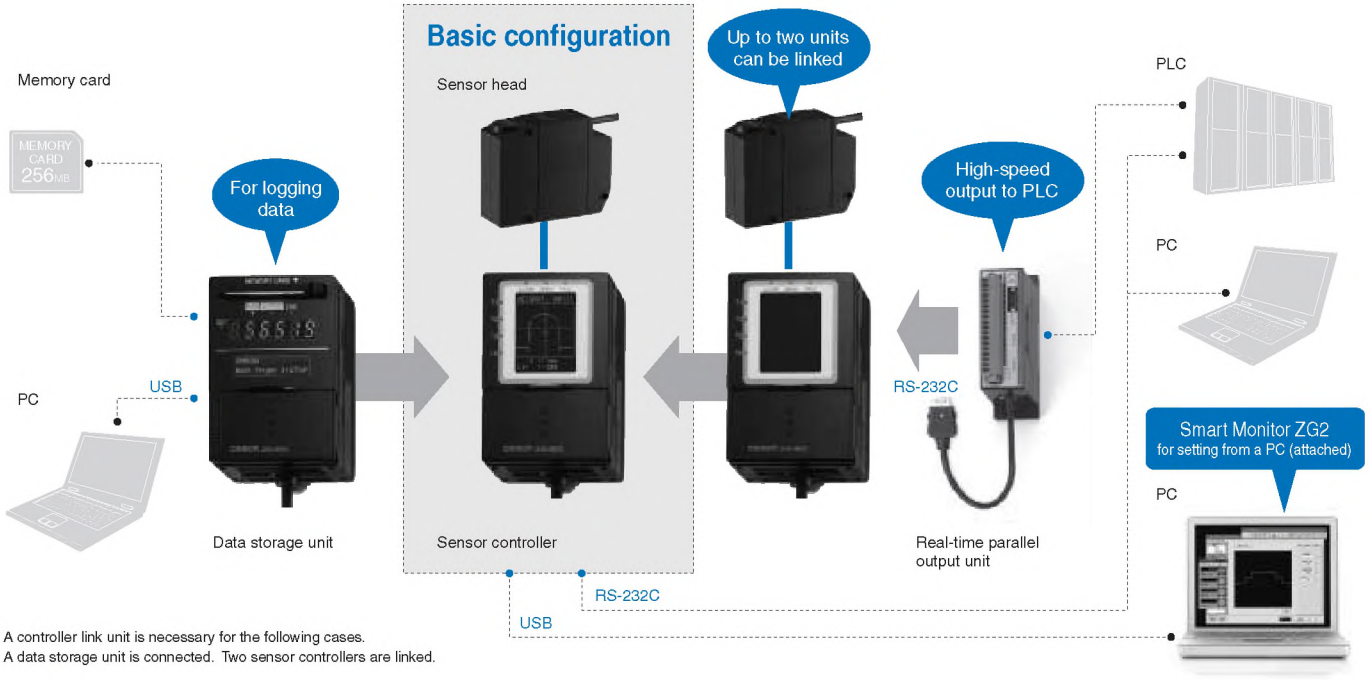
2D Profile Measuring Sensors

ZG2 - Smart Profile Sensor

The easy way to get your profile

- Easy to use - intuitive user interface
- Live - built-in LCD monitor for setup and immediate profile display
- Versatile - 18 measurement tools
- Accurate - 10 µm resolution
- Wide profiles - up to 70 mm
- Fast - 5 ms sampling time
- Smart - powerful PC software for configuration and post-processing (optional)

System configuration



A controller link unit is necessary for the following cases.
A data storage unit is connected. Two sensor controllers are linked.

27 m max.

