

Front End

Back End

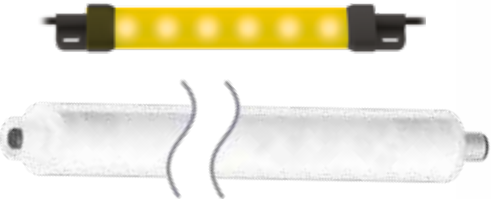


Detection
pages 4-5

- Front Edge Cassette Detection
- Wafer Mapping and Detection
- Integrated Circuit (IC) Chip Presence
- Wafer Center Detection
- Pouch Color Detection



Wafer Detection



Illuminate the Work Area with LED Lighting
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- Integrated Circuit (IC) Chip Orientation



Soldering Check

FOUP Process Status Indication

Machine and Process Status

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Communicate Status
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- Wafer Deposition Status Indication



Monitor Equipment
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- Equipment, Motors, and Machine Temperature and Vibration Monitoring
- Chip Shooter Temperature and Humidity Monitoring



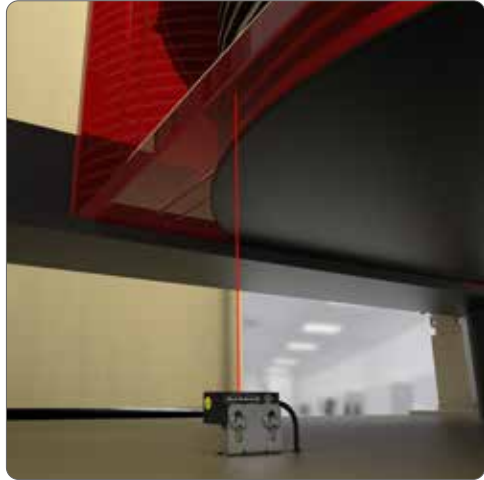
Prevent Staff from Bypassing Safety Functions

Increase Safety
page 8

- Battery Foil Slicer Safety



Sensor Solutions



Leading Edge Cassette Detection

Challenge

- Q2X reads the front edge of the cassette to make sure it is placed properly for barcode reading and loading
- Provides reliable leading edge detection

Key Features

- Small high-visibility red LED or Class 1 laser emitter for easy alignment
- Industry standard mounting
- Many connection types and output configurations available
- Crosstalk immunity algorithm allows two sensors to be used in close proximity

