



DENKI SEIGYO

DLD SERIES

CMOS LASER DISPLACEMENT SENSOR



High-Precision Non-Contact Distance Measurement Sensor

PRODUCT OVERVIEW

The **Denki Seigyo DLD Series Laser Displacement Sensors** are advanced CMOS laser-based measurement sensors designed for precise non-contact distance, height, thickness, position, and dimensional inspection applications.

Utilizing high-speed laser triangulation technology and intelligent signal processing, the DLD Series provides stable and accurate measurement performance with excellent repeatability and fast response times. The integrated digital display enables real-time monitoring and simplified setup, while analog output and RS-485 communication options provide seamless integration with PLC, SCADA, and industrial automation systems.

The DLD Series is available in **100 mm, 200 mm, and 435 mm reference distance models**, with **PNP or NPN outputs**, and **Analog Output or RS-485 Communication** versions.

KEY FEATURES

- CMOS laser triangulation technology
- High-precision non-contact measurement
- Reference distances: 100 mm, 200 mm, 435 mm
- PNP or NPN switching outputs
- Analog output models (4-20mA/0-10V)
- RS-485 Modbus RTU communication models
- High-speed response (1.5 ms / 5 ms / 10 ms selectable)
- Digital LED display
- One-point, two-point and window teach modes
- Threshold fine tuning
- Reverse polarity protection
- Short-circuit protection
- Compact aluminum housing
- IP67 protection rating



MODEL SELECTION

Model	Output Type	Communication	Reference Distance
DLD-S100PA	PNP	Analog Output	100 mm
DLD-S200PA	PNP	Analog Output	200 mm
DLD-S435PA	PNP	Analog Output	435 mm
DLD-S100NA	NPN	Analog Output	100 mm
DLD-S200NA	NPN	Analog Output	200 mm
DLD-S435NA	NPN	Analog Output	435 mm
DLD-S100PC	PNP	RS-485 Modbus	100 mm
DLD-S200PC	PNP	RS-485 Modbus	200 mm
DLD-S435PC	PNP	RS-485 Modbus	435 mm
DLD-S100NC	NPN	RS-485 Modbus	100 mm
DLD-S200NC	NPN	RS-485 Modbus	200 mm
DLD-S435NC	NPN	RS-485 Modbus	435 mm

MODEL CODE EXPLANATION

Example: DLD-S435PA

Code	Description
D	Denki Seigyo
LD	Laser Displacement Sensor
S100	100 mm Reference Distance
S200	200 mm Reference Distance
S435	435 mm Reference Distance
P	PNP Output
N	NPN Output
A	Analog Output
C	RS-485 Communication

Electrical Specifications

Parameter	Specification
Supply Voltage	12 – 24 VDC
Current Consumption	≤ 40 mA
Switching Output	PNP / NPN
Analog Output	0 – 10V DC/ 4-20mA
Communication	RS-485 Modbus RTU
External Input	Teach / Zero / Laser OFF
Protection Circuit	Reverse Polarity & Short Circuit Protection



TECHNICAL SPECIFICATIONS

General Specifications

Parameter	Specification
Sensor Type	CMOS Laser Displacement Sensor
Detection Method	Laser Triangulation
Laser Type	Visible Red Semiconductor Laser
Laser Class	Class 2
Display Type	Digital LED Display
Resolution	0.1 mm
Spot Diameter	0.5mm
Response Time	1.5 ms / 5 ms / 10 ms
Teaching Modes	One-point, Two-point, Window
Output Indicator	LED Status Indicator

Accuracy Specifications

Parameter	Specification
Display Resolution	0.1 mm
Repeatability	Up to ± 0.15 mm
Linearity	Up to $\pm 0.1\%$ F.S.
Measurement Principle	High-Speed CMOS Laser Processing

