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Industry 4.0

What IIoT Means for Manufacturing

IIoT is perhaps the biggest buzzword in factory automation today, and it is a key aspect of Industry 4.0. IIoT already impacts the way factories operate today, and it will increasingly impact businesses in the future.

Industry 4.0, IoT, and IIoT

Industry 4.0 describes the current wave of technological innovation as an era in history characterized by interconnectivity enabled by the internet and wirelessly-connected devices. While digital technologies enable the collection of large amounts of valuable data, this data primarily exists in silos that are not easily accessible for analysis and actionable insights.

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 of IIoT technologies for factory automation 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?

Following are three practical examples of how visibility, predictive analytics, and interconnectivity are impacting factories today.

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. However, it can be challenging knowing where to start and how to use these technologies to their fullest advantage.

Below are three questions to help manufacturers prepare for a move from digital to 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?

Answering these 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 is IO-Link?

IO-Link (IEC61131-9) is an open standard serial communication protocol that allows for the bi-directional exchange of data from sensors and devices that support IO-Link and are connected to a master. The IO-Link master can transmit this data over various networks, fieldbuses, or backplane buses, making the data accessible for immediate action or long-term analysis via an industrial information system (PLC, HMI, etc.). Each IO-Link sensor has an IODD (IO Device Description) file that describes the device and its IO-Link capabilities.

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.
Industry Challenges

- Unplanned Downtime
- Wash Down Environment
- Frequent Product Changeover
- Machine Troubleshooting
- Detecting Challenging Packaging material
- Safeguarding Complex machines
- Predictive Maintenance
- Data and Analytics
- Food Safety Regulations
- Track and Trace

Banner Engineering is Developing Products to meet these Challenges:

IO-Link Communication
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Safety Products that meet Cat 4 PLe
Protecting employees at your work place is a high priority and that is why Banner designs our safety components to the highest safety ratings in the market.
Ecolab Certified
Many manufactures use a mixture of cleaning chemicals to prevent the growth of bacteria on their equipment. Banner takes this into consideration when selecting housing and window materials for our products for food and beverage industries. Ecolab Certification means the Banner product is robust when exposed to cleaning chemicals and will hold up well to regular cleaning.

FDA Compliant Materials
In the manufacturing process it is possible for food or beverages to come in contact with components on the line during the processing, packaging, or storage process. Banner understands this concern and is developing products with housings made of FDA compliant materials.

IP69K Products
There is an increasing need in the market to develop sensors that can hold up to washdown areas and therefore Banner is developing more sensors that meet and exceed the IP69K test requirements. The IP69K rating refers to the product’s ability to resist ingress of dust as well as high temperature high pressure water.

Hygienic Design
Food safety is a high priority for manufacturers today. When developing new products for the food and beverage industry, Banner takes into consideration the shape of the sensor housing. It is important for the housing shape to be self-draining to remove residues of products and chemicals during the cleaning process. The housing should also be smooth and free from crevices, sharp corners, protrusions, and shadow zones.
Packaging in the Food Industry

The food industry is the largest industry on the planet. As economies around the world continue to evolve and develop, so do the lifestyles and demands of consumers. In this highly competitive market, a company’s ability to respond and adapt to these changes is critical. Changing consumer demands quickly translates to changes in products, production processes and packaging.

Banner has developed products specifically designed for the food industry. Our industry knowledge and expertise in sensors and vision sensors, LED lights and indicators, wireless networks and safety control allow us to offer solutions that address these challenges. Products and solutions from Banner help food manufacturers around the world reduce expenses, improve quality and efficiency, and increase product output and profits without compromising worker safety.
Solutions for Packaging in the Food Industry

Clear Tray Detection for Fill Trigger

Challenge
- Reliably sense transparent containers
- Suitable for harsh washdown environments

Key Features
- Algorithm uses distance and intensity for clear object detection
- FDA grade stainless steel and Ecolab certified
- IP69K
- No reflector required

Featured Solution
Q4X

Other Solutions
QM26 Clear Object Detection
QS18 Clear Object Detection

Key Benefits
- Reliably detects transparent containers no matter what shape or surface
- Holds up to chemicals used to clean equipment which reduces downtime
- Holds up to temperature cycling which occurs in high temperature and high pressure washdown
- Quick installation and the reflector is not a concern for maintenance

Roll Diameter

Challenge
- Accurately measure roll diameter
- Targets often contain vibrant, multi-colored, graphics of varying reflectivity

Key Features
- Sub-millimeter repeatability regardless of color, reflectivity, or angle
- Factory calibrated for full scale measurement out of box
- Two-line, eight-character display

Featured Solution
LE250

Other Solutions
LE550
LTF
Q4X

Key Benefits
- Stable measurement minimizes waste left on core
- Easily deployable without need to teach specific range or empty core
- Visual feedback for easy adjustment and troubleshooting

Hopper Fill Level Monitoring

Challenge
- Variable target size, texture, color and reflectivity
- Measuring hopper fill level while avoiding false readings from side walls

Key Features
- Best in class linearity, repeatability and resolution
- Visible red laser spot
- Two-line, eight-character display
- 12 m and 24 m range

Featured Solution
LTF

Other Solutions
LE550
QT50U

Key Benefits
- Accurate readings regardless of color, texture, or angle of target
- Laser spot allows for easy alignment
- Visual feedback for quick adjustment and troubleshooting
- Long range allows sensor to be out of the way of operators or for washdown
Clear Object Detection

Challenge
- Sense leading edge of clear PET trays and clamshell packaging
- Food powder on reflector creates false outputs
- Complicated sensor set up

Key Features
- Polarized coaxial optical design
- 400 µs ON/OFF response time
- ClearTracking Algorithm
- Single push teach method

Featured Solution
QS18 Clear Object Detection

Other Solutions
Q4X

Key Benefits
- Reliably detects clear and mirror-like surfaces
- Precise leading-edge detection
- Ability to compensate for dust build-up and ensure consistent detection
- Single push teach method makes for quick and easy installation

Carton Verification

Challenge
- Ensuring the product is correctly placed in the appropriate carton
- Changeover between different products can increase downtime
- Need easy-to-use solution

Key Features
- Reads a variety of linear and 2D barcodes
- Ethernet communications
- Up to 30 stored inspections
- Configured via touchscreen

Featured Solution
iVu GEN II BCR

Other Solutions
PresencePlus BCR

Key Benefits
- Robust barcode decoding
- Barcode data can be stored in PLC or set for simple pass fail
- Reduce downtime with saved inspections for different products
- No complex software minimizes necessary training for setup

Cabinet Lighting

Challenge
- Limited space inside panel
- Dark control panel makes it difficult to troubleshoot problems

Key Features
- 15 mm profile
- Completely sealed with an IP67 rating for use in wet or dusty environments

Featured Solution
WLS15

Other Solutions
WLB32

Key Benefits
- Low profile fits in tight spaces
- Will hold up and last a long time in tough environments
Sensors for Wash Down Areas

**Challenge**
- High pressure high temperature washdown
- Harsh cleaning agents degrade housing
- Thermal cycling causes condensation

**Featured Solution**
- T18-2

**Other Solutions**
- Q4X

**Key Features**
- IP69K-rated
- Ecolab certified
- Ultrasonically welded joints
- Epoxy encapsulated

**Key Benefits**
- Tested to withstand 1200 PSI and 180 °F washdown
- Chemically compatible with washdown chemicals
- Ultrasonically welded joints create one piece housing
- Epoxy-filled housing reduces potential for condensation

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Machine Illumination—Washdown

**Challenge**
- Machine illumination in close contact with food
- Wash down area
- Food contamination hazards

**Featured Solution**
- WLS27

**Other Solutions**
- WLS15

**Key Features**
- Brilliant LED illumination in hygienic cylindrical design
- Rugged ultrasonically welded, IP69K construction and Ecolab certified
- Shatterproof copolyester housing

**Key Benefits**
- 50,000 hours lifetime, easy-to-clean light
- Specifically designed to withstand food and beverage industry applications
- No secondary enclosure needed to protect against broken lights

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Wash Down Touch Buttons

**Challenge**
- Control panel located in washdown area
- Workers use thick rubber gloves
- Food area

**Featured Solution**
- S22 Touch

**Key Features**
- Rugged IP69K construction
- Smart electric field sensing technology
- FDA-grade models available

**Key Benefits**
- Built for high-pressure washdown environments
- Easily actuated with bare hands or work gloves
- FDA-grade models for use in food environments
Safety Light Curtain—Wash Down Area

Challenge
- Safeguard food processing machine
- Wash down area with harsh chemicals
- Temperature cycling

Key Features
- End-to-end zone protection with no dip switches
- IP69K enclosure with 316L stainless steel end caps
- Hydrophobically vented

Featured Solution
EZ-SCREEN LS (IP69K)

Key Benefits
- Intuitive, easy-to-use
- Build to withstand high pressure, high temperature washdown
- Air vents with vapor barriers prevent condensation during thermal cycling

Safety Monitoring—Wash Down Area

Challenge
- Safeguard machine with varying safety add-ons depending on customer needs
- Complex logic or multiple safety scenarios
- Communicate with HMI to display machine status

Key Features
- Free, easy-to-use software using drag and drop function blocks
- Simulation mode
- Expandable I/O modules
- Industrial Ethernet communications and Profinet communications

Featured Solution
XS26-2

Key Benefits
- Configure safety program in minutes
- Test configuration without need to wire or even own safety controller
- Base controller with 26 inputs and two dual-channel safety outputs can be expanded to fit machine requirements
- Ethernet-enabled models allows for easy communications with PLC or HMI

E-Stop Safety—Wash Down Area

Challenge
- Holding up to a harsh environment
- Ability to identify which E-Stop was pressed
- Assembling components is time consuming

Key Features
- IP69K rated FDA Grade Silicon cover
- Ecolab certified
- Preassembled for fast installation
- Green/Red lighted base
- 8-pin Quick-Disconnect

Featured Solution
30 mm Mount E-Stop (IP69K)

Key Benefits
- Withstands high pressure and high temperature washdown
- Certified to withstand cleaning chemicals used in the food processing industry
- 360° visible indication of E-Stop actuation
- Easy installation with no assembly or wiring required
Packaging in the Beverage Industry

Beverage production offers some of the biggest challenges in factory automation. From severe conditions and harsh cleaning processes that can quickly degrade system components to safeguarding palletizers, conveyors, and other equipment that pose a safety hazard to personnel, each challenge works against total Overall Equipment Effectiveness (OEE) and the overall profitability of an organization.

Banner understands these challenges. Our industry knowledge, expertise in sensors, safety control, LED lights and indicators is combined the most comprehensive product catalogs in the industry. We are able to provide products and solutions that solve the unique challenges faced by beverage producers, helping them ensure and improve product quality, productivity, and safety, and achieve maximum Overall Equipment Effectiveness.
Solutions for Packaging in the Beverage Industry

**Shrink Sleeve Labelling At High Speeds**

**Challenge**
- High speed shrink sleeve applicator can run 800 bottles per minute
- Precise leading-edge sensing to center sleeve on bottle

**Key Features**
- 700 µs response time
- Laser-based retroreflective sensor

**Featured Solution**
QS18 LLP

**Other Solutions**
DF-G2
QS18 Clear Object Detection

**Key Benefits**
- Fast response time to easily keep up with bottling line
- Narrow laser beam ensures repeatable leading-edge sensing

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**Line Pressure Control**

**Challenge**
- Sensing bottle stoppage and shortage often requires two sensors
- On and Off-delay logic to ignore passing bottles requires additional PLC programming
- Bottles can be clear to opaque and filled or empty

**Key Features**
- Dual discrete output
- Programmable output logic
- Dual mode/Clear Object Detection mode

**Featured Solution**
QS18 LLP

**Other Solutions**
DF-G2
QS18 Clear Object Detection

**Key Benefits**
- One sensor solution instead of two
- On and off-delays within sensor reduce PLC programming
- Robust clear object sensing using distance and intensity changes

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**Roll Diameter**

**Challenge**
- Flexible packaging often contains vibrant, multi-colored graphics of varying reflectivity that can be difficult to reliably sense
- Variable roll stock diameter increases changeover time when sensors need to be adjusted

**Key Features**
- Laser triangulation with linear array technology
- Ready to measure full scale out of box or can be programmed with integrated LCD display

**Featured Solution**
LE250/550

**Other Solutions**
Q4X
LTF

**Key Benefits**
- Ensures repeatability and accuracy for challenging targets regardless of color, reflectivity, or angle
- Reduces downtime between product changeover

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See page 43

See page 40

See page 44
Clear Bottle Tipped

**Challenge**
- Detect downed bottles to prevent jams on filling line
- Bottles can be plastic, glass, clear or opaque

**Key Features**
- Single-point teach mode
- Coaxial polarized optics

**Featured Solution**
QS18 Clear Object Detection

**Other Solutions**
Q4X

**Key Benefits**
- Easy teach process minimizes install time
- Coaxial optics ensure reliable sensing regardless of material or opacity

Level Fill

**Challenge**
- Sense liquid in bottles of various colors from clear to opaque
- Sense under-filled clear or opaque bottles

**Key Features**
- 1450 nm wavelength detects water-based liquids inside translucent or opaque plastic and glass bottles
- Use of apertures to decrease the minimum detectable change in liquid level

**Featured Solution**
QS30H2O

**Other Solutions**
DF-G3LIR

**Key Benefits**
- See through bottles and detect water-based liquids
- Under-filled bottles can be removed from bottling line
Data Code Presence

**Challenge**
- Laser etched date code changes regularly
- Product changeover requires parameter changes without connecting to a PC

**Featured Solution**
Nu Plus BCR Gen2

**Other Solutions**
VE  
P4 Omni

**Key Features**
- Easy-to-use toolset
- Integral and remote screen for configuration and troubleshooting
- Save and store 30 inspections

**Key Benefits**
- Quickly create barcode inspection
- No computer software needed for setup
- Save inspections for quick product changeover

Registration Mark on Shrink Sleeve Label

**Challenge**
- Repeatable sensing of registration mark
- Registration mark colors vary depending on product
- Shiny, high-gloss labels

**Featured Solution**
R58E

**Other Solutions**
R55F

**Key Features**
- 50 µs response time
- RGB LED
- Smart gain-control algorithm

**Key Benefits**
- Quick response time ensures repeatable sleeve length
- RGB LED optimizes contrast
- Smart gain-control maximizes performance on low-contrast or high-gloss applications
Sensors for Wash Down Areas

**Challenge**
- Case packers are subject to washdown procedures
- Cases are often multicolored and have a glossy finish

**Key Features**
- IP69K, FDA-grade materials
- Ultrasonically welded housing and epoxy encapsulated cavities
- High excess gain

**Featured Solution**
- T18-2

**Other Solutions**
- M18-4

**Key Benefits**
- Built to withstand high-pressure, high-temperature washdown
- One-piece construction eliminates adhesives and effectively seals out moisture
- Minimal color sensitivity prevents chattering output on difficult targets

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Machine Illumination—Washdown

**Challenge**
- Enclosed area is dark, making it hard for operators to see potential problems
- Filler machine is subject to washdown procedures
- Secondary lighting enclosure to protect against broken pieces

**Key Features**
- Bright LED illumination rated for 50k hours
- Hygienic, IP69K, Ecolab certified housing
- Shatterproof copolyester shell

**Featured Solution**
- WLS27

**Other Solutions**
- WLS28-2

**Key Benefits**
- Long lasting LED lights require minimal maintenance
- Rugged design stands up to demanding washdown procedures
- Shatterproof housing can be installed directly inside the machine without worry

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Wash Down Touch Buttons

**Challenge**
- Control panel located in washdown area
- Workers use thick rubber gloves
- Food area

**Key Features**
- Rugged, fully encapsulated IP69K construction
- Smart electric field sensing
- FDA-grade models available

**Featured Solution**
- S22 Touch

**Key Benefits**
- Built for high-pressure washdown environments
- Easily actuated with bare hands or work gloves
- FDA-grade models for use in food environments
### Cabinet Lighting

**Challenge**
- Limited space inside panel
- Dark control panel makes it difficult to troubleshoot problems

**Featured Solution**
- WLS15

**Other Solutions**
- WL332

**Key Features**
- 15 mm profile
- Completely sealed with an IP67 rating for use in wet or dusty environments

**Key Benefits**
- Low profile fits in tight spaces
- Will hold up and last a long time in tough environments

### Machine Indication

**Challenge**
- Ability to easily see indicator status from all angles in high ambient light conditions
- Machines use combination of AC and DC power sources
- Installation/Assembly time

**Featured Solution**
- TL50

**Other Solutions**
- TL70

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

**Key Benefits**
- High visibility of on and off states
- Flexibility to work with machines regardless of power supply
- Fast installation as no assembly is required
Safety Monitoring

