

CD33-L50□□

INSTRUCTION MANUAL

- Before the use, you should first thoroughly read this
- You should keep this manual at hand for proper use.

Carefully read and understand the safety precautions before operation. The important information is provided to protect your health and property. Do not apply any other installing or operating procedure other than that

Meanings of Safety Symbol



Indicates a possible hazard that may result in death, MARNING wARNINGS or serious property damage if the product is used without observing the stated

WARNING Mandatory Requirements

- The light source of this product applies the visible light semiconductor laser. Do not allow the laser beam to enter an eve, either directly or reflected from reflective object. If the laser beam enters an eye, it may cause blindness.
- 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
- This product is not an explosion proof construction. Do not use the product under flammable , explosive gas or liquid environment.

 • Use of controls or adjustments or performance of procedures other
- than those specified herein may result in hazardous radiation exposure

MARNING Safety Precautions

- It is dangerous to wire or attach/remove the connector with the power
- 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
- A place generating corrosive gas
 A place directly receiving scattering water or oil.
 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 letection. Also, avoid direct impact on the product
- ●This product cannot be used as a safety device to

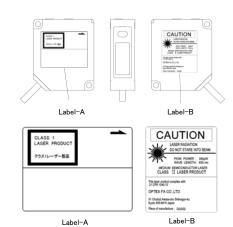
Precautions for using laser

■Laser label

This product is classified as Class 1 by JIS C6802/IEC and Class II by FDA Laser Product Laser Safety Standard

●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



Specifications

● Specifications of Measuring Range

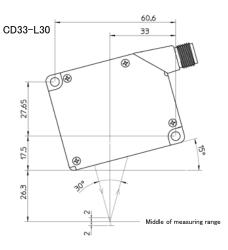
Opcomoac											
Туре	Cable type	CD33-L30N(P)	CD33-L50N(P)	CD33-L85N(P)							
Type	Connector type	CD33-L30CN(P)	CD33-L50CN(P)	CD33-L85CN(P)							
Center		26.3mm	47.3mm	82.9mm							
Measuring ra	ange	±2mm	±10mm								
Light source	,	Red laser Diode (wave length 655nm)									
Peak power		Max. output 390 μ W									
Laser Class	IEC/JIS	CLASS1									
Laser Olass	FDA	CLASS II									
Spot size	Near	0.15 × 0.15mm	0.15 × 0.15mm	0.15 × 0.15mm							
(approx. volume)	Middle	0.1 × 0.1mm	0.1 × 0.1mm	0.1 × 0.1 mm							
*1	Far	0.15 × 0.15mm	0.15 × 0.15mm	0.15 × 0.15mm							
Linearity *2		±0.2% F.S. (F.S.=4mm)	±0.2% F.S. (F.S.=10mm)	±0.2% F.S. (F.S.=20mm)							
Resolution *3		1 μ m	1 μ m 2.5 μ m								
	Fast	averaging: 1 time 5ms max.									
Response time	Standard	averaging: 16 times 12.5ms max.									
ume	High resolution	averaging: 64 times 36.5ms max.									
Sampling per	riod	500 /1000 /1500 /2000 μ s									
Temperature	e Drift	±0.08% F.S./°C									
Indicators	Distance Indicator	Bar graph LED									
indicators	Output Indicator	ON status : Orange									
MF (multi fu	nctional) input	Laser off, Remote teaching, Sample Hold (choose one function) Response time: 3ms max.									
Circuit prote	ection	Reverse polarity, Over current									
Protection C	Category		IP67								
Operating te	emp./humidity	-10~+45°C/3	35∼85%RH (No condensatio	on or freezing)							
Storage tem	p./humidity	-20 ~ +60°C/3	5∼95%RH (No condensatio	on or freezing)							
Ambient Ligh	ht	Sun light: 10,000	lx max. / Incandescent lar	mp: 3,000 lx max.							
Vibration res	sistance	10 to 55 Hz, D	ouble amplitude 1.5 mm, 2 l	h for XYZ axes							
Shock resist	tance	·	50G (500m/s2)								
Warm up per	riod		15min max.								
Material		PBT	(Case) PMMA (Front wind	low)							
Woight	Cable type	-	Approx. 65g (without cable)	,							
Weight	Connector type	Approx. 70g									

- *1 Defined with center strength 1/e2(13.5%). There may be leak light other than the specified spot size. The sensor may be damaged when there is a highly reflective object around the targets.
- *2 Averaging: 64(High resolution), Sampling period:500 μ s. Object: white ceramic
- *3 Middle of measuring range, Object: white ceramic. *4 Diameter of min bend cable is 40mm.

