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Industry 4.0

Industry 4.0, IoT, and IIoT

The technologies of Industry 4.0 make data readily available and automate the communication between industrial automation equipment and systems. This enables predictive analysis for machines as well as process optimization across the factory floor.

The Internet of Things (IoT) describes the technologies that connect objects—from consumer electronics to industrial components—to the internet.

The Industrial Internet of Things (or IIoT) refers specifically to the impact of this innovation on industrial applications.

The key benefits include:

• Visibility and Remote Access to the operational status of machine components (both historically and in real-time)
• Predictive Analytics for more accurate planning of machine maintenance
• Interconnectivity for seamless communication among machines, components, and people

What Does IIoT Mean For Factories?

Visibility and Remote Access Increase Efficiency

In order to ensure efficient processes throughout the factory, machine operators must quickly and easily determine the status of machines. The greater the visibility, the easier it is to identify and resolve problems and keep operations running smoothly.

Traditional tower lights provide visibility wherever they can be physically seen. However, tower lights equipped with wireless communication capabilities both display a visual indication of an event and transmit wireless alerts. This helps ensure that operational problems are identified and addressed immediately, regardless of whether a machine operator is physically present to see the visual indicator.

An additional benefit of wireless indicators is data logging for use in OEE (Overall Equipment Effectiveness) calculations. Not only can operators respond to alerts quickly as they occur, but a history of alerts can also be stored and analyzed offline. This historical data can be used to track machine uptime, production volume, rejected parts, and other key metrics to make more informed decisions over time.

Predictive Maintenance Increases Machine Uptime and Availability

In addition to real-time status monitoring, IIoT technologies can also be used to help avoid machine failures thanks to predictive maintenance.

By monitoring machine components in real-time for increases in vibration and temperature, problems can be detected and resolved before they become too severe and cause additional damage or result in unplanned downtime. Over time, the historical data creates a valuable machine performance log that can be used to make more informed maintenance decisions down the line.

Interconnectivity Streamlines Factory Communications

Wireless technologies also enable seamless interaction among human workers, and can have a significant impact on the efficiency of manual production lines. For example, instead of requiring machine operators to walk over to the manager area for assistance with a technical issue, a wireless system utilizing connected pushbuttons or switches and tower lights can be used to alert managers when assistance is needed on the line.

Is Your Business IIoT-Ready?

From keeping machines running smoothly to enabling seamless communication among machines, components, and people, the benefits of IIoT technologies are tangible. It can be challenging knowing where to start and how to use these technologies to their fullest advantage. Answering the following questions can help manufacturing facilities identify the best technologies to meet their immediate business needs and start taking advantage of the long-term benefits of IIoT.

• What are the inefficiencies in your operations?
• What kind of data would help you overcome these inefficiencies?
• What communication processes need to be in place in order to utilize data in a meaningful way?
5 Advantages of IO-Link

1. Standardized and Reduced Wiring
   IO-Link devices do not require any special or complicated wiring, but can be connected using the same cost-effective standard unshielded 3-wire cables as conventional discrete I/O. In addition, IO-Link also eliminates the need for analog sensors and reduces the variety of cord sets required for sensors, which saves inventory costs. IO-Link also supports a master-slave configuration with passive connection points, which further reduces wiring requirements.

2. Increased Data Availability
   Access to sensor-level data helps ensure the smooth operation of system components, streamlines device replacement, and enables optimized machine maintenance schedules—all of which save costs and reduce the risk of machine downtime.

   This wealth of valuable data made available through IO-Link is integral for the Industrial Internet of Things (IIoT) and Industry 4.0 initiatives.

3. Remote Configuration and Monitoring
   With IO-Link, users can read and change device parameters through the control system software, enabling fast configuration and commissioning that saves time and resources. In addition, IO-Link allows operators to dynamically change the sensor parameters from the control system as needed—such as in the case of product changeover—which reduces downtime and allows machines to accommodate greater product diversity.

   In addition, the ability to monitor sensor outputs, receive real-time status alerts, and adjust settings from virtually anywhere allows users to identify and resolve problems that arise on the sensor level in a timely manner. This capability reduces costly downtime and improves overall efficiencies.

4. Simple Device Replacement
   In addition to the ability to remotely adjust sensor settings, IO-Link’s data storage capability also allows for automated parameter reassignment in case of device replacement (also known as Auto-Device Replacement or ADR). Users can import existing sensor parameter values into a replacement sensor for seamless replacement, getting the new device up and running as quickly as possible.

5. Extended Diagnostics
   IO-Link provides users with visibility into errors and health status from each device. This means that users can see not only what the sensor is doing but also how well it is performing—a valuable insight into a machine’s efficiency. In addition, extended diagnostics allow users to easily identify when a sensor is malfunctioning and diagnose the problem without shutting down the line or machine.

   The combination of real-time and historic data not only reduces troubleshooting efforts as issues arise but also allows for optimization of machine maintenance schedules, saving costs and increasing efficiency in the long term.
Lithium Ion Battery Production

From precise edge guiding and roll diameter monitoring to glue and tape detection, lithium ion battery production processes require a variety of presence detection, measurement, and inspection solutions to ensure quality control within tight tolerances. Banner Engineering offers an extensive portfolio of fiber optic sensors, photoelectric and laser measurement sensors, and machine vision products for reliable error-proofing in this industry.
## Solutions for Lithium Ion Battery Production

### Tape Detection

**Challenge**
- Detect tape used to identify damaged film
- Low optical contrast between tape and film
- High speed processing: 1.5 meters per second
- Hard-to-access deployment area with very limited space

**Featured Solution**
- DF-G2 Series
  High-Speed Fiber Optic Amplifier and plastic fiber optic sensors

**Key Features**
- White, green, blue, and infrared LED sensing
- Best-in-class response speeds: up to 10 μs
- Very small, very flexible fiber optic sensors
- IO-Link models available

**Key Benefits**
- Detect low-contrast, multicolored, reflective, and other difficult targets
- Reliable performance in challenging high-speed applications
- Easily fits in tight, confined spaces and can be precisely positioned to perform inspections
- Advanced diagnostics, remote monitoring, teaching, and configuration

### Roll Diameter Monitoring

**Challenge**
- Control diameter of lithium ion battery film
- Continuous measurement on high-speed roll
- Hard to detect reflective material
- Machine vibration

**Featured Solution**
- T30UX Series
  Ultrasonic Sensor

**Key Features**
- Available ranges of 100 mm to 1 m, 200 mm to 2 m, or 300 mm to 3 m
- Provides continuous 0-10 V dc or 4-20 mA analog output
- Detects targets using 114 kHz, 174 kHz, or 224 kHz ultrasonic frequencies
- Built-in temperature compensation

**Key Benefits**
- Reliable monitoring of rolls regardless of size
- Reduced machine downtime and product damaged by incorrect tension control
- Immune to target reflectivity and variations in color
- Provides more reliable measurements to minimize waste left on the roll

### Edge Guiding

**Challenge**
- Monitor position of film edge on winding machine
- Minute detection of variation in edge position needed
- High-speed winder: up to 1.5 meters of film per second
- Hard-to-access deployment area with very limited space

**Featured Solution**
- DF-G3 Series
  Long-Range Fiber Optic Amplifier and heavy-duty shielded fiber array

**Key Features**
- Heavy-duty shielded fibers
- Detects 500 μm variation in edge position
- High-power amplifier with world-class long-range sensing capability
- IO-Link models available

**Key Benefits**
- Resists kinking, cutting, and snagging as well as chemicals and other environmental hazards
- Detects tiny misalignments, enabling precise adjustments to prevent winding errors and reduce material waste
- Advanced diagnostics, remote monitoring, teaching, and configuration
Glue Detection

**Challenge**
- Verify presence and consistency of adhesive on the outer casing of a battery
- Crowded production area with limited deployment space
- Frequent product changeover

**Featured Solution**
- iVu Series Image Sensor

**Other Solutions**
- VE Series Smart Camera

**Key Features**
- All-in-one solution with camera, controller, lens, and light included in one package
- PC, remote or integrated touchscreen operation
- EtherNet/IP™, Modbus/TCP, PROFINET®, PCCC and Serial RS-232 communication
- Full runtime editing capability

**Key Benefits**
- Simplifies installation and eliminates the expense of purchasing additional components
- Setup, manage, and monitor inspections on the device or from a convenient location
- Enables seamless integration with existing equipment
- Reduces costly downtime by changing inspection parameters while inspections are in progress

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Thickness Monitoring

**Challenge**
- Maintain consistent thickness battery film
- High-speed production process
- Hard-to-access, space-constrained deployment area

**Featured Solution**
- LM Series Laser Measurement Sensor

**Key Features**
- 0.002 mm resolution and repeatably
- Fast 0.5 ms response speed and 0.25 ms sampling rate
- Best in class thermal and mechanical stability
- Optional Remote Sensor Display (RSD)

**Key Benefits**
- Precise measurements for reliable quality and process control
- Reliably solves high-speed applications with fast-moving targets
- Superior thermal stability for more accurate and reliable measurements
- Simplifies setup and monitoring of sensors in difficult-to-access locations

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Monitoring Safety Doors

**Challenge**
- Monitor multiple guard doors
- Staff need to frequently access the protected area
- Prevent staff from bypassing safety functions

**Featured Solution**
- SI-RF Series RFID safety switches

**Other Solutions**
- SI-MAG Series magnetic safety switches

**Key Features**
- Achieves Cat 4, PL e, or SIL CL 3 safety ratings alone or in a cascade chain
- Cascade up to 32 switches together in a series
- No contact between switch and actuator
- Unique, high, and low code tamper resistance
- In-Series Diagnostics (ISD)

**Key Benefits**
- Operates at the highest levels of safety (PL e) without the possibility of fault masking
- Simplifies installation and wiring and frees space on the safety controller
- Allows easy access and minimizes wear and tear
- Ensures that safety functions cannot be bypassed
- Makes it easy to identify and resolve issues, minimizing downtime
Presence of Liquid

Challenge
• Detect presence of liquid at a collection site
• Potential exposure to oil and chemicals
• Below ground deployment area
• Provide indication if sensor is non-functional

Featured Solution
DF-G3 Series fiber optic amplifier

Key Features
• Small, flexible and chemically resistant fiber optics
• High-performance sensing for low-contrast application
• Intuitive user interface and easy-to-read dual digital display

Key Benefits
• Reliable detection in challenging environments
• Detects very small amounts of liquid
• Provides output for detection of liquid or damaged fibers
• Simplifies setup, programming, and application monitoring

see page 44

Liquid Detection in a Tube

Challenge
• Detect the presence of liquid in a tube
• Low optical contrast between the tube and liquid
• Multiple inspection points in hard-to-access areas

Featured Solution
DF-G3LIR Infrared water sensor

Other Solutions
DF-G1 Series general purpose fiber optic amplifier

Key Features
• High-performance sensing in low-contrast application
• Expert TEACH and SET methods
• Cross talk avoidance algorithm
• Easy-to-use mounting straps

Key Benefits
• Reliably detects liquids inside translucent or semi-opaque plastic and glass tubing
• Ensures optimal gain and threshold for all applications, including challenging high-speed and low-contrast applications
• Amplifiers can be deployed in close proximity to each other
• Simplifies setup, programming, and application monitoring

see page 44

Liquid Level Detection

Challenge
• Monitor fill levels of tanks to ensure steady supply and prevent overfills
• Hard-to-access equipment
• No wired infrastructure

Featured Solution
Q45UA all-in-one ultrasonic sensor and wireless node

Other Solutions
K50U ultrasonic sensor
QT50U with Performance Series -P14 Node

Key Features
• Combines ultrasonic sensor, wireless node, and battery power supply in one device
• Secure, robust Sure Cross® wireless network
• Immune to variations in target color, reflectivity, and transparency
• Plug-and-play compatibility with Wireless Solutions Kit for tank monitoring

Key Benefits
• Installs easily and can be deployed permanently or redeployed without altering infrastructure
• Eliminates the hassle and expense of running communication cable to connect devices
• Can be used to monitor a wide range of wet or dry materials
• Provides access to real time and historical data and makes it easy to create visualization tools, warnings, and alarms to ensure maximum uptime

see page 68
Safety Monitoring see page 46

Challenge
• Safeguard multiple safety devices
• Complex logic and multiple safety scenarios
• Communicate with HMI to display machine status

Featured Solution
XS26 Series expandable safety controllers with Ethernet

Other Solutions
SC26 Series safety controllers
SC10

Key Features
• Powerful software offering intuitive icon-based, drag-and-drop operation
• Base controller with 26 inputs and two dual-channel safety outputs supports up to eight expansion I/O modules
• Can be configured for virtual non-safety status outputs and virtual non-safety inputs

Key Benefits
• Configure safety program in minutes and test configuration prior to implementation
• Scalable solution can be expanded to fit changing machine requirements
• Two-way communication between the safety controller and PLC, HMI, and other devices for advanced functionality and diagnostic

Access Protection see page 49

Challenge
• Safeguard access to film slicing area
• Requires redundant, self-checking outputs
• Limited space for deployment

Featured Solution
LP Basic Series compact Type 4 safety light curtain

Other Solutions
LP Series full feature compact Type 4 safety light curtain
SLC4

Key Features
• Low-profile, compact design
• Provides basic functionality auto start/restart (trip output)
• Zone and status indicators plus digital display to indicate number of beams blocked and detailed diagnostics

Key Benefits
• Fits easily into small spaces without interfering with operations or processes
• Cost-effective safety device for simple applications
• Minimizes downtime by making it easy to troubleshoot and quickly resolve issues

Cabinet Illumination see page 53

Challenge
• Illuminate interior of a machine control panel
• Space-constrained deployment area
• DC powered equipment

Featured Solution
WLS15 Series Low Profile, Low Power LED Strip Light

Key Features
• Bright LED strip light with diffuse window
• Slim, space-saving 15 mm profile
• Flexible mounting options
• Operates on 12 V dc or 24 V dc in one model

Key Benefits
• Provides bright, even illumination with no hot spots
• Installs easily in confined areas without disrupting the work environment or obstructing sightlines
• Integrates easily into existing equipment
Solar Cell Production

Printed circuit board (PCB) manufacturing lines include several types of equipment and conveyors that all can benefit from the broad product offering provided by Banner Engineering. From presence detection in high temperatures to ultra-precise measurements to machine safety, Banner Engineering has solutions to critical challenges for PCB and IC chip production lines.
Solutions for Solar Cell Production

Solar Wafer Detection

Challenge
- Detect the presence/absence of a solar wafer
- Low reflectivity from light absorbing material
- Minimize interference with processes

Featured Solution
Q4X Series Laser Distance Sensor

Key Features
- Dual teach mode measures distance and light intensity changes compared to a background reference condition
- Reliable sensing range from 25 up to 610 mm

Key Benefits
- Reliably detects across a variety of target colors, materials, and surfaces
- No reflector required for detection
- Can be installed in a convenient location away from the line

