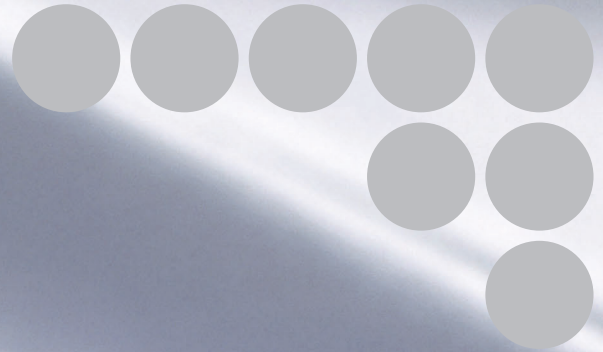


# OMRON

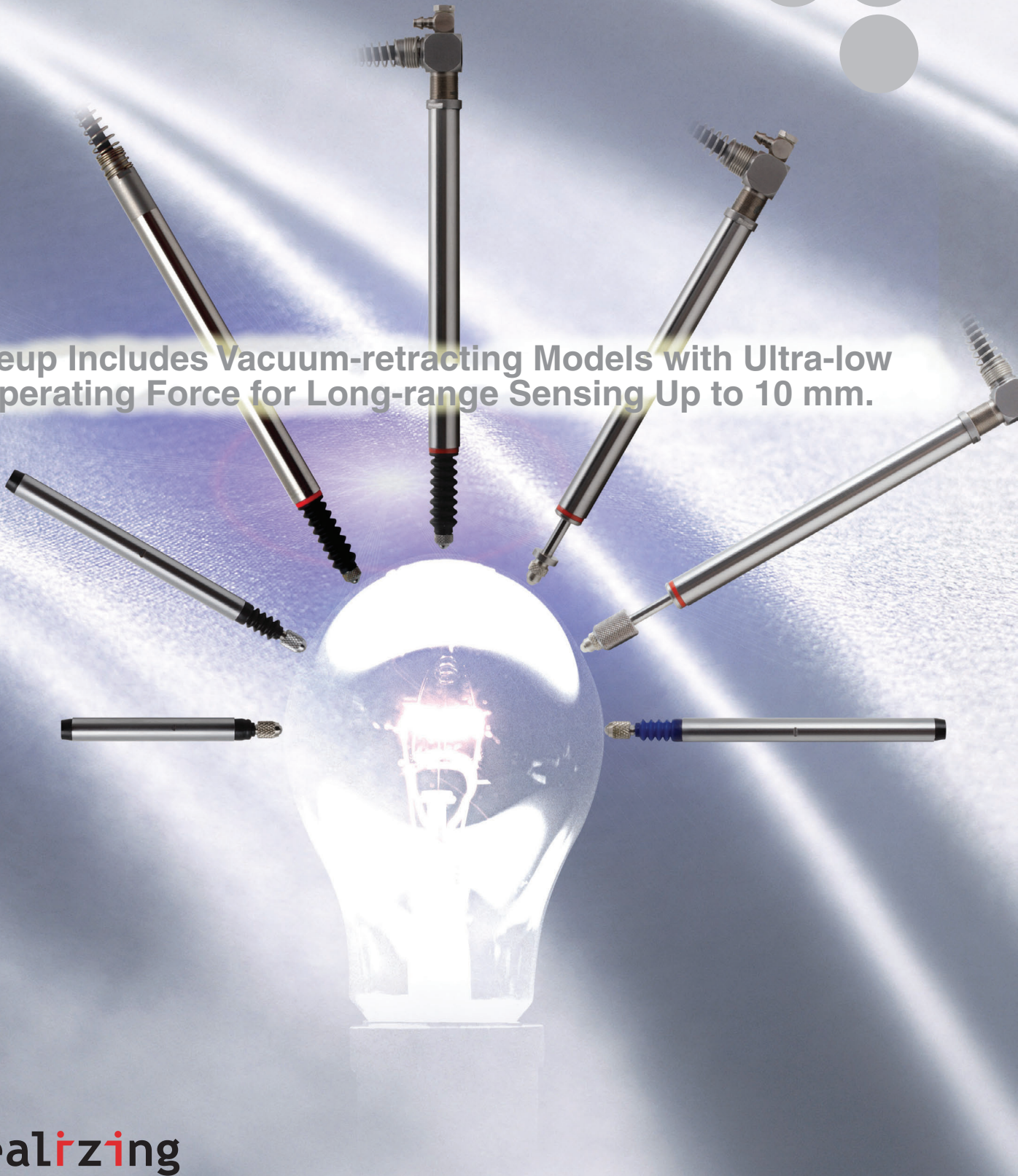
## Smart Sensors

High-Precision Contact Type

### ZX-T Series



Lineup Includes Vacuum-retracting Models with Ultra-low Operating Force for Long-range Sensing Up to 10 mm.