Mechanical Specifications

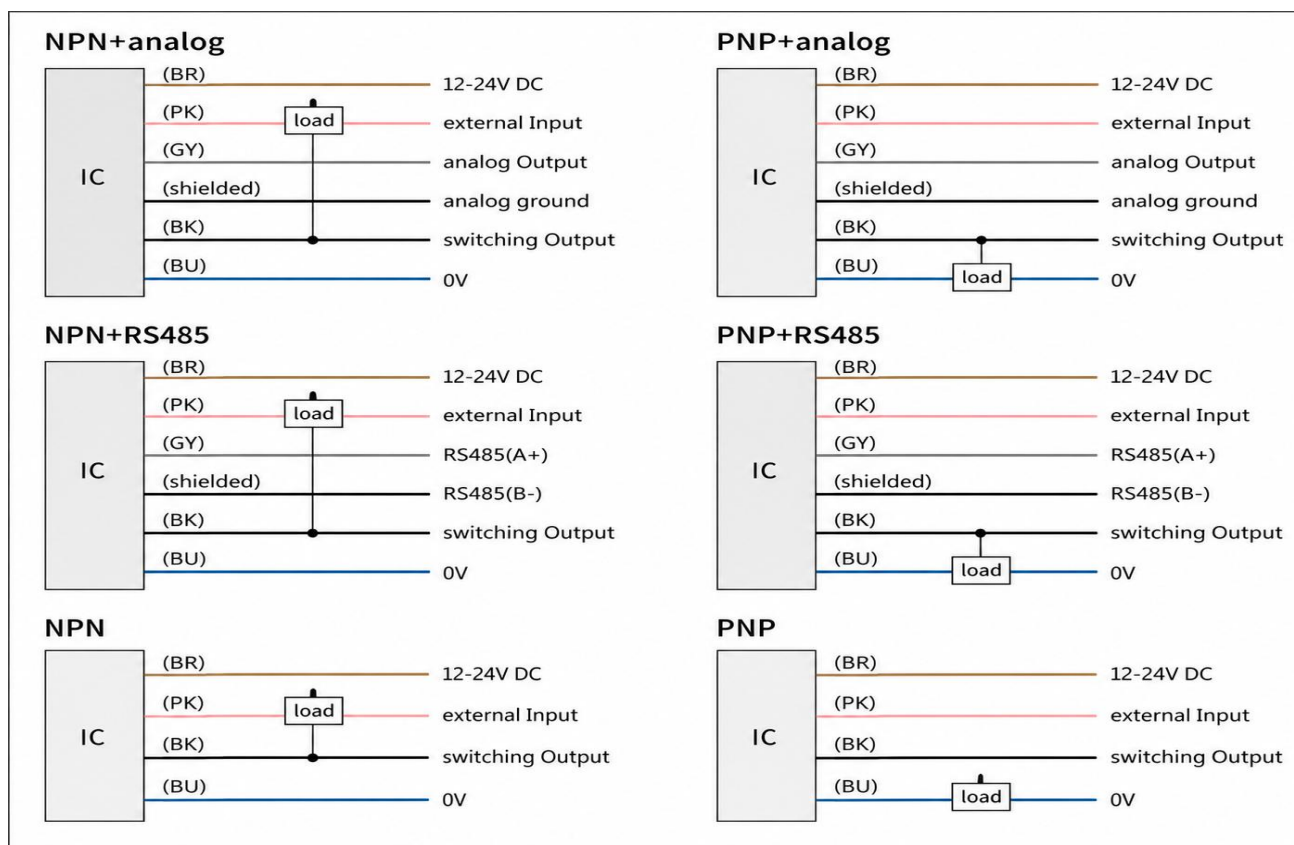
Parameter	Specification
Housing Material	Die-Cast Aluminum
Front Cover	Acrylic Lens
Display	Integrated Digital Display
Mounting Type	Bracket Mount
Cable Type	Multi-Core Shielded Cable
Protection Structure	Fully Sealed Housing



Environmental Specifications

Parameter	Specification
Protection Rating	IP67
Operating Temperature	-10°C to +50°C
Storage Temperature	-20°C to +70°C
Humidity	35% to 85% RH
Ambient Light Immunity	High Resistance
Vibration Resistance	Industrial Grade
Shock Resistance	Industrial Grade

