EN

Superior with Solids

SWR

ProGap S

with filling-signal-suppression

Microwave barrier

Operating Instructions

SWR engineering Messtechnik GmbH PART OF THE ENVIRONNEMENT S.A GROUP

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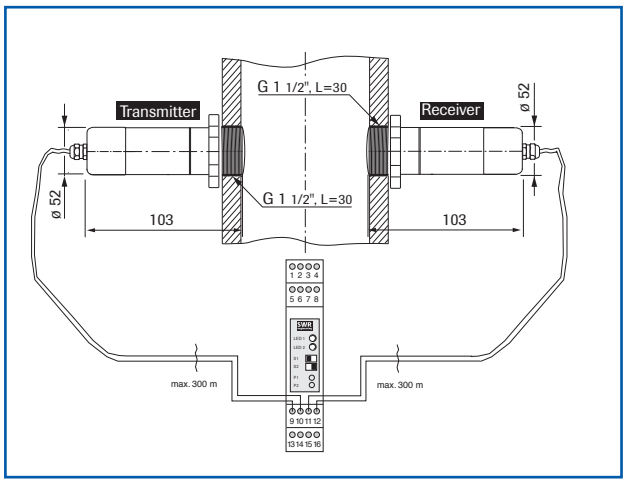
1. General

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.
The filling-stream detection will only work in metal silos, bins, hoppers or containers.

2. Mounting and installation

The transmitter and receiver need to be mounted, in one line of sight and level against to each other. Be aware that the sensors need to be in the same polarization alignment. (The polarization sticker should point vertically up or down).



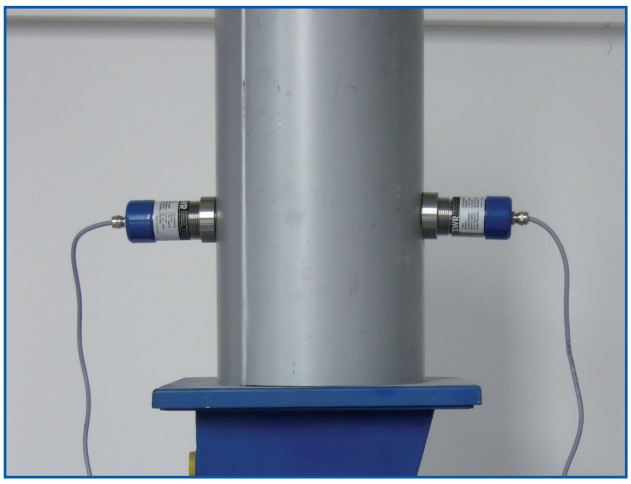
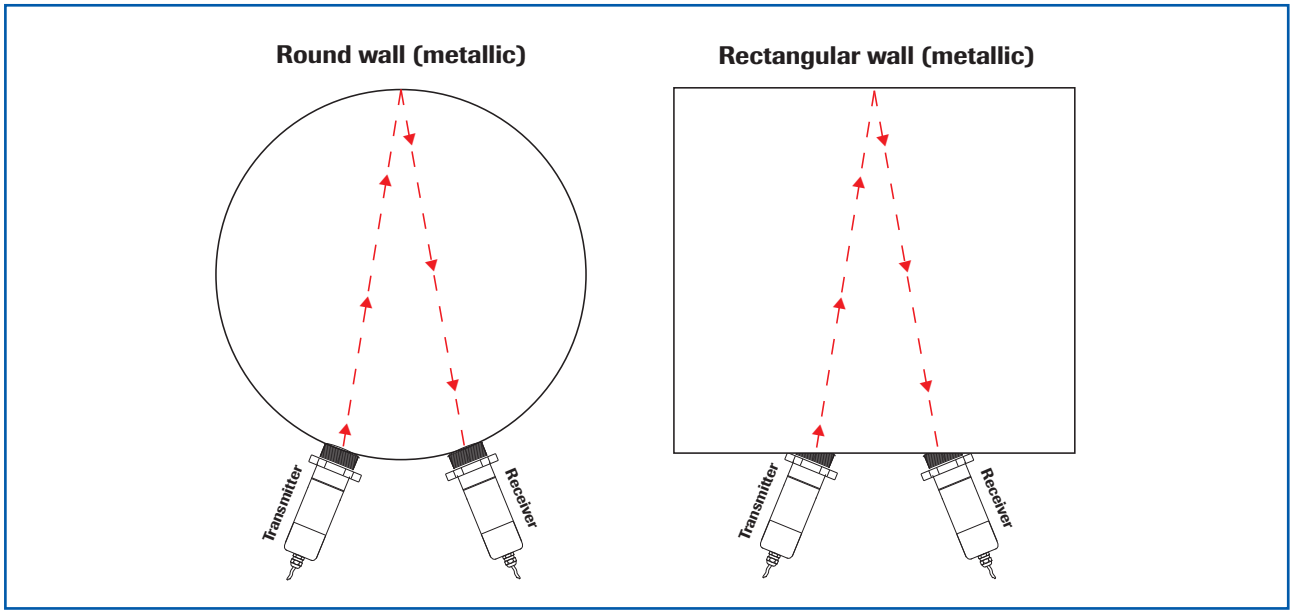


