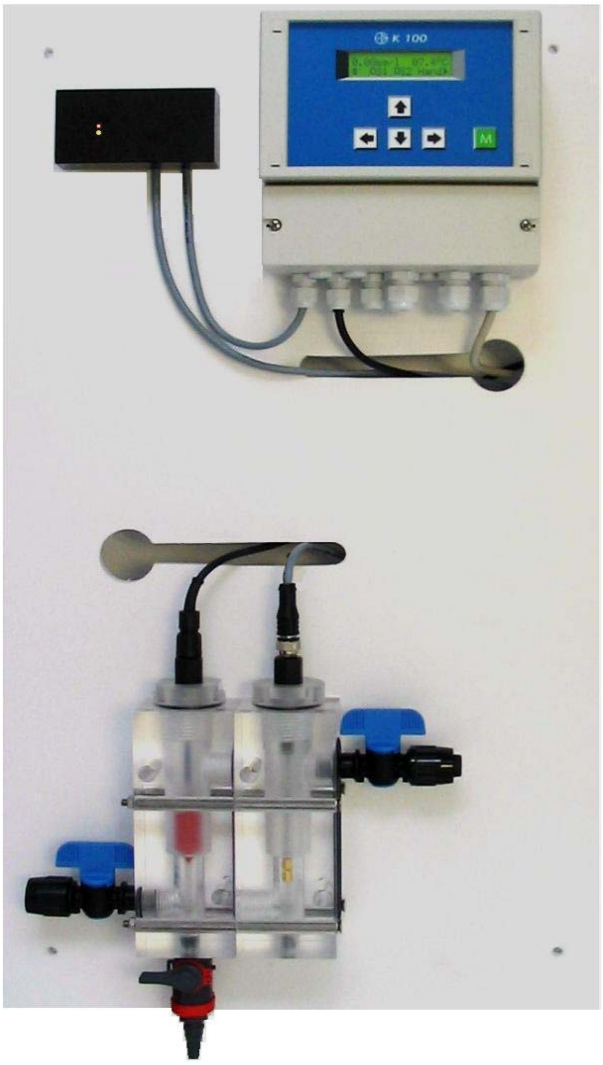
Operation manual

Krypton K

Measuring system for monitoring and control of the concentration of free Chlorine, Chlorine dioxide, Ozone, or Hydrogen peroxide, with integrated temperature measurement



Dr. A. Kuntze

Gutes Wasser mit System

Dr. A. Kuntze GmbH
Robert-Bosch-Str. 7a
D-40668 Meerbusch
Tel. +49-21 50-70 66-0
Fax +49-21 50-70 66-60
info@kuntze.com
www.kuntze.com

Contents

1. Your Krypton K

is a product by Dr.A. Kuntze GmbH, Germany that offers high quality and reliability for years.

The system is delivered ready-to-use, all monuted on a board, with a pre-adjusted working potential suitable for your measurement. It is even pre-calibrated, so you will receive approximate measured values immediately after installation. Single-point calibration is used to determine the electrode´s response characteristic.

Krypton K is equipped with our Automatic Cleaning function ASR. The patent-pending electrochemical cleaning function prevents coatings of lime, rust, or grease, and drastically reduces maintenance requirements.

The Krypton K´s instrument K 100 has an integrated controller which provides bidirectional PI control, via two relays or as a steady-state controller via the analog output. You can define a turn-on delay to prevent wrong dosage after power failure and operate the controller by remote control. A flow monitor will stop the controller automatically in a low water situation. Activate dosing control to get an alarm if dosage achieves no results, indicating damages in the feeding lines.

Let´s not forget the alarm function with minimum and maximum limit and turn-on delay...

You have certainly made a good choice. On the following pages you learn more about your Krypton K. If, however, you have further questions or are looking for information not included in this manual or if you are interested in supplementing products like sensors or armatures or in our other instrument series, just give us a call - we will be delighted to help you!

1.1 General and Safety instructions

This manual applies to the following instruments:

Instrument and type	Revision date
Krypton K Cl_2	05/07
Krypton K ClO_2	05/07
Krypton K O_3	05/07
Krypton K H_2O_2	05/07

It contains technical information for the installation, start-up and maintenance. If you have any questions not included in this manual please contact your supplier or the official representative of Dr. A. Kuntze GmbH in your country.

We would like to point out that the warranties specified in our general trading conditions are valid only if

- installation, connections, adjustments, start-up, and maintenance of the instrument are carried out by authorized personnel with adequate qualification.
- the instrument is used according to the description in this manual.

Please check for damages immediately after receiving the instruments and report any damages within 24 hours to the delivering company. Never work with a damaged instrument.

Keep this manual at a safe place where you can always look up the safety instructions and the informations on handling and usage. According to DIN 61010 the manual is part of the product and must be maintained as long as the instrument is used, and given to the next owner if the instrument is sold.

This instrument was designed and built according to the safety measures for electronic devices and has left our company in perfect working condition. To preserve this condition and to ensure safe usage follow all instructions carefully and pay special attention to all warnings issued in this manual. If the instrument is visibly damaged or has been stored inappropriately or if there are any doubts concerning safe usage, shut it down and make sure it cannot be restarted by accident.

You will notice that important safety instructions are highlighted:

WARNING **highlights instructions for the protection of people. Disregarding these instructions may cause accidents and injuries!**

ATTENTION **higlights instructions for the protection of the instrument and the equipment. Disregarding these instructions may lead to damage or destruction of the instrument or equipment!**

NOTE **is used to highlight interesting details.**

1.2 Application

Krypton K systems are used to measure the concentration of their specific parameters, i. e. Chlorine, Chlorine dioxdie, Ozone, or Hydrogen peroxide, in water. Alle have an integrated controller with two set points. With this you can control actuators such as dosing pumps or valves to add chemicals until the desired concentration is reached and maintained.

Applications are detoxication of industrial waste water, water treatment, and disinfection.

While the controller is set to Automatic, it controls independently the dosing of possibly hazardous chemicals, according to the measured values.

For safety measures, both the measurement and the calibration are checked for failure. Failures are indicated in the display and via the alarm relay, which can set off a horn or lamp or relate to a central control. If that failure makes control unreliable, the controller is automatically switched off until the failure has been taken care off.

CAUTION **The instrument checks the input signals, the calibration results, and the water flow. It cannot detect erroneous settings or failures in the treatment system, nor can it check for plausibility! The safety of the system of which the instrument is part of, lies within the reach of responsibility of whoever built the system.**

1.3 Intended use

Use these instruments only for the monitoring and control of water.

Use only sensors, fittings, and accessories of Dr. A. Kuntze, since instruments and sensors are attuned.

Ensure that the required measuring conditions are constantly maintained, such as flow, pressure, temperature, etc.

Set-up the instrument according to this manual. Carry out all the steps described, and check all measurements and settings before you activate the controller.

Use all available safety measures such as the alarm relay, the dosage check, and the lack-of-water indication.

Regularly check that all safety measures are in good working order.

CAUTION **The protection built into the instrument is impaired if they are not used as intended!**

1.4 Features

Meter

Measuring ranges	0.00 - 4.00 mg/l Cl_2	free Chlorine	(Krypton K Cl_2)
	0.00 - 4.00 mg/l ClO_2	Chlorine dioxide	(Krypton K ClO_2)
	0.00 - 4.00 mg/l O_3	Ozone	(Krypton K O_3)
	0.0 - 100.0 mg/l H_2O_2	Hydrogen peroxide	(Krypton K H_2O_2)
	-30.0 - 140.0 °C		

Display	Measured value and temperature with dimension Status display sensor, calibration, controller & alarm
Temperature compensation	manual or automatic with Pt100
Calibration	1-point calibration; zero-point-calibration possible
Averaging	can be activated and deactivated via menu
Automatic Sensor cleaning	0 / 1 / 2 cleaning cycles per day, with delay

Controller

Set points	2 set points with adjustable direction
Controller types	ON/OFF controller with hysteresis P controller as Pulse-Pause-, Impulse-Frequency- or steady controller PI controller as Pulse-Pause-, Impulse-Frequency- or steady controller
Hysteresis	ajustable within the measuring range
P range X_P	adjustable within the measuring range
Integral time T_N	0 - 2000 sec.
Least pulse	0.1 - 9.9 sec.
Pulse+Pause time	02 - 99 sec.
Impulse frequency	100 - 7200 pulses/h
Turn-on delay	0 - 200 sec.
Dosage check	0 - 90 min
Alarm function	min. and max. limit and onset delay

