

# Complete solution for microbiological monitoring on site

## From sample to result in 4 steps

### The most important facts

#### Simple

- As part of the Liquiline platform, the Liquistation or Liquiport autosampler allows easy configuration of sampling parameters
- Simple workflow with minimal time required
- No trained laboratory personnel required

#### Fast

- Fully automatic sampling with autosamplers
- Analysis results in less than 90 minutes
- Less than 5 minutes handling time

#### On-Site

- Carrying out the analysis directly at your site
- Full control from sampling to result
- No time-consuming shipping of your samples necessary
- Comprehensive autosampler portfolio for stationary and mobile sampling



**Microbiological wastewater monitoring is a time- and cost-effective method for comprehensive public health surveillance and is particularly suitable for infection monitoring.**

**Endress+Hauser has developed an innovative and rapid procedure for the detection of SARS-CoV-2 viral load in wastewater.**

**In SARS-CoV-2 wastewater monitoring, time is an important factor.**

Research has shown that an increasing viral load in wastewater is a very good indicator for the occurrence of a new wave of infection, as viral RNA is excreted via wastewater days before the onset of the first symptoms. Even asymptomatic but potentially infectious individuals are detected through regular wastewater monitoring. Increasing incidences can thus be detected in time, especially in the absence of clinical testing, and appropriate measures can be taken at an early stage to identify "hot spots"

and minimize the spread of the highly contagious SARS-CoV-2 virus.

**The gold standard for the detection of SARS-CoV-2 is Real-Time PCR.**

Normally, this type of analysis method is performed by trained specialists in laboratories. The BioSense Analysis System from Endress+Hauser enables efficient on-site execution of Real-Time PCR, with no requirement for specialized personnel. The time-consuming and error-prone steps that are normally carried out manually can be performed fully automatically on a Detection Module specially developed for process automation with the aid of the new analysis system.

The complete process flow is shown on the next page.

# Process workflow

**Sampling** From the inlet of the treatment plant, the stationary sampler Liquistation CSF48 (1) is used to obtain a daily 24-hour composite sample. Alternatively, the Liquiport CSP44 (2) is suitable for mobile sampling and is designed for flexible use at any sampling point in a wastewater collection network. Both models feature active or passive sample cooling to keep viral RNA stable in the sample. Being part of the Liquiline platform, easy configuration is also ensured. As an time-controlled, volume-proportional sampling can be performed with the Promag series flow meter (3).



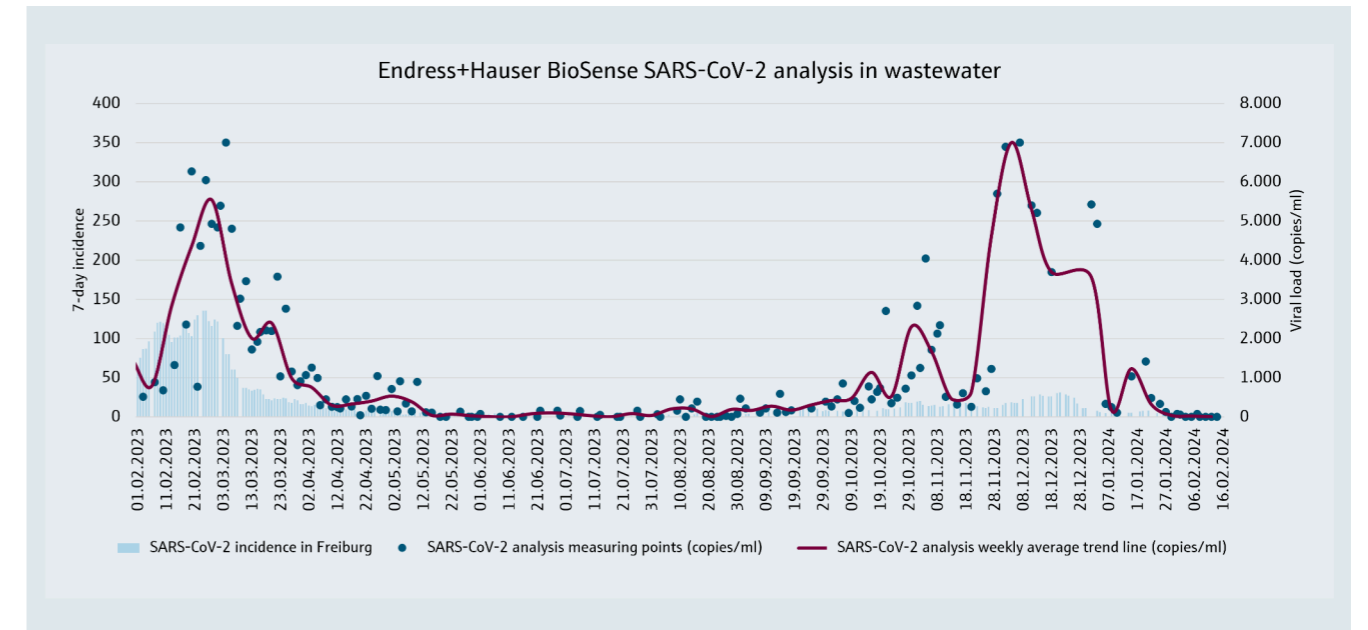
**Sample preparation** After sample collection, a simple concentration step is performed using a novel, patented method. In just 30 minutes, even small amounts of SARS-CoV-2 virus particles can be concentrated from the wastewater sample without the need for time-consuming, labor-intensive and costly centrifugation, filtration or flocculation. No special laboratory or biotechnological knowledge is required for this step. The manual time required for sample preparation is less than 5 minutes and can be performed outside of a laboratory.



