SteREO Discovery
Stereo microscope
Instruction Manual

You have purchased a product of the House of Zeiss. Before using the instrument the first time, please read this Instruction Manual in order to maintain the high quality of the instrument and ensure reliable work with it for a long time.

Knowledge of this manual is required for the operation of the instrument. Would you therefore please make yourself familiar with the contents of this manual and pay special attention to hints concerning safe operation of the instrument.

The specifications are subject to change; the manual is not covered by an update service.

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Revision History

Revision	Date of Issue	Introduced Modifications
4	05/2022	Implementation of revision history Adaptation to Regulation (EU) 2017/746 (IVDR) Update of accessory portfolio Removal of the system diagram

CONTENTS

1 INTRODUCTION

1.1 General

The SteREO Discovery stereo microscopes have been designed, manufactured and tested in compliance with EN 61010-1 (IEC 61010-1) and IEC 61010-2-101 "Safety requirements for electrical equipment for measurement, control and laboratory use" as well as the EMC directives EN 61326-1 (IEC 61326-1) and EN 61326-2-6.

The instruments meet the requirements of the European Directive IVDR 2017/746 EU (European Regulation on in-vitro diagnostic medical devices).

They also meet the requirements of the EC RoHS Directive 2011/65/EU, including Directive 2015/863.

The microscopes carry the CE mark.

The devices must be disposed of in accordance with the WEEE Directive 2012/19/EU and in compliance with the national laws in force.

This Instruction Manual includes information and warnings that must be observed by the user.

The following warning and information symbols are used in this Instruction Manual:

Symbol	Explanation
	**CAUTION** *This symbol indicates a potential hazard to the user.*
	**CRUSHING HAZARD** *Fingers may be pinched!*
	**CAUTION** *Emission of UV radiation!*
	**CAUTION** *Disconnect the instrument from the power supply before opening!*
	**NOTE** *This symbol indicates an instruction which requires particular attention.*
	**ATTENTION** *This symbol indicates a potential hazard to the instrument or system.*
	CE marking (Conformité Européene)
	CSA label: product tested by CSA to meet U.S. and Canadian standards. CSA approval master number optionally given adjacent to this symbol
	Manufacturer
	Date of manufacture

Symbol	Explanation
IVD	In-vitro diagnostic medical device
SN	Serial number
REF	Catalogue number
	WEEE label: Do not discard as unsorted waste. Send to separate collection facilities for recovery and recycling

1.2 Notes on instrument safety

Any serious incident that has occurred in relation to the microscope and its components shall be reported to these institutions:

- the competent authority of the Member State in which the user is established
- the manufacturer Carl Zeiss Microscopy GmbH, Jena, Germany

The SteREO Discovery stereomicroscopes, including original accessories, must not be used for applications other than those described in this manual. The manufacturer cannot assume any liability for other applications, including those of individual modules or single components. This also applies to any service or repair work that is not carried out by authorized service personnel. In case of non-compliance, all warranty claims shall be forfeited.
The instrument and the equipment operated in combination with it may only be modified and repaired by service technicians employed with or authorized by Carl Zeiss. The manufacturer is not liable for damage caused by unauthorized persons tampering with the instrument; such tampering will also forfeit any rights to claim under warranty.

Set-up and operation of SteREO Discovery in conjunction with the SYCOP 3 control panel and respective EMS 3 controller are described in the separate operating manual "SYCOP 3 - System Control Panel for Zoom and Stereo Microscopes").

The instruments may only be operated by trained personnel who must be aware of the possible dangers involved with microscopy and the particular application concerned. The stereomicroscope is a high-precision instrument that can be impaired in its performance or even be destroyed when handled improperly.

The power plug must be inserted in an outlet with a grounding (earth) contact. The protective capacity must not be rendered ineffective by using an extension cable without a ground wire.

If it is determined that protective measures are no longer effective, the instrument must be switched off and secured against inadvertent operation. Please contact a Zeiss service agency or the Carl Zeiss Microscopy Service to have the instrument repaired.

Before switching on the instrument, check whether it is suitable for the available line voltage.

Always disconnect the instrument from the power outlet before opening it and changing the fuses.

Only use fuses appropriate for the rated current as specified in the Technical data. The use of makeshift fuses and short-circuiting of the fuse holders are not permitted.

On stands with motorized focusing drive, there is the risk of hand crushing when lowering the microscope body.

- Before switching on the device, verify that the joystick on the SYCOP 3 is in zero position and not displaced.
- Do not reach with your hands into its operating area or under the motorized focusing drive.
- You can stop automatic movement of the drive by pressing the STOP button on the focusing drive (Fig. 4/15) or moving the joystick on the SYCOP 3 up or down, turning the knurled wheel on the HIP or pressing the Memory1/2 keys.
- To prevent the objective from colliding with the stage unit or specimen, make sure to adjust the lower limit switch of the motorized focusing drive (refer to Section 3.10).

Gas-discharge lamps emit ultraviolet radiation, which can cause burns to the eyes and skin. Therefore, never look directly into the light of these lamps and avoid direct, unprotected incidence of their light on your skin. When using the microscope, always use the protective devices belonging to the instrument (e.g. special attenuation filters or the fluorescence shield). When they are hot, gas-discharge lamps are under high internal pressure. Therefore, change them only when they have cooled down, and make sure to wear protective gloves and a face guard.

Avoid touching the hot lamp housing. Always pull the power plug before changing the lamps and allow the instrument to cool down for some 15 minutes.

When working with UV excitation light, the object surface is exposed to ultraviolet radiation. Make sure to avoid direct skin exposure. Take appropriate precautions for manipulations in the object plane (e.g. use of gliding stage, gloves and UV protective ointment, etc.).

When using fluorescence excitation, there is the risk of being dazzled. Strictly avoid dazzling of your eyes, particularly by the invisible UV excitation light. Install the dazzle protector and observe the specimen surface only through the dazzle protector!
Close the shutter, when excitation is not needed.

The instruments are not equipped with any special devices for protection from corrosive, potentially infectious, toxic, and radioactive or other substances that may be hazardous to health. Make sure to observe all legal regulations when handling such substances, particularly the relevant national accident prevention regulations.

Do not operate the equipment delivered in potentially explosive atmospheres, the presence of volatile anesthetics or flammable solvents, such as alcohol, benzine or similar chemicals.

Do not switch on the instrument unless all cable connections have been established; switch it off before disconnecting any cables.

Always connect only ONE power supply unit to the system. If you use the EMS 3 module, no other power supply unit may be connected to the system.

If the SteREO Discovery is operated with external LED spot or ring illuminators, do not look directly into the LED light. Read and regard the separate user manuals of the illuminators.

VisLED annular lights S are LED Class 1 equipment.

To avoid glare during transmitted light applications, swivel in anti-glare shield.

If you use an external cold-light source (high energy) for the SteREO Discovery, never look directly into the light guide exit of the cold-light source to avoid the risk of being dazzled and going blind. Read and regard the separate user manual of the cold light source.

If an external light source with integrated reflector lamp is used, always replace the lamp in accordance with the manufacturer's instructions. Otherwise, there is a risk of burning or explosion of the lamps.

Never look into the light beam - neither with nor without optical instruments, and not to simply observe the specimen either. In case of non-observance your eyes may be damaged!

Take appropriate protective measures if the specimen releases noxious gases, dust, and vapors, secondary radiation or explosive substances as a result of the UV radiation!

Dust and dirt may impair the instrument’s performance. The instrument must therefore be protected as far as possible from such influences and covered with the dust cover when not in use. Always check whether the instrument is switched off before you cover it. Avoid great variations in temperature, direct exposure to sunlight and vibrations.

Clogged or covered ventilation slats may lead to heat build-up that will damage the instrument and, in extreme cases, cause a fire. Always keep the ventilation slats clear and ensure that no objects enter the instrument through the ventilation slats. Set up all electrical units and components at least 15 cm away of flammable objects and walls.

For transporting the device over longer distances, it must be disassembled and packed in its original packaging. For short-distance transport, observe Section 3.11.

Defective microscopes must not be disposed of with household waste, but should be disposed of in compliance with the relevant legal requirements (see Section 5.5).
Specimens must also be disposed of properly in compliance with the valid legal requirements and in-house working instructions.

1.3 Warning and information labels on the device

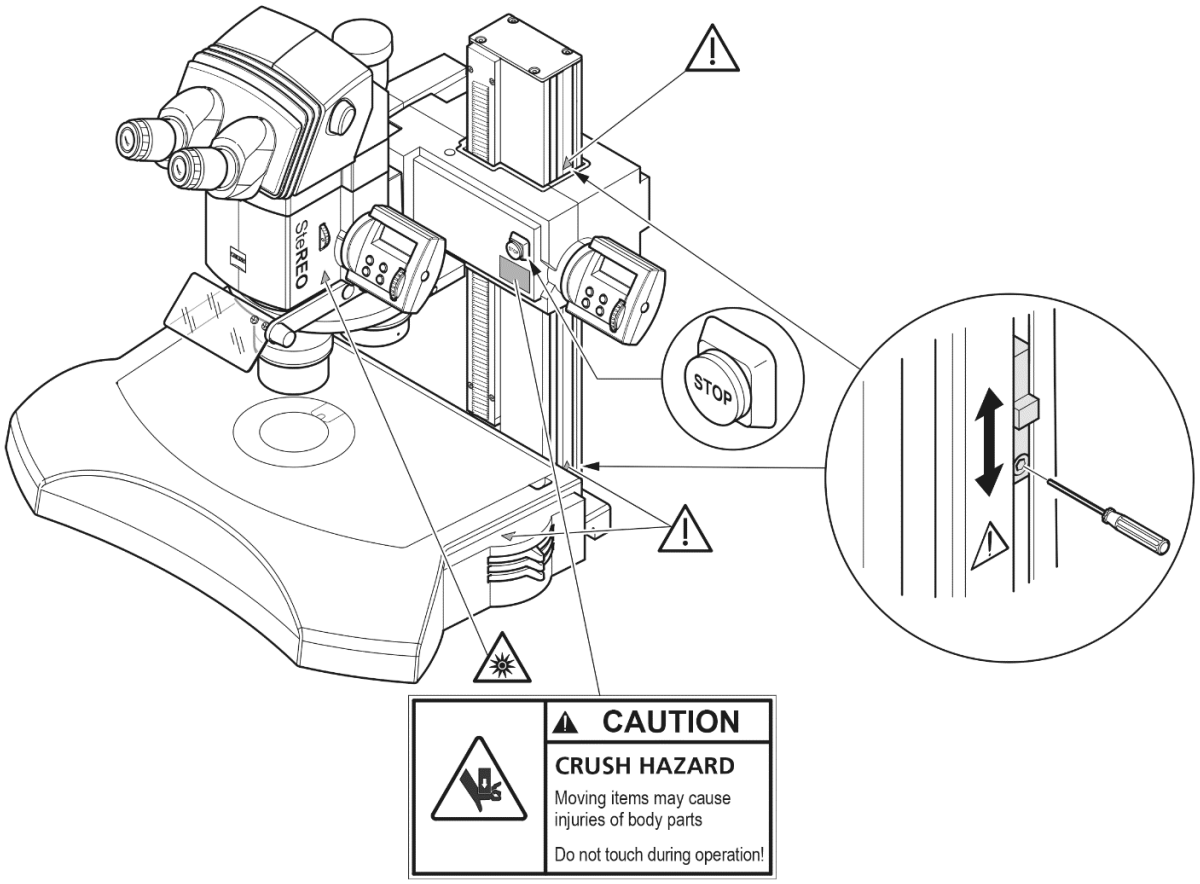


Fig. 1 Warning and information labels on the instrument

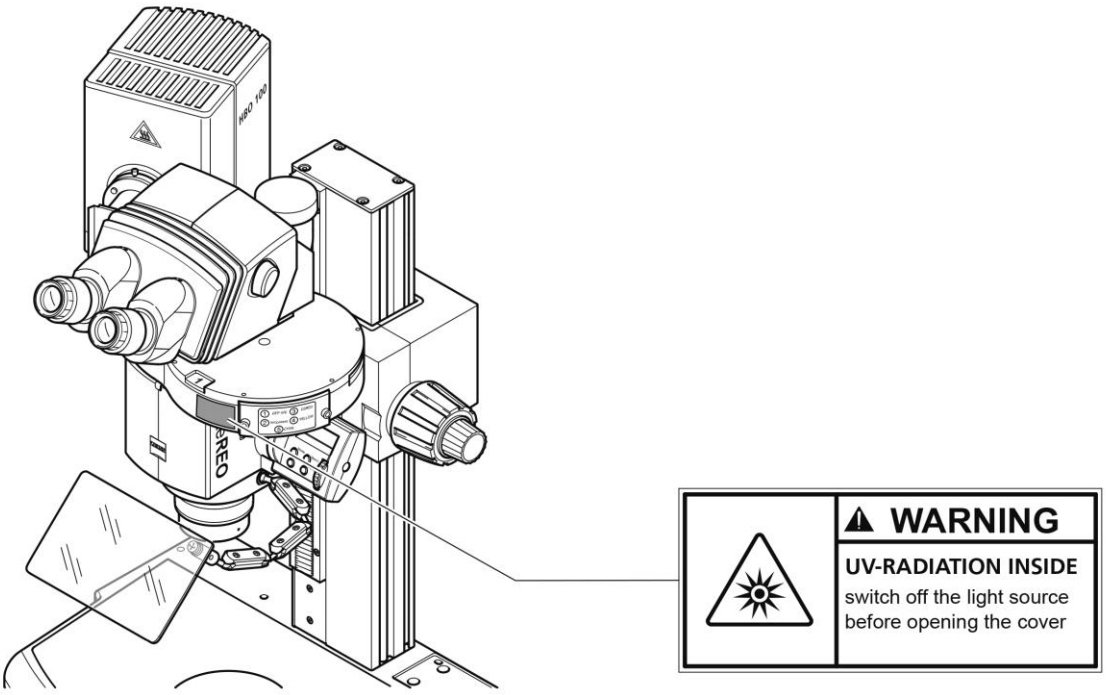
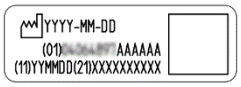
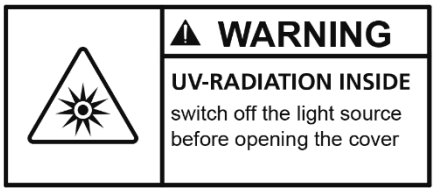


Fig. 2 Warning label on PentaFluar S vertical illuminator

1.4 Meaning of warning and information labels

Symbol	Description
	Type label SteREO Discovery Position: rear side of the microscope body
	UDI label Position: rear side of the microscope body
	IVD label Position: rear side of the microscope body
	WARNING UV RADIATION INSIDE switch off the light source before opening the cover
	CAUTION CRUSH HAZARD Moving items may cause injuries of body parts Do not touch during operation!
	Possible danger! Observe notes in the instruction manual and the supplied documents.
	LED radiation! Do not stare at operating lamp.

1.5 Additional applicable operating manuals

In addition to the present Instruction Manual, the following operating manuals for optional devices should also be consulted depending on the equipment of the system:

- ZEN Software Description (blue edition) (online version)
- SYCOP 3 System Control Panel
- Intermediate LED tube S,
- Drawing Tube S
- Co-Observation Equipment S
- Coaxial Incident Light Illuminator S
- Vertical Illuminator S
- Mechanical / Measuring stage S mot
- External illuminators (e.g. for fiberoptic cold light sources, LED spot or ring illuminators)
- Fluorescence illuminators (e.g. HXP200, HXP120 or X-Cite Xylis illuminator)
- Alternative stands (Stand U, Stand B, Stand SDA, Floor Stand S, Stand M LED)
- SVB 1 signal distribution box
- Computer system
- Monitor

1.6 Notes on warranty

The manufacturer guarantees that the instrument is free of material or manufacturing defects when delivered. Possible defects must be notified to us immediately and steps be taken to minimize damage. If notified of such a defect, the manufacturer is obligated to rectify it at his discretion, either by repairing the instrument or delivering an intact replacement. No guarantee is provided for defects caused by natural wear (wearing parts in particular) and improper use.

The instrument manufacturer shall not be liable for damage caused by faulty operation, negligence or any other tampering with the instrument, particularly the removal or replacement of instrument components, or the use of accessories from other manufacturers. Any such action shall lead to a forfeit of all warranty claims.

With the exception of the work specified in this manual, no maintenance or repair of the instrument may be undertaken. Repairs may only be carried out by Carl Zeiss service staff or persons expressly authorized by Carl Zeiss. In case of any malfunction of the device, contact the responsible Carl Zeiss service agency.

2 DESCRIPTION

2.1 Designation, intended purpose, and typical applications

Manufacturer's designation

- SteREO Discovery.V8 stereo microscope
- SteREO Discovery.V12 stereo microscope
- SteREO Discovery.V20 stereo microscope

Intended purpose

The stereo microscopes SteREO Discovery.V8/12/20 are instruments for the general magnifying, spatial observation of small objects. This includes the in vitro-examination of various biological samples including samples collected from humans or animals. The imaging provides information to further assess physiological and pathological conditions. The microscopes are intended to be used by trained professionals only.

General description

The SteREO Discovery stereo microscopes are designed for stereoscopic visual observation of small objects with simultaneous magnification.

They are universally applicable CMO type stereo microscopes in which both optical beam paths share a Common Main Objective, combining excellent optical image quality with a highly modular design.

The pancreatic magnification changer ensures high-contrast, sharp images over the whole field of view and throughout the entire zoom range. After the basic setting of the stereo microscope, the image remains precisely in focus.

SteREO Discovery stereo microscopes do not require a sample preparation and are therefore suitable for observing and handling spatial specimens in their natural state.

In addition to visual stereoscopic observation, they offer a wide range of image documentation capabilities.

Typical applications

- Observation, screening, sorting, preparation, microsampling (dissection, stimulation, manipulation) and image documentation of biological objects of any type and nature.
- Observation, inspection, examination, assembly, repair and image documentation of micro-mechanical, micro-optical or micro-electrical industrial devices and components.

General areas of application are:

– Biological and biomedical research facilities and routine laboratories

– Material science research institutions,

– Industrial research, development, production and quality assurance

Examples of fields of use:

Biology and medicine	– Developmental biology – Microbiology – Anatomy
Materials engineering and sciences	– Materials testing – Semiconductor industry – Glass-fiber engineering
Miscellaneous	– Forensic institutes or examination facilities – Restoration – Education

The SteREO Discovery stereomicroscopes, including original accessories, must not be used for applications other than those described in this manual. The manufacturer cannot assume any liability for other applications, including those of individual modules or single components. This also applies to any service or repair work that is not carried out by authorized service personnel. In case of non-compliance, all warranty claims shall be forfeited.

Set-up and operation of SteREO Discovery in conjunction with the SYCOP 3 control panel and respective EMS 3 controller are described in the separate operating manual "SYCOP 3 - System Control Panel for Zoom and Stereo Microscopes").

The instruments may only be operated by trained personnel who must be aware of the possible dangers involved with microscopy and the particular application concerned.

The stereomicroscope is a high-precision instrument that can be impaired in its performance or even be destroyed when handled improperly. It may only be used in compliance with the specified ambient conditions in closed, dust-free rooms, which are free of oily and other chemical vapors (see Section 2.5).

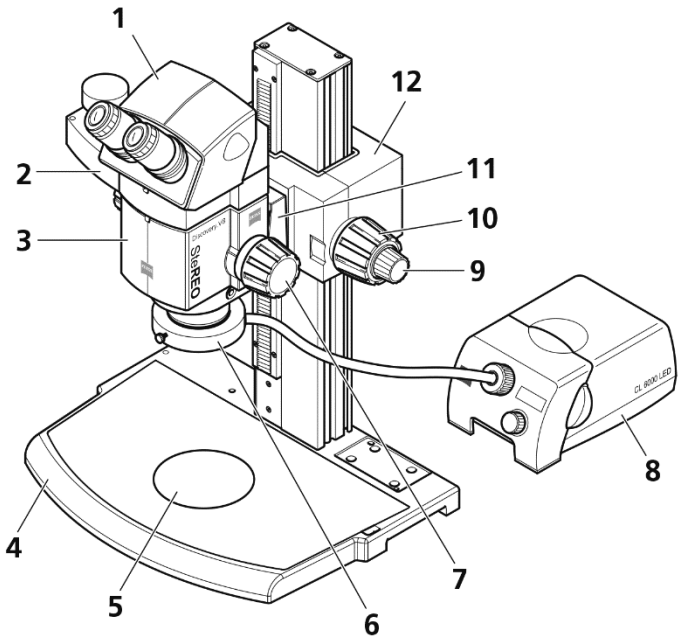
2.2 Lifetime

A microscope is an opto-electronic device. Its availability for use is significantly determined by the performed maintenance. ZEISS guarantees the ability for maintenance and repair within eight years after initial operation. This is ensured by a corresponding service and spare parts concept, thus enabling the intended purpose within this duration.

2.3 Description of the instrument

☞ The microscope configurations shown here may differ from that of your microscope!

