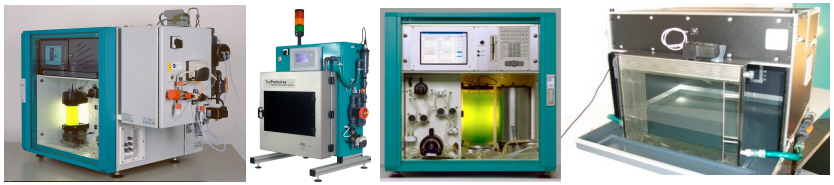

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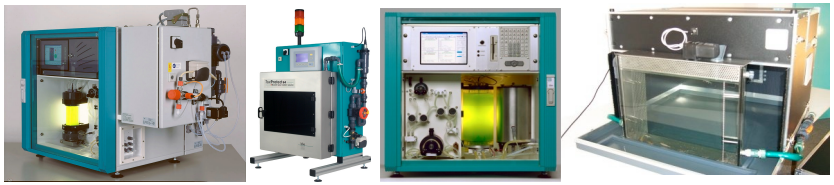
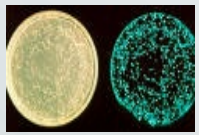
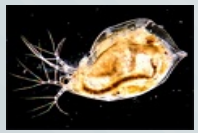
*Tox*Protect 64 vs Fish Toximeter - a comparison

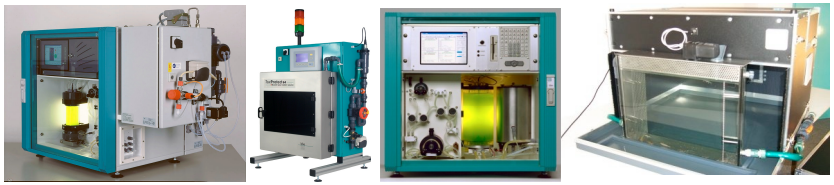


ACUTE TOXICITY

- Fish
- Algae
- Luminescent Bacteria
- Mussels
- Daphnia



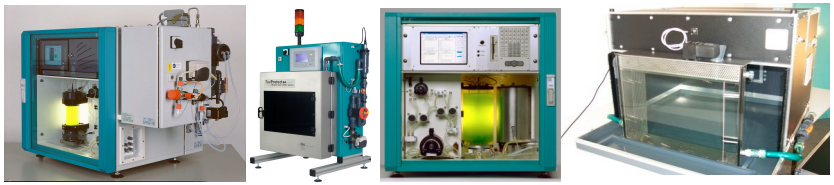




ACUTE TOXICITY FOR FISH

The purpose of this test is to determine the acute lethal toxicity of a substance to fish in fresh water, drinking water

Dir 92/69/EEC



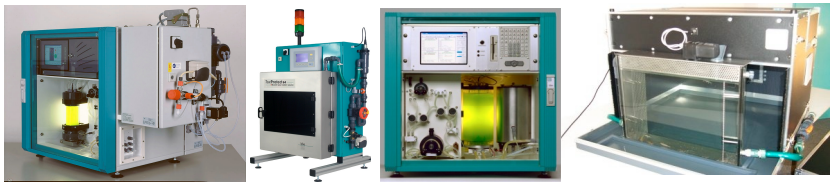
Fish Test in Germany

DIN 38412- L31 used for calculation of wastewater tax

Leuciscus idus

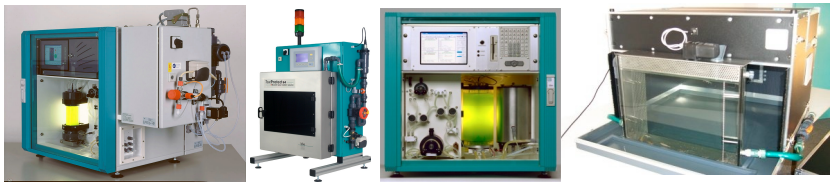
Fish egg test

Danio rerio Hamilton-Buchanan



Fish Test

- **Continuous monitoring**
- **Many toxicity data available**
- **Vertebrate - closer relationship to human being**
- **Availability**



www.pesticideinfo.org/List_EcoChemSpecies.jsp?Taxa_Group='Fish'

PAN Pesticides Database - Chemical Toxicity Studies on Aquatic Organisms

Home > Ecotoxicity Search

Aquire Search Results

The 'Fish' organism group contains the following species. Click on any species listed below for a list of studies. Note that if we do nc
in the results. The PAN Pesticide database only includes pesticide-related chemicals.

