iTOXcontrol User Manual

Version: V2.3
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4. GENERAL

4.1 VERSION OVERVIEW

Version	Release date	Changes
V0.1	September 2010	Basic version
V1.0	November 2010	Small layout changes
V2.0	December 2010	First final version
V2.1	January 2011	Update after review
V2.2	April 2011	Changed temperatures
V2.3	August 2012	Corrections

Table 1: Version overview

4.2 COPYRIGHT

4.3 WARRANTY

microLAN BV warrants each Model iTOXcontrol and its optional equipment against defects in materials and workmanship under normal use and service for a period of one (1) year. Equipment installed by microLAN is warranted from the installation date; all other equipment is warranted from the ship date. If purchaser schedules or delays installation more than 90 days after delivery, then the warranty period starts on the 91st day from date of shipment. This warranty extends only to the original purchaser. microLAN will, at its option, repair or replace equipment that proves to be defective during the warranty period, provided the equipment is returned to microLAN at the expense of the purchaser. Parts, labour, and return shipment to the customer shall be at the expense of microLAN. Travel costs shall be at the cost of the purchaser.

Software and firmware designed by microLAN for use with an external PC will execute its programming instructions when properly installed on that PC. microLAN does not warrant that the operation of the PC, software, or firmware will be uninterrupted or error-free.

Consumables, syringes and tubing are warranted for 30 days (parts only) and are not available for coverage under extended warranties or service contracts.

This warranty shall not apply to defects originating from:
- Improper maintenance or operation by purchaser.
- Purchaser-supplied accessories or consumables.
- Modification or misuse by purchaser.
- Operation outside of the environmental and electrical product specifications.
- Improper or inadequate site preparation.
- Purchaser-induced contamination or leaks.

4.4 MANUAL INFORMATION

4.4.1 Notes, Cautions and Warnings

This manual contains Notes, Cautions and Warnings, for situations that may endanger operating personnel, cause damage to equipment or need specific attention. The following formats and symbols are used:

Note

Notes provide additional information, such as expanded explanations, hints or reminders.

Caution

Cautions alert you to conditions that may cause damage to the equipment or interfere with the normal processing and damage the product.

Warning

Warnings point out procedures you must follow precisely to avoid personal injury or serious damage to the equipment.

4.4.2 Related documents

This manual is part of a set of microLAN b.v. manuals supplied for the iTOXcontrol. Additional information can be found in:

- 🕮 iTOXcontrol Software Manual
- 🕮 iTOXcontrol Advanced Manual
- 🕮 iTOXcontrol Parts Manual
- 🕮 Additional Cooling Operating Manual

5. INTRODUCTION ITOXCONTROL

5.1 INTRODUCTION

The industrial development, the use of pesticides in agriculture and the urbanization threaten the natural water resources. Legislation was introduced for monitoring and preventing the release of toxic substances to protect water quality. The traditional approach to toxicant monitoring in water involves standard analytic procedures. In general these techniques are selective and very sensitive. One is able to detect very low concentrations of a single chemical. However, these benefits have their drawback. Water may contain thousands of chemicals. Because of the selectivity only a limited number of compounds can be evaluated adequately. A broad based chemical analysis is expensive or sometimes impossible. Furthermore, most of the methods are laborious and time-consuming and cannot assess toxicity.
An alternative to the specific chemical methods is biomonitoring. In bioassays, whole organisms are used for testing the quality of aqueous samples. Living organisms are sensitive to a broad spectrum of bio-available substances. The conventional aquatic bioassays use fish or water fleas. However, these tests are unpractical for routine screening, because culturing and testing is costly and laborious as well as time and space consuming. This has led to the development of the microbiotests. The bioluminescence assay fulfils these needs and the *Vibrio fischeri* bioluminescence assay is standardized and widely used now.

5.2 THE BIOLUMINESCENCE ASSAY

The bioluminescence in *Vibrio fischeri* is a consequence of respiration. The intensity of the light output depends on several external factors including temperature, pH, salinity, nature and concentration of the toxicant. Toxic compounds interact with cellular structures and functions: DNA, membranes, enzymes and energy fluxes, which are fundamental to all living organisms. In *Vibrio fischeri* these interactions result in the inhibition of the light production. This light reduction is proportional to the toxicity of the sample.

Figure 1: Vials containing luminescent bacteria with an increasing concentration of toxic substances. The more toxic the sample the stronger the inhibition of the light production.

5.3 ITOXCONTROL

The iTOXcontrol is an automated biomonitor for testing acute toxicity based on this principle. The biomonitor uses freshly prepared bacteria directly from a luminescent culture. These bacteria are precultured and maintained at 5ºC in the iTOX itself. The culture is sufficient to operate the system for at least one week.
The test is performed at 15ºC. This is the optimal temperature for the sensitivity of bacteria. Because of their marine origin, the bacteria require NaCl. Consequently, the samples should contain 2% NaCl. To fulfil these conditions the samples and reference water are adjusted for the osmotic value by adding concentrated NaCl. Bacteria are prepared for testing by diluting a small quantity of bacterial suspension. The diluted bacterial suspension is mixed with sample and reference water respectively and exposed for 15 to 30 minutes. The light production is measured with a photomultiplier.

iTOXcontrol uses the luminescent bacteria *Vibrio fischeri* to test the water according to ISO 11348 and ISO 15839.

The luminescent bacteria test according to ISO 11348 is a procedure for the investigation of water samples on toxic effects. ISO 15839 describes a procedure for using on-line sensors / analyzing equipment for water. The "iTOXcontrol " is an on-line sensor for automation of this test procedure.

This means a continuous on-line monitoring of water and water treatment plants is made possible.

The automation of measurements gives you 24 hours per day, 7 days per week direct information of the water quality with only 1 service-visit per week.

📖 See also: § 5.4 ISO 11348
📖 See also: § 5.5 ISO 15839
📖 See also: § 5.6 The luminescent bacteria *Vibrio fischeri*

5.4 ISO 11348

ISO 11348 describes the procedure for the investigation of water samples on toxic effects.

5.5 ISO 15839

ISO 15839 describes the procedure and performance of on-line sensors/analysing equipment for water. This standard is applicable to most sensors/analysing equipment.

This International Standard :

- Defines an on-line sensor/analysing equipment for water quality measurements;
- Defines terminology describing the performance characteristics of on-line sensors/analysing equipment;
- Specifies the test procedures (for laboratory and field) to be used to evaluate the performance characteristics of on-line sensors/analysing equipment.

5.6 THE LUMINESCENT BACTERIA *VIBRIO FISCHERI*

The luminescent bacteria used for testing is of the water is species *Vibrio fischeri.*
This species is formally known as *Photo bacterium phosphoreum.*

Vibrio fischeri is a sea organism and there for the liquids for this bacteria must be kept on a salt concentration of 2%.

The lyophilized bacteria should be kept at - 20°C in a freezer.
Also during shipments/transport the lyophilized bacteria has to stay below 0°C.

The luminescent bacteria cultures can be conserved by cooling in the luminescent bacteria test equipment on 5°C for one week without losing pollutant sensitivity.

Figure 2: Bacteria & media solution

📖 See also: § 11.1 Cultivation of the luminescent bacteria

5.7 SAFETY

Figure 3: Wash hands

Wash your hands before and after working with iTOXcontrol.

Figure 4: Beware of moving parts

Beware of moving parts when you run the iTOXcontrol without covers.

Always switch off the instrument during maintenance and cleaning.

5.8 TERMINOLOGY AND ABBREVIATIONS

R = Reference,
S = Sample
T0 = Measurement after adaption period
T1 = Measurement after incubation period
CF = Correction factor
I = Inhibition

6. THE LUMINESCENT BACTERIA TEST (ISO 11348)

The test contains following steps:

1. Preparation (📖 See § 6.1)
2. Temperature adaption & Measurement T0 (📖 See § 6.2)
3. Mix and Wait (📖 See § 6.3)
4. Measurement T1 (📖 See § 6.4)
5. Determine Correction Factor & Inhibition (📖 See § 6.5)

6.1 PREPARATION

The process steps use luminescent bacteria of the species *Vibrio fischeri* that require a salt concentration of 2%. All steps are according to ISO 11348.

Used Suspensions:

1. **Bacteria suspension**
   Blank solution (water) with 2% NaCl and luminescent bacteria

2. **Reference Suspension**
   Blank solution (water) with 2% NaCl (= negative control)

3. **Sample**
   Water sample with 2% NaCl.

6.2 TEMPERATURE ADAPTION & MEASUREMENT T0

All suspensions should be used at a temperature of 15ºC ± 0.5ºC.

A temperature “Adaptation Time” is required to bring the bacteria from 5ºC to 15ºC.
The default value for the adaption time is 5 minutes.

With the correct temperature now the initial luminescence intensity “L**R**T0” of the bacteria suspension is measured by the photomultiplier.
This is the last measurement during the adaptation time.

LRT0 is the zero-measurement of the **R**eference material.

6.3 MIX AND WAIT

Subsequently, identical portions of the bacteria suspension are added to the reference suspension and the sample.

Bacteria suspension + Reference suspension = **R**eference material = L**R**T
Bacteria suspension + Sample = **S**ample material = L**S**T

Pollutants possibly existing in the sample will affect the luminescent bacteria during the time of contact. The time of contact is called incubation time.
The default value for the incubation time is 15 minutes*.

* Incubation time can be set higher if you want a longer incubation time to detect substances with a longer reaction time.

6.4 MEASUREMENT T1

After the incubation time the two final luminescence measurements are performed.

"LRT1" = **R**eference / blank
"LST1" = **S**ample

6.5 DETERMINE CORRECTION FACTOR & INHIBITION

Note: The ISO 11348 is set up for lab tests specifically and should be used as a guideline for the iTOXcontrol settings

The measurement of LRT0 and LRT1 determine the natural change of the luminescence intensity. The natural change of the luminescence intensity is as strong in Reference as in Sample (blank and sample). The Correction Factor (CF) serves to correct the natural drift of the light intensity in time. Therefore by the change of the luminescence intensity in Reference, a Correction Factor (CF) is automatically calculated:

Correction factor: $CF_{RT1}=L_{RT1}/L_{RT0}$

CF_{RT1} = Correction Factor Reference at time 1
L_{RT0} = Luminescence Reference at time 0 (first 5 minutes)
L_{RT1} = Luminescence Reference at time 1 (after 15 minutes)

Adjusted Luminescence intensity: $L_{CT1}=L_{ST0}*CF_{RT1}$

L_{CT1} = Corrected Luminescence at time 1
L_{ST0} = Luminescence of Sample at time 0
CF_{RT1} = Correction Factor at time 1

The inhibition in percentage is calculated with the formula:

Inhibition (in percentage): $I_{T1}=((L_{CT1}-L_{ST1})/L_{CT1})*100$

I_{T1} = Inhibition in percentage at time 1
L_{CT1} = Corrected Luminescence` at time 1
L_{ST1} = Luminescence of Sample at time 1

Schematic view of the course of the luminescent bacteria test according to ISO 11348.

