LANBAO

Laser displacement sensor PDE Analog series

Operation manual

Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

www.lanbaosensor.com

Precautions

- Please do not use in the following environment
  - ◎ Direct sunlight
  - ◎ Places with high humidity or easy condensation
  - ◎ Places containing corrosive gases
  - ◎ Places subject to severe vibration or shock
- Connection and installation
  - ◎ Do not use the sensor in an unstable state immediately after the power is turned on,it is recommended to test after 30 minutes of power on to achieve desired accuracy
  - ◎ Be sure to carry out wiring with the power off. If a wrong wiring occurs, it will cause a malfunction
  - ◎ Please make sure that the power supply voltage is within the rated value before powering on
  - ◎ Please use rated load
  - ◎ The RS485 signal line cannot be short-circuited with the power supply, otherwise it may cause product failure or damage the product
  - ◎ When installing the sensor,do not subject the sensor to severe external forces (such as hammering,etc),as this may damage the sensor performance
  - ◎ Do not bend the lead out of the cable with excessive force,and avoid applying pressure such as pulling
- Cleaning
  - ◎ Thinner will corrode the surface of the filter, it is best to avoid using it
  - ◎ If the surface of the display window is covered with dust, turn off the laser emission first, and then wipe it gently with a dry dust-free cloth

Safety warning(LASER RADIATION: CLASS 2 LASER PRODUCT)

- Do not use in an environment with flammable,explosive or corrosive gases
- The RS485 communication line should not be too long
- Do not disassemble,repair or modify this product without authorization
- This product is dangerous, please do not look directly at the laser or observe the optical system through the lens
- Do not look into the laser beam intentionally
- Never point the laser beam at people's eyes
- Current national regulations regarding laser protection must be observed

Maintenance/scrap treatment

- When the product is scrapped, please dispose of it as industrial waste
- Do not disassemble the sensor. If the sensor fails, contact the relevant supplier or manufacturer

Précautions

- Veuillez ne pas l'utiliser dans les environnements suivants
  - ◎ Endroits exposés à la lumière directe du soleil
  - ◎ Endroits très humides ou sujets à la condensation
  - ◎ Lieux contenant des gaz corrosifs
  - ◎ Lieux sujets à de fortes vibrations ou impacts
- Connexion et installation
  - ◎ Veuillez ne pas utiliser ce capteur dans un état instable peu de temps après la mise sous tension. Il est recommandé de tester après la mise sous tension pendant 30 minutes pour obtenir une précision idéale
  - ◎ N'effectuez pas de travaux de câblage sans couper l'alimentation électrique. Un mauvais câblage peut provoquer des dysfonctionnements
  - ◎ Veuillez vous assurer que la tension d'alimentation est comprise dans la tension nominale avant de mettre sous tension
  - ◎ Veuillez utiliser la charge sous la valeur nominale
  - ◎ La ligne de signal RS485 ne peut pas être court-circuitée avec l'alimentation, sinon cela pourrait provoquer une panne du produit ou l'endommager
  - ◎ Lors de l'installation du capteur, ne soumettez pas le capteur à une force externe importante (telle que des coups de marteau, etc.), car cela pourrait endommager les performances du capteur
  - ◎ Ne pliez pas excessivement la partie de sortie du câble et évitez d' appliquer une pression telle que tirer
- faire le ménage
  - ◎ Le diluant corrodera la surface du filtre, évitez son utilisation
  - ◎ Si la surface de la fenêtre d'affichage est recouverte de poussière, veuillez d'abord éteindre l'émission laser, puis essuyez délicatement avec un linge sec et sans poussière

Avertissement de sécurité (Rayonnement optique : produit laser de class 2)

- Ne pas utiliser dans des environnements contenant des gaz inflammables, explosifs ou corrosifs
- Ne rendez pas la ligne de communication RS485 trop longue
- Veuillez ne pas démonter, réparer ou modifier ce produit sans autorisation
- Ne regardez pas directement dans le laser et n'observez pas le système optique à travers la lentille
- Ne regardez pas intentionnellement dans le faisceau laser
- Ne dirigez pas le faisceau laser vers les yeux humains
- Veuillez respecter les réglementations nationales en vigueur concernant la protection laser

