

DROP SHAPE ANALYZER – DSA25



USER MANUAL
VERSION 3-02

Table of contents

In the electronic version of this documentation, click on the desired line of the table of contents to jump to the corresponding chapter. You can jump back to the table of contents by clicking the head section of any page.

1	General information	7
1.1	Reference to other user manuals.....	7
1.2	Symbols and text highlighting.....	7
1.2.1	Symbols.....	7
1.2.2	Text highlighting	7
1.3	Intended use and application restrictions.....	8
1.4	Technical Support	8
2	For your safety.....	9
2.1	Safety instructions.....	9
2.1.1	General safety instructions.....	9
2.1.2	Safety instruction using and disposing of hazardous substances	10
2.2	Warning information.....	10
3	Overview and controls.....	11
3.1	General view	11
3.2	Possible uses of the DSA25.....	12
4	Setup and external connections	13
4.1	Checking the scope of delivery	13
4.2	Location and ambient conditions.....	13
4.3	Levelling the instrument.....	14
4.4	Connections (not for DSA25B).....	14
4.4.1	Power supply (not for DSA25B).....	15
4.4.2	Connecting the computer (not for DSA25B).....	15
4.5	Switching on the instrument (not for DSA25B).....	15
4.6	Camera.....	16
4.6.1	Assembling the camera	16
4.6.2	Installing camera drivers	17
4.6.3	Connecting the camera	17
4.6.4	Horizontal alignment of the camera	17

4.7	Illumination.....	18
4.7.1	Connecting illumination.....	18
4.7.2	Adjusting height.....	19
4.8	Connecting a temperature sensor (optional).....	20
5	Operating optical components.....	21
5.1	Adjust optics.....	21
5.1.1	Adjust focus and zoom (optional).....	21
5.1.2	Adjust view angle.....	22
5.2	Adjust Illumination.....	22
5.2.1	Criteria for image brightness settings.....	23
5.2.2	Aperture	23
6	Sample tables	24
6.1	Standard sample table PS4000	24
6.2	Tilting Table PA4020	25
6.2.1	Safety instructions for working with the Tilting Table	25
6.2.2	Weight and dimensions (not mounted)	26
6.2.3	Mounting the tilting table	26
7	Needle dosing modules.....	29
7.1	Fixing the dosing bracket.....	29
7.2	Fitting the dosing module	30
7.3	Fitting the syringe	32
7.4	Adjusting the dosing height.....	36
7.5	Adjusting the horizontal dosing position.....	38
8	Twofold Liquid Needle dosing system DO3252.....	39
8.1	Assembly.....	39
8.2	Filling cartridges.....	40
8.3	Removing cartridges.....	43
8.4	Preparing a cartridge for reuse.....	44
8.5	Position adjustment	44
8.6	Assigning liquids.....	48
8.7	Taking a measurement.....	48
8.8	Calibrating the drop volume.....	48
8.8.1	Carrying out a volume calibration.....	49
8.8.2	Restoring the default settings.....	49

8.9	Cleaning	49
8.9.1	Housing	49
8.9.2	Valve	49
9	Environmental chambers TC30 and TC40	51
9.1	Warning information.....	51
9.2	Temperature range and method of temperature control.....	51
9.3	Construction	52
9.3.1	Front – controls.....	52
9.3.2	Rear - connectors.....	52
9.4	TC30/40: Mounting on the DSA25	53
9.5	Connections and preparations.....	53
9.5.1	Connecting the thermostat.....	53
9.5.2	Condensation protection	54
9.5.3	Inserting a covering disc	55
9.5.4	External temperature sensor	55
9.5.5	Inert gas connector	56
9.5.6	TC40 only: Power supply / communication.....	57
9.6	Preparing the measurement	57
9.6.1	Introducing the sample	57
9.6.2	Positioning the temperature control chamber	58
9.6.3	Positioning the sample perpendicular to the optical axis	59
9.7	Additional components	59
9.7.1	Base plate attachment for flat samples.....	59
9.7.2	Heat-conducting hood	59
9.8	TC40 only: Setting and reading off the measuring temperature.....	61
9.8.1	Warning information	61
9.8.2	The temperature controller.....	61
9.8.3	Setting the thermostat.....	62
10	Humidity chamber HC4210	63
10.1	Temperature range and method of temperature control.....	63
10.2	Notes for use.....	63
10.3	Mounting on the TC30/40 environmental chamber	63
10.4	Liquid and gas connections	65
10.4.1	Overview	65
10.4.2	Thermostat connection.....	66
10.4.3	Gas connector for humidity control	66

10.4.4 Gas connector for condensation protection.....	67
10.4.5 Power supply / communication.....	67
10.5 Filling / filling level.....	67
10.6 Fitting the temperature sensor.....	68
10.7 Covering the needle inlet.....	68
11 Maintenance.....	69
11.1 Cleaning and care.....	69
11.2 Calibration.....	69
11.3 Maintenance by the KRÜSS support	69
Appendix	70
I Technical data.....	70
II Computer system requirements for ADVANCE	70
III Procedure sending in instruments for repair.....	70
IV Warranty and caveat emptor.....	71
V Copyright and right to make alterations	72
EC Declaration of Conformity	73

1 General information

Dear KRÜSS customer,

Thank you for choosing a measuring instrument from KRÜSS. This user manual will help you with the commissioning, operation, and maintenance.

Read this user manual carefully before using the measuring instrument or accessories for optimal and save use of all functions. Keep this user manual safely in the vicinity of the measuring instrument and for the whole of its service life.

Great care has been taken in compiling the text and illustrations. You can inform us of any possible mistakes as well as suggestions for improvement by e-mail to techcom@kruss.de.

We wish you every success with your KRÜSS instrument.

1.1 Reference to other user manuals

The necessary steps for programming, carrying out and evaluating the measurement once preparation is complete are described in the ADVANCE software user manual.

1.2 Symbols and text highlighting

The following symbols and text highlighting are used in this user manual to increase the readability and clarity of different paragraphs and information.

1.2.1 Symbols

 Tips and tricks as well as information which, if disregarded, can lead to measuring errors, loss of data and undesirable behavior of your measuring instrument/accessory or of ADVANCE software

⇒ Further information on this topic at another point in the user manual or in a different document

▶ Carry out one operational step or several operational steps without necessary sequence

1. Carry out a number of operational steps in necessary sequence

■ Bullet point

1.2.2 Text highlighting

This highlighting indicates words and texts from the ADVANCE user interface and/or from the housing's labels and/or the display of the measurement instrument.

1.3 Intended use and application restrictions

- The DSA25 is intended only for measurements of the contact angle between a liquid and a solid, the surface tension of liquids as well as the interfacial tension between two liquids.
- Intended use includes the exclusive use of accessories supplied by KRÜSS.
- Some of the housing components of the DSA25 are not resistant against acids, bases or organic solvents. KRÜSS does not accept any guarantee for damage due to escape or spillage of such liquids. The same applies to damage due to corrosive vapors.

1.4 Technical Support

If your KRÜSS product should not work as expected, please consult our Technical Support office responsible for your area. You can contact them at:

KRÜSS GmbH
Technical Support (for areas
not mentioned elsewhere)
Borsteler Chaussee 85
22453 Hamburg, Germany
Phone: +49 40 514401-55
Fax: +49 40 514401-98
Email: service@kruss.de

KRÜSS China
Technical Support
Futong Dong Dajie 10, Baoneng Center,
Tower B, Room 605,
Chaoyang District,
100102 Beijing, China
Phone: +86 10 6184 2095
Fax: +86 10 6184 2207
Email: service@krusschina.cn

KRÜSS USA
Technical Support (CAN, USA)
1020 Crews Road, Suite K
Matthews, NC 28105, USA
Phone: +1 704 847 8933
Email: service@krussusa.com

KRÜSS France
Technical Support (FR, IRL, UK)
14, avenue du Québec
Bâtiment Kerria 3 – Silic 605
91140 Villebon sur Yvette, France
Phone: +33 1 60 14 94 04
Fax: +33 1 60 14 95 48
Email: service@kruss.fr

2 For your safety

This chapter contains safety-related information which will help you to recognize and avoid hazards in good time.

Therefore, read this chapter carefully to find out about the risks and how to avoid them before commissioning and using the DSA25.

2.1 Safety instructions

2.1.1 General safety instructions

- The measuring instrument is intended for use in a laboratory or pilot plant station. The general safety rules for working in a laboratory environment apply to work carried out with the measuring instrument.
- The measuring instrument and accessories may only be used by trained personnel.
- Before use and when disposing of hazardous substances, observe the relevant safety regulations and safety data sheets for handling hazardous substances as well as the relevant H and P statements.
- Do not use the measuring instrument in explosion-proof areas.
- The controls of the measuring instrument and a connected computer must not be operated when wearing protective gloves which have already come in contact with hazardous materials.
- Do not use the measuring instrument if the instrument, an attached component/module or an accessory is obviously damaged.
- When carrying out measurements with hazardous substances, the measuring instrument must be placed at a location which is appropriately configured for that purpose.
- Set up the measuring instrument so that access to the mains connection is unrestricted and the measuring instrument can be disconnected from the mains immediately in the event of danger.

- Disconnect the mains plug immediately if there is any damage to the electronics, if liquids are spilled over the measuring instrument or if there is an escape of temperature control liquid.
- Handle all glass parts and optical parts with care. Do not touch them with fingers or with sharp objects.

2.1.2 Safety instruction using and disposing of hazardous substances

When using and disposing of hazardous substances, this may result in a certain danger level depending on the hazard class.

- ▶ Before use and when disposing of hazardous substances, observe the relevant safety regulations and safety data sheets for handling hazardous substances as well as the relevant H and P statements.
 - ▶ Take care that you use as little of hazardous substances as possible.
-

2.2 Warning information

Warning information supplement safety instructions, in the course of the text at exactly the point in the user manual where it is needed.

Warning information designated by symbols with keywords describes the severity of the consequences that could occur if the measures for avoiding the hazard are not followed:

-  **CAUTION** means that slight to medium severity harm could occur to personnel.
-  **WARNING** means that severe to life-threatening harm could occur to personnel.

Information designated by the blue key word **NOTICE** means that there is a risk of material damage.

3 Overview and controls

Some components of the DSA25 are available in manual or software-controlled versions.

- ⇒ For operating software-controlled components and for carrying out measurements please read the ADVANCE manual.

3.1 General view

In principle, the DSA25 consists of three components:

- The sample table
- The video system with camera, optical system, light source and aperture
- A manual or software-controlled dosing unit, single or two-fold



Position	Designation	Position	Designation
1	Dosing unit	4	Viewing angle adjustment
2	Lens	5	Sample stage (z-axis)
3	Camera	6	Illumination with aperture

The instrument you have ordered may consist of other components.

The camera of your measuring instrument may differ from the camera shown.

3.2 Possible uses of the DSA25

- Contact angle measurements on drops of liquid in a gaseous or liquid phase
- Measurement of the surface tension of a pendant drop in a liquid or gaseous phase
- Measuring of advancing and receding drops
- Automatic control of the instrument and data recording by user-defined test methods
- Measurements at low and high temperatures

4 Setup and external connections

4.1 Checking the scope of delivery

1. Check the measuring instrument and its accessories for damage during shipment.
-

NOTICE

- ▶ Please keep the transport packing material, at least the PE foam forms. The transport packaging is required if the instrument has to be shipped for reparation.
-

2. Use the document "Final test and quality control sheet" provided to check if the delivery is complete.
3. Please contact KRÜSS or your local dealer without delay, if the delivery is incomplete. If damage during shipment occurred, please contact your contracted transport company and don't hesitate to inform us.