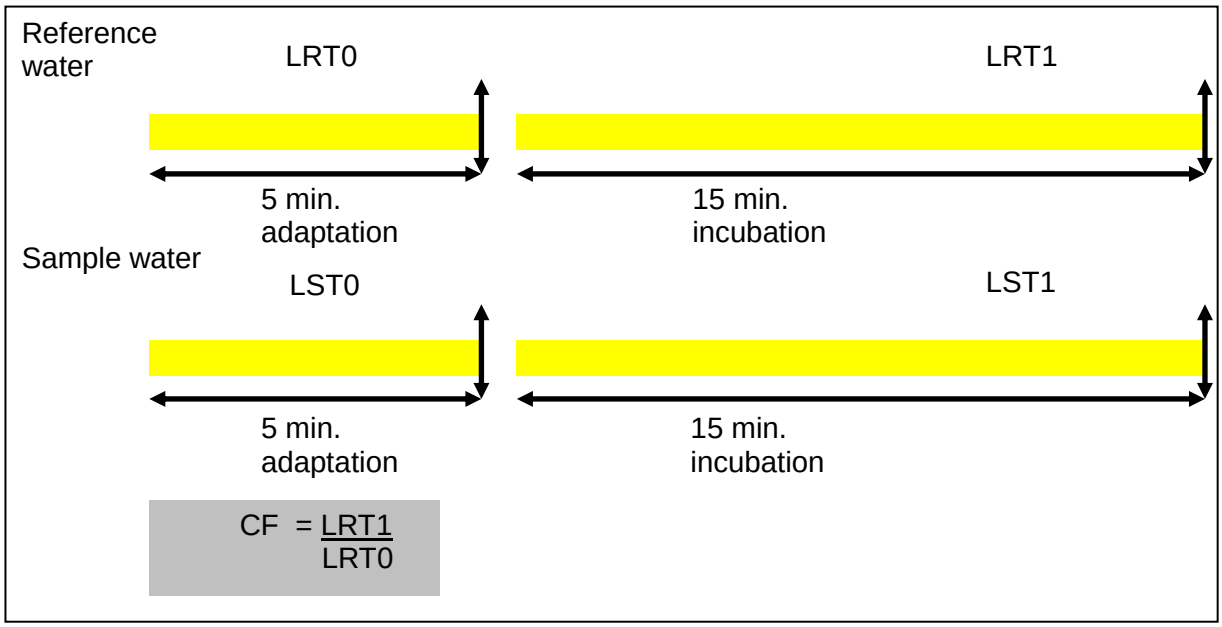


Figure 5: Schematic view calculations

Furthermore a decrease in intensity in the sample is rated as inhibition by pollutants in the sample.

6.6 EVALUATION

The iTOXcontrol is working correctly when:

- The Correction Factor is between 0,6 and 1,3 (according to ISO 11348 the test is valid)
- The luminescence of the bacteria shows more than 50.000 (with less luminescence the chance of malfunction is higher)
- The toxicity of the positive control is between 20% and 80%
- The toxicity of the negative control is between -5% and 5%
- Malfunction of the iTOXcontrol will be demonstrated by significant differences between the measurements and the reference values.
- Only measurements within the chosen part of the working range are valid.

7. INTRODUCTION TO THE ITOXCONTROL COMPONENTS

The complete iTOXcontrol system consists of following components:

- iTOXcontrol system (📖 See § 7.1)
- Software (📖 See § 7.1.1)
- Analyser (📖 See § 7.1.2)

7.1 ITOXCONTROL SYSTEM

The automatic measurement system.

Figure 6: iTOXcontrol system

Figure 7: iTOXcontrol system

This iTOXcontrol system contains the following modules:

7.1.1 Software

The iTOXcontrol software “TOXengine” is the controlling software and it’s Human Machine Interface (HMI).
“TOXview” software is also running on the computer and this software will take care of data in the database.

📖 See also: iTOXcontrol Software manual

7.1.2 Analyser

The iTOXcontrol analyser is the area where the actual measurements are performed.

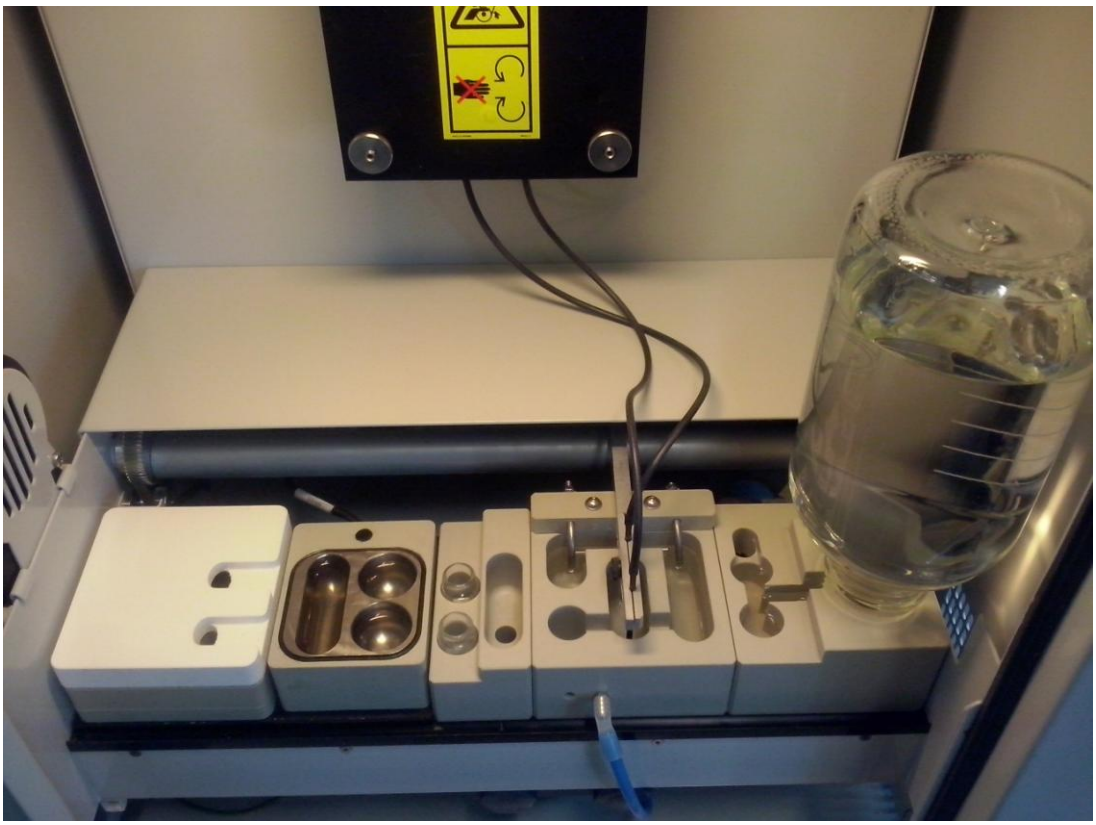


Figure 8: Analyser

8. ITOXCONTROL - ANALYSER

The analyser is the area where the actual measurements are performed.

8.1 INTRODUCTION

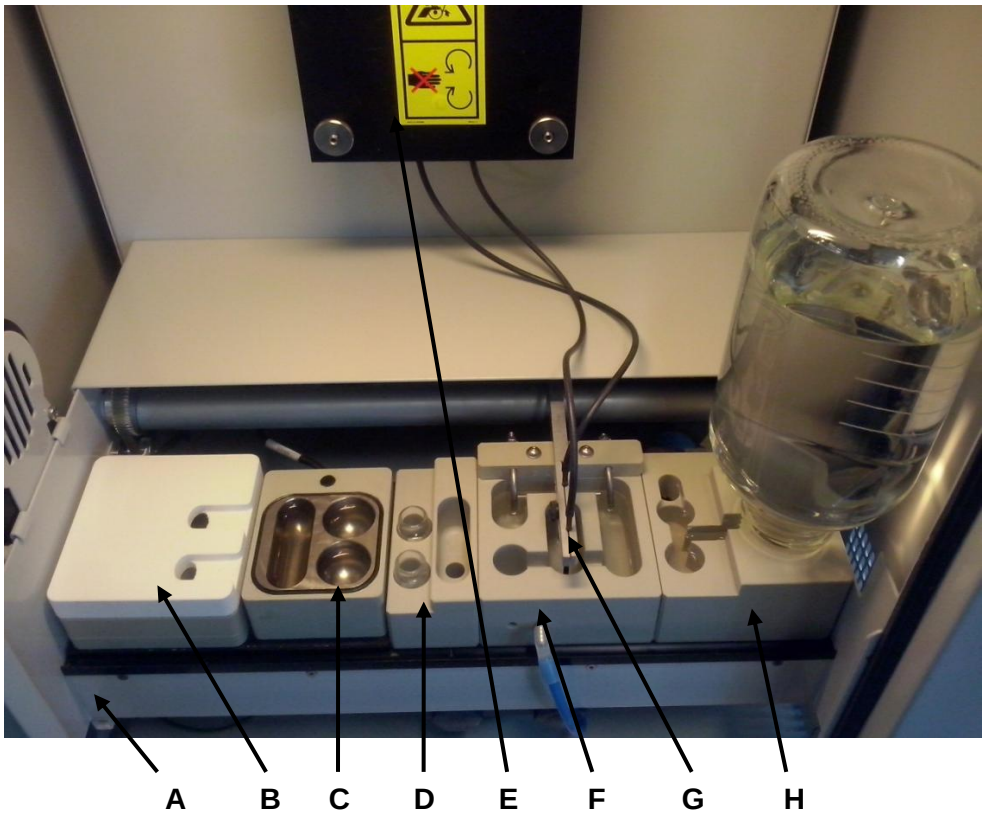


Figure 9: Overview Analyser

The analyser consists of:

A. Analyser - Housing	🕮 See also § 8.4
B. Bacteria module	🕮 See also § 8.5
C. Mixing module	🕮 See also § 8.6
D. Control module	🕮 See also § 8.7
E. PMT / syringe housing	🕮 See also § 8.8
F. Sample and reference module	🕮 See also § 8.9
G. Tip arm	🕮 See also § 8.4
H. Salt solution supply	🕮 See also § 8.10

8.2 MODULARITY OF THE PROCESS AREA

An overview of the process area is shown in Figure 9: Overview Analyser on Page 22

The cups with the liquids are placed as removable modules within the analyser housing. Advantages of this modular structure are:

- Easy removal of containers for cleaning
- Easy exchange of modules for cleaning or changing
- Easy extension of the equipment by adding additional modules

8.3 PRINCIPLES OF OPERATION

The instrument can handle sample and reference water simultaneously.

