

# ProGap S

Microwave barrier



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## 1. General

The microwave barrier is a non-contact measuring procedure and can be used both on metal as well as non-metal pipelines, containers, shafts, free-fall sections, bellows etc. Since it can penetrate non-conductive materials such as plastics, it is possible to measure from the outside or through a window. This makes it possible to completely decouple the measurement from the process - for example to measure aggressive, abrasive or coarsely grained materials. In case of very difficult conditions - e. g. temperatures up to 200 °C, pressures up to 20 bar as well as all DustEx-zones – the ProGap S can be used with the help of a process-adapter.

## 2. Mounting and Installation

The device can be installed at any installation height. However, it is absolutely necessary to ensure that transmitters and receivers are installed at the same height (arrow of transmitter and receiver up) and precisely aligned to each other (see following figure).

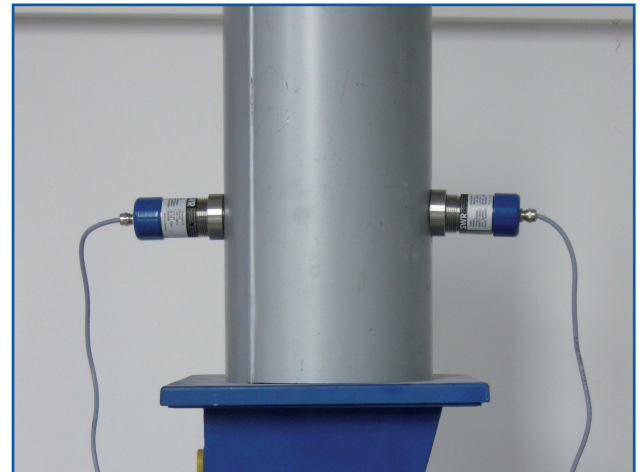
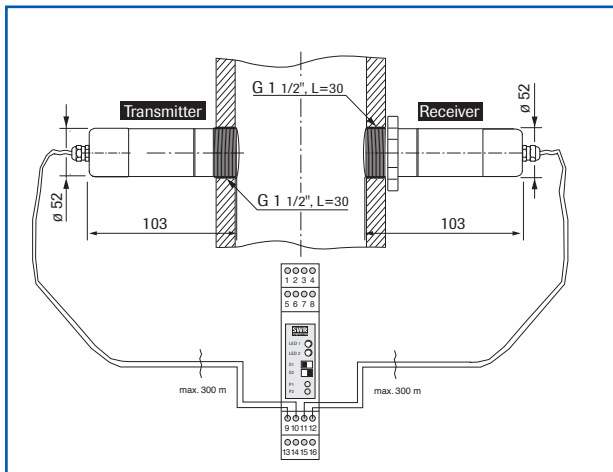


Fig. 1: Mounting

Transmitter and receiver have to be positioned with their front ends facing each other at the same height. Care should be taken that the ProGap S is installed in an area in which no vibrations are present.

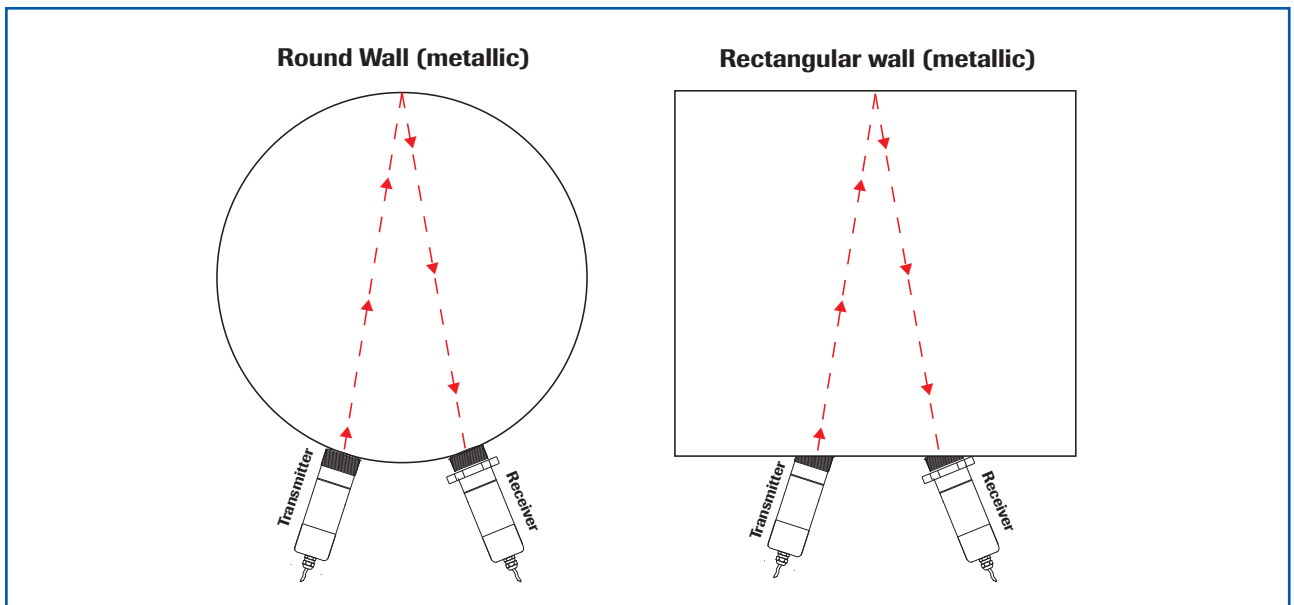
To detect levels of materials with low bulk density respectively with a low dielectric coefficient reliably, the installation of transmitter and receiver can be done as shown in the drawing below.

