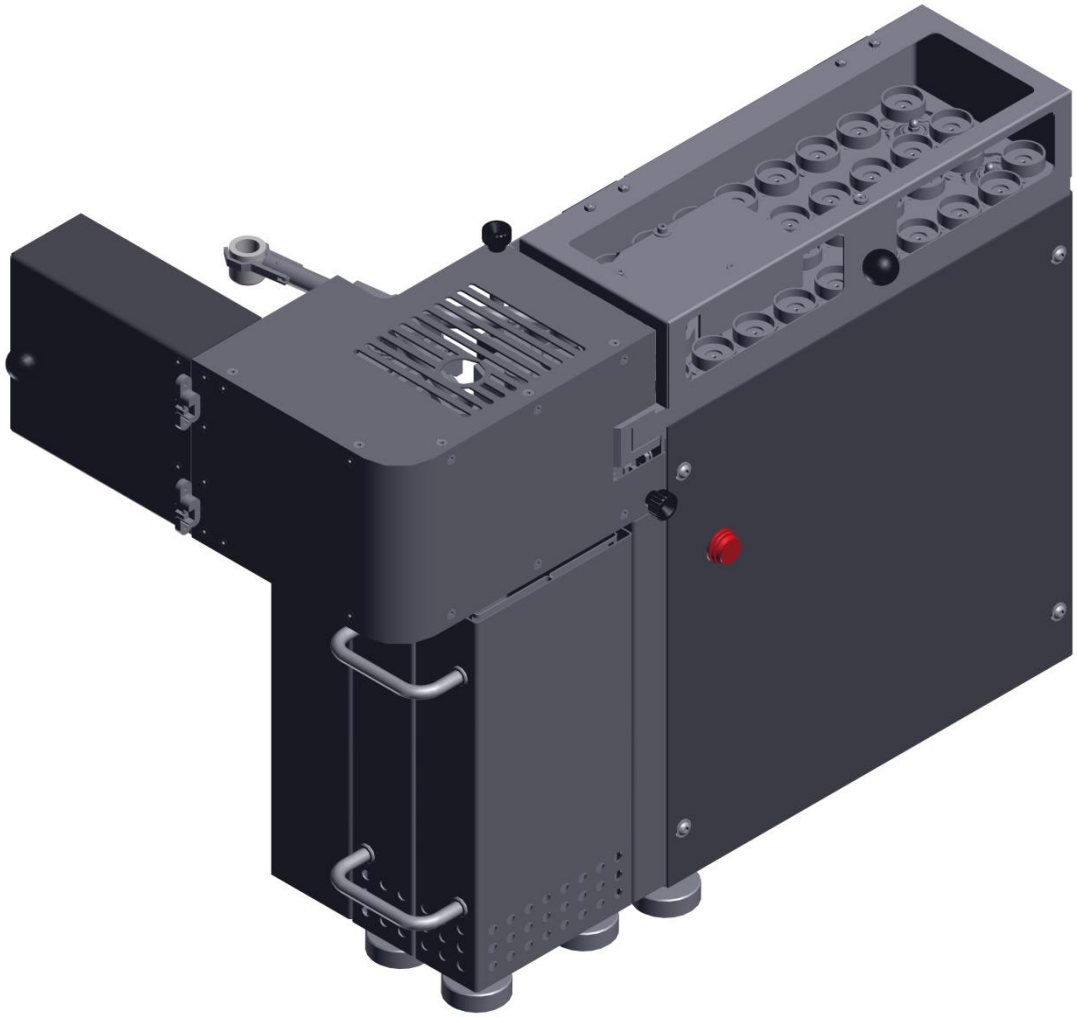
Manual

Autoloader CSi/d



Translation

ELTRA®

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1 Contact information

Please contact your local representative in the event of problems. You can find the complete list of dealers at www.eltra.com.

Of course you can also contact ELTRA-Germany directly:

ELTRA GmbH
Retsch Allee 1-5
42781 Haan
Germany
Web: www.eltra.com
Email: service@eltra.com

2 Notes on the Manual

This Operating Manual provides technical instructions for the safe operation of the device and contains all necessary information about the topics given in the table of contents. This technical documentation is meant to be a tutorial and a reference. The individual chapters are self-contained.
Knowledge of the relevant chapters (for the respective target groups defined according to areas) is a prerequisite for the safe and correct use of the device.
This Operating Manual contains no repair instructions. In the event of any faults or necessary repair work, please contact your supplier or Eltra GmbH directly.

Amendments
Subject to technical changes.

2.1 Intended use

This device is used for the automatic supply of crucibles for the CSi/d analyzer. It may only be used in the laboratory by appropriately qualified and trained personnel.

2.2 Improper use

Private use and use in conjunction with other equipment than the CSi/d analyzer is not permitted.
Repairs and modifications may only be carried out by Eltra GmbH, or an authorised representative, or by qualified service technicians.

2.3 Explanations of the Safety Instructions

In this Operating Manual, we give you the following safety warnings

Mortal injury may result from not following these safety warnings. We give you the following warnings and corresponding content.

DANGER D1.0000

Type of danger / personal injury
Source of danger

- Possible consequences if the dangers are not observed.
- **Instructions and information on how the dangers are to be avoided.**

We also use the following signal word box in the text or in the instructions on action to be taken:

DANGER

Serious injury may result from not following these safety warnings. We give you the following warnings and corresponding content.

WARNING W1.0000

Type of danger / personal injury
Source of danger

- Possible consequences if the dangers are not observed.
- **Instructions and information on how the dangers are to be avoided.**

We also use the following signal word box in the text or in the instructions on action to be taken:

WARNING

Moderate or mild injury may result from not following these safety warnings. We give you the following warnings and corresponding content.

CAUTION C1.0000

Type of danger / personal injury
Source of danger

- Possible consequences if the dangers are not observed.
- **Instructions and information on how the dangers are to be avoided.**

We also use the following signal word box in the text or in the instructions on action to be taken:

CAUTION C2.0000

In the event of possible **property damage** we inform you with the word “Instructions” and the corresponding content.

NOTICE N1.0000

Type of property damage
Source of property damage

- Possible consequences if the notices are not observed.
- **Instructions and information on how the property damages are to be avoided.**

We also use the following signal word in the text or in the instructions on action to be taken:

NOTICE

2.4 Explanation of the warning symbols

The warning symbols used are explained below.

Warning of hot surfaces — Warns of hot surfaces. Parts of the device get hot. Never touch hot components.

Warning of hand injuries — Warns of hand injuries. The device has moving parts. Never touch moving parts.

For further information, please observe the safety instructions at the relevant places.

2.5 General Safety Instructions

DANGER D2.0006

Danger caused by burning samples

- Damage to the respiratory tract, skin and/or mucous membranes.
- Radiation damage.
- **Users themselves must assess the risk emanating from a sample during analysis.**

DANGER D3.0006

Risk of explosion or fire
Potentially explosive atmosphere

- Due to its design, the device is not suitable for use in a potentially explosive atmosphere.
- **The device may not be operated in a potentially explosive atmosphere.**

⚠ CAUTION C3.0002

Risk of injury
Lack of knowledge of the Manual

– The Manual contains all safety-related information. Disregarding the Manual can therefore lead to injuries.
- **Read the Manual carefully before operating the device.**

Target group:
All activities required for correct use are described in this Operating Manual. Any activities that go beyond this may only be performed by authorised electricians who have received in-depth training for this analyzer.

As the operating company, you must ensure the following with respect to the personnel instructed to work on the analyzer:

- That all regulations in the area of safety have been noted and understood;
- That, before starting work, they know about all instructions and regulations pertaining to the target group relevant to them;
- That they have access at all times to technical documentation about this Autoloader;
- That new personnel have been familiarised with the safe, correct use of the Autoloader before starting work on it, either through verbal instruction by a competent person or with the help of the technical documentation available.

Incorrect operation can result in personal injury and damage to property. You are responsible for your own safety and that of your employees.
Ensure that no unauthorised persons have access to the analyzer.

⚠ CAUTION C4.0092

Risk of injury due to modifications
– Modifications to the Autoloader can result in personal injuries.
- Eltra GmbH's declared conformity with European directives shall then cease to be valid.
- All warranty claims shall expire.
- **Do not perform any modification to the Autoloader and only use accessories approved by Eltra.**

⚠ CAUTION C5.0092

Risk of injury caused by incorrect repairs
– This Manual does not contain any repair instruction.
- **For safety reasons, repairs may only be carried out by Eltra GmbH, an authorised representative or by qualified service technicians.**

3 General information

3.1 About the device

The CSi/d Autoloader is delivered in an assembled state. Only the connectors need to be connected on the back and the CSi/d Autoloader screwed to the analyzer. For this reason, no adjustment is usually required after installation. The various possible settings are, however, described in detail in the “Servicing” chapter.

3.2 Transport

The CSi/d Autoloader weights 18 kg. It should therefore only be lifted by two people. When doing so, ensure you grip it securely.

CAUTION C6.0092

Risk of cuts

– Sheet metal parts can have sharp edges.

• **During transport, ensure you grip them securely and do not grip the underneath of sheet metal parts.**

4 Installation

4.1 Setting up the CSi/d Autoloader

Proceed as follows to set up the CSi/d Autoloader:

1. Place the CSi/d Autoloader to the right of the analyzer.
2. When setting up ensure there is a stable, non-slip and fireproof base, and comply with the following safety instructions in this respect.

The CSi/d Autoloader has now been set up and can be installed.

DANGER D4.0006

Danger caused by burning samples

– Damage to the respiratory tract, skin and/or mucous membranes.
– Radiation damage.
- **Users themselves must assess the risk emanating from a sample during analysis.**

WARNING W2.0021

Fire hazard / risk of burns caused by hot components

Hot components (crucibles, reagents etc.) can fall down

– Surfaces onto which the hot component can fall catching fire.
– Clothing and other materials catching fire.
- **Set the Autoloader up in a fireproof environment. Pay special attention to the desk, floor and other surfaces near the Autoloader.**
- **Always wear suitable work clothes.**
- **Keep the work area free from all materials that could catch fire.**
- **Do not set the Autoloader up in any explosive atmosphere.**

CAUTION C7.0092

Risk of injury caused by the Autoloader falling down

Incorrectly set up or insufficient workspace

– Due to its weight, the Autoloader can cause personal injuries if it falls down.
- **Only operate the Autoloader on a sufficiently large, strong, non-slip and stable workspace.**
- **Ensure that the feet of the device are positioned securely.**

4.2 CSi/d Autoloader connections

The three connections on the back of the CSi/d Autoloader must be connected to put it into operation.

