

Anyone can use/Speedy operation/Accurate measurement

# Polariscope

## Fullauto StrainEye LSM-9000 product family

Meets customers' needs for measuring various residual stresses by observing strain in product made from glass or plastics and analyzing stress directions with built-in high-quality optical filters manufactured in-house.



# “Visualization” of strain

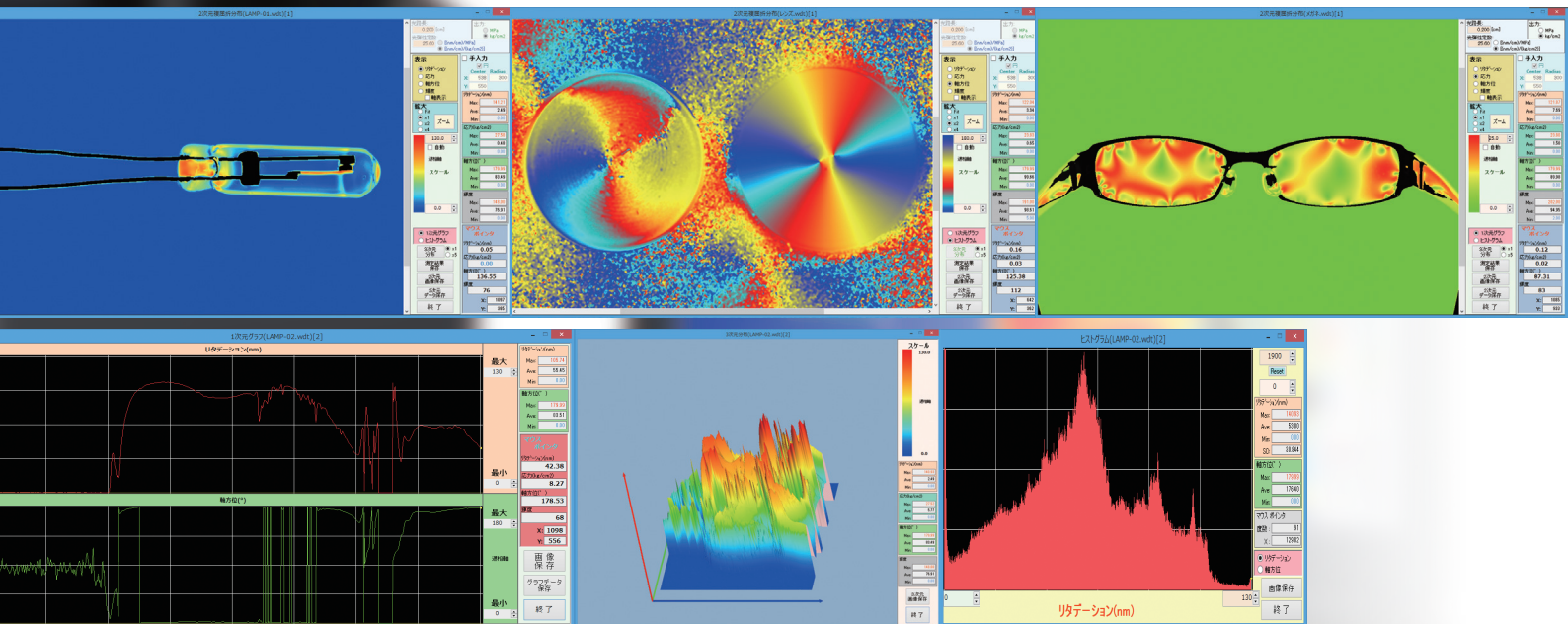
【Anyone can use】

【Speedy operation】

【Accurate measurement】

Polariscope LSM-9000 product family

measures “invisible non-uniform force” in transparent materials and solves various problems associated with “strain” speedily.



## Anyone can easily operate

Measures stress fully automatically just placing a sample in it. Entrust proficient skills to "LSM-9000".

## Accurate measurement at any time.

Our unique technology and know-how cultivated throughout history make it possible to measure strain very accurate. Products that are required high accuracy because they are transparent are reliably manufactured.

## Available to various materials

Opportunities to use LSM-9000 are expanding widely such as measuring residual stress in glass products quantitatively, inspecting strain in plastics products, measuring retardation in optical films and examination for the presence of strain in crystalline materials.

## Everything speedy

Realized speedy performance working in conjunction with a computer for not only preparation time and measurement time but also saving data or graphics.

## Save and cut

Adopting the high luminance LED to the light source enables long life and low-power and reduce maintenance time and running cost

### glass products

#### Large float glass plate

automotive glass · industrial new material glass · optical new material glass · glass wafer · thermister · glass paste

#### Glass tube

various types of lamps · electronic tube (vacuum tube, gas-enclosing tube), sealing glass tube for electronic component · combustion partition for heating appliance

#### Laboratory glassware

flask and beaker · test tube and connecting tubule · analysis component · evaporating dish · watch glass, etc.

#### Material of optical glass

Crystal · quartz · lens · glass material, etc.

