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What's New page 5**Selection Guide** page 8**Legacy Products** page 357 & 618**Applications** page 40**Photoelectric Sensors** page 50**Miniature** page 59

Miniature photoelectric sensors are tiny and slim, for mounting in confined spaces. Opposed-mode sensing distance is up to 15 m. Dimensions, in millimeters, range from 12x16x15 to 26x9x16.

WORLD-BEAM Q12	60	VSM.....	74
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Compact page 87

Compact photoelectric sensors are about the size of a thumb and are either rectangular or barrel shaped. Opposed-mode sensing distance is up to 30 m and operate with ac, dc or ac/dc universal voltage. Dimensions, in millimeters, range from 35x31x15 to 81x30.7x12.2.

WORLD-BEAM QS18	88	T18	134
WORLD-BEAM Q20	103	TM18	140
MINI-BEAM	108	Q25.....	144
S18/M18	127		

Midsize page 149

Midsize photoelectric sensors are rectangular or barrel shaped. Opposed-mode sensing distance is up to 60 m and operate with ac, dc or ac/dc universal voltage. Dimensions, in millimeters, range from 42x42x12.7 to 102x30.7x12.2 for rectangles and 102x30 for barrels.

WORLD-BEAM QS30	150	Q40.....	175
S30	161	PicoDot.....	179
SM30/SM130.....	166	QM42/QMT42.....	183
T30	170		

Fullsize page 189

Fullsize photoelectric sensors can sense distances up to 200 m, operate with ac, dc, or ac/dc universal voltage and offer E/M relay outputs. Dimensions, in mm, range from 67x52x25 to 98.6x54.6x44.5.

Q45.....	190	Q60.....	217
OMNI-BEAM	207		

Fiber Optic Sensors page 223**Fiber Sensors** page 223

Fiber optic sensors are ideal for harsh conditions: high vibration, extreme heat, and wet, explosive or corrosive environments. In confined areas, the flexible fibers can be positioned precisely.

D10.....	226	R55F.....	240
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Plastic Fibers page 243

Plastic fibers are for general purpose use. They tolerate severe flexing, can be cut to length during installation.

Glass Fibers page 260

Glass fibers are the best fiber choice for challenging environments such as high temperatures, corrosive materials and moisture.

Special-Purpose Sensors page 266**Part-Sensing** page 267

Part-sensing sensors detect objects that pass through an area defined by an array of sensing beams.

LX.....	267
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Slot & Label page 269

Slot sensors, sometimes called optical fork sensors because of their "forked" shape, detect objects that pass between the two arms—one with the emitter, the other with the receiver. The fixed slot width provides reliable opposed-mode sensing of objects as small as 0.30 mm.

SLM.....	270	SL.....	273
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Registration Mark & Color page 276

Registration mark sensors detect subtle color contrasts to inspect registration marks, using one, two or three color LEDs. True color sensors accurately analyze and compare color to color or varying intensities of one color.

R58E/R58A	277	QC50/QCX50	282
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Luminescence page 284

Luminescence sensors detect luminescence that is inherent in a material or luminophores that have been added to a material to make it luminescent.

QL50.....	285	QL56.....	288
QL51.....	287		

Optical Touch Buttons page 291

Ergonomic optical switches require no physical pressure to operate, eliminating the hand stress that can lead to repetitive-motion injuries.

OTB/LTB	455	STB	459
VTB	453		

Measurement & Inspection

page 292

Light Gauging

page 295

Light gauging sensors use lasers to deliver precise, long-distance sensing at the speed of light.

LT3	296	LH	303
LT7	300	LG5/LG10	305

Ultrasonic

page 308

Because ultrasonic sensors use sound waves rather than light, they are ideal for sensing uneven surfaces, liquids, clear objects and objects in dirty environments.

QT50U	309	M25U	328
S18U	314	T18U	330
WORLD-BEAM QS18U	317	Q45U	332
T30U/T30UX	320	Q45UR	336

Measuring Arrays

page 340

Using an array of closely spaced light beams, measuring light screens are designed for profiling, inspections and process monitoring.

EZ-ARRAY	341	MINI-ARRAY	348
High-Resolution MINI-ARRAY	344		

Radar

page 354

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

QT50R	354
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Vision

page 359

iVu Image Sensors

page 364

Touch screen image sensors delivers superior inspection performance faster and easier; no PC or external controller required.

iVu	364	iVu Plus	365
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PresencePlus® Vision Sensors

page 370

Full-featured vision sensors with a complete suite of location, inspection, analysis and geometric tools; all can be used simultaneously for inspecting multiple features and solving complex applications.

Pro	370	P4 Dedicated-Function	377
P4 OMNI	374		

Lenses

page 381

Standard, high-performance or megapixel C-mount and Microvideo lenses provide enhanced sensor performance.

Lighting

page 413

Specialized lighting creates all-important contrast between the feature of interest and its background.

Ring Lights	416	Low-Angle Lights	422
Area Lights	418	Spot Lights	423
Backlights	420	Tubular Fluorescent	424
Linear Array Lights	421	Structured Lights	424
On-Axis Lights	422		

Wireless

page 383

The Banner SureCross Wireless System is an industrial wireless I/O network that can operate in extreme environments while eliminating the need for costly wiring runs.

DX70	385	MultiHop	398
DX80	388	Ethernet Radio	399
DX99	396		

Lighting & Indicators

page 403

Task Lights

page 404

Task Lights provide a variety of sizes of bright and even illumination for enclosures, area lighting, machine lighting and control panels.

WL50	405	WLA	410
WLS28	407		

Vision Lights

page 413

Banner offers a wide selection of high-intensity LED lights with built-in current and strobe control. A variety of specialty lights are available, including fluorescent lights. A complete selection of polarizing filter kits, colored filters and lighting diffusers are offered to improve lighting quality.

Ring Lights	416	Low-Angle Lights	422
Area Lights	418	Spot Lights	423
Backlights	420	Tubular Fluorescent	424
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Indicators

page 427

EZ-LIGHT indicators provide real-time operational indication for workers and supervisors. Thirteen styles/housings include tower and column lights, segmented displays, daylight visible for outdoor applications, and dome, T-style and barrel housing.

Tower Lights	428	Segmented Displays	438
Multi-Color, General-Purpose	432	Call Light	439
Multi-Color, Multi-Function	435	Daylight Visible	439
Sensor Emulators	436	Traffic Lights	440
Indicators for Safety Devices	437		

Actuators

page 443

Actuators help manufacturers reduce the risk of error in the assembly process, boosting product quality and reducing cost.

K50/K80	444	VTB	453
PVD	448	OTB/LTB	455
PVA	450	STB	459

Photoelectrics
Sensors
Fiber Optic
Sensors
Special Purpose
Sensors
Measurement &
Inspection Sensors

Vision

Wireless

Lighting &
Indicators

Safety
Light Screens

Safety
Laser Scanners

Fiber Optic
Safety Systems

Safety Controllers &
Modules

Safety Two-Hand
Control Modules

Safety Interlock
Switches

Emergency Stop &
Stop Control

LEGACY

APPLICATIONS

WHAT'S NEW



Machine Safety page 461

Light Screens page 469

Safety light screens protect personnel from injury and machines from damage by guarding points of operation, access, areas and perimeters.

EZ-SCREEN Type 4	EZ-SCREEN
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EZ-SCREEN Type 4 Low Profile	PICO-GUARD
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EZ-SCREEN Type 2	
30 mm489	

Laser Scanner page 503

Safety laser scanners are used to protect personnel, as well as stationary and mobile systems, within a user-designated, two-dimensional area.

AG4503

Fiber Optic Systems page 507

A patent-pending combination of control-reliable, non-contacting photoelectric and fiber optic technologies provides a low-cost alternative to cumbersome, costly safeguarding methods.

Controllers508	Interlock Switches515
Grid and Points511	Emergency Stop Buttons518

Controllers & Modules page 523

Safety modules and controllers provide an interface between safety devices and the machines and processes those devices monitor.

SC22-3/-3E526	Muting544
PICO-GUARD508	Safe Speed Monitoring548
E-Stop & Interlocked Guard531	Extension Relay550
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Safety Mat Monitoring541	

Two-Hand Control Modules page 554

Module monitors the output of each mechanical switch button and de-energizes when the machine operator removes one or both hands from the buttons.

DUO-TOUCH SG	DUO-TOUCH SG
Two-Hand Control Modules556	Run Bars564
STB Buttons561	

Interlock Switches page 566

Safety interlock switches respond when a mechanical guard opens. They feature "positive opening" contacts for high reliability and coded actuators to discourage tampering or defeat.

PICO-GUARD Fiber Optic568	Compact Plastic578
Magnet Style569	Compact Metal584
Hinge Style572	Locking Style587

Emergency Stop & Stop Control page 599

Emergency stop devices provide workers a means of stopping a device during an emergency by pushing a button or pulling a rope.

PICO-GUARD	Rope Pulls605
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Work Lights, Indicators & Lamps page 743

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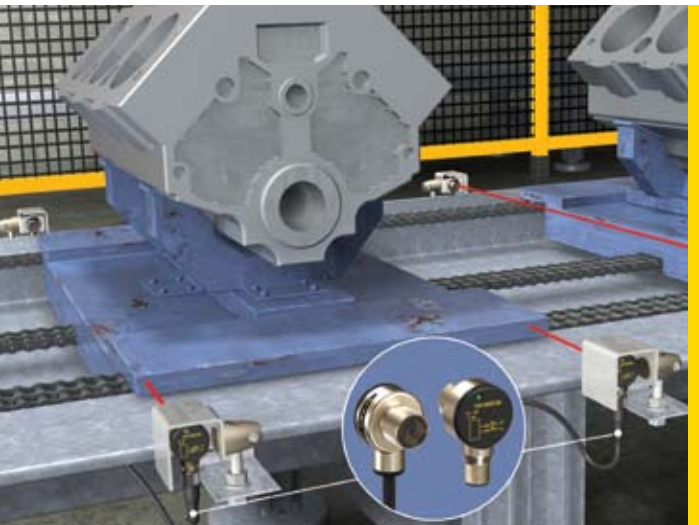
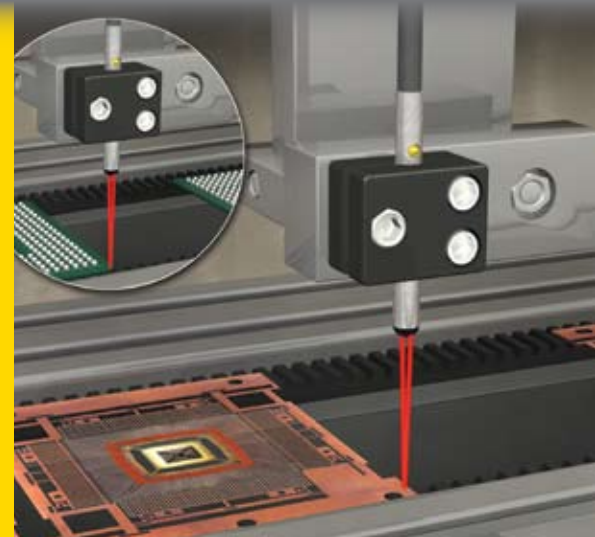
International Reps page 836

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VSM Heavy-Duty Metal Sensors

- Tough, 300 series stainless steel body with sapphire lens withstands a wide variety of chemicals and cutting fluids
- Tiny sensors are available as small as a 4 mm barrel (about the size of a single optical fiber assembly)
- Economical, self-contained sensors are available in convergent or opposed sensing modes; no separate amplifier required
- Well focused, narrow beam allows the entire sensor to be recessed into fixtures
- Smooth, stainless steel barrel is perfect for hygienic applications that require routine cleaning

