Hopewell, VA Master instruction index

11/07/2013 – RWD and ETO

Index by section

Hopewell Section 1
Central Dulconet control settings

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!

These operating resp. supplementary instructions apply only in conjunction with the following ticked operating resp. supplementary instructions:

- [x] Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa Part 1: Mounting and Installation
- [ ] Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller DXCa Part 2: Operation
- [ ] Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II Disinfection Controller DXCa Part 2: Operation
- [x] Supplementary Instructions DULCOMARIN® II Videographic Recorder Operation
- [x] Supplementary Instructions DULCOMARIN® II, M Module (Measurement Module for pH, Redox/ORP, Temperature) DXMaM Operation
- [ ] Supplementary Instructions DULCOMARIN® II, M Module (Measurement Module for pH, Redox/ORP, Temperature) DXMaM Connection
- [x] Supplementary Instructions DULCOMARIN® II, A Module (Actuator Module, Pumps and Standard Signal Outputs mA) DXMaA
- [ ] Supplementary Instructions DULCOMARIN® II, N Module (Power Supply Module without Relays) DXMaN
- [ ] Supplementary Instructions DULCOMARIN® II, P Module (Power Supply Module with Relays) DXMaP
- [x] Supplementary Instructions DULCOMARIN® II, I Module (Current Input Module, Standard Signal Inputs mA) DXMaI

Imprint:
Operating instructions
Multi-Channel Measuring and Control System
DULCOMARIN® II Disinfection Controller DXCa,
Part 2, Operation

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General User Information

Please read through the following user guidelines! Familiarity with these points ensures optimum use of the operating instructions.

Key points in the text are indicated as follows:

- enumerated points

 hints

Working guidelines:

NOTE

Notes are intended to make your work easier.

and safety guidelines:

CAUTION

Characterizes a possibly hazardous situation.
There is a danger of slight or minor injury if these notes are disregarded!

IMPORTANT

Characterizes a possibly hazardous situation.
There is a danger of damage to property if these notes are disregarded!

1 About this Controller

The provision of perfect drinking water poses a central, global challenge. The natural water supplies, which can be used as drinking water without any further treatment, are negligible. We have made it our task to treat the existing water supplies with suitable processes such that drinking water of best quality is produced. In this respect, we can rely on a comprehensive portfolio of all important technologies for the measurement of important parameters, such as pH value, chlorine or chlorine dioxide concentration, and the treatment of drinking water.

The DULCOMARIN® II Disinfection Controller is a measuring and control unit designed for the specific demands in drinking water treatment.
It can be combined with various measuring and actuator modules and thus ensures a very flexible use.
With the DULCOMARIN® II Disinfection Controller, ProMinent is the first supplier offering a standard bus system for networking the sensors and actuators with the control unit in drinking water treatment.
The device is equipped with the standardised bus system CANopen®. This is a system that already has a well-proven record of success in a variety of applications including elevators, motor vehicles, ships, medical equipment as well as building installations and rail vehicles.
All applications require a fast and extremely reliable transmission medium.
A further advantage is that all modules are based on the plug & play principle.
A flexible system that, corresponding to specific requirements, can be configured as a compact or decentral modular system while being fully prepared for future applications.

The DULCOMARIN® II Disinfection Controller can process the measured values of up to 16 drinking water lines.

The I module permits the connection of up to 3 (external) sensors with mA signals, e.g. for flow rate, turbidity and UV intensity, for each drinking water line.

Depending on the measured parameters, metering pumps, chlorine gas metering units or chlorine gas generation plants can be directly controlled.
The flow rate signal can be used as disturbance for the controlled measured variables.

The following sensors are available for the measurement of the following measured variables in drinking water: pH value, free chlorine, total available chlorine, chlorine dioxide, chlorite, ozone, fluoride, and ammonia/ammonium.
The measured values for chlorine, fluoride and ammonia/ammonium are pH-compensated. The DULCOMARIN® II Disinfection Controller has an integrated data logger and optionally an embedded Web server and OPC server which permit the transmission of the measured values and messages to a control desk via LAN/Ethernet.

2 Safety Chapter

2.1 Proper Use

The DULCOMARIN® II Disinfection Controller is exclusively designed for:

- **Measuring and controlling of the pH value or the ORP**
- **Measuring and controlling of the chlorine concentration**
- **Measuring and controlling of the chlorine dioxide concentration**
- **Measuring of the temperature**
- **Measuring of the fluoride concentration**
- **Measuring of ammonia and ammonium concentration**
- **Measuring of the flow rate**
- **Displaying of the measuring values**
- **Creating of output signals**

The DULCOMARIN® II Disinfection Controller is only destined for applications in water treatment! All other uses or modifications may only be performed after written agreement with ProMinent Dosiertechnik GmbH, Heidelberg!

- **Without protective cabinet, the controller may not be used for applications in the open!**

In the following, some facts are pointed out which are not expected because of the new technology!

IMPORTANT

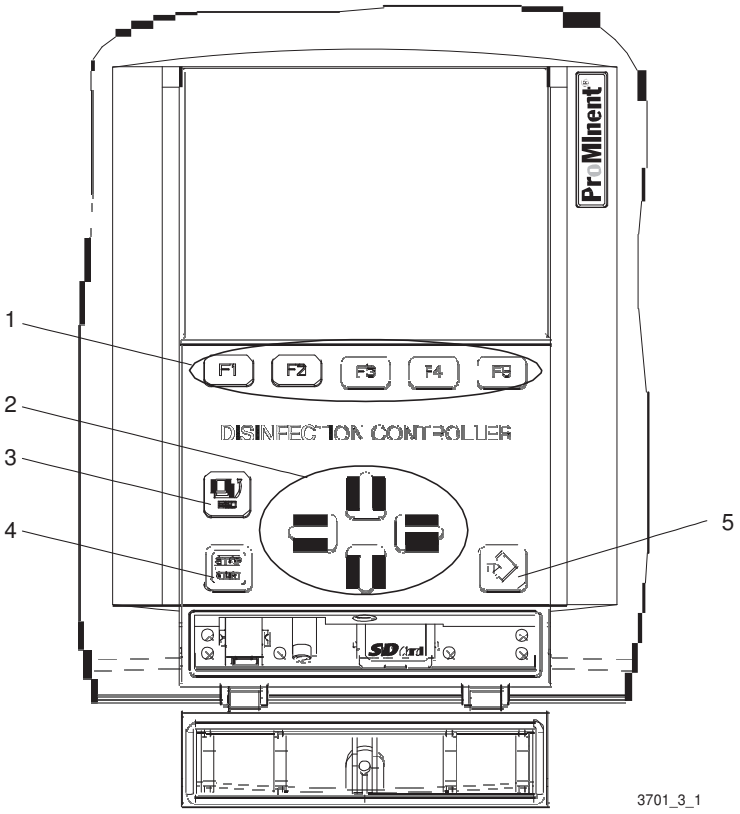
- ***If a module has been assigned to a system (pool), it cannot be simply exchanged with another module! CAN sensors for chlorine are also modules!***
  The central unit is not able to detect for which system (pool) a module is meant; furthermore,
  problems regarding the node IDs of the modules are created.
  If a module is to be replaced with another module, it has to be expressly assigned to a system (pool) "0" before removing it from the CAN bus train (see chap. 8 "Complex Activities"). If a new module is to be looped in a CAN bus train, it has to be expressly assigned to a system (pool) (see chap. 8 "Complex Activities")!
- ***Never alter the submenus UPDATE or BUS if you have not received proper training!***
  The software of the DULCOMARIN® II might be erased and the entire controller might fail!

NOTE

If a limit value criterion for chlorine was violated, the left LED at the chlorine sensor is flashing in red!

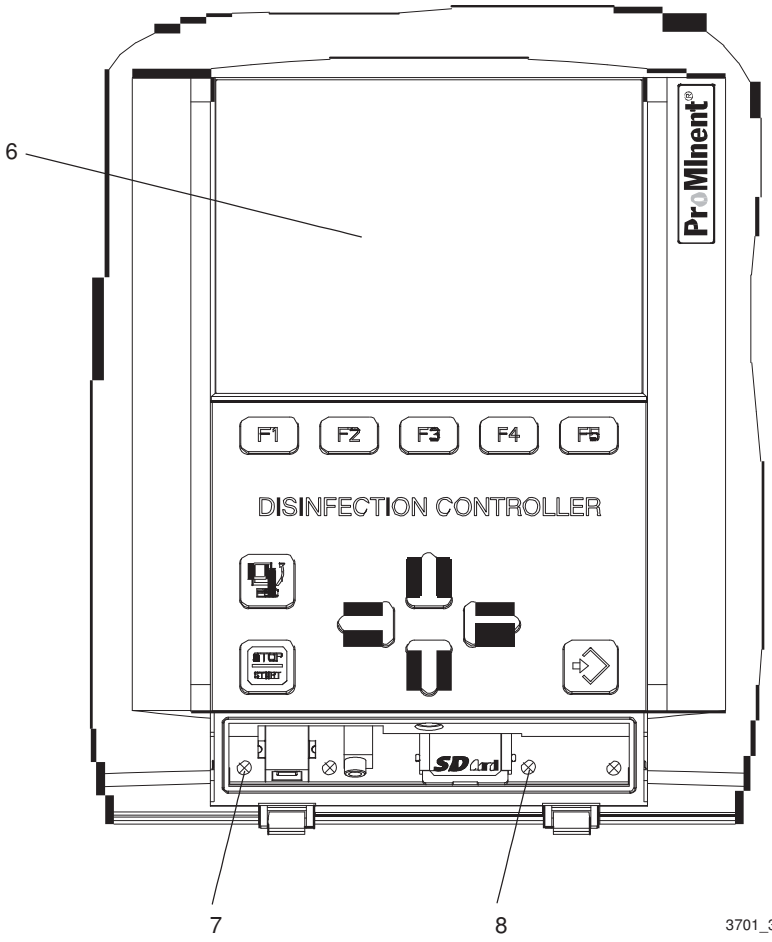
3 Controls

Fig. 1: The keys



1 Function keys, variable assignment
2 Arrow keys
3 ESC key
4 Start/stop key
5 ENTER key

Fig. 2:
The displays



6 LCD screen
7 NetDevice LED
8 CAN 1 LED

3.1 Function of the Keys

(navigation in the operating menu)

The **ENTER key** is used to:

- go from menu option to menu option in the operating menu - into the operating menu.
- access a selection in the index cards of a menu option and confirm a change.

The **ESC key** is used to:

- go from menu option to menu option in the operating menu - from the operating menu.

NOTE

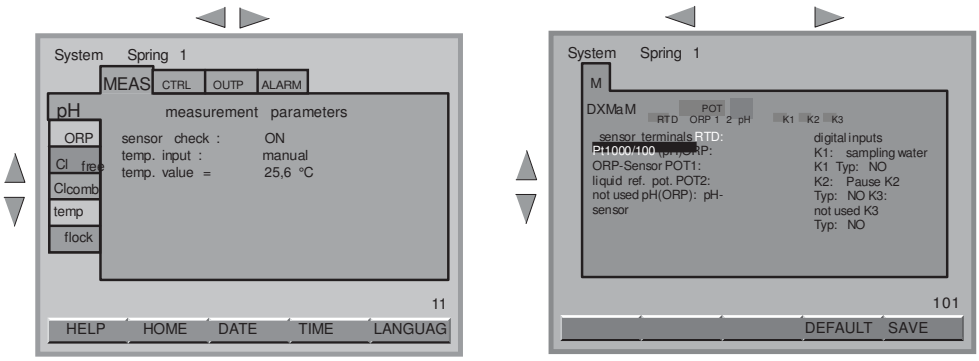
To return from any menu option of the operating menu to the permanent display, press the ESC key repeatedly until the permanent display appears.

It is also possible to wait until the DULCOMARIN® II automatically returns to the permanent display step by step.

The **arrow keys UP, DOWN, LEFT, RIGHT** are used to:

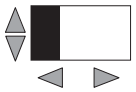
- toggle between the index cards of a menu option in a certain menu option.
- to toggle between the selections of an index card.

Fig. 3: Toggle between index cards - selection of an index card



The numerical value or variable displayed in a selection can be changed with the arrow keys UP, DOWN. With the arrow keys LEFT, RIGHT, the decimal point to be changed can be selected for a numerical value.

Fig. 4: Changing of numerical value



The variably assigned **function keys F1 through F5** are used to select the menus or functions displayed above in the display as keys (e.g. menus (CONFIG(uration), PASS(word), HELP or the function SAVE).

IMPORTANT

The numerical values or variables can only be saved in the index cards using the function SAVE.

Individual numerical values such as e.g. in PASSW, TIME or DATE are saved by pressing the ENTER key.

Fig. 5: Example for the allocation of function keys

The **START/STOP key** is used to start or stop overall controlling or dosing. In this case, the permanent display and the main center menu option show “Dosing ON” or “Dosing OFF”.

3.2 Access Code (Password)

The access to the controller can be extended level by level by adjusting the access code correspondingly. Upon delivery, the controller DULCOMARIN® II has the access codes according to the following table.

The 3 different levels permit the following:

Level	0 (Anybody)	1 (User)	2 (Installer)	3 (Service)	4 (Supervisor)	5 (ProMinent)
Password (Default)	0000	1111	2222	3333	4444	Confidential
Viewing	X	X	X			
Calibrating	X	X	X			
Parameterising			X	X	X	X
Configuring			X	X	X	X
Calibrating Cl NP			X	X	X	X
Configuring bus				X	X	X
Updating all modules				X	X	X
Updating individual modules					X	X
Updating central unit						X

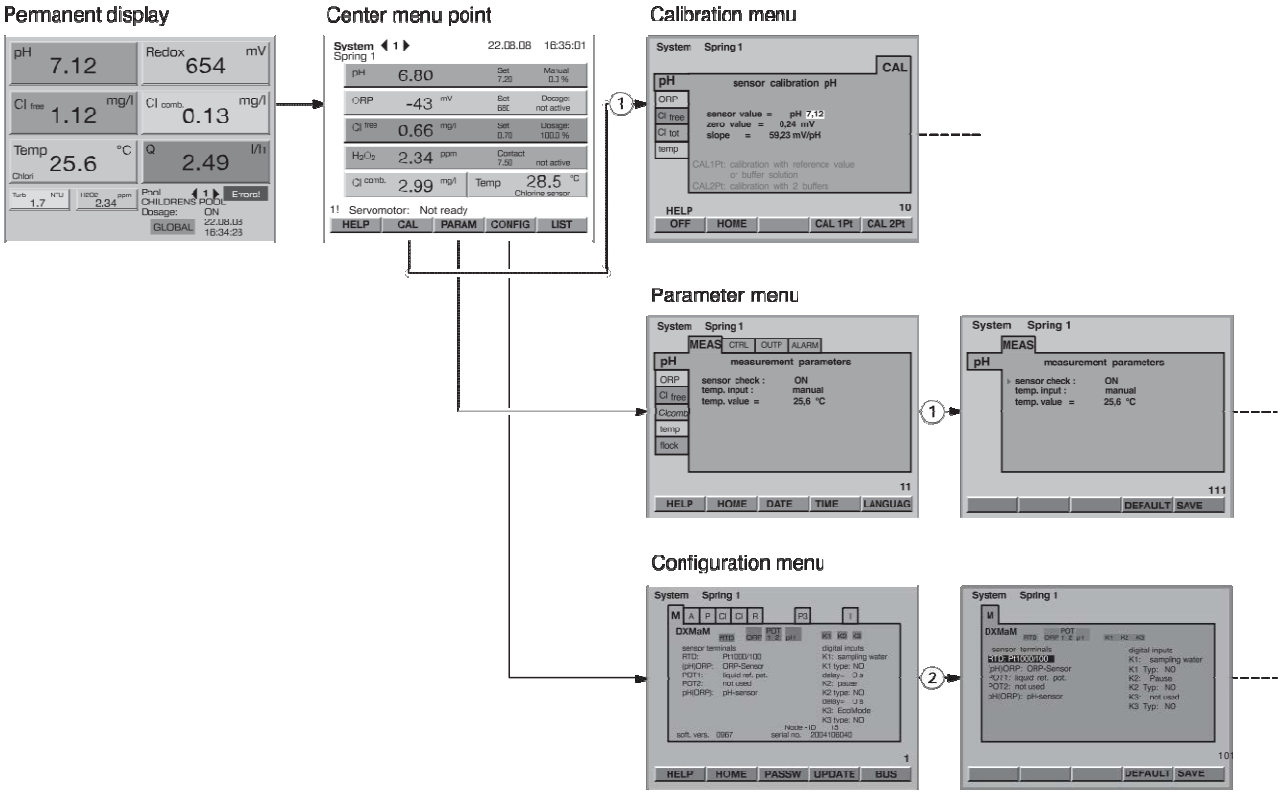
IMPORTANT

- ***Replace the access code ex works by your own code! Otherwise the following menus are not sufficiently protected!***
- ***When returning to the permanent display, the DULCOMARIN® II automatically resets to level "0" for "anybody".***
- ***If the level is to be set to "0", press the key sequence: F4 (CONFIG), F2 (OPTION), F5 (RESTART) from the center menu option – the module recognition function is started manually.***

NOTE

If the password has been set to "0000" for level 1 (users), it is possible to freely calibrate in the levels 0 and 1.

Fig. 6:
Menus protected by access codes



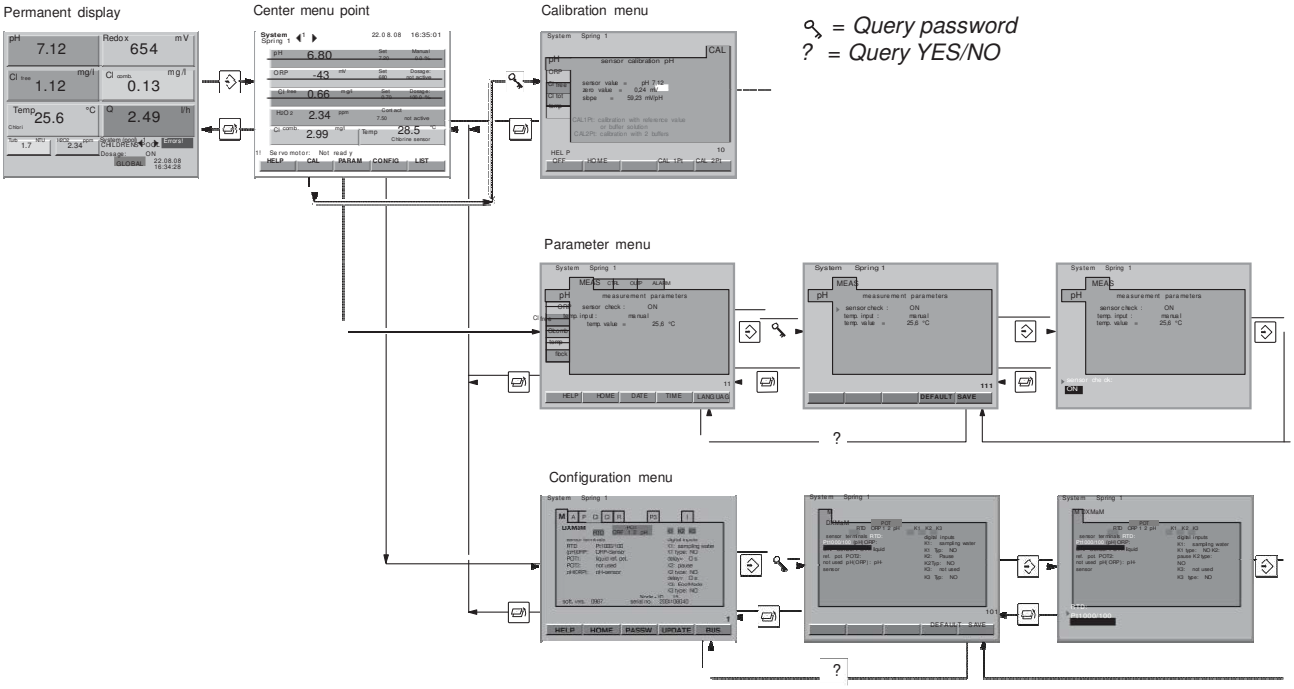
Language

The language can be set in the submenu LANGUAGE.
Press the function key F5 (PASSW) in the parameter menu.

4 Layout of the Operating Menu

4.1 General Layout

Fig. 7:
General layout of the operating menu

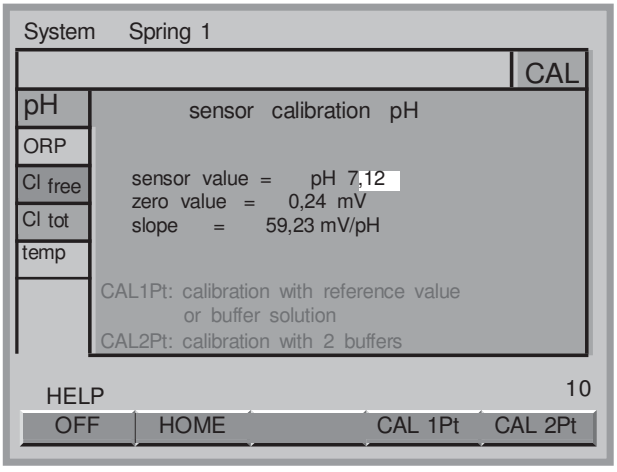


From the permanent display it is possible to go to the **center menu option**. At this option, the operating menu branches into:

- **Calibration menu**
- **Parameter menu**
- **Configuration menu**

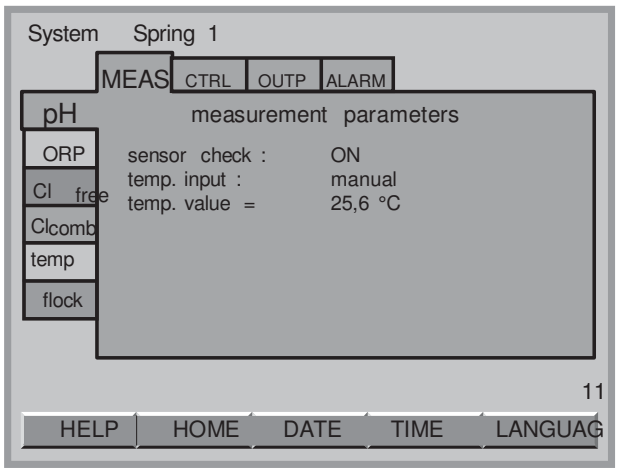
4.2 Menus Under Center Menu Option

Fig. 8:
First menu option of the calibration menu



The **calibration menu** for all measured variables can be accessed in the center menu option by pressing the function key F2 (CAL).

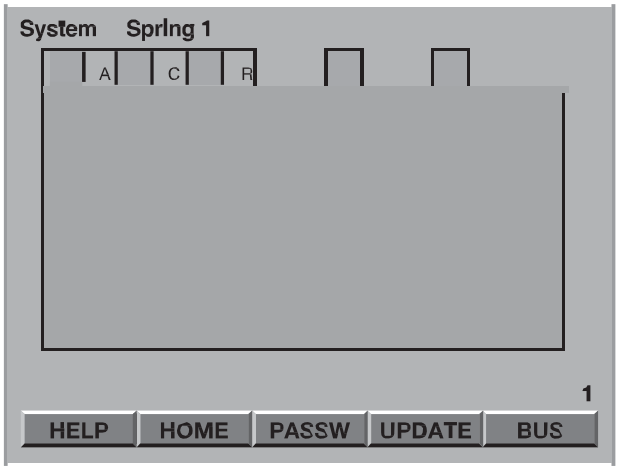
Fig. 9:
First menu option of the parameter menu



The **parameter menu** is designed like a card box (with horizontal and vertical tabs):

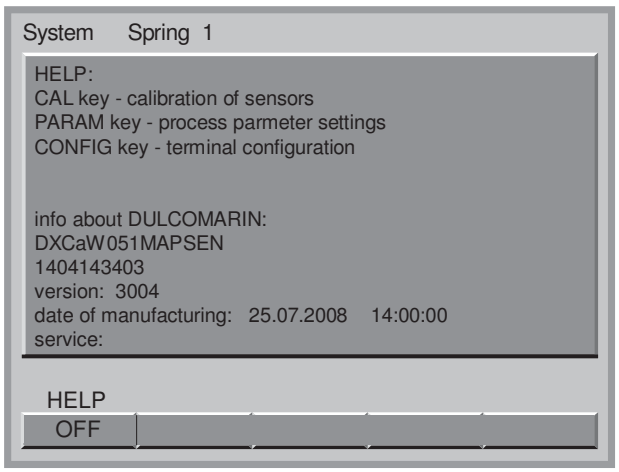
- the vertical tabs are the measured variables (pH, ORP, ...)
- the horizontal tabs contain the groups of parameters (e.g. measurement, controlling, mA outputs, alarm)

Fig. 10:
First menu option of the configuration menu



The layout of the **Configuration menu** represents the existing hardware modules. For each module, an index card is created which also shows the connections.

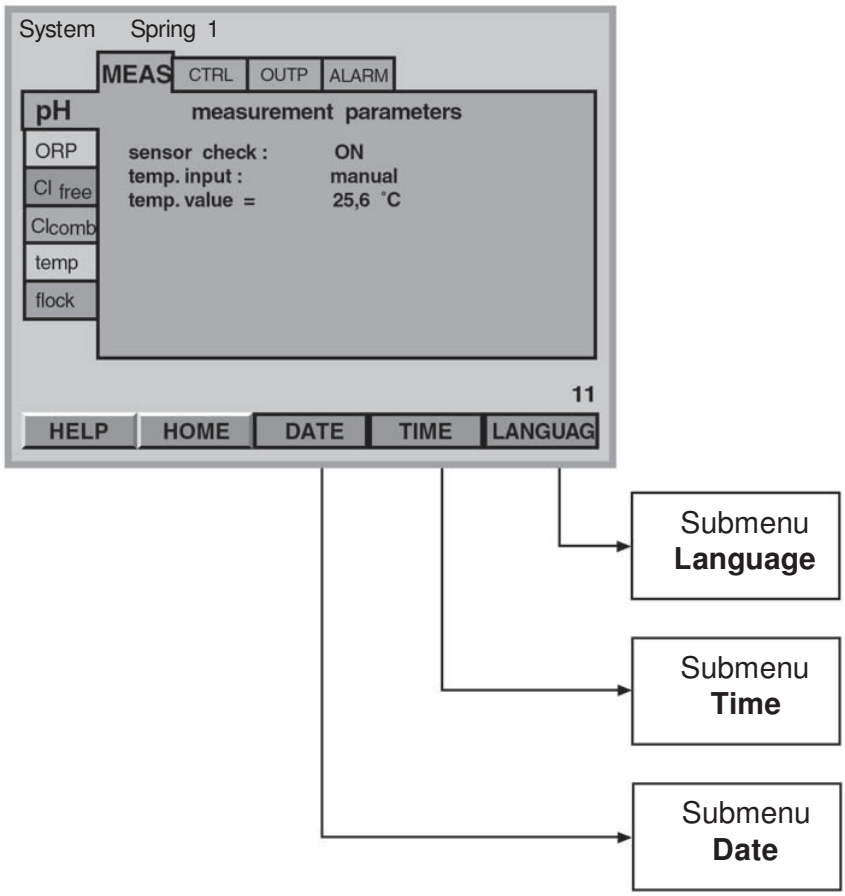
Fig. 11:
Example for a help display



The **Help function** can be called with F1 if HELP is displayed above F1 in the menu option. When called from the center menu option, the Help in addition displays the software version of the central unit and the production date.
In the calibration menu, common help texts for all menu options of the calibration menu can be activated and deactivated in the index cards by pressing F1 (HELP).

