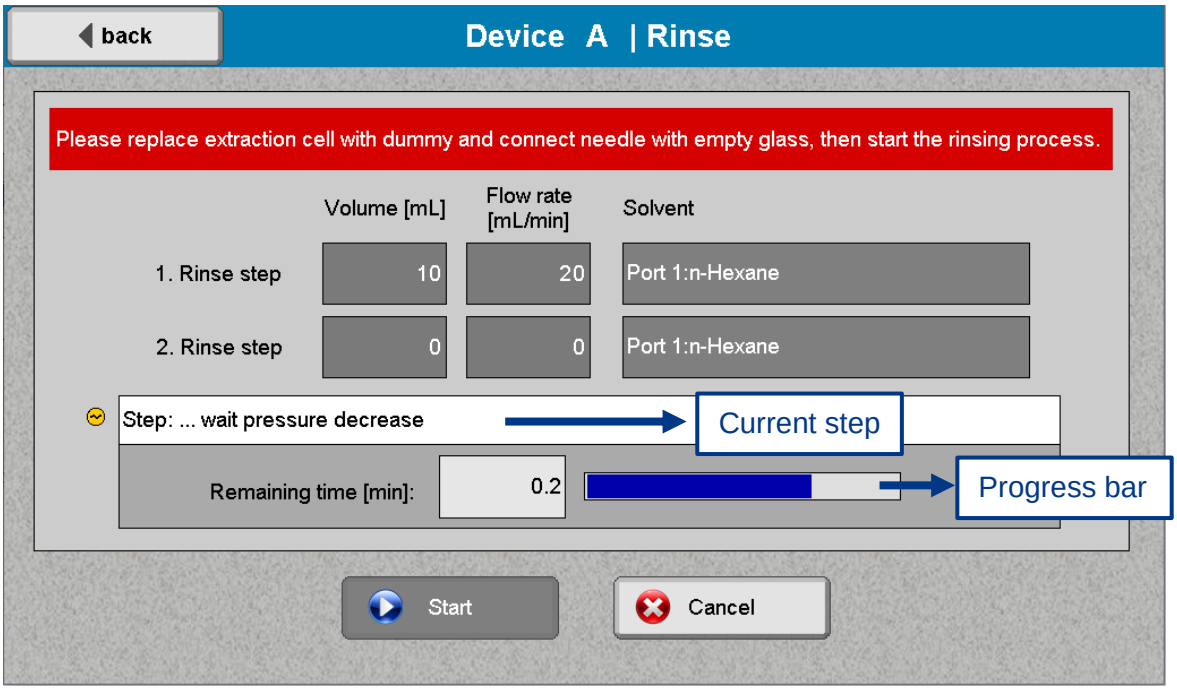


Figure 46: Active rinse window.

While the system rinse process is running, all input fields and buttons on the main menu are inactive except the “Cancel” button (see Figure 46, Figure 47). If necessary, the process can be interrupted by pressing the “Cancel” button.

Legend:

	Wait
	Processing
	Finish
	Error
	Inactive

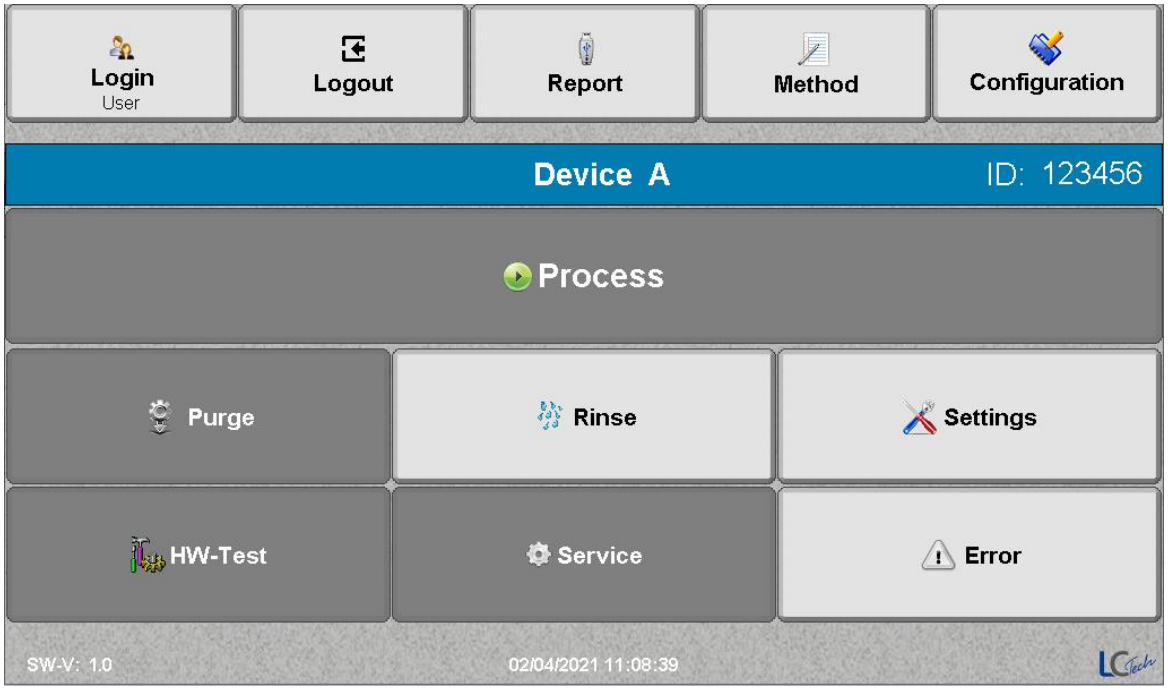


Figure 47: Locked buttons on main menu.

The completed rinse process is illustrated in Figure 46 below. Remove dummy cell and waste vial.

Disposal
Please observe local regulations for collection and disposal of laboratory waste.

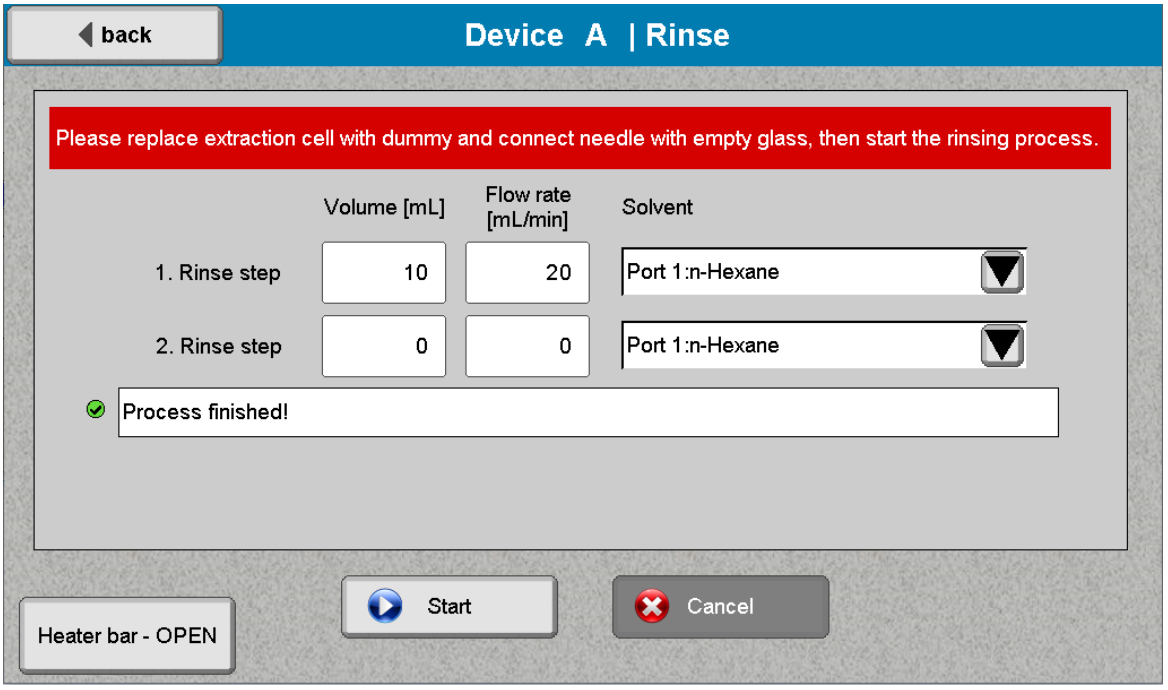


Figure 48: Completed rinse process.

If an error occurs during the rinsing process, the system will be stopped immediately and put into pause mode. The triggering fault is then displayed in the rinsing window.

Possible error messages during rinsing:

- Overpressure (page 103)
- No cell insert (page 104)
- Error tower > Position (page 105)
- Error tower < Position (page 107)
- Error motor tower (page 108)
- Error motor valve (page 108)
- Overpressure SP (page 110)
- Error Init SP (page 110)
- Error initialization SP (page 111)
- Error SP valve overload (page 111)
- Error SP plunger move (page 112)
- Timeout SP (page 112)
- Positioning valve (page 116)

5.8.2 Needle

After the rinsing process (see Chapter 5.8.1) is complete, the exterior cleaning of the two needles is recommended as the automatic rinsing just covers the inside of the needle.

Please remove the vial from the automatic rinse first.
Move the red lever to the down position in order to reach the needles.
To clean the outside of the needles, a damp, lint-free cloth can be used. Clean the needles with drops of acetone.
After the cleaning is finished, move the red lever back to the upwards position.

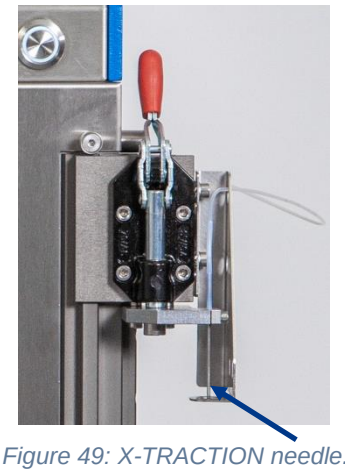


Figure 49: X-TRACTION needle.

ATTENTION: Sharp elements. Please be careful while cleaning the needles. To prevent injuries, always leave the red lever in the upwards position when cleaning is finished.

5.8.3 Overpressure Line

If overpressure occurs during the process (see Chapter 9.2.1) a manual cleaning of the pressure relief valve (see Chapter 3.3) is recommended.

To remove the pressure relief valve, please carefully remove the two 1/16“ SST-capillaries that are connected to the pressure relief valve with a fitting wrench (see Figure 50).

Figure 50: 1/16“ SST-capillaries.

Then, remove the 1/8“ PTFE tube by hand (see Figure 51).

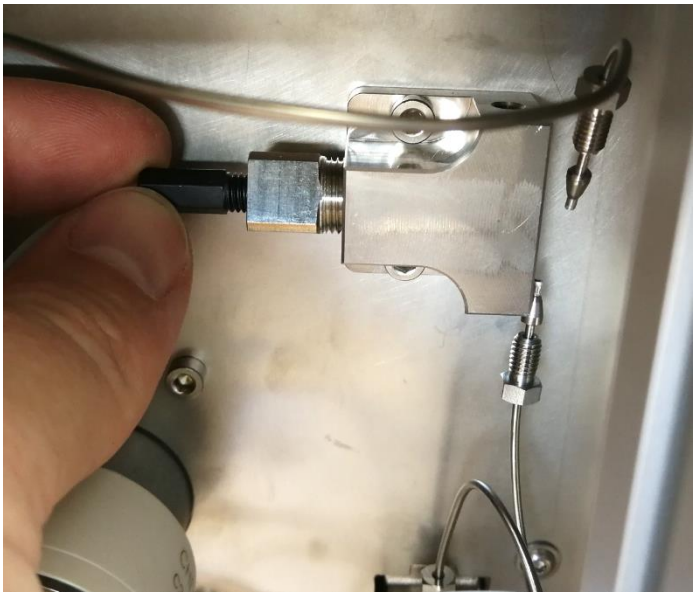


Figure 51: 1/8“ PTFE tube.

Then, open the two screws that attach the pressure relief valve to the housing with an Allen key (see Figure 52).

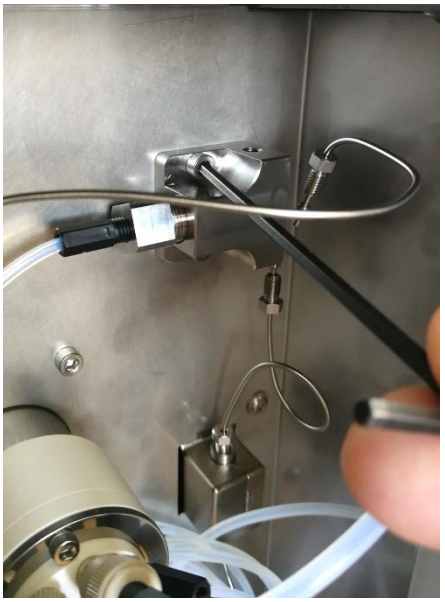


Figure 52: Housing screws.

Now, open the square closure of the pressure relief valve (see Figure 53).

Figure 53: Overpressure cartridge.

Remove the cartridge on the inside of the pressure relief valve and place it in a beaker glass filled with solvent (e.g. acetone) and/or place it in an ultrasonic bath. If desired, the housing of the pressure relief valve may be cleaned in the same way.

Allow the pieces to dry under a fume hood. When completely dry, reassemble the pieces and mount the pressure relief valve back to its original place.

NOTE: Please do not overtighten the 1/16“ SST capillaries of the pressure relief valve when reconnecting them.
Please do not use a tool to reconnect the 1/8“ PTFE tube to the pressure relief valve.

5.9. Error Management

If the process or the system rinse process is aborted while processing/rinsing is active, an error management window automatically appears, see Figure 52 below.

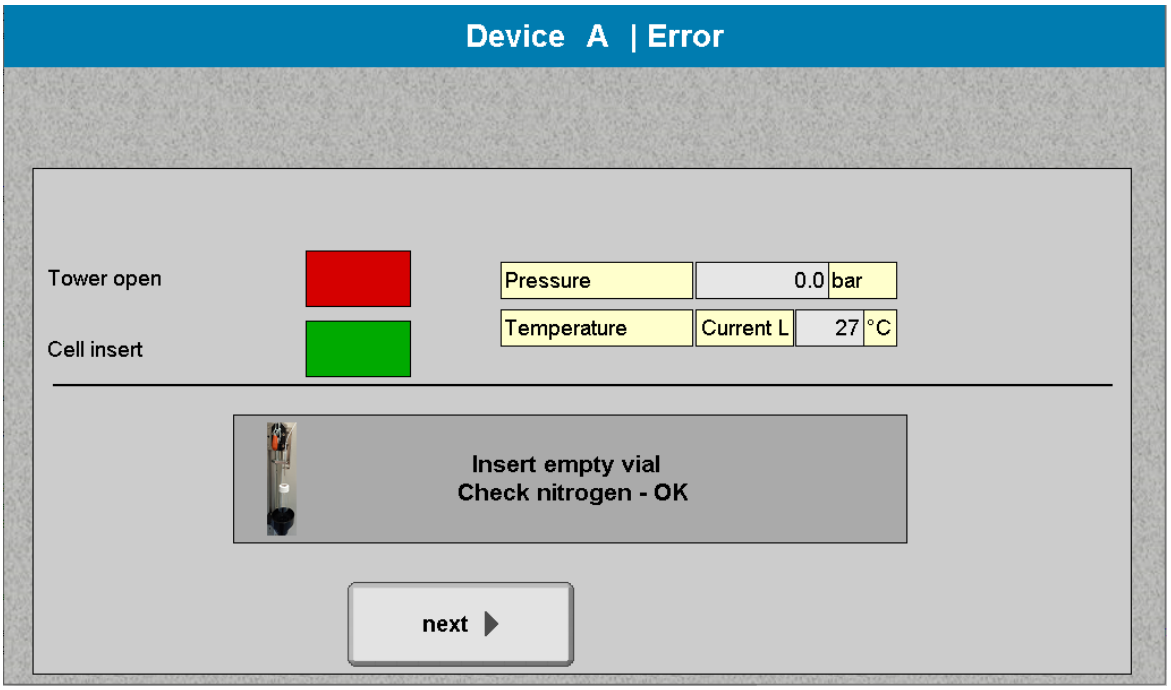


Figure 54: Error management.

Legend:

Tower  	Tower open Tower closed
Cell  	Cell inserted Cell not inserted

When pressing the “next” button, the system checks current temperature and if necessary cools down extraction cell, checks current pressure, empties cell with nitrogen and displays manual cleaning hint of tubing and opens cell tower (Figure 55). Only if the temperature and pressure are below the safety parameters, it is possible to select the “OK” button and to remove the extraction cell safely.

Safety note: In case of a clogged line, there can be no nitrogen drying. As such, after removing the cell, solvent may leak out of the bottom end of the cell. Please use hand and eye protection.

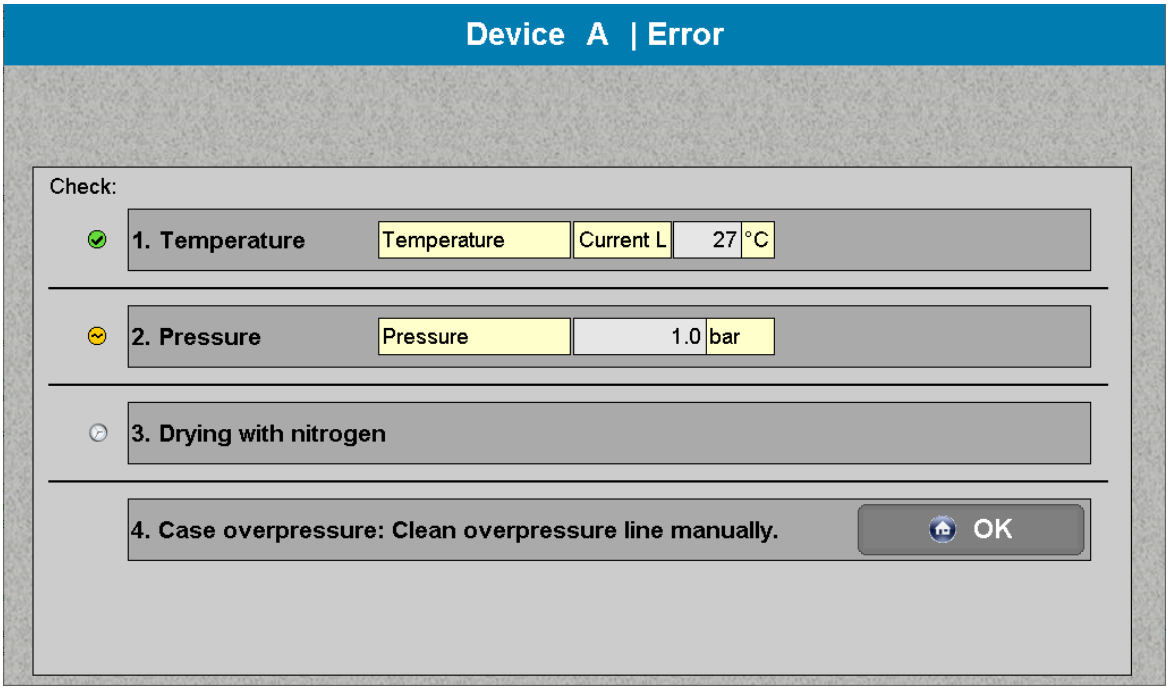


Figure 55: Error management active.

Legend:

	Wait
	Processing
	Complete
	Inactive

Confirm with “OK” and the system will proceed with the rinsing step (see Chapter 5.8).

Safety note: When replacing the cell with a dummy cell, solvent may leak out in an uncontrolled manner. Please use hand and eye protection.

ATTENTION: Do not touch heating bars within the device after removing the extraction cell, as they still could be hot.

5.10. Combine Mode

To operate devices simultaneously, the devices must be combined via “Configuration” (Figure 56). The solvents should be entered correctly in the solvent lines to the syringe pump, as well as in the software for each device. For the solvent selection in the software, the solvent from the basic device (Device A) is displayed in the combination mode.

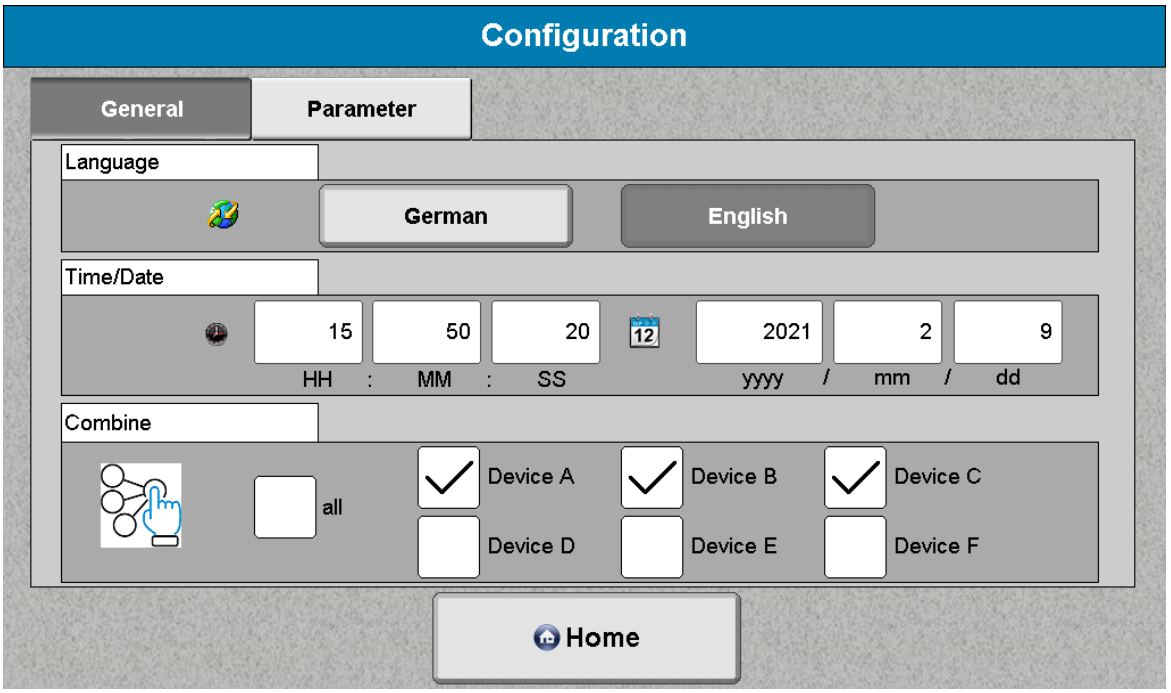


Figure 56: Combine device A, B and C.

NOTE: If the combined devices have not configured the same solvents, the following notice appears. The notice appears until the solvents match.

Figure 57: Hint solvent control.

The combination mode is now activated in the main menu and can be recognized by the chain symbol .

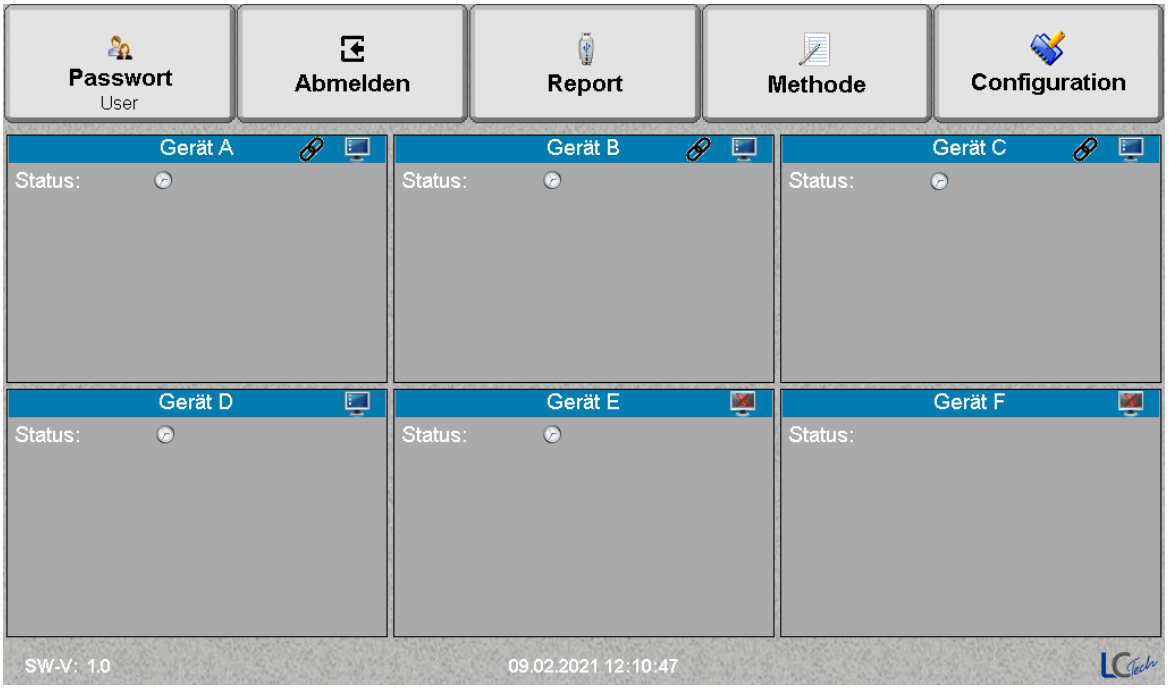


Figure 58: Main menu with active combine mode.