4.2 Location and ambient conditions

For accuracy of results the measuring instrument must be installed at an adequate location:

- Set up the instrument in a place where vibrations can be avoided.
- Do not place the instrument in the vicinity of a bright source of light.
- Avoid drafts while measuring. Do not place the instrument in the vicinity of cooling or heating systems or ventilation units.
- Avoid large variations in room temperature while measuring.
- Avoid contamination of sample liquids also by ambient air (e.g. exhaust gases).
- Place the instrument on a level, stable, and vibration-free base. Check if the base is level using a bubble level or spirit level.

4.3 Levelling the instrument

- ▶ Place a spirit level on the instrument.
- ▶ Adjust the height of the four feet of the measuring system until the air bubble in the spirit level is located in the center.



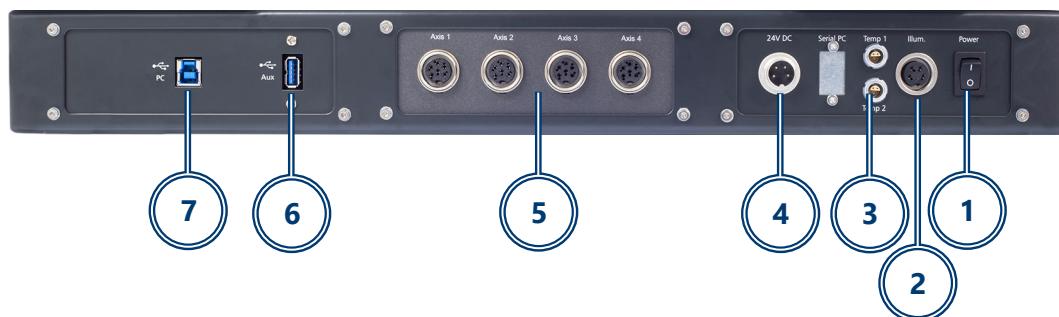
4.4 Connections (not for DSA25B)

 The basic version DSA25B has no connections on the rear and both sides of the housing. The camera is connected directly to the computer. The illumination is supplied with power directly via a net adapter unit.

The following figure shows the connections for a DSA25 in the Expert version DSA25E.

The connections are located on the rear, right and left on the bottom frame.

Rear



Position	Designation	Position	Designation
1	Power switch	5	Connectors for special sample tables (only tilting table for DSA25)
2	Connector illumination	6	Connector (USB) for the camera
3	Connector temperature sensor	7	Connector (USB) for the computer
4	Net adapter connector		

Sides

Left:



Rechts:



Position	Designation	Position	Designation
1	Connectors (USB) for a <i>Liquid Needle</i> dosing system	3	Connector for a Humidity Chamber HC4210
2	Power supply software-controlled dosing units		

4.4.1 Power supply (not for DSA25B)

A net adapter was delivered with the DSA25.

1. Connect the round 4-pin plug of the net adapter to the **24 V DC** connector at the rear panel of the DSA100.
2. Connect the net adapter to the mains (100-240 V AC).

For the DSA25B only the illumination is connected to the mains via a separate net adapter.

4.4.2 Connecting the computer (not for DSA25B)

- ▶ Connect the connector (USB) at the right-hand side of the rear panel to an interface (USB 3.0) of the computer.

A corresponding cable is within the supply of the instrument.

4.5 Switching on the instrument (not for DSA25B)

- ▶ Switch on the instrument using the **Power** switch on the right-hand side of the rear panel.

The tilting table, the needle selector, and the syringe drives (if present) move to their zero positions for initialization.

When the instrument is switched on the LED on the front panel lights up to show an intensive blue. When the instrument is switched off, it glows dimly.

The DSA25B only has a switch for the illumination.

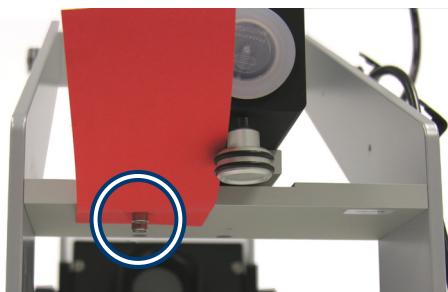
4.6 Camera

 The illustrations show fitting to an optics module CM4210 with zoom lens.

4.6.1 Assembling the camera

Removing the transport lock

- Unscrew the two screws for transport lock from the bottom of the optics carrier.



NOTICE

- Keep the screws. Screw in the screws before another transport.
-

Attaching the camera (only for CM4210 optics module with zoom lens)

1. Remove the protective cap from the rear side of the tube housing.
2. Loosen the knurled screw beneath the tube housing. Insert the C Mount adapter provided with the camera into the opening as far as it will go.



Fix the adapter with the previously loosened screw.

3. Remove the protective cap from the camera.
-

NOTICE

- Hold the camera with the opening pointing downward so that no dust can fall onto the glass cover of the camera chip.
-

4. Screw the camera onto the adapter.



4.6.2 Installing camera drivers

Required camera drivers are provided on the data carrier for the ADVANCE software.

- ⇒ Please read the installation instructions in the corresponding chapter in the ADVANCE user manual.

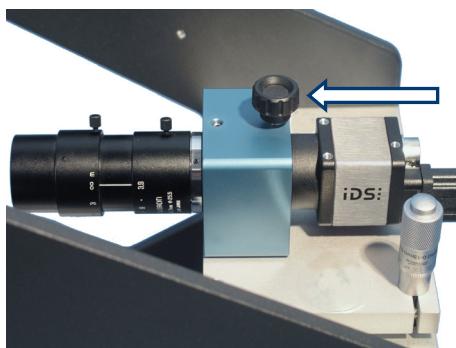
4.6.3 Connecting the camera

- ▶ *DSA25S and DSA25E:* Connect the camera with the provided to the connector (USB) at the rear panel of the computer 3.0 port on your computer.
DSA25B: Connect the camera directly to an interface (USB 3.0) of the computer.

4.6.4 Horizontal alignment of the camera

 The camera of your measuring instrument may differ from the camera shown.

1. Switch on the DSA25 and start the ADVANCE software.
2. Place an object with an exactly horizontal edge onto the sample table and get the edge into focus.
3. Ensure that the knurled screw at the tube housing is loosened.



CM4200



CM4210

4. Turn the camera so that the edge in focus is aligned horizontally.

 You may use the horizontal measuring lines in the ADVANCE software as a support.

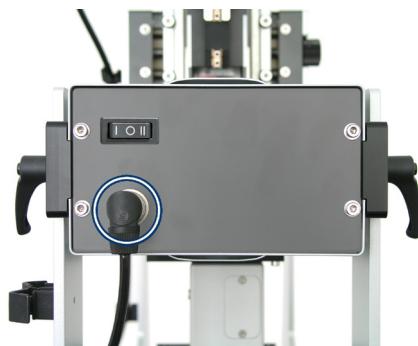
5. Fasten the loosened knurled screw at the correct camera position.

4.7 Illumination

4.7.1 Connecting illumination

Procedure for DSA25S and DSA25E

1. Connect the supplied cable with the two-pole plugs to the connector at the illumination housing.



2. Thread the cable through the cable supports at the rear side of the DSA25 frame. Close the cable supports with the clips.

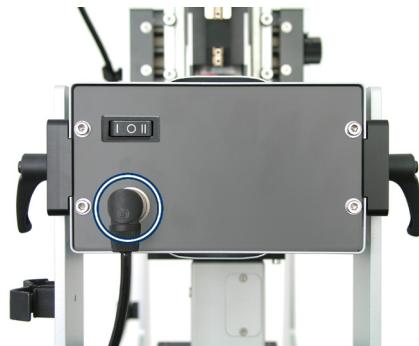


3. Connect the plug of the connecting cable to the connector **Illum.** at the rear of the DSA25 frame.



Procedure for DSA25B

1. Connect the supplied net adapter to the connector at the illumination housing.



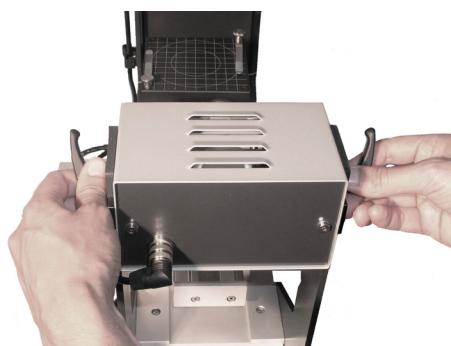
2. Connect the net adapter to the mains (100-240 V AC).

4.7.2 Adjusting height

The height of the illumination should be adjusted so that the camera image is homogeneously illuminated.

⇒ For necessary settings in the software please read the ADVANCE user manual.

1. Switch on the DSA25.
2. Minimize the zoom:
3. Vary the brightness and check if the image is always homogeneously bright:
4. *If the image is not homogeneously illuminated:* Hold the illumination housing firmly and loosen the two levers at the illumination housing.



Shift the housing until the image is homogeneously illuminated. Fix the illumination housing at the proper position using the lever.

4.8 Connecting a temperature sensor (optional)

- ▶ Connect the temperature sensor to the connector **Temp 1** on the rear side of the DSA25 frame.



As only one connector is currently read out, KRÜSS recommends using the connector **Temp 1** as this is set as the default connector in the ADVANCE software. **Temp 2** can also be used; however, in this case the connector must be changed in the software settings.

5 Operating optical components

5.1 Adjust optics

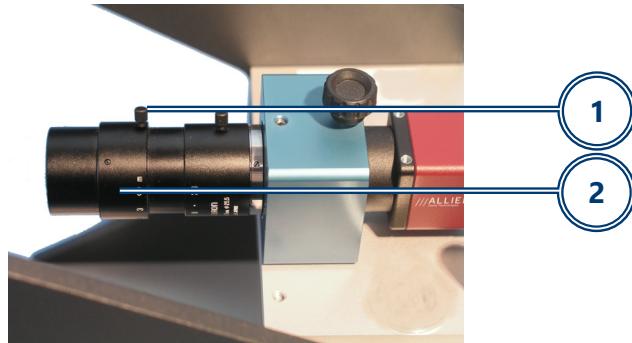


The camera of your measuring instrument may differ from the camera shown.

5.1.1 Adjust focus and zoom (optional)

CM4200 lens module with fixed focal length

The focus is adjusted using the outer rotating ring on the lens.



1: Locking screw; 2: Focus

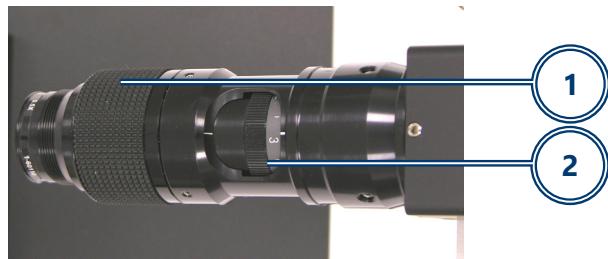
1. Loosen the locking screw.
2. Set the required focus.
3. Tighten the locking screw.



The aperture is adjusted with the inner rotating ring. This function is not required for the DSA25

CM4210 optics module with zoom lens

Adjusting zoom and focus is carried out with the help of two rotating rings at the lens.



1: Image focus; 2: Zoom

5.1.2 Adjust view angle



The figures show the adjustment of the view angle on a CM4210 optics module.

Adjusting the view angle is carried out with the help of a micrometer screw next to the camera.



The setting required for a desired angle can be read from a printed scale next to the camera housing.

