

EXPERTS IN WATER CHEMISTRY SINCE 1903



**Waltron Aqualert 6051**

**Hardness Analyzer**

**Instruction Manual**

**Waltron Customer Commitment**

This instruction manual is a technical guide to aid the customer in the set-up, operation, and maintenance of their new Waltron measuring system. Waltron provides continuous product improvement and reserves the right to make any modifications to the information contained herein without notice.

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Technical questions concerning this product should be addressed to:

**Waltron Technical Service Department**

Flemington, New Jersey

**Phone:** (908)-534-5100

**Fax:** (908)-534-5546

[www.waltron.net](http://www.waltron.net)

Please be ready to provide the following information:

* Date analyzer was purchased
* Analyzer model and serial number
* Recent maintenance history
* Calibration slope values and detailed description of problem

Waltron’s technical expertise and extensive experience provides personalized solutions to the water quality industry. It is Waltron’s commitment to provide the customer with timely and accurate technical service and support.

Waltron fully expects the customer to be satisfied with the quality, performance, and cost of this product.

If there are any questions or concerns regarding this product, please feel free to contact Waltron at (908)-534-5100.

**Thank you for choosing Waltron!**

Please note the Waltron mailing and shipping address:

Waltron Bull & Roberts, LLC

25 Minneakoning Road, Suite 101

Flemington, NJ 08822

**Safety**

Please observe proper safety and handling precautions when installing, operating, maintaining, and servicing this product. The following should be noted and adhered to:

* Read and understand manual before working with analyzer.
* Pay special attention to warning labels on enclosures, containers, packages and chemicals.
* Only qualified personnel should be involved in the installation, operation, and servicing of the analyzer.
* Follow safety precautions when operating analyzer in conditions of high pressure and/or temperature.
* Keep analyzer chemicals away from heat and extreme temperatures. Reagent powders must be kept dry.
* Follow all regulations and warning labels when disposing of chemicals. Do not mix chemicals.

To obtain analyzer safety information or Safety Data Sheets (SDS), please contact Waltron or logon to [www.waltron.net](http://www.waltron.net).

**Warranty Agreement**

If, within one year from the date of shipment, the customer experiences any equipment defects or is not satisfied with the analyzer manufacturing, Waltron will repair, or at its option, replace any defective part(s) free of charge. This warranty requires that the defective part(s) be returned to Waltron with shipping charges prepaid.

At Waltron discretion, a Technical Service Specialist may be sent out to repair or replace the defective part(s) on location. Traveling time and expenses of the Technical Service Specialist is at the customer’s expense.

Equipment sent to Waltron must be appropriately packaged and the following information must be provided prior to returning to Waltron:

* The Return Authorization (RA) number assigned to the customer by the Waltron Technical Service Department
* Customer name, address and department
* Name and telephone number of the individual responsible for returning items for repair
* Brief problem description

**Ship to Waltron service center:**

Waltron Bull & Roberts, LLC

25 Minneakoning Road, Suite 101

Flemington, NJ 08822

**The Waltron Warranty Agreement:**

* Covers expendable sensors for one month after shipment and reusable electrodes for six months after shipment.
* Does not apply to damages occurred during shipping.
* Warranty will be nullified if goods have been used for purposes other than those for which they are intended or if any seal has been removed, broken or tampered with or if the Waltron trademark or serial number has be removed, defaced, or altered.
* Does not cover expendable supply items such as reagents, tubing and electrolytes.
* Does not cover misuse or mistreatment by the user.
* Does not cover previous repair or alteration by unauthorized individuals.

Waltron does not assume responsibility for contingent liability through alleged failure or failures of products or product accessories.

**Checklist of Materials**

* In order to ensure customer satisfaction, Waltron does its best to provide adequate and timely packaging and shipping services. Please perform the following after receiving a shipment:
* Inspect all shipping containers upon receipt and record any visible damage. If there are any outward signs of damage, please retain all containers and packages for inspection by carrier. Please retain all packing material so that it can be used for future moving and shipping needs.
* Check all items received against those on the packing list. Chemicals are usually shipped in a separate package and will be itemized accordingly.
* Verify that the number of packages received agrees with the packing list and shipping papers.
* Notify both Waltron and the carrier if any problems occur.

**Important Notice:**

* All analyzers are inspected and tested prior to shipment.
* In normal use, the unit should require only minor maintenance and should operate correctly and without fault over a long period of time.
* Please note that if electronic components need to be replaced, it may be necessary to adjust and/or calibrate the analyzer.
* Failure to carry out correct maintenance procedures may result in inaccurate analyzer readings.

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# Introduction

Thank you for buying the **analyzer** from the product range of on-line water quality monitors.

The **analyzer** belongs to the most modern systems on the market and sets new standards:

* Simple to operate
* Quick commissioning via menu
* Easy maintenance and cleaning
* Intelligent measuring-chamber design
* High measuring accuracy
* Self calibrating

The **analyzer** for the monitoring of water quality is part of a water preparation system. This handbook is tailored for both the manufacturers and the operators of such equipment.

This handbook contains instructions for the use and operation of the **analyzer**. Please read these instructions carefully before operating the unit.

We recommend that this handbook is kept near the unit for quick reference although we have made every effort to make the unit, as far as possible, self explanatory in its operation.

The unit should only be operated in harmony with the instructions in this handbook.

We will not accept any liability for damage caused by operator error or failure to follow the instructions found in this handbook.

**Some details and instructions in this handbook may vary slightly from the delivered unit. We reserve the right to make technical changes to improve our products without prior notice.**

The **analyzer** from the product rangeis an on-line analyser that automatically recognises and warns of the increase in water hardness in a water preparation system. When used with a water grading system, the professional monitors can control the minimum and the maximum hardness (for drinking water for example).

**This is not a system to prevent increase in water hardness.**

# Analyzer at a Glance

The on-line Analyser **analyzer** has the following features:.

* Reliable, exact and fully automatic analysing unit with matching reagents for measuring the total hardness in the range 0.02-30 °dH (3.6- 5349 µmol/l)as well as carbonate hardness in the range 0.3 – 9 °dH (53.5 – 1605 µmol/l)
* Measurement of all parameters with one sensor.
* Simple commissioning with configuration assistant.
* BOB-Operation(72h)-salt boiler
* Self calibrating and self monitoring
* High measuring accuracy
* Easy maintenance and cleaning.
* Compact design 300x300x140mm.
* Multi-coloured and multi-lingual graphic display.
* 4 programmable relay outputs.
* 1 analogue output 0.4-20mA.
* 2 programmable digital inputs.
* Optional reagent level monitor.
* Measurement data storage.

Diverse programmable alarm functions

* Connection possibilities for: water-meters; turbines; pre-coolers; rinsing valves
* External operation by means of external controller
* Many programmable functions for the inputs and outputs
* Monitoring of 2 limit values
* No condensation
* CAN- interface
* Software updates by means of SD-card possible
* Open wall mounting or wall mounting in protective casing (optional)
* Supply voltage 85-264 Vac, 47 – 63 Hz or 24V AC/DC

# Unit description

The on-line hardness monitor **analyzer** is a compact analysis unit which is able to monitor the presents of various chemicals in water. In these instructions, only the on-line monitoring of total hardness and carbonate hardness are described.

## **Principle of Function**

The **analyzer** is an on-line analyser for the automatic investigation of water parameters by the colorimetric test method. Following the introduction of a reagent into the water sample ,a colour reaction occurs. Depending on the chosen method, the unit either evaluates the *intensity* of the colour or ascertains the *value* at which the colour changes. From this information the **analyzer** calculates the concentration of the chemical content. The unit can only ascertain one parameter. The method and the measurement range are determined by the reagent.

## **Unit overview**

The **analyzer** has two variations:

1. **Analysis unit on wall mounting**

The Analysis unit consists of a control unit and a measuring chamber. Both are mounted on a wall mounting plate. This variation is completely functional and includes the connections for the water inlets and outlets as well as the holder for the reagent bottle. (Fig. 1)

1. **Analysis unit in protective case**

In addition an optional plastic case is available to protect the unit in environments where extreme levels of dirt and grease are expected. (Fig. 2)The Analysis unit on the wall mounting plate is easily fixed in the protective case by 4 screws. If the analysis unit and the protective case are ordered together, they will be delivered assembled.