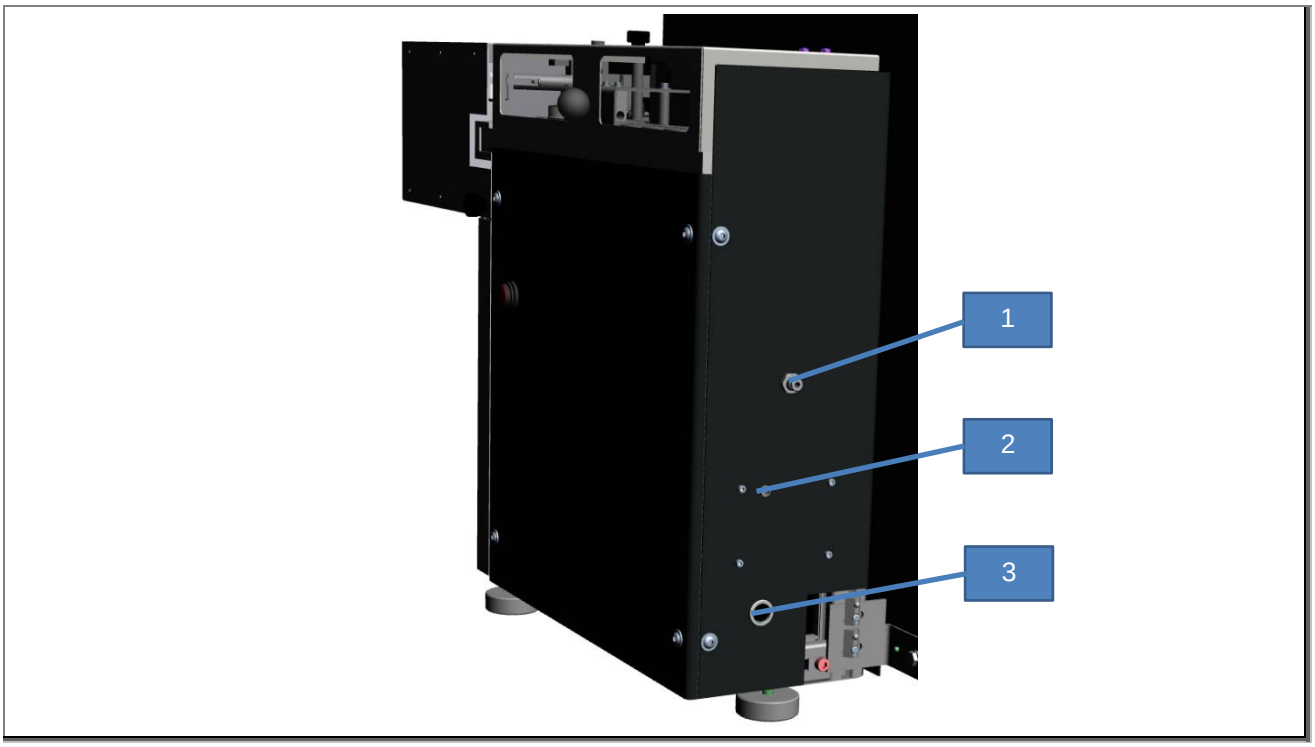

Fig. 1: Connections on the back of the CSi/d Autoloader

Number	Component	Description
1	Pneumatic connection	Connection for the pneumatic connection to the analyzer
2	Electrical connection	Connection for the power supply
3	Analyzer connection	Connection for communication between the analyzer and CSi/d Autoloader

Proceed as follows to connect the CSi/d Autoloader:

1. With the help of the supplied pneumatic hoses and the tee, connect the pneumatic connection on the CSi and the CSi/d Autoloader (**1**) (see Fig. 1: Connections on the back of the CSi/d Autoloader).
2. Connect the tee to your compressed air supply.
3. Connect the connection inside the analyzer to the analyzer connection (**3**) (see Fig. 1: Connections on the back of the CSi/d Autoloader).
4. Connect the power supply unit provided to the electrical connection (**2**) (see Fig. 1: Connections on the back of the CSi/d Autoloader).

The CSi/d Autoloader has now been connected.

NOTICE

Damage to the device

- The electronics of the device may be damaged.
- **Only use the power supply unit provided.**

4.3 Dismantling the side cover

The side cover must be dismantled to install and adjust the CSi/d Autoloader.

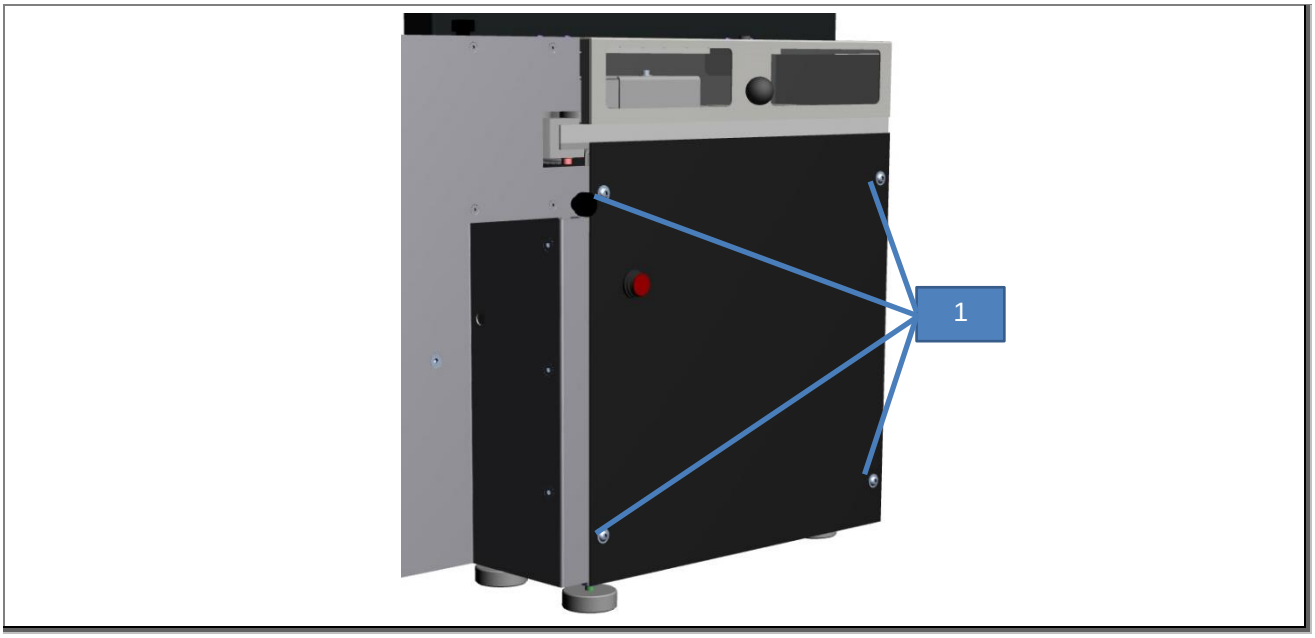

Fig. 2: Side cover

Number	Component	Description
1	Side cover screws	Used to secure the side cover

Proceed as follows to dismantle the side cover:

1. Remove the screws (**1**) (see Fig. 2: Side cover).
2. Place the side cover to one side.

The side cover has now been removed.

4.4 Switching to manual mode

Manual mode can be used to switch through the individual steps of the CSi/d Autoloader.

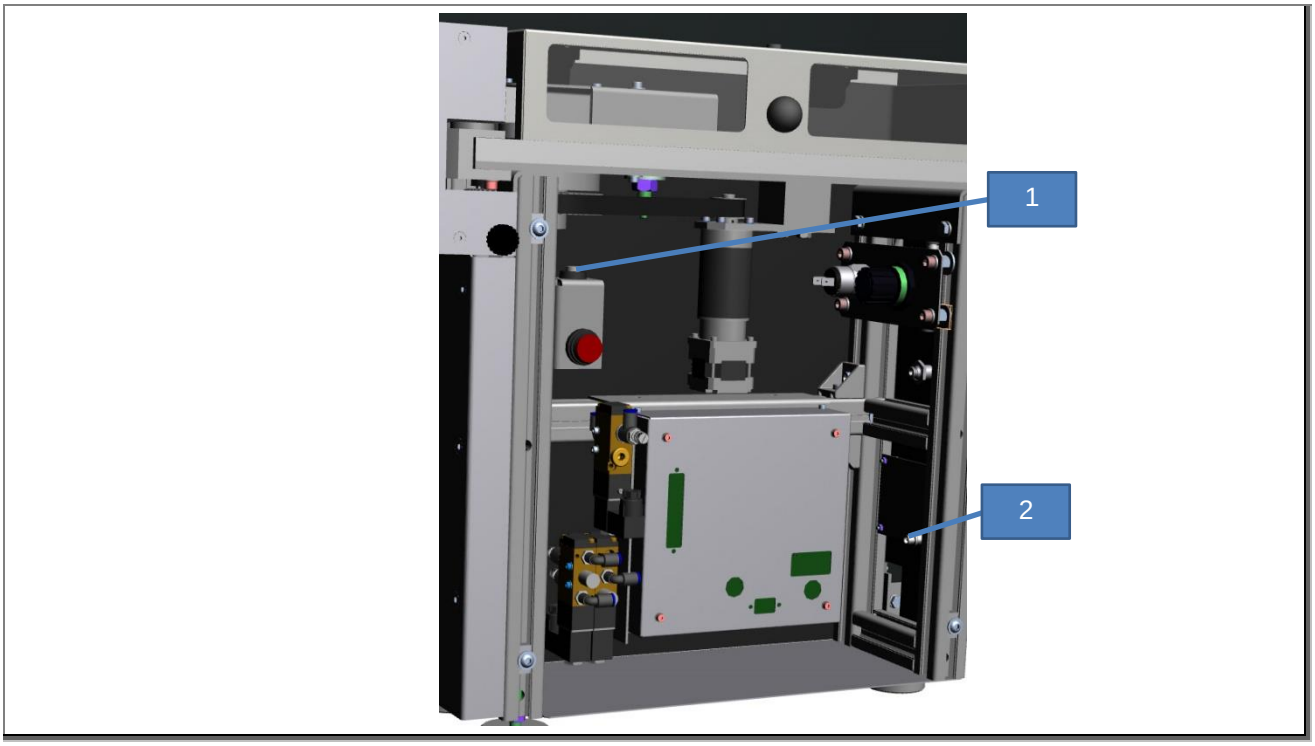

Fig. 3: Manual mode

Number	Component	Description
1	Button for manual control	Used to switch through the individual steps in manual mode
2	Electrical connection safety circuit	If the power supply unit of the CSi/d Autoloader is plugged in there, the safety circuit is bridged

To switch to manual mode the CSi analyzer must be turned off and connected to the CSi/d Autoloader. Proceed as follows:

1. Pull the power supply unit from the back of the CSi/d Autoloader.
2. Keep the manual control button (**1**) pressed and plug the power supply unit into the designated electrical connection (**2**) in the safety circuit (see Fig. 3: Manual mode).
3. Keep the manual control button (**1**) pressed for a few seconds (see Fig. 3: Manual mode).

