Mitutoyo

Mitutoyo Quality

Varifocal Lens
TAGLENS™

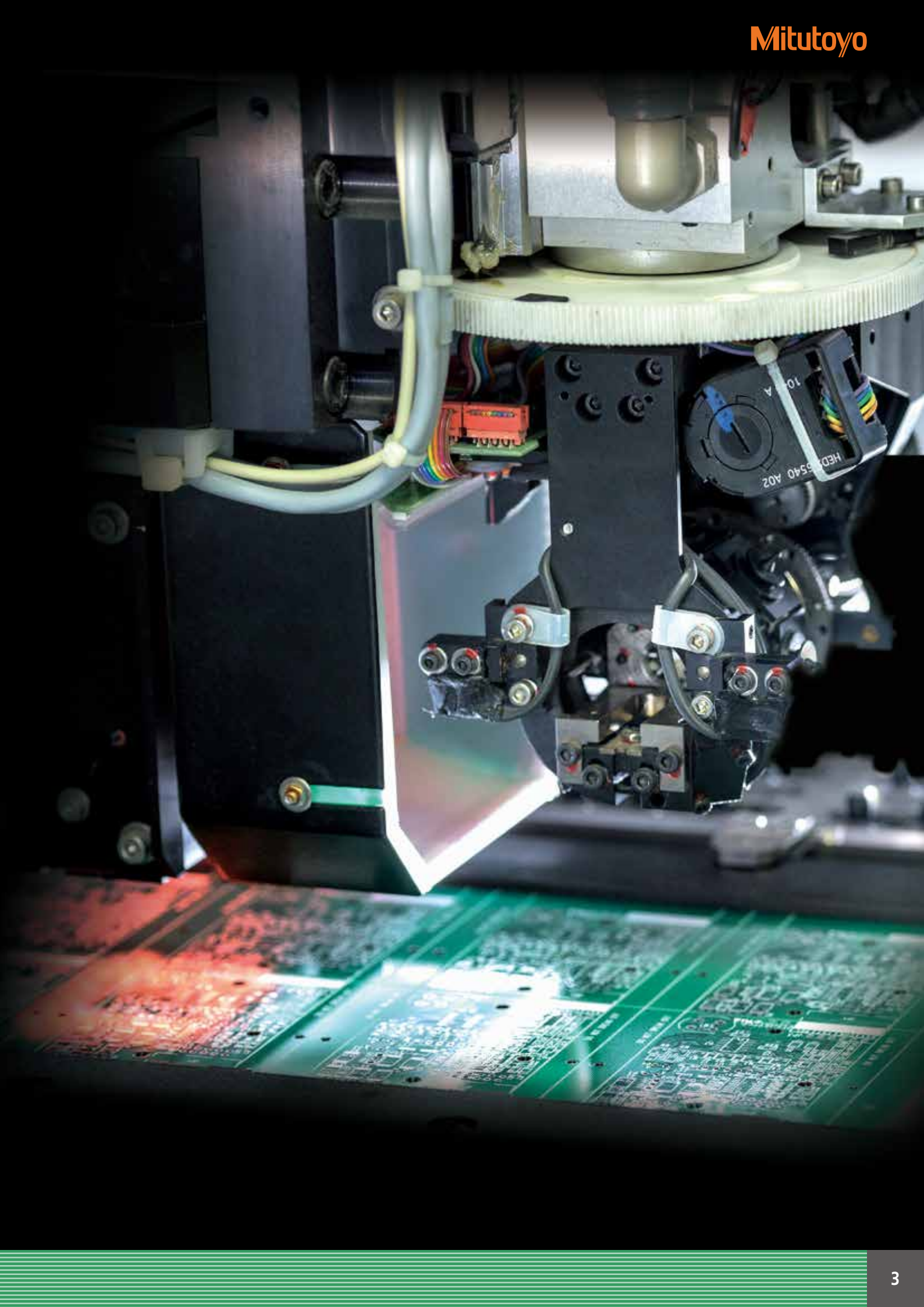
Optical Measuring

Catalog No.14025(2)

TAGLENS

Ultra-deep focus eliminates conventional lens limitations.

