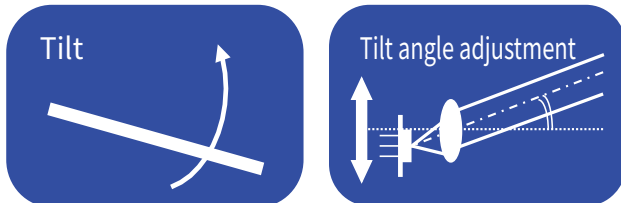


Smart LAC

A contactless angle measurement device by laser



- Instant non-contact angle measurement
- Wide working distance
(Angle Range $\pm 0.5^\circ$ at W.D. 300mm)
- High precision and resolution
- Single and multiple spot measurement mode available
- Red and Infrared laser available
- External beam measurement available

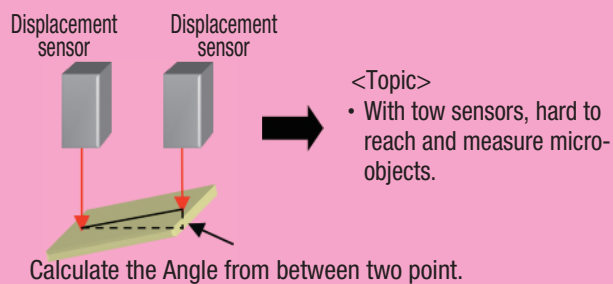
Note : Select Single or Multiple spot mode when ordering

All wavelength(R,IR) system can be measured External beam.

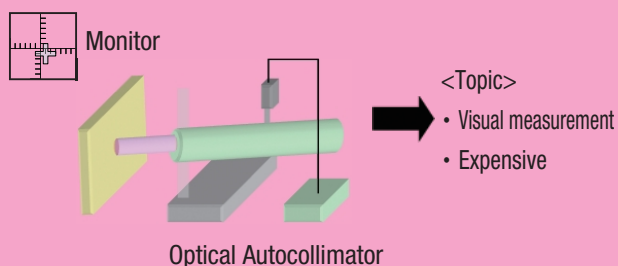
<Measurement comparison>

Conventional way

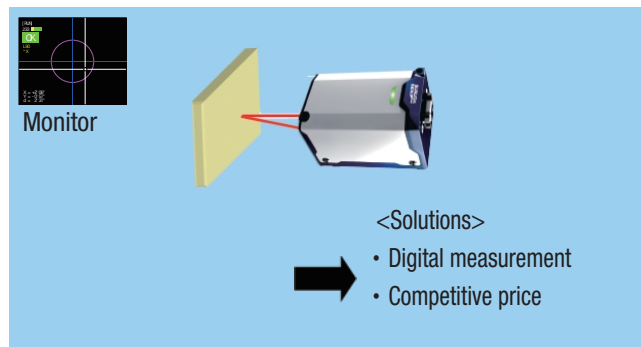
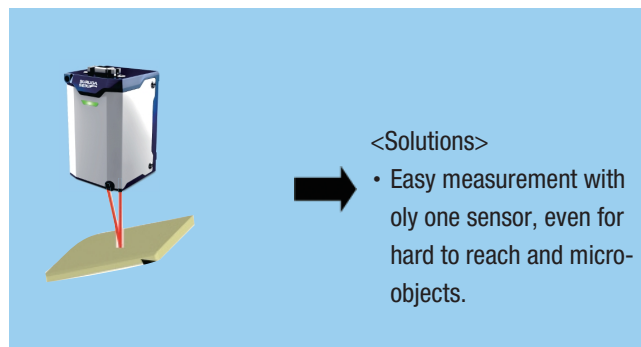
① Laser displacement sensor method



② Optical Autocollimator method



Laser Autocollimator method



Easy tilting angle measurement for various DUT(Device Under Test)

