

## Determination of solid matter in sewage sludge



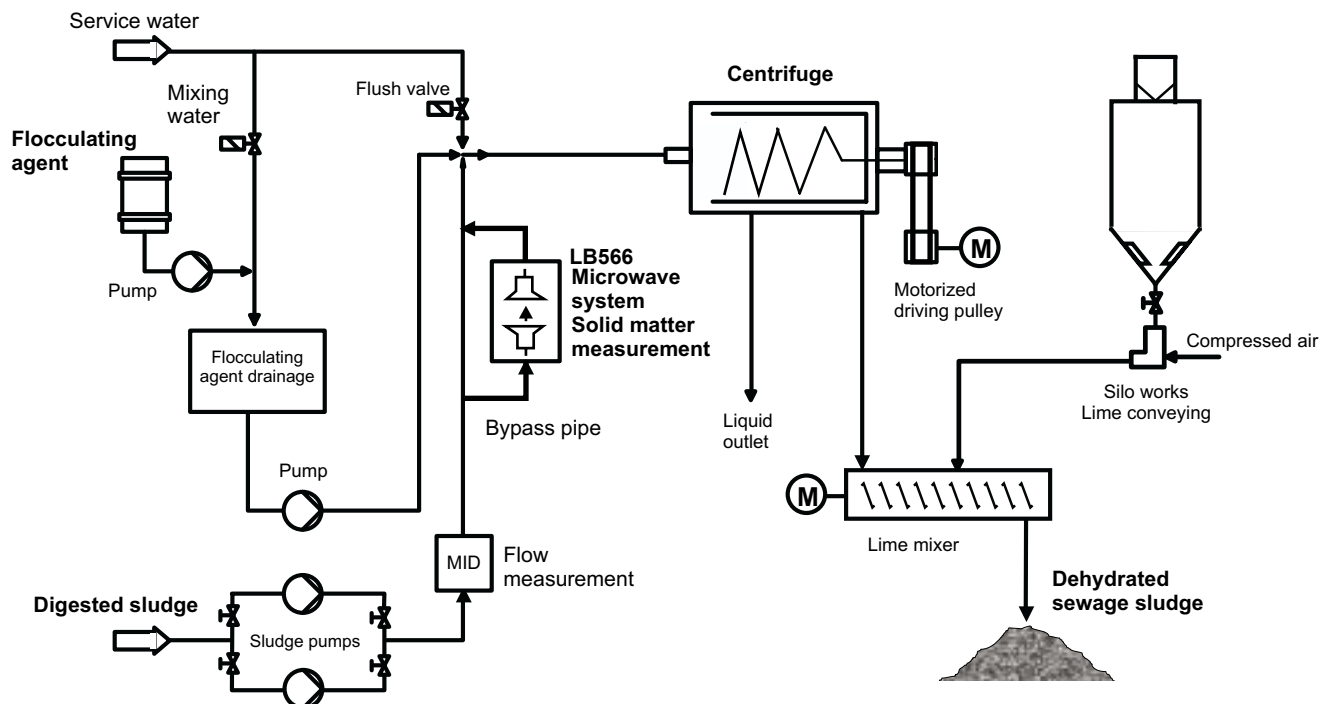
For years Berthold Technologies have been delivering solutions for determining the solid matter in a variety of processes. Their advanced non contact microwave technology provides the perfect solution to the sewage processing industry. Measurements are precise and reliable.

At a certain stage of the waste water treatment process thickened sludge is dosed with a flocculating agent, and is then de-watered by centrifuge. Under dosing and over dosing the amount of flocculant is problematic for the efficiency and the economics of the process. In the Berthold system the solid matter is measured continuously and from this the correct dosage is determined.

The general arrangement is shown in the flow diagram below. The microwave system provides the instantaneous dry solids content to the flocculation agent pump controller and also the sewage sludge pump controller.

