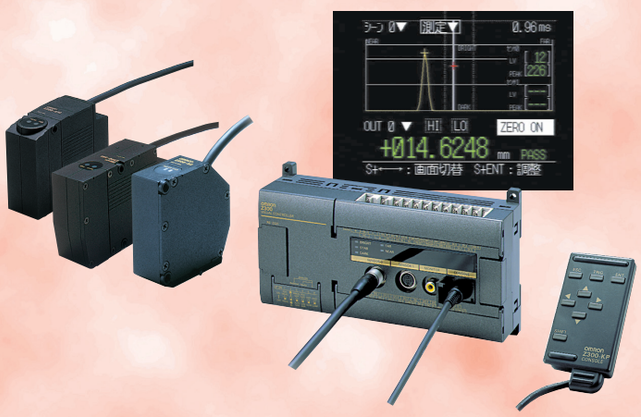
High-precision visual displacement meter

Z300

Employs a 2-dimensional CCD. A new type of displacement meter that takes advantage of image processing technology.

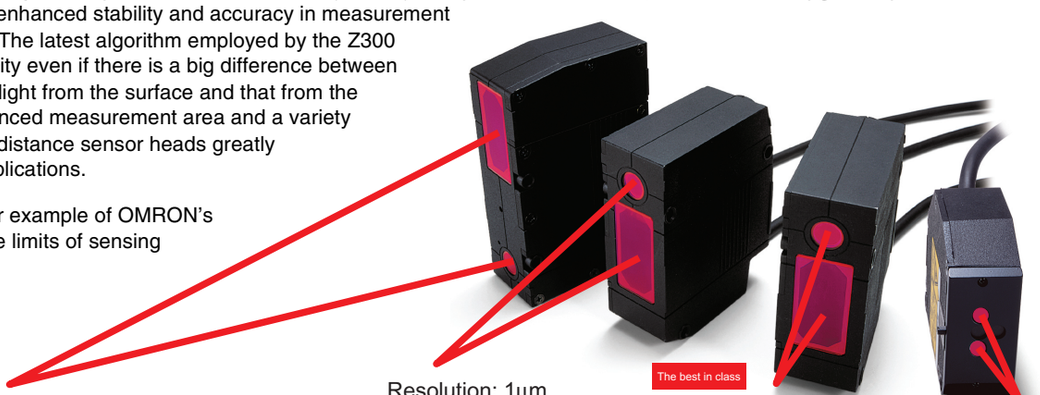


Features

Stable measurement of a transparent object or a glass.
A wide variety of sensor heads for enhanced detection possibilities.

OMRON's Z300 makes the notion that displacement sensors cannot perform stable measurement of a transparent object or a glass a thing of the past. The newly-developed 2-dimensional CCD (S-CCD) incorporated in the Z300, combined with upgraded performance of the controller, provides enhanced stability and accuracy in measurement of a transparent object. The latest algorithm employed by the Z300 enables optimal sensitivity even if there is a big difference between the amount of reflected light from the surface and that from the bottom of a glass. Enhanced measurement area and a variety of high-resolution, long-distance sensor heads greatly expand the range of applications.

The Z300 is just another example of OMRON's ongoing challenge to the limits of sensing possibilities.

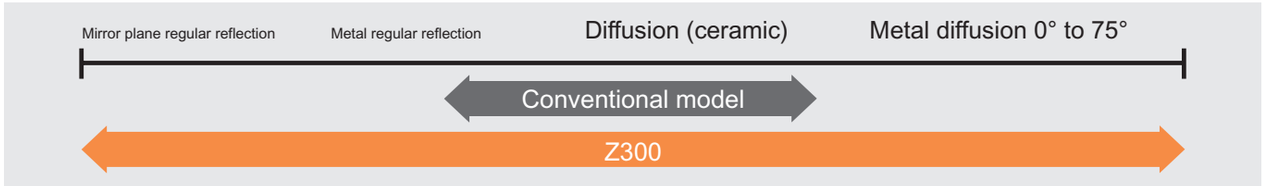


Resolution: 8μm (at 250 mm)
Super long range model
600 ± 350mm Super long range

Resolution: 1μm
Long range model
100 ± 20 mm

The best in class
Resolution: 0.4μm
High precision model
50 ± 5 mm

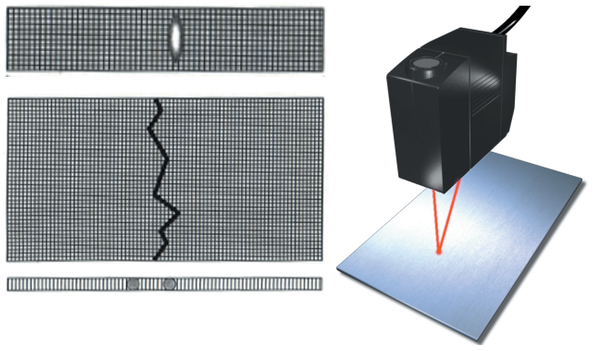
Resolution: 0.04μm
High precision model
20 ± 1 mm



The newly developed 2-dimensional CCD (S-CCD) achieves superb sensing performance.

A 2-dimensional CCD enables stable and high-speed measurement.

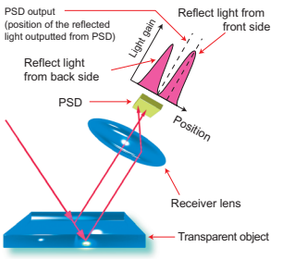
With previous 1-dimensional CCDs, flutter in the CCD would appear in the output. To stabilize the output value, it was necessary to add a signal averaging circuit, and this slowed the response time. The S-CCD with a 2-dimensional CCD divides the measurement point into 60 lines and measures each. Even if the surface of the work causes flutter in the CCD, the averaging effect for each pixel enables stable detection and high-speed processing.



There is nothing like a CCD for measuring transparent objects.

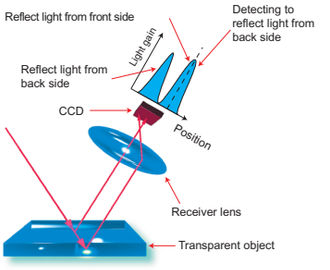
X PSD scheme

When a diffuse reflection type was used, measurement was not possible because there was insufficient diffuse reflected light. When a regular reflection type was used, reflected light from the rear side or background caused the PSD to incorrectly detect the position of the reflected light, preventing accurate measurement of the surface displacement.



O CCD scheme

In the CCD's regular reflection mode, it is possible to extract only the light from the surface. There are no effects from the rear side or background, and thus it is possible to accurately measure the displacement of a transparent body.



View the measurement state. Monitoring as you desire...

Employs an easy-viewing color display system (when color monitor is connected). This system allows you to monitor the information you need at each stage, including test adjustment, operation, and maintenance, helping to ensure certain measurement.

Monitoring - real time

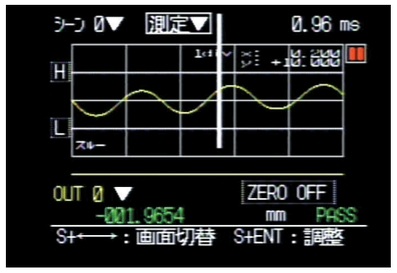
Digital monitor

Digital display enables easy viewing of the measured value. The decision is indicated in two colors as "Pass" (green) or "High/Low" (red), making it easy to discern a rejection.

Image monitor

The position of the measurement point and the intensity of the reflected light are expressed on the monitor. The operator can easily check whether optimum measurement is taking place.

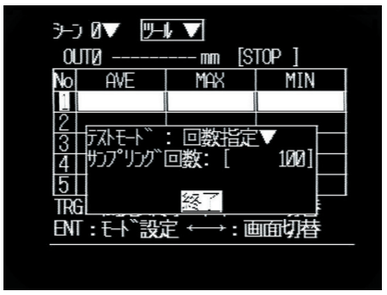
Trend monitor



Triggered monitoring of continuous measurement values over a certain time using the time system. Identify at a glance changes in measured values of a moving or rotating work and the correlation with the trigger.