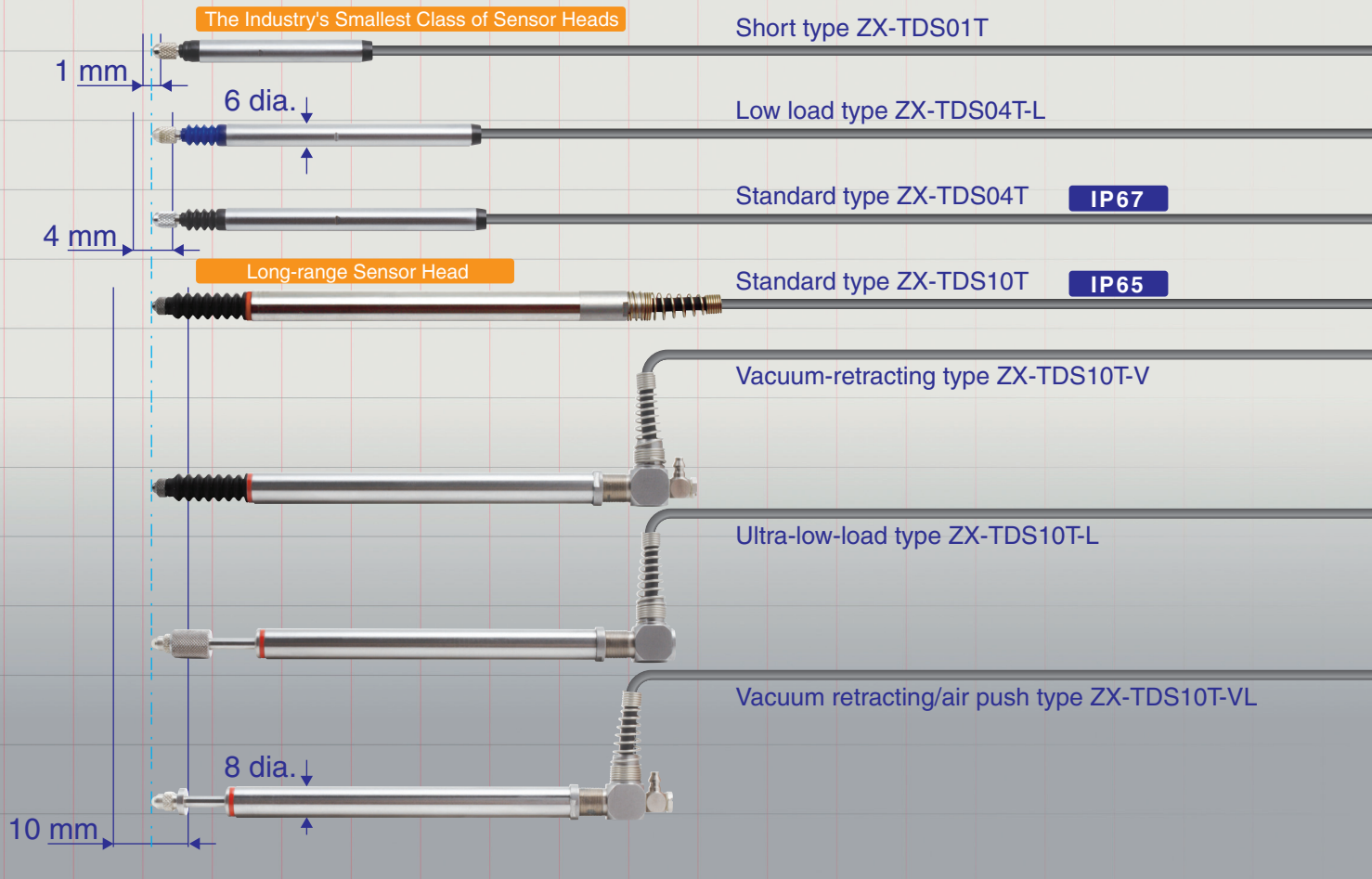


realizing



# Powerful Support for Multi-point and

## Variations



## Smart Sensors

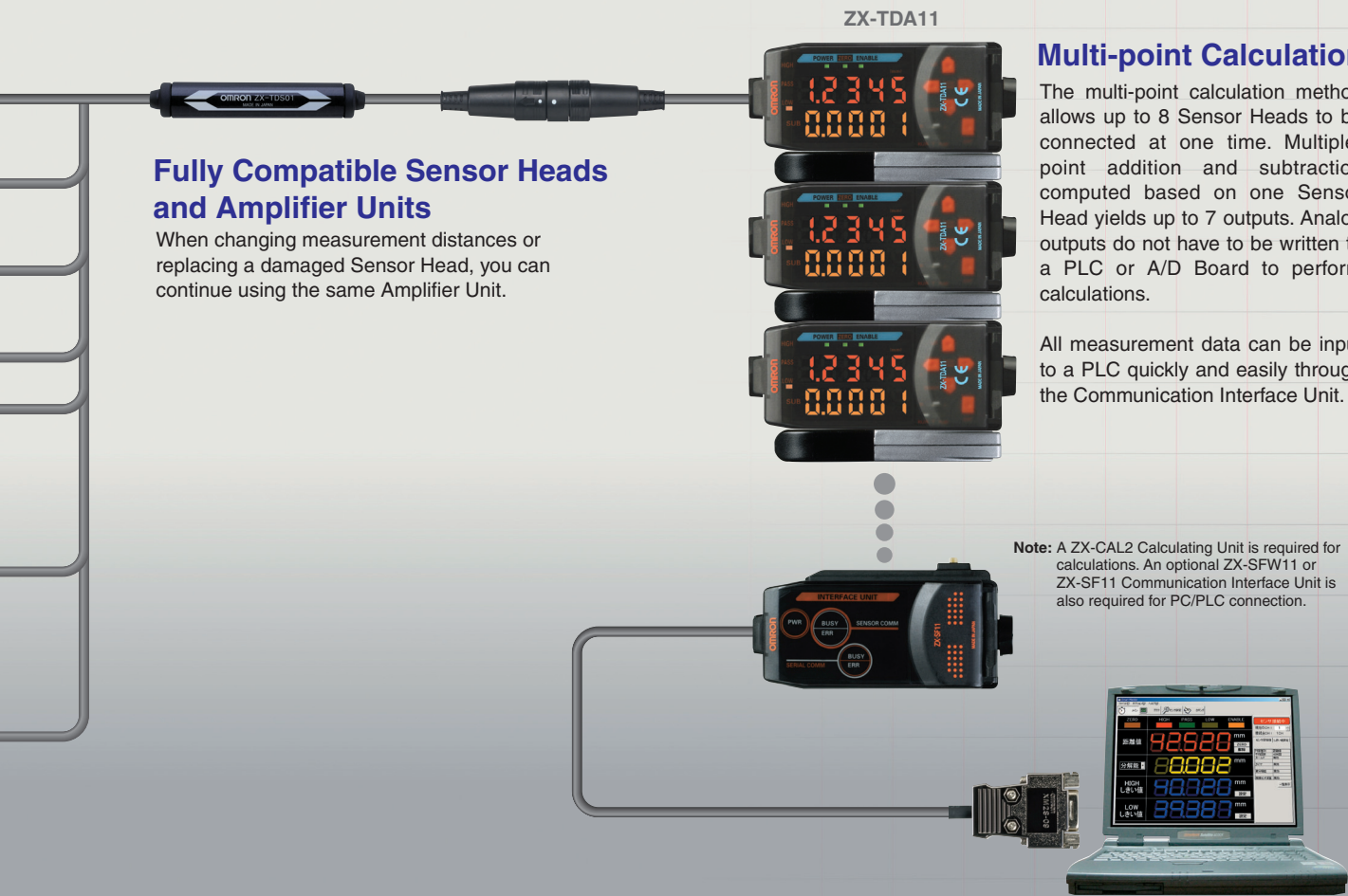
High-Precision Contact Type

### ZX-T Series

The ZX-T Series offers a host of remarkable functions inside a compact body. The complete lineup of Sensor Heads provides various sensing capabilities to handle an even wider range of applications. This is the platform for OMRON's sensing technology.



# Inline Measurement



## Fully Compatible Sensor Heads and Amplifier Units

When changing measurement distances or replacing a damaged Sensor Head, you can continue using the same Amplifier Unit.

## Multi-point Calculation

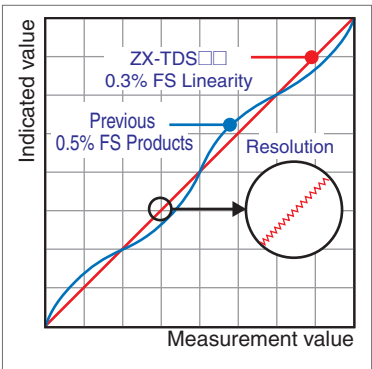
The multi-point calculation method allows up to 8 Sensor Heads to be connected at one time. Multiple-point addition and subtraction computed based on one Sensor Head yields up to 7 outputs. Analog outputs do not have to be written to a PLC or A/D Board to perform calculations.