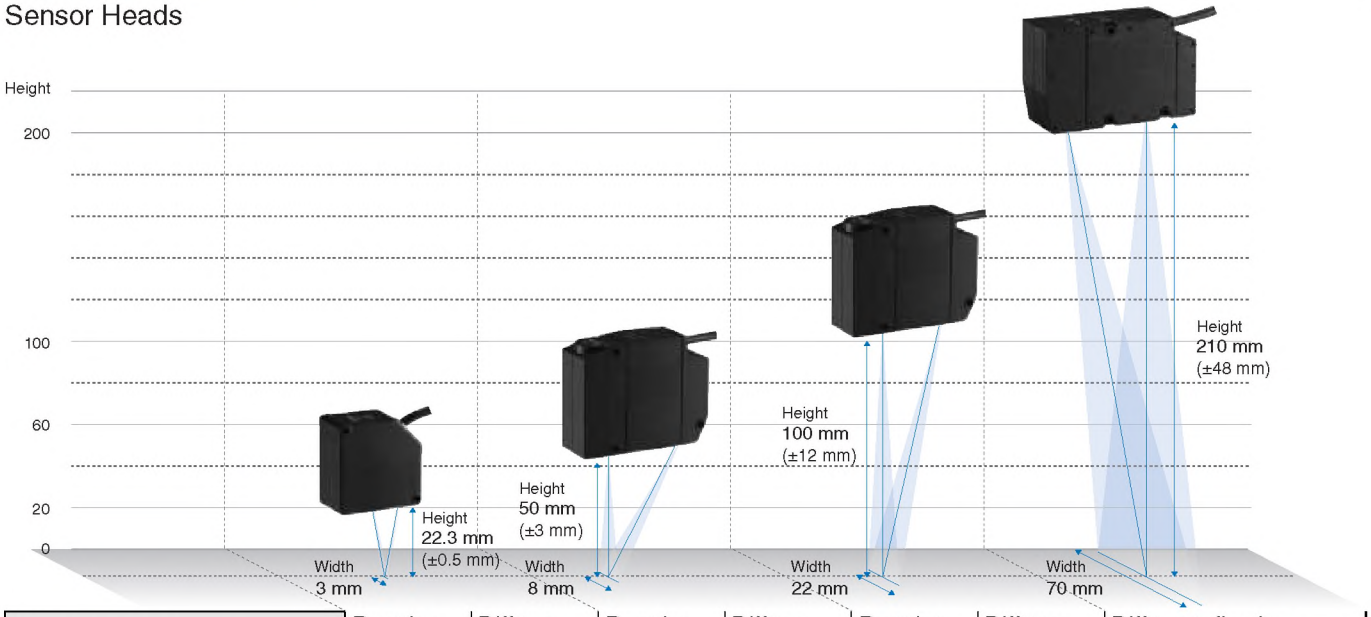
Sensor Head Extension Cables

Highly-flexible extension cables of four different lengths are available. The distance between the sensor head and sensor controller can be extended up to 27 m without delaying image input periods.

Sensor head cable length: 0.5 m/2 m 25 m/15 m/8 m/3 m

Ordering Information

Sensor Heads



Optical system		Regular reflective	Diffuse reflective	Regular reflective	Diffuse reflective	Regular reflective	Diffuse reflective	Diffuse reflective
Measure-ment range	Height direction	22.3 ±0.5 mm	10.6 ±0.4 mm	50 ±3 mm	44 ±2 mm	100 ±12 mm	94 ±10 mm	210 ±48 mm
	Width direction	3 mm (typical)		8 mm (typical)		22 mm (typical)		70 mm (typical)
Resolution	Height direction	0.25 µm		1 µm		2.5 µm		6 µm
	Width direction	5 µm (3mm/631pixels)		13 µm (8 mm/631 pixels)		35 µm (22 mm/631 pixels)		111 µm (70 mm/631 pixels)
Model		ZG2-WDS3VT		ZG2-WDS8T		ZG2-WDS22		ZG2-WDS70

Sensor Controllers

Appearance	Power supply	Output type	Model
	24 VDC	NPN	ZG2-WDC11A*
			ZG2-WDC11
		PNP	ZG2-WDC41A*
			ZG2-WDC41

* Setup Support Software for PC is attached.

Data Storage Unit

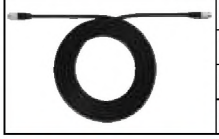
Appearance	Power supply	Output type	Model
	24 VDC	NPN	ZG2-DSU11
		PNP	ZG2-DSU41

Accessories (Order separately)

Real-time Parallel Unit (for the ZG-WDC-Series)

Appearance	Output type	Model
	NPN	ZG-RPD11
	PNP	ZG-RPD41

Sensor Head Extension Cable (Robot cable)

Appearance	Cable length	Model	Qty
	25 m	ZG2-XC25CR	1
	15 m	ZG2-XC15CR	1
	8 m	ZG2-XC8CR	1
	3 m	ZG2-XC3CR	1

RS-232 Cable

Connecting device	Model	Qty
For PLC/PT connection (2 m)	ZS-XPT2	1
For personal computer connection (2 m)	ZS-XRS2	1

