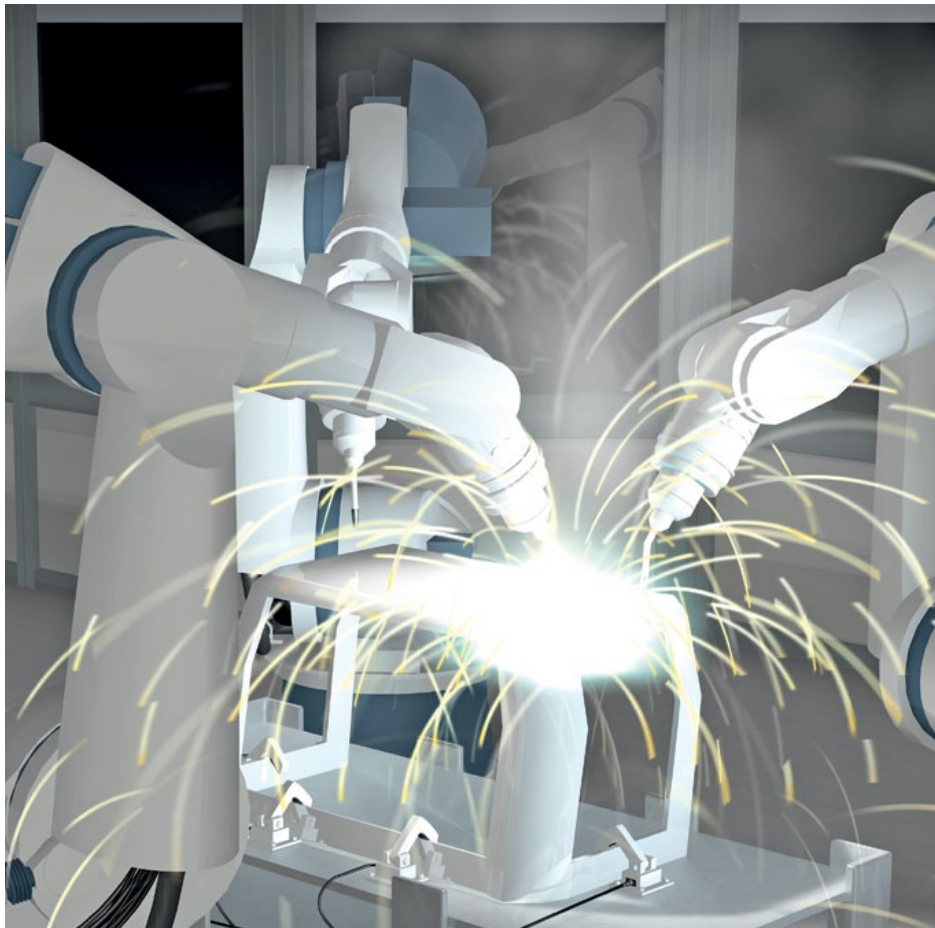
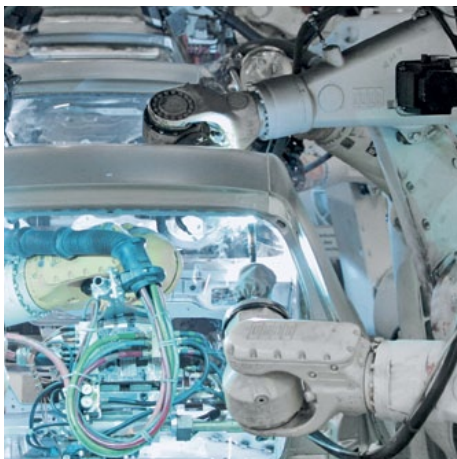
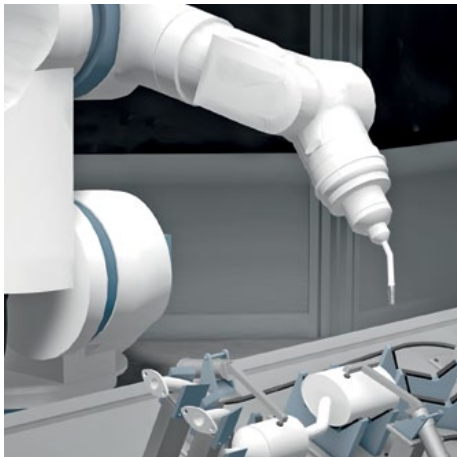


BALLUFF

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 10, 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've 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 SlagMaster® 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
Loading Impact	5
Cylinder & Clamp Position	6
Photoelectric Sensors	7
Protecting Connectivity	8
Non-Contact Coupling	9
Welding Best Practices	10
Welding Related Services & Training	12
Inductive Sensors	14
Cylinder and Clamp Sensors	26
Photoelectric Sensors	30
Pressure Sensors	32
Accessories	34
Connectivity Solutions	38

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.

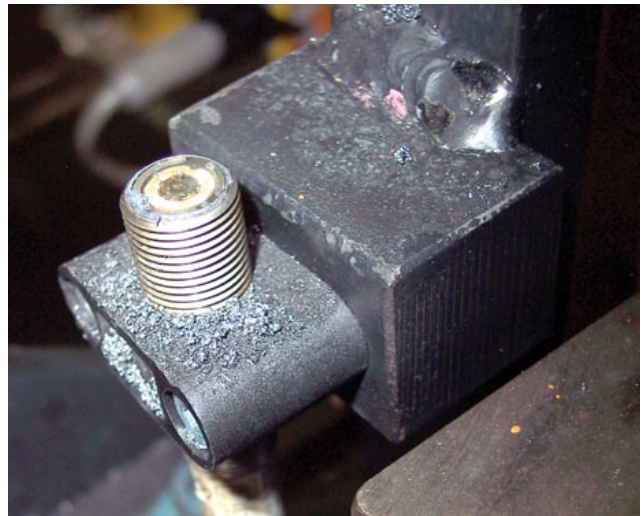
SOLUTION

Balluff SlagMaster® 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 16 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 20 or 22 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 24 or 34 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 Blocks™ 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 15 or 24 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.



See page 26 to find your solution

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 28 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.

