

SDKELI®



LSE Series Laser Lidar -
Obstacle Avoidance Type
OPERATION MANUAL
(April 2022)



Shandong Keli Opto-electronic Technology Co., Ltd.

■ Directives and standards

LSE series laser lidar (referred to as LSE) meets the following standards:

- European Union Directive EMC Directive 2014/30/EU
- International standard
EMI: EN61326-1: 2013
EN55011: 2009 + A1: 2010
EMS: EN 61326-1: 2013
EN 61000-4-2: 2009
EN 61000-4-3: 2006 + A1: 2009 + A2: 2010
EN 61000-4-4: 2004 + A1: 2010
EN 61000-4-6: 2009
EN 61000-4-8: 2010
EN 61000-4-11: 2004
- GB standard
GB 4028

■ Safety precautions

The following safety warning signs are used to warn potential personal injury hazards, please follow all safety information with this symbol to avoid possible injury.



This is a key information prompting sign.
Sign contents are very important.
Operators must understand content requirements and implement the operations in strict accordance with the requirements, so as to avoid possible accidents.



This is a safety warning sign.
Sign contents are very important.
Operators must strictly enforce the safety information prompted on the sign, so as to avoid possible accidents.

■ Safety precautions for use



- Before using LSE, please carefully read this manual carefully to understand the procedures and requirements of installation, operation and setting.
- LSE should be selected, installed, overhauled and maintained by professionals. Professionals refer to the people who have been professionally trained and accredited, or people who have a wealth of knowledge, training and experience and the ability to solve such problems.
- Do not drop LSE.
- LSE should be used in accordance with local relevant standards and laws and regulations.
- Users should establish rules and regulations for safe operation and management and implement them effectively.

■ Applications

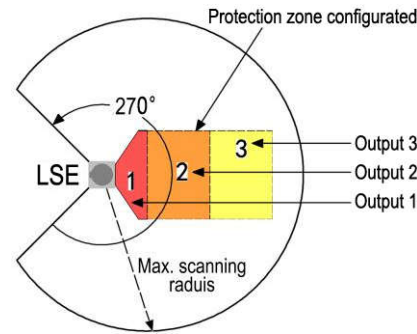
LSE for obstacle avoidance is suitable for collision prevention of mobile robots. The typical application is automated guided vehicle (AGV) and rail guided vehicle (RGV).

- The protection object of LSE must meet the following conditions:
 - 1) Only protect the objects that go into the protection zone.
 - 2) LSE cannot detect transparent and translucent objects.
The size of objects that go into the protection zone must be greater than or equal to the detection capability of LSE.
- Do not install LS in the following environments:
 - 1) Places outside the range of environment specified in the Operation Instructions (temperature, humidity, interference light, impact and vibration).
 - 2) Places with flammable or explosive gas.
 - 3) Places with smoke, particles, corrosive chemicals and other substances.
 - 4) Places that may generate strong light interference (such as direct light) on the LSE.

1. Working principles and protection zone configuration

LSE is designed based on pulsed laser ranging principles to realize the two dimensional zone detection with an angle of 270° and radius of 10m through rotational scanning.

Users can configure the mode and shape of protection zone through the configuration software.



Introduction of the protection zone

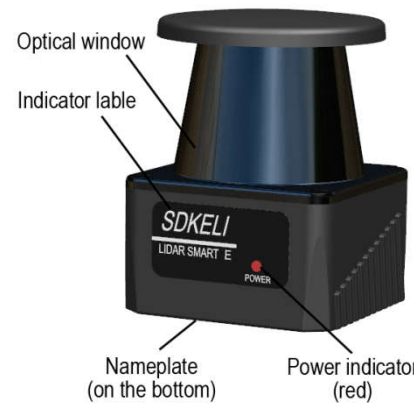
Identification	Meaning	Description
3	Protection zone 3 configured by user	OUTPUT3 will enter OFF state when any obstacle is detected
2	Protection zone 2 configured by user	OUTPUT2 will enter OFF state when any obstacle is detected
1	Protection zone 1 configured by user	OUTPUT1 will enter OFF state when any obstacle is detected
LSE	Laser lidar	Scanning angle: 270 °, radius: 10m@ 70% reflectance radius: 4m@10% reflectance

2. System description

LSE supplies power to its system and monitors the external equipment through the power cable. Users can use the USB configuration cable to connect the lidar with the computer, and set the relevant parameters such as the protection area through the configuration software.



