

## TS-C Series Spectral Confocal Displacement Sensor



- Minimum Measurement Blind Zone
- Multi-layer Transparent Thickness Measurement
- Ultra-smooth Mirror Surface Measurement
- Sub-micrometer Measurement Precision
- Strong Anti-interference Capability
- Axial/Radial Light Emission Measurement

### Ultra-fast Sampling Speed of 10 kHz

The design of Tronsight incorporates a high-brightness color light source, high-efficiency optical components, and highly sensitive electronic devices, enabling industry-leading sampling speeds and thereby helping customers to enhance measurement efficiency and accelerate production line pacing.

### Ultra-high Repeatability Precision of 0.02 $\mu\text{m}$

High-sensitivity, high signal-to-noise ratio components are used, with internal signal digitization implemented in the controller, significantly reducing noise interference. Additionally, the optical module of the probe head is isolated from the electronic modules inside the controller, minimizing the impact of environmental temperature fluctuations and structural vibrations on measurement accuracy, truly delivering high-precision measurement capabilities to the client.

### Ultra-high Linearity Precision of $\pm 0.02\%$ of F.S.

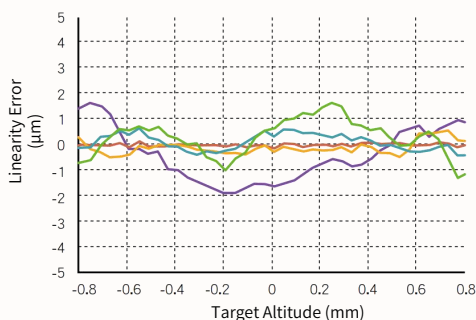
The independently designed high spatial resolution spectral confocal optical probe head brings excellent linear characteristics. Along with an automated calibration system of nanometer-level precision based on traceability to a laser interferometer, it meets the high-precision, mass-production performance calibration requirements of sensor products.

### Ultra-large Measurement Angle of $\pm 65^\circ$

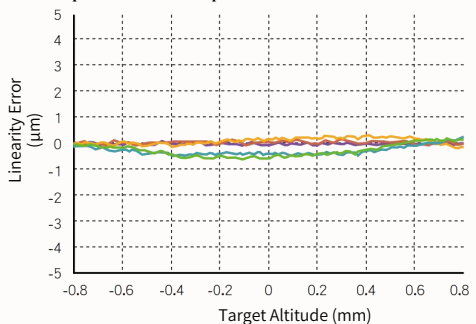
Tronsight offers probe head models with a maximum measurement angle of  $\pm 65^\circ$ , capable of meeting the requirements for 2.5D glass and chip pin morphology measurement and positioning.

#### High Linearity for Various Materials

Laser Displacement Sensor Measurement Data



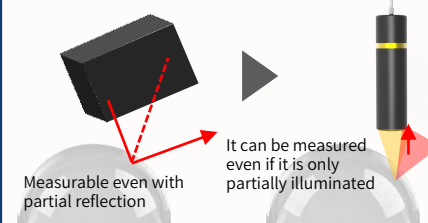
Spectral Confocal Displacement Sensor Measurement Data



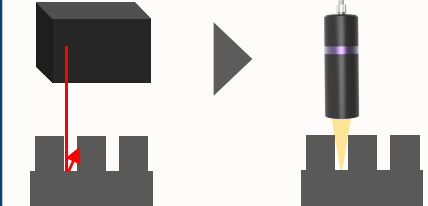
Transparent, Mirror-like Surfaces    White ceramic    Metal rough surface    Black rubber    Semi-transparent resin

#### Adaptable to Different Structural Features

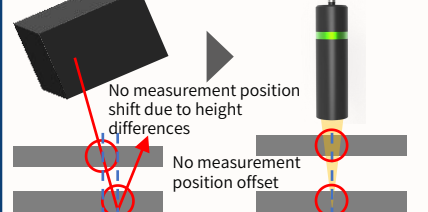
High-precision Measurement for Transparent Surfaces



No Dead Angles for Measuring Pits and Step Differences



Correct Measurement for Transparent and Mirror-like Surfaces



#### All-optical Measurement Probe

##### Zero Heat

Traditional laser displacement sensors often suffer from measurement errors due to self-heating, which can cause deformation of the fixture and misalignment of the optical axis. The TS-C series spectral confocal displacement sensor probe head features only a lens structure inside. As there are no electronic components, it does not generate heat, thus avoiding deformation of the fixture where the probe head is installed, enabling ideal high-precision measurement.



