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envea™
SWR engineering GmbH

PADDY

Screen break detection

Product Information

Use

In virtually all processes in which solids are processed, they must be ground and then screened.
At the end of these processes there are always at least two fractions: the fine particles, often also referred to as the material flow, and the coarse particles. To date, there has been no easy way to check the material flow for the presence of oversized particles. This unwanted situation often occurs when a so-called screen break occurs.
Unless screen breaks are detected at an early stage, large scrap quantities may be produced or it may be necessary to subsequently re-screen large quantities of material.

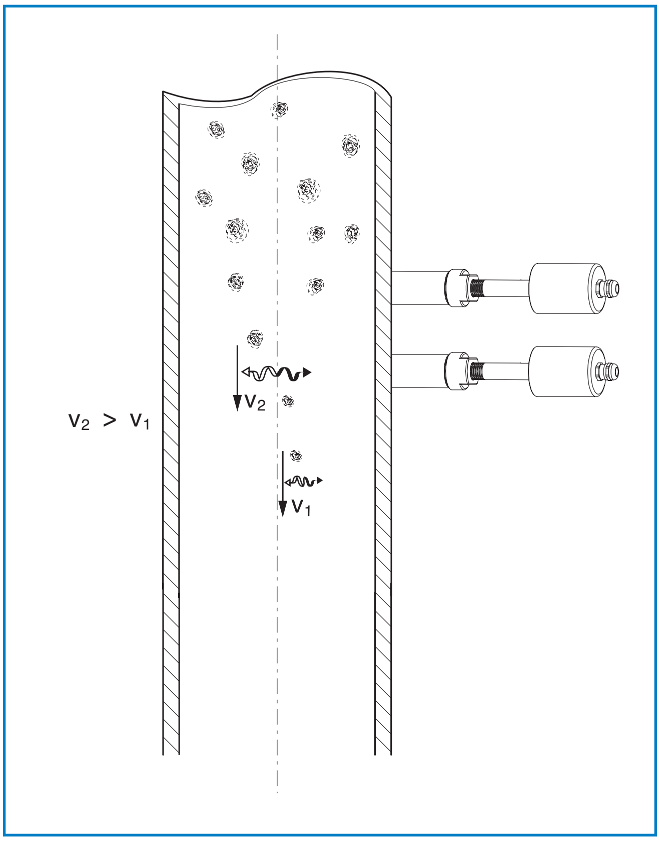
PADDY is a particle sensor that can detect and trigger an alarm in the presence of oversized particles in the material flow. PADDY uses state-of-the-art microwave technology in combination with intelligent evaluation software.

Function

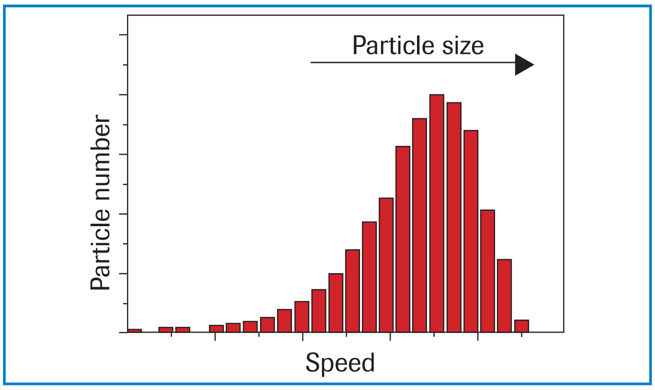
PADDY can be installed in free-fall pipes downstream from screening or grinding systems. Microwaves with a frequency of 24.125 GHz are fed into the product stream and back-scattered by the particles. This scattering effect occurs differently for particles that are significantly smaller than the wavelength of the emitted microwaves (Rayleigh scattering) and particles whose size lies in the same wavelength range as the microwaves (Mie scattering).

