

**ToxProtect64**



**Quick and reliable  
drinking water protection**

the water watchdog



Aquarium of the ToxProtect64

## Automated online surveillance

The **ToxProtect64** is an automated monitoring system for the protection of a drinking water supply against accidental or malicious contamination due to harmful substances. The characteristics of such threats are a relatively high concentration of dangerous substances that occurs suddenly. This challenging task requires a number of important criteria to be met. Such a system **MUST** be sensitive to a wide range of toxins. The detection of toxins using fish is a well-established method, with sensitivity data for nearly every combination of fish and toxin readily available.

The test organisms must react to substances harmful to humans. The use of fish gives the closest practical comparison available in the expected scenario. False alarms **MUST** be reduced to an absolute minimum in order to increase user-confidence and avoid unnecessary expense. The **ToxProtect64** uses an integrated alarm verification system to fulfil this requirement. It is easy to operate at affordable costs since for a high level of security, it may be necessary to employ multiple monitoring locations.

The **ToxProtect64** is a low-price, low-maintenance device which can be installed at various sites within a water company.

### Operation

The **ToxProtect64** user interface allows easy control of the instrument. All readings are shown as numbers or as charts. The parameters of the **ToxProtect64** measuring process can either be entered via the control panel or via the web interface.

### Control panel

On the left, a parameter settings menu to select the relevant submenu, in the center a summary of parameter readings and on the right an LED test displaying the number of interruptions for each light barrier during the last 60s.



| Readings          | Menu     | Summary                   | Menu     | LED Test        | Menu  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
|-------------------|----------|---------------------------|----------|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|----|---|---|---|---|---|----|---|----|---|---|---|
| Activity          | -        | Top LED_coverage [1/fish] | 0.00     | 0 0 0 0 0 0 0 0 | <table border="1"> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>1</td><td>3</td><td>3</td><td>2</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>2</td><td>4</td><td>4</td><td>4</td><td>6</td><td>0</td></tr> <tr><td>0</td><td>2</td><td>3</td><td>10</td><td>7</td><td>4</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>6</td><td>5</td><td>7</td><td>10</td><td>2</td><td>7</td><td>0</td></tr> <tr><td>0</td><td>7</td><td>15</td><td>7</td><td>11</td><td>6</td><td>2</td><td>0</td></tr> </table> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 2 | 0 | 1 | 1 | 2 | 4 | 4 | 4 | 6 | 0 | 0 | 2 | 3 | 10 | 7 | 4 | 0 | 0 | 0 | 6 | 5 | 7 | 10 | 2 | 7 | 0 | 0 | 7 | 15 | 7 | 11 | 6 | 2 | 0 |
| 0                 | 0        | 0                         | 0        | 0               |   | 0 | 0 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| 0                 | 0        | 0                         | 0        | 0               |   | 0 | 0 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| 0                 | 0        | 0                         | 0        | 0               |   | 0 | 0 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| 0                 | 0        | 0                         | 1        | 3               |   | 3 | 2 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| 1                 | 1        | 2                         | 4        | 4               |   | 4 | 6 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| 0                 | 2        | 3                         | 10       | 7               | 4   | 0 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| 0                 | 6        | 5                         | 7        | 10              | 2   | 7 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| 0                 | 7        | 15                        | 7        | 11              | 6   | 2 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| Specific Activity |          | Specific activity         | 0.00     |                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| Top LED Coverage  | +        | Activity [Imp/fish/min]   | 0.0000   |                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| Temperature       |          |                           |          |                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |
| Standby           | 15:40:15 | Standby                   | 15:39:28 | Run             | 10:51:31  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |    |   |   |   |   |   |    |   |    |   |   |   |

Control Panel of the ToxProtect 64

## Detection Method

The ToxProtect64 monitors the swimming activity of up to 20 fish by measuring the frequency of interruptions of an array of light barriers. The result is given in interrupts per minute and fish. In the event of values falling below a given threshold for a certain time, the alarm verification process is initiated.

Additionally, immobile fish at the bottom and in the upper region of the aquarium are registered.

The fish species employed is user-selectable, with recommendations given in the specifications. Best results are obtained using agile fish of 4-6 cm in length.