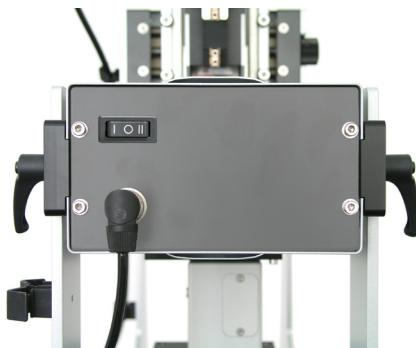


The recommended settings are $+2^\circ$ for sessile and 0° for pendant drops.

5.2 Adjust Illumination

After switching on the illumination shines with constant brightness. The illumination works with two switch settings:

- Switch setting I for standard operation
- Switch setting II for high image rates



In the ADVANCE software, the image brightness is set with the help of the camera's shutter.

5.2.1 Criteria for image brightness settings

The image brightness settings should be regarding the following criteria:

- clear contrast between drop and background
- clear mirror image of the drop if the sample does reflect



The mirror image is required for baseline detection.

5.2.2 Aperture

An aperture in front of the illumination is provided to measure small contact angles.



Shift the aperture downward in order to decrease the light slit.

6 Sample tables

6.1 Standard sample table PS4000

Height

The height of the sample table is regulated manually with the screw at the table.



Position

- ▶ To change the position of the sample table, unscrew the four screws at the base plate.
The sample table can be moved and attaches to the base plate magnetically.

6.2 Tilting Table PA4020

6.2.1 Safety instructions for working with the Tilting Table



WARNING

Risk of injury from unexpected Tilting Table movement

At the first start-up the Tilting Table automatically moves to its starting position. This could result in hands being pinched or in injuries caused by falling objects.

- ▶ Keep out of the range of movement of the Tilting Table during switch-on.
 - ▶ Before switch-on check that all the assembled items are securely fastened and remove any objects lying on the instrument.
-



WARNING

Risk of injury from unexpectedly rapid Tilting Table movement

If high movement speeds are set for the control of the axes then an unexpectedly rapid movement of the Tilting Table could cause injuries.

- ▶ Before using the Tilting Table set the movement speed for the axes to **medium** or **slow** (⇒ ADVANCE documentation).
-



WARNING

Risk of injury from unexpectedly rapid tilting table movement after using the Emergency Stop button.

When the Emergency Stop button is used the tilting table often moves with its highest speed when the ADVANCE software is not restarted and no hardware reset was carried out. The unexpectedly rapid movement could cause injuries.

- ▶ Quit the ADVANCE software after using the Emergency Stop button. Only restart ADVANCE after releasing the Emergency Stop button and switching on the instrument again.
 - ▶ Carry out a hardware reset for the tilting table. To do this, open the **Instrument configuration** tab in the Settings area of ADVANCE. Under **Components**, select **External tilting table** and click on **Reset hardware**. The tilting table will move to its zero position.
-

6.2.2 Weight and dimensions (not mounted)

Weight	14 Kg
Dimensions (W × D × H)	900 × 260 × 320 mm

6.2.3 Mounting the tilting table

 Assembling a tilting table should be carried out with two persons.

Replacing the base plate

Before mounting the DSA25, the base plate with adjustable feet has to be replaced by the base plate without adjustable feet.

 If you have ordered the tilting table with the DSA25, the tilting table is already mounted on the base plate without adjustable feet.

1. Place the DSA25 on its side. Make sure that the rear side connections are at the top.
2. Unscrew the screws marked in the illustration from the base plate by using the Allen wrench supplied. Hold the base plate tightly while doing so.



3. Remove the base plate with adjusting feet.



4. Screw the base plate without adjusting feet onto the DSA25 with the screws marked in the illustration.



Fixing the DSA to the tilting table

The DSA25 is mounted to the tilting table with the help of the two holes marked in the image below:



1. Put the DSA25 onto the tilting table so that the rear panel connections of the DSA25 and the tilting table lie on the same side.
2. Screw the two screws delivered with the tilting table into the threaded holes to fix the DSA25 at the table.



3. The Emergency Stop button is pressed after delivery. Turn the button clockwise to release it.



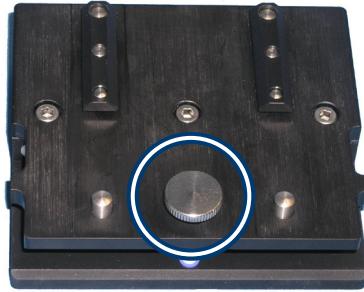
4. Connect the port on the rear side of the tilting table with one of the ports Axis 1, 3 or 4 at the rear panel of the DSA25.

7 Needle dosing modules

Depending on the equipment level, the DSA25 can be equipped with one or two manual or software-controlled needle dosing modules.

7.1 Fixing the dosing bracket

1. Undo the knurled screw on the dosing bracket.



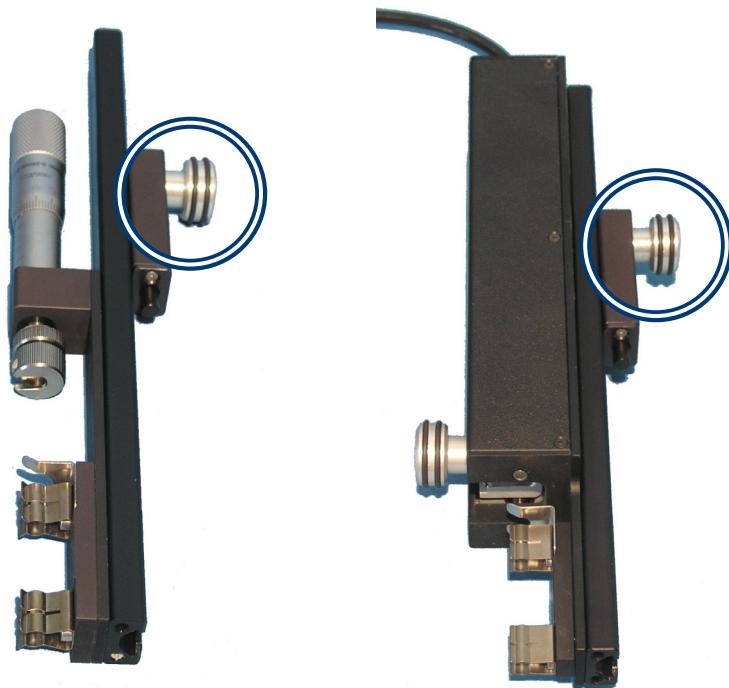
2. Place the dosing bracket on the transverse strut on the DSA25.



3. Screw the knurled screw into the dosing bracket until it can no longer be removed.

7.2 Fitting the dosing module

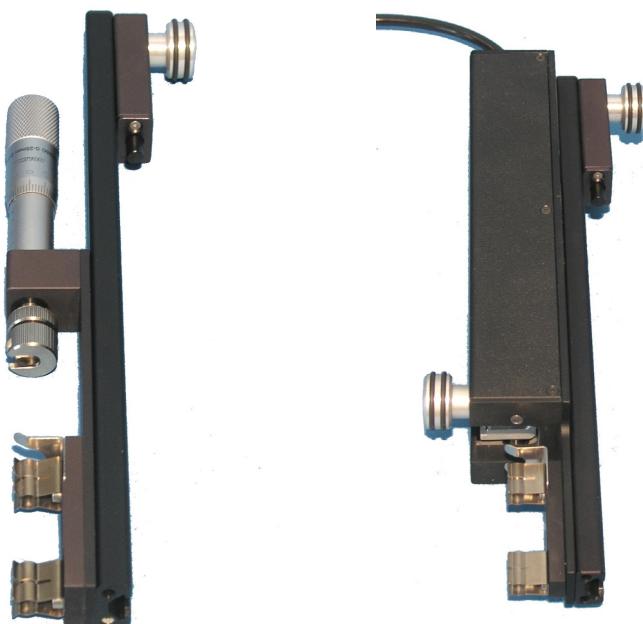
1. Loosen the screw on the slide at the rear of the dosing module.



Manual

Software-controlled

2. Push the slide up.



Manual

Software-controlled

Retighten the screw.

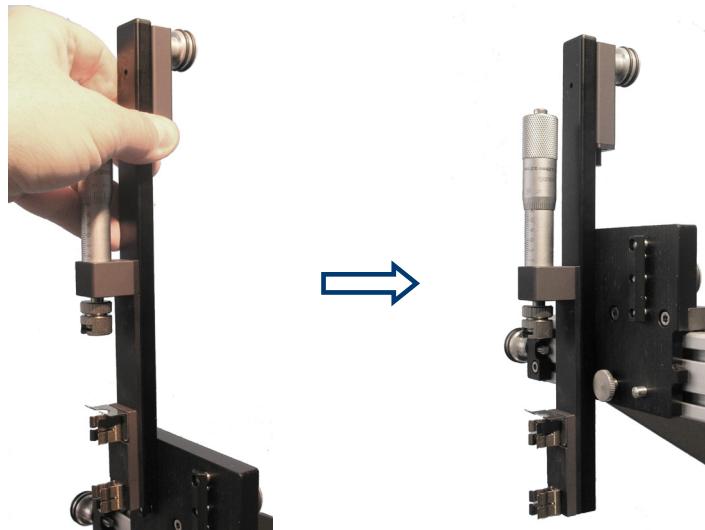
3. Loosen the screw on the rear of the dosing bracket for the side on which the dosing module is to be attached.



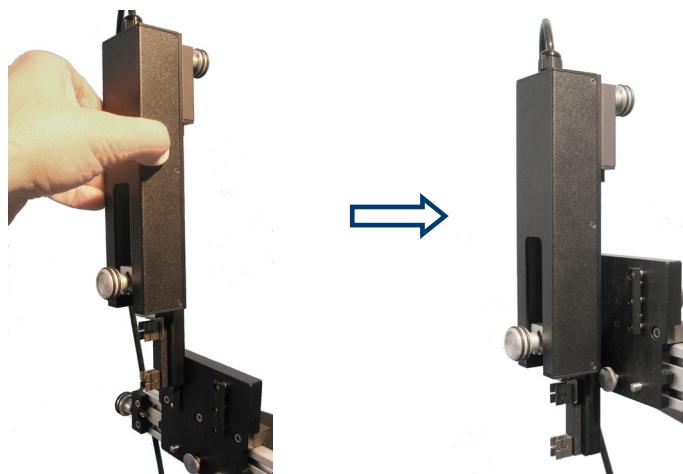
The third screw serves to lock the dosing bracket.

4. Push the guide rail of the dosing module over the slide of the bracket on the DSA25. Fix the dosing module with the help of the screw which was loosened in Step 3.

- Manual dosing module:



- Software-controlled dosing module:



Connecting the software-controlled dosing module

- ▶ *One dosing module:* Connect the dosing module to the **Con 1** connector on the left side of the DSA25

Two dosing modules: Connect the dosing modules to the **Con 1** and **Con 2** connectors on the left side of the DSA25.



 The module connected to **Con 1** is assigned the number 1 in the ADVANCE software and the module connected to **Con 2** the number 2.

- ▶ Thread the cable or cables through the cable supports at the rear side of the DSA25 frame. Close the cable supports with the clips.



7.3 Fitting the syringe

Two types of syringe can be used for the dosing modules:

- Glass syringe SY20
- Disposable plastic syringe SY3601

 In this chapter, the fitting of the syringe is described based on a glass syringe.

 The inner walls of the disposable syringes may be wetted with silicone oil as lubricant.