#### Optical glass element

optical filter · LD cover glass · ball lens · lens array · lens · prism · V-groove substrate

#### Glass container

Vial · bottle for beverage · wide-mouth bottle · preservation container · glass · dish

### Plastics products · synthetic resin

#### Large resin plate resin film

#### Injection-molded resin products

LCD monitor cover · sun visor · resin container, etc.

#### Resin optical elements

cover glass · lens array · lens · prism, etc.

## Product Feature

### 1 Display a distribution chart that is associated with values and directions of strain.

Distribution chart is composed of data per pixel taken by the embedded digital camera restoring the result on the computer monitor.

### 2 Promptly display a distribution chart

Some of instruments take long time to make a distribution chart by mapping data based on multiple measurement, however, LSM-9000 products enables it by single measurement.

### 3 Adopt in-house polarization elements (polarizer · wave plate) in LSM-9000 products.

LUCEO has produced polarizers and wave plates for over 50 years. High quality polarization elements manufactured in our factory are used in LSM-9000 products. These elements significantly reduce factors of negative effects for measurement.

### 4 LSM-9000 product is selectable according to a sample dimension.

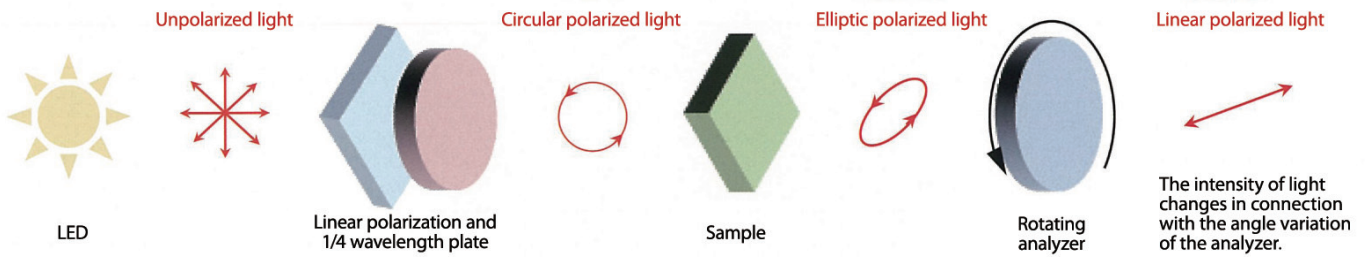
#### LSM-9000LE

Measurement Area:  $\phi$ 175mm  
Basic model, suitable for bigger samples

#### LSM-9000S

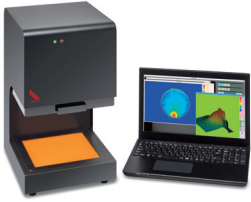
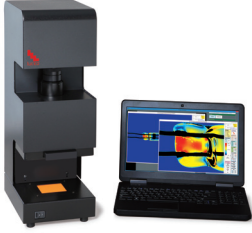
Measurement Area:  $\phi$ 10-60mm  
Available to smaller samples magnifying sample images by 6 times zoom lens.

# The principle of measurement: Rotating Analyzer Method



The state of a polarization is changed to an elliptical polarization by the influence of birefringence when a circular polarized light enters into a measured object having strain inside. After that just the component of light parallel to the direction of a transmission axis of a polarizer goes through as a linearly polarized light out of the elliptical polarized light by means of the rotating analyzer method. In this case, intensity of the light going through the rotating analyzer shows specific changes according to the state of the ellipse. This instrument captures images by the camera based on the defined 4 angular degree and calculates the state of polarization (ellipticity and inclination) at each angle. Then calculate strain by measuring differences of the state of the polarization between with a measured object and without a measured object in the instrument.

## Specifications

Model name	 LSM-9000LE	 LSM-9000S
Size (body)	W280×D340×H500 mm	W200×D280×H595 mm
Weight (body)	18.5kg	14.5kg
Circular polarizing plate size	W200×D200 mm	W70×D70 mm
Sample placement space (height)	130 mm	70 mm
Measurement range	Re : 0 ~ 130nm	
Inspection method	Rotating Analyzer Method	
Setting wavelength	590nm	
Repeat accuracy(Pixel)	$\sigma=1$ nm	
Measurement area size	175×175 mm	MAX: 60×60 mm MIN: 10×10 mm
Effective pixels	1100×1100	
Light source	High-Luminance LED	
Power source	100-240VAC 50/60Hz 0.35A	DC Input 24V 1.5A
Power consumption(body)	35W	38W
Component	Main body, computer, cables	
Accessory	Main body cover	AC/DC adapter, main body cover
OS	Windows10(64bit) Japanese/English	

**For more accurate measurement**



The mechanism is provided to the instrument not to be measured unless the chamber is closed. Unnecessary light is eliminated and a stable accuracy is obtained by this mechanism. In the case of measuring a large sample that is beyond the chamber size, the darkroom mode is available without closing the chamber.

We provide product portfolio taking advantage of polarization technologies adapting to the changing social needs consistently.

