



Original text

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Operation
instructions

JENA PLAN

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NOTE

- The built-in text pictures wearing a frame number and a caption for example, "2-8" means: In section 2, the image with the sequence number 8. The text discussed details are provided in the image with a reference stroke and local number (OZ). In the current text "screw (2-8/3)" means the screw is in the image 8 of section 2 labeled with site number 3.
- Explanations of abbreviations are included in the appendix.
- This manual refers to the microscope equipment JENA PLAN HD 9x12 (See page 1-3) and their additional equipment.
When working with other unit types, please contact these instructions, mutatis mutandis.

OVERALL VIEW

PRODUCT LIABILITY

The incident-light microscope camera JENA PLAN including original accessories or additional equipment may only be used for the microscopy method described in this manual.

For any other use, possibly also of individual modules or components may from Manufacturers will not accept any liability. This also applies to all service or Repairs that are not performed by authorized service personnel. Also invalidates all Garantie-/Gewährleistungsansprüche also for the parts that are not directly were affected by the repair.

The following warnings are of particular importance:

The microscope JENA PLAN was in accordance with IEC Publication 348-78, Safety requirements for electronic measuring instruments, designed and tested and is in a safe state has been delivered.

This manual contains information and warnings that the Operator must be followed.

JENA PLAN is a latest scientific and technical knowledge designed optical microscope for visual, micro photographic or video Investigation of microscopic objects. The appliance is only for the intended Use purpose. The device is not for unattended operation determined!

The microscope has no particular protection against samples with corrosive, toxic, radioactive or other adverse health effects. The allowable sample weight (<5 kg) must not be exceeded.

It is to verify that the mains voltage at the back of the con- corresponds to the value passed.

JENA PLAN is a device of protection class 1

The mains plug shall only be inserted in a socket outlet provided with a protective Ground contact is provided. This protective measure is not a by using Extension cord be rendered ineffective without a protective conductor. If the The mains voltage by means of an auto-transformer, must not by this protective conductor are interrupted. Any interruption of the protective conductor inside or outside the Device or the removal of the protective earthing terminal brings danger to the Device users and is therefore prohibited.

If the microscope is connected to the network, devices internal Lead terminals dangerous voltages and the opening of covers or the removal of parts (if it is not functional reasons) can possibly expose hazardous live parts. The device is therefore disconnected from the mains, before it is opened for adjustment, replacement, maintenance or repair. If an adjustment, maintenance and repair of the under-voltage device inevitably, this activity the which is to be performed by a qualified person in order is aware of the hazard involved.

Existing openings should not be affected by covering their effect be.

To cool down to room temperature For lamp replacement lamp can (cooling approximately Vents and lamp housing have in operating temperatures and are therefore not to touch. Was opened for lamp adjustment, the light, the To avoid touching the lamp and lying in the vicinity parts strictly.

Make sure that only fuses of the required rated current and the specified version will be used as a substitute. The use of makeshift fuses and the short-circuiting of fuse holders are prohibited.

If it is possible that the protective measures are no longer effective, the device out must Be taken down and secured against unintended operation. The microscope is then assigned to the manufacturer or to a service with the Send to workshop.

To avoid glare of the eyes is always a damping filter in the beam path to leave. It is only to be removed from the beam path when the light intensity is too low is.

When installing or removing cold, under high pressure xenon high pressure lamps in and from the additional light Xe must shatter protection leather gloves with Forearm tulips and a face shield may be used. The Xe lamp must after Switching them off to cool to ambient temperature before they can be opened (Cooling for at least 20 min).

It is on the proper disposal of used Xenon high pressure lamps eighth!
It is forbidden to take the Xe lamp in the open state operation.

Device modifications due to technical
Progress are always reserved.

1 Description

1.1 General Information

1.1.1 Designation

Manufacturer description: epi-camera microscope reverse type

Short name: for routine JENA PLAN
JENA PLAN

Within the family of reflected light microscopes the JENA PLAN is classified as follows:

- upright type:
 - JENATECH inspection
 - JENAVERT
- reverse design:
 - **JENA PLAN**
 - JENAPHOT 2000
 - NEOPHOT 32

1.1.2 Usage

The incident-light microscope camera JENA PLAN is a universal light microscope reverse design with good image quality. In particular, it is suitable for visual, micro photographic or video analysis of samples from the areas Metallography, plastography, Ceramography and from the field of environmental protection.

ATTENTION The device must only for equipment described in this manual work and Use cases are used. See also the Product Liability Statement (S.VII).

1.1.3 Overview of Modules

The microscope is recommended in the following equipment:

- JENA PLAN with bright-field lenses and camera attachment 9 x 12 cm (H 9 x 12)
- JENA PLAN with HD lenses without built-in camera (HD)
- JENA PLAN with HD lenses and camera projection 24 x 36 mm (HD 24 x 36)
- JENA PLAN with HD lenses and camera attachment 9 x 12 cm (9 x 12 HD).

1.1.3.1 microscope equipment JENA PLAN

Figure 1-1 microscope equipment JENA PLAN

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1-2

- Part of the microscope equipment

NOTE For reasons of clarity, not all positions in Figure 1-1 are not illustrated.

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1.1.3.2

- ▲ In conjunction with the microscope equipment functional unit
- + Function in conjunction with other auxiliary unit

NOTE For reasons of clarity, not all positions in the image 1-2 shown.

1.2 Specifications

1.2.1 Dimensions and mass

(1) Microscope

Dimensions (width x depth x height)	420 x 710 x 420 mm
Footprint (width x depth)	600 x 700 mm
Mass	32 kg

(2) Accessory box (closed)

Dimensions (width x depth x height)	375 x 330 x 134 mm
Mass (fully loaded)	approximately 5.4 kg ..

1.2.2 Environmental conditions

1.2.2.1 Storage and transport (in packaging)

Permissible ambient temperature	-40 to +55 ° C
Permissible relative humidity	max. 75%

1.2.2.2 Betrieb

Permissible ambient temperature	+10 to +35 ° C
Permissible relative humidity	max. 75%

1.2.3 Operating Specifications

Use class enclosed spaces
 Protection class I SK

Mains voltage either 100-127 V or 220-240 V
 Allowable voltage fluctuation +10 / -15% (at 100 V + / - 10%)
 Mains frequency 50/60 Hz
 Power 130 VA

Light source halogen lamp 12V 100W CPR S5A

Adjustment of the light source infinitely	6-12 V
Degree of protection	IP 20
Electrical safety	according to IEC 348-78 and VDE 0411
Radio interference (limits according to class B)	VDE 0875
Stage	
Cross table	50 x 30 mm
Table position	read with verniers
Table rotation	90 °
Table insert panels	
Outside diameter 132 mm inner diameter	40, 50, 70 mm
Outside diameter 56 mm, inner diameter	10, 20, 27 mm
Table load capacity	sample weight ≤ 5 kg ...
Object focus	
Coarse feed	4 mm
Fine drive	in the area of the coarse adjustment knob
Scaling	in 1-micron intervals
Automatic exposure control	switchable between the integrated cameras
	For 24 x 36 mm or
	Large format 4x5 "/ 9 x 12 cm
Setting the automatic exposure	ISO 6/9 ' - 5000/38'
	(ASA 6-5000) (DIN 9-38 ')

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1.2.4 Optical data

Standard lenses for brightfield illumination	Planachromat 5x / 0.1 ∞ / - (14.90) *)
	Plan Achromat 10x / 0.2 ∞ / - (13,90) *)
	Plan Achromat 20x / 0.4 ∞ / 0 (2.60) *)
	Plan Achromat 50x / 0.8 ∞ / 0 (0.46) *)
Standard lenses for Hell-/Dunkelfeldbeleuchtung	Planachromat 5x / 0.1 ∞ / - HD (2.80) *)
	Plan Achromat 10x / 0.2 ∞ / - HD (12,00) *)
	Plan Achromat 20x / 0.4 ∞ / 0 HD (2.65) *)
	Plan Achromat 50x / 0.8 ∞ / 0 HD (0.50) *)

*) Working distance (minimum value in mm)

Lens changes	manually	5x nosepiece
Display of the selected objective	via LED display in the control panel	
Eyepieces		
resistant design	GF- Pw 10x (25) Br10	
adjustable version	GF-Pw 10x (25) Br10	
Apparent field of view	Ø 250 mm	
Magnification ranges in the visual insight		
Standard equipment	50 - to 500-fold	
Additional Equipment	of 16 - to 2500-fold	
Photomicrographs magnifications (format 9x12 cm)		
Standard equipment	from 50:1 to 500:1	
Additional Equipment	25:1 up to 1600:1	

1.3 Description

1.3.1 Mechanical Design

The microscope JENA PLAN is a powerful desktop unit. Compact design and sensible arranged controls meet the highest ergonomic requirements.

