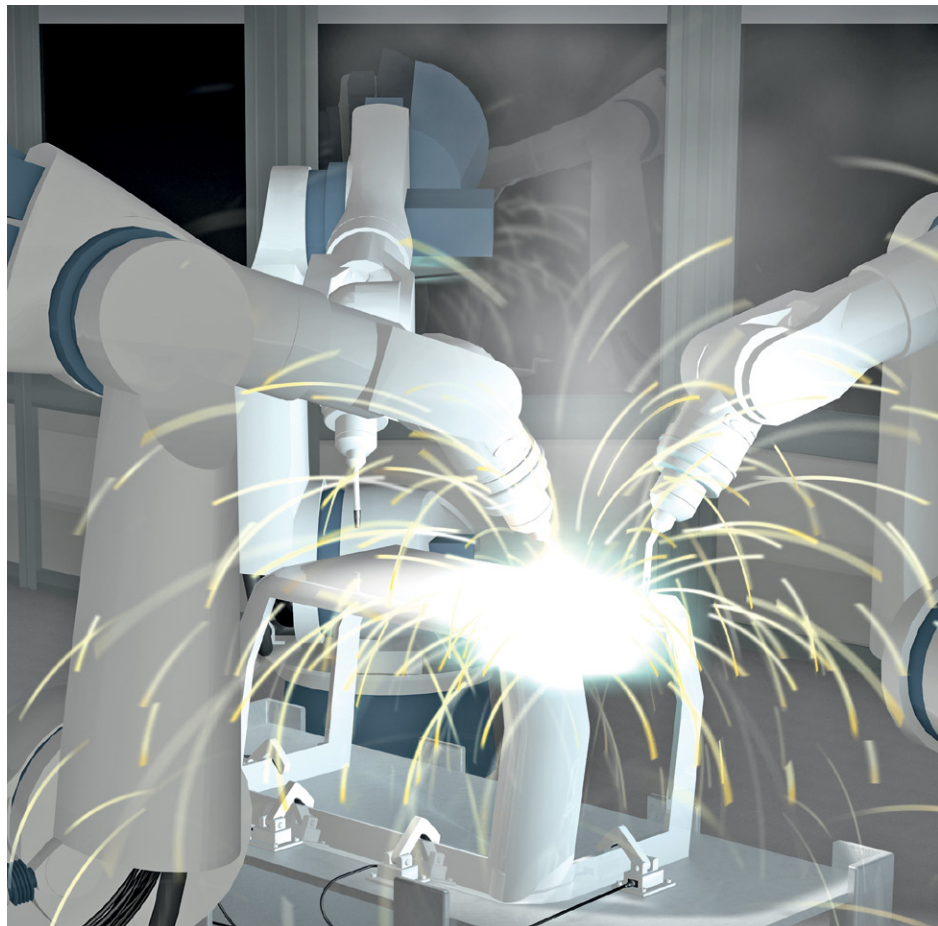
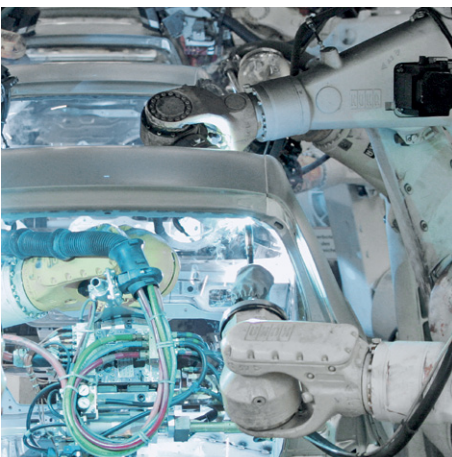
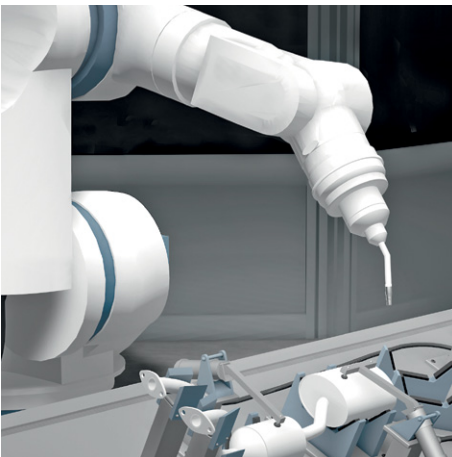


BALLUFF

sensors worldwide

Weld Select Series

Sensing products to boost welding productivity



Weld Select Series

Weld Select is an industry proven group of Balluff products designed for use in the most inhospitable welding environments.

Poor sensor selection costs welders in every industry increased downtime, unnecessary maintenance, delayed delivery, and lost profits. Balluff presents a complete package of welding solutions that extends sensor life and increases productivity in the harshest welding environments.

This guide contains two sections. The front section is designed to help all plant levels identify existing issues and offer Balluff-developed solutions to address them. The second section, beginning on page 14, offers an extensive list of products developed by Balluff welding experts from valuable customer input. These products have been tested in the harshest welding environments and provide significant process and part quality improvement.

- Stop wasting sensors and destroying connectors
- Change the paradigm of accepted high volume sensor usage
- Reduce downtime due to sensor failure
- Slash consumption of sensors and connectors
- Boost profitability throughout the plant

Examples of common weld cell problems that we have solved:

Unprotected and non-bunkered sensors, sensors in damage-prone areas, and/or light weight brackets.



Damage to unprotected sensor faces and cables caused by impact and contact.



Bunker Blocks™ and SpatterGuard coating allow full protection against harsh impact.



Weld Repel® Wrap and TPE cables provide flexibility and resistance to weld slag, lubricants, and connector burn-through.

Problems and Solutions	
Welding Environment	4
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Slag accumulation and unprotected pigtail sensors cause large amounts of downtime.



Standard sensors can accumulate slag, damage the sensing face and cause false tripping of the sensor.



PTFE coated Prox-Mounts and Weld Repel® tubing over sacrificial cables improve sensor life and productivity.



Steelface® sensors with W51 ceramic coating resist the slag and the sensor can be brushed clean with no damage or issues.

Welding Environment

Non-contact inductive proximity sensors must perform a wide variety of clamping and nesting indication, and Poka-Yoke functions in harsh welding environments. Hot weld slag accumulation, elevated ambient temperatures, and strong electromagnetic fields emitted by weld guns can cause false triggering and degrade sensor performance.

Weld Slag



PROBLEM

Hot welding slag (a.k.a. weld debris, weld spatter, weld berries) sticks to sensor faces and bodies and causes premature failure of sensors in weld cells.

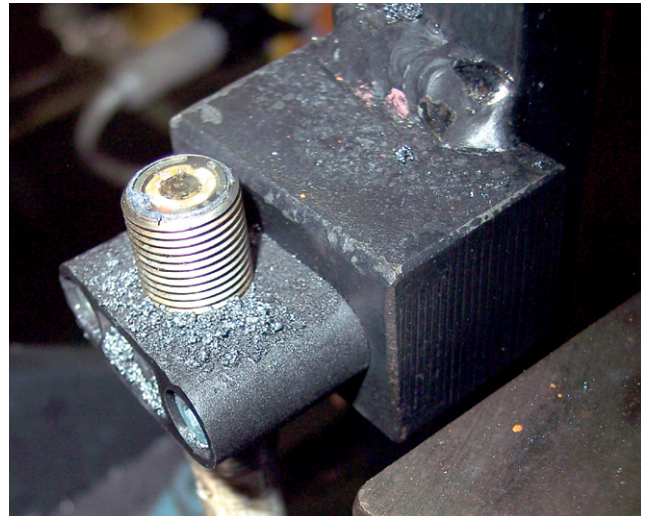
SOLUTION

Balluff SpatterGuard coating on sensor faces resists weld debris and provides a thermal barrier, significantly enhancing sensor longevity, and reducing false triggering. PTFE coated sensor bodies resist weld debris accumulation and promote slag removal during regular scheduled maintenance periods.



See page 20 to find your solution

Electromagnetic Weld Fields



PROBLEM

Strong electromagnetic fields cause conventional sensors to false trigger or “chatter.”

SOLUTION

Balluff inductive proximity and magnetic field sensors with weld field immunity (WFI) resist electromagnetic fields emitted by weld guns up to 100 kA/m.



See page 22 or 25 to find your solution

Loading Impact

Incidental sensor damage caused by parts loading impact can significantly degrade sensor performance, shorten sensor life, or even destroy a sensor. Balluff SteelFace® inductive proximity sensors can withstand multiple heavy impacts and abrasion, and often have the sensing range to be placed out of harm's way.

Damage from Loading Impact

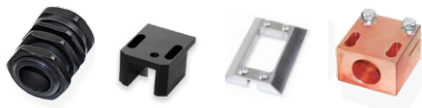


PROBLEM

Severe loading impact and continuous operational impact damages plastic and/or PTFE sensor faces as well as sensor bodies.

SOLUTION

Every precaution should be taken to prevent electronics such as sensors from being hit, but in many cases, loading impact cannot be avoided. By nesting a Balluff SteelFace® inductive proximity sensor into a rugged Prox Mount or Bunker Block™, the likelihood of premature failure becomes lessened, even with repeated impact over time.



See page 36 or 38 to find your solution

Sensor Face Damaged by Impact



PROBLEM

Standard tubular sensors often fail from damage to the sensor face and coil caused by slag and impact. Over time, small repeated impacts can damage the face and lead to sensor failure.

SOLUTION

Balluff SteelFace® inductive proximity sensors with extended range and stainless steel housings resist impact, providing long life in weld cell impact zones. Balluff Bunker Prox™ and PlungerProx™ provide sensors an extraordinary degree of physical protection, resisting or eliminating contact damage to the sensor body and face as well as rapid sensor removal and replacement without need for recalibration.



See page 18 or 28 to find your solution

Cylinder & Clamp Position

Parts welded in a robotic weld cell must be nested and held in place by pneumatically or hydraulically actuated clamps, which are often equipped with sensors located in the clamp jaws to indicate “clamped” or “unclamped” position. Clamp position can also be determined by magnetic field sensors located on the outer wall of an aluminum or composite pneumatic cylinder. To determine clamping position, a Balluff BMF magnetoresistive sensor tracks the magnetic field emitted by a magnet attached to the cylinder’s piston. In high-pressure hydraulic cylinders, Balluff StrokeMaster® end-of-stroke sensors detect the “spud” or cushion of a piston shaft to sense clamp position.

Cylinders & Clamps Need Stroke Detection



PROBLEM

High-pressure hydraulic welding clamps need the right sensors to accurately sense piston extend/retract position and may require electronic weld field immune sensors.

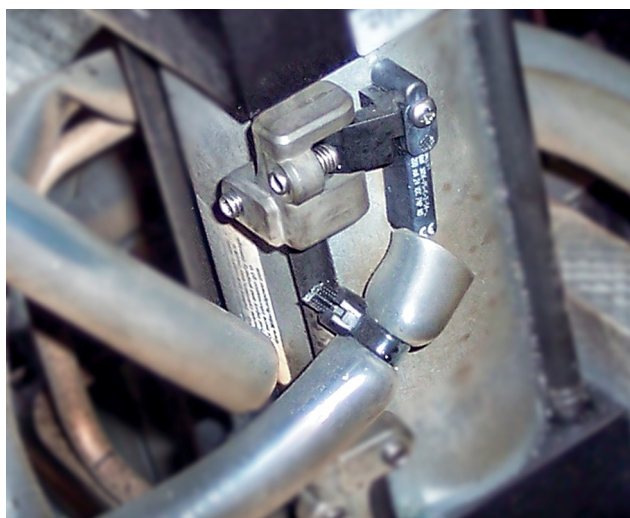
SOLUTION

Balluff StrokeMaster® high pressure-rated end-of-stroke sensors accommodate pressures up to 3,000 PSI and fit virtually all common cylinder brands and bore sizes. StrokeMaster heads swivel to direct connector wiring away from weld hostility.



More information on our website or on request

Premature Reed Switch Failure



PROBLEM

When installed on pneumatic clamping cylinders, failure-prone reed switches and drift-prone Hall Effect sensors deteriorate, often providing inaccurate switch points before failing completely.

SOLUTION

Balluff BMF magnetoresistive sensors come with a lifetime warranty and fit virtually all cylinder housing styles and brands. They provide precise switch points and withstand the rigors of the weld process, while providing wear free, non-contact reliability.

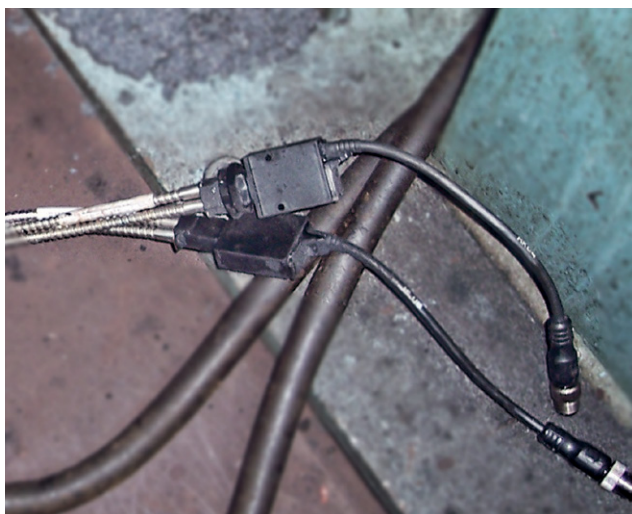


See page 30 to find your solution

Photoelectric Sensors

Photoelectric and fiber optic sensors require special protection and mounting expertise when integrated into welding cells. Balluff has a wide range of photoelectrics with application-specific infrared, red light, or laser capability that can reliably sense through smoke, oil and dirt. In addition, Balluff provides a range of accessories that protect photoelectric optics from heat, slag, and lens occlusion in the hostile weld cell environment.

