Port Equipment Sensing Solutions
Radar Sensors for Crane Collision Avoidance

Harbor cranes such as STS, RTG, RMG are a large investment and if damaged, require costly repair or replacement. Banner Engineering’s R-GAGE radar-based sensor is the perfect rugged solution for crane-to-crane, or crane-to-obstacle collision avoidance applications. Radar sensors can operate in harsh outdoor conditions. Sensing functions are unaffected by wind, rain or snow, fog, sunlight, humidity and fluctuating air 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. They operate at 24 GHz in the Industrial, Scientific and Medical (ISM) telecommunication band.

R-GAGE sensors allow for easy configuration by using DIP switches; there is no PC required for setup nor installation. The adjustable sensing field ignores objects beyond the setpoint. Sensing distance, sensitivity and output configuration are adjustable.

<table>
<thead>
<tr>
<th>Model*</th>
<th>Range</th>
<th>Sensing Zones</th>
<th>Beam Angle</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>QT50R-...-AFHQ</td>
<td>Up to 15 m</td>
<td>Single zone, adjustable</td>
<td>90 x 90°</td>
<td>5 pin M12</td>
</tr>
<tr>
<td>Q120RA-...-AF2Q</td>
<td>Up to 40 m</td>
<td>2 independent zones, adjustable</td>
<td>20 x 50°</td>
<td>5-pin M12</td>
</tr>
<tr>
<td>Q240RA-...-AF2Q</td>
<td>Up to 40 m</td>
<td>2 independent zones, adjustable</td>
<td>11 x 13°</td>
<td>5-pin M12</td>
</tr>
</tbody>
</table>

* Region specific models available – visit www.bannerengineering.com or call factory

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Mounting Brackets (for Q120 and Q240)</th>
</tr>
</thead>
<tbody>
<tr>
<td>QT50RCK</td>
<td>Rain cover for QT50R</td>
</tr>
<tr>
<td>SMBWSQ120</td>
<td>Rain cover for Q120RA</td>
</tr>
<tr>
<td>Q240WS</td>
<td>Rain cover for Q240RA</td>
</tr>
<tr>
<td>SMBQ240SS1</td>
<td>2-piece bracket, provides ±20° of tilt on one axis</td>
</tr>
<tr>
<td>SMBQ240SS2</td>
<td>Bracket, provides ±20° of tilt on two axes</td>
</tr>
<tr>
<td>SMBQ240SS3</td>
<td>Full bracket assembly, ±20° of tilt in all directions (SS1 + SS2)</td>
</tr>
</tbody>
</table>
Radar Sensor Typical Applications

STS Collision Avoidance
Radar sensing with dual detection zones with a range up to 40 m allows to slow down or stop cranes on rails.

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

Crane-to-Crane Collision Avoidance
Radar sensors can reliably detect the presence of another crane or obstacle and activate stop or warning signals.

Back Drive Sensor
Driver aid sensor to detect obstacles at the back side where the visibility is limited.

Truck Detection
Radar sensors act as a trigger to activate cameras to capture container ID markings.

Train Detection
Radar sensors detect container trains to activate RFID antennas or Gamma Ray Gates.
Industrial Wireless I/O Solutions

### Topologies
- **Point-to-Point:** direct I/O mapping; no software required; up to 32 pairs in the same location
- **Star Topology:** expandable network with one Gateway supporting up to 47 Nodes
- **Tree Topology (Mesh):** Host-controlled network with built-in repeater architecture, up to 50 slaves per network master

### Features
- Proprietary protocol with built-in signal strength, FHSS communication
- Multiple power possibilities including solar panel or battery options
- I/O options: 0–20 mA; 0–10 VDC; PNP-NPN; Counter; Thermistor; RTD; PT100; Bridge; RS-485; RS-232, Class 1/Div 1 ATEX...

