# PROXIMITY WARNING SOLUTION
## installation guide

GemOne®

# Content

# General information

Our proximity warning system reduces forklift accidents in the workplace. It uses Ultra Wide Band (UWB) radio technology. Distance measurements are accurate up to 6 inches and distance measurements are taken up to 10 times per second.

There are 3 main components to the solution:
1. Beacon: installed on a forklift
2. Wearable: worn by pedestrians
3. Dashboard: for solution configuration and contextual reporting

# Beacon

The Beacon warns forklift drivers when driving near pedestrians or other forklifts by emitting a sound and light alert warning.

The Beacon measures distance and relative speed up to 10 times per second in relation to other Beacons and Wearables. It is accurate up to 6 inches and it warns both the driver and the pedestrians when an incident is likely to occur.

1. Mounting bracket
2. LED feedback
3. User button
4. Speaker
5. Power supply port

## Technical specifications Beacon

| | |
|---|---|
| Warning distance | Configurable up to 32yd |
| Distancing technology Power supply Connectivity | UWB |
| Distance measurement accuracy | < 6 inches |
| Power supply port | 12-80V (including DC/DC converter, inputs up to 36V) WiFi 802.11 b/g/n - Bluetooth 5.2 - RS232 |
| Warning types | Sound (max 100dB) and LED |
| Connectivity | WiFi 802.11 b/g/n Bluetooth 5.2 - RS232 |
| Dimensions | 11 × 3.9 × 2.5 inches |
| Weight | 14 ounces |
| Water resistance | IP67 |
| Operating temp | -4°F to 140°F |
| Certification | CE, FCC |

# Wearable

The Wearable warns pedestrians when they are coming close to moving equipment with congigurable sound, light, and vibration alerts.

Drivers wear a Wearable as they can become a pedestrian at any time. The drivers' Wearable is linked with the Beacon based on distance and duration. The linking does not require any manual interaction.

The warning of the Beacon can be forwarded optionally to the Wearable of the driver. This means that both the warning of the forklift Beacon and driver Wearable activate when a pedestrian (or another vehicle) comes close.

The Wearable is charged using a USB charging cable and can be connected to any USB charger or USB port. Optional multi-port chargers are available.



1. Lanyard / belt clip mounting hole
2. Vibration and sound alarm
3. Configuration LED
4. User / configuration button
5. Alert LED
6. Magnetic charging port

## Technical specifications Wearable

| | |
|---|---|
| Warning distance | up to 32yd (configurable) |
| Technology | UWB and BLE |
| Distance measurement accuracy | < 6 inches |
| Types of alarm | Sound (max 100dB), Vibration and LED |
| Waring options | Wristband, carabiner, lanyard |
| Battery | 450mAH LiPo |
| Battery duration | 2 - 5 days |
| Charging time | 1 hour |
| Power supply | 5V, 500mA |
| Water resistance | IP67 |
| Certification | CE, FCC, RoHs |
| Dimensions | 1.8 × 1.8 × 0.75 inches |
| Weight | 1.25 ounces |

# Alert Functionality

## Warnings

The Alert is designed to help reduce incidents. Accurate distance measurements, relative speed, and motion direction are taken into account to provide relevant warnings only.

- **Dynamic warning**

  The warning distance takes into account the speed of the forklift. When driving faster, the warnings change dynamically with reference to the default configuration. The warning range only increases in the direction of movement.

  All warnings can be disabled optionally when the forklift is not moving. Alarms are activated immediately when the forklift starts moving again.

