DADISICK®

Laser Ranging Sensor User Manual

- Please confirm whether this product meets your needs.
- Please read this manual thoroughly before use and strictly follow the instructions below.
- Please read the precautions in the manual carefully and understand the relevant contents before use.

USER INSTRUCTIONS

⚠ **warn!** Indicates that use of this product without following the specified operating instructions may result in a certain degree of personal injury or property damage.

- Please read all operating instructions and safety regulations in this manual carefully before using the instrument. Failure to use the instrument in accordance with the operating methods guided by this manual may cause damage to the instrument, affect measurement accuracy, or cause personal injury to the user or a third party. harm.
- Do not open or repair the instrument by yourself in any way, and illegal modification or change of the performance of the instrument's laser transmitter is strictly prohibited. Please keep the instrument properly, keep it out of reach of children, and avoid use by unrelated persons.
- It is strictly forbidden to irradiate your own or other people's eyes and other parts of the body with the instrument's laser. It is strictly forbidden to irradiate the laser on highly reflective surfaces.
- The electromagnetic radiation of the instrument may cause interference to other equipment and devices. Please do not use this instrument near aircraft or medical equipment, and do not use the instrument in flammable or explosive environments.
- Scrapped instruments cannot be disposed of with domestic waste. Please dispose of them in accordance with relevant national or local laws and regulations.
- If you have any quality problems with the instrument or have any questions about using the instrument, please contact the DADISICK manufacturer in time and we will solve it for you as soon as possible.

1.Confirmation of packaging items

☐ Equipment — 1 set
☐ M12 8pin connector cable (2 m) — 1 set
☐ User's Guide — 1 set
☐ Packaging Box — 1 set
☐ Metal Film Resistors — 1 set
☐ Mounting Screws — 2 set

## 2. Product application/operation panel description

Provides accurate and stable distance measurement and can be integrated into various industrial applications. The red laser beam hits the reflective surface and non-contact measurement is performed based on the return signal.

Measurement datum   Measure distance
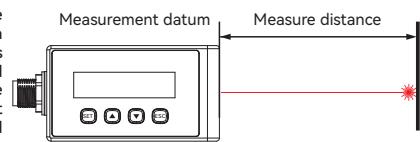
● Application

◇ Industrial measurement of position, displacement, thickness, distance, etc.
◇ Industrial automation and production intelligent management
◇ High-altitude cable erection measurement, railway catenary measurement
◇ Material level/liquid level detection
◇ Slope and dam deformation monitoring
◇ Building security monitoring

● Display

9.999 m

① Station number
② Measuring distance
③ Unit of measurement distance
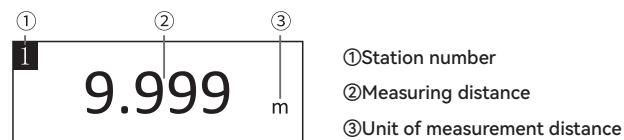
● Button

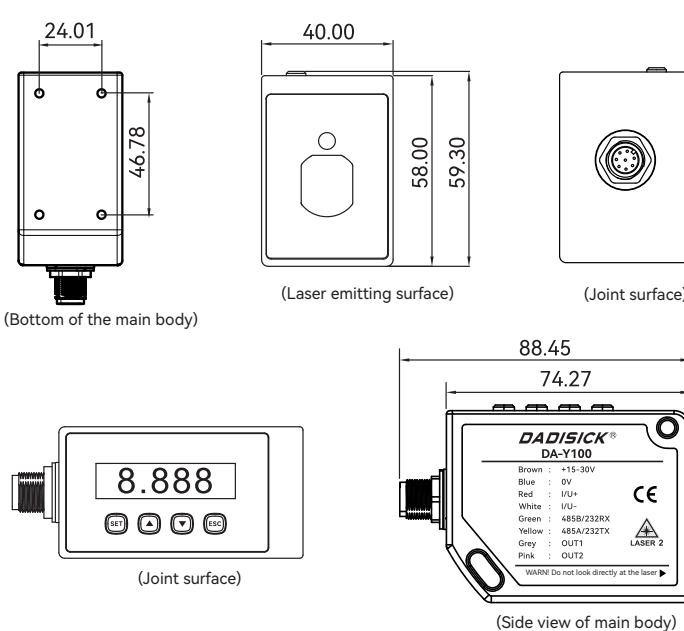| Button	Short press	Long press
SET	Confirm in setup mode	Enter parameter setting mode
ESC	Set mode return	Backlight switch settings
▲	Adjust option content	Adjust position forward
▼	Adjust option content	Adjust position and move back