Solar Wafer Flipping

Challenge
- Detect the presence/absence of a solar wafer
- Low reflectivity from light absorbing material
- Minimize interference with processes

Featured Solution
QS18 Series Photoelectric Sensors

Key Features
- Universal housing with an 18 mm threaded lens or side mounts
- Wide operating range up to 20 m
- Bright LED operating status indicators visible from 360°
- IO Link models available

Key Benefits
- Quick, easy installation
- Real-time feedback simplifies operation and troubleshooting
- Easy installation, wiring, preventative maintenance, and sensor backup

Solar Wafer Counting

Challenge
- Detect the presence/absence of a solar wafer
- Low reflectivity from light absorbing material
- Space constrained deployment area

Featured Solution
VS8 Series miniature sensors

Key Features
- Ultra-miniature housing (22 x 8 x 12 mm)
- High switching frequency
- Blue LED models reliably detect dark, reflective, and transparent objects
- Electronic push button or remote teach

Key Benefits
- Fits easily in very small spaces
- Reliable performance in high-speed applications
- Detects challenging targets without requiring a reflector
- Quick, easy setup enables rapid deployment
### Solar Wafer Counting

**Challenge**
- Detect the presence/absence of a solar cell
- Light absorbing solar cell reflects very little light
- Reflective surface of the metallic trace between cells

**Featured Solution**
Q3X Series Laser Contrast Sensor

**Key Features**
- High-speed detection as fast as 250 µs, capturing up to 2,000 events per second
- Reliable sensing range up to 300 mm
- Clear intensity readout from angled three-digit display
- Superior resistance to ambient light interference
- Two-point teach can easily detect the metal trace versus the light absorbing material

**Key Benefits**
- Reliable performance in high-speed applications
- Sensor can be deployed off the line to avoid interfering with processes
- Easy-to-see feedback simplifies operation and troubleshooting
- Resists nuisance output trips caused by changing light conditions

### Pressure Monitoring

**Challenge**
- Ensure pressure levels remain within recommended range
- Identify system problems before failure can occur
- Monitor large, complex system with multiple hard-to-access inspection points

**Featured Solution**
Performance Series All-in-One Pressure Sensor and Wireless Node

**Key Features**
- Combines pressure sensor, wireless node, and battery power supply in one device
- Field-proven Sure Cross® wireless architecture

**Key Benefits**
- Compact, one-piece design simplifies installation and eliminates the need for ordering multiple components
- Integrates easily in applications where infrastructure makes wired solutions impractical, ineffective, or cost-prohibitive
- Collect data from one or multiple points and monitor system performance from any network-enabled location

### Presence Detection on a Buffer Machine

**Challenge**
- Maintain a steady stream of wafers
- Inconsistencies in color of cell magazines
- Space constrained deployment area

**Featured Solution**
Q12 Series Miniature Sensors

**Other Solutions**
VS8 Series Miniature Sensors for Precise Detection

**Key Features**
- Ultra-miniature housing (22 x 8 x 12 mm)
- Superior resistance to fluorescent light interference
- Rugged design withstands exposure to extreme vibration

**Key Benefits**
- Fits easily in very small spaces
- Resists nuisance output trips caused by light interference
- Reliable performance in challenging environment
- Long operational life with only routine maintenance
IC Chips and Printed Circuit Boards

Printed circuit board (PCB) manufacturing lines include several types of equipment and conveyors that all can benefit from the broad product offering provided by Banner Engineering. From presence detection in high temperatures to ultra-precise measurements to machine safety, Banner Engineering has solutions to critical challenges for PCB and integrated circuit (IC) chip production lines.
Solutions for Printed Circuit Boards and Integrated Circuit (IC) Chips

Leading Edge And Adhesive Detection

Challenge
- Detect leading edge of printed circuit board (PCB)
- Verify that adhesive has been properly applied to PCB
- Very high levels of precision required for both inspections
- Tight-space constrained deployment area

Key Features
- Space-saving form factor (21.1 x 14.6 x 8 mm)
- Bright, precise spot for precise detection
- High switching frequency

Featured Solution
VS8 Series miniature sensors

Other Solutions
DF-G1 Series fiber optic amplifier with plastic fiber optic sensors

Key Benefits
- Will not interfere with equipment or movement of the PCB on the line
- Precision inspections reduce rework and wasted product
- Minimizes machine downtime for refilling the glue gun
- Reliable performance in high-speed applications

Integrated Circuit (IC) Chip Presence

Challenge
- Detect missing, tilted, and multiple IC chips in a nest
- Small, low-profile target
- High-speed inspections

Key Features
- Precise 0.002 mm - 0.004 mm resolution and ±0.02 - ±0.07 mm linearity
- Best-in-class thermal and mechanical stability
- Fast 0.5 ms response speed and 0.25 ms sampling rate
- Optional Remote Sensor Display (RSD)

Featured Solution
LM Series precision measurement sensor

Other Solutions
Q4X Series laser distance sensor

Key Benefits
- Ensures parts meet tight tolerances with fewer failures
- Achieves high levels of accuracy in challenging environments
- Reliable performance in high-speed application
- Simplifies setup and monitoring of sensors

Leading Edge Detection for Pick-and-Place Machine

Challenge
- Complex, multi-step pick-and-place process
- High level of precision required
- Space-constrained deployment area

Key Features
- Small, precise spot
- Cross talk avoidance algorithm
- Very small, very flexible fiber optic sensors

Featured Solution
DF-G2 Series High Speed Amplifier

Other Solutions
DF-G1 Series General Purpose Amplifier

Key Benefits
- Precise leading edge detection ensures proper placement of SMT components
- Multiple amplifiers can operate in close proximity to each other
- Amplifiers can be installed in a convenient location
Integrated Circuit (IC) Chip Orientation

Challenge
- Confirm correct orientation of IC chips on pocket tape
- Space-constrained deployment area
- Frequent product changeover

Featured Solution
Mu Series image sensor with integrated touch screen and light

Other Solutions
VE Series Smart camera

Key Features
- All-in-one solution with camera, controller, lens, and light included in one compact package
- Setup and manage inspections using Vision Manager PC software, remote touchscreen, or integrated touchscreen
- EtherNet/IP™, Modbus/TCP, PROFINET®, PCCC and Serial RS-232 communication
- Full runtime editing capability

Key Benefits
- Simplified installation without the expense of purchasing additional components
- Setup, manage, and monitor inspections on the device or from a convenient location
- Seamless integration with existing equipment and IIoT data collection
- Change inspection parameters while inspections are in progress

Data Matrix Code Reading

Challenge
- Small, complex 2D code on a printed circuit board (PCB)
- Printing errors leading to unreadable codes
- High-speed processes

Featured Solution
ABR Series Imager-Based Barcode Reader

Other Solutions
Mu BCR Series Barcode Reader

Key Features
- High-resolution 1.3 MP (1280 x 1024 pixels) imager
- Integrated red or multicolor LED lights
- Barcode manager software
- Web interface capability

Key Benefits
- Detects very fine details on small, complex, and challenging barcodes
- Optimizes the contrast between the Data Matrix code and the PCB
- Intuitive flowchart programming simplifies inspection setup
- Setup, manage, and monitor multiple ABR Series barcode readers from any network-enabled location
## Clean Room Monitoring

**Challenge**
- Monitor the status of each clean room
- Signal personnel when it is safe to enter and exit the clean room
- Alert maintenance personnel of alarm conditions via text or email

**Featured Solution**
- DXM700 Wireless Controller and K70 Series Wireless LED Indicators

**Key Features**
- Indicator provides bright, easy-to-see indication and wireless connectivity
- Controller supports two-way communication with up to 47 wireless nodes
- Controller combines wireless gateway with a logic controller offering advanced capabilities

**Key Benefits**
- Monitor clean room status from a convenient location
- Activate an indication light and lock/unlock doors from a convenient location
- No additional wiring or alterations to infrastructure required

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## Temperature and Humidity Monitoring at a Chip Shooter

**Challenge**
- Monitor temperature and humidity levels in multiple locations throughout a facility
- Maintain consistent temperature and humidity levels to suppress electrostatic discharge (ESD)
- Automate the collection of temperature and humidity information
- Minimize downtime during installation

**Featured Solution**
- Q45 Series Nodes for Predictive Maintenance and M12 Series Temperature and Humidity Sensor

**Key Features**
- Humidity accuracy of ± 2% relative humidity and temperature accuracy of ± 0.3 °C
- Wireless node is battery powered and preconfigured to work with M12 Series sensor
- Secure, robust Sure Cross® wireless network

**Key Benefits**
- Real-time monitoring ensures consistent temperature and humidity levels
- Quick, easy device setup and deployment
- Eliminates the hassle and expense of running communication cable
- Monitors environmental conditions in hard-to-access locations

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## Monitoring Machine Status

**Challenge**
- Monitoring multiple machines
- View machine status from all angles
- Bright ambient light conditions
- Machines use AC and DC power sources

**Featured Solution**
- TL50 Pro Series Tower Lights

**Other Solutions**
- TL50 Basic Tower Lights
- TL50 Core Series Tower Lights
- TL70 Series Modular Tower Lights

**Key Features**
- Features white windows with high intensity LED lights
- AC and DC power options available
- Audible options
- Preassembled models

**Key Benefits**
- At-a-glance visibility of machine status
- Versatile powering options enable use with a wide range of machines
- No assembly required for rapid deployment
Monitor Safety Devices  
**Challenge**
- Monitor multiple safety devices on a small assembly station
- Display machine status on an HMI
- Limited space on the machine control panel

**Featured Solution**
SC10 Series Compact Safety Controller/Relay Hybrid

**Other Solutions**
SC26 Series safety controller

**Key Features**
- Supports a wide range of safety devices
- Intuitive, icon-based programming with drag-and-drop PC configuration
- Two-way industrial Ethernet communication enables 256 virtual non-safe status outputs and 80 virtual non-safe inputs (reset, on/off, cancel off-delay, mute enable)

**Key Benefits**
- Consolidates the functionality of multiple safety relays into one compact device
- Eliminates the need to buy and stock dedicated relay modules
- Simplifies device setup and management
- Integrates multiple non-safety input and output devices without using additional IO terminals

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Safeguard Machine Access Points  
**Challenge**
- Safeguard point of access on a small assembly station
- Prevent attempts to bypass safety system

**Featured Solution**
SI-MAG Series Magnetic Safety Switches

**Other Solutions**
SI-RF Series RFID Safety Switches

**Key Features**
- Achieves category 4/PLe safety rating with a single sensor
- Two-piece, non-contact safety system
- Coded magnets for tamper resistance
- 3-5 mm tolerance to misalignment

**Key Benefits**
- Operates at the highest level of safety
- Provides a long operational life, even in applications with persistent use
- Resists attempts to bypass safety functions
- Minimizes machine downtime caused by nuisance trips

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Initiate Manual Reset  
**Challenge**
- Initiate manual reset on assembly station
- Provide status indication
- Unobtrusive operation

**Featured Solution**
S22 Pro Series Multicolor Touch Button

**Other Solutions**
K50 Core Series Illuminated Touch Buttons

**Key Features**
- Multicolor illuminated touch surface
- Ergonomic design requires no physical force to actuate
- Flush mount device with terminal connector options
- Solid state electronics

**Key Benefits**
- Clear, at-a-glance display of status to quickly resolve issues
- Easy actuation with no hand, wrist, and arm stresses
- Quick, easy installation in panels
- Long operational lifespan
Mobile Device Production

Mobile device production requires assembling and inspecting very small parts in tight spaces. Machines in this industry require reliable and compact equipment that does not get in the way of the process and allows machines and workers to complete tasks effectively. Banner Engineering offers a wide variety of compact machine safety equipment, lighting and indication, and sensor and vision products to ensure the safety, quality, and efficiency of production processes.
Solutions for Mobile Device Production

Operator Guidance at Robotic Assembly Station

Challenge
- Quickly identify assembly errors
- Maintain a continuous workflow
- Operate in challenging environment

Featured Solution
WLS28 Series LED Strip Lights with EZ-STATUS®

Other Solutions
WLS15 Series Low-Profile LED Strip Lights with EZ-STATUS®

Key Features
- Combines brilliant, bright illumination and high-visibility indication in one device
- Three- and five-color models available
- Rugged, water-resistant IP66, IP67 and IP69K construction

Key Benefits
- Simplifies installation, operation, and troubleshooting
- Allows operators to focus tasks without diverting attention to monitor status
- Reliable operation in challenging environmental conditions

Part Positioning on a Robotic Assembly Station

Challenge
- Verify the presence and position of cell phone board in a nest
- Low optical contrast between target and background
- Small, low-profile target requires high level of precision to verify position
- Minimize interference with processes

Featured Solution
Q4X Series Laser Distance Sensor

Other Solutions
Q5X Series High Power, Mid-Range Laser Measurement Sensor

Key Features
- Reliable sensing range from 25 up to 610 mm
- Immune to variations in target color, reflectivity, and transparency
- Dual teach mode (intensity + distance) sensing
- Detects height changes as small as 0.5 mm

Key Benefits
- Enables installation in a convenient location away from the line
- Precise measurements ensures proper position
- Detects across a variety of target colors, materials and surfaces based on distance

Part Inspection at a Robotic Assembly Station

Challenge
- Confirm presence and orientation of components on a cell phone board
- Complex inspection area with many similar looking components
- Inspection of fine details requires higher resolution camera

Featured Solution
VE Series Smart Camera

Other Solutions
iVu Series Image Sensor

Key Features
- Available with a high resolution 5MP imager
- Full runtime editing capability
- Software emulator
- EtherNet/IP®, Modbus/TCP, PROFINET®, and Serial RS-232 communication

Key Benefits
- Detects very small details to verify that all components are correctly placed and positioned
- Minimize downtime by changing inspection parameters while inspections are in progress
- Build and troubleshoot inspections offline prior to implementation
- Supports seamless integration with existing equipment and IIoT data collection
Safeguard Machine Access Point  see page 48

**Challenge**
- Safeguard access point on a small test machine
- Very fine levels of protection required
- Unobtrusive integration in small area

**Featured Solution**
SLC4 Series Compact, Low-Profile Type 4 Safety Light Curtains

**Other Solutions**
LP Series Low-Profile Safety Light Curtains

**Key Features**
- Defined area heights of 160 mm, 240 mm, and 320 mm
- 0.1 m to 2 m sensing range
- 14 mm or 24 mm resolution models available
- End-to-end sensing design

**Key Benefits**
- Fits easily in small spaces
- Will not interfere with machine access or operation
- Detects objects as small as a finger or a hand
- Eliminates detection blind zones

Emergenc Stop Actuation  see page 52

**Challenge**
- Provide emergency stop actuation on a small test machine
- Indicate actuator status

**Featured Solution**
30 mm Mount Emergency Stop Buttons

**Key Features**
- Pre-assembled one-piece, fully enclosed design with 8-pin quick-disconnect
- Illuminated base: one color solid red or two-color solid yellow with flashing red display