There are major problems with optical inspection of three-dimensional targets using conventional lenses, including variable distances, inclination, movement, and multiple reflections. The result of these problems is that some surfaces are out of focus in every image. The TAGLENS has ground-breaking ultra-deep focus, which allows completely in-focus images of the target to be captured instantaneously. This revolution in optical inspection will dramatically improve productivity and efficiency.



APPLICATION

TAGLENS gives prompt solutions to problems in inspection and observation.
Some application examples using TAGLENS are introduced hereafter.

Inspection of electronic / precision components

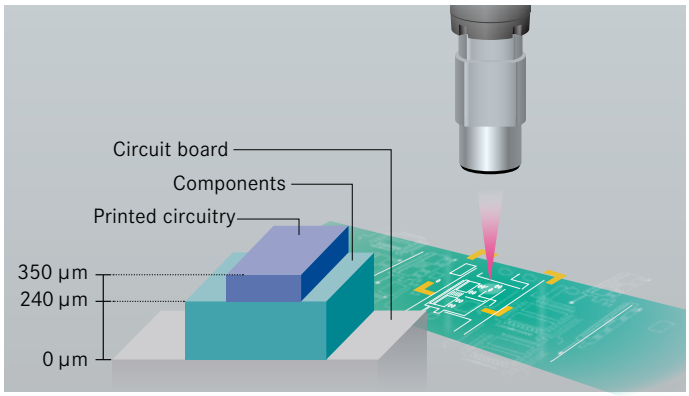
Problem

- Reducing inspection times used for electronic / precision components.
- Cutting down on the cost of inspection devices.

Solution

- A large depth of focus even in a high-magnification observation eliminates the need for focus adjustment, improving the inspection efficiency.
- Eliminates the use of a mechanical auto-focus drive unit, achieving cost saving of inspection devices.

Example: Semiconductor flaw inspection



Eliminates the need for focus adjustment, thus achieving effective inspection.

High-speed imaging

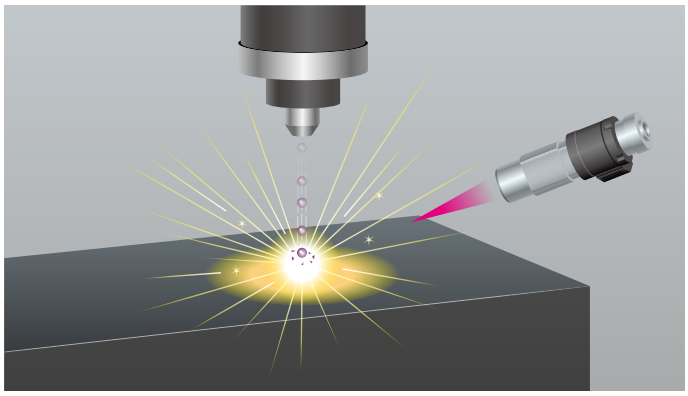
Problem

- Instantaneous shooting of a crash test results in defocusing of scattered chips.
- Completion with a single trial is needed because of destructive test.

Solution

- Allows shooting of deep images at a time, thus capturing all scattered chips.

Example: Car crash test



The high-speed shooting of a costly crash test is successfully completed at one try thanks to a large depth of focus.

Microscopic particle measurement

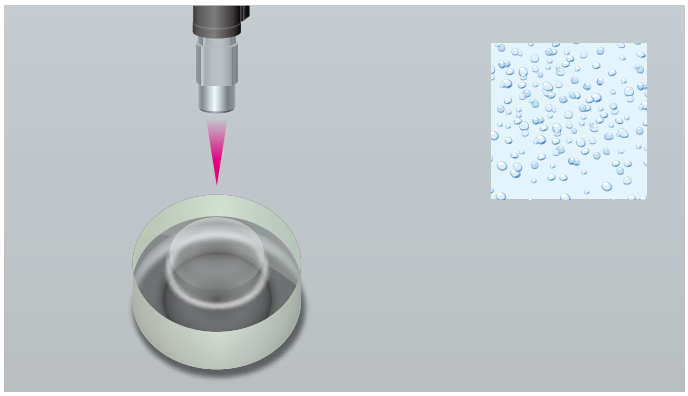
Problem

- The 3D positions of particles cannot be captured.
- The deeply-located particles cannot be focused sharply.

