FASELASE D10 2D LiDAR Sensor User Manual

Model: D10 2D LiDAR
USER MANUAL

QUICK START

Make sure that the USB driver is installed and plug the USB cable into the PC,
Connect the device to power supply (+5V±10%, 3A),
Run our data acquisition and analysis software,
Then select the correct communication port and set the baud rate to 921600bps.
Press the start button ” ” and start to work!

(Version V8.01.8)

For more info & supports, please visit http://www.top1sensor.com

Contents

Specifications

Items	Parameters
Scanning range 1	0.15m-10m, 6m@10%
Measurement error 2	±3CM@IOM@I0Hz
Scanning angle range	360°
Angle resolution	0.28°
Scanning frequency 3	10Hz
Measurement frequency	14.28Khz
Output Interface	TTL
Distance resolution	1 cm
Laser source	Laser diode 905nm, <1mW; comply with GB7247.1-2001 Class 1 Laser Eye Safety Requirements
Power supply	DC 5V±10%, Power consumption < 3W Starting current > 1.5A
Volume	78x78x56 mm
Operating temperature range	– 10°C- +50°C
Storage temperature range	– 20°C- +70°C
Protection level	IP54
Weight	190 g
Working life	50,000 hours under standard conditions

Notes:

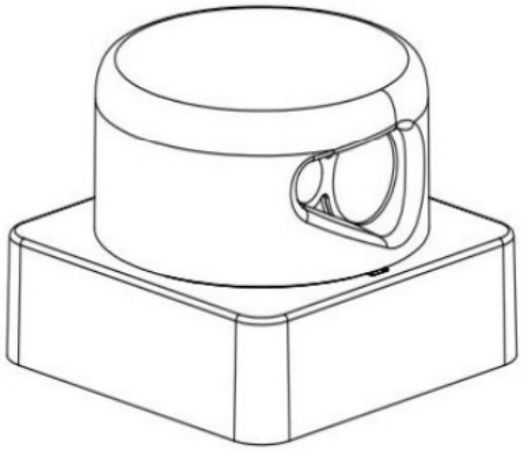
1. An object with only 10% reflectivity and dark color that can be measured 6m, Kadar white up to 10m
2. The measurement repeatability accuracy is ±3cm when the measurement range achieves 10m and scanning

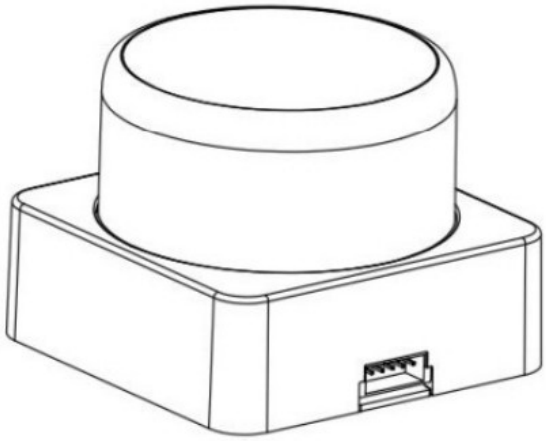
frequency is 10Hz.