3. Appearance information



State of power indicator	Corresponding sate of lidar
Slow flashing	Starting state
Continuous on	Operating state
Fast flashing	Fault state

4. Specification

Series	Max. scan radius	Scan angle	Output form	Max. measurement error	Angle resolution	Installation code
LSE	— □□	27	□□/	□	□□/	□□

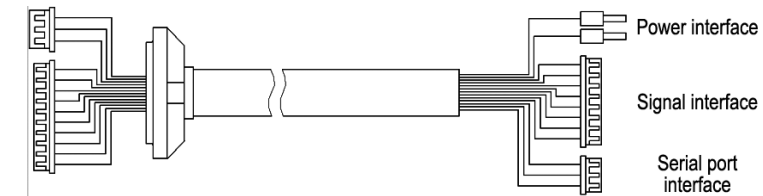
Specification	Maximum scan radius	Output form	Maximum measurement error	Angle resolution
LSE-0627BP/H05	6m@70 % reflectance	PNP	±3cm@1sigma	0.5°
LSE-0627BN/H05	2m@10 % reflectance	NPN		
LSE-1027BP/H05	10m@70% reflectance	PNP	±3cm@1sigma	0.5°
LSE-1027BN/H05	4m@10 % reflectance	NPN		

Scanning angle: 270°

Installation code: SZ—Horizontal installation

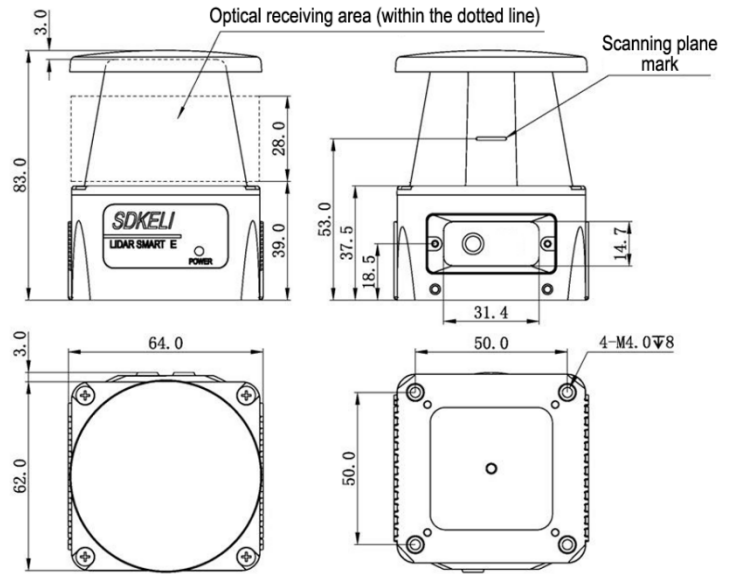
5. Power cable

The power cable structure is shown below, and the standard length is 1m.



No.	Wire core color	Signal definition	Signal description	Interface
1	Red	24V	Supply voltage +	Binding post
2	Green	0V	Supply voltage -	Binding post
3	PE	PE	Shield	3Y connector
4	Yellow	RXD	Connect TXD for user	
5	Cyan	TXD	Connect RXD for user	
6	White	Z1	Zone group selection signal, realize the switching among multiple protection zones through the changes in Z1, Z2, Z3 and Z4 input signals	8Y connector
7	Black	Z2		
8	Orange	Z3		
9	Pink	Z4		
10	Gray	INCOM+		
11	Brown	OUTPUT1	Output signal of each protection zone, PNP or NPN, OUTPUT enters OFF-state when an obstacle is detected in the corresponding detection zone	
12	Blue	OUTPUT2		
13	Purple	OUTPUT3		

6. Dimensions



CAUTION

In the scanning area set by the user, when the scanning optical axis is at any angle, it must be ensured that there is no obstacles in the optical receiving area.