Solution

- Allows all the particles spread in a wide range to come into focus.
- Enables the 3D positions of spatially-moving particles to be determined from each focusing position.
- TAGLENS can be used in microfluidic channels.

Example: Observation of minute bubbles in glass / liquid



Absolutely allows observation of target objects with a large depth of focus.

On a robot

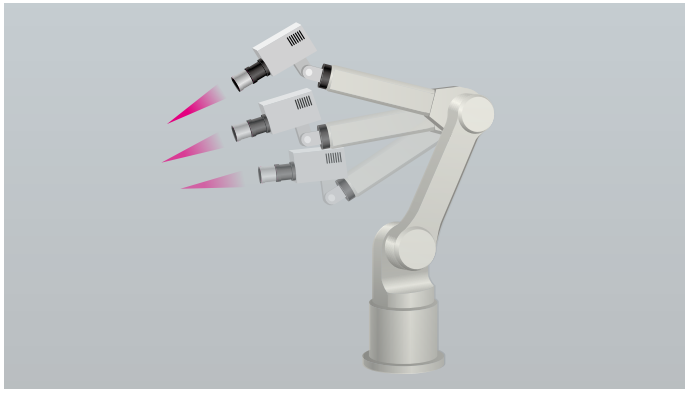
Problem

- It takes time to observe a workpiece from various angles with the camera mounted on a robot arm.

Solution

- The large depth of focus eliminates the need for focus adjustment and allows observation from various angles, thus contributing to time-saving of observation.

Example: Inspection using a robot.



Allows inspection of a workpiece with the camera mounted on a robot arm.

Mitutoyo

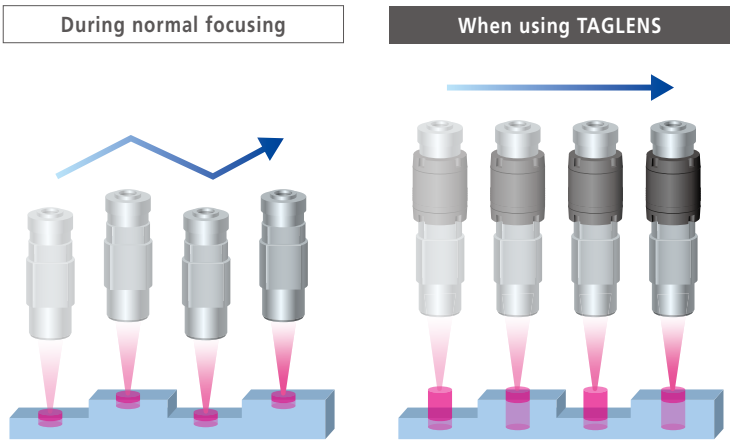
ABILITY

TAGLENS, the breakthrough ultra-fast varifocal lens, will always keep your sample in focus, enabling the highest observation and measurement efficiency ever.

Improve inspection efficiency using TAGLENS with its ultra-wide focus range

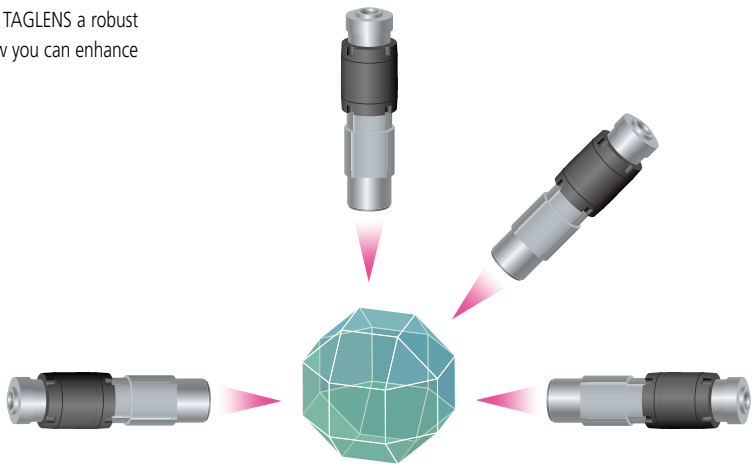
The focus range is variable without changing the camera position

Until now, imaging for subjects with differing heights and depths was performed by taking multiple photographs while moving the camera vertically (Z-axis motion). In contrast, TAGLENS allows simultaneous probing of multiple heights or depths. Moreover, a captured image is displayed in real time.



