CAMAG®

INSTRUCTION MANUAL
AMD 2

Zertifiziertes Managementsystem
SQS
ISO 9001

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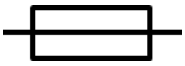
Declaration of Conformity (DoC)

1 Introduction

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 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
- 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 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
- 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 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
- Some parts in contact with the solvent are made of anodized aluminium. Do not use solvents or mixtures that may corrode this material (like strong acids or strong bases) or leave residuals when evaporated. The anodized aluminium is stable against solvents with pH between 4 and 8, provided no F-, Cl-, Br-, I- or heavy metal ions are present

- Not every vacuum pump is suitable for the AMD2 system. Make sure the capacity is high enough and no oil (fume) can be drawn into the AMD2 system after the pump has been turned off
- The screw caps of the bottles have to be carefully tightened by hand to prevent stripping the nipple threads
- The waste air of the vacuum pump has to be connected to a fume hood or other exhaust

1.2 Parts supplied

Part no		Description
140.8860-1	1	AMD 2 accessory kit
140.0450-1	1	Pneumatic connection set II
296.0028	1	Connecting plug for vacuum pump
362.0006	2	Fuse 1 AT 5.0x20
660.0048	2	O-ring 31, 42x2, 62 FEP/MQ
662.1011	2	Lid gasket for AMD 2 chamber
663.1528	2	Silicon gasket for conditioning bottle, Ø27xØ43x5
666.1550	4	PTFE flange for conditioning bottle
700.0028	1	Spirit level, Ø 60 mm, 1°
705.0009	1	Allen key, 3 mm, chromed
705.0014		Allen key, 2,5 mm, chromed
115.8879	1	HPTLC plate positioning device
125.1028	1	Control cable, RS232 9/25Pin
B.022.8860E	1	Instruction manual
700.1011	1	CCD-Test plate ADC 2/AMD 2
115.8878	1	Plate holder
	1	Power cable

1.3 Further accessories

Edwards vacuum pump

Optionally a kit containing an Edwards oil sealed rotary vane vacuum pump RV3 (2-phase 220V, operating voltage 100-120V or 220-240V selectable, 50/60 Hz) CAMAG order #022.8880 can be supplied including following parts:

Part no		Description
343.2100	1	Oil sealed rotary vane vacuum pump RV3
952.2100	1	Oil, ultra grade 15, 1 L
343.2101	1	Oil vapour filter EMF10
343.2102	1	Gas ballast/oil return kit
666.2101	1	Reducer DN25/10KF
672.3102	1	Flexible vacuum hose DN10KF, 1 m, metal
664.2101	2	Centring ring DN10KF
672.3101	2	Clamp ring DN10/16KF
666.2100	1	Tube adapter DN25KF Ø 12 mm
664.2100	3	Centring ring DN25KF
672.3100	3	Clamp ring DN20/25KF

Vacuum connection kit

Accessories for connecting a hose to other vacuum pumps can be supplied under the CAMAG order #140.8885 and contains:

Part no		Description
666.2102	1	Elbow (90 degrees, DN10KF)
666.2103	1	Hose connector
672.0028	1	Vacuum tube, 2m red Ø 10/20 mm
664.2101	2	Centring ring DN10KF
672.3101	2	Clamp ring DN10/16KF

Additional metal vacuum hose

Additional metal vacuum hose can be supplied under the CAMAG order #140.8880 and contains:

Part no		Description
672.3102	1	Flexible vacuum hose DN10KF, 1 m, metal
664.2101	1	Centring ring DN10KF
672.3101	1	Clamp ring DN10/16KF

Spare bottle set for AMD 2

A set of spare bottles can be supplied under the CAMAG order #140.8865 and contains:

Part no		Description
960.0064	5	250 mL bottle GL45, coated, with ETFE pouring ring
960.0062	2	500 mL bottle GL45, coated, with ETFE pouring ring
960.0070	7	Screw-cap GL45, blue