Réparation/traitement des déchets

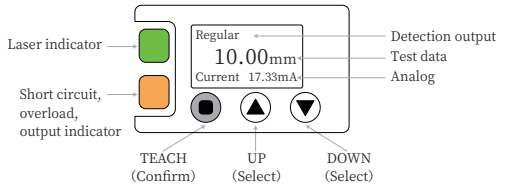
- Lorsque le produit est mis au rebut, veuillez le jeter comme déchet industriel
- Veuillez ne pas démontagez le capteur par vous-même. Si le capteur rencontre un dysfonctionnement, veuillez contacter le fournisseur ou le fabricant concerné

■ Laser label description

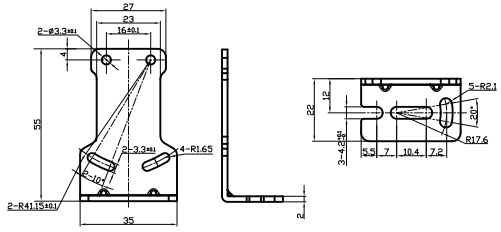
- This sensor series are Class 2 LASER PRODUCTS.please do not into beam. Warning labels are affixed to this series,please use them according to label instructions.

  Cette série de produits est un produit laser de classe 2. Veuillez ne pas regarder directement le laser ni observer à travers le laser.
  Une étiquette d'avertissement est attachée, veuillez l'utiliser conformément aux instructions de l'étiquette.