Monitoring - recording and playback

Test mode

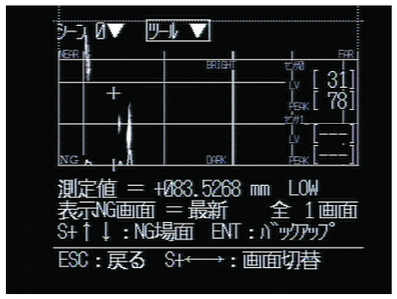


Store any amount of measured data.
Use for a work test.

Record and play back the conditions during test mode

The conditions of a test performed off-line in a different location can be saved. When installed in-line, the data can be referenced.

Record and play back the conditions when a rejection decision (High/Low) occurs.

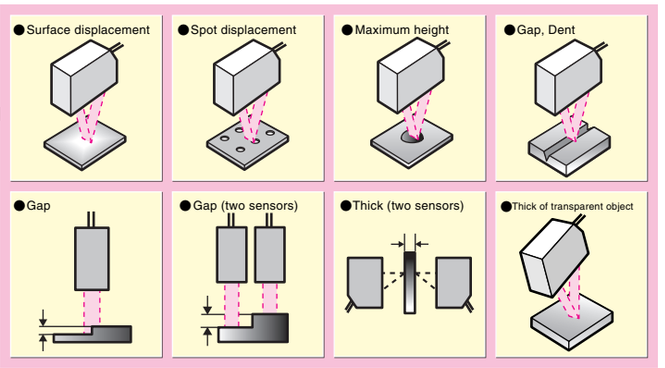


Up to 20 conditions (reflected light, measurement data, etc.) of a measurement that received a rejection decision in-line can be saved. This information can be used to analyze and troubleshoot problems in the work.

Dialogue-type menus provide strong support for programming.

Application menu

Menus allow you to set the main measuring methods with ease.
Follow the guidance of the monitor screen to set measuring conditions.



Expert menu

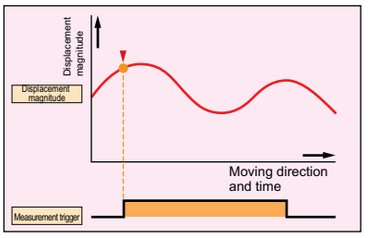
For measurement applications that cannot be handled by the Application menu, use the "Expert menu" to program detailed setting conditions.

Enhanced hold functions and freedom to set triggers widen the range of application.

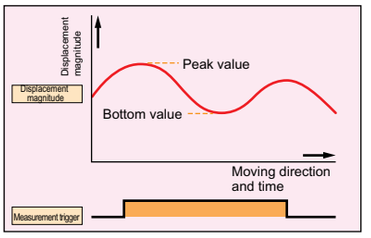
The Z300 makes it possible to implement hold functions with just the controller. Trigger (measurement timing) functions are also enhanced, with a wide range of features. Applications that were previously very difficult can now be performed with ease.

Hold function

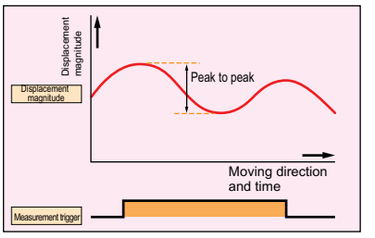
Sample hold



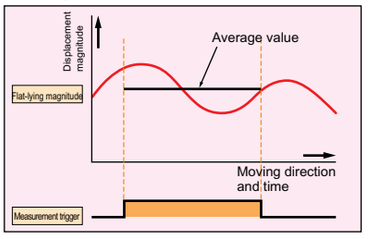
Peak hold (bottom)



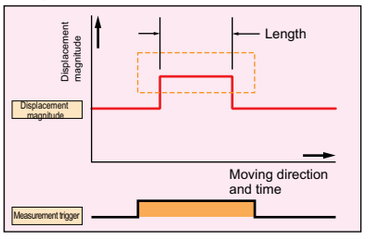
Peak to peak hold



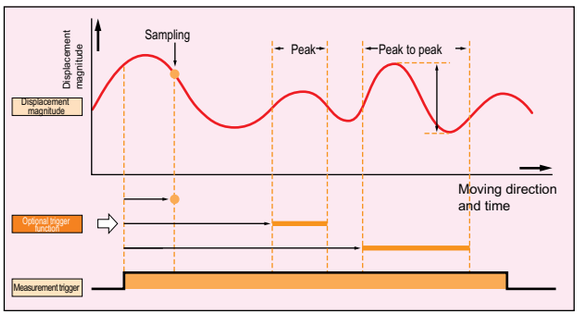
Average hold



Length hold



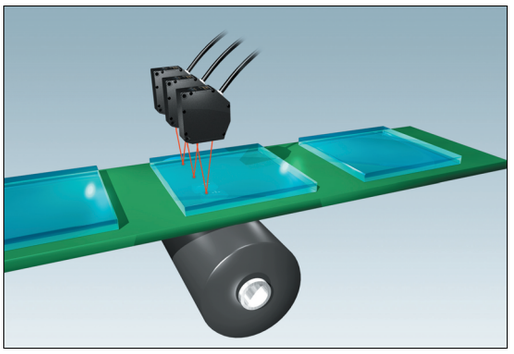
Selectable trigger function



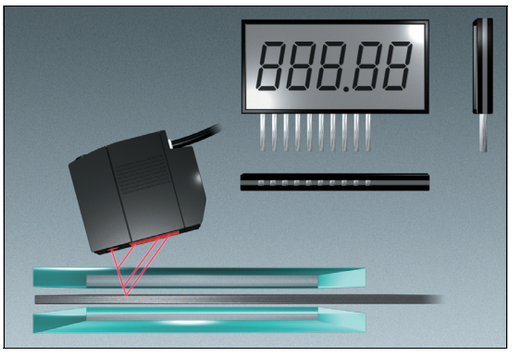
It is possible to build measurement timing arbitrarily inside a controller based on timing, such as a synchronization sensor. (It is based on the setting of delay time.) Maximum of four timings can be programmed.

Application

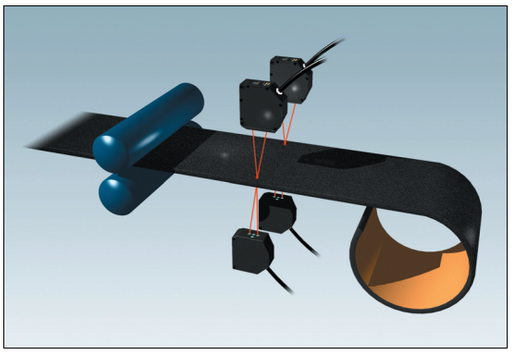
Measuring the thickness of transparent film



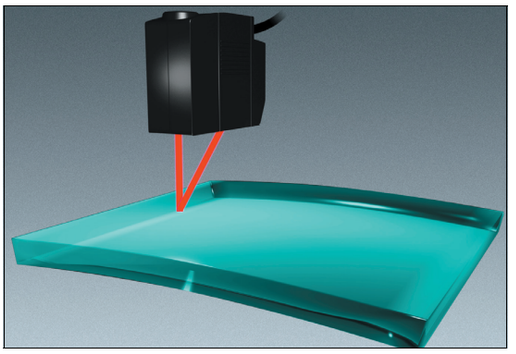
Verification of electrode position in the display module.



