

Chromatic Confocal Sensor

Small size, large measuring range

Ultralarge measuring angle, high repeatability

Small probe size: 7mm (OD) Large measuring range: $\pm 14\text{mm}$

Ultralarge measuring angle: $\pm 62^\circ$ Repeatability: $0.04\mu\text{m}$



Glass/lens



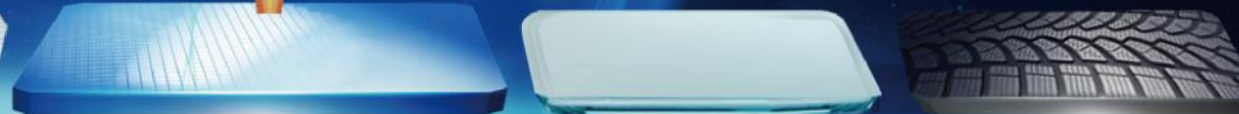
3C industry



Semiconductor



Thin Film Measurement



Linearity error: $\pm 0.15\mu\text{m}$



Ultralarge specular measuring angle: $\pm 62^\circ$



Excellent adaptability to various materials



One controller can support 4-channel measurement simultaneously

Product Description

- The measurement system includes a controller, an optical fiber and one or more sensor heads.
- The controller enjoys an excellent signal-to-noise ratio and is suitable for high-dynamic detection. Excellent surface light compensation technology can adjust exposure time quickly to adapt to the fast-changing material's surface reflectivity and ensure high-precision measurement. The optical fiber is wrapped with stainless steel tube and special silica gel, which can easily cope with complex conditions such as tension, load, bending, and lateral pressure. Besides, there are no electronic components in the sensor head, so the measurement accuracy won't be influenced by the fixture deformation caused by electronics heating.

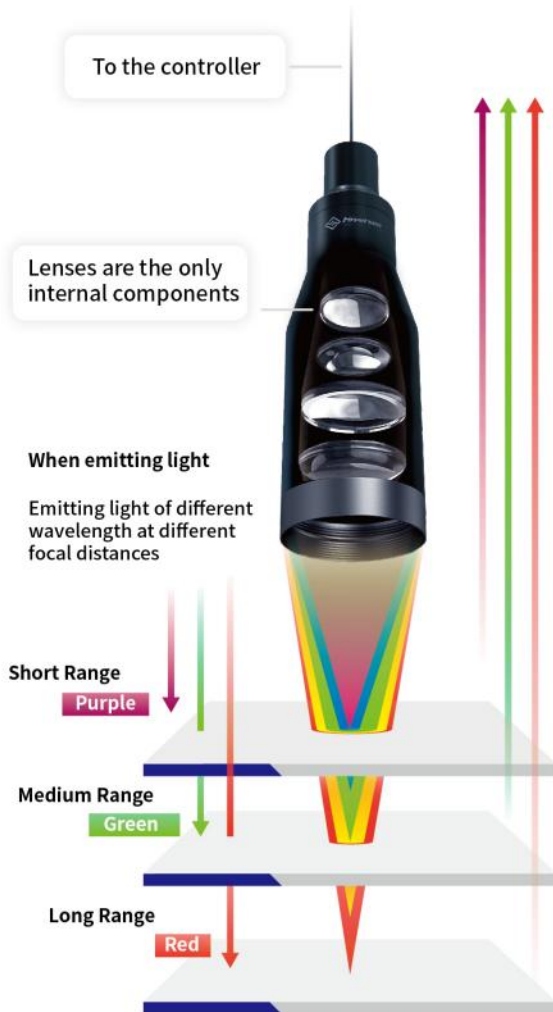
Chromatic Confocal Sensor

Hypersen



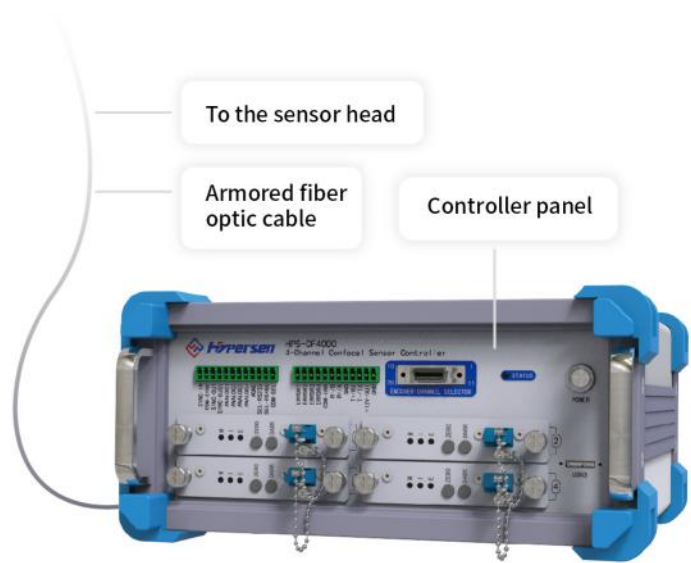
Sensor head

Controller

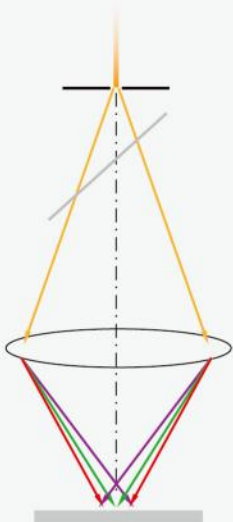


When receiving light

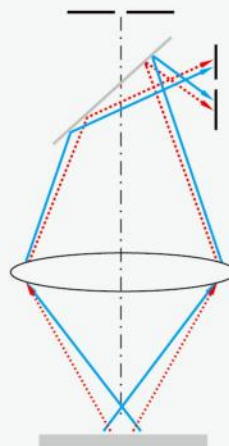
Only the light of a certain wavelength that best matches the focal point can pass through the pinhole.



Introduction to the principle of chromatic confocal sensor:



A beam of white light (or polychromatic light) passes through a pinhole and focuses light of different wavelengths on the optical axis through lenses. The dispersion forms a rainbow-like band, which is irradiated on the target, and then part of the reflected light on the surface is reflected back.



The light that is not illuminated at the intersection of the optical axis and the target surface passes through the spectroscopic component and is blocked around another pinhole. It cannot illuminate the spectrometer and will not interfere with the measurement.

Excellent performance to deal with different scenarios

Product Advantages

Excellent adaptability to any object material, shape and reflectivity
Repeatability: 0.04μm



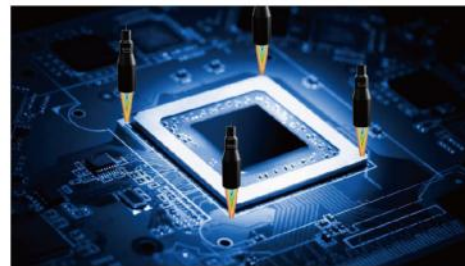
Ultralarge measuring angle

- Specular surface: $\pm 62^\circ$; diffuse reflection surface: $\pm 88^\circ$
- Obtain 3D profile of curved objects precisely



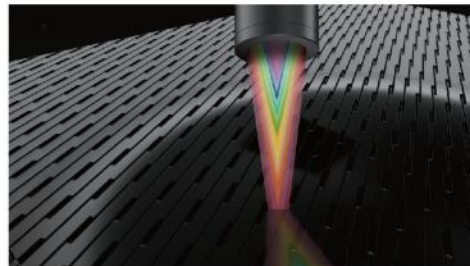
4-channel simultaneous measurement

- One controller can support 4 sensor heads
- Reduce cost



Measurement in restricted space

Compared with ordinary laser displacement sensors, the HPS-CF series chromatic confocal sensors that adopt confocal optical path are not easily interfered by the reflection from various surfaces, so there is no restriction on the measurement space, especially when measuring deep holes, slits, etc.