The default situation is:
Front row handles the sample materials.
Rear row handles the reference materials.

8.4 TIP ARM

In the process area a tip arm handles the transport of liquids.
The tip arm is equipped with pipette tips which are connected with tubes to the syringes. The tubes between tips and syringe must be light closed black tubes, so daylight does not disturb the luminescence measurement.

The robot arm is mounted on a glider arm and driven by a belt with stepper motor for movement from left to right.
The arm rests on a guide rod that is eccentric. Rotation of the guide rod lowers and raises the tip arm into the desired position. The eccentric rod is driven by a motor.

8.5 BACTERIA MODULE

The luminescent bacterial culture is kept in a polypropylene cup cooled by a Peltier element and controlled by a thermostat at default 5°C. To remove the heat, a ribbed cooling block is situated underneath the Peltier element .In the cover of the cup is an opening, through which the reference tip can get in.

Per measurement a quantity of 50µl is drawn up by the pipette. In this way the possible contaminated tip of the sample channel does not get in contact with the culture. The bacteria module contains a magnetic stirring device to prevent sedimentation of the bacteria.

Figure 10: Analyser - Bacteria module 40 ml

The cable with the connector for the electrical connection is connected to the upper connector of the left socket at the rear wall of the analyser housing (underneath the guide rail of the tip arm).

Note: When the luminescent bacteria test equipment is switched off for longer than one minute, the luminescent bacteria must be taken out and in the meantime stored in the refrigerator. The luminescent bacteria do not stand repeatedly warming up and cooling down!

Warning: When you take out the bacteria (or the mixing) module switch off the analyser before unplugging the connectors of the modules.

8.6 MIXING MODULE

The mixing module contains three cups in a square titanium block placed in a plastic housing.

Figure 11: Analyser - Mixing module

This module has three separate cups.

Left cup:	Preparation of bacteria solution.
Right front cup:	Preparation of sample solution.
Right back cup:	Preparation of reference solution.

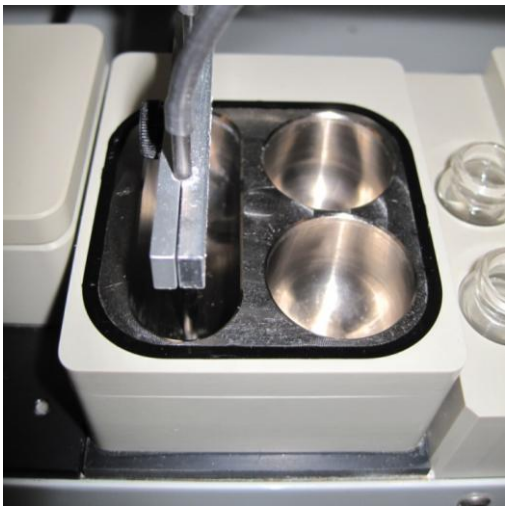


Figure 12: Analyser - Mixing module

The Mixing module, the bottom is cooled by a Peltier element and controlled by a thermostat. To remove the heat, a ribbed cooling block is situated underneath the Peltier element. The module is located in the machine at second position from the left. The cable with the connector for the electrical connection is connected at the right socket at the rear wall of the analyser housing (underneath the guide rail of the tip arm).

Warning: When you take out the bacteria (or the mixing) module switch off the analyser before unplugging the connectors of the modules.

The mixing module is made of titanium. This is on one hand corrosion resistant for the salt solution and on the other hand well heat conducting, so that a rapid cooling of the samples at 15°C by the Peltier element installed underneath, takes place.

8.7 CONTROL MODULE

The control module consists of a mounting plate and 2 storages bottles with a chemical stock solution (control solution), which the instrument automatically can dose at the beginning of the positive control test.

The control module is placed beside the mixing module into the analyser housing. The bottle with the stock solution is placed in the front row, that means in the sample channel. In order to exclude the influence of a different volume a bottle with reference water is placed in the rear row.

The control module is designed for glass bottles of 10ml. The used volume in the bottle is 6,5ml.

Figure 13: Analyser - Calibration solution module

The measuring program controls the test with automatic dosing of control sample: This mode is a sensitivity test of the luminescence bacteria in regular time intervals with always the same concentration of a reference chemical (like Zinc Sulphate or Pentachlorophenol).

8.8 PMT / SYRINGE HOUSING

In the PMT housing are the syringes located. The syringes are driven by a motor mounted on top of the housing.
The motor can move the plunger of the syringes up (suck) and down (blow).

Figure 14: Analyser – PMT / Syringe housing

Another function of the syringes is mixing the solutions by multiple intake / release movements.

In the PMT housing are the Photo Multiplier Tubes (PMT) mounted, these tubes are the sensors in the instrument. They count the emitted light from the bacteria solution.

The PMT housing is a closed cover so light measurement will not be influenced by external light.

The syringes are kept clean by movements of the plunger. The movements will prevent contamination of the measuring cells with suspended materials or particles (like sand).

8.9 SAMPLE AND REFERENCE MODULE

Sample and Reference water flow steadily at a speed of 300ml/min through the equipment. The cups, from which sample will be taken out, have an overflow into the waste, this is the drain in the centre of the block. Sample water flows into the front left cup and overflows then into the waste. Reference water flows first into the left rear cup and then over a channel into the right cup, which is for the supply of reference water which is used for dilution of sample and reference. From there the water flows over a threshold into the drain. With this construction it is possible in the left position to draw at the same time sample and reference, while in the right position in both channels a reference sample is taken in.

Figure 15: Analyser – Sample and Reference module

The block is connected to the drain of the equipment. It leads along a 90 degree connection underneath the block to the drain hose.

The supply of reference - and sample water leads through cups, which are milled into a plastic block. The left pair of cups is for taking in water and sample water. The right pair of cups is for taking in at the same time water from both channels, to rinse for example the modules or syringes. Sample water and reference water flow into the middle segment and then into the drain.

8.10 SALT SOLUTION SUPPLY

The supply of salt solution is stored in an 1 l glass bottle and instead of using a screw cap it is screwed on a plastic block with two chambers. The bottle is placed within the equipment, upside down on this block. In this way the salt solution flows by force of gravity into the chambers, until the overflow is locked by the fluid level. Thus no more air can flow into the bottle and developing negative pressure in the bottle which stops the overflow of liquid. Only if the fluid level sinks by withdrawal of salt solution, the overflow is released and air enters again. The level of liquid in the withdrawal chambers is kept constant by this mechanism.

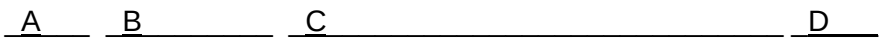
The module is performed with a drain to prevent that the NaCl solution will leak into the analyser. The drain connection is connected with a tube on the main drain.

Figure 16: Process chamber - Salt solution supply

The module is placed in the most right position within the equipment.

8.11 COURSE OF THE MEASUREMENT

The iTOXcontrol luminescent bacteria test is a semi continuous Biomonitor. This means, that in regular intervals a sample is taken and examined. The treatment of a sample is called measurement. The measurement is divided into the following sections:



A. Preparation: approx. 2,5 minutes

B. Adaption phase: 5 minutes (default)

C. Incubation phase: 15 minutes (default)

D. Rinsing: approx. 2,5 minutes

With an incubation phase of 15 minutes the duration of one normal measurement cycle is approximately 25 minutes.

8.11.1 Preparation

Preparing reference-suspension from dilution water, salt solution and bacteria. The measurement starts with drawing up 0,5ml salt solution in both channels. Then 4,5ml dilution water in both channels is taken in from the right side of the sample/reference module. The salt solution is well mixed by repeatedly dis-charging and drawing up in the left mix cup. From the luminescent bacteria supply module 50µl is taken and likewise injected into the left mixing cup. The luminescent bacteria are only taken by the reference (blank) channel, this is to avoid the possibility of a contaminated tip from the sample channel getting into the culture. The luminescent bacteria are likewise– mixed by repeatedly drawing up and discharging. In the right part of the mixing module 4,5ml sample and 4,5ml reference (blank) are both mixed with 0,5ml salt solution. The reference solution is positioned in the rear cup and the sample solution in the front cup.

8.11.2 Adaption phase

Already during the following five minutes adaptation phase (by temporary drawing up the samples into the syringes) the luminescence intensity in the reference suspension is measured each minute. The luminescent bacteria react to the rise in temperature of 5 to 15°C with a rise of luminescence. The last measurement is called T0 and used for the calculation of the correction factor and the toxicity.

8.11.3 Incubation phase

Finally the reference suspension is mixed with the samples. The ratio of reference suspension to sample amounts in this case, 1:1. The total volume from sample plus test suspension is 10ml (for each channel). Also in the following incubation phase sequentially the luminescence will be measured every minute. So one does not only get information at the beginning and at the end of the luminescence measurement, but also about the changes of the measurement of sample and reference sample. The last measurement is called T1 and used for the calculation of the correction factor and the toxicity.

8.11.4 Rinsing

At the end of the measurement, the calculation of the inhibition in accordance with the ISO regulation and rinsing of the mixing module and both syringes with reference water will take place.

9. SOFTWARE

📖 See also: iTOXcontrol Software Manual

9.1 ITOXCONTROL SOFTWARE

The iTOXcontrol luminescent bacteria test is operated by the iTOXcontrol engine and is described in a specific separate manual. The iTOXcontrol Engine program takes over all hardware-specific operating tasks like for instance the control of the valves or pumps or the registration of the measured values (which are stored in the TOXview software).

