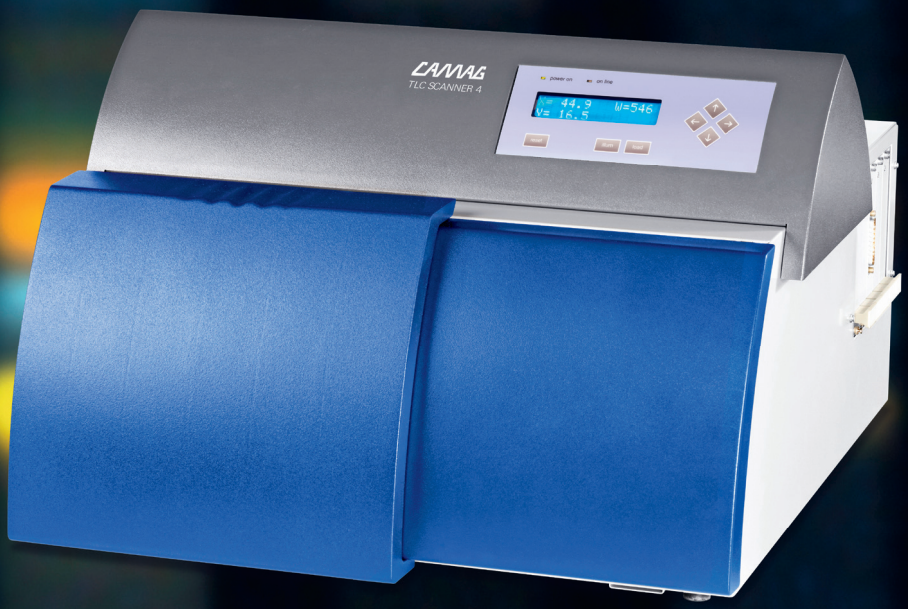
CAMAG®



INSTRUCTION MANUAL
TLC SCANNER 4

Zertifiziertes Managementsystem
SQS
ISO 9001

Contents

1 Introduction

Intended use:
The CAMAG TLC SCANNER 4 (Fig.1) is designed for densitometric measurement of thin-layer chromatograms and other objects up to 200x200 mm in size.

While the Scanner 4 performs the actual densitometric measurement, data is processed by the CAMAG visionCATS/winCATS Planar Chromatography Manager running on a connected computer.

This manual is about the instrument itself. It describes how to set up and maintain the device.

Fig. 1: The CAMAG TLC Scanner 4

1.1 Precautions

- 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

- Spare fuses must be of the type specified by the instrument manufacturer. It is forbidden to short-circuit or manipulate fuses

- 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
- 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
- If the instrument is used in a manner not specified in this manual, the protection provided by the equipment may be impaired
- Attention: For safety reasons the instrument may only be used for the purposes described in the operating manual
- 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
- To avoid injury use adequate safety equipment (protective goggles, gloves etc. if applicable) when working with the instrument
- 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 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
- Use only the original, with the instrument delivered power cord type
- 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 with a of a blow dryer, 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

- When working with UV light, especially with short-wave UV light, be sure to protect your eyes and skin from direct radiation, which inevitably causes irritation and inflammation. Ordinary goggles provide protection, but it is advisable to wear safety glasses or a face shield and gloves. See table with intensities and maximum exposure times (daily dose) in this manual
- Servicing the instrument with the lamp compartment open and the Mercury or Deuterium lamp ON can be dangerous because of the emitted UV light. Protective goggles and UV absorbent gloves must be worn
- To ensure sufficient cooling, the ventilation holes of the instrument must never be obstructed

2 Parts information

Parts supplied		
Part No.	Quantity	Description
140.6200	1	Accessory kit
115.0123	2	L-shaped magnetic strip
115.0124	2	Magnetic strip
115.6217	1	Foil-holder
125.1028	1	RS232 connection cable
362.0008	2	Fuse 230V, 2A slow blow
	1	Power cord
705.0018	1	Screwdriver Allen key type 2.5mm
705.0012	1	Screwdriver Allen key type 3.0 mm
B.027.6200E	1	Manual TLC Scanner 4
Spare parts		
Part No.	Description	
027.6440	Mercury vapor lamp	
027.6441	Deuterium lamp	
027.6442	Halogen-Tungsten lamp	
352.0014	Lamp compartment illumination 254 nm	
352.0013	Lamp compartment illumination 366 nm	
352.0019	Lamp compartment illumination Cool White	

3 Unpacking and Installation

Check with chapter *Parts information* whether any parts are missing.

