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.

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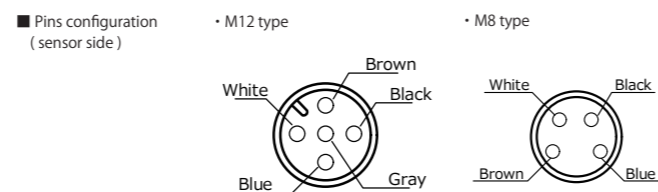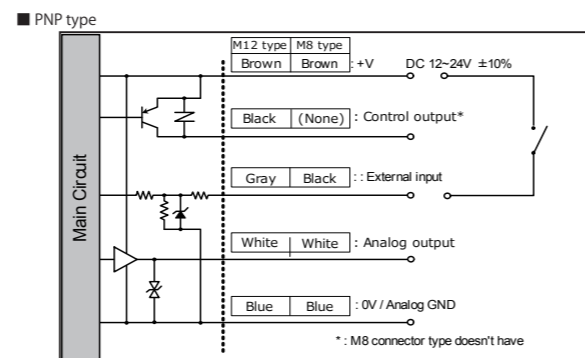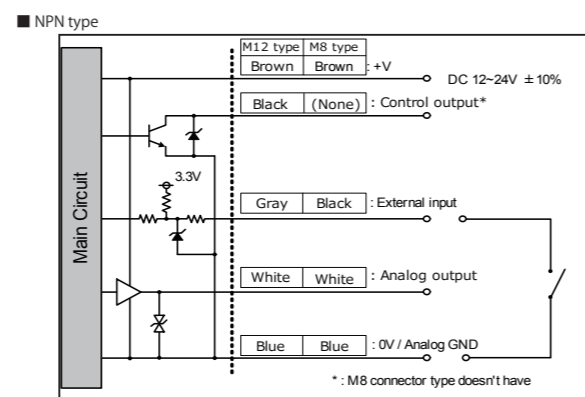
Laser diode
Wave length:655nm, Max output:10mW,//9 degree type.

Bundled goods in the box
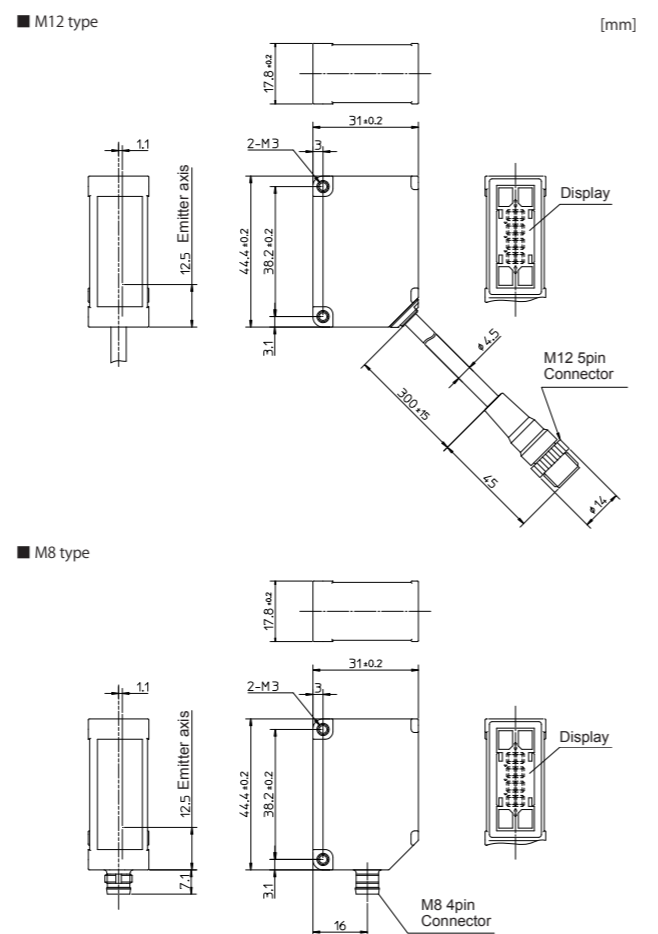
Please confirm following goods bundled in the box.

