

optiqua Monitoring Water Quality

EventLab 2.0



Optiqua EventLab: real time water quality monitoring

Optiqua EventLab provides a robust and sensitive solution for real-time continuous monitoring of water quality. The unique Lab-on-Chip technology makes it the solution of choice for applications where real time, continuous (remote) monitoring of the overall stability of the water quality is crucial. Easy installation, minimum maintenance and wireless data communication or SCADA connections facilitate the deployment in water distribution networks, at treatment plants (process and end quality control), in bulk water supply exit / entry point control applications, or for water intake protection (surface water).

- Continuous real-time water quality monitoring with a single sensor
- Based on patented optical chip technology measuring minute changes in Refractive Index.
- Generic sensor covering the full scope of all possible chemical contaminations.
- Early warning: real time detection and automated alerting of water quality incidents.
- High sensitivity.
- Overall stability of the water quality captured in a single parameter.
- Optical measurement method ensures robustness and long-term stability.
- Low maintenance: no calibration, no reagents.
- Wireless data transmission and web based network overview.
- Optimised for use in high-density sensor networks: detect, track and trace water quality issues throughout the network.
- Automatic cleaning system prevents (bio)fouling on the sensor (optional).



Figure 1: Optiqua EventLab 2.0

Complete solution, easy to install, low in maintenance

The EventLab system provides a complete solution including the sensor hardware, data transmission infrastructure and the software for data analysis and event detection.

The sensors are easy to install and are low in maintenance (no calibration, no reagents). Measurement data is transmitted from the monitoring stations to a central data server through cellular networks (2G, 3G), or alternatively can be transferred through SCADA.

In networked applications, such as drinking water distribution networks, EventLab can be deployed as a network of sensors, with distributed sensor nodes connected to a central server for data collection and processing. Data analysis and event detection is performed in real time by Optiqua's proprietary algorithms in the central data collection and analysis software (EventLab Online), and made available through a web based user interface or XML based API.

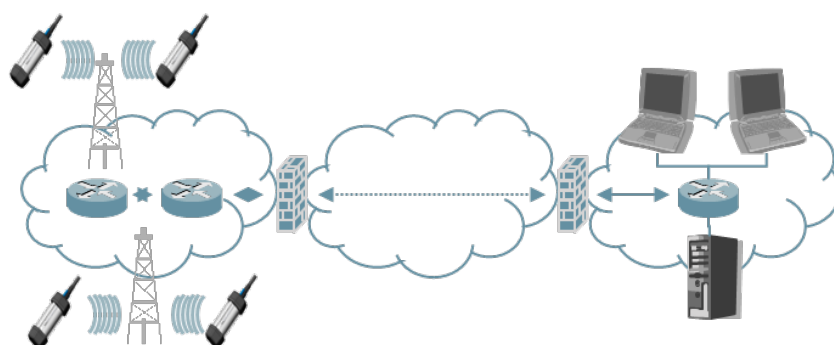


Figure 2: The components of an EventLab network – sensor systems, wireless data communication, data server and user interface

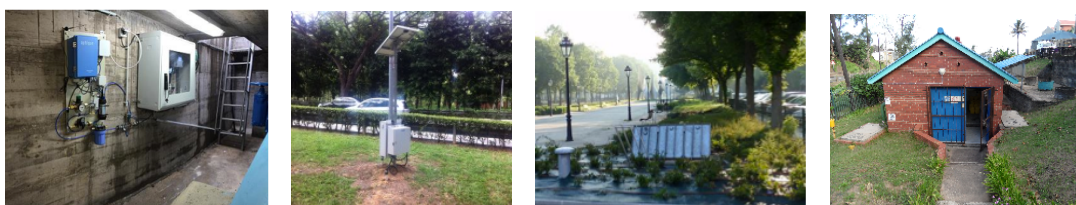


Figure 3: EventLab installation site examples

EventLab Online: data processing and web based network overview

Optiqua's proprietary event detection software, EventLab Online, is an internet-based software application that allows EventLab users to monitor and track water quality continuously and in real-time. It provides clients with an overview of their EventLab sensor network, as well as detailed information per individual sensor unit. EventLab Online facilitates (i) continuous monitoring of the stability of the water quality (baselines) throughout the network, (ii) early detection of water quality incidents and rapid response times, (iii) accurate location and real-time monitoring of the spread of a contamination within the network, and (iv) decision making and adequate actions to minimize damages.

