Mikroskop Technik Rathenow

Stereomicroscope - Technics - SMT 4

Stereomicroscope - Zoom - SMC 4

Brief description & Technical Data

Stereomicroscope - Technics - SMT 4

Technical studies in quality assurance

The SMT 4 is a stereomicroscope of telescope type (Galilei) with a parfocal infinity optics and a five-step magnification changer.

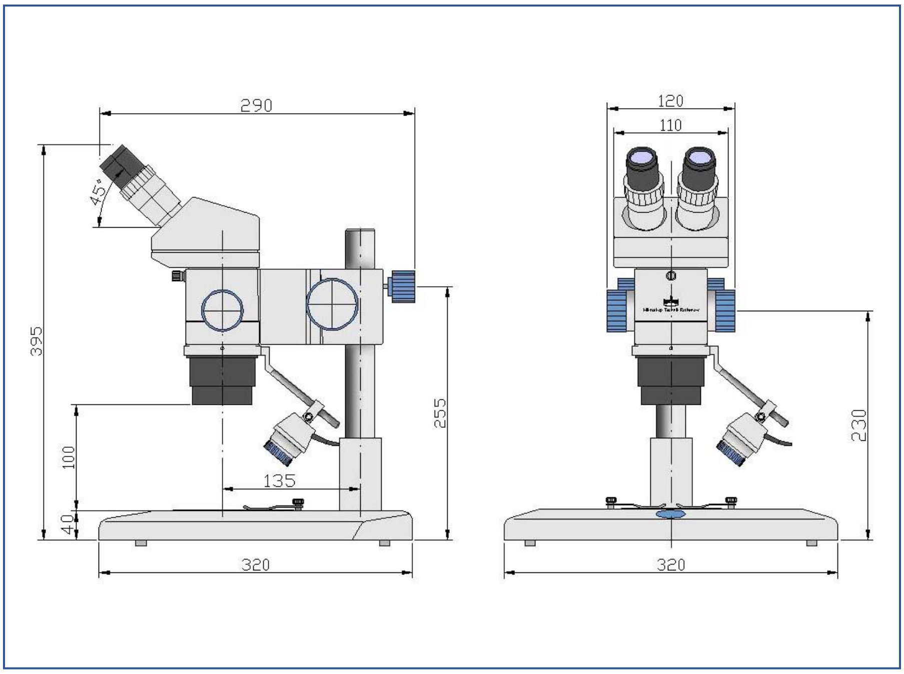
The easy possibility to mount the microscope at machines, the compact and modular design and the large working distance provide an unhindered manipulation at the object.

Expedient arranged interfaces allow a fast retrofitting of interchangeable lenses, positioning stages, illuminations and equipment for a photographic or video image documentation.

SMT 4 - with 3W-LED Spot illumination and Large stand with column 367mm

Technical Data

Zoom factor (5 fixed steps):	10:1	
Magnification (Standard):	5x; 10x; 16x; 25x; 50x	Magnification (min; max): 1x … 250x
Object field (Standard):	40; 20; 12,5; 8; 4mm	Object field (min; max): 0,8… 160mm
Working distance (Standard):	100mm	Working distance (min; max): 30 … 393mm
Interpupillary distance:	52 … 78mm	
Adjustment ametropia:	+/-5 dpt.	
Weight:	app. 8kg	
Photo-/TV-Exit:	no, optional accessories	



Dimensions W x D x H (mm): 320 x 320 x 395

Magnification tables

The following magnification table is showing possible magnifications and object fields ∅ (mm) in combination with different eyepieces and supplementary lenses.

