

“How do different techniques respond to contaminations in practice?”*

Independent scientific comparison of rapid microbiological online measurement technologies



ENZ - ColiMinder
(VWMs GmbH, Austria)
enzymatic measurement

“As **ENZ** was able to pick up all concentrations, its detection limit may even be lower than the lowest concentrations tested in this study.”*

3/3	4/4	4/4	4/4	2/2	3/3	4/4	5/5
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ENZ-MU - BACTControl (microLAN, NL) enzymatic measurement - is not included as during the monitoring period, ENZ-MU was not functioning properly



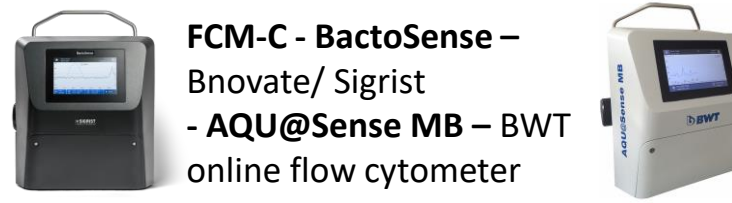
ATP - EZ-ATP
(Hach, Belgium) based on the ATP firefly assay

2/6	6/6	6/6	6/6	3/6	4/5	6/6	6/6
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FCM-H - onCyt
(onCyt Microbiology AG, Switzerland) coupled to an **Accuri C6** flow cytometer (BD Biosciences, Belgium).

0/12	0/12	9/9	12/12	0/9	6/9	12/12	12/12
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FCM-C - BactoSense – Bnovate/ Sigrist
- AQU@Sense MB – BWT
online flow cytometer

0/3	1/4	4/4	4/4	0/4	4/4	4/4	4/4
1/4	4/4	4/4	4/4	2/4	4/4	4/4	4/4



OPT - BACMON
(GRUNDFOS, Denmark)
flow cell (6 µL) and a camera that fixes and scans the sample respectively

1/11	2/11	7/12	10/11	0/11	1/12	8/11	10/11
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Measurement Technology

	Drinking water spiked with Rainwater (v%)				Drinking water spiked with Groundwater (v%)			
	0.01 %	0.1 %	1 %	20 %	0.01 %	0.1 %	1 %	10 %
OPT (cells/mL)	1/11	2/11	7/12	10/11	0/11	1/12	8/11	10/11
FCM-C (cells/mL)	0/3	1/4	4/4	4/4	0/4	4/4	4/4	4/4
FCM-C fingerprint (Bray Curtis)	1/4	4/4	4/4	4/4	2/4	4/4	4/4	4/4
ENZ (µU ALP/100mL)	3/3	4/4	4/4	4/4	2/2	3/3	4/4	5/5
ATP (pg ATP/mL)	2/6	6/6	6/6	6/6	3/6	4/5	6/6	6/6
FCM-H (cells/mL)	0/12	0/12	9/9	12/12	0/9	6/9	12/12	12/12
Coliform plate counts (CFU/100 mL)	0	0	1	1	0	0	1	0
Enterococci plate counts (CFU/100 mL)	0	0	0	0	0	1	0	2

Table 1 – Overview of contaminations detected by the devices. The ratio indicates the samples above the baseline compared to the total amount of samples measured during this spike. The colour code indicates the success rate of response to the respective contaminations of drinking water (0-25%: red, 25-50%: orange, 50-75%: yellow, 75-100%: green).

Number of results clearly above baseline - indicating contamination

2/6

Total number of measurements during this spike.

Hit rate / reliability

75% - 100%

50% - 75%

25% - 50%

0% - 25%

* Favere, J., Waegenaar, F., Boon, N., & De Gussemé, B. (2021). Online microbial monitoring of drinking water: How do different techniques respond to contaminations in practice? Water Research, 117387.

<https://doi.org/10.1016/j.watres.2021.117387>. In press