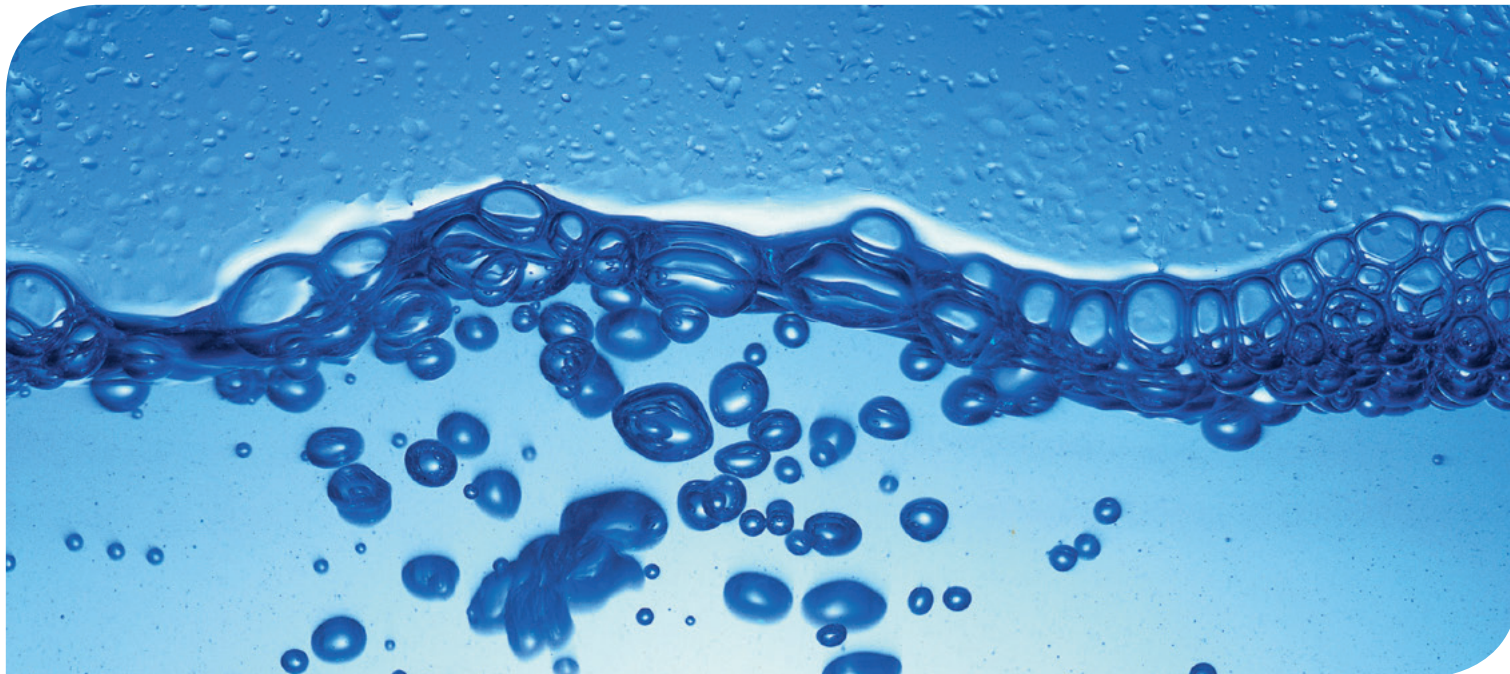


Reliable Management of Wastewater Solids

Valmet Total Solids Transmitter





Valmet TS – Effective Management of Sludge Reduces Capital and Operating Costs

Over the past decades, the waste load burdening our environment has become greater than ever. The measures applied to combat this trend include steadily tightening environmental protection regulations. While these are ultimately necessary and beneficial to us all, meeting the new targets is a challenge for wastewater treatment processes. Valmet focuses on developing new measurement technologies which help to ensure a cleaner environment for us and for future generations. Valmet Total Solids Transmitter (Valmet TS) represents the new microwave technology for the waste water industry. It measures and controls total solids for optimum process performance.

