DRW180066AC

Autonics

Laser Scanner
LSE-4A5R2

INSTRUCTION MANUAL

Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

▣ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.
※⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ **Warning** Failure to follow these instructions may result in serious injury or death.
⚠ **Caution** Failure to follow these instructions may result in personal injury or product damage.

⚠ Warning

1. **Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**
   Failure to follow this instruction may result in fire, personal injury, or economic loss.
2. **This product is not safety sensor and does not observe any domestic nor international safety standard. Do not use this product with the purpose of injury prevention or life protection, as well as in the place where economic loss maybe expected.**
3. **Do not connect, repair, or inspect the unit while connected to a power source.**
   Failure to follow this instruction may result in fire.
4. **Check 'Connections' before wiring.**
   Failure to follow this instruction may result in fire.
5. **Do not disassemble or modify the unit.**
   Failure to follow this instruction may result in fire.

⚠ Caution

1. **Do not stare at the laser emitter.**
   Failure to follow this instruction may result in eye damage.
2. **Use the unit within the rated specifications.**
   Failure to follow this instruction may result in fire or product damage.
3. **Use dry cloth to clean the unit, and do not use water or organic solvent.**
   Failure to follow this instruction may result in electric shock or fire.
4. **Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
   Failure to follow this instruction may result in fire or explosion.
5. **Do not apply high pressure to the laser scanner to clean it.**

▣ Laser Scanner Program [atLidar]

atLidar is the laser scanner program that allows installation of the laser scanner, setting of parameters, and management of monitoring data such as status information.

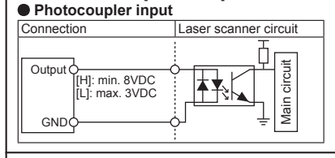
Item	Minimum specifications
System	32bit (×86) or 64bit (×64) processor over 1GHz
Operations	Microsoft Windows 7/8/10
Memory	4GB+
Hard disk	1GB+ of available hard disk space
VGA	Resolution: 1024×768 or higher

※Laser scanner is connected with atLidar in Ethernet communication.
※For initial IP address of the laser scanner, refer to the following table.
In order to connect the laser scanner and PC, set IP address of the PC to that of the laser scanner in same subnet.

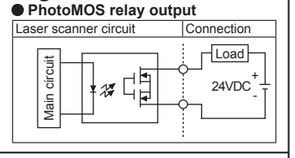
Item	Laser scanner	atLidar
Socket	Server	Client
IP address	192.168.0.1	IP address of the user PC
Subnet mask	255.255.255.0	255.255.255.0
Port	8000	–
Gateway	192.168.0.2	192.168.0.2

▣ Control Input/Output Circuit Diagram

● Photocoupler input



● PhotoMOS relay output



▣ Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
2. 24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. After supplying power, the sensor performs self-check for about 10 sec.
   When self-checking, error occurrence, remote control setting, and teaching, the laser scanner outputs the same as it sensed obstacle.
4. Mutual optical interference between laser scanners and photoelectric sensors may result in malfunction.
5. Mutual optical interference between laser scanners may result in malfunction.
6. Objects can not be scanned when covering the front cover of the laser scanner.
7. When the laser scanner is moved to another position, use it after re-teaching (Teach-in).
8. Do not drop the unit. It may cause malfunction.
9. Installing the laser scanner in the place where smoke, fog, dust, or corrosion is heavy may result in malfunction.
10. When installing the laser scanner outdoors, take protective measures. Otherwise, it may result in product damage.
11. Keep away from high voltage lines or power lines to prevent inductive noise.
    In case of installing power line and input signal line closely, use line filter or varistor at power line and shield wire at input signal line.
    Do not use the laser scanner near the equipment which generates strong magnetic force or high frequency noise.
12. Cover with shields, hoods, or etc. to prevent direct incidence of strong light (direct rays of sunlight, incandescent) into the laser scanner beam spread angle.
13. When fastening the laser scanner with the bracket, align with the mark line.
14. When mounting the bracket onto an external object, remove the wire fixture so that the wire of the laser scanner is not pressed.
15. Fix the laser scanner in position with the fixing screw. Vibration may result in malfunction.
16. When IP address of the laser scanner and wireless router is same, the communication does not connected.
    Set the wireless network (Wifi) to "Disable" in the network settings of the Windows operating system.
17. This unit may be used in the following environments.
    ①Indoors/Outdoors (in the environment condition rated in 'Specifications')
    ②Altitude max. 2,000m ③Pollution degree 2 ④Installation category II

