Displacement sensor

FASTUS

CD22 Series

CD22-15□□ **CD22M-15□□**
CD22-35□□ **CD22M-15□□**
CD22-100□□ **CD22M-100□□**

Instruction manual

- Thank you for purchasing CD22 series. We hope you are satisfied with its performance.
- Please read this manual carefully and keep it for future reference.

Indicates a possible hazard that may result in death, serious injury, WARNINGS or serious property damage if the product is used without observing the stated instructions.

Warning Mandatory Requirements

- The light source of this product applies the visible light semiconductor laser. Do not allow the laser beam to enter an eye, either directly or reflected from reflective object. If the laser beam enters an eye, it may cause blindness.
- This product is not an explosion proof construction. Do not use the product under flammable , explosive gas or liquid environment.
- Do not disassemble or modify the product since it is not designed to automatically stop the laser emission when open. Disassembling or modifying at customer's end it may cause personal injury, fire or electric shock.
- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

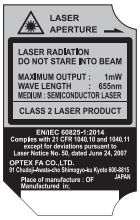
Warning Safety Precautions

- It is dangerous to wire or attach/remove the connector while the power is on. Make sure to turn off the power before operation.
- Installing in the following places may result in malfunction:
  1. A dusty or steamy place
  2. A place generating corrosive gas
  3. A place directly receiving scattering water or oil.
  4. A place suffered from heavy vibration or impact.
- The product is not designed for outdoor use.
- Do not use the sensor in a transient state at power on (Approx. 15min. Warm up period)
- Do not wire with the high voltage cable or the power lines. Failure to do this will cause malfunction by induction or damage.
- Do not use the product in water.
- Operate within the rated range.
- Wipe off dirt on the emitting/receiving parts to maintain correct detection. Also, avoid direct impact on the product.
- Don't bend the cable when the temperature of the cable or atmosphere is below freezing.

Precautions for using laser

- Regulations in the USA

When exporting laser devices to the USA, the USA laser control, FDA (Food and Drug Administration) is applied. This product has been already reported to CDRH (Center for Devices and Radiological Health). For details, contact our customer service.



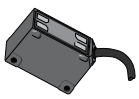
- Laser WARNING label
- FDA Certification label

Laser diode
Wave length:655nm, Max output:10mW,//9 degree type.

Bundled goods in the box

Please confirm following goods bundled in the box.

- CD22□-□□□□



- This instruction manual

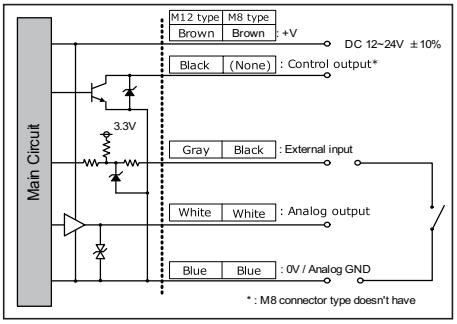
- Screws

M3 × 15···2

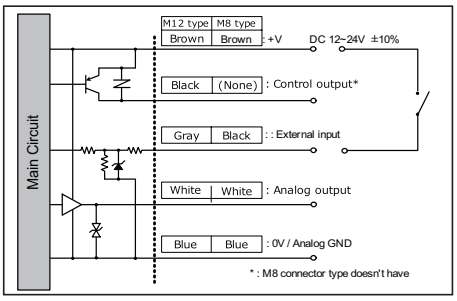
- Laser label [reserve]

Connection diagram

■ NPN type

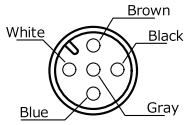


■ PNP type

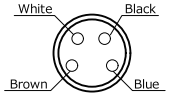


■ Pins configuration (sensor side)