**Challenge**
- Safeguard machine with variable safety add-ons depending on customer needs
- Complex logic or multiple safety scenarios
- Communicate with HMI to display machine status

**Key Features**
- Free, easy-to-use software using drag and drop function blocks
- Simulation mode
- Expandable I/O modules
- Ethernet and Profinet communications

**Featured Solution**
XS26-2

**Other Solutions**
SC26-2

**Key Benefits**
- Configure safety program in minutes
- Test configuration without need to wire or even own safety controller
- Base controller with 26 inputs and two dual-channel safety outputs can be expanded to fit machine requirements
- Ethernet-enabled models allow for easy communications with PLC or HMI

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Safety Light Curtain—Wash Down Area

**Challenge**
- Safeguard beverage palletizer
- Wash down area with harsh chemicals
- Temperature cycling

**Key Features**
- End-to-end zone protection with no dip switches
- IP69K enclosure with 316L stainless steel end caps
- Air vent with vapor barrier

**Featured Solution**
EZ SCREEN LS (IP69K)

**Key Benefits**
- Intuitive, easy-to-use safety light curtains
- Built to withstand high pressure high temperature washdown
- Air vents with vapor barriers prevent condensation during thermal cycling

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E-Stop Safety—Wash Down Area

**Challenge**
- Harsh environment with high pressure washdown
- Difficult to tell what E-Stop is pressed when wired in series
- Modular systems are time consuming to install

**Key Features**
- IP69K rated FDA Grade Silicon cover
- Ecolab certified
- Green/Red lighted base
- 8-pin Quick-Disconnect

**Featured Solution**
30 mm Mount E-Stop (IP69K)

**Key Benefits**
- Withstands high pressure and high temperature washdown
- Certified to withstand cleaning chemicals used in the food processing industry
- 360° visible indication of E-Stop actuation
- Easy installation with no assembly or wiring required

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**Other Solutions**
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- Easy installation with no assembly or wiring required
Packaging in Consumer Goods

From stand-up pouches packed in bliss boxes to plastic clam shells shrink-wrapped together, the size, shape and materials used to package a product are becoming increasingly diverse. To accommodate this diversity, packaging automation is becoming more intelligent to support a greater number of SKUs on production lines. With the accelerating pace of packaging automation comes greater need to safeguard packaging equipment.
### Shiny Product Detection

**Challenge**
- Reflective, irregular shaped objects can cause erratic and inconsistent readings
- No gap between products as they come down the conveyor
- PLCs with slow scan times may not keep up with high speed lines

**Key Features**
- High excess gain and dynamically adjusted laser power
- Built-in Foreground Suppression Mode
- On-delay and off-delay logic built into sensor

**Key Benefits**
- Excess gain and dynamic laser power allows the sensor to reliably measure shiny objects at steep angles
- Foreground Suppression Mode allows a sensing window to be set on the apex of the container as it passes by
- Built-in on and off-delays can extend output time

**Featured Solution**
- Q4X

**Other Solutions**
- LTF

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### Material Thickness—Diaper

**Challenge**
- Control thickness of absorbent material
- Porous or uneven material causes erratic reading
- Quickly change measurement range for product changeover

**Key Features**
- Laser triangulation distance measurement
- Advanced measurement algorithms
- Two-line, eight-character display with pushbutton programming

**Key Benefits**
- Repeatable and accurate measurements regardless of target’s color or texture
- Perform average, max/min, measurement range readings instead of a single point measurement
- Easy setup, troubleshooting, and real-time feedback

**Featured Solution**
- LE 550/250

**Other Solutions**
- Q4X

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### Roll Diameter

**Challenge**
- Accurately measure roll diameter of various materials
- Large parent rolls of material
- Easy to setup without need to present full/empty roll

**Key Features**
- Repeatable sensing regardless of texture, color, or angle of target
- 12 m and 24 m ranges available
- Two-line, eight-character display with push button input

**Key Benefits**
- Accurate measurement reduces waste left on the core
- Long ranges for large rolls and easy alignment with visible laser spot
- Pushbutton interface allows for easy setup, adjustment, and troubleshooting

**Featured Solution**
- LTF

**Other Solutions**
- LE550
Clear Object Detection

**Challenge**
- Two sensors used to sense down bottle and prevent jams on filling line
- Containers can be plastic, glass, clear or opaque

**Key Features**
- Single-point teach mode
- Coaxial polarized optics

**Featured Solution**
QS18 Clear Object Detection

**Other Solutions**
Q4X

**Key Benefits**
- Easy teach process minimizes install time
- Coaxial optics ensure reliable sensing regardless of material or opacity

---

Fill Level

**Challenge**
- Sense underfilled bottles through an opaque container
- Need to see through plastic bottle, but not clear liquid inside
- Repeatable level control

**Key Features**
- 1450 nm wavelength LED emitter
- 8 m model QS30H2O sensor
- Apertures available

**Featured Solution**
QS30H2O

**Other Solutions**
DF-G3LIR

**Key Benefits**
- Special wavelength that cannot see through water-based liquids
- Long range sensor can see through bottles, but not water-based liquid inside
- Use of apertures narrow the effective beam for precise fill level

---

Web Monitoring/ Splice Detection

**Challenge**
- Material texture and transparency vary
- Dusty environment
- Easy setup

**Key Features**
- Variety of opposed mode fiber arrays for edge guiding
- High excess gain with auto thresholding
- Option for mid-point teach mode

**Featured Solution**
DF-G3

**Key Benefits**
- Opposed mode fiber arrays minimize effects of changing textures and transparencies
- Able to burn through dust and compensate for dust that settles on fibers
- Mid-point teach learns the optimal web position with an easy single-point teach
Label and Cap Verification

**Challenge**
- Ensure cap integrity, label verification and bottle orientation before case packer
- High product changeover
- Vision systems can be complex and require computer software

**Key Features**
- Multiple vision tools in one inspection
- Save up to 30 inspections
- Configuration via integrated or remote display

**Featured Solution**
- Ivu Plus TG Gen2

**Other Solutions**
- VE

**Key Benefits**
- One Ivu vision sensor can inspect both cap and label using easy-to-use Match tool
- Preconfigured inspections reduce downtime between product changeovers
- No complex software to learn, easily troubleshoot problems through integral or remote screen

---

Visual Web Inspection

**Challenge**
- Operator visually inspects web of non-woven material for holes or thin spots
- Product changeover and operator changes require easy adjustability to get proper contrast
- Fluorescent lights require maintenance and risk of broken glass

**Key Features**
- Bright, uniform light
- Dimming capable via potentiometer or remote input
- Rugged metal housing, shatterproof light cover, long-lasting energy-efficient LEDs

**Featured Solution**
- WLB92

**Other Solutions**
- WLB32

**Key Benefits**
- Uniform light acts as backlight to see thin spots on web
- Easily dimmable to accommodate operator preferences and product changes
- Industrial-grade design provides maintenance-free illumination

---

Cabinet Lighting

**Challenge**
- Limited space inside panel
- Dark control panel makes it difficult to troubleshoot problems

**Key Features**
- 15 mm profile
- Completely sealed with an IP67 rating for use in wet or dusty environments

**Featured Solution**
- WLS15

**Other Solutions**
- WLB32

**Key Benefits**
- Low profile fits in tight spaces
- Will hold up and last a long time in tough environments
### E-Stop Safety

**Challenge**
- Many E-stops in series make it difficult to tell which one is pressed.
- Modular systems are time consuming to install.

**Key Features**
- Green/Red lighted base
- 8-pin Quick-Disconnect

**Featured Solution**
30 mm Mount E-Stop

**Other Solutions**

**Key Benefits**
- 360 visible indication of E-Stop actuation reduces downtime.
- Easy installation with no assembly or wiring required.

---

### Safety Light Curtain

**Challenge**
- Safeguard palletizing machine.
- Alignment of light curtains over large span.
- In an area where accidental impact can occur and cause damage.

**Key Features**
- End-to-end zone protection with no dip switches.
- Bi-color alignment indicators.
- Metal end caps, this aluminum housing with 5 mm recessed window.

**Featured Solution**
EZ-SCREEN LS

**Other Solutions**
EZ-SCREEN LP

**Key Benefits**
- Intuitive, easy-to-use safety light curtains.
- Highly visible indicators streamline alignment process and facilitate easy troubleshooting.
- Heavy duty housing to avoid damage from impact.

---

### Safety Monitoring

**Challenge**
- Safeguard machine with variable safety add-ons depending on customer needs.
- Complex logic or multiple safety scenarios.
- Communicate with HMI to display machine status.

**Key Features**
- Free, easy-to-use software using drag and drop function blocks.
- Simulation mode.
- Expandable I/O modules.
- Ethernet and Profinet communications.

**Featured Solution**
XS26-2 Safety Controller

**Other Solutions**
SC26-2

**Key Benefits**
- Configure safety program in minutes.
- Test configuration without need to wire or purchase safety controller.
- Base controller with 26 inputs and two dual-channel safety outputs can be expanded to fit machine requirements.
- Ethernet-enabled models allows for easy communications with PLC or HMI.
Packaging in the Pharmaceutical Industry

Around the world, companies operating in the pharmaceutical manufacturing industries rely on Banner Engineering for our industry knowledge, experience and expertise to provide products and solutions that improve automation efficiency, maintain product quality, and protect operator safety.

Banner is an expert in advanced optics, LED, laser, and photoelectric circuits, offering sensors for tablet fill level monitoring and count verification, cap and closure inspection, print and label verification, and product identification and serialization. We have the industry’s most complete family of safeguarding devices, allowing customers to design the highest level of safety into a machine, without compromising productivity. LED products from Banner provide clear status indication and bright, uniform illumination for machines, processes and workstations. We have a complete line-up of actuators, ideal for medical assembly, medical kitting and storage retrieval systems.
Solutions for Packaging in the Pharmaceutical Industry

Liquid Level Detection

**Challenge**
- Detect liquid level in different color vials and bottles
- Limited space to mount a sensor

**Featured Solution**
- DF-G3LIR Water sensor with a pair of IT43ST5-VL fiber optic bundle and L2 Lens

**Other Solutions**
- QS30H2O

**Key Features**
- Detect water-based liquids inside translucent or opaque plastic and glass containers
- Compatible with standard glass fibers

**Key Benefits**
- Reduce product waste by detecting underfilled vials early in the packaging process
- Quick and simple installation with many small fiber optic bundles styles to choose from

Clear Vial Detection

**Challenge**
- Reliably sense different vials of varying sizes, transparencies, and materials without a retroreflector
- Exposure to sterilizing chemicals

**Featured Solution**
- DF-G3LIR Water sensor with a pair of IT43ST5-VL fiber optic bundle and L2 Lens

**Other Solutions**
- QS30H2O

**Key Features**
- Algorithm uses distance and intensity for clear object detection
- FDA grade 316 Stainless Steel housing that is IP69K washdown rated and Ecolab certified

**Key Benefits**
- Reliably detect transparent objects without a reflector
- Reduced downtime from reflectors fogging up
- Reduced unscheduled down time from mechanical failure due to the SIP environment

Vibratory Feeder – Stopper Fill Level

**Challenge**
- Prevent frequent start/stops
- Reliably detect stoppers of different colors, sizes, and shapes

**Featured Solution**
- Q4X

**Other Solutions**
- Q60 (Adj. Field)
- QS30 (Adj. Field)

**Key Features**
- Independent and adjustable on delays and off delays
- Reliably measure distance regardless of the surface reflectivity or color

**Key Benefits**
- Increase the vibratory bowl’s product life by reducing the start/stop frequency by ignoring signal noise
- A single sensor and setup will work detect all stopper variations, reducing change over time
Raised/Missing Stopper inspection

**Challenge**
- The height of the vials can vary
- Do not want to support a complex “vision system”

**Key Features**
- Find and inspect key features
- Integral and Remote Touch Screen for programming

**Featured Solution**
- iVu Plus TG Gen2

**Other Solutions**
- VE
- Q4X

**Key Benefits**
- No need to mechanically move the iVu Plus when the height of the vial changes, which reduces downtime
- Easy configuration without a PC reduces setup time

---

Label Verification

**Challenge**
- Position and type of the barcode on the label varies between product SKUs
- Ability to view inspection status without connecting to a PC

**Key Features**
- Imager-based barcode reader can read all the standard 1D and 2D barcodes within the sensing window
- Integral and Remote Touch Screen for configuring and viewing captured images

**Featured Solution**
- iVu Plus BCR Gen2

**Other Solutions**
- PresencePLUS OMNI
- TCNM Barcode Reader

**Key Benefits**
- No required mechanical adjustments reduces changeover times
- Reduce unplanned down time by making all the necessary adjustment right on the integrated touch screen

---

Machine Illumination and Status Indication

**Challenge**
- Easily identify when the machine requires an operator intervention
- Hygienic requirements and shatterproof design inside a packaging area

**Key Features**
- Ability to switch between colors from a 24 V dc input
- Encased in a shatterproof, chemically resistant, IP69K copolyester shell

**Featured Solution**
- WLS27 (Dual Color)

**Other Solutions**
- WLS28-2 (Dual Color)

**Key Benefits**
- Quickly identify the machine requiring operator intervention by illuminating the entire machine
- Reduce installation costs by installing the worklight without an additional protective housing
Blister Filling Inspection

**Challenge**
- Partial tables can fall into a blister cavity
- The size of the blister pack and number of blisters per pack change frequently

**Key Features**
- 2 megapixel imager
- Store hundreds of configurations on the VE smart camera
- Standard Ethernet communication protocols like Ethernet/IP, and FTP

**Key Benefits**
- Detect small defects and partial tablets
- Rapid product changeovers
- Easily export results and images to central database

---

Roll Diameter Measurement to Reduce Waste

**Challenge**
- Flexible packaging often contains vibrant, multi-colored, graphics of varying reflectivity that can be difficult to reliably sense
- Varying size of roll stock increases changeover time when sensors need to be adjusted

**Key Features**
- Uses laser triangulation with linear array technology
- Ready to measure right out of the box or can be programmed with the integrated LCD display

**Key Benefits**
- Ensures repeatability and accuracy for challenging targets regardless of color, reflectivity, or angle
- Reduces downtime with rapid product changeovers

---

Tablet Counting During Bottle Filling

**Challenge**
- Tablet dust can accumulate in the environment
- Tablet can be as small as 2 mm in diameter

**Key Features**
- Automatic Gain Compensation (AGC) algorithm compensates for dust build-up on fiber optics
- 40 mm fiberoptic array can detect objects as small as 2 mm

**Key Benefits**
- Ensures repeatability and accuracy for challenging targets regardless of color, reflectivity, or angle
- Reduces downtime with rapid product changeovers

---

See page 43

See page 48

See page 61
E-Stop Safety—Pharmaceutical Isolator

**Challenge**
- Harsh environment with exposure to cleaning chemicals
- Difficult to tell what E-Stop is pressed when wired in series
- Modular systems are time consuming to install

**Key Features**
- IP69K FDA Grade Silicon cover
- Ecolab certified
- Green/Red lighted base
- 8-pin Quick-Disconnect

**Featured Solution**
30 mm Mount E-Stop (IP69K)

**Key Benefits**
- Certified to withstand cleaning chemicals used in the pharmaceutical industry
- 360° visible indication of E-Stop actuation
- Easy installation with no assembly or wiring required

Safety Light Curtain—Pharmaceutical Isolator

**Challenge**
- Safety light curtains that scan across the isolator internally must be easily cleaned and hold-up to the sterilization process
- Safeguarding large filling and packaging systems have multiple safeguarding points and zones

**Key Features**
- IP67/IP69K, hygienically designed and chemically-resistant tubular enclosed EZ-SCREEN LS
- Scalable safety solution

**Featured Solution**
EZ-SCREEN LS (IP69K)

**Other Solutions**
EZ-SCREEN LP

**Key Benefits**
- Designed to work in the harsh environment of a sterile filling and packaging systems

Safety Monitoring

**Challenge**
- Safeguard machine with variable safety add-ons depending on customer needs
- Complex logic or multiple safety scenarios
- Communicate with HMI to display machine status

**Key Features**
- Free, easy-to-use software using drag and drop function blocks
- Simulation mode
- Expandable I/O modules
- Ethernet and Profinet communications

**Featured Solution**
XS26-2

**Other Solutions**
SC26-2

**Key Benefits**
- Configure safety program in minutes
- Control and monitor all the safety devices on the filling equipment
- Test configuration without need to wire or even own safety controller
- Base controller with 26 inputs and two dual-channel safety outputs can be expanded to fit machine requirements
- Ethernet-enabled models allow for easy communications with PLC or HMI
Solutions for Remote Monitoring

Real-time monitoring of machine status allows supervisors to address any issues as they arise, minimizing machine downtime and potentially resolving small issues before they become big problems. Providing clear indication of status at a machine is a necessary requirement. Communicating that status information from a machine to other devices makes it possible for personnel to monitor multiple machines on a factory floor from a convenient location.
Temperature and Vibration Monitoring

**Challenge**
- Off-line motor testing requires costly down time and can miss changes between testing.
- On-line or dynamic testing may neglect key symptoms that indicate motor decline.