- **Orientation dependent warning**

  The direction of motion is taken into account to prevent irrelevant warnings being generated. If a forklift is approaching a pedestrian or other forklift, a warning will activate. If the forklift is moving away or maintaining the same distance then the default alarm range is taken into account.
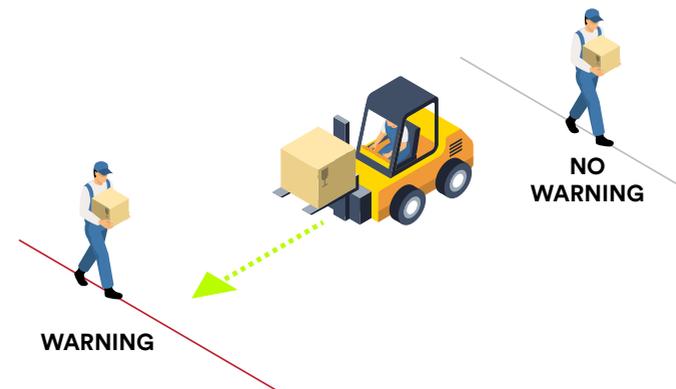


NO WARNING

WARNING

- **Muting of warnings**

  If a forklift is stationary, it is possible to mute the warnings by shortly pressing the user button on the Beacon. The warnings on both the Beacon and Wearable that are in the warning range are muted. When the forklift starts moving, the warnings are automatically enabled again.

  Note: the forklift needs to be stationary for 2 seconds before the warning can be muted

## Automatic Driver Linking

The driver of a forklift uses his Wearable to automatically link to the forklift Beacon. Once linked there are no warnings between the driver and his forklift Beacon. Because incidents may occur when the driver leaves his forklift, his Wearable will switch to pedestrian mode seamlessly as soon as he exits his vehicle (configurable distance from vehicle).

When the driver Wearable is linked, the Wearable can give warnings optionally to the driver that are synchronized with the warnings of the Beacon. This can augment the Beacon warning with a vibration on the Wearable.

Linking of the Wearable to the Beacon is automatic. No driver action is required.

## Speed control

The Alert can be used in combination with forklift speed control. The Beacon can activate an external relay that enables the speed reduction. Speed reduction can be enabled in different situations where a proximity warning is active (e.g. when a pedestrian or another forklift is too close).

Appendix 1 Relay connection explains how the external relay should be connected.

# Installation

## Forklift installation

The Beacon can be easily mounted to a forklift using the supplied mounting bracket. The mounting bracket is ideally mounted inside the forklift cage ceiling using two zip ties (supplied). The Beacon will slide into the bracket and is secured with two M4*55 screws (supplied)

A video of the installation using the mounting bracket is shown here. The recommended orientation is with the button facing downwards and in the viewing area of the forklift driver.

The Beacon is supplied with a power cable that is attached to the Beacon via a connector and has bare wires on the other end. Cable length is 10ft and connects to a 10v-36v power supply, or optionally up to 110v using a DC/DC converter.

# Wiring

The supplied cable has 7 wires, which are labeled with either numbers or colors. For a typical installation, only wire 2/Black (GND) and wire 3/Red (5-36V) are necessary. Wire numbers are shown on the individual wires. The following table indicates the functionality of each wire:

| Nr | Wire color | | Connection |
|---|---|---|---|
| 1 | Green | —— | GPIO1 |
| 2 | Black | —— | Power GND |
| 3 | Red | —— | Power 12-36V |
| 4 | Yellow | —— | Telematics interface |
| 5 | White | —— | Telematics interface |
| 6 | Orange | —— | GPIO2 |
| 7 | Purple | —— | GPIO3 |

The provided cable is a PVC control cable that is used for powering the Beacon. It can also be used to control external devices (speed control, warning lights, etc.) or integrate with other systems like a telematics solution.