### DX80PM Premapped Kit – 1x Gateway and 1x Node, 12-24 VDC, ±10%

<table>
<thead>
<tr>
<th>Model</th>
<th>IP Rating</th>
<th>Power</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX80K.M6-PM2</td>
<td>IP67</td>
<td>12-24 VDC</td>
<td>Mixed discrete and analog I/O Kit*</td>
</tr>
<tr>
<td>DX80K.M6-PM8</td>
<td>IP67</td>
<td>12-24 VDC</td>
<td>Discrete I/O only Kit*</td>
</tr>
</tbody>
</table>

### GPS Module – Vibration Sensor – Nodes with Serial Interface

<table>
<thead>
<tr>
<th>Model</th>
<th>IP Rating</th>
<th>Power</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS50M</td>
<td>IP69K</td>
<td>5–30 VDC</td>
<td>Modbus protocol on RS-485 serial; latitude, longitude, altitude (meters), time, and date in signed integer and floating point formats</td>
</tr>
<tr>
<td>QM42VT2</td>
<td>IP67</td>
<td>3.6-5.5 VDC</td>
<td>Vibration and temperature sensor Modbus version</td>
</tr>
<tr>
<td>QM42VT1*</td>
<td>IP67</td>
<td>3.6-5.5 VDC</td>
<td>Vibration and temperature sensor via 1-wire serial interface</td>
</tr>
<tr>
<td>DX80N.Q45VT*</td>
<td>IP67</td>
<td>2x 3.6 VDC</td>
<td>Q45 Vibration/Temperature Node with integrated batteries</td>
</tr>
</tbody>
</table>

*QM42VT1 sensor requires DX80N.Q45VT node

### DXM100 Wireless Controller

**Preconfigured as a Modbus RTU to EtherNet/IP protocol converter RS-232, RS-485 and Ethernet Communication Ports; USB Configuration Port**

<table>
<thead>
<tr>
<th>Model</th>
<th>Power</th>
<th>Topology</th>
<th>IP Rating</th>
<th>Discrete I/O</th>
<th>Analogue I/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>DXM100-B1R1</td>
<td>12-30 VDC</td>
<td>DX80 Radio</td>
<td>IP20</td>
<td>4–20 mA; 0–10 V, Counter, Temperature 10 kΩ Thermistor</td>
<td>0-20 mA or 0-10 VDC</td>
</tr>
<tr>
<td>DXM100-B1R2</td>
<td>12-30 VDC</td>
<td>MultiHop Radio</td>
<td>IP20</td>
<td>4–20 mA; 0–10 V, Counter, Temperature 10 kΩ Thermistor</td>
<td>0-20 mA or 0-10 VDC</td>
</tr>
</tbody>
</table>
Typical Industrial Applications for Wireless I/O

Truck Traffic Management
Wireless M-GAGE automatically detects the trucks and alerts operators of traffic and/or arrival of the trucks.

Crane-to-Crane Communication
Transmit distance and position data between cranes so multiple cranes for close proximity operation.

Four Load Cells on Spreader
Load cells and twist locks status information needed for stable lifting operations.

Load Cell – Hook to Cabin
Wireless I/O communication between the hook and the cabin with a long-lasting, battery-powered solution.

Vibration Monitoring for Predictive Maintenance
By monitoring increases in vibration, problems can be detected before they result in unplanned down time.

Monitoring Railcars Wirelessly
A railcar wheel monitoring system detects the railcar wheels and triggers an axle pushing arm.
Illumination & Indication Solutions

TL50 Beacon Tower Lights
- Highly visible indication for indoor or outdoor applications
- Compact, stylish design with rotating and flashing options
- Models available with rugged, water-resistant IP67 housing including omni-directional alarm option

K50 Beacon Omni-Directional Indicators
- High intensity with continuous, strobing and rotating light options
- Rugged, sealed housing rated to IP69K for outdoor and high-pressure washdown use
- Models for DC and AC operation