Fiber Optic Limitations



PROBLEM

Fiber optics can become occluded in the weld cell and stop functioning. They can become broken when weld fixtures are removed, causing fibers to vibrate loose. Cables with excess length break when tied back and get damaged by slag.

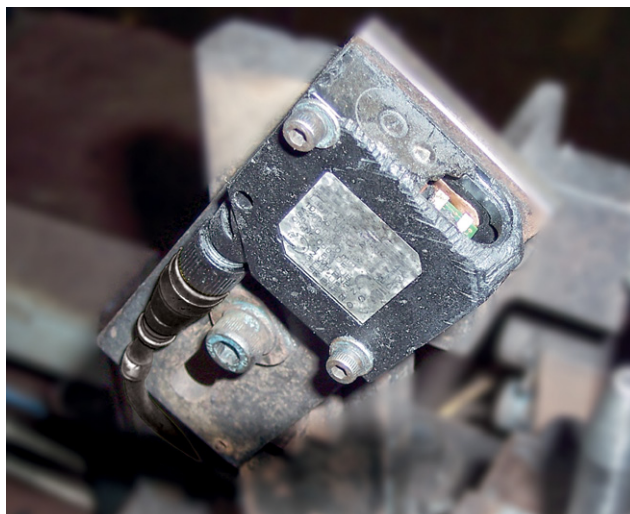
SOLUTION

Typically, fiber optic solutions are not the best choice in weld cells. Metal-body laser sensors or inductive proximity sensors are almost always a better choice.



See page 32 to find your solution

Damage by Loading Impact



PROBLEM

Impact-prone photoelectric sensors can easily become physically damaged in welding environments.

SOLUTION

Bunker Blocks™ and Prox Mounts can be used to protect tubular photoelectric sensors. They provide a thermal barrier, protect against weld slag and impact, and provide rapid sensor change out. Bunker Blocks™, available in several sizes and styles, protect block style photoelectric sensors in the weld environment.



See page 36 to find your solution

Protecting Connectivity

Weld cells demand the toughest connectivity solutions. Weld debris shortens the life of a cable in different fashions. Slag can build up on the jacket, pulling the cable out of the connector. Weld sparks burn through the cable causing shorts in the connection, and the extreme environment temperatures can cook components. Balluff's family of high durability cables were designed and tested with weld environments in mind. The bodies of the connectors are weld spark immune with PTFE coated nuts to prevent slag from sticking or burning the connectors. This family has multiple cable jackets selected to endure different environmental challenges.

Sensor Cable Burn-Through



PROBLEM

Weld slag burns through and destroys conventional cabling. It's weight often pulls the cable away from the connector, exposing it to even more damage.

SOLUTION

Balluff engineered a new line of high durability cables encompassing every part of the cable to withstand a welding environment. This line of cables has a PTFE coated nut to prevent accumulation of debris, as well as a weld spark immune connector body to withstand sudden burst in temperature. Balluff tested different kinds of cable jackets in weld cells until finding our most durable cables: silicone tube, silicone cable, and PTFE cable. These different options keep production moving and reduce the number of cable replacements.



See page 16 to find your solution

Network I/O Blocks Damaged



PROBLEM

Sensor connections often terminate into plastic junction blocks or network blocks which can easily be damaged in welding cells.

SOLUTION

A rugged line of industrial I/O products designed for use in the harshest environments offer a greater degree of strength and durability for applications like robotic welding cells. Most major bus and Ethernet based industrial networks are supported and provide detailed diagnostics on the connections from short circuit protection to network status. In the dark confines of a weld cell, the bright and large LEDs are easy to see.

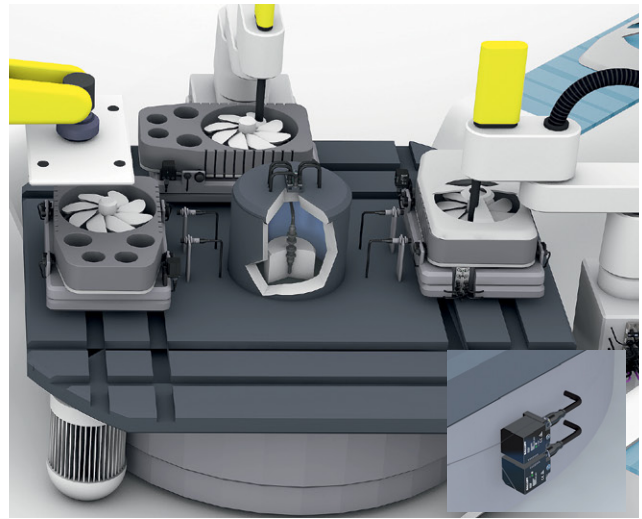
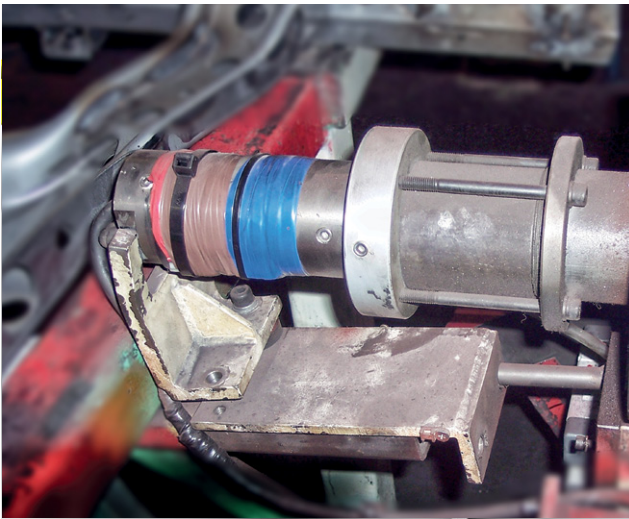


More information on our website or on request

Non-Contact Coupling

Interchangeable weld fixtures and rotating weld tables often require the use of troublesome, expensive, and high-maintenance contact-based rotating assemblies such as slip rings or commutator ring/brush solutions. In many cases, wires inevitably fray and break. In contrast, Balluff's unique non-contact connectors provide a wear free connectivity, powering sensors and providing control information across an air gap.

Broken or Worn Out Communicator Rings



PROBLEM

Rotational weld cells, or cells that use interchangeable fixtures, often incur high maintenance and frequent stoppages due to damaged slip rings, tangled, over-flexed, or twisted wiring.

SOLUTION

Non-contact connector systems provide communication between two or more separated weld cell components through an air gap to energize and communicate between the controller and the sensors. Since there is no hard-wired connection, weld fixtures can be inserted into a weld cell frame without the need for mechanical connections, facilitating rapid change out.

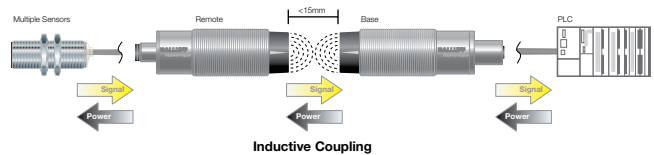
Any application with an A-side/B-side or 360° rotating table needs connections across an axis of rotation. The non-contact coupler from Balluff provides transparent connection between the sensors and controller. Since it is non-contact, it is completely wear-free and has dramatically reduced repair and downtime versus many traditional connection methods.

How Non-Contact Couplers Work

Think of this like a mechanical connector without pins or the requirement of physical contact. When connected, power goes out to the devices and signals come back from the devices. Depending on the specific product of interest, different information can be passed. Power only or power plus, discrete inputs and outputs, or analog voltage signals can be transmitted across the air gap. Each base head is mounted on the controller side of the application and as many remote heads as needed are mounted on the sensors/actuators side of the application.



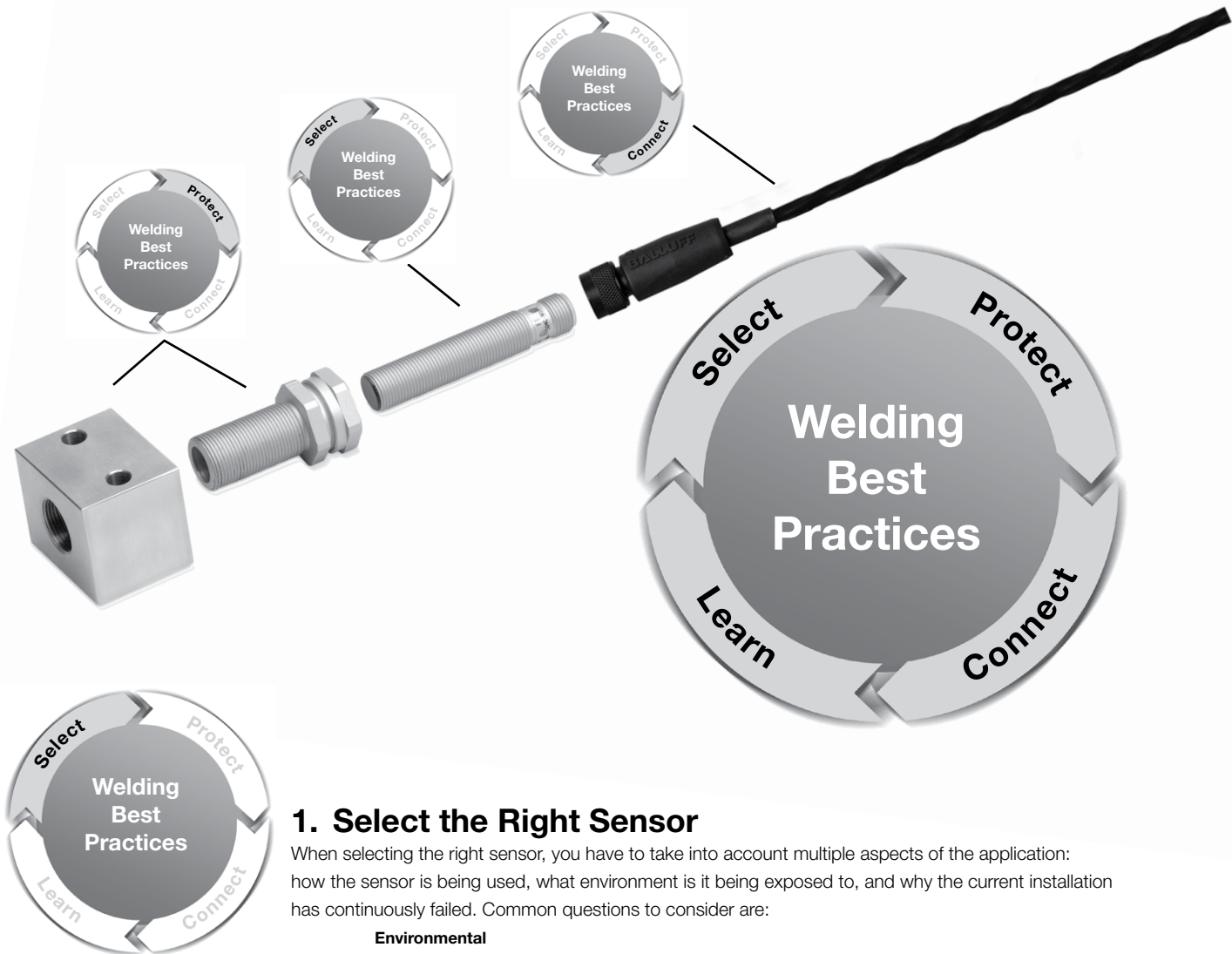
More information on our website or on request



Weld Sensing Best Practices

Selecting Components for Survivability

When working in harsh environments and in heavy duty applications like welding, it is important to take a multi-angle approach to designing the application. When you are working with existing sensor installations, it is important to consider all the reasons for the sensor's failure before determining a winning solution. While blind trial and error will eventually lead to improvements in sensor life, Balluff has developed, with our customers, a strong best-practice approach for applying sensors in automated welding.



1. Select the Right Sensor

When selecting the right sensor, you have to take into account multiple aspects of the application: how the sensor is being used, what environment it is being exposed to, and why the current installation has continuously failed. Common questions to consider are:

Environmental

- Will the sensor signal be affected by the weld noise?
- Is the sensor failing due to heat from the environment?
- Is there excessive weld slag accumulation on the sensor?

Application

- Does a different sensor technology make more sense?
- Can I detect this part from a different angle or location?
- Is there a better mounting solution for the sensor?

Balluff offers many combinations of sensor technologies for use in the welding environment, and the best technology may require some testing before it can be determined.



2. Protect the Sensor

When determining how much protection is needed for the sensor, you still have to consider these typical questions: what is the sensor being exposed to and why is the current installation failing. Other common questions to consider are:

- What available space do I have?
- Is there physical contact damage to the existing sensor?
- Can I change the tooling in any way?

Balluff offers one of the widest varieties of accessories specifically designed for applying sensors in the welding environment. The best accessory for your specific application may require adaption of the tooling for implementation.



3. Connect with Protection

Protecting the connection between the controller and the sensor can be as much of a pain point as keeping the sensor alive. Whether the sensor cable fails from weld slag buildup or from physical damage from contact with a part, the cable can be the lynchpin to a successful weld-sensing application. Questions to consider when looking at connectivity options:

- Is the cable collecting slag or melting from contact with slag?
- Is the connector not meeting the proper bend radius and being damaged?
- What temperatures and environments will the cable be exposed to?

Balluff offers the strongest options of sensor connectors for your welding applications. These products have been tested in real-world customer applications and extended the life of an application more than 50 times in some instances.



4. Learn with Continuous Improvement

There are some things worth doing over and over, but replacing a proximity sensor every shift is not one of them. By learning from our failures and analyzing them we can increase our productivity, improve our quality, and reduce headaches for operators, technicians, and managers. So when a sensor fails, it is best to document the failure and then begin to make a plan to improve the application. Some questions to consider at a failed sensor application include the following:

- What caused the eventual end of the sensor? Heat? Slag? Impact?
- What else is damaging the sensor? Is the cable failing?
- Where else do we have a similar installation or application?

While we understand that time is tight and downtime costs money, there isn't always the luxury to analyze for yourself what is going on in the facility: you are just trying to keep it running. Balluff offers many opportunities for training or service where we can help you improve the skill set of the technicians or bring in extra labor to implement improvements.