**Key Features**
- Sensor continuously monitors RMS velocity and temperature to detect problems early.
- Monitor remotely using wireless I/O instead of running cable.
- Schedule maintenance without disrupting production by getting email or text in real time when vibration threshold has been exceeded.

**Key Benefits**
- Automate the testing process to save time and better predict mechanical failure.
- Save maintenance costs by scheduling motor rework rather than unplanned downtime.

**Featured Solution**
QMV42VT1 or QMV42T2 (with DX80 nodes, Q45U Nodes, or MultiHop Modbus RTU radios)

Temperature and Humidity Monitoring

**Challenge**
- Running power and signal wire to sensors may require long conduit runs overhead or underground.
- Conduit runs over production lines lead to costly downtime.
- Checking temperature and humidity manually is time consuming and the human factor can lead to errors.

**Key Features**
- Battery-powered nodes with compatible temperature and humidity sensors are perfect for ease of installation.
- Temperature accuracy of +/- 0.3 °C and humidity accuracy of +/- 2% relative humidity.
- Signal is transmitted wirelessly over radio frequencies.
- Up to 47 nodes can be added per gateway creating an efficient network collecting data from multiple points.

**Key Benefits**
- Effective solution that reduces the scrap product from out of specification temperatures or humidity.
- Easily monitor environmental conditions in locations previously too difficult or expensive to access.

**Featured Solution**
M12FTH (with DX80 Node, Q45U Node, or MultiHop Modbus RTU radios)

Barrel, Tote, or Tank Level Inspection

**Challenge**
- Difficult to tell how much liquid product is in a barrel, tote or tank.
- Running out of product at the wrong time can be a hassle and create unnecessary production loss.
- Running cables for power and signal wires to barrels, totes or tanks for automatic level monitoring can be expensive and creates a potential tangled mess as items are moved around.

**Key Features**
- Ultrasonic sensor specifically for tank level monitoring, is optimized for power consumption and has threaded housing to fit a bung of a barrel or tote.
- Utilizes power from batteries inside the node for ease of installation and use.
- Signal can be monitored remotely with no cables by using wireless radio waves.

**Key Benefits**
- Easily monitor remote and mobile barrels, totes and tanks.
- Empty barrels are switched with full ones in a timely manner with no production loss.
- Manage inventory with real time data indicating when to re-order materials.

**Featured Solution**
K50U Ultrasonic (with DX80 Node, Q45U Node, or MultiHop Modbus RTU radios)
Wireless Clean Room Indication

**Challenge**
- Monitor the status of each clean room in one central location without adding long conduit runs
- Signal personnel when it is safe to enter and exit the clean room.

**Key Features**
- Up to 47 wireless nodes can wirelessly send a wide variety of data to a central gateway.
- Logic controller with action rules and ScriptBasic programming.

**Key Benefits**
- Without adding additional wiring, send current temperature, humidity, pressure and entry/exit door status from every clean room to a central monitoring room.
- Wirelessly activate an indication light and lock or unlock the entry/exit doors based on the room parameters.

---

Machine Indicator Tower Lights with Wireless Connectivity

**Challenge**
- Placing indicators in locations that don’t have an existing signal cable
- Long conduit runs are costly and installation may cause unnecessary down time
- Legacy machines often don’t have the ability to send data to the network

**Key Features**
- Flexible solution for placing an indicator in the desired location
- Line of sight range of signal is up to 2 miles
- Bright LED's for easy visual monitoring of a machine’s condition
- Wireless connectivity enables machine status to be collected on legacy machines

**Key Benefits**
- Wireless connectivity results in more uptime and efficient troubleshooting
- Easy installation compared to hard wiring tower lights into the network

---

Line Throughput/Scoreboarding/Part Counting

**Challenge**
- Monitoring machine production throughput requires time-consuming electrical installation
- Each machine and production line may have unique product detection needs

**Key Features**
- Nodes on a machine monitor the signal on existing sensors and wirelessly transmit the signal back to a Gateway
- Log the data and communicate to the network or the cloud
- Show production metrics on scoreboard

**Key Benefits**
- Easy and cost effective installation
- Add counting capabilities to legacy machines

---

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LE Series

Laser Sensor

- The LE laser sensors are ready to measure right out of the box with easy adjustment, setup and use.
- Easy adjustment with a two-line, eight-character intuitive display
- Repeatability and accuracy for challenging targets, from metal to black rubber
- Visible 2 laser for small spot size and simple alignment
- Applications see page 10, 16, 24

Specifications

| Supply Voltage and Current | 12 to 30 V dc
| Normal Run Mode: 1.7 W, Current consumption less than 70 mA at 24 V dc |
| Sensing Beam | Visible red Class 2 laser, 650 nm |
| Construction | Housing: die-cast zinc  Lens: polycarbonate |
| Environmental Rating | IP67, NEMA 6 |
| Operating Conditions | Temperature: –20 to +55 ºC  Humidity: 90% at +55 ºC |

5-pin M12 Euro-Style with Shield
MQDEC2-515
MQDEC2-515RA
5 m (15)

Additional lengths available on bannerengineering.com
## LTF Series

### High-Performance Laser Time-of-Flight

- Best in class combination of range, repeatability and accuracy enable highly reliable target detection and precise distance measurement
- Two-line, eight-character display and push-button programming for easy setup, troubleshooting and real-time distance measuring
- Durable IP67 housing, high ambient light immunity and stable performance across temperatures provide reliable performance in challenging environments
- Advanced options, including delay timers, advanced triggered measurement modes and cross-talk avoidance
- Applications see page 10, 24

### Specifications

<table>
<thead>
<tr>
<th>Family</th>
<th>Range (m)</th>
<th>Output</th>
<th>Laser Class</th>
<th>Sensing Mode</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTF</td>
<td>12</td>
<td>I</td>
<td>C2</td>
<td>LD</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>= 4 to 20 mA analog and (1) NPN/PNP discrete</td>
<td>= Class 2</td>
<td>= Laser diffuse</td>
<td>= Rotatable M12 Euro QD</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>U = 0 to 10 V analog and (1) NPN/PNP discrete</td>
<td>K = Dual Discrete with IO-Link</td>
<td>QP = PVC M12 Euro Pigtail QD</td>
<td></td>
</tr>
</tbody>
</table>

- **Beam Spot Size**
  - Distance (mm): 50, 7500, 12000, 24000
  - Size: 6.5 mm, 10 mm, 12.5 mm, 35 mm

- **Repeatability** (1σ) ±0.15 to 2 mm (Slow 256 ms shown. For more info see datasheet.)

- **Resolution** < 0.3 to 3 mm (Resolution measured as twice repeatability with white target at slow response speed at 20 °C)

- **Construction** Die-cast zinc housing; acrylic window

- **Environmental Rating** IEC IP67; NEMA 6

- **Operating Conditions**
  - Temperature: −20 to +55 °C
  - Humidity: 90% at +55 °C maximum relative humidity (non-condensing)

- **Certifications**

---

*Images of LTF Series components and connector options are included.*
R58E Series

Registration Mark Sensor

- The R58E sensors offer maintenance-free, solid-state reliability for color contrast applications. With a fast, 50-microsecond sensing response time, the R58E provides excellent registration repeatability, even in speedy applications.
- Bipolar outputs
- 10,000 actuations per second and 15 microsecond repeatability
- Rugged mechanical housing rated to IP67
- Applications see page 18

Visible Red, Green or Blue LED, depending on registration mark

<table>
<thead>
<tr>
<th>Sensing Mode/LED</th>
<th>Focus</th>
<th>Connection</th>
<th>Output Type</th>
<th>Parallel</th>
<th>Perpendicular</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONVERGENT</td>
<td>10 mm</td>
<td>2 m</td>
<td>Bipolar NPN/PNP</td>
<td>R58E CRGB1</td>
<td>R58E CRGB2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-pin Euro-Pigtail QD</td>
<td>Bipolar NPN/PNP</td>
<td>R58E CRGB1Q</td>
<td>R58E CRGB2Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 m</td>
<td>PNP</td>
<td>R58B PCRGB1</td>
<td>R58B PCRGB2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-pin Euro-Pigtail QD</td>
<td>PNP</td>
<td>R58B PCRGB1Q</td>
<td>R58B PCRGB2Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 m</td>
<td>NPN</td>
<td>R58B NCRGB1</td>
<td>R58B NCRGB2</td>
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<tr>
<td></td>
<td></td>
<td>5-pin Euro-Pigtail QD</td>
<td>NPN</td>
<td>R58B NCRGB1Q</td>
<td>R58B NCRGB2Q</td>
</tr>
</tbody>
</table>

Specifications

<table>
<thead>
<tr>
<th>Supply Voltage and Current</th>
<th>10 to 30 V dc (10% max. ripple)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R58A: 36 mA exclusive of load</td>
<td></td>
</tr>
<tr>
<td>R58B &amp; R58E: 75 mA @ 10 V dc</td>
<td></td>
</tr>
<tr>
<td>35 mA @ 30 V dc</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output Configuration</th>
<th>R58 Expert &amp; R58A: Bipolar: One current sourcing (PNP) and one current sinking (NPN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R58B: Single output: One current sourcing (PNP) or one current sinking (NPN)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output Response Time</th>
<th>50 microseconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeatability</td>
<td>15 microseconds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction</th>
<th>Zinc alloy die-cast housing with black painted finish and o-ring sealed lens port cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lens: Acrylic</td>
<td></td>
</tr>
<tr>
<td>Lens port cap and lens holder: ABS</td>
<td></td>
</tr>
<tr>
<td>Sensitivity and LO/DO adjusters: Acetal</td>
<td></td>
</tr>
<tr>
<td>GD: Anodized aluminum</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Rating</th>
<th>IEC IP67</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Operating Conditions</th>
<th>Temperature: R58E: –10 to +50 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>R58A &amp; R58B: –10 to +55 °C</td>
<td></td>
</tr>
<tr>
<td>Relative humidity: 90% at 50 °C (non-condensing)</td>
<td></td>
</tr>
<tr>
<td>Storage temperature: -20 to +80 °C</td>
<td></td>
</tr>
</tbody>
</table>

Certification | CE |
Q4X Series
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
- Applications see page 10, 16, 24, 30, 32

Threaded

<table>
<thead>
<tr>
<th>Family</th>
<th>Housing Style</th>
<th>Output</th>
<th>Mode</th>
<th>Range</th>
<th>Connector</th>
</tr>
</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>18 mm Threaded Barrel</td>
<td>= Bipolar Discrete NPN &amp; PNP</td>
<td>= Laser Adjustable-Field</td>
<td>= 25-600 mm</td>
<td>= Integral QD</td>
</tr>
</tbody>
</table>

Flush

<table>
<thead>
<tr>
<th>Family</th>
<th>Housing Style</th>
<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>= Flush face</td>
<td>= 0 to 10 V Analog</td>
<td>= Laser Adjustable-Field</td>
<td>= 35-610 mm</td>
<td>= Integral QD</td>
</tr>
</tbody>
</table>

Specifications

| Supply Voltage and Current | 10 to 30 V dc at less than 675 mW | 12 to 30 V dc for Analog models |
| Sensing Beam | Visible red Class 1 laser, 655 nm |
| Output Response Time | User selectable: 50 ms, 25 ms, 10 ms, 3 ms and 1.5 ms |
| Construction | Housing 316 L stainless steel; PMMA acrylic lens cover, Polysulfone lightpipe and display window |
| Environmental Rating | IP67 per IEC60529; IP68 per IEC60529; IP69K per DIN40050-9 |
| Operating Conditions | Temperature: −10 °C to +50 °C | Humidity: 35% to 95% relative humidity |
| Certifications | chemical compatibility on some models; contact Banner Engineering for details |

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 (6.3')

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

5-pin Euro-Style
- Used with: Dual Discrete
- MQDC1-515
- MQDC1-515RA
- 5 m (15')

4-Pin Washdown Euro-Style
- Used for: Bipolar
- 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
Specifications

Supply Voltage and Current  
10 to 30 V dc (10% max. ripple) at less than 35 mA

Output Response Time*  
700 microseconds ON/OFF

Repeatability*  
130 microseconds

Construction  
Housing: ABS  
Lens Cover: acrylic  
Window: PMMA

Environmental Rating  
Rated IEC IP67; NEMA 6; UL Type 1

Operating Conditions  
Temperature: -10° to +50 °C  
Relative humidity: 90% @ 50 °C (non-condensing)

Certifications  

---

DC-Operated Long-Range Laser Sensors

- Narrow visible beam spot for easy alignment and small object detection
- Long sensing ranges
- Available in opposed, diffuse and retroreflective mode
- Applications see page 16

QS18 Laser

Family  
QS18

Output  
VP

Power  
6

Sensing Mode  
LLP = Polar retro

Connector  
Q8

- Blank = 2 m Integral Cable  
Q8 = M12 4-pin Euro QD

Additional lengths available on bannerengineering.com

4-pin M12 Euro-Style  
MQDC-415  
5 m (15’)

4-pin M12 Euro-Style with Shield  
MQDE2-415  
5 m (15’)

MQDC-415RA  
MQDE2-415RA
• Response speed of 400 μs ON/OFF
• Coaxial optics and small spot size for applications with space limitations
• ClearTracking algorithm provides reliable operation by compensating for dust build-up and ambient temperature changes
• Applications see page 11, 17, 25

**Clear Object Detection Sensor**

**QS18 Expert™**

- **Family**: QS18E
- **Output**: P
- **Power**: 6
- **Sensing Mode**: XLPC
- **Connector**: Q8

**Connector Options**

- **MQDC-415**: 4-pin M12 Euro-Style
- **MQDC-415RA**: 5 m (15’)
- **PKG4M-5**: 4-pin M8 Pico-Style
- **PKW4M-5**: 5 m (15’)

*All models require a reflector*

---

**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>10 to 30 V dc (10% max. ripple) at less than 35 mA, exclusive of load; 10 to 24 V dc @ greater than 55° C</td>
</tr>
<tr>
<td>Output Response Time</td>
<td>400 microseconds ON/OFF</td>
</tr>
<tr>
<td>Repeatability</td>
<td>100 microseconds</td>
</tr>
<tr>
<td>Range</td>
<td>Depends on reflector</td>
</tr>
<tr>
<td>Construction</td>
<td>Housing: ABS Window: PMMA</td>
</tr>
<tr>
<td>Environmental Rating</td>
<td>Meets NEMA 6; IEC IP67; UL Type 1</td>
</tr>
<tr>
<td>Operating Conditions</td>
<td>Temperature: -20° to +70° C Relative humidity: 90% @ 50° C (non-condensing)</td>
</tr>
<tr>
<td>Certifications</td>
<td></td>
</tr>
</tbody>
</table>
QS30 Water Detection

DC-Operated Long-Range Sensors

- Ability to work reliably in low contrast applications
- Ability to detect liquid in translucent and opaque bottles
- 1450 nm infrared wavelength to enhance contrast of clear liquids
- Applications see page 17, 25

<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>OPPOSED WATER DETECTION</td>
<td>4 m</td>
<td>2 m</td>
<td>Bipolar NPN/PNP LO</td>
<td>QS30EXH2O Emitter*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30ARXH2O</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 m</td>
<td>Analog 0-10 V</td>
<td>QS30RRXH2O</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 m</td>
<td>Bipolar NPN/PNP LO</td>
<td>QS30EXH20Q5 Emitter*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 m</td>
<td>Bipolar NPN/PNP DO</td>
<td>QS30ARXH20Q5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 m</td>
<td>Analog 0-10 V</td>
<td>QS30RRXH20Q5</td>
</tr>
</tbody>
</table>

| SUPER HIGH-POWER    | 8 m   | 2 m        | Bipolar NPN/PNP LO   | QS30EXSH2O Emitter*          |
|                     |       | 2 m        | Bipolar NPN/PNP DO   | QS30ARXSH2O                   |
|                     |       | 2 m        | Analog 0-10 V        | QS30RRXSH2O                   |

Specifications

Supply Voltage and Current
- Emitters (Water): 10 to 30 V dc (10% max. ripple) at less than 80 mA
- Receivers (Water): 10 to 30 V dc (10% max. ripple) at less than 65 mA
- Analog Receivers (water): 15 to 30 V dc (10% max. ripple) at less than 65 mA (exclusive of load)

