CAMAG®

INSTRUCTION MANUAL
AUTOMATIC TLC SAMPLER 4

Zertifiziertes Managementsystem
SQS
ISO 9001

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Declaration of Conformity (DoC)

1 Introduction

1.1 CAMAG automatic TLC sampler 4 (ATS4)

The CAMAG Automatic TLC Sampler 4 is a fully automatic sample application device for use in qualitative, quantitative and preparative Thin-layer chromatography. The system consists of the instrument with interface, computer and software from which the instrument is programmed.

The parameters for up to 6 application programs can be saved for stand-alone operation without PC- control.

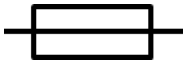
The ATS4 is controlled by CAMAG software that manages, monitors and reports all parameters and steps of the TLC analysis including definition of plate material, sample application, derivatization, development and evaluation. All data is handled in a GMP/GLP-compliant manner.

1.2 Precautions

- **Please read this operating manual before starting the installation!**
  This manual contains information and warnings the user has to follow to ensure reliable operation of the instrument.
- **Some interior parts of the instrument are under AC power. Careless and improper use can cause injury. Unauthorized manipulations can cause damage**

- This sign indicates (on instrument and in this manual) that failure to take note of the accompanying information may result in damage of the instrument
- The instrument is manufactured and tested in accordance with the respective European safety publications shown on the Declaration of Conformity (DoC). The instrument complies with safety class 1 and has been designed for indoor use only (IP 20). Further, this device has passed the CAMAG Quality Assurance tests and has been delivered in safe operation condition. For detailed instrument data see chapter technical data
- Attention: For safety reasons the instrument may only be used for the purposes described in the operating manual
- To avoid injury use adequate safety equipment (protective goggles, gloves etc. if applicable) when working with the instrument
- For the sample rack 022.7430 only standard 2 mL 12x32 mm with snap-cap, i.e. crimp closure or compatible are to be used. The penetration depth of the needle is fixed. Vials with the wrong depth may cause damage to the needle

- Before first operation, check whether the voltage shown on the instrument matches your local mains voltage. The power cord may only be connected to a grounded, fused (not higher than 16A) outlet. Do not use extension cords without ground contact
- The exhaust of the internal vacuum pump is located at the rear of the instrument. It can be connected to a fume hood
- When working with the fluids of the instrument, be sure to take the appropriate caution (protect your eyes from direct contact with liquid)
- In order to avoid damage to the bottle and syringe connections these have to be tightened by hand only
- Avoid overflow of the waste bottle. The vacuum pump is damaged and liquid can spill
- Risk of finger squeeze between moving parts; be careful closing the door
- The instrument may be used only by properly trained laboratory staff
- The instrument may not be used in rooms with danger of explosions
- The instrument contains highly sophisticated electronics and optical parts. It may be operated only in a non-condensing atmosphere in the temperature range outlined in the chapter "Technical Data". Before installation and use, the instrument should be acclimated properly
- Use a damp lint free cloth for cleaning the instrument surface. Do not employ aggressive detergents
- Protect yourself and the instrument from electrostatic shock which can cause damage to the electronic parts
- Only authorized personnel may open the instrument. Service and repair is only to be performed by trained specialists. Use spare parts and consumables supplied by CAMAG only. The warranty is voided if parts from other sources are used. Check the service manual before you start service to reduce product-specific risks
- The power cord has to be removed before the instrument is opened. It is not permitted to work on an instrument that has been opened and is connected to the power supply



- Spare fuses must be of the type specified by the instrument manufacturer. It is forbidden to short-circuit or manipulate fuses
- If the instrument is found to be defective, it must be switched off and steps must be taken to ensure that it cannot be switched on by mistake
- If liquids penetrate the inside of the instrument, the power has to be disconnected immediately. Small amounts of liquid can be wiped off and/or dried by means of a hairdryer, with larger amounts of liquid a service technician has to be called. A test of functionality has to be performed in all cases

- Carry out all safety checks and the preventive maintenance as recommended by the manufacturer in order to assure your personal safety and the full functionality of the instrument. Have an authorized service specialist perform any service not described by this manual
- See original manufacturers' manuals for further safety data on third party equipment supplied with the system
- Lift/move/transport the system with the necessary care and with sufficient manpower (install the transport security devices if applicable, transport it only in the original packaging)
- The safety of any system incorporate with the equipment is the responsibility of the assembler of the system

- This symbol indicates that this equipment must not be disposed of as unsorted municipal waste but is to be collected separately as electrical and electronic equipment (WEEE-Directive 2002/96/EC). To properly recycle the instrument or parts of it you are requested to send the equipment back to the distributor, producer or an adequate collection system at the end of its life. This will have potential effects on the environment and human health

1.3 Parts supplied with the instrument

Part no	Description
022.7430	Sample rack for 66sample vials 2 mL 12x32 mm
115.7405	Rinsing bottle 250 ml (mounted)
115.7420-1	Waste bottle 250 ml (mounted)
140.7400-1	Accessory set ATS4 containing:
715.2254	TLC-sheet down-holder
715.2328	10x10 plate levelling guide
140.0450-1	Pneumatics connecting kit
125.1021	RS232 connecting cable
140.7401	Tool kit
362.0008	Fuses 2AT – 2 pc.
740.1014	Test foil, tightness
720.3079	Spare Septum puncher
695.0053	25 µL Dosing syringe without needle
695.0046	Syringe needle for spray-on application
695.0047	Syringe needle for contact application
B.022.7400E	Instruction Manual
315.0016	Power cord EURO-plug or
315.0017	Power cord USA-plug or
315.0031	Power cord GB-plug