Connections

Relays	3 potential-free contacts (2x controller, 1x alarm) 6 A, 250 V, max. 550 VA
Analog output	0/4-20 mA galvanically isolated max. loading 500 Ohm
Analog inputs	1 measuring input for Cl_2, ClO_2, O_3, or H_2O_2 1 measuring input for temperature sensor
Digital input	external controller stop or low water indication
Serial interface (Option)	RS485, Baud rate 9600, data formate 8Bit, 1start and 1stop bit, no parity

1.5 Technical data

Feature	Description
Dimensions	400 x 700 x 90 mm (W x H x D)
Weight	4.2 kg
Terminals	spring terminals max. 1.5mm2
Protection class	IP 65
Power supply	230 V +6/-10%, 40 .. 60 Hz, optional 117 V or 24 V
Internal fuse	230 V: 63 mA HRC 117V : 125 mA HRC 24 V: 800 mA NRC
Power consumption	10 VA
Display	LCD, 2-line, 2x16 characters, illuminated background measured value and temperature with dimensions indication of relay status
Current output	0/4-20 mA, galvanically isolated, max. loading 500 Ohm
Interface (option)	RS485, Baud rate 9600, Data formate 8Bit, 1 Start / 1 Stop bit
Controller	ON/OFF controller with hysteresis, P or PI controller as Pulse-Pause- or Impulse-frequency controller, steady controller, bidirectional PI control action, adjustable onset-delay, manual operation of the relays, controller stop via external switch or level sensor (lack-of-water sensor)
Set points	2 set points adjustable within the measuring range
Alarm function	with min. and max. limit and turn-on delay
Contact rating	6 A/ 250 V, max. 550 VA resistive load (with RC protective circuit)
Operation temperature	0 - 50°C
Storage temperature	-20 - 65°C
Humidity	max. 90% at 40°C non-condensing

2. Installation

The measuring system is delivered ready-to-use. All you have to do is mount it on a suitable wall, install the sensors, and connect the water inlet and outlet. The positions of the sensors are shown on the next page.

ATTENTION **Install the instrument in a place where it is not put under mechanical or chemical strain!**

Mind the protection class: IP65 (closed terminal cover)

ATTENTION **The sensors are delivered with protective covers to keep the sensor tips wet. Remove these before mouting them in the flow cell.**

Connections:

You will find a detailed connection diagram on the following pages.

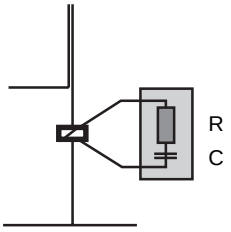
Before connecting the power supply check the information on the instrument label.

ATTENTION **Input, output and control lines must be installed separate from each other and separate from power lines!**

For inputs and outputs use screened cables, and connect the screens on one side only.

To protect the measurements against inferferences use only the special cables delivered for each measurement.

When using the relays, mind that with inductive loads, interference must be suppressed. If that is not possible, the relay must be protected at the terminals of the dialog by a resistance-capacitance filter, or, in case of direct current, by a free-wheeling diode.

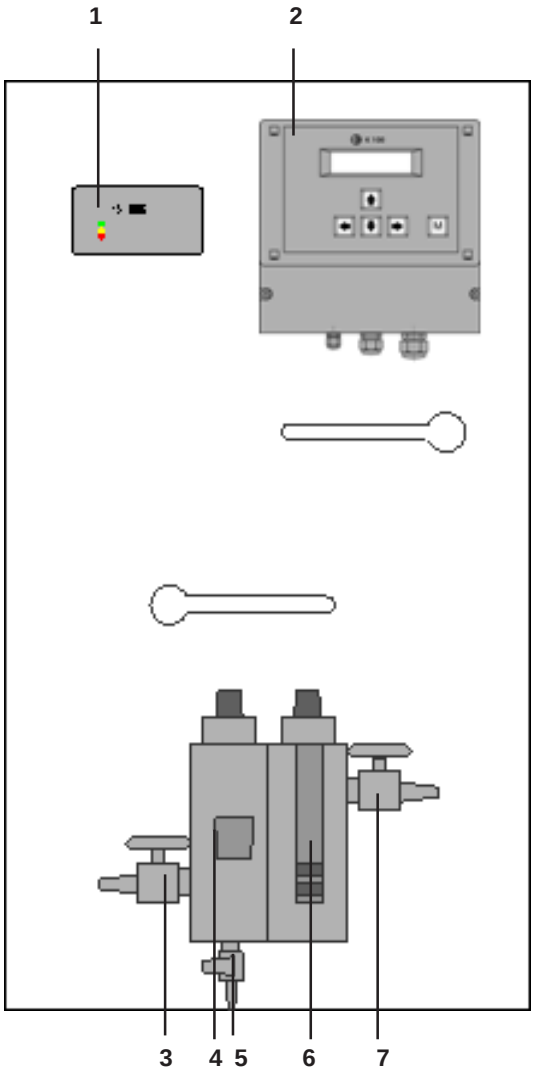


Current up to	Capacitor C	Resistance R
60 mA	10 nF 260 V	390 Ohm 2 Watt
70 mA	47 nF 260 V	22 Ohm 2 Watt
150 mA	100 nF 260 V	47 Ohm 2 Watt
1,0 A	220 nF 260 V	47 Ohm 2 Watt

Tube connections:

Connect the water inlet on the left side and the outlet on the right side of the flow cell. Water must be supplied at 30-300, ideally 50-200l/h. The outlet can be an open outlet, pressureless, or the water can be redirected into a pipe or basin.

2.1 Set up



1 Automatic Sensor Cleaning ASR

2 Meter / controller K 100 W

3 Water inlet

4 Flow monitor with integrated Pt100

5 Sampling point

6 Chlorine measurement (or ClO2 or O3 or H2O2)

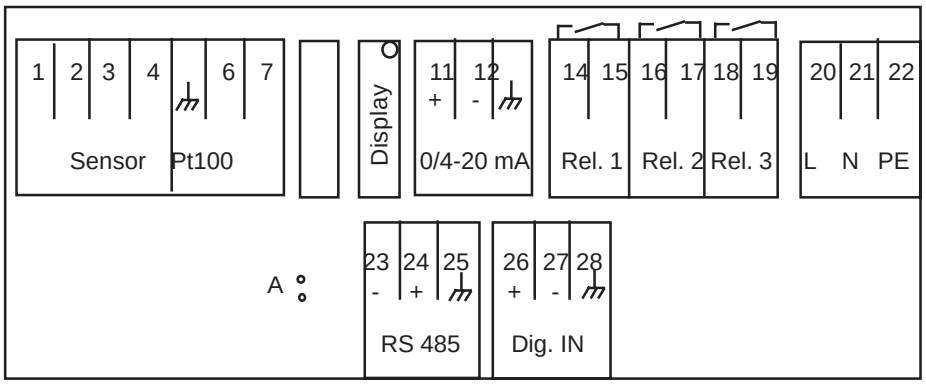
7 Water outlet

Sensors:

Flow monitor	PT-55-W with integrated Pt100
Cl2/ClO2/O3 measurement	AuAu-600-OO-2-1-PG
H2O2 measurement	PtPt-600-OO-2-1-PG

ATTENTION **The sensors are delivered with protective covers to keep the sensor tips wet. Remove these before mouting them in the flow cell.**

2.2 Connection diagram



Connection	Terminal	Notes
Cl2/ClO2/H2O2 Sensor	1 - 4	1 = screen 2 = measuring electrode, white* 3 = reference electrode, black* 4 = counter electrode, brown*
Flow monitor /Pt100	6 + 7	PT100, yellow + green
	26 + 27	flow monitor, brown + white
Display contrast	Display	Potentiometer to adjust the display contrast
Analog output	11 + 12	11 = +, 12 = -, maximum loading 500 Ohm
Relay 1	14 + 15	
Relay 2	16 + 17	
Relay 3	18 + 19	Alarm-Relais
Power supply	20 + 21 + 22	Check information on the instrument label!
RS485 (Option)	23 + 24	23 = -, 24 = + Jumper A bridged = terminating impedance
Digital input	26 + 27	external controller stop

***NOTE** **The colors refer to the 10core cable of the ASR.**

2.3 Installation procedure

ATTENTION **The sensors are delivered with protective caps to keep them wet. Remove these prior to installation!**

Mount the board on a suitable wall. Keep the water pipes going to the flow cell as short as possible.