3. The default rotating speed is 10 revolutions per second

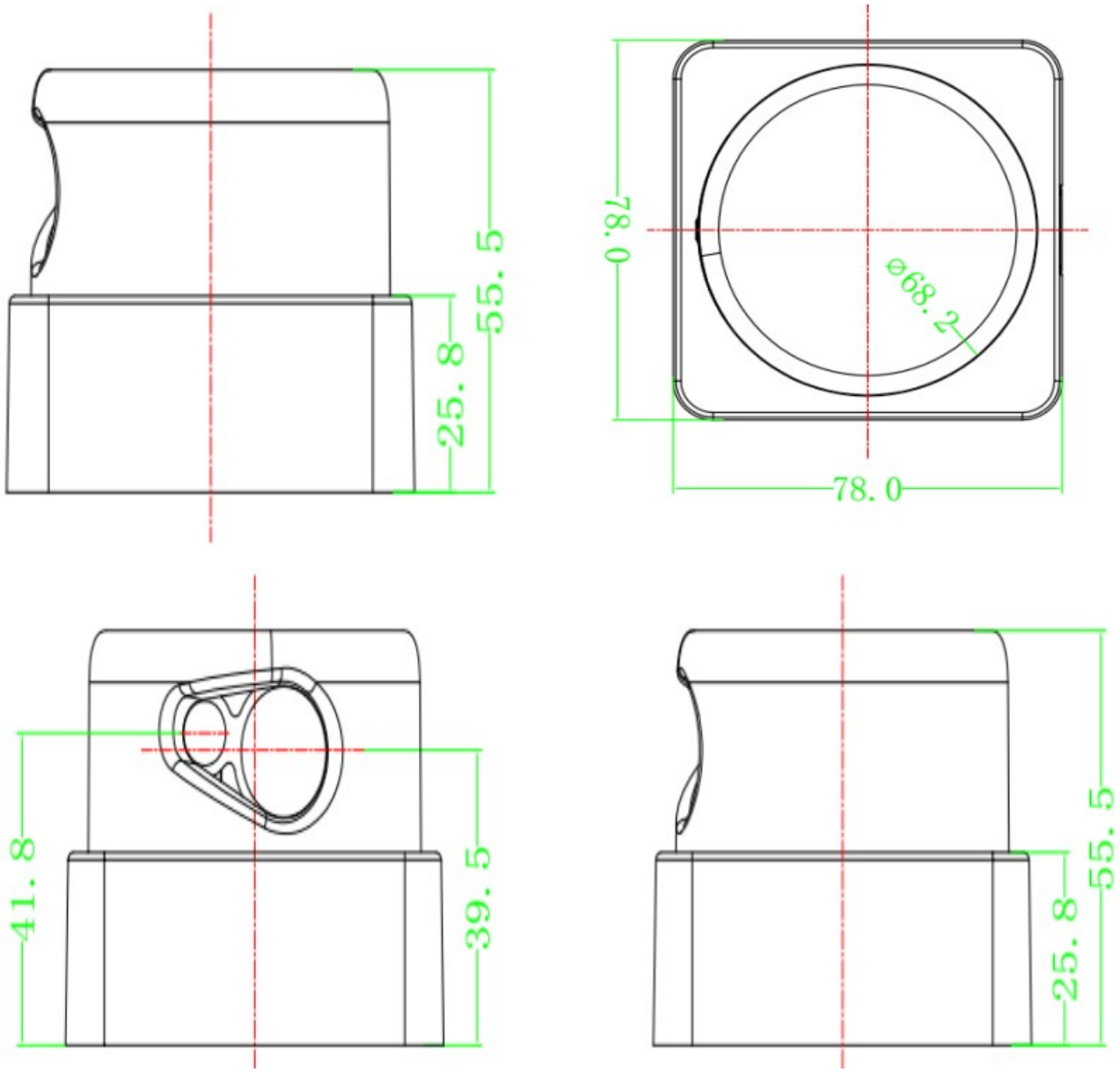
Dimensional drawing

2.1 Rendering



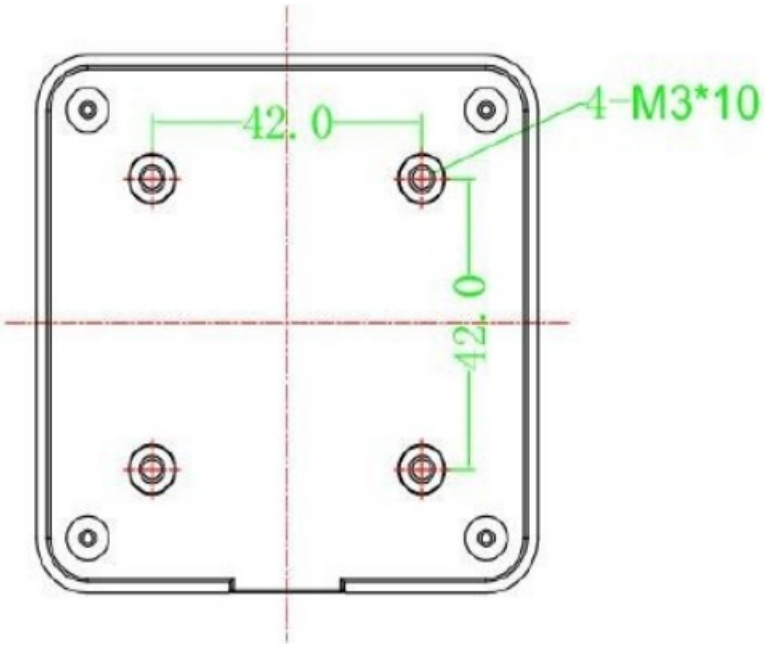


2.2 Dimensions



Installation and connection

3.1 Installation



3.2 Connection

3.2.1 Wiring diagram

3.2.2 Definitions of 10pin connection cable

Pin	Function	Color	Notes
0	+5V±10%	Red	DC power supply +5V
1	GND	White	DC power ground
2	Tx	Yellow	Connect to external TTL Rx
3	Rx	Green	Connect to external TTL Tx
4	GND	Black	Connect to internal GND

3.2.3 Power supply

Power supply +5V± 10%. The starting voltage needs to be 5V, the starting current needs to be 1500mA , the normal working current is 500mA. However the ripple coefficient of the power supply should not be greater than 40mV.The factory setting is that the D10 automatically starts rotating after power-on

Software setting

4.1 Driver installation

After the USB driver is successfully installed, connect the Lidar to the computer to confirm that it recognizes the com port, and then turn on the power. If the power is turned on first and then connected, there is a possibility that the computer mouse will be out of control. Please pay attention to the operation sequence. Run the “software exe file” and it can be used normally.

Some PC can automatically install the driver after LiDAR connected, if not, please download the CP210X driver in our software package.

4.2 Data acquisition

To run ‘Favelas LiDAR Point Cloud Data Acquisition and Analysis System.exe’ program, the communication settings window (see figure 1) will popup. First, select device D10. Second, select serial port number corresponding to the device, the serial port connected to the computer can automatically be identified by the program. Third, select baud rate 921600. Fourth, click ‘Yes’ to enter the monitoring interface(see figure2). Baud