**Key Benefits**
- Quick easy installation with no assembly or wiring required
- Clear, at-a-glance display of status to quickly resolve issues
- 360° visible indication of E-Stop actuation

Process Initiation  see page 62

**Challenge**
- Initiate test processes
- Unobtrusive actuation
- Operator strain from repeated actuation

**Featured Solution**
S22 Pro Series Programmable Multicolor Panel Touch Button

**Other Solutions**
K30 Core Series Illuminated Touch Buttons

**Key Features**
- Bright, colorful illuminated display
- Smart capacitative sensing technology
- Terminal connector options
- Solid state electronics

**Key Benefits**
- At-a-glance display of status to quickly resolve issues
- Requires no physical force to actuate, eliminating hand, wrist, and arm stresses
- Quick, easy installation in panels
- Long operational lifespan with minimal maintenance
Contract Manufacturing (EMS)

Banner Engineering’s broad offering of products and solutions enable electronics equipment manufacturers and electronics manufacturing services (EMS) companies throughout the world to solve their most challenging applications. From energy efficient LED work lighting to a comprehensive offering of safety products, Banner Engineering has the electronics industry experience necessary to solve a variety of applications.
Monitoring Machine Status

Challenge
- Provide status indication on legacy equipment
- Monitor multiple machines spread out over a wide area
- Improve overall equipment effectiveness
- Maintain a steady workflow

Featured Solution
TL70 Series Modular Tower Lights with Sure Cross® Wireless Communication Segment

Other Solutions
TL70 Series Modular Tower Lights with Sure Cross Wireless Base

Key Features
- Bright, high-visibility illuminated segments
- Modular design with color, audible, and wireless segments available
- Secure, robust Sure Cross wireless network with up to two miles line of sight signal range

Key Benefits
- Provides at-a-glance status indication
- Users can customize functionality adding segments as desired
- Wireless connectivity enables remote monitoring and access to machine performance data
- Quick, easy installation requiring no communication cables to connect devices to the network

Verify Presence and Position of Disk

Challenge
- Ensure disk is present and properly positioned in a specific location
- Shiny, reflective surface
- Minimize interference with processes

Featured Solution
Q20 Series Sensors and Q4X Series Analog Laser Measurement Sensor

Other Solutions
Q3X Series Laser Contrast Sensor and Q4X Series Laser Measurement Sensor

Key Features
- Reliable sensing range up to 150 mm (Q20) and 600 mm (Q4X)
- Small spot size for precise leading edge detection (Q20 and Q4X)
- Dual teach mode sensing measures the distance to and light intensity from a background condition (Q4X)
- Detects height changes as small as 0.5 mm (Q4X)

Key Benefits
- Enables installation in a convenient location
- Precise measurements ensures proper position
- Detects across a variety of target colors, materials and surfaces based on distance
- Detects a wide range of objects regardless of target color, reflectivity, and transparency
# Vibration and Temperature Monitoring on a Motor

## Challenge
- Off-line motor testing requires costly downtime and can miss changes between tests
- On-line or dynamic testing may neglect key symptoms that indicate motor decline

## Featured Solution
- Q45VA All-in-One Vibration and Temperature Sensor and Wireless Node and DXM Series Wireless Controller

## Other Solutions
- QM30VT Series Vibration and Temperature Sensor, MultiHop Modbus Radio or 1-Wire Serial Node, and DXM Series Wireless Controller

## Key Features
- Continuously monitor a variety of vibration characteristics and temperature to identify machine problems early
- Communicates data over a secure, reliable Sure Cross® wireless network
- Combines a vibration and temperature sensor, wireless node, and battery power supply in one compact and completely wireless device

## Key Benefits
- Monitor multiple machines in real-time from a convenient location
- Identify errors before a failure can occur by creating real-time alerts to notify operators when vibration thresholds have been exceeded
- All-in-one design eliminates the time and expense of installing separate sensors and nodes

---

# Vibration and Current Monitoring on a Motor

## Challenge
- Expose machine performance issues
- Identify equipment requiring full spectrum analysis
- Establish more strategic scheduling of equipment maintenance

## Featured Solution
- CM Series Condition Monitoring Node, Current Transformer, and QM30VT Vibration and Temperature Sensor

## Key Features
- Combines a wireless radio, antenna, and battery power supply in one compact device
- Preconfigured to work with current transformer and a QM30VT Series vibration and temperature sensor
- Includes 20 amp and a 150 amp current transformer
- Full compatibility with Wireless Solutions Kits and Connected Data Solutions cloud software

## Key Benefits
- Quick, easy deployment: simply connect one or both devices and begin communicating
- Eliminates the hassle and expense of running communication cable to connect devices
- Provides access to real time and historical data and makes it easy to create visualization tools, warnings, and alarms to ensure maximum uptime
- Monitors general health and performance, specific components, and can be used to verify that equipment is ON or OFF, track energy use, and identify power surges
### Operator Guidance for Electronic Assembly

**Challenge**
- Assemble multiple parts at one station
- Simplify complicated assembly processes
- Improve assembly accuracy
- Increase product output

**Featured Solution**
PTL110 Series Pick-to-Light devices

**Key Features**
- Bright, multi-color indication with animation options provide clear communication to guide staff through assembly
- Easy-to-see digital display indicates part count or instructions
- Optical sensor detects hands as they pick pieces
- Very fast response speed for indication of next step in assembly process
- Compatible with DXM700 wireless controller for use on carts and mobile picking stations

**Key Benefits**
- Simplifies the build of parts and ensures a high level of quality assurance
- System keeps pace with the speed of the assembler
- Precise picking system supports multiproduct assembly, allowing one assembler to work on different components at the same station
- Monitor for speed and accuracy, production and inventory levels, and respond quickly to quality issues

### Roll Diameter Measurement

**Challenge**
- Monitor roll of shrink wrap to alert when product is running out
- Splice new roll on to old roll with minimal downtime
- Ensure proper roll tension to prevent breakage

**Featured Solution**
Q5X Series High Power, Mid-Range Laser Measurement Sensor

**Other Solutions**
LE Series Laser Displacement Sensor
LTF Series Long-Range Laser Sensor

**Key Features**
- Dual teach mode sensing measures the distance to and light intensity of the background condition
- 0.1 to 2 m sensing range
- Optional Remote Sensor Display (RSD)

**Key Benefits**
- Reliable detection regardless of object color, translucence, or reflectivity
- Accurate measurement reduces waste left on the core
- Simplifies setup and monitoring of sensors in difficult-to-access locations
- Reduces downtime between product changeover
### Reading Barcodes on JEDEC Trays

**Challenge**
- Create record for IC chips being processed
- Space-constrained deployment area
- High-speed process

**Featured Solution**
ABR Series Imager-Based Barcode Reader

**Other Solutions**
iVu BCR Series Barcode Reader

**Key Features**
- Available in models with a WVGA imager or a 1.2 MP imager with standard or polarized windows
- Barcode Manager software with intuitive flowchart programming and advanced capabilities
- Ultracompact housing for even the tightest of spaces
- Factory communication options include Ethernet or USB

**Key Benefits**
- Reliably reads small, complex, and challenging barcodes
- Quick, easy device setup, management, and monitoring of multiple barcode readers from network-enabled location
- One-piece, ultracompact device fits easily in very small spaces
- Seamless integration with existing equipment and IIoT data collection

---

### Safeguarding Machine Access Points

**Challenge**
- Safeguard access to tray processing area
- Requires redundant, self-checking outputs
- Limited space for deployment

**Featured Solution**
LP Basic Series compact Type 4 safety light curtain

**Other Solutions**
LP Series full feature compact Type 4 safety light curtain

**Key Features**
- Low-profile, compact design and multiple mounting options
- Available in nickel-plated housings for ESD-safe applications
- Zone and status indicators plus digital display to indicate number of beams blocked and detailed diagnostics
- End-to-end sensing design

**Key Benefits**
- Installs easily in very small spaces
- Device can be installed within the machine frame
- Minimizes downtime by making it easy to troubleshoot and quickly resolve issues
- Eliminates detection blind zones

---

### Illuminating Work Area

**Challenge**
- Illuminate machine and work area
- Consistent, even illumination over a wide area
- Reduce service and maintenance on light fixtures

**Featured Solution**
WLB72 Series LED Task Light

**Other Solutions**
WLB92 Series LED Task Light

**Key Features**
- Ultra-bright white light with even light distribution
- Rugged metal housing with shatterproof cover
- Robust electronics and circuit design for long product lifetime
- Plug-and-play operation out of the box

**Key Benefits**
- Increased safety and productivity
- No bulb replacement or other maintenance
- Low installation costs, quick install time
- Fewer fixtures needed to illuminate the whole area
Displays (Clear Object Detection)

A challenging but critical aspect of electronics manufacturing is the ability to reliably and cost-effectively detect clear objects like transparent film, plastic, or glass and other targets with low optical contrast. Banner Engineering offers a wide variety of solutions to clear object detection challenges, including economical photoelectric sensors, versatile fiber optic sensors, and high-power laser sensors to meet any application requirements.
Detecting Clear Plastic Material

**Challenge**
- Detect clear plastic waste material in a bin
- Prevent overfill of material
- Low optical contrast

**Featured Solution**
QS18E Clear Object Detection Sensor

**Key Features**
- Polarized lens with coaxial optics
- Three user-selectable thresholds
- Universal housing design with 18 mm threaded lens and multiple mounting options
- Compensates for dust build up and ambient temperature changes

**Key Benefits**
- Reliably detects a wide range of clear, translucent, or opaque objects
- Detects at any distance from the face of the sensor out to the reflector with no dead zone
- Optimize performance to the type of object being detected
- Versatile, cost-effective and easy-to-use sensor
- Long operational life with only routine maintenance

Monitoring Tote Fill Levels

**Challenge**
- Detect high and low fill levels
- Low optical contrast between waste water and container
- Challenging environmental conditions

**Featured Solution**
QS30H2O Series Water Sensor

**Other Solutions**
DF-G3LIR Long-Range Infrared Water Sensor with Glass Fiber Optic Bundle

**Key Features**
- Emits a 1450 nm sensing beam that is attenuated by water-based liquids
- Long-range sensing of up to 8 m between emitter and receiver
- Rugged IP67 (NEMA 6) housing and encapsulated electronics

**Key Benefits**
- Reliably detects the presence of any water-based liquid
- Detects liquids in a wide range of different sized containers
- Resists harsh environments

Detecting Clear Plastic Film

**Challenge**
- Detect clear, thin glass sheet
- Low optical contrast
- Machine vibration

**Featured Solution**
Q4X Series Laser Distance Sensor

**Key Features**
- Dual teach mode measures distance and light intensity changes compared to a background reference condition
- Robust IP69K-rated stainless steel housing
- Clear intensity readout from angled three-digit display

**Key Benefits**
- Detects a wide range of objects regardless of color, reflectivity, and transparency
- Easy-to-see feedback simplifies operation and troubleshooting
- Resists aggressive cleaning, mechanical impact, and extreme vibration
- No reflector required
## Products

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LM Series
Compact Precision Laser Measurement Sensor

- Precise measurements with 0.002-0.004 mm analog resolution
- Fast 0.5 ms response speed and 0.25 ms sampling rate
- Compact housing designed to fit into small spaces
- Thermally stable housing and secure mounting for real-world stability
- IP67 and Grade 316 stainless steel for chemical compatibility
- Optional Remote Sensor Display (RSD) for remote monitoring and setup

LE Series
Laser Measurement Sensor

- Precise measurements with 0.02 mm resolution
- Ready to measure right out of the box with simple setup
- Two-line, eight-character intuitive display for easy adjustments
- Small spot, visible laser for simple alignment
- Repeatability and accuracy for challenging targets, from metal to black rubber
Q5X Series
High Power, Mid-Range Laser Measurement Sensor

- Reliable detection of black targets against a black background, black targets against a shiny metal background, clear and reflective objects, multicolor packaging, and targets of all colors
- Dual teach mode measures both distance plus light intensity to solve the most challenging applications
- 270-degree rotatable M12 QD to meet a variety of mounting constraints
- Rated IP67 for reliable performance in wet environments
- Optional Remote Sensor Display (RSD) for remote monitoring and setup

### Specifications

<table>
<thead>
<tr>
<th>Series</th>
<th>Output</th>
<th>Emitter</th>
<th>Mode</th>
<th>Range (mm)</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q5X</td>
<td>K</td>
<td>L</td>
<td>AF</td>
<td>2000</td>
<td>Q8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>K = Configurable Dual Discrete with IO-Link on all models</td>
<td>L = Laser</td>
<td>AF = Adjustable Field Background Suppression</td>
<td>2000 = 2000 (max. specified &amp; settable switch point detection range)</td>
<td>Q8 = Integral Swivel M12 connector</td>
</tr>
</tbody>
</table>

Double-Ended Euro-Style
- with 5-pin straight male to 4-pin straight female connectors
- Required for use between RSD and sensor

MQDC-4501SS
0.3 m (1')
MQDC-4506SS
1.83 m (6')

5-Pin M12 Euro-Style
- MQDC-415
- MQDC-415RA
- 5 m (15')

Additional lengths available on bannerengineering.com
Q4X Series
Rugged Laser Measurement Sensor

- Save time and money with the Q4X which is ready to measure right out of the box
- A simple user experience from installation to setup
  - Bright spot alignment
  - Three push buttons simplify setup
  - Intuitive menus
- Four-digit display shows distance to target in mm
- FDA-grade stainless steel is suitable for IP69K washdown environments

### Threaded

<table>
<thead>
<tr>
<th>Family</th>
<th>Housing Style</th>
<th>Output</th>
<th>Mode</th>
<th>Range</th>
<th>Connector</th>
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</thead>
<tbody>
<tr>
<td>Q4X</td>
<td>T</td>
<td>B</td>
<td>LAF</td>
<td>300</td>
<td>Q8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T = 18 mm Threaded Barrel</td>
<td>B = Bipolar Discrete NPN &amp; PNP</td>
<td>LAF = Laser Adjustable-Field</td>
<td>600 = 25-600 mm*</td>
<td>Q8 = Integral QD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U = 0 to 10 V Analog</td>
<td>COD = Clear Object</td>
<td>500 = 25-500 mm**</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I = 4 to 20 mA Analog</td>
<td></td>
<td>300 = 25-300 mm</td>
<td></td>
</tr>
<tr>
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<td>100</td>
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### Flush

<table>
<thead>
<tr>
<th>Family</th>
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<th>Output</th>
<th>Mode</th>
<th>Range</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4X</td>
<td>F</td>
<td>N</td>
<td>LAF</td>
<td>310</td>
<td>Q8</td>
</tr>
<tr>
<td></td>
<td>F = Flush face</td>
<td>N = NPN</td>
<td>LAF = Laser Adjustable-Field</td>
<td>610 = 35-610 mm*</td>
<td>Q8 = Integral QD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>310</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>110</td>
<td></td>
</tr>
</tbody>
</table>