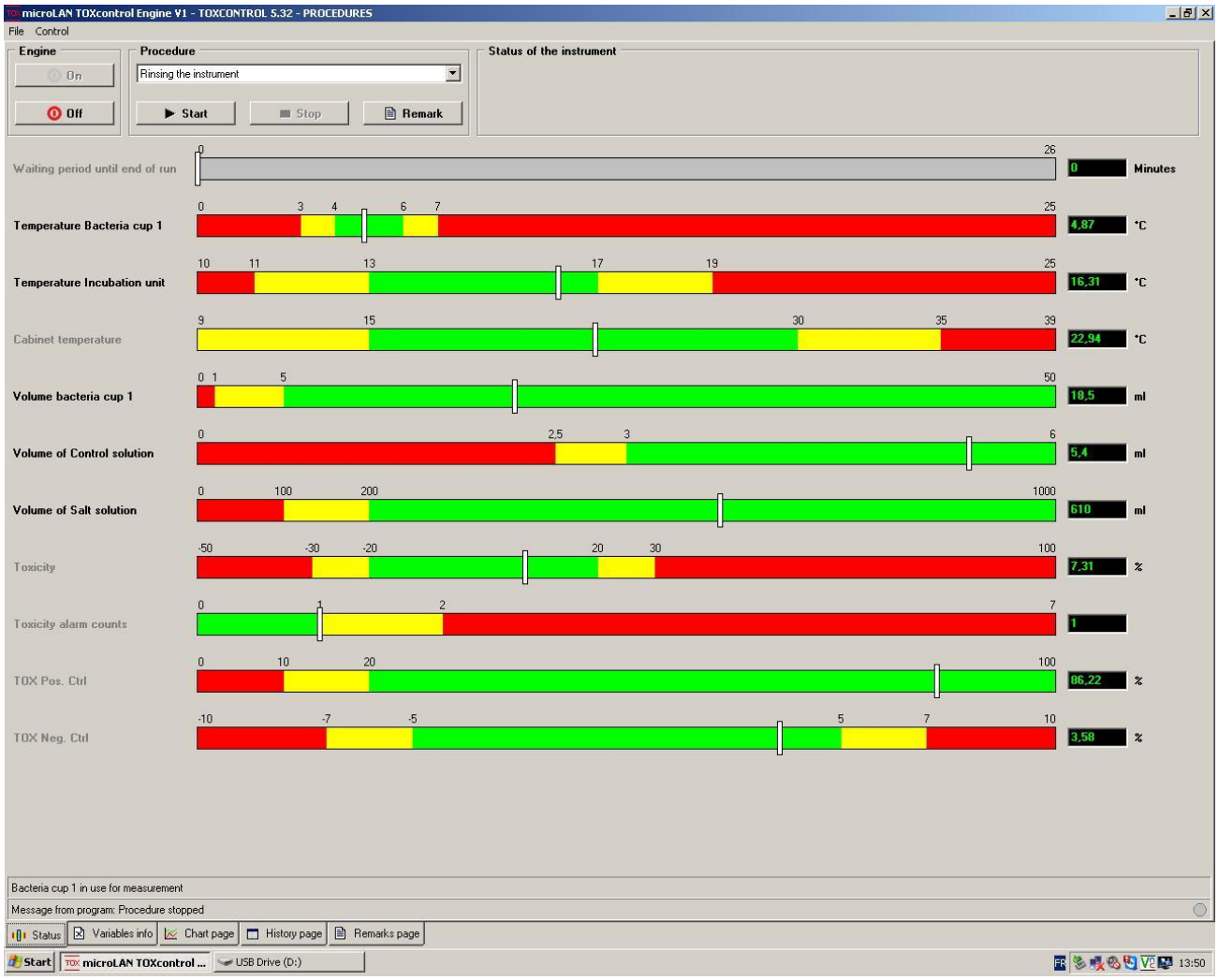


Figure 17: Software status screen

10. ITOXCONTROL OPTIONS

10.1 ANALOG OUTPUT MODULE

The analog output module is integrated on the main board of the instrument.

This module gives a output signal of 4 – 20 mA that represents the actual toxicity (0 – 100%).

📖 See also: iTOXcontrol Software Manual
📖 See also: iTOXcontrol Advanced Manual

10.2 TEMPERATURE SENSOR CABINET

To measure the temperature of the cabinet a thermometer is situated at the rear wall of the equipment. This sensor is directly connected to the PC by a USB connection.

Figure 18: iTOXcontrol – Temperature sensor

► Part number: 06TCB00701

10.3 AIR-CONDITIONING MODULE

The Air-Conditioning unit can be added on the cabinet of the iTOXcontrol when the room temperature is above the 25°C. The unit can be used to get a stable temperature in the process area of the analyser.

Figure 19: Air-Conditioning unit

The unit can be placed on the left side of the cabinet.

Figure 20: Air-Conditioning display

The display terminal consists a 3 position 7-segment display which indicates the internal enclosure temperature in ºC or ºF (changeable) as well as error codes.

📖 See also: Additional Cooling Operating Manual

Figure 21: Air-Conditioning door switch

When the front door of the cabinet will be opened the air-conditioning unit will be switched off by the door switch.

► Part number: 01TCB10302

10.4 MAGNETIC VALVE

The magnetic valve is used for dosing reference water. The valve will close when there is no reference water needed. This valve is controlled by the instrument software.

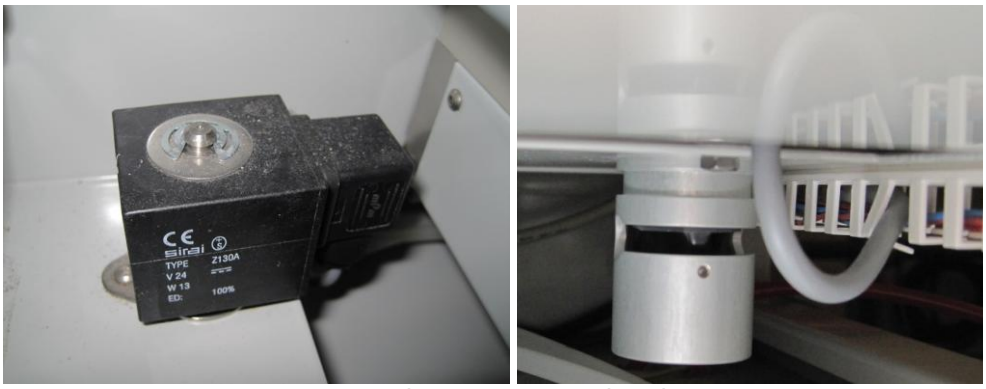


Figure 22: Magnetic valve

► Part number: 01TCB10501

Special tubing is needed for closing the supply of reference water.

► Part number: 04WM9300048016

11. MAINTENANCE PROCEDURES

11.1 CULTIVATION OF THE LUMINESCENT BACTERIA

11.1.1 Preparation of bacteria culture

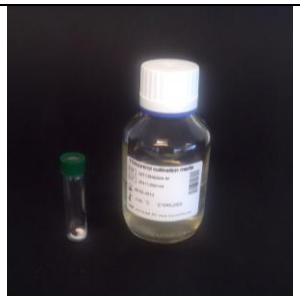
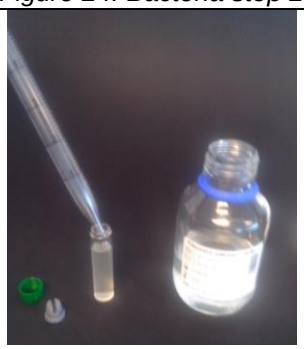
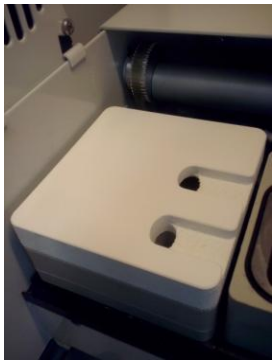
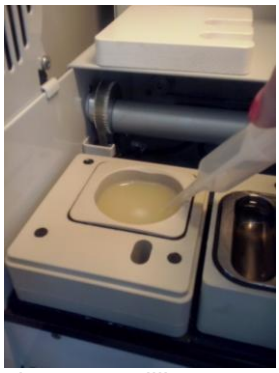
1	 *Figure 23: Bacteria step 1*	What's needed: 1. 02TCB00306 Medium and bacteria 2. 04TCB451432 Sterile Pipette 10ml
2	 *Figure 24: Bacteria step 2*	1. Remove cap from bacteria vial, check if vial is sealed.
3	 *Figure 25: Bacteria step 3*	1. Add +/- 3ml medium to the vial with the bacteria by using the sterile pipette.
4	 *Figure 26: Bacteria step 4*	1. Shake gently for 5-10 seconds. 2. Pour the solution in the vial into the media bottle.
5		1. Repeat step 3 & 4 2. Place the bacteria solution into the bacteria module. 🕮 See § 11.2 Filling up the luminescent bacteria supply

Table 2: Preparation of bacteria culture

11.2 FILLING UP THE LUMINESCENT BACTERIA SUPPLY

The luminescent bacteria supply for a two week period of operation is stored a polypropylene 40 ml cup, which is placed in the bacteria module.

1	 *Figure 27: Filling step 1*	1. Remove the cover.
2	 *Figure 28: Filling step 2*	1. Take out the remains of the old bacteria culture with a syringe. 2. Flush the bacteria supply module with Alcohol > 70%. 3. Dry with a paper towel or tissue.
3	 *Figure 29: Filling step 3*	1. Fill the cups with the reconstituted bacteria solution. 2. Check whether the stirring magnet is rotating in the center of the cup.

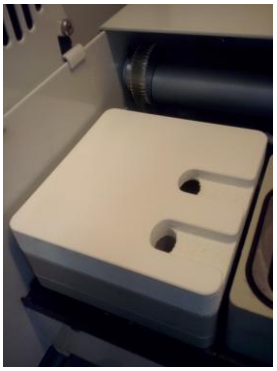
4	 *Figure 30: Filling step 4*	1. Place the cover of the module.