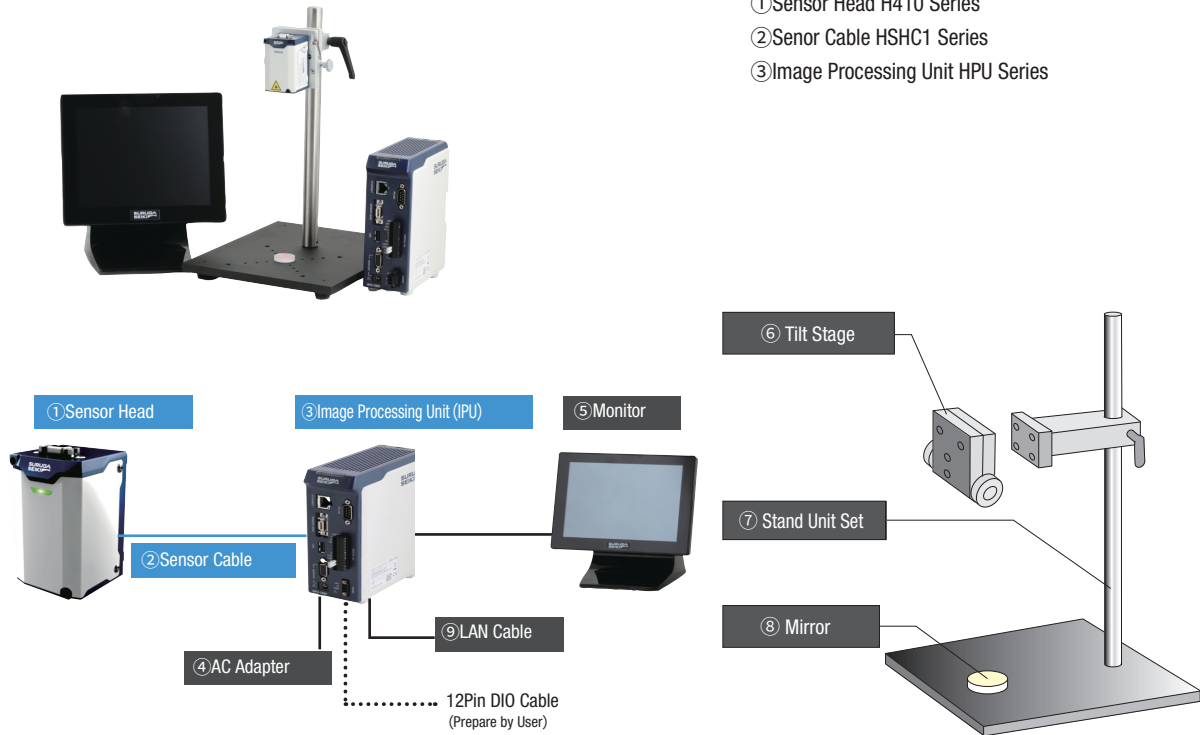
Leaser beam needed for measurement



Laser Autocollimator

■ Basic composition of Smart LAC series

- ① Sensor Head H410 Series
- ② Sensor Cable HSHC1 Series
- ③ Image Processing Unit HPU Series



■ Basic Set

Standard Configuration

For Single Spot Measurement		Note 1
Sensor Head Model [① Sensor Head + ③ IPU]		② Sensor Cable
Model	Wavelength	Model
HPU-500SET-175R	655nm±10nm	HSHC1-1.5 (1.5m)
HPU-500SET-175S1	852nm±10nm	HSHC1-4 (4m)
		HSHC1-10 (10m)

Note1: For Single spot measurement, Sensor Head and IPU are sold as a set.

For Multiple Spot Measurement			
① Sensor Head		② Sensor Cable	③ IPU
Model	Wave Length	Model	Model
H410-175R	655nm±10nm	HSHC1-1.5 (1.5m)	HPU-1000
H410-175S1	852nm±10nm	HSHC1-4 (4m)	
		HSHC1-10 (10m)	

High Speed and
High Resolution

General
Purpose

Accessories

■ Option

Standard Configuration

④ AC Adapter	⑤ Monitor	⑥ Tilt Stage	⑦ Stand Unit Set	⑧ Mirror	⑨ LAN Cable
Model	Model	Model	Model	Model	Model
HDC24V-2710MA	HMNT1	HB10	HA14	Parallel Mirror: HS-0(0deg)	RS232C Cable: HRSCC1-2
				Wedge Mirror: HS-025AL(0.25deg)	LAN Cable: HLANC1-2
				Wedge Mirror: HS-050AL(0.5deg)	
				Wedge Mirror: HS-100AL(1.0deg)	

Smart LAC Series Sensor Head : H410



Feature

■ Laser Class 1

Can be used at any working environment (former Laser Class is Class2)

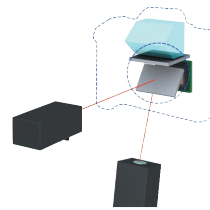
■ High Anti-vibration performance Max.2G(X/Y/Z Axial direction)