See page 74



TM18 Right-Angle Barrel-Mount Sensors

- Heavy-duty, die-cast metal housing with integral metal QD prevents sensor damage during machine assembly, transport, maintenance and operation
- Compact, right-angle T-style housing with 18 mm threaded lens mounts easily in tight places for added sensor protection
- All models have a visible red sensing beam for easy sensor alignment
- Completely epoxy-encapsulated electronics deliver superior durability, especially in harsh sensing environments
- Sensors rated IP69K for resistance to intermittent high-pressure washdown
- Sensors have enhanced immunity to fluorescent light and sensor crosstalk

See page 140

L-GAGE® LH High-Precision Laser Sensors

- Extremely accurate, robust and self-contained laser displacement sensing using a 1024 pixel CMOS linear imager
- Reliable and accurate measurement results on real world targets, such as machined metal, wood, ceramic, paper and painted targets
- Non-contact precise measurement on moving processes, hot parts, machined parts, and soft or sticky parts
- Two sensors self-synchronize for thickness measurements and thickness calculation within the sensors; no external controller required
- Serial communication for use of up to 6 sensors in multi-track or process control applications
- Dedicated software for sensor setup and performance monitoring
- Precise laser spot for easy alignment to the target
- Target displacement or thickness measurement with high-resolution 4-20 mA or RS-485 serial communication outputs
- Automatic laser power and measurement rate control for reliable measurement under changing or challenging target condition

See page 303



What's New!



iVu Plus TG and iVu Plus BCR

- No external PC required to configure or operate sensor
- Ethernet capabilities to control and communicate with the sensor
- Multiple stored inspections
- Recognize and sort up to ten different patterns in the same inspection
- Compact, rugged IP67-rated housing is available with or without a variety of integrated ring lights—red, blue, white, green and infrared
- One-piece integrated LCD and two-piece with remote LCD models

See page 364



EZ-LIGHT™ IP67-Rated Audible Indicator Lights

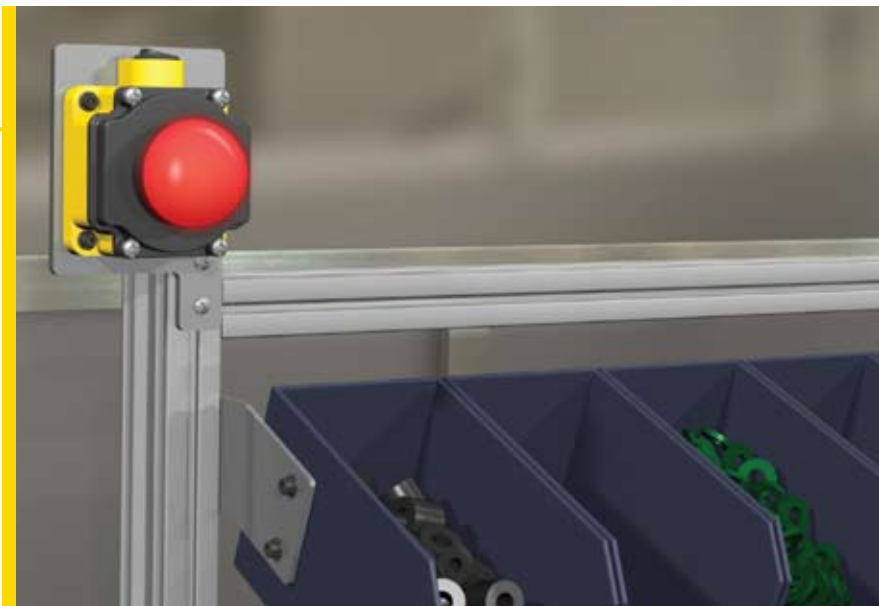
- TL50 Tower Lights with up to 4 colors in one housing
- Column Lights with 1, 2 or 3 colors
- Adjustable audible intensity to meet any environmental requirements
- A choice of black or gray housing (TL50 & CL50) and high-brightness LEDs (TL50)
- 30 mm threaded base for direct cabinet mounting with a single drilled hole

See page 428

EZ-LIGHT™ K80 Call Light

- Illuminated dome provides easy-to-see call for assistance indication
- Battery-powered light is ideal in locations where access to power is limited or unavailable
- Pre-assembled housing and multiple mounting options make the indicator light cost-effective and easy-to-install
- Large, red 50 mm dome is visible from 180 degrees
- Flashing red notification signal ensures part bins are refilled before supplies are gone, allowing line operators to sustain production

See page 439



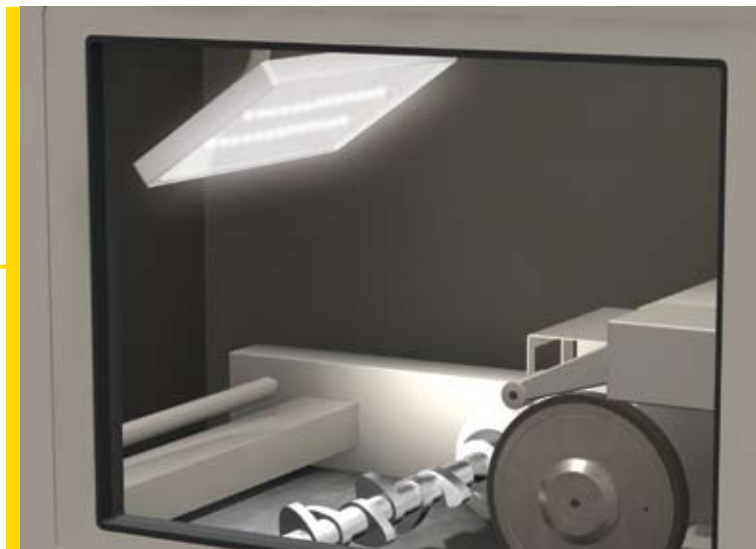
WLS28 Work Light Strip

- Low-profile, 28 mm wide housing for use inside or under any industrial control cabinet or in work stations
 - White LED lights in 145 to 1130 mm lighted lengths
 - Cascade models for connecting multiple lights end-to-end, minimizing wiring
 - High-power LEDs for superior illumination with an even pattern of light and no shadows
 - Extremely long-lasting LED technology for >50,000 hours of continuous working life
 - Low power consumption of less than 9 watts per foot
- See page 407



WLA Area Work Light

- Solid-state LED light for area and machine lighting
 - White LED lights in four sizes
 - High-power LEDs for superior illumination with an even pattern of light and no shadows
 - Extremely long-lasting LED technology for >50,000 hours of continuous working life
 - Rugged, sealed thermoplastic housing; IP69K rated
- See page 410



ED1G Enabling Devices

- Handheld grip-style switch typically used for manual control of machine functions including visual observations, minor adjustments, troubleshooting, calibration, etc.
- Enabling switch provides the three-position functionality (OFF-ON-OFF) required for manual control of a machine, including enabling and hold-to-run applications
- Safety function is provided when the user squeezes or releases the handlegrip enabling switch
- Suited for use as an enabling device for robotic cells
- Optional momentary push-button switch (depending on model) can provide hold-to-run, reset or jogging/inching functions

See page 615

Selection Guide

Miniature

					
Series	WORLD-BEAM® Q12	M12	T8	S12/SB12T	
Catalog Page	60	64	68	71	
Description	Miniature side-mount sensors	12 mm threaded barrel-mount sensor with visible red sensing beam	Right-angle barrel-mount sensor for small areas	Opposed-mode barrel-mount sensors	
Maximum Sensing Range	Opposed: 2 m Retro Non-Polar: 1.5 m Retro Polarized: 1 m Fixed-Field: 50 mm	Opposed: 5 m Retro Non-Polar: 2.5 m Retro Polarized: 1.5 m Diffuse: 400 mm Fixed-field: 75 mm	Opposed: 2 m Diffuse: 100 mm	Opposed: 15 m	
Dimensions (h x w x d)	23 x 8 x 12 mm	ø 12 x 67.5 mm	19 x 16 x 16 mm	SB12: ø 16 x 31 mm S12: ø 12 x 64 mm	
Housing Material	Thermoplastic elastomer	Nickel-plated brass	ABS	ABS	
Protection Rating	IP67	IP67; NEMA 6P, IP68	IP67; NEMA 6	SB12: IP65 SB12T: IP67 S12: IP67; NEMA 6P	
Operating Temperature	-20° to +55° C	-20° to +60° C	-20° to +55° C	SB12: -20° to +50° C S12: -40° to +70° C	
Power Supply	10 to 30V dc	10 to 30V dc	10 to 30V dc	10 to 30V dc	
Outputs	Bipolar NPN/PNP, PNP, NPN	Solid-state	Solid-state	Solid-state	
Output Response Time	Opposed: 1.3 ms ON/900 µs OFF All others: 700 µs ON/OFF	Opposed: 625 µs ON/375 µs OFF All others: 500 µs ON/OFF	1 ms ON/0.5 ms OFF	SB12: 2.5 ms ON; 1.75 ms OFF S12: 3.0 ms ON; 1.5 ms OFF	
Adjustments	—	—	—	—	

Miniature

			
VSM	VS1	VS2	VS3
74	78	81	84
Tiny, heavy-duty metal sensors	Miniature, convergent-mode sensor	Ultra-thin miniature sensor for confined flush-mounting	Miniature sensor with advanced optics and coaxial retroreflective models
Opposed: 250 mm Convergent: 90 mm	Convergent: 15 mm focus	Opposed: 3 m Convergent: 30 mm	250 mm
VSM4: \varnothing 4 x 36.8 mm VSM5: \varnothing 5 x 36.8 mm VSMQ: 40 x 5 mm	26 x 8 x 12 mm	25 x 12 x 4 mm	26 x 9 x 16 mm
Stainless steel	ABS	ABS	ABS
IP67	IP54; NEMA 3	IP67; NEMA 6	IP67; NEMA 6
0° to +55° C	-20° to +55° C	-20° to +55° C	-20° to +55° C
10 to 30V dc	10 to 30V dc	10 to 30V dc	10 to 30V dc
Solid-state	Solid-state	Solid-state	Solid-state
2.5 ms	1 ms ON/OFF	Opposed: 1 ms ON/0.5 ms OFF Convergent: 1 ms ON/OFF	1 ms ON/OFF
—	—	—	—

Selection Guide

Compact



Series	WORLD-BEAM® QS18	WORLD-BEAM® Q20	MINI-BEAM®	
Catalog Page	88	103	108	
Description	Right-angle barrel- and side-mount sensors	Side-mount rectangular sensors	Comprehensive family of Photoelectric sensors	
Maximum Sensing Range	Opposed: 20 m Laser Emitter: 15 m Retro Non-Polarized: 6.5 m Retro Polarized: 3.5 m Laser Retro Polarized: 10 m Diffuse: 1 m Laser Diffuse: 300 mm Convergent: 43 mm Adjustable-Field: 300 mm Laser Adjustable-Field: 250 mm Fixed-Field: 100 mm Ultrasonic: 500 mm Glass & Plastic fiber optic: depends on fiber used	Opposed: 20 m Retro Polarized: 4 m Retro Non-Polar: 6 m Diffuse: 1500 mm Fixed-Field: 100 mm	Opposed: 30 m Retro Non-Polarized: 5 m Retro Polarized: 3 m Diffuse: 380 mm Divergent: 130 mm Convergent: 49 mm Glass & Plastic fiber optic: depends on fiber used	
Dimensions (h x w x d)	35 x 15 x 31 mm	32 x 12 x 20 mm	Depends on model (see page 108)	
Housing Material	ABS	ABS	PBT polyester	
Protection Rating	IP67; NEMA 6	IP67; NEMA 6	IP67; NEMA 4X	
Operating Temperature	-20° to +70° C (most models)	-20° to +60° C	NAMUR: -40° to +70° C All others: -20° to +70° C	
Power Supply	10 to 30V dc, 20 to 140V ac/dc, or 20 to 270V ac/dc	10 to 30V dc	10 to 30V dc, 24 to 240V ac or 5 to 15V dc (NAMUR)	
Outputs	Solid-state, P-MOSFET, N-MOSFET	Solid-state	DC & Expert: Bipolar NPN/PNP AC: SPST SCR solid-state NAMUR: Constant current	
Output Response Time	Depends on model	Opposed: 1 ms ON/600 µs OFF All others: 800 µs ON/OFF	Depends on model	
Adjustments	Depends on sensing mode	Depends on sensing mode	Depends on model	