NOTE **For good control results the measured water has to be representative for the water that is to be controlled. Do not place the measurement directly after the injection points, make sure that the chemicals had time to mix porperly with the water and keep all distances short to reduce delay times.**

Take the sensors out of their boxes and remove the protective caps. Mount the sensors in the appointed slots and connect the cables according to their labels.

NOTE **To help you find the right places for the sensors: You can recognise Chlorine, Chlorine dioxide and Ozone sensors by the twin Gold rings, and peroxide sensors by their twin Platinum rings.. The water monitor with the integrated Pt100 is much smaller and thinner than the other sensors.**

Connect the water inlet and outlet. Make sure that the outlet valve is open and the stop-cock at the bottom of the flow cell is closed.

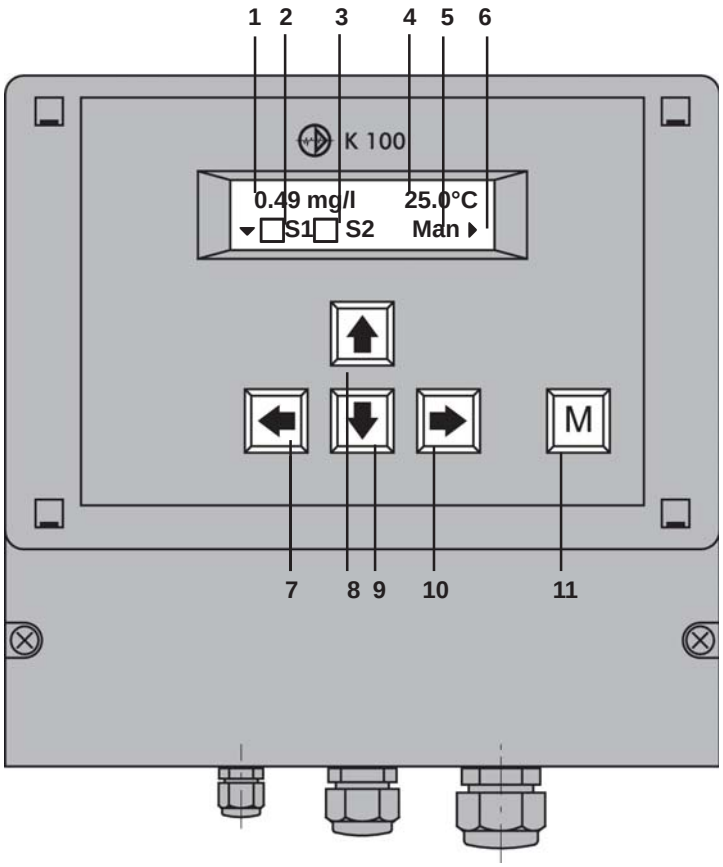
Open the inlet valve slowly until the water flows through the flow cell with the desired flow rate.

Switch on the power supply for the instrument..

Wait a few minutes until all readings are stable.

For calibration and settings follow the steps described in this manual.

3. Operation of the instrument



1 Measured value

2 Status relay 1

3 Status relay 2

□ relay OFF
■ relay ON

4 Temperature

5 Controller
AUTO: controller ON
MAN : controller OFF
(manual operation of the relays)

6 Orientation aids

7 Key left (◂)

8 Key up (▴)

9 Key down (▾)

10 Key right (▸)

When turned on the instrument shows the measured value and temperature together with the controller mode (Man) and the status of the relays S1 and S2 (both OFF).

With five membrane keys you can move within the menu:

With key ▾ you enter the main menu.

With keys ▴ and ▾ you move up and down in the menu.

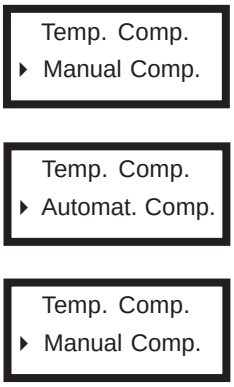
With key ▸ you adress a menu or parameter.

With key ◂ you leave a menu or store a change.

For your convenience triangles in the display indicate the directions you can take from your position in the menu.

With key „M“ you get back to the display of the measured values from any point in the menu. Changes that have not been stored will be lost.

3.1 How to adjust parameters



1) When you adress a parameter the actual setting is displayed.

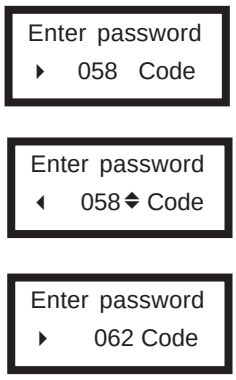
2) Switch to the next alternative setting with key ▸ .

3) When you have come to the last alternative, pressing the key once more will bring you back to the start.

Selection between alternatives

For many parameters you have the choice between two or more alternatives, for e. g. between manual and automatic temperature compensation. For these parameters you need only key ▸ . Switch from one alternative to the next until you either come back to where you started or until you reach the alternative you were looking for.

With these parameters any changes are immediately valid - there is no need to store the change.



1) Adress the parameter with key ▸ .

2) A double triangle appears behind the number indicating that the number can be changed now with keys ▲ and ▼ .

3) Store the new value with key ◂ . The double triangle disappears - the new value is stored.

Adjustment of numerical parameters

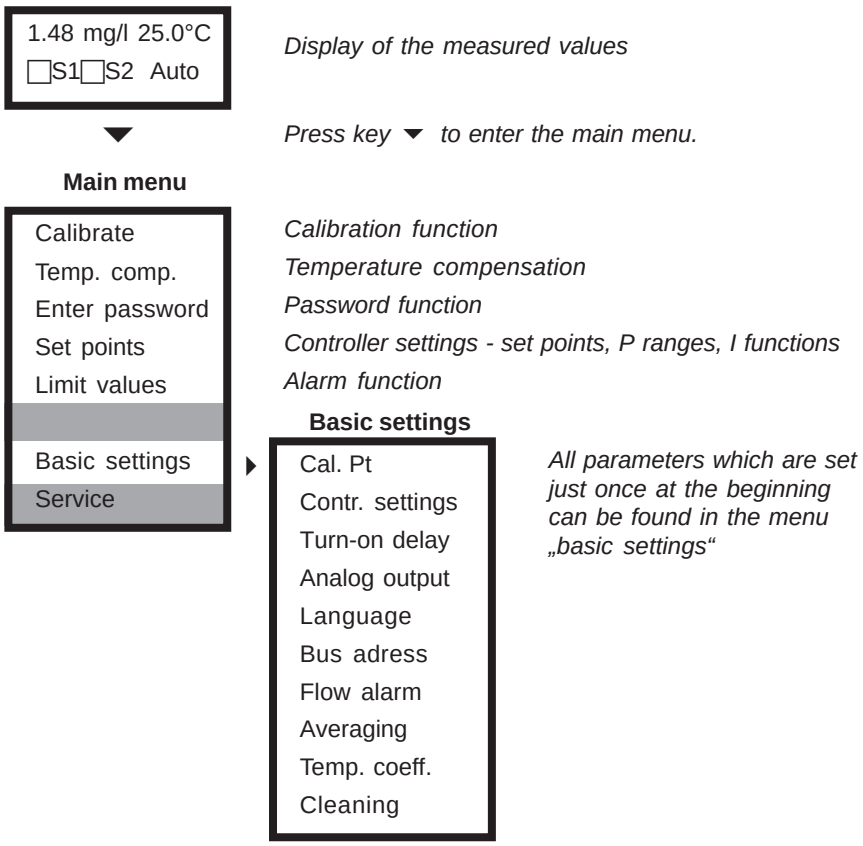
Numerical parameters can only be altered when a double triangle is visible behind the number. This double triangle appears when you adress the parameter with key ▸ .