Valmet TS Applications

Sludge pumping from primary & secondary sedimentations / Feed to Thickening

The principal goal of a sludge process is water removal, performed as efficiently and economically as possible. Sludge pumping control based on reliable total solids measurement, and thus optimizing sludge quality early on in the process, is vital for the whole sludge handling procedure. Excess sludge is usually

removed from the sedimentation basins at fixed intervals, which means that from time to time only water is pumped to sludge handling.

The purpose of sludge thickening and pumping control is to increase the solids content high enough for either water removal or digestion.

Digester feed

Maintaining a high, optimized total solids content in the sludge entering the digesters helps to achieve better process control and significant savings. Sludge digestion time can be increased to produce more biogas. As

the entering sludge with optimized total solids content needs less heating energy, even more electric energy can be produced and transferred for the aeration of biological reactors. This will decrease electricity costs, and a higher intake digester capacity means that new investments can be postponed.

Dewatering

Significant savings can be achieved through better dewatering control: a reliable total solids measurement helps to optimize polymer dosing and thus reduce polymer costs. At

Valmet TS benefits

- Lower energy consumption in dewatering, better utilization rate in energy production
- Higher pumping capacity means higher water processing volumes and helps to postpone investments
- Better utilization of solids transportation capacity
- Lower polymer consumption
- Highly efficient use of dewatering centrifuges
- Less laboratory analysis
- Provides higher solids content in sludge

the same time the quality of both the dewatered sludge and centrate water is stabilized. Better dewatering efficiency in turn reduces sludge transport costs and improves incineration efficiency if the sludge is eventually burned. Moreover, dewatering equipment can be run for shorter times, thus lowering their energy consumption and maintenance costs.

Dry Cake

The objective is to seek efficient combustion of the wastewater solids while minimizing fossil fuel consumption. The combustion of the biosolids in the incinerator is achieved by preheating a chamber at the bottom of the incinerator with Natural Gas and feeding the biosolids (sludge) into a fluidized sand bed in the main reactor. In order to maintain a preset temperature range in the main reactor, fuel can also be injected into the reactor depending on the temperature of the fluidized sand bed.

Therefore, one of the key parameters for optimizing the process is the percent dry solids of the sludge being pumped to the incinerator. Until recently, the only effective way to measure this was by manual laboratory analysis, which is a long tedious process. Also, when the results of the analysis are obtained, it is much too late to adjust the burning process. The Valmet TS can be installed in the feed line to the incinerator, immediately after the sludge cake pump. Lubrication water is added in order to minimize friction. Using the Valmet TS, the operator can now proactively adjust the feed rate of both the natural gas and the fuel oil based on the



Valmet's environmental business includes products and services that reduce the environmental load.