Binocular tube 1.6x, Magnification changer in steps 0.32x - 0.63x - 1x - 1.6x - 3.2x						
	Total magnification / Object field Ø (mm)					
Objective Working distance	**Magnification changer**	**Eyepiece 6,3x (25)**	**Eyepiece 10x (20)**	**Eyepiece 12,5x (20)**	**Eyepiece 16x (12,5)**	**Eyepiece 25x (8)**
Supplementary lens 0,5x 164mm	**0,32x**	1,6x / 100	2,5x / 80	3,2x / 80	4x / 50	6,3x / 32
	0,63x	3,2x / 50	5x / 40	6,3x / 40	8x / 25	12,5x / 16
	1x	5x / 32	8x / 12,5	10x / 25	12,5x / 16	20x / 10
	1,6x	8x / 20	12,5x / 16	16x / 16	20x / 10	32x / 6,2
	3,2x	16x / 10	25x / 8	32x / 8	40x / 5	63x / 3,2
Planachromat 1x 100mm N.A. ~0,1	**0,32x**	3,2x / 50	* 5x / 40	6,3x / 40	8x / 25	12,5x / 16
	0,63x	6,3x / 25	10x / 20	12,5x / 20	16x 12,5	25x / 8
	1x	10x / 16	16x / 12,5	20x / 12,5	25x / 8	40x / 5
	1,6x	16x / 10	25x / 8	32x / 8	40x / 5	63x / 3,2
	3,2x	32x / 5	50x / 4	63x / 4	80x / 2,5	125x / 1,6
Supplementary lens 2x 30mm	**0,32x**	6,3x / 25	10x / 20	12,5x / 20	16x / 12,5	25x / 8
	0,63x	12,5x / 12,5	20x / 10	25x / 10	32x / 6,3	50x / 4
	1x	20x / 8	32x / 6,3	40x / 6,3	50x / 4	80x / 2,5
	1,6x	32x / 5	50x / 4	63x / 4	80x / 2,5	125x / 1,6
	3,2x	63x / 2,5	100x / 2	125x / 2	160x / 1,25	250x / 0,8

Standard equipment

Binocular tube 2x, Magnification changer in steps 0.32x - 0.63x - 1x - 1.6x - 3.2x						
	Total magnification / Object field Ø (mm)					
Objective Working distance	**Magnification changer**	**Eyepiece 6,3x (25)**	**Eyepiece 10x (20)**	**Eyepiece 12,5x (20)**	**Eyepiece 16x (12,5)**	**Eyepiece 25x (8)**
Achromat 0,25x 393mm	**0,32x**	1x / 160	1,6x/ 125	2x / 125	2,5x / 80	4x / 50
	0,63x	2x / 80	3,2x / 63	4x / 63	5x / 40	8x / 25
	1x	3,2x / 50	5x / 40	6,3x / 40	8x / 25	12,5x / 16
	1,6x	5x / 32	8x / 25	10x / 25	12,5x / 16	20x / 10
	3,2x	10x / 16	16x /12,5	20x / 12,5	25x / 8	40x / 5
Achromat 0,32x 293mm	**0,32x**	1,25x / 125	2x / 100	2,5x / 100	3,2x / 63	5x / 40
	0,63x	2,5x / 63	4x / 50	5x / 50	6,3x / 32	10x / 20
	1x	4x / 40	6,3x / 32	8x / 32	10x / 20	16x / 12,5
	1,6x	6,3x / 25	10x / 20	12,5x / 20	16x / 12,5	25x / 8
	3,2x	12,5x /12,5	20x / 10	25x / 10	32x / 6,3	50x / 4
Achromat 0,4x 243mm	**0,32x**	1,6x / 100	2,5x / 80	3,2x / 80	4x / 50	6,3x / 32
	0,63x	3,2x / 50	5x / 40	6,3x / 40	8x / 25	12,5x / 16
	1x	5x / 32	8x / 25	10x / 25	12,5x / 16	20x / 10
	1,6x	8x / 20	12,5x /16	16x / 16	20x / 10	32x / 6,3
	3,2x	16x / 10	25x / 8	32x / 8	40x / 5	63x / 3,2
Planachromat 0,5x 185mm	**0,32x**	2x / 80	3,2x / 63	4x / 63	5x / 40	8x / 25
	0,63x	4x / 40	6,3x / 32	8x / 32	10x / 20	16x / 12,5
	1x	6,3x / 25	10x / 20	12,5x / 20	16x / 12,5	25x / 8
	1,6x	10x / 16	16x /12,5	20x / 12,5	25x / 8	40x / 5
	3,2x	20x / 8	32x / 6,3	40x / 6,3	50x / 4	80x / 2,5