Parallel Mounting Adaptor

Appearance	Model	
	ZS-XPM1	For 1 Unit
	ZS-XPM2	For 2 Units or more

Controller Link Unit

Appearance	Model
	ZS-XCN

Memory Card

Capacity	Model
128 MB	F160-N1285
256 MB	F160-N2565

Specifications

Sensor Heads

Item	Model	ZG2-WDS8T		ZG2-WDS22		ZG2-WDS70	ZG2-WDS3VT	
Optical system		Diffuse reflective	Regular reflective	Diffuse reflective	Regular reflective	Diffuse reflective	Regular reflective	Diffuse reflective
Measurement range	Height direction	50±3 mm	44±2 mm	100±12 mm	94±10 mm	210±30 mm	20±0.5 mm	5.2±0.4 mm
	Width direction	8 mm (typical)		22 mm (typical)		70 mm (typical)	3 mm (typical)	
Resolution	Height direction *1	1 µm		2.5 µm		6 µm	0.25 µm	
	Width direction	13 µm (8 mm/631 pixels)		35 µm (22 mm/631 pixels)		111 µm (70 mm/631 pixels)	5 µm (3 mm/631 pixels)	
Linearity (in the height direction) *2		±0.1% F.S.						
Temperature characteristic *3		0.03% F.S./°C		0.02% F.S./°C			0.08% F.S./°C	
Light source	Type	Visible semiconductor laser						
	Wavelength	658 nm					650 nm	
	Output	5 mW max. output, 1 mW max. exposure (without using optical instruments)					1 mW max.	
	Laser class	Class 2M of EN60825-1 / IEC60825-1 Class IIIB of FDA (21CFR 1040.10 and 1040.11)					Class 2 of EN60825-1 / IEC60825-1 Class II of FDA (21CFR 1040.10 and 1040.11)	
Beam shape (at measurement center distance) *4		30 µm×24 mm (typical)		60 µm×45 mm (typical)		120 µm×75 mm (typical)	25 µm×4 mm (typical)	
LED		STANDBY: Lights when laser irradiation preparation is complete (indication color: green) LD_ON: Lights when the laser is irradiating (indication color: green)						
Measurement object		Surface of non-transparent / transparent objects				Surface of non-transparent objects	Surface of non-transparent / transparent objects	
Environment resistance	Ambient light intensity	Illumination on the photo-receiving face 7,000 lx max. : Incandescent lamp						
	Ambient temperature	Operating: 0 to 50°C, Storage: -15 to 60°C (with no icing or condensation)						
	Ambient humidity	Operating and storage: 35 to 85% (with no condensation)						
	Degree of protection	IP66 (IEC 60529)					IP67 (IEC 60529)	
	Vibration resistance (destruction)	10 to 150 Hz with 0.35 mm single amplitude for 80 min each in X, Y and Z directions						
	Shock resistance (destruction)	150 m/s^2, 3 times each in 6 directions (up/down, right/left, forward/backward)						
Materials		Case: Aluminium diecast, Front cover: Glass, Cable insulation: Heat-resistive polyvinyl chloride (PVC), Connector: Zinc alloy or brass						
Cable length		0.5 m, 2 m (flexible cable)						
Weight		Approx. 500 g		Approx. 500 g		Approx. 650 g	Approx. 300 g	
Accessories		Laser labels (EN : 2 labels, FDA : 3 labels), Ferrite core (1), Instruction manual						

Note: 1 .Obtained by setting an OMRON standard measurement object at the measurement center distance and determining the average height of the beam line. The conditions are given in the table below. However, satisfactory resolution cannot e attained in strong electromagnetic fields. The minimum resolution of the ZG2-WDS8T/WDS3VT is 0.25 µm, even when the average number of operations is increased. Resolution does not go any lower.

Model	CCD Mode	Average No. of Operations	Measurement object	
			Regular reflective	Diffuse reflective
ZG2-WDS8T/ ZG2-WDS22/ ZG2-WDS70	High-precision mode	64	OMRON standard white alumina ceramic object	
ZG2-WDS3T			OMRON standard mirrored object	OMRON standard diffuse reflective object

2 .The tolerance for and ideal straight line obtained by determining the average height of and OMRON standard measurement object for the beam line. The CCD high-resolution mode is used. Linearity varies depending on the measurement object.