Communication from Start to Finish

IO-Link increases efficiency

What is IO-Link?

IO-Link is the first worldwide standardized IO technology (IEC 61131-9) for communicating from the controller to the lowest level of automation. The interface can be used universally and is a fieldbus-independent point-to-point connection that operates using an unshielded industrial cable.

What does IO-Link provide?

IO-Link transmits all sensor signals to the controller and, conversely, relays control data to the sensor/actuator level. With revolutionary results.

This is how IO-Link integrates every sensor into the fieldbus level.

And IO-Link enables comprehensive ongoing diagnostics and automated configuration of parameters for IO-Link devices via the controller. Even with all these capabilities, IO-Link is quite easy to install: one unshielded three-core cable is enough for integrating sensors and actuators. This cable can be up to 20 m long.

The connection has been standardized with M5, M8 and M12 plugs.

IO-Link simplifies the entire network topology. An IO-Link master is used with any fieldbus connection to connect IO-Link sensors/actuators or IO-Link sensor hubs. This master has multiple IO-Link ports so that it can bundle data from various devices and reduce the number of devices. This stems from the fact that IO-Link sensor hubs are capable of incorporating and relaying switch signals from up to 16 binary sensors. If these hubs are connected to an 8-fold IO-Link master, then data from up to 136 sensors is transmitted.

Each port on the IO-Link master can optionally be operated in switching mode (SIO mode for processing binary signals) or in IO communication mode, thus processing information from all of the sensors.

The IO-Link master transmits large volumes of data in almost no time in the process. By default, up to 32 bytes of process data are available per cycle. It takes just 400 μ s to exchange 2 bytes of process data and 1 byte of demand data between the IO-Link master and the device at a speed of 230 kbaud.



Simplification of installation

- Faster, simpler connection to an unshielded, three-wire standard cable
- Standard sensors can also be integrated into the fieldbus level
- 8-fold IO-Link master for eight different IO-Link devices or eight hubs, each with up to 16 binary sensors
- Cost-saving due to fewer mechanical installations
- High security against interference thanks to digital communication



More efficient operation

- Positioning of the sensors right where the action is
- Process monitoring, configuration and error analysis of the IO-Link devices via the controller
- Fast, high-performance data transmission
- Time-optimized machine processes
- High security against interference by means of digital communication
- A selection of sensors that is highly suited to the particular application because of the simultaneous use of binary, analog, and IO-Link sensors



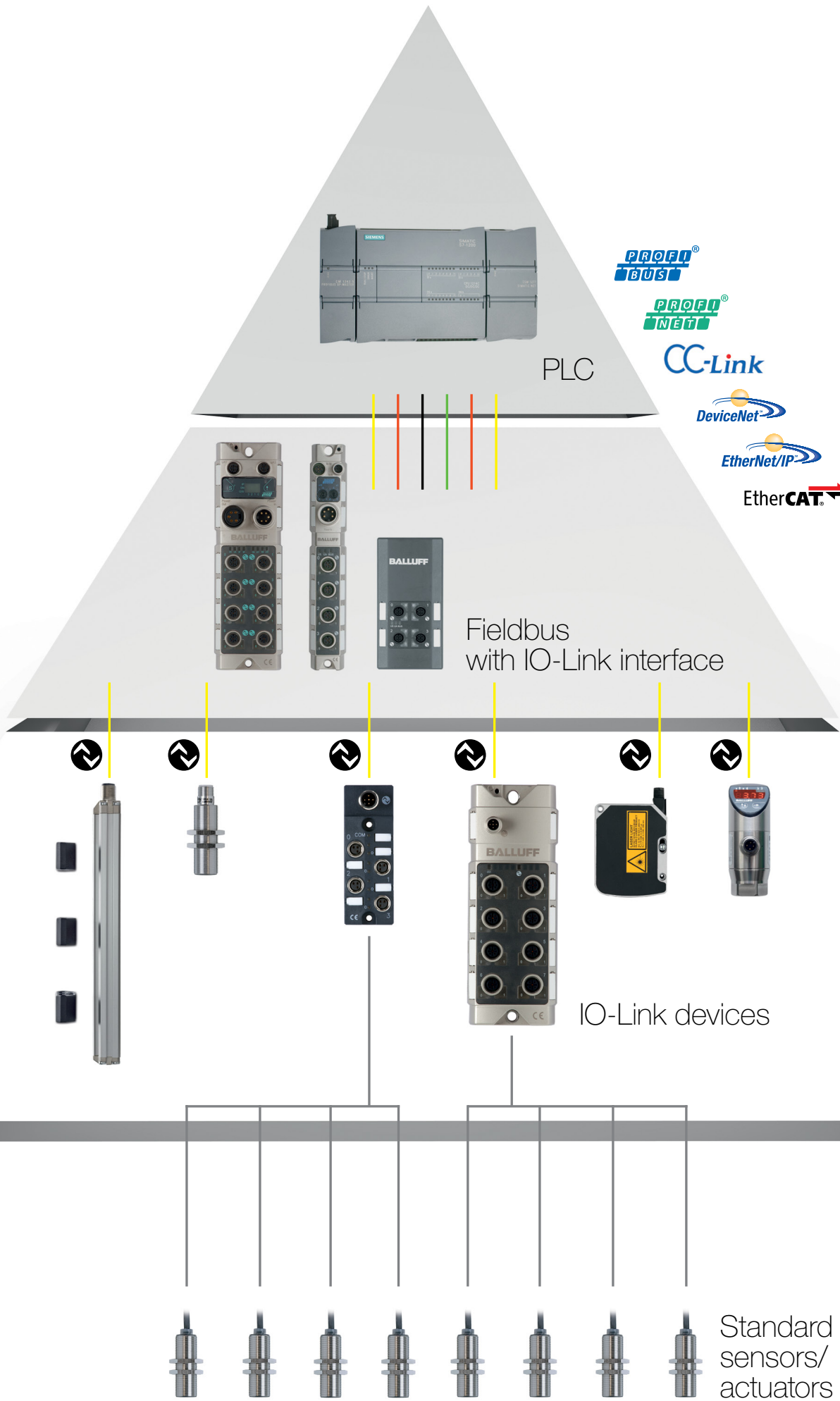
Requirements-based maintenance

- Continuous diagnostics
- Automatic readjustment via the controller
- Predictive error detection
- Longer maintenance intervals



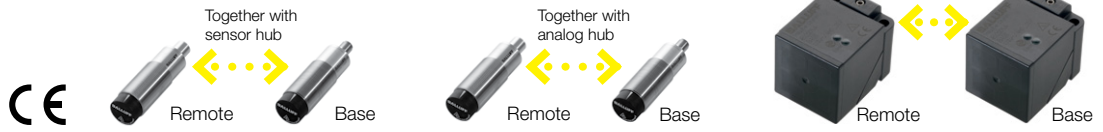
Highest machine availability

- Faster, error-free sensor replacement and prompt commissioning
- Automatic configuration of an IO-Link sensor
- Prompt format changes and recipe changes centrally via the controller
- Additional security from clearly identifiable IO-Link devices

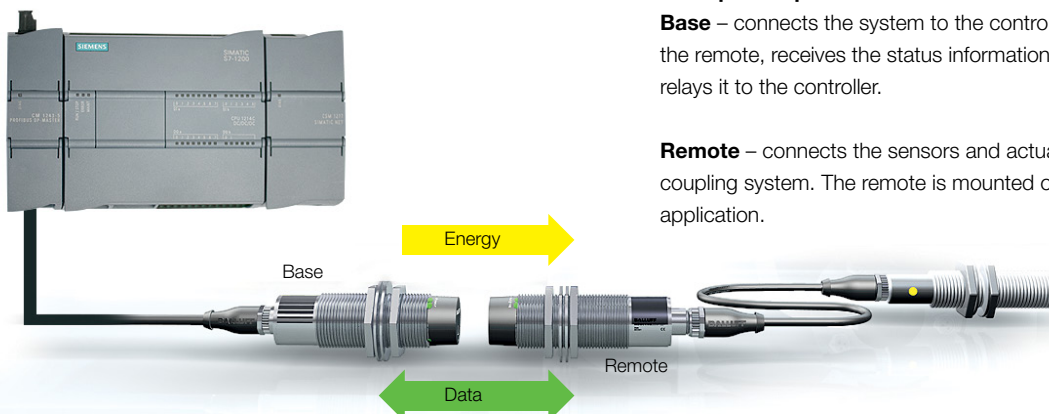


Inductive Couplers

BIC M30 and BIC Q40 bidirectional



	IO-Link interface 16 IN		IO-Link interface 4x, analog		IO-Link	
Type	M30x107.5 mm	M30x100 mm	M30x107.5 mm	M30x100 mm	40x40x63 mm	40x40x63 mm
Order code Part number	BIC000E BIC 210-I2A50-M30M13-SM4A5A	BIC000C BIC 110-I2A50-M30M13-SM4A4A	BIC0054 BIC 210-IAA50-M30M13-SM4A5A	BIC0053 BIC 110-IAA50-M30M13-SM4A4A	BIC0070 BIC 1B0-ITA50-Q40KFU-SM4A4A	BIC0071 BIC 2B0-ITA50-Q40KFU-SM4A5A
Working Range	0...5 mm	0...5 mm	0...5 mm	0...5 mm	1...5 mm	1...5 mm
Installation	Non-flush	Non-flush	Non-flush	Non-flush		
Reliable Offset	±4 mm	±4 mm	±4 mm	±4 mm	±5 mm	±5 mm
Transfer Voltage	24 V	24 V	24 V	24 V	24 V	24 V
Continuous Output Current Remote	500 mA		500 mA		500 mA	
Transferable Output	12 W	12 W	12 W	12 W	12 W	12 W
Degree of Protection as per IEC 60529	IP 67	IP 67	IP 67	IP 67		
Housing Material	CuZn Coated	CuZn Coated	CuZn Coated	CuZn Coated	PBTP	PBTP
Connection	M12 Connector, Female, 5-pin	M12 Connector, Male, 4-pin	M12 Connector, Female, 5-pin	M12 Connector, Male, 4-pin	M12 Connector, Male, 4-pin, A-coded	M12 Connector, Female, 5-pin, A-coded
IO-Link						
Transfer rate	38.4 kbaud	38.4 kbaud	38.4 kbaud	38.4 kbaud	COM 2	COM 2
Cycle Time min.	3 ms	3 ms	3 ms	3 ms	Depends on IO-Link device	Depends on IO-Link device
Process Data Cycle	12 ms	12 ms	33 ms	33 ms		
IO-Link Process Data Length	3 input bytes	3 input bytes	11 input bytes	11 input bytes	1...32 byte	1...32 byte
Frame Type	1	1	1	1		
SIO Mode					no	no



Principle of operation

Base – connects the system to the controller: transmits power to the remote, receives the status information from the sensor and relays it to the controller.

Remote – connects the sensors and actuators with the inductive coupling system. The remote is mounted on the mobile side of the application.

Cables

Cables for harsh environments

Hot weld sparks burn, melt and destroy cable and connector.

Buildup of damage over time can cause shorts and failures.

Silicone cable

- Abrasion and mechanical resistant
- Thermal shock resistant



Molded silicone-free cable

- Weld-resistant, flame-resistant, highly flexible



Type	M12 Single-ended	M8 Double-ended	M8 to M12 Double-ended	M12 Double-ended	M12 Splitters
Part number	BCC W415-0000-1A-003-SW0434- BCC W425-0000-1A-003-SW0434-	BCC W314-W314-30-304-SW0434-	BCC W313-W413-3E-300-SW0334- BCC W314-W414-3E-304-SW0434-	BCC W415-W414-3A-304-SW0434- BCC W425-W415-3A-304-SW0434-	BCC W414-W415-U2046- BCC W414-W425-U2046-
Female, Straight	■	■	■	■	■
Female, Right Angle		■		■	■
Male, Straight		■	■	■	■
Male, Right Angle					
3-wire			■		
4-wire	■	■	■	■	■
Jacket Temperature					
Operational Temperature Fixed	-40...200 °C				
Operational Temperature Moving	-25...200 °C				
Voltage Rating	250 V				
Amperage	4A				

Type	M12 Silicone-free Cable				
Part number	BCC W415-W414-3A-304-BW8434-003 BCC W415-W414-3A-304-BW8434-006 BCC W415-W414-3A-304-BW8434-010 BCC W415-W414-3A-304-BW8434-020				
Female, Straight	■	■	■	■	
Male, Straight	■	■	■	■	
Jacket Temperature					
Operational Temperature Fixed	-50...+130 °C				
Operational Temperature Moving	-40...+125 °C				
Maximum Temperature at Outer Jacket	Short-time 800 °C				
Special Properties	For high welding loads, flame-resistant				
Voltage Rating	250 V				
Amperage	4A				

Double-ended
Standard Lengths Available:
003 = 0.3 m
006 = 0.6 m
010 = 1 m
015 = 1.5 m
020 = 2 m
050 = 5 m

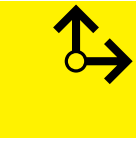
Single-ended
Standard Lengths Available:
003 = 0.3 m
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020 = 2 m
050 = 5 m

Splitter
Standard Lengths Available:
003 = 0.3 m
006 = 0.6 m

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010 = 1 m
015 = 1.5 m
020 = 2 m

Splitter
Standard Lengths Available:
003 = 0.3 m
006 = 0.6 m



PTFE (FEP)