In this type of installation the metallic wall on the opposite side of the bin can be used for the reflection of the microwave.

The arrangement of transmitter and receiver mustn't be exactly parallel to each other in this installation, because in that case the signal of the transmitter is not reflected to the receiver. The installation should be slightly angled.

According to the rule arriving angle = emergent angle a slightly angled positioning, depending on the distance to the opposite wall, is necessary.

The distance covered by the microwave in the shown installation is nearly twice as long as it is in a face to face installation. The installation of the equipment on one side of the bin is also an advantage in case of shortage of space.



### 3. Electrical Connection

The connection of the microwave barrier takes place according to the figure.

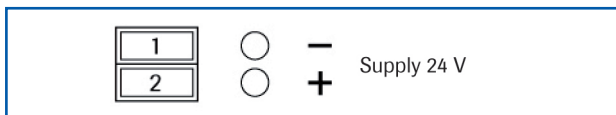


Fig. 4: Transmitter

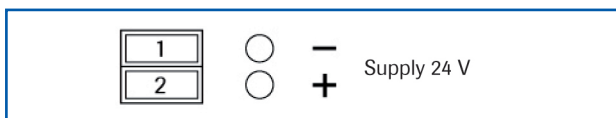


Fig. 5: Receiver

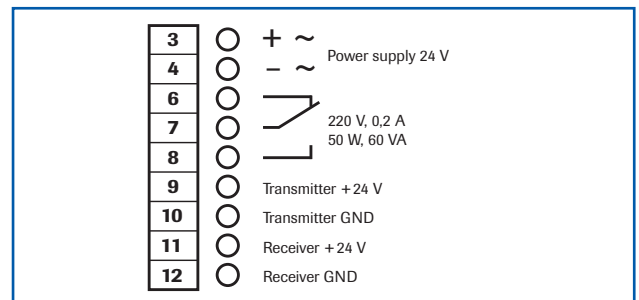


Fig. 6: DIN Rail electronic

A normal installation cable can be used for the 2-wire connection line to the transmitter or the receiver.

### 3.1 Safety Instructions

Marking according directive 94/9/EG:



II 3 D IP 65 T 70 °C

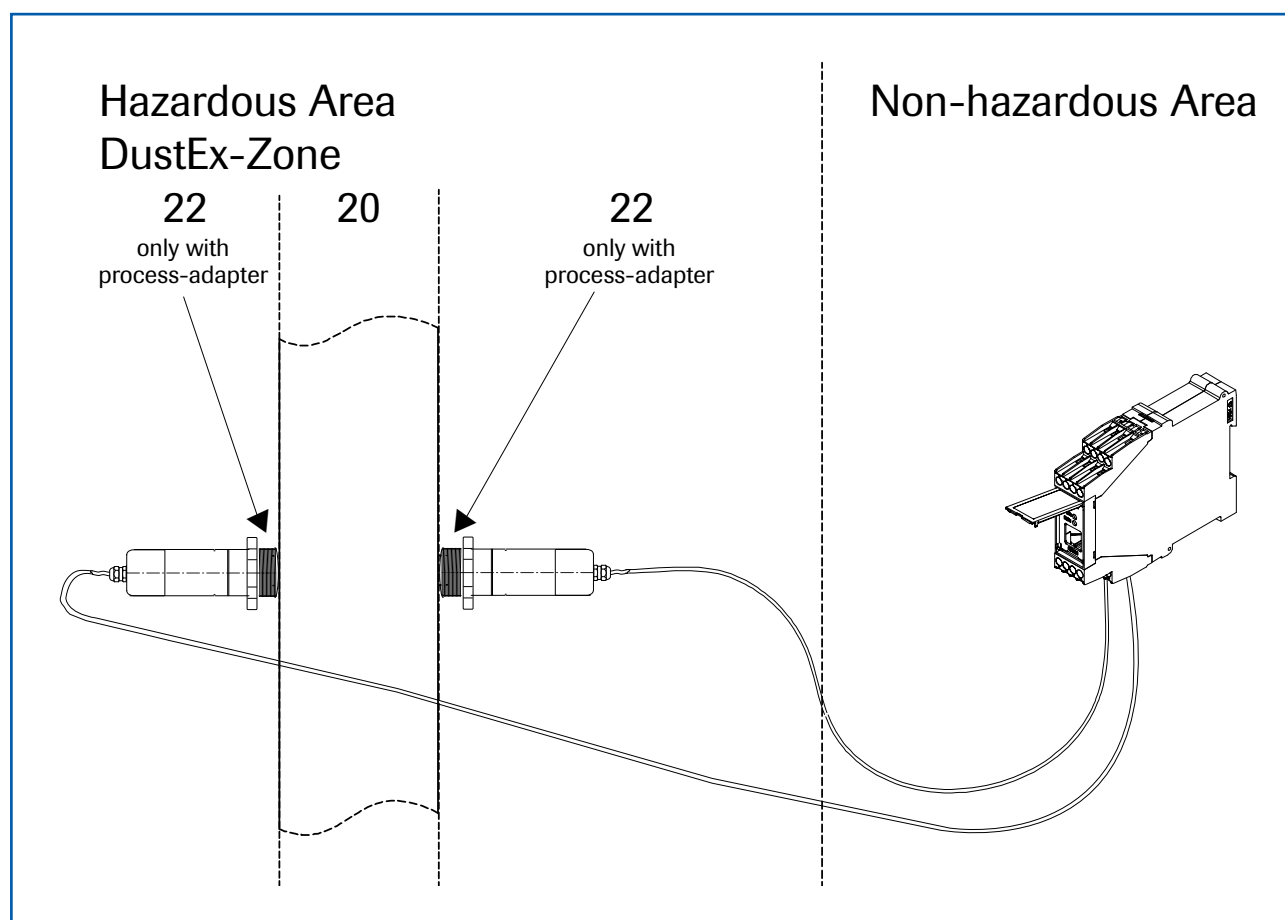
Equipment group \_\_\_\_\_

Equipment category \_\_\_\_\_

For explosive mixtures of air and combustible dusts \_\_\_\_\_

Degree of protection \_\_\_\_\_

Maximum surface temperature at maximum ambient temperature  $T_a = 60\text{ °C}$  \_\_\_\_\_



Equipment Category	Explosive dust/air-mixtures (D)
Category 1	Zone 20, 21 or 22
Category 2	Zone 21 or 22
Category 3	Zone 22

<b>Power Supply</b> (observe typeplate)	Voltage range  Power supply 12 V DC powered by DIN Rail electronic	Max. power consumption  1,5 W
<b>Category</b>	II 3 D Sensor in Zone 22	
<b>Type of protection</b>	Sensor = IP 65 / DIN Rail electronic = IP 40	

#### Safety notes for installation in explosion hazardous areas

1. Comply with the installation and safety instructions in the operating instructions.
2. Install the device according to the manufacture's instructions and any other valid standards and regulations.
3. The device may not be operated outside the electrical and thermal parameters.
4. To maintain the ingress protection IP 65 of the housing, install the housing cover and cable glands correctly.
5. Cable glands and cable entries must be used, which are suited for the category II 3 D.
6. To install the ProGap S in a DustEx-zone you need a process-adapter.