## Alarm Verification

Due to natural random variations of fish behaviour, any alarm criterion may be reached from time to time just by accident. Hence, to prevent false alarms, a verification system is required. This is achieved by increasing the illumination inside the aquarium during verification.

Normally, this leads to a dramatic increase in the activity of the fish. Under toxic conditions, this may not occur. The instrument thus accepts or rejects the alarm automatically.

## Alarm Indication

The alarm indicator (traffic light) shows the current operating mode:

|                         |                    |
|-------------------------|--------------------|
| <b>Red:</b>             | alarm              |
| <b>Yellow:</b>          | alarm verification |
| <b>Green:</b>           | normal operation   |
| <b>No light:</b>        | stand-by           |
| <b>Flashing green:</b>  | start-up           |
| <b>Flashing yellow:</b> | failure            |



## Instrument Malfunction Surveillance

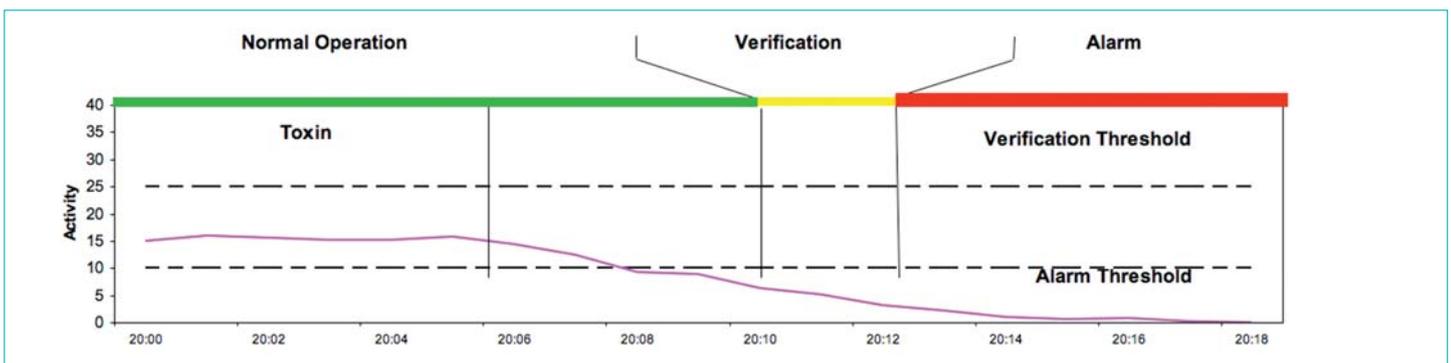
The ToxProtect64 is equipped with internal sensors to monitor and report on instrument malfunction including:

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

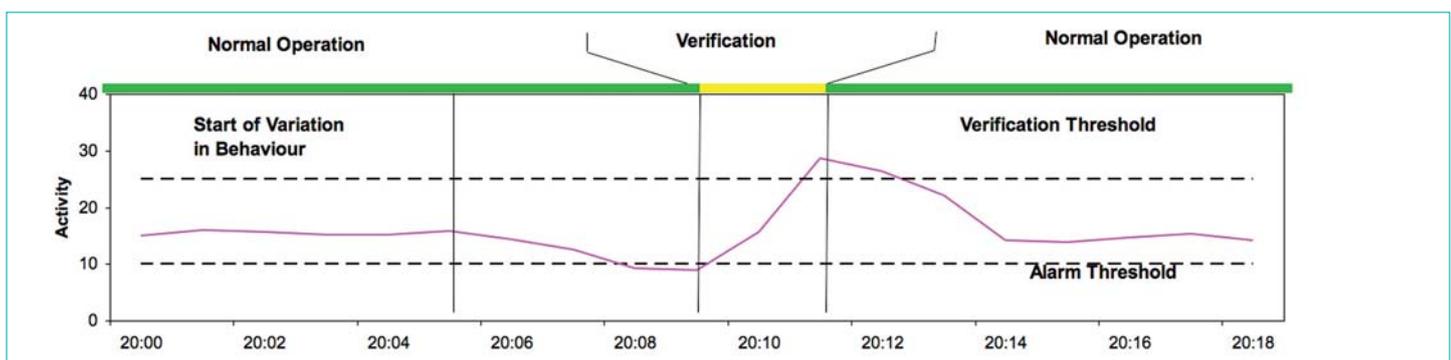
## Optional Dechlorination System

For chlorinated drinking water the ToxProtect64 can be equipped with a dechlorination unit with integrated level control, a peristaltic pump and a total chlorophyll electrode.

