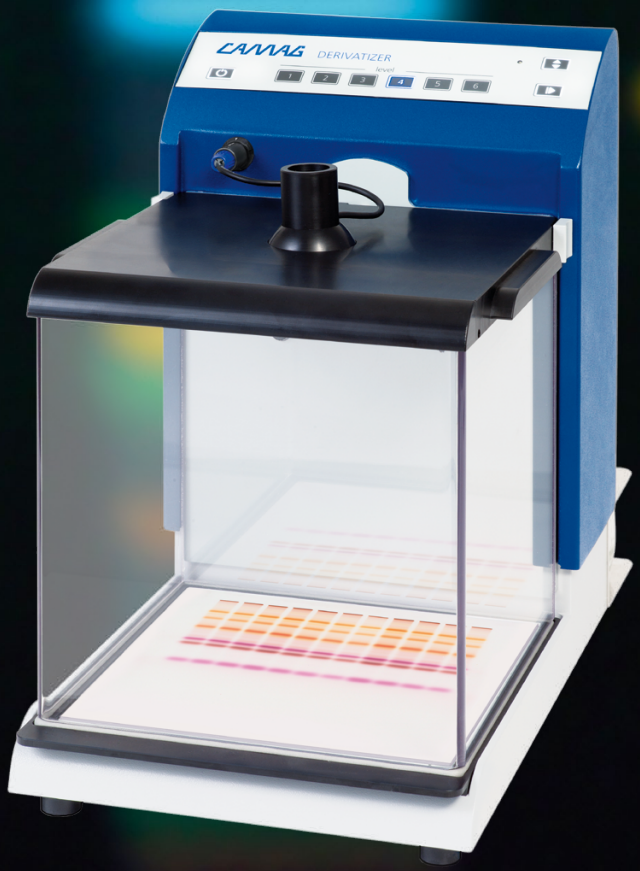
CAMAG®



INSTRUCTION MANUAL
DERIVATIZER

Zertifiziertes Managementsystem SQS ISO 9001

Content

1 Introduction

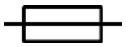
The CAMAG Derivatizer is an automated spraying device which sets a new standard of reproducibility in the reagent transfer onto TLC plates by employing a unique "micro droplet" spraying technology. The CAMAG Derivatizer ensures homogeneous and reproducible application of all common reagents. Moreover, the CAMAG Derivatizer offers further advantages compared to manual spraying:

- Environmentally friendly and safe handling through a closed system
- Intuitive handling and easy cleaning
- Low reagent consumption through efficient operation (4 mL for 20 x 20 cm plates and 2 – 3 mL for 20 x 10 cm plates)
- Reproducible and user-independent results

1.1 Precaution

- 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
- 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 to 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
- 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 16 A) outlet. Do not use extension cords without ground contact

- When working with the fluids of the instrument, be sure to take the appropriate caution (protect your eyes from direct contact with liquid)
- 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. 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



1.0AT, 250VAC

- Spare fuses must be of the type specified by the instrument manufacturer. It is forbidden to short-circuit or manipulate fuses
- Use only the original power cord type that is delivered with the instrument
- 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 incorporated 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
- The use of the instrument without adequate ventilation to outside air may constitute a health hazard depending on the substances in use
- This equipment is intended to be used in an Industrial Electromagnetic Environment according IEC 61326-1

1.2 Parts supplied with CAMAG Derivatizer

Part no	Description
022.6050	Derivatization hood 20 x 20 cm or *
022.6055	Derivatization hood 20 x 10 cm *
022.6051	Tray with seal 20 x 20 cm or*
022.6056	Tray with seal 20 x 10 cm *
022.6070	Sealing for tray 20 x 20 cm (5 pcs) or*
022.6071	Sealing for tray 20 x 10 cm (5 pcs) *
	Power cord
B.022.6000.E	Instruction Manual
B.022.6030.E	Table: Recommendations for common derivatization reagents
960.0055	Washing bottle
735.6015-1	Washing bottle holder
115.6019-1	Lid washing bottle
022.6080	Set of all 4 nozzles (one of each) or
022.6085	Set of 4 nozzles Ultra (one of each)*
735.6021-1	Nozzle holder
672.0067	Teflon tubing from/to washing bottle, o.d. 6 mm Red – 280 mm Yellow – 320 mm
672.0067	2 m tubing for the output air pipe to the fume hood

**Depending on ordered configuration*

1.3 Spare parts for CAMAG Derivatizer

Part no	Description
022.6070	Sealing for tray 20 x 20 cm (5 pcs)
022.6071	Sealing for tray 20 x 10 cm (5 pcs)
022.6080	Set of all 4 Nozzles (one of each)
022.6061	Nozzle green
022.6091	Set of 3 green nozzles
022.6062	Nozzle blue
022.6092	Set of 3 blue nozzles
022.6063	Nozzle yellow
022.6093	Set of 3 yellow nozzles
022.6064	Nozzle red
022.6094	Set of 3 red nozzles
022.6066	Nozzle Ultra green
022.6096	Set of 3 green nozzles Ultra
022.6067	Nozzle Ultra blue
022.6097	Set of 3 blue nozzles Ultra
022.6068	Nozzle Ultra yellow
022.6098	Set of 3 yellow nozzles Ultra
022.6069	Nozzle Ultra red
022.6099	Set of 3 red nozzles Ultra
720.6019-1	Nozzle lid

2 Unpacking/Installation

2.1 Unpacking

- Carefully unpack all components and accessories listed on the shipping list. Make sure the shipment is complete
- Carefully remove the instrument from the package and place it on a table