Table 3: Filling up the luminescent bacteria supply

11.3 FILLING UP THE SALT SOLUTION SUPPLY

1	 *Figure 31: Remove bottle*	1. Remove the bottle with the block carefully from the instrument (remove drain tubing when applied).
2	 *Figure 32: Remove block*	1. Unscrew the supply bottle from the block. 2. Rinse off any salt deposits, otherwise the bottle thread is difficult to operate. 3. Clean the block by rinsing with water. 4. Fill up again with NaCl solution (20%).
3		1. Screw the block on, like a cover cap onto the bottle. 2. The module can be turned and inserted again into the equipment. 3. The amount of filling should be indicated in the measuring program, so the level is correctly marked. Consumption per measurement is 2ml, the supply

	 *Figure 33: Turn block*	bottle has a volume of 1000ml.

Table 4: Filling up the salt solution supply

For the production of the salt solution in distilled water solve 200g NaCl, in a way that a liter of liquid results. (20% NaCl solution)

NaCl solution: ► Part number: 02TCB3180050 (5 liter)

11.4 CONTROL SOLUTION

11.4.1 Preparation of the control solution

Control solution: ► Part number: 02TCB00308

It's also possible to prepare your own control solution by: dissolving 1117mg ZnSO4*7H2O in 100ml distilled water, the concentration is then 2500mg $Zn^{2+,}$

The used amount of control solution in the instrument is 40 µl per measurement.

11.4.2 Filling up the control solution

Fill the front bottle with 6,5ml control solution.

Note: Do not fill the bottle completely, a contamination can be caused by control solution on the upper part of the tip.

The rear bottle is filled with reference water and will compensate volume differences.

Figure 34: Bottle control solution

11.5 EXCHANGE OF THE SYRINGES

The exchange of the syringes requires opening the measuring chamber.

Caution: First switch off photomultipliers before opening the measuring chamber

Figure 35: Switch Photomultiplier

Caution: The devices are additionally equipped with a safety switch, which interrupts automatically the electric power, when opening the cover. However do not rely on it as routine, since the switch can respond only, when the cover is already opened reasonably far. When daylight falls on the photomultipliers in operation, their life span reduces drastically.

11.5.1 Exchange of the syringes

These syringes have a life span of at least one week when continuously operating. Using for a longer period the syringe piston becomes leaky by wear and liquid withdraws behind the piston. Therefore the syringes have to be replaced weekly.

► Part number: 04TCB343110 TOXtip Syringes (100 pack)

11.5.2 Replace syringes and cleaning tips and tubing

For replacing the syringes the procedure: **Maintenance replacing syringes** must be started.

🕮 See also: TOXcontrol Software Manual

1	 *Figure 36: Change Syringes step 1*	1. Switch off the supply voltage of the Photomultipliers, to protect them against overloading by daylight. 2. Remove the screws that hold the cover of the measuring chamber.
2	 *Figure 37: Change Syringes step 2*	1. Remove the cover of the measuring chamber.
3	 *Figure 38: Change Syringes step 3*	1. Take the retaining plate out, by hooking your fingers behind the plate and pull it out of its housing.
4	 *Figure 39: Change Syringes step 4*	1. Remove the syringes.
5	 *Figure 40: Change Syringes step 6*	1. Fill the tube with Alcohol > 70% keep the end of the tube closed with your finger.

6	 *Figure 41: Change Syringes step 7*	1. Release your finger and squeeze the tube to remove sediment.
7	 *Figure 42: Change Syringes step 8*	1. Rinse properly afterwards with water to prevent bio film.
8	 *Figure 43: Change Syringes step 5*	1. Clean the inside of the PMT housing by using a dry cloth.
9	 *Figure 44: Change Syringes step 9*	1. Put in new syringes, press down firmly onto the junction to prevent leakage.
10	 *Figure 45: Change Syringes step 10*	1. Put the retaining plate back on. 2. Observe whether the syringes are working correctly by starting the rinsing program.

11	 *Figure 46: Change Syringes step 11*	1. Is everything ok, close the cover of the measuring chamber cover by locking the screws (6x).
12	 *Figure 47: Change Syringes step 12*	1. Restart the photomultiplier power supply. By activating the switch.

Table 5: Replace syringes and cleaning tips and tubing

11.6 CHANGE THE TUBING

► Part number: 06TCBSK001 Service kit (contains: Tubing, tips and inserts)

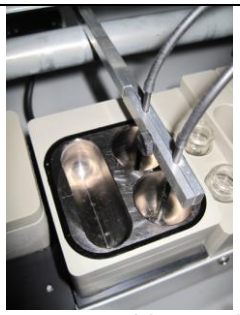
1	 *Figure 48: Tubing on PMT housing*	1. Remove the old tubing. 2. Place new tubing by connection on the PMT housing. 3. Left connection = Reference channel 4. Right connection = Sample channel
2	 *Figure 49: Tubing on tips*	1. Place the tubing on the tips. 2. Rear connection = Reference channel. 3. Front connection = Sample channel. 4. Check the tip height (see change tips).

Table 6: Change the tubing

11.7 CHANGE THE TIPS

► Part number: 06TCBSK001 Service kit (contains: Tubing, tips and inserts)

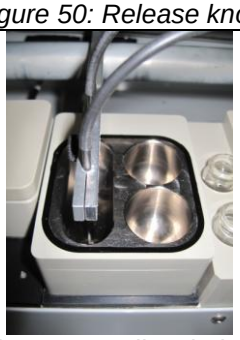
1	 *Figure 50: Release knob*	1. By turning the knob on the side you loosen the 2 parts which hold the tips. 2. Remove the tips and remove the tubing. 3. Place new tips and connect tubing.
2	 *Figure 51: Adjust height*	1. Adjust tip height by using maintenance procedure: “Adjust tip height” 2. You can adjust the height when the arm is in the down position in the right part of the mixing module. 3. The tips should be just above the bottom but may not touch the bottom.

Table 7: Change the tips

11.8 CHANGE THE INSERTS

► Part number: 06TCBSK001 Service kit (contains: Tubing, tips and inserts)

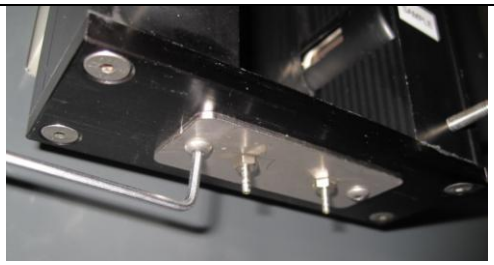
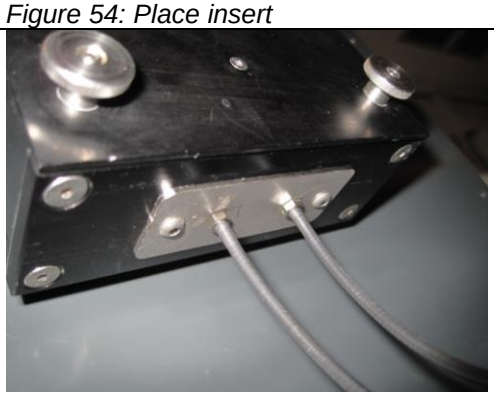
1	 *Figure 52: Remove plate*	1. Remove syringes and tubing. 2. Remove the inserts by unscrewing the bottom plate, (connection for the black tubes to the tips), by using an Allen key 2,5 mm.
2	 *Figure 53: Remove insert*	1. Remove the old inserts from the PMT housing by pushing it out from the top by using an Allen key.
	Warning: Do not re-use the old inserts, they can be damaged during removing.	
3	 *Figure 54: Place insert*	1. Clean the bottom plate and the insert holes. 2. Install new inserts by pushing the insert by hand up into the hole into the PMT housing.
4	 *Figure 55: Mount plate*	1. Mount plate and connect tubing. 2. Place the inserts and perform the “Change syringe procedure” 3. Perform the “Rinsing procedure” and check whether there are air bubbles in one or both channels. 4. When air bubbles appear check the insert and syringes.

Table 8: Change the inserts

11.9 ADJUSTMENT POSITION OF TIPS

For adjusting the tip positions the procedure: **Maintenance: Adjust step positions tips** must be started.

📖 See also: TOXcontrol Software Manual

11.10 MAGNETIC STIRRERS

In the luminescent bacteria supply cup (white) magnet stirrers with 5mm diameter and 12mm length are used. Rinse them with Alcohol > 70% and dry them with paper towel or tissues.

► Part number:06TCB480122 Stirrer bar white ptfe 5x12mm (5 pack)

11.11 DECONTAMINATION

Do you suspect a contamination of the equipment after tests with pollutants, due to continuous inhibitions, the following measures are recommended:

1. Cleaning of the mixing module by rinsing with Alcohol > 70% and dry with paper towel or tissues.

2. Changing of the tubes, tips and syringes (or cleaning them).

► Part number: 06TCBSK001 Service kit (contains: Tubing, tips and inserts)

📖 See also § 11.5.2 Replace syringes and cleaning tips and tubing

Note: According to experience, pollutants store themselves less into the materials of the equipment than into already existing contamination (bio films).

11.12 AIR-CONDITIONING SETTINGS

The display terminal consists a 3 position 7-segment display which indicates the internal enclosure temperature in ºC or ºF (changeable) as well as any fault codes. The actual enclosure internal temperature is constantly displayed.
When a system message is generated, this alternates in the display with the current internal enclosure temperature. While programming the unit, the programming level and prescribed value are also displayed.

11.12.1 Adjustment mode

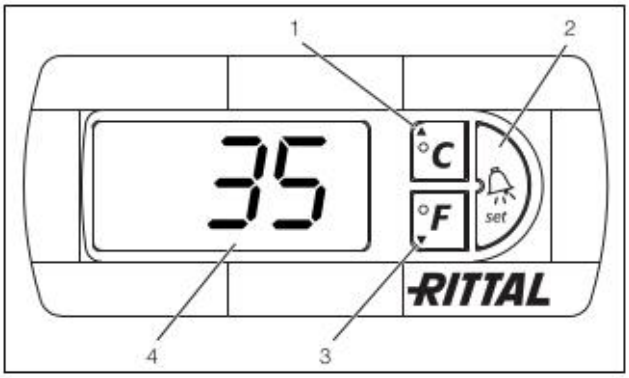


Figure 56 : Comfort Controller

Legend

1. Programming button, also display of the set temperature unit (degrees Celcius)
2. Set button
3. Programming button, also display of the set temperature unit (degrees Fahrenheit)
4. 7-segment display

In the EEPROM of the Comfort controller various parameters are stored which can be changed by using the buttons 1, 2 and 3 (Fig. 56). 24 changeable parameters can be set via 24 program levels in the stated ranges (max and min values) .