Compact

			
S18 & M18	T18	TM18	Q25
127	134	140	144
EZ-BEAM®-style 18 mm barrel-mount sensor in thermoplastic or stainless steel	EZ-BEAM®-style right-angle barrel-mount sensor	Heavy-duty, right-angle barrel-mount sensor	EZ-BEAM®-style right-angle base-mount sensor
Opposed: 20 m Retro Polarized: 2 m Retro Non-Polar: 2 m Diffuse: 300 mm Fixed-Field: 100 mm	Opposed: 20 m Retro Polarized: 2 m Retro Non-Polar: 2 m Diffuse DC: 500 mm Diffuse AC: 300 mm Fixed-Field: 100 mm	Opposed: 20 m Retro Polarized: 5.5 m Fixed-Field: 100 mm	Opposed: 20 m Retro Polarized: 2 m Fixed-Field: 100 mm
DC: ø 18 x 59 mm AC: ø 18 x 85 mm	DC: 42 x 30 x 30 mm AC: 52 x 30 x 30 mm	41 x 30 x 30 mm	50 x 25 x 30 mm
S18: PBT polyester M18: Stainless steel	PBT polyester	Zinc die-cast	PBT polyester
IP67; NEMA 6P QD models: IP69K per DIN 40050-9	IP67; NEMA 6P QD models: IP69K per DIN 40050-9	IP67 or IP69K	IP67; NEMA 6P QD models: IP69K per DIN 40050-9
-40° to +70° C	-40° to +70° C	-40° to +70° C	-40° to +70° C
10 to 30V dc or 20 to 250V ac	10 to 30V dc or 20 to 250V ac	10 to 30V dc	10 to 30V dc or 20 to 250V ac
Solid-state	Solid-state	Solid-state	Solid-state
Depends on model	Depends on model	Depends on model	Depends on model
—	Depends on sensing mode	—	—

Selection Guide

Midsize




Series	WORLD-BEAM® QS30	S30	SM30/SMI30	
Catalog Page	150	161	166	
Description	Midsize right-angle barrel- and side-mount sensors	EZ-BEAM®-style 30 mm barrel-mount sensors	Harsh-duty or intrinsically safe opposed-mode sensor with 30 mm threaded barrel	
Maximum Sensing Range	Opposed: 60 m Opposed High Power: 213 m Opposed Water: 8 m Retro Polarized: 8 m Retro Non-Polarized: 12 m Laser Retro Polar: 18 m Clear Object: 2 m Diffuse: 1 m Laser Diffuse: 800 mm Adjustable-Field: 600 mm Fixed-Field: 600 mm	Opposed: 60 m Retro Polarized: 6 m Fixed-Field: 600 mm	SM30: 200 m SMI30: 140 m	
Dimensions (h x w x d)	44 x 22 x 35 mm or 44 x 22 x 52 mm	DC: ø 30 x 69 mm AC: ø 30 x 81 mm	ø 30 x 102 mm	
Housing Material	PC/ABS (most models)	PBT polyester	PBT polyester or stainless steel	
Protection Rating	IP67; NEMA 6 (most models)	NEMA 6P; IP67 QD models: IP69K per DIN 40050-9	IP67; NEMA 6P	
Operating Temperature	-20° to +70° C (most models)	-40° to +70° C	-40° to +70° C	
Power Supply	10 to 30V dc, 12 to 250V dc or 24 to 250V ac	10 to 30V dc or 20 to 250V ac	10 to 30V dc or 24 to 240V ac	
Outputs	DC: Bipolar NPN/PNP AC/DC: SPDT e/m relay	Solid-state	DC: Bi-Modal™ (NPN or PNP) AC: SPST solid-state SMI: NPN	
Output Response Time	Depends on model	Depends on model	10 ms ON/OFF	
Adjustments	Depends on model	—	—	

Midsize

			
T30	Q40	PicoDot®	QM42 & QMT42
170	175	179	183
EZ-BEAM®-style right-angle barrel-mount sensors	EZ-BEAM®-style right-angle base-mount sensors	Compact laser for precise position detection, inspection and counting	Rugged sensors in die-cast housing with a range of sensing modes
Opposed: 60 m Retro Polarized: 6 m Fixed-Field: 600 mm	Opposed: 60 m Retro Polarized: 6 m Fixed-Field: 600 mm	Laser Convergent: 305 mm Laser Retro Polarized: 10.6 m	Opposed: 10 m Retro Polarized: 3 m Diffuse (LR): 6 m Diffuse (SR): 400 mm Adjustable-Field: 400 mm Fixed-Field: 2 m Plastic fiber optics: depends on fiber used
52 x 40 x 45 mm	70 x 40 x 46 mm	PD45: 41 x 13 x 46 mm PD49: 43 x 15 x 49 mm	QM42: 42 x 13 x 42 mm QMT42: 58 x 18 x 42 mm
PBT polyester	PBT polyester	ABS/polycarbonate	Zinc alloy
NEMA 6P; IP67 QD models: IP69K per DIN 40050-9	NEMA 6P; IP67 QD models: IP69K per DIN 40050-9	PD45: IP54; NEMA 3 PD49: IP67; NEMA 6	IP67; NEMA 6
-40° to +70° C	-40° to +70° C	-10° to +45° C	LR models: -20° to +55° C SR models: -20° to +70° C
10 to 30V dc or 20 to 250V ac	10 to 30V dc or 20 to 250V ac	10 to 30V dc	10 to 30V dc
Solid-state	Solid-state	Solid-state	Solid-state
Depends on model	Depends on model	200 µs ON/OFF	Depends on model
—	—	12-turn Sensitivity (Gain) adjustment	Depends on model

Selection Guide

Fullsize






			
Series	Q45	OMNI-BEAM™	Q60
Catalog Page	190	207	217
Description	Advanced one-piece, rugged sensor with outstanding optical performance	Modular, limit-switch style, field-programmable sensor	Laser or LED sensor for low reflectivity targets, regardless of background
Maximum Sensing Range	Opposed: 60 m Retro Laser: 70 m Retro Non-Polar: 9 m Retro Polarized: 6 m Diffuse: 3 m Convergent: 100 mm Glass & Plastic fiber optic: depends on fiber used	Opposed: 45 m Retro Non-Polar: 9 m Retro Polarized: 4.5 m Retro Clear Object: 4 m Diffuse: 2 m Convergent: 38 mm Glass & Plastic fiber optic: depends on fiber used	Adjustable-Field: 2 m
Dimensions (h x w x d)	88 x 45 x 55 mm	DC: 76 x 45 x 55 mm AC: 99 x 45 x 55 mm	75 x 25 x 60 mm
Housing Material	PBT polyester	PBT polyester	ABS/Polycarbonate
Protection Rating	IP67; NEMA 6P	IP66; NEMA 4	IP67; NEMA 6
Operating Temperature	DC: -40° to +70° C AC: -40° to +70° C AC/DC: -25° to +55° C	-40° to +70° C	-20° to +55° C (most models)
Power Supply	10 to 30V dc, 90 to 250V ac, 24 to 250V ac, 12 to 250V dc or 5 to 15V dc (NAMUR)	10 to 30V dc, 105 to 130V ac or 210 to 250V ac	10 to 30V dc, 12 to 250V dc or 24 to 250V ac
Outputs	DC: Bipolar NPN/PNP AC: SPST or SPDT Relay NAMUR: Constant current	DC: Bi-Modal™ AC: SPST relay	DC: Bipolar NPN/PNP AC/DC: SPST or SPDT Relay
Output Response Time	Depends on model	Depends on model	Depends on model
Adjustments	LO/DO switch, sensitivity adjustment control	Field-programmable for 4 operating parameters	2 momentary push buttons/ remote program wire

Fiber Optic Sensors

			
Series	D10	D12	R55F
Catalog Page	226	235	240
Description	High-performance, low-contrast sensor with numeric or bargraph display	Versatile, high-power sensor with bargraph display	Fiber optic sensor for outstanding color contrast sensitivity
Maximum Sensing Range	Range varies with power level/speed selection and with fiber optics used	Range varies depending on sensing mode and fiber optics used	Range varies depending on sensing mode and fiber optics used
Dimensions (h x w x d)	36 x 10 x 68 mm	Plastic Fibers: 30 x 12 x 64 mm Glass Fibers: 30 x 12 x 70 mm	25 x 30 x 85 mm
Housing Material	ABS/Polycarbonate	ABS	ABS/Polycarbonate
Protection Rating	IP50; NEMA 1	IP11; NEMA 2	IP67; NEMA 6
Operating Temperature	-20° to +55° C, depending on model	-40° to +70° C or -20° to +70° C, depending on model	-10° to +55° C
Power Supply	10 to 30V dc, 12 to 30V dc, 12 to 24V dc or 15 to 24V dc	10 to 30V dc	10 to 30V dc
Outputs	Expert Numeric Discrete: Two solid-state Expert Numeric Analog/Discrete: 0 to 10V or 4 to 20 mA and Solid-state Expert Bargraph Discrete: Bipolar NPN/PNP Discrete: Bipolar NPN/PNP Expert Small Object Counter: NPN or PNP	Expert: Solid-state Standard: Solid-state AC Coupled: Bipolar NPN/PNP	Bipolar NPN/PNP
Output Response Time	Depends on model	Expert: 200 µs ON/OFF Standard: 50 or 500 µs ON/OFF AC Coupled: 50 µs ON/OFF	50 µs

* Operating temperature range for plastic fiber optic assemblies is typically -30° to +70° C and -140° to +250° C for metal-sheathed glass fiber optic assemblies. See the Fiber Sensor section (beginning on page 243) for specific fiber optic temperature information.