Common Name	Scientific Name	Number of Studies
Blue Bream	Abramis ballerus	4
Bream	Abramis brama	28
Yellowfin goby	Acanthogobius flavimanus	5
Surf bream	Acanthopagrus australis	3
Porgy	Acanthopagrus schlegeli	36
Minnow, tanago	Acheilognathus moriokae	15
Siberian Sturgeon	Acipenser baerii	47
Lake sturgeon	Acipenser fulvescens	38
Sturgeon	Acipenser gueldenstaedti colch	1
Russian sturgeon	Acipenser gueldenstaedtii	2
Sterlet	Acipenser ruthenus	1
Sevruga, stellate sturgeon	Acipenser stellatus	8
White sturgeon	Acipenser transmontanus	42
Sturgeon family	Acipenseridae	1
Minnow	Acrossocheilus paradoxus	13
Spiny rayed fish class	Actinopterygii	3
Diamond killifish	Adinia xenica	3
Hooknose	Agonus cataphractus	48
Longfin dace	Agosia chrysogaster	3
Bleak	Alburnus albidus	5
Bleak	Alburnus alburnus	119
Yelloweye mullet	Aldrichetta forsteri	9
Blueback herring	Alosa aestivalis	9
Alewife	Alosa pseudoharengus	5
American shad	Alosa sapidissima	7
Glassy, Perchlet	Ambassis commersoni	3
Bald glassy	Ambassis gymnocephalus	3

(Carboxymethoxy)butanedioic acid, Trisodium salt

Show (Carboxymethoxy)butanedioic acid, Trisodium salt studies for all species

Zebra danio (Danio rerio)	Mortality	Mortality	FRY, 3 WK	96 h	LC50	2,100,000	1,700,000	2,500,000	ug/L	A	63.9 % AI	Static	Not Acutely Toxic		1982	J.Environ.Qual.of Life Report No.EUR 7549:284-295
Zebra danio (Danio rerio)	Mortality	Mortality	JUVENILE, 12 WK	96 h	LC50	2,600,000	2,500,000	2,700,000	ug/L	A	63.9 % AI	Static	Not Acutely Toxic		1982	J.Environ.Qual.of Life Report No.EUR 7549:284-295
Zebra danio (Danio rerio)	Mortality	Mortality	ADULT, 20 WK	96 h	LC50	2,500,000	1,800,000	3,100,000	ug/L	A	63.9 % AI	Static	Not Acutely Toxic		1982	J.Environ.Qual.of Life Report No.EUR 7549:284-295

(T-4)-bis(2-Hydroxypropanoato-O'1, O2)zinc

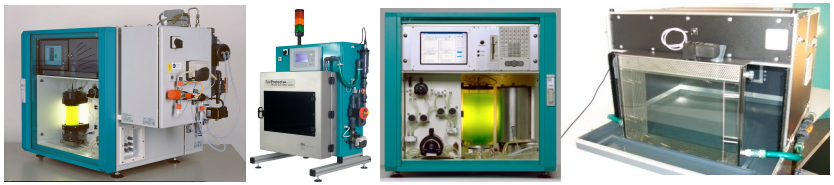
Show (T-4)-bis(2-Hydroxypropanoato-O'1, O2)zinc studies for all species

Zebra danio (Danio rerio)	Mortality	Mortality	NR	96 h	LC50	23,100	-	-	ug/L	T	NR	Static	Slightly Toxic		1998	Chemosphere 37(7):1317-1333
Zebra danio (Danio rerio)	Mortality	Mortality	NR	96 h	NOEC	12,900	-	-	ug/L	T	NR	Static			1998	Chemosphere 37(7):1317-1333

1,1,1-trichloroethane

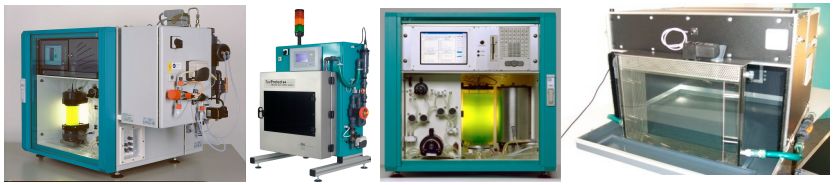
Show 1,1,1-trichloroethane studies for all species

Zebra danio (Danio rerio)	Behavior	Behavioral changes, general	NR	14 d	NOEC	3,400	-	-	ug/L	F	NR	Flow through			1990	Testbericht: Wassergefahrdende Sto Fraunhofer-Institut fur Umweltchemie und Okotoxikologie, Schmallenberg (OECDG Data File)
Zebra danio (Danio rerio)	Mortality	Mortality	NR	48 h	LC50	79,000	-	-	ug/L	F	NR	Flow through	Slightly Toxic		1990	Testbericht: Wassergefahrdende Sto Fraunhofer-Institut fur Umweltchemie und Okotoxikologie, Schmallenberg (OECDG Data File)