Click on one of the chain symbols to switch to the combination mode. A submenu (Figure 59) appears with the option of starting the process, or purging or rinsing.

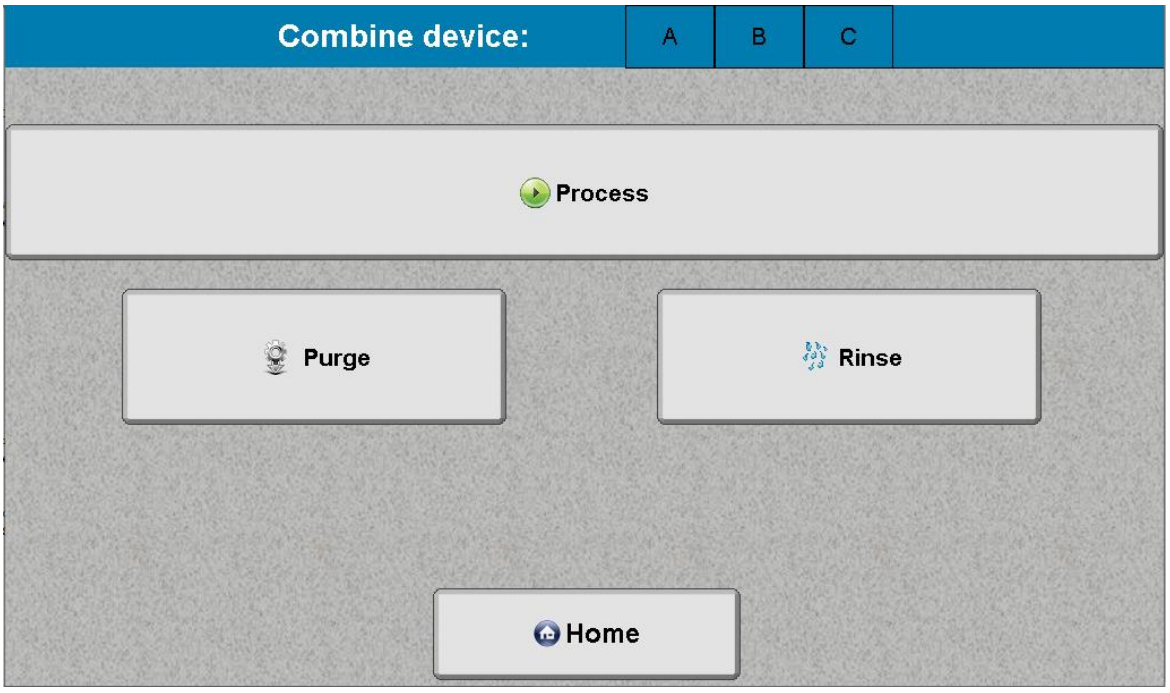
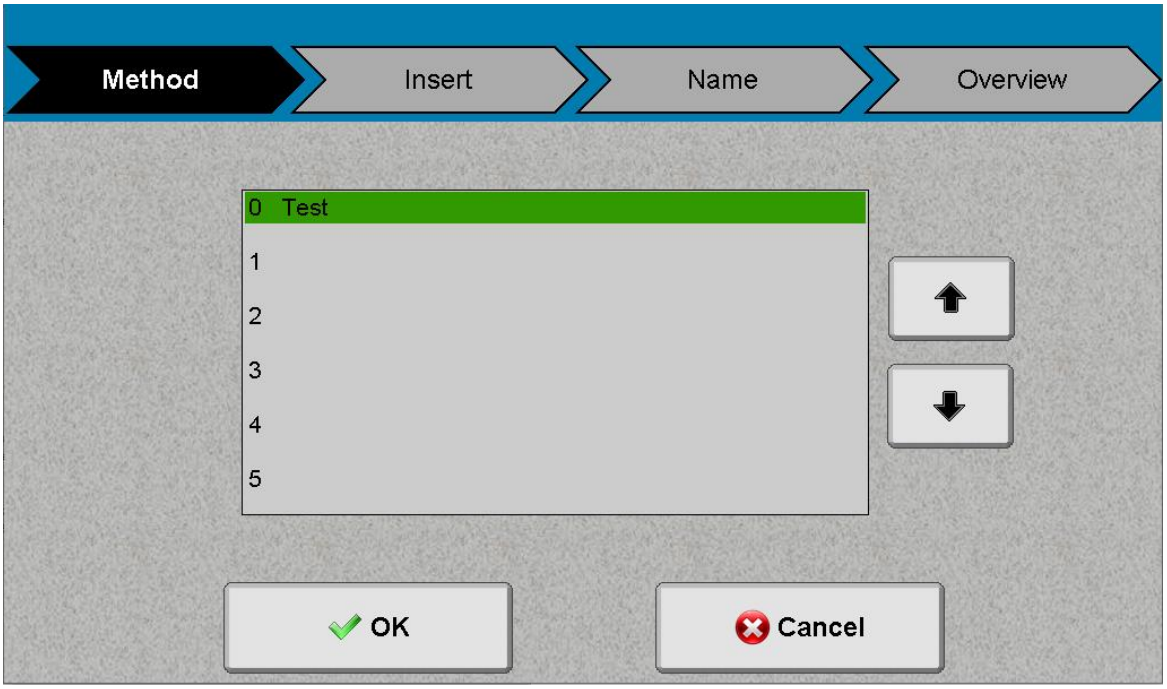


Figure 59: Combine menu.

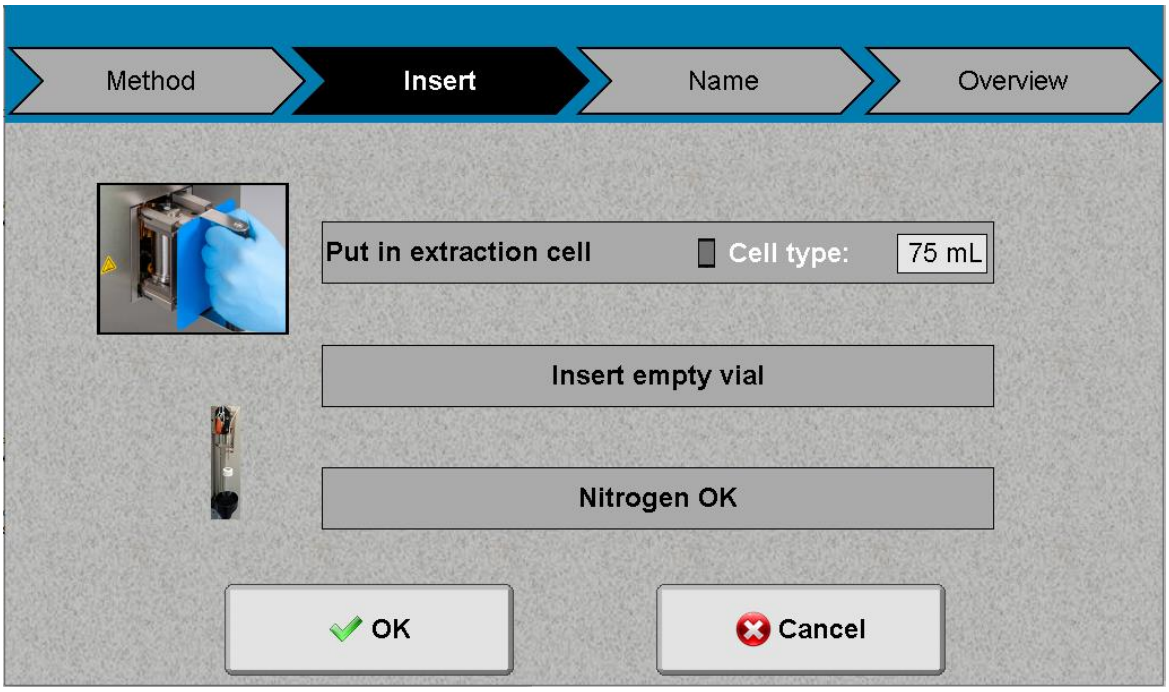
5.10.1 Process

In combination mode, process preparation must also take place as with a single process. This includes the following steps:

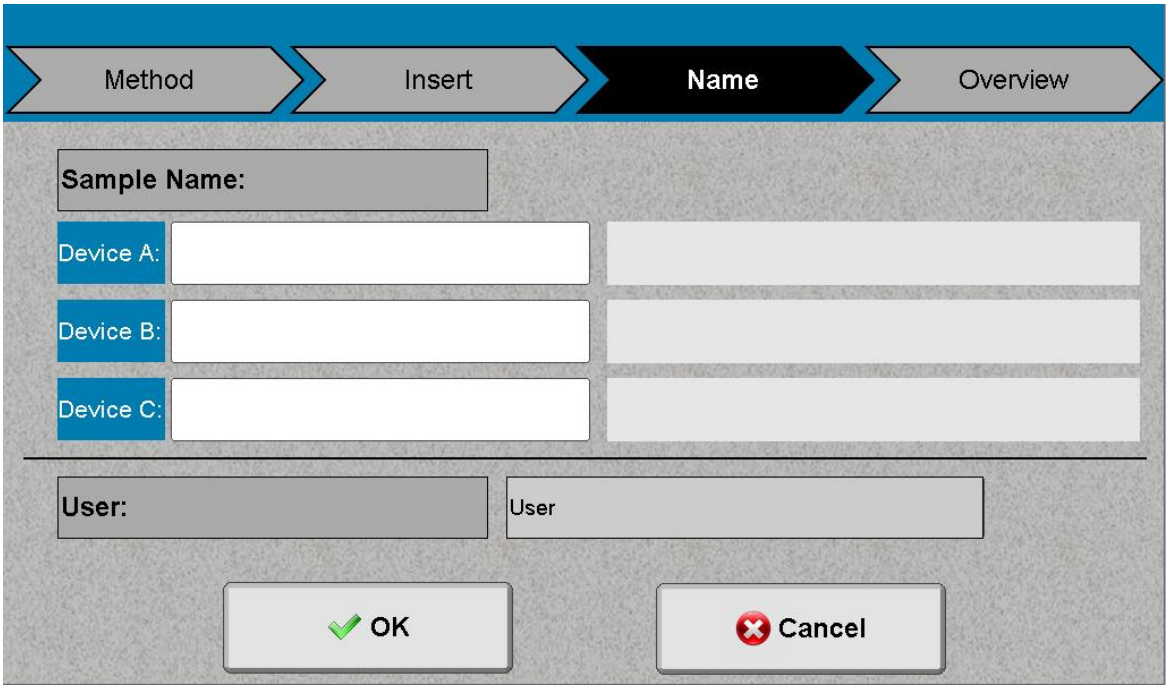
I. Select “Method” for all devices. For more information see chapter 5.7.1.



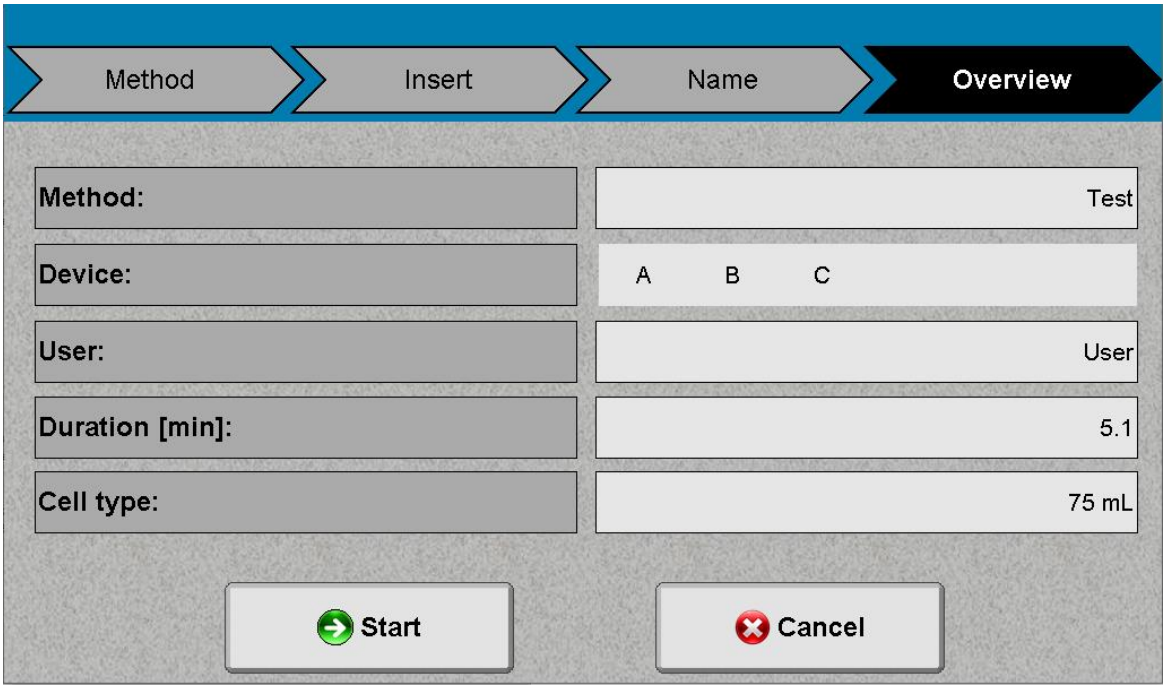
II. Preparation and insertion of the extraction cells into the towers. For more information see chapter 5.7.2.



III. Enter sample names and user. For more information see chapter 5.7.3.



IV. Overview. For more information see chapter 5.7.4.



After the parameter check, the parallel extractions for devices A, B and C can be started with the *"Start"* button.

5.10.2 Purge

Figure 60 displays simultaneous control of the purge of the solvent lines to the syringe pump with release into the waste.

INFORMATION: Control waste bottles of each combined device and if necessary, empty the waste bottles.

Disposal
Please observe local regulations for collection and disposal of laboratory waste.

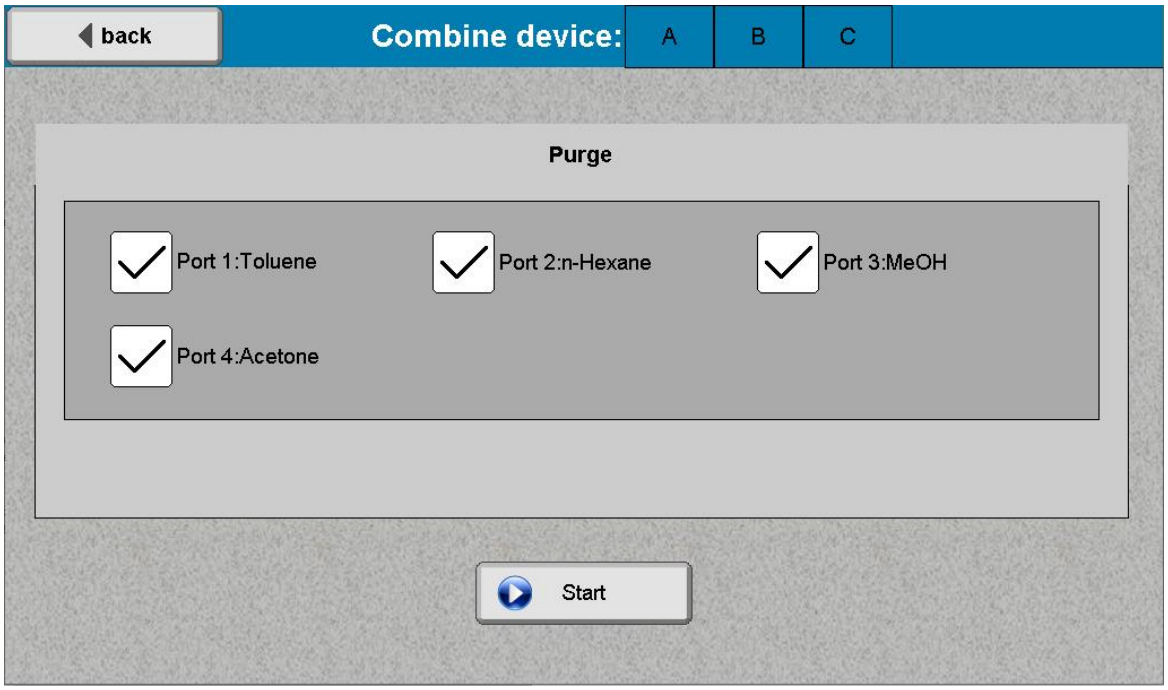


Figure 60: Combine window of purge.

To start the purge process, select the solvents and press the “Start” button. Thereafter, all combined devices start with the venting of the lines. For more information see chapter 5.6 Purge.

5.10.3 Rinse

The system rinses the fluidic path via dummy cell (including inner walls of the needle) into an empty glass and dries the fluidic path afterwards with nitrogen. For a parallel rinsing process (Figure 61), a dummy cell and a waste glass must be installed for each combined device.

Safety note: When replacing the cell with a dummy cell, solvent may leak out in an uncontrolled manner. Please use hand and eye protection.

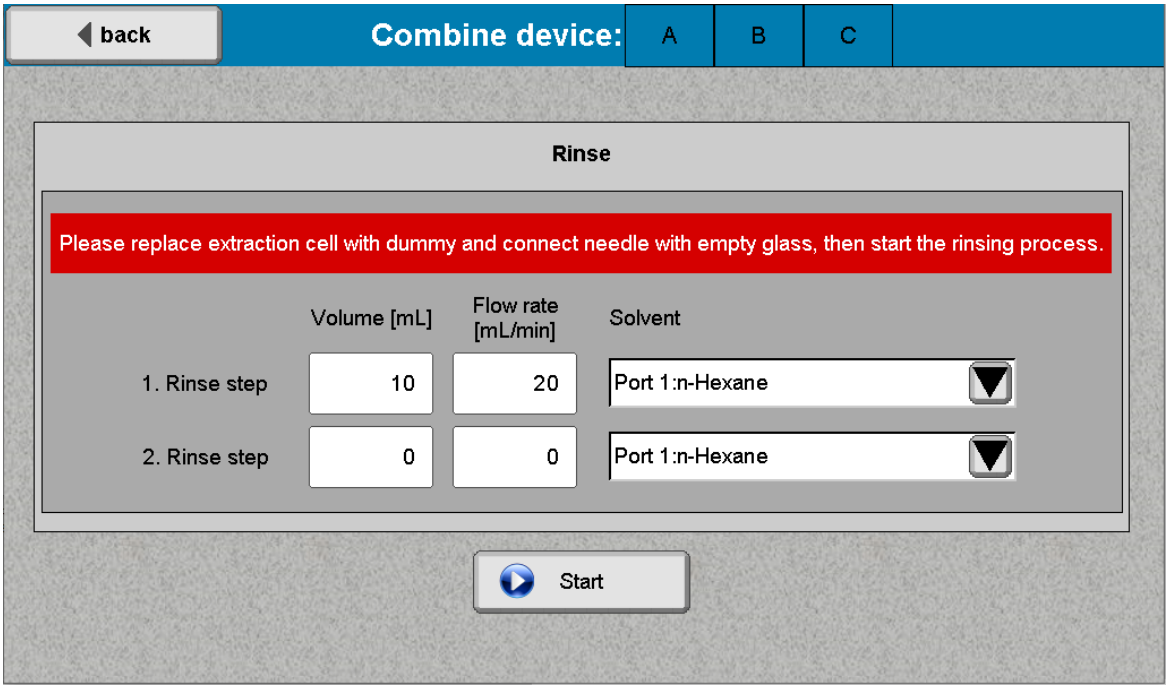


Figure 61: Combine menu rinse.

Enter the flow rate, volume and solvent to rinse the systems A, B, and C.

For more information see chapter 5.8.1 System.

6. Report

Transfer various data to a USB stick or import USB stick data into the X-TRACTION.

Successful data transfer onto a USB stick is only warranted for the use of a standard USB 2.0|3.0 stick. Only the USB stick supplied may be used for this purpose. To upload data, insert the USB stick in the USB port on the left-hand side of the unit (Figure 62).

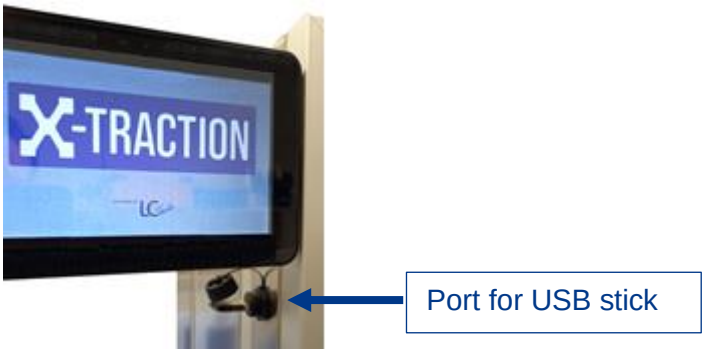


Figure 62: USB port on the X-TRACTION.

The “Report” button is located in the main menu (see Figure 63).

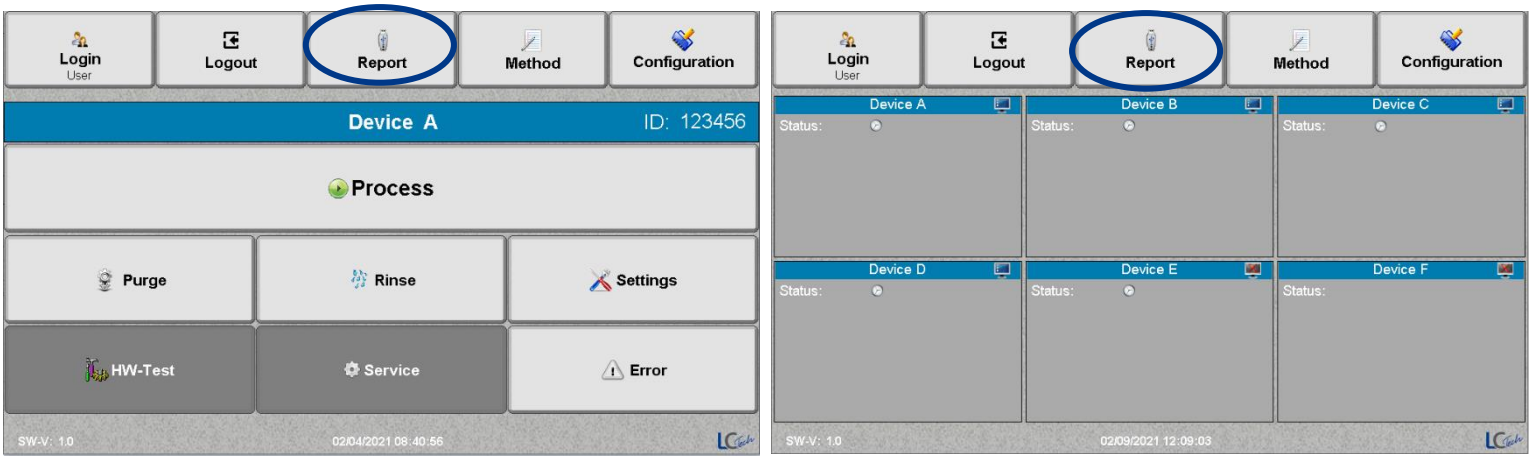


Figure 63: “Report” button on main screen.

Press the “Report” button on the main page. Once the USB stick is connected, a report page (see Figure 64) will appear.

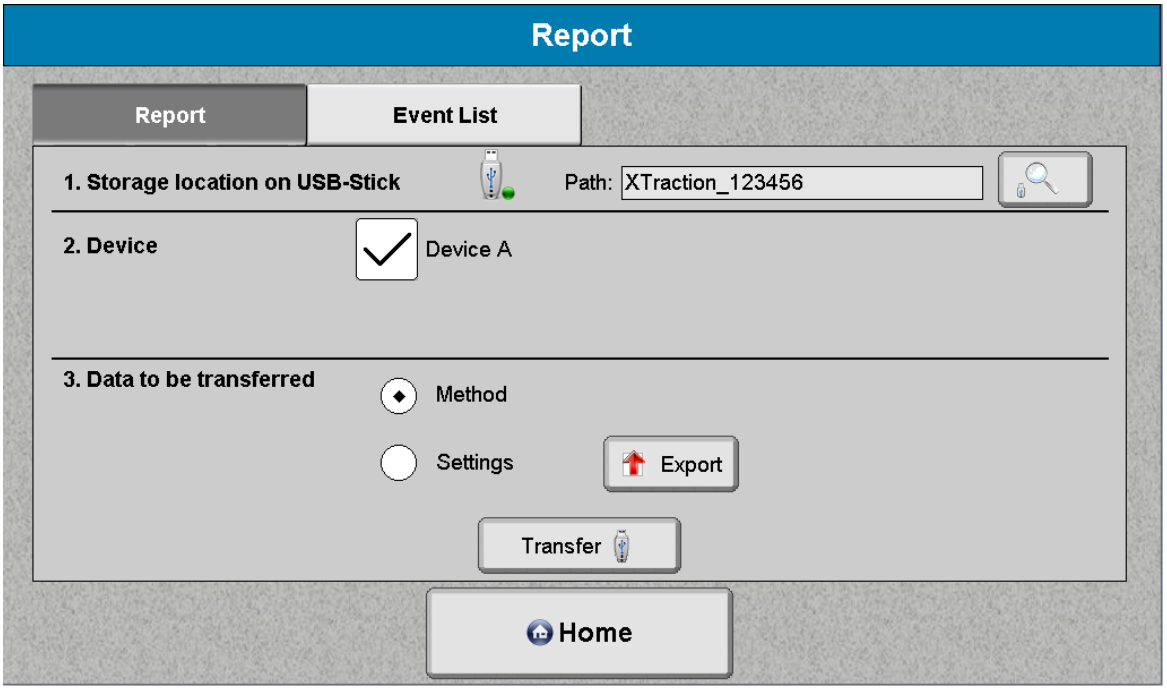


Figure 64: Report page.

