Safety Precautions for Laser Equipment

CAUTION
Do not expose your eyes to laser radiation either directly or reflected from a mirrored surface. Laser beams have a high power density and their exposure may lead to injury.

The warning and explanatory label on the side of the Sensor Head in the ZX-GT Series is in Japanese. Replace it with the English label that comes with the product.

This document provides information mainly for selecting suitable models. Please read the User's Manual carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.
New Standards for Dimension Measurement

Measurable at any position

The usual limitations, such as the measurement area being confined to the center or large errors due to positioning, that used to plague laser measuring sensors have now been overcome. Measurements can be consistently taken within a 500mm area, whatever stage the work is at or whichever way it is inserted. It can now be set to positions without interference from the work head and without limitations of size of work area.

Accurate! 10-µm by non-contact method

ZX-GT is the only sensor with the ability to measure and locate position to an accuracy of 10 µm without contact. Unlike conventional through-beam laser sensors, the ZX-GT's unique algorithm has the flexibility to meet a wide variety of applications, including the ability to accurately measure glass and mirror surfaces.

Fast! Small!

With OMRON's unique TRIO (Triple parallel processing) algorithm, it is possible to take 2000 high-speed samples per second, 7 times greater than previously possible, greatly reducing tact time.

Compact like palm-top

The controller, a continuation of the ZX series, is the smallest in its class. Combined with the compact sensor head, it is ideal for integration into various equipment.

What does "10-micron by 500-mm" mean?

It is like measuring the gap between a 50-meter long airplane and the runway when it is just 1mm off the ground.

Original collimator lens

Class-1 laser

CCD and TRIO algorithm

Maximum 500-mm area

Runway

1mm

100 times

An example of 10-micron by 500-mm accuracy.

1/7 in speed compared with conventional products

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New concept TRIO structure

500mm

10-micron by non-contact method

About 50m

1/7 of the previous speed

"10-micron by 500-mm" means...
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Cutting-edge laser technology

Strong temperature compensation

It is important to eliminate the influence of temperature to ensure the accuracy of a measurement. However, the temperature in the field environment changes according to the time and the season. With the ZX-GT, which employs CCD method, the influence on the resolution from temperature changes is greatly reduced leading to an error rate as low as 0.01% (2.8 micro-meters*).

*This is a representative case. Please see the specifications table for the details of the relevant conditions.

Dedicated glass-detection function

The detection of edges has been a problem for transparent objects with traditional transmission type sensors. However, ZX-GT adopts OMRON's unique MRC filter (Mirror Reflection Cut Filter) and CCD methodology. It can accurately detect work that reflects light such as mirror-finished surface or work that allows light to pass through such as glass (including coated glass).

*MRC Filter: OMRON’s proprietary optical filter.

Dedicated glass-detection function

Integrated MRC filter Patent pending

Collimate optical technology

Super parallel-beam

With OMRON's unique collimate optical technology, the closest to ideal parallel beam is created. Errors are controlled in the measurement area and the longest and most accurate measurement is achieved.

*Collimate optical technology
Collimate optical technology allows laser lights to stay parallel using mirror reflection and lens refraction effects, to take advantage of the laser light’s high-level of directivity.

Sub-pixel processing

CCD processing algorithm

CCD detects the shadow made from measurement objects and by performing sub-pixel calculation, it achieves 10 micrometer level accuracy.
Applications by industry

**Automotive & Automotive-components**
*<Outer diameter measurement>*
- Diameter measurement of metal objects
- Diameter measurement of large-scale pipe
- Diameter measurement of crank shaft

**LCD & PDP**
*<Glass-edge measurement>*
- Glass alignment for the FPD industry

**Semiconductor**
*<Insertion-amount measurement>*
- Notch position detection of glass wafer

**Electronic components**
*<Lead-pitch and diameter measurement>*
- Width and spacing inspection of leadframe
Longer, but Easy-to-use

**New Concept**

"Smart Recipe"

Using the PC software 'Smart-monitor GT', set up is easy with simply clicking the icons. This is OMRON's Smart Recipe methodology.

**Strong support tool**

The measurement data is gathered in the PCs in real time so it is easy to ascertain and analyse the current conditions at any time.

- **Grasp the data trend and prevent defective parts**
  - The trend of the measurement data and sudden change can be checked in the time-dependent graph, so that the appropriate action can be taken before defective goods are produced.