WIRING DIAGRAM



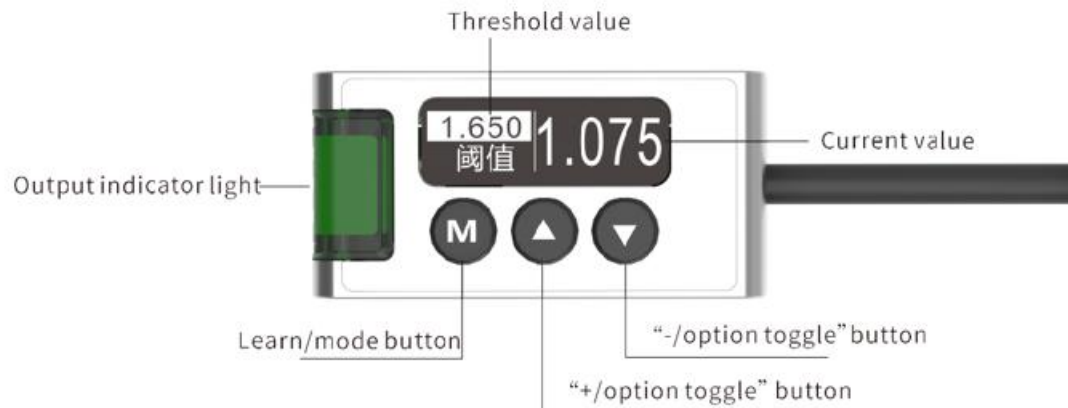
External Input

Select from the menu external Input: **Zero, Teach, Stop Laser.**

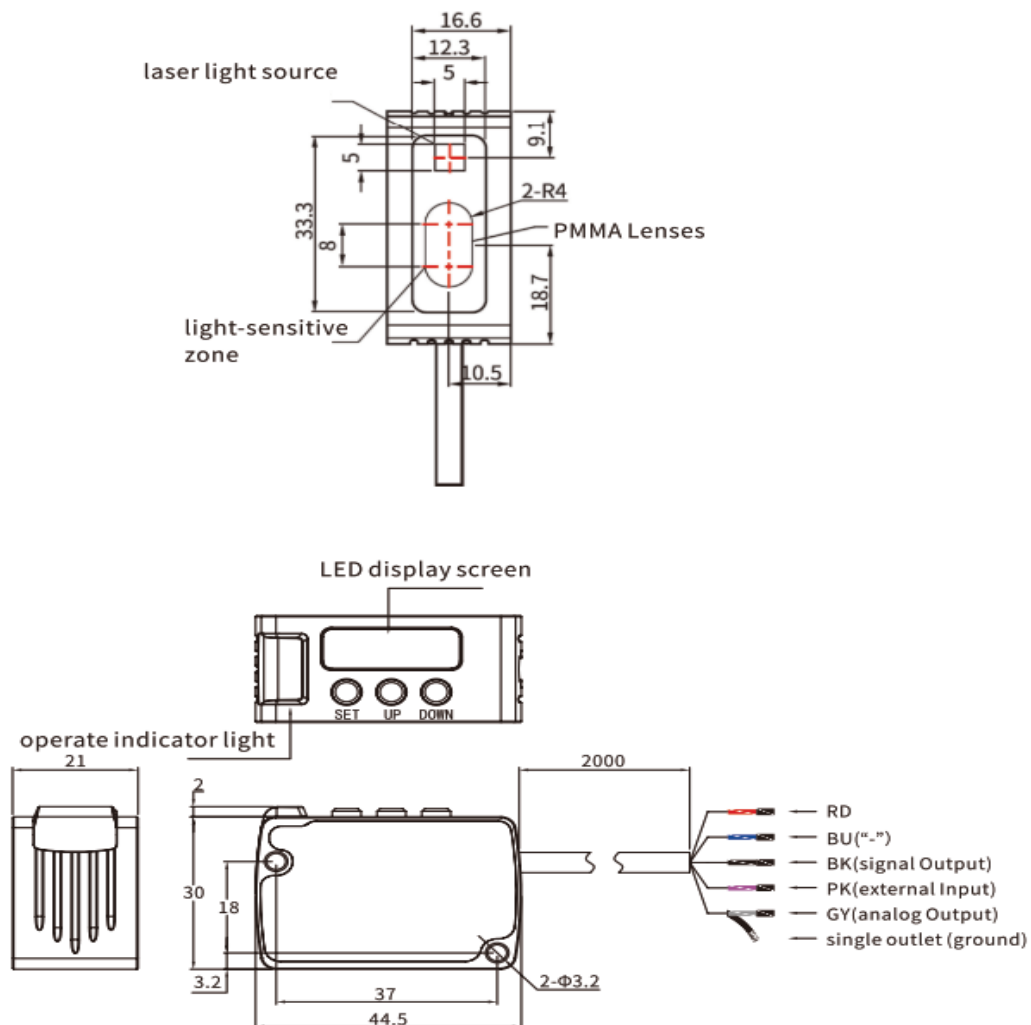
For NPN model: Release the PK wire after touching the negative terminal of the power supply.