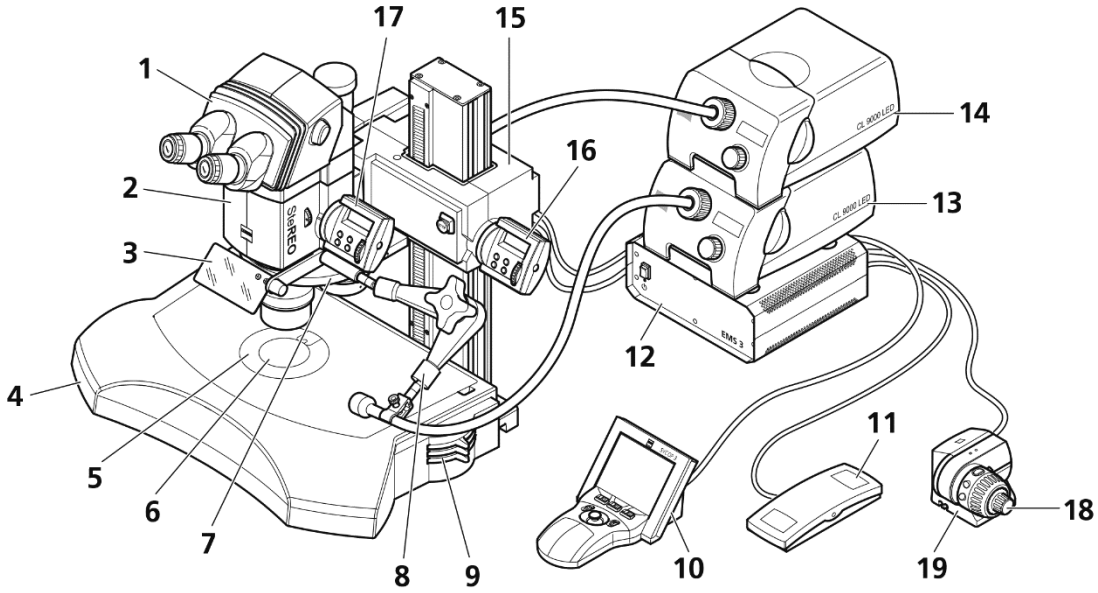
2.3.1 Stereomicroscope SteREO Discovery.V8



1 Binocular tube S 35° for the accommodation of eyepieces
2 Intermediate phototube S, left 100/100
3 SteREO Discovery.V8 microscope body
4 Stand plate 450, Profile S, with insert plate
5 Scratch-proof B/W plate, d=120 mm, for holding specimens
6 Slit-ring illuminator ECO
7 Control knob for magnification change (zoom)
8 Cold-light source Zeiss CL 6000 LED
9 Fine-focusing control
10 Coarse-focusing control
11 Mount S with d=76 mm support for microscope body and objective
12 Coarse/fine drive with Profile S column

Fig. 3 Main control and functional elements on SteREO Discovery.V8

2.3.2 Stereomicroscope SteREO Discovery.V12/V20



1 Binocular tube for holding eyepieces and a camera via adapter
2 SteREO Discovery.V12/V20 microscope body
3 Dazzle protector, swivel-type; provides dazzle-free microscopy in transmitted light
4 Transmitted-light equipment in combination with cold-light source
5 Support (120 mm diameter) for holding specimens or mounting stages via 84 mm/120 mm stage adapter
6 Support for opal glass plate of transmitted-light equipment (84 mm diameter)
7 Objective nosepiece, coded, for holding up to three objectives and the microscope body; allows stereo or vertical position of the objectives and the connection of coupled-motion slit-ring illuminators without light guide; Alternatively (without picture): mount S (diameter: 76 mm) to hold the microscope body equipped with one objective
8 Oblique incident-light system with flexible light guide and focusing attachment (alternatively, various light guides for reflected light are available)
9 Light intensity control for transmitted-light microscopy
10 System Control Panel SYCOP 3
11 Foot pedal for focus or zoom control
12 Electronics module EMS 3; provides connection of various functional units
13 Cold-light source for reflected light, e.g CL 9000 LED; controllable through EMS 3/SYCOP 3; for installation and operation please see the separate manual
14 Cold-light source for transmitted light, e.g CL 9000 LED, to provide the transmitted-light equipment S (Fig. 4/**4**) with light; controllable through EMS 3/SYCOP 3; for installation and operation please see the separate manual
15 Motorized focusing drive on column with STOP button for quick switch-off of the focusing drive

Control units alternatively or additionally to EMS 3/SYCOP 3:

16 Focus control unit HIP (Human Interface Panel); plug-in power unit for operation without EMS 3/SYCOP 3 included in scope of supply
17 Zoom control unit HIP (Human Interface Panel); plug-in power unit for operation without EMS 3/SYCOP 3 included in scope of supply
18 Manual Rotary Control MaRC, for sensitive operation of the motor focus by using the wheel and for operating motor focus and motor zoom by using press buttons; can be mounted instead of the HIP device to the microscope body, motor focus or table-top base for MaRC
19 Table-top base for MaRC

Fig. 4 Control and functional elements on SteREO Discovery.V12/V20

2.4 Mechanical interfaces on SteREO Discovery

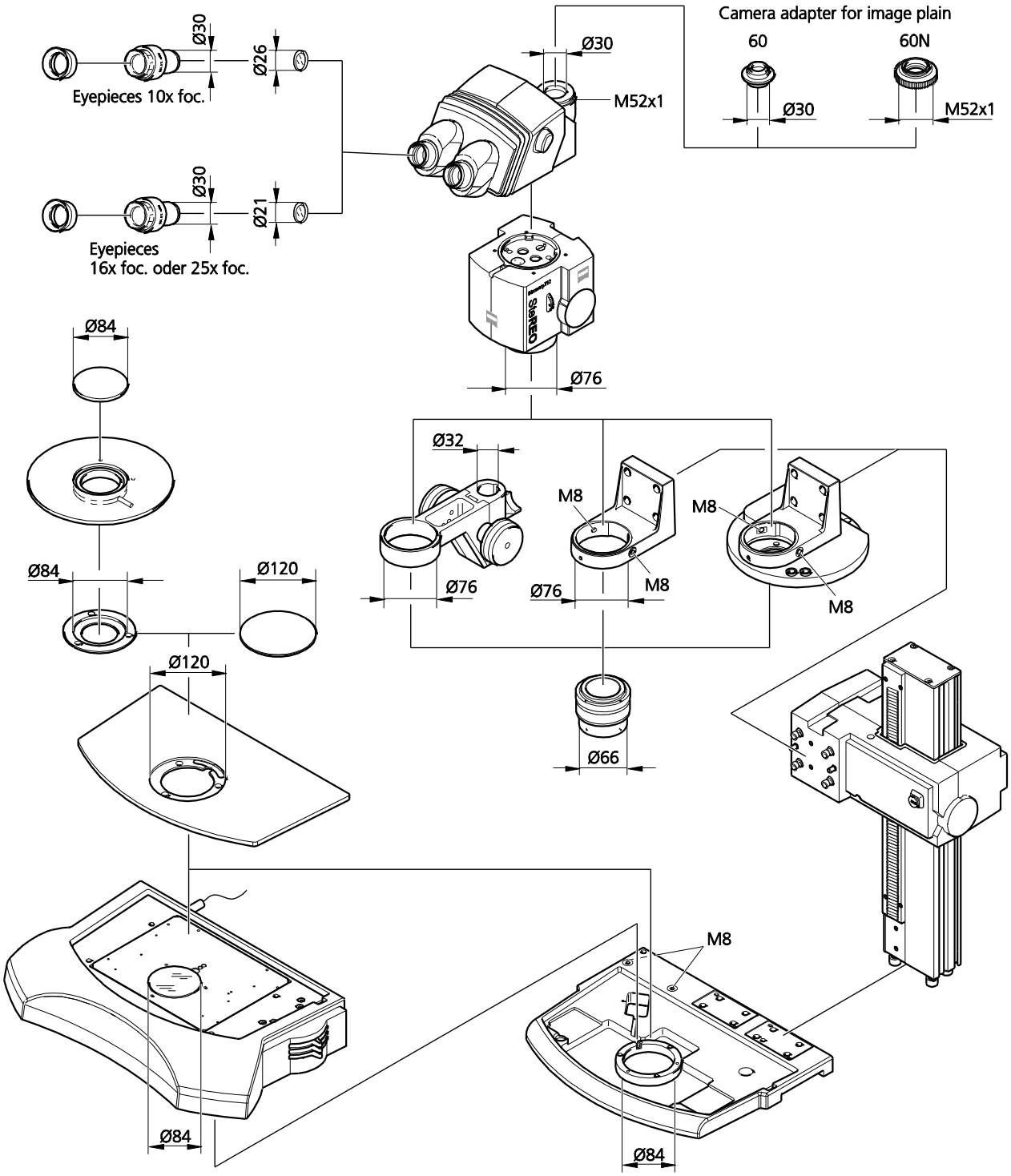
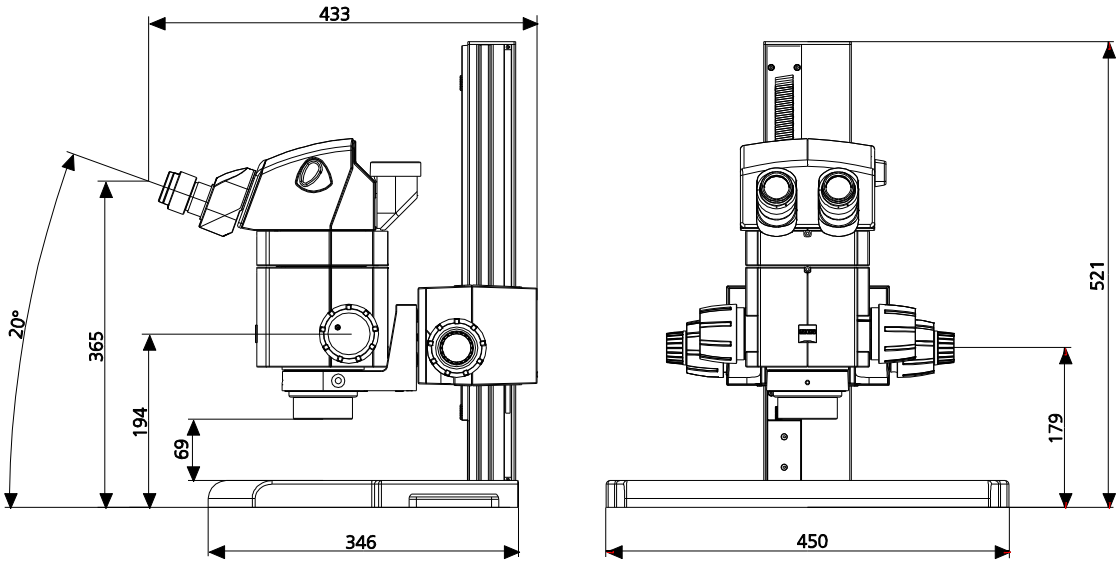


Fig. 5 Mechanical interfaces on SteREO Discovery

2.5 Technical data

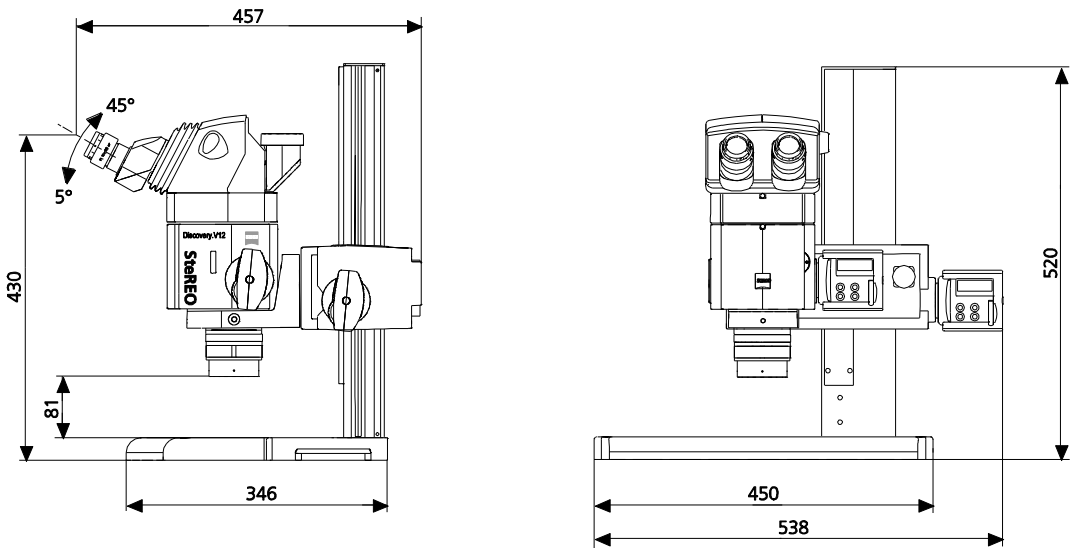
Dimensions of SteREO Discovery.V8



Weight of SteREO Discovery.V8

Microscope body.....1.4 kg
Binocular tube S 35°.....1.1 kg
Coarse/fine drive with Profile S column.....9.3 kg
Stand plate, Profile S .....9.1 kg
Total weight.....≥ 25 kg

Dimensions of SteREO Discovery.V12/V20



Weight of SteREO Discovery.V12/V20

Microscope body V12 ..... 2.0 kg
Microscope body V20 ..... 2.0 kg
Binocular ergo phototube ..... 2.0 kg
Motorized focusing system with Profile "S" column ..... 9.5 kg
Stand base, Profile S ..... 9.1 kg
Total weight ..... ≥ 30 kg

Optical risk group classification acc. to DIN EN 62471:2009

SteREO Discovery stereo microscope system with:

HXP ..... Risk group 1 (low risk)
CL 9000 LED ..... LED risk group 1 (low risk)
Transillumination base 300 ..... LED risk group 1 (low risk)
VisiLED ringlights ..... LED risk group 1 (low risk)

Ambient conditions for SteREO Discovery

Storage (in packaging)

Permissible ambient temperature ..... +10 to +40 °C
Permissible relative humidity ..... max. 75 % at +35 °C (no condensation)

Transport (in packaging)

Permissible ambient temperature ..... -40 to +70 °C

Operation

Permissible ambient temperature ..... +10 to +40 °C
Permissible relative humidity ..... max. 75 %
Atmospheric pressure ..... 800 hPa to 1060 hPa
Pollution degree 2

Operating data

1) EMS 3 Electronic Module

☞ See separate user Manual "SYCOP 3 System Control Panel"

2) Plug-in power unit as part of HIP

Electrical protection class II
Protection type ..... IP 40
Line voltage (wide input) ..... 100 to 240 V ±10 %
Line frequency ..... 50 to 60 Hz
Power consumption ..... 700 mA
Output voltage ..... 24 V DC; stabilized; 1.25 A; 30 W

Focusing drive

Travel ..... 340 mm

Maximum specimen height (including stage equipment and parfocalized objective) when using

- Objective nosepiece ..... 200 mm
- Support with 76 mm mount, bottom ..... 205 mm
- Support with 76 mm mount, top ..... 300 mm
- Reduction of maximum specimen height by transmitted-light equipment ..... 55 mm

Travel per revolution of manual focusing drive

- Coarse focusing drive ..... 27.9 mm
- Fine focusing drive ..... 2.2 mm

Step size of motorized focusing drive ..... 0.35 µm

Optical data of SteREO Discovery.V8

Objective...			... with eyepiece PL 10x/23 Br. foc		... with eyepiece PL 16x/16 Br. foc		... with eyepiece W 25x/10 foc	
	Factor	**FWD [1] in mm**	Magnification	Object field in mm	Magnification	Object field in mm	Magnification	Object field in mm
PlanApo S*	**0.63x**	**81**	6.3x … 50.4x	36.5 … 4.6	10.1x … 80.6x	25.4 … 3.2	15.8x … 126x	15.9 … 2.0
PlanApo S*	**1.0x**	**60**	10x … 80x	23.0 … 2.9	16x … 128x	16.0 … 2.0	25x … 200x	10.0 … 1.3
PlanApo S*	**1.5x**	**30**	15x … 120x	15.3 … 1.9	24x … 192x	10.7 … 1.3	37.5x … 300x	6.7 … 0.8
PlanApo S	**2.3x**	**10**	23x … 184x	10.0 … 1.3	37x … 294x	7.0 … 0.9	57.5x … 460x	4.3 … 0.6
PlanApo S ** * **	**3.5x mono**	**16**	35x … 280x	6.6 … 0.8	56x … 448x	4.1 … 0.51	87.5x … 700x	2.6 … 0.33
Plan S*	**1.0x**	**81**	10x … 80x	23.0 … 2.9	16x … 128x	16.0 … 2.0	25x … 200x	10.0 … 1.3
Achromat S	**0.3x**	**236**	3x … 24x	76.7 … 9.6	4.8x … 38.4x	53.3 … 6.7	7.5x … 60x	33.3 … 4.2
Achromat S	**0.5x**	**134**	5x … 40x	46.0 … 5.8	8x … 64x	32.0 … 4.0	12.5x … 100x	20.0 … 2.5
Achromat S*	**0.63x**	**107**	6.3x … 50.4x	36.5 … 4.6	10.1x … 80.6x	25.4 … 3.2	15.8x … 126x	15.9 … 2.0
Achromat S**	**1.0x**	**63**	10x … 80x	23.0 … 2.9	16x … 128x	16.0 … 2.0	25x … 200x	10.0 … 1.3
Achromat S**	**1.25x**	**50**	12.5x … 100x	18.4 … 2.3	20x … 160x	12.8 … 1.6	31.3x … 250x	8.0 … 1.0
Achromat S**	**1.5x**	**28**	15x … 120x	15.3 … 1.9	24x … 192x	10.7 … 1.3	37.5x … 300x	6.7 … 0.8

[1] FWD - Free Working Distance

* for objective nosepiece S/doc, 3x, 6x cod. parfocalized objectives with parfocal distance 137 mm

** for objective nosepiece S/doc, 3x, 6x cod. parfocalized objectives with parfocal distance 93 mm

*** The PlanApo S 3.5x mono objective can be used exclusively in the objective slider S/doc or in the objective nosepiece S/doc, 3x, 6x cod. for one-channel imaging. Stereoscopic observation is not possible.

Optical data of SteREO Discovery.V12 (resolving power and depth of focus, see HIP or SYCOP display)

Objective…			… with eyepiece PL 10x/23 Br. foc		… with eyepiece PL 16x/16 Br. foc		… with eyepiece W 25x/10 foc	
	Factor	FWD [1] in mm	Magnification	Object field in mm	Magnification	Object field in mm	Magnification	Object field in mm
PlanApo S*	**0.63x**	**81**	5.0x … 63x	46 … 3.7	8.1x … 101x	32 … 2.5	12.6x … 158x	20 … 1.6
PlanApo S*	**1.0x**	**60**	8.0x … 100x	29 … 2.3	12.8x … 160x	20 … 1.6	20x … 250x	12.5 … 1.0
PlanApo S*	**1.5x**	**30**	12.0x … 150x	19 … 1.5	19.2x … 240x	13.3 … 1.1	30x … 375x	8.3 … 0.7
PlanApo S	**2.3x**	**10**	18.4x … 230x	12 … 1.0	29.4x … 368x	8.7 … 0.7	46x … 575x	5.4 … 0.4
PlanApo S ** ***	**3.5x mono**	**16**	35x … 280x	6.6 … 0.8	56x … 448x	4.1 … 0.51	87.5x … 700x	2.6 … 0.33
Plan S*	**1.0x**	**81**	8.0x … 100x	29 … 2.3	12.8x … 160x	20 … 1.6	20x … 250x	12.5 … 1.0
Achromat S	**0.3x**	**236**	2.4x … 30x	96 … 7.7	3.8x … 48x	66.7 … 5.3	6.0x … 75x	41.7 … 3.3
Achromat S	**0.5x**	**134**	4.0x … 50x	58 … 4.6	6.4x … 80x	40.0 … 3.2	10x … 125x	25.0 … 2.0
Achromat S*	**0.63x**	**107**	5.0x … 63x	46 … 3.7	8.1x … 101x	32 … 2.5	12.6x … 158x	20 … 1.6
Achromat S**	**1.0x**	**63**	8.0x … 100x	29 … 2.3	12.8x … 160x	20 … 1.6	20x … 250x	12.5 … 1.0
Achromat S**	**1.25x**	**50**	10x … 120x	124 … 1.8	16x … 200x	16 … 1.3	25x … 313x	10 … 0.8
Achromat S**	**1.5x**	**28**	12.0x … 150x	19 … 1.5	19.2x … 240x	13.3 … 1.1	30x … 375x	8.3 … 0.7

[1] FWD – Free Working Distance

* for objective nosepiece S/doc, 3x, 6x cod. parfocalized objectives with parfocal distance 137 mm

** for objective nosepiece S/doc, 3x, 6x cod. parfocalized objectives with parfocal distance 93 mm

*** The PlanApo S 3.5x mono objective can be used exclusively in the objective slider S/doc or in the objective nosepiece S/doc, 3x, 6x cod. for one-channel imaging. Stereoscopic observation is not possible.

