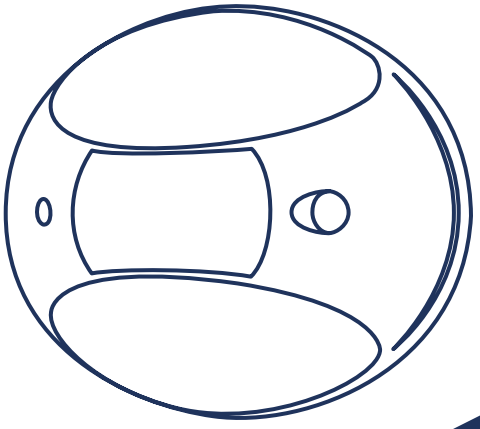
LZR®

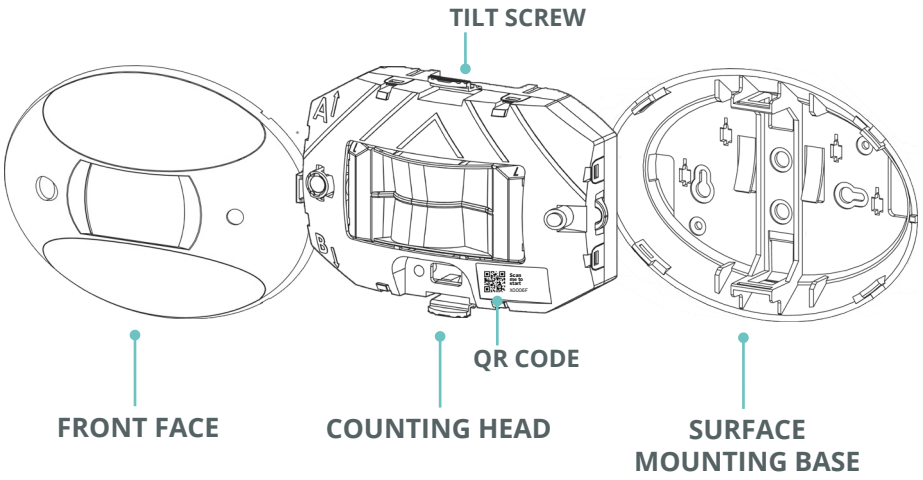
SIGMA

People-counting solution



CONTENTS

WHAT'S IN THE BOX



SCREWS

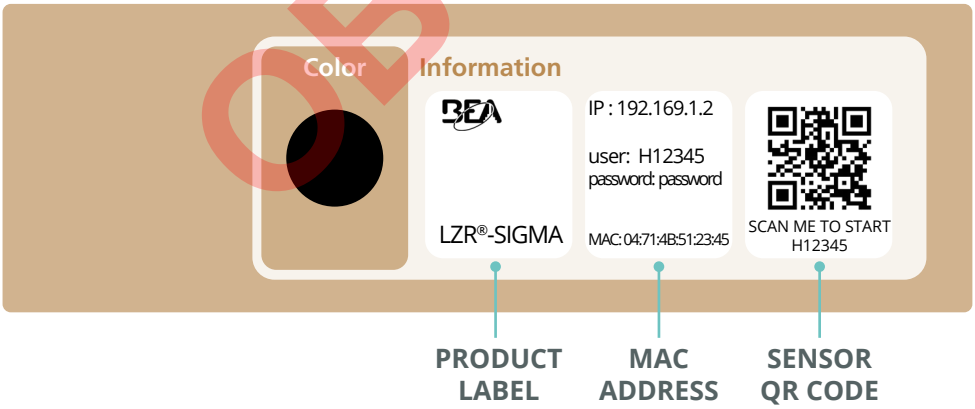
SENSOR QR CODE STICKER

WHAT YOU'LL NEED

- drill
- screwdriver, Phillips head
- wire cutters (optional)
- LZR-SIGMA app
- power (see page 4 for power options)

LABELS

side of box



When installing multiple sensors at one site, It is considered best practice to log each sensor and its location. Please use the log chart (Appendix) by adhering the extra sticker (loose in box) in the appropriate space and log the site location.

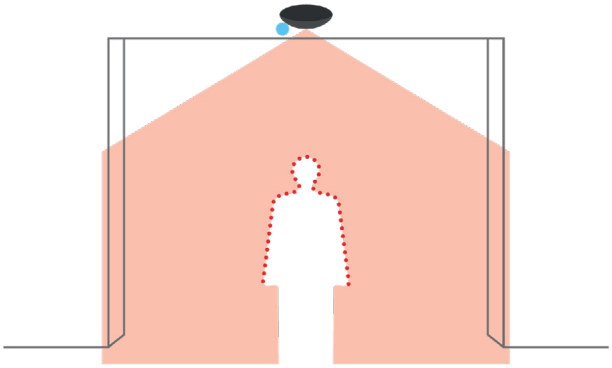
LED INDICATIONS

= solid LED
= flashing LED

LED SIGNAL	CAUSE	ACTION
	No internet connection	The ethernet configuration is wrong or no cellular network is available Check the network connection Check if port 8883 is opened
	Device is not powered *Note that the LED can also be off when the device is in normal operation*	Check power supply
	Communicating with the app or with Sensorio. Connected to the network	The device is communicating
	Searching for network	The device is connecting to the network
	Learning	Define the max. limit on your right or left
	Error	If this occurs, please contact BEA.
	Updating	Connection to the device is impossible Wait for update completion
	At least one of the following port is not opened: 123 (UDP) / 22 (TCP) / 443 (TCP) / 8883 (MQTTS)	Check network settings with your IT support *See page 4 for more information on connecting.*