Figure 1-3 shows the main components:

- Stand (1-3/6)
- Revolving nosepiece, 5 (1-3/10)
- Cross table, 50 x 30 mm (1-3/2) with 90 ° rotation,
- Binocular tube (1-3/3), adjustable,
- Power supply (1-3/9)
- Light (1-3/1)
- Control panel LO (1-3/4) with integrated display / control the lamp supply and Position indication of the objective turret (LO)
- Control panel (1-3/8) with integrated automatic exposure (BA),
- Large format camera 4 x 5 " / 9 x 12 cm (1-3/5) or alternatively miniature camera 24 x 36 mm,
- Universal device output (1 -3 / 7).

Figure 1-3 Main components JENA PLAN

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The microscope JENA PLAN is modular, ie, standard modules can easily be replaced by alternative modules or supplemented by additional equipment. Support element of this is the stand (1-3/6). On its rear side, the power supply (1-3/9) installed at both the two control panels (1-3/4, 8) and the light (1-3/1) be connected. The cross table (1-3/2) is to be rotated 90 ° and for recording different table insert panels prepared. The coordinates of movement of the table 50 x 30 mm and is readable even at the table with verniers. Below the table is the manually rotatable 5x nosepiece (1-3/10) with the planachromatic corrected Lenses. The objective change is done manually. Below the binocular tube (1-3/3) Viewing angle 40 °, depending on device type either the large format camera (1-3/5) or connected the miniature camera.

The main switch of the device is located on the rear of the power supply (1-3/9), the other controls are located on both sides of the stand. The armrests as designed control panels LO (1-3/4) and BA (1-3/8) to the right or to the left of the stand from Operator position.

The modular design allows a quick change of procedure. The integrated Automatic exposure control acts both in the beam path for large format as well as to Miniature camera. On universal device output (1-3/7) are special adaptation pieces Units of the micro-photographic Aufsetzkamerasystems (mf-AKS) and commercially available Miniature cameras with integrated automatic exposure or video cameras can be connected.

1.3.2 Operation

1.3.2.1 General

The electrical function relationships are shown in simplified form in Figure 1-4.

Figure 1-4 Electrical function groups JENA PLAN

The JENA PLAN is connected via a device connection cable to the AC grid. The device is factory set to either 100 - set 240 V - 127 V or 200. -Terminal and a On / Off switch located on the rear panel. In the power supply, the Supply voltage is translated to the required internal operating voltages.

The display and control of luminaire voltage via the control panel LO. There is also displayed, which lens is currently located in the beam path. Located in the control panel BA the automatic exposure control with display and control for the respective Camera shutter. If the universal device output additional units of the micro-photographic device mf-AKS 24 x 36 AUTOMATIC MOT 2 is connected, so you can these are controlled by the control panel BA.

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1.3.2.2 beam path

In Figure 1-5, the optical arrangement of the JENA PLAN is shown. Both lights are usable equipped with mirrors to make effective use of the lamp radiation.

1.3.2.3 Function of the Display, Connections and Operational (See Figure 1-6, following the table)

OZ designation	Purpose / Description
Device side, left	
1 Dust	Prevents the ingress of dust during the Transport. In operation, when replaced by: Slide DF (Separation of illumination beam path and Observation beam path) Slide DIK (For differential interference contrast)
2 Filter slider \varnothing 32 mm	Allows the insertion of light filters into the Observation beam path. Can be replaced by: Analyzer A (for polarization contrast) Analyzer A in conjunction with expansion joints, eg - Compensator λ -a (For more color changes in the Polarization contrast), please refer to the Method for differential interference contrast - Compensator λ -a sub (For small changes in vibrational direction, adjustable with a lever)
3 Universal device output	Enables (after removing the cover) connecting different Additional equipment, such as Adaptation V 0.8 x (For connecting a commercially available Television camera with C-mount) Adaptation T2 2:1 (For connecting a commercially available Mm camera with T2 Mount) Adaptation mf 2-1 (To connect the mf-AKS2)
4 Fine focusing "lens focus" (See also 35 OZ)	Enables precise "focusing" (Scale 1 micron) of the optical system on the Object; adjustable within the entire Grobverstellbereichs
5 Coarse focus "lens focus" (See also 36 OZ)	Allows the coarse adjustment of the optical system to the object Maximum adjustment range: 4 mm

NOTE The Fokussieranschlag is the Clamping ring the coarse adjustment knob adjustable; the Movement rate is fixed at the factory.

6 Rangefinder " **4x** " Changes the magnification by a factor of 4:
 pulled = switched on
 inserted = off

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OZ designation	Purpose / Description
Front panel	
7 Flap	Allows the insertion of glass plates with stick figures for imprinting in the beam path instead of the dust cover
8 Clamping spring	Can Pressing both clamping springs the complete "lens with clear part" to the right of the large format camera be deducted
9 Eyepiece, the left	Fixed Eyepiece with Eyecup
10 eyepiece, right	Stellbares Eyepiece with Eyecup
11 tube clamp	For clamping of the binocular tube
12 Binocular	For insertion of the two eyepieces (OZ 9 and 10); adjustable to the eye relief
Rear panel	
13 fuse holders for F1, F2	Fuse holders for two fuses
14 network connection, 3-pole	Power supply for 110 V or 220 V (factory setting)
15 Power switch	Turns the device
16 junction box, 6-pole	Junction box for lamp 12 V/100 W
17 junction box, 15-pin (BA)	Junction box to connect the control panel BA
18 Connection socket, 9-pin (LO)	Junction box to connect the control panel LO
Stage	
19 Object-pressure spring	To fix the object
20 table insert panel	Object support
21 Screen support	For holding table insert panels
22 cross table 50 x 30 mm	Relocatable in range 50 x 30 mm, read with verniers and tilted by 90 °
23 coaxial	To move the cross table in two coordinate
24 nosepiece	Support for a maximum of five lenses, be manually pivoted into the beam path
25 locking lever	Prevents inadvertent rotation the nosepiece in working position to protect the lenses
26 centering	To center the cross table

OZ designation	Purpose / Description
Device side, right	
27 bayonet lock ▶ >	To attach the lamp; includes in direction of arrow
28 filter turret	Support for up to five filters, be manually pivoted into the beam path can. The license number of the beam path Filter space is displayed in a window.
29 aperture	Aperture stop for limiting the Illumination: centered on two thumbscrews Change in the diameter using thumbwheel
0 Field diaphragm	Aperture to limit the illuminated Object field; with dark-field setting (Switch "DF / HF" pulled) is the field diaphragm removed from the beam path centered on two thumbscrews Change in the diameter using thumbwheel NOTE See also 34 OZ
31 Dust	Prevents the ingress of dust, can be replaced be due to polarizer
32 switch Beam path	Allows the division of coming from the object Light: Visual observation (20%) Photomicrograph (80%) Visual observation (100%)
33 switch the beam path	Allows the switching of the object light coming Beam path is based on the universal Switched output devices Beam path for device-internal Camera
34 switch DF RF	Switching between brightfield and darkfield Switch drawn: DF Switch pushed in: RF NOTE See also 30 OZ
35 fine focusing "lens focus" (See also OZ 4)	NOTE The fine and coarse to the lens-focusing is mechanically connected to the corresponding elements connected to the left side.
36 coarse focus "lens focus" (See also 5 OZ)	

OZ designation	Purpose / Description
Control panel BA	
37 LED display "Film speed" (10 yellow / green 2)	The setting film speed ranges from ISO 6/9 ° to 5000/38 °, ie: <ul style="list-style-type: none"> • 6-5000 ASA or • from 9 ° to 38 ° to DIN Intermediate values are obtained by combining a yellow display with one of the two green Ads shown, for example, Video ISO 80/20 ° (= 80 ASA, DIN 20): "ISO 50/18 °" (yellow) and "X1, 6/2 °" (green)
38 LED display "User Information"	The lights when: <ul style="list-style-type: none"> green internal device camera shutter manually open yellow Shutter open
INT	When the exposure time t ($\frac{1}{4}t$, $\frac{1}{2}t$ or $\frac{3}{4}t$) yellow It up, and exposure ended red blocked automatic exposure yellow ³⁵ Automatic exposure control for small image operational yellow ^{4x5} Automatic exposure control for large format operational
EXT -----	The indicator lights when exposure is externally via mf-AKS yellow
39 function keys "Exposure"	The keys cause <ul style="list-style-type: none"> ▶ Increasing the film speed indicator ◀ Decrease the film speed indicator Manual opening / closing of the internal Camera shutter > Release of the film transport to an image width 35/4x5 Switching the automatic exposure between small and large format image Triggering the automatic exposure

OZ designation	Purpose / Description
Control panel LO	
40 LED display "Lamp voltage"	(Yellow) Display of the currently applied lamp voltage; starting at 6 V to 12 V continuous (Red) Lamp voltage is too high (> 12.2 V)
41 adjustment controller "lamp voltage"	Change of the lamp voltage
42 LED "lens option"	Displays the currently located in the beam path Lens