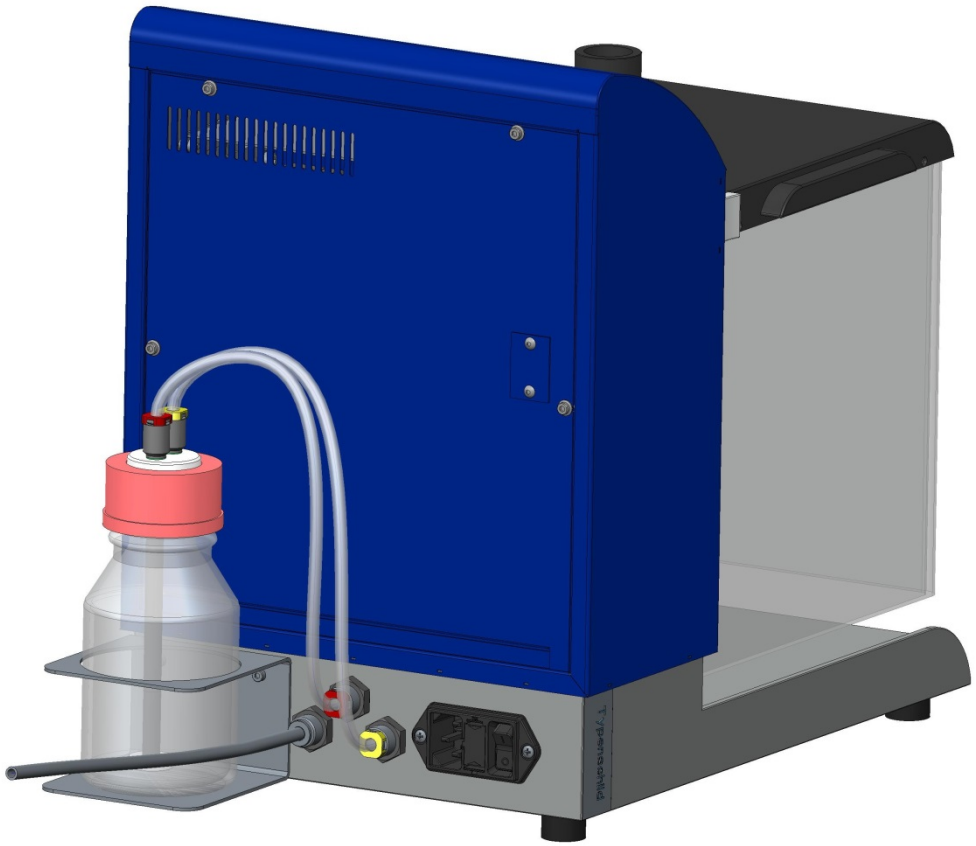
2.2 Installation environment

The place for installation must meet the following requirements:

Connections	• Grounded AC powerline • The CAMAG Derivatizer has to be used under the fume hood, or with the output air pipe connected to it
Bench space (w x d x h)	300 x 500 x 500 mm
Operating temperature	The temperature should be within a range of 10 to 40 °C
Humidity	Humidity and temperature conditions must not cause condensation

2.3 Installation

- Fill the washing bottle with 100 ml solvent able to dissolve the derivatization reagent (recommendation: a 50% v/v aqueous solution of ethanol), and mount it with the help of the washing bottle holder
- Mount the respective hood and plate tray
- Connect the power cord to the power inlet at the rear right side of the instrument



- If the instrument is not placed in a fume hood, connect the output air pipe (grey rear connector) to the fume hood

3 Getting started

3.1 Intended use

The primary use of the CAMAG Derivatizer is for derivatization of TLC plates. The following reagents have been tested and validated by CAMAG.

The exact composition for the above reagents is specified in the chapter 6.

Before using other reagents, check the material compatibility and spray characteristics.

- 10% sulfuric acid reagent
- *p*-Anisaldehyde – sulfuric acid reagent
- NP reagent (Natural product = diphenylborinic acid aminomethylester)
- PEG solution (polyethylene glycol 400 = macrocol)
- Iodine solution
- Dragendorff's reagent
- Fast blue salt B reagent
- Ehrlich's reagent
- Phosphomolybdic acid reagent
- Ninhydrin reagent
- Copper(II) sulfate reagent
- Aniline – diphenylamine- phosphoric acid reagent
- Vanillin – sulfuric acid reagent
- Potassium hydroxide solution*
- Enzymatic assay: Tyrosinase (aqueous solution)

*) recommended for the chemically resistant Ultra nozzle

3.2 Material compatibility

Materials in use:

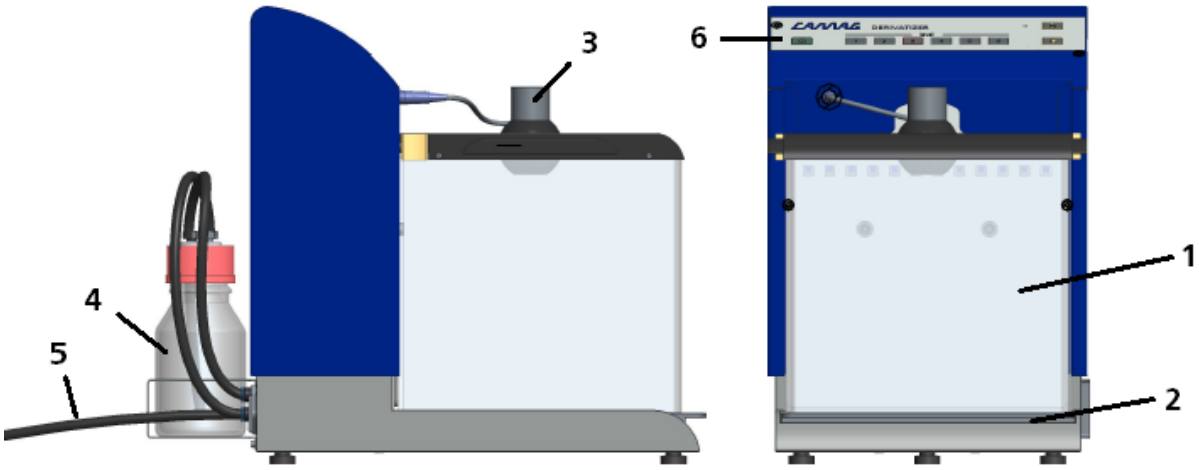
- Nozzle housing: PET / PEEK for the Ultra nozzle
- Nozzle membrane: Palladium-alloy
- Nozzle sealing ring: EPDM
- Hood, transparent: PETG
- Hood, cover: PET
- Tray: PET
- Tray seal: EPDM

Please consult chapter 6 for tested derivatization reagents. According to standard chemical resistance charts, reagents like acetone, acetonitrile and methylene chloride may cause problems. However, in the Derivatizer most parts are not in direct contact with the liquid phase of the reagents and might be unproblematic if sprayed. For some specific combinations of reagents, micro-cracks may appear in the transparent hood with continued use. This does not affect the spraying and derivatization itself, but the service life of the hood is limited in such cases. Please minimize contact with these reagents and clean and dry directly after the application.

If possible, change solvents to a methanol-, ethanol- or water-based derivatization reagent.

For potassium hydroxide containing reagents and for potentially aggressive reagents in general we recommend the chemically resistant Ultra nozzles.