Manual mode has now been activated and the individual steps can be activated using the manual control button (**1**).
Switching to manual mode bridges the safety circuit.
Remove the power supply unit to exit manual mode.

CAUTION

C8.0092

Risk of injury in manual mode

– The safety circuit is deactivated.

- **Manual mode should only be used when adjusting the settings on the CSi/d Autoloader. Important safety devices are deactivated. Exit manual mode before analysing samples.**

4.5 Affixing to the analyzer

Two brackets are used to screw the CSi/d Autoloader to the analyzer.

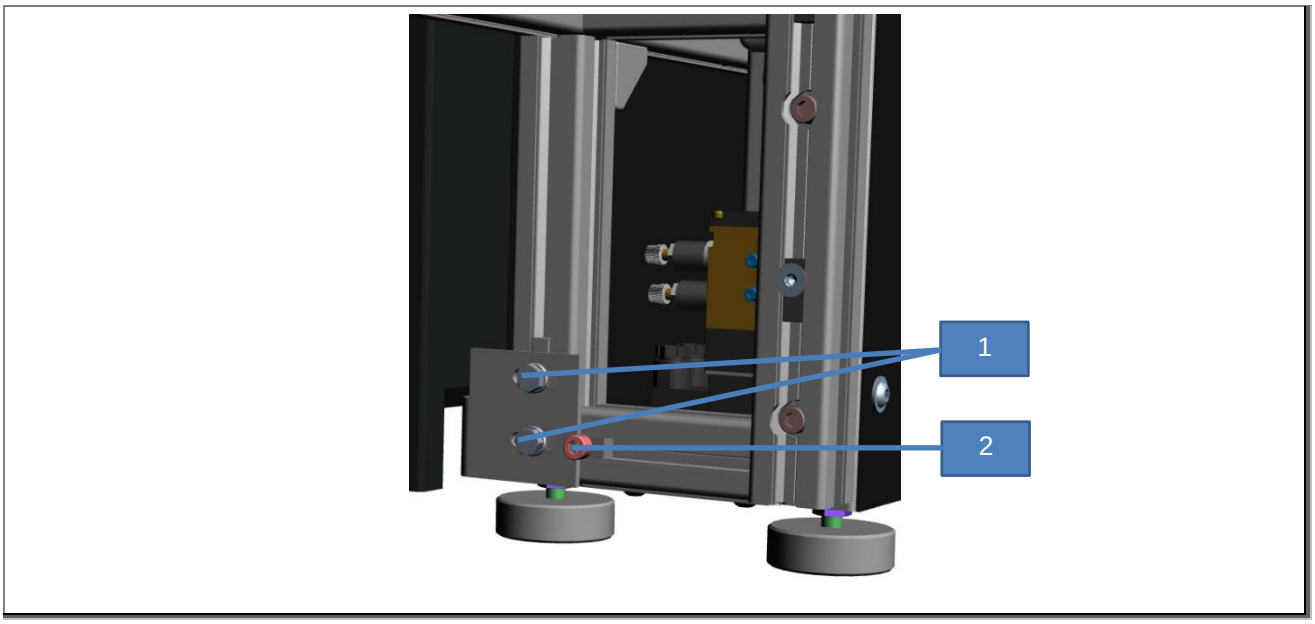

Fig. 4: Aligning the CSi/d Autoloader

Number	Component	Description
1	Screws for alignment	Used to align the CSi/d Autoloader to the analyzer
2	Locking screw	Used to lock the alignment

Proceed as follows to screw the CSi/d Autoloader to the analyzer:

1. Place the CSi/d Autoloader tightly onto the analyzer.
2. Switch to manual mode.
3. Using the manual control button, switch through the individual steps of the program until the gripper arm has reached the crucible position on the analyzer (see Chapter 7.4: Gripper arm positions).
4. Align the CSi/d Autoloader so that the gripper arm can place the crucible midway on the crucible tray of the analyzer.
5. Now align the height of the CSi/d Autoloader by screwing the three pedestals in and out so that there is a small gap between the crucible and the crucible tray of the analyzer. With the help of the supplied spirit level, ensure that the CSi/d Autoloader is horizontal.
6. Using the brackets, screw the CSi/d Autoloader to the analyzer. The CSi/d Autoloader can be adjusted in a horizontal direction using the slotted holes on the brackets (**1**) (see Fig. 4: Aligning the CSi/d Autoloader).
7. Press the locking screw (**2**) against the brackets and screw it tight. This prevents the position shifting if you need to disconnect the CSi/d Autoloader from the analyzer (see Fig. 4: Aligning the CSi/d Autoloader).

The Autoloader has now been connected to the analyzer.

4.6 Individual step cycles

If the CSi/d Autoloader is in manual mode, it is possible to switch through the individual steps of the device using the manual control button; the CSi/d Autoloader then follows the step sequence for the analysis mode.

The step sequence follows the pattern below:

1. The crucible chain conveys the first crucible to the chain crucible position (see Chapter 7.4: gripper arm positions).
2. The gripper fingers move to the analyzer crucible position (see Chapter 7.4: gripper arm positions).
3. The gripper fingers move to the disposal crucible position (see Chapter 7.4: gripper arm positions).

Pressing the manual control button again starts the next cycle. We recommend performing several cycles in manual mode to ensure that the mechanical settings are correct. If not, they must be adjusted again.

5 Operation

5.1 Operating the CSi/d Autoloader

To start the CSi/d Autoloader in normal operating mode, the device must be connected to the activated analyzer. The CSi/d Autoloader is switched on at the main switch. It is operated using the analyzer software, and only the loading of samples to the CSi/d Autoloader takes place on the device. You can find further information in the software manual for the analyzer.

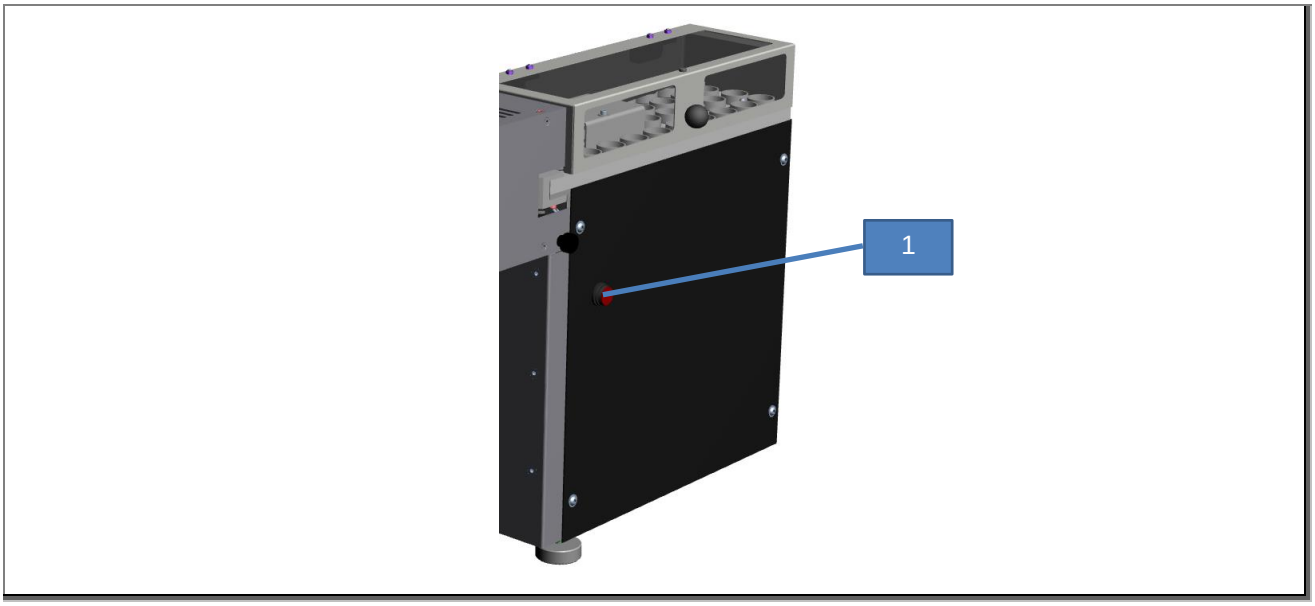

Fig. 5: CSi/d main switch

Number	Component	Description
1	CSi/d main switch	Switches the device on /off.

Operation of the CSi/d Autoloader

1. Make sure that the CSi/d Autoloader is connected to the activated analyzer.
2. Press the main switch (**1**) on the CSi/d Autoloader (see Fig. 5: CSi/d main switch)

The status LED on the main switch of the CSi/d Autoloader lights up and the device has been switched on.

5.2 Loading the analyzer

The CSi/d Autoloader can be loaded with up to 36 samples at the same time.