The TLC Scanner 4 is a high precision instrument. Place it on a suitable, plain and horizontal working surface. Its measuring sensitivity is impaired by dust, corrosive vapours, shocks and vibrations.

3.1 Installation environment

The place for installation should meet the following requirements:

Bench space	Width 570 (590mm with door open) (add space (approx. 200mm) for cables, appropriate ventilation and for emergency switch off on the left side of the device) Depth 590 (plus 60mm for extended Table position) (add space for appropriate ventilation approx. 60mm) Height 367mm (add space for appropriate ventilation approx. 200mm)

☞ *Add adequate space for a PC next to the instrument.*

Operating temperature	The temperature should be within a range of 20 to 35° C and free of significant variations.
Humidity	Humidity and temperature conditions must not cause condensation.
Atmospheric conditions	Adequate ventilation free of acidic, alkaline or other gas that may corrode metal or painted surfaces must be secured.
Further conditions	Pollution Degree 2 Overvoltage Category II

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's painted 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 same power line.

3.2 Conditions for the installation

Check the following requirements before installing the instrument:

Power supply and ground	
Line voltage:	115 or 230VAC (make sure the voltage selector switch is correctly set).
Frequency:	50 or 60 Hz
Power capacity:	180 W
Ground terminal:	A grounded outlet should be within 2 m of the instrument.
Gas supply for flushing the monochromator (optional)	
Nitrogen	Required pressure 0.5 bar (7 psi) Gas consumption 6 L/min

3.3 Removal of the shipping protection

Open the Scanner 4 by sliding the door to the right side and remove the knurled screws and the three brackets (1) (2) (3). Keep the whole shipping protection set in a suitable place. Prior to shipping the instrument the brackets must be screwed back on.

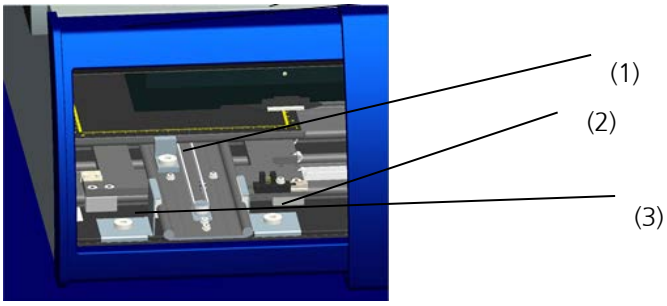


Fig. 2: The shipping protection

3.4 Connections

3.4.1 Power supply

The left side of the Scanner 4 shows the power socket with the ON/OFF switch (2), the voltage selector-switch (1) and the connection (tubing nipple) for the nitrogen gas supply (3).

