

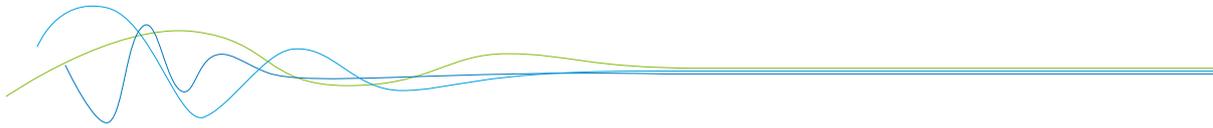


## OPERATING INSTRUCTIONS

# ProGap 2.0

LEVEL DETECTION





## CONTENTS

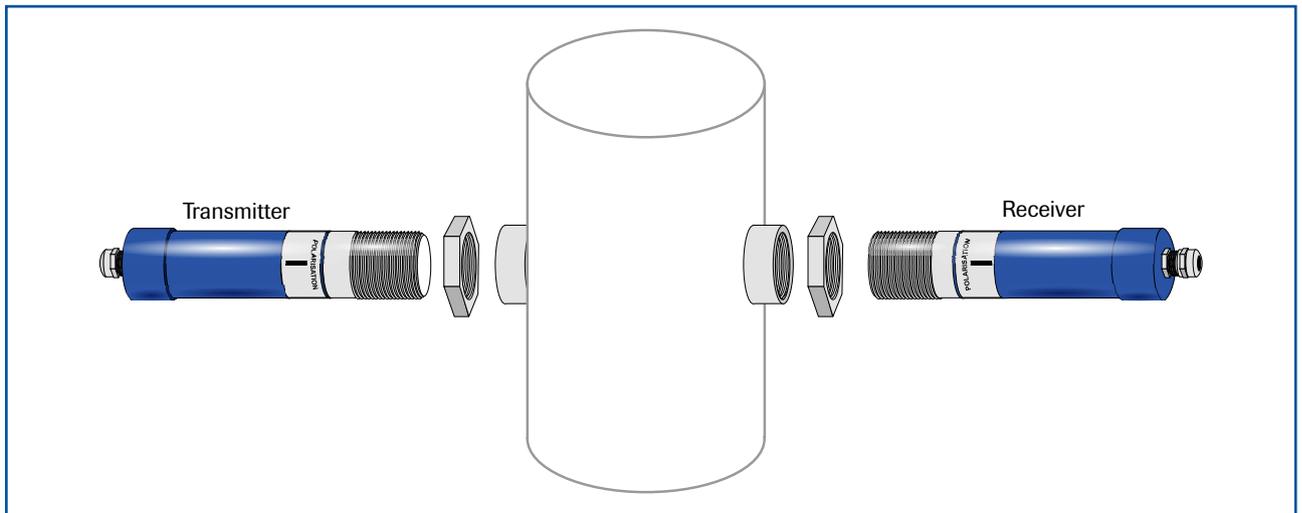
Page

1. General comment . . . . .	3
2. Function . . . . .	3
3. Safety . . . . .	4
3.1 Normal use . . . . .	4
3.2 Identification of hazards . . . . .	4
3.3 Operational safety. . . . .	4
3.4 Technical statement . . . . .	4
4. Mounting and installation . . . . .	5
4.1 A measuring point consists of the following components . . . . .	5
4.2 Required equipment . . . . .	5
4.3 Sensor installation . . . . .	5
5. Electrical connection . . . . .	6
5.1 Electrical connection receiver . . . . .	6
5.2 Electrical connection transmitter. . . . .	6
6. Start-up procedure . . . . .	7
7. Fault clearance . . . . .	8
8. Notice . . . . .	8
9. Technical data. . . . .	9

## 1. General comment

**A measuring point consists of the following components:**

- Transmitter unit
- Receiver unit
- 2 x lock nut for locking transmitter and receiver unit
- G-1½“-socket for mounting the unit



*Fig. 1: Overview measuring point*

## 2. Function

The ProGap 2.0 is a non-contact microwave barrier. The sensor can be used on metallic and non-metallic pipes, tanks, manholes, bellows, etc. The microwave measure through non-conductive materials, such as plastics, glass, etc. This makes it possible to detect with the sensor from the outside or through a window. In this way, the measurement can be completely decoupled from the process. For example to measure aggressive, abrasive or lumpy materials.