##### Anti-interference

The connection via optical fiber to the controller helps avoid the impact of electromagnetic interference from the site on measurement accuracy.

## • The Probe of Series TS-C

Model	Reference Distance <sup>1</sup>	Measuring Range	Measuring Angle <sup>2</sup>	Beam Diamteter <sup>3</sup>	Lateral Resolution	Static Noise <sup>4</sup>	Linear Error <sup>5</sup>	Outside Diameter * Length	Weight	Minimum Measurable Thickness	Temperature Characteristic	Protection grade	
C100 <sup>9</sup>	5mm	±0.05mm	/	/	/	/	/	/	/	5% of F.S.	<0.03% F.S./°C	IP40	
C400	10mm	±0.2 mm	±43°	Φ7 μm	3.5 μm	12 nm	< ±0.12μm	φ40*99.4mm	186 g				
C600	6.5mm	±0.3 mm	±32.5°	Φ8μm	4μm	16 nm	< ±0.18μm	φ20*110 mm	73g				
C1200	20 mm	±0.6 mm	±32°	Φ9.5 μm	4.75 μm	30 nm	< ±0.3μm	φ36*106.3mm	182 g				
C2000	50 mm	±1 mm	±14°	Φ20 μm	10μm	85 nm	< ±0.6μm	φ34*90.7mm	162 g	10% of F.S.	~0.1% F.S./°C	IP40	
C2400	9 mm	±1.2 mm	±60°	Φ5.48 μm	2.74μm	45nm	< ±0.48μm	φ94*267.5mm	2350g	5% of F.S.	<0.03% F.S./°C		
C2600 <sup>9</sup>	15mm	±1.3 mm	±31°	Φ9 μm	Φ4.5 μm	50nm	< ±0.3μm	φ36*97.9mm	228g	5% of F.S.			
C3000	7 mm	±1.5 mm	±14°	Φ20 μm	10 μm	100nm	< ±0.6 μm	φ8*38.7 mm	23g <sup>7</sup>	10% of F.S.	-0.05% F.S./°C		IP67
C4000N	14.5 mm	±2 mm	±21°	Φ12 μm	6 μm	100 nm	< ±0.8μm	φ32*158.8 mm	238 g	5% of F.S.	<0.03% F.S./°C	IP40	
C4000F	38 mm	±2 mm	±21°	Φ16 μm	8 μm	100 nm	< ±0.8μm	φ36*126.1mm	226 g		-0.05% F.S./°C		
C6000	40 mm	±3 mm	±14°	Φ22 μm	11 μm	140 nm	< ±1.2μm	φ30*71 mm	112 g		<0.03% F.S./°C		
C7000	45 mm	±3.5mm	±15.5°	Φ20 μm	10 μm	140 nm	< ±1.4μm	φ36*84.2 mm	200 g				
C7000L	47 mm	±3.5mm	±21°	Φ16 μm	8 μm	140 nm	< ±1.4μm	φ52*207 mm	784 g				
C10000	50 mm	±5 mm	±13°	Φ20 μm	10 μm	250 nm	< ±2 μm	φ36*84 mm	203 g				
C16000	55mm	±8mm	±15.3°	Φ15 μm	7.5 μm	300nm	< ±2 μm	φ60*211.1 mm	1180g				
C20000	55mm	±10mm	±15.3°	Φ15 μm	7.5 μm	300nm	< ±2 μm						
C50000	100mm	±25mm	±9.5°	Φ25 μm	12.5 μm	850nm	< ±5μm	φ60*217.3 mm	1154g				
CR1500 <sup>6</sup>	5.75mm	±0.75 mm	±14°	Φ20 μm	10 μm	80 nm	< ±0.3 μm	φ8*47.7 mm	23g <sup>7</sup>				
CR1500N	3mm	±0.75 mm	±12°	Φ17 μm	8.5μm	100nm	< ±0.75μm	φ3.8*85 mm	23g <sup>7</sup>				
CR4000	Axial Direction: 6.5mm	±2 mm	±11.5°	Φ20 μm	10.0 μm	100 nm	< ±1.2μm	φ8*39mm	24g <sup>7</sup>	10% of F.S.			
	Radial Direction: 8mm <sup>8</sup>												
Customizable Models	1~500 mm	0.1~50mm	±5°~60°	1~100 μm	0.5~50 μm	4~2000 nm	Typical Value ±0.02% of F.S.	Model Related	Model Related	Model Related			