3. Selection parameters

Item	Type A				
Model	DA-Y10	DA-Y20	DA-Y30	DA-Y50	DA-Y100
Measuring distance	0.2-10m	0.2-20m	0.2-30m	0.2-50m	0.2-100m
Voltage/current output	/				
Voltage output error	/				
Current output error	/				
Output mode	Digital quantity+switch quantity				

Item	Type B (With voltage and current output)				
Model	DB-Y10	DB-Y20	DB-Y30	DB-Y50	DB-Y100
Measuring distance	0.2-10m	0.2-20m	0.2-30m	0.2-50m	0.2-100m
Voltage/current output	Can be set to 0~5V / 0~10V / 4~20mA / 0~20mA /0~24mA output *Note				
Voltage output error	0.2%+0.5mV				
Current output error	0.2%+0.005mA				
Output mode	Digital quantity+switch quantity+analog quantity				

*Note: Current and voltage can't be output at the same time.

4.Installation dimensions

24.01   40.00   46.78   58.00   59.30

(Bottom of the main body)   (Laser emitting surface)   (Joint surface)

8.888

(Joint surface)

88.45   74.27

(Side view of main body)

5. Setup mode

- Miscellaneous settings
  - Switching output
    - OUT1 Positive polarity
    - OUT1_L Low value of OUT1 switching range
    - OUT1_H High value of OUT1 switching range
    - OUT2 Reverse polarity
    - OUT2_L Low value of OUT2 switching range
    - OUT2_H High value of OUT2 switching range
  - Speed level
  - Reset
- Analog output
  - Type
  - Lower limit
  - Upper limit
- Communication setup
  - Station No.
  - Port
  - Communication format setting
    - Baud rate 9600 Data bits 8
    - Check digit NO Stop bit 1
- Product information
  - Product model
  - Software version
  - Compilation date
  - Instrument temperature
- Language setting
  - Chinese
  - English

5.1 Setting Menu

The setting menu includes: Miscellaneous settings, analog output, communication setup, product information and language setting.

Menu — Miscellaneous Settings
- Analog Output
- Communication Setup
- Product Information
- Language Setting

1) Press ▲ to adjust the previous option;
2) Press ▼ to adjust the next option;
3) Press SET to enter the selected menu item;
4) Press ESC to return to the previous interface;

Note: "Analog output" function is only available for type B

5.2 Miscellaneous Settings

Enter the "Miscellaneous Settings" option in the settings menu, refer to [5.1 Settings Menu].

Miscellaneous Settings — Switching output
- Speed level 5
- Reset

1) Press ▲ to adjust the option upward;
2) Press ▼ to adjust the option downward;
3) Press SET to enter the selected menu item;
4) Press ESC to return to the previous interface;

5.2.1 Switching Output

Enter the "Switching Output" option in the miscellaneous settings, refer to [5.4 Miscellaneous Settings].

Switching Output
- OUT1 Positive polarity
- OUT1_L 01000
- OUT1_H 02000
- OUT2 Reverse polarity
- OUT2_L 01000
- OUT2_H 02000

1) Press ▲ to adjust the option upward/adjust the value of the selected option;
2) Press ▼ to adjust the option downward/adjust the value of the selected option;
3) Press SET to select/uncheck the menu item;
4) Press ESC to cancel the selected menu item;
5) Hold ▲ to switch to the previous bit of the selected value;
6) Hold ▼ to switch to the next bit of the selected value;

Trigger level options: Off/positive polarity/reverse polarity

5.2.2 Speed Level

Enter the "Speed Level" option in the miscellaneous settings, refer to [5.4 Miscellaneous Settings]. Speed level: The instrument provides a total of 5 levels of speed from 1 to 5 for users, Level 1 is the slowest with an output rate of about 10Hz, Level 5 is the fastest with an output rate of about 40Hz, The ranging accuracy is inversely proportional to the speed. Users can flexibly choose according to actual conditions.

Miscellaneous Settings — Switching output
- Speed level 5
- Reset

1) Press ▲▼ to adjust;
2) Press SET to return to the previous interface;

5.2.3 Reset

Enter the "Reset" option in miscellaneous settings, refer to [5.4 Miscellaneous Settings], and restore to factory settings.