Model	Measurement object	
	Regular reflective	Diffuse reflective
ZG2-WDS8T/ WDS22/WDS70	OMRON standard white alumina ceramic object	
ZG-WDS3T	OMRON standard mirrored object	OMRON standard diffuse reflective object

3 .A value attained by using an aluminum jig to secure the distance between the Sensor Head and the measurement object. The CCD standard mode is used.

4 .Defined as 1/e^2 (13.5%) of the center light intensity. This may be influenced when light leakage also exists outside the defined area and the reflectivity of the light around the measurement object is higher than that of measurement object.

Sensor Controllers

Item	Model	ZG2-WDC11/WDC11A	ZG2-WDC41/WDC41A
Input/output type		NPN	PNP
No. of connectable Sensor Heads		1 per Controller	
No. of connectable Controllers		2	
Measurement cycle *1		16 ms (high-precision mode), 8 ms (standard mode), 5 ms (high-speed mode)	
Min. display unit		10 nm	
Display range		-999.99999 to 999.99999	
Display	LCD monitor	1.8 inch TFT color LCD (557×234 pixels)	
	LEDs	• Judgment indicators for each task (indication color: orange): T1, T2, T3, T4 • Laser indicator (indication color: green): LD_ON • Zero reset indicator (indication color: green): ZERO • Trigger indicators (indication color: green): TRIG	
External interface	Input/output signal lines: Analog outputs	Select voltage or current (using the sliding switch on the bottom surface) • Voltage output: -10 to 10 V, output impedance: 40 Ω • Current output: 4 to 20 mA, maximum load resistance: 300 Ω	
	Input/output signal lines: Judgment output (ALL-PASSING/ERROR)	NPN open collector 30 VDC, 50 mA max. Residual voltage: 1.2 V max.	PNP open collector 50 mA max. Residual voltage: 1.2 V max.
	Input/output signal lines: Trigger auxiliary output (ENABLE/GATE)		
	Input/output signal lines: Laser stop input (LD-OFF)	ON: 0 V short or 1.5 V max. OFF: Open (leakage current: 0.1 mA max.)	ON: Power supply voltage short or power supply voltage -1.5 V min. OFF: Open (leakage current: 0.1 mA max.)
	Input/output signal lines: Zero reset input (ZERO)		
	Input/output signal lines: Measurement trigger input (TRIG)		
	Input/output signal lines: Bank switching input (BANK A, B)		
	Serial I/O: USB2.0	1 port, full speed (12 Mbps), MINI-B	
	Serial I/O: RS-232C	1 port, 115,200 bps max.	
	Parallel output *2	18 - terminal	
Main functions	No. of setting banks	16	
	Sensitivity adjustment	Multi, High-speed multi, Auto, Fixed	
	Measurement items	Height, 2-point Step, 3-point Step, Edge position, Edge width, Angle, Intersection coordinates, Intersection angle, Sectional area (up to eight items can be measured simultaneously)	
	Auxiliary functions	Filter, Laser power adjustment, Position correction (height, position, lope), Linked operation, Point of inflection measurement	
	Profiles saved	16 profiles (1 profile per bank)	
	Trigger modes	External trigger/continuous	
Ratings	Power supply voltage	21.6 to 26.4 VDC (including ripple current)	
	Current consumption	0.8 A max.	
	Insulation resistance	20 MΩ at 250 V between lead wires and Controller case	
	Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between lead wires and Controller case	
Environmental resistance	Ambient temperature	Operating: 0 to 50°C, Storage: -15 to 60°C (with no icing or condenstaion)	
	Ambient humidity	Operating and storage: 35 to 85%	
	Degree of protection	IP20 (IEC 60529)	
	Vibration resistance (destruction)	Vibration frequency: 10 to 150 Hz, single amplitude: 0.35 mm, acceleration: 50 m/s^2	
	Shock resistance (destruction)	150 m/s^2, 3 times each in 6 directions (up/down, right/left, forward/backward)	
Materials		Case: Polycarbonate (PC), Cable insulation: Heat-resistive polyvinyl chloride (PVC)	
Cable length		2 m	
Weight		Approx. 300 g (including cable) (Packed state: Approx. 450 g)	
Accessories		ZG2-WDC_1: Large Ferrite Core (1 piece), Instruction Manual ZG2-WDC_1A: Large Ferrite Core (1 piece), Small Ferrite Core (2 pieces), Instruction Manual, Setup Support Software (CD-ROM), USB Cable (1 m)	