4.3 Submenus of Parameter Menu

Fig. 12: Access to the submenus DATE, TIME and LANGUAGE via the first menu option of the parameter menu



The submenus **DATE**, **TIME**, and **LANGUAGE** can be accessed through the parameter menu or the configuration menu by pressing the function keys.

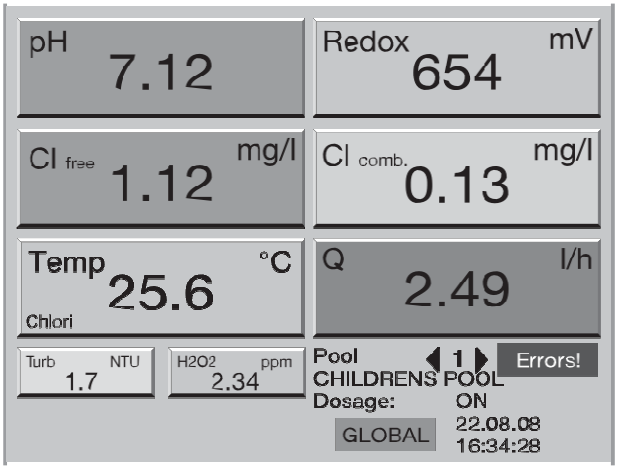
The submenus **PASSW** and **BUS** can be accessed through the configuration menu by pressing the function keys (for BUS see chap. 8 “Complex Activities”).

IMPORTANT

The DULCOMARIN® II does not automatically set to summer time!

4.4 Permanent Display

Fig. 13: The permanent display for all measured variables measured



The permanent display shows all existing measuring values of the sample water of a system (pool). If a limit value was exceeded or undershot, a red or blue angle is displayed besides the measuring value and the measuring value is also shown in the corresponding colour.

If a sensor-related error occurs or if the calibration is faulty, an error message is displayed besides the field of the relevant measured variable.
In the field at the right bottom, the permanent display shows the system (pool) number and the system (pool) name.
Date and time are also shown there.
The display also shows whether dosing was activated or deactivated by pressing the start/stop key. (dosing “ON” or “OFF”; (unlike the individual dosing in the center menu option)).
An overview of the measured values and the setpoints of all basins is displayed after F4 **(GLOBAL)** is pressed, if several basins were configured.

IMPORTANT

The DULCOMARIN® II calculates the displayed values for combined chlorine as difference of the measuring values of the chlorine sensors for free chlorine and total chlorine!

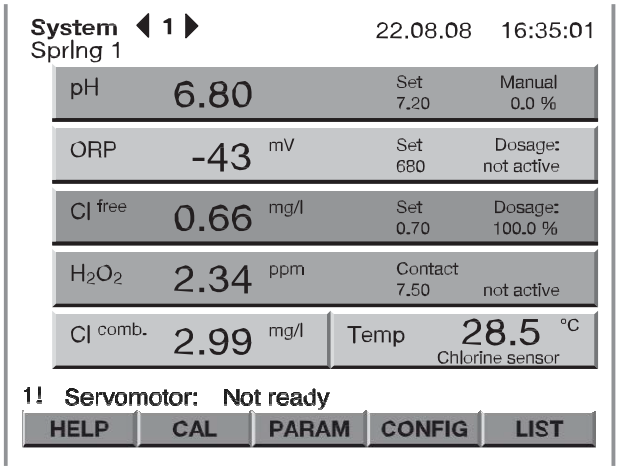
NOTE

- ***A fixed colour is assigned to each measured variable (e.g. pH = orange, redox/ORP = yellow, ...).***
- ***To return from any menu option of the operating menu to the permanent display, press the ESC key repeatedly until the permanent display appears.***

  It is also possible to wait until the DULCOMARIN® II automatically returns to the permanent display step by step.

4.5 Center Menu Option

Fig. 14: The center menu option for all measured measured variables



The central menu option typically shows the same data as the permanent display.
In addition, it may also show the setpoints and the switching point for combined chlorine or temperature.
If a measured variable is controlled, the coloured bar extends across the entire display.
If a measured variable is only displayed, its bar only extends across half the display.
If not all measured variables can be shown on the display but are to be visible, it can be checked whether there are measured variables which are not connected with each other. In this case, a set of measured variables can be separated and may be assigned to a second, virtual basin. These two basins are declared as subsystems and should be best identified immediately, but e.g. differentiated by the name affixes “_A” and “_B”.

Unlike the permanent display, the center menu option for the individual measured variables of a system (pool) shows whether dosing is set to “off” or “on” (see chap. 6.3. “Controlling”). It then shows the value of the control variable. If dosing was set to “off”, it cannot be activated via the START/STOP key.
It is only for several basins that the DULCOMARIN® shows the basin number.

The center menu option shows the error messages below the fields for the measured variables. If more than one error message is given, the function **LIST** is displayed after acknowledgement of an alarm by pressing F5: pressing F5 displays a list of the errors.

Here it is possible to change over to the archive of previous error messages with F5 **(ARCHIVE)** provided an SD card is installed.

The following data can be shown for each event:

Block 1: Number, date, time, OCCUR/CLEARED *
Block 2: Node ID, system (pool) number, serial number
Block 3: Error message

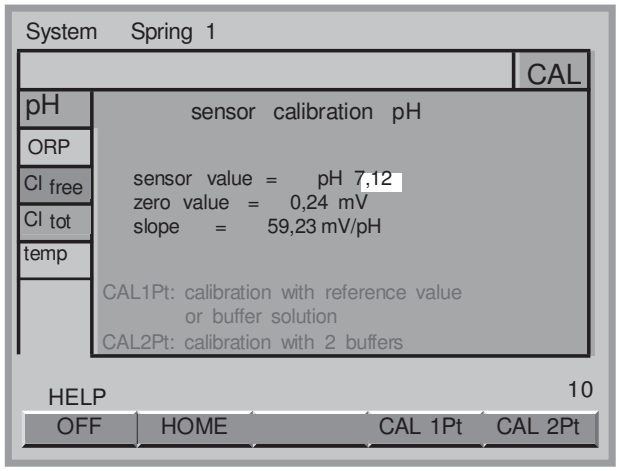
* Designates whether the fault occured or disappeared at this time.

These data are stored in the file “eventlog.txt” on the SD card. This file can be viewed with a text processing program on a PC (maximise window for better overview).

From the center menu option, the operating menu branches into the setting menus

- Calibration
- Parameter settings
- Configuration

5 Calibration



During the calibration, the DULCOMARIN® II sets the command outputs to “0”. Exception: if a base load or manual control variable was set, these are maintained during the calibration. The standard signal outputs mA (see chapter 7.2 “Module DXMaA”) are frozen.

After a successful calibration, all error examinations relating to the measuring value are started again. The DULCOMARIN® II stores the determined data for zero point and slope.

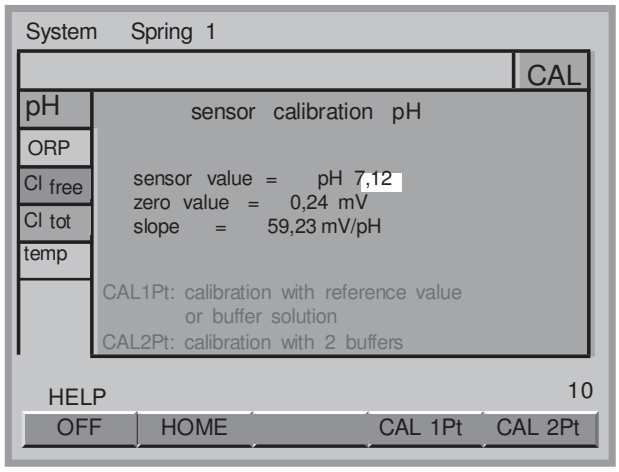
Start of calibration (for all measured variables):

- Close the sample water (acknowledge possible alarm pressing the ENTER key).
- Press F2 (CAL) in the center menu option to access the calibration menu.
- Enter the access code with the arrow keys UP and DOWN, LEFT and RIGHT and press the ENTER key.
- Select the index card with the desired measured variable (arrow keys).

NOTE

Help texts can be activated or deactivated by pressing F1 (Help).

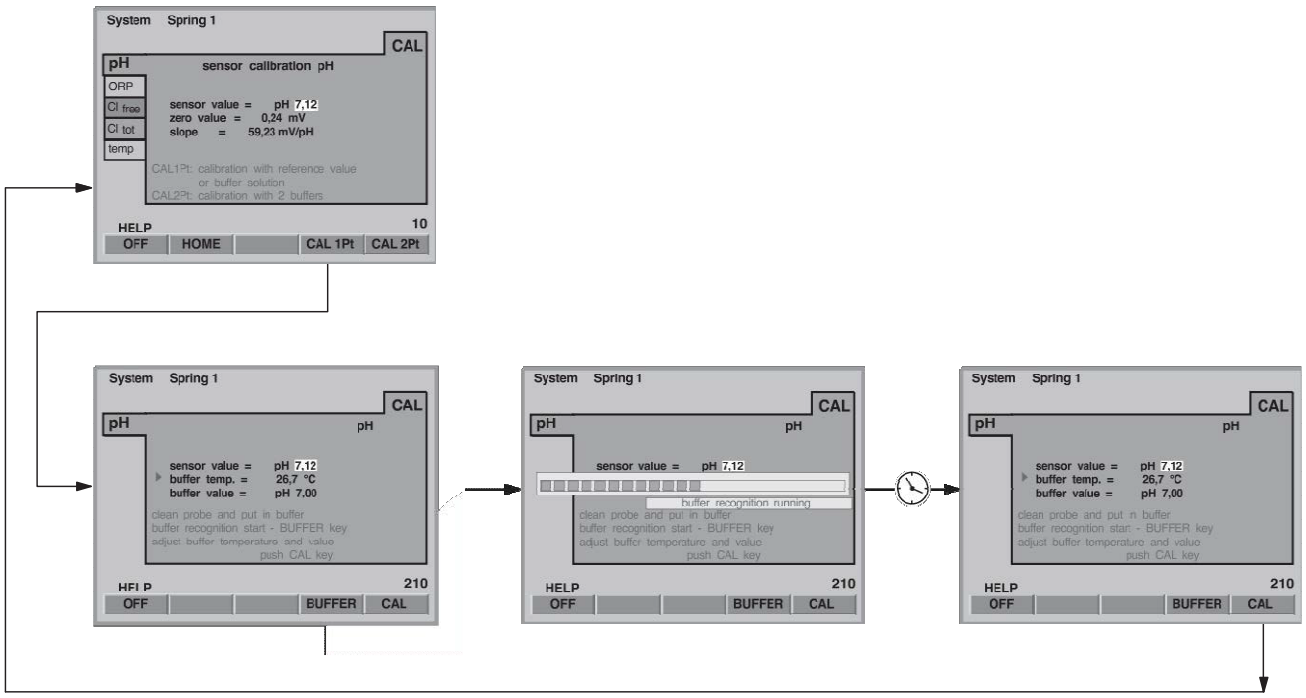
5.1 Measured Variable pH



NOTE

Reject used quality buffers!

1-Point Calibration

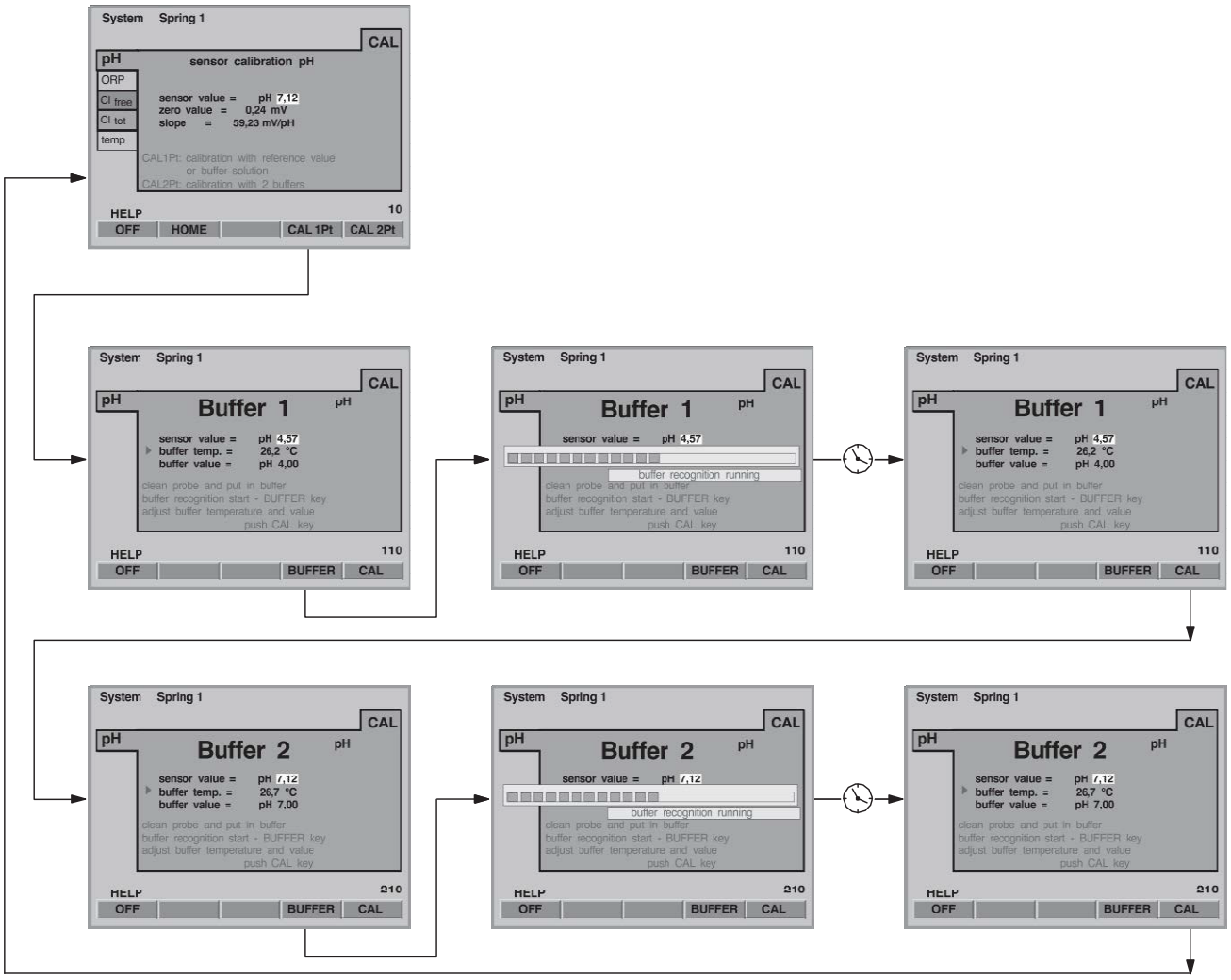


The DULCOMARIN® II calibrates:

- the zero point if the buffer value ranges between 6.8 pH and 7.5 pH.
- the slope, if the buffer value is lower than 6.8 pH or higher than 7.5 pH.

- Close the sample water (acknowledge possible alarm pressing the ENTER key).
- Disconnect the coaxial cable from the pH sensor
- Remove the pH sensor (sample water closed?)
- Rinse the pH sensor with distilled water
- Carefully dab dry the pH sensor using a fine cloth (fat-free, lint-free)
- Re-connect the coaxial cable to the pH sensor
- Press F4 (CAL 1Pt) to select a 1-point calibration
- Dip the pH sensor into quality buffer (e.g. pH 7) and stir a bit
- If measuring with an equipotential bonding pin, dip it also in quality buffer
- In the index card, select the buffer temperature (arrow keys) and press the ENTER key
- Enter the “buffer temperature” (arrow keys) and press the ENTER key
- Press F4 (buffer) (buffer detection) - the progress display and “buffer recognition running” are displayed
- Press the ESC key to access the calibration mode again
- Press F5 (CAL) to complete the calibration process and to save the values
- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the access code) or to the center menu option
- Disconnect the coaxial cable from the pH sensor
- Install the pH sensor again at the in-line probe (tighten fingertight but nevertheless watertight)
- Re-connect the coaxial cable to the pH sensor
- Re-install the equipotential bonding pin
- Open the shut-off valve for the sample water

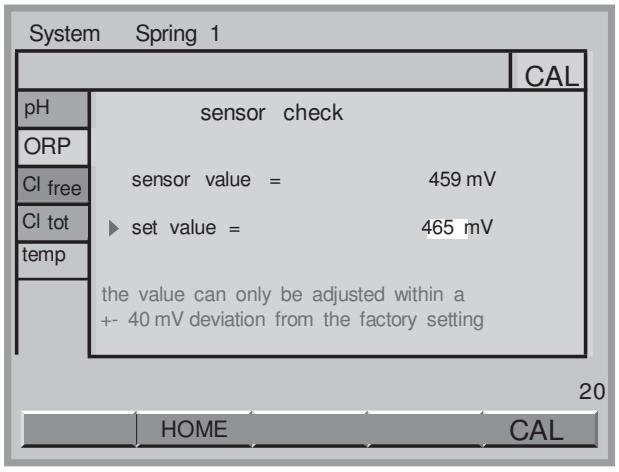
2-Point Calibration



- Close the sample water (acknowledge possible alarm pressing the ENTER key).
- Disconnect the coaxial cable from the pH sensor
- Remove the pH sensor (sample water closed?)
- Rinse the pH sensor with distilled water
- Carefully dab dry the pH sensor using a fine cloth (fat-free, lint-free)
- Re-connect the coaxial cable to the pH sensor
- Press F5 (CAL 2Pt) to select a 2-point calibration
- Dip the pH sensor into quality buffer pH 7 and stir a bit
- If measuring with an equipotential bonding pin, dip it also in quality buffer
- In the index card (key word “buffer 1” or display no. -110), select the buffer temperature (arrow keys) and press the ENTER key
- Enter the “buffer temperature” (arrow keys) and press the ENTER key
- Press F4 (buffer) (buffer detection) - the progress display and “buffer recognition running” are displayed
- Press the ESC key to access the calibration mode again
- Press the function key F5 (CAL) to continue with the calibration process
- Rinse the pH sensor, dab it dry carefully, dip into quality buffer pH 4 and stir a bit
- If measuring with an equipotential bonding pin, dip it also in quality buffer

- In the index card (key word “buffer 2” or display no. 210) now displayed, select the buffer temperature (arrow keys) and press the ENTER key
- Enter the “buffer temperature” (arrow keys) and press the ENTER key
- Press F4 (buffer) (buffer detection) - the progress display and “buffer recognition running” are displayed
- Press the ESC key to access the calibration mode again
- Press F5 (CAL) to complete the calibration process and to save the values. “Calibration OK” is displayed on successful calibration
- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the access code) or to the center menu option
- Disconnect the coaxial cable from the pH sensor
- Install the pH sensor again at the in-line probe (tighten fingertight but nevertheless watertight)
- Re-connect the coaxial cable to the pH sensor
- Re-install the equipotential bonding pin
- Open again the shut-off valves for the sample water - first outlet, then inlet

5.2 Measured Variable Redox/ORP



NOTE

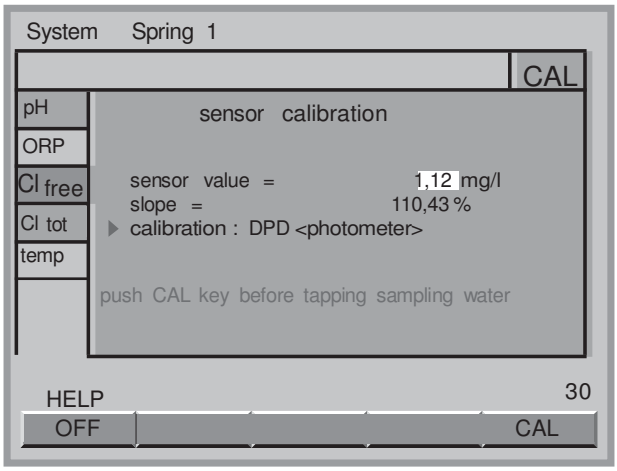
- ***The measuring value redox/ORP can only be set as a default within a range between ±40 mV around the test value.***
- ***Reject used quality buffers!***

- Select the index card “ORP” “Set value” (arrow keys) and press the ENTER key.
- Close the sample water (acknowledge possible alarm pressing the ENTER key).
- Disconnect the coaxial cable from the redox/ORP sensor.
- Remove the redox/ORP sensor (sample water closed?)
- Rinse the redox/ORP sensor with distilled water
- Carefully dab dry the redox/ORP sensor using a fine cloth (fat-free, lint-free)
- Re-connect the coaxial cable to the redox/ORP sensor
- Dip the redox/ORP sensor into quality buffer (e.g. 465 mV)
- If measuring with an equipotential bonding pin, dip it also in quality buffer.
- After the “sensor value” has stabilised, compare it to the mV value on the bottle of the quality buffer. The value may not deviate more than ±40 mV from the buffer value

Do not press F5 (SAVE)!

- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the password) or to the center menu option
- Disconnect the coaxial cable from the redox/ORP sensor
- Install the redox/ORP sensor again at the in-line probe (tighten fingertight but nevertheless watertight)
- Re-connect the coaxial cable to the redox/ORP sensor
- Re-install the equipotential bonding pin
- Open again the shut-off valves for the sample water - first outlet, then inlet

5.3 Measured Value Free Chlorine



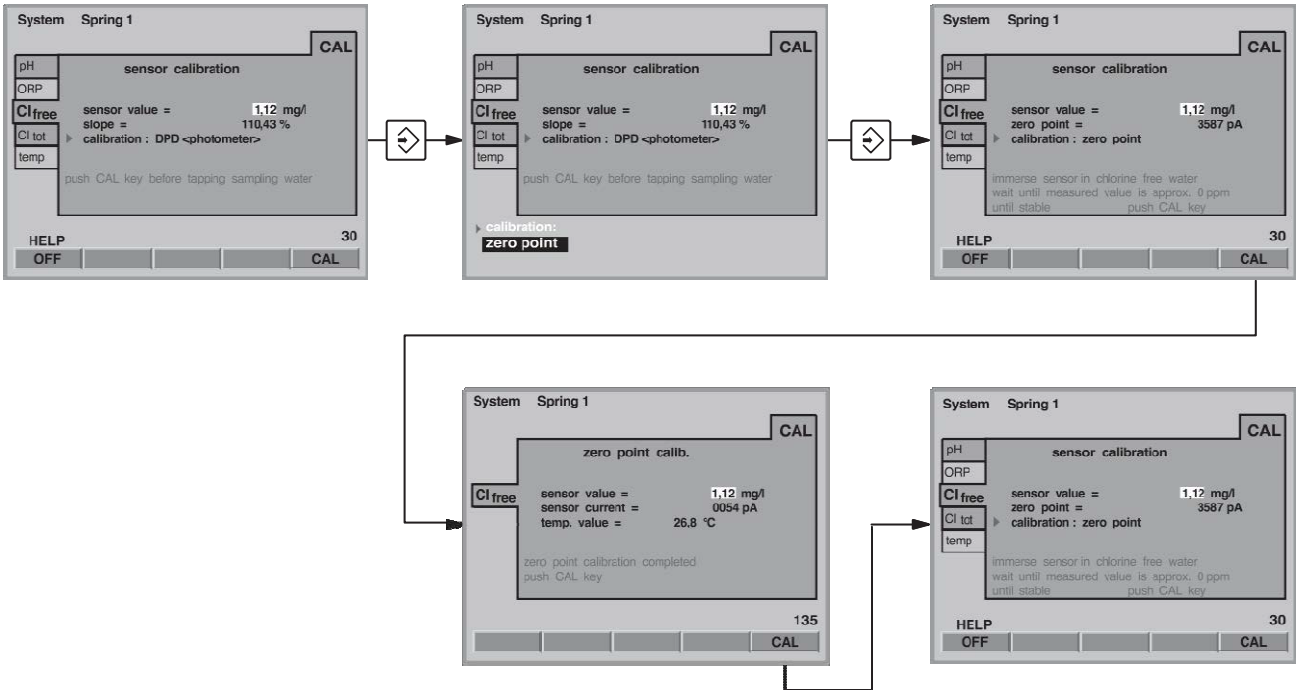
IMPORTANT

- ***Please also read the operating instructions for chlorine sensor and in-line probe!***
- ***A differential chlorine may only be set up in connection with a calibrated pH sensor!***
- ***If calibration was carried out with pH correction, the measurement may only be carried out with pH correction! If calibration was carried out without pH correction, the measurement may only be carried out without pH correction!***
- ***A slope calibration must be carried out after having replaced a diaphragm cap or electrolyte!***
- ***For a perfect functioning of the sensor, the slope calibration must be repeated in regular intervals! For system (pool)s and potable water, a calibration of the sensor every 3-4 weeks is sufficient.***
- ***Take care not to dose incorrectly which might cause air bubbles in the sample water! Air bubbles sticking to the diaphragm of the sensor might cause a low measuring value and thus might result in overdosing.***
- ***Observe the valid national regulations for calibration intervals!***