Selection Guide

Special Purpose					
					
Series	LX	SLM	SL Series	R58	
Catalog Page	267	270	273	277	
Description	High-speed light screens to detect tiny objects	Fixed opposed-mode metal slot sensor for easy installation, in eight slot widths	Opposed-mode slot sensor with multiple setup options, in two slot widths	High-performance color registration sensor with 3 light colors	
Maximum Sensing Range	Standard Normal: 300 to 2 m Reduced: 150 to 600 mm Short-range Normal: 100 to 200 mm Reduced: 75 to 150 mm	10, 20, 30, 50, 80, 120, 180 or 220 mm	10 or 30 mm	Focus: 10 mm	
Dimensions (h x w x d)	25 x 32 mm x height Array heights: 113 mm 190 mm 266 mm 342 mm 418 mm 494 mm 571 mm 647 mm	Max size: 12 x 252 x 140 mm	72 x 52 x 19 mm	62 x 30 x 83 mm	
Housing Material	Aluminum	Zinc and ABS	ABS	Zinc alloy	
Protection Rating	IP65	IP67; NEMA 6	IP67; NEMA 6	IP67	
Operating Temperature	-20° to +70° C	-20° to +60° C	SL30, SL10 & SLO: -40° to 70° C SLE30 & SLE10: -20° to 70° C	R58E: -10° to +50° C R58A: -10° to +50° C	
Power Supply	10 to 30V dc	10 to 30V dc	10 to 30V dc	10 to 30V dc	
Outputs	Bipolar NPN/PNP	Bipolar NPN/PNP, PNP or NPN	Bipolar NPN/PNP	Bipolar NPN/PNP	
Output Response Time	0.8 to 6.4 ms (ON-time) 6 to 11.5 ms (OFF-time)	500 µs	150, 300 or 500 µs or 1 ms, depending on model	50 µs	
Adjustments	—	One-turn sensitivity potentiometer	Depends on model	R58E: Push button and remote TEACH R58A: Potentiometer	

Special Purpose

				
QC50 & QCX50	QL50	QL51	QL56	Optical Buttons
282	285	287	288	291
True color sensor for detecting color and intensity	Compact luminescence sensor with an ultraviolet LED	Compact luminescence sensor with an ultraviolet LED	Compact luminescence sensor with an ultraviolet LED	Ergonomic touch buttons to prevent repetitive motion stress
20 mm (typical)	40 mm	20 mm	50 mm	—
50 x 25 x 50 mm	66 x 15 x 50 mm	82 x 31 x 60 mm	97 x 66 x 32 mm	57 x 60 x 43 mm
ABS	ABS	ABS	Aluminum	Black polysulfone or red polycarbonate with polyester or polycarbonate base
IP62	IP62	IP67	IP67	IP66; NEMA 4X
-10° to +55° C	-25° to +55° C	-10° to +55° C	-10° to +55° C	OTB/LTB/VTB: -20° to +50° C STB: 0° to +50° C
10 to 30V dc	10 to 30V dc	15 to 30V dc	15 to 30V dc	10 to 30V dc, 20 to 30V ac/dc, 120V ac, 220/240V ac or 12 to 30V dc
NPN or PNP, 3 channel	Discrete PNP or NPN	Bipolar PNP/NPN	Bipolar PNP/NPN & analog	Depends on model
QC50: 335 μ s QCX50: Selectable 5 ms or 1 ms	250 μ s	250 μ s	250 μ s	OTB/LTB/VTB: 100 ms STB: 20 ms
2 push buttons program teach, delay and tolerance level	1 push button and remote program wire	2 push buttons	2 push buttons	—

Selection Guide

Light Gauging



Series	LT3	LT7	
Catalog Page	296	300	
Description	Advanced laser distance-gauging sensor for precise inspections	Self-contained long-range laser sensor for accurate distance sensing	
Technology	Time-of-Flight Laser	Time-of-Flight Laser	
Maximum Sensing Range	Retro: 50 m Diffuse: 5 m	Retro: 250 m Diffuse: 10 m	
Dimensions (h x w x d)	69 x 35 x 87 mm	93 x 42 x 95 mm	
Light Source	Class 1 and 2 laser	Class 1	
Housing Material	ABS/polycarbonate	ABS	
Protection Rating	IP67; NEMA 6	IP67	
Operating Temperature	0° to +50° C	-30° to +75° C	
Power Supply	12 to 24V dc	18 to 30V dc	
Outputs	Analog and discrete, or dual discrete	Analog and discrete, or dual discrete	
Discrete Outputs	One NPN or PNP, or Dual NPN or PNP, depending on model	2 PNP	
Analog Outputs	0 to 10V dc or 4 to 20 mA	4 to 20 mA	
Analog Resolution or Discrete Repeatability	Retro: 5 or 10 mm Diffuse: 1 or 3.2 mm	Retro: ±2 mm Diffuse: ±4 mm	
Response Speed	1 to 192 ms, depending on model and setting	12 ms	
Adjustments	Window limits, response speed	See Specifications	

Light Gauging



	LH	LG
	303	305
	High-precision laser sensor for displacement and thickness measurements	Economical short-range laser sensor with analog and discrete outputs
	Laser /CMOS imager triangulation	Laser/PSD triangulation
	LH30: 35 mm LH80: 100 mm LH150: 200 mm	LG5: 60 mm LG10: 125 mm
	80 x 33 x 65 mm	55 x 20 x 82 mm
	Class 2 laser	Class 2 laser
	Aluminum	Zinc alloy die-cast; black painted finish
	IP67	IP67; NEMA 6
	-10° to +45° C	-10° to +50° C
	18 to 30V dc	12 to 30V dc
	Analog and Serial	Analog and discrete
	—	One NPN or PNP
	4-20 mA	0 to 10V dc or 4 to 20 mA
	LH30: 1 µm LH80: 4 µm LH150: 10 µm	LG5: 3 µm @ 50 mm LG10: 10 µm @ 100 mm
	250 µs typical	2, 10 or 100 ms, depending on setting
	Advanced configuration software	Window limits, response speed


Selection Guide

Ultrasonic

					
Series	QT50U	S18U	QS18U	T30UX/T30U	
Catalog Page	309	314	317	320	
Description	Long-range programmable, precision ultrasonic sensor	Compact barrel-mount ultrasonic sensor in straight or right-angle housing	Low-cost right-angle, barrel- and side-mount ultrasonic sensor in a compact universal housing	Compact right-angle barrel-mount ultrasonic sensors in long- and short-range	
Outputs	Analog, dual discrete or e/m relay	Analog or discrete	Discrete	Analog and discrete, dual discrete or analog	
Maximum Sensing Range	Proximity mode 200 mm to 8 m	Proximity mode 30 to 300 mm	Proximity mode 50 to 500 mm	Proximity mode 0.15 to 1.0 m, 0.3 to 2.0 m, 0.1 to 1 m, 0.2 to 2.0 m or 0.3 to 3.0 m	
Dimensions (h x w x d)	DC & AC/DC: 84 x 74 x 67 mm Teflon® Protected: 85 x 74 x 73 mm	Straight: ø 18 x 81 mm Right-angle: ø 18 x 85 mm	41 x 15 x 33 mm	Short- & Long-Range: 52 x 40 x 45 mm Teflon® Protected: 64 x 40 x 48 mm	
Housing Material	ABS/polycarbonate	PBT polyester, ABS/ polycarbonate	ABS	PBT polyester	
Protection Rating	IP67; NEMA 6P	IP67; NEMA 6P	Push button: IP67; NEMA 6P Remote TEACH: IP68, NEMA 6P	T30UX: IP67; NEMA 6 T30U: IP67, NEMA 6P	
Operating Temperature	-20° to +70° C	-20° to +60° C	-20° to +60° C	T30UX: -40° to +70° C T30U: -20° to +70° C	
Power Supply	10 to 30V dc or 85 to 264V ac / 24 to 250V dc	10 to 30V dc	12 to 30V dc	10 to 30V dc, 12 to 24V dc or 15 to 24V dc, depending on model	
Discrete Outputs (when available)	DC: Selectable dual NPN or PNP AC/DC: SPDT e/m relay	Bipolar NPN/PNP	NPN or PNP	NPN or PNP, or NPN/PNP selectable, depending on model	
Analog Resolution or Discrete repeatability	1.0 mm	0.5 mm	0.7 mm	T30UX: 0.1% of distance T30U: 0.25% of sensing distance	
Analog Output (when available)	0 to 10V dc or 4 to 20 mA, Selectable	0 to 10V dc or 4 to 20 mA, depending on model	—	0 to 10V dc or 4 to 20 mA, depending on model	
High/low Limit Control (pump control)	Yes	—	—	Yes	
Adjustments	Window limits, DIP switch functions	Near & far window limits	Near & far window limits	Window limits, output selection, analog output slope, temperature compensation and response speed	

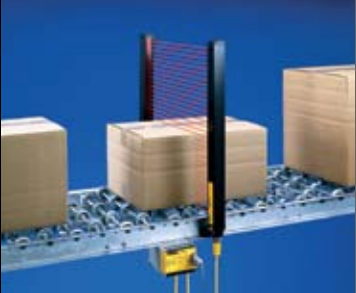



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Ultrasonic

			
M25U	T18U	Q45U	Q45UR
328	330	332	336
Stainless steel opposed-mode ultrasonic sensors	Right-angle, barrel-mount opposed-mode ultrasonic sensors	Programmable ultrasonic sensor with temperature compensation	High-precision ultrasonic sensor with remote sensing transducer
Discrete	Discrete	Analog or discrete	Analog or discrete
Normal Speed: 500 mm High Speed: 250 mm	Opposed mode 0.6 m	Proximity mode 0.1 to 1.4 m or 0.25 to 3.0 m	Proximity mode 50 to 250 mm
ø 25 x 103 mm	52 x 40 x 30 mm	Short range: 88 x 45 x 61 mm Long range: 88 x 45 x 79 mm	Controller: 88 x 45 x 6 mm Remote transducers: 28 x 28 x 12 mm flat or ø18 x 45 mm barrel
316 stainless steel	PBT polyester	PBT polyester	PBT polyester or stainless steel
IP67; NEMA 6, IP69K	IP67; NEMA 6P	IP67; NEMA 6P	Sensor: IP65; NEMA 4 Controller: IP67; NEMA 6P
-20° to +70° C	-40° to +70° C	-25° to +70° C	-25° to +70° C
10 to 30V dc	12 to 30V dc	12 to 24V dc or 15 to 24V dc, depending on model	12 to 24V dc or 15 to 24V dc, depending on model
Bipolar NPN/PNP	Complementary NPN or PNP, depending on model	Bipolar NPN/PNP	Bipolar NPN/PNP
Normal Speed: 4.0 ms High Speed: 3.0 ms	1 or 2 mm, depending on resolution	0.1% of sensing distance (0.25 or 0.5 mm min.)	0.2% of sensing distance
—	—	Selectable 0 to 10V dc or 4 to 20 mA	Selectable 0 to 10V dc or 4 to 20 mA
—	—	Yes	—
—	—	Near & far window limits; DIP Switch functions	Near & far window limits; DIP Switch functions

Selection Guide

Measuring Arrays

				
Series		EZ-ARRAY™	High-Resolution MINI-ARRAY®	MINI-ARRAY®
Catalog Page		341	344	348
Description		Cost-effective light curtains for quick installation and tough sensing application	High-speed, high-resolution scanning	Compact long-range array with flexible output configurations
Minimum Object Detection Size		5 mm	2.5 mm	19 mm for arrays/ 9.5 mm beam spacing 38 mm for arrays/ 19 mm beam spacing
Maximum Sensing Range		4 m	0.4 mm to 1.8 m	0.6 to 17 m, depending on model
Emitters and Receivers	Dimensions (h x w x d)	36.0 x 45.2 x height Array heights: 227 mm 828 mm 1578 mm 379 mm 978 mm 1878 mm 529 mm 1128 mm 2178 mm 678 mm 1278 mm 2478 mm	38.1 x 38.1 x height Array heights: 236 mm 887 mm 1540 mm 399 mm 1049 mm 1703 mm 559 mm 1215 mm 1865 mm 724 mm 1377 mm 2028 mm	38.1 x 38.1 x height Approximate array heights: 201 mm 810 mm 1572 mm 356 mm 963 mm 1877 mm 505 mm 1115 mm 659 mm 1267 mm
	Power Supply	12 to 30V dc	Supplied by controller	Supplied by controller
	Construction	Anodized aluminum	Black anodized aluminum	Black anodized aluminum
	Protection Rating	IP65	IP65; NEMA 4, 13	IP65; NEMA 4, 13
	Operating Temperature	-40° to +70° C	0° to +50° C	-20° to +70° C
Controllers	Power Supply	—	16 to 30V dc	16 to 30V dc
	Output Configuration	—	MAHCVP-1: Two analog 0 to 10V sourcing + two PNP MAHCVN-1: Two analog 0 to 10V sourcing + two NPN MAHCIP-1: Two analog 4 to 20 mA sinking + two PNP MAHCIN-1: Two analog 4 to 20 mA sinking + two NPN All models: Serial RS-232 & RS-485	MAC-1: One reed relay & one NPN MACN-1: Two NPN MAC16N-1: 16 NPN MACP-1: Two PNP MAC16P-1: 16 PNP MACV-1: Two 0-10V dc sourcing analog + one NPN MACI-1: Two 4-20 mA sinking analog + one NPN Serial RS-232 and/or RS-485, depending on model MACNXDN-1: 2 NPN (DeviceNet) MACPXD-1: 2 PNP (DeviceNet)
	Protection Rating	—	IP20; NEMA 1	IP20; NEMA 1
	Operating Temperature	—	0° to +50° C	-20° to +70° C