The advantages of this system are :

- Considerable reduction in costs by optimising the dosage of polymers
- High centrifuge efficiency by exact control of the solid matter loading through feedback to the sludge pumps
- Reliable and repeatable measurement requiring only one calibration factor, even for different digested sludges



# PRODUCT INFORMATION

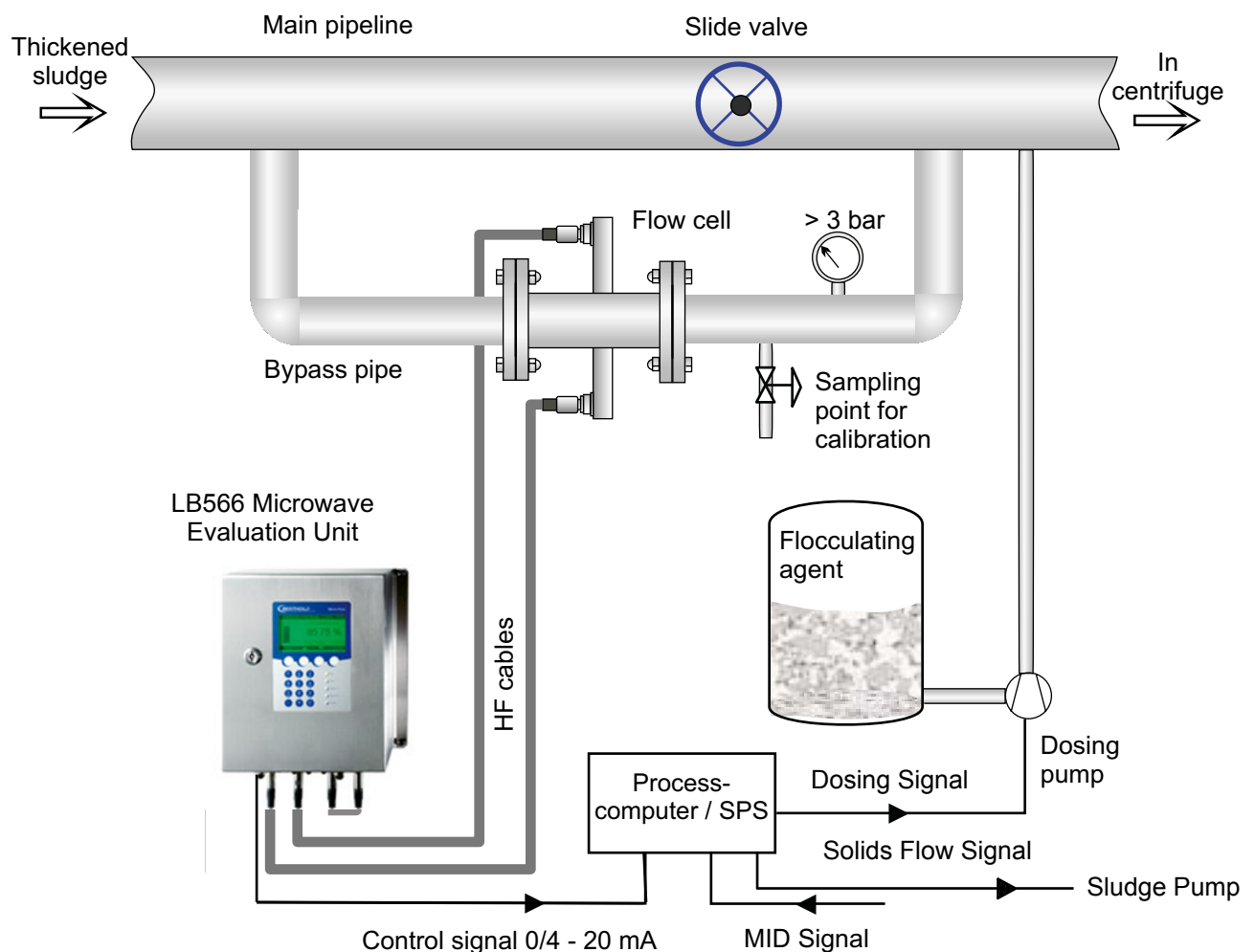
## Measuring Arrangement

The diameter of the main pipeline carrying the thickened sludge varies between treatment plants, typically ranging from 150-300mm. The Berthold measuring cell is available in a range of diameters DN50, DN65, DN80, and DN100. For this reason a representative sample of the thickened sludge is diverted into the measuring cell via a bypass pipe. In order to achieve an even flow, a slide valve installed in the main pipeline creates a pressure differential.

The thickened sludge contains a lot of abrasive materials which are very aggressive on traditional instrumentation. Typically the sensors require a considerable amount of maintenance work and frequent recalibration. By contrast the Berthold microwave measuring cell is lined with a smooth abrasive proof plastic and no part of the sensor protrudes into the flowing sludge.

