

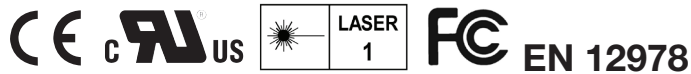
Presence Sensor

Safety sensor for industrial doors

LEYON-Safe-E



- Overhead presence sensor for industrial doors and gates
- Compliance to EN 12453, safety device type E, and UL 325
- Three-dimensional safety zone for accurate contactless detection of people and vehicles via precise time-of-flight measurements
- Sensing range: 4 x 4 m industrial doors, 5 x 2.5 m access gates
- Fast installation with no need for any mechanical adjustments, markers, or visual aids
- Extremely simple set-up of the safety area thanks to the unique auto-teach function
- WebApp for diagnostics and set-up via a mobile device with no need for internet connection nor to install any App
- Suitable for indoor and outdoor environments
- Easy access to the Web-App via unique QR Code

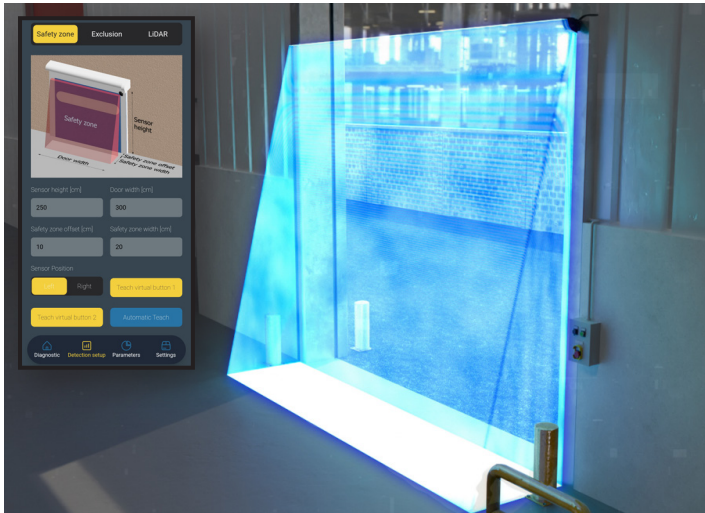


Description

LEYON-Safe-E is an advanced safety sensor based on LiDAR technology that offers high-level contactless protection of industrial doors and gates during opening and closing. This ensures a standalone type E safety protection of the area in front of the access. Based on a very accurate time-of-flight camera technology and infrared laser illumination, it ensures exhaustive protection in any demanding industrial environment, allowing manufacturers of automatic

doors and door automation systems to increase the level of safety. By scanning the narrow field of the doorway and its immediate vicinity, LEYON-Safe-E continuously monitors the presence and movement of people and vehicles no matter the conditions. It brings a unique simplicity of installation and set-up thanks to its symmetrical design, unique installation kit, and automatic teach function.

Simplified installation and set-up



Part selection

Family	Detection mode	Protection	Connection	Part number
LEYON	Presence	Contactless – safety device Type E	10 m cable	LEYON-Safe-E

Features

Main operational data

Sensing principle	Real-time 3D imaging sensor with infrared laser illumination and continuous wave time-of-flight measurement
Detection mode	Presence, EN 12453 Type E
Maximum detection range	Door size: 4 m x 4 m or 5 m x 2.5 m; Minimum installation height of 2.5 m
Field of view illumination	90° Vertical, 8° Horizontal
Sensing	
Blind zone	None
Light source	Wavelength 940 nm infrared VCSELs
Laser class	Class 1 (EN IEC 60825-1)
Light type	Infrared light modulated
Angular resolution	0.3°
Hysteresis	5 cm ± 3 cm
Minimum target size	5 cm x 5 cm @ 4 m, 10 cm x 10 cm @ Max range (18% reflective)
Testbody	700 x 300 x 200 mm box, Test piece A according to EN 12453
Target reflectivity (of testbody)	2%
Response time	
Response times t_{ON}	≤ 150 ms (Run state) ≤ 310 ms (Idle state) (Object enters detection area => Relay deenergizes)
Response times t_{OFF}	≤ 310 ms (Run state) ≤ 790 ms (Idle state) (Object leaves detection area => Relay energizes)
LED-signal	4 multi-color LEDs