TECHNICAL SPECIFICATIONS

Technology	LASER scanner, time-of-flight measurement
Emission characteristics - IR LASER	Wavelength 905 nm ; average output power 0.05 mW; Class 1 (EN 60825)
Device dimensions	7.87 in [L] x 5.59 in [W] x 2.40 in [H] (elliptical) (if mounted with recessed accessory : visible height 37 mm, invisible height 65 mm)
Temperature range	-13 – 131 °F if powered (storage temperature -31 – 158 °F)
Humidity	0 - 95% non-condensing
Power	24 VDC ± 10% External DC power or PoE (IEEE802.3af) Power consumption Max. 12 W/Peak - Average 6 W
Data transfer	3G/2G cellular, Ethernet (cable cat. 5/6)
Supported frequencies / Power	GSM 850 - 824 to 849 MHz (Tx) - 869 to 894 MHz (Rx) - 2 W (Max. Power) E-GSM 900 - 880 to 915 MHz (Tx) - 925 to 960 MHz (Rx) - 2 W (Max. Power) DCS 1800 - 1710 to 1785 MHz (Tx) - 1805 to 1880 MHz (Rx) - 1 W (Max. Power) PCS 1900 - 1850 to 1910 MHz (Tx) - 1930 to 1990 MHz (Rx) - 1 W (Max. Power)
Installation height	7 – 18 ft
Counting width coverage	Ratio [0.8 - 1.35] depending on mounting height (cf. sizer tool: **www.meetsigma.io/sizer/**)
Ports	123 NTP (UDP) / 22 SFTP (TCP) / 443 HTTPS (TCP) / 8883 MQTTS (TCP)
Video validation (optional feature)	Resolution 160px x 120px, frame rate 15 fps (for counting proof purposes only)
Counting data refresh rate / granularity	1 min. (granularity 1 min.) to 24h (granularity 5 min.)
Protection degree	IP53
Conformity	



DETECTION

LZR-SIGMA uses laser time-of-flight technology to anonymously detect people. The sensor precisely measures the shape of an object passing through the detection zone to create a point cloud. The point cloud is then analzyed in the sensor to determine if the object is an adult or child to be counted, or a common object such as a box, shopping cart, or stroller, and will be not be counted.

A person must cross the invisible detection zone to be detected by the LZR-SIGMA. The counting data is transferred via the sensor's network or cellular connection to a destination configured in the Sensorio portal (sensorio.com).

CAMERA

The built-in camera in the LZR-SIGMA is for verification purposes only - it does not count people or record/transit video continuously. For instance, if you want to ensure that your sensor is installed appropriately for optimal performance, you can access the Sensorio portal (sensorio.com) to schedule and review counting proofs recorded by the camera.

The camera was purposely designed to record low-resolution video to preserve anonymity, and can be masked entirely for applications in sensitive areas.

HOW TO CONNECT – POWER

- IEEE802.3af compatible PoE switch or injector
- 24 VDC (±10%) power supply (p/n 08.0829)

HOW TO CONNECT – NETWORK

LZR-SIGMA models:

- cellular (automatic connection)
- ethernet

LZR-SIGMA-ETH models:

- ethernet

ETHERNET INFORMATION:

When connecting via ethernet, ensure that the local network is set up correctly to allow the LZR-SIGMA to connect to the Sensorio portal.

Ports 123 (UDP), 22 (TCP), 443 (TCP), and 8883 (MQTT) must be open.

The following sites must be accessible:

SFTP (Port 22)
- sftp://drop.sensorio.com/upload
- sftp:// 13.80.21.238/upload

HTTPS (Port 443)
- https://callback.sensorio.com
- http://httpbin.org/post
- https://www.sensorio.com/

MQTTS (Port 8883)
- eu.airvantage.net

INSTALLATION PREPARATION

BEA, Inc. recommends that you prepare for your installation to avoid unexpected hurdles while on the job.

1. Identify all of the entryways that will require sensors for counting coverage.

2. Review the environment of each entryway (using the following BEA mounting recommendations) to strategize sensor placement.

   a. Identify any obstructions to the detection zone (i.e. laser field).

   b. Identify any objects in/near the detection zone that could affect the flow of traffic. Objects such as garbage bins, sanitizer stations, magazine racks, or end caps can cause traffic to stop within, stall within, and straddle the detection zone, leading to a higher rate of miscounts. If possible, such objects should be moved away from the entrance to improve counting accuracy.

   c. Understand your minimum and maximum installation height.

      - MAXIMUM HEIGHT: BEA, Inc. recommends that the sensor be installed at the maximum available height (no higher than 18 ft) for the best accuracy. If the detection zone is too wide at the maximum available height, it can be narrowed using the LZR-SIGMA mobile app.
      - MINIMUM HEIGHT: To understand your minimum installation height (no lower than 8 ft) , you must first know the width of your desired detection area. Once the desired coverage is identified, check the chart below to reveal your minimum installation height. You can also visit ***www.meetsigma.io/sizer*** to use the LZR-SIGMA sizer tool to calculate minimum installation height.