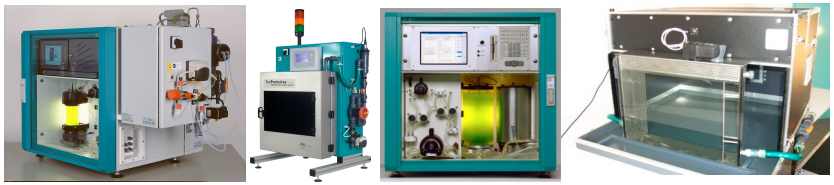
Water Quality Surveillance

- Drinking Water Supply
- Surface Waters
- Rivers, Lakes, Reservoirs, Dams



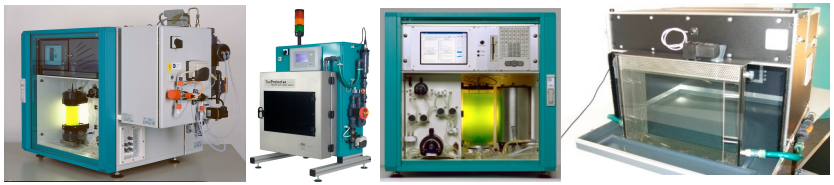
Surveillance of Water

	Environment protection	**Protection against terror / accidents**
Expected concentration of the toxicant	Very low – medium	Medium – high
Type of the toxicant	Often known	Unknown
Risk of an event	Low – medium	Extremely low
Expected damage	Variable	Extremely high
Type of Location	Line	Network



Requirements in drinking water protection

- Fairly sensitive
- Detection of a wide range of toxic chemicals
- Reasonable Price
- Easy to handle
- Very low probability of false alarms



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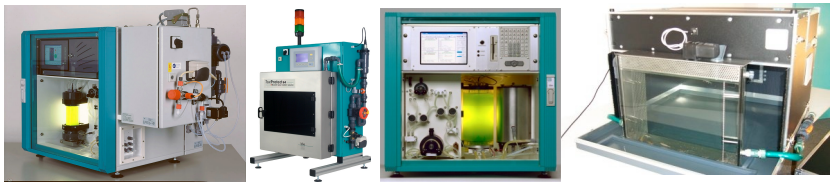
The *Tox*Protect64

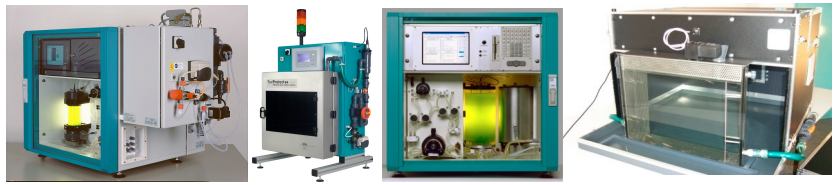
The ToxProtect is a cost-effective, automated biomonitor for early and rapid detection of acute toxic substances.
It is sensitive to a wide range of toxins which affect test substances (fish) comparable to humans.

- easy to use
- access via LAN, Internet or GSM
- detection of fish movements by an array of 78 light barriers
- software allows remote access to all data including all optional sensors
- online operation