■ High performance with Light and Small size

■ Applications



Measure Glass Parallelism



Mirror Angle measurement for Camera device

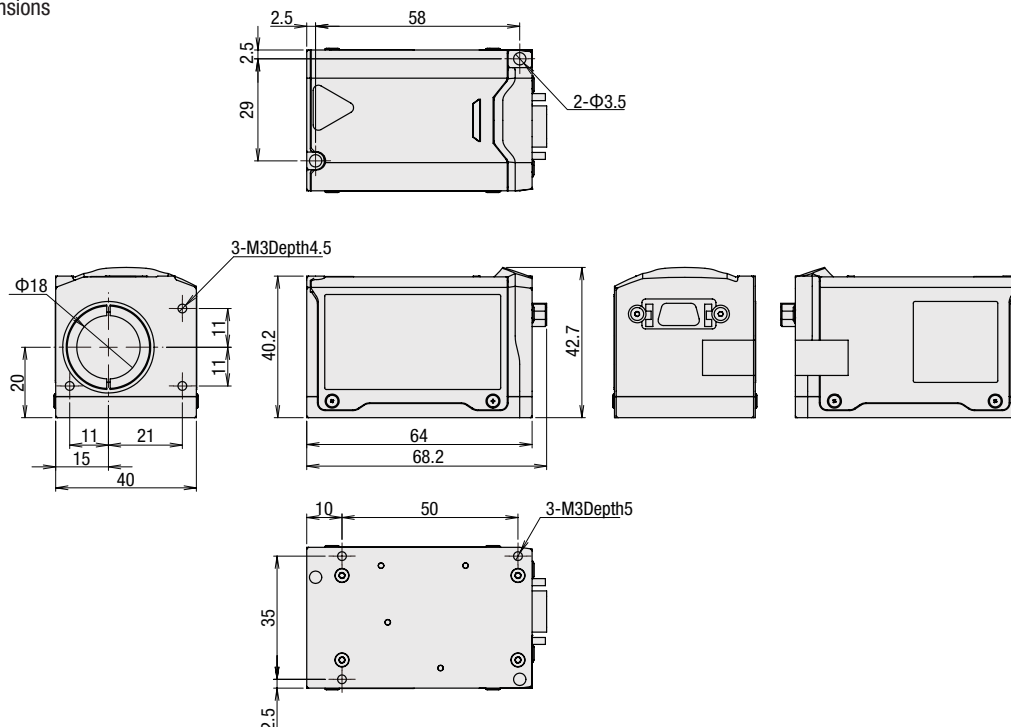
SPEC		
Model	H410-175R	H410-175S1
Wavelength	655nm±10nm	852nm±10nm
Laser Power	< 0.39mW Class 1	< 0.78mW Class 1
Measurement are by Working Distance	±0.5deg :200~300mm ±1.0deg :120~200mm ±1.75deg :0~120mm	
Laser Spot Size	Appr. φ1.0mm	
Repeatability	3.6sec / 1sec(Ave.)	
Linearity(Ave.)	±0.2% of Full Scale(W.D.=200, Full Scale=±1deg)	±0.4% of Full Scale(W.D.=200, Full Scale=±1deg)
Sampling Speed	25msec	
Calibration data	Stored in each sensor head	
Weight	160g	
Anti-vibration	Max 2G (X/Y/Z axial direction at 10~500Hz)	

*The sensor head cannot be used alone. A combination with an image processing unit is required.

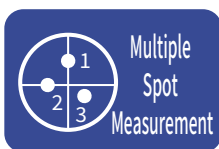
*This product does not require initial calibration.

There are no restrictions on the combination of the sensor head and image processing unit.

■ Dimensions



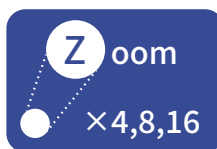
Smart LAC Image Processing Unit :HPU



Multiple
Spot
Measurement



3 different
Center
of Gravity
analysis



Zoom
×4,8,16



I/O Controllable



101101...
serial Communication
available



- Single-spot and Multiple-spot measurement are selectable
- Multiple-spot measurement
 - Max 5spot measurement simultaneously
 - Sorting by Spots angle or area
 - Measure both Spots angle and relative angle between each spots
- Single-spot measurement
 - Select one spot to measure from Max 5 spots.
- Internal Laser and External Laser mode available

*Note: Please specify the wavelength and single-spot measurement /multi-spot measurement mode when ordering.