For PNP model: Touch the PK wire to the positive terminal of the power supply and release it.

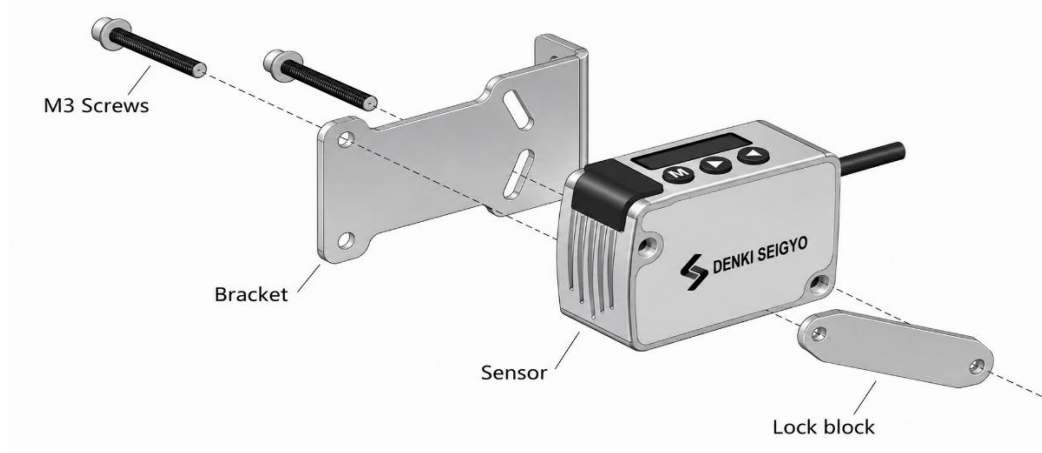
PANEL DESCRIPTION



DIMENSION DRAWING



INSTALLATION STEPS

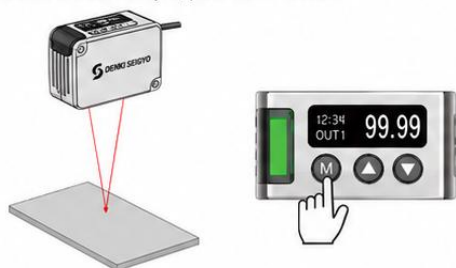


PRODUCT OPERATIONAL SETTING

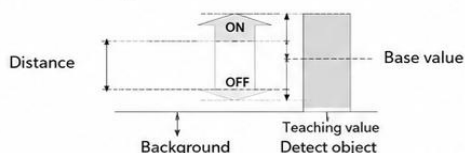
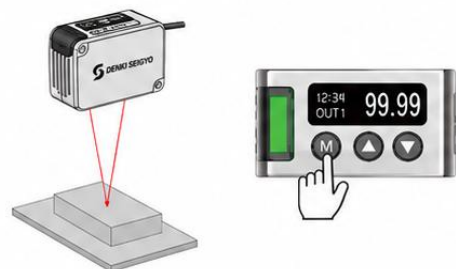
A 2-point teaching

Basic teaching method.

- ① In the state without an object, press the "M" button.



- ② In the state with an object, press the "M" button.

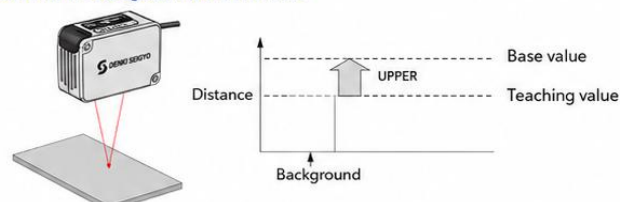


- ③ Complete calibration (when the difference between the two teachings is small, the display hysteresis is too small, and it is necessary to increase the difference and teach again)

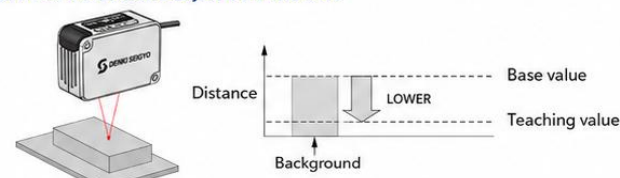
B Limited teaching

When there are tiny objects and background, it is very convenient to use this teaching method.

