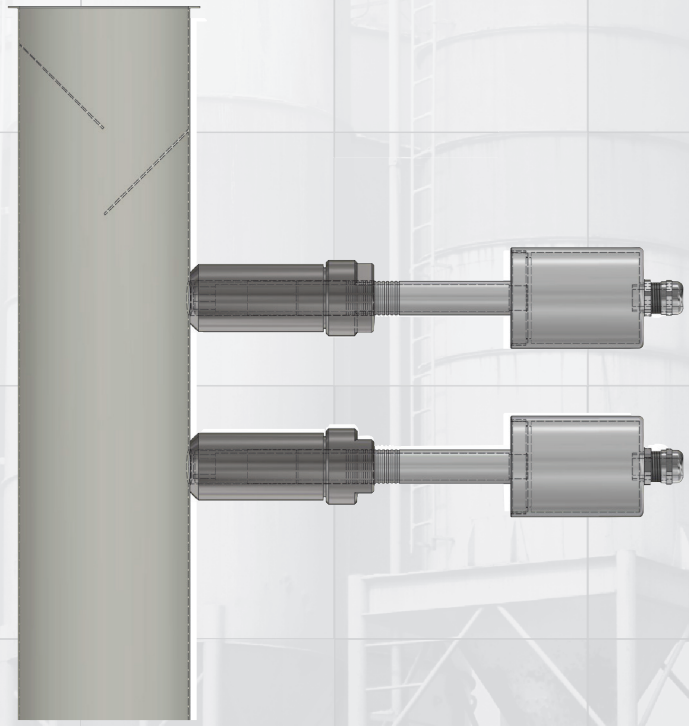
EN

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.

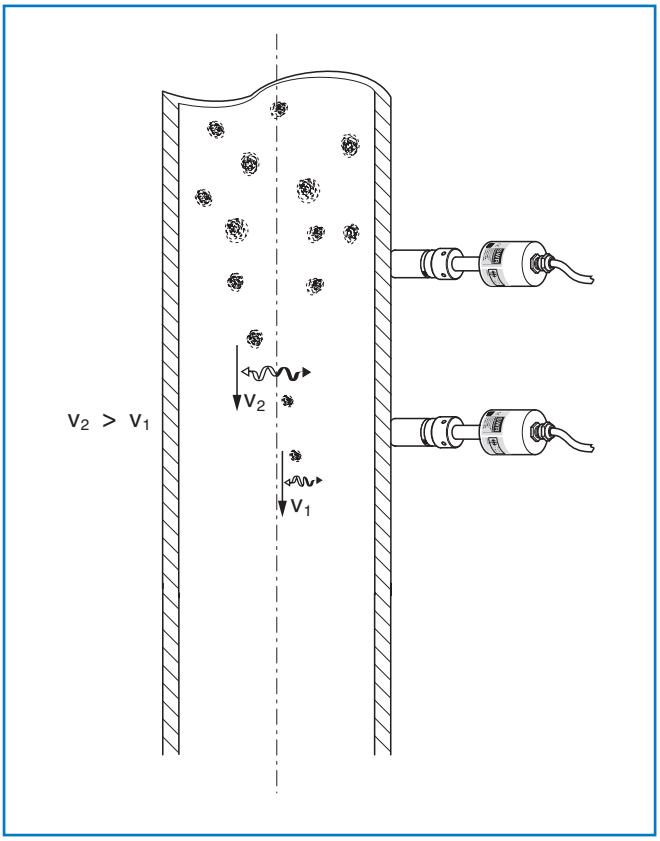
Paddy is a particle sensor that can detect and trigger an alarm in the presence of oversized particles in the material flow. Paddy uses state-of-the-art microwave technology in combination with intelligent evaluation software.

Function

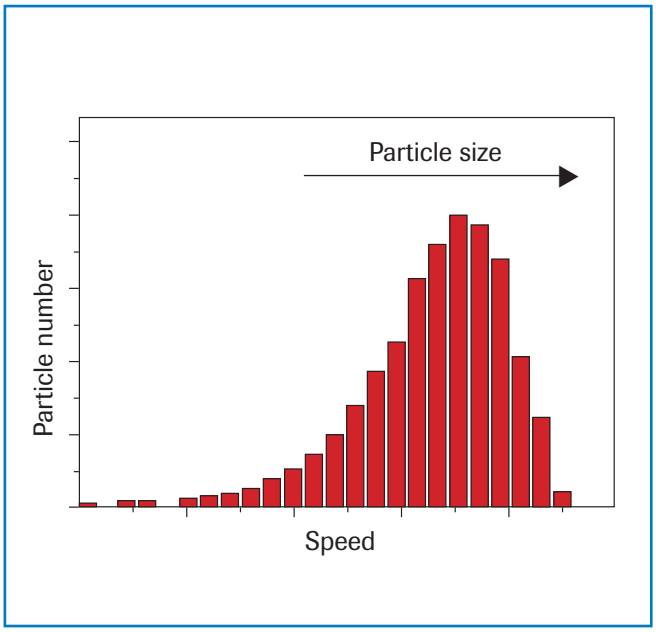
Paddy can be installed in free-fall pipes downstream from screening or grinding systems. Microwaves with a frequency of 24.125 GHz are fed into the product stream and back-scattered by the particles. This scattering effect occurs differently for particles that are significantly smaller than the wavelength 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.



