Mitutoyo

TAGLENS

VARIFOCAL LENS

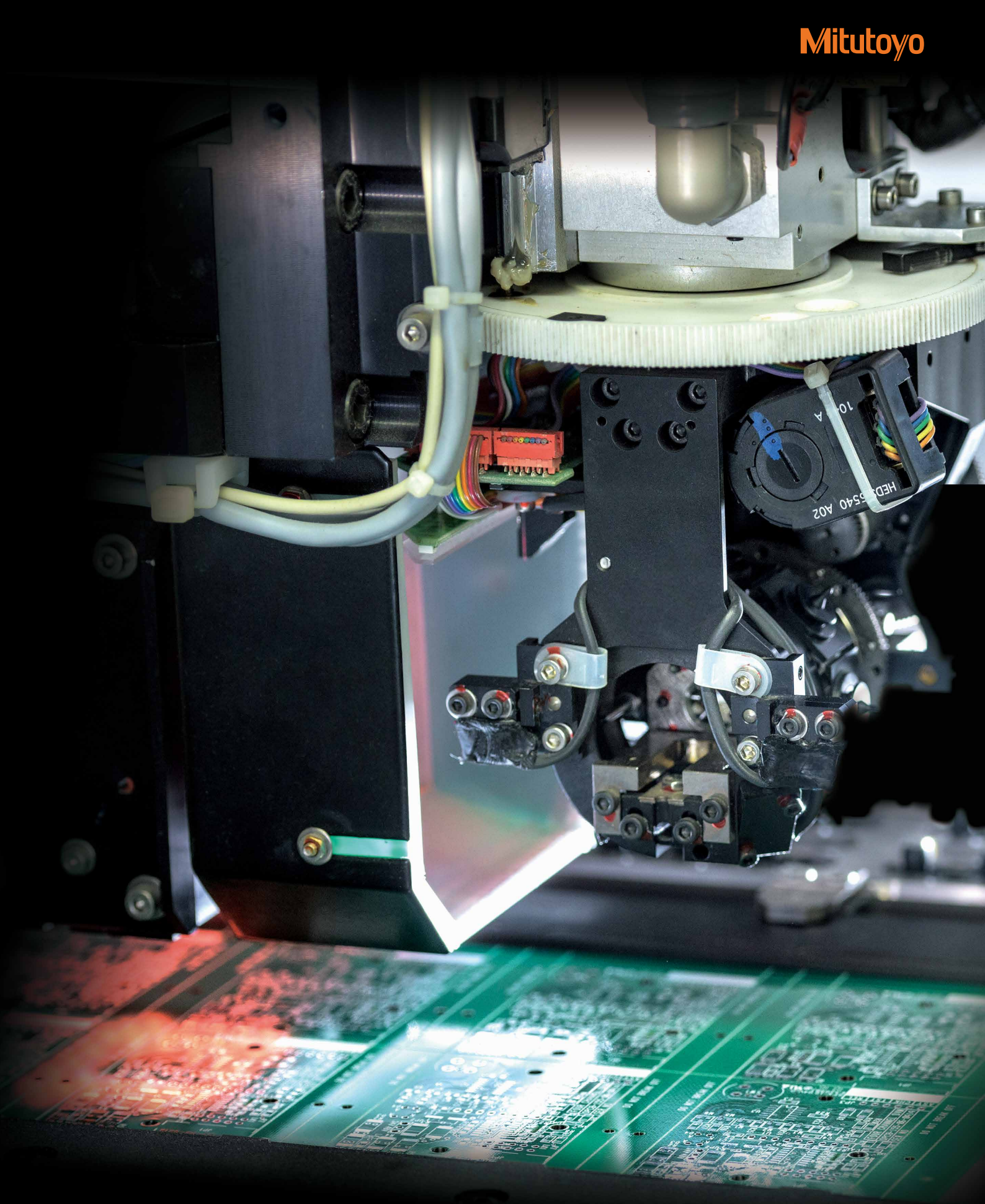
OPTICAL MEASURING

PRE1498(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

The TAGLENS gives rapid solutions to problems in inspection and observation.