The advantages of the Berthold microwave system are :

- Provides the true solids content because it measures across the full sample width
- Maintenance friendly because of smooth abrasive proof inner lining
- Extended calibration intervals typically greater than 12 months





6 of 15 Berthold Systems in SIAPP Plant in Paris

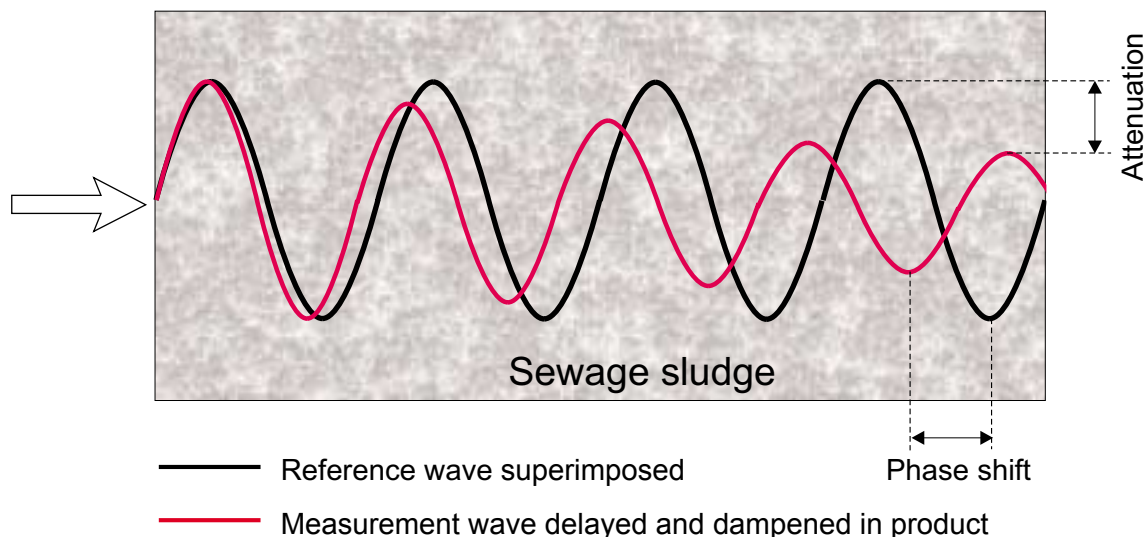


**Microwave Measurement of Solids- By Pass System**

## Measuring Principle

The Berthold microwave system generates two identical microwave signals, a measurement signal and a reference signal. The measurement signal is transmitted to the measuring cell via a cable and after the microwaves pass through the product, is returned to the system for processing via a return cable. The reference signal is transmitted through a single cable, which has the same combined length as the two measurement cables. The molecular structure of water in the sewage sludge changes the speed of the microwaves (phase shift) and the height of the microwaves (attenuation). The magnitude of the changes is perfectly repeatable and directly proportional to the moisture content of the sample stream. The phase shift and attenuation is determined by comparing the returned measurement signal with the returned reference signal. All other elements in the sewage sludge have practically no influence on the behavior of the microwaves.

The graph below shows the reference signal superimposed over the measurement signal as it passes through the sewage sludge, highlighting the phase shift and attenuation of the microwaves. The dry solids content is determined from the moisture measurement,  $\%DS = 100\% - \%Water$ . Repeatability is typically better than 0.2% DS.



The advantages of using an inline microwave measurement system from Berthold are :

- Virtually contactless measuring system
- Low operational costs, minimal maintenance requirements, infrequent calibration intervals
- Selective measuring principle provides high reliability of the measurement
- Reference system provides drift free measurements, repeatability better than 0.2%DS
- Low capital cost, economically priced, minimal operator training required



# PRODUCT INFORMATION

## Measuring Components

### Evaluation Unit

- Creates Microwave reference and measurement signals and directly displays the determined solid matter content (optionally displays %Water)
- Two 0/4-20 mA output signals provide interfacing to process control equipment
- Wall housing enclosure made of stainless steel
- Detailed Technical Data at the end of this document