Complete SDK and one-stop software support

- Easy installation
- Smart programming setting and straightforward software menu
- Customized, worry-free after-sales service



Chromatic Confocal Sensor

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3D Optical Profilometer

3D Line Confocal Sensor

Chromatic Confocal Sensor

High Speed Industrial Camera

6-Axis Force Torque Sensor

Laser Cross Beam Sensor

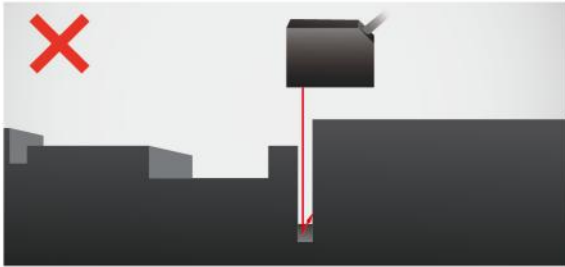
3D Solid-state LiDAR

ToF Ranging Sensor

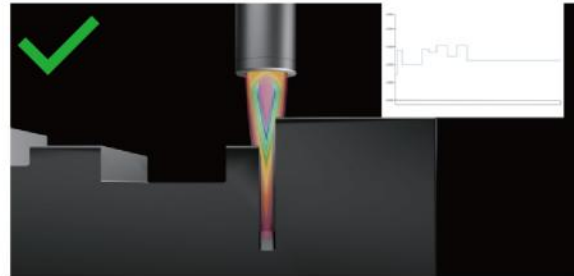
Different measuring results under different situations

Compared with traditional measurement method

No blind points in pits and steps



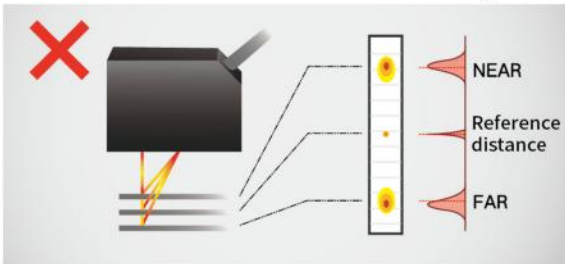
■ Traditional laser displacement meter



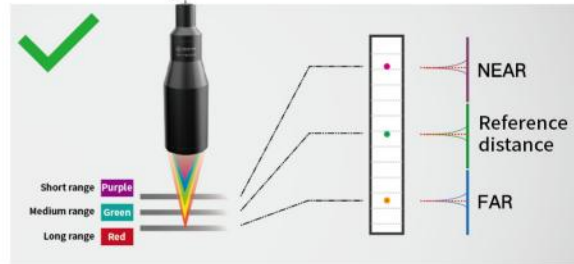
■ Chromatic confocal sensor HPS-CF Series

- Due to the coaxial chromatic confocal method, it can measure targets without affecting the installation and moving direction of the probe.

The spot diameter does not change when distance changes



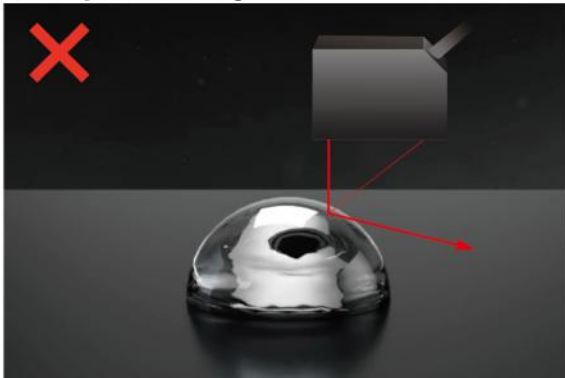
■ Ordinary laser displacement meter using triangular distance measuring method The diameter of the light spot on the light-receiving component



■ The diameter of the light spot on the light-receiving element of the chromatic confocal sensor

- The diameter of the light spot of a conventional laser displacement meter becomes larger when it reaches to the edge of the measurement range, which will cause worse accuracy and incorrect target shape tracking.

Realize high-precision measurement of the curved and inclined surface of transparent and specular objects



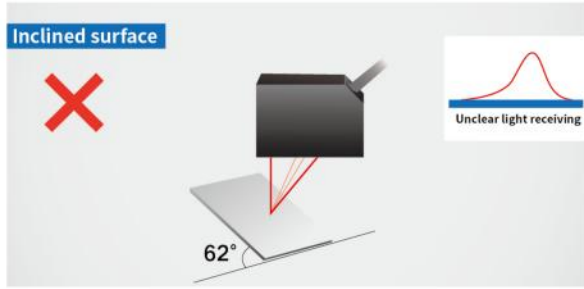
■ Traditional laser displacement meter



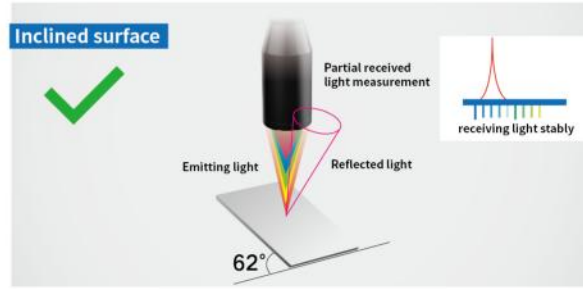
■ Chromatic Confocal Displacement Sensor HPS-CF Series

- The point is that in addition to the coaxial chromatic confocal method, the opening of the irradiating light is also in wide angle. If part of the reflected light can be received, high-precision measurement can be performed by detecting the wavelength position of the reflected light.

Inclined surface can also be measured precisely



■ Traditional laser displacement meter

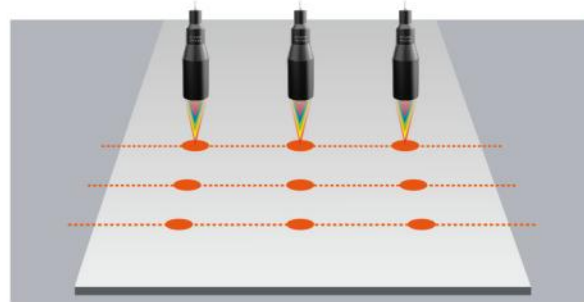


■ Chromatic confocal sensor HPS-CF Series

- Even if the light can be received temporarily, the measurement results will be unstable because of unclear received light contour and damaged shape under the influence of lens aberration.

All sensor heads can carry out measurement simultaneously

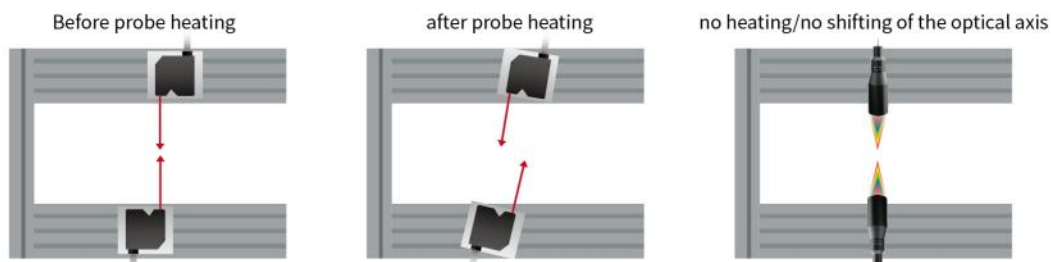
- Simultaneous measurement can be achieved by controlling all sensor heads with one controller. And the measurement accuracy of the sheet thickness can be improved without cumbersome steps.