Prerequisites

- constant flow at the in-line probe – minimum 40 l/h
- the sensor has been run in

a) Calibrate zero point



IMPORTANT

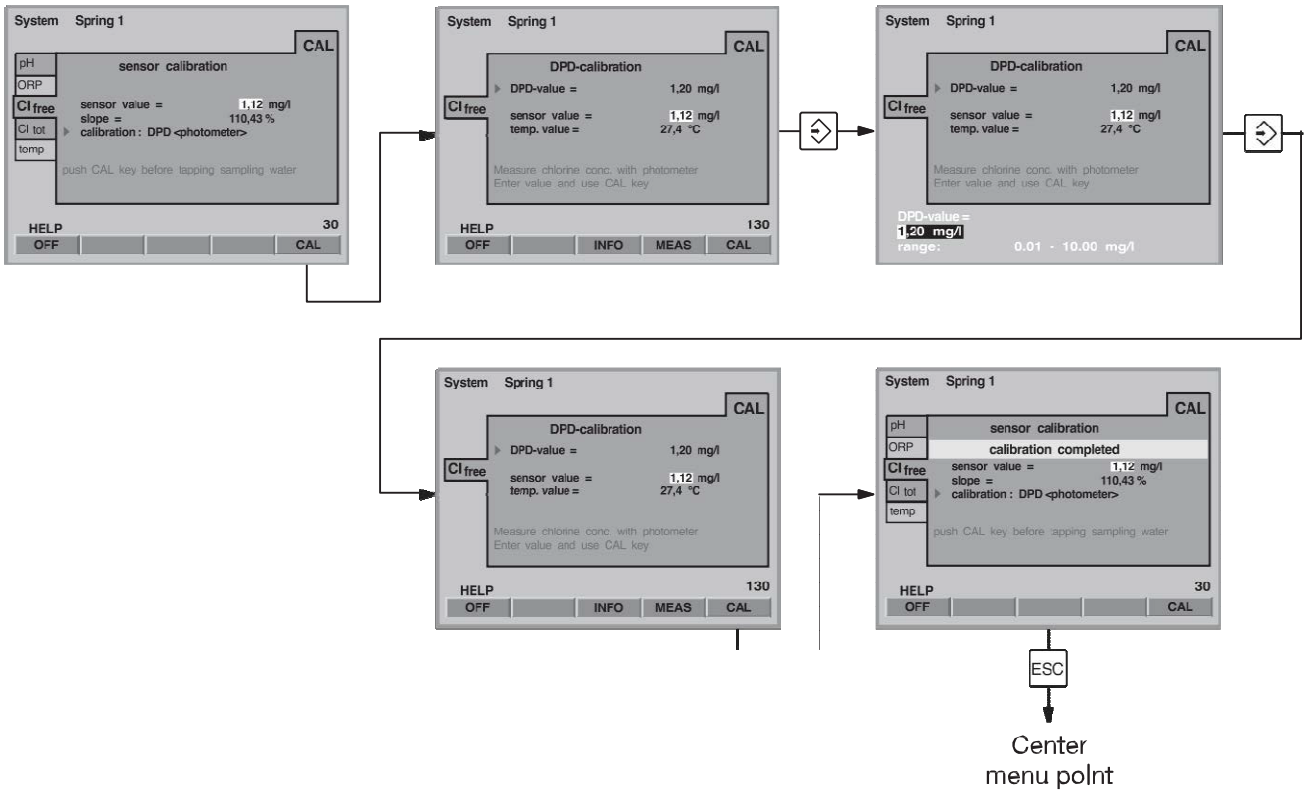
- ***The sensor must have run in!***
- ***Only perform a zero offset if you:***
  - ***use the sensor at the lower measuring range limit!***
  - ***intend to measure combined chlorine (differential chlorine measurement).***

- Select the index card “Cl free” - “Sensor calibration” (arrow keys) and press the ENTER key.
- Select “zero point” (arrow keys) and press the ENTER key.
- Shut-off the sample water – first inlet, then outlet.
- Remove the sensor.
  Do not disconnect the CAN cable from the sensor CLE!
- Rinse the sensor with chlorine-free water.
- Dip the sensor CLE into a bucket with clean, chlorine-free tap water (or in carbonic acid-free mineral water or distilled water. Check the tap water for chlorine with measuring tool). The chlorine-free water must have the same temperature as the system (pool) water.
- Stir carefully with the sensor until the “measured value sensor” has been stable for 5 min. and remains close to zero.
- Then press F5 (CAL).
- Press F5 (CAL) to complete the calibration process and to save the values - “Calibration completed” is displayed.
- Install the chlorine sensor again at the in-line probe
- Re-open the shut-off valves for the sample water. First the outlet, then the inlet.
  Before calibrating the slope, wait until the measured value is stable (wait for at least 15 min.).

CAUTION

The slope must now be calibrated.

b) Calibrate slope



IMPORTANT

Chlorine must be present in the sample water all the time (approx. 0.5 mg/l)! Otherwise, the measuring system cannot be calibrated.

- Select the index card “Cl free” “Sensor calibration” (arrow keys) and press the ENTER key
- Select “DPD (Photometer)” (arrow keys) and press the ENTER key
- After the “sensor value” has stabilised, press F5 (CAL)
- Directly after, take a sample water sample at the in-line probe
- Directly after this step, determine the chlorine content of the sample water using a photometer and a suitable measuring tool (e.g. DPD 1 for free chlorine (chlorine sensor CLE))
- Immediately enter the chlorine content (arrow keys) and press the ENTER key
- Press F5 (CAL) to complete the calibration process and to save the values. “Calibration completed” is displayed.
- If total chlorine is to be determined, too, calibrate this measured variable also with the same sample (next chapter)
- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the password) or to the center menu option

Repeat the calibration the next day!

NOTE

Only for customer service: By pressing F4 (MEAS), the pH value, the sensor current, and the temperature at the time of pressing the key can be displayed.

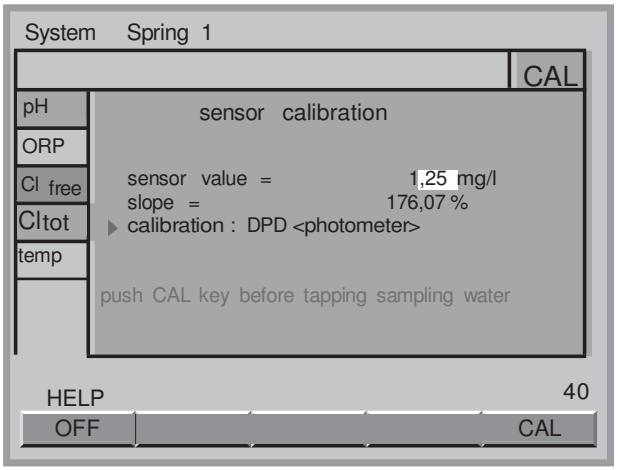
- ***If an error message is displayed during the calibration of a chlorine sensor, access more detailed data by pressing F3 INFO. These data are also of help when talking with the technical service.***

If, after the running-in period of the measuring cells (approx. 2-6 h for CLE 3.1 and CTE/CGE, approx. 2 h for CLE 3), DULCOMARIN® II shows a measured value that is much too low or cannot be calibrated (there should be approx. 1 mg/l free chlorine in the system (pool), the pH value should be 7.2 and the sample water and circulating pump must be running), double the running-in period or extend it until the next morning.

If the measuring cell can then still not be calibrated, contact ProMinent Customer Support (see back cover for telephone numbers). Have following data at hand:

- DPD1 value (free chlorine)
- DPD3 value (total chlorine)
- Primary sensor current in pA (with F4 MEASURE under steepness calibration menu)
- pH value
- Redox value (if ORP measurement is available)
- System (pool) size in cubic metres

5.4 Measured Value Total Chlorine

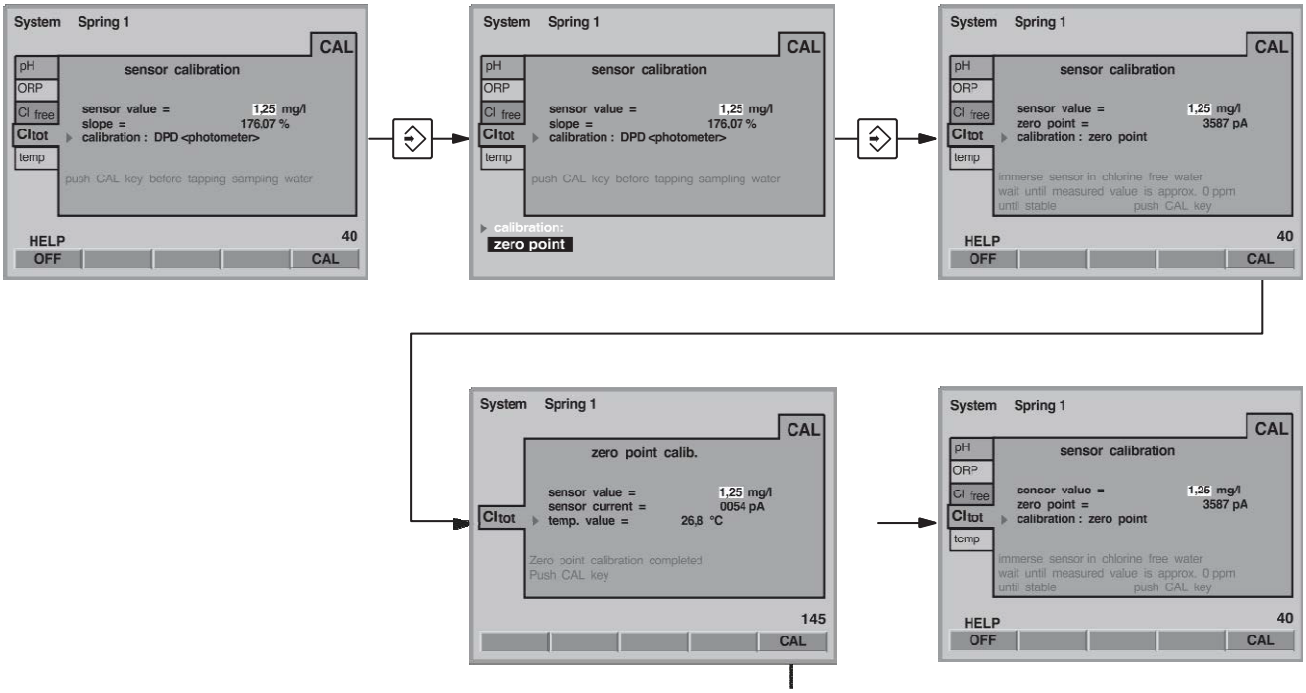


IMPORTANT

- ***In this step, the chlorine sensor CTE for total chlorine is calibrated!***
- ***The DULCOMARIN® II calculates the displayed values for combined chlorine as difference of the measuring values of the chlorine sensors for free chlorine and total chlorine!***
- ***For the purposes of the differential measurement, the chlorine sensor for free chlorine must be the sensor CLE 3.1!***
- ***Please also read the operating instructions for chlorine sensor and in-line probe!***
- ***A differential chlorine may only be set up in connection with a calibrated pH sensor!***
- ***If calibration was carried out with pH correction, the measurement may only be carried out with pH correction! If calibration was carried out without pH correction, the measurement may only be carried out without pH correction!***
- ***A slope calibration must be carried out after having replaced a diaphragm cap or electrolyte!***
- ***For a perfect functioning of the sensor, the slope calibration must be repeated in regular intervals! For system (pool)s and potable water, a calibration of the sensor every 3-4 weeks is sufficient.***
- ***Take care not to dose incorrectly which might cause air bubbles in the sample water! Air bubbles sticking to the diaphragm of the sensor might cause a low measuring value and thus might result in overdosing.***
- ***Observe the valid national regulations for calibration intervals!***

Prerequisites
- constant flow at the in-line probe – minimum 40 l/h
- the sensor has been run in
- a sensor CLE 3.1 for free chlorine must be installed in the system (basin, filtration circuit, …)

a) Calibrate zero point



IMPORTANT

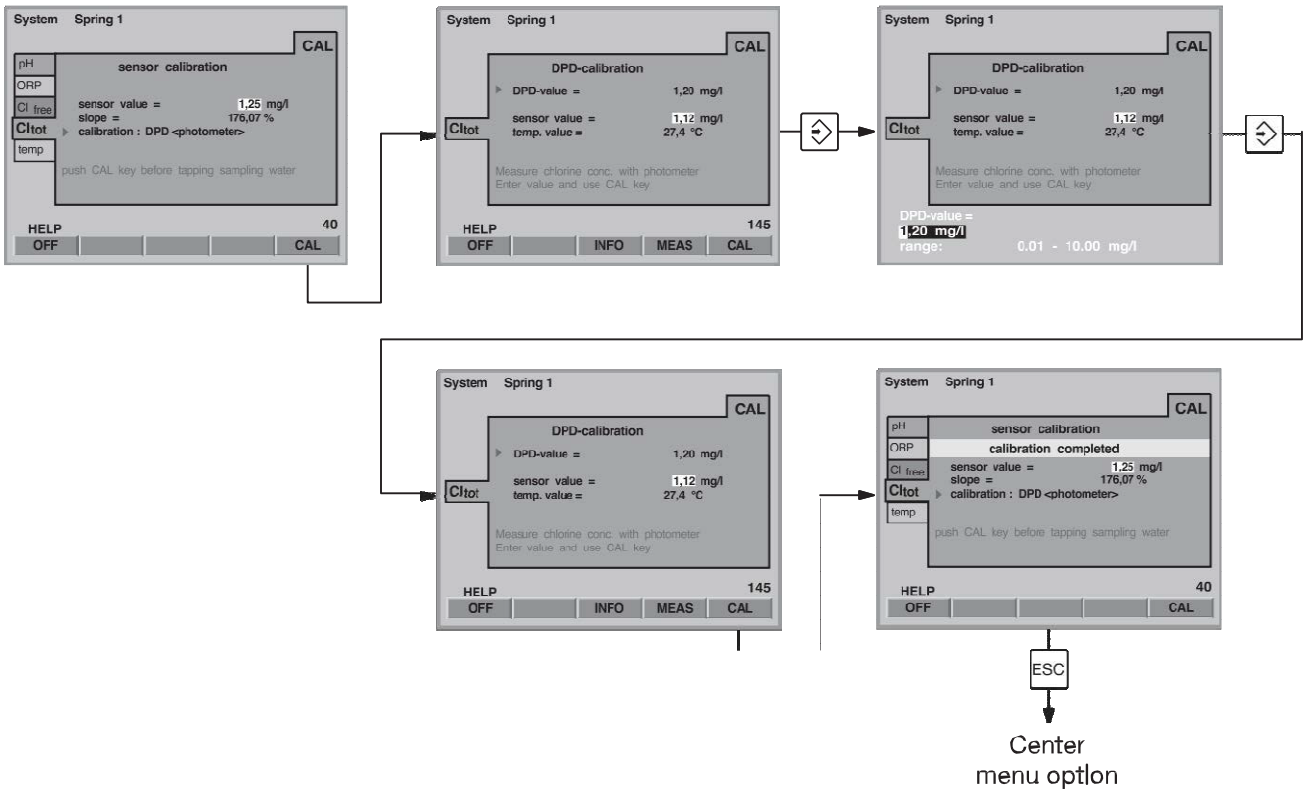
- ***The sensor must have run in!***
- ***Only perform a zero offset if you:***
  - ***use the sensor at the lower measuring range limit!***
  - ***intend to measure combined chlorine (differential chlorine measurement).***

- Select the index card “Cl comb.” “Sensor calibration” (arrow keys) and press the ENTER key
- Select “zero point” (arrow keys) and press the ENTER key
  Do not remove the CAN cable from the sensor CTE
- Shut-off the sample water – first inlet, then outlet.
- Remove the sensor.
- Rinse the sensor with chlorine-free water.
- Dip the sensor CTE into a bucket with clean, chlorine-free tap water (or in carbonic acid-free mineral water or distilled water. Check the tap water for chlorine with measuring tool). The chlorine-free water must have the same temperature as the system (pool) water
- Stir carefully with the sensor until the “measured value sensor” has been stable for 5 min. and remains close to zero.
- Then press F5 (CAL)
- Press F5 (CAL) to complete the calibration process and to save the values
  “Calibration completed” is displayed
- Install the sensor again at the in-line probe
- Re-open the shut-off valves for the sample water. First the outlet, then the inlet.
  Before calibrating the slope, wait until the measured value is stable (wait for at least 15 min.).

CAUTION

The slope must now be calibrated:

b) Calibrate slope



IMPORTANT

Chlorine must be present in the sample water all the time (approx. 0.5 mg/l)! Otherwise, the measuring system cannot be calibrated.

- Select the index card “Cl comb.” “Sensor calibration” (arrow keys) and press the ENTER key
- Select “DPD (Photometer)” (arrow keys) and press the ENTER key
- After the “sensor value” has stabilised, press F5 (CAL)
- Directly after, take a sample water sample at the in-line probe
- Directly after this step, determine the chlorine content of the sample water using a photometer and a suitable measuring tool (e.g. DPD 3 for total chlorine (sensor CTE))
- Immediately enter the chlorine content (arrow keys) and press the ENTER key
- Press F5 (CAL) to complete the calibration process and to save the values. “Calibration completed” is displayed
- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the password) or to the center menu option

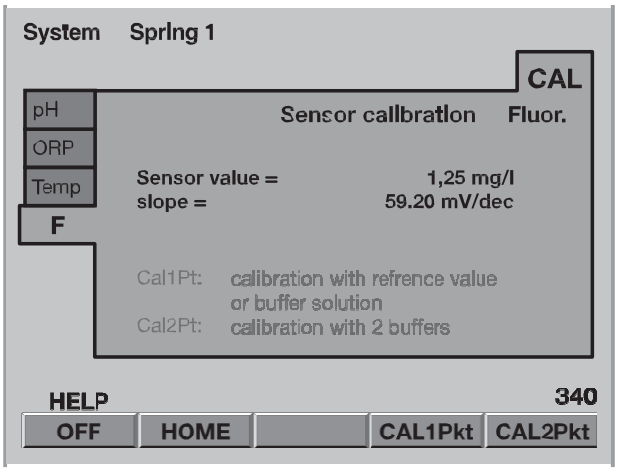
Repeat the calibration the next day!

NOTE

Only for customer service: By pressing F4 (MEAS), the pH value, the sensor current, and the temperature at the time of pressing the key can be displayed.

- ***If an error message is displayed during the calibration of a chlorine sensor, access more detailed data by pressing F3 INFO. These data are also of help when talking with the technical service.***

5.5 Measured Variable Fluoride (F^-)



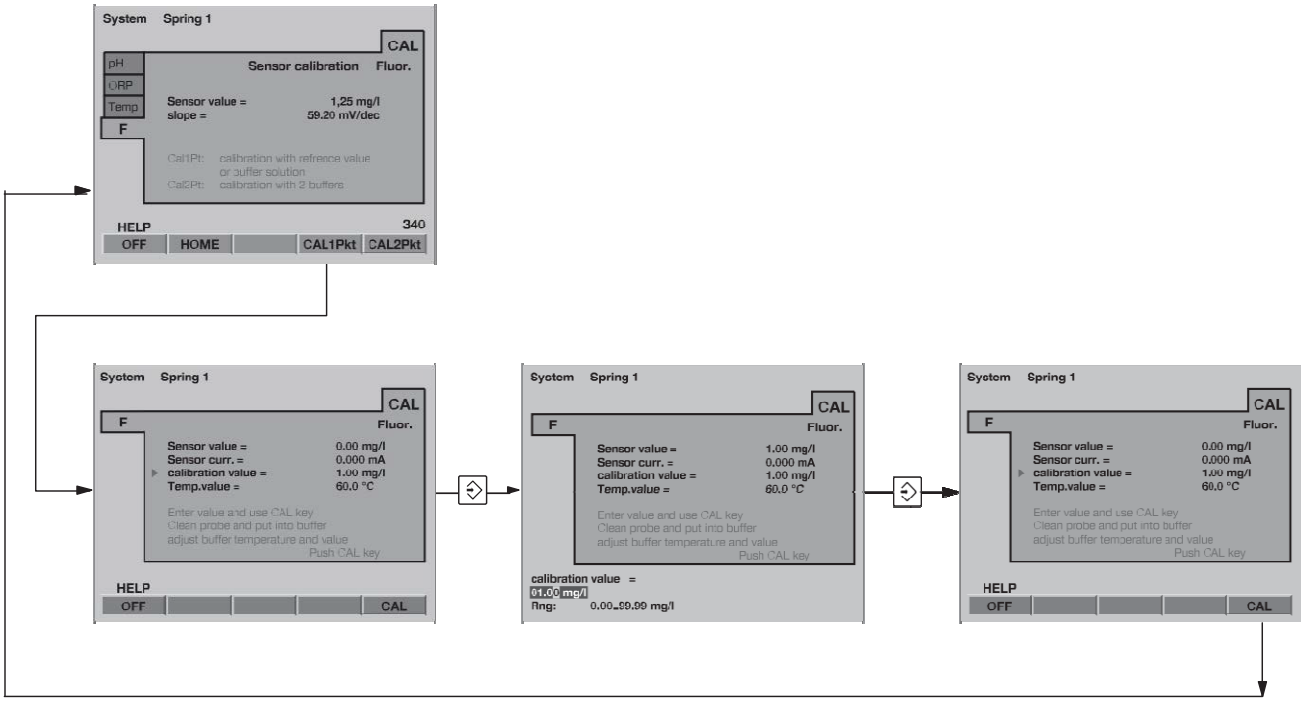
CAUTION

- ***Please also read the operating instructions for sensor, in-line probe and the "Operating instructions fluoride measurement on panel"!***
- ***For a perfect functioning of the sensor, the sensor has to be inspected and calibrated, if required, in regular intervals!***
- ***Take care not to meter incorrectly which might cause air bubbles in the sample water! Air bubbles sticking to the solid state diaphragm of the sensor might cause a too low measuring value and thus might result in overmetering.***
- ***A 2-point calibration has to be performed during the first commissioning!***
- ***Observe the valid national regulations for calibration intervals!***

Prerequisites

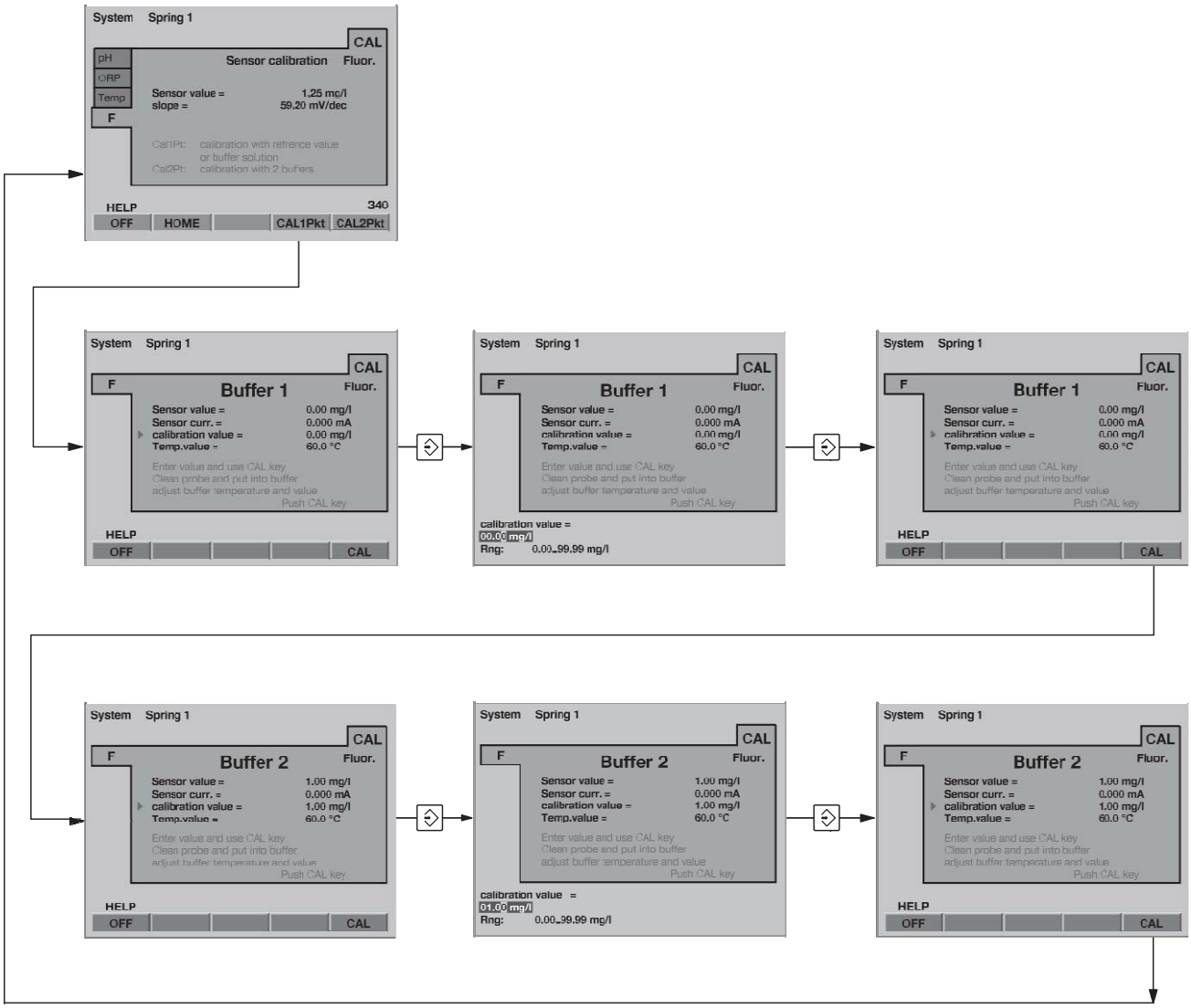
- the sensor has been run-in (min. 1 h)

5.5.1 1-Point Calibration
(via photometer)



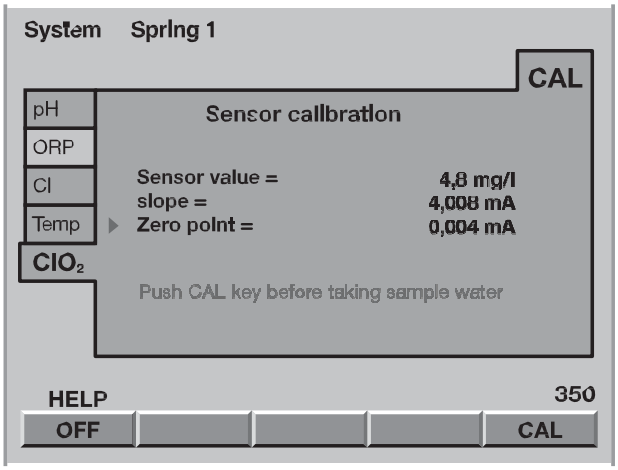
- For calibration, take a water sample from the sampling cock.
- Measure the water sample in accordance with the instructions of the photometer manufacturer.
- Then switch to the calibration menu using F2 CAL.
- Select the index card “F⁻“ (arrow keys) and press F4 CAL 1PT.
- If the temperature of the water is not correct, select “Temp.value” (arrow keys) and press the ENTER key.
- Enter the value of the measured temperature of the water (arrow keys) and press the ENTER key.
- Select “Calibration value” (arrow keys) and press the ENTER key.
- Enter the fluoride concentration measured with the photometer (arrow keys) and press the ENTER key.
- Then press F5 CAL.
- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the password) or to the central menu option.

