



2007-8

C A T A L O G
— ENGLISH —



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AGENT:



HANDY MICROMETER

Mobile Micrometer Built-In LED and Battery

All in One!



Most Suitable Inspection for Electric Parts, Circuit Board, Metal Work Surfaces, Printed Letters, etc.!

Erected Image

Observating Object with Erected Image by Using Roof Prisms

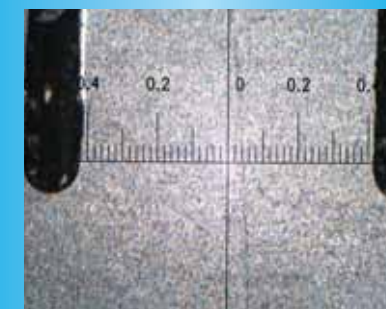
With Multi LED Lightings Function

3 LED Lights x 3 sets and ON/OFF each set with Brightness Control. Effective Observation for 3-D Object and Surface Condition.



With Precious Scale Built-In at Eyepiece Barrel

No Prevent for 3-D Observation.



TS-HM-25/TS-HM-60/TS-HM-120

	Mag.	F.O.V.	Min. Scale	Measuring Area
TS-HM-25	25x	7.2mm	0.05mm	5.0mm
TS-HM-60	60x	3.0mm	0.02mm	2.0mm
TS-HM-120	120x	1.8mm	0.01mm	1.0mm

※ M-PLAN 120x Objective Lens (Less Abberation outer area) coming soon.



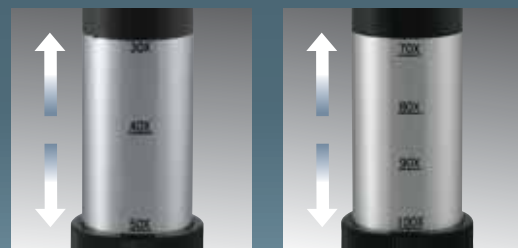
With Camera Stand
TS-0147NH

New Series of Microscopes!

P O C K E T MICROSCOPE



Magnifications Changed by Barrel Up-Down.

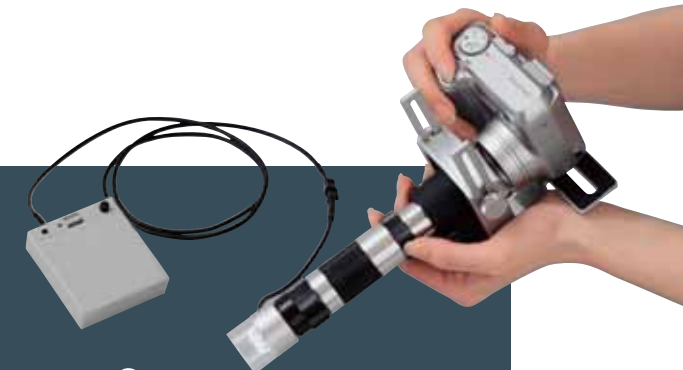


TS-SP-01 (30x - 50x)

TS-SP-02 (70x - 100x)



SCORPION-I/II



Small Pocket Microscopes, Easy to Carry.

Changeable Magnifications. Straight and Erected Type with LED Lights.
Gentle to Eyes and Have Clear Image because of All Lenses and Prisms with Coated.
Deep Field of View and Available to Focus All of 1.5mm Square Object.

Most Suitable to Inspect Electrical Parts, Circuit Board, Metal Works, Printed Letters, etc.
Length: Max. 180.0mm, Min.: 137.2mm / Diameter: Max. 30.0mm, Min.: 23.3mm / Weight 160g.

TS-SP-01

TS-SP-02

TS-SP-02P (with M-PLAN Lens: Less Aberration at Outside Area.)



High Brightness White LED 8 Lights



Eye Cup



Battery Holder with Light Control



Interchangeable Acrylic Base

With Cone Shape Diffuser.
Observing object diagonally and making the object image come up.

Observing object on a Monitor with C/CS Mount Camera.

※ Need 5.0mm thickness Ring for CS Mount.

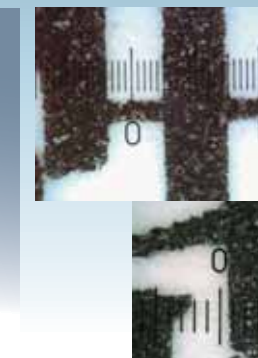
TS-8L-USB-01



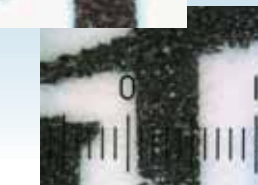
TSW-1614 (TV Lens)
TSW-1614 CCTV Lens
with Adapter for USB Camera



TS-CA-130M III
TS-CA-130M III 1.3M Pixels USB Camera
with CCTV and Adapter



Option:
TS-SP-M1
(0.05mm Scale)



Option:
TS-SP-M2 (0.1mm Scale)

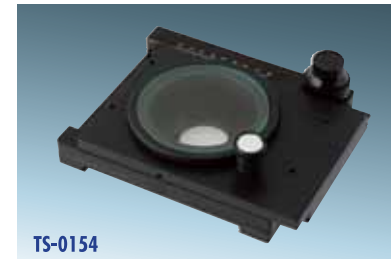
TS-XL-CZ2



Basic Set

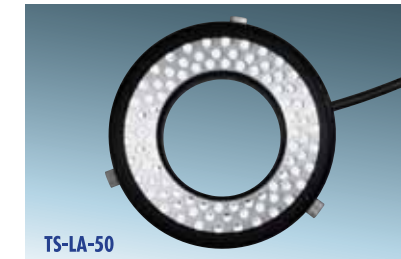
Description	P/N	Specifications
High Mag. Macro Zoom Lens	TS-93005	W.D. 82mm · Mag. 0.5x - 6.4x
Adapter	TS-ST-5	for R & P · with Tripod Scw
1.3M Pixels USB Camera	TS-CA-130M III	USB Camera · 1/2" · C-Mount
Rack & Pinion	TS-ST-X	X-Axis Rough, Forward 20mm/Z-Axis Rough&Fine, Up 30mm / D.10mm
LED Ring Lights	TS-LA-40	White LED 60 Lights
Power Supply for LED Lights	TS-LAS/LED-104L	with Control Volume 110 / 220V.
2 Heads LED Tilt Lights	TS-LA-2HEAD-N	SUS Flexible Arm · 1.4W White LED
Camera Stand with Transmit Light	TS-0151NH	with Control Volume · with Spare Halogen Lump
Transmit Light Hole · X-Y Stage with Scale	TS-0152	X-70mm / Z-80mm / Height 30mm · Load 3.5 Kgs.

Interchangeable Parts



TS-0154

Rotative · EX- 70mm / Z- 80mm / H 30mm
Load 3.6 Kgs.
※ Alternative of TS-0152 XY Stage



TS-LA-50

White Ring LED 90 Lights
※ Alternative of 60 Lights.
Power Supply is the same.



TS-CA-200M

※ Alternative of CA-130M III.

Interchangeable Zoom Lenses



TS-93006



TS-93007



TS-93022

Description	P/N	Specifications
Middle Mag. Macro Zoom Lens	TS-93006	W.D. 132mm · Optical Mag. 0.5x - 4.0x
Ultra Low Mag. Macro Zoom Lens	TS-93007	W.D. 249mm · Optical Mag. 0.25x - 2.0x
Low Mag. Macro Zoom Lens	TS-93022	W.D. 170mm · Optical Mag. 0.38x - 3.0x

Interchangeable Front Converter Lenses for TS-93005 only



TS-93017



TS-93018



TS-93019

Description	P/N	Specifications
0.5x for TS-93005	TS-93017	W.D. 164mm
2.0x for TS-93005	TS-93018	W.D. 46mm
3.0x for TS-93005	TS-93019	W.D. 31mm

Interchangeable Extender Lenses



TS-16-0



TS-16-1



TS-17-1N



TS-17-2

Description	P/N	Specifications
1.5x	TS-16-0	L= 4.1mm (except Thread Part) · C-Mount
2.0x	TS-16-1	L= 13.1mm (except Thread Part) · C-Mount
3.0x	TS-17-1N	L= 9.0mm (except Thread Part) · C-Mount
5.0x	TS-17-2	

TS-XL-CZ3



TS-93003 Lens Specifications

Optical Magnification	0.65x - 5.20x
Resolving Power at 550nm	14 - 16
Depth Field of View ※ Min Circle 0.04mm	2.004mm - 0.037mm
TV Distortion	0.16% - 0.05%
Angle of View (V x Hmm)	7.39 x 9.85 - 0.92 x 1.23mm
N.A.	0.0236 - 0.0202
Outside Dimension / Weight	32φ x L= 112mm / 85g.

Basic Set

Description	P/N	Specifications
High Mag. Macro Zoom Lens	TS-93003-CZ5	High Mag. Macro Zoom lens
Stand Adapter	TS-ST-4	Insert to Rack & Pinion · with Tripod Thread
Mega Pixels USB Camera	TS-CA-130M III	1.3M Pixels USB Camera · 1/2" · C-Mount
Rack & Pinion	TS-ST-8	Z-Axis, Rough · Up 30mm · Down 10mm
LED Ring Lights for CZ5	TS-LA-CZ5	White LED Ring 18 Lights
Power Supply for LED Lights	TS-8L-LCC	Battery Box with Light Control
Small Camera Stand	TS-0147NH	Pole = 20φmm · L= 300mm
Small XY Stage	TS-0143	Both Axes +/-25mm · Load 4.0 Kgs.

Interchangeable Front Converter Lenses



Description	P/N	Angle of View and W.D. for TS-93005
2.0x	TS-93008	0.45 x 0.6 - 3.75 x 5.0 · W.D. 25mm
3.0x	TS-93009	0.3 x 0.4 - 2.5 x 3.0 · W.D. 15mm
4.0x	TS-93010	0.23 x 0.3 - 1.87 x 2.5 · W.D. 12mm
6.0x	TS-93011	0.15 x 0.2 - 1.25 x 1.67 · W.D. 8mm

Fixed W.D. for TS-93003

Description	P/N	Optical Magnification and W.D.
W.D. 50mm	TS-WD-50	0.4x - 3.240x · W.D. 50mm
W.D. 75mm	TS-WD-75	0.280x - 2.240x · W.D. 75mm
W.D. 100mm	TS-WD-100	0.214x - 1.712x · W.D. 100mm

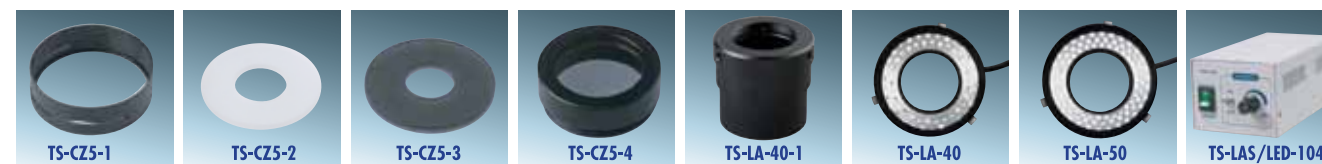
Interchangeable Extender Lenses

※Usable all Zoom Lenses



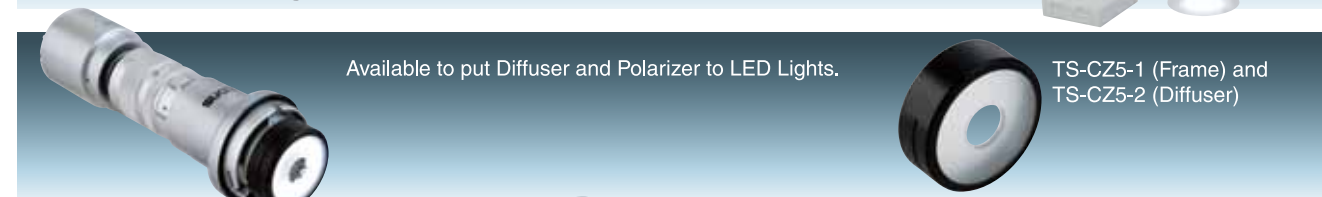
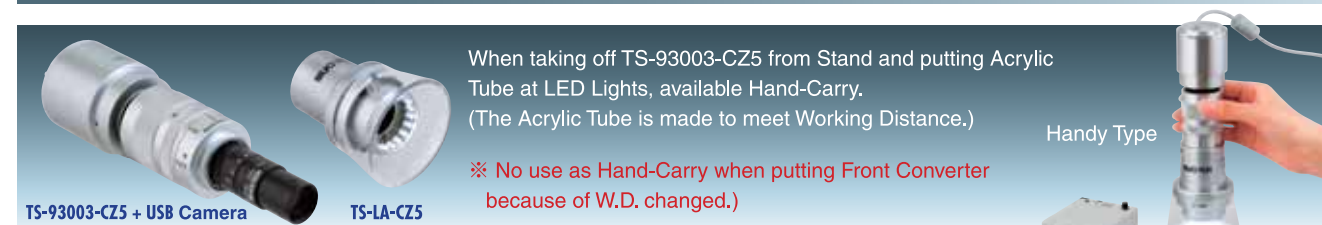
Description	P/N	Specifications (No influence in W.D.)
1.5x	TS-16-0	L= 4.1mm (except Thread Part) · C-Mount
2.0x	TS-16-1	L= 13.1mm (except Thread Part) · C-Mount
3.0x	TS-17-1N	L= 9.0mm (except Thread Part) · C-Mount
5.0x	TS-17-2	L= 30.0mm (except Thread Part) · C-Mount

Interchangeable Lights · Diffuser · Polarizer



Description	P/N	Specifications
Filter Frame	TS-CZ5-1	44mmφDiffuser/Polarized Frame. Available TS-LA-CZ5
Diffuser Filter	TS-CZ5-2	39.5mmφDoughnut type, Diffuser
Polarized Filter	TS-CZ5-3	39.5mmφDoughnut type, Polarizer
Area Polarized Filter	TS-CZ5-4	18mmφPolarizer at Top of Zoom Lens
Adapter for LED Light	TS-LA-40-1	Adapter for LED Ring Lights, Screw type
LED Ring 60 Lights	TS-LA-40	White LED 60 Lights
LED Ring 90 Lights	TS-LA-50	White LED 90 Lights
Power Supply for LED Lights	TS-LAS/LED-104L	Power Supply 110-220V with Light Volume Control

Variety of Original CZ5



※ Power Supply with Light Control

MACRO ZOOM LENS

Available to change Focal Length without changing W.D. We have 3x and 8x Ratio. 8x has with Iris.