<sup>1</sup> Calculated based on the center of the measurement range.

<sup>2</sup> Tilted testing using a standard plane mirror at a 1kHz sampling rate.

<sup>3</sup> Measuring sharp glass edges, verified using a nanometer positioning precision motion platform with laser interferometer as the displacement reference.

<sup>4</sup> Measuring standard silver-coated film reflection mirrors, 1kHz without averaging, using the root mean square deviation from 10,000 consecutively collected data sets.

<sup>5</sup> Verified using a nanometer-level high-precision laser interferometer for calibration.

<sup>6</sup> Models starting with "CR" are 90° side-emission versions, suitable for measuring features such as deep holes, inner walls, and side surfaces.

<sup>7</sup> This model probe includes a 3m pigtail cable, and the weight listed includes the weight of the cable.

<sup>8</sup> This model probe can be configured for either axial or side emission.

## • The Controller of Series TS-C

Model		TS-CCS	TS-CCD	TS-CCF
Number of Connected Sensors		1	2	4
Sample Frequency		Single Channel : Max.10 kHz; Dual Channel: Max.5 kHz; Four Channel: Max.2.5 kHz		
Input Port	Encoder Input	AB/ABZ encoder input, configurable for triggering		
	Trigger Input	Pulse/Level trigger		
Output Port	Digital Signal Output	Alarm output, comparator output		
	Analog output	Linear ±10 V analog voltage output / 4~20 mA analog current output (optional module)		
Industrial Interface	Ethernet Interface	100BASE-TX		
	USB Interface	Conforms to the USB2.0 full-speed standard		
	RS485 Interface	Modbus protocol, 19200~115200bps		
Test-control Software	Host Computer Software	TSConfocalStudio test-control software		
	Secondary Development Kit	C++&C#SDK		
Rated Power	Supply Voltage	24 VDC ±10%		
	Current Consumption	About 0.4 A		
Environmental Resistance	Working Temperature	0 to +50°C		
	Relative Humidity	20 to 85% RH ( Non-condensing )		
Weight		About 2000 g		

## TS-P Series

### Laser Triangular Displacement Sensor



- Ultra-long Measurement Range Multi-layer
- No Controller Required
- Nationally Produced
- Ultra-fast Sampling Rate
- Diffuse/Normal Reflection
- Full Frequency Industrial I/O

#### Ultra-fast Sampling Speed of 160kHz

The sampling speed is an order of magnitude higher than traditional models on the market, with a dedicated processor performing high-speed digital processing of the light spot signal, capable of meeting the demands for both high-speed and high-precision measurements. Reliable measurements can be taken of objects moving at high speeds, rotating rapidly, or vibrating quickly.

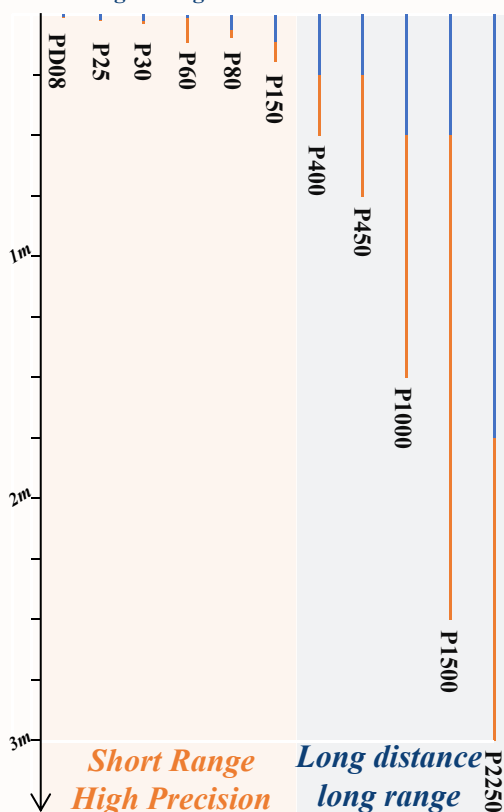
#### High Linear Accuracy of $\pm 0.02\%$ of F.S.