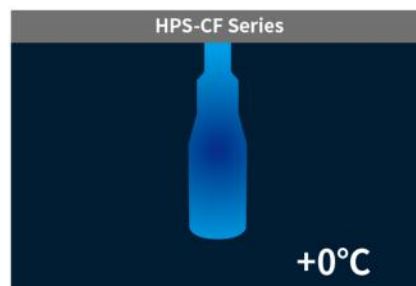
Structure design of the sensor heads: zero temperature drift, high stability, high precision

- The traditional laser displacement meter* can cause fixture deformation and shifting of the optical axis due to self-heating, which is prone to measurement errors. There are only lenses inside the sensor head of the HPS-CF series sensors. Since there are no electronic components, no heat is generated and there will be no deformation of the sensor head's fixture. Therefore, the ideal high-precision measurement can be achieved.

■ Traditional laser displacement meter (Schematic diagram)



■ The sensor head after 10 minutes of powering on (Schematic diagram)



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3D Solid-state LiDAR

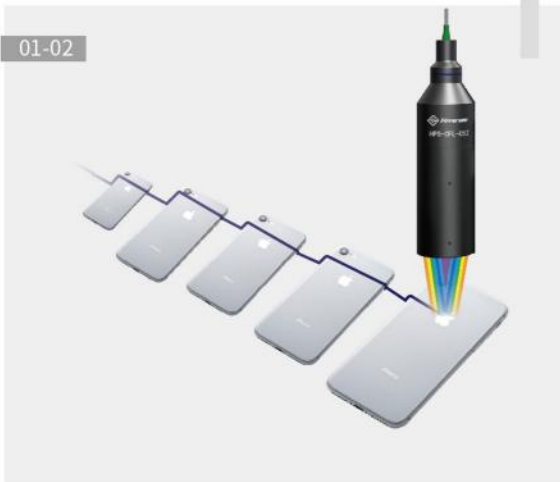
ToF Ranging Sensor

Excellent performance to deal with different scenarios

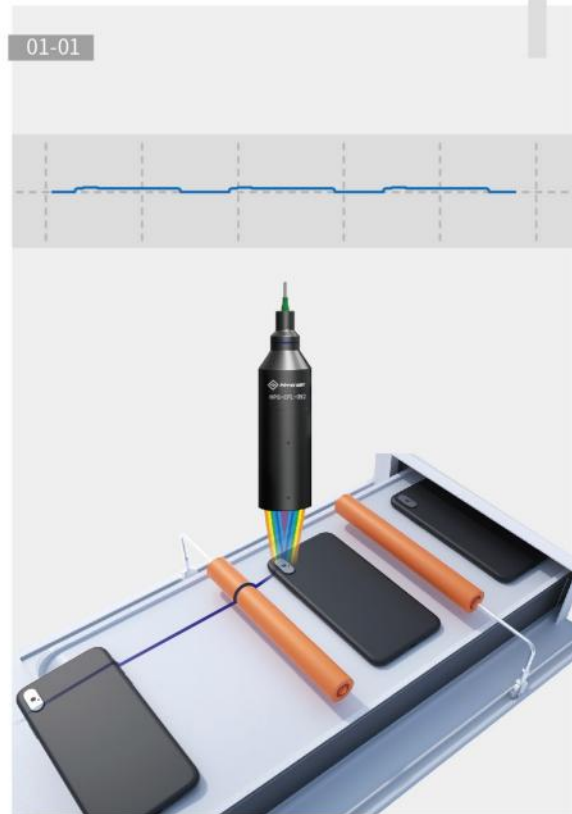
Applications

Applications
Applications

Mobile phone/3C industry



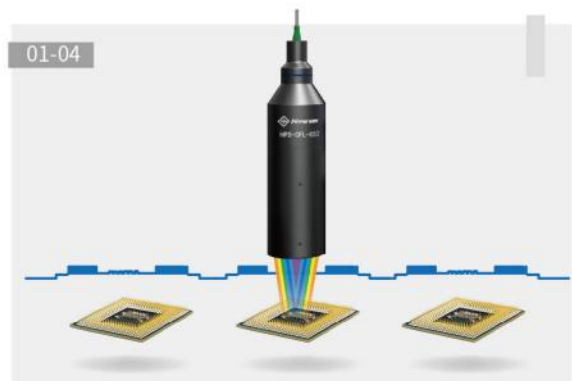
· Height/depth value measurement of mobile phone LOGO



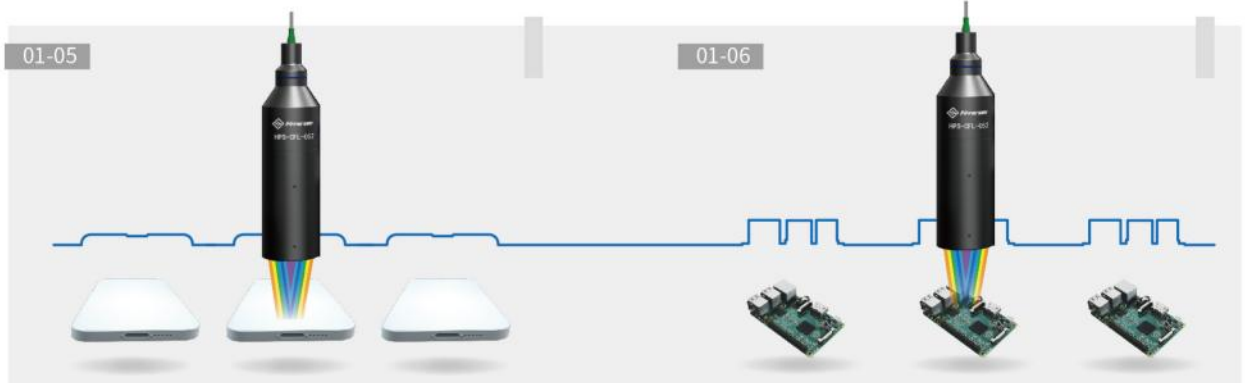
· Mobile phone camera module measurement



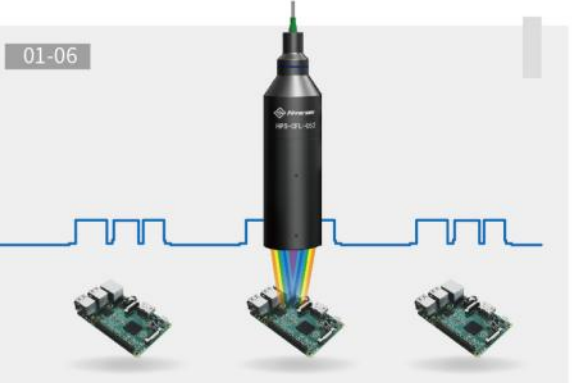
· Mobile phone curved glass profile measurement



· Mobile phone chip measurement



· Mobile phone key size/height measurement



· Mobile phone motherboard measurement

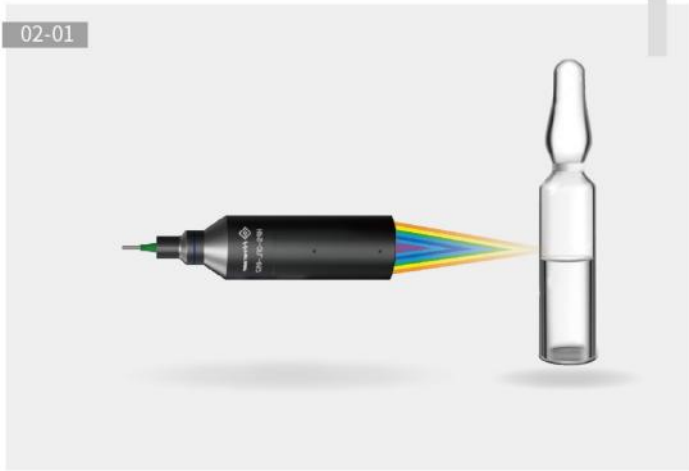
Excellent performance to deal with different scenarios