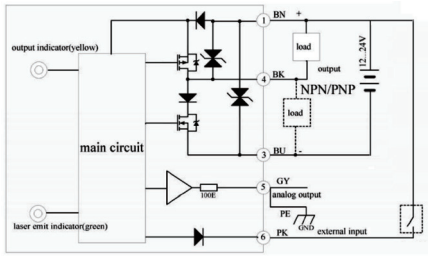
■ Keys and display instructions



■ Accessory Dimensions



■ Wiring diagram

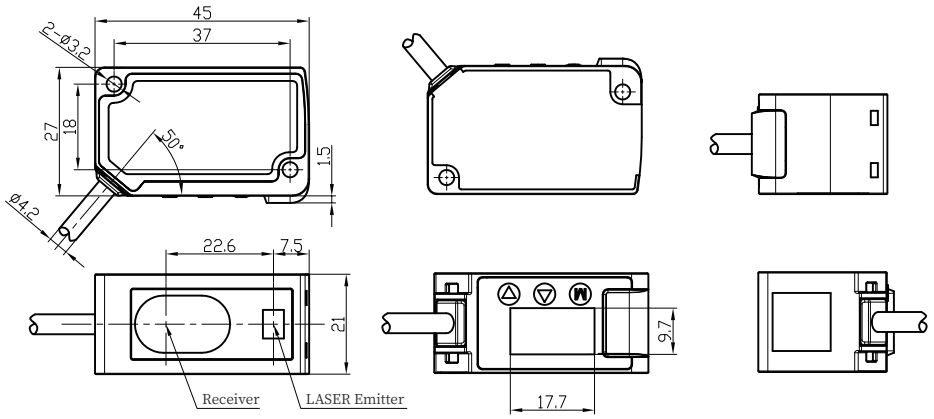


■ Technical specifications

Type	Analog		
Model	PDE-CR50TGIU	PDE-CR100TGIU	PDE-CR400TGIU
Center distance	50mm	100mm	400mm
Measuring range	±15mm	±35mm	±200mm
Full scale(F.S.)	35-65mm	65-135mm	200-600mm
Supply voltage	12...24VDC		
Consumption power	⩽960mW		
Load current	⩽100mA		
Voltage drop	<2V		
Light source	Red laser (658±8nm);Laser level:Class2;Max average power:1mW;Pulse duration:450μs; Emission angle:0.06°;Frequency:1.67kHz		
Beam diameter①	About Φ70μm(at 50mm)	About Φ120μm(at 100mm)	About Φ500μm(at 400mm)
Resolution	10μm	10μm	100μm
Linear accuracy②	±0.1%F.S.	±0.1%F.S.	±0.2%F.S. (measuring distance 200mm-400mm) ±0.3%F.S. (measuring distance 400mm-600mm)
Repeat accuracy②	30μm	70μm	300μm@200mm-400mm 800μm@400mm(Include)-600mm
Output	Analog:4...20mA(Load resistance<300Ω)/0-5V(Load resistance>5KΩ); Digital output:NPN/PNP and NO/NC settable		
Distance setting	Keypress setting		
Response time	<10ms		
Dimension	45mm*27mm*21mm		
Display	OLED display (Size:18*10mm)		
Temperature drift	<0.03%F.S./℃		<0.04%F.S./℃
Indicator	Laser working indicator:green light; Digital output indicator:yellow light		
Protection circuit③	Short circuit protection,reverse polarity protection, overload protection		
Built-in function	Analog output;teach mode;reference value fine tuning;Peak/bottom keeping; Zero setting;Keypad lock;Factory data reset;Chinese-English interface;Eco mode		
Operating environment	Operation temperature:-10...+45℃;Storage temperature:-20...+60℃; Ambient temperature:35...85%RH(No condensation)		
Anti ambient light	Incandescent light:<3,000lux; Sunlight interference:⩽10,000lux		
Protection degree	IP65		
Material	Housing:Zinc alloy;Lens:Glass;Diaplay:Glass		
Vibration resistant	10...55Hz Double amplitude 1.5mm,0.5H each in X,Y,Z directions		
Impulse resistant	500m/s²(About 50G)3 times each in X,Y,Z directions		
Connection	2m PVC cable(0.2mm²)		
Accessory	M3*30 screw ×2,nut x2,gasket ×2,mounting bracket ×1		

Remark: ① This data is a value that measures the distance from the center and is defined as 50% of the center light intensity.
② The measurement conditions are as follows: power supply voltage: 24V DC, ambient temperature: 23±5℃, response time: high precision, object: 90% reflectivity white card, test after preheating 30 minutes, 1000 statistical results (following 2σ criteria).
③ The circuit protection is only for digital output version.

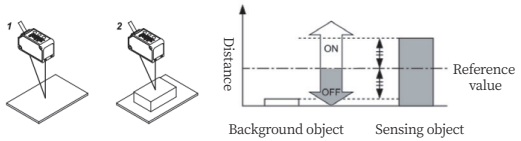
■ Dimensions

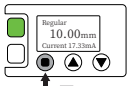


■ Operating instructions

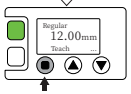
1.Normal detection

- When conducting basic teaching, please ensure that the detection output is set to [Normal Detection] in the PRO mode beforehand.



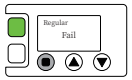


①In the presence of a background object, press the TEACH button.



②When an object is detected, press the TEACH button.

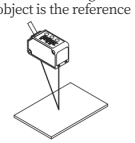
The stable detection is successful

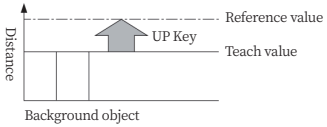


Unstable display failed

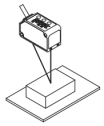
- This method is recommended when there are small object and background object.
- For normal detection, please ensure that the detection output is set to [Normal Detection] in the PRO mode beforehand.

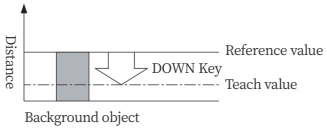
When the background object is the reference

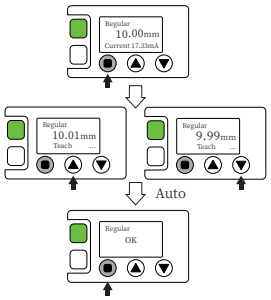




When the sensing object is the reference







①In the state of the background object or the state of the sensing object, press the TEACH key

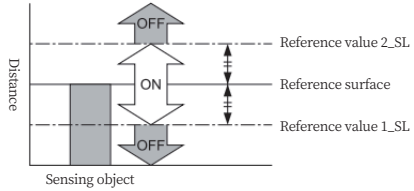
②Press the UP /DOWN key to adjust the reference value

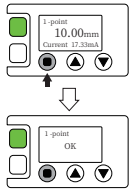
③Press the TEACH key to onfirm

2. 1-point teaching (window compare mode)

- For distance measurement from the detection object's reference surface, do not use the 1-point teaching method. Instead, set an upper and lower limit value. The system will make judgments within this range.
- When performing 1-point teaching (Window Comparison mode), please set the detection output to "1-Point Window" in the PRO mode in advance.