			*			
Planachromat 1x 100mm N.A. ~0,1	**0,32x**	4x / 40	6,3x / 32	8x / 32	10x / 20	16x / 12,5
	0,63x	8x / 20	12,5x /16	16x / 16	20x / 10	32x / 6,3
	1x	12,5x /12,5	20x / 10	25x / 10	32x / 6,3	50x / 4
	1,6x	20x / 8	32x / 6,3	40x / 6,3	50x / 4	80x / 2,5
	3,2x	40x / 4	63x / 3,2	80x / 3,2	100x / 2	160x /1,25

* Standard equipment*

Total magnification = Supplementary lens * Magnification changer * Tube * Eyepiece
Mag_{Tot} = 0,5x * 3,2x * 1,6x * 10x = 25x

Object field$_{Eyepiece}$ = Eyepiece$_{Field\ of\ view}$ /(Magnification$_{Objective}$ *Magnification$_{Tube\ factor}$ *Magnification$_{Mag\ changer}$)
OF_{Eyep} = 20mm / (0,25 * 2 * 0,32)= 125mm

SMT 4, Planachromat 0,5x (Working distance 185mm), ½“ Chip Camera, 22“ Monitor Magnification and Object field Ø (mm)				
	Tube lens 1,6x		**Tube lens 2,0x**	
Magnification changer	**TV-Adapter 0,4x**	**TV-Adapter 0,63x**	**TV-Adapter 0,4x**	**TV-Adapter 0,63x**
0,32x	7x / 62,5	11x / 40	9x / 50	14x / 32
0,63x	14x / 32	22x / 20	18x / 25	28x / 16
1,0x	22x / 20	35x / 13	28x / 16	44x / 10
1,6x	36x / 12,5	56x / 8	45x / 10	70x / 6
3,2x	72x / 6,25	112x / 4	90x / 5	140x / 3

Magnification$_{Monitor}$ = Weidth Monitor / Object field$_{Camera}$
Mag_{Mon} = 447mm / 62,5mm = 7x

Object field$_{TV}$ = Weidth Camera chip / (Magn.$_{Objective}$ * Magn.$_{Mag\ changer}$ * Magn.$_{Tube\ lens}$ * Magn.$_{TV\text{-}Adapter}$)
OF_{TV} = 6,4 mm / (0,5 * 0,32 * 1,6 * 0.4) = 62,5mm

Stereomicroscope - Zoom - SMC 4

Universal Stereomicroscope - Zoom for Research and Development tasks

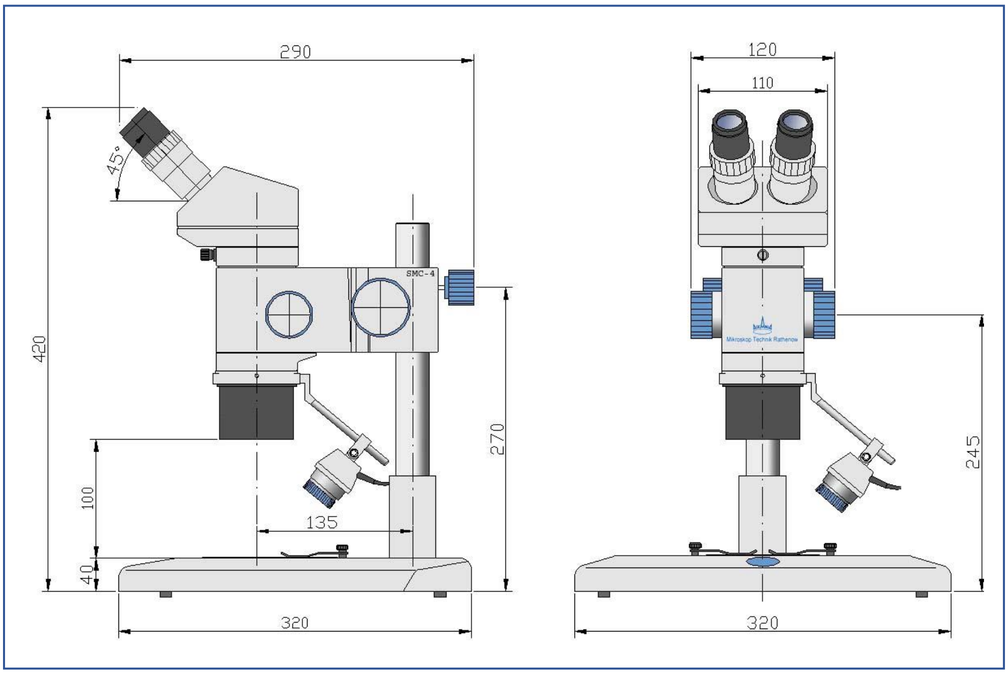
Scientists and developer of all industrial and scientific areas need a microscope equipment with a fast change between an overview magnification and a detailed magnification.

