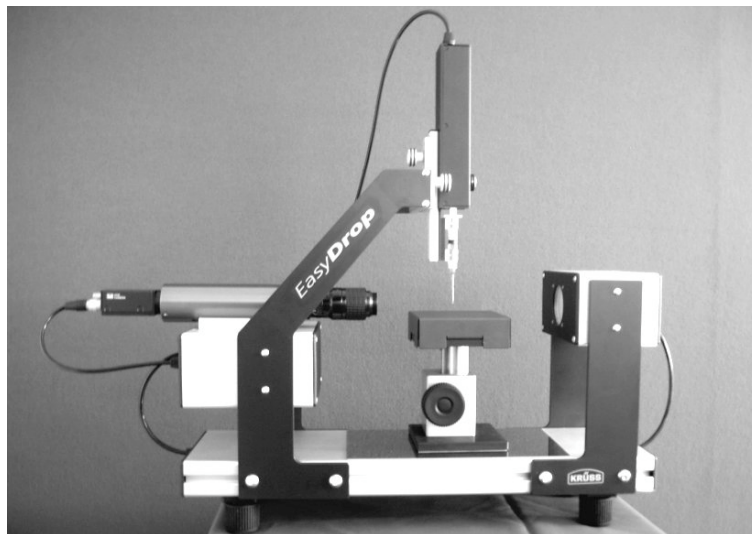




## **EASYDROP**

### **Drop Shape Analysis System**



### **Installation and Operation**

V1-01

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Dear KRÜSS GmbH Customer,

Thank you for deciding to purchase the EASYDROP Contact Angle Measuring System. With the EASYDROP and the DSA1 control and evaluation software you now have a tried and tested tool for carrying out computer-supported studies into the shapes of drops of liquid. In addition to the high-precision dosing and positioning of the liquid drops the system also permits the recording and evaluation of video images and the calculation of surface energies and surface tension with the aid of the numerous evaluation methods that have been implemented. Despite the numerous possibilities that the system offers, we have ensured that both the design and operation have remained simple, so that you can familiarize yourself quickly with the EASYDROP and be able to use it for your daily work in a very short time.

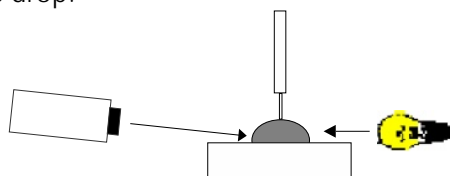
This manual provides instructions for the installation of the instrument. The procedure for making measurements is described in the DSA1 Software Manual, which is supplied together with the instrument and the software.

We strongly advise you to carry out the installation and necessary assembly work only after consulting this manual.

Even if you treat the instrument carefully, errors could inadvertently occur unless you are fully aware of its properties; these could result in incorrect measurements, damage to the instrument or even injury.

## Measuring principle

In order to measure the contact angle with EASYDROP a drop is placed on a sample located on a moveable sample table. The drop is illuminated from one side and a camera at the opposite side records an image of the drop.



The drop image is transferred to a computer equipped with a video-digitizer board (frame-grabber) and shown on the monitor. The DSA1 software contains time-proven tools for analyzing the drop image with whose help it is possible to calculate the contact angle, surface energies and surface tensions.

## Possible uses of EASYDROP

The EASYDROP measuring system – depending on the hardware and software supplied – opens up the following possibilities:

- 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 retreating drops as their volume changes
- Evaluation of a digitized drop image by various methods
- Calculation of the surface energy of a solid by various methods
- Integrated and extendable databases with substance data on liquids that can be directly linked to the measuring data
- Comfortable data management and documentation

## 1 Set-up

You should only carry out the installation and set-up of the instrument according to the instructions given in this manual.

### 1.1 Location

The measuring system should be installed in a location where it is not exposed to vibrations or interference from light.