The independently designed high spatial resolution emission and reception mirror groups bring excellent linear characteristics. With an automated calibration system of nanometer-level precision based on traceability to a laser interferometer, it meets the high-precision, mass-production performance calibration requirements of sensor products.

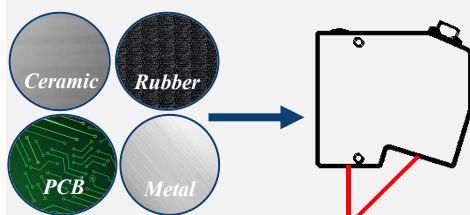
#### High Repeatability of $0.02\mu\text{m}$

High-sensitivity, high signal-to-noise ratio components are used, with internal signal digitization implemented in the probe head, significantly reducing noise interference. Moreover, the design is optimized for application sites, minimizing the impact of environmental temperature fluctuations and structural vibrations on measurement accuracy, truly delivering high-precision measurement capabilities to the client.

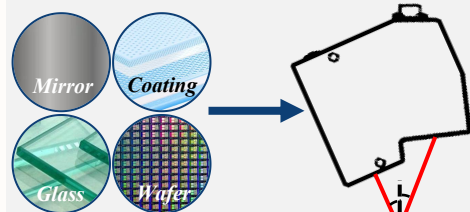
#### Covering a Range of Measurement Distances



