

# **Operating Manual**

Multi Matrix Sampler autoX 112



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For a proper and safe use of this product follow the instructions. Keep the operating manual for future reference.

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# 1 Basic information

## 1.1 Notes

	The Multi Matrix Sampler is a system module for the modular multi EA 5000 / multi EA 5100 analyzer. The autoX 112 model is a system module for the multi X 2500 analyzer.
	The autosampler can be installed on the analyzer or on the Automatic Boat Drive (ABD).
Third-party documents	<ul> <li>For this reason, the user manual is only valid in conjunction with the following documents:</li> <li>The multi EA 5000 / multi EA 5100 or multi X 2500 user manual</li> <li>The Automatic Boat Drive (ABD) user manual</li> <li>The software manual for the multiWin control and analysis software</li> </ul>
	Carefully read the aforementioned documents before connecting the autosampler and using it.
	The autosampler is intended for operation by qualified specialist personnel observing this user manual.
	This user manual contains information about the design and operation of the autosam- pler, and provides personnel familiar with analysis with the necessary information for safe handling of the device and its components.
	It also includes notes on maintenance and service of the device and potential causes and remedies for any faults.
	Store the user manual close to the device. It must be readily accessible to the operating and service personnel at all times.
	The user manual is considered an integral part of the device and must be provided to any following owners or users.
Conventions	Instructions for actions occurring in chronological order are numbered and combined into action units.
	Warnings are indicated by a warning triangle and a signal word. The type, source and consequences of the hazard are stated together with notes on preventing the hazard.
	<ul> <li>Elements of the control and analysis program are indicated as follows:</li> <li>Program terms are in bold (e.g., the <b>System</b> menu).</li> <li>Menu items are separated by vertical lines (e.g., <b>System   Device</b>).</li> </ul>
Symbols and signal words used in this manual	The user manual uses the following symbols and signal words to indicate hazards or in- structions. These warnings are always placed before an action.
$\mathbf{A}$	WARNING
	Indicates a potentially hazardous situation which can cause death or very serious (possibly permanent) injury.



## CAUTION

Indicates a potentially hazardous situation which can cause slight or minor injuries.



## NOTICE

Provides information on potential material or environmental damage.

## 1.2 Purpose

	Liquid or solid samples can be fed to the combustion system of the multi EA 5000 / multi EA 5100 or the multi X 2500 with the Multi Matrix Sampler and autoX 112 autosamplers.
	Liquid samples are injected directly via the injection port of the combustion tube (verti- cal mode) or via the injection port of the sample sluice of the ABD (horizontal mode) into a quartz glass boat inside.
Horizontal mode	Solid samples or loaded active carbon with or without quartz containers are fed in quartz boats via the sample sluice of the ABD (horizontal mode).
Vertical mode	In vertical mode, the loaded active carbon is transferred to the open combustion tube by ejecting it out of the container.
	The autosampler can only be used in conjunction with the multi EA 5000 / multi EA 5100 (basic module) or the multi X 2500. The modules are controlled via the multiWin control and analysis software.

## 1.3 Intended use

	The Multi Matrix Sampler and autoX 112 autosamplers must only be used for the proce- dures described in this user manual for the injection of liquid samples or addition of solid samples to the combustion system of the multi EA 5000 / multi EA 5100 or multi X 2500.
	Any other use is not as intended!
	In particular, the following samples must not be added with the autosampler:
mpermissible misuse	<ul> <li>Highly flammable organic compounds - risk of explosion!</li> <li>Substances tending to spontaneous decomposition (e.g. peroxides) - risk of explosion!</li> <li>Explosives, explosive materials (e.g. trinitrotoluol, inorganic azides) - risk of explosion!</li> <li>Highly saline samples, especially alkaline and alkaline earth samples (e.g. soil, fertilizer, fodder, construction materials)</li> <li>Inorganic compounds, such as metals, alloys, minerals etc.</li> <li>Sample materials for which digestion temperatures &gt;1100 °C are required</li> </ul>
Applicable documents	Also observe the information in the multi EA 5000 / multi EA 5100 or multi X 2500 user manuals.

# 2 Safety instructions

## 2.1 General notes

This user manual is only valid in conjunction with the following documents:

Applicable documents

- The multi EA 5000 / multi EA 5100 or multi X 2500 user manual
- The software manual for the multiWin control and analysis software

In particular, observe the information in the "Safety notes" chapters of the user manuals. The information included there also applies to the autosampler without restrictions.

## 2.2 Safety labeling on the device

Warning and mandatory action labels have been attached to the device and must always be observed.

Damaged or missing warning and mandatory action labels can cause incorrect actions leading to personal injury or material damage. The labels must not be removed. Damaged warning and mandatory action labels must be replaced immediately!

The following warning and mandatory action labels have been attached to the device:

Warning symbol	Meaning	Remark
	General hazard area warning	
	Warning against crushing	On the injector head: Risk of injury due to moving parts.
Mandatory action labels/information symbols	Meaning	Remark
<b>(</b>	Observe the user manual	On the device switch: Before starting work, read the user manual.
25	For People's Republic of China only	The device contains controlled sub- stances. Analytik Jena guarantees that these substances will not escape in the next 25 years if the device is only used for the intended purpose.