5.5.2 2-Point Calibration



Please use the detailed “Operating instructions fluoride measurement on panel” to perform the 2-point calibration!

5.6 Measured Variable Chlorine Dioxide (ClO_2)



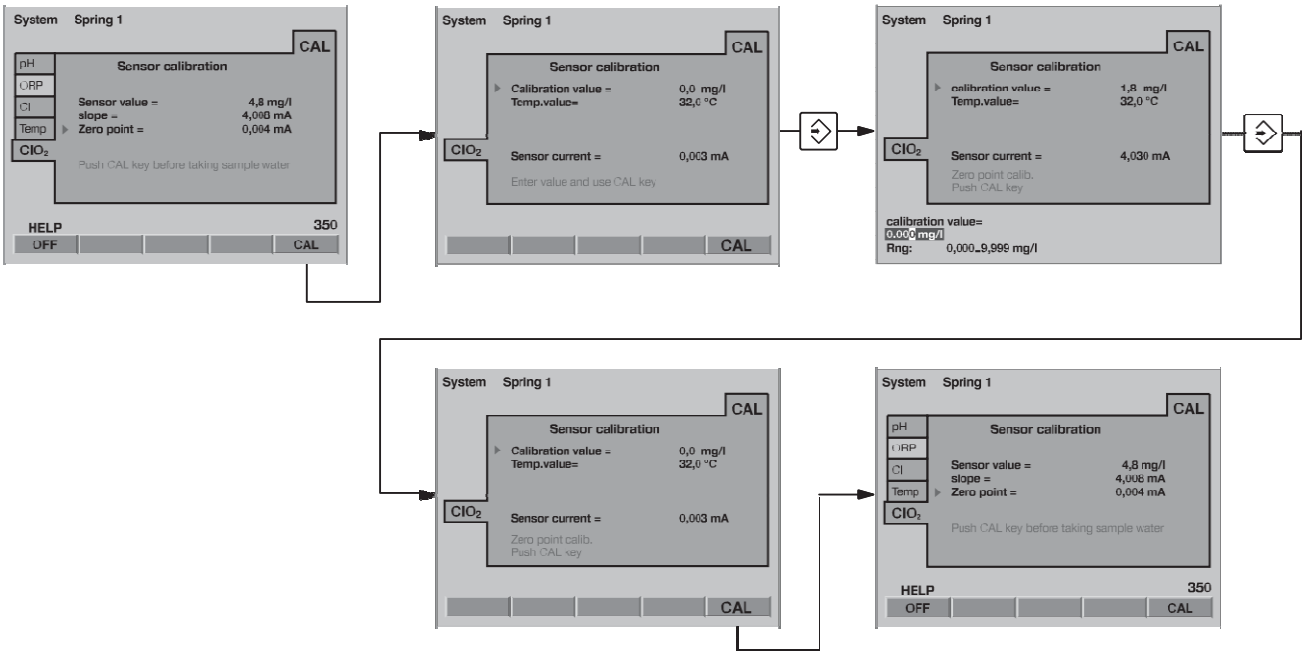
CAUTION

- ***Please also read the operating instructions for chlorine sensor and in-line probe!***
- ***A slope calibration must be carried out after having replaced a diaphragm cap or electrolyte!***
- ***For a perfect functioning of the sensor, the slope calibration must be repeated in regular intervals!***
- ***Take care not to meter incorrectly which might cause air bubbles in the sample water! Air bubbles sticking to the diaphragm of the sensor might cause a too low measuring value and thus might result in overmetering.***
- ***Observe the valid national regulations for calibration intervals!***

Prerequisites

- constant flow at the in-line probe – at least 20 l/h
- constant temperature of the sample water
- identical temperatures of sample water and sensor (wait for approx. 15 min.)
- the sensor has been run in

a) Calibrate zero point



CAUTION

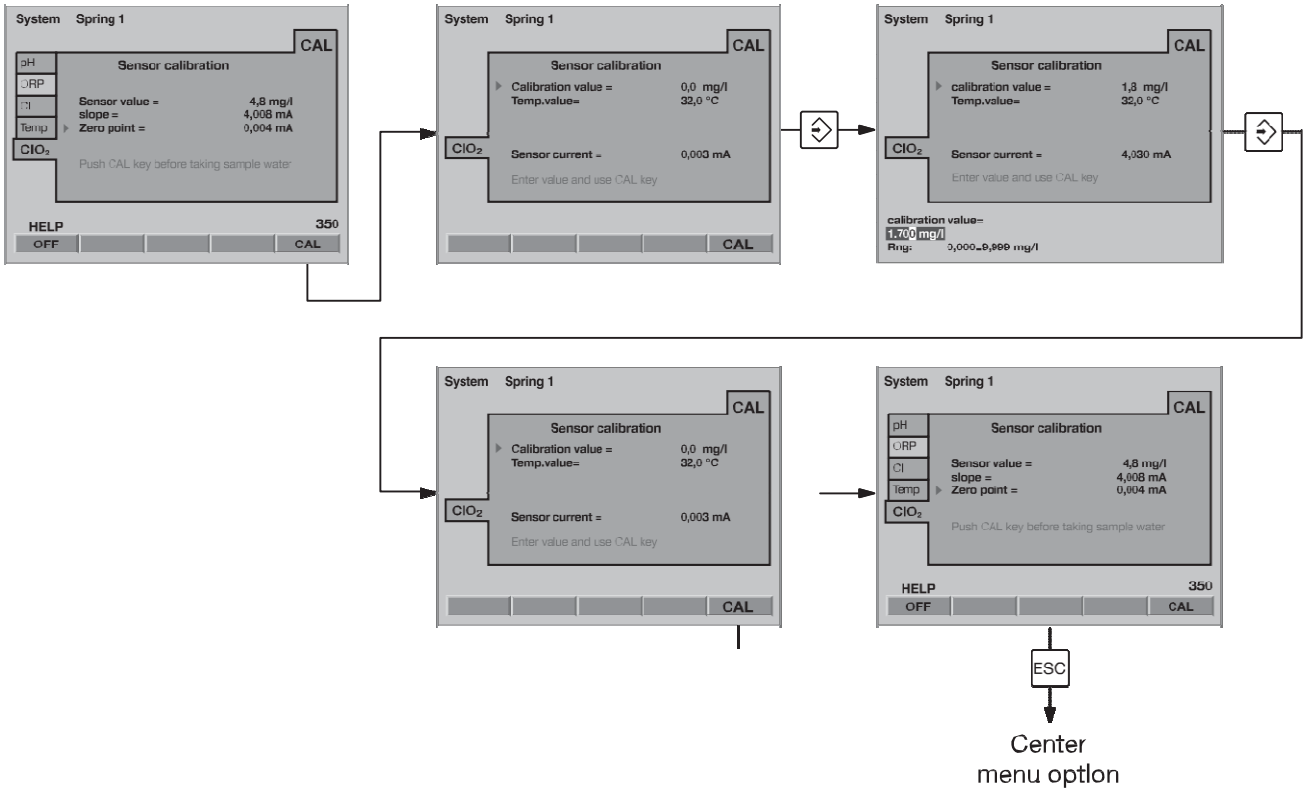
- ***The sensor must have run in!***
- ***Only perform a zero offset if you:***
  - ***use the sensor at the lower measuring range limit!***
  - ***use the 0.5 ppm type!***

- Select the index card "ClO_2" "Sensor calibration" (arrow keys), press F5 CAL and then the ENTER key.
- Enter the value 0.00 mg/l in "DPD value" and press the ENTER key – the index card now shows "Zero point calibration".
- Shut-off the sample water – first inlet, then outlet.
- Remove the sensor.
- Rinse the sensor with chlorine-free water.
- Dip the sensor CDE in a bucket with non-carbonated mineral water or distilled water. This water must have the same temperature as the sample water.
- Stir carefully with the sensor until the "Sensor value" has been stable for 5 min. and remains close to zero.
- Then press F5 CAL.
- Re-install the sensor at the in-line probe (see operating instructions for in-line probe).
- Open the shut-off valves for the sample water again. First the outlet, then the inlet.

CAUTION

Now, the slope has to be calibrated:

b) Calibrate slope



CAUTION

- ***Before calibrating the slope, wait until the measured value is stable (wait for at least 15 min.).***
- ***Chlorine dioxide must be present in the sample water all the time (approx. 0.5 mg/l)! Otherwise, the measuring system cannot be calibrated.***
- ***Please check the calibration using DPD after 24 h after initial commissioning!***

- Select the index card "ClO_2" "Sensor calibration" (arrow keys).
- After the "Sensor value" has stabilised, press F5 CAL.
- Directly after, take a sample water sample at the in-line probe.
- Immediately after this step, determine the chlorine dioxide content of the sample water using a photometer and a suitable measuring tool (e.g. DPD)
- Immediately enter the chlorine dioxide content (arrow keys) and press F5 CAL.
- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the password) or to the central menu option.

NOTE

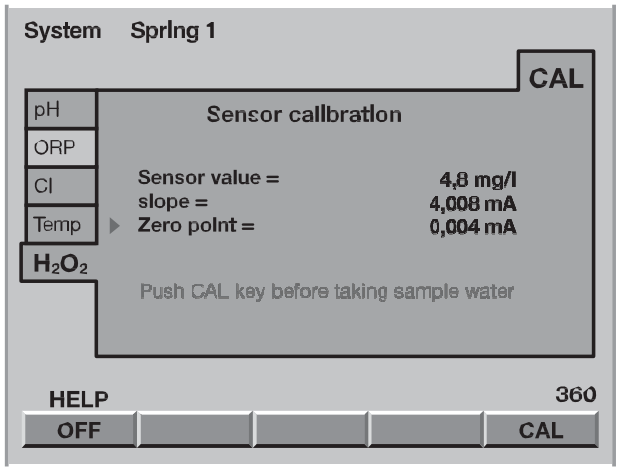
Calibration at increased temperature
Because in contrast to chlorine, chlorine dioxide is only physically solved in water, it quickly outgasses from the medium at increased temperatures (> 30 °C). The DPD measurement must thus be performed quickly.

After sample-taking, the reagents should be added within 1 minute. In this case, the red dye is to be directly generated at the sampling site by addition reagents and then the measurement is to be performed in the laboratory as quickly as possible.

If the DULCOMARIN® II indicates a clearly insufficient measured value or cannot be calibrated after the running-in period of the sensors (for CDE approx. 2-6 h), double the running-in period or extend it to the next morning.

If the sensor can then still not be calibrated, contact the ProMinent customer service (telephone numbers are stated on the back cover page).

5.7 Measured Variable Hydrogen Peroxide (H_2O_2)



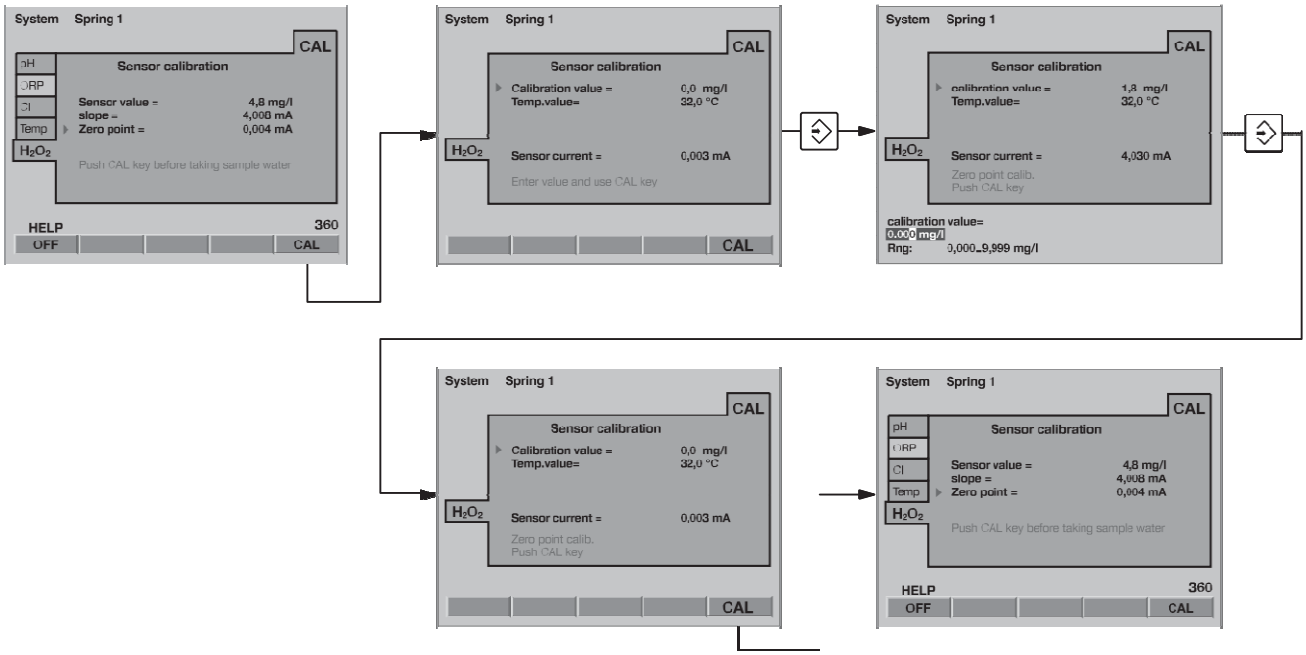
CAUTION

- ***Please also read the operating instructions for chlorine sensor and in-line probe!***
- ***A slope calibration must be carried out after having replaced a diaphragm cap or electrolyte!***
- ***For a perfect functioning of the sensor, the slope calibration must be repeated in regular intervals!***
- ***Observe the valid national regulations for calibration intervals!***

Prerequisites

- the H_2O_2 concentration of the sample water is sufficiently stable at the same time (observe the response time of the sensor of 8 min!)
- constant, permissible flow at the in-line probe – see operating instructions sensor, “Technical data”
- identical temperatures of sample water and sensor (wait for approx. 15 min.)
- the sensor has been run in

a) Calibrate zero point



CAUTION

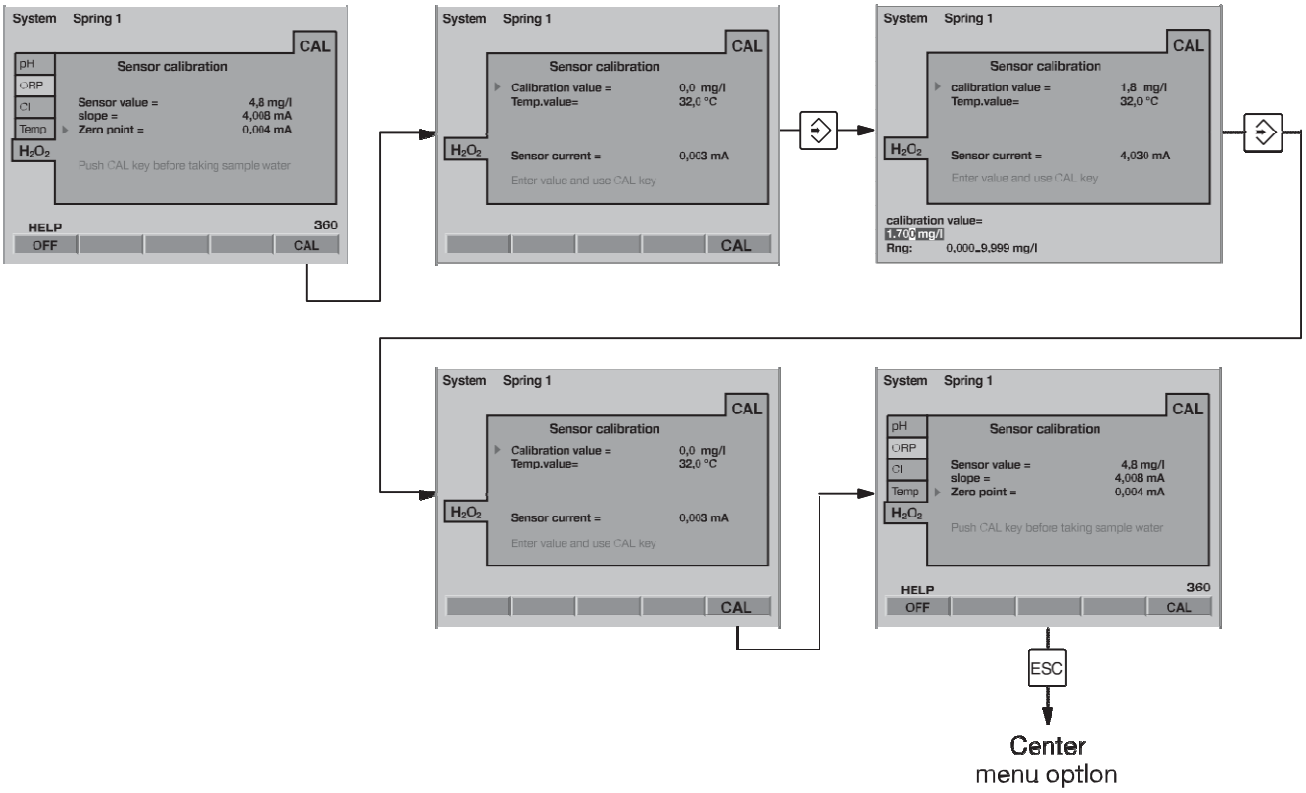
- ***The sensor must have run in!***
- ***Only perform a zero offset if you:***
  - use the sensor at the lower measuring range limit!

- Select the index card "H_2O_2" "Sensor calibration" (arrow keys), press F5 CAL and then the ENTER key.
- Enter the value 0.00 mg/l in "DPD value" and press the ENTER key – the index card now shows "Zero point calibration".
- Shut-off the sample water – first inlet, then outlet.
- Remove the sensor.
- Rinse the sensor with H_2O_2-free water.
- Dip the sensor PER in a bucket with non-carbonated mineral water or distilled water. This water must have the same temperature as the sample water.
- Stir carefully with the sensor until the "Sensor value" has been stable for 5 min. and remains close to zero.
- Then press F5 CAL.
- Re-install the sensor at the in-line probe (see operating instructions for in-line probe).
- Open the shut-off valves for the sample water again. First the outlet, then the inlet.

CAUTION

Now, the slope has to be calibrated:

b) Calibrate slope



CAUTION

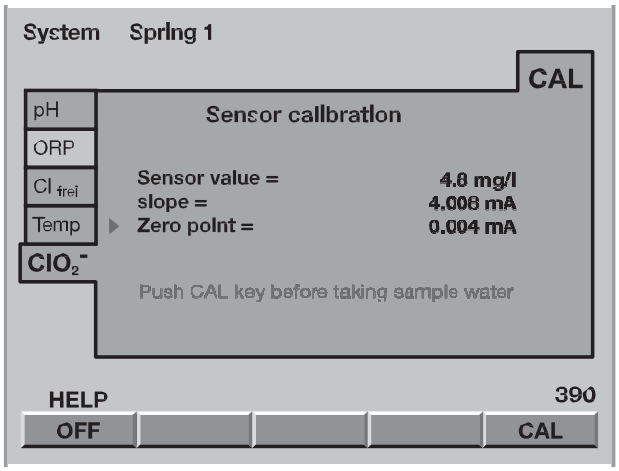
- ***Before calibrating the slope, wait until the measured value is stable (wait for at least 15 min.).***
- ***Please check the calibration using DPD after 24 h after initial commissioning!***
- ***Repeat the calibration, if the H_2O_2 concentration deviates more than 15 % from the reference value.***

- Select the index card "H_2O_2" "Sensor calibration" (arrow keys).
- After the "Sensor value" has stabilised, press F5 CAL.
- Directly after, take a sample water sample at the in-line probe.
- Immediately after this step, determine the H_2O_2 content of the sample water using a photometer and a suitable measuring tool (e.g. DPD)
- Immediately enter the H_2O_2 content (arrow keys) and press F5 CAL.
- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the password) or to the central menu option.

If the DULCOMARIN® II indicates a clearly insufficient measured value or cannot be calibrated after the running-in period of the sensors (for PER approx. 6-12 h), double the running-in period or extend it to the next morning.

If the sensor can then still not be calibrated, contact the ProMinent customer service (telephone numbers are stated on the back cover page).

5.8 Measured Variable Chlorite (ClO_2^-)



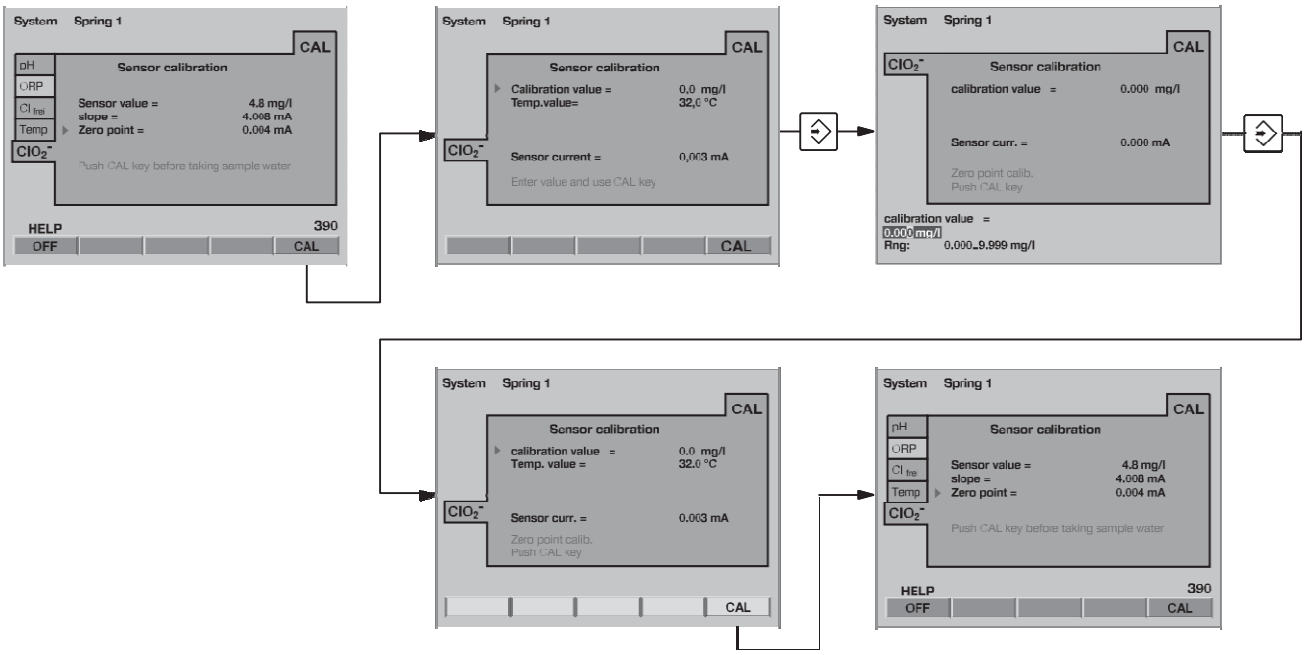
CAUTION

- ***Please also read the operating instructions for chlorine sensor and in-line probe!***
- ***A slope calibration must be carried out after having replaced a diaphragm cap or electrolyte!***
- ***For a perfect functioning of the sensor, the slope calibration must be repeated in regular intervals!***
- ***Take care not to meter incorrectly which might cause air bubbles in the sample water! Air bubbles sticking to the diaphragm of the sensor might cause a too low measuring value and thus might result in overmetering.***
- ***Observe the valid national regulations for calibration intervals!***

Prerequisites

- constant flow at the in-line probe – at least 20 l/h
- constant temperature of the sample water
- identical temperatures of sample water and sensor (wait for approx. 15 min.)
- the sensor has been run in
- constant pH value in the permitted range (pH 6.5 – 9.5)

a) Calibrate zero point



CAUTION

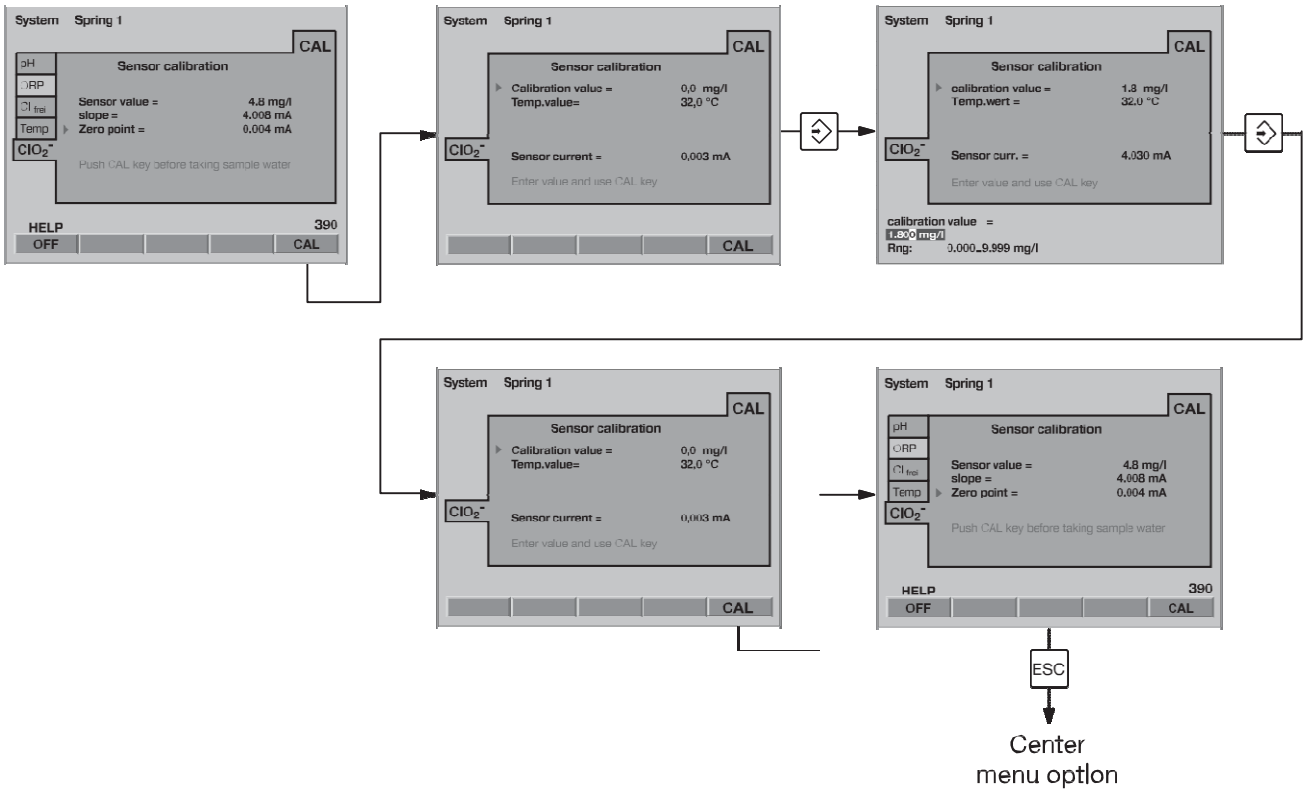
- ***The sensor must have run in!***
- ***Only perform a zero offset if you:***
  - use the sensor at the lower measuring range limit!