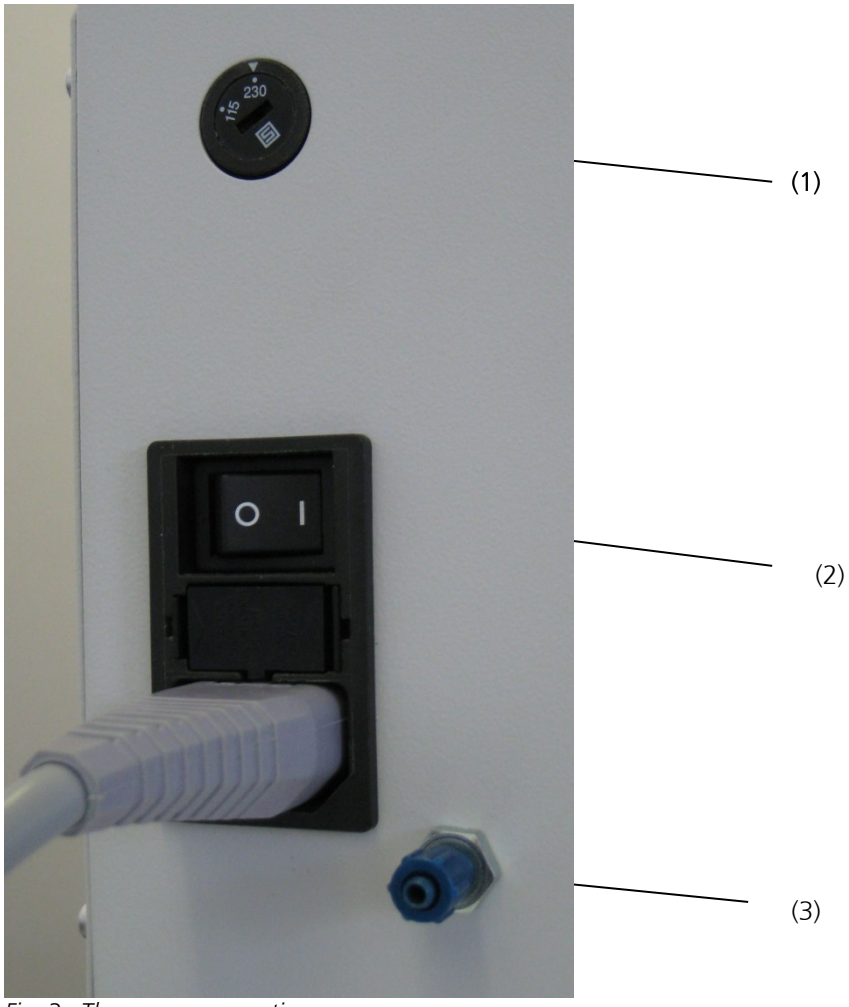


Fig. 3: The power connection

Before connecting the Scanner 4 to the wall outlet check whether the voltage selector-switch (1) is set in the appropriate position matching the mains power voltage of your laboratory

The housing of the power socket also contains the two fuses.

All Scanners are fitted with the fuse matching the voltage range of the voltage selector switch. Two extra fuses are supplied.

Connect the Scanner 4 to the power supply.

3.4.2 Peripheral equipment

The RS232 plug (1) for connecting the Scanner 4 to the computer ("Only for connection of IECxxxxx approved equipment") is located on the right side of the Scanner 4 housing.

Fig. 4: RS232 connection

3.4.4 Nitrogen flushing of the monochromator

When measuring below 200nm the oxygen in the air absorbs some UV light reducing UV light intensity and consequently sensitivity of the measurement. To avoid this, the monochromator housing can be flushed with nitrogen.

Proceed as follows:

- Remove the nut from the tubing nipple (Fig. 3 (3).
- Push the connecting tubing of the nitrogen supply (3x4.3mm pneumatic tubing) through the back of the nut over.
- Push the tube over the nipple and tighten the nut manually.
- Start nitrogen flushing at least 5 minutes before measurement starts.

Nitrogen consumption: approx. 6L/min at 0.5 bar (7 psi)

3.5 Inserting the TLC/HPTLC-plate

- Open compartment door fully!
- To move the scanning table into load position – press the LOAD POS key.
- Place the TLC/HPTLC plate against the plate stopper with the application position facing the rear of the instrument.
- Fix the plate with a L-shaped magnetic strip (1)

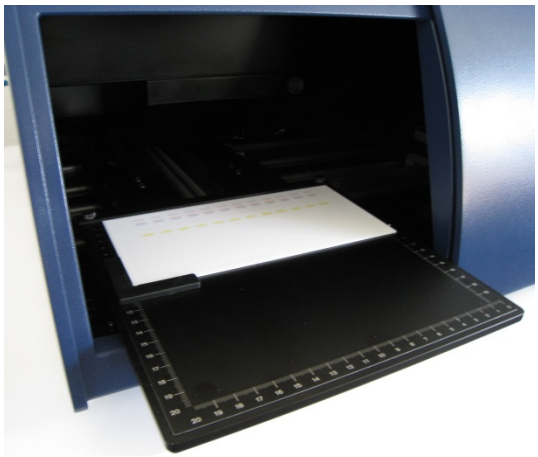


Fig. 5: Placement of TLC/HPTLC plate and magnetic strip

3.6 Optional Foil-Holder/Plate-Stopper

- The standard plate stopper is in a fixed position and is for glass TLC/HPTLC plates. It can also be used for foils.