1.4 Spare parts/consumables

Part no	Description
022.7450	Dosing syringe starter kit for ATS4 consisting of:
695.0053	25 µL Dosing syringe without needle
695.0046	Syringe needle for spray-on application
695.0047	Syringe needle for contact application
115.7402	Heated spray nozzle, pre-assembled
695.0043	100 µL Dosing syringe without needle
695.0053	25 µL Dosing syringe without needle
695.0042	10 µL Dosing syringe without needle
695.0046	Syringe needle for spray-on application (blue)
695.0047	Syringe needle for contact application (red)
695.0065	Replacement seal for syringe needle 695.0046/47, Pkg. of 5
695.0061	Replacement piston for 10µL syringe
695.0062	Replacement piston for 25µL syringe
695.0063	Replacement piston for 100µL syringe
115.7405	Rinsing bottle 250 ml
115.7420-1	Waste bottle 250 ml
960.0064	Bottle without closure
720.3079	Septum punch
022.7430	Sample rack for 66 sample vials 2 mL, 12x32 mm
022.7464	Sample vials 2 mL, 12x32 mm with snap-caps, Pkg. of 1000
022.7435	Support for 96-well-plate, 15mm depth
022.7436	Support for 96-well-plate, 45mm depth
022.7460	Baffle bridge with septum foil support (incl. in 022.7435 and 022.7436)
022.7462	Septum foil, Pkg. of 10 (incl. in 022.7435 and 022.7436)
115.7452	Instrument Cover

2 Unpacking/Installation

2.1 Unpack the instrument

Observe the environmental requirements (below) when setting up the instrument.
Carefully take all components listed in the shipping list as well as accessories out of the packing. Make sure the shipment is complete.
Before taking the instrument out of the container the upper foam packing must be removed. Then take out the instrument cover. To remove the instrument from the lower foam packing grip the bottom of the instrument through the opening on the side of the lower foam packing and lift the instrument up carefully.

- Never try to pull or lift the instrument by means of the transparent cover. The cover is not connected with the instrument and will break.
- Do not switch on power before all transport locks have been completely removed.

Turret, bottles and plate support are secured for shipment. Carefully remove all transport locks completely.

Remove turret transport lock

Remove the cardboard underneath the spray nozzle
Unscrew the turret holder on the backside of the turret Fig 1.1
Remove the spacer
Remove the u-shaped transport lock Fig 1.2

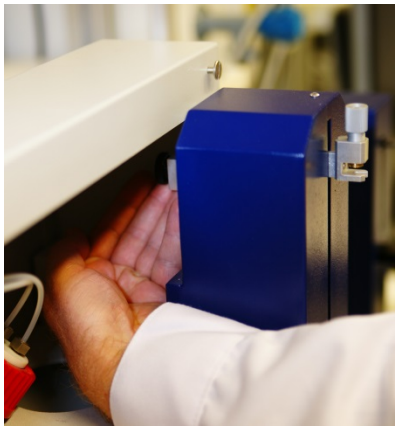


Fig. 1.1: Turret transport lock

Fig. 1.2 remove the u-shaped transport lock

Remove the table transport lock

To unlock the plate support: loosen the knurled screw and pull the plate support forward, then completely remove the clamp.

Fig. 2: Table transport lock

Do not dispose the transport lock – keep them at an appropriate place for further use.

2.2 Installation environment

The place for installation should meet the following requirements:

Bench space Width 630mm (add space for cables approx. 100mm)
Depth 530mm
Height 500mm

Add adequate space for a PC next to the instrument.

Weight 36kg

The operation temperature should be within a range of 18 to 35 degrees centigrade and free from significant variations.

Humidity and temperature conditions must not cause condensation.

Adequate ventilation free from acidic, alkaline or other gas that may corrode metal or painted surfaces must be secured.

Other requirements:

- Do not place the instrument in a location where the temperature undergoes significant changes (e.g. under an air conditioning duct or by a window). Significant changes in temperature will affect the performance of the unit.
- Do not place the instrument in direct sunlight. Direct sunlight may create significant temperature changes which will affect the performance of the system. Direct sunlight may discolor the instrument paint surfaces.
- Do not use the instrument in an environment with moving ambient air (draft).
- Do not expose the instrument to any strong vibration or shock.
- Avoid placing the instrument near equipment that radiates heat. Do not place the instrument near gas burners, electric heaters or ovens.

- Do not place the instrument near equipment that generates intense magnetic fields such as electric welding equipment, high frequency furnaces, pole transformers, etc.
- Protect the instrument from excessive dust.
- Connect the instrument to power lines that are free from sudden changes or voltage fluctuations.
- If you must use power motor driven equipment (such as a stirrer or shaker) in the same line as your instrument, ensure that a noise reduction unit is in the respective power line.

Confirm that the following requirements exist before installing the instrument:

Power supply and ground

Line voltage: 85 – 250VAC (see rating plate on instrument).

Frequency: 47 – 63 Hz

Power capacity: 60 VA

A grounded outlet should be within 2 meters of the instrument.

N2 or compressed air	¼" connection
Required pressure	4.5 - 6 bar (65-87 psi)
Gas consumption	0.2 - 0.3 L/min (spotwise)
	0.8 - 2.0 L/min (bandwise)

2.3 Installation

Rinsing bottles

The rear of the instrument features a compartment for the rinsing bottle and the waste bottle. Screw the proper lid to the corresponding bottle and place the bottle into the compartment's designated recess.

The waste bottle (three tubes) goes into the left position and the rinsing bottle (two tubes) into the right position.

Fill the rinsing bottle with an appropriate solvent.