Good for any orientation

TAGLENS performance is insensitive to orientation. This property makes TAGLENS a robust solution for inspection at various angles with respect to the sample. Now you can enhance your inspection throughput without moving and rotating the sample.

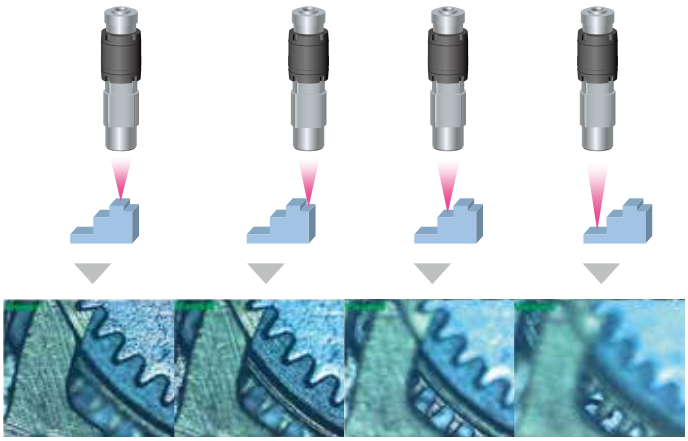


The ultrafast pulse illuminator【PLS】is new arrival. 【PLS】is faster than the scanning speed of TAGLENS.

Selective probing of height

- A focused image in any specified Z-position can be captured without mechanical drive system within the observation range at an extended depth of focus.
- Multiple images focused in given Z-positions can be captured.
- Each captured image is provided with a high-quality original image.

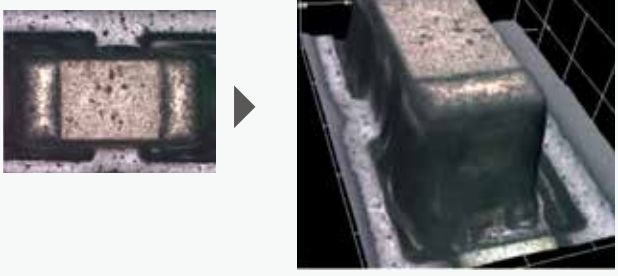
Capturing various Z planes is now possible without moving parts



Now you can do 3D imaging using TAGLENS

Batch real-time display of multiple images focused in different Z-positions (Multi Focus Viewer)

2D image composite from Z-stack and 3D image



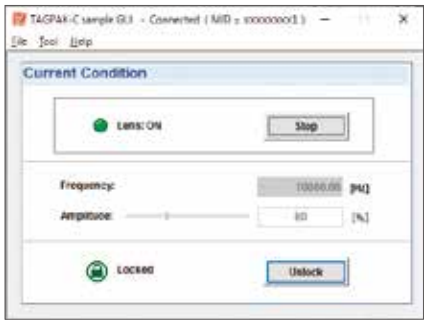
Furthermore, 3D imaging with the aid of commercial 3D Viewer software

SOFTWARE

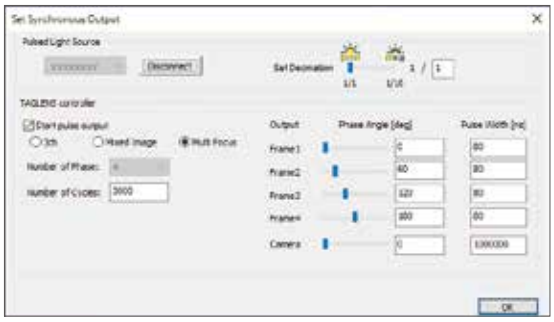
TAGPAK-C Supplied as standard

TAGPAK-C is software for setting the parameters to control "TAGLENS" and "Pulsed Light Source for TAGLENS".
This is included "TAGLENS-T1".