Note: 1 .The image input periode listed here are for fixed/auto sensitivity. The image input period will be longer for multi-sensitivity or other settings. Use the eco monitor in RUN mode to determine the actual image input period.
2 .When ZG-RPD is mounted

Data Storage Unit

Item	Model	ZG2-DSU11	ZG2-DSU41
Input/output type		NPN	PNP
No. of connectable Controllers*1		2	
Connectable Controllers		ZG2-WDC11/WDC41	
External interface	Input/output signal lines: Inputting starting/terminating logging	ON: O V short or 1.5 V max. OFF: Open (leakage current : 0.1 mA max.)	ON: Power supply voltage short or power supply voltage -1.5 V max. OFF: Open (leakage current : 0.1 mA max.)
	Input/output signal lines: Judgment output (HIGH/PASS/LOW/ERROR)	NPN open collector 30 VDC, 50 mA max. Residual voltage : 1.2 V max.	PNP open collector 50 mA max. Residual voltage : 1.2 V max
	Serial I/O: USB2.0	1 port, full speed (12 Mbps), MINI-B	
	Serial I/O: RS-232C	1 port, 115,200 bps max.	
Functions	No. of logged data*2: Memory of the main unit	Profiles saved : 5,120 profiles Measurement values saved : 65,000 values max.*3	
	No. of logged data*2: Memory card (256 MB)*4	Profiles saved : 35,328 profiles max. (256 profiles x 138 files) Measurement values saved : 7,150,000 values max. (65,000 values x 110 files)	
	Logging trigger functions	External triggers, data triggers (self-triggers), and time triggers	
	External banks functions	4096	
	Other functions	Alarm output functions	
Ratings	Power supply voltage	21.6 to 26.4 VDC (including ripple current)	
	Current consumption	0.5 A max.	
Environmental resistance	Ambient temperature	Operating : 0 to 50°C, Storage: 0 to 60°C (with no icing or condensation)	
	Ambient humidity	Operating and storage: 35 to 85% (with no condensation)	
Materials		Case: Polycarbonate (PC)	
Cable length		2 m	
Weight		Approx. 280 g	
Accessories		Ferrite Core (1 piece), Instruction Manual	

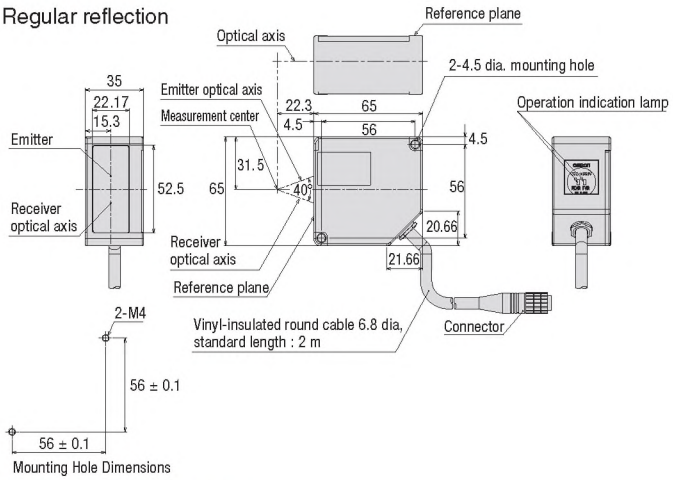
Note: 1 . The controller link unit is necessary for linking.
2 . Data is saved in the memory of the main unit during logging. The data is automatically saved in a memory card after logging is completed.The maximum number of logging differs according to set conditions. For details, refer to the Users Manual.
3 . Measurement values for 65,000 measurements can be saved even when two sensor controllers are connected and each performs eight tasks.
4 . The value is the maximum number achieved in the following conditions.
· One sensor controller performs one measurement task.
· Either profiles or measurement values are logged.