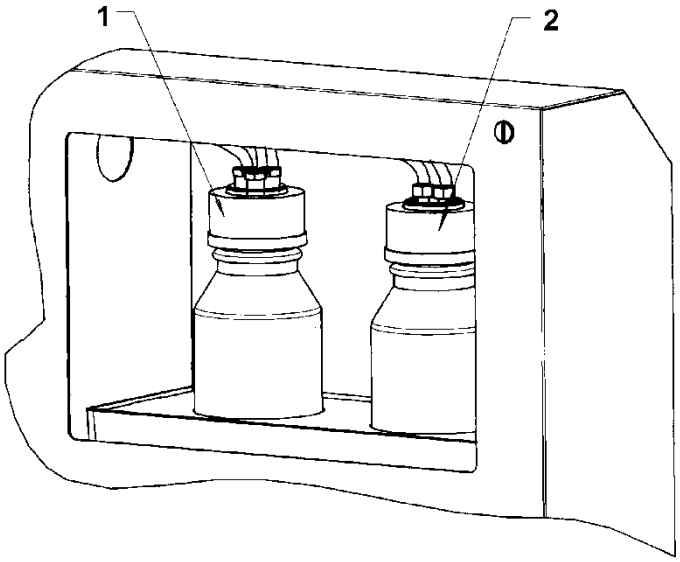


Fig. 3: 1 = waste bottle and 2 = rinsing bottle

Gas/air connection

Connect the supplied pressure tubing to the quick connection pressure inlet on the backside of the instrument. Connect the other end of the tubing to the gas supply.
If the outlet of your gas supply does not fit, the N2/compressed air connection kit allows connection to standard ¼" tubing.
Adjust the primary pressure between 4.5 and 6.0 bar (65-87 psi). If the instrument is started with low pressure the message: „Please connect to gas" will be displayed.
If long thin tubing is used it is recommended to increase the primary pressure to 6-8 bar (87-115 psi).

The right air connection is the outlet of the vacuum pump and does not need to be connected.

Dosage syringe and needle

Determine the proper syringe/needle for the specified method and place them into the designated holder of the application turret.
Please note that there are different needles for spray-on and contact application (red = contact, blue = spray).

- Loosen both knurled screws at the bottom of the syringe holder 4 (syringe body) and unscrew the upper holder (1) (syringe plunger).
- Insert the head of the syringe plunger into the upper holder (2) and fix it in position by tightening the knurled screw (1) half way down.
- Lower the syringe without needle carefully into the holder until it rests correctly in position (Hold the syringe down whilst tightening the screws (4) that they fit into the syringe head groove.

- Turn the syringe into a position where the side connector (3) faces the front of the instrument. Fix the position of the syringe with the two knurled screws (4) (tighten equally).
- DO NOT use force when tightening the knurled screws.
- Attach the short tubing onto the side connector (3) of the syringe and the other end of the tubing onto the connector (5) of the turret.
- Insert the needle into the Teflon guide of the nozzle. Attach it to the syringe.

  Make sure that the white Teflon seal at the top of the needle is correctly in place.

After mounting the syringe the syringe volume and the needle type must be entered into the instrument.

Procedure:

Press the DIALOG-key on the instrument and choose with the keys ▲ and ▼ the volume of the mounted syringe as well as the type of the needle (spray-on or contact application). Confirm choice by pressing the ENTER-key on the instrument.

If the wrong syringe volume is entered the application volumes will be wrong too.

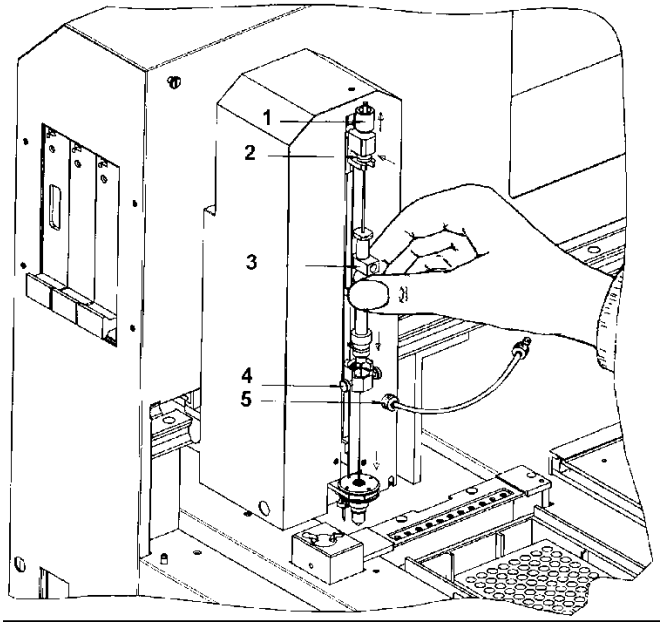


Fig.4: Installation of the syringe – 1= upper knurled screw, 2 = holder (plunger), 3 = side connector, 4 = syringe holder, 5 = tube connection on turret

Mains connection

Ensure that the voltage shown on the rating plate (left side) matches that of the mains. Use the supplied power cord for connection. Switch the instrument on (2).

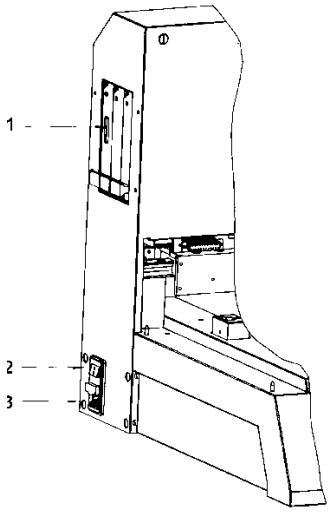


Fig. 5: Connections – 1=RS232 Interface, 2=Power switch, 3=Mains connection with fuse box

Connection to the PC and installation

The CAMAG automatic TLC sampler 4 is shipped with a 9-pin interface cable for connection to the PC. Connect the cable to the instrument and to a free COM-port of the PC to enable data transfer. Install the instrument according the software installation information.