・M12 type



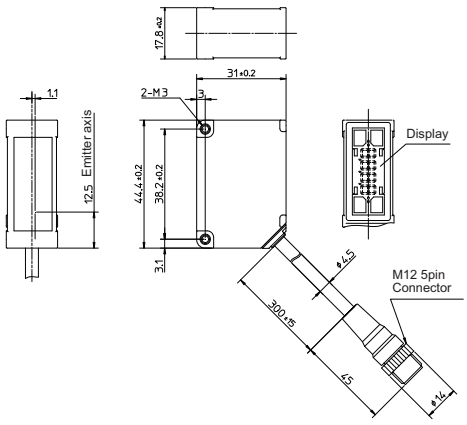
・M8 type



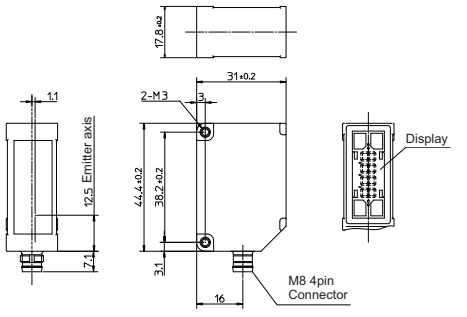
Dimensions

■ M12 type

[mm]

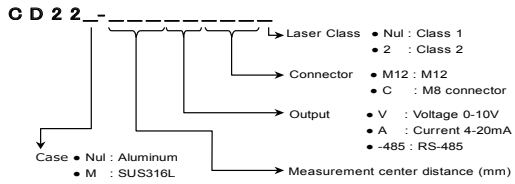


■ M8 type



Specifications

● Part number legend



● Specifications per measurement range

Part number	Aluminum housing	CD22-15-485□□	CD22-35-485□□	CD22-100-485□□
	SUS housing	CD22M-15-485□□	CD22M-35-485□□	CD22M-100-485□□
Center of measurement range		15mm	35mm	100mm
Measurement range		±5mm	±15mm	±50mm
Light source		Red laser Diode (wave length 655nm)		
		Max. output: 390 μW		Max. output: 1mW※3
Laser class	IEC/JIS	Suffix nul: CLASS 1 / 2: CLASS 2 (Laser Notice No.50)		
Spot size※1		500 * 700μm	450 * 800μm	600 * 700μm
Linearity		0.1% of F.S.	0.1% of F.S.	0.1% of F.S.
Repeatability※2		1μm	6μm	20μm
Sampling period		500μs / 1000μs / 2000μs / 4000μs / AUTO		
Temperature drift (typical value)		±0.02% / ℃ of F.S.	±0.02% / ℃ of F.S.	±0.05% / ℃ of F.S.
Indicator		Laser indicator: Green / Zero reset indicator: Red Output indicator: Orange / Mode indicator: Red		
Communication I/F		RS-485 Half Duplex (Multi-drop I/F is not supported)		
Power supply		12-24VDC ± 10%		
Current consumption		70mA max.		
Protection circuit		Reverse connection protection, Over current protection		
Protection category		IP67 including connection part		
Operating Temp./Humid.		-10 ~ 50℃ / 35 ~ 85% RH without freasing or condensation		
Storage Temp./Humid.		-20 ~ 60℃ / 35 ~ 85%/RH		
Ambient illuminance		Incandescent lamp: 3,000 lx max.		
Vibration resistance		10 ~ 55Hz, Double amplitude 1.5mm, X,Y,Z for 2 hours		
Shock resistance		500m/s² (approx. 50G) X,Y,Z 3 times each		
Material		Case: Aluminum/SUS316L, Front lens: PPSU, Display: PET		
Weight		Aluminum case with M12 connector : Approx. 60g including 300mm cable with connector SUS case with M12 connector type : Approx. 90g including 300mm cable with connector Aluminum case with M8 connector : Approx. 40g SUS case with M8 connector : Approx. 70g		

The specifications are based on the condition unless otherwise designated: Ambient temperature: 23℃ , Supply voltage: 24VDC, Sampling period: 500μs, Averaging: 64, Measuring distance: Center of the range, Testing object: White ceramic

※1 Defined with center strength $1/e^2$(13.5%) at the center. There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object close to the detection area.