**Battery forklift**

**3 interface options (such as relay)**

**Telematics interface option**
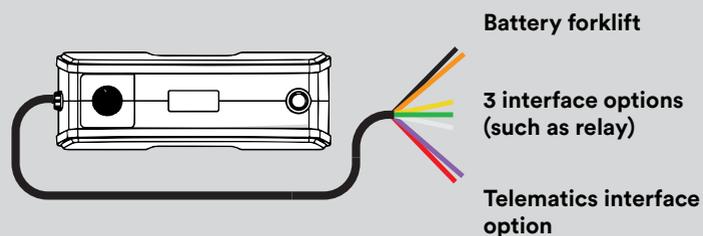
## Demo installation

For demo purposes, GemOne can supply a USB power cable. This enables you to power the Beacon using any type of USB port (phone charger, power bank, laptop, etc.). Be aware that the power supply of a USB port is limited and a specific firmware is needed to run the LEDs and sound at a lower intensity.

## WiFi setup

The Beacon should be connected to the WiFi network for internet access. The Beacon needs internet access to send telemetry, configuration, and usage data to the Dashboard. It can also be used for software updates.

Connecting the Beacon to the WiFi network is carried out using an Android or iPhone/iOS mobile application. Make sure the Beacon is in range of the WiFi network before continuing.

If you want to connect the Beacon to an Enterprise WiFi network, please contact support@gemone.com. Enterprise WiFi networks typically require a username and password.

The steps to connect to the WiFi network are shown below.

First place the Beacon in WiFi setup mode by long pressing the button (4 seconds). Your Beacon will sound a melody when entering the WiFi setup mode.
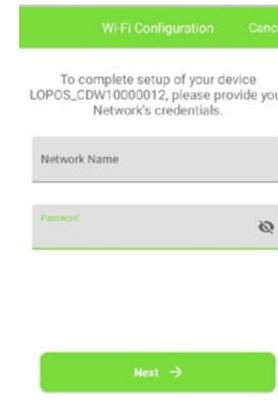
This is the start screen of the WiFi configuration app. Click Provision New Device to start.



Scan the QR code that is on the label of the Beacon.

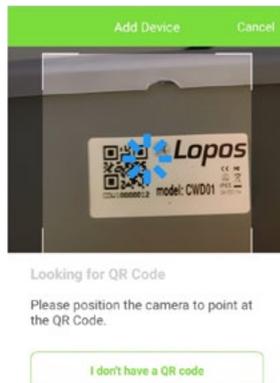Confirm that you want to configure this Beacon device by clicking Connect.



Fill in the WiFi network name (SSID) and password of the network to which you want to connect the Beacon.

Be aware, currently Enterprise WiFi networks are not supported. Enterprise WiFi networks are networks where you need to log on with a username and password.
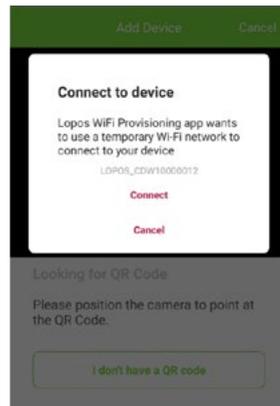
If the SSID/password combination is correct, and the Beacon is in range of the WiFi network, it will successfully connect.

# Configuration

The Alert is fully configurable to the company safety guidelines and/or safety use case. Configuration can be carried out through the Dashboard.

Any questions can be sent to support@gemone.com

The following items can be configured:

## Wearable specific configuration

| Configuration parameter | Description |
| --- | --- |
| Warning type | The type of warning that is activated. Options are: light, sound, and vibration. *Default: light, sound and vibration are activated.* |
| Driver alarm forward | Warnings on the Beacon are coupled with the Wearable of the driver. The Wearable adds an extra feedback mechanism (vibration) for the driver. *Default: enabled.* |

## Beacon specific configuration

| Configuration parameter | Description |
| --- | --- |
| Warning distance | The distance at which a warning is activated. *Default: 13ft at low speed, 33ft at high speed (note: the warning distance increases in the direction that the forklift is driving)* |
| Warning type | The type of warning that is activated. Options are: light, sound *Default: both light and sound are activated* |
| Multiple warnings | Multiple warnings can be defined at different distances, i.e. a light warning at 23ft and an audible warning at 13ft. A different set of warnings can be defined between different devices (Beacon - Wearable, Beacon - Beacon), each warning with its own configuration. *Default: Only one warning distance .* |
| Dynamic warning | Dynamic warnings can be activated or disabled. See 4.1.1. Dynamic warning for more info. *Default: enabled.* |
| Speed control active | An external output can be enabled to support speed control. *Default: disabled.* |
| Driver alarm forward | When enabled, the Wearable of the operator or driver will vibrate when the Beacon of the forklift activates its alarm. *Default: enabled.* |