From here, different data transfers (refer to Chapter 6.1 Method /6.1.3 Settings /6.3 Event List) can be initiated by clicking the button “Transfer”.

After pressing “Transfer”, a holding page will appear showing the progress of the data transfer (see Figure 65). This exchange can take quite a while depending on the chosen data transfer type and the amount of data.

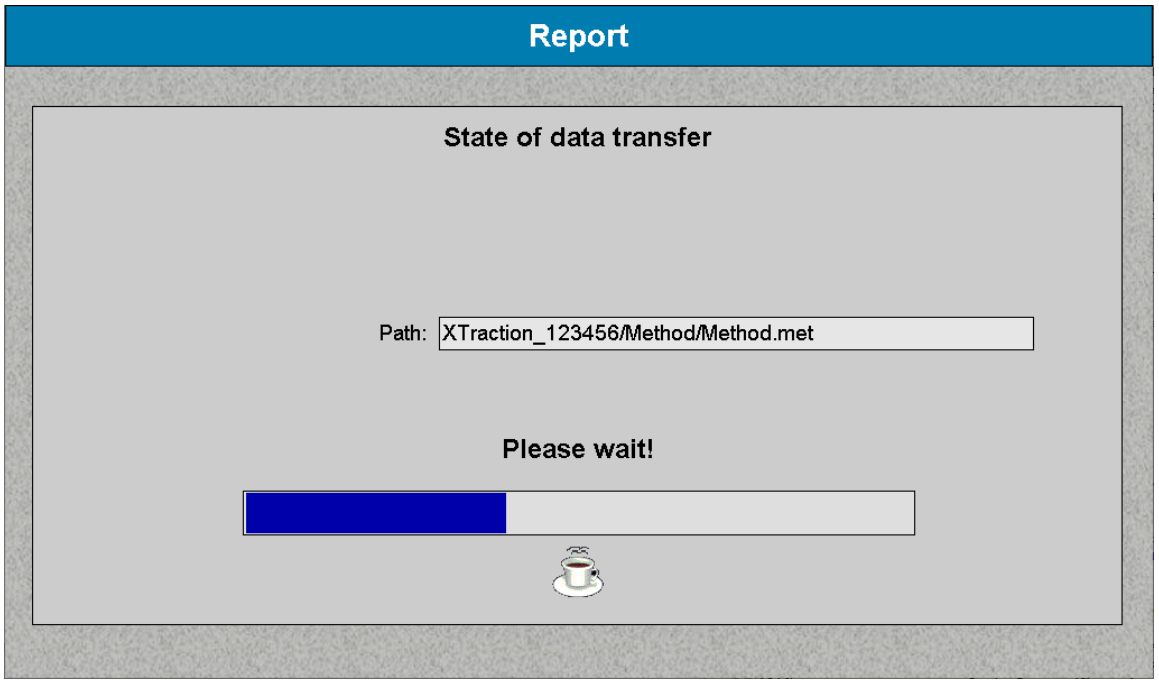


Figure 65: Progress of data transfer.

A screen message will confirm the successful completion of the data transfer (Figure 66). Click “OK”, and the USB stick may be removed from the device.

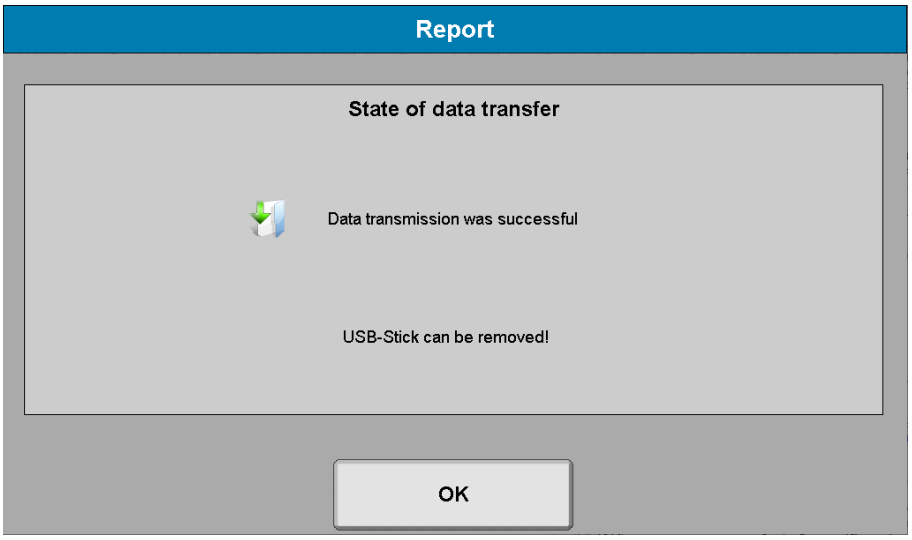


Figure 66: Completion of data transfer.

NOTE: If a USB stick is connected to the X-TRACTION and data transfer is activated in the software (button pressed), the USB stick may only be removed from the X-TRACTION when prompted (see Figure 66).

On the USB stick, you will now find a folder called "XTraction_" followed by the six digit serial number of the device (ID display on the main page of the standalone device – see Figure 8 or on the submenu of the expansion device – see Figure 10). In this automatically created folder is a new subfolder titled "Event_List"/”Method”/”Setting”, which contains a new file (depends on chosen data), see Figure 65 below.

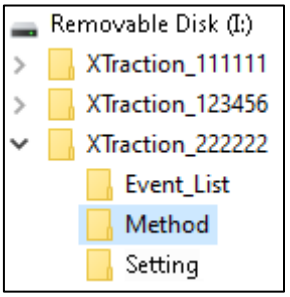
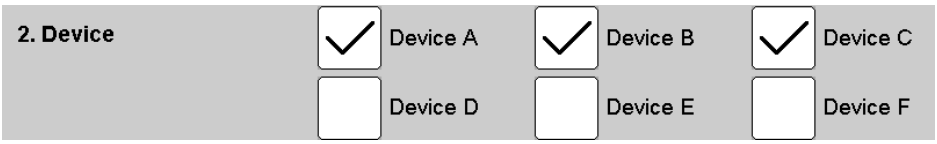


Figure 67: New folders on USB stick.

All future data transfers from this X-TRACTION device to the USB stick will be stored in the same folder (with the associated ID).

To transfer data from expansion device B-F, please choose desired device by setting checkmarks.



INFORMATION: A new folder with the corresponding six-digit serial number will be created on the USB stick for each of the devices.

6.1. Method

Uses to read all method data to a USB stick for two purposes:

i. Read out all method data before changing CF card (see Chapter 6.1.1) and to read in the data again after changing the CF card (see Chapter 6.1.3).

INFORMATION: A CF card exchange is only carried out by the service team.

ii. The method function creates reports of methods that have been saved on the X-TRACTION. The reports generated aid quality assurance in an analytical laboratory. For reporting, the data must be transferred from the device to a PC using a USB stick (the USB stick supplied may be used for this purpose; see section Chapter 6.1.1), for example. Following data transfer from a USB stick to the PC, report generation can be commenced on the PC (see Chapter 6.1.2).

6.1.1 Receiving Methods from the Device

Transmission of all device-independent stored methods (Figure 68).

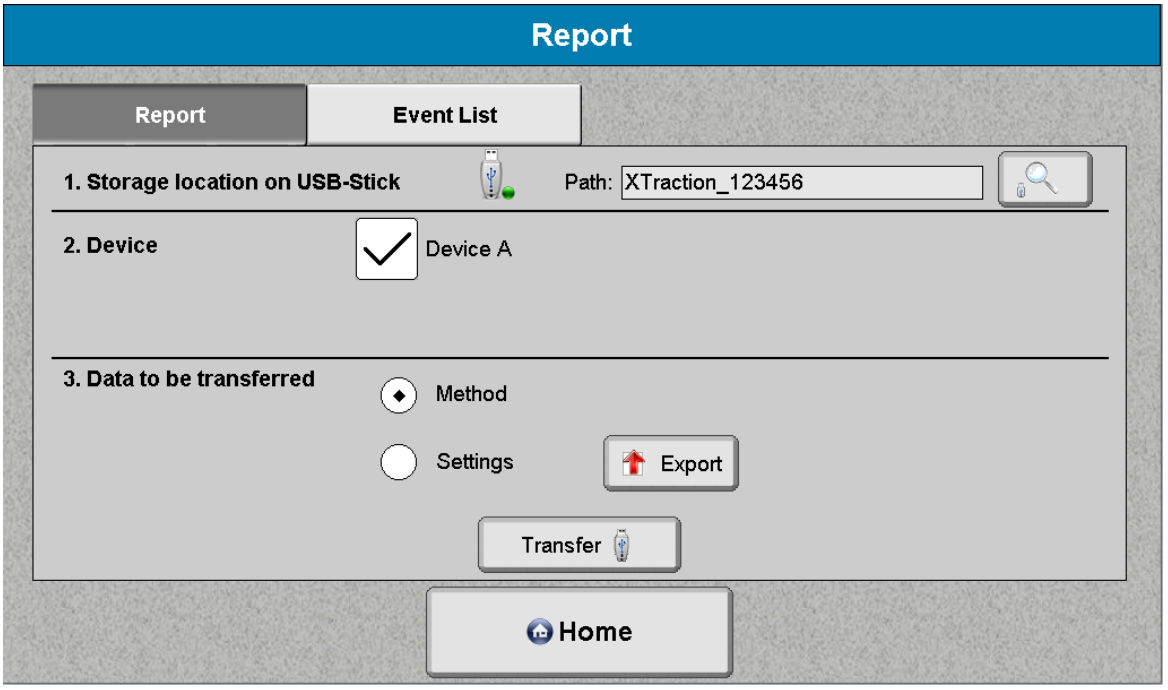


Figure 68: Transfer of methods.

On the USB stick, you will now find a folder titled "Method". A file named "Method.met" can be found in this automatically-created folder which contains all method data from the device.

INFORMATION: All future data transfers from this X-TRACTION device to the USB stick will be stored in the same folder (with the associated ID). The file name will be made up of the word “Method” plus a sequential number (for example: Method1.met).

6.1.2 Generating Reports on a Personal Computer (PC)

There is no need to install a separate program on a PC in order to generate a report. A personal computer running the Microsoft® Windows (Windows XP or higher) operating system is the sole prerequisite. It is sufficient to copy the entire folder named "*SW_XTraction*" (located on the supplied USB stick) onto the hard disk of the computer (at any location/path). This folder contains all necessary files that are required by the reporting software.

To generate reports, run the file *"XTraction.exe"*. This will open a window (see Figure 69), offering the options to either customize set-Up (a) or to generate reports (b).

Figure 69: Main window of the X-TRACTION software for report generation of methods.

a) Software Settings

The software langugage can be changed in the settings window (shown in Figure 70). There is a choice of German (deutsch.lng) or English (english.lng).

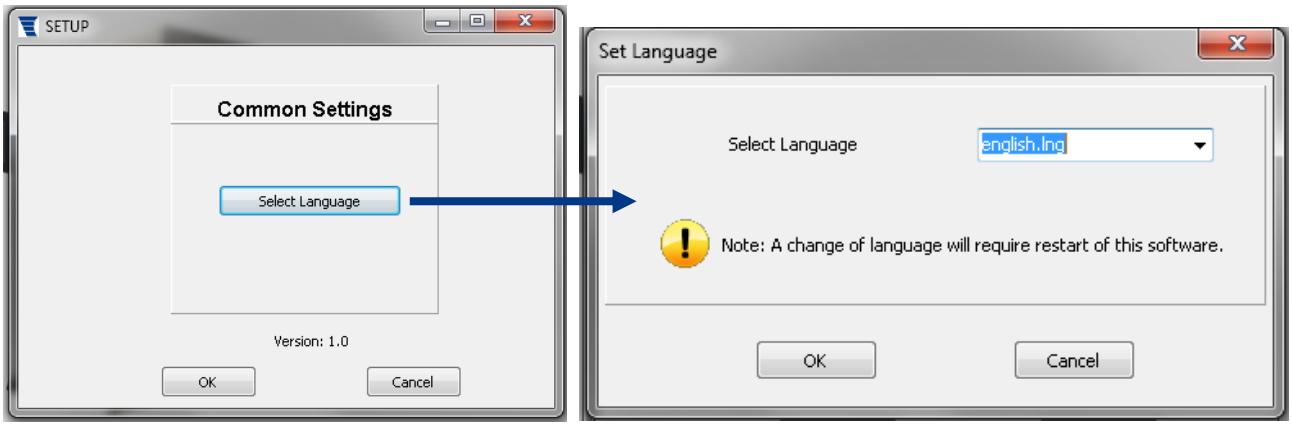


Figure 70: Settings window with tab for language selection: German or English.

If the language is changed, a dialogue box will appear (see Figure 71), which indicates the need to restart the software. “Yes” will restart immediately; “No” will change the language when the software is started the next time.

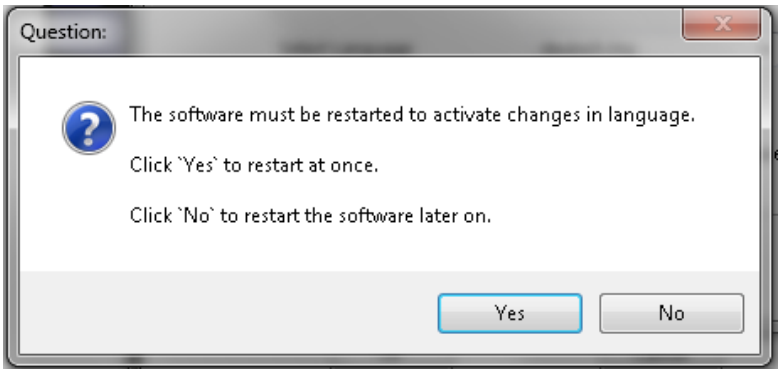


Figure 71: Notification to restart the software after changing language.

b) Report Generation

Report generation on a PC is only possible if the X-TRACTION method data is available on a USB stick that has been connected to the PC (see Figure 72).

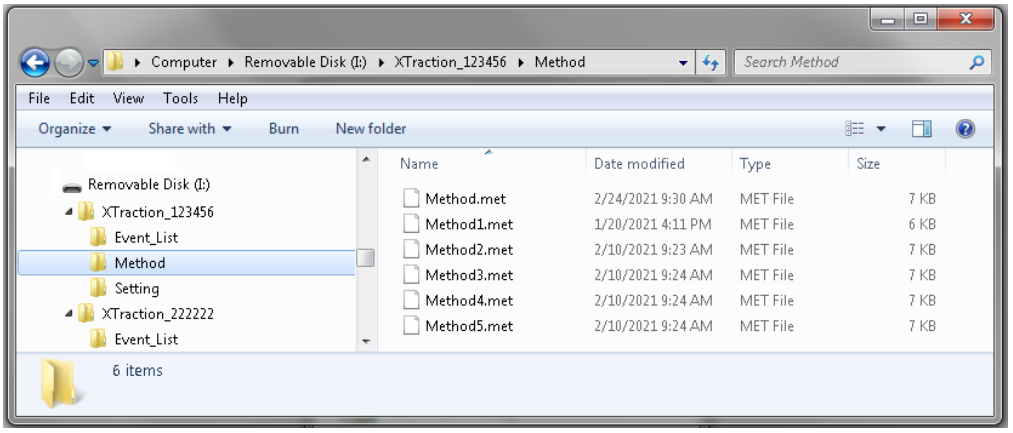


Figure 72: Saved method files (in the folder XTraxction_123456) on the USB stick.

Report generation is achieved by clicking the button “Report” on the main page (see Figure 69, point b).

INFORMATION: If no USB stick is connected to the PC, the following error message will appear.

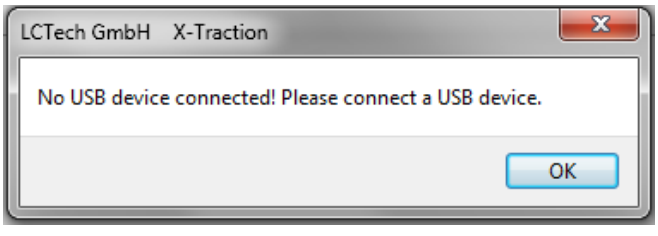


Figure 73: Error message indicating that no USB stick was found on the PC.

The software will automatically detect a connected USB stick. In addition, the software automatically preselects the folder containing the method data required for reporting.

INFORMATION: If there are several *"X-TRACTION"* folders containing method data, then the folder that is found first (smallest serial number) will be preselected.

NOTE: Once a USB stick is connected and has been selected as a path in the software, the USB stick may only be removed from the computer after completion of report generation.

Then, the report generation page will be displayed (Figure 74).

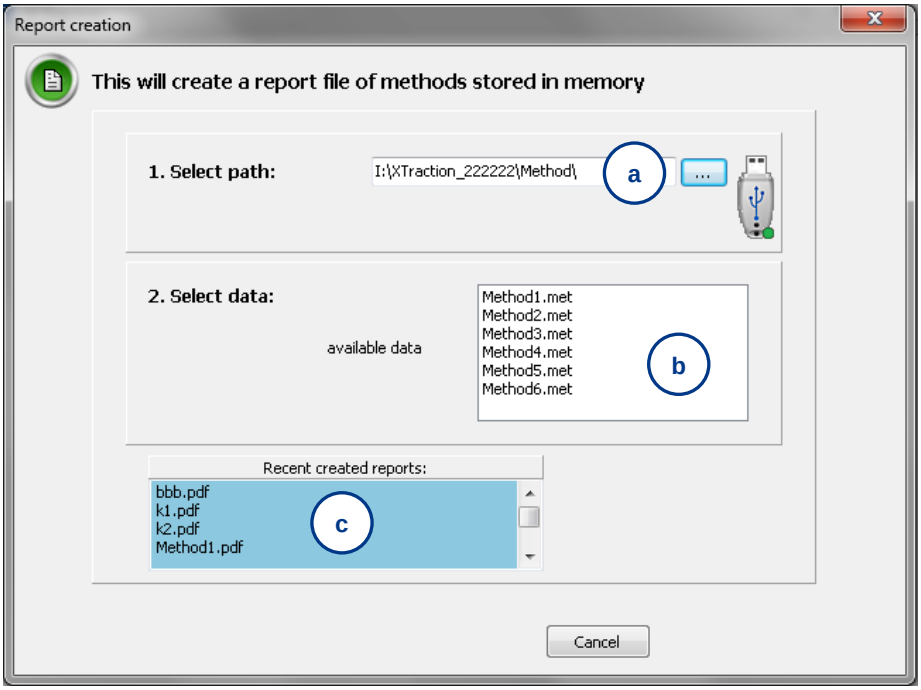


Figure 74: Report generation page with automatically recognized USB stick and folder XTraction_222222 containing respective method data.

a) Suggested path for the USB stick and preselected folder.

b) List of all files contained in the preselected folder with collected method data (one file corresponds to one set of transferred data from the X-TRACTION device to the USB stick).

c) List of all previously created reports that have been stored on the computer in the reports file with the six-digit serial number of the device.

NOTE: In the event that no USB stick is found, or an incorrect path has been preselected, the user has the option to change the path. By clicking the button for path selection (Figure 75, left) a standard Windows dialogue box will open (Figure 75 right). Here it is possible to specifically select the path for the connected USB stick and the XTraction folder with the unique six-digit number (serial number of the device required).

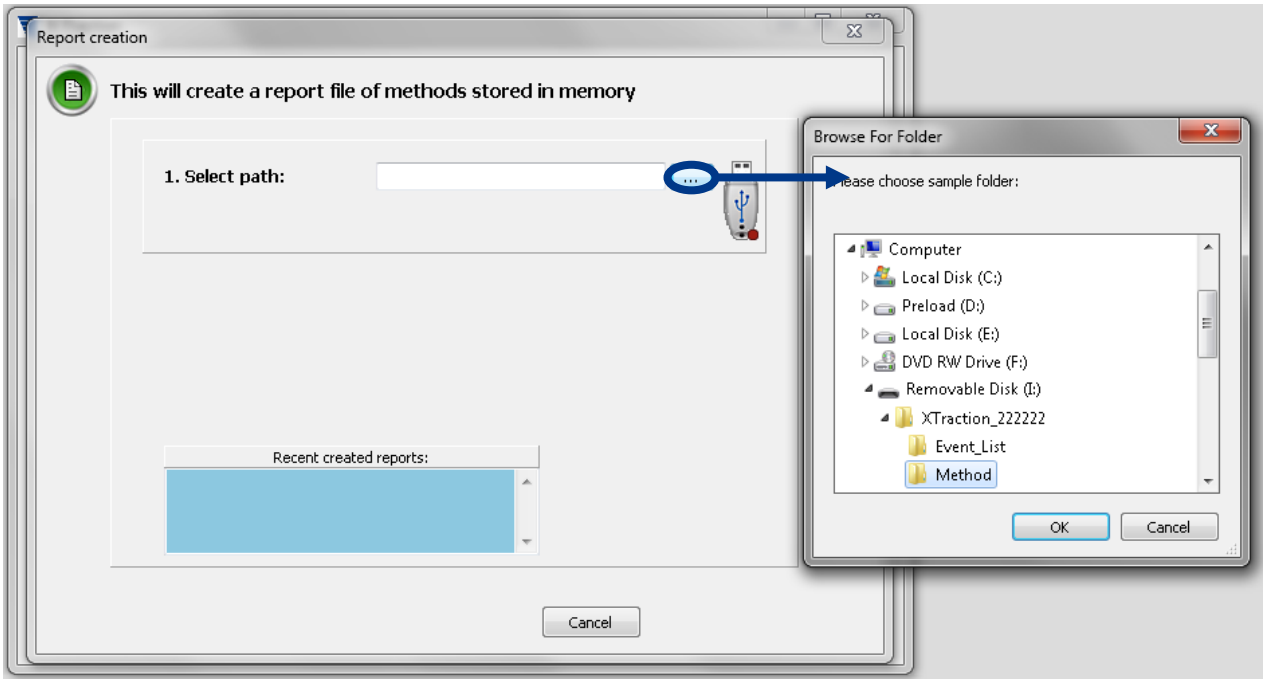


Figure 75: Report generation page (left) and a standard dialogue box for path selection (right).

After selecting a method file from the list, a forward arrow will appear which, when clicked, progresses to the next page (see Figure 76).

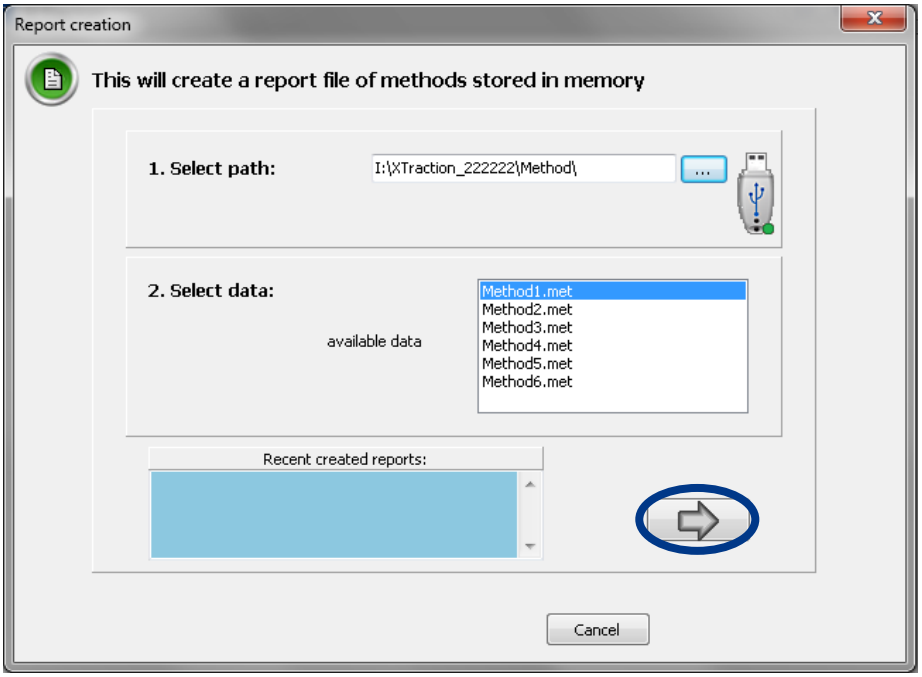


Figure 76: After selection of a method file (Method1.met, blue), a forward arrow will appear.