Radar



Series	R-GAGE™
Catalog Page	354
Description	Radar-based sensor for a wide variety of outdoor or challenging applications
Operating Principle	Frequency Modulated Continuous Wave (FMCW) radar
Detectable Objects	Objects containing metal or similar high-dielectric materials
Radio Frequency	24 GHz, ISM Band
Range	up to 15 m
Dimensions	100 x 74 x 46 mm
Power supply	12 to 30V dc
Housing Material	ABS/polycarbonate
Protection Rating	IP67
Operating Temperature	-40° to +65° C
Output Configuration	Bipolar NPN/PNP
Adjustments	DIP-switch functions

Selection Guide

Vision







Series		iVu TG	iVu Plus TG	iVu BCR	iVu Plus BCR
Catalog Page		364	364	364	364
Description		One-piece image sensor with integrated touch screen or two-piece image sensor with remote touch screen		One-piece image sensor with integrated touch screen or two-piece image sensor with remote touch screen	
Hardware	Integrated I/O	5	6	5	6
	Interchangeable Lenses	Microvideo	Microvideo	Microvideo	Microvideo
	Imager	CMOS 752 x 480	CMOS 752 x 480	CMOS 752 x 480	CMOS 752 x 480
	Effective Resolution	320 x 240	320 x 240	752 x 480	752 x 480
	Imager Speed	100 frames per second	100 frames per second	50 frames per second	50 frames per second
	Construction	Black Valox™ housing, acrylic window	Black Valox™ housing*, acrylic window	Black Valox™ housing, acrylic window	Black Valox™ housing*, acrylic window
	Environmental Rating	IP67	IP67	IP67	IP67
Communications	Serial	—	RS-232	RS-232	RS-232
	Ethernet	—	√	—	√
	Programmable Outputs	2	3	2	3
Programming/Interface	Runs without a PC	√	√	√	√
	Strobe OUT	√	√	√	√
	Remote TEACH	√	√	√	√
	Demo Mode	√	√	√	√
Inspection	Tools	Area, Blemish and Match	Area, Blemish, Match and Sort	Bar Code	Bar Code
	Multiple Inspections	—	√	—	√

* Die cast Zinc on Plus Integrated LCD models

Vision				
   				
Series		Pro	P4 OMNI	P4 Dedicated Function
Catalog Page		370	370	377
Description		Two-piece, all-purpose vision sensor with a full range of inspection tools	One-piece, all-purpose vision sensor with a full range of inspection tools	AREA: Inspects sizes, shapes and intensity EDGE: Counts and measures multiple edges and objects GEO: Pattern recognition, regardless of orientation BCR: Reads and grades 2D and 1D bar codes
Hardware	Integrated I/O	14	7	7
	Interchangeable Lenses	C-Mount	C-Mount	C-Mount
	Imager	PROII: CCD & CMOS PROII 1.3: CMOS PROII COLOR: CMOS	OMNI: CCD OMNI 1.3: CMOS OMNI COLOR: CMOS	AREA & AREA 1.3: CMOS BCR: CCD, BCR 1.3: CMOS EDGE & EDGE 1.3: CMOS GEO & GEO 1.3: CMOS
	Resolution	PROII: 640 x 480 PROII 1.3: 1280 x 1024 PROII COLOR: 752 x 480	OMNI: 640 x 480 OMNI 1.3: 1280 x 1024 OMNI COLOR: 752 x 480	AREA, EDGE & GEO: 128 x 100 BCR: 640 x 480 AREA1.3, EDGE 1.3, GEO 1.3 & BCR 1.3: 1280 x 1024
	Imager Speed (frames per second)	PROII: 48 fps PROII 1.3: 18 fps PROII COLOR: 17 fps	OMNI: 48 fps OMNI 1.3: 27 fps OMNI COLOR: 17 fps	AREA, EDGE & GEO: 500 fps BCR: 48 fps AREA1.3, EDGE 1.3, GEO 1.3 & BCR 1.3: 27 fps
	Live Video Output	√	√	√
	Memory	64 MB	32 MB	AREA, EDGE, GEO & BCR: 8 MB AREA1.3, EDGE 1.3, GEO 1.3 & BCR 1.3: 32 MB
	Construction/ Environmental Rating	Camera: <ul style="list-style-type: none"> Black anodized aluminum/ IP20; NEMA 1 Nickel-plated aluminum/ IP68, NEMA 6P 316 stainless steel/ IP68; NEMA 6P & 4X Controller: Steel with zinc plating/ IP20; NEMA 1	Black anodized aluminum/IP20; NEMA 1 or Nickel-plated aluminum/ IP68	Black anodized aluminum/IP20; NEMA 1
Communications & Programming/Interface	Ethernet	10/100		
	Serial	RS-232		
	Programmable Discrete I/O	6	4	4
	Industrial Ethernet Protocols	EtherNet/IP & Modbus TCP/IP	EtherNet/IP & Modbus TCP/IP	EtherNet/IP & Modbus TCP/IP
	Software Premium Tools	Bar Code Reader (BCR), OCR/OCV and Bead		OCR/OCV (BCR model only)
	Runs without a PC	Yes		
	ActiveX interface	√	√	√
	Quick & Remote TEACH	√	√	√





Selection Guide




Wireless				
				
Series	DX70	DX80	DX99	Data Radio
Catalog Page	385	388	396	398
Description	Point-to-Point Wireless I/O Pairs	Point-to-Multipoint Wireless Network	Point-to-Multipoint for Hazardous Areas	MultiHop Wireless Network
Radio Frequency & Range	900 MHz: up to 4.8 km 2.4GHz: up to 3.2 km	900 MHz: up to 4.8 km 2.4GHz: up to 3.2 km	900 MHz: up to 4.8 km 2.4GHz: up to 3.2 km	900 MHz: up to 9.6 km 2.4 GHz: up to 3.2 km
Power Supply	10 to 30V dc	10 to 30V dc, Solar, DX81 or DX81P6	Integrated battery	10 to 30V dc, Solar or DX81P6
Inputs/Outputs	Discrete: PNP/NPN, Dry Contact Analog: 0-20 mA	Discrete: PNP/NPN/NMOS, Dry Contact Counter Analog: 0-20 mA, 0-10V dc, PT100 RTD, Thermocouple	Discrete: PNP/NPN/NMOS, Dry Contact Analog: 0-20 mA, 0-10V dc, PT100 RTD, Thermocouple	Contact the factory
Dimensions & Housing Material	Polycarbonate: 127 X 81 X 60 mm	Polycarbonate: 127 X 81 X 60 mm	127 X 110 mm	Polycarbonate: 127 X 81 X 60 mm
Protection Rating	IP67; NEMA 6	DX80: IP67; NEMA 6 DX80...C: IP20; NEMA 1	IP68; NEMA 4X	IP67; NEMA 6
Certified Area	—	DX80...C: CI D2, Zone 1	CI D1, Zone 0 and 20	CI D2, Zone 2
Operating Temperature	-40° to +85° C	-40° to +85° C	-40° to +70° C	-40° to +85° C
Communication	I/O linking only, no serial communication output	Gateway: Modbus RTU Master and Slave, Modbus TCP/IP and EtherNet/IP	See DX80 Gateway	Modbus: RS-232 and RS-485 or EtherNet/IP




Task Lights			
			
Series	WL50/WL50F	WLS28	WLA
Catalog Page	405	407	410
Description	50 mm light for enclosure and area lighting	28 mm wide industrial strip lighting for enclosure and area lighting	Rugged, sealed light for area and machine lighting
Color	White	White	White
Dimensions	WL50: 47.5 x 50 mm WL50F: 76 x 23 x ø 50 mm	28 x 21 x (H) mm (H): 183.5 to 1181 mm (depending on position and light length)	105 x 180 mm 190 x 180 mm 275 x 180 mm 360 x 180 mm
Power Supply	10 to 30V dc	12 to 30V dc	12 to 30V dc
Construction	Polycarbonate	Clear anodized aluminum	Valox™
Mounting	WL50: 30 mm threaded base mount WL50F: Flat mount	End mounting	Flat mount
Environmental Rating	Standard models: IP69K per DIN 40050 Push-button models: IEC IP67	IP50	IP69K

Selection Guide





Vision Lights

			
Series	Ring Lights	Area Lights	Backlights
Catalog Page	416	418	420
Description	Mounts directly to the sensor for easy setup and illuminates any object directly in front of the sensor	Provides even illumination in a concentrated area	Installs behind the target, directly facing the sensor; has a highly diffused surface and uniform brightness

		
Linear Array Lights	On-Axis Lights	Low-Angle Ring Lights
421	422	422
Provides high-intensity illumination of large areas, at long distances	Provides collimated illumination along the same optical path as camera	Illuminates nearly perpendicular to the direction of an inspection

		
Spot Lights	Tubular Fluorescent Lights	Structured Lights
423	424	424
Provides even illumination in a small concentrated spot	Features flicker-free high-intensity illumination of large areas	Uses Class 2 laser line for 3-dimensional sensing






For additional Vision Lighting selection information, see page 415.

Indicators			
			
Series	TL50 Tower Lights	TL30F Tower Lights	CL50 Column Lights
Catalog Page	428	428	432
Description	Preassembled and preconfigured multi-segment indicators with up to five colors in a single tower	Preassembled and preconfigured multi-segment indicators with three or five colors in one tower	Large single illuminated segment with 30 mm base
Maximum Colors in One Housing*	General-Purpose: 5 Audible: 4	5	3 & Audible Alert
Indication	General-Purpose: Green, Yellow, Red, Blue, White Audible: Green, Yellow, Red, Blue, White, Audible Alert	General-Purpose: Green, Yellow, Red, Blue, White	General-Purpose: Green, Red, Yellow Audible: Green, Red, Yellow and Audible Alert
Typical Audible	IP50: 92 dB @ 1 m IP67: 94 dB @ 1 m	—	Typical : 92 dB @ 1 m
Dimensions	ø 50 mm x (H) Tower Height (H) General Purpose: 61.2 to 224.0 mm Audible (IP50): 92.0 to 214.1 mm Audible (IP67): 74.4 to 237.2 mm	30 x 19.1 mm x height Tower Height 3 Color: 128.1 mm 5 Color: 204.3 mm	General Purpose: ø 50 x 114.2 mm Audible (IP50): ø 50 x 145.3 mm Audible (IP67): ø 50 x 168.2 mm
Mounting	30 mm threaded base mount	Flat mount	30 mm threaded base mount
Construction	ABS/Polycarbonate (black or gray housings)	Black Painted Aluminum	Polycarbonate
Environmental Rating	General-Purpose: IP67 Audible: IP50 or IP67, depending on model	IP65	General-Purpose: IP67 Audible: IP50 or IP67, depending on model
Operating Temperature	General-Purpose: -40° to +50° C Audible: -20° to +50° C	-40° to +50° C	General-Purpose: -40° to +50° C Audible: -20° to +50° C
Power Supply	18 to 30V dc or 24V ac	18 to 30V dc or 24V ac	18 to 30V dc

* Contact factory for other colors and color combinations.