Fig. 1: Mounting

Do not exceed the detection range, nor mount the sensors in high vibration environment's.

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.

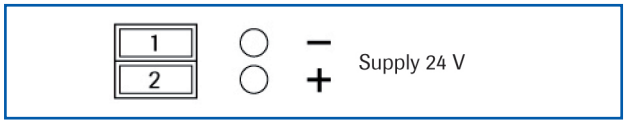


Fig. 4: Transmitter

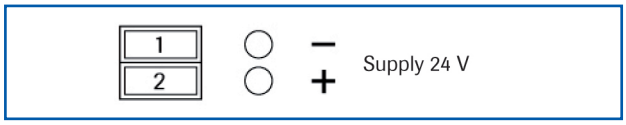


Fig. 5: Receiver

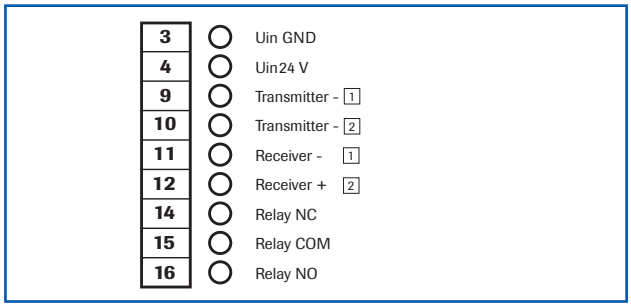


Fig. 6: DIN Rail electronic

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: Ex **II 3 D IP 65 T 70 °C**