Output Configuration
- Bipolar: One PNP (current sourcing) and one NPN (current sinking); Light Operate (LO) or Dark Operate (DO) selectable or configurable (depending on model)

Output Response Time
- Opposed (Water): 10 x excess gain or more– Standard: 1 millisecond ON/OFF
  2x to 10x excess gain– Standard: 3 milliseconds ON/OFF
- Super High-Power: 10 milliseconds ON/OFF
  Super High-Power: 30 milliseconds ON/OFF

Repeatability
- Opposed (Water): 10 x excess gain or more– Standard: 500 microseconds
  2x to 10x excess gain– Standard: 2.5 milliseconds
- Super High-Power: 5 milliseconds
  Super High-Power: 25 milliseconds

Construction
- Housing: ABS plastic
- Lens cover: acrylic

Environmental Rating
- Opposed (Water): IEC IP67 (nema 6); PW12 1200 PSI washdown per NEMA PW12

Operating Conditions
- Opposed (Water), Opposed (High-Power): -20° to +60° C
  Relative humidity: 90% (non-condensing)
**T18-2 Series**

Epoxy Encapsulated Right-Angle Sensor

- Chemically robust epoxy encapsulated plastic sensors for wash-down applications
- Permanent laser etched product marking will not wear off after repeated cleaning cycles
- Food grade plastics materials used for all exposed surfaces
- Powerful and bright visible red emitter beam for easy alignment and set-up
- Highly visible output and dual-function power and stability indicators
- Advanced ASIC technology makes sensor resistant to optical and electrical noise source
- Applications see page 12, 19

<table>
<thead>
<tr>
<th>Sensing Mode</th>
<th>Range</th>
<th>Output Type</th>
<th>Model*</th>
<th>Model with Red Emitter*</th>
<th>Model with Infrared Emitter*</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPPOSED</td>
<td>25 m</td>
<td></td>
<td>T18-2NAEL-2M Emitter</td>
<td>T18-2NAEL-2M IR Emitter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 m with beam inhibit</td>
<td></td>
<td>T18-2NAEJ-2M Emitter</td>
<td>T18-2NAEJ-2M IR Emitter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 m with adjustment</td>
<td></td>
<td>T18-2NAES-2M Emitter</td>
<td>T18-2NAES-2M IR Emitter</td>
<td></td>
</tr>
<tr>
<td>OPPOSED</td>
<td>25 m</td>
<td>Complementary NPN</td>
<td>T18-2VNRL-2M Receiver</td>
<td>T18-2VNRL-2M IR Receiver</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 m with adjustment</td>
<td>Complementary NPN</td>
<td>T18-2VPRRL-2M Receiver</td>
<td>T18-2VPRRL-2M IR Receiver</td>
<td></td>
</tr>
<tr>
<td>POLARIZED RETRO</td>
<td>6 m with BRT-84 reflector</td>
<td>Complementary NPN</td>
<td>T18-2VNLLP-2M Receiver</td>
<td>T18-2VNLLP-2M IR Receiver</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 m with BRT-84 reflector, with adjustment</td>
<td>Complementary NPN</td>
<td>T18-2VNLP-2M Receiver</td>
<td>T18-2VNLP-2M IR Receiver</td>
<td></td>
</tr>
<tr>
<td>RETRO</td>
<td>7.5 m with BRT-84 reflector, with adjustment</td>
<td>Complementary NPN</td>
<td>T18-2VNLV-2M Receiver</td>
<td>T18-2VNLV-2M IR Receiver</td>
<td></td>
</tr>
<tr>
<td>DIFFUSE</td>
<td>750 mm with adjustment</td>
<td>Complementary NPN</td>
<td>T18-2VNDL-2M Receiver</td>
<td>T18-2VNDL-2M IR Receiver</td>
<td></td>
</tr>
<tr>
<td></td>
<td>300 mm with adjustment</td>
<td>Complementary NPN</td>
<td>T18-2VNDL-2M Receiver</td>
<td>T18-2VNDL-2M IR Receiver</td>
<td></td>
</tr>
<tr>
<td>FIXED-FIELD</td>
<td>30, 50, 75, 100, 150, 200 mm</td>
<td>Complementary NPN</td>
<td>T18-2VNFF..-2M Receiver</td>
<td>T18-2VNFF..-2M IR Receiver</td>
<td></td>
</tr>
<tr>
<td></td>
<td>replace &quot;..&quot; in model number with range required</td>
<td>Complementary NPN</td>
<td>T18-2VNFF..-2M Receiver</td>
<td>T18-2VNFF..-2M IR Receiver</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T18-2VNP..-2M Receiver</td>
<td>Complementary PNP</td>
<td>T18-2VNP..-2M Receiver</td>
<td>T18-2VNP..-2M IR Receiver</td>
<td></td>
</tr>
</tbody>
</table>

* Only 2 m (6.5 ft) PVC cable models are listed. To order 9 m (30 ft) PVC cable models, add suffix "9M" (for example, T18-2VNDL-9M). To order 4-pin Euro M12 integral QD models, add suffix "Q8" (for example, T18-2VNDL-Q8).

---

**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply Voltage and Current</strong></td>
<td>10 to 30 V dc for ambient temperature ≤ 55 °C</td>
</tr>
<tr>
<td></td>
<td>10 to 24 V dc for ambient temperature &gt; 55 °C</td>
</tr>
<tr>
<td><strong>Output Configuration</strong></td>
<td>Complementary PNP or NPN by model number</td>
</tr>
<tr>
<td><strong>Output Response Time</strong></td>
<td>Response is independent of signal strength</td>
</tr>
<tr>
<td></td>
<td>Fixed Field models: 2 milliseconds ON, 2 milliseconds OFF</td>
</tr>
<tr>
<td></td>
<td>Delay on Power-up: 100 milliseconds; outputs do not conduct during this time</td>
</tr>
<tr>
<td><strong>Repeatability</strong></td>
<td>Repeatability is independent of signal strength</td>
</tr>
<tr>
<td></td>
<td>Retro, Polarized Retro, and Diffuse models: 100 microseconds</td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td>Housing, M12 QD, and cover: Black or Yellow PBT polyester</td>
</tr>
<tr>
<td></td>
<td>Indicator windows: Clear PST polyester</td>
</tr>
<tr>
<td></td>
<td>Front window: PMMA</td>
</tr>
<tr>
<td><strong>Environmental Rating</strong></td>
<td>IEC IP69K</td>
</tr>
<tr>
<td><strong>Operating Conditions</strong></td>
<td>−40 °C to +70 °C (−40 °F to +158 °F)</td>
</tr>
<tr>
<td></td>
<td>95% at +50 °C maximum relative humidity (non-condensing)</td>
</tr>
<tr>
<td><strong>Certifications</strong></td>
<td></td>
</tr>
</tbody>
</table>

---

**Additional**

- Stainless steel models available
- 4-pin Euro-Style
  - Used with: NPN, PNP, Dual Discrete
  - 4-pin Washdown Euro-Style
  - Used for: NPN, PNP, Dual Discrete
- MQDC-415
- MQDC-415RA
- MQDC-WDSS-0415

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
- Applications see page 25, 32

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>Channel 1: IO-Link, push/pull</td>
<td>DF-G3-KD-2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Channel 2: PNP only output, or input</td>
<td></td>
</tr>
<tr>
<td>Infrared, 850 nm</td>
<td>6,000 mm</td>
<td>2 m</td>
<td>Channel 1: IO-Link, push/pull</td>
<td>DF-G3IR-KD-2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Channel 2: PNP only output, or input</td>
<td></td>
</tr>
</tbody>
</table>

Single Output

<table>
<thead>
<tr>
<th>Sensing Beam Color</th>
<th>Range</th>
<th>Connection</th>
<th>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>
</tr>
<tr>
<td></td>
<td></td>
<td></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>
</tr>
<tr>
<td></td>
<td></td>
<td></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>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>
</tr>
<tr>
<td></td>
<td></td>
<td></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>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DF-G3IR-PD-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>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</td>
<td>DF-G3-NU-2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Current: 4-20 mA</td>
<td>DF-G3-NI-2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DF-G3-I-2M</td>
</tr>
<tr>
<td>Infrared, 850 nm</td>
<td>6,000 mm</td>
<td>2 m</td>
<td>Voltage: 0-10 V DC</td>
<td>DF-G3IR-NU-2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Current: 4-20 mA</td>
<td>DF-G3IR-NI-2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DF-G3IR-P-2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DF-G3IR-PI-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-G3 Series
Water Detection Fiber Optic Amplifiers

- 1450 nm infrared wavelength to enhance contrast of clear liquids
- Reliable detection of presence or absence of water-based liquids
- 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
- Applications see page 30

### 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>Long Infrared, 1450 nm</td>
<td>900 mm</td>
<td>2 m</td>
<td>DF-G3LIR-NS-2M</td>
<td>DF-G3LIR-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>Long Infrared, 1450 nm</td>
<td>900 mm</td>
<td>2 m</td>
<td>DF-G3LIR-ND-2M</td>
<td>DF-G3LIR-PD-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>Long Infrared, 1450 nm</td>
<td>900 mm</td>
<td>2 m</td>
<td>Voltage: 0-10 V DC</td>
<td>DF-G3LIR-NU-2M</td>
<td>DF-G3LIR-PU-2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Current: 4-20 mA</td>
<td>DF-G3LIR-NI-2M</td>
<td>DF-G3LIR-PI-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-G3LIR-Q3). To order M12 Euro pigtail, change suffix "2M" to "Q5" (for example, DF-G3LIR-Q5).

Additional DF-G1, DF-G2, and DF-G3 models are available at bannerengineering.com
Specifications

Supply Voltage and Current

<table>
<thead>
<tr>
<th></th>
<th>NPN/PNP Models: 10 to 30 V dc (10% max ripple)</th>
<th>IO-Link Models: 18 to 30 V dc (10% max ripple)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Mode: 960 mW, Current consumption &lt; 40 mA @ 24 V dc</td>
<td>ECO Display Mode: 720 mW, Current consumption &lt; 30 mA @ 24 V dc</td>
</tr>
</tbody>
</table>

Sensing Beam

|                      | DF-G3: Visible red, 635 nm | DF-G3IR: Infrared, 850 nm | DF-G3LIR: Long Infrared, 1450 nm |

Supply Protection Circuitry

Protected against reverse polarity, over voltage, and transient voltages

Output Configuration

<table>
<thead>
<tr>
<th></th>
<th>NPN/PNP Models: 1 current sourcing (PNP) or 1 current sinking (NPN) output, depending on model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voltage output models: 12 to 30 V dc (10% max ripple)</td>
</tr>
<tr>
<td></td>
<td>Standard Mode: 960 mW, Current consumption &lt; 40 mA @ 24 V dc</td>
</tr>
<tr>
<td></td>
<td>Current output models: 10 to 30 V dc (10% max ripple)</td>
</tr>
<tr>
<td></td>
<td>ECO Display Mode: 720 mW, Current consumption &lt; 30 mA @ 24 V dc</td>
</tr>
</tbody>
</table>

Voltage output models: 1 analog voltage output (user configurable as 1 V to 5 V or 0 V to 10 V) with 1 current sinking (NPN) or 1 current sourcing (PNP) discrete output

Current output models: 1 analog current output (4 mA to 20 mA) with 1 current sinking (NPN) or 1 current sourcing (PNP) discrete output

Output Rating

<table>
<thead>
<tr>
<th>Output Rating</th>
<th>100 mA max. load (derate 1 mA per °C above 30 °C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF-state leakage current:</td>
<td>NPN/PNP/current: &lt; 5 μA at 30 V dc</td>
</tr>
<tr>
<td>IO-Link: &lt; 50 μA at 30 V dc</td>
<td>ON-state saturation voltage: NPN: &lt; 1.5 V</td>
</tr>
<tr>
<td></td>
<td>PNP: &lt; 2 V</td>
</tr>
<tr>
<td></td>
<td>IO-Link: &lt; 2 V</td>
</tr>
</tbody>
</table>

Output Protection Circuitry

Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power up

Output Response Time

<table>
<thead>
<tr>
<th>Output Response Time</th>
<th>High Speed: 500 us</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard: 2 ms</td>
</tr>
<tr>
<td></td>
<td>Extra Long Range: 24 ms</td>
</tr>
<tr>
<td></td>
<td>Fast: 1000 us</td>
</tr>
<tr>
<td></td>
<td>Long Range: 8 ms</td>
</tr>
</tbody>
</table>

Delay at Power-up

500 milliseconds max.; outputs do not conduct during this time

Indicators

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Red 4-digit Display: Signal Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Green 4-digit Display: Threshold</td>
</tr>
<tr>
<td></td>
<td>(In Program Mode, Red and Green displays are used for programming menus)</td>
</tr>
<tr>
<td></td>
<td>Yellow LED: Output conducting</td>
</tr>
</tbody>
</table>

Construction

Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover

Environmental Rating

IEC IP50, NEMA 1

Operating Conditions

Temperature: –10 to +55 °C  Storage: –20 to +85 °C  Relative Humidity: 50% @ +50 °C (non-condensing)

Certifications

![CE](image)  ![Io-Link](image)
K50U Series

Ultrasonic Sensor for Wireless Level and Tank Monitoring

- Three meter sensing range with a 300 mm dead zone
- Provides a distance measurement from the target to the sensor
- Built-in temperature compensation
- Rugged design for demanding sensing environments; rated IEC IP67, NEMA 6P
- Functions as a Modbus slave device using RS-485
- Applications see page 36

### Specifications

<table>
<thead>
<tr>
<th>Supply Voltage and Current</th>
<th>Supply Voltage</th>
<th>I/O</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.6 to 5.5 V dc or 10 to 30 V dc</td>
<td>Distance to target using a 1-wire serial interface</td>
<td>K50UX1RA</td>
</tr>
<tr>
<td></td>
<td>3.6 to 5.5 V dc or 10 to 30 V dc</td>
<td>Distance to target using Modbus RS-485</td>
<td>K50UX2RA</td>
</tr>
</tbody>
</table>

- BWA-BK-006
  - Mounts both the K50U Ultrasonic sensor and a Wireless Q45 Node

- 5-pin Double Ended M12/Euro-Style with Shield
  - DEE2R-53D
  - 1 m (3')
  - Additional lengths available on bannerengineering.com

**BWA-BK-006**

Mounts both the K50U Ultrasonic sensor and a Wireless Q45 Node

**5-pin Double Ended M12/Euro-Style with Shield**

- DEE2R-53D
- 1 m (3')
- Additional lengths available on bannerengineering.com
## QT50U Series

### Long-Range Ultrasonic Sensors

- Features a small ultrasonic dead zone of 200 mm
- Available in a chemically resistant model with a Teflon® flange
- Detects targets at long ranges within confined areas, such as a storage tank, without interference from the tank walls
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience
- Applications see page 10

### 10-30 V DC

<table>
<thead>
<tr>
<th>Range</th>
<th>Connection</th>
<th>Output</th>
<th>Models*</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 mm to 8 m</td>
<td>2 m 5-pin Mini QD 5-pin Euro QD</td>
<td>Selectable 0 to 10 V dc or 4 to 20 mA</td>
<td>QT50ULB QT50ULBQ QT50ULB06</td>
</tr>
<tr>
<td>200 mm to 8 m</td>
<td>2 m 5-pin Mini QD 5-pin Euro QD</td>
<td>Selectable Dual NPN or PNP</td>
<td>QT50UDB QT50UDBQ QT50UDB06</td>
</tr>
</tbody>
</table>

### Universal Voltage, 85-264 V AC/48-250 V DC

<table>
<thead>
<tr>
<th>Range</th>
<th>Connection</th>
<th>Output Operation Mode</th>
<th>Models*</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 mm to 8 m</td>
<td>2 m 5-pin Micro QD 5-pin Mini QD</td>
<td>Window-limit (complementary outputs)</td>
<td>QT50UVR3W QT50UVR3WQ1 QT50UVR3WQ</td>
</tr>
<tr>
<td>200 mm to 8 m</td>
<td>2 m 5-pin Micro QD 5-pin Mini QD</td>
<td>Pump/level control (pump-in and pump-out logic)</td>
<td>QT50UVR3F QT50UVR3FQ1 QT50UVR3FQ</td>
</tr>
</tbody>
</table>

Add suffix -CRFV to model number for Teflon®-protected face and transducer.