MINIMUM INSTALLATION HEIGHT											
THRESHOLD WIDTH	≤ 40"	≤ 45"	≤ 50"	≤ 55"	≤ 60"	≤ 65"	≤ 70"	≤ 75"	≤ 80"	≤ 85"	≤ 90"
MINIMUM HEIGHT	90"	93"	96"	99"	102"	105"	108"	111"	114"	117"	120"

      - CONNECTED SENSORS: If you have reached your maximum available mounting height, but the detection zone is not wide enough, your application will require the installation of multiple sensors to achieve a wider detection zone (see Application Note 78.6034 for more information on installing multiple sensors). To determine the recommended number of sensors to use for your desired detection zone, visit ***www.meetsigma.io/sizer*** to use the LZR-SIGMA sizer tool.

   d. Identify your power supply (location of outlets, DC supply, PoE network drops, etc).

   e. Verify connectivity – network drop (ethernet) or cellular availability. To verify, power up the sensor and check that the blue LED is illuminated.

INSTALLATION PREPARATION

UNSURE ABOUT YOUR APPLICATION? EMAIL BEA FOR A GUIDED INSTALLATION!

If your application has many nuances to be considered that makes you question sensor placement, BEA is here to help. Before contacting BEA, please be sure to take photographs of the entryway in question - the more, the better!

Helpful tips for photos:

- Wide view of the immediate environment to show the flow of traffic and any objects that could affect the flow. See Figure 1.
- Angles to show depth of any obstructions above the entryway (e.g. air curtains, door hardware). See Figure 2.

FIGURE 1

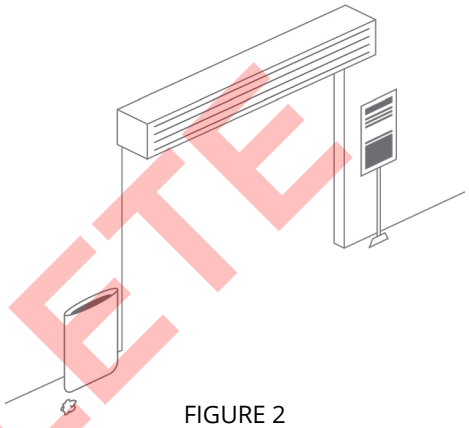


FIGURE 2

Once you have all of your pictures, please email BEA at sigmasupport@beasensors.com to request a guided installation!

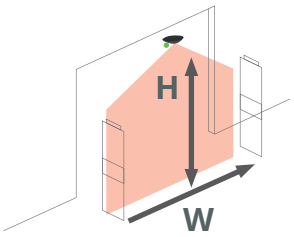
In your email, please include a detailed description of the intended application, what company you purchased your sensor from (direct from BEA or other), attach your photos, and leave your contact information.

BEA will be in touch to schedule a guided installation!

INSTALLATION LOCATION TIPS

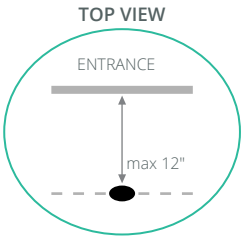
Detection area (location)

The threshold (i.e. counting area) should be appropriately covered. Measure the desired threshold width across the space in front of the entrance (this is the space that people will walk through). Beware of creating detection zone that is too wide, as you could mistakenly be set up to count more than what is intended.



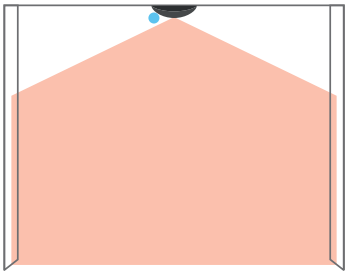
Proximity to door

The sensor should always be center-mounted above the desired detection zone (exception: See *Swing Doors* section), and as close to the entryway as possible while avoiding obstructions (ideally, no more than 12" from the threshold).



Corridor mounting

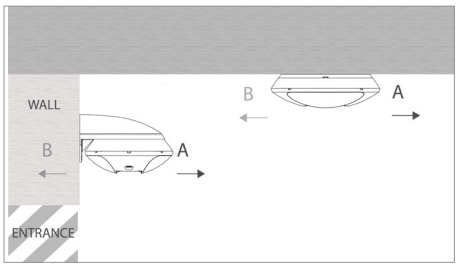
When the application calls for mounting in a corridor or hallway, you may mount away from the door as long as the entire width of the corridor can be covered by the laser field.

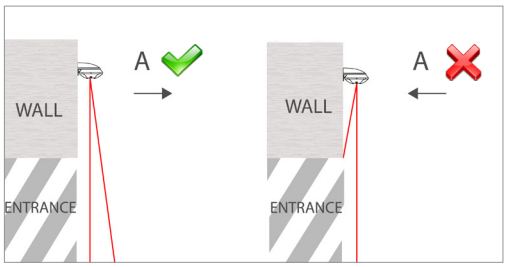


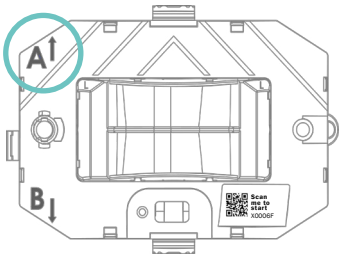
Sensor directionality

Observe the "A" and "B" markings on the sensor.

When wall mounting (or ceiling mounting near a wall), direction A must be pointing away from the wall.