※**The above specifications are subject to change and some models may be discontinued without notice.**
※**Be sure to follow cautions written in the instruction manual, user manual and the technical descriptions (catalog, homepage).**

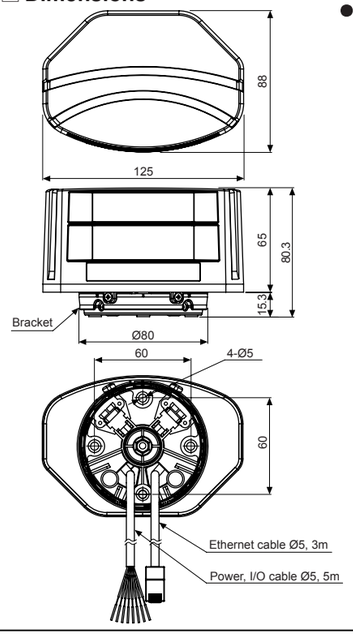
▣ Specifications

Model		LSE-4A5R2
Power supply		24VDC⎓
Allowable voltage range		80 to 120% of rated voltage
Emitting property		Infrared laser
	Laser class	CLASS 1
	Wavelength band	905nm
	Max. pulse output power	75W
Angular resolution		0.4°
Aperture angle		90°
Object reflectivity		Min. 2%
Scanning mode		Motion and presence
Monitoring zone※1		0.3×0.3m to 5.6×5.6m (object reflectivity: at approx. 10%)
Min. size of the scanning target		・At detection distance of 3m: approx. W2.1×H2.1×L2.1cm ・At detection distance of 5m: approx. W3.5×H3.5×L3.5cm ・Object reflectivity: 90% (at Kodak Gray card R-27, white)
Power consumption		Max. 8W
Response time※2		Typ. 20 to 80ms+monitoring time
Input		Photocoupler input: 1 (output test mode) ・[H]: min. 8VDC⎓ (max. 30VDC⎓), [L]: max. 3VDC ・[H] operates as output test mode and outputs obstacle detection output and error status output
Output		PhotoMOS relay output: 2 (obstacle detection output, error status output) ・Galvanic isolation, non-polarity ・30VDC / 24VAC, max. DC80mA (resistive load) ・Output resistance: 30Ω ・Switching time: t_{ON}=5ms, t_{OFF}=5ms
Installation angle※3	Laser scanner angle	-45°, 0°, 45°
	Bracket rotation angle※4	-5 to 5°
	Bracket tilt angle	-3 to 3°
Front contamination		Normal operation with max. 30% contamination of one material
Communication interface※5		Ethernet
Life expectancy		Max. 6.8 years (60,000 hours)
Insulation resistance		Over 5MΩ (at 500VDC megger)
Dielectric strength		500VAC 50/60Hz for 1 minute
Vibration		Max. 2G (18.7m/s²)
Shock		30G/18ms
Environment	Ambient illumination	Sunlight: max. 100,000lx
	Ambient temperature※6	-30 to 60℃
	Ambient humidity	0 to 95%RH, storage: 0 to 95%RH
Material		Polycarbonate
Protection structure		IP67 (IEC standard)
Cable	Power, I/O	Ø5mm, 8-wire, 5m (AWG 26, core diameter: 0.16mm, number of cores: 7, insulator out diameter: Ø1mm)
	Ethernet	Ø5mm, 4-wire, 3m, shielded cable (AWG 26, core diameter: 0.16mm, number of cores: 7, insulator out diameter: Ø1mm)
Component	Accessory	Bracket, M2.6×L6 Tapping screw (for fixing bracket rotation angle): 2, 3mm allen wrench
	PC program	atLidar (laser scanner program)
Korean Railway Standards		KRS SG 0068
Approval		CE KC
Weight※7		Approx. 0.96kg (approx 0.58kg)