The user dialog

By means of the User dialog you can select the communication Baud rate between the instrument and the PC, the LCD language and contrast.

To enter the user dialog:

- Hold down the DIALOG key and press the RESET key.
- Release the RESET key
- Wait 2 s and then release the DIALOG key.

The display will now show ATS4 V 1.00.xx Setup Mode.

- Press the ENTER key to start the user dialog (with the baud rate setting).

Set baud rate

Start the user dialog according to the procedure above. The display now shows the current baud rate (default is 19'200).

- Press the ▲ or ▼ key to change the setting.
- Press the ENTER key to accept the current setting (and move on to the language selection).
- Press the RESET key to quit the user dialog.

Set display language

Start the user dialog according to the procedure above. The display now shows the current baud rate.

- Press the ENTER key to move on to the language selection display.
  The current language setting is displayed.
- Press the ▲ or ▼ key to change the setting.
- Press the ENTER key to accept the current setting (and move on to the LCD contrast selection).
- Press the RESET key to quit the user dialog.

Set LCD contrast

Start the user dialog according to the procedure above. The display now shows the current baud rate.

- Press the ENTER key twice to move on to the LCD contrast selection display.
  The current contrast setting is displayed.
- Press the ▲ or ▼ key to change the setting.
- Press the ENTER key to accept the current setting.
- Press the RESET key to restart the instrument.

3 Getting started

3.1 Starting the system

Switch on the instrument. The ATS4 will now perform the following checks and tasks:

1. Checking memory for data loss. Parameters (methods) are stored in memory for more than 7 days.
2. Initializing the syringe drive.
3. Checking gas pressure. In case of low or no pressure an acoustic signal is given and the message "Please connect to gas" is displayed.
4. Initializing the septum punch.
5. Initializing all other drives.
6. Finally the application head is moving to the waste position. If start-up was successful the display will show:

** ATS4 **

Instrument ready

In this phase only physical blocking of a drive can cause an error. If necessary, check if all transport locks have been removed and whether there are unknown objects in the instrument (for instance below the sample rack).

3.2 Check syringe and needle type

Check if the syringe size and needle type is appropriate for your analysis method.
If not, change the syringe and/or needle and adjust the instrument according chapter 2.3 point "Dosage syringe and needle".

3.3 Loading the waste plate

Prior to application of a sample the application head moves to a position on the waste plate in order to pre-dose by contact or spray-on application. These pre-dosage positions are 2 mm apart from each other. The waste plate area X: 11 to 189 mm and Y: 11 to 89 mm is used which results in 3600 pre-dosing positions on each 20x10 plate. Each time prior to an application the system checks how many positions are still available. If necessary a warning is displayed. When you tell the software that a new waste plate was loaded the waste position is reset.
Positioning of the waste plate is achieved by pressing down the left stage. A 20x10 cm plate should always be used.

3.4 Loading a TLC-plate/foil

- Move the plate lift lever (1) situated on the right side of the plate stage to the rear in order to lower the right part of the stage.
- Flip the front ledge (2) of the stage down (forward) making the plate stage freely accessible.
- Place the plate (3) into the upper left corner of the stage so that it touches the rear stage ledge and the positioning pin (4) in the middle of the stage.
- Flip up the front stage ledge (2) and move the plate lift lever (1) back to the front. Guide the lever with your hand to avoid that the stage moves up too quickly.

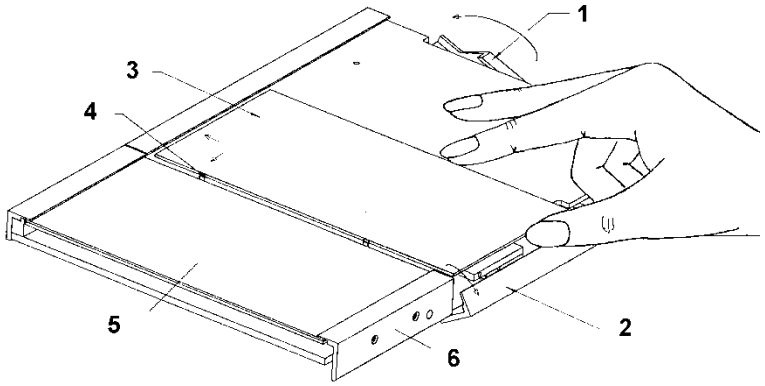


Fig.6: Plate stage – 1=plate stage lever, 2=front ledge of plate stage, 3=TLC-plate, 4=pin, 5=waste plate, 6=Front ledge at waste plate

- Use another 10x10 cm plate or the plate levelling guide if a 10x10cm plate is to be employed.