- Place the instrument on a stable laboratory bench in a quiet location. The floor should be constructed so that it does not transmit vibrations. Vibrations caused, for example, by slamming doors or passing personnel should also be avoided.
- Do not place the instrument in the vicinity of a bright source of light; under no circumstances should it be placed in front of a window.
- Avoid drafts during the measurements. Do not place the instrument in the vicinity of cooling or heating systems or ventilation units.
- Avoid large variations in room temperature during the measurements.

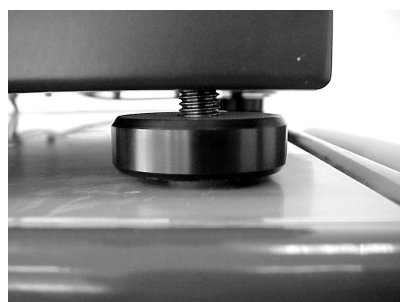
### 1.2 System requirements

The following list contains the minimum requirements for the perfect running of the DSA1 software and the EASYDROP. There are no upward limits to the performance of the computer.

- Pentium processor with at least 900 MHz
- 32 megabyte memory (RAM)
- Operating system Windows 95, 98, 2000, Windows NT (Version  $\geq$  4.0), Windows XP
- CD-ROM drive
- Hard disk with at least 200 megabyte free memory
- Free PCI-slot (full length) for the Falcon frame-grabber board
- Parallel or serial interface for printer operation (optional)
- Mouse
- VGA or SVGA graphics board
- Color monitor

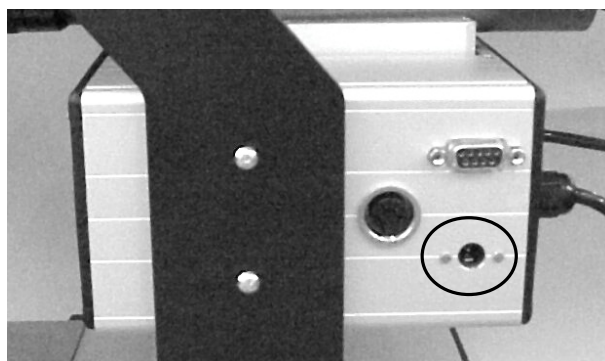
### 1.3 Levelling the instrument

1. After positioning the EASYDROP must be levelled. Place a spirit level on the device.
2. Adjust the height of the four feet of the measuring system until the air bubbles in the spirit level is located in the centre.



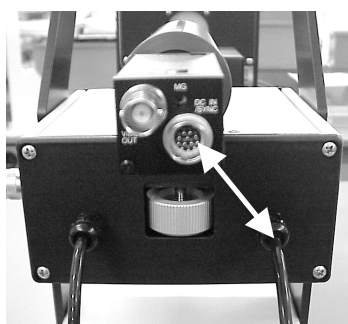
### 1.4 Power supply

A power supply is supplied with the EASYDROP. Connect the round plug to the "24V DC" socket on the side panel of the EASYDROP.



Then connect the power supply to the mains (100-240V AC).

The camera power supply leads from the EASYDROP rear panel to the connection "DC in/SYNC" on the rear side of the camera



## 1.5 Mounting the Falcon frame grabber board

**Before you start to install the frame grabber board please switch off the computer and pull out the mains plug.**



**The frame grabber board is sensitive to electrostatic charges. Before manual contact it is necessary to discharge yourself, for example by touching a metallic part of the panel.**



It is essential that the board is installed before the DSA1 software is installed. Please install the board in exact accordance with the following instructions. If necessary, obtain the help of a computer specialist.

1. Switch off the computer and pull out the mains plug. Open the computer housing.
2. Remove the Falcon board from the packaging and insert the board in a free PCI slot.
3. Screw the Falcon board with its fixture onto the computer housing.
4. Close the computer housing, reconnect your PC and switch it on.



## 1.6 Driver installation

After the start the new component will be recognized automatically . The installation routine requests a driver for the Falcon board.