* Only available in Dual Discrete with IO-Link models
** Not available in Dual Discrete with IO-Link models
†† Clear Object models only available with bipolar output

- SMBQ4XFA includes 3/8” bolt for mounting
- SMBQ4XFAM10 includes 10 mm bolt for mounting
- SMBQ4XFAM12 clamps directly onto industry standard bracket systems of 1/2” or 12 mm rods
- SMB18A
- SMBAMS18P
- SMBAM18P

5-pin Euro-Style
Used with: Analog models
MQDEC2-515
MQDEC2-515RA
5 m (15’)

5-Pin Washdown Euro-Style
Used for: Analog Washdown
MQDCWD-506
2 m (6.5’)

4-pin Euro-Style
Used with: NPN, PNP, Dual Discrete
MQDC-415
MQDC-415RA
5 m (15’)

5-pin Euro-Style
Used with: Bipolar
MQDC-515
MQDC-515RA
5 m (15’)

4-Pin Washdown Euro-Style
Used for: NPN, PNP, Dual Discrete
MQDC-WDSS-0415
5 m (15’)

5-Pin Washdown Euro-Style
Used for: Bipolar
MQDC-WDSS-0515
5 m (15’)

Additional lengths available on bannerengineering.com
Q3X Series
Laser Contrast Sensor

- High-speed part detection as fast as 250 µs, capturing up to 2,000 events per second
- Reliable sensing range up to 300 mm
- Used for challenging presence/absence or orientation detection for applications with small contrast differences
- Rugged, nickel-plated zinc housing suitable even for environments with cutting fluids and oils
- Clear intensity readout from angled three-digit display
- Fixed background suppression models allow for contrast detection in a fixed range while ignoring a background

<table>
<thead>
<tr>
<th>Family</th>
<th>Housing Style</th>
<th>Output</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3X</td>
<td>T</td>
<td>B</td>
<td>LD</td>
</tr>
<tr>
<td></td>
<td>18 mm Threaded Barrel</td>
<td>Bipolar Discrete NPN &amp; PNP</td>
<td>Laser Diffuse, 300 mm</td>
</tr>
<tr>
<td></td>
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<td>LD50</td>
</tr>
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<td>LD100</td>
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<td>LD150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LD200</td>
</tr>
</tbody>
</table>

Connector: Q8 = 5-pin integral QD

5-Pin M12 Euro-Style
- MQDC1-515
- MQDC1-515RA
- MQDC-WDSS-0515

Washdown - Stainless Steel
- MQDC1-515

Additional lengths available on bannerengineering.com

SMBQ4XFAM12
- includes 3/8" bolt for mounting
- clamps directly onto industry standard bracket systems of 1/2" or 12 mm rods

SMBQ4XFAM10
- includes 10 mm bolt for mounting

SMB18A

SMBAMS18P
QS18 Series

All-Purpose Photoelectric Sensor

- Features a universal housing with an 18 mm threaded lens or side mounts
- Meets IP67 and NEMA 6 standards for harsh environments
- Available in opposed, polarized and non-polarized retroreflective, convergent, regular and wide-angle diffuse, small spot diffuse, laser, ultrasonic, plastic or glass fiber optic, fixed-field and adjustable-field sensing modes
- Offers easy push-button TEACH-mode setup in Expert QS18E and ultrasonic models
- Available in models with IO-Link communication for simplified wiring, installation, preventative maintenance, and sensor backup

VS8 Series

Miniature Sensor for Precise Detection

- Miniature sensor for installation in the smallest of spaces
- Red laser models provide bright, precise laser light spot for optimum small part detection
- Models with a blue LED reliably detect challenging targets, including dark, reflective, and transparent objects without requiring a reflector
- High switching frequency for detection in even the fastest processes
- Robust, glass-fiber-reinforced plastic housing

*SMB312S SMB18A

**QS18**

<table>
<thead>
<tr>
<th>Family</th>
<th>Output</th>
<th>Power</th>
<th>Sensing Mode</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>VP</td>
<td>6</td>
<td>LLP</td>
<td>Q8</td>
</tr>
<tr>
<td>VP</td>
<td>NPN</td>
<td>6 DC power</td>
<td>Polar retro</td>
<td>2 m Integral Cable</td>
</tr>
<tr>
<td>VP</td>
<td>PNP</td>
<td>6 DC power</td>
<td>Polar retro</td>
<td>2 m Integral Cable</td>
</tr>
</tbody>
</table>

**QS18E**

<table>
<thead>
<tr>
<th>Family*</th>
<th>Output</th>
<th>Power</th>
<th>Sensing Mode</th>
<th>Connector</th>
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</thead>
<tbody>
<tr>
<td>VS18E</td>
<td>P</td>
<td>6</td>
<td>XLPC</td>
<td>Q8</td>
</tr>
<tr>
<td>PNP</td>
<td>6 DC power</td>
<td>Polar retro with coaxial optics for clear objects</td>
<td>2 m Integral Cable</td>
<td></td>
</tr>
<tr>
<td>NPN</td>
<td>6 DC power</td>
<td>Polar retro with coaxial optics for clear objects</td>
<td>2 m Integral Cable</td>
<td></td>
</tr>
</tbody>
</table>

* All models require a reflector

---

Opposed, retroreflective and additional background suppression models are available at bannerengineering.com

* To order the 200 mm (7.8 in) PUR cable model with a 3-pin M8/Pico-style quick disconnect, add suffix “Q3” to the model number. For example, VS8APFF15Q3

Additional lengths available on bannerengineering.com

---

**SMB**

SMBVS8DT SMBVS8RA
QS30 Water Detection
DC-Operated Long-Range Sensors

- Detects waterbased liquids in translucent and opaque bottles
- Ability to work reliably in low contrast applications
- 1450 nm infrared wavelength to enhance contrast of clear liquids

<table>
<thead>
<tr>
<th>Sensing Mode</th>
<th>Range</th>
<th>Connection</th>
<th>Output Type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2 m</td>
<td>5-pin Euro Pigtail QD</td>
<td>QS30EXH2O Emitter</td>
</tr>
<tr>
<td>OPPOSED WATER</td>
<td>4 m</td>
<td>2 m</td>
<td>5-pin Euro Pigtail QD</td>
<td>QS30EXH2OQ5 Emitter</td>
</tr>
<tr>
<td>DETECTION</td>
<td></td>
<td>2 m</td>
<td>5-pin Euro Pigtail QD</td>
<td>QS30ARXH2O</td>
</tr>
<tr>
<td>OPPOSED WATER</td>
<td>2 m</td>
<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30RRXH2O</td>
</tr>
<tr>
<td>DETECTION</td>
<td></td>
<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30RRXH2OQ5</td>
</tr>
<tr>
<td>OPPOSED WATER</td>
<td>8 m</td>
<td>2 m</td>
<td>Analog 0-10 V</td>
<td>QS30RXH20</td>
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<tr>
<td>DETECTION</td>
<td></td>
<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30RXH20Q5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30EXSH2O Emitter</td>
</tr>
<tr>
<td>SUPER HIGH-POWER</td>
<td>8 m</td>
<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30EXSH2OQ5</td>
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<tr>
<td>DETECTION</td>
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<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30ARXSH2O</td>
</tr>
<tr>
<td>OPPOSED WATER</td>
<td>8 m</td>
<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30RRXSH2OQ5</td>
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<tr>
<td>DETECTION</td>
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<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30RRXSH2O</td>
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<tr>
<td></td>
<td></td>
<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30RRXSH2OQ5</td>
</tr>
</tbody>
</table>

Additional lengths available on bannerengineering.com

5-Pin M12 Euro-Style
MQDC1-515
5 m (15°)
T30UX Series
Right-Angle, Long-Range Ultrasonic Sensors

- Built-in temperature compensation for high-accuracy across a wide range of ambient temperatures
- Resists harsh environments with rugged IP67 (NEMA 6) housing and fully encapsulated electronics
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency</th>
<th>Connection</th>
<th>Response Time</th>
<th>Output</th>
<th>Models*</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mm to 1 m</td>
<td>224 kHz</td>
<td>2 m 4-Pin Euro QD</td>
<td>45 ms</td>
<td>Discrete: NPN, PNP, NO, NC, Selectable</td>
<td>T30UXDA T30UXDAQ8</td>
</tr>
<tr>
<td>200 mm to 2 m</td>
<td>174 kHz</td>
<td>2 m 4-Pin Euro QD</td>
<td>92 ms</td>
<td>Discrete: NPN, PNP, NO, NC, Selectable</td>
<td>T30UXDB T30UXDBQ8</td>
</tr>
<tr>
<td>300 mm to 3 m</td>
<td>114 kHz</td>
<td>2 m 4-Pin Euro QD</td>
<td>135 ms</td>
<td>Discrete: NPN, PNP, NO, NC, Selectable</td>
<td>T30UXDC T30UXDCQ8</td>
</tr>
<tr>
<td>100 mm to 1 m</td>
<td>224 kHz</td>
<td>2 m 4-Pin Euro QD</td>
<td>Selectable 45 or 105 ms</td>
<td>Analog: 0 to 10 V dc</td>
<td>T30UXUA T30UXUAQ8</td>
</tr>
<tr>
<td>100 mm to 1 m</td>
<td>224 kHz</td>
<td>2 m 4-Pin Euro QD</td>
<td>Selectable 45 or 105 ms</td>
<td>Analog: 4 to 20 mA</td>
<td>T30UXIA T30UXIAQ8</td>
</tr>
<tr>
<td>200 mm to 2 m</td>
<td>174 kHz</td>
<td>2 m 4-Pin Euro QD</td>
<td>Selectable 92 or 222 ms</td>
<td>Analog: 0 to 10 V dc</td>
<td>T30UXUB T30UXUBQ8</td>
</tr>
<tr>
<td>200 mm to 2 m</td>
<td>174 kHz</td>
<td>2 m 4-Pin Euro QD</td>
<td>Selectable 92 or 222 ms</td>
<td>Analog: 4 to 20 mA</td>
<td>T30UXIB T30UXIBQ8</td>
</tr>
<tr>
<td>300 mm to 3 m</td>
<td>114 kHz</td>
<td>2 m 4-Pin Euro QD</td>
<td>Selectable 135 or 318 ms</td>
<td>Analog: 0 to 10 V dc</td>
<td>T30UXUC T30UXUCQ8</td>
</tr>
<tr>
<td>300 mm to 3 m</td>
<td>114 kHz</td>
<td>2 m 4-Pin Euro QD</td>
<td>Selectable 135 or 318 ms</td>
<td>Analog: 4 to 20 mA</td>
<td>T30UXIC T30UXICQ8</td>
</tr>
</tbody>
</table>

Additional lengths available on bannerengineering.com
Q12 Series
Miniature Self-Contained Sensor

- Delivers powerful sensing performance in extremely confined areas
- Rated IP67 for use in the widest range of locations and applications
- Available in models with rugged, sealed housing or PFA chemical-resistant jacket
- Uses unique overmolded design for enhanced durability and shielding

**Family**

<table>
<thead>
<tr>
<th>Q12</th>
<th>SMBQ12T</th>
<th>SMBQ12A</th>
</tr>
</thead>
</table>

**Output**

| B | Blank = Emitter
A = Light Operate (LO)
B = Bipolar
P = PNP
N = NPN |

**Power**

| 6 | DC power |

**Sensing Mode**

| LP | E = Emitter
R = Receiver
LV = Retroreflective
FF15 = Fixed-field (15 mm cutoff)
FF30 = Fixed-field (30 mm cutoff)
FF50 = Fixed-field (50 mm cutoff) |

**Connector**

| Blank = 2 m Integral Cable
Q = 4-pin Euro pigtail QD
Q3 = 3-pin Pico pigtail QD
Q5 = 4-pin Euro pigtail QD |

Q20 Series
Industry Standard Global Housing

- Versatile sensor with a universal rectangular housing and multiple mounting options, making it ideal for global manufacturing
- Rated to 1200 psi for use in washdown environments
- Enhanced design for noise immunity and crosstalk avoidance
- Visible red beam for easy alignment on most models

**Family**

<table>
<thead>
<tr>
<th>Q20</th>
<th>SMBQ20H</th>
<th>SMBQ20LV</th>
<th>SMBQ20L</th>
<th>SMBQ20U</th>
</tr>
</thead>
</table>

**Output**

| N | Blank = Emitter
P = PNP |

**Sensing Mode**

| FF | FF = Fixed Field
50 = 0-50 mm cutoff
100 = 0-100 mm cutoff
150 = 0-150 mm cutoff |

**Connector**

| Blank = 2 m Integral Cable
Q5 = M12 4-pin Euro Pigtail QD |

* Additional sensing modes available on bannerengineering.com

**Additional lengths available on bannerengineering.com**
DF-G3 Series
Long-Range Fiber Optic Amplifiers

- World-class long-range sensing capability, more than 3 m (10 ft) with opposed mode fibers
- Easy to read dual digital displays show both signal level and threshold simultaneously
- Cross-talk avoidance function allows seven inspections in dense sensing point applications
- Models with IO-Link enable a point-to-point communication link between a master device and a sensor, facilitating remote monitoring, teaching, and configuration
- Operator control of the sensitivity (hysteresis) provides additional detection sensitivity, or a stabilized output depending on the application details
- Additional DF-G1, DF-G2, and DF-G3 models are available at bannerengineering.com

### IO-Link

<table>
<thead>
<tr>
<th>Sensing Beam Color</th>
<th>Range</th>
<th>Connection</th>
<th>Output</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible Red, 635 nm</td>
<td>3,000 mm</td>
<td>2 m</td>
<td>Channel1: IO-Link, push/pull Channel2: PNP only output, or input</td>
<td>DF-G3-KD-2M</td>
</tr>
<tr>
<td>Infrared, 850 nm</td>
<td>6,000 mm</td>
<td>2 m</td>
<td>Channel1: IO-Link, push/pull Channel2: PNP only output, or input</td>
<td>DF-G3IR-KD-2M</td>
</tr>
</tbody>
</table>

### Analog

<table>
<thead>
<tr>
<th>Sensing Beam Color</th>
<th>Range</th>
<th>Connection</th>
<th>Analog Output</th>
<th>NPN Models</th>
<th>PNP Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible Red</td>
<td>3,000 mm</td>
<td>2 m</td>
<td>Voltage: 0-10 V DC Current: 4-20 mA</td>
<td>DF-G3-NU-2M</td>
<td>DF-G3-PU-2M</td>
</tr>
<tr>
<td>Infrared, 850 nm</td>
<td>6,000 mm</td>
<td>2 m</td>
<td>Voltage: 0-10 V DC Current: 4-20 mA</td>
<td>DF-G3IR-NU-2M</td>
<td>DF-G3IR-PU-2M</td>
</tr>
</tbody>
</table>