rate: 921600 bps, Parity bit: None , Data bits: 8 , Stop bit: 1

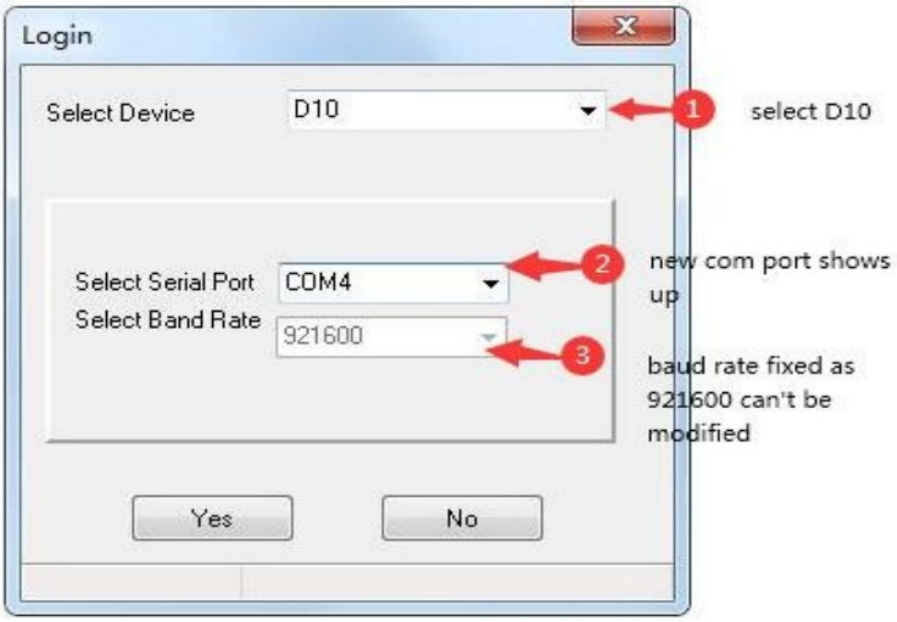


Figure 1: communication settings window

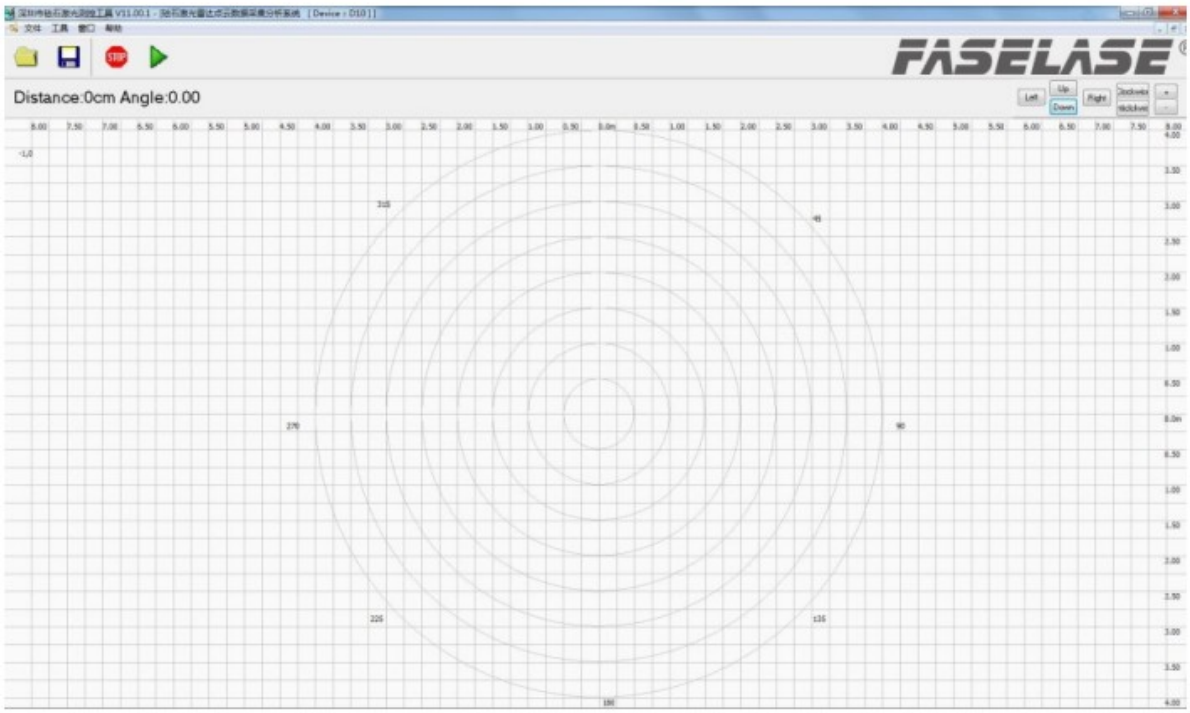


Figure 2: the monitoring interface

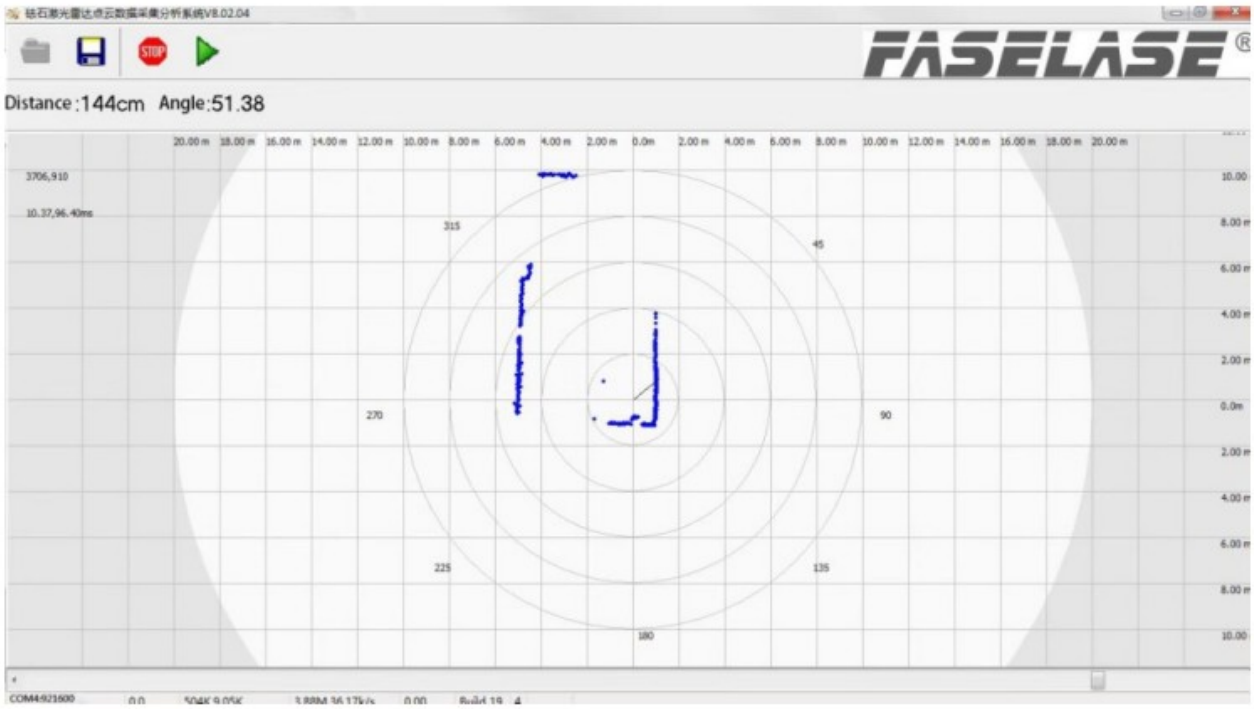


Figure 3:the measured results of the monitor window

Click the save icon to display the number of points detected in the current circle and the distance and angle of each point.
Click the right mouse button in the monitor interface to select ‘one dimensional display’ to observe the real-time data changes of each circle detection.

Click the Save icon to start recording the test data, to set the name and path, click OK, to end recording, click the Save button again , click Cancel in the pop-up window to complete the data recording.
The recorded data can also be opened by clicking the Open History File button

Communication protocol

5.1 Output data format

5.1.1 Binary output: 4 bytes, including both distance and angle values.