・CD22□-□□□□   ・This instruction manual   ・Screws
                                            M3 × 15…2
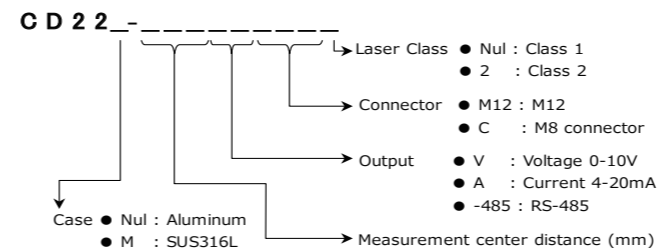
・Laser label [reserve]

Connection diagram

■ NPN type

M12 type	M8 type	
Brown	Brown	: +V — DC 12~24V ±10%
Black	(None)	: Control output*
Gray	Black	: External input
White	White	: Analog output
Blue	Blue	: 0V / Analog GND

* : M8 connector type doesn't have

■ PNP type

M12 type	M8 type	
Brown	Brown	: +V — DC 12~24V ±10%
Black	(None)	: Control output*
Gray	Black	:: External input
White	White	: Analog output
Blue	Blue	: 0V / Analog GND

* : M8 connector type doesn't have

■ Pins configuration (sensor side)

・M12 type
White / Brown / Black / Blue / Gray

・M8 type
White / Black / Brown / Blue

Dimensions

[mm]

■ M12 type

■ M8 type

Specifications

● Part number legend

C D 2 2 _ - _ _ _ _ _ _ _

→ Laser Class ● Nul : Class 1 ● 2 : Class 2
→ Connector ● M12 : M12 ● C : M8 connector
→ Output ● V : Voltage 0-10V ● A : Current 4-20mA ●-485 : RS-485
→ Measurement center distance (mm)
Case ● Nul : Aluminum ● M : SUS316L

● Specifications per measurement range

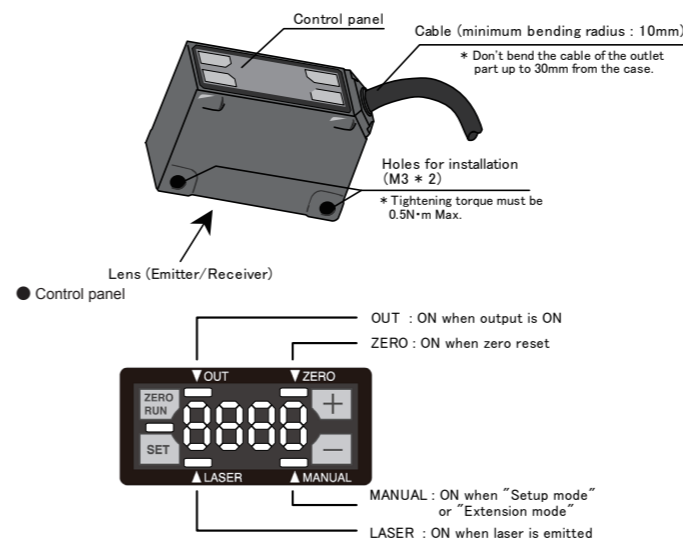| Part number	Aluminum housing	CD22-15□□	CD22-35□□	CD22-100□□
	SUS housing	CD22M-15□□	CD22M-35□□	CD22M-100□□
Center of measurement range		15mm	35mm	100mm
Measurement range		±5mm	±15mm	±50mm
Light source		Red laser Diode (wave length 655nm)		
		Max. output: 390 μW		Max. output: 1mW [3]
Laser class	IEC/JIS	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		
External Input		Laser OFF, Teaching, Sample & Hold, One shot, Zero reset		
Control Output		NPN/PNP max.100mA/DC30V ((Residual voltage 1.8 V max.)		
Current consumption		70mA max. including Analog output current		
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 resistence		10 ~ 55Hz, Double amplitude 1.5mm, X,Y,Z for 2 hours		
Shock resistence		500mm/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/e²(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 for Laser Class 2 type (Model : CD22-100AM122 , CD22-100VM122 , CD22-100A2 , CD22-100V2)

