

NON-CONTACT SAFETY SENSORS



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	114
BNS260	1.0" × 1.4" × 0.5"	24VDC	1 NO & 1 NC 1 NO & 2 NC 2 NC 3 NC	116
BNS33	3.5" × 1.0" × 0.5"	24VAC/DC 120VAC/DC	1 NO & 1 NC 1 NO & 2 NC 2 NC 3 NC	118
BNS33S	3.5" × 1.0" × 0.625"	24VDC 100VAC/DC	1 NO & 2 NC	122
BNS36	3.5" × 1.0" × 0.5"	24VDC	1 NO & 1 NC 1 NO & 2 NC 2NC, 3NC	124
BNS303	1.18" Dia × 1.74"	100VAC/DC	1 NO & 1 NC 1 NO & 2 NC	126
BNS30 & BNS300	1.18" Dia × 3.07"	24VDC	1 NC	128
BNS333	4.5" × 1.7" × 1.7"	24VDC	1 NC	130
BNS16	1.25" × 2" × 3"	100VAC/DC	1 NO & 2 NC 2 NC	132
BNS-B20	NA	24VDC	1 NO & 1 NC	136
CSS 180	0.7" Dia × 3.6"	24VDC	2 PNP	138
CSS 34	1" × 4" × 1"	24VDC	2 PNP	140
CSS 30S	1.18" Dia × 3.5"	24VDC	2 PNP	142
CSS 16	1.25" × 2" × 3"	24VDC	2 PNP	144
Coded-Magnet Sensor Compatible Safety Controllers				147



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.

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 PL_c, PL_d, or PL_e to EN ISO 13849-1, or Category 1, 3, or 4 to EN 954-1** ... when used with appropriate Schmersal safety controllers.

AVAILABLE STANDARD MODELS
(Please order BPS250 magnet separately)

Part Number	Contact Configuration*	Description
BNS250-11z	1 NO & 1 NC	Multiple reed switch assembly with 1-meter prewired pigtail
BNS250-12z	1 NO & 2 NC	
BNS250-12z-2187	1 NO & 2 NC	
BNS250-11zG	1 NO & 1 NC	Multiple reed switch assembly with 1 meter prewired pigtail and built-in LED display
BNS250-12zG	1 NO & 2 NC	
BNS250-11zG-2205	1 NO & 1 NC	Multiple reed switch 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 Series AES safety controller, see selection chart on Page 147.)



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 EN ISO 13849-1 UL EN 954-1 CSA BG-GS-ET-14

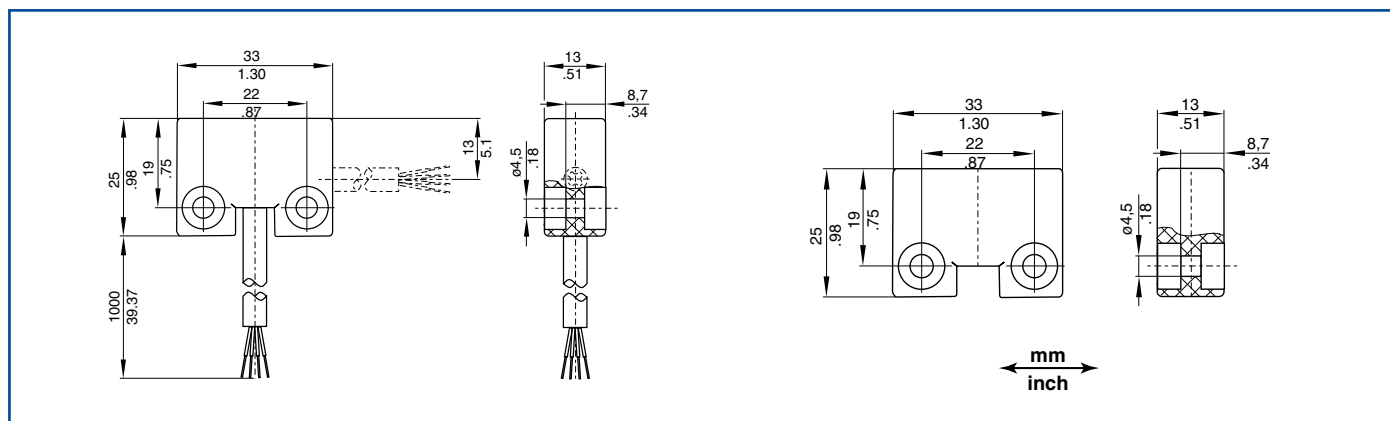
*Without ferromagnetic material in vicinity of switch or magnet. The proximity of ferrous material may affect switching distances.

ELECTRICAL SPECIFICATIONS

Maximum Operating Voltage	24VDC
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

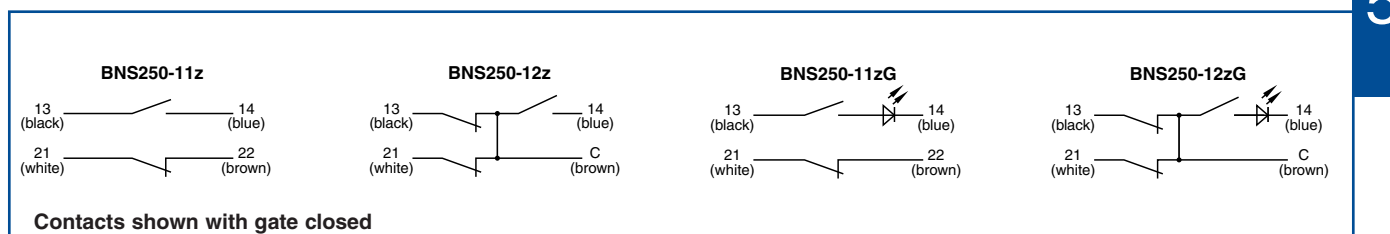
*Longer prewired cables (3M, 5M, or 10M lengths) available on request. Please consult factory.

DIMENSIONS



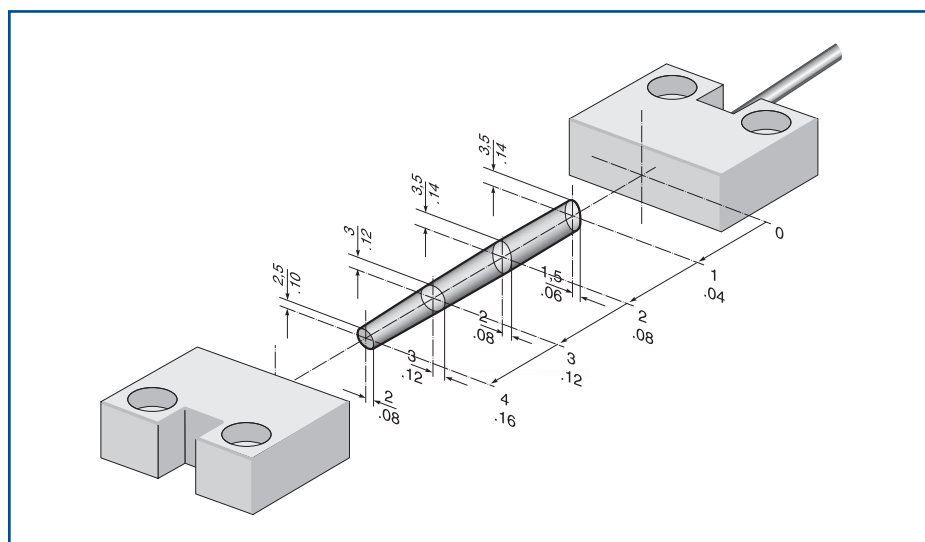
Note: BNS250 reed switch assemblies should be mounted at least 50mm (2") apart.

WIRING DETAILS

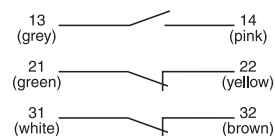


Contacts shown with gate closed

MISALIGNMENT ALLOWANCE



BNS250-12z-2187





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: See page 94 for appropriate M8 connector cables. 4 pole models accept either a screw-on or snap-on connector. 6 pole models (with signalling contact) 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.
- **Satisfy PL_c, PL_d, or PL_e to EN ISO 13849-1, or Category 1, 3, or 4 to EN 954-1** ... when used with appropriate Schmersal safety controllers.

AVAILABLE MODELS
(Actuator ordered separately)

Part Number	Contacts	Connection
BNS260-02Z-*	2 NC	prewired
BNS260-02ZG-*	2 NC	1 meter cable
BNS260-02Z-ST-*	2 NC	M8, 4 pole connector
BNS260-02ZG-ST-*	2 NC	
BNS260-11Z-*	1 NO & 1 NC	prewired
BNS260-11ZG-*	1 NO & 1 NC	1 meter cable
BNS260-11Z-ST-*	1 NO & 1 NC	M8, 4 pole connector
BNS260-11ZG-ST-*	1 NO & 1 NC	
With 1 NC signalling contact		
BNS260-02/01Z-*	2 NC	prewired
BNS260-02/01ZG-*	2 NC	1 meter cable
BNS260-02/01Z-ST-*	2 NC	M8, 6 pole connector
BNS260-02/01ZG-ST-*	2 NC	
BNS260-11/01Z-*	1 NO & 1 NC	prewired
BNS260-11/01ZG-*	1 NO & 1 NC	1 meter cable
BNS260-11/01Z-ST-*	1 NO & 1 NC	M8, 6 pole connector
BNS260-11/01ZG-ST-*	1 NO & 1 NC	

*Please indicate hinge direction: -L (left) or -R (right)

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

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 Series AES safety controller, see selection chart on Page 147.)



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 EN 954-1 cUL BG-GS-ET-14 EN ISO 13849-1

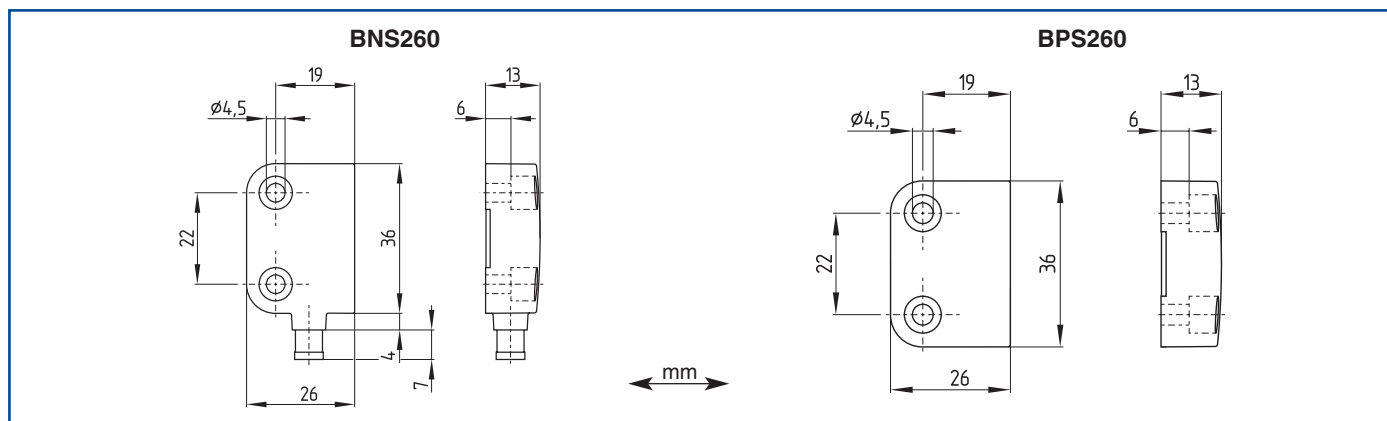
*Without ferromagnetic material in vicinity of switch or magnet. The proximity of ferrous material may affect switching distances.

ELECTRICAL SPECIFICATIONS

Maximum Operating Voltage	75VDC 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* 0.25mm² (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



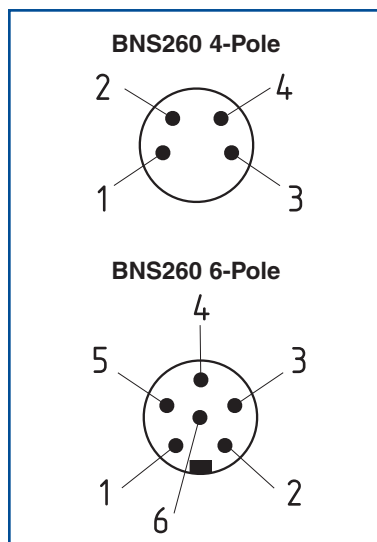
Note: BNS260 reed switch assemblies should be mounted at least 50mm (2") apart.

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

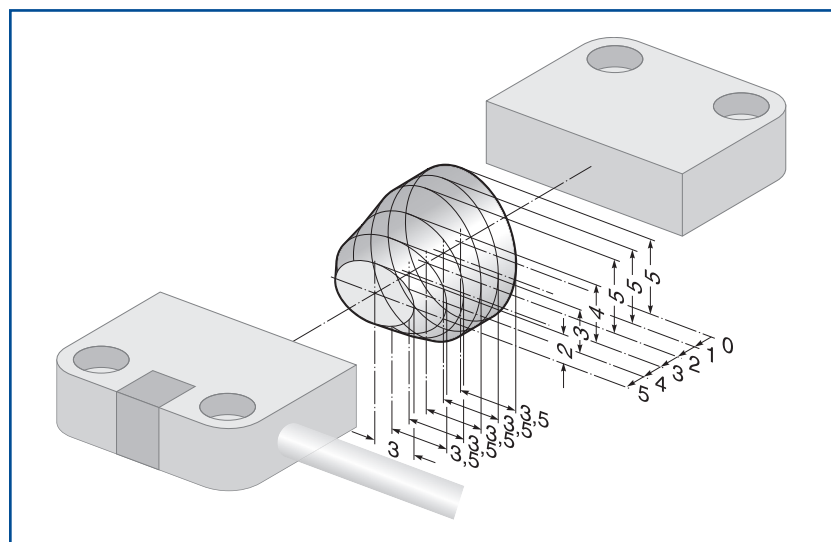
BNS260-02z(G)	BNS260-02/01z(G)	BNS260-11z(G)	BNS260-11/01z(G)
(3) BK S11 → S12 BU (4) (1) WH S21 → S22 BN (2)	(3) GY S11 → S12 PK (4) (1) GN S21 → S22 YE (2) (5) WH S31 → S32 BN (6)	(3) BK S13 → S14 BU (4) (1) WH S21 → S22 BN (2)	(3) GY S13 → S14 PK (4) (1) GN S21 → S22 YE (2) (5) WH S31 → S32 BN (6)

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.

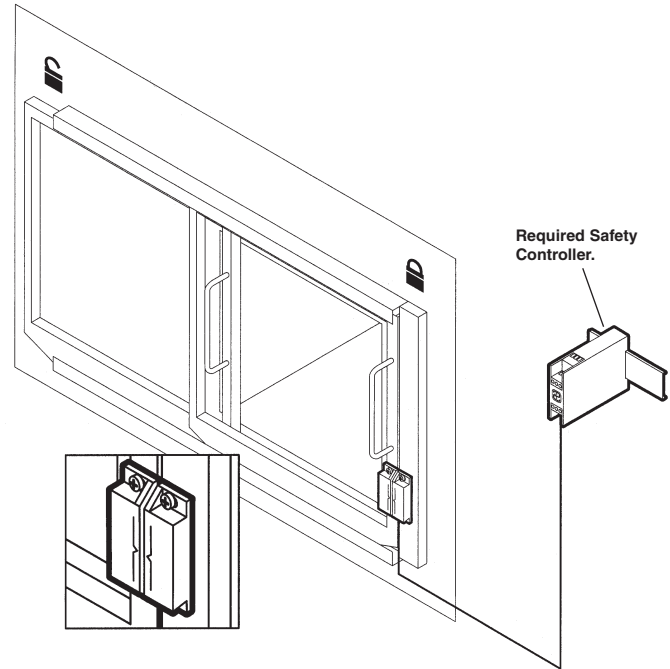
***Important Note:** Series BNS Coded-magnet sensors are for use in safety applications only when used with an electrically compatible safety controller or safety PLC. (For recommended compatible SCHMERSAL Series AES safety controller, see selection chart on Page 147.)



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.
- **Satisfy PL_c, PL_d, or PL_e to EN ISO 13849-1, or Category 1, 3, or 4 to EN 954-1** ... when used with appropriate Schmersal 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 (see page 122).



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		
BNS33-02Z-2187**	2 NC	100VAC/DC (250mA)	
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		
BNS33-02ZG-2187**	2 NC		
BNS33-12Z-2187**	1 NO & 2 NC	100VAC/DC (250mA)	Multiple reed switch assembly with 1-meter prewired pigtail
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.

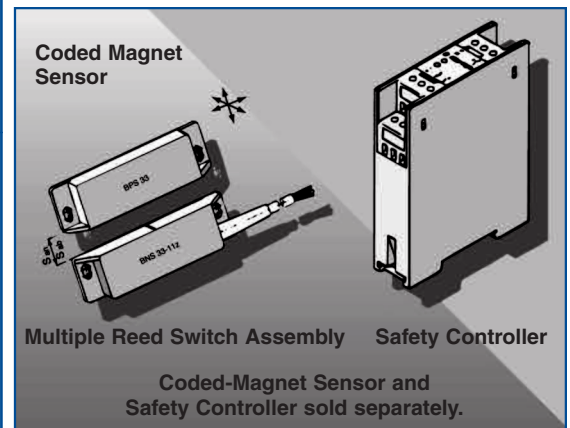
Note: Longer prewired cables (3M, 5M, or 10M lengths) available on request.
Please consult factory.

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

ACTUATORS & ACCESSORIES

Part Number	Description
BPS33	Coded-magnet actuator (5mm sensing distance)
BPS33-2326	Coded-magnet actuator (10mm sensing distance)
BN31/33	Shim plate for mounting reed switch assembly on ferrous material

Note: See page 94 for M8, 4 pin connector cables



BNS33 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Fiberglass reinforced thermoplastic	
Switching Distance "S"*	"On": 5mm (0.2")	
	"Off": 15mm (0.6")	
	"On": 8mm (0.3") (For BNS33S only) "Off": 18mm (0.7") (For BNS33S only)	
Degree of Protection	IP67 (BNS33S: IP69k)	
Operating Temperature	-13°F to +158°F (+178°F for BNS33S)	
Operating Principle	Magnetic	
Shock Resistance	30g/11ms	
Vibration Resistance	10 to 55 Hz, amplitude 1mm	
Conformity to Standards	CE	EN ISO 13849-1
	UL	EN 954-1
	CSA	BG-GS-ET-14
	IEC 529/EN60529	

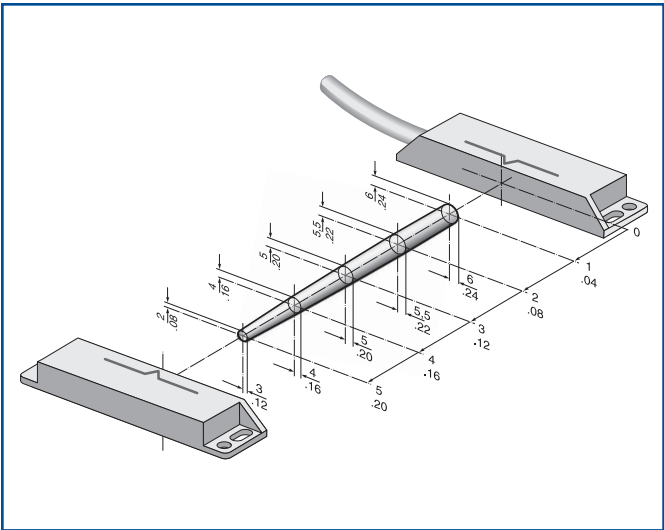
*Without ferromagnetic material in vicinity of switch or magnet. The proximity of ferrous material may affect switching distances.

ELECTRICAL SPECIFICATIONS

For electrical ratings see page 139	
Type Connection*	1 meter long LiYY4* 0.25mm² (23AWG) pre-wired pigtail. M8x1 quick-connect for versions with "ST" suffix

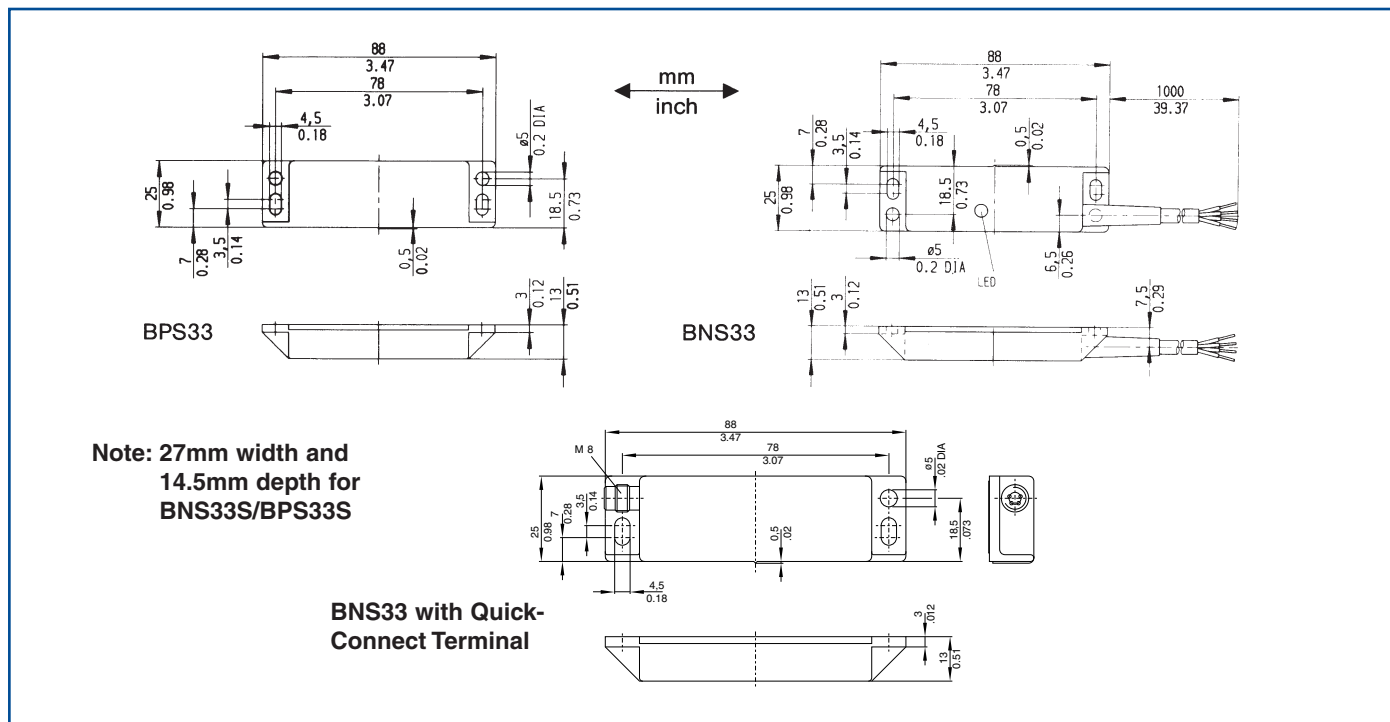
*Longer prewired cables available on request. Please consult factory.

BPS33 MISALIGNMENT ALLOWANCE



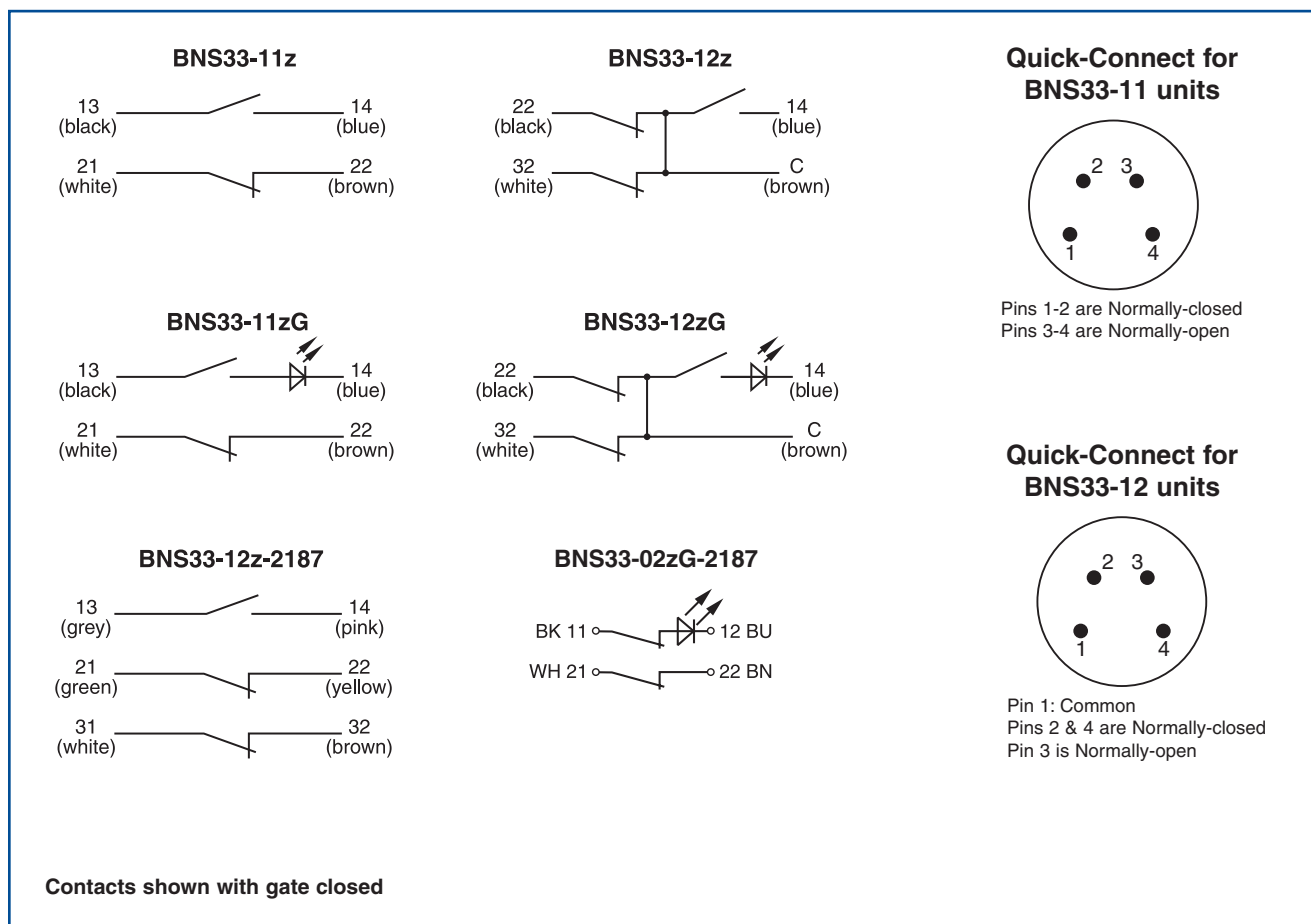
BNS33 TECHNICAL DATA

DIMENSIONS



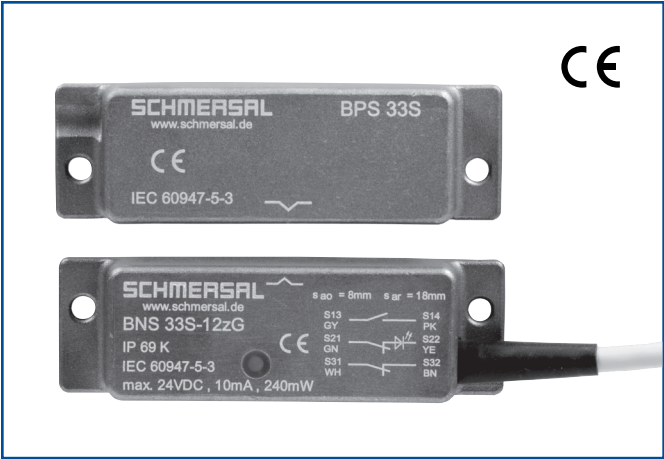
Note: BNS33 reed switch assemblies should be mounted at least 50mm (2") apart.

WIRING DETAILS



SERIES BNS33S

Stainless Steel Coded-Magnet Sensors



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 Series AES safety controller, see selection chart on Page 147.)

 **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.
- **Satisfy PL_c, PL_d, or PL_e to EN ISO 13849-1, or Category 1, 3, or 4 to EN 954-1** ... when used with appropriate Schmersal safety controllers.
- **Stainless steel housing** ... ideal for the food industry.

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 EN 954-1 IEC 529/EN60529 BG-GS-ET-14 EN ISO 13849-1

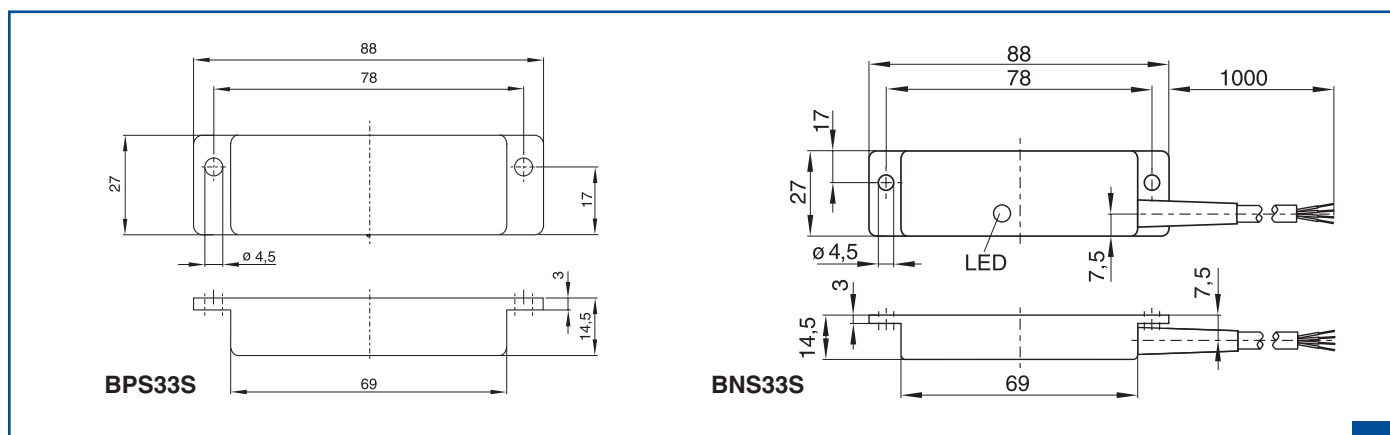
*Without ferromagnetic material in vicinity of switch or magnet. The proximity of ferrous material may affect switching distances.

ELECTRICAL SPECIFICATIONS

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

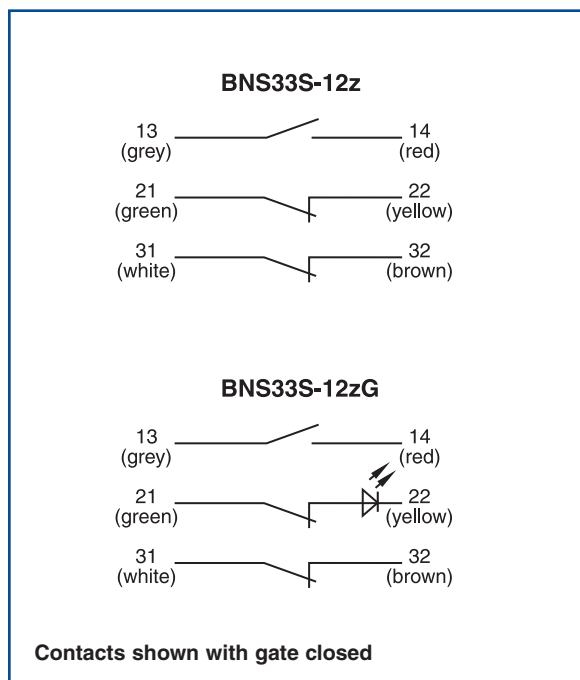
*Longer prewired cables available on request. Please consult factory.

DIMENSIONS

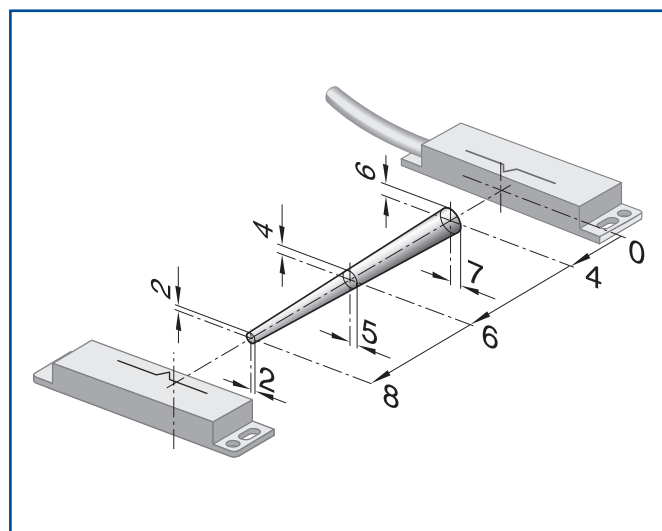


Note: BNS33 reed switch assemblies should be mounted at least 50mm (2") apart.

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: See page 94 for appropriate M8 connector cables. 4 pole models accept either a screw-on or snap-on connector.

6 pole models (with signalling output) 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.
- **Satisfy PL_c, PL_d, or PL_e to EN ISO 13849-1, or Category 1, 3, or 4 to EN 954-1** ... when used with appropriate Schmersal safety controllers.

AVAILABLE MODELS

(Actuator ordered separately)

Part Number	Contacts	Connection
BNS36-02Z-*	2 NC	prewired
BNS36-02ZG-*	2 NC	1 meter cable
BNS36-02Z-ST*	2 NC	M8, 4 pole connector
BNS36-02ZG-ST*	2 NC	
BNS36-11Z-*	1 NO & 1 NC	prewired
BNS36-11ZG-*	1 NO & 1 NC	1 meter cable
BNS36-11Z-ST*	1 NO & 1 NC	M8, 4 pole connector
BNS36-11ZG-ST*	1 NO & 1 NC	
With 1 NC signalling contact		
BNS36-02/01Z-*	2 NC	prewired
BNS36-02/01ZG-*	2 NC	1 meter cable
BNS36-02/01Z-ST*	2 NC	M8, 6 pole connector
BNS36-02/01ZG-ST*	2 NC	
BNS36-11/01Z-*	1 NO & 1 NC	prewired
BNS36-11/01ZG-*	1 NO & 1 NC	1 meter cable
BNS36-11/01Z-ST*	1 NO & 1 NC	M8, 6 pole connector
BNS36-11/01ZG-ST*	1 NO & 1 NC	

*Please indicate hinge direction: -L (left) or -R (right)

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

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 Series AES safety controller, see selection chart on Page 147.)



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 EN ISO 13849-1	EN 954-1 UL CSA

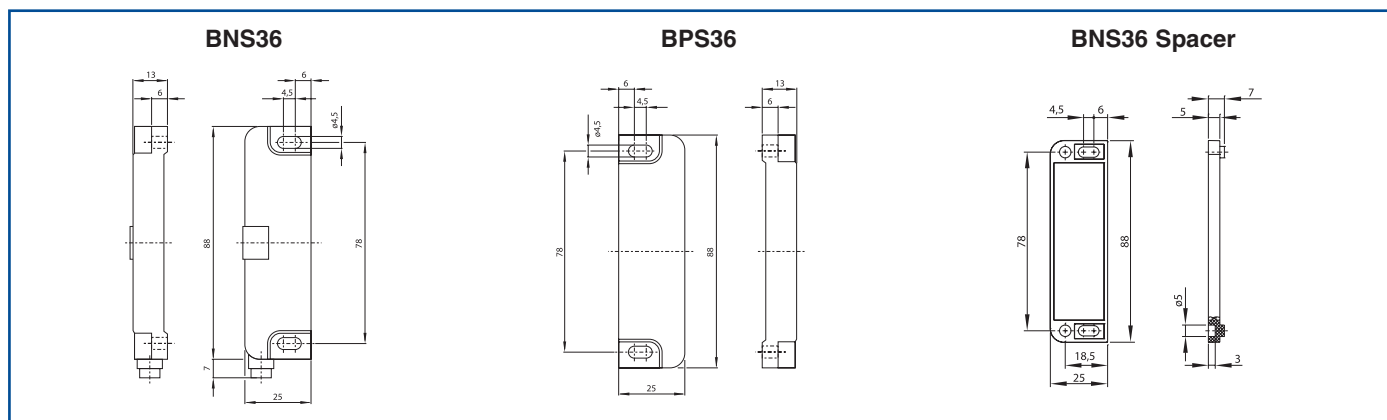
*Without ferromagnetic material in vicinity of switch or magnet. The proximity of ferrous material may affect switching distances.

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* 0.25mm² (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)

(3) BK S11 — S12 BU (4)
(1) WH S21 — S22 BN (2)

BNS36-02/01z(G)

(3) GY S11 — S12 PK (4)
(1) GN S21 — S22 YE (2)
(5) WH S31 — S32 BN (6)

BNS36-11z(G)

(3) BK S13 — S14 BU (4)
(1) WH S21 — S22 BN (2)

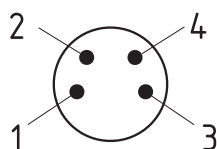
BNS36-11/01z(G)

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

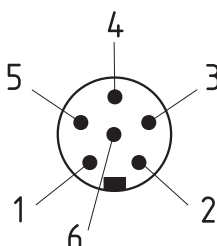
Contacts shown with gate closed. Color configuration shown for cabled versions, connector color codes may vary.

QUICK-CONNECT DIAGRAMS

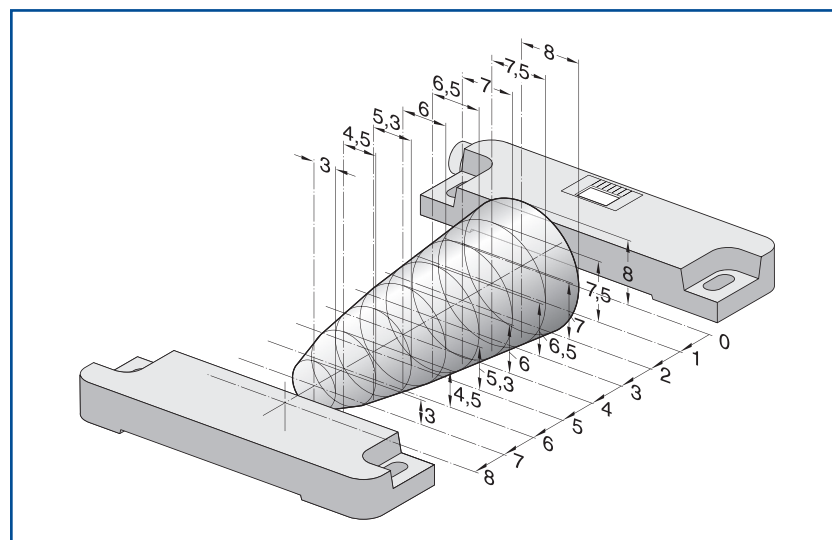
BNS36 4-Pole



BNS36 6-Pole



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.

***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 Series AES safety controller, see selection chart on Page 147.)

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

Features & Benefits

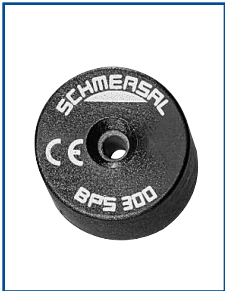
- **Compact size** ... ideal for limited space applications.
- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Rugged, corrosion-resistant housing** ... tolerates most industrial environments.
- **Shock and vibration tolerant** ... designed to withstand mechanical abuse.
- **Satisfy PL_c, PL_d, or PL_e to EN ISO 13849-1, or Category 1, 3, or 4 to EN 954-1** ... when used with appropriate Schmersal safety controllers.

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**

BNS303 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Fiberglass reinforced thermoplastic
Switching Distance, "S"*	"On": 5mm (0.2") "Off": 15mm (0.6") "On": 8 mm "Off": 18mm *Suffix 2211 only
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 EN ISO 13849-1 UL EN 954-1 CSA BG-GS-ET-14

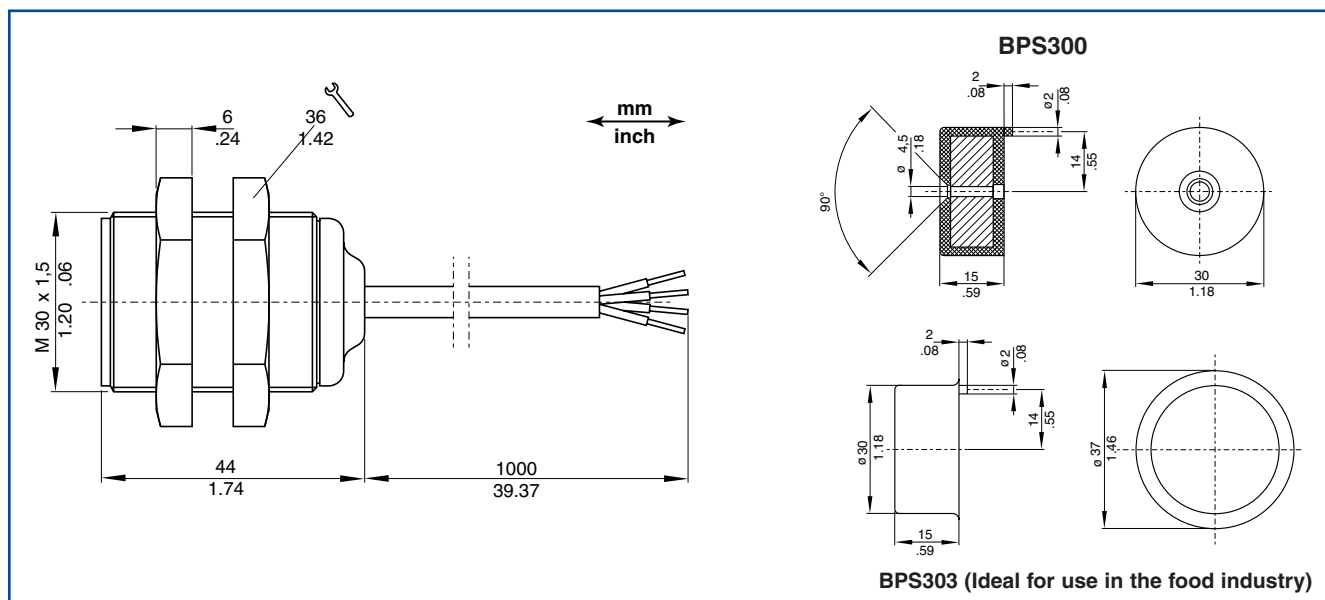
*Without ferromagnetic material in vicinity of switch or magnet. The proximity of ferrous material may affect switching distances.

ELECTRICAL SPECIFICATIONS

Maximum Operating Voltage	24VDC (with LED) 100VAC/DC (without LED)
Maximum Continuous Current Rating	10mA (with LED) 400mA (without LED)
Maximum Switching Capacity (Power Rating)	10VA
Type Connection*	1 meter long LiYY4* 0.25mm ² (23AWG) pre-wired pigtail

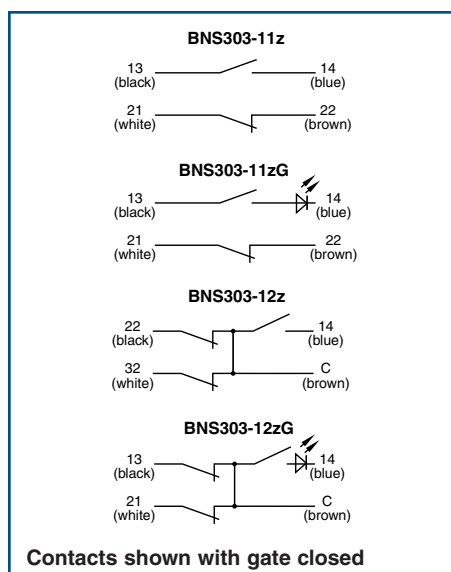
*Longer prewired cables (3M, 5M, or 10M lengths) available on request. Please consult factory.

DIMENSIONS

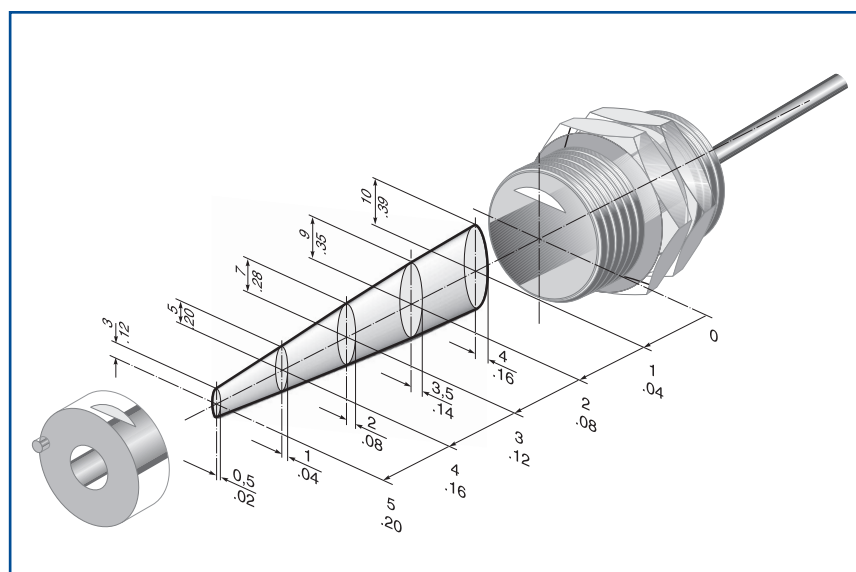


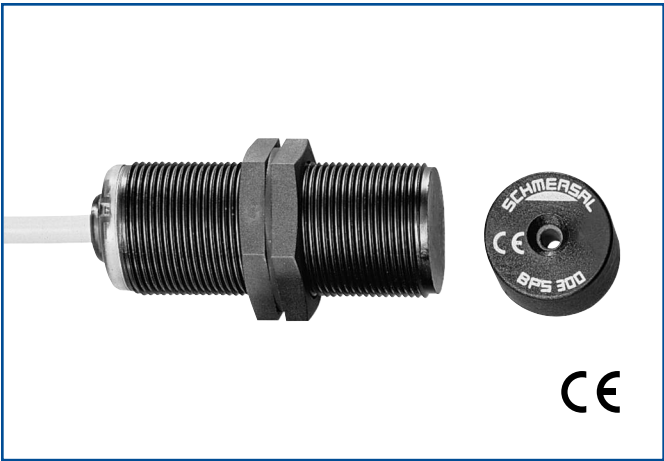
Note: BNS303 reed switch assemblies should be mounted at least 50mm (2") apart.

WIRING DETAILS



MISALIGNMENT ALLOWANCE





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 EN ISO 13849-1, PL_C/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.

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 PL_C per EN ISO 13849-1, or Safety Category 1 per EN 954-1.
- **Available in metal (BNS30) or plastic (BNS300) housings** ... for application versatility.

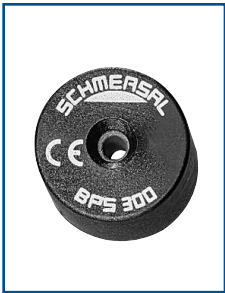
AVAILABLE STANDARD MODELS
(Please order BPS300 or BPS303 magnet separately)

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 PL_C per EN ISO 13849-1, or control Category 1 per EN 954-1. 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 EN ISO 13849-1, PL_C/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 PL_C per EN ISO 13849-1, or control Category 1 per EN 954-1.

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 PL_C per EN ISO 13849-1, or control Category 1 per EN 954-1. It is not designed for use with a separate safety controller.

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



BPS300 Actuator



BPS303 Actuator***

BNS333 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

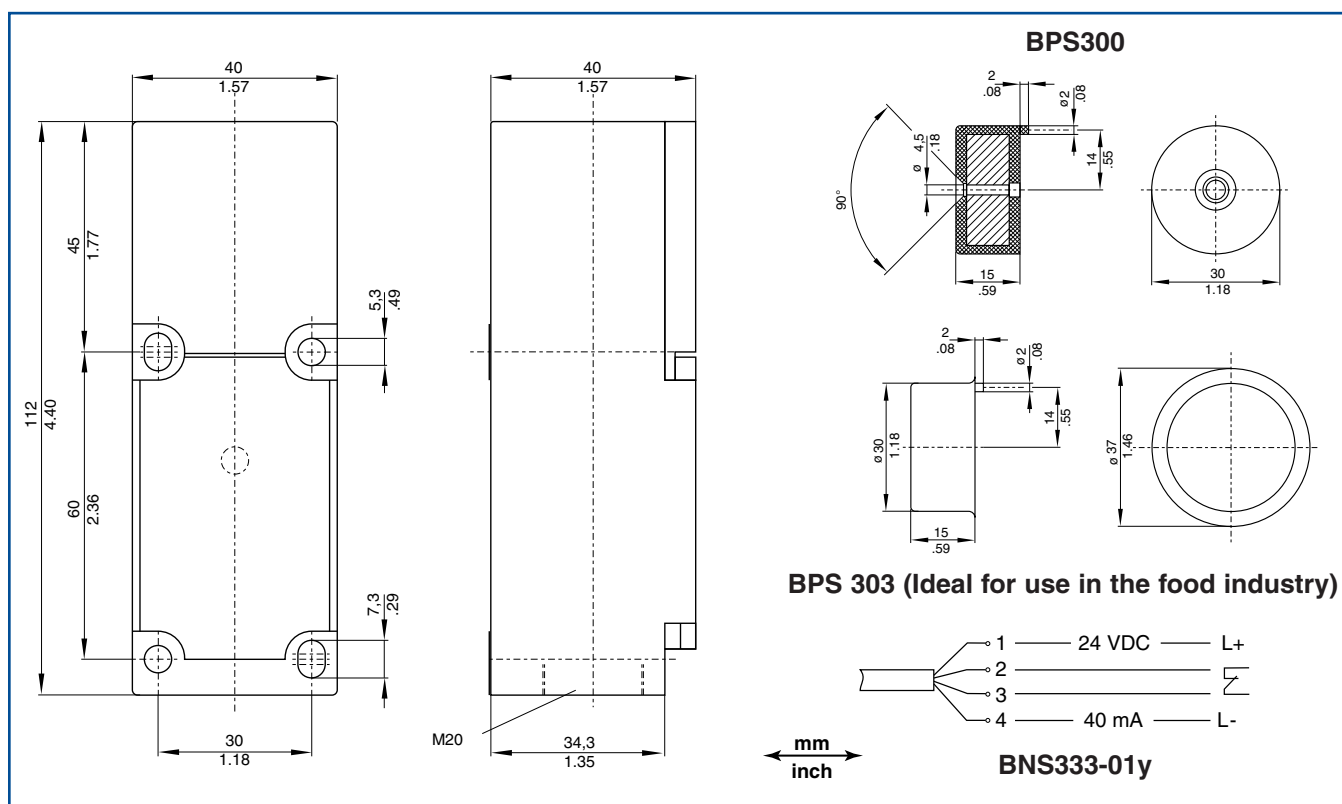
Housing	Fiberglass reinforced thermoplastic
Switching Distance "S"	"On": 4mm (0.16") "Off": 14mm (0.55")
Degree of Protection	IP65
Operating Temperature	-13°F to +158°F
Operating Principle	Magnetic
Shock Resistance	30g/11ms
Vibration Resistance	10 to 55 Hz, amplitude 1mm
Conformity to Standards	CE EN ISO 13849-1 EN 954-1 BG-GS-ET-14

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

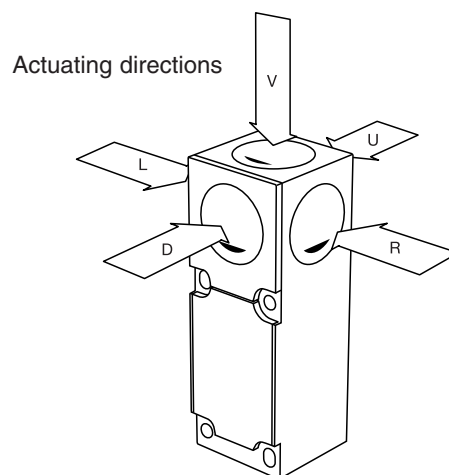
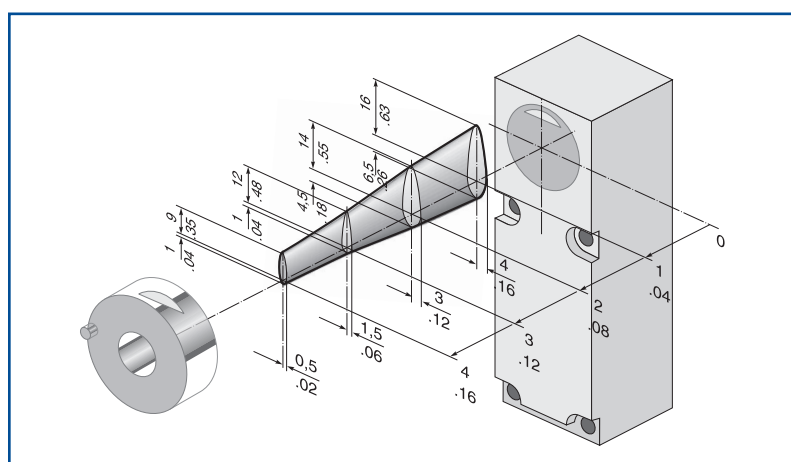
ELECTRICAL SPECIFICATIONS

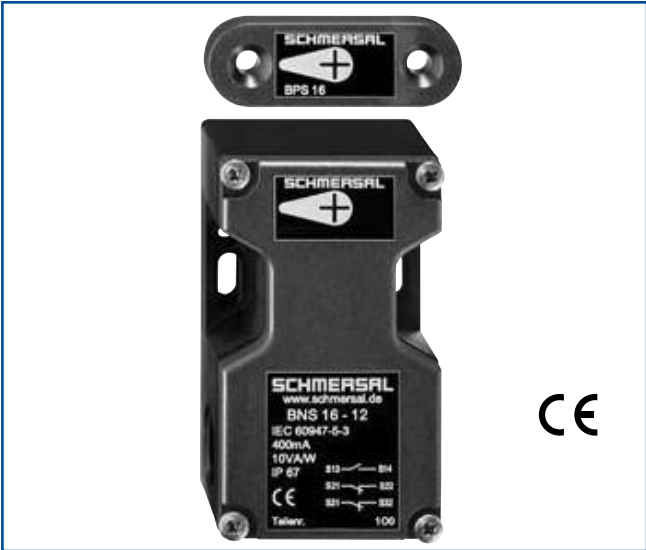
Maximum Operating Voltage	24VDC
Maximum Continuous Current Rating	40mA
Maximum Switching Capacity (Power Rating)	Voltage: 250VAC Current: 5A (1,250VA)
Type Connection	Screw terminals

DIMENSIONS & WIRING DETAILS



MISALIGNMENT ALLOWANCE





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.

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 Series AES safety controller, see selection chart on Page 147.)



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

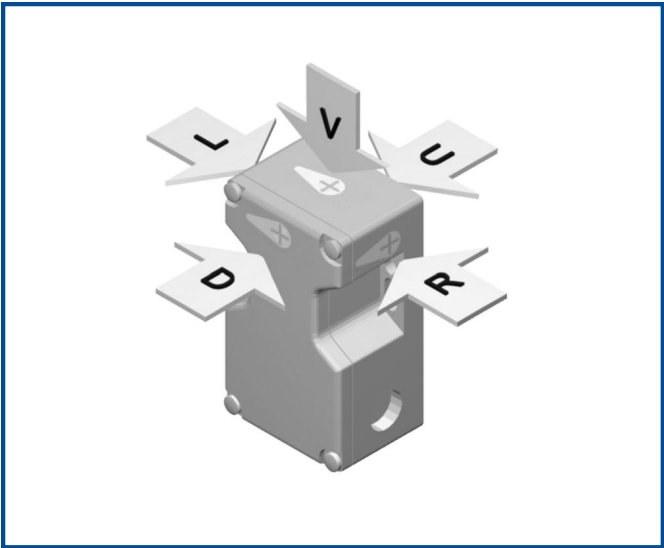
Features & Benefits

- **Sealed for submersibility** ... assures long-term reliability in the most hostile environments.
- **Tamper-resistant** ... cannot be bypassed with simple magnets.
- **Satisfy PL_c, PL_d, or PL_e to EN ISO 13849-1, or Category 1, 3, or 4 to EN 954-1** ... when used with appropriate Schmersal safety controllers.
- **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
(Actuator ordered 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



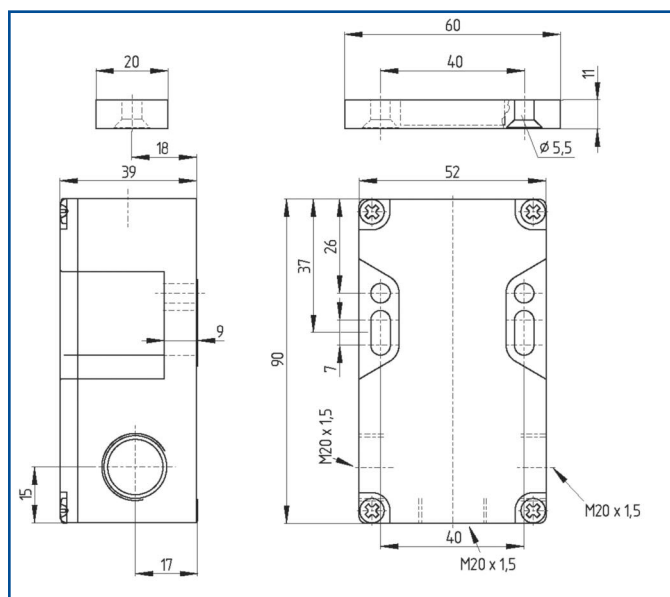
BNS16 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Fiberglass reinforced thermoplastic
Switching Distance "S" *	"On": 8mm (0.315") "Off": 18mm (0.700")
Maximum Switching Frequency	5H (in combination with Series AES safety controller)
Degree of Protection	IP67 per IEC 60529
Operating Temperature	-25°C to +70°C (-13°F to +158°F)
Operating Principle	Magnetic
Shock Resistance	30g/11ms
Vibration Resistance	10 to 55 Hz, amplitude 1mm
Conformity to Standards	EN 60347-5-3 EN ISO 13849-1 CE EN 954-1 UL BG-GS-ET-14 CSA

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

DIMENSIONS

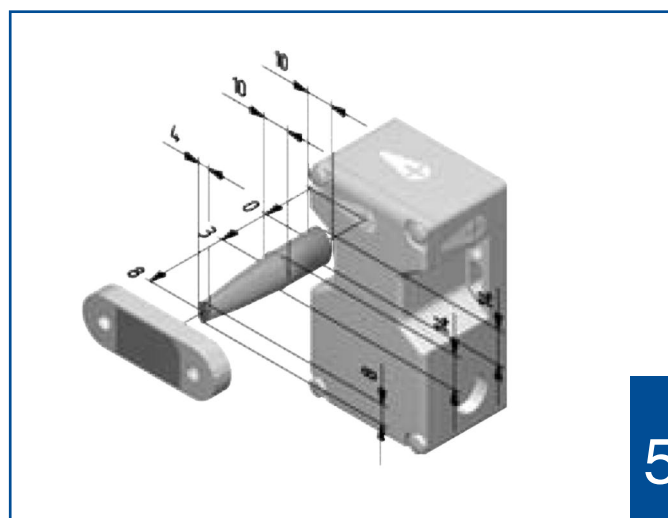


ELECTRICAL SPECIFICATIONS

Maximum Contact Rating*	100VAC/DC
Maximum Continuous Current Rating	0.4A
Maximum Switching Capacity (Power Rating)	10VA
Type Connection	3 removable cable entries (M20x1.5) give access to screw terminals with self-lifting clamps for up to 13AWG (2.5mm ²) flexible stranded wire.

*Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

AXIAL TOLERANCE



5

WIRING DETAILS

1 NO S13 — S14
2 NC S21 — S22
 S31 — S32

Contacts shown with gate closed

BNS16-11ZLR with actuation to right and left surfaces. Requires two actuators.



SERIES BNS-B20

Coded-Magnet Sensor with Safety Door Handle



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.

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.
- **Satisfy PL_c, PL_d, or PL_e to EN ISO 13849-1, or Category 1, 3, or 4 to EN 954-1** ... when used with appropriate Schmersal safety controllers.
- **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).

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) see page 96
BNS-B20-12ZG-ST-R	Sensor unit for right-hand hinged door	
BNS-B20-B-01	Actuator-door handle unit	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 Series AES safety controller, see selection chart on Page 147.)

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



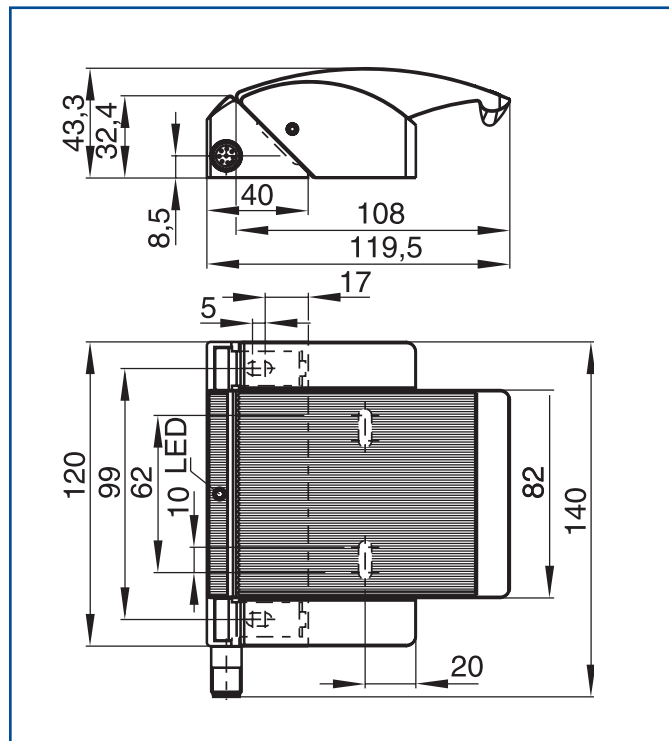
USE WITH ANY OTHER SAFETY CONTROLLER MAY DAMAGE SENSOR AND/OR VOID WARRANTY.

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 EN ISO 13849-1 BG-GS-ET-14 EN 954-1 UL CE CSA
Maximum Latching Force	Approx. 100N (22 lbs.)
Safety Control Category	Up to PL _e per EN ISO 13849-1, or 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 0.25mm²)
Contact Configuration	1 N.O. & 2 N.C. (LED in N.C. circuit)

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

WIRING DETAILS

Wiring diagram showing connections for S13, S21, S31, S14, S22, and S32. The diagram includes a circular pin configuration M12, 8 pins, with contacts shown with gate closed.

(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, up to 16 CSS 180 Safety Sensors can be wired in series without detriment to the Safety Performance Level/control category (PL_e per EN ISO 13849-1, control category 4 per 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 PL_e per EN ISO 13849-1, or Control Category 4 per EN 954-1. *See note below.
- **Designed for “daisy chaining”** ... up to 16 devices, max 200 m, can be wired in series without detriment to safety performance level.
- **Dual PNP 500mA safety outputs** ... for application versatility.

AVAILABLE CSS180 MODELS

Part 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 cables
CSS-8-180-2P+D-M-L	Series device with diagnostic output, pre-wired cables
CSS-8-180-2P-E-LST	End or single device, pre-wired cable with M12x1 4 pole connection
CSS-8-180-2P+D-E-LST	End or single device with diagnostic output, pre-wired cable with M12x1 5 pole connection
CSS-8-180-2P-Y-LST	Series device, two pre-wired cables with M12x1 4 pole connections
CSS-8-180-2P+D-M-LST	Series device with diagnostic output, two pre-wired cables with M12x1 8 pole connections

ACTUATORS & ACCESSORIES

Part Number	Description
CST-180-1	Actuator
CST-180-2	Actuator
CSA-M-1	Magnetic latch
H-18	Mounting clamp

Safety Control Module Requirements

Dual-channel safety inputs, suitable for PNP semiconductor outputs. See page 320 for recommended SCHMERSAL safety control modules.

*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 EN 60947-5-3 EN 954-1 IEC 61508	BG UL CSA EN ISO 13849-1

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 182 of the “Pulse-Echo Based Non-Contact Safety Sensors” section.



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, up to 31 CSS 34 Safety Sensors can be wired in series without detriment to the safety performance level/control category (PL_e per EN ISO 13849-1, control category 4 per 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 PL_e per EN ISO 13849-1, or Control Category 4 per 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 PL_e per EN ISO 13849-1, or Control Category 4 per EN 954-1, and may remove need for safety control module. *See note below.
- **Designed for “daisy chaining”** ... up to 31 devices, max 200 m, can be wired in series without detriment to safety performance level.
- **Dual PNP 500mA safety outputs** ... for application versatility.
- **Integrated mounting plate included** ... allows for easy and accurate alignment of sensor and actuator.

AVAILABLE MODELS (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

Note: See page 94 for M12, 9 pin connector cables.

Sensors are also available with a serial diagnostic output for use with various field bus protocols network. Please see page 204 for SD Gateways.

AVAILABLE ACTUATORS

Model Number	Description
CST34-S-1	Side surface actuator
CST34-V-1	Top surface actuator

Safety Control Module Requirements

Dual-channel safety inputs, suitable for PNP semiconductor outputs. See page 320 for recommended SCHMERSAL safety control modules.

*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 EN 954-1 CSA IEC 61508 EN ISO 13849-1

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:	Y-UL2517/8xAWG22 (8x0.35mm ²), 2m
Connector:	M12x1, 8 pin quick connect

NOTE: For complete technical data, diagnostics and wiring examples, please see page 188 of the “Pulse-Echo Based Non-Contact Safety Sensors” section.



Features & Benefits

- **Stainless Steel Housing** ... ideal for hygienic applications.
- **Non-contact sensing** ... for long term reliability.
- **IP69K rated housing (to DIN 40050-9)** ... suitable for high pressure, high temperature wash downs.
- **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 PL_e per EN ISO 13849-1, or Control Category 4 per EN 954-1.
*See note below.
- **Designed for “daisy chaining”** ... up to 31 devices, max 200 m, can be wired in series without detriment to safety performance level.
- **Dual PNP 250mA safety outputs** ... for application versatility.

Description

The CSS 30S 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 30S 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 30S Safety Sensor and CST 30S-1 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, up to 31 CSS 30S Safety Sensors can be wired in series without detriment to the safety performance level/control category (PL_e per EN ISO 13849-1, control category 4 per 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 food processing machinery, pharmaceutical and medical applications, material handling systems, packaging machinery, chemical processing equipment, and marine and outdoor applications.

AVAILABLE MODELS AND ACCESSORIES
(Accessories Ordered Separately)

Model Number	Description
CSS 11-30-SD-M-ST	2 PNP safety outputs, 1 serial diagnostic output
CSS 11-30S-D-M-ST	2 PNP safety outputs, 1 signalling output
CST 30S-1	Actuator
H 30	Mounting clamp

Note: For M12, 8 pin connection cables, see page 94.

Safety Control Module Requirements

Dual-channel safety inputs, suitable for PNP semiconductor outputs. See page 320 for the SCHMERSAL safety control modules recommended for this application.

*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 30S TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Stainless Steel
Degree of Protection	IP67 to IEC/EN 60529 IP69K to DIN 40050-9
Switching Distance	11mm
Operating Temperature	-25°C to +65°C
Storage Temperature	-25°C to +85°C
Hysteresis	< 2mm
Repeatability	< 1mm
Response Time	< 60ms
Vibration Resistance	10-55Hz, amplitude 1mm
Shock Resistance	30g/11ms
Conformity to Standards	CE UL IEC 60947-5-3 CSA IEC 61508 EN ISO 13849-1 TUV EN 954-1

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	0.8kV
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	min. (U _e – 5 V)
Signaling Output Operating Current	Max. 0.05A

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



Description

The CSS 16 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 16 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 16 Safety Sensor and CST 16-1 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, up to 16 CSS 16 Safety Sensors can be wired in series without detriment to the safety performance level/control category (PL_e per EN ISO 13849-1, or control category 4 per 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 PL_e per EN ISO 13849-1, or Control Category 4 per EN 954-1.
*See note below.
- **Designed for “daisy chaining” ...** up to 16 devices, max 200 m, can be wired in series without detriment to safety performance level.
- **Dual PNP 500mA safety outputs ...** for application versatility.
- **Same mounting dimensions as Series AZ16 ...** ideal alternative in applications with alignment problems or harsh environments.

AVAILABLE MODELS AND ACCESSORIES
(Accessories Ordered Separately)

Model Number	Description
CSS-8-16-2P-E-L	End or single device with pre-wired cable
CSS-8-16-2P+D-E-L	End or single device with diagnostic output, pre-wired cable
CSS-8-16-2P-Y-L	Series device with double pre-wired cable
CSS-8-16-2P+D-M-L	Series device with diagnostic output, pre-wired cable
CST-16-1	Actuator

Sensors available with M12 cable connector – Add **ST** after L in catalog number. See page 94 for M12 connector cables (4-, 5-, or 8-pin).

Safety Control Module Requirements

Dual-channel safety inputs, suitable for PNP semiconductor outputs. See page 320 for the SCHMERSAL safety control modules recommended for this application.

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

CST16-1 Actuator



SERIES CSS 16 TECHNICAL DATA

MECHANICAL SPECIFICATIONS

Housing	Glass fiber reinforced thermoplastic	
Degree of Protection	IP67/IP65	
Switching Distance	8mm (Nominal) 7.0mm to 11mm (Maximum)	
Operating Temperature	-25°C to +55°C for max. output current ≤ 500mA/output -25°C to +65°C for output current ≤ 200mA/output -25°C to +70°C for output current ≤ 100mA/output	
Storage Temperature	-25°C to +85°C	
Hysteresis	max. 1mm	
Repeatability	< 0.5mm	
Response Time	≤ 30ms	
Vibration Resistance	10-55Hz, amplitude 1mm	
Shock Resistance	30g/11ms	
Conformity to Standards	CE IEC 61508 IEC 60947-5-3 EN ISO 13849-1	BG UL CSA EN 954-1

ELECTRICAL SPECIFICATIONS

Mode of Operation	Inductive
Rated Operating Voltage	24 VDC -15%/+10%
Rated Operating Current	1.1A
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	4x0.5mm², 5x0.34mm², or 7x0.25mm²

NOTE: For complete technical data, diagnostics and wiring examples, please see page 212 of the “Pulse-Echo Based Non-Contact Safety Sensors” section.



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