☞ *Note: with foils there is a 2 mm offset in Y direction!*

- When mainly TLC/HPTLC foils are used, replace the standard plate stopper (2) with the special foil holder 115.6217 (1). Fig.6
- To replace the standard plate stopper remove the two knurled screws (3) and take out the plate-stopper. Then mount and screw on the optional foil-holder.
- With the two knurled screws loosened the foil holder can be moved into the desired position: front position for "foils", back position for "plates". When finished retighten the knurled screws.

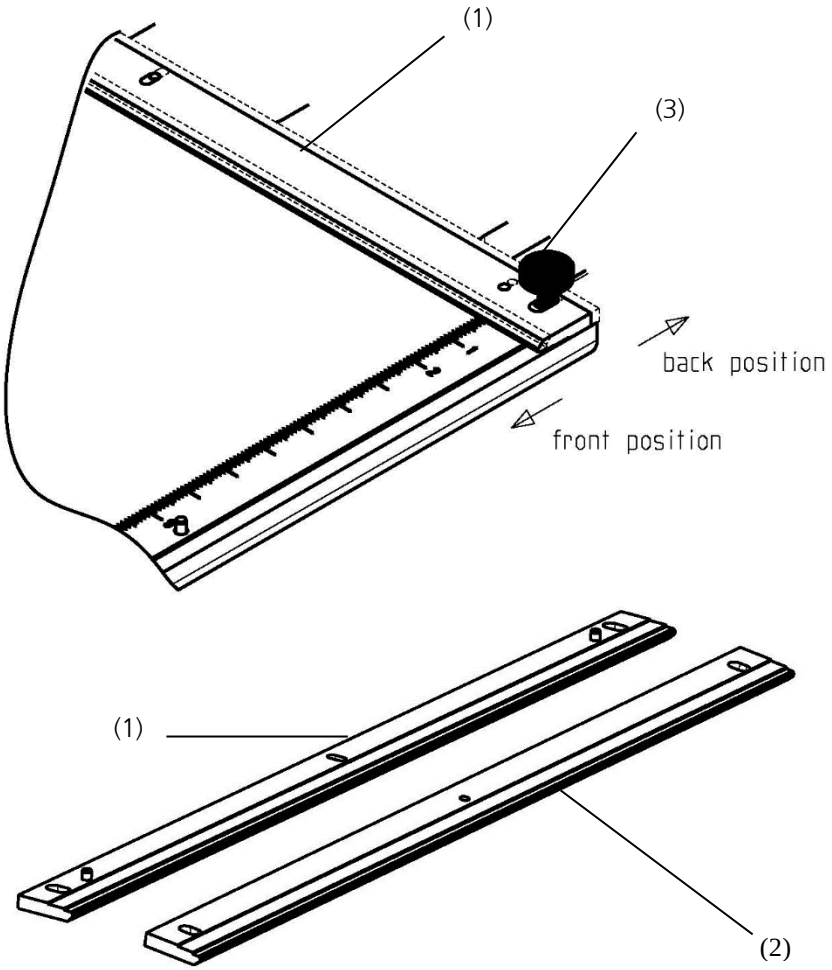


Fig. 6: Exchanging Foil-holder/Plate-stopper

4 The keypad and display

Switch ON the Scanner 4 by pressing the power switch towards **I**. (Fig. 3 (2))

4.1 ILLUM (Compartment illumination)

Press the **ILLUM** key to ignite the compartment illumination. The Scanner 4 automatically moves the monochromator to 546nm and ignites the Tungsten lamp in order to make the slit visible. The compartment illumination is turned OFF if the key is pressed a second time or the Scanner 4 door is closed.