※2 512 averaging time

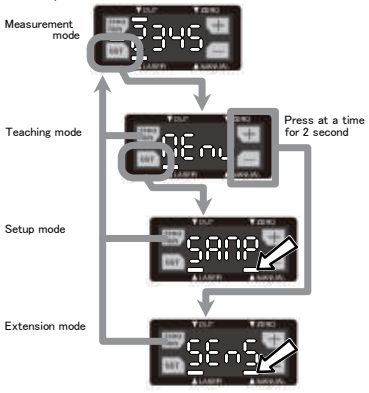
※3 Laser Class 2 type (Model: CD22-100-485M122 ,CD22-100-485C2)

Setup

● Changing mode

While it's "Teach mode", "Setup mode" or "Extension mode", you can change the mode to "Measurement mode" by pressing "ZERO/RUN" button.

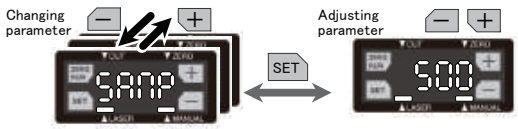
While it's "Setup mode" or "Extension mode", the LED "MANUAL" is lit.



● Changing parameters

You can choose and adjust the parameters by pressing "+" and "-" buttons.

The mode will be changed to "Measurement mode" by pressing "ZERO/RUN" button.



Teach mode

■ 1:Setup mode

To Setup mode

■ 2:Teaching mode

1Pt	1 point Teaching
FGS2	FGS2
2Pt	2 point Teaching

switching

■ 3:Calibration(Far end of the range)

Teaching current position

■ 4:Calibration(Near end of range)

Teaching current position

■ 5:FGS2 threshold

Teaching current position

■ 6:Near side threshold

Teaching current position

■ 7:1 point Teaching - Far side threshold

Teaching current position

Measurement mode

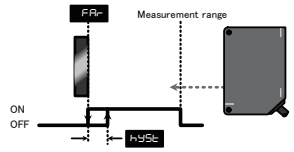
CD22 has 3 measurement mode. The mode is chosen by "Teach mode".

Output can be reversed by setting "Output polarity Act. ".

Following output shows its ON/OFF status as "Light ON L on ".

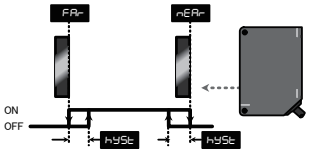
●1 point Teaching

Teaching is done at a position. When the measurement distance is closer than that position, the output will be ON.



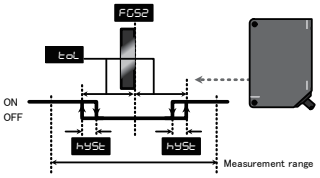
●2 point Teaching

Teaching is done at 2 positions. While the measurement distance is between those positions, the output will be ON.



●FGS2

Teaching is done at a position. When the measurement distance is closer than the distance set by "Hysteresis toL "from the position that Teaching is done, the output will be ON. It works as FGS sensor.

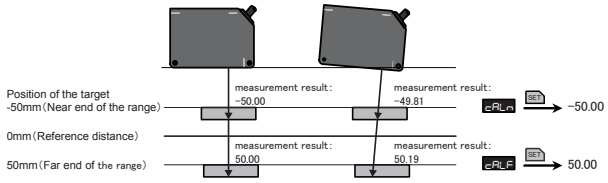


●Calibration (Far end of the range/ Near end of range)

The sensor can be calibrated by "Calibration" mode at both far and near end of the measurement range. This feature is very useful especially when you can't mount the sensor head parallel to the object surface.

● Example of Calibration of CD22-100

A) Calibration condition at the factory B) When the sensor is mounted tilted

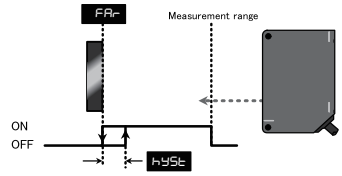


Just calibrate the sensor by "Calibration" mode at far end and near end of the measurement range. Then, you will get calibrated result if the sensor head is tilted.

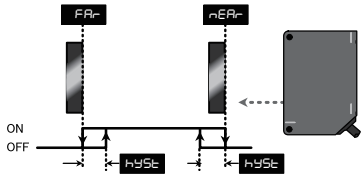
Measurement mode

CD22 has 3 measurement mode. The mode is chosen by "Teach mode".
Output can be reversed by setting "Output polarity Act. ".
Following output shows its ON/OFF status as "Light ON L on ".