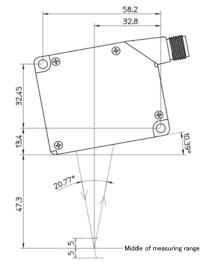
Dimension

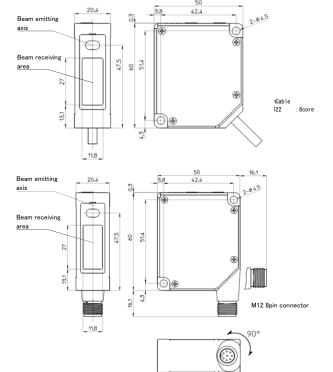
Installation

Install the sensor and adjust the light spot onto the measuring point so that the distance indicator turns ON (orange) at the middle of measuring points of distance indicator turns ON (orange) at the middle of measuring range. Use M4 screw (tightening torque need to be under 0.8N·m).

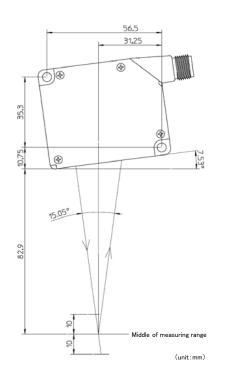


CD33-L50



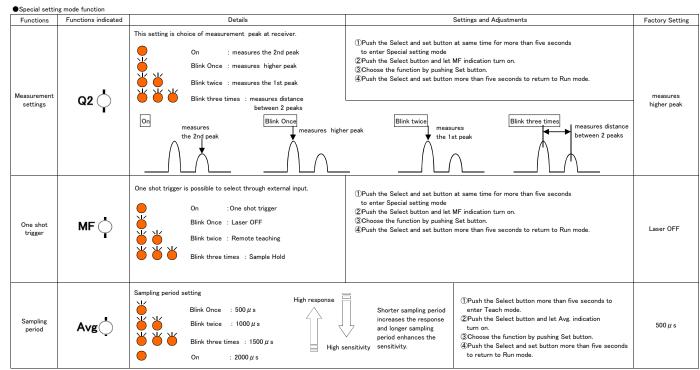


CD33-L85



Functions

Functions	Functions indicated	Details	Settings and Adjustments	Factory Setting
Output setting —	Q1 💍	set the range of Control Output. One point teaching :From the position of the teaching - 0.15%(FS) to the Near side of the sensing range. Two points teaching :Between the position of the first point teaching +0.15%(FS) and the position of the second point teaching -0.15%(FS). One point reverse teaching: From the position of the teaching +0.15%(FS) to the Far side of the sensing range. Range of sensing of One Point Teaching	● One point teaching ①Push the Select button more than five seconds to enter Teach mode. ②Push the Select button and let Q1(Q2) indication turn on. ③Set the object in the position that you want to measure and push the Set button ④ 01(Q2) indication flashes one time. In the case of adjustment failure, indication flashes for five seconds. Try again getting back to ② of above. ● Two points teaching ①Push the Select button more than five seconds to enter Teach mode. ②Push the Select button and let Q1(Q2) indication turn on ③Set up the object at the first point of the range that you want to measure and push the Set button ④ 01(Q2) indication flashes one time. In the case of adjustment failure, the indication flashes for five seconds. Try again getting back to ② of above.	The output in the
	Q2 🖒	Range of sensing of Two Points Teaching Range of sensing of One Point Reverse teaching	G01(02) which you Set up the object to the second point you want to measure, and push the Set button. O1(02) indication flashes two times. In the case of the adjustment failure that the indication flashes for five seconds. Try again getting back to £0 of above. ⑤ Push the Select button more than five seconds to return to Run mode. ⑥ One point Reverse teaching ① Push the Select button more than five seconds to enter Teach mode. ② Push the Select button more than five seconds to enter Teach mode. ② Push the Select button and let Q1(Q2) indication turn on ③ Set the object in the position that you want to measure and push the Set button more than five seconds. ④ Q1(Q2) indication flashes one time. In the case of adjustment failure, the indication flashes five seconds. ⑤ Push the Select button more than five seconds to return to Run mode.	measurement ran, & Self-diagnosis 4
External input	MF	Select the function of the external input. Blink Once : Laser OFF Blink twice : Remote teaching Blink three times : Sample Hold	①Push the Select button more than five seconds to enter Teach mode. ②Push the Select button and let MF indication turn on. ③Choose the function you need by pushing Set button. ④Push the Select button more than five seconds to return to Run mode.	_
		MF input Laser output Remote teaching Sample Hold Analog output	Input time (refer to Remote Teaching) Hold the output during inputs.	Laser OFF
		One Shot Trigger Analog output *Possible to choose One Shot Trigger by Special setting mode.	Update the output by edge of the input and hold the output until next input	
Averaging	Avg	Average count setting Blink Once : Fast (averaging 1 time) Blink twice : Standard (averaging 16 times) Blink three times : High Res. (averaging 64 times)	①Push the Select button more than five seconds to enter Teach mode. ②Push the Select button and let Avg. indication turn on. ③Choose the function by pushing Set button. ④Push the Select button more than five seconds to return to Run mode.	averaging: 16