Selection Guide

Indicators

					
Housing	K80L	K50L & K50FL	T30	K30L	
Catalog Page	444	444	432	432	
Description	50 mm dome or flat profile	50 mm dome or flat profile	30 mm T-style	30 mm dome	
Maximum Colors in One Housing	5	5	3	3	
Indication*	General-Purpose: Green, Red, Yellow Multi-Function: Green, Red, Yellow, Blue, White ON, flashing or alternating Sensor Emulator: Green, Yellow Audible: Green, Red, Yellow, Steady or Pulsed Tone Segmented: Green, Red, Yellow, Blue, White	General-Purpose: Green, Red, Yellow Multi-Function: Green, Red, Yellow, Blue, White ON, flashing or alternating Sensor Emulator: Green, Yellow Audible: Green, Red, Yellow, Steady or Pulsed Tone Daylight Visible: Green, Red, Yellow, Blue, White	General-Purpose: Green, Red, Yellow Multi-Function: Green, Red, Yellow ON, flashing or alternating Sensor Emulator: Green, Yellow	General-Purpose: Green, Red, Yellow Sensor Emulator: Green, Yellow	
Audible	Steady or Pulsed: Typical—75 dB @ 1 m Min—66 dB @ 1 m Loud Steady: Typical—92 dB @ 1 m Min—84 dB @ 1 m	Steady or Pulsed: Typical—75 dB @ 1 m Min—66 dB @ 1 m Loud Steady: Typical—92 dB @ 1 m Min—84 dB @ 1 m	—	—	
Dimensions	Segmented: 110 x 81 x 41mm All others: 110 x 81 x 66 mm	K50L: 57 x ø 50 mm K50FL: 60 x ø 50 mm Daylight visible: 50 x ø 50 mm	64 x 40 x 45 mm	42 x ø 30 mm	
Mounting	Flat or DIN-rail mount	30 mm threaded base or flat mount	30 mm threaded mount	22 mm threaded base mount	
Construction	Polycarbonate	K50L: Polycarbonate K50FL: ABS/polycarbonate Daylight Visible: Polycarbonate	Thermoplastic polyester	Polycarbonate	
Protection Rating	Audible: IP50 All others: IP67	Audible: IP50 All others: IP67	IP67	IP67	
Operating Temperature	Audible: -20° to +50° C All others: -40° to +50° C	Audible: -20° to +50° C All others: -40° to +50° C	-40° to +50° C	-40° to +50° C	
Power Supply	18 to 30V dc, 24V dc or 85 to 130V ac	15 to 30V dc, 24V dc, 18 to 30V dc or 85 to 130V ac depending on model	10 to 30V dc	10 to 30V dc	

* Contact factory for other colors and color combinations.

Indicators

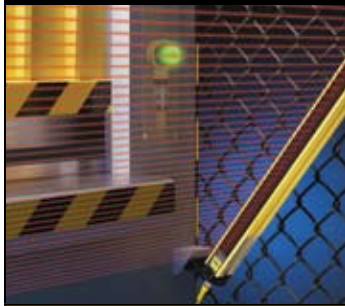
				
T18	M18	T8L	K80CLR Call Light	Traffic Lights
432	432	432	439	440
18 mm T-style	18 mm barrel	8 mm T-style	Battery-powered 50 mm dome	Preassembled indicators for signaling and traffic control
3	3	2	1	1 Light: 3 2 Light: 1 (each light) 3 Light: 1 (each light)
General-Purpose: Green, Red, Yellow Sensor Emulator: Green, Yellow	General-Purpose: Green, Red, Yellow Multi-Function: Green, Red, Yellow ON, flashing or alternating Sensor Emulator: Green, Yellow	General-Purpose: Green, Red, Yellow Sensor Emulator: Green, Yellow	Red	1 Light: Green, Red, Yellow 2 Light: Top—Red Bottom—Green 3 Light: Top—Red Middle—Yellow Bottom—Green
—	—	—	—	—
40 x 33 x ø 16 mm	51 x ø 18 mm	19 x 16 x ø 16 mm	80 x 81 x 41 mm	1 Light: 110 x 81 x 92 mm 2 Light: 190 x 88 x 110 mm 3 Light: 210 x 80 105 mm
18 mm threaded mount	18 mm threaded barrel mount	8 mm threaded nose mount	Flat or DIN-mount	Flat or DIN-mount polycarbonate
Thermoplastic polyester	Nickel-plated brass	Polycarbonate/ABS blend	Polycarbonate	Polycarbonate
IP67	IP67	IP67	IP50	1 Light: IP67 2 & 3 Light: IP65
-40° to +50° C	-40° to +50° C	-40° to +50° C	-20° to +50° C	-40° to +50° C
10 to 30V dc	10 to 30V dc	10 to 30V dc	18V (two 9V batteries)	15 to 30V dc or 85-130V ac, depending on model

Selection Guide

Actuators

    				
Series	K50 & K80	PVD	PVA	VTB
Catalog Page	444	448	450	453
Description	50 mm dome light with sensor in two housing styles	One-component light sensor for part assembly and error-proofing	Two-component light screen for part-pick verification	Ultra-bright optical touch buttons for indicating bin-picking sequences
Job Light Color	Green, Red, Yellow	Green, Red	Green	Green, Red, Blue
Maximum Sensing Range	Retroreflective: 2 m Fixed-Field: 100 mm Push button: —	Retroreflective: 2 m Diffuse: 400 mm	Opposed: 2 m	—
Minimum Object Detection Size	—	Retroreflective: 51 to 100 mm Diffuse: 55 mm	Opposed: 35 mm	—
Dimensions (h x w x d)	K50: ø 50 x 57 mm K80: 110 x 81 x 73 mm	PVD100: 138 x 30 x 16 mm PVD225: 266 x 30 x 16 mm	30 x 15 mm x height Array heights: 138 mm 341 mm 266 mm 417 mm	57 x 60 x 43 mm
Construction	Polycarbonate & Thermoplastic	Black painted aluminum	Black anodized aluminum	Black polysulfone or red polycarbonate with white polycarbonate base
Protection Rating	IP69K (depending on installation)	IP62; NEMA 2	IP62; NEMA 2	IP66; NEMA 4X
Operating Temperature	-40° to +50° C	0° to +50° C	0° to +50° C	-20° to +50° C
Power Supply	12 to 30V dc	12 to 30V dc	12 to 30V dc	12 to 30V dc
Output configuration	One NPN or PNP & NO or NC, depending on model	One user-selectable PNP or NPN	One NPN or PNP, depending on model; programmable for light or dark operate	One NPN or PNP, depending on model

Safety Light Screens



Series	EZ-SCREEN® Type 4	EZ-SCREEN® Type 2	PICO-GUARD™
Catalog Page	473	489	502
Description	2-piece system <ul style="list-style-type: none"> • 14 or 30 mm resolution light screen • 14 or 25 mm resolution LP light screen • 2-, 3- or 4- Beam Grids • Single-beam Points 	2-piece, 30 mm resolution light screen system for lower risk applications	Fiber Optic System <ul style="list-style-type: none"> • 2-, 3- or 4- Beam Grids • Single-beam Points For use with PICO-GUARD controller
Safety Rating (Depends on model)	Type 4 /Category 4/PLe	Type 2 /Category 2	Type 4 /Category 4
System Components	Emitter, receiver and one cordset for each. Optional interfacing components available.	Emitter, receiver and one cordset for each. Optional interfacing components available.	1 to 4 fiber optic element pairs, plus a controller
Range	14 or 30 mm: up to 18 m 14 or 25 mm: up to 7 m Grids & Points: up to 70 m	up to 15 m	up to 31 m
Supply Voltage	24V dc	24V dc	24V dc
Safety Output	2 PNP OSSD	2 PNP OSSD	2 PNP OSSD
Aux. Output	Yes	—	Yes
Response Time	8 to 56 ms, depending on model	11 to 25 ms	13 ms
Defined Area (Protected Height)	14 mm resolution: 150 to 1800 mm 30 mm resolution: 150 to 2400 mm 14 or 25 mm resolution: 270 to 1810 mm Grids: 500 to 1066 mm Points: 25 mm beam diameter	150 to 1500 mm	Grids: 500 to 1066 mm Points: 9 to 25 mm beam diameter
Cascading	Allow up to 4 emitter/receiver pairs (14, 25 or 30 mm systems) to be wired together to form a single safety device. Only matched pairs must be the same length and resolution.	—	Multiple PICO-GUARD controllers can be interconnected

Selection Guide

Safety Laser Scanner



Series	AG4
Catalog Page	503
Description	Two-dimensional, programmable area scanner
Safety Rating (Depends on model)	Type 3/Category 3
System Components	Laser scanner, configuration cordset and communication cordset
Protective Field	up to 6 m
Warning Field	up to 15 m
Scanning Angle	190°
Supply Voltage	24V dc
Safety Output	2 PNP OSSD
Aux. Output	2 PNP
Response Time	80 ms (adjustable to 640 ms)




Safety Controllers



Series	SC22-3/-3E	PICO-GUARD™
Catalog Page	526	508
Description	Four standard models and four models for direct connectivity to EtherNet/IP and Modbus TCP industrial networks	Two models with different output configurations and one model with muting
Safety Rating (Depends on models)	Category 2, 3 or 4	Type 4/Category 4
Functional Stop Category	0 & 1	0
Voltage	24V dc	24V dc
Inputs	22 input terminals monitor safety and non-safety devices.	Up to 4 fiber optic channels (optical channels) controlling one or more optical elements, depending on optical element. Also, two inputs for external safety devices (USSI)* or mute, depending on model.
Safety Output	6 PNP (3 pair)	2 PNP OSSD
Aux. Output	10 discrete status outputs, EtherNet/IP & Modbus TCP	3 or 7 solid-state, depending on model
Output Response Time	10 ms	Optical channels: 13 ms USSIs: 7 ms (except muting)

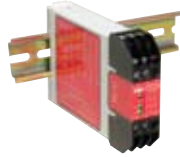
* USSI = Universal Safety Stop Interface

Safety Modules

					
Series	E-Stop & Interlocked Guard	Universal Input	Safety Mat	Muting	Safe Speed
Catalog Page	531	539	541	544	548
Description	Modules monitor contacts of E-stop switches, guard interlock switches or the outputs of other safety modules.	Modules monitor one or two solid-state PNP or relay contact outputs from safety or non-safety devices, such as sensors or safety light screens.	Modules monitor one 4-wire safety mat (or multiple connected in series).	Modules suspend safeguarding during non-hazards time in the machine's cycle.	Modules monitor two sensors with PNP outputs for rotation and linear movements.
Safety Rating (Depends on model)	Category 2 or 4, depending on model	Category 2, 3 or 4	Category 3 (with mat)	Category 2, 3 or 4	Category 3
Functional Stop Category	0 & 1	0	0	0	0
Supply Voltage	24V ac/dc, 115V ac & 12-24V dc, 230V ac & 12-24V dc or 24V dc	24V ac/dc	115V ac & 12-24V dc or 230V ac & 12-24V dc	24V dc	24V ad/dc
Safety Outputs	2 NO, 3 NO, 4 NO, 2 NO & 2 NO w/delay or 4 NO & 4 NO w/delay	3 NO or 2 NO	4 NO	2 PNP OSSD or 2 NO	2 NO
Aux. Outputs	1 NC, 1 NC & 2 PNP, or 1 NC (immediate) & 1 NC (delayed)	1 NC	1 NC & 2 PNP	1 PNP or 1 NC	1 NC
Output Response Time	25, 35 or 50 ms	25 ms	50 ms	10 or 20 ms	700 or 350 ms

Selection Guide

Safety Modules



Series	Extension Relay	Interface Relay
Catalog Page	550	552
Description	Single or dual (depending on model) input channels accept the outputs of a primary safety device. Modules provide additional safety outputs for a primary safety device. Typically interfaced with safety modules with relay outputs.	One dual input accepts the single or dual safety output of a primary safety device. Typically interfaced with devices solid-state OSSD Outputs. Module increases switching current capacity (up to 6 amps) for the output of a primary safety device.
Safety Rating (Depends on model)	Category 2, 3 or 4 (Depends on hookup)	Category 2, 3 or 4 (Depends on hookup)
Functional Stop Category	0 or 1	0
Supply Voltage	24V dc or 24V ac/dc, depending on model	24V dc
Safety Outputs	4 NO or 4 NO (w/delay)	3 NO or 2 NO
Aux. Outputs	—	1 NC, depending on model
Output Response Time	20, 30 or 35 ms, depending on model	20 ms