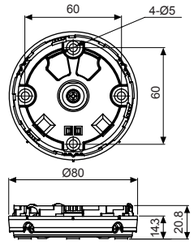
※1: The monitoring zone may be changed by the sensitivity level setting.
※2: 'Monitoring time' is able to be set with the remote control or atLidar.
※3: Please refer to '▣ Installation'.
※4: It represents alignment range of laser scanner and is able to be set within the range from -5 to 5° based on the mark line.
※5: It is used for setting sensor positions, parameters, and monitoring status information.
※6: Ambient temperature in power supplied status is -30 to 60℃ and in power cut status is -10 to 60℃.
※7: The weight includes packaging. The weight in parenthesis is for unit only.
※The temperature or humidity mentioned in Environment indicates a non freezing or condensation.

▣ Dimensions

(unit: mm)



● Bracket

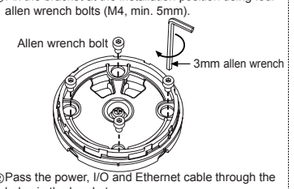


▣ Manual

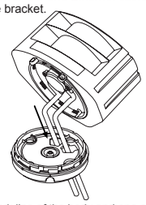
For the detail information and instructions, please refer to user manual and user manual for communication, and be sure to follow cautions written in the technical descriptions (catalog, homepage).
Visit our homepage (www.autonics.com) to download manuals.

▣ Installation

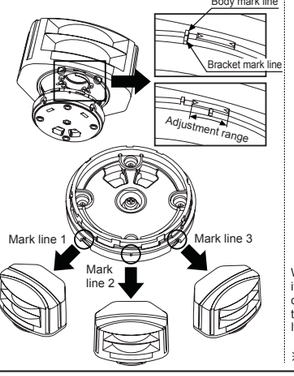
①Fix the bracket at the installation position using four allen wrench bolts (M4, min. 5mm).



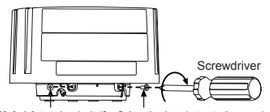
②Pass the power, I/O and Ethernet cable through the holes in the bracket.



③Align the mark line of the body and one of the three mark lines of the bracket and turn the bracket clockwise to fix. Turn only within the adjustment range.

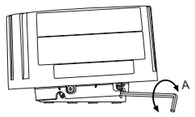


④After setting the bracket rotation angle, fix the bracket and laser scanner with the screwdriver.

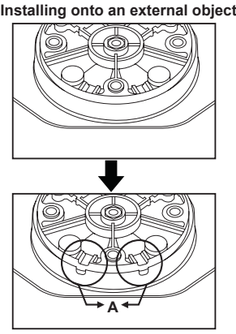


M2.6×L6 tapping bolt (for fixing the bracket rotation angle)

⑤The bracket tilt angle (-3 to 3°) can be adjusted according to the situation of the installed location. Following image shows the example of rotating the allen wrench to the A direction.



◎ Installing onto an external object

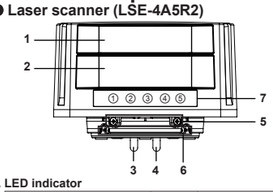


When installing the bracket onto the external object, it has possibility of applying excessive force on the cable due to the lack of space between the cable and the object.
If necessary, cut the A part and place the cable to be stable.

※When cutting the A part, be cautious of personal injury.

▣ Unit Description

● Laser scanner (LSE-4A5R2)



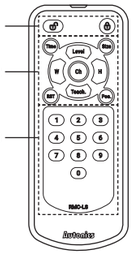
1. Laser emitter
2. Laser receiver
3. Power, I/O cable
4. Ethernet cable
: Connect with atLidar through communication.
5. Bracket rotation angle fixing part
6. Bracket tilt angle fixing part

7. LED indicator

Indicator		Color	Function
①	Ethernet connection indicator	Green	Flashes when connected with the PC (Ethernet communication status)
②	Power indicator	Green	Flashes when power is supplied
③	Remote control operation indicator	Green	Flashes when (⏻) key is pressed
④	Operation indicator	Red	Turns on when obstacle is scanned
⑤	Error indicator	Orange	Flashes according to the type of error

※Please refer to '▣ LED Indicator by Situation' for more detailed operation.