## 2.3 Safety instructions

Observe the following information when connecting and operating the autosampler:

Connection and operation

- When setting up the device, take into account the movement range of the arm during operation. Ensure that the entire potential movement range behind the device is unobstructed.
- Also exercise caution near the movement range of the arm guiding the sampling tool. Risk of injury from the sampling tool during operation.
- The operating personnel is prohibited from opening the device. Opening the device is only permissible when carried out by authorized Analytik Jena service personnel. Always disconnect the power plug before opening the housing! Danger of electric shock!
- Modifications, conversions and extensions to the device are only permitted after consultation with Analytik Jena. The operator is responsible for changing the dosing tools and the sample trays. Any unauthorized modifications going beyond these changes can jeopardize the device's operational safety and may result in limiting the manufacturer's warranty and access to customer service.
- Ensure that no liquid reaches the cable connections or the interior of the device! Danger of electric shock!
- Caution when handling glass components. Risk of broken glass and therefore risk of injury!

## 2.4 Decontamination after soiling

Observe the following:

- The operator is responsible for carrying out suitable decontamination should the device become contaminated externally or internally with dangerous substances.
- Splashes, drops or larger liquid spillages should be removed using an absorbent material such as cotton wool, laboratory wipes or cellulose.
- For biological contamination, wipe the affected area with a suitable disinfectant, such as an Incidin Plus solution. Then wipe the cleaned areas so that they are dry.
- The only suitable cleaning method for the housing is wipe disinfection. If the disinfectant has a spray nozzle, apply disinfectant to a suitable cloth before using it on the device.

Work particularly carefully and cleanly with infectious material because the device cannot be decontaminated as a whole.

 Before using a cleaning or decontamination procedure other than that prescribed by the manufacturer, the user is required to check with the manufacturer that the intended procedure will not damage the device. Safety labels attached to the device must not have methanol applied.

## 2.5 Safety instructions – maintenance and repair

The device is generally maintained by the customer service department of Analytik Jena or specialist personnel trained and authorized by them.

Unauthorized maintenance can damage the device. For this reason, only the activities described in the user manual in the "Maintenance and care" chapter may be performed by the operator.

 Only clean the exterior of the device with a slightly moistened, non-dripping cloth. Use only water and, if required, customary surfactants.

- Do not use organic solvents or abrasives to clean the device. Exercise caution when decontaminating the device with disinfectants containing alcohol. The alcohol can damage the safety labeling on the device.
- All maintenance and repair work on the device must only be carried out when the device is switched off (unless specified otherwise).
- Allow the device to cool down before any maintenance work or replacement of system components.
- Use only original spare parts, wear parts and consumables. They have been tested and ensure safe operation. Glass part are wear parts and are not subject to the warranty.
- The gas supply must be shut off before performing any maintenance or repair work (unless specified otherwise).
- Check that all hose connections are gas-tight after maintenance.
- All protective equipment must be reinstalled and checked for proper function when the maintenance or repair work is complete.

## 2.6 Behavior during emergencies

In hazardous situations or accidents, use the device switch on the rear of the device to switch off the autosampler and disconnect the plug from the power supply!

In emergencies, also observe the safety instructions in the user manual of the analyzer.

# 3 Design and function

## 3.1 System design

The autosampler is a system module for the modular multi EA 5000 / multi EA 5100 or multi X 2500 analyzers for the horizontal and vertical operating modes.

Main components

- The autosampler consists of the following main components:
- Basic unit
- Guide arm X
- Injector head with syringe drive
- Rack support
- Waste container with waste hose
- Solvent container



Fig. 1 Main components

- 1 Solvent container
- 3 Injector head with– syringe drive– safety label
- 5 Sample tray

- 2 Basic unit
- 4 Waste container
- 6 Receptacle

### 3.1.1 Device switch/interfaces

The autosampler is connected to the single-phase AC grid via an external table power supply unit (110 to 240 V + 10/-5 %).



Fig. 2 Wide-range table power supply unit



Fig. 3 Rear – connections

- 1 Connection socket for the wide-range table power supply unit
- 3 Connection socket for interface cable
- 2 Device switch
- 4 Connection socket for boat sensor (optional)

The connection sockets (1) and the device switch (2) for switching the device on and off are located on the left of the rear panel (viewed from the front).

### 3.1.2 Type plate

The type plate is attached to the rear of the device.

The type plate contains the following information:

- manufacturer address, trademark
- Designation of the device, serial number
- Electrical connection data
- Conformity markings
- WEEE marking

### 3.1.3 Sampling tools

Various sampling tools that can be inserted into the injector head are provided for metering and adding the samples.

Self-check system

The sampling tool inserted into the injector head is detected automatically by the Selfcheck system (SCS).