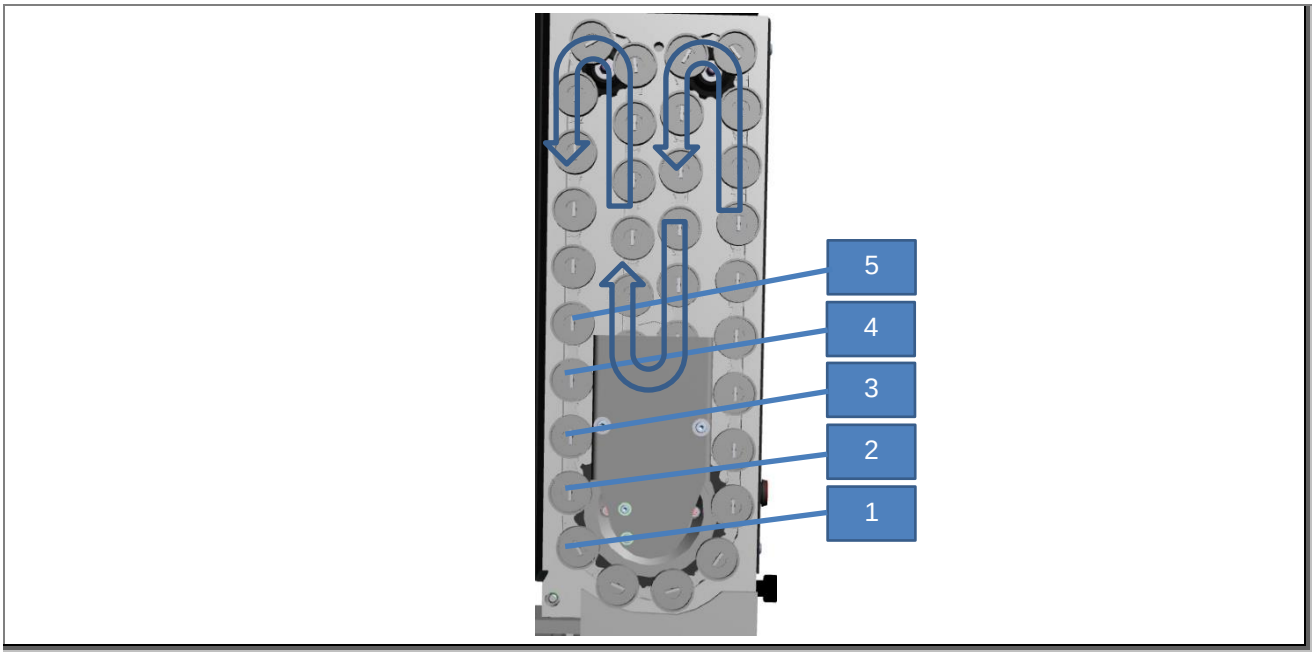

Fig. 6: Loading the CSi/d Autoloader

Number	Component	Description
1-5	Examples of positions	Order in which the crucibles must be positioned

Proceed as follows to load the CSi/d Autoloader with samples:

1. Place the first crucible onto the crucible tray (**1**) (see Fig. 6: Loading the CSi/d Autoloader).
2. Place all further crucibles onto the crucible trays (**2-5**) etc. (see Fig. 6: Loading the CSi/d Autoloader).

The CSi/d Autoloader has now been loaded.

5.3 Moving crucibles

For contamination reasons, crucibles may only be moved before the analysis using crucible tongs.

DANGER D5.0006

Danger caused by burning samples

- Damage to the respiratory tract, skin and/or mucous membranes.
- Radiation damage.
- **Users themselves must assess the risk emanating from a sample during analysis.**

Crucibles are very hot after analysis, and there is a risk of burns. After analysis, crucibles may only be moved using the crucible tongs.

5.4 Disposal of the crucibles

The crucibles from the analysed samples are collected in a crucible bin to permit their subsequent disposal.

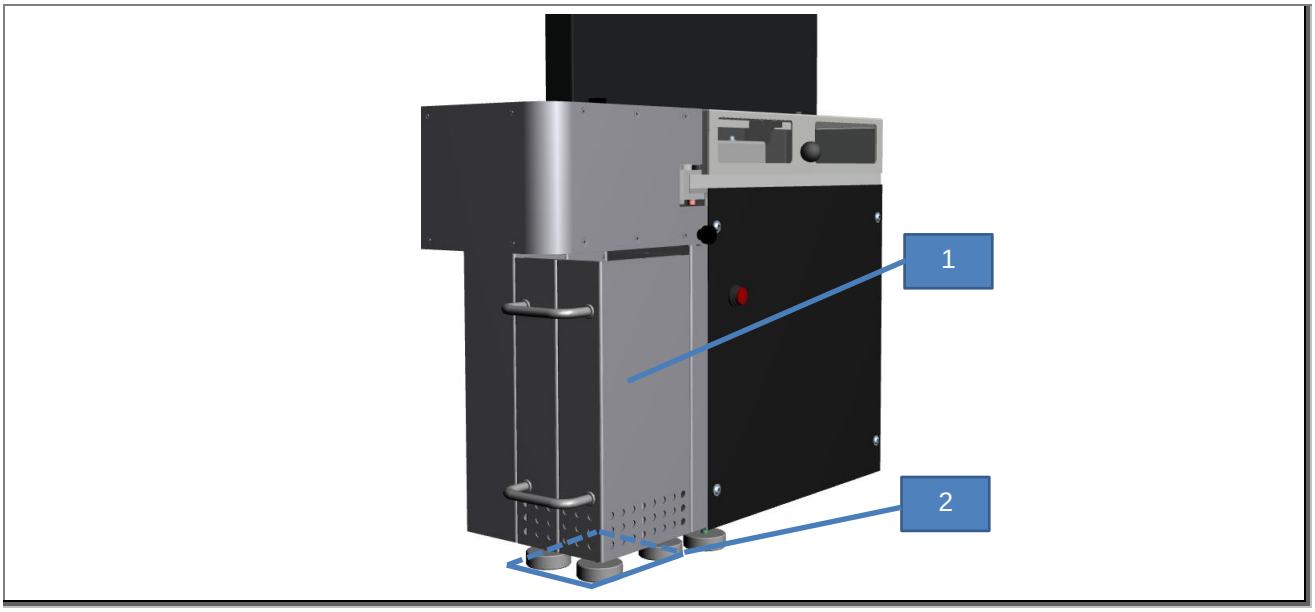

Fig. 7: Crucible disposal

Number	Component	Description
1	Crucible bin	Bin to collect crucibles after analysis
2	Space for the crucible bin	Space for the crucible bin

The crucibles are automatically collected in the crucible bin (**1**). Before each analysis process, make sure there is still enough space in the crucible bin to accommodate the analysed crucibles. If necessary, empty the crucible bin before starting an analysis process. An analysis can only be performed if the crucible bin has been put in its designated space (**2**) (see Fig. 7: Crucible disposal).

6 Servicing

NOTICE N2.0077

Damage to the housing
Use of organic solvents

– Organic solvents can damage coatings.

- **Organic solvents may not be used to clean the housing.**
- **Only use a slightly moist cloth for cleaning.**

6.1 Dismantling the top and bottom cover

Under some circumstances the top cover needs to be removed when servicing the CSi/d Autoloader.

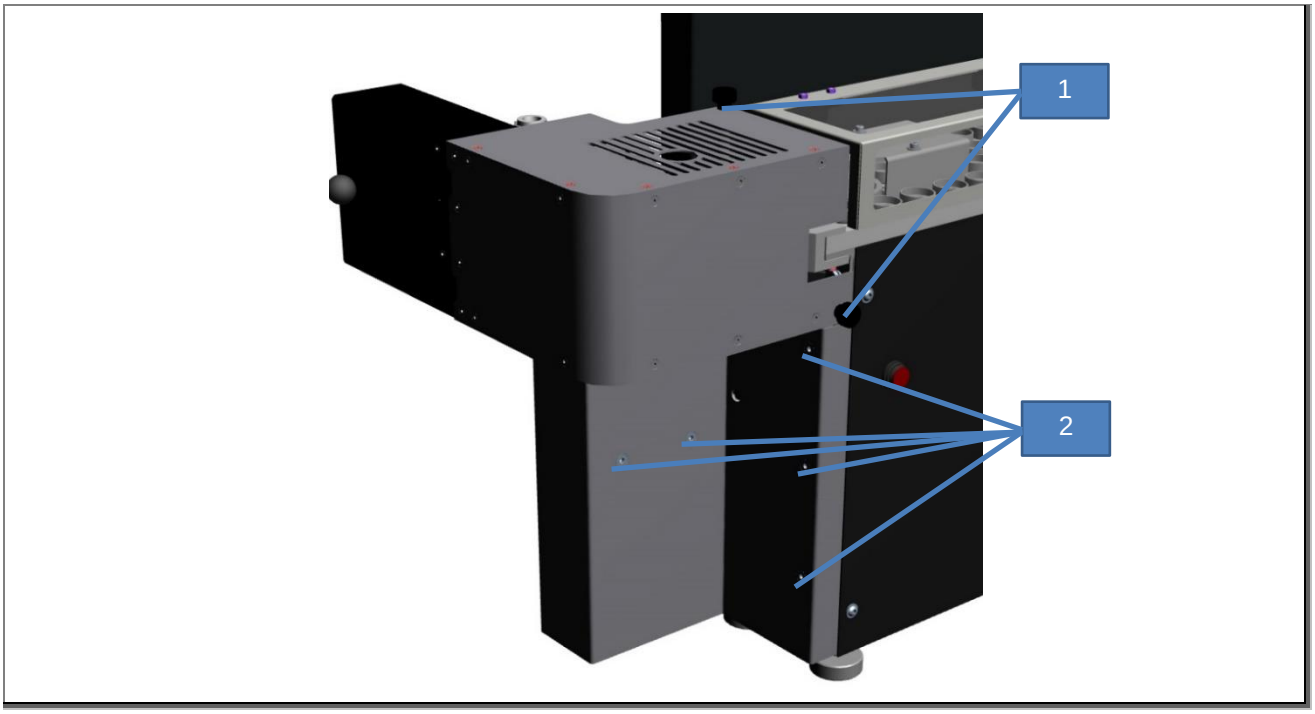

Fig. 8: Top/bottom cover

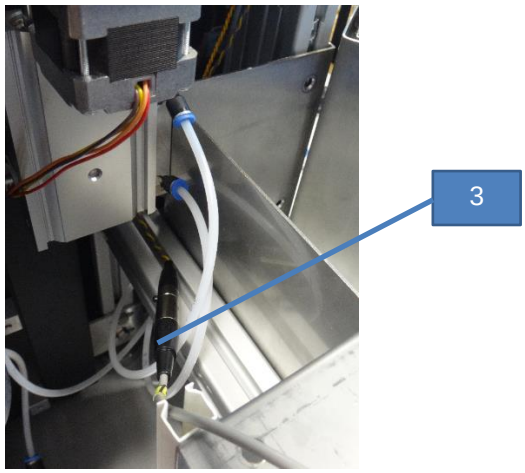

Fig. 9: Mini XLR connector

Number	Component	Description
1	Top cover screws	Used to secure the top cover
2	Bottom cover screws	Used to secure the bottom cover
3	Mini XLR connector	Connector between the bottom cover and the analyzer

Proceed as follows to dismantle the top cover:

1. Remove the two screws (**1**) (see Fig. 8: Top/bottom cover).
2. Pull the top cover forwards and remove it.

The top cover has now been removed.