Adjust the parameter with keys ▲ and ▼ . A short pressure on the key changes the last decimal by 1. If you keep the key pressed, the value will continue changing until the pressure is released.

Store the changes with key ◂ . The double triangle disappears.

NOTE **If you do not want to store the change, press key „M“ instead of key ◂ .**

3.2 Menu overview



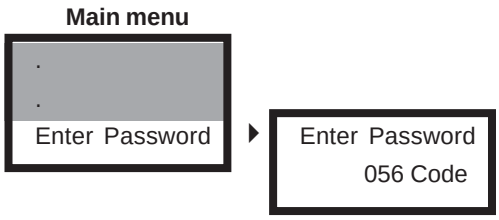
Main menu and basic settings

The parameters are sorted into two menus: In the main menu you will find all functions which are used regularly, such as calibration. The menu basic settings contains all parameters which are set just once during start-up.

On the following pages you will find information on how to adjust parameters and which parameters you need for which application, in the following order:

1) General adjustments: password and language
2) Adjustments for measurement: calibration, temperature compensation, averaging, and cleaning
3) Adjustments of the controller: selection of the controller version and corresponding parameters
4) Adjustments to read out data: analog, digitally and/or as alarm

4. Password and language



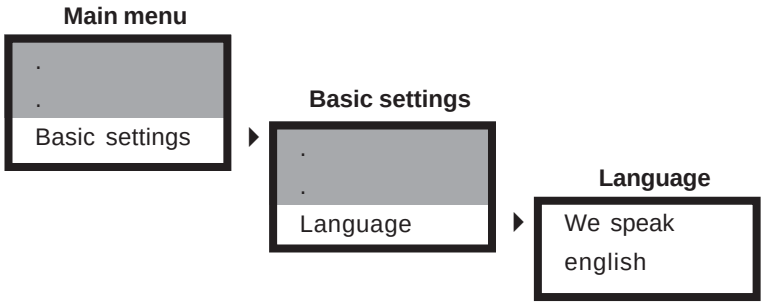
Enter password

To get access to the various parameters you have to enter the correct password:

Code 11 gives access to the parameters „calibration“, „temperature compensation“, and „set points“.

Code 86 gives access to all parameters and functions.

With any other number it is impossible to select, view or change any parameter.

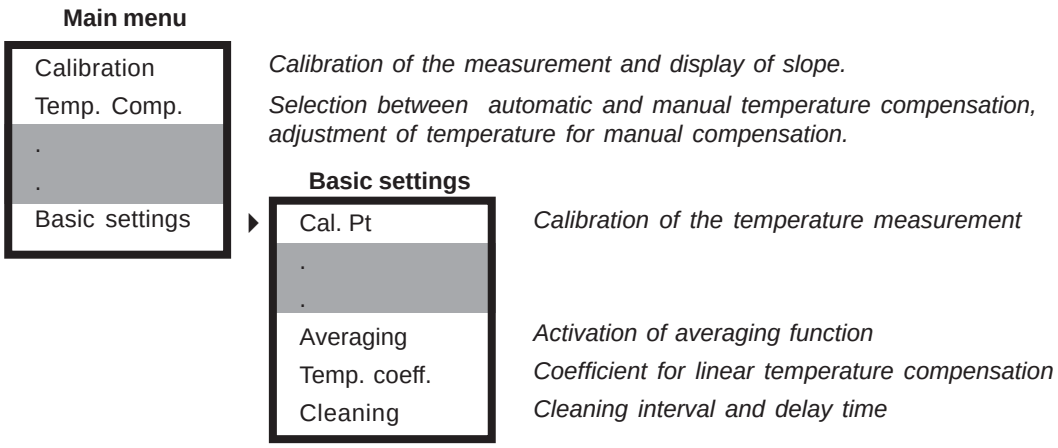


Language

For the communication with the instrument you can choose from a variety of languages.

Since choosing a language is part of the basic settings, it requires code 86. If a different code is set, you will be asked to enter the correct password.

5. Adjustment of the meter



Potentiostatic measurements require a 1-point calibration:

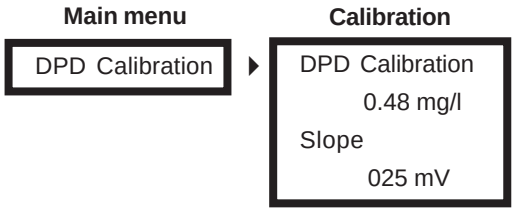
Since the measurement depends upon the flow-rate and calibration solutions would not be stable anyway, the sensor cannot be taken out of the armature for calibration, as is done with pH sensors. Instead the actual concentration of the test water is determined by an alternative method, for example photometrically with DPD, and this value is entered as calibration value.

The measurement is influenced by temperature. This influence can be compensated manually or automatically. For manual compensation the temperature is entered manually, for automatic compensation temperature has to be measured with a temperature sensor. For the temperature compensation a linear coefficient can be adjusted as %/K.

For smoother measured values activate the averaging function.

In the basic settings you can activate the automatic cleaning, define the interval between subsequent cleaning cycles and the time for the first cleaning cycle.

5.1 Calibration



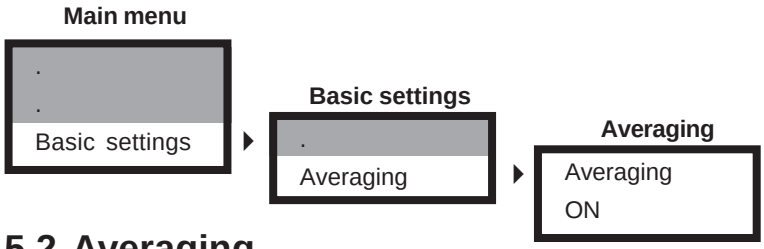
Enter the concentration determined by photometric measurement as calibration value.

Calibration of the measurement

1) Switch off the controller. Take a sample of the test water at the sampling point and determine the concentration by photometric DPD measurement or a similar reference method.

2) Enter the determined concentration and calibrate by pressing keys ▸ and ◂ : Start with key ▸ and then - while still applying pressure on this key - additionally press key ◂ .

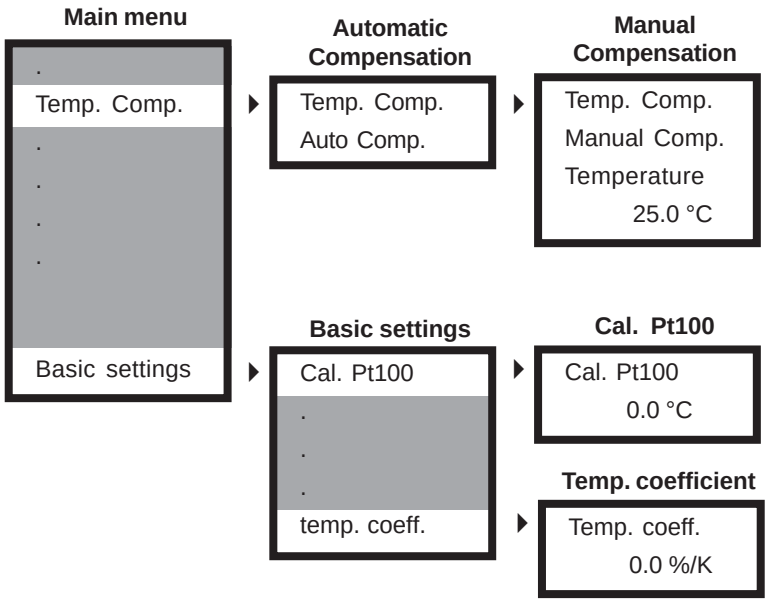
3) Check the displayed slope before switching on the controller.



5.2 Averaging

In the basic settings you can activate an averaging function to smoothen the signals.
This is especially useful when using membrane sensors.

5.3 Temperature compensation



Choose between two types of temperature compensation:

1) Automatic compensation with temperature sensor

Mind that the temperature sensor should measure the temperature in the vicinity of the sensor. If temperature sensor and potentiostatic sensor are not immersed in the same solution, better switch to manual compensation.

2) Manual compensation

If the temperature is more or less stable you can enter it manually. The instrument will then compensate the temperature effect of this temperature.