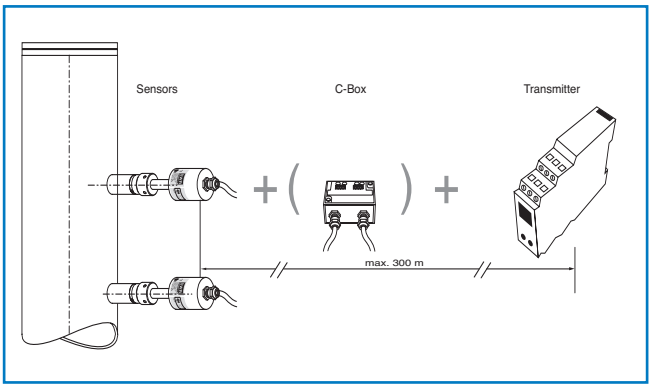
If speeds in the higher range are detected, this directly indicates the presence of larger particles and thus quickly alerts the operator to the possibility of a screen break.



System

The complete measuring system consists of the following components:

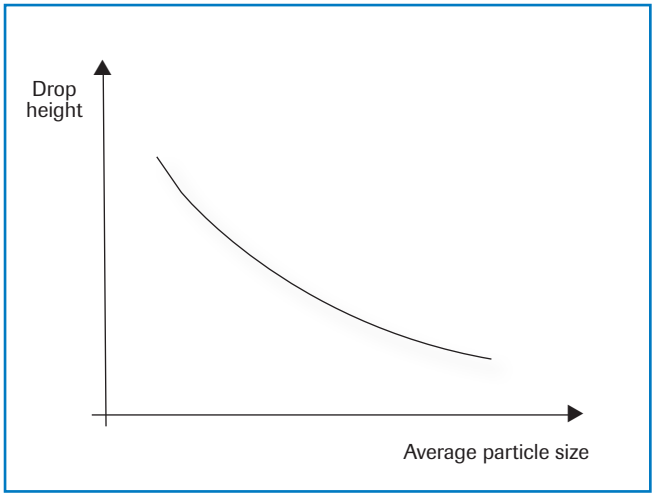
- Measuring tube with sensor holders
- 1 x microwave particle sensor (reference sensor)
- 1 x microwave particle sensor (measuring sensor)



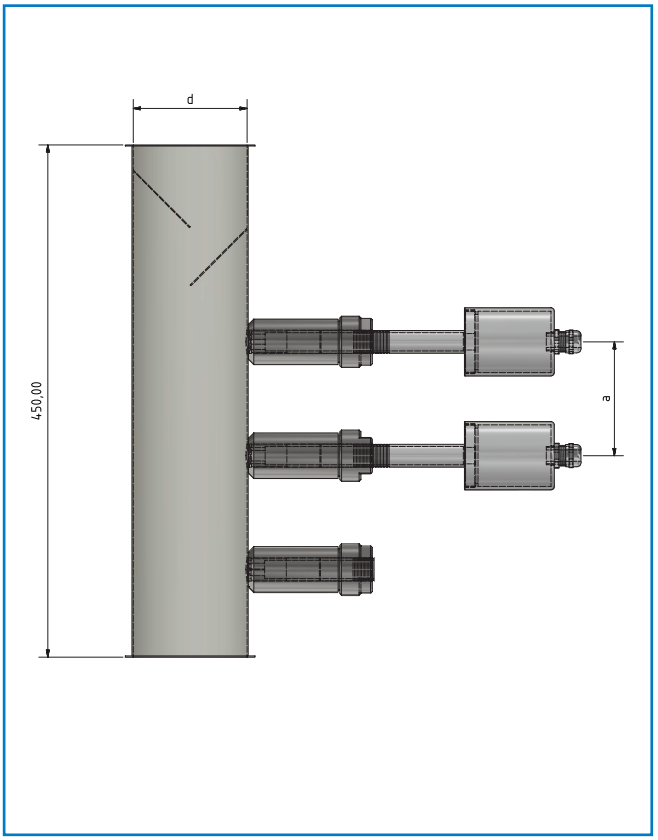
Assembly and installation

The measuring tube is available in the diameters 100, 150 and 200 mm and has an installation height of 450 mm.

The drop distance over which the maximum sedimentation rate occurs depends on the average size of the particles in the product flow.



For this reason, sensor holders are provided at various distances along the measuring tube.



Technical data

Measuring tube	
Inner diameter	100, 150, 200 mm
Installation height	450 mm
Housing material	Thin sheet 1.0332 or stainless steel 1.4301
Weight	Approx. 5 kg
Note: Can be arranged by costumer	

Sensors	
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 converter)	
Power supply	24 ± 10 % V DC
Power consumption	20 W / 24 V
Protection type	IP 40 to EN 60529
Ambient operating temperature	-10 … +45 °C
Dimensions	23 x 90 x 118 (W x H x D)
Weight	Approx. 172 g
Connection terminals cable cross-section	0.2 – 2.5 mm^2 [AWG 24-14]
Current output	4 … 20 mA, load < 500 Ω
Switch output measurement alarm Switch output error alarm	Relay output, either NC (break contact) or NO (make contact) – max. 250 V AC, 1 A
Field bus communication	ModBus RTU (RS 485)
Data backup	Flash memory

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