### Single Output

<table>
<thead>
<tr>
<th>Sensing Beam Color</th>
<th>Range</th>
<th>Connection</th>
<th>NPN Models</th>
<th>PNP Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible Red</td>
<td>3,000 mm</td>
<td>2 m</td>
<td>DF-G3-NS-2M</td>
<td>DF-G3-PS-2M</td>
</tr>
<tr>
<td>Infrared, 850 nm</td>
<td>6,000 mm</td>
<td>2 m</td>
<td>DF-G3IR-NS-2M</td>
<td>DF-G3IR-PS-2M</td>
</tr>
</tbody>
</table>

### Dual Output

<table>
<thead>
<tr>
<th>Sensing Beam Color</th>
<th>Range</th>
<th>Connection</th>
<th>NPN Models</th>
<th>PNP Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible Red</td>
<td>3,000 mm</td>
<td>2 m</td>
<td>DF-G3-ND-2M</td>
<td>DF-G3-PD-2M</td>
</tr>
<tr>
<td>Infrared, 850 nm</td>
<td>6,000 mm</td>
<td>2 m</td>
<td>DF-G3IR-ND-2M</td>
<td>DF-G3IR-PD-2M</td>
</tr>
</tbody>
</table>

* Only 2 m (6.5 ft) PVC cable models are listed. To order M8 Pico pigtail, change suffix “2M” to “Q3” (for example, DF-G3-NU-Q3). To order M12 Euro pigtail, change suffix “2M” to “Q5” (for example, DF-G3-NU-Q5).
DF-G2 Series
High-Speed Fiber Optic Amplifier

- Best in class response speeds of 10 μs, 15 μs, 50 μs, 250 μs, 500 μs, and 1000 μs
- Easy-to-read dual digital displays show signal level and threshold values
- Simple user interface ensures easy sensor set-up and programming via displays and switches/buttons or remote input teach wire
- Expert TEACH and SET methods ensure optimal gain and threshold for all applications, especially for high speed or low contrast applications
- Thermally stable electronics shortens start-up time and maintains signal stability during operation
- Economy display mode reduces amplifier power consumption by 25%
- Cross talk avoidance algorithm allows two sensors to operate in close proximity
- Additional DF-G1, DF-G2, and DF-G3 models are available at bannerengineering.com

DF-G2: High-Speed Single Discrete Output

<table>
<thead>
<tr>
<th>Sensing Beam Color</th>
<th>Range</th>
<th>Connection</th>
<th>Channel 1 Output</th>
<th>Channel 2 Output</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible red</td>
<td>1100 mm</td>
<td>150 mm (6 in) PVC pigtail, M12 Euro, 5-pin</td>
<td>IO-Link, push/pull</td>
<td>PNP only, or input</td>
<td>DF-G2-KD-Q5</td>
</tr>
<tr>
<td>Infrared†</td>
<td>2100 mm</td>
<td>150 mm (6 in) PVC pigtail, M12 Euro, 5-pin</td>
<td>IO-Link, push/pull</td>
<td>PNP only, or input</td>
<td>DF-G2IR-KD-Q5</td>
</tr>
</tbody>
</table>

DF-G2 Color LED

<table>
<thead>
<tr>
<th>Sensing Beam Color</th>
<th>Range</th>
<th>Connection*</th>
<th>NPN Model</th>
<th>PNP Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrared†</td>
<td>190% of Visible Red Range</td>
<td>2 m</td>
<td>DF-G2IR-NS-2M</td>
<td>DF-G2IR-PS-2M</td>
</tr>
<tr>
<td>Broad spectrum white</td>
<td>50% of Visible Red Range</td>
<td>2 m</td>
<td>DF-G2W-NS-2M</td>
<td>DF-G2W-PS-2M</td>
</tr>
<tr>
<td>Visible green</td>
<td>60% of Visible Red Range</td>
<td>2 m</td>
<td>DF-G2G-NS-2M</td>
<td>DF-G2G-PS-2M</td>
</tr>
<tr>
<td>Visible blue</td>
<td>70% of Visible Red Range</td>
<td>2 m</td>
<td>DF-G2B-NS-2M</td>
<td>DF-G2B-PS-2M</td>
</tr>
</tbody>
</table>

* Only 2 m (6.5 ft) PVC cable models are listed. To order M8 Pico pigtail, change suffix “2M” to “Q3” (for example, DF-G3-NU-Q3). To order M12 Euro pigtail, change suffix “2M” to “Q5” (for example, DF-G3-NU-Q5).
** Excess gain = 1, Long Range response speed, opposed mode sensing. PIT46U plastic fiber used for visible LED models, IT.83.3ST5M6 glass fiber used for IR model
† IR models require T5 terminated glass fiber optic cables
XS26-2
Expandable Safety Controller

- PC Configurable: Flexible and easy-to-use
- Safety Inputs: 26 (base unit) up to 154
- Independently controlled Safety Outputs: up to 68, 0.5A to 6A each
- Convertible Safety Inputs: 8 (Base Unit) up to 40
- LCD Display for easy troubleshooting
- Industrial Ethernet

<table>
<thead>
<tr>
<th>Model*</th>
<th>Description</th>
<th>Inputs/Convertible</th>
<th>Independently Controlled Safe Outputs</th>
<th>Max. Safety Output Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>XS26-2d</td>
<td>Base Controller with LCD</td>
<td>26/8</td>
<td>2</td>
<td>0.5A PNP @24 V dc</td>
</tr>
<tr>
<td>XS26-2e</td>
<td>Base Controller</td>
<td>26/8</td>
<td>2</td>
<td>0.5A PNP @24 V dc</td>
</tr>
<tr>
<td>XS8si</td>
<td>Safety Input Module</td>
<td>8/2</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>XS16si</td>
<td>Safety Input Module</td>
<td>16/4</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>XS2so</td>
<td>Safety Output Module</td>
<td>NA</td>
<td>2</td>
<td>0.75A PNP @24 V dc</td>
</tr>
<tr>
<td>XS4so</td>
<td>Safety Output Module</td>
<td>NA</td>
<td>4</td>
<td>0.5A PNP @24 V dc</td>
</tr>
<tr>
<td>XS1ro</td>
<td>Safety Relay Output Module</td>
<td>NA</td>
<td>1</td>
<td>6A; 2 NO, 1 NC aux</td>
</tr>
<tr>
<td>XS2ro</td>
<td>Safety Relay Output Module</td>
<td>NA</td>
<td>2</td>
<td>6A; 2 NO, 1 NC aux</td>
</tr>
</tbody>
</table>

* Models operate at 24 V dc +/- 20%
SC10
Hybrid Safety Controller plus 2 Safety Relays

- PC Configurable: Flexible and easy-to-use
- Safety Inputs: up to 10; up to 14 using Automatic Terminal Optimization (ATO)
- Independently controlled Safety Outputs: 2, 6A each
- Convertible Safety Inputs: 4
- Terminal LEDs for easy troubleshooting
- Industrial Ethernet

<table>
<thead>
<tr>
<th>Model*</th>
<th>Description</th>
<th>Inputs/Convertible</th>
<th>Independently Controlled Safe Outputs</th>
<th>Max. Safety Output Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC10-2roe</td>
<td>Base Controller</td>
<td>10/4</td>
<td>2</td>
<td>6A; 3 NO</td>
</tr>
</tbody>
</table>

* Models operate at 24 V dc ±10% - 20%

SC-XM3
Fast Programming and Swapout

- Backup copy of configuration, password, network settings
- Download configuration without a PC; Save time during panel build
- Fast swapout to minimize downtime at swapout

Store SC-XM3 memory card directly on SC10
SLC4 Series
Basic Feature, Very Compact Type 4 Safety Light Curtain

- Basic models with limited options for additional value on simple applications
- Very compact aluminum housing with IP65 polycarbonate enclosure for smaller production machines
- End-to-end sensing (no blind zone)
- Highly visible alignment and diagnostic indicators
- Available in 14 or 24 mm resolutions (detection capability)
- Defined areas of 160, 240 and 320 mm
- 2 m maximum sensing range
- Integral 300 mm M12 QD Pigtail included

<table>
<thead>
<tr>
<th>Family</th>
<th>System Type</th>
<th>Resolution</th>
<th>Defined Area</th>
<th>Termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLC4</td>
<td>P</td>
<td>14</td>
<td>160</td>
<td>P44</td>
</tr>
</tbody>
</table>

- P = Pair (Emitter and Receiver)
- E = Emitter only
- R = Receiver only

- P4 = 300 mm pigtail, 4-Pin M12 QD (individual Emitter or Receiver models)
- P44 = 300 mm pigtail, 4-Pin M12 QD pigtaills (Pair)
LP Basic
Basic Feature, Very Compact Type 4 Safety Light Curtain

- 4 meter range
- 14 and 25 mm resolution
- IP54 rated
- Defined areas from 270 to 690 mm in 140 mm increments
- Basic functionality auto start/restart (trip output)
- “RD” M12 pigtail and brackets ordered separately

### Family

<table>
<thead>
<tr>
<th>Family</th>
<th>System</th>
<th>Type</th>
<th>Resolution</th>
<th>Defined Area</th>
<th>Termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLPVA</td>
<td>P</td>
<td>14</td>
<td>410</td>
<td>270–690 mm</td>
<td>Blank</td>
</tr>
</tbody>
</table>

**P** = Pair (Emitter and Receiver)

**E** = Emitter only

**R** = Receiver only

**14** = 14 mm

**25** = 25 mm

**270** = 270 mm

**410** = 410 mm

**550** = 550 mm

**690** = 690 mm

“RD” to M12 Pigtail
Euro-Style M12 Male QD to LP Custom “RD” Connector

- DELPE-51D (5-pin) 0.3 m (1 ft)
- DELPE-81D (8-pin) 0.3 m (1 ft)

8-PIN RD Cordsets
- RDLS-815 4.6 m (15 ft)

8-pin M12 Euro-Style
- QDE-850D 15.2 m (50 ft)

5-pin M12 Euro-Style
- QDE-550D 15.2 m (50 ft)

Additional lengths available on bannerengineering.com
RFID Switches
Non-Contact

- Single and cascade models available to protect one or multiple entry points
- Status and performance data from each sensor in a cascade chain is available using In-Series Diagnostics (ISD) and can be accessed with an HMI or similar device
- On-sensor LED indicator provides at-a-glance status information
- Cascade up to 32 sensors in a series using a standard 4-wire cable with M12 connectors, T-adapters, and an end plug
- Tamper resistance to meet the needs of any application with unique, high, and low code models
- Achieves Cat 4, PL e, or SIL CL 3 safety ratings alone or in a cascade chain
- Rugged, IP69 construction withstands exposure to high-pressure, high-temperature washdown
- High tolerance (10 mm) to misalignment enables reliable performance in challenging industrial environments where machine vibration and impact are possible

In-Series Diagnostics (ISD) provides users with status and performance data from each sensor in a cascade chain. The ISD data collected is converted to IO-Link so it can be accessed with an HMI or similar device. Users receive notification when an event has occurred as well as where in the series the event occurred. Events include the opening or closing of a door, door misalignment, wrong actuator, and a number of sensor health attributes.

** ISD to IO-Link Module **
Access comprehensive diagnostic information for each sensor and for the entire system (string of switches) directly via IO-Link or an IO-Link Master with gateway or via a laptop with USB interface.
• Time and cost savings during commissioning, maintenance and fault investigation
• Protection against unexpected machine stops through pre-fault detection
• Basic information, such as switch safety input and safety output status, can be quickly obtained
• Extended diagnostic information and fault information can also be obtained as needed

<table>
<thead>
<tr>
<th>Model</th>
<th>Output</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>SI-RFA-DM1</td>
<td>8 digital outputs; 1 diagnostic circuit</td>
<td>IO-LINK and USB 2.0</td>
</tr>
</tbody>
</table>

For more accessories and specific cable lengths visit our website bannerengineering.com
Magnetic Switches
Non-Contact

- Cost-effective non contact solution minimizes device wear and tear, even in applications with persistent use
- 3 to 5 mm misalignment tolerance
- A single magnetic pair can achieve up to Category 4/PLe safety rating
- Coded magnets minimize the potential for intentional defeat
- Available in cable or QD models

Hinge Switches
One-Piece Sensor and Actuator with Hinge Function

- Mounts at the axis of a swinging guard where the possibility of misalignment is at its lowest, minimizing the opportunity for nuisance trips
- Achieves Category 4/PLe safety rating with two switches deployed
- Once set, the switch point setting mechanism is fully concealed within the switch, preventing access and complicating any attempts to bypass safety functions
- Available in stainless steel, IP69-rated models that resist high-pressure, high-temperature washdown and similar challenges
- Hinge switches are similar in appearance to standard door hinges, making them completely inconspicuous once installed
- One piece device installs quickly with no need to align the switch and actuator

---

Family | Housing | Device Type | Connection
------|---------|-------------|-------------
SI-MAGB | 1 | SM | Blank = Standard

Connection Orientation
Blank = Opposite

NOTE: When ordering housing 1 or 2 with a QD connection, you will receive an M6 Pico connector. When ordering housing 3 with a QD connection you will receive an M12 Euro connector.

