

# PERSONNEL PROXIMITY DETECTION



## Increasing safety for port personnel

### Collision Risks

Personnel working within close proximity to container handling equipment are at risk of serious collision injuries, which will often halt operations and have consequences that affect every aspect of the business, which incurs high indirect costs.

### Operational Challenge

Due to the elevated position of the control cabin and physical size of moving equipment, operators have limited ability to detect personnel in the path of the equipment. The risk of collision with personnel is further increased as ports become more busy and congested, and by plans to incorporate automation.

### Technology Challenge

A number of technologies have been applied to detect personnel near equipment:

- Radar, Ultrasonic and "Time of Flight" systems
- Laser, Infrared and video
- RFID and RSSI

Poor environmental conditions and factors like line-of-sight and unreliable strength of radio signals result in failure of the system to provide alerts.

False alarms are also common, causing unnecessary stoppages, and a high degree of frustration and mistrust of the system.

### MST Solution

MST's proximity detection systems uses electromagnetic near field technology. It consists of a controller, a transmitter, an operator's panel and any number of personnel proximity tags. The transmitter, installed on the moving equipment, generates a signal that activates the tag.

The system defines proximity boundaries for safe, warning and danger zones. The equipment operator and the personnel are alerted when they breach these proximity zones.

### Performance Requirements

Based on testing at ports and consultation with port operators, MST derived the requirements for its latest proximity technology which drive the following benefits:

#### KEY FEATURES

##### Increased Personnel Safety

- 360° field and detection of personnel around corners
- Operation in complete darkness, rain, fog and dust
- High reliability due to immunity to existing technologies
- 20-metre detection range provides early warnings
- Integration into braking system

##### Increased Productivity

- Minimal training and simple implementation
- Hazardous zones are software customised
- Remote configuration with standard web-browsers
- WiFi connection to smart phones, tablets or PC's
- No ongoing calibrations and physical adjustments
- Easy CAN bus integration into equipment control systems
- Dynamically adapts zone boundaries according to speed

##### Lower Cost of Ownership

- Low cost-of-ownership and capital investment
- Standard cable & connectors with no external infrastructure
- Multiple shared systems and tags in the same area
- Durability
  - exposed components are high impact, vibration resistant and IP69K
  - personnel tags are robust, water-resistant and fail-safe

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## System components

### The Controller



The controller is the primary logic component of the system and coordinates radio communication and signal generation. It manages the configuration of all connected peripherals.

An embedded web server, Ethernet and WiFi interface allows easy system configuration, history log downloads, and firmware upgrades using standard web browsers. For easy access, the Wi-Fi capability supports connection with smart phones, tablets, laptops and personal computers.

### The Display Panel



The 100mm x 135mm **display panel** with 8x8-tricolour LED array provides audible and visual alarms to the machine operator. A push-button allows the operator to suppress the alarm, which reactivates after a programmable time-out.

The display panel incorporates its own transmitter, which allows the system to recognise when personnel are in the safe zone of the cabin. An iButton security key and reader on the front of the panel enables Wi-Fi and unlocks configuration.

### The Transmitter



The Transmitter generates an encoded signal that is detected by the proximity tag. To maximise system safety, the transmitters also act as a receiver for radio emergency communications from proximity tags.

The transmitter requires no physical adjustments and to ensure reliability is only configured by the controller. Up to four transmitters can be installed to accommodate very large equipment and facilitate more customised zone shaping.

### The Tag



The Tag has a 12-hour battery life and is supplied with a desktop charging unit. An audible alarm, coloured LED, and vigorous vibration alerts the tag-bearer. The tag is IP66 rated, small and lightweight, resulting in better user adoption.

A push-button allows the operator to suppress the alarm, which reactivates after a programmable time-out. To ensure fail-safe operation a high degree of intelligence is built into the tag with a secondary backup radio channel to broadcast failure conditions.