### 1.6.1 Windows95 / Windows98 and Windows2000

All drivers necessary for installation of the Falcon board (v3.21) are located on the installation CD for the DSA1 software.

Let the hardware assistant search for a driver on the DSA1 CD (version 1.1 or higher). The required drivers (inf-files) are located in the root directory of the CD. The drivers will be installed after confirmation with „OK“. After installation Windows must be restarted.

The drivers on the CD have the version number v3.21. Only if drivers on the diskette or CD delivered with the Falcon board are more up-to-date they should be installed instead of the files on the DSA1-CD.

The frame grabber board **Falcon Plus** requires the same drivers as the standard Falcon board. Only use drivers from the diskette or CD delivered with the Falcon board if the installation from the DSA1-CD fails.

### 1.6.2 Windows NT4.0

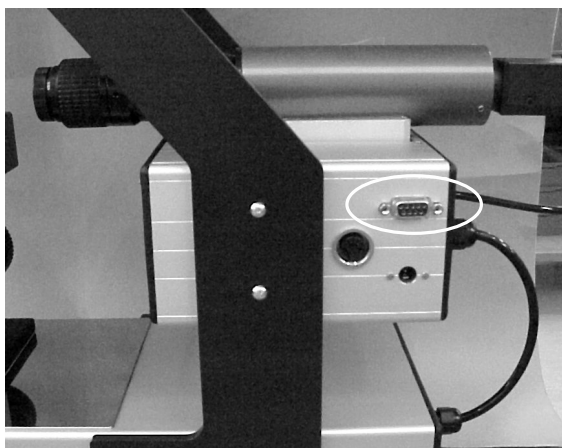
All drivers required to install the Falcon board are located on the DSA CD. The drivers are installed in the course of the software installation process. Start the software installation by running the program „Setup.exe“ from the subdirectory *..ldsasetup* (for DSA1).

## 1.7 Connecting the computer

After the successful installation of the frame-grabber board the DSA1 program can be installed. The necessary instructions can be found in the DSA1 manual.

In order to be able to control the EASYDROP with the DSA1 software the instrument must be connected to a serial interface of the computer. Use the RS232 connection cable with 9-pin plug supplied in the standard equipment.

The connection is located on the panel of the EASYDROP housing.



After the start of the software the program must be "informed" about the computer port to which the EASYDROP is connected. This is done in the menu option "Options" → "Device Control Options...".