Dimensions

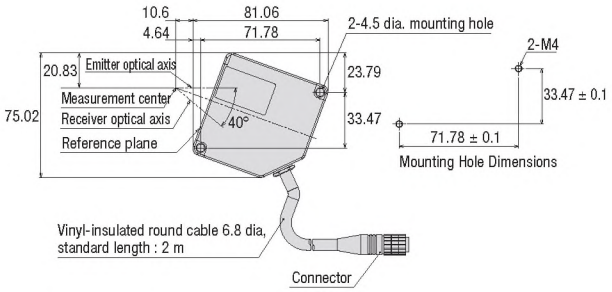
Sensor Heads

ZG2-WDS3VT

Regular reflection

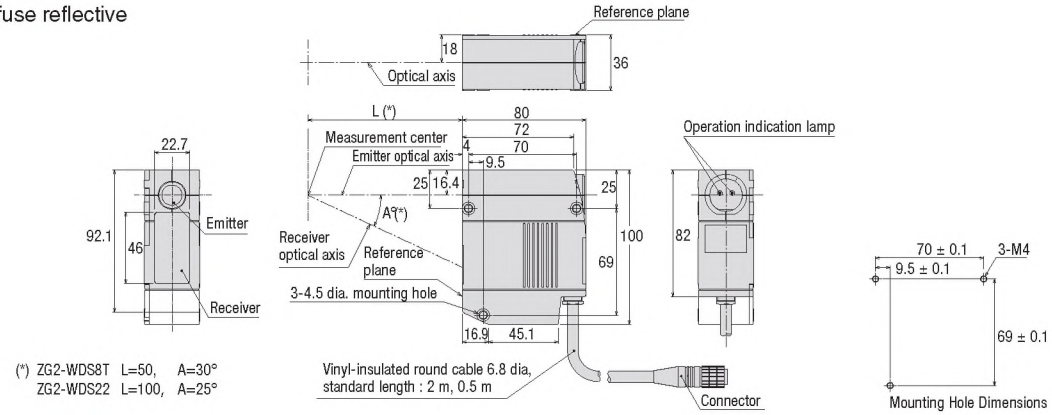


Diffuse reflective



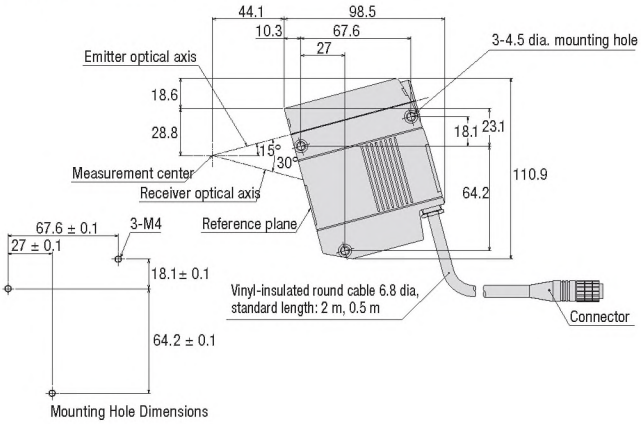
ZG2-WDS8T/WDS22

Diffuse reflective



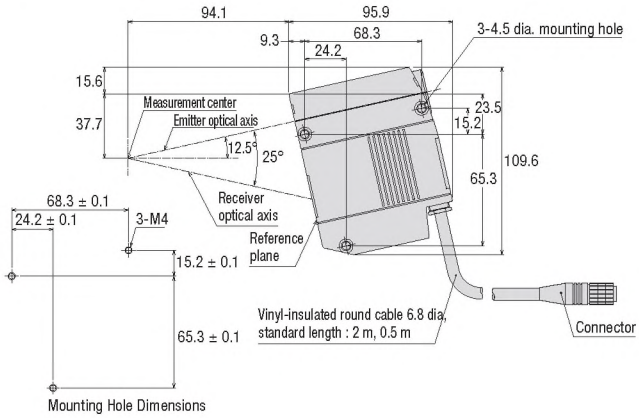
ZG2-WDS8T

Regular reflection



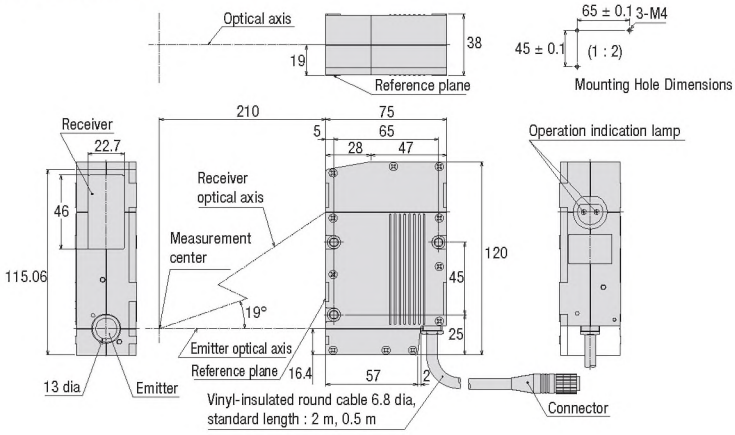
ZG2-WDS22

Regular reflection



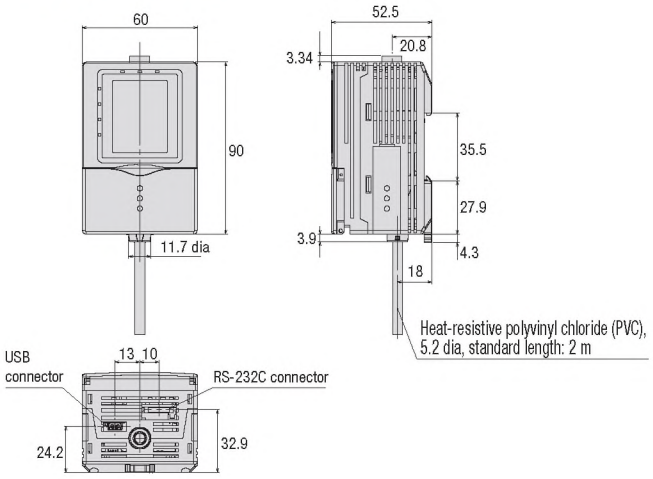