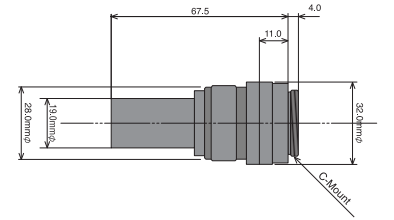
TS-93001VS

Comparison Chart of W.D. when using 15" Monitor and 1/2" Camera with Front Converter Lens.

	Normal	F.C. 2.0x	F.C. 3.0x	F.C. 4.0x	F.C. 6.0x
0.4000x	11.3 x 15.0	5.6 x 7.5	3.7 x 5.0	2.8 x 3.7	1.87 x 2.5
0.133x	37.5 x 50.0	18.7 x 25.0	12.5 x 16.6	9.4 x 12.5	6.2 x 8.3
W.D.	200	95	55	35	23

(mm)

Image Size : 1/2", 1/3" & 1/4"
 Lens Construction : 6 Groups-7 Elements
 Optical Magnification: min. 0.133x / max. 0.400x
 Zoom Ratio : 3x ±5%
 Focal Length : min. mag. 27.190mm · max. mag. 58.828mm
 Back Focal Length : min. mag. 27.190mm±5% · max. mag. 81.57mm±5%
 Aperture : F/7.5
 Dimensions : min. mag. 36.233 x 48.571mm (61.143mm dia.) max. mag. 11.995 x 15.991mm (19.986mm dia.)
 Object to Image Distance : 281.663mm
 Working Distance : 200mm±5%
 Weight : 60.5g.



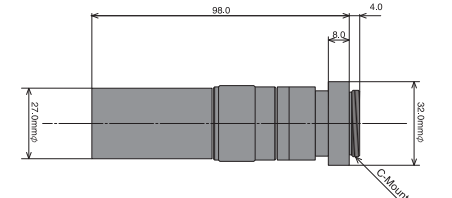
TS-93002

Comparison Chart of W.D. when using 15" Monitor and 1/2" Camera with Front Converter Lens.

	Normal	F.C. 2.0x	F.C. 3.0x	F.C. 4.0x	F.C. 6.0x
0.800x	6.0x8.0	3.0x4.0	2.0x2.7	1.5x2.0	1.0x1.3
0.100x	52.5x70.0	26.3x35.0	17.5x23.3	13.1x17.5	8.7x11.6
W.D.	200	82	50	35	17

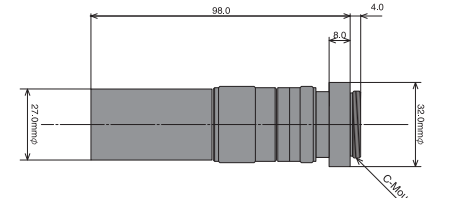
(mm)

Image Size : 1/2", 1/3" & 1/4"
 Lens Construction : 7 Groups - 10 Elements with All Multi Coated
 Optical Magnifications: min. 0.100x / max. 0.800x
 Zoom Ratio : 8x±5%
 Focal Length: min. 21.997mm / max. 72.448mm
 Back Focal Length: min. 21.997mm±5% / max. 175.976mm±5%
 Aperture : F/7.5 - 8.3
 Dimensions : min. mag. 48.212 x 64.510mm (31.034mm dia.) max. mag. 5.997 x 7.992mm (9.985mm dia.)
 Object to Image Distance : 316.619mm
 Working Distance : 200mm±5%
 Weight : 100g.



TS-93002i

Image Size : 1/2", 1/3" & 1/4"
 Lens Construction : 7 Groups - 10 Elements with All Multi Coated
 Optical Magnifications: min. 0.100x / max. 0.800x
 Zoom Ratio : 8x±5%
 Focal Length: min. 21.997mm / max. 72.448mm
 Back Focal Length: min. 21.997mm±5% / max. 175.976mm±5%
 Aperture : F/7.5 - 8.3
 Dimensions : min. mag. 48.212 x 64.510mm (31.034mm dia.) max. mag. 5.997 x 7.992mm (9.985mm dia.)
 Object to Image Distance : 316.619mm
 Working Distance : 200mm±5%
 Weight : 103g.



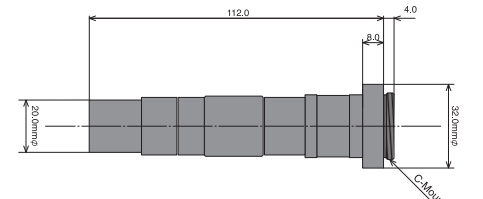
TS-93003

Comparison Chart of W.D. when using 15" Monitor and 1/2" Camera with Front Converter Lens.

	Normal	F.C. 2.0x	F.C. 3.0x	F.C. 4.0x	F.C. 6.0x	WD-50x	WD-70x	WD-100x
5.200x	0.9x1.2	0.45x0.6	0.3x0.4	0.23x0.3	0.15x0.2	1.42x1.9	2.1x2.8	2.65x3.5
0.650x	7.5x10.0	3.75x5.0	2.5x3.0	1.87x2.5	1.25x1.67	11.2x15	16.9x22.5	21.7x29.0
W.D.	35	25	15	12	8	50	75	100

(mm)

Image Size : 1/2", 1/3" & 1/4"
 Lens Construction : 9 Groups - 12 Elements
 Optical Magnifications: min. 0.650x / max. 5.200x
 Zoom Ratio : 8x±5%
 Dimensions : min. 7.38 x 9.84mm / max. 0.92 - 1.23mm
 Dimensions : 112.1mm x 32mm dia.
 Object to Image Distance : 165.63mm ±2mm
 Aperture : F/22 - 25
 Working Distance : 200mm±2mm
 Weight : 90g.



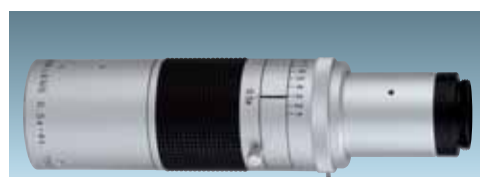
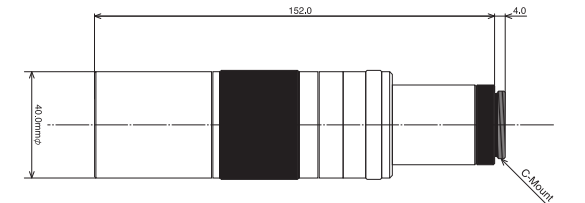
TS-93005

Comparison Chart of W.D. when using 15" Monitor and 1/2" Camera with Front Converter Lens.

	Normal	F.C. 0.5x	F.C. 2.0x	F.C. 3.0x	EX 1.5x	EX 2.0x	EX 3.0x	EX 5.0x	EX2x + FC2x
6.400x	0.8x1.0	1.6x2.1	0.4x0.53	0.26x0.33	0.5x0.7	0.4x0.53	0.26x0.33	0.1x0.24	0.2x0.25
0.800x	6.5x8.5	12.6x16.8	3.25x4.25	2.16x2.83	4.3x5.7	3.25x4.25	2.16x2.83	1.3x1.7	1.5x2.2
W.D.	83.0	167.9	48.9	31.0	83.0	83.0	83.0	83.0	48.9

(mm)

Image Size : 1/2", 1/3" & 1/4"
 Lens Construction : 10 Groups - 16 Elements (with All Multi Coated)
 Optical Magnifications: min. 0.800x / max. 6.400x
 Zoom Ratio : 8x±5%
 Depth of Field View (at Open): min. 0.3mm / max. 0.02mm
 Resolution Power (L/mm): max. 100 lines / min. 30 lines
 Dimensions : 156mm x 40.0mm dia.
 Object to Image Distance : 248.85mm±2mm
 Working Distance : 83.0mm±2mm
 Weight : 300g.



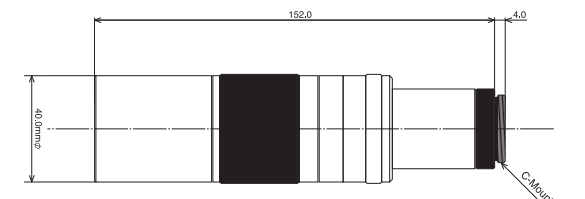
TS-93006

Comparison Chart of W.D. when using 15" Monitor and 1/2" Camera with Front Converter Lens.

	Normal	EX 2.0x	EX 3.0x	EX 4.0x	EX 6.0x
4.000x	1.2x1.6	0.8x1.0	0.6x0.8	0.42x0.53	0.24x0.32
0.500x	9.6x12.8	6.4x8.53	4.8x6.4	3.21x4.26	1.92x2.56
W.D.	132.20	132.20	132.20	132.20	132.20

(mm)

Image Size : 1/2", 1/3" & 1/4"
 Lens Construction : 10 Groups - 16 Elements (with All Multi Coated)
 Optical Magnifications: min. 0.500x / max. 4.000x
 Depth of Field View (at Open): min. 0.79mm / max. 0.05mm
 Resolution Power (L/mm): max. 100 lines / min. 40 lines
 Dimensions : 156mm x 40mm dia.
 Object to Image Distance : 298.2mm±2mm
 Working Distance : 132.20mm±1mm
 Weight : 300g.



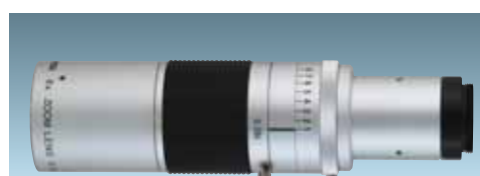
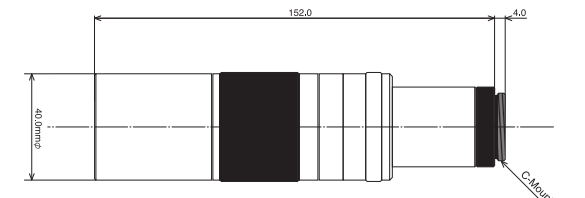
TS-93007

Comparison Chart of W.D. when using 15" Monitor and 1/2" Camera with Front Converter Lens.

	Normal	EX 2.0x	EX 3.0x	EX 4.0x	EX 6.0x
2.000x	2.4x3.2	1.6x2.13	1.2x1.6	0.8x1.06	0.48x0.64
0.250x	19.2x25.6	12.8x17.1	9.6x12.8	6.4x8.53	3.84x5.12
W.D.	249.65	249.65	249.65	249.65	249.65

(mm)

Image Size : 1/2", 1/3" & 1/4"
 Lens Construction : 10 Groups - 15 Elements (with All Multi Coated)
 Optical Magnifications: min. 0.250x / max. 2.000x
 Zoom Ratio : 8x +/-5%
 Depth of Field View (at OPEN): min. 4.80mm / max. 0.25mm
 Resolution Power (L/mm): max. 120 lines / min. 40 lines
 Dimensions : 156mm x 40mm dia.
 Object to Image Distance : 411.6mm +/-2.0mm
 Working Distance : 249.44 +/-1.0mm
 Weight : 300g.



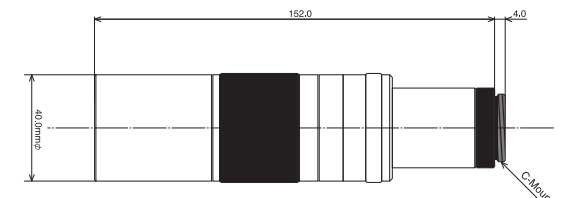
TS-93022

Comparison Chart of W.D. when using 15" Monitor and 1/2" Camera with Front Converter Lens.

	Normal	EX 2.0x	EX 3.0x	EX 4.0x	EX 6.0x
3.000x	1.6x2.1	10.6x14	0.8x10.5	0.53x0.7	0.32x0.42
0.380x	12.6x16.8	8.4x11.2	6.3x8.4	4.2x5.6	2.52x3.36
W.D.	170.1	170.1	170.1	170.1	170.1

(mm)

Image Size : 1/2", 1/3" & 1/4"
 Lens Construction : 10 Groups - 15 Elements (with All Multi Coated)
 Optical Magnifications: min. 0.380x / max. 3.000x
 Zoom Ratio : 8x +/-5%
 Depth of Field View : min. 2.42mm / max. 0.30mm
 Resolution Power (at OPEN): max. 120 lines / min. 40 lines
 Dimensions : 156mm x 40mm dia.
 Object to Image Distance : 335.1mm +/-2.0mm
 Working Distance : 170.1mm +/-1.0mm
 Weight : 300g.