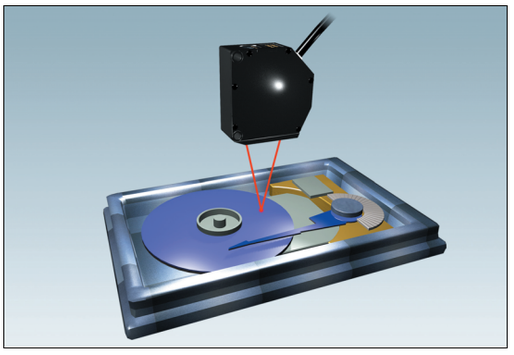
Measuring the thickness of sheet materials



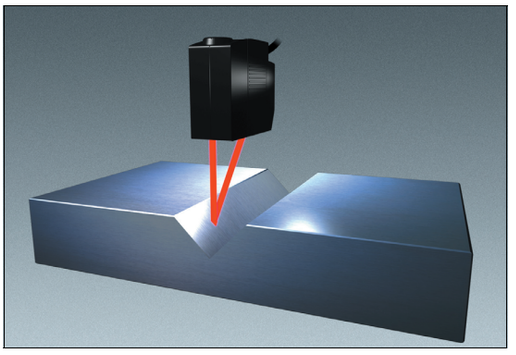
Measurement of warping in transparent plastic



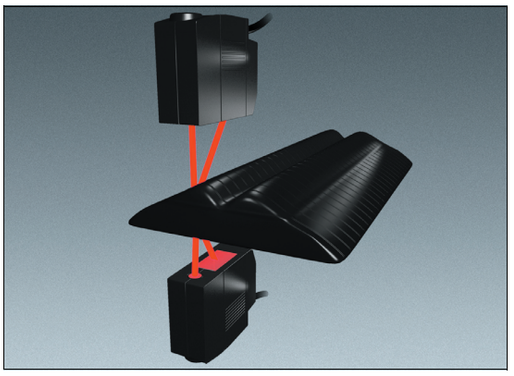
Inspecting the surface uniformity of a hard disk



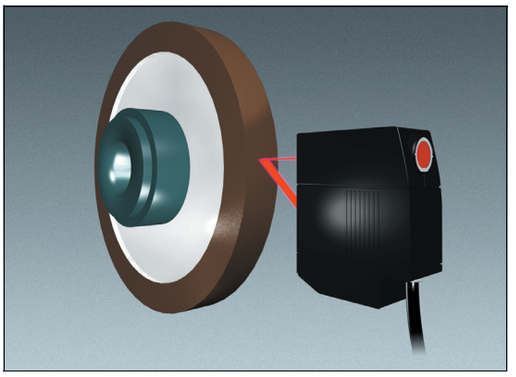
Shape measurement for welding robot control



Tire and black rubber thickness

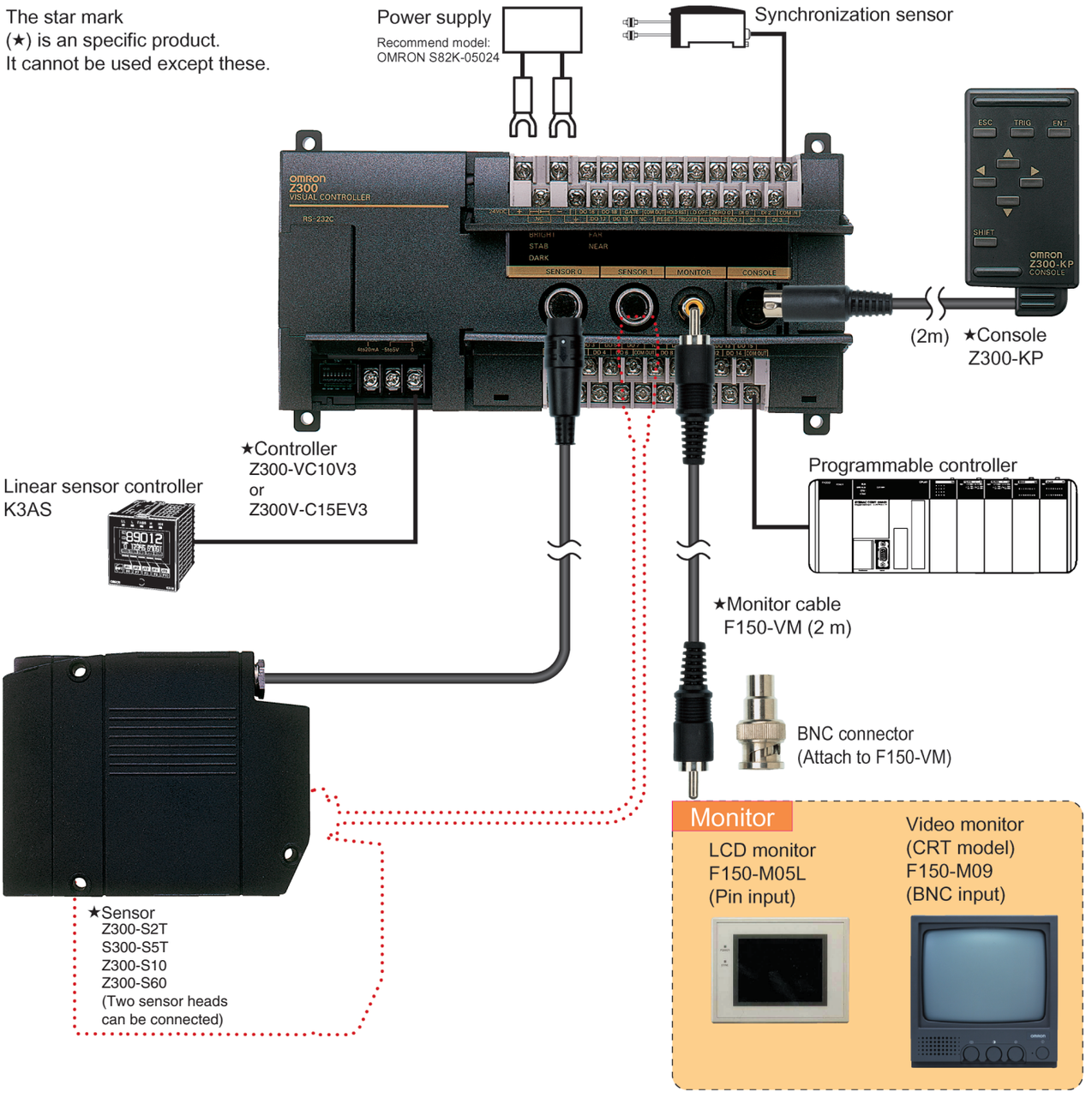


Grinding measurement of a whetstone



System configuration

The star mark
(★) is an specific product.
It cannot be used except these.

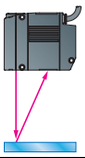
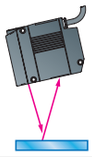
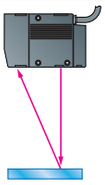


Ordering Information (Shaded models are normally stocked.)