- Select the index card "ClO_2^-" "Sensor calibration" (arrow keys), press F5 CAL and then the ENTER key.
- Enter the value 0.00 mg/l in "DPD value" and press the ENTER key – the index card now shows "Zero point calibration".
- Shut-off the sample water – first inlet, then outlet.
- Remove the sensor.
- Rinse the sensor with chlorine-free water.
- Dip the sensor CLT in a bucket with non-carbonated mineral water or distilled water. This water must have the same temperature as the sample water.
- Stir carefully with the sensor until the "Sensor value" has been stable for 5 min. and remains close to zero.
- Then press F5 CAL.
- Re-install the sensor at the in-line probe (see operating instructions for in-line probe).
- Open the shut-off valves for the sample water again. First the outlet, then the inlet.

CAUTION

Now, the slope has to be calibrated:

b) Calibrate slope



CAUTION

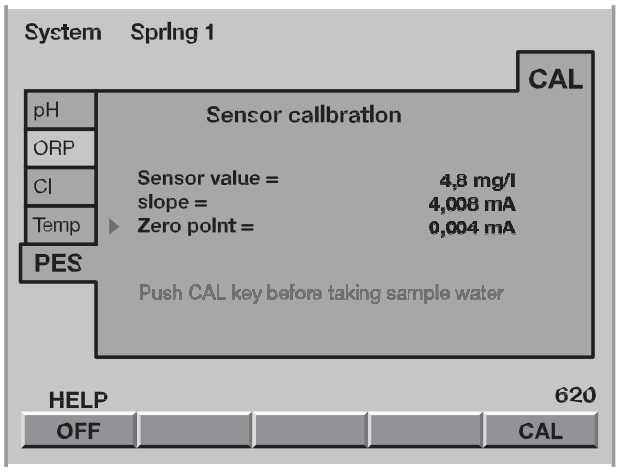
- ***Before calibrating the slope, wait until the measured value is stable (wait for at least 15 min.).***
- ***Chlorite must be present in the sample water all the time (approx. 0.5 mg/l)! Otherwise, the measuring system cannot be calibrated.***
- ***Please check the calibration using DPD after 24 h after initial commissioning!***

- Select the index card "ClO_2^-" "Sensor calibration" (arrow keys).
- After the "Sensor value" has stabilised, press F5 CAL.
- Directly after, take a sample water sample at the in-line probe.
- Immediately after this step, determine the chlorite content of the sample water using a photometer and a suitable measuring tool (e.g. DPD)
- Immediately enter the chlorine content (arrow keys) and press F5 CAL.
- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the password) or to the central menu option.

If the DULCOMARIN® II indicates a clearly insufficient measured value or cannot be calibrated after the running-in period of the sensors (for CLT approx. 2-6 h), double the running-in period or extend it to the next morning.

If the sensor can then still not be calibrated, contact the ProMinent customer service (telephone numbers are stated on the back cover page).

5.9 Measured Variable Peracetic Acid (PES)



CAUTION

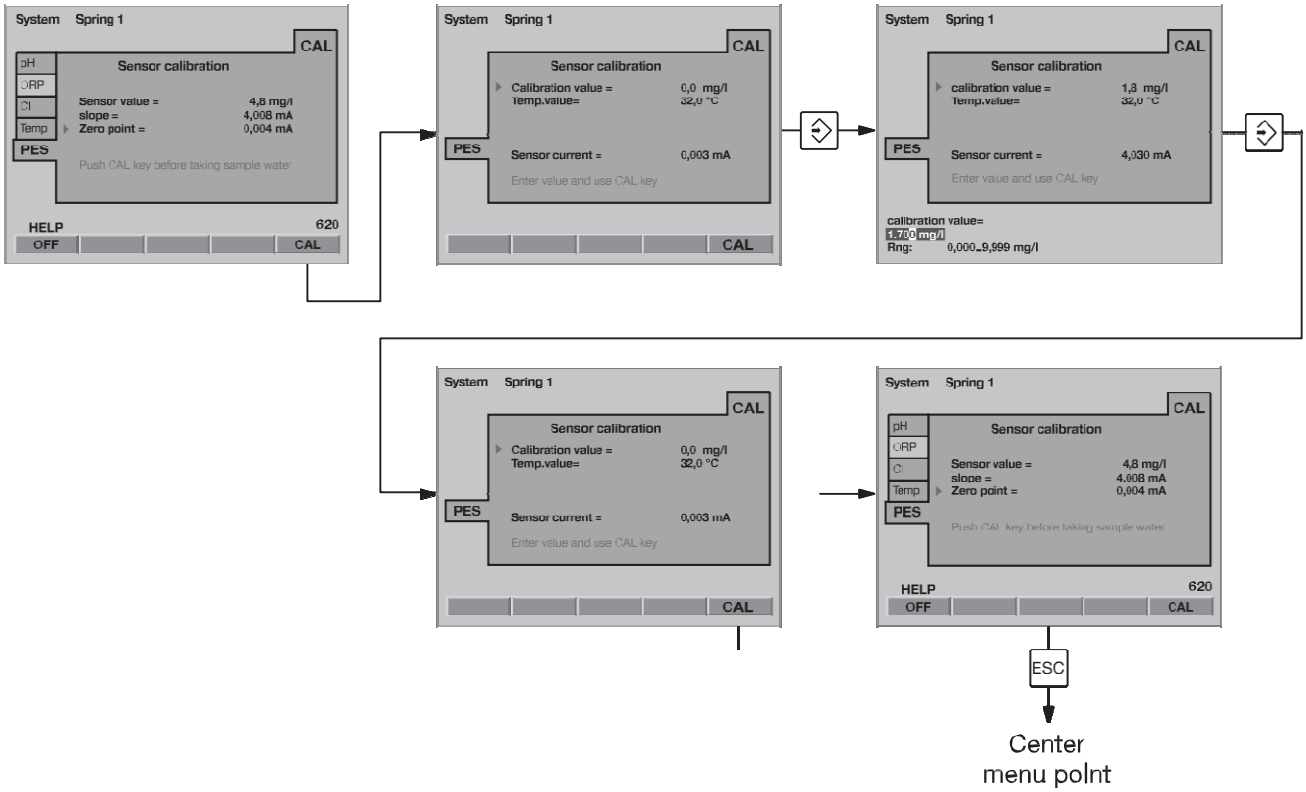
- ***Please also read the operating instructions for chlorine sensor and in-line probe!***
- ***A slope calibration must be carried out after having replaced a diaphragm cap or electrolyte!***
- ***For a perfect functioning of the sensor, the slope calibration must be repeated in regular intervals!***
- ***Take care not to meter incorrectly which might cause air bubbles in the sample water! Air bubbles sticking to the diaphragm of the sensor might cause a too low measuring value and thus might result in overmetering.***
- ***Observe the valid national regulations for calibration intervals!***

Prerequisites

- constant flow at the in-line probe – at least 20 l/h
- identical temperatures of sample water and sensor (wait for approx. 15 min.)
- the sensor has been run in

A zero point calibration is not required.

b) Calibrate slope



CAUTION

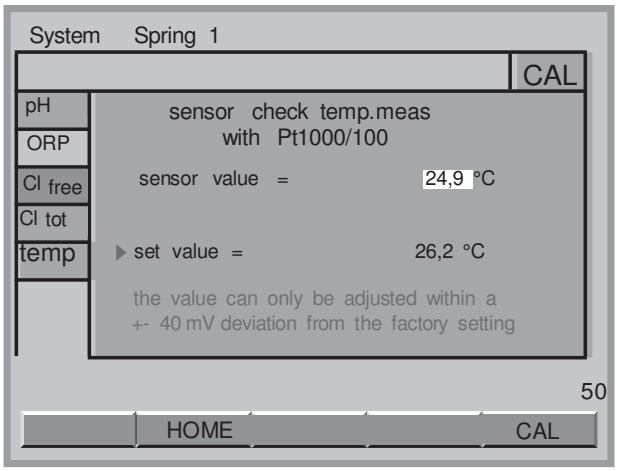
- ***Please check the calibration after 24 h after initial commissioning!***
- ***Repeat the calibration, if the PES concentration deviates more than 15 % from the reference value.***

- Select the index card “PER” “Sensor calibration” (arrow keys).
- After the “Sensor value” has stabilised, press F5 CAL.
- Shut-off the sample water – first inlet, then outlet.
- Fill a standard solution with known PES concentration, e.g. into the cup of the in-line probe DLG III.
- Mix the cup content with a magnetic stir bar.
- Dip the sensor into the cup until the measured value remains stable (15 min). Immediately enter the peracetic acid content (arrow keys) and press F5 CAL.
- Open the shut-off valves for the sample water again. First the outlet, then the inlet.
- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the password) or to the central menu option.

If the DULCOMARIN® II indicates a clearly insufficient measured value or cannot be calibrated after the running-in period of the sensors (for PAA approx. 1-2 h), double the running-in period or extend it to the next morning.

If the sensor can then still not be calibrated, contact the ProMinent customer service (telephone numbers are stated on the back cover page).

5.10 Measured Variable Temperature

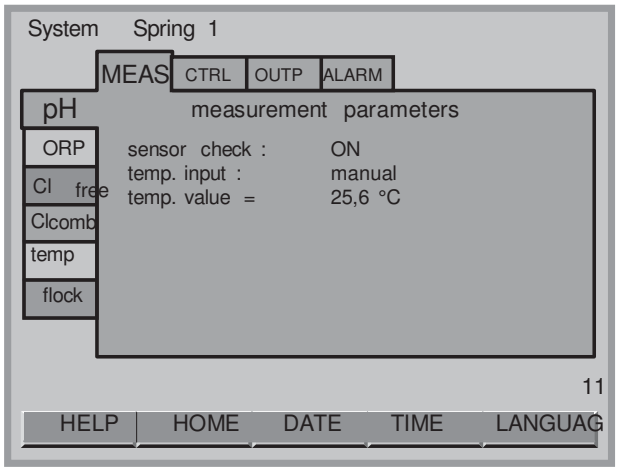


NOTE

- ***An external temperature sensor should only be calibrated if:***
  - ***use the temperature measurement of chlorine sensors***
  - ***you have a temperature sensor of type PT100***
  - ***you have a precise reference measuring instrument***
- ***Do not exchange the temperature sensor during calibration!***
- ***The measuring value temperature can only be set as default within a range of ± 4 °C around the calibration value.***

- Take a sample water sample of at least 250 ml
- Dip in the external temperature sensor PT100 of the DULCOMARIN® II and the sensor of the reference measuring instrument at the same time
- After the “sensor value” has stabilised, press the ENTER key
- Enter the value of the reference measuring instrument in “Set value” (arrow keys) and press the ENTER key
- Press F5 (SAVE) to complete the calibration process and to save the values
- If no other calibrations are to be performed, press the ESC key to return to the permanent display (all menus are then again protected by the password) or to the center menu option

6 Parameter Settings



This chapter describes the menu options for the parameter groups:

- **Measurement**
- **Controlling**
- **mA output**
- **Alarm**
- **Eco!Mode**

for the individual measured variables of the DULCOMARIN® II and the flocculant.

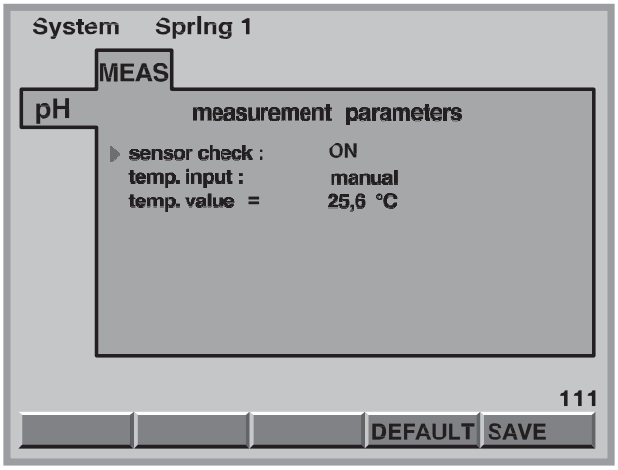
6.1 All Parameters

Exiting an index card of the parameter setting menu:

- without saving: press the ESC key repeatedly until the DULCOMARIN® II has returned to the permanent display (all menus are then again protected by the access code)
- with saving: Press F5 if SAVE is displayed above.
  Confirm the query “Save?” with the ENTER key.
  If no other parameters are to be set, press the ESC key to return to the permanent display (all menus are then again protected by the access code) or to the center menu option
- The default values can be called in the second menu option for the current index file by pressing F4 (DEFAULT)

6.2 Measurement

6.2.1 pH



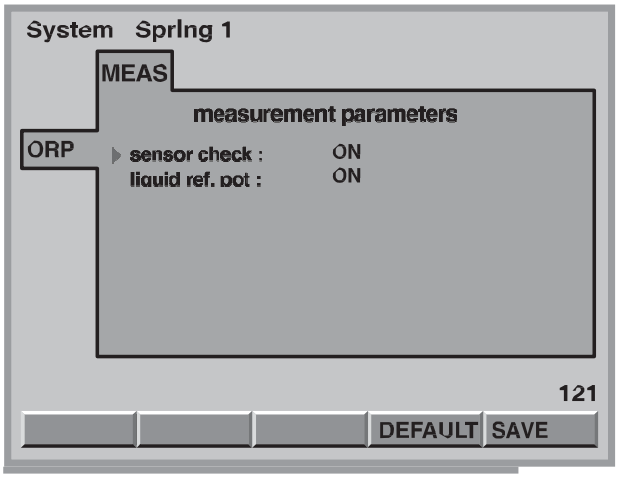
Adjustable variables	Increments	Remarks
Sensor check	Off	
	On	
Liquid ref. pot.	Off	Only displayed with equipotential bonding pin
	On	Equipotential bonding pin must be connected
Temp. input.	PT1000 (100)	Chlorine sensor or separate temperature sensor
	Input	
Temp. value	0.0 ... 99.9 °C	With “Temp. input.” “manual”

Sensor monitoring

Select “on” or “off” in “sensor check” to activate or deactivate the pH sensor monitoring.

During activated sensor monitoring, the resistance value of the pH sensor is measured. If the resistance value falls below 2 MΩ for more than 1 minute during operation, the error message “pH sensor faulty!” is displayed in the main menu option. If the resistance value exceeds 200 MΩ and if the measuring signal varies heavily, the error message “pH input faulty!” is displayed.

6.2.2 Redox/ORP



Adjustable variables	Increments	Remarks
Sensor check	Off	
	On	
Liquid ref. pot.	Off	Only displayed with equipotential bonding pin
	On	Equipotential bonding pin must be connected

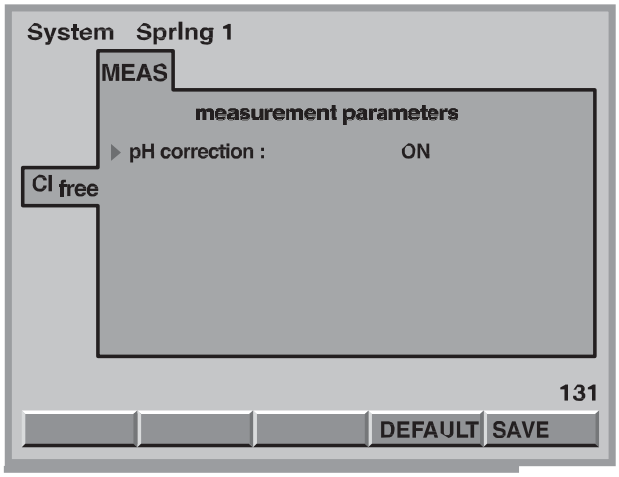
Sensor monitoring

Select “on” or “off” in “sensor check” to activate or deactivate the redox/ORP sensor monitoring.

During activated sensor monitoring, the resistance value of the redox/ORP sensor is measured.

If the resistance value falls below 2 MΩ for more than 1 minute during operation, the error message “ORP sensor faulty!” is displayed in the main menu option. If the resistance value exceeds 200 MΩ and if the measuring signal varies heavily, the error message “ORP input faulty!” is displayed.

6.2.3 Chlorine, Free

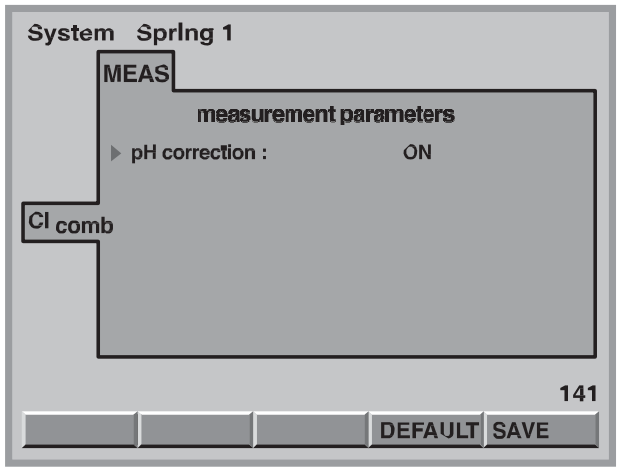


Adjustable variables	Increments	Remarks
pH correction	On	The controller can display a pH-corrected value for free chlorine
	Off	

IMPORTANT

If calibration was carried out with pH correction, the measurement may only be carried out with pH correction! If calibration was carried out without pH correction, the measurement may only be carried out without pH correction!

6.2.4 Chlorine, Combined

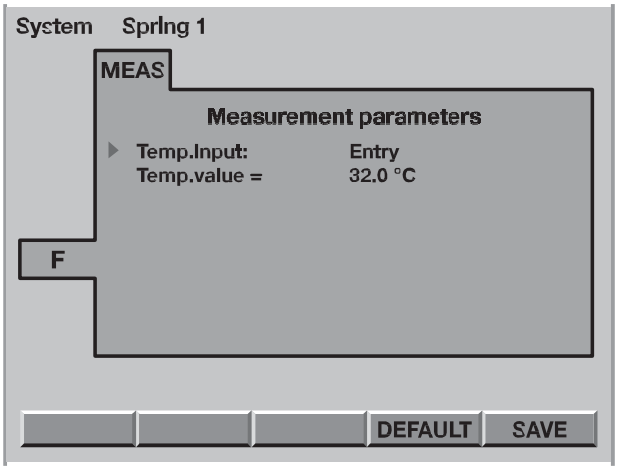


Adjustable variables	Increments	Remarks
pH correction	On	The controller can display a pH-corrected value for combined chlorine
	Off	

IMPORTANT

- ***If calibration was carried out with pH correction, the measurement may only be carried out with pH correction! If calibration was carried out without pH correction, the measurement may only be carried out without pH correction!***
- ***The DULCOMARIN® II calculates the displayed values for combined chlorine as difference of the measuring values of the chlorine sensors for free chlorine and total chlorine (CLE and CTE)!***

6.2.5 Fluoride (F^-)

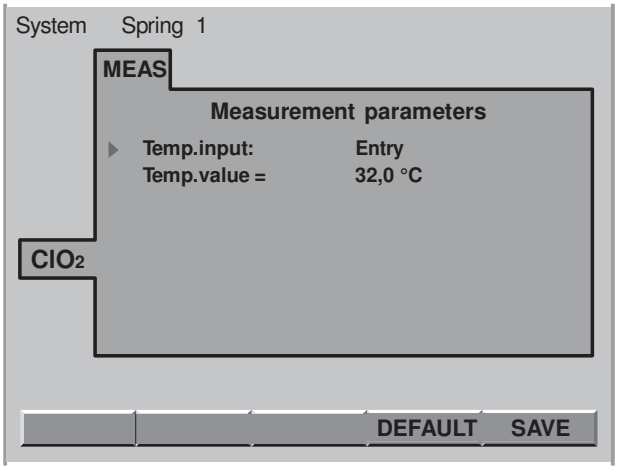


Only available if the terminal “I out 2” of the I modules was configured for the measured variable “F^-“.

Adjustable variables	Increment	Remarks
Temp. detect.	Off	
	Input	
	Sensor *	
Temp. value	0,0 ... 99.9 °C	With “Temp. detect.” “input”

* Only available if the terminal “I out 3” of the I module was configured for the measured variable “Temperature“.

6.2.6 ClO_2

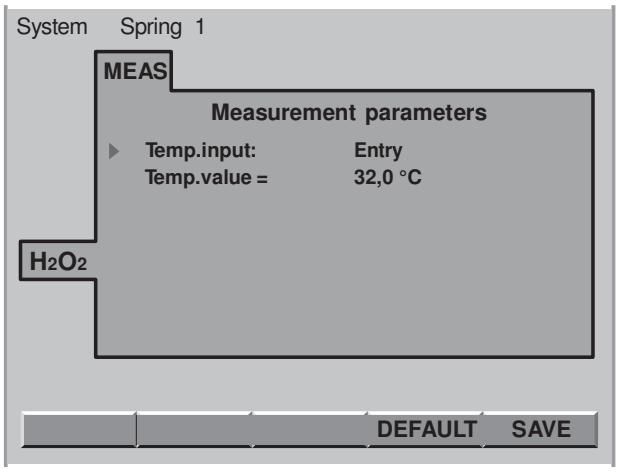


Only available if the terminal “I out 2” of the I module was configured for the measured variable “ClO_2“ and no chlorine sensor is connected.

Adjustable variables	Increment	Remarks
Temp. detect.	Off	
	Input	
	Sensor *	
Temp. value	0,0 ... 99.9 °C	With “Temp. detect.” “input”

* Only available if the terminal “I out 3” of the I module was configured for the measured variable “Temperature“.

6.2.7 H_2O_2



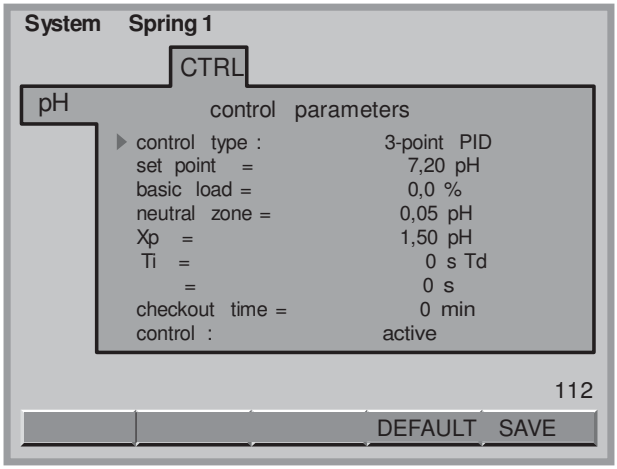
Only available if the terminal “I out 2” of the I module was configured for the measured variable “H_2O_2“ and no chlorine sensor is connected.

Adjustable variables	Increment	Remarks
Temp. detect.	Off	
	Input	
	Sensor *	
Temp. value	0,0 ... 99.9 °C	With “Temp. detect.” “input”

* Only available if the terminal “I out 3” of the I module was configured for the measured variable “Temperature“.

6.3 Controlling

6.3.1 pH



Adjustable variables	Increments	Remarks
Control type	Manual	
	PID 1 point	See fig. 15
	PID 2 point	See fig. 16
	P 2 point	
	P 1 point	
Setpoint	0.00 ... 12.00 pH	
Basic load	-100.0 ... 100.0 %	
Neutral zone	0.00 ... 1.00 pH	See fig. 15
xp *	0.01 ... 70.00 pH	
Ti	0 ... 9,999 s	With “Control type” “PID”
Td	0 ... 2,500 s	With “Control type” “PID”
Control direction	Act. pH lowering	Acid, one-way control
	Act. pH raising	Alkali,one-way control
Checkout time	0 ... 999 min	Not with “Control type” “manual”
Disturbance feedforward	Inactive	
	Mult.	Multiplicative disturbance of “I out 1“
Man. dosing	-100.0 ... 100.0 %	With “Control type” “manual”
Control	Active	Control loop can be deactivated independent of Start/stop key. Start/stop key stops all control loops.
	Inactive	

* Definition xp see Glossary

IMPORTANT

Check always whether the prerequisites for the settings in “Control” or “Control direction” were actually given in the configuration menu!

NOTE

We recommend keeping the pH value at 7.2 because chlorine shows good disinfection effects in this range. In addition, skin tolerability is good at this pH value.