Thermal Data	Category 3 (Zone 22)
Permissible range of ambient temperature	- 0 °C ... + 60 °C
Maximum surface temperature at an ambient temperature of 60 °C	+ 70 °C

## **4. Safety**

The ProGap S was designed, built and tested to be safe and was shipped in safe condition.

Nevertheless persons or objects may be endangered by components of the system if these are operated in an inexpert manner. Therefore the operational instructions must be read completely and the safety notes must be followed.

In case of inexpert or irregular use, the manufacturer will refuse any liability or guarantee.

### **4.1 Regular Use**

- Only original spare parts and accessories of SWR engineering must be used.

### **4.2 Identification of Dangers**

- Possible dangers when using the sensor are marked in the operating instructions.

### **4.3 Operational Safety**

- The microwave barrier must be installed by trained and authorised personnel only.
- In case of maintenance-work on the pipe or on components of the ProGap S-sensor, make sure that the piping is in unpressurized condition.
- Switch off the power supply for all maintenance, cleaning or inspection works on the tubes or on components of the ProGap S.
- Before hot work the microwave barrier must be removed from the installation place.
- The components and electrical connections must be checked for damages regularly. If a damage is found, it is to be repaired before further operation of the instruments.

### **4.4 Technical Progress**

- The manufacturer reserves the right to adapt technical data to the technical progress without particular advance notice. If you have any questions, SWR engineering will be pleased to inform you on possible changes and extensions of the operating instructions.

## 5. Commissioning

All operating controls required for calibration can be found in the receiver.

- P1: Setting the threshold level through sensitivity.
- P2: Setting the delay of the switch-off signal.
- S1: Relay active / passive
- S2: Doubling the sensitivity

- LED 1: shows the switching status of the relay.
- LED on = relay is closed
- LED 2: shows the signal strength through flashing.
- fast flashing = high signal strength
  - slow flashing = low signal strength
  - LED off = no reception signal

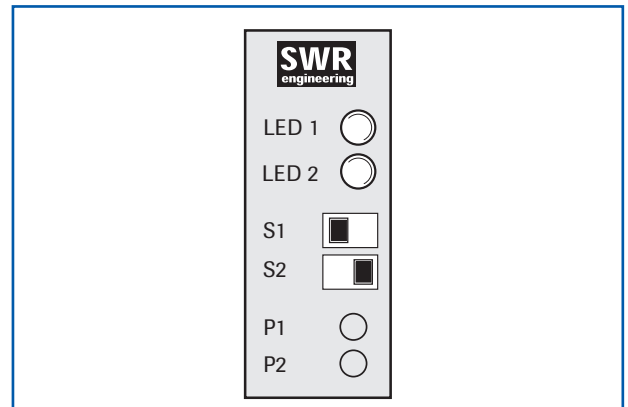


Fig. 8: Position of operating controls

### Set shift pattern with potentiometer P1

The threshold level at which the relay is to be switched is set with potentiometer P1.

The microwave barrier is set so that there are definite differentiations between an interrupted and a muted / non-interrupted microwave beam.

*Procedure:* In case of a non-interrupted beam and **flashing LED 2**, rotate P1 clockwise until the relay switches and LED 1 glows at the same time. Now interrupt the beam (place material to be detected between transmitter and receiver) and only rotate P1 counter-clockwise until LED 1 is turned off. Repeat the process. If LED 1 continues to glow even if P1 is turned all the way to the left, and if the materials are materials with a low dielectric coefficient and weak attenuation (e. g. paper, plastic, foams), then please contact SWR engineering Messtechnik GmbH.

If LED 2 doesn't flash, then set switch S2 to position 2, so that the sensitivity is doubled. If the LED itself does not flash even in this sensitive position, then the receiver is not receiving a signal from the transmitter. In this case, please check the microwave barrier for functionality with regard to the following:

- Wrong alignment between the barriers
- Distance between receiver and transmitter too great
- Too much attenuating material in the beam
- Attenuating crust built up on the sensors

### Set switch delay time with potentiometer P2

Finally, set the switch-on /switch-off time with potentiometer P2 according to its requirements in a range from 0.25 to 5 seconds. A counter-clockwise rotation increases the delay. This can prevent a flutter in the switch relay caused by a critical sensitivity setting.