All EventLab units in an EventLab sensor network transmit their data to the designated Optiqua databases and servers, where the data is processed by event detection algorithms. The algorithms identify statistically relevant deviations ("events") in the water quality from normal water quality variations. Events are categorized, representing different alarm limits or thresholds that can be set by the user. Algorithms and thresholds are calibrated to the specific requirements of the application in order to optimize the contamination detection limits and minimize false alarms.

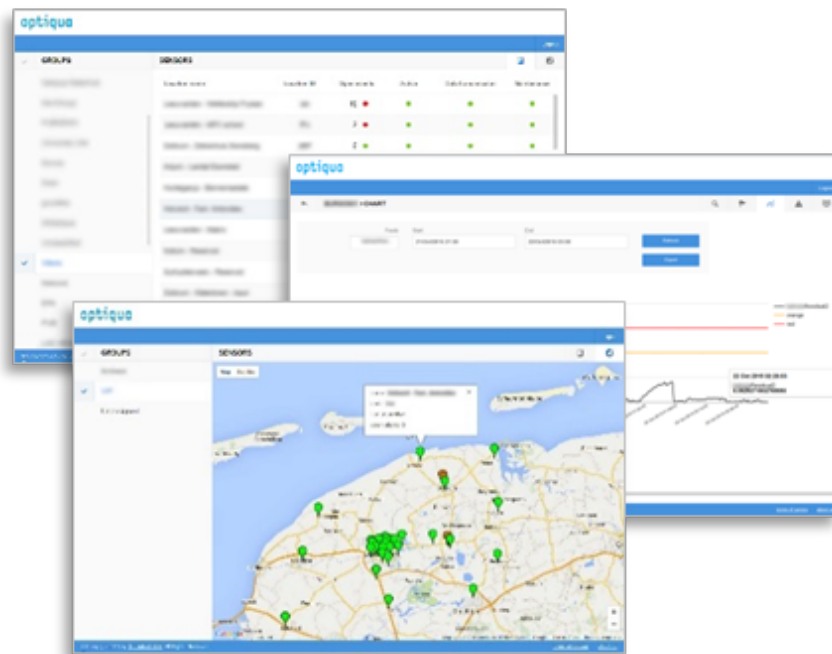


Figure 4: EventLab Online web-based graphical user interface.

EventLab 2.0 Technical Specification

Primary Parameter	Refractive Index
Measurement Principle	Mach Zehnder Interferometer
Resolution	10 ⁻⁷ refractive index units
Secondary Parameter	Temperature
Measurement Principle	Resistance Temperature Detector (RTD)
Measurement Range	5 – 40 °C (default range)
Resolution	± 0.002 °C
<i>Operating conditions</i>	
Water Flow	0.1 – 0.5 L/min
Water Pressure	2 – 15 bar
Flow configuration	Flow through cell, with open drain (no back pressure)
Water Temperature	5 – 40 °C
Environmental Temperature	5 – 45 °C
Environmental Protection Class	Dust and splash-proof enclosure and connections (IP65)
Included hydraulic infrastructure	Pressure reduction valve, flow regulator, flow indicator, filtration module (optional)
Automatic cleaning (optional)	Pressurised water, interval depending on application and controlled by solenoid valve
Power Supply	90 – 250V, 50/60Hz (AC version) 12V (DC1 version) 24V (DC2 version)
Power consumption	3W (continuous), 10W (max peak)
<i>Storage</i>	
EventLab Terminal	0 – 70 °C; 0 – 95% Relative humidity, Noncondensing
EventLab Probe	0 – 40 °C; 0 – 95% Relative humidity, Noncondensing
Light Source	Vertical Cavity Surface Emitting Laser (VCSEL), emitted wavelength: 850nm
Terminal Dimensions (WxHxD)	300 x 200 x 132 mm
Terminal Weight	3.75 kg
Outputs	1 x USB (external) for connection to computer, 1 x RS232 (internal) for connection to SCADA/external modem, 1 x relay output (AC & DC1 version 12V, 0.6A; DC2 version 24V, 0.3A)
Inputs	1 x flow sensor; 1 x temperature sensor; 1 x external maintenance switch; 1 x digital input for auxiliary use (aux1)
Modem	2G (default): GSM/GPRS Quad band 850/900/1800/1900 MHz / Class 10. 3G (optional): W-CDMA (UMTS) dual band modem (850/1900 or 900/2100) / Class 10 / Class 12
Probe Dimensions	ø50 x 165 mm (1.97 x 6.5 inches)
Probe Weight	0.5 kg

Measurement Principle

The measurement of the Optiqua EventLab system is based on the detection of minute changes in the Refractive Index of the water matrix. Refractive Index (RI) is a generic indicator of water quality as any substance, when dissolved in water, will change the refractive index of the water matrix. The Refractive Index measurement makes the Optiqua EventLab system unique as it offers a truly generic sensor system for water quality, which is sensitive to any type of dissolved chemical substance.