TS-CA-130M III

TS-CA-200M

USB CAMERA

TS-CA-130M III

PC Interface ※	USB 2.0 (Posterior and External Ports are not available.)
Sensor	Color CMOS 1.3M Mega Pixels
Max. Resolution	SXGA (1280 x 1024)
Frame Rate	15 fps at SXGA (1280 x 1024)
Data Format	RGB 24
Color	Max. 1.68M 24 Bit-Color
Video Mode ※	1280 x 1024 / 1280 x 768 (Viewer only)
Power Source	From USB 2.0 Port
Image Control	Color (R/G/B) and Brightness Adjustment, Gamma Correction, Hue, Exposure, Sharpness Adjustment, Gain Control and White Balance
Operation System	Windows 2000 (Professional · SP4) · XP (Professional · SP2) · (Being installed to PC at time of shipment from manufacturer only.) CPU equivalent to Intel Pentium III 800MHz Processor is minimum requirements.
Basic CPU ※	Recommended CPU equivalent to Intel Pentium 4 1.5GHz Processor or more. Memory: 256MB RAM · Recommended more than 512MB 1 High Speed USB 2.0 Port. (Need 1 more Port when using Look-Key for 2-D Measurement and Image Processing Software.)

With C-Mount · Camera Viewer Software
Option: 2-D Measurement / 2-D Measurement & Image Processing Software

TS-CA-200M

PC Interface ※	USB 2.0 (Posterior and External Ports are not available.)
Sensor	Color CMOS 2.0M Mega Pixels
Max. Resolution	SXGA (1280 x 1024) (Actual 1600 x 1200)
Frame Rate	10 fps at SXGA (1280 x 1024) (Actual 1600 x 1200)
Data Format	RGB 24
Color	Max. 1.68M 24 Bit-Color
Video Mode ※PC Option	1280 x 1024 (Actual 1600 x 1200) / 1024 x 768 (Viewer only)
Power Source	From USB 2.0 Port
Image Control	Color (R/G/B) and Brightness Adjustment, Gamma Correction, Hue, Exposure, Sharpness Adjustment, Gain Control and White Balance
Operation System	Windows 2000 (Professional · SP4) · XP (Professional · SP2) · (Being installed to PC at time of shipment from manufacturer only.) CPU equivalent to Intel Pentium III 800MHz Processor is minimum requirements.
Basic CPU ※	Recommended CPU equivalent to Intel Pentium 4 1.5GHz Processor or more. Memory: 256MB RAM · Recommended more than 512MB 1 High Speed USB 2.0 Port. (Need 1 more Port when using Look-Key for 2-D Measurement and Image Processing Software.)

With C-Mount · Camera Viewer Software
Option: 2-D Measurement / 2-D Measurement & Image Processing Software

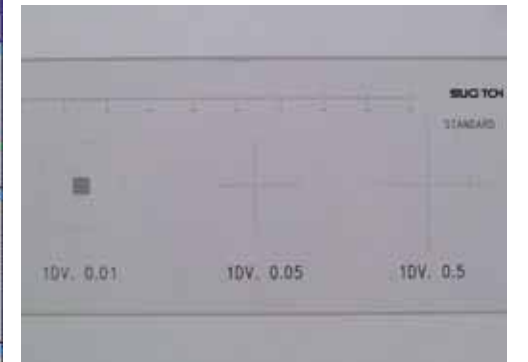
※ Please confirm your PC specifications before using the camera.

2-D Measurement & Image Processing Software for TS-CA-130M III-TS-CA-200M USB Cameras

TS-CA-VCM II



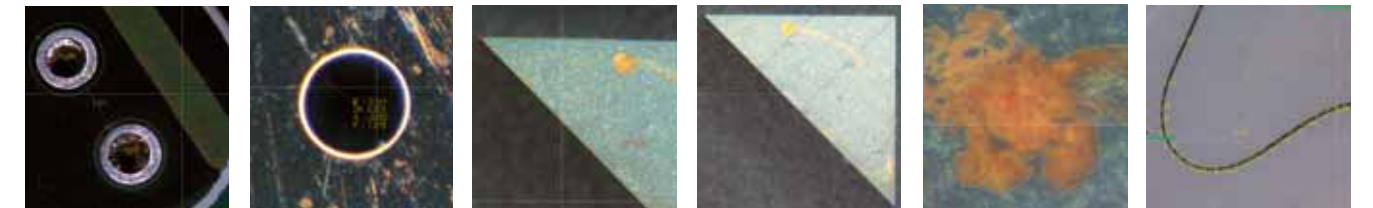
Software for 2-D Measurement & Image Processing of our 1.3M and 2.0M Pixels USB Cameras. Inputting corrected value by calibration, available to make accurate measurement at any magnifications. Function of Multi Focus can make synthetic picture instantly for different height of focuses.



with Scale 0.01mm/0.05mm/0.5mm
Multi Scale Plate for Calibration
TS-0073M

2-D Measurement & Image Processing Software
TS-CA-VCM II

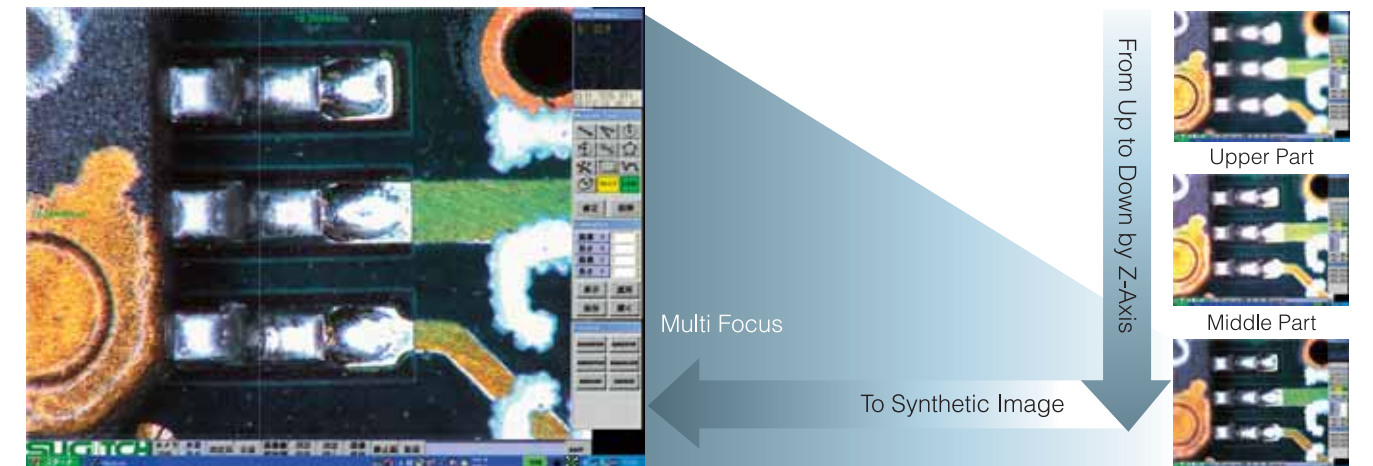
Main Function of Each Software



Between 2 Circles: Measuring length of 2 centers of circles
Circle: Measuring R·2R·Circumference and Area
Angle: Measuring Angles
Vertical: Measuring Length of Vertical Line
Area: Display Area, Circumference and Center Point
Between Multipoints: Measuring Total Distance from Multipoints
※ Total 10 Modo



Original Image: Original Image
Sharpen (Emphasis): Emphasis Image
Smooth: Smooth Image
Equalize: Clear Image



Multi Focus

To Synthetic Image

From Up to Down by Z-Axis

Upper Part

Middle Part

Lower Part

※ We have 2-D Measuring Software only, TS-CA-2DM II.

TS-8LN/LEN

Micrometer Scope with LED Lights

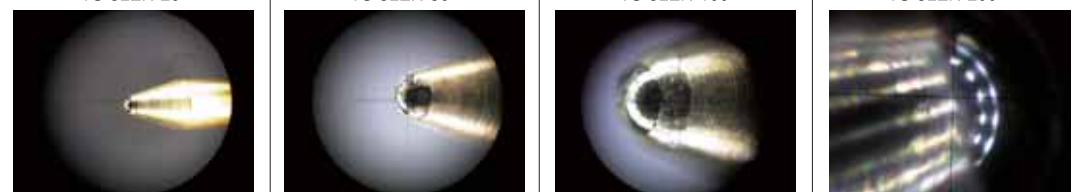

TS-8LN Series (Inverted Type) | TS-8LEN Series (Erected Type)




Part No.	Magnification	F.O.V.	Min.Scale	Measuring Area	Working Distance
TS-8LN-20	20×	9.0mm	0.05mm	5.0mm	28.0mm
TS-8LN-50	50×	3.6mm	0.02mm	2.0mm	16.0mm
TS-8LN-100	100×	2.1mm	0.01mm	1.0mm	16.0mm
TS-8LN-200	200×	1.05mm	0.005mm	0.3mm	6.3mm
TS-8LN-100P	100×	2.1mm	0.01mm	1.0mm	16.0mm
TS-8LN-200P	200×	1.05mm	0.005mm	0.3mm	6.3mm
TS-8LEN-20	20×	9.0mm	0.05mm	5.0mm	28.0mm
TS-8LEN-50	50×	3.6mm	0.02mm	2.0mm	16.0mm
TS-8LEN-100	100×	2.1mm	0.01mm	1.0mm	16.0mm
TS-8LEN-200*	200×	1.05mm	0.005mm	0.3mm	6.3mm
TS-8LEN-100P	100×	2.1mm	0.01mm	1.0mm	16.0mm
TS-8LEN-200P*	200×	1.05mm	0.005mm	0.3mm	6.3mm

Need Power Supply of LED Lights for all TS-8 Series.
P means M-PLAN Lens. (Corrected Spherical and Chromatic Abberation.)

Tip of ballpoint pen taken by TS-8LEN/8LN · Nikon CoolPix-4300.

Universal Type Camera Adapter TS-8L-DG
Please use smaller lens diameter camera.
※ One camera may not use this Camera Adapter.

Camera Optical Magnification 3x (60x) | Camera Optical Magnification 3x (150x) | Camera Optical Magnification 3x (300x) | Camera Optical Magnification 3x (600x) | CCD Element

- TS-8LEN Erected Type: Using Roof Prisms, image is Erected.
- TS-8LN Inverted Type: Image is Upside-Down.

TS-7L/7LE

Micrometer Scope with Small Lamp

TS-7L Series (Inverted Type) | TS-7LE Series (Erected Type)

Part No.	Magnification	F.O.V.	Min.Scale	Measuring Area	Working Distance
TS-7L-20	20×	9.0mm	0.05mm	5.0mm	28.0mm
TS-7L-50	50×	3.6mm	0.02mm	2.0mm	16.0mm
TS-7L-100	100×	2.1mm	0.01mm	1.0mm	16.0mm
TS-7L-200	200×	1.05mm	0.005mm	0.3mm	6.3mm
TS-7L-100P	100×	2.1mm	0.01mm	1.0mm	16.0mm
TS-7L-200P	200×	1.05mm	0.005mm	0.3mm	6.3mm
TS-7LE-20	20×	9.0mm	0.05mm	5.0mm	28.0mm
TS-7LE-50	50×	3.6mm	0.02mm	2.0mm	16.0mm
TS-7LE-100	100×	2.1mm	0.01mm	1.0mm	16.0mm
TS-7LE-200*	200×	1.05mm	0.005mm	0.3mm	6.3mm
TS-7LE-100P	100×	2.1mm	0.01mm	1.0mm	16.0mm
TS-7LE-200P*	200×	1.05mm	0.005mm	0.3mm	6.3mm

Power Supply: 2 pcs. of AA Battery. ※ 200x of TS-7LE-8LEN: Order Production Item.
P means M-PLAN Lens (Corrected Spherical and Chromatic Abberation.)