5.1.2 Each distance test data packet has 4 bytes (labeled A, B, C, and D in sequence.,
each byte has 8 bits, corresponding to A7,A6,…,A1,A0, B7,B6,…,B1,B0, C7,C6,…,C1,C0.and D7,D10,…,D1,D0.
5.1.3 The MSBs of the first 3 bytes are 0 (A7, B7, C7), and the MSB of the last byte is 1 (D7), which indicates the end of the data pack. There are 4*7 = 28 bits valid data in each data packet.
A6, A5, A4 of byte A are the check bit. For the specific algorithm, please check the data check algorithm in the next part.
A3, A2, A1, A0, B6, … B0, C6 are measured distances values (a total of 12 bits), its range is 0~4000cm .
C5…C0, D6,…D0 are measured angle values (a total of 13 digits). Its range is 0~5759, the angular accuracy is 1/16 degree.

Bits	A7	A6	A5	A4	A3	A2	Al	AO
Value	0	Check	Check	Check	Distance	Distance	Distance	Distance
Bits	B7	B6	B5	B4	B3	B2	B 1	BO
Value	0	Distance	Distance	Distance	Distance	Distance	Distance	Distance
Bits	C7	C6	C5	C4	C3	C2	C 1	CO
Value	0	Distance	Angle	Angle	Angle	Angle	Angle	Angle
Bits	D7	D 10	D5	D4	D3	D2	D1	DO
Value	1	Angle	Angle	Angle	Angle	Angle	Angle	Angle

