

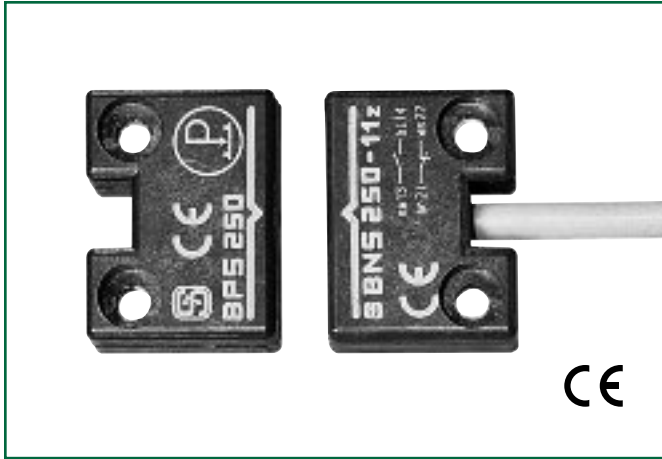
NON-CONTACT SAFETY SENSORS

These rugged presence-sensing devices feature a sealed (IP67) housing, making them ideal interlocks in hostile environments. Their tamper-resistant design and small size make them attractive alternatives to conventional proximity sensors, magnetic switches, and limit switches. Used with SCHMERSAL's matched safety circuit monitors, they allow achieving the highest levels of machine safety.



SELECTION GUIDE

Sensor Series	Approximate Envelope Dimensions	Operating Voltage	Contact Configuration(s)	Catalog Page No.
BNS250	1.0"×1.4"×0.5"	24VDC	1 NO & 1 NC 1 NO & 2 NC	130
BNS260	1.0"×1.4"×0.5"	24VDC	1 NO & 1 NC 1 NO & 2 NC 2 NC 3 NC	132
BNS33	3.5"×1.0"×0.5"	24VAC/DC 120VAC/DC	1 NO & 1 NC 1 NO & 2 NC 2 NC 3 NC	134
New! BNS33S	.625"×3.5"×1"	24VDC 100VAC/DC	1 NO & 2 NC	138
New! BNS36	3.5"×1.0"×0.5"	24VDC	1 NO & 1 NC 1 NO & 2 NC 2NC, 3NC	140
BNS303	1.25"Ø	100VAC/DC	1 NO & 1 NC 1 NO & 2 NC	142
BNS30 & BNS300	1.25"Ø	24VDC	1 NC	144
BNS333	4.5"×1.7"×1.7"	24VDC	1 NC	146
BNS16	1.25"×2"×3"	100VAC/DC	1 NO & 2 NC 2 NC	148
BZ16	1.25"×2"×3"	24VDC	1 NO & 1 NC	150
New! BNS-B20	NA	24VDC	1 NO & 1 NC	152
New! CSS 180	0.7"×3.6"	24VDC	2 PNP	154
New! CSS 34	1"×4"×1"	24VDC	2 PNP	156
Coded-Magnet Sensor Compatible AES Safety Controllers				159



Features & Benefits

- **Compact size** ... ideal for limited space applications.
- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **Integral LED status indicators** ... facilitate easy installation and provide visual indication of switch status.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- **Satisfy CE & fail-to-safe requirements** ... when used with Series AES safety controllers.

Description

The Series BNS250 coded-magnet sensors are designed for use as a safety interlock switch on movable machine guards/articulating robot arms. Each sensor set consists of a multiple reed switch unit and a coded-magnet actuator. The reed switches, wired in series, will only close in the presence of their matched magnetic field array.

Both switch and magnet assemblies are sealed to IP67 (submersible) standards. Their tamper-resistant design prevents bypassing with a simple magnet or improperly coded magnetic field. In addition, the BNS module features a 1-meter long prewired pigtail.

Operation

The reed switch assembly is typically mounted to a stationary portion of a guard structure, with the coded-magnet assembly mounted to the movable element of the machine guard. When the guard is closed, and the matched magnetic field aligns with the reed switch unit, the switches will close. When the guard is open, or the required magnetic-field array is not properly aligned with the reed switch assembly, the sensor output will remain "off."

Typical Applications



The sealed, compact BNS250 is ideal for use on movable machine guards in hostile environments. Typical applications include food processing equipment, chemical processing equipment, woodworking machinery, packaging machinery, and articulating robot arm rest position sensing.

AVAILABLE STANDARD MODELS

(Please order BPS250 magnet separately)

Part Number	Contact Configuration*	Description
BNS250-11z	1 NO & 1 NC	Multiple reed switch (100VAC/DC) assembly with 1-meter prewired pigtail
BNS250-12z	1 NO & 2 NC	Multiple reed switch (100VAC/DC) assembly with 1-meter prewired pigtail
BNS250-11zG	1 NO & 1 NC	Multiple reed switch (24VDC/10mA) assembly with 1 meter prewired pigtail and built-in LED display
BNS250-12zG	1 NO & 2 NC	Multiple reed switch (24VDC/10mA) assembly with 1 meter prewired pigtail and built-in LED display
BNS250-11zG-2205 (side entry cable)	1 NO & 1 NC	Multiple reed switch (24VDC/10mA) assembly with 5 meter pigtail (side entry) and built-in LED display
BPS250	N/A	Coded-magnet actuator

*Contact configuration in presence of BPS250 coded-magnet actuator.

***Important Note:** Series BNS Coded-magnet sensors are for use in safety applications only when used with an electrically-compatible safety controller or safety PLC. (For recommended compatible SCHMERSAL safety controllers, please see the selection chart on Page 159, or call our office for other new, available models.)



USE WITH ANY OTHER SAFETY CONTROLLER MAY DAMAGE SENSOR AND/OR VOID WARRANTY.

BNS250 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Fiberglass reinforced thermoplastic
Switching Distance "S"	"On": 4mm (0.16") "Off": 14mm (0.55")
Degree of Protection	IP67
Operating Temperature	-13°F to +158°F
Operating Principle	Magnetic
Shock Resistance	30g/11ms
Vibration Resistance	10 to 55 Hz, amplitude 1mm
Conformity to Standards	CE, UL, CSA VDE 0660 Part 209

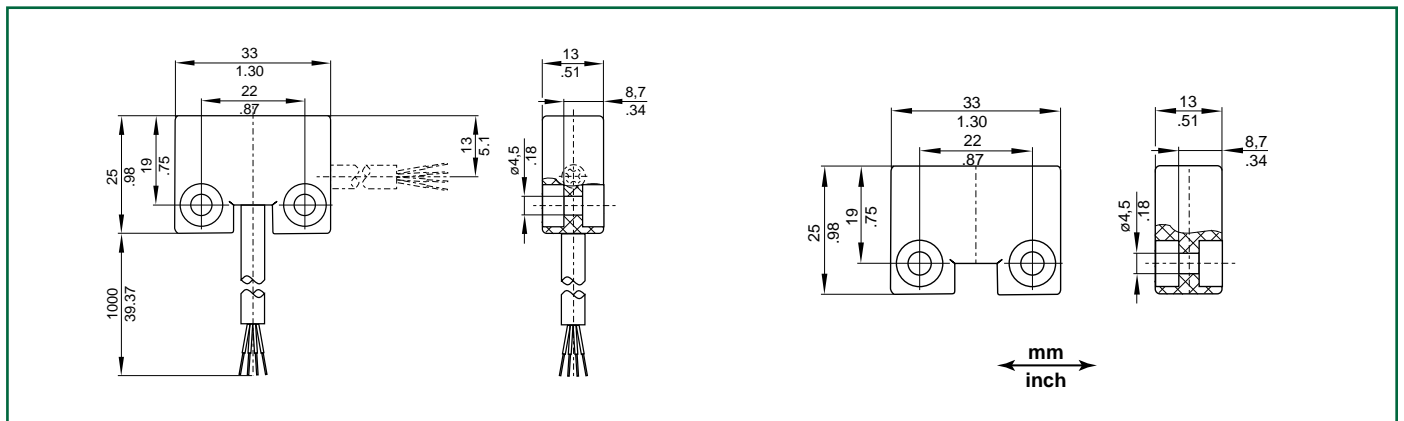
*Without ferromagnetic material in vicinity of switch or magnet. The proximity of ferrous material may affect switching distances.

ELECTRICAL SPECIFICATIONS

Maximum Operating Voltage	100VAC/DC 24VDC for -11zG or -12zG versions
Maximum Continuous Current Rating	100 mA (BNS250-11z/12z) 10 mA (BNS250-11zG/12zG)
Maximum Switching Capacity (Power Rating)	1W (BNS250-11z/12z) 240mW (BNS250-11zG/12zG)
Type Connection*	1 meter long LiYY4* 0.25mm ² (23AWG) pre-wired pigtail

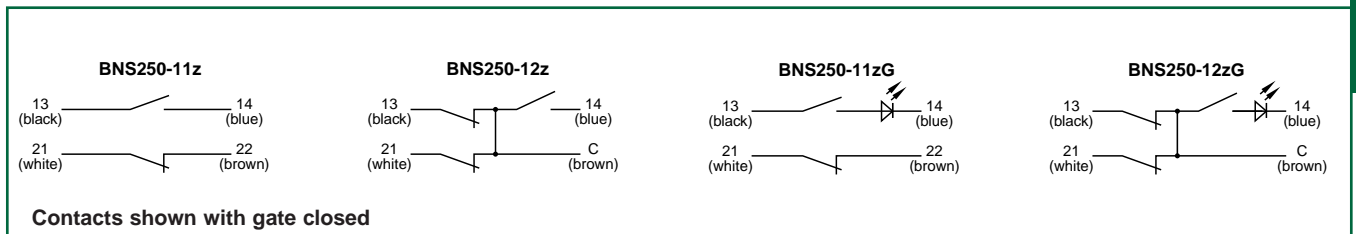
*Longer prewired cables (3M, 5M, or 10M lengths) available on request. Please consult factory.

DIMENSIONS

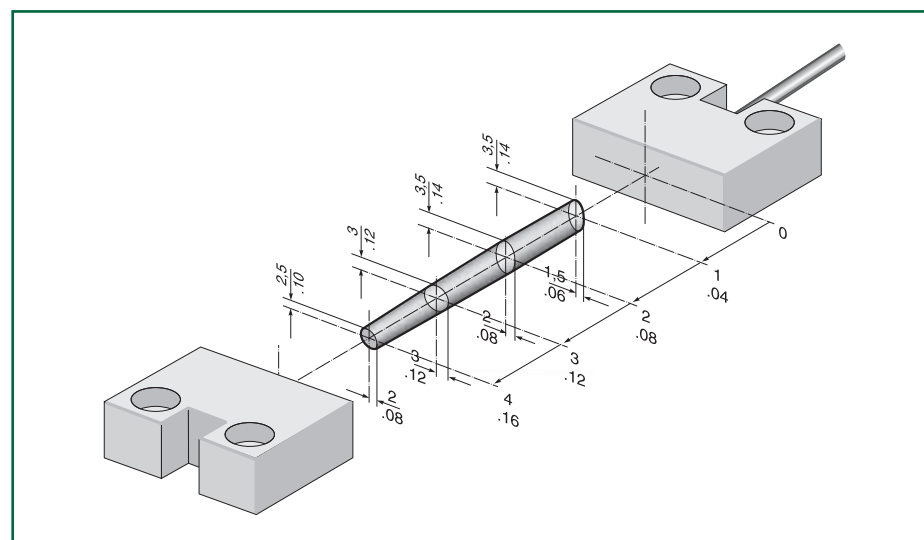


Note: BNS250 reed switch assemblies should be mounted at least 50mm (2") apart.