### Specifications

- **Supply Voltage and Current**
  - Analog models: 10 to 30 V dc (10% max. ripple); 100 mA max @ 10 V, 40 mA max @ 30 V (exclusive of load)
  - Dual-discrete models: 10 to 30 V dc (10% max. ripple); 100 mA max @ 10 V, 40 mA @ 30 V (exclusive of load)

- **Output Configuration**
  - Analog models: Voltage sourcing: 0 to 10 V dc  Current sourcing: 4 to 20 mA
  - Dual-discrete models: Dual PNP or NPN, selectable using DIP switch

- **Linearity (Analog Models)**
  +/− 0.2% of span from 200 to 8000 mm; +/− 0.1% of span from 500 to 8000 mm (1 mm minimum)

- **Resolution/Repeatability**
  1.0 mm

- **Output Response Time**
  Analog models: 100 to 2300 milliseconds
  Dual-discrete models: 100 to 1600 milliseconds

- **Construction**
  - Transducer: Ceramic/Epoxy composite
  - Membrane Switch: Polyester
  - Housing: ABS/Polycarbonate
  - Lightpipes: Acrylic

- **Environmental Rating**
  - IEC IP67; NEMA 6P

- **Operating Conditions**
  - Temperature: -20 to +70 °C
  - Relative humidity: 100%

- **Certifications**
  - CE
**DXM Wireless Controller**

**Industrial Wireless Controller**

- ISM radios available in 900 MHz and 2.4 GHz for local wireless network
- Converts Modbus RTU to Modbus TCP/IP or Ethernet I/P
- Logic controller can be programmed using action rules and text language methods
- Cellular connectivity
- Micro SD card for data logging
- Email and text alerts
- Local I/O options: universal inputs, NMOS outputs, and analog outputs
- Powered by 12 to 30 V dc, 12 V dc solar panel, or battery backup
- RS-232, RS-485, and Ethernet communications ports; and a USB configuration port
- LCD display for I/O information and user programmable LED's
- Applications see page 37

### Description

<table>
<thead>
<tr>
<th>Description</th>
<th>Frequency</th>
<th>Models*</th>
</tr>
</thead>
<tbody>
<tr>
<td>DXM100 Controller, with DX80 Gateway, preconfigured as a protocol converter</td>
<td>900 MHz</td>
<td>DXM100-B1R1</td>
</tr>
<tr>
<td>DXM100 Controller, with DX80 Gateway, preconfigured as a protocol converter</td>
<td>2.4 GHz</td>
<td>DXM100-B1R3</td>
</tr>
<tr>
<td>DXM100 Controller with MultiHop Data Radio</td>
<td>900 MHz</td>
<td>DXM100-B1R2</td>
</tr>
<tr>
<td>DXM100 Controller with MultiHop Data Radio</td>
<td>2.4 GHz</td>
<td>DXM100-B1R4</td>
</tr>
<tr>
<td>DXM100 Controller with DX80 Gateway and CDMA cellular module, preconfigured as a protocol converter</td>
<td>900 MHz</td>
<td>DXM100-B1C1R1</td>
</tr>
<tr>
<td>DXM100 Controller with DX80 Gateway and CDMA cellular module, preconfigured as a protocol converter</td>
<td>2.4 GHz</td>
<td>DXM100-B1C1R2</td>
</tr>
</tbody>
</table>

* Additional local I/O available with the DXM150 models, contact Banner for more information

### Specifications

- **Supply Voltage**: 12 to 30 V dc or 12 V dc solar panel and 12 V sealed lead acid battery
- **Power Consumption**: 35 mA average at 12 V
- **Solar Power Battery Charging**: 1 Amp maximum with 20 Watt solar panel
- **Radio Range**: 900 MHz, 1 Watt: Up to 9.6 km (6 miles) 2.4 GHz, 65 mW: Up to 3.2 km (2 miles)
- **Logging**: 8 GB maximum; removable Micro SD card format
- **Protocols**: Modbus RTU Master/Slave, Modbus TCP, and Ethernet/IP
- **Construction**: Polycarbonate; DIN rail mount option
- **Environmental Rating**: IP20
- **Courtesy Power**: One; output at 5 volts , 500 mA maximum
- **Switched Power Outputs**: 5 V/400 mA maximum; 18 V/125 mA maximum
- **Analog Outputs**: 0 to 20 mA or 0 to 10 V dc output
  - Accuracy: 0.1% of full scale +0.01% per °C
  - Resolution: 12 bit
- **NMOS Outputs**: Less than 1 A max current at 30 V dc
  - ON-state saturation: less than 0.7 V at 20 mA
  - ON condition: Less than 0.7 V
  - Off condition: Open

### Certifications

- PSVINP-24-13 DIN Rail mount power supply
- PSD-24-4 Desktop style power supply
- 4-pin Male Euro-Style MQDMC-401
QM42 Series

Vibration and Humidity Sensors

- Provides high accuracy vibration (velocity RMS) and temperature measurements
- Manufactured with a robust zinc alloy housing
- Connects via a 1-wire serial interface
- Reduces labor costs by obviating manual checks and eliminating error
- Applications see page 36

### I/O Power Connection Models

<table>
<thead>
<tr>
<th>I/O</th>
<th>Power</th>
<th>Connection</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Wire Serial</td>
<td>3.6 to 5.5 V dc</td>
<td>3 m</td>
<td>QM42VT1</td>
</tr>
<tr>
<td>RS-485 Modbus</td>
<td>3.6 to 5.5 V dc low power option or 10 to 24 V dc</td>
<td>3 m</td>
<td>QM42VT2</td>
</tr>
</tbody>
</table>

### Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage and Current</td>
<td>3.6 to 5.5 V dc or 10 to 24 V dc</td>
</tr>
<tr>
<td>Vibration</td>
<td>Mounted base resonance: 5.5 kHz nominal</td>
</tr>
<tr>
<td></td>
<td>Measuring range: 0-48 mm/sec or 0-1.8 in/sec RMS</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>10 – 1000 Hz</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±10% 925 °C</td>
</tr>
<tr>
<td>Temperature</td>
<td>Measuring range: -40 to +105 °C (-40 to +221 °F)</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 °C</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±3 °C</td>
</tr>
<tr>
<td>Construction</td>
<td>Housing: Zinc alloy</td>
</tr>
<tr>
<td>Shock</td>
<td>400G</td>
</tr>
<tr>
<td>Environmental Rating</td>
<td>IEC IP67; NEMA 6</td>
</tr>
<tr>
<td>Operating Conditions</td>
<td>Temperature: -40 to +105 °C</td>
</tr>
<tr>
<td>Certifications</td>
<td>CE</td>
</tr>
</tbody>
</table>
M12F Series

Temperature and Humidity Sensors

- Manufactured with a robust metal housing
- Designed to work as a Modbus slave device via RS-485 or with Sure Cross® 1-wire serial interface -P6 nodes, -H6 Multi-Hop Radios, or Q45 Sensor Node DX80N2Q45TH
- Ships with aluminum grill filter cap; optional stainless steel 10 micrometer sintered filter available separately
- Applications see page 36

Temperature and Humidity

<table>
<thead>
<tr>
<th>I/O</th>
<th>Power</th>
<th>Connection</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-485 Modbus</td>
<td>3.6 to 5.5 V dc low power option or 12 to 24 V dc</td>
<td>5-pin Euro QD</td>
<td>M12FTH3Q</td>
</tr>
<tr>
<td>1-wire serial interface</td>
<td>3.6 to 5.5 V dc</td>
<td></td>
<td>M12FTH4Q</td>
</tr>
</tbody>
</table>

Temperature

<table>
<thead>
<tr>
<th>I/O</th>
<th>Power</th>
<th>Connection</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-485 Modbus</td>
<td>3.6 to 5.5 V dc low power option or 12 to 24 V dc</td>
<td>5-pin Euro QD</td>
<td>M12FT3Q</td>
</tr>
<tr>
<td>1-wire serial interface</td>
<td>3.6 to 5.5 V dc</td>
<td></td>
<td>M12FT4Q</td>
</tr>
</tbody>
</table>

M12F Specifications

<table>
<thead>
<tr>
<th>Supply Voltage and Current</th>
<th>3.6 to 5.5 V dc low power option or 12 to 24 V dc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>Humidity: 0.1% relative humidity Temperature: 0.1 °C</td>
</tr>
<tr>
<td>Construction</td>
<td>Housing: metal</td>
</tr>
<tr>
<td>Environmental Rating</td>
<td>IEC IP67; NEMA 6</td>
</tr>
<tr>
<td>Operating Conditions</td>
<td>Temperature: −40 °C to +85 °C</td>
</tr>
<tr>
<td>Certifications</td>
<td>CSA: Class I, Division 2, Groups A, B, C, D — Certificate 1921239</td>
</tr>
</tbody>
</table>
EZ-SCREEN® LS

Rugged Safety Light Screen with Enhanced Features

- Alignment indicators are highly visible and intuitive diagnostics simplify setup, facilitate troubleshooting and streamline installation
- No blind zone design provides end-to-end sensing to eliminate gaps in detection
- Metal end caps, thick aluminum housing and a recessed window to avoid damage from impact
- Standard pairs, cascade systems and extensive accessories to suit a wide variety of safeguarding configurations
- Applications see page 13, 21, 27, 33

### Hygienic Family

<table>
<thead>
<tr>
<th>System Type</th>
<th>Resolution</th>
<th>Defined Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>EZLSA-HTE</td>
<td>R</td>
<td>23 = 23 mm</td>
</tr>
<tr>
<td>E</td>
<td>280 = 280 mm</td>
<td>700 = 700 mm</td>
</tr>
<tr>
<td>R</td>
<td>280 = 280 mm</td>
<td>770 = 770 mm</td>
</tr>
<tr>
<td>P</td>
<td>280 = 280 mm</td>
<td>840 = 840 mm</td>
</tr>
<tr>
<td>14 = 14 mm</td>
<td>280 = 280 mm</td>
<td>910 = 910 mm</td>
</tr>
<tr>
<td>23 = 23 mm</td>
<td>280 = 280 mm</td>
<td>980 = 980 mm</td>
</tr>
<tr>
<td>40 = 40 mm</td>
<td>280 = 280 mm</td>
<td>1050 = 1050 mm</td>
</tr>
</tbody>
</table>

**Connector**

- Blank = 25 ft., 8-wire, high durometer PVC Cordset
- F = Remote Fixed Blanking model with additional 25 ft. cordset for blanking configuration

### Standard Family

<table>
<thead>
<tr>
<th>System Type</th>
<th>Resolution</th>
<th>Defined Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>14 = 14 mm</td>
<td>770</td>
</tr>
<tr>
<td>R</td>
<td>23 = 23 mm</td>
<td>770</td>
</tr>
<tr>
<td>P</td>
<td>40 = 40 mm</td>
<td>770</td>
</tr>
</tbody>
</table>

**Connector**

- P8 = 300 mm pigtail, 8-Pin M12 QD (individual Emitter or Receiver models)
- P88 = 300 mm pigtail, 8-Pin M12 QD (on BOTH Emitter and Receiver models)
- Blank = no pigtail, RD connection (for RDLS-8..D cordset)

### Cascadable Family

<table>
<thead>
<tr>
<th>System Type</th>
<th>Resolution</th>
<th>Defined Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>14 = 14 mm</td>
<td>770</td>
</tr>
<tr>
<td>R</td>
<td>23 = 23 mm</td>
<td>770</td>
</tr>
<tr>
<td>P</td>
<td>40 = 40 mm</td>
<td>770</td>
</tr>
</tbody>
</table>

**Connector**

- P8 = 300 mm pigtail, 8-Pin M12 QD (individual Emitter or Receiver models)
- P88 = 300 mm pigtail, 8-Pin M12 QD (on BOTH Emitter and Receiver models)
- Blank = no pigtail, RD connection (for RDLS-8..D cordset)

* 5-pin M12 QD options available (P5 or P55)
Specifications

Supply Voltage at the Device
24 V dc ±15% (use a SELV-rated power supply according to EN IEC 60950). The external voltage supply must be capable of buffering brief mains interruptions of 20 ms, as specified in IEC/EN 60204-1.

Short Circuit Protection
All inputs and outputs are protected from short circuits to +24 V dc or dc common.

Effective Aperture Angle (EAA)
Meets Type 4 requirements per IEC 61496-2.

Residual Ripple
±10% maximum.

Electrical Safety Class
III (per IEC 61140: 1997).

Operating Range
0.1 m to 12 m (4 in to 39 ft) — Range decreases with use of mirrors and/or lens shields:
- Lens shields — approx 10% less range per shield
- Glass-surface mirrors — approx 8% less range per mirror
See the specific mirror datasheet for more information.

Resolution
14 mm, 23 mm, or 40 mm, depending on model.

Mounting Hardware
Emitter and receiver each are supplied with a pair of swivel end-mounting brackets (EZLSA-MBK-11). Models 980 mm and longer are supplied with an additional center-mount bracket (EZLSA-MBK-12) for center support in applications with significant vibration. Mounting brackets are 8-gauge cold-rolled steel, black zinc finish.

Enclosure
Extruded aluminum housing with yellow polyester powder finish, standard and well-sealed, rugged die-cast zinc end caps, acrylic lens cover.

Safety Rating
Type 4 per IEC 61496-1, -2. Category 4 PL e per EN ISO13849-1. SIL3 per IEC 61508; SIL CL3 per IEC 62061.

Environmental Rating
Light Screen: IEC IP65/IEC IP67
Enclosure: IP69K

Operating Conditions
-20 to +55 °C (−4 to +131 °F) 95% maximum relative humidity (non-condensing).

Shock and Vibration
Components have passed vibration and shock tests according to IEC 61496-1. This includes vibration (10 cycles) of 10-55 Hz at 0.35 mm (0.014 in) single amplitude (0.70 mm peak-to-peak) and shock of 10 g for 6 milliseconds (6,000 cycles).

Certifications

Machine Interface Connections

<table>
<thead>
<tr>
<th>8-PIN RD Cordsets</th>
<th>RDLS-815</th>
<th>4.6 m (15')</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-pin M12 Euro-Style</td>
<td>ODE-850D</td>
<td>15.3 m (50')</td>
</tr>
<tr>
<td>8-pin Euro-Style Straight splitter</td>
<td>CSB-M1280M1280</td>
<td></td>
</tr>
</tbody>
</table>
| 8-pin Euro-Style double-ended male/female | DEE2R-815D | 4.5 m (15')
| | DEE2R-850D | 15.3 m (50')

Cascading Connections

| Double-ended RD to RD | DELS-118E | 2.5 m (8.2')
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DELS-1115E 4.6 m (15')</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional lengths available on bannerengineering.com
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 NFPA79 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
- Models designed to interface with Safety BUS nodes/gateways
- Applications see page 13, 21, 27, 33

<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/RED-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>

Additional lengths available on bannerengineering.com
### 30 mm E-Stop Push Button Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Housing / Button Mounting</strong></td>
<td>Polycarbonate / Polyamide</td>
</tr>
<tr>
<td>Threaded base has M30 x 1.5 external threads. (M30 hardware included)</td>
<td></td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>-25 to +55 °C</td>
</tr>
<tr>
<td><strong>Environmental rating</strong></td>
<td>IP65 (IEC60529)</td>
</tr>
<tr>
<td><strong>Operating Humidity</strong></td>
<td>45% to 85% RH (no condensation)</td>
</tr>
<tr>
<td><strong>Insulation Resistance</strong></td>
<td>100M minimum (500 V dc megger)</td>
</tr>
<tr>
<td><strong>Impulse Withstand Voltage</strong></td>
<td>2.5 kV</td>
</tr>
<tr>
<td><strong>Pollution Degree</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Overvoltage Category</strong></td>
<td>II</td>
</tr>
<tr>
<td><strong>Contact material / bounce</strong></td>
<td>Gold plated silver / 20 ms</td>
</tr>
<tr>
<td><strong>Electrical Life</strong></td>
<td>100,000 operations minimum, 250,000 operations minimum at 24 V ac/dc, 100 mA</td>
</tr>
<tr>
<td><strong>Mechanical Life</strong></td>
<td>250,000 operations</td>
</tr>
<tr>
<td><strong>B10d</strong></td>
<td>100,000 (based on ISO 13849-1(2006))</td>
</tr>
<tr>
<td><strong>Shock &amp; Vibration Resistance</strong></td>
<td>Operating extremes: 150m/s² (15G)</td>
</tr>
<tr>
<td>Operating extremes: 10 to 500 Hz, amplitude 0.35 mm acceleration 50 m/s²</td>
<td></td>
</tr>
<tr>
<td><strong>LED Illumination</strong></td>
<td>Color: Yellow - 590 nm, Red - 618 nm, Green - 525 nm</td>
</tr>
<tr>
<td>Flash Rate: 1.6 Hz at 50% duty cycle</td>
<td></td>
</tr>
<tr>
<td>Voltage/Current: 12 – 30 V dc; 120 mA at 12 V dc; 65 mA at 24 Vdc; 60 mA at 30 V dc, SSA-EB1..LGR-..</td>
<td></td>
</tr>
<tr>
<td>GREEN only: 12 – 30 V dc; 135 mA @ 12 V dc, 75 mA @ 24 V dc, 70 mA @ 30 V dc</td>
<td></td>
</tr>
<tr>
<td><strong>Electrical Rating</strong></td>
<td>Minimum load: 1 mA @ 5 V ac/dc</td>
</tr>
<tr>
<td>SSA-EB1xx-..Q5A/Q5B: 3A @ 250 V maximum</td>
<td></td>
</tr>
<tr>
<td>UL Applications (UL/cUL): 1.5A @ 250 V ac, 1A @ 30 V dc (pilot duty)</td>
<td></td>
</tr>
<tr>
<td>SSA-EB1xx-..ED1Q8: 2A at 60 V ac/75 V dc maximum</td>
<td></td>
</tr>
<tr>
<td>CE Applications: AC-15: 1.5A @ 250 V ac, DC-13: 1A @ 30 V dc</td>
<td></td>
</tr>
<tr>
<td><strong>Rated Insulation Voltage (Ui)</strong></td>
<td>250 V</td>
</tr>
<tr>
<td><strong>Rated Current (Ith)</strong></td>
<td>3A</td>
</tr>
<tr>
<td><strong>Rated Operating Voltage (Ue)</strong></td>
<td>See Electrical Rating</td>
</tr>
</tbody>
</table>