Featured Solution

- Q2X Series Miniature Sensor

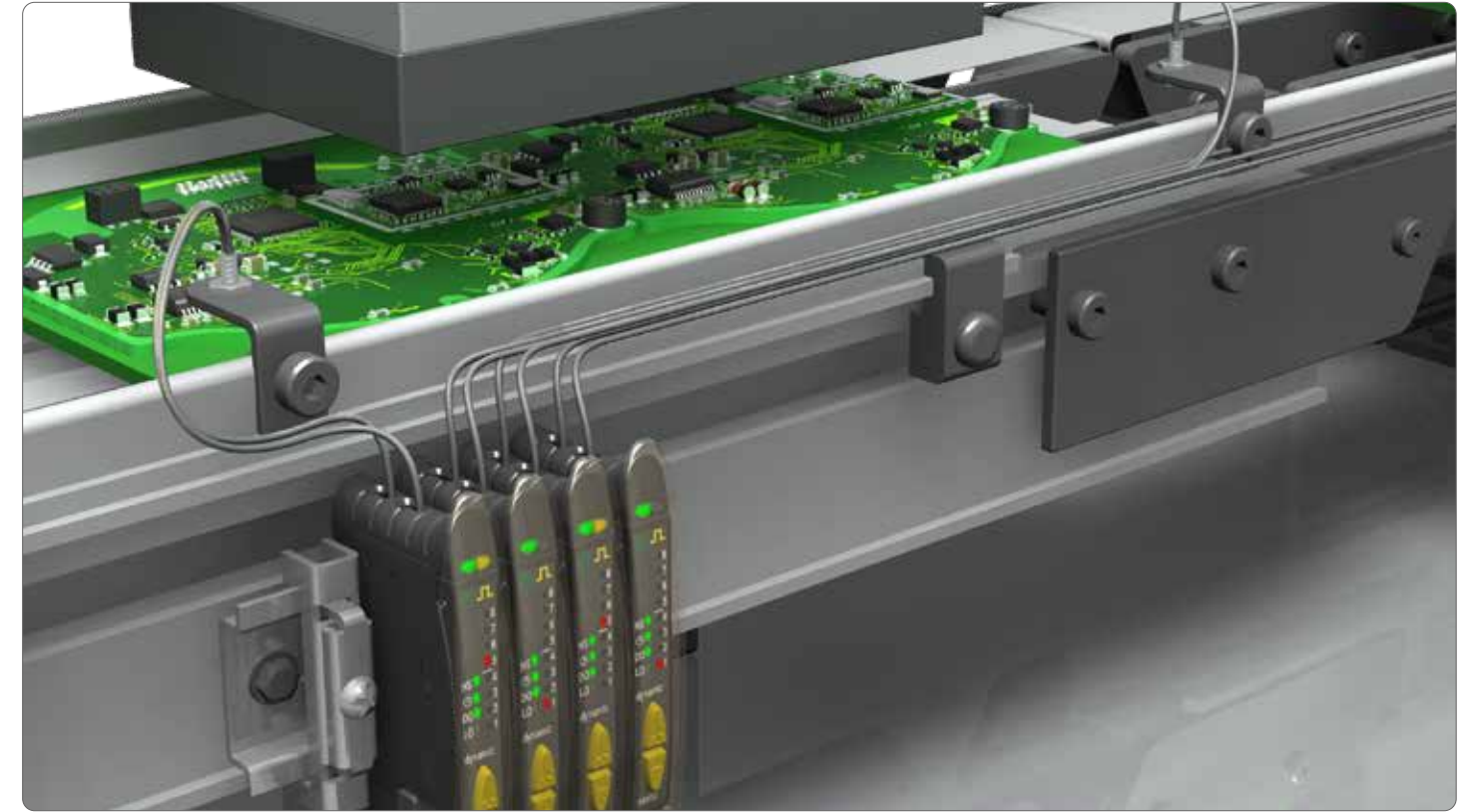


Other Solutions

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

Key Benefits

- Miniature sensor for installation in the smallest of spaces
- Precise and reliable position detection of small components
- Exceptional optical performance with long detection range



Sensing in a High-Speed Chip Shooter



Wafer Mapping and Detection

Challenge

- Jigs with Q4Xs installed at the same height move up and down to count wafers, mapping them and ensuring that they are in the correct position
- The Q4X can see the tilted wafer when it is moving up and down
- If the wafer mapping is found tilted, the machine sounds an alarm

Key Features

- Sensing range from 25 mm to 610 mm
- Discrete, analog, clear object, IO-Link and high resolution models available
- IP69K rated with FDA-grade stainless steel
- Rugged design resists mechanical impact, over tightening and extreme vibration

Featured Solution

- Q4X Series Laser Distance Sensor



Other Solutions

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

Key Benefits

- Superior performance and capable of detecting sub-millimeter changes in distance
- Clear distance readout from angled four-digit display
- Easy setup with responsive buttons
- Dual teach mode (intensity + distance) is ideal for error-proofing applications



Wafer Center Detection

Challenge

- Preventing damage to the high-priced wafers and equipment is vital
- High level of precision required
- Space-constrained deployment area

Key Features

- Small, precise spot
- Cross talk avoidance algorithm
- Very small, very flexible fiber optic sensors
- PLIS-1 fiber optics are suited for high temperature environments