2 Unpacking/Installation

- Take the instrument carefully out of its packaging and check the items supplied
- For installation select a smooth horizontal surface within convenient distance of the gas supply and the vacuum pump, preferably near a fume hood. Avoid influence of direct sunshine, heat and vibrations
- Check the position with the spirit level placed on the top of the chamber lid, when the lid is closed. Level the instrument by turning the 4 vertically adjustable feet at the bottom of the instrument
- Place one solvent safety trough into the recess in the rear part of the instrument lid and slide the other in behind the lower edge of the splash protection sheet

Provide:

- External supply of compressed nitrogen or clean air, e.g. a gas cylinder with reduction valve (4,5-6 bar, consumption about 1 L/step)

- A vacuum pump with sufficient capacity. If the recommended Edwards oil sealed rotary vane vacuum pump RV3 has been supplied by CAMAG, all necessary connections are provided. If the AMD system is to be operated with a different type vacuum pump, note that the minimum average pumping capacity of 3 m3/h according to PNEUROP and a final pressure of <10mbar are required. You may need to order the additional vacuum connection kit (CAMAG order #140.8885)

Connections

- Connect the reduction valve of the gas cylinder to the intake at the back of the instrument. Set the gas pressure to 6 bars (87psi) and open the valve of the pressure regulator
- Remove the stoppers from the vacuum pump connections. Place the centring ring DN25KF and the reducer DN25/10KF on the intake nipple of the vacuum pump. Fix it with the clamp ring DN20/25KF
- Connect the flexible vacuum hose to the gas inlet of the vacuum pump by means of the centring ring DN10KF and fix the connection with a clamp ring DN10/16KF
- Connect the other end of the flexible vacuum hose to the AMD2 vacuum connection at the rear of the instrument. Use a centring ring DN10KF and a clamp ring DN10/16KF
- Install the oil vapour filter EMF10 with a centring ring DN25KF and a clamp ring DN20/25KF on the gas outlet connection of the vacuum pump
- The same centring ring and clamp can be used to fit the tube adapter DN25KF inner Ø12 mm to the outlet side of the filter. Use a tube with an interior diameter of at least 10 mm to connect the oil vapour filter with your fume hood
- Connect the drain-cock from the oil vapour filter with the gas ballast/oil return using the 8 mm diameter silicon rubber tube supplied. Fix it with the plastic clamp
- Connect the tubing at the back of the AMD2 device with the respective glass bottle. The tube marked with blue stripes is to be connected with the conditioning bottle (A), blue connector and the tube marked yellow with the yellow connector
- Tighten all connector firmly
- Screw the red cap firmly onto waste bottle C.
- After checking that the voltage on the back of the AMD2 instrument matches your power supply, connect the instrument to the power outlet using the power cable supplied.
- Connect the AMD2 device to your PC via a serial port.

3 Getting started

3.1 The AMD 2

The AMD 2 instrument

The actual developing chamber is situated in the front part of the housing. Five solvent bottles (1-5) are arranged in front. A conditioning bottle (A) and a solvent waste bottle (B) are integrated in the hood. All valves, the gradient mixer, connecting elements and the electronics are accommodated inside the housing.
The developing module can also operate "stand alone", i.e. the developing program last used can be repeated as often as desired.

Display and function of 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 indicates a communication to the PC.

Keys

The following keys can be used:
DIALOG
Switches to the SETUP mode in which basic parameters, e.g. Baud-rate, language or LCD contrast can be edited, and the firmware version can be displayed.

ARROW KEYS, like ▲ = upwards and ▼ = downwards
OPERATING mode: Show the current pressure and temperature.
SETUP mode: Select the parameters in the dialog.
ENTER

OPERATING mode: Shows values of the last used method, like number of steps and used time.

SETUP mode: Switches to the next parameter.

END

Interrupts the current development, performs a drying step and ends the program.

Pressing the END key twice interrupts also the drying step and ends the program immediately.

In the SETUP mode this key is not active.

RESET

SETUP mode: Ends the dialog.