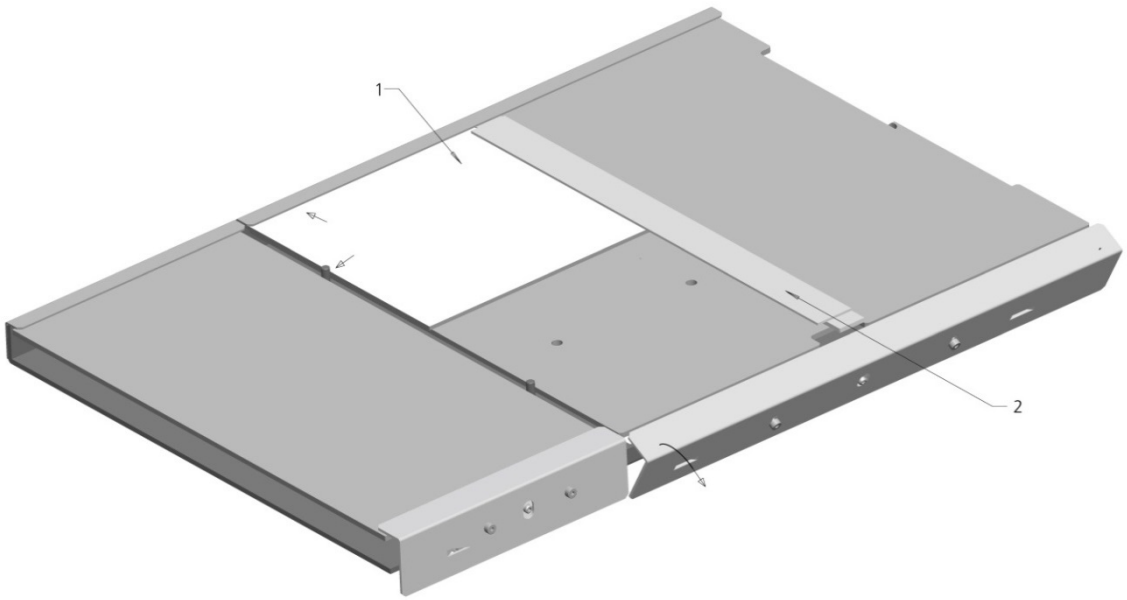


Fig.7: Plate stage setting for 10 x 10 cm plates – 1=TLC-plate 10x10 cm, 2 =10x10 plate levelling guide

For TLC foils which might not lay flat on the stage at the positioning pins a down-holder is designed. It is to be used according to below figure and may be left in place if only foils are being used.

The positioning of foils is similar to that of TLC-plates. Note also that the foil must be placed underneath the down-holder and firmly onto the positioning pin.

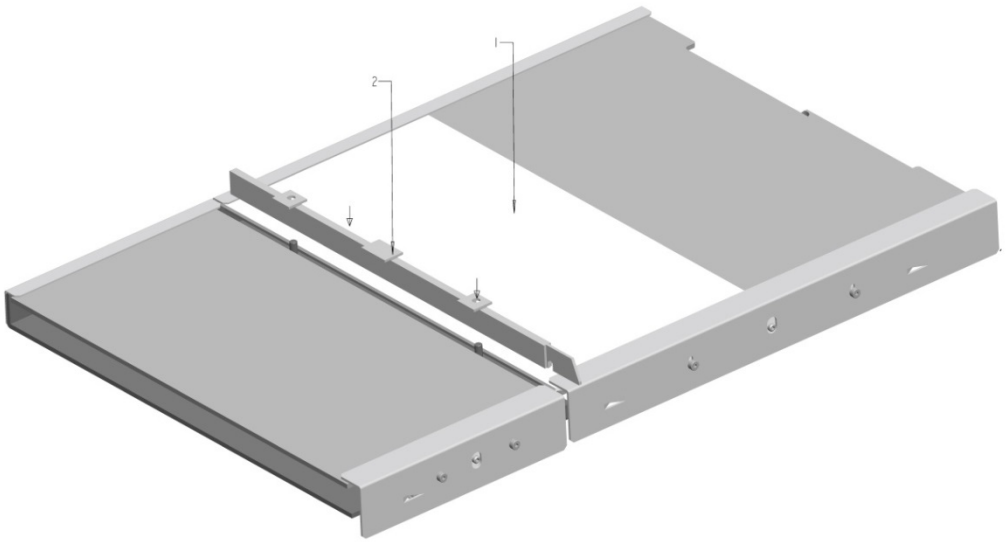


Fig.8: Foil down-holder- 1=foil, 2=foil down-holder before installation

Ensure that the plate or foil is resting against the positioning pin when fastened.

4 Manual operation

4.1 Display and function keys

Control lamps

The control lamps in the display indicate the following status:

- POWER ON: this lamp is lit when the instrument is switched on.
- ON LINE: this lamp is lit when the instrument is ON-LINE to the PC or is communicating with the PC.

Operating keys

Dialog

Activates the syringe and needle selection dialog.

ARROW KEYS, ▲ = upwards and ▼ = downwards

Select the parameters in the dialog.

ENTER

Confirms the current parameter and switches to the next display.

END

Interrupts the current application.

Starts the manual operations dialog to rinse the syringe, reset the waste position or clean the rinsing container and spray nozzle.

RESET

Resets and re-initializes the instrument. The current application is interrupted but the parameters remain in RAM.

RUN

Starts the program, i.e. repeats the last used method.

4.2 Standalone operation

The instrument can be used in standalone mode (offline modus, the instrument is not connected to the PC). Up to six methods can be saved locally and used after an offline start.

To save a method in the instrument follow the procedure outlined in the ATS4 section your TLC software.

Standalone application start

Prepare the instrument as usual for sample application (solvent, waste bottle, TLC-plate, etc.)

- Press the RUN key
- The most recently used method is displayed. With the ▲ and ▼ keys you can select another locally saved method.
- Press the ENTER or RUN key to start the application.

If no method is locally saved the message "MEMORY EMPTY" is displayed for 2 second. Then the instrument goes to ready position.

4.3 Aborting an application in progress

- Press the END key

The application in progress is aborted. An aborted application cannot be completed later.

4.4 Rinsing the syringe and spray nozzle

Syringe and spray nozzle can only be rinsed if no application is in progress and a syringe is installed.

- Press the END key
- Use the ▲ and ▼ keys to select the function „RINSE SYRINGE"
- Accept the selection with ENTER.

The syringe is now filled with rinsing solvent. 25% of this solvent is dosed into the spray nozzle and allowed to pour down into the waste container. Then the spray nozzle is blown clean with N2. This procedure is repeated 3 times.

4.5 Reset the pre-dosage position

The pre-dosage position can only be reset if no application is in progress.

- Press the END key
- Use the ▲ and ▼ keys to select the function „NEW WASTE PLATE"
- Accept the selection with ENTER.