Temperature coefficient

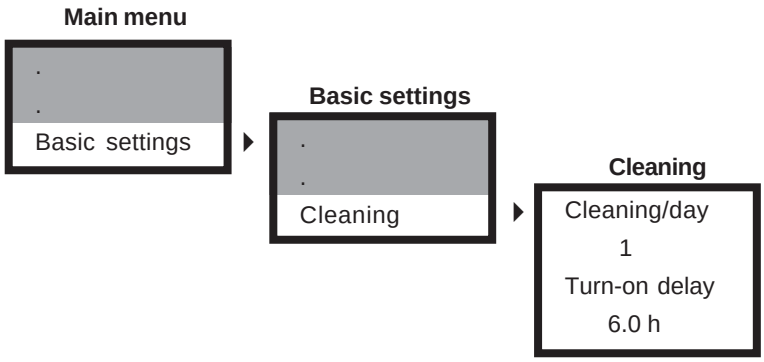
With the temperature coefficient you can adjust the degree of compensation. The coefficient is given as %/K. For example, with a coefficient of 2%/K two percent of the measured value are substracted per degree of temperature above 25°C.

Calibration of the temperature measurement

Since the temperature sensor is connected with a twin-core cable, slight deviations might occur between measured and real temperature. These deviations can be eliminated by calibration.

During start-up, measure the temperature manually and enter a correction term so that the display shows the exact temperature.

5.4 Automatic Sensor Cleaning ASR



The patented Automatic Sensor Cleaning ASR prevents staining and passivating coatings and keeps the surface of metal sensors clean throughout the measurement.

The cleaning is an electrochemical one: in adjustable intervals the instrument applies a strong voltage to the electrode to produce Hydrogen and Oxygen from the surrounding water. This method needs no addition of chemicals. Both Hydrogen and Oxygen are ORP active substances that will destroy inorganic coatings such as rust, maganese oxide, or lime, and organic coatings such as fat or grease.

Activate the cleaning after completing the set-up to conserve the clean metal surface of the new sensor during subsequent measurements.

The cleaning process takes about 30 seconds. During this time measurement is not possible, and after cleaning the sensor needs some time for polarisation. Therefor the display and the analog output will show the last measured value for five minutes, and the message „cleaning in progress“ is displayed. As a safety measure, attempts to calibrate within these five minutes are ignored.

Activation and timing

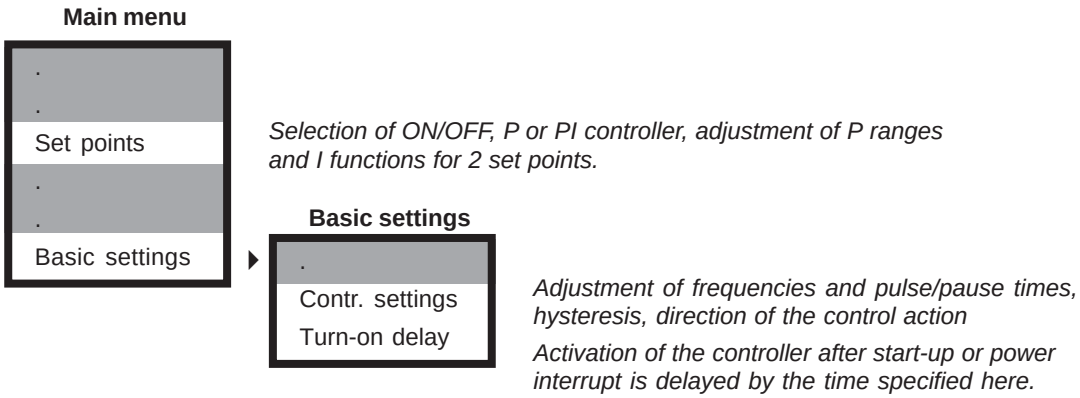
The cleaning is activated by setting the cleaning function from 0/day (never) to 1/day (every 24h) or 2/day (every 12 h). The first cleaning starts as soon as the function is activated, and subsequent cleanings are carried out after 24h, or 12h, according to settings.

NOTE **Often it is convenient to carry out the cleaning during the night. Therefor we have added a delay function that enables you to set the time for the cleaning to a later hour. If, for example, you select 1 cleaning per day at 10am and set the delay time to 12h, cleaning takes place every day at 10pm.**

NOTE **The instrument does not contain a real-time clock. Therefor all time settings have to be repeated after power failure or disconnection of the power supply.**

NOTE **Whenever the instrument indicates „no water“, cleaning is not carried out.**

6. Adjustments of the controller



For any type of controller you have to enter one or two set points, and you have to tell the instrument whether these set points are reached by increasing or decreasing the measured value.

You can choose between three different controller versions:

ON/OFF controller

The ON/OFF controller switches ON if the measured value exceeds the set point and OFF if it drops back below it or vice versa. Dosage is always carried out with 100% (ON) or 0% (OFF). The parameter for an ON/OFF controller is the hysteresis.

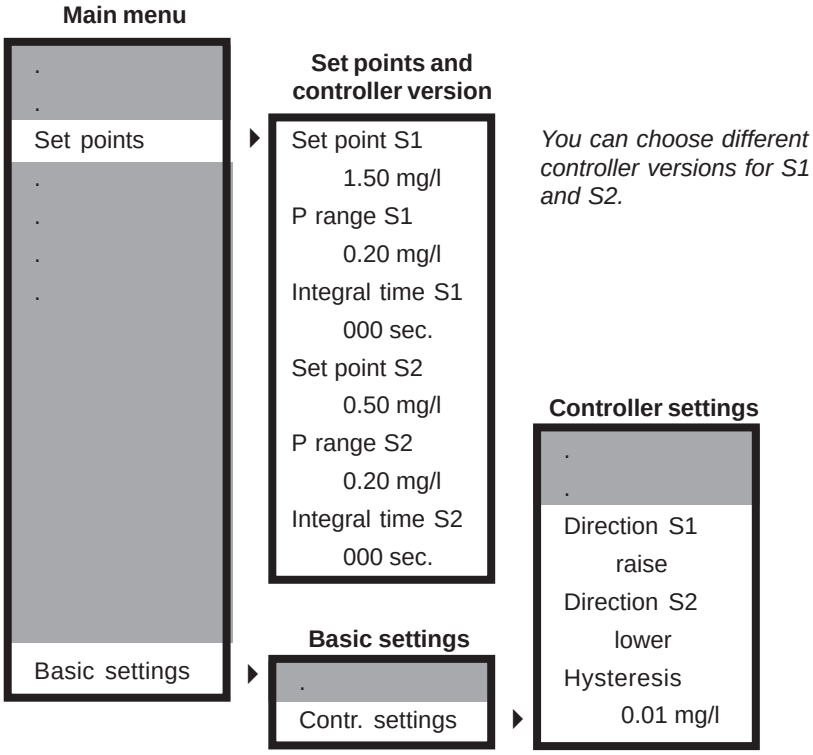
P controller

The P controller or proportional controller reduces the dosage in the vicinity of the set point proportional to the control deviation. This is easily achieved if the analog output is used as steady control output. If the relays are used, the proportional reduction is achieved by either reducing the switch frequency (Impulse-frequency controller) or reducing the time within a given period of time in which the relay is ON (pulse-pause controller). The parameters for a P controller are the P range and the impulse-frequency or the pulse+pause time and the minimum pulse.

PI controller

The PI controller is a P controller with an additional I function. Adjustments and parameters are the same as for an P controller. Additionally the integral action time has to be adjusted which determines the I function. The I function eliminates the P controller´s disadvantage of a remaining steady-state deviation.

6.1 ON/OFF controller



For an ON/OFF controller you have to set the following parameters:

1) Set points S1 and S2

Set point S1 refers to relay 1, set point S2 refers to relay 2.

2) P range and integral action time for S1 and S2

For an ON/OFF controller set P range = 0 and integral time = 0.