Various process adapters can be used to solve applications with temperatures up to 1000 °C, pressure up to 20 bar and all Dust-Ex-Zones. The maximum distance to be monitored between sender and receiver is 25 m.

### 3. Safety

The ProGap 2.0 measuring system has a state of the art, reliable design. It was tested and found to be in a perfectly safe condition when leaving the factory. Nevertheless, the system components may present dangers to personnel and items if they are not operated correctly.

Therefore, the operating manual must be read in full and the safety instructions followed to the letter. If the device is not used correctly for its intended purpose the manufacturer's liability and warranty will be void.

#### 3.1 Normal use

- The measuring system may only be used for level detection. It is not suitable for any other use or measuring system modifications.
- Only genuine spare parts and accessories from ENVEA Process may be used.

#### 3.2 Identification of hazards

- Possible dangers when using the measuring system are highlighted in the operating instructions with the following symbols:



##### **Warning!**

- This symbol is used in the operating manual to denote actions which, if not performed correctly may result in death or injury.



##### **Attention!**

- This symbol is used in the operating manual to denote actions which may result in danger to property.

#### 3.3 Operational safety

- The measuring system may only be installed by trained, authorised personnel.
- During all maintenance, cleaning and inspection work on the pipelines or ProGap 2.0 components, make sure that the system is in an unpressurised state.
- Switch off the power supply before performing any maintenance work, cleaning work or inspections on the pipelines or the ProGap 2.0 components. See the instructions in the section entitled Maintenance and care.
- The sensor must be taken out of the pipeline before any welding work is performed.
- The components and electrical connections must be inspected for damage at regular intervals. If any signs of damage are found, they must be rectified before the devices are used again.

#### 3.4 Technical statement

- The manufacturer reserves the right to adjust technical data concerning technical developments without notice. ENVEA Process will be delighted to provide information about the current version of the operating manual, and any amendments made.

## 4. Mounting and installation

### 4.1 A measuring point consists of the following components:

- 1 x Transmitter unit
- 1 x Receiver unit
- 2 x lock nut for locking transmitter and receiver unit
- 2 x G-1½"-socket for mounting the unit
- 1 x manual

### 4.2 Required equipment

- Certified tools for electrical connection
- 60 mm open-ended spanner for lock nut
- Teflon tape to ensure tightness

### 4.3 Sensor installation

Proceed as follows to install the sensor:

- Define a location with as little vibration as possible.
- A distance of 15 cm to adjacent walls is recommended.
- Weld the sensor sockets, that the transmitter and receiver face each other with their front sides in the same level.
- It is imperative that the sensor socket is free of dirt and deposits.
- If the measuring point is not directly installed, the sensor sockets can be closed with a cap with G-1½" thread.
- It is important to ensure that the transmitter and receiver are given the same orientation and are aligned precisely to each other. (Polarization sticker)
- After successful alignment transmitter and receiver unit must be locked with the lock nut.
- A maximum distance between sender and receiver of 25 m must not be exceeded.
- If transmitter and receiver can not be installed facing each other, installation on one side is possible (Fig. 2).
- If the material to be measured has a low bulk density or low DK value, the transmitter and receiver can be mounted on one side of the pipe (Fig. 2).