In principle, the programming is identical for all editable parameters.
To enter programming mode:

• Press button 2 (“Set”) for approx. 5 sec. The controller is now in programming mode. While in programming mode, if you do not press any buttons for approx. 30 sec., the display will first flash, then the controller will switch back to normal display mode. The “Esc” display indicates that any made changes have not been saved.

• Press the programming buttons ▲(°C) or ▼(°F) to switch back and forth between the editable parameters (see figure 57 and table 9).

• Press button 2 (“Set”) to select the displayed parameter for editing.
The current value of this parameter is displayed.

• Press one of the programming buttons ▲(°C) or ▼(°F). The “Cod” display will appear. In order to be able to change a value, you must enter the authorization code “22”.

• Keep the programming button ▲ (°C) held down until “22” appears.

• Press button 2 (“Set”) to confirm the code. You can now alter the parameter within the preset limits.

• Press one of the programming buttons ▲(°C) or ▼(°F) until the required value appears.

• Press button 2 (“Set”) to confirm the change. You can now alter other parameters in the same way. There is no need to re-enter the authorization code “22”.

• To exit programming mode, press button 2 (“Set”) again for approximately 5 sec. “Acc” will appear in the display to indicate that the changes have been saved. The display will then switch back to regular operation (enclosure internal temperature).

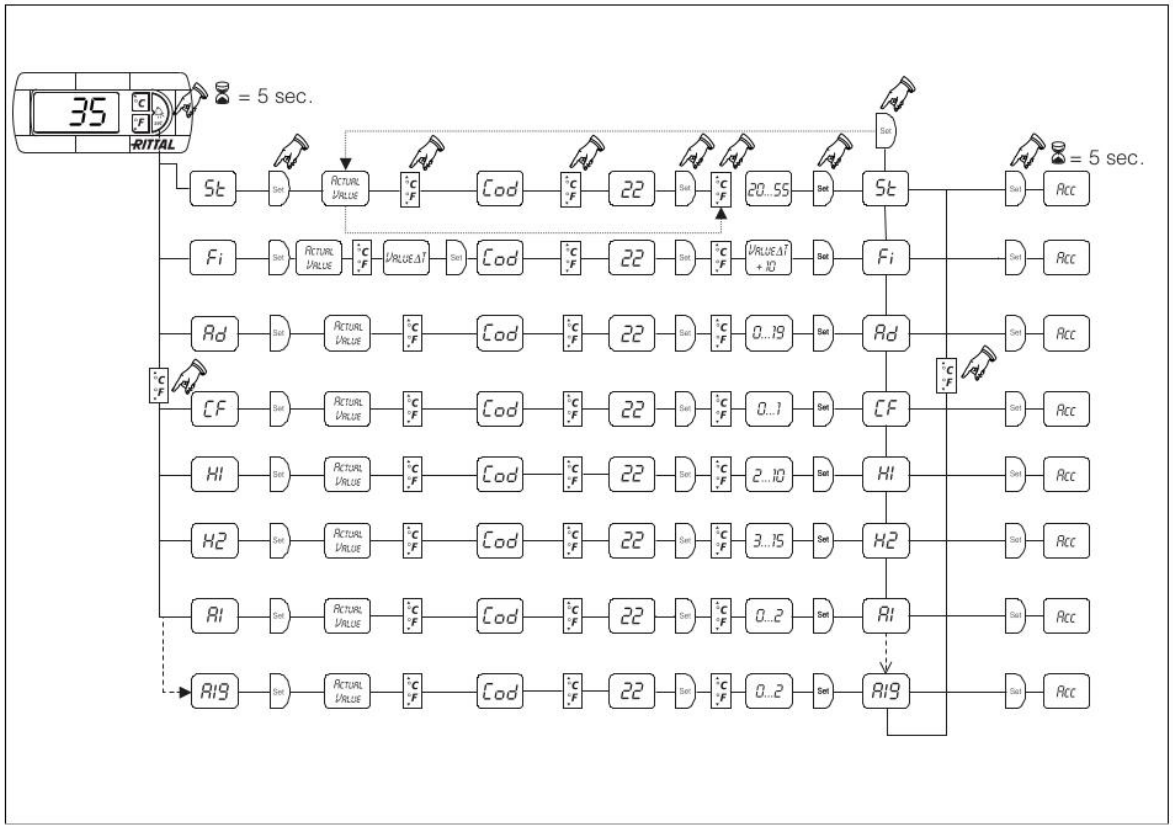


Figure 57: Air-Conditioning program steps

Default settings:

Display screen	Parameter	Set point	
St	Temperature set point	24	Advised by microLAN
Fi	**Filter mat monitoring**	**99**	**Default factory setting**
Ad	Master-slave programming	0	Default factory setting
CF	Temperature conversion	0	Default factory setting
H1	Temperature switching	5	Default factory setting
H2	Difference for error message 2	5	Default factory setting

Table 9: Air-Conditionings settings

📖 See also: Additional Cooling Operating Manual

12. MAINTENANCE SCHEDULE

This chapter describes the maintenance schedule.

🕮 See § 17 Appendix B: Maintenance

12.1 DAILY MAINTENANCE

Daily maintenance can be done on any time the instrument is visited. This is not really necessary for the instrument but can be seen as extra attention to the instrument

12.1.1 Visual check on leakage

Check visually if there is no leakage in the instrument.
Check whether there are salt remains on the connection of the tips to the tubes, this means that this connection is leaking.

12.1.2 Visual check tip positions

🕮 See § 11.9 Adjustment position of tips

12.1.3 Visual check volumes

Check whether the volumes in the right side of the mixing module on front and rear cups are equal during the measuring process.

12.1.4 Check Correction Factor

Is the correction factor between 0,6 and 1,8?

🕮 See § 6.5 Determine Correction Factor & Inhibition

12.1.5 Check Toxicity

Is the toxicity between -10 and 10%?

12.1.6 Check Toxicity Positive Control

Is the positive control measurement between 20 and 80% (according to the ISO standard)?

12.2 WEEKLY MAINTENANCE

12.2.1 Clean all blocks

Clean all cups in the blocks with water en dry with a paper cloth.

Note: When using Alcohol > 70% always flush with water to remove the residue.

12.2.2 Clean tubing & tips

📖 See § 11.5.2 Replace syringes and cleaning tips and tubing

12.2.3 Clean tubing; reference & sample water

Take of the supply tubes for reference and sample water and rinse with clean water.

12.2.4 Clean PMT housing

Clean the inside of the PMT housing with a dry cloth.

Caution: Do not remove the oil from the syringe motor axis.

12.2.5 Replace syringes

📖 See § 11.5.2 Replace syringes and cleaning tips and tubing

12.2.6 Refill bacteria

📖 See § 11.2 Filling up the luminescent bacteria supply

12.2.7 Refill salt solution

📖 See § 11.3 Filling up the salt solution supply

12.2.8 Refill control solution

📖 See § 11.4.2 Filling up the control solution

12.3 MONTHLY MAINTENANCE

12.3.1 Remove & Clean all blocks

Caution: Switch off the power before removing the bacteria and the mixing module.

Remove all blocks from the analyser.

Clean all cups in the blocks with water en dry with a paper cloth. Also clean the outside surface of all blocks.

Note: When using Alcohol > 70% always flush with water to remove the residue.

12.3.2 Clean analyser

Clean the inside of the instrument with water and dry with a paper cloth.

Note: When using Alcohol > 70% always flush with water to remove the residue.

12.3.3 Clean & Oil guiding tip arm

Note: Always use: 06TCBDIV010 Special iTOXcontrol oil.

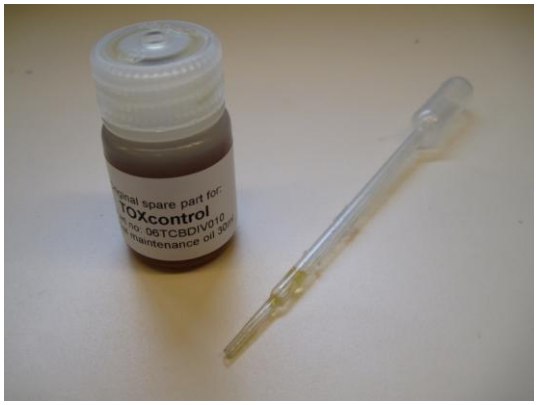


Figure 58: Maintenance oil

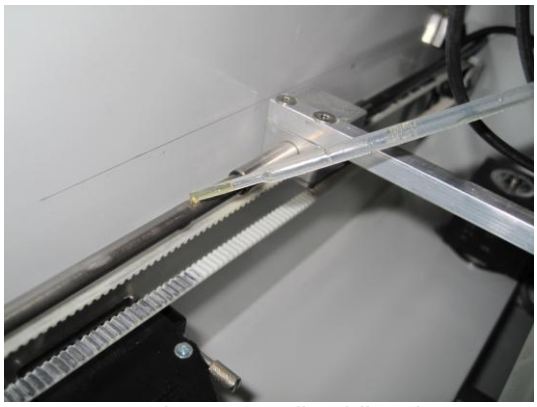


Figure 59: Oil guiding tip arm

- Clean the guiding of the tip arm movement left – right with a dry paper cloth.
- Put a few drops of oil on the guiding axis by using a pipette.

12.3.4 Clean & Oil shaft syringe motor

Note: Always use: 06TCBDIV010 Special iTOXcontrol oil.

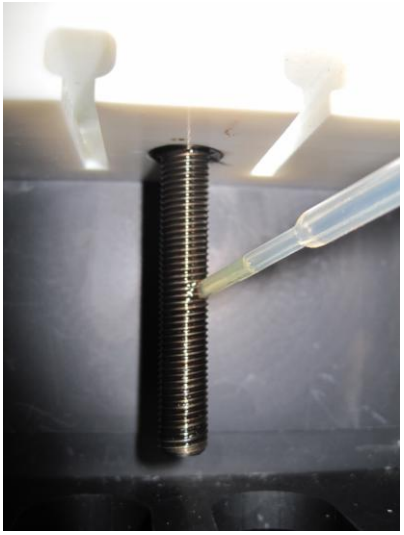


Figure 60: Oil shaft syringe motor

- Clean the screw thread with a dry paper cloth
- Put a few drops of oil onto the thread by using a pipette.