WIRING DETAILS



MISALIGNMENT ALLOWANCE





Description

The Series BNS260 coded-magnet sensors are designed for use as a safety interlock switch on movable machine guards/articulating robot arms. Each sensor set consists of a multiple reed switch unit and a coded-magnet actuator. The reed switches, wired in series, will only close in the presence of their matched magnetic field array.

Both switch and magnet assemblies are sealed to IP67 (submersible) standards. Their tamper-resistant design prevents bypassing with a simple magnet or improperly coded magnetic field. In addition, the BNS module features a 1-meter long prewired pigtail or an available connector.

Operation

The reed switch assembly is typically mounted to a stationary portion of a guard structure, with the coded-magnet assembly mounted to the movable element of the machine guard. When the guard is closed, and the matched magnetic field aligns with the reed switch unit, the switches will close. When the guard is open, or the required magnetic-field array is not properly aligned with the reed switch assembly, the sensor output will remain "off."

Typical Applications



The sealed, compact BNS260 is ideal for use on movable machine guards in hostile environments. Typical applications include food processing equipment, chemical processing equipment, woodworking machinery, packaging machinery, and articulating robot arm rest position sensing.

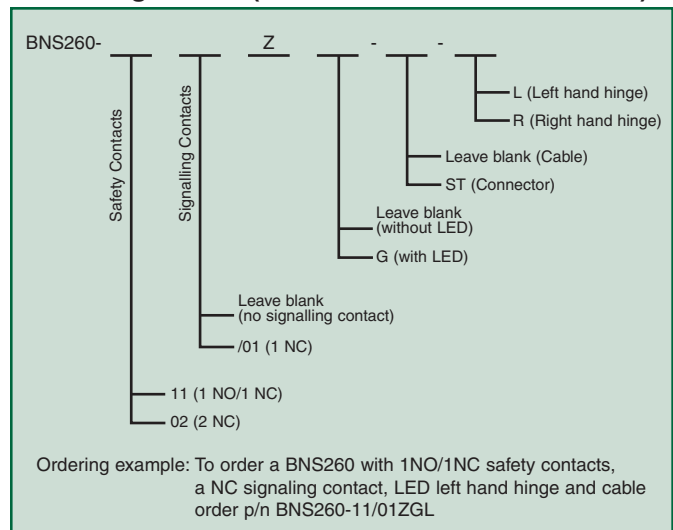
Note: 4 pole models accept either a screw-on or snap-on connector.

6 pole models accept only a snap-on connector.

Features & Benefits

- **Compact size** ... ideal for limited space applications.
- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **Integral LED status indicators** ... facilitate easy installation and provide visual indication of switch status.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- **Satisfy CE & fail-to-safe requirements** ... when used with Series AES safety controllers.

AVAILABLE BNS260 CODED-MAGNET SENSORS Ordering Details (Order BPS260 Actuator below)



CODED MAGNET ACTUATORS & ACCESSORIES

Model Number	Description
BPS260-1	Standard Actuator
BPS260-2	Actuator for 90° operation
BNS260	Spacer for mounting reed switch or magnet on ferrous material
M8S-4P-XX M8S-6P-XX	Straight snap-on connector. Available -2m, -5m and -10m lengths
M8SRA-4P-XX M8SRA-6P-XX	Right angle snap-on connector. Available -2m, -5m and -10m lengths

***Important Note:** Series BNS Coded-magnet sensors are for use in safety applications only when used with an electrically-compatible safety controller or safety PLC. (For recommended compatible SCHMERSAL safety controllers, please see the selection chart on Page 159, or call our office for other new, available models.)



USE WITH ANY OTHER SAFETY CONTROLLER MAY DAMAGE SENSOR AND/OR VOID WARRANTY.

BNS260 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Fiberglass reinforced thermoplastic
Switching Distance "S"*	"On": 5mm (0.2") "Off": 15mm (0.6")
Degree of Protection	IP67
Operating Temperature	-13°F to +158°F
Operating Principle	Magnetic
Shock Resistance	30g/11ms
Vibration Resistance	10 to 55 Hz, amplitude 1mm
Conformity to Standards	CE, VDE 0660 Part 209 cUL pending

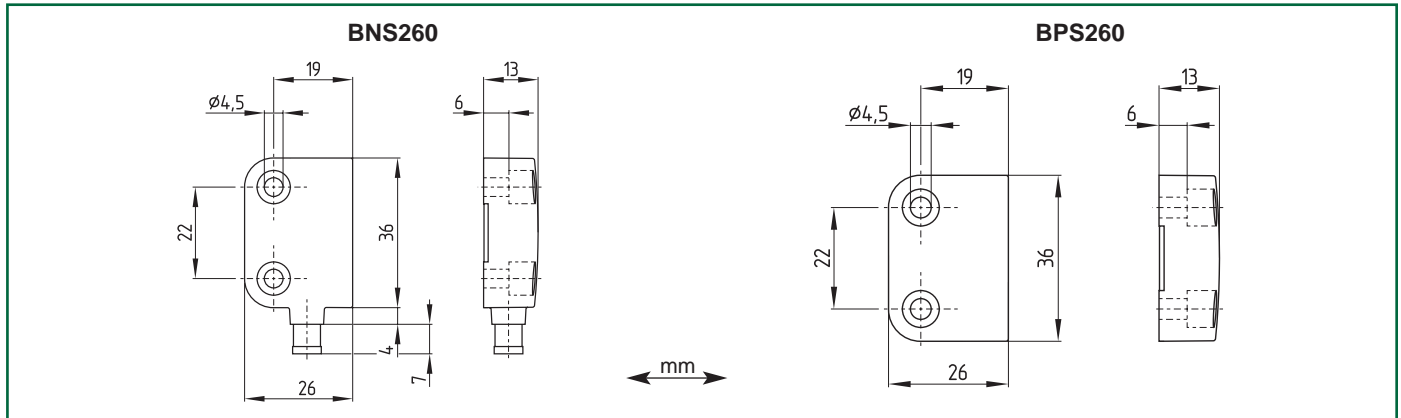
*Without ferromagnetic material in vicinity of switch or magnet. The proximity of ferrous material may affect switching distances.

ELECTRICAL SPECIFICATIONS

Maximum Operating Voltage	75VAC/DC 24VDC for LED versions
Maximum Continuous Current Rating	400 mA without LED 10 mA with LED
Maximum Switching	10va without LED 240mW with LED
Type Connection*	1 meter long LiYY4* 0.25mm ² (23AWG) pre-wired pigtail or M8 4 or 6 pin connector (ST)

*Longer prewired cables (3M, 5M, or 10M lengths) available on request. Please consult factory.

DIMENSIONS



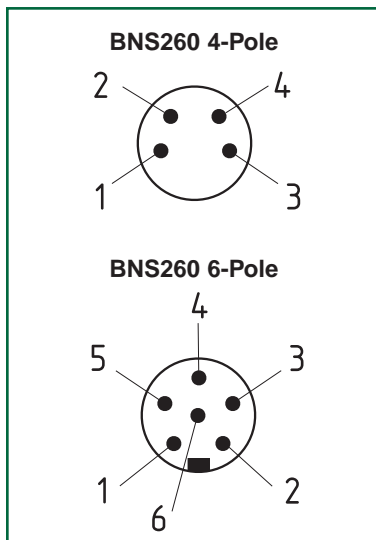
Note: BNS260 reed switch assemblies should be mounted at least 50mm (2") apart.

WIRING DETAILS (Contact configuration shown in presence of BPS260 Coded-magnet actuator)

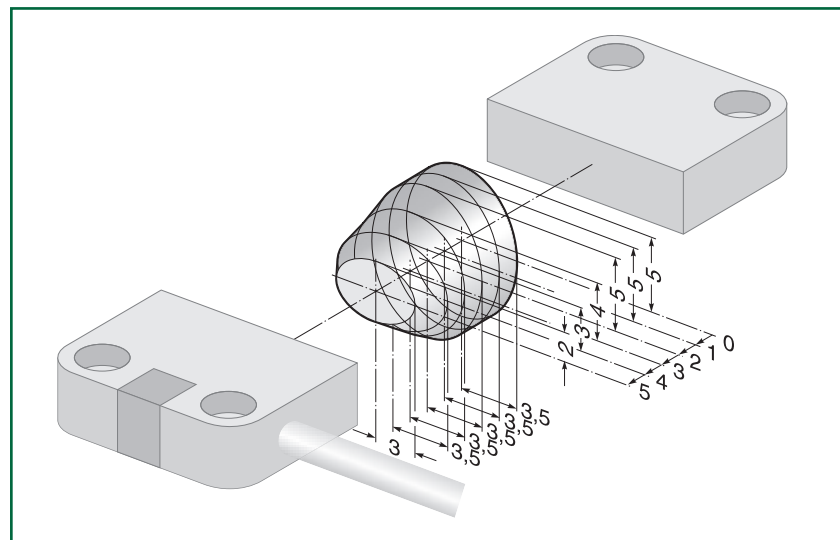
BNS260-02z(G)	BNS260-02/01z(G)	BNS260-11z(G)	BNS260-11/01z(G)
(3) BK S11 → S12 BU (4) (1) WH S21 → S22 BN (2)	(3) GY S11 → S12 PK (4) (1) GN S21 → S22 YE (2) (5) WH S31 → S32 BN (6)	(3) BK S13 → S14 BU (4) (1) WH S21 → S22 BN (2)	(3) GY S13 → S14 PK (4) (1) GN S21 → S22 YE (2) (5) WH S31 → S32 BN (6)

Contacts shown with gate closed. Color configuration shown for cabled versions, connector color codes may vary.

QUICK-CONNECT DIAGRAMS



MISALIGNMENT ALLOWANCE





Description

The Series BNS33 coded-magnet sensors are designed for use as a safety interlock switch on movable machine guards/articulating robot arms. Each sensor set consists of a multiple reed switch unit and a coded-magnet actuator. The reed switches, wired in series, will only close in the presence of their matched magnetic field array.

Both switch and magnet assemblies are sealed to IP67 (submersible) standards (IP69K for BNS33S). Their tamper-resistant design prevents bypassing with a simple magnet or improperly coded magnetic field. In addition, the BNS module features an optional built-in LED display of switch status, and a 1-meter long prewired pigtail to assure sealing integrity.