Tilt
Measurement

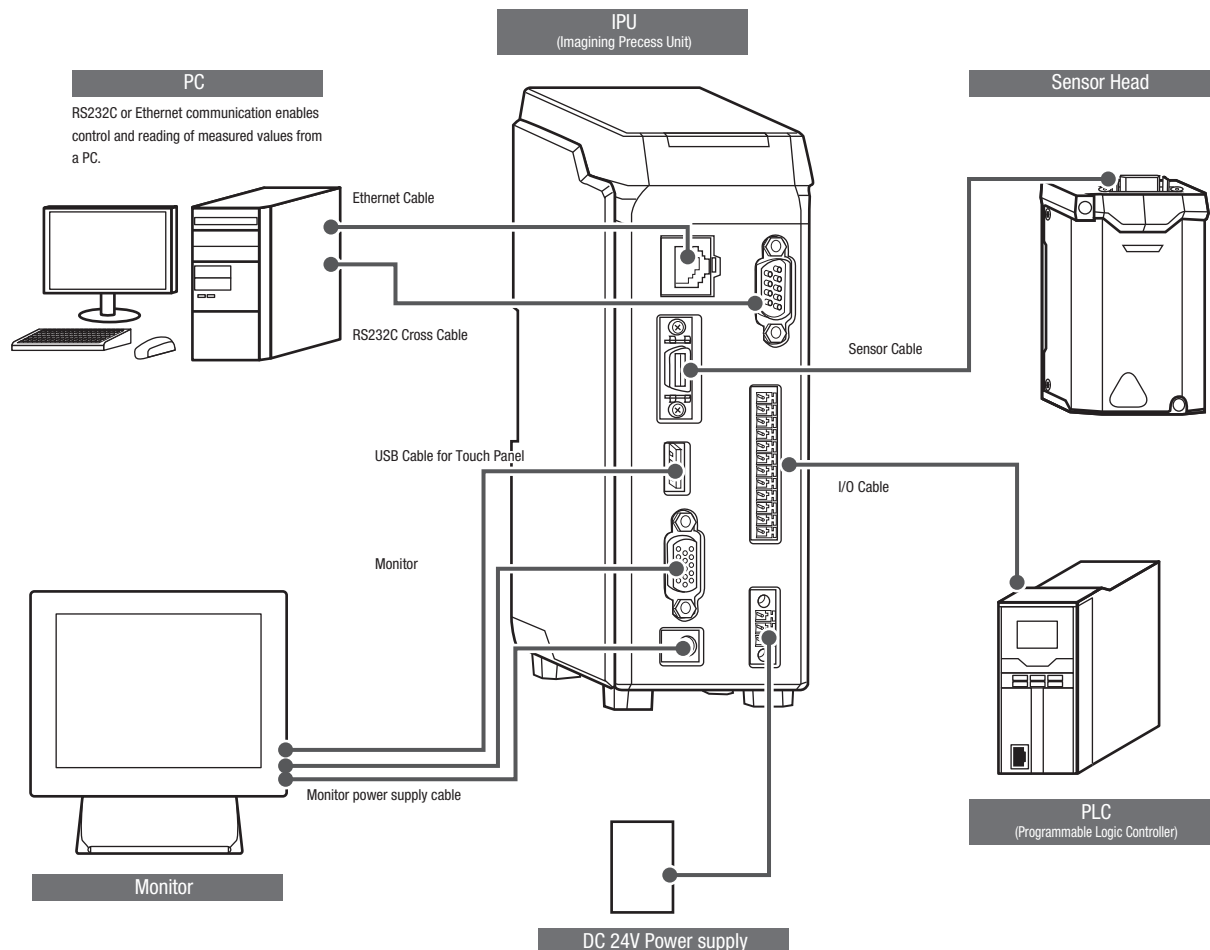
Laser
Autocollimator

Various communication capability can allow to operate Laser Autocollimator through Touch panel, PC or PLC.

For standalone usage, connect to either Touch panel or PC to control Laser Autocollimator.

For Embedded system, Connect to either PLC or PC to control Laser Autocollimator.

*:For PLC and PC usage, a Control software is needed to prepare by end user side.