The analysis unit is operated by means of a menu, a graphic display and 6 keys on the control panel.

|  |  |
| --- | --- |
| C:\Users\kthen.000\Desktop\Photos\6051\6051 with Waltron Membrane.png  Fig.1: Analyzer on wall mounting plate | C:\Users\kthen\Desktop\Photos\6051\6051 Blue Enclosure.png  Fig.2: Analyzer in protective housing |

|  |
| --- |
| **Description** |
| **analyzer on wall mounting plate** |
| **analyzer complete with housing** |

## Scope of delivery

The analyser is delivered completely pre-configured and ready for connection. Before installation, please check that all components are present and correct.

If you receive the analyser on a mounting plate, you will receive the following components:

|  |
| --- |
| **Description** |
| **analyzer Basic unit on mounting plate or**  **analyzer with housing** |
| **Accessory kit with bottle connector** |
| **Operating Instructions (Italian, English or German)** |

## Specifications and Areas of application

**General Specification**

|  |  |  |
| --- | --- | --- |
| **Supply Voltage** | **110-240V (50-60Hz) or 24V alternating current/direct current** | |
| **Power consumption** | 24 VA (in operation) | 3.5 VA (standby) |
| **Protection class** | Open wall mounting IP43 Mounting in case IP 54 | |
| **Environmental temperature** | 10°C – 40°C | |
| **Measuring water temperature** | 5°C – 40°C | |
| **Humidity** | 20 -90 % RF (without ice or condensation) | |
| **Water inlet pressure** | ca. 0.5 - 5 bar (max.) (Recommended 1 - 2 bar) | |
| **Water inlet in general** | clear, colourless, free of solid particles, without gas bubbles | |
| **Requirements of the water quality during measurement of the water hardness** | pH: | 4 – 10 |
| Iron: | < 3 ppm |
| Copper: | < 0.2 ppm, |
| Aluminium: | < 0.1 ppm |
| Manganese: | < 0.2 ppm |
| Acid capacity: | KS4.3 < 5mmol/l |

**Technical Data**

|  |  |  |
| --- | --- | --- |
| **Installation** | **Wall mounting in closed rooms** | |
| **Dimensions** | Without case: | 280x360x114 mm (WxHxD) |
| With case: | 300x380x120 mm (WxHxD) |
| **Weight** | Without case: | ca. 2.1 kg |
| With case: | ca. 4.0 kg |

**Analysis Qualities**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measurement method** | **Titration method with colour change** | | | |
| **Measurement range** | Total hardness | | | |
| °dH: | 0.02 | - 18 | (max. 30) |
| °TH / °fH | 0.04 | - 32 | (max. 53.5) |
| °TH / °fH | 0.04 | - 32 | (max. 53.5) |
| °e | 0.03 | - 22 | (max. 37.5) |
| ppm | 0.4 | - 320 | (max. 535) |
| mmol/l | 0.004 | - 3.2 |  |
| The measurement range of the unit is defined by the reagent used.The full measurement range of the total hardnessfrom0.004 to3.2 mmol/l is acquired by the application of different reagents (see page 59). Reagents dictating the carbonate hardness in the range from 0.9 dH to 9.0dH are available. Restrictions apply to the maximum indicated measurement range upper limits respecting the environmental temperature and accuracy. | | | |
| **Accuracy** | Measurement accuracy:  +/- 5% of the upper value of the respective reagent (see page 59.)  Repetition accuracy:  +/- 2.5% of the upper value of the respective.  Please note: The accuracy of the measurements may be adversely affected by the impurity of the water. In such cases, we recommend that you take a hardness measurement by hand titration and then calibrate the analysis unit to this value. | | | |
| **Reagent consumption** | ca. 0.20 ml / analysis depending on the hardness of the water | | | |
| **Measurement duration** | ca. 3 minutes depending on the hardness of the water | | | |
| **Number of analyses** | ca. 10,000 analyses / 500 ml reagent by low hardness. The consumption is dependent on the measured water hardness and the reagent used. | | | |
| **Expiration date of the reagent** | At least 2 years | | | |
| **Water consumption** | ca. 1l/analysis at 2 bar  The water consumption varies according to pressure and flush-time. | | | |

**Inputs / Outputs**

|  |  |
| --- | --- |
| **4 Relay outputs** | max. 250 V ac / V dc 4A  as potential free output NC/NO  the relays offer the following functions:   * Threshold alarm 1 * Threshold alarm 2 * Unit error * Analysis / Cooler / Pump * Reagent shortage |
| **2 Signal input** | Galvanic separated contact input  Input 1: Cancel error  Input 2:   * Analysis start * Water meter * Flow monitor * Turbine |
| **AnalogueOutput** | 0 – 20 mA / 4 – 20 mA  Resolution: < 100 μA  max. working resistance: 750 Ω |
| **CAN Interface** | Adjustable baud rate: 10.20 K bit/s  CAN 2.0A compatible  Applicable in Multi-master Systems  3 adjustable frames:   * Test result transmission * Status transmission * Control and Status request |

**Maintenance Intervals**

|  |  |
| --- | --- |
| **Every 6 months** | Cleaning of the measurement chamber  (in the event of higher environmental / water temperatures or water with higher biotical content, cleaning intervals need to be reduced accordingly.) |
| **Every 50,000 Analyses** | Installation maintenance set. |

## BOB-Operation

The abbreviation BOB stands for „Betrieb ohne Beobachtung“(which means „Operation without Observation“).This a special term found in the German ‘TÜV’ rules for boiler-houses. These rules require that an analysis unit has enough reagent last for 72 hours for unmanned operation.

A relay output can be used, for example to activate an alarm if the reagent level is below that necessary for the minimum time interval.

The analysis unit is specially designed for ‚BOB‘-operation. Boiler systems require an accurate monitoring of water quality, especially the hardness of the boiler supply water according to the technical guide-lines for boiler systems TRD 604 (Technische Regeln für Dampfkessel, published by the‘ TÜV’).

The analysis unit calculates the consumption of reagent to make sure that enough reagent is available for reliable measurements during the period of unobserved operation.

If the next 72 hour ‘BOB’-operation cannot be reliably guaranteed, the alarm “Reagent shortage” will be activated. Please check to see that the reagent is within its best before date. Only use fresh reagent.

## Installation requirements

Reagents / Maintenance sets / Accessories

There are various reagents available for the **analyzer** that cover a wide range of measurement. When choosing the correct reagent, it is important that the hardness range to be monitored lies in the middle of the measurement range of the reagent.

In all, the **analyzer** covers the measurement range of3.6 - 5349 µmol/l. There are 11 reagents available:

The order numbers of the reagents (500ml) are shown in the following table.

® professional: with display of water hardness and range of measuring

N.B.: ® e ® XII indicator with maximum set point and LED water good / water non good

|  |  |  |  |
| --- | --- | --- | --- |
| **Water Hardness** | | | |
| W1234-455 | | 500S/500 | , XII: 0,02°dH / 0,04°f Professional: 0,02-0,12°dH / 0,04-0,21°f |
| W1234-456 | | 500/500 | , XII: 0,05°dH / 0,09°f  Professional: 0,02-0,2 °dH / 0,04 - 0,36°f |
| W1234-457 | | 501/500 | , XII: 0,1°dH / 0,18°f  Professional: 0,03-0,3°dH / 0,05-0,54°f |
| W1234-458 | | 502/500 | , XII: 0,2°dH / 0,36°f  Professional: 0,06-0,6°dH / 0,11-1,07°f |
| W1234-459 | | 503/500 | , XII: 0,3°dH / 0,54°f  Professional: 0,09-0,9°dH / 0,16-1,61°f |
| W1234-460 | | 505/500 | , XII: 0,5°dH / 0,9°f  Professional: 0,15-1,5°dH / 0,27-2,68°f |
| W1234-461 | | 510/500 | , XII: 1,0°dH / 1,8°f  Professional: 0,3-3,0°dH / 0,54-5,36°f |
| W1234-462 | | 520/500 | , XII: 2,0°dH / 3,6°f  Professional: 0,6-6,0°dH / 1,07-10,71 °f |
| W1234-463 | | 530/500 | , XII: 3,0°dH / 5,4°f  Professional: 0,9 - 9,0°dH / 1,61-16,07°f |
| W1234-464 | | 550/500 | , XII: 5,0°dH / 9,0°f  Professional: 1,5-15°dH / 2,68-26,79°f |
| W1234-465 | | 600/500 | Professional: 3,0-30°dH / 5,36-53,57°f |
| **Carbonate Hardness** | | | |
| W6050-710 | C-710/500 | | , XII: 1,0°dH / 1,8°f  Professional: 0,3-3,0°dH / 0,54-5,36°f |
| W6050-715 | C-715/500 | | , XII: 1,5°dH / 2,7°f  Professional: 0,45-4,5°dH / 0,80-8,04°f |
| W6050-720 | C-720/500 | | , XII: 2,0°dH / 3,6°f  Professional: 0,6-6,0°dH / 1,07-10,71°f |
| W6050-730 | C-730/500 | | , XII: 3,0°dH / 5,4°f  Professional: 0,9-9,0°dH / 1,61-16,07°f |

N.B. Indicators 530/500 and above are very temperature sensitive and it may be necessary to correct the test results with reference to the environmental temperature.