The pre-dosage position is now reset to the first position on a new 20x10cm TLC plate. Always use a 20x10cm TLC plate as waste plate.

4.6 Clean the rinsing unit

The rinsing unit can only be cleaned if no application is in progress and a syringe is installed.

- Press the END key
- Use the ▲ and ▼ keys to select the function „CLEAN RINSE UNIT"
- Accept the selection with ENTER.

This way the rinse unit will be emptied through the syringe and then refilled with fresh rinsing liquid.

4.7 Manual control of the rinsing unit

Manual control of the rinsing unit can only be performed if no application is in progress and rinsing and waste bottles are correctly installed.

- Press the ▲ key

The inlet valve, drain valve and the pump are activated as long as the key is pressed.

- Press the ▼ key

The drain valve of the rinsing unit is open as long as the key is pressed.

4.8 Entering the syringe and needle type

Press the DIALOG key

- Use the ▲ and ▼ keys to select the volume of the installed syringe and the type of the needle.
- Accept your selection with ENTER

4.9 Stopping or resetting the instrument

- Press the RESET key

This will abort all activities in progress and re-initialize the instrument.

4.10 Mounting the baffle bridge with septum foil

The instrument is usually equipped with a baffle bridge without septum foil support. Optionally available is the baffle bridge with septum foil support (CAMAG part number 022.7460). This bridge is recommended when using micro titer plates or vials not equipped with septa.

How to mount the baffle bridge with septum foil:

- Turn off the instrument.
- Remove the syringe and carefully push the tower to the right-most position.
- Remove the attachment screws (5) at both ends of the baffle bridge and remove the old bridge.

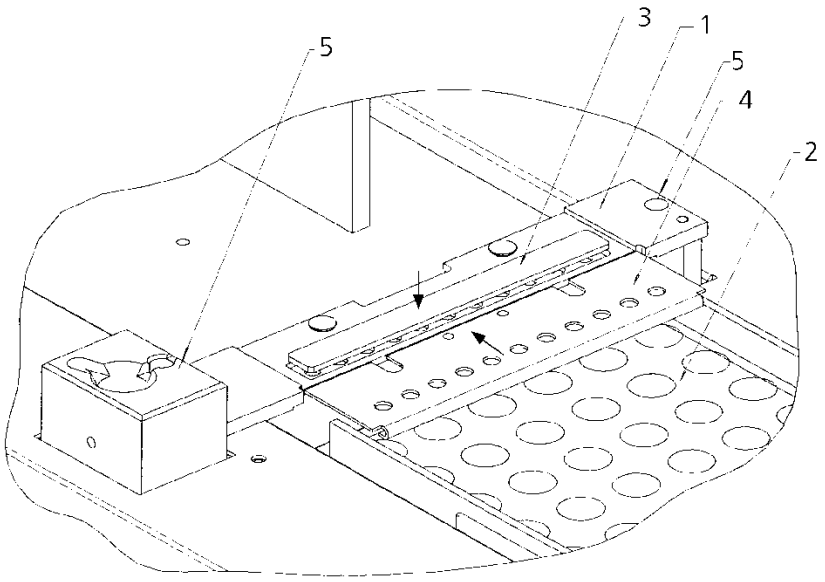


Fig. 9: Sample rack, baffle bridge with septum foil and rinsing unit

1 = baffle bridge with septum foil, 2 = sample rack for 2 mL sample vials 12x32 mm,

3 = septum foil, 4 = septum holder, 5 = attachment screws.

- Position the new baffle bridge with septum foil and attach it with the two screws (5).
- Insert a septum foil (3) with the Teflon layer face down into the groove of the baffle bridge (1) and clamp it with the septum holder (4). Make sure the holder rests below the spring bolts and clicks into position.

The septum foil has to be replaced when the needle is not completely cleaned any more.

5 Maintenance and troubleshooting

In general, CAMAG strongly recommends performing a preventive maintenance depending on the usage, but latest after 12 Month. The chapter Maintenance data sheet informs about the parts and their frequency to change.
Regular maintenance is mandatory to receive high quality and reproducible results with your Instrument.

5.1 Handling of the HAMILTON syringe

To achieve a maximum lifetime for the HAMILTON syringe the following points should be followed:

- Ensure extremely clean conditions when handling the syringe body and plunger.
- Never lubricate the plunger.
- The Teflon tip of the plunger is very sensitive. Even slightest scratches can cause a leak.
- Do not expose the plunger to boiling water.
- Plungers, needles and syringe bodies are exchangeable. CAMAG recommends exchanging those parts regularly. Check the CAMAG Maintenance Data Sheet for information of replacement cycles

5.2 Adjusting the spray gas pressure

Spray gas flow is controlled by a gas pressure regulator, factory adjusted to 0.5 bar. It may be suitable to increase this pressure to achieve better spray quality when using highly viscous liquids.
Procedure:

- Loosen the two screws of the pneumatic insert (left side, as seen from behind) and pull the insert about 10 cm out of the instrument.
- Turn the spray pressure regulator clockwise to increase pressure. The pressure can be read from the gauge. Adjust pressure to 0.8 – 1.0 bar.

Change the pressure only during a sample application to get a correct reading from the gauge.

5.3 Cleaning the spray nozzle

Even though the outside of the needle is cleaned by the septum during retraction the nozzle may get contaminated and spray quality can decrease. The nozzle should therefore be cleaned from time to time.
Procedure:

- Press the END - key

- With keys ▲ and ▼ select the function „RINSE NOZZLE“.
- Accept with ENTER
  This way some rinsing liquid is pressed / blown out of the nozzle.
- For this function a syringe must be mounted in the instrument.

5.4 Septum puncher

Prior to using the instrument check the state of the septum punch. A bent or broken septum punch will damage the needle.