OPERATING mode: The running program is aborted, but the parameters remain saved in the instrument.

In the chamber the solvent trough may remain filled with solvent. To remove the solvent and dry the chamber, press the END key.

RUN

Display

Line1	**Line 2**	**Description**
<RUN> STARTS	AMD 2 PROGRAM	System ready message.
WAITING FOR	SYSTEM PRESSURE CLOSE LID	System is waiting for N2-pressure or closing of the lid.
PLATE CHECK AND	CCD ADJUSTMENT	A brightness adjustment is per-formed on the plate.
SYSTEM	DRAINING	The chamber is emptied; solvents are disposed into the waste bottle.
OUTLET OPENED	TIME	Solvent outlet is opened for the time shown.
CANCELING	VACUUM	Chamber is equilibrated with atmospheric pressure.
GRADIENT IS	BEING BUILT BEING MIXED	Gradient solvents are filled into the syringe and mixed.
VENTILATE	TIME	The chamber is equilibrated with atmospheric pressure during the time shown.
PRECONDITIONING	TIME	The chamber is equilibrated with the gas phase of the conditioning bottle during the time shown.
PRES. TEMP.	1015 mb 25.4 °C	Shows the pressure and temperature of the current development step or before starting a run (after pressing the arrow keys).
PRES. TIME	2.3 mb 2:00	Shows the pressure and drying time of the current vacuum drying.
FRONT STEP TIME	27.4 mm 6 8:30	Shows the current state of the development step.
STEPS TIME	25 4:12:30	Shows the number of development steps and the time of the last used method (after pressing <ENTER>)
DRYING	-	Chamber is dried with vacuum.

RINSING PASS	NUMBER	Chamber is rinsed; the number of rinsing processes is indicated.
VACUUM TEST	-	Vacuum test is performed (before each start).
PAUSE	TIME	Appears by pressing <RUN> during the development. Pressing <RUN> again continues the program.
OPERATION	COMPLETED	System ready message at the end of a gradient.

3.2 Filling the bottles

Conditioning bottle (A)

If the AMD procedure calls for conditioning liquid, fill the conditioning bottle in position A with at least 200 mL of the respective solvent.

The two connections marked with blue and yellow stripes should always be fixed very tight. If you by some reason have to loosen them you must always loosen the blue connector first! Otherwise the conditioning liquid may be pushed up into the gas inlet pipe by the slight overpressure in the bottle.

Waste bottle (B)

This bottle collects the waste and protects the vacuum pump for excessive solvent. Make sure this bottle is empty before starting a new AMD 2 run.

Solvent bottles (1-5)

The solvent used to form the gradient is entered in these bottles. Depending on the purpose of the solvent in the gradient, it can be pure or contain a mixture of several solvents.

If acid or base has to be used in the gradient, this has to be mixed into the individual solvent bottles and not added by the gradient mixer from one separate bottle containing this pure acid or base.

3.3 Initial rinsing

The AMD 2 is a powerful tool for determining small amounts of impurities. Handle the instrument, solvents and plates carefully in order to avoid trouble with false peaks (blanks).

To avoid blanks in the chromatogram you should rinse the instrument carefully before you run the very first gradient.