- | | | |
|----|--------------------------------------|---|
| 1 | Dust | |
| 2 | Filter slider Ø 32 mm | |
| 3 | Universal device output | |
| 4 | Fine focusing "lens focus" | |
| 5 | Coarse focus "lens focus" | |
| 6 | Rangefinder " 4x " | |
| 7 | Flap | |
| 8 | Clamping spring | |
| 9 | Eyepiece, the left (fixed) | |
| 10 | Eyepiece, right (adjustable) | |
| 11 | Tube clamp | |
| 12 | Binocular | |
| 13 | Fuse holders for F1, F2 | |
| 14 | Network connection box | |
| 15 | Power switch | |
| 16 | Junction box, 6-pole | |
| 17 | Junction box, 15-pin (BA) | |
| 18 | Junction box, 9-pin (LO) | |
| 19 | Object-pressure spring | |
| 20 | Table insert panel | |
| 21 | Screen support | |
| 22 | Cross table 50 x 30 mm | |
| 23 | Coaxial for coordinate movement | |
| 24 | Nosepiece | |
| 25 | Locking lever for nosepiece | |
| 26 | Centering screw for cross table | |
| 27 | Bayonet lock ▶ > for light | |
| 28 | Filter turret | |
| 29 | Aperture | |
| 30 | Field diaphragm | |
| 31 | Dust | |
| 32 | Switch the beam path | (Visual observation + photomicrography
or just visual observation) |
| 33 | Switch the beam path | (Universal device output / internal) |
| 34 | Switch (darkfield / brightfield) | DF
RF |
| 35 | Fine focusing "lens focus" | |
| 36 | Coarse focus "lens focus" | |
| 37 | LED display "film speed" | |
| 38 | LED display "User Information" | |
| 39 | Function keys "exposure" | |
| 40 | LED "lamp voltage" | |
| 41 | Adjustment controller "lamp voltage" | |
| 42 | LED display "lens option" | |

2 Operation

2.1 Construction

2.1.1 Unpacking

Below are a packaging units, as shown in Figure 2-1, from the mail-
Remove the carton and place it on the workstation:

- Foam layers (2-1/1, 2) with accessories,
- Storage tank "accessories" (2-1/3)
- Instrument cover (2-1/4) and
- Stand (2-1/5).

Figure 2-1 Packaging JENA PLAN

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2-1

The following packaging units using the attached configuration list for completeness
Check:

(1) foam layer I

- 1 control panel LO
- 2 pedestal BA
- 3 mf-AKS exchange cassette 35 mm
- 4 light 12 V 100 W
- 5 binocular
- 6 filter tank with filter
- 7 space for lamps
- 8 filter wheel
- 9 Object-pressure spring
- 10 Space for large format camera
- 11 power cable

(2) foam layer II

- 1 cross table
- 2 visor carrier 1 and 3
- 3 Lenses
- 4 Space for Zusatzokular
- 5 room for Zusatzokular
- 6 x 0.8 V adjustment
- 7 Adjustment mf 2-1
- 8 Adjustment T2 2:1

(3) Storage Box Accessories

- 1 Linhofkassette
- 2 slide DIK
- 3 Target Object in the container
- 4 container format plate
- 5 Place for reticles
- 6 Place for reticles
- 7 diaphragm support,
Table insert aperture \varnothing 132 mm
- 8 Cleaning Cutlery
- 9 duster
- 10 eyepieces
- 11 Replacement Lamp
- 12 key 3/65
- 13 Socket B
- 14 glass plates with stick figures
- 15 table insert orifice \varnothing 56 mm
- 16 slide DF
- 17 Dust
- 18 polarizer
- 19 compensator λ -a
- 20 compensator λ -a sub
- 21 analyzer or filter slider
- 22 lens

2.1.2 Establish

Stand (2-1/5) parking is available on the intended workstation.

(1) Preparatory measures

- Remove the plastic shipping bag from the tripod.
- Dust caps of the tube-opening (2-2/1), the nosepiece (2-2/2) and the lamp opening (2-2/3) remove.

Figure 2-2 Remove the dust caps

(2) insertion of the filter turret

- filter turret (2-3/1) and filter container remove from foam layer I.
- lockwashers (2-3/3) from the filter turret remove.
- Select the desired filter \varnothing 32 (2-3/2) Insert and secure with lock washers.
- placement of the filter turret (Assignment Filter / slot) on the basis record of the viewing window and Insert the filter revolver in tripod and with Fasten screw (2-3/4).

Figure 2-3 Loading the filter wheel

(3) inserting the disk format into the focusing eyepiece

- The two Okularhälften (2-4/2 and 4) the adjustable eyepiece apart screws.
- Format disk from container (2-4/1) remove.
- Insert the disk format (2-4/3) and ocular reassemble, for Wearer of the eyecup (2-4/5) Evert.
- Format disk is properly inserted, if the writing is the right way round.

Figure 2-4 Inserting the disk format

(4) inserting the binocular tube and the Eyepieces

- Dust protection cap from the binocular tube (2-5/3) remove, in the quick-change (2-5/4) and secure it with the screw (2-5/5) secure.
- Fixed eyepiece (2-5/1) and steilbares eyepiece Insert (2-5/2) in the tube openings.

NOTE adjustable eyepieces always in the right Stuck opening of the binocular tube.

Figure 2-5 Onset of binocular

(5) inserting the lenses

- nosepiece (2-6/2) the coarse adjustment knob (2-6/4) Lower.
- Objective (2-6/3) in ascending order of magnification values in the nosepiece screw in (Starting with Anschrauböffnung 1).

Figure 2-6 Inserting the lenses

(6) Install the cross table

- centering screws (2-7/6) on the table support (2-7/7) back.
- Mechanical stage (2-7/4) in the table so a carrier-result that the cone (2-7/5) of the counter-pressure spring (centering movement) in the table support snaps into the notch on the spline object table.
- centering screws evenly, until they are engaged.
- Screen support (2-7/3) and select the table Insert inlay iris (2-7/2).
Tischeinlegebbenden with Ø 132 mm inserted without diaphragm support.
- Screw in the guide pin (2-7/8) and Objektandruckfeder (2-7/1) into position.

Figure 2-7 Insertion of the cross table

(7) **Prepare the light**

- 12 V/100 W lamp with bayonet
 - ▶ circuit > (2-8/4) to the tripod back secure.
- Connectors (2-8/5) on the power supply Connect (2-8/6).
- With Socket B (2-8/1) the captive Loosen the mounting screw and the lumingegehäuse (2-8/2) of the light (2-8/3) decrease.

Figure 2-8 Prepare the light

(8) **Inserting / Replacing the Lamp**

- Both Screws (2-9/5), remove if necessary the lamp.
- Lamp (2-9/4) in the pre-centered support and secure it with the two knurled ben clamp first, then the protection remove cardboard (2-9/3) from the bulb.

NOTE notch and surface of the lamp carrier plate must be exactly at both Anschlätions of the lamp receptacle rest.

WARNING lamp bulb with bare Fingers touch, possibly the lamp piston before the first switch with Clean pure alcohol to a one-burning of contaminants to prevent.

- Replace the lamp housing (2-9/2) and with the socket wrench B (2-9/1) tighten.

Figure 2-9 Inserting / Replacing the Lamp

(1) Setting up and connecting the control panels

View from behind

Figure 2-10

Control panel BA (2-10/3) and control panel LO (2-10/1) to the left or to the right order from the stand (2-10/2) connect to the power supply (2-10/4) and secure with screws (2-10/5).

NOTE The plug connections between the operator panels and the stand may not
Are released or produced voltage.

(2) Connect the mains voltage

CAUTION Check that the on the rear panel
value printed on the network-
voltage corresponds to!

- Power cord (2-11/4) in device connection (2-11/2)
plug it in and connect to the network
produce.
- Switch, network switch (2-11/1) in
Position "1". The operational readiness is
indicated by the LED on the control panels.

NOTE In case of failure both fuses
control: F1, F2:
2AT (100-127 V), 1AT (200 - 240 V)
For this purpose, the fuse holder (2-11/3) from
take the case by the
two spring tabs simultaneously in
Direction of the arrow pressed.

Figure 2-11 Connecting the mains voltage

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2.2 Operation

2.2.1 Initial start-up

The first time the microscope JENA PLAN The following work is performed:

- Unpacking specified in Section 2.1.1.
- Install the unit in accordance with section 2.1.2 and prepare it for operation.
- Connect the unit according to section 2.1.3.
- Before commissioning or as required following adjustments must be carried out:
 - Centering lamp 12 V/100 W
 - Centering the cross table 50 x 30 mm.

Refer to section 2.2.2.

