

# Port Machinery Sensing Solutions



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# Radar Sensors for Crane Collision Avoidance

Harbor cranes such as STS, RTG, RMG are a large investment and if damaged, require costly maintenance repairs or may need to be replaced. Banner Engineering's R-GAGE radar-based sensor is the perfect solution for crane-to-crane, or crane-to-obstacle collision avoidance applications to prevent costly repairs, and can operate in harsh outdoor conditions like strong wind and rain, direct sunlight and extreme temperatures.

Radar sensors use Frequency Modulated Continuous Wave (FMCW) technology to reliably detect moving or stationary targets, including cranes, cars, trains, trucks and cargo in extreme weather conditions.

## Features

- FMCW (true-presence) radar detects moving and stationary objects
- Sensing functions are unaffected by wind, falling rain or snow, fog, light, humidity and air temperatures
- Easy configuration using DIP switches, no PC required
- Adjustable sensing field—ignores objects beyond the setpoint
- Detects vehicles at distances up to 40 m
- Includes DIP switches for sensing distance, sensitivity and output configuration
- Operates at 24 GHz in the Industrial, Scientific and Medical (ISM) telecommunication band; no special licensing required
- Operating temperature range of -40° to +65° C
- 12 to 30V dc operation with bipolar PNP and NPN output
- Rugged IP67 housing withstands harsh environments

## Adjustable-Field Radar-Based Sensors

Q120RA-AF2Q



- Two independent adjustable sensing zones
- Detect objects up to 40 m
- Beam pattern (horizontal: 20°, vertical: 50°)

QT50R-AFHQ



- Single adjustable sensing zone
- Detects up to 15 m
- Beam Pattern (Horizontal: 90°, Vertical: 90°)

Q240RA-AF2Q



- Two independent adjustable sensing zones
- Detect objects up to 40 m
- Beam pattern (horizontal: 11°, vertical: 13°)



No PC  
Required



Easy  
Configuration



IP67



Extreme  
Temperatures



Snow, Fog,  
Heavy Rain &  
Humidity



Strong  
Wind

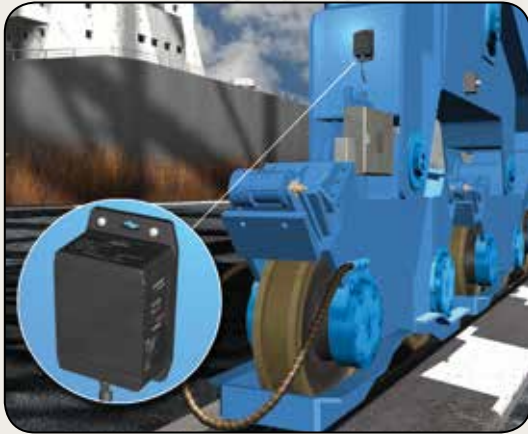


Sunlight  
Immune



Vibration  
Resistant

# Radar Sensor Typical Applications



### STS Collision Avoidance

Radar sensors with dual detection zones have a range of up to 40 m and allow cranes on rails to slow down or stop when approaching an obstacle.



### RTG Collision Avoidance

The dual detection zones allow high speed gantry cranes to slow down or stop when approaching an obstacle.



### STS Collision Avoidance

Radar sensors can reliably detect the presence of an obstacle and activate stop or warning signals.



### Spreader Control to Crane

Radar sensors detect the presence of a container and reduce the spreader dropping speed when approaching.



### Train Detection

Radar sensors detect the presence of container trains while the output activates equipment such as RFID antennas and Gamma Ray Gates.



### Truck Detection

Radar sensors act as a trigger at entrance/exit portals, activating cameras and lights that capture container and truck ID markings. The radar system replaces road sensing loops.