This window (see Figure 77) allows the selection of the format in which you wish to save the generated report.

Figure 77: Option for report generation.

a) Save all method data that is contained in the selected file (e.g. Method1.met) in one PDF file (page 74).
b) Select individual method data and save in separate PDF files (page 76).

Use the “Back“ button to return to the previous page.

Option a) Collect in one PDF File:

Following selection “a”, a forward arrow leading to the next page will appear. There is an option to choose a new name for the file, and if required, to select a different storage path. Moreover, by ticking ”show created report”, the completed report will be displayed immediately (see Figure 78).

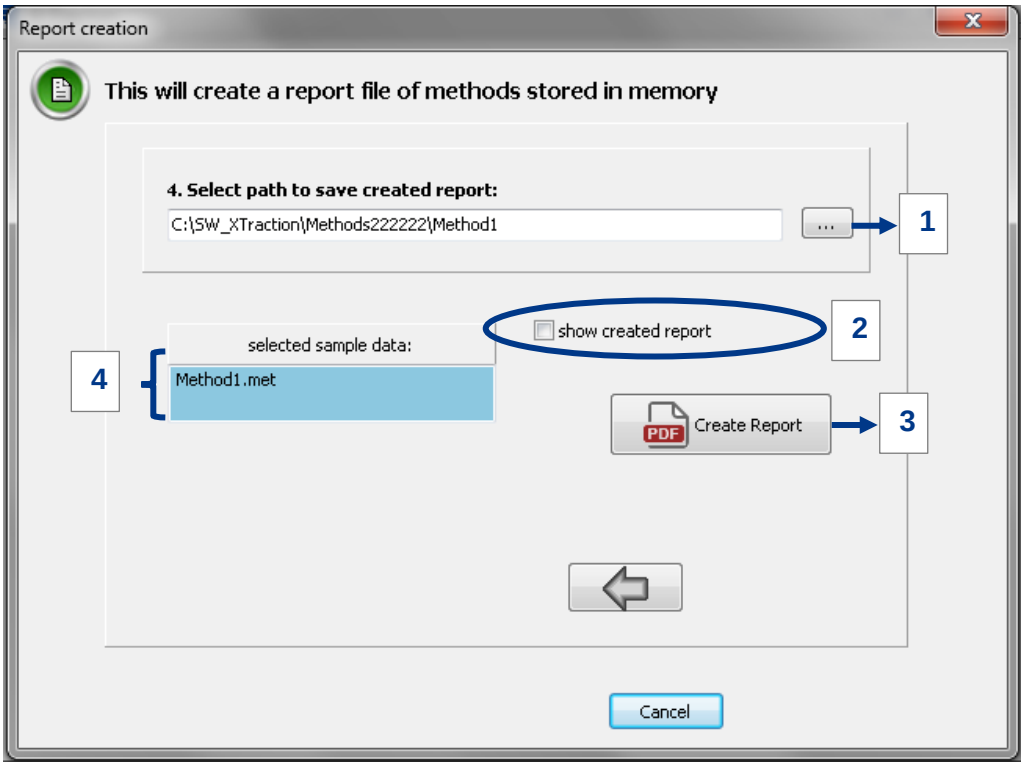


Figure 78: Report generation page with different options.

1) Option to rename the file for the report to be produced, and if required, to change the storage path.

NOTE: If the file name was changed, the list (of the most recent reports) will not include this generated report.

2) Option to display the newly generated report immediately.

INFORMATION: The installation of a PDF reader is required for this option.

Should the report not be displayed immediately (box not checked), then the chosen storage path and filename will be displayed (see Figure 79).

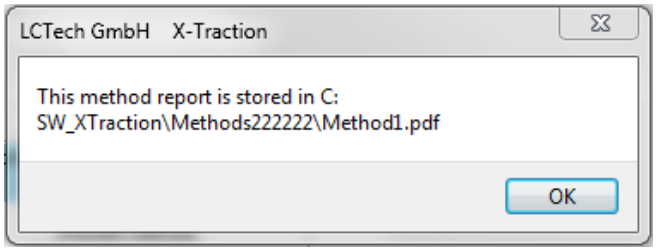


Figure 79: Display of the storage path for the generated report.

3) Button that creates the report in PDF format.

INFORMATION: Should the report to be produced already exist, then a message (Figure 80) will be displayed. Now, a new name or another method file can be chosen.

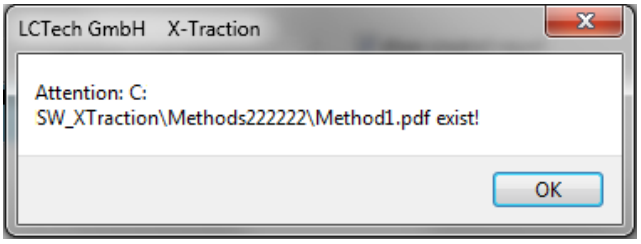


Figure 80: Duplicate file notification.

4) Display of the selected method file.

Pressing the button to specify the storage path will open a standard Windows dialogue box as shown in Figure 81. Here, a file name can be chosen for the report to be produced. The selected name is accepted by pressing the "Save" button. Alternatively, pressing the "Cancel" button will abort renaming. However, a different storage path may be selected.

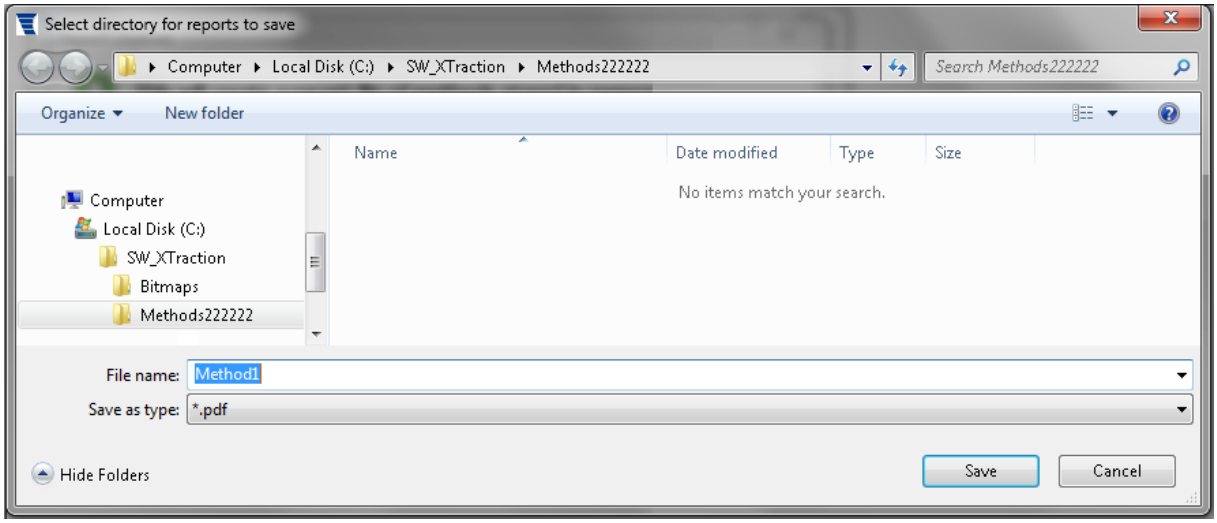


Figure 81: Windows dialogue box for name input and change of storage path for this report, if required.

If the suggested file name is not changed, then the final report will carry the same name as the selected method file. Pressing the “Create Report” button will save the report in the current directory (the software installation directory) in an automatically created folder named “Methods”, followed by the six-digit serial number of the X-TRACTION device (see Figure 82, highlighted in blue). When selecting a), all future reports, which are saved in a PDF file, will be collected in this folder.

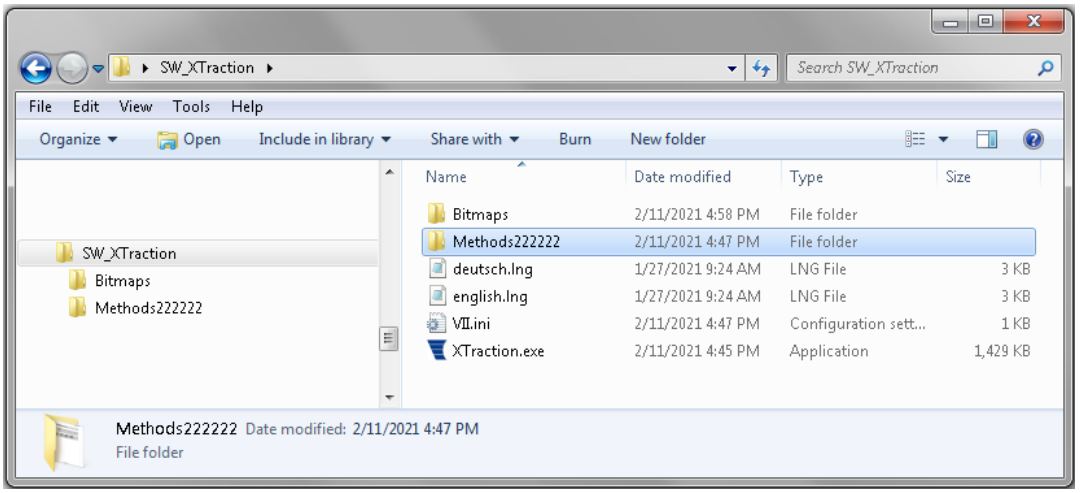


Figure 82: Current directory of the installation software now includes the folder “Methods222222“ (highlighted in blue), which will hold all future reports of the respective X-TRACTION device.

Option b) Individually in PDF Files:

Ticking “selected data” lists all stored method data individually with its corresponding method name (see Figure 83). By checking the individual method data, specific method names can be selected for reporting.

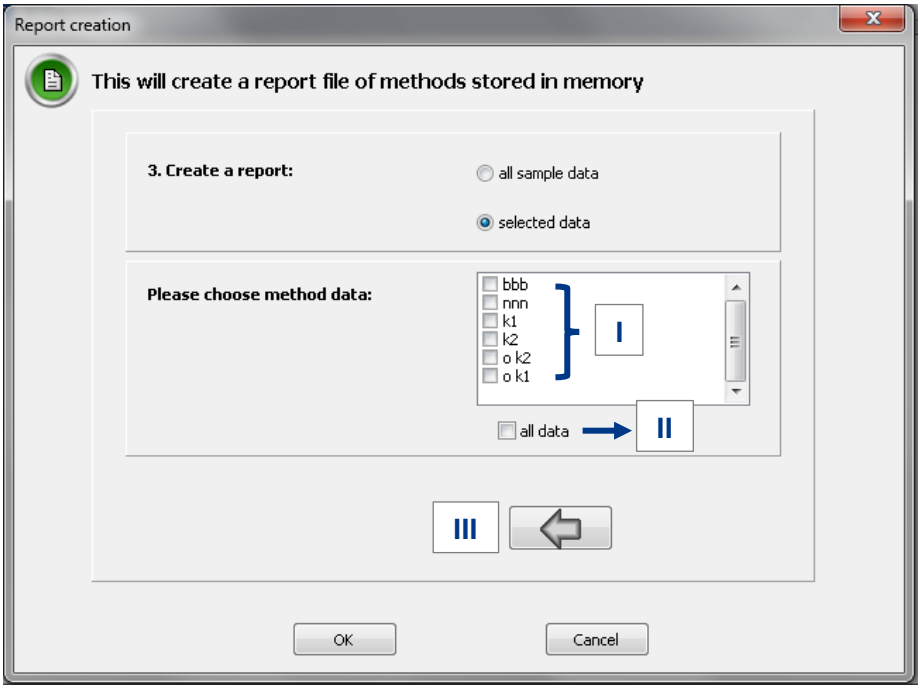


Figure 83: Option for the selection of individual methods for reporting.

I. Individual checking of the required method names.

II. Select all method names.

III. “Back“ arrow to return to previous page.

After your selection (see Figure 84, a “Forward” arrow will appear, which when clicked progresses to the next page.

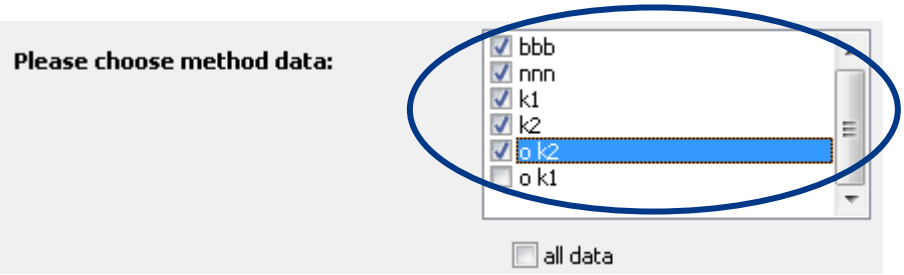


Figure 84: Selected method data to be used for reporting.

This page completes the report generation (Figure 85).

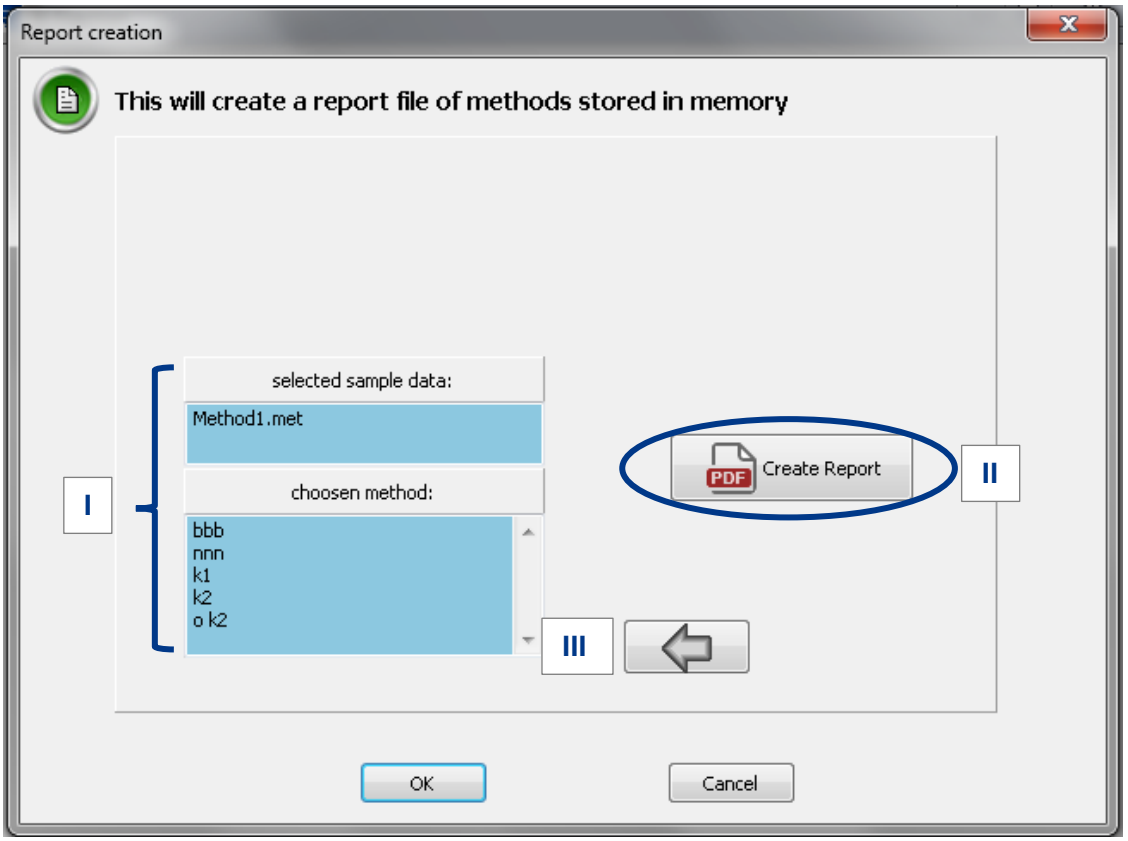


Figure 85: Final page with overview of the selected data and button to create the reports.

I. Overview of the method file used and the selected methods from which a report is to be generated.

II. Button that concludes the report generation.

III. “Back” button if different methods need to be selected.

INFORMATION: This is only possible if the "Create Report" button has not been clicked.

NOTE: Upon report generation, the respective method data (for example Method1.met) will not be deleted automatically from the USB stick. This data must be deleted specifically by the user.

The reports will be stored in the current directory (the software installation directory). For this purpose, a folder named “Methods”, followed by the six-digit serial number of the X-TRACTION device will be created automatically. The exact storage path of the reports is issued by a notification as shown in Figure 86.

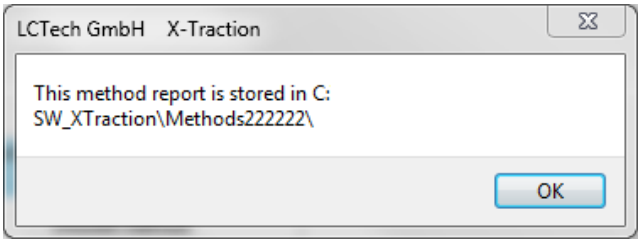


Figure 86: Issue of the storage path for the method reports.

NOTE: Should a PDF file already exist on the system, a new storage name is generated automatically. For example: existing data bbb.pdf → new name: bbb_1.pdf.

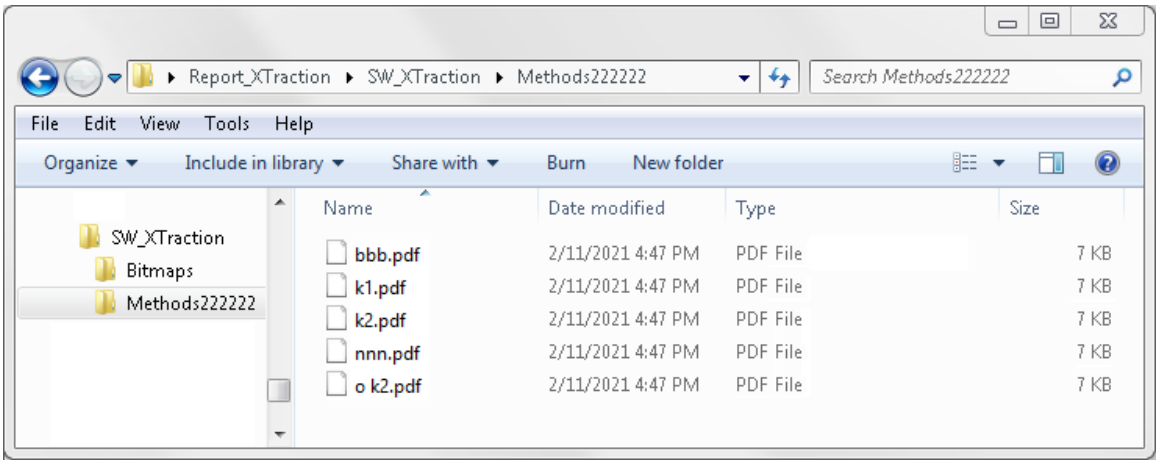


Figure 87: Generated files.

Once the reporting is completed, the button "New Report" will appear (see Figure 88), with which the next report can be created.

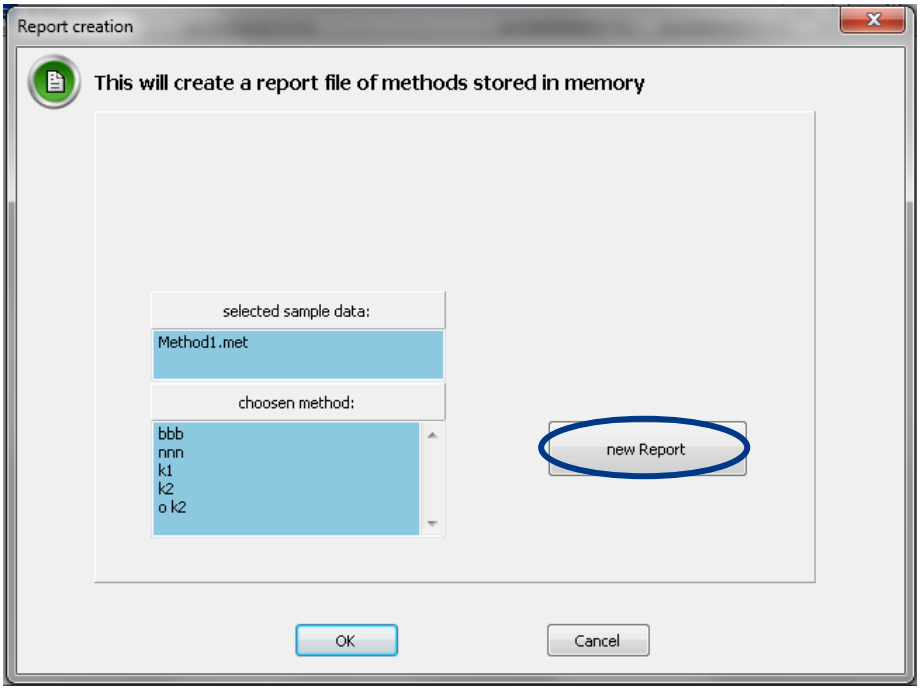


Figure 88: Completed report generation.

An example report is shown below.

Date: 5/24/2022 Time: 4:47:29 PM

X-TRACTION

LCTech X-Traction - Method report

Path: C:\Desktop\SW_XTraction\Methods222222\Test.pdf

Method name:	Test
Cell type:	75 mL
Cycles:	3

Method steps

Cycle 1				
	Step: Fill top	Volume: 20 mL	Flow rate: 30 mL/min	Solvent: Port 1: n-Hexane
	Step: Fill bottom	Volume: 20 mL	Flow rate: 30 mL/min	Solvent: Port 1: n-Hexane
	Step: Heating	100 °C		
	Step: Duration	5 min		
	Step: Rinsing	Volume: 10 mL	Flow rate: 30 mL/min	Solvent: Port 1: n-Hexane
	Step: Drying	Nitrogen	Time: 5 min	
Cycle 2				
	Step: Fill top	Volume: 20 mL	Flow rate: 30 mL/min	Solvent: Port 1: n-Hexane
	Step: Fill bottom	Volume: 20 mL	Flow rate: 30 mL/min	Solvent: Port 1: n-Hexane
	Step: Heating	100 °C		
	Step: Duration	5 min		
	Step: Rinsing	Volume: 10 mL	Flow rate: 30 mL/min	Solvent: Port 1: n-Hexane
	Step: Drying	Nitrogen	Time: 5 min	
Cycle 3				
	Step: Fill top	Volume: 20 mL	Flow rate: 30 mL/min	Solvent: Port 1: n-Hexane
	Step: Fill bottom	Volume: 20 mL	Flow rate: 30 mL/min	Solvent: Port 1: n-Hexane
	Step: Heating	100 °C		
	Step: Duration	5 min		
	Step: Rinsing	Volume: 10 mL	Flow rate: 30 mL/min	Solvent: Port 1: n-Hexane
	Step: Drying	Nitrogen	Time: 5 min	

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Figure 89: Example of a method report.

6.1.3 Method Import

Reading back method data from the USB stick after a CF card has been exchanged. To change, a level 1 password is required.

6.2. Settings

Used to read out the device settings before changing CF card (see chapter 6.2.1 Export) and to read in the data again after changing the CF card (see chapter 6.2.2 Import).

ATTENTION:
A CF card exchange is only carried out by the service team.

6.2.1 Export

Storage of the device setting data in a file by pressing the “Transfer” button (Figure 90).

NOTE: No created usernames with passwords are transferred.

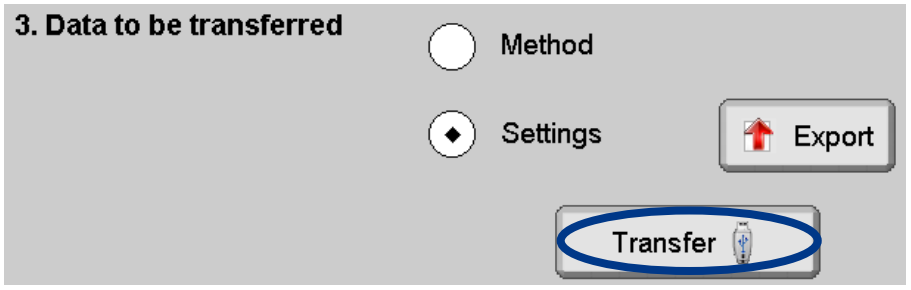


Figure 90: Trigger export of device data.

In the automatically created folder “Setting”, a file named "Setting.ini" can be found, containing all device data (see Figure 91).

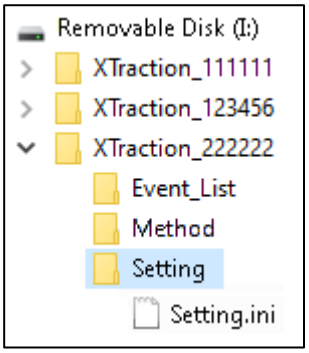


Figure 91: Saved setting file.