Electrical data

Power supply	
Power consumption	Max. 20 W Typical 8 W
Current consumption	Max. 1 A Typical 0.5 A
Operating voltage range (U_p)	24 VDC $\pm 15\%$ (Ripple included) UL: Class 2 Supply; EN/IEC: SELV/ES1 compatible power-supply
Ripple (U_{rip})	$\leq 10\%$
Power-ON delay	30 s, with ambient temperature $\geq 5^\circ\text{C}$. With temperature below 5°C a warm-up time of 15 minutes is recommended
Inputs	
Input function	Test input, Teach input
Input voltage	$\leq 24 \text{ VAC/DC} + 15\%$
Threshold levels	Low $< 2 \text{ V}$, High $> 10 \text{ V}$ (non isolated)
“Test input” activation	Input pulse time: $\geq 10 \text{ ms}$ Resulting output safe state pulse: $> 100 \text{ ms}$
Outputs	
Output function Configurable via WebApp as:	1 electromechanical relay and 2 solid state relays Safety detection / Warning / Error
SPDT EMR Relay output Factory setting: Max. voltage Max. current	SPDT electromechanical relay Safety detection 24V AC/DC $+15\%$ 100 mA AC/DC
SSR output N.O. Factory setting: Max. voltage: Max. current:	Solid-state relay Normally Open Warning 24V AC/DC $+15\%$ 100 mA AC/DC
SSR output N.C. Factory setting: Max. voltage: Max. current:	Solid-state relay Normally Closed Error 24V AC/DC $+15\%$ 100 mA AC/DC
Output switching function	N.O. or N.C. by configuration
Utilization category	AC-1 / DC-1

Environmental data

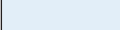
Ambient temperatures	
Operating	-30°C...+55°C (-22°F...+131°F) if powered
Storage	-40°C...+85°C (-40°F...+185°F)
Ambient humidity range	
Operating	0%...95% (With no icing or condensation)
Storage	35%...95%
Ambient light immunity	
	≤ 100.000 Lux In outdoor installation the sensor must be protected against direct sunlight
Mechanical influences	
Vibration	According to EN 12978
Categorization	
Pollution degree	3 (EN IEC 60664-1)
Degrees of protection	IP65 (EN 60529)
UL 325 location	Indoor and outdoor
Safety (electrical)	
Protections	Short circuits, reverse polarity and transients
Rated insulation voltage (U _i)	50 VDC
Dielectric insulation voltage	500 VAC rms, 50/60 Hz for 1 min
EMC emission standard	EN IEC 61000-6-4
EMC immunity standard	EN IEC 61000-6-2

Functions

DIP-switch settings

DIP-switches are accessible on the main board, after removing the back part

IR light modulation frequency		
Channel	1	2
DIP 1		
Output inverter		
Output	Not inverted	Inverted
DIP 4		
Wi-Fi server		
Wi-Fi	Enabled	Disabled
DIP 5		
Not used		
DIP 2		
DIP 3		
DIP 6		

 ON
  OFF
  Factory settings

Teach

Automatic Teach-in can be done in two different ways

Teach	Via WebApp on a mobile device when connected to the sensor's server
	Connect 24 VAC/DC to orange wire and ground to blue wire for >1 second, then disconnect