Name Item	Model
Sensor	Z300-S2T
	Z300-S5T
	Z300-S10
	Z300-S60
Controller NPN	Z300-VC10EV3
Controller PNP	Z300-VC15EV3
Console	Z300-KP
LCD monitor	F150-M05L
Video monitor	F150-M09
Sensor extension cable	Z309-SC1 3M
	Z309-SC1 8M
Monitor cable	F150-VM

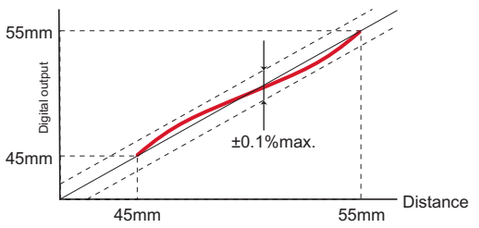
Rating/performance

Sensor: Z300-S10/Z300-S5/Z300-S60

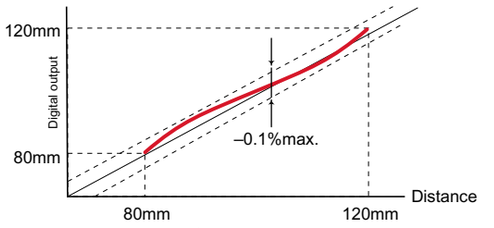
Item \ Model		Z300-S10 (long-range type)		Z300-S60 (Super long-range type)
Measurement Modes		Diffuse reflection mode	Regular reflection mode	Diffuse reflection mode only
				
Measurement center distance		100 mm	94 mm	600 mm
Measurement range		±20 mm	±16 mm	±350 mm (F.S. 700 mm)
Light source		Visible semiconductor laser (wavelength 670 nm, 1 mW max., Class 2)		Visible semiconductor laser (wavelength 658 nm, 15 mW max., Class 3B) *1
Minimum beam shape *2		60 μm × 1000 μm typical (standard distance)		0.3 mm × 16(10.3*) mm (at 500 mm) *Effective area of CCD
Linearity*3		±0.1% F.S.		±0.07%F.S (250 mm to 750 mm) ±0.1%F.S (750 mm to 950 mm)
Resolution*4		1 μm*5		8 μm (at 250 mm) 40 μm (at 600 mm)
Sampling period *6		500 μs (at high speed)		
LED indicator	NEAR lamp	Illuminates when the object is near the measurement center distance, and is on the near side of the measurement center distance in the measurement range. The lamp flashes when the object is out of the measurement range or insufficient light is received.		
	FAR lamp	Illuminates when the object is near the measurement center distance, and is on the far side of the measurement center distance in the measurement range. The lamp flashes when the object is out of the measurement range or insufficient light is received.		
Temperature drift*7		0.01% F.S. /°C		
Environ-mental Resistant	Protective structure	IEC 60529 IP67		IEC Standard IP66*8
	Ambient illuminance	Incandescent lamp: 3,000 lux max.		
	Ambient temperature	Operating: 0°C to 50°C, Storage: -15°C to 60°C (with no icing or condensation)		
	Ambient humidity	Operating/Storage: 35% to 85% RH (with no condensation)		
	Vibration resistance	10 to 150 Hz, 0.35-mm double amplitude for 8 minutes each in X, Y, and Z directions		
Material		Diecast aluminum		
Cable length		2 m		50 cm + extension cable
Minimum bending radius		68 mm		
Weight		Approx. 600 g		Approx. 1000 g

*1. For Class 2 types, please inquire.
*2. Defined at 1/e2 (13.5%) of the central light intensity. If there is stray light outside of the defined area and the reflectance of the light around the work is higher than the work, detection errors may result.
*3. The error with respect to the ideal straight line of displacement output during measurement of our standard while aluminum ceramic. The linearity may vary depending on the object.

·Z300-S5

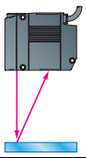
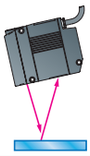
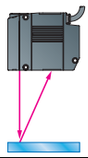
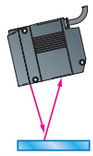


•Z300-S10



*4. The converted displacement value of peak-to-peak displacement output (when our standard aluminum ceramic is measured). In an electromagnetic field, resolution performance may not be satisfactory.
*5. Using an average measurement count of 64 times with the Z300-VC10V3.
*6. Using an average measurement count of 512 times with the Z300-VC10V3.
*7. Measured value when set to high-speed mode.
*8. Value when the distance between the sensor and the object (white aluminum ceramic) is fixed with an aluminum jig and the Z300-VC10V3 controller is connected.
*9. For IP 67 items, please inquire.

Sensor: Z300-S2T/Z300-S5T

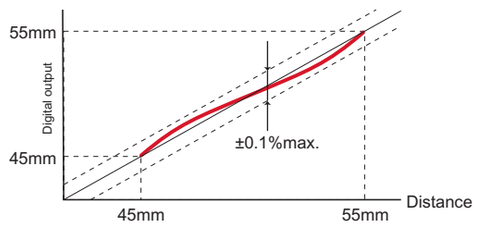
Item		Model	Z300-S2T		Z300-S5T	
			Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection
		Measurement Modes				
Measurement center distance			5.2 mm	20 mm	50 mm	44 mm
Measurement range			±1 mm		±5 mm	±4 mm
Light source			Visible laser diode (wavelength 650 nm, 1 mW max., Class 2)		Visible laser diode (wavelength 670 nm, 1 mW max., Class 2)*1	
Minimum beam shape *2			20 μm × 300 μm typical (standard distance)		30 μm × 400 μm typical (standard distance)	
Linearity*3			±0.05% F.S.	±0.05% F.S	±0.1% F.S	±0.1% F.S
Resolution*4			0.4 μm *5	0.4 μm	0.4 μm	0.4 μm
Sampling period *6			540 μs (at high speed)			
LED indicator	NEAR lamp		Illuminates when the object is near the measurement center distance, and is on the near side of the measurement center distance in the measurement range. The lamp flashes when the object is out of the measurement range or insufficient light is received.			
	FAR lamp		Illuminates when the object is near the measurement center distance, and is on the far side of the measurement center distance in the measurement range. The lamp flashes when the object is out of the measurement range or insufficient light is received.			
Temperature drift*7			0.01% F.S./°C			
Environmental Resistant	Protective structure		IEC 60529 IP67		IEC Standard IP66*8	
	Ambient illuminance		Incandescent lamp: 3,000 lux max.			
	Ambient temperature		Operating: 0°C to 50°C, Storage: -15°C to 60°C (with no icing or condensation)			
	Ambient humidity		Operating/Storage: 35% to 85% RH (with no condensation)			
	Vibration resistance		10 to 150 Hz, 0.35-mm double amplitude for 8 minutes each in X, Y, and Z directions			
Material			Diecast aluminum			
Cable length			2 m		50 cm + extension cable	
Minimum bending radius			68 mm			
Weight			Approx. 350 g		Approx. 600 g	

*1. For Class 2 types, please inquire.

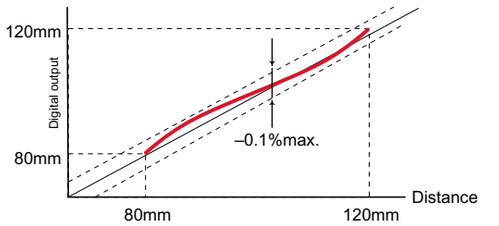
*2. Defined at 1/e2 (13.5%) of the central light intensity. If there is stray light outside of the defined area and the reflectance of the light around the work is higher than the work, detection errors may result.

*3. The error with respect to the ideal straight line of displacement output during measurement of our standard while aluminum ceramic. The linearity may vary depending on the object.

·Z300-S5



•Z300-S10



*4. The converted displacement value of peak-to-peak displacement output (when our standard aluminum ceramic is measured). In an electromagnetic field, resolution performance may not be satisfactory.

*5. Using an average measurement count of 512 times with the Z300-VC10V3.

*6. Using an average measurement count of 512 times with the Z300-VC10V3.

*7. Measured value when set to high-speed mode.

*8. Value when the distance between the sensor and the object (white aluminum ceramic) is fixed with an aluminum jig and the Z300-VC10V3 controller is connected.

*7. Measured value when set to high-speed mode.

*8. Value when the distance between the sensor and the object (white aluminum ceramic) is fixed with an aluminum jig and the Z300-VC10V3 controller is connected.

*9. For IP 67 items, please inquire.