2.2.2 Adjustments

2.2.2.1 centering the lamp 12 V / 100 W

The lamp 12 V / 100 W is factory centered. The fine centering for each used Halogen light bulb is with a throw adjustment aid (2-12/4) to carry out that instead of a lens is inserted into the beam path. Be on the lens then the adjustment aid the lamp filament, the mirror image and the aperture of the microscope shown.

- table insert orifice \varnothing 132 mm (2-12/3) or Diaphragm carrier 1 (2-12/2) with table insert-aperture \varnothing 56 mm (2-12/1) out.
- Adjusting (2-12/4) in the nosepiece Screw.
- Microscope on the rear panel switch.

Figure 2-12 Inserting the adjustment aid

- Open the field diaphragm (2-13/7).
- filter turret (2-13/2) for free passage switch.
- The lens of Justierhiffe (2-13/1) are mirror images of the lamp filament as well as the image of the half-closed aperture

- blende (2-13/6) visible.
with the attached at the aperture stop
Set screws centering the aperture.
The mark is a circle on the lens
for orientation.
Then open aperture.
- Two socket wrench 3/65 (2-13/5) from the side
on the centering of the lamp
Fit and the image of the lamp filament
centrally to mark a circle on the
Setting the lens.
- screw securing the lamp housing
(2-13/4) and remove by key B (2-13/3) and
Remove the lamp housing.
- Spiral image using the adjustment screws for
Lamp focusing focusing (2-14/1), if necessary
use the focusing magnifier 6x.
- Not the socket wrench 3/65 (2-14/3) the
Operate adjustment screws for mirrors (2-14/2).
Here, the mirror image of the filament is
moved that image and mirror image about a
Wire thickness laterally offset from each other
are mapped. The result is a homogeneous
luminous surface. Lamp housing
then reattach it.
- The state of adjustment, after the pupil image
Removal of an eyepiece from the
Binocular tube can be controlled.

**Figure 2-13 Preparing the
Lamp centering**

NOTE: The lamp voltage is continuously adjustable from
6 to 12 V via the setting dial
(2-13/9) in the control panel LO adjustable.
The current value is on the LED
Indicator "lamp voltage" (2-13/8)
read.

Figure 2-14 Centering the lamp

2.2.2.2 Centering of the cross table

- Microscope on.
- Lamp voltage at the control (from 2-15/6) to approximately 9 V
control set value on the LED display (2-15/5).
- Check whether the format plate (see Figure 1-1 / Item 7.4)
into the focusing eyepiece (2-15/8) is used; appropriate, as
Section 2.1.2 (3) use.

- centering plates (2-15/4) or a suitable object on the

Figure 2-15 Centering the cross table

- Mechanical stage with coaxial drive the (2-15/7) into the zero position.
The zero position is adjustable at two scales for
 - X-coordinate motion of: and y coordinates of movement.
- On the hundredweight cross or object with the lens 5x PA / 0.10 - / 00 HD focus.
- mid-centration or striking object location (= setpoint) with the center of
Bring format plate (= center) for cover.
- Locking device (2-15/3) to solve the cross table cross table and rotate so far that the largest
Removal of the set point is reached on the format disk center.
- set point with the coaxial drive (2-15/7) by half the sum of the distance to
Move format disk center.
- Use the socket wrench (2-15/1), the two centering screws (2-15/2) in the table support as
adjust that set point and format disk center come to cover.
- centering repeat until upon rotation of the cross table of the set point and
center of the image remain in cover.

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2.2.2.3 Changing the lenses and eyepieces

(1) changing lenses

- table insert orifice \varnothing 132 mm (2-16/5) or diaphragm support
with table insert orifice \varnothing 56 mm (2-16/6 +7) decrease.
- Lower the nosepiece (2-16/8) with the coarse (2-16/9)
and bring to changing lens in working position.
- Lens (2-16/4) Unscrew and remove the top.

NOTE: The locking lever (2-16/3) inhibits the rotation of the
Lens turret in working position (protection of
Lenses). This lock is by lowering the

Nosepiece the coarse adjustment knob (2-16/9) repealed.

Figure 2-16 Changing the lenses / eyepieces

(3) Lenses	Korrektionsklasse	Magnification	Tube- Aperture	Coverslip correction	Off leadership	Work distance
	Planachromat	5x	0.10	∞	- HD	2.80 mm
	Planachromat	10x	0.20	∞	- HD	12,00 mm
	Planachromat	20x	0.40	∞	0 HD	2.65 mm
	Planachromat	50x	0.80	∞	0 HD	0.50 mm
	Planachromat	2.5 x	0.05	∞	-	7.60mm
	GF-Planachromat	3.2 x	0.06	∞	- HD	3.10mm
	GF-Planachromat	6.3 x	0.12	∞	- HD DIK	3.10mm
	GF-Planachromat	7.5 x	0.15	∞	-	16.00 mm
	GF-Planachromat	12.5 x	0.25	∞	- HD DIK	2.50mm
	GF-Plan Apochromat	25x	0.60	∞	0 HD DIK	1.00 mm
	GF-Plan Apochromat	50x	0.85	∞	0 HD DIK	0.30 mm
	GF-Plan Apochromat	100x	0.90	∞	0 HD DIK	0.80 mm
	GF-Plan Apochromat	100x	1.30	∞	0 HD	0.10 mm
	Planachromat	100x	0.90	∞	0 HD	0.80 mm
	Plan Apochromat	160x	0.90	∞	0	0.30 mm
	Planachromat	5x	0.10	∞	-	14,90 mm
	Planachromat	10x	0.20	∞	-	13,90 mm
	Planachromat	20x	0.40	∞	0	2.60 mm
	Planachromat	50x	0.80	∞	0	0.46 mm
	Planachromat	2.5 x	0.05	∞	-	7.60mm
	Planachromat	100x	0.90	∞	0	0.80 mm

(2) Okularwechsel

Eyepieces (2 - 16/1) from the binocular tube (16/2) and remove switch.

NOTE: eyepieces without the additional code 10 can be used with matching rings 3mm.

(4) Eyepieces	Korrektionstyp	Magnification	Visual field number	Balance length	Execution
	GF-Pw	10x	(25)	10 mm	Glasses
	GF-Pw	10x	(25)	10 mm	Glasses, adjustable
	Pw	6.3 x	(25)	ng	en adjustable
	Pw	6.3 x	(25)	eichr	
	JENA PLAN Pw	16x	(16)	With 3mm	adjustable
	GF-Pw	16x	(16)	With 3mm	adjustable

2.2.3 Illumination and contrast methods

Dust (1-6/1) after loosening the clamping
Remove screw (2-19/1).

Microscope on.

Adjustment controller "lamp voltage" (2-17/4) on
about 9 set V;
Indication via LED display (2-17/3).

Switch "beam path" (2-17/1) in
To "" bring (internal beam path).

Switch "beam path" (2-17/2)
bring by sliding into position ""

(Visual observation).

Figure 2-17 Basic setting

2.2.3.1 Working with bright-field illumination (HF)

Preparatory work in accordance with 2.2.3.

Switch " DF/RF "(2-18/4) by
Inserted in the "HF" position.

Light-attenuating filter, or, if desired,
with the filter turret (2-18/1) into the beam-
Engage gear.

At low magnification (eg lens
PA 5x in the beam path) to the object with
the Grob-/Feintrieb (2-18/5) to focus on.

Field diaphragm (2-18/3) conclude with the
Set screws to center and adjust it so
that they no longer just in the visual field
appears.

Remove an eyepiece, then the eyepiece
lop recognizable aperture diaphragm (2-18/2) **Figure 2-18 bright field illumination**
close and with the two screws
center.

Set aperture to approximately $2/3$ the diameter of the objective pupil.

Magnification by changing lenses adapt to the requirements.

NOTE: To adjust the light field and aperture diaphragm a highly reflective object
Use (surface mirror, unetched section).

2.2.3.2 Working with dark-field illumination (DF)

Preparatory work in accordance with 2.2.3.

Switch " DF/RF "(2-18/4) by pulling in
Position "DF" position.

In the beam path swung-light /
Remove attenuation filter.

DF slider (2-19/2) from the left in this pre-
Push popular guide (2-19/3) and
lock in place with the clamping screw (2-19/1).

Aperture diaphragm (2-18/2) fully open and
the lamp voltage adjustment control
(2-17/4) regulate to about 12V.

NOTE: The slide DF (2-19/2) can except
when working with DIK in the guide

Figure 2-19 Inserting the slide DF

(2-19/3) remain.
Place object on the stage and with coarse / Fine adjustment knob to focus.

2.2.3.3 Working with oblique illumination

Preparatory work in accordance with section 2.2.3.1.

Aperture (2-20/1) to about 1/3 to 1/2 of the Close pupil diameter and contains speaking the desired visual impression decenter (Schattenbildung!).

Figure 2-20 Working with oblique illumination

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2.2.3.4 Working with polarization contrast

Preparatory work in accordance with 2.2.3.
Tischzentrierung according to section 2.2.2.2.
Dust cover (2-21/3) to the polarizer
Replace (2-21/2).
Switch " DF/RF"(2-21/4) by inserting
to position "HF".