<TAGPAK-C operation screen>



TAGPAK-C operation screen for Pulsed Light Source control



Items			System specifications
OS			Windows10 Pro 64bit
PC	CPU	Clock frequency	2.0 GHz or more
	Memory		8 GB or more
	Hard disk		25 GB or more
	Optical Drive		DVD-ROM Drive for installation software.
	Communication port	For TAGLENS control	USB 2.0 × 1 port or RS-232C × 1 port
		For Pulsed Light Source control	USB 2.0 × 1 port
Monitor			SXGA (1024×768 Pixel) or more

Note 1: Please prepare a PC for the software separately by the customer. For required operating environments, refer to the above table.
Note 2: For TAGPAK-C, some functions are available as SDK (Software Development Kit), enabling their integration into your software.

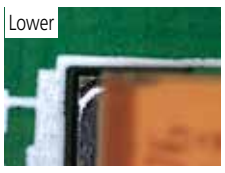
TAGPAK-E Optional Software (Required for checking the inspection images.)

TAGPAK-E is one of software used to display an image captured with the optical system equipped with TAGLENS and convert it to an extended depth-of-focus image (EDOF image). The software provides functions relating to EDOF images such as parameter setting, image ON/OFF and saving and loading the images. (Input/Output-enabled still image files: BITMAP, TIFF, PNG, JPEG)
Noise rejection filter, binarization filer and / or Sobel filter (edge enhancement) are available from the options in the Image Filter Settings dialog.
This is included "TAGLENS-T1 E-SET" only.

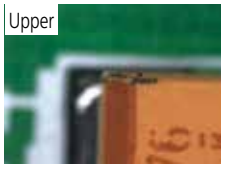
[Execution example of EDOF image]

Normal microscope observation

Lower



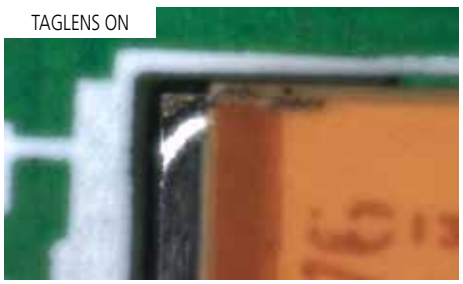
Upper



With a height difference, only the upper or lower plane can be focused.

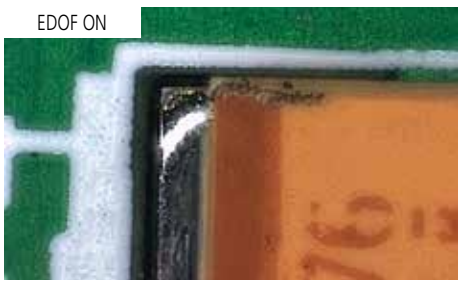
When using TAGLENS

TAGLENS ON



TAGLENS changes the focus point at high speed. However, because the capturing time per frame is longer than the focusing time, the images will have optically mixed focus points from different heights, and the image will be blurred.