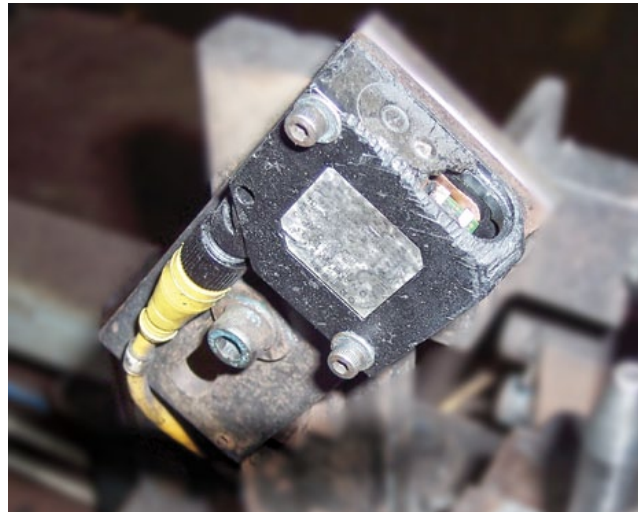
SOLUTION

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 30 to find your solution

Damage by Loading Impact

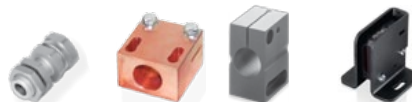


PROBLEM

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 34 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 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 to endure different environments.

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 to encompass 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 38 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.

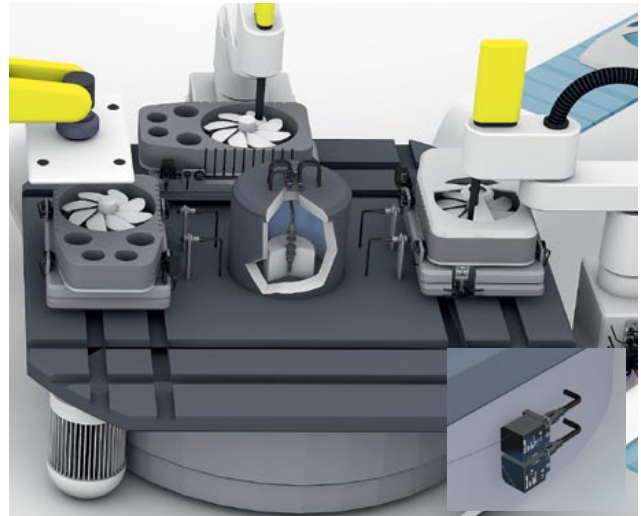
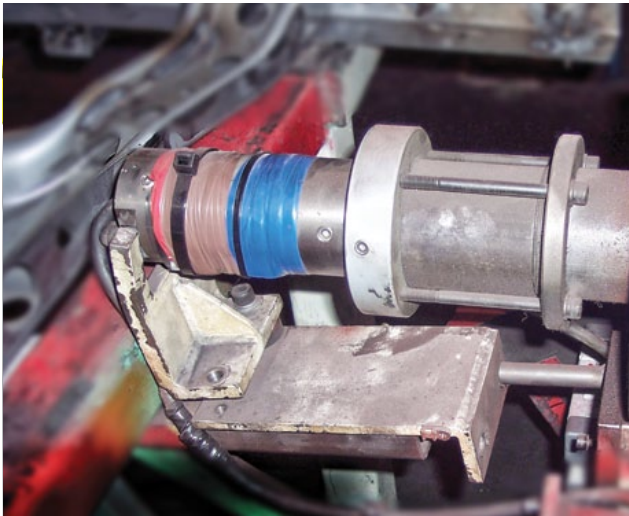


See www.balluff.us/bni to find your solution

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.

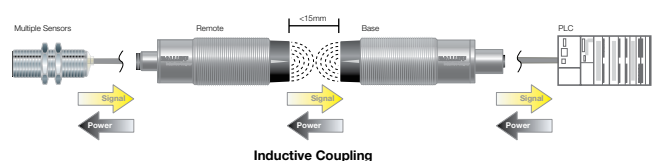


See www.balluff.us/bic to find your solution

Any place 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

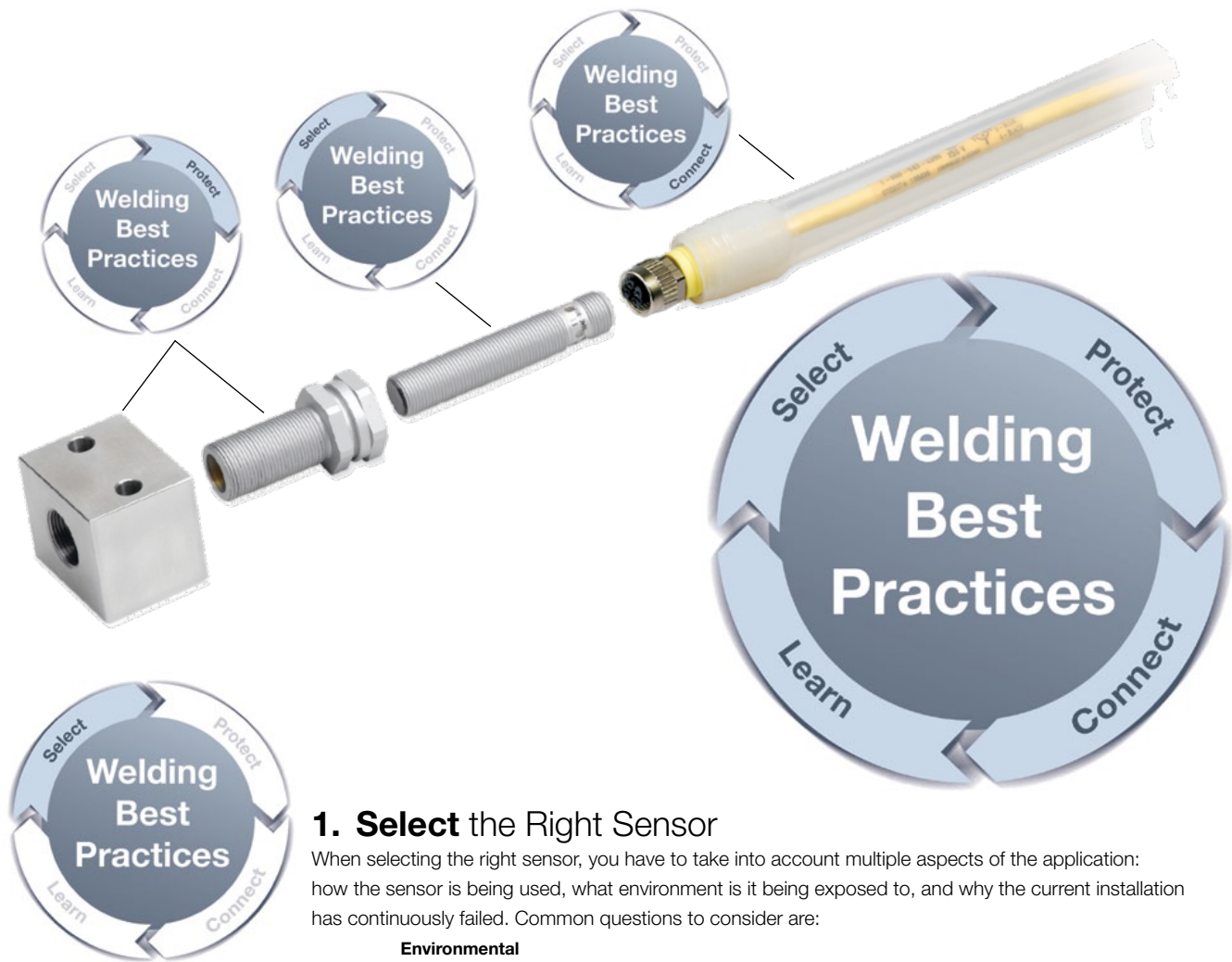
Think of this like a mechanical connector without pins or the requirement of physical contact. When connected, power goes out to the devices and signals come back from the devices. Depending on the specific product of interest, different information can be passed. Power only or power plus, discrete inputs 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.