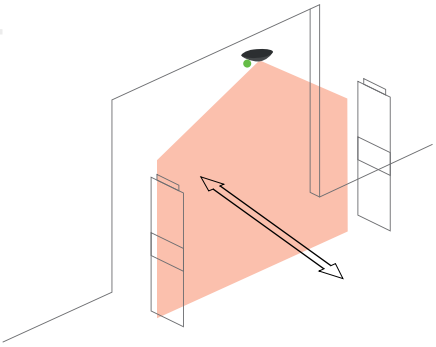




INSTALLATION LOCATION TIPS

Sensor angle

Mount perpendicular to the flow of foot traffic.

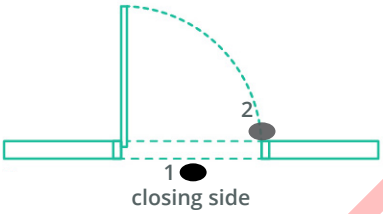


Swing doors

Single leaf (no door closer):

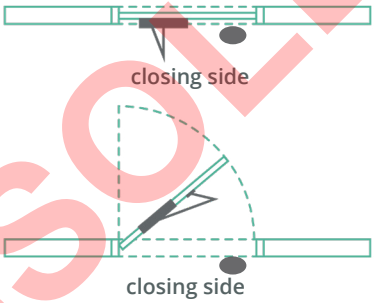
When possible, install SIGMA on the closing side in the middle, outside the swing path (option 1).

When that is not possible, you can install SIGMA on the opening side. Make sure you place it right above the leading edge (option 2).

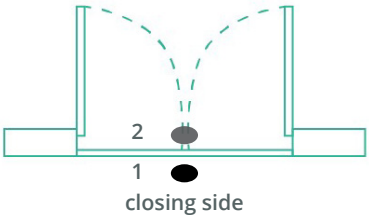


Single leaf (with door closer):

If a door closer is obstructing the view, simply offset the mounting location nearer to the leading edge.



Double leaf: Install SIGMA in the center. Preferred side is the closing side, outside the swing path (option 1).

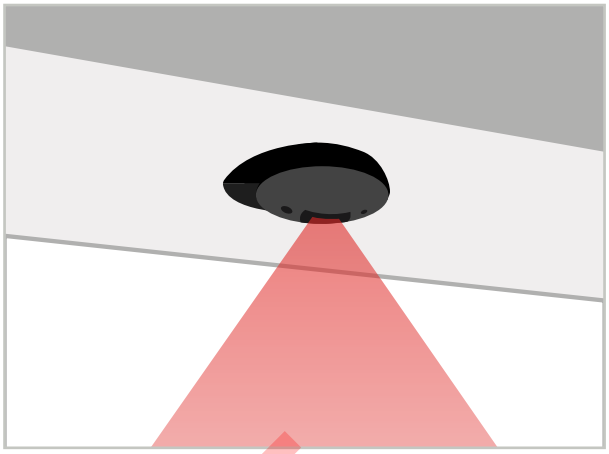


MOUNTING OPTIONS

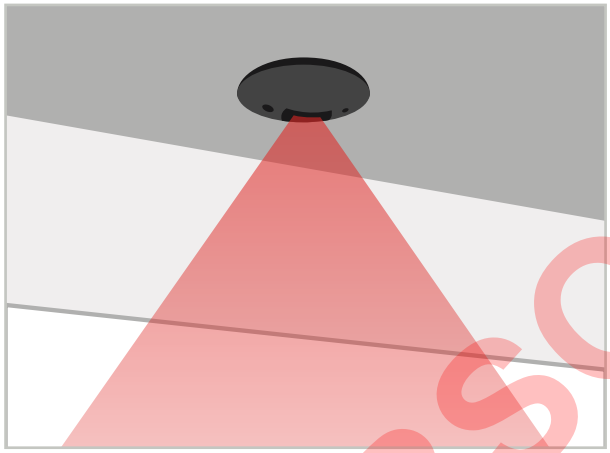
LZR-SIGMA can be mounted in 3 ways:

- surface-mounted to the ceiling
- recessed into the ceiling
- surface-mounted to a wall

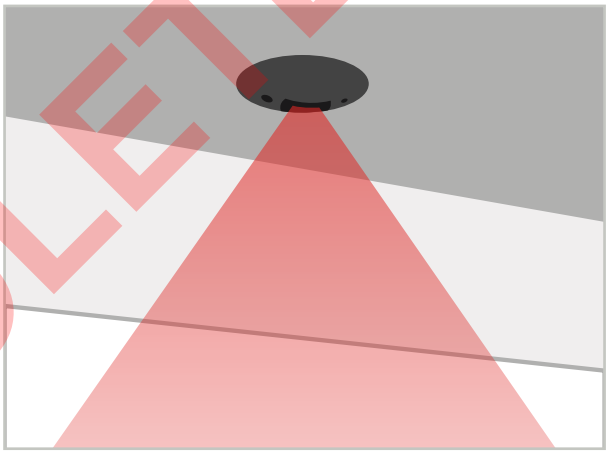
See following page for mounting instructions.



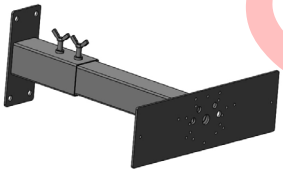
WALL SURFACE-MOUNT



CEILING WALL-MOUNT



CEILING RECESSED-MOUNT



The Mini Bracket (10MINIBRACKET) can also be used in applications that will require the sensor to extend from the wall to avoid obstructions.