Reset — Confirm to reset?

1) Press SET to confirm reset;
2) Press ESC to cancel and return to the previous interface;

5.3 Analog Output

Enter the "Analog Output" option in the setting menu, type B only, refer to [5.1 Settings Menu].

Analog Output
- Type No-Out
- Lower limit 00000
- Upper limit 10000

Output mode options: No-Out/0~5V / 0~10V / 4~20mA / 0~20mA / 0~24mA

1) Press ▲ to adjust the option upward/adjust the value of the selected option;
2) Press ▼ to adjust the option downward/adjust the value of the selected option;
3) Press SET to select/uncheck the menu item;
4) Press ESC to cancel the selected menu item;
5) Hold ▲ to switch to the previous bit of the selected value;
6) Hold ▼ to switch to the next bit of the selected value;

5.4 Communication Setup

Select the "Communication Setup" option in the menu, refer to [5.1 Settings Menu].

Communication Setup — Station No. 01
- Port RS485
- Communication format setting

1) Press ▲ to adjust the previous option;
2) Press ▼ to adjust the next option;
3) Press SET to enter/select the selected menu item;
4) Press ESC to return to the previous interface/cancel the selection;

5.4.1 Station No.

Select the "Station No." option in the communication setup, refer to [5.4 Communication Setup].

Communication Setup — Station No. 01
- Port RS485
- Communication format setting

1) Press ▲ to adjust the station number value upward;
2) Press ▼ to adjust the station number value downward;
3) Press SET to confirm the selected menu item;
4) Press ESC to cancel the selected menu item;

5.4.2 Port

Enter the "Port" option in the communication setup, refer to [5.4 Communication Setup].

Communication Setup
- Station No. 01
- Port RS485
- Communication format setting

1) Press ▲ to adjust the port upward;
2) Press ▼ to adjust the port downward;
3) Press SET to confirm the selected menu item;
4) Press ESC to cancel the selected menu item;

The port provides two options: RS485 and RS232

5.4.3 Communication Format Setting

Enter the "Communication Format Settings" option in the communication setup, refer to [5.4 Communication Setup]; there are four options: B (baud rate), D (data bit), P (parity check), and S (stop bit).

Communication Setup
- B 9600   D 8
- P Even   S 1

1) Press ▲ to adjust the option upward/adjust the value of the selected option;
2) Press ▼ to adjust the option downward/adjust the value of the selected option;
3) Press SET to select/uncheck the menu item;
4) Press ESC to cancel the selected menu item;

B (Baud rate) option: 1200/2400/4800/9600/19200/38400/57600/115200

D (data bit) option: 8/9

P (parity) option: Even/Odd/None

S (stop bit) option: 1/1.5/2

5.5 Product Information

Enter the "Product Information" option in the Settings menu, refer to [5.1 Settings Menu];

Product Information	
Product Model	DA-Y20
Software Version	V.1.20
Compilation Date	2024.01.31
Instrument Temperature	38℃

1) Press [ESC] to return to the previous interface;

5.6 Language Setting

Enter the "Language Settings" option in the settings menu, refer to [5.1 Settings Menu];

LNG	Chinese
	English

1) Press [▲] to adjust the option upward;
2) Press [▼] to adjust the option downward;
3) Press [SET] to confirm the selected menu item;
4) Press [ESC] to return to the previous interface;

5.7 Backlight Status Setting

The backlight has two states: ① Automatically extinguishes after 30 minutes, Press any button and the backlight will automatically turn on; ② The backlight is always on;

In the instrument measurement state, press and hold the [ESC] for about 3 seconds to switch between the two states;
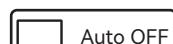
Auto OFF	The display backlight will automatically turn off after 30 minutes.
ON	The display backlight is always on.

6.Main Unit Wiring and Networking Instructions

No.	Wire color	Interface definition	Description
2	Brown	+15~30V	Positive pole of external power supply DC 15~30V (input)
7	Blue	0V	Power- (input)
8	Red	I/U+ (type B only)	Analog output + 4~20mA / 0~20mA / 0~24mA 0~5V / 0~10V
1	White	I/U- (type B only)	Voltage/current output dedicated ground terminal
3	Green	RS232RX/RS485-B	232 or 485 communication line
4	Yellow	RS232TX/RS485-A	232 or 485 communication line
5	Gray	OUT1	Switching output 1
6	Pink	OUT2	Switching output 2
	Shielded wire	EARTH	Connected to the ground

6.1 Current Output (type B only)

Note: Current and voltage can't be output at the same time.