● Specifications per output

Part number	CD22□-□□V	CD22□-□□A	CD22□-□□-485
Type	Voltage output	Current output	RS-485 type
Analog output range	0 ~ 10V [1]	4 ~ 20mA	—
Maximum load impedance	—	300Ω	—
Output impedance	100Ω	—	—
Power supply	DC12-24V ±10% [1]		

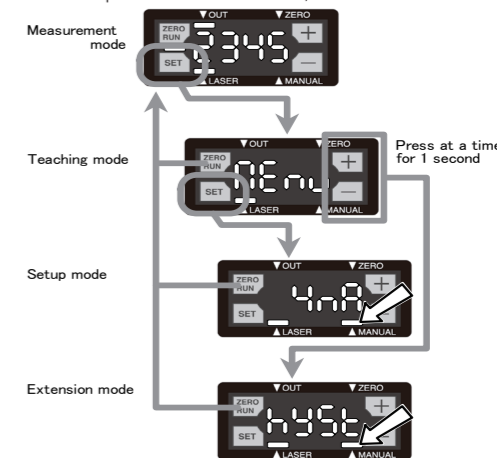※ 1   Please keep power supply voltage over 12.0V for Voltage output type to get 0-10V analog output correctly.

Functions of components

Control panel
Cable (minimum bending radius : 10mm)
* Don't bend the cable of the outlet part up to 30mm from the case.
Holes for installation (M3 * 2)
* Tightening torque must be 0.5N·m Max.
Lens (Emitter/Receiver)

● Control panel

OUT : ON when output is ON
ZERO : ON when zero reset
MANUAL : ON when "Setup mode" or "Extension mode"
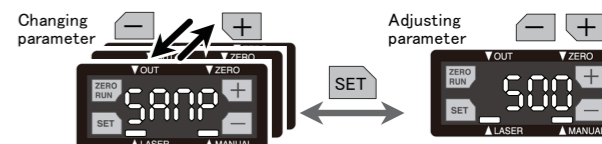LASER : ON when laser is emitted

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.

Measurement mode

Teaching mode   Press at a time for 1 second

Setup mode

Extension mode

● Changing parameters
You can choose and adjust the parameters by pressing "+" and "-" buttons.
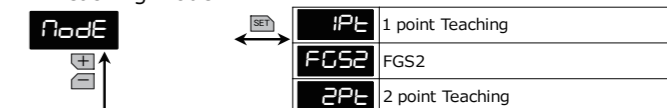The mode will be changed to "Measurement mode" by pressing "ZERO/RUN" button.

Changing parameter   Adjusting parameter

Teach mode

■ 1: Setup mode
∩Enu   → To Setup mode

■ 2: Teaching mode
∩odE   →
iPt	1 point Teaching
FGS2	FGS2
2Pt	2 point Teaching

■ 3: FGS2 threshold
FGS2   → tch Teaching current position

■ 4: Near side threshold
nEAr   → tch Teaching current position

■ 5: 1 point Teaching - Far side threshold
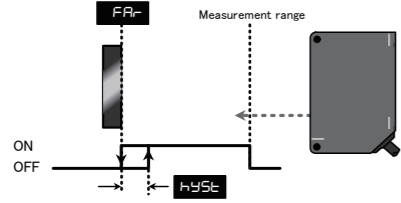FAr   → tch Teaching current postiion

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.
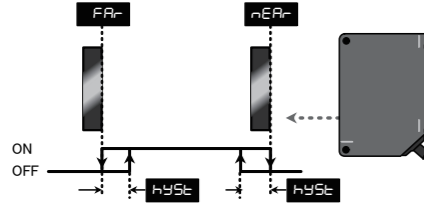

● FGS2
Teaching is done at a position. When the measurement distance is closer than the distance set by "Hysteresis toL "from the position that Teaching is done, the output will be ON. It works as FGS sensor.
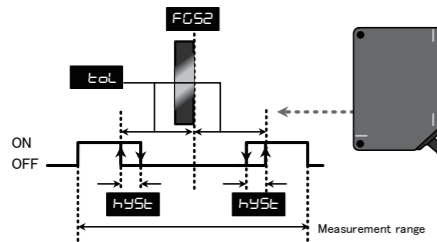
Analog Output