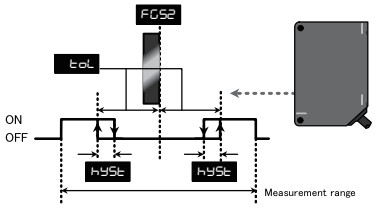
● 1 point Teaching
Teaching is done at a position. When the measurement distance is closer than that position, the output will be ON.



● 2 point Teaching
Teaching is done at 2 positions. While the measurement distance is between those positions, the output will be ON.

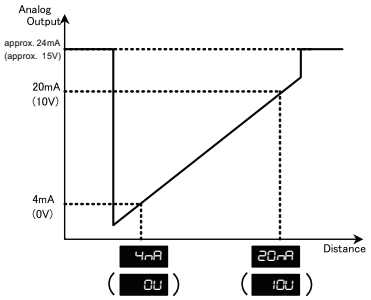


● FGS2
Teaching is done at a position. When the measurement distance is closer than the distance set by "Hysteresis toL "from the position that Teaching is done, the output will be ON. It works as FGS sensor.



Analog Output

Analog Current or Analog Voltage type outputs Analog output according to the measurement distance.
The distance range for Analog output is set in Teaching mode or Setup mode.



● Default value of each Analog output type

Current (Voltage)	CD22□-15□□	CD22□-35□□	CD22□-100□□
4nA (0U)	- 5.000	- 15.000	- 50.00
20nA (10U)	5.000	15.000	50.00

External Input

Multiple function can be set at external input. When it's set as "Teaching" or "Zero reset", The function varies by input period as follows.

■ Teaching

input period (sec.)	What to teach (Teaching current position)
0 to 0.5 sec.	Do nothing
0.5 to 1.5 sec.	Current output type : 4mA/ Voltage output type : 0V
1.5 to 2.5 sec.	Current output type : 20mA/ Voltage output type 10V
2.5 to 3.5 sec.	Near side threshold
3.5 to 4.5 sec.	Far side threshold
over 4.5 sec.	FGS2 threshold

■ Zero reset

input (sampling)	Function
0 to 1,999	Zero reset
over 2,000	Release Zero reset

Setup mode

Setup mode is chosen by pressing "SET" button from "Menu". (* means default value)

■ 1: Analog output setup (varies by type)

■ Voltage type
10U 10V ⇔ SET 0.123 Set the value
0U 0V ⇔ SET 0.123 Set the value

■ Current type
20nA 20mA ⇔ SET 0.123 Set the value
4nA 4mA ⇔ SET 0.123 Set the value

■ RS-485 type - no setup stage

■ 2: Near side threshold
nEAr ⇔ SET 0.123 Set the value

Default:		
	CD22□-15□□	-1.000
	CD22□-35□□	-03.00
	CD22□-100□□	-10.00

■ 3: 1 point Teaching - Far side threshold
FAr ⇔ SET 0.123 Set the value

Default:		
	CD22□-15□□	1.000
	CD22□-35□□	03.00
	CD22□-100□□	10.00

■ 4: FGS2 threshold
FGS2 ⇔ SET 0.123 Set the value

Default:		
	CD22□-15□□	0.000
	CD22□-35□□	00.00
	CD22□-100□□	00.00

■ 5: Teaching mode
ModE ⇔ SET

1Pt	1 point Teaching
FGS2	FGS2
2Pt	2 point Teaching *

■ 6:FGS2 hysteresis
toL ⇔ SET 0.123 Set the value

Default:		
	CD22□-15□□	1.000
	CD22□-35□□	03.00
	CD22□-100□□	10.00

■ 7: External input function
inP ⇔ SET

oFF	MF OFF : Disable exernal input *
LSr	Laser OFF : Kill laser power when input is ON
tch	Teaching : Set current value as threshold
S h	Sample hold : Keep the level when input is ON
onE	One shot : Active when input is ON
2Ero	Zero reset : Set current position as "0"

■ 8: Sampling period
SAMP ⇔ SET

500	500μs (2kHz) *
1000	1000μs (1kHz)
2000	2000μs (500Hz)
4000	4000μs (250Hz)
Auto	AUTO (Sensor will optimize automatically)