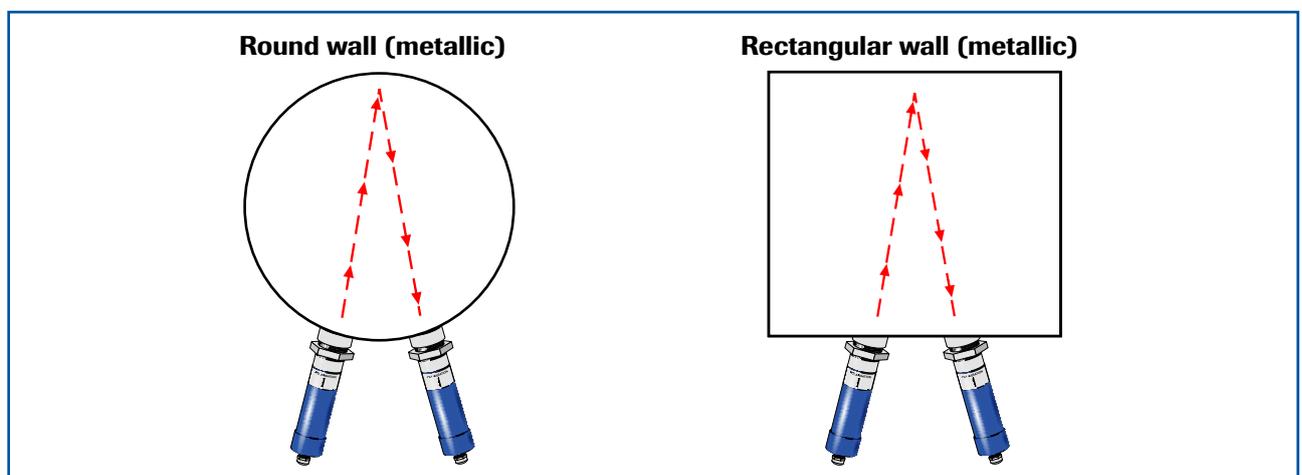
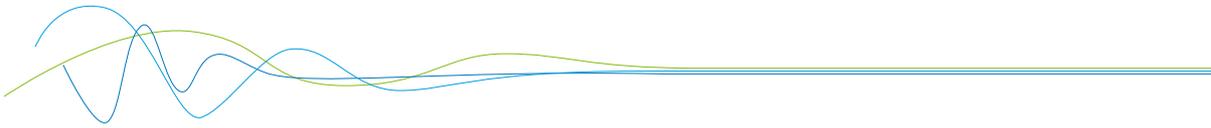


Fig. 2: Installation on one side of pipe



## 5. Electrical connection

The cable length between power supply and transmitter / receiver system is a maximum of 200 m.

A double insulated shielded cable with a minimum cross section of 0.75 mm<sup>2</sup> is recommended. From a cable length of 100 m, the cable cross-section must be increased to 1 mm<sup>2</sup>.

The transmitter / receiver system has an EMV cable gland. This serves for laying a cable shield. The shield should only be placed on the connector in the transmitter unit is additionally fastened with the existing screws. This will ensure that the contacts will not disconnect even on vibrated places. The electrical connection of the transmitter / receiver system is as shown in Figures 3 and 4:

### 5.1 Electrical connection receiver

- |          |                                  |
|----------|----------------------------------|
| <b>1</b> | U <sub>in</sub> +24 V            |
| <b>2</b> | U <sub>in</sub> 0 V              |
| <b>3</b> | Relay contact NC (break contact) |
| <b>4</b> | Relay contact COM                |
| <b>5</b> | Relay contact NO (make contact)  |