7. Technical parameters

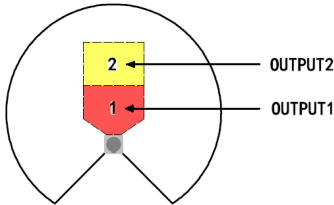
Optical properties			
Laser light source	Wavelength: 905nm; Class A laser product		
Max. scanning radius	10m@ 70% reflectance 4m@ 10% reflectance		
Scanning angle	270°	Angle resolution	0.5°
Pitch angle	±1.0°		
Max. measurement error	Typical ±3cm		
Electrical / mechanical parameters			
Supply voltage	DC9V to DC28V		
Power-on time	Typical 8s		
Power consumption	Typical 3W		
Output	OUTPUT1: Protection zone 1 will enter the OFF state when any obstacle is detected. OUTPUT2: Protection zone2 will enter the OFF state when any obstacle is detected. OUTPUT3: Protection zone3 will enter the OFF state when any obstacle / system failure is detected (alternative, it can be configured)		
Dimensions	62mm×64mm×83mm		
Cable length	Standard length 1m; Max.length≤30m		
Environmental properties			
Ambient temperature	Work: -10℃ to 50℃ (no frost or condensate fog) Storage: -40℃ to 70℃,		
Ambient humidity	Work: 35%RH to 85%RH Storage: 35%RH to 95%RH		
Ambient light immunity	15000Lux		
Enclosure rating	IP65		

Shock resistance	Acceleration: 10g; pulse duration: 16ms; Number of collision times: three axes, 1000 ± 10 times per axis	
Vibration resistance	Frequency 10Hz ~ 55Hz; amplitude: 0.35 ± 0.05mm; Number of scans: three axes, 20 times per axis	
Electromagnetic compatibility (EMC)	EMI	EN61326-1: 2013 EN55011: 2009+A1:2010
	EMS	EN61326-1: 2013 EN61000-4-2: 2009 EN61000-4-3: 2006+A1:2008+A2:2010 EN61000-4-4: 2004+A1:2010 EN61000-4-6: 2009 EN61000-4-8: 2010 EN61000-4-11: 2004
Configurable functions		
Protection zone configuration	The user can configure the protection zone of LS to the desired shape by configuring the software	
Response time	Adjustable (36ms/r)	
Zone group switching	4 groups of external input signal (Z1, Z2, Z3, Z4) to achieve the switching among 16 zone groups; when Z1, Z2, Z3 and Z4 are not received, zone group 1 will work by default	
Working mode	LSE provides 4 kinds of working modes, and the default is working mode 1	

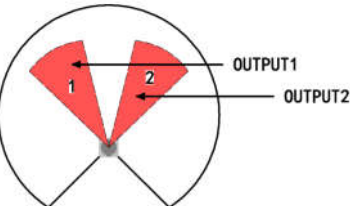
8. Working mode

LSE provides 4 kinds of working modes, and the default is working mode 1, and user may modify the working mode by configuring software. See “Operation Instructions of LSE Laser Lidar- Configuration Software”.

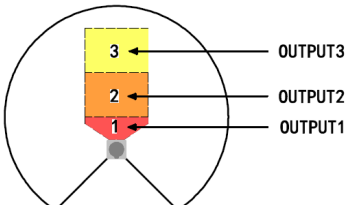
Mode 1: User can configure 2 protection zones from far and near corresponding to OUTPUT2 and OUTPUT1; meanwhile, provide system failure output OUTPUT3.



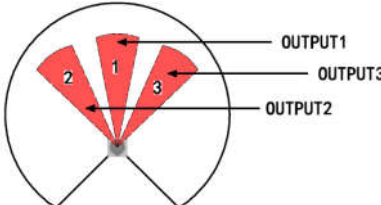
Mode 2: User can configure two independent protection zones corresponding to OUTPUT1 and OUTPUT2; meanwhile, provide system failure output OUTPUT3.



Mode 3: User can configure 3 protection zones from far and near corresponding to OUTPUT3, OUTPUT2 and OUTPUT1; not provide system failure output.

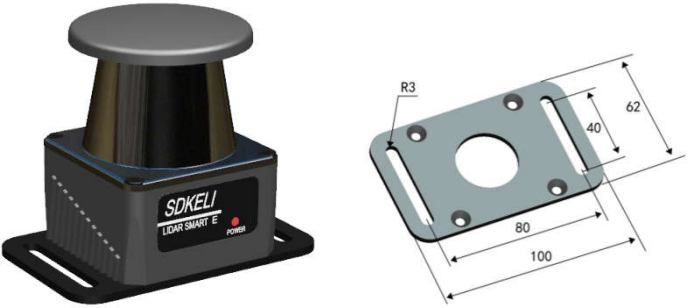


Mode 4: User can configure 3 independent protection zones corresponding to OUTPUT1, OUTPUT2 and OUTPUT3; not provide system failure output.