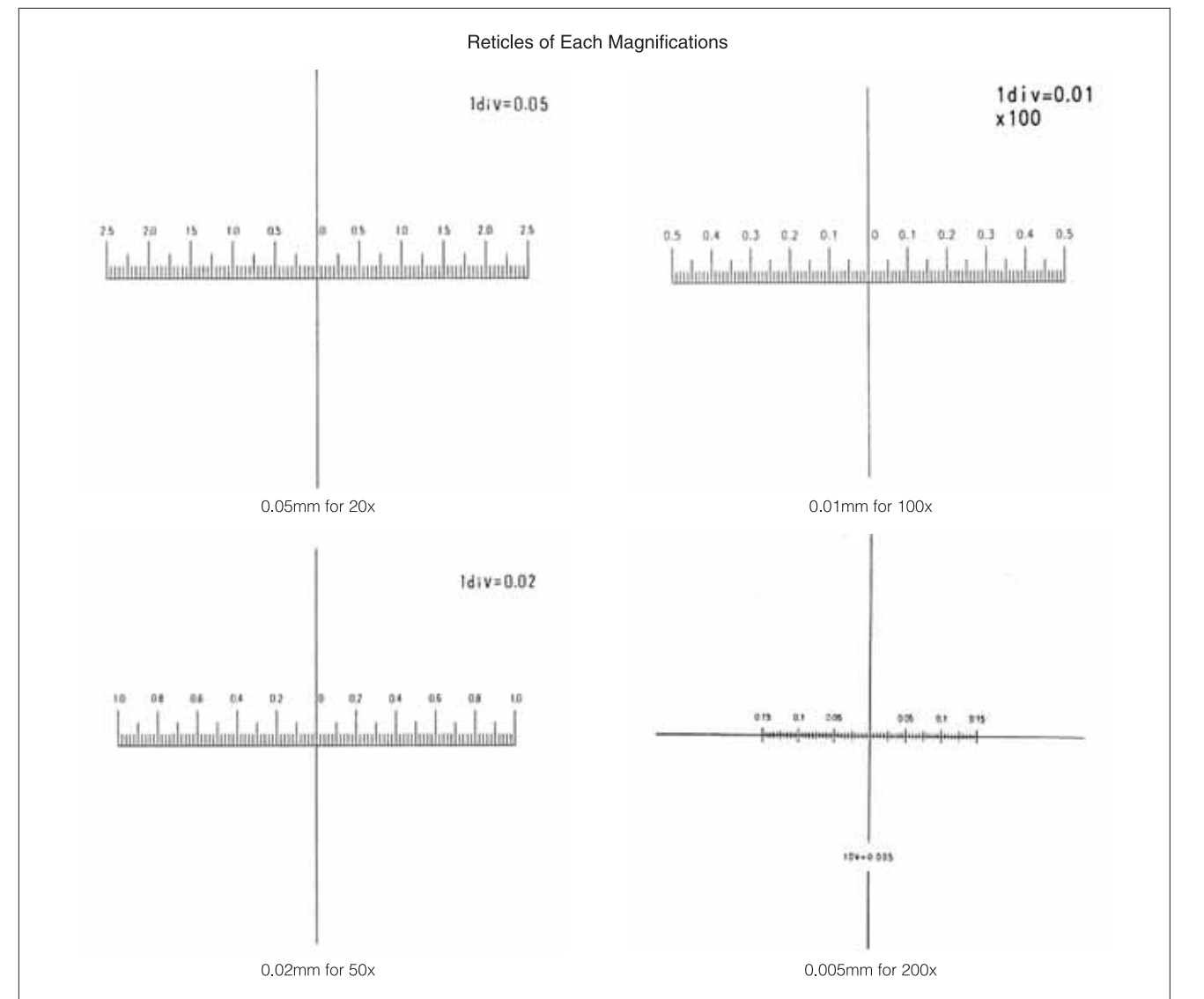
Available to Install Mega Pixels Camera to Micrometer Scope Series.




with Camera photo
After confirming the focus of an object by naked eyes, please make fine adjustment thru Monitor.

What is Micrometer Scope?

These are Fixed Magnification Handy Type Scopes. There are LED 18 Direct Lights and 1 Small Lamp Diagonal Light, and also Erected Type (same image as naked eyes with Roof Prism) and Inverted Type (image upside-down). The magnifications are 20x, 50x, 100x and 200x each. We have also 100x and 200x in using M-PLAN Lens.
※ Battery Holder of 1 Small Lamp is built in main body. Power Supply of LED type is optional.
Recommend to use TS-7 series Diagonal Light for Metal and Un-Level Surfaces.
To make shadow of an object by lighting diagonally, you can observe it 3-Dimensionally.
Recommend to use Bright LED 18 Lights of TS-8 series for Plane Surface.



- For Cameras
- Circuit Board Inspection
- Printed Letters Inspection

TS-3/TS-4

BUILT IN LED

Large Type Micrometer & Loupe Corresponded to Digital Cameras

Main Body TS-4

LED Light Adapter (Option)
TS-3-LED



Battery Box with Light Control (Option)
TS-8L-LCC

Available to Install to Digital Cameras! Bright and Easy to See, Large Diameter Micrometer & Loupe.



Features

- Easy to see because of Large Diameter and suitable to check a resolution power of negative film.
- Magnifications are 3x, 4x and 5.9x. (Micrometer is 5.9x only.)
- With Cloth Pouch

Option

- TS-3-LED** LED Lights Adapter for Large Type Micro-Loupe
White LED Lights Adapter for Large Type Micro-Loupe light an object equally and available to inspect in a dark place. This is battery type and available to use it everywhere. When using Battery Box with Light Control (Option), adjustable volume of LED Lights.
- TS-3-DGB** Available to use for Large Type Micrometer.

Large Type Micro-Loupe

Part No.	Mag.	Length	W.D.	Weight
TS-3-3	3x	100mm	45mm	240g
TS-3-4	4x	100mm	35mm	265g
TS-3-5	5x	80mm	30mm	265g
TS-3-5.9	5.9x	75mm	25mm	260g

Large Type Micrometer

Part No.	Mag.	Length	Measuring Area	Minimum scale	W.D.	Weight
TS-4-5.9	5.9x	75mm	54mm	0.1	25mm	290g

- For Cameras
- Inspection for Printed Letters

TS-2

Small Type Pocket Micro-Loupe



TS-2-7
Pocket Micro-Loupe 7x
Magnification: 7x
Outside Dia.: 43mm
Length: 55 - 61mm
Field of View: 32mm
Working Distance: 25mm
Lens Construction: 2 Groups - 3 Elements
Weight: 60g.



TS-2-10
Pocket Micro-Loupe 10x
Magnification: 10x
Outside Dia.: 43mm
Length: 50 - 55mm
Field of View: 32mm
Working Distance: 25mm
Lens Construction: 2 Groups - 4 Elements
Weight: 65g.



TS-2-15
Pocket Micro-Loupe 15x
Magnification: 15x
Outside Dia.: 38mm
Length: 25 - 30mm
Field of View: 9.7mm
Working Distance: 9.7mm
Lens Construction: 3 Groups - 4 Elements
Weight: 40g.

Features

- With Straight Acrylic Tube for all the Loupes and available to observe an object at corners. With Case.

- for Cameras
- Circuit Board Inspection
- Printed Letters Inspection

TS-1

Small Type Pocket Micrometer



TS-1-7
Pocket Micrometer 7x
Magnification: 7x
Outside Dia.: 43mm
Length: 53 - 60mm
Field of View: 32mm
Working Distance: 25mm
Lens Construction: 2 Groups - 3 Elements



TS-1-10
Pocket Micrometer 10x
Magnification: 10x
Outside Dia.: 43mm
Length: 48 - 55mm
Field of View: 32mm
Working Distance: 25mm
Lens Construction: 2 Groups - 4 Elements



TS-1-15
Pocket Micrometer 15x
Magnification: 15x
Outside Dia.: 38mm
Length: 25 - 30mm
Field of View: 24mm
Working Distance: 7.52mm
Lens Construction: 3 Groups - 4 Elements

Features

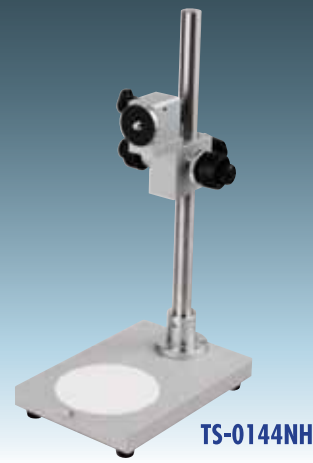
- With Straight Acrylic Tube for all the Micrometers and available to observe an object around corners.
- With removable Scale-Ring and selectable a favorite Scale.
- Basic Scale for TS-1-7 & TS-1-10 is NO. 100 and TS-1-15 is No. 1 (15x).
- TS-M1 (11 kinds) is for TS-1-7 & TS-1-10 and TS-M2 (2 kinds) is for TS-1-15. (ref. under drawings)
- With Case.

Option

- Interchangeable Scales: TS-M1 (for 7x & 19x) · TS-M2 (for 15x)

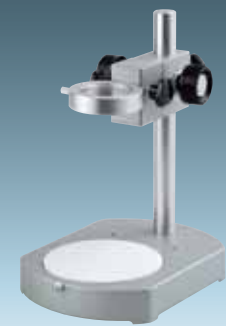
<p>No.100 Dia., Graph, Angle & Radius</p>	<p>No.101 Dia., Scale, Angle & Radius</p>	<p>No.102 Angle and Radius</p>	<p>No.103 Screw Pitch</p>
<p>No.104 Inch 8 - 50 Mounts</p>	<p>No.105 Scale. 0.1mm & 0.001ft</p>	<p>No.106 Thickness 0.02 - 0.16mm</p>	<p>No.107 Graph mm, Circle 0.1-2.5mm, 1mm Graph 10mm</p>
<p>No.108 Dia. Circle 0.05-3.0mm, 1/64"-1/16"</p>	<p>No.109 Scale 20mm</p>	<p>No.110 Cros Scale</p>	<p>for 15x No. 1: 0.1mm interval No. 2: 0.05mm Interval</p>

MICROZOOM SYSTEM CAMERA STAND



- Standard Stand for Macro Zoom**
- Height: 345mm
 - Pole Dia.: 20mm
 - Stand Base : Length 200mm Side 140mm
 - Weight: 2.25 Kgs.
 - with TS-ST-6-S: Rack & Pinion, Z-Axis

TS-0144NH



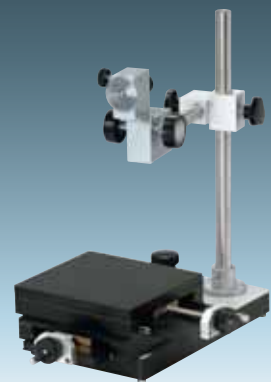
- Simple-Light Small Stand for Macro Zoom**
- Height: 250mm
 - Pole Dia.: 20mm
 - Stand Base: Length 178mm Side 135mm
 - Weight: 1.02 Kgs.
 - with TS-ST-8: Small Rack & Pinion , Z-Axis

TS-0147NH



- New Standard Stand for Macro Zoom**
- Height: 355mm
 - Pole Dia.: 20mm
 - Stand Base: Length 233mm Side 153mm
 - Weight: 3.26 Kgs.
 - Transpalent Type Stand Base. Halogen Lamp with Light Control

TS-0151NH



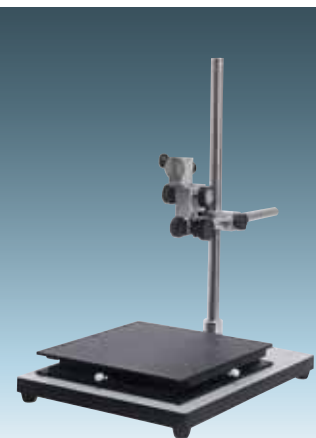
- Middle Type Stand for Macro Zoom**
- Height: 345mm
 - Pole Dia.: 20mm
 - Stand Base: Length 178 Side 135mm
 - Weight: 2.5 Kgs. (Stand Main Body only)
 - with Small Rack & Pinion (TS-ST-6-S) and XY Stage (TS-0148)
 - ※ Order Production Item.

TS-0150NH



- New Middle Type Stand for Macro Zoom**
- Height: 450mm
 - Pole Dia. 26mm
 - Stand Base: Length 292mm Side 285mm (max.)
 - Weight: 3.8 Kgs.
 - with Rack & Pinion, Z-Axis Rough movement

TS-0153NH



- Large Type Stand for Macro Zoom**
- Height: 500mm
 - Pole Dia.: 20mm
 - Stand Base: Length 450mm Side 300mm
 - with Small Type Rack & Pinion, Z-Axis (TS-ST-6-S) and XY Stage (TS-B01A-XY)

TS-B01A



- New Type Large Stand for Macro Zoom**
- Height: 500mm
 - Pole Dia.: 26mm
 - Stand Base: Length x Side 300 x 300mm

TS-0170NH

RACK & PINION



- Pole Diameter 20mm, Z-Axis Rough-Fine Movement**
- Z-Axis Stroke Up: 30mm Down: 10mm

TS-ST-6 (S)



- Pole Diameter 26mm, Z-Axis Rough-Fine Movement**
- Z-Axis Stroke Up: 30mm Down: 10mm

TS-ST-6 (L)



- Pole Diameter 20mm, XYZ-Axes Rough Movement**
- X: 30mm movement
 - Y: 35mm movement
 - Z: 32mm movement
 - ※ From 20mm I.D. Center Hole to Instllation Screw is 63mm - 93mm.

TS-ST-3



- Pole Diameter 20mm, X: Rough / Z: Rought-Fine Movements**
- Z-Axis Stroke: Up 30mm Down 10mm
 - X-Axis Stroke: Movement 20mm

TS-ST-X



- Pole Diameter 20mm, Z-Axis Rough Movement**
- Simple-Small Type Rack & Pinion
 - Z-Axis Stroke: Up 30mm Down 10mm
 - Inside Diameter: 43mm

TS-ST-8



- Pole Diameter 26mm, Z-Axis Ultra Fine Movement**
- Z-Axis Stroke Up 30mm Down 10mm
 - ※ Order Production Item.

TS-ST-7

Stand Adapter is installed to Rack & Pinion and available to insert Zoom Lens, USB Camera and LED Lights. All of the Stand Adapters are with Instllation Thread.