The reagents are available in 500ml bottles. This amount is sufficient for about 10,000 analyses at low hardness. The number of analyses is dependent upon the hardness level and the reagent used.

**Reagents that are not in use should be stored in a cool dark place. Avoid direct sunlight. The shelf life of the reagents is at least 24 months if stored below 25°C and in a dark place. High temperature sand direct sunlight can significantly reduce the shelf life!**

## Maintenance sets

The analysis unit needs very little maintenance. There is a **maintenance set** available for the analysis unit. It is recommended to change the dosing-pump cassette, the reagent pipes and the ‘o’-rings after 50,000 analyses or every 6 months.

It is also recommended that the measuring chamber is regularly cleaned – at least every 6 months. The cleaning set is offered for this purpose. This set contains everything necessary in the way of equipment including the cleaning fluid.

|  |  |  |
| --- | --- | --- |
| **Article** | | **Order number** |
| **Maintenance set for the professional** |  | 111 906 |
| **Cleaning set for PROFESSIONAL**  **Cleaning set for the chamber** |  | Road transport: 200 013  Air transport: 200 013S |

# General Safety

Please observe the following safety instructions before operating the unit.

We wish to inform you of the appropriate use, installation and maintenance of the **analyzer** in order to ensure a safe, problem free operation. Please take careful note of the possible dangers that may result from incorrect use. The safety symbols are explained and fundamental instructions given. The reading of this chapter does not replace technical training. **The installation and the commissioning of this unit should only be carried out by an authorised and qualified person.**

This handbook describes the installation and the operation of the on-line **analyzer** for the automatic ascertainment of water hardness.

This unit may only be used in accordance with the conditions described in this handbook. In particular, the unit must be protected from wet and damp. The protection class of the unit on an open mounting plate is IP43. When mounted in a protective case, the protection class is IP54. Splashing or condensation should be avoided. The unit may only be used for the specified purpose. During installation and operation of the analysis unit, the relevant regulations (e.g. EN, DIN, VDE, UVV) should be observed.

The analysis unit should only be used to ascertain the total water hardness or the carbonate hardness in the sample water. **Correct operation can only be warranted if the manufacturers recommended reagents and spare parts are used.**

Changes to the electrical wiring and the programmes should only be carried out by a designated and qualified person.

The connecting cables should be kept as short as possible and not laid next to, or in close proximity to, power cables. Analysis may be adversely affected by strong electromagnetic fields. In this case special protective measures should be applied. Correct earthing is essential.

It is recommended to have these operating instructions at hand during the initial operating of the equipment in order to get an immediate understanding of the functions. Since the various ideas build upon the previous information it makes sense to work through the chapters in their printed order.

If any problems occur or questions arise during the operation of the analysis unit, you can get assistance from your supplier. Try to locate the problem as accurately as possible or to record the action and conditions that lead to the problem. This makes speedy assistance possible.

**Safety Instructions and Symbols**

In this handbook you will find various safety details that warn of possible dangers associated with the use of the analysis unit. This applies to specific dangers to:

* persons,
* this product or connected equipment and installations,
* working environment.

Various symbols in this handbook point out special dangers for the purpose of protecting persons and equipment from injury or damage. Please read the whole text completely before you start working.

|  |  |
| --- | --- |
| **Danger** | This symbol warns of possible danger of injury. |
| **Warning** | This symbol warns of a general risk to the unit, the installation, the materials, the working area and the persons therein. |
| **Pressure** | This symbol warns that the parts may be under pressure. |
| **Voltage** | This symbol warns of the danger of electrocution as well as damage to electrical parts. |
|  | This symbol warns of a general risk and the need to take note of certain conditions. |
|  | This symbol is to make the user aware of useful tips to improve the understanding of this unit. |

**Working with pipes that are under pressure**

Maintenance and repair work are only to be carried out by qualified persons.

* Before you begin, make sure there is no pressure in the pipes.
* Pipes, joints and seals are to be checked regularly and where necessary, or as a precautionary measure, replaced. Maintenance intervals should, in any case, be observed.
* Before operating after maintenance, ensure that all joints, fittings and seals are correctly fitted. Check that all casing parts are closed and filters or other parts connected to the unit are correctly fitted.
* Remove all maintenance tools, parts and other materials before operating the system.
* Clean the unit and wipe up any fluids that have run out thereby leaving the unit in a clean condition.
* Check that all safety systems are in position and working.

**Transport**

Protect the analysis unit during transport. Remove any remaining fluids. Remove the reagent bottle and firmly close it to avoid any spillage.

Transport unit carefully and do not throw it.

Avoid direct sunlight, moisture and high temperatures.

Immediately on delivery, check that the unit is complete and has no damage. Even though the unit is well packed, damage can occur during transport. In the event of damage, inform the deliverer immediately.

**Storage**

Do not store for more than a year on account of the guarantee.Only store the analysis unit in a cool, dry place with temperature between 5 and 45°C and avoid direct sunlight.

**Scope of Delivery**

Check that all the ordered components are present.

Damage or missing parts are to be reported within 7 days of delivery. Later claims will not be accepted.

**Installation**

The installation should be carried out in the following order to avoid errors:

* Install the analyser in a dry and easily accessible place.
* Fix securely according to the mounting instructions.
* Power up the unit with the correct supply voltage as noted on the type label.
* Connect the inlet and outlet pipes according to the installation instructions.
* Insert the reagent bottle and connect to the dosing pump. Make sure the pipe is not twisted.
* Set the unit up according to the instructions in the following sections.
* Only switch on the unit when all preparation is done, the case is closed and the unit is set up.

# Installation

## Wall mounting without case

The analysis unit must be installed vertically. In the mounting plate there are 4 holes for fixing the unit as shown in the following drilling plan:

|  |  |
| --- | --- |
| C:\Users\kthen.000\Desktop\Photos\6051\6051 with Waltron Membrane.png |  |

## Wall mounting with case

The analyser can be delivered with a compact protection case as an optional extra. The case is delivered with the unit already mounted inside and 4 mounting brackets for fixing the case as shown in the drilling plan below:

252

|  |  |
| --- | --- |
| C:\Users\kthen.000\Desktop\Photos\6051\6051 Enclosure Closed with Waltron Membrane.png | 330 |

**To allow for opening the case, the designated mounting space must be at least 450x350mm (D xH).**

## Water Connections

The ideal input pressure for the analysis unit is between 1 and 2 bar, but at least 0.2 bar. In the water inlet pipe is an input valve which, when closed, allows the measuring chamber to operate without push. The unit can also be operated with an input pressure of up to5 bar, however when the push is released, gassing may occur.

It is recommended to reduce the push with a simple valve. A push reducer is not necessary.

**The sample water must be clear and free of solid particles or a filter installed. Solid particles in the water can damage the magnet valve or prevent it from closing. If the magnet valve is blocked or doesn’t open and close properly, the measuring chamber will not be properly flushed and this could lead to erroneous measurements.**

**The sample water temperature should not be less than** 5 °C or greater than 40 °C.

If the sample water has a higher temperature, a pre-cooler should be installed. These coolers are available as accessories.

The analysis unit has 2 connections with fittings for plastic pipes with an external diameter of 6mm for the water inlet (left) and the water outlet (right). These only need to be pushed into the fittings.



Input push: ca. 0.2 - 5.0 bar

(1-2 bar recommended)

**The water outlet should be as short as possible and the water should be able to run away vertically and freely. The system output must be at atmospheric pressure. The output pressure must not exceed the input pressure. The pipes should not be laid horizontally. Pipes should not exceed 2m in length. The output water must run into an open funnel or waste water pipe/drain.**

## Operating with pressure-less sample water

If the sample water is not under pressure, a simple membrane or immersion pump is necessary to deliver the sample to the analysis unit. Relay 4 can be used for this purpose.

# Electrical Installation

Please note that all electrical installation work should only be carried out by authorised and qualified personnel and according to current regulations. Make sure that cables are not connected to power.