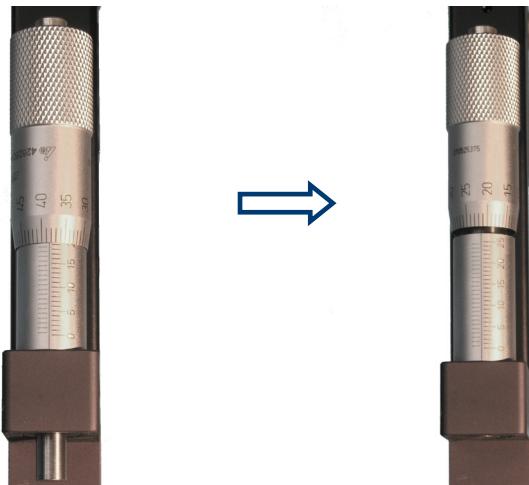
Bleeding the syringe

The syringe can be easily filled in the fitted state. To do this, it must first be filled and bled so that there is no air in the syringe when it is filled later.

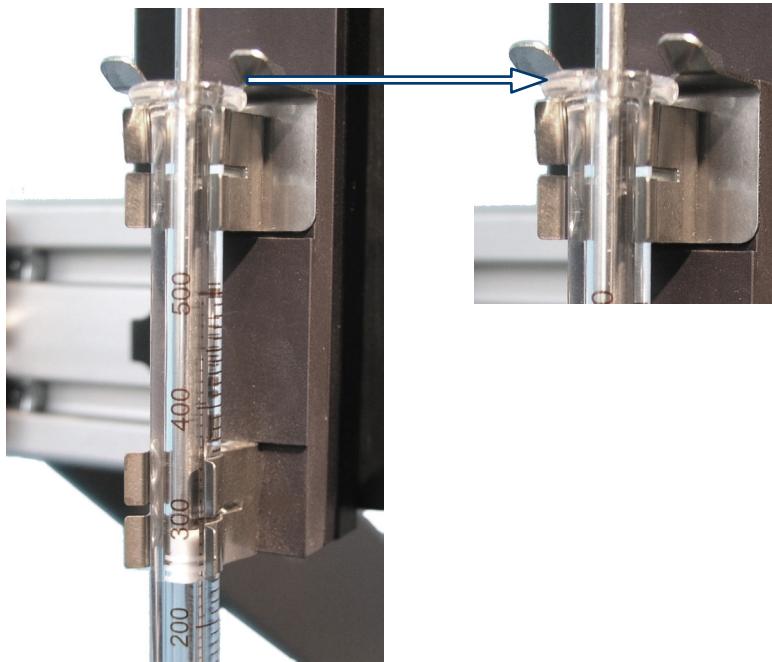
1. Fit a needle to the syringe.
2. Fill the syringe with the test liquid.
3. Hold the syringe upright and force residual air out of the syringe and needle.

Fitting the syringe in a manual dosing unit

1. Turn the micrometer screw on the dosing module in an upwards direction so that the plunger no longer protrudes.



2. Clip the glass syringe into the clamping springs so that the top edge of the syringe lies between the top clamping spring and the end spring.



3. Place a container with the test liquid below the syringe and immerse the needle in the liquid.
4. Undo the top part of the magnetic holder from the bottom part to some extent to produce a sufficiently large gap.



5. Place the magnetic holder on the plunger of the syringe. Fix the plunger by screwing the top part of the magnetic holder into the bottom part. Attach the magnetic holder to the plunger of the micrometer screw.



Fitting the syringe to a software-controlled dosing unit

1. Loosen the fixing screw on the syringe unit slightly (do not remove it!).

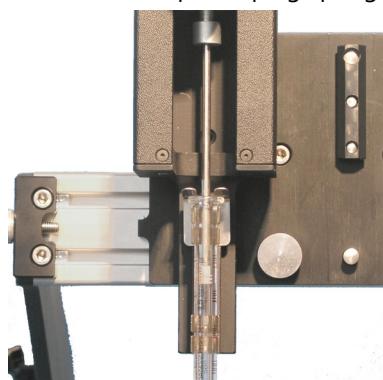


2. Insert the syringe in the syringe adapter.

To do this, push the syringe plunger upwards and insert the plunger.



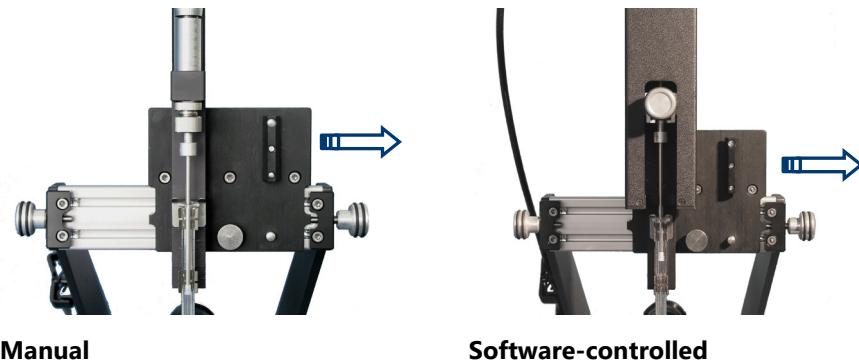
Clip the glass syringe into the clamping springs so that the top edge of the syringe lies between the top clamping spring and the end spring.



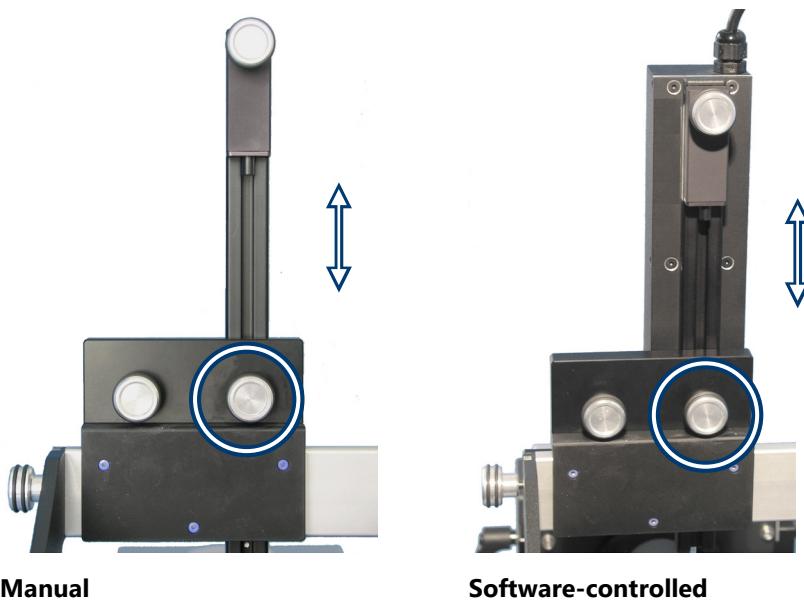
3. Fix the plunger of the syringe in the clamp with the help of the screw which was loosened in Step 1.

7.4 Adjusting the dosing height

1. Switch on the DSA25.
2. Set the view angle to the required value (⇒ [Chapter 5.1.2](#)).
3. Slide the dosing unit horizontally as far as it will go so that the dosing module to be adjusted is in the dosing position.



4. Set the illumination and the zoom to a medium value.
5. Hold the dosing unit securely. Loosen the fixing screw at the rear of the dosing bracket. Adjust the height of the dosing module.



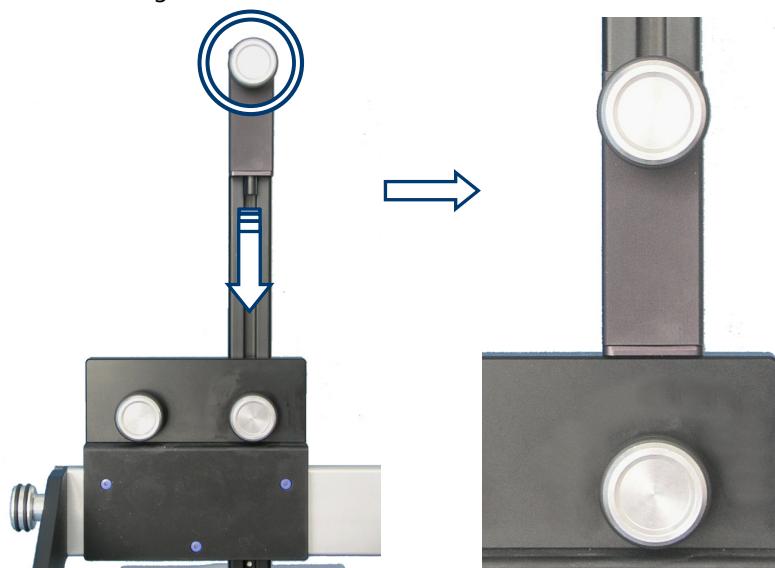
Focus on the needle as soon as it appears in the image.

Position the dosing module so that the tip of the needle lies between the vertical center of the image and the bottom third of the image.

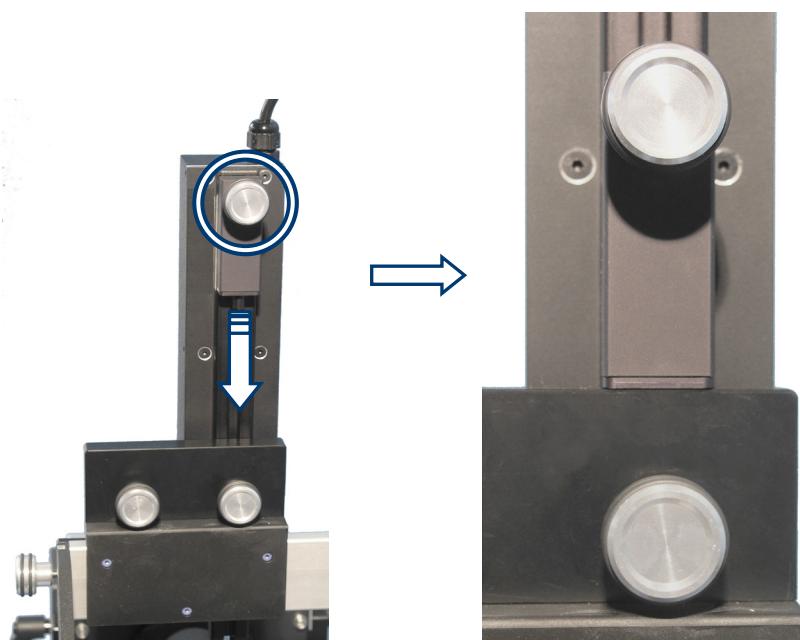
6. Fix the dosing module with the help of the screw which was loosened in Step 5.

Additional height adjustment for the dose-and-push function

- 👉 A drop which has been produced at the tip of the needle can be dosed by pushing down the dosing module with the help of the dose-and-push function. The dosing module moves up again when it is released.
- ▶ Loosen the fixing screw for the dose-and-push slide on the dosing module. Push the slide downwards against the resistance of the spring as far as it will go. Refix the slide.
 - Manual dosing module



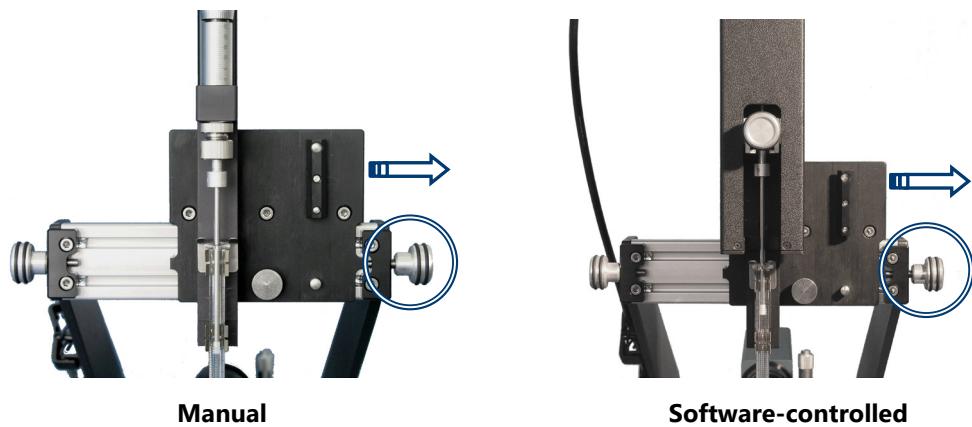
- Software-controlled dosing module



- ▶ Loosen the fixing screw at the rear of the dosing bracket. The dosing module will be pushed upwards by the spring force of the slide.