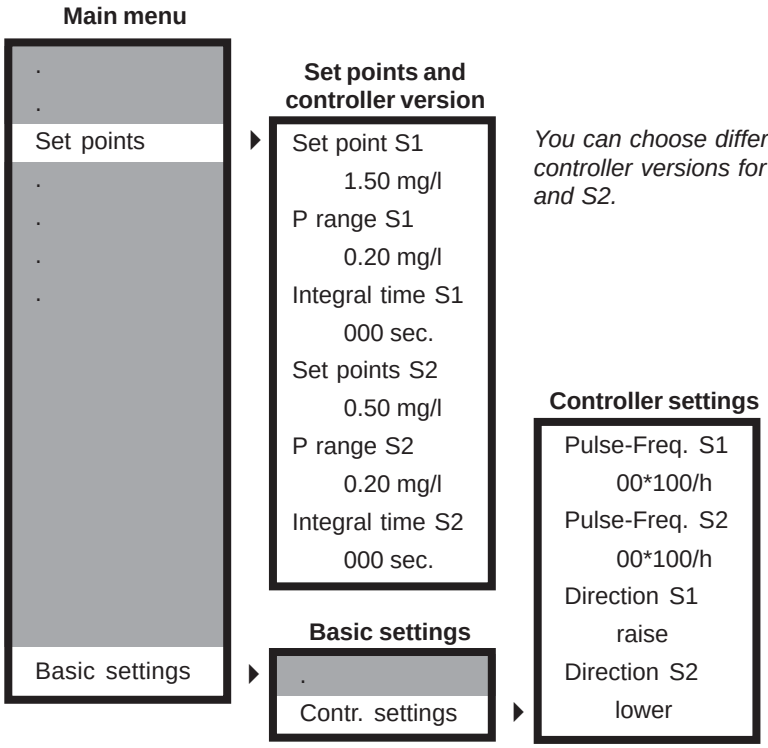
3) Acting direction for S1 and S2

Select „raise“ if the dosage raises the measured value.
Select „lower“ if the dosage lowers the measured value.

4) optionally a hysteresis

The hysteresis prevents fast switching in the vicinity of the set point. If hysteresis is activated (by setting a value > 0) the relay switches only when the set point is exceeded by half the hysteresis.

6.2 P / PI controller as impulse-frequency controller



For an impulse-frequency controller you have to set the following parameters:

1) set points S1 and S2

S1 refers to relay 1, S2 refers to relay 2.

2) P range and integral action time for S1 and S2

Adjust a P range > 0. For a P controller set integral time = 0, for a PI controller set an integral time > 0.

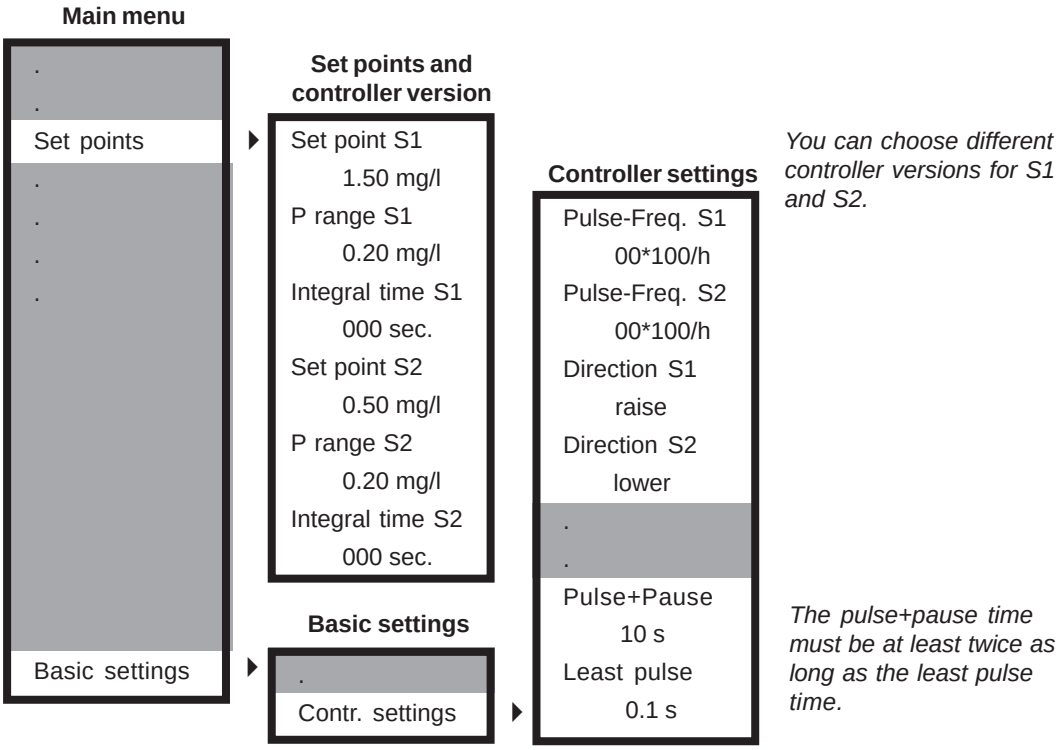
3) pulse-frequencies for S1 and S2

Enter the maximum pulse-frequency that corresponds to 100% dosage.

4) the acting direction for S1 and S2

Select „raise“ if the dosage raises the measured value.
Select „lower“ if the dosage lowers the measured value.

6.3 P / PI controller as pulse-pause controller



For a pulse-pause controller you have to set the following parameters:

1) set points S1 and S2

S1 refers to relay 1, S2 refers to relay 2.

2) P range and integral action time

Adjust a P range > 0. For a P controller set integral time = 0, for a PI controller set an integral time > 0.

3) pulse-frequencies for S1 and S2

Both frequencies must be set to 00, otherwise the controller will act as an impulse-frequency controller.

4) the acting direction for S1 and S2

Select „raise“ if the dosage raises the measured value.
Select „lower“ if the dosage lowers the measured value.

5) pulse+pause time

Define a period of time during which the relay is proportionally to the control deviation ON (pulse) or OFF (pause), respectively.

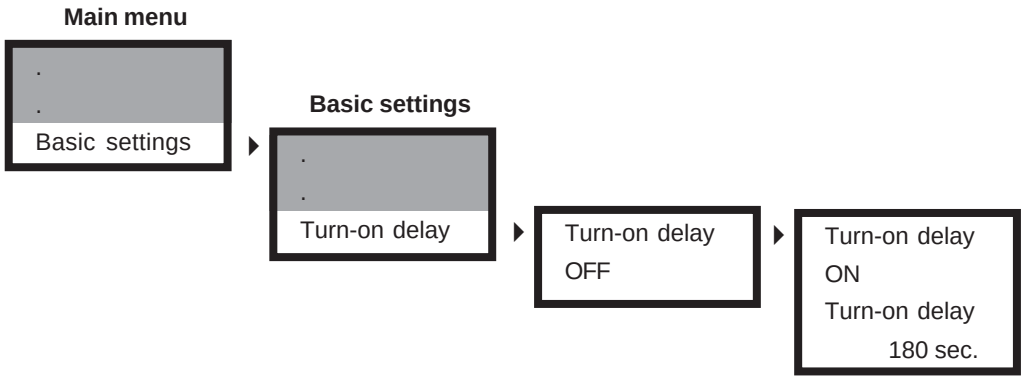
6) least pulse time

Set a minimum pulse time that the relay has to at least remain open to allow the actuator to react.

6.4 Activation and deactivation of the controller

You can activate and deactivate the controller without any menu. Press key ▸ to switch between manual operation (controller OFF) and automatic operation (controller ON). The actual operation mode is indicated in the display by MAN or AUTO.

WARNING **Make sure that the controller is OFF when connecting dosing pumps or other actuators!**



6.5 Turn-on delay

Set a delay time which has to pass before the controller is activated after start-up or power interrupt. This allows the measurement to settle and prevents inappropriate dosage of chemicals.

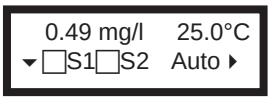
6.6 External controller stop

You can activate or deactivate the controller with an external switch by using the digital input. This feature requires no settings or adjustments. If the digital input is short-circuited, the controller stops, and the message „external controller stop“ appears in the display.