- When the Teach mode / special setting mode it returns to RUN if no operation in given for 60 seconds *1 Self-diagnosis output comes at the time of (1) laser stop (2) saturation by mirror-like object or (3) low sensitivity.
- This function does not work when you set the output of Q2. Reset the product when you want to use self-diagnosis again

Communication

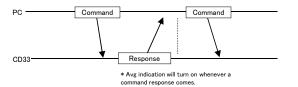
Specification

Communication method	RS422
Synchro system	Asynchronous
Baud rate	9600/19200/38400/76800 bps *
Transmission code	ASCII
Data length	8 bit
Stop bit length	1 bit
Parity check	Nil
Data classification	STX*ETX

* Baud rate :9600bps at factory set

■Communication Procedure

When PC sends a command to CD33 $\,$ it sends back a response to the PC. In principle one response is given to one command. When sending a command, make sure if you receive the response to the previous command.



●Transmission Data Format (Command)

Reading out Setting/Measurement Value/Output Status

02H		03H
STX	COMMAND	ETX
1	2	3

1 The code showing the head of transmit data (02H).

2 Selects the command to transmit.

Writing the setting

02H		20H		03H
STX	COMMAND	SPACE	COMMAND	ETX
1	2	3	4	5

- 1 The code showing the head of transmit data (02H).
- 2 Selects the command to transmit.
- 3 Shows the separation between Command and Command (20H).
- 4 Set the Setting/Measurement Value/Output Status.

●Incoming Data Format (Response)

02H		03H
STX	RESPONSE	ETX
1	2	3

- 1 The code showing the head of incoming data (02H).
- 2 The response data is set to the transmitted comman
- 3 The code showing the completion of incoming data (03H).

The following four responses are for the written commands:

> (3EH) :Writings completed

:Writings rejected due to wrong command, etc.

(Numerical value) : Measurements or settings

Continuous readout of measurement value Readout the measurements continuously at "START_MEASURE" command. The response of this case never has STX, ETX. CR(0DH) is

inserted between the measurements. 85.0000<CR>85.0001<CR>85.0···

Sure to use the command "STOP MEASURE" to stop the continuous reading. Any other command will be valid until the stop command is set. Continuous reading will not be activated simultaneously.