NOTE: If a file already exists with this name, it is overwritten.

6.2.2 Import

Reading back the previously stored device data from the USB stick after a CF card has been exchanged. To change, a level 1 password is required.

6.3. Event List

Read all stored event lists per selected extraction device. The maximum number of data is limited to 99 data records per device. The data transfer is started by the “Transfer” button and all samples are stored in a file. The transferred data records remain on the device and are not deleted.

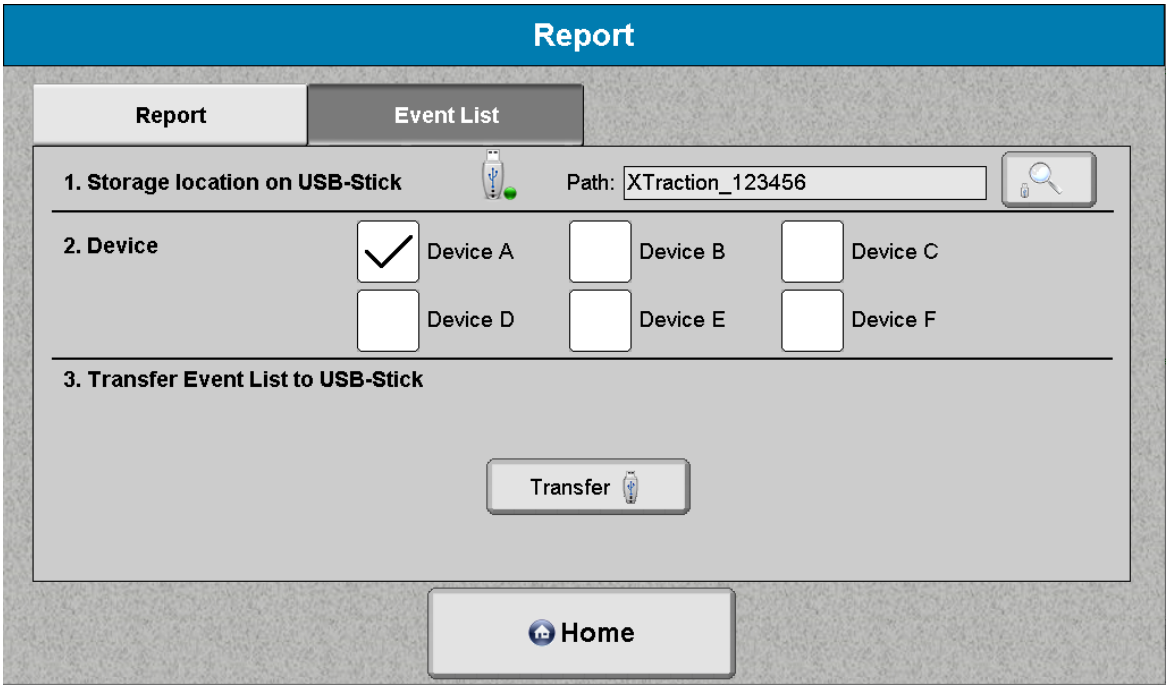


Figure 92: Screen of event list transfer.

In the automatically created folder “Event_List” files named "EventList_XX.log" can be found, containing all event lists from the executed extractions.

NOTE: If a file already exists with this name, it is overwritten.

For further steps→ Please contact our LCTech service team.

6.4. Error

The following errors can occur with the report function.

6.4.1 No USB Stick Found

General: An error message (see Figure 93) will be displayed on the screen. This indicates that no USB stick was found on the device.

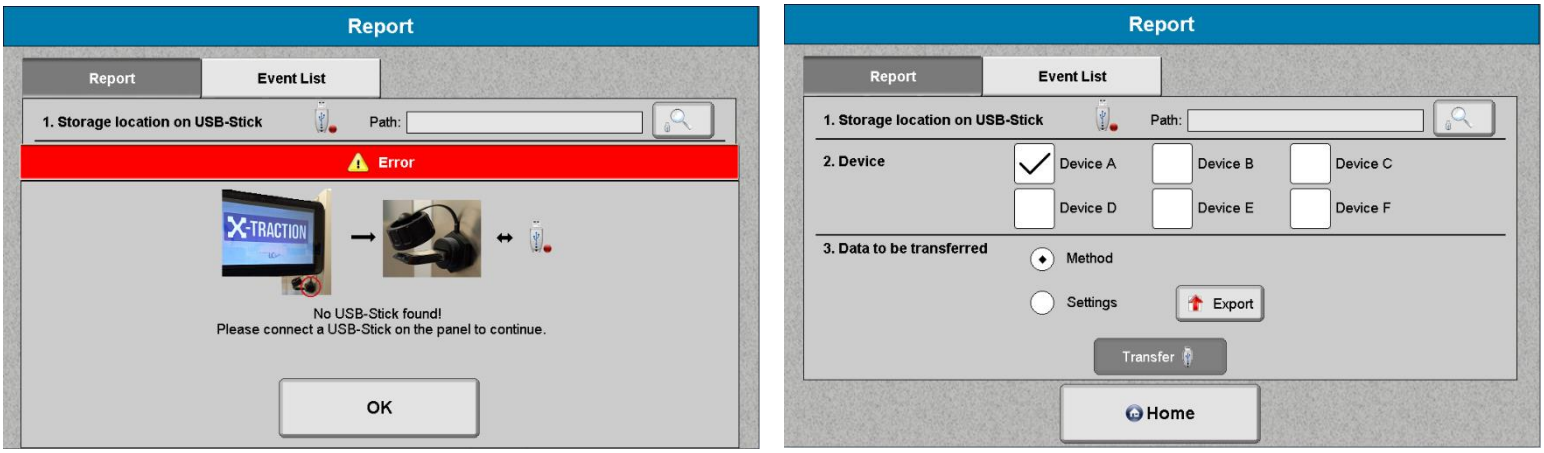


Figure 93: Error message indicating that no USB stick has been found on the device (left). Report page without USB stick (right).

Troubleshooting:

1. A USB stick must be inserted into the device's USB port (Figure 62). Once the USB stick is connected, press the USB search button (Figure 94).

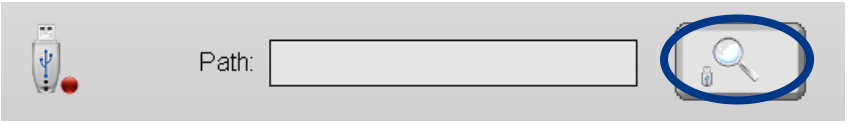


Figure 94: USB search button.

2. Error message appears again → Please contact our LCTech service team.

6.4.2 Lacking Memory on USB Stick

General: If the USB stick used does not have enough memory, the following error message appears on the display.

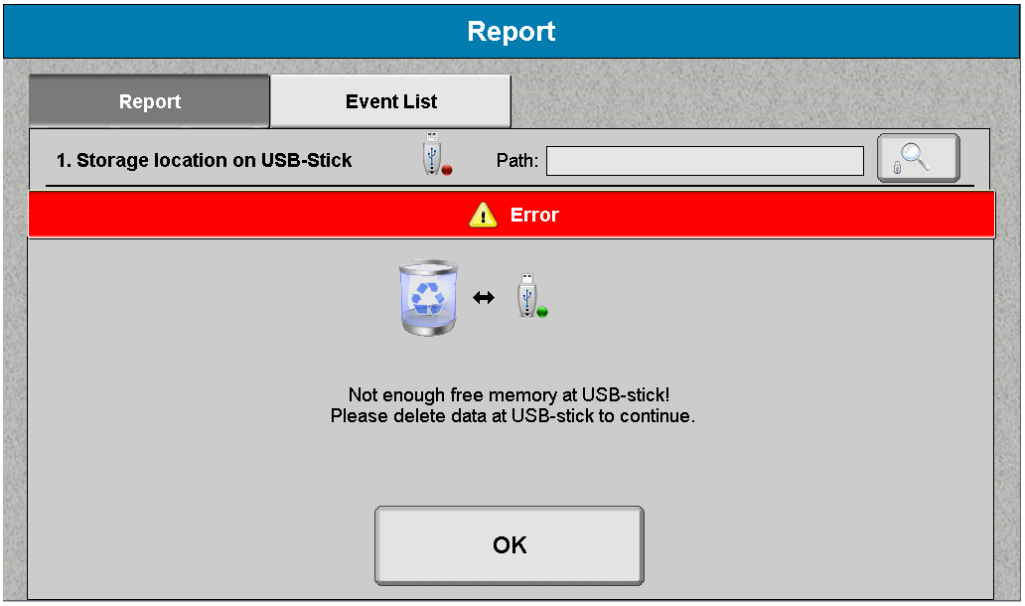


Figure 95: Memory error.

Troubleshooting:

In order to perform a transaction, data records must be deleted on the USB stick and the USB search button must be pressed (Figure 94).

6.4.1 Error During Data Transmission

General: Various errors may occur during the data transfer to the USB stick. Depending on when the error occurs, a different error number appears on the display.

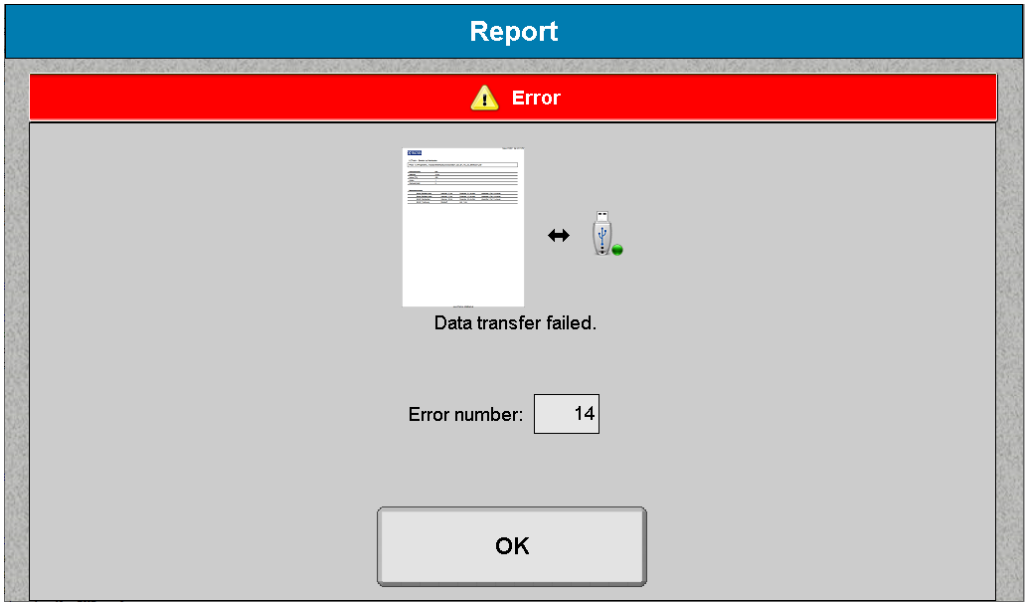


Figure 96: Error during data transfer.

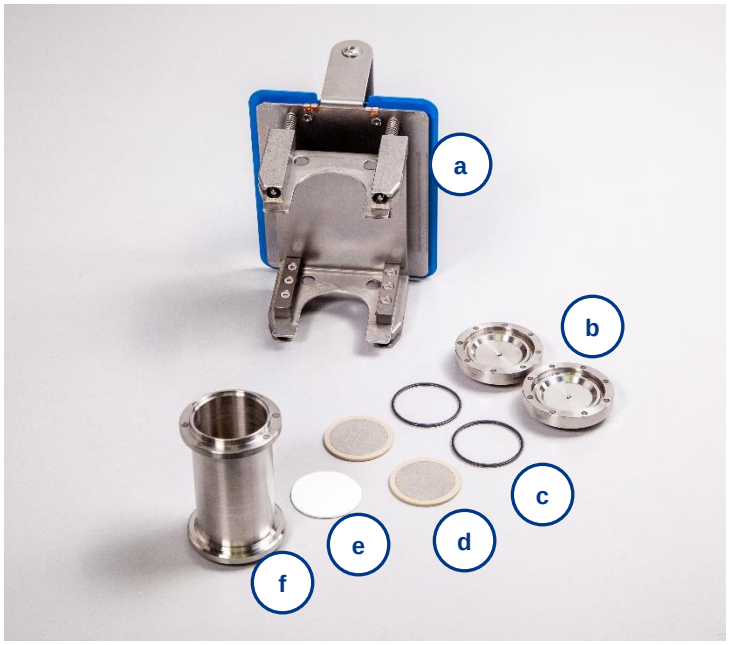
Troubleshooting:

1. Repeat step.
2. Error message appears again → Please contact our LCTech service team.

7. Cell

7.1. Filling and Mounting Extraction Cell

Overview of all cell parts needed for extraction:



a) Cell handle
b) Lids
c) FEP O-rings
d) Frits (SST)
e) GF-filter
f) Extraction cell

1. First put in reusable FEP O-ring into both lids:

NOTE: Ensure that the FEP O-ring is stable within the lid and does not fall out.

2. Put on the frit (SST) onto one end of the extraction cell:

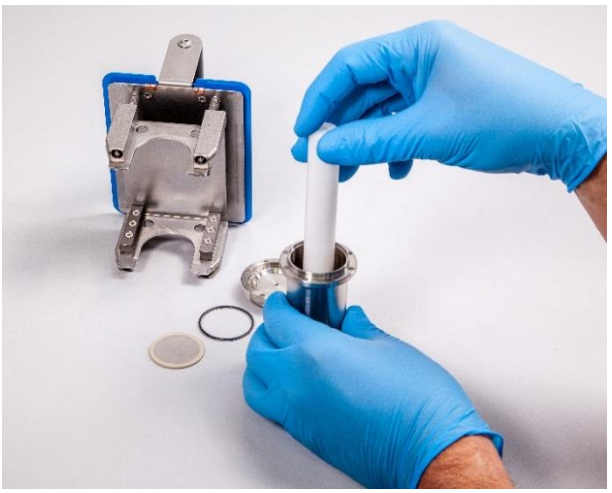
NOTE: Keep sealing surfaces clean! In case of dirt or grains, use a clean brush and remove dirt carefully before putting on the frit again.

3. Put on the lid (equipped with FEP O-ring):

NOTE: Ensure that the lid has a solid magnetic connection to the extraction cell. We recommend turning the lid until you feel the magnetic force between the lid and the extraction cell.

4. Turn around the extraction cell and place glass fibre filter (P/N 19281) on the upper end of the extraction cell.

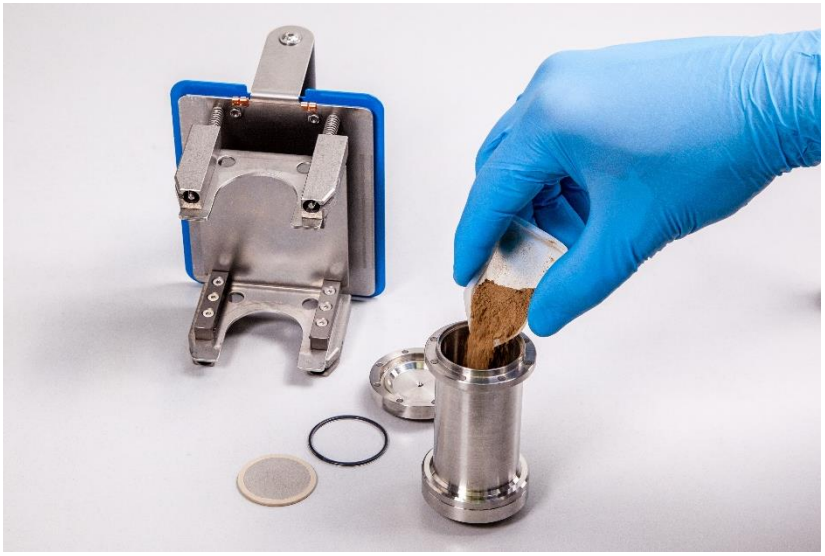
5. Carefully push down the glass fibre filter to the bottom of the extraction cell. Please use the plunger (P/N 19343), for the exact placement of the filter.



NOTE: Ensure that the glass fibre filter is pushed down equally on each side and has full contact to the inner diameter of the extraction cell.

6. Fill your sample.

A funnel or a weighing boat is recommended to ensure accurate filling of the cell.



NOTE: Keep sealing surfaces clean! In case of dirt or grains, use a clean brush and remove dirt carefully.

NOTE: To ensure the function of the X-TRACTION system, it is mandatory to keep a minimum 2 cm air-gap between the upper end of the extraction cell and the upper end of the sample volume within the extraction cell.

NOTE: Please only use free-flowing, dry samples. If sample is wet or fluid, please use sodium polyacrylate until sample is free-flowing and dry. **Never use sodium sulfate as drying agent as it could lead to clogging of the capillaries!**

7. Put on the frit (SST) onto the upper end of the extraction cell.

NOTE: Keep sealing surfaces clean! In case of dirt or grains, use a clean brush and remove dirt carefully.

8. Put on the lid (equipped with FEP O-ring):

NOTE: Ensure that the lid has a solid magnetic connection to the extraction cell. We recommend turning the lid until you feel the magnetic force between the lid and the extraction cell.

7.2. Insert Extraction Cell into Handle

For insertion, it is important that the extraction cell is fitted in its correct place within the cell holder (clicked in, see image on right). You hear a clicking sound when the extraction cell is inserted correctly in the cell holder.

Safety note: Please leave equipped cell handle always in the upwards position (see image, right), to prevent any unwanted release of the cell and injuries.

7.3. Insert Cell Holder into Heating Bar Compartment

Insert cell holder, equipped with an extraction cell, into heating bar compartment. Please pay attention to a clicking sound when the cell holder is inserted correctly. This should appear as in Figure 95, right. If not inserted correctly, the system will not close properly. The cell tower is opened and closed automatically via the software.

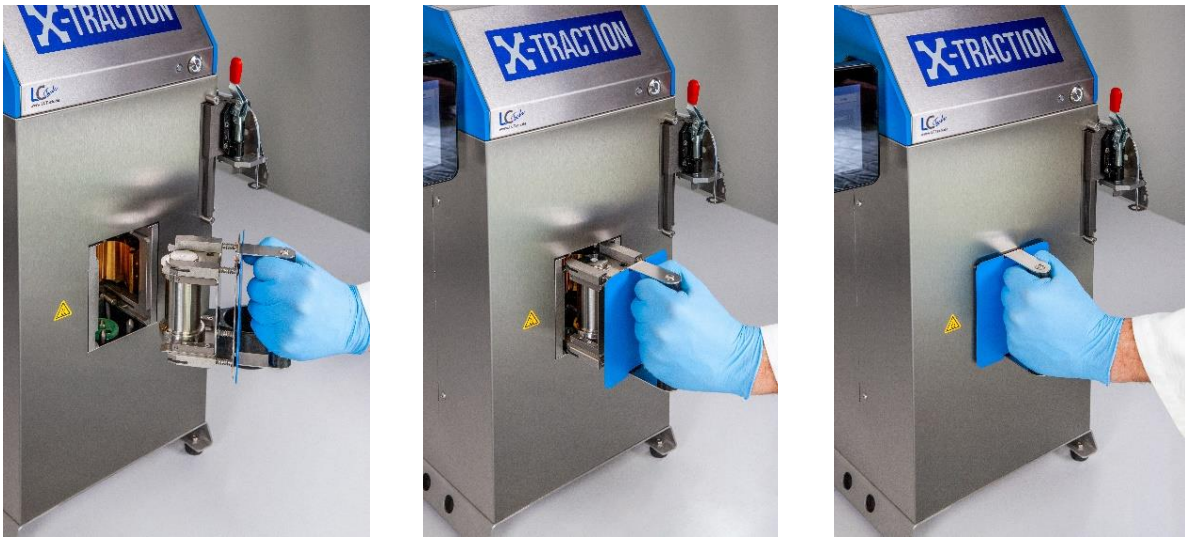


Figure 97: Left: cell with cell holder; middle and right: insert cell holder into heating bar compartment.

7.4. Emptying Extraction Cell

Carefully remove extraction cell out of the cell handle in a linear movement (otherwise the lids could loosen). Then, remove the magnetic lid with a gentle turn until the magnetic force disappears. Remove the upper frit (SST) from the extraction cell. Place the used sample into waste.

Safety note: When emptying the extraction cell, solvent residues may still be present. Please use hand and eye protection.

Disposal of wastes

Please observe local regulations for collection and disposal of laboratory waste as well as the relevant safety data sheets for the cell and the solvents used.

7.5. Cleaning Extraction Cell

For effective cleaning, disassemble the extraction cell in its single parts first of all (see chapter 7.1). Clean these parts with distilled water. Afterwards, put the single parts into a beaker glass filled with suitable solvent (e.g. acetone) and put it in an ultrasonic bath. Cell body and lids can also be cleaned by a laboratory dishwasher. After that, let the pieces dry completely under a fume hood.

NOTE: Take care not to damage parts of the extraction cell during the cleaning process, especially sealing surfaces of the extraction cell body. If necessary, place the parts into separate containers.

8. Service

The X-TRACTION system and its components have been designed for long-term operation without servicing. As such, it must be handled appropriately. Any accumulation of dirt and dust must be avoided. The system should be cleaned regularly, e.g. once a week.

The display and main housing should only be cleaned with a lint-free cloth or a non-shedding brush. If necessary, a damp cloth can be used. Do not use organic solvents, particularly for the painted areas.

As with all technical systems, parts may suffer wear and tear and require exchanging from time to time, e.g. the syringe pump. In general, all parts are very long-lasting but should you observe reduced performance, the corresponding parts must be exchanged.

Any exchange of spare parts, as well as the opening of the housing, may only be performed by authorized personnel. The service must be performed by an LCTech service engineer or personnel authorized by LCTech.

In general, we recommend annual maintenance by an LCTech service engineer to check the operating conditions of the X-TRACTION system. This can also be arranged in the course of service contracts.

Please contact our LCTech service team.

8.1. Maintenance Recommendations: Syringe Pump

In the event of leakage, the piston of the syringe should be replaced. More information on how to replace the syringe of the syringe pump can be found in the service manual.

Figure 98: Syringe pump.

Please contact our LCTech service team.

8.2. Software Maintenance Service Area

The service area contains maintenance recommendations for wear parts.

In the main window, a red service button will appear (Figure 99) if the wear parts reach a certain number of switching cycles (e.g. valve) or heating time (e.g. heater bar).

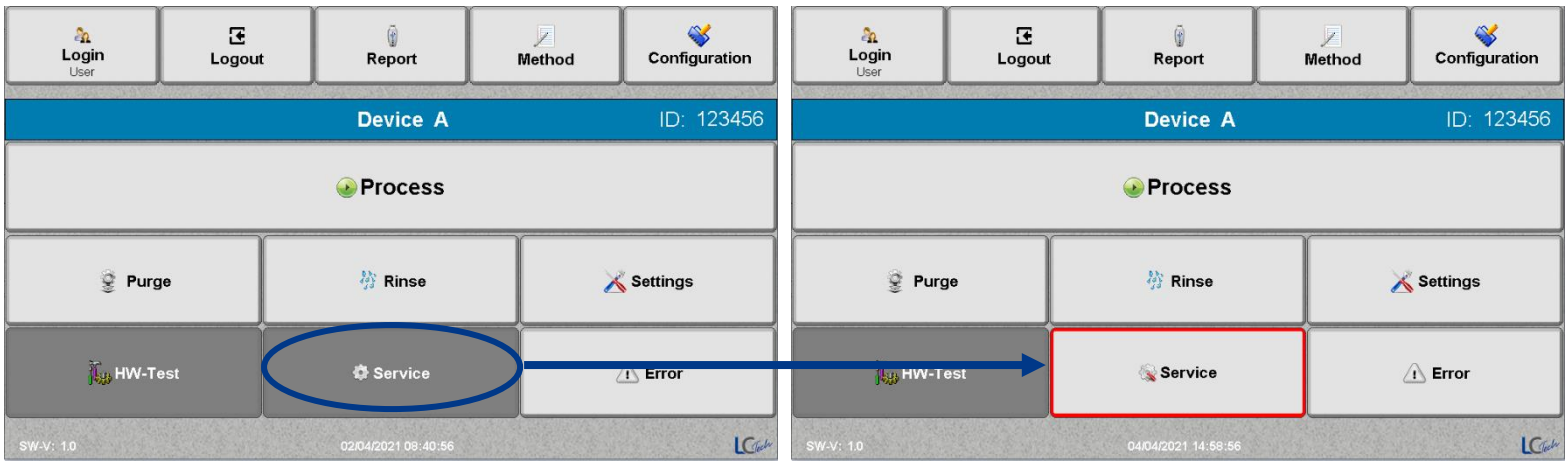


Figure 99: Main window without (left) and with (right) service display.