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 adaptation 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 even 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:

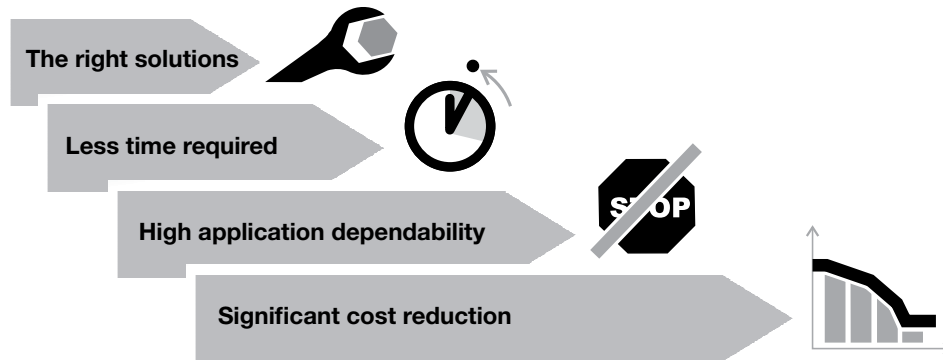
- What caused the eventual end of the sensor? Heat? Slag? Impact?
- What else is damaging the sensor? Is the cable failing?
- Where else do we have a similar installation or application?

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.

Services

Welding Related Services

Sometimes we want to implement change but are unable to find the time or manpower to get it done. Possibly we aren't sure that technicians or engineers have the skills today to implement the ideas we want to implement. Balluff offers onsite service to help you identify and implement critical updates to your welding fixtures to ensure longevity of the sensors and associated connectivity. For long-term durability of future applications, training technicians and engineers can be a wise investment in ensuring low downtime due to sensors and connectors.



Weld Cell Sensors Related Services

When you want to start implementing improvements and best practices it can be hard to determine where to start first or what to do. With Weld Cell services from Balluff we can provide trained and technical people to help you change from the status quo. After using Balluff services, customers typically see a dramatic reduction in their downtime as well as a fast ROI on their investment.

Description	Weld Cell Sensor Audit	Installation & Implementation	DeviceNet Analyzer Service
Location	At customer site	At customer site	At customer site
Requirements	<ul style="list-style-type: none"> - Technician or Engineer present during audit - Access to fixtures 	<ul style="list-style-type: none"> - Documented change plan - Technician or Engineer during installation - Extended access to fixtures 	<ul style="list-style-type: none"> - Documented network layout - Technician or Engineer present during analysis - Multiple T accesses to network
Length	By the day	By the day	By the day
Ordering code	BSS001P	BSS0040	BSS004Z
Part number	BSS TST-O-103-001	BSS INS-O-100-001	BSS CSL-O-250-001

The **Weld Cell Sensor Audit** will enable you to have a quick guide for where to implement improvements in your welding equipment as well as what specific components need to be ordered and implemented. The auditors will require access to the weld cell fixtures where the sensors are located. They will interview technicians, engineers and operators to understand and document problem areas. They will take measurements, specific small area photos and document as much as possible. After the audit is complete, a report will be written with recommendations and comments.

The **Installation & Implementation** service is available if you require assistance implementing updates and installing the new recommendations from a weld cell audit. The Balluff personnel will work with your engineers and technicians on mechanical hardware and 24VDC electrical applications during a down period. They will work to implement new sensors, protection accessories or connectivity protection solutions. Typically, before and after documentation, photos are retained for proof of work completed.

Balluff will send a trained engineer with our **DeviceNet analyzer** to your facility to work with your technicians on your networks and take a snapshot of the total health of the network. This total network health can help identify which nodes to work on and where to perform preventative maintenance. In addition, multiple measurements could be made over a number of different hours or days to help give a better picture of effects being felt on the networks in the facility. On site, you will receive a report from the Balluff engineer detailing each network's total health and highlighting poor node health.



Services



Training



Weld Cell Sensors Related Training

Training is truly an investment in people. But not all training is equal: some training results in knowledge that does not directly translate into better performance on the job. Balluff’s courses start with learning objectives: what the students should be able to DO at the end of the lesson. We measure these objectives with exercises and labs throughout the course. This “hands-on” approach means students leave better equipped to do their jobs.

Description	Best Practices for Welding	Sensor Fundamentals	Network Fundamentals Courses
Target Audience	Technicians, Engineers, Designers & Integrators	Technicians, Engineers, Designers & Integrators	Technicians, Engineers
Location	At customer site	At customer site	At customer site
Minumum Students	4	4	4
Length	1 day	1 day	Varies
Ordering code	BSS004A	BSS004N	Varies
Part number	BSS EDU-O-101-001	BSS EDU-O-220-001	Varies

The **Best Practices for Welding** course is focused on giving the student hands-on knowledge and training on our Weld Sensors Best Practices concept as well as basic training on how to live continuous process improvement in the manufacturing environment. Using best practices that have proven successful for more than a decade, the students will walk away with a strong understanding of how to select a sensor for the proper environment, how to protect the sensor and how to select the proper connectivity protection solution for the application.

The **Sensor Fundamentals** course will enable someone to select the correct sensor for a given application. Using a hands-on approach, participants will use a sensor demo which contains a sampling of various sensor types. By the end of the course you will be able to identify six sensor families, describe the basic operating technologies, and match a specific sensor to a specific application.