Optical data of SteREO Discovery.V20 (resolving power and depth of focus, see HIP or SYCOP display)

Objective…			… with eyepiece PL 10x/23 Br. foc		… with eyepiece PL 16x/16 Br. foc		… with eyepiece W 25x/10 foc****	
	Factor	FWD[1] in mm	Magnification	Object field in mm	Magnification	Object field in mm	Magnification	Object field in mm
PlanApo S*	**0.63x**	**81**	4.7x … 94.5x	48.7 … 2.4	7.6x … 151x	33.9 … 1.7	11.8x … 236x	21.1 … 1.1
PlanApo S*	**1.0x**	**60**	7.5x … 150x	30.7 … 1.5	12x … 240x	21.3 … 1.1	18.8x … 375x	13.3 … 0.7
PlanApo S*	**1.5x**	**30**	11.3x … 225x	20.4 … 1.0	18x … 360x	14.2 … 0.7	28.1x … 563x	8.9 … 0.4
PlanApo S	**2.3x**	**10**	17.3x … 345x	13.3 … 0.7	27.6x … 552x	9.3 … 0.5	43.1x … 863x	5.8 … 0.3
PlanApo S ** ***	**3.5x mono**	**16**	26.3x … 525x	8.8 … 0.4	42x … 840x	5.5 … 0.27	65.6x … 1312.5x	3.5 … 0.18
Plan S*	**1.0x**	**81**	7.5x … 150x	30.7 … 1.5	12x … 240x	21.3 … 1.1	18.8x … 375x	13.3 … 0.7
Achromat S	**0.3x**	**236**	2.3x … 45x	102 … 5.1	3.6x … 72x	71.1 … 3.6	5.6x … 113x	44.4 … 2.2
Achromat S	**0.5x**	**134**	3.8x … 75x	61.3 … 3.1	6x … 120x	42.7 … 2.1	9.4x … 188x	26.7 … 1.3
Achromat S*	**0.63x**	**107**	4.7x … 94.5x	48.7 … 2.4	7.6x … 151x	33.9 … 1.7	11.8x … 236x	21.1 … 1.1
Achromat S**	**1.0x**	**63**	7.5x … 150x	30.7 … 1.5	12x … 240x	21.3 … 1.1	18.8x … 375x	13.3 … 0.7
Achromat S**	**1.25x**	**50**	9.4x … 188x	24.6 … 1.2	15x … 192x	17.0 … 0.9	23.5x … 469x	10.6 … 0.6
Achromat S**	**1.5x**	**28**	11.3x … 225x	20.4 … 1.0	18x … 360x	14.2 … 0.7	28.1x … 563x	8.9 … 0.4

[1] FWD - Free Working Distance

* for objective nosepiece S/doc, 3x, 6x cod. parfocalized objectives with parfocal distance 137 mm

** for objective nosepiece S/doc, 3x, 6x cod. parfocalized objectives with parfocal distance 93 mm

*** The PlanApo S 3.5x mono objective can be used exclusively in the objective slider S/doc or in the objective nosepiece S/doc, 3x, 6x cod. for one-channel imaging. Stereoscopic observation is not possible.

**** When the eyepiece W25/10x foc is used, one goes clearly beyond the useful magnification range. A reduced image contrast due to an empty magnification may result.

3 START UP

3.1 Installation

Because of the complexity of the equipment, and to ensure perfect functioning, Carl Zeiss service will install and start up the instrument the first time.

The services in particular include the following:

- Installation and adjustment of all components
- Establishing cable connections and connecting the supply cables
- Firmware installation (factory-set) and configuration
- Introduction into instrument operation

☞ Before installation and start up, make sure to read the **Notes on instrument safety** carefully (refer to Section 1.2).

The column is supplied with the focusing drive installed. Do not lift up or carry the column at the focusing drive!

Always connect only ONE power supply unit to the system. If you use the EMS 3 module, no other power supply unit may be connected to the system.

Do not transport the installed, upright standing system over long distances. Avoid heavy shocks to the focusing drive as this might damage the rack of the column. For this, see Section 3.11.

☞ After having installed and connected the instrument, you should adjust the mechanical end stops for the travel of the motorized focusing drive (see Section 3.10).

☞ Provide for sufficient space for setting up the add-on units (the necessary bench area is approx. W x D: 800 × 800 mm).

The SteREO Discovery, including necessary tools and optional accessories, is supplied packed to commercial standards in several packages.

- Remove all units from the packaging and verify that all parts specified on the delivery note are present.
- Remove any transport locks (adhesive tapes or similar items).
- Keep the original packaging for any extended periods of non-use or return to the manufacturer, or dispose of it in compliance with the relevant regulations.
- Some components are supplied in special packaging, e.g. the Plan Apo S objective. You are strongly advised to use the special packaging for storing these components in extended periods of non-use or for their transport.

3.1.1 Installing stand components

☞ The microscope configuration shown here may differ from that of your microscope!

! To avoid any damage to the motorized focusing drive (Fig. 6/**A**), put it down only on the **back** of the column (Fig. 6/**a**) using sufficiently high supporting blocks (Fig. 6/**c**) (do **not** put it onto the rack side). The focusing unit (Fig. 6/**b**) of the focusing drive must not be used as support.
Do not lift or carry the focusing drive by holding it at the focusing unit (Fig. 6/**b**)! Avoid heavy shocks to the focusing drive.

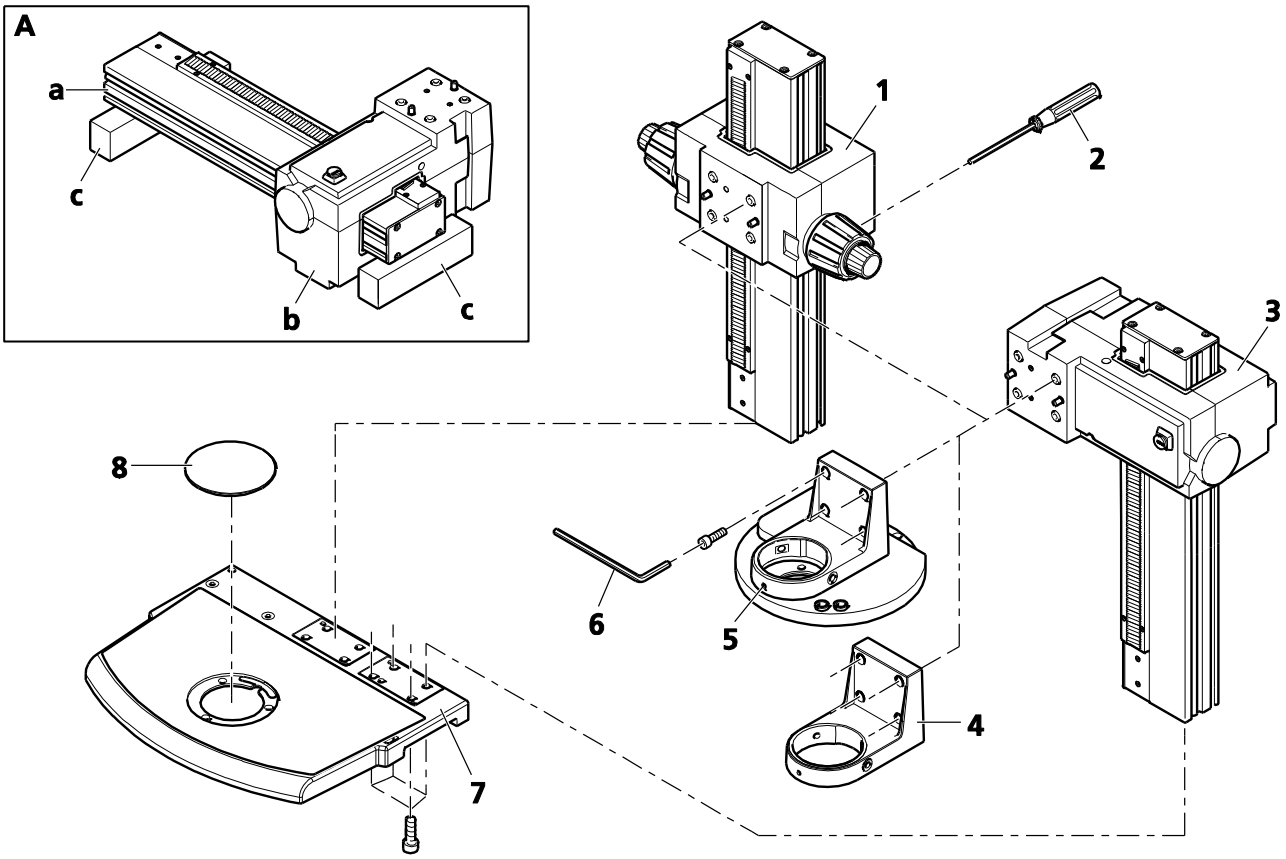


Fig. 6 Setting up the stand

- Attach the column of the *motorized focusing drives* (Fig. 6/**3**) to the **right** mounting surface of the stand base (Fig. 6/**7**) or the column of the *manual focusing drive* (Fig. 6/**1**) to the **left** mounting surface and let the two locating screws click into place.
- Screw on the column tightly by screwing four Allen screws (SW 8) through the stand base (Fig. 6/**7**).
- Set up stand base (Fig. 6/**7**) with screwed on column.

☞ Refer to Section 3.1.2 if you intend to use the optional transmitted-light equipment S.

☞ Proceed with Section 3.1.3 if you intend to use a stage.

- Put carrier (Fig. 6/**4**) or objective nosepiece (Fig. 6/**5**) onto the focusing drive letting the two locating screws click into place and keeping hold of the respective unit until the first screw has been tightened.

☞ Mount the carrier (Fig. 6/**4**) rotated by 180° if you want to examine higher samples.

- Screw down all four Allen screws (SW 5). Use the long leg of the offset Allen key (Fig. 6/**6**) to screw the screws in, and the short leg to fasten them hand-tight.
- Insert 120 mm B/W plastic plate (Fig. 6/**8**); press on its rear edge to remove it again.

Adjusting the travel of the motorized focusing drive

See Section 3.10, page 47.

Adjusting the torque of the manual focusing drive

Readjustment of the torque of the manual focusing drives becomes necessary, if the drive moves down by itself (e.g. because of an additional load on the microscope body or the objective nosepiece). In this case, the torque of the focusing drive must be increased. The torque has been adjusted correctly if the drive no longer moves down by itself. With additional loads of 10 kg or higher on the carrier or the nosepiece, it is advisable to use the motorized focusing drive.

If the motion of the drive is too stiff, the torque may also be reduced to improve the movability of the drive.

- Insert the supplied ball-headed screwdriver with SW 3 mm (Fig. 6/2) in one of the bores that are radially arranged on the torque-adjusting ring.
- To increase the torque (braking force), hold the coarse-focusing knob tight with your hand and turn the torque-adjusting ring clockwise. To reduce the torque of the focusing drive, turn the torque-adjusting ring counterclockwise.

Conversion work

- If the adapter ring (Fig. 7/**4**) is not mounted (e.g. after the removal of the transmitted-light equipment S), use three Allen screws (SW 3) to fasten it to the stand base (Fig. 7/**5**); then, put the insert plate (Fig. 7/**3**) onto the base.
- Fasten the insert plate (Fig. 7/**3**) without stage adapter to the adapter ring (Fig. 7/**4**) by means of three short Allen screws (Fig. 7/**2**).

3.1.2 Installing the optional transmitted-light equipment S

- Remove the insert plate (Fig. 7/**3**). To this end, loosen the three short Allen screws (Fig. 7/**2**), lift up the insert plate (using the grip hollow at the right edge of the stand base (Fig. 7/**5**)) and, taking hold of it with both hands, remove it safely.
- Loosen the three Allen screws (SW 3) of the adapter ring (Fig. 7/**4**) with the ball-headed screwdriver and remove the adapter ring.
- Put the transmitted-light equipment S (Fig. 7/**6**) laterally correct onto the stand base. Verify that the two large plastic taper pins on the bottom of the transmitted-light equipment S engage with the respective holes of the stand base.
- Use the ball-headed screwdriver (Fig. 7/**9**) to screw down the four countersunk Allen screws (SW 3) hand-tight on the transmitted-light equipment S.
- Put the insert plate (Fig. 7/**3**) onto the transmitted-light equipment S (Fig. 7/**6**).
- Insert the opal glass plate ∅ 84 mm (Fig. 7/**8**) to avoid that screws and other small parts get lost during the further installation work.
- Using the three, short Allen screws (Fig. 7/**2**) fasten the insert plate (Fig. 7/**3**) (without stage adapter) to the transmitted-light equipment S.

☞ Refer to Section 3.1.3 if you intend to use a stage.

- Replace the opal glass plate ∅ 84 mm (Fig. 7/**8**) by insert 52/84 (Fig. 7/**7**).
- Insert the 120 mm glass plate (Fig. 7/**1**); to remove it again, press on its rear edge.

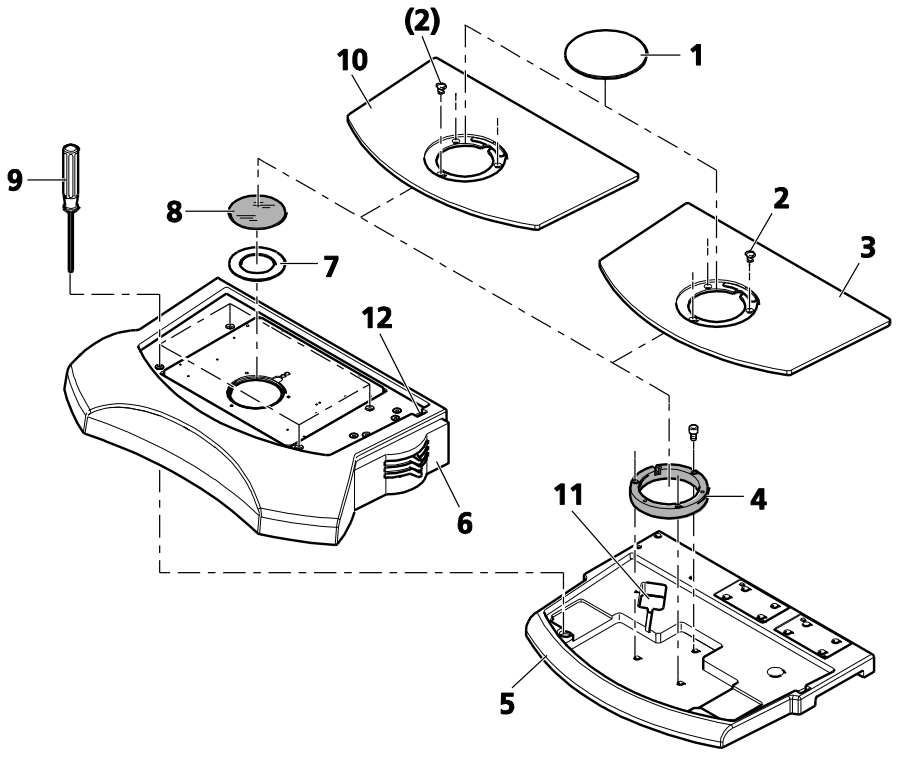


Fig. 7 Installing the transmitted-light equipment S

3.1.3 Installing the stage

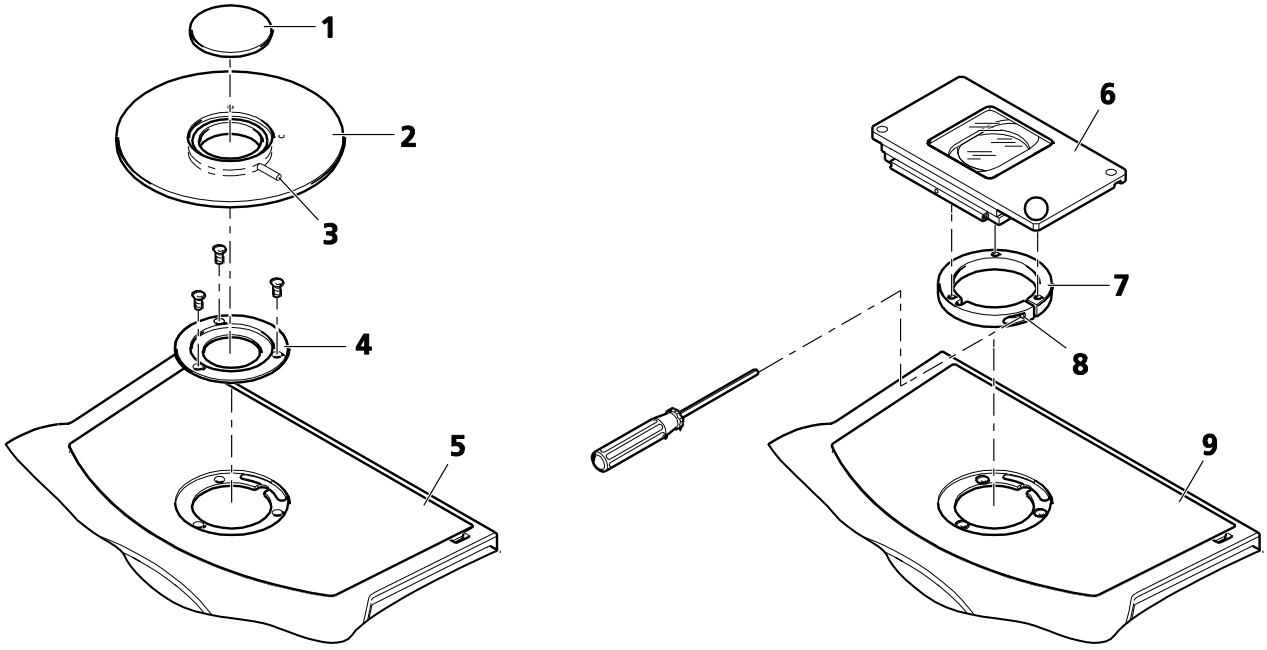


Fig. 8 Installing the stage

Stages with 84 mm interface

☞ Stages with 84 mm interface should be fastened to the stand base by means of the 84/120 mm stage adapter (Fig. 8/**4**).

- Unscrew three short Allen screws (SW 3) from insert plate (Fig. 8/**5**).
- Use three longer Allen screws (SW 3) to screw down the stage adapter (Fig. 8/**4**) hand-tight through the insert plate.
- Put the stage (Fig. 8/**2**) onto the stage adapter and align it.
- Throw eccentric clamping lever (Fig. 8/**3**) over to clamp the stage in the stage adapter.
- Put the round 84 mm plate (Fig. 8/**1**) into the stage interface.

Stages with 120 mm interface

☞ Stages with 120 mm interface (Fig. 8/**6**) should be fastened to the insert plate (Fig. 8/**9**) by means of the stage-clamping ring mounted to the stage (Fig. 8/**7**). Do not remove the stage-clamping ring.

- Put the stage with installed stage-clamping ring (Fig. 8/**6** and **7**) onto the insert plate (Fig. 8/**9**) and align it.
- Clamp the stage-clamping ring in the insert plate by turning the Allen screw (SW 3) (Fig. 8/**8**) clockwise.

3.1.4 Installing the SteREO microscope

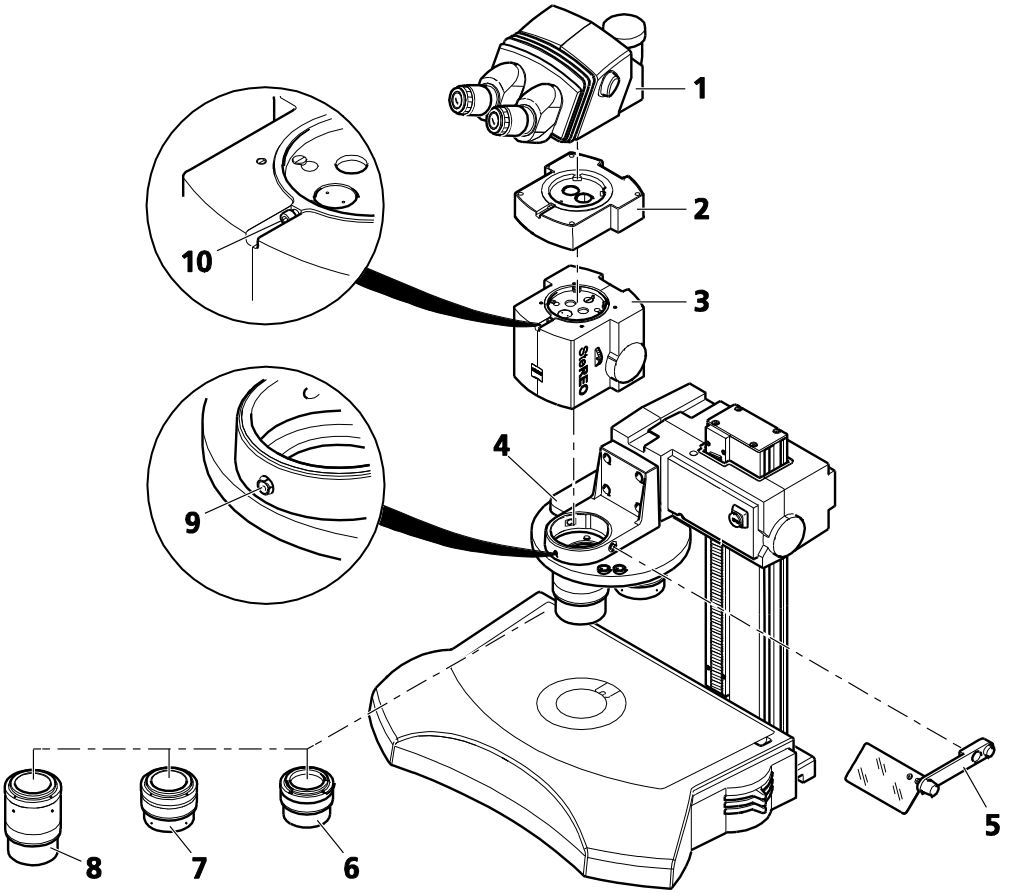


Fig. 9 Installing the microscope

- Verify that the grub screw (SW 3) on the carrier or objective nosepiece (Fig. 9/**9**) does not project into the opening of the holder. Turn it counterclockwise by a few turns, if necessary, using the ball-headed screwdriver (but do not fully unscrew it!).
- Put the microscope body (Fig. 9/**3**) into the mount (∅ 76 mm) of the carrier or objective nosepiece (Fig. 9/**4**) and align it.
- Fasten the grub screw (Fig. 9/**9**) on the carrier or objective nosepiece hand-tight.

Always hold the objective with both hands to ensure safe installation. When installing the objective, use its lens-protective cap! Always store the objectives in the special packaging.

Order of installation: At first, install the shortest objective (Fig. 9/**6**), then the medium one (Fig. 9/**7**) and finally the longest one (Fig. 9/**8**). To remove the objectives, proceed reversely.

- Take up the objective (Fig. 9/**6**) with both hands and screw it counterclockwise into the microscope body or objective nosepiece (upside down right-hand thread).
- Insert binocular tube (Fig. 9/**1**) in dovetail mount and clamp it by screwing down the Allen screw (Fig. 9/**10**) hand-tight using the ball-headed screwdriver.

You can use up to two 40 mm high intermediate tubes (Fig. 9/**2**) to increase the viewing height by a maximum of 80 mm. Clamp them in the same way as the binocular tube.