3.3 Instrument

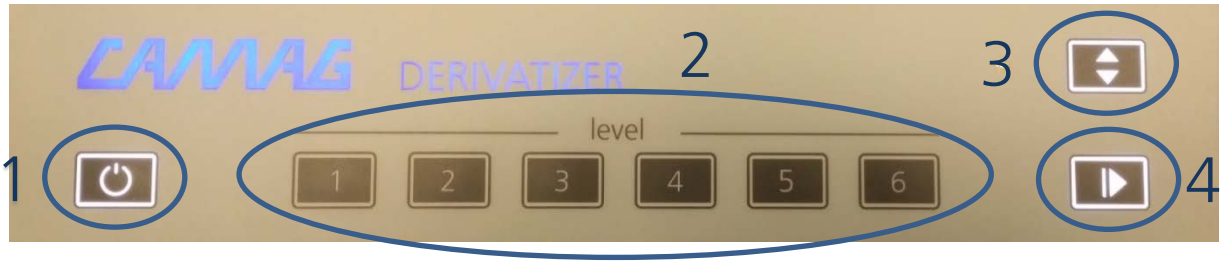


Elements of CAMAG Derivatizer:

1 Hood (20 x 20 cm version shown)
2 Tray with seal
3 Nozzle
4 Washing bottle
5 Output air pipe
6 Control panel

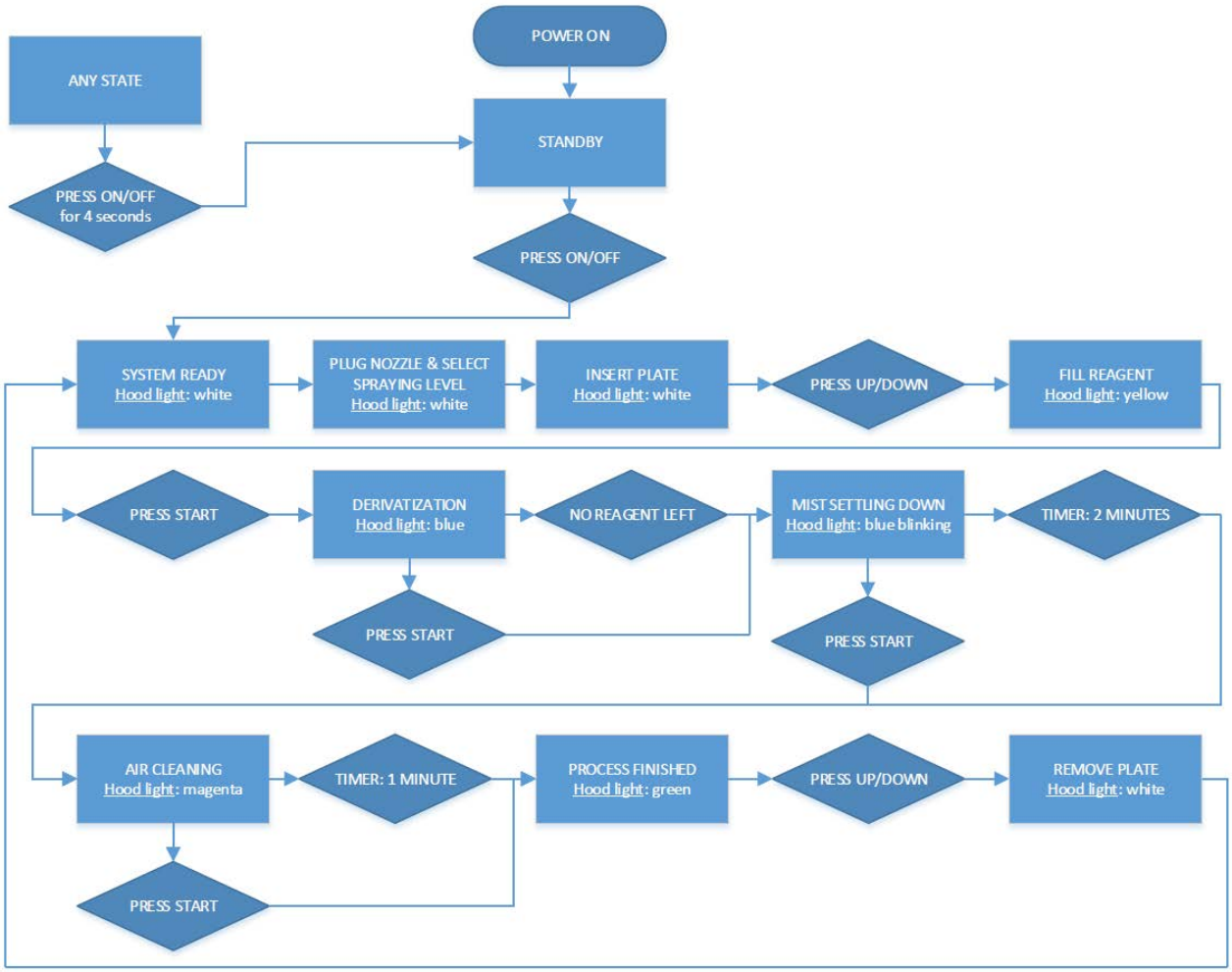
The CAMAG Derivatizer has to be used under the fume hood, or with the output air pipe connected to a fume hood

3.4 Control panel



1 Power ON/OFF
2 Spraying level (6 levels)
3 Hood UP/DOWN
4 START derivatization

3.5 State diagram



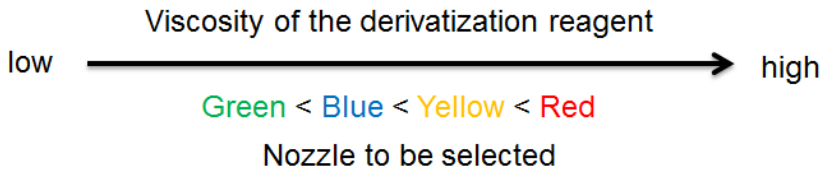
3.6 Nozzles

CAMAG provides 4 different types of nozzles. Each of them is coded by a different colour on the connector. The following types are available:

1. Green
2. Blue
3. Yellow
4. Red

There are the standard type nozzles and the chemically more resistant Ultra nozzles. For potassium hydroxide containing reagents and for potentially aggressive reagents not listed in this manual we recommend the chemically resistant Ultra nozzles.

The colours correspond to the porosity of the nozzle which should be adjusted to suit the general physicochemical properties of the reagents such as the viscosity. The porosity size from smallest to largest is as follows: green < blue < yellow < red.



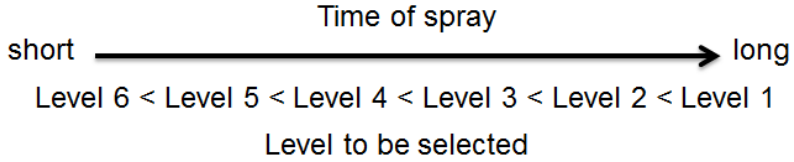
Depending on the derivatization reagent and the required homogeneity, the appropriate nozzle and spraying level should be selected according to CAMAG's recommendation (chapter 3.10) To ensure that the correct nozzle is plugged into the CAMAG Derivatizer, the level buttons are backlighted in the colour of the nozzle connector.

If the derivatization reagent is one of the derivatization reagents described in this manual, refer to chapter 3.11. For other derivatization reagents refer to chapter 3.10:

Be sure that the operational temperature of the nozzles is at room temperature (20 °C – 25 °C).