### Fig. 4 Metering syringe – inserted in injector head

- $1 \ \ {\rm Guide \ piece \ with \ clamping \ plate}$
- 3 Metering syringe



- Fig. 5 Gripper inserted in injector head
  - 1 Guide piece with clamping plate
  - 3 M3x25 fastening screws (2x)
- 2 Gripper drive shaft
- 4 Gripper

2 Safety clip

4 Holding-down clamp with cannula guide



### Fig. 6 Ejection tool – inserted in injector head

- $1 \ \ {\rm Guide \ piece \ with \ clamping \ plate}$
- 3 Ejector

- 2 M3x25 fastening screws (2x)
- 4 Gripper

### 3.1.4 Sample trays

Only the sample trays listed below can be used in the autosampler to add liquid and solid samples, AOX samples, EOX samples and EC/OC samples.

The sample trays are detected automatically by the SCS, and the bottom side is designed to only fit onto the rack receptacle in the correct manner.

### Sample tray for EOX samples and liquids

- for adding EOX and liquid samples in vertical and horizontal operating modes
- Sample cup: 2 ml, (Ø12 x 32) mm
- Capacity: 112 sample containers



Fig. 7 EOX/liquid sample tray

### Sample tray for AOX samples, solids, high-viscosity liquids

- for adding AOX, EC/OC and solid samples as well as high-viscosity liquids via quartz boat in horizontal operating mode with and without holding-down clamp
- Sample cup: Quartz boat (40 x 9) mm
- Capacity: 35 quartz boats



Fig. 8 Sample tray for AOX samples, solids, high-viscosity liquids

### Sample tray for TOC samples

- For automatic addition of aqueous TOC samples in vertical operating mode
- Sample cup: 9 ml, (Ø18 x 50) mm
- Capacity: 60 sample containers



Fig. 9 Sample tray for TOC samples

### Sample tray for AOX samples (for multi X 2500 only)

- For direct dosing of active carbon from up to 112 columns or for the addition of up to 112 quartz containers prepared in accordance with the column method in vertical operating mode
- Disposable tube, (18 x 6) mm, filled
- Capacity: 112 disposable tubes



Fig. 10 Sample try for AOX samples

### 3.2 Principle of operation

The autosampler automatically processes the sample matrices in accordance with the settings in the multiWin control and evaluation software. The samples are injected into the combustion system of the analyzer either via direct injection or via quartz boats or containers.

# 4 First commissioning

## 4.1 Location requirements

### 4.1.1 Installation conditions

The climate conditions in the room the autosampler is operated in are defined by the overall system requirements:

- Temperature range: 20 to 35 °C
- Max. humidity: 90 % at 30 °C
- Air pressure: 0.7 to 1.06 bar
- Maximum altitude: 2000 m

As far as possible, the atmosphere in the laboratory should be free of hydrocarbons, sulfur and halogen, low in nitrogen oxide and dust and free from drafts and corrosive vapor. Smoking is prohibited in the operating room of the analysis system!

Also observe the following:

- This laboratory device is designed for indoor use.
- Do not use the device in wet and damp environments. Keep the device surface clean and dry.
- Avoid direct sunlight and radiation from heaters onto the device. If necessary, provide air conditioning.
- Place the device on a heat-resistant and acid-resistant surface.
- Do not locate the device near sources of electromagnetic interference.
- Avoid mechanical shocks and vibrations.
- Do not use the device in explosion-hazard environments.
- Ensure sufficient space toward the rear of the device during installation. The guide arm can protrude beyond the rear panel of the ABD/analyzer when running.
- Always fasten the autosampler to the ABD/analyzer with the fastening screws included in the delivery to prevent accidental collision with or movement of the autosampler. Collisions and movement can necessitate readjustment of the device!

The following fastening points are provided on the ABD or analyzer:

- Use of the rear and the middle borehole on the ABD (autosampler in horizontal mode)
- Use of the rear and the front boreholes on the analyzer (autosampler in vertical mode)

### 4.1.2 Spatial requirements

The autosampler is positioned and fastened on an ABD or analyzer.

The required height results from the height of the analyzer or ABD and the height of the autosampler. There must be a clearance of at least 10 cm between the device system and any shelf or cabinet above the system.

### 4.1.3 Power supply



## CAUTION

The table power supply unit of the autosampler must only be connected to a properly grounded outlet in accordance with the voltage specifications on the type plate!

The autosampler is connected to the single-phase AC grid via an external table power supply unit (24 V).

The installation of the electrical equipment in the laboratory must comply with the DIN VDE 0100 standard. At the connection point, an electrical current in accordance with the standard IEC 60038 must be available.

## 4.2 Unpacking and setting up



## NOTICE

The autosampler may only be set up, assembled and installed by the customer service department of Analytik Jena or by specialist personnel authorized and trained by Analytik Jena!

Any unauthorized activity with the autosampler can endanger the user and the operational safety of the device, and limits or completely invalidates any warranty claims.



## NOTICE

Retain the transport packaging! Return transport for maintenance must be in the original packaging. This alone prevents transport damage.

The autosampler is unpacked and assembled by customer service or authorized and trained specialist personnel.