WLS28-2 LED Strip Lights
- Available in IP50 (indoor) or IP67/IP69K (outdoor) models
- Ability to dim lights using wiring, built-in switch or external PWM signal
- Single and dual colour models available, ideal for day/night vision applications

WLS27 LED Strip Lights
- IP67/IP68g/IP69K rated, ideal for outdoor use
- High/Low/Off external control or 0-100% dimmable (PWM signal)
- Single and dual colour models available, ideal for day/night vision applications

WLB32 LED Light Bar
- Robust metal housing, shatterproof light cover IP50 rated (dry location only)
- Ideal for work stations, machine lighting, control cabinets and manufacturing lines
- High/Low/Off switch allows users to customize light levels

Illuminated E-Stops (IEC/EN 60204-1)
- Easy installation and hookup with no assembly, using standard M12 cordsets for error free cabling
- Illuminated bases will guide operators to the nearest E-Stop in poor lighting conditions: once activated it will flash to easily define which button has been pushed

TL70 Tower Lights (standard and wireless)
- Select up to five highly-visible colour light segments per device with optional audible available
- Indicator segments appear gray when off, eliminating false indication from ambient light
- Base unit can be equipped with two way wireless communication, to eliminate costly and time-consuming wiring runs
Sensing Solutions

QS30EX/RX Long-Range Sensors
- High performance and long range optical sensors
- Universal mounting
- IP67 rated and sunlight immune for use in harsh environments

T30UX & QT50U Long-Range Ultrasonic Sensors
- The QT50U has a completely sealed, shock-resistant housing with an extended sensing range up to 8 m
- The T30UX has a 30 mm threaded barrel and sensing ranges up to 3 m

LTF Time-of-Flight Laser Sensors
- LTF series uses advanced “time-of-flight” technology for precise, long-distance gauging
- Reliably detects targets regardless of angles
- Visible red laser spot for easy alignment

Typical Applications

Beacon Light on Spreader
The beacon light indicates the status of the ship-to-shore crane spreader to the operator cabin.

Reach Stacker
Intensely bright beacon status lights are highly visible in daylight and dimmable for night-time operation.

Straddle Carrier Positioning
QS30EX/RX high power sensor pairs are mounted on a STS crane to accurately position the straddle carrier.

Electrical Cabinet Lighting
Rugged work area lights can be equipped with motion sensor for automatic operation.
Quick Start Guide

Laser displacement sensor with both analog and discrete (switched) outputs

This guide is designed to help you set up and install the L-GAGE® LE Laser Gauging Sensor. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at www.bannerengineering.com. Search for p/n 175094 to view the manual. Use of this document assumes familiarity with pertinent industry standards and practices.

WARNING: Not To Be Used for Personnel Protection

Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death.

This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

Features and Indicators

Power LED Indicator

Analog Output LED Indicator

Display

Discrete Output LED Indicator

Push Buttons

Figure 1. LE Analog Sensor Features

Three LED indicators provide ongoing indication of the sensing status.

Analog Output LED Indicator

Solid Amber = Displayed distance is within the taught analog output window

Off = Displayed distance is outside the taught analog output window

Power LED Indicator

Solid Green = Normal operation, power On and laser On

Flashing Green (1 Hz) = Power On and laser Off (laser enable mode)

Discrete Output LED Indicator

Solid Amber = Discrete Output is On

Off = Discrete Output is Off

Laser Description and Safety Information

CAUTION:

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. Do not attempt to disassemble this sensor for repair. A defective unit must be returned to the manufacturer.

Class 2 Laser Models

CAUTION: Never stare directly into the sensor lens. Laser light can damage your eyes. Avoid placing any mirror-like object in the beam. Never use a mirror as a retroreflective target.

For Safe Laser Use - Class 2 Lasers

• Do not stare at the laser.

• Do not point the laser at a person’s eye.

• Mount open laser beam paths either above or below eye level, where practical.

• Terminate the beam emitted by the laser product at the end of its useful path.

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