Inspection of electronic / precision components

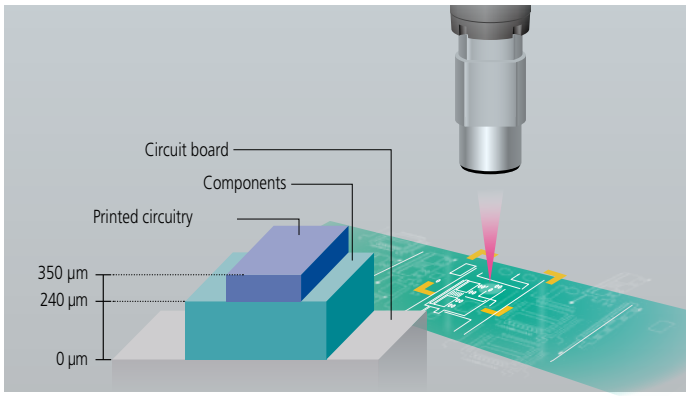
Problem

- 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 autofocus 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

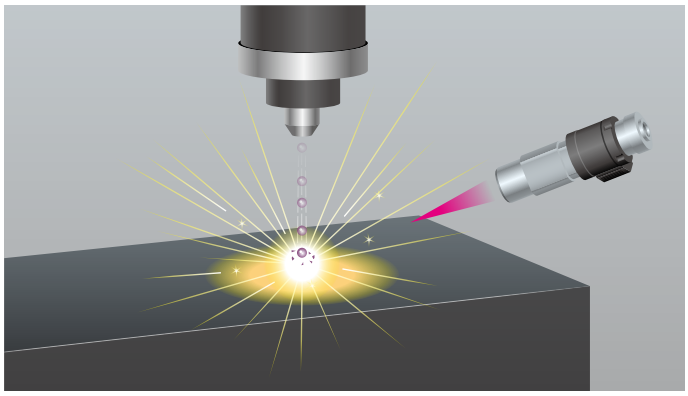
Problem

- 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 multiple deep images at a single time, thus capturing all scattered chips.

Example: Crash test



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

Microscopic particle measurement

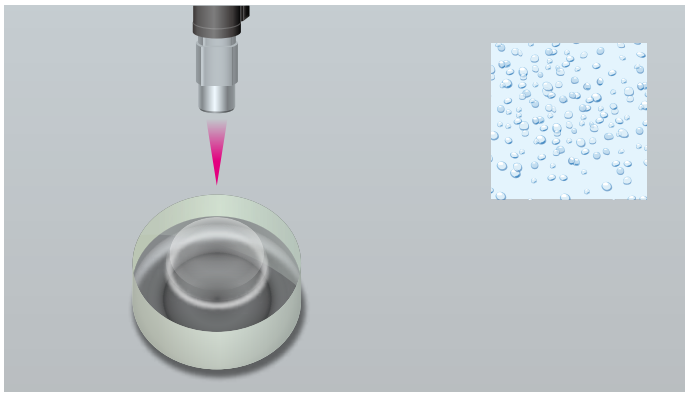
Problem

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

Solution

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

Example: Observation of minute bubbles in glass/liquid



Allows for observation of target objects within a large depth of focus.

Attached to a robotic arm

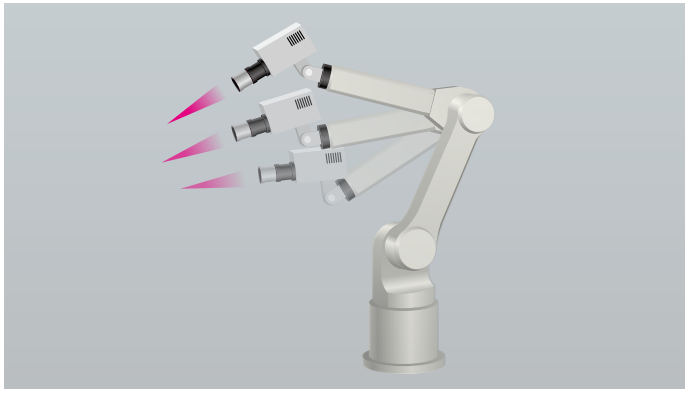
Problem

- 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, speeding up the inspection process by allowing observation regardless of the angle.