#### Rated Operating Current

<table>
<thead>
<tr>
<th>Safety Contact (NC)</th>
<th>AC 50/60 Hz</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistive Load (AC-12)</td>
<td></td>
<td>2A</td>
</tr>
<tr>
<td>Resistive Load (AC-15)</td>
<td>3A</td>
<td>1.5A</td>
</tr>
<tr>
<td>Inductive Load (DC-12)</td>
<td></td>
<td>0.4A</td>
</tr>
<tr>
<td>Inductive Load (DC-13)</td>
<td>0.22A</td>
<td>0.1A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety Contact (NC)</th>
<th>AC 50/60 Hz</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistive Load (AC-12)</td>
<td></td>
<td>2A</td>
</tr>
<tr>
<td>Resistive Load (AC-15)</td>
<td>3A</td>
<td>1.5A</td>
</tr>
<tr>
<td>Inductive Load (DC-12)</td>
<td></td>
<td>0.4A</td>
</tr>
<tr>
<td>Inductive Load (DC-13)</td>
<td>0.22A</td>
<td>0.1A</td>
</tr>
</tbody>
</table>

**SSA-EB1Pxx-xxECQ8**

See above for SSA-EB1P-22ECQ8 Monitor Contacts

<table>
<thead>
<tr>
<th>Safety Contact (NC)</th>
<th>AC 50/60 Hz</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistive Load (DC-12)</td>
<td></td>
<td>0.25A</td>
</tr>
<tr>
<td>Inductive Load (DC-13)</td>
<td>0.25A</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary Output (NO)</th>
<th>12 to 30 V dc (from pin 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistive Load (DC-12)</td>
<td>0.25A</td>
</tr>
<tr>
<td>Inductive Load (DC-13)</td>
<td>0.25A</td>
</tr>
</tbody>
</table>

### Design Standards

Compliant with EN/IEC 60497-1 / -5-1, ISO 13850, ANSI B11.19, ANSI NFPA79, IEC 60204-1

### Certifications

![CE, UL, KEMA]
XS26-2

Safety Controller

- Easy to both program and install while providing scalable flexibility to meet your growing automation needs.
- Allows up to eight expansion modules
- Configuration software free of charge
- Real-time live display feedback
- Intuitive functional diagram configuration; logic function blocks including AND, OR, XOR, NAND, NOR, SR Flip-flop, RS Flip-flop
- Ethernet models available providing up to 256 status outputs and non-safety virtual outputs
- Applications see page 13, 21, 27, 33

| Controller | Description | Model | Expansion Modules | Output Configuration | Model*
|-------------|-------------|-------|-------------------|----------------------|-------
|             | Expandable  | XS26-2|                   |                      |       |
|             | Expandable + Display | XS26-2d|                   |                      |       |
|             | Expandable + Ethernet | XS26-2e|                   |                      |       |
|             | Expandable + Display + Ethernet | XS26-2de|                   |                      |       |

<table>
<thead>
<tr>
<th>Description</th>
<th>Output Configuration</th>
<th>Model*</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Pin Safety input module</td>
<td>NA</td>
<td>XS8si</td>
</tr>
<tr>
<td>16 Pin Safety input module</td>
<td>NA</td>
<td>XS16si</td>
</tr>
<tr>
<td>Safety output module</td>
<td>2 dual channel PNP</td>
<td>XS2so</td>
</tr>
<tr>
<td>Solid-state safety output module</td>
<td>4 dual channel PNP</td>
<td>XS4so</td>
</tr>
<tr>
<td>Safety relay output module</td>
<td>2 NO/1NC</td>
<td>XS1ro</td>
</tr>
<tr>
<td>Safety relay output module</td>
<td>4 NO/2 NC</td>
<td>XS2ro</td>
</tr>
</tbody>
</table>

* All models come with screw terminals

Specifications

| Power | 24 V dc, ± 20% Ethernet models: add 40 mA Display models: add 20 mA Expandable models: add 3.6 A max. bus load |
| Safety Inputs (and Convertible I/O when used as inputs) | Input On threshold: > 15 V dc (guaranteed on), 30 V dc max. Input Off threshold: < 5 V dc and < 2 mA, –3 V dc min. Input current: 5 mA typical at 24 V dc, 50 mA peak contact cleaning current at 24 V dc Input lead resistance: 300 Ω max. (150 Ω per lead) Input requirements for a 4-wire Safety Mat: • Max. capacity between plates: 0.22 μF • Max. capacity between bottom plate and ground: 0.22 μF • Max. resistance between the 2 input terminals of one plate: 20 Ω |
| Solid State Safety Outputs | Input On threshold: > 15 V dc (guaranteed on), 30 V dc max. Input Off threshold: < 5 V dc and < 2 mA, –3 V dc min. Input current: 5 mA typical at 24 V dc, 50 mA peak contact cleaning current at 24 V dc Input lead resistance: 300 Ω max. (150 Ω per lead) Input requirements for a 4-wire Safety Mat: • Max. capacity between plates: 0.22 μF • Max. capacity between bottom plate and ground: 0.22 μF • Max. resistance between the 2 input terminals of one plate: 20 Ω |
| Response and Recovery Times | See Configuration Summary in the data sheet |
| Environmental Rating | NEMA 1 (IEC IP20), for use inside NEMA 3 (IEC IP54) or better enclosure |
| Operating Conditions | Temperature range: 0 to +55 °C |
| Mechanical Stress | Shock: 15g for 11 milliseconds, half sine, 18 shocks total (per IEC 61131-2) Vibration: 3.5 mm occasional / 1.75 mm continuous @ 5Hz to 9Hz, 1.0g occasional and 0.5g continuous @ 9Hz to 150Hz: all at 10 sweep cycles per axis (per IEC 61131-2) |
| Removable Terminals | Important: Clamp terminals are designed for 1 wire only. If more than 1 wire is connected to a terminal, a wire could loosen or become completely disconnected from the terminal, causing a short. Wire size: 24 to 12 AWG (0.20 to 3.13 mm²) Wire strip length: 7 to 8 mm (0.275 in to 0.315 in) |
| Design Standards | Category 4, PL e (EN ISO 13849) SIL CL 3 (IEC 62061, IEC 61508) |

Certifications

www.bannerengineering.com
VE Series

Versatile, Easy-To-Use Smart Cameras

- Available in 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 to achieve IP67 rating for use in harsh environments with heat, vibration, or moisture
- Applications see page 32

<table>
<thead>
<tr>
<th>Family</th>
<th>Resolution</th>
<th>Imager</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>VE202</td>
<td>WVGA, 752 x 480 pixels</td>
<td>G = Grayscale</td>
<td>1A = M12, 8-pin Euro-style female</td>
</tr>
<tr>
<td>VE201</td>
<td>1.3 MP, 1280 x 1024 pixels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VE200</td>
<td>2MP, 1600 x 1200 pixels</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specifications

<table>
<thead>
<tr>
<th>Power</th>
<th>12 to 30 V dc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete I/O</td>
<td>1 Trigger IN / 5 programmable I/O</td>
</tr>
<tr>
<td>Output Configuration</td>
<td>Optically isolated</td>
</tr>
<tr>
<td>Lens</td>
<td>C-mount</td>
</tr>
<tr>
<td>Communication</td>
<td>10/100/1000 Mbps Ethernet, Serial RS-232</td>
</tr>
<tr>
<td>Communication Protocols</td>
<td>Ethernet/IP, Modbus/TCP, PCCC, PROFINET, TCP/IP, FTP, and RS-232</td>
</tr>
<tr>
<td>Acquisition</td>
<td>256 grayscale levels</td>
</tr>
<tr>
<td>Frames per Second</td>
<td>VE202G1A: 50 fps, max. depending on inspection settings</td>
</tr>
<tr>
<td>VE202G2A: 50 fps,</td>
<td></td>
</tr>
<tr>
<td>VE201G1A: 60 fps,</td>
<td></td>
</tr>
<tr>
<td>VE201G1A: 60 fps</td>
<td></td>
</tr>
<tr>
<td>Image Size</td>
<td>752 x 480 pixels = VE200G1A</td>
</tr>
<tr>
<td>1280 x 1024 pixels = VE201G1A</td>
<td></td>
</tr>
<tr>
<td>1600 x 1200 pixels = VE202G1A, VE202G2A</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Housing: Aluminum</td>
</tr>
<tr>
<td>Display Label: Polyester</td>
<td></td>
</tr>
<tr>
<td>Connections</td>
<td>Communications: M12, 8-pin Euro-style male</td>
</tr>
<tr>
<td>Light Connector: M8, 3-pin Pico-style female</td>
<td></td>
</tr>
<tr>
<td>Power, Discrete I/O: M12, 12-pin Euro-style female</td>
<td></td>
</tr>
<tr>
<td>Software Tools</td>
<td>Average Gray, Bead, Blemish, Blob, Line Detect, Circle Detect, Edge, Locate, Logic, Match, Math, Measure, Object</td>
</tr>
<tr>
<td>Environmental Rating</td>
<td>IEC IP67 with optional lens cover</td>
</tr>
<tr>
<td>Certifications</td>
<td>CE, UL, LVD</td>
</tr>
</tbody>
</table>

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

Display Cover

Sealed Lens Cover

SMBVERA

SMBVEMP

Mounting plate with M8x1.25, 10-32, and 1/2-20 adapter holes

Ethernet Connection

12-pin Euro-Style 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

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

- Image sensor combines the simplicity of a photoelectric sensor and the intelligence of a vision sensor, providing high-performance inspection capabilities at your fingertips.
- All-inclusive image sensor with lens, light, IO and touch screen programming.
- Optional remote touch screen for programming.
- Profinet® communication protocol to simplify communications with some of the most commonly used industrial controllers in factory automation.
- Supports the ability to obtain results and command rapid product changeovers over TCP/IP, EtherNet/IP, Modbus/TCP protocols or PROFINET.
- Ability to change parameters on the fly.
- Additional sort tools, multi-tool and the ability to store up to 30 inspections.
- Applications see page 26, 31.

### IVU TG Plus Gen2

#### IVU2P = Match, Area, Blemish, Sort and Multi-tool with Ethernet and storage for 30 inspections

**Family**

<table>
<thead>
<tr>
<th>IVU2P</th>
<th>IVU2P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match</td>
<td>Area</td>
</tr>
<tr>
<td>Blemish</td>
<td>Sort</td>
</tr>
<tr>
<td>Sort</td>
<td>Match</td>
</tr>
</tbody>
</table>

**Touch Screen**

| TG = Integrated |
| R = Red |
| G = Green |
| W = White |
| I = Infrared |
| 6 = UV365 |
| 9 = UV395 |
| XC = C-mount** |
| X = No Ring Light |

**Ring Light Color**

**Lens (mm)**

<table>
<thead>
<tr>
<th>Lens (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04 = 4.3</td>
</tr>
<tr>
<td>06 = 6</td>
</tr>
<tr>
<td>08 = 8</td>
</tr>
<tr>
<td>12 = 12</td>
</tr>
<tr>
<td>16 = 16</td>
</tr>
<tr>
<td>25 = 25</td>
</tr>
<tr>
<td>Blank = No lens (only C-Mount)</td>
</tr>
</tbody>
</table>

* Remote display is required for set up and viewing of sensors with a remote touch screen.

** Requires C-mount lens.
### iVu & iVu Plus Specifications

#### General

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>10-30 V dc</td>
</tr>
<tr>
<td>Demo Mode</td>
<td>Full tool functionality on canned images</td>
</tr>
<tr>
<td>Sensor Lock</td>
<td>Optional password protection</td>
</tr>
<tr>
<td>Integrated Ring Light</td>
<td>Red, IR, Green, Blue, White, UV or no integrated ring light</td>
</tr>
<tr>
<td>Imager</td>
<td>1/3 inch CMOS 752 x 480 pixels; adjustable Field-of-View (FOV)</td>
</tr>
<tr>
<td>Lens Mount</td>
<td>M12 X 1 mm thread (c-mount lens); microvideo lens 4.3, 6, 8, 12, 16, 25 mm</td>
</tr>
<tr>
<td>Output Rating</td>
<td>150 mA</td>
</tr>
<tr>
<td>Exposure Time</td>
<td>0.1 milliseconds to 1.049 seconds</td>
</tr>
<tr>
<td>Construction</td>
<td>Black Valox™ sensor housing; acrylic window</td>
</tr>
<tr>
<td>External Strobe Output</td>
<td>+ 5 V dc</td>
</tr>
<tr>
<td>Environmental Rating</td>
<td>IP67</td>
</tr>
</tbody>
</table>

#### Model Specific

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Connection</td>
<td>Integrated and remote touch screen: 12-pin Euro-style (M12) male connector Accessory cordset required for operation; QD cordsets are ordered separately.</td>
</tr>
<tr>
<td>Supply Current</td>
<td>850 mA max. (exclusive of I/O load)</td>
</tr>
<tr>
<td>USB 2.0 Host</td>
<td>Integrated and remote touch screen: 4-pin Pico-style (M8) female connector Optional USB cordset required for operation of USB Thumb Drive. QD cordsets are ordered separately.</td>
</tr>
<tr>
<td>Ethernet Connection</td>
<td>iVu Plus TG: 4-pin Pico-style (M8) male connector. Ethernet cordsets are ordered separately.</td>
</tr>
<tr>
<td>Output Configuration</td>
<td>NPN or PNP, software on-screen selectable</td>
</tr>
<tr>
<td>Tools</td>
<td>Area, Blemish, Match and Sort</td>
</tr>
<tr>
<td>Display</td>
<td>Integrated touch screen: 88.5 mm (3.5”) LCD Color Integrated Display 320 x 240 pixels Remote touch screen: See RD35 Remote Display specifications</td>
</tr>
<tr>
<td>Acquisition</td>
<td>100 fps (frames per second) max.</td>
</tr>
<tr>
<td>Operating Conditions</td>
<td>Stable Ambient Temperature: Integrated touch screen: 0 to +45 °C Remote touch screen: 0 to +40 °C</td>
</tr>
<tr>
<td>Remote Display Connection</td>
<td>8-pin Euro-style (M12) female connector. Accessory cordset required for remote display; QD cordsets are ordered separately.</td>
</tr>
</tbody>
</table>

#### Certifications

- NOTE: iVu Plus remote must use Euro QD power cordset for CE compliance.