If this button appears, a corresponding maintenance step needs to be carried out. To locate the service part, follow the "Service" button or press "Setting" → "Service", where you will find an accurate list of all serviceable parts. An example is shown in Figure 100 below:

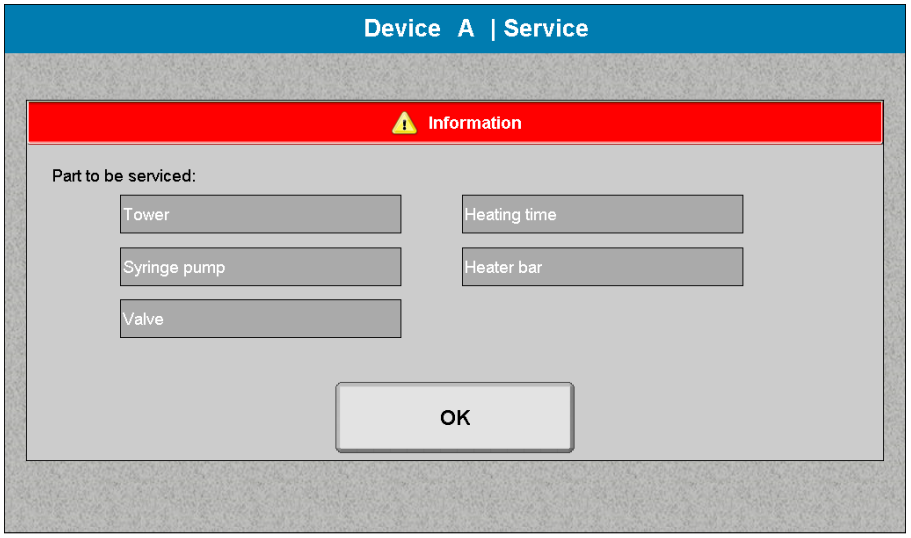


Figure 100: Service window with display serviceable parts.

9. Troubleshooting/FAQ (Frequently Asked Questions)

This chapter provides valuable information on issues and problems that might occur during the operation of your X-TRACTION.

For the elimination of most errors, there are simple rules to follow:

- Most errors are caused by an obvious event.
- It is unlikely for two errors to occur at the same time.
- Errors can be found by systematically analyzing the symptoms.
- Most errors have a defined starting point. Try to precisely determine the time when the error first occurred. The following questions are important: What happened before, during, and after the error occurred? The LCTech service engineers require this information in order to be able to locate the problem quickly.

ATTENTION:

- Never try to solve errors by unauthorized repair!
- Do not remove any covers or safety devices! After disassembling the system, reassemble the system to its original state.
- Checking and repairing the system's electrical components can only be carried out by LCTech staff. Any third-party repair attempt not authorized by LCTech voids any claims against LCTech and device warranty!
- Contact:

LCTech GmbH
Daimlerstraße 4
84419 Obertaufkirchen
Germany
Fax: +49 8082 2717-100
E-mail: service@LCTech.de

9.1. Non-Reported Errors

Non-reported errors are not displayed by the system. This results in no error message and a green LED. This means there is no indication of an error in the software, and consequently the system will not be stopped when such an error occurs. These errors can only be perceived visually by the user.

9.1.1 Device Switched On, Nothing Happens (Black Screen)

Possible cause: No power to device, display cable loose.

Troubleshooting:

- Check if the power switch on the front of the device is illuminated.
- Check the power supply (220-240 Volt AC), Figure 101.
- Check the connection cable on the rear of the display. If loose, turn it clockwise by hand.
- Switch system off and on again.

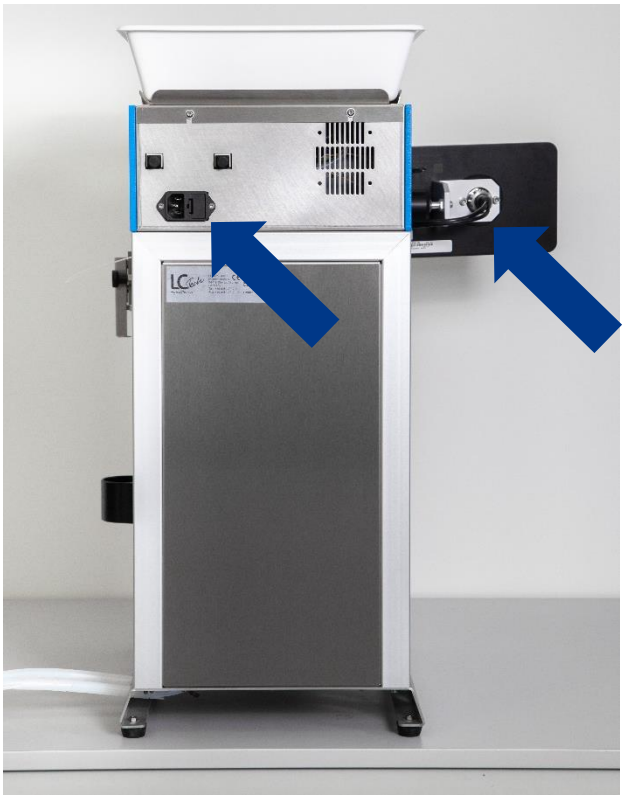


Figure 101: Power supply X-TRACTION.

- If no error can be found:

  →Please contact our LCTech service team.

9.1.2 Device Switched On, Permanent Start Screen

General: System doesn't boot. Display shows start screen without bar graph for minutes, see Figure 102.

Figure 102: Permanent start screen.

Possible cause: No connection to control system, display cable loose.

Troubleshooting:

- Check the power supply (220-240 Volt AC), Figure 101.
- Check the connection cable on the rear of the display. If loose, turn it clockwise by hand.
- Switch system off and on again.
- If no error can be found:

  →Please contact our LCTech service team.

9.1.3 Empty Solvent line

Possible cause: Solvent bottle not filled, consequently the solvent tubing has run empty.

Troubleshooting:

- Refill solvent supply bottle.
- Purge the respective solvent tubing (two times) using the appropriate software section (refer to Chapter 5.6 Purge).

NOTE: To ensure that the tubing is filled, the respective purging step must be executed twice.

9.1.4 Cell Cannot be Closed

General: Cell cannot be closed (Figure 103).

Figure 103: Closed cell.

Possible cause: Damaged magnets, overfilling of cell, incorrect mounting of cell, dirt or dust on the sealing surface of the cell, incorrect O-ring positioning.

Troubleshooting:

- In case of dirt or grains on the sealing surface, use a clean brush and remove dirt carefully before putting on the frit again.
- Remove lid of extraction cell and check correct positioning of O-ring.
- If no error can be found:

  →Please contact our LCTech service team.

9.1.5 Cell Cannot Insert into Handle

General: Cell insert does not lock in holder (Figure 104).

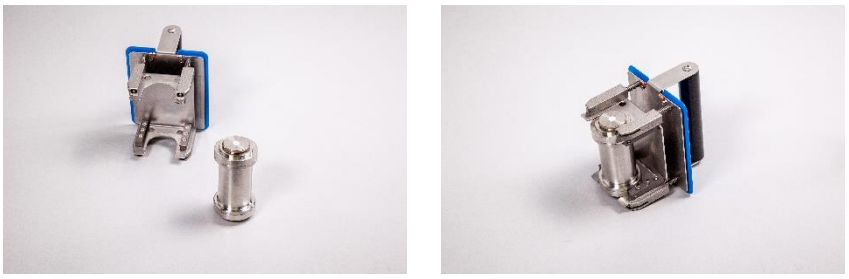


Figure 104: Cell insert to handle.

Possible cause: Cell holder damage, extraction cell is not closed correctly.

Troubleshooting:

- Try to put in the dummy cell in the cell holder to distinguish whether extraction cell or cell holder is damaged.
- If no error can be found:

→Please contact our LCTech service team.

9.1.6 Cell Holder Cannot Click in

General: The cell holder is inserted into heating bar compartment but does not click in (Figure 105).

Figure 105: Cell holder does not lock.

Possible cause: Heater bars are not opened (damaged or broken springs).

Troubleshooting:

→Please contact our LCTech service team.

9.1.7 Cell Status doesn't Change

General: Cell inserted into handle and cell holder inserted into heating bar compartment but state does not change (Figure 106).

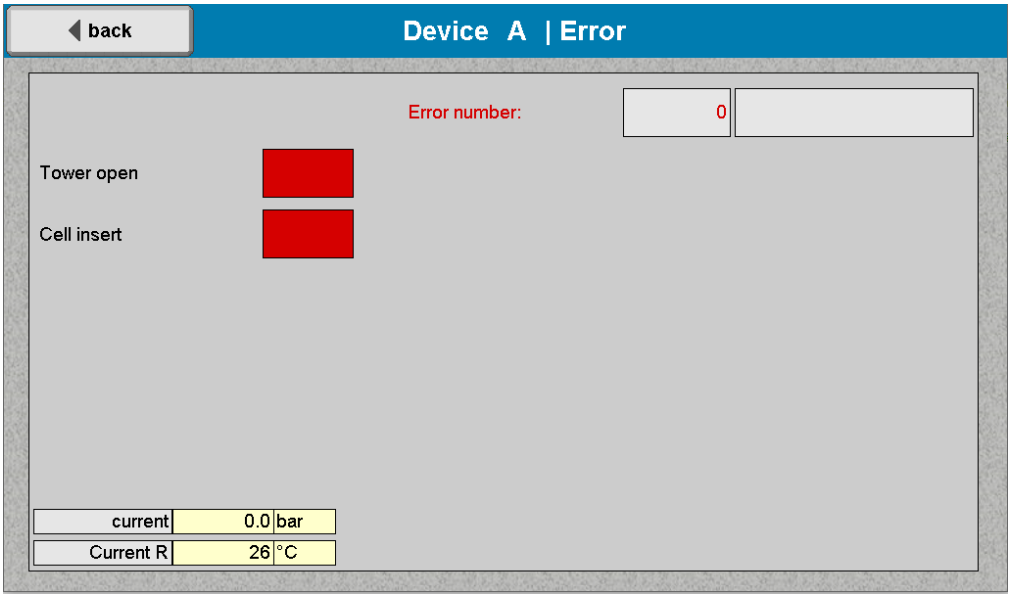


Figure 106: Screen with no cell insert.

Possible cause: Sensor damage, no insert of cell or incorrect insert of cell.

Troubleshooting:

- Check correct insert of cell, see chapter 7.2 and chapter 7.3.
- If an error message is received, refer to chapter 9.2.2.
- If no error can be found:
  →Please contact our LCTech service team.

9.1.8 Heater Bars don't Open

General: The cell holder is in the heating bar compartment and cannot be removed from the unit after the process or flushing process (Figure 107). Cell is not removable.

Figure 107: Insertion of cell.

Possible cause: Remaining pressure above safety value within the cell or capillaries, remaining temperature above safety value of the cell, damaged or broken springs, damaged or broken electric magnets within heating compartment.

Troubleshooting:

- Switch system off and on again.
- If no error can be found:

→Please contact our LCTech service team.

9.1.9 Tower Status doesn’t Change

Possible cause: The cell tower does not work. State does not change from open to closed or from closed to open (Figure 108).

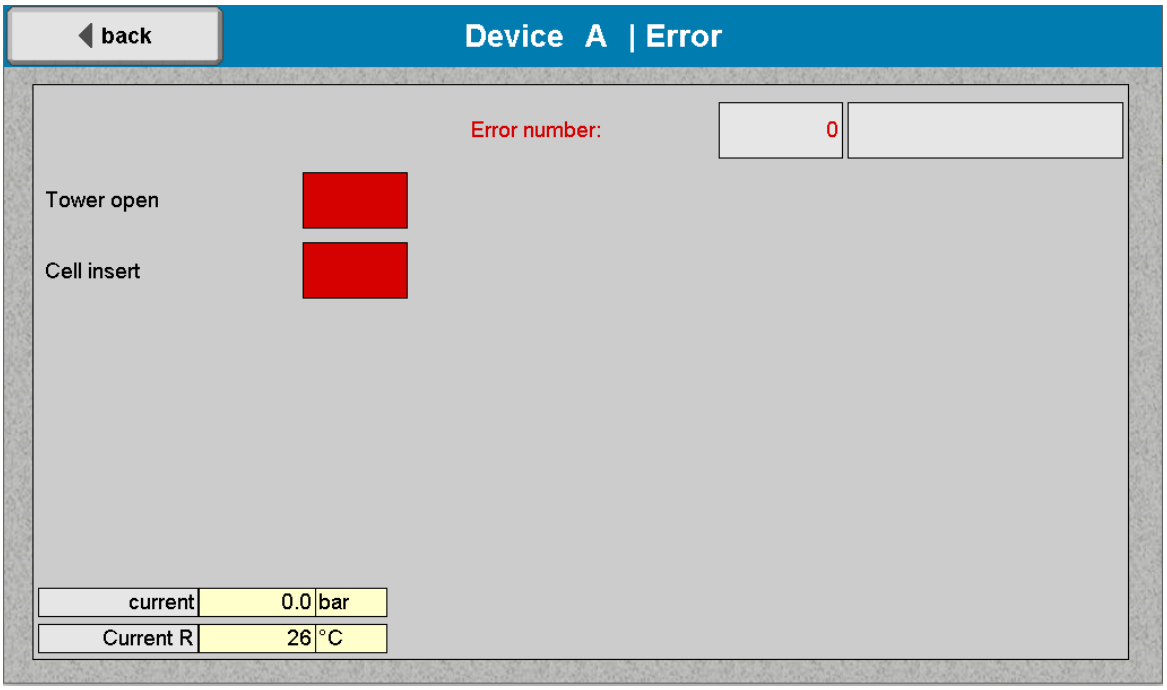


Figure 108: State tower closed.

Troubleshooting:

- If the cell tower is open, put the dummy cell in and close the tower by pressing the “Start” button on rinse window (see Figure 44).
- If an error message appears, refer to chapter 9.2.
- Switch system off and on again.
- If no error can be found:

  →Please contact our LCTech service team.

9.1.10 Implausible Pressure Values

Possible cause: Pressure sensor damaged or broken, wrong calibration of pressure sensor.

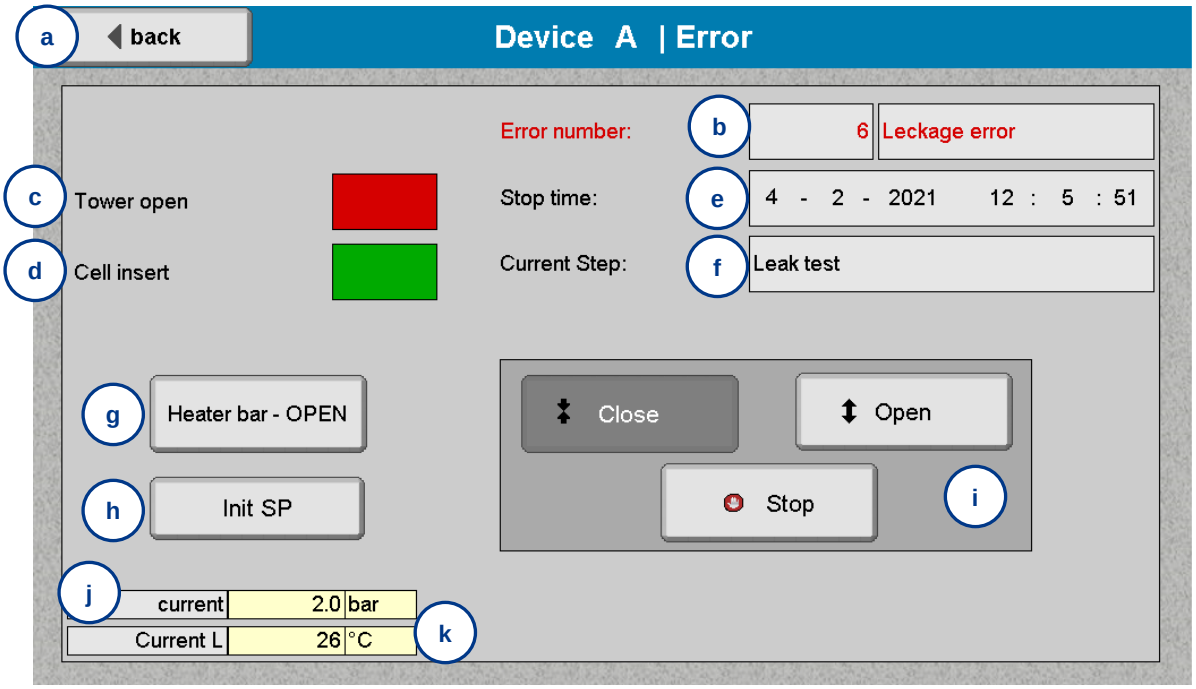
Troubleshooting:

- Check pressure value in idle state
- If no error can be found:

  →Please contact our LCTech service team.

9.2. Reported Errors

Should any of the following errors occur, the system will stop immediately and an appropriate error message (see following error message, for example) will be shown on the display. LED flashes red.



Error message 6: Example for displayed error.

(a) Back button

Return to cancel window (see Figure 41). The process can only be resumed if the cell has not yet been filled.

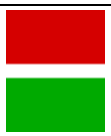
(b) Error number

Number of error and error type.

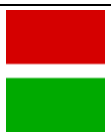
Error number	Error type
2	Overpressure
3	No cell insert
4	Error tower > Position
6	Leakage error
7	Error tower < Position
8	Error motor tower
9	Error motor valve
10	Timeout heating
11	Overpressure SP
12	Error Init SP

13	Error initialization SP
14	SP valve overload
15	SP plunger move
16	Timeout SP
17	I/O Link device A
18	I/O Link device B
19	I/O Link device C
20	I/O Link device D
21	I/O Link device E
22	I/O Link device F
23	Clogging of the tube
24	Timeout booster
25	Positioning valve

(c) State of tower

	Tower open Tower not open

(d) State of cell

	Cell not insert Cell insert

(e) Stop time

Time of error.

(f) Current step

Current step before interruption occurred.

(g) Heater bar button

Open heater bar.

(h) Init SP

Initialization of syringe pump.

(i) Tower button

Option to move cell tower. Open/Close/Stop button.

(j) Current pressure

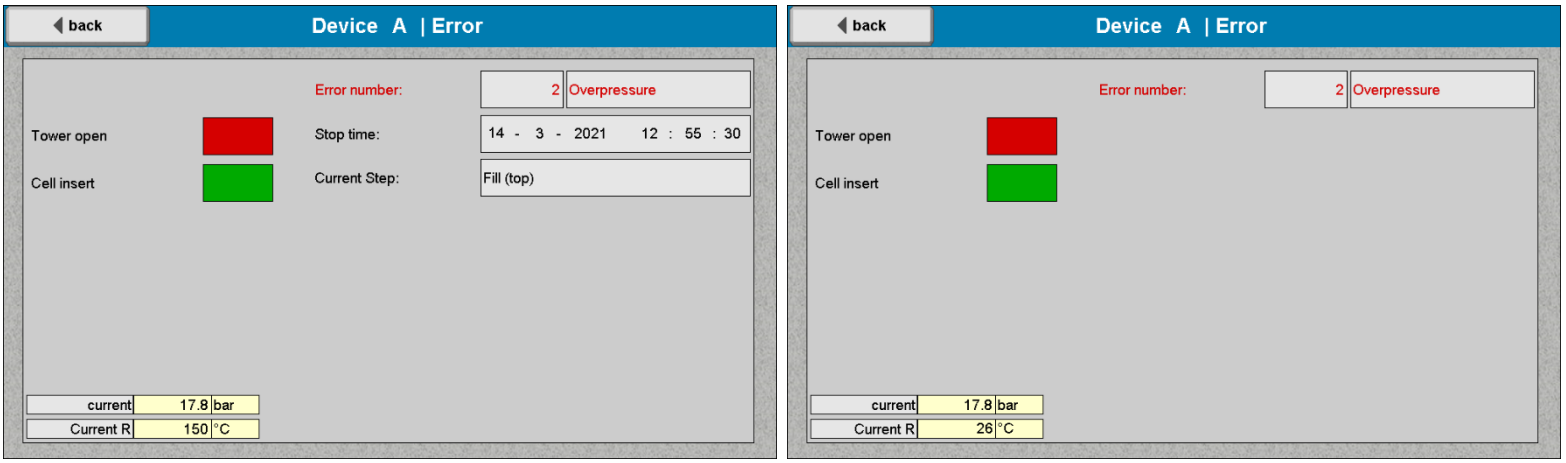
Display of current pressure of the system.

(k)Current temperature

Display of current temperature of the system. Heater bar left (L) and right (R).

9.2.1 Overpressure

General: This message (see Error message 2) appears when the system exceeds the set standard maximum pressure value, which is set at 17 bar.



Error message 2: Overpressure fault in the system. Left, during process and right, outside of process.

Possible causes:

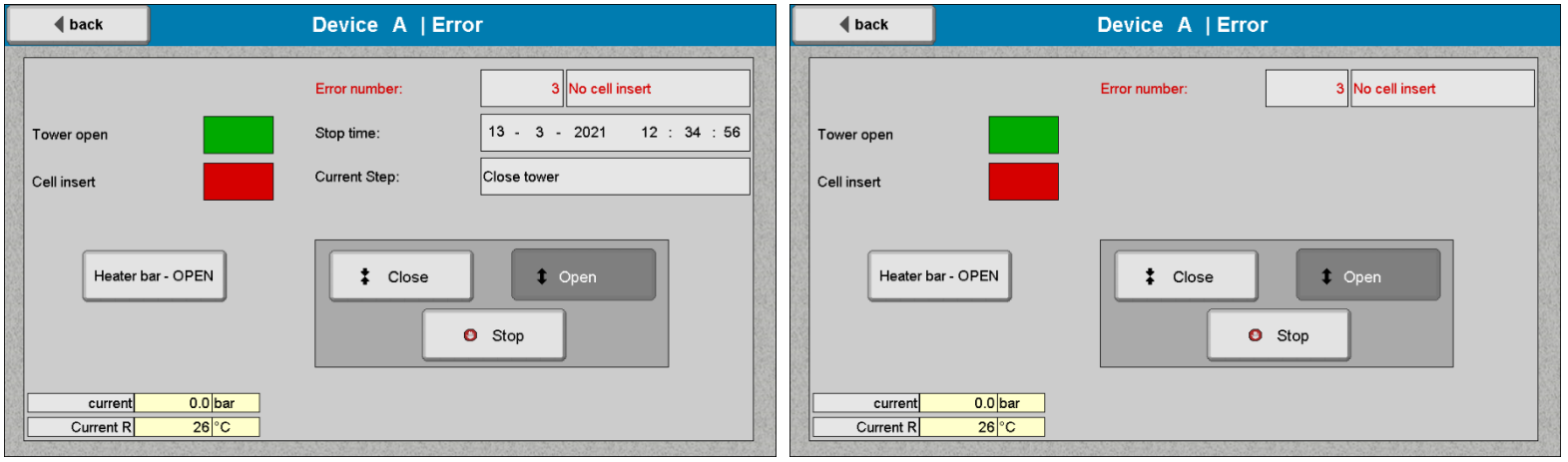
- Cell is overloaded and, as a result, the tube is blocked.
  Troubleshooting:
  1. Abort process.
  2. Reduce the sample load.

- Squashed tubes.
  Troubleshooting:
  Renew tubes.

- Incorrect valve position.
  - Contact the LCTech service team.

9.2.2 No Cell Inserted

General: This message (Error message 3) is triggered when no extraction cell was inserted. The sensor cannot detect a cell in the heating bar compartment.



Error message 3: Display of no cell insert. Left: error during processing. Right: during rinsing.

Possible causes:

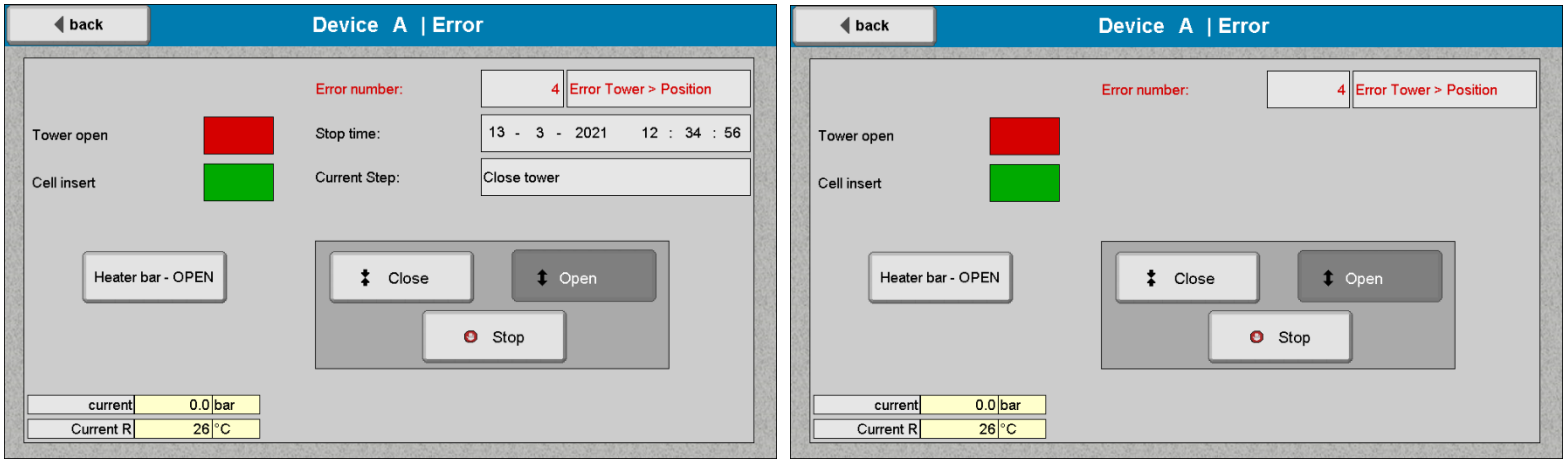
- No extraction cell inserted
  Troubleshooting:
  - Unlock cell holder with button “Heater bar-OPEN”.
  - Insert extraction cell in cell holder
  - Check, if extraction cell is inserted correctly (see chapter 7.2 and chapter 7.3.)
  - After insert cell restart process.