Controller: Z300-VC10V3/Z300-VC15V

Item mode		VISUAL mode	NON VISUAL mode
General specifications	Power supply voltage	21.6 to 26.4 V DC (including ripple)	
	Current consumption	1 A or less (when two sensors are connected)	
	Insulation resistance	Between external DC terminals and ground terminal: 20 MΩ or higher (using 100-V DC insulation resistance tester) (with built-in surge protector disconnected)	
	Dielectric strength	Between external DC terminals and ground terminal: 1000 V AC 50/60 Hz (with built-in surge protector disconnected)	
	Leakage current	10 mA max.	
	Noise resistance	1500 V p-p, pulse width of 0.1 μs/1 μs, Rise: 1-ns pulse	
	Vibration resistance	10 to 150 Hz (vibration width 0.1 mm) X, Y, Z directions 8 min.	
	Shock resistance	200 m/s^2, 6 directions, 3 times each	
	Ambient temperature	Operating: 0 to +50°C, storage: -15 to +60°C (with no icing or condensation)	
	Ambient humidity	Operating/storage: 35 to 85% RH (with no condensation)	
	Ambient Conditions	No corrosive gas	
	Ground	D-type ground (ground resistance 100 Ω or less) * The previous No. 3 type grounding	
	Protective structure	Built-in panel type (IEC60529 Standard IP20)	
	Material	Unit: ABS	
Performance specifications	Number of connected sensors	2 units	1 unit
	Number of scenes	16	1
	Image recording function	Maximum of 20 rejection images, maximum of 4 peripheral images Up to 4 work surface images can be recorded	—
	Processing method	Dark/light center, edge center	Edge center
	Image pre-processing	Noise elimination, smoothing	None
	Average/filter	Average count (12 levels, 1 to 4096 times), HPF (high-pass filter)	Average count (SLOW: 64 times, FAST: 1 time)
	Light intensity follow function	Auto (light intensity follow range can be specified), fixed (selected from 32 levels)	Auto (light intensity follow range cannot be specified), fixed (selected from HIGH or LOW)
	Applications	Select from following 8 types: surface displacement, spot displacement, maximum height, groove/depression, level difference, thickness of transparent object, level difference (2 sensors), thickness (2 sensors)	—
	Range specification	Area of line beam direction + displacement direction can be specified.	—
	2-area measurement mode	Absolute coordinate mode, relative coordinate mode	—
	Hold function	Sampling, peak, bottom, peak-to-peak, average, length	—
	2-sensor measurement mode	Simultaneous measurement, alternating measurement	—
	Measurement data	4 outputs/scene	1
	Calculation functions	The following calculations are possible for each of OUT 0 to 3 K+A, K-A, K+(A+B), K+iA-B), K-(A+B) A, B: Specified measurement points K: Any constant	—
	Result output	Decision output (HIGH, PASS, LOW, ERROR) → RS-232C output → Terminal block output • Measured value output (measured value) → RS-232C output → Terminal block output → Analog output	Analog output of measured values
	Terminal block	11 input points: $\overline{\text{TRIGGER}}$, $\overline{\text{HOLD-RESET}}$, $\overline{\text{LD-OFF}}$, $\overline{\text{ALL-ZERO}}$, $\overline{\text{ZERO0}}$, $\overline{\text{ZERO1}}$, $\overline{\text{RESET}}$, $\overline{\text{DI0}}$ to $\overline{\text{DI3}}$ 21 output points: $\overline{\text{DO0}}$ to $\overline{\text{DO20}}$	$\overline{\text{LD-OFF}}$
	Monitor I/F	1 CH (supports pin jack and over scan monitor)	—
	Analog output resolution	Full-scale output at maximum of 40,000 levels Resolution * 0.25 mV (± V), 0.4 μA (4-20 μA)	
Weight		Approximately 700 g (unit only)	
Accessories		Operation manual, 1 resistor (250 Ω, 1/2 W)	

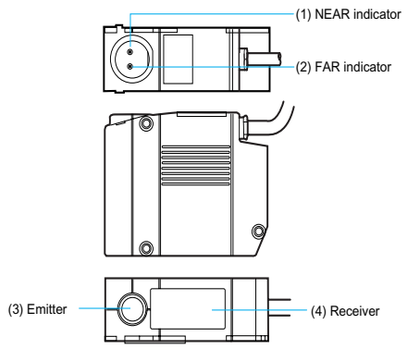
* Measured at an average count of 64 times with our K3AS Linear Sensor Controller connected

Monitor

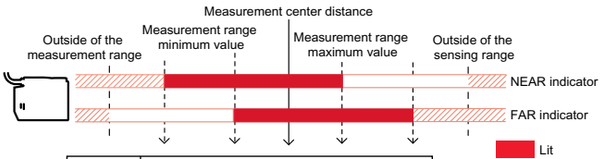
Item \ Product name / Model	LCD monitor	Video monitor
	F150-M05L	**F150-M09**
Size	5.5 type	9 inches
Type	TFT color LCD	Monochrome CRT
Resolution	320 × 240 dots	800TV or higher (center)
Input signal	NTSC composite video (1.0 V / 75 Ω)	
Power supply voltage	20.4 to 26.4 VDC	100 to 240 VAC (-15%, +10%)
Current consumption	Approx. 700 mA	Approx. 200 mA
Ambient temperature	Operating: 0°C to 50°C, Storage: -25°C to 65°C (with no icing or condensation)	Operating: -10°C to 50°C, Storage: -20°C to 65°C (with no icing or condensation)
Ambient humidity	Operating/Storage: 35% to 85%RH (with no condensation)	Operating/Storage: 10% to 90%RH (with no condensation)
Weight * Unit only	Approx. 1 kg	Approx. 4.5 kg
Accessories	Operation manual, 4 clamps	Instruction manual

Name and function of each part

Sensor: Z300-S5T/-S10/-S60



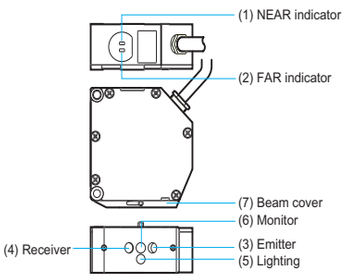
(1), (2) When the distance from the sensor front to the work is within the measurement range, these lamps illuminate in response to the distance.
If the work is outside the measurement range or there is insufficient light, both lamps will blink.



Z300-S2T	19	19.9	20	20.1	21
Z300-S5T	45	49.5	50	50.5	55
Z300-S10	80	98	100	102	120
Z300-S60	250	565	600	635	950

(Unit: mm)

Sensor: Z300-S2T

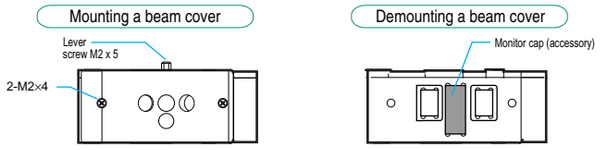


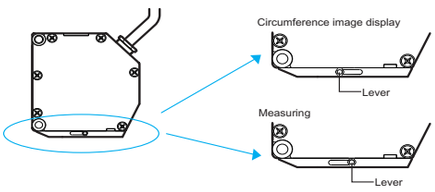
This indicator lamp also functions as a laser emission warning light.
- Immediately after turning on the power, at least one of the indicator lamps will illuminate steadily or blink.
- During the first 15 to 25 seconds after turning on the power, both indicator lamps will remain off, indicating that the laser light is off.
- During laser emission, one of the indicator lamps will illuminate steadily or blink.
- When the laser is off, both indicator lamps will be off.

(3) Laser projector
(4) Laser receiver
(5) Illumination for display of peripheral images.
(6) Load a peripheral image.
(7) Switch from measurement to peripheral image display, and then from peripheral image display to measurement. To display a peripheral image, loosen the screw on the beam cover lever and then move the lever to the left. To switch to measurement, move the lever to the right. The lever screw should be tightened to a torque of 1.5 to 3 kgf²cm using a slotted screwdriver.