Example: Inspection using a robot.



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

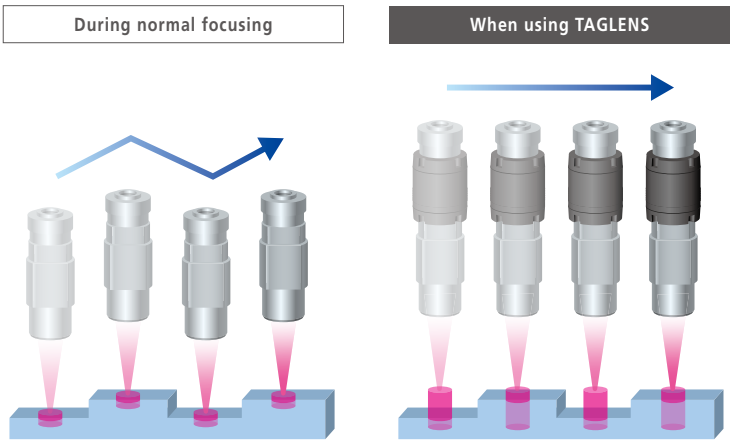
ABILITY

The 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 with an ultra-wide range of focus

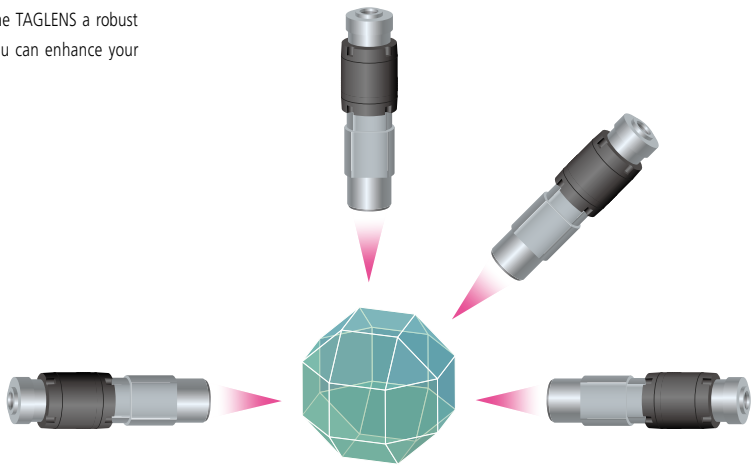
The focus range is variable without changing the camera position

Until now, imaging for subjects with differing heights and depths was performed by capturing multiple images while moving the camera vertically (Z-axis motion). In contrast, the TAGLENS allows for real-time probing of multiple heights or depths without the need for vertical motion.



Operable at any orientation

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

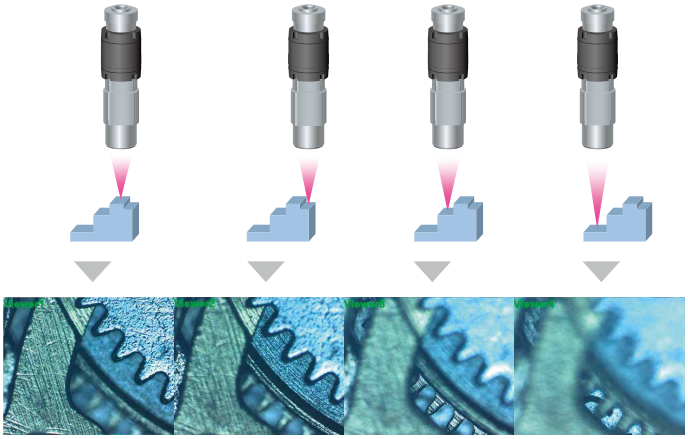


Developed for enhancing the abilities of the TAGLENS, the all-new Pulsed Light Source (PLS)