Installable to 40mm dia Zoom Lens.

Standard Stand Adapter. I.D. 30mm.

Z-Axis Fixed type Standard Adapter. This is only for TS-ST-6 Rack & Pinion. I.D. 30mm.

Installable to USB Camera and Adapter of CZ5 Light Cover.

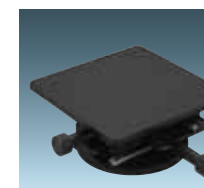
Standard Adapter. Installable to All Types of Rack & Pinion. I.D. 43mm.

XY-STAGE



- 60 x 70 x 39.5mm
- Both Axis +/-25mm Movement
- Load Weight: 4.0 Kgs.
- Base Size: 80φ/100mm
- Weight: 560g.

TS-0143



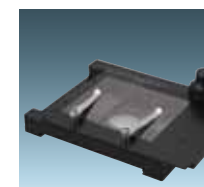
- 13 x 130 x 39mm
- Both Axis: +/-75mm Guarantee
- Load Weight: 5.0 Kgs.
- Base Size: φ100mm
- Weight: 920g.

TS-0149



- TS-0148: 160 x 150 x 64mm
- Both Axis +/-50mm Movement
- Load Weight: 10.0 Kgs.
- No Base (Fixed Type)
- Weight: 3.64 Kgs.
- ※ Order Production Item.

TS-0148



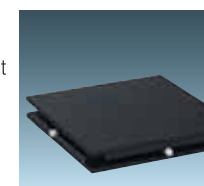
- 180 x 155 x 34mm
- X-Axis +/-70mm / Y-Axis +/-80mm Movement
- Load Weight: 3.5 Kgs.
- Base Size: 95φ/100mm
- Weight: 1.64 Kgs.

TS-0152



- 180 x 155 x 34mm
- X-Axis +/-70mm / Y-Axis +/-80mm Movement
- Rotatble 360°
- Load Weight: 3.5 Kgs.
- Base Size: 95φ/100mm
- Weight: 1.64 Kgs.

TS-0154



- 300 x 300 x 400mm
- Both Axis +/-100mm Movement
- Load Weight: 15.0 Kgs.
- No Base (Fixed Type)
- Weight: 5.26 Kgs.
- ※ Slide-Touch-Stopper Type

TS-B01A-XY

LIGHT & AC-ADAPTER

Lighting Equipments



- Q'tys of LED Light: 120 pcs.
- Inside Dia.: 30mm **※Dome Type Indirect Type LED Lights is Needed a Special Stand. Not Installable to Zoom Lens.**
- Outside Dia.: 118mm
- Working Distance: 80 - 100mm
- Adapter: 4P
- Weight: 850g.
- AC Power Supply: TS-LAS/LED-104L

TS-LA-DOME




- Q'tys of LED Light: 72 pcs.
- Inside Dia.: 33mm **※High-Angle Indirect Type LED Lights is Needed a Special Stand. Installable 40mm Diameter Zoom Lens with a Special Adapter.**
- Outside Dia.: 102mm
- Working Distance: 70 - 200mm
- Adapter: 4P
- Weight: 800g.
- AC Power Supply: TS-LAS/LED-104L

TS-LA-HIA



- Q'tys of LED Light: 1 x 2 pcs.
- Working Distance: 30 - 50mm
- Adapter: Non
- Weight: 480g.
- AC Power Supply: TS-LAC
- ※2 Heads High Brightness 1.4W White Color LED Lights: Arm is SUS Flexible. With Each Switch for 2 Lights and Exclude AC Power Supply with Light Control.**

TS-LA-2HEAD-N




- Q'tys of LED Light: 60 pcs.
- Inside Dia.: 40mm
- Outside Dia.: 74mm
- Working Distance: 30 - 100mm
- Adapter: 3P
- Weight: 100g.
- AC Power Supply: TS-LAS/LED-100L

TS-LA-40



- Q'tys of LED Light: 90 pcs.
- Inside Dia.: 40mm
- Outside Dia.: 74mm
- Working Distance: 78 - 165mm
- Adapter: 4P
- Weight: 100g.
- AC Power Supply: TS-LAS/LED-104L

TS-LA-50



- Q'tys of LED Light: 60 pcs.
- Inside Dia.: 55mm
- Outside Dia.: 89mm
- Working Distance: 80 - 130mm
- Adapter: 3P
- Weight: 100g.
- AC Power Supply: TS-LAS/LED-104L

TS-LA-60



- Q'tys of LED Light: 90 pcs.
- Inside Dia.: 40 (55)mm
- Outside Dia.: 89mm
- Working Distance: 80 - 130mm
- Adapter: 4P
- Weight: 100g.
- AC Power Supply: TS-LAS/LED-104L

TS-LA-70



- Q'tys of LED Light: Special Large 1 pc.
- Inside Dia.: T = 38mm **※LED Light for Coaxial Incident Light with Light Control and AC Power Supply.**
- Outside Dia.: 25mm
- Adapter: TS-93001-CII
- Weight: 200g.
- AC Power Supply: TS-LAC

TS-LA-02



- Tungsten Lamp
- Q'tys of Tungsten Lamp: 1 pc.
- Size: 60 x 60 x 60mm
- Adapter: Non
- Weight: 120g.
- AC Power Supply: TS-T/H-AC

TS-TL-01



- Halogen Lamp
- Q'tys of Halogen Lamp: 1 pc.
- Inside Dia.: 22mm
- Outside Dia.: 29mm
- Adapter: Non
- Weight: 220g.
- AC Power Supply: TS-T/H-AC

TS-HL-01

Accessories



TS-LA-40-1

Adjustable to All LED Ring Lights of TS-93001/002/003/003-CZ5




TS-LA-70-1

Ring Light of Inside Diameter 55mm (TS-LA-60/70) is adjustable to TS-93005.

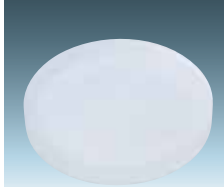
Lighting Parts



Circle Polarized Filter with Frame
TS-LA-60-R1




Dark Field Glass Adapter
TS-LA-60-R2

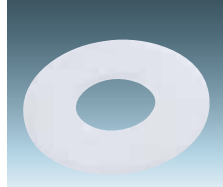


Dark Field Diffuser Glass
TS-LA-60-R3

Light Filter for CZ5



44mm ϕ Filter Cover
TS-CZ5-1



39.5mm ϕ Doughnut Glass
TS-CZ5-2




39.5mm ϕ Doughnut Polarized Glass
TS-CZ5-3



Polarized Adapter for 18mm ϕ Lens
TS-CZ5-4

for TS-LA-40/50



- Polarized Glass Frame
- I.D. 63.0mm
- O.D. 80mm
- Weight 60g.

TS-CZ8-1



- Diffuser Doughnut Glass
- I.D. 23.3mm
- O.D. 65.5mm
- Weight 20g.

TS-CZ8-2



- Polarized Doughnut Glass
- I.D. 23.3mm
- O.D. 65.5mm
- Weight 20g.

TS-CZ8-3



- Polarized Glass
- O.D. 65.5mm
- Weight 30g

TS-CZ8-4

For Lightings • AC Power Supply



TS-LA-CZ5



TS-3-LED

TS-LACL **TS-8L-LCC**
 ● LED for CZ5 and Micrometer **※Cannot be Used for LED Ring Lights**
※This is Set Part and Cannot Sell TS-LACL Only.
 ● LED for CZ5 and Micrometer



● Light Control
 ● Dimensions: 70 x 40 x 25mm
 ● Weight: 40g.

● Ac Adapter for LED Lights
 ● Dimensions: 60 x 45 x 25mm
 ● Weight: 120g.



● Battery Holder with Light Control
 ● Dimensions: 72 x 65 x 20mm
 ● Weight: 160g. (with Batterys)



- Power Supply for TS-TL-01 & TS-HL-01
- Dimensions: 120 x 80 x 63mm
- Weight: 720g.

TS-T/H-AC



- Power Supply for all LED Lights
- Dimensions: 150 x 79 x 65
- Weight: 1160g.

TS-LAS/LED-104L



coming soon
TS-LA-SP4

MANUAL ZOOM LENSES

High Speed Lens



Part No.	TSZS-08048	TSZK-08551	TSZK-11110	TSZS-11569	TSZK-12575	TSZK-16160		
Focal Length	8-48mm	8.5-51.0mm	11.0-110.0mm	11.5-69mm	12.5-75.0mm	16.0mm-160.0mm		
CCD Size	1/2"-1/4"	1/2"-1/3"	2/3"-1/3"	2/3"-1/4"	2/3"-1/3"	1"-1/3"		
Relative Aperture	1:1.0	1:1.2	1:1.8	1:1.4	1:1.8	1:2.0-2.4		
Zoom Ratio	6x	6x	10x	6x	6x	10x		
Iris	Operation	Manual	Manual	Manual	Manual	Manual		
	Aperture	1.0-Close	1.2-Close	1.8-Close	1.4-Close	1.8-Close	2.0(2.4)-Close	
Focus	Operation	Manual	Manual	Manual	Manual	Manual		
Zoom	Operation	Manual	Manual	Manual	Manual	Manual		
Field of View Angle (DxHxV)	1/3"	Wide	40.3°x32.2°x24.1°	38.8°x31.3°x23.6°	30.0°x24.2°x18.3°	29.2°x23.3°x17.5°	26.6°x21.2°x16.1°	20.8°x16.7°x12.5°
		Tele	6.9°x5.6°x4.2°	6.8°x31.3°x4.1°	3.2°x2.6°x1.9°	5.0°x4.0°x3.0°	4.5°x3.6°x2.7°	2.2°x1.8°x1.3°
	1/2"	Wide	53.8°x43.0°x32.2°	50.7°x41.2°x31.3°	40.0°x32.4°x24.6°	38.8°x30.5°x23.3°	34.9°x28.3°x21.4°	27.7°x22.1°x16.7°
		Tele	9.0°x7.3°x5.6°	8.9°x7.2°x5.5°	4.2°x3.3°x2.5°	6.7°x5.3°x4.0°	6.0°x4.8°x3.6°	3.0°x2.4°x1.8°
	2/3"	Wide	* * *	* * *	56.4°x45.0°x33.8°	53.3°x41.9°x32.0°	47.9°x38.7°x29.3°	37.1°x30.0°x22.8°
		Tele	* * *	* * *	5.8°x4.6°x3.5°	9.1°x7.3°x5.5°	8.2°x6.6°x4.9°	4.1°x3.3°x2.4°
	1"	Wide	* * *	* * *	* * *	* * *	* * *	53.4°x43.4°x32.9°
		Tele	* * *	* * *	* * *	* * *	* * *	5.7°x4.6°x3.5°
Min. Object Distance	1000mm (Service Near 500mm)	1000mm	1300mm	1000mm (Service Near 500mm)	1000mm	1500mm		
Back Focal Length	14.56mm	12.55mm	17.58mm	17.93mm	17.19mm	34.94mm		
Clear Aperture	Front	20.0mmφ	44.0mmφ	59.0mmφ	40.0mmφ	44.0mmφ	63.0mmφ	
	Rear	18.4mmφ	11.7mmφ	16.5mmφ	17.3mmφ	13.0mmφ	20.0mmφ	
Filter Size	M 46mm / P = 0.75	M 52mm / P = 0.75	M 67mm / P = 0.75	M 46mm / P0.75	M 49mm / P = 0.75	M 67mm / P = 0.75		
Mount/Fringe Back	C/17.526mm	C / 17.526mm	C / 17.526mm	C/17.526mm	C / 17.526mm	C / 17.526mm		
Dimensions	58.0mmφx102.4mm	58.8mmφx93.4mm	70.8mmφx140.5mm	46.0mmφx107.8mm	54.4mmφx100.5mm	70.4mmφx165.0mm		
Weight	395g	440.0g	724.0g	410g	368.0g	829.0g		
Operation Temperature	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C		



Part No.	T S L - 1 7 0 9 5	T S L - 2 5 0 9 5	T S L - 5 0 0 9 5	
CCD Size	1/4"-2/3"	1/3"-1"	1/3"-1"	
Focal Length	17.0mm	25.0mm	50.0mm	
Relative Aperture	1:0.95	1:0.95	1:0.95	
Iris	Operation	Manual	Manual	
	Aperture	0.95-close	0.95-16	0.95-close
Focus	Operation	Manual	Manual	
	Aperture	500mm-∞	500mm-∞	500mm-∞
Diagonal x Horizontal x Vertical	1/3"	15.1°x12.1°x9.1°	13.7°x11.0°x8.2°	6.9°x5.5°x4.1°
	1/2"	20.0°x16.1°x12.1°	18.2°x14.6°x11.0°	9.1°x7.3°x5.5°
	2/3"	26.5°x21.3°x16.1°	24.8°x20.0°x15.0°	12.6°x10.1°x7.6°
	1"	35.9°x29.0°x22.0°	35.5°x28.7°x21.7°	18.2°x14.6°x11.0°
Min. Object Distance	0.5m	0.5m	0.5m	
Back Focal Length	13.89mm	13.89mm	25.62mm	
Clear Aperture	Front	27mmφ	26.3mmφ	53mmφ
	Rear	17.5mmφ	17.5mmφ	32.5mmφ
Filter Size	M 40.5 / P = 0.5	M 40.5 / P = 0.5	M 60 / P = 0.75	
Mount	C-Mount	C-Mount	C-Mount	
Dimensions	42mmφx63.2mm	41.8mmφx45.2mm	65mmφx74.1mm	
Weight	165g	125g	470g	