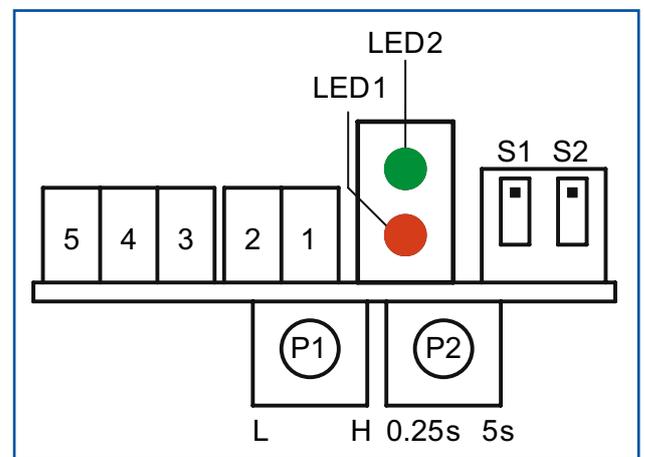


Fig. 3: Electrical connection receiver

### 5.2 Electrical connection transmitter

- |          |                       |
|----------|-----------------------|
| <b>1</b> | U <sub>in</sub> 0 V   |
| <b>2</b> | U <sub>in</sub> +24 V |

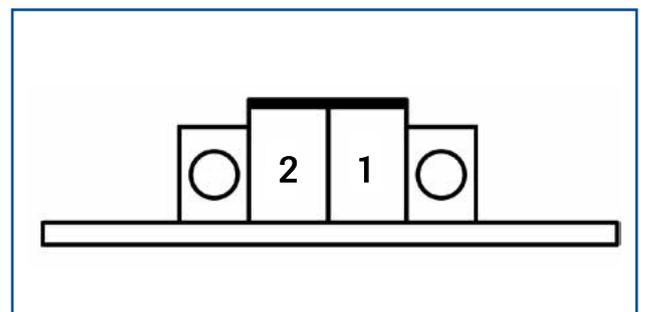


Fig. 4: Electrical connection transmitter

## 6. Start-up procedure

Before the ProGap 2.0 measuring point can be put into operation, the electrical connection should be checked. After the power supply has been switched on, a warm-up time of 5 minutes must be observed. All operating elements required for commissioning are located in the receiver.

### Electrical connection

1	U <sub>in</sub> +24 V
2	U <sub>in</sub> 0 V
3	Relay contact NO
4	Relay contact COM
5	Relay contact NC



Fig. 5: Control elements receiver

### Status LED

**LED 1 red** The flashing frequency of the red LED provides information about the signal strength between transmitter and receiver:

- Fast flashing = high signal strength
- Slow flashing = low signal strength
- LED off = no received signal

**LED 2 green** The green LED provides information about the switching state of the relay contact

- LED on = relay is energized
- LED off = relay is dropped

### Dip-switch

**S1** Changing the state of the DIP-switch S1 will invert the behaviour of relay output

**S2** Switching between near and far range is accomplished by operating the DIP-switch S2. If the state is ON (down-position), the signal will damped and the measurement of smaller distances and low density materials could be possible.

### Potentiometer

**P1** Adjustment of the threshold based on the sensitivity

- Left stop = lowest sensitive
- Right stop = highest sensitivity

**P2** Setting for time delay on the relay contact

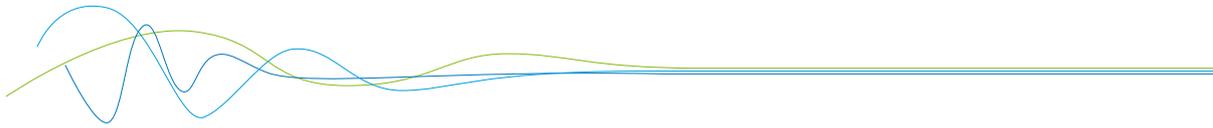
- Left stop = 0.25 s
- Right stop = 5 s

### Adjustment of the signal threshold with potentiometer P1

With the potentiometer P1 the signal threshold can be adjusted, so that the relay should switch. The microwave barrier is adjusted in such a way that clear distinctions between interrupted or damped resp. not-interrupted microwave beam are made.