### iVu Remote Display Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen Size</td>
<td>3.5” diagonal</td>
</tr>
<tr>
<td>LCD Aspect Ratio</td>
<td>4:3</td>
</tr>
<tr>
<td>Display Resolution</td>
<td>320 x 240 RGB</td>
</tr>
<tr>
<td>Viewing Angle</td>
<td>60 degrees left, and 60 degrees right, 50 degrees up, and 55 degrees down</td>
</tr>
<tr>
<td>Housing Material</td>
<td>Zinc Zamac #3 (RD35), Polycarbonate (RD35)</td>
</tr>
<tr>
<td>Bracket Material</td>
<td>Delrin (RD35), ABS (RD35)</td>
</tr>
<tr>
<td>Stylus</td>
<td>Delrin</td>
</tr>
<tr>
<td>Display Weight</td>
<td>4.8 oz (RD35), 12 oz (RDM35)</td>
</tr>
<tr>
<td>Bracket &amp; Stylus Weight</td>
<td>1.1 oz</td>
</tr>
<tr>
<td>Connection</td>
<td>Molex HandyLink connector</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0° to + 40 °C</td>
</tr>
</tbody>
</table>
Vu Plus BCR Gen2

Bar Code Reader (BCR)

- Powerful, affordable inspection solution solves a wide variety of simple and complex applications
- Solve a variety of linear and 2D bar code applications
- First-time users can have it up and running in minutes
- Optional remote touch screen for programming
- Ability to change parameters on the fly
- Ethernet communication available
- Capable of storing and controlling up to 30 inspections for fast product change over
- Applications see page 11, 18, 31

Specifications

General

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>10-30 V dc</td>
</tr>
<tr>
<td>Demo Mode</td>
<td>Full tool functionality on canned images</td>
</tr>
<tr>
<td>Sensor Lock</td>
<td>Optional password protection</td>
</tr>
<tr>
<td>Integrated Ring Light</td>
<td>Red, IR, Green, Blue, White, UV or no integrated ring light</td>
</tr>
<tr>
<td>Imager</td>
<td>1/3 inch CMOS 752 x 480 pixels; adjustable Field-of-View (FOV)</td>
</tr>
<tr>
<td>Lens Mount</td>
<td>M12 X 1 mm thread (c-mount lens); microvideo lens 4.3, 6, 8, 12, 16, 25 mm</td>
</tr>
<tr>
<td>Output Rating</td>
<td>150 mA</td>
</tr>
<tr>
<td>Exposure Time</td>
<td>0.1 milliseconds to 1.049 seconds</td>
</tr>
<tr>
<td>Construction</td>
<td>Black PBT sensor housing; acrylic window; IVU Plus Integrated: Die cast zinc and Black PBT</td>
</tr>
<tr>
<td>External Strobe Output</td>
<td>+ 5 V dc</td>
</tr>
<tr>
<td>Environmental Rating</td>
<td>IP67</td>
</tr>
</tbody>
</table>

Model Specific

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Connection</td>
<td>12-pin Euro-style (M12) male connector Accessory cordset required for operation; QD cordsets are ordered separately.</td>
</tr>
<tr>
<td>Supply Current</td>
<td>850 mA max. (exclusive of I/O load)</td>
</tr>
<tr>
<td>USB 2.0 Host</td>
<td>4-pin Pico-style (M8) female connector Optional USB cordset required for operation of USB Thumb Drive. QD cordsets are ordered separately.</td>
</tr>
<tr>
<td>Ethernet Connection</td>
<td>4-pin Pico-style (M8) male connector. Ethernet cordsets are ordered separately.</td>
</tr>
<tr>
<td>Output Configuration</td>
<td>NPN or PNP, software selectable</td>
</tr>
<tr>
<td>Display</td>
<td>Integrated touch screen: 68.5 mm (2.7”) LCD Color Integrated Display 320 x 240 pixels Remote touch screen: See RD35 Remote Display specifications</td>
</tr>
<tr>
<td>Acquisition</td>
<td>Integrated and remote touch screen: 100 fps (frames per second) max.</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Stable Ambient Temperature: Integrated touch screen: 0 to +45 °C Remote touch screen: 0 to +40 °C</td>
</tr>
<tr>
<td>Remote Display connection</td>
<td>8-pin Euro-style (M12) female connector Accessory cordset required for remote display; QD cordsets are ordered separately.</td>
</tr>
<tr>
<td>Certifications</td>
<td>NOTE: IVU Plus remote must use Euro QD power cordset for CE compliance.</td>
</tr>
</tbody>
</table>

Remote display specifications on previous page.
# 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
- Professional quality and certified product
- Applications see page 11, 20, 26

## Specifications

### Supply Voltage and Current

<table>
<thead>
<tr>
<th>Light Length (mm)</th>
<th>Typical Current (A) at 25 °C</th>
<th>Maximum Current (A) at −40 °C</th>
<th>Lumens</th>
</tr>
</thead>
<tbody>
<tr>
<td>0220</td>
<td>0.19</td>
<td>0.24</td>
<td>175</td>
</tr>
<tr>
<td>0360</td>
<td>0.38</td>
<td>0.48</td>
<td>350</td>
</tr>
<tr>
<td>0500</td>
<td>0.57</td>
<td>0.72</td>
<td>525</td>
</tr>
<tr>
<td>0640</td>
<td>0.76</td>
<td>0.96</td>
<td>700</td>
</tr>
<tr>
<td>0920</td>
<td>1.14</td>
<td>1.44</td>
<td>1050</td>
</tr>
<tr>
<td>1200</td>
<td>1.52</td>
<td>1.92</td>
<td>1400</td>
</tr>
</tbody>
</table>

### Light Characteristics

- Color Temperature (CCT):
  - Daylight white: 5,000 K
  - Warm white: 3,000 K
  - CRI: 80 minimum

### Construction

- Clear anodized aluminum inner housing; Polycarbonate outer housing, Polyamide end caps

### Mounting

- Integral mounting slots for M4 (#8) screws, tighten to 5 in-lbf max torque
- Multiple bracket options available

### Environmental Rating

- Rated IEC IP66 and IEC IP67
- Suitable for wet locations per UL 2108

### Operating Conditions

- Temperature: −40 to +70 °C
- Storage Temperature: −40 to +70 °C

### Application Notes

- When connecting cascadable lights in series it is important not to exceed maximum current limitations:
  - Maximum length of light at 12 V dc = 2.4 m
  - Maximum length of light at 24 V dc = 6 m

### Certifications

- CE
- UL
- C2
- E476617

## LMBWLS15 Series

- WLS15 Series
- 15 mm low profile fits in tight spaces that other lights cannot
- Installs in minutes without impacting existing application framework
- Professional quality and certified product
- Applications see page 11, 20, 26

## Connector Options

- 2-pin Deutsch
- Single-ended cordset with straight connectors
- LMBWLS15 LMBWLS15-150S LMBWLS15MAG
- 2-pin Deutsch
- Single-ended cordset with straight connectors
- Additional cord lengths available on bannerengineering.com

- LMBWLS15 LMBWLS15-150S LMBWLS15MAG
- 2-pin Deutsch
- Single-ended cordset with straight connectors
- Additional cord lengths available on bannerengineering.com

## Table Options

- ...
WLS27 Series

LED Light Bar

- Encased in shatterproof, UV-stabilized, copolyester shells
- Round shape makes them suitable for laminar airflow applications
- Rugged, water-resistant IP66, IP67 and IP69K design
- Daisy chain power to multiple lights
- Capability to dim lights using the wiring pinout (Hi/Lo/Off)
- Automatic temperature protection built into the unit extends the product life
- Single- and dual-colored models available
- Applications see page 12, 19, 31

**Single Color**

<table>
<thead>
<tr>
<th>Family</th>
<th>Cascadable</th>
<th>Color</th>
<th>Lighted Length (mm)</th>
<th>Window</th>
<th>Construction</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLS27</td>
<td>X</td>
<td>W</td>
<td>285</td>
<td>D</td>
<td>S</td>
<td>Q</td>
</tr>
</tbody>
</table>

- C = Cascadable
- X = Non Cascadable
- Blank = Cool White
- WW = Warm White
- R = Red
- G = Green
- B = Blue
- Y = Yellow

- 145, 285, 430, 570, 710, 850, 990, 1130
- D = Diffused Plastic
- S = Sealed
- Q = Integral Euro QD [dc]

**Dual-Color**

<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>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLS27</td>
<td>X</td>
<td>C1 W, D1 R, C2 D2 2</td>
<td>285</td>
<td>D</td>
<td>S</td>
<td>Q</td>
</tr>
</tbody>
</table>

- C = Cascadable
- X = Non Cascadable
- Blank = Cool White
- WW = Warm White
- R = Red
- G = Green
- B = Blue
- Y = Yellow

- Density:
  - Blank = 100%
  - 2 = 50%
  - 3 = 33%

- 145, 285, 430, 570, 710, 850, 990, 1130
- D = Diffused Plastic
- S = Sealed
- Q = Integral Euro QD
### WLS27 Specifications

<table>
<thead>
<tr>
<th>Supply Voltage and Current</th>
<th>12 to 30 V dc  see data sheet for details by length</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Lumens</th>
<th>Length (mm)</th>
<th>One-Color WLS27 Lumens (Typical @ 25 °C)</th>
<th>Typical Wattage* (Watts)</th>
<th>Length (mm)</th>
<th>One-Color WLS27 Lumens (Typical @ 25 °C)</th>
<th>Typical Wattage* (Watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>145</td>
<td>325 Cool White 325 Warm White 55 Red 180 Green 40 Blue 50 Yellow 40</td>
<td>3.6</td>
<td>165</td>
<td>1625 Cool White 1625 Warm White 275 Red 900 Green 200 Blue 250 Yellow 250</td>
<td>18.5</td>
</tr>
<tr>
<td></td>
<td>285</td>
<td>650 Cool White 650 Warm White 110 Red 360 Green 80 Blue 100 Yellow 100</td>
<td>7.2</td>
<td>1950</td>
<td>1950 Cool White 1950 Warm White 330 Red 1080 Green 240 Blue 300 Yellow 300</td>
<td>22.1</td>
</tr>
<tr>
<td></td>
<td>430</td>
<td>975 Cool White 975 Warm White 165 Red 540 Green 120 Blue 150 Yellow 150</td>
<td>11.0</td>
<td>2275</td>
<td>2275 Cool White 2275 Warm White 385 Red 1260 Green 280 Blue 350 Yellow 350</td>
<td>25.9</td>
</tr>
<tr>
<td></td>
<td>570</td>
<td>1300 Cool White 1300 Warm White 220 Red 720 Green 160 Blue 200 Yellow 200</td>
<td>14.6</td>
<td>2600</td>
<td>2600 Cool White 2600 Warm White 440 Red 1440 Green 320 Blue 400 Yellow 400</td>
<td>29.8</td>
</tr>
</tbody>
</table>

*Typical operating wattage is measured at 24 V dc

<table>
<thead>
<tr>
<th>Light Characteristics</th>
<th>Color: Cool white  Color temperature (CCT): 6000–7100K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful Life</td>
<td>Lumen Maintenance - L70 When operating within specifications, output will decrease less than 30% after 50,000 hours.</td>
</tr>
<tr>
<td>Construction</td>
<td>Clear anodized aluminum housing; FDA-grade copolyester outer housing</td>
</tr>
<tr>
<td>Mounting</td>
<td>Bracket LMBWLS27EC included (2 for lights up to 570 mm or 3 for lights 710 mm and longer); see datasheet for additional options</td>
</tr>
<tr>
<td>Environmental Rating</td>
<td>IEC IP66, IP67, and IP69K, per DIN 40050</td>
</tr>
<tr>
<td>Operating Conditions</td>
<td>–40 to +70 °C</td>
</tr>
<tr>
<td>Certifications</td>
<td>CE UL D</td>
</tr>
</tbody>
</table>

---

**Standard**

- 4-pin Euro-Style
  - MQDC-415 5 m (15')
  - MQDC-415RA 5 m (15')
- 4-pin Euro-Style QD Double-Ended Straight/Straight
  - MQDEC-403SS 1 m (3')

**Length**

- Branches: 0.3 m
- Trunk: 0.3 m

**MQC-M1241M1241**

Additional cordset lengths available on bannerengineering.com

**IP69K Washdown**

- 4-pin M12 Euro-Style Washdown Cordset
  - MQDC-WDSS-0415 5 m (15')
  - MQDC-WDSS-403SS 1 m (3')

**Light Characteristics**

- MQDC-WDSS-0415: 4-pin Euro-Style QD Splitter models only

**MQDEC-WDSS-403SS**

- MQDEC-WDSS-403SS: 4-pin Euro-Style QD Double-Ended Washdown Straight/Straight

Additional cordset lengths available on bannerengineering.com

---

**WLS27 Specifications**

<table>
<thead>
<tr>
<th>Supply Voltage and Current</th>
<th>12 to 30 V dc  see data sheet for details by length</th>
</tr>
</thead>
</table>

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<thead>
<tr>
<th>Lumens</th>
<th>Length (mm)</th>
<th>One-Color WLS27 Lumens (Typical @ 25 °C)</th>
<th>Typical Wattage* (Watts)</th>
<th>Length (mm)</th>
<th>One-Color WLS27 Lumens (Typical @ 25 °C)</th>
<th>Typical Wattage* (Watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>145</td>
<td>325 Cool White 325 Warm White 55 Red 180 Green 40 Blue 50 Yellow 40</td>
<td>3.6</td>
<td>165</td>
<td>1625 Cool White 1625 Warm White 275 Red 900 Green 200 Blue 250 Yellow 250</td>
<td>18.5</td>
</tr>
<tr>
<td></td>
<td>285</td>
<td>650 Cool White 650 Warm White 110 Red 360 Green 80 Blue 100 Yellow 100</td>
<td>7.2</td>
<td>1950</td>
<td>1950 Cool White 1950 Warm White 330 Red 1080 Green 240 Blue 300 Yellow 300</td>
<td>22.1</td>
</tr>
<tr>
<td></td>
<td>430</td>
<td>975 Cool White 975 Warm White 165 Red 540 Green 120 Blue 150 Yellow 150</td>
<td>11.0</td>
<td>2275</td>
<td>2275 Cool White 2275 Warm White 385 Red 1260 Green 280 Blue 350 Yellow 350</td>
<td>25.9</td>
</tr>
<tr>
<td></td>
<td>570</td>
<td>1300 Cool White 1300 Warm White 220 Red 720 Green 160 Blue 200 Yellow 200</td>
<td>14.6</td>
<td>2600</td>
<td>2600 Cool White 2600 Warm White 440 Red 1440 Green 320 Blue 400 Yellow 400</td>
<td>29.8</td>
</tr>
</tbody>
</table>

*Typical operating wattage is measured at 24 V dc

---

**Light Characteristics**

- Color: Cool white  Color temperature (CCT): 6000–7100K

**Useful Life**

- Lumen Maintenance - L70 When operating within specifications, output will decrease less than 30% after 50,000 hours.

**Construction**

- Clear anodized aluminum housing; FDA-grade copolyester outer housing

**Mounting**

- Bracket LMBWLS27EC included (2 for lights up to 570 mm or 3 for lights 710 mm and longer); see datasheet for additional options

**Environmental Rating**

- IEC IP66, IP67, and IP69K, per DIN 40050

**Operating Conditions**

- –40 to +70 °C

**Certifications**

- CE UL D
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
- Applications see page 11, 20, 26

### WLB32 Series

**Example Model Number:** WLB32C285PBQ

<table>
<thead>
<tr>
<th>Family</th>
<th>Power</th>
<th>Cascadable</th>
<th>Lighted Length (mm)</th>
<th>Shield</th>
<th>Control</th>
<th>Connector</th>
<th>Plug Type**</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLB32</td>
<td></td>
<td>C</td>
<td>285</td>
<td>PB</td>
<td>Q</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Blank = DC
- Z = AC
- C = Cascadable
- Blank = No shield
- E = Eye shield
- Blank = None
- M = Motion Switch
- PB = Hi/Lo/OFF Switch
- Blank = 2 m Integral Cable (dc)
- Q = Integral Euro QO (dc)
- QM = AC

** Only needed for AC models

- B = North & Central America, Japan, Taiwan
- D = India, Sri Lanka, Nepal, Namibia
- EF = France, Belgium, Slovakia, Tunisia, Germany, Austria, Netherlands, Spain, S. Korea, Turkey, Poland
- G = UK, Ireland, Cyprus, Malta, Malaysia, Singapore, Hong Kong, Vietnam
- I = Australia, New Zealand, Papua New Guinea, Argentina, China
- N = Brazil, South Africa
- C = AC connector with flying leads
- Blank = AC (no power cord)
Specifications

Supply Voltage and Current  
12 to 30 V dc  
90 to 264 V ac

<table>
<thead>
<tr>
<th>Lighted Length (mm)</th>
<th>Max Current Draw (A)</th>
<th>Typical Current Draw (A)</th>
<th>Lumens</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DC</td>
<td>AC (at 90 V ac)</td>
<td>12 V DC</td>
</tr>
<tr>
<td>285</td>
<td>0.8</td>
<td>0.125</td>
<td>0.66</td>
</tr>
<tr>
<td>570</td>
<td>1.6</td>
<td>0.250</td>
<td>1.36</td>
</tr>
<tr>
<td>850</td>
<td>2.4</td>
<td>0.375</td>
<td>2.19</td>
</tr>
<tr>
<td>1130</td>
<td>3.2</td>
<td>0.500</td>
<td>3.02</td>
</tr>
</tbody>
</table>

Light Characteristics  
Color: Daylight white  
Color temperature (CCT): 5000K (±300K)

Useful Life  
Lumen Maintenance - L70 When operating within specifications, output will decrease less than 30% after 50,000 hours.