Featured Solution

- DF-G2 Series High Speed Amplifier

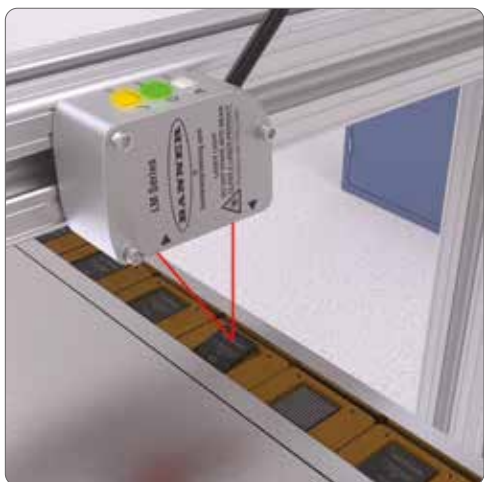


Other Solutions

- DF-G1 Series General Purpose Amplifier

Key Benefits

- Precise leading edge detection ensures proper placement of wafer is on the robotic arm's end
- Multiple amplifiers can operate in close proximity to each other
- Amplifiers can be installed in a convenient location
- Opposed mode PLIS-1 fiber optics have a very tight beam pattern, allowing for a precise measurement of wafer positioning



Integrated Circuit (IC) Chip Presence

Challenge

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

Key Features

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

Featured Solution

- LM Series Precision Measurement Sensor



Other Solutions

- Q4X Series Laser Distance Sensor

Key Benefits

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



Pouch Color Detection

Challenge

- QCM50 sensor reads the color of the top of the raw silicon wafer to determine if the wafer is correctly placed before being loaded into the cassette (FOUP) with other wafers
- The wafer cannot be corrected if it is loaded upside down into the FOUP, causing issues down the line

Key Features

- Reliable color detection across the entire range of the sensor
- Available in an anti-glare model to reliably detect reflective targets

Featured Solution

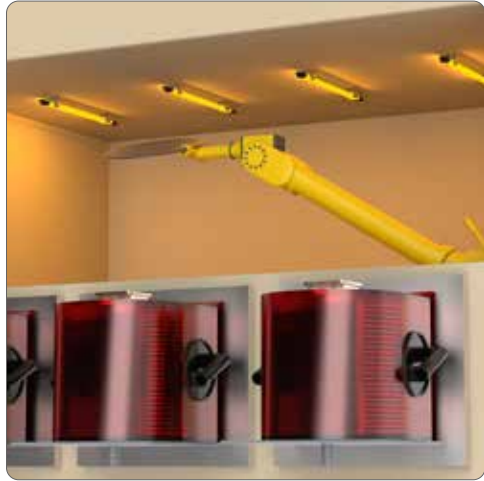
- QCM50 High Performance Color Sensor



Key Benefits

- Reliable detection even in extremely challenging color- and contrast-based applications
- Up to 12 colors can be detected with one sensor, which saves inventory costs and enables faster changeover

Lighting Solutions



Amber Illumination for Photosensitive Materials

Challenge

- White light negatively affects photosensitive materials during the photolithography processes
- Yellow and amber tinted light can also affect photosensitive materials if the color is achieved with phosphor-converted LEDs

Key Features

- Composed of non-phosphor converted LEDs (AlInGaP)
- LEDs with a spectral output above 560 nm
- Blue wavelength content is less than 0.35%
- Slim, low-profile housing
- Versatile mounting options

Featured Solution

- WLS15 Series Amber-Colored Low Profile, Low Power LED Strip Light



Key Benefits

- Dual color capability provides additional versatility in photosensitive applications
- Amber and daylight white LEDs enable semiconductor manufacturers to switch between colors as needed
- Clean room can be illuminated with white light for greater visibility during maintenance and cleaning



Process Tool Illumination

Challenge

- Light fixtures must not disrupt the laminar flow of air through the system
- Spatial constraints can severely limit light fixture placement options
- Certain colors of light can have a negative impact on system processes
- Lights are exposed to harsh chemicals

Key Features

- Space-saving, aerodynamic design
- Fully encased in a shatterproof polycarbonate shell
- IEC IP66, IP67 and IP69K rated
- Polycarbonate brackets are available to protect from scarring and corrosion
- Broad range of illumination color options

Featured Solution

- WLS27 LED Strip Light



Key Benefits

- Provide brilliant, even illumination in challenging environments and compact spaces
- The cylindrical shape of the light fixtures will not disrupt the laminar flow of air
- Cost-effective LED light strips will provide vivid, maintenance-free illumination throughout their 50,000 hour or more lifespan



Dock Door Illumination

Challenge

- Bright, uniform LED light provides illumination for operators
- Durable construction improves reliability in harsh environments