3.7 Spraying level

There are 6 different spraying levels available. The selection of the spraying level is dependent on the desired time for spraying. With a higher spraying level, a stronger reagent flow, and therefore a shorter spraying time, is achieved. However, the spraying distribution will be less homogenous. Best homogeneity is usually achieved when the spraying takes 3 -5 min. In any case, the spraying time has to be adjusted to < 10 min.



If the derivatization reagent is one of the derivatization reagents described in this manual, refer to chapter 3.11. For other derivatization reagents refer to chapter 3.10:

General remark:
If two different nozzles spray well, it is always advisable to use a lower one (Green < Blue < Yellow < Red) with a higher spraying level than a higher nozzle with the same or even a lower spraying level so that the spray is as homogeneous as possible.

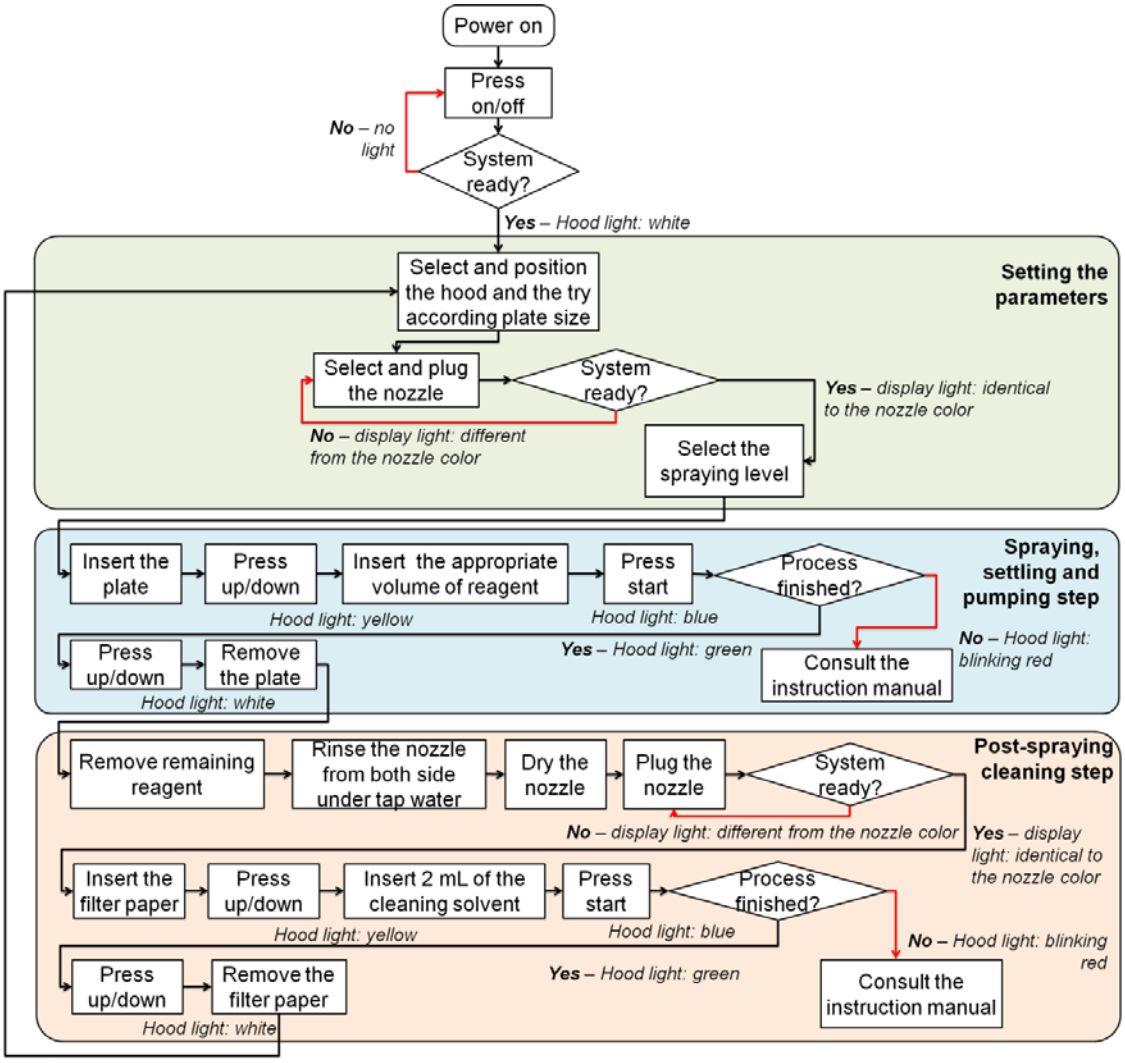
3.8 Insert/Remove plate

The hood is lifted up and down when the UP/DOWN button is pressed.
While the hood is in the up position, the tray can be removed from the device for inserting/removing a plate or cleaning.
Place the plate onto the tray with the application position facing the rear of the instrument and the solvent front facing the front of the instrument.

Use only the corresponding tray. Ensure that the seal of the tray is well positioned and not damaged. If the seal is damaged, please replace it (see chapter 4.5 Replacing the seal of the tray)

3.9 Derivatization process

CAMAG strongly recommends the following procedure:



3.9.1 Preparation of the reagents

Choose the appropriate reagent and prepare it according chapter 6 Preparation of Derivatization reagents

Be aware that some formulations used for immersion should not be used directly for spraying.

See chapter 3.2 for material compatibility and chapter 6 for tested derivatization reagents.

Preparation of the cleaning solution

Dissolve half of a spatula (~ 300 mg) of sodium chloride (NaCl) in 500 mL water.
The concentration does not have to be analytically accurate.

Dilute 10 mL of the aqueous NaCl solution in 90 ml ethanol.
This results in a ~1 mmol/L NaCl cleaning solution.

Setting the parameters

Size of the hood:

- CAMAG provides two different types of hoods (20 x 20 cm and 20 x 10 cm). The size of the hood is related to the size of the plate

Spray nozzle and level:

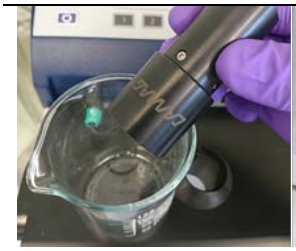
- Choose the appropriate spray nozzle and spray level according chapter 3.6, 3.7 and 3.10
- Make sure the nozzle is dried and clean outside and inside. Perform the cleaning procedure when necessary or when changing spraying reagent

Cleaning steps

Perform the cleaning procedure when necessary before / after spraying or when changing spraying reagent

Unless it can be ensured that a cleaning step has been performed with the nozzles, the tray and the hood, a pre-cleaning step is required.

Nozzle:




Empty nozzle, if necessary, and insert a filter paper instead of a TLC / HPTLC plate and perform a spraying procedure with 2 mL of cleaning solution (level 6).