Selective probing of height

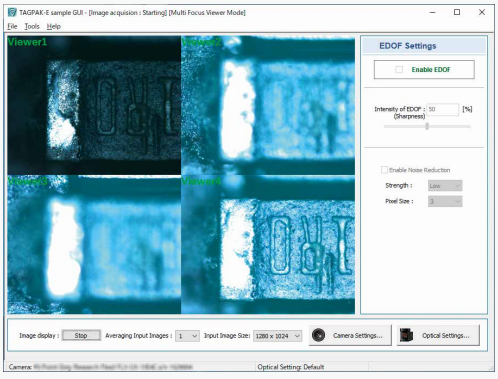
- A focused image in any specified Z-position can be captured without mechanical drive system within the observation range using an extended depth of focus with the TAGLENS.
- Multiple images focused in selected Z-positions can be captured in real-time.
- Captured images are provided without any image processing algorithms.

Capturing various Z planes is now possible without moving parts

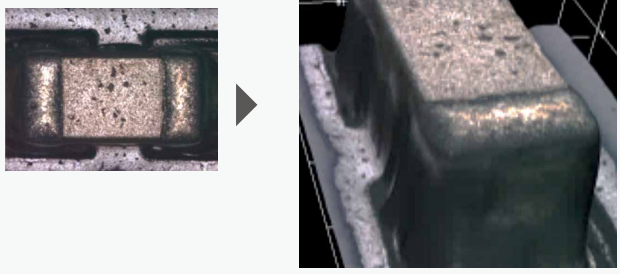


Perform 3D imaging with the TAGLENS

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



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



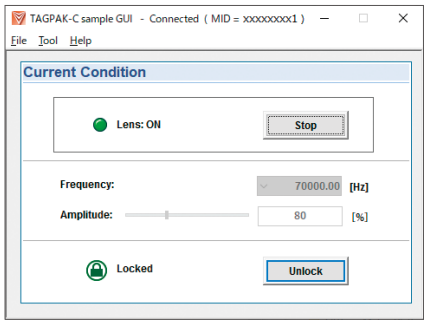
3D imaging performed with the aid of commercial 3D Viewer software

SOFTWARE

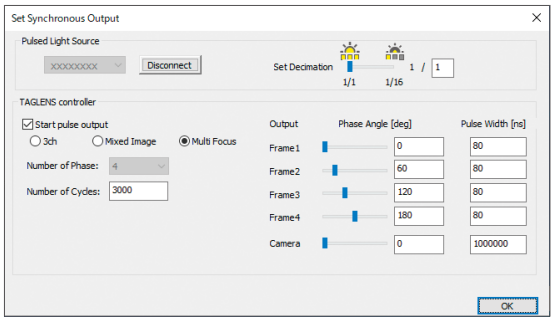
TAGPAK-C Supplied as standard

TAGPAK-C is software for setting the parameters to control the TAGLENS and Pulsed Light Source.
TAGPAK-C is a standard accessory for 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.
	Comm. 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 or higher)

Note 1: The customer must prepare a PC for the software. For required operating environments, refer to the above table.
Note 2: For TAGPAK-C, all functions come with an SDK (Software Development Kit), enabling their integration into your software.

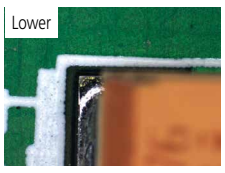
TAGPAK-E Optional Software (Required for checking the inspection images.)

TAGPAK-E is one software used to display an image captured by the optical system equipped with the 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/loading the images. (Input/output-enabled still image files: BITMAP, TIFF, PNG, JPEG)
Noise rejection filter, binarization filter and/or Sobel filter (edge enhancement) are available from the options in the Image Filter Settings dialog.
This is included in the "TAGLENS-T1 E-SET" and as an additional software.