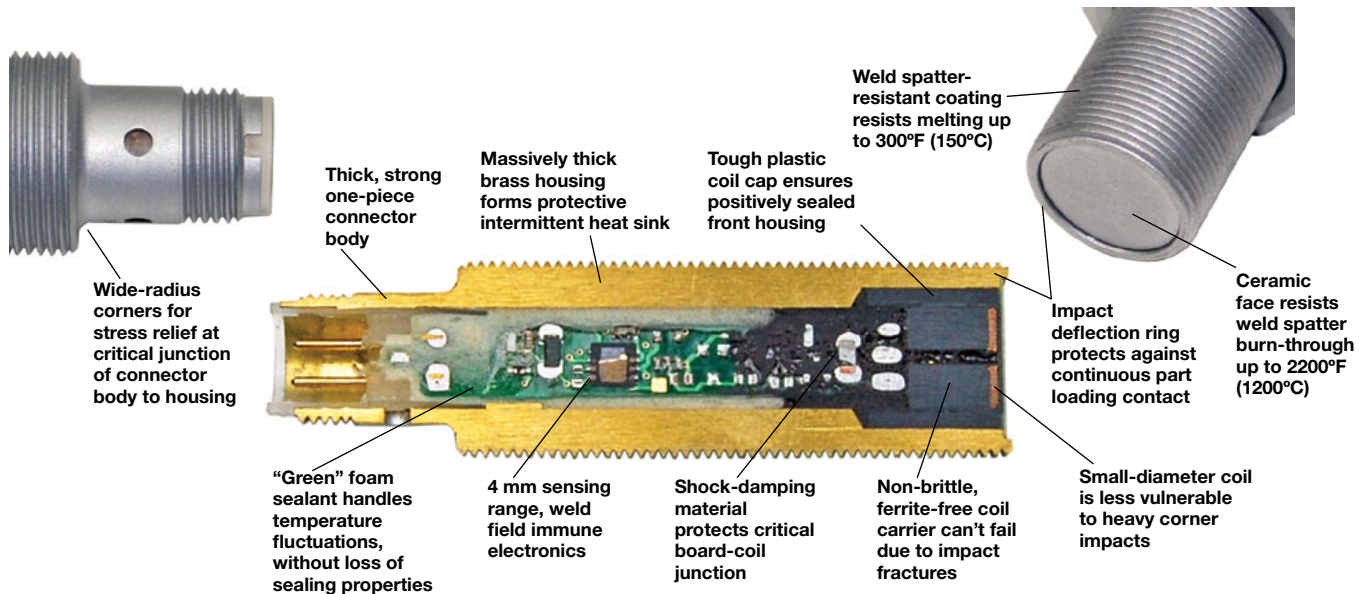
Balluff offers a continuously widening selection of **network fundamentals courses**.

Whether you are interested in brushing up on DeviceNet or really diving into Ethernet based protocols, a course is available for your needs. If a specific course is not available on our website contact us and we will be happy to tailor a course to your needs from our existing materials. We can even customize a course specific to your company or facility for training specific to the way you do things and your data/logic/structure.

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

Balluff, Inc. - www.balluff.com - 1-800-543-8390

BunkerProx

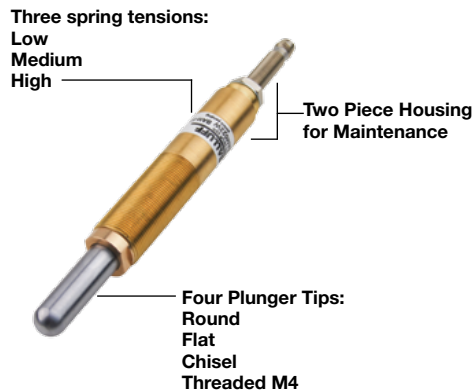
Tubular

Inductive
Sensors



Type	M18 Tubular, 10...30VDC
Order code Part number	BES03MY BES M18MI-PSO40B-S04G-W03
Sn (mm) / Mounting	4 F
Output Logic	PNP NO
Special Properties	WFI
Coatings	PTFE
Connector	M12

Balluff's all new PlungerProx is a high durability assembly intended for direct contact applications. The heavy duty design allows the ability 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		Threaded Tip		Paddle Tip Accessory to Threaded Tip
Order code Part number	SET015A BAV BP-PH-00093-01	SET015F BAV BP-PH-00093-02	SET0167 BAV BP-PH-00100-01	SET0168 BAV BP-PH-00100-02	SET0169 BAV BP-PH-00101-01	SET016A BAV BP-PH-00101-02	SET016C BAV BP-PH-00102-01	SET016E BAV BP-PH-00102-02	BAM025T 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

SlagMaster® coating

SlagMaster® 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 20**.

Tubular

Inductive
Sensors

3-Wire DC, Non-Weld Field Immune, SlagMaster®



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
Sn (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	SM	SM	SM	SM	SM	SM	SM	SM		SM	SM	SM	SM	SM
Connector	M12 3m PUR	M8 3p	M8 3p	M12	M12	M12	M12 1 PUR	M12		M12	M12	M12	M12	M12

Block

Inductive
Sensors

3-Wire DC, Non-Weld Field Immune, SlagMaster®



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
Sn (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	SM	SM	SM	SM	SM	SM		SM Face	SM Face
Connector	M12 .2m TPU	M8 3p .2m TPU	5m TPU	M12 .2m PUR	M12 .2m PUR	M8 3p .2m PUR		M12	M12



Tubular & Block
Inductive
Sensors

2-Wire DC, Non-Weld Field Immune, SlagMaster®



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	BES00C0	BES0324	BES00C1	BES0326	BES0329	BES032A	BES03TM	BES044A	BES0484
Part number	BES M08ME1-GSC20B-S04G-101	BES M08MG-GSC20B-BP00,3-GS04-101	BES M12MF-GSC30B-S04G-101	BES M12MG-GSC30B-BP00,3-GS04-101	BES M18MG-GSC70B-BP00,3-GS04-101	BES M30MF-GSC15B-BP00,3-GS04-101	BES R01ZC-USC50B-BP00,2-GS04-101	BES 516-209-SA96-S21-E	BES R01ZC-PSC70B-EZ05-108
Sn (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	SM	SM	SM	SM	SM	SM	SM	SM	SM
Connector	M12	M12 .3m PUR	M12	M12 .3m PUR	M12 .3m PUR	M12 .3m PUR	M12 .2m PUR	1/2" 3p	5m 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
- SM = SlagMaster
- M8 3p = M8 3-pole



SLAGMASTER®

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	BES039R BES M08ME1-GSC20B-S04G-U		BES039U BES M12MF-GSC30B-S04G-U			BES03FH BES M18MF-GSC70B-S04G-U			BES027K BES M30MF-GSC15B-BX00,3-GS04-U		
Part number	BES03H7 BES M08ME1-USC20B-S04G-U		BES039W BES M12MG-GSC30B-BX00,3-GS04-U			BES03FJ BES M18MG-GSC70B-BX00,3-GS04-U			BES03KL BES M30MF-GSC15B-S04G-U		
Sn (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, 3m iPUR	M12	M12	M12, 3m iPUR	M12	M12, 3m iPUR	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

SM = SlagMaster
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° F**, Balluff high temperature sensors meet either **IP67** or **IP69** ratings.