Command Table

<For diffuse reflection /specular reflection type>

	use reflection / Command	type*	Initial value	Description	Example of Response		
	OTADT ME COURS			Ctart and and a			
	START_MEASURE	CR	-	Start continuous reading of measurements	85.0000[CR]85.0001[CR]85.0···		
Read the	STOP_MEASURE	-	-	Stop continuous reading of measurements	[STX] > [ETX]		
	MEASURE	R	-	Read the measurements	[STX] 85.0000 [ETX]		
measurements	START_MEASURE_S	CR	-	Start continuous reading of measurements and sensitivity *1	85.0000 121[CR]85.0001 121[CR]85.0···		
	STOP_MEASURE_S	-	-	Stop continuous reading of measurements and sensitivity *1	[STX] > [ETX]		
	MEASURE_S	R	-	Read the measurements and sensitivity	[STX]85.0000 121[ETX]		
S	TART_Q2	CR	-	Start continuous Q2 output	ON[CR]ON[CR]OFF[CR]OFF		
S	TOP_Q2	-	-	Stop continuous Q2 output	[STX] > [ETX]		
	Q2	R	-	Read Q2 output	[STX]ON[ETX]		
	Q2_HI	R	-	Read actual setting of Q2 Hi	[STX]105.0000[ETX]		
00	Q2_LO	R	-	Read actual setting of Q2 Lo	[STX]65.0000[ETX]		
Q2 setting	Q2_HI()60.000	w	-	Set Q2 Hi for example to 60mm *2	[STX] > [ETX] or [STX]?[ETX]		
	Q2_LO()40.000	w	-	Set Q2 Lo for example to 40mm *2	[STX] > [ETX] or [STX]?[ETX]		
	Q2 DEFAULT	R	•	Set Q2 to default (Self-diagnosis output)	[STX] > [ETX]		
	AVG	R	-	Read setting of the response time	[STX]FAST[ETX]		
	AVG()FAST	w	-	Set response time to Fast	[STX] > [ETX]		
Avg. setting	AVG()MEDIUM	w	•	Set response time to Standard	[STX] > [ETX]		
	AVG()SLOW	w	-	Set response time to High resolution	[STX] > [ETX]		
	MF	R	_	Read setting of multi functional inputs	[STX]LSR OFF[ETX]		
Multi functional	MF()LSR_OFF	w	•	Set to Laser off (default)	[STX] > [ETX]		
	MF()SH	w	-	Set to Sample Hold	[STX] > [ETX]		
Multi functional input	MF()TEACH	w	-	Set to external Teach	[STX] > [ETX]		
	MF()OS	w	-	Set to one shot by trigger or command	[STX] > [ETX]		
	ALARM	R	-	Read actual setting for Alarm	[STX]CLAMP[ETX]		
Alarm	ALARM()CLAMP	w	•	Set Alarm to clamp	[STX] > [ETX]		
setting	ALARM()HOLD	w	-	Set Alarm to Hold	[STX] > [ETX]		
RI	ESET	w	-	Reset all settings to default settings	[STX] > [ETX]		
0	N	w	-	Set MF active	[STX] > [ETX]		
0	FF	-	_	Set MF inactive	[STX] > [ETX]		
External	ON()500	w	-	Q2: One point teaching The second point of two points of teaching; Complete input of the same command within one minute.	[STX] > [ETX]		
Teach	ON()600	w	-	Q2: One Point Reverse teaching	[STX] > [ETX]		
	ON()700	w	-	Offset *8 *9	[STX] > [ETX]		
	ON()5000	w	-	Offset cancel	[STX] > [ETX]		
S/	AVE	R	-	Save all setting			
W	'RITE()xxxx	w	-	Write all setting *3			
SI	ERIAL_NO	R	-	Read Serial number *4	[STX]xxxxxxxxxF[ETX]		
U	SER DATA	R	-	Read user Data	[STX]xxxxxxxxxxxxxxx[ETX]		
U	SER_DATA()xxx	W	-	Write user data (max. 16 byte ASCII) *5	[STX] > [ETX]		
BI	IT_RATE	R	-	Read actual setting for Bit rate	[STX]9.6K[ETX]		
	IT_RATE()9.6	w	9.6	Set baud rate *6	[STX] > [ETX]		
	AMPLE_RATE	R	-	Read actual setting for sampling period	[STX]500US[ETX]		
	AMPLE_RATE()500	w	500	Set sampling period *7	[STX] > [ETX]		
				ling command, R: Reading comman			

Command type = CR: Continuous reading command, R: Reading command, W: writing command The space (20H) is shown as () for convenience.

- *1 Sensitivity is automatically adjusted between the value of 0 and 223. (0 as Low limit, 223 as HIGH limit). Manual setting of sensitivity is not available.
- *2 Input the distance to set by mm. Possible to input decimal four columns, but the setting distance over the detection performance becomes invalid.
- *3 Write the values in turn as they have been read out in the SAVE.
- *4 Reads out the serial numbers (11 digit) that is printed in the product label on the back.
- *5 Up to 16byte by ASCII code
- *6 Baud rate is 9.6kbps at factory set. Choose baud rate among (9.6/19.2/38.4/57.6/76.8/115.2/128/256kbps)
- *7 Sampling period is $500 \,\mu$ s at factory set. Choose sampling period among ($500/1000/1500/2000 \,\mu$ s)
- *8 While Offset is activated, it will output displacement data including minus sign for the data smaller than zero.
- *9 Please set MF input as "Remote teaching" when you activate Offset.