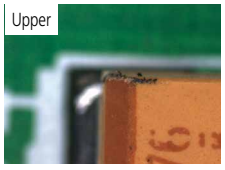
[Execution example of EDOF image]

Normal microscope observation

Lower



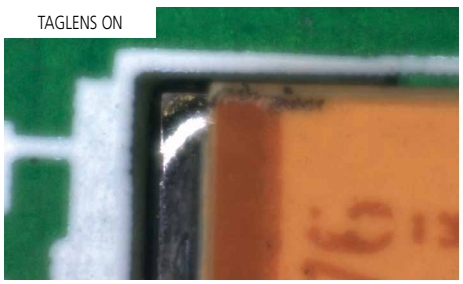
Upper



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

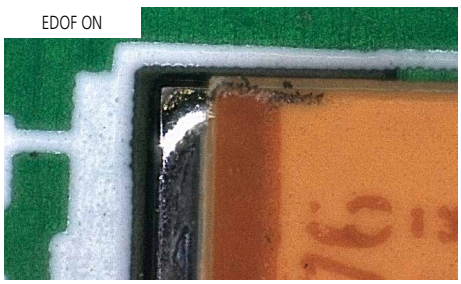
When using TAGLENS

TAGLENS ON



The 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, causing the image to be blurred.

EDOF ON

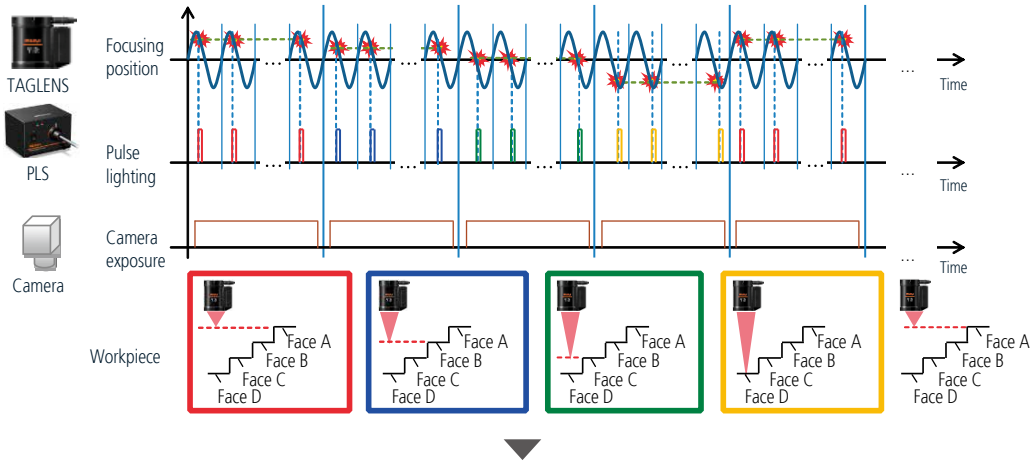


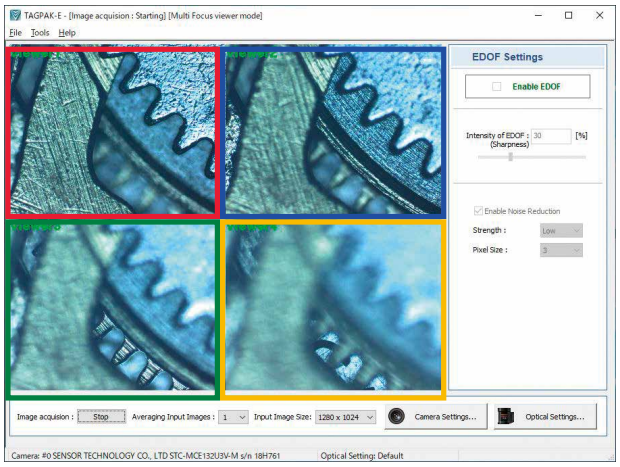
The software restores this blurred image to a much sharper image by determining a blurred amount estimate from the TAGLENS control parameter that has been set in TAGPAK-C/information in the optical system and then performs deconvolution processing.

TAGPAK-E Optional Software

This software is also equipped with the Multi Focus Viewer mode that works with the Multi Focus mode enabled by combination with the newly-developed Pulsed Light Source (PLS) for the 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 the TAGLENS with the external trigger signal. This function allows batch display of multiple images focused in the selected Z-positions by dividing an image for every camera frame among multiple windows.





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	Hard disk		25 GB or more
	Optical drive		DVD-ROM Drive for installation software
	Comm. 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 or higher) Note: TAGPAK does not support High DPI monitors.