Under some circumstances the bottom cover needs to be removed when servicing the CSi/d Autoloader.

Proceed as follows to dismantle the bottom cover:

1. Remove the two screws (**2**) (see Fig. 8: Top/bottom cover).
2. Release the mini XLR connector (**3**) (see Fig. 9: Mini XLR connector).
3. Place the bottom cover to one side.

The bottom cover has now been removed.

6.2 Adjusting the chain motor belt

The chain motor belt is situated below the crucible chain behind the side cover. The mechanical tension on the chain motor belt can be checked by applying pressure to the chain motor belt.

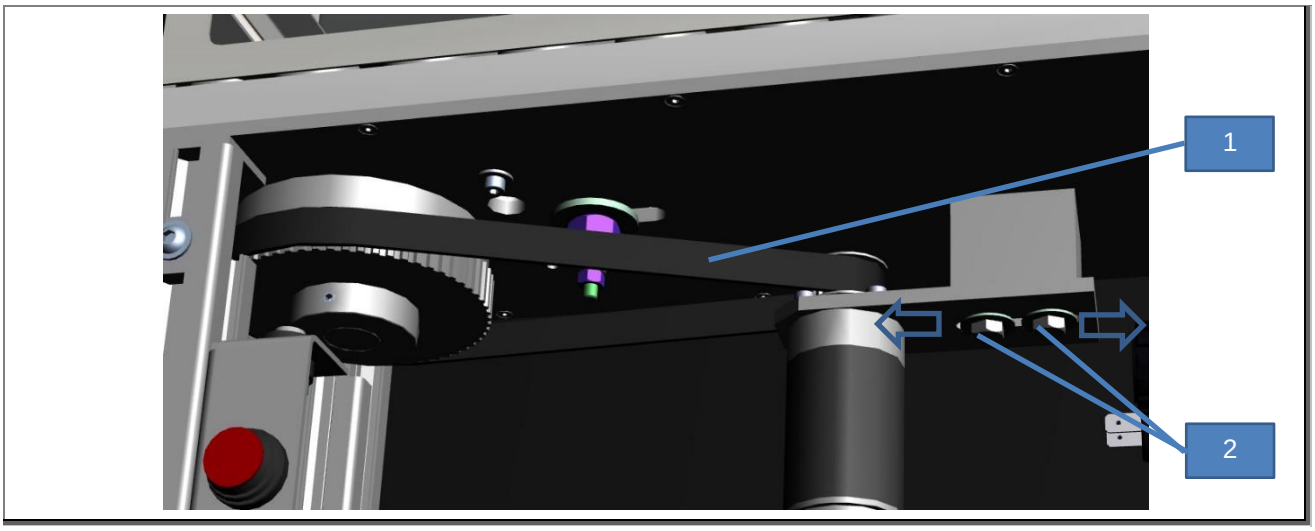

Fig. 10: Adjusting the chain motor belt

Number	Component	Description
1	Chain motor belt	This should give way easily when pressure is applied to the chain motor belt
2	Chain motor screws	Used to adjust the tension on the chain motor belt

Proceed as follows to change the tension on the chain motor belt:

1. Release the two screws (**2**) (see Fig. 10: Adjusting the chain motor belt).
2. Press the motor support forwards or backwards to change the tension on the chain motor belt (**1**) (see Fig. 10: Adjusting the chain motor belt).
3. Hold the motor support in position and tighten the two screws (**2**) again (see Fig. 10: Adjusting the chain motor belt).
4. Check the tension on the chain motor belt (**1**) again (see Fig. 10: Adjusting the chain motor belt).

The chain motor belt has been adjusted

6.3 Adjusting the chain tension

The CSi/d Autoloader is supplied with the chain tension adjusted. This can be checked and adjusted where necessary.

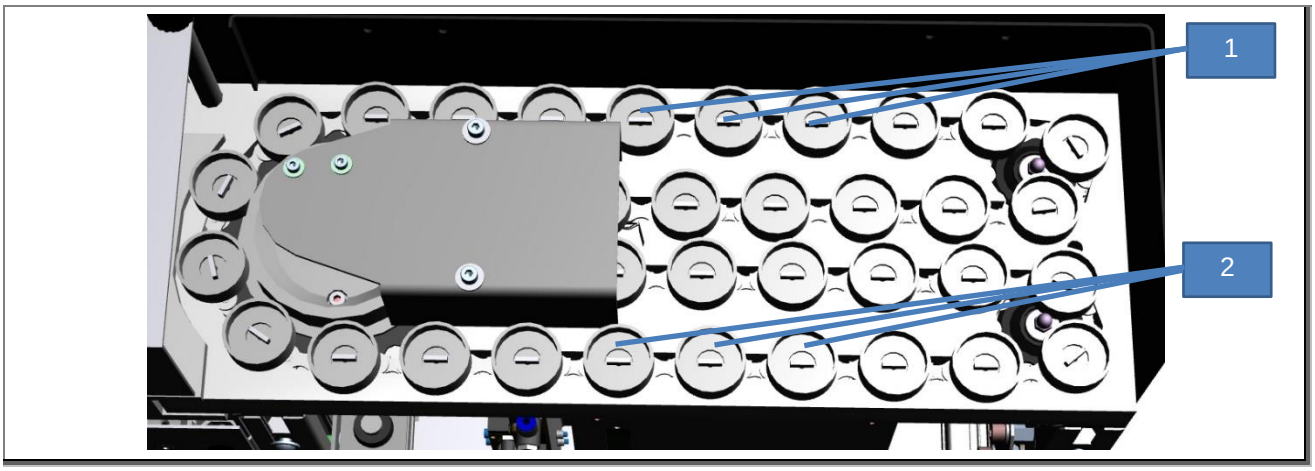

Fig. 11: Crucible chain

Number	Component	Description
1	Examples of positions for holding	Holding to check the chain tension
2	Examples of positions for moving	Should have approx. 1 mm of play in the chain direction (left/right)

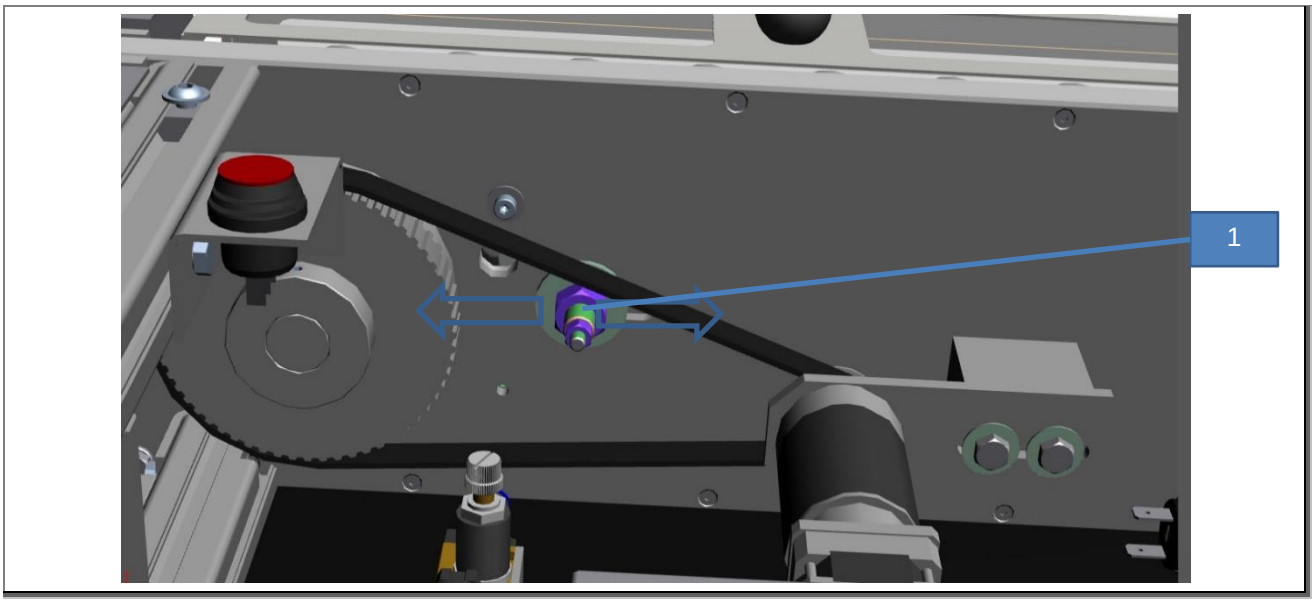

Fig. 12: Adjusting the chain tension

Number	Component	Description
1	Chain tension screw	Used to adjust the chain tension

Proceed as follows to check the chain tension:

1. Press a number of crucible trays in the back row down (**1**) to hold them in their current position (see Fig. 11: Crucible chain).
2. Move the front crucible trays (**2**) to the right and left (see Fig. 11: Crucible chain). The crucible trays should have approx. 1 mm of play.

NOTICE

Blockage
Incorrect tension

- Excessive tension can lead to a blockage when the crucibles are moved by the motor. If the chain has too much play, bent elements on the chain can block the cogwheel support. A chain play of approx. 1 mm should be maintained (see description above).

Proceed as follows to adjust the chain tension:

1. Release the screw (**1**) on the underneath of the sample changer platform (see Fig. 12: Adjusting the chain tension).
2. Move the screw (**1**) to and fro to adjust the chain tension (see Fig. 12: Adjusting the chain tension).
3. Check the chain tension again.

The chain tension has now been adjusted.

6.4 Adjusting the height of the gripper arm

The height of the gripper arm must be adjusted before putting into operation.