High Speed and
High Resolution

General
Purpose

Accessories

Smart LAC Image Processing Unit :HPU

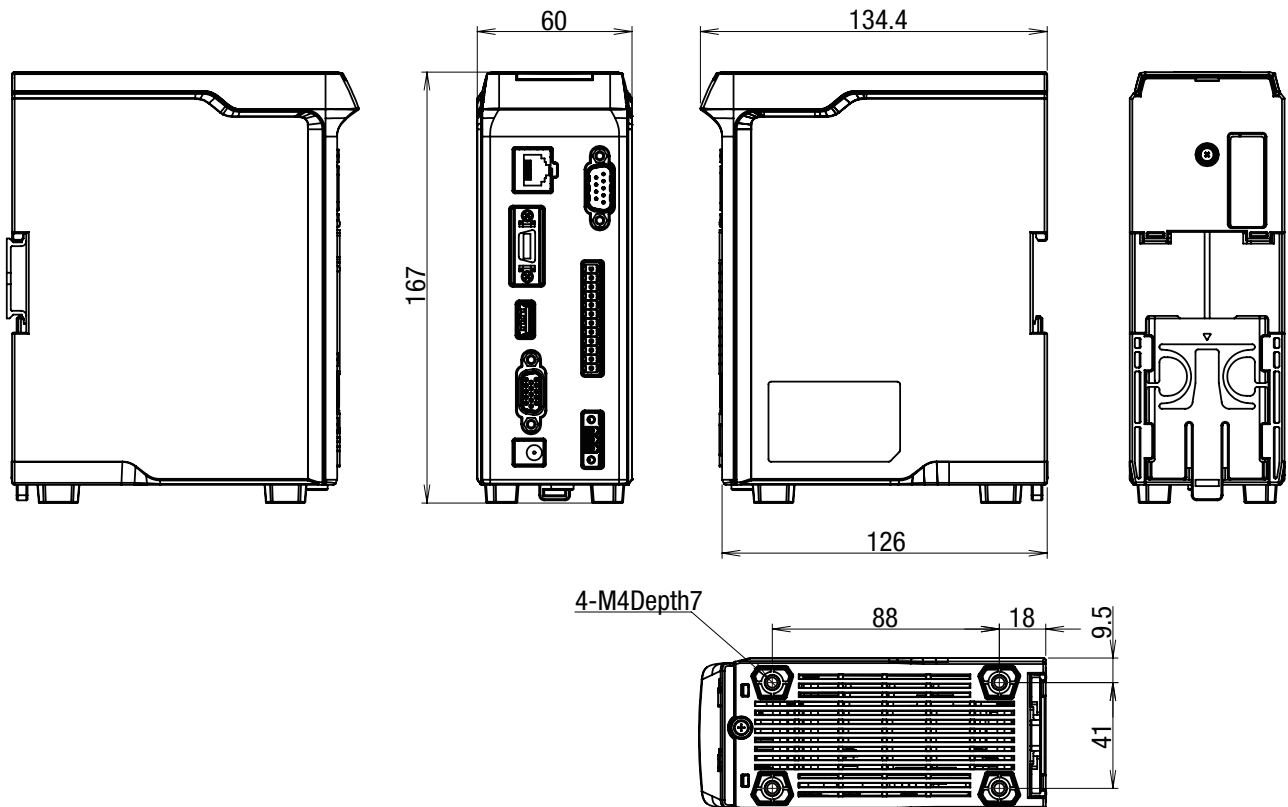
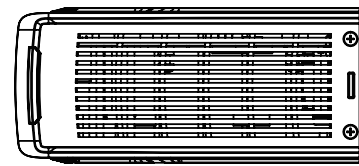
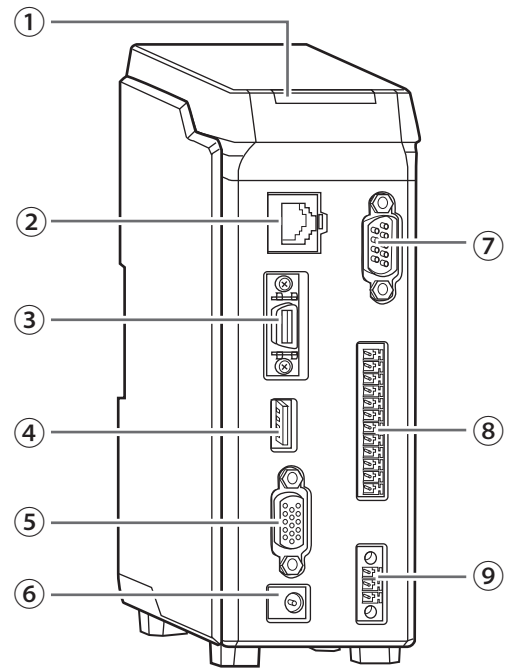
Tilt
MeasurementLaser
AutocollimatorHigh Speed and
High ResolutionGeneral
Purpose

Accessories

Function		HPU-1000	HPU-500
Angle Measurement	Single-spot measurement	○	○
	Multiple-spot measurement	Max 5 Spots	—
Angle Analysis	Center of Area	○	○
	Luminance centroid	○	○
	Luminance peak	○	○
Convenient Functions	Luminance value	○	○
	Zoom	○	○
	Image rotation and reverse	○	○
Pass/Fail Judgment Judgement Area	Circle	○	○
	Rectangle	○	○
Pass/Fail Judgment Judgement Conditions	Offset judgement	○	○
	Specified spot	○	○
	All spots	○	—
Digital I/O	Input/Output	○	○
	Input1 Hold results	○	○
	Input2 Zero reset	○	○
	Input3 Start trigger (24V)	○	○
	Input4 Laser power ON	○	○
	Input5 Start trigger (5V)	○	○
	Output1 Judgement strobe signal	○	○
	Output2 Results	○	○
	Output3 Busy for trigger	○	○