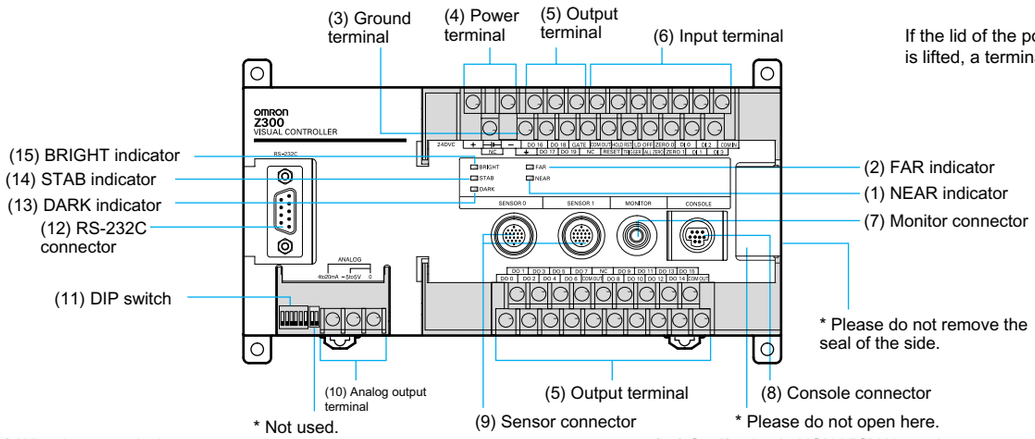
Check

●Using Z300-S2T
- When you remove and measure a beam cover, please attach the monitor cap attached to the sensor in the position of the following figure.
- When you display a circumference image, please be sure to attach a beam cover. Where a beam cover is removed, a circumference image cannot be displayed correctly.





Controller: Z300-VC10V3/Z300-VC15V3

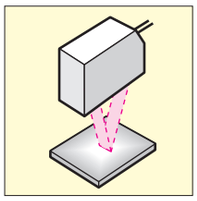


(3) Wire the ground wire.
(4) Connect to the power supply unit.
(5), (6) Connect to a programmable controller or other external device.
(7) Connect the monitor.
(8) Connect the console.
(9) Connect the sensor.
(10) Connect if using an analog output.
(11) Set if using in NON VISUAL mode.
(12) Connect to a computer, programmable controller, or other external device.
(13), (14), (15) Illuminates according to the light intensity in the sensor unit.
If LDOFF is input from the terminal block or RS-232C, or the sensor is not connected, all indicator lamps will blink.
- BRIGHT indicator lamp: Illuminates when the light intensity is too high.
- DARK indicator lamp: Illuminates when the light intensity is too low.
- STAB indicator lamp: Illuminate when the light intensity is suitable.

Setting menu

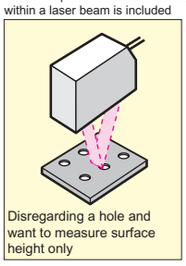
Application menu

Surface displacement



Make stable measurements of the average displacement magnitude in the laser beam, even if there are gaps (hair line scratches, etc.).

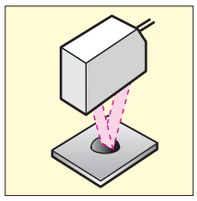
When the part which does not desire measurement within a laser beam is included



Since the measurement range can be set up freely, it can be measured like a spot beam.

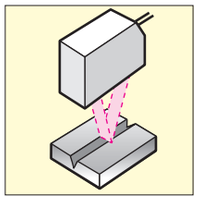
Disregarding a hole and want to measure surface height only

Maximum height



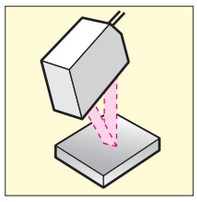
The highest position in a laser beam is measured.

Gap, Dent



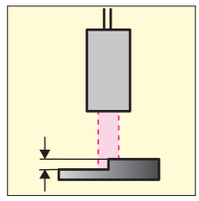
The lowest position in a laser beam is measured.

Thickness of transparent object



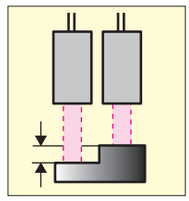
The thickness of a transparent object can be measured by one sensor.

Gap



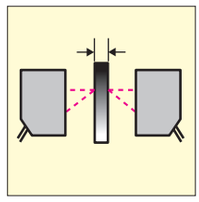
Between a peak and a bottom is measured within a laser beam.

When you want to measure by two sets of sensors



The peak of each sensor is measured and the difference is taken out.

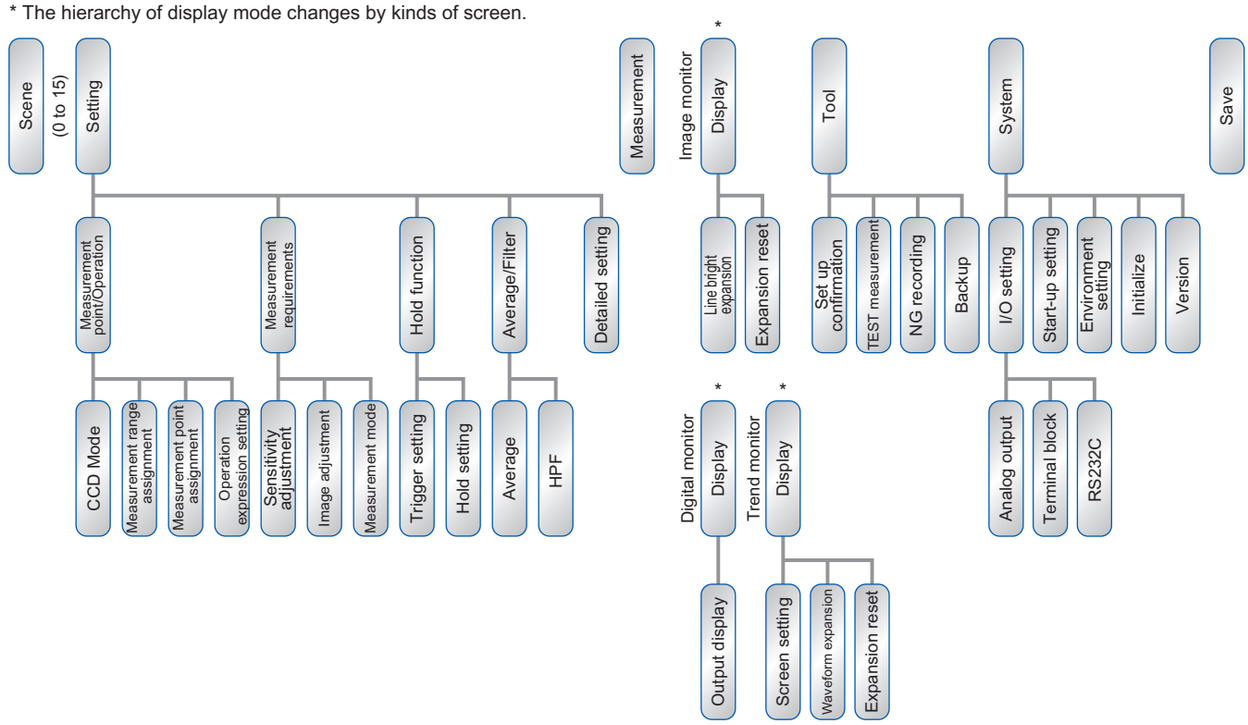
Thickness (2 cm)



Between a peak and a bottom is measured within a laser beam.

Expert menu

* The hierarchy of display mode changes by kinds of screen.



Precautions

⚠ Warning

Be careful not to expose your eyes to the laser beam directly or to the light reflected by a mirror-smooth object.
The laser beam emitted from the laser has high power density and its entry to your eyes may cause blindness.

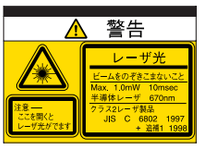
For safe use of laser products

The Z300 uses a laser light source. The laser is classified in accordance with JIS Standards (JIS-C6802).