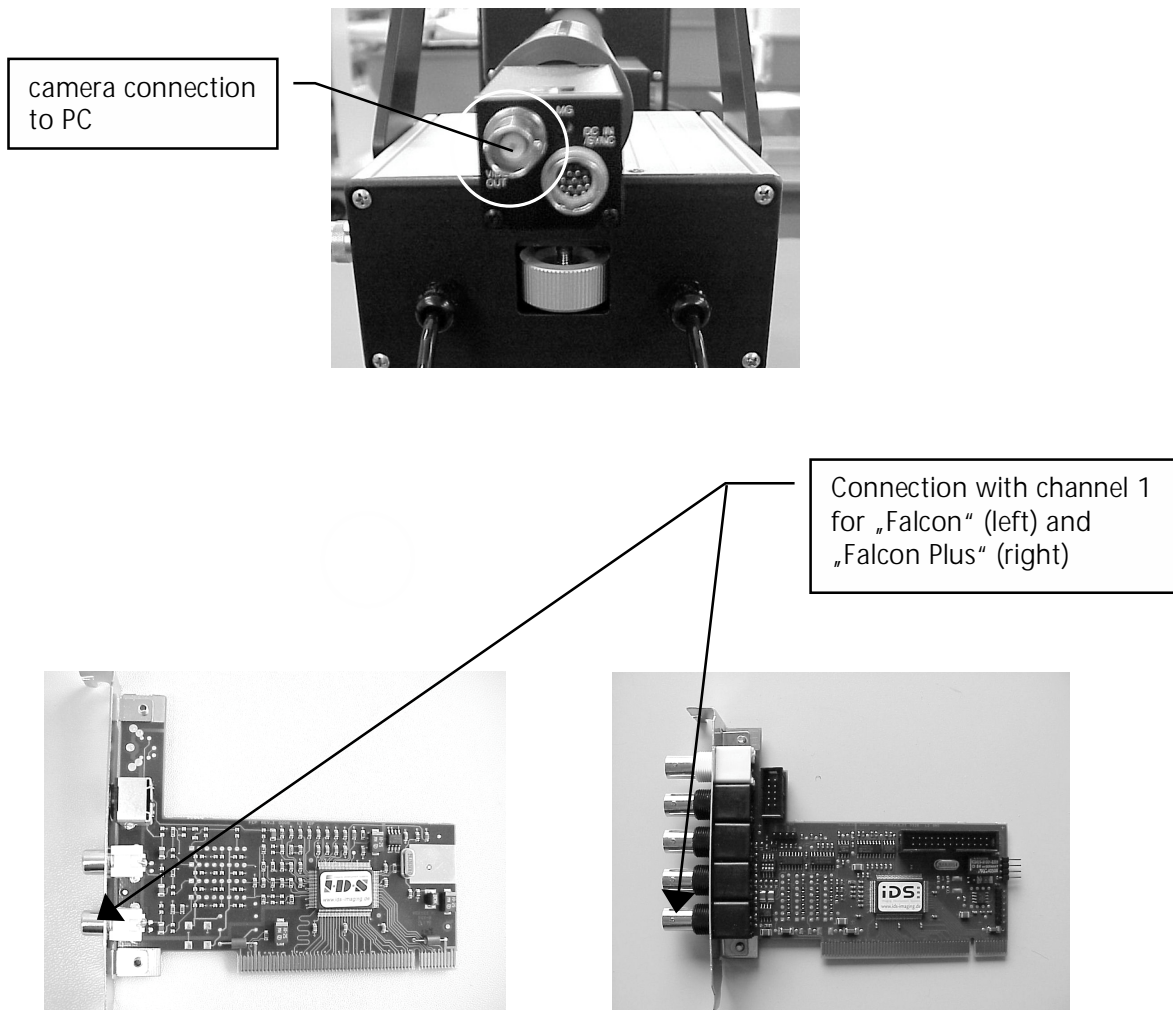
The following dialog opens:



Select the occupied COM-port from the drop-down menu.

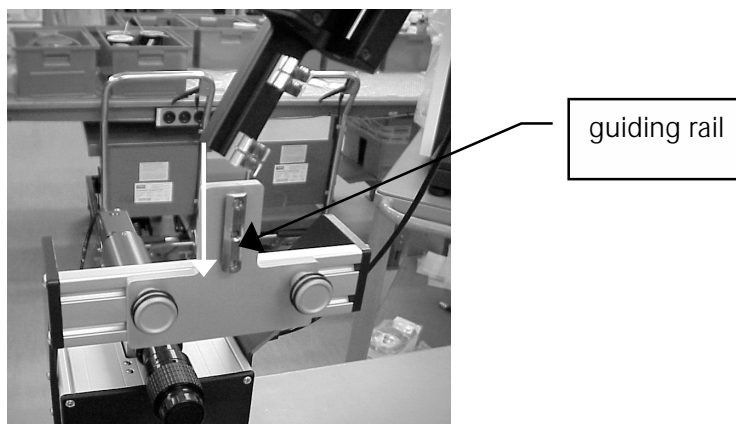
## 1.8 Connecting the camera

The EASYDROP comes with a camera already mounted. In order to transmit the video image the camera must be connected to the frame-grabber board of the computer. This is done by connecting the "Video2" connection on the rear side of the camera:

