

Density measurement under all circumstances

with highly available and reliable radiometric measurement

White Paper



Density measurement in the Mining and Metal industry

In the Mining industry ores are crushed and milled to a fine powdery state. For further processing, the powder is mixed with water to form slurry. This highly abrasive suspension is pumped through pipes of various diameters in different process stages.

The process steps have one common point. For most of them it is vital to measure the density of the slurry in the pipes **to monitor the process of extracting** metal from ores properly.

In this demanding environment, radiometric measurement offers a perfect solution. A nucleonic source inside a source container is placed on one side of the pipe emitting gamma radiation through the pipe. Directly opposite, a detector is placed. The amount of radiation at the detector depends on the media density in the pipe - higher density causes more absorption thus less signal. The detector finally transfers the gamma signal into a density value with high accuracy and high repeatability.

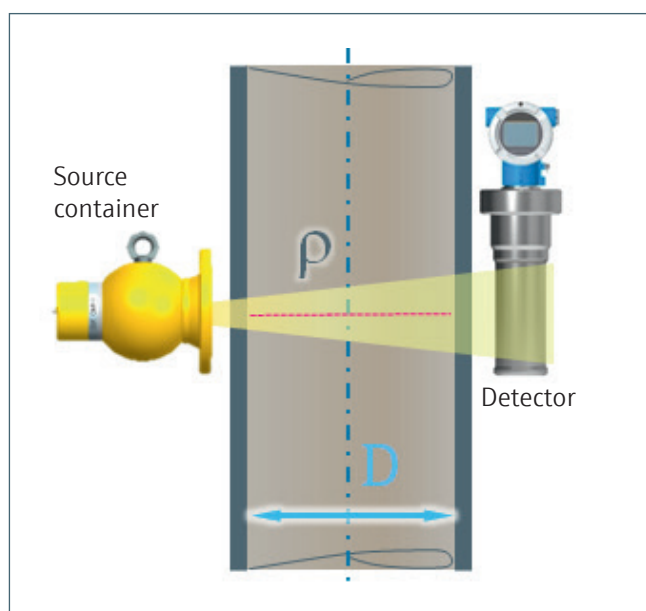
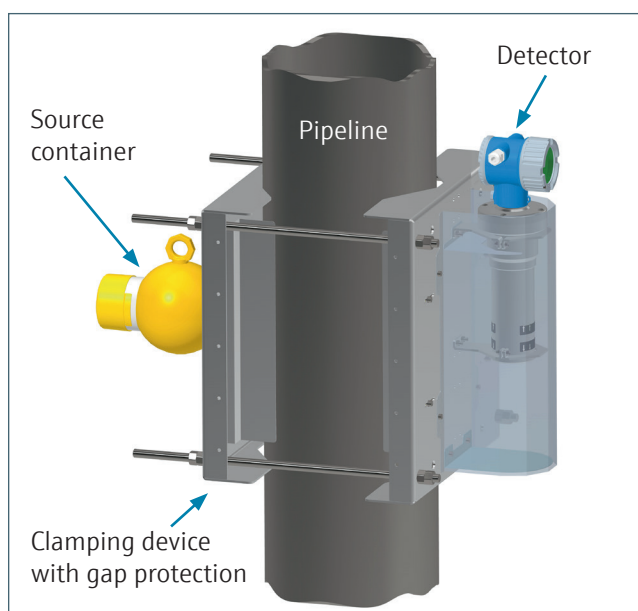


Figure 1: a) Schematic of a density measurement



b) Mounting arrangement for 12" pipe

Customer requirements	Radiometric solution
Measurement non-invasive	Abrasive media is not a problem
Minimal installation effort	Clamp on to existing pipes
Large density range	1kg/m ³ ... 3000kg/m ³
Common range	1000kg/m ³ ... 1800kg/m ³
Fits most pipe diameters	DN50 ... DN1200

The best fit of the above-mentioned industrial challenges is offered with a detector which is **highly resistant to vibration**, easy to install and to setup. Therefore, the Gammapiot FMG50 is the detector of choice when it comes to mining applications. Only 2 wires are needed to connect the detector to the DCS and no additional power supply or transmitter is required. This makes it the easiest Gamma installation on the market.

Application example thickener

After the flotation process and concentrating the suspension to its desired density, the slurry is pumped to the thickener. The idea of the thickener is to simply thicken the slurry thus reducing the water content. What sounds simple is finally very important for a mine because it gets paid for the metal in the concentrate and not for the water in it.