- **Measurement result can be logged at appropriate times**
  - The logged data can be sent to Excel. It is useful for traceability management and for preparing quality assurance reports.
**3-way optical axis adjustment**

Three optical axis adjustment functions are integrated for the industry’s longest measurement. This function provides the optimal adjustment when the sensor head is installed on-site.

**With the sensor-head**

LED on the light-receiving device is lit up to indicate when the light axis is matched.

**With the controller**

The CCD light reception balance is displayed in the upper display and the amount of light received can be confirmed with numerical values underneath.

**With the PC**

The direction of the sensor head’s adjustment is graphically displayed. The adjustment conditions can be confirmed through the shapes of the light reception waveforms.

**First in the industry** Patent pending

**Longest in the industry**

**30-m cable extension**

The emitter and receiver do not need to be connected with each other. Each cable can be extended up to 30 m. It is perfectly suited for installation into large-scale production line.
## Ordering Information

### Sensor

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Optical system</th>
<th>Measuring width</th>
<th>Sensing distance</th>
<th>Resolution</th>
<th>Output type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate type</td>
<td>Through-beam</td>
<td>28mm</td>
<td>0 to 500mm</td>
<td>10µm</td>
<td>NPN</td>
<td>ZX-GT28S11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40mm</td>
<td></td>
<td></td>
<td>PNP</td>
<td>ZX-GT28S41</td>
</tr>
<tr>
<td>Integrated type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NPN</td>
<td>ZX-GT2840S11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PNP</td>
<td>ZX-GT2840S41</td>
</tr>
</tbody>
</table>

### Controller

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Power supply</th>
<th>Output type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DC</td>
<td>NPN</td>
<td>ZX-GTC11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PNP</td>
<td>ZX-GTC41</td>
</tr>
</tbody>
</table>

### Accessories (Order Separately)

#### Set of Interface Unit and Setup software PCs

<table>
<thead>
<tr>
<th>Output type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPN</td>
<td>ZX-GIF11A</td>
</tr>
<tr>
<td>PNP</td>
<td>ZX-GIF41A</td>
</tr>
</tbody>
</table>

#### Interface Unit (RS-232C/Binary output)

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Power supply</th>
<th>Output type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DC</td>
<td>NPN</td>
<td>ZX-GIF11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PNP</td>
<td>ZX-GIF41</td>
</tr>
</tbody>
</table>

#### Setup software PCs

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Monitor GT</td>
<td>ZX-GSW11</td>
</tr>
</tbody>
</table>

### Calculating Units

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ZX-CAL2</td>
</tr>
</tbody>
</table>

### Receiver-Controller Extension Cable

<table>
<thead>
<tr>
<th>Cable length</th>
<th>Model standard cable</th>
<th>Model flexible cable</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1m</td>
<td>ZX-XGC1A</td>
<td>ZX-XGC1R</td>
<td>1</td>
</tr>
<tr>
<td>2m</td>
<td>ZX-XGC2A</td>
<td>ZX-XGC2R</td>
<td>1</td>
</tr>
<tr>
<td>5m</td>
<td>ZX-XGC5A</td>
<td>ZX-XGC5R</td>
<td>1</td>
</tr>
<tr>
<td>8m</td>
<td>ZX-XGC8A</td>
<td>ZX-XGC8R</td>
<td>1</td>
</tr>
<tr>
<td>20m</td>
<td>ZX-XGC20A</td>
<td>ZX-XGC20R</td>
<td>1</td>
</tr>
</tbody>
</table>

Up to two extension cables can be connected. However, be sure to limit the total extension cable length between the receiver and the Controller to 30 meters (including the receiver cable).
Ordering Information

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Appearance</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate</td>
<td>nlp</td>
<td>NPN</td>
</tr>
<tr>
<td>Integrated</td>
<td>DC 28mm</td>
<td>PNP</td>
</tr>
</tbody>
</table>