For setting method, please refer to “10 PRO Mode Operating Instruction”.



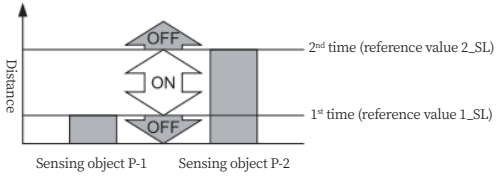


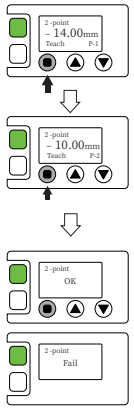
①In the case of sensing object, press the TEACH key twice

②End of teach

3. 2-point teaching (window compare mode)

- Method of conducting 2-point teaching and setting reference value range.
- In the case of performing 2-point teaching (window compare mode), please set the detection output in PRO mode to [2-point window] in advance.
  For setting method, please refer to “10 PRO Mode Operating Instruction”.
- When conducting teaching, please use sensing objects in different distances (P-1, P-2).





①Press the TEACH key in the presence of sensing object P-1 (1st time).

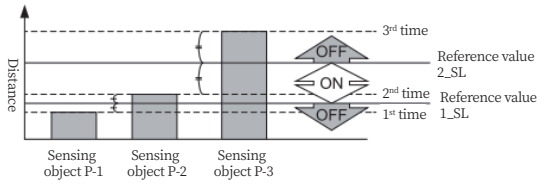
②Press the TEACH key in the presence of sensing object P-2 (2nd time).

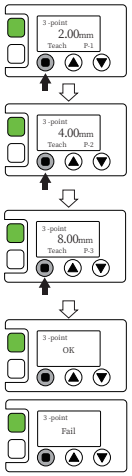
Display “OK” for stable detection.

Display “Fail” for unstable detection

4. 3-point teaching (window compare mode)

- When conducting 3-point teaching (P-1, P-2, P-3). Set the reference value 1_SL between the 1st and 2nd times, and set the reference value 2_SL between the 2nd and 3rd times.
- In the case of performing 3-point teaching (window compare mode), please set the detection output in PRO mode to [3-point window] in advance.
  For setting method, please refer to “10 PRO Mode Operating Instruction”.
- When conducting teaching, please use sensing objects in different distances (P-1, P-2, P-3).
- After teaching, the reference points P-1, P-2, P-3 are automatically sorted in ascending order.





①Press the TEACH key in the presence of sensing object P-1 (1st time).

②Press the TEACH key in the presence of sensing object P-2 (2nd time).

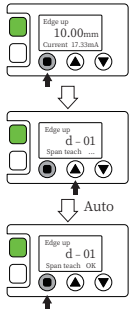
③Press the TEACH key in the presence of sensing object P-3 (3rd time).

Display “OK” for stable detection.

Display “Fail” for unstable detection.

5. Rising /Trailing differential span adjustment

- Ignore gradual change measurement and only use when detecting sharp measurement changes.
- In the case of using rising differential or trailing differential mode, please set the detection output in PRO mode to [rising differential] or [trailing differential] in advance.
- For setting method, please refer to “10 PRO Mode Operating Instruction”. The reference value can be set by the reference value fine adjustment
- function. For this function, please refer to “6 reference value fine adjustment function”.



①Press the TEACH key to enter.

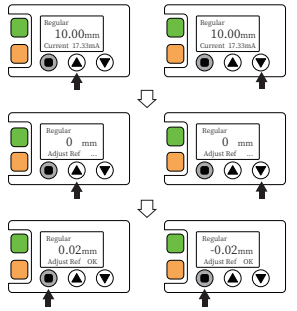
②Press UP key/DOWN key to choose span.

③Press the TEACH key to confirm.

6. Reference value fine adjustment function

- The reference value can be fine-tuned in the measurement screen.
- The reference value can be fine-tuned after teaching.