To avoid being dazzled in transmitted light, fix the dazzle protector (Fig. 9/**5**) to the carrier or the objective nosepiece (Fig. 9/**4**) and swing it in.

If the microscope mounted to the manual focusing drive should come down by its own weight, please readjust the torque of the drive (see page **Fehler! Textmarke nicht definiert.**).

3.1.5 Fitting the binocular tube

Inserting eyepieces

- Remove both dust caps from the tube.
- Insert both eyepieces into the tube pushing them down up to the stop.

Attaching the fold-over eyecups

The eyepieces have a rubber ring each to protect the lenses of spectacles against scratches. The protection rings can be replaced with fold-over eyecups (Fig. 10/**1**) when required.

- Remove the protection rings (Fig. 10/**2**) from the eyepieces and attach the eyecups (Fig. 10/**1**).
- Sometimes the eyeglass protection rings are seated very tightly in the eyepiece groove, so you may need a blunt object (stick) to prod them off.

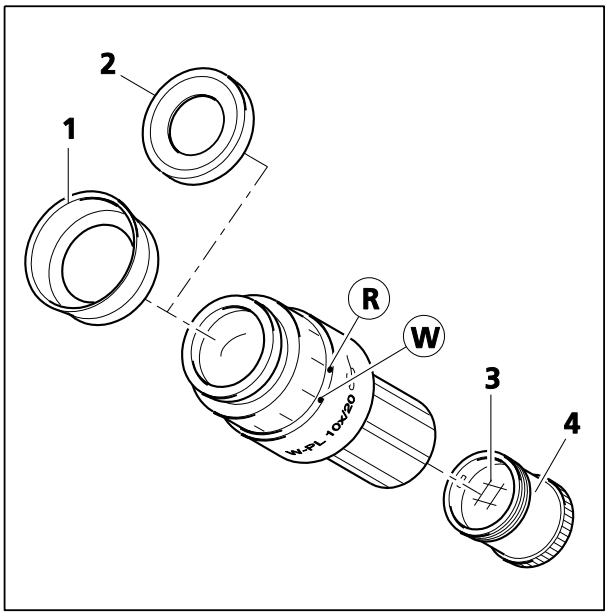


Fig. 10 Inserting the eyepiece reticle

Inserting eyepiece reticles

The focusing eyepieces are intended for use with eyepiece reticles.

The slight image shift caused by the additional path through glass is taken into account on the diopter scale by the fact that the zero point position is indicated not by the white dot (Fig. 10/**W**), but the red dot (Fig. 10/**R**).

In the eyepiece W-PL 10x/23 Br. foc. (455043-0000-000) and E-PL 10x/20 Br. Foc. (444132-9902-000) the eyepiece reticles (Fig. 10/**3**) have been adhered to screw-in mounts (Fig. 10/**4**) by the manufacturer for easy replacement. Complete mounts with reticles adhered can be ordered directly from Zeiss.

To change the mount, proceed as follows:

- Unscrew the existing mount (Fig. 10/**4**) with eyepiece reticle (Fig. 10/**3**) from the eyepiece, without exerting heavy radial pressure on the diaphragm unit in order to avoid deformation and jamming. Replace it with a new mount containing the eyepiece reticle required.

☞ When inserting an eyepiece reticle in the unscrewed mount, consider that its writing appears reversed before and non-reversed after screwing the mount back into the eyepiece.

Installing camera adapters

☞ On the SteREO Discovery, a new port type, "60N interface", is used for connecting cameras. However, you can continue using the well-known "60 interface" adapters (30 mm inside diameter).

The following cameras can be connected to the camera port: microscope cameras (e.g. Carl Zeiss AxioCam), commercial SLR cameras (Single Lens Reflex; 35-mm film or digital) or compact digital cameras.

☞ Only use camera/adapter combinations recommended by Carl Zeiss! Otherwise, clearly visible vignetting will appear (dark marginal areas of the image).

☞ Additionally observe the separate operating instructions of the cameras used when you work with photomicrographic equipment.

Adapter for 60N interface (M52 x 1 external thread)

☞ Before using the interface 60N-T2 1x (426103-0000-000) for SLR camera, verify that large-sized camera bodies (with a sensor diagonal of less than 18 mm) do not knock against the tube. Use an additional camera adapter with additional magnification, if necessary.

- Attach the camera adapter "60N" (Fig. 11/**1**; **2**) to the camera.
- Remove the dust cap from the camera port.

☞ Please note: The three grub screws (SW 3) (Fig. 11/**5**) at the camera port must project neither into the external thread nor into the inner aperture.

- Put the pre-assembled unit onto the camera port (Fig. 11/**4** or **6**), align it and fasten the sleeve nut of the adapter (Fig. 11/**1** or **2**) hand-tight.

Adapter for 60 interface (30 mm inside diameter)

- Attach the camera adapter "60" (Fig. 11/**3**) to the camera.
- Remove the dust cap from the camera port.
- Put the pre-assembled unit onto the camera port (Fig. 11/**4** or **6**). Take care that the three grub screws (Fig. 11/**5**) do not project too far into the inner aperture; unscrew them slightly, if necessary.
- Turn the three grub screws (SW 3) on the tube (Fig. 11/**5**) counterclockwise until the adapter is firmly seated.

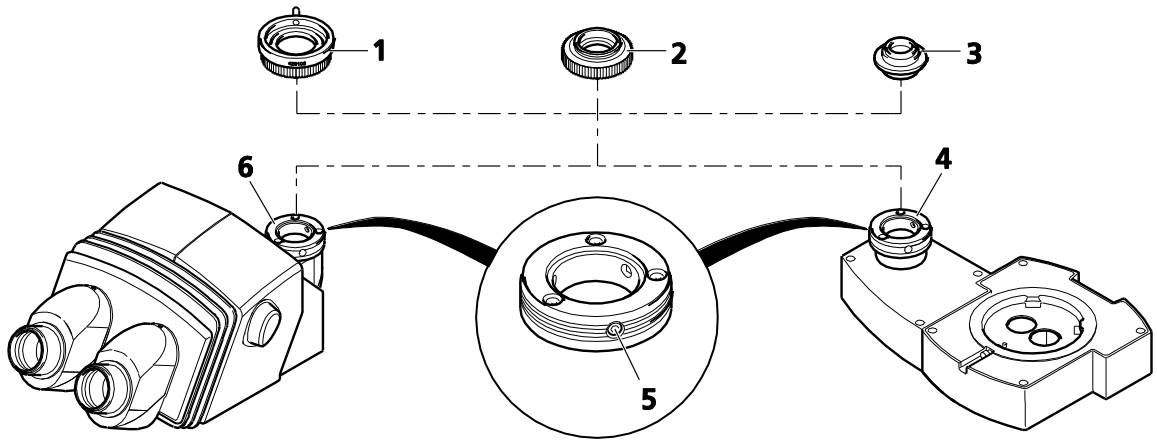


Fig. 11 Using camera adapters

3.1.6 Installing incident-light illuminators

☞ – **Flexible light guide with focusing attachment** (Fig. 12/**3** and **6**):
To be fastened to objective nosepiece, microscope carrier or stand base (Fig. 12/**8**) by means of the articulated arm and the clamp.

– **Fiber-optical ring illuminators and LED ring illuminators** (Fig. 12/**10**):
The fiber-optical slit-ring illuminators without light guide are used for illumination purposes on objectives mounted to the objective nosepiece, see Section 3.6. It is also possible to attach a slit-ring illuminator ECO to an objective. With each objective change, however, it is necessary to detach this illuminator and to attach it again to the then used objective.

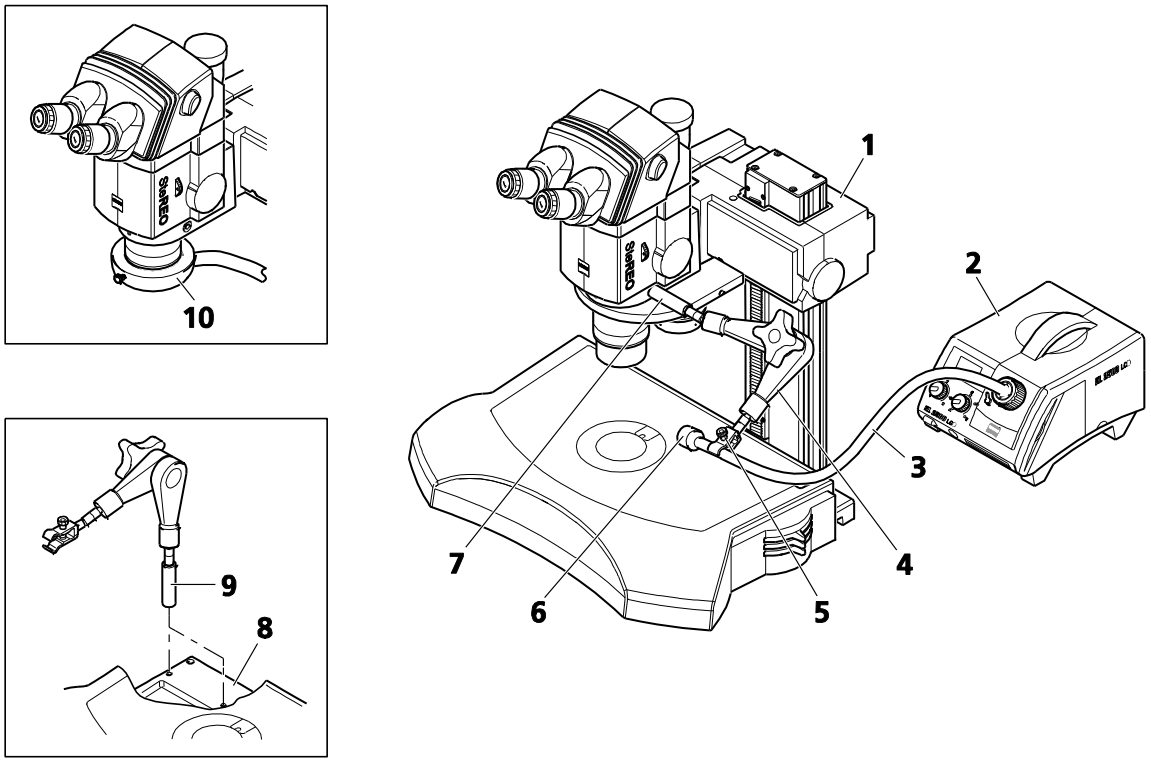


Fig. 12 Installing the incident-light illuminator

Installing the flexible light guide with focusing attachment

- Screw in the spacing rod (Fig. 12/**7**), if necessary.
- Hold the articulated arm (Fig. 12/**4**) in such a way that the label is correctly readable. Then, screw the clamp for the light guide (Fig. 12/**5**), the line light or the appropriate focusing attachment (Fig. 12/**6**) onto the upper end of the articulated arm.
- Screw the bottom end of the articulated arm (Fig. 12/**4**) into the spacing rod or one of the tapped holes on the stand. Tighten the tensioning screw on the articulated arm so that the latter can be used as lever.
- Successively clamp the three joints of the articulated arm from bottom to top by means of the clamping screw; loosening the joints is in reverse order, i.e. from top to bottom.
- Connect the light guide (Fig. 12/**3**) to the cold-light source (Fig. 12/**2**).

☞ The articulated arm may also be fixed to the stand base (Fig. 12/**8**). To this end, screw in the spacer (Fig. 12/**9**).

Installing the fiber-optical slit-ring illuminators (∅ 66 mm)

- Push the slit-ring illuminator (Fig. 12/**10**) onto the objective and clamp it by means of the knurled screw.
- Connect the light guide to the cold-light source (Fig. 12/**2**).

☞ Do not look directly into the light source and avoid reflections at reflecting surfaces.

Installing LED ring illuminators (∅ 66 mm)

- Push the LED ring illuminator onto the objective and clamp it by means of the knurled screw.

☞ For the installation and operation of the VisiLEDs MC Series, observe the corresponding separate operating instructions.

The LED illuminator is an LED class 1 device. Avoid directly viewing into the LED light.

3.2 Installing the coaxial epi-illumination S

- The switching lever for light guide positioning and optimization of the specimen field illumination can optionally be screwed in at the back or at the bottom.
  Preferably together
  - with manual coarse/fine drive:
    Screw in the switching lever at the bottom (Fig. 13/2) after fitting the unit to mount S.
  - with objective slider S/doc:
    Screw in the switching lever at the back (Fig. 13/**1**) **before** fitting the unit to mount S.
- Move the switching lever backwards to position **D** (Fig. 13/**2a**) and retain it.

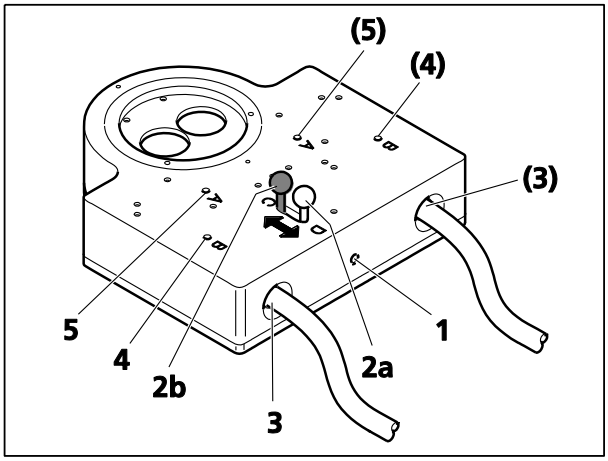


Fig. 13 **Coaxial epi-illumination (bottom side)**

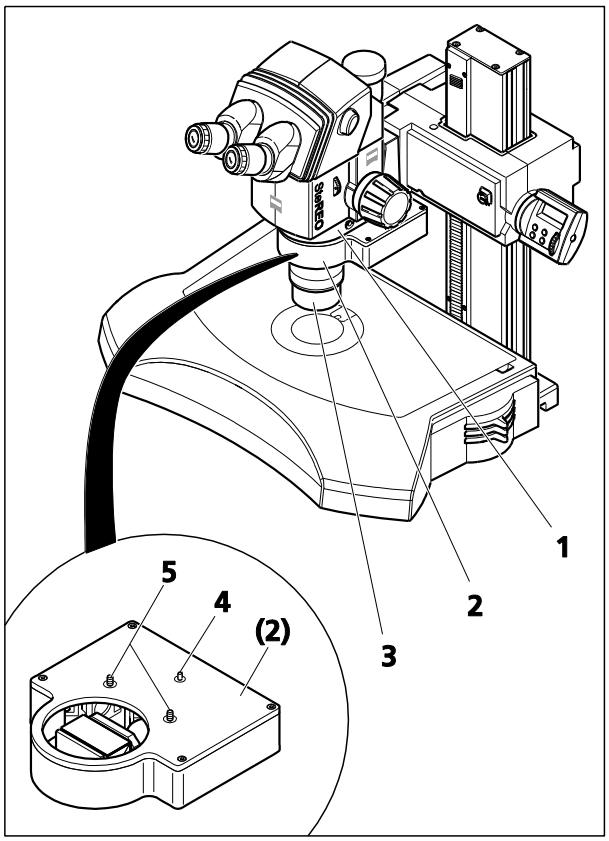


Fig. 14 Coaxial epi-illumination (upper side)

- Insert both light guide arms carefully into the back holes (Fig. 13/**3**), thread them into the light guide slot and push them to stop.
- Tighten the clamping screws through the drill holes **B** (Fig. 13/**4**) using the Allen key 3 mm.
- Unscrew the objective (Fig. 16/**3**) from the microscope body.
- Insert the coaxial epi-illumination S (Fig. 16/**2**) with the guide pin (Fig. 16/**4**) facing upward into the drill hole underneath mount S (Fig. 16/**1**).
- Screw both screws of the coaxial epi-illumination (Fig. 16/**5**) through the drill holes **A** (Fig. 16/**5**) into the mount S.

Attention during unscrewing: Do not continue to turn the screws after you have unscrewed them from mount S!

- Screw the objective into the coaxial epi-illumination or mount the objective slider S/doc (see B 46-0010).

For vertical observation with the objective slider S/doc use the lambda-quarter cap positioned in front of the objective and clamped at its 66 mm outer diameter.

To achieve a more homogeneous illumination for magnifications equal to or larger than those indicated in the following table, you can adjust the lever at front position **C** (Fig. 13/**2b**) without additional vignettation also for **objectives S 1.0x**.

Objective S	**Avoidance of vignettation in standard front position C above**	
	(in units of zoom magnification)	(total magnification with eyepieces 10x/23)
Plan Apo S 1.0x	1.1x	11.0x
Plan S 1.0x	1.4x	13.6x
Achromat 1.0x	1.8x	17.8x

3.3 Installing and connecting the PentaFluar vertical illuminator

3.3.1 Installing PentaFluar vertical illuminator and dazzle protector to the microscope body

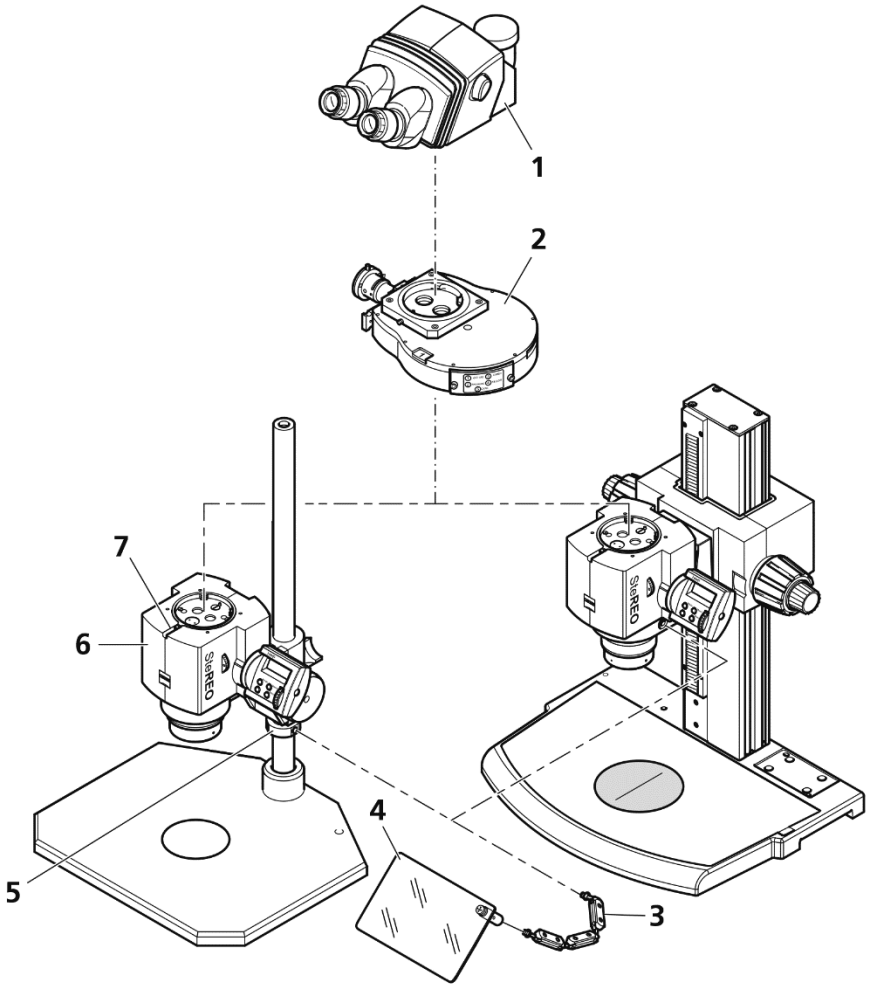


Fig. 15 Installation of PentaFluar S/X-Cite

- Loosen clamp screw (Fig. 15/**7**) using an SW 3 Allen key and remove the tube (Fig. 15/**1**). If attached, remove the intermediate tube in the same way.
- Depending on the chosen equipment, attach the PentaFluar S/X-Cite (Fig. 15/**2**) vertical illuminator to the microscope body (Fig. 15/**6**), align it (the connector for the illumination equipment should point to the left) and tighten the clamp screw (Fig. 15/**7**).
- Using the plugged through SW 3 ball-headed screwdriver, screw the support (Fig. 15/**3**) of the dazzle protector into the M8 tapped hole on the carrier of the microscope body.

☞ The support of the dazzle protector can be mounted to both sides of the microscope body.

- At the other side of the support (Fig. 15/**3**), screw on the dazzle protector (Fig. 15/**4**) and tighten it with the SW 3 ball-headed screwdriver plugged through.

- Move the spherical joints of the carrier to adjust the dazzle protector so that you cannot be dazzled during microscopic work. To this end, slightly loosen the clamp screws on the spherical joints or the clamp screw on the dazzle, if necessary. After the adjustment, retighten the clamp screws.

☞ When using the dazzle protector on column stands, before installing the Stemi mount, first slip the clamping ring (Fig. 15/**5**) for the dazzle protector over the column and fix it by means of its clamp screw. The clamping ring has two M8 tapped holes, into which you may optionally screw in the support of the dazzle protector.