a. When the background is the reference



b. When the detection object is the reference



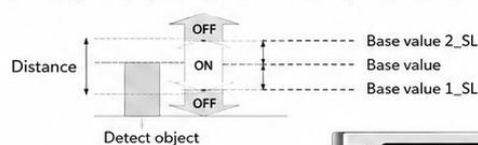
- ① Press the "M" button when there is a background object or when there is a detection object.
- ② When the background object is the reference, press the button and set the reference value in the sensor. When the detected object is the reference, press the button and set the value in the detected object.
- ③ Calibration is completed.

C 1-point teaching (window comparison mode)

This function is used when the distance to the reference surface of the detection object is judged within the upper and lower limits by setting the upper and lower limits instead of performing 1-point teaching.

When performing 1-point teaching (window comparison mode), please set it to [1-point teaching (window comparison mode)] in the detection output setting of PRO mode in advance.

For the setting method, please refer to "PRO mode operation instructions"



- ① With the object being detected, press the "M" button twice.
- ② Teaching is complete.



Product Function Settings

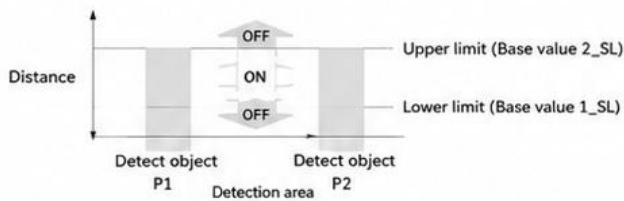
D 2-point teaching (window comparison mode)

How to perform 2-point teaching and set the reference value range.

When implementing 2-point teaching (window comparison mode), please set to [2-point teaching (window comparison mode)] in the detection output setting of PRO mode in advance.

For the setting method, please refer to "PRO mode operation instructions"

When performing teaching, please use a detection object with a certain distance [P1>P2].



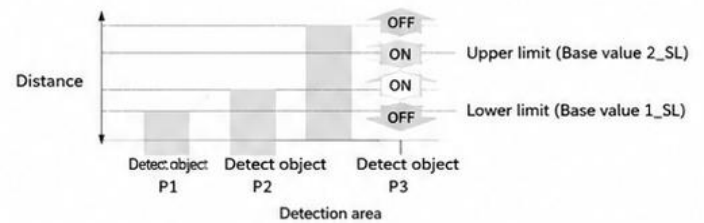
- ① With the detection object P1, press the "▼" button (1st time)
- ② With the detection object P2, press the "M" button (2nd time)
- ③ Complete calibration.

E 3-point teaching (window comparison mode)

Perform 3-point (P1, P2, P3) teaching, as shown in the figure below, set the reference value 1_SL between the 1st and 2nd time, set the reference value 2_SL between the 2nd and 3rd time, and set the reference value range.

When performing 3-point teaching (window comparison mode), please set it to [3-point teaching (window comparison mode)] in the detection output setting in advance.

After teaching, P1, P2, and P3 will be automatically arranged in order from small to large.



- ① With the detection object P1, press the "M" button (1st time)
- ② With the detection object P2, press the "M" button (2nd time)
- ③ With the detection object P3, press the "M" button (3rd time)
- ④ Complete calibration.

Threshold Fine Tuning Function

Normal detection mode:

Press the "▲" button or the "▼" button to change the threshold directly.

Window comparison mode:

Press the "▲" button or the "▼" button to change the threshold directly.

Press the "▲" button and the "▼" button at the same time to switch between threshold 1 and threshold 2.

Zeroing Function

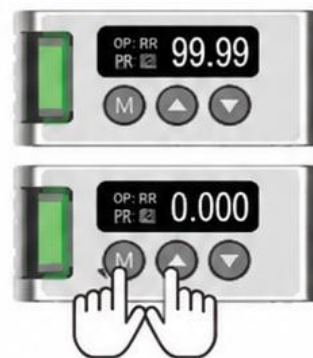
Note: Zero adjustment can only be performed when the display mode is set to reverse mode.

Zero adjustment function is the function of forcing the measured value to "zero".