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

Tubular
Inductive
Sensors

High Temperature 120° C,
Non-Weld Field Immune,
SlagMaster®

Tubular
Inductive
Sensors

High Temperature 160° C,
IP69 Rated,
Non-Weld Field Immune,
Non-SlagMaster 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	BES02HY	BES02HZ	BES032K	BES02J3	Order code	BES043T	BES043U	BES043W	BES043Y
Part number	BES 516-324-SA55-03	BES 516-325-SA68-03	BES 516-105-SA9-S4	BES 516-347-SA13-03	Part number	BES 515-326-SA49-D-TF-02	BES 515-360-SA13-D-TF-02	BES 515-327-SA22-D-TF-02	BES 515-362-SA4-D-TF-02
Sn (mm) / Mounting	2 F	2 F	5 F	5 F	Sn (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°	120°	120°	120°	Special Properties	160°	160°	160°	160°
Coatings	SM	SM	SM	SM	Coatings				
Connector	3m PTFE	3m Silicone	M12	3m Silicone	Connector	2m FEP	2m FEP	2m FEP	2m 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

SM = SlagMaster
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
Sn (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	NPN	NPN	NPN	NPN	NPN	NPN	NPN	PNP	NO	PNP	NO	PNP
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	BES02JJ 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
Sn (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	BES02LO 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
Sn (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	20x32mm, Block, 10...30VDC								40x40 mm, Cube, 10...30VDC							
Order code Part number	BES048K BES R01ZC-PSC50B-BZ00,2-GS04-W05	BES02KT BES R01ZC-PSC50B-BX00,2-GS04-W11	BES048N BES R01ZC-PSC50B-BZ00,2-GS04-W13	BES0493 BES R01ZC-PSC50B-BZ00,2-GS49-V02	BES048W BES R01ZC-PSC50B-BZ00,5-GS04-V02	BES04RT BES R01ZC-PSC50B-BZ00,5-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
Sn (mm) / Mounting	5 F	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 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	WFI
Coatings	SM	SM	SM	SM	SM	SM	SM	SM			SM face				SM face	
Connector	M12, 2m TPU	M12, 2m TPU	M12, 2m TPU	M8, 2m TPU	M12, 5m TPU	M8, 3p, 5m TPU	3m TPU	5m TPU	Conduit	M12	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
Sn (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 SM face	PTFE	PTFE SM face	PTFE	PTFE	PTFE SM 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
Sn (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 SM face	PTFE	PTFE SM face	PTFE	PTFE	PTFE SM face	PTFE	PTFE SM face	PTFE	PTFE SM 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
Sn (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
Output Logic	PNP Comp	PNP Comp	PNP Comp	PNP NOPNP	PNP NOPNP	PNP NOPNP	PNP Comp	PNP Comp	PNP NOPNP	PNP Comp	PNP Comp	PNP Comp	PNP NOPNP	NO	PNP NOPNP
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
Coatings	SM face		SM face	SM face		SM face	SM face		SM face	SM face		SM face	SM face		
Connector	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	M18 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
Sn (mm) / Mounting	2 F	4 F	12 QF	8 F	8 F	15 F
Output Logic	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
Coatings	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
Connector	M12	M12	M12	M12	M12	M12

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	BES02N5	BES02N3	BES02NA	BES02N8	BES02NJ	BES02NF	BES02N6	BES02N4	BES02NC	BES02N9	BES02NK	BES02NH
Part number	BES M08EH1-PSC20B-S04G-S	BES M08EH1-NSC20B-S04G-S	BES M12EI-PSC40B-S04G-S	BES M12EI-NSC40B-S04G-S	BES M18EI-PSC72B-S04G-S	BES M18EI-NSC72B-S04G-S	BES M08EH1-PSC20B-S04G-S01	BES M08EH1-NSC20B-S04G-S01	BES M12EI-PSC40B-S04G-S01	BES M12EI-NSC40B-S04G-S01	BES M18EI-PSC72B-S04G-S01	BES M18EI-NSC72B-S04G-S01
Sn (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

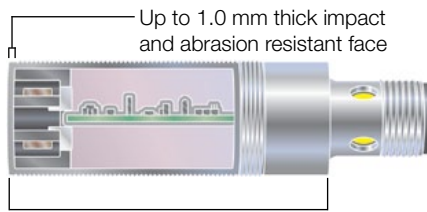
Tubular

3X

Sensors



Type	M12 Tubular, 10...30VDC				M18 Tubular, 10...30VDC				M30 Tubular, 10...30VDC			
Order code	BES02WH	BES02WF	BES02WE	BES02WC	BES02Y3	BES02Y2	BES02Y1	BES02Y0	BES02YF	BES02YE	BES02YC	BES02YA
Part number	BES M12EG1-PSC60Z-S04G-S11	BES M12EG1-NSC60Z-S04G-S11	BES M12EF1-PSC10F-S04G-S	BES M12EF1-NSC10F-S04G-S	BES M18EG1-PSC10Z-S04G-S11	BES M18EG1-NSC10Z-S04G-S11	BES M18EF1-PSC20F-S04G-S	BES M18EF1-NSC20F-S04G-S	BES M30EG1-PSC20Z-S04G-S11	BES M30EG1-NSC20Z-S04G-S11	BES M30EE1-PSC40F-S04G-S	BES M30EE1-NSC40F-S04G-S
Sn (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
Special Properties												
Coatings												
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
Sn (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
Coatings											
Connector	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12

Flatpack

Sensors



Type	R01 Steelface		R01ZC	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		
Sn (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 .3m PUR	M12 .3m PUR	M12 .3 Silicon rubber	M8 3p .2m Silicon rubber		

Cylinder and Clamp Sensors

StrokeMaster® sensors

Balluff high-pressure cylinder sensors are designed to sense the “spud” or cushion of a high pressure pneumatic or hydraulic cylinder’s piston to indicate clamped or unclamped cylinder gripping jaw positions. Rated to 3000 psi, these embedded inductive, WFI sensors are commonly found in heavy duty welding applications. StrokeMaster® sensors are available to accommodate many cylinder bore diameters in both AC/DC and in DC formats to meet many welding electrical requirements.