All measurement data can be input to a PLC quickly and easily through the Communication Interface Unit.

**Note:** A ZX-CAL2 Calculating Unit is required for calculations. An optional ZX-SFW11 or ZX-SF11 Communication Interface Unit is also required for PC/PLC connection.

# The Smart Answer to High-precision Measuring Applications that Were Difficult with Non-contact Types

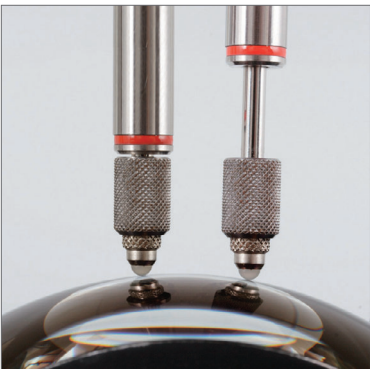
## Industry's Top Class Resolution



The long-stroke ZX-TDS04T (4-mm measurement range) achieves high-precision measurement with the industry's top class of resolution (0.1 μm) and linearity of 0.3 FS max.

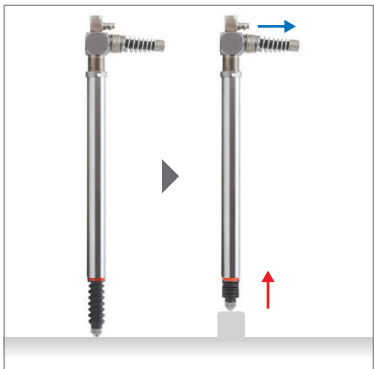
- ZX-TDS10T-□□ long-range type  
Resolution: 0.4 mm, Linearity: ±0.5% FS

## Ultra-low-load Type (0.065 N)



Since micropressure contact is achieved using the Actuator's own weight, these Sensor Heads are ideal for taking measurements where non-contact Sensors cannot be used, such as on transparent and glossy products or products that are easily scratched or warped

## Automate Measurements with Vacuum-retracting Type (Air Lifter Type).



Switching from dial gauges to automatic inspection is a snap with the ZX-TDS10T-V. Meanwhile, the ZX-TDS10T-VL can control air push models in addition to air lift models so that contact force can now be controlled externally.

# Smart Sensors

High-Precision Contact Type

## ZX-T Series

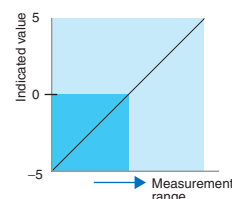
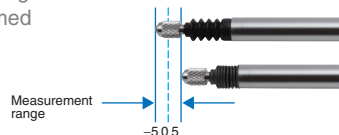
# Combines Reliability and Innovations in Advanced Technology with Remarkable Ease of Use

### No Need to Calculate or Reset the Origin

The ZX-T uses a differential transformer method, so there is no need to change the absolute origin position.

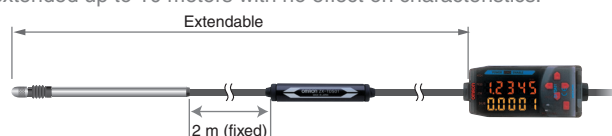
As a result, master adjustment and origin calculation do not have to be performed each time operation is started.

There is also no need for complex zero point return operations have been eliminated.



### Auto Scale Function

The Amplifier automatically displays the measurement distance when it is connected to the Sensor Head. The cable also be extended up to 10 meters with no effect on characteristics.



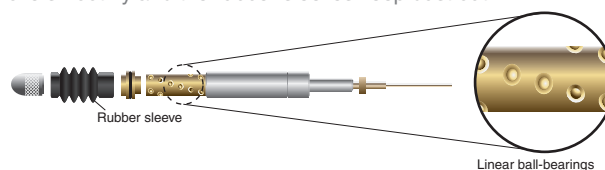
### Warming-up Display

After the power is turned ON, this display indicates when the Sensor Head has warmed up to its optimum measurement condition.



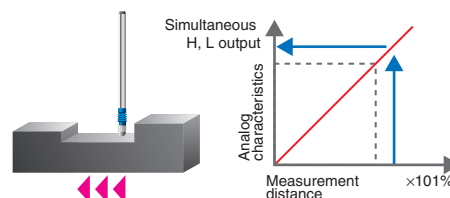
### Long Product Life (Mechanical Durability: 10,000,000 Operations Min.)

The ZX-TDS01T Sensor Head (1-mm measurement range) and the ZX-TDS04T Sensor Head (4-mm measurement range) have long service lives thanks to the unique linear ball-bearing structure shown below. Sliding parts move smoothly and the rubber sleeves keep dust out.