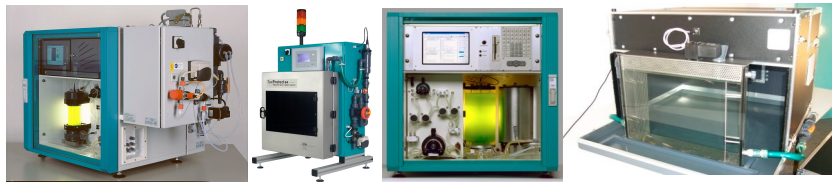
Features and Benefits

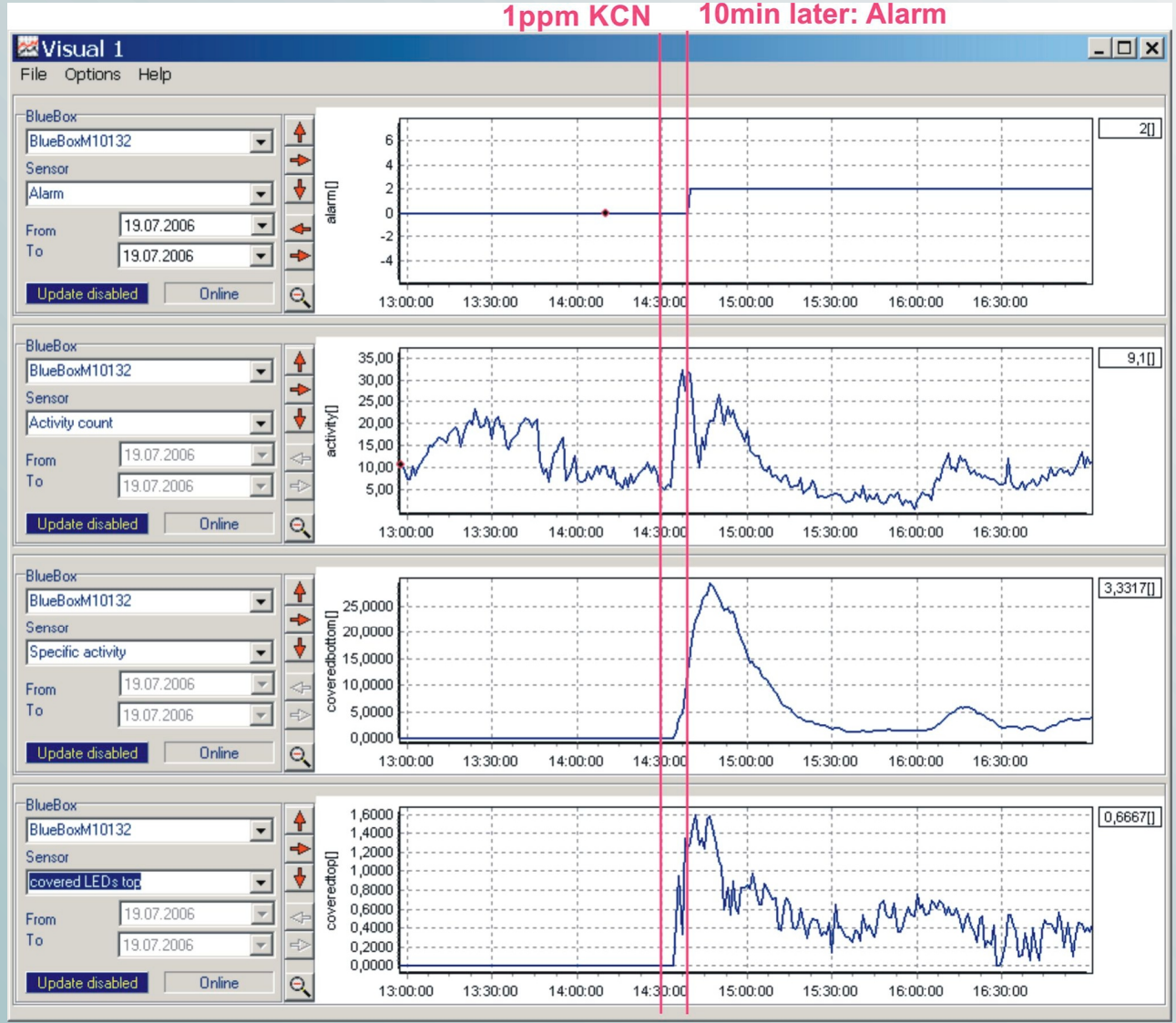
Features	Benefits
Array of 64 Light barriers to detect fish movements	• **Detecting the movements in the whole aquarium** • **Possibility to use single light barriers or rows of light barriers for special alarm algorithms**
30 Light barriers to detect immobile fish	• **Immobile fish on the top or on the bottom generate an alarm relevant signal**
Alarm verification system	• **Significant reduce of false alarms**
Sensors to control the instrument • **Sample flow control** • **Sample temperature detector** • **Overflow detector** • **Optional redox detector**	• **Avoids alarms due to insufficient operating conditions**



Features and Benefits

Features	Benefits
Access via LAN or Internet	• Simple maintenance, service and data evaluation
Optional access via GSM modem	• Possibility to access to the instrument even if no phone line is available
PC data evaluation software available	• Simple data evaluation
Optional dechlorination	• Applicable at sites with chlorinated drinking water
Various additional sensors available	• Possible extension of the instrument according to the requirements on site



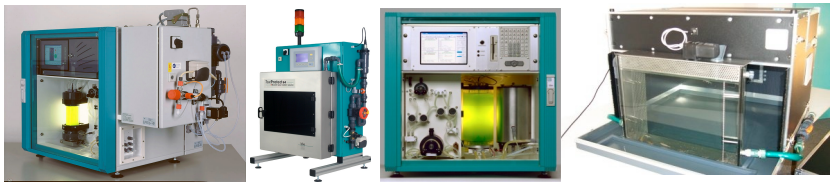


Alarm

Activity count

Specific Activity

Top Coverage



False Alarm Prevention

Problem:

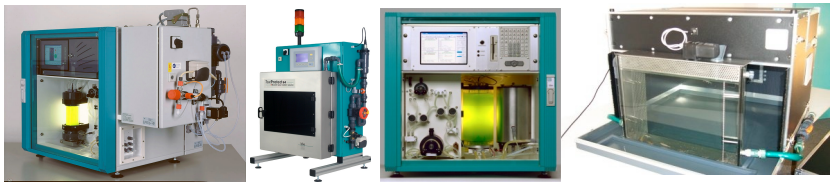
- **False alarms occur due to the natural variation of the behaviour**
- **Due to the extremely low risk of an event most of the alarms can be false**