Connection
Blank = 3 m cable
QD = 4-pin QD
-W/30 = 9 m cable

---

Material
Blank = Stainless Steel
Z = Zinc Die-cast

Contact Configuration
QD = 6-pin Micro-style QD

Connection
QD = 6-pin Micro-style QD

Switch Position
Blank = Inline QD/Cable
R = Right angle QD/Cable

Contact Exit
Blank = Inline QD/Cable
R = Right angle QD/Cable

Washdown Rating
Blank = IP67
-W = IP69 Washdown

---

SI-LS31HG Lever Hinge Switch
SI-LS3R Rotary Hinge Switch
SI-HG63A Stainless Steel Blank Hinge
SI-HGZ63A Zinc Blank Hinge
**E-Stop Button**

**Illuminated 30 mm Mount**

- Illumination allows for easy identification of which E-stop has been activated
- Easy installation and no assembly or individual wiring required
- Push-to-stop, twist-to-release or pull-to-release operation per IEC 60947-5-5
- Compliant with ANSI B11.19, ANSI NFPA 79 and IEC/EN 60204-1 Emergency Stop requirements
- Incorporate with OTB/STB optical touch button for a simplified operator station that does not require an additional enclosure.
- “Safe Break Action” ensures NC contacts will open if the contact block is damaged or separated from the actuator
- Internal electronics automatically change the color from the on state to the off state when the button is pressed

<table>
<thead>
<tr>
<th>Description</th>
<th>Illumination</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>2NC / 1NO (PNP)</td>
<td>YEL/RED-Flash/Solid</td>
<td>SSA-EB1PLYR-12ECQ8</td>
</tr>
<tr>
<td>2NC / 1NO (PNP)</td>
<td>GREEN/RED-Flash/Solid</td>
<td>SSA-EB1PLGR-12ECQ8</td>
</tr>
<tr>
<td>2NC / 1NO (PNP)</td>
<td>OFF/RED-Flash/Solid</td>
<td>SSA-EB1PLXR-12ECQ8</td>
</tr>
<tr>
<td>2NC / 1NO (PNP)</td>
<td>OFF/RED-Flash/Solid, with 60 mm button</td>
<td>SSA-EB2PLXR-12ECQ8</td>
</tr>
<tr>
<td>2NC / 1NO (PNP)</td>
<td>OFF/RED-Solid/Solid</td>
<td>SSA-EB1PL-12ECQ8</td>
</tr>
<tr>
<td>2NC – Safety BUS node compatible</td>
<td>YEL/RED-Flash</td>
<td>SSA-EB1PLYR-02ECQ5A</td>
</tr>
<tr>
<td>2NC – Safety BUS node compatible</td>
<td>OFF/Flash</td>
<td>SSA-EB1PLXR-02ECQ5A</td>
</tr>
<tr>
<td>2NC – Safety BUS node compatible</td>
<td>OFF/RED-Solid</td>
<td>SSA-EB1PL-02ECQ5A</td>
</tr>
<tr>
<td>2NC – Safety BUS node compatible</td>
<td>Illuminated button, OFF (armed), RED (solid, PUSH ON)</td>
<td>SSA-EB1PL2-02ECQ5A</td>
</tr>
<tr>
<td>2NC – Safety BUS node compatible</td>
<td>YEL/RED-Flash</td>
<td>SSA-EB1PLYR-02ECQ5B</td>
</tr>
<tr>
<td>2NC – Safety BUS node compatible</td>
<td>OFF/RED-Flash</td>
<td>SSA-EB1PLXR-02ECQ5B</td>
</tr>
<tr>
<td>2NC – Safety BUS node compatible</td>
<td>OFF/RED-Solid</td>
<td>SSA-EB1PL-02ECQ5B</td>
</tr>
<tr>
<td>2NC – Safety BUS node compatible</td>
<td>Illuminated button, OFF (armed), RED (solid, PUSH ON)</td>
<td>SSA-EB1PL2-02ECQ5B</td>
</tr>
</tbody>
</table>

---

**E-Stop Button**

- Illuminated 30 mm Mount
- 5-Pin
  - (A) Euro-Style Double-ended male/female
    - DEE2R-53D 0.9 m (3')
    - DEE2R-83D 0.9 m (3')
- 4-Pin
  - CSS-M12F43M12M41M12F41 0.9 m (3')
- 8-Pin
  - CSS-M12F83M12M81M12F81 0.9 m (3')
- 4-Pin
  - MQDC-415 5 m (15')
  - MQDC-415RA 5 m (15')
- 8-Pin
  - MQDC2S-815 5 m (15')
  - MQDC2S-815RA 5 m (15')
- M12/Euro-Style Straight female, non-shielded
  - SXA-815D 5 m (15')

---

**Washdown cover**

SSA-MBK-EEC1  SSA-MBK-EEC2  SSA-MBK-EEC3  SSA-EB1P-ECWC
## WLS15 Series

**Low Profile LED Strip Light**

- Improves visibility, safety, and efficiency
- 15 mm low profile fits in tight spaces that other lights cannot
- Installs in minutes without impacting existing application framework
- Single-color and dual-color with EZ-STATUS® available
- EZ-STATUS® combines illumination and multiple indication capabilities in a single device

### Single-Color Models

<table>
<thead>
<tr>
<th>Family</th>
<th>Cascadable</th>
<th>Color</th>
<th>Length (mm)</th>
<th>Window</th>
<th>Construction</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLS15</td>
<td>X</td>
<td>DW</td>
<td>0360</td>
<td>D</td>
<td>S</td>
<td>C2</td>
</tr>
</tbody>
</table>

- **G** = Cascadable
- **X** = Non Cascadable
- **DW** = Daylight White
- **WW** = Warm White
- **D** = Diffuse
- **S** = Sealed (IP66, IP67)

### Dual-Color Models

<table>
<thead>
<tr>
<th>Family</th>
<th>Cascadable</th>
<th>Color 1</th>
<th>Color 2</th>
<th>Length (mm)</th>
<th>Window</th>
<th>Construction</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLS15</td>
<td>X</td>
<td>W</td>
<td>R</td>
<td>0360</td>
<td>D</td>
<td>S</td>
<td>C2</td>
</tr>
</tbody>
</table>

- **C** = Cascadable
- **X** = Non Cascadable
- **W** = Daylight White
- **B** = Blue
- **G** = Green
- **R** = Red
- **Y** = Yellow
- **A** = Amber
- **D** = Diffuse
- **S** = Sealed (IP66, IP67)

### Connectors
- **C2** = 2 m Integral
- **QP** = 150 mm Integral Euro QD
- **QS** = 150 mm Integral cable with Deutsch DTM connector

Models with a QD or Deutsch DTM connector require a mating cordset.

### Models with QD or Deutsch DTM connector
- **LMBWLS15-150S**
- **LMBWLS15MAG**
- **LMBWLS15TF (Tape)**

### Power Supply
- **PSW-24-1**
  - Type C
  - Type I
  - Type G
  - Type A

- **4-Pin Euro-Style Double-ended**
- **2-Pin Deutsch Single-ended cordset with straight connectors for single-colored models**
- **2-Pin Deutsch Double-ended cordset with straight connectors**

### Cordsets
- **MQDC-415** 5 m (15’)
- **MQDC-415RA** 5 m (15’)
- **MQDC-412SS** 3 m (12’)
- **MQDC-412RS** 3 m (12’)
- **DTMC-215** 5 m (15’)
- **DTMEC-206** 2 m (6’)

Additional cordset lengths available on bannerengineering.com
WLB32 Series
LED Light Bar

- Banner’s WLB32 is an ultra-bright LED fixture that features an even light output for a no glare ‘glow’
- Highly energy efficient for overall cost savings
- High/Low/Off switch
- Daisy chain power to multiple lights
- Metal housing, shatterproof window
- Easy installation with snap clips, or a choice of magnetic or angle brackets

WLB32 Series
- 285 = 285 mm (11"")
- 570 = 570 mm (22"")
- 1130 = 1130 mm (44"")

WLB32 Family
- DC Cascadable
- AC Cascadable
- Hi/Low/Off
- Motion Detection
- Eye Shield

Cordsets for DC Models
- 4-pin Euro-Style QD
- Double-Ended
- Straight/Straight or
- Straight/Right-angle
- MQDC-415
  5 m (15"")
- MQDC-415RA
  5 m (15"")
- MQDEC-403SS
  1 m (3"")
- MQDEC-403RS
  1 m (3"")
- Branches: 0.3 m
- Trunk: 0.3 m
- CSB-M1241M1241

Cordsets for AC Models
- Double-Ended
- NEMA 5-15 grounded
  (IEC Type B)
- LQMAC-306B
  2 m (6.5"")
- Double-Ended
  For Cascading
  Straight/Straight
- LQMAEC-312SS
  3 m (12"")

Additional cordset lengths available on bannerengineering.com
PTL110
Scalable, Versatile Pick-to-Light Solution

- Achieve fast picking speeds in large scale systems with PICK-IQ™ serial communication
- Optimize application performance with options including optical sensor, touch button and display
- Reduce system costs with simple mounting and direct device connection

<table>
<thead>
<tr>
<th>Family</th>
<th>Housing</th>
<th>Control</th>
<th>Sensor</th>
<th>Touch</th>
<th>Display</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTL</td>
<td>110</td>
<td>S</td>
<td>FF100</td>
<td>T</td>
<td>D3</td>
<td>QP150</td>
</tr>
</tbody>
</table>

**FF100 =** 100 mm fixed-field

**FF200 =** 200 mm fixed-field

**Blank =** No sensor input

**T =** Touch with Indicator

**L =** Indicator only

**D3 =** 3-digit LED display

**Blank =** No display

**QP150 =** Dual 150 mm PVC cable with M12 Euro-style QD

**MQDC-415**
5 m (15’)

**MQDC-415RA**
5 m (15’)

**MQDC-415S**
5 m (15’)

**MQDEC-401SS-MF**
5.3 m (18’)

**MQDEC-401SS-FF**
5.3 m (18’)

Additional cordset lengths available on bannerengineering.com

LMBPTL110F
For slotted extrusion and flat rail mounting

LMBPTL110A45

LMBPTL110C
For 28 mm tubular racking

WLB72
Industrial LED Strip Light

- Improve visibility with bright, uniform illumination
- Reduce costs through high-efficiency, low-maintenance design
- Simplify installation and wiring with versatile, reliable hardware

**Family**

**Tier**

**Voltage**

**Cascadeable**

**Color**

**Lighted Length (mm)**

**Window**

**Control**

**Connector**

**WLB72**

**B =** Basic

**Z =** AC

**C =** Cascadable

**W =** Daylight White

**D =** Diffuse

**A =** 0-10 V Analog Dimming

**CT =** Conduit Entry

**B**

**Z**

**C**

**1200**

**D**

**A**

**CT**

**WLB72HK5**

**WLB72F**

**WLB72RAS**
WLS28-2 Series
LED Light Strip

- Compact, space-saving design
- Rugged, water-resistant IP69K option
- Available in 8 lengths from 145 mm to 1130 mm
- Lensed models, or choice of clear or diffuse window
- Cascadable models available for connecting multiple lights end-to-end
- Low power consumption less than 9 watts per foot
- Optional snap clips for easy installation and repositioning

**Single-Color**

<table>
<thead>
<tr>
<th>Family</th>
<th>Cascadable</th>
<th>LED Color</th>
<th>Lighted Length (mm)</th>
<th>Window</th>
<th>Construction</th>
<th>Control</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLS28-2</td>
<td>C</td>
<td>W</td>
<td>145</td>
<td></td>
<td></td>
<td></td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>W</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>W</td>
<td>430</td>
<td></td>
<td></td>
<td></td>
<td>Q</td>
</tr>
</tbody>
</table>

**UV Models**

<table>
<thead>
<tr>
<th>Family</th>
<th>Cascadable</th>
<th>Wavelength</th>
<th>Lighted Length (mm)</th>
<th>Window</th>
<th>Construction</th>
<th>Control</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLS28-2</td>
<td>C</td>
<td>UV395</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UV395</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
<td>Q</td>
</tr>
</tbody>
</table>

**Dual Colors Models**

<table>
<thead>
<tr>
<th>Family</th>
<th>Cascadable</th>
<th>Colors (C)/Density (D)</th>
<th>Lighted Length (mm)</th>
<th>Window</th>
<th>Construction</th>
<th>Control</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLS28-2</td>
<td>X</td>
<td>C1,D1</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C2,D2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Q</td>
</tr>
</tbody>
</table>

* Sealed models not available with ON/OFF Switch (PB) or Motion Switch (M)

**Notes:**
- QD models require mating cordset
- Not available in UV365 models
- Sealed models not available with ON/OFF Switch (PB) or Motion Switch (M)
Multicolor with EZ-STATUS® Models

<table>
<thead>
<tr>
<th>Family</th>
<th>Cascadable</th>
<th>Colors 1-5 and Control</th>
<th>Lighted Length (mm)</th>
<th>Window</th>
<th>Construction</th>
<th>Voltage</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLS28-2</td>
<td>X</td>
<td>WGRXX3</td>
<td>0285</td>
<td>D</td>
<td>S</td>
<td>24</td>
<td>Q</td>
</tr>
</tbody>
</table>

Blank = Clear Plastic  
D = Diffused Plastic  
L25 = 25' Lensed Window  
X = Not Sealed  
S = Sealed

24 = 24 V  
Blank = 2 m integral cable  
Q = Integral 4-pin M12/Euro-style quick disconnect

WGRXX3 = White, Green, and Red with override control  
WYRX3 = White, Yellow, and Red with override control  
GYRX3 = Green, Yellow, and Red with override control  
WGRYXS5 = White, Green, Red, Yellow, and Blue with binary control  
WGRXS6 = White, Green, and Red with I/O Block control  
GYSX6 = Green, Yellow, and Red with I/O Block control

Compact, space-saving design available in eight lengths from 145 to 1130 mm

Optional switch for local intensity or color control  
IP69K sealed model options available

Lensed models or choice of clear or diffuse window

Top Mount  
Side Mount  
Snap Mount

SMBWLS28RA  
SMBWLS28SM  
SMBWLS28SMAG  
SMBWLS28SP

Magnetic Mount  
Protective cover for magnet sold separately

PSD-24-4 Class 2 Power Supply  
Input: 90-264 V ac  1.5A  
Output: 24 V dc  3.9A  
2 m (6.5') 4-Pin Euro Connector

MQDC-415  
5 m (15')  
MQDC-415RA  
5 m (15')  
MODEC-403SS  
1 m (3')

Additional cordset lengths available on bannerengineering.com
**TL50 Tower Lights**

*Preconfigured Tower Lights*

- Exceptionally bright, highly visible from a distance
- Install quickly and easily with no assembly required
- Clearly evident on/off status
- Versatile mounting options
- Compact, sleek, rugged design with IP67 models available
- Audible alert: continuous, pulsed and staccato models available

---

### Standard and High-Brightness

<table>
<thead>
<tr>
<th>Housing</th>
<th>Brightness</th>
<th>Supply Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank (1 to 5 colors)</td>
<td>H = High Brightness</td>
<td>18 to 30 V dc or 21 to 27 V ac</td>
</tr>
<tr>
<td>Blank (6 or 7 colors)</td>
<td>Z = 100 to 240 V ac</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color Position</th>
<th>Audible Alarm</th>
<th>Housing Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>G = Green</td>
<td>G = Audible Only</td>
<td></td>
</tr>
<tr>
<td>Y = Yellow</td>
<td>Y = Audible Only</td>
<td></td>
</tr>
<tr>
<td>R = Red</td>
<td>R = Audible Only</td>
<td></td>
</tr>
<tr>
<td>W = White</td>
<td>W = Audible Only</td>
<td></td>
</tr>
<tr>
<td>Blank = None (IP67)</td>
<td>Blank = None (IP67)</td>
<td></td>
</tr>
<tr>
<td>A = Audible (IP50)</td>
<td>A = Audible (IP50)</td>
<td></td>
</tr>
<tr>
<td>ALS = Sealed Audible Continuous Tone</td>
<td>ALS = Sealed Audible Continuous Tone</td>
<td></td>
</tr>
<tr>
<td>ALS3 = Sealed Audible Pulsed Tone</td>
<td>ALS3 = Sealed Audible Pulsed Tone</td>
<td></td>
</tr>
<tr>
<td>ALS4 = Sealed Audible Staccato Tone</td>
<td>ALS4 = Sealed Audible Staccato Tone</td>
<td></td>
</tr>
<tr>
<td>AOS = Omni-Directional Sealed Audible Continuous Tone</td>
<td>AOS = Omni-Directional Sealed Audible Continuous Tone</td>
<td></td>
</tr>
<tr>
<td>AOS3 = Omni-Directional Sealed Audible Pulsed Tone</td>
<td>AOS3 = Omni-Directional Sealed Audible Pulsed Tone</td>
<td></td>
</tr>
<tr>
<td>AOS4 = Omni-Directional Sealed Audible Staccato Tone</td>
<td>AOS4 = Omni-Directional Sealed Audible Staccato Tone</td>
<td></td>
</tr>
<tr>
<td>AOSI = Omni-Directional Sealed Audible Continuous Tone with Intensity Adjust</td>
<td>AOSI = Omni-Directional Sealed Audible Continuous Tone with Intensity Adjust</td>
<td></td>
</tr>
<tr>
<td>ALSI = Sealed Audible Continuous Tone with Intensity Adjust</td>
<td>ALSI = Sealed Audible Continuous Tone with Intensity Adjust</td>
<td></td>
</tr>
<tr>
<td>ALS3I = Sealed Audible Pulsed Tone with Intensity Adjust</td>
<td>ALS3I = Sealed Audible Pulsed Tone with Intensity Adjust</td>
<td></td>
</tr>
<tr>
<td>ALS4I = Sealed Audible Staccato Tone with Intensity Adjust</td>
<td>ALS4I = Sealed Audible Staccato Tone with Intensity Adjust</td>
<td></td>
</tr>
<tr>
<td>AOS3I = Omni-Directional Sealed Audible Pulsed Tone with Intensity Adjust</td>
<td>AOS3I = Omni-Directional Sealed Audible Pulsed Tone with Intensity Adjust</td>
<td></td>
</tr>
<tr>
<td>AOS4I = Omni-Directional Sealed Audible Staccato Tone with Intensity Adjust</td>
<td>AOS4I = Omni-Directional Sealed Audible Staccato Tone with Intensity Adjust</td>
<td></td>
</tr>
</tbody>
</table>