### Proceeding:

With not-interrupted beam and flashing red LED 1 turn P1 clockwise as long as the relay switches and at the same time the LED 2 shines green. Now interrupt the beam path (put the material to be detected between the transmitter and the receiver) and turn P1 only so far against the clockwise until the green LED 2 disappear. If the green LED 2 still lights, even with a complete left turn of P1, via S2 can be switched in the near range. This switching will attenuate the signal on the sensor side and material detection should be possible. To ensure that the measuring point works properly, this process should be repeated.



### Adjusting of the switch response time potentiometer P2

Adjust the switch response time with the potentiometer P2 according to your requirement between the range of 0.25 and 5 seconds. By turning P2 to left stop, the delay will be 0.25 seconds. At right stop the delay time will be 5 seconds. Thereby a fluttering of the relay can be stopped, which have been produced by critical adjustment of the sensitivity.

### Measuring materials with low bulk density or low DK value

In order to detect threshold levels reliably even for materials with low bulk density or low DK values, the transmitter and receiver unit can also be installed on one side of the pipe (see chapter 4.3, Fig. 2).

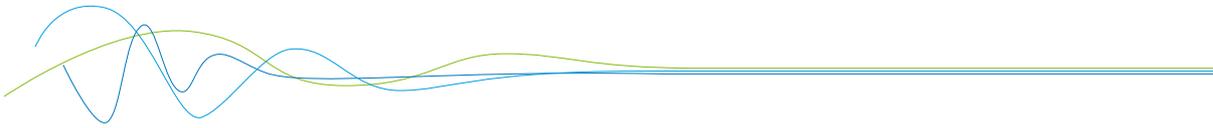
In this installation variant, the opposite metallic wall is used as a reflection surface for the microwave. In this case the orientation of transmitter and receiver must not be exactly parallel to each other. Otherwise there is a risk that the emitted microwave will not be reflected to the receiver. A slightly angled positioning is required. Depending on “angle of dip = emergent angle”, a slightly angled positioning is required depending on the distance of the reflector wall. The distance travelled by the microwave is approximately twice as long with this arrangement compare to an normal installation. This mounting option can also be use in case of less space on one side of the container. The settings of the measuring point are then made as described in chapter 6.

## 7. Fault clearance

Error	Cause	Action
No reaction on relay contact when level reached	Low density of material	Measuring point set to maximum sensitive: - P1 right stop - P2 left stop - S2 OFF  Check installation situation
	Low DK-value of material	
	Transmitter and receiver doesn't see each other	
Red LED 1 doesn't light up	No power supply	Check power supply (24 V DC)
	Transmitter and receiver doesn't see each other	Check installation situation

## 8. Notice

- A minimum distance of 15 cm to adjacent walls is recommended to avoid disturbing reflections.
- In case of less installation space or material with low bulk density or low DK-value, installation on one side of the container is possible.
- Various process adapters are available to protect the sensor, observe ATEX zones or solve difficult process conditions.



## 9. Technical data

Material	Housing: Stainless steel 1.4571 Sensor-Isolation: POM
Protective system	IP65; DustEx (optional)
Process temperature	- 20 ... + 80 °C - 20 ... + 220 °C (with tecapeek-process-adapter) Max. 1000 °C (with ceramic-process-adapter)
Ambient temperature	- 20 ... + 60 °C
Working pressure	Max. 1 bar Max. 20 bar (with process-adapter)
Detection range	0.1 ... 25 m
Power supply	24 V DC (-10 / +15 %) 24 V AC (-10 / +15 %)
Power consumption	approx. 20 VA
Current consumption	approx. 850 mA
Relay contact	Max. switching capacity: 250 V AC Max. start-up current: 6 A Max. breaking capacity 230 V AC: 250 VA Max. switching current DC1: 3/110/220 V: 3/0.35/0.2 A Min. breaking capacity: 500 mW (10 V/5 mA)
Response time	0.25 s ... 5 s (continuously adjustable)
Measuring frequency	K-Band 24.125 GHz / ± 100 MHz
Transmitting power	max. 5 mW
Weight	Transmitter 1.1 kg Receiver 1.1 kg