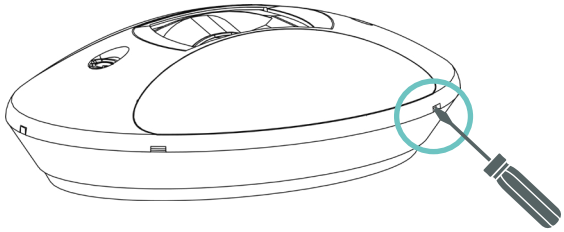
See User's Guide 75.5799 for more information.

BEFORE YOU BEGIN

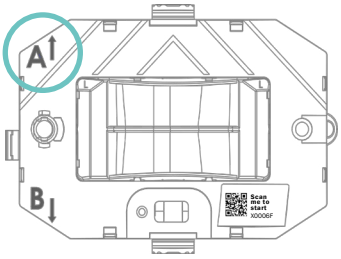
BEA highly recommends downloading the LZR-SIGMA mobile app and registering your account before you begin the mounting process.

MOUNTING

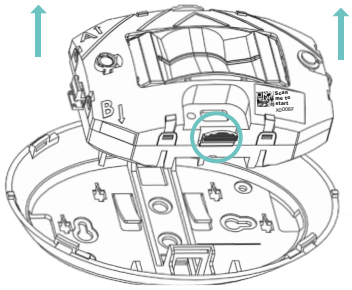
1. Open SIGMA.



2. Determine directionality (see page 7).

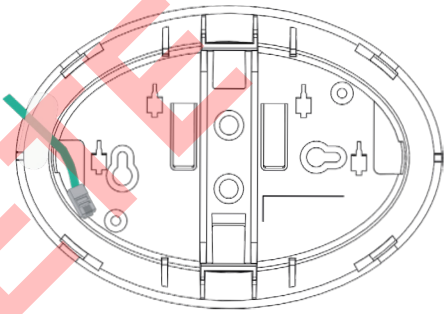


3. Remove the counting head by unclipping it.

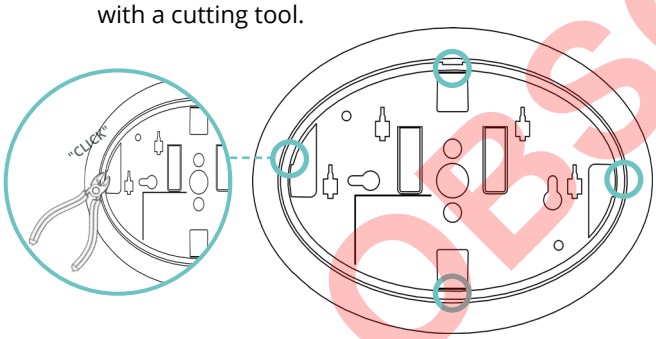


Caution – Do not open the counting head as it may result in hazardous radiation exposure.

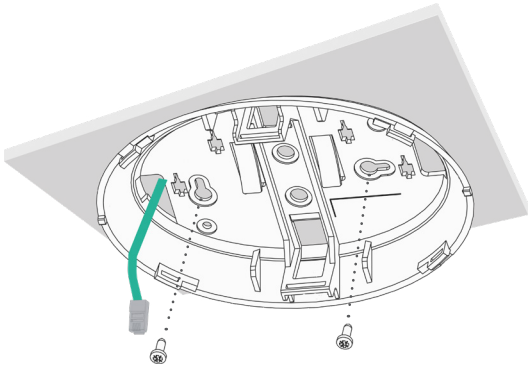
4. Pass the cable through the base.



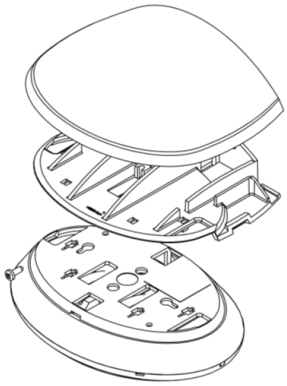
5. If necessary, a piece of the base can be removed with a cutting tool.



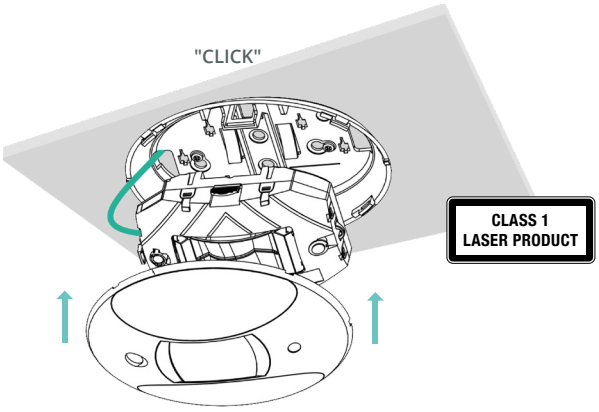
6. Secure the base to the ceiling.