## 6. Trouble Shooting

In case LED 1 should not light up even during a highest sensitivity being set (potentiometer P1 turned all the way to the right and switch S2 set to position 2) when there is material between transmitter and receiver, there is a possibility that, due to

- the position of the installation locations in relation to each other
- the position of transmitter in relation to receiver or
- too great a distance between transmitter and receiver,

the maximum detection range is limited.

## 7. Notice

- Avoid reflections on metal parts.

## 8. Declaration of Conformity

The described product meets the requirements of the following European directives:

Number: 89/336/EEC

Text: Electromagnetic compatibility

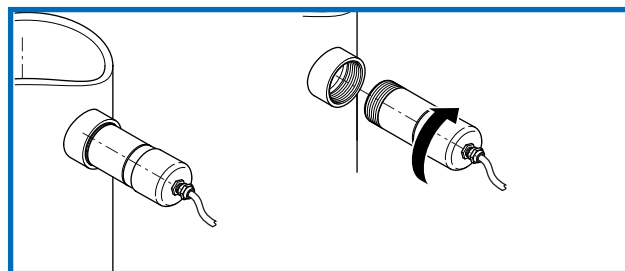
The accordance of the described product with the regulations of Directive No. 89/336/EEC is demonstrated by the complete compliance with the following standards:

Reference number	Issue date	Reference number	Issue date
DIN EN 55011	2007	DIN EN 61000-4-3	1997
DIN EN 61000-1		DIN EN 61000-6-1	2002
DIN EN 61000-3-2	2001	DIN EN 61000-6-2	2000
DIN EN 61000-3-3	2001	DIN EN 61000-6-3	2002

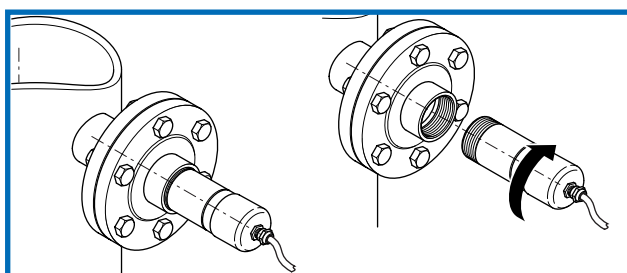
## Mounting types

The ProGap S can be easily installed in the following ways:

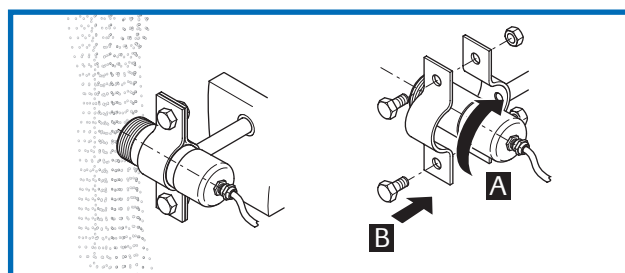
- Screwing it into a G 1½-inch threaded connection,
- using a DN 40 flange or
- using a pipe clamp or other holding bracket.



Thread mounting



Mounting with separating flange



Mounting with pipe clamp

## 9. Technical Data

Sensor	
Material	Housing: Stainless steel 1.4571 Sensor-isolation: POM
Protective system	IP 65
Using in EX-Zones	As ProGap S Ex-sensor in DustEx-zone 20/22 and GasEx-zone 0/2 only with process-adapter
Process temperature	-20 ... + 80 °C -20 ... +220 °C (with process-adapter) max. 1000 °C (with ceramic flange)
Ambient temperature	-20 ... +60 °C
Working pressure	max. 1 bar max. 20 bar (with process-adapter)
Detection range	0 ... 4 m 0 ... 18 m > 18 m (on demand)
Power supply	12 V DC powered by DIN Rail electronic
Power consumption	approx. 1.8 VA
Current consumption	max. 100 mA
Measuring frequency	K-Band 24.125 GHz (± 100 MHz)
Transmitting power	max. 5 mW
Weight	Transmitter: approx. 560 g Receiver: approx. 560 g

DIN Rail electronic	
Power supply	24 V DC ± 10 %
Power consumption	3.5 W
Current consumption	120 mA at 24 V
Relay (max.)	
▪ Voltage	250 V AC
▪ Current	1 A
▪ Capacity	60 W
Fall-delay time	0.25 ... 5 s (continuously adjustable)
Weight	approx. 172 g
Protective system	IP 40



certificated  
according to **ATEX**