Please check when unpacking the device for completeness and soundness of the delivery in accordance with the packing list included.

Customer service tests the analyzer after assembly and documents the test.

# 5 Operation

## 5.1 Basic information

The autosampler can be operated with the multi EA 5000 / multi EA 5100 or multi X 2500 analyzers, or with the ABD. When operating the autosampler, always include the use of the user manual for the analyzer used and, if necessary, for the ABD, as well as the user manual for the multiWin control and evaluation software.

Samples and standard solutions with organic solvents can change composition rapidly due to their volatility. For this reason, ensure that the clear space above the liquid in the sample cup is small when preparing and storing samples. Store the solutions in the fridge.



## NOTICE

Always observe the handling information in the user manuals of the system modules (detectors) for the chemicals used!

Before operations, the autosampler must be adjusted ( $\rightarrow$  "Adjustment and setup tasks"  $\cong$  21).

## 5.2 Metering liquid samples

Requirements

- The system components are switched on
- The multiWin control and evaluation software is running



- Insert the metering syringe in the metering head. Ensure that the cannula fits properly in the cannula guide adapter (1) and that the encoding of the syringe points toward the device.
- Close the retaining clip (3) and the locking lever (2).
  - Set the syringe piston with the aid of the guide piece with clamping plate (4).
    - $\checkmark$  The inserted metering syringe is detected automatically by the SCS.









- Place the sample tray (1) on the receptacle. Ensure that the rack coding points toward the device, and that the sample tray is correctly positioned on the rack receptacle.
  - $\checkmark$  The sample tray is detected automatically by the SCS.
- Insert the solvent container (2) in the rear pin on the left side of the rack receptacle.

Note: When using the autosampler to inject liquid samples via the sample sluice of the ABD (horizontal mode), remove the solvent container before opening the sample sluice. Observe the user manual of the ABD for this.

- Check that the waste hose (see arrow) is correctly connected to the waste container (1).
- Hang the other end of the hose into a waste container.
   NOTICE! Ensure sufficient slack for the hose, and that is not kinked or obstructed.
- Adjust the autosampler (→ "Adjusting the metering syringe (EOX/liquid sample tray)" 
  <sup>(1)</sup> 22).
- Insert the sample containers with the samples in the sample tray.
- Activate a method in the control and evaluation software and follow the instructions given.

### Sample tray for TOC samples

The sample tray for TOC samples can only be used in vertical mode and with a TOC module as a detector module.

The procedure for inserting the TOC sample tray is the same as the one for EOX samples. Observe the following:



- Replace the solvent containers with the acid container.
- Close the purge hose (external diameter 1.6 mm) with Fingertight connectors at the purge opening of the TOC syringe.

Note: The purge hose must also be fastened to the holder on the sampler.

Further steps can be found in the user manual of the TOC module or the an-alyzer.



## 5.3 Adding solid samples

### Requirements

- The autosampler is mounted on the ABD and connected
- The system components are switched on
  - The multiWin control and analysis software is running
    - Insert the gripper in the metering head.
    - To do this, push the holding-down clamp with the cannula guide (1) all the way up and fasten the gripper with the two fastening screws (2). The holding-down clamp with cannula guide is kept in the top position by the gripper.
    - Set the drive shaft of the gripper with the aid of the guide piece with clamping plate (3).
      - $\checkmark$  The gripper is detected automatically by the SCS.
    - **I** NOTICE! If the gripper does not open wide enough, readjust its axis.



- Place the AOX/solid sample tray (1) on the rack receptacle. Ensure that the rack coding points toward the device, and that the AOX/solid sample tray is correctly positioned on the rack receptacle.
  - $\checkmark$  The AOX/solid sample tray is detected automatically by the SCS.
- If necessary, insert the optional boat sensor (2) into both pins on the left side of the rack receptacle.



- Adjust the gripper to the sluice position in accordance with the auxiliary position (see arrow) for correct adjustment, and to position 1.
- If necessary, weigh the solid samples into quart boats.
- Insert the quartz boats with solid samples or the AOX samples into the AOX/solid sample tray of the autosampler.
  - Activate a method in multiWin and follow the instructions given.

## 5.4 Direct addition of AOX samples (column method)

### Requirements

- The autoX 112 autosampler is mounted on the multi X 2500 and connected
- The system components are switched on
- The multiWin control and analysis software is running



- Insert the ejection tool in the metering head.
- To do this, push the holding-down clamp with the cannula guide (1) all the way up and fasten the gripper with the two fastening screws (2). The holding-down clamp with cannula guide is kept in the top position by the gripper.
- Set the drive shaft of the ejection tool with the aid of the guide piece with clamping plate (3).
  - $\checkmark$  The ejection tool is detected automatically by the SCS.
- Place the AOX sample tray (1) on the rack receptacle. Ensure that the rack coding points toward the device, and that the AOX sample tray is correctly positioned on the rack receptacle.
  - $\checkmark$  The AOX sample tray is detected automatically by the SCS.
- Adjust the ejection tool to position 1 on the AOX sample tray and to the furnace.
- Insert the AOX container in the AOX sample tray.
- Activate a method in the control and evaluation software and follow the instructions given.