7.5 Adjusting the horizontal dosing position

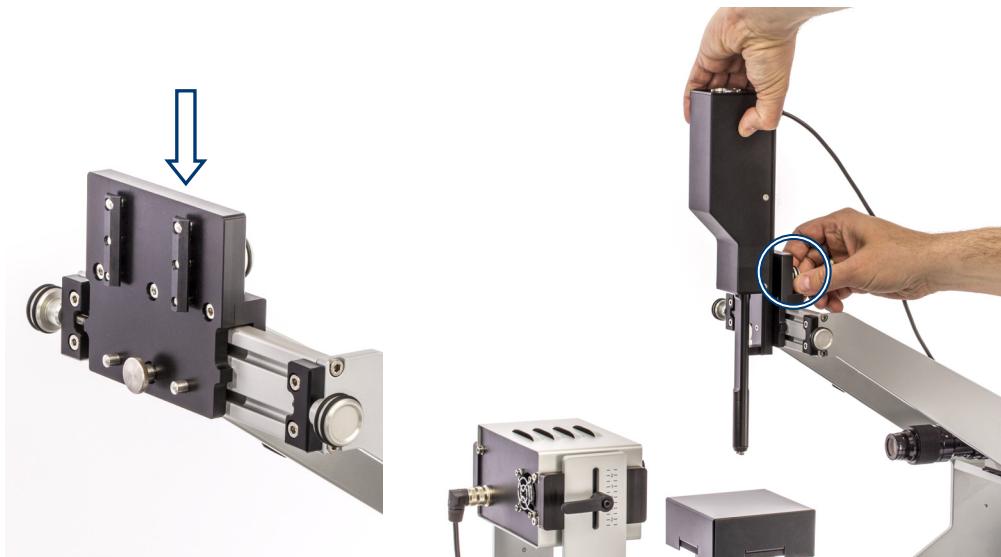
- ▶ Slide the dosing unit horizontally as far as it will go so that the dosing module to be adjusted is in the dosing position. Push the dosing unit against the stop. Adjust the position of the stop with the help of the knurled screw until the needle is in the horizontal center of the image. .



8 Twofold Liquid Needle dosing system DO3252

8.1 Assembly

1. Attach the dosing bracket as described in Chapter 7.1.
2. Slide the double dosing onto the front rail from the top. Tighten the rear screw by hand.



3. Push the dosing bracket back as far as it will go, so that the dosing unit is in the middle.
4. Connect the dosing unit to a connector (USB) on the right side of the DSA25 using the supplied USB cable.



8.2 Filling cartridges

-  The two-fold Liquid Needle dosing unit may only be used exclusively for distilled water and diiodomethane.
-  If you refill the cartridges, note that the inside sealing foil can become more susceptible with each filling cycle. Please also read the instructions for reusing a cartridge (⇒ [Chapter 8.4](#)).

1. Remove the dosing unit from the positioning unit.
2. Remove the wing screw at the top of the dosing unit.



3. Press the pressure point (indentation in the cover) and take off the dosing cover.
 4. Take a cartridge from the supply.
-  The transparent cartridges are intended for water and the brown ones for diiodomethane. Do not interchange the cartridges or their positions in the dosing unit.
5. Fit a Luer adapter to the cartridge.
 6. Fill a disposable syringe with exactly 1 mL of the test liquid.

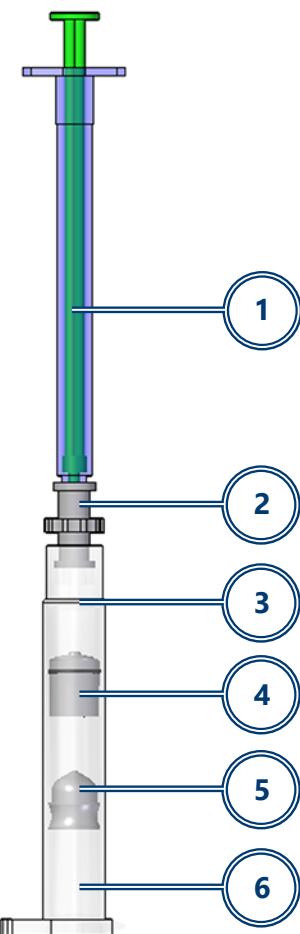


CAUTION

Diiodomethane, which is used as one of the test liquids, is a hazardous substance.

- Observe the safety data sheet and the concerning H- and P-phrases.

7. Hold the cartridge with the Luer connection upwards. Fit the syringe.



Position	Designation	Position	Designation
1	Syringe	4	Stopper
2	Luer adapter	5	Plunger
3	Sealing foil (not shown)	6	Cartridge

8. Slowly press the test liquid into the cartridge with pumping movements and tap against the syringe periodically so that air bubbles rise.

NOTICE

- Do not press against a noticeable resistance with force because the sealing foil inside the cartridge then may tear.
-

9. Slowly and carefully extract any remaining air with the syringe.

10. Remove the syringe and the Luer adapter.



CAUTION

The hazardous substance diiodomethane has a high density and can therefore easily drip from the cartridge, thus contaminating gloves, protective clothing or the workspace.

- ▶ Hold the cartridge permanently with the Luer connection upwards after having removed the syringe and the Luer adapter until you have finished inserting the cartridge in the dosing unit.
- ▶ Hold the dosing unit upside down when placing the cartridge in the dosing unit. Otherwise, the liquid might get into the dosing unit and damage the electronic system.

11. Place the cartridge in the dosing unit according to the following arrangement:



1: diiodmethane cartridge (brown); 2: water cartridge (transparent)

12. Repeat steps 4 to 11 for the second test liquid with a new Luer adapter and a new syringe.

13. Fit the cover to the dosing unit. Tighten the wing screw by hand.

14. Reattach the dosing unit to the positioning unit.

15. Start ADVANCE and open a measurement with the template **Double sessile drop**.

16. Use the button to dispense drops onto a suitable surface until drops appear on both sides.

17. Dab the dosed drops off the surface with an absorbing cloth and dispose of the cloth professionally.

8.3 Removing cartridges

NOTICE

- ▶ Hold the dosing unit upside down when removing the cartridges. This minimizes the risk of any liquid entering the dosing unit.
-

1. Put the supplied removal lever underneath the cartridge to be removed without lifting it.



2. Hold the dosing unit together with the removal lever upside down.

3. Pull the removal lever to release and remove the cartridge.
-

NOTICE

- ▶ Whenever you remove a cartridge, make sure there are no drops of liquid left in the dosing unit.
 - ▶ If you notice a drop left in or on the edge of the dosing unit, remove the drop with an absorbent cloth.
-

4. If there is still liquid in the cartridge which you want to use later, place a supplied blind cap onto the cartridge to seal it.

5. Put the cartridge in an appropriate place or dispose of the cartridge professionally.

8.4 Preparing a cartridge for reuse



CAUTION

Risk of the hazardous substance diiodmethane leaking in the case of incorrect filling of a reused cartridge.

It is possible that when reusing a cartridge the sealing foil does not lie on the inner wall, but instead covers the stopper. This can lead to the foil blocking the stopper, so that overpressure can arise during filling and cause the foil to tear or detachment of the syringe. Leaking of the hazardous substance diiodmethane can lead to a hazard as per the respective H-phrases.

- ▶ Carry out the preparatory steps for reusing a cartridge as indicated below.
 - ▶ Stop filling immediately as soon as you notice a resistance when pressing the syringe plunger. Prepare the cartridge for reuse as indicated below or use a new one.
-

1. Place a Luer adapter and an empty, unfilled syringe on the cartridge.
2. Pull the piston of the syringe slowly and carefully up to a maximum volume of 1 mL in such a way that the sealing foil is lying on the inner wall of the cartridge.

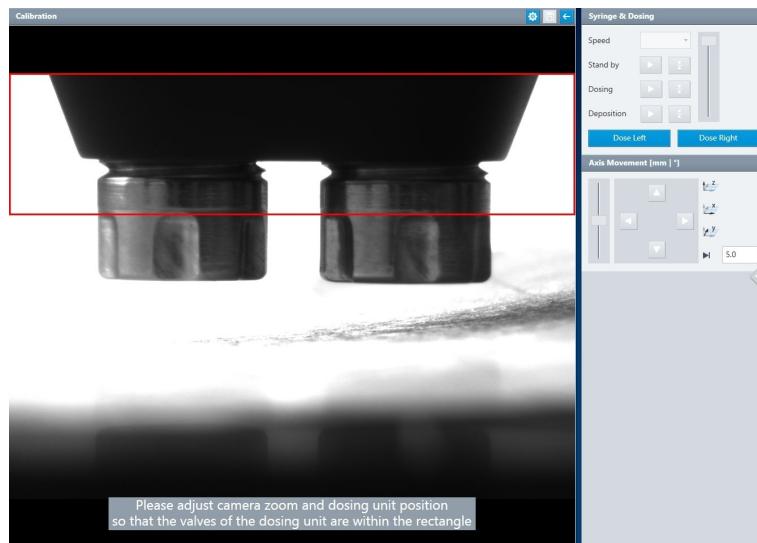
8.5 Position adjustment



If you change the height of the dosing unit or the kind of sample you have to perform this process again.

1. Put a sample on the sample table which has the same height as the actual sample in the later measurement.
2. Start ADVANCE and open a measurement with the template **Double sessile drop**.
3. Shift the dosing unit support to the rear until stop so that the dosing unit is positioned in the center.

4. Click the  button in the left side live view. The following window appears:



5. Adjust the camera zoom and the position of the dosing unit as instructed in ADVANCE so that both dosing valves are placed inside the red rectangle.

If the position is correct the rectangle is displayed green. At the same time the contours of the dosing valves are shown and illustrations of two drops appear at the intended positions for the drops to be dispensed.





The horizontal position might also need to be adjusted so that the dosing openings are in the center of the image. For this purpose, change the position of the rear stop by using the marked knurled screw. Track the position of the dosing unit, so that it is always next to the stop.



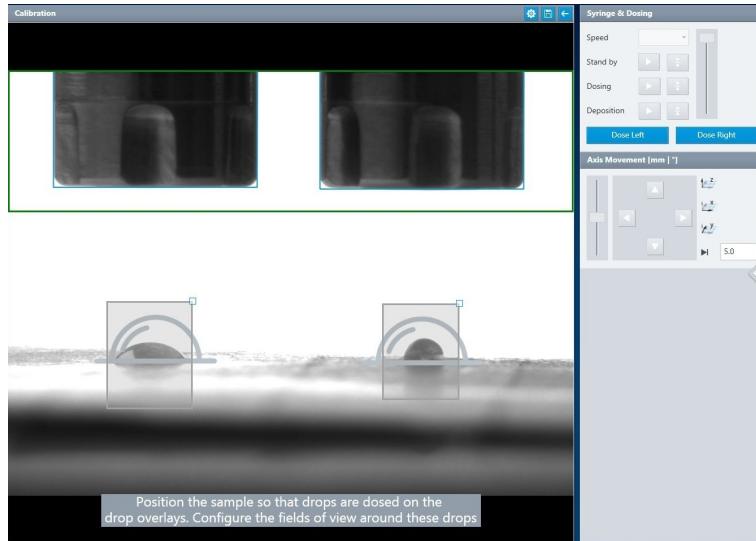
6. Fix the horizontal position at the rear of the dosing bracket with the bottom screw.