12.4 3 MONTHLY MAINTENANCE

12.4.1 Replace tubing & tips

Replace tubing and tips

📖 See § 11.6 Change the tubing
📖 See § 11.7 Change the tips

Always use original iTOXcontrol spare parts.

Parts needed: iTOXcontrol service kit ► Part number: 06TCBSK001

Note: When the sample water has a high turbidity and/or contains a lot of particles change the service kit every month.

12.4.2 Replace inserts

Replace inserts

📖 See § 11.8 Change the inserts

Always use original iTOXcontrol spare parts.

Parts needed: iTOXcontrol service kit ► Part number: 06TCBSK001

Note: When the sample water has a high turbidity and/or contains a lot of particles change the service kit every month.

12.4.3 Replace tubing; reference & sample water

Take of the supply tubes for reference and sample water and replace them by new tubes.

12.4.4 Check side ventilator

Caution: Switch off the power before checking the fan

- Check if fan is running smoothly
- Check if there are no NaCl particles or water on the fan and housing
- Clean the fan and housing when polluted

12.4.5 Check top ventilator (2x) (when applied)

Caution: Switch off the power before checking the fan

- Check if fan is running smoothly
- Check if there are no particles or water on the fan and housing
- Clean the fan and housing when polluted

12.4.6 Air-Conditioning unit maintenance

- Clean the intake filter
- 🕮 Additional Cooling Operating Manual

12.5 PREVENTIVE MAINTENANCE

Preventive maintenance can be performed by your distributor.
During preventive maintenance the instrument is fully calibrated and tested.
If necessary software updates will be preformed.

For more information about this preventive maintenance contact your local distributor.

13. ITOXCONTROL INSTALLATION

Installation of the iTOXcontrol system is performed by engineers of microLAN or qualified engineers of the local distributor.
The procedures in this section should only carried out by authorized engineers.

13.1 CONNECTION OF THE WATER SUPPLY

The equipment not only needs a constant inflow of test material (sample) but also reference / dilution water with a low flow rate (about 300 ml / min is needed). The sample flows into the front chamber of the sample cup by the connection "sample" (see figure). The water runs over the overflow into the drain opening.

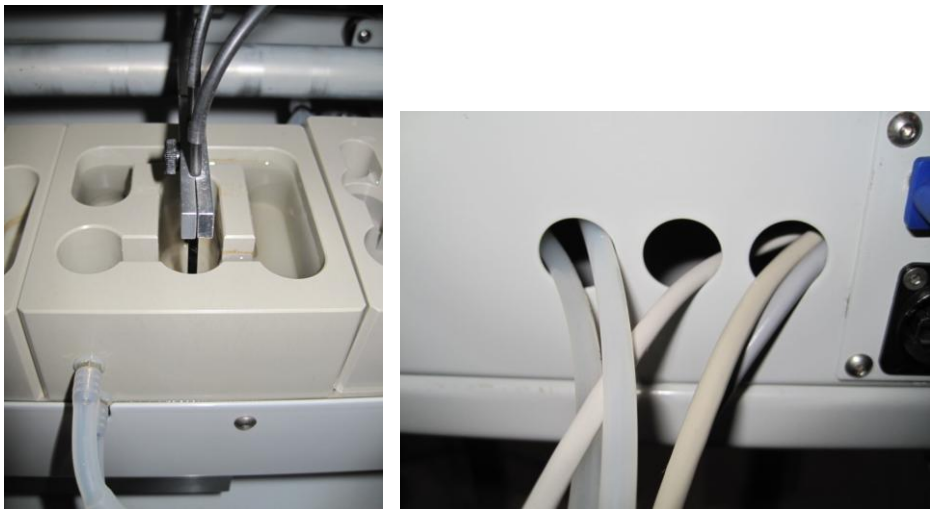


Figure 61: Water connections

The tubing is lead into the instrument through the holes on the back and can be connected on the front of the analyser.
Reference water is connected to the lower tube connector of the sample and reference module.
Sample water is connected to the upper tube connector of the sample and reference module.

13.2 SEVERAL WAYS TO SUPPLY REFERENCE AND SAMPLE WATER

There are several ways to control the supply of reference and sample water.

13.2.1 Pressurized supply:

The flow can be controlled by using a dosing valve. This should be mounted in the supply of the reference and the sample water.
From this dosing valve you can connect the tubing to the instrument.

Figure 62: Dosing valve

Figure 63: Dosing valves in line

13.2.2 Pressure less supply

The supply can be controlled by using peristaltic pumps to supply reference and sample water to the instrument.

The instrument can control the pump for the reference water so the reference water is only running when necessary.

The control valve can also be used to control the supply of reference water.

Caution: When using the control valve in combination with a pump, create a bypass loop to release the pressure from the tubing.

External pumps for reference and sample water.
Reference water pump: ► Part number: 01WM0401H1D010
Sample water pump: ► Part number: 01WM010051100E

13.3 CONNECTION OF THE DRAIN

The instrument has separate drain connections for normal measurements and control measurements.
This is because during the control measurement a zinc solution is used and may not be drained on the regular drain.
The drain connections are situated on the backside of the instrument.

Because the drain is made purely passively by the force of gravity, the connection on the back side of the iTOXcontrol drain may not be selected too small, otherwise there will be a backflow. This can also occur by an air blockage or other reason, so one should arrange the water NEVER can get back into the instrument. The drain hose should have a sufficiently downward gradient. Under any circumstances it may not have a rising position.

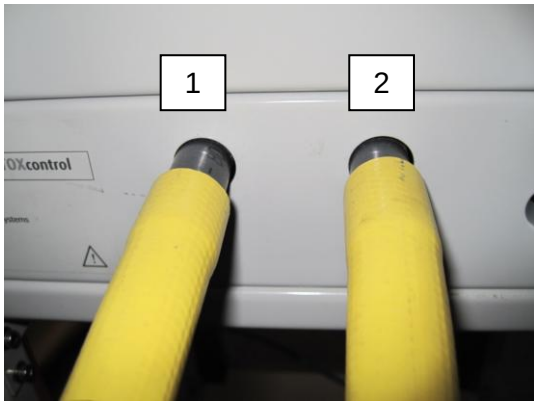


Figure 64: Drain connection

1 = Drain for normal and negative control measurements
2 = Drain for positive control measurements

The drain tubing for the positive control solution is connected on the bottom of the calibration solution module and can be place in a empty can on the bottom of the trolley.

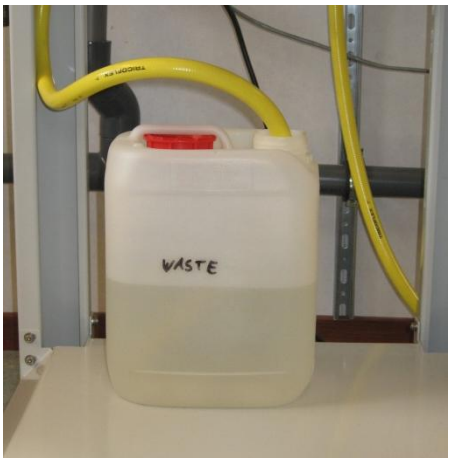


Figure 65: Control drain

13.4 START-UP THE ITOXCONTROL INSTRUMENT

Connect the instrument to a 230 VAC / 50 Hz power outlet (if you use 115V / 60 Hz you have to check with your supplier whether the system is converted for this).
Switch on the main switch. The control light in the main switch will turn on.

Figure 66: Main switch

The magnetic stirrer in the bacteria module will starts to turn.
The instrument will perform a initialization procedure. This means that the tip arm will go up and move to the right position of the analyser.

When the computer will not start automatically it should be started manually.
Open the right panel of the cabinet and switch on the computer by pressing the power switch.

Figure 67: Power switch PC

The software will automatically start.

📖 See also: iTOXcontrol Software Manual

Add the reagents to the instrument.

See also § 11 Maintenance procedures

The instrument is now ready to use.

14. FAQ'S ITOXCONTROL

Q: How do you remove the chlorine in the reference water?

A: We recommend to put 30mg/L Thiosulphate into the NaCl solution (1 liter bottle). This will result to a concentration in the system of 3mg/L. If you prepare a larger quantity than 1 liter, you can preserve it at 4°C for about 2 months.

Q: Will Thiosulphate remove Chloramines?

A: Yes, Thiosulphate will remove chloramines. The ratio is higher - about 5:1 instead of 3:1. For the iTOXcontrol, Thiosulphate is added to the salt solution so a mechanical device for de-chlorination is not required.
This is only used when the reference water contains Chloride.

Q: Will the Thiosulphate remove more than just the chlorine?

A: We recommend when you only want to de-chlorinate the reference water, preferably use a filter. The Thiosulphate will potentially also take out more compounds of the sample (maybe metals for example). We only recommend this option if you want to use the iTOXcontrol in the distribution system where the sample water is also chlorinated.

Q: Why are the reference standards sometimes showing a difference in peaks (lower or higher luminescence level)?

A: Because a new bacteria sample is taken for every measurement, this could be a possible side effect.

Q: Why do the bacteria sometimes give more light after 15 minutes incubation?

A: This can be caused by the nutrients in the water, this effect is often seen when river water is used as sample water. We have seen this effect in several rivers like the Danube and the Thames river.
The effect can also be caused by Hormesis which is discussed in several publications. This is a biological response to low exposures of toxins and other stressors. So a pollutant or toxin showing Hormesis has the opposite effect in small doses than in large doses.

Q: What is the explanation of "Hysteresis"?

A: Hysteresis can be used to filter a signal in a way the output reacts slowly by taking recent history into account. For example the bacteria module controlled by thermostat (the Peltier element) may turn the cooling on when the temperature drops below A degrees, but not turn it off until the temperature rises above B degrees. Thus the on/off output of the thermostat to the cooler when the temperature is between A and B depends on the history of the temperature. This prevents rapid switching on and off as the temperature drifts around the set point. Often, some amount of hysteresis is intentionally added to a variable setting to prevent unwanted rapid switching.

Q: What is a Peltier cooler?