The SMC 4, with its large continuous Zoom range, is the suitable microscope for this demand. The microscope can be configured after the customer requirements due to its modular design and the wide range of accessories. That's why this system is optimal for a usage for many applications.

SMC 4 - with 3W-LED Spot illumination and Large stand with column 367mm

Technical Data

Zoom factor:	10:1		
Magnification (Standard):	6,3x … 63x	Magnification (min; max):	1x … 320x
Object field (Standard):	32 … 3,2mm	Object field (min; max):	0,6 … 160mm
Working distance (Standard):	100mm	Working distance:	26 … 210mm
Interpupillary distance (mm):	52 … 78		
Adjustment ametropia:	+/-5 dpt.		
Weight:	app. 8,5kg		
Photo-/TV-Exit:	no, optional accessories		



Dimensions W x D x H (mm): 320 x 320 x 420

Magnification table

	Zoom range 0,32x ... 3,2x (1:10)						22“ Monitor
	Total magnification min ... max (Binocular tube 2x) Object field – Ø (mm)						D-SLR Camera with APS-C Sensor
Objective	Eyepiece						Tube lens 2,0
Working distance	6,3x (25)	10x (20)	10x (25)	12,5x (20)	16x (12,5)	25x (8)	Photo-Adapter 1,6x
Achromat 0,25x 393 mm	1x ... 10x 160 ... 16	1,6x ... 16x 125 ... 12,5		2x ... 20x 125 ...12,5	2,5x ... 25x 80 ... 8	4x ... 40x 50 5	5x … 50x 87 … 8,7
Achromat 0,32x 293 mm	1,25x...12,5x 125 ... 12,5	2x ... 20x 100 ... 10		2,5 x ... 25x 100 ... 10	3,2x ... 32x 63 ... 6,3	5x ... 50x 40 ... 4	6,6x … 66x 68 … 6,8
Achromat 0,4x 243 mm	1,6x ... 12,5x 100 ... 10	2,5x ... 25x 80 ... 8		3,2x ... 32x 80 ... 8	4x ... 40x 50 ... 5	6,3x ... 63x 32 ... 3,2	8x … 80x 54 … 5,4
Planachromat 0,5x 185 mm	2x ... 20x 80 ... 8	3,2 ... 32 63 ... 6,3		4x ... 40x 63 ... 6,3	5x ... 50x 40 ... 4	8x ... 80x 25 ... 2,5	10x … 100x 43 … 4,3
GF-Planachromat 0,63x 175 mm	2,5x ... 25x 63 ... 6,3	4x ... 40x 50 ... 5	4x ... 40x 63 ... 6,3	5x ... 50x 50 ... 5	6,3x ... 63x 32 ... 3,2	10x ... 100x 20 ... 2	13x … 130x 34 … 3,4
GF-Planachromat 0,8x 126 mm	3,2x ... 32x 50 ... 5	5x ... 50x 40 ... 4	5x ... 50x 50 ... 5	6,3x ... 63x 32 ... 3,2	8x ... 80x 25 ... 2,5	12x ... 120x 16,5 ... 1,6	17x … 170x 27 … 2,7
GF-Planachromat 1x 100 mm N.A. ~0,11	4x ... 40x 40 ... 4	* 6,3x ... 63x 32 ... 3,2	6,3x ... 63x 40 ... 4	8x ... 80x 32 ... 3,2	10x ... 100x 20 ... 2,0	16x ... 160x 12,5 ... 1,25	21x … 210x 21 … 2,1