Our patented measuring method consists of two microwave sensors, which are installed in a free-fall pipe.
Due to the arrangement of two baffles, all particles in the product flow begin to fall at the same speed.
During the second leg of the drop, differences in the falling speeds occur due to sedimentation - the coarser particles fall at a higher speed than the finer particles.

The frequency spectrum of the backscattered microwave signal contains information about the speed of the particles.



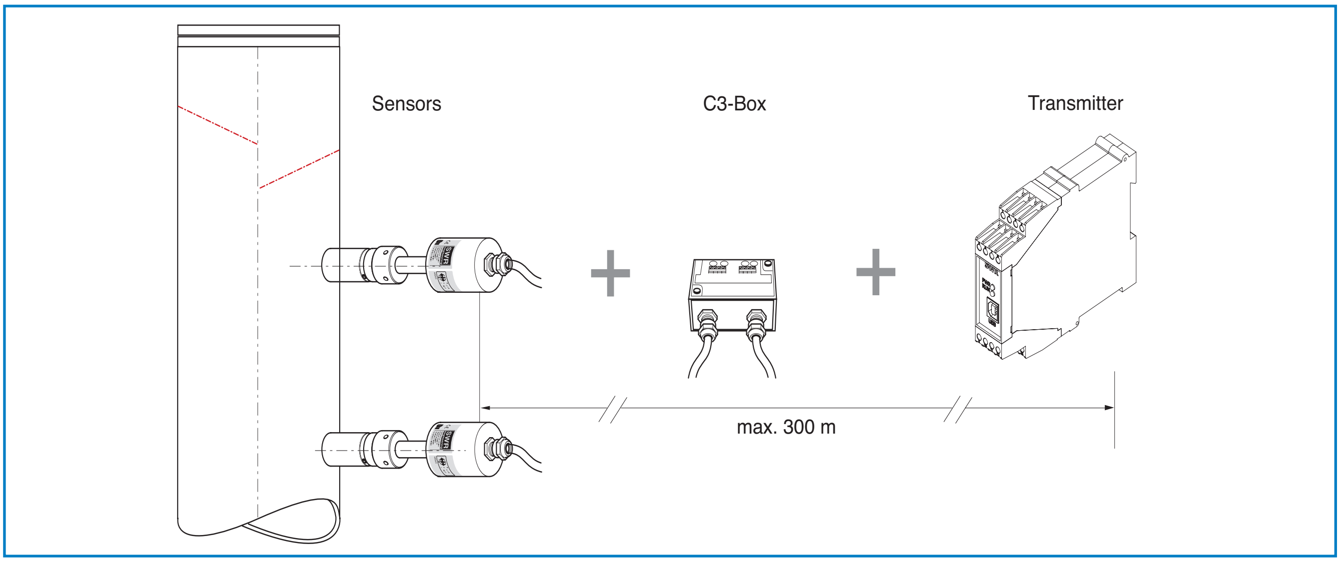
If speeds in the higher range are detected, this directly indicates the presence of larger particles and thus quickly alerts the operator to the possibility of a screen break.



System

The complete measuring system consists of the following components:

- 1 x microwave particle sensor (reference sensor)
- 1 x microwave particle sensor (measuring sensor)
- C3-Box
- Transmitter in DIN Rail or field housing
- 2 x sensor socket for welding on the pipe
- Manual