To measure Refractive Index, EventLab uses Optiqua's awarded and patented Lab-on-Chip sensor technology, which utilises a Mach Zehnder Interferometer (MZI) to continuously measure minute changes of refractive index (RI) in the water. The MZI operates at a sensitivity level of 10^{-7} in the refractive index, which can be translated to ppm levels of most contaminants. The refractive index measurement does not require calibration or the use of reagents or any other consumables.

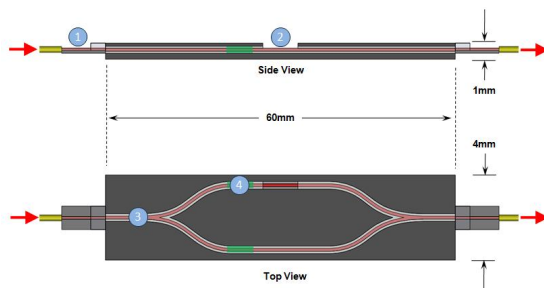
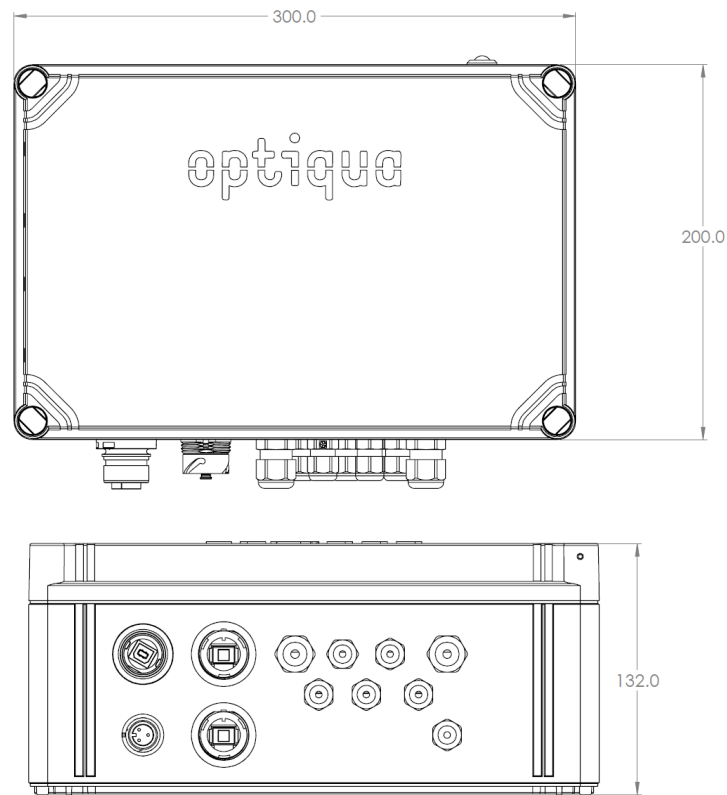
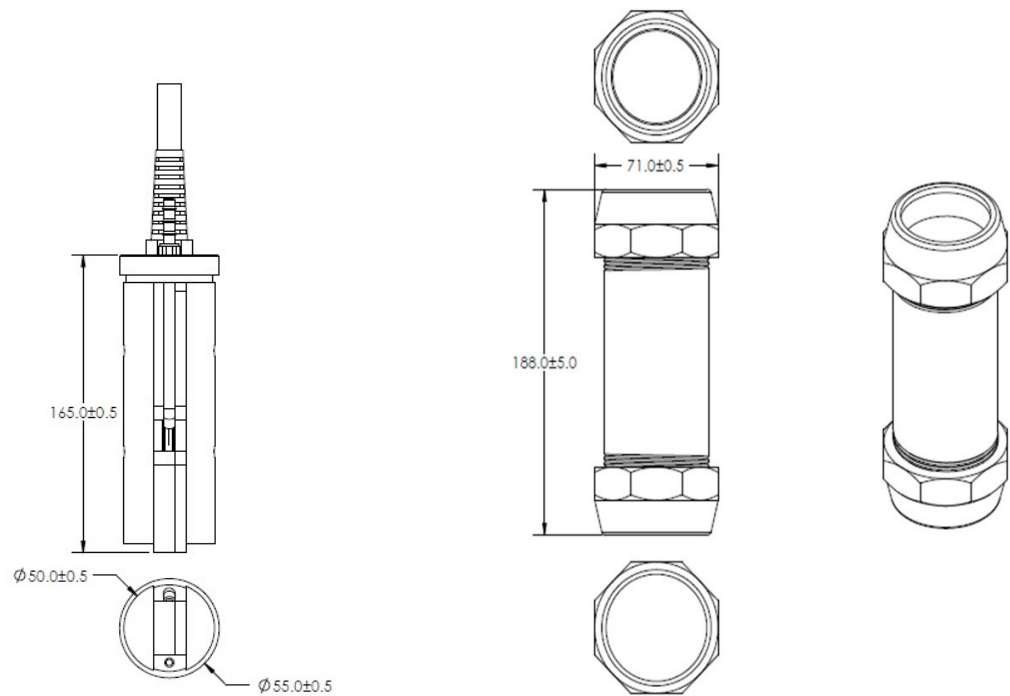