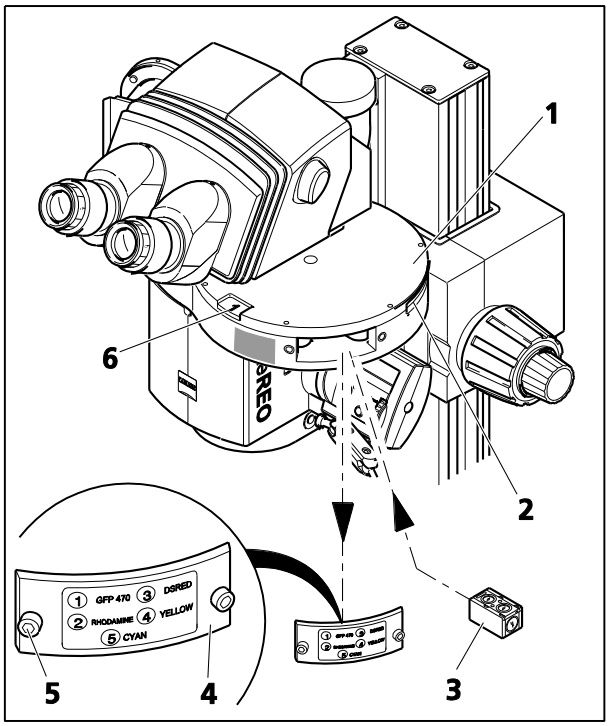


Fig. 16 Inserting filter blocks

3.3.2 Inserting and changing filter blocks

Make sure the light source is switched off or the shutter slider (Fig. 17/**5**) pulled out.

- Undo both screws (Fig. 16/**5**) and remove the cover (Fig. 16/**4**) from the mounting aperture of the PentaFluar vertical illuminator (Fig. 16/**1**).
- Insert the filter block (Fig. 16/**3**) in one of the five positions of the filter mount. To this end, push in the filter block through the installation aperture, until the magnetic fixation device catches the filter block and positions it in the correct place. When pushing the filter block in, take care that the barrier filters point up and the exciter filter points outward.
- Turn on the filter wheel at its knurling (Fig. 16/**2**) by one position and insert the next filter block.
- Insert the other filter blocks in the same way.
- Reattach the cover and tighten the screws.

☞ The filter position swung into the light path is displayed in the read-out window (Fig. 16/**6**). To move this filter position into the installation aperture, turn on the filter wheel counterclockwise by two positions.
Affix the supplied self-adhesive labels for the filter combinations to the cover (Fig. 16/**4**) allocated to the corresponding position numbers.

3.3.3 Connecting the X-Cite illuminator to the PentaFluar S/X-Cite vertical illuminator

- Undo clamp screw (Fig. 17/**3**) for optical fiber on the mounting port (Fig. 17/**1**) of the PentaFluar S/X-Cite vertical illuminator using the SW 1.5 mm offset Allen key.
- Push the optical fiber (Fig. 17/**2**) as far as it will go into the mounting port and clamp the clamp screw (Fig. 17/**3**) using the SW 1.5 mm key.
- Lever (Fig. 17/**4**) serves to open and close the iris diaphragm.
- The shutter and filter slider (Fig. 17/**5**) has three functional positions:

Pulled out:	Blocking position
Middle position:	Free aperture,working position
Pulled in:	Additional filter BG38 for attenuation of a possible reddish background

- Plug the other end of the optical fiber (Fig. 18/**2**) as far as it will go into the X-Cite illuminator (Fig. 18/**1**).
- Connect the power cable of the X-Cite illuminator to the power outlet.

Do not switch on the illuminator unless both ends of the optical fiber are correctly mounted to avoid health hazards by UV radiation!

The liquid optical fiber has a minimum bending radius of 40 mm; if bent too sharply it will be destroyed! At normal room climate (23 °C, 60 %), the optical fiber has a lifetime of four years. The lifetime may be prolonged by cool and humid storage (refrigerator).

The liquid optical fiber of the HXP 120 can be connected to the corresponding light source in the same way.

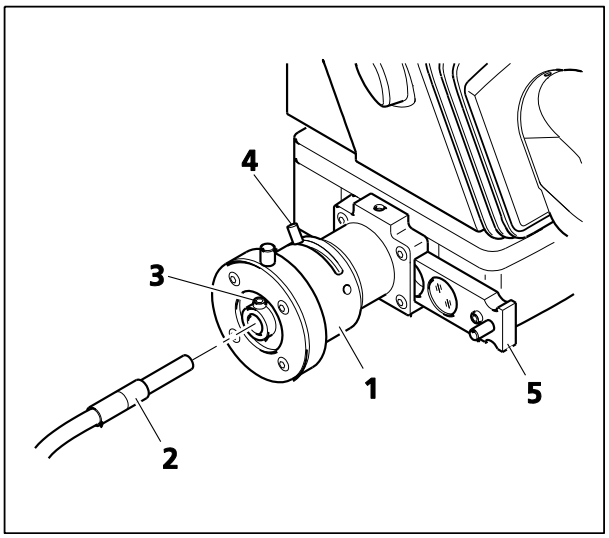


Fig. 17 **Connecting the optical fiber of the X-Cite illuminator to the PentaFluar S/X-Cite**

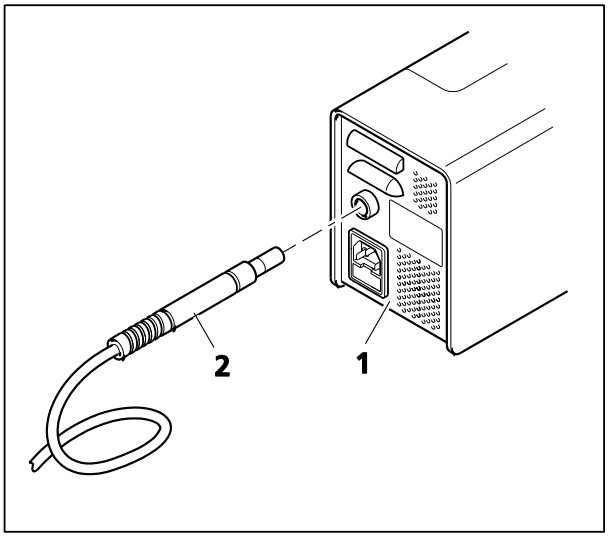


Fig. 18 **Connecting the optical fiber to the X-Cite illuminator**

3.4 Installing and connecting the Human Interface Panel (HIP)

You can swivel the HIP by about 30 degrees about its longitudinal axis to adjust it to a favorable viewing angle. Make sure not to exceed the stated swivel range. Forcible twisting will result in damage to the device.

If you connect the HIP and SYCOP units simultaneously to the system, the functional range of the HIP will be restricted to zoom and focus control via knurled wheel and memory keys. Besides, you must not connect the plug-in power unit to a power outlet, as in this case the HIP will be powered via the microscope body/focusing drive.

The plug-in power unit is supplied with four socket adapters (EURO, US, UK, AUS). Before connecting it to the power outlet, choose the appropriate adapter and push it onto the transformer.

Install the HIP (Fig. 19/**3**) to the microscope body (zoom function) or to the motorized focusing drive (focus function) by following this procedure:

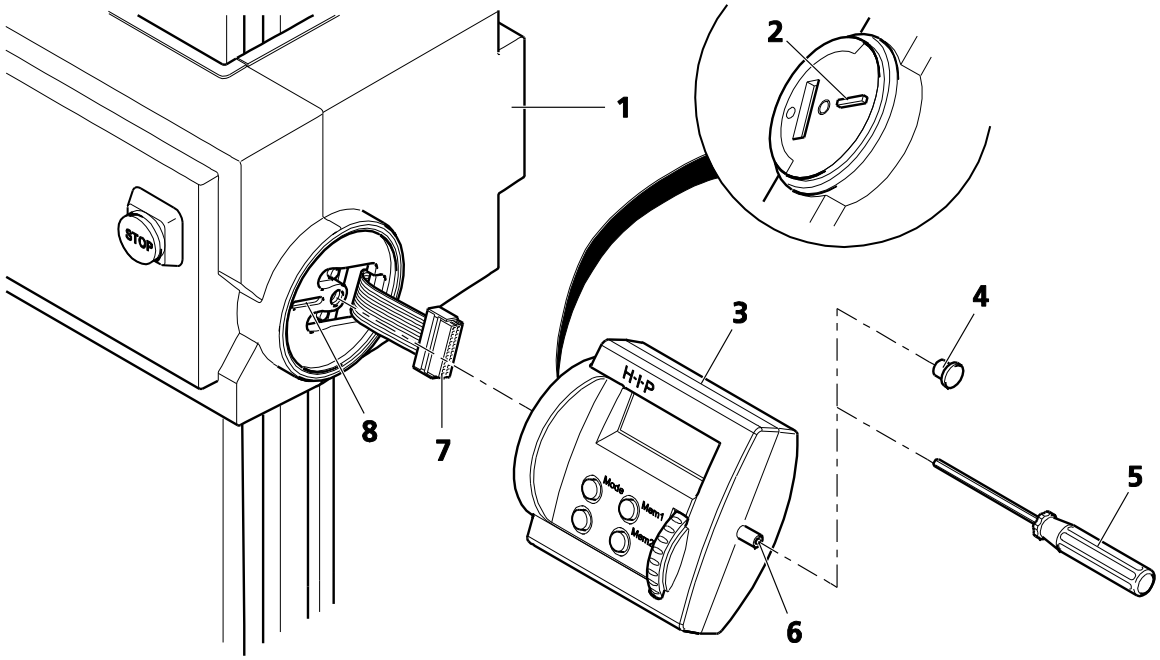


Fig. 19 Installing the HIP control unit

- Remove the cover (right) from the microscope body (only on SteREO Discovery.V12/V20) or the focusing drive (Fig. 19/**1**) and the cover cap from the HIP (Fig. 19/**4**).
- Slightly pull out the connecting cable (Fig. 19/**7**) without applying force and connect it to the corresponding connector on the HIP.
- Push the cable fully back into the casing without folding it; carefully attach the HIP so that the nose (Fig. 19/**2**) on the HIP engages with the provided groove (Fig. 19/**8**).
- Screw in the Allen screw (SW 3) (Fig. 19/**6**) with the ball-headed screwdriver (Fig. 19/**5**) as far as it will go.

- Re-attach the cover cap (Fig. 19/**4**) to the HIP.
- Connect the cable of the plug-in power unit to the rear panel of the microscope body (only on SteREO Discovery.V12/V20) or the focusing drive and connect the plug-in power unit to the power outlet.

3.5 Mounting and connecting the Manual Rotary Control (MaRC)

MaRC is a component used to control motor focus and zoom, respectively, and may be mounted to the focusing drive (Fig. 20/**1**), the microscope body (only on SteREO Discovery.V12/V20) or the table-top base (Fig. 21/**1**).

Mounting MaRC to the microscope body or to the motorized focusing drive:

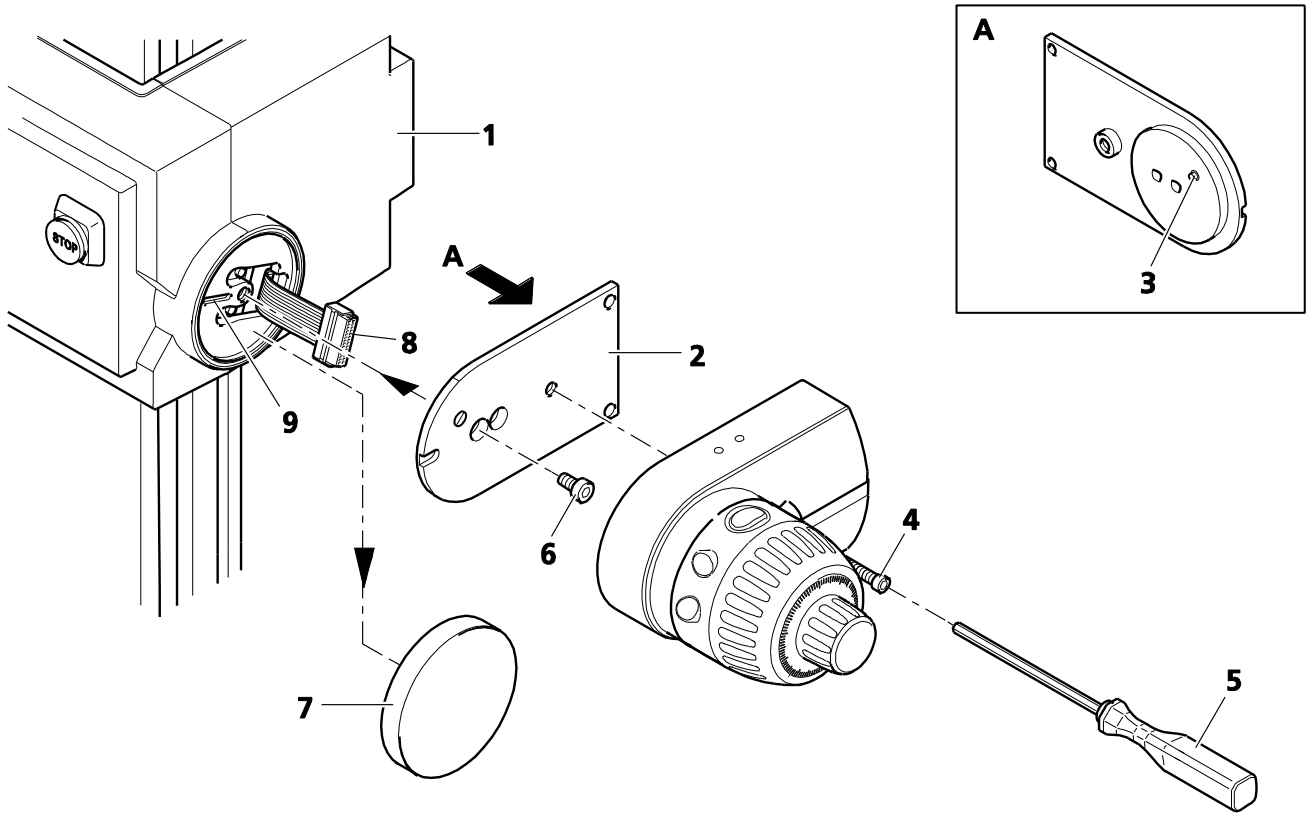


Fig. 20 Mounting the MaRC control unit (e.g.: to the focusing drive)

- Remove the mounting plate (Fig. 20/**2**) from the MaRC unit after loosening the Allan screw (SW 3; Fig. 20/**4**).
- Remove the cover (Fig. 20/**7**) from the focusing drive (Fig. 20/**1**) or from the microscope body (only on SteREO Discovery.V12/V20).
- Pull the connecting cable (Fig. 20/**8**) fully back into the casing without folding it.

- Bolt the mounting plate (Fig. 20/**2**) with the screw (Fig. 20/**6**) to the flange of the focusing drive (Fig. 20/**1**) (or the microscope body), putting the screw through the left hole of the mounting plate. Make sure that the orientation pin (Fig. 20/**3**) of the mounting plate engages with the groove (Fig. 20/**9**) provided for this purpose.
- Bolt MaRC by means of the Allan screw (SW 3; Fig. 20/**4**) to the fixed mounting plate (Fig. 20/**2**) using the ball-headed screwdriver (Fig. 20/**5**).
- Connect the patch cable to the CAN bus connectors of MaRC (underside) and to the motorized focusing drive.

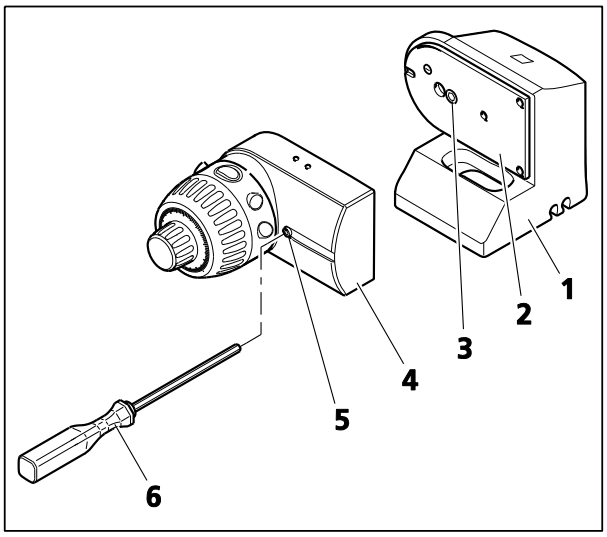


Fig. 21 Mounting the control unit MaRC to the table-top base

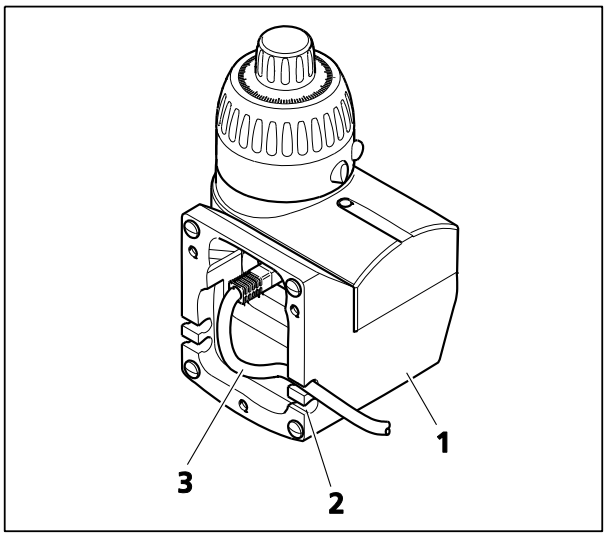


Fig. 22 Connecting the patch cable to MaRC mounted to the table-top base

Mounting MaRC to the table-top base:

- Bolt the mounting plate (Fig. 21/**2**) with the screw (Fig. 21/**3**) to the table-top base (Fig. 21/**1**), putting the screw through the right hole of the mounting plate.
- Bolt MaRC (Fig. 21/**4**) with the Allan screw (SW 3; Fig. 21/**5**) to the fixed mounting plate using the ball-headed screwdriver (Fig. 21/**6**).
- Connect the patch cable (Fig. 22/**3**) to the CAN bus connectors of MaRC (through the underside of the table-top base, Fig. 22/**1**) and the motorized focusing drive.

☞ The patch cable can also be connected directly to a CAN bus connector of the EMS Electronic Module.

- Lead the patch cable through the table-top base bending it in a radius as large as possible (do not fold it) and pass it through one of the cut-outs (on the right or left, Fig. 22/**1**) to the outside.
- Place the table-top base with MaRC on the right or left beside the microscope.

☞ If MaRC is used in a system without focus motor or EMS, the handwheel has to be connected to the motorized zoom body by means of a patch cable. Power is then supplied to the second CAN bus connector of MaRC via the patch cable connection of the power supply unit delivered for the HIP panel.

3.6 Mounting the objective nosepiece S/doc, 3x, 6x cod.

The objective nosepiece S/doc, 3x, 6x cod. is a microscope component for three objectives, which can be used in stereo position as well as in the macroscope / mono / documentation position (doc). The objective positions are coded, allowing the selected objective and the corresponding position (3D for stereo or 2D for mono) to be indicated in the SYCOP 3 display and ZEN blue/ZEN core software.

Furthermore, a special fiber-optic slit-ring illumination element, the slit-ring illuminator d = 66 mm without light guide, may be attached to the objectives of the nosepiece. If necessary, light-conducting rods of different lengths may be inserted between the light transmission interface and the slit-ring illuminator to adapt the system to the working height required.

Mounting the objective nosepiece S/doc

The objective nosepiece may be attached to the motorized focusing drive with Profile S column as well as to the manual coarse/fine focusing drive with Profile S column (see also Section 3.1.1).

- Attach the objective nosepiece (Fig. 23/**2**) to the focusing drive of the column used (Fig. 23/**1**), let the two locating screws click into place and keep hold of the unit until the first screw has been tightened.
- Screw down the four Allen screws (SW 5). Use the long leg of the offset Allen key (Fig. 23/**4**) to screw the screws (Fig. 23/**3**) in, and the short leg to fasten them hand-tight.

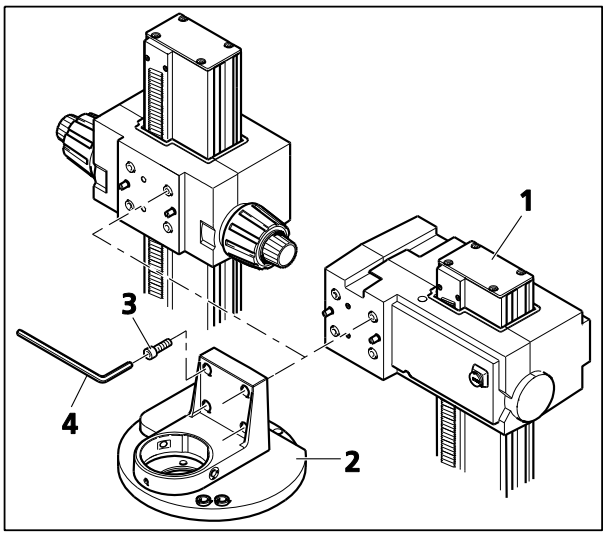


Fig. 23 Mounting the objective nosepiece to the column

Inserting objectives into the objective nosepiece S/doc

- The objective nosepiece is suited for 2 groups of parfocalized objectives:

  1. Objectives with parfocal distance 137 mm:
     PlanApo S 0.63x; PlanApo S 1.0x; PlanApo S 1.5x; Plan S 1.0x; Achromat 0.63x

  2. Objectives with parfocal distance 93 mm:
     PlanApo S 3.5x mono; Achromat 1.0x; Achromat 1.5x

- To insert the PlanApo S 3.5x mono, the adapter ring included in the set "rings for nosepiece 6x cod + objective mono" is required.

☞ Please note that the PlanApo S 3.5x mono objective can be used only with the objective nosepiece being in macroscope position.

! Please do not insert the PlanApo S 1.5x together with objectives having a parfocal distance of 93 mm or the PlanApo S 2.3x into the objective nosepiece to avoid collision with the microscope stage or the specimen.