■Dimensions

No.	Function
①	Power Lamp
②	Ethernet connector
③	Sensor cable connector
④	USB connector for Touch Panel
⑤	Monitor connector
⑥	Power supply for monitor
⑦	RS232C connector
⑧	12-pole terminal block
⑨	DC24V terminal block



Tilt
Measurement

Laser
Autocollimator

High Speed and
High Resolution

General
Purpose

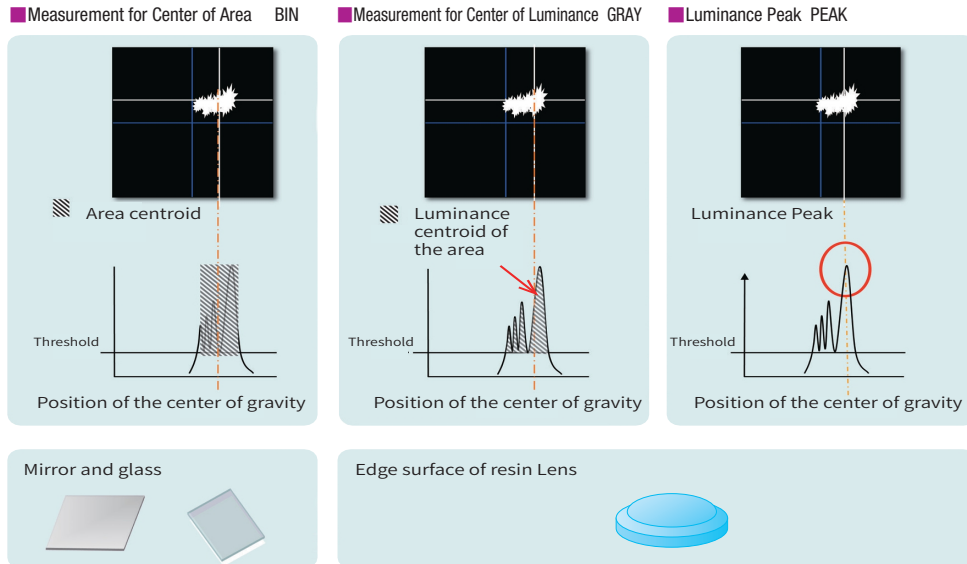
Accessories

Smart LAC Series Software : HPU

■ Various center of gravity analysis

Three types of spot center-of-gravity analysis modes are available for more accurate measurements.

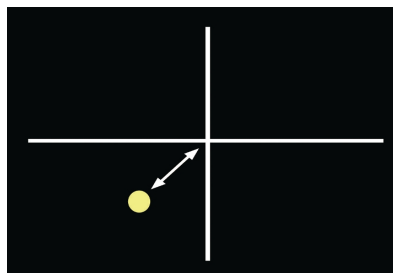
The center of area is suitable for specular reflectors with high flatness precision such as mirrors and glass, and the center of luminance is suitable for cases where reflection is distorted, such as the edge of a lens.



■ Single-spot measurement

Single-spot measurement is a method of measuring the reflected light from a specified point out of multiple reflected lights.

Single-spot measurement SINGLE



Angle measurement by specifying any one point from a maximum of 5 light points

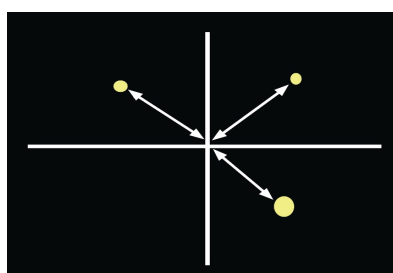
■ Multiple-spot measurement

Multiple-spot measurement can be selected from two types of measurement according to the purpose.

Multiple A: Measure each spot angle simultaneously

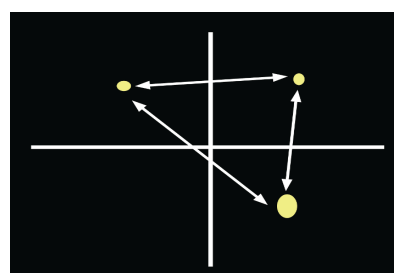
Multiple B: Measure relative angle between each spot simultaneously

Multiple-spot measurement MULTI A



Each spot angle measurement simultaneously

Multiple relative measurement MULTI B

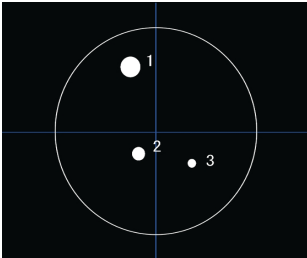


Relative angle measurement between each spot simultaneously

Labeling Function

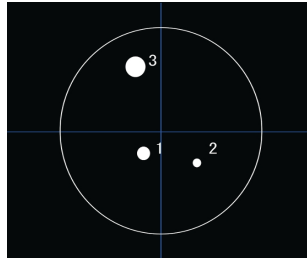
Each spot can be labeled when measuring multiple reflectors. Select a mode for labeling by size order or labeling by angle order.