4.2 LOAD (Table in load position)

Open compartment door fully! Press **LOD POS** to move the scanning table to the foremost position.

4.3 Arrow keys (Move stage)

By pressing one of the arrow keys, the scanning table will move in the direction of the arrow. The table will start slowly and accelerates if the key remains pressed. The current position of the table in X and Y is displayed live. A diagonal movement (pressing two keys) is not possible.

4.4 RESET (Warm start of the Scanner 4)

If for some unknown reason the Scanner 4 is neither reacting to the keypad nor software commands, press **RESET**.

5 Maintenance

Dust and powder (e.g. from TLC plates) that has accumulated in the measuring compartment has to be removed with a vacuum cleaner regurarly.

Maintenance should be performed only by authorized technicians who are familiar with the Scanner's technical and functional characteristics. Experience has shown that a Scanner 4 in daily use requires maintenance about once a year. If the instrument is used less frequently, maintenance should be carried out every two years.

Before opening or replacing parts on the instrument, make sure the instrument is disconected from the mains.

5.1 Replacing the lamps

Exchange lamps only when they have cooled down properly.

- Switch OFF the Scanner 4 and disconnect the power cord. Let the lamps cool down
- Remove the screws (1) and (2) of the Top-cover (3)
- Lift up the Top-cover and place it on the backside as shown in Fig.7 make sure the panel ribbon cable does not get disconnected

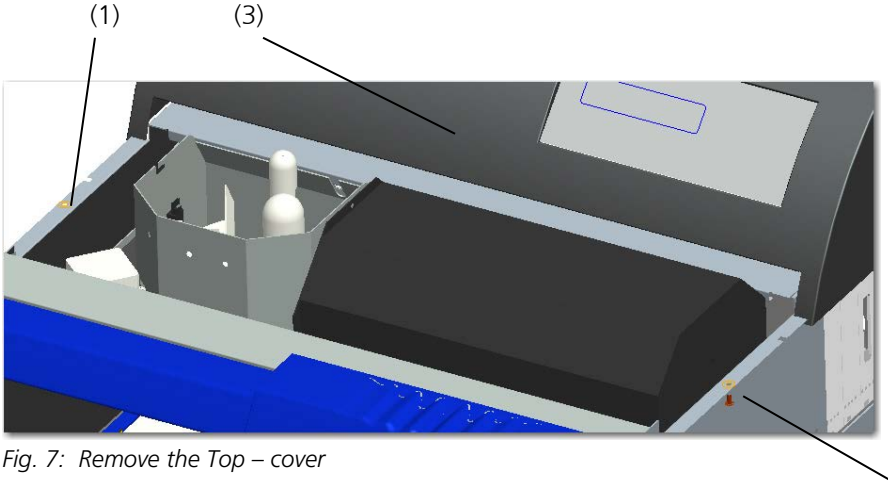


Fig. 7: Remove the Top – cover

- Run the function NEW XX LAMP of the USER DIALOG to adjust the lamp (see following pages)

Make sure not to touch the glass of the lamps with your bare fingers.

5.2 Mercury lamp exchange

The mercury vapour lamp (cat. no. 027.6440) - Fig.8 (1), has a life time of about 500 hours. Towards the end of the life time the lamp

will occasionally not ignite properly and the electronic amplification setting of the Scanner 4 will increase.

- Pull the cable connector of the Mercury lamp.
- Loosen the two Allen screws in the lamp socket.
- Turn the lamp about 15 degrees to release it from the lamp support fitting.
- Remove the old Mercury lamp and insert the new one.
- Turn the lamp into the lamp support fitting so that the window is parallel with the entrance optics.
- Tighten the two screws in the socket with the lamp in this position.
- Plug the cable connector of the new lamp into the connection and mount the light cover.
- Switch ON the instrument and start the USER DIALOG (see chapter 6.3). Select the function NEW HG LAMP and confirm by pressing the **LOAD POS** key. The following will now happen automatically:

The position of the lamp will be optimized in the ray path.