NOTE **This feature is also used as low water indication. The flow monitor is connected to the digital input. However, it can still be used as an external switch - the controller stops as soon as either the flow monitor or the external switch close the digital input.**

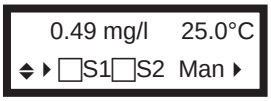
NOTE **If you get the message „external controller stop“ even though the flow sensor indicates a sufficient water flow, please check under „basic settings“ that „Flow alarm“ is set to „contact“ and not to „flow“.**

6.7 Manual operation of the relays



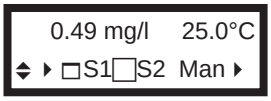
1) If the controller is ON, switch it OFF with key ▸ .

Instead of „Auto“ the display shows „Man“.



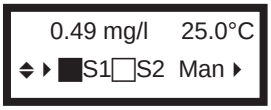
2) Switch to the operation mode of S1 with key ▲ .

The square to the left of S1 starts to flash.



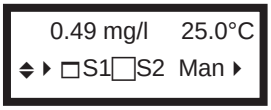
3) Switch ON relay 1 with key ▸ .

The square to the left of S1 gets dark.



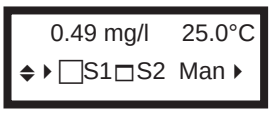
4) Switch OFF relay 1 again with key ▸ .

The square gets light.



5) Switch to the operation mode of S2 with key ▲ .

The square to the left of S2 starts to flash.

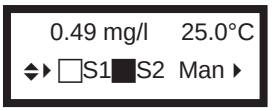


6) Switch ON relay 2 with key ▸ .

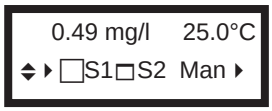
The square to the left of S2 gets dark.

7) Switch OFF relay 2 again with key ▸ .

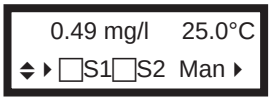
The square gets light.



8) Leave the operation mode of relay 2 with key ▲ .



Both squares appear light, none flashes - You have left the operation mode.



For manual operation you need no menu.

With key ▸ you switch OFF the controller.

With key ▲ you switch between Manual operation <> operation mode S1 <> operation mode S2 <> manual operation.

In the operation mode you can Switch ON and OFF the selected relay with key ▸ .

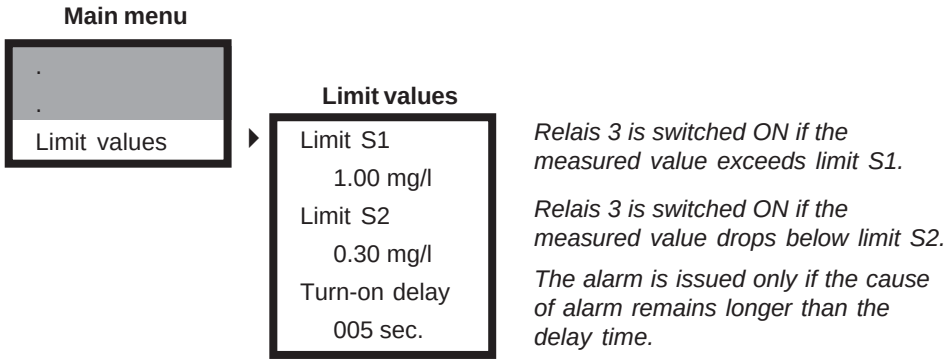
A flashing square indicates that the relay is in operation mode.

A dark square indicates that the relay is swichted ON.

A light square indicates that the relay is switched OFF.

WARNING **If you switch ON a relay it stays ON until you switch it OFF again manually!**

6.8 Limit values and Alarm



For the alarm, you can ajust two limits: limit 1 is an upper limit. If the measured value exceeds limit 1, an alarm is issued. Limit 2 is a lower limit. The alarm is issued if the measured value drops below limit 2.

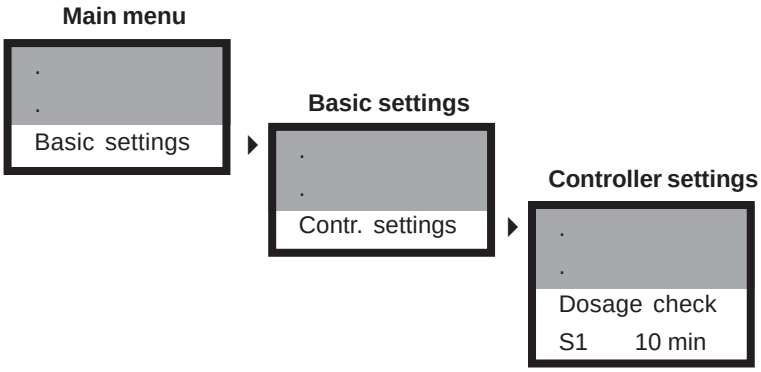
In case of alarm the display shows the message „limit 1“ (or 2, respectively), and relay 3 is switched ON. This relay can be used to activate an external horn or lamp.

NOTE **The alarm function is only active when the controller is set on automatic mode. When you switch the controller to MAN, the alarm is extinguished.**

Turn-on delay

In some applications it happens regularly that the measured value exceeds a limit for a short period of time. To avoid having an alarm issued under these circumstances you can adjust a turn-on delay which has to pass before an alarm is issued. If the turn-on delay time is >0 then the alarm is issued only if the cause of alarm remains longer than the specified turn-on delay time.

6.9 Dosage check



In the basic settings of the controller you can define, how long a controller is supposed to dose with 100% without raising alarm.

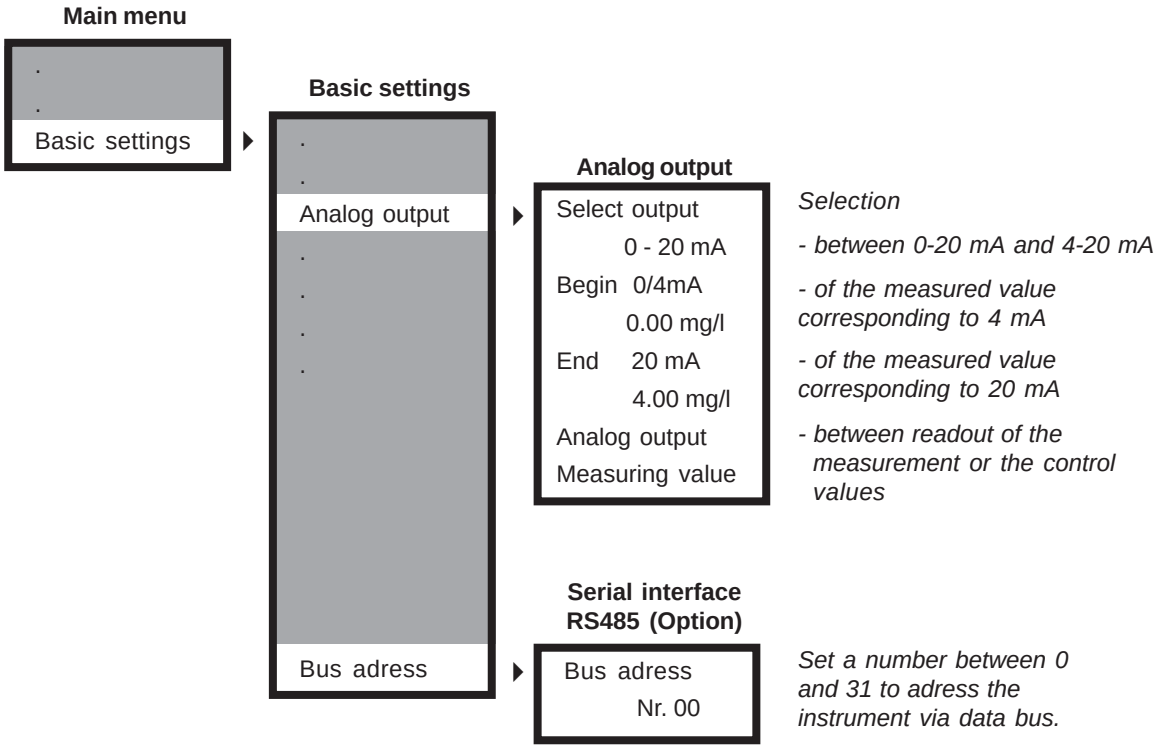
If the controller output is 100% for more than the specified time, this is interpreted as an indication of failure, and the instrument issues an alarm and deactivates the controller, thus stopping further dosage.