When setting zero adjustment, there is a vertical line on the screen, as shown in the right figure:

Press the "M" button and the "▲" button at the same time to set zero adjustment

Press the "M" button and the "▲" button at the same time to cancel zero adjustment



Key Locking Function

Press the "M" button and the "▼" button at the same time to lock the button.

Press the "M" button and the "▼" button at the same time to unlock the button.





Press and hold the "M" button for 3 seconds in the distance display to enter the menu setting mode.
Press and hold "M" for 3 seconds in menu setting mode to exit menu setting mode.

In the menu setting mode, stop for 20 seconds without pressing any key to exit the menu setting mode automatically.

After entering the menu setting mode, press "▲" key or "▼" key to switch the menu up and down.

Short press "M" key can enter the corresponding menu item.

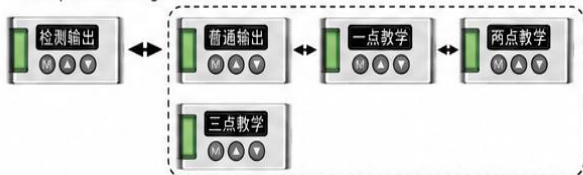
(1) Working mode: Standard high speed and high accuracy



(2) Normally open and normally closed: Press "M" key to enter "or" switching selection, press "M" to confirm.



(3) Detection output: usual mode, one-point teaching, two-point teaching, three-point teaching.



(4) Analog selection: 0-5V, 4-20mA.

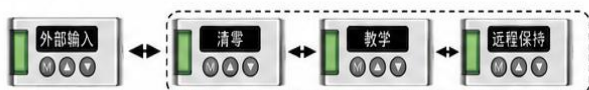


(5) Strain equivalent to the sensitivity of the fine-tuning, the default accuracy of 0.07, detecting small differences can be adjusted to the minimum when detecting small differences.



(6) External input: when selecting the corresponding function, the pink line and 0V are shorted once.

Zeroing: the current value is cleared to zero, and the value is displayed in the range.
Teaching: it can be used as pressing "M" key once.



(7) Output Timing: Output Delay, Delayed Output, Single Output, Output Extension, No Timing. Default 5ms not adjustable.



(8) Display mode standard inversion will change the current detection value from +35 to -35 to -35 to +35, and the corresponding 0-5V or 4-5V or 4-5V will be displayed. and the corresponding 0-5V or 4-20mA is reversed to 5-0V or 20-4mA] The offset is to change the value of 535 to 0-70.



(9) Hold: the default is to keep off, can be up and down keys to choose to keep on, that is, the current detection value reaches the maximum or minimum, you can put the value of the
The minimum time, the output voltage or current can be maintained [common application is beyond the range also keep 0 or 5v].



(10) Rest screen selection: normally light, timed rest screen.



(11) Language



(12) Address (only 485 version has this menu).



(13) Reset: Press "M" to enter the default display return, can switch up and down key to confirm reset, press "M"
Press "M" to confirm reset, press "OK", the display has been restored to factory settings.
"M" and "▼" key at the same time press the keypad lock on/off.



MODBUS PROTOCOL COMMUNICATION SPECIFICATION

Communication method	RS485
Synchronization method	Asynchronous
Baud rate	9.6/19.2/38.4/57.6/115.2/256kbps
Data length	8-bit
Stop bit	1-bit
Parity check	None

04H Instruction (read input register)				
Communication frame format				
1byte	1byte	2byte	2byte	2byte
Address code	Function code	Register address	Number of bytes N	CRC Code
Response frame format				
1byte	1byte	1byte	2N byte	2byte
Address code	Function code	Number of bytes 2N	Register Value	CRC Code
Error frame format				
1byte	1byte	1byte	2byte	
Address code	Error Code	Exception Code	CRC Code	