Applications

Applications

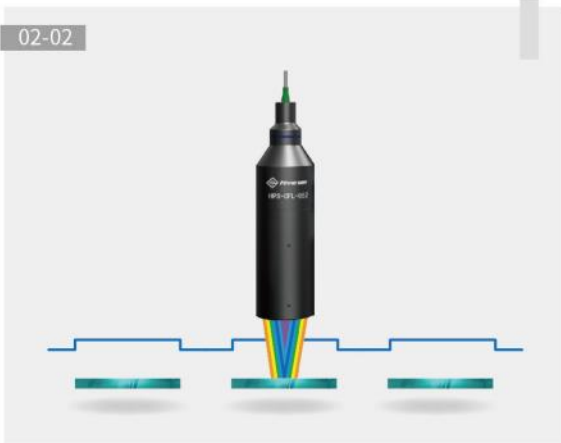
Glass/lens Industry

02-01



• Glass bottle thickness/size measurement

02-02



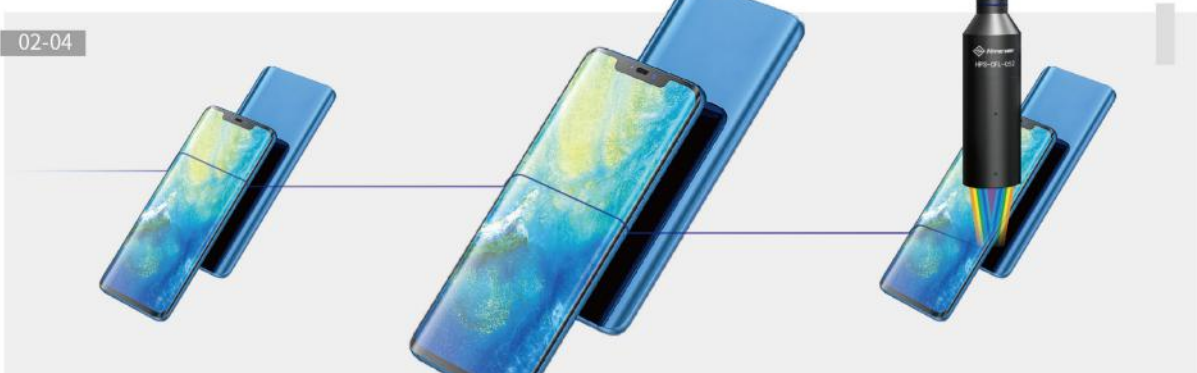
• Glass thickness measurement

02-03



• Camera/sapphire lens thickness measurement

02-04



• LCD measurement

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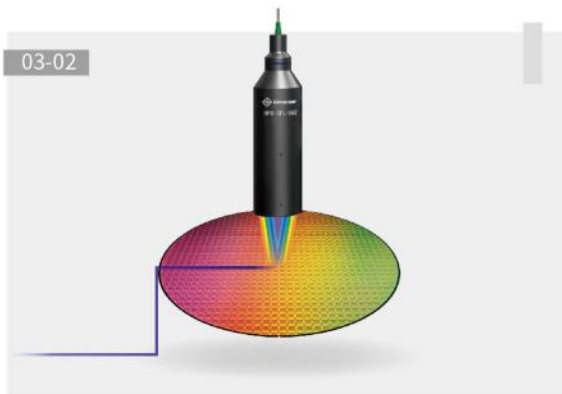
Applications

APPLICATIONS
APPLICATIONS

Semiconductor industry



· Electronic circuit/diode measurement



· Wafer thickness measurement



· IC chip pin flatness measurement



· CPU detection

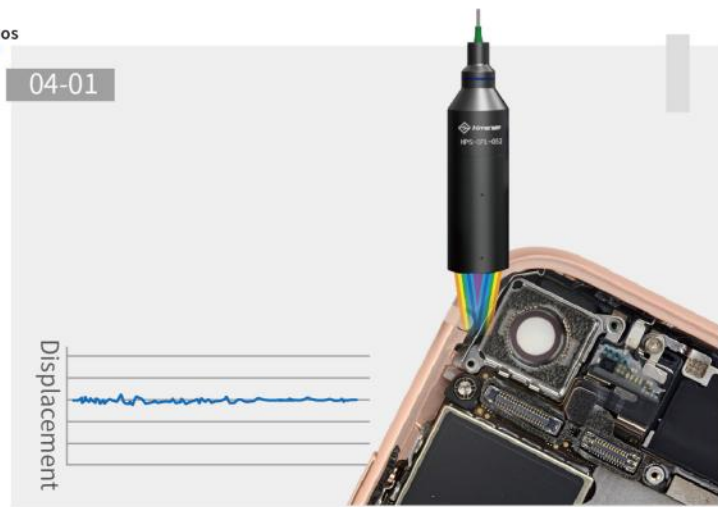
Excellent performance to deal with different scenarios

Applications

Applications
 Applications

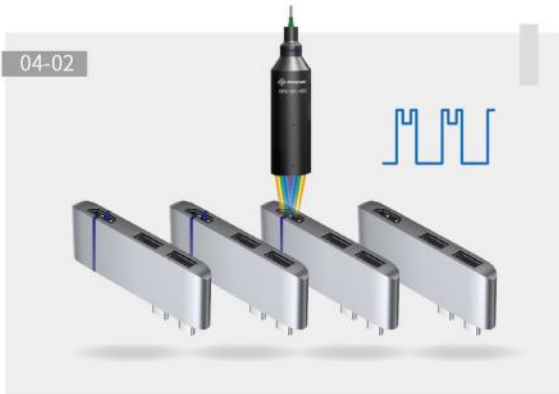
Other industry

04-01



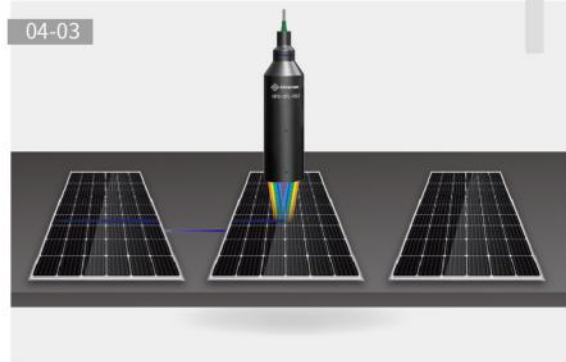
• Glue thickness measurement

04-02



• Deep hole/liquid level measurement

04-03



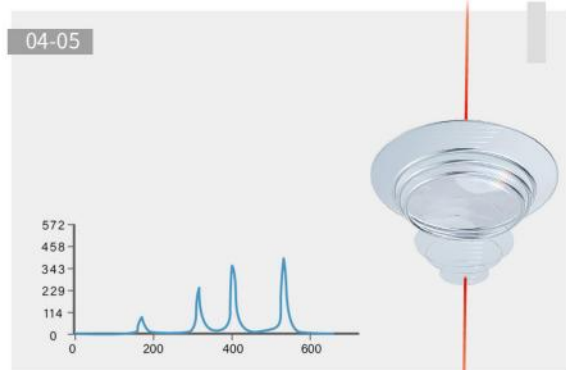
• Solar panel inspection

04-04



• Film thickness measurement

04-05



• Multi-layer transparent material thickness measurement

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3D Solid-state LiDAR

ToF Ranging Sensor

For more application scenarios/videos, please visit the official website: <https://www.hypersen.com/>