	Z300-S2T	Z300-S5T	Z300-S10	Z300-S60
Wavelength	650 nm	670 nm	670 nm	658 nm
Maximum output	1 mW max.	1 mW max.	1 mW max.	15 mW max.
Class	2			3B
Maximum pulse width	7ms	7ms	7ms	17.5ms
Period	0.5 to 10 ms	0.5 to 10 ms	0.5 to 10 ms	0.5 to 25 ms

Labels related to laser

The following warning label is attached to the side of the sensor on the Z300.



Z300-S2T
Z300-S5T
Z300-S10

Z300-S60

About safety devices

The Z300 is equipped with a laser emission warning lamp and a laser-off input circuit. An interlock function can be configured using an external circuit.

About operation

- If there is a reflective body with a specular surface in the light path, install a light shielding cover. If the light path must be left open, ensure that it is not at eye height.
- The safe distance (Nominal Optical Hazard Distance: NOHD) is approximately 1 m (15 m for the Z300-S60); however, endeavor to terminate the light path in so far as is possible. The optimum terminating material has a delustering coating and minimal reflection.
- When installing or adjusting the Z300-S60 use laser-protective glasses.

Overview of JIS C6802 Standard

Safety measures that users must implement based on the class of laser product are as follows.

Class / Requirements	Class 1	Class 2	Class 3A	Class 3B*	Class 4
Remote interlock connector	Not required			Connect to room or door circuit	
Key control	Not required			Remove key when not needed	
Beam attenuator	Not required			Prevent inadvertent light exposure during use	
Emission indicator device	Not required			Indicates that laser is in operation	
Warning sign	Not required			Observe the cautions in the warning sign	
Beam path	Not required	Terminate ends of necessary beam paths			
Mirror reflection	Not required			Prevent unexpected reflection	
Eye protection	Not required			Required when technical or administrative methods cannot be carried out, and when the MPE is exceeded.	
Protection clothes	Not required			Required in some cases	Specific instructions are required
Training	Not required		Required for all operators and maintenance personnel		

* A Class 3B laser product that does not exceed 5 times the Class 2 AEL and which has a remote interlock connector, shade-based control, a beam attenuator, an emission warning device, and with respect to eye protection, has a wavelength range of 400 nm to 700 nm, is treated as a Class 3A laser product.

FDA approval pending

Products equipped with this device are subject to the laser regulations of the FDA (Food and Drug Administration) if exported to the U.S.A. The Z300 is scheduled for registration with the CDRH (Center for Devices and Radiological Health).

Correct Use

About warming up

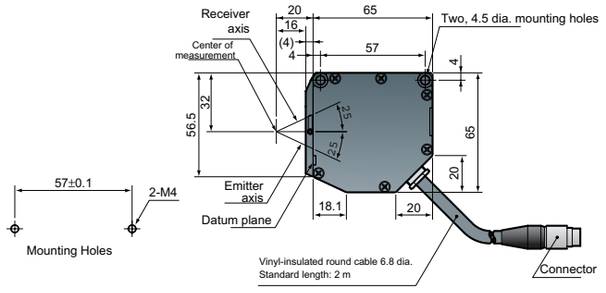
After turning on the power, wait about 30 minutes before using the equipment. The circuits are not stable after turning on the power, and thus measured values tend to gradually drift.

Mounting the sensor head of the Z300-S2T, Z300-S10, Z300-S5T

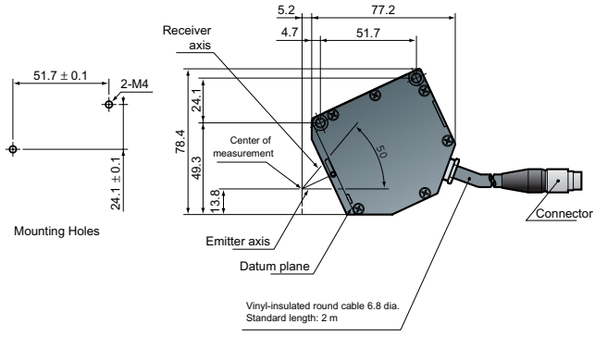
The sensor head of the Z300-S2T can be mounted in two ways to allow use as a regular reflection optical device, or a diffuse reflection optical device.

Select the optimum mounting method according to the object of detection and its surface to achieve high-precision measurement.

Using for regular reflection
Z300-S2T



Using for diffuse reflection
Z300-S2T

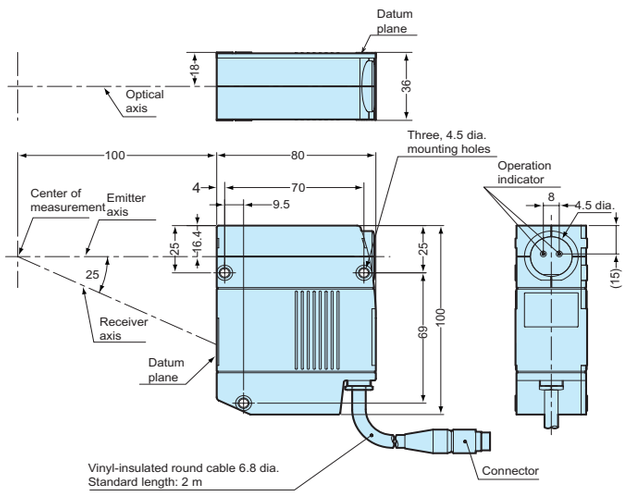


(Unit: mm)

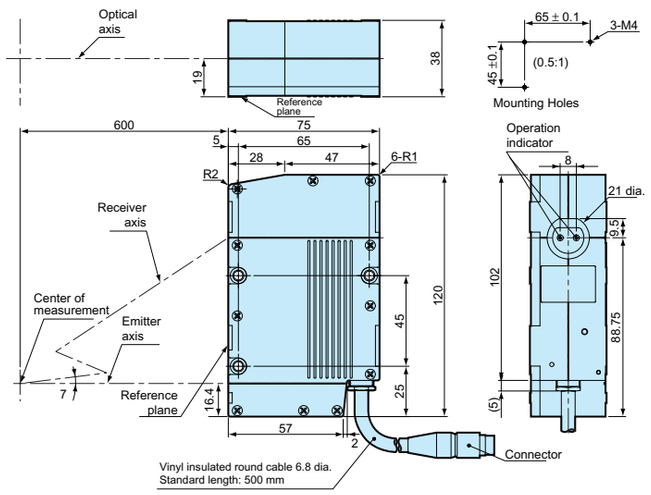
Dimensions (Unit: mm)