**The required supply voltage is:**

**110-240V alternating current / 50 to 60 Hz or 24V alternating current/direct current (see on-line monitor)!**

Open the lid of the control box

Battery holder

|  |
| --- |
| Power supply  Connection terminals  SD-card |

The analysis unit has 2 rows of terminals. The terminal descriptions are underneath the bottom row.

## Connecting the supply voltage



Connect the mains supply in the **bottom row** terminals as follows:

|  |  |  |
| --- | --- | --- |
| **Description** | **Function** | **Connection** |
| **PE** | Protective earth | PE |
| **N in** | Neutral | N 110-240V alternating current or 24V alternating/direct current |
| **L in** | Live | L 110-240V alternating current or 24V alternating/direct current |
|  |  |  |
| **PE** | Protective earth | PE |
| **N out** | Output Neutral | N |
| **L out** | Output Live | L |

**Take care to make a good earth contact to avoid possible malfunctions of the unit.**

**The mains output appearing on the top row can be used via the output relays to drive pumps, valves or others. The total consumption of all the connected appliances must not exceed 500 VA.**

## Connecting the relay outputs

In the second terminal block you will find the connections for the 4 output relays. All relays are 2 way change over types with a common contact and outputs A and B.



|  |  |  |
| --- | --- | --- |
| **Description** | **Function** | **Connection** |
| **Relay 1 COM** | Common | Relay 1 (max. 250Vac / 4A) |
| **Relay1 A** | NC | Relay 1 (max. 250Vac / 4A) |
| **Relay1 B** | NO | Relay 1 (max. 250Vac/ 4A) |
|  |  |  |
| **Relay2 COM** | Common | Relay 2 (max. 250Vac / 4A) |
| **Relay2 A** | NC | Relay 2 (max. 250Vac / 4A) |
| **Relay2 B** | NO | Relay 2 (max. 250Vac / 4A) |
|  |  |  |
| **Relay3 COM** | Common | Relay 3 (max. 250Vac / 4A) |
| **Relay3 A** | NC | Relay3 (max. 250Vac / 4A) |
| **Relay3 B** | NO | Relay 3 (max. 250Vac/ 4A) |
|  |  |  |
| **Relay4 COM** | Common | Relay 4 (max. 250Vac / 4A) |
| **Relay4 A** | NC | Relay4 (max. 250Vac / 4A) |
| **Relay4 B** | NO | Relay 4 (max. 250Vac / 4A) |

All relays can be placed as you wish. We recommend however, the following:

Recommended allocation for water softening:

|  |  |
| --- | --- |
| **Relay** | **Recommended Function** |
| **Relay 1** | Limit 1  (Alarm when limit 1 is exceeded) |
| **Relay 2** | Reagent shortage (Level<10%) |
| **Relay 3** | Unit fault / Breakdown |
| **Relay 4** | Analysis / Sample cooler  (Activation of solenoid valve for pre-cooler or external controller) |

Recommended relay allocation for blending:

|  |  |
| --- | --- |
| **Relay** | **Recommended Function** |
| **Relay 1** | Limit 1  (Alarm when limit 1 is exceeded) |
| **Relay 2** | Limit 2  (Alarm when limit 1 is not reached or exceeded) |
| **Relay 3** | Unit fault / Breakdown |
| **Relay 4** | Reagent shortage (Level<10%) |

**Please note the difference in behaviour when configured as error contact.**

## Connecting the digital inputs

In the third terminal block you will find the connections for the digital inputs, the power outputs and the CAN interfaces.



|  |  |  |
| --- | --- | --- |
| **Description** | **Function** | **Connection** |
| **IN 1** | Input | Input signal |
| **IN 1 24V** | Output | Aux. voltage to connect potential free outputs |
| **IN 1 Gnd** | Output |  |
|  |  |  |
| **IN 2** | Input | Input signal |
| **IN 2 24V** | Output | Aux. voltage to connect potential free outputs |
| **IN 2 Gnd** | Output |  |
|  |  |  |
| **20 mA +** | Output | Output + current interface 0.4-20mA |
| **20 mA -** | Input | Input – current interface 0.4-20mA |
|  |  |  |
| **CAN high** | Bi-directional | Data line CAN high |
| **CAN low** | Bi-directional | Data line CAN low |
| **CAN shield** | Bi-directional | Data line CAN (optional) |

All inputs can be placed as you wish. We recommend however, the following:

Recommended input configuration:

|  |  |  |
| --- | --- | --- |
| **Input** | **Function** |  |
| **Input 1** | Deactivated; water meter Flow monitor analysis request |  |
| **Input 2** | Deactivated cancel error |  |

# Components

## Location of Components

The analysis unit consists of the following components: On the left hand side is the control box with a graphic display and operating field. On the underside of the control box there are 4 cable entry fittings, to the right, the dosing-pump and under that, the measuring chamber.

The dosing-pump is simply clipped on and can easily be removed without tools. The measuring chamber hangs on 2 studs on the control box and can also be removed without tools simply by pulling the 2 securing pins. Similarly, the reagent dosing plug, the input and output plugs are mounted on the measuring chamber and can easily be removed.

Dosing pump



Dosing plug

Outlet plug

Optical measuring section / Transmitter

Space for the reagent bottle (500ml)

Water outlet (6mm)

Inlet plug

Control box

Graphic display

On/Off switch

Cable entry

Operating field

Water inlet (6mm)

Magnetic stirrer

Wall mounting plate

**The securing pins can only be pulled and not removed**.

The measuring chamber is always at atmospheric pressure and full of water in order to avoid the development of algae. In the middle of the chamber is the white high powered led transmitter. The sensor is located inside the control box. A magnetic stirrer is located underneath the measuring chamber. The magnetic stirring unit is securely fixed to the chamber.

At the bottom right of the mounting plate you will find the water inlet (left) and outlet (right) connectors both of which are secured to the mounting plate. The solenoid input valve is located behind the reagent bottle.



Solenoid valve in the inlet line

## Display and keyboard

The analysis unit has a graphic display that displays both the test results and the operating menu. The unit is set up by means the 8 keys in the operating field. The background colour of the display changes according to the current function of the display:

|  |  |
| --- | --- |
| **Back-ground colour** | **Function** |
| **White** | Unit is working normally |
| **Yellow** | The warning limit has been exceeded in the operating mode ‘softening’. |
| **Red** | Limit exceeded or unit fault |

Located centrally in the middle are 4 keys for navigation and entry of values (<> + -):



Back / Reject last entry

OK / Confirm

Help

Menu

Navigation <> + -

Display

Additionally there are 4 function keys:

|  |  |
| --- | --- |
| **Key** | **Function** |
|  | Back / Reject last entry  Cancel current analysis |
|  | Enter menu  Switch between menu and display of test results |
|  | Reserved for Help function |
|  | OK  Confirm |

The display can be switched between “menu” and “measurement” by means of the menu key.

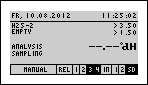
**Display (Menu)**

The menu window offers the following choices:



|  |  |
| --- | --- |
| **Automatic** | Starts the automatic analysis operation |
| **Manual (Service)** | In this mode the analysis unit can be operated by hand |
| **Parameter (Settings)** | Under this menu point various unit settings can be undertaken |
| **Assistant (Wizard)** | Starts the configuration assistants |
| **Info** | Informs about status of the software, date of manufacture and serial number of the unit |
| **History** | Shows the last 100 measurements as a graph |

**Display (measurement)**



Time

Date

Reagent in use und Level (empty)

Limit

Result of the previous analysis

Analysis Step

Status bar:

Automatic active

Relays 1-4 (3&4 energised)

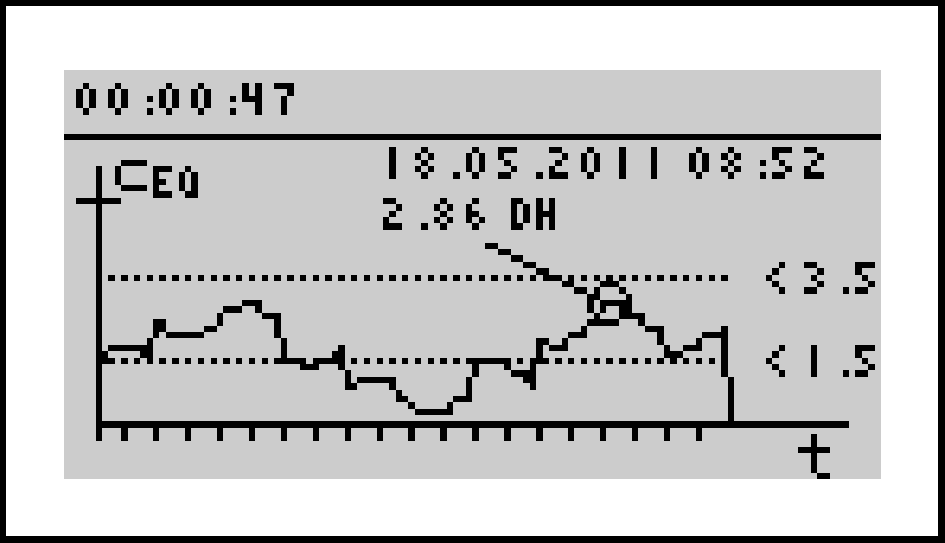
Digital inputs 1-2

SD card present

**Display (Reading progress)**

With the help of the ‘left’ **<**and ‘right’**>** keys you can call up the results history with date and time (max. 100 analyses). All results are stored on the SD-card and can be called up and read. The limit settings are shown as points on the graph.