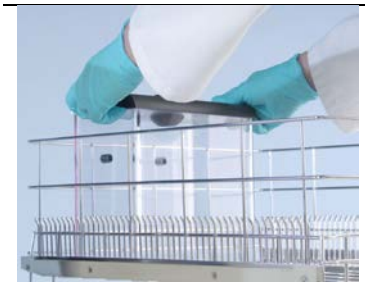

After spraying the settling time can be skipped by pressing the start button so that the process moves forward to the pumping step.

When necessary or when changing the reagent rinse the tip of the nozzle and the inside of the reagent container with (tap) water, ethanol or cleaning solution.
Do not rinse the entire nozzle as this might harm the electrical connection.
Make sure that the nozzle has dried thoroughly before next use.

Make sure the nozzle is dry before next use. Do not harm the nozzle's membrane by applying manual pressure.

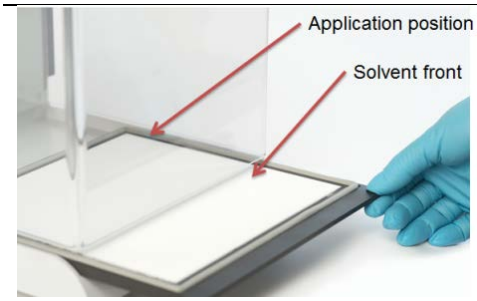
Note: Dry the nozzle and lid with e.g. a lab cleaning tissue but be careful not to scratch or pierce the membrane.

Hood and Tray:



The hood and the tray can be cleaned manually (e.g. with ethanol 96 %).
When necessary, remove nozzle and tray seal and wash both parts in the dishwasher at **maximum 55 °C**.
Both parts must be dry after cleaning.

Spraying steps



Insert the plate with the solvent front facing the front of the instrument.

Lower the hood by pressing the "UP/DOWN" button.

Fill the recommended volume of reagent into the nozzle and close the nozzle with the lid. **Immediately** start the spraying process by pressing the "START" button.
The spraying step will stop automatically when no reagent is left in the nozzle.

After filling the nozzle proceed immediately with spraying. Dripping might occur if the solvent is stored in the nozzle for too long.
Do not start the process when there is no reagent in the nozzle and do not continue with the spraying step after the reagent has been sprayed.

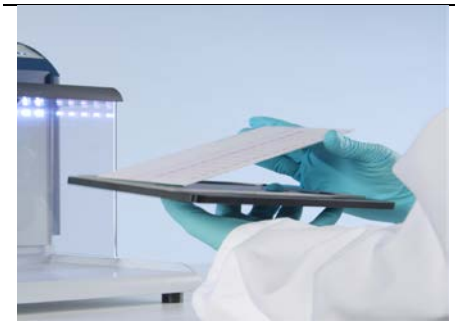
Note: The spraying process can be stopped any time by pressing the Start button again. To avoid damage to the nozzle the instrument will automatically stop after 10 minutes of spraying.

Wait until reagent has been sprayed and settled on the plate
This phase automatically starts after the reagent has completely been sprayed (nozzle is empty). The device will remain in this phase for 2 minutes. The duration of this phase can be shortened by pressing the "START" button.

CAMAG recommends using the default settling time to ensure a homogeneous distribution of the reagent on the TLC plate.

In the reagent evacuation phase, fumes are withdrawn from the hood with the internal pump and absorbed in the washing bottle. This step lasts for one minute but can be shortened by pressing the "START" button.

It is not recommended to shorten the reagent evacuation phase.



Lift the hood and remove plate.

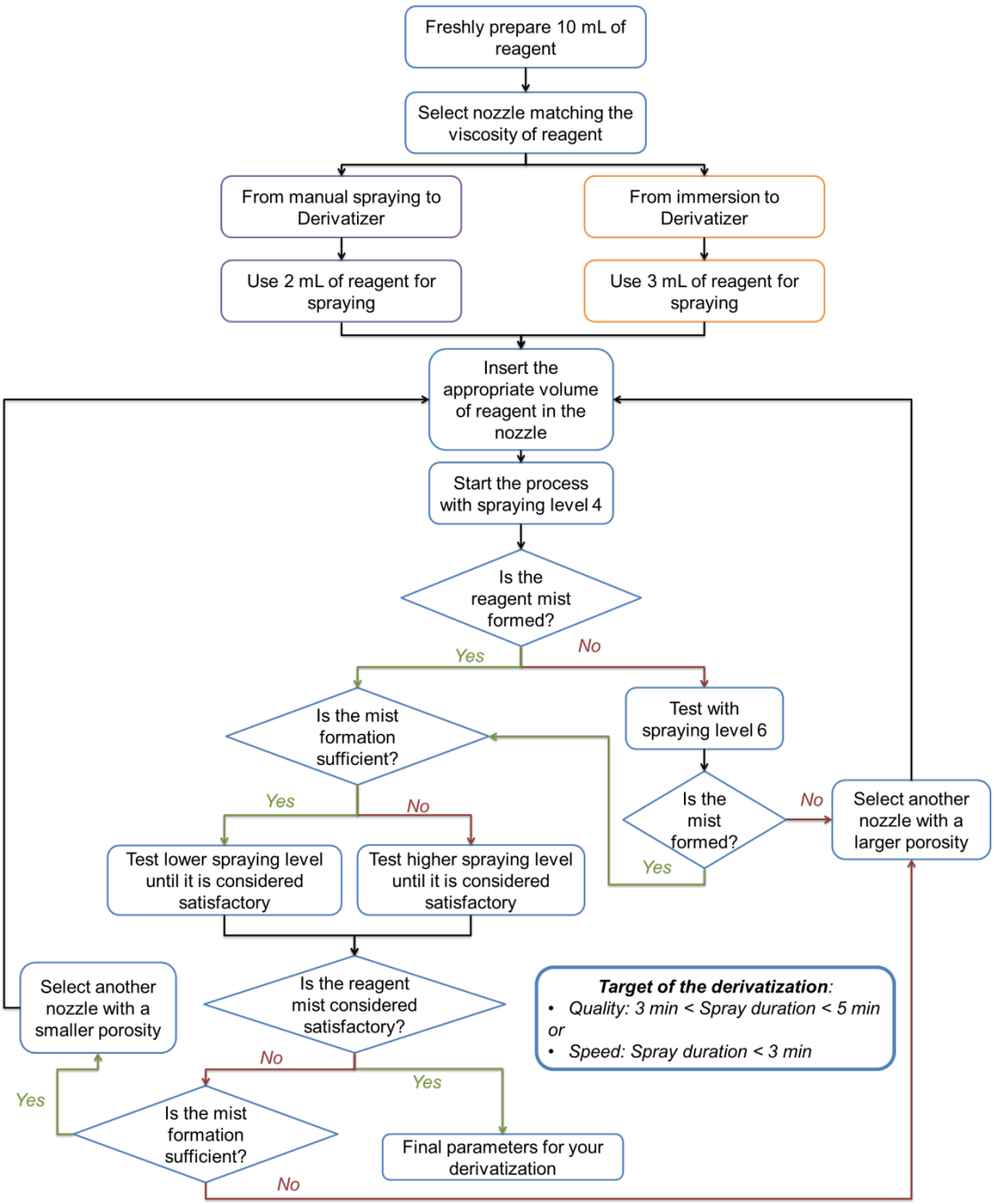
Perform the cleaning procedure when necessary or when changing spraying reagent.