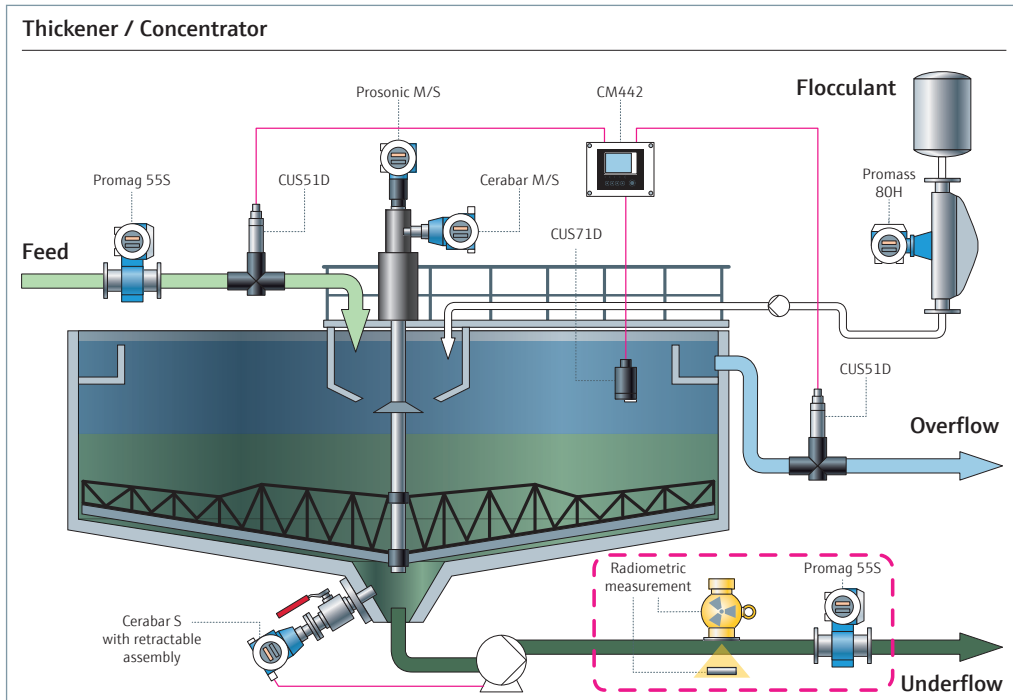


Figure 2: a) Thickener application – schematic installation



Figure 2: b) Thickener application – real installation

A special task of the density measurement at the underflow of the thickener is the combination with a flow measurement giving the operator the mass flow information of their thickener

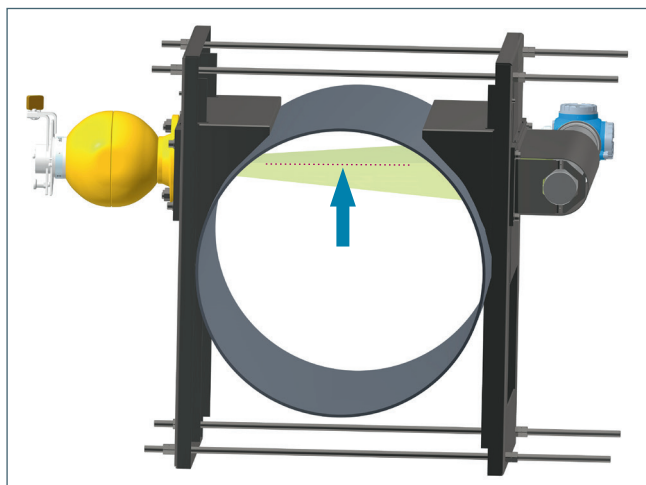


Figure 3: Installation out of center



Figure 4: Installation with new detector and old source

For large pipe diameters bigger than 30", measurement installations can be put out of center in order to reduce the required source activity with a smaller penetration length and thereby giving the best fit solution to the specific measurement requirements. This also ensures that the ALARA (As Low As Reasonably Achievable) radiation rules are followed.

The radiometric measurement is a very reliable and long-term stable principle. Therefore Endress+Hauser offers site surveys to check whether existing sources can be reused and only the detector needs to be renewed. The offering also contains 2-wire detectors which fit to every existing wiring scheme and mounting plates. Thus, the adaption to older measurement systems of various suppliers is very easy.

Commissioning benefits

The Bluetooth functionality enables the remote commissioning of the device. This is particularly relevant for measuring points that are difficult to access. Furthermore, Bluetooth allows the guided step-by-step calibration which reduces errors. One-point calibration algorithms are provided to further simplify commissioning process.

Contact

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg
Germany

Tel +49 7622 28 0
Fax +49 7622 28 1438
info.ehlp@endress.com
www.ehlp.endress.com