Operation

The reed switch assembly is typically mounted to a stationary portion of a guard structure, with the coded-magnet assembly mounted to the movable element of the machine guard. When the guard is closed, and the matched magnetic field aligns with the reed switch unit, the switches will close. When the guard is open, or the required magnetic-field array is not properly aligned with the reed switch assembly, the sensor output will remain “off.”

Typical Applications

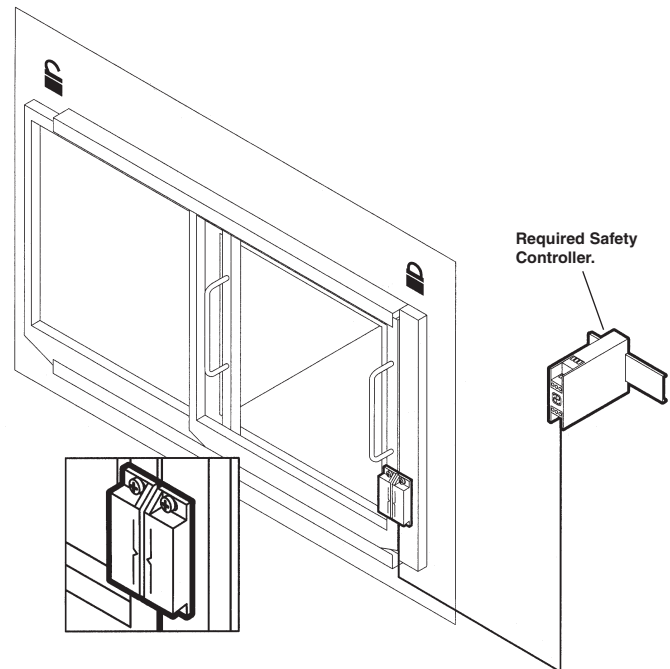


The sealed, compact BNS33 is ideal for use on movable machine guards in hostile environments or where space is limited. Typical applications include food processing equipment, chemical processing equipment, woodworking machinery, packaging machinery, and articulating robot arm rest position sensing.

***Important Note:** Series BNS Coded-magnet sensors are for use in safety applications only when used with an electrically-compatible safety controller or safety PLC. (For recommended compatible SCHMERSAL safety controllers, please see the selection chart on Page 159, or call our office for other new, available models.)

Features & Benefits

- **Compact size** ... ideal for limited space applications.
- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **Integral LED status indicators** ... facilitate easy installations and provide visual indication of switch status.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- **Satisfy EN954, Category 1, 3, or 4** ... when used with appropriate Series AES safety controllers.
- **Optional high-strength field coded-magnets** ... extends sensing range to 10mm.
- **Units available with M8 quick-connect.** (Please consult factory).
- **Available stainless steel housing (BNS33S)** ... ideal for the food industry.



USE WITH ANY OTHER SAFETY CONTROLLER MAY DAMAGE SENSOR AND/OR VOID WARRANTY.

BNS33 AVAILABLE MODELS AND ACCESSORIES

AVAILABLE STANDARD MODELS

(Please order BPS33 or BPS33-2326 magnet separately)

Part Number	Contact Configuration*	Maximum Contact Rating	Description
BNS33-11z**	1 NO & 1 NC	100VAC/DC (400mA)	Multiple reed switch assembly with 1-meter prewired pigtail
BNS33-12z***	1 NO & 2 NC		
BNS33-11zG**	1 NO & 1 NC	24VDC (10mA)	Multiple reed switch assembly with 1-meter prewired pigtail and built-in LED display
BNS33-12zG***	1 NO & 2 NC		
BNS33-12z-2187**	1 NO & 2 NC	120VAC/DC (250mA)	Multiple reed switch assembly with 1-meter prewired pigtail
BNS33S-12z** <i>New!</i>	1 NO & 2 NC	100VAC/DC (250mA)	Multiple reed switch assembly with 1-meter prewired pigtail and stainless steel enclosure
BNS33S-12zG** <i>New!</i>	1 NO & 2 NC	24VDC (10mA)	
BPS33	N/A	N/A	Coded-magnet actuator (5mm sensing distance)
BPS33-2326	N/A	N/A	Coded-magnet actuator (10mm sensing distance)
BPS33S <i>New!</i>	N/A	N/A	Stainless steel coded-magnet actuator
BNS33-11z-ST**	1NO & 1NC	60VAC/DC (400mA)	Multiple reed switch assembly with M8x1 quick-connect
BNS33-11zG-ST**	1NO & 1NC	24VDC (10mA)	
BNS33-12z-ST***	1NO & 2NC	60VAC/DC (400mA)	
BNS33-12zG-ST***	1NO & 2NC	24VDC (10mA)	

*Contact configuration in presence of BPS33 coded-magnet actuator.

**These models feature isolated contacts.

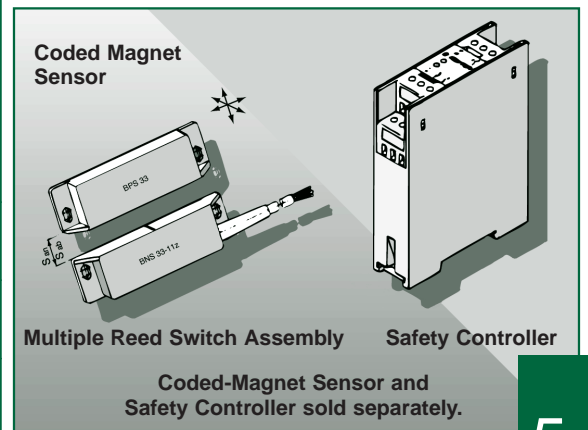
***These models feature C-form contacts.

Note: Longer prewired cables (3M, 5M, or 10M lengths) available on request. Please consult factory.

Note: SPEZ-2237 for sliding doors is available for BNS33-11z and -11zG only. Contact factory for more information.

AVAILABLE ACCESSORIES

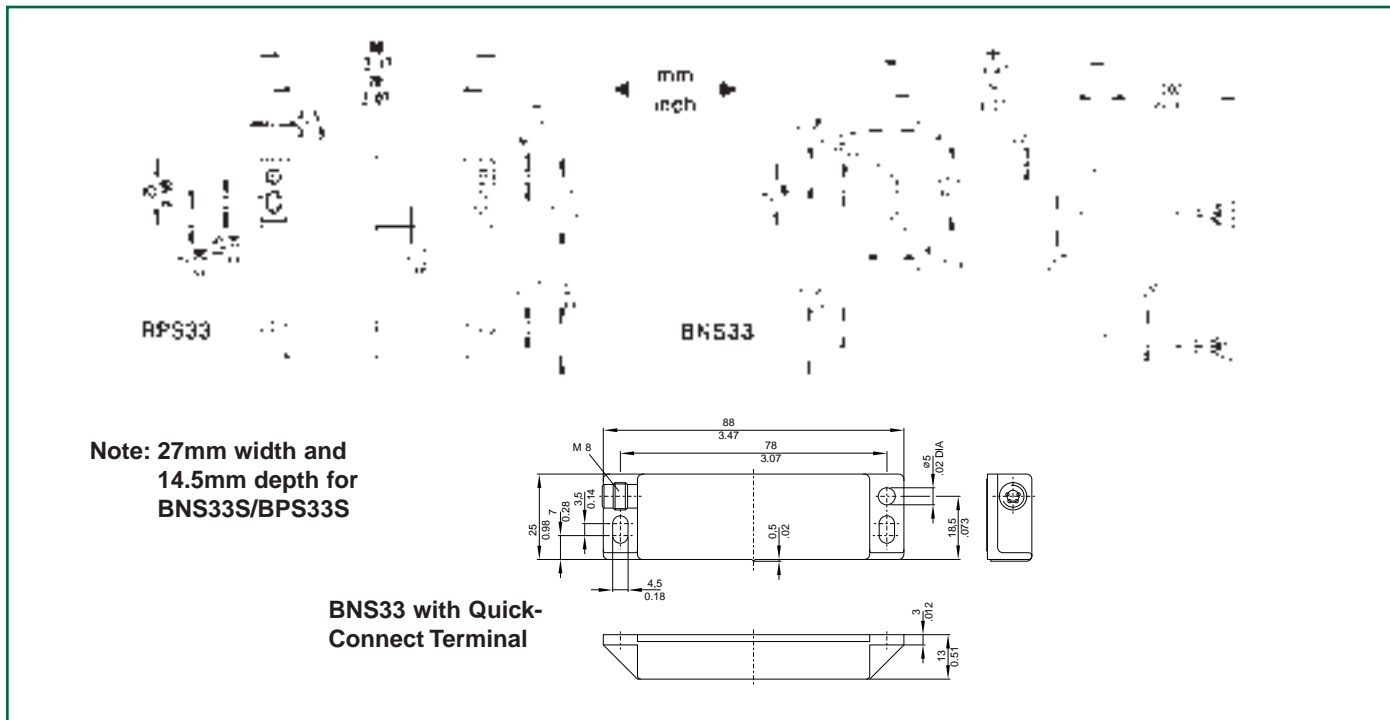
Part Number	Description
BN31/33	Shim plate for mounting reed switch assembly on ferrous material
M8ST-2M	Straight quick-connect with 2M cable
M8ST-5M	Straight quick-connect with 5M cable
M8ST-10M	Straight quick-connect with 10M cable
M8ST-15M	Straight quick-connect with 15M cable
M8ST-RA-2M	Right-angle quick-connect with 2M cable
M8ST-RA-5M	Right-angle quick-connect with 5M cable
BNS-SS-CVR	Stainless-steel protective cover for BNS33-xxx
BPS-SS-CVR	Stainless-steel protective cover for BPS33-xxx



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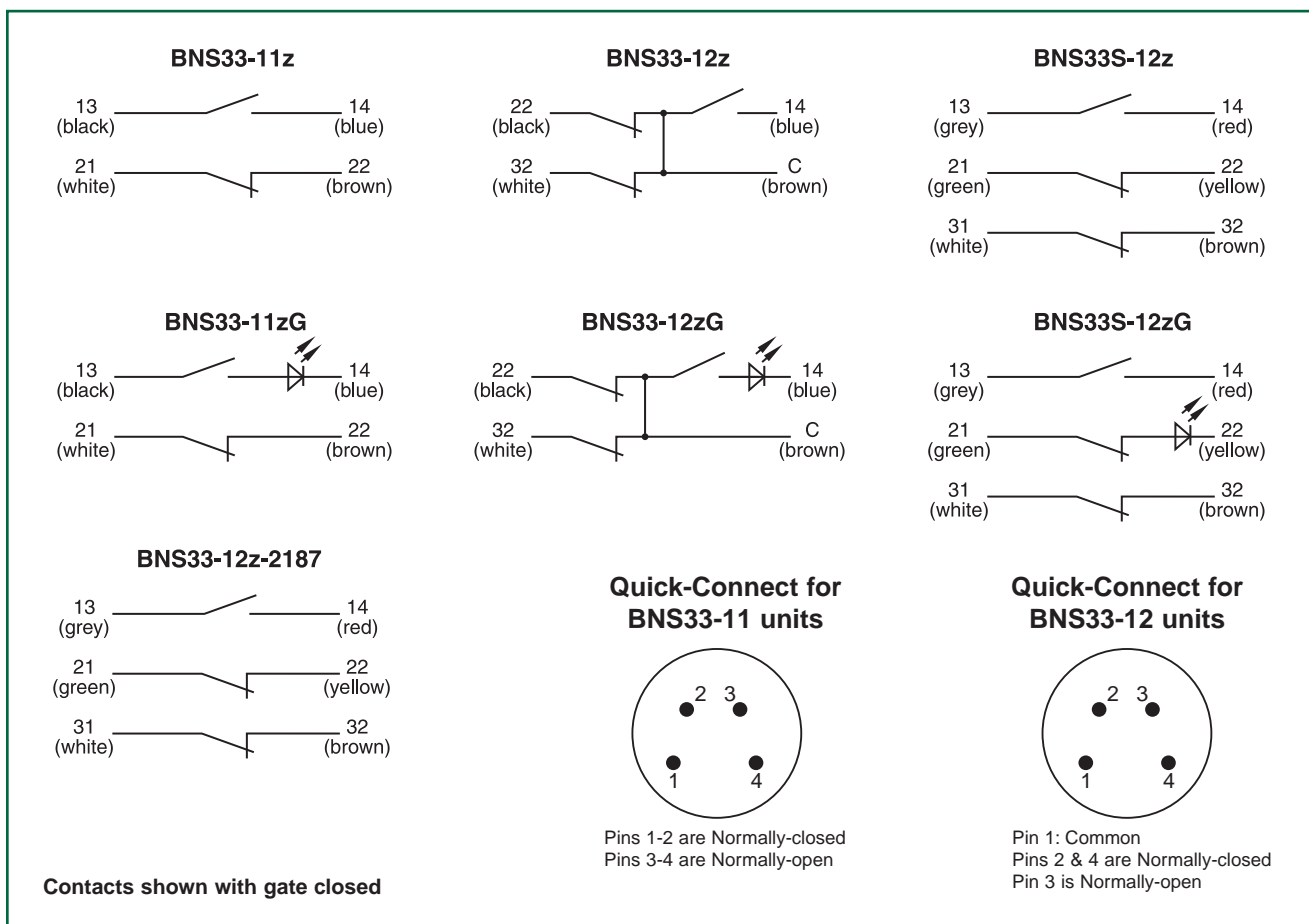
BNS33 TECHNICAL DATA

DIMENSIONS



Note: BNS33 reed switch assemblies should be mounted at least 50mm (2") apart.

WIRING DETAILS





Features & Benefits

- **Compact size** ... ideal for limited space applications.
- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **Integral LED status indicators** ... facilitate easy installations and provide visual indication of switch status.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- **Satisfy EN954, Category 1, 3, or 4** ... when used with appropriate Series AES safety controllers.
- **Stainless steel housing** ... ideal for the food industry.

Description

The Series BNS33S coded-magnet sensor is designed for use as a safety interlock switch on movable machine guards/articulating robot arms. Each sensor set consists of a multiple reed switch unit and a coded-magnet actuator. The reed switches, wired in series, will only close in the presence of their matched magnetic field array.

Both switch and magnet assemblies are sealed to IP69K standards. Their tamper-resistant design prevents bypassing with a simple magnet or improperly coded magnetic field. In addition, the BNS module features an optional built-in LED display of switch status, and a 1-meter long prewired pigtail to assure sealing integrity.

Operation

The reed switch assembly is typically mounted to a stationary portion of a guard structure, with the coded-magnet assembly mounted to the movable element of the machine guard. When the guard is closed, and the matched magnetic field aligns with the reed switch unit, the switches will close. When the guard is open, or the required magnetic-field array is not properly aligned with the reed switch assembly, the sensor output will remain “off.”

Typical Applications



The sealed, compact BNS33S is ideal for use on movable machine guards in hostile environments or where space is limited. Typical applications include food processing equipment, chemical processing equipment, woodworking machinery, packaging machinery, and articulating robot arm rest position sensing.

***Important Note:** Series BNS Coded-magnet sensors are for use in safety applications only when used with an electrically-compatible safety controller or safety PLC. (For recommended compatible SCHMERSAL safety controllers, please see the selection chart on Page 159, or call our office for other new, available models.)



USE WITH ANY OTHER SAFETY CONTROLLER MAY DAMAGE SENSOR AND/OR VOID WARRANTY.

AVAILABLE STANDARD MODELS (Please order BPS33S magnet separately)

Part Number	Contact Configuration*	Maximum Contact Rating	Description
BNS33S-12z**	1 NO & 2 NC	100VAC/DC (250mA)	Multiple reed switch assembly with 1-meter prewired pigtail and stainless steel enclosure
BNS33S-12zG**	1 NO & 2 NC	24VDC (10mA)	
BPS33S	N/A	N/A	Stainless steel coded-magnet actuator

*Contact configuration in presence of BPS33S coded-magnet actuator.

**These models feature isolated contacts.

Note: Longer prewired cables (3M, 5M, or 10M lengths) available on request. Please consult factory.

BNS33S TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Type V4A (316L) stainless steel
Switching Distance "S" *	"On": 8mm (0.3") "Off": 18mm (0.7")
Degree of Protection	IP69k
Operating Temperature	-13°F to +178°F
Operating Principle	Magnetic
Shock Resistance	30g/11ms
Vibration Resistance	10 to 55 Hz, amplitude 1mm
Conformity to Standards	CE, UL, CSA VDE 0470 Part 1 IEC 529/EN60529

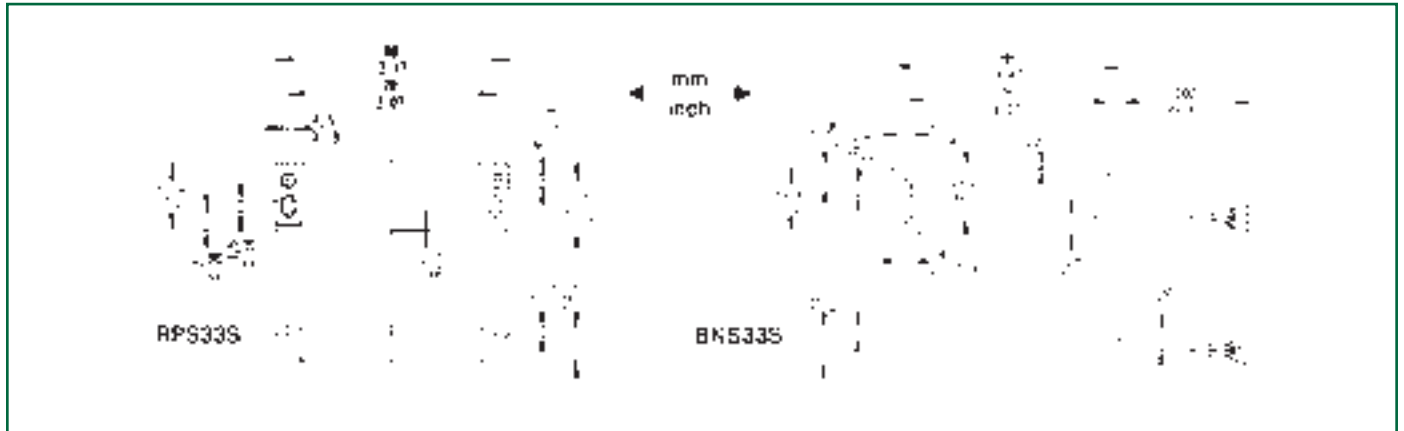
*Without ferromagnetic material in vicinity of switch or magnet. The proximity of ferrous material may affect switching distances.

ELECTRICAL SPECIFICATIONS

For electrical ratings see page	
Type Connection*	1 meter long LiYY4* 0.25mm ² (23AWG) pre-wired pigtail.

*Longer prewired cables available on request. Please consult factory.

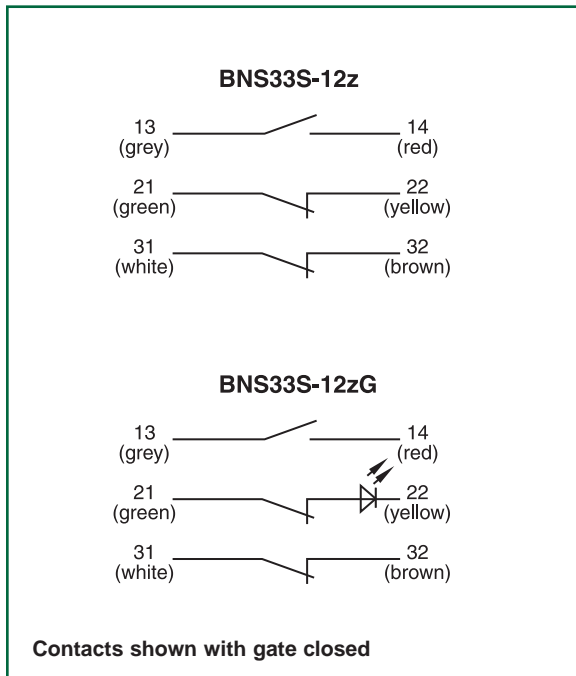
DIMENSIONS



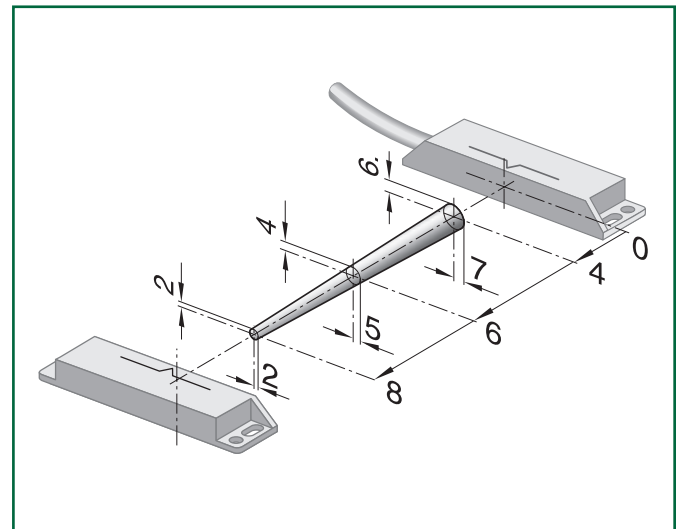
Note: BNS33 reed switch assemblies should be mounted at least 50mm (2") apart.

5

WIRING DETAILS



BNS33S MISALIGNMENT ALLOWANCE





Description

The Series BNS36 coded-magnet sensors are designed for use as a safety interlock switch on movable machine guards/articulating robot arms. Each sensor set consists of a multiple reed switch unit and a coded-magnet actuator. The reed switches, wired in series, will only close in the presence of their matched magnetic field array.

Both switch and magnet assemblies are sealed to IP67 (submersible) standards. Their tamper-resistant design prevents bypassing with a simple magnet or improperly coded magnetic field. In addition, the BNS module features an optional built-in LED display of switch status, and a 1-meter long prewired pigtail or an available connector.

Operation

The reed switch assembly is typically mounted to a stationary portion of a guard structure, with the coded-magnet assembly mounted to the movable element of the machine guard. When the guard is closed, and the matched magnetic field aligns with the reed switch unit, the switches will close. When the guard is open, or the required magnetic-field array is not properly aligned with the reed switch assembly, the sensor output will remain “off.”

Typical Applications



The sealed, compact BNS36 is ideal for use on movable machine guards in hostile environments. Typical applications include food processing equipment, chemical processing equipment, woodworking machinery, packaging machinery, and articulating robot arm rest position sensing.

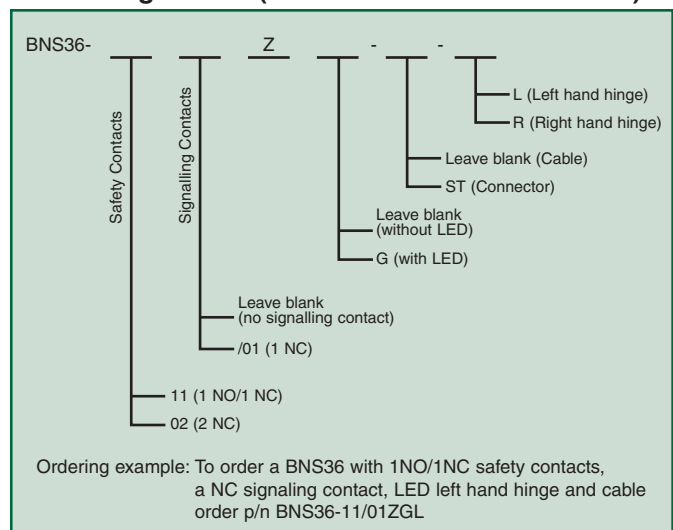
Note: 4 pole models accept either a screw-on or snap-on connector.

6 pole models accept only a snap-on connector.

Features & Benefits

- **Compact size** ... ideal for limited space applications.
- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **Integral LED status indicators** ... facilitate easy installation and provide visual indication of switch status.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- **Satisfy CE & fail-to-safe requirements** ... when used with Series AES safety controllers.

AVAILABLE BNS36 CODED-MAGNET SENSORS Ordering Details (Order BPS36 Actuator below)



CODED MAGNET ACTUATORS & ACCESSORIES

Model Number	Description
BPS36-1	Standard Actuator
BPS36-2	Actuator for 90° operation
BNS36	Spacer for mounting reed switch or magnet on ferrous material
M8S-4P-XX M8S-6P-XX	Straight snap-on connector. Available -2m, -5m and -10m lengths
M8SRA-4P-XX M8SRA-6P-XX	Right angle snap-on connector. Available -2m, -5m and -10m lengths

***Important Note:** Series BNS Coded-magnet sensors are for use in safety applications only when used with an electrically-compatible safety controller or safety PLC. (For recommended compatible SCHMERSAL safety controllers, please see the selection chart on Page 159, or call our office for other new, available models.)



BNS36 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Fiberglass reinforced thermoplastic
Switching Distance "S"*	"On": 7mm "Off": 17mm
Degree of Protection	IP67
Operating Temperature	-13°F to +158°F
Operating Principle	Magnetic
Shock Resistance	30g/11ms
Vibration Resistance	10 to 55 Hz, amplitude 1mm
Conformity to Standards	CE, BG-GS-ET14, cUL pending

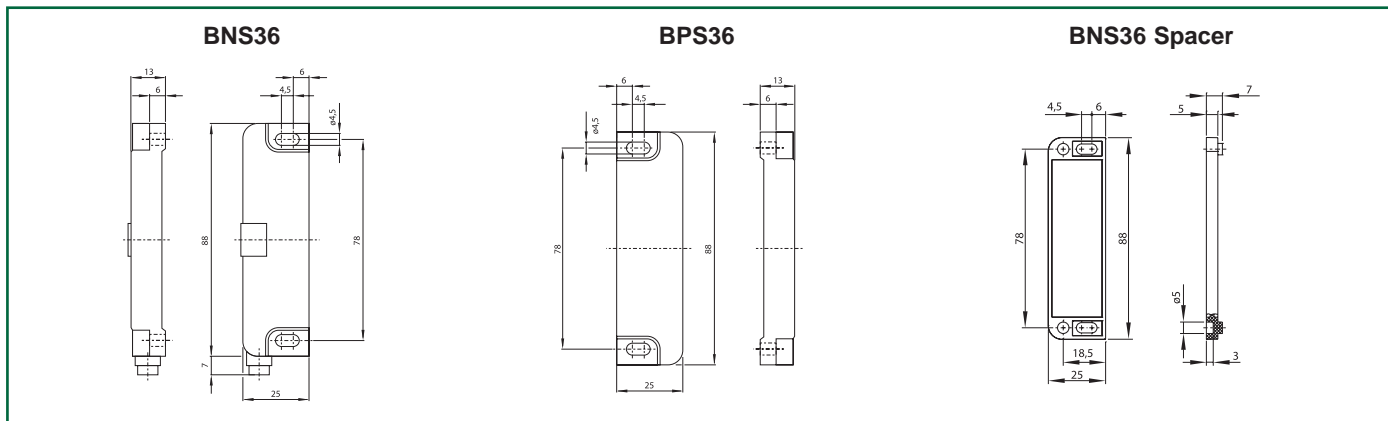
*Without ferromagnetic material in vicinity of switch or magnet. The proximity of ferrous material may affect switching distances.

ELECTRICAL SPECIFICATIONS

Maximum Operating Voltage	75V DC 24VDC for LED versions
Maximum Continuous Current Rating	400 mA without LED 10 mA with LED
Maximum Switching	10va without LED 240mW with LED
Type Connection*	1 meter long LiYY* 0.25mm ² (23AWG) pre-wired pigtail or M8 4 or 6 pin connector (ST)

*Longer prewired cables (3M, 5M, or 10M lengths) available on request. Please consult factory.

DIMENSIONS



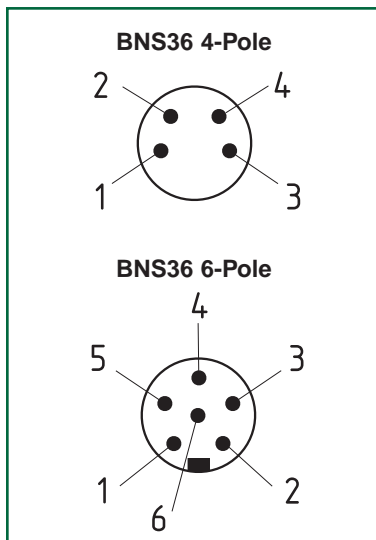
Note: BNS36 reed switch assemblies should be mounted at least 50mm (2") apart.

WIRING DETAILS (Contact configuration shown in presence of BPS36 Coded-magnet actuator)

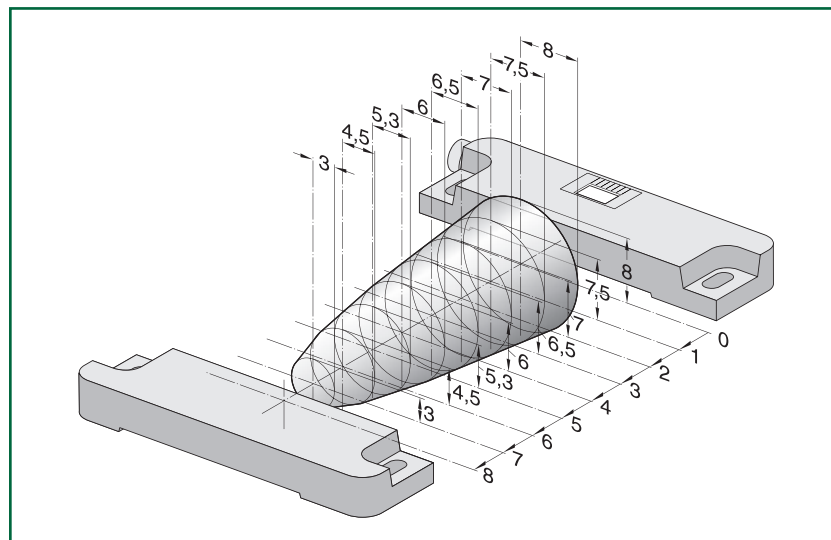
BNS36-02z(G)	BNS36-02/01z(G)	BNS36-11z(G)	BNS36-11/01z(G)
(3) BK S11 → S12 BU (4) (1) WH S21 → S22 BN (2)	(3) GY S11 → S12 PK (4) (1) GN S21 → S22 YE (2) (5) WH S31 → S32 BN (6)	(3) BK S13 → S14 BU (4) (1) WH S21 → S22 BN (2)	(3) GY S13 → S14 PK (4) (1) GN S21 → S22 YE (2) (5) WH S31 → S32 BN (6)

Contacts shown with gate closed. Color configuration shown for cabled versions, connector color codes may vary.

QUICK-CONNECT DIAGRAMS



MISALIGNMENT ALLOWANCE





Description

The Series BNS303 coded-magnet sensors are designed for use as a safety interlock switch on movable machine guards/articulating robot arms. Each sensor set consists of a multiple reed switch unit and a coded-magnet actuator. The reed switches, wired in series, will only close in the presence of their matched magnetic field array.

Both switch and magnet assemblies are sealed to IP67 (submersible) standards. Their tamper-resistant design prevents bypassing with a simple magnet or improperly coded magnetic field. In addition, the BNS module features an integral built-in LED display of switch status, and a 1-meter long prewired pigtail.

Operation

The reed switch assembly is typically mounted to a stationary portion of a guard structure, with the coded-magnet assembly mounted to the movable element of the machine guard. When the guard is closed, and the matched magnetic field aligns with the reed switch unit, the switches will close. When the guard is open, or the required magnetic-field array is not properly aligned with the reed switch assembly, the sensor output will remain "off."

Typical Applications



The sealed, compact BNS303 is ideal for use on movable machine guards in hostile environments. Typical applications include food processing equipment, chemical processing equipment, woodworking machinery, packaging machinery, and articulating robot arm rest position sensing.

Features & Benefits

- **Compact size** ... ideal for limited space applications.
- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- Satisfy EN954, Category 4 ... when used with appropriate safety controller.

AVAILABLE STANDARD MODELS

(Please order BPS300 or BPS303 magnet separately)

Part Number	Contact Configuration*	Description
BNS303-11z	1 NO & 1 NC	Multiple reed switch (100VAC/DC/400mA) assembly with 1-meter prewired pigtail
BNS303-12z	1 NO & 2 NC	
BNS303-11zG	1 NO & 1 NC	Multiple reed switch (24VDC/10mA) assembly with 1-meter prewired pigtail and built-in LED display
BNS303-12zG	1 NO & 2 NC	
BPS300	N/A	Coded-magnet actuator (front mount)
BPS303**	N/A	Coded-magnet actuator (rear mount)

*Contact configuration in presence of BPS300 or BPS303 coded-magnet actuator.

**Available with stainless-steel outer jackets. Please consult factory.



BPS300 Actuator



BPS303 Actuator**

***Important Note:** Series BNS Coded-magnet sensors are for use in safety applications only when used with an electrically-compatible safety controller or safety PLC. (For recommended compatible SCHMERSAL safety controllers, please see the selection chart on Page 159, or call our office for other new, available models.)



USE WITH ANY OTHER SAFETY CONTROLLER MAY DAMAGE SENSOR AND/OR VOID WARRANTY.



Features & Benefits

- **Compact size** ... ideal for limited space applications.
- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **Integral LED status indicators** ... facilitate easy installations and provide visual indication of switch status.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- **Integral reed switch monitoring & control module...** detects faults in reed switch array. Satisfies EN954, Safety Category 1.
- **Available in metal (BNS30) or plastic (BNS300) housings** ... for application versatility.

Description

The Series BNS30 and BNS300 coded-magnet sensors are designed for use as a safety interlock switch on movable machine guards/articulating robot arms. Each sensor set consists of a multiple reed switch unit and a coded-magnet actuator. The reed switches, wired in series, will only close in the presence of their matched magnetic field array.

In addition, the Series features an integral monitoring and control circuit which detects faults in the reed switch array (satisfying EN954, Category 1 without use of an ancillary safety relay module).

Both switch and magnet assemblies are sealed to IP67 (submersible) standards. Their tamper-resistant design prevents bypassing with a simple magnet or improperly coded magnetic field. In addition, the BNS module features an integral LED display of switch status and a 1-meter long prewired pigtail.

Operation

The reed switch assembly is typically mounted to a stationary portion of a guard structure, with the coded-magnet assembly mounted to the movable element of the machine guard. When the guard is closed, and the matched magnetic field aligns with the reed switch unit, the switches will close. When the guard is open, or the required magnetic-field array is not properly aligned with the reed switch assembly, the sensor output will remain "off."

Typical Applications

The sealed, compact units are ideal for use on movable machine guards in hostile environments. Typical applications include food processing equipment, chemical processing equipment, woodworking machinery, packaging machinery, and articulating robot arm rest position sensing.

AVAILABLE STANDARD MODELS

(Please order BPS300 or BPS303 magnet separately)

Part Number	Contact Configuration*	Description
BNS30-01ZG** and BNS300-01zG**	1 NC	Multiple reed switch (24VDC/30mA) assembly with 1-meter prewired pigtail and built-in LED display
BPS300	N/A	Coded-magnet actuator (front mount)
BPS303***	N/A	Coded-magnet actuator (rear mount)

*Contact configuration in presence of BPS300 or BPS 303 coded-magnet actuator.

**Important Note: The BNS30 and BNS300 are 4-wire sensors designed to satisfy EN954, Category 1 requirements. They are not designed for use with a separate safety controller.

***Available with stainless-steel outer jacket. Please consult factory



BPS300 Actuator



BPS303 Actuator***

SERIES BNS333

Coded-Magnet Sensors with Integral Safety Control Module



Description

The Series BNS333 coded-magnet sensors are designed for use as a safety interlock switch on movable machine guards/articulating robot arms. Each sensor set consists of a multiple reed switch unit and a coded-magnet actuator. The reed switches, wired in series, will only close in the presence of their matched magnetic field array.

In addition, the BNS333 features an integral monitoring and control circuit which detects faults in the reed switch array (satisfying EN954, Category 1 without use of an ancillary safety circuit monitoring module).

Their tamper-resistant design prevents bypassing with a simple magnet or improperly coded magnetic field. In addition, the BNS module features an optional built-in LED display of switch status.

Operation

The reed switch assembly is typically mounted to a stationary portion of a guard structure, with the coded-magnet assembly mounted to the movable element of the machine guard. When the guard is closed, and the matched magnetic field aligns with the reed switch unit, the switches will close. When the guard is open, or the required magnetic-field array is not properly aligned with the reed switch assembly, the sensor output will remain "off."

Typical Applications

The sealed, compact BNS333 is ideal for use on movable machine guards in hostile environments. Typical applications include food processing equipment, chemical processing equipment, woodworking machinery, packaging machinery, and articulating robot arm rest position sensing.

Features & Benefits

- **Compact size** ... ideal for limited space applications.
- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **Integral LED status indicators** ... facilitate easy installation and provide visual indication of switch status.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- **Integral reed switch monitoring/control module** ... detects faults in reed switch array. Satisfies EN954, Category 1.

AVAILABLE STANDARD MODELS

(Please order BPS300 or BPS303 magnet separately)

Part Number	Contact Configuration*	Description
BNS333-01YU**	1 NC	Multiple reed switch(24VAC/DC/40mA) assembly with integral switch monitoring and control module. Actuation from rear ("U")
BNS333-01YD**		Same as above but actuation from front ("D")
BNS333-01YL**		Same as above but actuation from left ("L")
BNS333-01YR**		Same as above but actuation from right ("R")
BNS333-01YV**		Same as above but actuation from top ("V")
BPS300	N/A	Coded-magnet actuator (front mount)
BPS303***	N/A	Coded-magnet actuator (rear mount)

*Contact configuration in presence of BPS300 or BPS 303 coded-magnet actuator.

**The BNS333 is a 4-wire sensor designed to satisfy EN954, Category 1 requirements. It is not designed for use with a separate safety controller.

***Available with stainless steel outer jacket. Please consult factory



BPS300 Actuator



BPS303 Actuator***



Description

The Series BNS16 coded-magnet sensors are designed for use as a safety interlock on movable machine guards. Each sensor set consists of a multiple reed switch unit and a coded-magnet actuator. The sensor outputs will only change state in the presence of their matched magnetic field array.

Both switch and magnet assembly are sealed to IP67 (submersible) standards. The unit features the same mounting dimensions as our popular Series AZ16 keyed safety interlock switches ... providing an attractive alternative in applications characterized by alignment problems and/or harsh environments.

Operation

The reed switch assembly is typically mounted to a stationary portion of a guard structure, with the coded-magnet assembly mounted to the movable element of the machine guard. When the guard is closed, and the matched magnetic field aligns with the reed switch unit, the switches will close. When the guard is open, or the required magnetic-field array is not properly aligned with the reed switch assembly, the sensor output will remain "off."

Typical Applications



The sealed, compact BNS16 is ideal for use on movable machine guards in hostile environments or where space is limited. Typical applications include food processing equipment, chemical processing equipment, woodworking machinery, packaging machinery, and articulating robot arm rest position sensing.

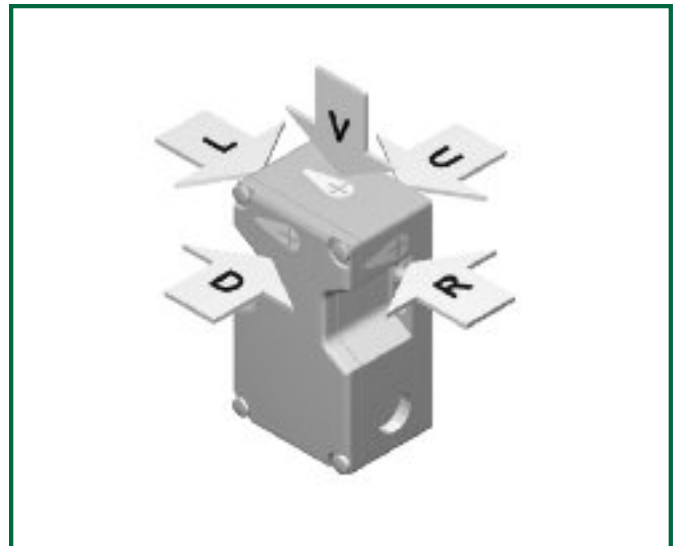
Features & Benefits

- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Satisfies EN954 Category 4** ... when used with appropriate Series AES safety controller.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **Long-life** ... no mechanical wear due to non-contact design
- **Same mounting as Series AZ16** ... ideal alternative in wet, dirty environments.

AVAILABLE STANDARD MODELS (BNS16 actuator sold separately)

Part Number	Actuator Plane
BNS16 - 12ZD	Front cover
BNS16 - 12ZU	Back
BNS16 - 12ZV	Top
BNS16 - 12ZR	Right
BNS16 - 12ZL	Left
BNS16 - 12ZLR	Dual actuation - both Left and Right (2) BPS16 actuators required
BPS16	Coded-magnet actuator

Actuating Planes



Important Note: Series BNS Coded-magnet sensors are for use in safety applications only when used with an electrically-compatible safety controller or safety PLC. (For recommended compatible SCHMERSAL safety controllers, please see the selection chart on Page 159, or call our office for other new, available models.)



USE WITH ANY OTHER SAFETY CONTROLLER MAY DAMAGE SENSOR AND/OR VOID WARRANTY.

SERIES BZ16

Dual-Channel Non-Contact Safety Interlock Switch (with “tamper-resistant” actuating key)



Features & Benefits

- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **10 mm actuating distance** ... extends application versatility.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **IP 67 rated** ... ideal for wash-down applications.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- **Non-contact operation** ... tolerant to minor misalignment.
- **Integral “positive-guided” relays** ... heightens reliability.

Description

The BZ16 is a non-contact safety interlock switch with an internal dual-channel design. The assembly consists of the switch and a coded actuating key. The switch can be actuated from the front, top, and rear with each version available with 1 NO/1 NC or 2 NC contacts.

Operation

When 24VDC is applied to the switch an internal oscillator is energized. The operating frequency is sent to a transmitting solenoid in the active area of the switch. When the actuating key is in the proper location it receives the signal, modifies it, and returns it to the switch. This signal is then sent to a monitoring module.

In addition a permanent magnet is located in the actuator. When the actuator is in place, the magnetic field activates a Hall-effect sensor in the active area. This signal is sent to a second monitoring module.

Thus this dual-channel device only operates if both channels are actuated concurrently. Any fault in either channel will be recognized by the next switching cycle such that authorized operation is prevented.

Typical Applications



The BZ16 safety interlock switch is suitable for sliding, hinged, or lift-off safety guards. It is ideal for food processing and other “washdown” applications.

AVAILABLE STANDARD MODELS

(Includes 1/2" NPT Plastic Adaptor)

Actuating Key sold separately ... see below

Part Number	Contact Configuration*	Description
BZ16-02D	2 NC	Front
BZ16-02V		Top
BZ16-02U		Rear
BZ16-11D	1 NO & 1 NC	Front
BZ16-11V		Top
BZ16-11U		Rear

ACTUATING KEY

(Sold separately)

Part Number	Description
BZ16 - B1	Actuating “Key”



A SAFETY CONTROLLER MAY BE REQUIRED TO MEET SAFETY CONTROL CATEGORIES 3 OR 4.

BZ16 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

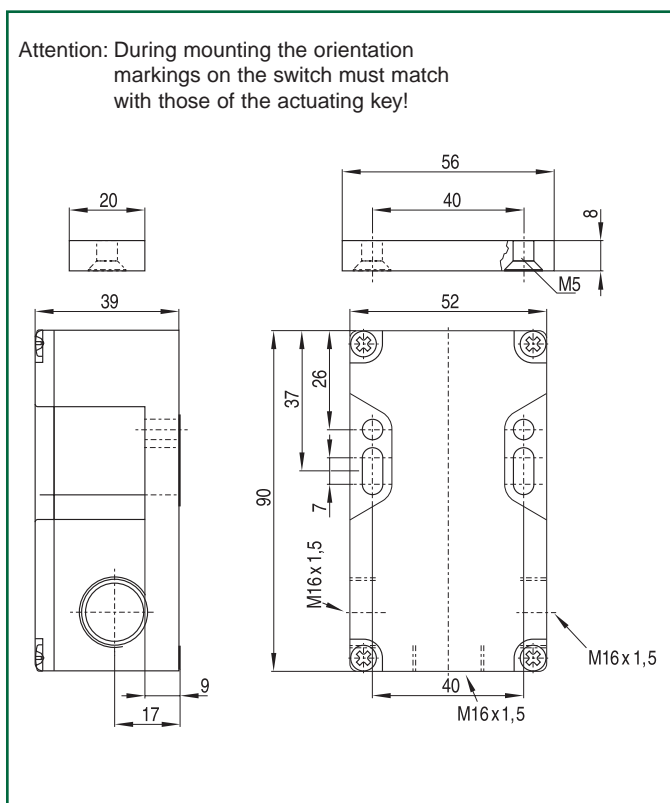
Housing	Fiberglass reinforced thermoplastic Self-extinguishing
Degree of Protection	IP67
Actuator	Non-contact (via coded actuator)
Switching Distance*	“On”: Max. 10mm (Note a minimum distance of 2 mm must be maintained when approaching the switch laterally) “Off”: Min. 20mm
Maximum Switching Frequency	1Hz
Operating Temperature	0°C to 55°C
Operating Principle	Magnetic & Hall Effect
Conformity to Standards	EN 60947-5-3/PDF-M EN 954-1, EN 1088 CE

*When no ferromagnetic material is present in the vicinity of the sensor or actuator.

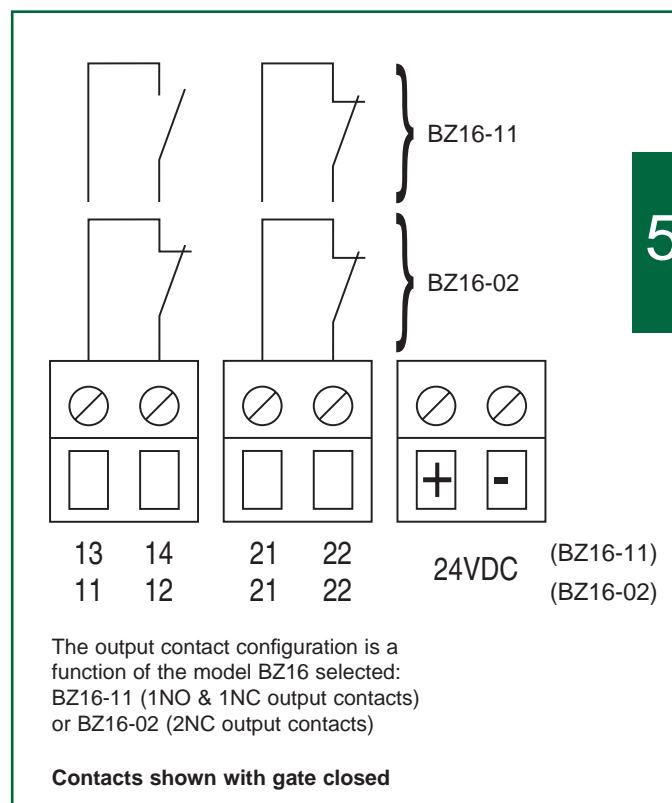
ELECTRICAL SPECIFICATIONS

Operating Voltage	24VDC \pm 15%
Contact Configuration	1 NO & 1 NC (or) 2 NC
Power Consumption	<4W
Maximum Switching Voltage	250VAC
Maximum Switching Capacity	250VAC (max), 1000VA, 4A DC13, 24VDC, 60W, 2.5A
Switching-on time	Approx. 200 ms
Type Connection	Screw terminals with self-lifting clamps (max. 2x2.5mm ² , AWG26-14 solid or stranded wires) (max. 2x1.5mm ² , AWG26-14 with ferrule)

DIMENSIONS



WIRING DIAGRAM



SERIES BNS-B20

Coded-Magnet Sensor with Safety Door Handle



Features & Benefits

- **Tamper-resistant** ... cannot be bypassed with simple magnets
- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Dual-function latch & sensor** ... integral magnetic holding latch (with force of 100N).
- **Application flexibility** ... 3-contact design compatible with 35mm, 40mm, and 45mm aluminum profiles
- **Long-life** ... no mechanical wear due to non-contact design.
- **Satisfies EN 954 Safety Control Category 4** ... when used with compatible SCHMERSAL Series AES safety controller.
- **Easy-to-install** ... optional M12 x 1 quick disconnect & LED status indicator in NC circuit
- **Application diversity** ... suitable for hinged & sliding guards, available for left- or right-hand doors/guards.
- **Integral LED** ... displays switch status (non-LED models also available).

Description

The Series BNS-B20 is designed for use as a combination door handle and safety interlock switch for use on light to medium weight hinged and sliding machine guards. Each unit consists of a door handle assembly equipped with two multiple reed switch arrays and coded magnet actuators. In addition, the unit features two latching magnets that attract pole pieces in the sensor unit—providing a holding force of approximately 100 Newtons.

The reed switches will only close in the presence of their matched magnetic field array ... thus enabling machine operation. Both switch and magnet assemblies are sealed to IP67 standards. Their tamper-resistant design prevents bypassing with simple magnets. The unit also features an LED display of switch status and an optional M12x1 quick-connect for ease of wiring and installation.

Operation

The unit consists of two components ... the door handle unit and the sensor unit. The sensor unit is typically mounted to the stationary portion of the guard structure, with the coded-magnet/handle assembly mounted to the movable element of the machine guard.

When the guard is closed, the matched magnetic fields align with the reed switch arrays, closing the switches and enabling machine operation. When the guard is open, or the magnetic fields are not properly aligned with their reed switch arrays, the sensor output will remain “off.”

Typical Applications

The sealed low-profile, ergonomic door handle system is ideal for use on movable machine guards in hostile environments. The absence of protruding elements eliminate/reduce risk of injury and unintentional opening of the guard. Typical applications include food processing equipment, chemical processing equipment, woodworking machinery, packaging machinery, and printing equipment.

AVAILABLE STANDARD MODELS & ACCESSORIES*

(Please order sensor, actuator-door handle unit and optional connector separately)

Part Number	Description	Termination
BNS-B20-12ZG-L	Sensor unit for left-hand hinged door	1 meter of bottom-mounted cable**
BNS-B20-12ZG-R	Sensor unit for right-hand hinged door	
BNS-B20-12ZG-H	Sensor unit for both right- and left-hand hinged door	1 meter of rear-mounted cable**
BNS-B20-12ZG-ST-L	Sensor unit for left-hand hinged door	Bottom-mounted M12 connector (M12x1, 8-pin)
BNS-B20-12ZG-ST-R	Sensor unit for right-hand hinged door	
BNS-B20-B-01	Actuator-door handle unit	N/A
M12-8P-5M	5m cable with M12x1, 8-pin connector	N/A

Note: Sensor unit is also available for ASI Safety-at-Work bus systems. Please add suffix “-AS” to sensor part number.

***Important Note:** Series BNS Coded-magnet sensors are for use in safety applications only when used with an electrically-compatible safety controller or safety PLC. (For recommended compatible SCHMERSAL safety controllers, please see the selection chart on Page 159, or call our office for other new, available models.)

** 3, 5, and 10 meter cable lengths available on request; add suffix “-XXm”



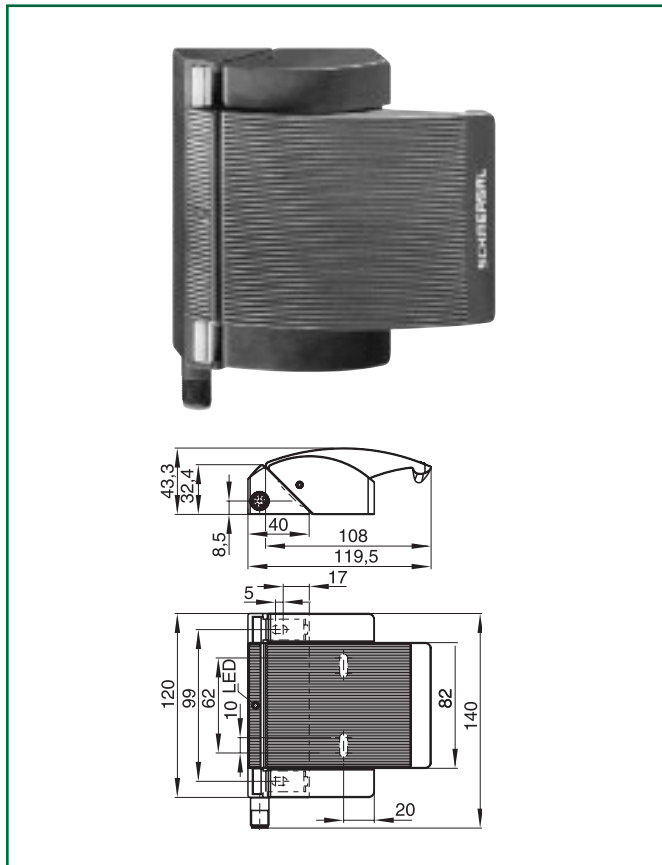
USE WITH ANY OTHER SAFETY CONTROLLER MAY DAMAGE SENSOR AND/OR VOID WARRANTY.

SERIES BNS-B20 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Glass fiber reinforced thermoplastic
Operating Principle	Magnetic
Maximum Sensing Gap (S _{ar}) (S _{ao})	22mm 0mm
Protection Class	IP67
Ambient Operating Temperature	-25°C to +70°C
Maximum Storage Temperature	-25°C to +70°C
Switching Frequency	5 Hz
Resistance to Shock	30g/11ms
Resistance to Vibration	10-55Hz, amplitude 1mm
Max. door/guard weight	Hinged guard: 5Kg Sliding guard: 3Kg
Conformity to Standards	IEC 60947-5-3 BG-GS-ET-14 UL CSA
Maximum Latching Force	Approx. 100N (22 lbs.)
Safety Control Category	Up to Safety Control Category 4 per EN 954-1 when used with appropriate SCHMERSAL Series AES safety controller
Compatible Extrusion Frames	35mm, 40mm, 45mm

DIMENSIONS



ELECTRICAL SPECIFICATIONS

Maximum Switching Voltage	24 VDC
Maximum Switching Current	10mA
Maximum Switching Capacity	240mW
Indication of Switching Condition	LED (Illuminated when guard is closed)
Termination	M12x1 or cable (LiYY 6 x 0.25mm ²)
Contact Configuration	1 N.O. & 2 N.C. (LED in N.C. circuit)

Note: Available in "ASI Safety-at-Work" configuration.

WIRING DETAILS

(3) GY S13 S14 PK (4)
 (1) GN S21 S22 YE (2)
 (5) WH S31 S32 BN (6)

Contacts shown with gate closed

PIN configuration M12, 8 pins

Note: Loads with high switch-on or switch-off voltage spikes must be suppressed by an appropriate protective circuit.





Description

The CSS 180 non-contact, electronic safety sensor is designed for application in safety circuits and is used for monitoring the position of movable safety guards. In this application the safety sensor monitors the closed position of hinged, sliding or removable guards with the aid of a coded actuator.

The CSS 180 Safety Sensor fulfills the requirements for proximity devices with defined behavior under fault conditions according to EN 60947-5-3 with the classification PDF-M (self-monitoring).

Operation

The CSS 180 Safety Sensor and CST 180 actuator are a matched pair. As the actuator approaches the sensor, the sensor excites the actuator at a predetermined resonant frequency and the reads back the actuator oscillation. The sensor evaluates the actuator frequency and its distance to the actuator.

Identification of the actuator is interpreted as a closed guard by the safety sensor, and the safety outputs are enabled.

The safety sensor is a dual channel design with two short-circuit proof, safe PNP outputs, each of which can switch up to 500 mA. Due to continuous internal function tests and the monitoring of the safety outputs, a number of CSS 180 Safety Sensors can be wired in series without detriment to the control category. Series wired safety sensors continue to fulfill the requirements of Control Category 4 according to EN 954-1.

Typical Applications

The sealed, compact units are ideal for use on movable machine guards where multiple guard monitoring on a machine is required, and/or where hostile environments exist. Typical applications include printing machinery, textile machinery, paper converting equipment, material handling systems, packaging machinery, chemical processing equipment, and woodworking machinery.

Features & Benefits

- **Non-contact sensing** ... for long term reliability.
- **Sealed for moisture protection** ... ideal for most hostile environments.
- **Tamper-resistant** ... frequency-matched sensor and actuator required for operation.
- **Integral LED diagnostic indicators** ... facilitate easy installation and troubleshooting.
- **Integral self-monitoring** ... satisfy requirements of Safety Control Category 4. *See note below.
- **Designed for “daisy chaining”** ... up to 200m.
- **Dual PNP 500mA safety outputs** ... for application versatility.

AVAILABLE MODELS AND ACCESSORIES (Accessories Ordered Separately)

Model Number	Description
CSS-8-180-2P-E-L	End or single device with pre-wired cable
CSS-8-180-2P+D-E-L	End or single device with diagnostic output, pre-wired cable
CSS-8-180-2P-Y-L	Series device with double pre-wired cable
CSS-8-180-2P+D-M-L	Series device with diagnostic output, pre-wired cable
CST-180-1	Actuator
CSA-M-1	Magnetic latch
H-18	Mounting clamp

Sensors available with M12 cable connector – Add **ST** after L in catalog number

Safety Control Module Requirements

Dual-channel safety inputs, suitable for PNP semiconductor outputs. The internal function tests of the sensor cause the outputs to periodically switch off for a millisecond. This must be tolerated by the control module. The following SCHMERSAL safety control modules are recommended for this application: SRB 301 LCB and SRB 324ST

*Note: A safety control module may be required for reset function and/or feedback monitoring functions, as well as increased output current requirements.

SERIES CSS 180 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Glass fiber reinforced thermoplastic
Degree of Protection	IP67
Switching Distance	8mm (Nominal) 7.0mm to 9.5mm (Maximum)
Operating Temperature	-25°C to +55°C
Storage Temperature	-25°C to +85°C
Hysteresis	≤ 0.5mm
Repeatability	≤ 0.2mm
Response Time	≤ 30ms
Vibration Resistance	10-55Hz, amplitude 1mm
Shock Resistance	30g/11ms
Conformity to Standards	CE BG EN 60947-5-3 UL EN 954-1 IEC 61508

ELECTRICAL SPECIFICATIONS

Mode of Operation	Inductive
Rated Operating Voltage	24 VDC -15%/+10%
Rated Operating Current	1.0A
No Load Current	0.05A
Residual Current	≤ 0.5mA
Rated Impulse Withstand Voltage	0.8kV
Rated Insulation Voltage	32 VAC/VDC
Safety Outputs	(2) PNP, short-circuit proof
Safety Output Current	0.5A per output
Safety Output Voltage Drop	Max. 0.5V
Signaling Output	PNP, short-circuit proof
Signaling Output Operating Voltage	Max. 4V below rated operating voltage
Signaling Output Operating Current	Max. 0.05A
Type Interconnection Cable	4x0.5mm ² , 5x0.34mm ² , or 7x0.25mm ²

NOTE: For complete technical data, diagnostics and wiring examples, please see page 194 of the “Pulse-Echo Based Non-Contact Safety Sensors” section.

SERIES CSS 34

Pulse-Echo Based Compact Non-Contact Safety Sensor



Description

The CSS 34 non-contact, electronic safety sensor is designed for application in safety circuits and is used for monitoring the position of movable safety guards. In this application the safety sensor monitors the closed position of hinged, sliding or removable guards with the aid of a coded actuator.

The CSS 34 Safety Sensor fulfills the requirements for proximity devices with defined behavior under fault conditions according to EN 60947-5-3 with the classification PDF-M (self-monitoring).

The CSS 34 Safety Sensor and CST 34 actuator are a matched pair. As the actuator approaches the sensor, the sensor excites the actuator at a predetermined resonant frequency and the reads back the actuator oscillation. The sensor evaluates the actuator frequency and its distance to the actuator.

Identification of the actuator is interpreted as a closed guard by the safety sensor, and the safety outputs are enabled.

The safety sensor is a dual channel design with two short-circuit proof, safe PNP outputs, each of which can switch up to 250 mA. Due to continuous internal function tests and the monitoring of the safety outputs, a number of CSS 34 Safety Sensors can be wired in series without detriment to the control category. Series wired safety sensors continue to fulfill the requirements of Control Category 4 according to EN 954-1.

The models CSS34 F0/F1 have an integrated feedback option that control positive-guided contactors/relays without the need for a downstream safety control module. The integrated start/restart interlock feature provides an input for a reset pushbutton with edge detection, or without edge detection (suitable for automatic reset). The CSS34F0/F1 models are suitable as individual or end devices in a series wired chain of standard CSS34 sensors to replace a safety control module. The CSS34F0/F1 system, comprising the sensor, monitored relay and the reset switch, meets the requirements of Control Category 4 according to EN954-1, provided that positive guided contactors/relays are used.

Typical Applications

The sealed, compact units are ideal for use on movable machine guards where multiple guard monitoring on a machine is required, and/or where hostile environments exist. Typical applications include printing machinery, textile machinery, paper converting equipment, material handling systems, packaging machinery, chemical processing equipment, and wood-working machinery.

Features & Benefits

- **Non-contact sensing** ... for long term reliability.
- **Four different actuating surfaces** ... for a variety of mounting options.
- **Sealed for moisture protection** ... ideal for most hostile environments. Meets both IP65 and IP67 requirements.
- **Tamper-resistant** ... frequency-matched sensor and actuator required for operation.
- **Integral LED diagnostic indicators** ... facilitate easy installation and troubleshooting.
- **Integral self-monitoring (CSS34), feedback and reset functions (CSS34F0/F1)** ... satisfy requirements of Safety Control Category 4, and may remove need for safety control module. *See note below.
- **Designed for “daisy chaining”** ... up to 200m.
- **Dual PNP 500mA safety outputs** ... for application versatility.
- **Integrated mounting plate included** ... allows for easy and accurate alignment of sensor and actuator.

AVAILABLE MODELS AND ACTUATORS (Actuators Ordered Separately)

Model Number Standard Version	Description
CSS12-34-VDML*	Top Actuating surface with diagnostic output
CSS12-34-VDMST*	Top Actuating surface with diagnostic output, M12 Cable connector
CSS14-34-SDML*	Side Actuation surface with diagnostic output
CSS14-34-SDMST*	Side Actuation surface with diagnostic output, M12 Cable connector
F0	Integrated Feedback, without edge detection, auto-reset
CSS12-34F0-VDMST	Top Actuating surface with diagnostic output, M12 Cable connector
CSS14-34F0-SDMST	Side Actuation surface with diagnostic output, M12 Cable connector
F1	Integrated Feedback, with edge detection of reset button, manual reset
CSS12-34F1-VDMST	Top Actuating surface with diagnostic output, M12 Cable connector
CSS14-34F1-SDMST	Side Actuation surface with diagnostic output, M12 Cable connector
CST34-S-1	Side surface actuator
CST34-V-1	Top surface actuator

Sensors available with a serial diagnostic cable, for use with a PROFIBUS DP network. Please consult factory.

*See note below.

Safety Control Module Requirements

Dual-channel safety inputs, suitable for PNP semiconductor outputs. The internal function tests of the sensor cause the outputs to periodically switch off for a millisecond. This must be tolerated by the control module. The following SCHMERSAL safety control module is recommended for this application: SRB 301 LCB, SRB 324 ST

*Note: A safety control module may be required for reset function and/or feedback monitoring functions, as well as increased output current requirements.

SERIES CSS 34 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Glass fiber reinforced thermoplastic
Degree of Protection	IP65 and IP67
Switching Distance	Top (V) 12mm Nominal 10-15mm (Maximum) Side (S) 14mm Nominal 12-17mm (Maximum)
Operating Temperature	-25°C to +70°C
Storage Temperature	-25°C to +85°C
Hysteresis	1mm
Repeatability	≤ 0.5mm
Response Time	≤ 30ms
Vibration Resistance	10-55Hz, amplitude 1mm
Shock Resistance	30g/11ms
Conformity to Standards	CE BG EN 60947-5-3 UL/CSA EN 954-1 IEC 61508

ELECTRICAL SPECIFICATIONS

Mode of Operation	Inductive
Rated Operating Voltage	24 VDC -15%/+10%
Rated Operating Current	0.6A
No Load Current	0.1A
Residual Current	≤ 0.5mA
Rated Impulse Withstand Voltage	1 kV
Rated Insulation Voltage	32 VAC/VDC
Safety Outputs	(2) PNP, short-circuit proof
Safety Output Current	0.25A per output
Safety Output Voltage Drop	Max. 0.5V
Signaling Output	PNP, short-circuit proof
Signaling Output Operating Voltage	Max. 4V below rated operating voltage
Signaling Output Operating Current	Max. 0.05A
Interconnection Cable: Connector:	Y-UL2517/8xAWG22 (8x0.35mm ²), 2m M12x1, 8 pin quick connect

NOTE: For complete technical data, diagnostics and wiring examples, please see page 200 of the “Pulse-Echo Based Non-Contact Safety Sensors” section.