

## Determination of solid matter in sewage sludge



To enable a separation of water and solids, a flocculating agent is mixed into the thickened sludge during the sludge de-watering. The polymers used for this process are very expensive and therefore have to be used sparingly. The dosage of the polymers, respectively the concentrated flocculating agents depends on the solid matter content of the sewage sludge.

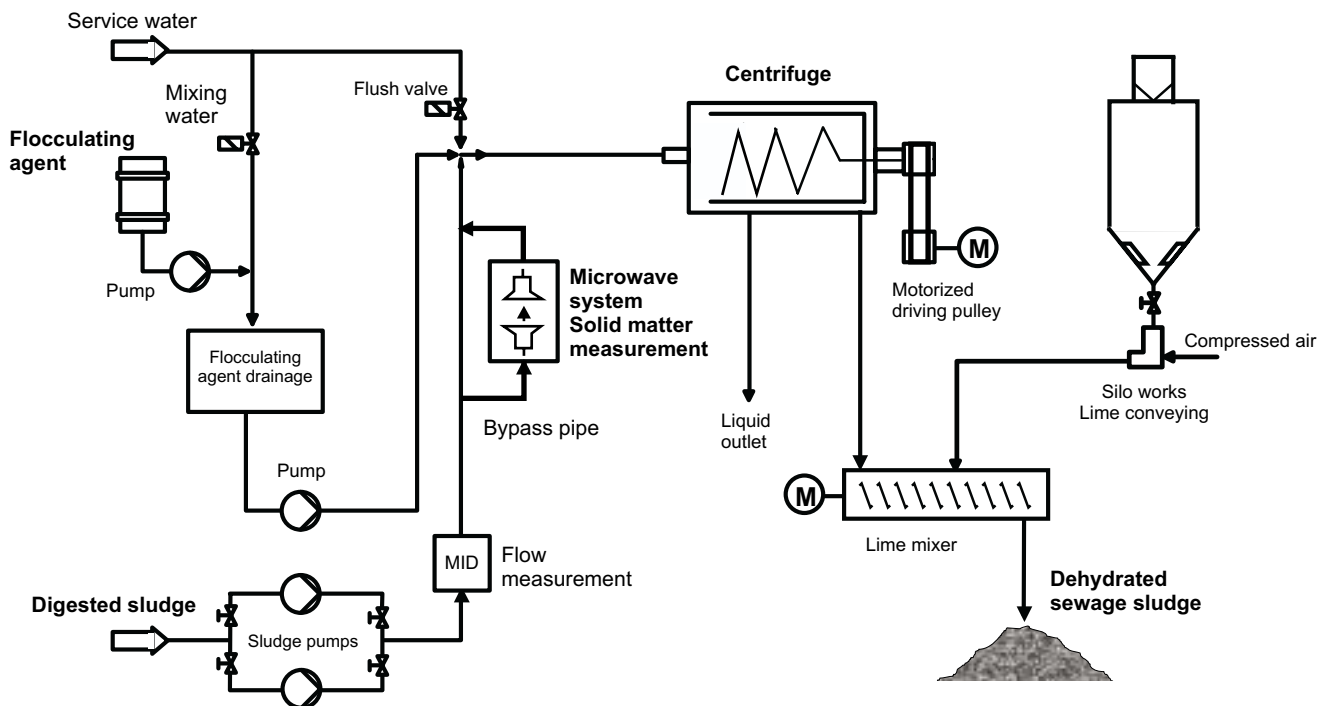
Berthold Technologies have developed a measuring system for this purpose, with which the solid matter content can be determined exactly and reliably.

The flow image/picture of a drainage plant for digested sludge illustrates the measuring task:

The thickened sludge is de-watered by means of high power centrifuge. Before adding the flocculating agent, the solid matter content is determined using the latest microwave technology which then

- a) determines the dosage of the flocculating agent and
- b) allows to feed the centrifuge with a constant solid matter load.