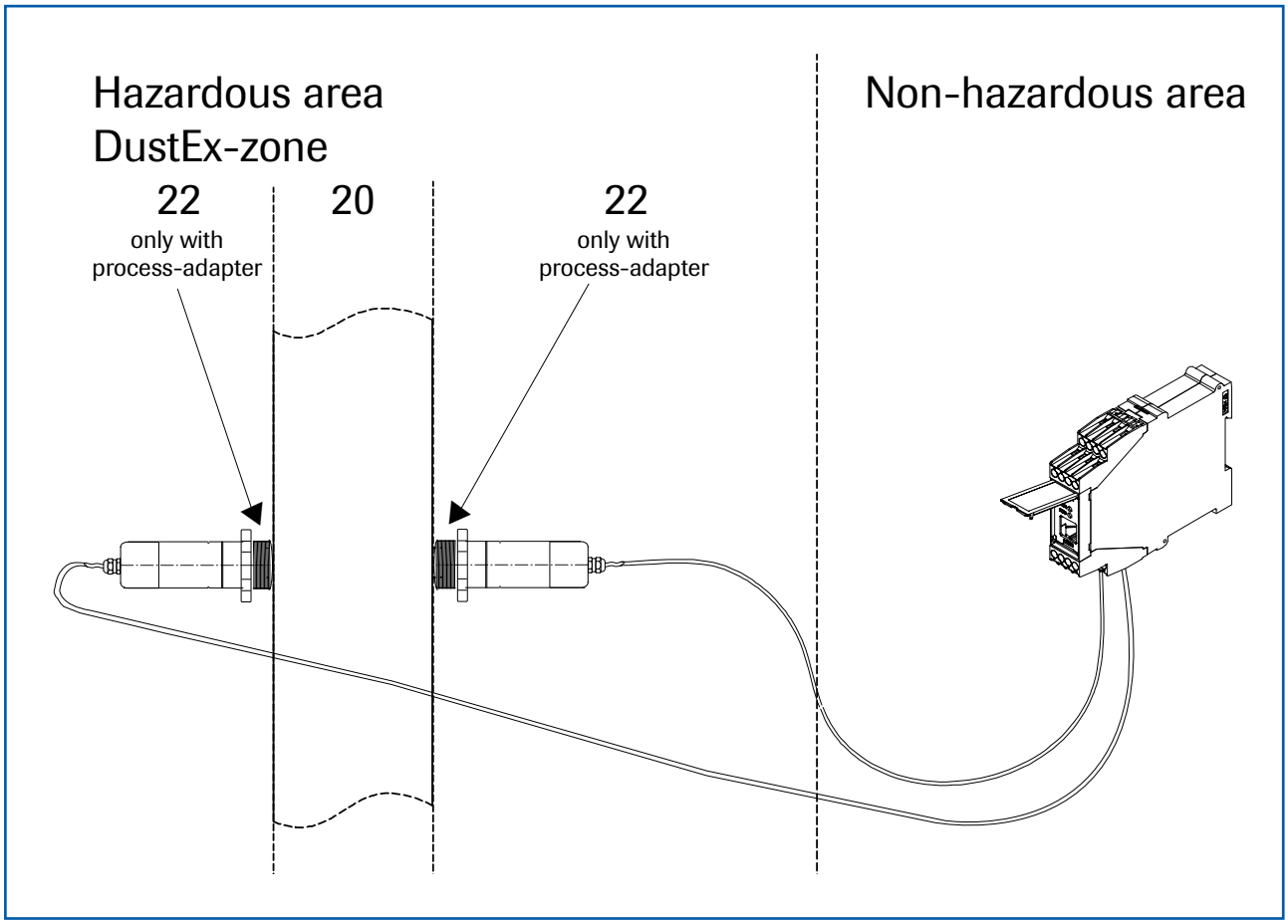
Equipment group — II

Equipment category — 3

For explosive mixtures of air and combustible dusts — D

Degree of protection — IP 65

Maximum surface temperature at maximum ambient temperature Ta = 60 °C — T 70 °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

Power supply (observe typeplate)	Voltage range Power supply 24 V DC powered by DIN Rail electronic	Max. power consumption 1,5 W
Category	II 3 D sensor in zone 22	
Type of protection	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 manufactures 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 unpressurised 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. Menu description

The parameter setup menu is activated by pressing the menu button for more than 5 seconds. After 5 seconds, the display will show a “1” to indicate the present menu-point.
To cycle in the menus, use the “Menu-Button”. You can change the active menu parameter with the “+” and “-“ button.
To exit the menu, cycle in the menu until “7” is shown, save with “+”, when “-“ is pressed, all current changes won’t be saved.
If no key is pressed, for more than 5 minutes, all changes will be discarded.
In normal operation, the 7 segment display is turned off, only the (DP*)
*Decimal Point LED is flashing.