- Low friction, high temperature
- Resistant to caustic agents



Fiberglass cloth cable

- Weld-resistant, flame-resistant, highly flexible



Type	M12 Single-ended		M8-M12 Double-ended		M12 Double-ended		M12 Splitters	
Part number	BCC W415-0000-1A-003-TW0434-__	BCC W425-0000-1A-003-TW0434-__	BCC W313-W413-3E-300-TW0334-__	BCC W415-W414-3A-304-TW0434-__	BCC W425-W414-3A-304-TW0434-__	BCC W414-W415-U2048-__	BCC W414-W425-U2048-__	
Female, Straight	■		■	■	■	■		
Female, Right Angle		■			■		■	
Male, Straight			■	■	■	■	■	
Male, Right Angle								
3-wire			■					
4-wire	■	■		■	■			
Jacket Temperature	Operational Temperature Fixed -65...200 °C							
Operational Temperature Fixed	Operational Temperature Moving -65...200 °C							
Operational Temperature Moving	Voltage Rating 250 V							
Voltage Rating	Amperage 4A							
Amperage								

Type	M12 Fiberglass Cloth Cable			
Part number	BCC W415-W414-3A-304-FW9434-003	BCC W415-W414-3A-304-FW9434-006	BCC W415-W414-3A-304-FW9434-010	BCC W415-W414-3A-304-FW9434-020
Female, Straight	■	■	■	■
Male, Straight	■	■	■	■
Jacket Temperature	Operational Temperature Fixed -40...+130 °C			
Operational Temperature Fixed	Operational Temperature Moving -25...+180 °C			
Operational Temperature Moving	Maximum Temperature at Outer Jacket Short-time 800 °C			
Maximum Temperature at Outer Jacket	Special Properties Weld-resistant, flame-resistant, highly flexible			
Special Properties	Voltage Rating 250 V			
Voltage Rating	Amperage 4A			
Amperage				

Double-ended
Standard Lengths Available:
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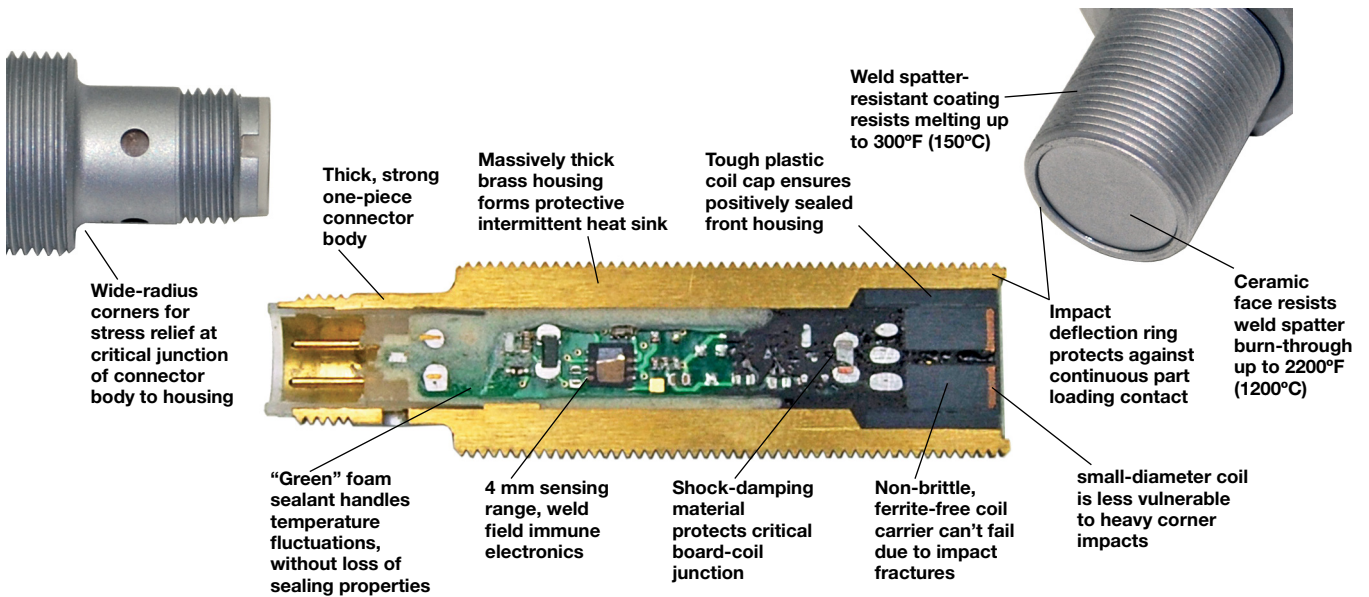
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050 = 5 m

Splitter
Standard Lengths Available:
003 = 0.3 m
006 = 0.6 m

Inductive Sensors

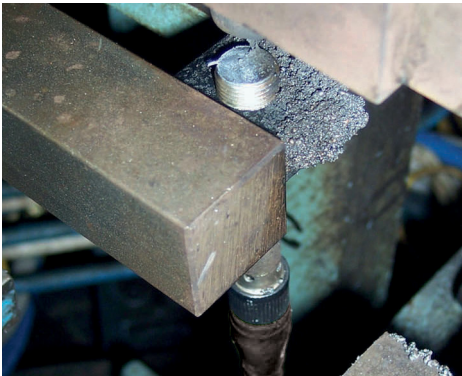
BunkerProx®

Balluff's BunkerProx® is a rugged "self-bunkering" M18 inductive sensor specially designed to survive longer in abusive welding applications without external protection. The strong, massive thick housing has the ability to withstand repeated mechanical impacts and also serves as an intermittent heat sink to shield the sensor electronics from the intense heat of the red-hot weld slag. A frontal impact deflection ring helps protect the high-temperature ceramic face from impact damage during part loading and unloading.



Benefits of BunkerProx®:

- Repels weld slag and makes manual removal of slag easier
- Eliminates sensor output flicker due to weld fields
- Resists damage of electronics and sensing face due to heat and hot slag
- Survives repeated impacts at the sensor face and body



WARNING

- Read, understand, and follow warnings and manual. Failure to do so could result in serious injury or death.
- NEVER USE AS A SENSING DEVICE FOR PERSONNEL PROTECTION
- Does NOT include self-checking redundancy circuitry required for use in personnel safety applications
- Does NOT meet OSHA and ANSI standards for point-of-operation devices

BunkerProx®

Tubular
Inductive
Sensors

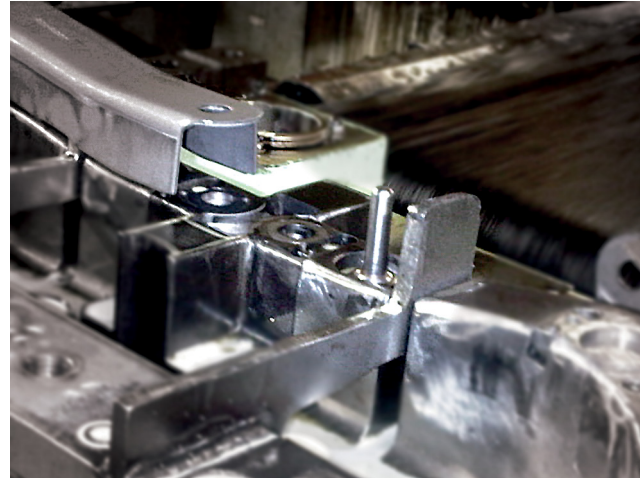
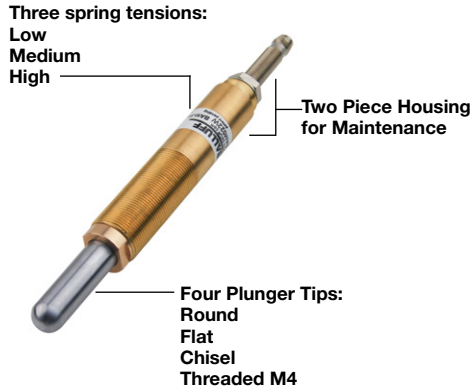


Type	M18 Tubular, 10...30VDC
Order code Part number	BES03MY BES M18MI-PSC40B-S04G-W03
S _n (mm) / Mounting	4 F
Output Logic	PNP NO
Special Properties	WFI
Coatings	PTFE
Connector	M12

Inductive Sensors PlungerProx™



Balluff's all new PlungerProx™ is a high durability assembly intended for direct contact applications. The heavy duty design allows the sensor to come in constant contact with the machine or part to verify presence or position, making it ideal for welding fixtures, stamp and die, and ejection control applications. Mated with Balluff M8 sensors and multiple tip selections, the PlungerProx™ offers the maximum in application flexibility.



Benefits of PlungerProx™:

- High reliability and long service life even in contaminated environments
- Disassemble easily for cleaning and repair
- Control the switch point with precision and allow for plunger over travel
- Specialize the application for a variety of sizes, approaches, and requirements



Inductive Sensors

Type	Round Tip		Chisel Tip		Flat Tip		M6 Threaded Tip		Paddle Tip (ø50mm) Accessory to Threaded Tip
Order code	SET015A	SET015F	SET0167	SET0168	SET0169	SET016A	SET016C	SET016E	BAM025T
Part number	BAV BP-PH-00093-01	BAV BP-PH-00093-02	BAV BP-PH-00100-01	BAV BP-PH-00100-02	BAV BP-PH-00101-01	BAV BP-PH-00101-02	BAV BP-PH-00102-01	BAV BP-PH-00102-02	BAM TG-AM-015-001
Output Logic PNP, NO	■	■	■	■	■	■	■	■	■
Tip	Round	Round	Chisel	Chisel	Flat	Flat	Threaded	Threaded	Paddle
Tip Actuator Material	Steel/Chrome Plated	Steel/Chrome Plated	Steel/Chrome Plated	Steel/Chrome Plated	Steel/Chrome Plated	Steel/Chrome Plated	Steel/Chrome Plated	Steel/Chrome Plated	Steel/Chrome Plated
Housing Material	Brass M18	Brass M18	Brass M18	Brass M18	Brass M18	Brass M18	Brass M18	Brass M18	
Connection	M8	M12	M8	M12	M8	M12	M8	M12	

Inductive Sensors

SpatterGuard coating

SpatterGuard coating significantly prolongs sensor life by providing a thermal barrier to protect against heat, retarding build up of weld spatter and slag, and easing removal of surrounding deposits of weld debris during scheduled maintenance periods.

The parts listed below are **non-weld field immune** sensors and **without PTFE-coating**.

For PTFE-coated, weld field immune sensors, **see page 22**.

Tubular Inductive Sensors

3-Wire DC, Non-Weld Field Immune, SpatterGuard



Type	M8 tubular 10...30VDC							M12 tubular 10...30VDC			M18 tubular 10...30VDC		
Order code Part number	BES02P5 BES 516-324-SA96-G-E4-C-S4-00.3	BES02P0 BES 516-324-SA96-G-E5-C-S49	BES02P1 BES 516-343-SA96-G-E5-C-S49	BES02PN BES M08MH1-NSC20B-S04G-101	BES02PU BES M08MH1-PSC20B-S04G-101	BES0149 BES M08EE-PSC20B-S04G-101	BES0388 BES G08EC-PSC20B-EP01-GS04-516	BES02PW BES M08MH1-PSC30B-S04G-101	BES0450 BES 516-325-SA96-G-E5-C-S4	BES035R BES 516-325-SA96-G-S4-C	BES03UP BES 516-329-SA96-G-E5-C-S4	BES02P3 BES 516-326-SA96-G-E5-Y-S4	BES02P4 BES 516-355-SA96-G-E5-Y-S4
S _n (mm) / Mounting	2 F	2 F	2 F	2 F	2 F	2 F	2 F	3 QF	4 F	4 F	4 F	8 F	8 F
Output Logic	PNP NO	PNP NO	NPN NO	NPN NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	NPN NO	PNP NO	NPN NO
Coatings	SG	SG	SG	SG	SG	SG	SG	SG	SG	SG	SG	SG	SG
Connector	M12 0.3 m PUR	M8	M8	M12	M12	M12	M12 1 PUR	M12	M12	M12	M12	M12	M12

Block Inductive Sensors

3-Wire DC, Non-Weld Field Immune, SpatterGuard



Type	20x32 mm Block, 10...30VDC						40x40 mm Cube, 10...30VDC	
Order code Part number	BES048Y BES R01ZC-PSC70B-BZ00.2-GS04-108	BES0492 BES R01ZC-PSC70B-BZ00.2-GS49-108	BES0484 BES R01ZC-PSC70B-BZ05-108	BES02PT BES R01ZC-PSC70B-BP00.2-GS04-101	BES0314 BES R01ZC-PAC70B-BP00.2-GS04-107	BES02KY BES R01ZC-PSC70B-BX00.2-GS49-105	BES0455 BES Q40KFU-PAC20B-S04G-101	BES0456 BES Q40KFU-PAC30F-S04G-101
S _n (mm) / Mounting	7 F	7 F	7 F	7 F	7 F	7 F	20 F	30 F
Output Logic	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP Comp	PNP Comp
Coatings	SG	SG	SG	SG	SG	SG	SG Face	SG Face
Connector	M12 0.2 m TPU	M8 0.2 m TPU	5 m TPU	M12 0.2 m PUR	M12 0.2 m PUR	M8 0.2 m PUR	M12	M12



Tubular & Block
Inductive
Sensors

2-Wire DC, Non-Weld Field Immune, SpatterGuard



Type	M8 Tubular, 10...30VDC		M12 Tubular, 10...30VDC		M18 Tubular, 10...30VDC		M30 Tubular, 10...30VDC		20x32mm Block, 10...30VDC		M12 Tubular, 20...250V AC/DC		20x32mm Block, 10...30VDC
Order code Part number	BES00C0 BES M08ME1-GSC20B-S04G-101	BES0324 BES M08MG-GSC20B-BP00,3-GS04-101	BES00C1 BES M12MF-GSC30B-S04G-101	BES0326 BES M12MG-GSC30B-BP00,3-GS04-101	BES0329 BES M18MG-GSC70B-BP00,3-GS04-101	BES032A BES M30MF-GSC15B-BP00,3-GS04-101	BES03TM BES R01ZC-USC50B-BP00,2-GS04-101	BES044A BES 516-209-SA96-S21-E	BES0484 BES R01ZC-PSC70B-BZ05-108				
S _n (mm) / Mounting	2 F	2 F	3 F	3 F	7 F	15 F	5 F	4 NF	7 F				
Output Logic	Pol NO	Pol NO	Pol NO	Pol NO	Pol NO	Pol NO	Non-Pol NO	NO	PNP NO				
Coatings	SG	SG	SG	SG	SG	SG	SG	SG	SG				
Connector	M12	M12 0.3 m PUR	M12	M12 0.3 m PUR	M12 0.3 m PUR	M12 0.3 m PUR	M12 0.2 m PUR	1/2" 3p	5 m TPU				



Quick Reference

- F = Flush
- NF = Non-Flush
- QF = Quasi-Flush

- NO = Normally Open
- NC = Normally Closed
- Comp = Complementary

- Pol = Polarized
- Non Pol = Non-Polarized
- F1 = Factor 1
- WFI = Weld Field Immune

- SG = SpatterGuard
- M8 3p = M8 3-pole



Inductive Sensors

Slag resistant housing

PTFE-coating helps prevent hot weld slag from sticking to the metal sensor body. In areas where weld slag is inevitable, the slick PTFE-coating makes it easier to quickly remove the weld slag without damaging the sensor.