Key Features

- Includes 0–10 V dimming for intensity control and customization
- Durable metal housing and shatter-resistant window
- IEC IP20 rated
- Fast installation with multiple integrated mounting options or accessory brackets

Featured Solution

- WLB72 LED Strip Light



Key Benefits

- Increase worker productivity and ergonomics with bright, high-quality, uniform light
- Energy-efficient LED lights provide years of maintenance-free operation and a low total cost of ownership
- Diffuse window reduces glare and hotspots, which can cause eye strain



Status Indication of FOUP Process

Challenge

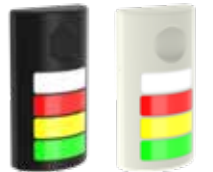
- The progress of multiple FOUPs in a single wafer deposition machine must be closely monitored
- Eye strain caused by working near bright lights can result in worker fatigue, increase errors, and decrease productivity
- TLF100 tower lights provide at-a-glance status indication with comfortable light output

Key Features

- Superior indication, advanced animations, and an audible option
- 14 selectable audible tones and audible intensity control
- IO-Link gives access to advanced animations which provide dynamic responses to changing machine conditions
- IP65 and IP69K-rated

Featured Solution

- TLF100 Pro Flush Mount Tower Light (Available in black or cool gray housing)



Key Benefits

- Illuminated LED segments provide easy-to-see operator guidance and indication of equipment status
- Flush mounting allows for easy integration to machines and equipment
- Rugged, versatile, and easy-to-install



Wafer Deposition Status Indication

Challenge

- To optimize efficiency and output, FOUPs in single wafer deposition machine must be closely monitored
- Prolonged exposure to bright light from tower lights can cause eye strain, leading to physical and mental fatigue

Key Features

- Slim 30 mm cylindrical body
- Banner's most cost-effective tower light
- IP65 and IK07-rated
- Does not require a controller
- Comes fully assembled, enabling rapid deployment

Featured Solution

- TL30 LED Tower Light



Key Benefits

- Easy-to-see status indication improves efficiency and increases output
- Level of light output is comfortable to the human eye, preventing discomfort and eye strain
- LED lights ensure long-term, maintenance-free operation

Safety Solutions



Battery Foil Slicer Safety

Challenge

- Monitor guard doors and prevent staff from bypassing safety functions
- Safety devices on a semiautomatic tabletop assembly station must be monitored to ensure that they perform reliably and meet required safety standards
- An XS26-ISDd Expandable Safety Controller was able to replace the functionality of three safety relay modules with one cost-effective device offering intuitive operation and advanced capabilities

Key Features

- Program in minutes with intuitive, easy-to-use configuration software
- Up to eight expansion I/O modules can be added as automation requirements grow or change
- Innovative live display feature and diagnostics allow for active monitoring of I/O on a PC and assist in troubleshooting and commissioning
- Ethernet-enabled models can be configured for up to 256 virtual status outputs

Key Features

- 100 mm to 4 m sensing range, with defined areas of 270 mm, 410 mm, 550 mm, or 690 mm
- Low-profile, compact package for smaller production machines
- Highly immune to EMI, RFI, ambient light, weld flash, and strobe light

Key Features

- Easy installation and hookup with no assembly, individual wiring or additional enclosure required
- Base will flash red when actuated and indicate armed status with either green, yellow, or no illumination
- Rugged design rated to IP65 for use in harsh environments; IP69 cover available

Featured Solution

- XS26-ISDd Expandable Safety Controller

Other Solutions

- SC10 Safety Controller



Key Benefits

- In-Series Diagnostics (ISD) provides detailed status and performance data from each connected safety device that can be accessed with an HMI or similar device
- Connect to up to 256 ISD devices; expandable up to 394 total safety devices and 68 safety outputs
- Easy to configure with free PC software

Featured Solution

- EZ-SCREEN LP Safety Light Curtain

Other Solutions

- SLC4 Safety Light Curtain



Featured Solution

- Emergency Stop Button



Vision and Barcode Solutions



Soldering Check

Challenge

- Electronic production and assembly operations often use integrated circuits that include BGAs (ball grid arrays)
- BGAs have solder balls that form the electrical bridge between the package and board assembly
- It is critical that all solder balls in the array exist and that there is no foreign matter that interferes with the circuitry