Fig. 15: Figure of control type PID two-way, without and with neutral zone

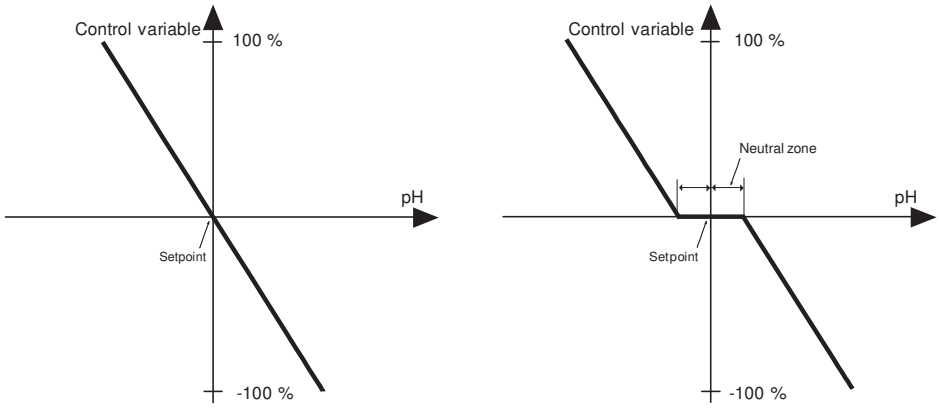
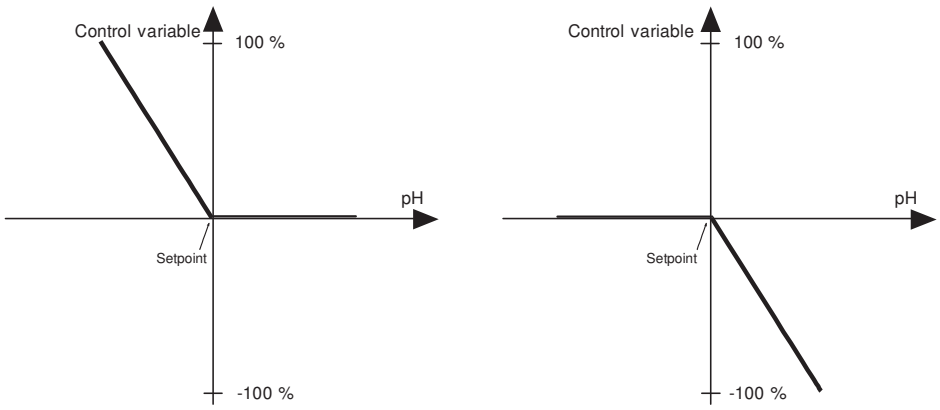
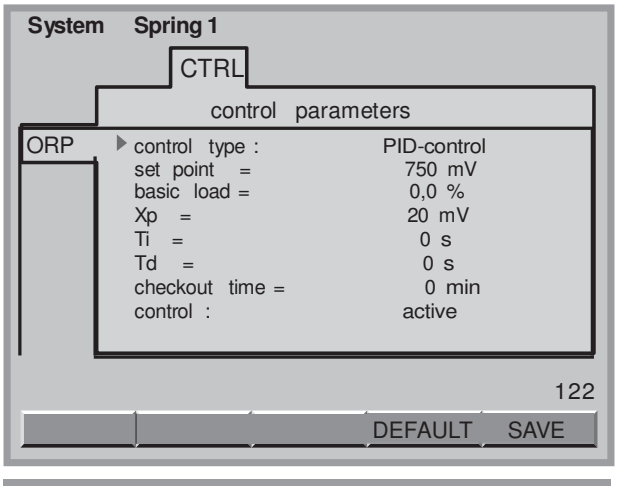


Fig. 16: Figure of control type PID 1 point, direction acid and direction alcaline



6.3.2 Redox/ORP

(Not, if chlorine is controlled)



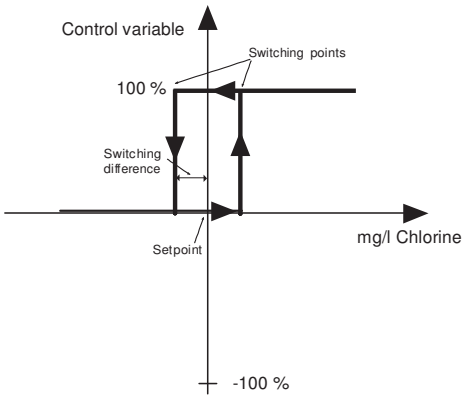
Adjustable variables	Increments	
Control type	PID controller	
	P controller	
	2-pt contact	See fig. 17
	Manual	
Setpoint	700 ... 850 mV	
Basic load	0.0 ... 100.0 %	
xp *	1 ... 1,000 mV	
Ti	0 ... 9,999 s	With “Control type” “PID”
Td	0 ... 2,500 s	With “Control type” “PID”
Switching interval	0 ... 50 mV	
MIN ON time	0 ... 6,000 s	
MIN OFF time	0 ... 6,000 s	
Checkout time	0 ... 999 min	Not with “Control type” “manual”
Control	Active	Control loop can be deactivated independent of Start/stop key. Start/stop key stops all control loops.
	Inactive	

* Definition xp see Glossary

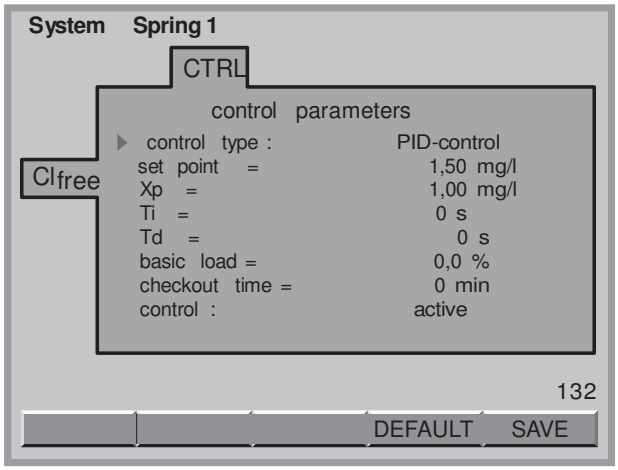
IMPORTANT

Check always whether the prerequisites for the settings in “Control” or “Control direction” were actually given in the configuration menu!

Fig. 17: Figure of control type 2-point contact



6.3.3 Chlorine, Free



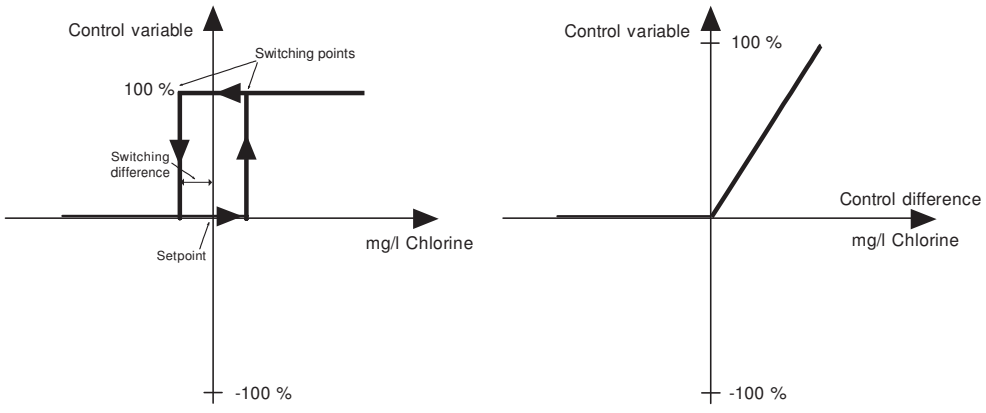
Adjustable variables	Increments	
Control type	PID controller	
	P controller	
	2-pt contact	See fig. 18
	Manual	
Setpoint	0.00 ... 20.00 mg/l	
Basic load	0.0 ... 100.0 %	
xp *	0.10 ... 99.99 mg/l	
Ti	0 ... 9,999 s	With “Control type” “PID”
Td	0 ... 2,500 s	With “Control type” “PID”
Switching interval	0.00 ... 0.50 mg/l	
MIN ON time	0 ... 6,000 s	
MIN OFF time	0 ... 6,000 s	
Checkout time	0 ... 999 min	Not with “Control type” “manual”
Control	Active	Control loop can be deactivated independent of Start/stop key. Start/stop key stops all control loops.
	Inactive	

* Definition xp see Glossary.

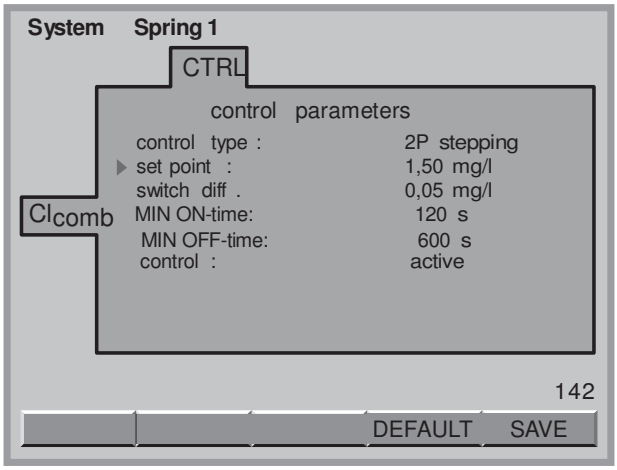
IMPORTANT

Check always whether the prerequisites for the settings in “Control” or “Control direction” were actually given in the configuration menu!

Fig. 18: Figure of control type 2-point contact and PID controller for chlorine



6.3.4 Chlorine, Combined



Adjustable variables	Increments	Remarks
Switching point	0.00 ... 20.00 mg/l	Above the switching point, relay P4 can switch an UV plant
Switching diff.	0.00 ... 0.50 mg/l	
MIN ON time	0 ... 9,999 s	
MIN OFF time	0 ... 9,999 s	
Control	Active	Control loop can be deactivated independent of Start/stop key. Start/stop key stops all control loops.
	Inactive	

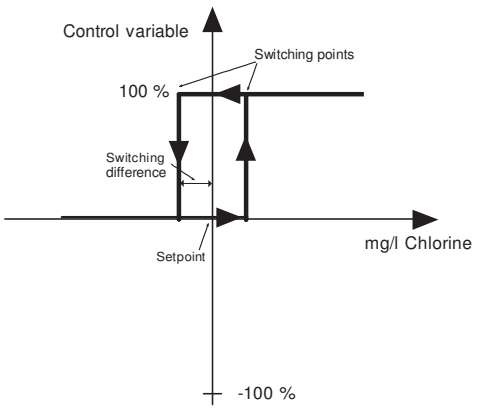
Only “Control type” “2-pt contact” possible.

IMPORTANT

- ***For the entries to be effective, a power relay must be configured!***
- ***The control Cl comb. serves minimising the combined chlorine, e.g. through a UV plant.***

For explanations see “limit value” in the glossary at the end of the operating instructions.
(The “switching point” corresponds to a “max. limit”.)

Fig. 19: Figure of control type 2-point contact



6.3.5 Temperature

Adjustable variable	Range	Remarks
Switching point	0.0 ... 40.0 °C	Comparable to target value. Relay P4 can switch a hot water solenoid valve of a heat exchanger.
Switching interval	0.0 ... 1.5 °C	Corresponds to a hysteresis
MIN ON time	0 ... 9,999 s	Minimum time the actuator must be switched on for increasing temperature to be detected.
MIN OFF time	0 ... 9,999 s	Limits the switching frequency of the actuator.
Control	Inactive	Control circuit can be switched off independent of the Start/Stop button. Start/Stop button stops all control circuits.
	Active	

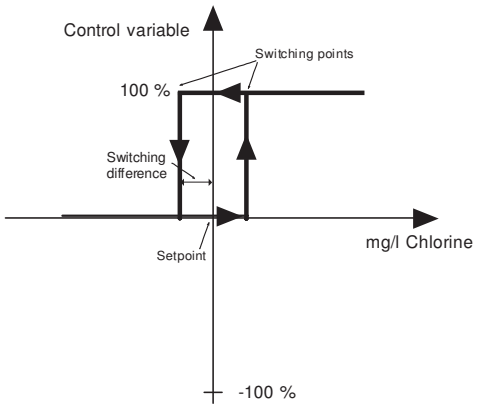
Only control type “2-pt. contact” possible.

IMPORTANT

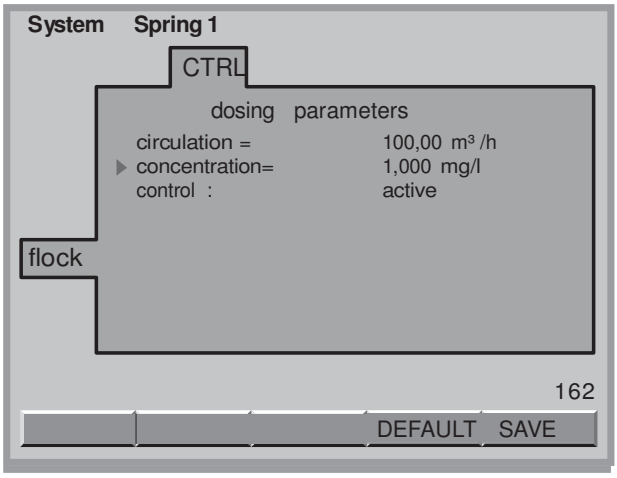
A power relay must be configured for all entries to be effective!

For explanations, see “Limit value” in index of technical terms at the end of the operating instructions (the “switching point” corresponds to a “max. limit”).

Fig. 20: Figure of control type 2-point contact



6.3.6 Flocculants



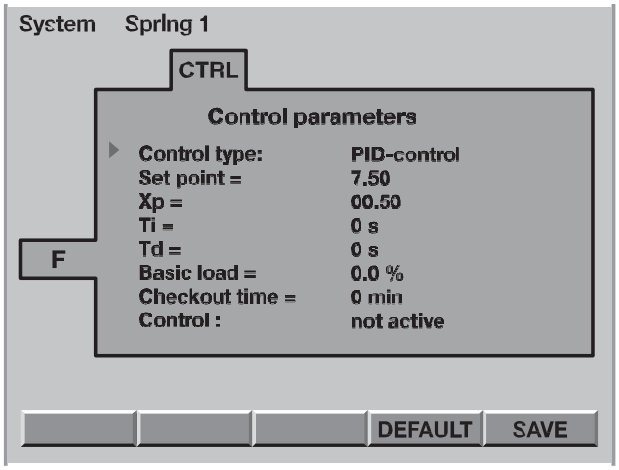
Adjustable variables	Increments	Remarks
Circulation	0.0 ... 500.0 m³/h	
Concentration	0.1 ... 9.9 mg/l	Desired concentration of flocculants
Control	Active	Control loop can be deactivated independent of Start/stop key. Start/stop key stops all control loops.
	Inactive	

Pump capacity

If a flocculant pump is configured, after saving under “pump output” DULCOMARIN® II will show its metering capacity (calculated from “circulation” and “concentration” realised through stroke rate) as a percentage referred to the “max. output”.

Under “max. output” DULCOMARIN® II shows the maximum calculated metering capacity for the pump type at the set stroke length, 100 % stroke rate and 1.5 bar backpressure (identical to “output” in index card P1, P2 or P3 under the configuration menu).

6.3.7 Fluoride (F^-)



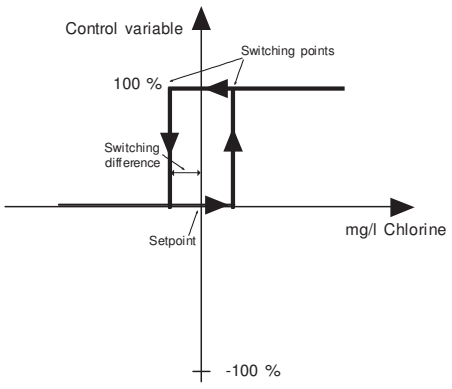
Adjustable variables	Increment	Remarks
Control type	PID controller	
	P controller	
	2-pt contact	See fig. 21
	Manual	
Setpoint	0,00 ... 9.99 ppm	
Basic load	0,0 ... 100,0 %	
xp *	1 ... 1,000 ppm	
Tn	0 ... 9,999 s	With “Controlling” “PID”
Tv	0 ... 2500 s	With “Controlling” “PID”
Switching interval	0 ... 50 ppm	
Min. switch-on time	0 ... 6,000 s	
Min. switch-off time	0 ... 6,000 s	
Control time	0 ... 999 min	Not with “Controlling” “manual”
Disturbance feedforward	Inactive	
	Mult.	Multiplicative disturbance of “I out 1”
	Add.	Additive disturbance of “I out 1”
Controlling	On	Controlling only with metering pumps with CANopen bus. Control loop can be deactivated independent of Start / stop key. Start / stop key stops all control loops in the selected system.
	Off	

* Definition xp see Glossary.

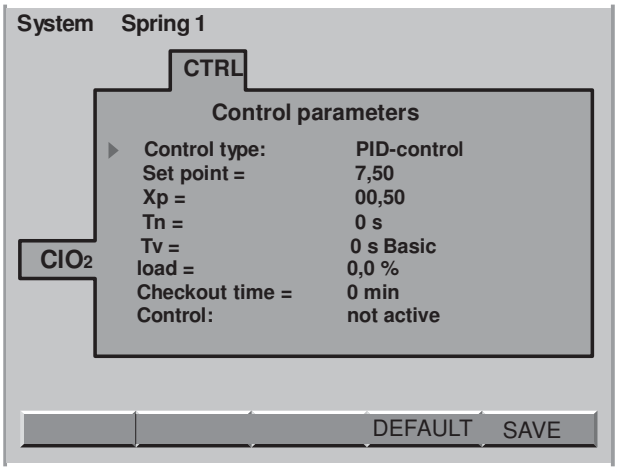
CAUTION

Check always whether the prerequisites for the settings in “Controlling” or “Control direction” were actually given in the configuration menu!

Fig. 21: Figure of control type 2-point contact



6.3.8 Chlorine Dioxide (ClO_2)



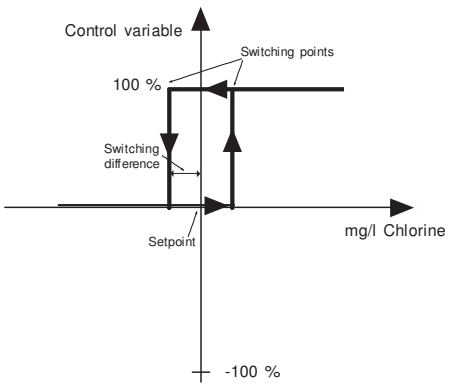
Adjustable variables	Increment	Remarks
Control type	PID controller	
	P controller	
	2-pt contact	See fig. 22
	Manual	
Setpoint	0,00 ... 9.99 ppm	
Basic load	0,0 ... 100,0 %	
xp *	1 ... 1,000 ppm	
Tn	0 ... 9,999 s	With “Controlling” “PID”
Tv	0 ... 2500 s	With “Controlling” “PID”
Switching interval	0 ... 50 ppm	
Min. switch-on time	0 ... 6,000 s	
Min. switch-off time	0 ... 6,000 s	
Control time	0 ... 999 min	Not with “Controlling” “manual”
Disturbance feedforward	Inactive	
	Mult.	Multiplicative disturbance of “I out 1“
	Add.	Additive disturbance of “I out 1“
Controlling	On	Controlling only with metering pumps with CANopen bus. Control loop can be deactivated independent of Start / stop key. Start / stop key stops all control loops in the selected system.
	Off	

* Definition xp see Glossary.

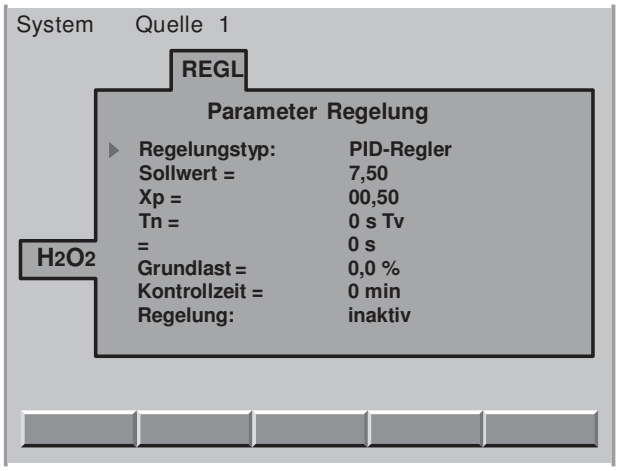
CAUTION

Check always whether the prerequisites for the settings in “Controlling” or “Control direction” were actually given in the configuration menu!

Fig. 22: Figure of control type 2-point contact



6.3.9 Hydrogen Peroxide (H_2O_2)



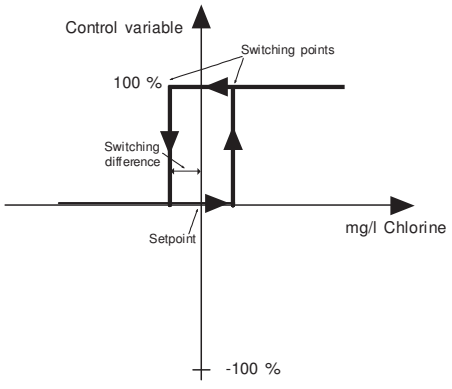
Adjustable variables	Increment	Remarks
Control type	PID controller	
	P controller	
	2-pt contact	See fig. 23
	Manual	
Setpoint	0,00 ... 9.99 ppm	
Basic load	0,0 ... 100,0 %	
xp *	1 ... 1,000 ppm	
Tn	0 ... 9999 s	With “Controlling” “PID”
Tv	0 ... 2500 s	With “Controlling” “PID”
Switching interval	0 ... 50 ppm	
Min. switch-on time	0 ... 6,000 s	
Min. switch-off time	0 ... 6,000 s	
Control time	0 ... 999 min	Not with “Controlling” “manual”
Disturbance feedforward	Inactive	
	Mult.	Multiplicative disturbance of “I out 1“
	Add.	Additive disturbance of “I out 1“
Controlling	On	Controlling only with metering pumps with CANopen bus. Control loop can be deactivated independent of Start / stop key. Start / stop key stops all control loops in the selected system.
	Off	

* Definition xp see Glossary.

CAUTION

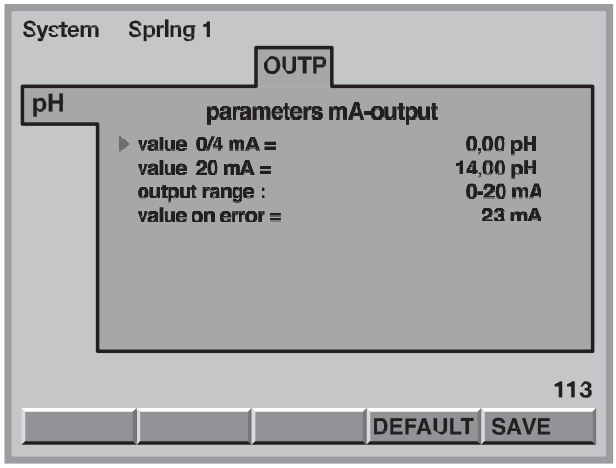
Check always whether the prerequisites for the settings in “Controlling” or “Control direction” were actually given in the configuration menu!

Fig. 23: Figure of control type 2-point contact



6.4 mA Output

All measured variables

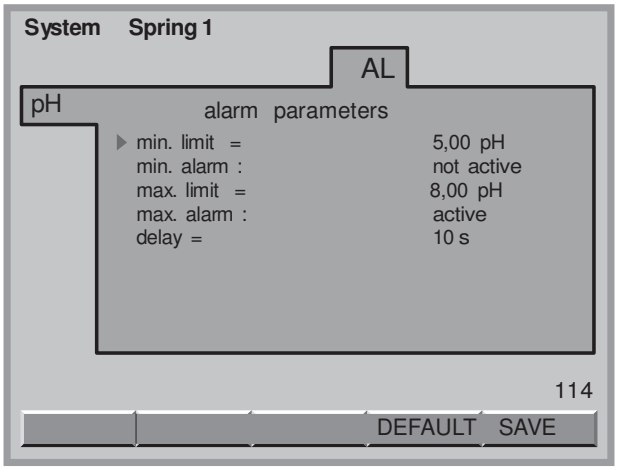


Adjustable variables	Increments	Remarks
Value 0/4 mA	0.00 ... xx.xx Y *	mA value depending on “output”
Value 20 mA	0.00 ... xx.xx Y *	
Output range	0-20 mA	Not with “Iout” “not used” (see configuration)
	4-20 mA	
Value if error	23 mA OFF 3.7 mA 22 mA	Not with “Iout” “not used” (see configuration)

* “xx.xx Y” is the value and the unit of measurement of a measured variable of this controller.

6.5 Alarm

All measured variables

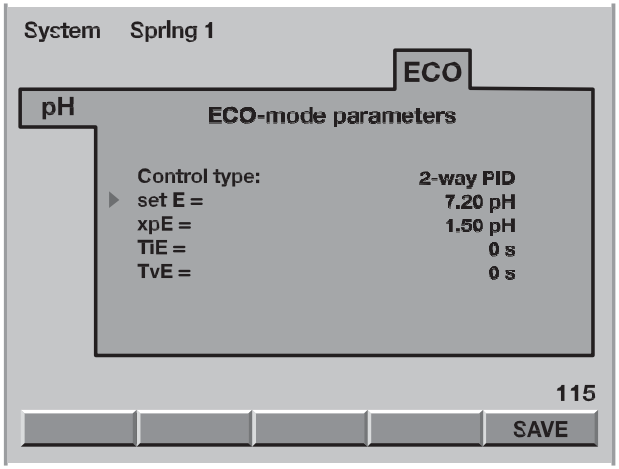


Adjustable variables	Increments	Remarks
Min. limit	0.00 ... xx.xx Y *	
Min. alarm	Not active	Only error message for error
	Active	Error message, alarm horn, relay for error. Must be acknowledged.
Max. limit	0.00 ... xx.xx Y *	
Max. alarm	Not active	Only error message for error
	Active	Error message, alarm horn, relay for error. Must be acknowledged.
Delay	0 ... 3,600 s	

* “xx.xx Y” is the value and the unit of measurement of a measured variable of this controller.

Influence on controlling see table 2.

6.6 Eco!Mode



In Eco!Mode, a second parameter set for controlling can be switched to active temporarily in order to save energy. This can e.g. be done together with reducing the circulation rate. As soon as a contact at the contact input K3 of the M module switches, the Eco!Mode becomes active or inactive. The Eco!Mode is available for all measured variables of the M module, if controlled:

- pH
- ORP
- Chlorine, free
- Chlorine, combined
- Temperature
- Flocculants

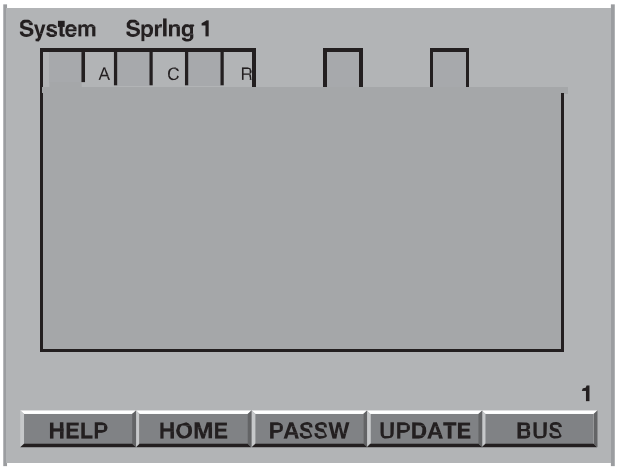
As soon as the second parameter set is activated, the central menu option shows a green identifier ‘ECO’.