Fixed Focal Length "CCTV" Lenses



Part No.	TSS-0284I	TSS-0284	TSS-0412	TSS-0412I	TSK-0612	TSK-0612I	TSS-0812	TSS-0812I	
Focal Length	2.8mm	2.8mm	4.0mm	4.0mm	6.0mm	6.0mm	8.0mm	8.0mm	
CCD Size	1/3"~1/4"	1/3"~1/4"	1/3"~1/4"	1/3"~1/4"	1/3"~1/4"	1/3"~1/4"	1/3"~1/4"	1/3"~1/4"	
Aperture	1:1.3	1:1.3	1:1.2	1:1.2	1:1.2	1:1.2	1:1.2	1:1.2	
Iris	Operation	Manual	Manual	Manual	***	Manual	Manual	Manual	
	Aperture	1.3~Close	1.3	1.2	1.2~Close	F1.2	F1.2~Close	1.2	
Focus	Operation	Manual	Manual	Manual	Manual	Manual	Manual	Manual	
Field of View Angle (DxHxV)	1/4"	***	***	***	***	***	***	***	
	1/3"	103.7°x87.7°x68.3°	103.7°x87.7°x68.3°	83.0°x67.3°x50.9°	83.0°x67.3°x50.9°	61.1°x48.1°x35.6°	61.1°x48.1°x35.6°	45.6°x35.7°x26.4°	45.6°x35.7°x26.4°
	1/2"	***	***	***	***	***	***	***	
	2/3"	***	***	***	***	***	***	***	
	1"	***	***	***	***	***	***	***	
Min. Object Distance	100mm	100mm	100mm	100mm	300mm	300mm	100mm	100mm	
Back Focal Length	8.5mm	8.5mm	9.0mm	9.0mm	9.30mm	9.30mm	10.7mm	10.7mm	
Clear Aperture	Front	15.5mmφ	15.5mmφ	11.2mmφ	11.2mmφ	14.0mmφ	14.0mmφ	11.0mmφ	11.0mmφ
	Rear	10.7mmφ	10.7mmφ	10.5mmφ	10.5mmφ	8.9mmφ	8.9mmφ	10.2mmφ	10.2mmφ
Filter Diameter	-	-	-	-	***	***	-	-	
Mount/Frange Back	CS/12.526mm	CS/12.526mm	CS/12.526mm	CS/12.526mm	CS/12.5mm	CS/12.5mm	CS/12.526mm	CS/12.526mm	
Dimensions	30.0mmφx33.7mm	29.0mmφx33.2mm	29.0mmφx33.2mm	30.0mmφx33.7mm	30mmφx26.5mm	30mmφx26.8mm	29.0mmφx33.2mm	30.0mmφx33.7mm	
Weight	35g	35g	35g	35g	45.6g	41.7g	35g	35g	
Operation Temperature	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	



Part No.	TSW-0813	TSK-1212	TSS-1212	TSS-1614	TSW-1614	TSK-2514	TSW-2514	TSW-5018	TSK-5018	
Focal Length	8.0mm	12.0mm	12.0mm	16.0mm	16.0mm	25.0mm	25.0mm	50.0mm	50.0mm	
CCD Size	2/3"~1/3"	1/2"~1/3"	1/2"~1/4"	2/3"~1/4"	2/3"~1/3"	1~1/3"	2/3"~1/3"	2/3"~1/3"	1~1/3"	
Aperture	1:1.3	1:1.2	1:1.2	1:1.4	1:1.4	1:1.4	1:1.4	1:1.8	1:1.8	
Iris	Operation	Manual	Manual	Manual	Manual	Manual	Manual	Manual	Manual	
	Aperture	F:1.3~Close	F1.2~Close	1.2~Close	1.4~Close	F:1.4~Close	F1.4~Close	F:1.4~Close	F:1.8~Close	
Focus	Operation	Manual	Manual	Manual	Manual	Manual	Manual	Manual	Manual	
Field of View Angle (DxHxV)	1/4"	***	***	***	***	***	***	***	***	
	1/3"	41.0°x33.4°x25.4°	27.4°x22.1°x16.7°	28.3°x22.6°x16.9°	20.8°x16.7°x12.5°	21.2°x17.0°x12.8°	13.3°x10.6°x8.0°	13.7°x10.1°x8.2°	6.8°x5.5°x4.1°	6.9°x5.5°x4.2°
	1/2"	56.0°x43.6°x33.4°	37.1°x29.7°x22.3°	38.0°x30.2°x22.6°	27.7°x22.2°x16.7°	28.0°x22.6°x17.0°	17.6°x14.2°x10.6°	2.0°x14.6°x10.1°	9.1°x7.3°x5.5°	9.1°x7.3°x5.5°
	2/3"	69.0°x57.6°x45.0°	***	***	37.9°x30.4°x22.9°	38.0°x30.7°x23.3°	24.1°x19.4°x14.6°	24.8°x19.9°x15.0°	12.5°x10.0°x7.5°	12.6°x10.1°x7.6°
	1"	***	***	***	***	***	34.8°x27.8°x20.9°	***	***	18.6°x14.8°x11.1°
Min. Object Distance	200mm	300mm	300mm	400mm	400mm	300mm	500mm	1000mm	300mm	
Back Focal Length	10.99mm	12.10mm	12.6mm	14.2mm	12.44mm	11.50mm	11.94mm	13.94mm	22.15mm	
Clear Aperture	Front	16.0mmφ	11.2mmφ	11.8mmφ	12.0mmφ	11.1mmφ	18.7mmφ	18.0mmφ	25.6mmφ	27.4mmφ
	Rear	10.7mmφ	11.0mmφ	11.2mmφ	11.0mmφ	9.0mmφ	14.0mmφ	9.0mmφ	7.9mmφ	14.0mmφ
Filter Diameter	25.5mm / P=0.5mm	M 34.0 P= 0.5	-	-	27.0mm / P=0.5mm	M 43.0 P= 0.75	27.0mm / P=0.5mm	30.5mm / P=0.5mm	M 40.5 P= 0.5	
Mount/Frange Back	C/17.526mm	C/ 17.526mm	CS/12.526mm	CS/12.526mm	C/17.526mm	C/ 17.526mm	C/17.526mm	C/17.526mm	C/17.526mm	
Dimensions	29.0mmφxL=34.5mm	37.0mmφx34.5mm	42.0φx40.2mm	30.0φx30.0mm	30.0mmφxL=24.5mm	45.0mmφx28.0mm	30.0mmφxL=24.5mm	32.0mmφxL=37.0mm	44.0mmφx48.5mm	
Weight	60g	74.5g	65g	45g	40g	81.0g	45g	60g	145.0g	
Operation Temperature	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	-10°C~+50°C	

● for Factory Automation, Image Processings, Industrial Machine Vision, etc.

Mega Pixels CCTV Lenses

Part No.	TSMY-0614	TSMS-0814	TSMS-1214	TSMS-1614	TSMY-2514	TSMY-3520	TSMY-5028
Focal Length	6.0mm	8.0mm	12.0mm	16.0mm	25.0mm	35.0mm	50.0mm
Relative Aperture	1.4	1.4	1.4	1.4	1.4	2.0	2.8
Iris	1.4~16	1.4~Close	1.4~Close	1.4~16	1.4~22	2.0~22	2.8~22
Field of View Angle	57.4°x44.3°	56.5°x43.9°	38.3°x26.2°	38.3°x26.2°	20.1°x15.1°	14.33°x10.45°	9.98°x7.49°
Min. Object Distance	250mm	100mm	150mm	200mm	250mm	250mm	500mm
Back Focal Length	12.32mm	9.7mm	11.7mm	13.1mm	13.13mm	18.06mm	21.20mm
Flange Back	17.526mm	17.526mm	17.526mm	17.526mm	17.526mm	17.526mm	17.526mm
Filter Size	manual	manual	manual	manual	manual	manual	manual
Mount	C-Mount	C-Mount	C-Mount	C-Mount	C-Mount	C-Mount	C-Mount
Filter Size	M30.5 (P=0.5)	-	M27mm (P=0.5)	M25.5m (P=0.5)	M25.5 (P=0.5)	M25.5 (P=0.5)	M25.5 (P=0.5)
Lens Construction	6G- 7E	8G - 10E	7G - 8E	7G - 8E	4G - 6E	4G - 6E	4G - 6E
Front Principal Points	19.24mm	19.8mm	23.06mm	27.5mm	23.34mm	19.94mm	-9.57mm
Rear Principal points	6.37mm	1.44mm	-1.02mm	-3.4mm	-11.94mm	-16.94mm	-28.70mm
Distance of Principal Points	29.13mm	27.6mm	13.9mm	5.0mm	-8.98mm	-10.38mm	7.47mm
Optical Whole Length	42.0mm	55.7mm	49.7mm	49.0mm	26.30mm	26.50mm	26.60mm
Entrance Pupil	14.88mm	11.2mm	11.0mm	10.2mm	17.52mm	20.99mm	24.98mm
Exit Pupil	-21.77mm	226mm	-215mm	-340mm	-32.67mm	-33.98mm	-29.56mm
Effective Dia. of Front Lens	25.8mmφ	17.5mmφ	15.8mmφ	20.2mmφ	17.00mmφ	17.80mmφ	17.40mmφ
Effective Dia. of Rear Lens	9.0mmφ	14.6mmφ	14.1mmφ	15.5mmφ	12.80mmφ	11.80mmφ	8.4mmφ
Lens Movement	0.17mm	0.65mm	1.4mm	2.3mm	3.10mm	6.70mm	6.50mm
Metal Front-#1 Lens Surface	0.68mm	3.4mm	4.8mm	5.0mm	9.60mm	11.47mm	8.23mm
Design Wave Length	540nm	540nm	540nm	540nm	540nm	540nm	540nm
TV Distortion	-0.96%	0.60%	0.07%	0.05%	-0.28%	-0.02%	-0.20%
Center Resolving Power	100L/mm (F=1.4)	100L/mm	100L/mm	100L/mm	140L/mm (F=1.4)	140L/mm (F=2.0)	140L/mm (F=2.8)
Outer Resolving Power	80L/mm (F=1.4)	80L/mm	80L/mm	80L/mm	100L/mm (F=1.4)	100L/mm (F=2.0)	100L/mm (F=2.8)
Outer Lighter Volume	54%	30%	37%	60%	62%	59%	73%
Operation Temperature	-20°C~50°C	-10°C~+45°C	-10°C~+45°C	-10°C~+45°C	-20°C~50°C	-20°C~50°C	-20°C~50°C
Weight	66g	83g	75g	81g	45g	55g	55g
Dimensions	32mmφx37.5mm	34.0mmφx41.0mm	34.0mmφx37.0mm	33.0mmφx36.5mm	29mmφx31.5mm	29mmφx38.5mm	29mmφx38.5mm

● Resolving Power of Center and Outer Parts is not so difference and has low distortion in compare with regular CCTV Lenses.

Board Camera Lens

Part No.	TSBL-02520	TSBL-03020	TSBL-04020	TSBL-06018	TSBL-08020
Focal Length	2.5mm	3.0mm	4.0mm	6.0mm	8.0mm
Back Focal Length	5.5mm	5.6mm	5.5mm	8.29mm	8.5mm
Sensor Size	1/3" 1/4"	1/3" 1/4"	1/3" 1/4"	1/3" 1/4"	1/3" 1/4"
Max. Aperture	F2.0	F2.0	F2.0	F1.8	F2.0
Field of View Angle	140°·104°(Diagonal)	120°·90°(Diagonal)	80°·64°(Diagonal)	56°·41.3°(Diagonal)	40°·30°(Diagonal)
Dimensions(φxL)	15x18.7mm	14x15.4mm	14x15.7mm	14x15.7mm	14x14.32mm
Weight	6g	5g	6g	5.5g	4.2g
Lens Construction	6G - 6E	4G - 4E	4G - 4E	3G - 4E	4G - 4E

Part No.	TSBL-12022	TSBL-16025	TSBL-25025	TSBL-35020	TSBL-50025
Focal Length	12.0mm	16.0mm	25.0mm	35.0mm	50.0mm
Back Focal Length	9.2mm	12.3mm	11.89mm	18.9mm	33.78mm
Sensor Size	1/3" 1/4"	1/3" 1/4"	1/2" 1/3"	1/2" 1/3"	1/2"
Max. Aperture	F2.2	F2.5	F2.5	F2.0	F2.5
Field of View Angle	28°·19°(Diagonal)	19°·15°(Diagonal)	16.9°·13.8°(Diagonal)	12.4°·9.8°(Diagonal)	9.2° (Diagonal)
Dimensions(φxL)	14x11.35mm	14x14.4mm	24.8x22.0mm	25x23.1mm	27x56.77mm
Weight	3g	4.5g	16.5g	15.4g	38.0g
Lens Construction	3G - 3E	3G - 3E	4G - 4E	4G - 4E	4G - 4E