## Advanced configuration

| Configuration parameter | Description |
|---|---|
| Dynamic warning sensitivity | **Low:** The warning distance increases in relation to the relative speed. At lower speeds, the warning distance is barely increased; at higher speeds, the warning distance is increased. *Advantage*: A narrow warning shape **Medium:** The warning distance increases in relation to the relative speed. The increase is more sensitive than Low. The warning shape has a medium width. **High:** The warning distance increases rapidly to the maximum warning distance the moment the speed exceeds the threshold. *Advantage*: very wide detection beam. *Default: High.* |
| Driver lock-in distance | When a pedestrian comes within this distance of the forklift, their Wearable is coupled with the Beacon (only if no other Wearable is coupled already). *Default: 6.5ft.* |
| Driver lock-out distance | When a Wearable goes further than this distance from a Beacon, the Wearable will be unlocked as the driver. *Default: 6.5ft.* |

# LED behavior

The following table shows the behavior of the Beacon LED status. The LED status is integrated in the button on the bottom side of the Beacon.

| Beacon LED behavior | Description |
|---|---|
| Blinking blue every 5s | The Beacon is powered correctly and is waiting for a driver to be linked. |
| Constant blue | The Beacon is linked to a driver. |
| Blue LED continuously turns on after 3s and off after 3s | The Beacon is in update mode and is ready to receive a firmware update. The Beacon is not operational during this time. |
| Blinking twice every 5s | Beacon is not connected to a WiFi network. |

The following table shows the LED behavior of the Wearable

| Wearable LED behavior | Description |
| --- | --- |
| Blinking green every 2s | The Wearable is turned on and operational. |
| Blinking blue every 2s | The Wearable is linked to the forklift and is in operator mode. |
| Blinking red | The Wearable is in warning mode as a forklift is close by. |
| Continuous red | The Wearable is in update mode and is ready to receive a firmware update. The Beacon is not operational during this time. |
| Blinking red every 1s | The battery of the Wearable is almost empty. The Wearable should be charged. |

# Product and safety information

- **FOR YOUR SAFETY**
  Read these simple guidelines. Not following them may be dangerous or against local laws and regulations.

- **DO NOT USE IN RESTRICTED AREAS**

  Do not use the device in areas where mobile phone use is not allowed or when it may cause interference or danger, for example, in aircraft, in hospitals or near medical equipment, fuel, chemicals, or blasting areas. Obey all instructions in restricted areas.

- **INTERFERENCE**

  All wireless devices may be susceptible to interference, which could affect performance.

- **AUTHORIZED SERVICE**

  Only authorized personnel may install or repair this product.

- **RECYCLE**

  Always return your used electronic products, and packaging materials to dedicated collection points. In this way you help prevent uncontrolled waste disposal and promote the recycling of materials. Electrical and electronic products contain a lot of valuable materials, including metals (such as copper, aluminum, steel, and magnesium) and precious metals (such as gold, silver, and palladium). All materials of the device can be recovered as materials and energy.

- **CROSSED-OUT WHEELIE BIN SYMBOL**

  The crossed-out wheelie bin symbol on your product, battery, literature, or packaging reminds you that all electrical and electronic products and batteries must be taken to separate collections at the end of their working life. Do not dispose of these products as unsorted municipal waste: take them for recycling. For info on your nearest recycling point, check with your local waste authority.