You can call up the record by selecting Menu>History. By pressing the key [OK] or [Back] you can return to the measurement value.



**Display (Select)**

You can use the <> keys to change your choice. Confirm it with [OK]. If you do not wish to make a change, leave by pressing the [back] key.

In the figure below, the active choice is YES.



**Display (Selection lists)**

You can navigate the selection list by the [▲] and [▼]keys. Confirm with the [OK] key. Leave the list with the [back] key. If there are more than 3 choices in the list, you can use the scroll facility on the right of the display.

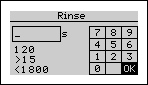
In the figure below, the active choice is indicator 503/500.



**Display (Entering a value)**

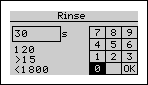
Numbers can be given in via the virtual keyboard on the display. The cursor is moved by the **< > ▲▼**keys. The entry mask shows the numbers given in.

When the cursor is not moved and the [OK] key pressed the highlighted number will be entered.



As an example: the flush time = 30 seconds.

The possible times are from 15 to 1800 seconds.



# Connecting Additional Components

## Connecting a flow monitor

Input 1 serves as connection for a flow monitor. A galvanic separated voltage is provided by this input that can be used to power a flow meter.

## Connecting a Water Meter

Input contact 1

## Connecting an external controller

Input contact 1

## Connecting a Buzzer

Relay 1 + relay 2

## Connecting an Immersion Pump

Relay 4

## Connecting a Control Unit

Relay 1 + relay 2 (impulse mode)

## Connecting an External Flush Unit

Relay 4

# Configuration

## Works Settings

The unit has the following works settings:

## Configuration Assistant

The configuration assistant serves to simplify the initial commissioning. Via the menu, the unit guides you step by step through all necessary settings. At the same time the full functionality of the unit is checked.

All settings of the menu parameters can later be changed again.

To start the assistant, select the selection assistant in the menu and confirm with [OK].

The following steps will be carried out:

|  |  |
| --- | --- |
| Language Selection | Please choose your language. / Bitte wählen Sie Ihre Sprache. [OK]  Choice of language:  German, English, French, Italian, Polish, Spanish, Russian  Select and confirm with [OK] |
| Your setting: |

|  |  |
| --- | --- |
| Start  Configuration assistant | Do you want to start the configuration assistant?  [YES / NO] [OK]  YES: Starts the Configuration assistant  NO: Return to main menu |

|  |  |
| --- | --- |
| Works setting | Do you wish to reset the unit to the works settings?  [YES / NO] [OK]  YES: Resets the unit to recommended settings.  NO: The unit keeps your settings. |

|  |  |
| --- | --- |
| Select test parameters | Please select the test parameters  [OK]  You have the choice\* between:  Total hardness or carbonate hardness  Select and confirm with [OK]  \* Further parameter are being prepared |
| Your setting: |

|  |  |
| --- | --- |
| Select reagent | Please select your reagent [OK]  According to test parameters, a choice of possible reagents is now shown:  Total hardness: 500S/500 to 600/500  Carbonate hardness: C710/500 to C730/500  Select and confirm with[OK] |
| Your setting: |

|  |  |
| --- | --- |
| Deliver reagent | Place a new bottle of reagent in position [OK]  The reagent pump starts the delivery of reagent. The delivery can be stopped with [OK]. After ca. 30secondsreagent will have reached the measuring chamber. |

|  |  |
| --- | --- |
| Select unit of measurement | Select the unit in which the test results should be displayed. [OK] You will get a choice of possible measurement units according to the measurement parameters:  °dH, °f, ppm(CACO3), mmol/l, mg/l, mval/l, e  Select and confirm with[OK] |
| Your setting: |

|  |  |
| --- | --- |
| Set flushing time | Give in the required flushing time.[OK]  Flushing time: 0001 – 9999seconds  The flushing time must be set according to the length of the inlet pipe and the water pressure. It must be sufficiently long to allow a complete change of sample water in the chamber.  Select with navigation keys and confirm. [OK] |
| Your setting: |

|  |  |
| --- | --- |
| Flushing | You will now be invited to flush the system [OK].Flush as long as necessary to rid (as far as possible) the chamber of bubbles. You can end the flush with [OK]. |

|  |  |
| --- | --- |
| Set limit mode | Choose the mode of limit 1 and limit 2.  Select with navigation keys and confirm.[OK]  With this choice, you set the unit’s logic to limit monitoring.  In a softening system, the test result should lie below limit 1 (warning) and below limit 2 (error).  In a blending system, on the other hand, the test result should lie *between* limit 1 (lower limit)and limit 2.(upper limit) |
| Your setting: |

|  |  |
| --- | --- |
| Set limit 1 | At what value should the monitoring of limit 1 take place?[OK]  You can see this mask:    Via the navigations-keys, you can select the value and confirm [OK].  The recommended value is displayed under the entry box pressing [OK] accepts this suggestion. The minimum und maximum values for the selected indicator are shown behind the <and >symbols. |
| Your setting: |

|  |  |
| --- | --- |
| Set limit 2 | At what value should the monitoring of limit 2 take place?[OK]  ***The limit must be greater than limit 1*.**  Via the navigations-keys, you can select the value and confirm [OK]. |
| Your setting: |

|  |  |
| --- | --- |
| Set analysis start | Select whether the analysis should be started after a time interval, after a discharge or both.[OK]  You have the possibility to start an analysis via one of the following:  External contact, time, amount, time and amount  Select and confirm[OK].  **Select [external contact)**  After selecting external contact, no further settings are necessary.  **Selection [time]**  After selecting time, you will be invited to select a time interval between measurements:  Select the required time interval [OK].  001 – 999 min  Via the navigations-keys, select the value and confirm [OK]  **Selection [amount]**  Select the unit of measurement for the amount of water discharged [OK]  You are given the following choices:  l, hl, m3, gallons(US), gallons(Imp)  Select the value using the navigations-keys and confirm[OK]  Select the amount after which the analysis should start [OK]  e.g. 1000 l  Select the value using the navigations-keys and confirm[OK]  **Selection[time and amount]**  As above. |
| Your setting: |
| Your setting: |
| Your setting: |
| Your setting: |
| Your setting: |

|  |  |
| --- | --- |
| Test repetition,  First result suppression | Set the number of tests that you require to be made following a failed test. [OK]  You have the following possibilities:  No repeat  Repeat once  Repeat twice  Repeat 3 times  Via the navigations-keys, you can select the value and confirm[OK].  An analysis can produce a bad result after the system has stood a while. It is, therefore advisable to carry out a control test to confirm a result before an alarm is set off.. |
| Your setting: |

|  |  |
| --- | --- |
| Define input2 | Choose the function of input2 [OK]  You have the following possibilities:  Deactivated, analyse start, Water-meter, Flow-monitor  Via the navigations-keys, make a selection and confirm [OK].  Different functions can be assigned to input2.  **Deactivated**  **If the input is not used**  **Analysis start**  The analysis can be started by a controller. This is only possible if the unit is ready and not already in the process of an analysis.  **Water meter**  This setting should be selected if the unit is to be controlled by an external water-meter.  **Flow-monitor**  This setting should be selected if an external flow-monitor is connected to the input and the analysis unit should only carry out tests at preset time intervals if water is removed from the system. |
| Your setting: |
|  |