3.10 Method to transfer from manual spraying or immersion to automated spraying

Operation parameters for each nozzle are versatile. Any derivatization reagent can be sprayed with 2 or 3 different nozzles. Parameters should be chosen according to the user's need:

- If a very homogeneous derivatization is desired, a nozzle with small porosity should be chosen. This will lead to smaller droplets but it will take more time to spray.
- If a rapid derivatization is preferred, a nozzle with a larger porosity should be selected

A convenient transfer of methods involving manual spraying, immersion and automated spraying with the CAMAG Derivatizer is illustrated in the flowchart below:



3.11 Recommendations for common derivatization reagents

Be aware that the formulation of derivatization reagents should be adapted for the use in the CAMAG Derivatizer. Material compatibility and spray characteristics have to be considered. See chapter 6 Preparation of Derivatization reagents

Tested and validated by CAMAG to obtain comparable results to manual spraying or to immersion. Recommendations to obtain optimal results with the freshly prepared reagents are a temperature of 20 °C – 25 °C and a relative humidity of 35 % - 45 %. See chapter 6 Preparation of Derivatization reagents for the composition of the reagents.

Reagent	Use
10% sulfuric acid reagent	Spray, then heat the plate at 100 °C for 3 min on the CAMAG TLC Plate Heater, let cool to room temperature. Detection under UV 366 nm and white light. (Please note that sulfuric acid > 20% in methanol cannot be sprayed.)
p-Anisaldehyde – sulfuric acid reagent	Spray, then heat the plate at 100 °C for 3 min on the CAMAG Plate Heater, let cool to room temperature. Detection under UV 366 nm and white light.
NP reagent	Spray, wait 5 min. Detection under UV 366 nm.
PEG solution	Spray, wait 5 min. Detection under UV 366 nm.
Iodine solution	Spray, dry with cold air for 2 min. Detection after background has turned white again. Detection under UV 254 nm and white light.
Dragendorff's reagent	Spray, dry with cold air for 10 min. Detection under white light.
Fast blue salt B reagent	Spray. Detection under white light within the 2 min after spraying (white background).
Ehrlich's reagent	Spray, heat the plate at 100 °C for 5 min on the CAMAG TLC Plate Heater, and let cool to room temperature. Detection under white light.
Phosphomolybdic acid reagent	Spray, heat at 120 °C for 10 min on the CAMAG TLC Plate Heater, and let cool down to room temperature. Detection under white light.
Ninhydrin reagent	Spray, heat at 105 °C for 3 min on the CAMAG TLC Plate Heater, let cool to room temperature. Detection under white light.
Copper(II) sulfate reagent	Spray, heat the plate at 110 °C for 10 min on the CAMAG TLC Plate Heater, let cool to room temperature. Detection under white light.
Aniline – diphenylamine-phosphoric acid reagent	Spray, heat at 110 °C for 10 min on the CAMAG Plate Heater, let cool to room temperature. Detection under white light.
Vanillin – sulfuric acid reagent	Spray, heat at 100 °C for 3 min on the CAMAG Plate Heater, let cool to room temperature. Examination under UV 366 nm and white light.
Potassium hydroxide solution	Spray, heat at 100 °C for 2 min on the CAMAG Plate Heater, let cool to room temperature. Detection under UV 366 nm and white light.
Enzymatic test: Tyrosinase (enzyme and substrate in aqueous solutions)	Spray subsequently the appropriate volume of substrate solution and the appropriate volume of enzyme solution onto the plate. Incubate the plate for 10 minutes at room temperature in a closed box to prevent from drying (e.g. inside of the glass covered drawer of the BioLuminizer). Dry the plate to <2% relative humidity for 5 minutes in a desiccator or in the ADC 2 by using molecular sieve.

3.11.1 Transfer from manual spraying to automated spraying (20 x 10 cm or 20 x 20 cm hood)

The exact composition for the reagents is specified in the chapter 6.

Reagent	Nozzle	Spraying level for 20 x 10 cm 2 ml	Spraying level for 20 x 20 cm 4 ml
10% sulfuric acid reagent	yellow	3-4	4-5
p-Anisaldehyde – sulfuric acid reagent	blue	3-4	4-5
NP reagent	green	3-4	4-5
PEG solution	blue	2-3	3-4
Iodine solution	blue	3-4	4-5
Dragendorff's reagent	red	2-3	3-4
Fast blue salt B reagent	yellow	4-5	5-6
Ehrlich's reagent	yellow	5-6	6
Phosphomolybdic acid reagent	yellow	6	6
Ninhydrin reagent	blue	3-4	4-5
Copper(II) sulfate reagent	blue	3-4	4-5
Aniline – diphenylamine- phosphoric acid reagent	yellow	5-6	5-6
Vanillin – sulfuric acid reagent	yellow	3-4	4-5
Potassium hydroxide solution*	blue	3-4	4-5
Enzymatic test: Tyrosinase (enzyme and substrate in aqueous solutions)	yellow	(3 ml) 4-5	n/a

*) recommended to use with the chemically resistant Ultra nozzle

3.11.2 Transfer from immersion to automated spraying (20 x 10 cm hood)

The exact composition for the reagents is specified in the chapter 6.

Reagent	Nozzle	Spraying level 20 x 10 cm 3 ml
10 % sulfuric acid reagent	blue	3-4
p-Anisaldehyde – sulfuric acid reagent	blue	1-3
NP reagent	green	3-4
PEG solution	green	4-5
Iodine solution	green	6
Dragendorff reagent	red	3-4
Fast blue salt B reagent	yellow	3-4
Ehrlich's reagent	blue	1-2
Phosphomolybdic acid reagent	yellow	6
Ninhydrin reagent	green blue	6 3-5

Reagent	Nozzle	Spraying level 20 x 10 cm 3 ml
Copper (II) sulfate reagent	blue	5-6
Aniline – diphenylamine- phosphoric acid reagent	yellow	6
Vanillin – sulfuric acid reagent	yellow	2-3
Potassium hydroxide solution*	green blue	2-3 3
Enzymatic test: Tyrosinase (enzyme and substrate in aqueous solutions)	yellow	4-5

*) recommended to use with the chemically resistant Ultra nozzle

4 Maintenance and Service

4.1 Cleaning

Regular cleaning:

- Clean the instrument with a lint free cloth
- The hood and the tray can be cleaned in a dishwasher at a maximum temperature of 55 °C, with the nozzle and the tray seal removed

Before and after each cycle follow the instruction under chapter Cleaning step in this manual

4.2 Decontamination

Nozzle:

- Empty any remaining reagent in the nozzle
- Rinse the nozzle from both sides with tap or deionized water
- Dry the nozzle with a laboratory cloth
- Rinse the nozzle with 2 mL of water containing 10 % of a ~10 mM aqueous solution of NaCl (spraying level 6), then with 2 mL of cleaning solution (ethanol containing 10 % of a 10 mM aqueous solution of NaCl) with spraying level 5, and finally with 2 mL of methanol with spraying level 5

Tray:

- Wipe off the tray with ethanol (96%)

Hood:

- Wipe off the hood with ethanol (96%)

Note: The hood and the tray can be cleaned in a dishwasher at a maximum temperature of 55 °C, with the nozzle and the tray seal removed

4.3 User maintenance

Regular check/maintenance (at least every 3 months) by the user is strongly recommended.

User maintenance procedure:

- Check the pipes to the washing bottle
- Replace the respective parts as outlined in chapter “Maintenance Data Sheet”
- Clean the instrument with a lint free cloth

4.4 Maintenance data sheet

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	Not available

Consumable parts		
Part No.	Description	Replacement cycle
022.6050	Hood 20x20	24 months
022.6055	Hood 20x10	24 months
022.6051	Tray with seal 20x20	24 months
022.6056	Tray with seal 20x10	24 months
022.6070	Tray seal 20x20 (5pcs)	12 months
022.6071	Tray seal 20x20 (5pcs)	12 months
115.6015-1	Y-connection kit fluoric rubber tubes	12 months
115.6030-1	Bubbler (set)	12 months
022.6061	Nozzle green	6 month/600 spraying cycles Replace only if defective
022.6062	Nozzle blue	6 month/600 spraying cycles Replace only if defective
022.6063	Nozzle yellow	6 month/600 spraying cycles Replace only if defective
022.6064	Nozzle red	6 month/600 spraying cycles Replace only if defective
022.6066	Nozzle Ultra green	6 month/600 spraying cycles Replace only if defective
022.6067	Nozzle Ultra blue	6 month/600 spraying cycles Replace only if defective
022.6068	Nozzle Ultra yellow	6 month/600 spraying cycles Replace only if defective
022.6069	Nozzle Ultra red	6 month/600 spraying cycles Replace only if defective
	Solvent in washing bottle	After 100 cycles or if a colour cast is visible

4.5 Troubleshooting

Issue:

Inhomogeneous derivatization, drops on the plate

Action:

- Check whether the nozzle type and spraying level is correct for the solvent in use (check the list of recommended derivatization reagents under chapter 3.11).
- Got to a higher spraying level and/or nozzle with a larger pore size (green < blue < yellow < red).
- Check the nozzle. If the membrane is broken, replace the nozzle

Solvent left after end of spraying

Action:

- Check nozzle for blocked membrane
- Check spray level and nozzle type and adjust until all of the solvent is prayed
- Dilute the spraying reagent
- Be sure that all the reagent is sprayed in < 10 minutes (choose a higher spraying level / nozzle with a larger pore size)

Sprayed aerosol leaks out of the hood

Action:

- Make sure that the seal fits properly in the groove and that the right format of the tray is used.
- Replace the seal if it has gotten hard or is unevenly thick.
- If the hood still does not sit properly on the seal when it is lowered, the height of the hood has to be adjusted: please contact support@camag.com

Replacing the seal of the tray

- Remove the seal
- Clean the tray (in a dish washer or similar)
- Mount the new seal
- Put the seal onto the groove of the tray with the start/end at the middle rear position
- Press both ends of the seal into the groove
- Distribute the seal evenly on the tray
- Press the seal into the groove at the middle front position
- Press the seal into the groove at the middle right position
- Press the seal into the groove at the middle left position
- Press the rest of the seal evenly into the groove

- Smooth the seal so that there are no wrinkles left (except at the corners)

Internal errors

In case of an error, the chamber will be illuminated in red, blinking at a frequency of 1 Hz. Additionally, the level buttons will be backlighted in red, the error code being displayed with the 6 levels.

If an error occurs, to set the device back to its initial state, press the power ON/OFF button for 4 seconds or restart the device with the main power switch.

In some cases the device might switch to safety mode and constantly pump off fume. If this happens, please restart the device to set it back to its initial state.

Example: Level 1 and level 3 are blinking in white → Error code 13

Level 1, level 4 and level 5 are blinking in white → Error code 145

Error	Description
123	24V voltage error
124	8V voltage error
125	3.3V voltage error
126	Processor reference voltage error
134	Processor temperature too high
135	Communication to display / memory not OK
136	Communication to nozzle controller not OK
145	Memory read error
146	Memory write error
156	Memory check error
234	Lift motor error
235	Lift motor reference position error
236	Swing motor error
245	Swing motor reference position error
246	DC-DC converter error
256	DC voltage not OK
345	AC piezo spraying not OK
346	Nozzle cable defect
356	End of spray error
456	Fatal error

5 Technical data

General data	
Plate types	Up to 20x20 cm (tested for 20x20 cm and 20x10 cm TLC plates)
Operating temperature:	10-40 °C
Recommended working temperature	20 – 25 °C
Electrical data	
Operating voltage:	100-240VAC 50 -60Hz
Power consumption:	30 W
Fuse:	1.0AT, 250VAC
Mechanical data	
Dimensions (w x d x h):	245 x 430 x 355 mm
Weight	~12.0kg

6 Preparation of Derivatization reagents

Be aware that the formulation of derivatization reagents should be adapted for the use in the CAMAG Derivatizer. Material compatibility and spray characteristics have to be considered.

The reagent preparation can be followed to obtain comparable results to manual spraying or to immersion.