### Pressing Force Alarm

Problems caused by excessive pressing force in inappropriate measurement situations can be detected in advance and a signal can be output to prevent malfunction. For example, preventive measures can be taken with a PLC, such as automatically stopping the measurement.



### Actuators (1-mm and 4-mm measurement range types only: ZX-TDS01T and ZX-TDS04T)

Select the most appropriate Actuator for your application.



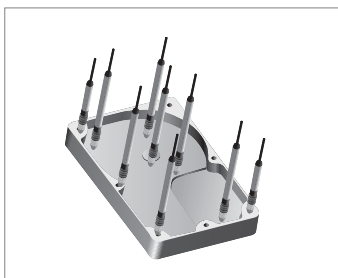


## A Host of Applications



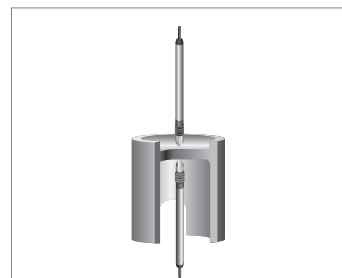
### Measuring Parts Height during Clock Assembly

The Sensor Head can be placed in direct contact with the measurement object, so height differences can be confirmed even in extremely small parts.



### Measuring Warp in HDD Chassis

Measurement time can be greatly reduced by using the multi-point measurement function.



### Measuring Processing Dimensions in Engine Parts

Because the ZX-TDS01T and ZX-TDS04T conform to IP67, they can be reliably used in applications that are subject to water splashing.



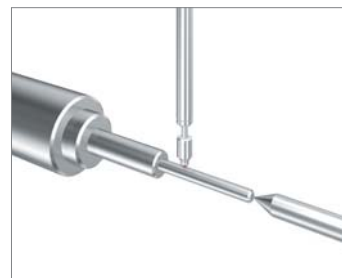
### Insulated Sensor Measurement

The relatively low measurement power allows multi-points to be simultaneously measured for small or thin parts. Because the Sensor Heads are insulated, there is no risk of the measurement object being electrically damaged by leak current. (ZX-TDS01T/04T only)



### Glass Warping Measurement

Sensor Heads with a low measurement force ensure that high-precision measurements can be taken without damaging products.



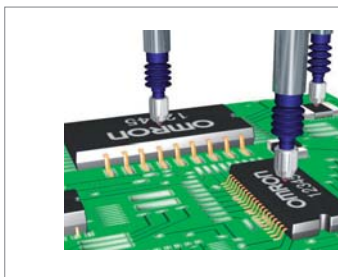
### Precise Product Measurement

Vacuum-retracting Sensor Heads enable post-processing measurements to be automated.



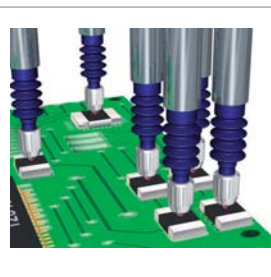
### Small Parts Measurement

Multi-contact Sensor Heads can be used to precisely measure all the dimensions of small parts at the same time.



### Electronic Component Measurement

Multiple thin, lightweight Sensor Heads can be arranged to measure the heights of several densely mounted components in different locations all at one time.





# Ordering Information


## Sensors

### Sensor Heads

| Size   | Type                   | Sensing distance | Resolution (See note.) | Model        | Screw section |
|--------|------------------------|------------------|------------------------|--------------|---------------|
| 6 dia. | Short type             | 1 mm             | 0.1 μm                 | ZX-TDS01T    | Male thread   |
|        | Standard type          | 4 mm             |                        | ZX-TDS04T    |               |
|        | Low-load type          |                  |                        | ZX-TDS04T-L  |               |
| 8 dia. | Standard type          | 10 mm            | 0.4 μm                 | ZX-TDS10T    | Female thread |
|        | Ultra-low-load Type    |                  |                        | ZX-TDS10T-L  |               |
|        | Air Lift Type          |                  |                        | ZX-TDS10T-V  |               |
|        | Air Lift/Air Push Type |                  |                        | ZX-TDS10T-VL |               |


**Note:** Refer to the resolution specified in Ratings and Specifications for the conditions required to achieve this resolution.