|  |  |
| --- | --- |
| Relay1 (Limit 1)  Period or impulse contact | Do you need a period or impulse contact on relay 1?[OK]  You have the following possibilities:  Period / Impulse [OK]  By selecting impulse, you can set the impulse length to control a switch room:  001 to 999 seconds. |
| Your setting: |

|  |  |
| --- | --- |
| Define Relay 2 | Choose the function of input 2 [OK]  You have the following possibilities:  Limit 2 or reagent level<10%  Via the navigations-keys, make a selection and confirm [OK].  Alternatively, the reagent level can be configured to relay 4. |
| Your setting: |

|  |  |
| --- | --- |
| Relay2 (Limit 2)  Period or impulse contact | Do you need a period or impulse contact on relay 2?[OK]  You have the following possibilities:  Period / Impulse [OK]  By selecting impulse, you can set the impulse length to control a switch room:  001 to 999 seconds. |
| Your setting: |  |
|  |  |
| Define Relay4 | Choose the function of input 4. [OK]  You have the following possibilities:  Analysis or reagent level<10%  Via the navigations-keys, make a selection and confirm [OK].  With analysis, you can control an external pump, the cool water valve of a sample cooler or an external controller.  Alternatively, the reagent level can be configured to relay 2. |
| Your setting: |

|  |  |
| --- | --- |
| Interface configuration | Select the operating mode for the current interface[OK]  You have the following choices:  Off, 0 to 20mA, 4 to 20mA  Select the value via the navigation keys and confirm [OK].  Current loop  Assigning a hardness-grade limit to the maximum output current (20mA)  Formula for calculating the current:    For I0, 0 or 4 mA should be inserted according to operating mode |
| Your setting: |
| Your setting: |

|  |  |
| --- | --- |
| CAN-interface configuration | Do you wish to use the CAN interface? [OK]  You have the following choices:  YES / NO [OK]  If you have selected YES, you will be invited to make the following choice:  Choose the baud rate of your CAN net [OK]  10 kbits/s, 20 kbits/s  Select the value via the navigation keys and confirm [OK].  Choose the chanel-ID, on which the unit is to be controlled [OK].  Test result channel  0000-CFFF  Choose the chanel-ID, on which the unit is to transmit the test results[OK].  0000- CFFF  Choose the chanel-ID, on which the unit is to transmit the status message [OK].  0000- CFFF  Select the value via the navigation keys and confirm [OK]. |
| Your setting: |
| Your setting: |

**The unit is now completely configured.**

# Operation

**Manual and Automatic operation**

In the automatic mode, (menu>automatic), the analysis unit can be started by time, amount or via external switch. In the manual mode, (menu>manual), functions like analysis start, inject reagent or flush can be controlled manually. Also included in the manual mode is a diagnosis function through which individual components can be tested.

**Main menu**

Via the main menu it is possible to set up the unit set (Menu>Parameter), start the configuration assistant (Menu>Assistant), call up system information (Menu > Info) and to carry out the necessary functions for maintenance and installation (Menu > Manual).

The operating of the analysis unit is virtually self-explanatory and all functions are well arranged in a tree like structure.

## Menu structure

The menu structure is laid out in the following table in order to give you an overview of the various functions that the analysis unit has to offer.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Main menu** |  | **1. Undermenu** |  | **2. Undermenu** | **Unit function** |
| Automatic |  |  |  |  | Automatic operation on /off. |
| Manual | -> | Analysis |  |  | Start analysis |
| Manual | -> | Reagent |  |  | Inject reagent |
| Manual | -> | Diagnosis |  |  | Start diagnosis |
| Manual | -> | Flush |  |  | Flush chamber |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Main menu** |  | **1. Under menu** |  | **2. Under menu** | **Unit function** |
| Parameter | -> | General | -> | Display contrast | Set display contrast |
| Parameter | -> | General | -> | Language | DE, EN, FR, and others |
| Parameter | -> | General | -> | Date / time | Set date / time |
| Parameter | -> | General | -> | Measurement size | Total / carbonate hardness, |
| Parameter | -> | General | -> | Unit | °dH, °f, mg/l, ppm, Set parameter |
| Parameter | -> | General | -> | Codeword | Assign codeword (0000) |
| Parameter | -> | General | -> | Import settings | Load configuration from SD-card |
| Parameter | -> | General | -> | Export settings | Save configuration to SD-card |
| Parameter | -> | General | -> | Works settings | Reset to works settings |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Main menu** |  | **1. Under menu** |  | **2. Under menu** | **Unit function** |
| Parameter | -> | Analysis | -> | Reagent | Select reagent type |
| Parameter | -> | Analysis | -> | Limit mode | Select Binding or Softening system |
| Parameter | -> | Analysis | -> | Limit 1 | Set Limit 1 |
| Parameter | -> | Analysis | -> | Limit 2 | Set Limit 2 |
| Parameter | -> | Analysis | -> | Flushing time | Set pre-analysis flush time |
| Parameter | -> | Analysis | -> | Analysis delay | Time setting to delay analysis start |
| Parameter | -> | Analysis | -> | Auto-start option | Define start initiator i.e. Time /amount/ or time and amount |
| Parameter | -> | Analysis | -> | Auto-interval time | Define time interval between 2 analyses |
| Parameter | -> | Analysis | -> | Auto-interval amount | Define water volume between 2 analyses |
| Parameter | -> | Analysis | -> | Check measurements | Set amount of check measurements(0-3) |
| Parameter | -> | Analysis | -> | Check interval | Set interval between check measurements |
| Parameter | -> | Analysis | -> | Calibration factor | Value correction in % |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Main menu** |  | **1. Under menu** |  | **2. Under menu** | **Unit function** |
| Parameter | -> | Inputs | -> | Input 1 | Select input function |
| Parameter | -> | Inputs | -> | Input 2 | Select input function |
| Parameter | -> | Inputs | -> | Through-flow measurement | Select contact or semi-conductor sensor |
| Parameter | -> | Inputs | -> | Through-flow unit of measurement | Select unit of measurement |
| Parameter | -> | Inputs | -> | Through-flow K-factor | Select the K-factors |
| Parameter | -> | Inputs | -> | Flow meter | Select NPN / PNP output sensor |
| Parameter | -> | Inputs | -> | Level indicator | Select whether or not an external level reagent is to be used |
| Parameter | -> | Inputs | -> | Input 2 | Select input function |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Main menu** |  | **1. Under menu** |  | **2. Under menu** | **Unit function** |
| Parameter | -> | Outputs | -> | Current loop Type1 | Setting the operating mode:  0..20mA4..20mA |
| Parameter | -> | Outputs |  | Current loop cal | Setting the hardness value relating to the 20mA |
| Parameter | -> | Outputs | -> | Relay 1 | Settings for relay 1 |
| Parameter | -> | Outputs |  | Relay 2 | Settings for relay 2 |
| Parameter | -> | Outputs |  | Relay 3 | Settings for relay 3 |
| Parameter | -> | Outputs |  | Relay 4 | Settings for relay 4 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Main menu** |  | **1. Under menu** |  | **2. Under menu** | **Unit function** |
| Parameter | -> | Interface | -> | CAN-Baudrate | Transmission rate of the CAN net |
| Parameter | -> | Interface | -> | CAN- Results channel | Identifier ID of the result |
| Parameter | -> | Interface | -> | CAN- Status channel | Identifier ID of the Status message |
| Parameter | -> | Interface | -> | CAN- Control channel | Identifier ID of the control commands |

## Maintenance functions

Various functions of the analysis unit can be checked and tested via the menu point Menu > Manual > Diagnosis.

## Action in event of power loss

Various settings can be saved on to the SD-card or to the internal memory. In the event of a power loss, the settings will be available at the next power-up. If the unit had been running in automatic mode, it will automatically re-commence analysing after a short interval. The previous settings of amount and time intervals will still apply.

If the analysis unit fails and has to be replaced, you only have to remove the SD-card from the old unit and install it in the new. Using menu function Parameter> General > Settings, import the unit settings and test result history.

## SD-Card

The analysis unit contains an SD-card. The following information is stored on this card: Test results, error reports, unit firmware.

The information is stored as .csv files. These files can be opened and further processed on an editor or table calculation programme (e.g. MS Excel, OO Calc). The system data remains on the SD-card (.bin).

The analysis unit is also fully functional without an SD-card. However, it will only store the last 100 test results in the internal memory.

If you use an SD-card other than the one supplied, it must be formatted as follows:

Memory capacity: max. 2.0 GB

Data system: FAT16

Size of the allocation data: 32 k Byte

Bigger SD-cards can be formatted under e.g. Windows 7 > START > execute command und then by entry of format x: /FS:FAT /A32K. X stands for the letter of the disc-drive assigned to the SD-card.