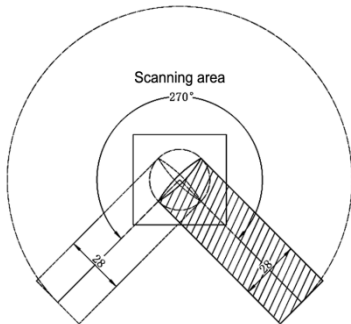
9. Installation

Horizontal installation (SZ)

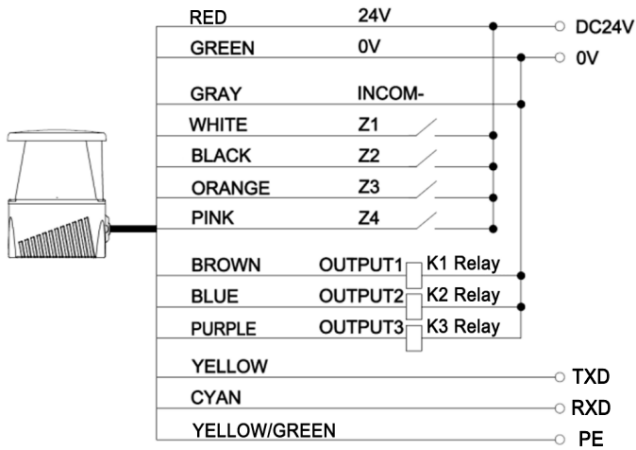


Installation precautions

- To prevent the light from being projected to the ground, the installation height of LS should not be smaller than 200mm.
- Try to keep LSE away from the vibration area during installation.
- During installation, there should be no obstacles in the optical receiving area shown in the following below.

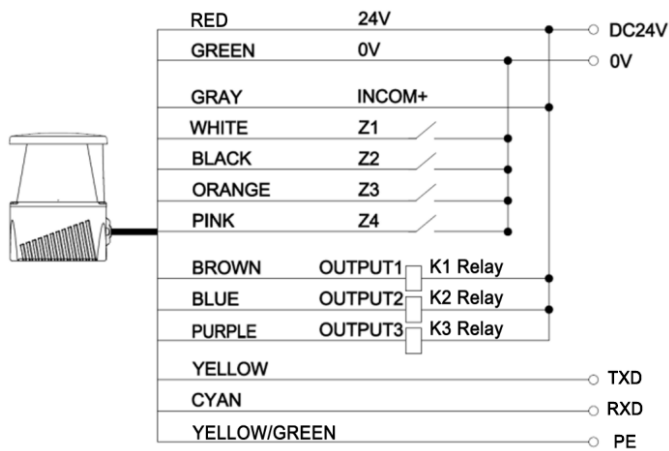


10. Wiring



TXD and RXD are signals from the user's terminal.

PNP output



TXD and RXD are signals from the user's terminal.

NPN output

WARNING

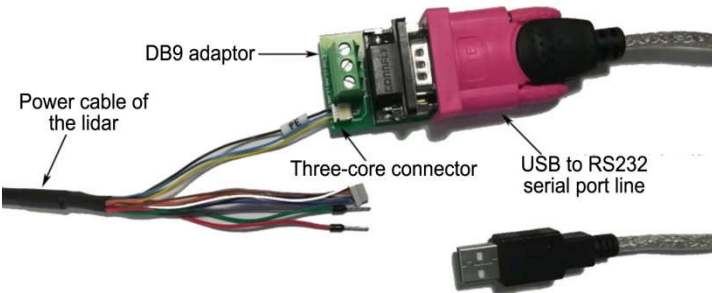
- Please read this manual carefully before wiring.
- Wiring must be conducted when the power is cut off.
- Double insulation or reinforced insulation must be used between all input and output interfaces and dangerous voltage. Otherwise, electric shock may be caused.
- The cable of LSE must be kept away from high-voltage wires and power lines.
- It is strictly forbidden for users to replace the cable without permission.
- Conduct correct wiring after defining the signal meanings of all terminals.

11. Instructions for use of configuration cable

The configuration cable consists of DB9 adaptor and USB to RS232 serial port line.



The connection between the configuration cable and the lidar is as follows:



The serial port lines are yellow line and cyan line, and the black shielded line is connected to GND.