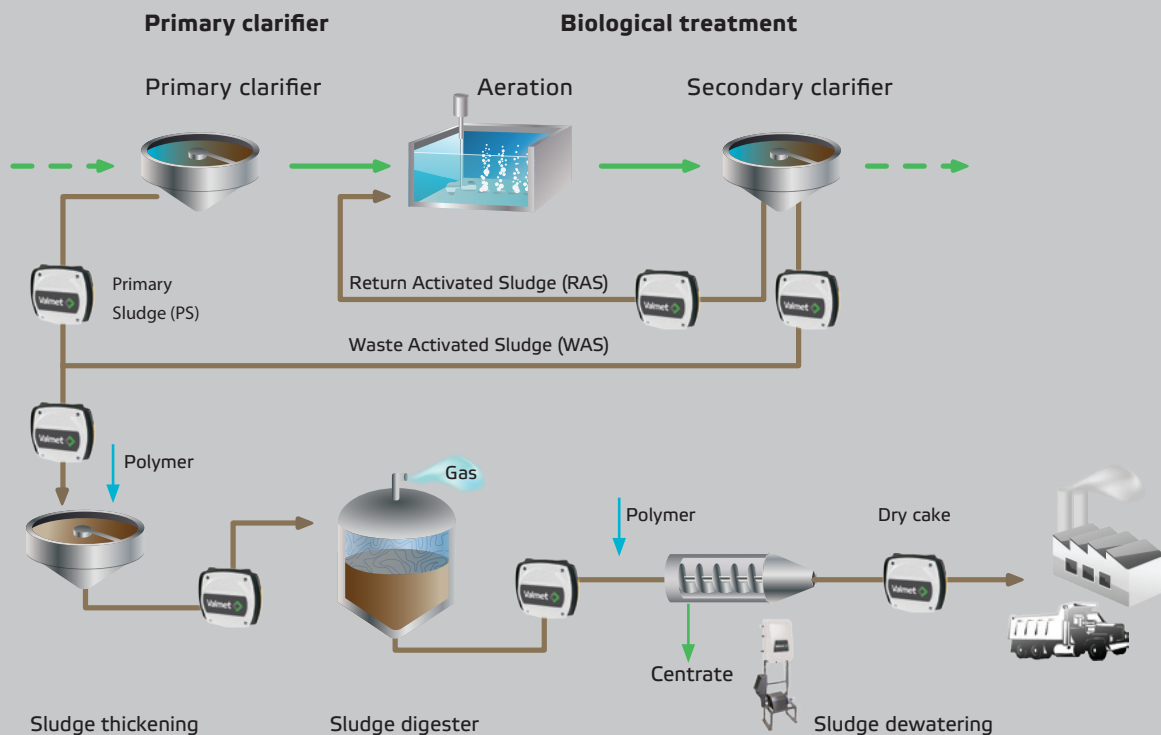
incoming solids of the sludge. This window into this process will also bring significant energy cost savings.

Fewer laboratory analyses

Valmet TS measures total solids continuously and reliably in all applications, and also helps to reduce the amount of laboratory work required.

Notable savings in energy

Microwave transmitters have given excellent results in the total solids measurement of wastewater plants. The achieved energy savings alone are enough to ensure a short investment payback period, ranging from a few weeks to a few months according to the size of the plant.





History of the technology

For more than ten years Valmet's microwave-based solid content transmitters have been used in the process industry for highly demanding applications. Its use, particularly in the pulp and paper industry has become almost synonymous with superior accuracy. Microwave-based transmitters are not affected by changes in process conditions, such as raw material quality, production rate, or contamination.

In addition to its superior measurement technology, the microwave-based transmitter is also practically maintenance free.

Now available for wastewater

Valmet TS has been developed from third generation microwave solids transmitters, combining cost-efficiency with the extreme accuracy of microwave technology. Operating environments are much more benign outside the pulp and paper industry with its high temperatures and aggressive chemicals, and this provided a good opportunity to cut the cost of the measurement.

The new transmitter meets the needs of wastewater treatment plants – with no compromises in accuracy.

Measurement Principle



The basic principle is that the transmitter measures the time of flight of a microwave signal in the process medium. The time of flight is dependent on the permittivity of the measured medium. For organic substances it is practically constant, whereas the permittivity of water is considerably different, thus the measured change in permittivity allows us to calculate the total solids content in the medium. The transmitter flow through design gives a representative measurement and eliminates effectively risk of the plugging.

Advantages

In wastewater processes, microwave technology has many advantages over other types of total solids measurements:

The start-up and calibration performed within a few minutes.

No reaction to changes in the composition of solids, thus allowing reliable single-point calibration.

No moving parts, therefore practically maintenance-free.

Impurities on the ceramic measurement antenna have minimal impact on results, due to representative method of measurement.