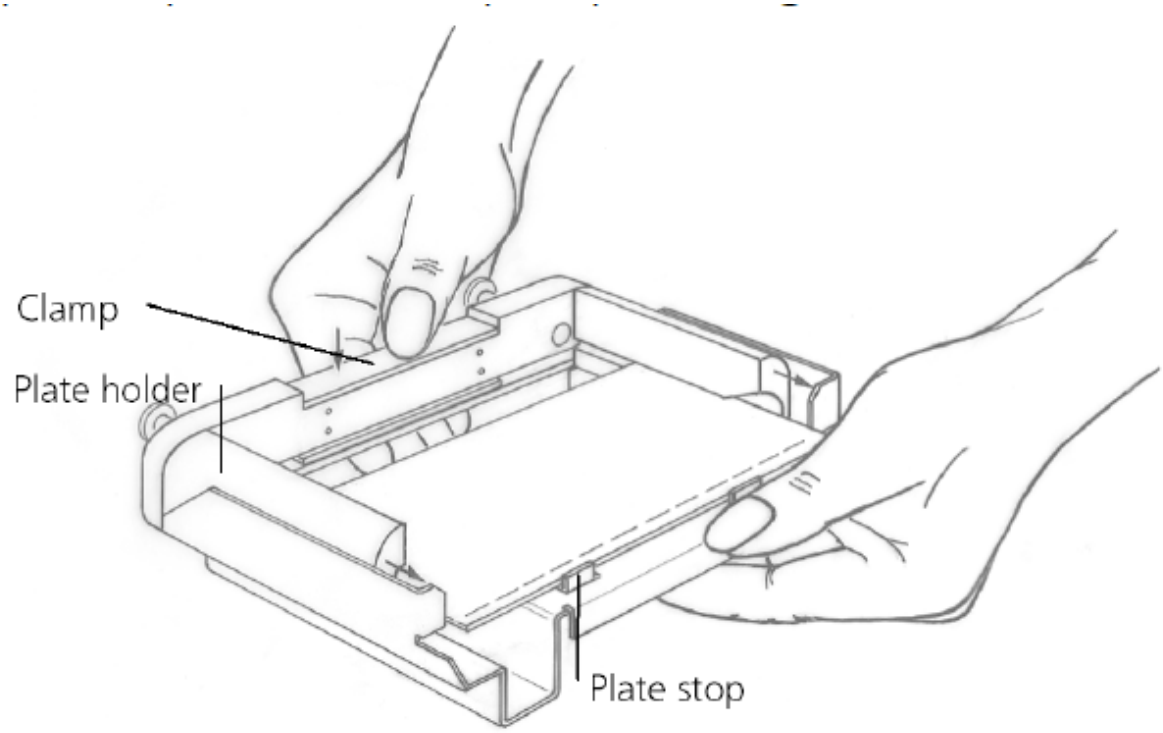
- Open visionCATS and double click on the AMD2 icon
- Go to the subtab "Manual control"
- Set "number of rinsing press" to 3
- Click on "Start"
- Activate the tick box "Empty solvent tubes only"
- Click on "Start"

3.4 Insert a plate

Plate positioning is a delicate operation that can spoil the result if carried out improperly!

- Make sure not to touch the silica gel on the plate
- Carefully position the applied plate, layer upwards on the HPTLC plate positioning device
- Note, that the lower plate edge (application side) has to be pushed against the two plate stops on the positioning device
- Hold the HPTLC plate positioning device with the left hand (do not touch the plate!) and take the plate holder in the right hand
- Inserted the plate holder into the HPTLC plate positioning device parallel to the guide bar
- Press the clamp of the plate holder to insert the upper edge of the plate into the clamp
- Push the plate holder over the plate until both supports hit the end of the sliding range
- Release the clamp and then carefully remove the plate holder carrying the HPTLC plate from the positioning device. The plate is now correctly positioned

During the whole process the plate has to stay adjusted to both plate stops of the HPTLC plate positioning device



HPTLC plate positioning device with HPTLC plate and plate holder

- Now the plate holder containing the correctly positioned HPTLC-plate can be inserted into the separation chamber of the AMD2 device

Make sure the layer/sorbent side of the HPTLC plate faces towards the backside of the instrument.

Check to make sure that the chamber lid sealing is clean, then place the lid on and fix it with the two screws

4 Application hints

4.1 Universal gradient

Universal gradient is the term for a normal phase AMD gradient that starts with a very polar solvent and is varied via a solvent of medium polarity to a non-polar solvent, so that substances from virtually all classes of compounds are chromatographed. Such a gradient covers a wide range of polarity.

Example of an universal gradient from methanol to n-hexane based on dichloromethane

Unlike a gradient in column liquid chromatography, the AMD gradient starts with the strongest, in this case the most polar solvent and is varied toward decreasing elution strength. The most polar elution solvent is run over the shortest developing distance, the most non-polar over the longest.