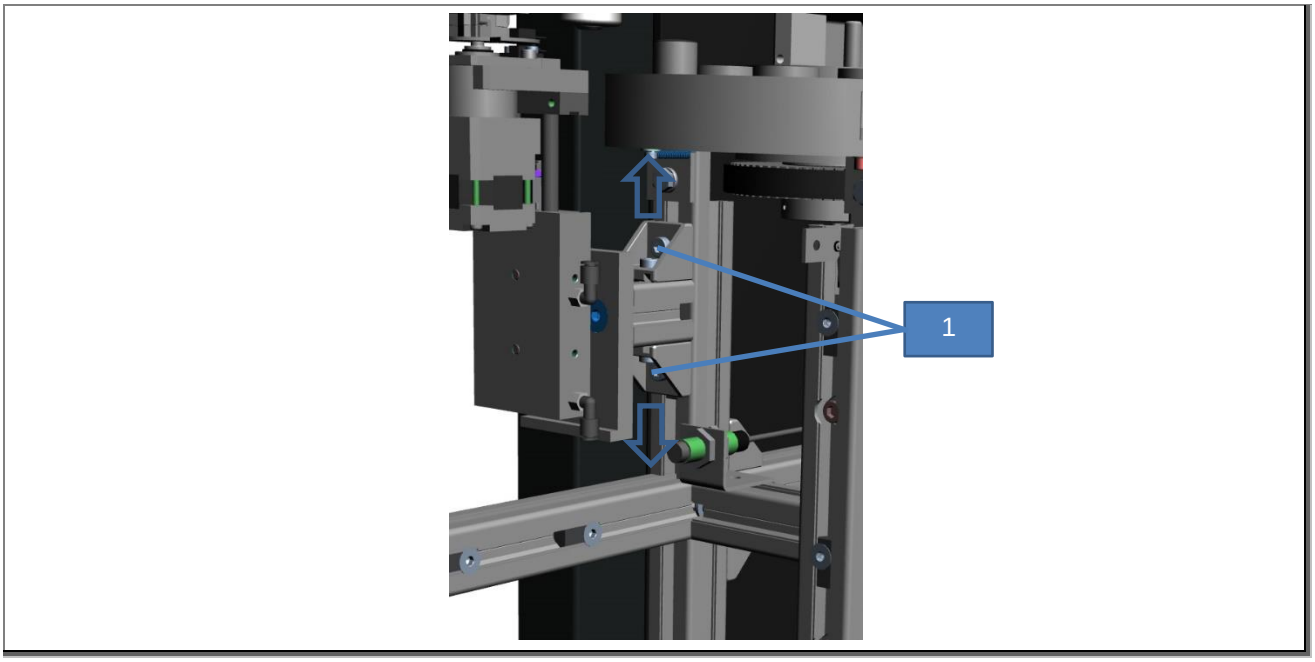

Fig. 13: Adjusting the gripper arm height

Number	Component	Description
1	Screws for the gripper arm height	Used to adjust the gripper arm height

CAUTION

C9.0092

Pinching / abrasions caused by moving elements

- Reaching into moving elements may result in pinching and abrasions.
- **Do not reach into the space between moving parts.**
- **When carrying out maintenance and adjusting settings, ensure that the CSi/d Autoloader is not in operation.**

Proceed as follows to adjust the height of the gripper arm:

1. Switch to manual mode.
2. Using the manual mode button, switch the gripper arm position through until the gripper arm has reached the “Chain” crucible collection position (see Fig. 13: Adjusting the gripper arm height).
3. Release the screws (**1**) (see Fig. 13: Adjusting the gripper arm height).
4. Move the assembly up or down until the distance between the assembly and the bottom edge of the CSi/d Autoloader is approx. 253 mm.
5. Tighten the screws (**1**) again (see Fig. 13: Adjusting the gripper arm height).
5. The distance between the top edge of the crucible and the top edge of the gripper arm should now be 4 mm.

The height of the gripper arm has now been correctly adjusted.

6.5 Adjusting the gripper arm position

The gripper arm position must be precisely adjusted to ensure that the crucible is gripped accurately.

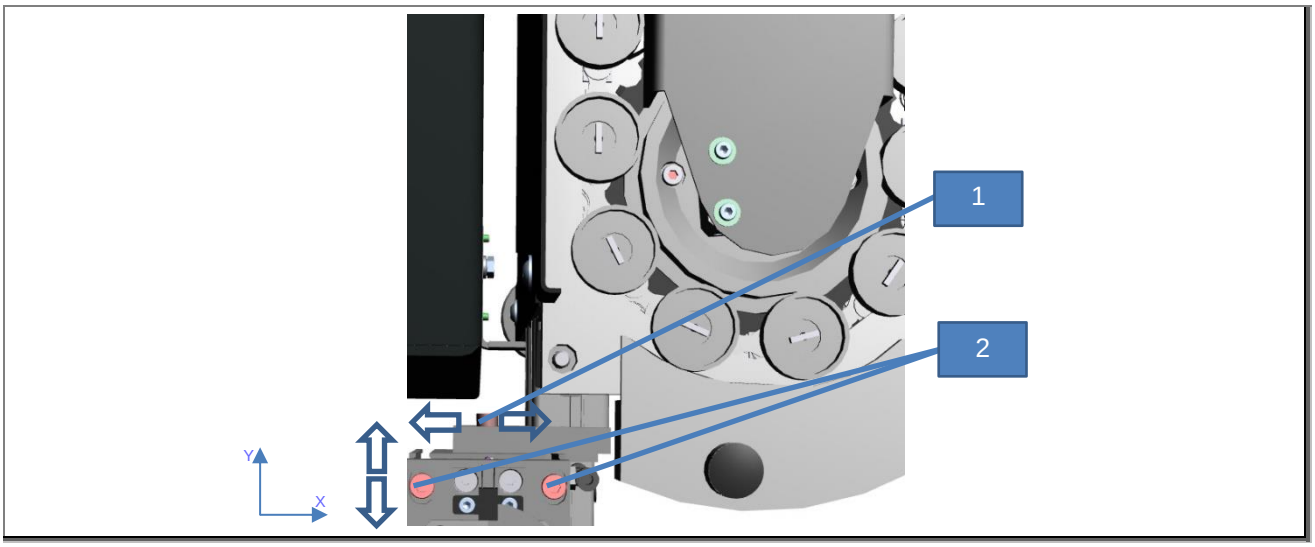

Fig. 14: Adjusting the gripper arm position

Number	Component	Description
1	Screws for the X position	Used to adjust the X position of the gripper arm
2	Screws for the Y position	Used to adjust the Y position of the gripper arm

Proceed as follows to adjust the gripper arm position:

1. Release the screws for the X (**1**) and Y (**2**) position of the gripper arm (see Fig. 14: Adjusting the gripper arm position)
2. Switch through the individual steps with the help of manual mode until the arm has reached the chain crucible position.
3. Align the gripper arm with the help of the supplied spirit level until it is as horizontal to the crucible as possible.
4. Align the gripper arm so that the crucible is midway between the fingers.
5. Tighten the screws for the X (**1**) and Y (**2**) position of the gripper arm (see Fig. 14: Adjusting the gripper arm position).

The position of the gripper arm has now been adjusted.

6.6 Adjusting the gripper fingers

The distance between the gripper fingers must be adjusted to guarantee safe gripping of the crucibles. This distance should be adjusted again if the crucibles are not gripped correctly.

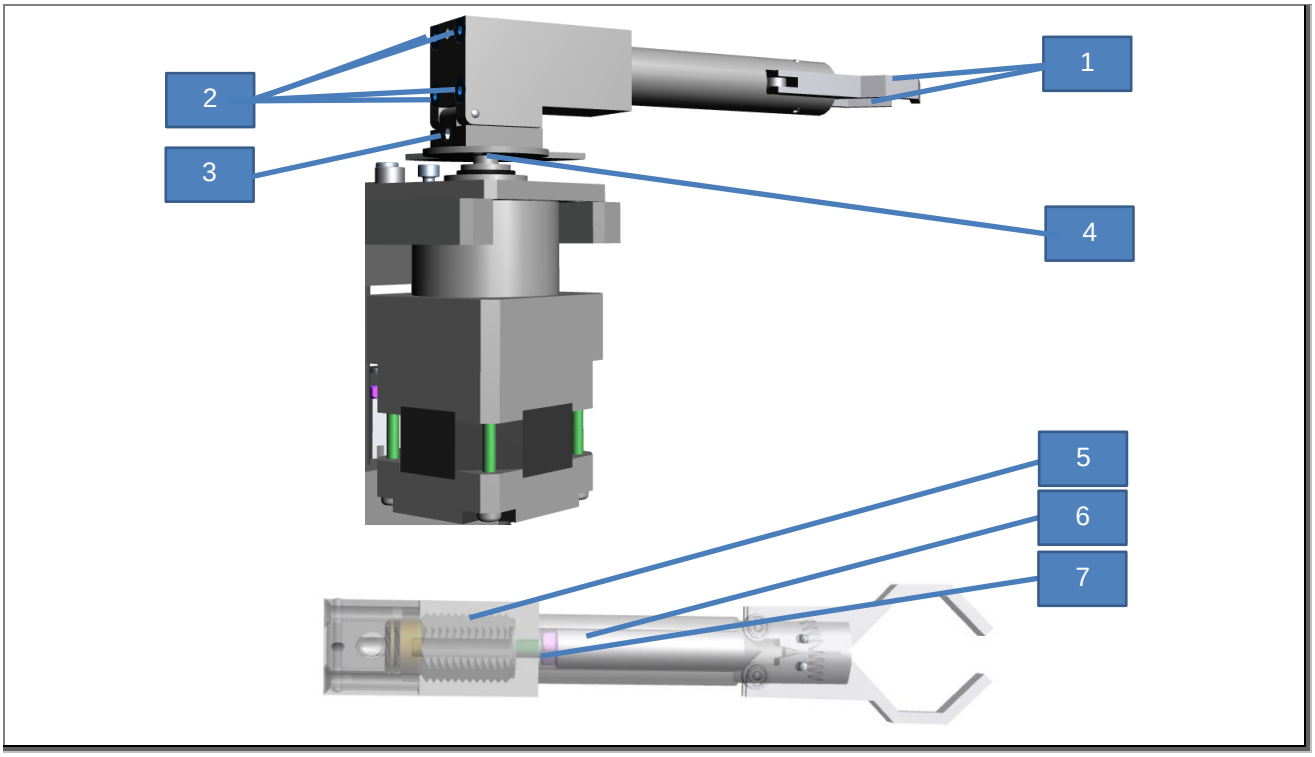

Fig. 15: Adjusting the gripper fingers

Number	Component	Description
1	Gripper fingers	Gripper fingers on the gripper arm
2	Gripper arm screws	Screws on the back cover of the gripper arm
3	Motor shaft screws	Screws to secure the gripper arm to the motor shaft
4	Motor shaft	Drive motor shaft
5	Ram	Ram on the gripper arm
6	Ram rod	Gripper arm
7	Hex nut	Adjusting nut for the gripper fingers