Size order



Identify spots size automatically and label them in increasing order.

Angle order

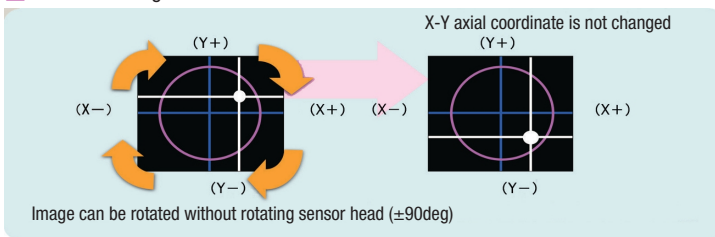


Identify spots angle automatically and label them in increasing order.

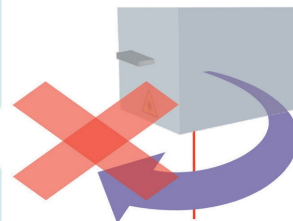
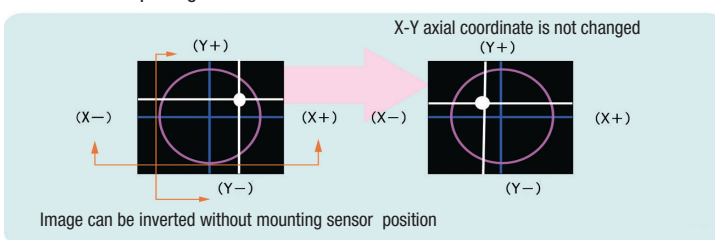
Center of gravity analysis	Sorting	Single Spot Measurement	Multiple Spot Measurement
Center of Area (BIN)	Angle Ascending order	○	○
	Size Descending order	○	○
Center of Luminance (GRAY)	Angle Ascending order	○	○
	Size Descending order	○	○
Peak Top (PEAK)	Max. Luminance point	○	Not available

Convenient functions

Function 1 Image rotate

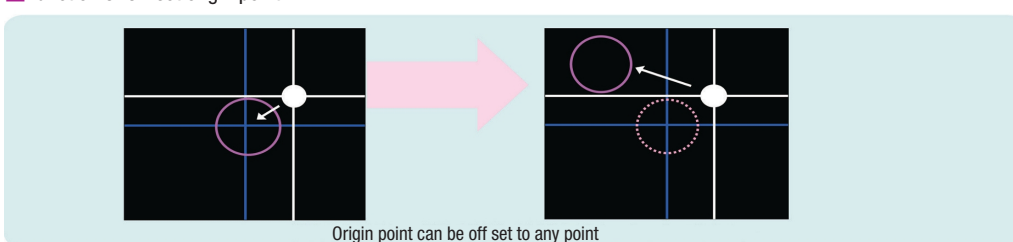


Function 2 Flip image

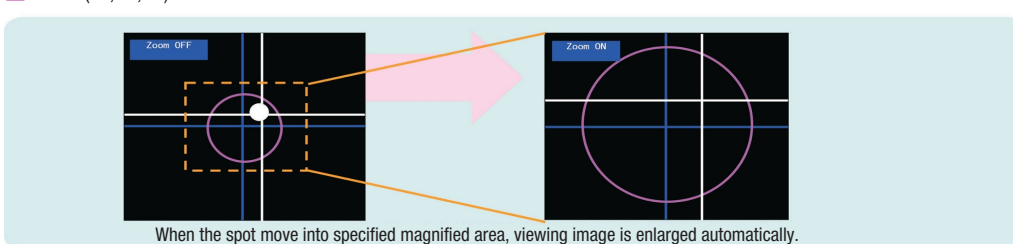


Without changing sensor mounting position or angle, the viewing image can be changed by the function.

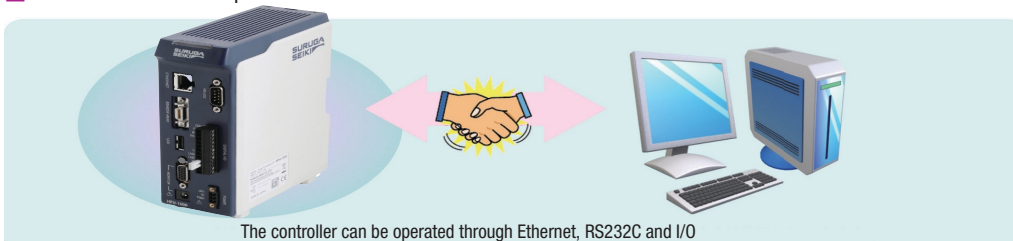
Function 3 Off set origin point



ZOOM (x2,X4,X8)



External communication port



Smart LAC Series Specification

NOTE

Please note that part of the specifications of this product may be changed without prior notice in order to improve its performance.