### Connector

| Q = Euro Integral QD (dc only) |

**Connector**

| Q = Euro Integral QD (dc only) |

**QD models require mating cordset**

* Positions 6 and 7 not available in high brightness or AC models
* Position 7 not available with audible alert

---

**SMB30A**

**SMB30MM**

**SMBAMS30P**

**SMB30RAVK**

---

**3 Segments/4-Pin Euro-Style**

- for use with DC models
  - MQDC-415:
    - 5 m (15')
    - MQDC-415RA:
      - 5 m (15')

**4 Segments/5-Pin Euro Style**

- for use with DC models
  - MQDC1-515:
    - 5 m (15')
    - MQDC1-515RA:
      - 5 m (15')

**5+ Segments/8-Pin Euro Style**

- for use with DC models
  - MQDC2S-815:
    - 5 m (15')
    - MQDC2S-815RA:
      - 5 m (15')

**3 Light Segments/4-Pin Micro-Style**

- for use with AC models
  - MQAC-415:
    - 5 m (15')
    - MQAC-415RA:
      - 5 m (15')

**4 Lights/5-Pin Micro-Style**

- for use with AC models
  - MQDAC2-515:
    - 5 m (15')
    - MQDAC2-515RA:
      - 5 m (15')

---
TL50 Pro Tower Lights
Programmable Tower Lights

- Up to ten segments (depending on model) for advanced status signaling and high-resolution process details
- Full control of color, flashing, rotation and intensity settings
- Advanced animations like level, timer, counter and action mode provide dynamic visual response
- Parameter and process data options on IO-Link models enable fast and complete control of functionality
- Discrete models are programmable using Banner's Pro Editor software and Pro Converter Cable

**Family**
- TL50

**Style**
- P

**Housing**
- C

**Number of Segments**
- 3

**Audible Alarm**
- A

**Housing Color**
- Blank = Black
- C = Gray

**Connector**
- Q

**IO-Link®**

<table>
<thead>
<tr>
<th>Housing</th>
<th>Number of Segments</th>
<th>Audible Alarm</th>
<th>Control</th>
<th>Housing Color</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL50</td>
<td>3</td>
<td>A</td>
<td>K</td>
<td>Blank = Black</td>
<td>Q</td>
</tr>
<tr>
<td>TL50C</td>
<td>3</td>
<td>A</td>
<td>K</td>
<td>C = Gray</td>
<td>Q</td>
</tr>
<tr>
<td>TL50BL</td>
<td>3</td>
<td>A</td>
<td>K</td>
<td>Q = Euro Integral QD</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>QP = Euro Pigtail QD</td>
<td>Q</td>
</tr>
</tbody>
</table>

*Not available with audible

**PRO-KIT-ACC** includes:
- MQDC-506-USB
- Pro Converter Cable
- CSB-M1251FM1251M Splitter
- PSW-24-1 Power Supply

**ACC-PRO-CABLE5**
- Mating accessory for cabled and terminal models
- MQDC-801-5M-PRO 5-pin to 8-pin double-ended cordset
TL70 Tower Lights

Modular Tower Lights

- Light segments have user-selectable solid ON or flashing
- Up to six light segments (six color options) or five segments plus an audible in one device
- Rugged, water-resistant IP65 housing with UV stabilized material
- Bright, uniform indicator segments appear gray when off to eliminate false indication from ambient light

**Preassembled DC**

<table>
<thead>
<tr>
<th>Housing</th>
<th>Color/Position</th>
<th>Audible Alarm*</th>
<th>Housing</th>
<th>Color</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL70</td>
<td>1    G</td>
<td>W</td>
<td>Blank = None</td>
<td>4</td>
<td>Blank = None</td>
</tr>
<tr>
<td></td>
<td>2    R</td>
<td>O</td>
<td>A = Audible (92 dB)</td>
<td>5</td>
<td>Blank = Black</td>
</tr>
<tr>
<td></td>
<td>3    Y</td>
<td>W</td>
<td>AL = Louder Audible (85 - 101 dB)</td>
<td>6</td>
<td>Blank = 2 m Integral Cable</td>
</tr>
<tr>
<td></td>
<td>4    B</td>
<td>O</td>
<td>AP = Programmable Audible</td>
<td></td>
<td>Q = Euro Integral QD</td>
</tr>
<tr>
<td></td>
<td>5    W</td>
<td>W</td>
<td></td>
<td></td>
<td>QP = Euro Pigtail QD</td>
</tr>
<tr>
<td></td>
<td>6    O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Color Code**: G = Green, Y = Yellow, R = Red, B = Blue, W = White, O = Orange, Blank = None

**Preassembled AC**

<table>
<thead>
<tr>
<th>Housing</th>
<th>Color/Position</th>
<th>Audible Alarm*</th>
<th>Housing</th>
<th>Color</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL70Z</td>
<td>1    G</td>
<td>W</td>
<td>Blank = None</td>
<td>4</td>
<td>Blank = None</td>
</tr>
<tr>
<td></td>
<td>2    R</td>
<td>O</td>
<td>A = Audible (92 dB)</td>
<td>5</td>
<td>Blank = Black</td>
</tr>
<tr>
<td></td>
<td>3    Y</td>
<td>W</td>
<td>AL = Louder Audible (85 - 101 dB)</td>
<td>6</td>
<td>Blank = 2 m Integral Cable</td>
</tr>
<tr>
<td></td>
<td>4    B</td>
<td>O</td>
<td>AP = Programmable Audible</td>
<td></td>
<td>Q = Euro Integral QD</td>
</tr>
<tr>
<td></td>
<td>5    W</td>
<td>W</td>
<td></td>
<td></td>
<td>QP = Euro Pigtail QD</td>
</tr>
<tr>
<td></td>
<td>6    O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Color Code**: G = Green, Y = Yellow, R = Red, B = Blue, W = White, O = Orange, Blank = None

**Preassembled Wireless**

<table>
<thead>
<tr>
<th>Housing</th>
<th>Radio</th>
<th>Color/Position</th>
<th>Audible Alarm*</th>
<th>Housing</th>
<th>Color</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL70</td>
<td>DXN2</td>
<td>1    W</td>
<td>Blank = None</td>
<td>4</td>
<td>Blank = None</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2    B</td>
<td>A = Audible (92 dB)</td>
<td>5</td>
<td>Blank = Black</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3    G</td>
<td>AL = Louder Audible (85 - 101 dB)</td>
<td>6</td>
<td>Blank = 2 m Integral Cable</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4    Y</td>
<td>AP = Programmable Audible</td>
<td></td>
<td>Q = Euro Integral QD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5    R</td>
<td></td>
<td></td>
<td>QP = Euro Pigtail QD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6    O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Radio Models**: DXN2 = Node 2.4 GHz, DXN9 = Node 900 MHz, DR2M = MultiHop Data Radio 2.4 GHz, DR9M = MultiHop Data Radio 900 MHz
- **Color Code**: G = Green, Y = Yellow, R = Red, B = Blue, W = White, O = Orange, Blank = None

Requires Gateway or master radio of the same frequency

*Not available with six light modules

**Models with Q are limited to 4 modules**

Accessories for TL70 shown on previous page. Additional accessories and cordset lengths are available on bannerengineering.com
## K50 and K30 Pro
Domed and Compact Indicators

- Simplified ordering and design
- Reliable performance in harsh environments
- Improved production efficiency
- Compact models for low profile applications
- Full flexibility of colors and animations with Pro Editor software or IO-Link®

### K50 Pro
Example Model Number: K50L2RGB7Q

<table>
<thead>
<tr>
<th>Family</th>
<th>Material</th>
<th>Color &amp; Input</th>
<th>Audible Alarm*</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>K50L2</td>
<td>Blank</td>
<td>RGB7</td>
<td>A1</td>
<td>Q</td>
</tr>
</tbody>
</table>

RGB7 = RGB Multicolor (7 colors)
RGBK = RGB Multicolor with IO-Link

Blanks = No Audible
A1 = Audible
AL1 = Loud Audible
ALS = Sealed Audible

Blank = 2 m Integral Cable
Q = Euro Integral QD*
QP = Euro Pigtail QD

* Audible models not available in FDA-grade material or compact

** Compact and integral QD models not available in FDA-grade material

### K30 Pro
Example Model Number: K30L2RGB7Q

<table>
<thead>
<tr>
<th>Family</th>
<th>Material</th>
<th>Color &amp; Input</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>K30L2</td>
<td>Blank</td>
<td>RGB7</td>
<td>Q</td>
</tr>
</tbody>
</table>

Blank = Standard
F = FDA Grade

RGB7 = Multicolor

Blank = 2 m Integral Cable
Q = Euro Integral QD*
QP = Euro Pigtail QD

* Integral QD and Terminal Screw models not available in FDA-grade material

** QD models require mating cordset

### PRO-KIT-ACC
Includes:
- MQDC-506-USB Pro Converter Cable
- CSBM125IFM1251M Splitter
- PSW-24-1 Power Supply

### ACC-PRO-CABLE5
Mating accessory for cabled and terminal models
- MQDC-801-5M-PRO 5-pin to 5-pin double-ended cordset

### MQDC-1S15
5 m (15')
MQDC1-515RA 5 m (15')
MQDC1-515RA 5 m (15')

MQDC-WDSS-0515 5 m (15')

Additional lengths available on bannerengineering.com
S22 Touch Series
Flush Touch Button

- Large, bright illuminated area for clear visibility of input and touch status
- Flush mount design sits tight against panel, machine and bracket surfaces
- Independent color control or preconfigured models to suit your indication needs
- Momentary versions remain activated as long as touch is present, while latching versions toggle between activated and not activated states on successive touches
- Excellent immunity to false triggering by water spray, detergents, oils, and other foreign materials
- Rugged, water-resistant IP69K design for washdown environments
- Ergonomically designed to eliminate hand, wrist and arm stresses, requiring no physical pressure to operate and can be actuated with bare hands or work gloves

Multipurpose Independent Control

<table>
<thead>
<tr>
<th>Family</th>
<th>Output State</th>
<th>Output Function</th>
<th>Activation Method</th>
<th>Material</th>
<th>Color</th>
<th>Function</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>S22</td>
<td>A</td>
<td>M</td>
<td>T</td>
<td>S</td>
<td>RGB7</td>
<td>F2</td>
<td>QP</td>
</tr>
<tr>
<td></td>
<td>Normally Open</td>
<td>Momentary</td>
<td>Touch</td>
<td>Standard</td>
<td>Multicolor</td>
<td>Multifunction</td>
<td>Integral Cable</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Blank</td>
</tr>
</tbody>
</table>

Illuminated Button Control

<table>
<thead>
<tr>
<th>Family</th>
<th>Output State</th>
<th>Output Function</th>
<th>Activation Method</th>
<th>Material</th>
<th>Color</th>
<th>Function</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>S22</td>
<td>A</td>
<td>L</td>
<td>T</td>
<td>S</td>
<td>G</td>
<td>H</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td>Normally Open</td>
<td>Momentary</td>
<td>Touch</td>
<td>Standard</td>
<td>Green</td>
<td>Output only</td>
<td>Integral Cable</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>L</td>
<td></td>
<td></td>
<td>Yellow</td>
<td></td>
<td>Blank</td>
</tr>
</tbody>
</table>

Additional lengths available on bannerengineering.com
VE Series
Versatile, Easy-To-Use Smart Cameras

- Available in 5 MP (2592 x 2048 pixels), 2MP (1600 x 1200 pixels), 1.3MP (1280 x 1024 pixels), and WVGA (752 x 480 pixels) models, all with the same powerful inspection capabilities

- Runtime editing capability reduces costly downtime and the software emulator allows for offline building and troubleshooting of applications

- Factory communications (EtherNet/IP™, Modbus/TCP, PROFINET® and RS-232 Serial) for integration on the manufacturing floor

- Two-line, eight-character onboard display provides inspection information and focus number and makes it easy to update sensor settings, facilitating fast product changeover

- Robust metal housing with optional lens covers with or without LED lighting to achieve IP67 rating for use in harsh environments with heat, vibration, or moisture

<table>
<thead>
<tr>
<th>Family</th>
<th>Resolution</th>
<th>Imager</th>
<th>Ethernet Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>VE</td>
<td>202</td>
<td>G</td>
<td>1A</td>
</tr>
<tr>
<td></td>
<td>200 = WVGA, 752 x 480 pixels</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>201 = 1.3 MP, 1280 x 1024 pixels</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>202 = 2MP, 1600 x 1200 pixels</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>205 = 5 MP, 2592 x 2048 pixels</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Select a camera resolution
Choose lens
Optional filters create additional contrast
IP67 lens covers or ring lights available for additional protection

C-Mount lenses, lens covers, ring lights, and bandwidth filters are available on bannerengineering.com

SMBVERA
SMBVEMP
Mounting Plate

12-pin Euro with Shield
MQDC2S-1215
MQDC2S-1215RA
5 m (15')

RJ45 to Ethernet 8-pin
M12 Euro (Cat5e shielded)
STP-M12-815
5 m (15')

Additional lengths available on bannerengineering.com
ABR Series
Imager-Based Barcode Readers