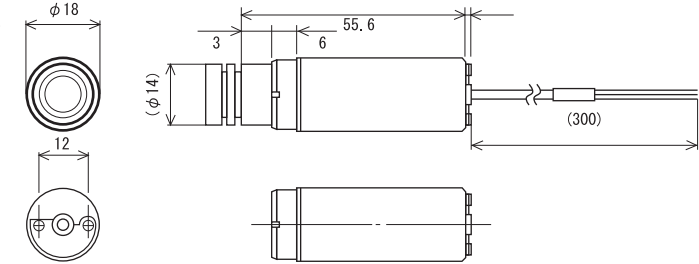
● Thread Pitch: 12mm dia. P= 0.5mm

ANALOG CAMERA

WAT-240 (NTSC, PAL) VIVID Color Camera



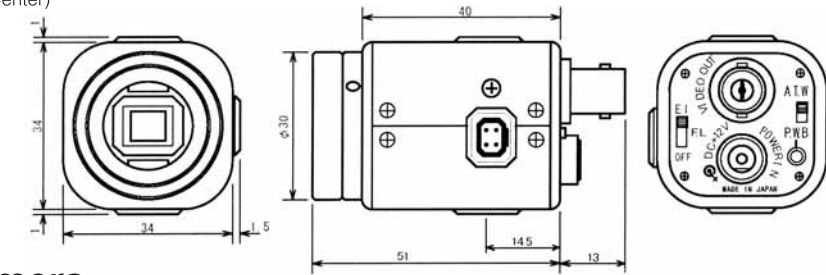
Pick-Up Element 1/4" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 507 (V) for NTSC : 795 (H) x 595 (V) for PAL
 Number of Effective Pixels 768 (H) x 494 (V) for NTSC : 752 (H) x 582 (V) for PAL
 Horizontal Resolution 450TV Lines (Center)
 Mount 28g. (with Glass f3.8mm Lens)



WAT-250D (NTSC) DSP Color Camera



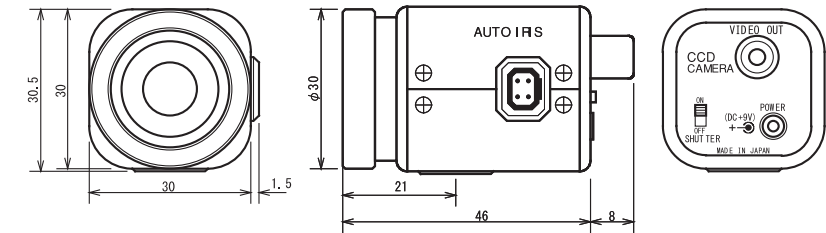
Pick-Up Element 1/3" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V)
 Number of Effective Pixels 768 (H) x 494 (V)
 Horizontal Resolution 450TV Lines (Center)
 Mount CS
 Weight approx. 90g.



WAT-502B (EIA) Monochrome Camera



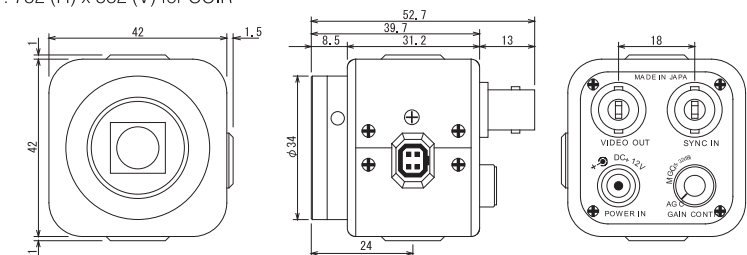
Pick-Up Element 1/3" Interline Transfer Image Sensor
 Number of Total Pixels 537 (H) x 505 (V)
 Number of Effective Pixels 510 (H) x 492 (V)
 Horizontal Resolution 400TV Lines
 Mount CS
 Weight 85g.



WAT-525EX (EIA, CCIR) Monochrome Camera



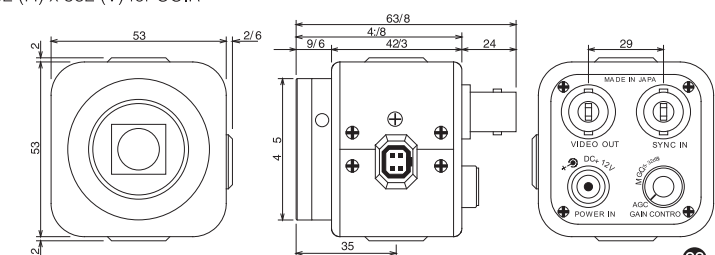
Pick-Up Element 1/2" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V) for EIA : 795 (H) x 596 (V) for CCIR
 Number of Effective Pixels 768 (H) x 494 (V) for EIA : 752 (H) x 582 (V) for CCIR
 Horizontal Resolution 570TV Lines (Center)
 Mount CS
 Weight 130g.



WAT-535EX (EIA, CCIR) Monochrome Camera



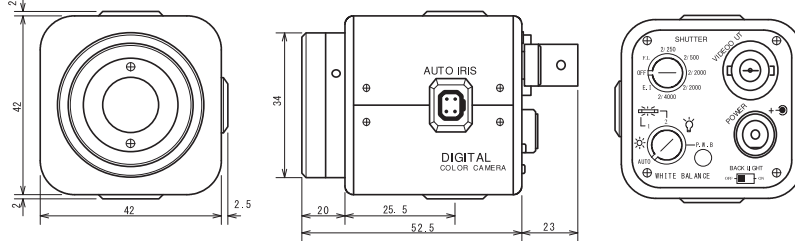
Pick-Up Element 1/3" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V) for EIA : 795 (H) x 596 (V) for CCIR
 Number of Effective Pixels 768 (H) x 494 (V) for EIA : 752 (H) x 582 (V) for CCIR
 Horizontal Resolution 570TV Lines (Center)
 Mount CS
 Weight 130g.



WAT-202D (NTSC, PAL) Color Camera



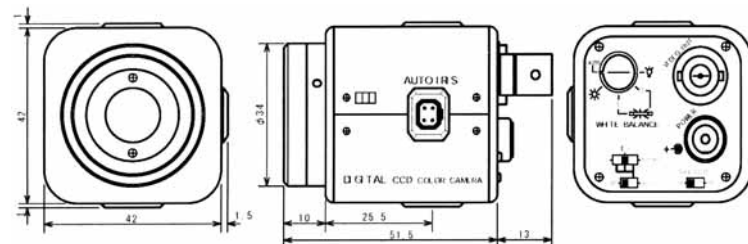
Pick-Up Element 1/3" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V) for NTSC : 795 (H) x 596 (V) for PAL
 Number of Effective Pixels 768 (H) x 494 (V) for NTSC : 752 (H) x 582 (V) for PAL
 Horizontal Resolution 450TV Lines (Center)
 Mount CS
 Weight Approx. 160g.



WAT-204CX (NTSC, PAL) Coaxial Transmission Camera



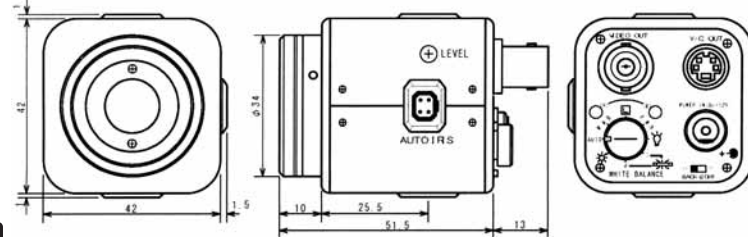
Pick-Up Element 1/3" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V) for NTSC : 795 (H) x 596 (V) for PAL
 Number of Effective Pixels 768 (H) x 494 (V) for NTSC : 752 (H) x 582 (V) for PAL
 Horizontal Resolution 450TV Lines (Center)
 Mount CS
 Weight approx. 160g.



WAT-221S (NTSC) DSP Color Camera



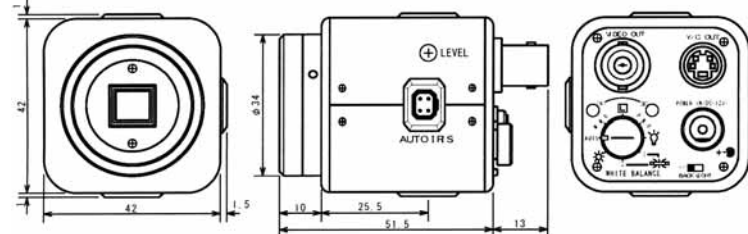
Pick-Up Element 1/2" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V)
 Number of Effective Pixels 768 (H) x 494 (V)
 Horizontal Resolution Composite Out : 450TV Lines (Center)
 Y/C Out : 480TV Lines (Center)
 Mount CS / C (with 34CMA-R)
 Weight approx. 160g.



WAT-231S (NTSC) DSP Color Camera



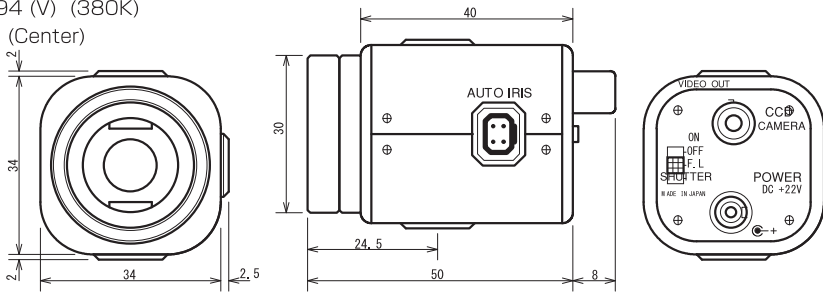
Pick-Up Element 1/3" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V)
 Number of Effective Pixels 768 (H) x 494 (V)
 Horizontal Resolution Composite Out : 450TV Lines (Center)
 Y/C out : 480TV Lines (Center)
 Mount CS
 Weight approx. 160g.



WAT-902B (EIA) Monochrome Camera



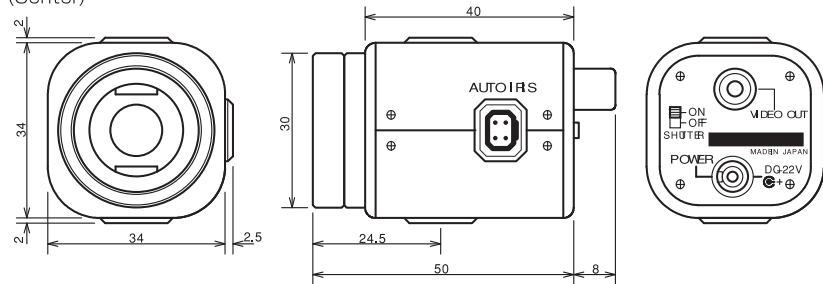
Pick-Up Element 1/2" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V)
 Number of Effective Pixels 768 (H) x 494 (V) (380K)
 Horizontal Resolution 570TV Lines (Center)
 Mount CS
 Weight approx. 90g.



WAT-902H (EIA) Monochrome Camera



Pick-Up Element 1/2" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V)
 Number of Effective Pixels 768 (H) x 494 (V) (380K)
 Horizontal Resolution 570TV Lines (Center)
 Mount CS
 Weight 90g.



902H SUPREME



WAT-902H2 SUPREME (EIA)

Pick-Up Element 1/2" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V)
 Number of Effective Pixels 768 (H) x 494 (V)
 Horizontal Resolution 570TV Lines (Center)
 Weight 90g.

WAT-902H2 SUPREME (CCIR)

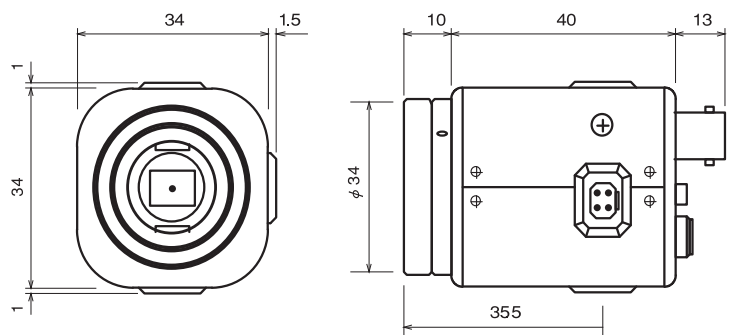
Pick-Up Element 1/2" Interline Transfer CCD Image Sensor
 Number of Total Pixels 795 (H) x 596 (V)
 Number of Effective Pixels 752 (H) x 582 (V)
 Horizontal Resolution 570TV Lines (Center)
 Weight 90g.

WAT-902H3 SUPREME (EIA)

Pick-Up Element 1/3" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811(H) x 508 (V)
 Number of Effective Pixels 768 (H) x 494 (V)
 Horizontal Resolution 570TV Lines (Center)
 Weight 90g.

WAT-902H3 SUPREME (CCIR)

Pick-Up Element 1/3" Interline Transfer CCD Image Sensor
 Number of Total Pixels 795 (H) x 596 (V)
 Number of Effective Pixels 752 (H) x 582 (V)
 Horizontal Resolution 570TV Lines (Center)
 Weight 90g.



WAT-902H 2/3 ULTIMATE



WAT-902H2 ULTIMATE (EIA)

Pick-Up Element 1/2" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V)
 Number of Effective Pixels 768 (H) x 494 (V)
 Horizontal Resolution 570TV Lines (Center)
 Weight approx. 98g.