Data check algorithm

Each character has 8 bits (bit7~bit0), each bit can be 0 or 1. The check bits A6,A5,A4 store the low 3 bit of sum of 1 of B,C,D 3 bytes, when check algorithm, first get the number of ‘1’ in the 3 bytes of B,C,D by looking up the table and then add them up, and then compare the lower 3 bits of the sum with A6,A5,A4, if they are consistent, output the measurement results unsigned char GetCrcPackage4Byte (unsigned char *buf)
{. unsigned char B,C,D;
B = buf[1];
C = buf[2];
D = buf[3];
//chit is a number table of 1corresponding to 0-255 static unsigned char cubit[256] = {
0,1,1,2,1,2,2,3,1,2,2,3,2,3,3,4,1,2,2,3,2,3,3,4,2,3,3,4,3,4,4,5,
1,2,2,3,2,3,3,4,2,3,3,4,3,4,4,5,2,3,3,4,3,4,4,5,3,4,4,5,4,5,5,6,
1,2,2,3,2,3,3,4,2,3,3,4,3,4,4,5,2,3,3,4,3,4,4,5,3,4,4,5,4,5,5,6,
2,3,3,4,3,4,4,5,3,4,4,5,4,5,5,6,3,4,4,5,4,5,5,6,4,5,5,6,5,6,6,7,
1,2,2,3,2,3,3,4,2,3,3,4,3,4,4,5,2,3,3,4,3,4,4,5,3,4,4,5,4,5,5,6,
2,3,3,4,3,4,4,5,3,4,4,5,4,5,5,6,3,4,4,5,4,5,5,6,4,5,5,6,5,6,6,7,
2,3,3,4,3,4,4,5,3,4,4,5,4,5,5,6,3,4,4,5,4,5,5,6,4,5,5,6,5,6,6,7,
3,4,4,5,4,5,5,6,4,5,5,6,5,6,6,7,4,5,5,6,5,6,6,7,5,6,6,7,6,7,7,8,
};
return (cubit[B]+cubit[C]+chit[D])&0x07; } return the low 3 digits the sum of 1 in the 3 bytes of B,C,.D

Data analysis algorithm

//buf is a data package pointer, which stores 3 bytes as A, B, C in order.
//return distance value, if data check is not correct, return -1
// Int Decode Lase Data(unsigned char *buf)
{ Int distance; unsigned char cordate = GetCrcPackage3Byte(buf);
//unsigned char orgcrc = (buf[0]>>4)&0x07;
if(cordate!= (buf[0]>>4))
return -1; ;

```
//calculate the distance. A0,B6..B0,C6…C0
. distance = ((buf[0]&0x1)<<14)+(buf[1]&0x7F)<<7)+((buf[2]&0x7F)); return distance ;
}
//
//buf is a data package pointer, which stores 4 bytes as A, B, C and D in order.
//return the distance value, if data check is not correct, return -1 typedef struct{ into distance;
Int Angle;
}FSDNode;
bool DecodeFSD10(FSDNode *nodelist,unsigned char *buf) { unsigned char cordate =
GetCrcPackage4Byte(buf);// calculate the low 3 digits the sum of 1 in the 3 bytes of B,C,.D
unsigned char orgcrcdata = (buf[0]>>4)&0x07;//get original check A6,A5 A4 if(orgcrcdata!= cordate) return false;
unsigned Int distance angle;
//calculate distance
distance = (buf[0]&0x0F);
distance <<= 7;
distance += (buf[1]&0x7F);
distance <<= 1;
if( buf[2]&0x40)
distance ++; novelist->distance = distance;
//calculate angle
angle = buf[2]&0x3F;
angle <<= 7;
angle += (buf[3]&0x7F);
novelist->Angle = angle;
return true;
```

Contact us to get more engineering cases and SDK packages supporting ROS drivers.

Trouble shooting

Factors affecting the measurement range

The D10 is an optical measuring device whose measurement results are affected by environmental factors. Therefore the actual measuring result might be different with typical value which is measured in standard environment.
The following factors will effect actual measuring range.

Factors	Affecting result
Multipath reflection	Wrong measurement results may occur when the laser energy returned from other objects exceeds the energy returned from the target
Transparent surface	Wrong measurement results may occur when the measurement target is colorless liquids or glasses
Small object	When the measured object is smaller than the laser spot, or the laser measures the corner of the measured object, incorrect measurement results may occur.

Standard and optional accessories

No.	Items	Qty	Remarks
1	D I 0	1 pc	
2	Data cable	1 pc	
3	TTL to USB convertor	1 pc	
4	DC +5V power adapter	1 pc	Optional

Contact us

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Documents / Resources

	FASELASE D10 2D LiDAR Sensor [pdf] User Manual D10, D10 Bee eyes 360 degree sensor navigation, 360 degree sensor navigation, D10 2D LiDAR Sensor, D10, 2D LiDAR Sensor, LiDAR Sensor, Sensor

References

- Xi'an Zhizun International Trade Co., Ltd. – Top1 laser distance sensor supplier from China
- Xi'an Zhizun International Trade Co., Ltd. – Top1 laser distance sensor supplier from China
- User Manual