6.1 Normal detection/rising differential/trailing differential mode



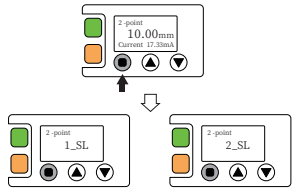
Press the UP/DOWN key to enter.

Press the UP/DOWN key to adjust the value.

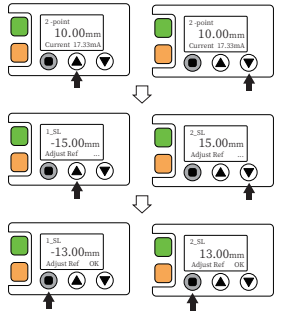
Press the TEACH key to confirm.

6.2 Window compare mode

- When the detection output is set to window compare mode, press the TEACH key for 1s to switch between 1_SL and 2_SL.



- When you want to fine-tune the reference value of 1_SL or 2_SL, press the UP key or DOWN key, and after 1_SL or 2_SL is displayed, you can fine-tune the reference value.



Press the UP/DOWN key to enter.

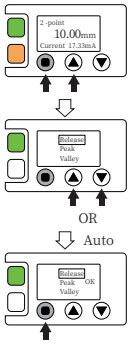
Press the UP/DOWN key to adjust the reference value.

Press the TEACH key to confirm.

Remark: ① The reference value is the action point

7. Peak and bottom hold function

- Peak and bottom hold function is the function that display peak and bottom values.
- This function can only be realized by selecting [Setting Hold]-[Open].



Press the TEACH key and UP key for 3s simultaneously.

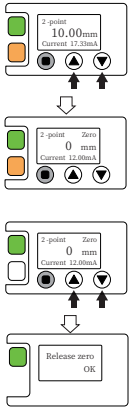
Press the UP/DOWN key.

Press the TEACH key to confirm.

Name	Function
Release	Release the peak and bottom hold state and hold the measured value out of range.
Peak	Hold the maximum value of the measurement when out of range.
Bottom	Hold the minimum value of the measurement when out of range.

8. Zero set function

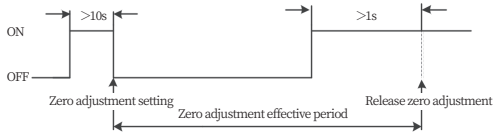
- Zero set function is the function of forcing the measurement value to "zero".
- This function cannot be set when the display setting is set to offset.



①Setting the zero set function: Press the UP key and DOWN key for 3s simultaneously.

②Release the zero set function: Press the UP key and DOWN key for 6s simultaneously.

- To set or release the zero adjustment function via external input, the operation is shown in the figure below:

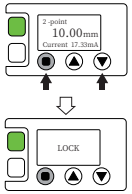


- When the zero adjustment function is set via external input, if power is reapplied, the setting will be cleared, and the zero adjustment will
- not be saved.
  Even if the sensor itself has set the zero adjustment function, it can
- still be set or released via external input. However, the setting will be cleared upon re-powering.
  When the zero adjustment is set and saved to the sensor itself via external input, the "10 PRO Mode Set" external input must be used to make the saving effective.

9. Key lock function

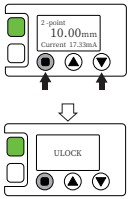
- The key lock function is the function that not accept key operation so as not to change the setting conditions in each setting mode incorrectly.
- After setting the key lock, if you operate the keys, "LOCK" will be displayed.

9.1 Setting the key lock function



Press the TEACH key and DOWN key for 3s simultaneously.