■ 9: Output polarity
Act. ⇔ SET

L on	Light ON: ON when exceeds the threshold *
d on	Dark ON: ON when less than the threshold

■ 10: NPN/PNP selection
n_P ⇔ SET

nPn	Set input/output as NPN *
PnP	Set input/output as PNP

This parameter won't be change by reset

■ 11: Averaging number
AVG ⇔ SET

1	Once
8	8 times
64	64 times *
512	512 times

■ 12: Alarm setting

CLMP	Clamp : display "9999" *
HOLD	Hold : keep previous value

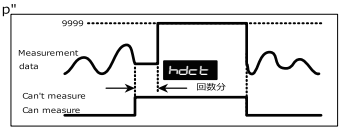
■ 12-2: Alarm - Hold and Clamp

0000 Set sampling number to Hold

When Alarm is set as HOLD, measurement data will be as follows for Alarm.

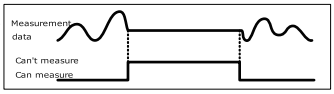
● "Hold and Clamp" is active

Keep the previous data for the period and clamp to "9999" after that.



● "Hold and Clamp" is not active (when it's set "0000")

Keep the previous data while it's Alarm status.



■ 13: Reset (Initializing)

YES	Initialize the parameters to default setting
NO	Do nothing

■ 14: Display setting

ON	Activate the display while "Key lock" *
OFF	Desable the display while "Key lock"

Extension mode

Extension mode is chosen by pressing "+" and "-" buttons at a time for 1 second.
Parameters in Extension mode must be set correctly otherwise it might not work correctly.
Please use with default setting when changing parameters is not needed. (" * " means default setting)

■ 1: Hysteresis

0.123 Set the value

Default: CD22□-15□□ 0.050
CD22□-35□□ 00.15
CD22□-100□□ 00.50

■ 2: Measurement point

Choose measurement point when it receives multiple reflection from the object.

MAX	MAX : Maximum distance *
Pt5	Pt5 : 5th point from sensor side
Pt4	Pt4 : 4th point from sensor side
Pt3	Pt3 : 3rd point from sensor side
Pt2	Pt2 : 2nd point from sensor side
Pt1	Pt1 : Closest point from sensor side

■ 3: Treshold

Set threshold level to recognize as measurement point.

BASE	Base : Set threshold to lowest level *
P400	P400 : Set threshold to upper level
P200	P200 : Set threshold to middle level
P100	P100 : Set threshold to lower level

■ 4: Time out

This is only for communication type. Set Time out period.

OFF	Disable Time out *
100M	Time out in 100ms
SMP	Time out in sampling period

■ 5: External input filter

Set filtering number for external input. The unit is sampling times.

1	Once *
≀	
256	256 times

■ 6: Zero shift

0.123 Set the value

■ 7: Sensitivity

Set Sensitivity of the sensor.

Auto	**Auto** : Adjust automatically *
n_6	6 : Maximum sensitivity
≀	
n_1	1 : Minimum sensitivity

Miscellaneous function

■ Zero reset function

● Set Zero reset

While it's measurement mode, press ZERO RUN for 2 seconds.
Then, 0.000 will be shown. The position of decimal point varies by sensor type.
When setting Zero reset, the red indicator LED "ZERO" will be ON.

● Release zero reset

While it's measurement mode, press ZERO RUN for 4 seconds to release Zero reset.

■ Key lock function

● Activate Key lock

While it's measurement mode, press + − at a time for 1 second. Then, LOC will be shown.
While LOC is shown, any access except "Releasing Key lock" will be neglected.

● Release Key lock

While Key lock is activated, it will be released by pressing + − at a time for 3 seconds. Then, ULOC will be shown.
After this process, every access will be accepted.

Attention: Not to be Used for Personnel Protection.
Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death. These sensors do not include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.
Please consult our distributors about safety products which meet OSHA, ANSI and IEC standards for personnel protection.

→ http://www.optex-fa.com/rohs_cn/

● **Specifications and equipment are subject to change without any obligations on the part of manufacture.**
● **For more information, questions and comments regarding products, please contact us below.**

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