EDOF ON

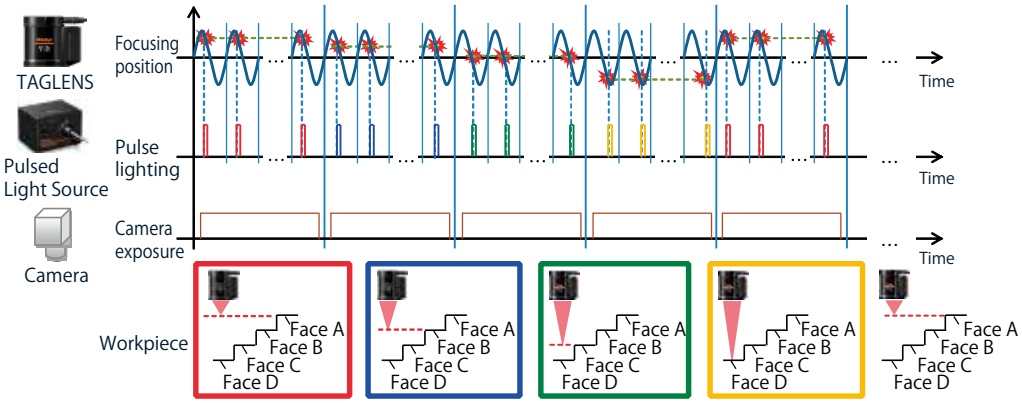


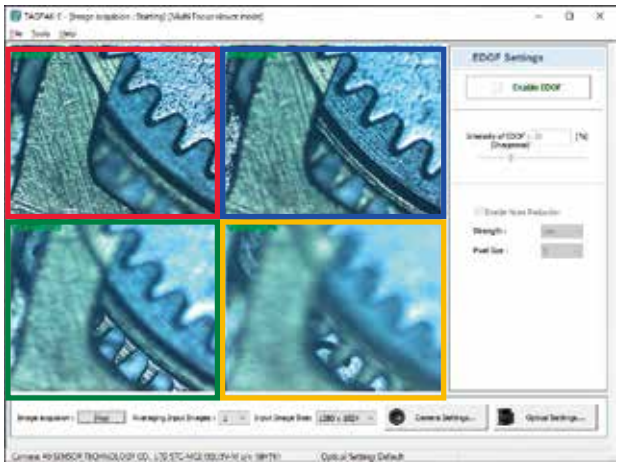
The software restores this blurred image to an entirely sharper image from the upper surface to the lower surface by determining a blurred amount estimate from the TAGLENS control parameter that has been set in TAGPAK-C and information in the optical system and then performing deconvolution processing.This is called the EDOF image.

TAGPAK-E Optional Software

This software is also equipped with the Multi Focus Viewer mode that corresponds to the Multi Focus mode enabled by combination with the newly-developed Pulsed Light Source (PLS) for TAGLENS.

Note: Multi Focus Viewer mode: Enables capture of a focused image in a different Z-position for every camera frame when turning on the Pulsed Light Source (PLS) for TAGLENS with the external trigger signal. This function allows batch display of multiple images focused in given different Z-positions by dividing an image for every camera frame among multiple viewers.





Items			System specifications
OS			Windows10 Pro 64bit
PC	CPU	Clock frequency	2.0 GHz or more
	Memory		8 GB or more
	Hard disk		25 GB or more
	Optical Drive		DVD-ROM Drive for installation software
	Communication port	For TAGLENS control	USB 2.0 × 1 port or RS-232C × 1 port
		For Pulsed Light Source control	USB 2.0 × 1 port
		For camera control	LAN (1000BASE-T) × 1 port (for GigE VISION camera) USB 3.0 × 1 port (for USB3 VISION camera)
		Dongle	USB 2.0 × 1 port
Monitor			SXGA(1024×768 Pixel) or more Note: TAGPAK does not support High DPI monitor.

Note 1: Please prepare a PC for the software separately by the customer. For required operating environments, refer to the above table.
Note 2: For TAGPAK-E, some functions are available as SDK (Software Development Kit), enabling their integration into your software.

SPECIFICATIONS

TAGLENS-T1

Ultra-high speed, varifocal lens.
A dedicated controller and a control software TAGPAK-C are offered as a standard product.

<TAGLENS main unit>

Resonance frequency	70 kHz
Effective aperture	ø11 mm
Transmittance	90% or more (λ 400 nm to 700 nm)
Max. amplitude of optical power	1 D (total range 2D)
Min. amplitude of optical power	0.7 D (total range 1.4D)
Mounting angle	Any
Guaranteed operational temperature range	15 ℃ to 30 ℃
Operating Environment / Humidity	10 ℃ to 40 ℃ / 40% to 70% RH (non-condensing)
Storage Environment / Humidity	-10 ℃ to 50 ℃ / 80% RH or less (non-condensing)
Mass	Approx. 0.6 kg

<Controller>

Dimensions（W × D × H）	144.2 mm × 107 mm × 51.2 mm
Mass	Approx. 0.4 kg
Input	+12V (Attached AC adapter)
Power supply voltage	AC 100 V to 240 V 50 Hz / 60 Hz
Power consumption	Max. 20 W

Video Microscope Unit　VMU-T1

TAGLENS-T1 is installed in the microscope unit. Incorporating the objective lens and the camera enables configuring a varifocal microscope.