- Sensor problem.
  Troubleshooting:
  - Check correct insertion of cell, see chapter 7.2 and chapter 7.3.
  - Please contact the LCTech service team.

NOTE: The fault is rectified when a green field is displayed in the software.

9.2.3 Error Tower > Position

Cause: Error message 4 appears when the cell tower exceeds a certain safety value.



Error message 4: Displayed when cell tower get an error.

Possible causes:

- Cell tower not closed

Troubleshooting:

- Press “Stop” button.
- “Open” slightly (1 cm) and then close again properly with “Close” button.
- Error message still active or no control of the tower.
  → Please contact the LCTech service team.

ATTENTION: Never reach directly into moving machine parts or into gaps, which are provided for mechanical movements.

- Locked cell tower

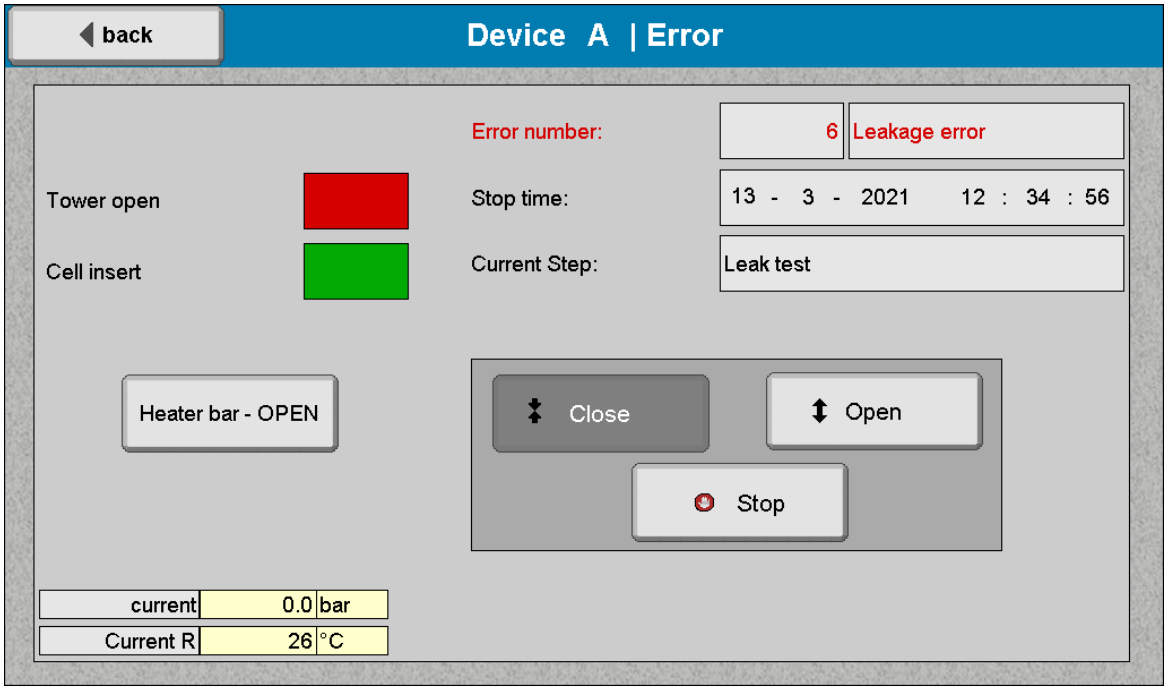
Troubleshooting:

- No control possible by the buttons “Stop”/”Open”/”Close” and error message still active, the positioning sensor has been overridden.
  → Please contact the LCTech service team.

NOTE: Tower status does not change because the INI sensor is 0 position.

9.2.4 Leakage Error

General: Leakage test failed.



Error message 6: Leakage error during process.

Possible causes:

- Missing nitrogen or low pressure of nitrogen.
  Troubleshooting:
  - Check nitrogen supply.
  - Check nitrogen connection.
  - Set nitrogen pressure to 3.0 bar (~ 43 psi).

- Leakage of extraction cell

  Troubleshooting:

  - Click on “Heater bar – OPEN”.
  - Click on “OPEN” to open cell tower.
  - Remove cell holder with extraction cell.
  - Check positioning of extraction cell within cell holder.
  - Check correct positioning of O-rings or replace O-rings.
  - Check if sealing surfaces are clean
  - Check if sealing surfaces are free of any damages.
  - Check presence of frit (SST) or replace frit (SST).

Once everything has been checked, please reassemble extraction cell, position extraction cell correctly in cell holder and reinsert equipped cell holder in the heater bar compartment.

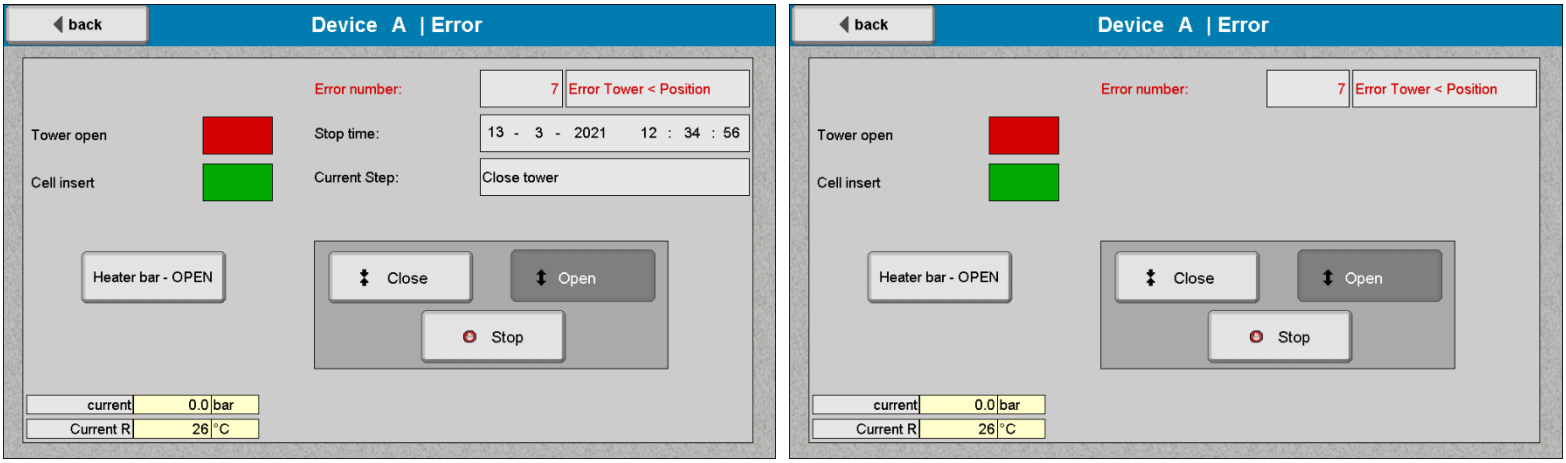
- Click on “CLOSE” to close cell tower.
- Click “back” to resume the process and repeat leakage test.

If leakage test is still unsuccessful after several attempts:

→ Please contact the LCTech service team.

9.2.5 Error Tower < Position

Cause: Tower motor had loss of steps. This is indicated in the following error message:



Error message 7: Tower not locked. Left extraction process, right rinse process.

Possible causes:

- Cell tower not completely locked

Troubleshooting:

- Press “Stop” button.
- “Open” slightly (1 cm) and then close again properly with “Close” button.
- Error message still active or no control of the tower:
  → Please contact the LCTech service team.

ATTENTION: Never reach directly into moving machine parts or into gaps, which are provided for mechanical movements.

- Locked cell tower

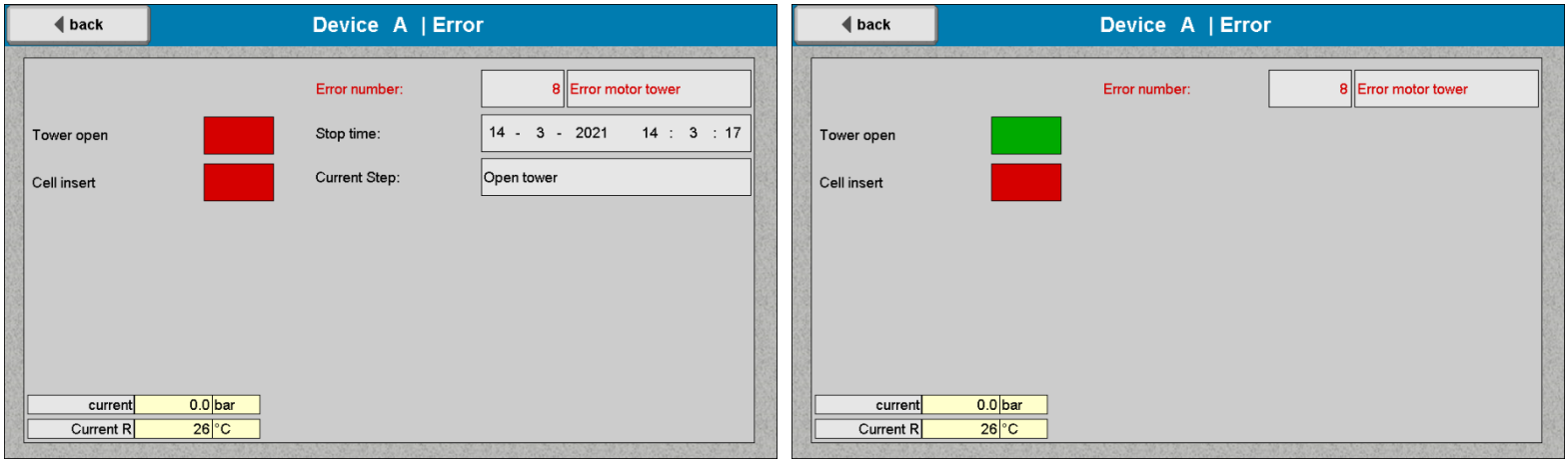
Troubleshooting:

- No control possible by the buttons “Stop”/”Open”/”Close” and error message still active, then the positioning sensor has been overridden.
  → Please contact the LCTech service team.

NOTE: Tower status does not change because the INI sensor is 0 position.

9.2.6 Error motor tower

Cause: Error message 8 appears when tower motor has an internal error or data connection is lost.



Error message 8: Reporting a motor fault and indicating the respective, affected motor. Left during the process and right outside of the process.

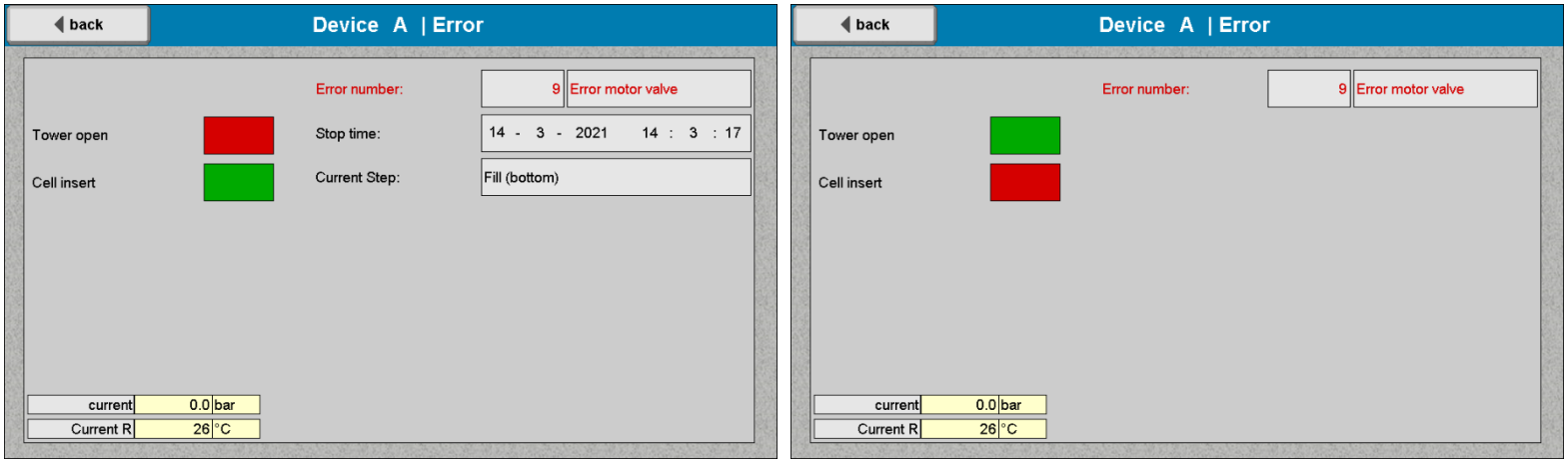
Troubleshooting:

- If during process: Cancel running process. Switch system off and on again.
- If not during process: Switch system off and on again.

If the error reoccurs, please contact the LCTech service team.

9.2.7 Error Valve Motor

Cause: Error message 9 appears when valve motor has internal error or data connection is lost.



Error message 9: Valve motor error.

Troubleshooting:

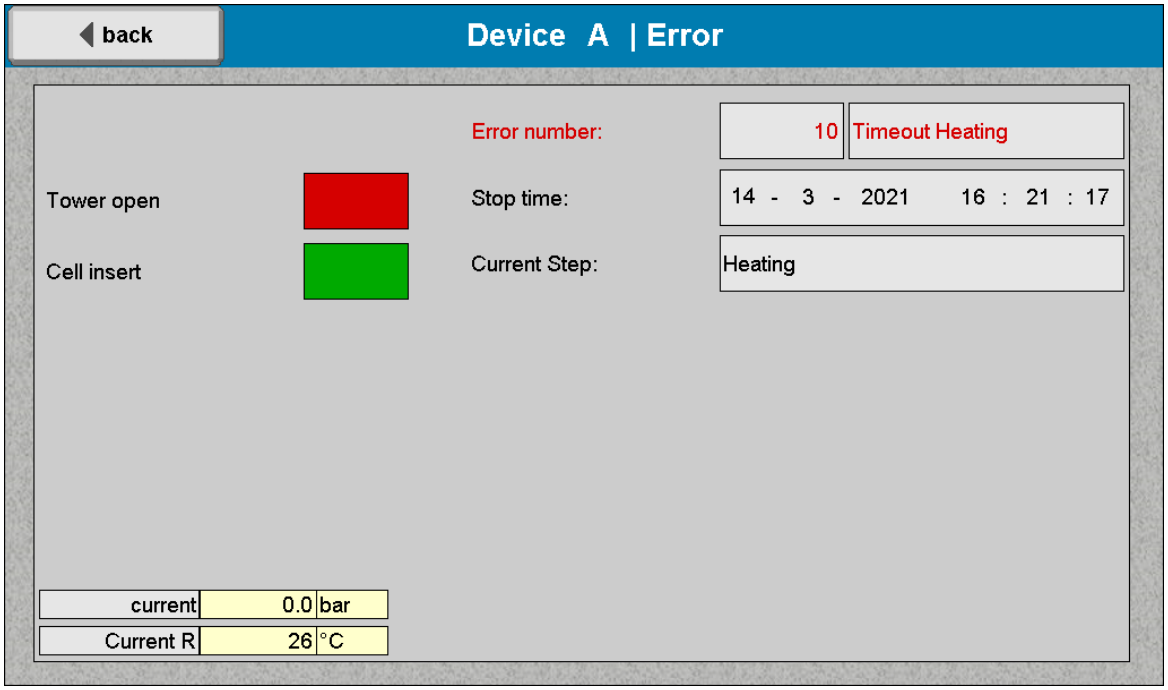
- If during process: Cancel running process. Switch system off and on again.
- If not during process: Switch system off and on again.
- Check, if valve makes any switching noise.

If the error reoccurs, please contact the LCTech service team.

NOTE: The process can only be resumed if the cell has not yet been filled. Otherwise only a process abort is possible.

9.2.8 Timeout Heating

Cause: Error message 10 appears when parameterized temperature was not reached within a certain period of time.



Error message 10: Heating error during process.

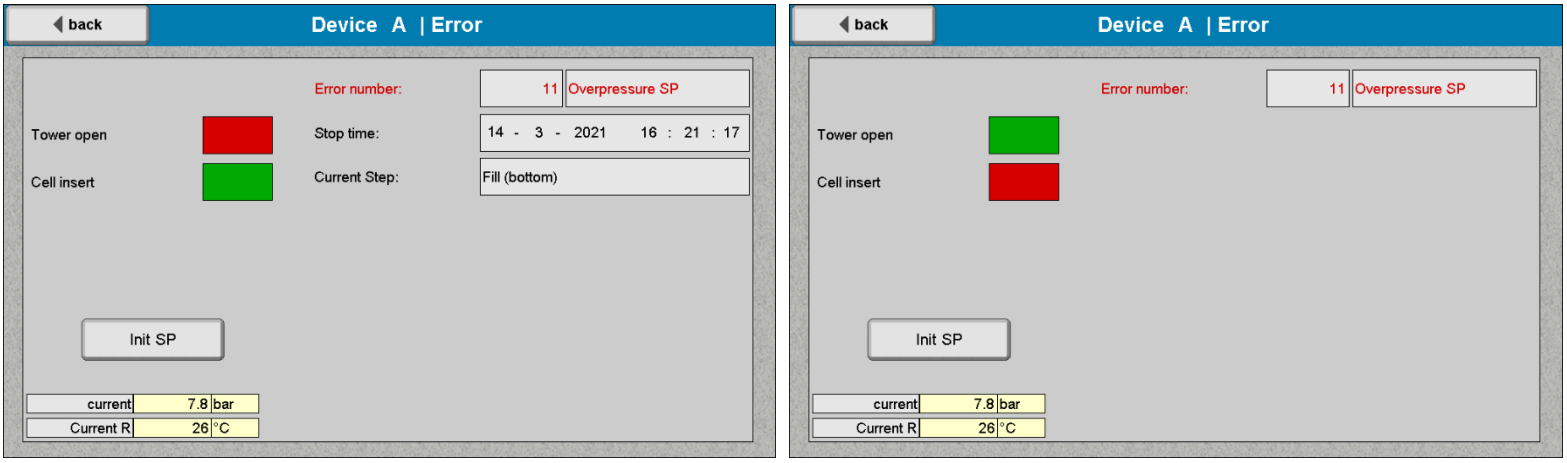
Troubleshooting:

- Check current temperature of left and right heating bar in the lower left corner within error window.
- Cancel running process. Switch system off and on again.

➔ If the error reoccurs, please contact the LCTech service team.

9.2.9 Overpressure SP

General: Error message 11 appears if the syringe pump detects overpressure.



Error message 11 Error page for syringe pump during process (left) and outside process (right).

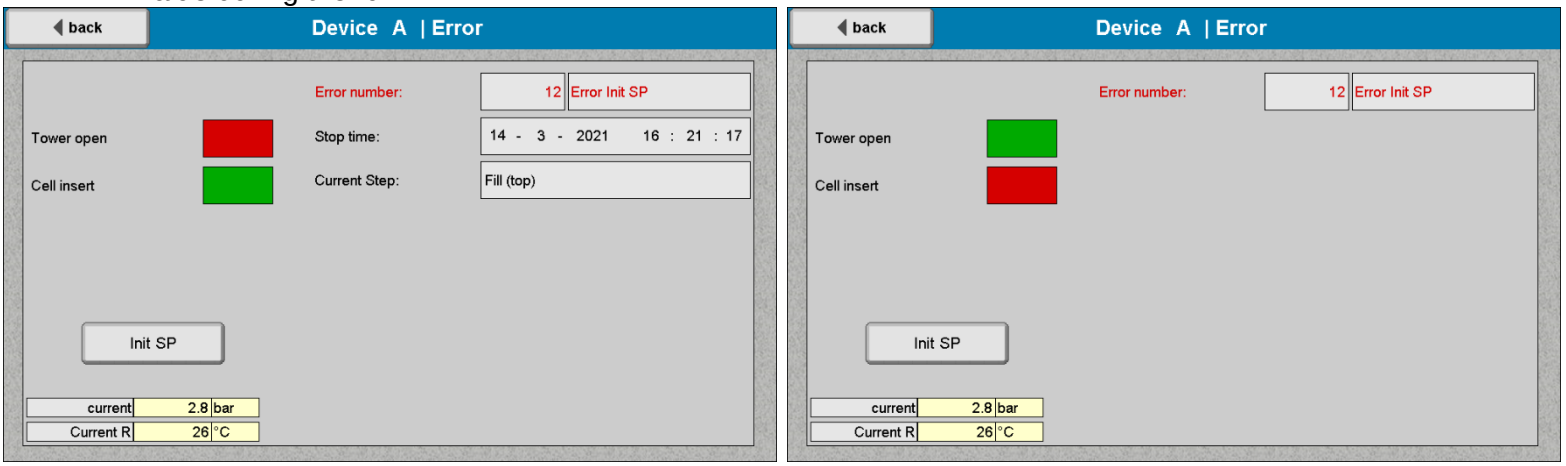
Possible cause: Cell is overloaded and, as a result, the tube is blocked.

Troubleshooting:

- Press *"Init SP"* button. Afterwards, the syringe should reinitialize.
- Alternative
  - Control possible: Cancel process, rinse system, reduce the sample load and restart process.
  - No control possible: Switch system off and on again.
    Contact the LCTech service team.

9.2.10 Error Init SP

General information: The Error SP Init will appear (Error message) if the syringe pump loses its initial value during the run.



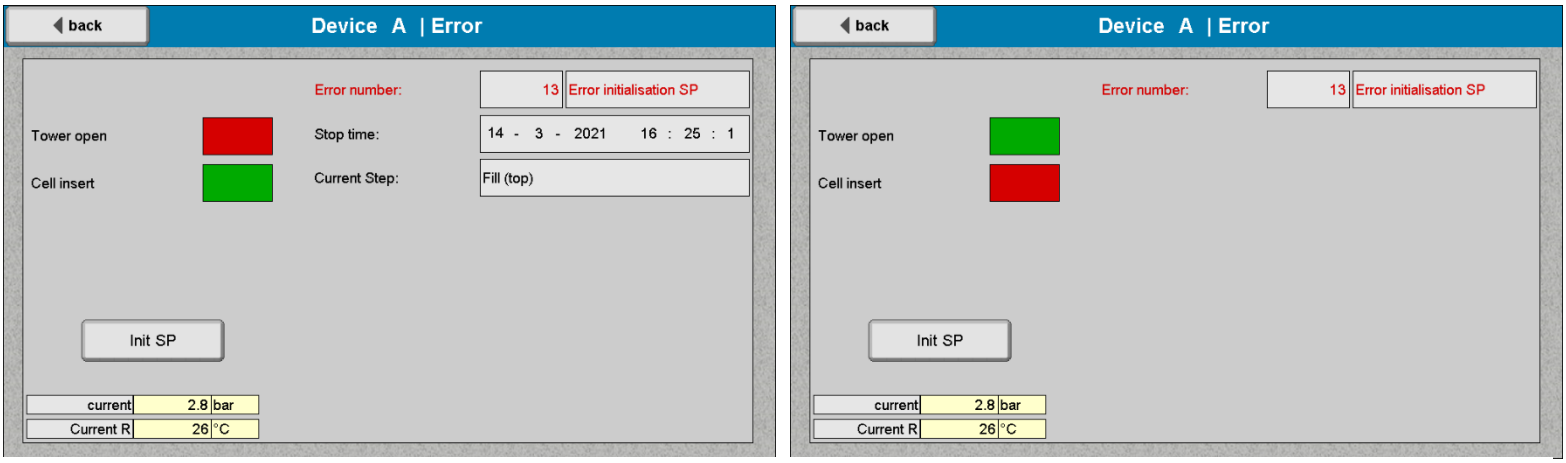
Error message 12: Error Init SP. During (left) and outside (right) of the process.

Troubleshooting:

- Press *"Init SP"* button. Afterwards, the syringe should reinitialize.
- Alternative
  - Control possible: Cancel process, rinse system and restart process.
  - No control possible: Switch system off and on again.
    Contact the LCTech service team.

9.2.11 Error Initialization SP

General information: The error “Error initialization SP” (Error message 13) will appear if the syringe pump was not initialized during the boot process.



