

The **ToxProtect** is an automated monitoring system to protect drinking water supplies from accidental or malicious contamination due to harmful substances. The characteristic of these threats is a relatively high concentration of dangerous substances that occurs suddenly.

### Features

To counteract this risk, the instrument is ...

- sensitive to a wide range of toxins:  
detection of toxins using fish is a well-established method, with sensitivity data for nearly every combination of fish and toxin readily available.
- closely comparable to humans:  
test organisms must react to substances harmful to humans; the use of fish gives the closest practical comparison available in the expected scenario.
- reliable:  
false alarms **MUST** be reduced to an absolute minimum in order to increase user confidence and avoid unnecessary expense; for this, the ToxProtect uses an integrated alarm verification system.
- easy to operate at affordable costs:  
for a high level of security, it may be necessary to employ multiple monitoring locations; the ToxProtect is a low-price, low-maintenance device which lends itself to multiple site applications within a water company or agency.

### Detection Method

The **ToxProtect** monitors the swimming activity of up to 20 fish by measuring the frequency of interruption of an array of light barriers. The result is given in interrupts per minute per fish. In the event of the values falling below a given threshold for a certain period of time, the alarm verification process is activated. Immobile fish at the bottom and in the upper region of the aquarium are also registered.

The fish species used can be selected by the user, with recommendations given in the specifications; however all fish must be active and 4-6 cm in length.

### Applications

- drinking water supply
- dam monitoring
- waterway analysis and assessment
- general environmental monitoring
- intake assessment
- chemical analysis

### Alarm Verification

Due to naturally occurring random variations in fish behaviour, each alarm criterion is met from time to time by accident. Hence, in order to prevent false alarms, a verification system is required. This is achieved by increasing the illumination inside the aquarium during the verification period.

Normally, this leads to a dramatic increase in fish activity. Under toxic conditions, however, this may be different. Hence by monitoring the “increase” in activity during modified illumination, it is possible to accept or reject the initial alarm.

### Instrument Malfunction Surveillance

The **ToxProtect** is equipped with internal sensors to monitor and report on instrument malfunction including:

- inadequate sample flow
- drain blockage
- temperature loss
- accidental/unauthorised exposure of test chamber to ambient light
- high chlorine concentration