The following files are saved on the card:

|  |  |
| --- | --- |
| **File name** | **Content** |
| professional. csv | Contains the results in table form with Date; time; result. The data are stored in the following formats: YYYY.MM.DD [Tab] hh. mm [Tab] x.xxx [LF] The results (x.xxx) will be stored in the unit mmol/l. The relevant conversion tables can be found on page60. |
| error. csv | Contains the results in table form with Date; time; error. The data are stored in the following formats: YYYY.MM.DD [Tab] hh. mm [Tab] Error code [LF] |
| History. bin | System data. These files contain the last 100 results which are loaded into the internal memory when unit is switched on. |
| config. bin | System data. These files contain various settings of the analysis unit. If the analysis unit fails and has to be replaced, use menu function Parameter> General > Settings to import the unit settings and test result history. |
| Firmware .bin | These files are not to be found on the SD-card. If software updates for your analysis unit become available, they can be acquired from our distributors or as a download from the home page.  You can then copy these files on to the SD-card. Press and hold the [OK] key while switching the unit on. Following a security question, the new software can be successfully installed.  We recommend that the files are removed from the SD-card after they have been installed in the unit. |

# Maintenance and Service

In order to ensure a long and disturbance free functioning of the analysis unit, maintenance of the unit should be carried out at regular intervals. In most cases tools are not needed. Before commencing maintenance work, ensure that the unit is switched off. During this period, no analyses will be carried out. Always wear protective glasses and gloves while carrying out maintenance to avoid contact with reagent, cleaning fluid or water

Please observe the following maintenance intervals

|  |  |
| --- | --- |
| All6 months | Clean the measuring chamber (by higher environmental or water temperatures or high levels of biocides, it may be necessary to reduce the interval) |
| 6 until 12 months | Installation maintenance set |

## Cleaning the measuring chamber

Cleaning the measuring chamber requires about 20 minutes. This is done as follows:

* Remove the dosing-pump-cassette from its mounting by squeezing the clips above and below then pulling outwards.
* Remove the connections to the dosing-plug and reagent-bottle.
* Pull the securing pins outwards until all the plugs are free. Do not try to remove the pins completely.
* Remove the chamber from the holding pins on the control box.
* Clean the chamber using the cleaning kit PROFESSIONAL Cleaning set (Art.-No: 200 013 or 200 013S) according to the instructions.

When re-assembling, please follow the following sequence:

* Push the clean chamber on to the two holding pins and push in the securing pins to secure.
* Re-insert all plugs and secure with securing pins. Ensure that the plugs are firmly pushed in to their holes before attempting to push in the securing pins. **Do not force them!** This may lead to damage of the plugs or pins. All pipes must be free and not twisted.
* Switch the unit on again, flush the measuring chamber then pump reagent into the chamber. The unit is now ready for use(Menu > Manual > Flush / Reagent).

## Changing the dosing-pump-cassette

It is necessary to change the dosing-pump-cassette at regular intervals. This is included in the “maintenance set for analyzer”. The exchange takes about 10 minutes.

The exchange is achieved as follows:

* Switch off.
* Remove the connections to the dosing-plug and reagent-bottle.
* Remove the pump-cassette from its mounting by squeezing the clips above and below then pulling outwards.
* Remove the dosing plug at the top of the chamber by pulling the 2 securing pins and gently pulling the plug upwards.
* Discard cassette and tubes.

When re-assembling, please follow the following sequence:

* Connect the cassette to the reagent bottle. Turn the bottle until all bends are removed and the pipe hangs freely.
* Connect the cassette to the dosing-plug. First ensure that the pipe is not twisted then re-insert the plug. Ensure that the plug is firmly pushed in to its hole before attempting to push in the securing pins. **Do not force them!** If you have difficulty inserting the plug without force, apply a little Vaseline to the o-ring.
* Clip the cassette securely on to the pump.
* Switch the unit back on, flush and pump reagent into the chamber. The unit is now ready for use (Menu > Manual > Flush /Reagent).

## Changing the reagent bottle

Ensure that the new reagent is within its best before date. Only use fresh reagent.

The exchange is achieved as follows:

* Switch off.
* Unscrew the cap and remove the bottle adapter and lance. Insert these in the new bottle and secure cap. Clean up any spilt fluid.
* Switch the unit back on, flush and pump reagent into the chamber. By confirming the reagent bottle change after the injection of reagent, the reagent level for the ‘BOB’ operation will be reset to 100%. Only use 500 ml bottles.

## Calibrating the unit

The unit is calibrated at the factory at a room temperature of20°C. If the unit is to be used in especially hot or cold environments, please re-calibrated when commissioning.

You can calibrate the unit as follows:

* Carry out analysis using the unit
* At the same time carry out an analysis in the laboratory (lab.)
* Calculate the correction factor for the unit with the following formula:



* Feed the correction factor into the unit via(Menu >Parameter>Analysis > Correction factor). To do this, it is necessary to give in the code word of the unit or assign a new code word via (Menu > General >Codeword).

## Changing the Battery

If the unit does not show the time when it is switched of, it is necessary to change the back up battery as follows:

* Switch off and disconnect the power from the unit.
* Open the control box by removing the 4 screws. The battery holder is found on the circuit board under the lid.
* Replace the battery with the type CR2032.
* Ensure that the ribbon cable between the 2 circuit boards has not come loose. Close the control box again.
* Dispose of the battery in a responsible way.

## Software Update

The analysis unit offers the possibility to update the software. In the framework of product improvement, you can receive updates from our agents or from our home-page. If it is necessary, the agent will send you the data with the file-name firm ware bin

To install an update:

* Switch off unit.
* Open the control box by removing the 4 screws. The battery holder is found on the circuit board under the lid. Remove the SD-card which is found under the lid.
* Copy the firm ware bin files on to the SD-card using a computer and then return the SD-card to the unit.
* Ensure that the ribbon cable between the 2 circuit boards has not come loose. Close the control box again. Reconnect power.
* Press [OK] while switching on the unit. The unit will actuate the software and recommence normal operation.
* Switch the unit off again. Remove the SD-card and delete the firm ware bin files from it.
* Re-insert the SD-card in its slot under the lid.
* Switch on and check the unit configuration.

# Error Analysis

## Fault finding

**The analysis will not begin**

Check that the flow meter is correctly configured and connected.

Check that the interval time is set.

Check whether a water meter is connected and correctly configured.

Check, if relevant, connections from an external controller.

**Error during the blank test**

Check that there is water in the chamber and that the supply and waste pipes are not swopped.

Check the chamber for dirt, gas bubbles or foreign bodies.

Check the water pressure (recommended 1-2 bar).

Check that the waste pipe is free and that there are no foreign bodies in the magnet valve.

If a pump is used to supply the sample water, ensure that it is correctly connected.

With the help of the diagnosis menu, check the function sensor and magnet valve.

**Error during Titration**

Check that there is enough reagent available.

Check the pipes between the reagent bottle and the dosing-pump for air bubbles. If necessary, pump reagent until the pipes are full of reagent.

Check that the blue o-ring is still on the nozzle of the dosing-plug.

Check that there is water in the chamber.

Check that there is a magnetic stirrer (stir-fish) in the chamber.

Check the reagent delivery, the sensor and the stir-fish with the diagnosis menu.

**False test result**

Check that the reagent corresponds to that programmed.

Check for air bubbles in the reagent delivery pipe.

During the blank test, check that the sample water is not coloured by foreign substances, sediment or air bubbles.

Check that there is water in the chamber and that the supply and waste pipes are not swopped.

Check that there is a magnetic stirrer (stir-fish) in the chamber.

Check that the blue o-ring is still on the nozzle of the dosing-plug and that it is positioned correctly.

Check that the magnet valve closes properly.

Exchange the reagent pump-cassette

Re-calibrate the unit with a new correction factor.

## Diagnosis function

If the analysis unit doesn’t function properly, you have the possibility to check all the functions. Please take in to consideration any controllers and peripherals that are connected. Observe all safety regulations.

Select Menu > Manual>Diagnosis. You can check every part step for step:

**Display**

The display changes its colour between red, green and blue.

**Sensor**

The LED in the chamber pulses on and off. If this doesn’t happen, check the electrical connections to the LED-plug and in the unit. If everything is ok, the LED-plug must be replaced.