WAT-902H3 ULTIMATE (EIA)

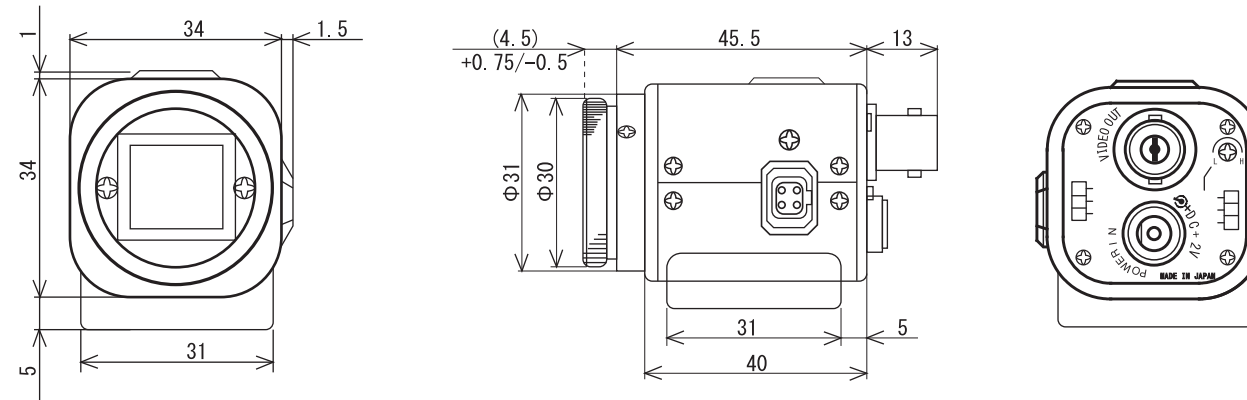
Pick-Up Element 1/3" Interline Transfer CCD Image Sensor
 Number of Total Pixels 811 (H) x 508 (V)
 Number of Effective Pixels 768 (H) x 494 (V)
 Horizontal Resolution 570TV Lines (Center)
 Weight approx. 98g.

WAT-902H2 ULTIMATE (CCIR)

Pick-Up Element 1/2" Interline Transfer CCD Image Sensor
 Number of Total Pixels 795 (H) x 596 (V)
 Number of Effective Pixels 752 (H) x 582 (V)
 Horizontal Resolution 570TV Lines (Center)
 Weight approx. 98g.

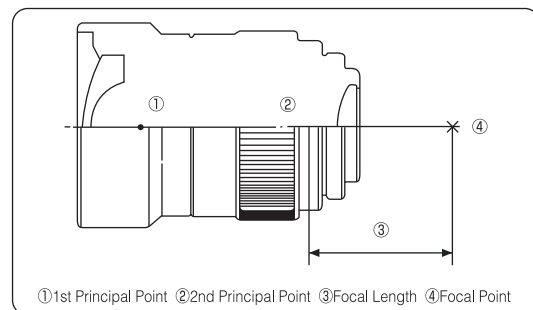
WAT-902H3 ULTIMATE

Pick-Up Element 1/3" Interline Transfer CCD Image Sensor
 Number of Total Pixels 795 (H) x 596 (V)
 Number of Effective Pixels 752 (H) x 582 (V)
 Horizontal Resolution 570TV Lines (Center)
 Weight approx. 98g.



Focal Length

The focal length is a distance from 2nd Principal Point to Focal Point on the optical axis.
 When a short focal length, an inclusive angle is wide angle and be able to take a photo of wide area.
 When a long focal length, an inclusive angle is narrow angle and be able to take a photo of long distance.



Aperture Ratio and F-No.

A diameter of incident pupil is aperture.
 An aperture ration shows 1:1.2, 1:1.3, etc.
 The value of 1.2 or 1.3 is F-No. The F-No. shows the brightness of a lens.
 A smaller F-No. is a brighter lens.

$$F\text{-No.} = \frac{f(\text{focal length})}{A(\text{aperture})}$$

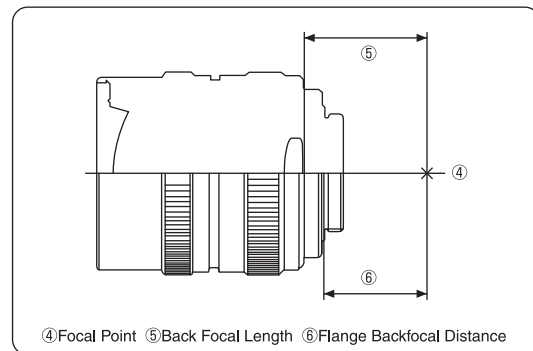
Back Focal Length and Flange Backfocal Distance

< Back Focal Length >

A distance from last lens surface to focal point.

< Flange Backfocal Distance >

A distance from flange surface (contact surface of camera and lens) to focal point.



C-Mount and CS-Mount

CCTV Lens is always with C or CS-Mount.
 These are same shape, but Flange Backfocal Distance is difference.
 C-Mount: 17.526mm Flange Backfocal Distance
 CS-Mount: 12.5mm Flange Backfocal Distance

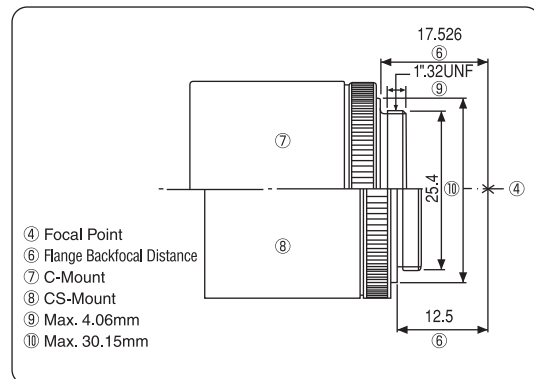
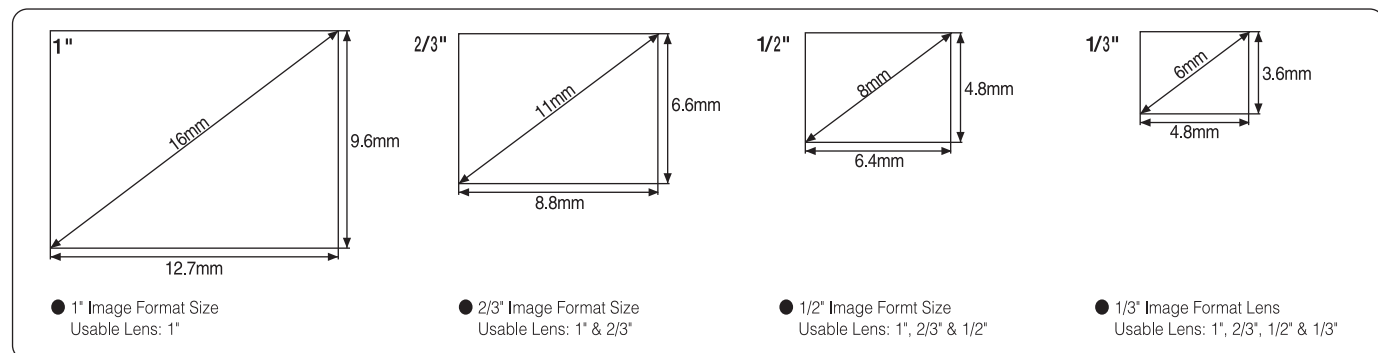


Image Format Size

There are 4 kinds of Image Format Sizes, 1", 2/3", 1/2" and 1/3".
 It is very important to know which Image Format Size of your lens.
 If you use 1" Image Format Size by 1/3" Image Format Size Lens, corners of screen/photo will be vignetting. The 1" Image Format Lens can be used for all of the sizes.

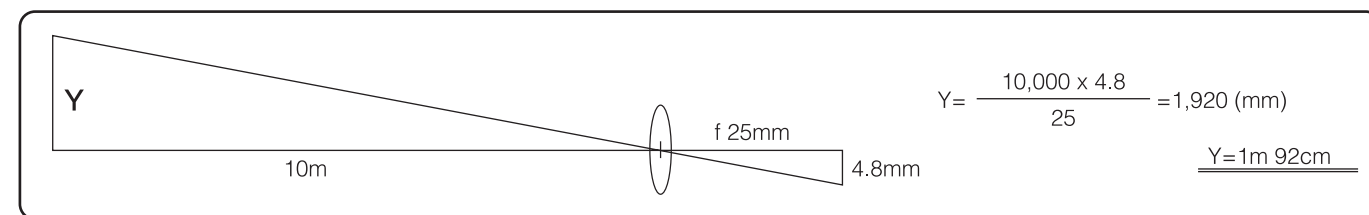


Taking a photo area and How to calculate a Focal Length.

How to calculate a photo area.

$$Y = \frac{(A \text{ distance from Lens to Object}) \times (\text{Image Format Size})}{\text{Focal Length of Lens}}$$

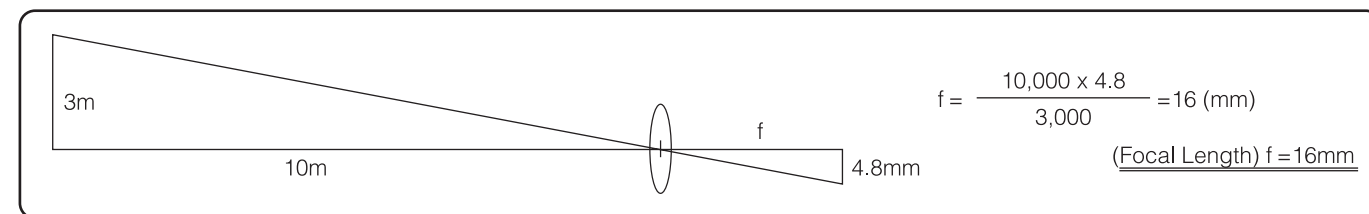
For Example
 How to calculate an object height (Y) when we take a photo an object which is 10m away from here in using 1/2" and 25mm focal length camera.



How to Calculate a Focal Length.

$$f = \frac{(A \text{ Distance from Lens to Object}) \times (\text{Image Format Size})}{A \text{ Height of Object}}$$

For Example
 How to calculate a focal length when we take a photo an object which is 10m away from lens surface and 3m height in using 1/2" camera.



How to Calculate Monitor Magnification and Total Magnification

Monitor Magnification = Monitor Inch x 25.4mm (1") ÷ Image Format Size of CCD Camera Diagonal
 Total Magnification = Monitor Magnification x Optical Magnification

For example

How to calculate an Total Magnification on 14" Monitor in using 2x Optical Magnification Lens and 1/2" CCD Camera.

Front Converter Lens and Rear Converter Lens

These lenses are mounted to a main Lens.
 Front Converter Lens is mounted to front of main lens and Rear Converter Lens is mounted to raer of main lens.

● Front Converter Lens

MT=MxM1
 NAT=NAxM1 → Changed Resolving Power and Angle of Field View.
 NA'T=NA' → Unchanged Rear Numerical Aperture and F-Number.
 WD → Changed.

● Rear Converter Lens

Mx=MxM2
 NAT=NA → Unchanged Resolving Power, but changed Angle of Field View
 NA' → NA'
 NA'T= → Rear Numerical Aperture changed to 1/M2 and F-Number changed to 2.
 WD → Unchange.

- M : Main Lens Magnification
- NA : Main Lens Front Numerical Aperture
- NA' : Main Lens Rear Numerical Aperture
- M1 : Front Converter Lens Magnification
- M2 : Rear Converter Lens Magnification
- MT : Total Magnification
- NAT : Front Total Numerical Aperture
- NA'T : Rear Total Numerical Aperture

With Coaxial Incident Light Barrel or Transmitted Light Barrel · Ultra Fine Movement Rack & Pinion

High-End Ultra Zoom Scope System

Max. Magnification
**12,500x with
50x Objective Lens
1/2" Camera · 15" Monitor**
(Max. Magnification: 5,500x with 20x Objective Lens · 1/2" Camera · 15" Monitor)

Ultra High Magnification Zoom Scope System

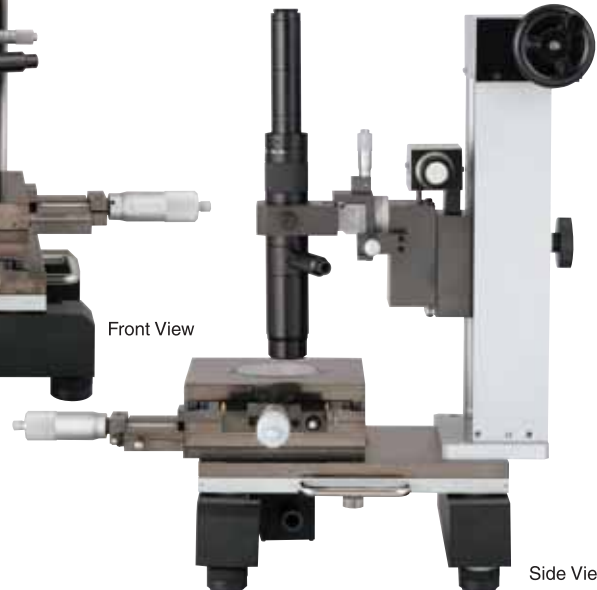
羅 RAGO 号



TS-RG-01



Front View



Side View



Coaxial Incident Light Barrel



Ultra Precision X-Y-Z Rack & Pinion

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