To get correct results and keep the instrument in god condition, CAMAG recommends following below point:

- Check the needle of the septum punch prior to each use of the instrument.
- From time to time also check the position of the septum punch. The position is factory adjusted to the position of the syringe needle.
- If the movement of the turret or the sample rack was or is obstructed by anything immediately press RESET.
- The sample rack should only be removed when the application head is in park position.
- If you apply samples from open vials use the optional baffle bridge with septum foil (CAMAG part number 022.7460, see Fig. 9). The septum foil (CAMAG part number 022.7462) is inserted with the Teflon layer face down and secured with the foil holder. The septum foil serves the same purpose as a septum on a sample vial and can be used with well-plates without closure. See also part “Mounting the baffle bridge with septum foil”.

5.5 Replacing the septum puncher

A bent or damaged septum puncher can cause a number of malfunctions and damage the syringe needle. Therefore it should be replaced if any irregularities are observed (tilt puncher, tip has a hook, tip is no longer sharp).

To replace the septum puncher:

- Switch off the instrument.
- Remove the syringe and the sample rack.
- For easy access loosen and remove the screws on the left and right of the baffle bridge.
- Manually pull the holder (arm) of the septum punch into the middle position.
- Loosen the septum puncher with a 6 mm wrench while pushing the arm slightly to the right. This avoids twisting the arm. Use the wrench rectangular to the arm to minimize large lateral forces.

- Screw the new septum punch into position and tighten it.
- Re-install the baffle bridge.
- Mount the syringe and the sample rack

5.6 Replacing fuses

- Switch off the instrument.
- Disconnect the power cord from the electrical inlet of the instrument.
- With a small screwdriver pull out the fuse box from above the power connection of the instrument.
- Replace the fuse(s). The label 250 V 2.0 AT (slow) is valid to the full voltage range.
- Push the fuse box back into the instrument.
- Reconnect the power cord.

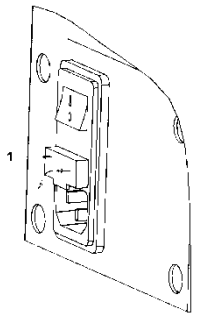


Fig.10: Fuse holders

5.7 Troubleshooting

- During the filling of the syringe bubbles are visible:
  The connection between syringe and needle is not tight
  Action: check connection and tighten it
  The needle is clogged
  Action: replace needle
  The Teflon small white seal of the needle is missing
  Action: Add the Teflon seal between the needle and the syringe
- During suction (if the plunger is at the top position) bubbles are visible in the tubing (and only there):
  The syringe plunger is not thigh
  Action: Replace syringe plunger
  The side connector is not tight
  Action: check side connector and tighten it
- Little or no liquid is transported through tubing during suction (if the plunger is at the top position):
  The needle is clogged
  Action: Replace needle

The side connector or another connection such as the lid of the waste bottle is not tight

Action: Check side connector and tighten it, check lid of waste bottle for tightness

The vacuum pump or the valve for emptying the waste container is defective

Request service for vacuum pump or valve.

- Too little rinsing liquid in rinsing unit:

  Rinsing bottle empty

  Action: Refill rinsing bottle

  Lid of rinsing bottle not tight

  Action: Check lid and tighten

  Tubing of rinsing unit clogged or valve for rinsing liquid defective

  Request service for checking the tubing or the valve of the rinsing unit

- Waste container overflow:

  Lid of waste bottle not tight

  Action: Check lid and tighten it

  No syringe present

  Action: Insert syringe and attach tubing

  Vacuum pump or valve for emptying waste container is defective

  Action: Request service for vacuum pump or valve

- Spray quality always bad:

  Bad adjustment of spray quality, low gas pressure

  Action: Adjust spray quality with the qualification program, increase gas pressure during application (standard: 0.8 – 1.0 bar) and continuously check spray quality

  Dosage speed too low or too high

  Action: Select proper solvent type in software or use manual control

  Wrong needle (red instead of blue)

  Action: Install spray-on needle

  Crust on needle tip, contaminated spray nozzle

  Action: Execute needle rinse procedure

  Needle tip damaged

  Action: Replace needle

  Nozzle damaged

  Action: Request service

- Spray quality not stable:

  Wrong dosage speed

  Action: Select a solvent with correct volatility or select user defined settings in software

5.8 Service maintenance

The instrument may only be serviced by authorized technicians who have been properly trained. In addition to the aforementioned user maintenance, CAMAG strongly recommend that maintenance be performed at least once each year by CAMAG authorised service personnel. Regular service and maintenance will ensure that the instrument performs according to CAMAG specifications.

5.9 Error messages and possible causes

Error #	Description	Action
11	No rack found	Enter the Rack
14	Content of this method faulty	Redo the analysis from the scratch
32	Pneumatic pressure too low	Connect/check the pneumatic pressure
41	MCP (Motor Controller Processor) does not start	Call your service contact
42	Program memory fault	Call your service contact
46	Internal movement calculation error	Call your service contact
110	Rack drive end switch was expected	Press reset or perform a restart
111	Stage drive end switch was expected	Press reset or perform a restart
112	Turret drive end switch was expected	Call your service contact
113	Lift drive end switch was expected	Call your service contact
114	Syringe drive: end switch was expected	Call your service contact
166	Fault while sorting the dosage command	Call your service contact
220	Rack drive: Movement over position limit was requested and aborted by low level driver	Call your service contact
221	Stage drive: Movement over position limit was requested and aborted by low level driver	Call your service contact
222	Turret drive: Movement over position limit was requested and aborted by low level driver	Call your service contact
223	Lift drive: Movement over position limit was requested and aborted by low level driver	Call your service contact
224	Syringe drive: Movement over position limit was requested and aborted by low level driver	Call your service contact
230	Lift was expected to move into end switch (or had too much backlash)	Call your service contact
231	Lift was expected in end switch (for punch or turret movement)	Call your service contact
232	Weight compensation system is blocked	Call your service contact
233	Slit wheel of rack not in punch position	Call your service contact
234	Slit wheel of turret not in punch position	Call your service contact
235	Punch attempted to punch outside of rack limits	Call your service contact
236	Punch movement could not be executed correctly	Call your service contact
237	Not all drives could be initialized correctly	Call your service contact
Internal problems with data exchange		
1074	There is no free timer	Call your service contact
1075	Invalid motor number	Call your service contact
1076	Empty mask at Start_mot(mask)	Call your service contact
1077	Too many simultaneous starts	Call your service contact