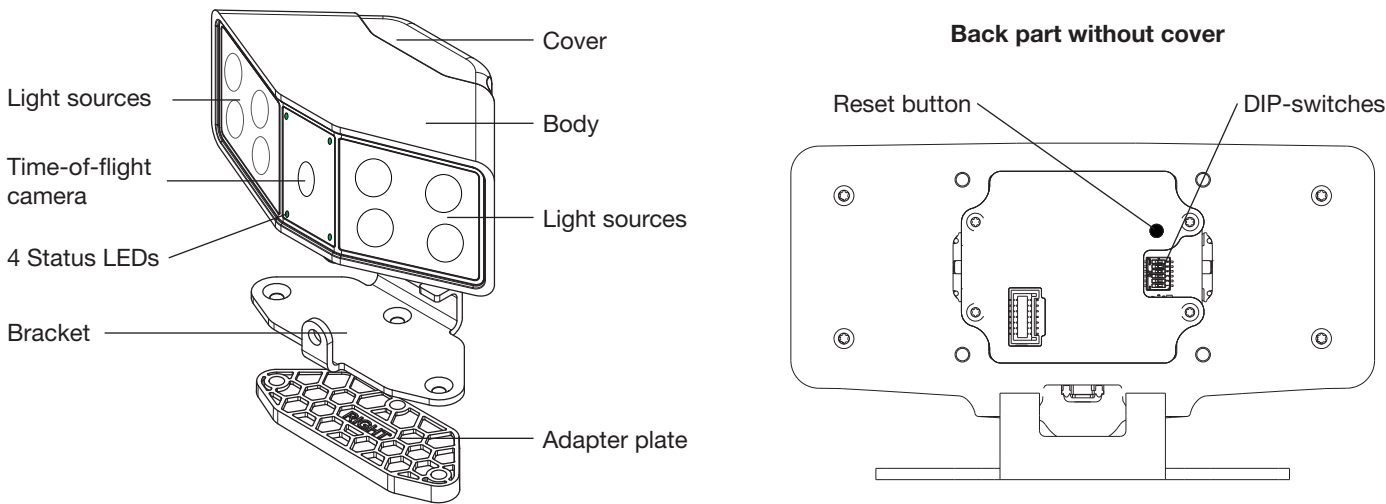
Factory reset

Reset button is accessible on the main board, after removing the back part

Factory reset	By pressing the reset button for 10 seconds it is possible to reset the sensor to factory settings
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Structure

Housing



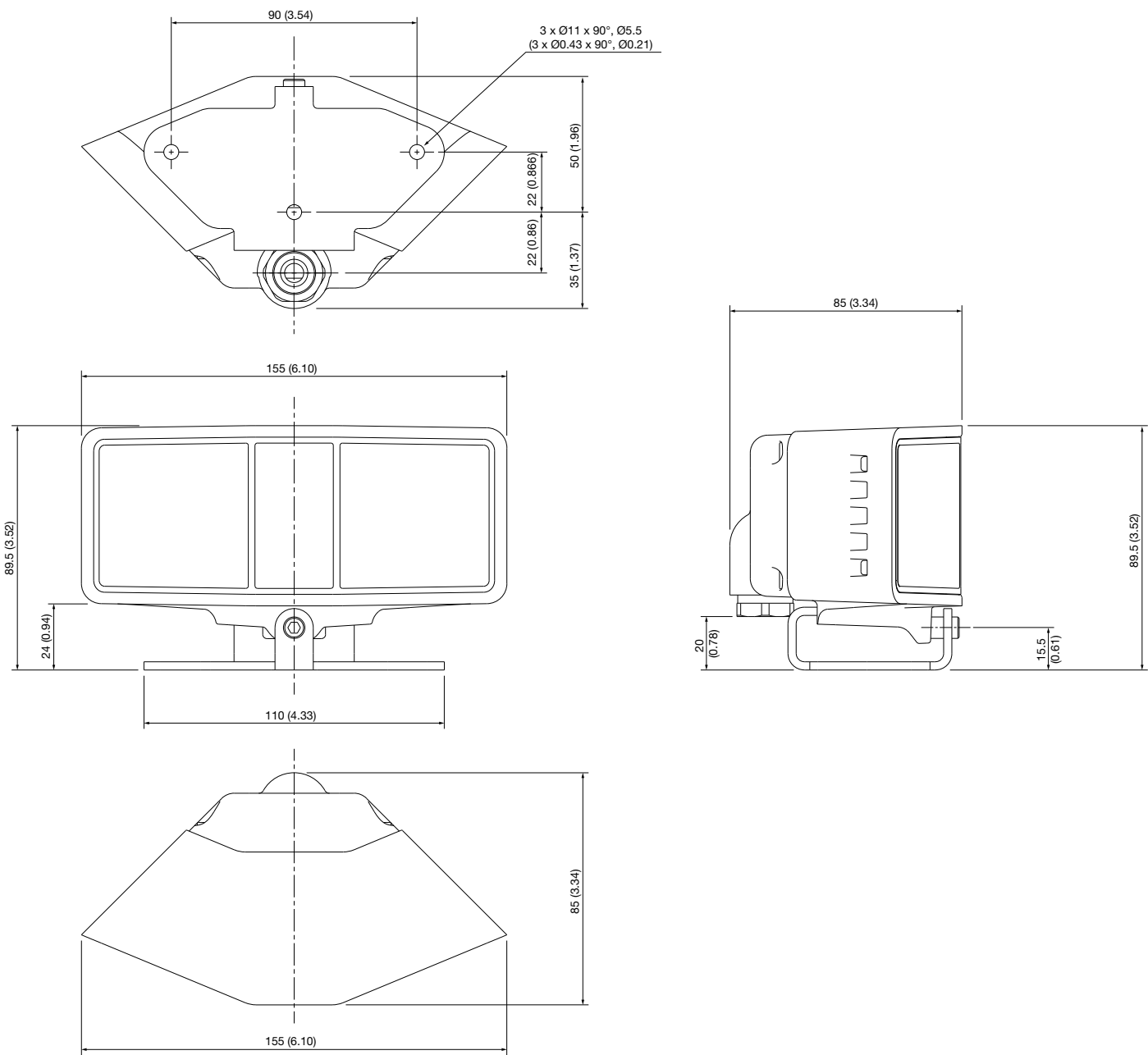
Housing	
Body	Diecast aluminium, black powder coating
Frame and cover	PC
Front glass	PC, Dark tinted
Cable gland	PC
Mainboard	DIP-switches
	Reset button
Bracket (included)	Stainless steel
Adapter plate (included)	PC, black
Dimensions (HxWxD)	155 x 85 x 89.5 mm (6.10 x 3.34 x 3.52 in)
Weight	1250 g
Connection	
Cable	10 m (32.8 ft) 10-wire (Ø6.2 mm)