Wiring method:

DC ammeter

12.000 mA

Pink OUT2
Grey OUT1
Yellow RS232TX/RS485-A
Green RS232RX/RS485-B
Blue 0V
Brown +15~30V
White I/U-
Red I/U+

Analog -
Analog +
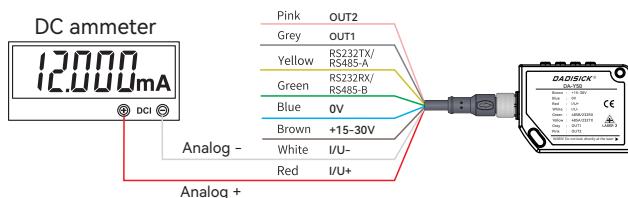
Output value calculation:

$$I_{out} = \frac{(I_{max} - I_{min}) * (D - D_{min})}{D_{max} - D_{min}} + I_{min}$$

In the formula, I_{out} is the output current;

I_{max} is the maximum value of the output current range, I_{min} is the minimum value of the output current range;

D is the present measurement distance;

D_{min} is the minimum distance value of analog output, Set in 5.3 [Lower limit];

D_{max} is the maximum distance value of analog output, Set in 5.3 [Upper limit].

For example:

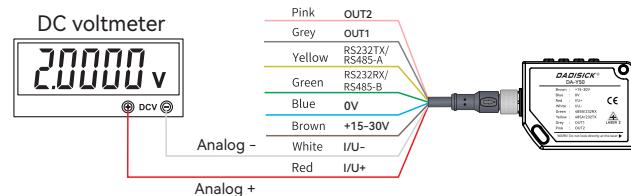The working mode is 4~20mA output ($I_{max} = 20$, $I_{min} = 4$),

The maximum distance value [upper limit] 0x1B=5000 (mm), the minimum distance value [lower limit] 0x1A=0 (mm), the present measurement distance = 3000 (mm), the calculation method is as follows:

$$I_{out} = \frac{(20-4) * (3000-0)}{5000-0} + 4 = 13.600mA$$

6.2 Voltage Output (type B only)

Note: Current and voltage can't be output at the same time.

Wiring method:

DC voltmeter

2.0000 V

Pink OUT2
Grey OUT1
Yellow RS232TX/RS485-A
Green RS232RX/RS485-B
Blue 0V
Brown +15~30V
White I/U-
Red I/U+

Analog -
Analog +

Output value calculation:

$$U_{out} = \frac{(U_{max} - U_{min}) * (D - D_{min})}{D_{max} - D_{min}}$$

In the formula, U_{out} is the output voltage;

U_{max} is the maximum value of the output voltage range, Umin is the minimum value of the output voltage range;

D is the present measurement distance;

D_{min} is the minimum distance value of analog output, Set in 5.3 [Lower limit];

D_{max} is the maximum distance value of analog output, Set in 5.3 [Upper limit].

For example:

The working mode is 0~10V output, the maximum distance value [upper limit] 0x1B=6000 (mm), the minimum distance value [lower limit] 0x1A=0 (mm), the present measurement distance = 4000 (mm), the calculation method is as follows:

$$U_{out} = \frac{(10-0) * (4000-0)}{6000-0} = 6.666V$$
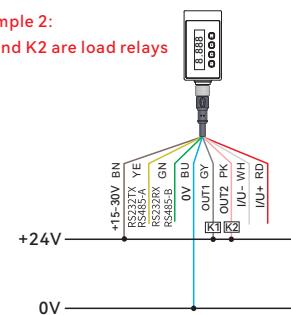
6.3 Transistor Switching Output

This function has an open-drain (collector) output inside the instrument, It can only input DC current and cannot directly output voltage and current, Please note that the current sink cannot exceed DC36V 0.5A.