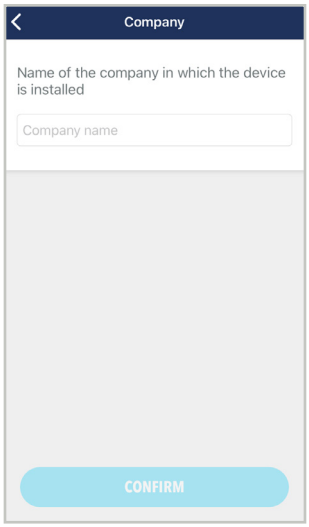
7. Or use BEA's wall mounting accessory to secure to the wall.



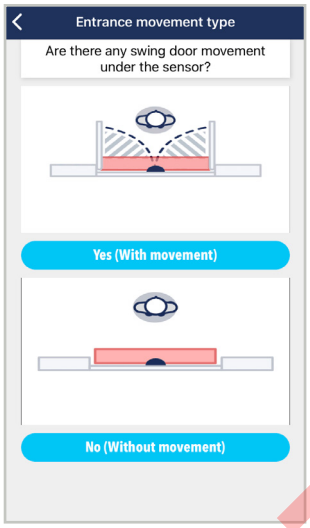
8. Connect the cable to the counting head
Clip the counting head to the base and close SIGMA.



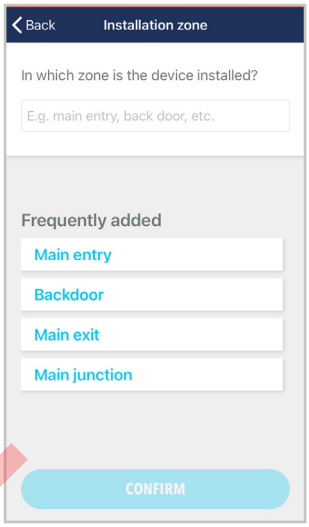
Before beginning the setup process, you must enter data about the sensor you will be programming.
Log in to the LZR-SIGMA mobile app and follow instructions.



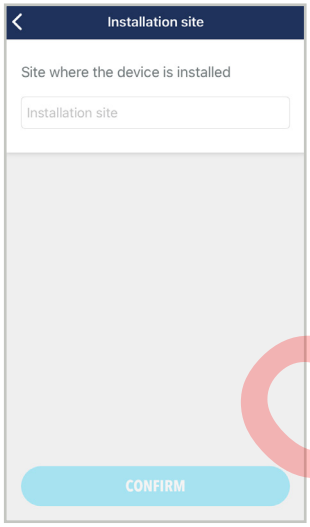
Enter the full name of the company where the sensor is being installed.



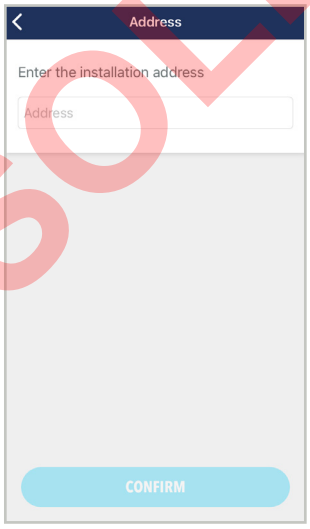
Choose if the sensor is installed above an area where there will be swing door movement.



Enter a unique description of the entryway or choose from a list of frequently used descriptions.



Identify the site (usually a store number or location name).

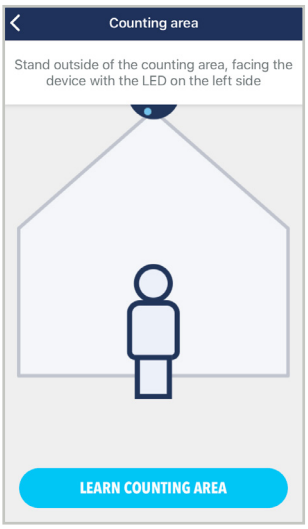


Begin typing the address and a list will autopopulate with locations. Choose from an option within the list.

Now that all of the applicable sensor information has been entered, continue to follow the prompts in the app to guide you through the sensor setup.

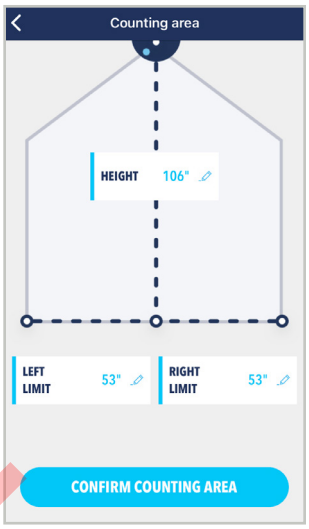
One sensor = NO

Multiple sensors = YES, see Application Note 78.6034 for more information



Allow the sensor to learn the field.

At this step, the sensor is learning the height and will set left and right limits according to the maximum allowed width based on mounting height.



You may manually adjust left and right limits by simply clicking the edit button beside the given dimension.

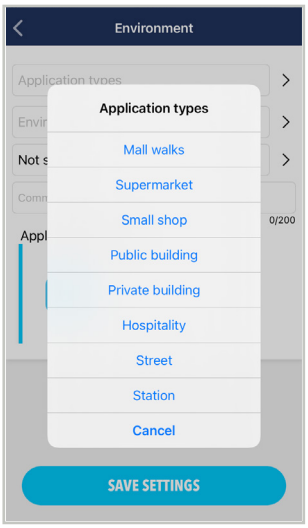
Verify that the learned height is accurate. If not, see Troubleshooting.

Be sure to press CONFIRM when finished.