The internal distance between the gripper fingers (**1**) should be around 36 mm. Proceed as follows to adjust this distance as required:

Adjusting the gripper fingers:

1. Release the screws (**3**) (see Fig. 15: Adjusting the gripper fingers).
2. Pull the gripper arm upwards to release it from the motor shaft (**4**) (see Fig. 15: Adjusting the gripper fingers).
3. Release the four screws (**2**) (see Fig. 15: Adjusting the gripper fingers).
4. Remove the ram (**5**) with the ram rod (**6**) (see Fig. 15: Adjusting the gripper fingers).
5. Release the hex nut (**7**) (see Fig. 15: Adjusting the gripper fingers).
6. Screw the ram rod (**6**) onto the ram (**5**) in a clockwise direction to increase the distance between the gripper fingers (**1**). Screw the ram rod (**6**) in an anticlockwise direction from the ram (**5**) to decrease the distance between the gripper fingers (**1**) (see Fig. 15: Adjusting the gripper fingers).
7. Tighten the hex nut (**7**) (see Fig. 15: Adjusting the gripper fingers).
8. Make sure that the ram rod (**6**) and the inside of the gripper arm are clean (see Fig. 15: Adjusting the gripper fingers).
9. Push the ram (**5**) with ram rod (**6**) into the gripper arm (see Fig. 15: Adjusting the gripper fingers).
10. Screw the four screws (**2**) tight (see Fig. 15: Adjusting the gripper fingers).
11. Push the gripper arm onto the motor shaft (**4**) (see Fig. 15: Adjusting the gripper fingers).
12. Tighten the screws (**3**) (see Fig. 15: Adjusting the gripper fingers).

The gripper fingers have now been adjusted.

6.7 Speed of Movement

The speed of movement of the gripper fingers and the raising and lowering of the gripper arm can be regulated by needle valves behind the side cover.

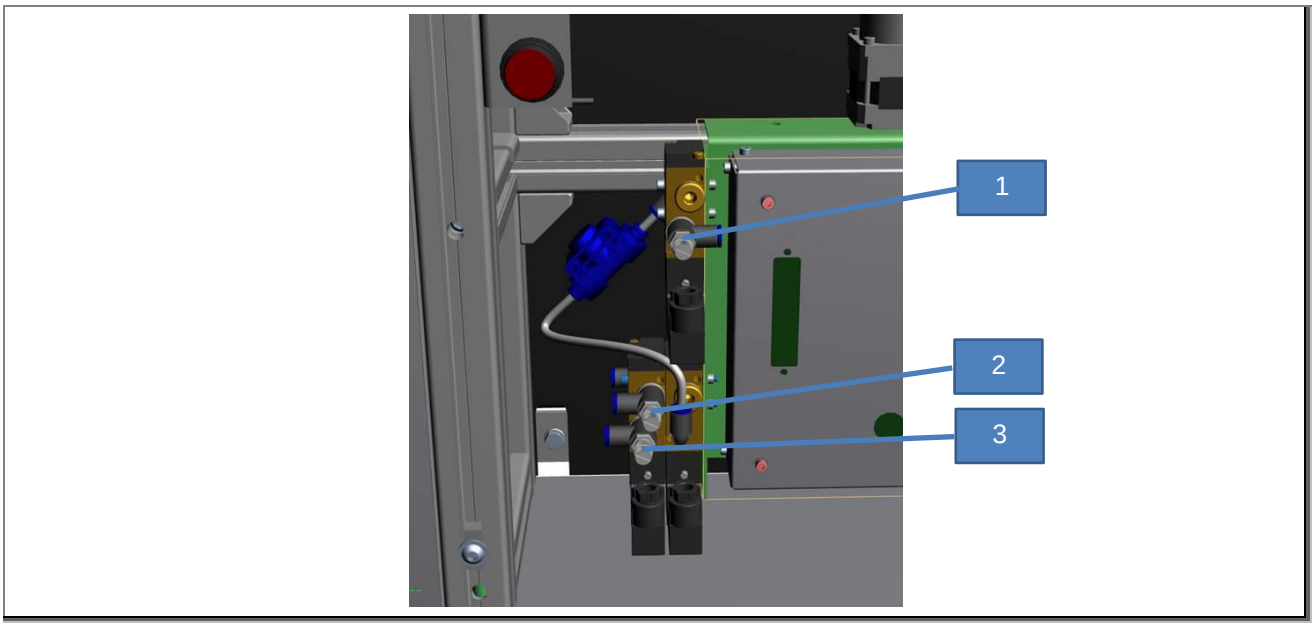

Fig. 16: Adjusting the speed of movement

Number	Component	Description
1	Needle valve gripper finger speed	Needle valve for regulating the gripper finger speed
2	Needle valve gripper arm speed up	Needle valve for regulating the gripper arm speed (raising)
3	Needle valve gripper arm speed down	Needle valve for regulating the gripper arm speed (lowering)

Proceed as follows to set the appropriate speed:

Adjusting the needle valves for speeds:

1. Turn the needle valve (**1**) in a clockwise direction to reduce the speed of movement of the gripper fingers (see Fig. 16: Adjusting the speed of movement).
2. Turn the needle valve (**1**) in an anticlockwise direction to increase the speed of movement of the gripper fingers (see Fig. 16: Adjusting the speed of movement).

The gripper finger speed has now been adjusted.

Adjusting the speed with which the gripper arm is raised:

1. Turn the needle valve (**2**) in a clockwise direction to reduce the speed of movement when raising the gripper arm (Fig. 16: Adjusting the speed of movement).
2. Turn the needle valve (**2**) in an anticlockwise direction to increase the speed of movement when raising the gripper arm (Fig. 16: Adjusting the speed of movement).

The speed for raising the gripper arm has now been adjusted.

Adjusting the speed with which the gripper arm is lowered:

1. Turn the needle valve (**3**) in a clockwise direction to reduce the speed of movement when lowering the gripper arm (see Fig. 16: Adjusting the speed of movement).
2. Turn the needle valve (**3**) in an anticlockwise direction to increase the speed of movement when lowering the gripper arm (see Fig. 16: Adjusting the speed of movement).

The speed for lowering the gripper arm has now been adjusted.

7 Technical information

7.1 Technical information

Dimensions	Width	20 cm
	Depth	65 cm
	Height	60 cm
	Weight	21 kg
Electrical data	Power supply	Ext. power supply unit (100-240 V AC 50/60 Hz)
	Voltage	24 V
	Power consumption	<= 1.4 A
Safety	Protection class	III
	Overvoltage category	II
	Degree of contamination	2
	Compressed air	5 – 8 bar
	Type of environment	Indoors
	Max. altitude	<= 2000 m
	Ambient temperature	+5 … +40˚C
	Ambient humidity	<80% at +31°C <50% at +40°C Non-condensing
	Type of protection	IP20

7.2 Safety circuit

The safety circuit ensures that the CSi/d Autoloader can only be put into operation under certain conditions. This is designed to prevent personal injury and damage to property.

The safety circuit checks the following conditions:

- Pneumatic pressure
- Top/bottom cover installed
- Furnace cover is closed
- Crucible bin is present

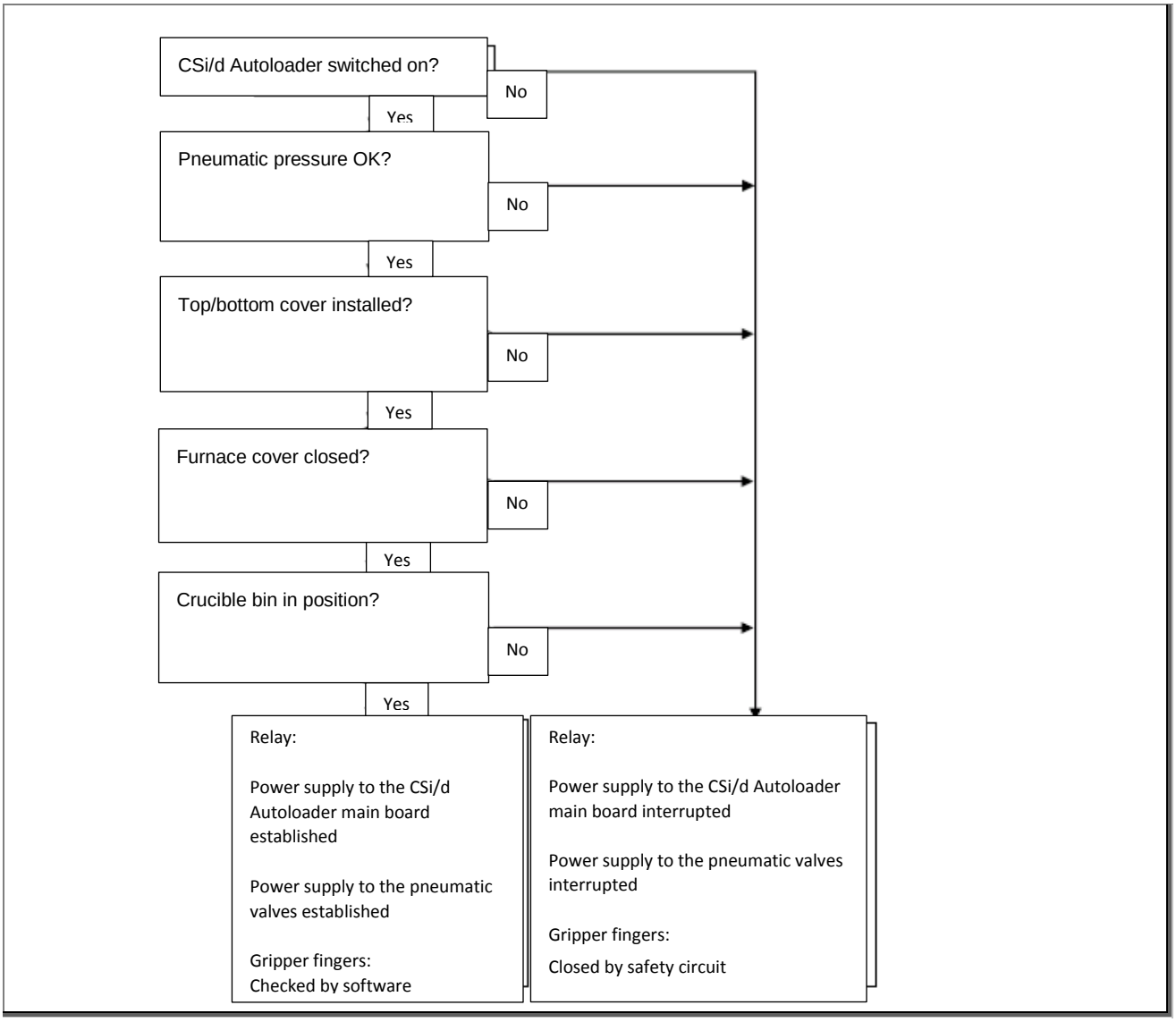

Fig. 17: Safety circuit diagram

If one of these conditions has not been met, the power supply to the main circuit board and to the valves of the CSi/d Autoloader are interrupted. As a result, crucibles continue to be held tight in the event of a fault

7.3 Non-Stop cycles

In some cases it is necessary to automatically repeat complete cycles. An example is during a fatigue test of the CSi/d Autoloader. Non-stop operation without burning is also required at trade fairs, and the CSi/d Autoloader can be loaded with 26 empty crucibles to this end.