7. Dose a drop at each side (**Dose left** and **Dose right** buttons). Adjust the sample position with the z-axis (sample table) so that the drop lies roughly within the boundaries of the calculated contour.



8. As an option you can move and adjust the image area (grey boxes in the picture) to the drop size.



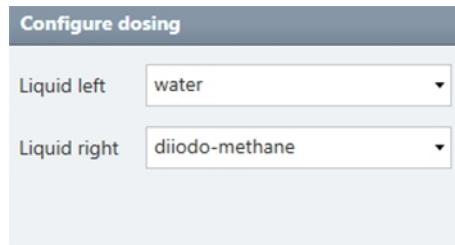
9. Click the  button. ADVANCE returns to double live view and the calibration is finished.

 The set distance should not change; otherwise the height adjustment has to be repeated.

8.6 Assigning liquids

The liquids water and diiodomethane are located in the cartridges. On their way to the dosing valves the connection tubes are crossed.

- ▶ Assign the liquids in ADVANCE only in accordance with the following figure.

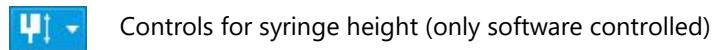


We recommend to save the opened measurement after adjusting the settings as a measurement template and to use this template for measurements.

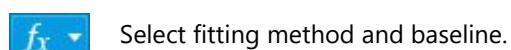
8.7 Taking a measurement

Both liquids can be dosed manually in succession to start each measurement manually afterwards. As an alternative, an automation program can be created (⇒ ADVANCE user manual).

The live view shows the control buttons for the measurement:



👉 The optimal drop volume is 1µL.



8.8 Calibrating the drop volume

If the set value of drop volume deviates from the measured volume by more than 0.2 µL, a calibration of the drop volume can be executed.

NOTICE

- ▶ Errors in carrying out this step may lead to maladjustment of the dosing volume.
-

8.8.1 Carrying out a volume calibration



During calibration one drop per liquid is dosed in three steps, i.e. there are two drops on the dosing surface after calibration.

1. Take measures to remove electrostatic charge from the supplied dosing surface, such as wiping it with an antistatic cloth.
2. Position the dosing surface underneath the dosing unit in the same way as for a real sample
3. Set the used liquids in ADVANCE.
4. Click the  button in the **Live view** tile.

The calibration is executed automatically.

8.8.2 Restoring the default settings

You can reset the dosing unit to the default settings in the *Settings* area of ADVANCE.

1. Click on the  button.
2. Select the **Instrument configuration** tab.
3. Under **Components**, select **Pressure**.
4. Click **Reset hardware**.
5. Restart the ADVANCE Software.

8.9 Cleaning

8.9.1 Housing

- Clean the housing with a damp cloth. A rinsing agent can be used in the case of severe contamination.

8.9.2 Valve

The valve has to be cleaned if

- drops are dosed in wrong size and a calibration does not help with the issue or
 - no drop emerges from the dosing outlet.
1. Turn the DSA25 upside down.

2. Screw the valve with the supplied valve wrench out of the DSA25.



3. Fill one of the supplied disposable syringes with a suitable cleaning liquid (e.g. clean water or isopropanol).
4. Put the cannula on the filled syringe and insert the valve in the other end.
5. Put the rod magnet parallel against the valve. Clean the valve by pressing the syringe plunger.



The magnet opens the valve.



Alternately you can put the valve opened with the magnet in an ultrasonic bath.



9 Environmental chambers TC30 and TC40

9.1 Warning information



CAUTION

Risk of burns from hot chamber and tubes

At higher operating temperatures contact with the chamber and tubes could cause burns.

- ▶ Wear heat-resistant protective gloves.
 - ▶ Allow the chamber to cool down before working on it.
-

NOTICE

- ▶ In order to avoid soiling the viewing window, do not touch it with your fingers. Avoid contacting the window with sharp objects.
-

9.2 Temperature range and method of temperature control

- TC30: -10 – 90 °C by using a connected thermostat,
 - TC40: -30 – 160 °C by using a Peltier element. A liquid thermostat must also be connected for counter-cooling.
-

NOTICE

- ▶ Do not set the temperature to values outside the given temperature range. Otherwise the chamber could be damaged.
-



The temperature values refer to the center of the base plate.

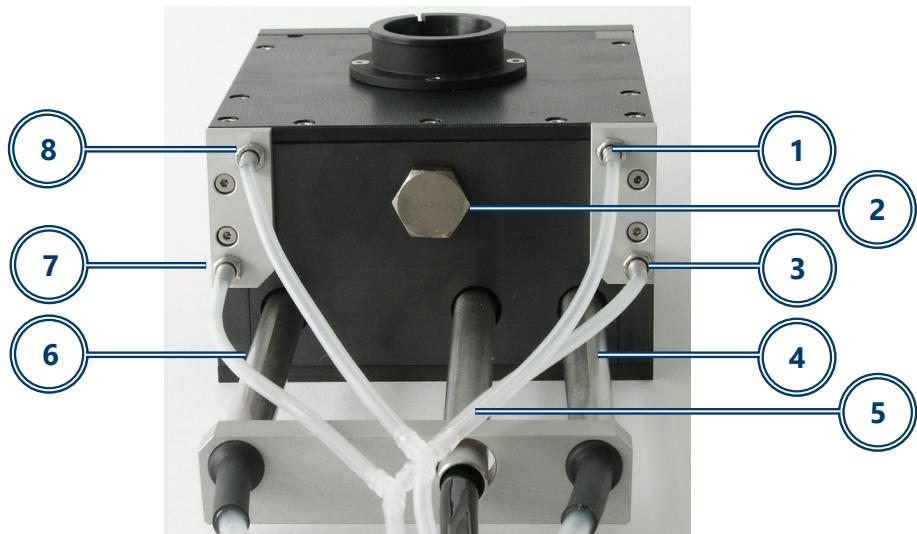
9.3 Construction

9.3.1 Front – controls



Position	Designation	Position	Designation
1	Dosing inlet	3	Adjusting screw for sample position
2	Fixing screw for sample drawer	4	Temperature sensor inlet

9.3.2 Rear - connectors

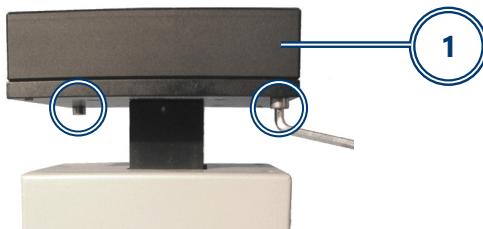


Position	Designation	Position	Designation
1,8	Condensation protection for heat-conducting hood window	4,6	Channels for thermostat tubes
2	Protective gas or HC4210 sensor inlet	5	TC40: Channel for control unit connector
3,7	Condensation protection for outside window		

9.4 TC30/40: Mounting on the DSA25

 If an HC4210 humidity chamber is to be installed it must first be mounted on the environmental chamber.

- 1 Raise the assembled dosing unit. Lower the sample table.
2. Unscrew the two hexagonal socket screws underneath the sample table support using an Allen wrench. Remove the sample table adapter.



1: Sample table adapter

3. Place the chamber on the sample table. Screw the chamber securely to the sample table using the screws which were removed in Step 2.



9.5 Connections and preparations

9.5.1 Connecting the thermostat

 Both environmental chambers are connected to a thermostat. In most cases, water is used as the thermostat liquid.

NOTICE

- Do not use silicone oil because it attacks the seals and tubes. Vegetable oils and ethylene glycol on the other hand are suitable liquids.

- ▶ Connect the Quick-Lock connections at the ends of the hoses to a flow-through thermostat.

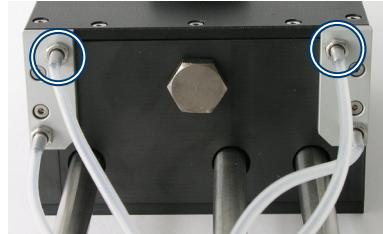


9.5.2 Condensation protection

At a high relative humidity condensation could form on the viewing and measuring window with measurements below room temperature. In order to prevent this, the divided tube connectors are used to direct a stream of air through the chamber and past the windows.

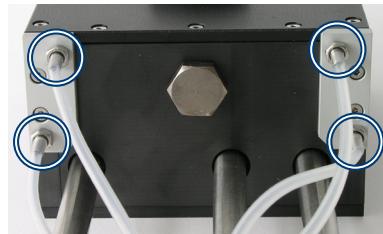
Measurements without heat-conducting hood

- ▶ Connect the tube attached to the top connectors to a compressed gas supply (approx. 500 mbar).



Measurements with heat-conducting hood:

- ▶ Connect the tube attached to the top and bottom connectors to a compressed gas supply (approx. 500 mbar).



9.5.3 Inserting a covering disc

Three different covering disks are available to be used with different needles:



Covering disk with small outlet opening for standard needles

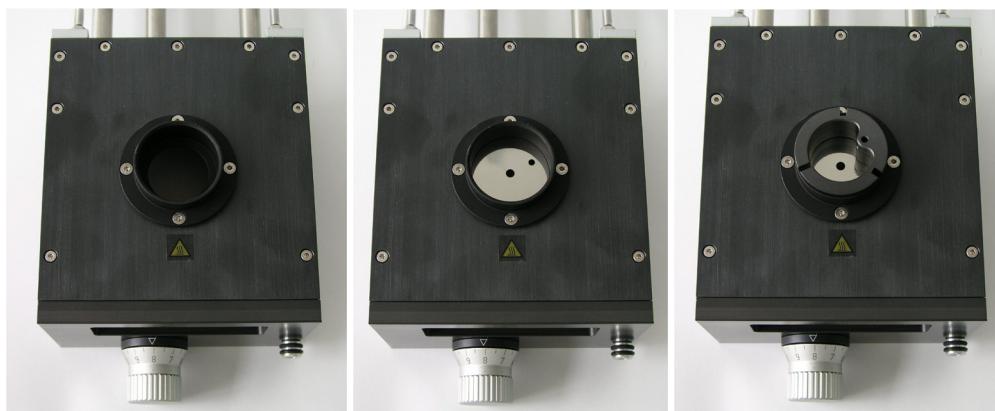


Covering disk with large outlet opening for temperature control unit for syringe dosing units TC3213



Covering disk with slit-shaped outlet opening for J-shaped needles (e.g. for Captive Bubble Method)

- ▶ Place the disc in between the corpus on top of the chamber and the stopper, according to the used needle.



Take care that both holes for the temperature sensor in disc and stopper lie above each other.

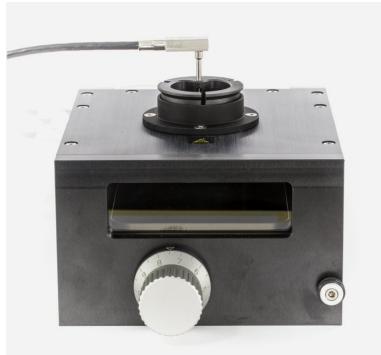
9.5.4 External temperature sensor

The temperature above the sample can be measured with the help of an external temperature sensor.



If the heat-conducting hood is used then this must be placed in position before the temperature sensor is inserted.