Push Button  
II = 100% intensity  
i = 50% intensity  
0 = Off

Construction  
Anodized aluminum housing; polycarbonate window and end caps; stainless steel mounting brackets

Mounting  
Snap clips; magnetic mount or swivel bracket accessories available

Environmental Rating  
IEC IP50

Operating Conditions  
DC models: –40 C to 70 °C  
AC models: –25 to 45 °C

Certifications  
[Images of certification logos]
## WLB92 Series

**LED Light Bar**

- Increase worker productivity and ergonomics with bright, high-quality, uniform light
- Durable light stands up in your environment with a rugged metal housing and shatterproof light cover
- No maintenance time or cost with long-life, energy-efficient LEDs
- Flexibility to place light where needed with ac and dc models
- Easy installation with variety of mounting options: surface, swivel, snap and hanging brackets
- AC models are DLC certified and have a five year warranty
- Applications see page 26

### 24 V DC

<table>
<thead>
<tr>
<th>Family</th>
<th>Voltage</th>
<th>Cascadable</th>
<th>Control</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLB92</td>
<td>Z</td>
<td>X</td>
<td>PB</td>
<td>Q</td>
</tr>
</tbody>
</table>

- X = Non Cascadable
- Blank = Daylight White
- WW = Warm White
- R = Red
- G = Green
- B = Blue
- Y = Yellow

### 100-277 V AC

<table>
<thead>
<tr>
<th>Family</th>
<th>Voltage</th>
<th>Cascadable</th>
<th>Control</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLB92</td>
<td>Z</td>
<td>C</td>
<td>PB</td>
<td>Q</td>
</tr>
</tbody>
</table>

- Z = AC
- C = Cascadable
- Blank = Daylight White
- WW = Warm White
- R = Red
- G = Green
- B = Blue
- Y = Yellow

### Specifications

- **Lighted Length (mm)**: 550
- **Control**: PB = Switch and Dimming Knob
- **Connector**: Q = Integral Euro QD (dc)

### Options

- **AC QM models**: PB = Switch and Dimming Knob
- **DC (2 m)**: QM

### Additional Information

- **Plug Type**
  - B = North & Central America, Japan, Taiwan
  - D = India, Sri Lanka, Nepal, Namibia
  - EF = France, Belgium, Slovakia, Tunisia, Germany, Austria, Netherlands, Spain, S. Korea, Turkey, Poland
  - G = UK, Ireland, Cyprus, Malta, Malaysia, Singapore, Hong Kong, Vietnam
  - I = Australia, New Zealand, Papua New Guinea, Argentina, China
  - N = Brazil, South Africa
  - C = AC connector with flying leads
  - Blank = AC (no power cord)

† Models with a connector include ON/OFF switch as well as a dimming knob for intensity control
†† Conduit entry models include dimmability via a 0 to 10 V input circuit
### Specifications

<table>
<thead>
<tr>
<th>Supply Voltage and Current</th>
<th>Max Current Draw (A)</th>
<th>Typical Current Draw (A)</th>
<th>Lumens</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 V dc +/- 10% 100 to 277 V ac</td>
<td>DC</td>
<td>AC (at 90 V ac)</td>
<td>24 V DC</td>
</tr>
<tr>
<td>550</td>
<td>1.75 A</td>
<td>0.425 A</td>
<td>1.45 A</td>
</tr>
<tr>
<td>1100</td>
<td>3.5 A</td>
<td>0.850 A</td>
<td>2.9 A</td>
</tr>
</tbody>
</table>

### Light Characteristics
- Color: Daylight white
  - Color temperature (CCT): 5000K (±300K)
- Color: Warm white
  - Color temperature (CCT): 3,000 K

### Useful Life
- Lumen Maintenance - L70 When operating within specifications, output will decrease less than 30% after 50,000 hours.

### Construction
- Anodized aluminum housing; polycarbonate window and end caps

### Mounting
- Several options available; see above and datasheet

### Environmental Rating
- IEC IP40

### Operating Conditions
- See datasheet

### Certifications
- UL
- DLC
- AC daylight white models only
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
- Models available with IO-Link communication
- Applications see page 20

**TL50 Tower Lights**

<table>
<thead>
<tr>
<th>Housing</th>
<th>Brightness</th>
<th>Supply Voltage</th>
<th>Color Position</th>
<th>Audible Alarm</th>
<th>Control</th>
<th>Housing Color</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL50</td>
<td>H</td>
<td>Blank = Standard</td>
<td>Blank = Audible Only</td>
<td>G = Green</td>
<td>K = IO-Link*</td>
<td>Blank = Black</td>
<td>Q = Euro Integral QD (dc only)</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>H = High Brightness</td>
<td>G = Green</td>
<td>T = Turquoise</td>
<td>C = Gray</td>
<td>Blank = Black</td>
<td>QP = Euro Pigtail QD (Available with Micro Pigtail QD for ac models if 4 segments or less)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y = Yellow</td>
<td>O = Orange</td>
<td>W = White</td>
<td>Blank = 2 m Integral Cable</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R = Red</td>
<td>V = Violet</td>
<td>M = Magenta</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B = Blue</td>
<td>S = Sky Blue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>W = White</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

- **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**
- **Models available with IO-Link communication**
- **Applications see page 20**

*These colors are not available in the high brightness models
**Positions 6 and 7 not available in high brightness models; Position 7 not available with audible
† IO-Link not available on high brightness or ac models

---

**TL50 Tower Lights**

<table>
<thead>
<tr>
<th>Audible</th>
<th>Sealed</th>
<th>Sealed Omni-Directional</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. intensity 92 db @ 1 meter (typical)</td>
<td>max. intensity 94 db @ 1 meter (typical)</td>
<td>max. intensity 99 db @ 1 meter (typical)</td>
</tr>
</tbody>
</table>

---

**LASER MARKING AVAILABLE**
Specifications

Supply Voltage and Current
- DC models: 18 to 30 V dc (10% max. ripple); or 21 to 27 V ac
- Standard Brightness:
  - Indicators: 45 mA max. current per LED color
  - Standard Audible Alarm (IP50): @ 25 mA max. current
  - Omni-Directional Sealed Audible Alarm: 45 mA max. current
- High Brightness: max. current per LED color:
  - Indicators: 18 V dc—100 mA; 30 V dc—60 mA; 21 V ac—80 mA; 27 V ac—70 mA
  - Standard Audible (IP50): 25 mA max. current
  - Sealed Audible Alarm (IP67): 35 mA max. current
- Audible only: @ 45mA max.

AC models:
- 100 to 240 V ac; 50 or 60 Hz

Indicators
- LEDs are independently selected—Green, Yellow, Red, Blue, White, Turquoise, Orange, Violet, Sky Blue or Magenta;
  1-7 colors depending on model

Supply Protection Circuity
- Protected against reverse polarity and transient voltages

Input Response Time
- Audible measurements are made in the direction sound exits the device. For standard audible models, this is the top of the unit (when mounted vertically, sound is directed toward the ceiling). For sealed audible models (IP67), sound exits the vented openings in the side of the unit, which should be oriented so that the sound is directed toward the machine operator(s). In environments with high ambient noise levels or high ceilings that absorb sound, the sealed version is recommended.
- Standard Audible Alarm: 2.7 KHz ± 500 Hz oscillation frequency; max. intensity 92 db @ 1 meter (typical)
- Sealed Audible Alarm: 29 KHz to 250 Hz oscillation frequency; max. intensity 94 db @ 1 meter (typical)
- Omni-Directional Sealed Audible Alarm with Intensity Adjustment: 2.1 KHz ± 250 Hz oscillation frequency; max intensity 95 dB at 1 meter (3.3 ft) (typical)

Audible Adjustments
- Standard Audible Alarm: Unscrew the cover (up to 1.5 turns max.) to adjust the audible intensity. (Do not exceed 1.5 turns or the cover may detach during operation.) For max. intensity, rotate the center plug 180° counterclockwise to remove it.
- Sealed Audible Alarm and Omni-Directional Sealed Audible Alarm with Intensity Adjustment: Rotate the front cover until the desired intensity is reached.

Construction
- Bases and Covers: ABS
- Light Segment: Polycarbonate

Environmental Rating
- General-Purpose: IEC IP67
- Audible: IEC IP50 or IEC IP67, depending on model

Operating Conditions
- General-Purpose: −40 to +50 °C
- Audible: −20 to +60 °C
- Relative Humidity: 95% @ 50 °C (non-condensing)
- Storage Temperature: −40 to +70 °C

Certifications
- CE
- UL
TL70 Series

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
- Applications see page 37

Preassembled DC

<table>
<thead>
<tr>
<th>Housing</th>
<th>Color/Position</th>
<th>Audible Alarm*</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL70</td>
<td>G R Y B W O</td>
<td>Blank = None, A = Audible (92 dB), AL = Louder Audible (85 - 101 dB), AP = Programmable Audible</td>
</tr>
</tbody>
</table>

Preassembled AC

<table>
<thead>
<tr>
<th>Housing</th>
<th>Color/Position</th>
<th>Audible Alarm*</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL70Z</td>
<td>G R Y B W O</td>
<td>Blank = None, A = Audible (92 dB), AL = Louder Audible (85 - 101 dB), AP = Programmable Audible</td>
</tr>
</tbody>
</table>

Preassembled Wireless

<table>
<thead>
<tr>
<th>Housing</th>
<th>Radio</th>
<th>Color/Position</th>
<th>Audible Alarm*</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL70</td>
<td>DXN2</td>
<td>W B G Y R O</td>
<td>Blank = None, A = Audible (92 dB), AL = Louder Audible (85 - 101 dB), AP = Programmable Audible</td>
</tr>
</tbody>
</table>

* Not available with six light modules
** Models with Q are limited to 4 modules

Requires Gateway or master radio of the same frequency
### Specifications

#### Supply Voltage and Current

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Blue, Green, White</th>
<th>Red, Yellow, Orange</th>
<th>Audible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum current</td>
<td>420 mA at 12 V dc</td>
<td>285 mA at 12 V dc</td>
<td>30 mA</td>
</tr>
<tr>
<td>per LED color</td>
<td>145 mA at 30 V dc</td>
<td>120 mA at 30 V dc</td>
<td>350 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>110 mA</td>
</tr>
</tbody>
</table>

#### Supply Protection Circuitry

Protected against reverse polarity and transient voltages

#### Indicator Response Time

**DC models:**
- OFF Response: 150 μs (maximum) at 12 to 30 V dc
- ON Response: 180 ms (maximum) at 12 V dc;
- 50 ms (maximum) at 30 V dc

**AC models:**
- OFF Response: 150 μs (maximum) at 12 to 30 V dc
- ON Response: 180 ms (maximum) at 12 V dc;
- 50 ms (maximum) at 30 V dc

#### Audible Alarm

2.6 KHz ± 250 Hz oscillation frequency; maximum intensity 92 dB at 1 m (3.3 ft) (typical)

#### Audible Adjustments

Rotate the cover until the desired volume is reached
Change in sound intensity from fully open to fully closed is 8 dB

#### Radio Range (Wireless Models)

- 900 MHz, 1 Watt (Internal antenna): Up to 3.2 km (2 miles)
- 2.4 GHz, 65 mW (Internal antenna): Up to 1000 m (3280 ft) with line of sight

#### Minimum Separation Distance (Wireless Models)

- 900 MHz, 1 Watt: 4.57 m (15 ft)
- 2.4 GHz, 65 mW: 0.3 m (1 ft)

#### Construction

- Bases, segments and Covers: Polycarbonate

#### Environmental Rating

- IEC IP65

#### Operating Conditions

- −40 to +50 °C
- Relative Humidity: 95% @ 50 °C (non-condensing)
- Storage Temperature: −40 to +70 °C

#### Certifications

- CE

K50L2 and K30L2

Domed Indicators

- Get seven colors via only three inputs
- Save controller outputs and wiring
- Improve production efficiency through enhanced visual management
- Install wherever you need indication to improve communication and productivity
- Standardize to simplify ordering and spare parts
- Collaborate with Banner on custom models
- Applications see page 12, 19

### Specifications

<table>
<thead>
<tr>
<th>Property</th>
<th>K50L2: 10 to 30 V dc; 220 mA Max. at 10 V dc; 100 mA Max. at 30 V dc</th>
<th>K30L2: 10 to 30 V dc; 60 mA Max. at 10 V dc; 30 mA Max. at 30 V dc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage and Current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Poly carbonate housing</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>−40 to 50 °C</td>
<td></td>
</tr>
<tr>
<td>Certifications</td>
<td>CE, UL Listed</td>
<td></td>
</tr>
</tbody>
</table>

Addition lengths available on bannerengineering.com

K30L2 accessories listed on next page.
S22 Touch Series

Flat 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
- Applications see page 12, 19

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 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>QP</td>
</tr>
</tbody>
</table>

- A = Normally Open
- R = Normally Closed
- M = Momentary
- L = Latching
- T = Touch
- S = Standard
- F = FDA Grade
- RGB7 = RGB Multicolor (7 colors)
- F2 = Multifunction
- Blank = 2 m Integral Cable
- QP = Euro Pigtail QD

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 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 R</td>
<td>Q</td>
</tr>
</tbody>
</table>

- A = Normally Open
- R = Normally Closed
- M = Momentary
- L = Latching
- T = Touch
- S = Standard
- F = FDA Grade
- Green (G)
- Yellow (Y)
- Red (R)
- Blue (B)
- White (W)
- Not used (X)
- H = Output only
- Blank = 2 m Integral Cable
- Q = Euro Integral QD
- QP = Euro Pigtail QD
- T = Terminal Screws

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>10 to 30 V dc</td>
</tr>
<tr>
<td>Supply Current</td>
<td>80 mA max current (exclusive of load)</td>
</tr>
<tr>
<td>Supply Protection Circuitry</td>
<td>Protected against reverse polarity and transient voltages</td>
</tr>
</tbody>
</table>
| Construction                 | Housing: Polycarbonate or FDA grade plastic, depending on model
|                              | Translucent dome: Polycarbonate or FDA grade plastic, depending on model
| Environmental Rating         | Standard: UL Type 4x; 13
|                              | FDA Grade: UL Type 4x
|                              | Cable, Pigtail, QD models: IEC IP66, IP67, IP69K per DIN 40050-9 on front and back
|                              | Terminal models: IEC IP66, IP67, IP69K per DIN 40050-9 on front only |
| Connections                  | 2 m PVC integral cable, integral Euro-style QD, 150 mm Euro-style pigtail QD or terminal |
| Operating Conditions         | Temperature: −40 to +50 °C
|                              | Storage Temperature: −40 to +70 °C |
| Certifications               | CE, UL, cULus, LSTB |

5-pin Euro QD
- MQDC1-515
- 5 m (15’)
- MQDC1-515RA
- 5 m (15’)

5-pin M12 Euro-Style Washdown Cordset
- Straight connector models only
- MQDC-WDSS-0515
- 5 m (15’)

Additional lengths available on bannerengineering.com
K70L Series

Medium-Sized Domed Indicator

- Bright, uniform indicator light
- All models have flashing input control
- Models are available with up to five colors in one device
- Rugged, water-resistant IP65-rated design
- 12 V to 30 V dc operations
- Wireless options available in either 900 MHz and 2.4 GHz ISM Bands
- Applications see page 37

Standard and Wireless

<table>
<thead>
<tr>
<th>Family</th>
<th>Model</th>
<th>Color</th>
<th>Input*</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>K70</td>
<td>L</td>
<td>W</td>
<td>G</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R</td>
<td>P</td>
</tr>
</tbody>
</table>

- L = Standard
- DXN2 = Wireless 2.4 GHz
- DXN9 = Wireless 900 MHz
- G = Green
- Y = Yellow
- R = Red
- B = Blue
- W = White
- P = PNP
- N = NPN

Connection Family:
- SMB30FA
- SMB22FVK
- SMB30SC
- SMB30A

Input:
- Leave blank for wireless

Specifications

<table>
<thead>
<tr>
<th>Supply Voltage and Current</th>
<th>K70L: 12 V to 30 V dc; 200 mA Max. at 12 V dc; 90 mA Max. at 30 V dc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Protection Circuitry</td>
<td>Protected against reverse polarity, transient voltages</td>
</tr>
<tr>
<td>Construction</td>
<td>Polycarbonate housing</td>
</tr>
<tr>
<td>Environmental Rating</td>
<td>K70L: IEC IP65</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>–40 to 50 °C</td>
</tr>
<tr>
<td>Certifications</td>
<td>CE (Depending on model)</td>
</tr>
</tbody>
</table>

Additional lengths available on bannerengineering.com
For the latest products, brackets, cordsets, accessories, and new solutions, find us on the web at www.bannerengineering.com.

You also have access to more detailed information such as engineering drawings, complete specifications, installation instructions, product configurators and product videos.
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