● Remote control (RMC-LS, sold separately)



1. LOCK/UN-LOCK

Key	Function	Description
⏻	Unlock	Unlock to press menu key
🔒	Lock	Lock remote control

2. Menu key

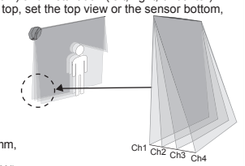
Key	Function	Description
Time	Monitoring time	Outputs after monitoring time when an obstacle is scanned
Size	Scanning target size	Sets size of the scanning target (approx. 5, 10, 15, 20cm)
INIT	Initialization to factory default	Initializes all settings values to their factory default
Pos.	Sensor position	Sets installation position of the laser scanner (view and left, right, center)
Ch	Activated channel	Sets channel (Ch1, Ch2, Ch3, Ch4) to activate
Level	Sensitivity	Adjusts object scanning sensitivity of the laser scanner
W	Width of the monitoring zone or concentrated monitoring zone	Sets width of the monitoring zone or concentrated monitoring zone
H	Height of the monitoring zone or concentrated monitoring zone	Sets height of the monitoring zone or concentrated monitoring zone
Teach.	Teaching	Familiarizes with the space where the laser scanner will scan

3. Number key: Setting values can be input to each menu, using 0 to 9 number keys.

▣ Function

◎ Sensor position

-Set the actual installed laser scanner position: view (top or bottom) and installation (left, right, or center).
-When a user look at the installed laser scanner and the sensor top, set the top view or the sensor bottom, set the bottom view.
※In case of left or right installation, setting value of monitoring zone width (W) and height (H) must be entered.
※In case of center installation, monitoring zone width (W) and height (H) is not changeable.



◎ Activated channel(s)

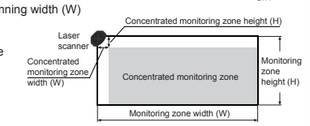
-The laser scanner has 4 channels (Ch1, Ch2, Ch3, Ch4). Activate the channel(s) for obstacle detection.

◎ Monitoring zone width (W) and height (H)

-Monitoring zone width and height can be set in increments of 0.1mm, within the range from 0.5×0.5m to 6×6m.
※In case of center installation, setting value of scanning width (W) and height (H) are fixed to 5.6×5.6m.

◎ Concentrated monitoring zone

-As shown in the right image, it is possible to set the area where obstacles are scanned intensively except for unnecessary area. Height and width are settable from OFF, 10, 20, 30cm individually.
※In case of left or right sensor install position, the concentrated zone is available to set.



◎ Sensitivity level

-It is able to set the object scanning sensitivity of the laser scanner.
-Setting range is from level 1 (most sensitive, indoor installation) to level 4 (most insensitive, installation in an environment subject to snow or rain).

◎ Minimum size of the scanning target

-The minimum size of the scanning target can be set from OFF, approx. 5, 10, 15, 20cm.
For example, when '5cm' is selected, the object of size over W5cm×H5cm×L5cm.
-If the minimum size of the scanning target is set to OFF, the size of the scannable object is as follows.
・At detection distance of 3m: approx. W2.1×H2.1×L2.1cm
・At detection distance of 5m: approx. W3.5×H3.5×L3.5cm
※The size of the scanning target is approximate.

◎ Monitoring time

-When an obstacle is scanned, obstacle detection output occurs after monitoring time. By setting monitoring time longer, the laser scanner scans monitoring zone repeatedly and scans obstacles without being affected by snow or rain.

◎ Output

-The type of obstacle detection output is settable to normally open or normally closed.
-The type of error status output is settable to normally open, normally closed, or pulse.
※In case of OUT2 (error status output) as pulse, it repeats open-close operation for 1 sec at the normal operation and it closes at error status.