Other selectable current output signal: either process temperature or process conductivity (ref. specifications)

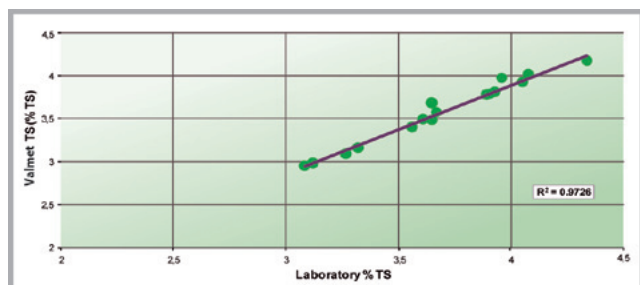
The currently used transmitters are mostly optical and strong contamination – mainly limestone buildup – makes them drift out of range and increases maintenance costs. Valmet TS uses ceramic sensors that are resistant to dirt accumulation and give extremely good, long-term stability.

Communication

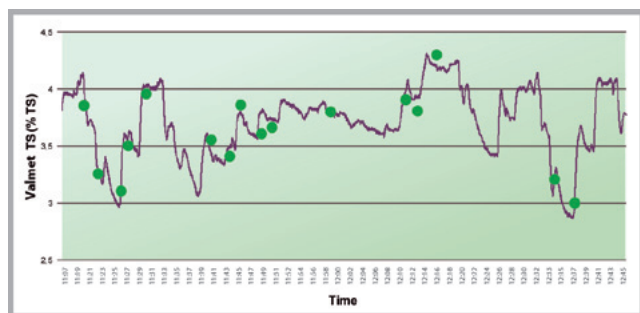
Interfacing with plant control systems is ensured with modern solutions: Valmet TS is available for mA+HART, PROFIBUS PA and DTM-descriptions provide connectivity with FDT-based configuration and operation monitoring systems.

On-site results

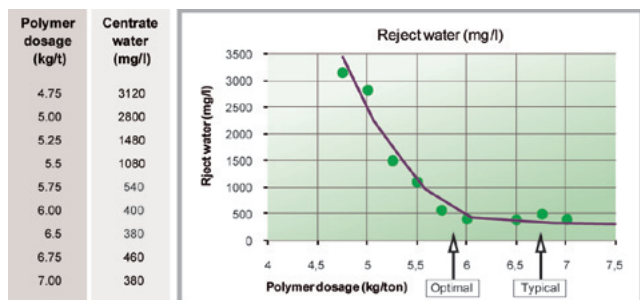
Microwave technology provides excellent correlation to laboratory results. A reliable measurement reduces tremendously the need of laboratory analyses.



Typical fluctuation of primary sludge solids. Especially in multi clarifier systems, it is important to measure and control solids independently of discharge sequences.



Optimum polymer dosage can be defined only by a reliable solid content measurement, saving of 20% in polymer costs can be achieved. Depending on process capacity, the return of investment can be surprisingly short.



Valmet TS enables optimum process controls and cost savings in many different applications.

Example: WWTP, pe= 760,000	Energy consumption (MWh)	Primary sludge: Solids content increase			
		5 %	10 %	15 %	20 %
1. Savings on heating costs/ a					
Needed heating energy (MWh)	10447	9 925	9 402	8 880	8 358
Saved gas m³		81 621	163 242	244 863	326 484
Produced energy (MWh)		415	830	1 245	1 662
Savings / a (kEUR)		24.9	49.8	74.7	99.7
2. Savings on pumping costs					
Primary sludge pumping (MWh)	121	115	109	103	97
Digested sludge pumping (MWh)	187	178	169	159	150
Centrifugal pumping (MWh)	147	140	132	125	118
Centrifugal running hours (MWh)	1358	1290	1222	1154	1087
Total energy consumption (MWh)	1813	1723	1632	1541	1452
Total savings on pumping (MWh)		90	181	272	361
Savings / a (kEUR)		5.4	10.9	16.3	21.7
3. Savings on laboratory work					
Savings / a (kEUR)		5.0	5.0	5.0	5.0
Total savings / a (kEUR)		35.3	65.7	96.0	126.4