Connection and wiring

10 wire cable color code

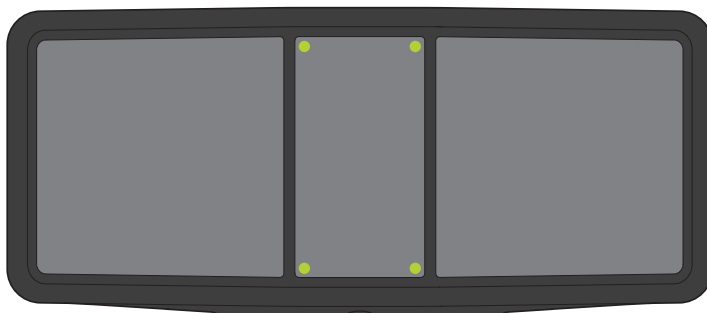
Cable color	Cable function	Function	Wiring diagram
 Red	24 V	24 VDC supply	
 Black	GND		
 Yellow	N.O.	SSR output N.O.	
 Green	Common	Factory setting: Warning output	
 Violet	N.C.	SSR output N.C.	
 Green	Common	Factory setting: Error output	
 Grey	N.C.	SPDT EMR output N.C.	
 Green	Common		
 White	N.O.	SPDT EMR output N.O.	
 Green	Common		
 Orange	DI 2	Teach input	
 Blue	Common		
 Brown	DI 1	Test input	
 Blue	Common		

Dimensions in mm (inches)



LED indication

The sensor has 4 multicolor LEDs, one in each corner of the central panel:



LED indication during run conditions

LED color	Pattern	Sensor state
 4 x Green	Blinking (~1 Hz) for 30 seconds	Start-up in progress after power up
 4 x Blue	Steady	Teach/set-up not yet performed
 2 x Green	Steady – bottom left corner + top right corner	Detection mode - Idle state - No detection
 4 x Green	Steady	Detection mode - Run state - No detection
 4 x Red	Steady	Run state - Detection in safety zone
 4 x Purple	Steady	Set-up mode
 1 x Blue	Steady – Bottom right corner	Connected via Wi-Fi
 2 x Orange	Blinking (~1 Hz) – Right side	Warning condition
 4 x Orange	Blinking (~1 Hz)	Error condition