Standard equipment

Total magnification = $\text{Magnification}_{\text{Objective}}$ * Zoom factor * $\text{Magnification}_{\text{Tube lens}}$ * Eyepiece

Mag_{Tot} = 1 * 3,2x * 2x * 10x = 64x

Equipment/Variants

The microscopes SMT 4 and SMC 4 can be configured individually due to its modular design with different variants of bases, illuminations (reflected or transmitted light) based at Halogen or LED, Photo- or TV-Adapter, supplementary lenses, different positioning stages (e.g. for measurement tasks), polarization …

Stereomicroscope with coaxial illumination - SMT 4 Coax

The microscope is suited especially for the investigation of deep holes because of the large depth of field!

The coaxial illumination comes vertical to the object and the object will be illuminated shadow free. In this way the equipment is very suitable to see into bores of mechanical parts (longitudinal magnification 10:1).

Features:

Magnification:	4x … 40x
Object field (mm):	62,5 … 6,25
Objective:	Planachromat 0,5x
Working distance:	185mm
Cold light device:	Halogen or LED with flexible light guide

SMT 4 - with coaxial illumination

Stereomicroscope with straight insight - Oblique observation microscope

The basis for this configuration is the stereomicroscope SMT 4. New feature is: The eyepieces are aligned in a line with the objective and magnification changer. The microscope is mounted on a tiltable vertical axis so that it possible to adjust the right working position for each user. The result is a straight, ergonomic insight.

Another advantage of this configuration is, that corrosive soldering vapors (e.g. in prototype where under the microscope is soldered) no longer reach directly to the optics of the objective. The durability of the objective significantly increase.
The microscope is configured primarily with a fixed magnification, a magnification with a magnification changer in 5 fixed steps as option is possible.

SMT 4 - Oblique observation microscope

The magnification can individually configured by different eyepieces, tubes and main objectives. There are equipment with a magnification of 5x and an object field of 30mm (eyepiece GF-Pw 6,3x/25, tube 1,6x and objective Planachromat 0,5x) and magnification of 25x and an object field of 10mm (eyepiece GF-Pw 12,5x/20, tube 2x and objective Planachromat 1x).

The free and large working distance varies depending from the used configuration between 100mm (Planachromat 1x) and 185mm (Planachromat 0,5x). The built-in power supply into the base allows a connection of a 3W-LED Spot illumination, which can be adjusted in different positions around the main objective toward to the sample. A LED ring light illumination can be used for a shadow-free, uniform illumination - optional.

The microscope is mainly used in the area of prototyping, manufacturing and quality assurance. Typical applications are in the field of electronics, precision engineering (e.g. watch maker) or in the dental technology.

Additional possible Equipment/Variants

SMT 4 - with LED ring light illum. and phototube

SMC 4 - with LED ring light illumination

SMT 4 - with two observation tubes

SMT 4 - Fold bellows microscope (ergonomic)

SMT 4 - Control and Soldering Environment

SMT 4 - with LED ring light illumination

SMC 4 - with Multifunction tube, transmitted light base, Multi sample holder

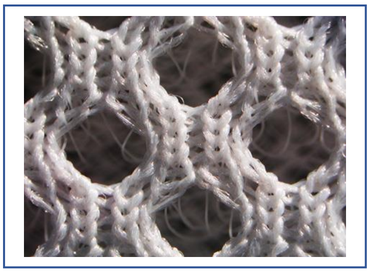
SMC 4 - configured at the mechanical stage K150x150 and USB camera

SMT 4 - with 3W-LED Spot illuminator mounted at the articulated arm

Applications

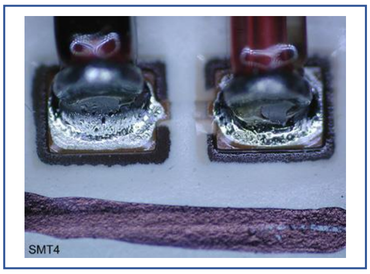
The SMT 4 and the SMC 4 are versatile microscopes, which because of their upright, laterally corrected images and stereoscopic observation are suited for all users, who wish to observe their objects in three dimensions with lower magnifications or to work/handle/manipulate under the microscope.