Consequence:

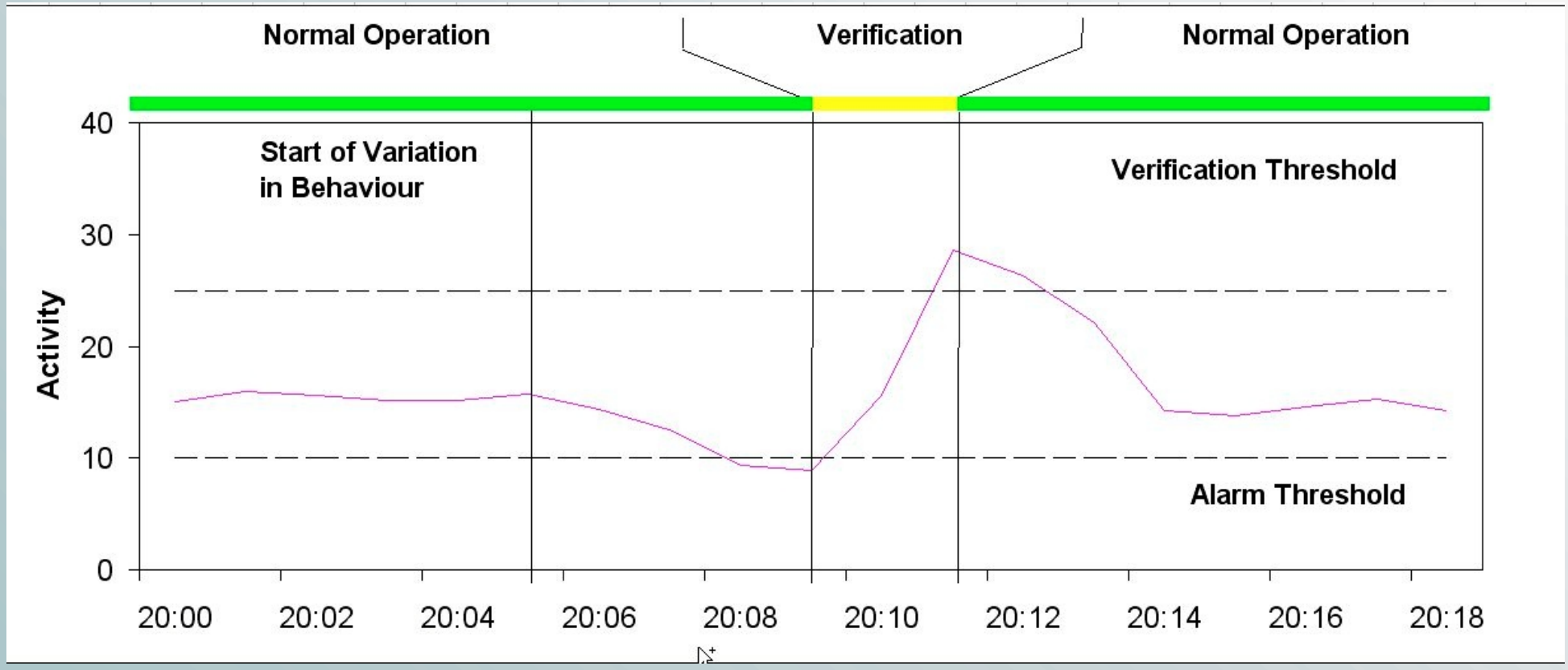
- **A second alarm indicator is required to reduce this risk**

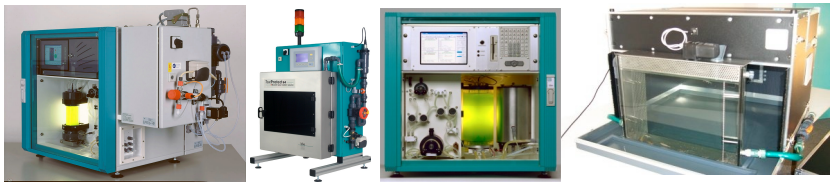
Possible solutions:

- **second independent instrument**
- **second type of test in the same instrument**