Drive problems (mechanical or electrical)		
1124	Rack drive: End switch was active during movement	Call your service contact
1125	Stage drive: ditto	Call your service contact
1126	Turret drive: ditto	Call your service contact
1127	Lift drive: ditto	Call your service contact
1128	Syringe drive: ditto	Check plunger and syringe
1134	Rack drive: End switch was expected	Call your service contact
1135	Stage drive: ditto	Call your service contact
1136	Turret drive: ditto	Call your service contact
1137	Lift drive: ditto	Call your service contact
1138	Syringe drive: ditto	Check plunger and syringe
Firmware internal problems		
1144	Rack drive: No calculate or start	Call your service contact
1145	Stage drive: ditto	Call your service contact
1146	Turret drive: ditto	Call your service contact
1147	Lift drive: ditto	Call your service contact
1148	Syringe drive: ditto	Call your service contact
1154	Rack drive: No start	Call your service contact
1155	Stage drive: ditto	Call your service contact
1156	Turret drive : ditto	Call your service contact
1157	Lift drive: ditto	Call your service contact
1158	Syringe drive: ditto	Call your service contact
1164	Rack drive: Hardware limits exceeded	Call your service contact
1165	Stage drive: ditto	Call your service contact
1166	Turret drive : ditto	Call your service contact
1167	Lift drive: ditto	Call your service contact
1168	Syringe drive: ditto	Call your service contact
1174	Rack drive: Motor already runs with timer	Call your service contact
1175	Stage drive: Motor already runs with timer	Call your service contact
1176	Turret drive : Motor already runs with timer	Call your service contact
1177	Lift drive: Motor already runs with timer	Call your service contact
1178	Syringe drive: Motor already runs with timer	Call your service contact

6 Technical data

Power connections	85 – 250 V~ 47 – 63 Hz 60 VA
Dosing syringe	Choice of 10, 25 or 100 µL, gas-tight with side port
Dosing volume	100 nL to 1 mL in steps of 100nL
Syringe drive	Stepper motor 1600 steps / rev.: 100nL = 960 steps for 10µL syringe 100nL = 384 steps for 25µL syringe 100nL = 96 steps for 100µL syringe
Y-drive (turret)	Stepper motor 1600 steps/rev. 4 steps = 0.1 mm Maximum speed 200 mm/s with acceleration ramp Positions programmable: 5.0 – 195.0 mm in 0.1 mm steps
X-drive (stage)	Step motor 3200 steps/rev. 8 steps = 0.1 mm Maximum speed 200 mm/s with acceleration ramp Positions programmable: 5.0 – 195.0 mm in 0.1 mm steps
Gas supply	External pressure: 4.5 - 6 bar (65 - 87 psi). Consumption: 0.2 - 0.3 L/min for contact application 0.8 – 2.0 L/min for spray-on application (pressure dependent)
Pressure rinsing bottle	100 mbar above normal pressure
Pressure waste bottle	100 mbar below surrounding pressure
Septum puncher	Suitable for normal septa; pneumatic operation
Reservoir for rinsing liquid	250 mL bottle
Rack	For 66 sample vials 2 mL (12x32mm) or 96-well-plate (optional)
Max. no of application	100 application per analysis
Measures	Width 630mm, depth 530mm, height 500mm
Weight	36 kg

7 Maintenance data sheet

CAMAG Maintenance data sheet

ATS 4

October 2013/UB

Purpose	The maintenance data sheet informs about maintenance interval of the respective instrument as well as the proposal for IQ/OQ interval if applicable. In addition, it identifies consumable parts with the respective replacement cycle.

Maintenance interval

Maintenance	12 Months
IQ/OQ	12 Months

Consumable parts

Part No.	Description	Replacement cycle Heavy/frequent/occasional use
695.0061	Plunger 10µl syringe	3/6/12 Months
695.0062	Plunger 25µl syringe	3/6/12 Months
695.0063	Plunger 100µl syringe	3/6/12 Months
695.0042	Syringe 10µl	24/24/24 Months
695.0053	Syringe 25µl	24/24/24 Months
695.0043	Syringe 100µl	24/24/24 Months
695.0046	Needle for spray on application (blue)	6/12/24 Months
695.0047	Needle for contact application (red)	6/12/24 Months
115.7450	Spray nozzle	24/24/24
720.3079	Septum puncher	6/12/24
115.7434	Tube from syringe to tower	24/24/24
695.0065	Replacement seal for syringe needle 695.0046/47, Pkg. of 5	3 Months

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DECLARATION OF CONFORMITY

EC – Declaration of Conformity

We, CAMAG Chemie-Erzeugnisse und Adsorptionstechnik AG
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Switzerland

declare under our sole responsibility that the product

CAMAG® ATS 4

Product name

022.7400/ 022.7410

Article number(s)

to which this declaration relates is in conformity with the following provisions of directive(s):

- 2006/95/EC
- 2004/108/EC

Following standard(s) or other normative document(s):

- EN61010-1: 2010
- EN61326-1: 2013

Muttenz, 26 March 2015

Walter Rahm, Head of Quality Management

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