Proceed as follows to make the CSi/d Autoloader perform non-stop cycles:

1. Load the CSi/d Autoloader with crucibles.
2. Start the CSi/d Autoloader in manual mode and secure the manual control button with the help of a rubber band (see Chapter 4.4).
3. Set the power switch of the analyzer from position 0 to position 1.

The CSi/d Autoloader is then in non-stop cycle mode and keeps repeating all individual steps until the last crucible is removed from the platform. The CSi/d Autoloader continues to rotate the chain for some time afterwards to search for further crucibles. If no more crucibles are found, the chain is stopped.

7.4 Gripper arm positions

There are three different positions for the gripper arm of the CSi/d Autoloader (see Fig. 18: Gripper arm positions):

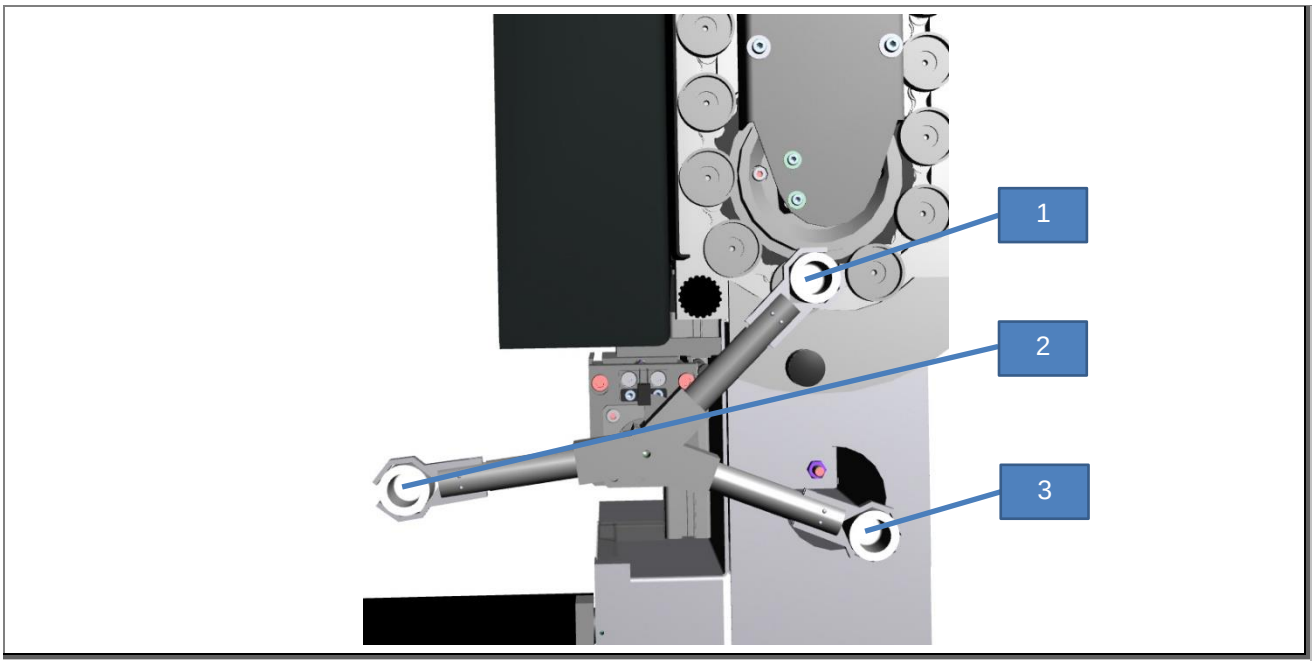

Fig. 18: Gripper arm positions

Number	Crucible position
1	Chain crucible position
2	Analyzer crucible position
3	Disposal crucible position

7.5 Attaching and removing the plastic pipes

To connect the plastic hose (KS), simply press as far as possible into the relevant connector.

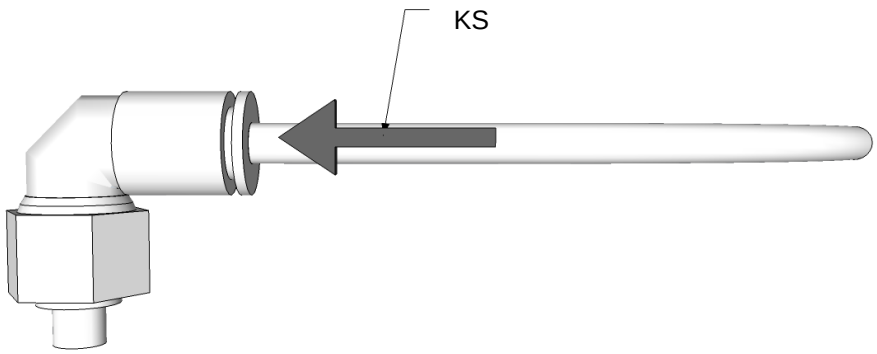

Fig. 19: Connecting the plastic pipe

To remove the plastic hose (KS), first press the plastic ring (KR) of the connector against the metal ring and then pull the pipe out, keeping the ring pressed.

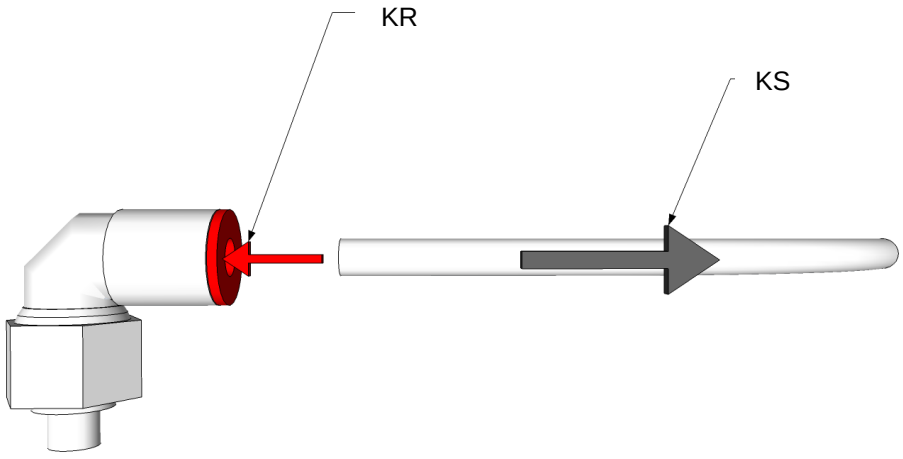

Fig. 20: Removing the plastic pipe

Proceed as follows to reinstall the sample changer:

- The analyzer has been switched off (the power switch is in the 0 position). There is no compressed air supply to the analyser.

7.6 Error messages

The electronic circuit board of the CSi/d Autoloader is fitted with a buzzer. The buzzer uses a fixed number of sounds (buzzes) to alerts to faults. You can find an overview of the number of buzzes and corresponding error messages in the following table:

Number of buzzes	Description of the fault
1	The light barrier to detect the position of the gripper arm cannot detect any light. Light barrier for detecting the position of the gripper arm is faulty. Check the positioning disc.
2	The light on the light barrier is continuously detected. Light barrier is faulty. Check the positioning disc.
3	There is no crucible in the CSi/d Autoloader, although it has received a command to load the next crucible.
4	The horizontal light barrier cannot be detected. Faulty light barrier, crucibles are not moving due to a blockage, faulty motor.
5	The furnace was not opened to enable the CSi/d Autoloader to place a crucible onto the crucible tray. Fault in the ram control or the ram sensor.
6	The gripper fingers have not picked up the crucible. The crucible has got stuck in its tray, no compressed air, faulty light barrier.
7	The CSi/d Autoloader has received a command to load, but the furnace is not open or there was a long delay when lowering the ram.
∞	Infinite number of buzzes in manual operation. The ram sensor has been incorrectly adjusted (bottom end of the furnace cylinder).

8 Disposal

In the case of a disposal, the respective statutory requirements must be observed. In the following, information on the disposal of electrical and electronic devices in the European Community are given.

Within the European Community the disposal of electrically operated devices is regulated by national provisions that are based on the EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE).

Accordingly, all devices supplied after August 13th 2005 in the business-to-business area, to which this product is classified, may no longer be disposed of with municipal or household waste. To document this, the devices are provided with the disposal label.

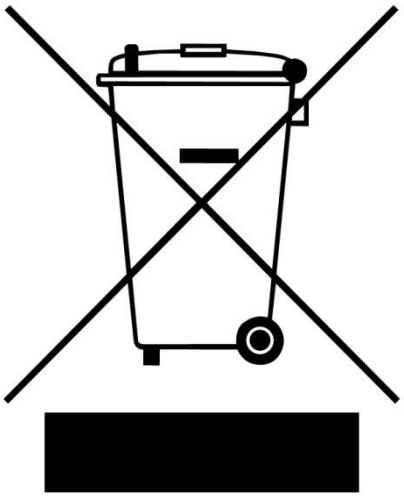

Fig. 21: Disposal label

Since the disposal regulations worldwide and also within the EU may differ from country to country, the supplier of the device should be consulted directly in case of need.

This labelling obligation is applied in Germany since March 23rd 2006. From this date on, the manufacturer must provide an adequate possibility of returning all devices delivered since August 13th 2005. For all devices delivered before August 13th 2005 the end user is responsible for the proper disposal.

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