Filter slider \varnothing 32 (2-22/5) against the

Figure 2-21 Inserting the Polarlsators

Exchange analyzer (2-22/3).
Lens 10x PA bring into the beam path.

With the Grob-/Feintrieb (2-22/6) on a isotropic
pes object focus (eg metal mirror).

Aperture diaphragm (2-21/1) on the half-Through
Close diameter of the objective pupil and possibly
a the path of rays filter corresponding
distant.

With the knurled wheel (2-22/4) on the analyzer (2 -
22/3) in the field of view at maximum extinction position
adjust it.

To be examined specimen on the table
hang up and fix it with the pressure spring.

Set the desired magnification and
focus.

Figure 2-22 Inserting the analyzer

- size of the aperture to the size of the objective pupil, such as follows:

Lens	Aperture	Objektivpuplle
Planachromat 5x / 0.1	1	1
Planachromat 10x / 0.2	3	4
Planachromat 20x / 0.4	3	8
Planachromat 50x / 0.8	1	5
Planachromat 100x / 0.9	1	6

By turning the mechanical stage optimal polarization image.
If necessary, additional insert the compensator λ -a sub (2-22/1) into the analyzer
and optimize the contrast with the control lever (2-22/2).

2.2.3.5 Working with differential interference contrast (DIK)

The additional equipment for differential interference contrast (DIK) works on polarization-shear
Basis. From the object by a small amount of two laterally displaced images are formed,
interfere with each other.

Differential Interference Contrast is the JENA PLAN with all lenses adjustable, whose
Magnification $\geq 5x$ is.

The system consists of:

Slide DIK and
Compensator λ -a.

Operation

Preparatory work in accordance with 2.2.3.

Switch " $D_{F/RF}$ "(2-20/2) by
Inserted in the "HF" position.

Dust cover (2-21/3) to the polarizer
Replace (2-21/2).

Filter slider $\varnothing 32$ mm (2-23/5) against the
Exchange analyzer (2-23/3).

Highly reflective object on the stage

Laying, select the desired lens and focus.

With the knurled wheel (2-23/4) on the analyzer Dark position adjust it.

Figure 2-23 Working with differential Interference contrast (DIK)

DIK slider (2-24/3) to the stop in the Guide (2-24/5) and secure with the Clamping screw (2-24/4) lock.

NOTE: When pushing and pulling the slide DIK has the red dot on the screw (2-24/1) to show up.

With the Grob-/Feintrieb on the object plane focus.

With the adjusting screw (2-24/2) on dark Set the field of view ("quasi" dark field without Relief effect).

With the adjusting screw (2-24/1) optimal Homogeneity of Sehfeldaussleuchtung ago provide.

With the adjusting screw (2-24/2) is now the favor- Set stigsten contrast.

Figure 2-24 Inserting the slide DIK

To extend the range adjustable color contrasts the compensator λ -a (2-24/6) in the Use analyzer (2-24/7).

NOTE: Differential Interference Contrast has an azimuthal preferred direction. By turning the Mechanical stage is to consider the position in which the best contrast is achieved.

2.2.4 Measuring, counting and comparison method

2.2.4.1 Working with surface plates

For measuring, counting and comparison method, the JENA PLAN works with the following **surface plates** be equipped with:

Eyepiece Target 20: 200w	Eyepiece grid plate 1 x 1w	Object Target 1/0, 01 a 1/0, 01 d
---------------------------------	-----------------------------------	---

Horizontal division in Sehfeldmitte, Pitch length 20mm Scale interval 0.1 mm

Square grid with lines distance of 1 mm above the entire field of view

Pitch length 1 mm Scale spacing 0.001 mm, Pitch error ≤ 0.001 mm

Eyepiece-2x20 Target: 200w Eyepiece grid plate 25/2x2w Eyepiece grid plate 225/0, 5x0, 5w

2 graduations 20:200, which intersect,
Pitch length 20mm,
Scale interval 0.1 mm

25 test points
Test line length 25x2x2mm
Test area 25x2x2 mm²

25 coarse test points,
rough test line length 25x2x1, 5mm
and 225 test points overall,
Test line length 225x2x0, 5mm,
Test area 225x0, 5x0, 5mm²

Eye piece grid plate 400/0, 5 x 0.5 mm **Eye piece circular plate U3 - U5** **Eye piece circle disk 0 from 0.2 to 2.2 mm**

100 coarse test points,
rough test line length 100x2x1mm
and 400 test points overall,
Test line length 400x2x0, 5mm,
Test area 400x0, 5x0, 5 mm²

Concentric circle with
circumferences of 3, 6, 9 and 12 mm
and radial lines with angle-
intervals of 60 °

Sequence of circles whose diameter of
0.2 to 2.2 mm grow according to
the geometric sequence module $\sqrt{2}$;
for surface and diameter
classing

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Okularplatte with logarithmic scale

Structure comparison plate A according to ASTM E 112/PI. I **Structure comparison plate B according to ASTM E 112/PI. I**

A series of graduations which
Distances from 0.25 to 5.6 mm
grow according to a geometric
between sequence with the module $\sqrt{2}$;
statistical size classification

Grain structure

Grain structure

Inserting a Okularplatte

Stellbares eyepiece (2-25/1) from the binocular
tubus (2-25/3) and remove apart-
screws.

Cleaned Okularplatte (2-25/2) into the
Insert the version that the inscription is-
tenrichtig is readable.

Eyepiece screw together and back into the Tube plugging.

By turning the eye lens line figure focus, then the object focus. Line figure and object must be imaged simultaneously sharp.

Figure 2-25 Inserting a Okularplatte

If size relationships between pitches or intervals on the surface plates and object-be determined detailed dimensions, one uses a scale as an object of known Interval value (eg, object-Target 1/0, 01 a), and compares a given optical combination whose division with the division on the eyepiece measuring plate. For simple size determinations of the scale value in the microscopic image is determined by the line spacing of the eyepiece measuring plate (eg, 0.10 mm at 20: 200) by the value of "Lens enlargement "will be divided.

Example:

Lens: 20x PA / 0.40 ∞ / 0 HD

Eyepiece Target: 20: 200

Size of the object to be measured: 5 lines on the eyepiece Target

$$\text{Object size} = \frac{5 \times 0.10 \text{ mm}}{20} = \frac{0.5 \text{ mm}}{20} = 0.025 \text{ mm}$$

For detailed information on working with measuring, counting and comparison plates are following Be found instructions for use:

30-G0510-1 "reticles for measuring and counting for JENA MICROSCOPES 250-CF" and **30-G492/b-1** "Accessories for microscopic measuring and counting."

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2.2.4.2 Working with the monocular measuring tube P16x -10

The auxiliary unit **monocular measuring tube P16x -10** is for conventional length measurement in Okularzwischenbild suitable. In addition, a higher accuracy than when using the Surface plates can be achieved.

Cultivation

Remove from binocular microscope.

Monocular measuring tube P16x -10 (2-26/1) in Insert the quick-change (2-26/3) and with Fasten the clamping screw (2-26/4).

Drum division (2-26/2) during the measuring process in Concave mirror (2-26/5) read (enlarged Representation).

Figure 2-26 Attaching the measuring tube P16x-10

Extensive instructions for use:

30-G0525 "Measuring and counting under the microscope."

2.2.4.3 Working with the binocular measuring device

The auxiliary unit **binocular measuring device** is suitable for measuring and counting tasks that a require greater accuracy than with the use of ocular surface plates (section 2.2.4.1.)

It is a combination of:

binocular sliding tube (2-27/2) with Vice-Barem eyepiece (2-27/1) and Meßschraubenokular P10x (2-27/3) with justable eyepiece (2-27/4).

In addition are included
Okularplattenrevolver and
Okularplattensatz (0 20.5 mm).

NOTE: Okularplattenrevolver and measuring
Screw revolver are against
interchangeable.

Figure 2-27 Binocular measuring device

Cultivation

Remove from binocular microscope.
Binocular sliding tube (2-28/2) in the
Quick Change (2-28/3) and secure with the
Fasten the clamping screw (2-28/4).
Stellbares eyepiece (2-28/1) in the Tubusstutzen
use of the sliding tube and the image-
sharpness with the lens (not the
Focusing drive) correct.
Meßschraubenokular (2-28/5) with the over-
Attach union nut on the sliding tube.

NOTE When using this facility is not
Conjugation to the photo outputs
available.

**Figure 2-28 Preparation of the binocular
Measuring device**

Extensive instructions for use:

30-G0525 "Measuring and counting under the microscope."