Figure 5: The basic layout of the MZI consists of an input channel wave-guide (#1) that splits into two identical branches (#3), a sensing branch exposed to the water sample (#2 and #4) and a reference branch, and are then combined again to form the output wave-guide.

Dimensional Data (All dimensions in mm)



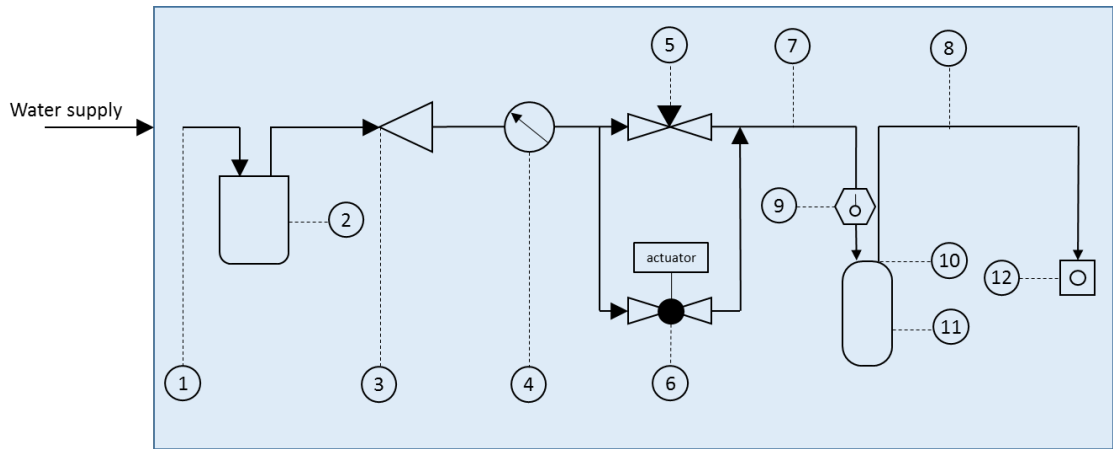
Dimensions of controller



Dimensions of sensor

Dimensions of flow cell

Fluidic Connections



1	Water supply connection: With filter option installed: ½" BSP female at filter inlet port Without filter option installed: 1/8" BSP female fitting at inlet of (3)
2	Filter (optional, necessity and pore size depends on water quality)
3	Pressure reducing valve
4	Pressure gauge
5	Flow regulator
6	Solenoid valve for automatic cleaning (optional)
7	6mm OD tubing
8	6mm OD tubing
9	Temperature sensor
10	Flow cell outlet at atmospheric pressure
11	Flow cell
12	Drain

Optiqua Technologies Pte Ltd

Asia Pacific Office

Waterhub #C2-11/1, 82 Toh Guan Road East

Singapore 608576

Telephone: +65 68969196

Europe Office

Hengelosestraat 705, 7521 PA Enschede

The Netherlands

Telephone: +31(0)534836377

Visit for more information

www.optiqua.com

info@optiqua.com