Energy price in this example: 0,06 EUR/kWh

Specifications

Measuring range 0 – 40 % TS. If more than 16 % TS, please consult Valmet
 Repeatability ±0.01%Cs
 Sensitivity 0.001 %Cs
 Damping 1 to 99 s
 Ambient temperature –20...+70 °C (–4...+158 °F), protect from direct heat radiation

Valmet TS sensors

Enclosure class IP 65 (NEMA 4)
 Wetted materials FT sensors AISI 316, AISI 316L, Ceramic gasket EPDM, Simrit 483

ATEX Certificate No. VTT 12 ATEX 058X
 II 3G Ex nR IIC T6 Gc

Optional Glass-lined versions available

Operating Unit, TCU

Enclosure class IP 65 (NEMA 4)
 Operating voltage 90...260 VAC / 0.1 A

Outputs:

Current output Total solids 4 – 20 mA
 + HART® 18 to 35 VDC

Secondary output Process temperature/Conductivity 4 – 20 mA 18 – 35 VDC

Inputs: binary inputs 2 inputs, isolated 12 – 48 VDC

Communication PC-connection RS-232
 PROFIBUS PA

Support for Valmet FieldCare

Process conditions

pH-range 2.5 – 11.5
 Process temperature 0...+100 °C (+32...+212 °F)
 Operating pressure Recommended minimum process pressure >1.5 bar (22 psi), No entrained air.
 If less than 1.5 bar (22 psi), please consult Valmet

Vibration max. 20 m/s², 10 – 200 Hz

Pressure rating PN16 bar (232 psi) standard.
 PN100 bar (1440 psi) option for FT100/150/200 (4"/6"/8") sensors.

Conductivity maximum limits in different process temperatures and sensors weights:

	30 °C / 86 °F (mS/cm)	50 °C / 122 °F (mS/cm)	weight (kg/lbs)
FT 50 / 2"	25	25	8.5 / 18.7
FT 80 / 3"	20	20	9 / 20
FT 100 / 4"	18	15	10.0 / 22.0
FT 150 / 6"	13	12	13.5 / 30.0
FT 200 / 8"	12	11	17.0 / 37.5
FT 250 / 10"	12	11	24.5 / 54.0
FT 300 / 12"	10	9	29.0 / 64.0

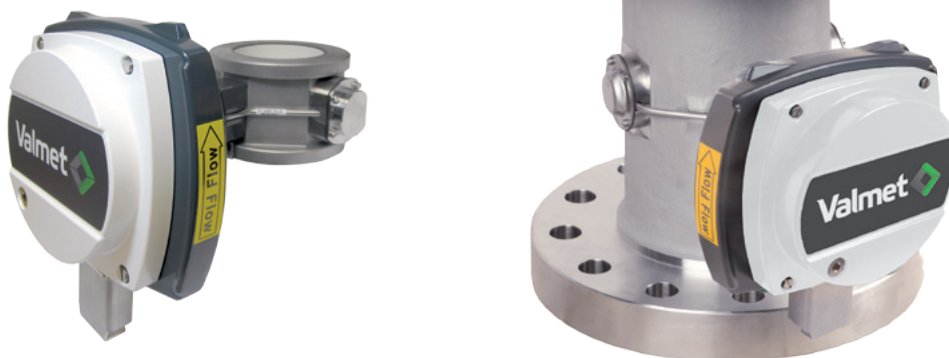


Valmet TS content of delivery

- Valmet TS sensor unit
- Transmitters central unit
- Sensor cable 10 m
- Operating manual



Special sensor versions



- Glass-lined version to avoid grease build-up in primary sludge applications

- High pressure, max 100 bar

For more information, contact your local Valmet office. www.valmet.com
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