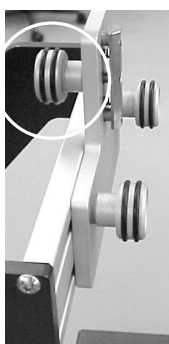


## 1.9 Setting up Syringe and dosing system

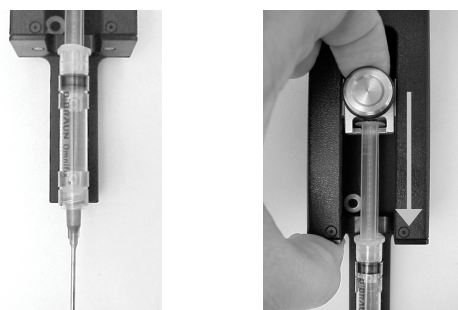
1. When the syringe plunger has been inserted tighten up the screw again.
2. Fix the dosing system at the dosing system fixture by leading it over the guiding rail.



3. Fix the dosing system with the screw behind the fixation plate.



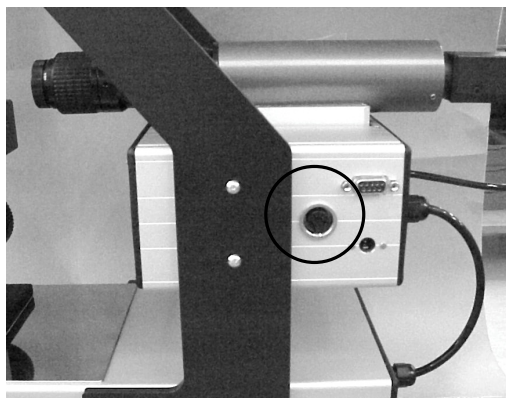
4. Loosen the screw on the syringe unit slightly (do not remove it!). Insert the syringe in the syringe adapter. You must additionally press down the fastening for the syringe plunger and insert the plunger.



There are two types of syringe adapter:

- a version with wide clips for disposable plastic syringes, and
- a version with narrow clips for reusable glass syringes

5. Finally, the dosing system is connected to the free plug on the rear panel of the EASYDROP:

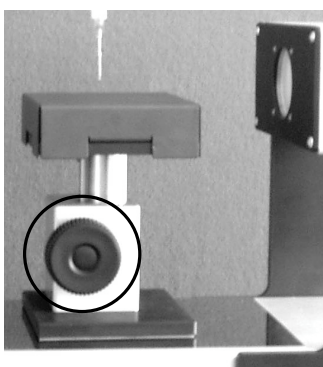


## 2 Operating EASYDROP

After set-up, most operations needed for measurements are done inside the DSA1 software which is delivered with a separate manual. This manual only covers the manual operations necessary.

### 2.1 Sample table height

The height of the sample table is regulated manually with the screw at the front side of the EASYDROP:

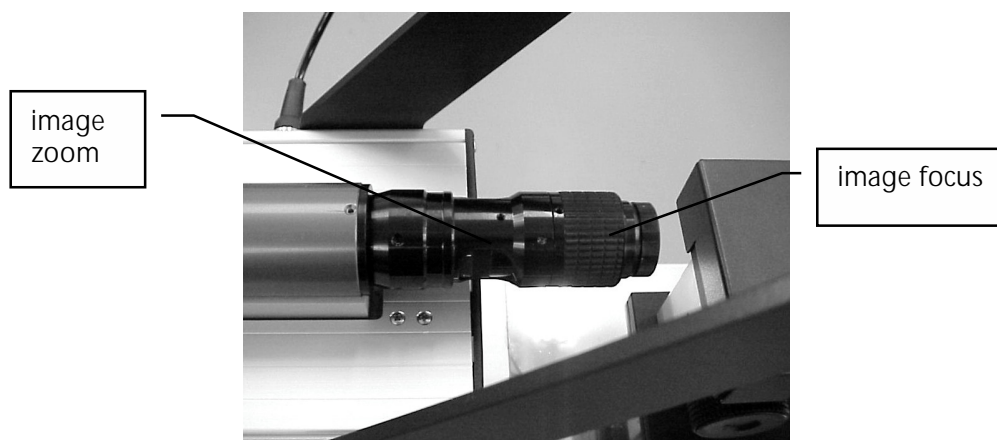


### 2.2 Illumination

The sample is illuminated with a PC-controlled illumination. The illumination has to be adjusted to the individual measurement requirements; for specific information look up in the DSA1 software manual.

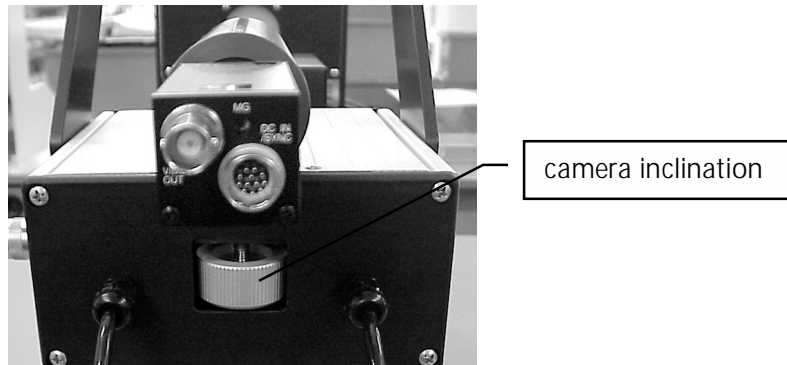
### 2.3 Zoom and focus

Zoom and focus of the image are adjusted manually at the camera:



## 2.4 Camera inclination

The camera inclination is adjusted using the round screw at the rear side of the camera box (see figure above).



**Warranty conditions**

KRÜSS GmbH guarantees that this instrument will function perfectly provided that it is properly installed, used and maintained in accordance with the instructions given in this manual. Any further warranty with regard to this instrument and this manual, in particular concerning the correctness of the measuring results, is ruled out.

The warranty period is 24 months from the date of delivery; the place of performance for the warranty is KRÜSS Hamburg or the local KRÜSS GmbH agency.

If the instrument is returned for a claim under warranty then KRÜSS reserves the right to decide whether to refund the purchase price or repair or exchange the instrument. In no case can the value of the claim for compensation by the purchaser be higher than the price paid for the purchase of the instrument. The returned instrument must be accompanied by a copy of the sales invoice.

The residual warranty period after receipt of a replacement or repaired instrument is at least 60 days, even if the original warranty period should have expired within this time.

Warranty claims will not be entertained if the instrument has been damaged by negligent behaviour or improper handling. Improper handling is to be understood as being the use of the instrument for a purpose other than that which is given in this manual or by disregarding the instructions and hazard warnings given in this manual. Improper handling also includes the damage of measuring means by careless handling, contact with substances which the instrument and its components were never designed for, or impairment or damage to the instrument by dirt (sludge, dust, smoke, etc.) or exposure to excessive heat or coldness.

The warranty claim also elapses if alterations to the instrument that go further than the activities described in the manual are made by the purchaser or third parties without prior consultation with KRÜSS GmbH. This also applies to repair measures carried out by the purchaser or third parties.

KRÜSS GmbH accepts no liability for consequential damages caused directly or indirectly by damage to the instrument or as a result of downtime.

The General Terms and Conditions of KRÜSS GmbH apply; subsidiary agreements are only valid if expressly confirmed in writing by KRÜSS GmbH.

The warranty conditions given here have no effect on claims for damages caused by "Fehlern" (faults) within the meaning of the "Produkthaftungsgesetz" (product liability laws). The same applies for damage caused by intent or gross negligence on the part of KRÜSS GmbH.



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