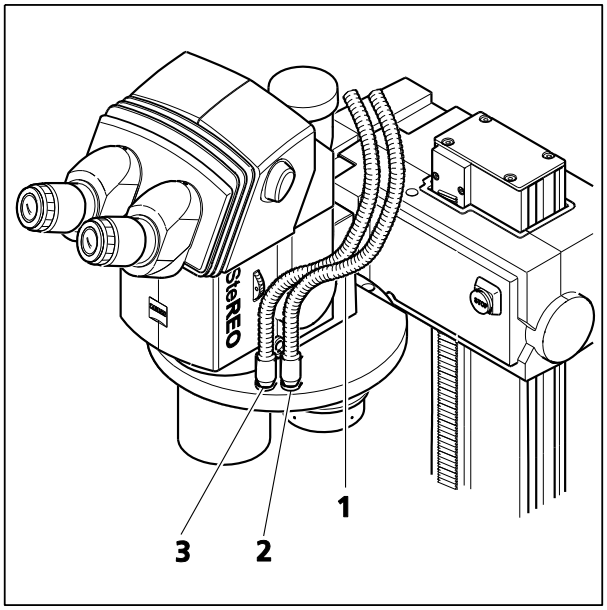


Fig. 24 Light guide mount

Illumination

A light guide mount is used for central supply of light to the slit-ring illumination system. It allows the light coming from a standard light guide to be conducted to the fiber-optical ring illuminator attached to the currently used objective.

That means that the light guide mount is a transmission interface between the supplying light guide and the downstream slit-ring illuminator. Upon rotating another objective into working position, also another ring illuminator will be situated downstream of the light guide.

The light guide mount is located vertically on top of the nosepiece plate. It has an internal diameter of 10 mm and a length of 10 mm for fixing the end sleeves of a flexible standard light guide. There are two light guide mounts one beside the other - one for stereo position and one for macroscope position.

- Insert the end sleeve of the one-branch light guide, or both end sleeves in case of the two-branch light guide, into the corresponding light guide mount(s).

– If you use the flexible one-branch light guide, it must be re-positioned when changing from the stereo position (Fig. 24/**3**) to the macroscope position (Fig. 24/**2**).

– This is not necessary if you use the flexible two-branch light guide (Fig. 24/**1**).

– To avoid re-positioning, you can use two one-branch light guides combined with two light sources.

Attaching fiber-optical slit-ring illuminators to the objective nosepiece S/doc

Special adapters are required to adapt the slit-ring illuminator (d = 66 mm without light guide) to different working heights, conditioned by different objective lengths:

Objective	Light-conducting rod 13 mm	Light-conducting rod 51 mm	Spacing ring d = 66x16 mm for Achromat S
PlanApo S 0.63x			
PlanApo S 1.0x	X		
PlanApo S 1.5x		X	
PlanApo S 3.5x mono	X		
Plan S 1.0x			
Achromat S 0.3x			X
Achromat S 0.5x			X
Achromat S 0.63x			X
Achromat S 1.0x			X
Achromat S 1.25x			
Achromat S 1.5x	X		

If one or two objective nosepiece positions shall not be provided with a slit-ring illuminator d = 66 mm without light guide, the corresponding light opening in the nosepiece plate must be closed with a stopper **prior to** mounting the objective nosepiece to the stand.

Inserting/Removing the stopper

- Rotate the nosepiece plate (Fig. 25/**3**) accordingly to make the light opening (Fig. 25/**2**) of the corresponding nosepiece position accessible at the rear of the nosepiece.
- Put the stopper (Fig. 25/**1**) from above into the hole, with the taper hole of the stopper facing downwards.

CAUTION
During operation, the stoppers may become hot. That is why you should let the stoppers cool down for at least 5 minutes before removing them from the objective nosepiece.

- If you want to attach slit-ring illuminators later, you can remove the stopper as well with the objective nosepiece remaining mounted to the microscope. For this purpose, lift the stopper from below out of the nosepiece plate using the Allan key SW 3 and remove it sideways.

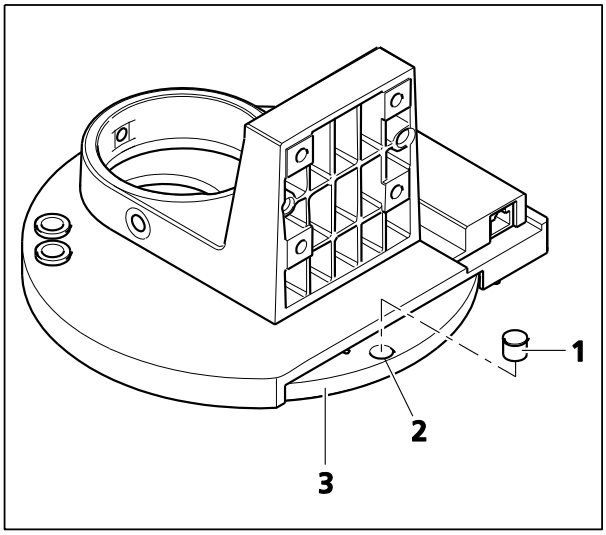


Fig. 25 Inserting a stopper

Attaching the slit-ring illuminator d = 66 mm without light guide

- Put the appropriate light-conducting rod (Fig. 26/**1**; 13 mm or 51 mm) onto the fiber input (Fig. 26/**2**) of the slit-ring illuminator (Fig. 26/**3**).
- If necessary, screw a spacing ring from below on the Achromat objective.
- Put the slit-ring illuminator from below on the corresponding objective and push it upwards until the light-conducting rod touches the mechanical stop in the corresponding hole at the underside of the objective nosepiece (Fig. 26/**5**).
- Fix the slit-ring illuminator with the knurled knob (Fig. 26/**4**) in this position.

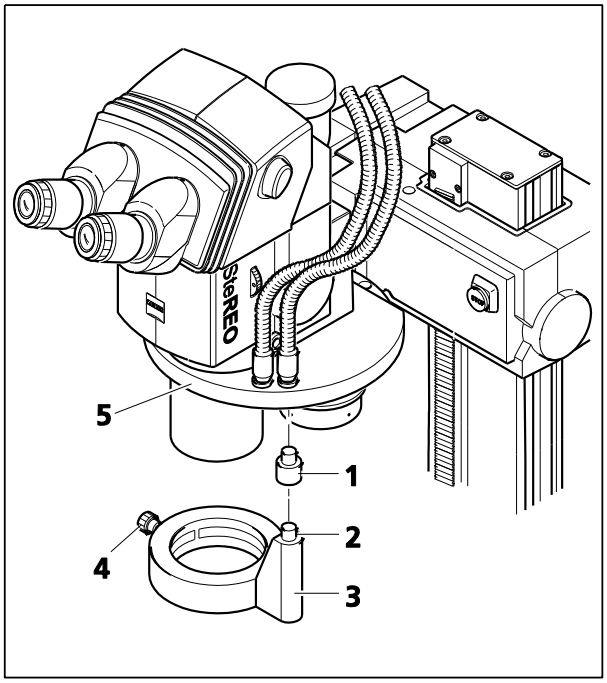


Fig. 26 Slit-ring illuminator

Mounting Y intermediate tubes to the microscope

A binocular image can be obtained in the macroscope position by mounting the Y intermediate tube S or the Y intermediate tube S mot between the microscope body and the binocular tube (see Section 3.1.4).

3.7 Switching on

Requirement: The instrument has been properly installed and connected (see Sections 3.1 and 3.4).

☞ The switch-on procedure depends on the existing configuration of the system.

- Briefly press ⏻ button on HIP.
- Set the toggle switch(es) on the cold-light source(s) used to **I**.
- If you intend to use the LED illuminator, set the switch on the rear panel of the VisiLED controller to **I**.

3.8 Switching off

☞ The switch-off procedure depends on the existing configuration of the system.

- Briefly press ⏻ button on HIP.
- Disconnect the plug-in power unit from the power outlet.
- Set the toggle switch(es) on the cold-light source(s) used to **O**.
- If the LED illuminator is used, set the switch on the rear panel of the VisiLED controller to **O**.

The instrument is now switched off. For switching off further devices used, refer to the respective operating instructions.

3.9 Standby mode

☞ For breaks and short interruptions, it will do to press the ⏻ button on the HIP. In this case, the instrument is not disconnected from line power, i.e. it is still powered.
To restart it, press the ⏻ button on the HIP once more.

3.10 Adjusting the travel of the motorized focusing drive

After the first installation, the lower limit switch (Fig. 27/**3**) in the column (Fig. 27/**1**) must be adjusted from the delivery position to an appropriate working position by means of the ball-headed screwdriver. The upper stop (Fig. 27/**2**) may also be readjusted. Adjust the limit switches instantly to prevent the microscope from being damaged by the movement of the motorized focusing drive.

When you move the motorized focusing drive down, there is the risk of hand crushing in the operating area. While the drive is moving down, do not reach with your hands into the operating area or under the motorized focusing drive.

Take care to avoid colliding of the objective with stage equipment or the specimen! Lower the motorized focusing drive only carefully unless you have adjusted the lower limit switch.

The operation of the HIP is described in Section 4.1.4.

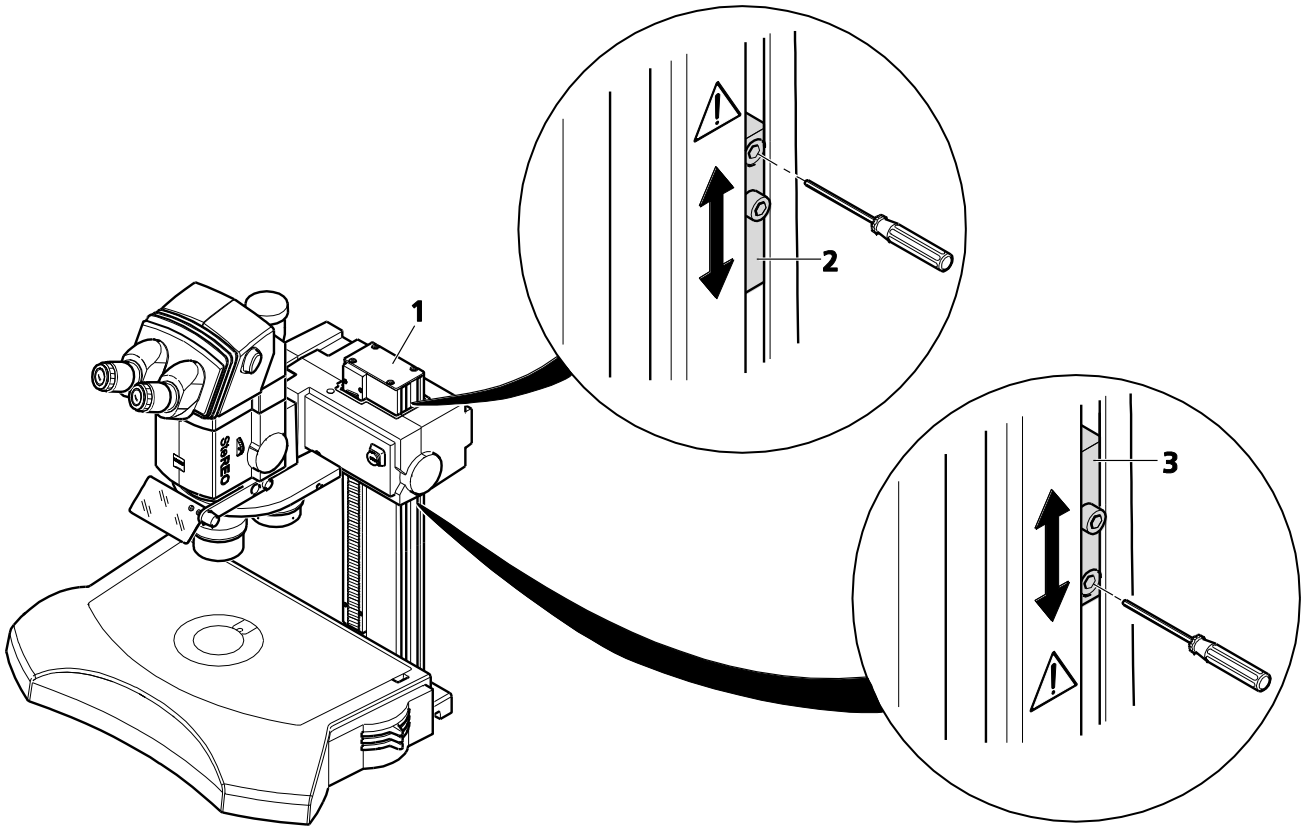


Fig. 27 Adjusting the travel of the focusing drive

The instrument has been properly installed, connected and switched on (see Sections 3.1 and 3.4). A printed sheet of paper has been put onto the specimen support:

If you intend to examine specimens that are higher than 20 mm, use the flattest specimen to be examined in place of the sheet of paper.

- When using the objective nosepiece, swing in the objective with the greatest length.
- Loosen the screw (SW3) at the lower limit switch (Fig. 27/**3**) and push the switch downward. Tighten the screw again.
- Turn the knurled wheel on the HIP or the coarse/fine drive on the MaRC downward, at first under direct observation and then while looking through the eyepieces, until the print on the paper is in focus. Stop moving on the drive!
- If the lower limit switch releases too soon, loosen the screw (SW3), push the limit switch a little bit down and re-tighten the screw.
- Check the position of the limit switch by moving the focusing drive up and down.
- Repeat this procedure until a collision between objective and stage is effectively prevented.
- Readjust the position of the upper limit switch as described above, if necessary, to prevent the motorized focusing drive from colliding with objects right next to the instrument (shelves, etc.).

3.11 Short-distance transport

Do not move the installed, upright standing system over longer distances. Avoid heavy shocks to the focusing drive as this might damage the rack of the column.

For transporting the device over longer distances, it must be disassembled and packed in its original packaging.

For short-distance transport, e.g. for relocating the device within a laboratory, follow this procedure:

- Move the focusing drive down to its bottom mechanical stop.
- Switch the device off and disconnect all cable connections.
- Remove binocular tube, intermediate tube, objective, and microscope body. For this, refer to Section 3.1.4 (consider that the order of operations for disassembly is reverse).
- If used, remove the transmitted-light equipment S. For this, refer to Section 3.1.2 (consider that the order of operations for disassembly is reverse).

Consider that the center of mass of the device is above the stand base. Therefore, do not carry the device over longer distances. Do not tilt or incline the device. To lift up and put down the device, hold it by the laterally arranged recessed grip wells.

- Taking the device by the recessed grip wells at the stand base, lift it up and carry it; do not hold and lift it up it by the focusing drive.
- Reinstall disassembled components, establish all cable connections correctly to the device and switch it on.

4 OPERATION

4.1 Adjustments

4.1.1 Setting transmitted-light illumination

- Connect the light guide for transmitted light (TL) to the cold-light source.
- For low magnifications, insert the ∅ 84 mm opal glass plate.
- To avoid dazzling in transmitted light, swivel in the dazzle protector.
- Turn on the cold-light source for transmitted light (TL) at the toggle switch (position **I**).
- Use the cold-light source to adjust the illumination intensity as required.
- Select the desired technique via the illumination control on the transmitted-light equipment (Fig. 28). Use intermediate positions to optimize the contrast by oblique light.

The bundle of light emerges vertically (reflector inclined by 45°)	
Inclination of the bundle of light towards the operator (risk of being dazzled!)	**Inclination** of the bundle of light off the operator
Bundle of light emerges centrally	**Translation** of the bundle of light towards the operator
Diffuse **light quality** through white reflector surface	Directed **light quality** through specular reflector surface

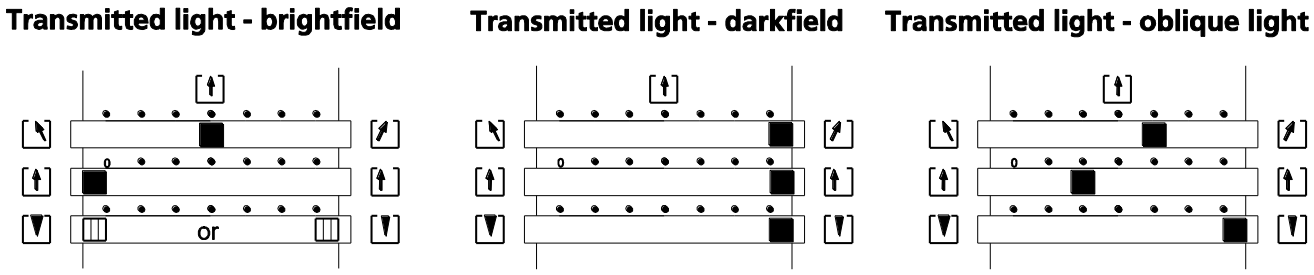


Fig. 28 Setting illumination control on transmitted-light equipment

4.1.2 Setting incident-light illumination

- Connect the light guide for incident light to the cold-light source (RL) (cf. Section 3.1.6). Clamp the ring illuminator onto the single objective (not to the nosepiece).
- Turn on the cold-light source for incident light (RL).
- Adjust the light guide to the specimen.
- Use the cold-light source to adjust the illumination intensity as required.

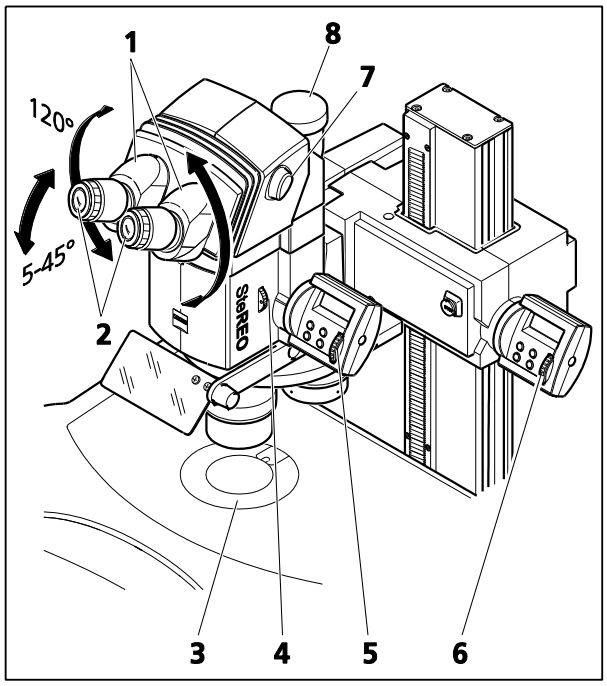


Fig. 29 **Adjusting the stereomicroscope (motorized zoom and focusing)**

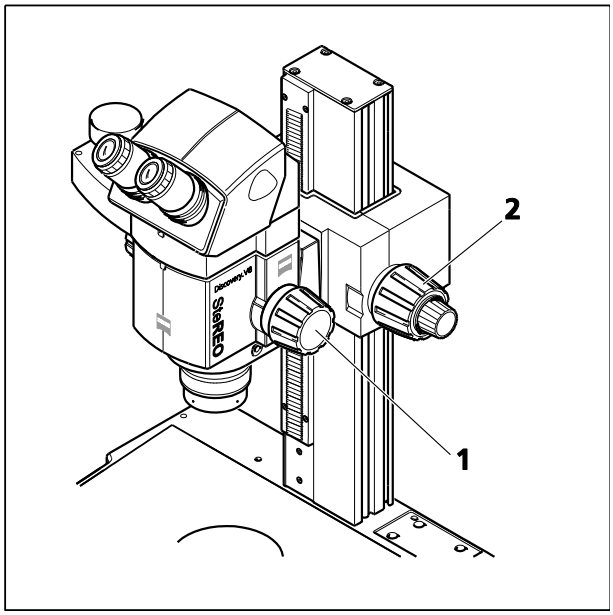


Fig. 30 **Adjusting the stereomicroscope (manual zoom and focusing, e.g. SteREO Discovery.V8)**

4.1.3 Adjusting the stereomicroscope

☞ Before using the motorized focusing drive for the first time, you must adjust the mechanical stops for the travel range (see Section 3.10).

The stereomicroscope has been connected and switched on. Focus and zoom can be controlled via HIP or SYCOP. For more information see Section 4.2 or the separate instruction manual.

- Place the specimen in the center of the round stage insert (Fig. 29/**3**).
- Set the diopter-setting ring on focusing eyepieces (Fig. 29/**2**) to the required value, if known, otherwise set it to "0".
- Select the desired viewing height by swiveling the eyepiece sockets (Fig. 29/**1**) by maximally 120°; adjust them to your interpupillary distance. You should see an unclipped circle of light when you look into the eyepieces.

☞ Verify that the eyepieces have been pushed down in the tube up to the stop.

- Adjust the viewing angle in the range of 5° to 45° by tilting the binocular body.
- Turn knurled wheel (Fig. 29/**4**) to open the aperture diaphragm.
- At first, set the zoom (Fig. 29/**5**) to minimum magnification to find the object to be examined.
- Focus on a small, prominent feature in the center of the image (Fig. 29/**6**).
- Adjust the maximum zoom value (Fig. 29/**5**). Because of the high magnification, it is likely that the feature appears blurred again and off center.
- Search for the feature by moving the specimen and exactly re-focus on it (Fig. 29/**6**).
- Then, set the minimum zoom again (Fig. 29/**5**) and correct for any existing image blurring by separately turning the diopter-setting rings of the focusing eyepieces (Fig. 29/**2**) to compensate for defective vision.

Once the microscope has been adjusted in this way, the image will remain focused throughout the entire zoom range.

If desired, connect a camera of your choice to the camera port of the ergo phototube (Fig. 29/**8**). To switch the light path over, turn the lever (Fig. 29/**7**) over. The right light path is reflected at 100 %.

☞ After the operator has changed, steps 2 … 4 must be repeated.

☞ After having changed the objective, repeat steps 6 through 9. If no objective nosepiece and no control via SYCOP are used, set the currently used objective on the HIP (see Section 4.2.2).

4.1.4 Coaxial epi-illumination

The coaxial epi-illumination S is mainly intended for the non-reflecting illumination of plane reflecting objects. A distinction is made between regular (mirroring) and diffuse reflection.

4.1.4.1 Diffuse reflection

In case of diffuse scattering objects, the switching lever for the illumination adjustment should be positioned for **all objectives** in front position **C** (Fig. 31/**2**), because with such objects no vignettation is produced and the illumination in this position is brighter and more homogeneous.