2.2.4.4 Working with the electronic evaluation system RETARMET 2

The auxiliary unit electronic evaluation system RETARMET 2 permits, coupled with the binocular measuring device, the following tests:

Length measurement, ie the start of series of measurements to determine statistical statements on the linear dimensions of an object detail the calculation and display of the current Mean value and the mean square error and

Statements about a population of similar structures, ie at each structure, a single Measured value determined and the current mean and the standard deviation of the population is calculated.

The system for length measurement consists of:

central evaluation unit RETARMET 2
(2-29/1)

Messschraubenokular P10x with incremental
Donor IGR-M3/250 (2-29/2)

Foot switch (2-29/3) for remote control and

Adapter cable (2-29/4) for printer connection.

Figure 2-29 RETARMET 2 for length measurement

For detailed information on working with the electronic evaluation system RETARMET 2

The following instructions refer to:

30-G0066 "RETARMET 2".

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2.2.4.5 Working with the Gefügevergleichsokular P10x

The auxiliary unit **Gefügevergleichsokular P10x** is suitable for comparative microscopic investigations with the aid of standard series as well as for simple counting and comparison tasks.

The Gefügevergleichsokular comprises the components:

- Eyepiece (2-30/3) with eyepiece tubes
- Turret disk (2-30/2) with standard series set (2-30/1) 1-5 (lower panel) and a free passage,
- Tube 23.2 / 91 (2-30/4),
- Adjustment ring 3 mm (2-30/5)

Figure 2-30 Gefügevergleichsokular P 10x

Grain size Hexagonal grid Directional sequence ASTM E 19	Grain size Directional sequence ASTM E 112/Pl. I	Grain structure with twinning Directional sequence ASTM E 112/Pl. II	Square grid for a- multiple counting tasks	Stick figure with three compare routes
---	--	---	---	---

Cultivation

- Remove from binocular microscope.
- Tube 23.2 / 91 (2-31/4) in the quick-change
- Use (2-31/5) and with the clamping screw

Attach (2-31/6).

Adjustment ring (2-31/8) on the Gefügevergleichsokular (2-31/2) into position.

Gefügevergleichsokular on the tube 23.2 / 91 and secure it with the clamping screw (2-31/3) secure.

To take out the turret disk (2-31/7) and pulling the shaft (2-31/1).

Figure 2-31 Attaching the Gefügevergleichsokulars

For detailed information on working with the Gefügevergleichsokular are the following use-to remove manual:

30-G0660 "Gefügevergleichsokular P10x".

2.2.5 Photomicrography

With the automatic exposure control of the JENA PLAN in conjunction with the integrated Camera outputs it is possible to make photomicrographs in the following formats:

- For 24 x 36 mm,
- Large format 4 x 5 " / 9 x 12 cm,
- Polaroid 3 1/4 x 4 1/4 ".

(1) Preparatory device setting

Microscope turn, adjustment controller "Lam-Set penspannung" (2-32/3) to approximately 9 V (Display via LED chain (2-32/4)).

Switch "beam" (2-32/6) to position "(Internal beam path).

Switch "beam" (2-32/5) to position
" "

(Visual observation + photomicrograph).

Replace the object (2-32/2), lens (magnification Select control) and illumination method.

With Grob-/Feintrieb (2-32/7) on the set-level focus.

Format disk, if not already done, accordance with section 2.1.2 (3) in the adjustable Eyepiece (2-32/1) use.

With the adjustable eyepiece the double bar-to focus cross the format plate.

With the Grob-/Feintrieb (2-32/7), the sharpness the microscopic image focus.

With the adjusting ring (2-32/8) the focus in fixed eyepiece (2-32/9) to refocus.

Figure 2-32 Device setting micro-photography

NOTE: Since the image planes of the visual insight to where the camera outputs optically are conjugate, so that is the focus for photomicrographs achieved.

Using the Format figure on the format plate to be registered object section Set.

(2) automatic exposure

On application of the microscope is the exposure ing automatic operational; in the control panel BA lit: ISO 50/18 '.

Automatic exposure control with buttons "◀" or "▶" to the film speed of the Setting the film material used.

When the light flashes then the automatic exposure blocked.

Possible reasons:

- Beam path is not device-internal Outputs switched.
- Time range of automatic exposure is über-/unterschritten.

If the exposure time on the labor range of automatic exposure control:

- Increase lamp voltage and filter revolver switch to free passage.
- If the automatic exposure continues blocked, the closure of the JENA PLAN with key " " . Use "manual required exposure time be empirically . agree

If the exposure time of the shortest Shutter speed: attenuation filter for reduction tion of the light intensity in the beam path bring.

Use the "35 / 4x5" automatic exposure switch to small format or large format (a the two LEDs "35" or "4x5" must lit).

**Figure 2-33 Control panel
Automatic exposure BA**

(3) General information for photomicrography with the JENA PLAN

Compensation of the Schwarzschild effect

All film materials show a so-called Schwarzschild effect, ie at low Illuminance is to provide a specific density greater exposure time

negatively with respect to the exposure time, which are exposed using larger illumination exposures occur. Since different recording materials (especially color films) under- show schiedliches Schwarzschild behavior, the manufacturer must be observed.

Color films are in terms of color fidelity optimized for certain exposure times:

- Daylight films mainly on 1/50 s,
- Tungsten films mostly at 1/5 s,
- L-films (long) for exposure times up to 60 s

Occurring color shifts can be compensated by the use of Korrektionsfiltern.

Selection criteria are the desired representation of the object color and image contrast.

Increase the image contrast

In black / white photography, color filters are used to enhance image contrast. For the selection of the filter applies:

The contrast of object details in relation to the ground is raised, if the color of the filter is complementary to that of the object details.

The contrast of object details compared to the background is reduced, if the color of the filter matches the color of the object details.

When using panchromatic films (recording material for all colors is sensitive) are also reproduced all the color tonal values.

When using orthochromatic films (recording material, the orange or not sensitive to red is), it is convenient to work with the green filter V233/32. The identification of the Shots with the coding of the DATEX mf-AKS is not possible with this material.

Adjusting the light source to the color recording material

Color films have a high sensitivity to the used light source (color temperature-temperature). According to their heritage, they are used as artificial light or daylight film con-offered.

Spectral characteristics of the light sources JENA PLAN:

Lamp 12 V / 00 W 1 = artificial light source with a color temperature of 3200 K, increased Red. -

Light Xe = daylight source with color temperature of 5500 K, increased amount of blue.

For adjusting the color temperature of the light source used on the receiving material be **conversion filter** used (marking on the filter edge etched):

- C311/32, C312/32, C313/32 to reduce the Rot-/Gelbanteils.

- C314/32, C315/32, C316/32 to reduce the blue-Niolettanteils.

NOTE: When working with daylight film (color temperature 5500 K), in conjunction with the 12 V/100 W halogen lamp (color temperature 3200 K), the conversion filter C311/32 recommended. Note that the color temperature of this lamp the operating voltage dependent. During a series of recordings, therefore, the Lamp voltage is not changed.

Recommendation: Maximum for color shots lamp voltage.

2.2.5.1 Large Format Camera

The in JENA PLAN HD 9 x 12 H and 9 x 12 integrated large format camera is for all of the international back attachable cartridge types, such as

- LINHOF double cassette 9 x 12 cm,
- GRAPH MATIC-exchange cartridge and
- POLAROID film pack holder 405, 545, 550, furnished.
- Conversion to POLAROID cassette CB33 is possible.

Operation

Microscope according to section 2.2.5 for the micro-photo-prepare graphy.

Open the cover (2-34/7) on the camera approach and dust windscreen (2-34/6) possibly by a glass plate with Line figure replace (see section 2.2.6.1).

Using the focusing magnifier 6x (2-34/3) is a check of the image detail and the focus-setting possible. For monitoring purposes can the lens with clear part (2-34/2) by the Demonstration use with fresnel lens (2-34/4) be replaced (see section 2.2.6.1).

For photomicrography the film cassette (2-34/1) of Slide right into the camera approach.

Exposure of the film material as described in Section 2.2.5 (2) described.

NOTE: converting large format on small screen see Section 2.2.5.3.

Figure 2-34 overall form camera

2.2.5.2 miniature camera

The equipment in the JENA PLAN HD 24 x 36 built-in miniature camera allows the micro-photo-graphy in the format 24 x 36 mm.

Operation

Microscope according to section 2.2.5 for the micro-photo-prepare graphy.

mf-AKS-change cassette 35 mm (2-35/1) to the desired Kleinbildfilm load and the camera approach 24 x 36 insert (2-35/2).

Exposure of the film material as described in Section 2.2.5 (2) described.

NOTE retrofitting small picture to see large size
Section 2.2.5.3.

Figure 2-35 mm camera

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2.2.5.3 Conversion Large Format Small image

JENA PLAN Microscope with an integrated camera can without any particular effort by the operator are even converted to another photo format.

- The attachment of each camera on the microscope takes place as shown in Figure 2-36.
- The large format camera (2-36/2) is in this case with three screws (2-36/1), the small-imager (2-36/3) fastened with two diagonally positioned screws (2-36/4).