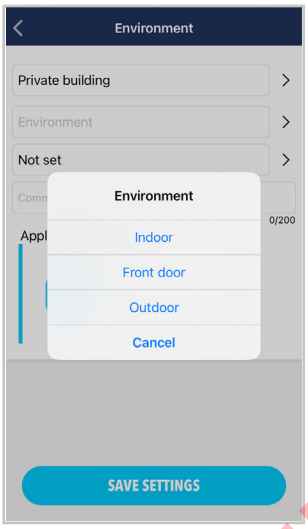
MANUAL ADJUSTMENT (preferred): Measure the width of the entryway and increase or decrease limit accordingly using the + and - buttons. BEA recommends adding 6" to your dimensions to ensure your area is fully covered.

AUTOMATIC ADJUSTMENT: Follow prompts.

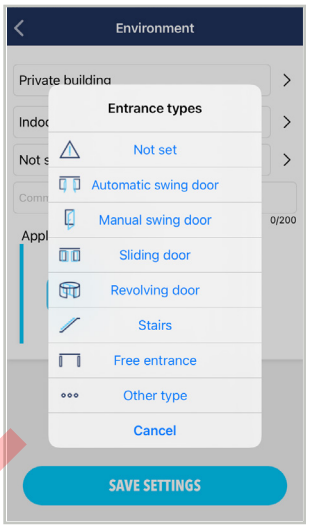
The following three screens are optional and do not affect the performance of the sensor. They are for troubleshooting and data collection purposes only.



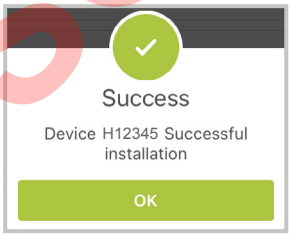
Choose the application type from the list.



Choose the environment type from the list.



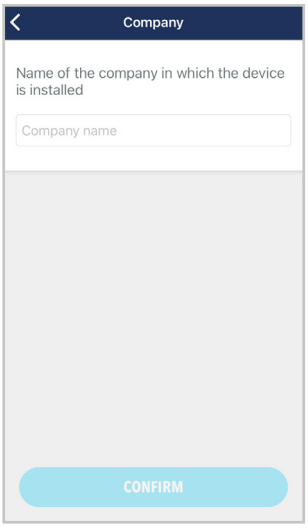
Choose the entrance type from the list.



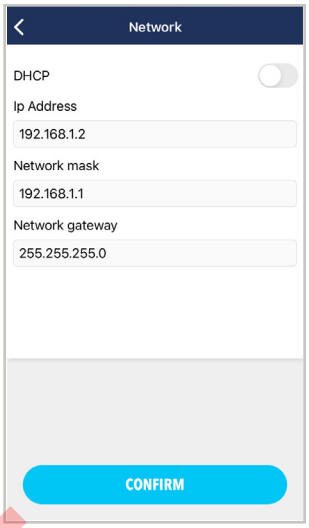
Once setup is complete, perform a manual counting proof to verify that your sensor setup is satisfactory.

See next page for information on counting proofs.

After the sensor has been set up, this screen will appear when you connect to the sensor.

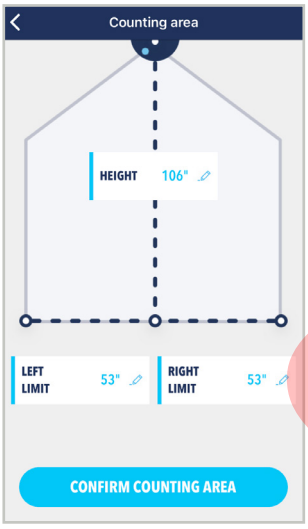


Choosing SET DEVICE INFORMATION will guide you through the sensor information setup. See page 11 for full run-through of screens.

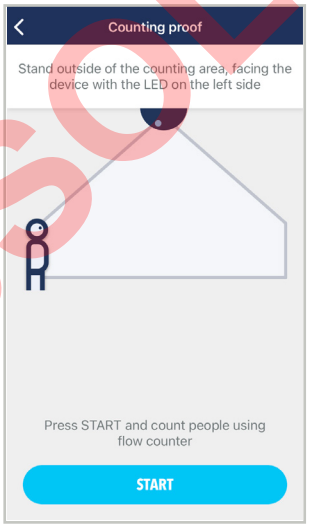


Choosing SET DEVICE NETWORK will display the information regarding the network that the sensor is connected to.

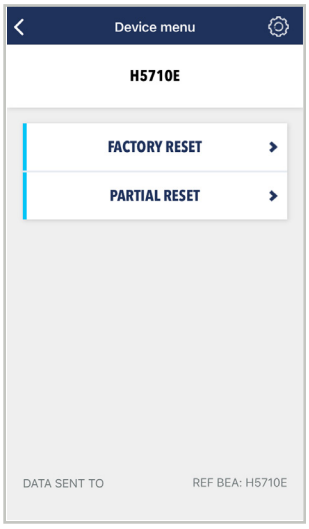
CAUTION: These settings should only be modified by the site network administrator.



Choosing SET COUNTING AREA will guide you through the laser field setup. See page 12 for full run-through of screens.



Choosing COUNTING PROOF will allow you to perform a manual check to verify that the device is counting properly and that setup was successful.