The solvent of medium polarity is also called „base solvent", the one with the strongest elution strength „increasing solvent" (increasing the elution strength) and the one with

the lowest elution strength „decreasing solvent“ (decreasing the elution strength). The „base solvent“ governs the selectivity of a universal gradient.

Examples for a universal gradient are listed below:

Increasing solvent	Base solvent	Decreasing solvent
methanol	dichloromethane	n-heptane
methanol	t-butyl methyl ether	n-heptane
acetonitrile	dichloromethane	n-heptane
methanol + water[1]	acetonitrile	dichloromethane
methanol + water[1]	t-butyl methyl ether	dichloromethane
various solvents	ethyl acetate	various solvents
acetone	various solvents	various solvents

[1] max. 40%

Methanol as „increasing solvent“, dichloromethane as „base sol-vent“ and n-heptane as „decreasing solvent“ are preferred if separation according to functional groups is required. T-butyl methyl ether as „base solvent“ is often used for the separation of homologues mixtures.
It is recommended to develop an unknown sample first with a universal gradient and to optimize the gradient afterwards according to the separation results.

4.2 Gradient optimization

In the past, a wealth of chromatographic experience was required to find a suitable solvent system for a given separation problem. With the AMD technique, optimization of the solvent gradient becomes routine. For gradient optimization the analogue curve of a chromatogram is superimposed with the in-scale diagram of the gradient, as shown in the following figures. Thus the region of the gradient causing the separation of selected fractions can be identified. This means you should spread the part of the gradient which was responsible for the beginning separation and can omit non relevant parts. This leads to a shallower gradient.
Additionally, the gas phase can be varied to improve the separation. Alkaline (e.g. 15 mL NH_3 25%/200 mL H_20), neutral or acidic (e.g. 12 mL CH_3COOH conc./200 mL H_20) conditioning can be tested.

4.3 Remarks

- A 25-step developing program for a regular 200 µm HPTLC plate using 3 mm distance increments takes about 4 hours, all intermediate drying and conditioning steps included. Reducing the number of steps to 20 lowers the total time to about 2.5 hours.

- A reduction of AMD running times by up to 50 % can be reached by using "extra thin" (100 µm) layers which require only 2 mm migration increments and shorter drying times. Use of Licrosphere plates reduces developing times as well.
- If a polarity change of the gradient does not result in the desired resolution after 2-3 attempts: change selectivity, i.e. the „base solvent". If there is still poor resolution the stationary phase must be changed, e.g. to diol, amino, cyano and RP18 W HPTLC plates.
- Gradients with less change in volume % than shown in the table below are comparable with multiple isocratic developments over the same distance. Such gradients are not recommended.

Polarity change	**Min. change (% per step)**
methanol to dichloromethane	5
acetonitrile to dichloromethane	10
t-butyl methyl ether to n-heptane	15
dichloromethane to n-heptane	30

- To avoid increasing diffusion of peaks, 5-10 steps are sufficient for isocratic development
- Of course all solvents, glassware, HPTLC plates etc. used should be as pure as required by the analytical task. If necessary pre-washing of HPTLC plates can be done by immersion in very pure methanol or isopropanol for about 2 hours or by pre-developing with the above mentioned solvents to a higher running distance than the following gradient. Then the plates have to be dried again, e.g. in a very pure drying cabinet at 120 °C for 20 min. It is recommended to keep prewashed plates protected against laboratory atmosphere, e.g. in an (empty!) desiccator or wrapped in aluminium foil
- If basic or acidic components are present or expected in a sample, it is recommended to adjust the pH. This can be done by adding small amounts (0.01-2 %) of NH_3, HCOOH, CH_3COOH etc. to the polar solvent. Adding bases or acids to dichloromethane or less polar solvents has no effect. In this case the layer has to be conditioned by the gas phase by filling the conditioning bottle with about 200 mL of a 0.1-4.0 N solution of the acids or bases. The rule that acids are to be chromatographed in an acid environment and bases in an alkaline one need not be followed with AMD chromatography and a universal gradient. Since a universal gradient starts with a high polarity, even salts will initially migrate, i.e. salts of acids in an alkaline medium or salts of bases in an acidified medium. Often sharper separations are obtained in such systems. The less favourable behaviour of acids in an acidified medium etc. may be explained as follows: in an acid medium the free, dissociated acid migrates to the position corresponding to its polarity. Of course this is a different position than the one assumed by the salt of this acid when