Two-Hand Control



Series	DUO-TOUCH® SG THC Modules	DUO-TOUCH® SG Run Bars
Catalog Page	556	564
Description	Two-Hand Control Modules; STB compatible	Two-hand control Run Bar with pre-mounted STB buttons
Inputs	Two STB Self-Checking Touch Buttons or Form C Mechanical Button	Requires IIC Two-Hand Control logic device for safe guarding applications
Safety Rating	Category 4 (module); Type IIC	Dependent on controller/module
Modules	Five models with different supply voltage, outputs and control functions (example, muting)	Five models with different supply voltage, outputs and control functions (purchased separately)
Supply Voltage	24V ac/dc, 115V ac/24V dc or 230V ac/24V dc, depending on model	10 to 30V dc
Safety Outputs	2 NO or 4 NO	—
Aux. Outputs/Function	AT-FM-10K: none All others: 1 NPN, 1 PNP & 1 NC	Models with or without E-Stop buttons
STB Touch Buttons	6 models with varying supply voltage, output type, cable and housing material Kits with modules and STB buttons available	2 x STBVP6

Selection Guide

Safety Interlock Switches

					
Series	PICO-GUARD™	Magnet	Hinge	Compact Plastic & Metal	Locking
Catalog Page	568	569	572	578 & 584	587
Type	Fiber Optic	Magnetic	Electromechanical Non-Locking	Electromechanical Non-Locking	Electromechanical Locking
Package Style	2-piece	2-piece	1-piece	2-piece	2-piece
Housing Material	Plastic or metal	Plastic	Plastic or metal	Plastic or metal	Plastic or metal
Actuator Contacts	For use with PICO-GUARD controller	1 NO & 1 NC	2 NC & 1 NO, SPDT (Form C), 1 NC & 1 NO, or 2 NC	2 NC & 1 NO, 1 NC & 1 NO, 2 NC, 1 NC, or 1 NO & 1 NC	1 NC & 1 NO, 2 NC, 2 NC & 1 NO, or 3 NC
Solenoid Contacts	—	—	—	—	1 NC & 1 NO, or 1 NC

Emergency Stop & Stop Control Devices

				
Series	PICO-GUARD™	Mechanical E-Stop Buttons	Rope Pull Switches	Enabling Devices
Catalog Page	599	601	605	615
Description	Optical E-Stop Push Buttons	Mechanical E-Stop Push Buttons	E-Stop and Stop Control Rope Pulls	Stop Control Enabling Devices
Housing Material	Plastic or metal	Plastic or metal	Plastic or metal	Plastic
Contacts	For use with PICO-GUARD controller	2 NC, 1 NC & 1 NO, or 2 NC & 1 NO	Safety Contacts: 2 NC or 4 NC Aux. Contacts: 2 NO or 1 NO	2 NC & 1 NO Aux. or 2 NC & 1 NO Aux. & 1 NO momentary push button, or 2 NC & 2 NO momentary push button

Applications

Sensor Applications

Low-Profile Object Detection



Objective:
To detect the presence of integrated circuit chips in a confined space.

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Reflective Object Counting



Objective:
To reliably count metal rings passing on a conveyor.

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Part Presence



Objective:
To verify the presence of colored caps on bottles of children's medicine.

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page 60

People Detection



Objective:
To detect people as they enter/exit an escalator.

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Precise Counting



Objective:
To count the narrow barrels of syringes.

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Sorting



Objective:
To sort letters from packages, based on height.

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Liquid Leak Detection



Objective:
To detect a hazardous fluid leaking from pipes inside a valve box.

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Reflective Package Detection



Objective:
To detect the presence of product wrapped in reflective Mylar on a conveyor belt.

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Tilt Tray Inspection



Objective:
To detect items in a tray for sorting.

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Outsert Detection



Objective:
To ensure that a coupon is present before applying it to a bottle cap.

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Thread Hole Inspection



Objective:
To verify, from a distance, that threads have been cut into holes in a manifold.

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Feeder Bowl Level Monitoring



Objective:
To monitor supply level of caps as they move out of the feeder bowl.

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Lumber Inspection



Objective:
To check lumber for warping.

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Vehicle Detection



Objective:
To verify that a vehicle is in position in a car wash.

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page 150

Liquid Detection



Objective:
To detect water or liquid containing water, regardless of bottle color.

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Clear Bottle Counting



Objective:
To reliably count clear bottles moving on a high-speed conveyor line.

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Sensor Applications

Long-Distance Feature Detection



Objective:
To detect a small flange from a long distance.

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Product Flow Control



Objective:
To signal the machine control when cans are absent, using a time delay to filter out gaps between the cans.

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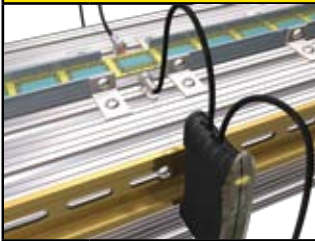
Edge Guiding



Objective:
To keep a roll of plastic in the correct position by monitoring the edge.

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page 226

Lead Frame Presence Detection



Objective:
To detect the presence of an IC lead frame.

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Loop Tension Monitoring



Objective:
To control the speed of a web using a loop control system.

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page 226

Wafer Mapping



Objective:
To map the presence of wafers in a cassette.

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Poly Bag Seal Detection



Objective:
To locate the perforations between bags on a web.

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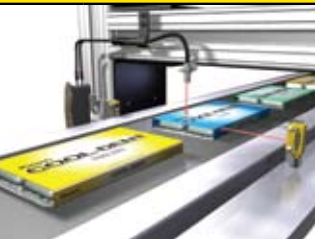
Thread Break Detection



Objective:
To detect broken threads on a loom.

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Color Sorting



Objective:
To sort gum packets by label color.

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Pill Counting



Objective:
To quickly and accurately count small pills, tablets and gelatin tablets to ensure correct fill level.

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Part Detection Error-Proofing



Objective:
To check that certain steps have been performed before the assembly process can continue.

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Equipment Inspection



Objective:
To check whether the weld tips of an automotive welder are within specifications.

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Small Part Detection



Objective:
To detect extremely small parts as they fall through a web of sensing beams.

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Small Object Detection



Objective:
To accurately detect flat objects passing on a conveyor.

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Splice Detection



Objective:
To identify splices on a roll of paper.

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Registration Mark Detection



Objective:
To detect registration marks on labels as they pass at high speeds.

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Applications

Sensor Applications

Counting



Objective:
To count syringe barrels in an assembly line.

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Gear Tooth Sensing



Objective:
To sense the teeth of a timing gear to produce pulses used in automated production machinery.

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Tamper Evident Seal Detection



Objective:
To detect the presence of a tamper evident seal on a bottle.

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Range of Motion



Objective:
To accurately measure the range of motion of an auto seat back.

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Dry Fill Level



Objective:
To accurately determine the level of dry bulk material in a bin hopper, despite the material's uneven surface.

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page 295

Extremely Long-Range Sensing



Objective:
To instantly measure the location of an automated storage and retrieval shuttle, to track its position.

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page 300

Long-Range Sensing



Objective:
To detect the presence and position of a car seat on an automotive assembly line.

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Thickness Measurement



Objective:
To measure thickness of drywall at the points across the width of a sheet.

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Wood Profiling



Objective:
To accurately profile wooden moldings, regardless of color.

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Liquid Level Monitoring



Objective:
To monitor the level of liquid in a tank by sending a continuous signal that represents the current depth.

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Roll Size



Objective:
To monitor the decreasing size of a roll of material, so it can be replaced when empty.

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Pallet Load



Objective:
To detect that a pallet with packages stacked at different heights is loaded and ready for wrapping.

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Loop Control



Objective:
To control the amount of play in a loop of clear plastic within a set range.

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Liquid Level Detection



Objective:
To accurately determine the level of liquid in a narrow tube.

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page 314

Bottle Counting



Objective:
To count tinted glass bottles on a conveyor in a soft drink bottling operation.

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Liquid Level Detection



Objective:
To monitor the level of soap in a reservoir in a car wash.

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Sensor Applications

Loop Control of Clear Plastic



Objective:
To control the speed of a web by reliably detecting the clear plastic film.

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Moonroof Detection



Objective:
To reliably detect the presence of clear glass to ensure that the moonroof has been installed.

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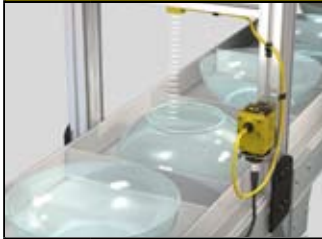
Pharmaceutical Bottle Detection



Objective:
To reliably detect clear bottles in an aseptic environment.

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Inverted Object Detection



Objective:
To detect a product that has flipped over by measuring small differences in height.

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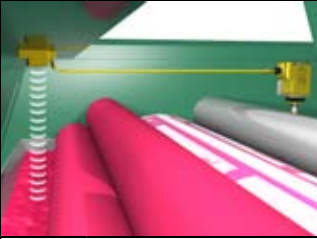
Height Measurement



Objective:
To verify that a stack of boards has the correct number.

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Ink Level



Objective:
To monitor the ink level in a printer tray.

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Web Thickness



Objective:
To measure the thickness of webbing.

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Empty Rack Verification



Objective:
To verify that all glass hard disks are removed from the holding rack after the disks are rinsed.

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page 330

Carton Sizing



Objective:
To measure height, length and width of cartons for storage or palletizing

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Plastic Bottle Detection



Objective:
To ensure that clear bottles are properly placed on a conveyor.

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Carpet Web Detection



Objective:
To determine the location of two edge transitions on carpet web: air to selvage and selvage to tufting.

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Vehicle Separation



Objective:
To detect vehicle separation in an Automated Vehicle Classification (AVC) system.

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Edge Monitoring



Objective:
To track the edge of a web as it rolls, to make sure it stays aligned.

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Train and Tram Detection



Objective:
To detect and locate a train or tram in a tunnel

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Cargo Positioning



Objective:
To detect and position cargo on a truck bed

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Automobile Detection in Drive-Through



Objective:
To detect the presence of large moving or stationary objects, regardless of shape or color.

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page 354

Applications

Vision Applications

Label Alignment Inspection



Objective:
To verify that each bottle has a label applied and that each label is applied straight.

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Date/Lot Code Inspection



Objective:
To verify each package has a date/lot code printed on it.

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page 364

Punch Hole Inspection



Objective:
To verify that the expected number of holes exist on a small metal part.

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page 364

Vial Stopper Inspection



Objective:
To ensure that a stopper is properly inserted as each vial leaves the filling station.

ONLINE
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page 364

Part Flaw Detection



Objective:
To detect bent or missing connectors, and make sure electronic components are correctly oriented.

ONLINE
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page 364

Intelligent Mail Bar Code (IMB) Reading



Objective:
To sort mail by reading the information encoded in the bar code.

ONLINE
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page 364

Lot Code Inspection



Objective:
To verify that a readable lot code is present on the chip.

ONLINE
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page 364

Pharmaceutical Insert Verification



Objective:
To read and verify data matrix code on the documentation prior to the final packaging process.

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Vial Fill Level and Cap Seal Inspection



Objective:
To rapidly verify that vials are filled to the correct level and that the vial caps are correctly aligned.

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Stamped Metal Pin Inspection



Objective:
To check for correct count, straightness and pitch of connector pins on a stamped metal subassembly.

ONLINE
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page 370

Color Inspection and Verification



Objective:
To inspect pour spouts for correct insertion and color.

ONLINE
LOOK FOR MORE INFO
page 370

Capping and Fill Inspection



Objective:
To make sure bottles are filled and capped properly.

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LOOK FOR MORE INFO
page 370

Verification of Two Bar Codes on a Part



Objective:
To read and verify 1D and 2D bar codes on a part.

