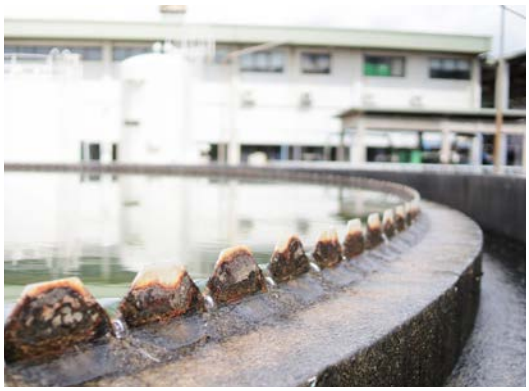
Automated sludge management

with the IFL 700 IQ sludge level sensor

Increasingly frequent heavy rainfall events and rising peak precipitation levels are resulting in significant hydraulic loads and overloads for wastewater treatment plants. This increases the risk of technical damage to the plant, disturbances in biological treatment performance, or sludge washout. To prevent such damage, continuous sludge level monitoring is becoming increasingly important. For this purpose, the IFL 700 IQ sludge level sensor is the ideal solution, especially when it comes to preventing sludge washout.



Application report on the IFL 700 IQ at Germany's largest wwtp

Fig. 1 (above): Extreme weather event that can hydraulically overload a wastewater treatment plant and cause sludge washout.
Fig. 2: Clarifier whose operation may become critical during intense rainfall events.

1. Background

A growing number of heavy rainfall events and especially higher peak precipitation have major impacts on sewer networks and, consequently, on wastewater treatment plants. While combined sewage can be temporarily stored in stormwater overflow tanks to a certain extent, these too have their limits. As a result, the hydraulic peak loads entering treatment plants are becoming a key area of focus.

One possible and relatively rapid consequence of such peak loads is sludge washout in the secondary clarifier. Hydraulic stress causes the sludge to disperse throughout the entire sedimentation tank. In this diluted state, it can no longer settle properly at the bottom and is eventually washed out. The resulting loss of biomass reduces the treatment performance of the plant. Effluent values increase and may even exceed permitted limits. The risk of sludge washout can affect sewage treatment plants of all sizes. Small plants are less able to cope with hydraulic peaks, while in larger plants, sludge washouts would have enormous consequences due to the volume, both for the receiving water and for the operation of the plant.

2. Continuous sludge level monitoring

To mitigate this risk, continuous sludge level monitoring is becoming increasingly important. Compared to spot checks or manual measurements, continuous monitoring provides objective and up-to-date insights into the conditions within the basin at all times.

The measurement values can also be processed by the PLC, enabling automatic control and regulation of the sludge level. In the event of impending sludge washout, this may include early additional sludge removal or increasing the return sludge pump capacity.

WTW's IFL 700 IQ (Figures 1 and 2) offers a precise, reliable, and low maintenance sludge level sensor for both primary and secondary clarification. After just a few settings (immersion depth, basin depth), the sensor is ready for operation and not only provides the measurement value, but also a detailed representation of the echo profile, making the basin conditions visible. Unwanted signals (e.g., structural components or scrapers) can be filtered out, and the automatic, contactless wiper removes interfering air bubbles.

3. Detecting sludge washout

As described earlier, sludge becomes distributed more or less evenly throughout the basin before washout occurs. As a result, the sludge level is no longer clearly identifiable because the distinct separation layer between sludge and clear water disappears. Once this happens, the IFL 700 IQ outputs a sludge level of 0 meters. This makes sense in applications with very little or very thin sludge, but it is misleading when sludge washout is beginning.

To prevent this and to detect the onset of sludge washout, the IFL 700 IQ offers the clear water function. When activated, the sensor outputs an invalid measurement value if the sludge is rising toward the surface.

Fig. 3: IFL 700 IQ sludge level sensor

Fig. 4: Typical location for the IFL 700 IQ on a scraper bridge in the secondary clarifier

Clear water function

- Select sensor
- Press "OK"
- Advanced sensor settings
- Press "OK"
- Press "C"
- Select clear water function
- Value is specific to the plant (contact technical support: TechInfo.XAGS@xylem.com)

Information on how to mount, set, and measure

with the IFL 700 IQ sludge level sensor can be found in this video.