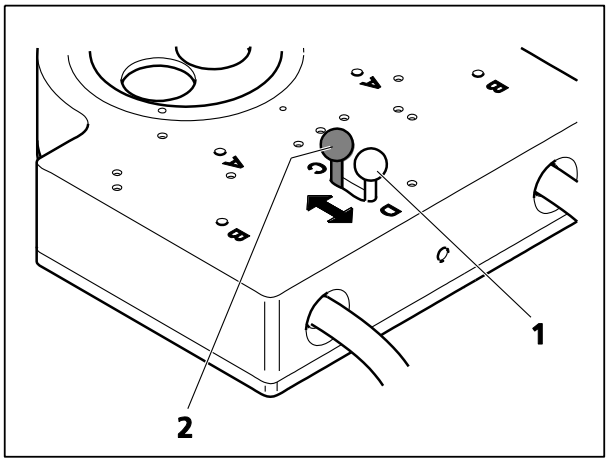


Fig. 31 **Switching lever for optimizing the illumination of the specimen field (mounted at the bottom side)**

4.1.4.2 Regular reflection

For **objectives S 1.0x** the switching lever, used for optimizing the illumination of the specimen field for different objectives, has to be in rear position **D** (Fig. 31/**1**). For **all other objectives** the lever has to be in front position **C** (Fig. 31/**2**).

To achieve a more homogeneous illumination for magnifications equal to or larger than those indicated in the table on page 2, you can place the lever to front position **C** (Fig. 31/**2**) without additional vignettation also for objectives S 1.0x.

Objective S	**Avoidance of vignettation in standard front position C above**	
	(in units of zoom magnification)	(total magnification with eyepieces 10x/23)
Plan Apo S 1.0x	1.1x	11.0x
Plan S 1.0x	1.4x	13.6x
Achromat 1.0x	1.8x	17.8x

☞ For vertical observation with the objective slider S/doc the lambda-quarter cap has to be used.

Hints for application with regular reflection:

In case of regular reflection, i.e., with objects reflecting the light of the illumination source directly into the objective, vignettations of the field of view are possible when using low zoom magnifications.

Using SteREO Discovery.V12/V20 with eyepieces 10x/23, the Plan Apo S 1.0x objective works nearly without vignettation.
Using SteREO Discovery.V8 with eyepieces 10x/23, the Plan Apo S 1.0x, Plan S 1.0x, and Achromat S 1.5x objectives are nearly without vignettation. The documentation remains unimpaired in these cases.

With objectives < 1.0x the maximum specimen fields are smaller than with objectives 1.0x because of extensive vignettations.

With objectives > 1.0x higher magnifications and a better resolution can be achieved. Vignettation, however, should be considered when choosing the eyepiece.

4.1.5 Adjusting the PentaFluar S/X-Cite

When working with UV excitation light, ultraviolet radiation is incident on the object surface. Strictly avoid direct exposure to the skin. Take appropriate precautions when manipulating in the object plane (e.g. gliding stage, gloves, UV protection cream, etc.).
When working with UV light, always swing in the fluorescence protection screen (dazzle protector) in front of the specimen to protect your eyes from scattered light.
Before swinging in another filter block, make sure to pull the slider (Fig. 32/**1**) on the vertical illuminator always to the frontmost position (blocking position).

Make sure the stereomicroscope has been adjusted according to Sections 4.1.2 to 4.1.3.

- Pull slider (Fig. 32/**1**) on PentaFluar vertical illuminator into the frontmost position (blocking position).
- Switch on the fiberoptic light source of the PentaFluar vertical illuminator (e.g. HXP 120 or HXP 200 light sources, Excelitas X-Cite or Xylis light sources) and let it warm up about 5 minutes.
- Put the object into the center of the round stage insert (Fig. 29/**3**).
- Turn the filter wheel of the vertical illuminator to move a filter position into the light path.
- Push the slider on the PentaFluar vertical illuminator (Fig. 32/**1**) into the mid-position (blank aperture) or the backmost position (position with red attenuation filter).
- Open the iris diaphragm (Fig. 32/**2**) of the vertical illuminator completely by pushing the lever fully back.
- Focus the specimen and choose the desired magnification.

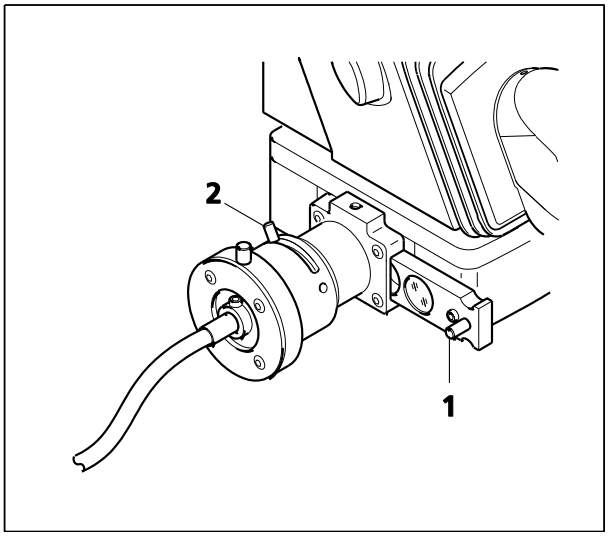


Fig. 32 Adjusting the vertical illuminator

To minimize bleaching of the specimen, you may first focus on it with brightfield illumination (if available) before using the vertical illuminator.

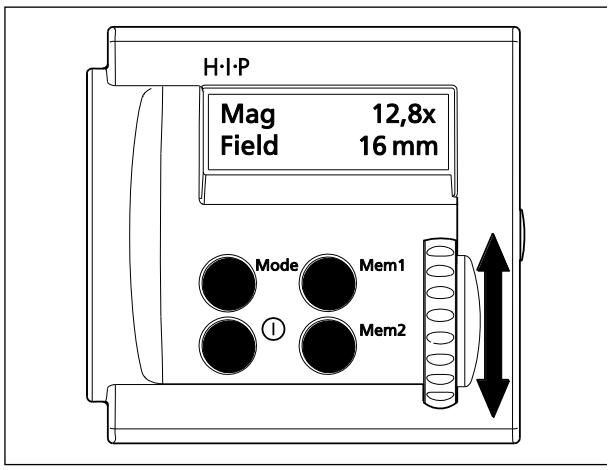


Fig. 33 Design of HIP control unit

4.2 Human Interface Panel (HIP)

The HIP control unit can be used to operate the microscope (without SYCOP). One HIP controls the motorized focusing drive (Fig. 4/**16**), while the second one controls the microscope body (Fig. 4/**17**). With the SYCOP unit connected, the HIP is not necessary and usable only to a limited extent.

The HIP contains a two-line display.

Besides, it has four function keys: **Mode**, ⏻ (Standby), **Mem1** and **Mem2**.

The knurled wheel can be moved up and down and pressed.

Two modes are selectable: **Basic Mode** for microscope operation and the **Setting Mode** for adjusting specific parameters.

4.2.1 Functional elements on HIP

Zoom control unit	Focus control unit
Two-line display	**Two-line display**
– Display of magnification (Mag) in the top line	– Display of focus position Z in the top line
– Press the **Mode** key briefly to display further parameters.	– Press the **Mode** key briefly to set the focus value to zero.
– In Setting Mode: Display of parameters and the current or selected value	– In Setting Mode: Display of parameters and the current or selected value
Knurled wheel ⬆⬇	**Knurled wheel ⬆⬇ with key function**
– ⬆ Adjustment of a higher zoom value	– ⬆ Moves focusing drive up
– ⬇ Adjustment of a lower zoom value	– ⬇ Moves focusing drive down
	– Press briefly: Switches between various focusing modes.
– ⬆⬇ In Setting Mode: Selects list entry	– ⬆⬇ In Setting Mode: Selects list entry
Mem1/Mem2 keys	**Mem1/Mem2 keys**
– Press briefly to set the stored zoom value	– Press briefly to set the stored focus position
– Press for two seconds (confirmation beep) to store the currently set zoom value	– Press for two seconds (confirmation beep) to store the currently set focus position

Zoom control unit	Focus control unit
Mode key	**Mode key**
– Briefly press this key repeatedly to display field size (Field of View), resolving power (Resolution) and depth of focus (Depth of Focus) successively.	– Press **Mode** key briefly to reset the focus value to zero.
– Press it for two seconds to switch to the Setting Mode	– Press it for two seconds to switch to the Setting Mode
– In Setting Mode: Press it briefly to select parameters	– In Setting Mode: Press it briefly to select focus parameters
NOTE: Press the key for two seconds to switch to Basic Mode and permanently store the newly selected parameter values.	NOTE: Press the key for two seconds to switch to Basic Mode and permanently store the newly selected parameter values.
⏻ **key**	⏻ **key**
– Switches HIP ON/OFF (Standby)	– Switches HIP ON/OFF (Standby)

4.2.2 Menu guidance in Setting Mode

☞ The parameters of the zoom control unit are partly different from those of the focus control unit (see the following parameters table).
For acoustic confirmation of new values, please activate the **Beep Level** function.

To change any parameters, switch from Basic Mode to Setting Mode.

- To this end, press the **Mode** key for two seconds until a confirmation beep (2x briefly) is generated and the display switches over.

On the display, the first parameter and the corresponding value are displayed, e.g.: `Set Lens 1x`

- Press the **Mode** key several times to select the desired parameter.
- To change the value of the selected parameter, move the knurled wheel up or down (⬆ ⬇) until the desired value is displayed, e.g.: `Set Lens 0.63x ⬆ 1x ⬆ 1.5x`
- Press the **Mode** key once more to select the next parameter.

If you have set all parameters, you can return to the Basic Mode.

- To this end, press the **Mode** key for two seconds until a confirmation beep (1x long) is generated and the display switches over. All changed values are being stored now.

☞ The new values will be stored permanently only after switchover to the Basic Mode. Switching the device off at the ⏻ key or disconnecting the power supply in Setting Mode will result in losing the changed values.

General parameters		**Values**	**Remarks**
Backlight	Adjustment of display backlight	12-stage progress bar	⬆ Increase background brightness ⬇ Reduce background brightness
Beep Level	Switching the confirmation beep ON/OFF	ON → OFF	Activation is recommended

Zoom parameters (Zoom control unit only)		**Value**	**Remarks**
Set Lens	Change of objective magnification	Achro 1.5x Achro 1.25x Achro 1.0x Achro 0.63x Achro 0.5x Achro 0.3x PlanApo 3.5x PlanApo 2.3x PlanApo 1.5x PlanApo 1.0x PlanApo 0.63x Plan 1.0x	Required for the correct display of magnification
Conv. 1.5x ?	Converter 1.5x mono	NO → YES	Use/do not use the converter S 1.5x mono
Set Eyepiece	Change of eyepiece magnification	25x/10foc 16x/16Br foc 10x/23Br foc 10x/20Br foc	Required for the correct display of magnification
Confirmation	Activating/deactivating the start query	ON → OFF	Start query is useful only if the magnifications of objectives/eyepieces are to be changed frequently
Zoom Speed	Adjustment of setting speed	1 → 2 → 3	Flat → steep speed profile
Reset Param?	Reset to factory defaults	NO → YES	

Focus parameters (Focus control unit only)		**Values**	**Remarks**
Focus Speed	Adjustment of setting speed	1 → 2 → 3 Slow → fast	Relevant only to Focus Speed not to Fine Focus
Reset Param?	Reset to factory defaults	NO → YES	

4.3 Manual Rotary Control unit (MaRC)

The MaRC unit is used to operate the motor focus and zoom functions of the microscope (also without SYCOP).

All versions of the focus motor of SteREO Discovery can be controlled, except for focus motor 1 (435401-0000-000).

MaRC offers the following scope of functions:

- Control of focus motor by using the coarse (Fig. 34/**8**) and fine drive knob (Fig. 34/**9**).
- Travel to zoom clickstop positions by pressing briefly keys **1** and **2** (Fig. 34/**1** and **2**).
- Quick zooming in positive and negative directions by means of a pair of keys – long press of keys **1** and **2** (Fig. 34/**1** and **2**).
- Quick focusing in positive and negative directions by means of a pair of keys – long press of keys **4** and **5** (Fig. 34/**4** and **5**)
- Storing a focus position – key **3** (Fig. 34/**3**).
- Travel to the stored position – key **3** (Fig. 34/**3**).
- Reversing the sense of rotation of the MaRC unit – key **3** (Fig. 34/**3**).

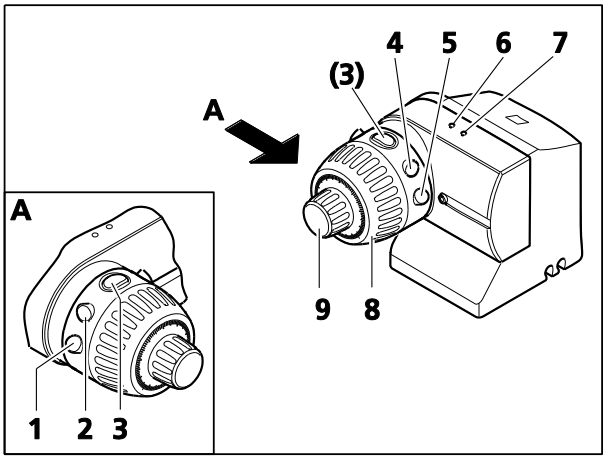


Fig. 34 MaRC control unit

4.3.1 On-position

In systems provided with the EMS module, MaRC is switched on by switching on the EMS module. In systems without EMS, MaRC is switched on as soon as it is connected to a mains adapter (patch cable) via the CAN bus.

After power ON, the stored focus position will remain unchanged, provided that a focus position was stored and MaRC was switched off properly by **Shut Down** after it was used the previous time. If it has not been switched off properly, the switch-on focus position will be set as stored value.

If a focus motor ready for operation is connected, the blue LED (Fig. 34/**7**) will be lighting.

MaRC is immediately ready for operation.

4.3.2 Control of motorized focus by means of coarse and fine drive

The motorized focus can be controlled quickly or slowly by turning the coarse (Fig. 34/**8**) or the fine drive (Fig. 34/**9**).

If a motorized zoom body is used, the sensitivity of the coarse/fine drive depends on the zoom magnification set and on the configured objective.

4.3.3 Travel to zoom clickstop positions

By briefly (≤ 200 ms) pressing key **1** or **2** (Fig. 34/**1** or **2**), the zoom body will travel to the next lower or next higher clickstop position.

A clickstop counter will be incremented or decremented accordingly if key **2** or **1** is pressed briefly several times.

The clickstop travel of the zoom body starts 200 ms after the last keystroke. Travel will stop exactly at the magnification position indicated on the HIP panels according to the current objective/eyepiece combination.

4.3.4 Quick zooming in positive or negative direction by means of a pair of keys

By pressing key **1** or **2** (Fig. 34/**1** or **2**) for more than 200 ms, the zoom body will start traveling and not stop until you release the respective key or the end of travel is reached.

At the beginning, speed will increase linearly with the duration of the keystroke until the maximum speed is reached.

The reachable maximum speed depends on the currently active speed profile settable via HIP.

4.3.5 Quick focusing in positive or negative direction by means of a pair of keys

By pressing key **4** or **5** (Fig. 34/**4** or **5**), the motorized focusing system will start traveling upwards (**5**) or downwards (**4**) until you release the respective key or the end of travel is reached.

At the beginning, speed will increase linearly with the duration of the keystroke until the maximum speed is reached.

The reachable maximum speed does not depend on the currently active speed profile settable via HIP.

4.3.6 Storing a focus position

The current focus position will be stored when key **3** (Fig. 34/**3**) is being pressed between 2 s and 5 s.

The green LED (Fig. 34/**6**) briefly lighting up and **one** short beep tone on the motorized focusing system will indicate the completion of the storing process after 2 s.

4.3.7 Traveling to the stored focus position

When pressing key **3** (Fig. 34/**3**) for less than 2 s, the motorized focusing system will travel to the stored focus position.

4.3.8 Reversing the sense of rotation of MaRC

The sense of rotation will be reversed when key **3** (Fig. 34/**3**) will be pressed for more than 5 s.

The green LED (Fig. 34/**6**) briefly lighting up twice and **two** short beep tones on the motorized focusing system will indicate that change-over has been completed.

That means that, altogether, key **3** must be pressed until the green diode has lighted up **three times** and **three** beep tones have been produced by the motorized focusing system.

4.4 Operating the objective nosepiece S/doc, 3x, 6x cod.

The objectives are changed by rotating the objective nosepiece (Fig. 35/**2**) to the lock-in position of the desired objective. It is recommended to hold the nosepiece on the right by the slit-ring illuminator d = 66 mm without light guide.

For each objective, a lock-in position for stereo (S) and another for documentation (doc) is available.

If an Y intermediate tube (Fig. 35/**1**) has been attached, a binocular image can be produced in the macroscope position of the objective by pushing in the lever (Fig. 35/**3**).
For documenting purposes via the binocular phototube it is recommendable to use the stereo position of the Y intermediate tube also in the macroscope position of the objective in order to allow the full amount of light to pass to the camera.

Without the Y intermediate tube, no image will appear in the left eyepiece when the objective is in macroscope position.

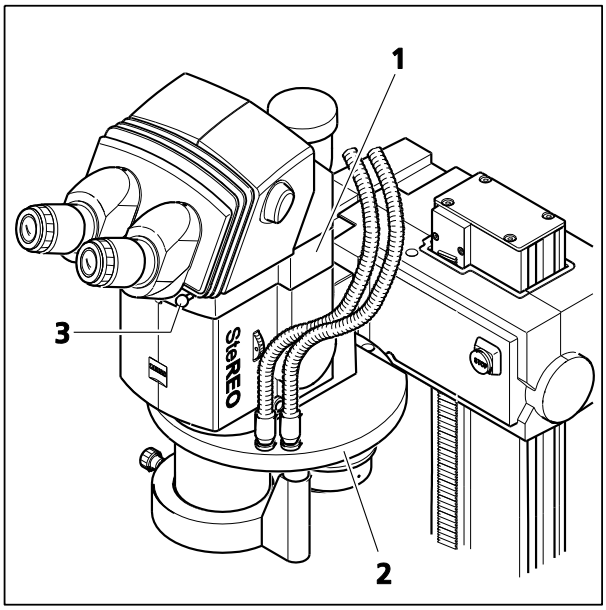


Fig. 35 **Objective nosepiece S/doc, 3x, 6x cod.; Y intermediate tube S**

CAUTION
When operating the objective nosepiece S/doc manually with the left coarse focusing knob without paying attention, there is a possible danger of injury due to the edges of the objective nosepiece S/doc.

CAUTION
Take care to avoid colliding of the objective with the stage equipment or the specimen! If you use the objective nosepiece S/doc, adjust the travel of the motorized focusing drive (see section 3.10 on page 47) in such a way that there is sufficient space between the objective with the largest end-to-end dimension and the microscope stage.

If you use the objective nosepiece, not all objectives can be combined with each other. The following table shows you the possible combinations:

Combination of objectives with/without converter when using the objective nosepiece combinable not combinable	PlanApo S 0.63x	PlanApo S 1.0x	PlanApo S 1.5x	PlanApo S 2.3x	PlanApo S 3.5x	Plan S 1.0x	Achromat S 0.3x	Achromat S 0.5x	Achromat S 0.63x	Achromat S 1.0x	Achromat S 1.25x	Achromat S 1.5x
PlanApo S 0.63x	X											
PlanApo S 1.0x		X										
PlanApo S 1.5x			X									
PlanApo S 2.3x				X								
PlanApo S 3.5x					X							
Plan S 1.0x						X						
Achromat S 0.3x							X					
Achromat S 0.5x								X				
Achromat S 0.63x									X			
Achromat S 1.0x										X		
Achromat S 1.25x											X	
Achromat S 1.5x												X

4.5 Documentation equipment

4.5.1 Objective slider S/doc

CAUTION
The objective slider can be used only in combination with mount S (with Ø 76 mm support). It is non-operational in combination with the objective nosepiece S/doc, 3x.

CAUTION
After mounting the objective slider, the lower limit switch on the motorized focusing drive must be readjusted (see section 3.10 on page 47).

The following phototubes and intermediate phototubes can be used in combination with the objective slider S/doc and the objective nosepiece S/doc:

- Binocular ergo phototube S (4351000-0000-000)
- Binocular phototube S (435107-0000-000)
- Intermediate phototube S mot., right 100/100 (435118-0000-000)
- Intermediate phototube S, left 100/100 (435108-9901-000)
- Intermediate phototube S, right, 3 pos. (435103-9000-000) and
- Intermediate phototube S with two output ports 50/50 (435109-0000-000)

4.5.1.1 Mounting

- Move the focusing drive upwards to create a free space of about 20 cm.
- Unscrew the objective (Fig. 36/**5**) from the microscope body (Fig. 36/**1**). Attach the lens-protective cap.
- Hand-tighten the clamping screw (Fig. 36/**4**) onto the objective slider.
- Hold the objective slider (Fig. 36/**3**) with both hands and screw it into the microscope body (Fig. 36/**1**) as far as it will go.
- Screw the objective (Fig. 36/**5**) into the objective slider (Fig. 36/**3**) as far as it will go. Remove the lens protective cap again.
- Loosen the clamping screws (Fig. 36/**2** and **4**).
- Align the clamping screw (Fig. 36/**4**) of the objective slider and the joint of the microscope body (Fig. 36/**1**) with the clamping screw (Fig. 36/**2**) (Fig. 36/**6**).
- Hand-tighten the clamping screws (Fig. 36/**2** and **4**).