chromatographed in an alkaline medium. As the universal gradient turns to lower polarities, pH loses its influence of „no dissociation“. Due to functional groups the acid molecule may regain a certain mobility, leading to broadening of the separation zones

- Additionally to a slight polarity gradient a pH gradient can be employed in the AMD 2 system. This means adding e.g. a small volume of a base to the first bottle content and a small volume of an acid to the third bottle content. The content of bottle 2 is kept neutral. Of course all solvents used should be sufficiently polar, so that the base and the acid may dissociate during chromatography

5 Maintenance and Service

5.1 Cleaning

- Open visionCATS and double click on the AMD2 icon
- Go to the subtab “Manual control”
- Set “number of rinsing press” to 3
- Click on “Start”
- Activate the tick box “Empty solvent tubes only”
- Click on “Start”

Use a damp lint free cloth for cleaning the instrument surface. Do not employ aggressive detergents

Use a lint free cloth soaked in e.g. Methanol and rub all inside surfaces thoroughly

5.2 Decontamination

Before transportation or a longer term of not using your system, decontaminate it in an appropriate manner. The decontamination procedure below reflects the minimal requirements, so keep in mind that the procedure for your instrument has to be adapted according the substances used.

Decontamination procedure:

- Empty and clean the conditioning bottle
- Fill all solvent bottles with a suitable cleaning solvent
- Open visionCATS and double click on the AMD2 icon
- Go to the subtab “Manual control”
- Set “number of rinsing press” to 3
- Click on “Start”
- Activate the tick box “Empty solvent tubes only”
- Click on “Start”

- To rinse the chamber it is recommended to run a short washing „gradient“, using a suitable solvent and develop a plate up to about 20 mm 3 times at least.
- Repeat the steps to clean the instrument with a suitable solvent (to get rid of residuals of the first cleaning solvent) if appropriate
- Clean the exterior of the instrument with a lint free cloth
- Open the chamber lid and all bottles for one day

5.3 User maintenance

User maintenance procedure which should be performed once a week (depending on the usage):

AMD 2

- Check proper horizontal levelling of the AMD2 device by means of the spirit level supplied. Placed it on top of the closed chamber lid and level the instrument by rotating the 4 adjustable feet at the bottom of the instrument
- The inside of the chamber needs cleaning approximately every 10 plates. Use a lint free cloth soaked in e.g. Methanol an rub all inside surfaces thoroughly
- Remove dust, particles of the layer and other soiling matter from the trough of the developing chamber e.g. by sucking it off
- Check the tightness of the lid gasket of the development chamber by carefully inspecting the surface. Clean the gasket surface if it is soiled or replace the lid gasket if it is inflexible, hard or has small scratches
- Check the external supply of compressed nitrogen (or clean air). The external pressure should be 4,5-6 bar (60-90 psi)

Vacuum pump

- The vacuum pump must always run at least 30 minutes after the last drying process in order to allow any solvent dissolved in the oil to be removed. To support this, always run the vacuum pump with the gas ballast valve fully open:
    - Heraeus vacuum pump models: black turning cap with two holes
    - Edvards vacuum pump models: Respective knob
- The oil in the vacuum pump must be replaced at least once every year. Follow the maintenance instructions of your vacuum pump
- If corrosive components such as acids are present in the solvents, their vapours could impair the quality of the vacuum pump oil. The annual oil change is therefore particularly important.