The schematic diagram of the external relay and alarm light of the instrument is as follows:
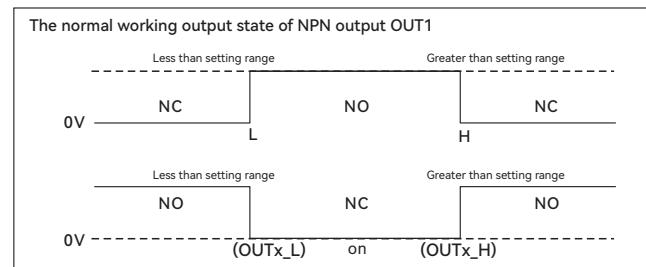

Example 1:
Example of alarm light
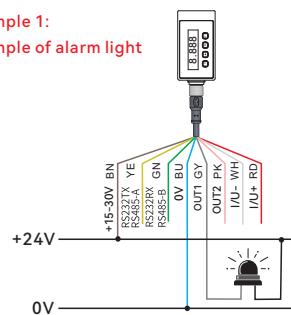
Example 2:
K1 and K2 are load relays

+24V
0V

+24V
0V

Note: The output current is less than 500mA

The level output mode is NPN and can be set to NO and NC.

The normal working output state of NPN output OUT1

	Less than setting range	Greater than setting range
0V	NC	NO	NC
	L	H	

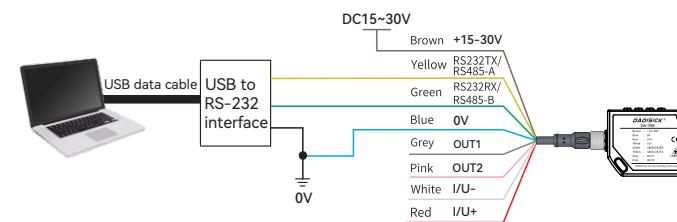|	Less than setting range	Greater than setting range
0V	NO	NC	NO
	(OUTx_L)	on	(OUTx_H)

Note * When working normally, OUT1 or OUT2 is set to NC, The L~H interval maintains NPN output continuously, while other areas are disconnectedState; When OUT1 or OUT2 is set to normally open, The L~H interval remains disconnected, while other areas maintain NPN output.

Give an example：

The output mode of OUT1 is now set to NPN normally closed, The value of QUT1L is 2000 (mm), The value of QUT1H is 3000 (mm). When the measured distance value is less than 2000mm, OUT1NPN does not output; When the measurement distance is between 2000mm~3000mm, output NPN. When the measurement distance is greater than 3000mm, OUT1 does not output.

6.4 RS232 Wiring Method

DC15~30V

Brown +15~30V
Yellow RS232TX/RS485-A
Green RS232RX/RS485-B
Blue 0V
Grey OUT1
Pink OUT2
White I/U-
Red I/U+
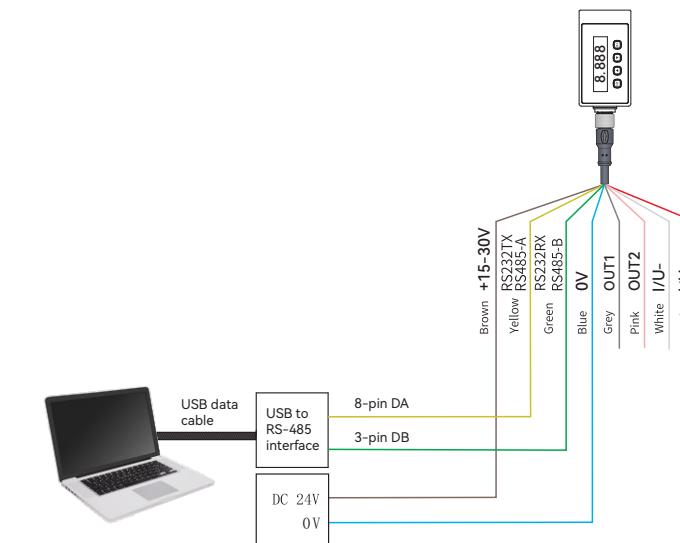
USB data cable
USB to RS-232 interface

0V

Note: RXD and TXD on the computer side and instrument side need to be cross-connected.

RS232 has three connections: RX (green) TX (yellow) GND (blue).
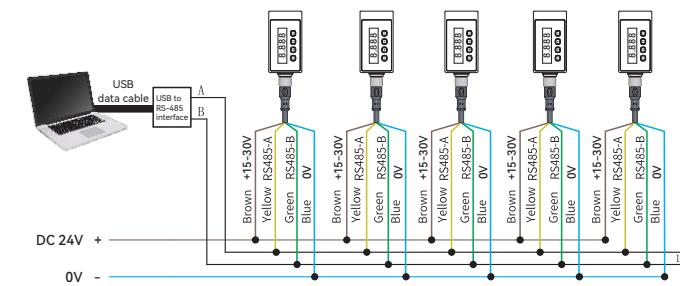

6.5 RS485 Wiring Method

Note: The power supply for the instrument in the figure is provided by 24V.