Sensor

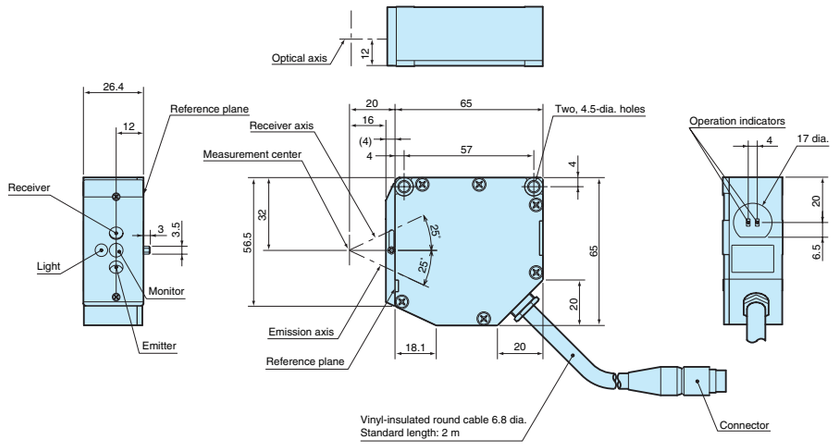
Z300-S10



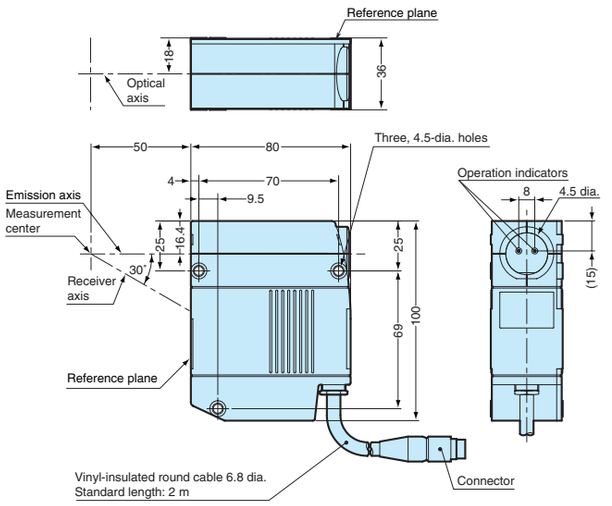
Z300-S60



Z300-S2T

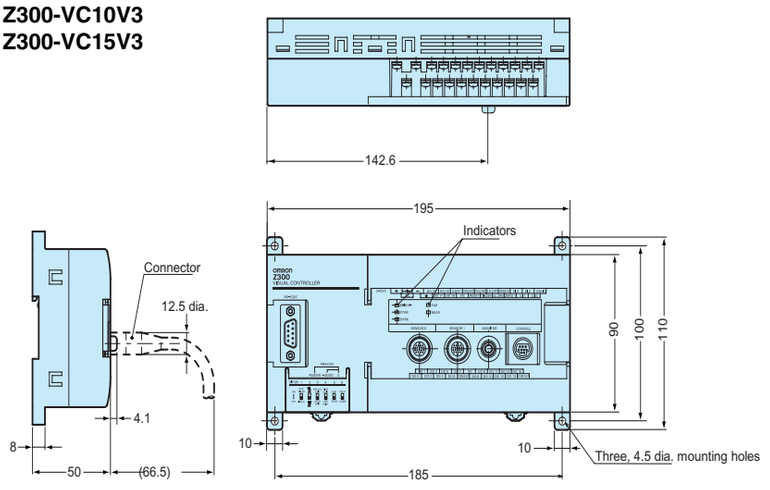


Z300-S5T



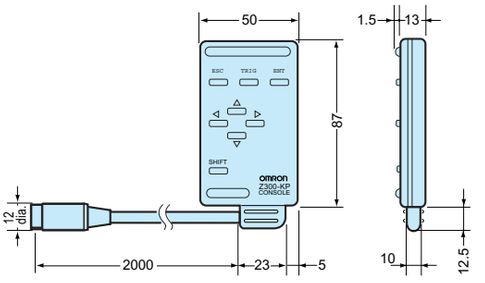
Controller

Z300-VC10V3
Z300-VC15V3



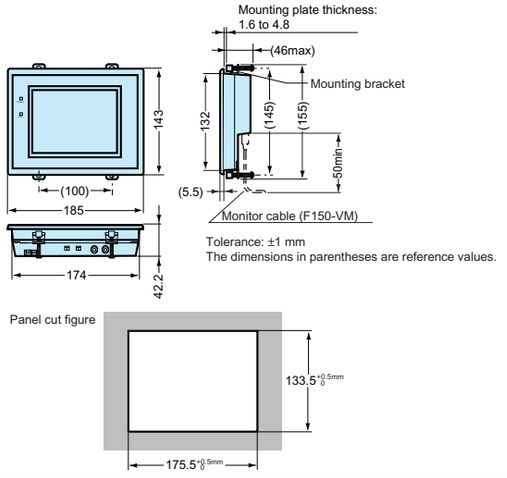
Console

Z300-KP



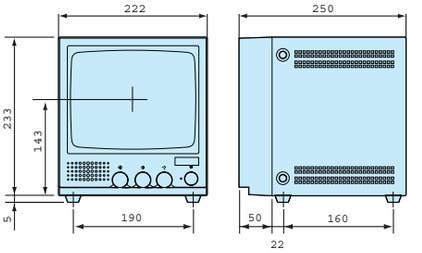
LCD monitor

F150-M05L



Video monitor

F150-M09



Certain Terms and Conditions of Sale

1. Offer; Acceptance. These terms and conditions (these "Terms") are deemed part of all catalogs, manuals or other documents, whether electronic or in writing, relating to the sale of goods or services (collectively, the "Goods") by Omron Electronics LLC and its subsidiary companies ("Seller"). Seller hereby objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms. Please contact your Omron representative to confirm any additional terms for sales from your Omron company.
2. Prices. All prices stated are current, subject to change without notice by Seller. Buyer agrees to pay the price in effect at time of shipment.
3. Discounts. Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Seller's payment terms and (ii) Buyer has no past due amounts owing to Seller.
4. Orders. Seller will accept no order less than $200 net billing.
5. Governmental Approvals. Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Goods.
6. Taxes. All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Seller or required to be collected directly or indirectly by Seller for the manufacture, production, sale, delivery, importation, consumption or use of the Goods sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Seller.
7. Financial. If the financial position of Buyer at any time becomes unsatisfactory to Seller, Seller reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Seller may (without liability and in addition to other remedies) cancel any unshipped portion of Goods sold hereunder and stop any Goods in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
8. Cancellation; Etc. Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Seller fully against all costs or expenses arising in connection therewith.
9. Force Majeure. Seller shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
10. Shipping; Delivery. Unless otherwise expressly agreed in writing by Seller:
    a. Shipments shall be by a carrier selected by Seller;
    b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
    c. All sales and shipments of Goods shall be FOB shipping point (unless otherwise stated in writing by Seller), at which point title to and all risk of loss of the Goods shall pass from Seller to Buyer, provided that Seller shall retain a security interest in the Goods until the full purchase price is paid by Buyer;
    d. Delivery and shipping dates are estimates only.
    e. Seller will package Goods as it deems proper for protection against normal handling and extra charges apply to special conditions.
11. Claims. Any claim by Buyer against Seller for shortage or damage to the Goods occurring before delivery to the carrier must be presented in writing to Seller within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Goods from Seller in the condition claimed.
12. Warranties. (a) Exclusive Warranty. Seller's exclusive warranty is that the Goods will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Seller (or such other period expressed in writing by Seller). Seller disclaims all other warranties, express or implied. (b) Limitations. SELLER MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE GOODS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE GOODS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Seller further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Goods or otherwise of any intellectual property right. (c) Buyer Remedy. Seller's sole obligation hereunder shall be to replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Good or, at Seller's election, to repay or credit Buyer an amount equal to the purchase price of the Good; provided that in no event shall Seller be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Goods unless Seller's analysis confirms that the Goods were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any goods by Buyer must be approved in writing by Seller before shipment. Seller shall not be liable for the suitability or unsuitability or the results from the use of Goods in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.
13. Damage Limits; Etc. SELLER SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE GOODS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY. Further, in no event shall liability of Seller exceed the individual price of the Good on which liability is asserted.
14. Indemnities. Buyer shall indemnify and hold harmless Seller, its affiliates and its employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not Seller is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Goods. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Seller and defend or settle any action brought against Seller to the extent that it is based on a claim that any Good made to Buyer specifications infringed intellectual property rights of another party.
15. Property; Confidentiality. The intellectual property embodied in the Goods is the exclusive property of Seller and its affiliates and Buyer shall not attempt to duplicate it in any way without the written permission of Seller. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Seller. All information and materials supplied by Seller to Buyer relating to the Goods are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.
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OMRON®

OMRON ELECTRONICS LLC
One Commerce Drive
Schaumburg, IL 60173
847-843-7900
For US technical support or other inquiries:
800-556-6766

OMRON CANADA, INC.
885 Milner Avenue
Toronto, Ontario M1B 5V8
416-286-6465

OMRON ON-LINE
Global - http://www.omron.com
USA - http://www.omron.com/oei
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