Verified Alarm of the ToxProtect64



Discarded Alarm of the ToxProtect64



## Applications

- municipal drinking water uptakes and distribution
- hotels and leisure centres
- hospitals, medical facilities
- apartment blocks, palaces and public buildings
- wells

## Features

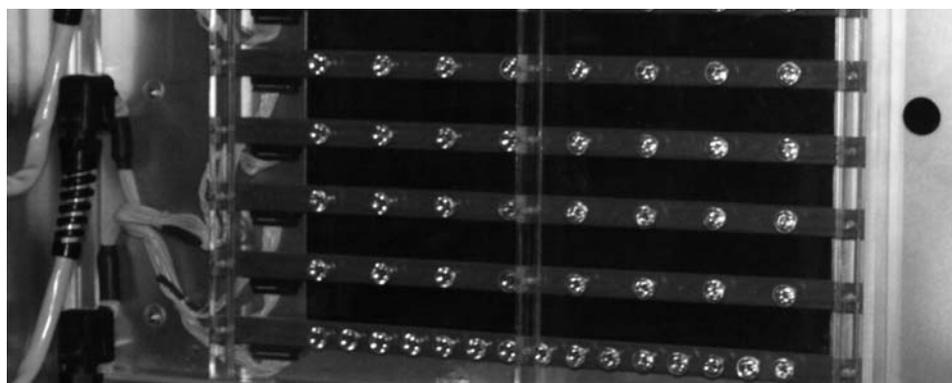
- array of 64 light barriers to detect fish movements
- 30 light barriers to detect immobile fish
- alarm verification system
- flow control
- temperature control
- overflow detector
- access via LAN, Internet or GSM
- PC data-evaluation software
- dechlorination option



## Benefits

- continuous registration of movements all over the aquarium
- alarm-relevant signals
- reduction of false alarms
- low maintenance
- easy service
- reliable data evaluation
- add-ons

Your local bbe dealer...



## Specifications

### ToxProtect64 (basic instrument without options)

|                                      |   |
|--------------------------------------|---|
| <b>Weight of the instrument</b>      | 50 kg   |
| <b>Size (H x W x D)</b>              | 800 x 790 x 444 mm <sup>3</sup>   |
| <b>Power supply</b>                  | 110/230V @ 50/60 Hz   |
| <b>Power consumption</b>             | 200 W   |
| <b>Sample temperature</b>            | 5 - 28 °C   |
| <b>Sample flow</b>                   | 50 -150 l/h   |
| <b>Turbidity</b>                     | < 40 FTU  |
| <b>Aquarium volume</b>               | 9 l   |
| <b>Housing protection class</b>      | IP54  |
| <b>Relay outputs</b>                 | 4 x 24V 1 A contacts  |
| <b>Interface</b>                     | LAN   |
| <b>Maintenance interval</b>          | 7 days; 1 h   |
| <b>Recommended fish species</b>      | zebrafish, tiger barb, minnow, goldfish, bitterling – depending on the temperature; tests for other local fish on request |
| <b>Feeding of the fish</b>           | automatic feeder with selectable intervals  |
| <b>Number of fish</b>                | 15-20   |
| <b>Length of fish</b>                | 4-6 cm  |
| <b>Recommended tank time of fish</b> | 4 weeks   |
| <b>Optional features</b>             | dechlorination system, visual alarm indicator, support stand for desktop operation, pressure reducer/strainer             |
| <b>Optional interfaces</b>           | 4-20mA (2x), RS232, RS485, GSM, SCADA   |
| <b>Additional sensors</b>            | oxygen, pH, redox, conductivity, absorption; others available on request  |

Subject to alteration!

biological · biophysical · engineering

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