The parts listed below are **non-weld field immune**.

Tubular
Inductive
Sensors

2-Wire DC,
Non-Weld Field Immune,
PTFE Coated



Type	M8 Tubular, 10...36VDC		M12 Tubular, 10...36VDC			M18 Tubular, 10...36VDC			M30 Tubular, 10...36VDC		
Order code Part number	BES039R BES M08ME1-GSC20B-S04G-U	BES03H7 BES M08ME1-USC20B-S04G-U	BES039U BES M12MF-GSC30B-S04G-U	BES039W BES M12MG-GSC30B-EX00,3-GS04-U	BES03HL BES M12MF-USC30B-S04G-U	BES03FH BES M18MF-GSC70B-S04G-U	BES03FJ BES M18MG-GSC70B-EX00,3-GS04-U	BES0398 BES M18MF-USC70B-S04G-U	BES027K BES M30MF-GSC15B-EX00,3-GS04-U	BES03KL BES M30MF-GSC15B-S04G-U	BES03FR BES M30MF-USC15B-S04G-U
S _n (mm) / Mounting	2 F	2 F	3 F	3 F	3 F	7 F	7 F	7 F	15 F	15 F	15 F
Output Logic	Pol NO	Non-Pol NO	Pol NO	Pol NO	Non-Pol NO	Pol NO	Pol NO	Non-Pol NO	Pol NO	Pol NO	Non-Pol NO
Coatings	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
Connector	M12	M12	M12	M12 0.3 m PUR	M12	M12	M12 0.3 m PUR	M12	M12 0.3 m PUR	M12	M12

Quick Reference

F = Flush
NF = Non-Flush
QF = Quasi-Flush

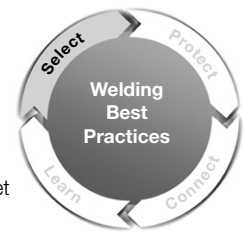
NO = Normally Open
NC = Normally Closed
Comp = Complementary

Pol = Polarized
Non Pol = Non-Polarized
F1 = Factor 1
WFI = Weld Field Immune

SG = SpatterGuard
M8 3p = M8 3-pole

Inductive Sensors

Ultra high temperature-resistant sensors



For applications that require reliable sensor function at high ambient temperature, Balluff offers high temperature resistant sensors. Capable of operating in temperatures as high as **160 °C**, Balluff's high temperature sensors meet either **IP 67** or **IP 69** ratings.

The following sensors are **non-weld field immune**.

Tubular
Inductive
Sensors

High Temperature 120 °C,
Non-Weld Field Immune,
SpatterGuard

Tubular
Inductive
Sensors

High Temperature 160 °C,
IP 69 Rated,
Non-Weld Field Immune
Non-SpatterGuard Coated



Type	M8 Tubular, 10...30VDC	M12 Tubular, 10...30VDC	M18 Tubular, 10...30VDC	25x50mm Block, 24VDC	Type	M18 Tubular, 10...30VDC	M30 Tubular, 10...30VDC		
Order code Part number	BES02HY BES 516-324-SA55-03	BES02HZ BES 516-325-SA68-03	BES032K BES 516-105-SA9-S4	BES02J3 BES 516-347-SA13-03	Order code Part number	BES043T BES 515-326-SA49-D-TF-02	BES043U BES 515-360-SA13-D-TF-02	BES043W BES 515-327-SA22-D-TF-02	BES043Y BES 515-362-SA4-D-TF-02
S _n (mm) / Mounting	2 F	2 F	5 F	5 F	S _n (mm) / Mounting	5 F	8 NF	10 NF	15 NF
Output Logic	PNP NO	PNP NO	PNP Comp	PNP NO	Output Logic	PNP NO	PNP NO	PNP NO	PNP NO
Special Properties	120 °C	120 °C	120 °C	120 °C	Special Properties	160 °C	160 °C	160 °C	160 °C
Coatings	SG	SG	SG	SG	Coatings				
Connector	3 m PTFE	3 m Silicone	M12	3 m Silicone	Connector	2 m FEP	2 m FEP	2 m FEP	2 m FEP

Quick Reference

F = Flush
NF = Non-Flush
QF = Quasi-Flush

NO = Normally Open
NC = Normally Closed
Comp = Complementary

Pol = Polarized
Non Pol = Non-Polarized
F1 = Factor 1
WFI = Weld Field Immune

SG = SpatterGuard
M8 3p = M8 3-pole

Inductive Sensors

Weld field immune

Weld field immune inductive sensors are used for work-piece positioning in welding areas where strong magnetic fields influence ordinary sensors oscillator/coil systems. This leads to false switching when no target is present. Balluff weld field immune inductive sensors can be mounted in the direct vicinity of welding tongs or electrodes, since welding currents of up to 100 kA do not affect the switching function of the sensor.

Tubular Inductive Sensors



Type	M12 Tubular, 10...30VDC										M18 Tubular, 10...30VDC				
Order code Part number	BES02J4 BES 516-113-SA2-S4-CW	BES02J5 BES 516-325-S4-CW	BES02J6 BES 516-325-S4-W	BES02J8 BES 516-325-SA96-S4-W	BES02K1 BES M12MI-PSC30B-S04G-W	BES02K2 BES M12MI-PSC30B-S04G-W01	BES02JM BES 516-356-S4-CW	BES02JN BES 516-356-S4-W	BES02JY BES M12MD1-PSC80E-S04G-W01	BES02J9 BES 516-326-S4-CW	BES02JA BES 516-326-S4-W	BES02JC BES 516-326-S4-WR	BES02JE BES 516-326-SA30-S4-CW	BES02JF BES 516-326-SA96-S4-W	
S _n (mm) / Mounting	2 F	2 F	2 F	2 F	3 F	3 F	4 NF	4 NF	8 NF	5 NF	5 F	5 F	5 F	5 F	
Output Logic	PNP Comp										PNP NO	PNP NO	PNP NO	PNP NO	
Special Properties	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	
Coatings	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	Ceramic	PTFE	PTFE	
Connector	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	

Tubular Inductive Sensors



Type	M18 Tubular, 10...30 VDC					M30 Tubular, 10...30 VDC						
Order code Part number	BES02KC BES M18MI-PSC70B-S04G-W	BES02KE BES M18MI-PSC70B-S04G-W01	BES02JP BES 516-360-S4-CW	BES02JR BES 516-360-S4-W	BES02K8 BES M18MD-PSC12E-S04G-W01	BES02JH BES 516-327-S4-CW	BES02LJ BES 516-327-S4-W	BES02JL BES 516-327-SA96-S4-W	BES02KL BES M30MI-PSC13B-S04G-W	BES03F1 BES M30MI-PSC13B-S04G-W01	BES02JU BES 516-362-S4-W	
S _n (mm) / Mounting	7 F	7 F	8 NF	8 NF	12 NF	10 F	10 F	10 F	13 F	13 F	15 F	
Output Logic	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	
Special Properties	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	
Coatings	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	
Connector	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	



Tubular
Inductive
Sensors



Type	M18 Tubular, 20...250AC/DC						
Order code Part number	BES02KZ BES 516-211-S21-EL-W	BES02L0 BES 516-211-S5-EL-W	BES02L3 BES 516-211-SA96-S21-EL-W	BES02L4 BES 516-211-SA96-S5-EL-W	BES02L1 BES 516-211-S5-EL-W-SA1	BES02L2 BES 516-211-SA2-S5-EL-W	
S _n (mm) / Mounting	5 F	5 F	5 F	5 F	5 F	5 F	
Output Logic	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	
Special Properties	WFI	WFI	WFI	WFI	WFI	WFI	
Coatings	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	
Connection	1/2" 3p	7/8" 3p	1/2" 3p	7/8" 3p	7/8" 90° 3p	7/8" 90° 3p	

Block
Inductive
Sensors



Type	20x32 mm, Block, 10...30VDC								40x40 mm, Cube, 10...30VDC							
Order code Part number	BES048K BES R01ZC-PSC50B-EZ00.2-GS04-W05	BES02KT BES R01ZC-PSC50B-BX00.2-GS04-W11	BES048N BES R01ZC-PSC50B-EZ00.2-GS04-W13	BES0493 BES R01ZC-PSC50B-EZ00.2-GS49-V02	BES048W BES R01ZC-PSC50B-EZ00.5-GS04-V02	BES04RT BES R01ZC-PSC50B-EZ00.5-GS49-V02	BES0481 BES R01ZC-PSC50B-BZ03-V02	BES0483 BES R01ZC-PSC50B-BZ05-W05	BES0230 BES 517-385-M3-CW-S	BES0231 BES 517-385-M3-CW-S-S4	BES022L BES Q40KFU-PAC15A-S04G-007	BES0215 BES Q40KFU-PAC15A-S04G-W01-007	BES021C BES Q40KFU-PAC25E-S04G-007	BES021J BES Q40KFU-PAC35E-S04G-007	BES021L BES Q40KFU-PAC35E-S04G-W01-007	BES021M BES Q40KFU-PAC40E-S04G
S _n (mm) / Mounting	5 F	5 F	5 F	5 F	5 F	5 F	5 F	15 F	15 F	15 F	15 F	25 F	35 F	35 F	40 F	
Output Logic	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP Comp	PNP Comp	PNP Comp	PNP Comp	PNP Comp	PNP Comp	
Special Properties	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	
Coatings	SG	SG	SG	SG	SG	SG	SG	SG	SG	SG face	SG face	SG face	SG face	SG face	SG face	
Connector	M12 0.2 m TPU	M12 0.2 m TPU	M12 0.2 m TPU	M8 0.2 m TPU	M12 0.5 m TPU	M8 0.5 m TPU	3 m TPU	5 m TPU	Conduit	M12	M12	M12	M12	M12	M12	

Inductive Sensors

Factor 1 – weld field immune

Balluff Factor 1 weld field immune sensors have special dual coil design that enables them to sense all metals, both ferrous and non-ferrous, at the same distance. Factor 1+ sensors provide greater switching distances for increased performance.

There is no need to de-rate the sensing distance based on target material. They also come equipped with PTFE-coated housings resistant to weld splatter. Factor 1 weld field immune sensors are also unaffected by strong magnetic fields found in applications such as induction hardening and welding environments.

Tubular Factor 1

Inductive
Sensors



Type	M8 Tubular, 10...30VDC		M12 Tubular, 10...30VDC						
Order code Part number	BES02YT BES M08EG1-PSC15A-S04G-W	BES02YR BES M08EG-PSC15A-S49G-W	BES02JZ BES M12MF1-PSC30A-S04G-W	BES02K0 BES M12MF1-PSC30A-S04G-W01	BES02K3 BES M12ML-PSC30A-S04G-W	BES02K4 BES M12ML-PSC30A-S04G-W01	BES02JW BES M12MD1-PSC80E-S04G-W	BES02K5 BES M12ML-PSC80E-S04G-W	BES02K6 BES M12ML-PSC80E-S04G-W01
S _n (mm) / Mounting	1.5 F	1.5 F	3 F	3 F	3 F	3 F	8 F	8 F	8 F
Output Logic	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO
Special Properties	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI
Coatings	PTFE	PTFE	PTFE	PTFE SG face	PTFE	PTFE SG face	PTFE	PTFE	PTFE SG face
Connector	M12	M8 3p	M12	M12	M12	M12	M12	M12	M12

Tubular Factor 1

Inductive
Sensors



Type	M18 Tubular, 10...30VDC							M30 Tubular, 10...30VDC				
Order code Part number	BES02K9 BES M18MF1-PSC50A-S04G-W	BES02KA BES M18MF1-PSC50A-S04G-W01	BES02KJ BES M18ML-PSC50A-S04G-W	BES02KK BES M18ML-PSC50A-S04G-W01	BES02K7 BES M18MD-PSC12E-S04G-W	BES02KF BES M18ML-PSC12E-S04G-W	BES02KH BES M18ML-PSC12E-S04G-W01	BES02KM BES M30ML-PSC10A-S04G-W	BES02KN BES M30ML-PSC10A-S04G-W01	BES02KP BES M30ML-PSC20E-S04G-W	BES03MZ BES M30ML-PSC20E-S04G-W01	
S _n (mm) / Mounting	5 F	5 F	5 F	5 F	12 NF	12 NF	12 NF	10 F	10 F	20 NF	20 NF	
Output Logic	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	
Special Properties	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	
Coatings	PTFE	PTFE SG face	PTFE	PTFE SG face	PTFE	PTFE	PTFE SG face	PTFE	PTFE SG face	PTFE	PTFE SG face	
Connector	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	