**Solenoid valve**

The magnet valve in the water inlet can be heard opening and closing. If this is not the case, check the electrical connections to the valve and inside the unit If all connections are okay, measure the voltage at the valve while the test is in progress. It should switch between 0V and 20V. When this is okay then an electrical error can be ruled out. Change the magnet valve.

**Reagent dosing**

When the diagnosis starts, the dosing pump can be seen to turn. It can also be heard. If this is not the case, check the 4 pole connector on the circuit board. If you can hear the motor but there is no movement, then the pump-cassette is defect. If the connection are okay and the pump can neither be seen or heard, then the pump is defect or there is a defect in the electronics.

**Magnetic stirrer**

The stirrer in the measurement chamber should spin - at first slowly – then increasing to its maximum speed. If the stirrer doesn’t spin, check the connection to the circuit board (red plug).

Remove the chamber and check that nothing is obstructing the movement of the drive disk.

If the above are okay, change the motor assembly.

**Relay 1 to 4**

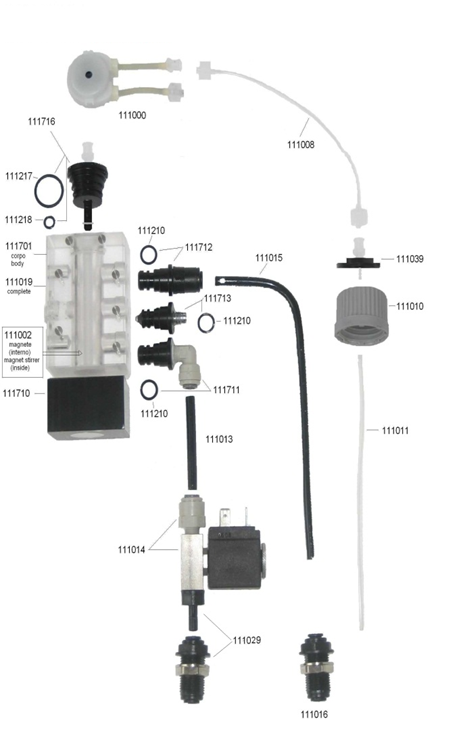
When this function is selected, you should hear the relays clicking as they operate.

Using a continuity meter or buzzer, measure between COM and A then COM and B. If there is no continuity when the relay contacts close or there is no sound of clicking, the control circuit board must be changed.

**Current loop**

To test the current loop, a test meter set to mA is necessary. Connect the meter probes to the connector marked[20mA+ und 20mA-].

# Spare parts



|  |  |  |
| --- | --- | --- |
| **Article no** | **Description** | **Part Number** |
| 111 002 | Magnetic stirrer | W6050-002 |
| 111 008 | Bottle connector | W6050-008 |
| 111 009 | Bottle adapter | W6050-009 |
| 111 011 | Suction lance | W6050-011 |
| 111 060 | Bottle cap | W6050-060 |
| 111 013 | Inlet pipe ¼" | W6050-013 |
| 111 014 | Magnet valve 24V complete | W6050-014 |
| 111 015 | Outlet pipe 6mm | W6050-015 |
| 111 016 | Connector 6mm water outlet | W6050-016 |
| 111 029 | Connector 6mm water inlet | W6050-029 |
| 111 727 | Actuator for magnetic stirrer 12V complete. | W6050-727 |
| 111 210 | O-Ring | W6050-210 |
| 111 217 | O-Ring | W6050-217 |
| 111 218 | O-Ring | W6050-218 |
| 111 000 | Dosing-pump cassette | W6050-000 |
| 111 700 | Measuring-chamber complete (33-090002,33-090701,33-090711,33-090712,33-090713,33-090716+ o-rings) | W6050-700 |
| 111 701 | Body of measuring-chamber | W6050-701 |
| 111 711 | Inlet plug 6mm | W6050-711 |
| 111 712 | Outlet plug 6mm | W6050-712 |
| 111 713 | Actuator plug (LED) | W6050-713 |
| 111 716 | Dosing plug | W6050-716 |
| **Spare Not Shown In Picture** | |  |
| 111 020 | Cable for magnet valve | W6050-020 |
| 111 021 | Cable for Actuator(LED) | W6050-021 |
| 111 023 | Power supply board 85-264 V | W6050-023 |
|  | Control box case (with lid) |  |
| 111 028 | Dosing-pump complete | W6050-028 |
|  | Control board complete |  |
|  | Display board complete |  |
| 111 911 | **O-Ring Set Complete** (1x 111217, 3x 111210, 1x 111218) | W6050-911 |
| 111 906 | **Maintenance Set 02** (1x 111000 Dosing pump cassette, 1x 111008 Bottle connector, 1x 111011 Suction Lance, 1x 111217 O-ring, 3x 111210 O-ring, 1x 111218 O-ring) | W6050-906 |

|  |  |  |
| --- | --- | --- |
| **Recommended Spare parts for 2-3 years** | | |
| 1x 111727 | Actuator for magnetic stirrer | 1x W6050-727 |
| 1x 111014 | Magnet valve 24V | 1x W6050-014 |
| 1x 111700 | Measuring chamber complete | 1x W6050-700 |
| 1x 111028 | Dosing pump complete | 1x W6050-028 |
| 4x 111906 | Maintenance set 02 | 4x W6050-906 |

# Measurement range of our reagents

**Reagents for water hardness (500ml):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Order number** | **Type** | **Range of measuring** | | |
| **°f** | **°dH** | **ppm** |
| W1234-455 | 500S/500 | 0,022-0,21°f | 0,012-0,12°dH | 0.22-2.14 ppm |
| W1234-456 | 500/500 | 0,04 - 0,36°f | 0,02-0,2 °dH | 0.36-3.56 ppm |
| W1234-457 | 501/500 | 0,05-0,54°f | 0,03-0,3°dH | 0.53-5.34 ppm |
| W1234-458 | 502/500 | 0,11-1,07°f | 0,06-0,6°dH | 1.07-10.68 ppm |
| W1234-459 | 503/500 | 0,16-1,61°f | 0,09-0,9°dH | 1.60-16.02 ppm |
| W1234-460 | 505/500 | 0,27-2,68°f | 0,15-1,5°dH | 2.67-26.70 ppm |
| W1234-461 | 510/500 | 0,54-5,36°f | 0,3-3,0°dH | 5.34-53.40 ppm |
| W1234-462 | 520/500 | 1,07-10,71 °f | 0,6-6,0°dH | 10.68-106.8 ppm |
| W1234-463 | 530/500 | 1,61-16,07°f | 0,9 - 9,0°dH | 16.02-160.2 ppm |
| W1234-464 | 550/500 | 2,68-26,79°f | 1,5-15°dH | 26.70-267.0 ppm |
| W1234-465 | 600/500 | 5,36-53,57°f | 3,0-30°dH | 53.4-534.0 ppm |
| **Carbonate hardness** | | | | |
| W6050-C710 | C-710/500 | 0,54-5,36°f | 0,3-3,0°dH | 5.34-53.4 ppm |
| W6050-C715 | C-715/500 | 0,80-8,04°f | 0,45-4,5°dH | 8.01-80.1 ppm |
| W6050-C720 | C-720/500 | 1,07-10,71°f | 0,6-6,0°dH | 10.68-106.8 ppm |
| W6050-C730 | C-730/500 | 1,61-16,07°f | 0,9-9,0°dH | 16.02-160.2 ppm |

# Calculation table for common units of water hardness

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **°dH** | **°e** | **°f** | **ppm** | **mval/l** | **mmol/l** |
| **German  Hardness** | 1 °dH = | 1 | 1.253 | 1.78 | 17.8 | 0.357 | 0.1783 |
| **English Hardness** | 1 °e = | 0.798 | 1 | 1.43 | 14.3 | 0.285 | 0.142 |
| **French Hardness** | 1 °fH = | 0.56 | 0.702 | 1 | 10 | 0.2 | 0.1 |
| **ppm CaCO3  (USA)** | 1 ppm = | 0.056 | 0.07 | 0.1 | 1 | 0.02 | 0.01 |
| **mval/l  Earth alkali** | 1 mval/l = | 2.8 | 3.51 | 5 | 50 | 1 | 0.5 |
| **mmol/l  Earth alkali** | 1 mmol/l = | 5.6 | 7.02 | 10 | 100 | 2 | 1 |

# Instructions for disposal

* Do not dispose of the unit in household rubbish.
* The unit should be taken to a certified collection point for electrical devices.
* The battery must be disposed of separately.

The unit can also be returned to the dealer or manufacturer for proper disposal.