- ▶ With the sample drawer closed, slide the sensor into the guide on the top of the chamber.



Make sure that the inserted samples do not come into contact with the sensor; if necessary pull the sensor out slightly.

- ▶ Connect the temperature sensor to the connector on the DSA25 provided for the purpose (⇒ [Chapter 4.8](#)).

9.5.5 Inert gas connector

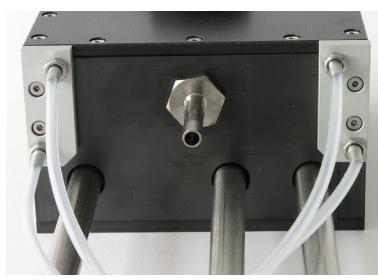


Use only inert gases such as nitrogen or argon. Do not use gases which are harmful, poisonous, inflammable, or corrosive.

1. Remove the screw on the rear of the chamber.



2. Screw the connection socket supplied with the chamber into the thread.



3. Connect an inert gas line to the connection socket.



Do not set too high a value for the gas flow, as this could result in temperature variations. A good guideline value is 500 mbar.

Protective gas with condensation protection

- ▶ If condensation protection is necessary, then also connect the protective gas to the connectors provided for the purpose.

9.5.6 TC40 only: Power supply / communication

 Make sure that the control unit is switched off.

1. Plug the mains cable into the socket at the rear of the control unit.
2. Connect the control unit to the mains supply.
3. Connect the cable coming from the TC40 to the **HEATER** socket on the front of the control unit.



9.6 Preparing the measurement

9.6.1 Introducing the sample

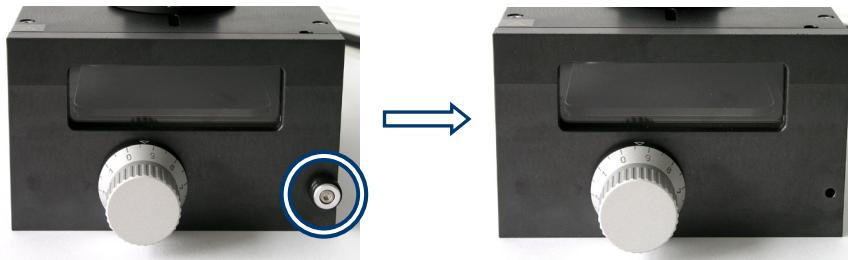
 **WARNING**

Risk of burns

There is a risk of burns when opening and closing the sample drawer.

- ▶ Wear heat-resistant protective gloves.
 - ▶ Avoid touching hot components.
-

1. Remove the screw on the right-hand side.



NOTICE

If a tilting table is used, the sample drawer must be secured with the screw once more when the sample has been introduced.

2. Open the sample drawer.



3. Fit the base plate attachment and two holding clamps in the sample chamber if required.



4. Place the sample on the base plate. Secure it with the two holding clamps if required.

5. Close the sample drawer.

9.6.2 Positioning the temperature control chamber

- 1 Lower the sample table.
- 2 Move the dosing needle so that it appears in the camera image.
- 3 Raise the sample table slowly so that the needle moves through the opening.
If horizontal axes are fitted: Adjust the horizontal position accordingly.

NOTICE

- Do not move the chamber horizontally while the needle is in the opening.
-

9.6.3 Positioning the sample perpendicular to the optical axis

- ▶ Position the sample using the adjusting screw so that the needle lies above the required dosing position.



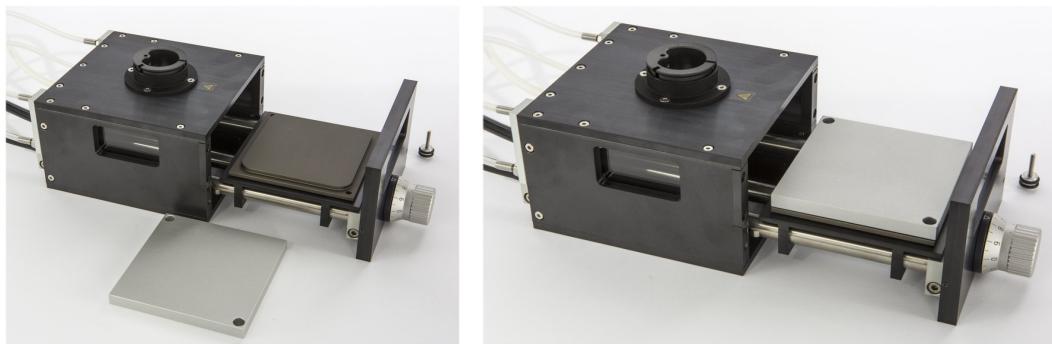
9.7 Additional components

A heat-conducting hood and a base plate attachment for flat samples are included as additional components.

- 👉 The heat-conducting hood and the base plate attachment cannot be used at the same time.

9.7.1 Base plate attachment for flat samples

In order to capture flat samples in the video image, a base plate attachment can be placed on the base plate.



9.7.2 Heat-conducting hood

- 👉 Using the optional heat-conducting hood ensures a better transportation of heat in the interior of the chamber and thus reduces temperature variations.
- 👉 When the heat-conducting hood is used, the target temperature will be achieved more slowly.
- 👉 The heat-conducting hood cannot be used together with a TC3213 temperature control unit for syringe-dosing units

1. Pull out the sample drawer. Remove the base plate attachment and the two holding clamps if necessary. Withdraw the temperature sensor if fitted.
2. Position the sample on the plate.
3. Fit the hood so that the slot is at the rear.



4. Push the drawer back into the chamber.
5. Fit the temperature sensor if necessary (⇒ [Chapter 9.5.4](#)).

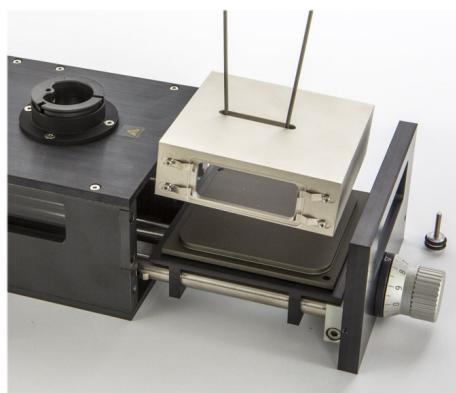
 The temperature sensor must be withdrawn once more before removing the heat-conducting hood.

Using the carrying bracket

A carrying bracket is supplied to enable the heat-conducting hood to be fitted and removed when it is hot.



- ▶ Squeeze the two sides together and feed the hooks into the slot in the heat-conducting hood.
- ▶ Release the sides and lift the heat-conducting hood.



9.8 TC40 only: Setting and reading off the measuring temperature

9.8.1 Warning information



WARNING

Risk of burns from chamber heating up unexpectedly

If too high a temperature has previously been set then burns could occur after switching on the control unit.

- ▶ After use reset the temperature at the control unit to room temperature.
 - ▶ Observe which set temperature appears on the display after switch-on and, if necessary, set a lower value.
-

NOTICE

The Peltier element could be damaged if it is heated up without counter-cooling.

- ▶ Always switch the thermostat on before the control unit and set a suitable temperature.
 - ▶ Make sure that the flow is not impeded by kinks in the tube.
-

9.8.2 The temperature controller

The required temperature is set by using the **CONTROLLER** element on the control unit of the TC40.

Immediately after the mains switch is switched on, the control unit initializes itself and is ready for use after about 3 seconds.



Temperature display

- The top line indicates the current temperature of the heating elements.
 - The set temperature is shown in the lower line of the display.
-  The temperature measured by the external temperature sensor is not displayed.
⇒ To display this, please refer to the ADVANCE user manual.

Setting the desired temperature

The desired temperature is set by using the two arrow keys ( = temperature increase;  = temperature decrease).

- Pressing the key briefly changes the temperature in one-tenth of a degree steps.
 - Fast adjustment is carried out by pressing the key longer.
-  No functions are assigned to the two keys  and .

9.8.3 Setting the thermostat

With the TC40 the thermostat is used to mediate between room temperature and target temperature.

-  The given temperature limits of 160 °C or -30 °C can only be achieved when the Peltier element is supported by the thermostat.
-  As a rule of thumb the temperature difference between the measuring temperature and the thermostat liquid should not exceed 30 °C when cooling down and 70 °C when heating up. However, greater temperature differences can be used in the temperature range between -10 and 120 °C.

The following table assumes that water is used as the thermostat liquid:

Measuring temperature range	Recommended thermostat setting
-30 to 10 °C	2 °C
-10 to 120 °C	20 °C
50 to 160 °C	85 °C

10 Humidity chamber HC4210

The HC4210 Humidity Chamber is used together with a TC30 or TC40 environmental chamber.

10.1 Temperature range and method of temperature control

The humidity chamber HC4210 can be used in a temperature range between 5 and 90 °C.

- 👉 It is possible to operate the TC40 environmental chamber alone with the Humidity Chamber HC4210 connected.

NOTICE

The maximum permissible temperature for TC40 is reduced to 120 °C when an HC4210 chamber is connected.

- 👉 If a TC40 is used then the Peltier element is not used for temperature control. Instead the temperature of both environmental chambers is controlled by an external thermostat.

10.2 Notes for use

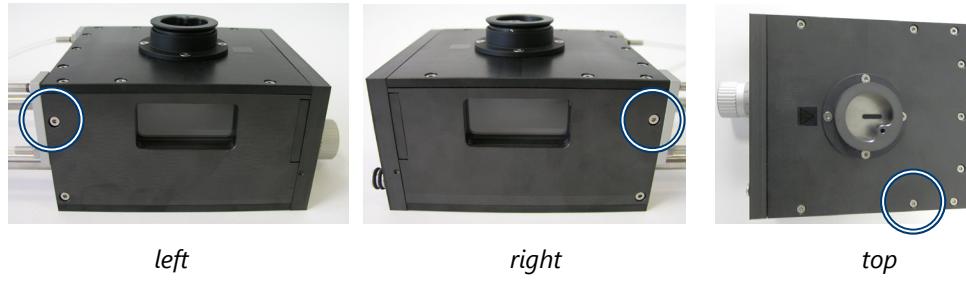
- 👉 In order to prevent condensation at the windows the humidity should be set after the required measuring temperature has been reached.
- 👉 After using, the environmental chamber should stay open and be continuously heated where appropriate in order to dry it internally.

10.3 Mounting on the TC30/40 environmental chamber

1. Remove the screw on the rear panel (or the protective gas connection, if present).



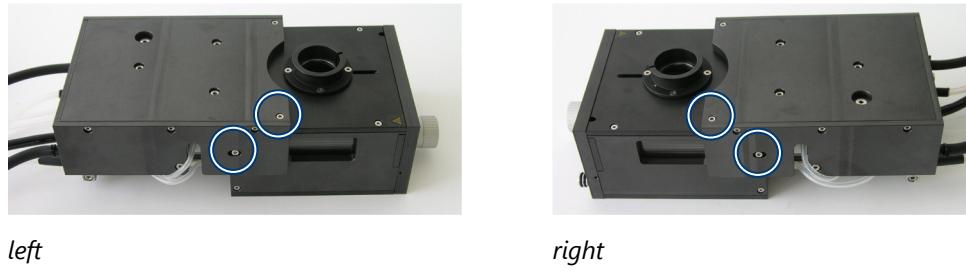
2. Remove the screws on the left and right hand side and on the top of the chamber marked in the following illustrations.



3. Push the HC4210 over the environmental chamber from the rear as far as it will go. Feed the tubes for the condensation protection through the openings in the side.