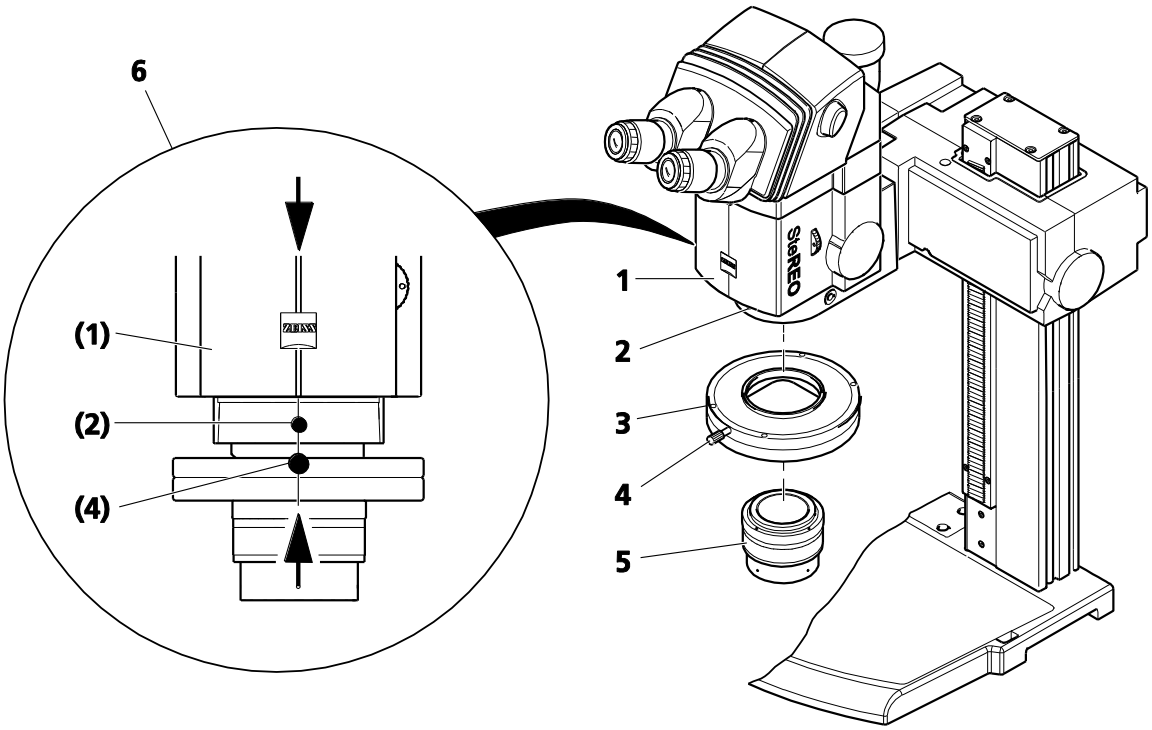


Fig. 36 Mounting the objective slider S/doc

4.5.1.2 Operation

The objective slider allows you to position the objective in the following three click-stop positions:

← LEFT:	MIDDLE:	RIGHT →
for vertical and monocular imaging, via the left light path, of a specimen detail 12 mm to the left from position **A** (Fig. 37).	for stereoscopic imaging of the specimen detail (**A**).	for vertical and monocular imaging, via the right light path, of a specimen detail 12 mm to the right from position **A** (Fig. 38).

Documentation using intermediate phototubes:

- Push the sliding knob (Fig. 37/**1**) to the front stop position to deflect the light ray to the camera port.
- Move the objective carefully to the left stop position of the objective slider.

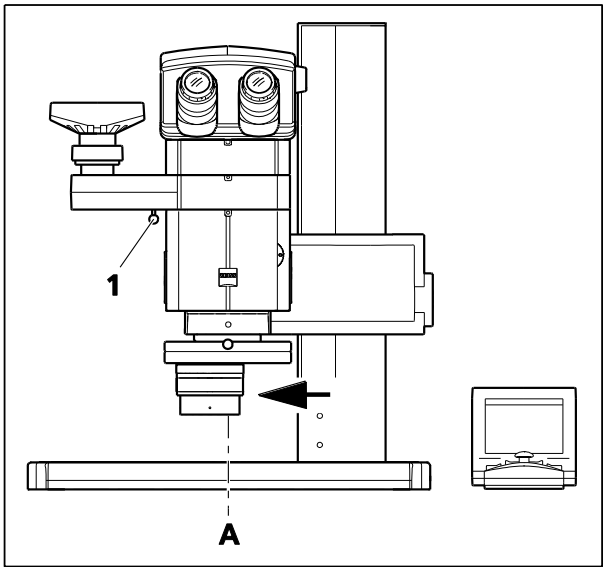


Fig. 37 **Objective slider S/doc with intermediate phototube**

Documentation using ergo phototubes:

- Turn the lever (Fig. 38/**1**) to the rear position to deflect the light ray to the camera port.
- Move the objective carefully to the right stop position of the objective slider.

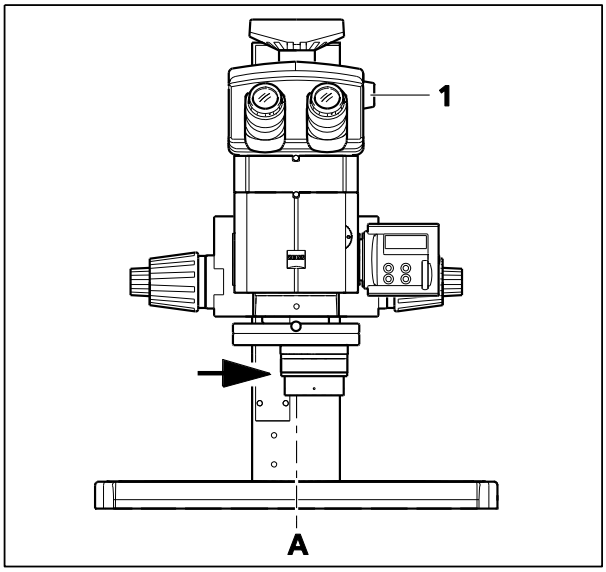


Fig. 38 **Objective slider S/doc with ergo phototube**

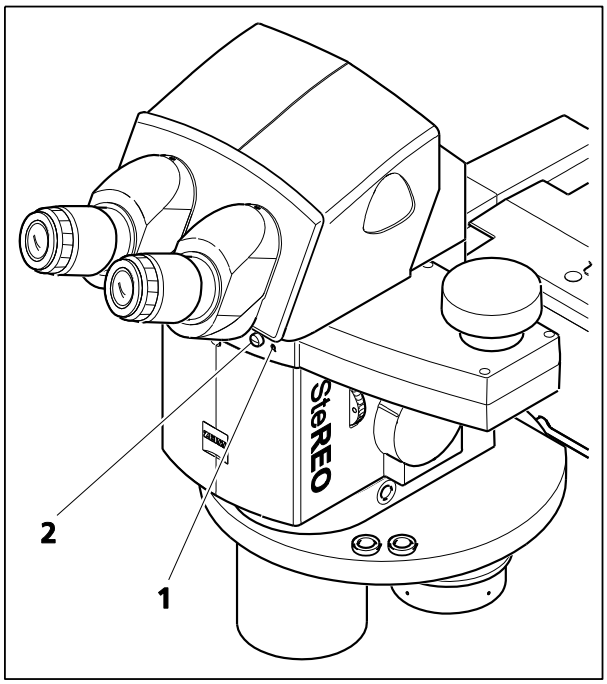


Fig. 39 Intermediate phototube S mot., right 100/100

4.5.2 Intermediate phototube S mot., right 100/100

Using the intermediate tube S mot., right 100/100, a camera can be connected on the right side of the microscope body.

- Mount the intermediate phototube between the microscope body and the binocular tube (see Section 3.1.4).
- Link the CAN bus port of the intermediate tube (on the back) with:
  - CAN bus connector of the focus motor or
  - CAN bus connector of the EMS Electronic Module or
  - a free CAN bus connector of another CAN bus accessory component or
  - Plug-in power unit RJ45-CAN (direct power supply).
- Change over the beam path between the camera port (doc) and the binocular tube by briefly pressing the button (Fig. 39/**2**). If the camera port is active, the blue LED (Fig. 39/**1**) in the front part of the intermediate phototube is lighting.

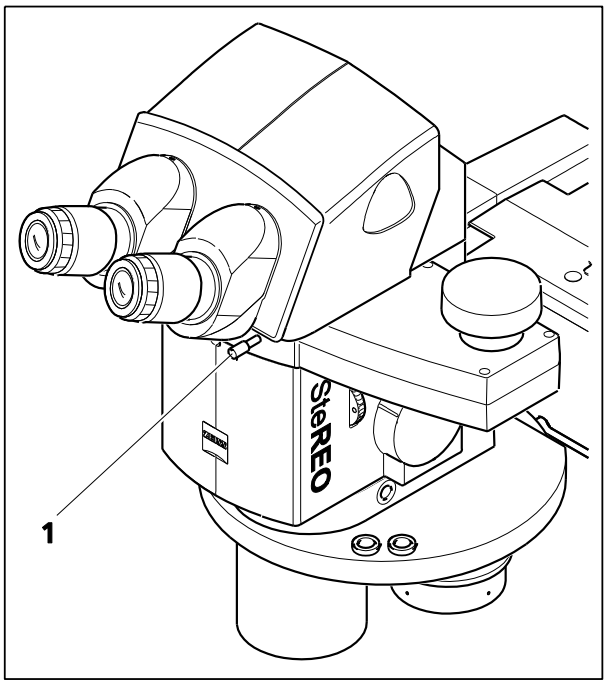
The intermediate phototube may also be switched via SYCOP 3 or ZEN blue/ZEN core software.

4.5.3 Intermediate phototube S, right, 3 pos.

Using the intermediate phototube S, right, 3 pos., allows you to connect a camera to the right channel of the microscope body. This is, in particular, the prerequisite for documentations with the objective nosepiece S/doc in macroscope position.

The design of the intermediate phototube allows you to couple out optionally 0 %, 50 % or 100 % of the light from the right stereo channel to the camera port on the right side.

- Mount the intermediate phototube to the microscope body or above another intermediate tube, if existing.



1 Slide rod

Fig. 40 **Intermediate phototube S, right, 3 pos.**

Light portions in the three ports (visual - left, visual - right, and camera) of the intermediate phototube S, right, 3 pos.:

Use	Slide rod position (Fig. 40/1)	Visual - left	Visual - right	Camera
Universal position	pushed in	50	50	50
Documentation at high luminosity	middle position	100	0	100
Observation at high luminosity	pulled out	100	100	0

The "universal position" allows stereoscopic observation through both eyepieces and, at the same time, camera documentation. All three ports provide the same brightness due to the intermediate phototube attenuating the left channel light intensity to the half.

In the position "Documentation at high luminosity", all of the light of the right stereo channel is reflected to the camera. Visual observation at full intensity is only possible in the left channel and in a two-dimensional format.

In the position "Observation at high luminosity", all of the light of the left and right stereo channel is available for the eyepieces. No light is sent to the camera.

4.5.4 Y intermediate tube S

The Y intermediate tube S allows binocular observation with the objective nosepiece S/doc, 3x, 6x cod. in macroscope position.

- Push in the slide rod (Fig. 35/**3**) on the Y intermediate tube (Fig. 35/**1**) in order to obtain a binocular image in the macroscope position.
- Pull out the slide rod (Fig. 35/**3**) for stereoscopic observation.

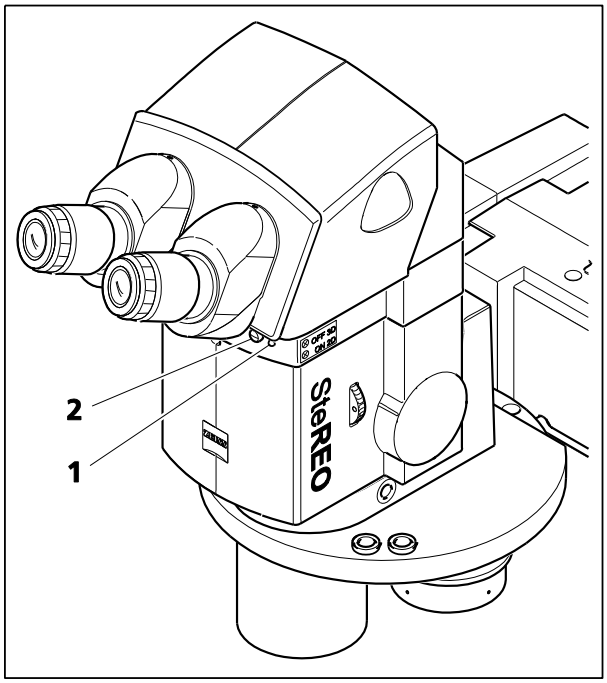


Fig. 41 Y intermediate tube S mot

4.5.5 Y intermediate tube S mot

With the Y intermediate tube S mot mounted, the image of the right channel can be conducted to both eyes (just as with the manually operated Y intermediate tube S, see Section 4.5.4).
The two positions **OFF** and **ON** have the following meanings:

– OFF 3D:
The stereo observation over the left and right channel remains unaffected. The LED (Fig. 41/**1**) is dark.

– ON 2D:
50 % of the light from the right channel is conducted to the left channel for a binocular, but two-dimensional observation. The LED (Fig. 41/**1**) is lighting blue.

The motorized Y intermediate tube S is an appropriate means for binocular observations if the objective nosepiece S/doc, 3x, 6x cod. is to be used in mono mode and the switching positions (3D = stereo or 2D = mono/doc) shall change automatically.

- Mount the Y intermediate tube directly beneath the binocular tube or the binocular phototube (see Section 3.1.4).

☞ If, instead of a binocular phototube, an intermediate phototube shall be used, it must couple out the right channel to the camera. The intermediate phototube S, right, 3 pos. (see 4.5.3) or the intermediate phototube S mot, right, 100/100 (see 4.5.2) should always be mounted beneath the Y intermediate tube to make sure that the nominal light yield is obtained for the camera.

- Connect one of the two CAN connectors located on the back of the Y intermediate tube S mot with a CAN distributor (on EMS 3, focus motor or CMD-USB) by means of the 1 m long cable included.
- Connect the other CAN connector with the CAN connector of the objective nosepiece S/doc by means of the 0.5 m long cable included.
This enables the Y intermediate tube S mot to switch automatically, in dependence on the nosepiece operation. It may also be operated via SYCOP 3 or ZEN blue/ZEN core software.

- Automatic switching is also possible by connecting the plug-in power unit RJ45-CAN instead of the cable to the CAN distributor.

ATTENTION
At present, the combination of the Y intermediate tube S mot and the objective nosepiece S/doc must not be supplied with power via the HIP plug-in power unit.

- Irrespective of the automatic switching function, the switching position can be changed by briefly pressing the button (Fig. 41/**2**). By switching the objective nosepiece, the Y intermediate tube S mot will return to the automatic operation mode.

4.5.6 Intermediate tube S mot mono with analyzer

Using the intermediate tube S mot mono, a polarization filter can be swung into/out of the right stereo channel.

- Mount the intermediate tube between the microscope body and the binocular tube (see section 3.1.4).
- Link the CAN bus port of the intermediate tube (on the back) with:
  - CAN bus connector of motor focus or
  - CAN bus connector of the EMS 3 module or
  - a free CAN bus connector of another CAN bus accessory component or plug-in power unit RJ45-CAN (direct power supply).
- Press the button (Fig. 42/2) briefly to swing the polarization filter into/out of the light path. If the filter is active, the blue LED (Fig. 42/1) at the front of the intermediate tube with analyzer is lighting.

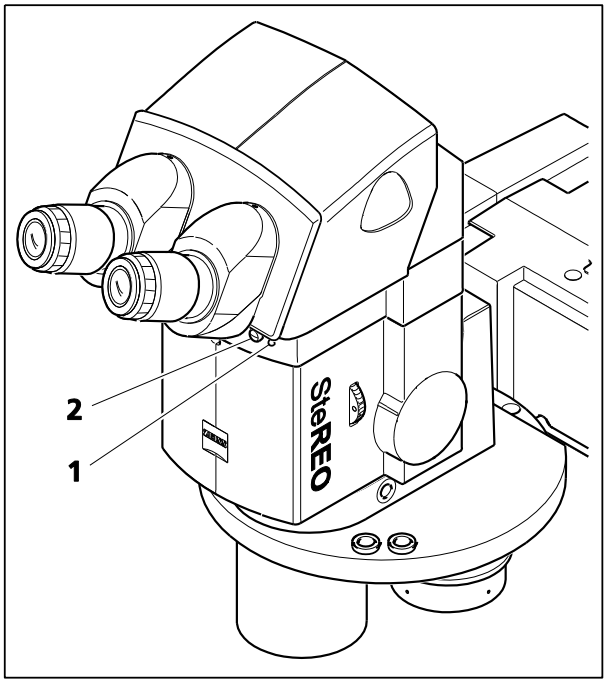


Fig. 42 **Intermediate tube S mot. with analyzer**

The filter may also be swung into/out of the light path via SYCOP 3 or ZEN blue/ZEN core software.

The direction of transmission of the intermediate tube with analyzer is east-west.

The polarizers of the associated reflected-light/transmitted-light device have to be adjusted with respect to the intermediate tube with analyzer.

As additional components for binocular observation, the objective slider S/doc or the objective nosepiece S/doc, 3x, 6x cod. and the Y intermediate tube S are recommended.

5 CARE, MAINTENANCE AND SERVICE

5.1 Care

Care of the instrument is restricted to the following operations:

The instruments are not equipped with any special devices for protection from corrosive, potentially infectious, toxic, and radioactive or other substances that may be hazardous to health. Make sure to observe all legal regulations when handling such substances, particularly the relevant national accident prevention regulations.

- Remove any instrument contamination in compliance with the relevant national accident prevention regulations.
- Switch off the instrument each time after use and place the instrument cover on it to protect it from dust and humidity.
- Never expose the instrument to impermissible climatic conditions (increased humidity and temperature) for extended periods.

Disconnect the devices from line power before cleaning them. Take care that no cleaning liquid enters the interior of the device.

Stubborn dirt on glass surfaces, such as fingerprints and traces of grease, is best removed with a cotton swab wrapped around a round stick and moistened slightly with distilled water or a non-corrosive solvent:

- Distilled water: Clean the glass surface with a slightly moistened cotton swab polishing in circles starting in the center and moving to the edges.
- Optics cleaning solution consisting of 15 % isopropanol and 85 % gasoline: Clean the glass surface with a slightly moistened cotton swab polishing in circles starting in the center and moving to the edges.
- Remove dust from optical surfaces using a natural-hair brush or an air blower.
- Clean plastic parts with a commercial cleansing agent (no solvent!). Stubborn dirt may be treated carefully with benzine or spirit.

5.2 Maintenance

When the motorized focusing drive is moved down, there is the **risk of hand crushing** in the working area.
Regularly check the travel of the motorized focusing drive for perfect functioning of the limit switches according to Section 3.10.

5.3 Consumables

You may order the following consumables directly from Carl Zeiss:

Designation	**Cat. No.**	**Remarks**
Opal glass plate, d = 84 mm	000000-1052-281	
B/W plastic plate, d = 84 mm	475290-9901-000	
B/W plastic plate, d = 120 mm	435430-0120-010	
Clear glass plate, d = 120 mm	435501-0002-000	
Clear glass plate, d = 84 mm	475265-0001-000	
Halogen lamp, 24 V 250 W	000000-0300-271	
Halogen lamp, 15 V 150 W	417053-0000-000	
Eyecup	444801-0000-000	2x required
Dust protection set	434303-0000-000	
Ball-headed screwdriver, 3 mm	000000-0069-551	
Power/CAN bus cable, 15-pin; 1.6 m	435600-8316-000	for EMS 3
Control cable of cold-light source	435600-8306-000	
USB 2.0 cable; 2.0 m	000000-0446-321	
Plug-in power unit RJ45-CAN, 24 V/1.25 A	000000-0514-784	
CAN cable, 0.5 m	000000-0423-039	
CAN cable, 1.0 m	000000-0451-206	

5.4 Service

All repairs of mechanical, optical or electronic components inside the SteREO Discovery may only be performed by Carl Zeiss service staff or specially **authorized** personnel.

To ensure optimum setting and trouble-free function of your microscope over an extended period, we recommend that you enter into a service/maintenance agreement with Carl Zeiss.

Please get in touch with your local Carl Zeiss representative for re-ordering any components or when service is required.

5.5 Product disposal

The product was developed, tested and produced in compliance with the regulations and guidelines of Environmental Law of the European Union in force.

The product and the corresponding accessories meet the requirements the EC RoHS Directive 2011/65/EU, including Directive 2015/863, as well as the WEEE Directive 2012/19/EU.

The product contains electronic components which must not be disposed of in household waste. Rather, they have to be disposed of as specified in WEEE Directive 2012/19/EU and in compliance with the national laws in force.

Please contact your Carl Zeiss dealership or customer service organization if you need more information on disposal and recycling.

6 ANNEX

6.1 List of abbreviations

Br	For spectacle wearers
CAN	Controller Area Network
CMO	Common main objective
EMS 3	Electronic Module Stereomicroscopes, Version No. 3
Eyep	Eyepiece
Fl	Fluorescence
Foc	Focusable
FocSp	Focusing speed
FWD	Free working distance
HIP	Human Interface Panel, stand-alone control panel for zoom body or motorized focusing device
KL	Cold light
Mag	Magnification
MC 1500	VisiLED Multiple Controller 1500
Obj	Objective
PentaFluar S	Fluorescence illuminator with space for max. 5 FL filter cubes
PL	Plane field, stereo
RL	Reflected light
RS232	Recommended Standard 232
SpProt	Specimen protection
SteREO	Redefine In Ergonomy and Optics in Stereomicroscopy
SYCOP 3	System Control Panel, version 3
s/w	Black/white
TL	Transmitted light
USB	Universal Serial Bus
UV	Ultra violet
VisiLED	Light emitting diode in visible range
V8	Vario/zoom with factor 8
V12	Vario/zoom with factor 12
V20	Vario/zoom with factor 20
ZoomSp	Zoom speed