9.2 Release the key lock function



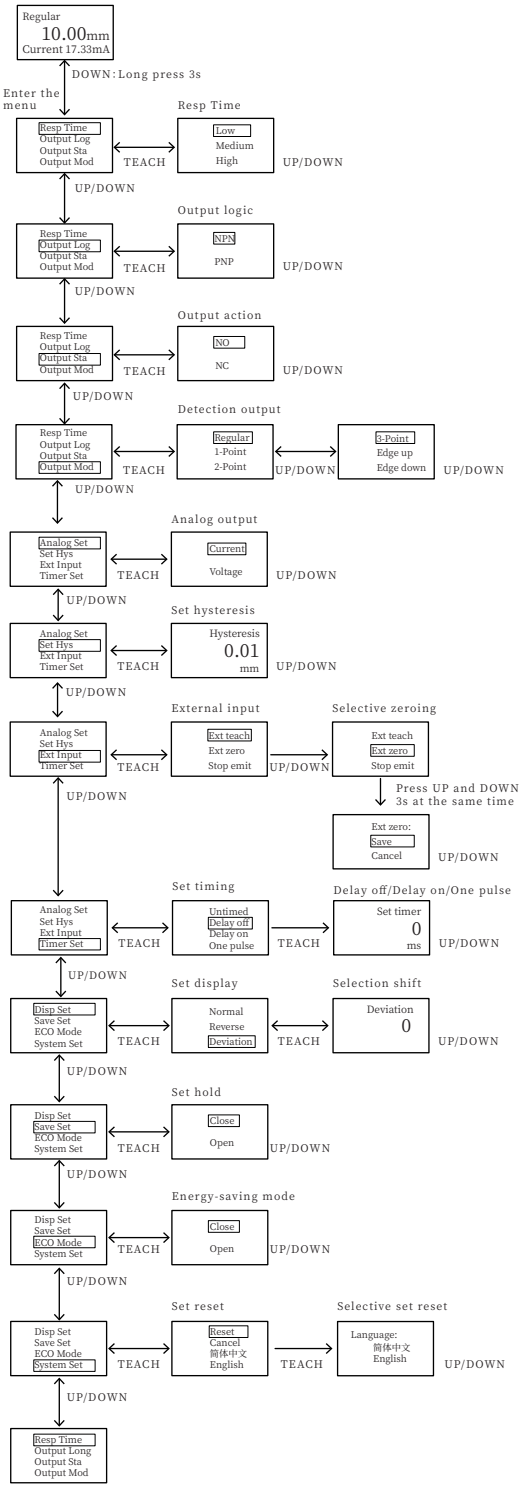
Press the TEACH key and DOWN key for 3s simultaneously.

10. PRO mode setting

- In the process of setting PRO mode, if you press the DOWN key for more than 3s, you will return to the measurement interface.

Item	Initial state	Content
Response time	High precision	Set response time. High precision, standard, high speed
Output logic	NPN	Select output logic NPN, PNP
Output status	NO	Select output status. NO, NC
Detection output	Normal detection	Set detection output. Normal detection/1-point window/2-point window/3-point window/rising differential/ trailing differential
Analog output	Current	Select the analog output action mode. Current(4-20mA), Voltage(0-5V).
Hysteresis setting	PDE-CR50TGxx: 0.01mm PDE-CR100TGxx: 0.02mm PDE-CR400TGxx: 0.2mm	Hysteresis range PDE-CR50TGxx:0.01~15.00mm PDE-CR100TGxx:0.02~35.00mm PDE-CR400TGxx:0.2~200.0mm
External input	Teaching	Set up the external input. Teach, Zero Adjustment(Save, Cancel), Stop Emission.
Timer setting	No timer setting	Set the timer action. No timer setting, Off-delay(0~100ms), On-delay(0~100ms), one pulse(0-100ms)
Display setting	Normal	Switchable measurement value display. Normal, Invert, Offset Offset range: PDE-CR50TGxx:0~35mm PDE-CR100TGxx:0~65mm PDE-CR400TGxx:0~200mm
Hold setting	Off	Control output and analog output actions are set when measurement errors occur(due to insufficient light, light saturation, out of measurement range). off, on
Eco mode	Open	If the key is not operated within 5 minutes, the digital display can be partially extinguished. Current consumption can be controlled. Open and close
System setting	Set reset	Set the system mode. Set reset, cancel reset, Chinese, English

Measurement screen



11. Error display

The following measures should be taken in case of error

Error display	Content	Proposal
----	The reflected light is insufficient, and the sensing object is out of the measurement range.	Please confirm whether the sensing object is within the measuring range. Please adjust the mounting angle of the sensor.
Short circuit overload, the yellow indicator blinks at 4Hz	Detects excessive current caused by short circuit of the output load.	Please cut off the power supply to confirm the load.
Laser damage	The semiconductor laser is damaged or has reached the end of its useful life.	Please consult our company.

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