Assembly and installation

The PADDY measuring point is mounted after the sieve construction and requires a distance of approx. 450 mm. On this freefall, the required welding sockets and baffle plates are mounted. Depending on the sieve, the PADDY measuring point becomes direct mounted on the output or after a compensator.
A PADDY measuring point necessarily requires two sensors and two baffle plates in the pipeline. The baffle plates ensure a controlled flow of material in front of the two sensors.
The positions of the baffle plates and the sensor mounts are determined by ENVEA - SWR engineering, as there may be differences from application to application.
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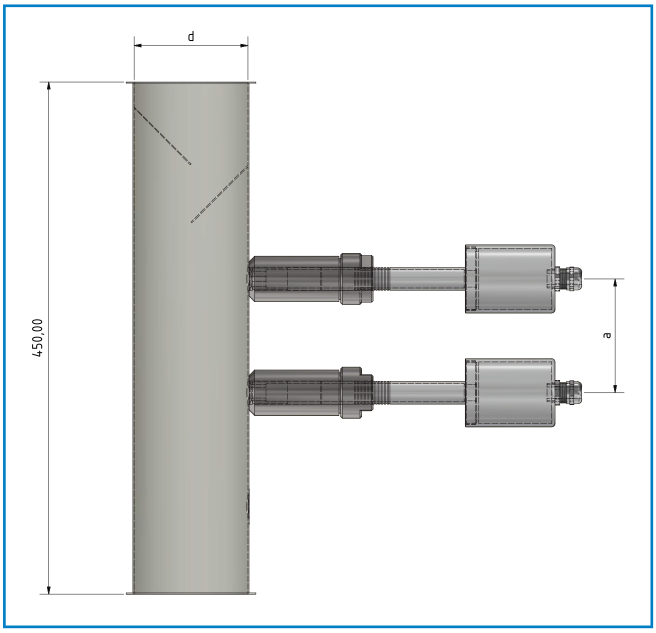

Technical data

Sensor	
Measurement principle	Microwave
Measurement range	Particle sizes up to 10 mm – larger sizes on request
Housing material	Stainless steel 1.4571
Protection type	IP 65, dust explosion zone 20 or gas explosion zone 1 (optional)
Ambient operating temperature	Sensor tip: -20 … +80 °C Optional: -20 … +200 °C Sensor element: 0 … +60 °C
Max. operating pressure	1 bar
Operating frequency	K band 24.125 GHz, ±100 MHz
Transmission power	Max. 5 mW
Weight	1.3 kg
Dimensions	Ø 60, Ø 20, L 271 mm

Transmitter (DIN Rail)	
Power supply	24 V DC ±10 %
Power consumption	20 W / 24 VA
Protection type	IP 40 to EN 60 529
Ambient operating temperature	-10 … +45 °C
Dimensions	23 x 90 x 118 mm (W x H x D)
Weight	Approx. 172 g
DIN rail fastening	DIN 60715 TH35
Connection terminals cable cross-section	0.2-2.5 mm^2 [AWG 24-14]
Current output	1 x 4 … 20 mA (0 … 20 mA), load < 500 Ω
Interface	ModBus RTU (RS 485) / USB
Pulse output	Open collector - max. 30 V, 20 mA
Relay contact	Max. rated load: 250 V AC Max. peak current: 6 A Max. rated load 230 V AC: 250 VA Max. breaking capacity DC1: 3/110/220 V: 3/0.35/0.2 A Min. switching load: 500 mW (10 V / 5 mA)
Data backup	Flash memory

Transmitter (field housing)	
Power supply	110 / 230 V AC 50 Hz (optional 24 V DC)
Power consumption	20 W / 24 VA
Protection type	IP 65 to EN 60 529/10.91
Ambient operating temperature	-10 … +45 °C
Dimensions	258 x 237 x 174 mm (W x H x D)
Weight	Approx. 2.5 kg
Interface	RS 485 (ModBus RTU) / USB
Cable screw connectors	3 x M20 (4,5 - 13 mm Ø)
Connection terminals cable cross-section	0.2-2.5 mm^2 [AWG 24-14]
Current output	3 x 4 … 20 mA (0 … 20 mA), load < 500 Ω
Pulse output	Open collector - max. 30 V, 20 mA
Relay contact	Max. rated load: 250 V AC Max. peak current: 6 A Max. rated load 230 V AC: 250 VA Max. breaking capacity DC1: 3/110/220 V: 3/0.35/0.2 A Min. switching load: 500 mW (10 V / 5 mA)
Data backup	Flash memory

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