Block Factor 1

Inductive
Sensors



Type	40x40 mm Cube, 10...30VDC															40x40 mm, Cube w/corner LEDs, 10...30VDC		
Order code Part number	BES022K BES Q40KFU-PAC15A-S04G	BES0214 BES Q40KFU-PAC15A-S04G-W01	BES04AW BES Q40KFU-PAC20A-S04G-W14	BES021P BES Q40KFU-PSC15A-S04G	BES021R BES Q40KFU-PSC15A-S04G-M01	BES021T BES Q40KFU-PSC15A-S04G-W01	BES0216 BES Q40KFU-PAC20A-S04G	BES0457 BES Q40KFU-PAC20A-S04G-W01	BES021U BES Q40KFU-PSC20A-S04G	BES021A (25 mm) BES Q40KFU-PAC25E-S04G	BES021H BES Q40KFU-PAC35E-S04G	BES021K BES Q40KFU-PAC35E-S04G-W01	BES0220 BES Q40KFU-PSC35E-S04G	BES0221 BES Q40KFU-PSC35E-S04G-W01	BES0305 BES Q40KFU-PSC20A-S04G-012	BES0307 BES Q40KFU-PSC35E-S04G-012	BES0304 BES Q40KFU-PAC40E-S04G-012	
S _n (mm) / Mounting	15 F	15 F	20 F	15 F	15 F	15 F	20 F	20 F	20 F	25 NF	35 NF	35 NF	35 NF	35 NF	20 F	35 NF	40 NF	
Output Logic	PNP Comp	PNP Comp	PNP Comp	PNP NOP	PNP NOP	PNP NOP	PNP Comp	PNP Comp	PNP NOP	PNP Comp	PNP Comp	PNP Comp	PNP NOP	PNP NO	PNP NOP	PNP NO	PNP Comp	
Special Properties	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	F1 WFI	
Coatings		SG face	SG face			SG face		SG face				SG face		SG face				
Connector	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	

Factor 1+

Inductive
Sensors



Type	M8 Tubular, 10...30VDC		M12 Tubular, 10...30VDC		M18 Tubular, 10...30VDC			M30 Tubular, 10...30VDC		
Order code Part number	BES03YP BES M08MG1-PSC20A-S04G-W	BES0452 BES M12MG-PSC40A-S04G-W12	BES03YW BES M18MG-PSC12A-S04G-W	BES03YT BES M18MG-PSC80A-S04G-W	BES0453 BES M18MI-PSC80A-S04G-W12	BES0454 BES M30MI-PSC15A-S04G-W12				
S _n (mm) / Mounting	2 F		4 F		12 QF			8 F		15 F
Output Logic	PNP NO		PNP NO		PNP NO			PNP NO		PNP NO
Special Properties	F1 WFI		F1 WFI		F1 WFI			F1 WFI		F1 WFI
Coatings	PTFE		PTFE		PTFE			PTFE		PTFE
Connector	M12		M12		M12			M12		M12

Inductive Sensors

Steelface

Balluff SteelFace® sensors are the go-to sensors for physically abusive environments. Their one-piece, gun-drilled stainless steel housings stand up to major incidental impacts, their long range characteristics combined with optional PTFE coatings give them long-term survivability in tough weld cell applications, and their price/performance ratio is the best in the market.

Tubular

2X
Sensors



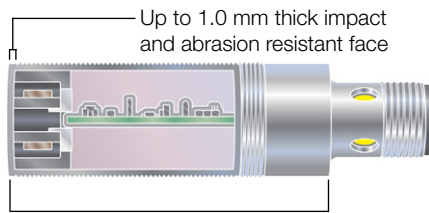
Type	M8 Tubular, 10...30VDC		M12 Tubular, 10...30VDC		M18 Tubular, 10...30VDC		M8 Tubular, 10...30VDC		M12 Tubular, 10...30VDC		M18 Tubular, 10...30VDC	
Order code Part number	BES02N5 BES M08EH1-PSC20B-S04G-S	BES02N3 BES M08EH1-NSC20B-S04G-S	BES02NA BES M12EI-PSC40B-S04G-S	BES02N8 BES M12EI-NSC40B-S04G-S	BES02NJ BES M18EI-PSC72B-S04G-S	BES02NF BES M18EI-NSC72B-S04G-S	BES02N6 BES M08EH1-PSC20B-S04G-S01	BES02N4 BES M08EH1-NSC20B-S04G-S01	BES02NC BES M12EI-PSC40B-S04G-S01	BES02N9 BES M12EI-NSC40B-S04G-S01	BES02NK BES M18EI-PSC72B-S04G-S01	BES02NH BES M18EI-NSC72B-S04G-S01
S _n (mm) / Mounting	2 F	2 F	4 F	4 F	7.2 F	7.2 F	2 F	2 F	4 F	4 F	7.2 F	7.2 F
Output Logic	PNP NO	NPN NO	PNP NO	NPN NO	PNP NO	NPN NO	PNP NO	NPN NO	PNP NO	NPN NO	PNP NO	NPN NO
Special Properties												
Coatings							PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
Connector	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12

Tubular

3X
Sensors



Type	M12 Tubular, 10...30VDC				M18 Tubular, 10...30VDC				M30 Tubular, 10...30VDC			
Order code Part number	BES02WH BES M12EG1-PSC60Z-S04G-S11	BES02WF BES M12EG1-NSC60Z-S04G-S11	BES02WE BES M12EF1-PSC10F-S04G-S	BES02WC BES M12EF1-NSC10F-S04G-S	BES02Y3 BES M18EG1-PSC10Z-S04G-S11	BES02Y2 BES M18EG1-NSC10Z-S04G-S11	BES02Y1 BES M18EF1-PSC20F-S04G-S	BES02Y0 BES M18EF1-NSC20F-S04G-S	BES02YF BES M30EG1-PSC20Z-S04G-S11	BES02YE BES M30EG1-NSC20Z-S04G-S11	BES02YC BES M30EE1-PSC40F-S04G-S	BES02YA BES M30EE1-NSC40F-S04G-S
S _n (mm) / Mounting	6 QF	6 QF	10 NF	10 NF	10 QF	10 QF	20 NF	20 NF	20 QF	20 QF	40 NF	40 NF
Output Logic	PNP NO	NPN NO	PNP NO	NPN NO	PNP NO	NPN NO	PNP NO	NPN NO	PNP NO	NPN NO	PNP NO	NPN NO
Connector	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12



One-piece solid stainless steel construction

Tubular

Ferrous & Non-Ferrous Sensors



Type	M12 Tubular, 10...30VDC			M18 Tubular, 10...30VDC			M30 Tubular, 10...30VDC		M12 Tubular, 10...30VDC	M18 Tubular, 10...30VDC	M30 Tubular, 10...30VDC
Order code Part number	BES02Z3 BES M12EG1-PSC20S-S04G-S	BES02Z1 BES M12EG1-POC20S-S04G-S	BES02Z0 BES M12EG1-NSC20S-S04G-S	BES02Z9 BES M18EG1-PSC50S-S04G-S	BES02Z7 BES M18EG1-POC50S-S04G-S	BES02Z6 BES M18EG1-NSC50S-S04G-S	BES02ZJ BES M30EG1-PSC80S-S04G-S	BES02ZF BES M30EG1-NSC80S-S04G-S	BES02Z2 BES M12EG1-PSC20N-S04G-S	BES02Z8 BES M18EG1-PSC50N-S04G-S	BES02ZH BES M30EG1-PSC80N-S04G-S
S _n (mm) / Mounting	2 F	2 F	2 F	5 F	5 F	5 F	8 F	8 F	2 F	5 F	8 F
Output Logic	PNP NO	PNP NO	NPN NO	PNP NO	PNP NO	NPN NO	PNP NO	NPN NO	PNP NO	PNP NO	PNP NO
Special Properties	Ferrous Only	Ferrous Only	Ferrous Only	Ferrous Only	Ferrous Only	Ferrous Only	Ferrous Only	Ferrous Only	Non-Ferrous	Non-Ferrous	Non-Ferrous
Connector	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12



Flatpack

Sensors



Type	R01 Steelface®			R04 MC	
Order code Part number	BES04AH BES R01EC-PSC50A-BP00,3-GS04-W50	BES049Y BES R01EC-PSC50A-BP00,3-GS04-W51	BES04RE BES R01EC-PSC50A-BS00,3-GS04-W51	BES049E BES R04MC-PSC20B-EP00,2-GS49-107	
S _n (mm) / Mounting	5 F	5 F	5 F	2 F	
Output Logic	PNP NO	PNP NO	PNP NO	PNP NO	
Special Properties	F1 WFI	F1 WFI	F1 WFI		
Coatings		PTFE W51	PTFE W51		
Connector	M12, 0,3 m Silicone tube	M12, 0,3 m Silicone tube	M12, 0,3 m Silicon cable	M8, 0,2 m Silicon tube	

Cylinder and Clamp Sensors

Magnetostrictive sensors

Poor-performing, low-cost reed or Hall Effect switches, often fail to provide reliable clamped or unclamped position information for pneumatic cylinders used in weld cells. An upgrade to Balluff BMF magnetostrictive sensors will provide highly dependable position information over time. BMF sensors are available for virtually every cylinder configuration. They increase machine uptime, lower stocking requirements, and carry a lifetime warranty.



Type	BMF 204 C-slot for Festo (3.8mm), Slide-In, 10...30VDC, 3-wire, Max Temp. 85 °C						BMF 214 C-slot for SMC (4mm), Slide-In, 10...30VDC, 3-wire, Max Temp. 85 °C					
Order code	BMF00A6	BMF0002	BMF0003	BMF0005	BMF0006	BMF00FC	BMF00A2	BMF00A3	BMF00A4	BMF00A5	BMF00A5	
Part number	BMF 204K-PS-C-2A-SA2-S4-00,3	BMF 204K-PS-C-2A-SA2-S49-00,3	BMF 204K-PS-C-2A-SA2-S49-00,5	BMF 204K-PS-C-2A-SA95-S4-00,3	BMF 204K-PS-C-2A-SA95-S75-00,3	BMF 214K-PS-C-2A-SA2-S4-00,3	BMF 214K-PS-C-2A-SA2-S49-00,3	BMF 214K-PS-C-2A-SA2-S49-00,5	BMF 214K-PS-C-2A-SA95-S4-00,3	BMF 214K-PS-C-2A-SA95-S75-00,3		
Output Logic	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	
V-Twin®				■	■				■	■		
Housing Material	PBT	PBT	PBT	PBT	PBT	PBT	PBT	PBT	PBT	PBT	PBT	
Connector	M12 0.3 m PUR	M8 0.3 m PUR	M8 0.5 m PUR	M12 0.3 m PUR	M8 0.3 m PUR	M12 0.3 m PUR	M8 0.3 m PUR	M8 0.5 m PUR	M12 0.3 m PUR	M8 0.3 m PUR		



Type	BMF 235 T-slot, Drop In, 10...30VDC, 3-wire, Max Temp. 85 °C										
Order code	BMF00H5	BMF00C5	BMF00C4	BMF00C9	BMF00CA	BMF00H3	BMF00H5	BMF00C2	BMF00EU	BMF00C6	
Part number	BMF 235K-PS-C-2A-SA93-S4-00,3	BMF 235K-PS-C-2A-SA2-S4-00,3	BMF 235K-PS-C-2A-SA2-S49-00,3	BMF 235K-PS-C-2A-SA95-S4-00,3	BMF 235K-PS-C-2A-SA95-S75-00,3	BMF 235K-PS-C-2A-SA93-S4-00,3	BMF 235K-PS-C-2A-SA93-S49-00,3	BMF 235K-NS-C-2A-SA2-S49-00,3	BMF 235K-NS-C-2A-SA95-S4-00,5	BMF 235K-PO-C-2A-SA2-S49-00,3	
Output Logic	PNP	NPN	NO	NO	NO	NO		NPN	NONPN	NO	PNP
V-Twin®				■	■				■		
Housing Material	PA12	PA12	PA12	PA12	PA12	PA12	PA12	PA12	PA12	PA12	
Connector	M12 0.3 m Silicone	M12 0.3 m PUR	M8 0.3 m PUR	M12 0.3 m PUR	M8 0.3 m PUR	M8 0.3 m Silicone	M12 0.3 m Silicone	M8 0.3 m PUR	M12 0.3 m PUR	M8 0.3 m PUR	

Know your cylinder, find your sensor at www.balluff.us/bmfcenter

Balluff's V-Twin® magnetic field sensors provide two sensors with a single connector in either an M8 or M12 configuration. The BMF V-Twin® is available in several sizes and form factors to cover applications from grippers and short stroke cylinders to C-Slot, T-Slot, round, and tie rod cylinders—in some cases without requiring additional mounting brackets. Realize sensor and connection savings of 30 % or more!