The emitted light energy of the new lamp will be measured and saved for use in the respective procedure of CAMAG software.

5.3 Deuterium lamp exchange

The Deuterium lamp (cat. no. 027.6441) - Fig.8 (3), has a life time of about 1000 hours. Towards the end of the life time the lamp will occasionally not ignite properly and the electronic amplification setting of the Scanner 4 will increase (see chapter 6.4).

- To exchange Deuterium lamp proceed as outlined in the description of the Mercury lamp (see chapter 5.2).

5.4 (Halogen)-Tungsten lamp exchange

The Tungsten lamp (cat. no. 027.6442) - Fig.8 (2), has a life time of over 2000 hours. It burns out suddenly.

- Remove the lamp by pulling it upwards out of the holder.
- Inset the new lamp carefully in the opposite manner.
- Proceed as outlined in the description of the Tungsten lamp (see chapter 6.5).

Fig. 8: The lamp compartment

5.5 Compartment illumination lamp exchange

- Remove the knurled screw Fig.9 (1) of the PM-cover on the front side. Pull the PM-cover towards left Scanner 4 side and take it out of the Scanner (2). Inset the PM-cover carefully in the opposite manner (3) Fig.9 and Fig.10.
- **Be careful! Do not damage the filter holder.**
- Rotate the fluorescent tube about 90 degrees and remove it according to Fig.11.
- Mount a new tube and make sure it sits properly in the holder. (4W tubes: UV-254 # 352.0014 - UV-366 # 352.0013)
- Slide the PM-cover carefully back into stop position (3) and replace and tighten the knurled screw (1) Fig.9.

  (UV-filter in PM-cover # 692.0025)

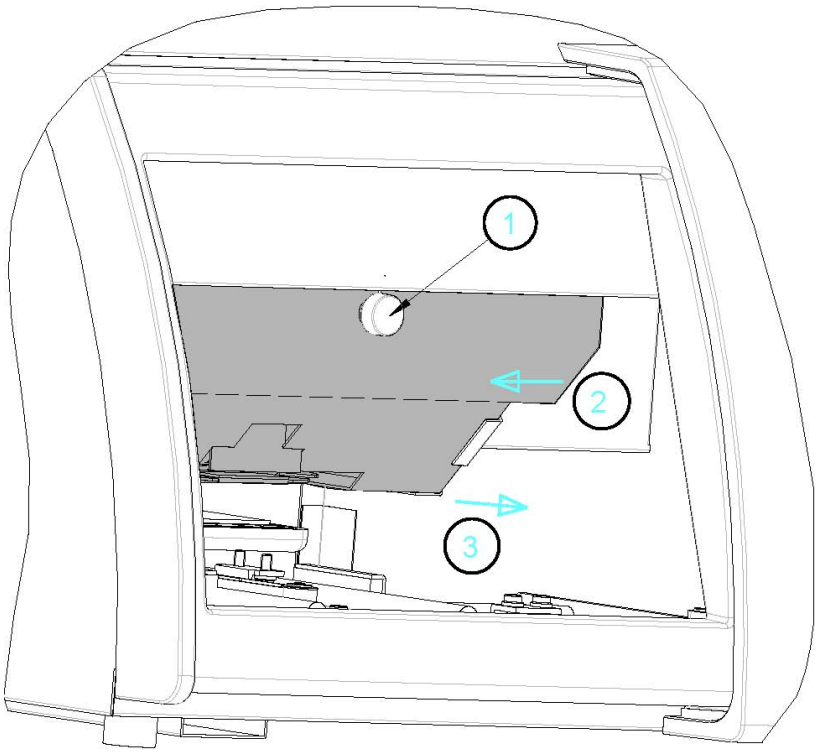


Fig. 9: Handling of the PM-cover for illumination lamp exchange.