# 6 Maintenance and care

## 6.1 Maintenance intervals

Maintenance task	Maintenance interval
Cleaning and caring for the device	Weekly
Adjusting the autosampler	During commissioning, after every re- arrangement, and after transport and stor- age
Replacing the septum of the solvent con- tainer	As required
Cleaning the cannula guide	As required
Replace the cannula	As required
Replacing the quartz boats (due to surface divitrification)	As required
Replacing the carrier material in quartz boats (due to discoloration, hardening or increased brittleness, deformation or dissolution)	As required

## 6.2 Adjustment and setup tasks

### 6.2.1 General notes

Adjustment of the autosampler is required before starting for each sample tray and each metering head. After replacing the syringe, gripper or ejection tool, and when recommissioning after rearrangement, transport or storage, the adjustment positions must be checked. If necessary, repeat adjustment.

When adjusting, the metering syringe, gripper or ejection tool must be adjusted to position 1 on the sample tray and to the furnace (injection port) or the sample sluice of the ABD, depending on the operating mode. The following presets are stored in the control and evaluation software for the adjustment:

Sample tray/ operating mode	Adjustment po- sition	Х	Y	Z
EOX/liquid	Position 1	50	1465	100
sample tray,	Furnace	900	400	850
vertical	Piston			0
EOX/liquid	Position 1	50	1465	100
sample tray,	Sluice	1115	115	750
nonzontai	Piston			0
AOX/solid sam-	Position 1	10	1595	300
ple tray, hori- zontal	Sluice	955	415	850
	Gripper			0
TOC sample tray, vertical	Position 1	0	0	100
	Furnace	900	400	850
	Piston			0

Sample tray/ operating mode	Adjustment po- sition	Х	Y	Z
AOX sample	Position 1	5	1460	100
tray, vertical	Furnace	700	400	500
	Ejection tool			0

## 6.2.2 Adjusting the metering syringe (EOX/liquid sample tray)



## CAUTION

## **Risk of crushing**

There is a risk of crushing within the movement range of the injector head with sampling tool.

• Keep a safe distance from the autosampler during operation.



## CAUTION

### Risk of injury from the syringe

The syringe is very sharp and pointy.

- Do not touch the syringe on the needle. The syringe can also become contaminated.
- Keep a safe distance from the movement range of the syringe during operation.
  - Open the **Adjust sampler** window via menu **System** | **Adjust sampler** in the control and evaluation software.

### Position 1

- Select **Position 1** in the **Adjust position** drop-down field (1).
- Click on the [Default] (2) button.
  - ✓ The presets for position 1 are accepted.
- Ensure that a sample container is at position 1 on the sample tray.
- Click on the [Adjust position] (3) button.
  - $\checkmark$  The device moves to position 1 on the sample tray.
- Perform a fine adjustment by carefully modifying the preset values and moving the device to position 1 via the [Adjust position] button, repeatedly if necessary:
- X/Y direction:
- Position the injector cannula above the middle of the sample container.Z direction:
  - Position the injector cannula so that it is immersed in the sample container almost to its bottom (1 to 2 mm distance).
- The metering syringe is adjusted to position 1.
- Click on [Save and exit] to confirm the set values.









# Field Start 112 Cir la patter Cir la patter 0 Selecter 0 Adapt poster 0 Selecter 0



### Sluice of the ABD (horizontal operating mode only)

- Select **Sample port** in the **Adjust position** drop-down field (1).
- Click on the **[Default]** (2) button.
  - ✓ The presets stored in the software for the sluice position are accepted.
- Click on the [Adjust position] (3) button.
  - $\checkmark$  The device moves to the sluice position.
- Perform a fine adjustment by carefully modifying the preset values and moving the device to the sluice position via the [Adjust position] button, repeatedly if necessary:
   X/X direction:
  - X/Y direction: Position the metering syringe over the middle of the septum of the injection port of the sluice.
  - Z direction: Position the metering syringe so that the injector cannula touches the carrier material in the quartz boat.
- The metering syringe is adjusted to the sluice position.
- Click on [Save and exit] to confirm the set values.

### Furnace (vertical operating mode only)

- Select **Furnace** in the **Adjust position** drop-down field (1).
- Click on the **[Default]** (2) button.
  - ✓ The presets stored in the software for the furnace position are accepted.
- Click on the [Adjust position] (3) button.
  - $\checkmark$  The device moves to the furnace position.
- Perform a fine adjustment by carefully modifying the preset values and moving the device to the furnace position via the [Adjust position] button, repeatedly if necessary:
- X/Y direction:

Position the metering syringe over the middle of the septum of the injection port of the combustion tube.

Z direction:

Position the syringe so that the cannula screw connection of the metering syringe is inside the cannula guide of the holding-down clamp. It must still be possible to move the holding-down clamp approx. 1 - 2 mm upward.

- The metering syringe is adjusted to the furnace position.
- Click on [Save and exit] to confirm the set values.