- Advantages:**
- **Considerable reduction in costs by optimising the addition of polymers**
  - **High efficiency by exact control of the solid matter load**
  - **Reliable measurement using only one calibration factor even for different digested sludges**

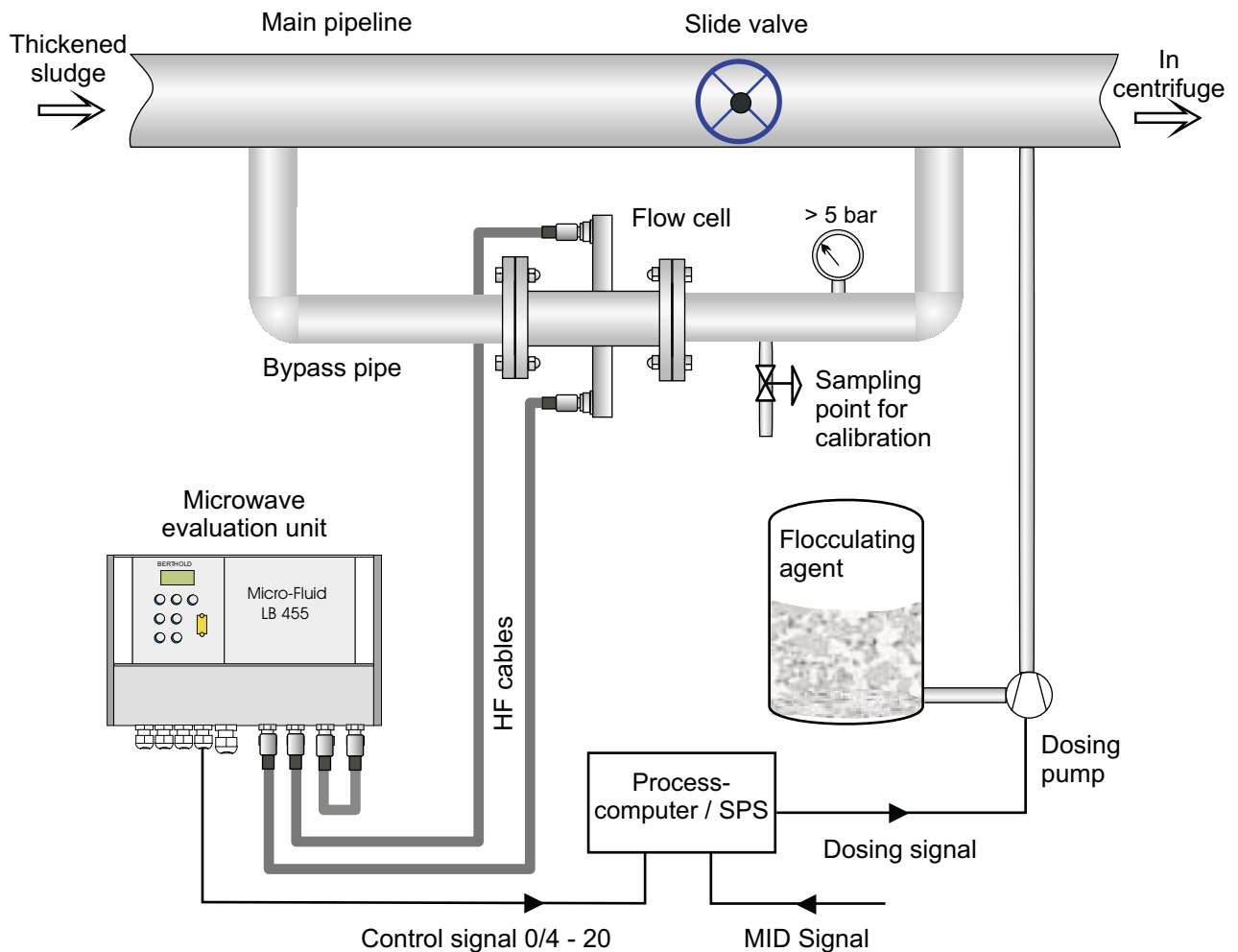


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### Measuring arrangement:

The continuous thickened sludge is led into a measuring cell in a bypass pipe. In order to achieve an even flow, a slide valve throttles the thickened sludge into the main pipeline. In the further flow of the wastewater, a lot of grate material and abrasion causing solids can be found. These lead to a considerable amount of maintenance work on the optical solid material measurements. The microwave measuring cell contains no insertions and is lined with smooth abrasive proof plastic.