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.
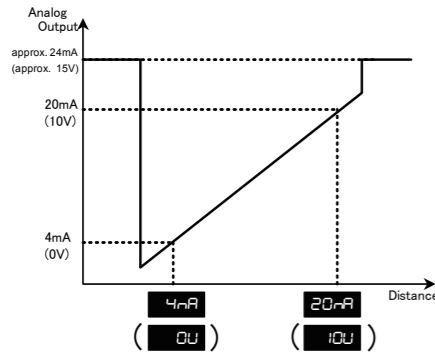
● Default value of each Analog output type

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 → 0.123 Set the value
0U 0V → 0.123 Set the value

■ Current type
20nA 20mA → 0.123 Set the value
4nA 4mA → 0.123 Set the value

■ RS-485 type - no setup stage

■ 2: Near side threshold
nEAr → 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 → 0.123 Set the value
Default: CD22□-15□□ 1.000
CD22□-35□□ 03.00
CD22□-100□□ 10.00

■ 4: FGS2 threshold
FGS2 → 0.123 Set the value
Default: CD22□-15□□ 0.000
CD22□-35□□ 00.00
CD22□-100□□ 00.00

■ 5: Teaching mode
NodE
IPt 1 point Teaching
FGS2 FGS2
2Pt 2 point Teaching *

■ 6:FGS2 hysteresis
toL → 0.123 Set the value
Default: CD22□-15□□ 1.000
CD22□-35□□ 03.00
CD22□-100□□ 10.00

■ 7: External input function
inP
oFF MF OFF : Disable external 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
ZEro Zero reset : Set current position as "0"

■ 8: Sampling period
SANP
500 500µs (2kHz) *
1000 1000µs (1kHz)
2000 2000µs (500Hz)
4000 4000µs (250Hz)
Auto AUTO (Sensor will optimize automatically)

■ 9: Output polarity
Act
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
nPn Set input/output as NPN *
PnP Set input/output as PNP
This parameter won't change by reset

■ 11: Averaging number
AUG
1 Once
8 8 times
64 64 times *
512 512 times

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
hYSt → 0.123 Set the value
Default: CD22□-15□□ 0.050
CD22□-35□□ 00.15
CD22□-100□□ 00.50

■ 2: Measurement point
NtoP
Choose measurement point when it receives multiple reflection from the object.
NAH 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
thrE
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
tout
This is only for communication type. Set Time out period.
oFF Disable Time out *
100n Time out in 100ms
SANP Time out in sampling period

■ 5: External input filter
inct
Set filtering number for external input. The unit is sampling times.
1 Once *
~
256 256 times

■ 6: Zero shift
ZEro → 0.123 Set the value

■ 7: Sensitivity
SEnS
Set Sensitivity of the sensor.
Auto Auto : Adjust automatically *
n__6 6 : Maximum sensitivity
~
n__1 1 : Minimum sensitivity

(column 3)

■ 12: Alarm setting
ALrn
cLNP Clamp : display "9999" *
hoLd Hold : keep previous value

■ 12-2: Alarm - Hold and Clamp
hdct → 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)
rESt
YES Initialize the parameters to default setting
no Do nothing

■ 14: Display setting
di SP
on Activate the display while "Key lock" *
oFF Desable the display while "Key lock"

Miscellaneous function

■ Zero reset function

● Set Zero reset
While it's measurement mode, press ZERO 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.

● 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.

Manufactured and sold by :

OPTEX FA CO.,LTD.

Displacement sensor

CD22 Series

CD22-15-485□□   CD22M-15-485□□
CD22-35-485□□   CD22M-35-485□□
CD22-100-485□□   CD22M-100-485□□

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.

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.
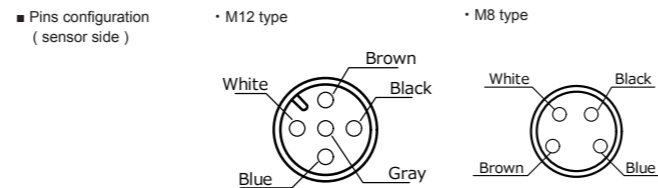
Included items

Before using this product, confirm that the following items are contained in the package.