Imaging lens magnification	1X
Imaging FOV (diagonal)	ø11 mm
Applicable objective lenses	M Plan Apo Series
Options	Manual turret, Power turret, Polarizer and Analyzer, Focusing unit, X-Y stage, Simple stand

■ Variable focal length range

		M Plan Apo Series						
Objective lens		1X	2X	5X	7.5X	10X	20X	50X
Depth of focus × 2 (mm)*		0.88	0.18	0.028	0.012	0.007	0.003	0.0018
Z scan range (mm)		16	4	0.64	0.28	0.16	0.04	0.007
Real FOV (mm)	1/2" camera	4.8 × 6.4	2.4 × 3.2	0.96 × 1.28	0.64 × 0.85	0.48 × 0.64	0.24 × 0.32	0.096 × 0.128
	2/3" camera	6.6 × 8.8	3.3 × 4.4	1.32 × 1.76	0.88 × 1.17	0.66 × 0.88	0.33 × 0.44	0.132 × 0.176

Note: Not available for M Plan Apo HR 5X and 10X.
* Total in focus range without TAGLENS.

Illumination light source Pulsed Light Source　PLS

This product is an ultrafast LED pulse illuminator that combines with TAGLENS-T1 to achieve focused image acquisition and two-dimensional image synthesis at a desired position.
Using this product and TAGLENS software (TAGPAK-C), you can adjust the brightness and viewing position.

Lighting system		Pulse lighting
luminous color		White
Maximum light output*1		30 lm
Dimming rage		0 to 100 %
Dimming system (Controlled by TAGPAK-C)		1) Variable input pulse width 2) Pulse decimation
Light guiding system		Optical fiber light guide system
Number of optical fiber output channels		1 ch
Pulse input Trigger IN jack	Frequency (resonant frequency of the TAGLENS-T1)	75 kHz or less
	input pulse width	10 ns to 85 ns
Pulse output	Optical pulse width (full width at half maximum) *2	50 ns to 100 ns
Extenal trigger input *3		• Trigger IN: Periodic signal from the TAG controller Input synchronized pulse signal • Camera IN: Camera trigger signal (as needed)
Interface		USB 2.0
Power consumption		Max. 25W
Operating temperature range		5 to 40 ºC,80 % RH max.
Dimensions		169.2 mm (W) × 133.2 mm (D) × 115.6 mm (H)
Mass		2.7 kg

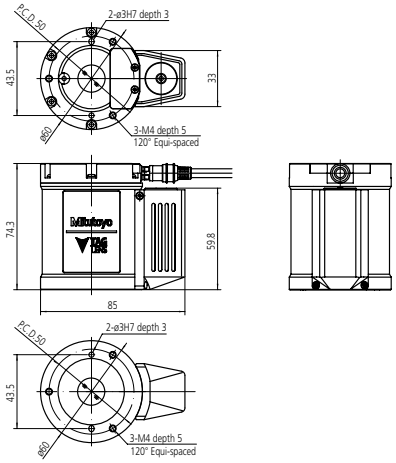
*1 Lighting frequency: 70 kHz, Input pulse width: 80 ns Light guide: 2 m long, multicomponent glass fiber
*2 Width of emission pulse (Varies with input pulse width)
*3 SMB connector, 5V TTL