Alarm Verification





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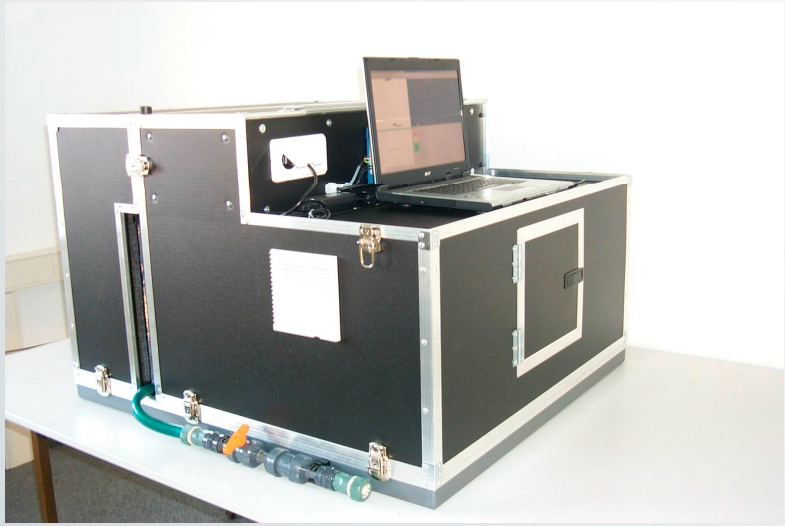
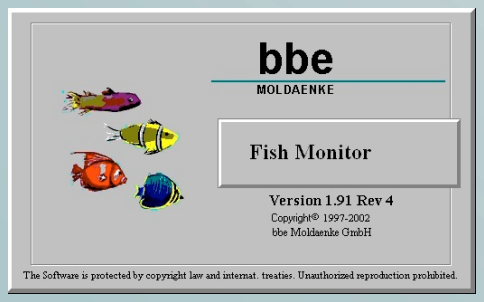
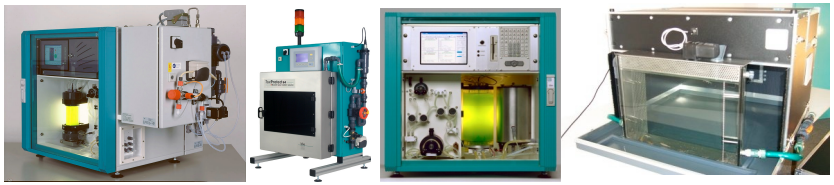
The Fish Toximeter

This instrument enables supervision and assessment to detect, record and respond rapidly to incidents of toxic contamination.
It is capable of long-term monitoring during the "strategic" evaluation of water quality.



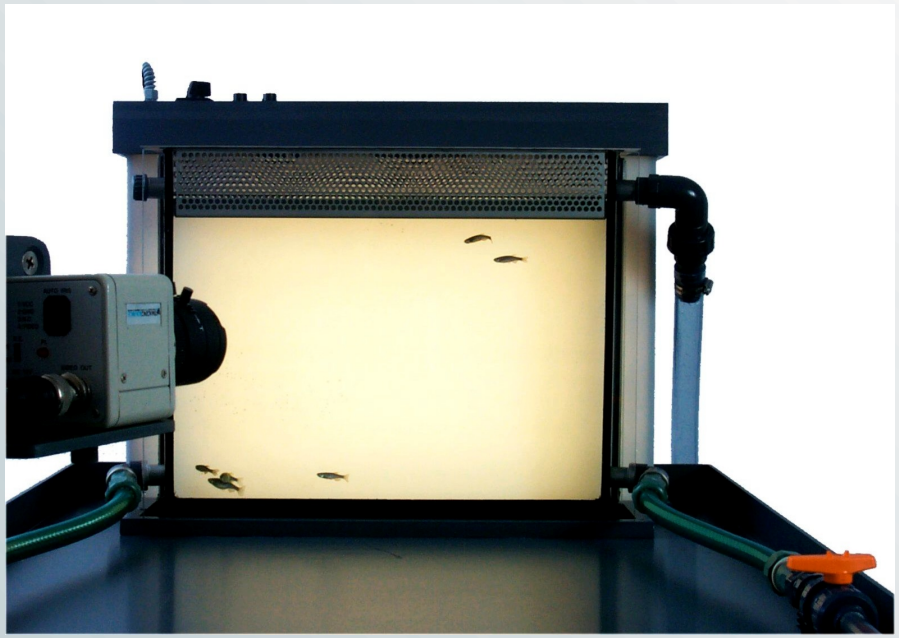


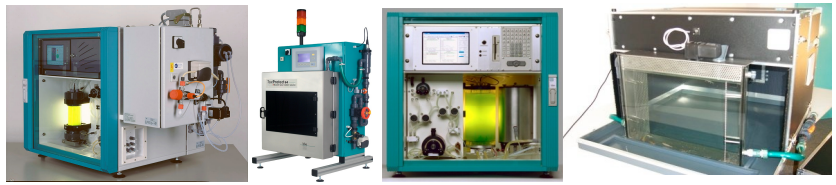
Live video camera images of swimming fish are recorded with a digital camera and analysed online by an integrated PC.