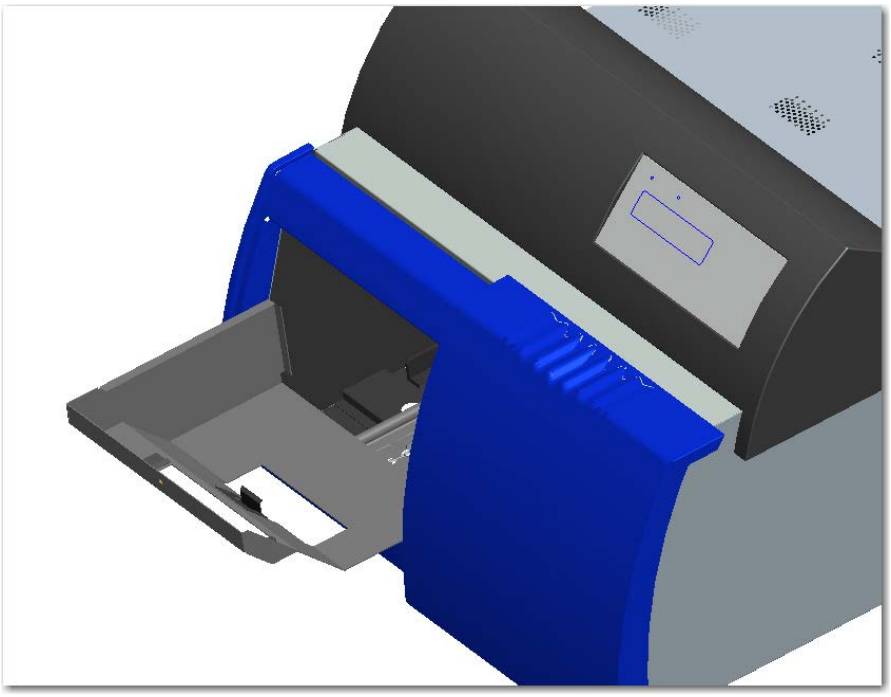


Fig. 10: Taking out the PM-cover.

Fig.11: Replacing the compartment illumination lamp.

5.6 Maintenance data sheet

CAMAG Maintenance data sheet

TLC Scanner 3/4

April 2012/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
027.6440	Hg lamp	Upon need*
027.6441	D2 lamp	Upon need*
027.6442	W lamp	Upon need*
352.0014	Compartment illumination UV254	Upon need
115.0123	L-shaped magnetic strip	Upon need
115.0124	Magnetic strip	Upon need

* Latest when the intensity is dropping under 60%

6 The USER-Dialog

With the USER-Dialogs you have access to the setup parameters Scanner Baud rate and Display Contrast of your Scanner 4. To enter the USER-Dialog:

- Press and hold the **RESET** key, press ➔. Now release **RESET** and then release ➔. The Scanner 4 now shows "USER-Dialog" in the display.

New values for the parameters are saved by means of the ➔ key; RESET discards any change in the current parameter. The key ➔ moves between the two functions **Baud rate** and **LCD-Contrast.** Quit the USER Dialog with the ← key.

6.1 Baud rate

The Baud rate is the RS232 communication speed between computer and Scanner 4. To change the Baud rate:

- Select the function Baud rate in the USER-Dialog (by means of the ➔ key)
- Use the keys ↑ and/or ↓ to select the desired Baud rate.
- Press ← or ➔ to save the new value. The new Baud rate is now valid. (recommended 19`200 baud)

☞ *The new Baud rate will be recognized automatically by the CAMAG software at the next connection.*

6.2 LCD-Contrast

The keypad display of the Scanner 4 can be adapted to the current light conditions by means of this function in the USER-Dialog. To change the LCD-Contrast:

- Select the function LCD-Contrast in the USER-Dialog (by means of the ➔ key).
- Use the keys ↑ and/or ↓ to select the desired contrast.
- Press ← or ➔ to save the new value.

6.3 NEW HG LAMP

Use this function to automatically optimize a new Mercury lamp in the ray path and measure the lamp emission. It may take as much as 7 minutes to run this task.