Type	Cylinder Sensors, 20...250 VAC/VDC, 3000 PSI, 304° Rotation																
Order code	Cylinder Sensors, 20...250 VAC/VDC, 3000 PSI, 304° Rotation																
Part number	Cylinder Sensors, 20...250 VAC/VDC, 3000 PSI, 304° Rotation																
Probe Length	0.912"	1.025"	1.225"	1.250"	1.300"	1.350"	1.500"	1.592"	1.725"	1.750"	1.875"	2.062"	2.275"	2.375"	2.775"	2.875"	3.750"
Output Logic	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	AC/DC NO	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	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI
Connector	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p	7/8" 3p



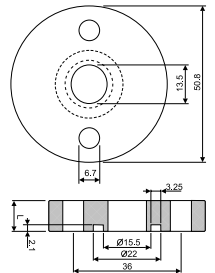
Type	Cylinder Sensors, 10...30VDC, 3000 PSI, 304° Rotation																							
Order code	Cylinder Sensors, 10...30VDC, 3000 PSI, 304° Rotation																							
Part number	Cylinder Sensors, 10...30VDC, 3000 PSI, 304° Rotation																							
Probe Length	0.912"	1.025"	1.225"	1.250"	1.300"	1.350"	1.500"	1.592"	1.750"	1.875"	2.062"	2.275"	2.875"	3.775"	4.560"	4.990"	1.025"	1.250"	1.500"	1.750"	2.062"	2.875"	3.775"	
Output Logic	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	PNP NO	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	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	WFI	
Connector	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	M12	

304°



Spacer Kit (refer to drawing)

Order code	BAM0165	BAM0166	BAM0167	BAM0168	BAM0169	BAM016A	BAM016C	BAM016E	BAM016F	BAM016H	BAM016J	BAM016K	BAM016L	BAM016M	BAM016N	BAM016P	BAM016R	BAM016T	BAM016U	BAM016W	BAM016Y	BAM016Z	BAM0170	BAM0171	BAM0172	BAM0173	BAM0174	BAM0175
Length	0.150" 0.158"	0.180" 0.188"	0.198" 0.188"	0.198" 0.188"	0.225" 0.250"	0.291" 0.307"	0.315" 0.337"	0.362" 0.372"	0.375" 0.380"	0.400" 0.440"	0.500" 0.562"	0.600" 0.650"	0.684" 0.712"	0.742" 0.810"	0.850" 0.875"	0.937"												



		Z/Spacers (inches)														
		0.18	0.188	0.225	0.307	0.372	0.375	0.5	0.544	0.562	0.6	0.684	0.712	0.81	0.937	
Probe Length (inches)	0.912	0.732	0.724	0.687	0.605	0.540	0.537	0.412	0.368	0.350	0.312	0.228	0.200	0.102	--	
	1.025	0.845	0.837	0.800	0.718	0.653	0.650	0.525	0.481	0.463	0.425	0.341	0.313	0.215	0.088	
	1.25	1.070	1.062	1.025	0.943	0.878	0.875	0.750	0.706	0.688	0.650	0.566	0.538	0.440	0.313	
	1.35	1.170	1.162	1.125	1.043	0.978	0.975	0.850	0.806	0.788	0.750	0.666	0.638	0.540	0.413	
	1.5	1.320	1.312	1.275	1.193	1.128	1.125	1.000	0.956	0.938	0.900	0.816	0.788	0.690	0.563	
	1.75	1.570	1.562	1.525	1.443	1.378	1.375	1.250	1.206	1.188	1.150	1.066	1.038	0.940	0.813	
	1.875	1.695	1.687	1.650	1.568	1.503	1.500	1.375	1.331	1.313	1.275	1.191	1.163	1.065	0.938	
	2.062	1.882	1.874	1.837	1.755	1.690	1.687	1.562	1.518	1.500	1.462	1.378	1.350	1.252	1.125	
	2.375	2.195	2.187	2.150	2.068	2.003	2.000	1.875	1.831	1.813	1.775	1.691	1.663	1.565	1.438	
	2.775	2.595	2.587	2.550	2.468	2.403	2.400	2.275	2.231	2.213	2.175	2.091	2.063	1.965	1.838	
	2.875	2.695	2.687	2.650	2.568	2.503	2.500	2.375	2.331	2.313	2.275	2.191	2.163	2.065	1.938	
	3.775	3.595	3.587	3.550	3.468	3.403	3.400	3.275	3.231	3.213	3.175	3.091	3.063	2.965	2.838	
4.56	4.380	4.372	4.335	4.253	4.188	4.185	4.060	4.016	3.998	3.960	3.876	3.848	3.750	3.623		

Example: Need probe length of 1.125" combine sensor BES-516-200-S2-1.35-S21 with a 0.225" spacer (1.35" tube length - 0.225" spacer = 1.125" adjusted length).

Note: A difference of 0.005" will still have to be carefully considered when sizing a spacer and sensor to the cylinder.
 - Spacer kits include a spacer, "O" ring, and appropriate mounting screws.
 - Other spacer kits may be available; consult factory.

To order a spacer kit: Use part number BES-516-20-KIT- (X.XXX) measured in inches. (For both DC and AD/DC devices, there is no difference in flange dimensions.)

Cylinder and Clamp Magneto-resistive 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 magneto-resistive 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 Part number	BMF00A6 BMF 204K-PS-C-2A-SA2-S4-00,3	BMF0002 BMF 204K-PS-C-2A-SA2-S49-00,3	BMF0003 BMF 204K-PS-C-2A-SA2-S49-00,5	BMF0005 BMF 204K-PS-C-2A-SA95-S4-00,3	BMF0006 BMF 204K-PS-C-2A-SA95-S75-00,3		BMF00FC BMF 214K-PS-C-2A-SA2-S4-00,3	BMF00A2 BMF 214K-PS-C-2A-SA2-S49-00,3	BMF00A3 BMF 214K-PS-C-2A-SA2-S49-00,5	BMF00A4 BMF 214K-PS-C-2A-SA95-S4-00,3	BMF00A5 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	
V-Twin												
Housing Material	PBT	PBT	PBT	PBT	PBT		PBT	PBT	PBT	PBT	PBT	
Connector	M12 .3m PUR	M8 .3m PUR	M8 .5m PUR	M12 .3m PUR	M8 .3m PUR		M12 .3m PUR	M8 .3m PUR	M8 .5m PUR	M12 .3m PUR	M8 .3m PUR	