Technical Parameters

Sensor head

Model								
	HPS-CFL007	HPS-CFL010	HPS-CFL025	HPS-CFL030	HPS-CFL036	HPS-CFL037	HPS-CFL040	HPS-CFL041
Stand-off distance (mm)*1	6.5mm	7.5mm	43.9mm	32.5mm	11.3mm	35.9mm	24.45mm	48.5mm
Measuring range	±0.8mm	±1.25mm	±6mm	±3.2mm	±1.2mm	±1.6mm	±1.2mm	±6mm
Linearity error	3.2μm	6μm	4μm	2μm	0.3μm	0.9μm	0.5μm	0.63μm
Static repeatability	0.27μm	0.3μm	0.34μm	0.23μm	0.04μm	0.1μm	0.06μm	0.24μm
Measuring angle	±10°	±12.5°	±8.9°	±13°	±35.23°	±19.2°	±23°	±16°
Spot diameter	50μm	60μm	70μm	52μm	12.4μm	37μm	28μm	32μm
Enclosure IP rating	Standard IP52, customizable IP67							
Ambient temperature	0~+50°C							
Material	aluminum 6061							
Fiber length from the sensor head to the controller	Standard: 3m, Options: 5m, 10m							
Weight (including the standar optical fiber)	≈42g	≈46g	≈132g	≈153g	≈380g	≈249g	≈270g	≈280g
Sensor head outer diameter	7mm	10mm	25mm	30mm	36mm	37mm	40mm	41mm

Model							
	HPS-CFL042	HPS-CFL043	HPS-CFL052	HPS-CFL053	HPS-CFL054	HPS-CFL060	HPS-CFL094
Stand-off distance (mm)*1	68.45mm	7mm	51.24mm	19.98mm	9.83mm	46mm	9.09mm
Measuring range	±8mm	±0.23mm	±8.29mm	±0.39mm	±1.06mm	±14mm	±1.2mm
Linearity error	2.5μm	0.2μm	2.2μm	0.15um	0.35μm	2.8μm	0.4μm
Static repeatability	0.35μm	0.18μm	0.4μm	0.045um	0.06μm	0.5μm	0.07μm
Measuring angle	±11°	±44°	±15.4°	±33.4°	±46°	±14°	±62°
Spot diameter	65μm	7μm	38μm	3.1um	15μm	44μm	12.8μm
Enclosure IP rating	Standard IP52, customizable IP67						
Ambient temperature	0~+50°C						
Material	aluminum 6061						
Fiber length from the sensor head to the controller	Standard: 3m, Options: 5m, 10m						
Weight (including the standar optical fiber)	≈238g	≈479g	≈710g	≈460g	≈548g	≈895g	≈2340g
Sensor head outer diameter	42mm	43mm	52mm	53mm	54mm	60mm	94mm


*① This is the value from the lens structure surface to the center point of the lens measurement range.

*② This value is a 3σ value, which is obtained by measuring the tungsten steel standard gauge block on the optical platform in our company's cleanroom. The number of samples: 200000; integration time: 400us; light signal intensity (manually adjusted): 50%; window size for the moving average filter: 128.


* All technical specifications shall be subject to the latest official product datasheet.

* Hypersen Technologies reserves the right of final interpretation.

Controllers

Model		 HPS-CF2000
Power input	Power voltage	AC 100V~240V 50/60Hz
	Max. current	0.1A
Ligth source		White LED
Number of channels		2
Power		Typical value:10W
Operating temperature		0~+45°C
Relative humidity		20% to 85%RH (no condensation)
Weight		≈3.4kg
Communication Interface	Ethernet x 1	Single channel: 2.4kHz; Dual channel: 1.5kHz
	RS-422(multiplexed)x1	Baud rate: 9600bps/19200bps/38400bps/57600bps/ 115200bps/230400bps/460800bps/921600bps Data length: 8 bit Stop bit length: 1 bit Parity: none/even/odd/0/1
	RS-232(multiplexed)x1	
	RS-485(multiplexed)x1	
Input/output port	Differential single-ended encoder Compatible input x1	AB phase signal input
	Sync input x2	Optocoupler isolation
	Sync output x3	
	Analog output x2	Output voltage range:-10V~+10V

*: Without the optical fiber and sensor head

Model		 HPS-CF3000
Power input	Power voltage	AC 100V~240V 50/60Hz
	Max. current	0.1A
Ligth source		White LED
Number of channels		2
Power		Typical value:10W
Operating temperature		0~+45°C
Relative humidity		20% to 85%RH (no condensation)
Weight		≈4kg
Communication Interface	Ethernet x 1	Single channel:2.4kHz; Dual channel:1.5kHz; Ethernet
	RS-232(multiplexed)x1	Baud rate: 9600bps/19200bps/38400bps/57600bps/ 115200bps/230400bps/460800bps/921600bps Data length: 8 bit Stop bit length: 1 bit Parity: none/even/odd/0/1
	RS-485(multiplexed)x1	
Input/output port	Differential single-ended encoder Compatible output x1	AB phase signal input
	Sync input x2	Optocoupler isolation
	Sync output x2	
	Analog output x2	Output voltage range:-10V~+10V

*: Without the optical fiber and sensor head

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3D Optical Profilometer

3D Line Confocal Sensor

Chromatic Confocal Sensor

High Speed Industrial Camera


6-Axis Force Torque Sensor

Laser Cross Beam Sensor


3D Solid-state LiDAR

ToF Ranging Sensor

Controllers

Model		 HPS-CF3000 lite
Power input	Power voltage	AC 100V~240V 50/60Hz
	Max. current	0.1A
Ligth source		White LED
Number of channels		2
Power		Typical value: 10W
Operating temperature		0~+45°C
Relative humidity		20% to 85%RH (no condensation)
Weight		≈3.75kg
Communication Interface	USB 3.0 x 1	Single channel: 6.3kHz Dual channel: 4.2kHz USB 3.0
Input/output port	Sync input x1	Optocoupler isolation
	Sync output x1	
	GPIO Input/output x1	GPIO Input/output

*: Including four fiber optic adapter panels; without the optical fiber and sensor head

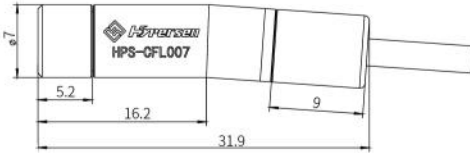
Model		 HPS-CF4000
Power input	Power voltage	AC 100V~240V 50/60Hz
	Max. current	0.1A
Ligth source		White LED
Number of channels		4
Power		Typical value: 10W
Operating temperature		0~+45°C
Relative humidity		20% to 85%RH (no condensation)
Weight		≈ 6kg
Communication Interface	USB x 1	Single channel:6.3kHz; Four-channel: 1.8kHz USB3.0
	RS-422(multiplexed)x1	Baud rate 9600bps/19200bps/38400bps/57600bps/ 115200bps/230400bps/460800bps/921600bps Data length: 8 bits Stop bit length: 1 bit Parity: none/even/odd/0/1
	RS-232(multiplexed)x1	
	RS-485(multiplexed)x1	
Input/output port	Differential single-ended encoder Compatible output x1	AB phase signal input
	Sync input x1	Optocoupler isolation
	Sync output x1	
	Alarm output x4	
	Analog output x4	Output voltage range: -10V~+10V