To activate Eco!Mode, set connection K3 to Eco!Mode in the index card DXMaM under the configuration menu.

CAUTION

See section 6.3 “Controlling” for more detailed information on the set variables!

7 Configuration



The index cards of the individual CAN modules display the version of the module software at the left bottom and the allocated CAN node number (node ID) and the serial number (R. no. on the rating plate of the module) at the right bottom.

IMPORTANT

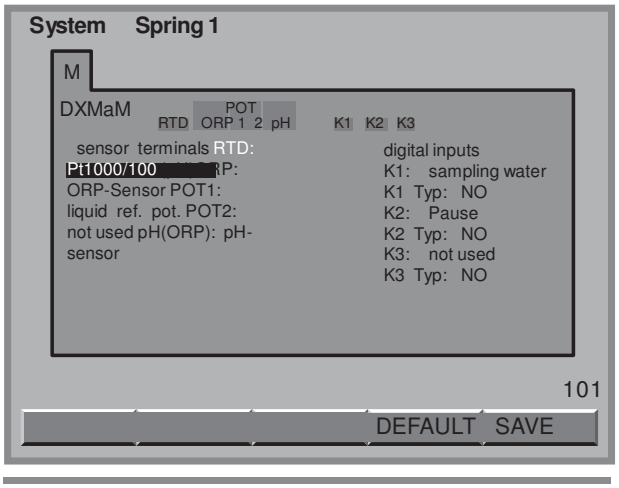
- ***The CAN sensors and the CAN pumps, too, are modules!***
- ***Terminals which are not assigned must be configured as "not assigned"!***

NOTE

As a reminder, each index card displays the arrangement of the module's terminals at the top with a coloured background.

7.1 Module DXMaM

M Module (measurement module)



Sensor connections:

Te minals/adjustable variables	Increments	Remarks
RTD (temperature)	PT1000/100	PT1000/PT100 (self-detection) if no chlorine sensor used
	Not used	Free
(pH) ORP	Redox/ORP sensor	
	Not used	Free
POT1	Liquid ref. pot.*	To “(pH) ORP” (ORP = Redox)
	Not used	Free
POT2	Liquid ref. pot.*	To “pH (ORP)” (ORP = Redox)
	Not used	Free
pH (ORP)	pH sensor	
	Not used	Free

* for equipotential bonding pin. Do not connect to ground! No jumper required.

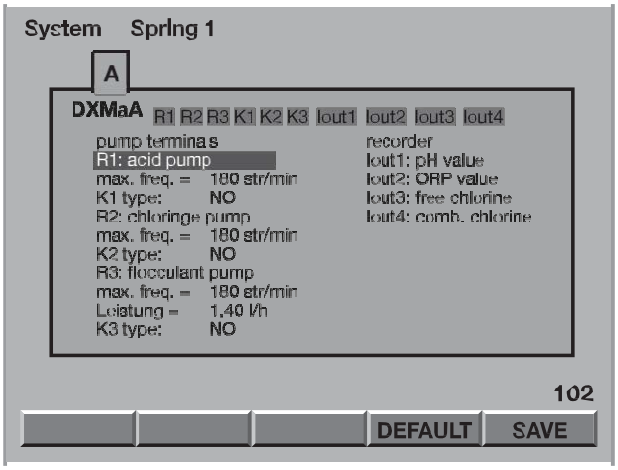
Switch inputs:

Terminals/adjustable variables	Increments	Remarks
K1	Sample flow	Sample water monitoring
K1 type	NC	
	NO	
Delay (contact)	0 ... 3,600 s	
K2	Pause control	
	Not used	Free
K2 type	NC	
	NO	
Delay (contact)	0 ... 3,600 s	
K3	Eco!Mode	Second set of parameters for all controlled variables
	Not used	Free
K3 type	NC	
	NO	

K1 - K3 are switch inputs of the M module DXMaM (the A module DXMaA shows the same designations!).

7.2 Module DXMaA

A Module (actuator module)



Pump connections:

Terminals/adjustable variables	Increments	Remarks
R1	Acid pump	For external input acid pump
	Alcaline pump	For external input alkali pump
	Not used	Free
max. freq.	0 ... 500 strokes	Only when pump selected
K1 type	NO	Only when pump selected
	NC	Only when pump selected
	Not used	Free
R2	Chlorine pump	For external input Sodium hypochlorite pump
	Acid pump	For external input acid pump
	ORP pump	For external input
	Not used	Free
max. freq.	0 ... 500 strokes	Only when pump selected
K2 type	NO	Only when pump selected
	NC	Only when pump selected
	Not used	Free
R3	Flocculation pump	For external input Flocculant pump
	Chlorine pump	For external input Sodium hypochlorite pump
	ORP pump	For external input
	Not used	Free
max. freq.	0 ... 500 strokes	Only when pump selected
Capacity	0.10 ... 18.00 l/h	Only when pump selected
K3 type	NO	Only when pump selected
	NC	Only when pump selected

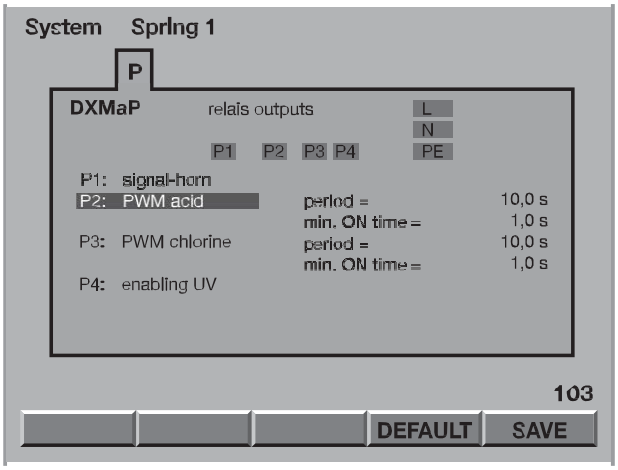
R1 - R3 are frequency outputs; K1 - K3 are switch inputs.
K1 - K3 are switch inputs of the A module DXMaA (the M module DXMaM shows the same designations!).

Outputs 0/4-20mA (standard signal outputs):

Terminals/adjustable variables	Increments	Remarks
Iout1	pH value	For recorder
	pH lower dosing	Control variable
	pH lift dosing	Control variable
	Cl dosing	Control variable
	Flocc. dosing	Control variable
	Control. out ORP	Control variable
	Not used	Free
Iout2	ORP value	For recorder
	pH lower dosing	Control variable
	pH lift dosing	Control variable
	Cl dosing	Control variable
	Flocc. dosing	Control variable
	Control. out ORP	Control variable
	Not used	Free
Iout3	Free chlorine	For recorder
	pH lower dosing	Control variable
	pH lift dosing	Control variable
	Cl dosing	Control variable
	Flocc. dosing	Control variable
	Control. out ORP	Control variable
	Not used	Free
Iout4	Comb. chlorine	For recorder ”value comb. chlorine” is the difference between the measuring values of CLE and CTE
	pH lower dosing	Control variable
	pH lift dosing	Control variable
	Cl dosing	Control variable
	Flocc. dosing	Control variable
	Control. out ORP	Control variable
	Temperature value	For recorder value temperature is received from the chlorine sensor or PT1000/PT100
	Not used	Free

7.3 Module DXMaP

P Module (power supply module)



Relay outputs:

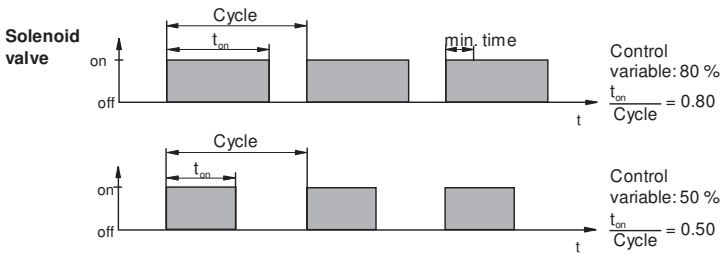
Terminals/adjustable variables	Increments	Remarks
P1	Signal-horn	
P2	PWM acid	Solenoid valve or switch-on of pump (acid)
	PWM alcaline	Solenoid valve or switch-on of pump (alkali)
	Not used	Free
P3	PWM alcaline	Solenoid valve or switch-on of pump (alkali)
	PWM chlorine	Solenoid valve or switch-on of pump (sodium hypochlorite pump)
	PWM ORP	Solenoid valve or switch-on of pump
	PWM acid	Solenoid valve or switch-on of pump (acid)
	Not used	Free
P4	UV enable	Releases locking mechanism
	PWM chlorine	Solenoid valve or switch-on of pump (sodium hypochlorite pump)
	PWM ORP	Solenoid valve or switch-on of pump
	Heating enable	
	Not used	Free
Period	0.0...999.0 s	
MIN ON time	0.0...500.0 s	

When controlling solenoid valves (PWM = pulse width modulation), the cycle times are to be observed.

NOTE

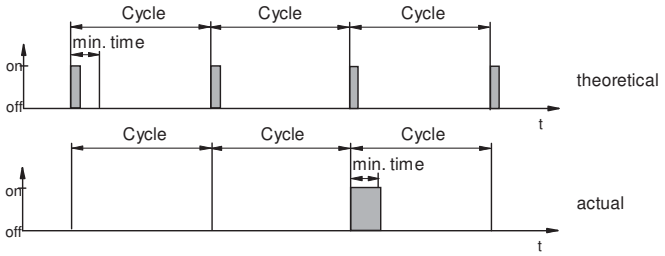
The power relays P1 (alarm) of all P modules always make and break simultaneously.

Solenoid valve relay



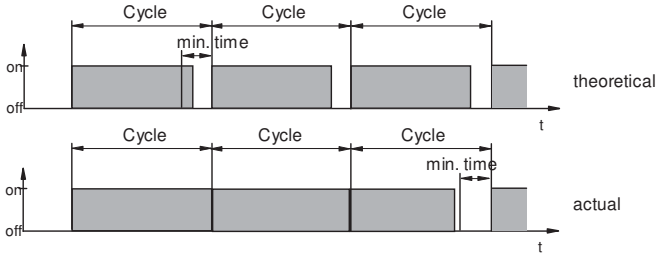
The operating intervals of the DULCOMARIN® II (solenoid valve) depend on the control variable and on “min. time” (smallest permissible operating time of the connected device).
The control variable determines the ratio t_{on}/cycle and thus the switching times (see fig. above).
“min. time” affects the switching times in two situations:

a) theoretical switching time < min. time:



The DULCOMARIN® II does not switch on for several cycles until the sum of the theoretical switching times exceeds “min. time”. Then, the controller switches on for the duration of the sum of times.

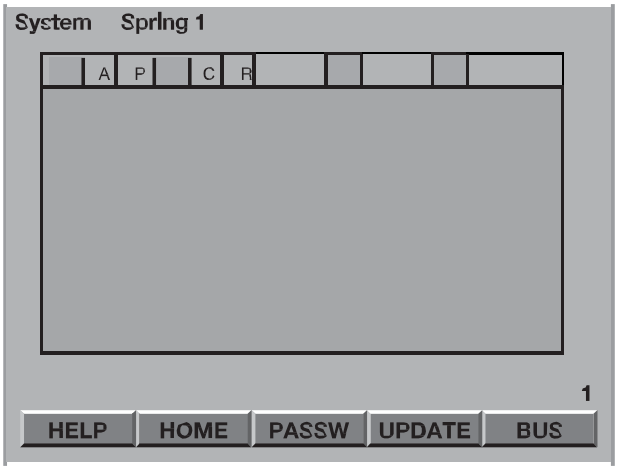
b) theoretical switching time > (cycle - min. time) and calculated switching time < cycle



The DULCOMARIN® II does not switch off for several cycles until the differences between the cycle and the theoretical switching time exceeds “min. time”.

7.4 Module Cl Free

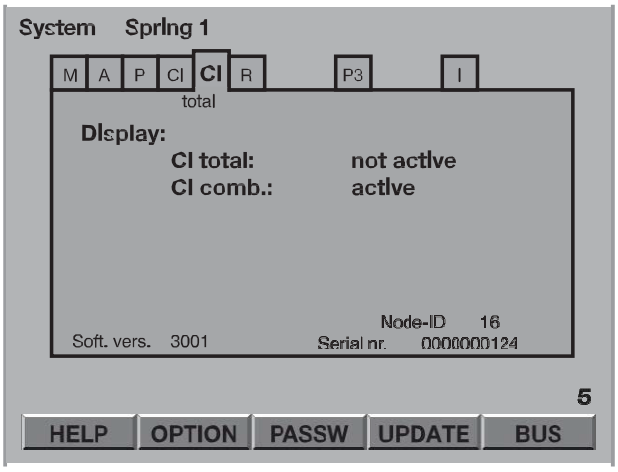
Measuring Sensor CLE



The index card only displays the software version, the CAN node number (node ID) and the serial number (R. no. on the rating plate of the module) because the CAN connection of the chlorine sensor does not require any calibration.

7.5 Module Cl Total

Measuring Sensor CTE



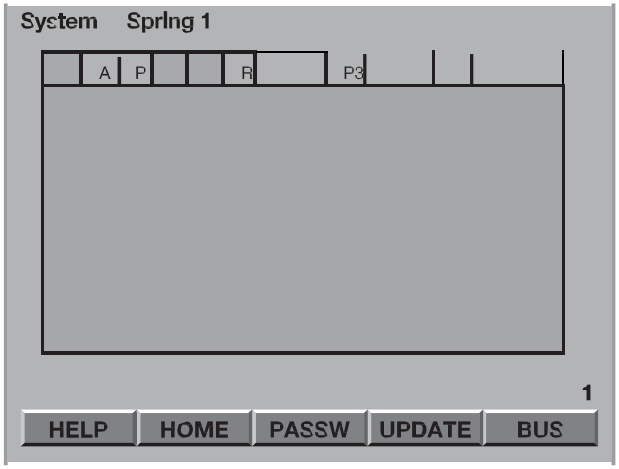
The index card shows only the version of the software, the CAN node number (node ID) and the serial number (R no. on the rating plate of the module).

It is also possible to specify in “Display” which chlorine concentration is to be shown by the DULCOMARIN® II.

Adjustable value	Increment	Remarks
Cl total	Inactive	
	Active	
Chlorine combined	Active	
	Inactive	

7.6 Module Cl

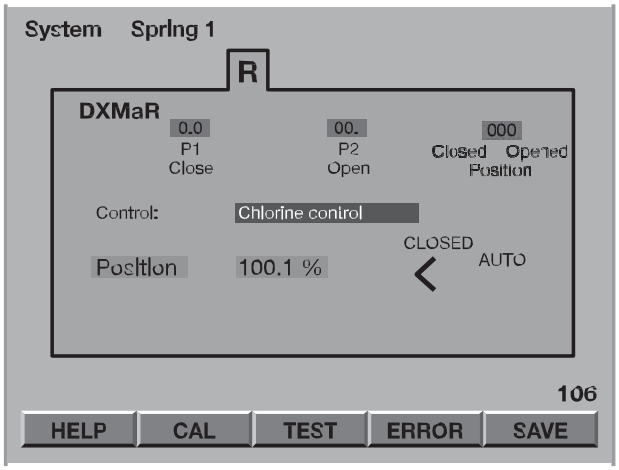
Measuring Sensor CGE



The index card only displays the software version, the CAN node number (node ID) and the serial number (R. no. on the rating plate of the module) because the CAN connection of the chlorine sensor does not require any calibration.

7.7 R Module (Actuator Module for Chlorine Gas Metering Unit)

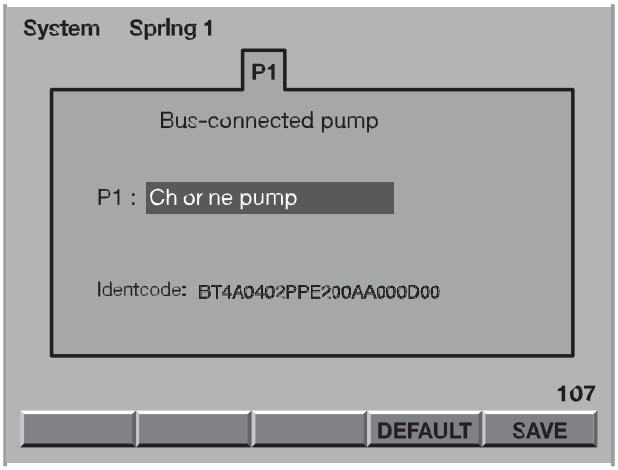
DXMaR Module



Adjustable variable	Range	Remarks
Control	Chlorine control	
	ORP control	

7.8 P1 Module (Metering Pumps Module)

CAN-Beta®



Pump use

Adjustable variable	Range	Remarks
P1	Acid pump	For acid
	Chlorine pump	
	Flocculation pump	
	Alkaline pump	For alkaline solution
	ORP pump	
	Pump standby chlorine	Only with I module and chlorine sensor
	Pump NH_4OH	Only with I module and chlorine sensor
	Pump F^-	Only if set at I module
	Pump ClO_2	Only if set at I module, without chlorine sensor
	Pump H_2O_2	Only if set at I module, without chlorine sensor
	Free	

An index card: P1, P2 or P3 appears for each pump connected to the CAN bus.

The index card also shows the current values for the following variables:

Variable	Range	Remarks
Pump capacity	0...100 %	Display of the current, relative pump capacity
Stroke length	0 ... 100 %	The metering accuracy decreases below 30 %
Level	> 10 %	Level OK
	< 10 %	Prepare tank change
	Tank empty	Change tank
Output		Maximum calculated metering capacity for the pump type at the set stroke length, 100 % stroke rate and 1.5 bar backpressure
Pump status	OFF	Beta multifunction switch set to STOP
	ON	Beta multifunction switch not set to STOP
	Bus	Beta multifunction switch set to BUS
	Manual	Beta multifunction switch not set to BUS
	Calibrate pump!	
	Calibration OK!	

Even in systems with only one system (pool), CAN pumps must be allocated to this system (pool) (see chapter 8 “Complex Activities“). The metering rate curves for each stroke length at a constant backpressure of 1.5 bar are stored in each Beta/4-CANopen.
DULCOMARIN® II will trigger an alarm and a message will appear in the display if the stroke length of Beta changes by more than ±10 %. The pump, however, continues to operate.
The message disappears after saving the settings (calibration) and DULCOMARIN® II adapts the pump output corresponding to the new metering rate curve.

Pump standby chlorine

The Disinfection controller can control up to 4 metering pumps with CAN bus.
It is possible to configure a metering pump for chlorine as standby pump to supplement the main chlorine pump.
In this case, the screen recorder must be activated and a SD card must be inserted because the recorder saves the operating modes in the event file on the SD card (see Supplementary instructions for screen recorder).

The following causes effect switching to the standby pump:

- failure of the main chlorine pump
- chemicals supply of the main chlorine pump is empty
- The main pump was set to “Stop” at the multifunctional switch.

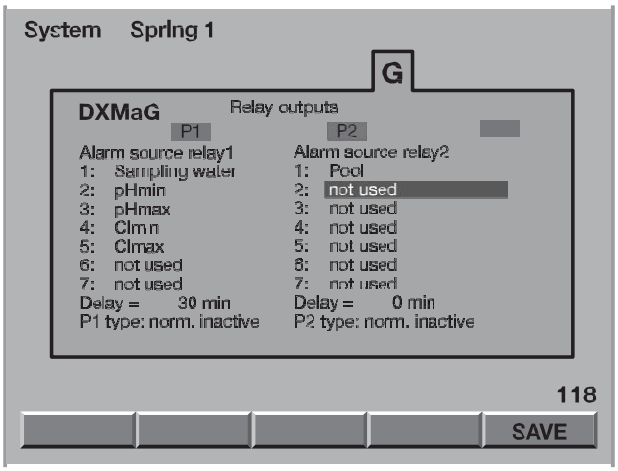
A power failure or disconnection of the bus connection to the main pump, however, does not result in any switching to the standby pump.

Pump NH_4OH

If CAN pumps are configured for chlorine control, a pump for chloramination can also be configured via “PumpNH_4OH”. The pump then meters an ammonium solution parallel to the chlorine solution. To obtain the correct stoichiometry, the concentration of the ammonium solution and the stroke length of the ammonium pump must be adjusted to the chlorine concentration in the treated water.

7.9 G Module (Limit Value Module)

DXMaG Module

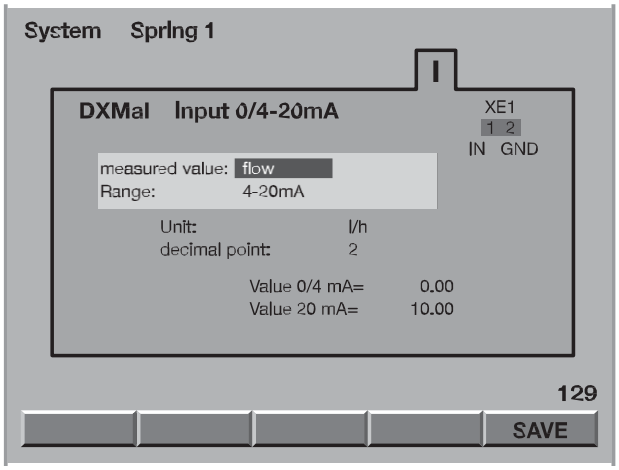


Variable	Range	Remarks
Alarm sources	System (pool)	All alarm sources can be selected with “System (pool)”. Only alarm source 1.
	Sample water	Sample water monitoring
	pH min	
	pH max	
	Cl min	
	Cl max	
	Free	
Delay (error)	0 ... 999 min	
P1 Type	Normally inactive (NO)	Power relay P1 of all
	Normally active (NC)	P modules
P2 Type	Normally inactive (NO)	Power relay P2 of all
	Normally active (NC)	P modules

Up to 7 alarm sources per power relay can be selected (the alarm sources are then OR operations).

7.10 I Module (Current Input Module)

Module DXMaI



Adjustable variables	Increment	Remarks
Measured variable	Sample water	Only at K1
	Pause	Only at K2
	Flow rate Q	Only at “I out 1”; can be used as disturbance for measured variables at “I out 2”
	Turbidity	Only at “I out 1” or “I out 3”
	Conductivity	Only at “I out 2”
	F^-	Only at “I out 2”
	O_2	Only at “I out 2”
	ClO_2	Only at “I out 2”
	ClO_2^-	Only at “I out 2” or “I out 3”
	H_2O_2	Only at “I out 2”
	UV	Only at “I out 3”
	Temp.	Only at “I out 3”
	PES	Only at “I out 3”; peracetic acid
Range	0-20 mA	
	4-20 mA	

Unit/adjustable variables	Increment	Remarks
Flow rate Q	m^3/h	
	l/h	
Turbidity	NTU	
	FNU	
	FTU	
	FAU	
	EBC	
Conductivity	µS/cm	
	mS/cm	
	S/cm	
UV	W/m^2	
	mW/cm^2	
Others	mg/l	For F^-, O_2, ClO_2, ClO_2^-, H_2O_2, PES
	ppm	

Adjustable variables	Increment	Remarks	
		Value range for 0/4 mA	Value range for 20 mA
Decimal places	0	0...9000	0...9,999
	1	0...900,0	0...999.9
	2	0...90,00	0...99.99
	3	0...9,000	0...9,999

Adjustable variables	Increment	Remarks
Value 0/4 mA	0...9999	For 0 decimal place
	0...999,9	For 1 decimal places
	0...99,99	For 2 decimal places
	0...9,999	For 3 decimal places
Value 20 mA	0...9999	For 0 decimal places
	0...999,9	For 1 decimal place
	0...99,99	For 2 decimal places
	0...9,999	For 3 decimal places

Setting of measured variables

Measured variables With the I module, the signals of sensors or units can be processed which supply a mA standard signal for the following measured variables:

Measured variable	Sensor or unit
Fluoride (F^-)	Measuring transducer 4-20 mA FP V1
Dissolved oxygen (O_2)	DULCOMETER® controller type D1C for dissolved oxygen
Chlorine dioxide (ClO_2)	Amperometric DULCOTEST® sensor
Chlorite (ClO_2^-)	Amperometric DULCOTEST® sensor
Ammonia (NH_2)	Measuring transducer 4-20 mA A V1
Hydrogen peroxide (H_2O_2)	Amperometric DULCOTEST® sensor
Peracetic acid (PES)	Amperometric DULCOTEST® sensor
Conductive conductivity	Measuring transducer DMT conductivity
Temperature	Measuring transducer 4-20 mA PT 100 V1
Flow	Matching third-party unit
UV intensity (UV)	Matching third-party unit
Turbidity	Matching third-party unit

Displays and limit values The signals are displayed and can be monitored via the limit values (PARAM – AL).

Temperature compensation For fluoride, a temperature compensation can be selected in PARAM - MEAS. To achieve this, a temperature sensor must be connected to the input “I out 3”.

Configuration All measured variables, which can be selected here, are shown in 3 lines which can be selected using the arrow keys.
The sensors for the measured variables in line 1 must be connected to the terminal XE1, the sensors for the measured variables in line 2 to the terminal XE2 … .

Configuration of a sensor or unit:

- Select the correct line for the terminal (arrow keys UP/DOWN; for KE1 - line 1,...) and press the ENTER key – a screen to select the measured variable is displayed.
- Press the ENTER key.
- Select the correct measured variable and press the ENTER key.
- Confirm the setting by pressing the key F5 ACC – a scroll bar is displayed.

The defaults for the new measured variable are now loaded. Changing of certain parameters of the configuration, if required:

- Select the correct range of the standard signal in “Range”.
- Press the RIGHT key to select the next parameter block.
- Set the correct unit in “Units”.
- Select the desired number of decimal places after the comma to be shown in “Decimal places”.
- Press the RIGHT key to select the next parameter block.
- Select the correct zero value of the measured variable in “0/4 mA“.
- Select the correct maximum value of the measured variable in “20 mA“.
- Safe all settings by pressing F5 SAVE.
- In the following dialogue box, press the ENTER key for "Yes".
- Check whether parameters have to be adjusted in the PARAM menu, such as e.g. alarms or temperature compensation.
- A new measured variable for concentration has now to be calibrated.