Sensor Head

Item		SPEC	
Model		H410-175R	H410-175S1
Specifications		$\pm 0.50\text{deg}$ at W.D. 0~300mm $\pm 1.00\text{deg}$ at W.D. 0~200mm $\pm 1.75\text{deg}$ at W.D. 0~120mm	
Laser	Wavelength	655nm $\pm$ 10nm	852nm $\pm$ 10nm
	Power	< 0.39mW Class 1	< 0.78mW Class 1
	Output position	20 $\pm$ 0.5mm at Reference surface 1 15 $\pm$ 0.5mm at Reference surface 2	
	Out going angle	$\pm 0.05\text{deg}$	
External Laser	Power	Max 5mW : Note1	
	Incident position	Within Radius 7.5mm from center of lens	
	Incident angle	Within $\pm 3.5\text{deg}$ from center axial of lens.	
Laser Spot size		Appr. $\phi 1\text{mm}$	
Indicated resolution		1 sec	
Repeatability		3.6 sec / 1 sec (Ave.)	
Linearity(Ave.)		$\pm 0.2\%$ of Full Scale (W.D.=200mm, Full Scale $\pm 1.0\text{deg}$)	$\pm 0.4\%$ of Full Scale (W.D.=200mm, Full Scale $\pm 1.0\text{deg}$)
Sampling speed		25mSec ~	
Operation display		LED(Green/Red)	
Environment	Ambient temp. for use	0~40deg	
	Ambient humid. for use	35~85% RH	
	Performance guarantee temperature	23 $\pm$ 5deg	
	storage Temp.	-10~+60deg	
	Anti-vibration	Max 2G (X/Y/Z axial direction) at 10~500Hz	
Weight		Appr. 160g	

Note 1: Depending on Wavelength, beam size and power, ND filter may be needed for use.

Image Processing Unit

Item		SPEC
Model		HPU-500 (Note 1), HPU-1000
Adaptable number of sensor head		1 unit
Applicable Sensor Model		H410-175R, H410-175S1
Rating Power	Voltage	DC24V $\pm 10\%$ * : Include voltage ripple
	Current	1.8A or less
	Output	Sensor Head: 12V, 0.5A Touch Panel monitor: 12V, 0.5A
12-pole connector	Pin assign	Output1: Common ground Output2: Strobe output for judgment Output3: Output for judgment Output4: Trigger busy Input1: Common ground Input2: Hold signal input for the result Input3: Zero re-set Input4: Start trigger (24V) Input5: Laser on (+) Input6: Laser on (-) Input7: Start trigger (+5V) Input8: Start trigger (-5V)
	Output circuit for 2,3,4	NPN/PNP open drain output Withstand Voltage : Max 30V Maximum drive current : Max 50mA Residual Voltage Max 0.5V: Leak current : Max 0.1mA
	Input circuit for 2,3,4	NPN/PNP input voltage Max input voltage: 30V Input current : 2.3mA ON Voltage : Min 15V OFF Voltage : Max 2V
	Input circuit for 5(+) and 6(-)	Laser On (connect 5 and 6 pin: Non-voltage contact) Internal voltage : 5V Short-circuit current : 2mA Input condition for OFF(Open) : Over 10k Ω m of Min 4V Input condition for ON(Short) : Max 0.5k Ω m or Max 1V
	Input circuit for 7(+) and 8(-)	Start trigger condition (Rising edge detection for 5V system) Input voltage range : 0~5V Input current : 4mA at 5V voltage On voltage : Min 3.5V Off voltage : Max 1V
Monitor output	Video Output	Analog RGB
	Number of Pixel	1024x768 pixel
	Connector	D-sub 15pin
Serial input	USB	USB 2.0 Type A for Touch panel or Mouse
External communications	RS-232C	D-sub 9 pin (Cross cable) Baud rate : 9600, 19200, 38400, 57800, 115200
	Ethernet	RJ-45 connector Transmission Method: 1000Base-T, 100Base-TX Communication Method: TCP/IP, Socket Data output, Control command input/output
Indicator		LED(Green/Red)
Environment condition	Operating Temperature range	0~40deg
	Operation humidity range	35~85% RH
	Storage Temperature	-10~60deg
	Anti-vibration	Max. 2G X/Y/Z axial direction at 10-500Hz
Weight		Appr. 900g

Note: HPU-500 is not sold standalone, Please order HPU-500 with sensor head.