*: Including four fiber optic adapter panels; without the optical fiber and sensor head

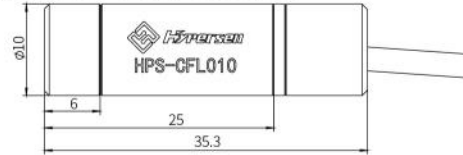
Dimensions

Sensor heads

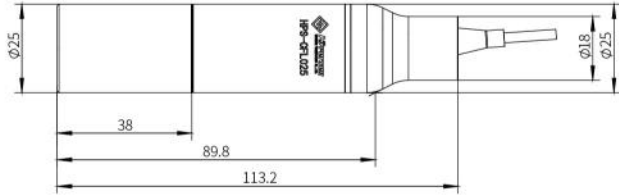
picture 1. HPS-CFL007 sensor head



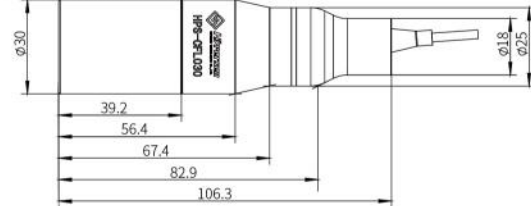
picture 2. HPS-CFL010 sensor head



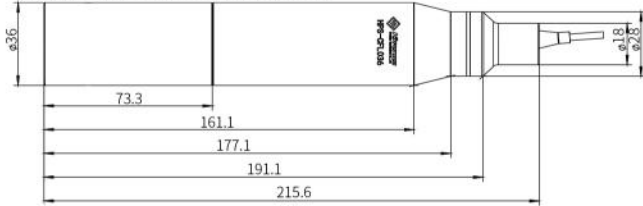
picture 3. HPS-CFL025 sensor head



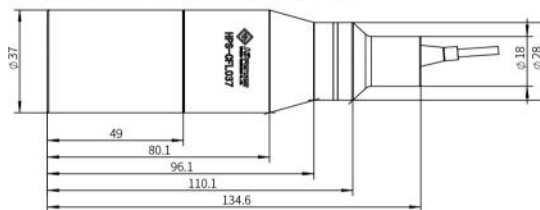
picture 4. HPS-CFL030 sensor head



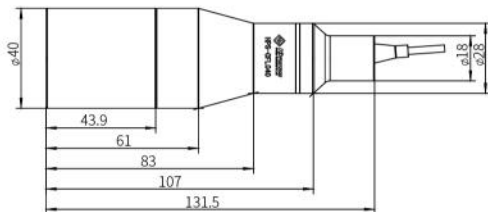
picture 5. HPS-CFL036 sensor head



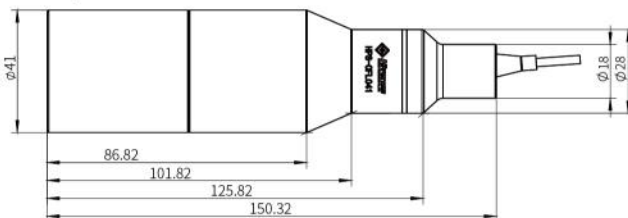
picture 6. HPS-CFL037 sensor head



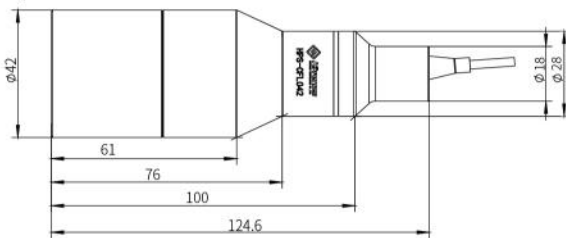
picture 7. HPS-CFL040 sensor head



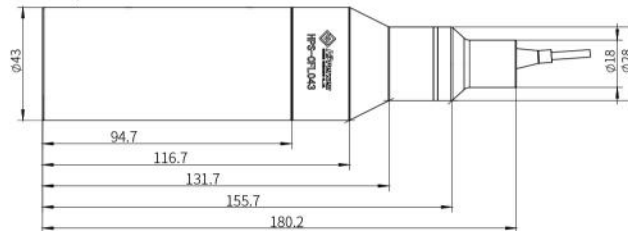
picture 8. HPS-CFL041 sensor head



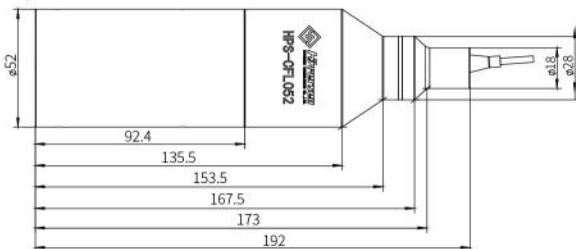
picture 9. HPS-CFL042 sensor head



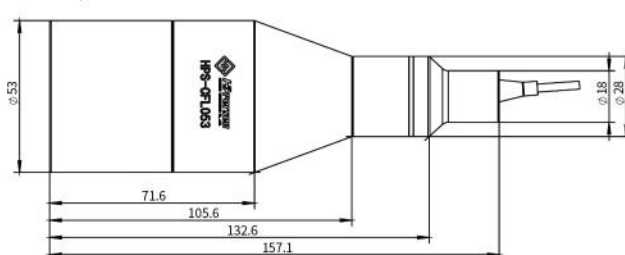
picture 10. HPS-CFL043 sensor head



picture 11. HPS-CFL052 sensor head



picture 12. HPS-CFL053 sensor head



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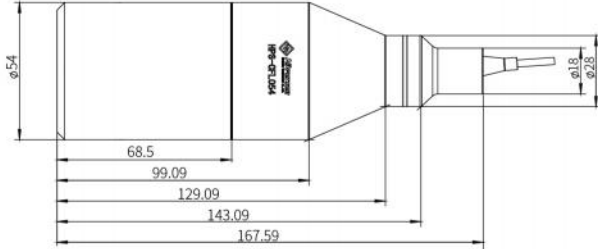
Laser Cross Beam Sensor

3D Solid-state LiDAR

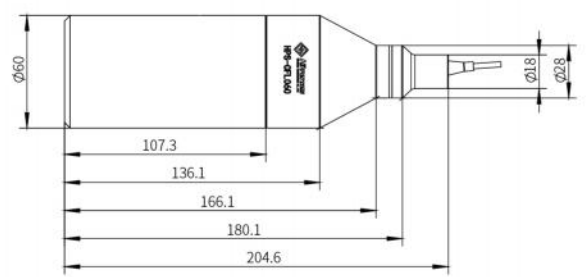
ToF Ranging Sensor

Sensor heads

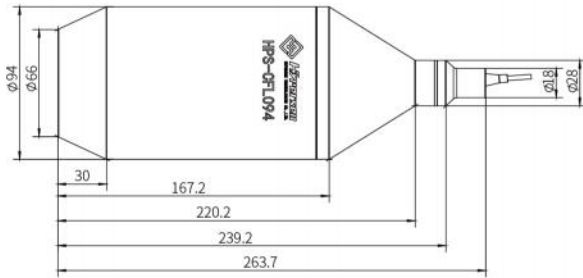
picture 13. HPS-CFL054 sensor head



picture 14. HPS-CFL060 sensor head

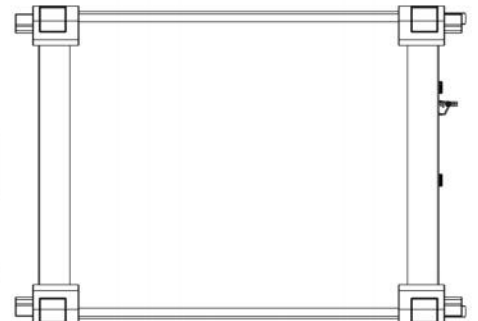
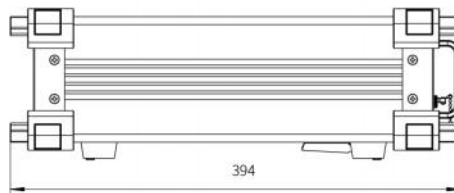
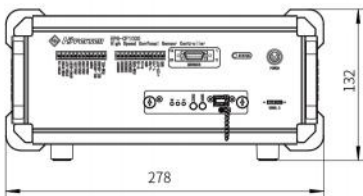