- **MEDICAL DEVICES**

  Operation of radio transmitting equipment may interfere with inadequately shielded medical devices' function. Consult a physician or the medical device's manufacturer to determine if it is adequately shielded from external radio energy.

- **IMPLANTED MEDICAL DEVICES**

  To avoid potential interference, manufacturers of implanted medical devices recommend a minimum separation of 6 inches between a wireless device and the medical device. Persons who have such devices should:

  - Always keep the wireless device more than 6 inches from the medical device.
  - Follow the manufacturer directions for the implanted medical device.

  If you have any questions about using your wireless device with an implanted medical device, consult your healthcare provider.

- **POTENTIALLY EXPLOSIVE ENVIRONMENTS**

  Do not carry your device in potentially explosive environments, such as near gasoline pumps. Sparks may cause an explosion or fire resulting in injury or death. Note restrictions in areas with fuel; chemical plants; or where blasting operations are in progress. Areas with a potentially explosive environment may not be clearly marked. These usually are areas where you are advised to switch your engine off, below deck on boats, chemical transfer or storage facilities, and where the air contains chemicals or particles. Check with the manufacturers of vehicles using liquefied petroleum gas (such as propane or butane) if this device can be safely used in their vicinity.

- **MAGNETISM**

  Parts of the device are magnetic. Metallic materials may be attracted to the device. Do not place credit cards or other magnetic stripe cards near the device for extended periods of time, since the cards may be damaged.

- **SOUND LEVEL**

  If the auditory warning is active immediately move away from other Wearables or Beacons to deactivate the warning. Prolonged exposure to the high volume warning can lead to permanent hearing damage.

- **VISIBLE DAMAGE**

  Do not use the device when it is visibly damaged. If the device is damaged, return the device to the manufacturer for repair or replacement.

- **SAR**

  This device meets guidelines for exposure to radio waves. Your device is a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields), recommended by international guidelines from the independent scientific organization ICNIRP. These guidelines incorporate substantial safety margins that are intended to assure the protection of all persons regardless of age and health. The exposure guidelines are based on the Specific Absorption Rate (SAR), which is an expression of the amount of radio frequency (RF) power deposited in the head or body when the device is transmitting. SAR tests are carried out with the device in standard operating positions, transmitting at its highest certified power level, in all its frequency bands.

The World Health Organization (WHO) has stated that current scientific information does not indicate the need for any special precautions when using wireless devices. If you are interested in reducing your exposure, they recommend you limit your usage or to keep the device away from your head and body. For more information and explanations and discussions on RF exposure, go to the WHO website at www.who.int/peh-emf/en.

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# Appendix
# Relay connection

The Beacon can be connected optionally to an external relay to add extra functionality. Typical use cases are speed control or external feedback systems like lights, buzzers, etc.

The picture below shows the connection between the Beacon, the power source, and an external relay.



Relay

Optional for speed control
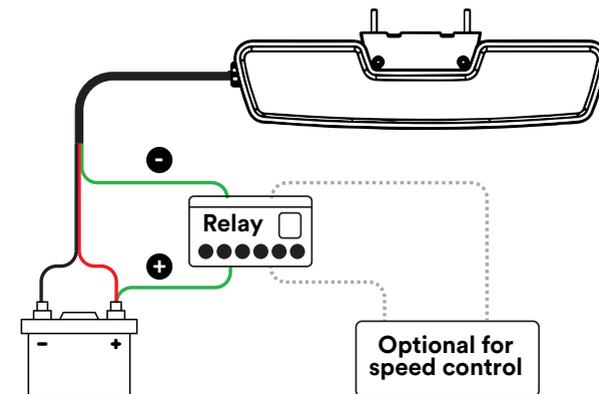
# Support

In case of issues, questions or feedback, feel free to contact our support team.

📞 Americas: +1-844-275-2801

✉️ Americas: support@gemone.com

# Save time with our connectors

Request connectors for your machines to save time during installation. GemOne offers a multitude of different connectors. Get in contact with your account manager for an offer.