## NOTICE

Adjustment of the piston is necessary if a gap can be seen between the piston and the syringe body, or if the piston hits the syringe body with a loud and audible impact.



### Piston

Select **Piston** in the **Adjust position** drop-down field (1).

**I** NOTICE! After selecting the piston adjustment position, the piston moves approx. 1.2 cm upward. After the piston has moved upward, the piston must be adjusted, as this position will otherwise be saved as the start position!

- Enter the value 100 in the Z field and move to the position via [Adjust position].
- First change the value in increments of 10 and move to the position via [Adjust position], repeatedly if necessary.
- If the piston is almost at the bottom position, change the value in increments of 1.
- Move to the position via [Adjust position], if necessary repeatedly, until a crack can be heard.
- Set the value back by 1.
  - ✓ This adjusts the piston stroke.
- Click on [Save and exit] to confirm the set values.

## 6.2.3 Adjusting the gripper (AOX/solid sample trays)



## CAUTION

### Risk of injury and device damage due to incorrect position values!

Change the preset values carefully and in steps to find the correct adjustment position.

• Open the **Adjust - sampler** window via menu **System** | **Adjust - sampler** in the control and evaluation software.

### Position 1

- Place the adjusting aid on the empty sample tray.
- Position the adjusting aid so that the lug on the side (see arrow) points toward position 1.



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- The software presets for position 1 are accepted.
- Click on the **[Adjust position]** (3) button.
- The device moves to position 1 on the sample tray.



- Perform a fine adjustment by carefully modifying the preset values and moving the device to position 1 via the [Adjust position] button, repeatedly if necessary:
- X/Y direction:
- Position the gripper above the middle of the adjustment marking. Z direction:

Position the gripper so that it dips into the adjustment marking and the gripper edges are max. 0.5 mm above the surface of the adjusting aid.

- Click on [Save and exit] to confirm the set values.
- Check the adjustment by moving the device to the lower adjustment marking.
  - $\checkmark$  The gripper has been adjusted to position 1.
- Remove the adjusting aid and place the boats on the sample tray.

### Sample sluice

There is an adjustment marking on the right edge of the open sample port. The gripper must be adjusted until it dips into the adjustment marking without touching the edges of the marking.

- Select **Sample port** in the **Adjust position** drop-down field (1).
- Click on the **[Default]** (2) button.
  - $\checkmark$  The presets stored in the software for the sluice position are accepted.
- Click on the **[Adjust position]** (3) button.
  - $\checkmark$  The device moves to the position.



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- Perform a fine adjustment by carefully modifying the preset values and moving the device to the adjustment marking of the sluice via the [Adjust position] button, repeatedly if necessary:
- X/Y direction:

Position the gripper above the middle of the adjustment marking. Z direction:

Position the gripper so that it dips into the adjustment marking by approx. 1 mm (the gripper must not rest on the adjustment marking).

• The gripper has been adjusted to the sluice position.



• Click on [Save and exit] to confirm the set values.

6.2.4 Adjusting the ejection tool (AOX sample tray)



## CAUTION

### Caution

Risk of injury and device damage due to incorrect position values! Change the preset values carefully and in steps to find the correct adjustment position.



• Open the **Adjust - sampler** window via menu **System** | **Adjust - sampler** in the control and evaluation software.

### Position 1

tray.

- Select **Position 1** in the **Adjust position** drop-down field (1).
- Click on the [Default] (2) button.
  - $\checkmark$  The software presets for position 1 are accepted.
- Click on the **[Adjust position]** (3) button.
  - $\checkmark$  The device moves to position 1 on the sample tray.



- Perform a fine adjustment by carefully modifying the preset values and moving the device to position 1 via the [Adjust position] button, repeatedly if necessary:
- X/Y direction: Position the ejection tool above the middle of the AOX container.
  - Z direction: Position the ejection tool so that the grippers are at the height of the
- The ejection tool has been adjusted to position 1.
- Click on [Save and exit] to confirm the set values.





### Furnace

- Select **Furnace** in the **Adjust position** drop-down field (1).
- Click on the [Default] (2) button.
  - $\checkmark$  The presets stored in the software for the furnace position are accepted.
- Click on the [Adjust position] (3) button.
  - $\checkmark$  The device moves to the furnace position.
- Perform a fine adjustment by carefully modifying the preset values and moving the device to the furnace position via the [Adjust position] button, repeatedly if necessary:
   X/Y direction:
  - X/Y direction: Position the ejection tool above the middle of opening of the open combustion tube.
- Z direction: Position the ejection tool so that the gripper dips into the combustion tube by approx 1-2 mm.
- The ejection tool has been adjusted to the furnace position.
- Click on [Save and exit] to confirm the set values.

# 7 Troubleshooting

For fault analysis, log files can be recorded. Log file recording should be activated after consultation with Analytik Jena customer service for specific faults.

Log files

The save location of the log files can be defined via the **Extras** | **Interface** | **Error analysis** menu item.



## NOTICE

If faults cannot be remedied by the customer, the service department must always be informed. This also applies for the repeated occurrence of individual faults.