## Amplifier Units



| Appearance  | Power supply | Output type | Model    |
|---|--------------|-------------|----------|
|  | DC           | NPN         | ZX-TDA11 |
|   |              | PNP         | ZX-TDA41 |

## Accessories (Order Separately)


### Calculating Unit

| Appearance   | Model   |
|--|---------|
|  | ZX-CAL2 |

### Preamplifier Mounting Brackets

| Appearance  | Model   | Remarks                      |
|---|---------|------------------------------|
|   | ZX-XBT1 | Attached to each Sensor Head |
|  | ZX-XBT2 | For DIN Rail mounting        |

### ZX-series Communication Interface Unit

| Appearance  | Name                                   | Model   |
|---|--|---------|
|  | ZX-series Communication Interface Unit | ZX-SF11 |

### Cables with Connectors on Both Ends (for Extension)

| Cable length | Model   | Qty |
|--------------|---------|-----|
| 1 m          | ZX-XC1A | 1   |
| 4 m          | ZX-XC4A |     |
| 8 m          | ZX-XC8A |     |

# Ratings and Specifications

## Sensor Heads (Thin and Lightweight Type)

| Item  |  | Model       | ZX-TDS01T  | ZX-TDS04T    | ZX-TDS04T-L    |
|---|--|-------------|--|--------------|----------------|
| Measurement range                           |  |             | 1 mm   | 4 mm         |                |
| Maximum actuator travel distance            |  |             | Approx. 1.5 mm   | Approx. 5 mm |                |
| Resolution (See note 1.)                    |  |             | 0.1 μm   |              |                |
| Linearity (See note 2.)                     |  |             | ±0.5% FS   |              |                |
| Operating force (See note 3.)               |  |             | Approx. 0.7 N  |              | Approx. 0.25 N |
| Degree of protection (Sensor Head)          |  |             | IP67 (IEC 60529)   |              | IP54           |
| Mechanical durability                       |  |             | 10,000,000 operations min.   |              |                |
| Ambient temperature                         |  |             | Operating: 0 to 50°C (with no icing or condensation), Storage: −15 to 60°C (with no icing or condensation) |              |                |
| Ambient humidity                            |  |             | Operating and storage: 35% to 85% (with no icing or condensation)  |              |                |
| Temperature characteristic<br>(See note 4.) | Sensor Head                            | 0.03% FS/°C |  | 0.01% FS/°C  |                |
|   | Preamplifier                           | 0.01% FS/°C |  |              |                |
| Weight (packed state)                       |  |             | Approx. 100 g  |              |                |
| Materials                                   | Sensor Head                            |             | Stainless steel  |              |                |
|   | Preamplifier                           |             | Polycarbonate  |              |                |
|   | Actuator contact section (See note 5.) |             | Steel  |              |                |
| Accessories                                 |  |             | Instruction manual, Preamplifier Mounting Brackets (ZX-XBT1)   |              |                |

Note: 1. The resolution is given as the minimum value that can be read when a ZX-TDA11/41 Amplifier Unit is connected. This value is taken 15 minutes after turning ON the power with the average number of operations set to 256.

2. The linearity is given as the error in an ideal straight line displacement output.

3. These figures are representative values that apply for the measurement center when the provided actuator is used, with the actuator fixed to face downwards.

If the actuator is fixed to face horizontally or upwards, the operating force will be reduced. Also, if an actuator other than the standard one is used, the operating force will vary with the weight of the actuator itself.

4. These figures are representative values that apply for the mid-point of the measurement range.

5. For a Standard Actuator



# Ratings and Specifications

## Sensor Heads (Long-range Type)

| Model  |  | ZX-TDS10T   | ZX-TDS10T-V          | ZX-TDS10T-L     | ZX-TDS10T-VL        |
|--|--|---|----------------------|-----------------|---------------------|
| Vacuum retract (VR) and air push (AP) compatible |  | No  | VR                   | No              | VR/AP               |
| Measurement range                                |  | 10 mm   |                      |                 |                     |
| Maximum actuator travel distance                 |  | 10.5 mm   |                      |                 |                     |
| Resolution (See notes 1 and 5.)                  |  | 0.4 μm  |                      |                 |                     |
| Linearity (See notes 2 and 5.)                   |  | ±0.5% FS  |                      |                 |                     |
| Operating force (See note 3.)                    |  | Approx. 0.7 N   | Approx. 0.6 N        | Approx. 0.065 N | 0.09 to 1.41N       |
| Air pressure                                     | Vacuum retracting                      | ---   | -0.55 to -0.70 (bar) | ---             | -0.22 to -0.5 (bar) |
|  | Air push                               |   | ---                  |                 | 0.125 to 2 (bar)    |
| Degree of protection                             | Sensor Head                            | IP65  |                      | IP50            |                     |
|  | Preamplifier                           | IP40  |                      |                 |                     |
| Mechanical durability                            |  | 10,000,000 operations min.  |                      |                 |                     |
| Ambient temperature                              |  | Operating: 0 to 50°C (with no icing or condensation), Storage: -10 to 60°C (with no icing or condensation)      |                      |                 |                     |
| Ambient humidity                                 |  | Operating and storage: 35% to 85% (with no icing or condensation)   |                      |                 |                     |
| Temperature characteristic (See note 4.)         | Sensor Head                            | ±0.01% FS/°C  |                      |                 |                     |
|  | Preamplifier                           | ±0.01% FS/°C  |                      |                 |                     |
| Vibration resistance                             |  | 0.35-mm single amplitude at 10 to 55 Hz for 50 min each in the X, Y, and Z directions                           |                      |                 |                     |
| Shock resistance                                 |  | 150 m/S <sup>2</sup> 3 times each in 6 directions (up/down, left/right, and forward/backward)                   |                      |                 |                     |
| Connection method                                |  | Prewired connector (2 m from the Sensor Head to the Preamplifier, 0.2 m from the Preamplifier to the connector) |                      |                 |                     |
| Weight (packed state)                            |  | Approx. 100 g   |                      |                 |                     |
| Materials  | Sensor Head                            | Stainless steel   |                      |                 |                     |
|  | Rubber sleeve                          | Viton   |                      | None            |                     |
|  | Preamplifier                           | Polycarbonate   |                      |                 |                     |
|  | Mounting Brackets                      | Stainless steel   |                      | Polyamide       |                     |
|  | Actuator contact section (See note 7.) | Super steel   |                      |                 |                     |
| Accessories                                      |  | Instruction manual, Preamplifier Mounting Brackets (ZX-XBT1), Right-angle Adapter (See note 6.)                 |                      |                 |                     |