4. Fix the HC4210 to the environmental chamber. To do this, use the 4 longer screws supplied with the HC4210 in the holes in the environmental chamber which were freed in Step 2.



Preparing the TC30/40 heat-conducting hood



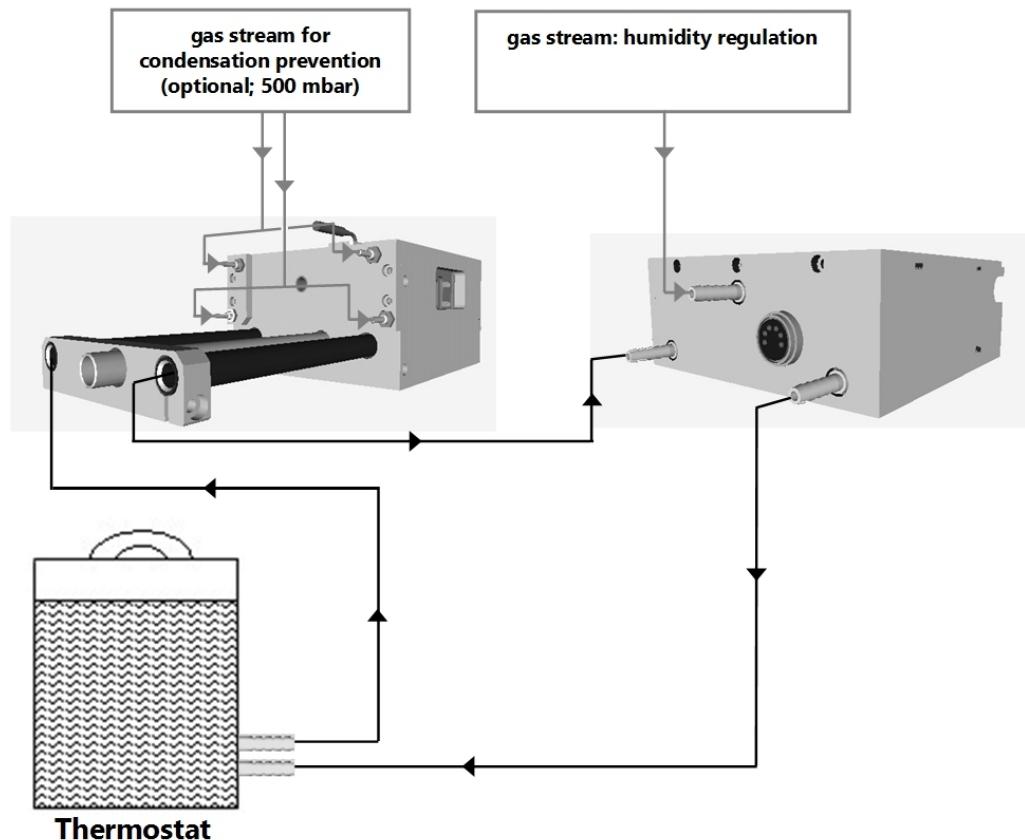
KRÜSS recommends the use of the heat-conducting hood if this is possible. This reduces variations in temperature and humidity. However, the heat-conducting hood cannot be used together with a TC3213 temperature control unit for dosing units

- Remove the plate on the rear of the heat-conducting hood.



10.4 Liquid and gas connections

10.4.1 Overview



NOTICE

- Oil-free gas must be used for all gas connections (air filter!).



When using a TC3213 temperature control unit for dosing units in addition, this component should be connected in series between the HC4210 humidity chamber and the thermostat.

10.4.2 Thermostat connection



The TC30/40 and the HC4210 are connected in series. The thermostat liquid flows from the male quick-release connector to the female quick-release connector.



1. Connect the output of the through-flow thermostat to the input of the environmental chamber.
2. Connect the output of the environmental chamber to the input of the HC4210.
3. Connect the output of the HC4210 to the input of the through-flow thermostat.

10.4.3 Gas connector for humidity control



Dry gas must be used for all connections when the humidity of the air used for measurement is low. If the flow of gas is produced by a compressor then the air must be dried if the humidity of the air used for the measurement is to be lower than the atmospheric humidity.

- ▶ Connect the connector on the throttle valve to a compressed gas connection (1 bar).



NOTICE

Inappropriate use can damage the valve

- ▶ Please maintain the specified input pressure of 1 bar.
 - ▶ Do not try to adjust the throttle valve.
-

10.4.4 Gas connector for condensation protection

- ▶ Connect compressed gas for condensation protection if required (⇒ [Chapter 9.5.2](#)).
- 👉 The gas connection on the TC30/40 chamber should only be used when the observation window is actually affected by condensation. The additional flow of air reduces the atmospheric humidity that can be achieved and reduces the accuracy of the humidity control.

10.4.5 Power supply / communication

- ▶ Connect the connector on the rear of the HC4210 to the corresponding connector on the left side of the DSA25.



10.5 Filling / filling level

NOTICE

- ▶ Use only demineralized water to prevent calcification.
-

👉 The required liquid volume is 40 mL.

- ▶ Remove the screw marked in the illustration.



- ▶ Fill the chamber to the top with demineralized water.
- 👉 When the chamber is less than one-third full with water its performance falls off rapidly. During operation you should check the filling level about once every three hours and top up with water as necessary

10.6 Fitting the temperature sensor

- ▶ Feed the temperature sensor into the opening in the environmental chamber.

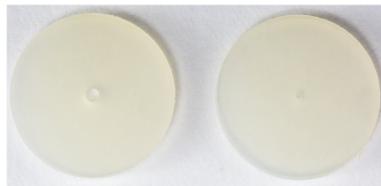


- ▶ Connect the temperature sensor to the connector on the DSA25 provided for the purpose (⇒ [Chapter 4.8](#)).

10.7 Covering the needle inlet

The needle inlet of the environmental chamber is covered in order to guarantee a good regulation of the humidity. Silicone covers are supplied for this purpose:

- three covers with small opening for sessile drop measurements
- three covers with large opening for pendant drop measurements



Procedure

1. Feed the silicone cover over the dosing needle as far as it will go.
2. Set the required dosing height.
3. Slide the silicone cover down so that the cover rests on the dosing needle inlet.

11 Maintenance

11.1 Cleaning and care

- ▶ Use cotton-wool tips soaked with a solvent (e.g. isopropanol) to clean the lens of the objective.
 - ▶ Use a wet cloth to clean the instrument's surface.
-

NOTICE

- ▶ Do not use solvents or cleaning agents to clean the instrument's surface.
 - ▶ During downtime put the dust cover over the instrument.
-

11.2 Calibration

KRÜSS offers the drop contour standard sets CP22-26 for calibration of the optics and the drop shape analysis. The procedure for the calibration is described in the corresponding manuals for these standards.

11.3 Maintenance by the KRÜSS support

For maintenance procedures that exceed those described above KRÜSS offers a service contract.

-  A calibration is also carried out within the scope of a service contract.

Appendix

I Technical data

Dimensions	610 x 250 x 430 mm (WxDxH)
max. sample space	320 x ∞ x 148 mm (WxDxH)
Weight	approx. 20 kg
Power supply	88-264 V, 50/60 Hz
Operating voltage	24 V
Power consumption	100 W

II Computer system requirements for ADVANCE

In order to enable the ADVANCE software to run without any problems, your computer system must match the minimum requirements defined by KRÜSS. You find a document that contains these requirements on the ADVANCE data carrier in the folder "Support\SystemRequirements".

III Procedure sending in instruments for repair

Contact KRÜSS



If you did not obtain the measuring instrument directly from KRÜSS but from a dealer, please contact your dealer first. He may be able to rectify the damage. If not, contact KRÜSS Technical Support directly.

1. Contact KRÜSS Technical Support (⇒ [Chapter 1.4](#)).

You will be given an alphanumeric CASE ID.

2. Please quote this CASE ID outside of the packaging and in your covering letter when you dispatch the instrument.

Send us the measuring instrument or accessories

1. Do *not* dispatch the measuring instrument or accessories *without* consulting our Technical Support.

 Components which are not directly affected by the damage may also have to be sent with the instrument. Our Technical Support will advise you on the necessary scope of the shipment with regard to an appropriate packaging and provide assistance to a possible disassembly of the measuring instrument.
2. Remove liquids (e.g. samples, temperature control liquid) completely from the measuring instrument and the accessories.
3. Clean the instrument or accessories before dispatch. This applies particularly if there is contamination due to hazardous substances.
4. Pack all components separately which were packed separately when the instrument was supplied. Do not dispatch the instrument in the assembled state.
5. If the instrument or accessories were provided with transportation locks, refit these before shipping.
6. For shipment use the original packaging of the instrument or accessories. If you no longer have the original packaging, KRÜSS recommends the order of a new original packaging for transport security reasons (available for a fee).
7. Use box-in-box packaging.
8. Please dispatch larger measurement instruments (BP100, DSA30, DSA100, K11, K100 and LSA) to KRÜSS standing on a pallet to ensure transport security.

IV Warranty and caveat emptor

The warranty terms and deadlines are described in the general terms and conditions of KRÜSS GmbH.

There is no warranty claim if the product was damaged due to careless usage or improper treatment or if it was not used according to purpose, and if the instructions, warning information and safety instructions in this documentation were not observed.

The warranty claim is void if changes on the product are performed by the customer or a third party without prior consultation of KRÜSS GmbH, which go beyond the activities described in this documentation. This also applies to repair work, which was independently performed or carried out by a third party.

V Copyright and right to make alterations

The information contained in this documentation may be altered without notice and does not represent any obligation by KRÜSS GmbH.

Neither this documentation nor any part of it may be reproduced or transmitted for any purpose whatsoever in any form and by any means, electronic or mechanical, by photocopy or drawing without the express approval of KRÜSS GmbH in writing.

©2012-2020 , KRÜSS GmbH, Hamburg, all rights reserved.



EC Declaration of Conformity

in accordance with the following directives:

- Electromagnetic Compatibility Directive 2014/30/EU

We hereby declare that the product Drop Shape Analyzer – DSA25 conforms to the aforementioned directives.

Responsible manufacturer

KRÜSS GmbH
Borsteler Chaussee 85
22453 Hamburg

Harmonized standards applied

- DIN EN 61326-1: 2013-07

Hamburg, January 6, 2021

Venue, date

A handwritten signature in blue ink, appearing to read "Florian Weser".

Florian Weser

Managing Director

ALWAYS CLOSE TO YOU

At KRÜSS, we combine technical know-how and scientific expertise with plenty of passion. That is why we not only produce high-quality measuring instruments for surface and interfacial chemistry – we offer a unique combination of product and scientific consulting. Our continuous know-how transfer ensures that not only we at KRÜSS keep pace with scientific developments, but also our customers.

In this way, we help you to optimize and make better use of your technologies. This had made us the global market leader in the field of surface and interfacial tension measurement. As a matter of course, we will gladly support you with further information as well. Feel free to ask us about publications, application cases, and helpful information about other KRÜSS products. We are always close to you.

Headquarters

KRÜSS GmbH

Borsteler Chaussee 85 | 22453 Hamburg | Tel.: +49 40 514401- 0 |

Fax: +49 40 514401- 98 | info@kruss.de

Further locations

USA Matthews, NC | Tel.: +1 704 847 8933 | info@krussusa.com

China Shanghai & Peking | Tel.: +86 21 2425 3010 | info@krusschina.cn

Frankreich Villebon sur Yvette | Tel.: +33 1 6014 9494 | info@kruss.fr

UK Bristol | Tel.: +44 117 325 0257 | info@kruss.co.uk

Select your local contact: kruss-scientific.com/contact

Item No.: 39685, 39686, 40990 10112020 DSA25