	OUT1 (obstacle detection output)	OUT2 (error status output)
N.O./N.O.	Normally open	Normally open
N.O./N.C.	Normally open	Normally closed
N.C./N.O.	Normally closed	Normally open
N.C./N.C.	Normally closed	Normally closed
N.O./Pulse	Normally open	Pulse
N.C./Pulse	Normally closed	Pulse

◎ Teaching

-This function is to familiarize the space which is set by the monitoring zone width (W) and height (H) in advance. Objects in the space at moment of teaching are not regarded as obstacles.
When the environment is changed or some objects are removed or added in the space, newly operate teaching.
※Operate teaching in the environment free from snow, rain, fog, hail, or mutual interference of another laser scanner.

◎ Password

-When entering the (⏻) key of the remote control, only the user who entered the right password changes the parameter settings of sensor position, monitoring zone width (W), height (H), etc.
※Setting range: 0000 to 9999
※When losing the set password, re-supply the power and set the password again in 10 minutes.
※Please use the password function for preventing mutual interference of several units or malfunction.

◎ Initialization

-Except for the password, all setting values (including IP setting) are initialized to their factory default setting values.

◎ IP Initialization

-The laser scanner's IP address initializes as factory default.

▣ LED Indicator

※☼: ON, ●: OFF, ◑: Flash

◎ Error indicator

Status \ Indicator		Ethernet connection indicator (green)	Power indicator (green)	Remote control operation indicator (green)	Operation indicator (red)	Error indicator (orange)
Comm. cable connection		◑	—	—	—	—
Scanning waiting sequence	1	—	●	●	●	☼
	2	—	●	●	☼	☼
	3	—	●	☼	☼	☼
	4	—	●	◑ (flashing twice in every 0.5 sec)		
Scanning		—	◑ (every sec)	●	—	●
Detection		—	◑ (every sec)	●	☼	●
Remote control key input waiting	Password	—	●	◑ (every 0.05 sec)	●	●
	Menu	—	●	◑ (every 0.03 sec)	●	●
	Number	—	●	◑ (every 0.05 sec)	●	●
Teaching		—	◑ (flashing in every sec for 35 sec)	●	◑ (flashing in every sec for 35 sec)	●
Output test mode		—	◑ (every 0.05 sec)	●	—	●

※'—' means nothing to '☼: ON, ●: OFF, ◑: Flash'.

◎ Error indicator

①Voltage error: Repeats "◑ (0.2 sec) > ◑ (0.2 sec) > ◑ (0.2 sec) > ◑ (1 sec) > ● (2 sec)" operation.
②Temperature error: Repeats "◑ (0.2 sec) > ◑ (1 sec) > ◑ (1 sec) > ◑ (1 sec) > ● (2 sec)" operation.
③Internal error: Flashing of error indicator besides voltage error and temperature error means occurrence of internal error.
※When error occurs, the power indicator (green) and the remote control operation indicator (green) turn OFF and the operation indicator (red) turns ON.

▣ Connection Cable

● Power, I/O cable

Color	Signal	Function
Brown	+V	24VDC
Blue	GND	0VDC
Yellow	OUT1_A	Obstacle detection output
Green	OUT1_B	
Red	OUT2_A	Error status output
Gray	OUT2_B	
Black	IN_A	Output test mode
White	IN_B	

● Ethernet cable

Pin no.	Signal	Pin no.	Signal
1	TX+	5	–
2	TX-	6	RX-
3	RX+	7	–
4	–	8	–

※The input/output signals can operate in both direction regardless of the polarity.
※When the photocoupler input is not used, do not wire both end of input terminal, or supply power under 3VDC.

▣ Major Product

■ Photoelectric Sensors
■ Fiber Optic Sensors
■ Door Sensors
■ Door Side Sensors
■ Area Sensors
■ Proximity Sensors
■ Pressure Sensors
■ Rotary Encoders
■ Connectors/Sockets
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, CO_2, Nd: YAG)
■ Laser Welding/Cutting System
■ Temperature Controllers
■ Temperature/Humidity Transducers
■ SSRs/Power Controllers
■ Counters
■ Timers
■ Panel Meters
■ Tachometer/Pulse (Rate) Meters
■ Display Units
■ Sensor Controllers

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