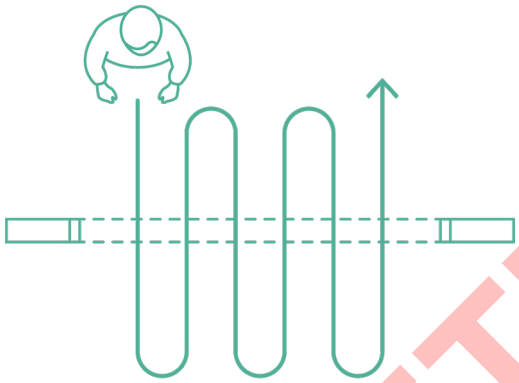
Choosing RESET DEVICE will give options for performing a full reset or partial reset.

Partial = clears only field limits

Full = clears all, including sensor information

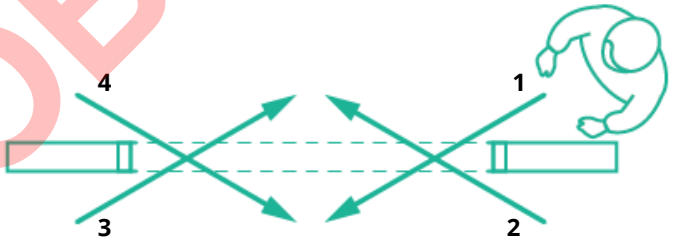
Once the sensor setup is complete, perform a final check of the detection area to ensure that the sensor is installed and programmed properly.

1. Perform a manual counting proof using the LZR-SIGMA mobile app, and walk straight through the detection area, both ways, covering the entire detection area (see pattern below). Be sure to manually count yourself in the app each time you cross the threshold.



Review the manually counted number against the sensor-counted number and determine if obstructions are affecting sensor performance or if the sensor mounting orientation is incorrect (see page 6, *Sensor Directionality*).

2. Perform another manual counting proof and walk at an angle through the detection zone, entering on the edges of the detection zone.



Review proof and determine if limits need widened. BEA recommends widening by 6" increments. Review proof and determine if obstructions are affecting sensor performance or if the sensor mounting orientation is incorrect (see page 6, *Sensor Directionality*).

If the results of the manual counting proof are below 90%, contact your integrator to schedule a video proof via the Sensorio portal for further investigation.

TROUBLESHOOTING

PROBLEM	SYMPTOM	SOLUTION
 White LED	No internet connection	The ethernet configuration is wrong or no cellular network is available Check the network connection Check if port 8883 is opened
 Orange LED on	Error	If this occurs, please contact BEA.
 Orange LED flashing	Updating	Connection to the device is impossible Wait for update completion
 Orange and white LEDs flashing	At least one of the following port is not opened: 123 (UDP) / 22 (TCP) / 443 (TCP) / 8883 (MQTTS)	Check network settings with your IT support *See page __ for more information on connecting.*
Incorrect height after learn	Detection zone obstructed	Clear obstructions. If clear, manually adjust the height.
	Incorrect sensor orientation (laser field hitting the wall)	Verify that the sensor is mounted so that the "A" side of the sensor is pointing away from the wall.
	Sensor tilted towards wall, field not reaching floor *If you are able to access the Sensorio portal, you can check the line position on a snapshot or from a video counting proof.*	Fix the wall mount by tightening top screws and/or loosening the bottom screw.
		Confirm that the A side of the sensor is pointed away from the wall, and tighten the tilt screw to move the detection field farther away from wall. If the tilt screw does not solve the issue, insert a shim at the base of the wall mount accessory to increase the tilt more.
Learned height less than actual mounting height	Sensor mounted above the maximum height limit	Lower the mounting height to within recommended limits (8 – 18 ft). If not possible, higher mounting heights are acceptable, but beware that people less than 4 feet tall may not be counted.
Inaccurate counts (multiple symptoms could be present)	Sensor mounted above the maximum height limit	Lower the mounting height to within recommended limits (8 – 18 ft). If not possible, higher mounting heights are acceptable, but beware that people less than 4 feet tall may not be counted.
	Detection field obstructed	Check to see if missed counts are occurring in one area of the field. Perform a manual counting proof if necessary. Clear any obstructions from this area. If unsuccessful, contact integrator to schedule and review a video counting proof to further investigate.
	Incorrect sensor orientation (detection field hitting the wall)	Verify that the sensor is mounted so that the "A" side of the sensor is pointing away from the wall.
	Limits set too small, causing miscounts on edges of field	Check to see if missed counts are occurring on the edges of the field. If so, increase the limits (recommended: at least 6" wider than entryway on each side).
	Limits set too wide and the sensor counts because of activity at the edges of the field	Check to see if false counts are occurring on the edges of the field. If so, decrease the limits (recommended: no more than 6" wider than entryway on each side).
	Sensor too far from entryway and the sensor misses counts	Check to see if false counts are occurring due to people walking around the detection field. • Choose a new mounting area • Increase the limits as much as possible • Place a barrier near the edges of the field to redirect the flow of traffic back through the detection field.

If your problem persists, contact your integrator for further investigation.

APPENDIX: SENSOR LOG

When installing multiple sensors at one site, It is considered best practice to log each sensor and its location. Please use the log chart below by adhering the extra sticker (loose in box) in the appropriate space and log the site location.

QR code				
Site location				

QR code				
Site location				

QR code				
Site location				

QR code				
Site location				