NOTE: When attaching the small picture approach is to be noted that the electrical connection is guaranteed.

2.2.5.4 Universal device output

The **universal device output** of the JENA PLAN is closed by the cover plate (2-37/2). The following additional units can be connected:

- Adaptation V 0.8 x (2-37/1) for commercially available video cameras,
- Adaptation T2 2:1 (2-37/3) for commercially available miniature cameras and
- Adaptation mf 2-1 (2-37/4) for the modules of photomicrographic Aufsetzkamera-system mf-AKS 2 (2-37/5), possibly in conjunction with the encoder mf-AKS DATEX.

*)

Figure 2-37 Additional units for universal device output

(1) Video-adjustment

Optional Equipment, **adjusting video** includes the components:

- Adaptation V 0.8x and
- Video approach with C-mount.

Thus, commercially available video cameras can be connected to the JENA PLAN.

Connection

Cover plate (2-38/2) from the universal device
Unscrew the outlet.

Both caps (2-38/1) and remove the
Adaptation V 0.8 x (2-38/3) with the union-
Fasten nut (2-38/4)

NOTE: When attaching note the groove!

Video approach (2-38/6) with the clamping screw
Attach (2-38/5).

Figure 2-38 Prepare the adjusting video

NOTE:

If a video camera different kind
Coupling elements require, can be
Video approaches according to the adjacent
Drawing (Figure 2-39) make.

Operation

Microscope according to section 2.2.5 for video
Prepare recordings.

Switch "beam" (2-32/6) in
Position " " (External beam).

Figure 2-39 Dimensional Drawing

For detailed information on working with video cameras are following instructions to refer to:

(2) T2 adaptation

The **T2-adaptation** includes the components:

- Adaptation T2 2:1 and
- T2-Mount (commercially available, camera-specific).

Thus, commercially available miniature cameras can be connected to the JENA PLAN.

Connection

Cover plate (2-40/3) from the universal
Remove the device output.

Remove both caps (2-40/2) and
adaptation T2 2:1 (2-40/5) with the over-
Attach union nut (2-40/4).

Commercial T2 mount (2-40/6) on the
miniature camera used (2-40/1) on-
screws and both the adaptation
T2 / 2:1 screw. Provide camera so that
the long format page is vertical (90 °-win-
cle to format disk).

Figure 2-40 Preparation of the T2 adaptation

Operation

Section 2.2.5 Prepare microscope as for photomicrography, but the switch
"Beam" (2-32/6) in position "" (external beam).

If the exposure time within the working range of the film camera, it may with
the automatic exposure control to work.

Other operations in accordance with the miniature camera used.

If the exposure time outside the working range of the connected
Miniature camera, so the optimal value must be determined by bracketing.

Always open shutter of the miniature camera manually; Select position "B" or "T" of the camera.
Working at position "B" with lockable trigger.

Bracketing make.

(3) mf-AKS 24 x 36 AUTOMATIC MOT 2

Optional Equipment **mf-AKS 24 x 36 CAR AUTOMATIC MOT 2** includes the

- Adaptation mf 2-1 and
- components of the mf-AKS 2, consisting of:
 - mf-AKS-closure part AUTOMATIC 2 (2-41/2)
 - mf-AKS-transport part of MOT 2 (2-41/9)
 - mf-AKS-change cassette 35 mm (2-41/8)
 - mf-AKS-shipping container (not shown).

The control of the automatic exposure via the control panel BA.

Connection**Figure 2-41 Attaching the mf-AKS**

Cover plate (2-41/4) and remove the universal device output.

Remove both caps (2-41/3) and the adaptation mf 2-1 (2-41/6) with the union-nut (2-41/5) fix.

NOTE: When attaching groove note!

Closure part (2-41/2) and transport part (2-41/9) put together, connecting cable (2-41/1) Connect and set entire assembly to the adaptation mf 2-1 and with the clamp-screw (2-41/7) fix.

Load cassette exchange (2-41/8) with the desired film material and the transport part-slide.

- Connection cable (2-42/1) of the closure part (2-42/2) on the back of the control panel BA (2-42/3), female "-" Connect.

NOTE: The green with one point marked recorded side of the connector must go show up.

Operation

Prepare microscope according to section 2.2.5.

Switch "beam" (2-32/6) to position "" (External beam) position.

Figure 2-42 Connecting the mf-AKS

For detailed information on working with the mf-AKS system are the following instructions refer to:

30-G0603 "Photomicrography device mf-AKS 24 x 36 AUTOMATIC- MOT 2".

(4) coding mf-AKS DATEX

The additional equipment Codlereinrichtung **mf-AKS DATEX** includes the components:

- Control unit mf-AKS DATEX and
- Codieransatz mf-AKS DATEX.

In conjunction with the components of the system mf-AKS 24 x 36 AUTOMATIC MOT 2 represents the Coding mf-AKS DATEX supplementing means for imprinting is a nine-digit freely programmable sequences of digits in the micro-photographic image.

Connection

Transport part (2-43/2) with interchangeable cartridge
Remove from the closure part.

Codierlichtschutz (2-43/8) from the Ver-
trailer pull.

Codieransatz (2-43/3) into the free
Opening slide; the cover of the coding
approach must be facing upwards.

Plug (2-43/1) of the Codieransatzes to
Socket "CD" of the control unit mf-AKS
DATEX (2-43/6) to connect.

Open exchange cartridge (2-43/4) and coding
blende (2-43/5) into the cell holder of the Kas-
sette insert; Insert the film cassette
close.

Transport unit with interchangeable cartridge assembly back on
Put closure part.

Jack "CO" in the rear wall of the control device via the MF AKS Datex diodes cable
(2-43/7) to the socket "CO" in the control panel BA.

Connect the power connector of the control unit mf-AKS DATEX.

For detailed information on working with the encoder mf-AKS DATEX are following
Instructions below:

30-G0603 "Photomicrography device mf-AKS 24 x 36 AUTOMATIC- MOT 2".

**Figure 2-43 Connecting the coding -
device mf-AKS DATEX**

2.2.6 Other additional equipment

Options enables a variable expansion of the JENA PLAN to optimize for special application areas.

2.2.6.1 Demonstration use

For observation, demonstration and discussion of microscopic findings, instead of **Lens with clear part** of a demonstration application with a Fresnel lens at the wide-format camera approach are recognized.

Cultivation

Both springs (2-44/1) at the same time an-
Press the frame with clear part (2-44/2)
Pull off to the right, and the Demon-
strationseinsatz (2-44/3) to install.

NOTE: Application predominantly in bright-field
lighting when the reflection
assets of the samples > 10 to 20%
is. Filter principle of the
Remove the beam path and Lamp
regulate voltage to 12V.

Figure 2-44 Attaching the Demonstration use

Use of glass plates with stick figures (2-44/4) for imprinting in the large format
Photomicrograph (see section 2.2.5.1):

2.2.6.2 slit diaphragm

Slit diaphragms are used for microscopic studies of samples with uneingebetteten small size of the contact surface as well as for the observation of edge regions. The contact surface has a diameter of 25 mm.

Operation

Diaphragm carrier 2 (2-45/3) in the cross table 50 x 30 mm insert.

One of the three slit diaphragm (2-45/2) in the Insert diaphragm carrier 2.

NOTE: For cross table 20 x 20 mm is the Diaphragm carrier 2 is not required.

Attention must when working with slit diaphragms the object-spring plate (2-45/1) **not** be used to a loading damage to the 0.1 mm thick Plates for object support to ver-prevent.

Figure 2-45 Working with slit diaphragms

2.2.6.3 Filter for epi-fluorescence excitation

By means of these filters, fluorescent components of the sample and with fluorchromierten Media saturated voids and defects such as cracks, pores and voids in metal, ceramic, Plastic and concrete can be made visible. If there is insufficient light intensity of the halogen-lamp 12 V / 100 W Xe lamp should the additional 150 W (see section 2.2.6.6) is used be.

The filter set includes:

- 2x excitation filter (short pass filter) KP490, Ø 32
- 1 x excitation filter, blue B228G, Ø 32
- 1 x blocking filter yellow G247 2E, Ø 32

Installing the filter

Filter turret (2-46/4) after loosening the screw (2-3/4) out of the illuminator.

Spring ring (2-46/1) from the filter turret corresponding distant and both excitation filter KP490 (2-46/2) with intermediate excitation filter B228G (2-46/3) replace in the filter turret.

NOTE The sides engraved with the type-designations of the excitation filter KP490 must lie against each other.

Blocking filter G247 (2-46/6) in the filter slide Ø 32 (2-46/5) and insert it into the Beam path slide.

Fully open the aperture diaphragm (2-18/2) and setting regulator "lamp voltage" on the control panel LO 12 V control.

Figure 2-46 Inserting the fluorescence filter

NOTE: Do not touch the filter surfaces as possible, dust with clean hair brush remove; clean if smeared filter with distilled water and cotton ball.