Type	BMF 235 T-slot, Drop In, 10...30VDC, 3-wire Max Temp. 85° C												
Order code Part number	BMF00H5 BMF 235K-PS-C-2A-SA93-S4-00,3	BMF00C5 BMF 235K-PS-C-2A-SA2-S4-00,3	BMF00C4 BMF 235K-PS-C-2A-SA2-S49-00,3	BMF00C9 BMF 235K-PS-C-2A-SA95-S4-00,3	BMF00CA BMF 235K-PS-C-2A-SA95-S75-00,3	BMF00H3 BMF 235K-PS-C-2A-SA93-S4-00,3	BMF00H5 BMF 235K-PS-C-2A-SA93-S49-00,3	BMF00C2 BMF 235K-NS-C-2A-SA2-S49-00,3	BMF00EU BMF 235K-NS-C-2A-SA95-S4-00,5	BMF00C6 BMF 235K-PO-C-2A-SA2-S49-00,3			
Output Logic	PNP	NPN	NPN	NPN	NPN	NPN		NPN	NPN	NPN	NC		
V-Twin													
Housing Material	PA12	PA12	PA12	PA12	PA12	PA12	PA12	PA12	PA12	PA12			
Connector	.3m M12 Silicone	.3m M12 PUR	.3m M8 PUR	.3m M12 PUR	.3m M8 PUR	.3m M8 Silicone	.3m M12 Silicone	.3m M8 PUR	.3m M12 PUR	.3m M8 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 .3m PUR	M8 .3m Silicone	M8 .3m PUR	M8 .3m PUR	M12 .3m PUR	M8 .3m PUR	M12 .3m Silicone	M8 .3m Silicone	M12 .3m PUR	M8 .3m 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							
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		
.3m M8 PUR	.3m M12 PUR w/LED	.3m M12 PUR	.3m M12 PUR	.3m M12 PUR	.3m M12 PUR	M12	.3m M12 PUR	M8	M12	M8	M8	M12		

* Weld Field Immune

Photoelectric Sensors

BOS and BOD 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	
Sn (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 NO	PNP Comp	PNP Comp	PNP NO	PNP NO	PNP Comp	PNP Comp	PNP Comp	PNP NO	PNP Comp	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	

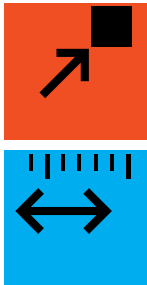


Type	Thru-Beam, One Piece, "L" Shaped, 10...30VDC		Thru-Beam, One Piece, Slot Sensor, 10...30VDC		
Order code Part number	BWL001J BWL 4241A-001-S4	BWL000N BWL 5454D-L011-S49	BGL0016 BGL-30A-001-S49	BGL001M BGL-50A-003-S49	BGL0029 BGL-80A-007-S49
Sn (mm)	43x43	54x54	30	50	80
Output Logic	PNP NO	PNP Comp	PNP Comp	PNP Comp	PNP Comp
Light Source	Infrared	Laser	Red Light	Laser	Infrared
Housing Material	Stn. Stl.	GD-Zn	GD-Zn	GD-Zn	GD-Zn
Sensing Face Material	Epoxy Resin	Glass	Glass	Glass	Glass
Connector	M12	M8 3p	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		
	Block	Block	Block	Block	Block	Block	Block	Block		
	5...800	30...300	50...300	150...600	200...2000	5...1200	0...2000	1...2000		
	PNP Comp	PNP Comp	PNP Comp	PNP Comp	PNP Comp	PNP Comp	PNP Comp	PNP Comp		
	Laser	Red Light	Laser	Infrared	Red Light	Laser	Red Light	Red Light		
		■	■	■						
	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS		
	PMMA	PMMA	PMMA	PMMA	Glass	PMMA	PMMA	Glass		
	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
Sn (mm)	45...85	45...85	30...100	80...300	200...2000	200...6000	25...45	25...500	100...600	200...2000
Output Logic	0-10VDC	0-10VDC	4-20mA PNP Comp	4-20mA PNP Comp	4-20mA PNP Comp	4-20mA PNP Comp	4-20mA PNP Comp	4-20mA PNP Comp	4-20mA 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.



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, 0...10 VDC & 4...20 mA & NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC											
Pressure Range	-14.5...145-14.5...145-14.5...145 0...145 0...145 0...145 0...1,4500...1,4500...1,4500...3,6260...3,6260...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 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-A02S1B-S4	BSP008H BSP B250-EV002-D00S1B-S4	BSP008Y BSP B250-EV002-A00S1B-S4	BSP0099 BSP B250-EV002-A02S1B-S4				
Output Logic	(2) PNP, 0...10 VDC & 4...20 mA & NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC PNP NO or NC											
Pressure Range (psi)	0...145 0...145 0...145 0...1,4500...1,4500...3,6260...3,6260...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	

BSP Pressure Sensors

Pressure transmitters Current variants 4...20mA

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...10VDC 0...10VDC 0...10VDC			4...20mA 4...20mA 4...20mA			0...10VDC 0...10VDC 0...10VDC 4...20mA 4...20mA				
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	G1/4"	1/4" NPT	R1/4"	G1/4"	1/4" NPT	R1/4"	G1/4"	1/4" NPT	R1/4"	G1/4"	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...20mA	0...10VDC	0...10VDC	0...10VDC	4...20mA	4...20mA	4...20mA				
Pressure Range (psi)	0...145	0...1450	0...1450	0...1450	0...1450	0...1450	0...1450				
Process Connection	R1/4"	G1/4"	1/4" NPT	R1/4"	G1/4"	1/4" NPT	R1/4"				
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
Process Connection	G1/4"	G1/4"	G1/4"	G1/4"	G1/4"	G1/4"	1/4" NPT
Electrical Connection	G1/4"	G1/4"	G1/2"	M20x1.5	R1/4"	NPT1/4"	Internal Thread NPT1/4"

Accessories

Sensor protection

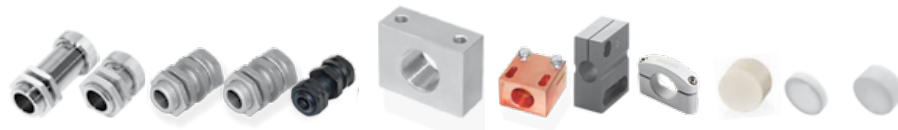
Balluff offers many accessories designed to survive in the welding environment. These offerings are very effective at protecting and increasing sensor and connectivity life. Covers, caps, plungers, and clamps are all designed to help protect the sensor from damage. Metal connectivity accessories allow 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

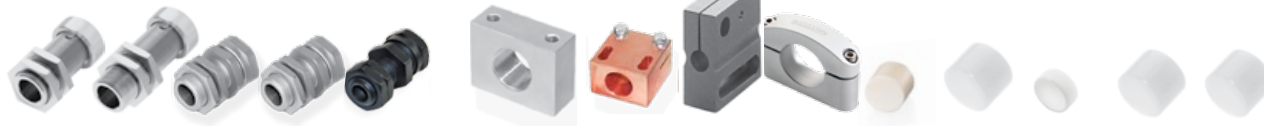


Application	PTFE Prox Mount (≥30 mm)	PTFE Prox Mount (≥40 mm)	PTFE Steel Prox Mount	AL Bunker Block	Cu/Steel Bunker Block II	AL Clamp with Positive Stop	PTFE Cover		
Order code	BAM00AK	BAM00AF	BAM00AC	BAM00EJ	BAM00EK	BAM00A4	BAM00A7	BAM009Z	BAM00A0
Part number	BES 08,0-KH-2S/W	BES 08,0-KH-2L/W	BES 08,0-KH-11S/W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