- Note: 1. The resolution indicates the variation ( $\pm 3 \sigma$ ) in the linear output (voltage output) when a ZX-TDA11/41 Amplifier Unit is connected. This value is taken 30 minutes after turning ON the power with the average number of operations set to 1,024. The minimum value that can be read is 1  $\mu$ m.
2. The linearity is given as the error in an ideal straight line displacement output.
3. These figures are representative values that apply for the mid-point of the measurement range when the Actuator provided is secured facing downward.
- ZX-TDS10T and ZX-TDS10T-V ZX-TDS10T-VL: The operating force will be reduced if the Actuator is secured facing horizontally or upward.
  - ZX-TDS10T-L: The actuator can be installed only facing downward.
4. These figures are representative values that apply for the mid-point of the measurement range.
5. These values were measured at an ambient temperature of 23°C.
6. The ZX-TDS10□ comes with a Right-angle Adapter.
7. For a Standard Actuator

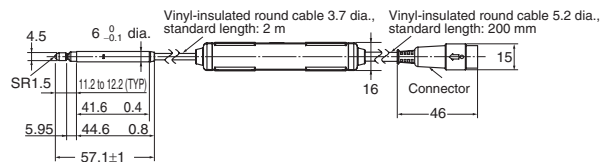
## Amplifier Units

| Item   | Model | ZX-TDA11   | ZX-TDA41   |
|--|-------|--|--|
| Measurement period (See note 1.)   |       | 1 ms   |  |
| Possible average count settings  |       | 1, 16, 32, 64, 128, 256, 512, or 1,024   |  |
| Linear output (See note 2.)  |       | 4 to 20 mA/FS, Max. load resistance: 300 $\Omega$ $\pm 4$ V ( $\pm 5$ V, 1 to 5 V (See note 3.)), Output impedance: 100 $\Omega$   |  |
| Judgement outputs (3 outputs: HIGH/PASS/LOW)                             |       | NPN open-collector outputs, 30 VDC, 30 mA max.<br>Residual voltage: 1.2 V max.   | PNP open-collector outputs, 30 VDC, 30 mA max.<br>Residual voltage: 2 V max. |
| Zero reset input, timing input, reset input, judgement output hold input |       | ON: Short-circuited with 0-V terminal or 1.5 V<br>OFF: Open (leakage current: 0.1 mA max.)   |  |
| Function   |       | <ul style="list-style-type: none"> <li>- Measurement value display - Present value/set value/output value display</li> <li>- Display reverse - ECO mode - Number of display digit changes</li> <li>- Sample hold - Peak hold - Bottom hold - Peak-to-peak hold</li> <li>- Self-peak hold - Self-bottom hold - Zero reset</li> <li>- Initial reset - Direct threshold value setting - Position teaching</li> <li>- Hysteresis width setting - Timing inputs - Reset input</li> <li>- Judgement output hold input - Monitor focus - (A-B) calculations (See note 4.)</li> <li>- (A+B) calculations (See note 4.) - Sensor disconnection detection - Zero reset memory</li> <li>- Function lock - Non-measurement setting - Clamp value setting</li> <li>- Scale inversion - Zero reset indicator - Span adjustment</li> <li>- Warming-up display - Pressing force alarm</li> </ul> |  |
| Indicators   |       | Operation indicators: High (orange), pass (green), low (yellow), 7-segment main digital display (red), 7-segment sub-digital display (yellow), power ON (green), zero reset (green), enable (green)  |  |
| Power supply voltage   |       | 12 to 24 VDC $\pm 10\%$ , Ripple (p-p): 10% max.   |  |
| Current consumption  |       | 140 mA max. (with Sensor connected)  |  |
| Ambient temperature  |       | Operating and storage: 0 to 50°C (with no icing or condensation)   |  |
| Temperature characteristic   |       | 0.03% FS/°C  |  |
| Connection method  |       | Prewired (standard cable length: 2 m)  |  |
| Weight (packed state)  |       | Approx. 350 g  |  |
| Materials  |       | Case: PBT (polybutylene terephthalate), Cover: Polycarbonate   |  |

