Ultrasonic sensors
XX range

Catalogue

Simply easy!™

Telemecanique

Optimise detection with XX range

Detect objects in challenging applications with our XX ultrasonic sensors range. These ultrasonic sensors offer an efficient solution for reliable and high performance detection at distances of up to 8 m, on window mode*.

* The window mode enables suppression of the foreground and the background using the same sensor.

> A technology suited to your needs

Detect objects regardless lightning conditions or material reflectivity degree.

> 3 operating modes for efficient detection

Ideal for detecting irregular-shaped objects.

> Short or long distance detection

From 50 mm up to 8 m.

Contents

Selection guide based on applications ..... pages 4 and 5
Product selection guide ..... pages 6 to 9
Application examples ..... pages 10 to 15
General ..... pages 16 to 21
Cylindrical sensors ..... pages 22 to 41
Cylindrical sensors, configurable by software ..... pages 42 to 61
Obstacle detection system for mobile equipment ..... pages 62 to 67
Flat format sensors ..... pages 68 to 71
XX configuration software ..... pages 74 to 77
Accessories ..... pages 78 and 79
Product reference index ..... page 80

A technology suited to your needs

Ultrasonic sensors enable non-contact detection of objects in many kinds of industrial environment, irrespective of :

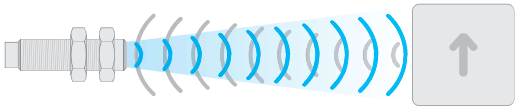
- material (metal, plastic, wood, cardboard, etc.),
- nature (solid, liquid, powder, paste, etc.),
- colour,
- degree of transparency.

The ultrasonic sensors are simple to install; they feature integrated connectors, or cable versions in select models, and offer a wide range of cabling and mounting accessories for a seamless integration.

3 operating modes for efficient detection

Diffuse mode

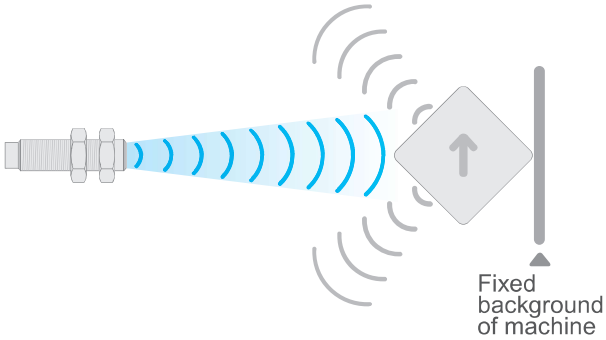
An object reflects the ultrasonic wave back to the sensor which, in turn, changes the output state.
This operating mode is well suited for detecting objects with flat surfaces that are positioned perpendicularly to the direction of the ultrasonic beam.



Reflex mode

The sensor is permanently detecting a fixed background (previously taught) on a machine or application. When another object breaks the ultrasonic beam, the output changes its state.

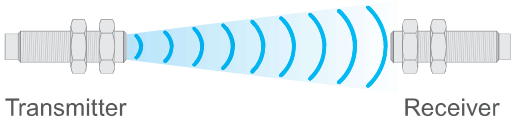
Well suited for detecting objects that absorb the ultrasonic waves (sponges, etc.) or that do not reflect the wave back to the sensor (non-flat surfaces, pointy or irregular-shaped objects).



Thru-beam mode

The transmitter is constantly sending an ultrasonic wave to the receiver. When an object breaks the ultrasonic beam, the output changes its state.

Well suited for small object detection and applications where higher accuracy and faster response time are required.



Long distance proximity detection

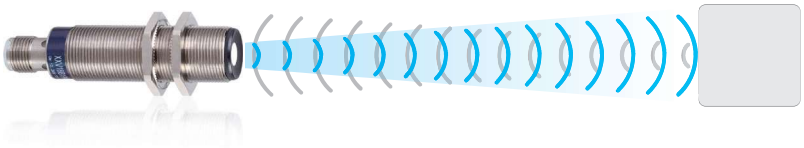
Ultrasonic technology allows now for long distance proximity detection. The XXV Ø18 ultrasonic sensors enable detection from 0 to 50 mm (i.e. 2.5 times farther than standard inductive proximity sensors) with minimal environment constraints or object material and colour restrictions.

Sensors mounted too close to moving-metal parts are exposed to hits or impacts which can cause machine downtime. Being able to install sensors farther away from moving targets reduces the exposure to potential incidents.
You increase installation profitability!

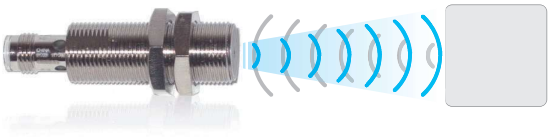
x 2.5

detection distance than standard inductive proximity sensors

XXV Ø 18 sensor



Standard inductive proximity sensor



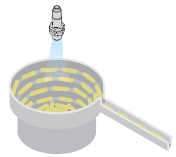
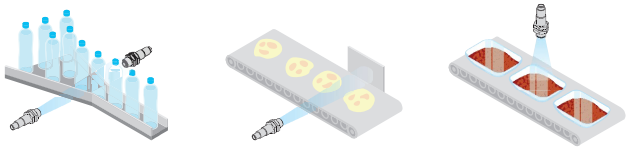
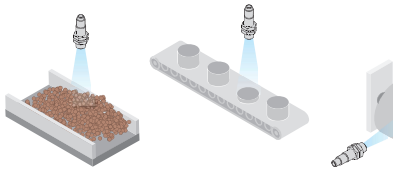
The XXV ultrasonic sensor is a “Plug and Play” solution with no adjustment or teaching required. Its solid-state output changes state when an object is less than 50 mm away from the sensor face.

Its accurate and well-defined transmission angle enables precise detection. Crosstalk with other sensors and object edge effects are mastered.

Plug & Play solution

100 %

Worldwide availability

Sensor type	Detection "Digital"							Regulation "Ar
								
	Assembly			Conveying			Packaging	Conveying	Packa
	Machine part	Vibrating bowl	Presence Absence	Transparent bottles	Jam	Flow	Transparent film	Material level	Height of part	Ra of str
Ø 18 (M18x1)										
Ø 12 (M12x1)										
Ø 18 (M18x1)										
Ø 30 (M30x1.5)										
79x32.5+Ø 54										
7.6x19x33										

Ultrasonic sensors

XX range

Cylindrical type

Applications
Non-contact detection of sound reflecting objects regardless their shape, material, colour, orientation, etc.

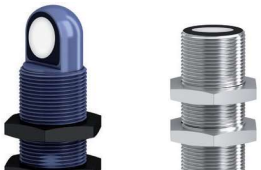
Sensors with solid-state digital output

Cylindrical type

Dimensions (mm)		**Ø 12** (M12 x 1)			**Ø 18** (M18 x 1)			**Ø 18** (M18 x 1) *(continued)*		**Ø 30** (
Sensing distance Sn	**Diffuse**	**5 cm**	**10 cm**	**–**	**5 cm**	**15 cm**	**50 cm**	**–**	**1 m**	**1 m**
	Reflex	**–**	**–**	**–**	**–**	**–**	**50 cm**	**–**	**1 m**	**1 m**
	Thru-beam	**–**	**–**	**20 cm**	**–**	**–**	**–**	**61 cm/1 m**	**–**	**–**
Assured operating distance (mm)		6.4...51 fixed	6.4...102 fixed	**–**	2...50 fixed	25...152 fixed	Adjustable using teach mode	**–**	Adjustable using teach mode	Adjust
Power supply		12...24 V ⎓ with protection against reverse polarity						12...24 V ⎓ with protection against reverse polarity		12...24
Type of output		PNP/NPN	NPN or PNP	PNP/NPN	PNP or NPN	PNP/NPN	NPN or PNP	PNP/NPN	PNP	PNP o
Function		NO	NO	NO/NC	NO NC	NO	NO	NO NC	NO or NC (selectable)	NO or or NO
Degree of protection		IP 67	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67
Connection		M8 connector	M8 connector	M8 connector	M12 connector or pre-cabled	M12 connector	M12 connector or pre-cabled	M12 connector	M12 connector	M12 c
Sensor type		**XX512A1●**	**XX512A2●**	**XX●12A8●**	**XXV18B1●**	**XX518A1●**	**XX518A3●**	**XX●18A3●** **XX●18A4●**	**XX●18●1PM12**	**XX●3** **XX6V** **XX63**
Page		22			22		26	26	30	36 an

Sensors with analogue output

Cylindrical type

Dimensions (mm)		**Ø 18** (M12 x 1)						**Ø 18** (M12 x 1) *(continued)*		**Ø 30**
										
Sensing distance Sn	**Diffuse**	**5 cm**	**10 cm**	**–**	**5 cm**	**15 cm**	**50 cm**	**–**	**1 m**	**1 m**
	Reflex	**–**	**–**	**–**	**–**	**–**	**50 cm**	**–**	**1 m**	**1 m**
	Thru-beam	**–**	**–**	**20 cm**	**–**	**–**	**–**	**61 cm/1 m**	**–**	**–**
Assured operating distance (mm)		6.4...51 fixed	6.4...102 fixed	**–**	2...50 fixed	25...152 fixed	Adjustable using teach mode	**–**	Adjustable using teach mode	Adjust
Power supply		12...24 V ⎓ with protection against reverse polarity						12...24 V ⎓ with protection against reverse polarity		12...24
Type of output		PNP/NPN	NPN or PNP	PNP/NPN	PNP or NPN	PNP/NPN	NPN or PNP	PNP/NPN	PNP	PNP o
Function		NO	NO	NO/NC	NO NC	NO	NO	NO NC	NO or NC (selectable)	NO or or NO
Degree of protection		IP 67	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67
Connection		M8 connector	M8 connector	M8 connector	M12 connector or pre-cabled	M12 connector	M12 connector or pre-cabled	M12 connector	M12 connector	M12 c
Sensor type		**XX512A1●**	**XX512A2●**	**XX●12A8●**	**XXV18B1●**	**XX518A1●**	**XX518A3●**	**XX●18A3●** **XX●18A4●**	**XX●18●1PM12**	**XX●3** **XX6V** **XX63**
Page		22			22		26	26	30	36 an

Ultrasonic sensors
XX range
Flat format

Applications
Non-contact detection of sound reflecting objects regardless their shape, material, colour, orientation, etc.

Sensors with solid-state digital output

Flat format

Dimensions (mm)		**7.6 x 19 x 33**	**16 x 30 x 74**	**18 x 33 x 60 + Ø 18** (M18 x 1)
Sensing distance Sn	**Diffuse**	**10 cm**	**25 cm**	**50 cm (ajustable)**
	Reflex	–	–	**50 cm (ajustable)**
	Thru-beam	–	–	–
Assured operating distance (mm)		6.4...100 fixed	51...250 fixed	Adjustable using teach mode
Power supply		12...24 V ⎓ with protection against reverse polarity		12...24 V ⎓ with protection against reverse po
Type of output		NPN or PNP	PNP	NPN or PNP
Function		NO	NO	NO
Degree of protection		IP 67	IP 67	IP 67
Connection		M12 connector on flying lead	M12 connector	M12 connector
Sensor type		**XX7F1A2●**	**XX7K1A2PAM12**	**XX7V1A1●AM12**
Page		68	68	68

Sensors with solid-state digital output and analogue output

Format for mobile equipments

Dimensions (mm)		**79 x 32.5 + Ø 54**

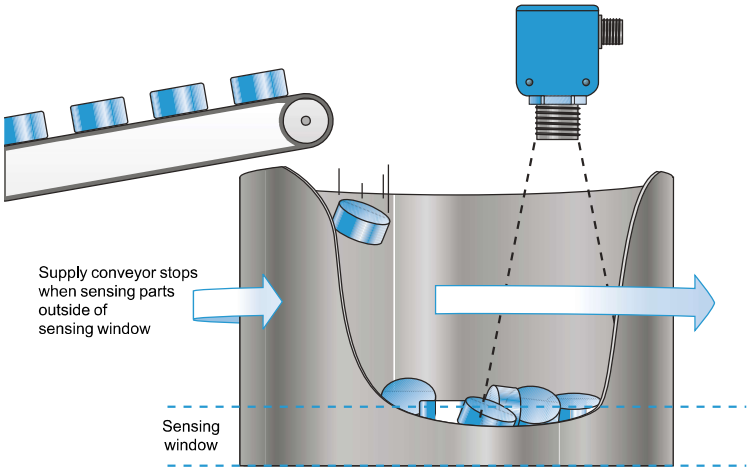
Sensors with analogue output

Flat format

18 x 33 x 65 + Ø 18 (M18 x 1)

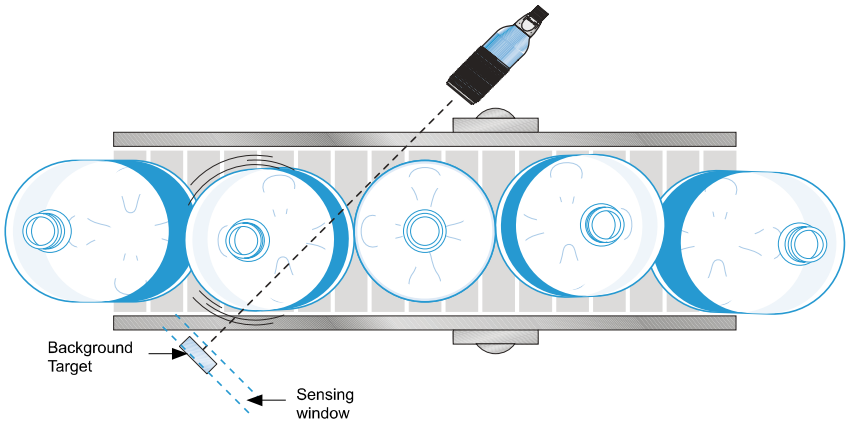
Feeder bowl supply control

XXS18, XXA18, XX7V1A1



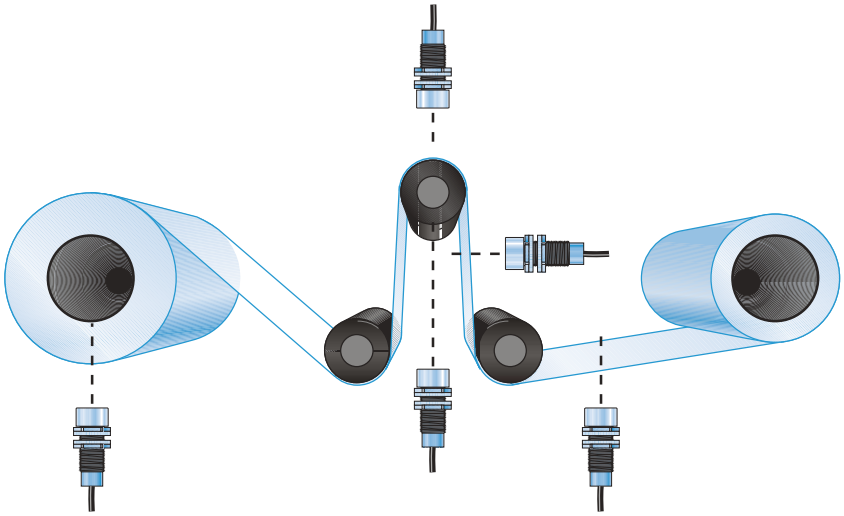
Conveyor jam and backup detection

XXS18, XXA18, XXB18A3



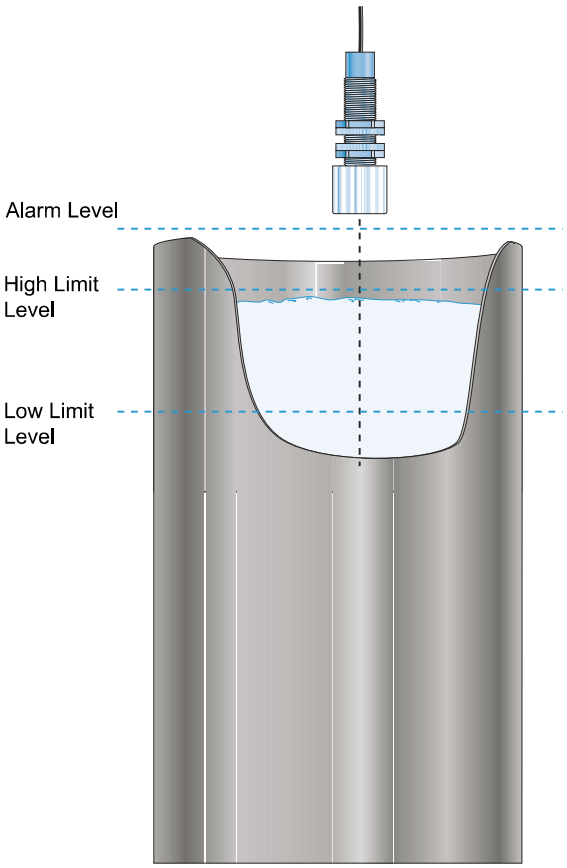
Web process control sensing functions

XXS18, XXS30



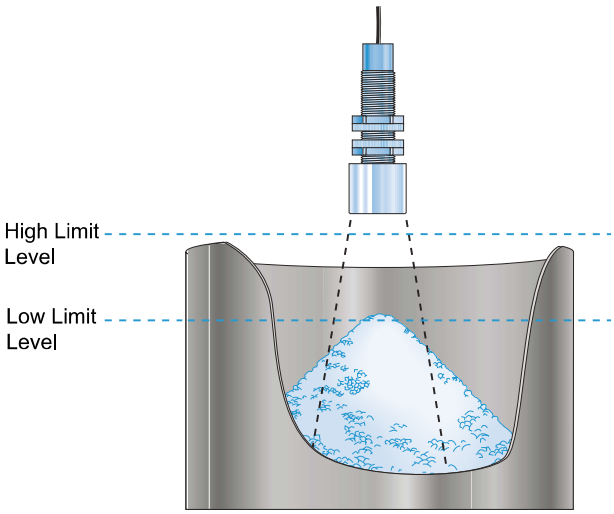
Dual level high-low latch control detection of liquids

XXS30P8, XX230A3



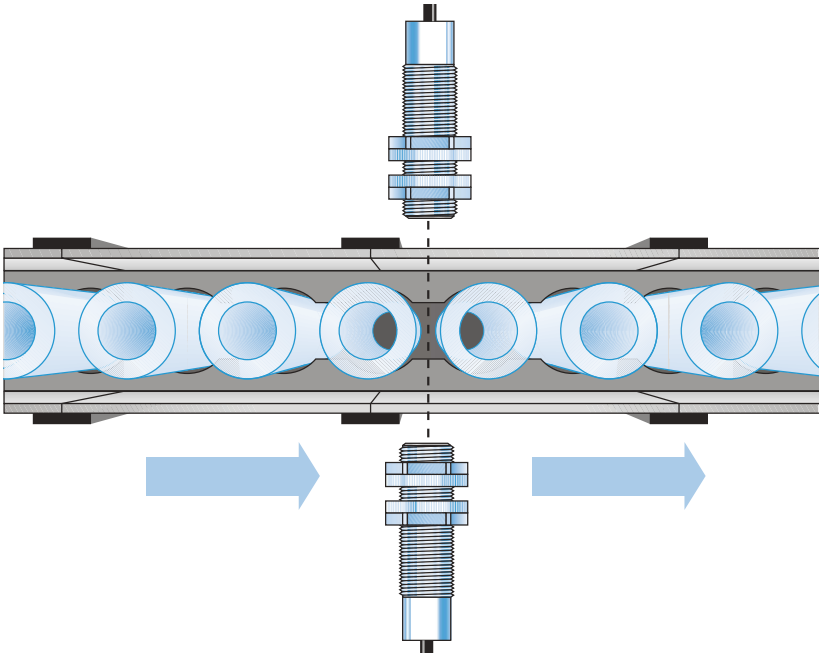
High level detection

XXS30P8, XX630A3



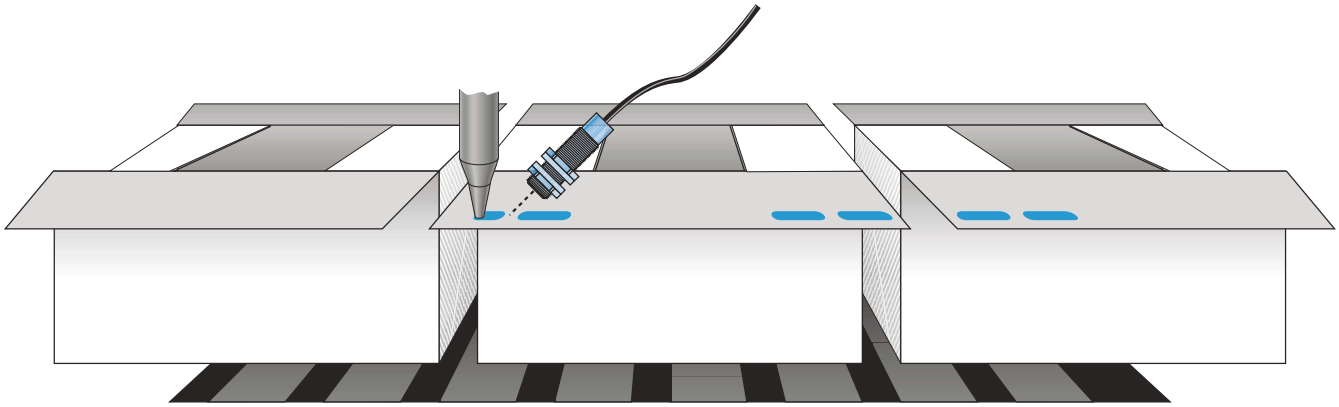
Accurate high speed counting of cylindrical clear objects

XXT18 + XXR18



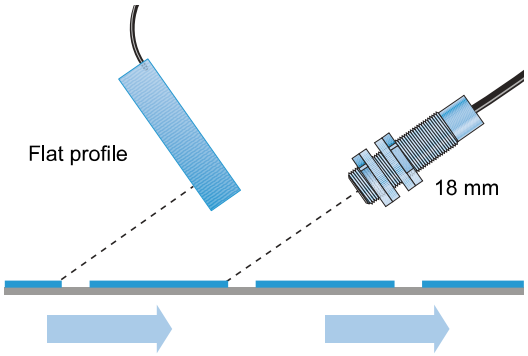
Glue bead detection

XXV18



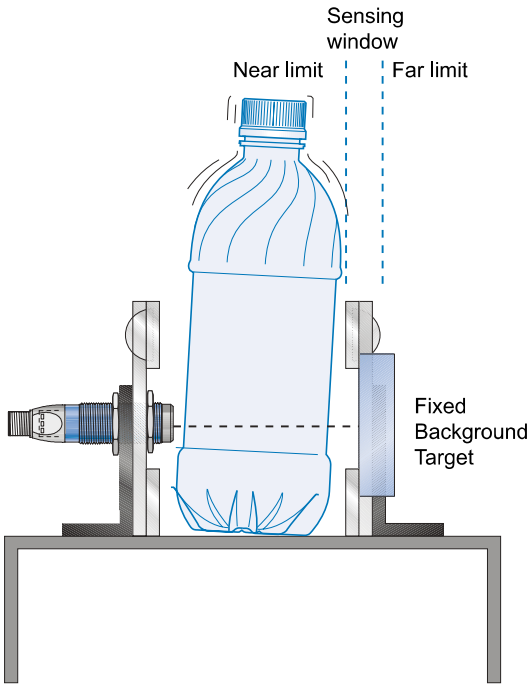
Label edge detection on carrier web

XX7K, XX7F (flat format), **XX518A3** (M18)



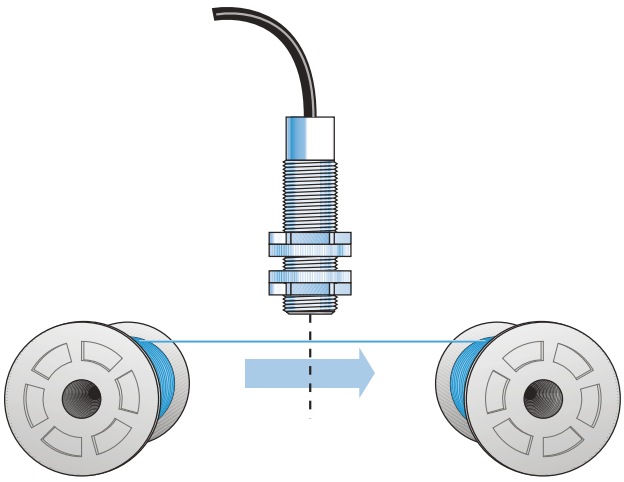
Clear bottle detection for sustainable environments

XXS18, XXA18, XXB18



Broken wire/thread detection

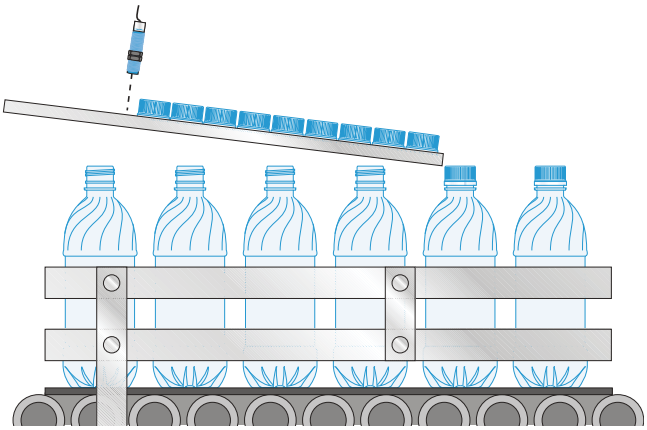
XXV18



Missing cap detection low cap supply

Automatically stops filler and capper

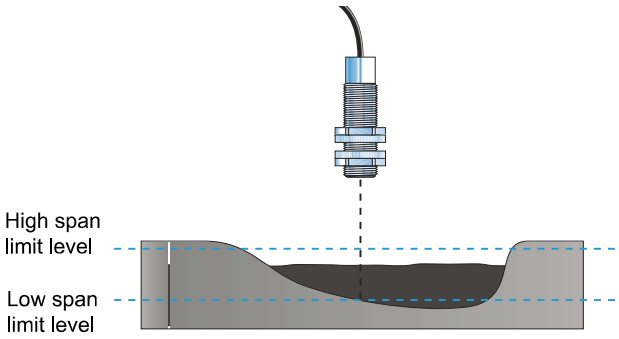
XX512



Continuous level monitoring

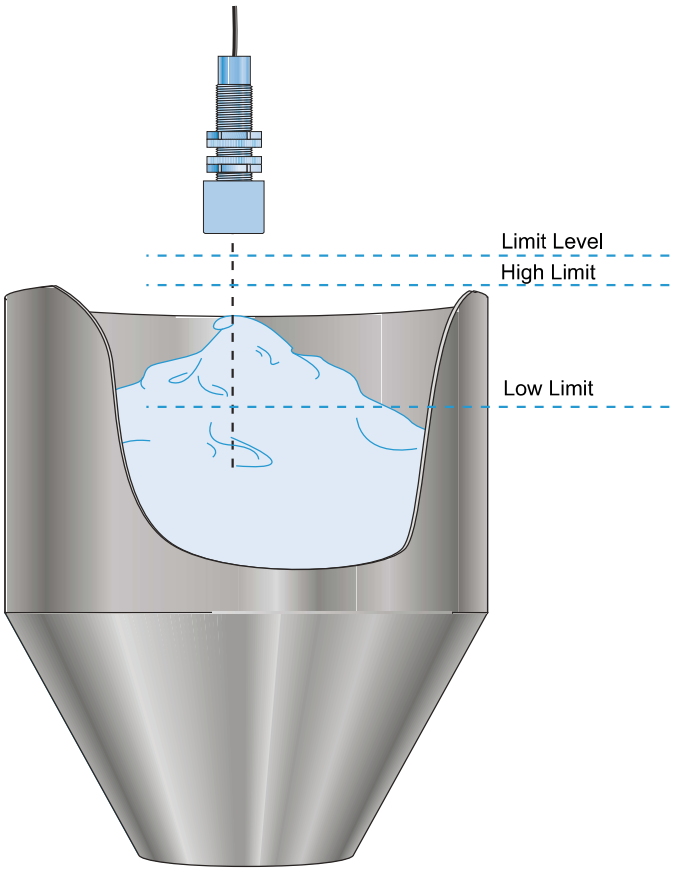
Analog output sensors

XXS18, XXS30, XX918, XX930



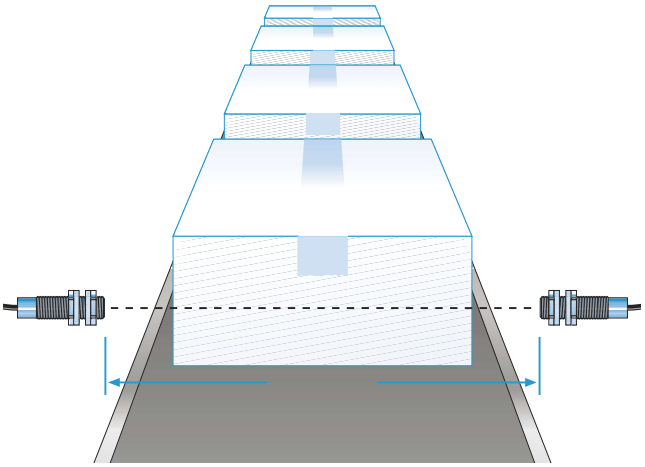
Dual level high-low latch control detection

XXS30●●PM12, XX230

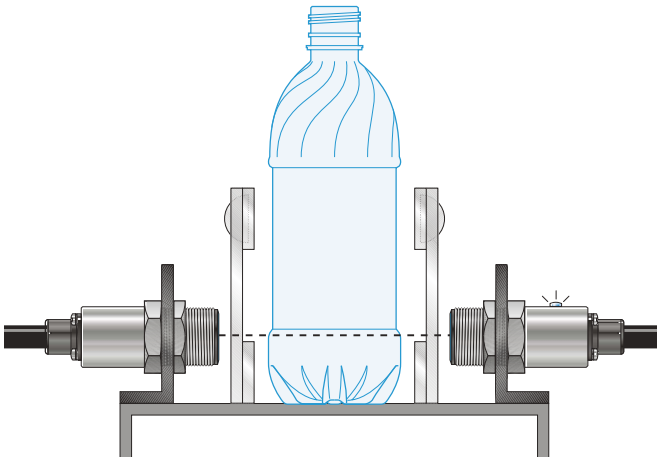


Lead edge or backup detection

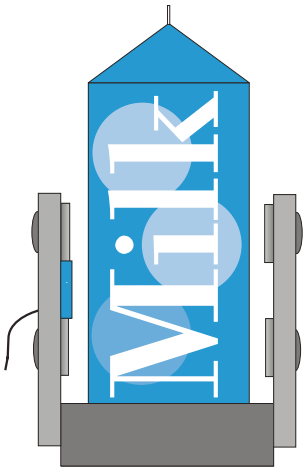
XXT18 and XXR18



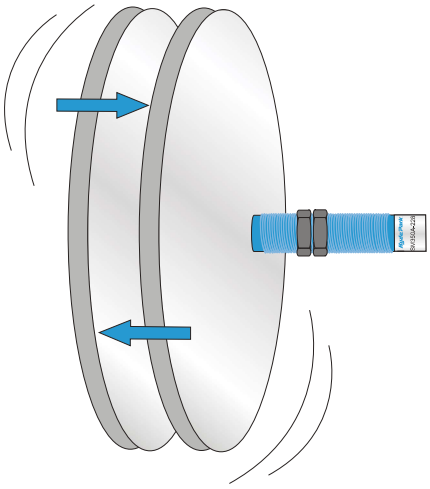
Clear bottle detection
XXT12 and XXR12



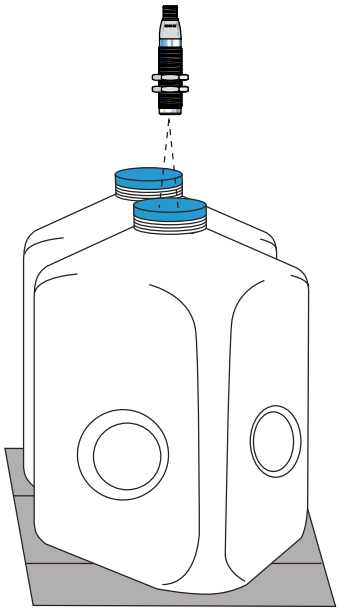
Container detection
XX7F1



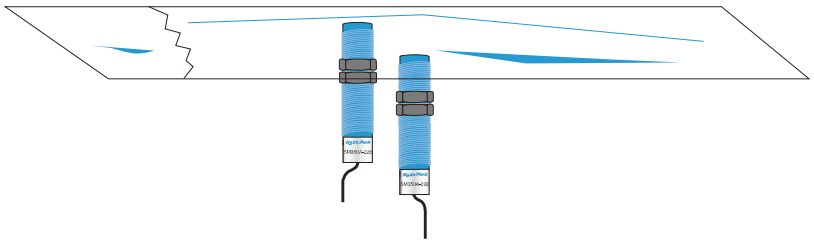
Metal material detection
XX512



Missing cap detection
XX518

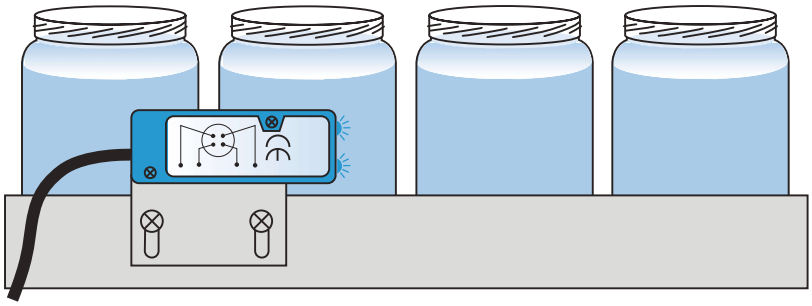


Clear web detection
XX512



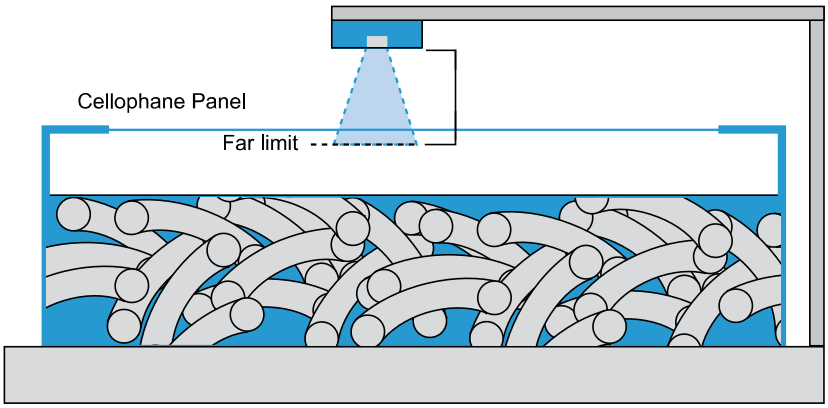
Container detection

XX7F1



Clear cellophane panel detection

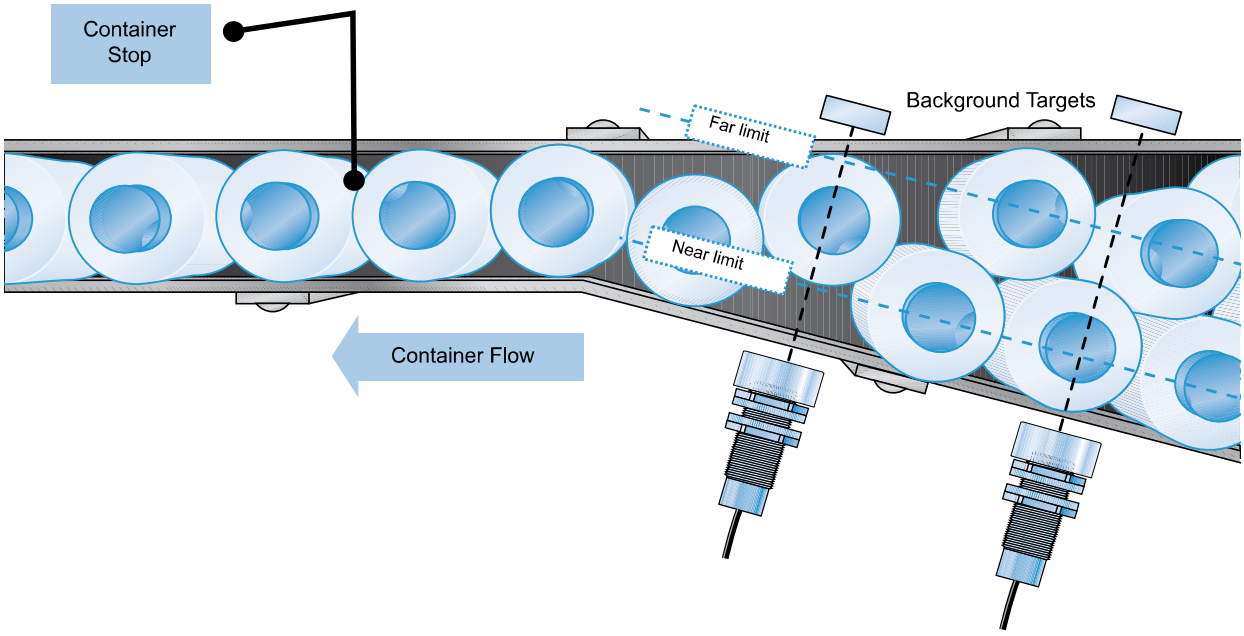
XX7F1A2



Single file jam protection

Dual level latch control sensor

XX218 and XX230



Ultrasonic sensors
XX range

Quality, standards and certifications

Quality control

The XX ultrasonic sensors models are subjected to special precautions in order to guarantee their reliability in arduous industrial environments.

■ **Qualification**
A **qualification procedure** on the characteristics of XX range ultrasonic sensors is carried out in our laboratories.

■ **Production**
The electrical characteristics and the sensing distances at the ambient and operating temperatures are 100% verified.
Sensors are statistically selected during the course of production and subjected to **monitoring tests** on all qualified characteristics.

■ **Customer returns**
Returned ultrasonic sensors are subjected to systematic analysis and corrective actions are implemented to eliminate recurrence of the fault.

Conformity to standards

The XX ultrasonic sensors models conform to the standards IEC 60947-5-2.
Standards and characteristics: refer to pages 23, 27, 32, 38, 41, 45, 46, 50, 54 and 58.

Resistance to chemicals in the environment

To ensure lasting efficient operation, it is essential that any chemicals coming into contact with the ultrasonic sensors will not affect their casing and, in doing so, prevent their reliable operation.

Due to the materials used, the XX ultrasonic sensors models are very resistant to:

■ Chemical agents:
salts, aliphatic and aromatic oils,
petroleum, diluted bases and acids.
Depending on their nature and concentration, tests should be carried out beforehand for the following chemical agents:
alcohols, ketones and phenols.

■ Food and beverage industry products:
vegetable oils, animal fats,
fruit juices,
milk proteins, etc.

Resistance to the environment

■ **IP 65**: protection against water jets.
Tested in accordance with IEC 60529: the device is subjected to water sprayed from a Ø 6.3 mm nozzle, at a flow rate of 12.5 litres/min for 3 min at a distance of 3 m.
No deterioration in either operating or insulation characteristics is permitted.

■ **IP 67**: protection against the effects of immersion.
Tested in accordance with IEC 60529: the sensor is immersed for 30 minutes in 1 m of water.
No deterioration in either operating or insulation characteristics is permitted.

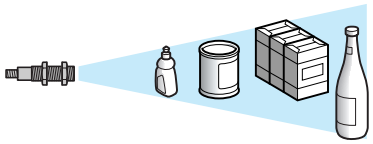
■ **IP 69K**: protection against the effects of high pressure cleaning. Adherence to standard DIN 40050 which stipulates that the product must withstand a water jet at a pressure of 90 bar and temperature of +80°C for 3 minutes.
No deterioration in either operating or insulation characteristics is permitted.

Ultrasonic sensors
XX range

Recommendations

The ultrasonic sensors are designed for use in standard industrial applications involving presence detection.
Since these sensors do not incorporate a redundant electrical circuit, they are not suitable for use in safety applications.
For safety applications, please refer to our website www.tesensors.com

Principle of ultrasonic detection

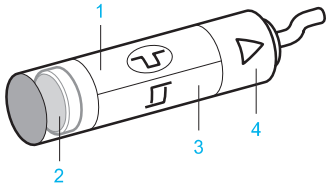


Presentation

Ultrasonic sensors enable detection, without contact, of objects irrespective of its:
- material (metal, plastic, wood, cardboard, etc.),
- nature (solid, liquid, powder, etc.),
- colour,
- degree of transparency.

They are used in industrial applications for detecting, for example:
- the position of machine parts,
- the presence of the windscreen during automobile assembly,
- the flow of objects on a conveyor system: glass bottles, cardboard packages, cakes, etc.,
- the level
  - of different colour paints in pots,
  - of plastic pellets in injection moulding machine feeders.

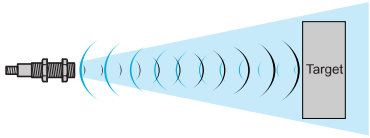
The ultrasonic sensors are simple to install due to their integral connector and availability of cabling and fixing accessories.



Operating principle

The principle of ultrasonic detection is based on measuring the time taken between transmission of an ultrasonic wave (pressure wave) and reception of its echo (return of transmitted wave).

The XX ultrasonic sensors models comprise:
1 a high voltage generator
2 a piezoelectric transducer (transmitter and receiver)
3 a signal processing stage
4 an output stage



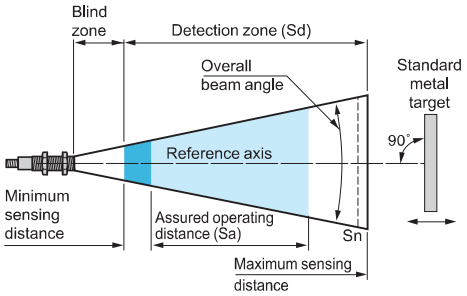
Excited by the high voltage generator 1, the transducer (transmitter-receiver) 2 generates a pulsed ultrasonic wave (200 to 500 kHz depending on the product) which travels through the ambient air at the speed of sound. When the wave strikes an object, it reflects (echo) and travels back towards the transducer. A micro controller 3 analyses the signal received and measures the time interval between the transmitted signal and the echo. By comparison with the preset or taught times, it determines and controls the output states 4.
The output stage 4 controls a solid-state switch (PNP or NPN transistor) corresponding to a NO or NC contact (detection of object).

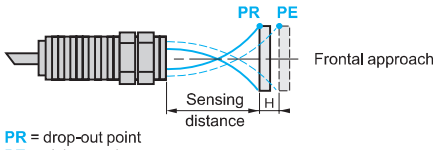
Advantages of ultrasonic detection

- No physical contact with the object to be detected, therefore, no wear and detection possible of fragile and/or freshly painted objects, etc.
- Detection of materials, irrespective of colour, at the same distance, without adjustment or correction factor.
- Teach mode function, by simply pressing a button, for defining the effective detection zone. Teaching of the minimum and maximum sensing distances (very precise foreground and background suppression, ± 6 mm).
- Very good resistance to industrial environments (robust products entirely encapsulated in resin).
- Solid-state units: no moving parts in the sensor, therefore, service life independent of the number of operating cycles.
- Various types of outputs to suit requirements:
  - Digital output for level control or detection of any type of object
  - Analogue output for controlling systems that require a signal that is proportional to the distance at which the object is detected.

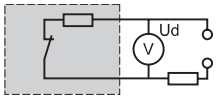
Ultrasonic sensors
XX range

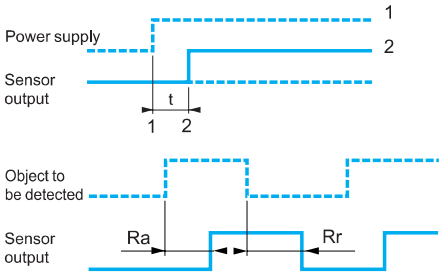
Terminology





PR = drop-out point
PE = pick-up point





Definitions

The terms listed below are defined by the standard IEC 60947-5-2:

■ Nominal sensing distance (Sn)
Conventional value for indicating the sensing distance. It does not take into account manufacturing tolerances nor variations caused by external conditions such as voltage and temperature.

■ Detection zone (Sd)
Zone in which the sensor is sensitive to objects.

■ Minimum sensing distance
Lower limit of the specified detection zone.

■ Maximum sensing distance
Upper limit of the specified detection zone.

■ Assured operating distance (Sa)
This corresponds to the operating zone of the sensor (activation of outputs), and is included in the detection zone. It is also known as the “detection window”.
Its limits are fixed:
- at the factory for fixed sensing distance sensors,
- when setting-up within the application for sensors with teach mode.

■ Blind zone: Zone located in front of the sensing face of the sensor.
For diffuse sensors, it is the zone in which the object will not be reliably detected.
For reflex sensors, it is the zone in which the target (fixed background of machine for example) will not be reliably detected, but the object can be in this zone.
For thru-beam sensors, there is no blind zone.

■ Differential travel
The differential travel (H) or hysteresis is the distance between the pick-up point as the standard metal target moves towards the sensor and the drop-out point as it moves away from the sensor.

■ Repeat accuracy
The repeat accuracy (R) is the precision of reproduction between two successive measurements of the sensing distance, made in identical conditions.

■ Overall beam angle
Fixed angle around the reference axis of an ultrasonic proximity sensor.

■ Standard metal target
The standard IEC 60947-5-2 defines the standard target as a square metal plate, 1 mm thick with rolled finish, placed perpendicularly to the reference axis.
Its side dimension depends on the detection zone:

Detection zone (mm)	Size of target (mm)
< 300	10 x 10
300 < d < 800	20 x 20
> 800	100 x 100

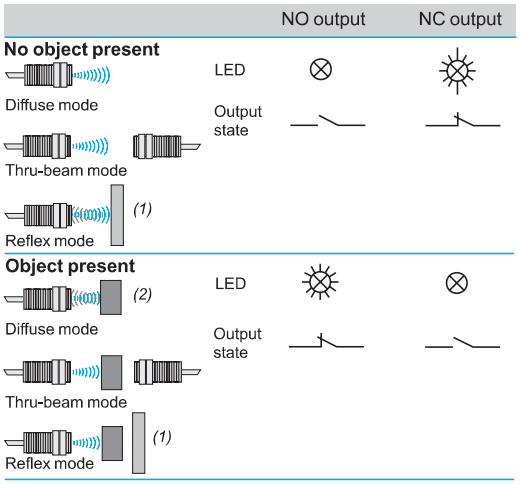
■ Voltage drop (Ud)
The voltage drop (Ud) corresponds to the voltage at the terminals of the sensor when in the closed state (value measured at the nominal current of the sensor).

■ First-up delay
Time required to ensure operation of the sensor’s output signal following power-up.
1 *Power-up*
2 *Output signal state (0 or 1)*

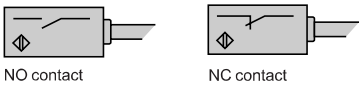
■ Response time
Response time (Ra): time taken between the instant the object to be detected enters the active zone and the changing of the output signal state. This time limits the passing speed of the target in relation to its dimensions.
Recovery time (Rr): time taken between the object being detected leaving the active zone and the changing of the output signal state. This time limits the interval between 2 objects.

Ultrasonic sensors
XX range

Digital outputs



(1) Fixed background of machine
(2) Object



LED indicators

The majority of XX ultrasonic sensors models incorporate light-emitting diode output state indicators.

- Ø 12 sensor
  - Green LED (power on)
  - Yellow LED (object present)
- Ø 18 sensor, sensitivity 500 mm (except thru-beam versions XXT18 and XXR18)
  - Yellow LED (object present) or green LED (power on) + user assistance when adjusting the detection zone
- Ø 30 sensor
  - Multicolour LED for assisting the user when adjusting the detection distance
  - Yellow LED (object present)
  - Analogue version with LED (object present, with luminosity increasing as output signal increases)
- Parallelepiped format sensor
  - XX●F: Dual colour yellow (object present) or green (power on) LED
  - XX●V: Dual colour yellow (object present) or green (power on) LED + user assistance when adjusting the detection zone
  - XX7K: Yellow LED (object present); green LED (power on)
  - XXTK: Yellow LED (object present) only
  - XX●D: Yellow LED (object present); green LED (power on)
  - Analogue version with LED (object present, with luminosity increasing as output signal increases)

Sensors with digital switching

Output contact logic

- NO contact (normally open)

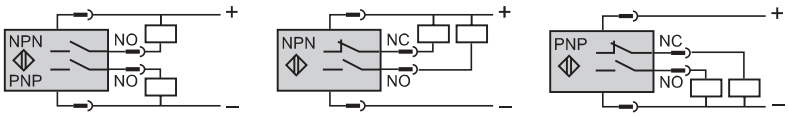
Corresponds to a sensor whose output changes to the closed state when an object is present in the detection window.

- NC contact (normally closed)

Corresponds to a sensor whose output changes to the open state when an object is present in the detection window.

4-wire technique ⎓

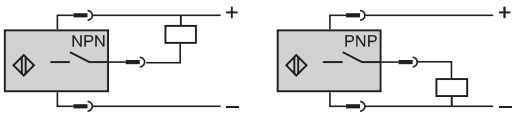
NO output/PNP and NPN	NO + NC output/NPN	NO + NC output/PNP



These sensors comprise 2 wires for the supply and 1 wire for each output signal

3-wire technique ⎓

NO output/NPN	NO output/PNP



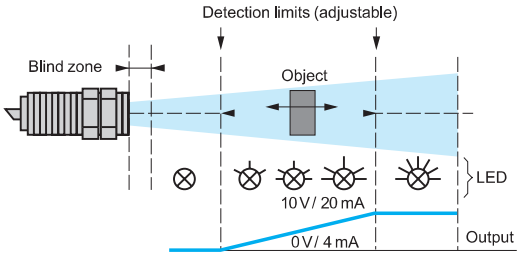
These sensors comprise 2 wires for the supply and 1 wire for the output signal,

PNP type: switching the positive side to the load.
NPN type: switching the negative side to the load.

Sensors with analogue output

Operation

The characteristic feature of these sensors is the output which delivers a signal (either current or voltage) that is proportional to the distance of the object being detected. Within the detection limits, which are adjustable using teach mode, the value of the output signal increases or decreases in relation to the distance of the object.
When an object is detected, an LED indicator (D) illuminates and its luminosity increases in relation to the value of the output signal. The slope of the signal can simply be changed by pressing the teach button



Advantages

- Visual information available relating to the sensor/object distance.
- Protection against reverse polarity.
- Protection against overloads and short-circuits.
- No residual current, low voltage drop.

Ultrasonic sensors
XX range

Power supply

Sensors for DC circuits

■ **DC source:** Check that the voltage limits of the sensor and the acceptable level of ripple, are compatible with the supply used.

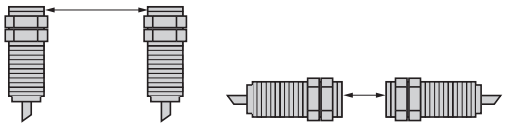
■ **AC source** (comprising transformer, rectifier, smoothing capacitor): The supply voltage must be within the operating limits specified for the sensor.

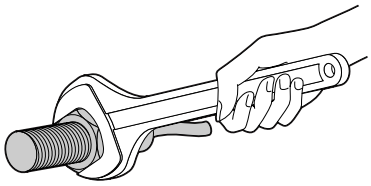
Where the voltage is derived from a single phase AC supply, the voltage must be rectified and smoothed to ensure that:
- the peak voltage of the DC supply is lower than the maximum voltage rating of the sensor.
Peak voltage = nominal voltage x √2
- the minimum voltage of the supply is greater than the minimum voltage rating of the sensor, given that:
$\Delta V = (I \times t) / C$
ΔV = max. ripple: 10% (V),
I = anticipated load current (mA),
t = period of 1 cycle (10 ms full-wave rectified for a 50 Hz supply frequency),
C = capacitance (µF).
As a general rule, use a transformer with a lower secondary voltage (Ue) than the required DC voltage (U).

Example:
18 V ∼ to obtain 24 V ⎓ ,
36 V ∼ to obtain 48 V ⎓.

Setting-up precautions

For diffuse sensors:





Mounting

Mounting distance between ultrasonic sensors

If 2 standard sensors are mounted too close to each other, the wave transmitted by one sensor is likely to interfere with the other and result in erratic operation.
In order to avoid this, it is necessary to adhere to the minimum distances between sensors. See setting-up precautions.

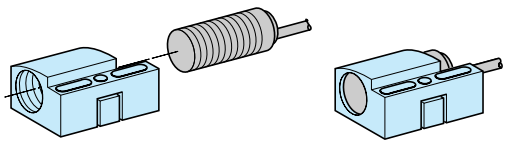
Maximum tightening torque

Cylindrical sensors	Diameter mm	Tightening torque
XX●12●	Ø 12	0.7 N.m/ 0.52 lb-ft
XX●18●	Ø 18	1 N.m/ 0.74 lb-ft
XX●30●	Ø 30	1.35 N.m/ 1 lb-ft
XX●V3●	Ø 30	1.35 N.m/ 1 lb-ft
XXS18*/ XXA18*	Ø 18 (Plastic)	2 N.m / 1.47 lb-ft
	Ø 18 (Metal)	15 N.m / 11.06 lb-ft

Flat sensors	Screw	Tightening Torque
XX●F●	M3	0.7 N.m/ 0.52 lb-ft
XX●K●	M4	1 N.m/ 0.74 lb-ft
XX●V●	M3	0.7 N.m/ 0.52 lb-ft
	Ø 18	1 N.m/ 0.74 lb-ft

Interchangeability

Interchangeability is made easy by using **indexed** fixing clamps:
XSZB112 (Ø 12 mm),
XSZB118 (Ø 18 mm),
XSZB130 (Ø 30 mm),
XXZB118 (Ø 18 mm),



XSZB1●●

Cabling

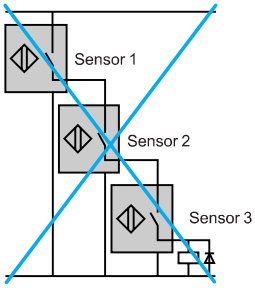
Electrical connection

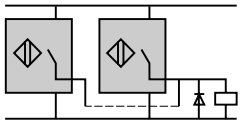
■ **Connect the sensor before switching on the supply**

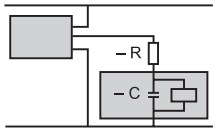
■ **Length of cable**
No limitation up to 200 m or up to a line capacitance of < 0.1 µF.
It is, however, advisable to take into account the voltage drop on the line.

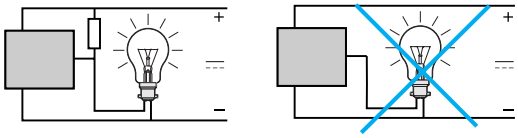
■ **Separation of control and power cables**
The sensors are immune to electrical interference encountered in normal industrial conditions. Where extreme conditions of electrical "noise" could occur (large motors, spot welders, etc.), it is advisable to protect against transients in the normal way:
- suppress interference at source,
- separate power and control wiring from each other,
- smooth the supply,
- limit the length of cable.

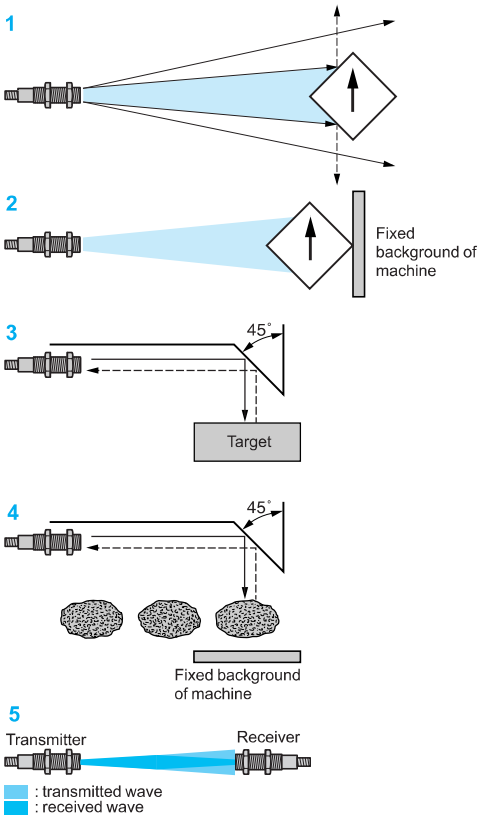
Setting-up precautions (continued)











Connection in series

This connection method is not recommended.

- Correct operation of the sensors cannot be assured and, if this method is used, tests should be made before installation.

The following points should be taken into account:
Sensor 1 carries the load current in addition to the no-load current consumption values of the other sensors connected in series. For certain models, this connection method is not possible unless a current limiting resistor is used.
When in the closed state, each sensor will produce a voltage drop and, therefore, the load voltage should be selected accordingly.
As sensor 1 closes, sensor 2 will not operate until a certain time "T" has elapsed (corresponding to the first-up delay) and likewise for the following sensors in the sequence.
"Flywheel" diodes should be used when the load being switched is inductive.

Sensors and units in series with an external mechanical contact

- The following points should be taken into account:

When the mechanical contact is open, the sensor is not supplied.
When the contact closes, the sensor will not operate until a certain time "T" has elapsed (corresponding to the first-up delay).

Connection in parallel

- No specific restrictions. The use of "flywheel" diodes is recommended when an inductive load (relay) is being switched.

Capacitive load (C > 0.1 mF)

- At switch-on, it is necessary to limit (by resistor) the charging current of the capacitive load C. The voltage drop in the sensor can also be taken into account by subtracting it from the supply voltage for calculation of R.

$$R = \frac{U\ (\text{supply})}{I\ \text{max.}\ (\text{sensor})}$$

Load comprising an incandescent lamp

- If the load comprises an incandescent lamp, the cold state resistance can be 10 times lower than the hot state resistance. This can cause very high current levels on switching. Fit a pre-heat resistance in parallel with the sensor.

$$R = \frac{U^2}{P} \times 10,\ U = \text{supply voltage and } P = \text{lamp power}$$

Detection

Influencing factors

The ultrasonic sensors are particularly suited for the detection of objects that are capable of reflecting an acoustic wave and, in general, having a flat surface perpendicular to the detection axis. However, the correct operation of the ultrasonic sensor can be disrupted by:
- air currents, which can accelerate or divert the acoustic wave transmitted by the sensor (ejection of part by air jet),
- high temperature gradients within the detection zone: an object emitting considerable heat can create zones of varying temperature that will modify the propagation time of the wave and thus prevent reliable operation,
- sound insulators: sound absorbing materials (cotton, fabrics, rubber, etc.),
- the angle between the face of the object to be detected and the reference axis of the sensor: when the angle is offset from 90°, the wave is no longer reflected back along the sensor axis and the operating distance is reduced. The greater the distance between the sensor and the target, the greater the effect. Detection is not possible when the angle exceeds ± 10°.
- the shape of the object to be detected: similar to the example above, an excessively angular object can be difficult to detect 1. In this case, use reflex mode detection.

Detection systems

Diffuse mode

In this mode, it is the object itself that reflects the ultrasonic wave back to the sensor which, in turn, switches its output. It is the most widely used and the most simple mode. In this mode, the object will not be detected in the blind zone.

Reflex or beam break mode

The sensor is in a permanently detecting state on a fixed background of the machine and when the object to be detected breaks the acoustic beam the output switches state 2. This mode is particularly recommended in cases where the shape of the object changes (irregular, angular, non perpendicular) and also for objects that absorb sound (see above). This mode can be achieved by using a diffuse mode sensor (with background teaching) or, more simply, by using a ready to use reflex mode sensor.
In cases where space is restricted, a reflector 3 and 4, angled at 45°, can be used. This system can be used for both the diffuse and reflex modes. This reflector can be a flat part of the machine or a separate element. In this mode, the background of the machine must not be within the blind zone. But if the object is within this zone, it will be reliably detected.

Thru-beam mode

Detection is achieved using both a transmitter and receiver, with the transmitter permanently transmitting an acoustic wave to the receiver. The breaking of the beam by the presence of an object switches the output of the receiver. This mode provides long detection distances 5.

Ultrasonic sensors

XX range, General purpose
Cylindrical, plastic or metal
DC supply, solid-state digital output

121363

XX512A1KAM8

PF131112

XX518A1KAM12

PF511482

XXV18B1PAM12

Diffuse mode

ø 12 sensors

Sensors	Sensing distance (Sn)	Function/output	Connection	Reference	Weight
	m				kg
Ø 12 Plastic	0.05	NO/PNP + NO/NPN	M8 connector	**XX512A1KAM8**	0.011
	0.1	NO/NPN	M8 connector	**XX512A2NAM8**	0.011
		NO/PNP	M8 connector	**XX512A2PAM8**	0.011

ø 18 sensors

Sensors	Sensing distance (Sn)	Function/output	Connection	Reference	Weight
Ø 18 Plastic	0.15	NO/PNP + NO/NPN	M12 connector	**XX518A1KAM12**	0.033
Ø 18 Metal	0.05	NO/NPN	Pre-cabled (L = 2 m)	**XXV18B1NAL2**	0.110
			M12 connector	**XXV18B1NAM12**	0.050
		NO/PNP	Pre-cabled (L = 2 m)	**XXV18B1PAL2**	0.110
			Pre-cabled (L = 5 m)	**XXV18B1PAL5**	0.200
			M12 connector	**XXV18B1PAM12**	0.050
		NC/NPN	Pre-cabled (L = 5 m)	**XXV18B1NBL5**	0.200
		NC/PNP	Pre-cabled (L = 2 m)	**XXV18B1PBL2**	0.110
			M12 connector	**XXV18B1PBM12**	0.050

Thru-beam mode

ø 12 sensors

Sensors	Sensing distance (Sn)	Function/output	Connection	Reference	Weight
Transmitter	0.2	–	M8 connector	**XXT12A8M8**	0.020
Receiver	0.2	NO/PNP + NO/NPN	M8 connector	**XXR12A8KAM8**	0.020

Ultrasonic sensors

XX range, General purpose
Cylindrical, plastic or metal
DC supply, solid-state digital output

Sensor type			XX512A1●	XX512A2●	XX●12A8●	XXV18B1●	XX518A1●
General characteristics							
Conformity to standards			CE, IEC 60947-5-2				
Product certifications			UL	UL	UL	cULus	cULus
Nominal sensing distance (Sn)		**m**	0.05	0.1	0.2	0.05	0.15
Blind zone (in diffuse mode the object is not detected in this zone, in reflex mode the background is not detected in this zone)		**mm**	0…6.4	0…6.4	–	0...2	0... 19
Detection window			Fixed				Fixe
Detection system	Diffuse mode		●	●	–	●	●
	Reflex mode		–	–	–	–	–
	Thru-beam mode		–	–	●	–	–
Transmission frequency (transmitter resonance)		**kHz**	500			360	200
Differential travel		**mm**	< 0.7	< 0.7	–	< 3	–
Repeat accuracy		**mm**	± 0.7		± 0.79	± 1.5	± 0.79
Overall beam angle (see detection lobe)			11°	10°	10°	10°	20
Minimum size of object to be detected	Cylinder Ø (in mm), at distance (in mm)		Ø 2.5 at 38	Ø 2.5 at 50	Ø 12 at 200	Ø 2.5 at 20	Ø 1.6 at 63
Deviation angle from 90° of the object to be detected			± 10°	± 10°	–	± 8°	± 10°
Materials	Case		ULTEM®			Nickel plated brass	ULTEM®
			Stainless steel 303 for XX630AS1●●●●				
	Sensing face *(1)*		Epoxy			Epoxy	Silicone
Connection	Connector		M8, 4-pin	M8 3-pin	M8, 4-pin	M12, 4-pin	M12, 4-pin
	Pre-cabled (wire c.s.a.)		–	–	–	3 x 0.34 mm²/ AWG 22	–
Supply characteristics							
Rated supply voltage		**V**	12…24 V ⎓ with protection against reverse polarity				
Voltage limits (including ripple)		**V**	⎓ 10…28 V			⎓ 10…36 V	⎓ 10…28 V
Current consumption, no-load		**mA**	25		50	15	60
Output characteristics							
LED indicators	Output state		Yellow LED				–
	Power on		Green LED			–	–
	Setting-up assistance		–	–	–	–	–
Switching capacity (with overload and short-circuit protection)		**mA**	< 100			< 200	< 100
Voltage drop		**V**	< 1 (NPN), < 1.5 (PNP), 1.1 for XX●12A8, < 2 for XXV18B1●, 0.5 for XX630A2●				
Maximum switching frequency		**Hz**	125	125	125	80	80
Delays	First-up	**ms**	20	20	20	5	350
	Response	**ms**	2	3	0.4	4	3
	Recovery	**ms**	2	3	0.4	4	3
Environment characteristics							
Degree of protection	Conforming to IEC 60529 and IEC 60947-5-2		IP 67			IP 65 IP 67 or *(2)*	IP 67
Storage temperature		**°C**	- 40…+ 80				
Operating temperature		**°C**	- 20…+ 65			0…+ 60	0…+ 50
Vibration resistance	Conforming to IEC 60068-2-6		Amplitude ± 1 mm (f = 10…55 Hz); ± 2 mm for XXV18B1●				
Mechanical shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms, in all 3 axes 50 gn, duration 11 ms, in all 3 axes for XXV18B1●				
Resistance to electromagnetic interference			Conforming to IEC 60947-5-2				

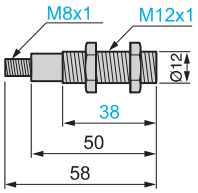
(1) Silicone face for optimum chemical resistance.
(2) Double insulation for pre-cabled sensors. IP 69K for sensors with M12 connector.

Ultrasonic sensors

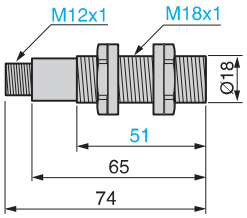
XX range, General purpose
Cylindrical, plastic or metal
DC supply, solid-state digital output

Dimensions

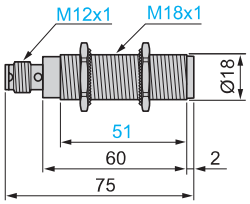
XX●12A●●●M8



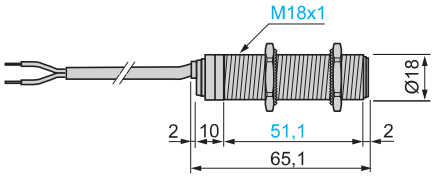
XX518A1KAM12
XXT18A●M12
XXR18A●●●●●



XXV18B1●●●M12



XXV18B1●●L●

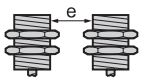


Setting-up precautions

Minimum mounting distances

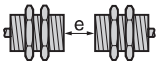
Diffuse sensors, cylindrical type

Side by side



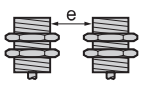
e: respect the distances indicated on the detection curves

Face to face

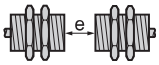


e ⩾ 4 x Sn

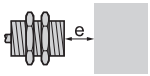
XXV18●



e > 25 mm

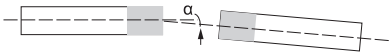


e > 700 mm



e > 60 mm

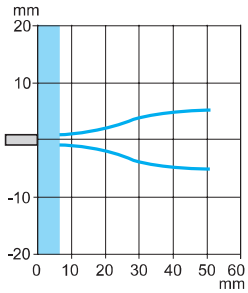
Thru-beam sensors



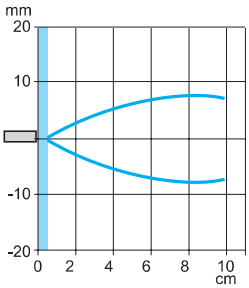
Sensors	α
XX●12●●/XX●F1●●	±5°
XX●18A4●●/XX●K1A4 XX●18A2●●/XX●K1A2	±10°

Curves

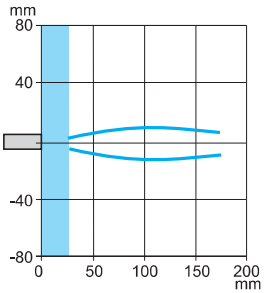
XX512A1KAM8



XX512A2●NAM8



XX518A1KAM12



Ultrasonic sensors

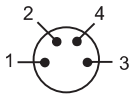
XX range, General purpose
Cylindrical, plastic or metal
DC supply, solid-state digital output

Schemes

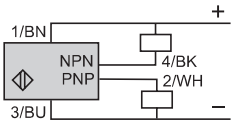
Digital output, Ø 12 sensor, M8 connector

XX512A1KAM8

4-wire type



NO outputs, PNP and NPN

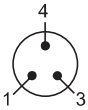


1 (+) 2 PNP output
3 (-) 4 NPN output

(-) BU (Blue) (+) BN (Brown)
WH (White) BK (Black)

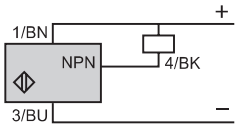
XX512A2●

3-wire type



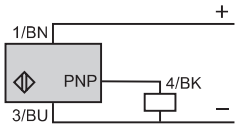
1 (+) 3 (-)
4 NPN or PNP output

NO outputs, NPN



(-) BU (Blue) (+) BN (Brown)
BK (Black)

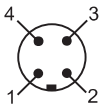
NO outputs, PNP



Digital output, Ø 18 sensor, M12 connector, Ø 30 (XX6V3●, XXBV3●)

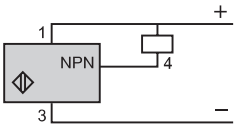
XXV18B1●●●M12

3-wire type

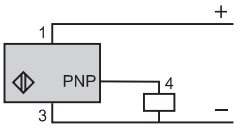


1 (+)
3 (-)

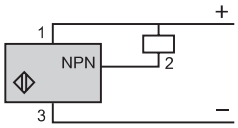
NO outputs, NPN



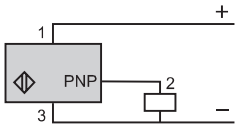
NO outputs, PNP



NC outputs, NPN



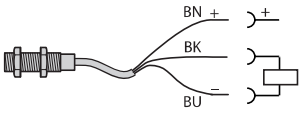
NC outputs, PNP



Digital output, Ø 18 sensor, pre-cabled

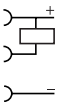
XXV18B1●● L●

3-wire type



PNP/NO, NC

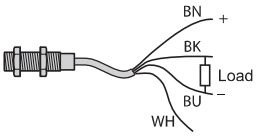
NPN/NO, NC



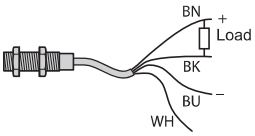
(-) BU (Blue) (+) BN (Brown) BK (Black)

XX518A3●● L2

PNP output



NPN output

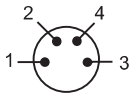


Thru-beam sensors: XXT12●/XXR12●, XXT18●/XXR18●, XXTF1●/XXRF1●

Transmitter

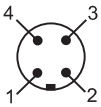
XXT12A8M8, XXT18A3M12

M8

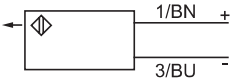


1 (+)
3 (-)

M12



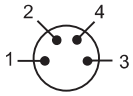
1 (+)
3 (-)



Receiver

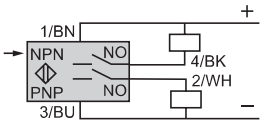
XXR12A8KBM8

M8



1 (+)
2 (PNP)
3 (-)
4 (NPN)

NPN, PNP, NO



Ultrasonic sensors

XX range, General purpose
Cylindrical, plastic or metal
DC supply, solid-state digital or analog output

XX518A3NAL2

XX918A3C2M12

XXT18A3M12

XXZPB100

Diffuse mode

Ø 18 sensors, digital output

Sensors	Sensing distance (Sn)	Function/ output	Connection	Reference	Weight
	m				kg
Ø 18 Plastic	0.5 (adjustable)	NO/NPN	Pre-cabled (L = 2 m)	**XX518A3NAL2**	0.08
		NO/PNP	Pre-cabled (L = 2 m)	**XX518A3PAL2**	0.08
		NO/NPN	M12 connector	**XX518A3NAM12**	0.033
		NO/PNP	M12 connector	**XX518A3PAM12**	0.033

Ø 18 sensors, analog output

Ø 18 Plastic	0.5	4-20 mA	M12 connector	**XX918A3C2M12**	0.033
		0-10 V	M12 connector	**XX918A3F1M12**	0.033

Thru-beam mode

Ø 18 sensors, digital output

Transmitter	0.61	–	M12 connector	**XXT18A3M12**	0.04
Receiver	0.61	NO/PNP + NO/NPN	M12 connector	**XXR18A3KAM12**	0.04
Transmitter	1	–	M12 connector	**XXT18A4M12**	0.04
Receiver	1	NO/PNP + NO/NPN	M12 connector	**XXR18A4KAM12**	0.04

Accessories

Teach pushbutton

Teach pushbutton	For use with sensors	Reference	Weight kg
Selection of detection window **Length of cable: 152 mm** **Input: M12 female connector** **Output: M12 male connector**	XX918A● XX9V3A● XX9D1A●	**XXZPB100**	0.035

Ultrasonic sensors

XX range, General purpose
Cylindrical, plastic or metal
DC supply, solid-state digital or analog output

Sensor type			XX●18A3●	XX518A3●
General characteristics				
Conformity to standards			CE, IEC 60947-5-2	
Product certifications			UL	UL, cCSAus
Nominal sensing distance (Sn)		**m**	0.6	0.5
Blind zone (in diffuse mode the object is not detected in this zone, in reflex mode the background is not detected in this zone)		**mm**	–	0 ... 51 (XX518A3●)
Detection window			Fixed	Remotely adjustable or by using teach button
Detection system	Diffuse mode		–	●
	Reflex mode		–	●
	Thru-beam mode		●	–
Transmission frequency (transmitter resonance)		**kHz**	300	300
Differential travel		**mm**	< 2.5	< 2.5
Repeat accuracy		**mm**	± 1.27	± 1.27
Overall beam angle (see detection lobe)			6°	6°
Minimum size of object to be detected			–	
	Cylinder Ø (in mm), at distance (in mm)		Ø 38 to 600 Ø 114 to 1 000	Ø 2.5 to 150
Deviation angle from 90° of the object to be detected			–	± 7°
Materials	Case		ULTEM®	Valox®
	Sensing face *(1)*		Silicone	Epoxy
Connection	Connector		M12, 4-pin	M12, 4-pin
	Pre-cabled (wire c.s.a.)		–	4 x 0.08 mm^2 / AWG 28

(1) Silicone face for optimum chemical resistance.

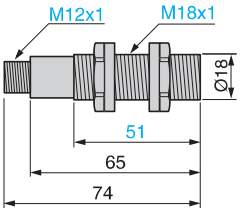
Ultrasonic sensors

XX range, General purpose

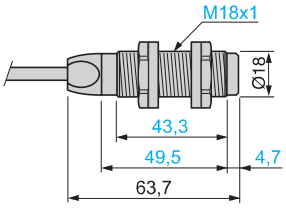
Cylindrical, plastic or metal

Dimensions

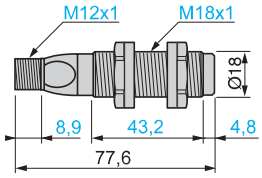
XX518A3●AM12, XXT18A●M12, XXR18A●KAM12



XX518A3●AL2



XX918A3●●M12



Ultrasonic sensors

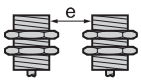
XX range, General purpose
Cylindrical, plastic or metal
DC supply, solid-state digital output

Setting-up precautions

Minimum mounting distances

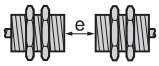
Diffuse sensors, cylindrical type

Side by side



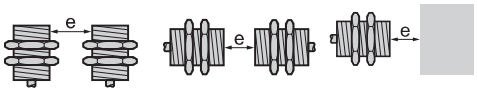
e: respect the distances indicated on the detection curves

Face to face



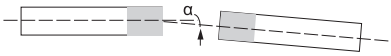
e ⩾ 4 x Sn

XXV18●



e > 25 mm e > 700 mm e > 60 mm

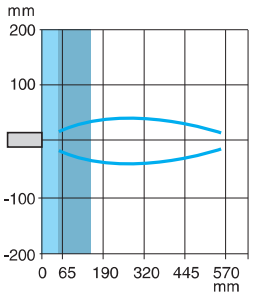
Thru-beam



Sensors	α
XX●18A4●●/XX●K1A4	±10°

Curves

XX518A3●●L2,
XX518A3●AM12,
XX918A3●●M12



Blind zone for diffuse sensors.

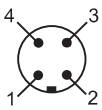
Blind zone for reflex sensors.

Schemes

Digital output, Ø 18 sensor, M12 connector

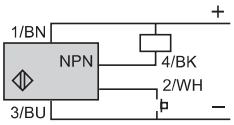
XX518A3●

3-wire type



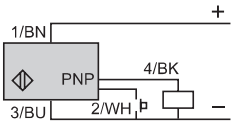
1 (+) 2 Teach input (WH)
3 (-) 4 NPN or PNP output

NO outputs, NPN



(-) BU (Blue) (+) BN (Brown)
BK (Black)

NO outputs, PNP



Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 18 mm
Diffuse mode, solid-state digital or analog output
Configurable by software

XXA18P1●M12

XXS18P1●M12

XXA18B1●M12
XXA18S1●M12

XXS18B1●M12
XXS18S1●M12

XXZPB100

Diffuse mode

Sensors with solid-state digital output, M12 connector

Sensors	Sensing distance (Sn) Adjustable	Function/output	Sensing axis	Reference	Weight
	m				kg
Ø 18 Plastic	1	NO or NC *(1)*/ PNP	Straight	**XXS18P1PM12**	0.033
			90° angled	**XXA18P1PM12**	0.040
Ø 18 Nickel-plated brass	1	NO or NC *(1)*/ PNP	Straight	**XXS18B1PM12**	0.050
			90° angled	**XXA18B1PM12**	0.055
Ø 18 Stainless steel 316L	1	NO or NC *(1)*/ PNP	Straight	**XXS18S1PM12**	0.050
			90° angled	**XXA18S1PM12**	0.055

Sensors with analog output, M12 connector

Sensors	Sensing distance (Sn) Adjustable	Analog output *(2)*	Sensing axis	Reference	Weight
	m				kg
Ø 18 Plastic	1	4-20 mA	Straight	**XXS18P1AM12**	0.033
		0-10 V	Straight	**XXS18P1VM12**	0.033
		4-20 mA	90° angled	**XXA18P1AM12**	0.040
		0-10 V	90° angled	**XXA18P1VM12**	0.040
Ø 18 Nickel-plated brass	1	4-20 mA	Straight	**XXS18B1AM12**	0.050
		0-10 V	Straight	**XXS18B1VM12**	0.050
		4-20 mA	90° angled	**XXA18B1AM12**	0.055
		0-10 V	90° angled	**XXA18B1VM12**	0.055
Ø 18 Stainless steel 316L	1	4-20 mA	Straight	**XXS18S1AM12**	0.050
		0-10 V	Straight	**XXS18S1VM12**	0.050
		4-20 mA	90° angled	**XXA18S1AM12**	0.055
		0-10 V	90° angled	**XXA18S1VM12**	0.055

Accessories

Description	For use with sensor	Reference	Weight kg
Teach pushbutton Input: M12 female connector Output: M12 male connector	XXS18●● XXA18●●	**XXZPB100**	0.035

Configuration interface and configuration kit for the synchronization function

See page 74.

*(1) Output function (NO or NC) and mode (window, reflex, proximity, pump) are selectable using the **XXZPB100** remote teach pushbutton.*
*(2) Selectable using the **XXZPB100** remote teach pushbutton.*

Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 18 mm
Diffuse mode, solid-state digital or analog output
Configurable by software

PF120213

XZCPV11V12L●●

PF120214

XZCPV12V12L●●

XZ_524_CPMFS17008

XZCP1141L●

XZ_524_CPMFS17006

XZCP1241L●

PF152522

XZCC12FDM50B

XZCC12FCM50B

XZCC12FCM50B

XX_519_CPFJR16005

XXZB118

Accessories

Description	Type	Length m	Reference	Weight kg
Connection accessories for synchronization function				
Pre-wired connector 5-pin, 5-wire female M12 connector/ bare wires PVC cable	Straight	2	**XZCPV11V12L2**	0.090
		5	**XZCPV11V12L5**	0.201
		10	**XZCPV11V12L10**	0.360
	Elbowed	2	**XZCPV12V12L2**	0.090
		5	**XZCPV12V12L5**	0.201
		10	**XZCPV12V12L10**	0.360
Connection accessories without synchronization function				
Pre-wired connector 5-pin, 4-wire female M12 connector/ bare wires PVC cable	Straight	2	**XZCP1141L2**	0.090
		5	**XZCP1141L5**	0.190
		10	**XZCP1141L10**	0.370
	Elbowed	2	**XZCP1241L2**	0.090
		5	**XZCP1241L5**	0.190
		10	**XZCP1241L10**	0.370
Female M12 connector 5-pin, Pg 7 cable gland	Straight	–	**XZCC12FDM50B**	0.020
	Elbowed	–	**XZCC12FCM50B**	0.020

Mounting accessory

Description	For use with sensor	Reference	Weight kg
Fixing clamp *(1)*	XXS18●● XXA18●●	**XXZB118**	0.010

(1) Recommended to use in applications below 0°C.

Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 18 mm
Diffuse mode, solid-state digital or analog output
Configurable by software

Sensor type			XX●18●1PM12	XX●18●1AM12	XX●18●1VM12
General characteristics					
Conformity to standards			EN/IEC 60947-5-2, UL 508, and CSA C22.2 n°14		
Compliance with regulations			CE (based on EMC directive 2014/30/EU), NEC (ANSI/NFPA 70), CEC (CSA C22), UNECE R10		
Product certifications			cULus with class 2 power supply, E2, EAC, and RCM		
Nominal sensing distance (Sn)		m	1 (adjustable)		
Blind zone (in diffuse mode the object is not detected in this zone)		m	0.105		
Detection window			Remotely adjustable or by using external teachbutton **XXZPB100**		
Transmission frequency (transmitter resonance)		kHz	200		
Differential travel		mm	< 5	–	–
Repeat accuracy (repeatability)			0.1 %		
Minimum size of object to be detected			Cylinder Ø 1 mm up to sensing distance of 0.6 m		
Tilt angle with 100 x 100 mm target			± 7° at 1 m, ± 35° at 0.5 m, ±10° at 0.9 m		
Materials	Case		XX●18P●●: PBT XX●18B●●: Nickel-plated brass XX●18S●●: Stainless steel 316L		
	Sensing face		Epoxy, polyurethane, and butyl		
Connection			M12 connector - 5-pin		
Supply characteristics					
Rated supply voltage (Ue) with protection against reverse polarity		V	12…24 V ⎓		24 V ⎓
Voltage limits (including ripple)		V	10…30 V ⎓	10…30 V ⎓	14…30 V ⎓
Current consumption, no-load		mA	< 30	< 30	< 30
Output characteristics					
LED indicators	Output state		Yellow LED	Yellow LED	Yellow LED
	Echo state		Green LED	Green LED	Green LED
Switching capacity (with overload and short-circuit protection)			< 100 mA	–	–
Resistive load impedance		Ω	–	12 V ⎓, load ⩽ 250 Ω 24 V ⎓, load ⩽ 850 Ω	⩾ 1 kΩ
Voltage drop		V	< 2	–	–
Internal temperature compensation			Yes	Yes	Yes
Maximum switching frequency		Hz	11	–	–
Delays	First-up	ms	120	180	180
	Response	ms	45	–	–
	Recovery	ms	45	100	100
Environment characteristics					
Degree of protection	Conforming to IEC 60529 and EN/IEC 60947-5-2		IP 65, IP 67		
Storage temperature		°C	- 40…+ 80		
Operating temperature		°C	- 25…+ 70 *(1)*		
Relative humidity			< 95%, without condensation		
Vibration resistance	Conforming to IEC 60068-2-6		Amplitude ± 1 mm (f = 10…55 Hz)		
Mechanical shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms, in all 3 axes		
Resistance to electromagnetic interference			Conforming to EN/IEC 60947-5-2 and UNECE R10-05		

*(1) For applications below 0°C, it is recommended to use the **XXZB118** fixing clamp (see page 31).*

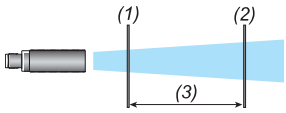
Ultrasonic sensors

XX range, General purpose
Cylindrical, plastic or metal, Ø 18 mm
Diffuse mode, solid-state digital or analog output
Configurable by software

Operating diagrams for digital output sensors

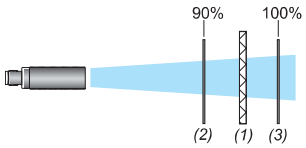
Settings with teach procedure

Window mode



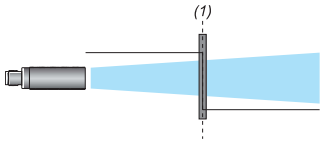
(1): Near limit
(2): Far limit
(3): Sensing window

Reflex mode



(1): Reflector
(2): Near limit
(3): Far limit

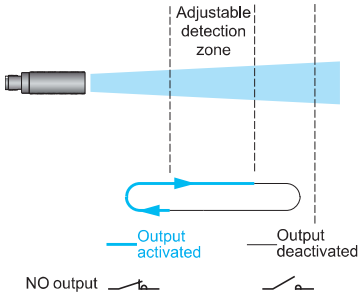
Proximity mode



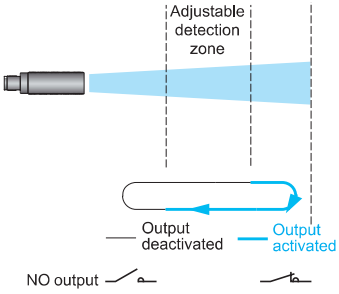
(1) Switch point

Pump/Hysteresis mode

Emptying (stored in high threshold memory)

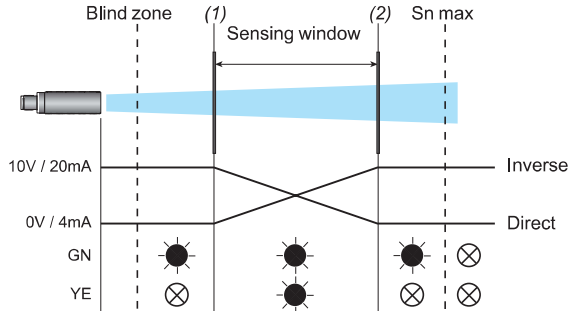


Filling (stored in low threshold memory)



Operating diagram for analog output sensors

Near and far limits setting with teach procedure



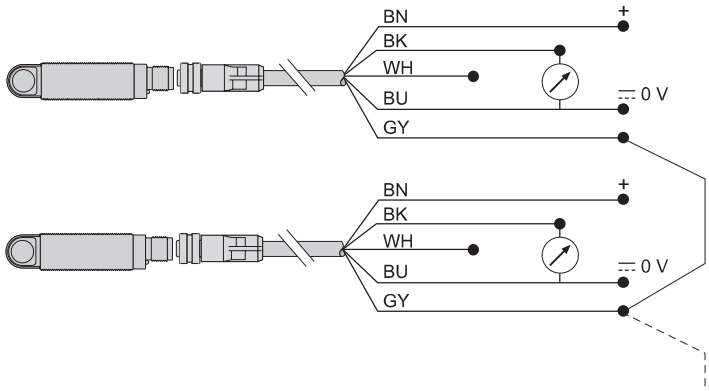
GN: Green LED
YE: Yellow LED

⊗ : OFF

● : ON

(1): Near limit
(2): Far limit

Diagram for the synchronization function (side by side application)



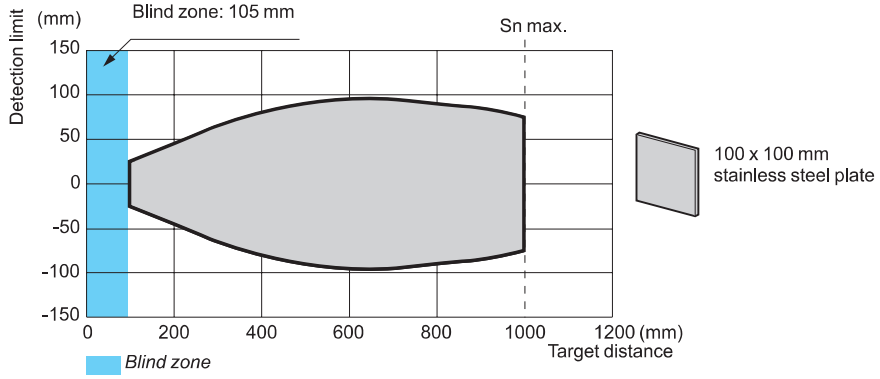
***NB**: To enable synchronization between several sensors, all of the wires of pin no.5 (gray) must be electrically connected together.*
A maximum of 8 sensors can be synchronized. To enable "Multiplexer" function for the sensors, use the XX Configuration Software.
Without synchronization or multiplexing, the sensors must be at least 50 cm away from each other in order to avoid mutual interference.

Ultrasonic sensors

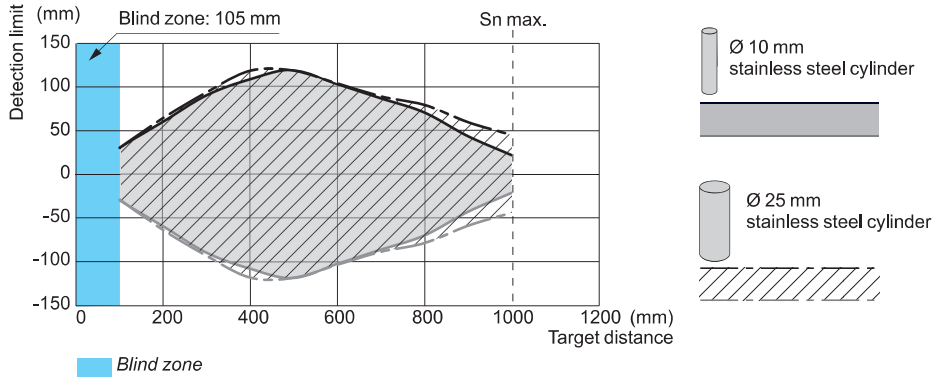
XX range, General purpose
Cylindrical, plastic or metal, Ø 18 mm
Diffuse mode, solid-state digital or analog output
Configurable by software

Curves

Detection curve with 100 x 100 mm square target



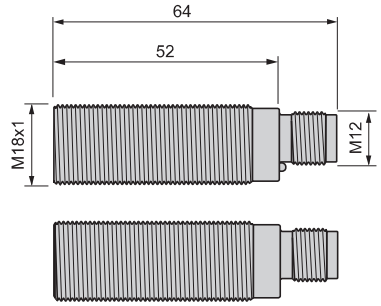
Detection curve with round bar



Dimensions

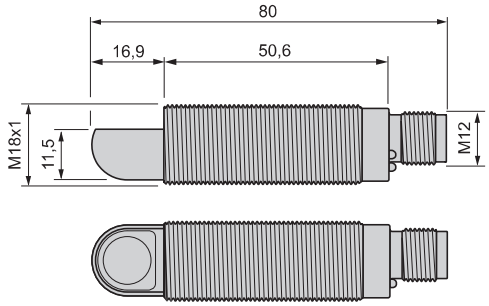
Plastic sensors, straight

XXS18P1●M12



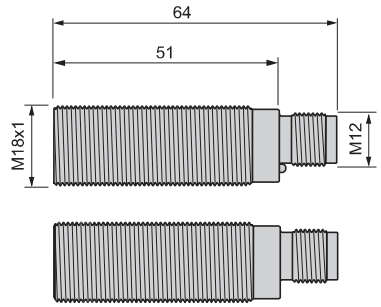
Plastic sensors, 90° angled

XXA18P1●M12



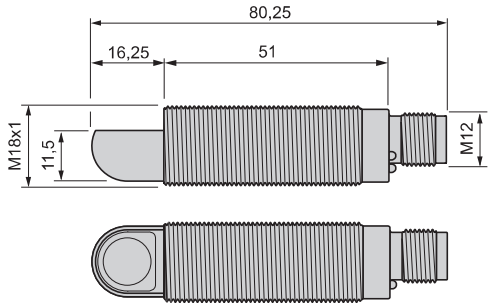
Nickel-plated brass and stainless steel sensors, straight

XXS18B1●M12 and XXS18S1●M12



Nickel-plated brass and stainless steel sensors, 90° angled

XXA18B1●M12 and XXA18S1●M12

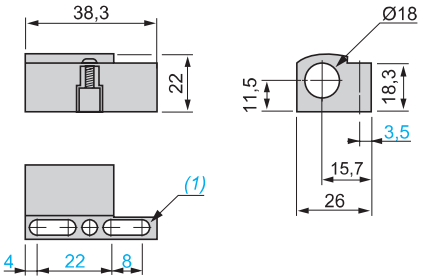


Ultrasonic sensors

XX range, General purpose
Cylindrical, plastic or metal, Ø 18 mm
Diffuse mode, solid-state digital or analog output
Configurable by software

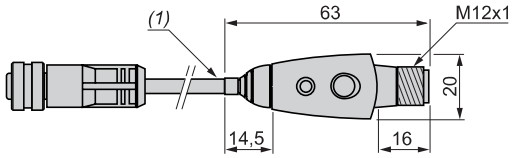
Dimensions *(continued)*

Fixing clamp XXZB118



(1) 2 elongated holes Ø 4 X 8 mm

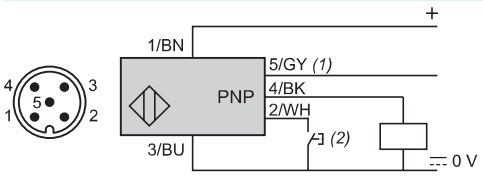
Teach pushbutton XXZPB100



(1) Cable length: 152 mm

Connections

Connector wiring

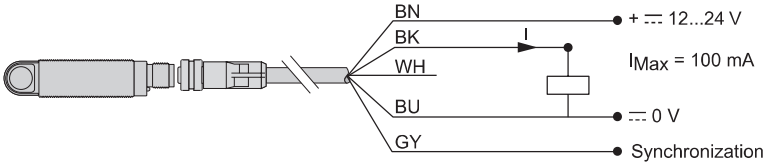


Pin number	Wire color	Digital output description	Analog output description	
			4-20 mA	0-10 V
1	BN: Brown	+12…24 V ⎓	+12…24 V ⎓	+14…24 V ⎓
2	WH: White	Input teach		
3	BU: Blue	0 V ⎓		
4	BK: Black	Output		
5	GY: Gray	Synchronization		

(1) Synchronization.
*(2) External setting pushbutton or **XXZPB100** remote teach pushbutton (see page 30).*

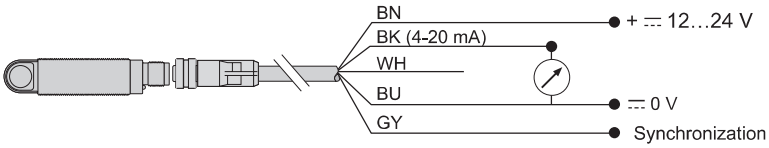
Wiring scheme (digital output NO or NC)

XXS18●1PM12 and XXA18●1PM12



Wiring scheme (analog output 4-20 mA)

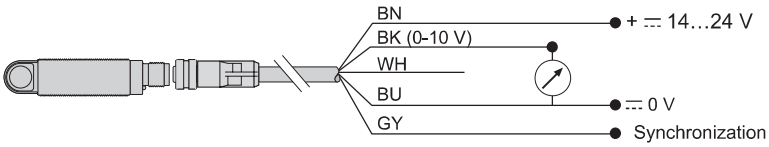
XXS18●1AM12 and XXA18●1AM12



4-20 mA:
- For 12 V ⎓, load ≤ 250 Ω
- For 24 V ⎓, load ≤ 850 Ω

Wiring scheme (analog output 0-10 V)

XXS18●1VM12 and XXA18●1VM12



0-10 V:
1 kΩ…∞

Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal

DC supply, solid-state digital or analog output

PF150035A

XX630A1KAM12

121367-40

XX630S1NCM12

108064

XX6V3A1NAM12

XX_519_CPODA2016005

XX930A1A2M12

PF150033A

XX930A3A2M12

Diffuse mode

Solid-state digital output, M12 connector

Sensors	Sensing distance (Sn)	Function/output	Reference	Weight
	m			kg
Ø 30 Plastic	1 (adjustable)	NO/PNP + NO/NPN	**XX630A1KAM12**	0.09
		NO/NPN	**XX6V3A1NAM12**	0.09
		NO/PNP	**XX6V3A1PAM12**	0.09
		NO/NPN + NC/NPN	**XX630A1NCM12**	0.09
		NO/PNP + NC/PNP	**XX630A1PCM12**	0.09
	2 (adjustable)	NO/NPN + NC/NPN	**XX630A2NCM12**	0.09
		NO/PNP + NC/PNP	**XX630A2PCM12**	0.09
	8 (adjustable)	NO/NPN + NC/NPN	**XX630A3NCM12**	0.11
		NO/PNP + NC/PNP	**XX630A3PCM12**	0.11
Ø 30 Stainless steel 303	1 (adjustable)	NO/NPN + NC/NPN	**XX630S1NCM12**	0.09
		NO/PNP + NC/PNP	**XX630S1PCM12**	0.09

Standard analogue output, M12 connector

Sensors	Sensing distance (Sn)	Analogue output (Slope selection using teach button)	Reference	Weight
	m			kg
Ø 30 Plastic	1	4-20 mA	**XX930A1A2M12**	0.095
		0-10 V	**XX930A1A1M12**	0.095
		4-20 mA	**XX9V3A1C2M12**	0.090
		0-10 V	**XX9V3A1F1M12**	0.090
	2	4-20 mA	**XX930A2A2M12**	0.095
		0-10 V	**XX930A2A1M12**	0.095
	8	4-20 mA	**XX930A3A2M12**	0.115
		0-10 V	**XX930A3A1M12**	0.115
Ø 30 Stainless steel 303	1	4-20 mA	**XX930S1A2M12**	0.095
		0-10 V	**XX930S1A1M12**	0.095

250 ms delayed analogue output (for unstable object), M12 connector

Ø 30 Plastic	1	4-20 mA	**XX930A1A2230M12**	0.095
	2	4-20 mA	**XX930A2A2230M12**	0.095

Ultrasonic sensors

XX range, General purpose
Cylindrical, plastic or metal
DC supply, solid-state digital output

Sensor type			XX6V3A1●	XX630A1● XX630A2● XX630S1●	XX630A3●	XX930A1● XX930A2● XX930S1●	XX930A3●	XX9V3A1●
General characteristics								
Conformity to standards			CE, IEC 60947-5-2			CE, IEC 60947-5-2		
Product certifications			UL, cCSAus *(1)*			UL, cCSAus		
Nominal sensing distance (Sn)		**m**	1	1 or 2 *(2)*	8	1 or 2 *(3)*	8	1
Blind zone (in diffuse mode the object is not detected in this zone, in reflex mode the background is not detected in this zone)		**mm**	0 ...100	0…51 (XX630●1) 0...120 (XX630A2●)	0…300	0…51 or 0...120 *(3)*	0…300	0…100
Detection window			Remotely adjustable or by using external teach button	Adjustable using teach button on sensor		Adjustable using teach button on sensor		Remotely adjustable or by using external teach button
Detection system	Diffuse		●	●	●	–	–	–
	Reflex		●	–	–	–	–	–
	Thru-beam		–	–	–	–	–	–
Transmission frequency (transmitter resonance)		**kHz**	180	200	75	200	75	180
Differential travel		**mm**	< 2.5	< 2.5	< 12.7			
Repeat accuracy		**mm**	± 1.6	± 0.87	± 2.54	± 0.9	± 2.54	± 0.9 1.6mm
Overall beam angle (see detection lobe)			7°	10°	16°	10°	16°	7°
Minimum size of object to be detected			Cylinder Ø 50 mm at distance 1 m	Cylinder Ø 1.6 mm at distance 635 mm	Cylinder Ø 51 mm at distance 4732 mm	Cylinder Ø 1.6 mm up to a sensing distance of 635 mm	Cylinder Ø 51 mm up to a sensing distance of 4732 mm	Cylinder Ø 50 mm up to a sensing distance of 1 m
Deviation angle from 90° of the object to be detected			± 5°	± 7° or ± 10° *(2)*	± 5°	± 8°	± 5°	± 5°
Materials	Case		Valox®	ULTEM®	ULTEM®	ULTEM® : XX930A1● and XX930A2●	ULTEM®	Valox®
			Stainless steel 303 for XX630AS1●●●●			Stainless steel 303: XX930S1●	–	
	Sensing face *(4)*		Epoxy	Silicone	Epoxy	Silicone	Epoxy	
Connection			M12 connector, 4-pin					

(1) Only XX6V3A1●, XX630A1●, XX630A2●, XX630S1● and XX630A3● sensors are cCSAus certified.
(2) The first value is given for XX630A1● and XX630S1●, the second value for XX630A2●.
(3) The first value is given for XX930A1● and XX930S1●, the second value for XX930A2●.
(4) Silicone face for optimum chemical resistance.

Ultrasonic sensors

XX range, General purpose
Cylindrical, plastic or metal
DC supply, solid-state digital output

Sensor type			XX6V3A1●	XX630A1● XX630A2● XX630S1●	XX630A3●	XX930A1● XX930A2● XX930S1●	XX930A3●	XX9V3A1●
Supply characteristics								
Rated supply voltage		V	12…24 V ⎓ with protection against reverse polarity			⎓ 15…24 V	⎓ 15…24 V	⎓ 15…24 V
Voltage limits (including ripple)		V	⎓ 10…28 V			⎓ 10…28 V	–	
Current consumption, no-load		mA	60	50 or 100 *(1)*	50	60 or 80 *(2)*	60	60
Output characteristics								
LED indicators	Output state		Yellow LED			Yellow LED	–	
	Power on		Green LED			Green LED	–	
	Setting-up assistance		Multicolour LED			Dual colour LED	–	
Slope type			–			Direct or inverse by using teach button **XXZPB100**		
Switching capacity (with overload and short-circuit protection)		mA	< 100			–	–	
Voltage drop		V	< 100			–	–	
Maximum switching frequency		Hz	70	10 or 16 *(1)*	2	–	–	
Delays	First-up	ms	75	720	800	720	1 200	75
	Response	ms	15	20 or 25 *(1)*	200			
	Recovery	ms	75	20	200	250 (delayed) 50 (standard)	250	180
Resistive load impedance	4-20 mA	Ω	–			10...500		10...350
	0-10 V	Ω	–			1 k...∞		2 k...∞
Environment characteristics								
Degree of protection	Conforming to IEC 60529 and IEC 60947-5-2		IP 67	IP 65 or IP 67 *(1)* IP67 for plastic versions. IP65 for stainless steel versions.	IP 67	IP 67	IP 67	IP 67
Storage temperature		°C	- 40…+ 80					
Operating temperature		°C	0…+ 70	0…+ 60 or 0...+ 50 *(1)*	- 20…+ 60	0…+ 50	- 20…+ 60	0…+ 70
Vibration resistance	Conforming to IEC 60068-2-6		Amplitude ± 1 mm (f = 10…55 Hz); ± 2 mm for XXV18B1●			Amplitude ± 1 mm (f = 10…55 Hz)		
Mechanical shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms, in all 3 axes 50 gn, duration 11 ms, in all 3 axes for XXV18B1●			30 gn, duration 11 ms, in all 3 axes		
Resistance to electromagnetic interference			Conforming to IEC 60947-5-2					

(1) The first value is given for XX630A1● and XX630S1●, the second value for XX630A2●.
(2) The first value is given for XX930A1● and XX930S1●, the second value for XX930A2●.

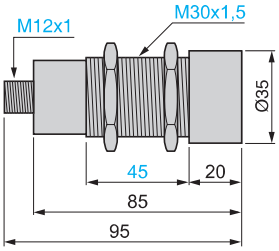
Ultrasonic sensors

XX range, General purpose

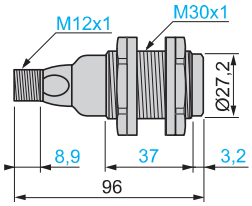
Cylindrical, plastic or metal, Ø 30 mm
DC supply, solid-state digital output

Dimensions

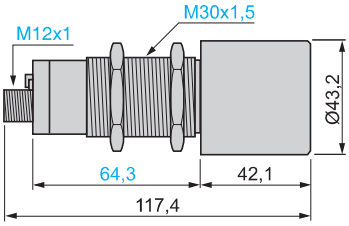
XX630A1●●M12
XX630S1●●M12
XX630A2●●M12
XX930A1A●M12
XX230A1●●A00M12
XX230A2●●A00M12



XX6V3A1●AM12
XX9V3A1●●M12



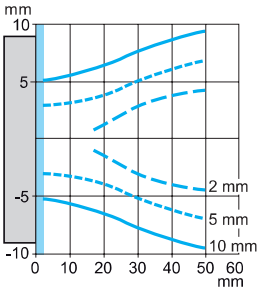
XX630A3●●M12
XX930A3A●M12



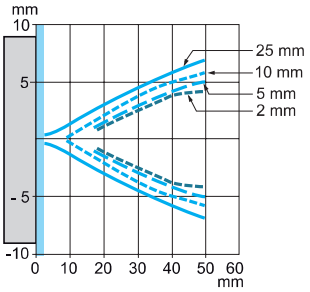
Curves

XXV18B1●

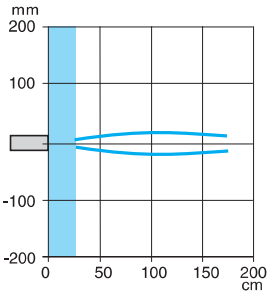
Square object



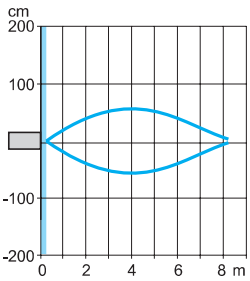
Cylindrical object



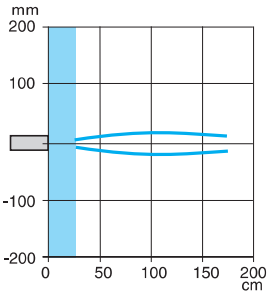
XX630A2●CM12



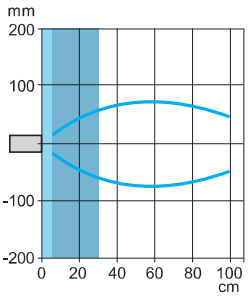
XX630A3●CM12
XX930A3●●M12



XX230A2●



XX230A1●, XX630A1●CM12, XX6V3A1●AM12, XX930A1●●M12, XX9V3A1●●M12, XX8D1A1●AM12, XXBD1A1●AM12



Blind zone for diffuse sensors

Blind zone for reflex sensors

Ultrasonic sensors

XX range, Application

Sensors for monitoring 2 levels
Cylindrical plastic case, M18 x 1 and M30 x 1.5
DC supply, solid-state digital output

121364

XX218A3P●M12

121366

XX230A12NA00M12

Sensors for monitoring 2 levels

Sensors	Sensing distance (Sn)	Function/output	Reference	Weight
	m			kg
Ø 18, threaded M18 x 1				
2 emptying levels	0.5 (adjustable)	NO/PNP	**XX218A3PHM12**	0.035
2 filling levels	0.5 (adjustable)	NO/PNP	**XX218A3PFM12**	0.035
Ø 30, threaded M30 x 1.5				
2 levels 2 independent outputs	1 (adjustable)	NO/NPN + NO/NPN	**XX230A12NA00M12**	0.090
		NO/PNP + NO/PNP	**XX230A12PA00M12**	0.090
	2 (adjustable)	NO/PNP + NO/PNP	**XX230A22PA00M12**	0.090
2 emptying levels	1 (adjustable)	NO/PNP + NO/PNP	**XX230A10PA00M12**	0.090
	2 (adjustable)	NO/PNP + NO/PNP	**XX230A20PA00M12**	0.090
2 filling levels	1 (adjustable)	NO/PNP + NO/PNP	**XX230A11PA00M12**	0.090
	2 (adjustable)	NO/PNP + NO/PNP	**XX230A21PA00M12**	0.090

Accessories

Teach pushbutton

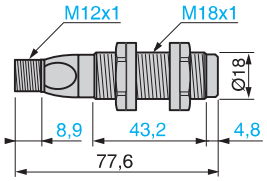
Teach pushbutton	For use with sensors	Reference	Weight kg
Selection of detection window **Length of cable:** 152 mm **Input**: M12 female connector **Output**: M12 male connector	XX218A3●	**XXZPB100**	0.035

Other connection and fixing accessories

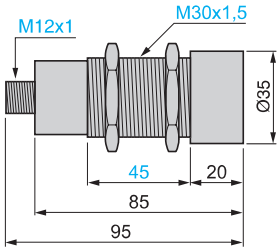
See page 78.

Dimensions

XX218A3P●M12

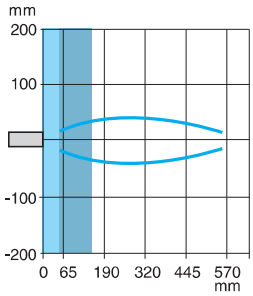


XX230A1●●A00M12
XX230A2●●A00M12

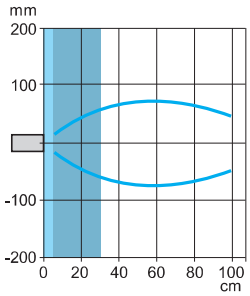


Curves

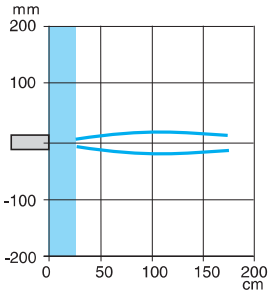
XX218A3●●M12



XX230A1●●●●●M12



XX230A2●●●●●M12



Blind zone for diffuse sensors.

Blind zone for reflex sensors.

Ultrasonic sensors

XX range, Application

Sensors for monitoring 2 levels
Cylindrical plastic case, M18 x 1 and M30 x 1.5
DC supply, solid-state digital output

Sensor type			XX218A3●●●●	XX230A1●●●●	XX230A2●●●●
General characteristics					
Conformity to standards			CE, IEC 60947-5-2		
Product certifications			UL, cCSAus	UL, cCSAus	UL, cCSAus
Nominal sensing distance (Sn)		**m**	0.50 (adjustable)	1 (adjustable)	2 (adjustable)
Blind zone (no object must pass through this zone whilst the sensor is operating)		**mm**	0…51	0…51	0…120
Detection window			Remotely adjustable or by using external teach button	Adjustable using teach button on sensor	
Transmission frequency		**kHz**	300	200	
Differential travel		**mm**	< 2.5	< 2.5	< 2.5
Repeat accuracy		**mm**	± 1.27	± 0.9	
Overall beam angle (see detection lobe)			6°	10°	10°
Minimum size of object to be detected			Cylinder Ø 2.5 mm up to a sensing distance of 150 mm	Cylinder Ø 1.6 mm up to a sensing distance of 305 mm	
Deviation angle from 90° of the object to be detected			± 7°	± 10° on 305 x 305 mm	
Materials	Case		Valox®	ULTEM®	
	Sensing face *(1)*		Epoxy	Silicone	
Connection	Connector		M12, 4-pin		
Supply characteristics					
Rated supply voltage		**V**	12…24 V ⎓ with protection against reverse polarity		
Voltage limits (including ripple)		**V**	10…28 V ⎓		
Current consumption, no-load		**mA**	40	100	
Output characteristics					
LED indicators	Output state		Yellow LED	Multicolour LED	
	Power on		Green LED	–	
	Setting-up assistance		Dual colour LED	Multicolour LED	
	Distance indication		–	Yellow LED	
Switching capacity		**mA**	< 100 (PNP and NPN) with overload and short-circuit protection		
Voltage drop		**V**	< 1 (PNP and NPN)		
Delays	First-up	**ms**	100	1000	1000
	Response	**ms**	15	150	150
	Recovery	**ms**	1000	1000	1000
Environment characteristics					
Degree of protection	Conforming to IEC 60529 and IEC 60947-5-2		IP 67	IP 65	
Storage temperature		**°C**	- 40…+ 80	- 10…+ 80	
Operating temperature		**°C**	- 20…+ 65	0…+ 50	
Vibration resistance	Conforming to IEC 60068-2-6		Amplitude ± 1 mm (f = 10…55 Hz)		
Mechanical shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms, in all 3 axes		
Resistance to electromagnetic interference			Conforming to IEC 60947-5-2		

(1) Silicone face for optimum chemical resistance.

Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm
Diffuse mode, solid-state digital or analog output
Configurable by software

XXA30P1PM12
XXS30P1PM12

XXS30B2PM12
XXA30S2PM12

XXS30S4PM12

XXS30P8●●M12

XXS30P1AM12

XXS30P2AM12

Diffuse mode

Sensors with solid-state digital output, M12 connector

Sensors	Sensing distance (Sn)	Function/ output	Sensing axis	Reference	Weight
	m				kg
Ø 30 Plastic	1	NO or NC *(1)*/PNP	Straight	**XXS30P1PM12**	0.047
			90° angled	**XXA30P1PM12**	0.100
	2	NO or NC *(1)*/PNP	Straight	**XXS30P2PM12**	0.095
			90° angled	**XXA30P2PM12**	0.100
	4	NO or NC *(1)*/PNP	Straight	**XXS30P4PM12**	0.115
	8	NO or NC *(1)*/PNP x 2	Straight	**XXS30P8PPM12**	0.210
		NO or NC *(1)*/NPN x2	Straight	**XXS30P8NNM12**	0.210
Ø 30 Nickel-plated brass	1	NO or NC *(1)*/PNP	Straight	**XXS30B1PM12**	0.165
			90° angled	**XXA30B1PM12**	0.175
	2	NO or NC *(1)*/PNP	Straight	**XXS30B2PM12**	0.165
			90° angled	**XXA30B2PM12**	0.175
	4	NO or NC *(1)*/PNP	Straight	**XXS30B4PM12**	0.195
Ø 30 Stainless steel 316L	1	NO or NC *(1)*/PNP	Straight	**XXS30S1PM12**	0.160
			90° angled	**XXA30S1PM12**	0.170
	2	NO or NC *(1)*/PNP	Straight	**XXS30S2PM12**	0.160
			90° angled	**XXA30S2PM12**	0.170
	4	NO or NC *(1)*/PNP	Straight	**XXS30S4PM12**	0.190

Sensors with analog output, adjustable sensing distance, M12 connector

Sensors	Sensing distance (Sn)	Function/ output	Sensing axis	Reference	Weight
	m				kg
Ø 30 Plastic	1	4-20 mA	Straight	**XXS30P1AM12**	0.047
		0-10 V	Straight	**XXS30P1VM12**	0.047
		4-20 mA	90° angled	**XXA30P1AM12**	0.100
		0-10 V	90° angled	**XXA30P1VM12**	0.100
	2	4-20 mA	Straight	**XXS30P2AM12**	0.095
		0-10 V	Straight	**XXS30P2VM12**	0.095
		4-20 mA	90° angled	**XXA30P2AM12**	0.100
		0-10 V	90° angled	**XXA30P2VM12**	0.100
	4	4-20 mA	Straight	**XXS30P4AM12**	0.115
		0-10 V	Straight	**XXS30P4VM12**	0.115
	8	4-20 mA + PNP *(2)*	Straight	**XXS30P8APM12**	0.210
		0-10 V + PNP *(2)*	Straight	**XXS30P8VPM12**	0.210

(1) NO or NC: configurable by software (see page 74).
(2) One analogic output and one digital output with NO or NC configurable by software (see page 74).

Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm
Diffuse mode, solid-state digital or analog output
Configurable by software

XXS30B1AM12
XXA30B1AM12

XXS30S2AM12
XXA30B2AM12

XXS30B4AM12 *XXS30S1AM12*

XXZPB100

Diffuse mode *(continued)*

Sensors with analog output, adjustable sensing distance, M12 connector

Sensors	Sensing distance (Sn)	Function/ output	Sensing axis	Reference	Weight
	m				kg
Ø 30 Nickel-plated brass	1	4-20 mA	Straight	**XXS30B1AM12**	0.165
		0-10 V	Straight	**XXS30B1VM12**	0.165
		4-20 mA	90° angled	**XXA30B1AM12**	0.175
		0-10 V	90° angled	**XXA30B1VM12**	0.175
	2	4-20 mA	Straight	**XXS30B2AM12**	0.165
		0-10 V	Straight	**XXS30B2VM12**	0.165
		4-20 mA	90° angled	**XXA30B2AM12**	0.175
		0-10 V	90° angled	**XXA30B2VM12**	0.175
	4	4-20 mA	Straight	**XXS30B4AM12**	0.195
		0-10 V	Straight	**XXS30B4VM12**	0.195
Ø 30 Stainless steel 316L	1	4-20 mA	Straight	**XXS30S1AM12**	0.160
		0-10 V	Straight	**XXS30S1VM12**	0.160
		4-20 mA	90° angled	**XXA30S1AM12**	0.170
		0-10 V	90° angled	**XXA30S1VM12**	0.170
	2	4-20 mA	Straight	**XXS30S2AM12**	0.160
		0-10 V	Straight	**XXS30S2VM12**	0.160
		4-20 mA	90° angled	**XXA30S2AM12**	0.170
		0-10 V	90° angled	**XXA30S2VM12**	0.170
	4	4-20 mA	Straight	**XXS30S4AM12**	0.190
		0-10 V	Straight	**XXS30S4VM12**	0.190

Accessories

Teach pushbutton	For use with sensors	Reference	Weight kg
Selection of detection window **Length of cable: 152 mm** **Input:** M12 female connector **Output:** M12 male connector	XXS30●● XXA30●●	**XXZPB100**	0.035

Configuration interface and configuration kit for the synchronization function

See page 74.

Ultrasonic sensors

XX range, General purpose
Cylindrical, plastic or metal, Ø 30 mm
Diffuse mode, solid-state digital or analog output
Configurable by software

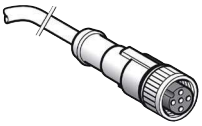
PF121334

XZCPV11V12L2

PF111910

XZCPV12V12L2

DF100520



XZCPV1164L10

PF152522A

XZCC12FDM50B

PF152522A

XXZB130

Accessories *(continued)*

Description	Type	Length	Reference	Weight kg
Pre-wired connector 5-pin, 5-wire female M12 connector/bare wires PVC cable	Straight	2	**XZCPV11V12L2**	0.090
		5	**XZCPV11V12L5**	0.201
		10	**XZCPV11V12L10**	0.360
	Elbowed	2	**XZCPV12V12L2**	0.090
		5	**XZCPV12V12L5**	0.201
		10	**XZCPV12V12L10**	0.360

Connection accessories without synchronization function

Pre-wired connector 5-pin, 5-wire female M12 connector/bare wires PVC cable	Straight	2	**XZCPV1164L2**	0.090
		5	**XZCPV1164L5**	0.190
		10	**XZCPV1164L10**	0.370
	Elbowed	2	**XZCPV1264L2**	0.090
		5	**XZCPV1264L5**	0.201
		10	**XZCPV1264L10**	0.360
Female M12 connector 5-pin, Pg 7 cable gland	**Straight**	**–**	**XZCC12FDM50B**	0.020
			XZCC12FDM50B	0.020

Mounting accessory

Description	For use with sensor		Weight kg
Fixing clamp	XXS30●● XXA30●●	**XXZB130**	0.010

Configuration interface and configuration kit for the synchronization function

See page 74.

Characteristics

Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm,1 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Sensor type			XXS30P1PM12	XXS30P1AM12	XXS30P1VM12
General characteristics					
Conformity to standards			EN/IEC 60947-5-2, UL 508, and CSA C22.2 n°14		
Compliance with regulations			CE (based on EMC directive 2014/30/EU), NEC (ANSI/NFPA 70), CEC (CSA C22), UNECE R10		
Product certifications			cULus with class 2 power supply, E2, EAC, RCM , and ECOLAB		
Nominal sensing distance (Sn)		m	1 (adjustable)		
Blind zone (in diffuse mode the object is not detected in this zone)		m	0.105		
Detection window			Remotely adjustable or by using external teachbutton **XXZPB100**		
Transmission frequency (transmitter resonance)		kHz	200		
Differential travel		mm	< 5	–	–
Repeat accuracy (repeatability)			0.1 %		
Minimum size of object to be detected			Cylinder Ø 1 mm up to sensing distance of 0.6m		
Tilt angle with 100 x 100 mm target			± 7° at 1 m, ± 10° at 0.9 m ± 35° at 0.5 m		
Materials	Case		XX●30P●: PBT		
	Sensing face		Epoxy, resin, and rubber		
Connection			M12 connector - 5-pin		
Supply characteristics					
Rated supply voltage (Ue) with protection against reverse polarity		V	⎓ 12…24 V	⎓ 12…24 V	⎓ 24 V
Voltage limits (including ripple)		V	⎓ 10…30 V	⎓ 10…30 V	⎓ 14…30 V
Current consumption, no-load		mA	< 30	< 30	< 30
Output characteristics					
LED indicators	Output state		Yellow LED	Yellow LED	Yellow LED
	Echo state		Green LED	Green LED	Green LED
Switching capacity (with overload and short-circuit protection)			< 100 mA	–	–
Resistive load impedance		Ω	–	⎓ 12 V, load ⩽ 250 Ω ⎓ 24 V, load ⩽ 850 Ω	⩾ 1 kΩ
Voltage drop		V	< 2	–	–
Internal temperature compensation			Yes	Yes	Yes
Maximum switching frequency		Hz	11	–	–
Delays	First-up	ms	120	180	180
	Response	ms	45	–	–
	Recovery	ms	45	100	100
Environment characteristics					
Degree of protection	Conforming to IEC 60529 and EN/IEC 60947-5-2		IP 65, IP 67		
Storage temperature		°C	- 40…+ 80		
Operating temperature		°C	- 25…+ 70		
Relative humidity			< 95%, without condensation		
Vibration resistance	Conforming to IEC 60068-2-6		Amplitude ± 1 mm (f = 10…55 Hz)		
Mechanical shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms, in all 3 axes		
Resistance to electromagnetic interference			Conforming to EN/IEC 60947-5-2 and UNECE R10-05		

Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm,1 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Sensor type			XXA30P1PM12 XX●30B1PM12 XX●30S1PM12	XXA30P1AM12 XX●30B1AM12 XX●30S1AM12	XXA30P1VM12 XX●30B1VM12 XX●30S1VM12
General characteristics					
Conformity to standards			EN/IEC 60947-5-2, UL 508, and CSA C22.2 n°14		
Compliance with regulations			CE (based on EMC directive 2014/30/EU), NEC (ANSI/NFPA 70), CEC (CSA C22), UNECE R10		
Product certifications			cULus with class 2 power supply, E2, EAC, RCM , and ECOLAB		
Nominal sensing distance (Sn)		m	1 (adjustable)		
Blind zone (in diffuse mode the object is not detected in this zone)		m	0.155		
Detection window			Remotely adjustable or by using external teachbutton **XXZPB100**		
Transmission frequency (transmitter resonance)		kHz	120		
Differential travel		mm	< 5	-	-
Repeat accuracy (repeatability)			0.1 %		
Minimum size of object to be detected			Cylinder Ø 1 mm up to sensing distance of 1m		
Tilt angle with 100 x 100 mm target			± 12° at 1 m, ± 15° at 0.9 m ± 45° at 0.5 m		
Materials	Case		XX●30P●: PBT XX●30B●: Nickel-plated brass XX●30S●: Stainless steel 316L		
	Sensing face		Epoxy, resin, and rubber		
Connection			M12 connector - 5-pin		
Supply characteristics					
Rated supply voltage (Ue) with protection against reverse polarity		V	12…24 V ⎓	12…24 V ⎓	24 V ⎓
Voltage limits (including ripple)		V	10…30 V ⎓	10…30 V ⎓	14…30 V ⎓
Current consumption, no-load		mA	< 65	< 65	< 65
Output characteristics					
LED indicators	Output state		Yellow LED	Yellow LED	Yellow LED
	Echo state		Green LED	Green LED	Green LED
Switching capacity (with overload and short-circuit protection)			< 100 mA	-	-
Resistive load impedance		Ω	-	⎓ 12 V, load ≤ 250 Ω ⎓ 24 V, load ≤ 850 Ω	≥ 1 kΩ
Voltage drop		V	< 2	-	-
Internal temperature compensation			Yes	Yes	Yes
Maximum switching frequency		Hz	11		
Delays	First-up	ms	120	180	180
	Response	ms	45	-	-
	Recovery	ms	45	100	100
Environment characteristics					
Degree of protection Conforming to IEC 60529 and EN/IEC 60947-5-2			IP 65, IP 67		
Storage temperature		°C	- 40…+ 80		
Operating temperature		°C	- 25…+ 70		
Relative humidity			< 95%, without condensation		
Vibration resistance Conforming to IEC 60068-2-6			Amplitude ± 1 mm (f = 10…55 Hz)		
Mechanical shock resistance Conforming to IEC 60068-2-27			30 gn, duration 11 ms, in all 3 axes		
Resistance to electromagnetic interference			Conforming to EN/IEC 60947-5-2 and UNECE R10-05		

Ultrasonic sensors

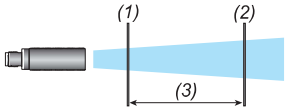
XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm,1 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Operating diagrams for digital output sensors

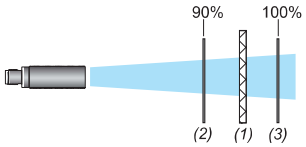
Settings with teach procedure

Window mode



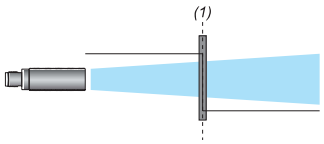
(1): Near limit
(2): Far limit
(3): Sensing window

Reflex mode



(1): Reflector
(2): Near limit
(3): Far limit

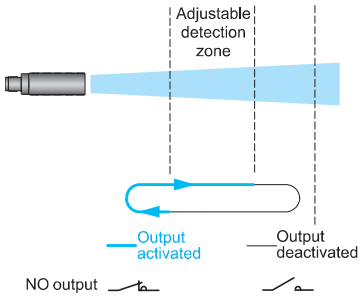
Proximity mode



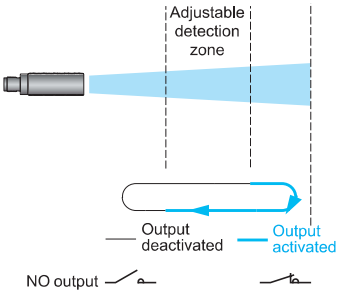
(1) Switch point.

Pump/Hysteresis mode

Emptying (stored in high threshold memory)

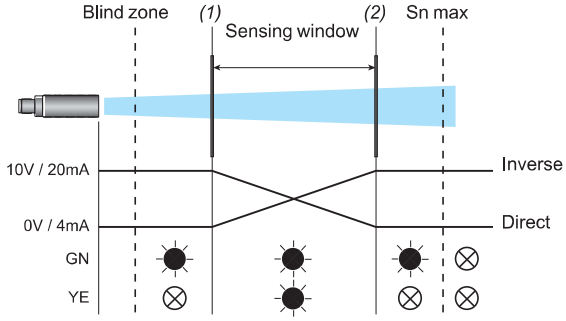


Filling (stored in low threshold memory)



Operating diagram for analog output sensors

Near and far limits setting with teach procedure



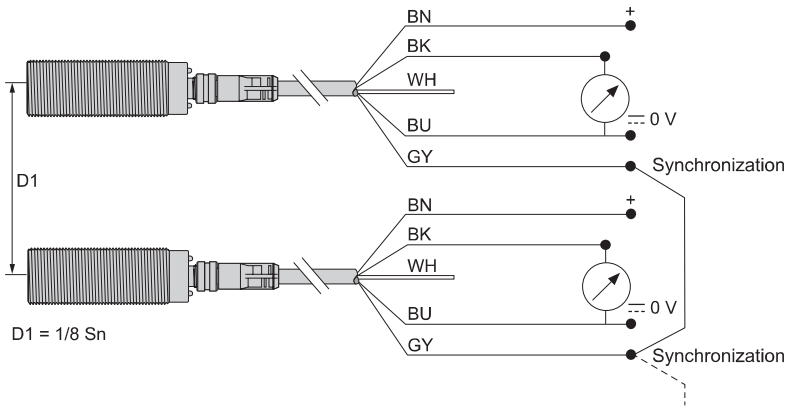
GN: Green LED
YE: Yellow LED

: OFF

: ON

(1): Near limit
(2): Far limit

Diagram for the synchronization function (side by side application)



***NB**: To enable synchronization between several sensors, all of the wires of pin no.5 (gray) must be electrically connected together. A maximum of 8 sensors can be synchronized. To enable "Multiplexer" function for the sensors, use the XX Configuration Software.*

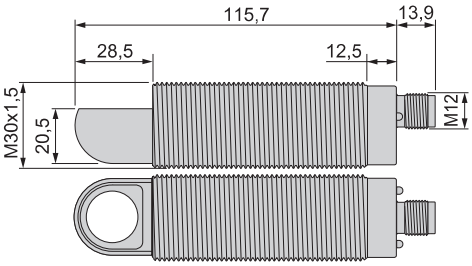
Ultrasonic sensors

XX range, General purpose

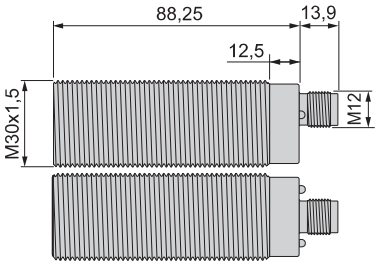
Cylindrical, plastic or metal, Ø 30 mm,1 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Dimensions

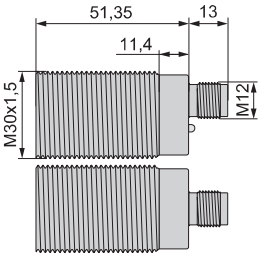
XXA30●1●M12



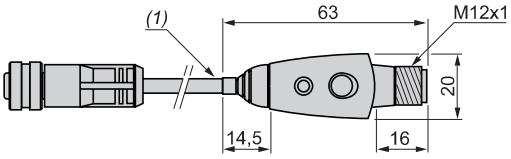
XXS30B1●M12, XXS30S1●M12



XXS30P1PM12, XXS30P1AM12, XXS30P1VM12



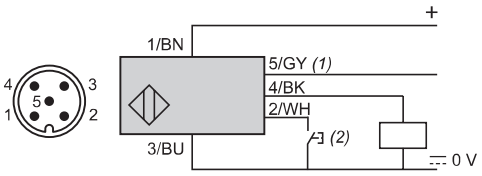
Teach pushbutton XXZPB100



(1) Cable length: 152 mm

Connections

Connector wiring

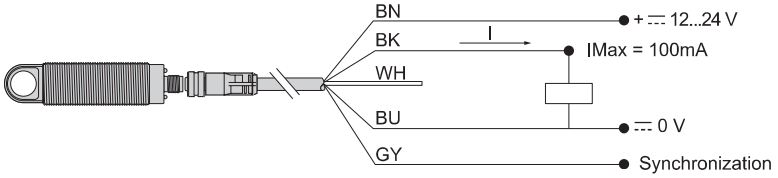


Pin number	Wire color	Digital output description	Analog output description	
			4-20 mA	0-10 V
1	BN: Brown	+12…24 V ⎓	+ ⎓ 12…24 V	+ ⎓ 14…24 V
2	WH: White	Input teach		
3	BU: Blue	0 V ⎓		
4	BK: Black	Output		
5	GY: Gray	Synchronization		

(1) Synchronization.
*(2) External setting pushbutton or **XXZPB100** remote teach pushbutton (see page 43).*

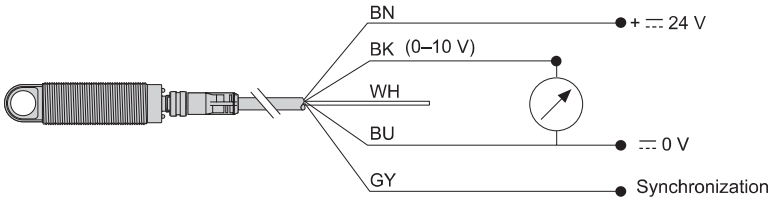
Wiring scheme (digital output NO or NC)

XXA30●●PM12/XXS30●●PM12



Wiring scheme (analog output 0-10V)

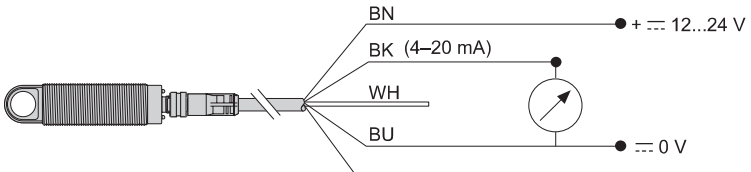
XX●30●●VM12



0-10 V:
1 kΩ…∞

Wiring scheme (analog output 4-20 mA)

XX●30●●AM12



4-20 mA:
- For 12 V ⎓, load ≤ 250 Ω
- For 24 V ⎓, load ≤ 850 Ω

Ultrasonic sensors

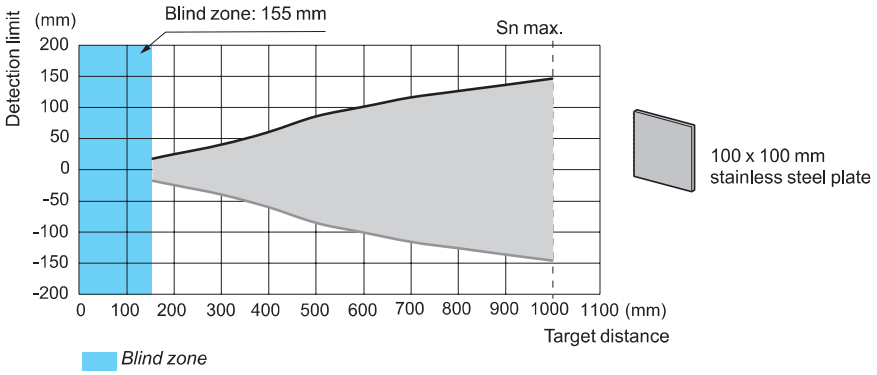
XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm,1 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

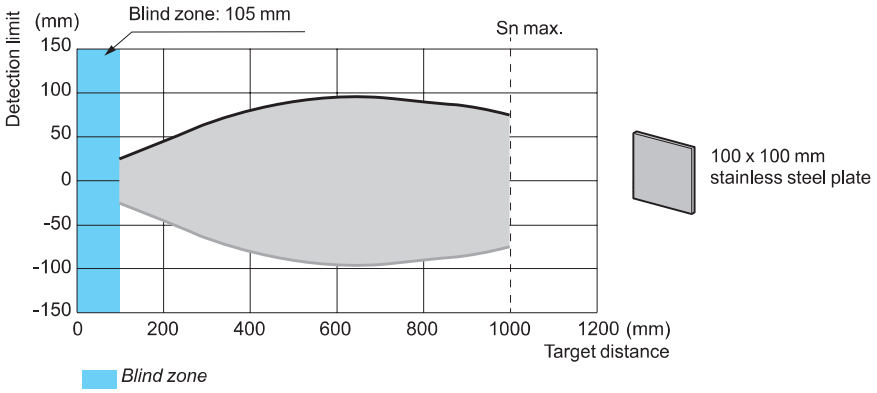
Curves

Detection curve with 100 x 100 mm square target

XXA30●1●M12, XXS30B1●M12, XXS30S1●M12

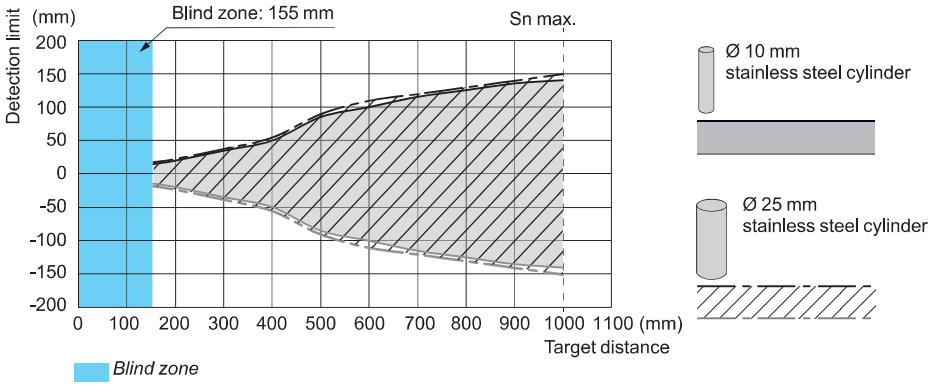


XXS30P1PM12, XXS30P1AM12, XXS30P1VM12

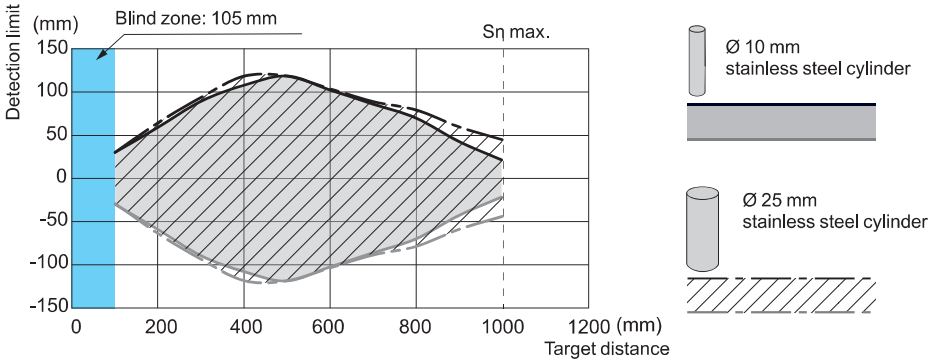


Detection curve with round bar

XXA30●1●M12, XXS30B1●M12, XXS30S1●M12



XXS30P1PM12, XXS30P1AM12, XXS30P1VM12



Characteristics

Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm, 2 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Sensor type			XX●30P2PM12 XX●30B2PM12 XX●30S2PM12	XX●30P2AM12 XX●30B2AM12 XX●30S2AM12	XX●30P2VM12 XX●30B2VM12 XX●30S2VM12
General characteristics					
Conformity to standards			EN/IEC 60947-5-2, UL 508, and CSA C22.2 n°14		
Compliance with regulations			CE (based on EMC directive 2014/30/EU), NEC (ANSI/NFPA 70), CEC (CSA C22), UNECE R10		
Product certifications			cULus with class 2 power supply, E2, EAC, RCM , and ECOLAB		
Nominal sensing distance (Sn)		m	2 (adjustable)		
Blind zone (in diffuse mode the object is not detected in this zone)		m	0.155		
Detection window			Remotely adjustable or by using external teachbutton XXZPB100		
Transmission frequency (transmitter resonance)		kHz	120		
Differential travel		mm	< 10	–	
Repeat accuracy (repeatability)			0.1 %		
Minimum size of object to be detected			Cylinder Ø 1 mm up to sensing distance of 1.4m		
Tilt angle with 100 x 100 mm target			± 10° at 2 m ,± 12° at 1.8 m ± 45° at 1m		
Materials	Case		XX●30P●: PBT XX●30B●: Nickel-plated brass XX●30S●: Stainless steel 316L		
	Sensing face		Epoxy, resin, and rubber		
Connection			M12 connector - 5-pin		
Supply characteristics					
Rated supply voltage (Ue) with protection against reverse polarity		V	12…24 V ⎓	12…24 V ⎓	24 V ⎓
Voltage limits (including ripple)		V	10…30 V ⎓	10…30 V ⎓	14…30 V ⎓
Current consumption, no-load		mA	< 65	< 65	< 65
Output characteristics					
LED indicators	Output state		Yellow LED	Yellow LED	Yellow LED
	Echo state		Green LED	Green LED	Green LED
Switching capacity (with overload and short-circuit protection)			< 100 mA	–	–
Resistive load impedance		Ω	–	⎓ 12 V, load ⩽ 250 Ω ⎓ 24 V, load ⩽ 850 Ω	⩾ 1 kΩ
Voltage drop		V	< 2	–	–
Internal temperature compensation			Yes	Yes	Yes
Maximum switching frequency		Hz	5.5		
Delays	First-up	ms	150	250	250
	Response	ms	90	–	–
	Recovery	ms	90	200	200
Environment characteristics					
Degree of protection	Conforming to IEC 60529 and EN/IEC 60947-5-2		IP 65, IP 67		
Storage temperature		°C	- 40…+ 80		
Operating temperature		°C	- 25…+ 70		
Relative humidity			< 95%, without condensation		
Vibration resistance	Conforming to IEC 60068-2-6		Amplitude ± 1 mm (f = 10…55 Hz)		
Mechanical shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms, in all 3 axes		
Resistance to electromagnetic interference			Conforming to EN/IEC 60947-5-2 and UNECE R10-05		

Ultrasonic sensors

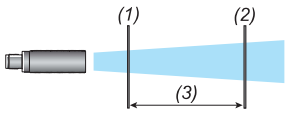
XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm, 2 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Operating diagrams for digital output sensors

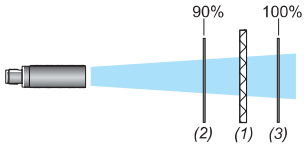
Settings with teach procedure

Window mode



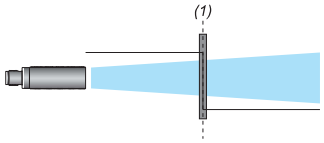
(1): Near limit
(2): Far limit
(3): Sensing window

Reflex mode



(1): Reflector
(2): Near limit
(3): Far limit

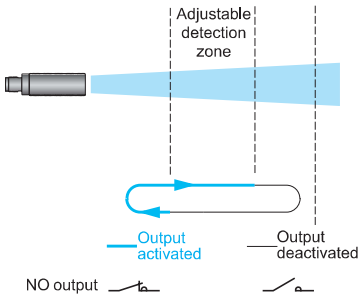
Proximity mode



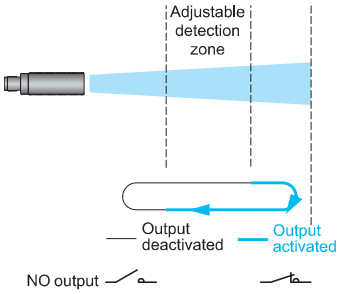
(1) Switch point

Pump/Hysteresis mode

Emptying (stored in high threshold memory)

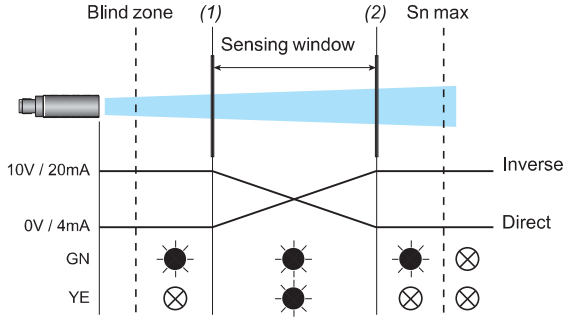


Filling (stored in low threshold memory)



Operating diagram for analog output sensors

Near and far limits setting with teach procedure



GN: Green LED
YE: Yellow LED

⊗ : OFF

● : ON

(1): Near limit
(2): Far limit

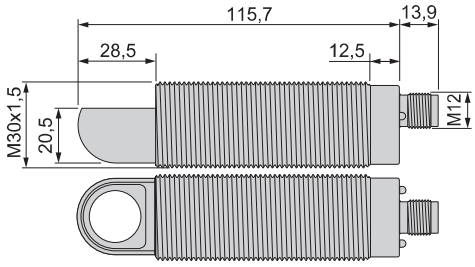
Ultrasonic sensors

XX range, General purpose

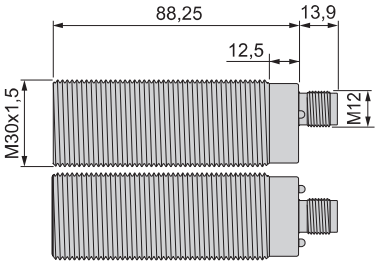
Cylindrical, plastic or metal, Ø 30 mm, 2 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Dimensions

XX●30P2PM12, XX●30B2PM12, XX●30S2PM12

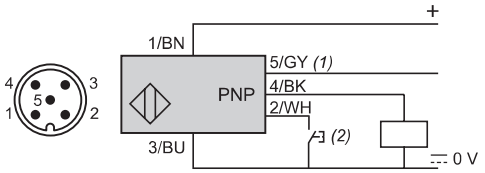


XX●30P2AM12, XX●30B2AM12, XX●30S2AM12
XX●30P2VM12, XX●30B2VM12, XX●30S2VM12



Connections

Connector wiring

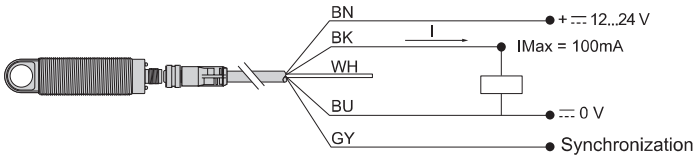


Pin number	Wire color	Digital output description	Analog output description	
			4-20 mA	0-10 V
1	BN: Brown	+12…24 V ⎓	+12…24 V ⎓	+14…24 V ⎓
2	WH: White	Input teach		
3	BU: Blue	0 V ⎓		
4	BK: Black	Output		
5	GY: Gray	Synchronization		

(1) Synchronization.
*(2) External setting pushbutton or **XXZPB100** remote teach pushbutton (see page 43).*

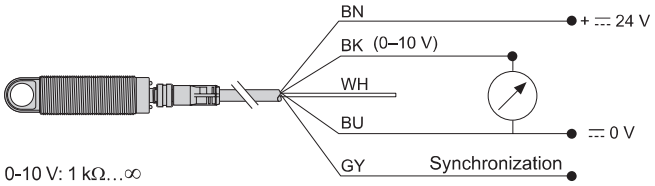
Wiring scheme (digital output NO or NC)

XXS30●●PM12, XXA30●●PM12



Wiring scheme (analog output 0-10V)

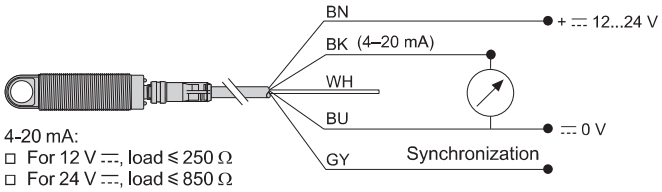
XX●30●●VM12



0-10 V: 1 kΩ…∞

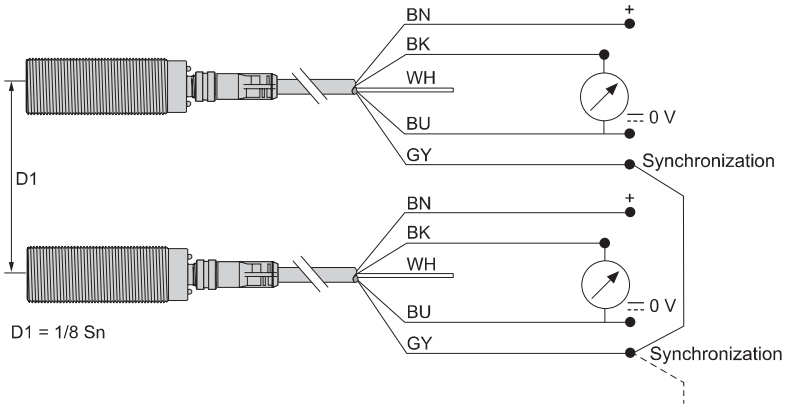
Wiring scheme (analog output 4-20 mA)

XX●30●●AM12



4-20 mA:
- For 12 V ⎓, load ≤ 250 Ω
- For 24 V ⎓, load ≤ 850 Ω

Diagram for the synchronization function (Side by side application)



***NB**: To enable synchronization between several sensors, all of the wires of pin no.5 (gray) must be electrically connected together.*
A maximum of 8 sensors can be synchronized. To enable "Multiplexer" function for the sensors, use the XX Configuration Software.
Without synchronization or multiplexing, the sensors must be at least 50 cm away from each other in order to avoid mutual interference.

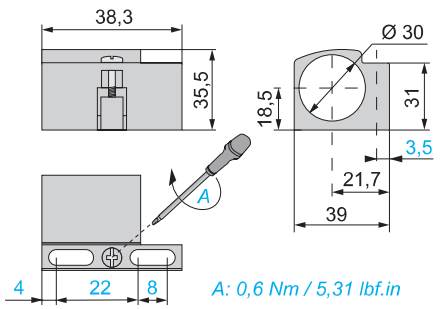
Ultrasonic sensors

XX range, General purpose

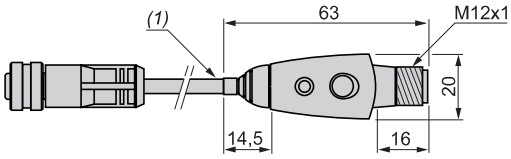
Cylindrical, plastic or metal, Ø 30 mm, 2 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Dimensions *(continued)*

Fixing clamp XXZB130



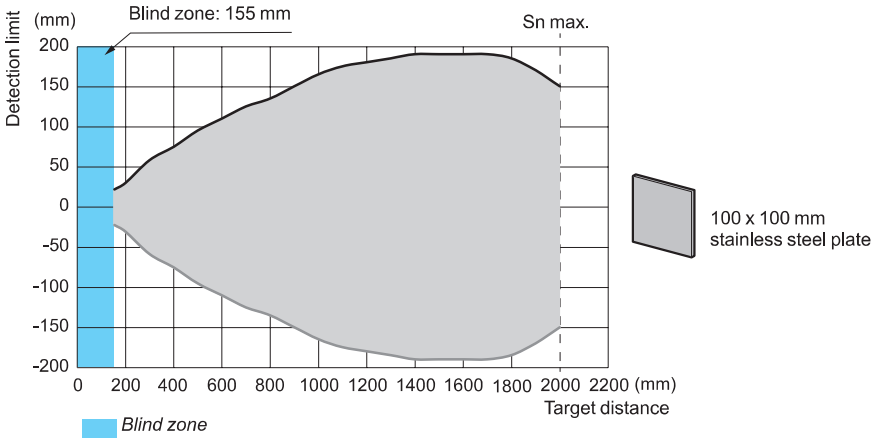
Teach pushbutton XXZPB100



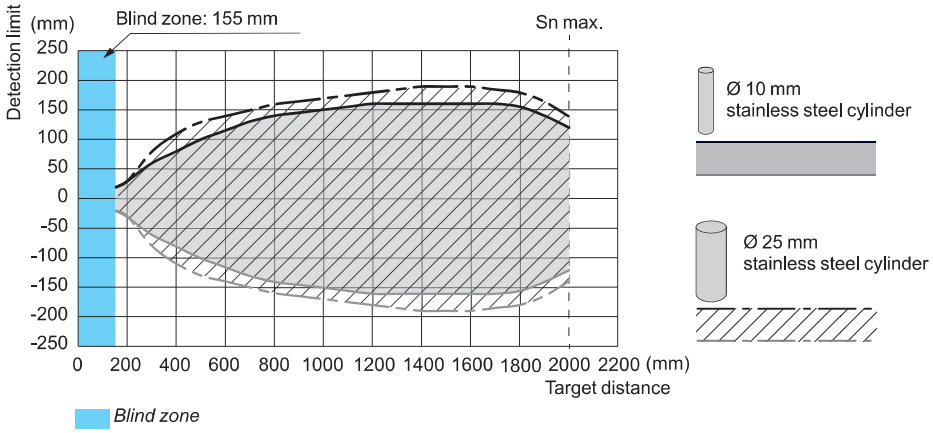
(1) Cable length: 152 mm

Curves

Detection curve with 100 x 100 mm square target



Detection curve with round bar



Characteristics

Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm, 4 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Sensor type			XXS30●4PM12	XXS30●4AM12	XXS30●4VM12
General characteristics					
Conformity to standards			EN/IEC 60947-5-2, UL 508, and CSA C22.2 n°14		
Compliance with regulations			CE (based on EMC directive 2014/30/EU), NEC (ANSI/NFPA 70), CEC (CSA C22), UNECE R10		
Product certifications			cULus with class 2 power supply, E2, EAC, RCM , and ECOLAB		
Nominal sensing distance (Sn)		m	4 (adjustable)		
Blind zone (in diffuse mode the object is not detected in this zone)		m	0.420		
Detection window			Remotely adjustable or by using external teachbutton XXZPB100		
Transmission frequency (transmitter resonance)		kHz	80		
Differential travel		mm	< 20	–	
Repeat accuracy (repeatability)			0.1 %		
Minimum size of object to be detected			Cylinder Ø 1 mm up to sensing distance of 1.8m		
Tilt angle with 500 x 500 mm target			± 7° at 4 m, ± 10° at 3.6 m ± 40° at 2 m		
Materials	Case		XXS30P●: PBT XXS30B●: Nickel-plated brass XXS30S●: Stainless steel 316L		
	Sensing face		Epoxy, resin, and rubber		
Connection			M12 connector - 5-pin		
Supply characteristics					
Rated supply voltage (Ue) with protection against reverse polarity		V	12…24 V ⎓	12…24 V ⎓	24 V ⎓
Voltage limits (including ripple)		V	10…30 V ⎓	10…30 V ⎓	14…30 V ⎓
Current consumption, no-load		mA	< 65	< 65	< 65
Output characteristics					
LED indicators	Output state		Yellow LED	Yellow LED	Yellow LED
	Echo state		Green LED	Green LED	Green LED
Switching capacity (with overload and short-circuit protection)			< 100 mA	–	–
Resistive load impedance		Ω	–	12 V ⎓, load ≤ 250 Ω 24 V ⎓ , load ≤ 850 Ω	≥ 1 kΩ
Voltage drop		V	< 2	–	–
Internal temperature compensation			Yes	Yes	Yes
Maximum switching frequency		Hz	2.7	–	–
Delays	First-up	ms	250	500	500
	Response	ms	180	–	–
	Recovery	ms	180	400	400
Environment characteristics					
Degree of protection	Conforming to IEC 60529 and EN/IEC 60947-5-2		IP 65, IP 67		
Storage temperature		°C	- 40…+ 80		
Operating temperature		°C	- 25…+ 70 *(1)*		
Relative humidity			< 95%, without condensation		
Vibration resistance	Conforming to IEC 60068-2-6		Amplitude ± 1 mm (f = 10…55 Hz)		
Mechanical shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms, in all 3 axes		
Resistance to electromagnetic interference			Conforming to EN/IEC 60947-5-2 and UNECE R10-05		

Ultrasonic sensors

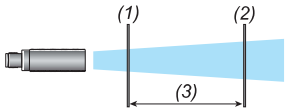
XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm, 4 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Operating diagrams for digital output sensors

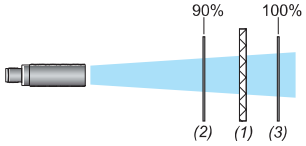
Settings with teach procedure

Window mode



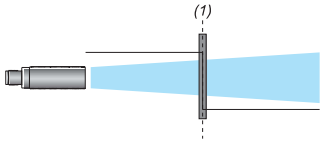
(1): Near limit
(2): Far limit
(3): Sensing window

Reflex mode



(1): Reflector
(2): Near limit
(3): Far limit

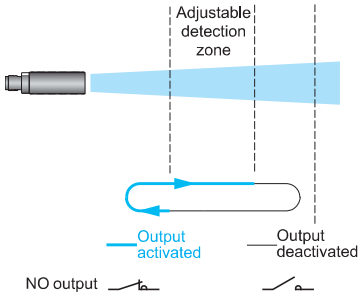
Proximity mode



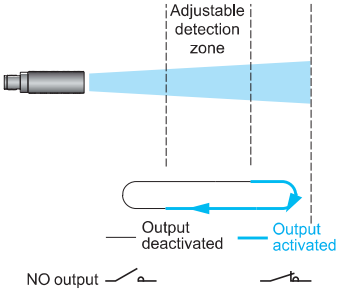
(1) Switch point

Pump/Hysteresis mode

Emptying (stored in high threshold memory)

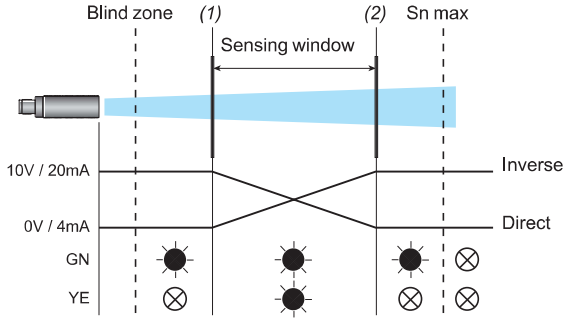


Filling (stored in low threshold memory)



Operating diagram for analog output sensors

Near and far limits setting with teach procedure



GN: Green LED
YE: Yellow LED

⊗ : OFF

● : ON

(1): Near limit
(2): Far limit

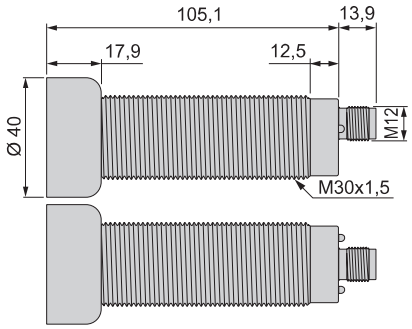
Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm, 4 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

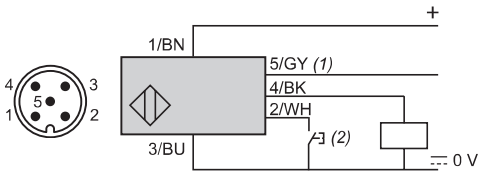
Dimensions

XXS30P4PM12, XXS30B4PM12, XXS30S4PM12



Connections

Connector wiring

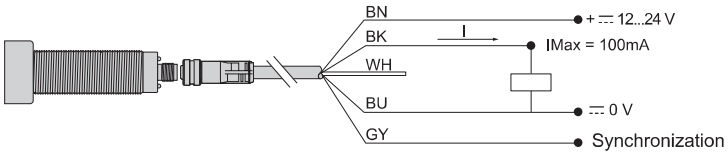


Pin number	Wire color	Digital output description	Analog output description	
			4-20 mA	0-10 V
1	BN: Brown	+12…24 V ⎓	+12…24 V ⎓	+14…24 V ⎓
2	WH: White	Input teach		
3	BU: Blue	0 V ⎓		
4	BK: Black	Output		
5	GY: Gray	Synchronization		

(1) Synchronization.
*(2) External setting pushbutton or **XXZPB100** remote teach pushbutton (see page 43).*

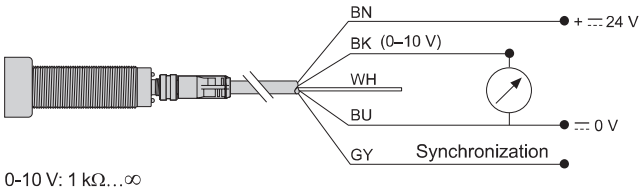
Wiring scheme (digital output NO or NC)

XXS30●●PM12



Wiring scheme (analog output 0-10V)

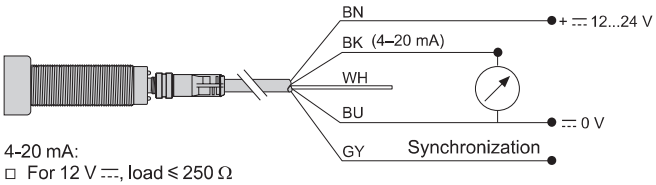
XX●30●●VM12



0-10 V: 1 kΩ…∞

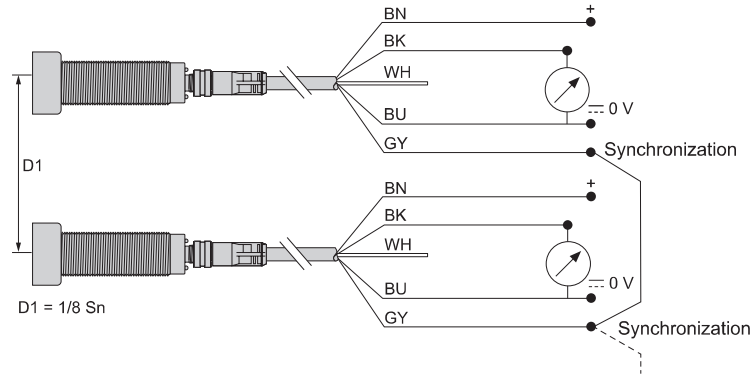
Wiring scheme (analog output 4-20 mA)

XX●30●●AM12



4-20 mA:
- For 12 V ⎓, load ≤ 250 Ω
- For 24 V ⎓, load ≤ 850 Ω

Diagram for the synchronization function (Side by side application)



***NB**: To enable synchronization between several sensors, all of the wires of pin no.5 (gray) must be electrically connected together.*
A maximum of 8 sensors can be synchronized. To enable "Multiplexer" function for the sensors, use the XX Configuration Software.
Without synchronization or multiplexing, the sensors must be at least 50 cm away from each other in order to avoid mutual interference.

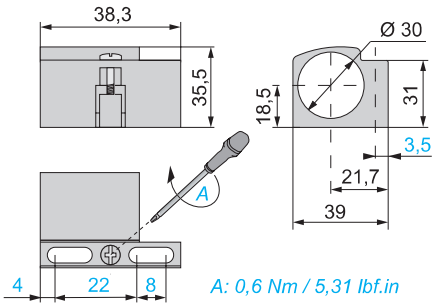
Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm, 4 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

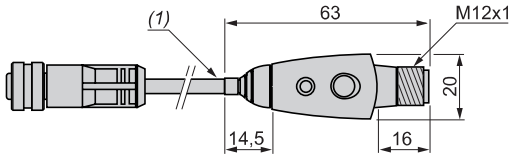
Dimensions *(continued)*

Fixing clamp XXZB130



A: 0,6 Nm / 5,31 lbf.in

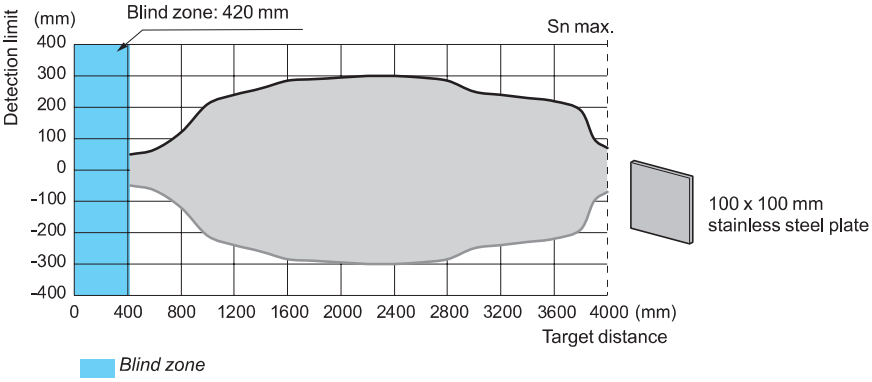
Teach pushbutton XXZPB100



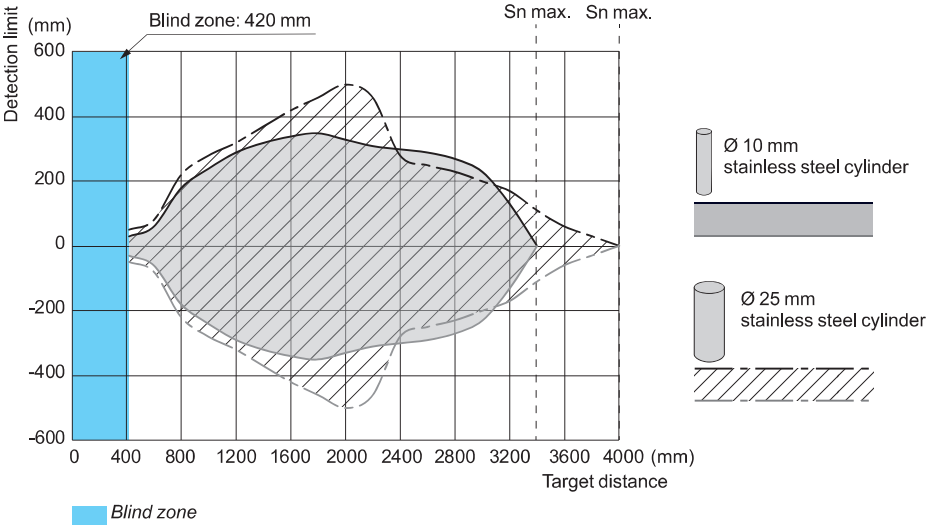
(1) Cable length: 152 mm

Curves

Detection curve with 100 x 100 mm square target



Detection curve with round bar



Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm, 8 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Sensor type			XXS30P8PPM12 XXS30P8NNM12	XXS30P8APM12	XXS30P8VPM12
General characteristics					
Conformity to standards			EN/IEC 60947-5-2, UL 508 and CSA C22.2 n° 14		
Compliance with regulations			CE (based on EMC directive 2014/30/EU), NEC (ANSI/NFPA 70), CEC (CSA C22), UNECE R10		
Product certifications			cULus with class 2 power supply, E2, EAC, RCM , and ECOLAB		
Nominal sensing distance (Sn)		**m**	8 (adjustable)		
Blind zone (in diffuse mode the object is not detected in this zone)		**m**	0.290		
Detection window			Remotely adjustable or by using external teachbutton **XXZPB100**		
Transmission frequency (transmitter resonance)		**kHz**	75		
Differential travel		**mm**	< 12.7	–	
Repeat accuracy (repeatability)			0.1 %		
Minimum size of object to be detected			Cylinder Ø 1 mm up to sensing distance of 1.8m		
Tilt angle with 500 x 500 mm target			± 4° at 8 m, ± 5° at 7.2 m ± 12° at 4 m		
Materials	Case		PBT		
	Sensing face		Epoxy, resin, and rubber		
Connection			M12 connector - 5-pin		
Supply characteristics					
Rated supply voltage (Ue) **with protection against reverse polarity**		**V**	⎓ 12…24 V	⎓ 12…24 V	⎓ 24 V
Voltage limits (including ripple)		**V**	⎓ 10…30 V	⎓ 10…30 V	⎓ 14…30 V
Current consumption, no-load		**mA**	< 50	< 50	< 50
Output characteristics					
LED indicators	Output state		1 dual colour LED (yellow/green) 1 three-colour LED (yellow/green/red)	1 dual colour LED (yellow/green) 1 three-colour LED (yellow/green/red)	1 dual colour LED (yellow/green) 1 three-colour LED (yellow/green/red)
	Echo state		Green LED	Green LED	Green LED
Switching capacity (with overload and short-circuit protection)			< 100 mA	–	–
Resistive load impedance		**Ω**	–	⎓ 12 V, load ⩽ 250 Ω ⎓ 24 V, load ⩽ 850 Ω	⩾ 1 kΩ
Voltage drop		**V**	< 2	–	–
Internal temperature compensation			Yes	Yes	Yes
Maximum switching frequency		**Hz**	2	–	–
Delays	First-up	**ms**	600	600	600
	Response	**ms**	300	–	–
	Recovery	**ms**	300	500	500
Environment characteristics					
Degree of protection	Conforming to IEC 60529 and EN/IEC 60947-5-2		IP 65, IP 67		
Storage temperature		**°C**	- 40…+ 85		
Operating temperature		**°C**	- 25…+ 70		
Relative humidity			< 95%, without condensation		
Vibration resistance	Conforming to IEC 60068-2-6		Amplitude ± 1 mm (f = 10…55 Hz)		
Mechanical shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms, in all 3 axes		
Resistance to electromagnetic interference			Conforming to EN/IEC 60947-5-2 and UNECE R10-05		

Dimensions, connections

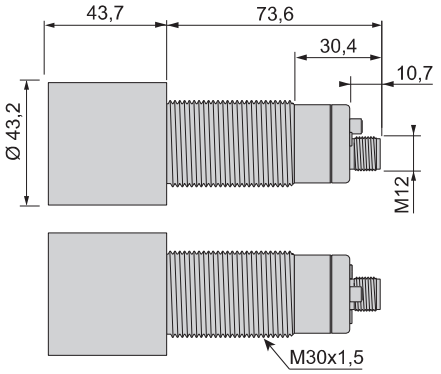
Ultrasonic sensors

XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm, 8 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Dimensions

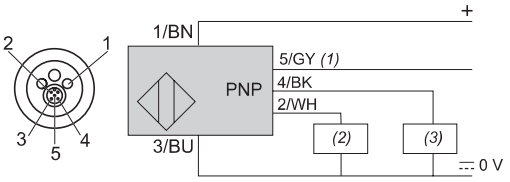
XXS30P8PPM12, XXS30P8NNM12, XXS30P8APM12, XXS30P8VPM12



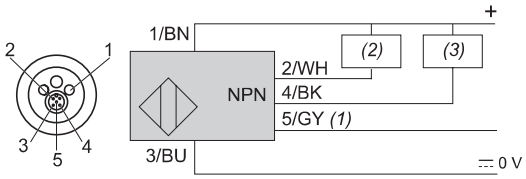
Connections

Connector wiring

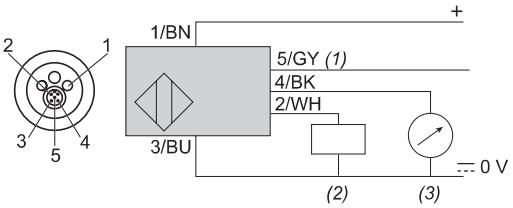
XXS30P8PPM12



XXS30P8NNM12



XXS30P8APM12, XXS30P8VPM12

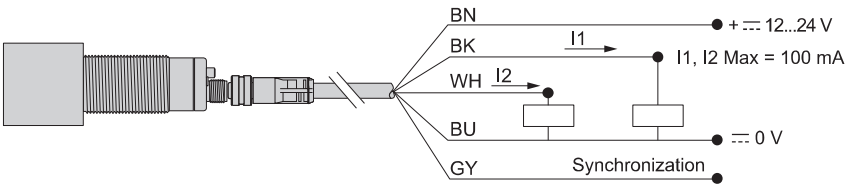


Pin number	Wire color	Digital output description	Analog output description	
			4-20 mA	0-10 V
1	BN: Brown	+12…24 V ⎓	+12…24 V ⎓	+24 V ⎓
2	WH: White	Output 2	PNP output	PNP output
3	BU: Blue	0 V ⎓	–	–
4	BK: Black	Output 1	4-20 mA output	0-10 V output
5	GY: Gray	Synchronization		

(1) Synchronization
(2) Output 2
(3) Output 1

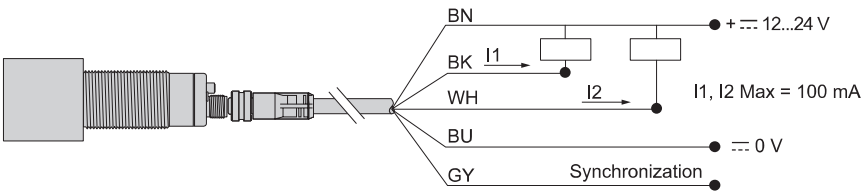
Wiring scheme (digital output PNP, NO or NC)

XXS30P8PPM12



Wiring scheme (digital output NPN, NO or NC)

XXS30P8NNM12



Ultrasonic sensors

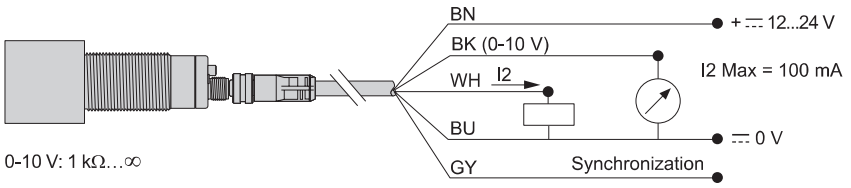
XX range, General purpose

Cylindrical, plastic or metal, Ø 30 mm, 8 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Connections (continued)

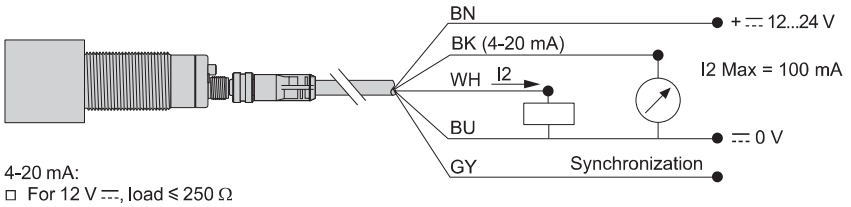
Wiring scheme (analog output 0-10 V and PNP, NO or NC)

XXS30P8VPM12



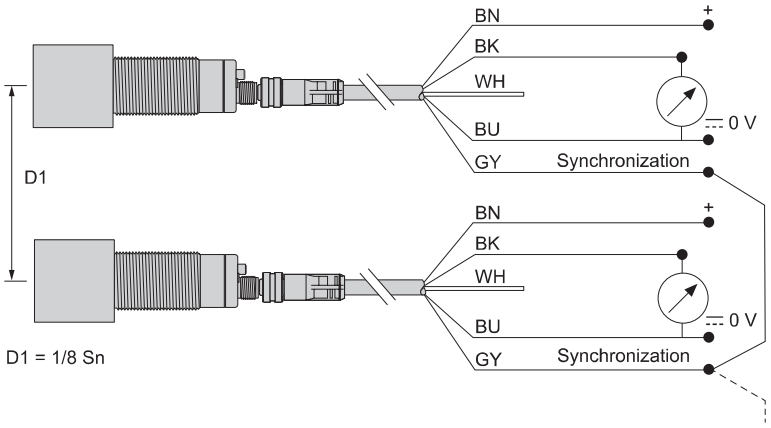
Wiring scheme (analog output 4-20 mA and PNP, NO or NC)

XXS30P8APM12



4-20 mA:
- For 12 V ⎓, load ≤ 250 Ω
- For 24 V ⎓, load ≤ 850 Ω

Diagram for the synchronization function (Side by side application)



***NB**: To enable synchronization between several sensors, all of the wires of pin no.5 (gray) must be electrically connected together.*
A maximum of 8 sensors can be synchronized. To enable "Multiplexer" function for the sensors, use the XX Configuration Software.
Without synchronization or multiplexing, the sensors must be at least 50 cm away from each other in order to avoid mutual interference.

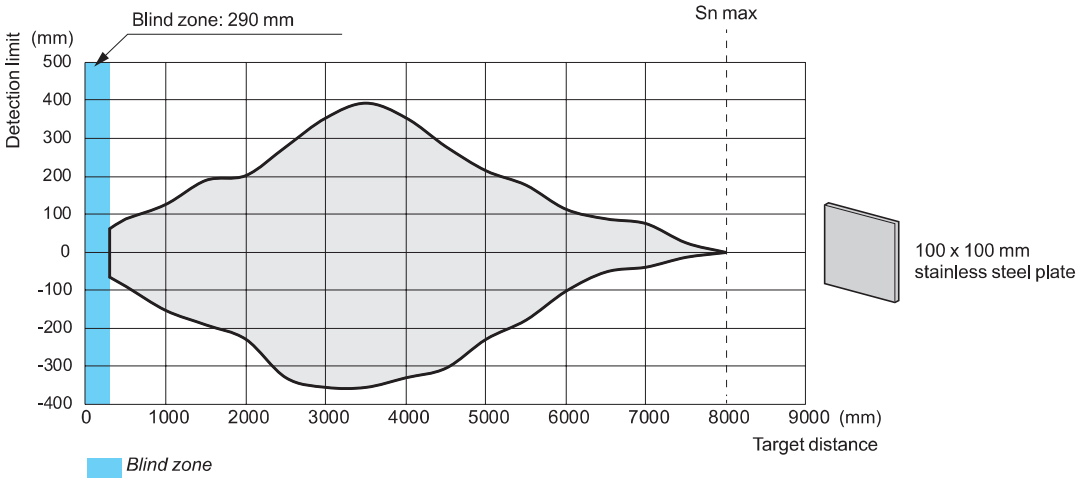
Ultrasonic sensors

XX range, General purpose

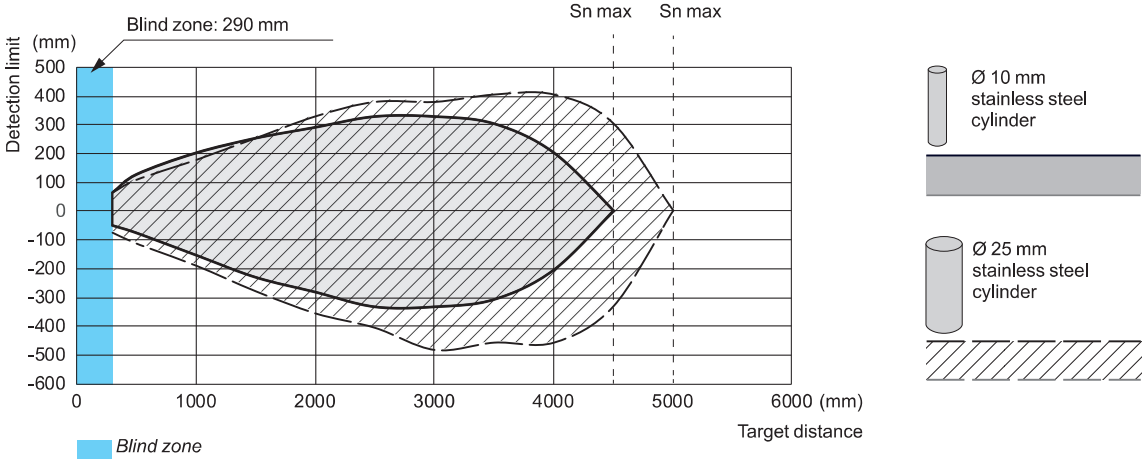
Cylindrical, plastic or metal, Ø 30 mm, 8 m sensing distance. Diffuse mode, solid-state digital or analog output. Configurable by software

Curves

Detection curve with 100 x 100 mm square target

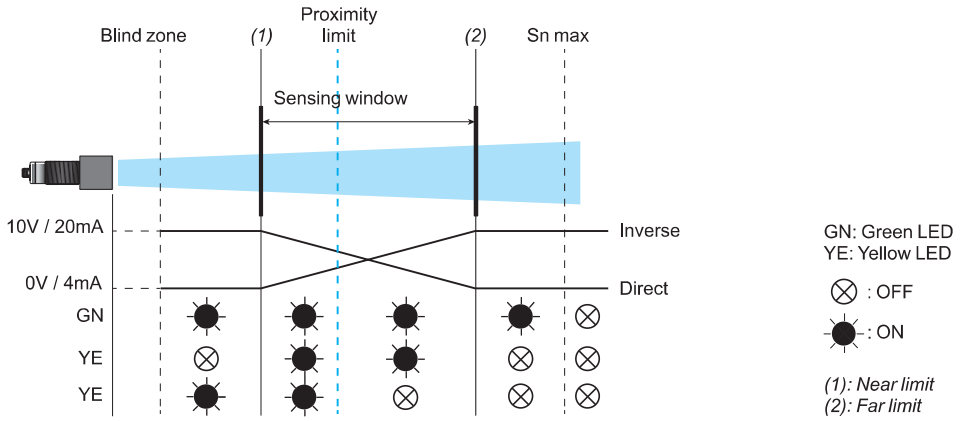


Detection curve with round bar



Operating diagram for analog output sensors

Near and far limits setting with teach procedure



Presentation

Ultrasonic sensors

XX range, Wide Beam

Obstacle detection system for mobile equipment.
Diffuse mode, solid-state digital output and analog output. Configurable by software

Wide Beam ultrasonic sensors

Telemecanique Sensors has expanded its range of ultrasonic sensors with the "XX Wide Beam" offer to meet the specific needs of mobile equipment such as:
- Lift trucks
- Cherry pickers
- Mobile elevating work platforms
- Self-propelled ride-on handling trucks
- Ground support equipment
- Aircraft access platforms, etc.

These sensors are designed to detect the following kinds of obstacles when mobile equipment is lifting or rotating:
ceilings, beams, cables, scaffolding, other platforms or buckets, etc.

Compact and flush mountable in metal, these sensors are easy to install with:
- A remote Deutsch DTM04 connector on a 0.15 m cable, or
- A 0.5 m cable

They operate silently and are also suitable for indoor use.

The XX configuration software makes these sensors easy to program.
The synchronization function is used to reduce interference between sensors, even when installed close to each other, thus helping to ensure objects are detected over a wide area.

***Important**: This device does not have a Performance Level or Safety Integrity Level or any other type of capability with regard to functional safety.*
For safety applications, visit our website: www.tesensors.com

Obstacle detection system

> **Wide detection area**: Fewer sensors are needed to cover a given area.
> Better tilt angle for enhanced detection of targets and surfaces, even those that are slightly reflective or curved

> **Rugged sensors suitable for use in harsh environments**
> Operation in temperatures as low as -40 °C with no adverse impact on detection capability
> Thermoplastic UV-resistant front face that can tolerate potential damage caused by building materials or bad weather
> IP69K rating for high-pressure washdown

> **Noise detection capability to assist the user**
> The sensor is equipped with a noise detection function that is enabled by default. When noise detection is enabled, the sensor's analog output emits 2 mA or 5 volts (depending on model) when it detects excessive environmental noise.
> Noise detection settings can be changed using the configuration interface and software (see page 74).

Certified
> **E2** according to UN Regulation 10R-06
> **cULus**

Ultrasonic sensors

XX range, Wide Beam

Obstacle detection system for mobile equipment. Diffuse mode, solid-state digital output and analog output. Configurable by software

XXW54P3●PL01DM6

XXW54P3●PL05

XXZKITDM6

References

Description	Sensing distance (Sn)	Function/ output	Connections	Reference	Weight
	m				kg
Diffuse sensors with 0.5…4.5 V analog output and solid state digital output					
Ø 54 mm plastic sensor	3	0.5…4.5 V + PNP	0.15 m cable with remote Deutsch DTM04 6-pin connector	**XXW54P3HPL01DM6**	0.115
			0.5 m cable	**XXW54P3HPL05**	0.115
Diffuse sensors with 4…20 mA analog output and solid state digital output					
Ø 54 mm plastic sensor	3	4…20 mA + PNP	0.15 m cable with remote Deutsch DTM04 6-pin connector	**XXW54P3APL01DM6**	0.115
			0.5 m cable	**XXW54P3APL05**	0.115
Connection accessory					
Configuration cable for sensors XXW54P3●PL01DM6			1 m cable with female Deutsch DTM04 6-pin connector and male M12 5-pin connector	**XXZKITDM6**	0.050
Configuration software, interface, and kit for synchronization function					

See page 74.

Ultrasonic sensors

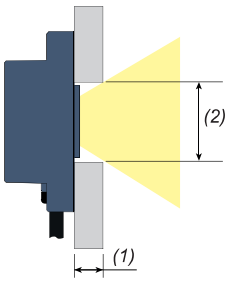
XX range, Wide Beam

Obstacle detection system for mobile equipment. Diffuse mode, solid-state digital output and analog output. Configurable by software

Sensor type			XXW54P3HPL01DM6	XXW54P3APL01DM6	XXW54P3HPL05	XXW54P3APL05
General characteristics						
Conforming to standards			EN/IEC 60947-5-2, UL 60947-5-2 and CSA C22.2 n° 60947-5-2			
Compliance with regulations			CE (based on the EMC directive 2014/30/UE), NEC (ANSI/NFPA 70), CEC (CSA C22), UNECE R10			
Product certifications			UKCA, E2 *(pending)*, cULus			
Nominal sensing distance (Sn)		**m**	0.425…3			
Blind zone		**mm**	425			
Detection window			Adjustable using XX configuration software, up to 4 m			
Transmission frequency (transmitter resonance)		**kHz**	48			
Differential travel		**mm**	< 20			
Repeat accuracy			0.1 %			
Sensor accuracy			2 %			
Minimum size of object to be detected			Cylinder Ø 10 mm up to a sensing distance of 3 m			
Tilt angle with 500 x 500 mm target			± 6° at 4 m, ± 10° at 3 m, ± 45° at 1.5 m			
Materials	Casing		PBT (Valox), UV resistant			
	Sensing face		PEI (ULTEM) with PUR coating, UV resistant			
Fixing method			Using 2 M4 screws (not provided). 2 x Ø 4.32 mm stainless steel inserts and silicone washers are provided with the sensor. Tightening torque ≤ 3 Nm (26.6 lb-in)			
Connection			By remote Deutsch DTM04 6-pin connector, on 0.15 m Ø 6 mm TPU cable		By 0.5 m Ø 6 mm TPU cable CSA: 5 x 0.34 mm²	
Power supply characteristics						
Rated supply voltage (Ue) with protection against reverse polarity		**V**	12…24 V ⎓. Powered by a dedicated safety extra low voltage (SELV) or a protected extra low voltage (PELV)			
Voltage limits (including ripple)		**V**	⎓ 9…32			
Current consumption, no-load		**mA**	< 30	< 50	< 30	< 50
Output characteristics						
Indicator lights	Output status		1 yellow LED			
	Power supply and echo status		1 two-tone LED (white and green). White: power on; green: echo status			
Switching capacity		**mA**	< 100 (with overload and short-circuit protection)			
Resistive load impedance			≥ 2 K Ω	≤ 250 Ω (12 V), ≤ 850 Ω (24 V)	≥ 2 K Ω	≤ 250 Ω (12 V), ≤ 850 Ω (24 V)
Voltage drop		**V**	< 2			
Internal temperature compensation			Yes			
Maximum switching frequency		**Hz**	1.6			
Delays	First-up	**ms**	400			
	Response	**ms**	300			
	Recovery	**ms**	300			
Environmental characteristics						
Degree of protection	Conforming to IEC 60529 and EN/IEC 60947-5-2		IP 65, IP 67, IP 69K			
Storage temperature		**°C**	- 40…+ 85			
Operating temperature		**°C**	- 40…+ 70			
Relative humidity			< 95%, non-condensing			
Vibration resistance	Conforming to IEC 60068-2-6		Amplitude ± 1 mm (f = 10…55 Hz)			
Mechanical shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms, in all 3 axes			
Immunity to electromagnetic interference			Conforming to EN/IEC 60947-5-2			

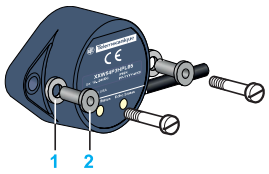
Setting-up precautions

Flush-mounting recommendations



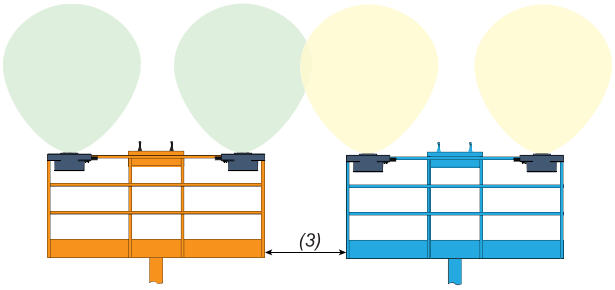
(1) Max. thickness = 10 mm
(2) Minimum Ø = 33 mm

Mounting with inserts and washers



1 Silicone washer
2 Stainless steel insert

Mutual interference between two separate pieces of mobile equipment, side by side



(3) Minimum distance: 2.5 m
***Note**: Sensors in the same mobile equipment must be synchronized, but sensors in two separate pieces of mobile equipment cannot be synchronized*

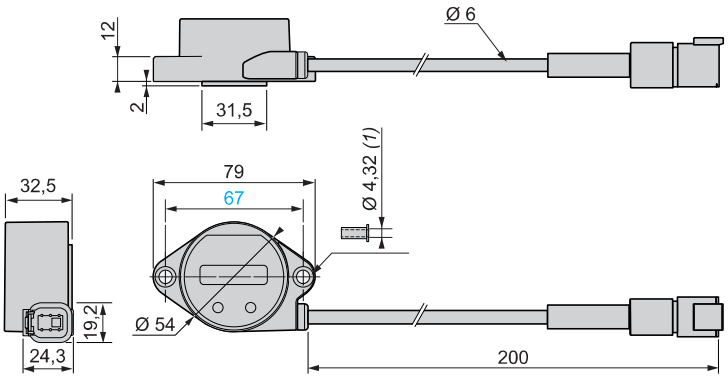
Ultrasonic sensors

XX range, Wide Beam

Obstacle detection system for mobile equipment. Diffuse mode, solid-state digital output and analog output. Configurable by software

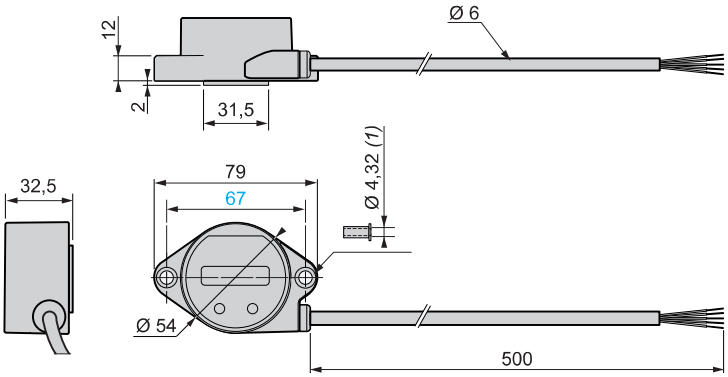
Dimensions

XXW54P3HPL01DM6, XXW54P3APL01DM6



(1) The sensor is supplied with 2 stainless steel inserts Ø 4.32 mm and 2 silicone washers. M4 screws not provided

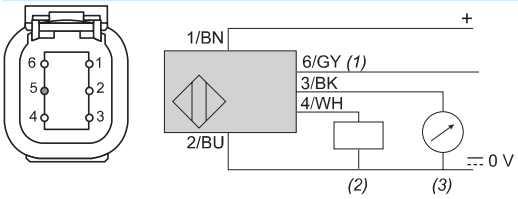
XXW54P3HPL05, XXW54P3APL05



(1) The sensor is supplied with 2 stainless steel inserts Ø 4.32 mm and 2 silicone washers. M4 screws not provided

Connections

Connector wiring

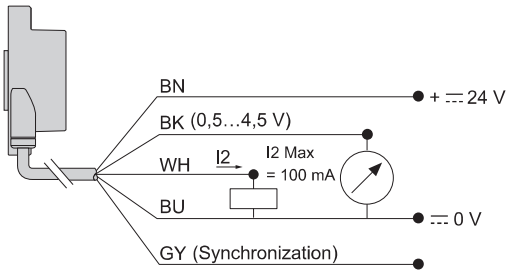


Pin number	Wire color	Description	
		XXW54P3HPL01DM6	XXW54P3APL01DM6
1	BN: Brown	+12…24 V ⎓	+ 12…24 V ⎓
2	BU: Blue	0 V ⎓	0 V ⎓
3	BK: Black	0.5…4.5 V analog output *(5)*	4…20 mA analog output *(6)*
4	WH: White	PNP solid-state output	PNP solid-state output
5 *(4)*	–	Not connected	Not connected
6	GY: Gray	Synchronization	Synchronization

(1) Synchronization
(2) Output 2
(3) Output 1
(4) Contact not connected, equipped with a sealing plug.
(5) The sensor's analog output emits 5 volts when it detects excessive environmental noise.
(6) The sensor's analog output emits 2 mA when it detects excessive environmental noise.

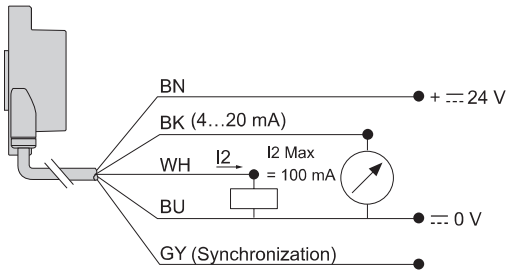
Wiring diagrams

XXW54P3HPL05



0.5…4.5 V: load 2 kΩ…∞

XXW54P3APL05



4…20 mA: load ≤ 250 Ω (⎓ 12 V), load ≤ 850 Ω (⎓ 24 V).

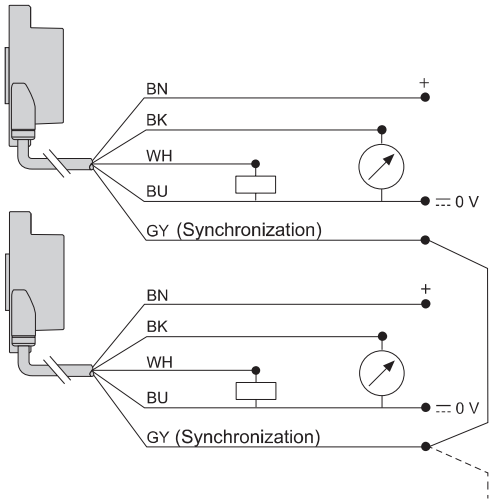
Ultrasonic sensors

XX range, Wide Beam

Obstacle detection system for mobile equipment. Diffuse mode, solid-state digital output and analog output. Configurable by software

Connections *(continued)*

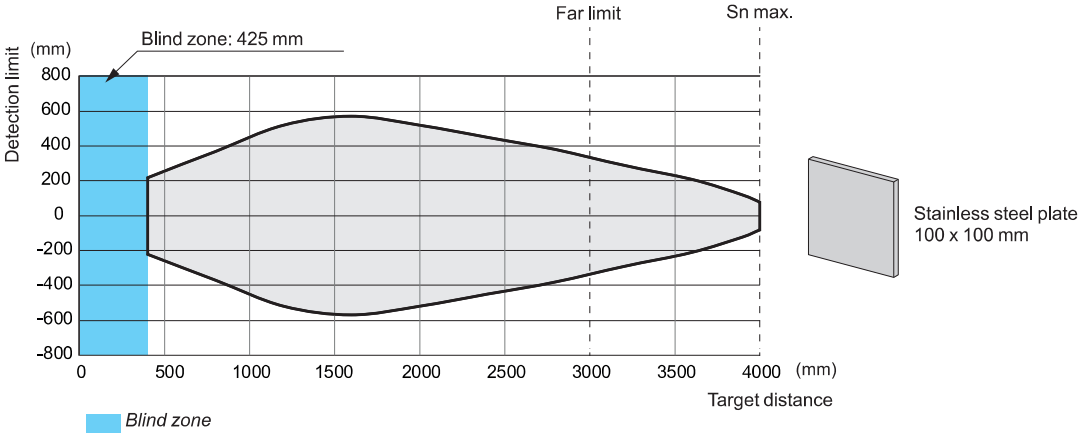
Synchronization function diagram (side-by-side application)



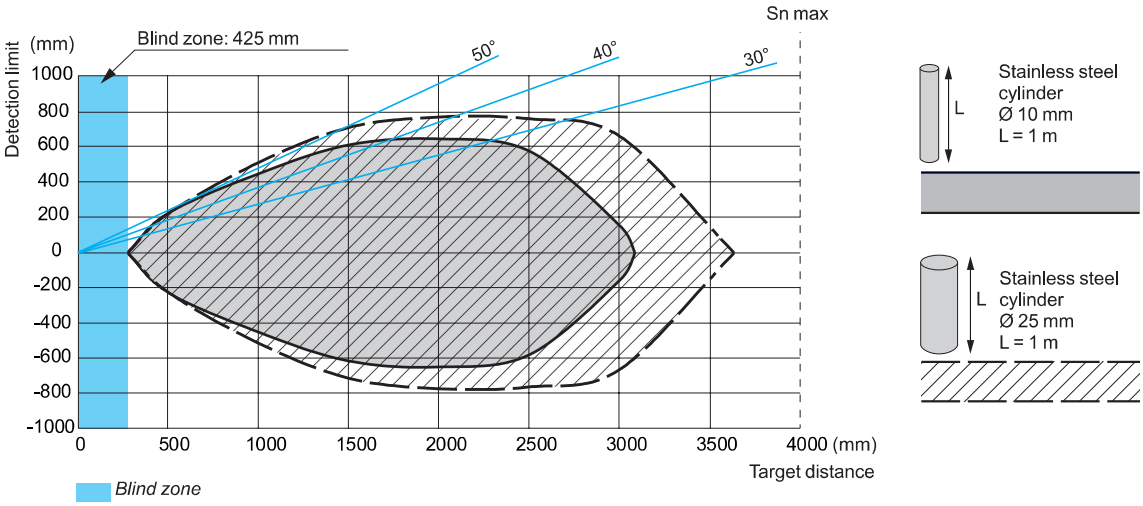
***Note**: Synchronization is recommended if more than one sensor is used in the same direction in order to avoid any interference between sensors due to the width of their beam.*
Up to 8 sensors can be synchronized to operate side by side by electrically connecting all pin no. 6 (gray) wires together.
All sensors must be the same model and have the same cycle time setting.

Curves

Detection curve with 100 x 100 mm square target



Detection curve with round bar



Ultrasonic sensors

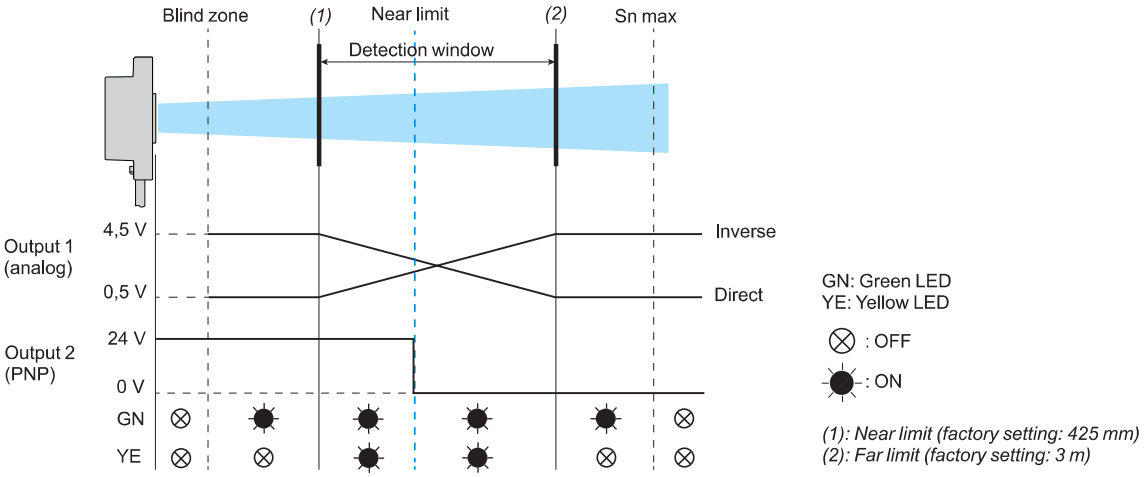
XX range, Wide Beam

Obstacle detection system for mobile equipment. Diffuse mode, solid-state digital output and analog output. Configurable by software

Operating diagram

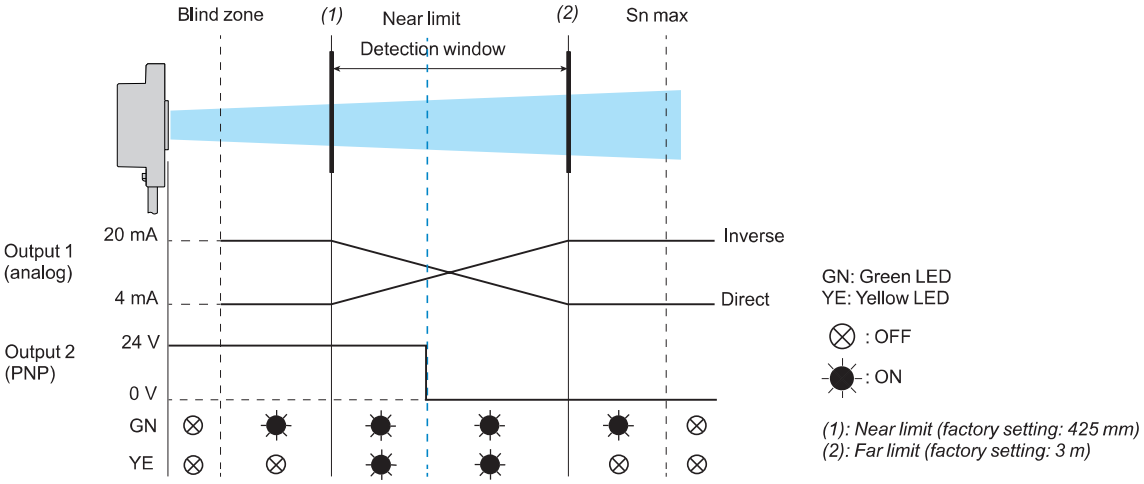
Setting the near and far limits using the configuration software

XXW54P3HPL01DM6, XXW54P3HPL05



***Note**: The sensor's analog output emits 5 volts when it detects excessive environmental noise.*

XXW54P3APL01DM6, XXW54P3APL05



***Note**: The sensor's analog output emits 2 mA when it detects excessive environmental noise.*

Ultrasonic sensors

XX range
Flat format, plastic
DC supply, solid-state digital output

121359

XX7F1A2NAL01M12

121360

XX7K1A2PAM12

108068

XX8D1A1NAM12

121368

XXZPB100

Diffuse mode

Fixed sensing distance sensors

Sensors	Sensing distance (Sn)	Function/ output	Connection	Reference	Weight
mm	m				kg
7.6 x 19 x 33	0.10	NO/NPN	152 mm flying lead + M12 connector	**XX7F1A2NAL01M12**	0.040
		NO/PNP	152 mm flying lead + M12 connector	**XX7F1A2PAL01M12**	0.040
16 x 30 x 74	0.25	NO/PNP	M12 connector	**XX7K1A2PAM12**	0.050

Adjustable sensing distance sensors

18 x 33 x 60 + Ø 18	0.50 (adjustable)	NO/NPN	Connecteur M12	**XX7V1A1NAM12**	0.060
		NO/PNP	Connecteur M12	**XX7V1A1PAM12**	0.060
80 x 80 x 34	1 (adjustable)	NO/NPN	Connecteur M12	**XX8D1A1NAM12**	0.300
		NO/PNP	Connecteur M12	**XX8D1A1PAM12**	0.300

Accessories

Teach pushbutton

Description	For use with sensor	Reference	Weight kg
Selection of detection window **Length of cable:** 152 mm **Input:** M12 female connector **Output:** M12 male connector	XX7V1A1●AM12 XX8D1A1●AM12	**XXZPB100**	0.035

Other connection and fixing accessories

See page 78.

Ultrasonic sensors

XX range
Flat format, plastic
Sensors with analogue output signal 0…10 V or 4-20 mA

DF537726

XX9V1A1C2M12

108068

XX9D1A1●●M12

121368

XXZPB100

Diffuse mode

Adjustable sensing distance sensors

Sensors	Sensing distance (Sn)	Analogue output (Slope selection using teach button)	Reference	Weight
mm	m			kg
18 x 33 x 65 + Ø 18	0.50 (adjustable)	4-20 mA	**XX9V1A1C2M12**	0.090
		0-10 V	**XX9V1A1F1M12**	0.060
80 x 80 x 34	1 (adjustable)	4-20 mA	**XX9D1A1C2M12**	0.300
		0-10 V	**XX9D1A1F1M12**	0.300

Accessories

Teach pushbutton

Description	For use with sensors	Reference	Weight kg
Selection of detection window **Length of cable: 152 mm** **Input:** M12 female connector **Output:** M12 male connector	XX9V1A1●●M12 XX9D1A1●●M12	**XXZPB100**	0.035

Other connection and fixing accessories

See page 78.

Ultrasonic sensors

XX range

Flat format, plastic

Sensor type			XX7F1A2●	XX7K1A2●	XX7V1A1●	XX8D1A1●	XX9V1A1●	XX9D1A1●
General characteristics								
Conformity to standards			CE, IEC 60947-5-2					
Product certifications			UL	UL	UL	UL	UL, cCSAus	
Nominal sensing distance (Sn)		**m**	0.1	0.25	0.5	1	0.5	1
Blind zone (in diffuse mode the object is not detected in this zone, in reflex mode the background is not detected in this zone)		**mm**	0…6.4	0…51	0 ... 51	0 ... 100	0…51	0…100
Detection window			Fixed		Remotely adjustable or by using teach button			
Detection system	Diffuse mode		●	●	●	●	●	●
Transmission frequency		**kHz**	500	500	300	180	300	180
Differential travel		**mm**	< 0.7	< 0.35	< 2.5	< 2.5	–	–
Repeat accuracy		**mm**	± 0.7	± 0.7	± 1.27	± 1.6	1.27	± 1.6
Overall beam angle (see detection lobe)			14°	14°	12°	7°	6°	7°
Minimum size of object to be detected			Cylinder Ø 2.5 mm or flat bar 1 mm wide up to 50 mm	Cylinder Ø 1.6 mm up to 76 mm	Cylinder Ø 2.5 mm or flat bar 1 mm wide for a sensing distance of 150 mm	Cylinder Ø 50 mm up to 1 m	Cylinder Ø 2.5 mm or flat bar 1 mm wide for a sensing distance of 150 mm	Cylinder Ø 50 mm up to a sensing distance of 1 m
Deviation angle from 90° of the object to be detected			–				± 7°	± 5°
Materials	Case		ULTEM®		Valox®			
	Sensing face *(1)*		Epoxy	Silicone	Epoxy			
Connection	Connector		M12, 4-pin, on 152 mm flying lead	M12, 4-pin				
Supply characteristics								
Rated supply voltage		**V**	⎓ 12…24 V					⎓ 15…24 V
Voltage limits (including ripple)		**V**	⎓ 10…28 V					
Current consumption, no-load		**mA**	25	60	40	70	40	70

(1) Silicone face for optimum chemical resistance.

Ultrasonic sensors

XX range

Flat format, plastic

Sensor type			XX7F1A2●	XX7K1A2●	XX7V1A1●	XX8D1A1●	XX9V1A1●	XX9D1A1●
Output characteristics								
Slope type			Direct or inverse by using teach button (see page 68).					
LED indicators	Output state		Yellow LED					
	Power on		Green LED		Green LED			
	Setting-up assistance		–		Multicolour LED		Dual colour LED	
Delays	First-up	**ms**	–				100	75
Recovery time		**ms**	–				150	180
Resistive load impedance	4-20 mA	**Ω**	–				10...500	10...350
	0-10 V	**Ω**	–				1 k...∞	2 k fixed
Switching capacity	(PNP and NPN)	**mA**	< 100, NO or NC function			100		
Voltage drop	(PNP and NPN)	**V**	< 1	< 1	< 1	< 1		
Maximum switching frequency		**Hz**	100	80	40	72		
Delays	First-up	**ms**	20	350	100	75		
	Response	**ms**	4	5	10	15		
	Recovery	**ms**	4	5	10	75		
Environment characteristics								
Degree of protection	Conforming to IEC 60529 and IEC 60947-5-2		IP 67					
Storage temperature		**°C**	- 40…+ 80					
Operating temperature		**°C**	- 20…+ 65	0…+ 50	- 20…+ 65	0…+ 70	- 20…+ 65	0…+ 70
Vibration resistance	Conforming to IEC 60068-2-6		Amplitude ± 1 mm (f = 10…55 Hz)					
Mechanical shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms, in all 3 axes					
Resistance to electromagnetic interference			Conforming to IEC 60947-5-2					

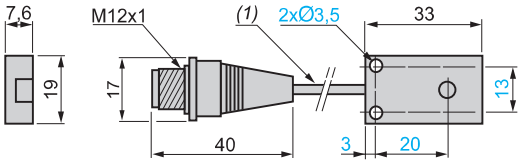
Ultrasonic sensors

XX range

Flat format, plastic

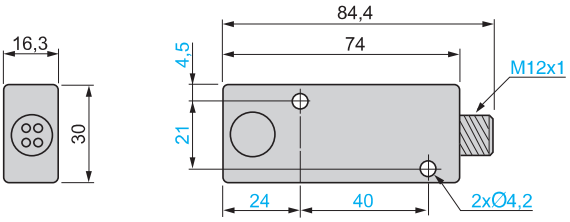
Dimensions

XX7F1A2NAL01M12, XX7F1A2PAL01M12

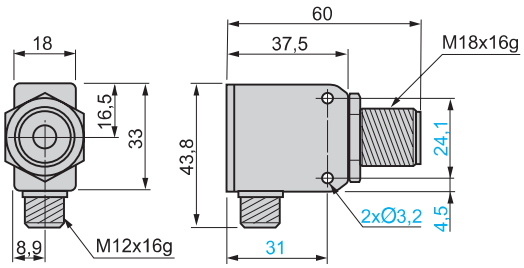


(1) Cable, length: 152 mm.

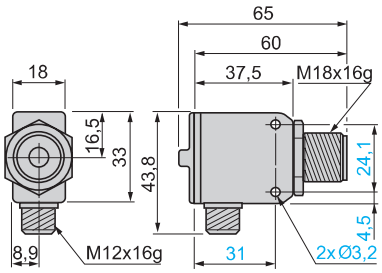
XX7K1A2PAM12



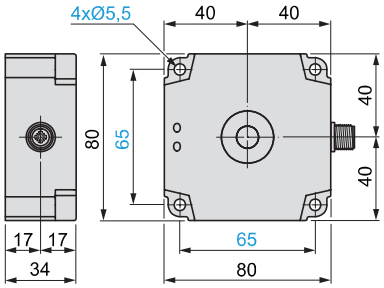
XX7V1A1NAM12, XX7V1A1PAM12



XX9V1A1C2M12, XX9V1A1F1M12

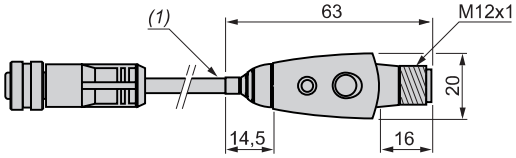


XX8D1A1NAM12, XX8D1A1PAM12, XX9D1A1C2AM12, XX9D1A1F1AM12



XXZPB100

Teach pushbutton



(1) Cable, length: 152 mm.

Ultrasonic sensors

XX range

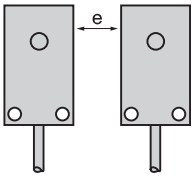
Flat format, plastic

Setting-up precautions

Minimum mounting distances

Diffuse sensors, flat format

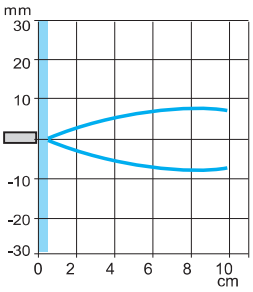
Side by side



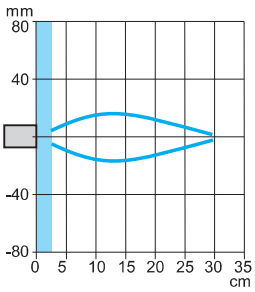
e: respect the distances indicated on the detection curves

Curves

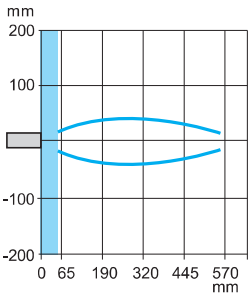
XX7F1A2NAL01M12, XX7F1A2PAL01M12



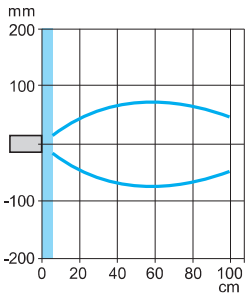
XX7K1A2PAM12



XX7V1A1NAM12, XX7V1A1PAM12, XX9V1A1C2M12, XX9V1A1F1M12



XX8D1A1NAM12, XX8D1A1PAM12, XX9D1A1C2AM12, XX9D1A1F1AM12

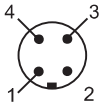


Blind zone

Schemes

M12 connector, solid-state digital output

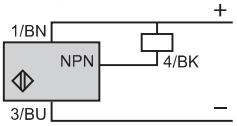
3-wire type



1 (+)
3 (-)
4 NPN or PNP output

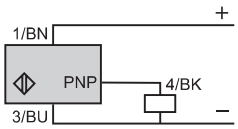
XX7F1A2NAL01M12 *(1)*

NO outputs, NPN



XX7F1A2PAL01M12 *(1)*, **XX7K1A2PAM12**

NO outputs, PNP

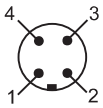


(-) BU (Blue)
(+) BN (Brown)
BK (Black)

(1) Remote connector on flying lead approximately 15 cm long.

M12 connector, analogue output

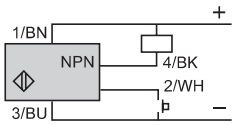
4-wire type



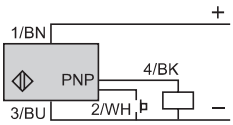
1 (+)
2 Return signal or teach
3 (-)
4 Output signal

BN (Brown)
WH (White)
BU (Blue)
BK (Black)

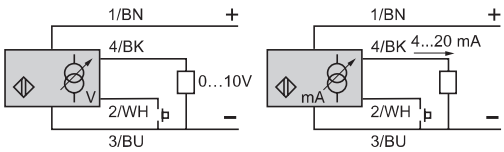
XX7V1A1NAM12
XX8D1A1NAM12



XX7V1A1PAM12
XX8D1A1PAM12



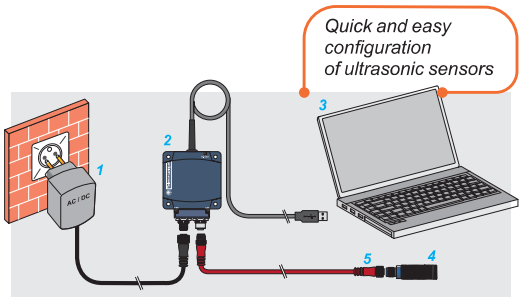
XX9V1A1C2M12, XX9V1A1F1M12, XX9D1A1C2AM12, XX9D1A1F1AM12



For impedance of resistive load refer to values on page 71.

Ultrasonic sensors
XX range
XX Configuration Software

XX Configuration Software



1: Power supply, provided with 4 adapters
*2: Configuration interface **XXZBOX01***
3: XX Configuration Software, installed on a PC
*4: Ultrasonic sensor **XXS●●**, **XXA●●** or **XXW54P3HPL●●**.*
5: M12-M12 cable or Deutsch DTM04-M12.

Telemecanique Sensors is now offering a solution for configuring ultrasonic XX range sensors. This software enables users to quickly find the optimal sensing solution for their applications. An interface unit connects the sensor to the PC via a USB connection.

> **Easy configuration to unique applications**
The configuration software has more than 20 parameters that can be modified to suit the machine application. The parameters can be saved in PDF format for quick, easy reference.

> **Real-time sensor performance display**
One of the best functions of the new software is the ability to troubleshoot and visualize the effects of the parameters on the configured sensor. The "echo display" function shows the exact position of any false echoes. The recording function can record the values of the echoes in an .xlsx or .xml file for extended periods of time.

> **Quick duplication of programmed settings**
Optimal parameters set on one sensor can be saved and loaded on other units of the same reference. This function reduces time and effort.

> The interface can be used to configure specific configurable models of XX ultrasonic sensors (XXS●●, XXA●● & XXW54P3HPL●●).

XX Configuration Software for ultrasonic sensors

> XX Configuration Software is available in English, French, German, Spanish, Italian, and Chinese. It can be installed using the setup file in the USB key provided with the configuration kit or downloaded directly from the website www.tesensors.com.

> Recommended PC performance:
> Windows OS: 7 SP1 embedded standard(x86 & x64), 8.1 (x86 & x64), or 10 (x86 & x64)
> Internet Explorer: 9.0 or higher
> Disk space: 1 GB or higher
> RAM memory: 2 GB or higher
> Processor speed: 1 GHz or higher
> Display resolution: 1360 x 768 or higher

Ultrasonic sensors configuration interface XXZBOX01

Ultrasonic sensors configuration kit XXZKIT01

References

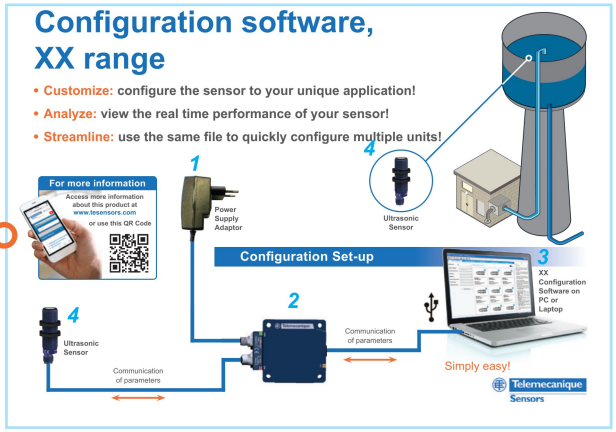
Description	Reference	Weight kg
Ultrasonic sensors configuration interface		
Configuration interface provided with: 1 power supply *(1)* 1 UK adapter 1 SAA adapter 1 US adapter 1 EU adapter	**XXZBOX01**	0.400
Ultrasonic sensors configuration kit		
Plastic case including: 1 configuration interface XXZBOX01 1 power supply *(1)* 1 UK adapter 1 SAA adapter 1 US adapter 1 EU adapter 1 cable of 1 m, with M12 connectors (5-pin male/female) 1 USB Flash Drive/USB key, including: the setup file for XX Configuration Software, ReadMe file, instruction sheet, tutorial, and the XX range catalogue.	**XXZKIT01**	1.200

(1) Power supply: 24 V ⎓, 0.5 A min., with M12 connector.

Ultrasonic sensors
XX range
XX Configuration Software

Configuration software presentation

Principle



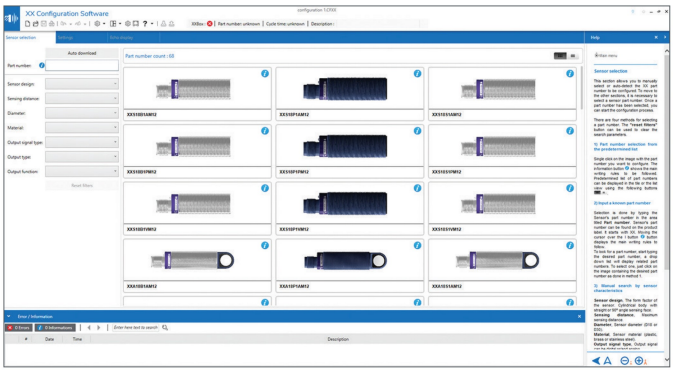
1: Power supply, provided with 4 adapters
*2: Configuration interface **XXZBOX01***
3: XX Configuration Software, installed on a PC
*4: Ultrasonic sensor **XXS●●**, **XXA●●** or **XXW54P3HPL●●**.*

Setting examples

Sensor selection

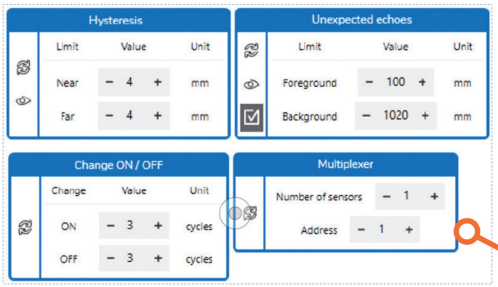
> This page is used to manually select or auto-download the XX reference sensor to be configured. Once a reference has been selected, the user can start the configuration process.

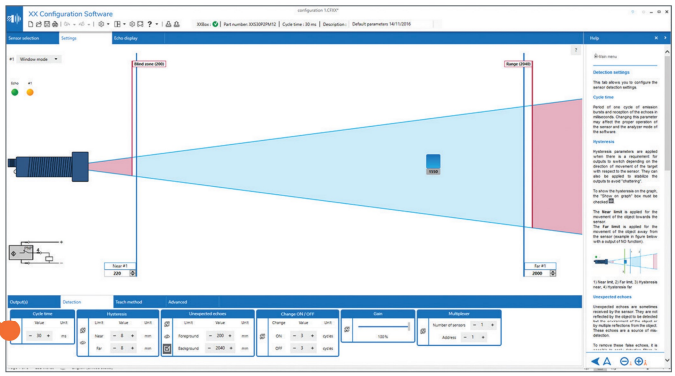
> There are **4** methods of selection.
The **Reset search** button can reinitialize the search, regardless of the method used.
1: Direct selection from the full reference list
2: Selection through reference
3: Manual search using criteria
4: Automatic sensor detection



Detection settings

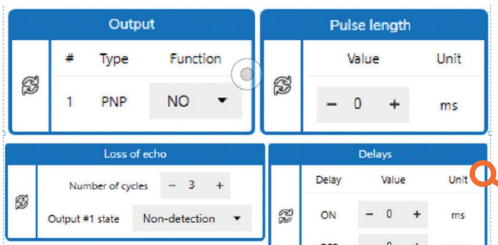
> This tab is used to configure the sensor detection settings.

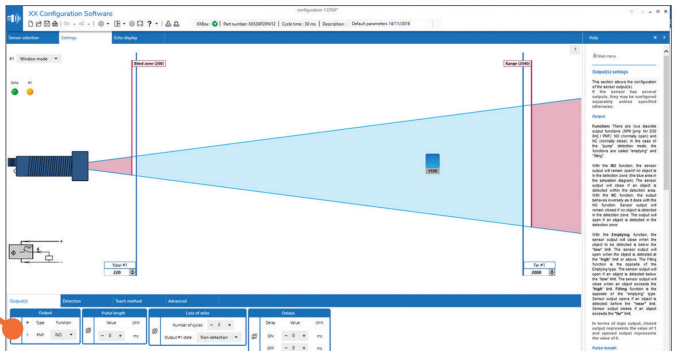




Output settings

> This page enables the configuration of sensor outputs. If the sensor has several outputs, they may be configured separately, unless specified otherwise.



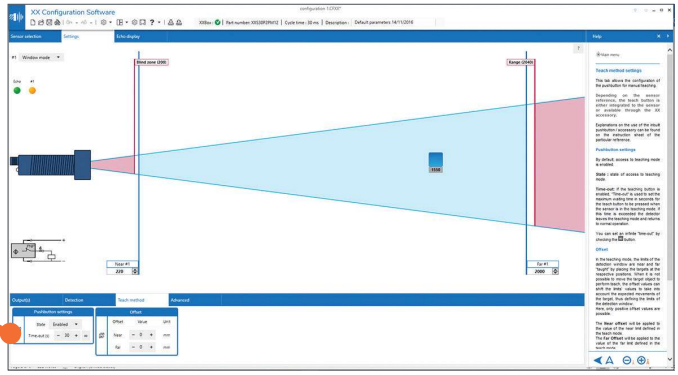


Configuration software presentation *(continued)*

Setting examples *(continued)*

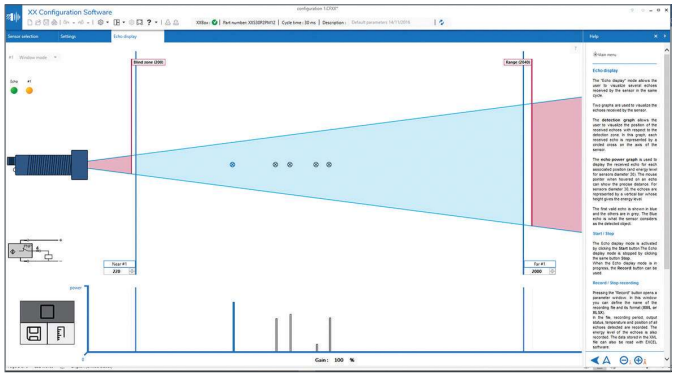
Teach method settings

> This tab allows the configuration of the pushbutton for manual teaching. Depending on the sensor reference, the teach button is either integrated in the sensor or available through the teach pushbutton **XXZPB100** (see page 43).



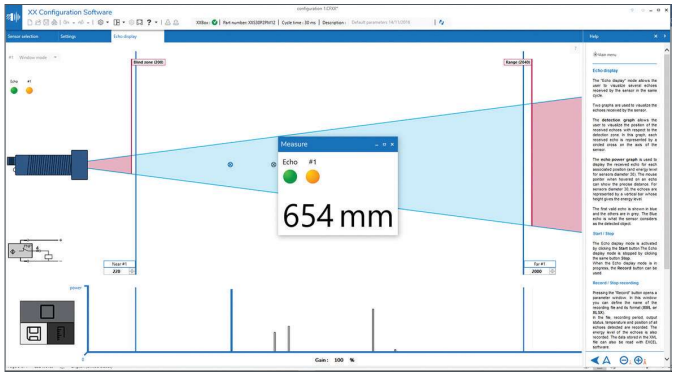
Echo display mode

> With the “echo display” mode, the user can visualize several echoes received by the sensor in the same cycle.
> The first valid echo is shown in blue and the others in gray. The blue echo is what the sensor considers as the detected object.
> It is also possible to record the data over extended periods of time using the “record” function.



Measure mode

> The “measure” button opens a pop-up window giving a real-time numerical display of the position of the object in mm or inches.



Ultrasonic sensors

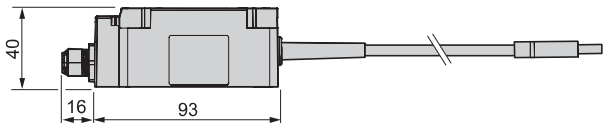
XX range

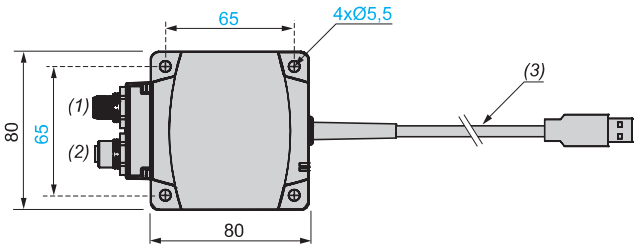
Configuration interface XXZBOX01

Characteristics

Supply characteristics			
Rated supply voltage (Ue) with protection against reverse polarity		**V**	24 V ⎓
Voltage limits		**V**	14…30 V ⎓ (ripple: 10% max)
Consumption		**W**	4 (consumption excluding sensor)
LED indicators			
LED indicators	Power supply		Green LED
	PC communication		Orange LED
	Error		Red LED
Communication			
Data communication baud rate		**bps**	19,200
Connection			
Maximum cabling distance between sensor and interface		**m**	3
Electrical connection to sensor			M12 female connector
Connection to PC or laptop			0.5 m USB cable , A type connector
Environment characteristics			
Compliance to regulations			CE
Degree of protection	Conforming to IEC 60529		IP 40
Storage temperature		**°C**	-20…+45
Operating temperature		**°C**	0…+45
Relative humidity			< 95%, without condensation

Dimensions

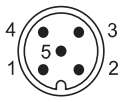




(1) Male M12 connector, 5-pin: power supply
(2) Female M12 connector, 5-pin: sensor
(3) Cable length: 0.5 m (USB cable A type connector): PC

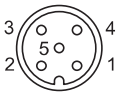
Connections

Interface connector for power supply adapter (M12 male)



Pin number	Wire color	Description
1	BN: Brown	+14…30 V ⎓
2	WH: White	Output 2 *(4) (5)*
3	BU: Blue	0 V ⎓
4	BK: Black	Output 1 *(4)*
5	–	Not used *(6)*

Interface connector for sensor (M12 female)



Pin number	Description
1	Power out to sensor
2	Software communication
3	0 V ⎓
4	Software communication
5	Not used *(6)*

(4) Output is only active during the "echo display" mode and "measure" mode.
(5) Output 2 is not available on all sensors.
(6) The 5th pins of the M12 male and M12 female connectors are electrically connected to one another.

Ultrasonic sensors

XX range

Accessories

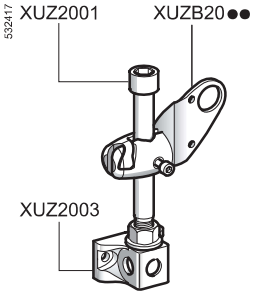
XZCC12FD●40B

XZCP1041L●

XSZB11●

XUZA118

XSZBD10



3D fixing kit example

References of accessories

Cabling accessories

Connectors	For use with sensor	Type of connection		Reference	Weight kg
M8 3-pin	Ø 12	IDC (Insulation Displacement Connector)	Straight	**XZCC8FDM30V**	0.010
	XX512A2●		Elbowed	**XZCC8FCM30V**	0.010
M8 4-pin	XX512A1●		Straight	**XZCC8FDM40V**	0.010
	XX●12A8●		Elbowed	**XZCC8FCM40V**	0.010
M12	Ø 18, Ø 30	Screw terminals, metal clamping ring	Straight	**XZCC12FDM40B**	0.020
			Elbowed	**XZCC12FCM40B**	0.020
		Screw terminals, plastic clamping ring	Straight	**XZCC12FDP40B**	0.020
			Elbowed	**XZCC12FCP40B**	0.020

Pre-wired connectors	For use with sensor	Type	Cable length	Reference	Weight
			m		kg
M8 3-pin	Ø 12 XX512A2●	Straight	2	**XZCP0166L2** *(1)*	0.080
		Elbowed	2	**XZCP0266L2** *(1)*	0.080
M12	Ø 18, Ø 30	Straight	2	**XZCP1141L2** *(1)*	0.090
		Elbowed	2	**XZCP1241L2** *(1)*	0.090

Fixing accessories

Description		For use with sensor	Reference	Weight kg
Fixing clamps		Ø 12	**XSZB112**	0.006
		Ø 18	**XSZB118**	0.010
		Ø 30	**XSZB130**	0.020
Fixing clamps (mounting on 35 mm ⎍ rail)		XX●D●	**XSZBD10**	0.065
90° fixing bracket		Ø 12	**XXZ12**	0.025
		Ø 18	**XUZA118**	0.038
		Ø 30	**XXZ30**	0.115
3D fixing kit *(2)*	M12 rod	Ø 12, Ø 18 and Ø 30	**XUZ2001**	0.050
	Support for M12 rod	Ø 12, Ø 18 and Ø 30	**XUZ2003**	0.160
	Ball-joint mounted fixing bracket	Ø 12	**XUZB2012**	0.175
		Ø 18	**XUZB2003**	0.175
		Ø 30	**XUZB2030**	0.160

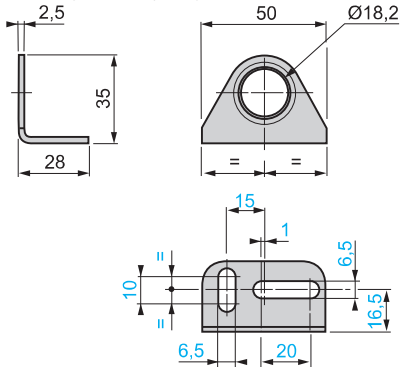
*(1) For a 5 m long cable replace **L2** by **L5**, for a 10 m long cable replace **L2** by **L10**.*
(2) To obtain a 3D fixing kit, order:
*rod support **XUZ2003**, M12 rod **XUZ2001** and ball-joint mounted fixing bracket **XUZB20●●***

Dimensions of accessories

Fixing accessories

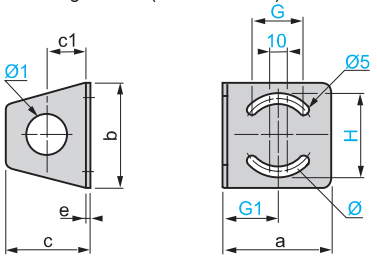
XUZA118

90° fixing bracket (Ø 18)



XXZ12, XXZ30

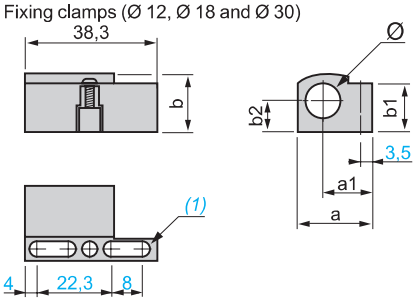
90° fixing bracket (Ø 12 and Ø 30)



XXZ	a	b	c	c1	e	H	G	G1	Ø	Ø1
12	35	40	33	18	2	31	18	18	25	13
30	67	65	52	25	3	51	35	33	50	31

XSZB112, XSZB118

Fixing clamps (Ø 12, Ø 18 and Ø 30)

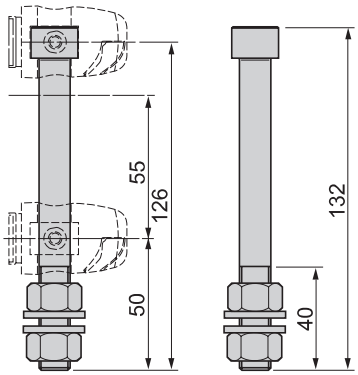


XSZ	a	a1	b	b1	b2	Ø
B112	21.9	14.5	16	15.5	8.5	12
B118	26	15.7	22.3	20.1	11.5	18
B130	39	21.7	35.5	31	18.5	30

(1) 2 elongated holes Ø 4 x 8.

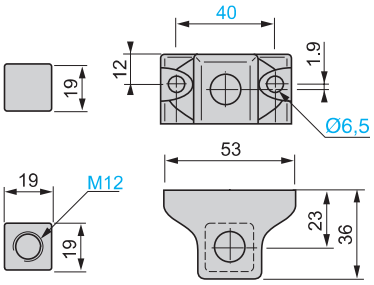
XUZ2001

M12 rod

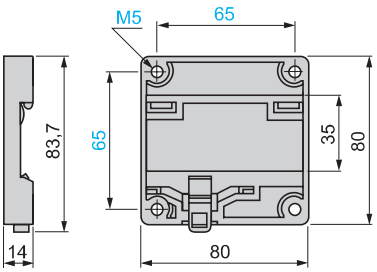


XUZ2003

Support for M12 rod

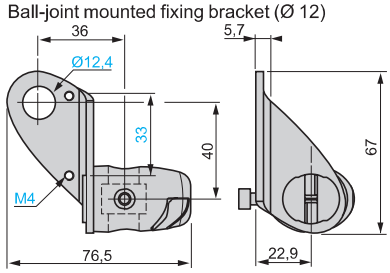


XSZBD10



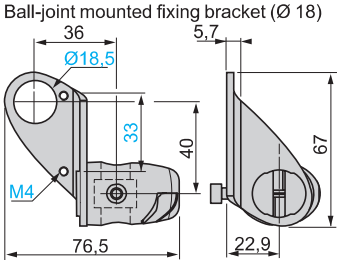
XUZB2012

Ball-joint mounted fixing bracket (Ø 12)



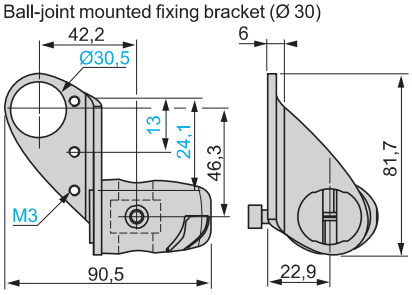
XUZB2003

Ball-joint mounted fixing bracket (Ø 18)



XUZB2030

Ball-joint mounted fixing bracket (Ø 30)



Product reference index

X

XSZB112 78
XSZB118 78
XSZB130 78
XSZBD10 78
XUZ2001 78
XUZ2003 78
XUZA118 78
XUZB2003 78
XUZB2012 78
XUZB2030 78
XX6V3A1NAM12 36
XX6V3A1PAM12 36
XX7F1A2NAL01M12 68
XX7F1A2PAL01M12 68
XX7K1A2PAM12 68
XX7V1A1NAM12 68
XX7V1A1PAM12 68
XX8D1A1NAM12 68
XX8D1A1PAM12 68
XX9D1A1C2M12 69
XX9D1A1F1M12 69
XX9V1A1C2M12 69
XX9V1A1F1M12 69
XX9V3A1C2M12 36
XX9V3A1F1M12 36
XX218A3PFM12 40
XX218A3PHM12 40
XX230A10PA00M12 40
XX230A11PA00M12 40
XX230A12NA00M12 40
XX230A12PA00M12 40
XX230A20PA00M12 40
XX230A21PA00M12 40
XX230A22PA00M12 40
XX512A1KAM8 22
XX512A2NAM8 22
XX512A2PAM8 22
XX518A1KAM12 22
XX518A3NAL2 26
XX518A3NAM12 26
XX518A3PAL2 26
XX518A3PAM12 26
XX630A1KAM12 36
XX630A1NCM12 36
XX630A1PCM12 36
XX630A2NCM12 36
XX630A2PCM12 36
XX630A3NCM12 36
XX630A3PCM12 36
XX630S1NCM12 36
XX630S1PCM12 36
XX918A3C2M12 26
XX918A3F1M12 26
XX930A1A1M12 36
XX930A1A2M12 36
XX930A1A2230M12 36
XX930A2A1M12 36
XX930A2A2M12 36
XX930A2A2230M12 36
XX930A3A1M12 36
XX930A3A2M12 36
XX930S1A1M12 36
XX930S1A2M12 36
XXA18B1AM12 30
XXA18B1PM12 30
XXA18B1VM12 30
XXA18P1AM12 30
XXA18P1PM12 30
XXA18P1VM12 30
XXA18S1AM12 30
XXA18S1PM12 30
XXA18S1VM12 30
XXA30B1AM12 43
XXA30B1PM12 42
XXA30B1VM12 43
XXA30B2AM12 43
XXA30B2PM12 42
XXA30B2VM12 43
XXA30P1AM12 42
XXA30P1PM12 42
XXA30P1VM12 42
XXA30P2AM12 42
XXA30P2PM12 42
XXA30P2VM12 42
XXA30S1AM12 43
XXA30S1PM12 42
XXA30S1VM12 43
XXA30S2AM12 43
XXA30S2PM12 42
XXA30S2VM12 43
XXR12A8KAM8 22
XXR18A3KAM12 26
XXR18A4KAM12 26
XXS18B1AM12 30
XXS18B1PM12 30
XXS18B1VM12 30
XXS18P1AM12 30
XXS18P1PM12 30
XXS18P1VM12 30
XXS18S1AM12 30
XXS18S1PM12 30
XXS18S1VM12 30
XXS30B1AM12 43
XXS30B1PM12 42
XXS30B1VM12 43
XXS30B2AM12 43
XXS30B2PM12 42
XXS30B2VM12 43
XXS30B4AM12 43
XXS30B4PM12 42
XXS30B4VM12 43
XXS30P1AM12 42
XXS30P1PM12 42
XXS30P1VM12 42
XXS30P2AM12 42
XXS30P2PM12 42
XXS30P2VM12 42
XXS30P4AM12 42
XXS30P4PM12 42
XXS30P4VM12 42
XXS30P8APM12 42
XXS30P8NNM12 42
XXS30P8PPM12 42
XXS30P8VPM12 42
XXS30S1AM12 43
XXS30S1PM12 42
XXS30S1VM12 43
XXS30S2AM12 43
XXS30S2PM12 42
XXS30S2VM12 43
XXS30S4AM12 43
XXS30S4PM12 42
XXS30S4VM12 43
XXT12A8M8 22
XXT18A3M12 26
XXT18A4M12 26
XXV18B1NAL2 22
XXV18B1NAM12 22
XXV18B1NBL5 22
XXV18B1PAL2 22
XXV18B1PAL5 22
XXV18B1PAM12 22
XXV18B1PBL2 22
XXV18B1PBM12 22
XXW54P3APL01DM6 63
XXW54P3APL05 63
XXW54P3HPL01DM6 63
XXW54P3HPL05 63
XXZ12 78
XXZ30 78
XXZB118 31
XXZB130 44
XXZBOX01 74
XXZKIT01 74
XXZKITDM6 63
XXZPB100 26, 30, 40, 43, 68, 69
XZCC8FCM30V 78
XZCC8FCM40V 78
XZCC8FDM30V 78
XZCC8FDM40V 78
XZCC12FCM40B 78
XZCC12FCM50B 31
XZCC12FCP40B 78
XZCC12FDM40B 78
XZCC12FDM50B 31, 44
XZCC12FDP40B 78
XZCP0166L2 78
XZCP0266L2 78
XZCP1141L2 31, 78
XZCP1141L5 31
XZCP1141L10 31
XZCP1241L2 31, 78
XZCP1241L5 31
XZCP1241L10 31
XZCPV11V12L2 31, 44
XZCPV11V12L5 31, 44
XZCPV11V12L10 31, 44
XZCPV12V12L2 31, 44
XZCPV12V12L5 31
XZCPV12V12L10 31
XZCPV1164L2 44
XZCPV1164L5 44
XZCPV1164L10 44
XZCPV1264L2 44
XZCPV1264L5 44
XZCPV1264L10 44

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