ONLINE
LOOK FOR MORE INFO
page 370

Product ID and Lot Control



Objective:
To track a batch of a pharmaceutical product.

ONLINE
LOOK FOR MORE INFO
page 370

Label Inspection in a Wet Environment



Objective:
To confirm that each bottle in a wet environment has a label in the correct position.

ONLINE
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page 370

2D Stamped Bar Code Verification



Objective:
To detect and verify a dot-peened bar code on a metal part.

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Wireless Applications

Preventative Maintenance



Objective:
To gather I/O data such as temperature and vibration on a mobile Automated Storage and Retrieval System (AS/RS) crane motor.

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Warehouse Door



Objective:
To control the routing of an Automated Guided Vehicle (AGV) through a facility a FlexNode is positioned at each door.

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page 391

Report Activated Emergency Shower Location



Objective:
To alert management when and where an emergency shower has been activated.

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page 390

Rotary Bottle Filler Monitoring



Objective:
To monitor fill level, temperature and pressure to determine when to activate the inflow into the tank.

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Gated Community Entry



Objective:
To open/close gates by detecting presence/absence of vehicles using a wireless M-GAGE Node.

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Call for Parts (Flooring Monitoring)



Objective:
To allow operators to call forklift drivers to deliver additional parts or remove completed assemblies.

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Energy Management



Objective:
To control and optimize energy consumption by turning on and off industrial fans and air movers.

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Pick-to-Light



Objective:
To deploy a wireless pick-to-light system using a FlexNode equipped with low-power EZ-LIGHT models.

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Environmental Monitoring



Objective:
To maintain optimal temperature and relative humidity using a wireless Node.

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Process Tank Level Monitoring



Objective:
To maintain optimal fill level with a FlexPower Node and power-optimized ultrasonic sensor.

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Valve Temperature Monitoring in a Steam Power Plant



Objective:
To monitor the valve temperature to identify possible energy losses and schedule repairs.

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Failing Conduit Replacement



Objective:
To replace failing wired systems with a Node and Gateway pair.

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Robotics Retrofit



Objective:
To eliminate the need for slip rings using a FlexNode to capture data onboard a moving robot.

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page 390

HVAC Control



Objective:
To manage energy by monitoring the HVAC system and identifying areas where improved efficiency is possible.

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Tank Level Pressure



Objective:
To maintain tank levels using a submersible pressure sensor and a FlexNode.

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page 390

Automated Parts System



Objective:
To schedule pick up of a pallet by an AGV simply by pressing a button at a workstation.

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Applications

Indicator & Actuator Applications

Machine Status Indication



Objective:
To clearly indicate where in the process the machine is, and when the machine needs attention.

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Pump Panel Status Indication



Objective:
To use multiple lights and audible alert to communicate pump status, even from a distance.

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Checkout Lane Status Indication



Objective:
To identify which grocery store lanes are open, which are closed and which are about to close.

page 427

Conveyor Jam detection



Objective:
To use an indicator light and audible alert to signal a conveyor jam.

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Part Loaded Indicator



Objective:
To signal to an operator that a part is placed correctly, without leaving the station.

page 427

Process Inspection Indicator



Objective:
To allow an inspector to monitor the pass/fail reading of several sensors at the same time.

page 427

Remote Level Indication



Objective:
To alert the operator that a sensor has detected that the content level is running low.

page 427

Traffic Control



Objective:
To indicate the status of a loading dock.

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Call for Parts



Objective:
To alert personnel to refill bins before parts are depleted.

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Incorrect Pick Signal



Objective:
To indicate whether the operator is picking from the correct bin or wrong bin.

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Wide Bin Confirmation



Objective:
To provide compact part-pick confirmation for a shelf with a wide opening.

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Call for Service



Objective:
To signal and indicate that service is required using a hanging indicator and push button.

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Enclosure Lighting



Objective:
To provide bright, even illumination where space is limited.

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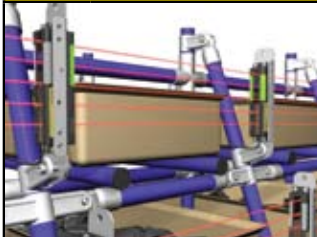
Order Fulfillment



Objective:
To guide a packer to the next item in an order and to confirm the pick.

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Long Bin Pick-to-Light



Objective:
To provide pick-to-light sensing for bins that extend beyond the rack.

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Part Pick Verification



Objective:
To indicate which part to pick for an assembly and to verify the pick is done.

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Machine Safety Applications

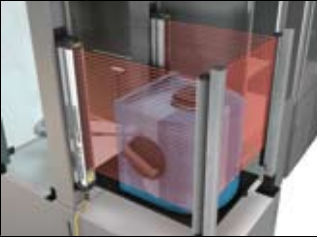
Personnel Protection with Fixed Blanking



Objective:
To protect hands and fingers from the hazardous parts of a carton erector.

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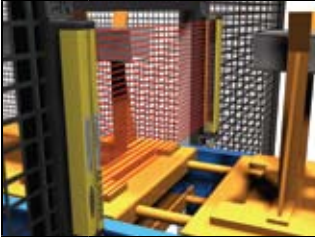
Guarding in ESD-Sensitive Environment



Objective:
To guard a wafer cell in an environment sensitive to electrostatic discharge.

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Safe Material Access



Objective:
To prevent injury while allowing materials into a process.

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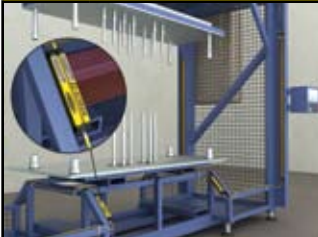
Perimeter Guarding



Objective:
To combine a light screen and mirrors to guard access to a work cell.

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Vertical and Horizontal Guarding



Objective:
Guarding of two sides of machine because of separate operator load and unload stations.

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Weld Cell Protection



Objective:
To protect operators in semi-automated operations involving the manual feeding and/or removal of parts.

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L-Configured Guarding



Objective:
To link multiple light screens to safeguard a robotic cell.

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Small Machine Guarding



Objective:
To provide low-profile, point-of-operation guarding for small machinery.

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U-Configured Guarding



Objective:
To guard multiple sides of a machine without overlapping light curtains.

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L-Configured Guarding without Overlapping



Objective:
To provide continual sensing with no gaps.

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Lower-Risk Machine Guarding



Objective:
To provide guarding for a lower-risk application.

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Lower-Risk Machine Guarding



Objective:
To protect personnel from a machine that can cause slight injuries.

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Perimeter Guarding



Objective:
To shut off the hazardous motion of a tube bender when someone enters the cell.

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Single-Point Access Guarding



Objective:
To prevent personnel from accessing a hazardous area.

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Entry/Exit Guarding with Muting



Objective:
To prevent personnel from accessing a hazardous area.

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Explosive Environment Point-of-Operation Guarding



Objective:
To protect hands from a hazard while allowing material to pass through, by spacing individual Points as needed.

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Applications

Machine Safety Applications

Moving Door Monitoring



Objective:
To prevent passengers from being struck by closing doors.

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Explosive Environment Guarding with Muting



Objective:
To provide entry/exit guarding and muting, using Points in an explosive environment.

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Monitoring Access to an Assembly Line



Objective:
To detect the presence/absence of objects or personnel as vehicles move along an assembly line.

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Collision Avoidance



Objective:
To provide collision avoidance for automated guided vehicle (AGV).

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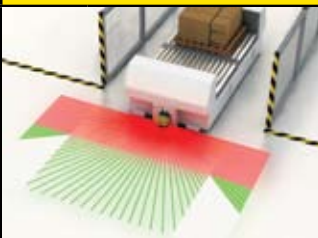
Two-Zone Monitoring



Objective:
To detect the approach of personnel to each of two operator work stations of a robotic cell.

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AGV Turn Clearance



Objective:
To detect the presence of personnel or objects in the path of the automated guided vehicle (AGV).

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Point-of-Operation Guarding



Objective:
To detect a hand, arm or entire body using reference container monitoring.

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Whole Body Detection



Objective:
To safeguard a pallet load/unload station using two scanners with field pair switch over.

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Monitoring of Multiple Safety Devices



Objective:
To provide monitoring of safety light grids, interlock switches, E-Stop button and a run bar with one safety controller.

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Monitoring of Multiple Safety Devices



Objective:
To monitor a safety light screen, self-checking touch buttons and an E-Stop button with one safety controller.

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Emergency Stop Monitoring



Objective:
To stop a machine's operation in an emergency, using a module with three output switching channels.

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Emergency Stop Monitoring



Objective:
To stop a machine's operation in an emergency, using a module with four output switching channels.

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Gate Monitoring



Objective:
To monitor a door-guarding switch, whether the switch is mechanical or magnetic.

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Mat Monitoring



Objective:
To monitor a safety mat that provides area guarding by responding to pressure.

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Safe Material Access



Objective:
To prevent injury while allowing material into a process.

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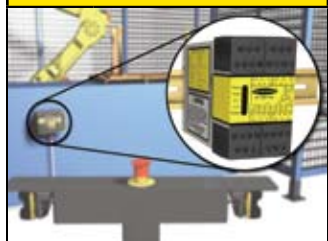















Two-Hand Control Monitoring



Objective:
To monitor any actuation device pair, using a module with two redundant output contacts.

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Machine Safety Applications

Two-Hand Control Monitoring  Objective: To monitor any actuation device pair, using a module with four redundant output contacts. ONLINE LOOK FOR MORE INFO page 554	Two-Hand Control Monitoring with Muting  Objective: To use a two-hand control to start a cycle and mute during the cycle's safe portion. ONLINE LOOK FOR MORE INFO page 554	Door Monitoring  Objective: To provide door guarding using compact, barrel shaped interlocking switches. ONLINE LOOK FOR MORE INFO page 507	Gate Monitoring  Objective: To monitor the position of a swing gate using a pair of interlocking switches. ONLINE LOOK FOR MORE INFO page 507
Door Monitoring  Objective: To provide door guarding in an explosive environment, using fiber optic switches. ONLINE LOOK FOR MORE INFO page 507	Door Monitoring  Objective: To provide door guarding in an environment cleaned with chemicals, using a fiber optic switch. ONLINE LOOK FOR MORE INFO page 507	Door Monitoring  Objective: To safeguard a door in an area with heavy machine traffic. ONLINE LOOK FOR MORE INFO page 507	Swinging Gate Monitoring  Objective: To safeguard a hazard with a guard, gate or door that is mounted on a hinge. ONLINE LOOK FOR MORE INFO page 572
Gate Monitoring  Objective: To prevent trapping or crushing by protecting an interlocked breakaway guard with an integral hinge. ONLINE LOOK FOR MORE INFO page 572	Switch Door Locking  Objective: To lock out an area until a machine's hazardous motion stops. ONLINE LOOK FOR MORE INFO page 587	Sliding Door Monitoring  Objective: To instantly stop a hazardous machine when sliding door is opened. ONLINE LOOK FOR MORE INFO page 587	Emergency Stopping  Objective: To instantly stop the hazardous motion of a conveyor from multiple points, using a heavy-duty switch. ONLINE LOOK FOR MORE INFO page 507
Emergency Stopping  Objective: To instantly stop the hazardous motion of a conveyor from multiple points, using a center-mounted switch. ONLINE LOOK FOR MORE INFO page 605	Emergency Stopping  Objective: To instantly stop the hazardous motion of a conveyor from multiple points, using an end-mounted switch. ONLINE LOOK FOR MORE INFO page 605	Emergency Stopping  Objective: To instantly stop the hazardous motion of a machine from a safe distance. ONLINE LOOK FOR MORE INFO page 605	Emergency Stopping  Objective: To instantly stop the hazardous motion of a machine from a safe distance. ONLINE LOOK FOR MORE INFO page 599