- In the USER-Dialog advance to the function NEW HG LAMP (by means of the ➔ key).
- Use the key ↓ to select the Hg lamp optimizing function; the message CONFIRM: **LOAD POS** appears.

- Press the key **LOAD POS** to start the automatic optimization routine or any other key to get back to the USER DIALOG.
- Press ← to quit the USER DIALOG or → to select another function.

6.4 NEW D2 LAMP

Use this function to automatically optimize a new Deuterium lamp in the ray path and measure the lamp emission. It may take as much as 3 minutes to run this task.

- In the USER-Dialog advance to the function NEW D2 LAMP in (by means of the → key).
- Use the key ↓ to select the D2 lamp optimizing function; the message CONFIRM: **LOAD POS** appears.
- Proceed as outlined in the NEW HG LAMP part.

6.5 NEW W LAMP

Use this function to automatically optimize a new Tungsten lamp in the ray path and measure the lamp emission. It may take as much as 2 minutes to run this task.

- In the USER-Dialog advance to the function NEW W LAMP (by means of the → key).
- Use the key ↓ to select the Tungsten lamp optimizing function; the message CONFIRM: **LOAD POS** appears.
- Proceed as outlined in the NEW HG LAMP part.

6.6 TEST FUNCTIONS

This function contains some basic information about the system that can be useful for diagnosing an error condition, e.g. in a telephone contact with the service engineer.

7 Technical data

Light sources	• Halogen Tungsten lamp: continuum 350 - 900 nm. • Mercury vapour lamp: line spectrum 220 - 580 nm. • Deuterium lamp: continuum 190 - 450 nm. All lamps are built into the instrument; the mechanical switch of the lamps is triggered automatically by a stepper motor. The lamps are current or voltage stabilized.
Lamp power supply	The lamp power supply is built into the Scanner 4.
Pilot lamp	The slit is automatically illuminated with a visible wavelength (546 nm) if the compartment illumination is turned ON.

Compartment illumination	4 W fluorescent tube: 254nm (standard) or 366nm or COOL WHITE (optional).
Optical system	Apochromatic Suprasil optic with 190 - 900 nm transmission. Automatic switching between MACRO and MICRO image depending on slit size selected.
Monochromator	Grating type, band width selectable 5/20 nm, wavelength range 190 - 900 nm. Stepper motor driven, accuracy better than 1 nm.
Scanning slit	48 fixed, software selectable slit sizes ranging from 0,25x0,1 to 12x0.9mm.
Detectors	Two wide-band photomultipliers, multi-alkali type, spectral sensitivity 185 -900 nm.
Stage movement	Independent stepper motors to drive the X and Y movement. • Reproducibility of position in Y = 0.05, in X = 0.1 mm. • Manual movement speed: 0-20 mm/s • Scanning speed selectable 5 - 100 mm/s, return 150 mm/s.
Power supply	115V and 230V, 50/60 Hz. Power consumption max. 180 W (Tungsten and Mercury lamps ON)
Nitrogen	Consumption at approx. 0.5 bar: 6 L/min.
Interface	RS 232 port for connection to the PC.
Weight	37 kg
Dimensions	Width = 570 (590) mm, Depth = 590 (650) mm, height = 367 mm

7.1 UV intensity of compartment illumination

Wavel-ength	2cm above TLC plate		At compartment door	
	µW/cm²	MAC time eye/skin	µW/cm²	MAC time eye/skin
254nm	650	9 sec	10	10 min

7.2 Cut-off Filter position

Filter	Position
320 nm	1
Empty	2
540 nm	3
400 nm	4
790 nm	5
User 1	6
User 2	7
User 3	8

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DECLARATION OF CONFORMITY

EC – Declaration of Conformity

We, CAMAG Chemie-Erzeugnisse und Adsorptionstechnik AG
Sonnenmattstrasse 11
4132 Muttenz
Switzerland

declare under our sole responsibility that the product

CAMAG® TLC Scanner 4

Product name

027.6200

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

Year of the CE characteristic assignment: 2010

Muttenz, 26 March 2015

Walter Rahm, Head of Quality Management

SWISS MADE

CE

Notes:

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