Reagent	Reagent preparation to obtain comparable results to manual spraying or to immersion.
Aniline-diphenylamine-phosphoric acid reagent	Spaying: Dissolve 2 g of diphenylamine and 2 mL of aniline in 80 mL of methanol. After addition of 10 mL of *o*-phosphoric acid (85%), fill up to 100 mL with methanol. Immersion: Dissolve 4 g of diphenylamine in 160 mL of acetone, add 4 mL of aniline, and carefully add 30 mL of *o*-phosphoric acid. Shake well to dissolve the initially formed precipitate.
p-Anisaldehyde sulfuric acid reagent	Spraying and immersion: Place 85 mL of methanol in a 100 mL glass bottle and cool it down in a water-ice cubes-salt bath or in a freezer. To the ice-cold methanol add slowly and carefully 10 mL of acetic acid and 5 mL of sulfuric acid and mix well. Allow the mixture to cool to room temperature, then add 0.5 mL of *p*-anisaldehyde.
Copper(II) sulfate reagent	Spraying: Dissolve 1.5 g of copper(II) sulfate pentahydrate in a few milliliters of water and fill up to 100 mL with methanol.
Dragendorff's reagent	Spraying: Solution A: Weigh 0.85 g of basic bismuth nitrate in a glass bottle and add 10 mL of glacial acetic acid and 40 mL of water. Solution B: Weigh 8 g of potassium iodide in a glass bottle and dissolve in 30 mL of water. Just before spraying, mix 1 mL of solution A and 1 mL of solution B and 4 mL of acetic acid in 20 mL water.
Ehrlich's reagent	Spraying: Dissolve 0.5 g of 4-dimethylaminobenzaldehyde in 150 mL of methanol, and add 50 mL of hydrochloric acid (37 %).
Fast blue salt B reagent	Spraying and immersion: Dissolve 250 mg of fast blue salt B (*o*-dianisidine bis(diazotized) zinc double salt) in 10 mL of water and mix with 25 mL of methanol and 15 mL of dichloromethane. Prepare fresh on each day.

Reagent	Reagent preparation to obtain comparable results to manual spraying or to immersion.
Iodine solution	Spraying: Place 0.5 g of iodine in a glass bottle and dissolve in 100 mL of ethanol. Store in a dark place.
Natural products reagent (NP reagent)	Spraying: Dissolve 1.0 g of 2-aminoethyl diphenylborinate in 100 mL of methanol. Immersion: Dissolve 1.0 g of 2-aminoethyl diphenylborinate in 200 mL of ethyl acetate.
Ninhydrin reagent	Spraying: Dissolve 0.1 g of ninhydrin (2,2-dihydroxyindene-1,3-dione) in 50 mL of ethanol (96 %) and add 1.5 mL of glacial acetic acid. Immersion: Dissolve 0.6 g of ninhydrin (2,2-dihydroxyindene-1,3-dione) in 190 mL of isopropanol and add 10 mL of glacial acetic acid.
Potassium hydroxide solution	Spraying: Dissolve 5 g potassium hydroxide in 100 mL of methanol (96 %).
Phosphomolybdic acid reagent	Spraying: Dissolve 10 g of phosphomolybdic acid hydrate in 50 mL of ethanol (96 %).
Polyethylene glycol reagent (PEG reagent)	Spraying: Dissolve 5 g of polyethylene glycol 400 (macrogol) in 100 mL of ethanol (96 %). Immersion: Dissolve 10 g of polyethylene glycol 400 (macrogol) in 200 mL of dichloromethane.
Sulfuric acid reagent	Spraying and immersion: Dissolve 10 mL of concentrated sulfuric acid in 90 mL of methanol under cooling. (Please note that sulfuric acid > 20% in methanol cannot be sprayed.)
Vanillin reagent R	Spraying and immersion: Dissolve 1 g of vanillin in 100 mL of ethanol 96 % and carefully add 2 mL of concentrated sulfuric acid. Use within 48 h.

Reagent	Reagent preparation to obtain comparable results to manual spraying or to immersion.
Enzymatic assay: Tyrosinase (aqueous solution)	Preparation of phosphate buffer 0.02 M, pH = 6.8 Solution A: Dissolve 0.35 g of potassium phosphate dibasic (K_2HPO_4) in 100 mL of deionized water (in a volumetric flask). Solution B: Dissolve 0.28 g of sodium phosphate monobasic monohydrate (NaH_2PO_4·H2O) in 100 mL of deionized water (in a volumetric flask). Mix 4 parts of solution A with 6 parts of solution B. Measure the pH of the solution. To adjust the pH to 6.8 add a few drops of solution A or B. Preparation of the enzyme solution: Stock solution: Prepare a stock solution with an activity of 12'000 U/mL by dissolving the required amount of mushroom tyrosinase in phosphate buffer. Ten aliquots of 100 µL each are made and stored at -20 °C. Before use, an aliquot is diluted with 3 mL of phosphate buffer to reach an activity of 400 U/mL (Example: 3.83 mg of tyrosinase (activity: 3130 U/mg) are dissolved in 1 mL of phosphate buffer 0.02 M, pH 6.8). Substrate solution: L-DOPA 12 mmol/L: dissolve 0.047 g of L-DOPA in 20 mL of phosphate buffer containing 1 % Triton X-100 and sonicate for 40 min. The solution can be used for maximum 3 days, if stored in the dark at 4 °C.

7 Declaration of Decontamination (DoD)

In order to protect our employees and to fulfil the statutory regulations please fill out this form duly and completely. Attach it to any instrument or part that may be contaminated by hazardous substances

Customer information (if not the same as the ones on the RMA form):

Company

Contact name

Street

ZIP/City

Country

Product information:

Product or
RMA no

Serial no

Estimation of spraying performed:

Was the instrument/part in contact with hazardous substances?

Toxic ☐ Corrosive ☐

Explosive ☐ Microbiological ☐

Radioactive ☐

Other dangerous substances: _____

Solvents used for derivatization

Solvent 1: _____

Solvent 2: _____

Solvent 3: _____

Has the instrument/part been decontaminated professionally?

Yes ☐ No ☐ *

* We dispose of instruments and parts not decontaminated correctly at the expense of the sender.

Legally binding declaration

I declare that I have completed the present declaration truthfully to the best of my knowledge. With this form and my signature, I confirm that the returned instruments/parts were cleaned and decontaminated according to the applicable industry and regulatory standards and all appropriate regulations.

The instruments/parts are free of hazardous substances.

_____ _____

Company stamp and legally binding signature Location

_____ _____

Name and position of signatory in block letters Date

CAMAG (Switzerland) · Sonnenmattstrasse 11 · CH-4132 Muttenz 1
Telephone +41 61 467 34 34 · Fax +41 61 461 07 02 · E-Mail: info@camag.com

CAMAG (Germany) · Bismarckstraße 27-29 · D-12169 Berlin
Telephone +49 30 516 55 50 · Fax +49 30 795 70 73 · E-Mail: infoberlin@camag.com

CAMAG Scientific Inc. (USA) · 515 Cornelius Harnett Drive · Wilmington, NC 28401
Telephone 800 334 3909 · Fax 910 343 1834 · E-Mail: tlc@camag.com

www.camag.com

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® Derivatizer

Product name

022.6000/ 022.6010/ 022.6020

Article number(s)

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

- 2014/35/EU
- 2014/30/EU

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

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

Year of the CE characteristic assignment: 2016

Muttenz, 14.October 2016

Walter Rahm, Head of Quality Management

SWISS MADE

CE

SONNENMATTSTRASSE 11, 4132 MUTTENZ
WWW.CAMAG.COM

CAMAG®

Notes:

Notes: