2

Sonar proximity switches – from 2.5 cm to 10 m – they hear everything

The Sonar proximity switches detect objects in different materials, shapes, colors or consistencies with absolute precision, flexibility and reliability. The range of applications is almost limitless. In fill-level or height sensing, distance measurement or bottle counting – at distances from 2.5 cm to 10 m, they detect objects with widely differing characteristics. Regardless of whether they are liquid, solid, powder or even transparent. The nature of the surfaces is irrelevant, they can be rough or smooth, clean or dirty, wet or dry. The proximity switches are extremely rugged and insensitive to dirt, vibration, ambient light or ambient noise.

Highlights

- Measurement accurate to the millimeter
- Color and material-independent, even transparent objects
- Individual parameter setting
- Small, compact enclosures (K21)
- Very high degree of repeat accuracy
- Can be used all over the world: UL/CSA approvals
- Sensors available for Ex Zone 2/22
- Insensitive to temperature, noise, light or water
- Sensors with IO-Link

Configurator

A configurator for sonar proximity switches is available in the Mall. Based on the technical features required, the desired product can be quickly and easily selected, placed in the shopping cart and ordered.

The configurator can be reached by the following link:
www.siemens.com/simatic-sensors/px

PXS series

The ultrasonic proximity switches are organized in different product families in accordance with their technical version and design:

SIMATIC sensors	Design
PXS100	K0 compact range, 3SG16 compact form, sonar thru-beam sensor
PXS200	M30 K1 compact range, M18S compact range, K21 compact range, K08 compact form
PXS300	M30 K2 compact range, M18 compact range, K65 compact form
PXS400	M30 K3 compact range
PXS800	M18 compact range ATEX, M30 K3 compact range ATEX
PXS900	Double-layer sheet monitoring

Application

The wide range of areas of application for the Sonar proximity switch ultrasonic sensors gives full rein to the imagination:

- Fill level and height sensing
- Spacing measurement
- Winding diameter sensing
- Bottle counting, and much more.

The Sonar proximity switches are extremely rugged and insensitive to dirt, vibration and ambient noise.

Applications in food processing

For use in contact with food or corrosive chemicals, on request, the ultrasonic sensors can be protected with transformer cover foil and supplied in a stainless-steel enclosure.

Objects

Using ultrasonic technology, Sonar proximity switches can detect objects of any kind, this includes liquids, powders or granulates, and colored or transparent objects. Whether the surface of the object is rough or smooth, clean or dirty, wet or dry is of no consequence. Even at a maximum operating distance, all level or smooth surfaces can be reliably detected up to an angular variation of approximately 3° from the sound cone. Depending on the peak-to-valley height of the object, the angular variation may also be higher.

As a rule, the objects can enter the sound cone from any direction.

Sensors for Ex Zone 2/22

These sonar proximity switches are approved according to EU Guideline 94/9/EG (ATEX) Appendix VIII

The approval is for:

- Gas EX II 3G EEx nA II T6 X and
- Dust EX II 3D IP65 T 80 °C X

The functionality of the sonar proximity switches with ATEX approval is identical to that of the standard proximity switches.

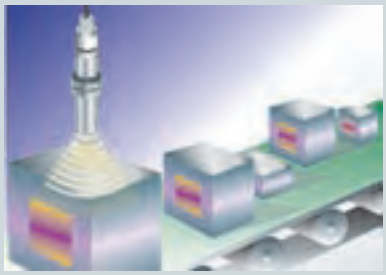
Personal safety

NSD0_00801

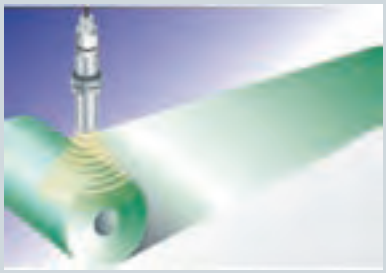
Due to their physical characteristics, the ultrasonic proximity switches cannot be used for safety-related applications (e.g. for the protection of personnel).

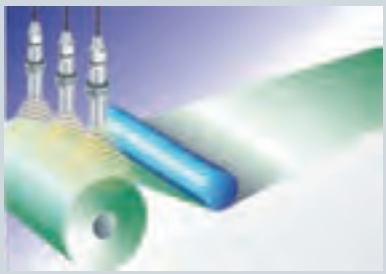
2

Application examples


Size measurement


Measurement of stack height


Measurement of diameter and speed


Contour measurement


Loop monitoring


Quality control


Distance monitoring


Level measurements

2

Design

Mounting

Sonar proximity switches can be operated in any mounting position. Mounting positions in which deposits can settle on the transducer surface must however be avoided.

The best results are obtained if the Sonar proximity switches are aligned such that the ultrasound waves hit the object as near to the vertical as possible. If this is not possible (e.g. in the case of bulk material), the maximum possible range must be determined experimentally. This depends on the material, surface and alignment of the objects.

To prevent undesirable reflections, the distance a must be maintained from disturbing objects around the axis of the sound cone.

Between the sound cone axis and a smooth wall running in parallel to it, the distance b must be maintained to prevent disturbing reflections. The distance c must be maintained to ensure that no objects enter the blind zone (see sound cones).

Mounting multiple sensors

Mutual interference between Sonar proximity switches that can result in spurious signals is excluded by maintaining sufficient distances between the sensors or an appropriate alignment.

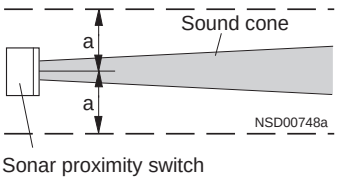
If two Sonar proximity switches of an identical design are mounted opposite each other, the distance d must be maintained between them. If two sensors of identical design are arranged in parallel, the distance e must be maintained between the sensors.

To avoid mutual interference (cf. function), proximity switches of K0, M30 K2, M30 K3 and M18 compact ranges can be synchronized or operated in multiplex mode.

Fouling

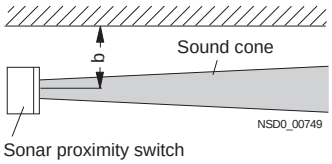
The range of the proximity switch is reduced if the transducer surface is damaged or painted or if water or wet dirt is applied to it.

Clearance a around the axis of the sound cone: keep space free of objects



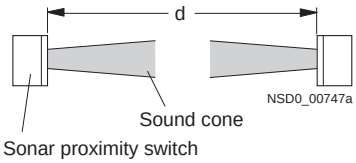
Sonar proximity switches with sensing range	a
cm	cm
6 (5) … 30	> 6
20 to 130 (100)	> 30
40 to 300	> 60
60 to 600	> 90
80 to 1000	> 150

Distance b between two Sonar proximity switches and a smooth surface



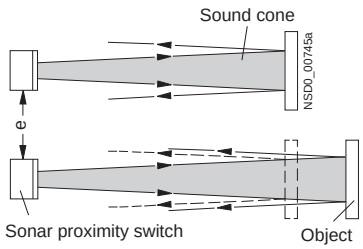
Sonar proximity switches with sensing range	b
cm	cm
6 (5) … 30	> 3
20 to 130 (100)	> 15
40 to 300	> 30
60 to 600	> 40
80 to 1000	> 70

Distance d between two Sonar proximity switches mounted opposite each other with the same sensing range



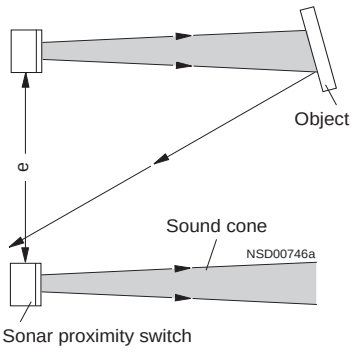
Sonar proximity switches with sensing range	d
cm	cm
6 (5) … 30	> 120
20 to 130 (100)	> 400
40 to 300	> 1200
60 to 600	> 2500
80 to 1000	> 4000

Distance e between two Sonar proximity switches arranged in parallel with the same sensing range, object perpendicular to the axis of the sound cone



Sonar proximity switches with sensing range	e
cm	cm
6 (5) … 30	> 15
20 to 130 (100)	> 60
40 to 300	> 150
60 to 600	> 250
80 to 1000	> 350

Distance e between two Sonar proximity switches arranged in parallel with the same sensing range, object with unfavorable orientation



The distance e must be experimentally determined depending on the angle between the object and the Sonar proximity switch.

Function

The Sonar proximity switches only operate through the medium of air and can detect any objects that reflect ultrasound.

The sensors emit ultrasonic pulses cyclically. When an object reflects these pulses, the generated echo is received and converted into an electrical signal. The incoming echo is detected in accordance with its intensity which, in turn, is dependent on the distance between the object and the Sonar proximity switch.

The Sonar proximity switches operate according to the echo propagation principle, i.e. the time difference between the emitted pulse and the echo pulse is evaluated.

The construction of the sensor causes the ultrasonic beam to be emitted in the shape of a cone. Reflecting objects are only detected within this sound cone. Within the blind zone, which lies between the sensor surface and the sensing range, echoes cannot be evaluated for physical reasons.

Resolution

The resolution is the smallest change in the distance to the object that is necessary for a change in the output of the BERO. The internal resolution is 256 or 4096 steps. If values are entered during programming that exceed this resolution, the program will automatically correct them. The corrected values will be displayed in a window with a message.

Example

3RG6014–..... sonar proximity switch (60 to 600 cm)

For a sensing range 60 to 600 cm, this results in a resolution of 1.3 mm:

6000 mm – 600 mm = 5400 mm
5400 mm/4096 = 1.3 mm (12 bit)

If the measuring range is restricted, the step size is reduced because the distance that is split up into 4096 steps has reduced. The smallest step size is, however, limited to 1 mm by the electronics. If the sensing range is restricted, the resolution is enhanced.

Temperature compensation

The Sonar proximity switches of M30 K2, M30 K3 and M18 compact ranges are fitted with temperature sensors and a compensation circuit that equalizes changes in operating distances caused by temperature changes.

Compensation can be performed throughout the temperature range. This means that an absolute precision of ± 1.5 % (M30 K2 and M30 K3 compact ranges) or of ± 2.5 % (M18 compact range) is achieved.

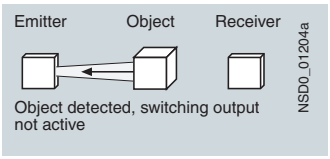
Operating modes with switching output

The Sonar proximity switches with switching output can be used in the following modes depending on their type.

Only emitter, only receiver

Two Sonar proximity switches are required in each case for this operating mode. One is parameterized as a receiver and the other is parameterized as the emitter. There are two possible applications:

- Thru-beam sensor:
  It is only evaluated whether an object lies between the proximity switches. The range is twice the normal range. Adjustment of the operating range and evaluation of the analog output is not relevant in this case.

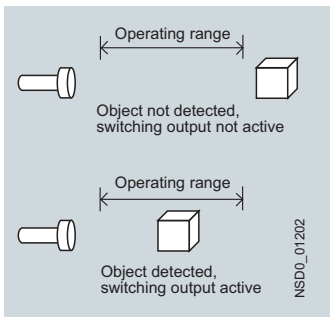


- Active measurement system:
  The propagation time of the ultrasonic signal from the emitter to the receiver is measured. The enabling inputs of the two proximity switches must be connected together for this purpose. All options of the proximity switches can still be used; the range is twice the normal range.

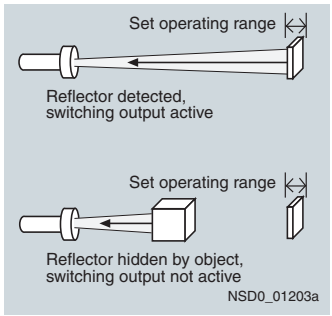
Emitter and receiver

This is the normal operating mode of the Sonar proximity switch; it operates as a typical proximity switch.

- Diffuse sensor:
  In this case, the object that is to be detected acts as a reflector. As soon as an object enters the preset operating range, the echo from this object causes the output signal of the proximity switch to change.



- Reflex sensor:
  In this case, a permanently fixed reflector (e.g. a small metal plate) is mounted opposite the proximity switch. The operating range is adjusted to this reflector. If the path between the proximity switch and the reflector is interrupted, the sensor no longer detects the reflector and this triggers a change in the signal at the switching output.



Synchronization

In K0, M30 K2, M30 K3 and M18 compact ranges, several devices can be synchronized with each other by simply interconnecting the synchronization outputs of the devices (Pin 2 for NO function, Pin 4 for NC function). Up to 10 devices can be synchronized (or 6 devices in the case of K0 compact range). This allows the sensors to be mounted extremely close to each other in many cases without causing mutual interference.

Advantages

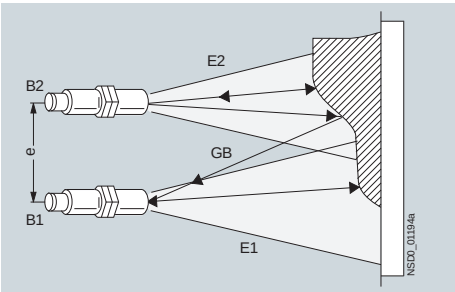
- No additional wiring overheads, simply connect the enable inputs of the individual proximity switches.
- Fast response, because every proximity switch is constantly active.

Disadvantages

- The object cannot be assigned to a particular proximity switch.

Example

Two Sonar proximity switches are mounted at a clearance e that is smaller than the minimum clearance (see mounting guidelines). An object is located in their common sound field. The echo from B2 can reach B1 by reflection (GB). Mutual interference can occur. The object is detected from the two echoes E1 and E2 by Sonar proximity switches B1 and B2. If the two devices are synchronized, there may be no mutual interference, because for example, echo E1 arrives after echo E2 at proximity switch B2. The devices only ever respond to the first echo.



Multiplex function

External multiplex mode

The fourth connection can be used as an external enabling input. This can be used to switch the Sonar proximity switch to active or inactive using an external control without the need to switch the supply voltage on and off. An external multiplex mode can be configured when Sonar proximity switches have to be switched on and off in sequence via the enabling input. In this case, it is ensured that the Sonar proximity switches will not interfere with each other. In contrast to internal multiplex mode, more than 10 Sonar proximity switches can be operated in multiplex mode.

Connection of the enable input:

- Sonar proximity switch active, Enable input XI at L+ or open.
- Sonar proximity switch inactive, enable input XI at 0 … 3 V DC

Advantages

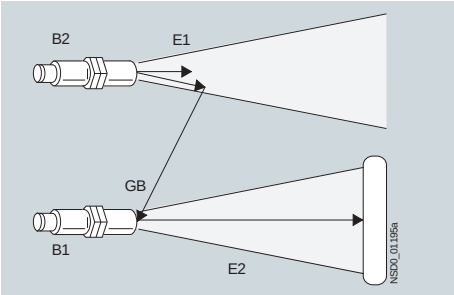
- Reliable protection against mutual interference.
- An object can be assigned to a proximity switch.

Disadvantages

- Additional connection overheads (e.g. a PLC).
- Longer response time than for a synchronization circuit because each proximity switch is only active briefly and then has to wait until all the other proximity switches in the circuit have emitted.

Example: Recognition of narrow objects

Narrow objects are to be recognized and it shall be determined whether one, two or no objects are present.



In this example, echo GB would cause proximity switch B1 to mistakenly detect an object. Synchronization of the proximity switches would not help here because echo pulse E2 would not arrive until after echo GB at proximity switch B1 and a proximity switch only ever detects the first echo. In this example, a PLC must be used to switch cyclically to and fro between the two proximity switches.

Internal multiplex mode

The Sonar proximity switches of K0, M30 K2, M30 K3 and M18 compact ranges can be interconnected to form a network. Up to 10 devices (or 6 devices in the case of K0 compact range) can be operated in series or parallel (see "Synchronization"). No additional electronics is required. The enable inputs of all the proximity switches are simply connected together. On programming, each device is informed about the number of proximity switches in the network as well as its own position (address) in the network. When they have been wired up and the supply voltage has been connected, the proximity switches automatically operate in multiplex mode.

SONPROG programming device

SONPROG Using the SONPROG 3RX4 000 programming device and the relevant software, the Sonar proximity switches of M30 K2, M30 K3 and M18 compact ranges can be individually adapted to the respective application requirements. The device is an interface for the following tasks:

- Checking the parameters of the Sonar proximity switch
- Modifying the parameters of the Sonar proximity switch
- Aligning the Sonar proximity switch to the application.

This enables a Sonar proximity switch to be optimized specifically for an application. The adjustments found can be saved or printed out to facilitate maintenance and documentation of the equipment.

When a Sonar proximity switch has been replaced, the new device can be programmed with the saved data quickly and easily. No new adjustments are necessary.

The main parameters that can be set are

- Lower and upper limit of the operating range
- Hysteresis
- Switching function NO or NC
- Switching frequency
- Lower and upper limit of the analog characteristic
- Analog characteristic, rising or falling
- End of close range
- End of sensing range
- Mean value generation
- Attenuation.

The function can also be set for the device:

- Multiplex function
- Temperature compensation
- Diffuse or reflex sensor.

For a detailed description of the possible settings, see "SONPROG PC interface", page 2/260.

Adjustment with potentiometers

The potentiometers are used to select the required limits (min. or max.) of the switching range.

SIMATIC design	K21	K08	M18S	M18	M18 ATEX	M30 K1	M30 K2	M30 K3	M30 K3 ATEX	K0	K65	Sonar thru-beam sensor	Spherical	3SG16	Double sheet control
PXS100															
• 30 cm										2/18					
• 100 cm										2/18				2/20	
• 150 cm												2/22			
PXS200															
• 25 cm	2/34		2/31												
• 30 cm						2/27									
• 40 cm	2/34	2/36	2/31												
• 70 cm			2/31												
• 80 cm	2/34	2/36													
• 130 cm						2/27									
• 300 cm						2/27									
• 600 cm						2/27									
PXS300															
• 30 cm				2/44			2/40								
• 50 cm											2/46				
• 100 cm				2/44											
• 130 cm							2/40								
• 150 cm											2/46				
• 250 cm											2/46				
• 300 cm							2/40								
• 600 cm							2/40								
PXS400															
• 30 cm								2/50							
• 130 cm								2/50							
• 300 cm								2/50							
• 600 cm								2/50							
• 1000 cm													2/52		
PXS800															
• 30 cm					2/56				2/58						
• 100 cm					2/56										
• 130 cm									2/58						
• 300 cm									2/58						
• 600 cm									2/58						
PXS900															
• 6 cm															2/63

Overview

SIMATIC sensors PXS100

- K0 compact range,
- 3SG16 compact form,
- Sonar thru-beam sensor

Selection table

SIMATIC PXS100

	K0 compact range				Sonar thru-beam sensor	3SG16 compact form
	Fixed sensor head		Separate sensor head			
Sensing range (cm)	**6 ... 30**	**20 ... 100**	**6 ... 30**	**20 ... 100**	**5 ... 150**	**20 ... 100**
Operating mode						
• Diffuse sensor	■	■	■	■		■
• Reflex sensor						■
• Thru-beam sensor					■	
Output						
• 1 switching output	■	■	■	■	■	
• 2 switching outputs						■
• Analog output 0 ... 10 V	■	■	■	■		
Adjustment						
• 1 potentiometer	■	■	■	■		
• Jumper plug						■
Connection						
• M8 connector					■	
• M12 connector	■	■	■	■	■	
• Cable					■	
• Terminals						■
Degree of protection						
• IP65	■	■	■	■		■
• IP67					■	
See page	**2/18**				**2/22**	**2/20**

A configurator for fast product selection and ordering in the Internet can be found at www.siemens.com/simatic-sensors/px

SIMATIC PXS100

K0 compact range

Overview

K0 compact range with separate and fixed sensor

The Sonar proximity switches of K0 compact range are ready-to-use units with a rectangular enclosure. They are available with two sensing ranges.

- Operate as diffuse sensors
- Adjustable via potentiometer
- Can be synchronized
- Temperature compensation
- Solid-state outputs:
  - switching output
  - analog output
- Connection via M12 connector, type F

Design

The devices of K0 compact range are supplied in the standard version with permanently installed sensors.

The devices of K0 compact range can also be supplied with separate sensors. Due to its small dimensions, the sensor is especially suitable in confined spaces.

The ultrasonic sensor is installed in a cylindrical enclosure separated from the other electronics. In 3RG63 42 devices, the sensor is installed in an M18 shell and in 3RG63 43 devices it is installed in an M30 shell with a length of 25 mm in both cases.

Two nuts are supplied for fixing. The connecting lead of 1.6 m in length is molded onto the sensor. The connection to the evaluation electronics located in the enclosure of K0 compact range is established via the preassembled coaxial cable plug. The plug-in socket is installed on the end face of the enclosure.

Function

K0 compact range is designed for simple applications. The devices are only suitable for operation as diffuse sensors.

The sensors can be supplied with analog outputs. The end of operating range or analog range can be set using a potentiometer.

Up to 6 devices can be synchronized with each other.

Technical specifications

Type		3RG63 42	3RG63 43
Sensing range	cm	6 ... 30	20 ... 100
Standard target	cm	1 × 1	2 × 2
Hysteresis *H*	mm	5	10
Repeat accuracy *R*	mm	± 0.45	± 1.5
Operational voltage (DC)	V	10 ... 35 (including ± 10% residual ripple, at 10 … 18 V sensitivity reduced by approx. 30%)	
Rated operational current I_e	mA	100	
No-load supply current I_0	mA	max. 35	
Ultrasonic frequency	kHz	400	200
Switching frequency *f*	Hz	8	5
Response time	ms	70	90
Power-up delay t_v	ms	7	7
Switching status display		Yellow LED	
Enclosure material		CRASTIN; epoxy resin converter surface	
Degree of protection		IP65; IP68 with separate sensor	
Ambient temperature			
• During operation	°C	0 ... +55	
• During storage	°C	–40 ... +85	

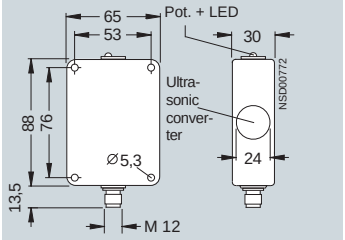
Selection and Ordering data

	Sensing range	Rated operational current	Switching output	Analog output		Order No.
	cm	mA	pnp			
Fixed sensor						
	6 ... 30	100	1 NO	–	►	**3RG63 42–3AB00**
	20 ... 100	100	1 NO	–	►	**3RG63 43–3AB00**
	6 ... 30	100	1 NC	–		**3RG63 42–3AA00**
	20 ... 100	100	1 NC	–		**3RG63 43–3AA00**
	6 ... 30	100	–	0 ... 10 V	►	**3RG63 42–3JK00**
	20 ... 100	100	–	0 ... 10 V	►	**3RG63 43–3JK00**
Separate sensor						
	6 ... 30	100	1 NO	–	►	**3RG63 42–3AB01**
	20 ... 100	100	1 NO	–	►	**3RG63 43–3AB01**
	6 ... 30	100	1 NC	–		**3RG63 42–3AA01**
	20 ... 100	100	1 NC	–		**3RG63 43–3AA01**
	6 ... 30	100	–	0 ... 10 V	►	**3RG63 42–3JK01**
	20 ... 100	100	–	0 ... 10 V		**3RG63 43–3JK01**

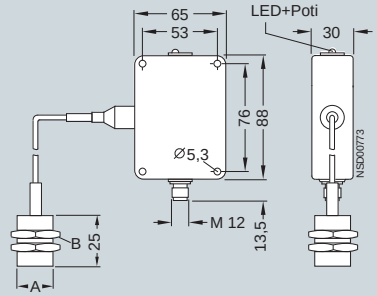
► Preferred type, available from stock.

Dimensions

3RG 63 4.–3..00



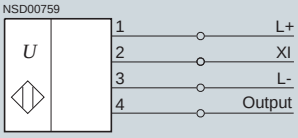
3RG 63 4.–3..01



Type	A	B
3RG63 42–3..01	M18	SW 24
3RG63 43–3..01	M30	SW 36

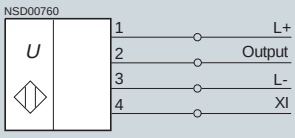
Schematics

NSD00759



NO or analog output

NSD00760



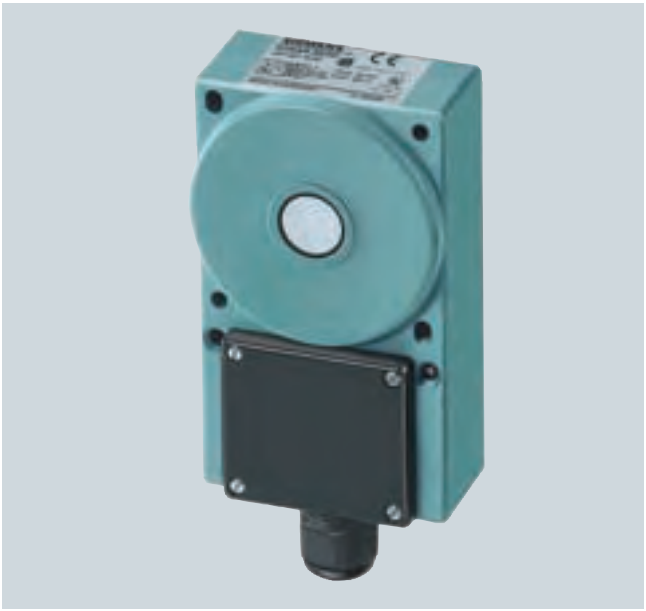
NC

View from rear onto device

NSD01042a

3SG16 compact form

Overview



3SG16 compact form

The sonar proximity switch in compact form for DC is a complete, factory-assembled unit, ready for connection. It cannot be combined with devices from the compact range.

- Operates as diffuse sensor or reflex sensor
- Foreground and background suppression
- Adjustable by means of plug-in jumpers
- Solid-state outputs:
  - 2 switching outputs
- Terminal compartment with screw terminals

Design

All components are located in a single box-shaped enclosure. The ultrasonic converter and the terminal compartment are arranged on the same enclosure level.

The electrical connections are made via screw terminals in the terminal compartment; cable entry is through an M20 cable gland.

Aligning unit

To make it easier to align the Sonar proximity switch with the object to be detected, a 3SX6 287 aligning unit is available.

This unit allows swiveling about a horizontal and a vertical axis with an angle of rotation in each case of up to 30°.

Function

Range definition and adjustability

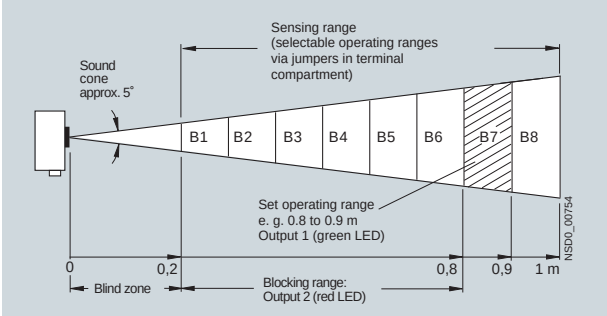
The sonar proximity switch outputs a signal while an object is located in the set operating range or inhibit range outside the blind zone (see figure).

The sensing range between 0.2 and 1 m is subdivided into 8 equal operating ranges of 0.1 m. Each operating range B1 to B8 can be selected using a connector in the terminal compartment.

The Sonar proximity switch signals with one output and one LED in each case whether objects are located in the set operating range or in the so-called inhibit range that precedes it.

With the help of the supplied programming plug, two to eight of the separate operating ranges (B1 to B8) can be combined to form an extended operating range.

The switching range is defined by two programming plugs. The plug is fitted to a pin connector in the terminal compartment of the device. The possible pin assignments are shown in the cover of the terminal compartment.



Modes

Standard operating mode, diffuse sensor

The sonar proximity switch switches when an object enters the sound cone from any direction, output 14 (NO) outputs a 1-signal if the object is located within a set operating range (B1 to B8). Output 24 (SX) outputs a 1-signal if the object is in the inhibit range. Objects in the blind zone do not cause a utilizable signal change on outputs 14 and 24.

Reflex sensor

If a reflector is permanently fixed within a set operating range, the ultrasonic beam will be interrupted by all objects in the inhibit range even those that absorb sound.

In this case, output 14 (NO) changes to the 0-signal. In the case of reflective objects in the inhibit range, output 24 (SX) changes to the 1-signal at the same time.

Technical specifications

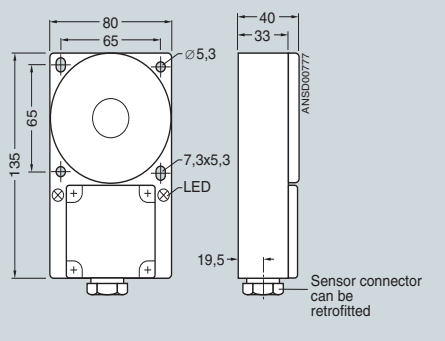
Type		3SG16 compact form
Sensing range	cm	20 ... 100
Standard target	cm	2 × 2
Hysteresis *H*	mm	10
Repeat accuracy *R*	mm	± 2
Operational voltage (DC)	V	10 ... 35 (including ± 10% residual ripple, at 10 … 18 V sensitivity reduced by approx. 30%)
No-load supply current I_0	mA	< 60
Switching output		
• Rated operational current I_e	mA	150
• Voltage drop	V	2
• Residual current	mA	0.01
Ultrasonic frequency	kHz	200
Switching frequency *f*	Hz	4
Response time	ms	120
Power-up delay t_v	ms	280
Switching status display		Yellow LED
Enclosure material		CRASTIN; epoxy resin converter surface
Degree of protection		IP65
Ambient temperature		
• During operation	°C	–25 ... 70
• During storage	°C	–40 ... 85

Selection and Ordering data

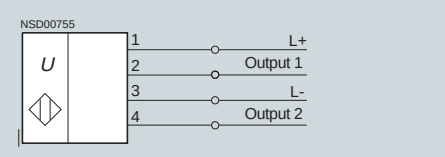
	Sensing range	Rated operational current	Switching output	Connection		Order No.
	cm	mA	pnp			
3SG16 sonar proximity switches	20 ... 100	150	2 NO	Terminal compartment	▶	**3SG16 67–1BJ87**
Accessories						
	Aligning unit					**3SX6 287**

▶ Preferred type, available from stock.

Dimensions



Schematics



SIMATIC PXS100

Sonar thru-beam sensor

Overview

Sonar thru-beam sensor

The sonar thru-beam sensor comprises an ultrasonic emitter and a receiver. The emitter and receiver circuits are installed in separate box-shaped enclosures of molded plastic.

- Operation as thru-beam sensor
- 3 measurement ranges can be set
- Solid-state output:
  - Switching output
- Connection
  - With 3 m cable
  - With M8 connector, 4-pole, type B
  - With M12 connector, 4-pole, type F

Function

Thru-beam sensor mode

The emitter of the sonar thru-beam sensor emits a narrowly focused continuous tone in the direction of the receiver.

The receiver located opposite evaluates this ultrasonic signal. Interruption of the tone by an object will cause the output signal to change.

Adjustment of sensitivity

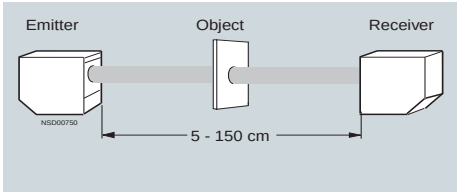
The sensitivity can be adjusted at the receiver module at terminal 2 (NO version) or 4 (NC version).

XI	Switching rate	Emitter/receiver distance
	Hz	cm
Not connected	100	< 150
L–	150	< 80
L+	200	< 40

Object detection

The minimum size of detectable objects depends on the distance between emitter and receiver. If the distance is less than 40 cm, objects 2 cm or larger will be detected. The gap with between two objects must be at least 3 mm.

If the distance is shorter, gaps of even <1 mm can be detected. At maximum distance, objects greater than 4 cm in size can be detected. In this case the gaps between the objects must be >1 cm.



Layout

Technical specifications

Type		3RG62 43–.P (receiver)	3RG62 43–.N (emitter)
Sensing range	cm	–	5 ... 150
Standard target	cm	2 × 2	
Operational voltage (DC)	V	20 ... 30 (including ± 10% residual ripple)	
Rated operational current I_e	mA	100	
No-load supply current I_0	mA	< 20	
Ultrasonic frequency	kHz	-	200
Switching frequency *f*			
• Up to 40 cm	Hz	200	–
• Up to 80 cm	Hz	150	–
• Up to 150 cm	Hz	100	–
Response time			
• Up to 40 cm	ms	2	–
• Up to 80 cm	ms	1.5	–
• Up to 150 cm	ms	1	–
Power-up delay t_v	ms	< 40	
Status indication		Green LED	
Enclosure material		CRASTIN; epoxy resin converter surface	
Degree of protection		IP67	
Ambient temperature			
• During operation	°C	0 ... +70	
• During storage	°C	–25 ... +85	

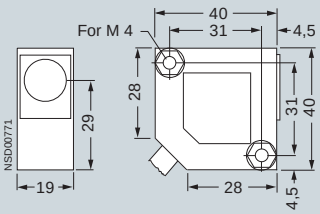
Selection and Ordering data

Sensing range	Rated operational current	Switching output	Connection		Order No.
cm	mA	pnp			
5 ... 150	100	1 NO	Cable, 3 m	►	**3RG62 43–0PB00**
5 ... 150	100	1 NC	Cable, 3 m		**3RG62 43–0PA00**
5 ... 150	–	Emitter	Cable, 3 m	►	**3RG62 43–0NN00**
5 ... 150	100	1 NO	M 8 connector		**3RG62 43–7PB00**
5 ... 150	100	1 NC	M 8 connector		**3RG62 43–7PA00**
5 ... 150	–	Emitter	M 8 connector		**3RG62 43–7NN00**
5 ... 150	100	1 NO	M12 connector	►	**3RG62 43–3PB00**
5 ... 150	100	1 NC	M12 connector		**3RG62 43–3PA00**
5 ... 150	–	Emitter	M12 connector	►	**3RG62 43–3NN00**

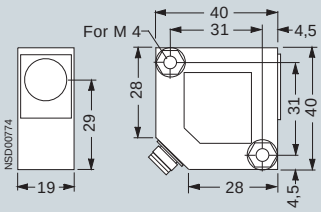
► Preferred type, available from stock.

Dimensions

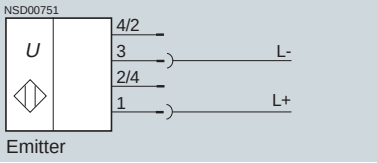
3RG62 43–0..00



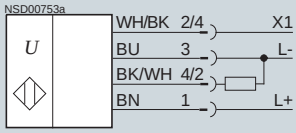
3RG62 43–3..00, 3RG62 43–7..00



Schematics



Emitter



Receiver (NO/NC)

View from rear onto device

Overview

SIMATIC sensors PXS200

- M30 K1 compact range,
- M18S compact range,
- K21 compact range,
- K08 compact form

Selection table

SIMATIC PXS200

	M30 K1 compact range									
	Fixed sensor head				Swivel-mounted sensor head				Separate sensor head	
Sensing range (cm)	**6 ... 30**	**20 ... 130**	**40 ... 300**	**60 ... 600**	**6 ... 30**	**20 ... 130**	**40 ... 300**	**60 ... 600**	**6 ... 30**	**20 ... 130**
Operating mode										
• Diffuse sensor	■	■	■	■	■	■	■	■	■	■
• Reflex sensor	■	■	■	■	■	■	■	■	■	■
Output										
• 1 switching output	■	■	■	■	■	■	■	■	■	■
Adjustment										
• 2 potentiometers	■	■	■	■	■	■	■	■	■	■
Connection										
• M12 connector	■	■	■	■	■	■	■	■	■	■
Degree of protection										
• IP65	■	■	■	■	■	■	■	■	■	■
See page	2/27									

A configurator for fast product selection and ordering in the Internet can be found at www.siemens.com/simatic-sensors/px

SIMATIC PXS200

	K08 compact range			M18S compact range					
				Straight sensor head			Angled sensor head		
Sensing range (cm)	**5 ... 40**	**0 ... 80**	**0 ... 40**	**2 ... 25**	**2.5 ... 40**	**5 ... 70**	**2 ... 25**	**2.5 ... 40**	**5 ... 70**
Operating mode									
• Diffuse sensor	■			■	■	■	■	■	■
• Reflex sensor			■	■	■	■	■	■	■
• Thru-beam sensor		■							
Output									
• 1 switching output				■	■	■	■	■	■
• 2 switching outputs	■	■	■						
• Frequency output				■	■	■	■	■	■
Adjustment									
• Teach-in	■	■	■	■	■	■	■	■	■
Connection									
• M12 connector	■	■	■	■	■	■	■	■	■
Degree of protection									
• IP67	■	■	■	■	■	■	■	■	■
See page	**2/36**			**2/31**					

A configurator for fast product selection and ordering in the Internet can be found at
www.siemens.com/simatic-sensors/px

2

SIMATIC PXS200

	M18S compact range, 2 switching outputs				K21 compact range		
	Straight sensor head		Angled sensor head				
Sensing range (cm)	**2.5 ... 40**	**5 ... 70**	**2.5 ... 40**	**5 ... 70**	**2 ... 25**	**2.5 ... 40**	**0 ... 80**
Operating mode							
• Diffuse sensor	■	■	■	■	■	■	
• Reflex sensor					■	■	
• Thru-beam sensor							■
Output							
• 1 switching output					■	■	■
• 2 switching outputs	■	■	■	■			
• Frequency output					■	■	
Adjustment							
• Teach-in	■	■	■	■	■	■	■
Connection							
• M8 connector					■	■	■
• M12 connector	■	■	■	■			
• Cable					■	■	■
Degree of protection							
• IP67	■	■	■	■	■	■	■
See page	**2/31**				**2/34**		

A configurator for fast product selection and ordering in the Internet can be found at
www.siemens.com/simatic-sensors/px

Overview

M30 design with fixed sensor

The Sonar proximity switches of M30 K1 compact range are ready-to-use all-in-one units with a cylindrical M30 enclosure. They differ with regard to their range, their functional scope and their adjustment or programming capability.

- Operates as diffuse sensor or reflex sensor
- Adjustable via 2 potentiometers
- Electronic switching output
- Connection via M12 connector, 3-pole or 4-pole, Type E, F

Design

Standard version

In the standard version, the devices have a permanently installed sensor.

Version with separate sensor

M30 design with separate sensor

Due to its small dimensions, the sensor is especially suitable in confined spaces.

The ultrasonic sensor is installed in a cylindrical enclosure separated from the other electronics. For 3RG6. 12 devices, the sensor is in an M18 sleeve, for 3RG6. 13 devices, the sensor is installed in an M30 sleeve with a length of 25 mm in each case.

Two nuts are supplied for fixing. The connecting lead, which is 1.6 m long, is cast onto the sensor. The connection to the evaluation electronics located in the M30 enclosure of the compact range is established via the preassembled coaxial cable plug. The plug-in socket is installed on the end face of the enclosure.

Version with swivel sensor

These devices correspond functionally to the other devices of M30 K1 compact range. They are particularly suitable for applications where the standard type cannot be used due to space limitations.

M30 design with swivel sensor

The ultrasonic sensor is hinged with a swivel arm to the tubular enclosure of the signal evaluator. This allows rotation about the cylinder axes as well as perpendicular movement at about 100° to the cylinder axis.

Passive reflector

With the Sonar proximity switches of M30 K1 compact range, a 3RX1 910 passive reflector can be clamped onto the sensor head (see "Accessories").

Where space is limited, objects can be detected which are perpendicular to the Sonar proximity switch (which reduces the installation depth). The blind zone is therefore reduced by about 6 cm.

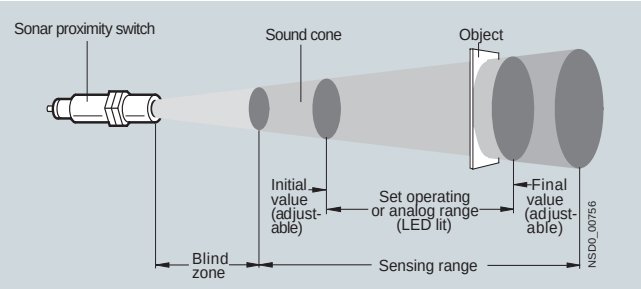
M30 K1 compact range

Function

Range definition and adjustability

Objects within the preset operating range or analog range will be reliably detected causing the switching output or analog output to change state.

The blind zone must be kept clear of any objects since this might cause false outputs. Objects at a distance from the sensor that is outside the set operating range limits will not be signaled at the switching output.



Sound cone

Modes

Standard operating mode, diffuse sensor

An object entering the sound cone from any direction causes the output signal to change when it enters the preset sensing range.

Reflex sensor

If a reflector is permanently fixed within a set operating range, the Sonar proximity switch will be operated by all objects that lie between the Sonar proximity switch and the reflector, even those that absorb sound.

Technical specifications

Type		3RG60 .2	3RG60 .3	3RG60 .4	3RG60 .5
Sensing range	cm	6 ... 30	20 ... 130	60 ... 600	40 ... 300
Standard target	cm	1 × 1	2 × 2	10 × 10	5 × 5
Hysteresis *H*	mm	10	10	60	20
Repeat accuracy *R*	mm	± 0.45	± 2	± 9	± 5
Operational voltage (DC)	V	12 ... 30 (including ± 10% residual ripple, at 12 … 20 V sensitivity reduced by approx. 20%)			
Rated operational current I_e					
• NO contact	mA	300			
• NC contact	mA	300			
No-load supply current I_0	mA	max. 50			
Ultrasonic frequency	kHz	400	200	80	120
Switching frequency *f*	Hz	8	4	1	2
Response time	ms	80	110	400	200
Power-up delay t_v	ms	280	280	280	280
Switching status display		Yellow LED			
Enclosure material		Brass, nickel-plated; CRASTIN converter cover; epoxy resin converter surface			
Degree of protection		IP65; IP68 with separate sensor		IP65	
Ambient temperature					
• During operation	°C	–25 ... +70			
• During storage	°C	–40 ... +85			

Selection and Ordering data

	Sensing range	Rated operational current	Switching output	Analog output		Order No.
	cm	mA	pnp			
Fixed sensor						
3RG60 12–3..00 	6 ... 30	300	1 NO	–	▶	**3RG60 12–3AD00**
	20 ... 130	300	1 NO	–	▶	**3RG60 13–3AD00**
	40 ... 300	300	1 NO	–	▶	**3RG60 15–3AD00**
	60 ... 600	300	1 NO	–	▶	**3RG60 14–3AD00**
3RG60 13–3..00 	6 ... 30	300	1 NC	–	▶	**3RG60 12–3AC00**
	20 ... 130	300	1 NC	–	▶	**3RG60 13–3AC00**
	40 ... 300	300	1 NC	–		**3RG60 15–3AC00**
	60 ... 600	300	1 NC	–	▶	**3RG60 14–3AC00**
3RG60 15–3..00 						
3RG60 14–3..00 						
Swivel sensor						
3RG60 25–3..00 	6 ... 30	300	1 NO	–		**3RG60 22–3AD00**
	20 ... 130	300	1 NO	–		**3RG60 23–3AD00**
	40 ... 300	300	1 NO	–		**3RG60 25–3AD00**
	60 ... 600	300	1 NO	–		**3RG60 24–3AD00**
	6 ... 30	300	1 NC	–		**3RG60 22–3AC00**
	20 ... 130	300	1 NC	–		**3RG60 23–3AC00**
	40 ... 300	300	1 NC	–		**3RG60 25–3AC00**
	60 ... 600	300	1 NC	–		**3RG60 24–3AC00**
Separate sensor						
3RG60 12–3..01 	6 ... 30	300	1 NO	–		**3RG60 12–3AD01**
	20 ... 130	300	1 NO	–		**3RG60 13–3AD01**
	6 ... 30	300	1 NC	–		**3RG60 12–3AC01**
	20 ... 130	300	1 NC	–		**3RG60 13–3AC01**

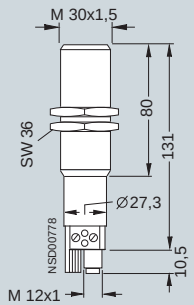
▶ Preferred type, available from stock.

M30 K1 compact range

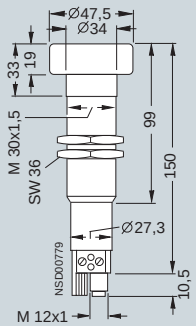
Dimensions

With fixed sensor

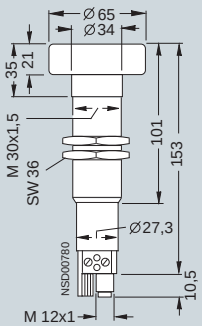
3RG 6. 12–3..00
3RG 6. 13–3..00



3RG 6. 15–3..00

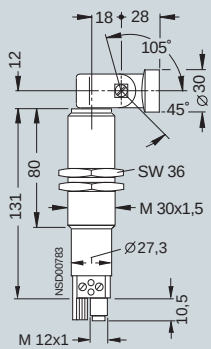


3RG 6. 14–3..00

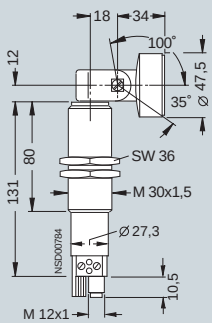


With swiveling sensor

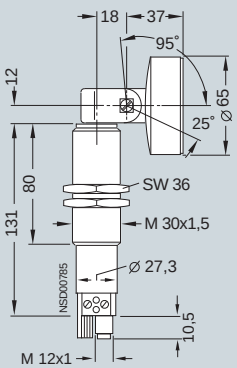
3RG 6. 22–3..00
3RG 6. 23–3..00



3RG 6. 25–3..00

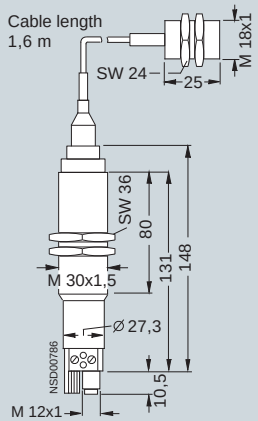


3RG 6. 24–3..00

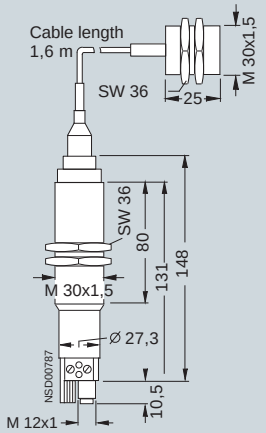


With separate sensor

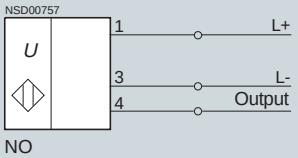
3RG 6. 12–3..01

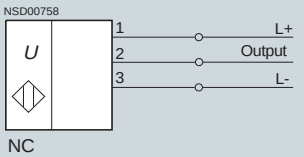


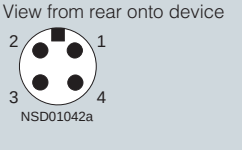
3RG 6. 13–3..01



Schematics







Overview

M18S design

The Sonar proximity switches of the M18S compact series are ready-to-connect complete units in a cylindrical enclosure.

- Can be operated as diffuse sensor or thru-beam sensor
- Adjustable via teach-in (switching output only)
- Electronic outputs:
  - Switching output
  - Frequency output, suitable for connection to LOGO!
- Connected via M12 connector
  - 4-pole, type F (1 output)
  - 5-pole, type G (2 outputs)

Design

M18S compact range can be supplied with an aligned sensor head or an angled sensor head. The small physical size of the sensors makes them ideal for applications where space is limited.

Function

Available as diffuse sensors and reflex sensors. The sensors can be supplied with switching or frequency outputs. Due to their wide range and a minimized close range, they are suitable for a wide variety of applications.

Programming

The sensors with a switching output can be set via the device terminals by means of a teach-in function. For the sensors with a frequency output, the range can be set via the wiring. Evaluation can be performed in a PLC or in a LOGO! mini PLC.

M18S compact range

Technical specifications

Type M18S		6GR62 22, 6GR62 32	6GR62 21, 6GR62 31	6GR62 23, 6GR62 32
Number of outputs		**1**	**1**	**1**
Sensing range	cm	2 ... 25 or 0 ... 25	2.5 ... 40 or 0 ... 40	5 ... 70 or 0 ... 70
Adjustment range	cm	3.5 ... 25 or 9 ... 25	4 ... 40 or 11.5 ... 40	7.5 ... 70 or 20 ... 75
Standard target	cm	2 × 2		
Hysteresis *H*	mm	10 or 2		10 or 3
Repeat accuracy *R*	mm	± 1 (frequency output ± 2.5)		
Operating voltage (DC)	V	20 ... 30 (including ± 10% residual ripple)		
Rated operating current I_e	mA	150		
No-load supply current I_0	mA	Max. 20		
Ultrasonic frequency	kHz	400	300	200
Switching frequency *f*	Hz	10		5
ON-delay	ms	50		100
Power-up delay	ms	20		
Switching status display		Yellow LED		
Enclosure material		Brass, nickel-plated; CRASTIN converter cover; epoxy resin converter surface		
Degree of protection		IP67		
Ambient temperature				
• Operation	°C	–25 ... +70		
• Storage	°C	–40 ... +85		

Type M18S		6GR62 21, 6GR62 31	3RG62 23, 6GR62 33
Number of outputs		**2**	**2**
Sensing range	cm	2.5 ... 40	5 ... 70
Adjustment range	cm	4 ... 40	7.5 ... 70
Standard target	cm	2 × 2	
Hysteresis *H*	mm	10	
Repeat accuracy *R*	mm	± 1 (frequency output ± 2.5)	
Operating voltage (DC)	V	20 ... 30 (including ± 10% residual ripple)	
Rated operating current I_e	mA	375	
No-load supply current I_0	mA	max. 20	
Ultrasonic frequency	kHz	300	200
Switching frequency *f*	Hz	10	5
ON-delay	ms	50	100
Power-up delay	ms	20	
Switching status display		2 yellow LEDs	
Enclosure material		Brass, nickel-plated; CRASTIN converter cover; epoxy resin converter surface	
Degree of protection		IP67	
Ambient temperature			
• Operation	°C	–25 ... +70	
• Storage	°C	–40 ... +85	

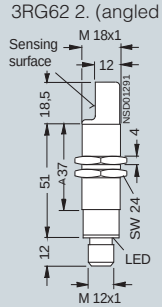
Selection and Ordering data

	Sensing range	Rated operational current	Switching output	Operating mode/ frequency output		Order No.
	cm	mA	pnp			
Straight sensor						
	2 ... 25	150	1 NO	Diffuse sensor	▶	**6GR62 32–3AB00**
	2.5 ... 40	150	1 NO	Diffuse sensor	▶	**6GR62 31–3AB00**
	5 ... 70	150	1 NO	Diffuse sensor	▶	**6GR62 33–3AB00**
	0 ... 25	150	1 NO	Reflex sensor	▶	**6GR62 32–3BB00**
	0 ... 40	150	1 NO	Reflex sensor	▶	**6GR62 31–3BB00**
	0 ... 70	150	1 NO	Reflex sensor	▶	**6GR62 33–3BB00**
	2 ... 25	150	–	280 … 2000 Hz 140 … 1000 Hz		**6GR62 32–3RS00**
	2.5 ... 40	150	–	160 … 1600 Hz 40 … 400 Hz		**6GR62 31–3RS00**
	5 ... 70	150	–	150 … 1400 Hz 75 … 700 Hz		**6GR62 33–3RS00**
	2.5 ... 40	375	2 NO	Diffuse sensor		**6GR62 31-3AH00**
	5 ... 70	375	2 NO	Diffuse sensor		**6GR62 33-3AH00**
	2.5 … 40	375	1 NC, 1 NO	Diffuse sensor		**6GR62 31-3AJ00**
	5 ... 70	375	1 NC, 1 NO	Diffuse sensor		**6GR62 33-3AJ00**
Angled sensor						
	2 … 25	150	1 NO	Diffuse sensor	▶	**6GR62 22–3AB00**
	2.5 … 40	150	1 NO	Diffuse sensor		**6GR62 21–3AB00**
	5 … 70	150	1 NO	Diffuse sensor	▶	**6GR62 23–3AB00**
	0 … 25	150	1 NO	Reflex sensor		**6GR62 22–3BB00**
	0 … 40	150	1 NO	Reflex sensor		**6GR62 21–3BB00**
	0 … 70	150	1 NO	Reflex sensor		**6GR62 23–3BB00**
	2 … 25	150	–	280 … 2000 Hz 140 … 1000 Hz		**6GR62 22–3RS00**
	2.5 … 40	150	–	160 … 1600 Hz 40 … 400 Hz		**6GR62 21–3RS00**
	5 … 70	150	–	150 … 1400 Hz 75 … 700 Hz		**6GR62 23–3RS00**
	2.5 … 40	375	2 NO	Diffuse sensor		**6GR62 21-3AH00**
	5 … 70	375	2 NO	Diffuse sensor		**6GR62 23-3AH00**
	2.5 … 40	375	1 NC, 1 NO	Diffuse sensor	▶	**6GR62 21-3AJ00**
	5 … 70	375	1 NC, 1 NO	Diffuse sensor	▶	**6GR62 23-3AJ00**
Accessories						
	Teach-in adapter, 4-pole				▶	**3RX4 010**
	Teach-in adapter, 5-pole				▶	**3RX4 020**

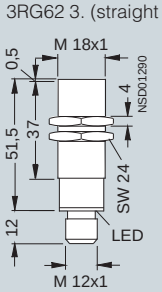
▶ Preferred type, available from stock.

Dimensions

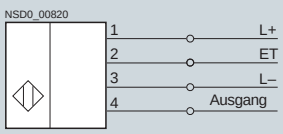
3RG62 2. (angled sensor)



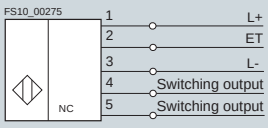
3RG62 3. (straight sensor)



Schematics

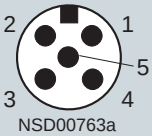


1 switching output/frequency output



2 switching outputs

View from rear onto device



View from rear onto device

SIMATIC PXS200

K21 compact range

Overview

K21 compact range

Sonar proximity switches from the K21 compact range are complete, prewired units in a miniature cubic enclosure.

- Operation as a diffuse sensor, reflex sensor or thru-beam sensor
- Adjustable via "teach-in" (with switching output only)
- Solid-state outputs:
  - Switching output
  - Frequency output, suitable for connection to LOGO!
- Wiring via M8 connector
  - 4-pole, type B

Benefits

- Simple, precise object recognition
- Also senses transparent objects and liquids
- Ultrasonic: Not influenced by the object's color or brightness
- Suitable for use in cramped conditions and tough environments
- High degree of protection IP67
- Configured using "teach-in"

Technical specifications

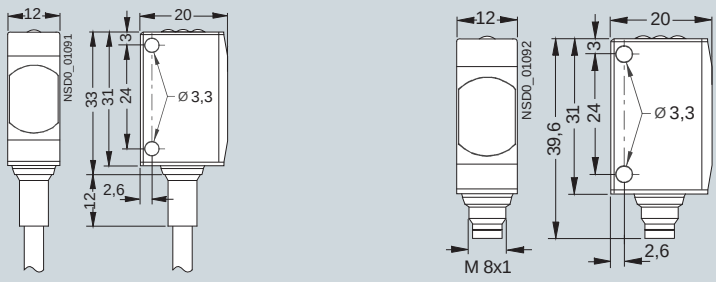
Type		6GR62 42	6GR62 41	6GR62 41-.P.. (receiver) 6GR62 41-.N.. (emitter)
Sensing range	cm	2 ... 25 or 0 ... 25	2.5 ... 40 or 0 ... 40	0 ... 80
Adjustment range	cm	4.5 ... 25 or 9.8 ... 25	4 ... 40 or 12 ... 40	–
Standard target	cm	2 x 2		–
Hysteresis *H*	mm	2.5	4	–
Repeat accuracy *R*	mm	± 1 (frequency output ± 2.5)		–
Operating voltage, including 10% residual ripple	V DC	20 ... 30		
Rated operating current I_e				
• Switching output, max.	mA	200		
• Frequency output, max.	mA	100		
No-load current I_0, max.	mA	20		
Ultrasonic frequency	kHz	400	300	
Switching frequency *f*	Hz	10	5	100
Response time	ms	50	75	5
Power-up delay t_v	ms	150		
Switching status indicator		Yellow LED		Yellow LED, green LED
Enclosure material		ABS / PMMA		
Transformer surface finish		Epoxy resin		
Degree of protection		IP67		
Ambient temperature				
• During operation	°C	-25 ... +70		
• During storage	°C	-40 ... +85		

Selection and Ordering data

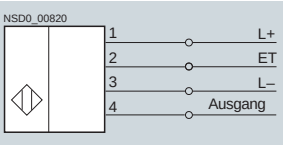
	Sensing range cm	Operating mode/ frequency output	Switching output	Connection		Order No.
K21 compact range						
	2.5 … 40	Diffuse sensor	NO contact	2 m cable	▶ A	**6GR62 41-0AB00**
		Diffuse sensor	NO contact	M8 connector	▶	**6GR62 41-7AB00**
		Diffuse sensor	NC contact	2 m cable	▶ A	**6GR62 41-0AA00**
		Diffuse sensor	NC contact	M8 connector	▶	**6GR62 41-7AA00**
	4 … 40	40 ... 400 Hz / 80 ... 800 Hz	-	2 m cable	▶ A	**6GR62 41-0RS00**
		40 ... 400 Hz / 80 ... 800 Hz	-	M8 connector	▶	**6GR62 41-7RS00**
	2 … 25	Diffuse sensor	NO contact	2 m cable	▶ A	**6GR62 42-0AB00**
		Diffuse sensor	NO contact	M8 connector	▶	**6GR62 42-7AB00**
		Diffuse sensor	NC contact	2 m cable	▶ A	**6GR62 42-0AA00**
		Diffuse sensor	NC contact	M8 connector	▶	**6GR62 42-7AA00**
	3.5 … 25	70 ... 500 Hz / 35 ... 250 Hz	-	2 m cable	▶ A	**6GR62 42-0RS00**
		70 ... 500 Hz / 35 ... 250 Hz	-	M8 connector	▶	**6GR62 42-7RS00**
	0 … 40	Retroflective sensor	NO contact	2 m cable	▶ A	**6GR62 41-0BB00**
		Retroflective sensor	NO contact	M8 connector	▶	**6GR62 41-7BB00**
		Retroflective sensor	NC contact	2 m cable	▶ A	**6GR62 41-0BA00**
		Retroflective sensor	NC contact	M8 connector	▶	**6GR62 41-7BA00**
	0 … 25	Retroflective sensor	NO contact	2 m cable	▶ A	**6GR62 42-0BB00**
		Retroflective sensor	NO contact	M8 connector	▶	**6GR62 42-7BB00**
		Retroflective sensor	NC contact	2 m cable	▶ A	**6GR62 42-0BA00**
		Retroflective sensor	NC contact	M8 connector	▶	**6GR62 42-7BA00**
	0 … 80	Thru-beam sensor emitter		2 m cable	▶ A	**6GR62 41-0NN00**
		Thru-beam sensor emitter		M8 connector	▶	**6GR62 41-7NN00**
		Thru-beam sensor receiver	NO contact	2 m cable	▶ A	**6GR62 41-0PB00**
		Thru-beam sensor receiver	NO contact	M8 connector	▶	**6GR62 41-7PB00**
		Thru-beam sensor receiver	NC contact	2 m cable	▶ A	**6GR62 41-0PA00**
		Thru-beam sensor receiver	NC contact	M8 connector	▶	**6GR62 41-7PA00**
Accessories						
	Teach-in adapter				▶	**3RX4 030**
	Mounting bracket				▶	**3RX7 308-0AA00**

▶ Preferred type, available from stock.
A: Subject to export regulations AL = N and ECCN = EAR99H

Dimensions

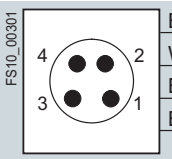


Schematics



1 switching output/frequency output

View from rear onto device



BN (1)	+ U_b
WH (2)	ET
BK (4)	Sw/freq output
BU (3)	0 V

M8 connector, type B, cable

SIMATIC PXS200

K08 compact form

Overview

K08 compact form

The Sonar proximity switches of K08 compact form are ready-to-use all-in-one units with a rectangular metal enclosure.

- 3 versions with different operating modes:
  - Diffuse sensors with background suppression
  - Reflex sensor
  - Thru-beam sensor:
- Diffuse sensor and reflex sensor:
  - Up to 6 devices can be synchronized
  - Adjustment per teach-in
- Solid-state outputs:
  - 1 pnp and 1 npn switching output
  - NO/NC adjustable
- Connection via M12 connector, 5-pole, rotatable by 90°, Type G

Technical specifications

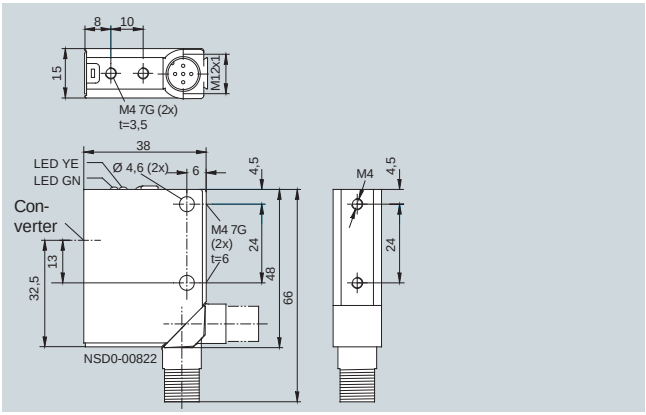
Type		3RG64 51–3CC00	3RG64 51–3DC00	3RG64 51–3SB00
Operating mode		Diffuse sensor	Reflex sensor	Thru-beam sensor
Sensing range	mm	50 ... 400	0 ... 400	0 ... 800
Adjustment range	mm	60 ... 400	160 ... 400	0 ... 800
Standard target	cm	2 × 2	2 × 2	2 × 2
Hysteresis *H*	mm	10	2	–
Repeat accuracy *R*	mm	± 1	± 1	–
Operational voltage (DC)	V	20 ... 30 (including ± 10% residual ripple)		
Rated operational current I_e	mA	150		
No-load supply current I_0	mA	Max. 25		
Ultrasonic frequency	kHz	300	300	300
Switching frequency *f*	Hz	8	8	250
Response time	ms	100	100	100
Power-up delay t_v	ms	250	250	250
Indicators				
• Switching status		Yellow LED		
• Operating voltage		Green LED		
Enclosure material		Metal		
Degree of protection		IP67		
Ambient temperature				
• During operation	°C	–25 ... +70		
• During storage	°C	–40 ... +85		

Selection and Ordering data

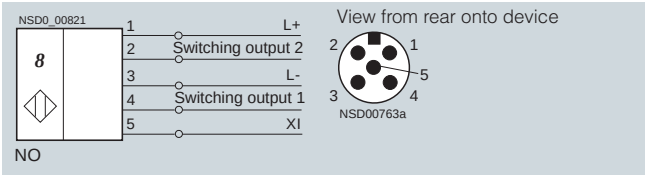
	Sensing range	Rated operational current	Switching output	Operating mode		Order No.
	cm	mA	pnp + npn			
Cubic form						
	5 ... 40	150	1 selectable NO/NC contact each	Diffuse sensor	►	**3RG64 51-3CC00**
	0 ... 40	150	1 selectable NO/NC contact each	Reflex sensor		**3RG64 51-3DC00**
	–	–	–	Thru-beam sensor emitter		**3RG64 51-3NN00**
	0 ... 80	150	1 NO each	Thru-beam sensor receiver		**3RG64 51-3SB00**

► Preferred type, available from stock.

Dimensions



Schematics



Overview

SIMATIC sensors PXS300

- M30 K2 compact range,
- M18 compact range,
- K65 compact form

Selection table

SIMATIC PXS300

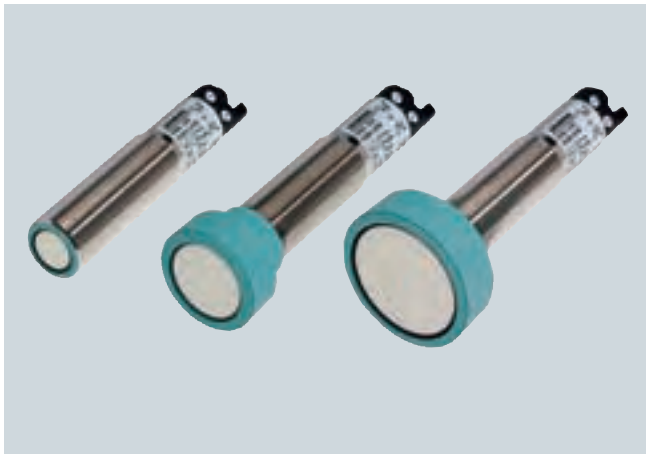
	M30 K2 compact range										M18 compact range			K65 compact form		
	Fixed sensor head				Swivel-mounted sensor head				Separate sensor head		Fixed sensor head					
Sensing range (cm)	6 ... 30	20 ... 130	40 ... 300	60 ... 600	6 ... 30	20 ... 130	40 ... 300	60 ... 600	6 ... 30	20 ... 130	5 ... 30	10 ... 100	15 ... 100	6 ... 50	20 ... 150	25 ... 250
Operating mode																
• Diffuse sensor	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
• Reflex sensor	■	■	■	■	■	■	■	■	■	■	■		■			
• Thru-beam sensor	■	■	■	■	■	■	■	■	■	■	■		■			
Output																
• 1 switching output	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
• 2 switching outputs	■	■	■	■										■	■	■
• Analog output 0 ... 20 mA											■		■	■	■	■
• Analog output 4 ... 20 mA											■		■	■	■	■
• Analog output 0 ... 10 V											■		■	■	■	■
• Frequency output	■	■	■	■							■		■	■	■	■
Direct communication with the controller																
• IQ-Sense											■		■			
• IO-Link												■				
Temperature compensation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Adjustment																
• 1 potentiometer											■		■			
• 2 potentiometers	■	■	■	■	■	■	■	■	■	■						
• Teach-in														■	■	■
• SONPROG program-ming device	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■
Connection																
• M12 connector	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Degree of protection																
• IP65	■	■	■	■	■	■	■	■	■	■				■	■	■
• IP67											■	■	■			
See page	2/40										2/44			2/46		

A configurator for fast product selection and ordering in the Internet can be found at
www.siemens.com/simatic-sensors/px

Notes

M30 K2 compact range

Overview



M30 design with fixed sensor

The Sonar proximity switches of M30 K2 compact range are ready-to-use all-in-one units with a cylindrical M30 enclosure. They differ with regard to their range, their functional scope and their adjustment or programming capability.

- Operate as diffuse sensor, reflex sensor or thru-beam sensor
- Adjustable via 2 potentiometers, with SONPROG
- Foreground and background suppression
- Synchronization capability, multiplex operation
- Temperature compensation
- Solid-state outputs:
  - 1 or 2 switching outputs
  - Frequency output, suitable for connection to LOGO!
- Connection with M12 connector
  - 4-pole (with 1 output), Type F
  - 5-pole (with 2 outputs), Type G

Design

Standard version

In the standard version, the devices have a permanently installed sensor.

Version with separate sensor

M30 design with separate sensor

Due to its small dimensions, the sensor is especially suitable in confined spaces.

The ultrasonic sensor is installed in a cylindrical enclosure separated from the other electronics. For 3RG6. 12 devices, the sensor is in an M18 sleeve, for 3RG6. 13 devices, the sensor is installed in an M30 sleeve with a length of 25 mm in each case.

Two nuts are supplied for fixing. The connecting lead, which is 1.6 m long, is cast onto the sensor. The connection to the evaluation electronics located in the M30 enclosure of the compact range is established via the preassembled coaxial cable plug. The plug-in socket is installed on the end face of the enclosure.

Version with swivel sensor

These devices correspond functionally to the other devices of M30 K2 compact range. They are particularly suitable for applications where the standard types cannot be used due to space limitations.

M30 design with swivel sensor

The ultrasonic sensor is hinged with a swivel arm to the tubular enclosure of the signal evaluator. This allows rotation about the cylinder axes as well as perpendicular movement at about 100° to the cylinder axis.

Passive reflector

With the Sonar proximity switches of M30 K2 compact range, a 3RX1 910 passive reflector can be clamped onto the sensor head (see "Accessories").

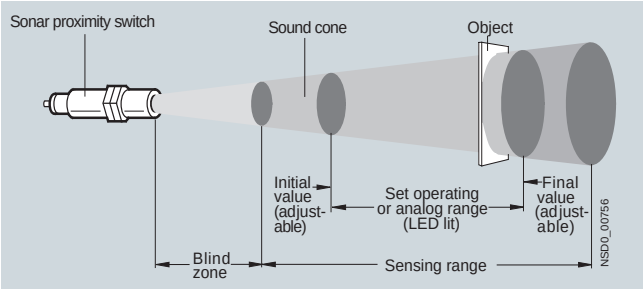
Where space is limited, objects can be detected which are perpendicular to the Sonar proximity switch (which reduces the installation depth). The blind zone is then reduced by about 6 cm.

Function

Range definition and adjustability

Objects within the preset operating range or analog range will be reliably detected causing the switching output or analog output to change state.

The blind zone must be kept clear of any objects since this might cause false outputs. Objects at a distance from the sensor that is outside the set operating range limits will not be signaled at the switching output.



Sound cone

Modes

Standard operating mode, diffuse sensor

An object entering the sound cone from any direction causes the output signal to change when it enters the preset sensing range.

Reflex sensor

If a reflector is permanently fixed within a set operating range, the Sonar proximity switch will be operated by all objects that lie between the Sonar proximity switch and the reflector even those that absorb sound.

Thru-beam sensors.

The Sonar-BERO only evaluates whether or not an object is located between the emitter and the receiver. The range of the arrangement is twice that of a single sensor.

Programming

SONPROG For optimizing to the operating conditions, all sensors of the M30 K2 compact range can be programmed using a PC and the SONPROG 3RX4 000 programming device.

The main parameters that can be changed are:

- Lower and upper limit of the operating range
- Hysteresis
- Switching function NO or NC
- Switching rate
- Lower and upper limit of the analog range
- Analog characteristic, rising or falling
- End of close range
- End of sensing range
- Mean value generation
- Multiplex function
- Temperature compensation
- Sensitivity

Sonar proximity switches with non-standard values available on request. The minimum ordering quantity is 10 units.

Technical specifications

Type		3RG60 .2	3RG60 .3	3RG60 .4	3RG60 .5
Sensing range	cm	6 ... 30	20 ... 130	60 ... 600	40 ... 300
Standard target	cm	1 × 1	2 × 2	10 × 10	5 × 5
Hysteresis *H*	mm	10	10	60	20
Repeat accuracy *R*	mm	± 0.45	± 2	± 9	± 5
Operational voltage (DC)	V	12 ... 30 (including ± 10% residual ripple, at 12 … 20 V sensitivity reduced by approx. 20%)			
Rated operational current I_e					
NO contact	mA	300			
NC contact	mA	300			
No-load supply current I_0	mA	max. 50			
Ultrasonic frequency	kHz	400	200	80	120
Switching frequency *f*	Hz	8	4	1	2
Response time	ms	80	110	400	200
Power-up delay t_v	ms	280	280	280	280
Switching status display		Yellow LED			
Enclosure material		Brass, nickel-plated; CRASTIN converter cover; epoxy resin converter surface			
Degree of protection		IP65; IP68 with separate sensor		IP65	
Ambient temperature					
• During operation	°C	–25 ... +70			
• During storage	°C	–40 ... +85			

M30 K2 compact range

2

Selection and Ordering data

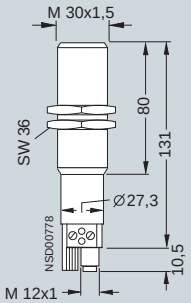
	Sensing range	Rated operational current	Switching output	Frequency output		Order No.
	cm	mA	pnp			
Fixed sensor						
3RG60 12–3..00 	6 ... 30	300	1 NO	–	▶	**3RG60 12–3AF00**
	20 ... 130	300	1 NO	–	▶	**3RG60 13–3AF00**
	40 ... 300	300	1 NO	–	▶	**3RG60 15–3AF00**
	60 ... 600	300	1 NO	–	▶	**3RG60 14–3AF00**
3RG60 13–3..00 	6 ... 30	300	1 NC	–		**3RG60 12–3AE00**
	20 ... 130	300	1 NC	–	▶	**3RG60 13–3AE00**
	40 ... 300	300	1 NC	–	▶	**3RG60 15–3AE00**
	60 ... 600	300	1 NC	–		**3RG60 14–3AE00**
3RG60 15–3..00 	6 ... 30	300	2 NO	–	▶	**3RG60 12–3AH00**
	20 ... 130	300	2 NO	–	▶	**3RG60 13–3AH00**
	40 ... 300	300	2 NO	–	▶	**3RG60 15–3AH00**
	60 ... 600	300	2 NO	–	▶	**3RG60 14–3AH00**
3RG60 14–3..00 	6 ... 30	–	2 NC	–		**3RG60 12–3AG00**
	20 ... 130	–	2 NC	–		**3RG60 13–3AG00**
	40 ... 300	–	2 NC	–		**3RG60 15–3AG00**
	60 ... 600	–	2 NC	–		**3RG60 14–3AG00**
	6 ... 30	300	–	30 ... 150 Hz		**3RG60 12–3RS00**
	20 ... 130	300	–	20 ... 130 Hz		**3RG60 13–3RS00**
	40 ... 300	300	–	20 ... 150 Hz		**3RG60 15–3RS00**
	60 ... 600	300	–	15 ... 150 Hz		**3RG60 14–3RS00**
Swivel sensor						
3RG60 25–3..00 	6 ... 30	300	1 NO	–		**3RG60 22–3AF00**
	20 ... 130	300	1 NO	–		**3RG60 23–3AF00**
	40 ... 300	300	1 NO	–		**3RG60 25–3AF00**
	60 ... 600	300	1 NO	–		**3RG60 24–3AF00**
	6 ... 30	300	1 NC	–		**3RG60 22–3AE00**
	20 ... 130	300	1 NC	–		**3RG60 23–3AE00**
	40 ... 300	300	1 NC	–		**3RG60 25–3AE00**
	60 ... 600	300	1 NC	–		**3RG60 24–3AE00**
Separate sensor						
3RG60 12–3..01 	6 ... 30	300	1 NO	–		**3RG60 12–3AF01**
	20 ... 130	300	1 NO	–		**3RG60 13–3AF01**
	6 ... 30	300	1 NC	–		**3RG60 12–3AE01**
	20 ... 130	300	1 NC	–		**3RG60 13–3AE01**
Accessories						
	**SONPROG programming device,** 100 ... 240 V AC, 24 V DC				▶	**3RX4 000**

▶ Preferred type, available from stock.

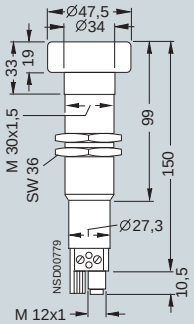
Dimensions

With fixed sensor

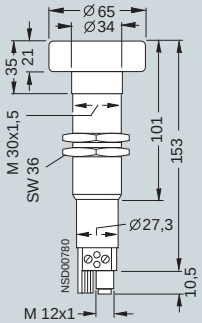
3RG 6. 12–3..00
3RG 6. 13–3..00



3RG 6. 15–3..00

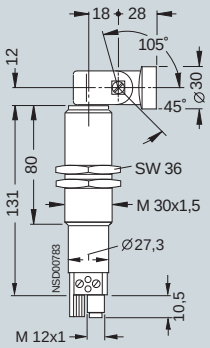


3RG 6. 14–3..00

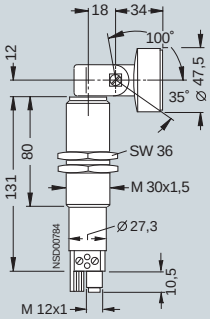


With swivel sensor

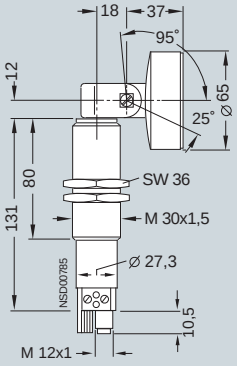
3RG 6. 22–3..00
3RG 6. 23–3..00



3RG 6. 25–3..00

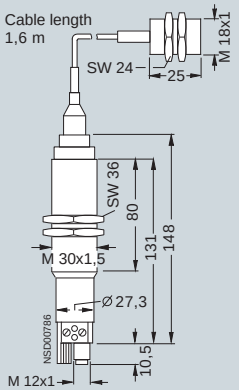


3RG 6. 24–3..00

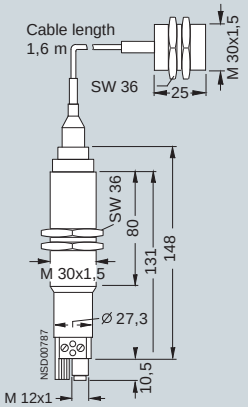


With separate sensor

3RG 6. 12–3..01

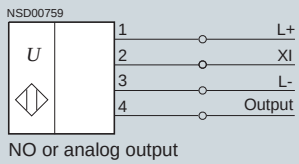


3RG 6. 13–3..01

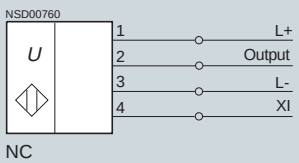


Schematics

M30 K2 compact range

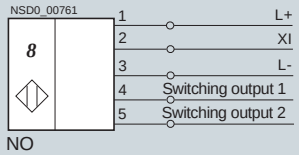


NO or analog output

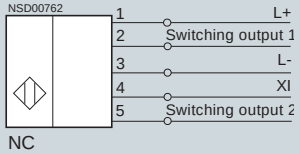


NC

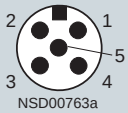
M30 K2 compact range with 2 switching outputs



NO



NC



SIMATIC PXS300

M18 compact range

Overview

M18 design

The Sonar proximity switches of M18 compact range are ready-to-use all-in-one units with a cylindrical enclosure.

- Operates as diffuse sensor, thru-beam sensor and can be parameterized as a reflex sensor with SONPROG
- Adjustable via a potentiometer, with SONPROG programming device
- Background suppression and can be set as foreground suppression with SONPROG
- Synchronization capability, multiplex operation
- Temperature compensation
- Solid-state outputs:
  - Switching output
  - Analog output
  - Frequency output, suitable for connection to LOGO!
- Connection via M12, 4-pole, Type F connector

Design

The devices of M18 compact range are all supplied with permanently installed sensors in the longitudinal axis.

Function

The devices are suitable for operation as diffuse sensor, reflex sensor and thru-beam sensor. The sensors can be supplied with switching, analog or frequency outputs.

Up to 10 sensors of the M18 compact range can be synchronized with each other via the enable inputs. The devices are also suitable for multiplex mode.

For a detailed description, see M30 K2 compact ranges.

Programming

SONPROG For optimizing to the operating conditions, all sensors of the M18 compact range can be programmed using a PC and the SONPROG 3RX4 000 programming device.

The main parameters that can be changed are:

- Lower and upper limit of the operating range
- Hysteresis
- Switching function NO or NC
- Switching frequency
- Lower and upper limit of the analog range
- Analog characteristic, rising or falling
- End of close range
- End of sensing range
- Mean value generation
- Multiplex function
- Temperature compensation
- Susceptibility.

Sonar proximity switches with non-standard values available on request. The minimum ordering quantity is 10 units.

Technical specifications

Type		3RG62 32	3RG62 33
Sensing range	cm	5 ... 30	15 ... 100
Standard target	cm	1 × 1	2 × 2
Hysteresis *H*	mm	10	
Repeat accuracy *R*	mm	± 1	± 2
Operational voltage (DC)	V	12 ... 30 (including ± 10% residual ripple; at 12 … 20 V DC sensitivity reduced by up to 20%)	
Rated operational current I_e	mA	150	
No-load supply current I_0	mA	max. 60	
Ultrasonic frequency	kHz	400	200
Switching frequency *f*	Hz	5	4
Response time	ms	100	120
Power-up delay t_v	ms	280	280
Switching status display		Yellow LED	
Enclosure material		Brass, nickel-plated; CRASTIN converter cover; epoxy resin converter surface	
Degree of protection		IP67	
Ambient temperature			
• During operation	°C	–25 ... +70	
• During storage	°C	–40 ... +85	

Selection and Ordering data

	Sensing range	Rated operational current	Switching output	Analog/ frequency output		Order No.
	cm	mA	pnp			
	5 ... 30	150	1 NO	–	▶	**3RG62 32–3AB00**
	15 ... 100	150	1 NO	–	▶	**3RG62 33–3AB00**
	5 ... 30	150	1 NC	–	▶	**3RG62 32–3AA00**
	15 ... 100	150	1 NC	–	▶	**3RG62 33–3AA00**
	5 ... 30	–	–	4 ... 20 mA	▶	**3RG62 32–3LS00**
	15 ... 100	–	–	4 ... 20 mA	▶	**3RG62 33–3LS00**
	5 ... 30	–	–	0 ... 20 mA		**3RG62 32–3TS00**
	15 ... 100	–	–	0 ... 20 mA		**3RG62 33–3TS00**
	5 ... 30	–	–	0 ... 10 V	▶	**3RG62 32–3JS00**
	15 ... 100	–	–	0 ... 10 V	▶	**3RG62 33–3JS00**
	5 ... 30	–	–	250 ... 1500 Hz		**3RG62 32–3RS00**
	15 ... 100	–	–	150 ... 1000 Hz		**3RG62 33–3RS00**
Communication-capable proximity switches of the M18 IO-Link compact range[1]						
	10 ... 100	of IO-Link	IO-Link	–		**6GR63 33-3KS00**
Communication-capable proximity switches of the M18 IQ-Sense range						
	5 ... 30	From IQ-Sense	IQ-Sense	–		**3SF62 32–3JA00**
	15 ... 100	From IQ-Sense	IQ-Sense	–		**3SF62 33–3JA00**

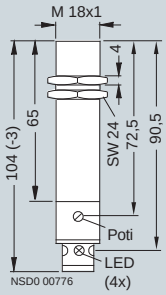
Accessories

	**SONPROG programming device,** 100 ... 240 V AC, 24 V DC	▶	**3RX4 000**

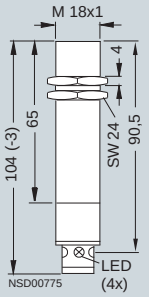
1) for further information, refer to "IO-Link" see page 2/6.
Preferred type, available from stock.

Dimensions

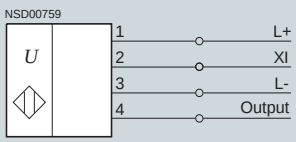
3RG 62 3.–3A.00



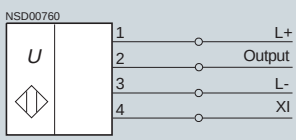
3RG 62 3.–3.S00



Schematics



NO or analog output

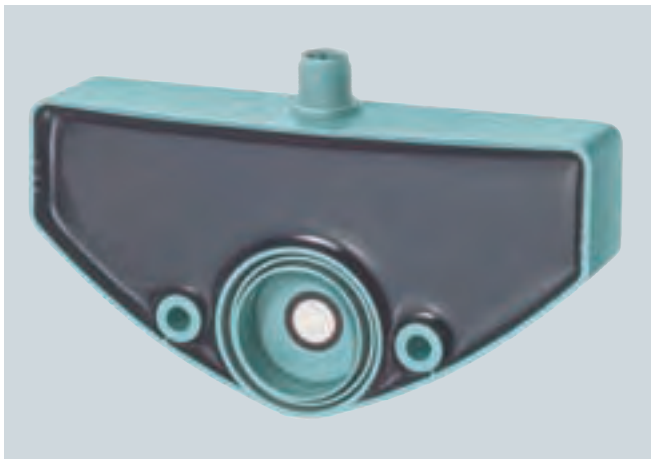


NC

View from rear onto device

K65 compact form

Overview



K65 compact form

The Sonar proximity switches of the K65 compact form are ready-to-use complete self-contained units. They operate with a DC supply. Their enclosure design and function makes them ideal for level applications in small containers.

The devices feature two switching outputs (S_{min} and S_{max}) to which different distances can be assigned. This allows, for example, the minimum and maximum fill level in a tank to be evaluated. The values are set using the SONPROG programming device or by means of automatic alignment (teach-in function).

Design

All components are located in a box-shaped enclosure with rounded edges. The ultrasonic converter is mounted in the enclosure – slightly recessed – in the enclosure. The integrated circular sealing ring allows the Sonar proximity switch to be used as a plug with integrated level measuring.

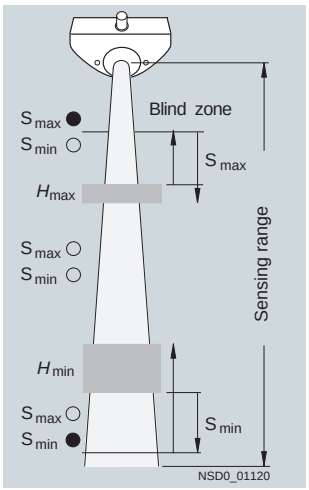
The tank opening must have a minimum diameter of 26 mm. It can be fixed to the tank by means of two M5 screws.

The electric connection is made using a 5-pole connector with M12 thread.

Function

Sensors with switching or analog output

Within the sensing range, the fill level of a container is detected. If the fill level reaches one of the two switching thresholds (S_{min}, S_{max}), the corresponding output is set. On emptying or filling, the switching outputs remain set in accordance with the hysteresis (H_{min}, H_{max}). This is signaled by the corresponding LED. If the level is located between the two operating ranges, both outputs are reset (see "Definition of the ranges").



Definition of the ranges

Blind zone

Objects at close range cause fault signals, so the user must install the sensor such that the fill level cannot enter close range.

Programming

SONPROG For optimizing to the operating conditions, all sensors of K65 compact form can be programmed using a PC and the 3RX4000 SONPROG programming device.

The main parameters that can be changed are:

- Lower and upper limit of the operating range
- Hysteresis
- Switching function NO or NC
- Switching frequency
- Lower and upper limit of the analog range
- Analog characteristic, rising or falling
- End of close range
- End of sensing range
- Mean value generation
- Multiplex function
- Temperature compensation
- Susceptibility.

Sonar proximity switches with non-standard values available on request. The minimum ordering quantity is 10 units.

Technical specifications

Type		3RG62 52	3RG62 53	3RG62 55
Sensing range	cm	6 ... 50	20 ... 150	25 ... 250
Standard target	cm	1 × 1	2 × 2	5 × 5
Switching threshold				
• S_{max}	cm	8	25	35
• S_{min}	cm	45	140	230
Hysteresis H				
• H_{max} (adjustable)	cm	2	5	10
• H_{min} (adjustable)	cm	10	10	20
Operational voltage (DC)	V	12 ... 30 (including ± 10% residual ripple, at 12 … 20 V sensitivity reduced by approx. 20%)		
No-load supply current I_0	mA	max. 60		
Switching output				
• Rated operational current I_e	mA	150 or 300 (see Selection and Ordering data)		
• Voltage drop	V	2		
• Switching element function S_{max}		NO contact		
• Switching element function S_{min}		NO/NC programmable		
Ultrasonic frequency	kHz	400	200	120
Response time	ms	20	25	50
Power-up delay t_V	ms	250		
LEDs				
• Switching status		2 yellow LEDs		
• Operating voltage		Green LED		
Enclosure material		CRASTIN; epoxy resin converter surface		
Degree of protection		IP65		
Ambient temperature				
• During operation	°C	–25 ... 70		
• During storage	°C	–40 ... 85		

Selection and Ordering data

	Sensing range	Rated operational current	Switching output	Analog / frequency output	Connection		Order No.
	cm	mA	pnp				
	6 ... 50	150	2 NO	–	M12 connector		**3RG62 52–3AH00**
	20 ... 150	150	2 NO	–	M12 connector		**3RG62 53–3AH00**
	25 ... 250	150	2 NO	–	M12 connector		**3RG62 55–3AH00**
	6 ... 50	300	1 NO	4 ... 20 mA	M12 connector		**3RG62 52–3BF00**
	20 ... 150	300	1 NO	4 ... 20 mA	M12 connector		**3RG62 53–3BF00**
	25 ... 250	300	1 NO	4 ... 20 mA	M12 connector		**3RG62 55–3BF00**
	6 ... 50	300	1 NO	0 ... 20 mA	M12 connector		**3RG62 52–3CF00**
	20 ... 150	300	1 NO	0 ... 20 mA	M12 connector		**3RG62 53–3CF00**
	25 ... 250	300	1 NO	0 ... 20 mA	M12 connector		**3RG62 55–3CF00**
	6 ... 50	300	1 NO	0 ... 10 V	M12 connector		**3RG62 52–3GF00**
	20 ... 150	300	1 NO	0 ... 10 V	M12 connector		**3RG62 53–3GF00**
	25 ... 250	300	1 NO	0 ... 10 V	M12 connector		**3RG62 55–3GF00**
	6 ... 30	300	1 NO	30 ... 150 Hz	M12 connector		**3RG62 52–3RS00**
	20 ... 150	300	1 NO	20 ... 150 Hz	M12 connector		**3RG62 53–3RS00**
	25 ... 250	300	1 NO	12.5 ... 125 Hz	M12 connector		**3RG62 55–3RS00**

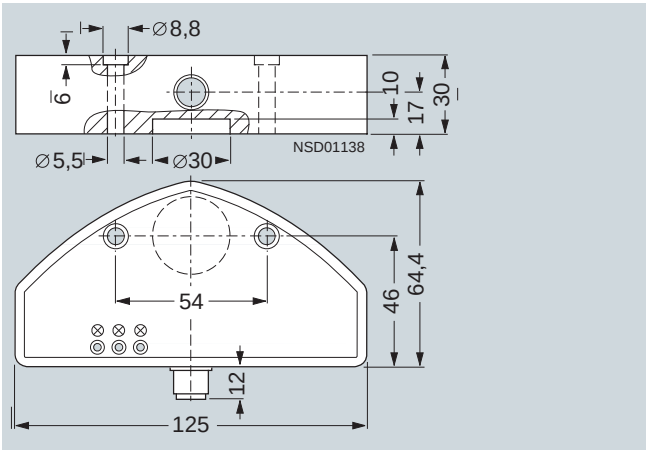
Accessories

	**SONPROG programming device,** 100 ... 240 V AC, 24 V DC	►	**3RX4 000**
	Teach-in adapter	►	**3RX4 010**

► Preferred type, available from stock.

K65 compact form

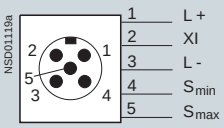
Dimensions



Schematics

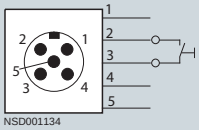
Sensors with switching output

Wiring



View from rear onto device

Automatic alignment



View from rear onto device

XI must be connected to L- for the automatic alignment.

Overview

SIMATIC sensors PXS400

- M30 K3 compact range

Selection table

SIMATIC PXS400

	M30 K3 compact range										
	Fixed sensor head					Swivel-mounted sensor head				Separate sensor head	
Sensing range (cm)	6 ... 30	20 ... 130	40 ... 300	60 ... 600	80 ... 1000	6 ... 30	20 ... 130	40 ... 300	60 ... 600	6 ... 30	20 ... 130
Operating mode											
• Diffuse sensor	■	■	■	■	■	■	■	■	■	■	■
• Reflex sensor	■	■	■	■	■	■	■	■	■	■	■
• Thru-beam sensor	■	■	■	■	■	■	■	■	■	■	■
Output											
• 1 switching output	■	■	■	■	■	■	■	■	■	■	■
• Analog output 0 ... 20 mA	■	■	■	■	■	■	■	■	■	■	■
• Analog output 4 ... 20 mA	■	■	■	■	■	■	■	■	■	■	■
• Analog output 0 ... 10 V	■	■	■	■	■	■	■	■	■	■	■
Temperature compensation	■	■	■	■	■	■	■	■	■	■	■
Adjustment											
• 2 potentiometers	■	■	■	■	■	■	■	■	■	■	■
• SONPROG programming device	■	■	■	■	■	■	■	■	■	■	■
Connection											
• M12 connector	■	■	■	■	■	■	■	■	■	■	■
Degree of protection											
• IP65	■	■	■	■	■	■	■	■	■	■	■
See page	2/50										

A configurator for fast product selection and ordering in the Internet can be found at
www.siemens.com/simatic-sensors/px

M30 K3 compact range

Overview

M30 design with fixed sensor

The Sonar proximity switches of M30 K3 compact range are ready-to-use all-in-one units with a cylindrical M30 enclosure. They differ with regard to their range, their functional scope and their adjustment or programming capability.

- Operate as diffuse sensor, reflex sensor or thru-beam sensor
- Adjustable via 2 potentiometers, with SONPROG programming device
- Foreground and background suppression
- Synchronization capability, multiplex operation
- Temperature compensation
- Solid-state outputs:
  - Switching outputs
  - Analog output
- Connection via M12, 5-pole, Type G connector

Design

Standard version

In the standard version, the devices have a permanently installed sensor.

Version with separate sensor

M30 design with separate sensor

Due to its small dimensions, the sensor is especially suitable in confined spaces.

The ultrasonic sensor is installed in a cylindrical enclosure separated from the other electronics. For 3RG6. 12 devices, the sensor is in an M18 sleeve, for 3RG6. 13 devices, the sensor is installed in an M30 sleeve with a length of 25 mm in each case.

Two nuts are supplied for fixing. The connecting lead, which is 1.6 m long, is cast onto the sensor. The connection to the evaluation electronics located in the M30 enclosure of the compact range is established via the preassembled coaxial cable plug. The plug-in socket is installed on the end face of the enclosure.

Version with swivel sensor

These devices correspond functionally to the other devices of M30 K3 compact range. They are particularly suitable for applications where the standard types cannot be used due to space limitations.

M30 design with swivel sensor

The ultrasonic sensor is hinged with a swivel arm to the tubular enclosure of the signal evaluator. This allows rotation about the cylinder axes as well as perpendicular movement at about 100° to the cylinder axis.

Passive reflector

With the Sonar proximity switches of M30 K3 compact range, a 3RX1 910 passive reflector can be clamped onto the sensor head (see "Accessories").

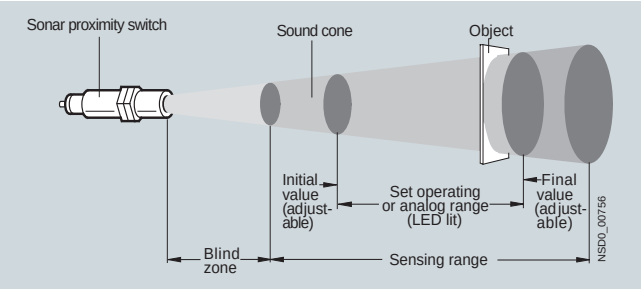
Where space is limited, objects can be detected which are perpendicular to the Sonar proximity switch (which reduces the installation depth). The blind zone is then reduced by about 6 cm.

Function

Range definition and adjustability

Objects within the preset operating range or analog range will be reliably detected causing the switching output or analog output to change state.

The blind zone must be kept clear of any objects since this might cause false outputs. Objects at a distance from the sensor that is outside the set operating range limits will not be signaled at the switching output.



Sound cone

Modes

Standard operating mode, diffuse sensor

An object entering the sound cone from any direction causes the output signal to change when it enters the preset sensing range.

Reflex sensor

If a reflector is permanently fixed within a set operating range, the Sonar proximity switch will be operated by all objects that lie between the Sonar proximity switch and the reflector even those that absorb sound.

Thru-beam sensors.

It is only sensed whether an object is located between the emitter and receiver. The range of the system is doubled as compared to the range of an individual sensor.

Programming

SONPROG For optimizing to the operating conditions, all sensors of the M30 K3 compact range can be programmed using a PC and the SONPROG 3RX4 000 programming device.

The main parameters that can be changed are:

- Lower and upper limit of the operating range
- Hysteresis
- Switching function NO or NC
- Switching rate
- Lower and upper limit of the analog range
- Analog characteristic, rising or falling mean value generation
- End of close range
- End of sensing range
- Multiplex function
- Temperature compensation
- Sensitivity

Sonar proximity switches with non-standard values available on request. The minimum ordering quantity is 10 units.

Technical specifications

Type		3RG61 .2	3RG61 .3	3RG61 .5	3RG61 .4	3RG61 76
Sensing range	cm	6 ... 30	20 ... 130	40 ... 300	60 ... 600	80 ... 1000
Standard target	cm	1 × 1	2 × 2	5 × 5	10 × 10	10 × 10
Hysteresis *H*	mm	10	10	20	60	80
Repeat accuracy *R*	mm	± 0.45	± 2	± 5	± 9	± 15
Operational voltage (DC)	V	12 ... 30 (including ± 10% residual ripple, at 12 ... 20 V sensitivity reduced by approx. 20%)				
Rated operational current I_e						
• NO contact	mA	300				300
• NC contact	mA	150 or 300 (see table below)				150
No-load current I_0	mA	max. 50				max. 75
Ultrasonic frequency	kHz	400	200	120	80	60
Switching frequency *f*	Hz	8	4	2	1	0.5
Response delay	ms	80	110	200	400	800
Power-up delay t_v	ms	280	280	280	280	280
Switching status display		Yellow LED				
Enclosure material		Brass, nickel-plated; CRASTIN converter cover; epoxy resin converter surface				CRASTIN; epoxy resin converter surface
Degree of protection		IP65; IP68 with separate sensor		IP65		IP65
Ambient temperature						
• During operation	°C	–25 ... +70				
• During storage	°C	–40 ... +85				

M30 K3 compact range

2

Selection and Ordering data

	Sensing range	Rated operational current	Switching output	Analog output		Order No.
	cm	mA	pnp			
Fixed sensor						
3RG61 12–3..00 	6 ... 30	300	1 NO	4 ... 20 mA	►	**3RG61 12–3BF00**
	20 ... 130	300	1 NO	4 ... 20 mA	►	**3RG61 13–3BF00**
	40 ... 300	300	1 NO	4 ... 20 mA	►	**3RG61 15–3BF00**
	60 ... 600	300	1 NO	4 ... 20 mA	►	**3RG61 14–3BF00**
	80 ... 1000	300	2 NO	4 ... 20 mA		**3RG61 76–6BH00**
3RG61 13–3..00 	6 ... 30	150	1 NC	4 ... 20 mA		**3RG61 12–3BE00**
	20 ... 130	150	1 NC	4 ... 20 mA		**3RG61 13–3BE00**
	40 ... 300	150	1 NC	4 ... 20 mA		**3RG61 15–3BE00**
	60 ... 600	150	1 NC	4 ... 20 mA		**3RG61 14–3BE00**
	80 ... 1000	150	2 NC	4 ... 20 mA		**3RG61 76–6BG00**
3RG61 15–3..00 	6 ... 30	300	1 NO	0 ... 20 mA		**3RG61 12–3CF00**
	20 ... 130	300	1 NO	0 ... 20 mA		**3RG61 13–3CF00**
	40 ... 300	300	1 NO	0 ... 20 mA		**3RG61 15–3CF00**
	60 ... 600	300	1 NO	0 ... 20 mA		**3RG61 14–3CF00**
	80 ... 1000	300	2 NO	0 ... 20 mA		**3RG61 76–6CH00**
3RG61 14–3..00 	6 ... 30	150	1 NC	0 ... 20 mA		**3RG61 12–3CE00**
	20 ... 130	150	1 NC	0 ... 20 mA		**3RG61 13–3CE00**
	40 ... 300	150	1 NC	0 ... 20 mA		**3RG61 15–3CE00**
	60 ... 600	150	1 NC	0 ... 20 mA		**3RG61 14–3CE00**
	80 ... 1000	150	2 NC	0 ... 20 mA		**3RG61 76–6CG00**
3RG61 76–6..00 	6 ... 30	300	1 NO	0 ... 10 V	►	**3RG61 12–3GF00**
	20 ... 130	300	1 NO	0 ... 10 V	►	**3RG61 13–3GF00**
	40 ... 300	300	1 NO	0 ... 10 V	►	**3RG61 15–3GF00**
	60 ... 600	300	1 NO	0 ... 10 V	►	**3RG61 14–3GF00**
	80 ... 1000	300	2 NO	0 ... 10 V		**3RG61 76–6GH00**
	6 ... 30	150	1 NC	0 ... 10 V		**3RG61 12–3GE00**
	20 ... 130	150	1 NC	0 ... 10 V		**3RG61 13–3GE00**
	40 ... 300	150	1 NC	0 ... 10 V		**3RG61 15–3GE00**
	60 ... 600	150	1 NC	0 ... 10 V		**3RG61 14–3GE00**
	80 ... 1000	150	2 NC	0 ... 10 V		**3RG61 76–6GG00**

► Preferred type, available from stock.

	Sensing range	Rated operational current	Switching output	Analog output		Order No.
	cm	mA	pnp			
Swivel sensor						
3RG61 25–3..00 	6 ... 30	300	1 NO	4 ... 20 mA		**3RG61 22–3BF00**
	20 ... 130	300	1 NO	4 ... 20 mA	▶	**3RG61 23–3BF00**
	40 ... 300	300	1 NO	4 ... 20 mA		**3RG61 25–3BF00**
	60 ... 600	300	1 NO	4 ... 20 mA		**3RG61 24–3BF00**
	6 ... 30	150	1 NC	4 ... 20 mA		**3RG61 22–3BE00**
	20 ... 130	150	1 NC	4 ... 20 mA		**3RG61 23–3BE00**
	40 ... 300	150	1 NC	4 ... 20 mA		**3RG61 25–3BE00**
	60 ... 600	150	1 NC	4 ... 20 mA		**3RG61 24–3BE00**
	6 ... 30	300	1 NO	0 ... 20 mA		**3RG61 22–3CF00**
	20 ... 130	300	1 NO	0 ... 20 mA		**3RG61 23–3CF00**
	40 ... 300	300	1 NO	0 ... 20 mA		**3RG61 25–3CF00**
	60 ... 600	300	1 NO	0 ... 20 mA		**3RG61 24–3CF00**
	6 ... 30	150	1 NC	0 ... 20 mA		**3RG61 22–3CE00**
	20 ... 130	150	1 NC	0 ... 20 mA		**3RG61 23–3CE00**
	40 ... 300	150	1 NC	0 ... 20 mA		**3RG61 25–3CE00**
	60 ... 600	150	1 NC	0 ... 20 mA		**3RG61 24–3CE00**
	6 ... 30	300	1 NO	0 ... 10 V		**3RG61 22–3GF00**
	20 ... 130	300	1 NO	0 ... 10 V		**3RG61 23–3GF00**
	40 ... 300	300	1 NO	0 ... 10 V		**3RG61 25–3GF00**
	60 ... 600	300	1 NO	0 ... 10 V		**3RG61 24–3GF00**
	6 ... 30	150	1 NC	0 ... 10 V		**3RG61 22–3GE00**
	20 ... 130	150	1 NC	0 ... 10 V		**3RG61 23–3GE00**
	40 ... 300	150	1 NC	0 ... 10 V		**3RG61 25–3GE00**
	60 ... 600	150	1 NC	0 ... 10 V		**3RG61 24–3GE00**
Separate sensor						
3RG61 12–3..01 	6 ... 30	300	1 NO	4 ... 20 mA		**3RG61 12–3BF01**
	20 ... 130	300	1 NO	4 ... 20 mA		**3RG61 13–3BF01**
	6 ... 30	150	1 NC	4 ... 20 mA		**3RG61 12–3BE01**
	20 ... 130	150	1 NC	4 ... 20 mA		**3RG61 13–3BE01**
	6 ... 30	300	1 NO	0 ... 20 mA		**3RG61 12–3CF01**
	20 ... 130	300	1 NO	0 ... 20 mA		**3RG61 13–3CF01**
	6 ... 30	150	1 NC	0 ... 20 mA		**3RG61 12–3CE01**
	20 ... 130	150	1 NC	0 ... 20 mA		**3RG61 13–3CE01**
	6 ... 30	300	1 NO	0 ... 10 V		**3RG61 12–3GF01**
	20 ... 130	300	1 NO	0 ... 10 V		**3RG61 13–3GF01**
	6 ... 30	150	1 NC	0 ... 10 V		**3RG61 12–3GE01**
	20 ... 130	150	1 NC	0 ... 10 V		**3RG61 13–3GE01**

Accessories

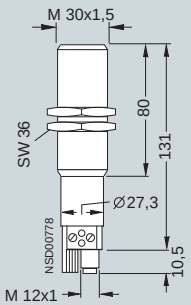
	**SONPROG programming device,** 100 ... 240 V AC, 24 V DC	▶	**3RX4 000**

M30 K3 compact range

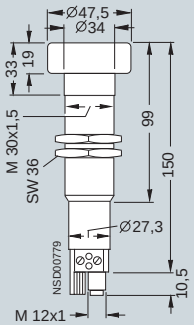
Dimensions

With fixed sensor

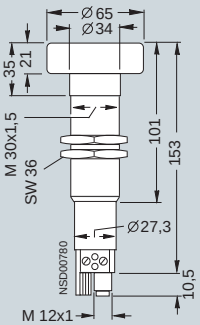
3RG 6. 12–3..00
3RG 6. 13–3..00



3RG 6. 15–3..00

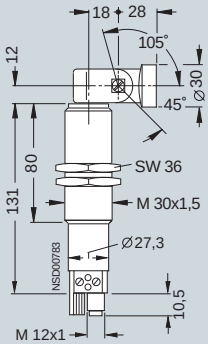


3RG 6. 14–3..00

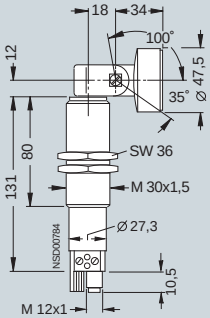


With swivel sensor

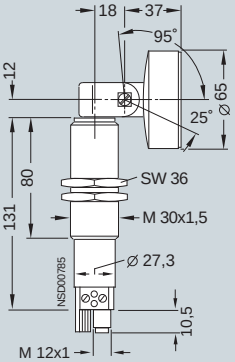
3RG 6. 22–3..00
3RG 6. 23–3..00



3RG 6. 25–3..00

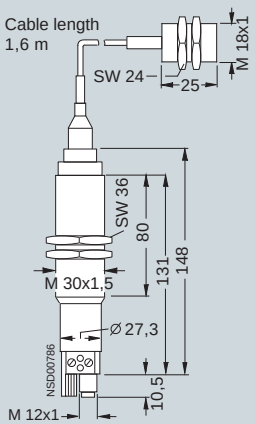


3RG 6. 24–3..00

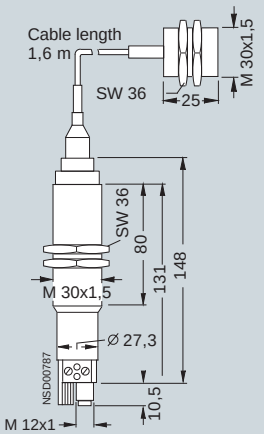


With separate sensor

3RG 6. 12–3..01

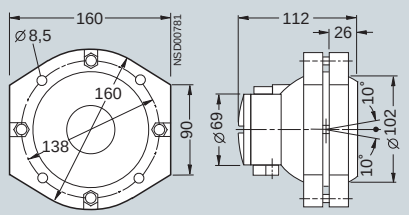


3RG 6. 13–3..01

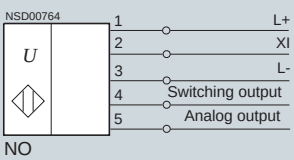


Spherical

3RG 61 76–6..00



Schematics



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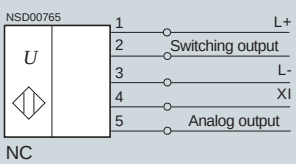
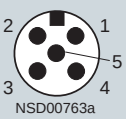


NC



NSD00763a

Overview

SIMATIC sensors PXS800

- M18 ATEX compact range,
- M30 K3 ATEX compact range

Selection table

SIMATIC PXS800

	M18 ATEX compact range		M30 K3 ATEX compact range			
Sensing range (cm)	**5 ... 30**	**15 ... 100**	**6 ... 30**	**20 ... 130**	**40 ... 300**	**60 ... 600**
Operating mode						
• Diffuse sensor	■	■	■	■	■	■
• Reflex sensor	■	■	■	■	■	■
• Thru-beam sensor	■	■	■	■	■	■
Output						
• 1 switching output	■	■	■	■	■	■
• Analog output 0 ... 20 mA	■	■	■	■	■	■
• Analog output 4 ... 20 mA	■	■	■	■	■	■
• Analog output 0 ... 10 V	■	■	■	■	■	■
• Frequency output	■	■				
• Temperature compensation	■	■	■	■	■	■
Adjustment						
• 1 potentiometer	■	■				
• 2 potentiometers			■	■	■	■
• SONPROG programming device	■	■	■	■	■	■
Connection						
• M12 connector	■	■	■	■	■	■
Degree of protection						
• IP65			■	■	■	■
• IP67	■	■				
Approval for hazardous area						
• Zone 2/22	■	■	■	■	■	■
See page	**2/56**		**2/58**			

A configurator for fast product selection and ordering in the Internet can be found at
www.siemens.com/simatic-sensors/px

M18 ATEX compact range

Overview

M18 ATEX design

The sonar proximity switches of M18 ATEX compact range are ready-to-use, all-in-one units with a cylindrical enclosure.

- Sensors for Ex Zone 2/22
  These sonar proximity switches are approved according to EU Directive 94/9/EG (ATEX) Appendix VIII.
  The approval is for:
  - gas EX II 3G EEx nA II T6 X and
  - dust EX II 3D IP65 T 80 °C X
- Operates as diffuse sensor, thru-beam sensor and can be parameterized as a reflex sensor with SONPROG
- Adjustable via a potentiometer using SONPROG programming device
- Background suppression and can be set as foreground suppression with SONPROG
- Synchronization capability, multiplex operation
- Temperature compensation
- Solid-state outputs:
  - switching output
  - analog output
  - frequency output, suitable for connection to LOGO!
- Connection via M12, 4-pole, type F connector

Design

The devices of M18 compact range are all supplied with permanently installed sensors in the longitudinal axis.

Function

The devices are suitable for operation as diffuse sensor, reflex sensor and thru-beam sensor. The sensors can be supplied with switching, analog or frequency outputs.

Up to 10 sensors of the M18 compact range can be synchronized with each other via the enable inputs. The devices are also suitable for multiplex mode.

For a detailed description, see M30 K2 compact ranges.

Programming

SONPROG For optimizing to the operating conditions, all sensors of the M18 compact range can be programmed using a PC and the SONPROG 3RX4 000 programming device.

The main parameters that can be changed are:

- Lower and upper limit of the operating range
- Hysteresis
- Switching function NO or NC
- Switching frequency
- Lower and upper limit of the analog range
- Analog characteristic, rising or falling
- End of close range
- End of sensing range
- Mean value generation
- Multiplex function
- Temperature compensation
- Susceptibility.

Sonar proximity switches with non-standard values available on request. The minimum ordering quantity is 10 units.

Technical specifications

Type		3RG62 32-0XB.	3RG62 33-0XB.
Sensing range	cm	5 ... 30	15 ... 100
Standard target	cm	1 × 1	2 × 2
Hysteresis *H*	mm	10	
Repeat accuracy *R*	mm	± 1	± 2
Operational voltage (DC)	V	12 ... 30 V (including ± 10% residual ripple; at 12 … 20 V DC sensitivity reduced by up to 20%)	
Rated operational current I_e	mA	150	
No-load supply current I_0	mA	max. 60	
Ultrasonic frequency	kHz	400	200
Switching frequency *f*	Hz	5	4
Response time	ms	100	120
Power-up delay t_v	ms	280	280
Switching status display		Yellow LED	
Enclosure material		…-0XB4: Brass, nickel-plated; CRASTIN converter cover; epoxy resin converter surface …-0XB7: Stainless steel, CRASTIN converter cover; epoxy resin converter surface with protective foil	
Degree of protection		IP67	
Ambient temperature			
• During operation	°C	–25 ... +70	
• During storage	°C	–40 ... +85	

Selection and Ordering data

	Sensing range	Rated operational current	Switching output	Analog/ frequency output	Order No.
	cm	mA	pnp		
Brass, nickel-plated, epoxy resin converter surface					
	5 ... 30	150	1 NO	–	**3RG62 32–3AB00-0XB4**
	15 ... 100		1 NO	–	**3RG62 33–3AB00-0XB4**
	5 ... 30		1 NC	–	**3RG62 32–3AA00-0XB4**
	15 ... 100		1 NC	–	**3RG62 33–3AA00-0XB4**
	5 ... 30	–	–	4 ... 20 mA	**3RG62 32–3LS00-0XB4**
	15 ... 100		–	4 ... 20 mA	**3RG62 33–3LS00-0XB4**
	5 ... 30		–	0 ... 20 mA	**3RG62 32–3TS00-0XB4**
	15 ... 100		–	0 ... 20 mA	**3RG62 33–3TS00-0XB4**
	5 ... 30	–	–	0 ... 10 V	**3RG62 32–3JS00-0XB4**
	15 ... 100		–	0 ... 10 V	**3RG62 33–3JS00-0XB4**
	5 ... 30		–	250 ... 1500 Hz	**3RG62 32–3RS00-0XB4**
	15 ... 100		–	150 ... 1000 Hz	**3RG62 33–3RS00-0XB4**
Stainless steel, epoxy resin converter surface with protective foil					
	5 ... 30	150	1 NO	–	**3RG62 32–3AB00-0XB7**
	15 ... 100		1 NO	–	**3RG62 33–3AB00-0XB7**
	5 ... 30		1 NC	–	**3RG62 32–3AA00-0XB7**
	15 ... 100		1 NC	–	**3RG62 33–3AA00-0XB7**
	5 ... 30	–	–	4 ... 20 mA	**3RG62 32–3LS00-0XB7**
	15 ... 100		–	4 ... 20 mA	**3RG62 33–3LS00-0XB7**
	5 ... 30		–	0 ... 20 mA	**3RG62 32–3TS00-0XB7**
	15 ... 100		–	0 ... 20 mA	**3RG62 33–3TS00-0XB7**
	5 ... 30	–	–	0 ... 10 V	**3RG62 32–3JS00-0XB7**
	15 ... 100		–	0 ... 10 V	**3RG62 33–3JS00-0XB7**
	5 ... 30		–	250 ... 1500 Hz	**3RG62 32–3RS00-0XB7**
	15 ... 100		–	150 ... 1000 Hz	**3RG62 33–3RS00-0XB7**

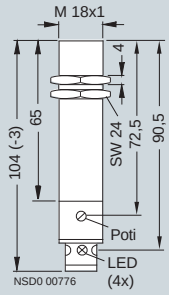
Accessories

	**SONPROG programming device,** 100 ... 240 V AC, 24 V DC	►	**3RX4 000**

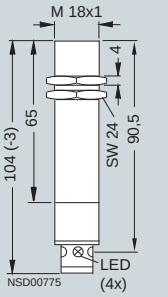
► Preferred type, available from stock.

Dimensions

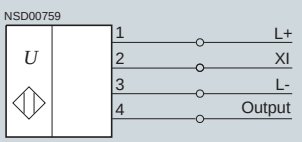
3RG 62 3.–3A.00



3RG 62 3.–3.S00

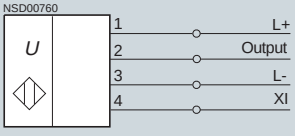


Schematics



NO or analog output

View from rear onto device



NC

M30 K3 compact range ATEX

Overview

M30 K3 ATEX design with fixed sensor

The M30 K3 ATEX compact range sonar proximity switches are ready-to-use, all-in-one units with a cylindrical M30 enclosure. They differ with regard to their range, their functional scope and their adjustment or programming capabilities.

- Sensors for Ex Zone 2/22
  These sonar proximity switches are approved according to EU Directive 94/9/EG (ATEX) Appendix VIII.
  The approval is for:
  - gas EX II 3G EEx nA II T6 X and
  - dust EX II 3D IP65 T 80 °C X
- Operation as diffuse sensor, reflex sensor or thru-beam sensor
- Adjustable via 2 potentiometers using SONPROG programming device
- Foreground and background suppression
- Synchronization capability, multiplex operation
- Temperature compensation
- Solid-state outputs:
  - switching outputs
  - analog output
- Connection via M12, 5-pole, type G connector

Design

Passive reflector

With the sonar proximity switches of M30 K3 ATEX compact range, a 3RX1 910 passive reflector can be clamped onto the sensor head (see "Accessories").

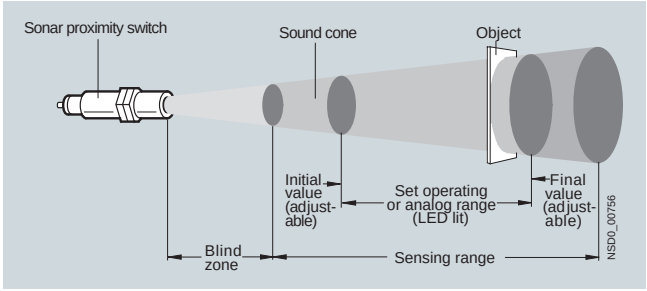
Where space is limited, objects can be detected which are perpendicular to the sonar proximity switch (which reduces the installation depth). The blind zone is then reduced by about 6 cm.

Function

Range definition and adjustability

Objects within the preset operating range or analog range will be reliably detected causing the switching output or analog output to change state.

The blind zone must be kept clear of any objects since this might cause false signals. Objects at a distance from the sensor that is outside the set operating range limits will not be signaled at the switching output.



Sound cone

Operating modes

Standard operating mode, diffuse sensor

An object entering the sound cone from any direction causes the output signal to change when it enters the preset sensing range.

Reflex sensor

If a reflector is permanently fixed within a set operating range, the sonar proximity switch will be operated by all objects that lie between the sonar proximity switch and the reflector, even those that absorb sound.

Thru-beam sensor

It is only sensed whether an object is located between the emitter and receiver. The range of the system is doubled compared to the range of a single sensor.

Programming

SONPROG For optimum adaptation to the operating conditions, all sensors of the M30 K3 compact range can be programmed using a PC and the SONPROG 3RX4 000 programming device.

The main parameters that can be changed are:

- Lower and upper limit of the operating range
- Hysteresis
- Switching function NO or NC
- Switching frequency
- Lower and upper limit of the analog range
- Analog characteristic, rising or falling mean value generation
- End of blind zone
- End of sensing range
- Multiplex function
- Temperature compensation
- Susceptibility.

Sonar proximity switches with non-standard values available on request. The minimum ordering quantity is 10 units.

Technical specifications

Type		3RG61 .2-0XB.	3RG61 .3-0XB.	3RG61 .5-0XB.	3RG61 .4-0XB.
Sensing range	cm	6 ... 30	20 ... 130	40 ... 300	60 ... 600
Standard target	cm	1 × 1	2 × 2	5 × 5	10 × 10
Hysteresis *H*	mm	10	10	20	60
Repeat accuracy *R*	mm	± 0.45	± 2	± 5	± 9
Operational voltage (DC)	V	12 ... 30 (including ± 10% residual ripple, at 12 … 20 V sensitivity reduced by approx. 20%)			
Rated operational current I_e					
• NO	mA	300			
• NC	mA	150 or 300 (see table below)			
No-load current I_0	mA	max. 50			
Ultrasonic frequency	kHz	400	200	120	80
Switching frequency *f*	Hz	8	4	2	1
Response time	ms	80	110	200	400
Time delay before availability t_v	ms	280	280	280	280
Switching status display		Yellow LED			
Enclosure material		…-XB4 Brass, nickel-plated; CRASTIN converter cover; epoxy resin converter surface …-0XB7 Stainless steel, CRASTIN converter cover; epoxy resin converter surface with protective foil			
Degree of protection		IP65			
Ambient temperature					
• During operation	°C	–25 ... +70			
• During storage	°C	–40 ... +85			

Selection and Ordering data

	Sensing range	Rated operational current	Switching output	Analog output	Order No.
	cm	mA	pnp		
Brass, nickel-plated, epoxy resin converter surface					
3RG61 12–3..00 	6 ... 30	300	1 NO	4 ... 20 mA	**3RG61 12–3BF00-0XB4**
	20 ... 130	300	1 NO	4 ... 20 mA	**3RG61 13–3BF00-0XB4**
	40 ... 300	300	1 NO	4 ... 20 mA	**3RG61 15–3BF00-0XB4**
	60 ... 600	300	1 NO	4 ... 20 mA	**3RG61 14–3BF00-0XB4**
3RG61 13–3..00 	6 ... 30	150	1 NC	4 ... 20 mA	**3RG61 12–3BE00-0XB4**
	20 ... 130	150	1 NC	4 ... 20 mA	**3RG61 13–3BE00-0XB4**
	40 ... 300	150	1 NC	4 ... 20 mA	**3RG61 15–3BE00-0XB4**
	60 ... 600	150	1 NC	4 ... 20 mA	**3RG61 14–3BE00-0XB4**
3RG61 15–3..00 	6 ... 30	300	1 NO	0 ... 20 mA	**3RG61 12–3CF00-0XB4**
	20 ... 130	300	1 NO	0 ... 20 mA	**3RG61 13–3CF00-0XB4**
	40 ... 300	300	1 NO	0 ... 20 mA	**3RG61 15–3CF00-0XB4**
	60 ... 600	300	1 NO	0 ... 20 mA	**3RG61 14–3CF00-0XB4**
3RG61 14–3..00 	6 ... 30	150	1 NC	0 ... 20 mA	**3RG61 12–3CE00-0XB4**
	20 ... 130	150	1 NC	0 ... 20 mA	**3RG61 13–3CE00-0XB4**
	40 ... 300	150	1 NC	0 ... 20 mA	**3RG61 15–3CE00-0XB4**
	60 ... 600	150	1 NC	0 ... 20 mA	**3RG61 14–3CE00-0XB4**
	6 ... 30	300	1 NO	0 ... 10 V	**3RG61 12–3GF00-0XB4**
	20 ... 130	300	1 NO	0 ... 10 V	**3RG61 13–3GF00-0XB4**
	40 ... 300	300	1 NO	0 ... 10 V	**3RG61 15–3GF00-0XB4**
	60 ... 600	300	1 NO	0 ... 10 V	**3RG61 14–3GF00-0XB4**
	6 ... 30	150	1 NC	0 ... 10 V	**3RG61 12–3GE00-0XB4**
	20 ... 130	150	1 NC	0 ... 10 V	**3RG61 13–3GE00-0XB4**
	40 ... 300	150	1 NC	0 ... 10 V	**3RG61 15–3GE00-0XB4**
	60 ... 600	150	1 NC	0 ... 10 V	**3RG61 14–3GE00-0XB4**

SIMATIC PXS800

M30 K3 compact range ATEX

	Sensing range	Rated operational current	Switching output	Analog output		Order No.
	cm	mA	pnp			
Stainless steel, epoxy resin converter surface with protective foil						
3RG61 12–3..00 	6 ... 30	300	1 NO	4 ... 20 mA		**3RG61 12–3BF00-0XB7**
	20 ... 130	300	1 NO	4 ... 20 mA		**3RG61 13–3BF00-0XB7**
	40 ... 300	300	1 NO	4 ... 20 mA	►	**3RG61 15–3BF00-0XB7**
	60 ... 600	300	1 NO	4 ... 20 mA		**3RG61 14–3BF00-0XB7**
3RG61 13–3..00 	6 ... 30	150	1 NC	4 ... 20 mA		**3RG61 12–3BE00-0XB7**
	20 ... 130	150	1 NC	4 ... 20 mA		**3RG61 13–3BE00-0XB7**
	40 ... 300	150	1 NC	4 ... 20 mA		**3RG61 15–3BE00-0XB7**
	60 ... 600	150	1 NC	4 ... 20 mA		**3RG61 14–3BE00-0XB7**
3RG61 15–3..00 	6 ... 30	300	1 NO	0 ... 20 mA		**3RG61 12–3CF00-0XB7**
	20 ... 130	300	1 NO	0 ... 20 mA		**3RG61 13–3CF00-0XB7**
	40 ... 300	300	1 NO	0 ... 20 mA		**3RG61 15–3CF00-0XB7**
	60 ... 600	300	1 NO	0 ... 20 mA		**3RG61 14–3CF00-0XB7**
3RG61 14–3..00 	6 ... 30	150	1 NC	0 ... 20 mA		**3RG61 12–3CE00-0XB7**
	20 ... 130	150	1 NC	0 ... 20 mA		**3RG61 13–3CE00-0XB7**
	40 ... 300	150	1 NC	0 ... 20 mA		**3RG61 15–3CE00-0XB7**
	60 ... 600	150	1 NC	0 ... 20 mA		**3RG61 14–3CE00-0XB7**
	6 ... 30	300	1 NO	0 ... 10 V		**3RG61 12–3GF00-0XB7**
	20 ... 130	300	1 NO	0 ... 10 V		**3RG61 13–3GF00-0XB7**
	40 ... 300	300	1 NO	0 ... 10 V		**3RG61 15–3GF00-0XB7**
	60 ... 600	300	1 NO	0 ... 10 V		**3RG61 14–3GF00-0XB7**
	6 ... 30	150	1 NC	0 ... 10 V		**3RG61 12–3GE00-0XB7**
	20 ... 130	150	1 NC	0 ... 10 V		**3RG61 13–3GE00-0XB7**
	40 ... 300	150	1 NC	0 ... 10 V		**3RG61 15–3GE00-0XB7**
	60 ... 600	150	1 NC	0 ... 10 V		**3RG61 14–3GE00-0XB7**

Accessories

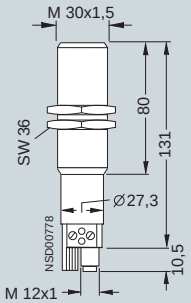
	**SONPROG programming device,** 100 ... 240 V AC, 24 V DC	►	**3RX4 000**

► Preferred type, available from stock.

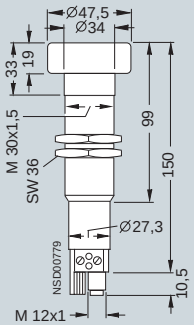
Dimensions

With fixed sensor

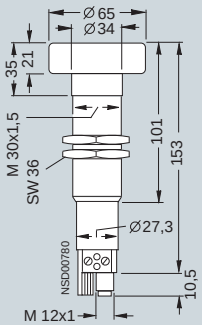
3RG 6. 12–3..00
3RG 6. 13–3..00



3RG 6. 15–3..00

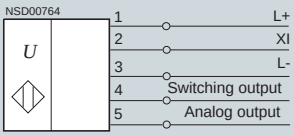


3RG 6. 14–3..00

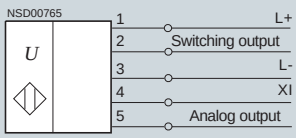


Schematics

M30 K3 ATEX compact range



NO



NC

Overview

SIMATIC sensors PXS900

- Double-layer sheet monitoring

Selection table

	SIMATIC PXS900
	
	Double sheet control
Sensing range (cm)	**2 ... 6**
Operating mode	
• Thru-beam sensor	■
Output	
• 2 switching outputs	■
Adjustment	
• Teach-in	■
Connection	
• M12 connector	■
Degree of protection	
• IP65	■
See page	**2/63**

A configurator for fast product selection and ordering in the Internet can be found at www.siemens.com/simatic-sensors/px

Overview

Double-layer sheet monitoring with separate sensors

The 3RX2 210 Sonar proximity switch for double-layer sheet monitoring comprises one signal evaluator and two Sonar sensors (emitter and receiver).

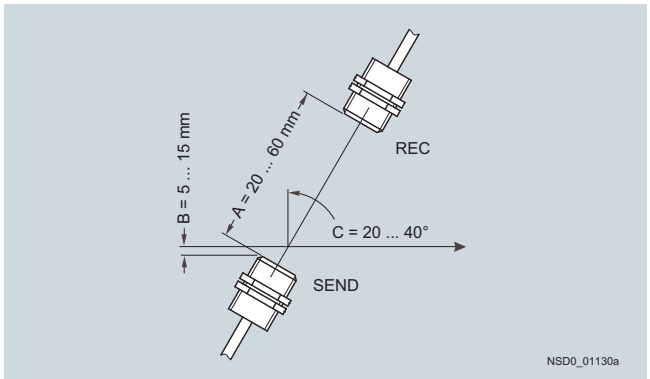
- Reliable detection of multiple layers of paper, plastic sheets or metal foil
- Measuring range from 20 g/m^2 paper to 1100 g/m^2 cardboard
- Manual or automatic offset
- Sonar sensors in M18 enclosure
- Short-circuit proof electronic outputs (pnp)
- Connection via M12 connector

Design

The emitter and receiver sensors are of the same type and must be mounted at an angle of 30° (±10°) or 5° to the vertical. The setting is made using the internal S2 switch. If the system is operated at an inclination angle of 5° to 20°, the S2 switch (operating mode) must be set to position "1".

The object to be detected must be located approximately 5 to 15 mm above the emitter. A wider mounting angle increases the flutter range, e.g. at an angle of 40°, fluttering within 60% of the measuring range is permitted.

The spacing between the emitter and receiver must be at least 20 mm and can be up to 60 mm. Precise alignment is essential (±1°). The operating range is reduced if they are not aligned along the axis.



Sensor mounting

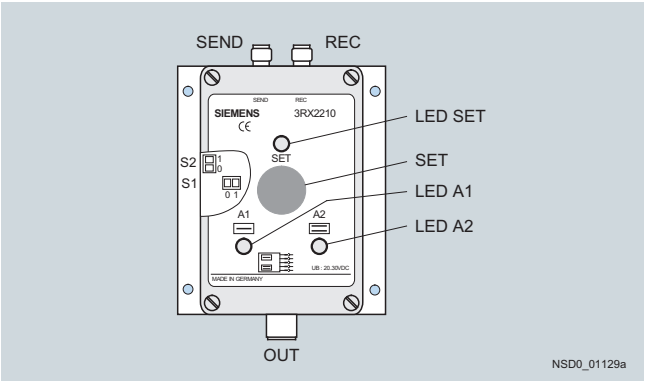
Function

These devices are used mainly for monitoring sheets of paper as well as plastic and metal film. Each sheet is compared to the stored reference value and indicated as a single or double sheet accordingly.

The 3RX2 210 signal evaluator continuously signals the situation between the Sonar sensors at the two outputs A1 and A2. Output A1 "Single sheet" remains active as long as only one sheet is located between the sensors. Output A2 "Double sheet" is activated as soon as two or more sheets are detected between the sensors. Two LEDs also indicate the status of the outputs. The yellow LED A1 indicates a single sheet and the red LED A2 indicates a double sheet.

Programming

The signal evaluator can be set to two different modes.



User interface

Manual setting

Switch S1 (setting) is in position "1".

The sensor is set up for the material to be sensed either by pressing the "SET" button on the top of the device or by applying a control command to the "SET" input of the M12 connector (pin 5). The value obtained remains stored until the setting procedure is repeated. The sensor is set by placing a single sheet between the Sonar sensors and activating the "SET" command.

The 3RX2 210 requires max. 100 ms for the setting; i.e. the "SET" key must be pressed for this time, or a "1" signal (> 6 V) must be present at pin 5. The green LED "SET" flashes during the setting. It lights up permanently following successful setting.

Automatic setting

Switch S1 (setting) is in position "0" (factory setting).

Setting can be performed as described above or automatically when a sheet is fed in and the supply voltage is applied if a sheet lies between the sensors at this moment.

Automatic setting is performed when a sheet is fed in following an interval of 2 s during which a sheet was not detected between the Sonar sensors.

Double-layer sheet monitoring

Technical specifications

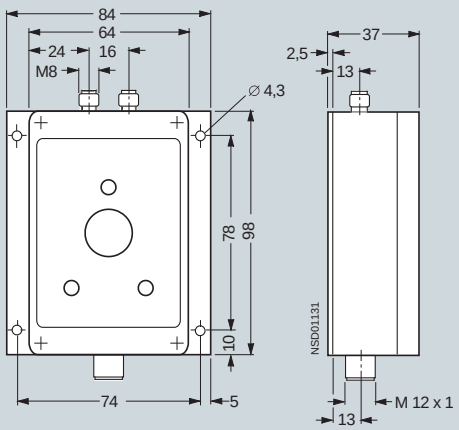
Type		3RX2 210
Sensing range	mm	20 ... 60
Material strength (paper, cardboard)	g/m^2	20 ... 1100
Operational voltage (DC)	V	18 ... 36 (including ± 10% residual ripple)
No-load current I_0	mA	< 75
Switching output		
• Rated operational current I_e	mA	200
• Voltage drop at 200 mA	V	< 3
Ultrasonic frequency	kHz	200
Switching frequency f	Hz	100
Response time	ms	5
Power-up delay t_v	ms	100
Switching status display		Red and yellow LEDs
Enclosure material		
• Evaluation unit		Metall
• Sensor		Brass, nickel-plated; epoxy resin converter surface
Degree of protection		IP65
Ambient temperature		
• During operation	°C	0 ... +65
• During storage	°C	–40 ... +85

Selection and Ordering data

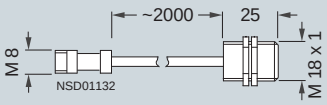
	Sensing range	Rated operational current	Switching output	Connection	Order No.
	cm	mA	pnp		
Double-layer sheet monitoring	2 ... 6	200	2 NO	M12 connector	**3RX2 210**

Dimensions

Evaluation unit



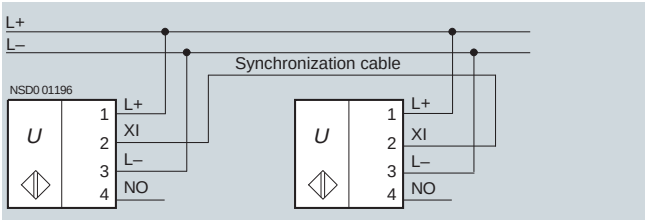
Sensor



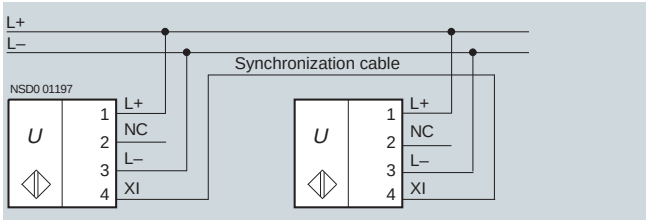
Schematics

Synchronization

NO function

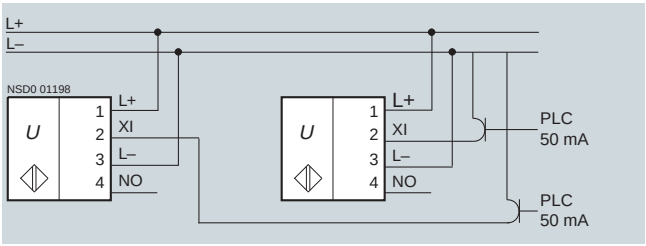


NC function

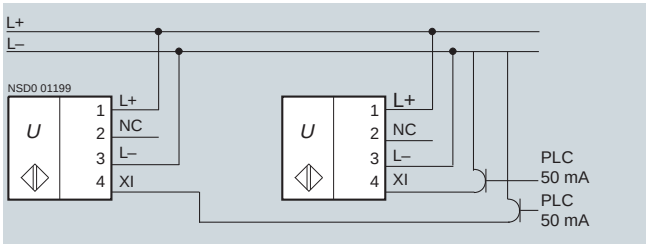


External multiplex mode

NO function

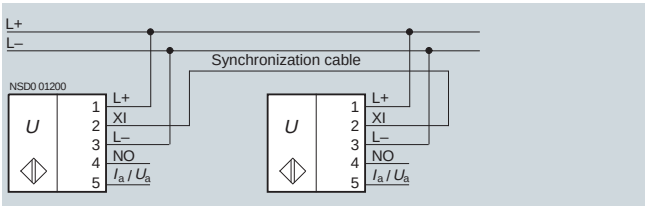


NC function

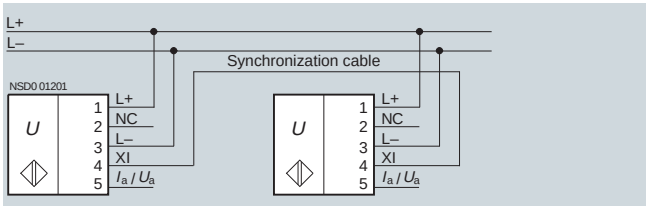


Internal multiplex mode (analog output)

NO function



NC function



2

Characteristic curves

Sound cones

The following diagrams are the results of measurements with Sonar proximity switches, with their production-dependent scatter, at room conditions (20 °C). Standard reflectors moved radially are detected within the possible sensing range by the Sonar proximity switches.

The diagrams apply to the individual types of sensor for the defined reflectors and for larger reflectors.

- Measurement 1 with an aligned object, with the most optimum reflection ⇔ keep environment free of objects which should not be detected.
- Measurement 2 with an object which has partially aligned surfaces ⇔ detection of round materials and plates with rounded edges.
- Measurement 3 with an object with a plane surface moving perpendicularly to the sound cone ⇔ detection of plane surfaces and edges.

Defined reflectors:

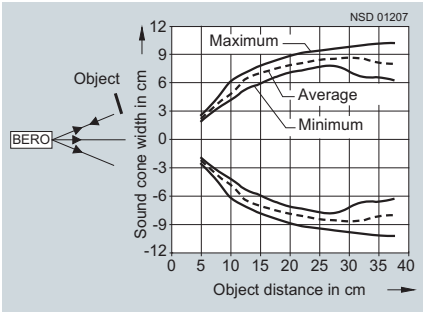
- Measurements 1, 3: plane object
  - 2 cm × 2 cm, for sensors with sensing ranges up to 130 cm
  - 10 cm × 10 cm, for sensors with larger sensing ranges
- Measurement 2: cylindrical object, 8 cm diameter.

The following pages show the sound cones for the following designs:

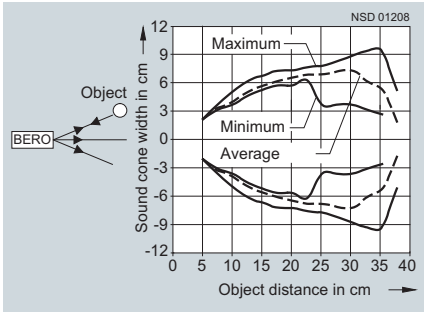
- K0, K08 compact ranges
- Sonar thru-beam sensor
- K65 compact range
- M18, M18S compact ranges
- K21 compact range
- M30 K1, M30 K2 and M30 K3 compact ranges

K0 compact range, sensing range 6 ... 30 cm

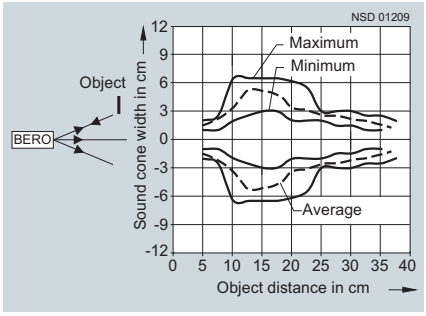
Measurement 1 (most optimum reflection), attenuation 0



Measurement 2 (cylindrical object), attenuation 0

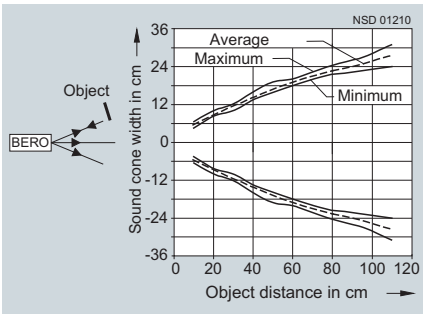


Measurement 3 (plane object), attenuation 0

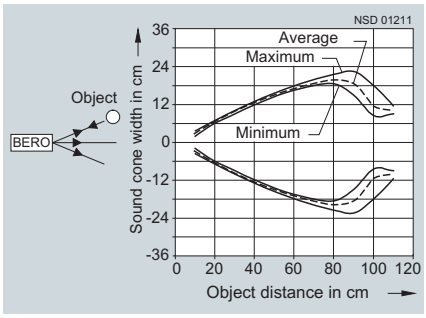


K0 compact range, sensing range 20 ... 100 cm

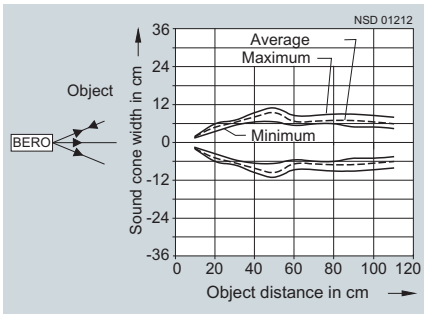
Measurement 1 (most optimum reflection), attenuation 0



Measurement 2 (cylindrical object), attenuation 0

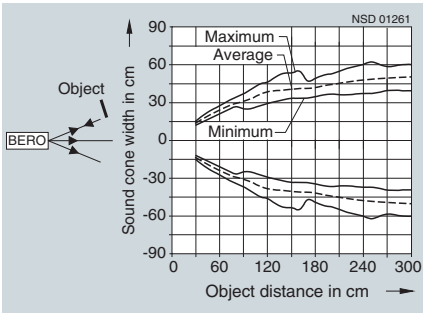


Measurement 3 (plane object), attenuation 0

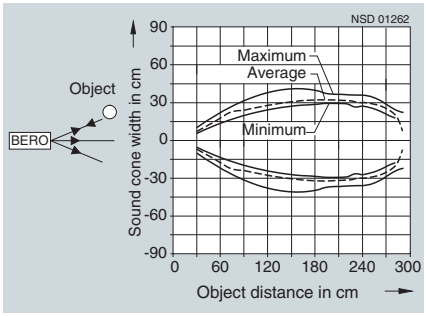


K65 compact form, sensing range 25 ... 250 cm

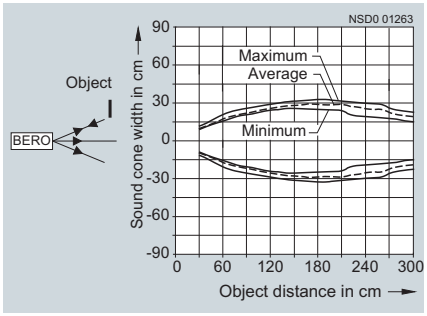
Measurement 1 (most optimum reflection), attenuation 0



Measurement 2 (cylindrical object), attenuation 0

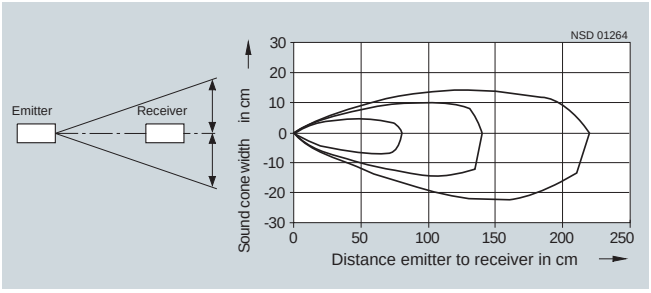


Measurement 3 (plane object), attenuation 0

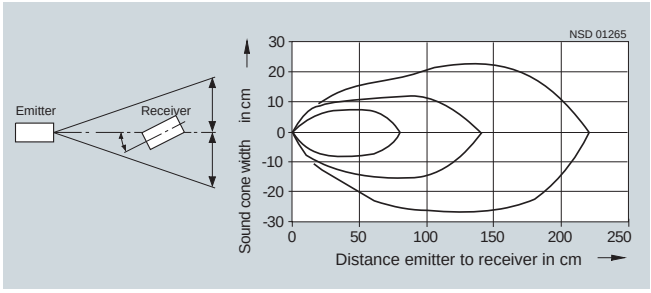


Sonar thru-beam sensor, sensing ranges 5 ... 40 cm, 5 ... 80 cm, 5 ... 150 cm

Receiver angle 0°



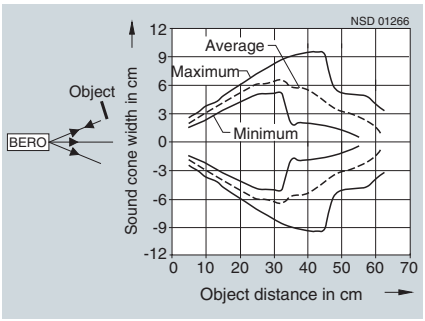
Variable receiver angle, optimally aligned



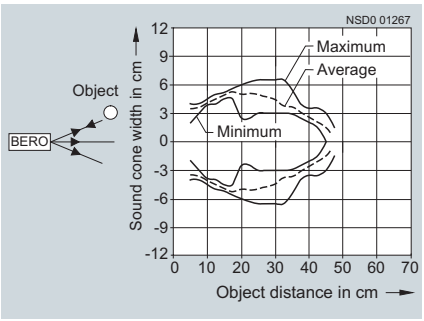
Characteristic curves

M18 compact range, sensing range 5 ... 30 cm

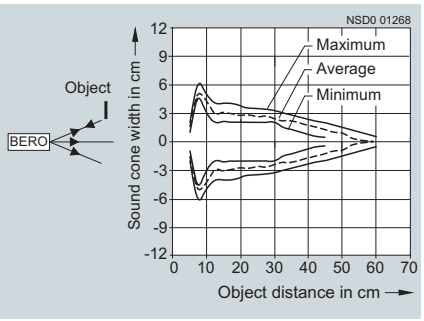
Measurement 1 (most optimum reflection), attenuation 0



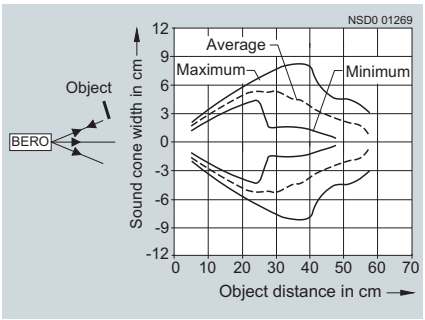
Measurement 2 (cylindrical object), attenuation 0



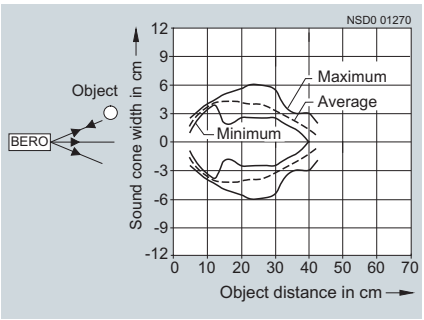
Measurement 3 (plane object), attenuation 0



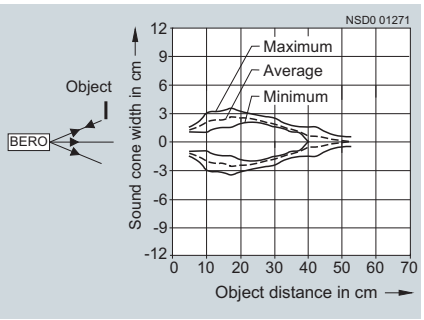
Measurement 1 (most optimum reflection), attenuation 2



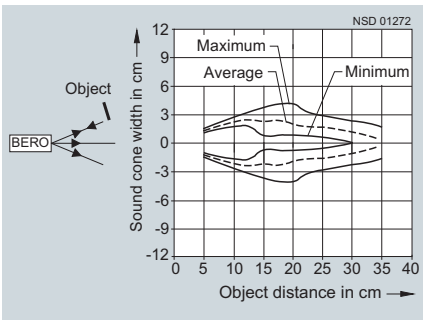
Measurement 2 (cylindrical object), attenuation 2



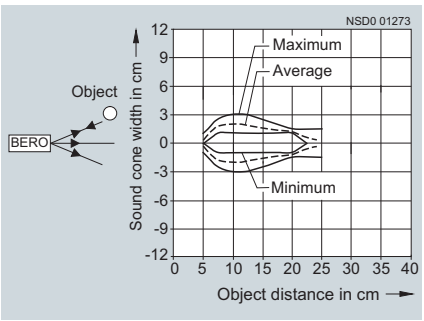
Measurement 3 (plane object), attenuation 2



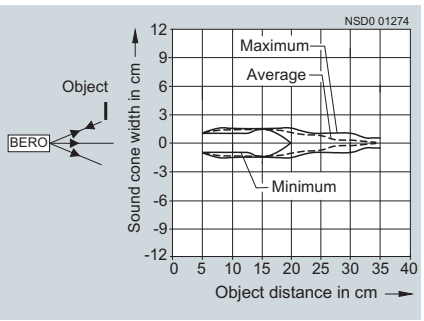
Measurement 1 (most optimum reflection), attenuation 4



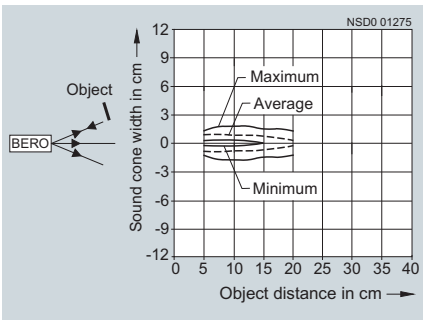
Measurement 2 (cylindrical object), attenuation 4



Measurement 3 (plane object), attenuation 4



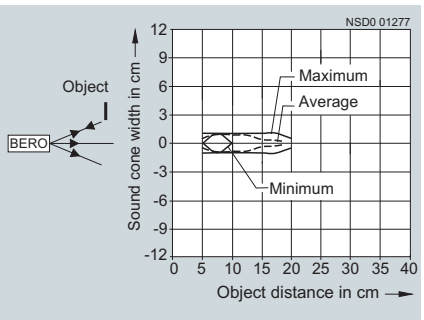
Measurement 1 (most optimum reflection), attenuation 6



Measurement 2 (cylindrical object), attenuation 6

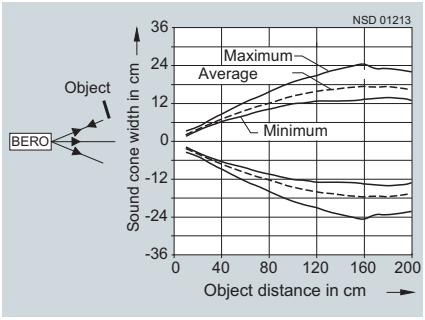
Insufficient sensitivity

Measurement 3 (plane object), attenuation 6

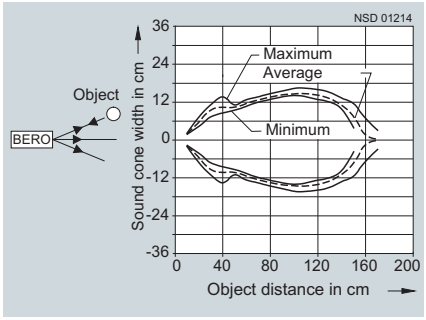


M18 compact range, sensing range 15 ... 100 cm

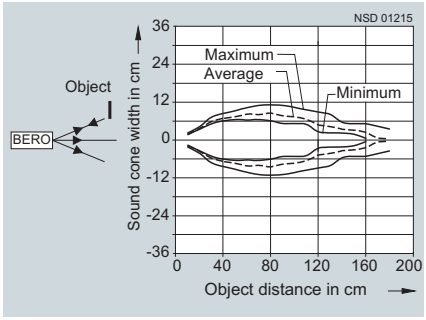
Measurement 1 (most optimum reflection), attenuation 0



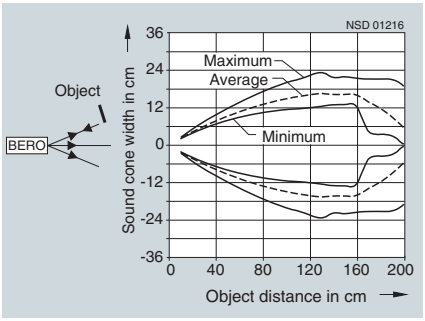
Measurement 2 (cylindrical object), attenuation 0



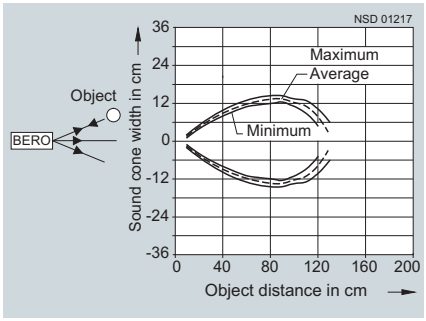
Measurement 3 (plane object), attenuation 0



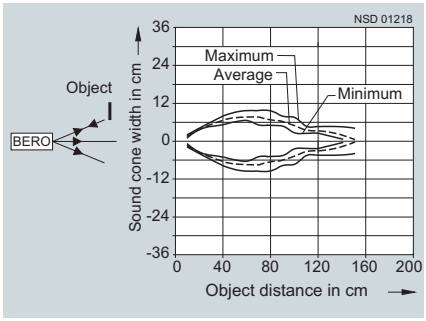
Measurement 1 (most optimum reflection), attenuation 2



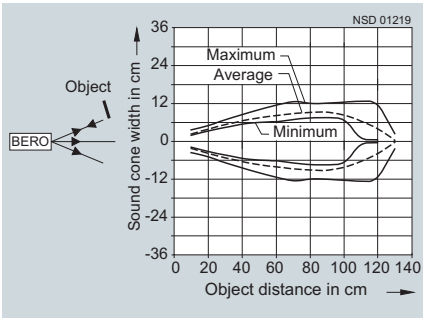
Measurement 2 (cylindrical object), attenuation 2



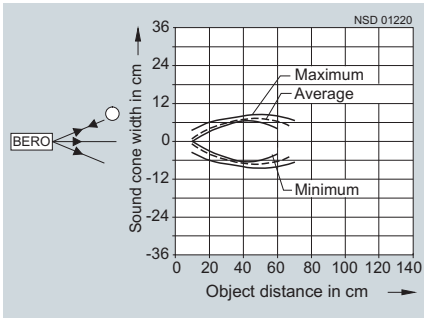
Measurement 3 (plane object), attenuation 2



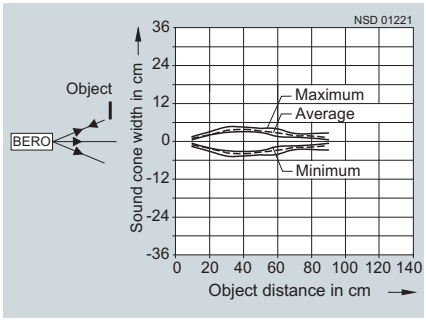
Measurement 1 (most optimum reflection), attenuation 4



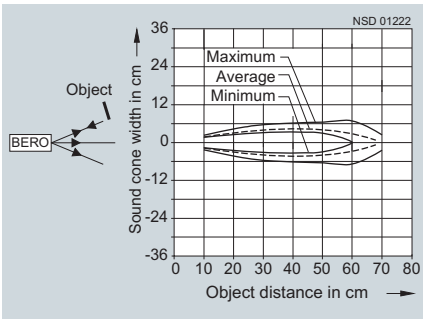
Measurement 2 (cylindrical object), attenuation 4



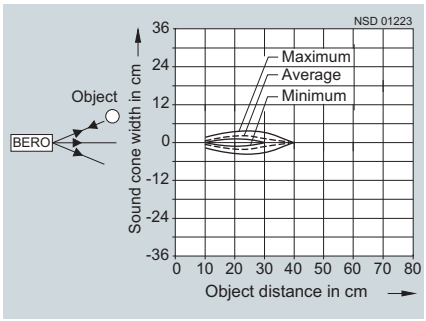
Measurement 3 (plane object), attenuation 4



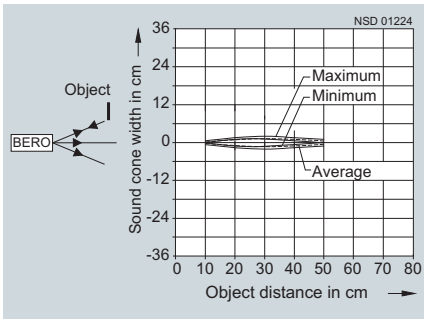
Measurement 1 (most optimum reflection), attenuation 6



Measurement 2 (cylindrical object), attenuation 6



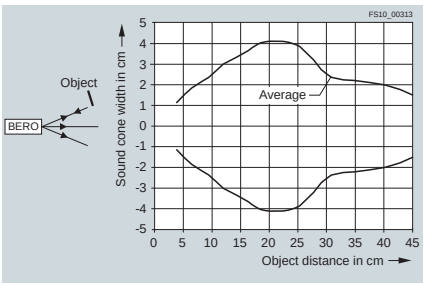
Measurement 3 (plane object), attenuation 6



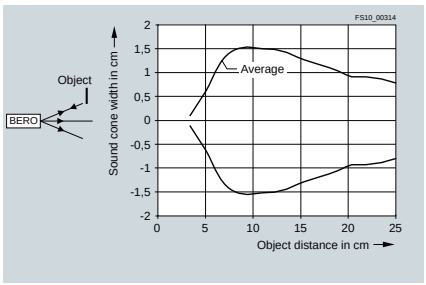
Characteristic curves

M18S compact range, sensing range 2 ... 25 cm

Measurement 1 (most optimum reflection), attenuation 0

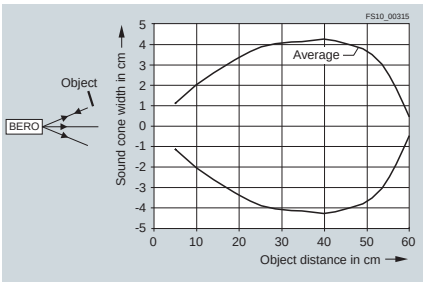


Measurement 2 (plane object), attenuation 0

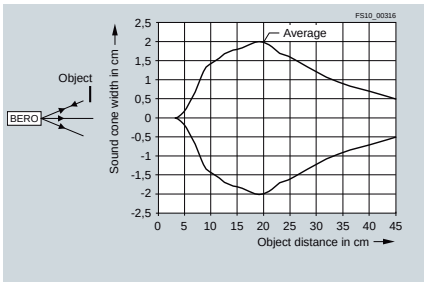


M18S compact range, sensing range 2 ... 40 cm

Measurement 1 (most optimum reflection), attenuation 0

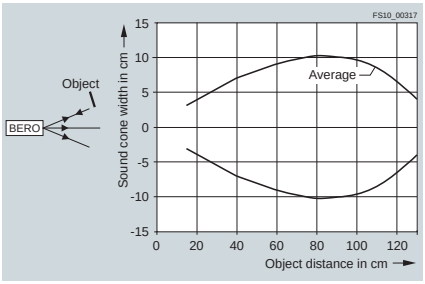


Measurement 2 (plane object), attenuation 0

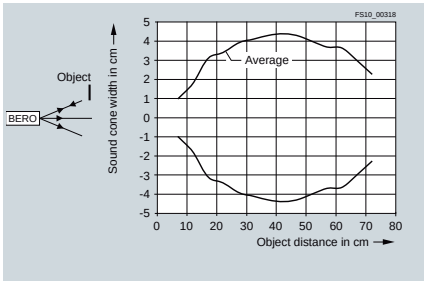


M18S compact range, sensing range 5 ... 70 cm

Measurement 1 (most optimum reflection), attenuation 0

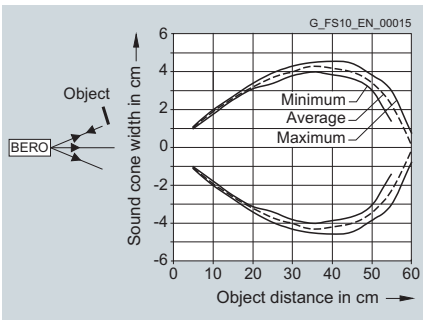


Measurement 2 (plane object), attenuation 0

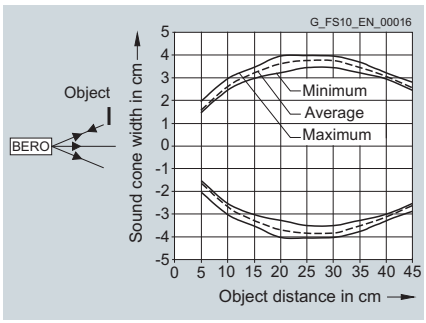


K08 compact range, sensing range 5 ... 40 cm

Measurement 1 (most optimum reflection), attenuation 0

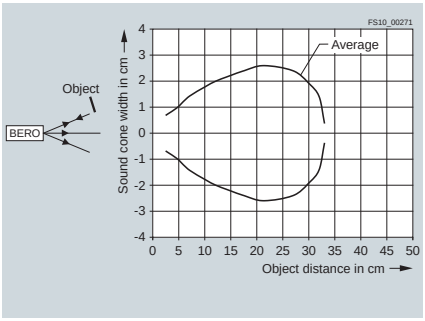


Measurement 2 (plane object), attenuation 0

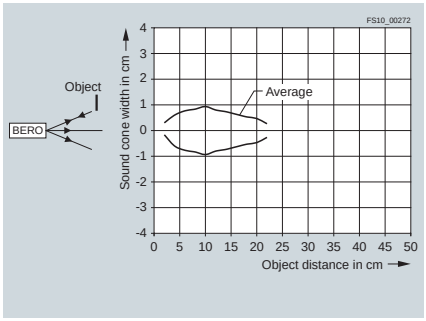


K21 compact range, sensing range 20 ... 250 mm

Measurement 1 (most optimum reflection)

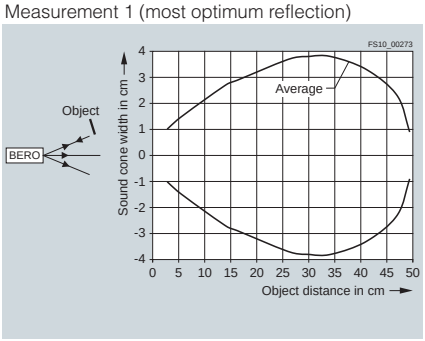


Measurement 2 (plane object)

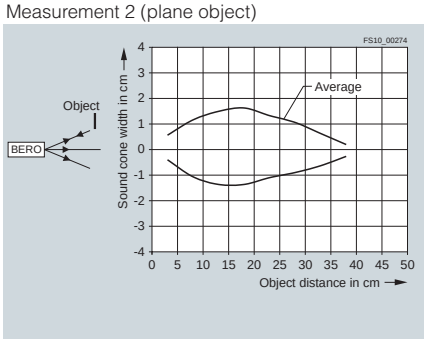


K21 compact range, sensing range 25 ... 400 mm

Measurement 1 (most optimum reflection)



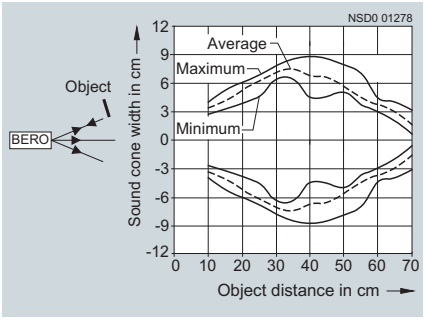
Measurement 2 (plane object)



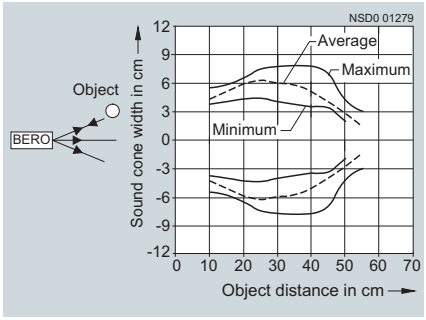
Characteristic curves

M30 K1 to M30 K3 compact range, sensing range 6 ... 30 cm

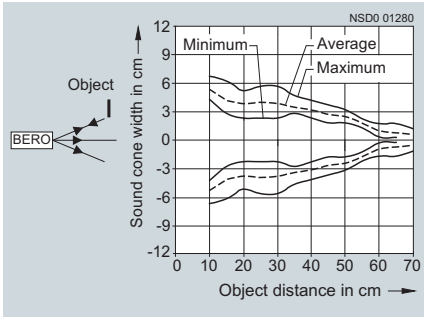
Measurement 1 (most optimum reflection), attenuation 0



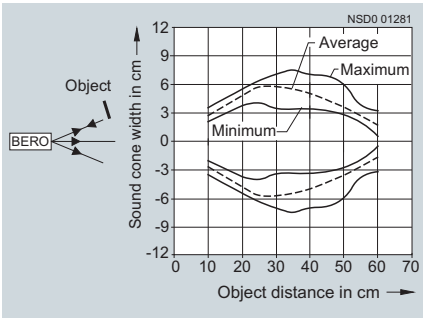
Measurement 2 (cylindrical object), attenuation 0



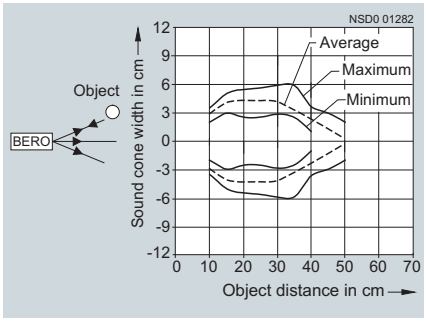
Measurement 3 (plane object), attenuation 0



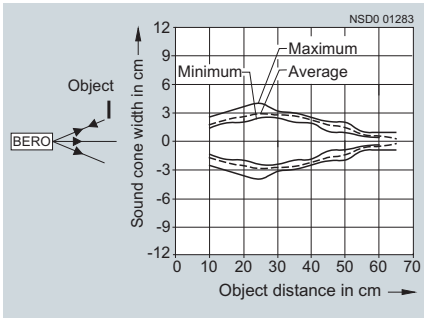
Measurement 1 (most optimum reflection), attenuation 2



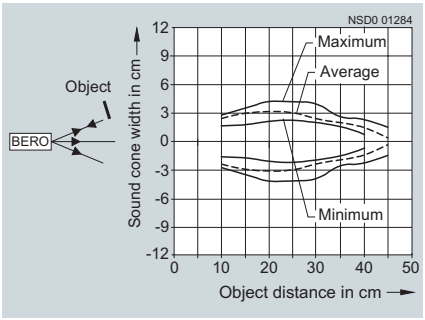
Measurement 2 (cylindrical object), attenuation 2



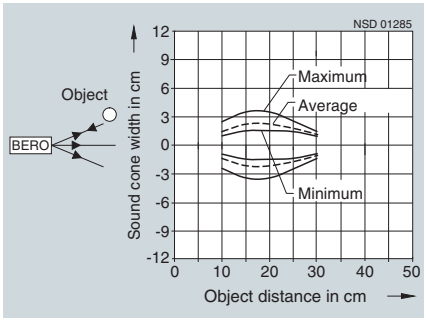
Measurement 3 (plane object), attenuation 2



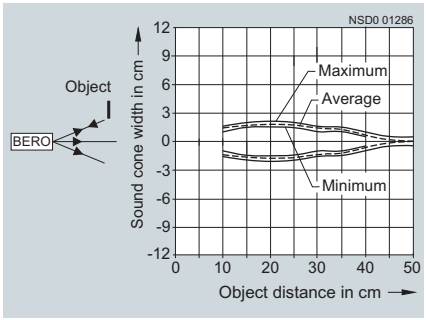
Measurement 1 (most optimum reflection), attenuation 4



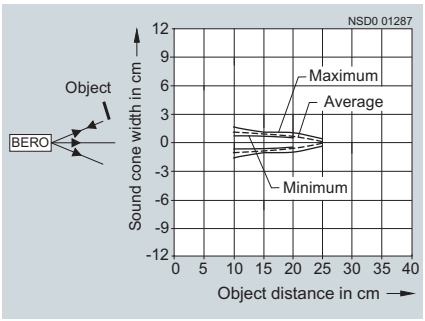
Measurement 2 (cylindrical object), attenuation 4



Measurement 3 (plane object), attenuation 4



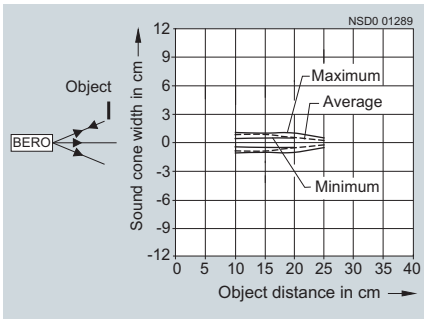
Measurement 1 (most optimum reflection), attenuation 6



Measurement 2 (cylindrical object), attenuation 6

Insufficient sensitivity

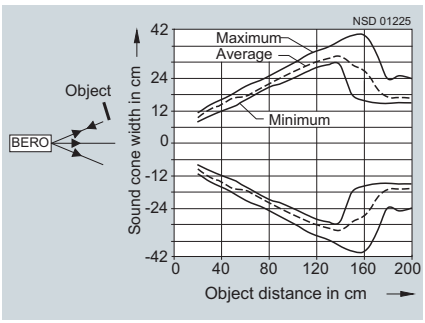
Measurement 3 (plane object), attenuation 6



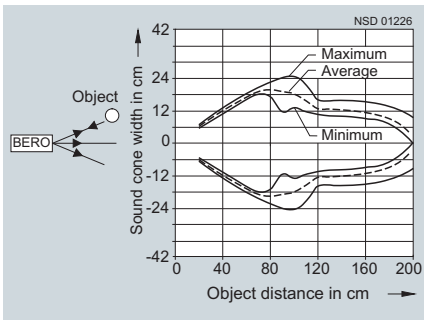
Note: only the sound cones with attenuation 0 apply to M30 K1 compact range.

M30 K1 to M30 K3 compact range, sensing range 20 ... 130 cm

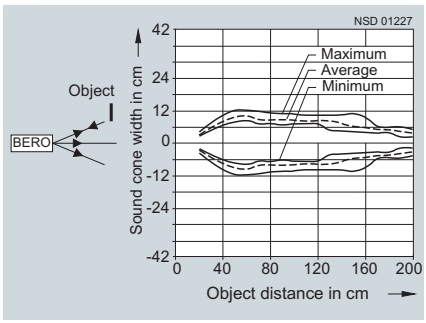
Measurement 1 (most optimum reflection), attenuation 0



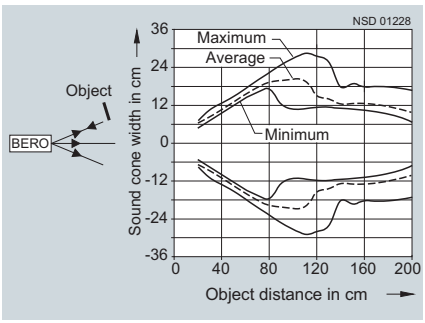
Measurement 2 (cylindrical object), attenuation 0



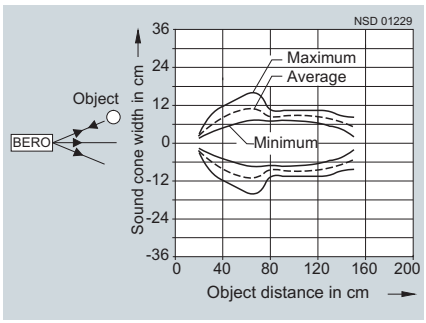
Measurement 3 (plane object), attenuation 0



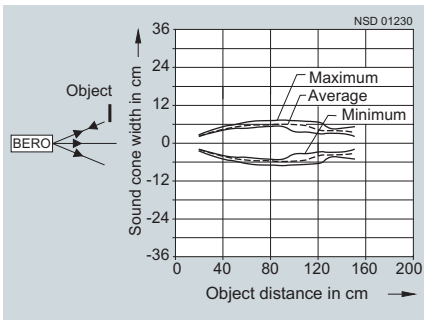
Measurement 1 (most optimum reflection), attenuation 2



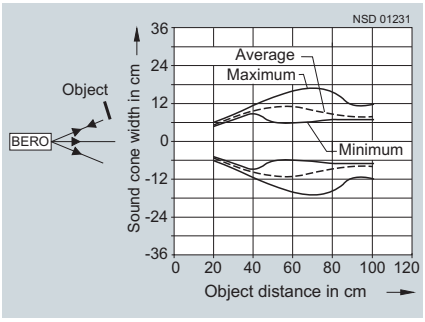
Measurement 2 (cylindrical object), attenuation 2



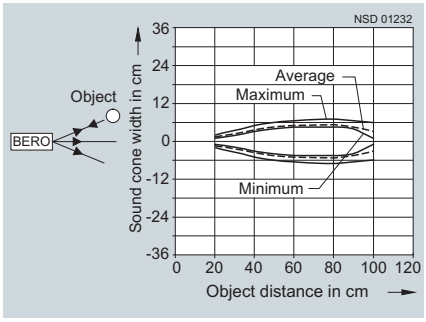
Measurement 3 (plane object), attenuation 2



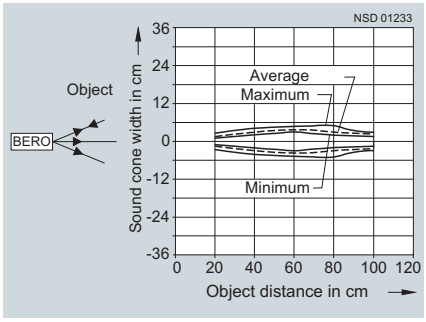
Measurement 1 (most optimum reflection), attenuation 4



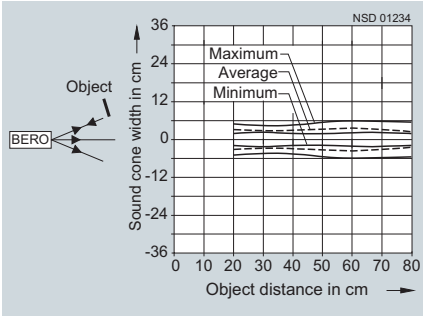
Measurement 2 (cylindrical object), attenuation 4



Measurement 3 (plane object), attenuation 4



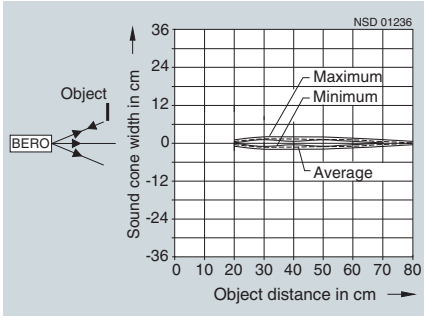
Measurement 1 (most optimum reflection), attenuation 6



Measurement 2 (cylindrical object), attenuation 6

Insufficient sensitivity

Measurement 3 (plane object), attenuation 6

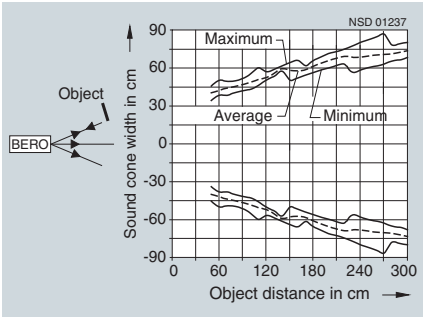


Note: only the sound cones with attenuation 0 apply to M30 K1 compact range.

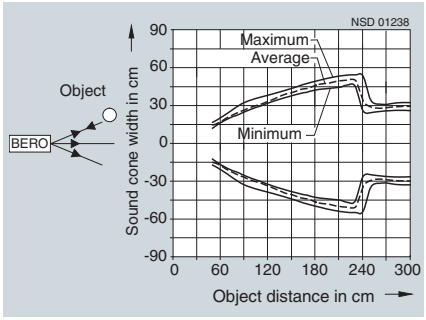
Characteristic curves

M30 K1 to M30 K3 compact range, sensing range 40 ... 300 cm

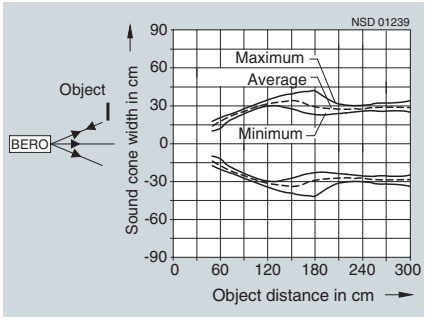
Measurement 1 (most optimum reflection), attenuation 0



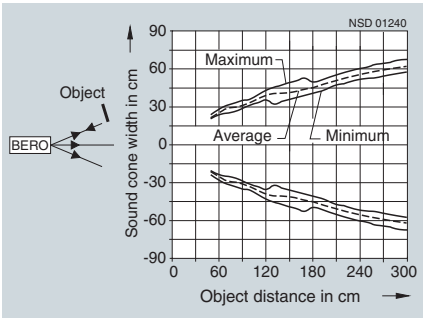
Measurement 2 (cylindrical object), attenuation 0



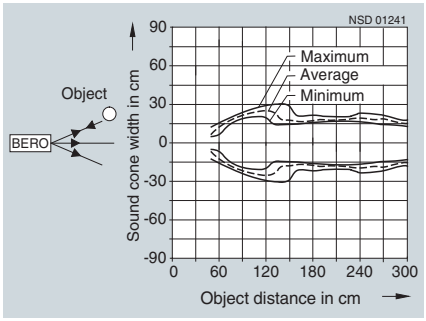
Measurement 3 (plane object), attenuation 0



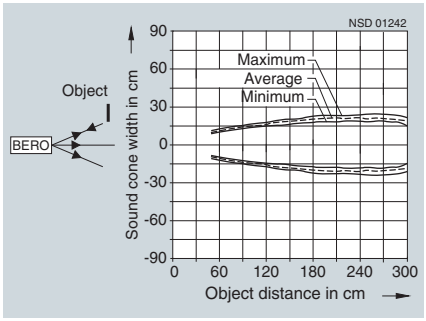
Measurement 1 (most optimum reflection), attenuation 2



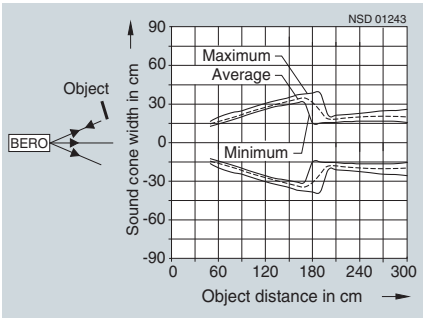
Measurement 2 (cylindrical object), attenuation 2



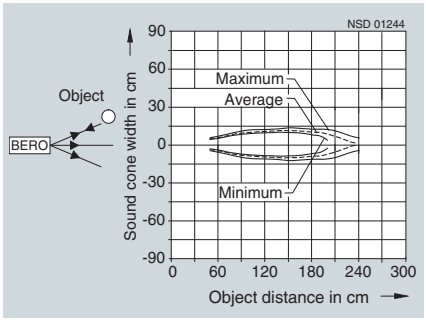
Measurement 3 (plane object), attenuation 2



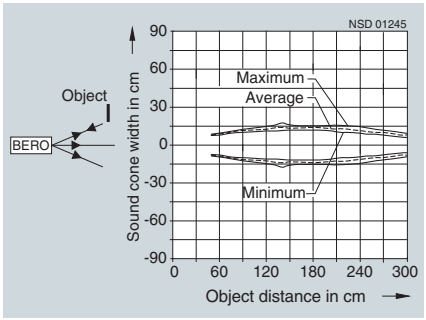
Measurement 1 (most optimum reflection), attenuation 4



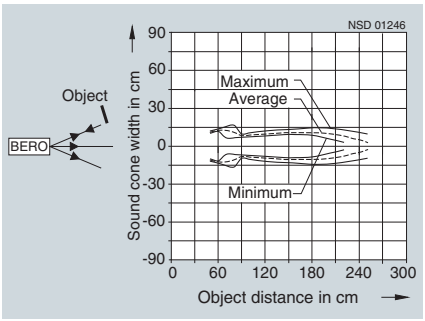
Measurement 2 (cylindrical object), attenuation 4



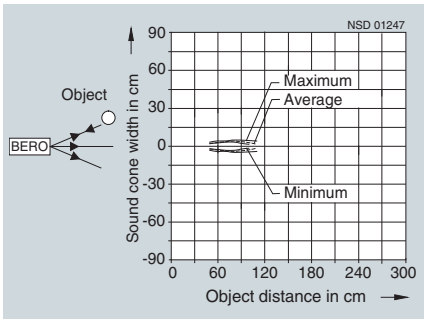
Measurement 3 (plane object), attenuation 4



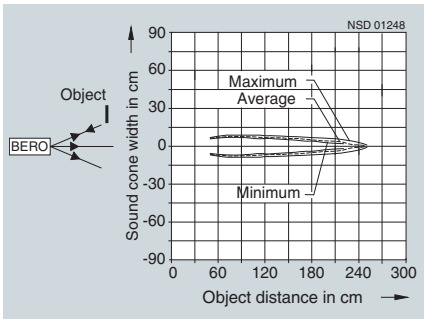
Measurement 1 (most optimum reflection), attenuation 6



Measurement 2 (cylindrical object), attenuation 6



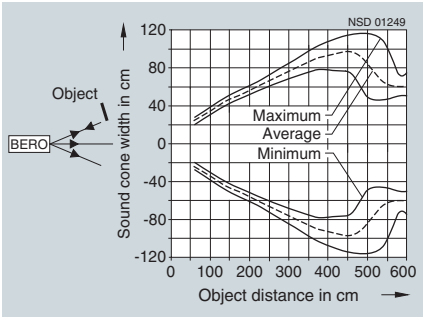
Measurement 3 (plane object), attenuation 6



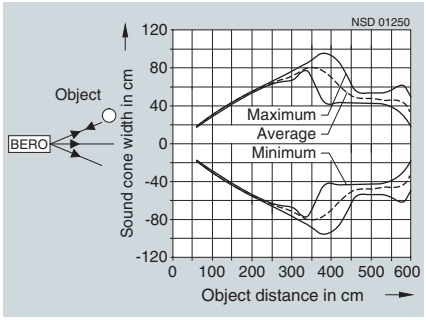
Note: only the sound cones with attenuation 0 apply to M30 K1 compact range.

M30 K1 ... M30 K3 compact range, sensing range 60 ... 600 cm

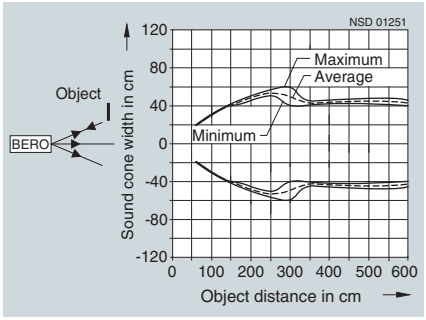
Measurement 1 (most optimum reflection), attenuation 0



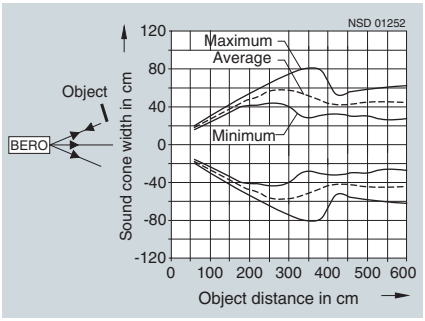
Measurement 2 (cylindrical object), attenuation 0



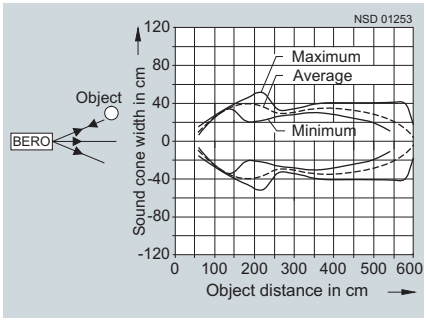
Measurement 3 (plane object), attenuation 0



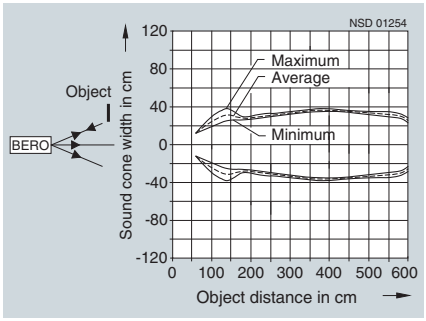
Measurement 1 (most optimum reflection), attenuation 2



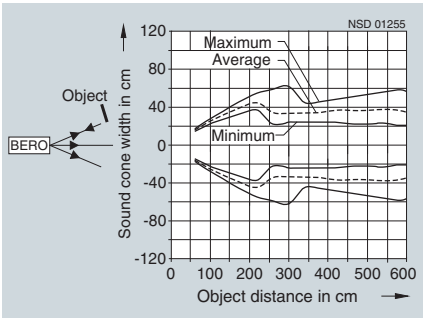
Measurement 2 (cylindrical object), attenuation 2



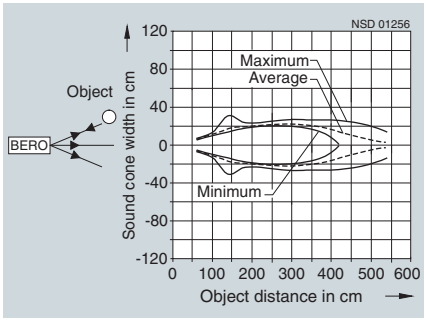
Measurement 3 (plane object), attenuation 2



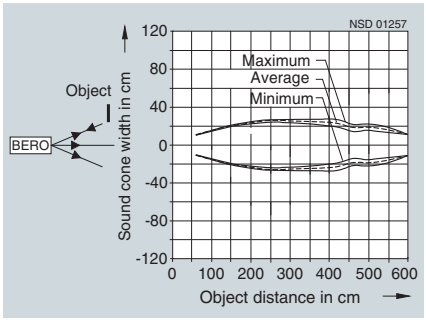
Measurement 1 (most optimum reflection), attenuation 4



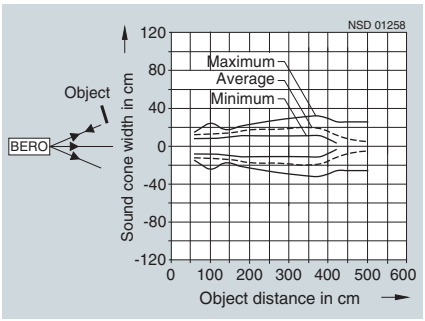
Measurement 2 (cylindrical object), attenuation 4



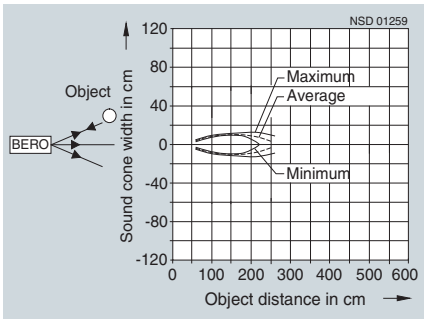
Measurement 3 (plane object), attenuation 4



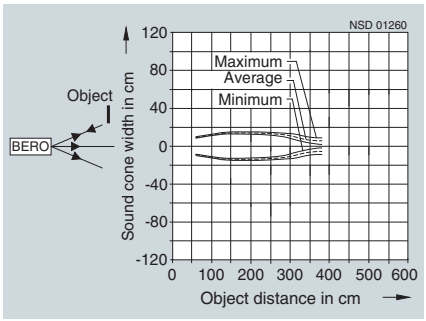
Measurement 1 (most optimum reflection), attenuation 6



Measurement 2 (cylindrical object), attenuation 6



Measurement 3 (plane object), attenuation 6



Note: only the sound cones with attenuation 0 apply to M30 K1 compact range.

Glossary for sonar proximity switches

More information

Active surface

The active surface of an ultrasonic proximity switch is the surface at which the ultrasound is emitted and received (IEC).

Reference axis

The reference axis is the axis running perpendicular to the active surface and through its center (IEC).

Sensing range

The sensing range is defined as the range within which the operating distance can be set (IEC).

With the sonar proximity switches, this range extends from 3 cm to 10 m depending on the type.

The construction of the sensor causes the ultrasonic beam to be emitted in the shape of a cone. Reflecting objects are only detected within this sound cone. Within the blind zone, which lies between the sensor surface and the sensing range, echoes cannot be evaluated for physical reasons.

Operating distance

The operating distance is the distance at which a change in signal is caused at the output when the target approaches the active surface along the reference axis (IEC).

Rated operating distance s_n

The rated operating distance is a conventional variable for the definition of the operating distances. Neither specimen scatter nor changes resulting from external influences such as voltage or temperature are taken into account (IEC).

Effective operating distance s_r

The real operating distance is the operating distance of a particular proximity switch measured at defined temperature, voltage and mounting conditions (IEC).

Accuracy

The accuracy is the permissible error that exists as the difference between the true distance and the indicated value. The accuracy of a Sonar proximity switch depends on internal tolerances as well as certain physical parameters of the air such as humidity, atmospheric pressure and air movement. These parameters influence the sound propagation time and therefore the measured value received.

Atmospheric pressure

Any other atmospheric changes at a permanent site will have a negligible effect on the sound propagation time. Between sea level and 3000 m altitude, the speed of sound is reduced by less than 1%. Sound propagation is not possible in a vacuum.

Air humidity

At room temperature and at lower temperatures, the humidity will have a negligible effect on the sound propagation time. At higher temperatures, the speed of sound increases with humidity.

Air temperature

The sound propagation time is dependent on the air temperature. An air temperature of 20 °C is used as the reference variable here. The speed of sound changes with air temperature by 0.17%/K. This temperature-dependent change in sound propagation time means that as the temperature increases, the distance to the object appears to become shorter.

A change in temperature of, for example, +10 °C results in a change in the speed of sound of approximately +1.75% and therefore a change in the operating distance of +1.75%.

Gas types

The Sonar proximity switch is designed for operation in atmospheric air. If it is operated in other gases, different values for the speed of sound and attenuation can result in significant measurement errors and even malfunction (e.g. in carbon dioxide).

Air currents

Changes to the speed of sound as a result of constant changes in the flow direction and flow velocity of the air cannot be quantified by means of a generally applicable formula. High-temperature objects, such as glowing metal, cause air turbulence. This will scatter or deflect the ultrasound. An echo will not be generated that can be evaluated.

Precipitation

Average levels of precipitation in the form of rain or snow will not adversely affect the functionality of the sonar proximity switch. The transducer surface should not, however, be wetted. Dewing is permissible.

Paint spray

This has no determinable effect on the functioning of the sonar proximity switch. To prevent any detrimental effect on the sensitivity of the transducer, however, the paint spray must not be allowed to settle on the active transducer surface.

External sound

External sound is distinguished from the system-specific echoes and does not usually cause malfunctions.

Repeat accuracy R

The repeat accuracy is the change in the effective operating distance sr at defined conditions (IEC).

The repeat accuracy is measured over a period of 8 hours at an ambient temperature of 23 °C (± 5 °C), any relative humidity within the specified range, and a defined supply voltage.

The repeat accuracy of the Sonar proximity switch is 0.15% of full-scale.

Notes

SONPROG programming device for SIMATIC PXS

Overview

PC with SONPROG programming device and Sonar proximity switch

SONPROG Using the SONPROG 3RX4 000 PC programming device and the relevant software, the following Sonar proximity switches can be individually adapted to the respective application requirements:

- M30 K1 and M30 K3 compact ranges
- M18 compact range
- K65 compact form

Scope of supply

- PC-Interface,
- Plug-in power supply
- Connecting leads to the PC and Sonar proximity switch
- SONPROG software for Windows.

Function

The SONPROG 3RX4 000 programming device allows the user to program several Sonar proximity switches simultaneously. The lower and upper limit of the operating range can be saved at the click of a button for copying to other Sonar proximity switches.

For each Sonar proximity switch, the following parameters can be set:

- Lower and upper limit of the operating range
- Hysteresis
- Switching function NO or NC
- Switching frequency
- Lower and upper limit of the analog characteristic
- Analog characteristic, rising or falling
- End of close range
- End of sensing range
- Mean value generation
- Attenuation.

The function can also be set for the device:

- Multiplex function
- Temperature compensation
- Function as diffuse or reflex sensor
- Fill level mode

The programmed values are saved in the Sonar proximity switch and are retained even without interface or after the supply voltage has been disconnected.

The programmed values can be printed out and recorded. They will then be immediately available, for example for series applications or for replacement of the Sonar proximity switch.

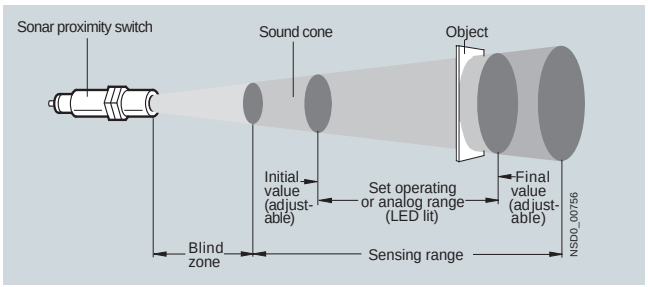
Parameters

Operating range

The commands "Lower limit of operating range" and "Upper limit of operating range" are used to define a window within the sensing range of the Sonar proximity switch.

If an object enters the operating range, the switching output is active (with NO contact). If an object is outside the operating range, the switching output is not active.

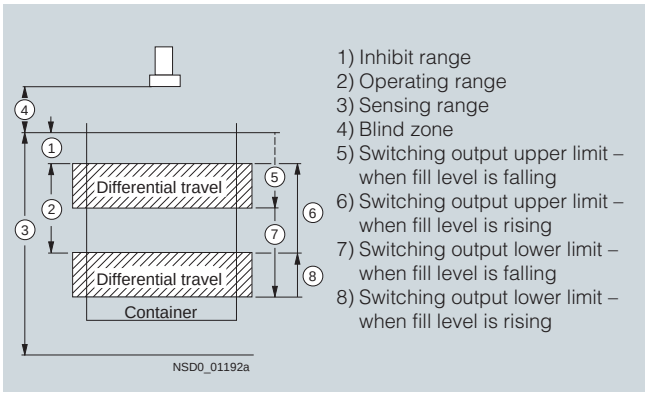
In the case of Sonar proximity switch of M30 K2 compact range with two switching outputs, the second switching output is active when an object is located between the blind zone and the operating range.



Sound cone

Hysteresis

The hysteresis can be adjusted to move the switch-on point and the switch-off point at the limits of the operating range away from each other. This prevents output flutter and level control tasks can be solved elegantly.



Example: Fill level monitoring with adjustable hysteresis

Switching element function

The function of the switching output that was set at the factory can be changed, e.g. from NO to NC.

The assignment of the connections does not change as a result. This means that when a device with NO function is changed to NC, the switching output remains assigned to pin 4.

SONPROG programming device for SIMATIC PXS

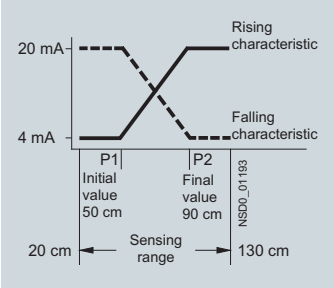
Switching rate

The Sonar proximity switch can be switched over from standard switching frequency (in accordance with the technical specifications) and rapid switching frequency (3 times the standard value).

Note:
A Sonar proximity switch with a rapid switching frequency is more sensitive to disturbance.

Analog distance measurement

Proximity switches with an analog output can detect the distance to an object. This distance is converted into a proportional analog output signal (0 to 10 V, 0 to 20 mA or 4 to 20 mA). The resolution of the analog output is at least 1 mm within the preset limits.



Example

Blind zone

A value must not be set for the blind zone that is less than the minimum value. This is the time that the Sonar proximity switch requires to switch over from send to receive mode.

The blind zone can be moved away from the Sonar proximity switch (i.e. increased) to permit interfering objects in the foreground to be ignored. The interfering echo resulting from such an object is suppressed by extending the blind zone, and detection of the desired object is possible again. The range of the Sonar proximity switch can be reduced in this case because part of the echo from the object to be detected is suppressed. However, objects are still not permitted within the original blind zone.

It is important to ensure with this setting the object does not reflect ultrasound so well that double or triple echoes arise that give the impression of a more distant object. (a fault of this kind cannot occur during normal operation because only the first echo is accepted as valid).

Sensing range

Reducing the sensing range can enhance the resolution of the Sonar proximity switch. With large sensing ranges, it is not possible to adjust some values in steps of one millimeter. The minimum resolution of a Sonar proximity switch is 1 mm.

Mean value generation

Unfortunate reflective conditions or moving surfaces (e.g. in the case of moving liquids and bulk material on conveyors) can cause the measured values to change continuously, which results in constant switching. The Sonar proximity switch allows a mean value to be generated from up to 255 measurements.

Failed signals (when no object is in the sensing range) are ignored on mean-value generation. After each measurement, a mean value is generated immediately from the new measured value and the stored number of old values. The response time of the Sonar proximity switch is, therefore, not extended. A delay only occurs at the end of a measurement if the object is removed from the sensing range. This delay corresponds to the measurement cycle time multiplied by the saved number of mean values.

Attenuation (see sound cones)

The susceptibility of the receive amplifier is reduced here. Weakly reflecting objects at the edge of the sound cone are suppressed. It is also possible to reduce the size of the sound cone here electronically. The permitted values are 0 (maximum sensitivity) to 7 (minimum sensitivity).

Technical specifications

Type	3RX4 000
Required hardware	PC with VGA graphics card, serial interface COM1 or COM2
Required software	MS-DOS Version 3.1 and higher, Windows 3.X, Windows 95, 98, Windows NT
Operational voltage	100 … 240 V AC, 24 V DC

Software update on the Internet:
www.siemens.com/simatic-sensors/px

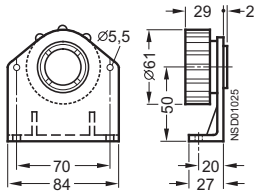
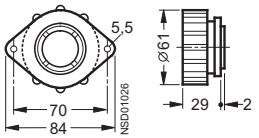
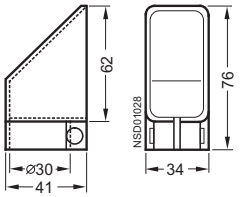
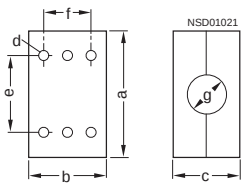
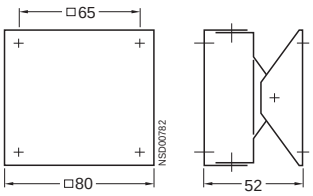
Selection and Ordering data

	Order No.
SONPROG programming device ►	**3RX4 000**

► Preferred type, available from stock.

Mounting hardware for SIMATIC PXS

Selection and Ordering data

	Type		Order No.
	**Aligning unit with mounting bracket** for M30 Sonar proximity switch Swivel range approx. 20° around longitudinal axis of proximity switch. Following alignment, the proximity switch is screwed tight in the selected position.		**3RX1 301**
	**Aligning unit with mounting flange** for M30 Sonar proximity switch Swivel range approx. 20° around longitudinal axis of proximity switch. Following alignment, the proximity switch is screwed tight in the selected position.		**3RX1 302**
	**Diverting reflector** for M30 Sonar proximity switch		**3RX1 910**
	**Mounting clamp** (molded plastic) • for Sonar proximity switch, M18 design • for Sonar proximity switch, M30 design	► ►	**3SX6 283** **3SX6 284**
	**Aligning unit** for 3SG16 67 Sonar proximity switch		**3SX6 287**

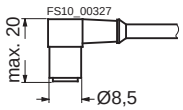
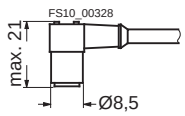
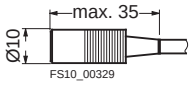
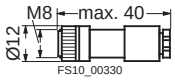
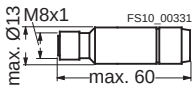
	3SX6 283	3SX6 284
a	45	58
b	30	30
c	26	36
d	Ø 4.5	Ø 4.5
e	32	44
f	19.6	19.6
g	18.0 (for M18)	29.8 (for M30)

► Preferred type, available from stock.

For plug-in connections and cables see from page 2/268.

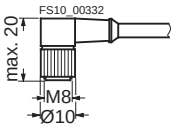
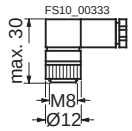
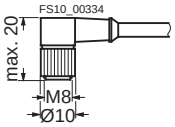
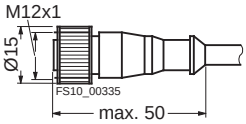
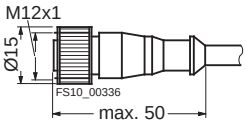
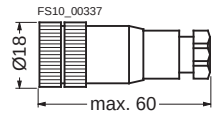
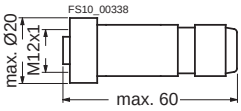
Plug-in connections

Selection and Ordering data

	Fig.	Type[1]	Cable[2]	Length m	Color		Order No.
Fig. 1	**8 mm cable sockets (female) for snap-on mounting, degree of protection IP65**						
	3-pole, 3 × 0.34 mm²						
	1	A	PUR	5	Black	►	**3RX8 000-0BH32-1AF0**
	1	A	PUR	10	Black	►	**3RX8 000-0BH32-1AL0**
Fig. 2	4-pole, 4 × 0.34 mm²						
	1	B	PUR	5	Black	►	**3RX8 000-0BH42-1AF0**
	1	B	PUR	10	Black	►	**3RX8 000-0BH42-1AL0**
	8 mm angular cable sockets (female) for snap-on mounting, degree of protection IP65						
Fig. 3	3-pole, 3 × 0.34 mm²						
	2	A	PUR	5	Black	►	**3RX8 000-0BJ32-1AF0**
	2	A	PUR	10	Black	►	**3RX8 000-0BJ32-1AL0**
	4-pole, 4 × 0.34 mm²						
	2	B	PUR	5	Black	►	**3RX8 000-0BJ42-1AF0**
	2	B	PUR	10	Black	►	**3RX8 000-0BJ42-1AL0**
	3-pole, 3 × 0.34 mm², with 2 LEDs for pnp proximity switches						
	3	C	PUR	5	Black/ clear	►	**3RX8 000-0BJ34-1AF0**
	3	C	PUR	10	Black/ clear	►	**3RX8 000-0BJ34-1AL0**
Fig. 4	**M8 cable sockets (female) for screw mounting, degree of protection IP67**						
	4	A	PUR	5	Black	►	**3RX8 000-0BB32-1AF0**
	4	A	PUR	10	Black	►	**3RX8 000-0BB32-1AL0**
Fig. 5	5	A	Coupling plug with soldering pins, max. 0.25 mm²		Black	►	**3RX8 000-0BB35**
	6	A	Coupling plug, can be assembled		Black	►	**3RX8 000-0BB37**
	4-pole, 4 × 0.34 mm²						
	4	B	PUR	5	Black	►	**3RX8 000-0BB42-1AF0**
Fig. 6	4	B	PUR	10	Black	►	**3RX8 000-0BB42-1AL0**
	5	B	Coupling plug with soldering pins, max. 0.25 mm²		Black	►	**3RX8 000-0BB45**
	6	B	Coupling plug, can be assembled		Black	►	**3RX8 000-0BB47**

Cable sockets (female) with special lengths available as options:
- Minimum order quantity: 50 units
- Delivery time on request.
- Extra charge per m.

[1] For terminal assignment, see page 2/273.
[2] PUR cables suitable for trailing
► Preferred type, available from stock.

	Fig.	Type[1]	Cable[2]	Length m	Color		Order No.
Fig. 7	**M8 angular cable sockets (female) for screw mounting, degree of protection IP67**						
	3-pole, 3 × 0.34 mm²						
	7	A	PUR	5	Black	▶	**3RX8 000-0BC32-1AF0**
	7	A	PUR	10	Black	▶	**3RX8 000-0BC32-1AL0**
	8	A	Coupling plug with soldering pins, max. 0.25 mm²		Black	▶	**3RX8 000-0BC35**
Fig. 8	3-pole, 3 × 0.34 mm², with LEDs						
	9	C	PUR	5 (pnp)	Black	▶	**3RX8 000-0BC34-1AF0**
	9	C	PUR	10	Black	▶	**3RX8 000-0BC34-1AL0**
	9	D	PUR	5 (npn)	Black	▶	**3RX8 000-0BC30-1AF0**
Fig. 9	9	D	PUR	10	Black	▶	**3RX8 000-0BC30-1AL0**
	4-pole, 4 × 0.34 mm²						
	7	B	PUR	5	Black	▶	**3RX8 000-0BC42-1AF0**
	7	B	PUR	10	Black	▶	**3RX8 000-0BC42-1AL0**
	8	B	Coupling plug with soldering pins, max. 0.25 mm²		Black	▶	**3RX8 000-0BC45**
Fig. 10	**M12 cable sockets (female) for screw mounting, degree of protection IP67**						
	10	E	PUR	5	Black	▶	**3RX8 000-0CB32-1AF0**
	10	E	PUR	10	Black	▶	**3RX8 000-0CB32-1AL0**
	11	E	PUR, shielded	2	Black	▶	**3RX8 000-0CB32-1GC0**
	11	E	PUR, shielded	10	Black	▶	**3RX8 000-0CB32-1GL0**
Fig. 11	4-pole, 4 × 0.34 mm²						
	10	F	PUR	5	Black	▶	**3RX8 000-0CB42-1AF0**
	10	F	PUR	10	Black	▶	**3RX8 000-0CB42-1AL0**
	12	F	Coupling plug with terminal compartment, preassembly possible		Black	▶	**3RX8 000-0CB45**
	13	F	Coupling plug with quick-connection technology		Black	▶	**3RX8 000-0CB47**
Fig. 12	5-pole, 5 × 0.34 mm²						
	10	G	PUR	5	Black	▶	**3RX8 000-0CB52-1AF0**
	10	G	PUR	10	Black	▶	**3RX8 000-0CB52-1AL0**
	11	G	PUR, shielded	5	Black	▶	**3RX8 000-0CB52-1GF0**
Fig. 13	11	G	PUR, shielded	10	Black	▶	**3RX8 000-0CB52-1GL0**
	12	G	Coupling plug with terminal compartment, preassembly possible		Black	▶	**3RX8 000-0CB55**
	8-pole, 8 × 0.25 mm²						
	11	O	PUR, shielded	5	Black	▶	**3RX8 000-0CB81-1GF0**

Cable sockets (female) with special lengths available as options:
- Minimum order quantity: 50 units
- Delivery time on request.
- Extra charge per m.

[1] For terminal assignment, see page 2/273.

[2] PUR cables suitable for trailing.

▶ Preferred type, available from stock.

Plug-in connections

Fig. 14

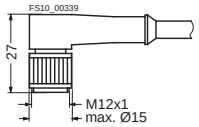


Fig. 15

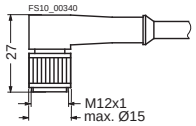


Fig. 16

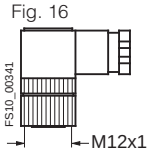


Fig. 17

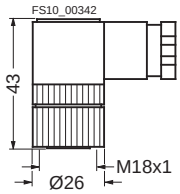


Fig.	Type[1]	Cable[2]	Length m	Color		Order No.
M12 angular cable sockets (female) for screw mounting, degree of protection IP67						
3-pole, 3 × 0.34 mm²,						
14	E	PUR	5	Black	►	**3RX8 000-0CC32-1AF0**
14	E	PUR	10	Black	►	**3RX8 000-0CC32-1AL0**
14	E	PVC	5	Black	►	**3RX8 000-0CC32-1BF0**
14	E	PVC	10	Black	►	**3RX8 000-0CC32-1BL0**
3-pole, 3 × 0.34 mm², with LEDs for pnp proximity switches, NO contact only [3]						
15	H	PUR	5	Black	►	**3RX8 000-0CC34-1AF0**
15	H	PUR	10	Black	►	**3RX8 000-0CC34-1AL0**
15	H	PVC	5	Black	►	**3RX8 000-0CC34-1BF0**
15	H	PVC	10	Black	►	**3RX8 000-0CC34-1BL0**
16	H	Coupling plug with terminal compartment, preassembly possible			►	**3RX8 000-0CC36**
3-pole, 3 × 0.34 mm², with LEDs for pnp proximity switches, NO or NC [3]						
15	J	PUR	5	Black	►	**3RX8 000-0CC38-1AF0**
15	J	PUR	10	Black	►	**3RX8 000-0CC38-1AL0**
4-pole, 4 × 0.34 mm²						
14	F	PUR	5	Black	►	**3RX8 000-0CC42-1AF0**
14	F	PUR	10	Black	►	**3RX8 000-0CC42-1AL0**
16	F	Coupling plug with terminal compartment, preassembly possible		Black	►	**3RX8 000-0CC45**
4-pole, 4 × 0.34 mm², with LEDs [3]						
15	K	PUR	5	Black	►	**3RX8 000-0CC44-1AF0**
15	K	PUR	10	Black	►	**3RX8 000-0CC44-1AL0**
16	K	With terminal compartment, transparent for LEDs		clear	►	**3RX8 000-0CC46**
		LED insert for angular cable plug, transparent			►	**3RX8 000-0CA06**
5-pole, 5 × 0.34 mm²						
14	G	PUR	5	Black	►	**3RX8 000-0CC52-1AF0**
14	G	PUR	10	Black	►	**3RX8 000-0CC52-1AL0**
16	G	Coupling plug with terminal compartment, preassembly possible		Black	►	**3RX8 000-0CC55**
M18 angular cable sockets (female) for screw-type mounting, degree of protection IP65, 4-pole						
17	F	Preassembly possible, with terminal compartment		Black	►	**3RX8 000-0DC45**

Cable sockets (female) with special lengths available as options:
- Minimum order quantity: 50 units
- Delivery time on request.
- Extra charge per m.

[1] For terminal assignment, see page 2/273.

[2] PUR cables suitable for trailing.

[3] Only limited use of sonar proximity switches.

► Preferred type, available from stock.

Fig.	Type[1]	Cable[2]	Length m	Color		Order No.
	M8 coupling sockets (female), degree of protection IP67					
	For extension cable (metal screw cap) can be assembled; max. 0.34 mm²					
Fig. 18						
18		3-pole	–	Black	►	**3RX8 000-0BD37**
18		4-pole	–	Black	►	**3RX8 000-0BD47**
	M12 coupling sockets (female), degree of protection IP67					
	for extension cable (metal screw cap) with terminal compartment, cable gland max. 6 mm					
Fig. 19						
19	L	4-pole	–	Black	►	**3RX8 000-0CD45**
19	M	5-pole	–	Black	►	**3RX8 000-0CD55**
20	L	4-pole	Can be assembled; max. 0.34 mm²	Black	►	**3RX8 000-0CD47**
	M12 angled coupling sockets (female), degree of protection IP67					
	for extension cable (metal screw cap) with terminal compartment, cable gland max. 6 mm					
Fig. 20						
21	L	4-pole	–	Black	►	**3RX8 000-0CE45**
21	M	5-pole	–	Black	►	**3RX8 000-0CE55**
	For AS-Interface, degree of protection IP67					
	M12 cable plugs (male)					
	4 × 0.34 mm² (metal screw cap)					
Fig. 21						
22	L	PUR	5	Black	►	**3RX8 000-0CD42-1AF0**
22	L	PUR	10	Black	►	**3RX8 000-0CD42-1AL0**
	M12 angular cable plugs (male)					
	4 × 0.34 mm² (metal screw cap)					
Fig. 22						
23	L	PUR	5	Black	►	**3RX8 000-0CE42-1AF0**
23	L	PUR	10	Black	►	**3RX8 000-0CE42-1AL0**
Fig. 23						
	Flush-type M12 connector					
	Adapter with single cores, 4-pole with single cores					
Fig. 24						
24	• Twistable		0.5		►	**3RX8 000-0CA40-1JA5**
24	• Not twistable		0.2		►	**3RX8 000-0CA40-1JA2**

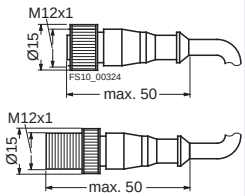
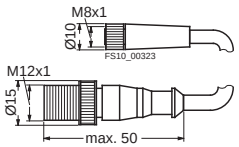
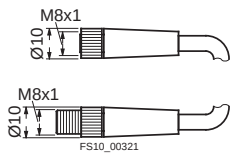
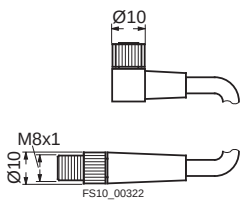
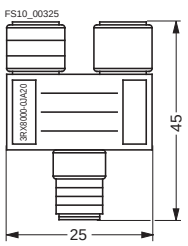
Cable sockets (female) with special lengths available as options:
- Minimum order quantity: 50 units
- Delivery time on request.
- Extra charge per m.

1) For terminal assignment, see page 2/273.

2) Suitable for trailing.

► Preferred type, available from stock.

Plug-in connections

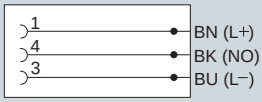
	Version	Type[1]	Wire cross-section/color	Length m		Order No.
	**Cable** with M12 socket (female) and M12 plug (male) Connection to 3RX8 000-0JA0 distributor (metal union nut), PUR cable Caution: Only terminal 4 (NO) is connected.	E, L	3 × 0.34 mm², Black	0.6	►	**3RX8 000-0GF32-1AA6**
				1	►	**3RX8 000-0GF32-1AB0**
				1.5	►	**3RX8 000-0GF32-1AB5**
		F, L	4 × 0.34 mm², Black	0.6	►	**3RX8 000-0GF42-1AA6**
				1	►	**3RX8 000-0GF42-1AB0**
				1.5	►	**3RX8 000-0GF42-1AB5**
	**Cable** with M8 socket (female) and M12 plug (male) Connection to 3RX8 000-0JA0 distributor (metal union nut), PUR cable Caution: Only terminal 4 (NO) is connected.	A, L	3 × 0.34 mm², Black	0.6	►	**3RX8 000-0FF32-1AA6**
				1	►	**3RX8 000-0FF32-1AB0**
				1.5	►	**3RX8 000-0FF32-1AB5**
		B, L	4 × 0.34 mm², Black	0.6	►	**3RX8 000-0FF42-1AA6**
				1	►	**3RX8 000-0FF42-1AB0**
				1.5	►	**3RX8 000-0FF42-1AB5**
	**Cable** with M8 socket (female) and M8 plug (male), PUR cable	A	3 × 0.34 mm², Black	1	►	**3RX8 000-0EF32-1AB0**
				2	►	**3RX8 000-0EF32-1AC0**
	**Cable** with M8 angular socket (female) and M8 plug (male), PUR cable	A	3 × 0.34 mm², Black	1	►	**3RX8 000-0EG32-1AB0**
				2	►	**3RX8 000-0EG32-1AC0**
	Cables, 20 m, black According to the number of cores, the cables can be used for all inductive proximity switches, sonar proximity switches and optical proximity switches.					
	• PUR		3 × 0.34 mm²		►	**3RX8 000-0KA32-1AR0**
	• PUR		4 × 0.34 mm²		►	**3RX8 000-0KA42-1AR0**
	• PUR, shielded		4 × 0.34 mm²		►	**3RX8 000-0KA42-1GR0**
	**T-distributor, M12 connection** For connection of thru-beam sensors to AS-Interface modules				►	**3RX8 000-0JA20**

[1] For terminal assignment, see page 2/273.
► Preferred type, available from stock.

Schematics

Plug connections

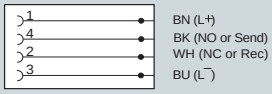
Type A, E



NSD01032a

proximity switches with NO contact

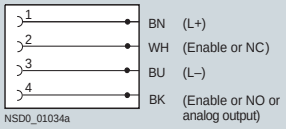
Type B, F, L, N, P



NSD0_01033a

proximity switches with NC/NO contact

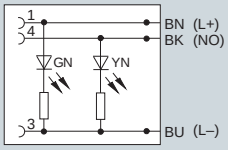
Type B, F, L, N, P



NSD0_01034a

sonar proximity switches in M18 compact series

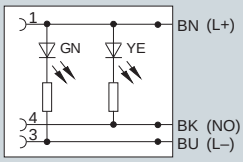
Type C, H



NSD01035a

proximity switches with NO contact, pnp

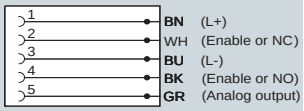
Type D



NSD01036a

proximity switches with NO contact, npn

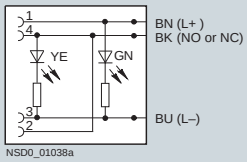
Type G, M



NSD0_01037a

proximity switches with NC/NO contact, sonar proximity switches M30 K2 and M30 K3 compact series

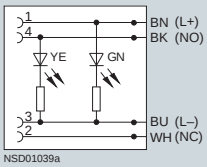
Type J



NSD0_01038a

proximity switch with NC or NO contact, pnp

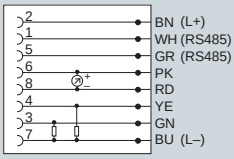
Type K



NSD01039a

proximity switch with NO contact or NC/NO contact, pnp

Type O



FS10_00139

PXO530/540 proximity switch

BN = Brown
BK = Black
WH = White

BU = Blue
GR = Gray
GN = Green

YE = Yellow
PK = Pink
RD = Red

Pin assignment

M8 wiring for cable plugs and angular cable plugs

Type A, C, D

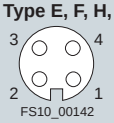
FS10_00140

Type B

FS10_00141

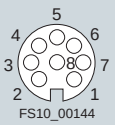
M12 wiring for cable plugs and angular cable plugs

Type E, F, H, J, K, L, N



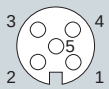
FS10_00142

Type O



FS10_00144

Type G, M



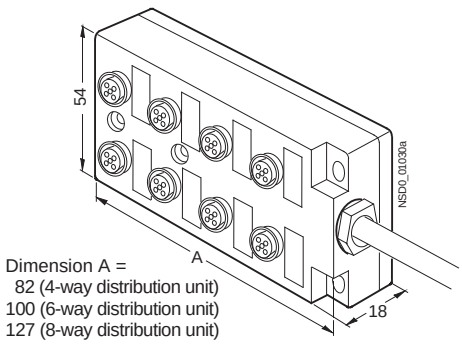
FS10_00143

Distributors

Technical specifications

Type		3RX8 000-0JA
Operational voltage	V DC	24
Max. current per switching output	A	2
Connections		M12 connector-in connections (socket in distribution unit)
Core identification, PUR cable		in color
Display		
• Per output		Yellow LED
• Operational voltage		Green LED
Enclosure material		Molded plastic
Degree of protection		IP65, in inserted and locked state
Operating temperature	°C	–15 ... +80

Selection and Ordering data

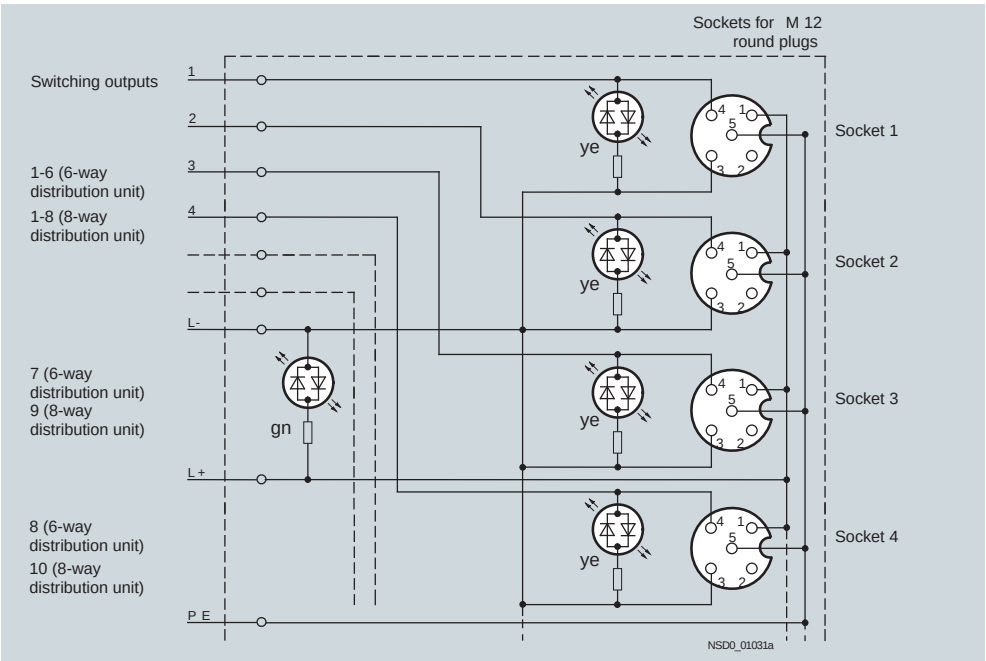


Dimension A =
82 (4-way distribution unit)
100 (6-way distribution unit)
127 (8-way distribution unit)

	Type	Order No.
Distribution units, quadruple		
• 5 m PUR line	►	**3RX8 000-0JA40-1AF0**
• 10 m PUR line	►	**3RX8 000-0JA40-1AL0**
Distribution units, 6x		
• 5 m PUR line	►	**3RX8 000-0JA60-1AF0**
• 10 m PUR line	►	**3RX8 000-0JA60-1AL0**
Distribution units, 8x		
• 5 m PUR line	►	**3RX8 000-0JA80-1AF0**
• 10 m PUR line	►	**3RX8 000-0JA80-1AL0**
Distributors Preassembly possible, with connecting hood	►	**3RX8 000-0JA80**

► Preferred type, available from stock.

Schematics



Sensor assembly system

Overview

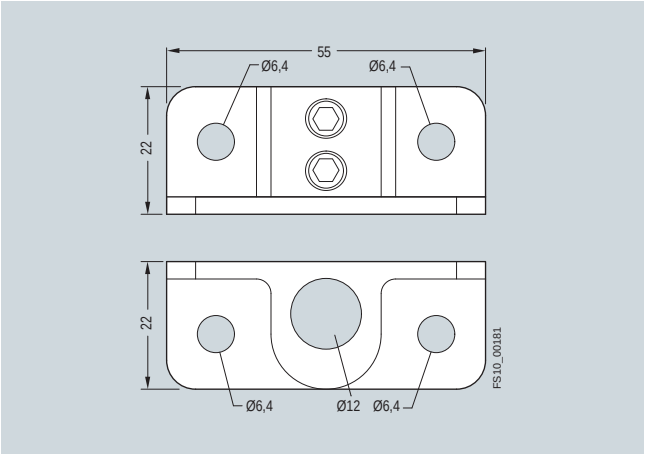
Sensor assembly system

Selection and Ordering data

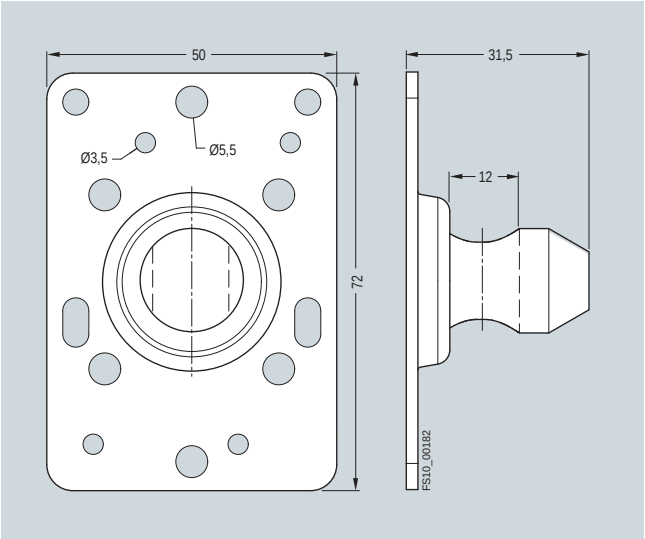
		Order No.
Sensor assembly system		
Consisting of:		
Mounting base for sensor assembly system, with 12 mm hole for inserting round rod	►	**3RX7 322**
Holding plate for sensor assembly system, for mounting on 12 mm round rod, suitable for all cubic proximity switches	►	**3RX7 326**
Round rod for sensor assembly system, 12 mm diameter		
• 200 mm long	►	**3RX7 315**
• 300 mm long	►	**3RX7 316**

► Preferred type, available from stock.

Dimensions

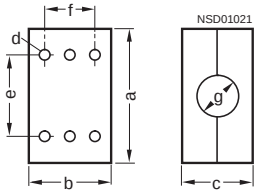
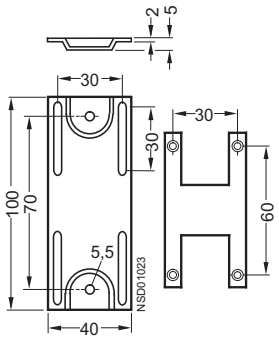
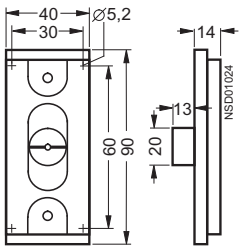


Mounting base 3RX7 322



Holding plate for accommodating 3RX7 326 sensors

Selection and Ordering data

	Type		Order No.
32SX6 281 to 3SX6 284 	**Fixing clamp (molded plastic, supplied without fixing screws)** for proximity switches with thread	M8 M12 ► M18 ► M30 ►	**3SX6 281** **3SX6 282** **3SX6 283** **3SX6 284**
3SX9 910 	**Adapter** from Pg 13.5 to NPT ½, for proximity switches with Pg 13.5 connecting thread	►	**3SX9 910**
	Adapter from M20 x 1.5 to NPT ½, for proximity switches with M20 connecting thread		**3SX9 918**
	Molded plastic M20 × 1.5 screwed joint 6 mm long, with seal, for proximity switches with M20 connecting thread		**3SB39 01–0CK**
3RX1 303 	**Alignment plate** for cubic proximity switches 3RG16 30, 3RG40 30, 3RG40 31, 3RG40 34, 3RG40 41, 3RG41 31, 3RG41 41, 3RG46 31	►	**3RX1 303**
3RX1 304 	**Mounting bracket** For snapping onto C-shaped rails, can slide up to 20 mm lengthwise, rotatable through 360° for cubic proximity switches 3RG16 30, 3RG40 30, 3RG40 31, 3RG40 34, 3RG40 41, 3RG41 31, 3RG41 41, 3RG46 31		**3RX1 304**

	a	b	c	d	e	f	g
3SX6 281	26	22	11,6	Ø 3.5	16	12.6	7.9 (for M8)
3SX6 282	36	30	18	Ø 4.5	24	18.5	11.9 (for M12)
3SX6 283	45	30	26	Ø 4.5	32	19.6	18.0 (for M18)
3SX6 284	58	30	36	Ø 4.5	44	19.6	29.8 (for M30)

► Preferred type, available from stock.

Appendix
Order No. index

Appendix
Order No. index