A: The Peltier effect is a creation of a heat difference from an electric voltage. It occurs when a current is passed through two dissimilar metals or semiconductors that are connected to each other at two junctions (Peltier junctions). The current drives a transfer of heat from one junction to the other: one junction cools off while the other heats up; as a result, the effect is often used for thermoelectric cooling (for example in pc's).

15. TROUBLE SHOOTING

15.1 CABINET

15.2 ANALYSER

When you observe that one of the channels is showing a lower inhibition:
Squeeze the black Viton tube very hard during the measurement, there was probably a pollution in the tube.

The small magnet is not staying at its place and moves up and down: Check the wiring of the connectors, one of them might be loose (or contact the iTOXcontrol distributor for support).
Notice that the stirrer does not stay in the centre.

Leakage of the syringes: Check whether the syringes are put in properly otherwise replace them.

Water above the syringes: When the syringes are used more than one week, they are worn out, replace them.

Temperature of the bacteria and mixing modules is not correct: Check if the cable is put in properly in the rear wall socket.

Bacteria show no light: Maybe you forgot to put on the photomultipliers or there is too little luminescence, then raise the volume of the bacteria, used for every measurement

Lower results of standard: Prepare a new standard and see whether the results are equal.
If not, your standard wasn't giving good results anymore. If so, check whether the tips are to be lowered correctly into the solution.

15.3 COMPUTER

15.4 OPTIONS

Leakage of pump tubing: Check the tubes for little holes, is the tube properly connected?
Check the connectors.

16. APPENDIX A: TECHNICAL SPECIFICATIONS

16.1 FLOORSPACE ITOXCONTROL

Depth:	500 mm
Width:	500 mm
Width with optional cooling	750 mm
Height:	730 mm
Height incl. monitor:	1130 mm
Height incl. trolley	1850 mm

16.2 FLOORSPACE TOTAL

Depth:	700 mm	(+ 200 mm for connections)
Width:	900 mm	(+ 400 mm working space maintenance)
Width with optional cooling	1150 mm	
Height:	730 mm	
Height with optional trolley:	1850 mm	

16.3 CONNECTIONS

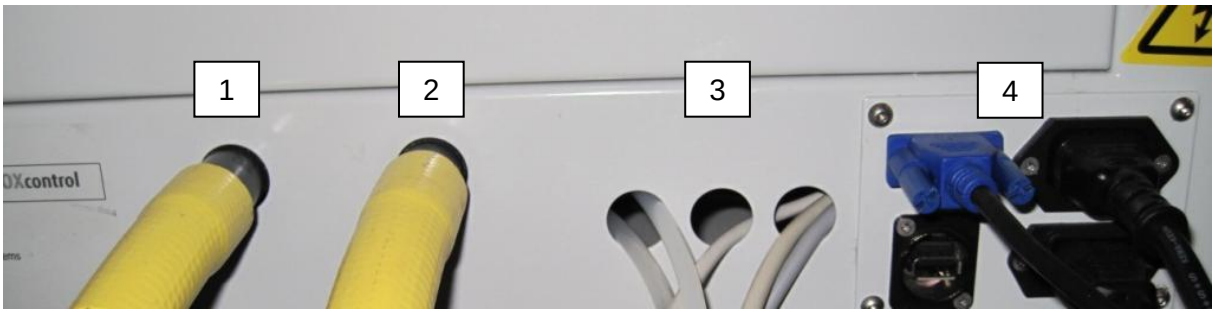


Figure 68: Connections

1 = Drain for normal measurements
2 = Drain for positive control measurements
3 = Sample and reference water and electrical connections; telephone, internet or 4 – 20mA signal
4 = Electrical connections (see specification below)

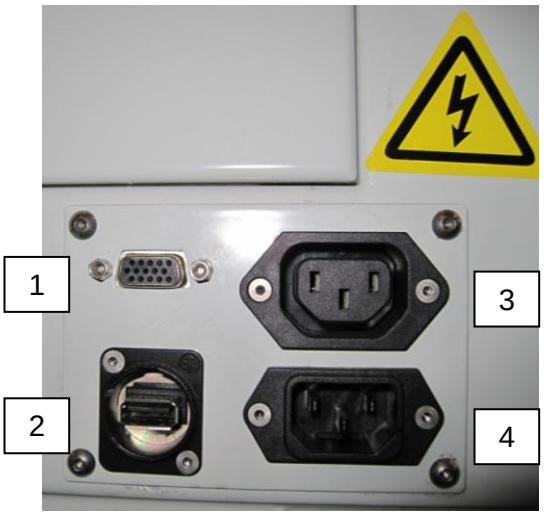


Figure 69: Electrical connections

1 = VGA connection for monitor
2 = USB connection
3 = Power connection for monitor power
4 = Power connection for main power

16.3.1 Water

- Sample water:
  - Tube size: 6x4 mm
  - 4,5 ml is needed per measurement.
  - Flow: 300 ml/min
  - 5 - 25 °C

- Reference water:
  - Not chlorinated
  - Tube size: 6x4 mm
  - Flow: 300 ml/min
  - 5 - 25 °C

- Drain:
  - Free flow hose
  - Tube size: 20 mm internal diameter

16.3.2 Electrical

- Main power supply: 230 VAC / 50 Hz / 140 Watt or 115 VAC / 60 Hz / 140 Watt
- Cabinet protection class: IP31
- Internal power supply: 24 VDC / 6,3 A
- Computer specifications:
  - Network connection; for internet connection for remote control & support
  - 1x Serial communication port;
    - Communication with analyser
    - Serial MODBUS communication with external PC (optional)
  - Analog telephone modem 56k; remote control & support (optional)

16.3.3 Weight

- Weight : +/- 90 kg
- Weight including air-conditioning option: +/- 110 kg

16.3.4 Environment

- Room temperature: 15 - 30 °C
  For room temperatures up to 40 degrees Celsius additional cooling is required.
- Humidity: < 95%, no condensation.
- Sun light: Instrument should not be placed directly in sun light

16.3.5 Reagents

- NaCl Solution (20%):
  ► Part number: 02TCB3180050 NaCl reagent 5 liter
  Usage: ± 700 ml / week (2 ml per measurement)
- Blank solution (NaCl Solution) (2%):
  ► Part number: 02TCB00307 TOXcontrol Blank solution 1 liter
  ► Part number: 02TCB00307L5 TOXcontrol Blank solution 5 liter
  Usage: only for blank measurements during calibrations
- Positive control solution:
  Specification: Zinc sulphate: 1117 mg ZnSO4*7H2O in 100 ml distilled water
  ► Part number: 02TCB00308 Positive control
  Usage: 40 µl / positive control measurement
- iTOXcontrol bacteria; Freeze dried luminescent bacteria for low toxicity (clean water) applications.
  ► Part number: 02TCB00305
  Contains:
  10x bacteria vials (store at -20 C°)
  10x cultivation media (store at +4 C°)
  Usage:1 vial + 1 bottle cultivation media per week

16.3.6 Parts & consumables needed

- TOXtip syringes:
  ► Part number: 04TCB343110
  Usage: 2 pieces / week
- Pipettes (10 ml sterile):
  ► Part number: 04TCB451431
  Usage: 1 piece / week
- Service kit: Contains 1 set of tubing, tips and inserts
  ► Part number: 06TCBSK001
  Usage: 1 set / 3 months (with normal measurements)
- Tubing: depending on application.
  Usage: pump tubing should be exchanged 1 p/wk

16.4 OPTIONS

16.4.1 Automatic dosing system

Provides a contact supply of salt solution and reference water
► Part number: 01TCBAA2011-00-01

16.4.2 Optional feed option

Optional feed option to dose the reference water with a magnetic valve.
► Part number: 01WM010051100E

16.4.3 Pump systems

External pumps for reference and sample water.
Reference water pump: ► Part number: 01WM0401H1D010
Sample water pump: ► Part number: 01WM010051100E

16.4.4 Filter unit

This filter can be used to remove chloride from the reference water.
► Part number: 01TCB802360-1 (incl. filter head)
► Part number: 04TCB802361 (Filter cartridge)

16.4.5 External TCP/IP convertor

External convertor to add an extra serial communication port for data communication. Data from the instrument can be send to another computer.
► Part number: 01TCB00605

16.4.6 Cooling option

When the room temperature gets above 30 degrees Celsius an additional cooling can be added to the instrument.
► Part number: 01TCB00302

16.4.7 UPS system

UPS system to protect the instrument for power failures.
► Part number: 01TCB0602

17. APPENDIX B: MAINTENANCE CHECKLIST

The next page is a checklist for your maintenance activities.
microLAN advises you to copy the checklist and use the copy at your iTOXcontrol to monitor Preventive Maintenance activities.

Checklist			
iTOX	Maintenance Schedule Checklist	Form: mL9025	microLAN On-line Biomonitoring Systems

Rev.: 0.2 / HdB
Date: 28-Sep-10

Year / Week nr.:		Monthly Maintenance:	yes / no	3 Monthly Maintenance:	yes / no

		Item:			
		By:			
		Date:			
Daily	0.1	Visual check on leakage	yes / no	yes / no	yes / no
	0.2	Visual check tip positions	yes / no	yes / no	yes / no
	0.3	Visual check volumes	yes / no	yes / no	yes / no
	0.4	Check Correction Factor	yes / no	yes / no	yes / no
	0.5	Check Toxicity	yes / no	yes / no	yes / no
	0.6	Check Toxicity Positive Control	yes / no	yes / no	yes / no
Weekly	1.1	Clean all blocks	yes / no		
	1.2	Clean tubing & tips	yes / no		
	1.3	Clean tubing; reference & sample water	yes / no		
	1.4	Clean PMT housing	yes / no		
	1.5	Replace syringes	yes / no		
	1.6	Refill bacteria	yes / no		
	1.7	Refill salt solution	yes / no		
	1.8	Refill control solution	yes / no		
Monthly	2.1	Remove & Clean all blocks	yes /no		
	2.2	Clean analyser	yes / no		
	2.3	Clean & Oil guiding tip arm	yes / no		
	2.4	Clean & Oil shaft syringe motor	yes / no		
3 Monthly	3.1	Replace tubing & tips	yes / no		
	3.2	Replace inserts	yes / no		
	3.3	Replace tubing; reference & sample water	yes / no		
	3.4	Check side ventilator	yes / no		
	3.5	Check top ventilator (2x) (when applied)	yes / no		
	3.6	Check air-conditioning condenser & filter (when applied)	yes / no		

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