DIMENSIONS

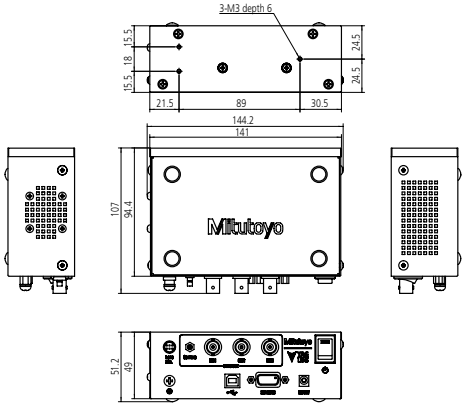
Unit: mm

TAGLENS-T1

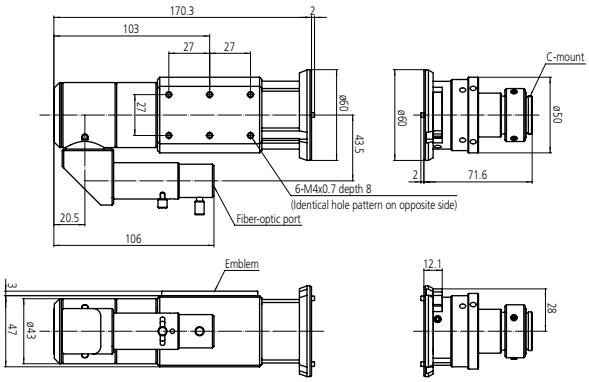
＜Main unit＞



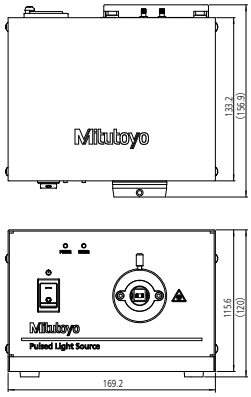
＜Controller＞



VMU-T1



Pulsed Light Source　PLS



[System diagram]

- TAGLENS-T1 379-010A
- TAGLENS-T1 E-SET*1 379-011A
- VMU-T1 379-110
  - Focus unit A 378-705
  - Simple stand 378-730
  - X-Y stage 378-020
  - USB3 Vision or GiGE Vision supported camera (C mount) e.g. 1.3-megapixel USB color camera / Camera connecting cable C531-043 / C177-045
  - Objective M Plan Apo Series
  - Manual turret 378-707
  - Aligning motor revolver 378-713
  - Revolver for VMU (aligning, parfocal) 378-717
  - Pulse lightning
    - Pulsed Light Source / Light guide*2 379-200A
  - Continuous lightning
    - LED light source / Light guide*2 Please contact Mitutoyo.
    - LED RING (for FS Objectives) Please contact Mitutoyo.
    - Halogen fiber-optic Illumination unit 100 W*3 378-700*4
    - Halogen fiber-optic Illumination unit 150 W*3 176-316*4
  - Polarized unit 378-710
  - Transmitted light unit 378-736

Optional TAGLENS
Optional peripheral equipment

*1 The standard accessory set supplied with software TAGPAK-E.
*2 Please prepare a light guide for the light sources separately.
Following light guides are available for the "LED light source" and "Pulsed Light Source".
1) Multi-component glass
C520-065 2m
C520-075 5m
C520-076 8m
2) Plastic
C520-077 2m
C520-078 5m
C520-079 8m
・Transmittance decreases if the light guide gets longer
・Transmittance of plastic is lower than multi-component glass
*3 The light guide included in the halogen illumination unit can NOT be used for the "LED light source" and "Pulsed Light Source".
*4 Please contact Mitutoyo as power cable is different to each region.

108 2003(2)g-(DI)HS, Printed in Japan

Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

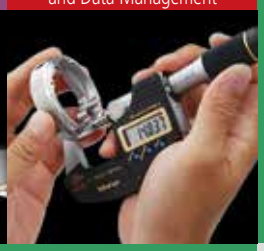
Optical Measuring

Sensor Systems

Test Equipment and Seismometers

Digital Scale and DRO Systems

Small Tool Instruments and Data Management



Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver bespoke measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

Find additional product literature and our product catalogue

https://www.mitutoyo.co.jp/global.html

Our products are classified as regulated items under Japanese Foreign Exchange and Foreign Trade Law.
Please consult us in advance if you wish to export our products to any other country.
If the purchased product is exported, even though it is not a regulated item (Catch-All controls item), the customer service available for that product may be affected. If you have any questions, please consult your local Mitutoyo sales office.

Mitutoyo

Mitutoyo Corporation
20-1, Sakado 1-Chome,
Takatsu-ku, Kawasaki-shi,
Kanagawa 213-8533, Japan
T +81 (0) 44 813-8230
F +81 (0) 44 813-8231
https://www.mitutoyo.co.jp