• CD22□-□□□□   • This instruction manual   • Screws
       M3 x 15   2 pieces
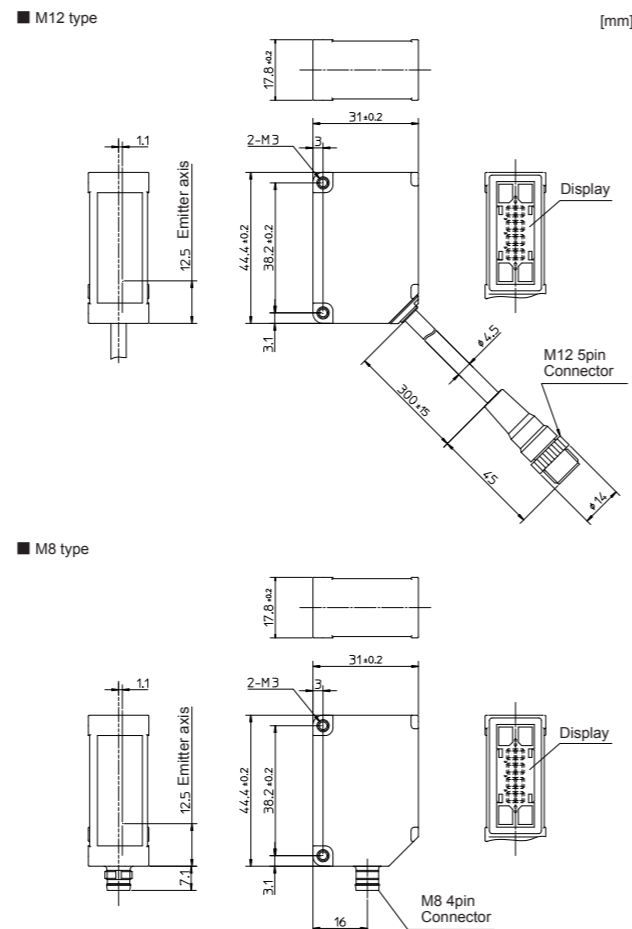
• Laser label

Pins configuration and cable color

Pins configuration of the connector and cable color are as follows.
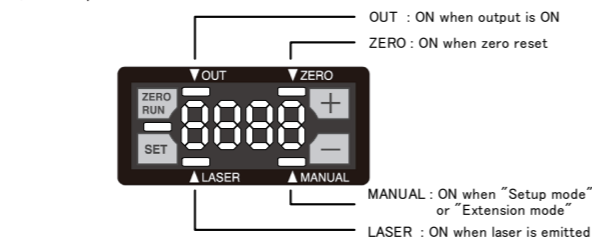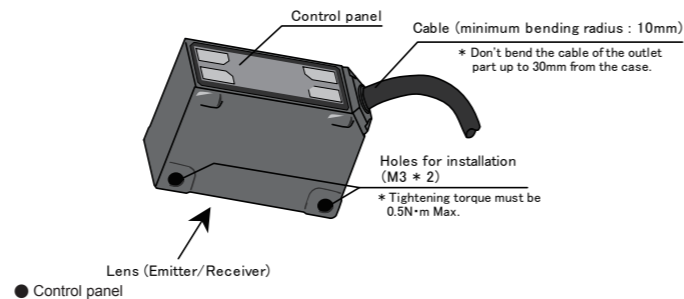
Color	Description
Brown	12-24VDC ±10%
Blue	0V
Gray	(N.C.)
Black	RS-485(A)
White	RS-485(B)

■ Pins configuration (sensor side)

• M12 type
Brown
Black
White
Blue
Gray

• M8 type
White
Black
Brown
Blue

Dimensions

■ M12 type   [mm]

17.8±0.2
1.1
12.5 Emitter axis
31±0.2
2-M3
44.4±0.2
38.2±0.2
3.1
Display
M12 5pin Connector
300±15

■ M8 type

17.8±0.2
1.1
12.5 Emitter axis
31±0.2
2-M3
44.4±0.2
38.2±0.2
3.1
Display
7.1
16
M8 4pin Connector

Functions of components

Control panel
Cable (minimum bending radius : 10mm)
※ Don't bend the cable of the outlet part up to 30mm from the case.