# SureCross Wireless I/O Solutions

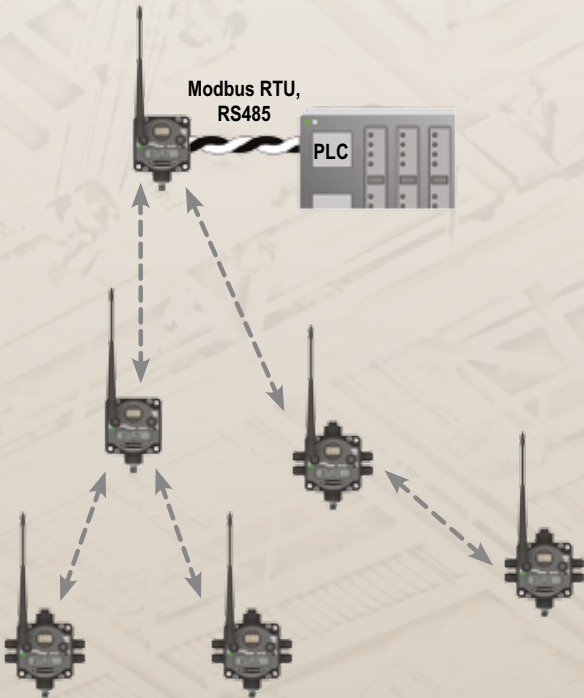


## DX70 Point to Point

- Direct I/O mapping; no software required
- Digital and analog I/O available on each device
- Integrated LEDs provide real-time RF link indication

## DX80 Star Topology

- Free software offers simple user configuration and I/O mapping
- Digital, analog, temperature and counter inputs available at the Node
- Gateways offer I/O and serial communication output (Modbus RTU or Ethernet available)
- Up to 48 Nodes per Network/Gateway
- Unlimited networks in the same location
- 10 to 30V dc, solar panel or battery option



## MultiHop Radio with I/O

- Host Controlled network with repeater architecture built-in
- Every radio can be set up as a Master, repeater or slave through integrated DIP switches
- Digital, analog, temperature, counter and more I/O options available on each device
- Up to 50 slaves per network master
- Unlimited networks in the same location
- 10 to 30V dc, solar panel or battery option

- 0 - 20 mA
- 0 - 10V dc
- PNP - NPN
- Frequency Counter
- Thermistor
- RTD
- PT100
- Bridge
- RS485 - RS232
- ...



FHSS Communication



Built-in Signal Strength



Proprietary Protocol



Link Loss Output



Configurable & Mapped I/O



Power Possibilities

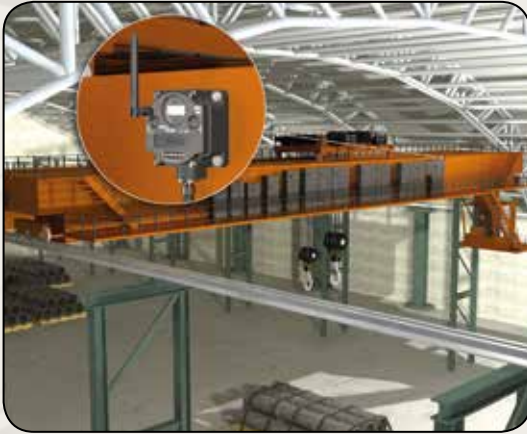


ATEX Solutions



Multiple Signals, Digital and Analog

## Wireless I/O Solutions Typical Applications



### Data Synchronization

Overhead crane controllers communicate position data to synchronize independent or tandem movement control.



### Crane to Crane Communication

Wireless solutions allow transmission of distance data between cranes so multiple cranes can service one ship while avoiding collisions.



### Four Load Cells on Spreader

Load cells communicate weight information and the status of the twist locks to the cabin ensuring even distribution of weight before lifting a container.



### Load Cell—Hook to Cabin

Wireless I/O communication between the hook and the cabin with a long-lasting, battery-powered solution.



### Work Area Conditions

Wind speed data is transmitted wirelessly from the field sensing device to the cab and operator control room.



### Loading Dock Notification

Wireless M-GAGE automatically detects the truck and alerts operators of an arrival at the loading dock.