		BMF 243 C-slot, Drop In, 10...30VDC, 3-wire, Max Temp. 85 °C											
		BMF00EN BMF 243K-NS-C-2A-SA2-S49-00,3	BMF00H4 BMF 243K-NS-C-2A-SA92-S75-00,3	BMF00FA BMF 243K-NS-C-2A-SA95-S4-00,3	BMF00EM BMF 243K-PO-C-2A-SA2-S49-00,3	BMF00ER BMF 243K-PS-C-2A-SA2-S4-00,3	BMF00EL BMF 243K-PS-C-2A-SA2-S49-00,3	BMF00H6 BMF 243K-PS-C-2A-SA93-S4-00,3	BMF00H7 BMF 243K-PS-C-2A-SA93-S49-00,3	BMF00F9 BMF 243K-PS-C-2A-SA95-S4-00,3	BMF00ET BMF 243K-PS-C-2A-SA95-S75-00,3		
		NPN NO	NPN NO	NPN NO	PNP NC	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO		
		PA12	PA12	PA12	PA12	PA12	PA12	PA12	PA12	PA12	PA12		
		M8 0.3 m PUR	M8 0.3 m Silicone	M8 0.3 m PUR	M8 0.3 m PUR	M12 0.3 m PUR	M8 0.3 m PUR	M12 0.3 m Silicone	M8 0.3 m Silicone	M12 0.3 m PUR	M8 0.3 m PUR		



		BMF 315 T-slot, Drop In, 10...30VDC, 3-wire, Max Temp. 70...105 °C						BMF 32 Universal, Bracket Required, 10...30VDC, 3-wire, Max Temp. 85 °C		BMF 305 Universal, Bracket Required, 10...30VDC, 3-wire, Max Temp. 70...105 °C					
		BMF007Y BMF 315M-PS-D-2-SA3-S49-00,3	BMF00C1* BMF 315M-PS-W-2-SA4-S4-00,3	BMF0081* BMF 315M-PS-W-2-S4-00,3	BMF0082* BMF 315M-PS-W-2-S49-00,3	BMF0083* BMF 315M-PS-W-2-SA94-S4-00,3	BMF0084* BMF 315M-PS-W-2-SA95-S4-00,3	BMF008A* BMF 32M-PS-W-2-S4	BMF0061* BMF 305K-PS-W-2-SA3-S4-00,8	BMF008C BMF 305M-NS-C-2-S49	BMF008E BMF 305M-PS-C-2-S4	BMF008F BMF 305M-PS-C-2-S49	BMF0066 BMF 305M-PS-C-2-SA4-S49	BMF0067* BMF 305M-PS-W-2-S4	
		PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	NPN NO	PNP NO	PNP NO	PNP NO	PNP NO	
		AI	AI	AI	AI	AI	AI	AI	LCP	AI	AI	AI	AI	AI	
		M8 0.3 m PUR	M12 0.3 m PUR w/LED	M12 0.3 m OPUR	M12 0.3 m PUR	M12 0.3 m PUR	M12 0.3 m PUR	M12	M12 0.3 m PUR	M8	M12	M8	M8	M12	

* Weld Field Immune

Photoelectric Sensors

Diffuse sensors, analog sensors and photoelectric sensors

When a photoelectric sensor has to be used in a weld cell, it must be protected to survive in this extreme sensing environment. Success requires a degree of application expertise. Mechanical protection and bunkering must be applied to achieve acceptable sensor survivability. In addition, ambient weld smoke, weld debris, oil, and mist, as well as sensing distance, excess gain requirements, and precision parameters must be taken into account in the choice of a photoelectric sensor. However, with the appropriate sensor choice, mounting hardware, and connectivity, it is possible to apply a photoelectric in the weld cell environment.



Type	Background Suppression 10...30VDC					Diffuse, 10...30VDC									
Order code Part number	BOS014W BOS 18M-PA-RH22-S4	BOS01C5 BOS 18M-PA-LH23-S4	BOS007T BOS 12M-PU-1HA-S4-C	BOS015U BOS 5K-PS-RH12-S49	BOS0034 BOS 21M-PUS-LH12-S4	BOS01CA BOS 18M-PA-RD21-S4	BOS0045 BOS 12M-PS-1PD-S4-C	BOS01HL BOS 18M-PS-ID23-S4	BOS01CF BOS 18M-PA-RD20-S4	BOS01EY BOS 18M-PA-ID20-S4	BOS013H BOS 18M-PA-LD10-S4	BOS015J BOS 5K-PS-ID10-S49	BOS0031 BOS 21M-PA-ID10-S4	BOS0032 BOS 21M-PA-LD10-S4	BOS001C BOS 18E-PS-1YD-E5-D-S4
Housing Size	M18	M18	M12	Block	Block	M18	M12	M18	M18	M18	M18	Block	Block	Block	M18
S _n (mm)	30...300	30...150	10...60	20...200	50...100	0...300	0...400	0...600	0...600	0...800	0...350	0...900	50...2000	0...600	0...400
Output Logic	PNP Comp	PNP Comp	PNP Comp	PNP	NOPNP	PNP Comp	PNP	NOPNP	NOPNP	PNP Comp	PNP Comp	PNP	NOPNP	PNP Comp	PNP NO
Light Source	Red Light	Laser	Red Light	Red Light	Laser	Red Light	Infrared	Infrared	Red Light	Infrared	Laser	Infrared	Infrared	Laser	Red Light
Bunker Block™ Available	■	■	■			■	■	■	■	■	■				
Housing Material	Ni CuZn	Ni CuZn	Ni CuZn	PC, PBT	Ni CuZn	Ni CuZn	Ni CuZn	Ni CuZn	Ni CuZn	Ni CuZn	Ni CuZn	PC, PBT	Ni CuZn	Ni CuZn	Stn. Stl.
Sensing Face Material	Glass	PMMA	PMMA	PMMA	PMMA	Glass	PMMA	Glass	Glass	Glass	PMMA	PMMA	PMMA	PMMA	Glass
Connector	M12	M12	M12	M8 3p	M12	M12	M12	M12	M12	M12	M12	M8 3p	M12	M12	M12

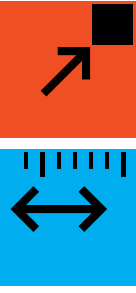


Type	Thru-Beam, One Piece, "L" Shaped, 10...30VDC		Thru-Beam, One Piece, Slot Sensor, 10...30VDC		
Order code Part number	BWL001J BWL 4241A-001-S4		BWL000N BWL 5454D-L011-S49		
S _n (mm)	43x43		54x54		
Output Logic	PNP NO		PNP Comp		
Light Source	Infrared		Laser		
Housing Material	Stn. Stl.		GD-Zn		
Sensing Face Material	Epoxy Resin		Glass		
Connector	M12		M8 3p		
	BGL0016 BGL-30A-001-S49		BGL001M BGL-50A-003-S49		BGL0029 BGL-80A-007-S49
S _n (mm)	30		50		80
Output Logic	PNP Comp		PNP Comp		PNP Comp
Light Source	Red Light		Laser		Infrared
Housing Material	GD-Zn		GD-Zn		GD-Zn
Sensing Face Material	Glass		Glass		Glass
Connector	M8 3p		M8 3p		M8 3p

See Balluff's Object Detection Catalog for more products.



	Background Suppression 10...30VDC					Diffuse 10...30VDC					
	BOS01FR BOS 23K-PA-LH10-S4	BOS0089 BOS 26K-PA-1HC-S4-C	BOS008F BOS 26K-PA-1LHC-S4-C	BOS008A BOS 26K-PA-1IE-S4-C	BOS018P BOS 50K-PA-RH12-S4	BOS0175 BOS 23K-PU-LD20-S4	BOS01FM BOS 23K-PA-RD10-S4	BOS01CJ BOS 50K-PA-RD10-S4	BOS01JA BOS 50K-PU-RD11-S4	BOS01JJ BOS 50K-PI-RD11-S4	BLA0001 BLA 50A-001-S115
	Block	Block	Block	Block	Block	Block	Block	Block			Block
	5...800	30...300	50...300	150...600	200...2000	5...1200	0...2000	1...2000			0...2000
	PNP Comp	PNP Comp	PNP Comp	PNP Comp	PNP Comp	PNP Comp	PNP Comp	PNP Comp			PNP analog U/I
	Laser	Red Light	Laser	Infrared	Red Light	Laser	Red Light	Red Light			Laser
		■	■	■							
	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS			Al anodized
	PMMA	PMMA	PMMA	PMMA	Glass	PMMA	PMMA	Glass			Glass
	M12	M12	M12	M12	M12	M12	M12	M12			M12



Type	Analog - Block 18...28VDC				Analog - Block 15...30VDC		Analog - Block 18...30VDC		Analog - Block 18...30VDC Light Source Visible Red	
Order code Part number	BOD0002 BOD 26K-LA01-S4-C	BOD0004 BOD 26K-LA02-S4-C	BOD0007 BOD 26K-LB06-S92-C	BOD0008 BOD 26K-LB07-S92-C	BOD0010 BOD 63M-LB02-S115	BOD0011 BOD 63M-LB04-S115	BOD000P BOD 21M-LB01-S92	BOD000T BOD 21M-LB04-S92	BOD0016 BOD 66M-RB01-S92-C	BOD0014 BOD 66M-LB04-S92-C
S _n (mm)	45...85	45...85	30...100	80...300	200...2000	200...6000	25...45	25...500	100...600	200...2000
Output Logic	0...10 V DC	0...10 V DC	4...20 mA PNP Comp	4...20 mA PNP Comp	4...20 mA PNP Comp	4...20 mA PNP Comp	4...20 mA PNP Comp	4...20 mA PNP Comp	4...20 mA PNP NO	4...20mA PNP NO
Light Source	Laser	Laser	Laser	Laser	Laser	Laser	Laser	Laser	Red Light	Laser
Bunker Block™ Available	■	■	■	■						
Housing Material	ABS	ABS	ABS	ABS	GD-Al	GD-Al	Ni CuZn	Ni CuZn	GD-Zn	GD-Zn
Sensing Face Material	PMMA	PMMA	PMMA	PMMA	Glass	Glass	Glass	Glass	Glass	Glass
Connector	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12

See Balluff's Object Detection Catalog for more products.

Pressure Sensors

Fluid detection sensors

Balluff pressure sensors offer an impressive price/performance ratio and are suitable for a wide variety of applications and pressure ranges in factory automation. A large display and simple operating concept save time when configuring parameters. Balluff pressure sensors are versatile and space-saving, with display and connector that can be rotated independently of the flange. Other features include compact housing design, local pressure indicator, digital switching outputs, and available analog output. See Balluff's Pressure Sensor Catalog for more products.



Standard

Pressure
Sensors

Order code Part number	BSP005C BSP V010-GV002-D00A0B-S4	BSP005H BSP V010-GV002-A00A0B-S4	BSP005J BSP V010-GV002-A02A0B-S4	BSP000J BSP B010-EV002-D00A0B-S4	BSP000W BSP B010-EV002-A00A0B-S4	BSP0016 BSP B010-EV002-A02A0B-S4	BSP005E BSP B100-GV002-D00A0B-S4	BSP0010 BSP B100-EV002-A00A0B-S4	BSP0019 BSP B100-EV002-A02A0B-S4	BSP005F BSP B250-GV002-D00A0B-S4	BSP0011 BSP B250-EV002-A00A0B-S4	BSP001A BSP B250-EV002-A02A0B-S4
Output Logic	(2) PNP NO or NC	0...10 V DC PNP NO or NC	4...20 mA PNP NO or NC	(2) PNP NO or NC	0...10 V DC PNP NO or NC	4...20 mA PNP NO or NC	(2) PNP NO or NC	0...10 V DC PNP NO or NC	4...20 mA PNP NO or NC	(2) PNP NO or NC	0...10 V DC PNP NO or NC	4...20 mA PNP NO or NC
Pressure Range (psi)	-14.5...145	14.5...145	14.5...145	0...145	0...145	0...145	0...1,450	0...1,450	0...1,450	0...3,626	0...3,626	0...3,626
Process Connection	1/4" NPT	1/4" NPT	1/4" NPT	1/4" NPT	G1/4"	G1/4"	1/4" NPT	G1/4"	G1/4"	1/4" NPT	G1/4"	G1/4"
Electrical Connection	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12

IO Link

Pressure
Sensors



Order code Part number	BSP008A BSP B010-EV002-D00S1B-S4	BSP008R BSP B010-EV002-A00S1B-S4	BSP0095 BSP B010-EV002-A02S1B-S4	BSP008F BSP B100-EV002-D00S1B-S4	BSP0098 BSP B100-EV002-A00S1B-S4	BSP008H BSP B100-EV002-A00S1B-S4	BSP008Y BSP B250-EV002-D00S1B-S4	BSP0099 BSP B250-EV002-A02-S1B-S4				
Output Logic	(2) PNP NO or NC	0...10 V DC PNP NO or NC	4...20 mA PNP NO or NC	(2) PNP NO or NC	4...20 mA PNP NO or NC	(2) PNP NO or NC	0...10 V DC PNP NO or NC	4...20 mA PNP NO or NC				
Pressure Range (psi)	0...145	0...145	0...145	0...1,450	0...1,450	0...3,626	0...3,626	0...3,626				
Process Connection	G1/4"	G1/4"	G1/4"	G1/4"	G1/4"	G1/4"	G1/4"	G1/4"				
Electrical Connection	M12	M12	M12	M12	M12	M12	M12	M12				

Design	Relative nominal pressure		Overload pressure		Burst pressure ≥		Permitted vacuum
Pressure sensors -1...2 bar	29 psi	2 bar	58 psi	4 bar	145 psi	10 bar	vacuum proof
Pressure sensors -1...10 bar	145 psi	10 bar	290 psi	20 bar	508 psi	35 bar	
Pressure sensors 0...2 bar	29 psi	2 bar	58 psi	4 bar	145 psi	10 bar	
Pressure sensors 0...5 bar	73 psi	5 bar	145 psi	10 bar	218 psi	15 bar	
Pressure sensors 0...10 bar	145 psi	10 bar	290 psi	20 bar	508 psi	35 bar	
Pressure sensors 0...20 bar	290 psi	20 bar	580 psi	40 bar	1088 psi	75 bar	
Pressure sensors 0...50 bar	725 psi	50 bar	1450 psi	100 bar	2176 psi	150 bar	
Pressure sensors 0...100 bar	1450 psi	100 bar	2900 psi	200 bar	3626 psi	250 bar	
Pressure sensors 0...250 bar	3626 psi	250 bar	5802 psi	400 bar	6527 psi	450 bar	
Pressure sensors 0...400 bar	5802 psi	400 bar	9428 psi	650 bar	10153 psi	700 bar	
Pressure sensors 0...600 bar	8702 psi	600 bar	10878 psi	750 bar	11603 psi	800 bar	

Pressure Sensors

Pressure transmitters

Balluff pressure transmitters provide a rugged stainless steel housing, reliable measurement technology and a large temperature range from -40 to 125 °C. This enables reliable operation and long service life. Choose between eleven different pressure ranges, voltage or current output and various process connections for the appropriate sensor.