Send the correspond files to the service department via email for fault diagnosis (address on inside of the front cover).



## NOTICE

Observe the user manual of the control and evaluation software for fault messages and status displays.

# 8 Transport and storage

- 8.1 Transport
- 8.1.1 Preparing for transport



## CAUTION

When removing glass components there is a risk of injury from broken glass!

Exercise caution when removing glass components from the autosampler!



## CAUTION

### Risk of injury from the movable guide arm with injector head!

Only lift or carry the autosampler horizontally! Otherwise, the guide arm can move unexpected and lead to injury. When carry and setting down the device, note that it can be slightly imbalanced toward the front due to the position and geometry of the injector head.



## NOTICE

### Unsuitable packaging material can lead to damage to the individual components of the autosampler! Risk of possible damage to the guide arm and the injector head if transport locks are not applied!

Only transport the autosampler with the transport locks applied between the injector head and the rack receptacle, and only in the original packaging!

Preparing for transport

Prepare the autosampler for transport as follows:

- Switch off the autosampler via the device switch.
- Remove the connection plug of the external table power supply unit and disconnect the power plug from the socket.
- Remove the interface cable (RS 232 connection).
- Remove all sample containers, the sample tray and the solvent container.
- If necessary, remove the boat sensor (disconnect the interface cable on the rear of the device).
- Remove the autosampler from the ABD or analyzer.



Push the injector head over the rack receptacle and apply the transport lock (1).



• Place the device in the original packaging.



- Insert the foam insert so that the injector head is seated in the corresponding recesses.
- Carefully package the device in the original packaging.

### 8.1.2 Transport notes

Transport the autosampler very carefully to prevent damage from impact, shock or vibration.

The autosampler should be transported in such a way that major temperature fluctuations are avoided, preventing any condensate formation.

### 8.1.3 Moving the device in the laboratory



## CAUTION

### Risk of injury from the movable guide arm with injector head!

Only lift or carry the autosampler horizontally! Otherwise, the guide arm can move unexpected and lead to injury. When carry and setting down the device, note that it can be slightly imbalanced toward the front due to the position and geometry of the injector head.



## CAUTION

There is a risk of injury and device damage if loose parts fall out , or if the autosampler accidentally falls down!

Remove all loose parts before moving the device, in particular the solvent container, the sample containers and the sample tray!

Exercise great caution when moving the autosampler! Securely grip the autosampler with both hands from below!

Observe the following when moving the autosampler in the laboratory:

- Switch off the autosampler via the device switch.
- Remove the connection plug of the external table power supply unit and disconnect the power plug from the socket.
- Remove the interface cable (RS 232 connection).
- Remove all sample containers, the sample tray and the solvent container.
- If necessary, remove the boat sensor (disconnect the interface cable on the rear of the device).
- Remove the autosampler from the ABD or analyzer by unscrewing the fastening screws.
- Securely grip the autosampler with both hands from below and place the autosampler in its new location. Observe the location notes for setting up the autosampler.
- Install the autosampler at the new location and connect the device connections.

## 8.2 Storage



### NOTICE

Environmental influences and condensation can destroy individual components of the device!

Only store the autosampler in air-conditioned rooms.

The atmosphere must be low in dust and free from aggressive vapors.

If the autosampler is not installed immediately after delivery or not needed for prolonged periods, it should be stored in its original packaging. A suitable desiccant should be added to the packaging to prevent damage from moisture.

The following requirements are placed on the climatic conditions in the storage room:

- Temperature range: 15 to 55 °C
- Max. humidity: 10 to 30 °C
- Air pressure: 0.7 to 1.06 bar

## 8.3 Recommissioning after transport or storage

### 8.3.1 Setting up the sampler

Observe the safety information when setting up the autosampler.

- Carefully remove the autosampler and its accessories from the transport packaging. Ensure that the transport packaging does not get damaged!
- Place the autosampler on the ABD or analyzer and fasten it with the fastening screws included in the delivery.

### 8.3.2 Connecting the autosampler

Always observe the following safety information when connecting the device:



## CAUTION

Always connect the device to power or to further system module when it is switched off!

- Ensure that the device switches on the rear of the device are at the "0" position before connection!
- Only use the table power supply unit and the accompanying power cable included in the delivery to connect the device to power (VDE label, 1.5 m length). Extending the supply cable is not permitted!



## NOTICE

Settled condensation and temperature differences can damage individual components of the basic module during recommissioning.

Allow the autosampler at least one hour for acclimatization after positioning it in the room it will operate in before recommissioning.

### Connect the autosampler to the ABD/analyzer:



- Connect the green and yellow potential equalization cable of the autosampler to the ABD or analyzer.
  - To do this, plug the flat plug receptacle of the cable onto the corresponding flat plug.





 Connect the low-voltage cable of the table power supply unit with the 2pin Sub-D connector to the corresponding socket on the rear of the device (see arrow).