4. Automating sludge management through advanced condition detection

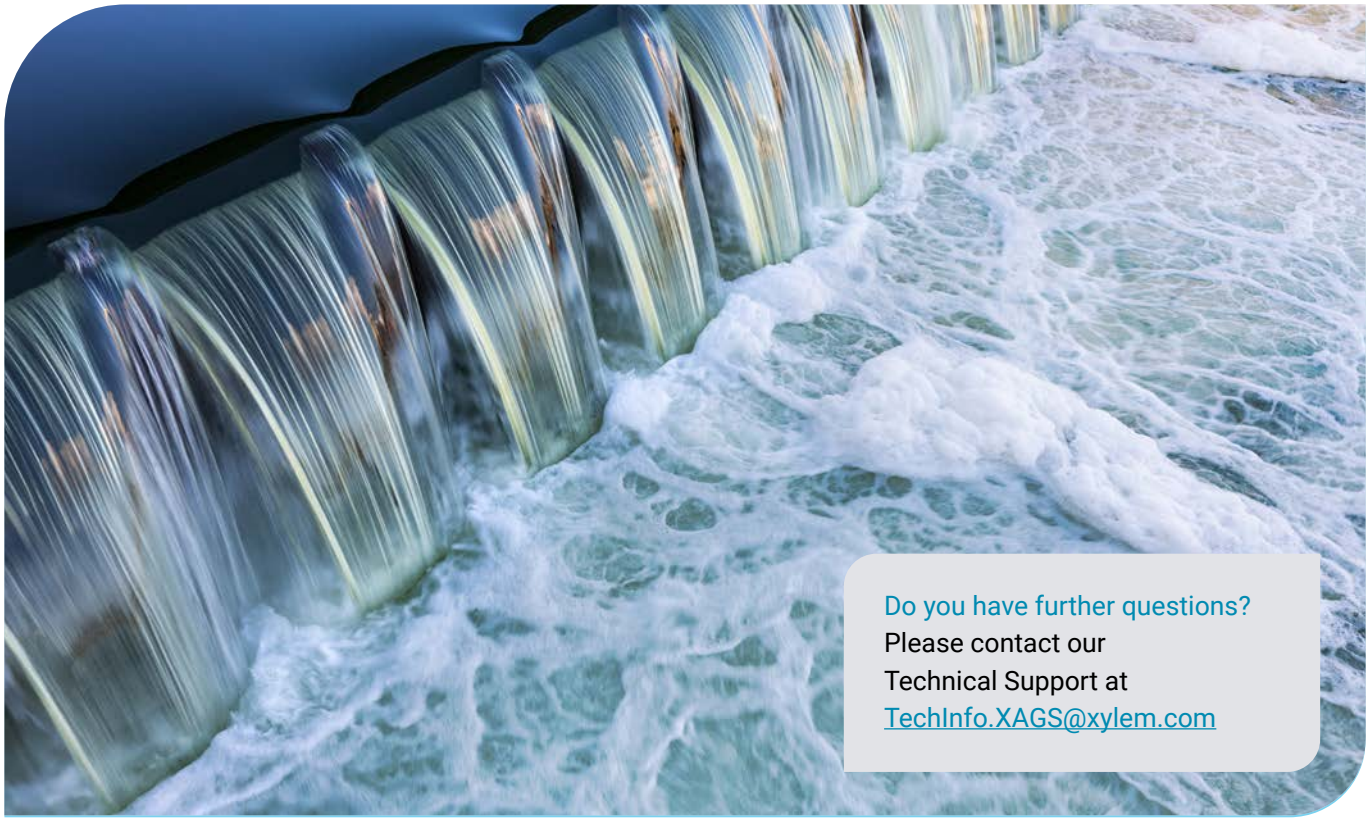
The IFL 700 IQ sludge level sensor detects the following different conditions in a secondary clarifier and transmits them to the PLC via status bits. This enables automatic control of the necessary actions.

Note:
The change of the bits occurs immediately as soon as the situation changes. The display on the IQ SENSOR NET appears with a delay. The longer the establishment time, the longer this delay will be.

IFL 700 IQ
on the web:

5. Conclusion

- **Heavy rainfall events increase the risk of sludge washout**
- **Continuous sludge level measurement enables early detection of sludge washout**
- **With the IFL 700 IQ, necessary corrective actions can be automated**
- **The IFL 700 IQ is quick to install and delivers reliable results with minimal maintenance**



Do you have further questions?
Please contact our
Technical Support at
TechInfo.XAGS@xylem.com

Xylem Analytics Germany Sales GmbH & Co. KG
Am Achalaich 11
D-82362 Weilheim, Germany