picture 15. HPS-CFL094 sensor head

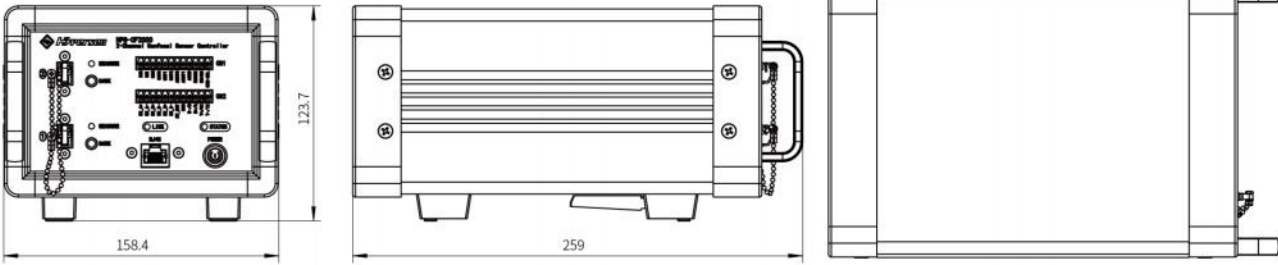


Controllers

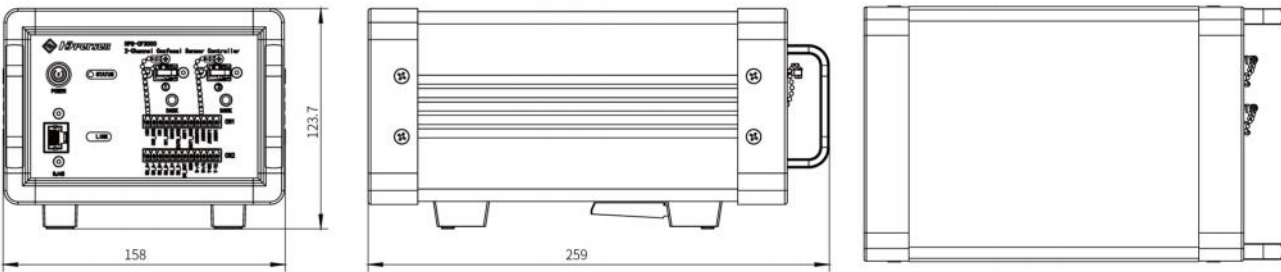
• HPS-CF1000 Controller



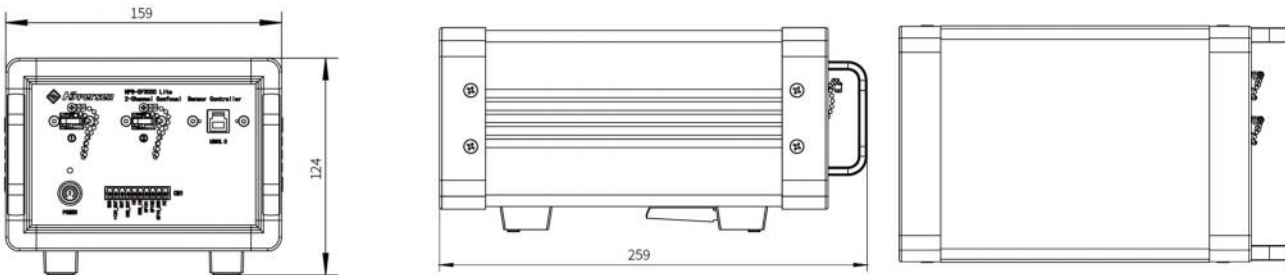
·HPS-CF2000 Controller



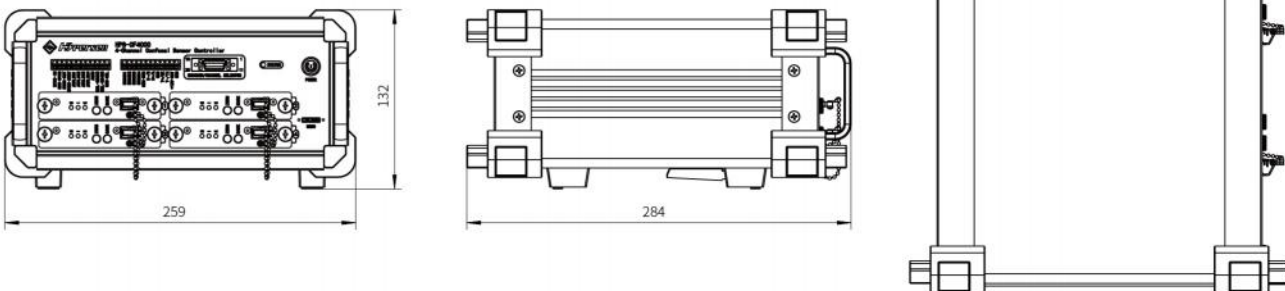
·HPS-CF3000 Controller



·HPS-CF3000 lite Controller



·HPS-CF4000 Controller



Chromatic Confocal Sensor

hypersen

3D Optical Profilometer

3D Line Confocal Sensor

Chromatic Confocal Sensor

High Speed Industrial Camera

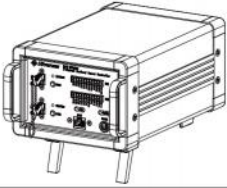


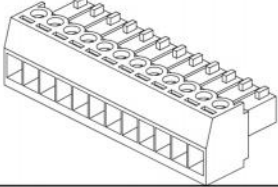

6-Axis Force Torque Sensor

Laser Cross Beam Sensor

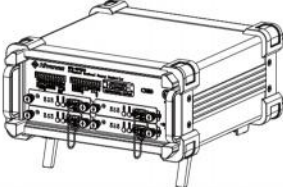
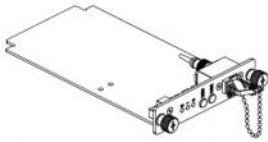



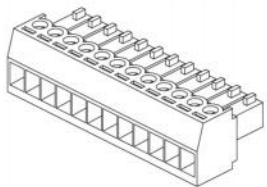
3D Solid-state LiDAR

ToF Ranging Sensor

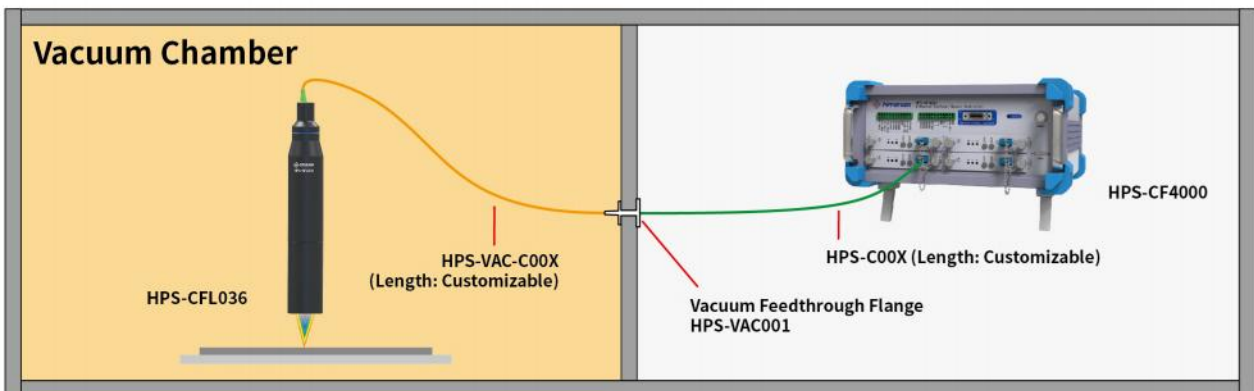
HPS-CF2000/3000/3000 lite Controller' s standard accessories