Holes for installation (M3 ＊ 2)
※ Tightening torque must be 0.5N・m Max.

Lens (Emitter/Receiver)

● Control panel

▼OUT ▼ZERO
ZERO RUN
SET
＋
－
▲LASER ▲MANUAL

OUT : ON when output is ON
ZERO : ON when zero reset
MANUAL : ON when "Setup mode" or "Extension mode"
LASER : ON when laser is emitted

Specifications

● Part number legend

C D 2 2 _ _ _ _ _ _ _ _ _ _

Laser Class ● Nul : Class 1
          ● 2 : Class 2
Connector ● M12 : M12
         ● C : M8 connector
Output ● V : Voltage 0-10V
      ● A : Current 4-20mA
      ● -485 : RS-485
Measurement center distance (mm)
Case ● Nul : Aluminum
     ● M : SUS316L

● 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 resistence		10 ~ 55Hz, Double amplitude 1.5mm, X,Y,Z for 2 hours		
Shock resistence		500mm/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/e²(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.
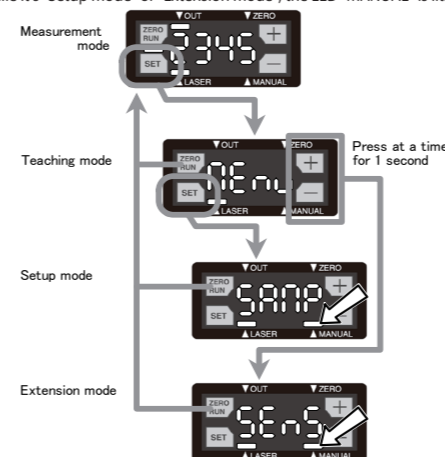※ 2 512 averaging time
※ 3 Laser Class 2 type (Model: CD22-100-485M122 ,CD22-100-485C2)
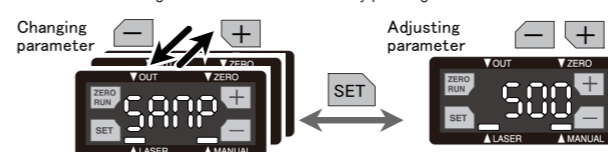
Setup

● 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.

Measurement mode — 5345

Teaching mode — ΠΕnu   Press at a time for 1 second

Setup mode — SAΠP

Extension mode — SEnS

● Changing parameters
You can choose and adjust the parameters by pressing "+" and "-" buttons.
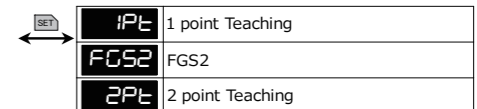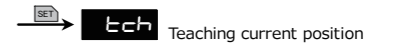The mode will be changed to "Measurement mode" by pressing "ZERO/RUN" button.

Changing parameter — SAΠP   SET   Adjusting parameter — S00

Teach mode

■ 1: Setup mode
ΠΕnu   SET → To Setup mode

■ 2: Teaching mode
ΠodE
     SET
     1Pt   1 point Teaching
     FGS2   FGS2
     2Pt   2 point Teaching

■ 3: FGS2 threshold
FGS2   SET → tch   Teaching current position

■ 4: Near side threshold
nEAr   SET → tch   Teaching current position

■ 5: 1 point Teaching - Far side threshold
FAr   SET → tch   Teaching current postiion

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.

FAr   Measurement range
ON
OFF
HYSt

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

FAr   nEAr
ON
OFF
HYSt   HYSt

● 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.