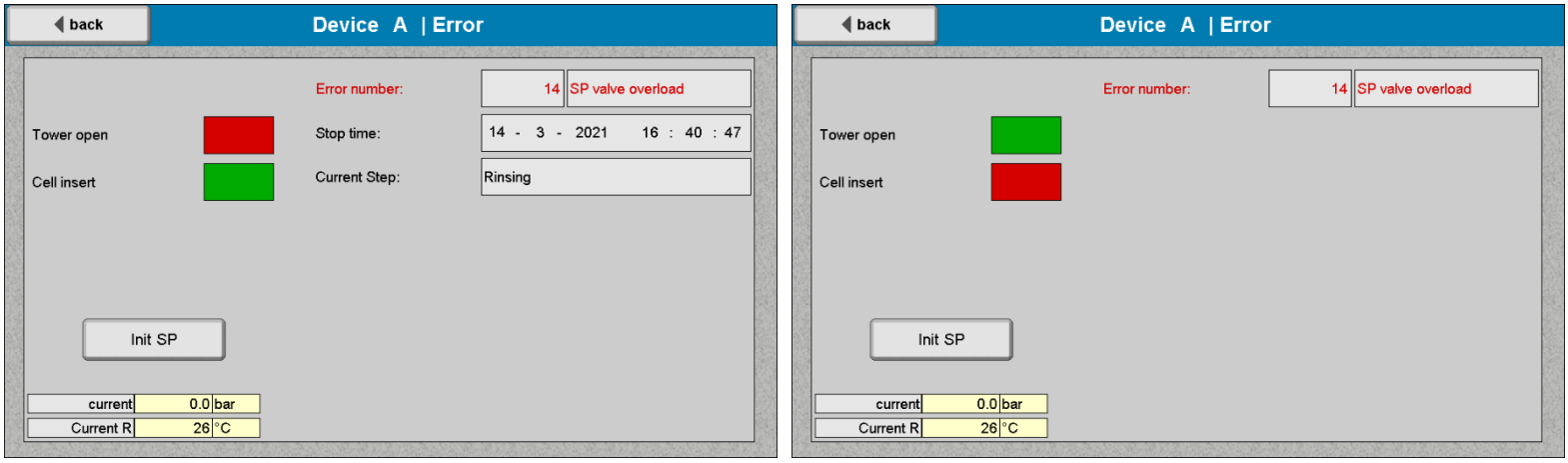
Error message 13: Initialization error of the syringe pump. During (left) and outside (right) of the process.

Troubleshooting:

- Press “*Init SP*“ button. Afterwards, the syringe should reinitialize.
- Alternative
  - Control possible: Cancel process, rinse system and restart process.
  - No control possible: Switch system off and on again.
    Contact the LCTech service team.

9.2.12 Error SP Valve Overload

General information: Error message appears if the syringe pump valve overloads during the run with the effect that the valve does not turn afterwards.



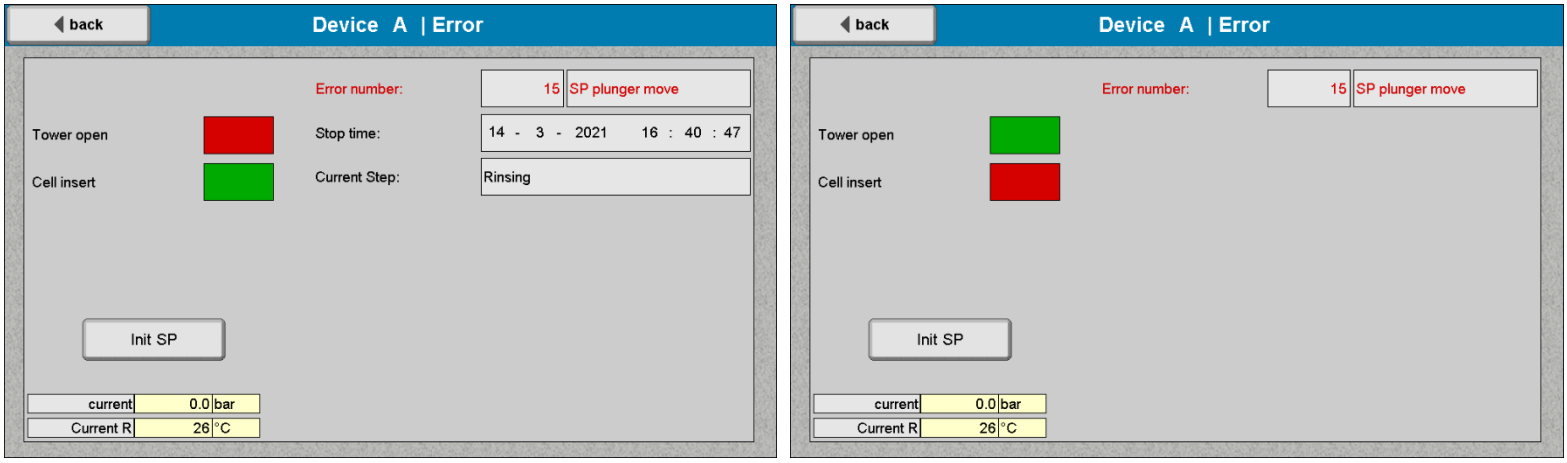
Error message 14: Error SP valve overload. During (left) and outside (right) of the process.

Troubleshooting:

- Press *“Init SP“* button. Afterwards, the syringe should reinitialize.
- Alternative
  - Control possible: Cancel process, rinse system and restart process.
  - No control possible: Switch system off and on again.
    Contact the LCTech service team.

9.2.13 Error SP Plunger Move

General information: The Error SP plunger move will appear (Error message 15) if the syringe pump plunger does not move during the run.



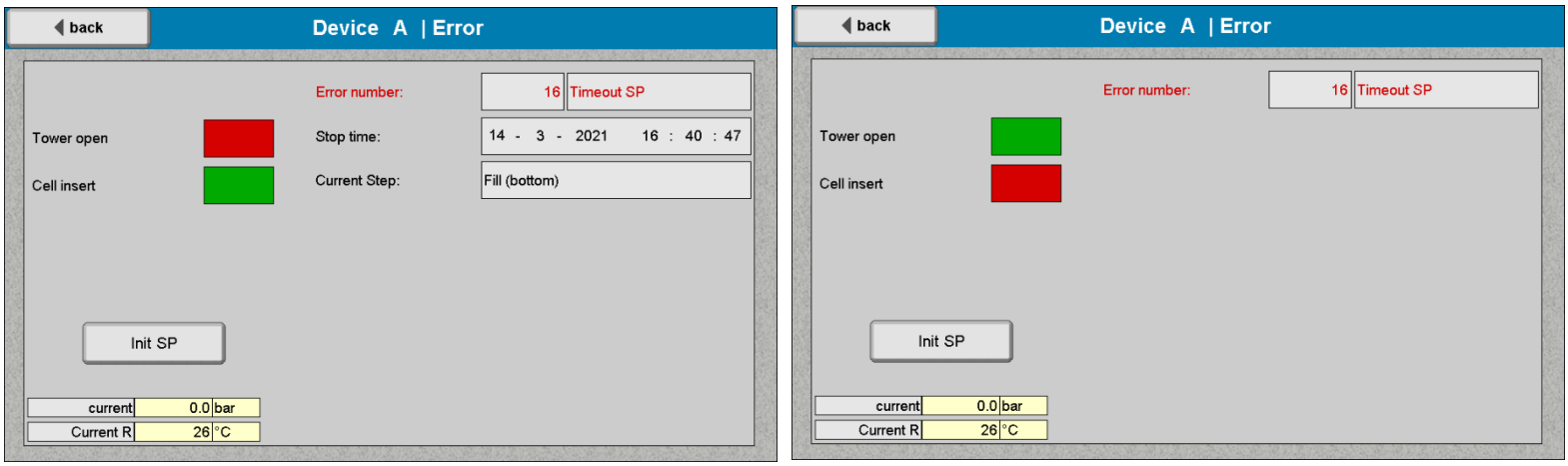
Error message 15: Error SP Plunger Move. During (left) and outside (right) of the process.

Troubleshooting:

- Press *"Init SP"* button. Afterwards, the syringe should reinitialize.
- Alternative
  - Control possible: Cancel process, rinse system and restart process.
  - No control possible: Switch system off and on again.
    Contact the LCTech service team.

9.2.14 Timeout SP

General information: This error message appears on the display if the syringe pump has not reacted to a signal for a certain period of time.



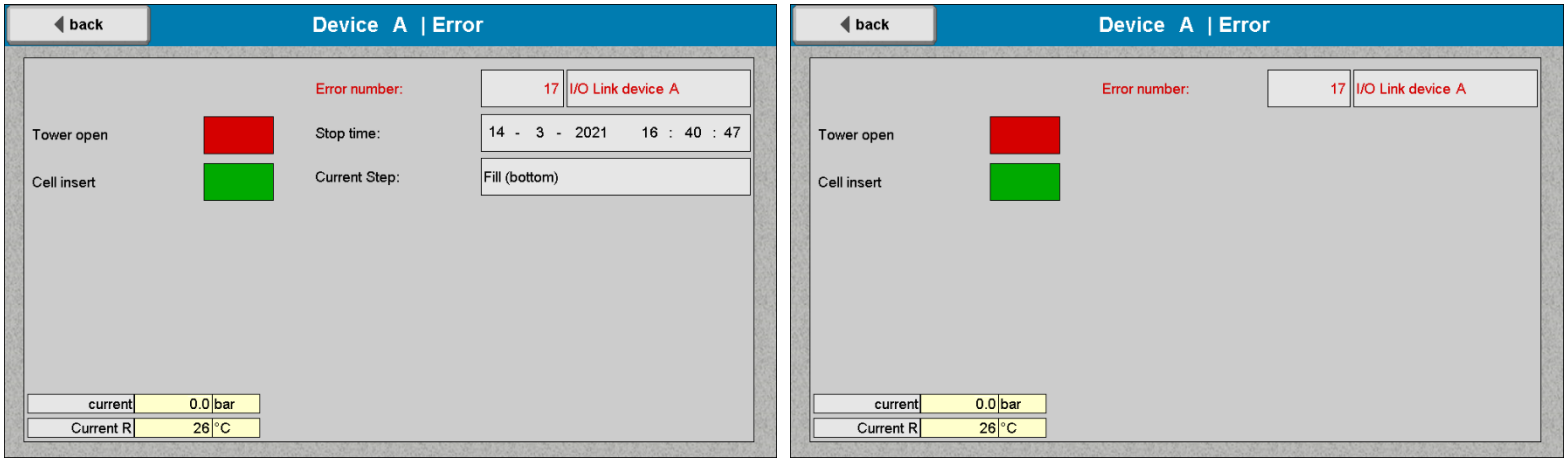
Error message 16: Syringe pump error. Left: during the process. Right: outside of the process.

Troubleshooting:

- Press *"Init SP"* button. Afterwards, the syringe should reinitialize.
- Alternative
  - Control possible: Cancel process, rinse system and restart process.
  - No control possible: Switch system off and on again.
    Contact the LCTech service team.

9.2.15 I/O Link Device X

General information: Data connection of certain device (in this case device A) was lost.



Error message 17: Example for I/O link problem.

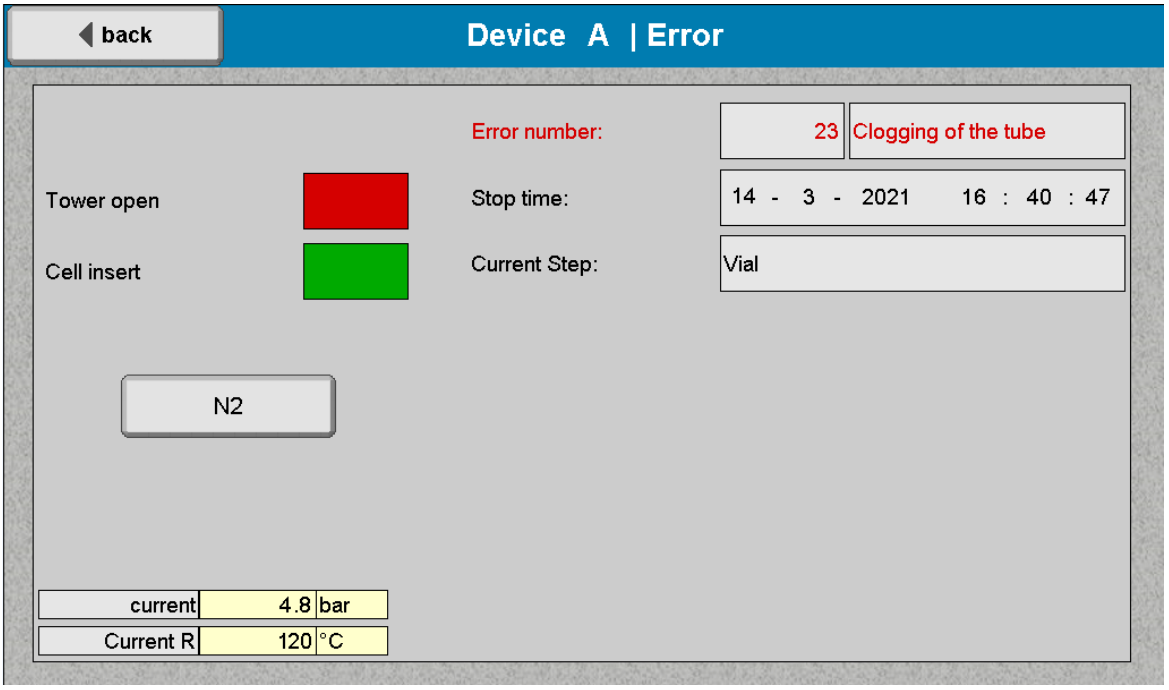
Troubleshooting:

- If during process: Cancel running process. Switch system off and on again.
- If not during process: Switch system off and on again.

➔ If the error reoccurs, please contact the LCTech service team.

9.2.16 Clogging of Tube

General information: Clogged line after extraction. Pressure value does not fall below safety value during process when extract is transferred into result vial.



Error message 23: Clogging error device A.

Possible cause:

- Cooling capillary is clogged
- Releasing the extract into the result vial takes to long, therefore also the pressure decrease, which is leading to a time out.

Troubleshooting:

- Push N_2-Button, trying to solve the clogging or overpressure. If the current pressure value gets under 0.5 bar, you can resume process by clicking *"back"*.
- If possible, increase the solvent volume and/or the temperature within the method, to create more pressure.

- If the above mentioned steps do not work, please cancel process.
- Switch system off and on again.
- Apply error management (see chapter 5.9).
- If the error reoccurs, please contact the LCTech service team.

Safety note: In case of a clogged line, there can be no nitrogen drying. As such, after removing the cell, solvent may leak out in an uncontrolled manner. Please use hand and eye protection.

9.2.17 Power Failure

General information: After a power failure, a particular window will appear after the device is switched on again (Figure 109). The message depends on which step was interrupted during the process. In general, the process cannot be continued.

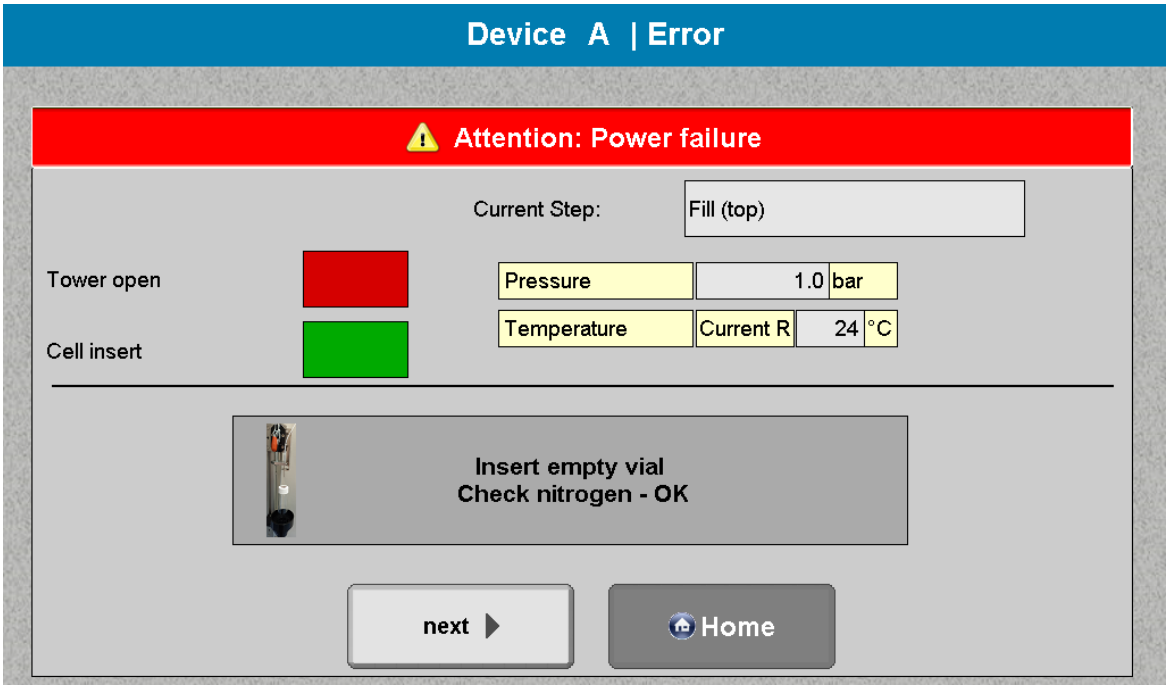


Figure 109: Restart window during extraction step fill top.

Possible causes:

- Blown fuse
- Power failure
- User switched off system during process

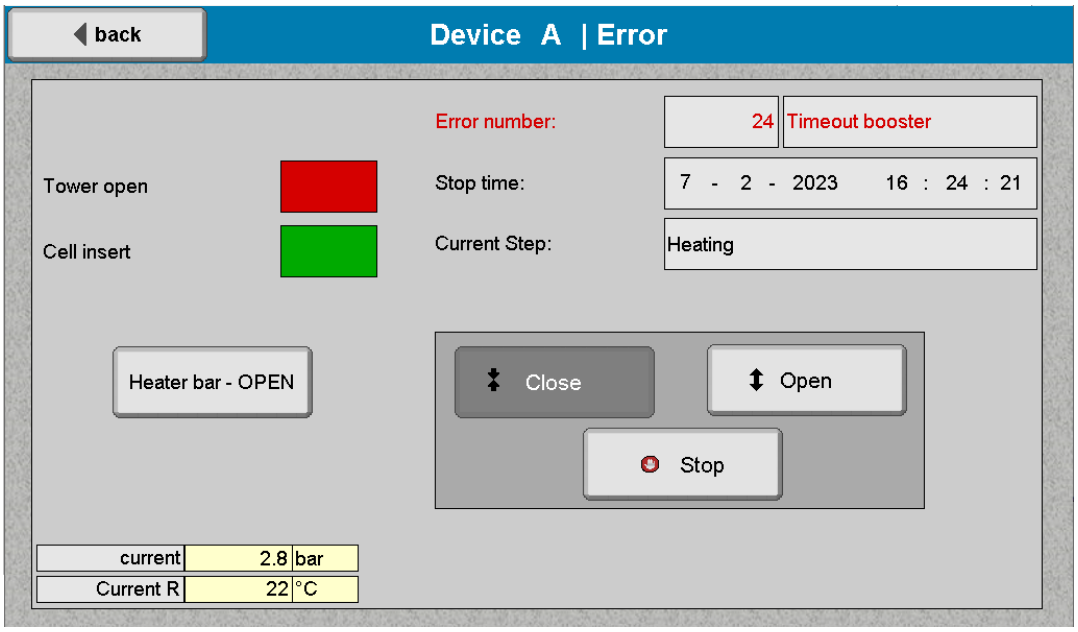
Troubleshooting:

1) During process:
- Apply error management (see chapter 5.9).
- Rinse the system.

2) Outside of process:
- *„next“* button: Apply error management (see chapter 5.9).
- *„Home“* button: return to main menu.

9.2.18 Timeout booster

Cause: Error message 24 appears when parameterized temperature was not reached within a certain period of time.



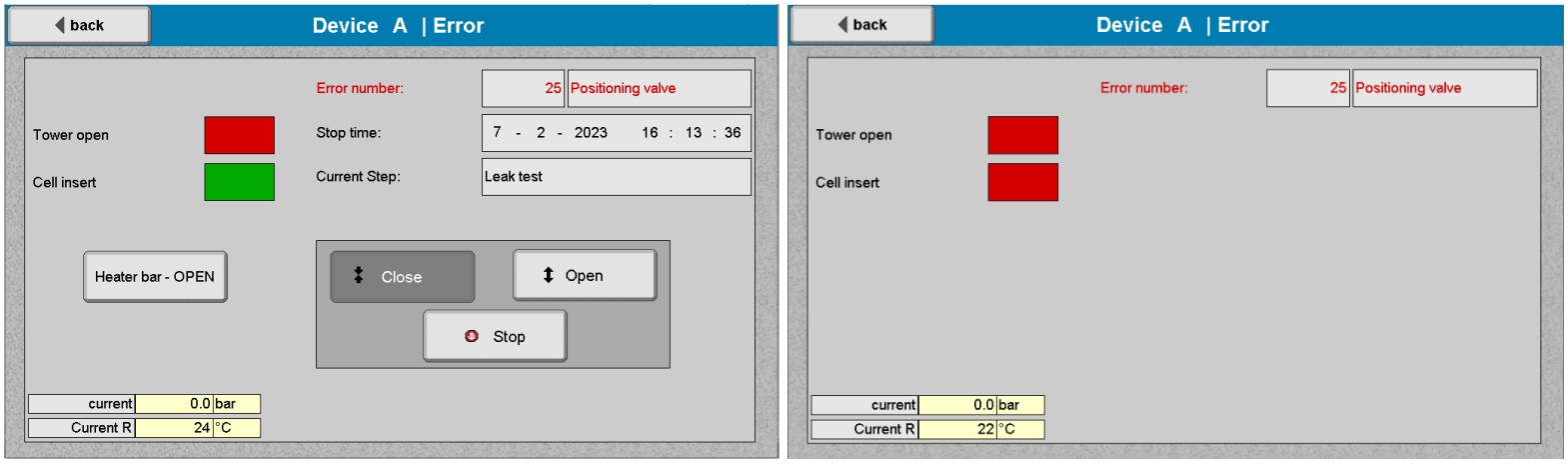
Error message 24: Booster error during heat process.

Troubleshooting:

- Check current temperature of left and right heating bar in the lower left corner within error window.
- Cancel running process. Switch system off and on again.
  If the error reoccurs, please contact the LCTech service team.

9.2.19 Positioning valve

Cause: Error message 25 appears when a valve position cannot be approached correctly.



Error message 25: Reporting a positioning fault. Left during the process and right outside of process.

Troubleshooting:

- If during process: Cancel running process. Switch system off and on again.
- If not during process: Switch system off and on again.
- Check, if valve makes any switching noise.

If the error reoccurs, please contact the LCTech service team.

10. Reshipment of Device

If you need to return your LCTech device, please contact the LCTech Service team first.

11. Disposal of Device

Please observe local regulations for collection and disposal of laboratory waste as well as the relevant safety data sheets for the chemicals used. For help, please contact the local authorities.

To ensure an environmentally-friendly disposal of the device, please recycle and separate the components correctly.

For disposal of solvents or consumables, please see the material safety data sheets of these chemicals.

12. Parts and Accessories

In case parts need to be replaced, use LCTech original parts only. All parts have been carefully selected and tested and ensure proper function.

Below you will find the part to be serviced.

General accessories

Part-Number	Description
F060	Screw-Thread Bottle, 60 mL, 100 pcs. per carton
F250-D	Screw-Thread Bottle, 250 mL, 2 pcs. per carton
F250	Screw-Thread Bottle (with concave bottom), 250 mL, 2 pcs. per carton
19342	Vial holder vor D-EVA centrifuge vial (P/N 16725)
16725	Centrifuge Tube, 85 mL, GL 32, 2 pcs / pck
16754	Screw Cap, GL 32, 10 pcs / pck
10020	Solvent filter 10 µm sinter filter
19341	Rack for Extraction Cell 75 mL, for up to 3 Extraction Cells
19700	Extraction Cell, nominal volume 75 mL, ready to use
18617	O-Ring, reusable, 10 pcs / pck
17782	Frit (Stainless Steel), 10 µm, reusable, 10 pcs / pck
19263	Rinsing Cell
19281	Glass Fiber Filter, diameter 37 mm, 100 pcs / pck
19343	Plunger for Filter, placement in 75 mL-extraction cell

Spare parts

Part-Number	Description
19478	Lid for Extraction Cell
17697	Extraction Cell (only Body)
18998	Cooling Capillary
11842	Syringe, 10 mL
19653	Report function for X-TRACTION (USB-Stick)

13. Version History

Version-No	Date	Description	SW Version
1.1	21.12.2021	Update Error management	1.1
1.2	03.06.2022	Update Error management and method management	2.0
1.3	28.02.2023	Update Error management	2.1

Any Questions?
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