- Installation/Assembly
- Machining components
- Quality control
- Adjustment work
- Preparative work
- Assembly work
- Manipulation at objects
- Laboratory work

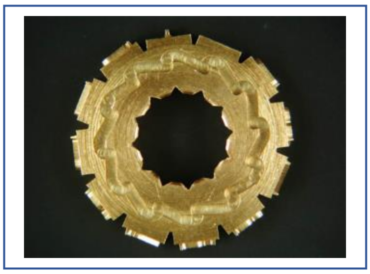

Textile


Askania watch

<u>Industry:</u>
- Electrical engineering/Electronics
- Solar technology
- Precision Engineering
- Plant engineering
- Vehicle construction
- Optical engineering
- Geology
- Metallurgy
- Textile and Clothing industry
- Restoration



Soldered joint


Milled part

<u>Research and Development:</u>
- Microsystems technology
- Microtechnology
- Electronics
- Mineralogy
- Biology and Medicine


Gear wheel


Crystal

<u>Hobby microscopy:</u>
- Biology
- Botany
- Ecology
- Natural sciences


Butterfly Eye

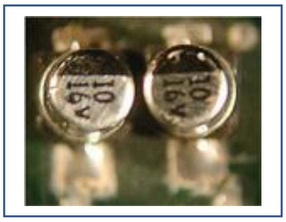

Poppy grain

Additional accessories

Sliding objective

Stereomicroscopes are used for stereoscopic observation as well as for photography and measurement. The sliding objective offers best conditions for both applications. The objective is in a middle (normal) position for a stereoscopic observation. For photography and measurement tasks the objective is moved to the center of the used optical beam. In this the observation of the specimen will be perpendicularly.

Sliding objective at a SMT 4



Middle (normal) position:
Convergent beam

Sliding objective to the right:
Image of the right beam

Planapochromat objective

To improve the picture reproduction of standard objectives the usage of a Planapochromat objective is recommended. The Planapochromat objective produces a high-contrast, planar image without color fringes which hardly contains abberations.

Comparison chromatic abberation

Objective Planachromat

Objective Planapochromat

Multifunction tube (ergonomics tube)

The multifunction tube allows the user to work under good ergonomic conditions. Relaxed work is guaranteed as the tube is adjustable to the right position. The viewing angle diversifies from 10° to 55°.

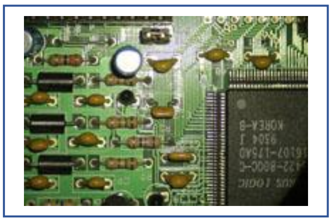
Multifunction tube

The adjustment of the interpupillary distance is made by rotation of the cones and can be done on the lower position and for larger people in the upper position. The multifunction tube can be equipped with width field eyepieces GF-Pw 10x/23.

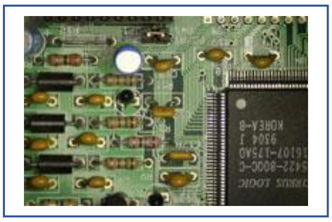
Diffuse Incident Illumination

The indirect, diffuse incident illumination is used for a contrast enhancement of spatial objects with high-gloss, spherical surfaces and to reduce reflections.

The diffuse incident illumination should be used together with cold light devices and flexible light guides. We recommend to use a gliding stage or a spherical stage for a better sample orientation.



Circuit board without diffuse incident illumination
- strong reflections



Circuit board with diffuse incident illumination
- less reflections

SMT 4 – with Diffuse Incident Illumination

Accessory - instructions for installation

Adaptation (option) by column socket

The column socket can be directly mounted to or at machines. There are columns available with diameter 29mm and different length of 245mm, 367mm and 600mm. The microscope can be adapted about the column to the machine.

Installation Planapochromat objective (lens)

1. Remove the existing objective from the microscope

2. Take the threaded adapter ring and screw it into the lower thread of the microscope middle part (instead of the standard objective)

3. Remove the new Planapochromat objective from the transport container

4. Screw the objective carefully into the thread of the threaded adapter ring

Please proceed in the reverse order in case you would like to remove the objective again.

Notes

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