2.2.6.4 Cross table 20 x 20 mm

The auxiliary unit **Kreuztisch 20 x 20 mm** has following characteristics:

- coordinate movement 20 x 20 mm
Position indicator; 0.1-mm-scale,
- Rotation 360 °, centered,
- Nonienablesung and
- Adjustable 45 ° detent.

NOTE: The insertion and centering this additional unit is the same as in Section 2.1.2 (6) or 2.2.2.2 be-written.

Figure 2-47 Cross table 20x 20 mm

Operation

By screwing the Rändschraube (2-47/1) fix the table rotation to locked position, thus at the same time the 45 ° detent effective.

NOTE: Loosen the thumbscrew only in locked position!

2.2.6.5 means microhardness testing mhp 100/45 -10 aut

The auxiliary unit **mhp 100/45 -10 aut** allows the determination of the microhardness with VICKERS Load values from 0.049 to 0.981 N (5 to 100 p).

It includes the components:

- microhardness tester (2-48/4)
- mono clear Meßschraubentubus with encoder IGR-M (2-48/1)
- RETARMET 2-T (2-48/3) for automatic measured value,
- mass pieces (2-48/1) and
- Storage tank (2-48/2).

Aut Figure 2-48 Components of the mhp 100/45- 10

Cultivation

Monoculars Meßschraubentubus (2-49/4) instead of the binocular tube into the quick-use change (2-49/2) and with the Clamping screw (2-49/3) lock.

Meßschraubentubus according to the instructions (see below) to align the optical axis.

Microhardness tester (2-49/1) instead of a lens Screw.

Connection of the encoder IGR-M for RETARMET produce 2-T (2-49/5).

Aut Figure 2-49 Attaching the mhp 100/45- 10

For detailed information on working with the device mhp 100/45 -10 are on the following Ge-need instructions below:

30-G0677-1 "hardness tester mhp 100/45" and
30-G0066-1 "RETARMET 2".

2.2.6.6 illumination device 150 W Xe

The auxiliary unit

Lighting device 150 W Xe

is a light source with high intensity radiation and daylight color temperature.

The unit consists of:

- Lamp housing with Xenon High-pressure lamp 150 W / 7.5 A (2-50/2) and
- Ballast SX150 (2-50/1).

The illumination device 150 W Xe instead the lamp 12 V/100 W via the quick-change attached to the microscope. Adjustment of the light 150 W Xe analog section 2.2.2.1.

Figure 2-50 illumination device 150 W Xe

Detailed information can be found in the following instructions:
30-G0360a-1 "Lighting equipment Xe/25 and Xe/100".

2.2.6.7 Transmitted light CPR 6 V / 25 W

The auxiliary unit **transmitted light equipment CPR 6 V / 25 W** allows, with the JENA PLAN Through light and combined Durchlicht-/Auflichtbeleuchtung to work.

The unit consists of:

- lamp with carrier (2-51/3)
- ballast (2-51/1) of the light and
- filter (consisting of color and Attenuation filters) (2-51/4).

Cultivation

Transmitted light CPR 6 V/25 W with two screws (2-51/2) on the table support secure.

After lamping light on the pre-ballast (2-51/1) to connect.

Connect the ballast to the grid and Switch.

If necessary. Color or attenuation filter (2-51/4) in Insert the slider.

Figure 2-51 Preparation of the transmitted light CPR device 6 V / 25 W

3 Care, Maintenance, Service

3.1 Care

The care of the JENA PLAN limited to the jobs listed below:

- Appliance after each use with the dust cover to cover.
- Clean Exposed optical parts with the cleaning utensils if necessary.
- The 3-point support for the object table, and the supporting surface of the table insertion apertures Regularly clean and protect with a thin film of acid-free Vaseline.
- Immersion oil to HI-lenses with a lint-free cloth and pure gasoline (no alcohol!) remove.
- Moisture deposits or precipitation aggressive vapors carefully with a dry cloth wipe.
- Tougher stains (eg, fingerprints) of optical surfaces with commercially clean conventional optics or lens cleaning cloths; Towels if necessary with mineral spirits or Xylene weak moisturize.

3.2 Maintenance

3.2.1 Preventive Maintenance

Taking into account the environmental conditions listed in Section 1.2.2 above, the maintenance work sufficient.

When using the JENA PLAN in humid climatic zones, the following points should be noted:

Keep JENA PLAN in bright, dry and well ventilated rooms, humidity <65%; particularly prone modules and accessories, such as lenses and eyepieces, in dry restrict store.

For prolonged storage in closed containers fungal infection can be largely avoided be if absorbent and contaminated with fungicides substances are placed in the container.

ATTENTION opto-mechanical devices are under the following conditions by always

Mold infestation at risk:

relative humidity > 75% over 3 days at a temperature between +15 to +35 ° C,
Installation in dark rooms with no air movement and

in dust and fingerprints on optical surfaces.

3.2.2 Setting the Tubusbremse

The binocular includes a brake that ensures that the adjusted eye relief not changes by itself.

This brake can follow after-
be asked:

Eyepiece tubes (3-1/2) on the smallest eye-
provide distance, be two group
visible groups of three screws.

WARNING The big screws (3-1/1)
must not be obstructed.

By uniformly varying the small
Screw the smooth running of the brake ver-
make:

- Tighten: the transition difficult
- Solve: Transition easier.

Figure 3-1 Setting the Tubusbremse

3.2.3 Troubleshooting

Fault indication	Possible Cause	Measure
"" Indicator in Control panel BA lights red	Auto exposure is from at least one of the following Reasons disturbed:	
	Switch	Switch

	"Beam path universal is in position" Device output ()	"Beam path position in internal radiation-input () bring
	From the automatic exposure determined exposure time smaller than the shortest Shutter speed (<0.01 s)	Attenuation filter in the Turn beam path or Lower lamp voltage (Be careful with color photography!) Change in Color temperature of the lamp)
	Time period of the exposure automatic is exceeded	In the beam path located Remove filter or Position of the aperture stop change or Use shutter manually or Insert luminaire Xe
"" Indicator in BA control panel flashes	Film end (Only for connection of the system mf-AKS at Universal Device output)	Replace film and Press the ">" (Release of the film transport to an image width)
LED (2-11/5) does not light when Turning on the Device	Unit fuse blown or Defect in the power supply	Replacing the fuse Repair by manufacturer or authorized service Workshop
Light source not light despite Operational readiness	Lamp defective Defect in the power supply	Relamping Repair by manufacturer or authorized service Workshop

3.3 Service

All work on optical parts or moving elements inside the unit as well as Work on the JENA PLAN Electrical equipment may only customer service professionals or specially authorized personnel are carried out.

(Address as at July 2005)

In case you have contact

Carl Zeiss / Med Micro Service

Telephone: 01803 336 333
Fax: 0 7364-20 4939

eMail: med-mikro-service@zeiss.de

We will advise you of new acquisitions

Carl Zeiss / Microscopy
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King Avenue 9-21
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eMail: mikro.verkauf@zeiss.de

Or contact our regional representative responsible for you.

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Manufacturer's certification of radio interference

The Bulletin 163/1984

1957

Annex 2 to AmtsblVfg 1046/1984

Certificate of the Manufacturer / Importer

This is to certify that the / the / the

Jenaplan
(Device type, name)

in accordance with the provisions of

Administrative Order 1046/84

(Official Gazette Order)

radio interference suppression.

The German Post Office has been displayed, the supply of this equipment and the authority to review the series for compliance with the provisions granted.

Carl Zeiss Jena GmbH

(Name of Herstllers / importer)

List of abbreviations

a	Incident
A	Analyzer
AKS	Aufsetzkamerasystem
ASA	American Standards Association
ASTM	American Society of Testing Materials
aut	Automatic data processing
BA	Automatic exposure control
d	Transmitted light
DF	Dark field
DIK	Differential Interference Contrast
DIN	German Institute for Standardization
GF	Large field

H, HF	Bright field
HD	Hell-/Dunkelfeld
HI	Homogeneous Immersion
CPR	Halogen lamp light throw
IEC	International Electrotechnical Commission
IGR	Incremental Encoder
IP	Initial Point
ISO	International Organization for Standardization
KB	Small image
LED	Light Emitting Diode
LO	Lamp voltage nosepiece
mhp	Microhardness tester, testing
mf	Photomicrography
OZ	Local number
PA	Planachromat (chromatic aberration correction for two wavelengths)
Papo	Plan Apochromat (chromatic aberration correction for three wavelengths)
Pw	Widefield Planokulare (plug diameter 30 mm)
SK	Protection class
SV	Power supply
t	Exposure time
T	sluggish
VDE	Association of German Electrical Engineers
w	Widefield: Okularsteckdurchmesser 30 mm, 26.5 mm Okularplattendurchmesser
Xe	Xenon

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