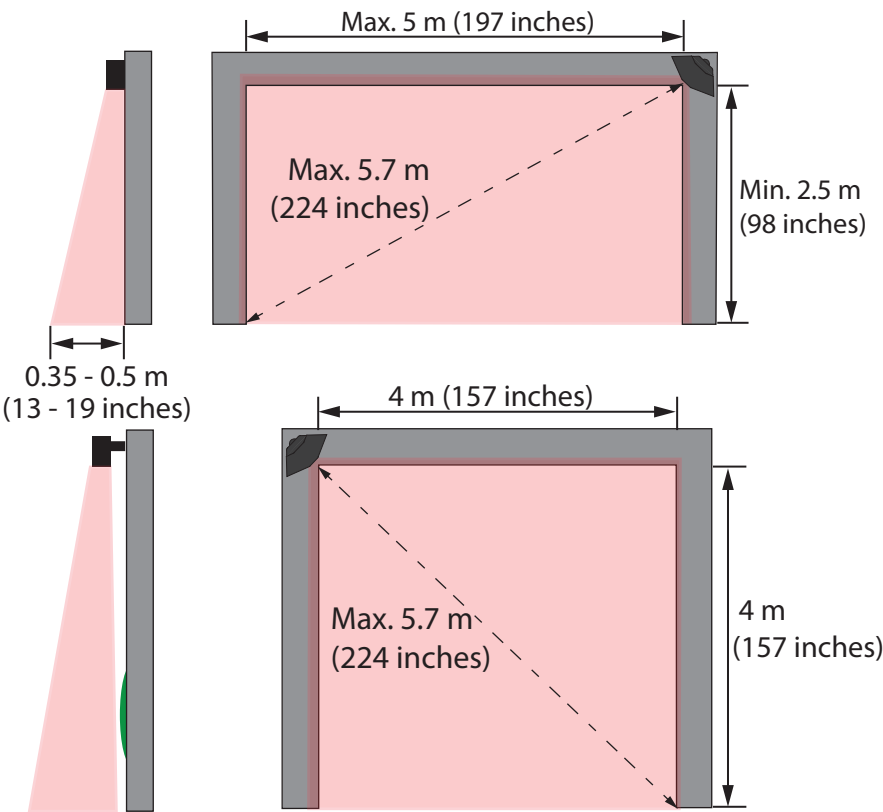
LED indication during teach

LED color	Pattern	Sensor state
 4 x Blue	Blinking (~1 Hz)	Teach in progress
 4 x Blue	Blinking (~4 Hz)	Prompt to close door during Auto-teach
 4 x Green	One 5 second long blink	Auto-teach completed successfully
 4 x Orange	One 5 second long blink	Auto-teach completed but not successfully

Sensing

Detection diagram

The sensor must be mounted top left or top right of the door / gate, pointing downwards to cover the door / gate aperture

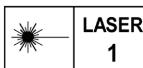


Connectivity

Wireless interface	Wi-Fi access point
Data	Maintenance and configuration data
Wi-Fi Protocol	802.11 b g n

Compatibility and conformity

Approvals and markings

General reference EU	Sensor designed according to EN 12453 and EN 12978	
CE-marking		
Approvals	EU Type Examination Certification by TÜV Nord Industrial door standard EN 12453 5.2.1.7/EN 12978	
	IEC 60825-1:2014 as well as EN 60825-1:2014 + EN 60825-1/A11:2021	
Directives	2014/53/EU (RED) 2014/35/EU (LVD) 2014/30/EU (EMC) 2006/42/EC (Machinery Directive) 2011/65/EU (RoHS) 1907/2006/EC (REACH) 2012/19/EU (WEEE)	
General reference US and Canada		
Canadian EMC marking	CAN ICES-003(A) / NMB-003(A)	
Approvals		E234263 ANSI/CAN/UL 325* Approved for: Commercial and Industrial vertically moving doors
FCC ID nr **		2AC7Z-ESPC3MINI1
IC ID nr.	21098-ESPC3MINI1	
Laser safety		Class 1 laser according to IEC 60825-1:2014 as well as EN 60825-1:2014 + EN 60825-1/A11:2021. 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.

* UL Note: Must be installed according to the requirements of UL 325.

Not for use and mounting as a separate accessory. Only for incorporation by a professional inside a Door, Drapery, Gate, Louver or Window Operator or System after evaluation of the combination (assembly) has shown compliance with the applicable standards.

** FCC Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Safety parameters for industrial doors

EN ISO 13849-1 Safety Category	Cat 2
EN ISO 13849-1 Performance Level	PL d
EN ISO 13849-1 Mission time	20 years
MTTF_d (y) (1 relay: EMR)	56 (100 operations/day) 40 (500 operations/day)
PFH_d (1/h) (1 relay: EMR) (EN ISO 13849-1. Table K.1)	1.48e-07 (100 operations/day) 2.31e-07 (500 operations/day)
DCavg (1 relay: EMR)	92.7% (100 operations/day) 91.9% (500 operations/day)
B10d (EMR)	2.0e6 operations
Test input	The test input must be activated by the door controller and produce the correct OSSD safety output response before a potentially hazardous door movement is initiated.

EMR = Electro Mechanical Relay

OSSD = Output Signal Switching Device

Delivery contents and accessories

Delivery contents

- Sensor LEYON-Safe-E with 10 m cable
- Mounting bracket with main screw
- Adapter plate
- Label with QR code to allow connection to the sensor hot spot and open the WebApp on the mobile device
- Drill template
- Quick start guide

Accessories

- Universal bracket: AUB1-LEYONr
- Stand-off block 30 mm: ASO30-LEYON
- Sun cover: ASC-LEYON

Further information

Instruction manual	http://cga.pub/?97cf65	
Carlo Gavazzi website	www.gavazziautomation.com	

Please refer to the instruction manual for in-depth explanations.