Read data					
Address code	Function code	Register Address	Number of registers	CRC	Function description
0x01	0x04	0x0000	0x0002	0x71CB	Get-Distance
0x01	0x04	0x0001	0x0001	0x600A	Get-Working Mode
0x01	0x04	0x0002	0x0001	0x900A	Get-NO/NC
0x01	0x04	0x0003	0x0001	0xC1CA	Get-Detection Output
0x01	0x04	0x0004	0x0002	0x300A	Get-Hysteresis
0x01	0x04	0x0005	0x0001	0x21CB	Get-External Input
0x01	0x04	0x0006	0x0001	0xD1CB	Get-Output Timing
0x01	0x04	0x0007	0x0001	0x800B	Get-Output Timing Time
0x01	0x04	0x0008	0x0001	0xB008	Get-Display Mode
0x01	0x04	0x0009	0x0001	0xE1C8	Get-Hold
0x01	0x04	0x000A	0x0001	0x11C8	Get-Zero Value
0x01	0x04	0x000B	0x0002	0x0009	Get-Threshold
0x01	0x04	0x000C	0x0002	0xB1C8	Get-Threshold 1
0x01	0x04	0x000D	0x0002	0xE008	Get-Threshold 2
0x01	0x04	0x000E	0x0002	0x1008	Get-Baud Rate

Response					
Address code	Function code	Number of 2N bytes	Register value	CRC	Response
0x01	0x04	0x04			Distance
0x01	0x04	0x02	0x0000	0xB930	High Precision
			0x0001	0x78F0	Standard
			0x0002	0x38F1	High Speed
0x01	0x04	0x02	0x0000	0xB930	NO
			0x0001	0x78F0	NC
0x01	0x04	0x02	0x0000	0xB930	Normal test
			0x0001	0x78F0	1 point teaching
			0x0002	0x38F1	2 point teaching
			0x0003	0xF931	3 point teaching
0x01	0x04	0x04			Hysteresis
0x01	0x04	0x02	0x0000	0xB930	Zeroing
			0x0001	0x78F0	Teaching
			0x0002	0x38F1	Stop laser
0x01	0x04	0x02	0x0000	0xB930	No timing
			0x0001	0x78F0	Output extension
			0x0002	0x38F1	Delayed output
			0x0003	0xF931	Single output
0x01	0x04	0x02			Timed time
0x01	0x04	0x02	0x0000	0xB930	Normal
			0x0001	0x78F0	Reverse
			0x0002	0x38F1	Offset
0x01	0x04	0x02	0x0000	0xB930	Keep on
			0x0001	0x78F0	Keep off
0x01	0x04	0x02	0x0000	0xB930	Timed screen off
			0x0001	0x78F0	Always on
0x01	0x04	0x04			Zero value
0x01	0x04	0x04			Threshold 1
0x01	0x04	0x04			Threshold 2
0x01	0x04	0x04	0x000012C0		4800
			0x00002580		9600
			0x00009600		38400
			0x0001C2000xFB24		115200
			0x0003E800		256000

Operation function							
Address code	Function code	Register address	Number of registers	Number of bytes	Register value	CRC	Function setting
0x01	0x10	0x0000	0x0001	0x02	0x0000	0xA650	Discontinuous output
					0x0001	0x6790	Continuous output
0x01	0x10	0x0001	0x0001	0x02	0x0000	0xA781	High precision
					0x0001	0x6641	Standard
					0x0002	0x2640	High speed
0x01	0x10	0x0002	0x0001	0x02	0x0000	0xA7B2	NO
					0x0001	0x6672	NC
0x01	0x10	0x0003	0x0001	0x02	0x0000	0xA663	Normal detection
					0x0001	0x67A3	One-point teaching
					0x0002	0x27A2	Two-point teaching
					0x0003	0xE662	Three-point teaching
0x01	0x10	0x0004	0x0002	0x04			Deviation
0x01	0x10	0x0005	0x0001	0x02	0x0000	0xA605	Zero adjustment
					0x0001	0x67C5	Teaching
					0x0002	0x27C4	Stop laser
0x01	0x10	0x0006	0x0001	0x02	0x0000	0xA636	No timing
					0x0001	0x67F6	Output extension
					0x0002	0x27F7	Delayed output
					0x0003	0xE637	Single output
0x01	0x10	0x0007	0x0001	0x02			Timing time
0x01	0x10	0x0008	0x0001	0x02	0x0000	0xA718	Normal
					0x0001	0x66D8	Reverse
					0x0002	0x26D9	Offset
0x01	0x10	0x0009	0x0001	0x02	0x0000	0xA6C9	Keep on
					0x0001	0x6709	Keep off
0x01	0x10	0x000A	0x0001	0x02	0x0000	0xA6FA	Timed screen off
					0x0001	0x673A	Always on
0x01	0x10	0x000B	0x0001	0x02	0x0001	0x66EB	Zero-Current measurement value
0x01	0x10	0x000C	0x0002	0x04			Threshold-Input threshold
0x01	0x10	0x000D	0x0002	0x04			Threshold-Input threshold
0x01	0x10	0x000E	0x0002	0x04	0x000012C0	0x7ED3	4800
					0x00002580	0x6913	9600
					0x00009600	0x1D83	38400
					0x0001C200	0x7283	115200
					0x0003E800	0xCC23	256000
0x01	0x10	0x000F	0x0001	0x02	0x0000	0xA6AF	Reset