Maintenance check which should be performed once a week:

- Check the level and quality of the vacuum pump oil. If necessary, fill it up or replace the oil if it has changed color

5.4 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 a year by CAMAG authorised service personnel. Regular service and maintenance will ensure that the instrument performs according to CAMAG specifications.

The section "Maintenance data sheet" informs about the parts to be replaced and their respective replacement cycle.

5.5 Maintenance data sheet

CAMAG Maintenance data sheet

AMD 2

October 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
662.1011	Silicon gasket for lid	12 months
663.1528	Silicon Gasket for conditioning bottle	12 months
695.0050	Dosage syringe	36 months
115.8871-1	Tube, chamber – and 8-port valve to distribution block (set of 2)	36 months
115.8866-1	Tube, distribution block to V4	36 months
660.0031	O-ring for lid (6)	36 months

Maintenance interval of vacuum pump in use	
Maintenance	Refer to the respective manual / suppliers recommendation
IQ/OQ	CAMAG recommends no IQ/OQ as the pump is tested with the AMD2 IQ/OQ

5.6 Troubleshooting

1. Migration distances are not reproducible:
    - Check the temperature in the laboratory. Has it changed? The gradient should be performed at 15-30 °C.
    - Check if the chamber is leaking (see item 4).
    - Check the plate quality. Does the plate have a different activity which can be influenced by the humidity of the ambient air? Did you use a plate from an old package opened for a long time? Repeat the test with a plate from a new batch.
2. Total run time is not reproducible:
    - If the total run time changes more than ± 5 min check the temperature, plate quality and pump efficiency (see item 1 and 4).
3. Solvent exhausted:
    - Check if all solvent bottles are filled. If they are filled check if tube connections are distorted?

4. Chamber leaking - if the pre-set value entered at EDITDevelopment parameters cannot be reached by the vacuum test before the start of the gradient:
    - Check the tightness of the lid gasket of the development chamber, i.e. clean the gasket surface if it is soiled or replace the lid gasket if it is inflexible, hard or has small scratches.
    - Check the connections of vacuum pump.
    - Check the maintenance and oil of the vacuum pump (Check User maintenance)
    - Does the vacuum pump used fulfil the requirements? Check the vacuum of the pump using a separate vacuum gauge.
    - If necessary and of no importance to your application, increase the limit values at EDIT-Development parameters.
    - If the above mentioned items are correct and the end pressure is still not reached, contact CAMAG service.
5. N2 pressure is missing:
    - If the pneumatic pressure is too low, check your gas supply. It should indicate 4,5-6 bar (60-90 psi).
6. N2 consumption is too high:

- If the nitrogen consumption is significantly higher than 1L/gradient step check the tightness of all tube connections and bottle caps.

7. Chromatograms are distorted:
   - Check the levelling of the AMD2 device using the spirit level shipped with the instrument (place it onto the closed chamber lid). Make sure that plate positioning is correct.
8. Blanks in the chromatogram:
   - Check the purity of the solvents used, pre-develop the plate with methanol or isopropanol, rinse the chamber and solvent tubes.

6 Technical data

General data	
Plate types	TLC/HPTLC glass plates 20 x 10 cm Glass thickness 1 mm Layer thickness up to 250 µm
Nitrogen or clean air pressure	4.5 – 6 bar (60 – 90 psi)
Nitrogen consumption	Approx. 1 L / gradient step
Gas volume of chamber	Approx. 550 mL
Weight	Approx. 31 kg
Dimension (wxdxh)	430 x 500 x 360 mm (550 incl. bottles)
Environment temperature	15° – 30° C
Solvent front detection	CCD, accuracy better than ± 1mm
Number of developing steps	Max. 99
Electrical data	
Power connection	100 V – 240 V; 50 / 60 Hz
Power consumption	Approx. 60 W
Max. power outlet current to vacuum pump	5 A
Fuses	2 x 1.0 AT, at 115/230 V, slow blow

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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® AMD 2

Product name

022.8860/ 022.8861

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

Muttenz, 22 August 2018

Walter Rahm, Head of Quality Management

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