- Advantages:**
- **Representative measuring results by detection of the whole material flow in the bypass pipe**
  - **Maintenance friendly and high abrasion resistance because of smooth inner lining without any inserted sensors as opposed to optical measuring systems with cleaning equipment**
  - **Physiologically safe PTFE lining**



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### Measuring principle:

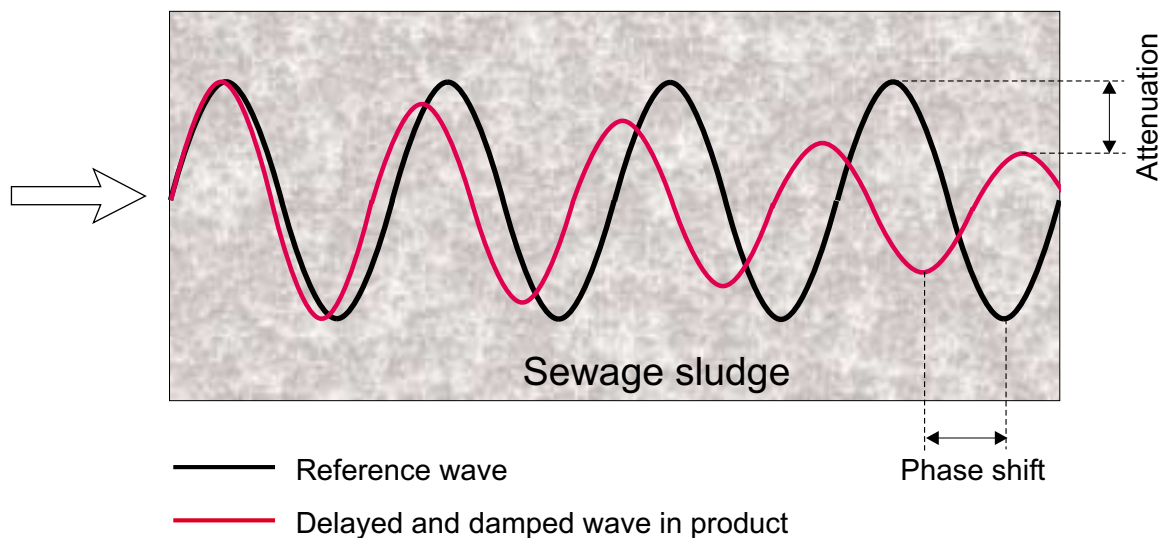
The water content of the sewage sludge causes a high reaction to the microwaves due to the molecule structure of water. If an electromagnetic wave passes through the sewage sludge, the speed and the amplitude of the wave decrease due to the occurring polarity reversal of the water molecules in the alternating field.

The phase shift and attenuation arising from this, compared with the reference signal can be measured with the measuring system Micro-Fluid LB 455 from Berthold Technologies.

The phase shift and the attenuation are determined over a wide frequency band and subsequently undergo a plausibility analysis.

**Advantages:** *high reliability of the measurement*  
**Achievable reliability:** *< +/- 0,2 Weight-% solid matter content (Standard deviation)*

The graph shows the delayed movement and the attenuation of an electromagnetic wave through the product, which compared with the reference wave leads to phase shift and attenuation which are both a measure for the water content.



All other elements in the sewage sludge practically have no influence on the behavior or propagation of the electromagnetic waves. The phase shift and the attenuation are therefore only dependant on the water content and thus the solid matter content can be definitely determined.

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### Measuring components:

Evaluation unit with microwave part:  
Creates frequencies over a wide spectrum and directly displays the determined solid matter content by means of the phase shift or attenuation. A 0/4-20 mA signal is available for the process control system.  
The complete electronics is available in a standard ABS plastic housing with IP 65. On request, a stainless steel housing with IP 66 can be delivered.



Measuring cell made from stainless steel (1.4301) and PTFE lining

For product temperatures up to 130°C

Nominal diameter 50 mm and 65 mm, use depending on product characteristics

Nominal pressure up to 20 bar.

Flange according to DIN 2527 Form B, thread bearings and Tri-Clamp-Bearings as an option.



We have subsidiaries and representatives worldwide.  
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