Specifications

<table>
<thead>
<tr>
<th>Sensor</th>
<th>DC 28mm</th>
<th>DC 40mm</th>
<th>DC 40mm</th>
<th>DC 40mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>30 VDC 20 mA max.</td>
<td>30 VDC 20 mA max.</td>
<td>20 mA max.</td>
<td>20 mA max.</td>
</tr>
<tr>
<td>Power Supply Voltage</td>
<td>24 VDC +10%, -15% ripple (p-p) 10% max.</td>
<td>1,000 VAC, 50/60 Hz for 1 min</td>
<td>Dielectric Strength</td>
<td>20 MΩ (at 500 VDC megger)</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>3000 lx (incandescent light)</td>
<td>1000 lx (incandescent light)</td>
<td>Ambient Temperature</td>
<td>Operating: 0 to +40 C Storage: -15 to +50 C (with no icing or condensation)</td>
</tr>
<tr>
<td>Vibration Resistance (Durability)</td>
<td>10 to 150 Hz Single-amplitude: 0.75 mm for 80 min each in X, Y and Z directions</td>
<td>Shock Resistance (Durability)</td>
<td>IEC60529 IP40</td>
<td></td>
</tr>
<tr>
<td>Cable Length</td>
<td>2m</td>
<td>2m</td>
<td>2m</td>
<td>2m</td>
</tr>
<tr>
<td>Weight (packed state)</td>
<td>Approx.550g</td>
<td>Approx.570g</td>
<td>Approx.570g</td>
<td>Approx.550g</td>
</tr>
</tbody>
</table>

Accessories

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser OFF input/sync input</td>
<td>Laser deterioration alarm output</td>
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</table>

The amount of fluctuation (–3σ) in the analog output when the distance between the emitter and receiver is 100 mm and a ZX-GTC__ is connected *4:

Change in the light cutoff value on one side when the distance between the emitter and receiver is 100 mm and the light is half-cutoff at a distance of 50 mm from the receiver *4:

Standard mode (NORM) used

ON: Short-circuited with power supply voltage or power supply voltage -1.5 V max.
OFF: Open (leakage current: 0.1 mA max.)
The response time in the high-speed mode (FAST) for the IC lead pitch and to the specified measurement cycle time.

In other measurement modes, a moving average is used. The first measurement cycle time can be calculated as follows: Specified measurement cycle time x (Number of samples/Total number of measurements).

ZX-GIF_1A: Setup Software (CD-ROM), 2 clamps, Instruction Sheet

ZX-GIF_1: Approx. 330g

ZX-GIF41/-GIF41A: Case: PBT (polybutylene terephthalate), Cover: Polycarbonate

ZX-GTC11 ZX-GTC41: Cable length

IEC 60529 IP20

Vibration resistance (durability)

Operating and storage: 35 to 85% (with no condensation)

Operating: 0 to +50°C Storage: -15 to +60°C (with no icing or condensation)

20 M

Dielectric strength

Power supply voltage

Supplied from Controller (power consumption: 60 mA max.)

12-bit binary output

Communications port

RS-232C (9-pin D-sub connector)

RS-232C communications error (red), binary output (orange)

Compatible Controller

ZX-CAL2 ZX-XGC_A/-XGC_R

Separate type: ZX-GT28S11/-GT28S41

5 mm dia. (7/0.18 mm dia.)

4-core, standard length 2 m

Connector

Laser alarm indicator (red)

Laser ON indicator (green)

Optical axis 2-3.2 mm dia. holes

Five, 6.5 mm dia. countersunk holes, depth 5

Mounting hole dimensions

ConnectorVoltage/Current switch

4.5 49

Connector: 5 mm dia. (7/0.127 mm dia.)

Round vinyl insulated cable

Round vinyl insulated cable

5 mm dia. (7/0.18 mm dia.)

Round vinyl insulated cable

6.2 mm dia. (7/0.127 mm dia.)

Round vinyl insulated cable

336

6.2 mm dia. (7/0.127 mm dia.)

Round vinyl insulated cable

15-pole connector (male) 15-pole connector (female)

Round vinyl insulated cable

Mounting hole dimensions

Note 1:

Flexible cable: 6.1 mm dia.

Note 2:

ZX-XGC20A/R: 8M

ZX-XGC2A/R: 2M

Flexible cable: 6.1 mm dia.

Note 2:

ZX-XGC8A/R: 8M

ZX-XGC4A/R: 4M

Flexible cable: 6.1 mm dia.

Note 2:

ZX-XGC16A/R: 16M

ZX-XGC8A/R: 8M

Flexible cable: 6.1 mm dia.
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