Model/Name	Shape	Model/Name	Shape
Controller (HPS-CF2000) x1		Sensor head fiber (3m) x1 •HPS-C003 (The optical fiber has been connected to the sensor head at the factory)	
Network cable - Gigabit communication cable (3m) x1		12Pin, terminal block x2 •HPS-OP89901	
Three-hole power cord (1.8m) x1 •HPS-OP80102			
















HPS-CF4000 Controller' s standard accessories

Model/Name	Shape	Model/Name	Shape
Controller (HPS-CF4000) x1 USB disk (included in the controller)x1 •Hypersen Confocal Studio •Related manuals and documents		Optical fiber adapter board x1 •HPS-B01 (The fiber optic adapter board has been installed inside the controller at the factory)	
USB3.0 communication cable (3m) x1 •HPS-OP80101		Optical fiber adapter board x1 •HPS-C003 (The optical fiber has been connected to the sensor head at the factory)	
Three-hole power cord (1.8m) x1 •HPS-OP80102		12Pin, 3.5mm terminal block x2 •HPS-OP89901	

Sensor Setup for Vacuum Condition



Optional Sensor Heads


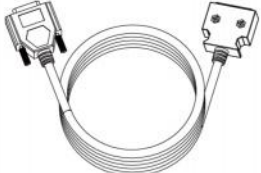
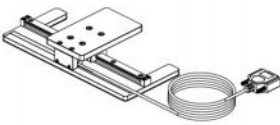
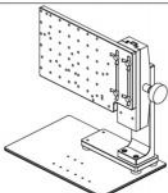
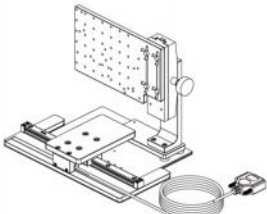
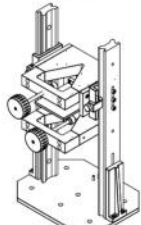
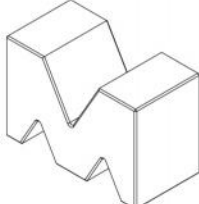
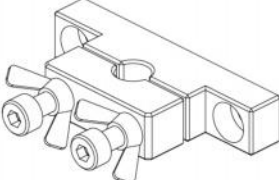
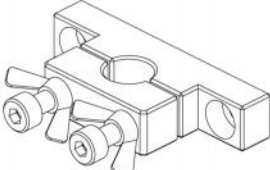
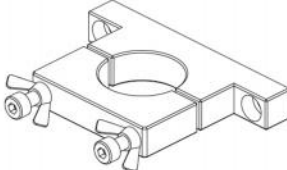
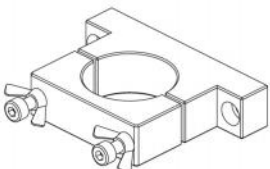
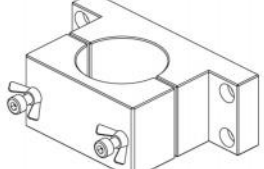
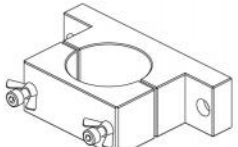
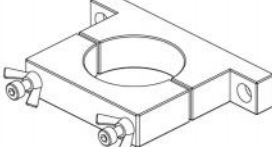
Model / Name	Shape	Model / Name	Shape
Φ7mm Small sensor head · HPS-CFL007		Φ10mm Small sensor head · HPS-CFL010	
Φ25mm sensor head · HPS-CFL025		Φ30mm sensor head · HPS-CFL030	
Φ36mm sensor head · HPS-CFL036		Φ37mm sensor head · HPS-CFL037	
Φ40mm sensor head · HPS-CFL040		Φ41mm sensor head · HPS-CFL041	
Φ42mm sensor head · HPS-CFL042		Φ43mm sensor head · HPS-CFL043	
Φ52mm sensor head · HPS-CFL052		Φ53mm sensor head · HPS-CFL053	
Φ54mm sensor head · HPS-CFL054		Φ60mm sensor head · HPS-CFL060	
Φ94mm sensor head · HPS-CFL094			



- 3D Optical Profilometer ■
- 3D Line Confocal Sensor ■
- Chromatic Confocal Sensor** ■
- High Speed Industrial Camera ■
- 6-Axis Force Torque Sensor ■
- Laser Cross Beam Sensor ■
- 3D Solid-state LiDAR ■
- ToF Ranging Sensor ■

Optional Accessories

Optional Accessories List

Model/Name	Shape	Model/Name	Shape
Sensor head optical fiber · 5m (HPS-C005) · 10m (HPS-C010) · 30m (HPS-C030)		Encoder cable · Differential input type (HPS-OP80103) · Single-end input type (HPS-OP80104)	
Measurement sliding table (including grating encoder) · HPS-OP80301		Lifting table of sensor head · HPS-OP80302	
Measurement sliding table kit (including sliding table and sensor head lifting table) · HPS-OP80401		Adjusting fixture for double-head thickness measurement · HPS-OP80602	
M type support block · HPS-OP89902		HPS-CFL007 Sensor head fixture · HPS-OP80203	
HPS-CFL010 Sensor head fixture · HPS-OP80206		HPS-CFL025 Sensor head fixture · HPS-OP80201	
HPS-CFL030 Sensor head fixture · HPS-OP80207		HPS-CFL036 Sensor head fixture · HPS-OP80208	
HPS-CFL037 Sensor head fixture · HPS-OP80209		HPS-CFL040 Sensor head fixture · HPS-OP80202	



Model/Name	Shape	Model/Name	Shape
HPS-CFL041 Sensor head fixture · HPS-OP80215		HPS-CFL042 Sensor head fixture · HPS-OP80213	
HPS-CFL043 Sensor head fixture · HPS-OP80214		HPS-CFL052 Sensor head fixture · HPS-OP80204	
HPS-CFL053 Sensor head fixture · HPS-OP80216		HPS-CFL054 Sensor head fixture · HPS-OP80211	
HPS-CFL060 Sensor head fixture · HPS-OP80212		HPS-CFL094 Sensor head fixture · HPS-OP80205	
HPS-CFL007 Sensor head (90° adapter) · HPS-OP80703		HPS-CFL010 Sensor head (90° adapter) · HPS-OP80704	
HPS-CFL025 Sensor head (90° adapter) · HPS-OP80701		HPS-CFL030 Sensor head (90° adapter) · HPS-OP80702	

Chromatic Confocal Sensor
hypersen

- 3D Optical Profilometer ■
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- Chromatic Confocal Sensor** ■
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- Laser Cross Beam Sensor ■
- 3D Solid-state LiDAR ■
- ToF Ranging Sensor ■