Process connection
NPT 1/4"



Process connection
G 1/4"

Order code Part number	BSP00JF BSP V010-DV004-A04A1A-S4	BSP00JW BSP V010-FV004-A04A1A-S4	BSP00K8 BSP V010-KV004-A04A1A-S4	BSP00FY BSP V010-DV004-A06A1A-S4	BSP00H8 BSP V010-FV004-A06A1A-S4	BSP00HN BSP V010-KV004-A06A1A-S4	BSP00JK BSP B010-DV004-A04A1A-S4	BSP00K0 BSP B010-FV004-A04A1A-S4	BSP00KC BSP B010-KV004-A04A1A-S4	BSP00H1 BSP B010-DV004-A06A1A-S4	BSP00HC BSP B010-FV004-A06A1A-S4
Output Logic	0...10 V DC	0...10 V DC	0...10 V DC	4...20 mA	4...20 mA	4...20 mA	0...10 V DC	0...10 V DC	0...10 V DC	4...20 mA	4...20 mA
Pressure Range (psi)	-14.5...145	-14.5...145	-14.5...145	-14.5...145	-14.5...145	-14.5...145	0...145	0...145	0...145	0...145	0...145
Process Connection	G 1/4"	1/4" NPT	R 1/4"	G 1/4"	1/4" NPT	R 1/4"	G 1/4"	1/4" NPT	R 1/4"	G 1/4"	1/4" NPT
Electrical Connection	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12



Process connection
NPT 1/4"



Process connection
G 1/4"



Order code Part number	BSP00HT BSP B010-KV004-A06A1A-S4	BSP00JN BSP B100-DV004-A04A1A-S4	BSP00K3 BSP B100-FV004-A04A1A-S4	BSP00KH BSP B100-KV004-A04A1A-S4	BSP00K4 BSP B100-DV004-A06A1A-S4	BSP00HH BSP B100-FV004-A06A1A-S4	BSP00HY BSP B100-KV004-A06A1A-S4				
Output Logic	4...20 mA	0...10 V DC	0...10 V DC	0...10 V DC	4...20 mA	4...20 mA	4...20 mA				
Pressure Range (psi)	0...145	0...1450	0...1450	0...1450	0...1450	0...1450	0...1450				
Process Connection	R 1/4"	G 1/4"	1/4" NPT	R 1/4"	G 1/4"	1/4" NPT	R 1/4"				
Electrical Connection	M12	M12	M12	M12	M12	M12	M12				

BSP Accessories   **Manometer screw connection per DIN EN 837**      **Internal thread**

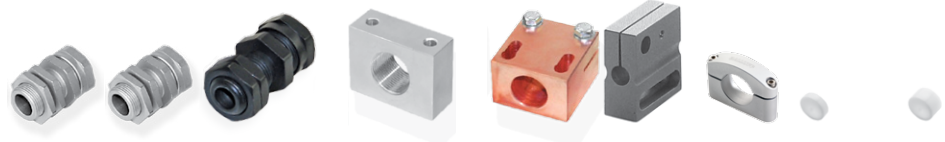
Order code Part number	BAM01KP BAM AD-SP-008-1G4/1G4-4	BAM01KR BAM AD-SP-008-1G4/1G4-4-EN837	BAM01UJ BAM AD-SP-008-1G4/1G2-4	BAM0209 BAM AD-SP-008-1G4/M20X1.5-4	BAM01RP BAM AD-SP-008-1G4/1R4-4	BAM01KT BAM AD-SP-008-1G4/1N4-4	BAM01TR BAM AD-SP-011-1G4/1N4-4
Sensor Connection	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 1/4"
Process Connection	G 1/4"	G 1/4"	G 1/2"	M20x1.5	R 1/4"	NPT 1/4"	Internal Thread NPT 1/4"

Accessories

Sensor protection

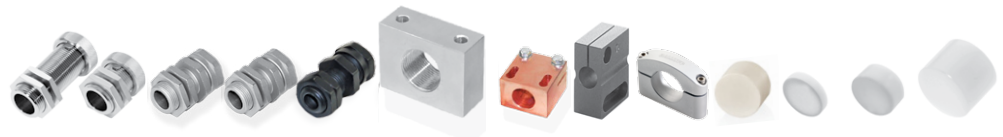
Balluff offers many accessories designed to survive in the welding environment. These offerings are very effective at protecting and increasing sensor and connectivity life. Covers, caps, plungers, and clamps are all designed to help protect the sensor from damage. Metal connectivity accessories allow for heavy duty applications in the harshest environments, while Weld Jacket is another option in the fight to protect cables from damage. All of the products listed below will help reduce sensor failure and increase sensor life expectancy.

Tubular M8



Application	PTFE Prox Mount (≥30 mm)	PTFE Prox Mount (≥40 mm)	PTFE Steel Prox Mount	Al Bunker Block™		Cu/Steel Bunker Block II™	Al Clamp with Positive Stop	Al Cuff Mount	PTFE Cover	
Order code	BAM00AK	BAM00AF	BAM00AC	BAM00EJ	BAM00EK	BAM00A4	BAM00A7	BAM0269	BAM009Z	BAM00A0
Part number	BES 08,0-KH-2S/W	BES 08,0-KH-2L/W	BES 08,0-KH-11S/W	BES 12,0-KB-9L	BES 12,0-KB-9S	BES 08,0-KB-10/W	BES 08,0-KB-4-F	BAM MC-XA-027-D08,0-1	BES 08-SM-1	BES 08-SM-1F
Requires Prox Mount				BAM00AF	BAM00AK					
M8	■	■	■	■	■	■	■	■	■	■
M12										

Tubular M18



Application	PTFE Prox Mount with metal bushing	PTFE Prox Mount (≥30 mm)	PTFE Prox Mount (≥40 mm)	PTFE Steel Prox Mount	Al Bunker Block™	Cu/Steel Bunker Block II™	Al Clamp with Positive Stop	Al Cuff Mount	Ceramic Cap	PTFE Cover	PTFE Cap (M24 Prox Mount)			
Order code	BAM022J	BAM022F	BAM00FW	BAM00FP	BAM00FM	BAM00HE	BAM00HF	BAM00F5	BAM00FC	BAM0219	BAM0157	BAM00EZ	BAM00F0	BAM00HC
Part number	BAM MC-XA-028-D18,0-2-FXL/W	BAM MC-XA-023-D18,0-2-FXS/W	BES 18,0-KH-2S/W	BES 18,0-KH-2L/W	BES 18,0-KH-11S/W	BES 24,0-KB-9L	BES 24,0-KB-9S	BES 18,0-KB-10/W	BES 18,0-KB-4-F	BAM MC-XA-027-D18,0-1	BES 18-CERAMIC-CAP-1	BES 18-SM-1	BES 18-SM-2	BES 24-SM-4
Requires Prox Mount						BAM00FP	BAM00FW							
M18	■	■	■	■	■	■	■	■	■	■	■	■	■	■
M30														



**Tubular
M12**



		PTFE Prox Mount with metal bushing																		
	BAM0247 BAM MC-XA-023-D12,0-2-FM/W																			
	BAM0248 BAM MC-XA-023-D12,0-2-FXL/W																			
	BAM00E1 BES 12,0-KH-2S/W	PTFE Prox Mount (≥30 mm)																		
	BAM00CZ BES 12,0-KH-2L/W	PTFE Prox Mount (≥40 mm)																		
	BAM00CW BES 12,0-KH-11S/W	PTFE Steel Prox Mount																		
	BAM00EU BES 16,0-KB-9L	Al Bunker Block™																		
	BAM00EW BES 16,0-KB-9S																			
	BAM00C6 BES 12,0-KB-10/W	Cu/Steel Bunker Block II™																		
	BAM00CF BES 12,0-KB-4-F	Al Clamp with Positive Stop																		
	BAM0218 BAM MC-XA-027-D12,0-1	Al Cuff Mount																		
	BAM0156 BES 12-CERAMIC-CAP-1	Ceramic Cap																		
	BAM00C3 BES 12-SM-4	PTFE Cap																		
	BAM00C2 BES 12-SM-2	PTFE Cover																		
	BAM00ER BES 16-SM-4 (M16 Prox Mount)	PTFE Cap																		
	BAM00EP BES 16-SM-2 (M16 Prox Mount)	PTFE Cap																		



**Tubular
M30**



		PTFE Prox Mount (≥30 mm)																			
	BAM00J7 BES 30,0-KH-2S/W																				
	BAM00J5 BES 30,0-KH-2L/W	PTFE Prox Mount (≥40 mm)																			
	BAM00JP BES 36,0-KB-9L	Al Bunker Block™																			
	BAM00JR BES 36,0-KB-9S																				
	BAM00HR BES 30,0-KB-10/W	Cu/Steel Bunker Block II™																			
	BAM00HW BES 30,0-KB-4-F	Al Clamp with Positive Stop																			
	BAM01U0 BAM MC-XA-017-D30,0-1	Al Cuff Mount																			
	BAM00HJ BES 30-SM-1	PTFE Cover																			
	BAM00HK BES 30-SM-2																				
	BAM00JM BES 36-SM-4	PTFE Cap																			
	BAM00JL BES 36-SM-2	PTFE Cover																			

Accessories

Sensor protection

Block



Application	Over-the-top Bunker Protection	Socket Bunker Protection	PTFE Cover	Metal Mount	AL Cover	PA6 Cover	Tester
Order code Part number	BAM00NK BES R01-SH-4-A	BAM00NL BES R01-SH-4-B	BES02YW BES R01ZC-TC	BAM00JY BES Q40-HW-2	BAM00KO BES Q40-SH-1	BAM00K1 BES Q40-SH-2	BAE002C BES 516-7
R01	■	■	■				
Q40				■	■	■	
18 VDC							■
PNP Sensors							■
NPN Sensors							■

Photoelectric



Application	Glass Lens Cap	Lens Cover	Air Blow-off	Lens Cover	Lens Cover Replacement	Protection	BMS Protection	Protection	Protection	Steel Bunker Block	Protection	Lens Cover	Lens Cover Replacement	Protection	Air Blow-off	
Order code Part number	BAM00RM BOS 18-SM-2-A	BAM01NC BAM PC-XO-005-18M-4	BAM00R9 BOS 18-LT-1	BAM01L8 BAM PC-XO-006-23K-1	BAM01YL BAM PC-XO-006-23K-G/RK	BAM01FK BAM MB-XO-006-B05-4	BAM01AW BMS CS-M-D12-B23K-05	BAM0227 BAM MB-XO-014-B10-4-BLS	BAM0228 BAM MB-XO-014-B10-4-RLS	BAM0225 BAM MB-XO-014-B10-4-RRR	BAM0155 BOS 26-HW-7	BAM0226 BAM MB-XO-014-B10-4-BRR	BAM01U6 BAM PC-XO-006-50K-1	BAM01YM BAM PC-XO-006-50K-G/RK	BAM003Z BMS CZ-M-B-001	BAM0041 BMS CZ-M-D12-I-001
M18	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
BOS 23K M12																
BOS 26K								■	■	■	■					
BOS 50K												■	■			
BOD 63M															■	■
BOD 66M															■	■
BWL															■	■



Silicone Tubes & Tape



Application	White Silicone Tube	Clear Silicone Tube	Clear Silicone Tube	White Silicone Tube	Clear Silicone Tube	Clear Silicone Tube	White Silicone Tube	Clear Silicone Tube	White Silicone Tube	Clear Silicone Tube	White Silicone Tube	Clear Silicone Tube	White Silicone Tube	Clear Silicone Tube	Silicone Tape	Silicone Tape	Silicone Bonding Wrap	Silicone Bonding Wrap
Order code	BAM0212	BAM017E	BAM0181	BAM0213	BAM017H	BAM017K	BAM0214	BAM017L	BAM0215	BAM017N	BAM0216	BAM017R	BAM0217	BAM017Z	BAM021E	BAM021F	BAM0183	BAM0182
Part number	BAM PT-XA-004-070-T-R16	BKS-PT-07/16-SI-15	BKS-PT-8/16-SI-15	BAM PT-XA-004-100-T-R16	BKS-PT-10/16-SI-15	BKS-PT-11/16-SI-15	BAM PT-XA-004-130-T-R16	BKS-PT-13/16-SI-15	BAM PT-XA-004-160-T-R16	BKS-PT-16/16-SI-15	BAM PT-XA-004-190-T-R16	BKS-PT-19/16-SI-15	BAM PT-XA-004-500-T-R16	BKS-PT-50/16-SI-07.5	BAM PT-XA-005-260-T-R20	BAM PT-XA-005-510-T-R20	BKS-PW-26/20-SI-TR-03,5	BKS-PW-51/30-SI-TR-11
Width mm	7	5	8	10	9.5	11	13	13	16	16	19	19	50	50	26	51	25	50
Length m	16	15	15	16	15	15	16	15	16	15	16	15	16	7.5	20	20	3.5	11

Fiberglass, Sheet & Covers



Application	Silicone/Fiberglass Tube	Silicone/Fiberglass Tube	Silicone/Fiberglass Tube	Silicone/Fiberglass Tube	Silicone/Fiberglass Tube	Silicone/Fiberglass Tube	Silicone/Fiberglass Tube	Silicone/Fiberglass Tube	Silicone Sheet	BNI Protection Cover	BNI Protection Cover
Order code	BAM01R1	BAM022Z	BAM01R2	BAM0230	BAM01UY	BAM0231	BAM0232	BAM0233	BAM017A	BAM020Z	BAM0210
Part number	BAM PT-XA-002-095-2-30	BAM PT-XA-002-100-2-R15	BAM PT-XA-002-127-2-30	BAM PT-XA-002-130-2-R15	BAM PT-XA-002-190-2-30	BAM PT-XA-002-190-2-R15	BAM PT-XA-002-380-2-R15	BAM PT-XA-002-500-2-R15	BKS-PS-914/16-SI-00,91	BAM PC-XA-014-207-1	BAM PC-XA-014-250-1
Width mm	9.5	10	13	13	19	19	38	50	914.4	≤ 200	≤ 250
Length m	30	15	30	15	30	15	15	15	0.9		

BALLUFF

sensors worldwide



Systems and Service



Industrial Networking and Connectivity



Industrial Identification



Object Detection



Linear Position Sensing and Measurement



Condition Monitoring and Fluid Sensors



Accessories

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