Response				
Address code	Function code	Register address	Number of registers	CRC
0x01	0x10	0x0000	0x0001	0x01C9
0x01	0x10	0x0001	0x0001	0x5009
0x01	0x10	0x0002	0x0001	0xA009
0x01	0x10	0x0003	0x0001	0xF1C9
0x01	0x10	0x0004	0x0002	0x4008
0x01	0x10	0x0005	0x0001	0x11C8
0x01	0x10	0x0006	0x0001	0xE1C8
0x01	0x10	0x0007	0x0001	0xB008
0x01	0x10	0x0008	0x0001	0x800B
0x01	0x10	0x0009	0x0001	0xD1CB
0x01	0x10	0x000A	0x0001	0x21CB
0x01	0x10	0x000B	0x0001	0x700B
0x01	0x10	0x000C	0x0002	0x81CB
0x01	0x10	0x000D	0x0002	0xD00B
0x01	0x10	0x000E	0x0002	0x200B
0x01	0x10	0x000F	0x0001	0x31CA



COMMUNICATION EXAMPLE (ACQUISTION DISTANCE)

Communication example (acquisition distance)

- Send command

01 04 00 00 00 02 71 CB

Address code	Function code	Register address	Number of registers N	CRC
01	04	0000	0002	71CB

- BLG Feedback Information

01 04 04 00 01 19 36 21 C2

Address code	Function code	Number of bytes	Register value-distance value	Check code
01	04	04	00 01 19 36	21 C2

Among them, 00 01 19 36 is the distance information, the unit is um

Set the baud rate to 9600

- Send command

01 10 00 0E 00 02 04 00 00 25 80 69 13

Address code	Function code	Register address	Number of registers	Number of bytes	Register value	CRC
0x01	0x10	0x000E	0x0002	0x04	0x00002580	0x6913

- BLG Feedback Information

01 10 00 0E 00 02 20 0B

Address code	Function code	Register address	Number of registers	CRC
0x01	0x10	0x000E	0x0002	0x200B

Note: The sensor address code can be set in the function menu.
After the address code is changed, the CRC also needs to be changed at the same time.



OUTPUT CONFIGURATION

Analog Output Models (A)

Suitable For:

- PLC Analog Input
- Process Control
- Thickness Measurement
- Height Monitoring
- Position Control

Output:

- 0-10V/ 4-20mA Analog Output
- Switching Output

Communication Models (C)

Suitable For:

- PLC Communication
- SCADA Systems
- MES Integration
- Industry 4.0 Applications

Communication:

- RS-485 Modbus RTU
- Distance Data Acquisition
- Remote Parameter Setting
- Multi-Sensor Networking

ADVANCED FUNCTIONS

One-Point Teach

Simple threshold setting using a reference target.

Two-Point Teach

Accurate switching point setup between two target positions.

Window Mode

Output activates when measurement falls within a predefined range.



Threshold Fine Tuning

Precise adjustment of switching thresholds.

Zero Adjustment

Allows reference position calibration and offset compensation.

Key Lock Function

Prevents accidental modification of parameters.

External Teach Input

Remote setup through PLC or external control signal.

APPLICATIONS

- Thickness Measurement
- Height Detection
- Gap Measurement
- Position Verification
- Robotic Positioning
- Packaging Inspection
- Semiconductor Manufacturing
- Electronics Assembly
- Automated Quality Inspection
- CNC Machinery
- Conveyor Automation
- Industrial Automation Systems

PRODUCT SUMMARY

The **Denki Seigyo DLD Series Laser Displacement Sensors** combine advanced CMOS laser technology, high-speed processing, digital display, analog output, and RS-485 communication capabilities to deliver accurate and reliable non-contact measurement solutions for industrial automation, inspection, and quality control applications.

DENKI SEIGYO

Industrial Automation Components