### Measuring Cell

- Made from stainless steel (1.4301) and PTFE lining
- For product temperatures up to 130 degrees celsius
- Nominal diameter 50mm, 65mm, 80mm and 100mm
- Nominal pressure up to 20 bar
- Various flange and process connection options



Applied Instruments

**BERTHOLD**  
TECHNOLOGIES

## Recent news from Overseas

### Oxford STW Thermal Hydrolysis Plant, England

Project underway and being managed by Veolia Water

2 x LB566 Dewatered Sludge, 0-30%

Process temperature 34 Deg C, Total Flow 12,690 kg per hour

2 x LB566++ Hydrolysed Sludge, 0-20% solids

Process temperature 85 Deg C, Total Flow 13,960 kg per hour

### Putzhagen Sewage Treatment Plant, Gutersloh, Germany

Population of 195,000

2 x LB566++ Digested Sludge, 2-5 % solids measured in 2 x bypass pipes using DN50 measuring cells

16% annual savings in flocculant costs

### TSK, Filtration Systems, Japan

Japans Largest supplier of centrifuges for the waste water industry has ceased using conventional instrumentation for determining solids content. They now install Berthold LB566 system as their standard solution

For more information please contact your local supplier



## Applied Instruments

Telephone: + 64 (09) 579 2633

[www.applied-inst.co.nz](http://www.applied-inst.co.nz)



# Technical Data Micro-Polar

Evaluation Units	
Assembly	Wall housing made of stainless steel (1.4571) HxWxD: 300x323x140 mm or HxWxD: 400x338x170 mm Protection class IP 65 Weight approx. 6.5 or 8.0 kg Graphic LC display (114x64 mm), alphanumeric keyboard and 4 soft-keys
Mains supply	1. 90...265 V AC (45...65 Hz) 2. 24 V AC/DC (DC: 18...36 V, AC: -20...+5 %, 40...440 Hz) 3. 24 V DC (18...36 V)
Power consumption	max. 30 VA (AC/DC) or 48/60 VA (AC/DC)
Operating temperature	-20...+60 °C (-4...+140 °F) or -20...+50 °C (-4...+122 °F) no condensation
Interfaces	RS 232, RS 485
Inputs	
Analog inputs	2 x 0/4 - 20 mA, load 50 Ω, invertible 1 x insulated, 1 x instrument ground
Digital inputs	3 x digital inputs: start/stop, product selection, sample measurement, measurement hold
PT-100 connection	Measuring range -50...+ 200°C (-58...392 °F)
Outputs	
Analog outputs	1 x 4...20 mA, 1 x 0/4...20 mA load max. 800 Ω, insulated, invertible
Digital outputs	2 x relay (SPDT), insulated Configuration options: - collective error message - measurement hold - threshold (min. and max.)

HF Sensor connection	
HF-channels	Measurement and reference channel
HF-cable	Various types and lengths, typical lengths 2...4 m, max. 10 m (distance sensor- evaluation unit)
Sensors	
Antennas	Horn and spiral antennas (Transmitter and receiver)
Measuring cell	Material: PTFE-lining, stainless steel Product temperature: 10...130 °C (50...266 °F) Pressure range: Nominal pressure up to 20 bar, depending on nominal width and type of flange Flange: according DIN or ASA Varieties: Pipe nominal widths: 50...150 mm
Container probe	Material: Plastic, stainless steel Product temperature: 10...120 °C (50...248 °F) Flange: according DIN or ASA Varieties: 1. without flushing device, with PT 100 2. with flushing device, 2 x 3/8" flush connection
Measurement chute	Internal dimensions HxWxD: 360x360x250 mm Varieties: 1. Plastic PP-H, max. temperature 100 °C (212 °F) 2. Ceramics, max. temperature 500 °C (932 °F)
Radio licences	
	FCC, IC, ETSI

The corresponding data applies depending on the product version.  
For details see technical information Micro-Polar.  
Right to implement technical improvements and/or changes without prior notice reserved.

For more information please contact your local supplier



## Applied Instruments

Telephone: +64 (09) 579 2633  
www.applied-inst.co.nz



BERTHOLD TECHNOLOGIES GmbH & Co. KG · P.O. Box 100 163 · D-75312 Bad Wildbad, Germany  
Phone +49 7081 177-0 · Fax +49 7081 177-100 · industry@berthold.com · www.Berthold.com