- Powerful decoding capability to read even difficult 1D and 2D codes, including DPM and low contrast codes
- Compact metal housing for industrial environments
- Quick configuration with on-board push buttons or a PC using Barcode Manager to solve the most difficult barcode reading applications
- Integrated LED lighting and easy focus adjustment in one package for maximum application flexibility
- Versatile lens options are available to simplify setup and configuration, including autofocus (ABR 7000) which easily adapts to changes in reading distance
- Factory communication options include Ethernet, serial and USB for integration on the manufacturing floor
- Embedded web server interface for monitoring images and statistics over any network
For Use with ABR Ethernet Models

- 17-pin M12 female shielded (for power, serial and IO)
  - MQDC2S-1715
  - 5 m (15’)

- 4-pin M12 D-code to RJ45 Ethernet for Ethernet Communication
  - STP-M12D-415
  - 5 m (15’)

For Use with ABR USB Models

- Power and USB Communication only
  - 17-pin M12 female to USB
    - MQDEC-1703SS-USB

- Power, USB Communication, IO and Serial Communication
  - 17-pin M12 female shielded (for power, serial and IO)
    - MQDC2S-1715
    - 5 m (15’)

- Splitter cable. 17-pin M12 female trunk with one 17-pin M12 male branch and one USB branch
  - CSB-M121701USB02M121702

For Use with TCNM-ACBB1 Connection Box

- 17-pin M12 female to DB25 (replaces MQDC2S-17xx)
  - MQDEC-1703SS-DB25
  - 0.9 m (3’)

- 17-pin female to 17-pin male shielded (optional extension cable)
  - MQDEC-1715SS
  - 5 m (15’)

**iVu BCR Barcode Reader**

**Imager-Based Barcode Readers**

- Program through an integrated touch screen, remote touch screen or PC interface
- Reads a variety of 1D and 2D barcodes including DataMatrix (ECC 200), Linear Bar Codes, Code 128, Code 39, Codabar, Interleaved 2 of 5, EAN 13, EAN 8, UPC-E, POSTNET, IMB, and Pharmacode
- Ethernet (EtherNet/IP™, Modbus/TCP, and PROFINET®) and Serial RS-232 communications
- Read multiple barcodes in any orientation with one device
- Rugged IP67 housing for factory environments
- Available with a variety of lens and integrated light options – red, blue, green, white, UV or infrared

<table>
<thead>
<tr>
<th>Series</th>
<th>Touch Screen</th>
<th>Sensor Type</th>
<th>Ring Light Color</th>
<th>Lens (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVU2P</td>
<td>T</td>
<td>B</td>
<td>R</td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>T = Integrated</td>
<td>B = Barcode</td>
<td>R = Red</td>
<td>04 = 4.3</td>
</tr>
<tr>
<td></td>
<td>R = Remote*</td>
<td></td>
<td>B = Blue</td>
<td>06 = 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G = Green</td>
<td>08 = 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>W = White</td>
<td>12 = 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I = Infrared</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 = UV365</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9 = UV395</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>XC = C-mount</td>
<td>16 = 16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X = No Ring Light</td>
<td>25 = 25</td>
</tr>
</tbody>
</table>

* Remote display or PC is required for set up and viewing of Remote Touch Screen sensors

Accessories shown on page 66
iVu Vision Sensors
Color and Grayscale Vision Sensors

- The iVu and iVu Color Vision Sensors are used to monitor parts for type, size, orientation, shape, location, and color or color variations.
- Configure in minutes using Vision Manager PC software, onboard touchscreen display or using remote touchscreen to access to hard to reach places
- All-in-one solution with camera, controller, lens, and light included in one package
- Inspect multiple features with a wide variety of grayscale or color tools
- Compact, rugged, IP67 housing available with a variety of integrated ring lights including red, blue, green, white, infrared or UV
- Interchangeable lenses, including C-mount, for maximum application flexibility
- Factory communications (EtherNet/IP®, Modbus/TCP, PROFINET®, PCCC and Serial RS-232) for integration on the manufacturing floor
- Ability to change parameters on the fly with full runtime editing to reduce costly downtime

### Series

<table>
<thead>
<tr>
<th>Touch Screen</th>
<th>Sensor Type</th>
<th>Color</th>
<th>Lens (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVU2P</td>
<td>T</td>
<td>R</td>
<td>R = 4.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>06 = 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>G</td>
<td>08 = 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W</td>
<td>12 = 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>16 = 16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>25 = 25</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>Blank</td>
<td>Blank</td>
</tr>
</tbody>
</table>

* Remote display or PC is required for set up and viewing of Remote Touch Screen sensors
** Requires C-mount lens
† Color sensor only available in white, C-mount or no ring light

### Remote Touch Screen

- RDM35 Remote Touch Screen
- Docking station for machine mountable remote display
- Power (Required): 12-Pin M12/Euro with Shield
- Ethernet (Required for Ethernet communications): RJ45 to 4-Pin Pico QD
- USB: Used to update firmware and access sensor files
- Machine Mountable Remote Display (Required for use of RDM35 remote display): Double-ended M12/8-pin Euro

Additional lengths available on www.bannerengineering.com
DXM Wireless Controller
Industrial Wireless Controller

- Enables end-to-end IIoT solutions, connecting Banner sensors to Banner’s Connected Data Solutions (CDS) cloud platform
- Integrates Banner’s ISM radio, cellular connectivity, and local I/O
- Program the DXM using action rules and ScriptBasic language, which can execute concurrently
- Log data on the Micro SD card
- Automation protocols include Modbus RTU, Modbus/TCP, and EtherNet/IP for communications with PLC’s, HMI’s, or other local hosts
- Interactive programmable user interface with LCD and LED indicators
- Industry standard RS-485, Ethernet, and USB communication ports
- Easily interfaces with Banner CDS and other cloud service providers

Controller Models*

<table>
<thead>
<tr>
<th>Models</th>
<th>Description</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>DXM700–B1R1</td>
<td>DXM700 Controller with Performance Series Gateway</td>
<td>900 MHz</td>
</tr>
<tr>
<td>DXM700–B1R2</td>
<td>DXM700 Controller with MultiHop Modbus Data Radio</td>
<td>900 MHz</td>
</tr>
<tr>
<td>DXM700–B1R3</td>
<td>DXM700 Controller with Performance Series Gateway</td>
<td>2.4 GHz</td>
</tr>
<tr>
<td>DXM700–B1R4</td>
<td>DXM700 Controller with MultiHop Modbus Data Radio</td>
<td>2.4 GHz</td>
</tr>
<tr>
<td>DXM1000–B1R1</td>
<td>DXM1000 Controller with Performance Series Gateway</td>
<td>900 MHz</td>
</tr>
<tr>
<td>DXM1000–B1R2</td>
<td>DXM1000 Controller with MultiHop Modbus Data Radio</td>
<td>900 MHz</td>
</tr>
<tr>
<td>DXM1000–B1R3</td>
<td>DXM1000 Controller with Performance Series Gateway</td>
<td>2.4 GHz</td>
</tr>
<tr>
<td>DXM1000–B1R4</td>
<td>DXM1000 Controller with MultiHop Modbus Data Radio</td>
<td>2.4 GHz</td>
</tr>
</tbody>
</table>

* For additional models and cellular data plans go to bannerengineering.com

Connected Data Soutions (CDS) Software Packages

<table>
<thead>
<tr>
<th>Models</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>806252</td>
<td>Starter Package 1,000 Data Points per hour Total Storage: 2 million Data Points</td>
</tr>
<tr>
<td>806253</td>
<td>Standard Package 4,000 Data Points per hour Total Storage: 20 million Data Points</td>
</tr>
<tr>
<td>806254</td>
<td>Premium Package 12,000 Data Points per hour Total Storage: 100 million Data Points</td>
</tr>
</tbody>
</table>

PSD-24-4 DC power supply – desktop style, 24 V dc 4A, Euro 4-pin connector
PSDNP-24-13 DC power supply DIN rail mount, 24 - 28 V dc, 1.3A
MQDMC-401 Euro-style male quick disconnect cable, 4-Pin straight connector
BWA-AH12106 enclosure
SX1-LTE-001 Cellular Data Modem Verizon 4G LTE Cat. 1
SX1-GSM-001 Cellular Data Modem Worldwide HS/PA 3G with 2G GSM fallback
**Q45 Nodes**
for Predictive Maintenance

- To save on installation time, Q45 1-wire serial nodes are pre-configured to work with Banner 1-wire serial sensors. The compact size, integrated lithium batteries, and a variety of compatible sensors make remote monitoring easy.
- The Q45VTP is designed to pair with the QM30VT1 Vibration and Temperature sensor. Vibration characteristics and sample intervals can be set using DIP switches.
- The Q45TH connects directly to the M12FTH4Q temperature and humidity sensor. Sample rates can be set using DIP switches.
- The Q45U is a universal 1-wire serial node that reads any Banner 1-wire serial sensor and determines an efficient power setting.

---

**Select Your Node**

<table>
<thead>
<tr>
<th>Radio Band</th>
<th>Series</th>
<th>Device Type*</th>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX80N</td>
<td>2</td>
<td>Q45</td>
<td>900 MHz</td>
<td>All-in-one Vibration and Temperature sensor</td>
</tr>
<tr>
<td>2</td>
<td>2.4 GHz</td>
<td>Q45</td>
<td>2.4 GHz</td>
<td>All-in-one Vibration and Temperature sensor</td>
</tr>
</tbody>
</table>

* Sensor units must be ordered separately

---

**Select Your Sensor**

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Models</th>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration &amp; Temperature</td>
<td>DX80N9Q45VA</td>
<td>900 MHz</td>
<td>All-in-one Vibration and Temperature sensor</td>
</tr>
<tr>
<td>Vibration &amp; Temperature</td>
<td>DX80N2Q45VA</td>
<td>2.4 GHz</td>
<td>All-in-one Vibration and Temperature sensor</td>
</tr>
<tr>
<td>Temperature and Humidity</td>
<td>K50UX1RA</td>
<td></td>
<td>Ultrasonic Sensor</td>
</tr>
</tbody>
</table>

---

**Q45 All-in-One Sensors**

- Vibration and Temperature or Tank Level sensor and node in one compact package
- Uses a 1-wire serial interface
- Easy-to-order
- Easy-to-deploy
- DIP switch configurable for vibration characteristics and sample intervals
- Dual-axis vibration sensing

---

**Vibration: Sensor and Node**

<table>
<thead>
<tr>
<th>Models</th>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX80N9Q45VA</td>
<td>900 MHz</td>
<td>All-in-one Vibration and Temperature sensor</td>
</tr>
<tr>
<td>DX80N2Q45VA</td>
<td>2.4 GHz</td>
<td>All-in-one Vibration and Temperature sensor</td>
</tr>
</tbody>
</table>

**Ultrasonic: Sensor and Node**

<table>
<thead>
<tr>
<th>Models</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX80N9Q45UAC</td>
<td>900 MHz</td>
<td>Q45 Node with Integrated Ultrasonic Sensor</td>
</tr>
<tr>
<td>DX80N2Q45UAC</td>
<td>2.4 GHz</td>
<td>Q45 Node with Integrated Ultrasonic Sensor</td>
</tr>
</tbody>
</table>
QM30VT Series
Vibration and Temperature Sensor

- Avoid machine failures and delays by detecting problems early
- Provides high accuracy vibration and temperature measurements
- Dual-axis vibration detection up to 4 KHz bandwidth
- Manufactured with a sealed aluminum housing
- Reduces labor costs by obviating manual checks and eliminating error

### Models | Description
--- | ---
QM30VT1 | Vibration and temperature sensor with 1-wire serial interface; 3 m QD cable
QM30VT2 | Vibration and temperature sensor that functions as a modbus slave device via RS-485; 3 m QD cable
QM30VT2-SS-9M | Vibration and temperature sensor with stainless steel housing that functions as a modbus slave device via RS-485; 9 m cable with flying leads

K50U Ultrasonic Sensor
Wireless Level and Tank Monitoring

- Provides a distance measurement from the target to the sensor
- Monitor wirelessly to avoid long cable runs
- Built-in temperature compensation for reliable measurement
- Threaded housing for easy installation

### Models | Description
--- | ---
K50UX1ARA | Ultrasonic sensor with 1-wire serial interface; 1 m sensing range
K50UX1CRA | Ultrasonic sensor with 1-wire serial interface; 3 m sensing range
K50UX2ARA | Ultrasonic sensor that functions as a modbus slave device via RS-485; 1 m sensing range
K50UX2CRA | Ultrasonic sensor that functions as a modbus slave device via RS-485; 3 m sensing range

---

Additional lengths available on [bannerengineering.com](http://bannerengineering.com)
Pressure Sensor Node
All-in-One Performance Series Node

- Combines a media isolated pressure sensor, a Performance Series wireless node, and a battery power supply
- Compact, one-piece design simplifies installation and eliminates the need for ordering multiple components
- Integrates easily in applications where infrastructure, movement, or mobility make wired solutions impractical, ineffective, or cost-prohibitive
- Field-proven, Sure Cross wireless architecture ensures secure, reliable communication between devices

<table>
<thead>
<tr>
<th>Models</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX80N9X1W-PS50G</td>
<td>0-50 PSI GAUGE Pressure Sensor in the housing port pre-wired to the Node</td>
</tr>
<tr>
<td>DX80N9X1W-PS50G1</td>
<td>0-50 PSI GAUGE Pressure Sensor in the housing port 1 meter cable pre-wired to the Node</td>
</tr>
<tr>
<td>DX80N9X1W-PS150G</td>
<td>0-150 PSI GAUGE Pressure Sensor in the housing port pre-wired to the Node</td>
</tr>
<tr>
<td>DX80N9X1W-PS150G1</td>
<td>0-150 PSI GAUGE Pressure Sensor in the housing port 1 meter cable pre-wired to the Node</td>
</tr>
<tr>
<td>DX80N9X1W-PS500S</td>
<td>0-500 PSI SEALED GAUGE Pressure Sensor in the housing port pre-wired to the Node</td>
</tr>
<tr>
<td>DX80N9X1W-PS500S1</td>
<td>0-500 PSI GAUGE SEALED Pressure Sensor in the housing port 1 meter cable pre-wired to the Node</td>
</tr>
</tbody>
</table>

Condition Monitoring Node
Vibration, Temperature, and Current

- Performance Node with a Euro-style connector for use with a Banner VT1 Vibration and Temperature sensor (sold separately) and one-meter twisted pair cable for use with a current transformer
- 20 A and 150 A split core current transformers included
- DIP switch configurable
- Compatible with the Vibrations Solutions Kit
- Improved internal antenna for extended wireless range
- 6+ year battery life

<table>
<thead>
<tr>
<th>Models</th>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX80N9X1W-CM1L</td>
<td>900 MHz</td>
<td>Pre-wired Euro-style connector for use with any Banner 1-Wire Serial Vibration Sensor (sold separately). Pre-wired one-meter twisted pair cable reports true RMS current (20 A and 150 A current transformers included with Node).</td>
</tr>
<tr>
<td>DX80N2X1W-CM1L</td>
<td>2.4 GHz</td>
<td></td>
</tr>
</tbody>
</table>
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