#### Support for Various Measurement Modes

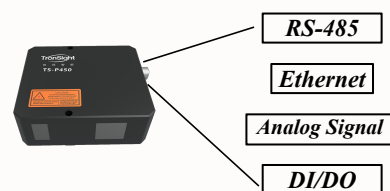


Diffuse Reflection Measurement Mode



Normal Reflection Measurement Mode

#### Integrated Industrial Interface



No Controller Needed

Single Probe Head  
Direct Connection



PLC



PC



DAQ Card

## ● The Probe of Series TS-P

Model	Reference Distance <sup>*1</sup>	Measuring Range	Beam Diamteter	Static Noise <sup>*2</sup>	Static Noise <sup>*3</sup>	Linear Error <sup>*4</sup>	Dimensions	Weight	Sample Frequency	Light Source <sup>*5</sup>							
PD08 <sup>*8</sup>	8mm	Range	Φ20μm	0.03μm	0.01μm	< ±0.5μm	82*115*38.5mm	213 g	Max. 160 kHz	655 nm Max. 0.5mW							
PD15	15mm	±1.0mm	Φ35μm	0.05μm	0.01μm	< ±0.6μm	102*137*55.5mm	475g		655 nm Max. 0.5mW							
PD50	50mm	±0.8 mm	Φ25μm	0.05μm	0.01μm	< ±0.6μm	74*205*110mm	/		655 nm Max. 0.5mW							
P25 <sup>*8</sup>	25 mm	±1 mm	Φ18μm	0.05μm	0.01μm	< ±0.6μm	120*80*30mm	372 g		405 nm Max. 4.9 mW							
P30	30mm	±5mm	Φ35μm	0.15μm	0.02μm	< ±3μm	87*76*30mm	287 g		Max. 25kHz	655 nm Max. 4.9 mW						
P30W			About Φ35*400μm			< ±2μm											
P30U			About Φ35*1100μm	0.075μm													
P60	60mm	±50mm	Φ70μm	0.8μm	0.2μm	< ±20μm	136*100*30mm	405 g	Max. 160 kHz			655 nm Max. 4.9 mW					
P80	80mm	±15mm	Φ70μm	0.5μm	0.1μm	< ±6μm	93*78*36mm	384 g					Max. 25kHz				
P80W			About Φ70*800μm														
P80U			About Φ70*2200μm	0.25μm													
P150	150mm	±40mm	Φ110μm	1.2μm	0.25μm	< ±16μm	95*80*36 mm	374g	Max. 160 kHz	655 nm Max. 4.9 mW							
P150W			About Φ110*1400μm														
P400	400mm	±100mm	Φ300μm	3μm	1.5μm	< ±60μm	115*85*36mm	456 g					Max. 160 kHz	655 nm Max. 4.9 mW			
P400W			About Φ300*3400μm														
P450	450mm	±250mm	Φ320μm	8μm	2μm	< ±250μm	120*75*36mm	416 g							Max. 160 kHz	655 nm Max. 4.9 mW	
P450W			About Φ320*4200μm														
P1000	1000mm	±500mm	Φ320μm	12μm	/	< ±500μm	180*85*40mm	785g									Max. 160 kHz
P1500	1500mm	±1000mm	Φ400μm	30μm	/	<±1000μm	260*85*45mm	1250g									
P2250	2250mm	±650mm	Φ700μm	50μm	/	<±650μm	200*85*41mm	975 g									
Customizable Models	8~2250mm	5~2500mm	Model Related	20ppm of F.S.	Model Related	Typical Value ±0.05% of F.S.	Model Related	Model Related			Max. 160 kHz						Model Related
Temperature Characteristic	0.01% of F.S./°C																
Industrial Interface <sup>*6</sup>	Ethernet, 485 serial port, analog signal output*7 (Max.±10V, 4-20mA)																
Test-control Software	TSLaserStudio measurement and control software and C++, C# SDK																
Working Mode	Works independently without a controller. The probe can be configured as a host or slave, and the host controls the slave to achieve the same step thickness measurement, alternating exposure anti-interference and other functions.																
Supply Voltage	DC 9~36V, maximum allowed ±10% fluctuation																
Power Consumption	About 2.5W																
Protection grade	IP67 ( IEC60529 )																
Working Temperature	0 to +50°C																

\*1 Calculated based on the center position of the measurement range;

\*2 Measured on standard white ceramic samples, 50kHz without averaging, using the root mean square deviation (1 σ) from 65,536 measurement data sets;

\*3 Measured on standard white ceramic samples, 50kHz with 1024 averages, using the root mean square deviation (1 σ) from 65,536 measurement data sets;

\*4 Verified using a nanometer-level high-precision laser interferometer for calibration;

\*5 Laser power can be customized according to different application requirements, with some models offering a 405nm blue light version;

\*6 The probe head can independently provide voltage, current, and RS485 output;

\*7 Optional analog voltage/current output module available;

\*8 This model is new to the market, and actual parameters may vary slightly, subject to the contract.

## TS-IT Series

### White Light Interference Thickness Sensor



\*Thin film thickness measurement scenarios

- Nanometer-level Measurement Precision
- Wide-range Working Distance
- Thin Film and Thin-layer Glass Thickness Measurement.
- Integrated Probe Structure.

#### 10kHz Ultra-Fast Sampling Rate

Tronsight design utilizes a high-brightness color light source, high-efficiency optical components, and highly sensitive electronic devices, achieving industry-leading sampling speeds and thus helping customers to improve measurement efficiency and accelerate production line pacing.

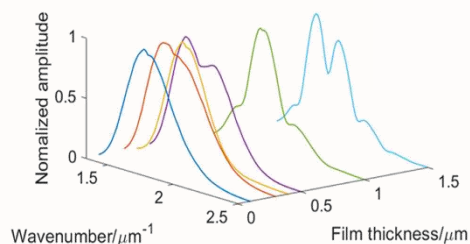
#### $\pm 20\text{nm}$ Ultra-high Linearity Precision

The independently designed high spatial resolution white light interference optical probe head offers excellent linear characteristics. The thickness measurement probe based on the interference principle introduces no nonlinear factors at the principle level, with only nonlinear errors to be considered during the spectral analysis process.