# Indicators, Detection & Measuring Sensors



Robust Housing



Vibration Resistant



IP67  
IP69K



Long Life LED



Daylight Visible



Various Color Options



Long Life LED



IP69K Models



Robust Housing



IP67



Integrated TEACH



Chemically Resistant



Bright Laser Spot



IP67



Integrated TEACH

## EZ-LIGHT Beacon Light

- Intense levels of light output are highly visible during daylight and perfect for outdoor applications
- Perimeter and top view models available
- Rugged, sealed thermoplastic housing rated for IP67 and IP69K
- 12 to 30V dc and 120V ac operation, depending on model



## EZ-LIGHT Traffic Light

- Preassembled indicators for signaling and traffic control, available with one, two or three indicators
- Intense levels of light output are highly visible during daylight and perfect for outdoor applications
- Controlled field of view for signage and narrow lane use
- Rugged, cost-effective and easy-to-install
- Compact devices are completely self-contained – no external controller needed
- Immune to EMI and RFI interference, which can hinder circuit activity



## Work Light WLS28

- Extremely long-lasting LED technology for greater than 50,000 hours of continuous working life
- High power solid state LED array with cool white light
- Rugged aluminum housing with narrow 28 mm total width
- Lighted lengths available from 145 mm to 1130 mm
- Illuminates a large area with an even pattern of light and no shadows
- Low power consumption; less than 9 watts per foot



## QT50U Ultrasonic Sensor

- Extended sensing range of up to 8 m
- Available in analog or discrete dc models and in ac/dc universal voltage models with electromechanical relay output
- Features a completely sealed, shock-resistant housing
- Uses a narrow sensing beam to detect targets at long ranges within confined areas
- Compensates for temperature, for greatest sensing accuracy
- Simplifies setup with push-button and remote TEACH-mode programming
- Shows status during setup and operation, using highly visible LED indicators



## LT3 Time-of-flight Sensor

- Available in diffuse-mode with 5 m range and retroreflective mode with 50 m range
- Offered in dual-discrete or analog/discrete models
- Features push-button TEACH-mode programming for custom sensing windows
- Includes push-button programming for three output response speeds
- Uses rugged construction to withstand demanding sensing environments—rated IEC IP67



# Lights, Detection & Measuring Typical Applications



## Loading Dock

The bright SP250 indicator traffic lights signal truckers which dock to use.



## Reach Stacker

Intensely bright beacon lights are highly visible during daylight and indicate the condition of the spreader twist locks to the operator cabin.



## Beacon Light on Spreader

With top and perimeter models, the beacon light indicates the status of the ship-to-shore crane spreader to the operator cabin.



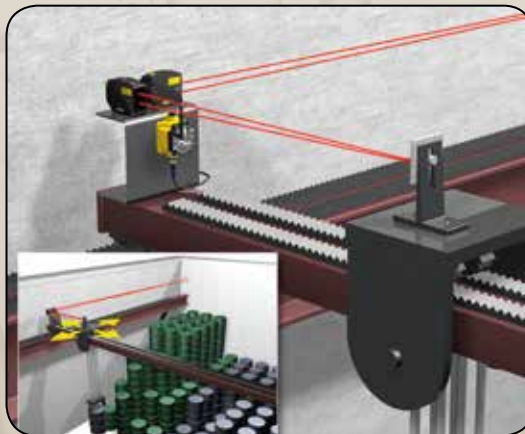
## Cabinet Lighting

Rugged work area lights brightly illuminate and conveniently fit in the designated work area or control panel.



## Obstacle Detection

Ultrasonic sensing from crane-to-crane or crane-to-obstacle provides a distance range in analog outputs (4 to 20 mA) to prevent collision during operation.



## Overhead Crane Position

The LT3 Time-of-flight laser sensor reliably detects and measures the position of the crane as it moves back and forth on the rails, and measures load position in ranges from 5 to 50 m.



**Sensors**

- Presence
- Absence
- Inspection
- Gating
- Counting
- Measurement
- Position

**Vision**

- Pattern Recognition
- Complex Part Inspection
- Multi-Component Gauging
- Part ID/Orientation
- Assembly Verification
- Print Verification
- Traceability (Bar Code and Text)

**Wireless**

- Process Control & Monitoring
- Factory Automation
- Agriculture & Water Management
- Traffic Monitoring & Control
- Commercial & Consumer Monitoring

**Lighting & Indication**

- Bin & Part Picking
- Error Proofing
- Pick-to-Light & Call for Parts
- Visual & Audible Indication
- Operator Guidance
- Visual Management
- Andon Indication
- Pilot & Stack Light Replacement

**Machine Safety**

- Safety Light Screens
- Fiber Optic Safety Systems
- Safety Modules & Controllers
- Emergency Stop Devices
- Safety Interlocks
- Ergonomic Two-Hand Control & Run Bars

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