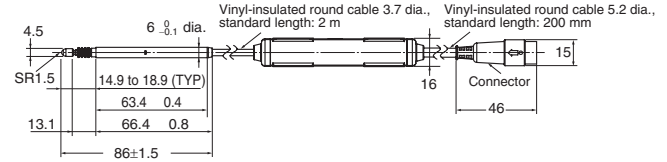
- Note: 1. The response time for the first linear output or judgment output is calculated as follows (with fixed sensitivity): Measurement period  $\times$  (Average count setting + 1).  
The response time for the second and later outputs is the measurement period specified in the table.
2. The output can be switched between a current output and voltage output using a switch on the base of the Amplifier Unit.
3. Setting is possible via the monitor focus function.
4. A Calculating Unit (ZX-CAL2) is required.

Sensors

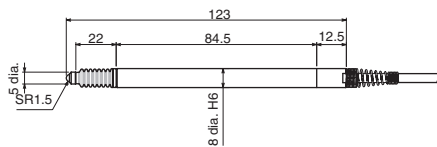
ZX-TDS01T



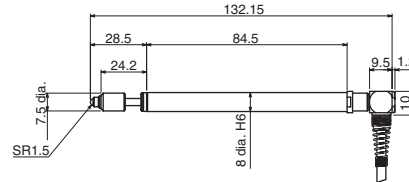
ZX-TDS04T/04T-L



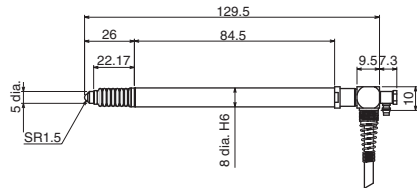
ZX-TDS10T



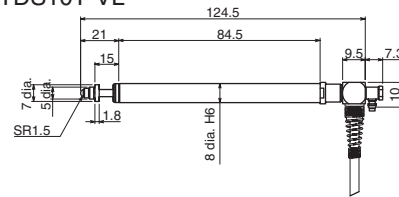
ZX-TDS10T-L



ZX-TDS10T-V



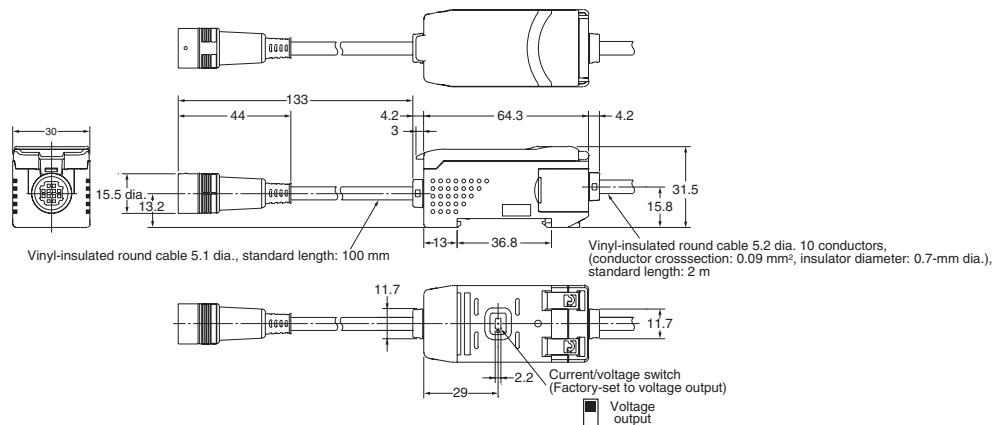
ZX-TDS10T-VL



Amplifier Unit

ZX-TDA11

ZX-TDA41



This document provides information mainly for selecting suitable models. Please read the *Operation Manual* (E346) carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.

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specifications are subject to change without notice.

**CSM\_1\_2\_0811**  
Cat. No. E344-E1





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Электрон  
Связь**

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