Tel + 49 881 1830
Fax + 49 881 183-420
Info.XAGS@Xylem.com

xylemanalytics.com

T202601 . March 2026

xylem
Let's Solve Water

Appendix

Condition and Example Scenario	Display	Bit 1	Bit 2	Bit 3	Bit 4
Normal measurement with sludge – The sensor detects the sludge level and the bottom signal (Figure 5).	Measured value	0	0	0	0
Normal measurement without sludge – The sensor detects no sludge level, only the bottom signal (Figure 6).	Measured value	1	0	0	0
Sludge level too high – Sludge washout is imminent, for example due to heavy rainfall causing sludge to float. The sludge level rises into the sensor's dead zone, and the sensor may even be submerged in sludge (Figure 7). The clear water function must be activated for detection.	„----"	0	0	1	0
Sensor exposed to air – If sludge washout is imminent, the inflow to the secondary clarifier may be stopped while sludge continues to be pumped out. The water level drops and the sensor may end up exposed to air (Figure 8). Initially, the sensor detects no signal and first switches to Bit 4 = 1. After approximately 5 seconds, the sensor detects air and switches to Bit 2 = 1.	„----"	0 0	0 1	0 0	1 0
No echo – The sensor detects no sludge level and no bottom signal, e.g., because the evaluation range is restricted (Figure 9). (The sensor is not defective; a defective sensor would output "1" on Bit 0)	„----"	0	0	0	1

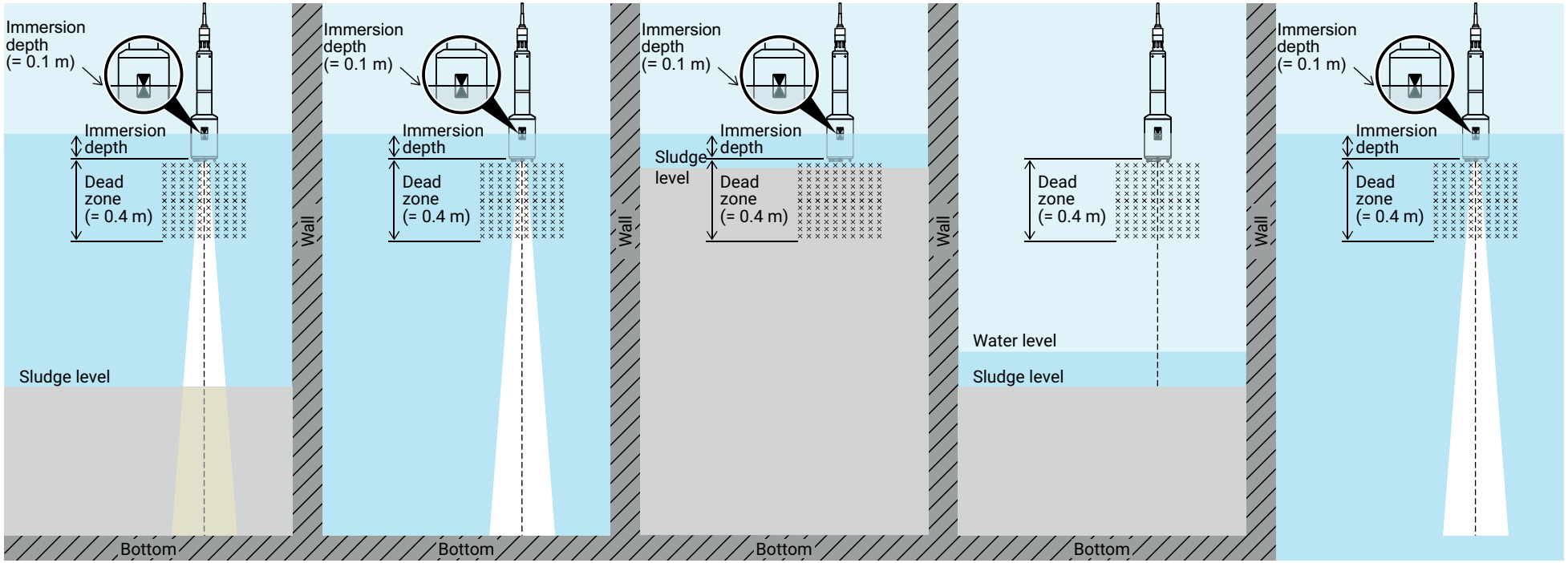


Fig. 5: Sensor detects sludge level and bottom signal

Fig. 6: Sensor detects no sludge level, only bottom signal

Fig. 7: Sludge level in sensor's dead zone — clear water function

Fig. 8: Sensor exposed to air — change of status bit after 5 seconds

Fig. 9: No echo