FGS2
tol
ON
OFF
HYSt   HYSt   Measurement range

Setup mode

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

■ 1: Buad rate

bAud	SET		
		96	9,600bps *
		192	19,200bps
		384	38,400bps
		576	57,600bps
		1152	115,200bps
		2304	230,400bps
		3125	312,500bps
		4688	468,750bps
		5000	500,000bps
		6250	625,000bps
		8333	833,333bps
		9375	937,500bps
		1250	1,250,000bps

■ 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

nodE	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: Sampling period

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

■ 8: Output polarity

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

■ 9: Averaging number

AUG	SET		
		1	Once
		8	8 times
		64	64 times *
		512	512 times

■ 10:アラーム（測定不能）時の挙動

ALrn	SET		
		cLnP	クランプ ： 異常値（9999）を出力します *
		hoLd	ホールド ： 直前の値を保持し続けます

■ 10-2:アラーム時ホールドカウント

hdct	SET	0000	（数値直接入力 ： サンプリング回数）

アラーム時挙動 hoLd 設定時、測定不能時には以下のように動作します。

● 「ホールドカウント」設定時

※ アラーム時ホールドカウントの指定回数分ホールドした後、「9999」を出力

● 「ホールドカウント」未設定時

※ ホールドカウント「0000」設定値は常に直前の値を保持します

■ 11: Reset (Initializing)

rESt	SET		
		YES	Initialize the parameters to default setting
		no	Do nothing

■ 12: Display setting

diSP	SET		
		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

hYSt	SET	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.

ntoP	SET		
		nAX	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: Threshold

Set threshold level to recognize as measurement point.

thrE	SET		
		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

■ 6: Zero shift

Set display value for Zero reset .

2Ero	SET	0.123	Set the value

■ 7: Sensitivity

Set Sensitivity of the sensor.

SEnS	SET		
		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.

Communication

Specifications are as follows.

Communication method	RS-485 Half Duplex (Multi-drop I/F is not supported)
Transmission code	Binary
Data length	8bit
Stop length	1bit
Parity check	Nil
Baud rate (bps)	9.6k/19.2k/38.4k/57.6k/115.2k/230.4k/312k/460k/500k/625k/833k/920k/1.25M
Data classification	STX / ETX

■ Data Format

Transmission data :

STX	COMMAND	DATA1	DATA2	ETX	BCC

Incoming data :

STX	ACK	RESPONSE1	RESPONSE2	ETX	BCC

Incoming data (error) :

STX	NAK	ERROR CODE	00H	ETX	BCC

STX = 02H , ETX = 03H , ACK = 06H , NAK = 15H , BCC = XOR of values hatched

Basic commands

C(43H)	Reading out Measurement value/Output status
W(57H)	Writing the setting
R(52H)	Reading out setting

Error code table

02H	Address is invalid
04H	BCC value is invalid
05H	Invalid command is issued except "C", "W", "R"
06H	Setting value is invalid (out of specifications)
07H	Setting value is invalid (out of range)

■ C(43H) parameter table (Reading out Measurement value/Output status)

Command	Type	DATA1 (upper)	DATA2 (lower)	Description
Reading out Measurement value	Write	B0h	01h	
	Read	Upper data	Lower data	Response in 2 bytes [1]
Reading out Output status	Write	B0h	02h	
	Read	00h	Output status	bit:0 = 1 (ON) bit:4 = 0 (the status has been read)
Writing the setting	Write	A0h	00h	Write the setting into EEPROM. The setting will be dissapeared if this command is not done.
	Read	00h	00h	
Dismissing the setting	Write	A0h	01h	Dismiss the setting and set the parameters to previous value back.
	Read	00h	00h	
Teaching FGS2	Write	11h	05h	
	Read	00h	00h	
Teaching near side point	Write	11h	06h	
	Read	00h	00h	
Teaching far side point	Write	11h	07h	
	Read	00h	00h	
Laser ON	Write	A0h	03h	
	Read	00h	00h	
Laser OFF	Write	A0h	02h	
	Read	00h	00h	
Execute Zero reset	Write	A1h	00h	
	Read	00h	00h	
Release Zero reset	Write	A1h	01h	
	Read	00h	00h	
Execute Key lock	Write	A1h	04h	
	Read	00h	00h	
Release Key lock	Write	A1h	05h	
	Read	00h	00h	
Initializing	Write	40h	00h	Initialize all parameters except communication speed and re-boot. The communication won't worrk while initializing.
	Read	00h	00h	

*1 : Measurement value is described as following.