<Only for specular reflection type>

	Command	type*	Initial value	Description	Example of Response	
	MODE	R	HIGHEST	Read out measurement settings	[STX] HIGHEST [ETX]	
Measurem	MODE()HIGHEST	W	•	measures higher peak	[STX] > [ETX]	
ent	MODE()FIRST	W	-	measures the 1st peak	[STX] > [ETX]	
settings	MODE()LAST	W	-	measures the 2nd peak	[STX] > [ETX]	
	MODE()GLASS	W	-	measures distance between 2 peaks	[STX] > [ETX]	
PI	XEL_DATA	R	-	Read out pixel level (1024byte) and header (16byte) data from receiver	See below.	
	SENSE		-	Read out sensitivity value (0-223). The bigger higher sensitivity.	AUTO_XXX / FIX_XXX	
Sensitivity			Change the sensitivity mode to automatic. Use fixed auto sensitivity usually.	[STX] > [ETX]		
Measurem ent settings				[STX] XXXX [ETX]		
Zero	ZSUPPRESS			Read out the current zero suppress setting. (Zero suppress : Rejecting "0" at the forefront of the data.)	[STX] ON [ETX] / [STX] OFF [ETX]	
	ZSUPPRESS()ON	W	ON	Use zero suppress (default setting).	[STX] > [ETX]	
Sensitivity setting Zero suppress setting Multi functional input logic setting	ZSUPPRESS()OFF	W	-	Does not use zero suppress.	[STX] > [ETX]	
Measurem ent settings PIX Sensitivity setting Zero suppress setting Multi functional input logic setting	LOGIC	OGIC R		Read out the current multi function input (MF: gray cable) status.	[STX] NORMAL [ETX] / [STX] INVERTED [ETX]	
	LOGIC()NORMAL	w	NORMAL	Change the logic of the multi function input to "Normal mode".(NPN:connect 0V to active / PNP: connect +V to active)	[STX] > [ETX]	
	LOGIC()INVERTED	W	-	Change the logic of the multi function input to "Inverted mode".(NPN:connect +V or open to active / PNP: connect 0V or open to active)	[STX] > [ETX]	
	GLASS_T	R	-	Read out the refractive index for correction value for measurement of the glass thickness.	[STX] XXX [ETX]	
	GLASS_T xxx	w	_	Teaching the refractive index using gauge glass. Measure the glass thickness and send its know thickness.	[STX] > [ETX]	

●Reading format of PIXEL_DATA

Response is 1040byte data including header and pixel data (No STX and ETX)

Header 16byte	Pixel deta : 512pixcel 1pixel = 2byte 1024byte

Header data 16byte at the forefront of the data.

bit data	0byte	1byte	2byte	3byte	4byte	5byte	6byte	7byte	8byte	9byte	10byte	11byte	12byte	13byte	14byte	15byte
lower/higher	Ĺ	Ĥ	Ĺ	Ĥ	Ĺ	Ĥ	Ĺ	Ĥ	Ĺ	Ĥ	Ĺ	H	L	H	Ĺ	H
		,	,	,	1	•		,								
	read the measurement settings read t		read the firs	t peak pixel	read the seco	nd peak pixel	peak pixel reading threshold		reserve		reserve		reserve		serve reserve	
	0	Highest	lighest response by 0-5		response by 0-511											
	1	First			(number		response threshold			_ _ `			\	_		
	2	Glass		(number is pixel position)				response un esnoid								
	3	Last	posi	.1011)	position)											
example																
Hex	02	00	42	01	00	00	1C	04	00	00	00	00	00	00	00	00
Dec	2	2	322		()	10	52	()	0		Ö		0	

XOne data is 2byte(16bit)

XPart of reserve data is response by 00 00

XONE

Pixel data 1024hvte data after header data

1024byte da	ata arter ne	ader data											
bit data	0byte	1byte	2byte	3byte	4byte	5byte		1018byte	1019byte	1020byte	1021byte	1022byte	1023byte
lower/higher	L	Н	L	Н	L	Н		L	Н	L	Н	L	Н
	,	ļ	,	ļ		,		,	ļ		ļ	,	ļ
Γ					pixel 2receiver level response by 0-4095		1	pixel 509 re	ceiver level	pixel 510re	ceiver level	pixel 511re	ceiver level
								response by 0-409		response by 0-4095		response by 0-4095	
example							1						
Hex	20	00	22	00	25	00		40	03	42	03	1F	02
Dec	2	0	2	22	2	5		8	32	8	34	5	43

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