USB data cable
USB to RS-485 interface

DC 24V
0V

Brown +15~30V
Yellow RS232TX/RS485-A
Green RS232RX/RS485-B
Blue 0V
Grey OUT1
Pink OUT2
White I/U-
Red I/U+

8-pin DA
3-pin DB

6.6 RS485 Networking Wiring Method

For example, the figure below is a connection diagram for networking a computer and multiple instruments through RS485 half-duplex communication, All instruments are connected to the bus, Due to address restrictions, the maximum number is 64.

Note: In practical applications, if communication is unstable, a 120 Ω/8W resistor needs to be connected in parallel at the RS485 terminal.

USB data cable
USB to RS-485 interface
A
B

Brown +15~30V
Yellow RS232TX/RS485-A
Green RS485-B
Blue 0V

DC 24V +
0V -

120Ω

7. Data Transmission

7.1 Data Transmission Format

Default format Baud rate: 9600   Data bit: 8   Stop bit: 1   Parity bit: N

Baud rate, data bits, stop bits, parity bits and other parameters can be set in 5.2.3 [Communication Format Settings].

7.2 RS485 Interface

When the instrument is connected to 485 network, each instrument (slave) must be set with a unique address.

Because it is a slave device, when the instrument measures data, it will not actively send the data, and the host computer needs to issue instructions to obtain the data.

Instruct	Illustrate
01 06 00 11 00 00 D9 CF	Instrument is off
01 06 00 11 00 02 58 0E	continuous measurement
01 03 00 15 00 02 D5 CF	Get distance data

01	03	00 15	00 02	D5 CF
①	②	③	④	⑤

①Slave machine address, station number ② Read function code ③ Read address
④ Number of reads (2 16 bits) ⑤ Check code

7.3 RS232 Interface

When the instrument measures data, the interface will actively upload the data in the following format:

01	03	04	00 01 0D 7E	2F 43
①	②	③	④	⑤

① 01 indicates that the slave address is 1, only 1~64 are used in the system, and other addresses are reserved.

② 03 is the read function code, which means reading the data register.

③ 04 means returning 4 bytes of data.

④ The distance is 0x00010d7e (hexadecimal) = 68990 (decimal), which means the measured distance is 6.8990m.

⑤ Error parity bit, which allows the host and terminal to check errors during the transmission process and occupies two bytes.

7.4 Function Register List (16-bit)

Hexadecimal address	Decimal address	Attribute	Value range	Function description
0x10	16	R/W (reserved)		
0x11	17	R/W	0~2	0: Turn off measurement 2: Continuous measurement
0x12	18	R/W	1~5	Ranging speed level: 1: slowest, 5: fastest
0x13	19	R/W (reserved)		
0x14	20	R/W	1~64	Slave station number
0x15	21	R		High byte of distance register
0x16	22	R		Low byte of distance register
0x17	23	R		Ranging status register *
0x18	24	R/W	0~7	Communication baud rate
0x19	25	R/W	0~4	Voltage output 0: 0~5V 1: 0~10V Current output 2: 4~20mA 3: 0~20mA 4: 0~24mA
0x1A	26	R/W	0~50000	Minimum value register of analog output
0x1B	27	R/W	0~50000	Maximum value register of analog output
0x1C	28	R/W	0~50000	Minimum distance of Q1 switch output
0x1D	29	R/W	0~50000	Maximum distance of Q1 switch output
0x1E	30	R/W	0~2	Q1 0: Off 1: Positive polarity 2: Reverse polarity
0x1F	31	R/W	0~50000	Minimum distance of Q2 switch output
0x20	32	R/W	0~50000	Maximum distance of Q2 switch output
0x21	33	R/W	0~2	Q2 0: Off 1: Positive polarity 2: Reverse polarity

Note: When this register is 0, the distance measurement is successful; when it is not 0, the distance measurement is wrong, and the value of the distance register (21, 22) is 9999999.

For more information please visit: www.dadisick.com