**Analysis** Lysis, RNA extraction and Real-Time PCR are automated within a closed system (4). This not only drastically reduces waste and thus protects the environment, but also minimizes potential health and contamination risks. All reagents required for the above steps are already pre-stored on the Detection Module (5), so that only the sample concentrate needs to be added. Avoiding error-prone manual intervention and automated analysis ensures reproducible and reliable results at all times. The detection module can be easily disposed of after completion of the analysis without any special pretreatment.



**Results** The Endress+Hauser BioSense Device is equipped with a special algorithm that automatically interprets the Real-Time PCR results and calculates the number of gene copies per milliliter. Knowledge in the interpretation of PCR results is therefore not necessary. The result can be easily read on the instrument's display at the end of the analysis. Through regular measurements, the results obtained during the measurement period can provide early indications of changes in COVID-19 population incidence.



Comparison of viral load in wastewater and 7-day incidence in the Freiburg im Breisgau area

Through regular measurements, the quantitative results of the virus load measurement can provide early indications of the change in COVID-19 population incidence with the help of the wastewater monitoring. Together with the Abwasserzweckverband Breisgauer Bucht, Endress+Hauser BioSense GmbH collected and analyzed the wastewater monitoring data over a period of 16 months. For this purpose, 24-hour composite samples were regularly taken from the inlet of the sewage plant Forchheim using the CSF48 stationary sampler from Endress+Hauser and further processed in the Endress+Hauser BioSense GmbH analysis system.

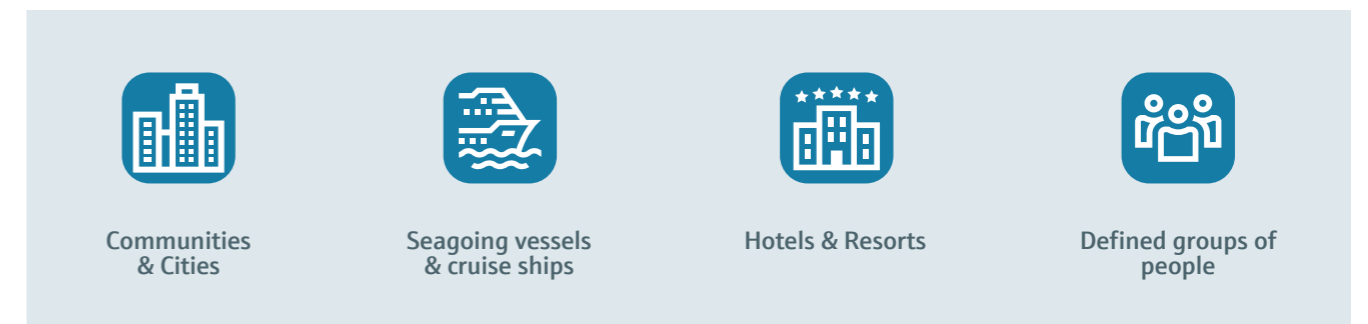
the graph above. This clearly shows that an increase, but also a decrease, in the viral load detected in wastewater correlates with the clinical incidences. Wastewater monitoring is therefore becoming increasingly important, especially in times of reduced public awareness and the lifting of testing requirements and protective measures, in order to detect increasing incidents quickly and reliably.

The new Endress+Hauser BioSense analysis system has been designed so that it can be adapted and expanded at any time to include additional health-related parameters. This means that new situations can be responded to in the shortest possible time and the health of the population can be protected.

The results could be compared directly with the daily case figures of the Robert Koch Institute and are shown in

### Info about the AZV Breisgauer Bucht

The Abwasserzweckverband Breisgauer Bucht has been in operation since 1980 as a purely mechanical-biological wastewater treatment plant in Forchheim. The total sewer network length is 140 km and covers a catchment area of 650 km<sup>2</sup> with approx. 375,000 connected inhabitants. This catchment area includes the municipalities from Weisweil to Pfaffenweiler in the north-south extension, and from Wasenweiler to Gutach in the east-west extension. From the Schauinsland mountain station near Freiburg in Breisgau, the wastewater covers a distance of approx. 40 km with an altitude difference of over 1000 m in only 6 hours flow time to the Forchheim treatment plant.



Applications for microbiological wastewater monitoring for the Endress+Hauser BioSense analysis system



**Germany**

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V 3.0

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