The dosage check is a safety catch to prevent hazardous chemicals to be set free in case of a defective dosing tube or tube connection.

NOTE **In case of an alarm due to dosage check, only the controller concerned is deactivated.**

NOTE **If you set the dosage check time to 0 seconds, the dosage check function is deactivated.**

7. Data output



7.1 Current output

You can read out the measured values as 0/4-20 mA signals via the current output. With the setting 4-20 mA the resolution is lower, but defective cable connections are immediately evident.

With the parameters Begin and End you define which part of the measuring range you want to read out.

Alternatively you can use the current output as steady-state controller output. In that case assign the current output to the correcting variables S1 bzw. S2.

7.2 Serial interface RS485 (option)

The instruments are available with serial interface RS485 by means of which they can be integrated in a data bus system. Via the interface, all settings, measured and control values as well as any error messages can be read out digitally.

Instruments with RS485 are automatically delivered with the leaflet „Information on the RS485“ which contains instructions on the communication and a complete list of the functions available via interface.

8. Operation and maintenace

Display contrast

The display contrast can be adjusted to the actual light conditions by means of a potentiometer. It is indicated in the connection diagram with the word „display“.

Cleaning

The front and the display should not get in touch with organic solutions such as methanol. Never let water get inside the instrument. We suggest to simply use a damp cloth for cleaning.

Exchange fuse

WARNING! Disconnect the power supply before opening the instrument!

ATTENTION Mind that the cable connections to the front are not damaged, broken or torn during the process!

The instrument has an internal fuse which has to be replaced at need. You will find a spare fuse fixed to the inside of the terminal cover. Information on the fuse can be found in the chapter „Technical data“.

To exchange the fuse, open the front carefully. The fuse is located in the lower right hand side. It is kept in place by a Bayonet lock. Turn the lock to the left until the fuse pops up. Exchange it and fix the new fuse by turning the lock to the right. Put the front back on and fix it tightly.

Maintenance of the safety functions

Regularly check the alarm relay to make sure that in case of failure both the indication by the instrument and the recognition by the superior control (SPS etc.) work reliably.

You can set off the alarm for example by setting limit S1 to a value smaller than the current measured value.

NOTE Mind that perhaps an alarm delay has been set. Also remember to restore the original settings after the test!

Regularly check the function of the flow monitor to make sure that in case of a low water situation the sensor gives the signal that leads to the controller stop.

Simulate lack of water by briefly interrrupting the water supply. This must lead to a sinking of the flow monitor, and the message „ext. controller stop“ or „no water“ must appear in the display.

Maintenance of the measurement

The metallic surfaces of the sensor are cleaned regularly and automatically by ASR. Mind that the measurement will take some time to repolarise after cleaning.

Recalibrate if the difference between sensor output and photometric measurement is too large. Do not calibrate immediately after cleaning.

NOTE **The instrument checks the calibration data and indicates if a sensor has to be cleaned or replaced.**

If you have to exchange a sensor, make sure that the replacement sensor is an original Dr. Kuntze product and that it corresponds to the equipment used.

Mind that you have to calibrate whenever you change a sensor - or an instrument!

Regulary clean the flow cell and ensure free movement of the flow monitor.

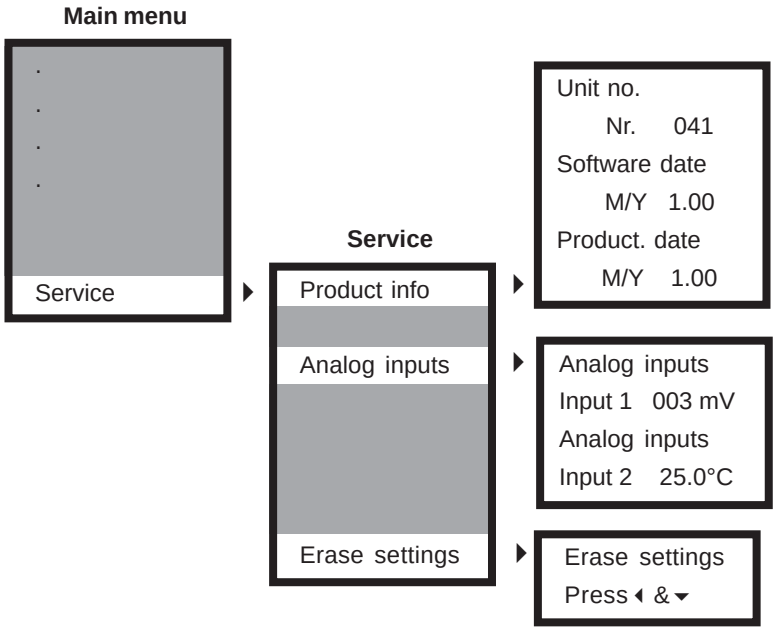
Set-up

Follow the instructions of this manual. Carry out all steps described. Check both the measured values and the settings before you activate the controller.

Disposal:

For disposal please notice that the instrument contains electrolyte capacitors which have to be disposed separately.

9. Service



In this menu you will find information which is especially important for any inquiries, updates or problems.

9.1 Product info

These figures allow a precise identification of the instrument (hardware and software).

9.2 Analog inputs

Here you can see the raw data the instrument obtains from the sensors. They are not influenced by compensations or calibration and offer valuable information in case of problems with the measurement or the instrument.

If you have difficulties interpreting this data, send them to your supplier together with the instrument data - he will know what to do.

9.3 Erase settings (reset)

With this function you can erase all customer settings and restore the original at-works data.

The process takes some 30 seconds. When it is finished the display will show the measured value, and the controller will switch off.

10. Error messages

Error message	Cause	Measures
Slope error	The slope determined by calibration was higher than 200% or lower than 20 %.	Please check the sensor connection and cable, the flow, and the temperature sensor and settings. Then repeat the calibration. If the error message remains, the sensor has to be cleaned, regenerated, or replaced.
Error input 1	The measuring electrode gives no signal.	Please check the connections, the cable and the sensor for signs of damage.
Error input 2	The temperature sensor gives no signal.	Please check the connections, the cable and the sensor for signs of damage. This message also appears if automatic temperature compensation was selected although no temperature sensor was used or the sensor did not correspond to the settings.
Limit 1 / 2	The measured value exceeded limit 1 (or dropped below limit 2, respectively).	Please check the dosing and readjust the control parameters, if necessary.
Dosage check 1 / 2	Controller 1 (or 2, resp.) gives out a 100% output for more than the defined period of time.	Please check the dosing, especially the feeding tubes and connections. Caution! Carefully check for leaking chemicals!
Ext. controller stop	The digital input has been short-circuited.	This indicates the external controller stop. If issued by the flow monitor, this message indicates „no water“.
Cleaning in progress	The Automatic Sensor Cleaning has started less than five minutes ago.	The message will disappear automatically five minutes after the start of the cleaning process. While it´s displayed, calibration is not possible.

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Customer settings - for reference!

Instrument:

Identification / location: .....

Type: ..... Date of installation .....

Instrument no..... Software version .....

Measurement:

☐ Cl_2 ☐ ClO_2 ☐ H_2O_2 ☐ O_3

Averaging: ☐ ON ☐ OFF

Cleaning: ☐ none ☐ 1/ day ☐ 2 / day delay: .....h

Temperature compensation:

☐ Manual ☐ Automatic

Temperature: ..... °C Correction .....°C

Temperature coefficient .....% / K

Current output:

☐ 0-20mA ☐ 4-20mA for: ☐ Meas. value ☐ controller S1 ☐ controller S2

Begin: .....

End: .....

Controller:

Controller S1	Controller S2
Direction: ☐ raise ☐ lower	Direction: ☐ raise ☐ lower
Set point:	Set point: .....
Hysteresys	Hysteresys .....
P range	P range .....
Integral time .....sek.	Integral time .....sek.
Pulse pause time..... sek.	Pulse pause time ..... sek.
Min. pulse ..... sek.	Min. pulse ..... sek.
Pulse frequency .....*100 / h	Pulse frequency .....*100 / h
Dosage check ..... min	Dosage check ..... min

Turn-on delay:

Delay time ..... min.

Alarm:

Limit S1 ..... Limit S2 .....

Dealy time ..... min.

Interface RS 485:

Bus adress .....