Key Features

- Available with a high resolution 5MP imager
- Full runtime editing capability
- Robust metal housing with optional lens covers to achieve IP67 rating for use in harsh environments
- EtherNet/IP, Modbus/TCP, PROFINET, and Serial RS-232 communication protocols

Featured Solution

- VE Series Smart Camera

Other Solutions

- iVu Series Image Sensor



Key Benefits

- Detects very small details to verify that all components are correctly placed and positioned
- Runtime editing capability reduces costly downtime
- Software emulator allows for offline building and troubleshooting of applications
- Six optically isolated I/O and the ability to power and control external lighting



QR Code Reader

Challenge

- ABR7000 is needed to read the QR code ID of the FOUP to track its progress through the manufacturing process
- The scanner syncs with the machine to ensure the proper process is taking place

Key Features

- Reads a full library of 1D and 2D barcodes
- Two compact form factors rated up to IP67
- Resolutions up to 2MP and multiple lighting configurations and lens focal lengths, including autofocus, to fit any application
- Configure over Industrial Ethernet, Serial and USB to simplify device integration and enable IIoT data collection

Featured Solution

- ABR7000 Series Barcode Reader



Key Benefits

- Superior decoding capability to solve the most challenging track and trace applications
- Configures in minutes using on-board push buttons or a PC
- Web interface for monitoring, configuring, and reviewing statistics remotely on any network



Integrated Circuit (IC) Chip Orientation

Challenge

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

Key Features

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

Featured Solution

- iVu Series Image Sensor with Integrated Touch Screen and Light

Other Solutions

- VE Series Smart Camera



Key Benefits

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

Wireless Solutions



Chip Shooter Temperature and Humidity Monitoring

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

- Key Features**
- Converts Modbus RTU to Modbus TCP/IP or Ethernet I/P
 - Compact 70 mm size
 - Four PNP outputs (100 mA max at 30 V DC)
 - Customizable email and text alerts
 - Interactive programmable user interface with LCD and LED indicators

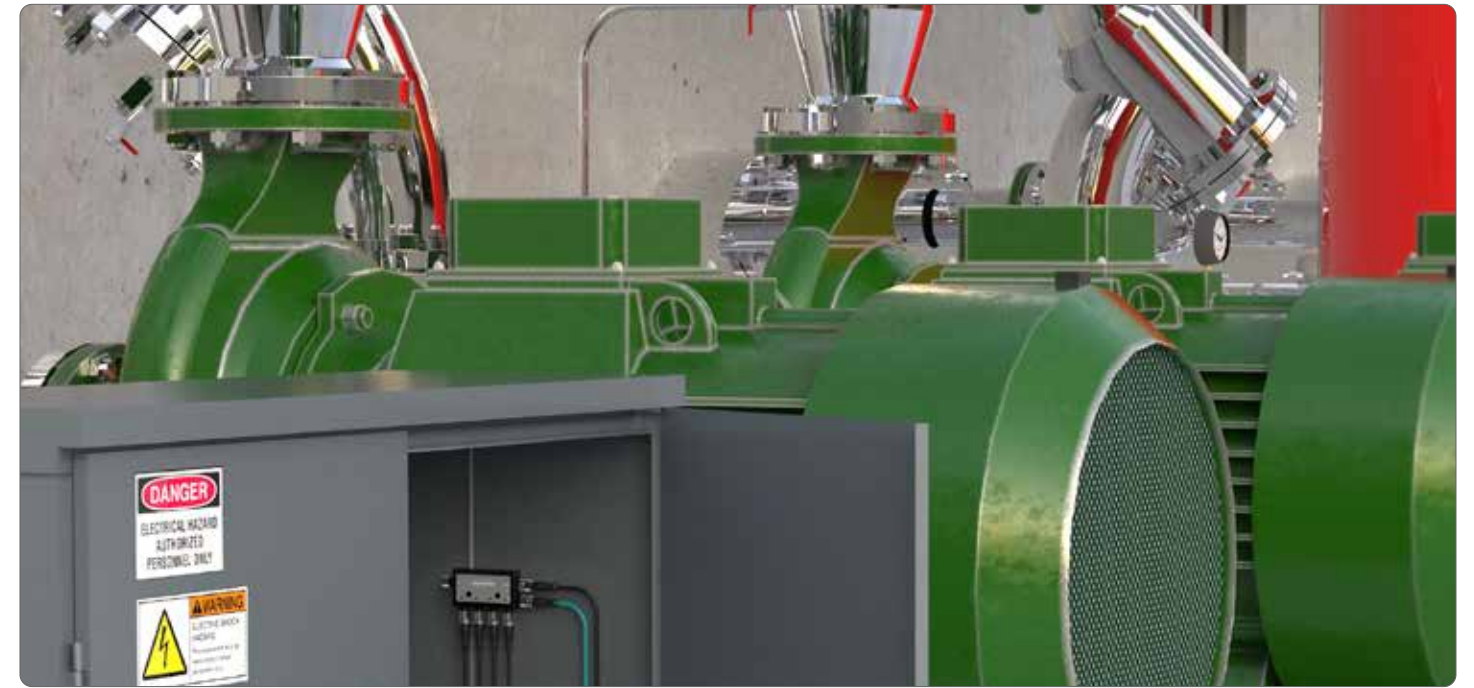
- Featured Solution**
- DXM700 Industrial Wireless Controller