Tubular M18



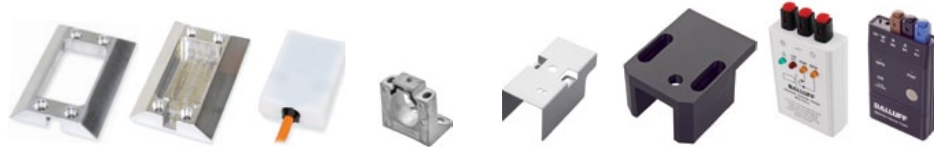
Application	PTFE Prox Mount		PTFE Prox Mount (≥30 mm)	PTFE Prox Mount (≥40 mm)	PTFE Steel Prox Mount	Al Bunker Block	Cu/Steel Bunker Block II	Al Clamp with Positive Stop	Cuff Mount	Ceramic Cap	PTFE Cover		
Order code	BAM022J	BAM022F	BAM00FW	BAM00FP	BAM00FM	BAM00HE	BAM00HF	BAM00F5	BAM00FC	BAM0219	BAM0157	BAM00EZ	BAM00F0
Part number	BAM MC-XA-023-D18,0-2-FXLW	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
Requires Prox Mount						BAM00FP	BAM00FW						
M18	■	■	■	■	■	■	■	■	■	■	■	■	■
M30													

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Accessories

Sensor protection

Block



Application	Over-the-top Bunker Protection	Socket Bunker Protection	PTFE Cover	Metal Mount	AL Cover	PA6 Cover	Tester	
Order code	BAM00NK	BAM00NL	BES02YW	BAM00JY	BAM00K0	BAM00K1	BAE000M	BAE002C
Part number	BES R01-SH-4-A	BES R01-SH-4-B	BES R01ZC-TC	BES Q40-HW-2	BES Q40-SH-1	BES Q40-SH-2	BES 516-3	BES 516-7
R01	■	■	■					
Q40				■	■	■		
18 VDC							■	■
PNP Sensors							■	■
NPN Sensors							■	■

Photoelectric



Application																	
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					■	■	■	■	■	■	■						■
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	Clear Silicone Tube	White Silicone Tube	Clear Silicone Tube	Silicone Tape	Silicone Tape	Silicone Vulcanizing Wrap	Silicone Vulcanizing Wrap
Order code	BAM0212	BAM017E	BAM0181	BAM0213	BAM017H	BAM017K	BAM0214	BAM017L	BAM0215	BAM017N	BAM0216	BAM017R	BAM017U	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	BKS-PT-38/16-SI-07.5	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
Dimension Width	7 mm	1/4"	5/16"	10 mm	3/8"	7/16"	13 mm	1/2"	16 mm	5/8"	19 mm	3/4"	1.5"	50 mm	2.0"	26 mm	51 mm	1"	2"
Dimension Length	16 mm	50ft	50ft	16 m	50ft	50ft	16 m	50ft	16 m	50ft	16 m	50ft	25ft	16 m	25ft	20 m	20 m	12ft	36ft



Silicone Tubes & Tape



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	Silicone Sheet	BNI Protection Cover	BNI Protection Cover
Order code	BAM01R1	BAM022Z	BAM01R2	BAM0230	BAM01UY	BAM0231	BAM0232	BAM0233	BAM017A	BAM0179	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	BKS-PS-914/16-SI	BAM PC-XA-014-207-1	BAM PC-XA-014-250-1
Dimension Width	3/8"	10 mm	1/2"	13 mm	3/4"	19 mm	38 mm	50 mm	3ft	3ft		
Dimension Length	30 m	15 m	30 mm	15 m	30 m	15 m	15 m	15 m	3ft	Length in ft ≤ 200 mm	≤ 250 mm	≤ 250 mm

Connectivity Solutions

Weld Slag

- 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 tube

- Sealed tube, resistant to ingress
- Slag resistance on nut



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-W415-U2046-_-_-	BCC W414-W425-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									

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
006 = 0.6 m
010 = 1 m
015 = 1.5 m
020 = 2 m
050 = 5 m

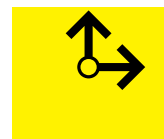
Splitter
Standard Lengths Available::
003 = 0.3 m
006 = 0.6 m

Type	M12 Single-Ended		M12 Double-Ended	
Part number	BCC W415-0000-1A-003-NW0434-_-_-	BCC W425-0000-1A-003-NW0434-_-_-	BCC W415-W414-3A-304-NW0434-_-_-	BCC W425-W414-3A-304-NW0434-_-_-
Female, Straight	■		■	
Female, Right Angle		■		■
Male, Straight			■	■
Male, Right Angle				
3-wire				
4-wire	■	■	■	■
Jacket Temperature	-60...180 °C			
Operational Temperature Fixed	-50...80 °C			
Operational Temperature Moving	-25...80 °C			
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

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

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



PTFE

- Low friction, high temperature
- Resistant to caustic agents

Extended silicone tube

- M8 and 3 meter versions
- Protection over the overmold



Type	M12 Single-Ended		M8 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-W415-U2048-_-_-	BCC W414-W425-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 Moving	-65...200 °C							
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
006 = 0.6 m
010 = 1 m
015 = 1.5 m
020 = 2 m
050 = 5 m

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

Type	M8 Double-Ended			M12 Double-Ended		M12 Double-Ended	
Part number	BCC M314-M314-30-304-EX44T2-_-_-C008	BCC M313-M413-3E-300-EX43T2-_-_-C008	BCC M314-M414-3E-304-EX44T2-_-_-C008	BCC M415-M414-3A-304-EX44T2-030-C008	BCC M425-M414-3A-304-EX44T2-030-C008	BCC M414-M415-M415-U2002-_-_-C008	
Female, Straight	■	■	■	■		■	
Female, Right Angle					■		
Male, Straight	■	■	■	■	■	■	
Male, Right Angle							
3-wire		■					
4-wire	■		■	■	■		
Jacket Temperature	-60...180 °C						
Operational Temperature Fixed	-50...80 °C						
Operational Temperature Moving	-25...80 °C						
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
030 = 3 m

Single-ended
Standard Lengths Available:
003 = 0.3 m
006 = 0.6 m
010 = 1 m
015 = 1.5 m
020 = 2 m
030 = 3 m

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



Systems and Services



Industrial Networking and Connectivity



Industrial Identification



Object Detection



Linear Position Sensing and Measurement



Fluid Sensors



Accessories

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