Fish Toximeter with Video Camera

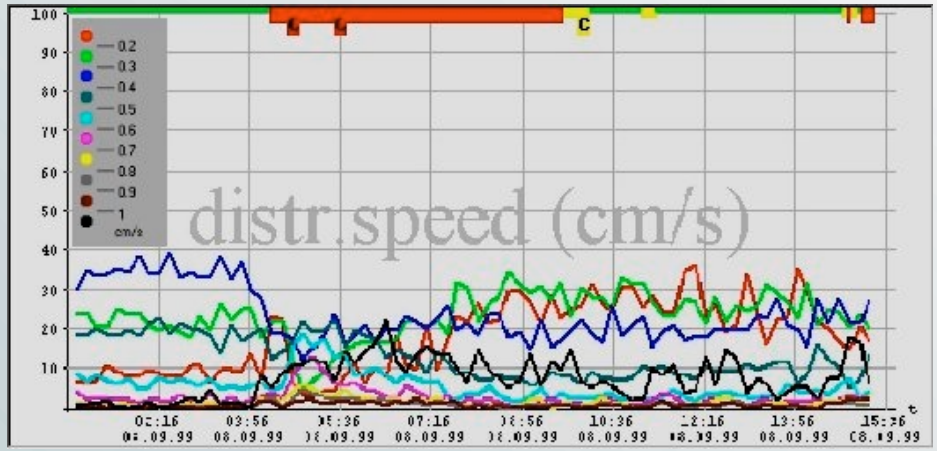
- Rivers
- Reservoirs
- Water supply systems
- Water treatment plant intakes
- Sewers

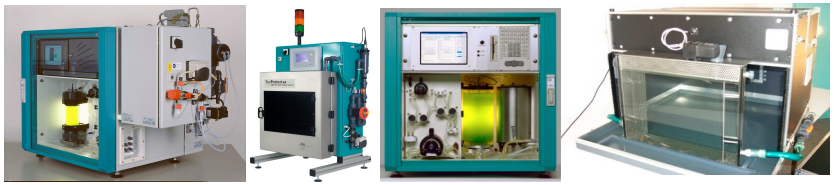




Behavioural Parameters

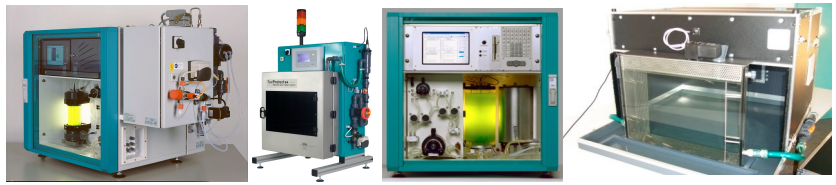
- Speed observation
- Altitude
- Turns
- Circling movements
- Growth observation
- Number of living fish





Evaluation of Parameters

The behaviour of the fish is examined and analysed for significant changes. A combined parameter - the so-called toxic index - is calculated continuously.