Note 1: The customer must prepare a PC for the software. For required operating environments, refer to the above table.
Note 2: For TAGPAK-E, all functions come with an SDK (Software Development Kit), enabling their integration into your software.

SPECIFICATIONS

TAGLENS-T1

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

<TAGLENS main unit>

Resonance frequency	70 kHz
Effective aperture	ø11 mm
Transmittance	90% or more (λ400 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 °C to 30 °C
Operating Environment / Humidity	10 °C to 40 °C / 40% to 70% RH (non-condensing)
Storage Environment / Humidity	-10 °C to 50 °C / 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) with TAGLENS		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.

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 and software for the TAGLENS (TAGPAK-C), you can adjust the brightness and focus 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
External 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 °C,80 % RH max.
Dimensions		169,2 mm (W) × 133,2 mm (D) × 115,6 mm (H)
Mass		2,7 kg

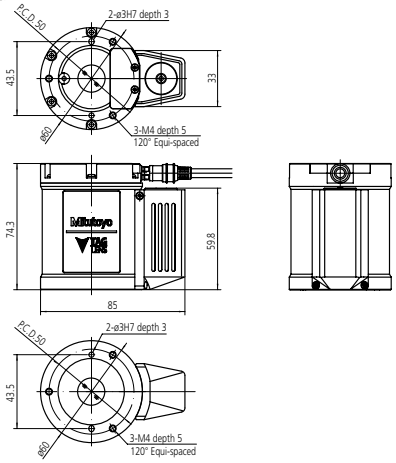
*1 Pulse frequency: 70 kHz, Input pulse width: 80 ns Light guide: 2 m long, multicomponent glass fiber
*2 Width of emission pulse (Varies with input pulse width)
*3 SMB connector, 5V TTL

DIMENSIONS

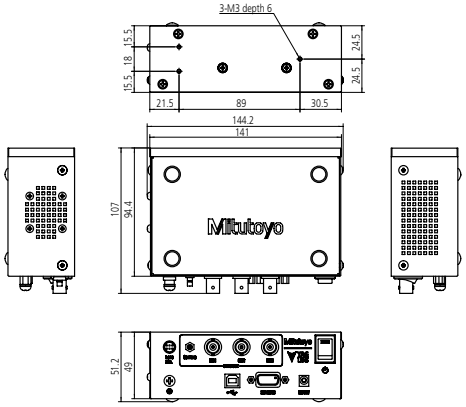
Unit: mm

TAGLENS-T1

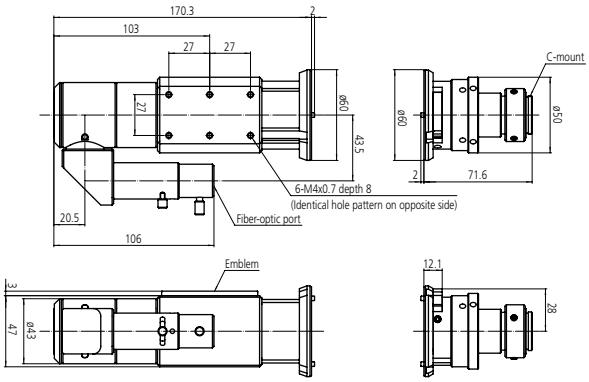
<Main unit>



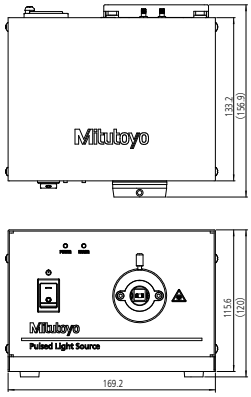
<Controller>



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 the power cable is different for each region.

Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

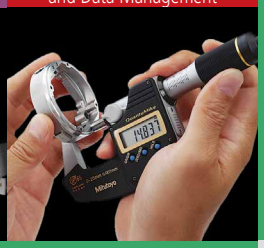
Optical Measuring

Sensor Systems

Test Equipment and Seismometers

Digital Scale and DRO Systems

Small Tool Instruments and Data Management



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, ensuring 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 complete catalog here.

www.mitutoyo.eu

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