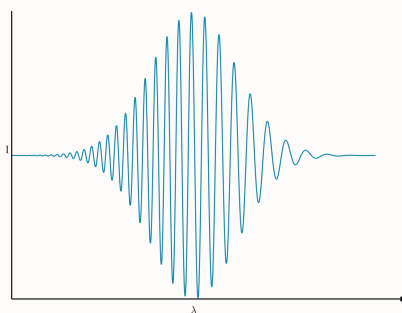
#### 1nm Ultra-high Repeatability Precision

High-sensitivity, high signal-to-noise ratio components are used, with internal signal digitization implemented in the probe head, significantly reducing noise interference. Additionally, the interference-based thickness measurement method greatly enhances the sensor's ability to suppress external disturbances.

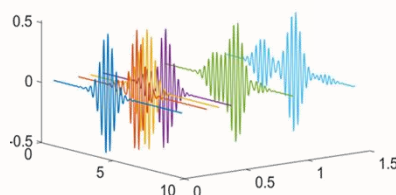
#### Nanometer-level Thickness Measurement Capability



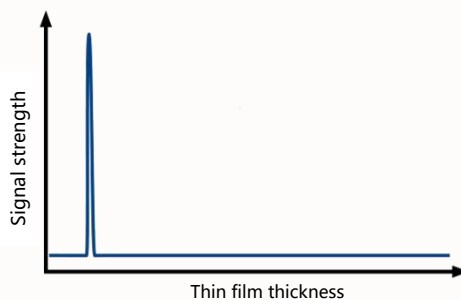
Spectral Signal Intensity



Fourier Transform



Interference Fringes



Thickness Calculation

#### Wide Working Distance Range



A working range of  $50\pm 2\text{mm}$  ensures flexibility in field applications

## ● The Probe of Series TS-IT

Model	Reference Distance <sup>*1</sup>	Recommended Measuring range	Measuring Angle <sup>*2</sup>	Beam Type <sup>*3</sup>	Static Noise <sup>*4</sup>	Linear Error <sup>*5</sup>	Outside Diameter * Length	Weight	Protection grade
IT50	50mm	±2mm	±3°	Focus Spot, Φ100μm	1nm	<±20nm	φ30*58mm	90g	IP40
IT10W-UV-VIS	Non-focusing probe	Recommended installation distance: 5-10mm	±10°	Diffuse spot, spot diameter is about 4mm at 10mm installation distance	1nm	<±20nm	φ6.35*65mm		

\*1 Focus position, where the reflected light signal of the sensor is the strongest.

\*2 Using a standard plane mirror, tilt test at a 1kHz sampling rate.

\*3 Measuring sharp glass edges, verified with a nanometer positioning precision motion platform using a laser interferometer as the displacement reference.

\*4 Measuring standard film thickness samples, 1kHz without averaging, using the root mean square deviation from 10,000 consecutive thickness data sets.

\*5 Theoretical value.

## ● The Controller of Series TS-IT

Model		TS-ITS-100	TS-ITS-100W
		Compatible with IT50	Compatible with IT10W-UV-VIS
Number of Connected Sensors		1	
Sample Frequency		Max.10 kHz	
Thickness Measuring Range		About1μm~100μm ( When the refractive index is 1.5 )	
Input Port	Encoder Input	AB/ABZ encoder input, configurable for triggering	
	Trigger Input	Pulse/Level trigger	
Output Port	Digital Signal Output	Alarm output, comparator output	
	Analog output	Linear ±10 V analog voltage output / 4~20 mA analog current output (optional module)	
Industrial Interface	Ethernet Interface	100BASE-TX	
	USB Interface	Conforms to the USB2.0 full-speed standard	
	RS485 Interface	Modbus protocol, 19200~115200bps	
Test-control Software	Host Computer Software	TSConfocalStudio test-control software	
	Secondary Development Kit	C++&C#SDK	
Rated Power	Supply Voltage	24 VDC±10%	
	Current Consumption	About 0.4 A	
Environmental Resistance	Working Temperature	0 to +50°C	
	Relative Humidity	20 to 85% RH ( Non-condensing )	
Weight		About 2000 g	