ZG2-WDS70

Diffuse reflective



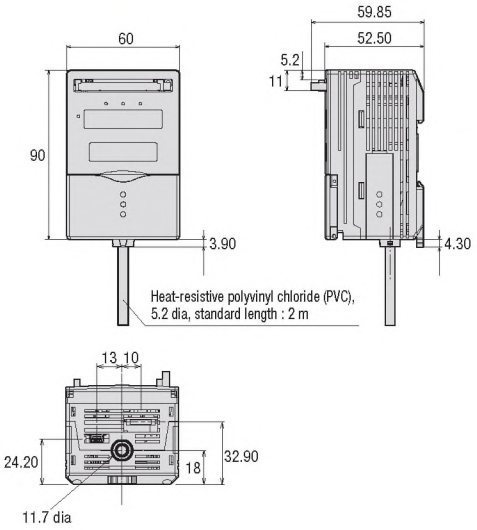
Sensor Controller

ZG2-WDC11/WDC41



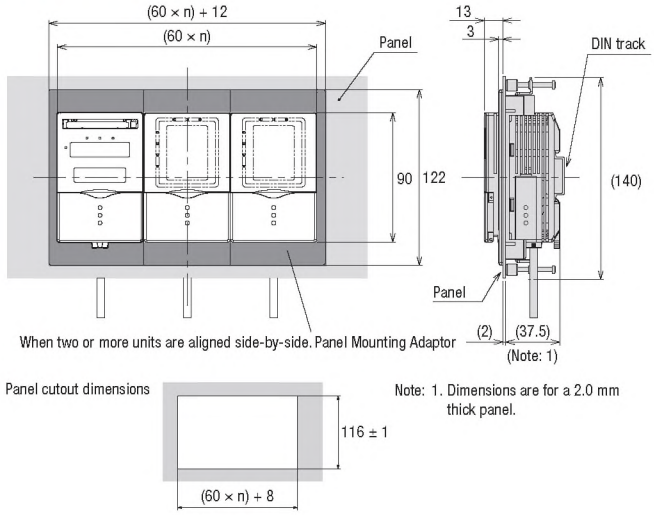
Data Storage Unit

ZG2-DSU11/DSU41



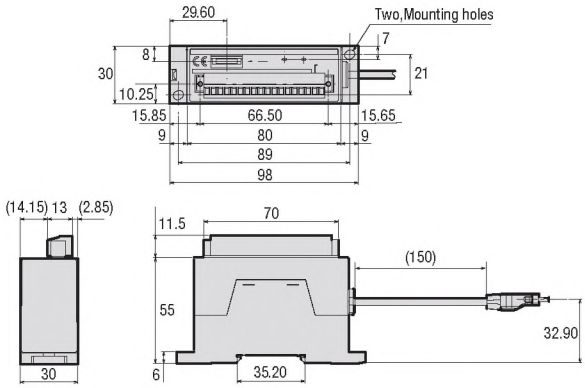
Panel Mounting Adaptor

ZS-XPM1/XPM2



Panel cutout dimensions

Note: 1. Dimensions are for a 2.0 mm thick panel.

Real-time Parallel Output Unit

ZG-RPD11/RPD41