Parameter

Menu item	Function
1	Motion sensitivity DP LED on: high sensitivity DP LED off : low sensitivity Yellow LED on: motion detected Yellow LED off: no motion detected
2	Threshold for motion detection (resolution: 20 steps) DP LED slow flashing: low switching threshold DP LED fast flashing: high switching threshold Yellow LED on: motion detected Yellow LED off: no motion detected
3	Microwave barrier sensitivity DP LED on: high sensitivity DP LED off: low sensitivity Yellow LED on: no material
4	Switching threshold microwave barrier (resolution: 20 steps) DP LED slow blinking: low switching threshold DP LED fast blinking: high switching threshold Yellow LED on: no material
5	Relay falling-delay (resolution 20: steps) DP LED slow flashing: short delay DP LED fast flashing: long delay Yellow LED: The blinking frequency is, 1 to 1, depending on the adjusted delay
6	Switching behaviour of the relay DP LED on: relay switches, if no material is detected DP LED off: relay switches when material is detected Yellow LED on: Material detected, but no movement
7	Exit setup menu Press “+” to save and exit Press “-“ to exit without saving

Note: DP = Decimal Point on the 7-Segment LED

6. Troubleshooting

1. **Transmitter detection**
   No transmitter detected: „S“ will flash the 7-segment-display
2. **Receiver detection**
   No receiver detected: “E” will flash on the 7-segment-display
3. **Saving parameters**
   When the system was not able to save the parameter: “P” will flash on the 7-segment-display
4. **Detection of swapped transmitter and receiver**
   Swapped transmitter and receiver detected: “C” will flash on the 7-segment-display

If several errors are present, they’ll be sequentially displayed on the 7-segment display.

If a sensor error is detected (missing sensor, or transmitter/receiver swapped), the transmitter will turn on LED P1.

In case of corrupt parameters, the transmitter will use the factory defaults, and will continue working.

In case that the microwave barrier will not work, even at maximum sensitivity, please check following possibility’s:

- No material to detect
- Orientation, alignment or polarization not correct
- A too big distance between transmitter and receiver
- Permanent movement, or movement-detection sensitivity to high

7. Declaration of conformity

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

Number: 89/336/EEC
Text: Electromagnetic compatibility

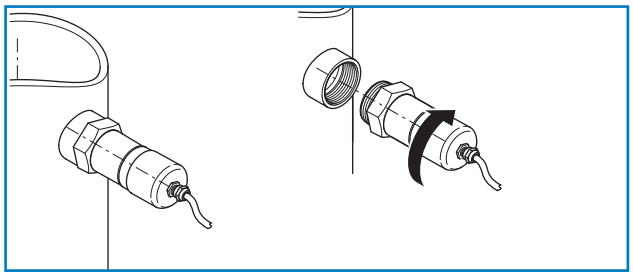
The accordance of the described product with the regulations of Directive No. 89/336/EEC is demonstrated by the complete compliance with the following standards:

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

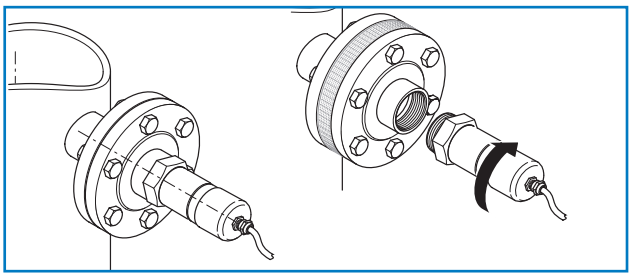
Mounting types

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

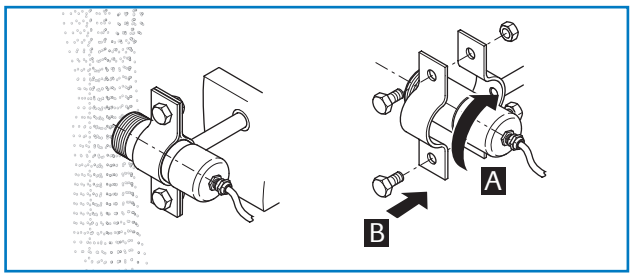
- Screwing it into a G 1½-inch threaded connection,
- using a DN 40 flange or
- using a pipe clamp or other holding bracket.



Thread mounting



Mounting with separating flange



Mounting with pipe clamp

8. 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
Power supply	24 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 ▪ Current ▪ Capacity	 250 V AC 1 A 60 W
Weight	approx. 172 g
Protective system	IP 40

certificated according to ATEX

Superior with Solids SWR

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