- Connect the special bus cable to the RS 232 interface (see arrow).
- Connect the other end of the interface cable to the "Sampler" interface on the rear of the analyzer, or to the RS 232 bus system.
   NOTICE! Secure all plug connections with the screws located on the grips.



- Connect the waste hose to the waste container (see arrow).
- Hang the other end of the hose into a waste container.
   NOTICE! Ensure sufficient slack for the hose, and that is not kinked or obstructed.

# 9 Disposal

The operator must dispose of any waste material generated during measurements (sample materials) in accordance with statutory and local regulations.

At the end of its service life, the device and all its electronic components must be disposed of as electronic waste in accordance with applicable regulations.

# 10 Specifications

## 10.1 Technical data

### 10.1.1 Multi Matrix Sampler

General specifications	Designation/type	Multi Matrix Sampler
		autoX 112 universal autosampler
	Dimensions (W x H x D)	ca. 510 x 500 x 410 mm
	Mass	ca. 9.5 kg
	Table 1         General specifications	
Procedural data	Sample feed principle	Direct
	Sample matrix	<ul> <li>Liquid</li> <li>Solid</li> <li>AOX container</li> <li>Quartz-fiber (EC/OC) and polycarbonate filters (AOX)</li> </ul>
	Sampling tools	<ul> <li>Metering syringe, 50 µl, and metering syringe, 100 µl (with and without temperature control)</li> <li>Metering syringe, 250 µl, and metering syringe, 500 µl (with NPOC connection, for vertical mode with TOC module only)</li> <li>Gripper for quartz boats (for horizontal mode only)</li> <li>Ejection tool for AOX containers (for vertical mode on the multi X 2500 only)</li> </ul>
	Sample trays	<ul> <li>EOX/liquid sample tray (for 112 containers with Ø12 mm)</li> <li>AOX/solid sample tray (for 35 quartz boats, 40 x 9 mm)</li> <li>TOC sample tray (for 60 containers with Ø18 mm)</li> <li>AOX sample tray (for 112 AOX containers, 18 x 6 mm, for multi X 2500 only)</li> </ul>
	Sample container volume	<ul><li>2 ml (112 positions)</li><li>9 ml (60 positions)</li></ul>
	Stirring function	No
	Waste container	PTFE container with waste hose
	Solvent container	25 ml
	Acid container	Plastic container, 25 ml

### Electrical variables

Power supply unit voltage supply	110 to 240 V +10/-5 %
Frequency	50/60 Hz
Overvoltage category	

	Degree of contamination	2
	Nominal voltage	24 V DC, 1.25 A
	Typical average power con- sumption	30 W
	Interfaces	RS 232 (special bus)
Environmental conditions	Temperature during storage	15 to 55 °C
	Temperature during operation	20 to 35 °C
	Humidity during operation	Max. 90 % at 30 °C
	Humidity during storage	10 to 30 °C (use desiccant)
	Air pressure	0.7 to 1.06 bar
	Maximum altitude	2000 m
		<del>.</del>

Table 3 Environmental conditions

## 10.2 Standards and directives

Protection class and protection type	The device is protection class I. The housing is protection type IP 20.	
Device safety	<ul><li>The device complies with the following safety standards</li><li>EN 61010-1</li><li>EN 61010-2-081</li></ul>	
EMC compatibility	The device has been checked for transient emissions and noise immunity.	
	<ul><li>It meets the requirements for transient emissions according to</li><li>EN 61326-1 (EN 55011 group 1, class B)</li></ul>	
	<ul><li>The device meets the requirements for noise immunity according to</li><li>EN 61326-1 (requirements for use in a basic environment)</li></ul>	
Environmental and ambient in- fluences	<ul> <li>This device has been tested in environmental simulations under operation and transport conditions and is in accordance with the requirements in:</li> <li>ISO 9022-2</li> <li>ISO 9022-3</li> </ul>	
EU directives	The device meets the requirements of the directive 2011/65/EU.	
	The device is designed and tested in accordance with standards meeting the require- ments of EU directives 2014/35/EU and 2014/30/EU. The device leaves the factory in a sound condition with regard to technical safety. To maintain this condition and to en- sure safe operation, the user must strictly observe the safety and operating instructions contained in this operating manual. For accessories delivered with the device and sys- tem components from other manufacturers, the information provided in their respective operating manuals has priority.	
Guidelines for China	The device contains substances subject to regulation (according to the directive GB/T 26572-2011). Analytik Jena guarantees that, if the device is used as intended, these substances will not leak within the next 25 years and therefore will not pose a threat to the environment or health within this time period.	

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	Main components

### **Automatic Boat Drive**

Automatic Boat Drive (ABD) – a system module for the horizontal operating mode of the modular multi EA 5100 / multi EA 5000 or multi X 2500 analyzers. It is used to transport quartz boats into the combustion tube of the analyzer. The boats can accept liquid or solid substances.

### **Multi Matrix Sampler**

Multi Matrix Sampler – system module for the modular multi EA 5100 / multi EA 5000 or multi X 2500 analyzers

### multiWin

Control and analysis software

### SCS

Self-check system

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## Waste hose