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

- Key Features**
- Provides high accuracy temperature and humidity measurements
 - Achieves humidity accuracy of $\pm 2\%$ relative humidity
 - Achieves temperature accuracy of ± 0.3 °C
 - Houses the sensor element in a robust stainless steel case
 - Includes a red/green LED that can be used to provide local visual indication of change in environmental conditions

- Featured Solution**
- Q45 Temperature and Humidity Node



Equipment, Motors, and Machine Temperature and Vibration Monitoring

- Challenge**
- Monitoring changes in machine performance allows for corrective action to be taken before larger issues arise
 - QM30 sensors send temperature and vibration performance data of the motors to DXMR90 IIoT industrial controllers
 - These products can withstand high vibration, temperature changes, and work well in demanding environments

- Key Features**
- Converts wireless nodes to modbus RTU/TCPIP/EIP/Profinet
 - User programmable LEDs for local status indication
 - Connects to databases (including Banner's Cloud Data Services) over Ethernet or through a cellular enabled DXM Controller

- Featured Solution**
- DXMR90 IIoT Enabling Industrial Controller
 - R45C Converter
 - S15C Converter



- Key Benefits**
- Continuously monitor machine health, run time, and detect unexpected machine failures

- Key Features**
- Provides high accuracy vibration and temperature measurements
 - Industrial grade sensor with small form factor to fit into tight locations
 - Dual-axis vibration detection up to 4 kHz bandwidth
 - Manufactured with a sealed aluminum housing

- Featured Solution**
- QM30VT Vibration and Temperature Sensors



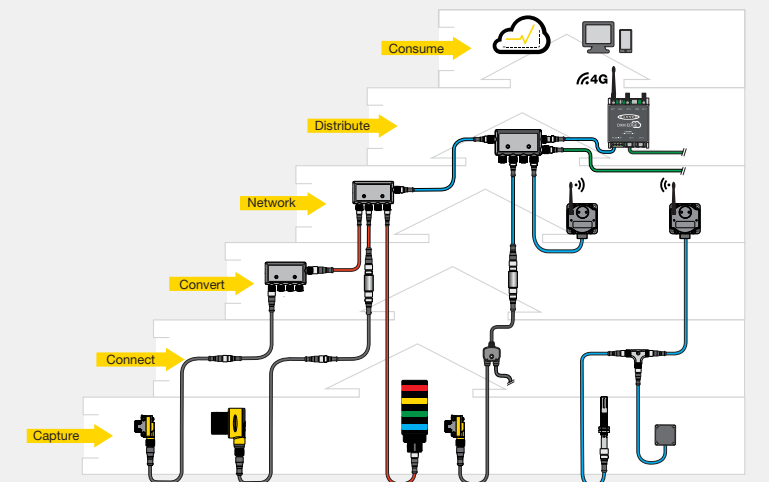
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