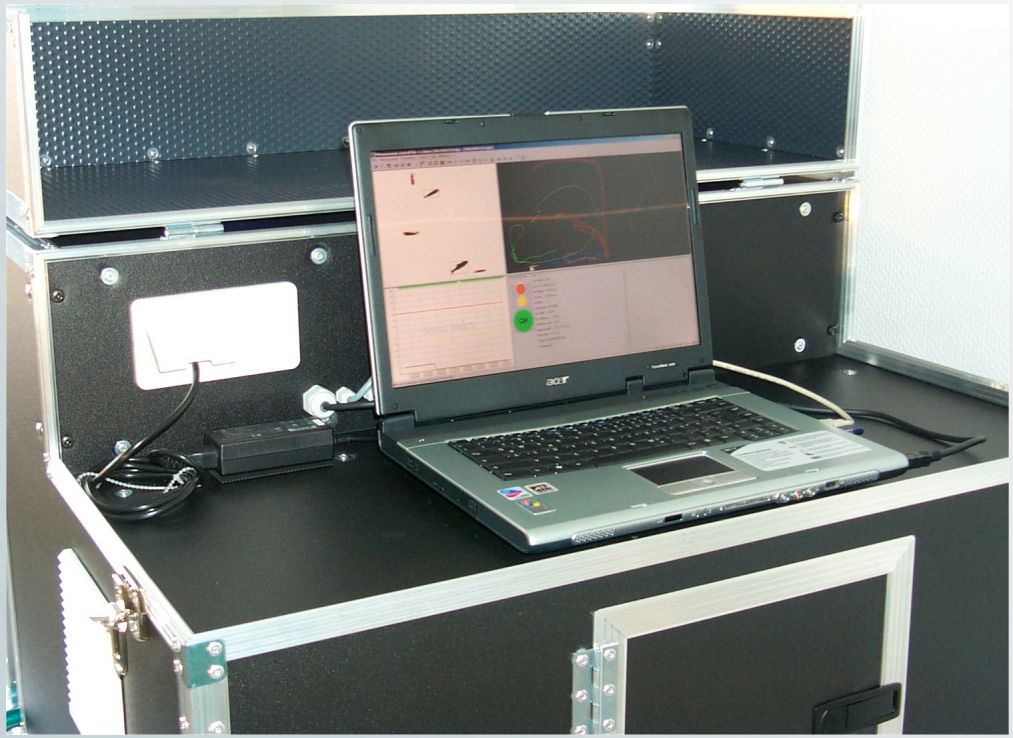
The Fish Toximeter

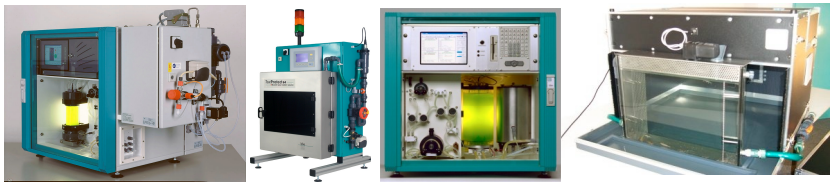
Water protection:
- drinking water
- process water
- raw water

Medium-high sensitivity:
- pesticides
- neurotoxins
- respiratory toxins

Alarm Verification:
- no

Work involved: 1 h/week





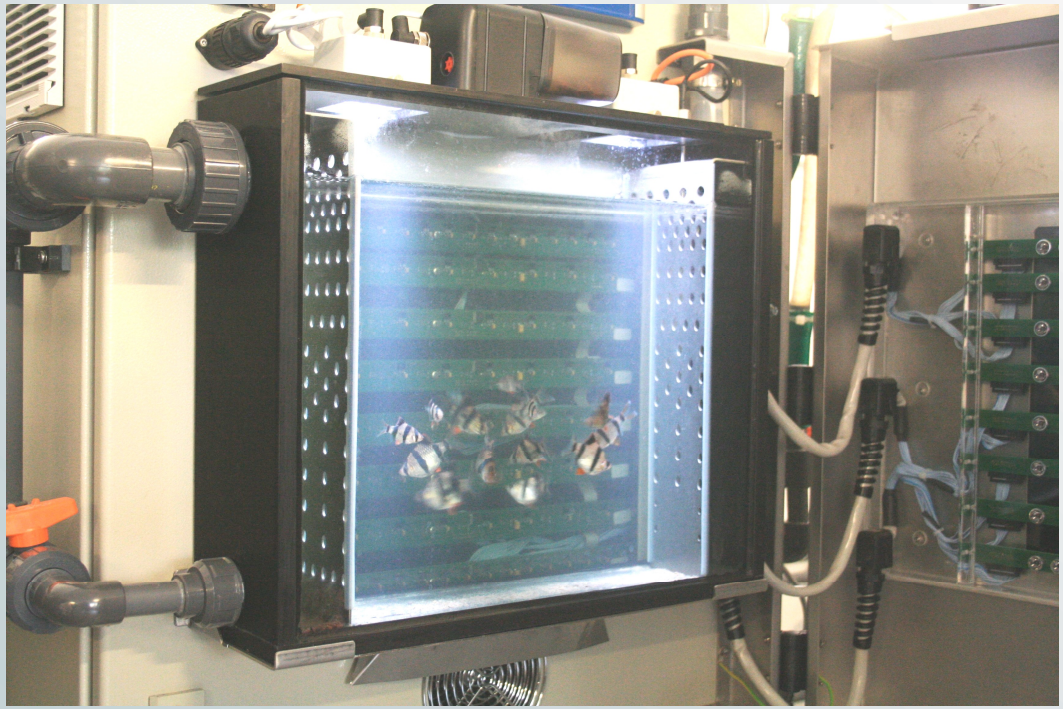
The *Tox*Protect64

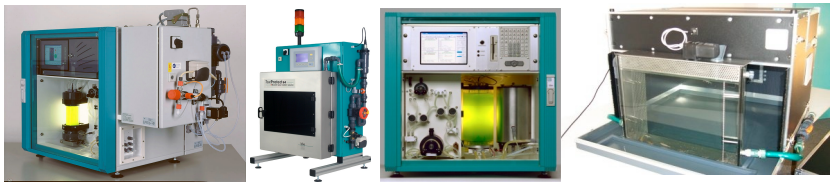
Water protection:
- drinking water

High sensitivity:
- pesticides
- neurotoxins
- respiratory toxins

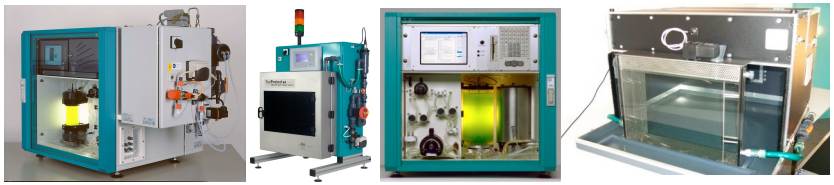
Alarm Verification:
- yes

Work involved: →2h/ month





Many thanks for your attention



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