Model	CD22□-15-485-□		CD22□-35-485-□		CD22□-100-485-□	
Range	±5mm		±15mm		±50mm	
Unit	1µm		10µm		10µm	
Data (Hex)	EC78h	1388h	FA24h	05DCh	EC78h	1388h
Data (Decimal)	-5000	+5000	-1500	+1500	-5000	+5000

■ Writing Data

Writing is done as following proceedure.

1. Read out setting
   Execute Command "R" (Reading out setting) on the target parameter.
   Set "Address" at "DATA1" and "DATA2".

2. Write setting
   Execute Command "W" (Writing the setting) on the target parameter.
   Writing data is done to the address set at "1. Read setting".

Example: Setting "Sampling period" to "AUTO"
1. Read out "Sampling period"

Transmission command :

STX (02h)	R (52h)	40h	06h	ETX (03h)	BCC (14h)

Incoming data :

STX (02h)	ACK (06h)	00h	00h	ETX (03h)	BCC (06h)

2. Write the setting

Transmission command :

STX (02h)	W (57h)	00h	04h	ETX (03h)	BCC (53h)

Incoming data :

STX (02h)	ACK (06h)	00h	00h	ETX (03h)	BCC (06h)

* Incoming data of command "W" (Writing the setting) will be "00h" and "00h".

■ Setting parameter table

Setting	Address/ Parameter	DATA1 (upper)	DATA2 (lower)	Description
Model type	Address	01h	00h	Return center value of measurement range (only for checking model type)
	Parameter	00h	0Fh	15mm type
		00h	23h	30mm type
		00h	64h	100mm type
Measurement mode	Address	40h	04h	
	Parameter	00h	00h	2 point Teaching
		00h	01h	1 point Teaching
		00h	02h	FGS2 Teaching
Near side threshold	Address	41h	00h	
	Parameter	Upper data	Lower data	
Far side threshold	Address	41h	00h	
	Parameter	Upper data	Lower data	
FGS2 threshold	Address	41h	04h	
	Parameter	Upper data	Lower data	
FGS2 hysteresis	Address	41h	06h	
	Parameter	Upper data	Lower data	
Output polarity	Address	40h	08h	
	Parameter	00h	00h	Light ON: ON when exceeds the threshold
		00h	01h	Dark ON: ON when less than the threshold
Sampling period	Address	40h	06h	
	Parameter	00h	00h	500µs
		00h	01h	1,000µs
		00h	02h	2,000µs
		00h	03h	4,000µs
		00h	04h	AUTO
Averaging number	Address	40h	0Ah	
	Parameter	00h	00h	Once
		00h	01h	8 times
		00h	02h	64 times
		00h	03h	512 times
Alarm setting	Address	40h	0Ch	
	Parameter	00h	00h	Clamp
		00h	01h	Hold
Alarm - Hold and Clamp	Address	41h	0Ch	
	Parameter	Upper data	Lower data	
Display setting	Address	40h	0Eh	
	Parameter	00h	00h	ON
		00h	01h	OFF
Hysteresis	Address	41h	0Eh	
	Parameter	Upper data	Lower data	
Measurement point	Address	40h	10h	
	Parameter	00h	00h	MAX. : Maximum distance
		00h	01h	Pt5 : 5th point from sensor side
		00h	02h	Pt4 : 4th point from sensor side
		00h	03h	Pt3 : 3rd point from sensor side
		00h	04h	Pt2 : 2nd point from sensor side
		00h	05h	Pt1 : Closest point from sensor side
Threshold	Address	40h	12h	
	Parameter	00h	00h	Base : Lowest level
		00h	01h	Level 400 : Upper level
		00h	02h	Level 200 : middle level
		00h	03h	Level 100 : lower level
Zero shift	Address	41h	12h	
	Parameter	Upper data	Lower data	
Sensitivity	Address	40h	14h	
	Parameter	00h	00h	AUTO
		00h	01h	6 : Maximum sensitivity
		00h	02h	5
		00h	03h	4
		00h	04h	3
		00h	05h	2
		00h	06h	1 : Minimum sensitivity

* Execute the command "R" (Read out) before executing command "W" (Write).

Manufactured and sold by :