8 Complex Activities

CAUTION

When performing these activities, always allow a few seconds to elapse between the last message or the last progress bar and the next activity.

NOTE

Modules can be logged on and off, but not temporarily, via the bus menu (the central unit does not store all data that are required for seamlessly restarting operation of the module).

8.1 Logging Modules On and Off

1. To add a module to the CAN configuration of the DULCOMARIN® II or a module that was deleted from the last configuration (see below):
   (The central unit does not yet have data relating to the module.)

- Add the module to the CAN-bus line – the message “Configuration service started – LSS node detected …” appears in the central menu option.
- See 3.

2. To disconnect a module temporarily without interim use of the CAN bus line at its basin:
   (The central unit stores all data that are required for seamlessly resuming operation of the module.)

- Disconnect the module from the CAN-bus line – the message “Module disconnected! Press ENTER” appears in the central menu.
- Press the ENTER key – the menu “Logged off modules” is displayed.
- Press F4 (SAVE); the module remains saved in the CAN configuration.
  The message "Reconfiguration complete. Press ESC” is displayed.
- Press the ESC key to go to the central menu
  (The overview at the beginning of the BUS submenu in the configuration menu shows that the module is “not connected”)
  See next section for further procedure.

3. To reconnect a module which was temporarily disconnected without interim use of the CAN bus line (see paragraph above) to the CAN bus line at the old basin:
   (The central unit again activates all data that are required for seamlessly resuming operation of the module.)

- Connect the module to the CAN bus line – the message “Automatic configuration started – LSS node detected …” with progress bar is displayed in the central menu option and then “Automatic configuration complete – press ESC”.
- Press the ESC key - the permanent display with the message “Module registered! Press ENTER” is shown.
- Press the ENTER key – the central menu option with the message “Module registered! Press ENTER” is shown.
- Press the ENTER key – the menu “Registered modules detected” is displayed.
- Press F4 (ACC) for the module to function again at the CAN bus as saved in the CAN configuration - first a progress bar is shown and then the message "Reconfiguration complete. Press ESC”.
- Press the ESC key to go to the central menu

4. To finally disconnect a module from its system (pool) or the DULCOMARIN® II or to use it at another system (pool) or another DULCOMARIN® II:
   (The central unit deletes all data in connection with this module.)

- Disconnect the module from the CAN-bus line – the message “Module disconnected! Press ENTER” appears in the central menu.
- Press ENTER followed by F2 (DELETE) to delete the module from the CAN configuration.
- Press the ESC key to go to the central menu
  (The overview at the beginning of the BUS submenu in the configuration menu shows that the module is set to “not connected”)
- Add the module in the same way as a new module to the CAN configuration of the DULCOMARIN® II – see 1.

8.2 Placing Pump CAN-Beta into Operation

CAUTION

To avoid problems, follow these instructions precisely!

Preparation

- If not yet done, start up the central unit.
- Set the stroke length to 95 % or as required at the pump.
- Check that the multifunction switch is set to BUS.
- Connect the pump to the CAN bus and only then connect to the supply voltage – the display of the central unit shows the message “Automatic configuration in progress – LSS node detected ” with progress bar and then “Automatic configuration complete – press ESC”.
- Press the ESC key - the permanent display with the message “New module reported! Press ENTER” is shown.
- Press the ENTER key – the central menu option with the message “New module reported! Press ENTER” is shown.
- Press the ENTER key – the menu “New module detected” is displayed.

Assignment to a system (basin, filtration circuit …)

- Select “System” with the arrow keys and press the ENTER key.
- Enter the desired system number with the arrow keys and press the ENTER key.

Assignment of pump number

- Select “No.” with the arrow keys and press the ENTER key.
- Enter the desired number for the pump (P1 … P4) with the arrow keys and press the ENTER key.

Saving of the configuration

- Press F4 (ACC) to save the CAN configuration - first a progress bar is shown and then the message "Reconfiguration complete. Press ESC”.

Allocate purpose

- In the central menu option press this key sequence to assign the pump to an application purpose: F4 (CONFIG), LEFT/RIGHT (index card P1 or P2 …), ENTER, arrow keys (password for level 3), 2x ENTER, arrow keys (application pump), ENTER, F5 (SAVE), ENTER, a progress bar is displayed, if “Pump Flocculation” was selected as application purpose.
- Then press ESC key.

“Calibrate” pump

- Press the following key sequence to “calibrate” the pump: F3 (PARAM), arrow keys (index card FLOCCULATION CONTROLLER):
- Even if the message “Pump capacity changed. Press ENTER and SAVE” does not appear, press the following key sequence: ENTER, F5 (SAVE), ENTER – progress bars appear.
- Then press ESC key 2x.

8.3 Placing R Module into Operation

CAUTION

Shut down chlorine gas metering while placing into operation (motive water pump, gas)! Otherwise chlorine gas could escape into the system (pool) area!

- If you wish to change the measured variable to be controlled (chlorine or ORP), do it now.

Test connection to R module

CAUTION

The test can be terminated at any time with F2 (STOP) – the chlorine gas metering unit then closes.

- Press the F4 key (TEST) – the TEST menu appears.
- As a test, manually actuate the chlorine gas metering unit with the keys F3 (CLOSED) and F4 (OPEN).
- Press F5 (QUIT) to exit the menu.

Calibrate R module

CAUTION

- ***The calibration procedure can be terminated at any time with F4 (STOP) – the chlorine gas metering unit then closes.***

NOTE

- ***The index card shows the current opening angle of the valve at all times (= position in %, low number = valve relatively closed, high number = valve relatively open).***

- Press the keys F2 (CAL) and F2 (START) one after the other.
  The message “Calibration running” appears in the display.
  Initially, DULCOMARIN® II closes the chlorine gas metering unit.
  It then performs two calibration runs (open and close) (DULCOMARIN® II waits for a short time in each end position in order to evaluate the constancy of the potentiometer signal).
  The message “Calibration finished” appears when the calibration procedure has finished and “Press QUIT”.
- Press F5 (QUIT) to exit the calibration menu.
  After pressing F5 (SAVE) and the ENTER key, DULCOMARIN® II opens the chlorine gas metering unit corresponding to the current control variable.

8.4 Updating Software

Request the adequate update instructions for the present update from ProMinent Dosiertechnik GmbH.

9 Troubleshooting

IMPORTANT

The number before the error message shows the system (pool) number of the relevant system (pool) for the Dulco-Net.

Error messages	Response of DULCOMARIN® II and remedies
Sample water error	Dosing at base load, measuring values incorrect, check sample water throughput
pH sensor defective	Dosing at base load, measuring values incorrect, replace sensor
pH value too low	Dosing at base load, look for causes if required, switch to manual dosing
pH value too high	Dosing at base load, look for causes if required, switch to manual dosing
pH input hot-wired	Dosing at base load, measuring values incorrect, look for cause (incorrect connection)
pH not connected	Dosing at base load, measuring values incorrect, look for cause (incorrect connection)
pH error pump	Check tank, check pump, bleed air, measuring value OK
pH tank empty	Replace tank, bleed air, measuring value OK
ORP sensor defective	Measuring value incorrect, dosing at base load (if redox/ORP control active)
ORP value too low	Measuring value incorrect, dosing at base load (if redox/ORP control active)
ORP value too high	Measuring value incorrect, dosing at base load (if redox/ORP control active)
ORP input hot-wired	Measuring value incorrect, dosing at base load (if redox/ORP control active)
ORP not connected	Measuring value incorrect, dosing at base load (if redox/ORP control active)
Chlorine free CLE sensor defective	Measuring value incorrect, replace sensor
Chlorine free CLE - value too low	Dosing at base load, look for causes if required, switch to manual dosing
Chlorine free CLE - value too high	Dosing at base load, look for causes if required, switch to manual dosing
Chlorine free CLE not connected	Connect sensor
Chlorine free CLE - correction value temp. missing	Dosing at base load, measuring values incorrect, replace sensor
Chlorine free CLE - correction value pH missing	No pH sensor, switch pH correction to manual
Chlorine error pump	Check tank, check pump, bleed air, measuring value OK
Chlorine tank empty	Replace tank, bleed air, measuring value OK
Chlorine free CTE sensor defective	Measuring value incorrect, replace sensor
Combined chlorine value too low	Recalibrate chlorine sensors
Combined chlorine value too high	Addition of fresh water required
Chlorine total CTE - correction value temp. missing	Measuring value incorrect, replace sensor
Chlorine total CTE - correction value pH missing	No pH sensor, switch pH correction to manual
Chlorine total CTE sensor not connected	Connect sensor
Temperature sensor defective	Measuring value incorrect, replace PT1000(100)
Temperature value too low	Look for cause

Temperature value too high	Look for cause
Temperature input hot-wired	Measuring values incorrect, look for cause (incorrect connection)
Temperature not connected	Measuring values incorrect, look for cause (incorrect connection)
Error pump flocculants	Check tank, check pump, bleed air
Flocculant tank empty	Replace tank; bleed air
Module DXMaM bus error	Contact customer service
Module DXMaA bus error	Contact customer service
Module DXMaP bus error	Contact customer service
Chlorine free CLE - probe bus error	Contact customer service
Chlorine total CLE - probe bus error	Contact customer service
Actuator motor not ready	Basic load? See Table 3 “Specific faults …” for further procedure

Tab. 1: Error messages center menu option and remedies

Error messages	Response of DULCOMARIN® and remedy
Sensor error	Identify causes, if required replace sensor
Calibrate sensor	Calibrate sensor

Tab. 2: Error messages in the fields for measured variable and remedy

NOTE

- ***By pressing F4 (MEAS), the pH value, the sensor current, and the temperature at the time of pressing the key can be displayed.***
- ***If an error message is displayed during the calibration of a chlorine sensor, access more detailed data by pressing F3 INFO.***
  These data are also of help when talking with the technical service.

Rectifying servomotor fault

- If the error message “servomotor: Not ready” appears in the display, press F4 (ERROR) in the index card “R module” – the index card “Operating error” appears.
- Note down the specific error message relating to the actuator motor.
- Rectify the fault corresponding to the table 3.
- Press F2 (RESET) to exit the menu and acknowledge the fault.

NOTE

In preparation for a call to ProMinent Service, write down the calibration values of the actuator motor: Press F1 (HELP) in the index card “R module” – the table with the calibration values appears.

Error message	Cause	Remedy
Upper calibration point exceeded	Upper cam switch did not trip	Check mechanism in chlorine gas metering unit
Lower calibration point exceeded	Lower cam switch did not trip	Check mechanism in chlorine gas metering unit
Potentiometer not connected	No position feedback to R module	Check that wiring of potentiometer in the chlorine gas metering unit and wiring in the R module is connected correctly
Wrong direction of rotation	Direction of rotation of actuator motor does not agree with direction of rotation of potentiometer	Check that wiring of potentiometer and of relay actuation in the chlorine gas metering unit and wiring in the R module is connected correctly

Position not reached	Actuator motor does not reach the calculated position	Interruption in voltage supply, check wiring, excessive play in mechanism
Communication timeout	R module does not respond within the permitted time window	Check BUS connection, M module
Heartbeat timeout	Module not connected correctly	Check BUS wiring
Lower stop too low	Cam switch did not trip	Check mechanism, secure cam
Upper stop too high	Cam switch did not trip	Check mechanism, secure cam
Differences in calibration runs	There are runtime differences between the two calibration runs	Check mechanism, replace if necessary
Motor too fast	Jump in potentiometer or mechanism	Replace potentiometer or mechanism

Table 3: Specific actuator motor faults of index card “Operating faults”

Dosing	START/ STOP key	Parameter menu Controlling: OFF	Sample water error	Pause contact	Meas. value error	Display	Dosing	Remarks
Controller						Dosing ***60 %***	Control variable	
	X					Dosing **OFF**	0 %	For all measured variables of the displayed system
		X				Dosing **OFF**	0 %	For one measured variable
			X			Dosing **OFF** Error message	0 %	
				X		Dosing **Pause**	0 %	
					X	Dosing ***10 %***	Base load	Adjustable (see chapter 6.3)
Manual						Man. dosing ***20 %***	Set value	Adjustable (see chapter 6.3)
	X					Man. dosing **OFF**	0 %	For all measured variables of the displayed system
		X				Man. dosing **OFF**	0 %	For one measured variable
			X			Man. dosing **OFF** Error message	0 %	
				X		Man. dosing **Pause**	0 %	
					X	Man. dosing ***20 %***	Set value	Adjustable (see chapter 6.3)

Tab. 4: Dosing characteristics at various controller modes

Left LED
(Device LED)

Colour	Flash code	Cause	Result	Remedies
Red	Illuminated	Any	Warnings or acknowledged error messages	Remedy error (see tab. 1)
Red	Flashing	Unacknowledged error messages	Alarm	Acknowledge alarm, remedy error (see there)
Green	Illuminated	No device defect present	Standard operation DULCOMARIN® II	-

Right LED
(CAN-open LED)

Colour	Flash code	Cause	Result	Remedies
Green	Illuminated	Bus status OPERATIONAL	Standard operation bus	-
Green	Flashing	Bus status PRE-OPERATIONAL	Presently no measuring value communication	Wait briefly

Ignore the flash codes for approx. 2 min. (acknowledge any alarm, if any) after connecting the DULCOMARIN® II.

If the LEDs repeatedly start to send one and the same sequence of flash codes, the bus has to supply too many devices.
In this case, loop a (further) N or P module into the bus (see part 1 of the operating instructions).

In case of all other flash codes, contact the customer service!

Tab. 5: Flash code for LEDs DULCOMARIN® II (central unit DXCa)

Left LED
(Device LED)

Colour	Flash code	Cause	Result	Remedies
Red	Illuminated	Electronics error	Sensor faulty	Return chlorine sensor or contact customer service
Red	Flashing*	Start-up phase	No measuring value communication	Wait briefly
Red	Simple Flashing**	Calibration incorrect	Measuring value incorrect	Re-calibrate
Red	Double Flashing***	0 ppm > measuring value > 10 ppm	Measuring value too high / too low	Check chlorine content of sample water
		Measuring value ∓ limit value	Violation of limit value	Clarify cause; if required, re-set values
		No correction value pH transmitted	Correction value pH missing	Check parameters and configuration. Check pH sensor
Green	Illuminated	No device defect present	Standard operation Sensor	-
-	Dark	No supply voltage	Sensor not functioning	Check cable connections

Right LED
(CAN-open LED)

Colour	Flash code	Cause	Result	Remedies
Red	Any	Bus error	No measuring value communication	Contact customer service
Green	Illuminated	Bus status OPERATIONAL	Standard operation bus	-
Green	Flashing	Bus status PRE-OPERATIONAL	Presently no measuring value communication	Wait briefly

Ignore the flash codes for approx. 2 min. (acknowledge any alarm, if any) after connecting the chlorine sensor.

If the LEDs repeatedly start to send one and the same sequence of flash codes, the bus has to supply too many devices.
In this case, loop a (further) N or P module into the bus (see part 1 of the operating instructions DULCOMARIN® II).

In case of all other flash codes, contact the customer service!

Tab. 6: Flash code for LEDs CAN chlorine sensors (DXUa)

LEDs of Power Supply Modules

The two light emitting diodes LED 1 and LED 2 (last figure in chapter 8 “Terminal Connection Diagram” of supplementary instructions for power supply modules) indicate the load of the 24 V voltage supply for the CAN-bus.

Operating status	LED 1 (H2, current)	LED 2 (H3, voltage)	Current	Remarks
Normal	OFF	Green	< 1.1 A	Everything OK
Limit load	Red	OFF	> 1.1 A	Loop in a further power supply module
Overload/short-circuit	Red, flashing	OFF	> 1.35 A	Check wiring

Table 7: Flash code LEDs, power supply module monitoring DULCOMARIN® II (N and P module)

10 Glossary

pH Value

The pH value is the measure for the concentration (activity) of hydrogen ions or more simply: a measure for the acid or alkali character of water.

In system (pool) water treatment, the pH value is of significant importance. It affects:

- **the disinfection effect: the disinfection effect of chlorine decreases with increasing pH value**
- **the flocculation: for each flocculant there is only one pH range where the agent shows optimum effect**
- **the corrosivity: the aggressiveness of water increases with decreasing pH value. Metallic materials are attacked.**
- **the skin tolerability: the acid protection layer of human skin has a pH of 5.5. Excessive pH values of the system (pool) water attack the acid protection layer and result in skin irritations.**

A pH value which is too low promotes the formation of tri-chloramine. This results in eye irritations (reddened, burning eyes) and irritations of mucous membranes (e.g. coughing).

For the above mentioned reasons, the pH values in system (pool)s in general should range between 6.5 and 7.6 (optimum: pH optimum of the used flocculant). In a private system (pool), where in general no flocculant is used, the pH value should range between 7 and 7.2

On the other hand, the pH measurement is affected by the following factors:

- **the chlorination: all chlorine products result in a change of pH value**
- **the water flow: carbonic acid (CO_2) exhaled from the system (pool) water leads to an increase of the pH value. This effect can be increased by an unfavourable water flow or by air jets, water mushrooms or similar.**

For the above mentioned reasons, it is necessary to constantly measure and control the pH value.

Redox/ORP

The redox/ORP depends on the sum of the substances present in the water having a reducing and oxidising effect. It is a measure for the disinfection power in the water. The higher the concentration of the oxidising substances, the higher the value of the redox/ORP (oxidation = disinfection).

In the system (pool), the hypochlorous acid is the determining oxidising substance. The contaminating substances have a reducing effect.

pH value and temperature have the following effect on the redox/ORP value when the water is chlorinated:

increasing pH value --> decreasing redox/ORP

increasing temperature --> increasing redox/ORP

A stable pH value is of particular importance!

There exists no clear relationship between the concentration of the disinfectant and the redox/ORP. An redox/ORP of 750 mV guarantees that the introduced microorganisms are either destroyed or inactivated within a few seconds. At an ORP of less than 600 mV, the disinfection time may range between a few minutes and several hours.

Calibration (Sensor Calibration)

All pH electrodes, too, deviate from the theoretical values. Thus, a calibration (sensor calibration of zero point and slope) must be performed at the transducer.

In case of a one-point calibration this is done with a quality buffer solution of pH 7. This means that only the zero point is calibrated.

In case of a 2-point calibration, a second value is to be selected for slope calibration: e.g. pH 4 or pH 10. The second value depends on the actual measuring range (alkaline or acid).

In system (pool) applications, it is sufficient only to calibrate the zero point (at pH 7) and to check the sensor function with a buffer solution of pH 4 or pH 10. Since the measurement is done around the zero point, a moderate slope error is negligible.

The slope of the measuring sensor changes due to ageing and contamination.

Zero Point

The zero point describes e.g. the voltage a pH sensor gives off at a pH value of 7. The zero point of the pH sensor changes due to ageing and contamination.

The zero point of pH sensors is theoretically 0 mV. In practice, a zero point between -30 mV and +30 mV is still acceptable in practice. New electrodes have a zero point deviation of max. ±30 mV.

Slope / Sensitivity

This value is e.g. stated in mV/pH at 25 °C.

Controlled Variable (Measuring Value, Actual Value)

The controlled variable is the variable to be measured or detected (e.g. pH value, ORP value).

Setpoint

The setpoint is the value to be permanently maintained stable throughout the processing by controlling.

xp Value

The xp value affects the proportional control behaviour. In case of a deviation of +1.4 pH , a xp of 1.4 pH e.g. leads to a control variable of -100 %, or a deviation of -1.4 pH leads to a control variable of +100 %. Thus, if a deviation in the magnitude of xp occurs, a control variable of 100 % results.

Disturbance

The control can process a signal of a flow measurement at the analogue input “I out 1” of the DXMal module as disturbance for the controlled measured variables of the I module.
This disturbance influences the controller output calculated by the controller depending on this external signal.

Depending on the type of the influence on the controlled output, the following is differentiated:

- multiplicative disturbance (flow-proportional influence)
- additive disturbance (controller output-dependent influence)

IMPORTANT

During “Commissioning”, the zero point signal of the flow meter must be checked without flow (must be $\geq$ 0).

Multiplicative Disturbance

This type of disturbance processing is used e.g. for continuous neutralisation.
The “controlled output” first “determined” by the controller is influenced multiplicatively by a factor F.
The factor ranges between $0 \leq F \leq 1$ ($0 \mathrel{\tilde{=}} 0$ %, $1 \mathrel{\tilde{=}} 100$ %). The controller output may thus be 100 % max.

$$\text{Controller output to actuator [\%]} = \frac{\text{determined controller output [\%]} * \text{current disturbance [mA]}}{\text{Rated value disturbance [mA]}}$$

A “current disturbance” larger than or equal to the “Rated value disturbance” has no influence on the controller output (see examples 2 and 3 in the table).

Examples:

Designation	Unit	1.	2.	3.	4.
Determined controller output	%	50	50	50	0
Current disturbance (for 0-20 mA)	mA	5	10	20	15
Rated value disturbance	mA	10	10	10	10
Factor F	-	0.5 (50 %)	1 (100 %)	1 (100 %)	1 (100 %)
Final controller output	%	25	50	50	0

Caption:

The determined controller output is the controller output the controller would deliver without disturbance. The rated value disturbance limits the used range.

Example:

A flow meter is e.g. used which is able to detect a maximum flow of Q = 250 m^3/h. The analogue output of the flow meter delivers a signal corresponding to 4 mA = 0 m^3/h, 20 mA = 250 m^3/h. The flow, which is achieved in the application as a maximum, however, is only 125 m^3/h. If the standard signal output signal of the flow meter is now not adjusted to the 4…20 mA range of the D1C (is possible with most flow meters), the standard signal at 125 m^3/h is only 12 mA. This value is then to be entered in the menu “Set disturbance?” in “Rated value disturbance”.

The disturbance is the present analogue current which is supplied by the flow meter. The final controller output is signalled to the actuator.

CAUTION

The multiplicative disturbance is not to be used for the permanent deactivation of the controller output! Please use the pause function for deactivation.

Additive Disturbance

The additive disturbance feedforward is suitable for metering tasks where the metering amount primarily depends on the disturbance (e.g. flow) and only requires little correction. This type of disturbance processing is used e.g. for chlorination of water with almost constant chlorine consumption.

A base load metering depending on the disturbance is added to or subtracted from the “controller output” first “determined” by the controller. The controller output may be 100% max.

$$\text{Controller output to actuator [\%]} = \frac{\text{determined controller output [\%]} + \text{max. additive controller output [\%]} * \text{current disturbance [mA]}}{\text{Rated value disturbance [mA]}}$$

Examples:

Designation	Unit	1.	2.	3.	4.	5.	6.
Determined controller output	%	40	90	50	50	50	0
Current disturbance (for 0-20 mA)	mA	5	5	2	10	20	5
Rated value disturbance	mA	10	10	10	10	0	10
Max. add. controller output	%	100	-100	200	200	200	100
Final controller output	%	90	40	90	100	50	50

Caption:

The maximum additive disturbance specifies which disturbance is to be added at a maximum (given current disturbance = rated value disturbance).
For further captions, see “Multiplicative disturbance”.

CAUTION

If no current disturbance exists (flow = 0) but a determined C of the PID controller, then the final controller output equals the determined controller output of the PID controller.

If a current disturbance exists (flow > 0) and the determined controller output of the PID controller is "0", then the final controller output equals the 2nd term of the above equation:

$$\frac{\text{max. additive controller output} * \text{current disturbance}}{\text{Rated value controller output}}$$

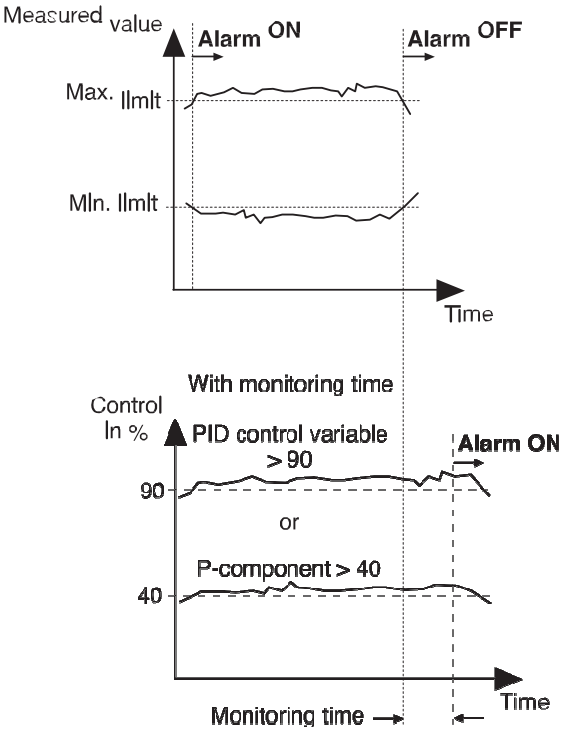
Control Variable

The control variable is the output (e.g. frequency, mA signal) transmitted e.g. by the controller to the actuator of a metering pump to reach the setpoint again (at control variable 100 %, the pump functions at full capacity).

Limit Values

"min. limit" means that the limit value criterion is violated in case of undershoot.

"max. limit" means that the limit value criterion is violated in case of overshoot.



Monitoring Time

CAUTION

Do not confuse the "monitoring time control" function with the "monitoring time measured value" of the DULCOMETER® D1C!

The "monitoring time control" function provides a protection facility to avoid overmetering. After the monitoring time has elapsed, the function switches the corresponding control circuit to 0 % metering and triggers an error message when:

- Pure P control: the P component of the control variable is greater than 40 %
- PID control: the PID control variable Y is greater than 90 %

Press the Start/Stop button twice to restart the corresponding control circuit and to remove the error message for the control circuit.

Determining the monitoring time

Precondition:

The system has reached the target values for chlorine concentration (0.45 mg/l) as well as the pH value.

- Stop the control system with the Start/Stop button.
- Wait until the chlorine concentration has dropped to 0.1 mg/l.
- Restart the control system with the Start/Stop button.
- Stop the time until the target value is reached again.
- Enter this time multiplied by 1.5 as the monitoring time for the chlorine concentration.
- Provided the pump variables were selected correctly, this monitoring time can also be entered for the pH value.

Delay (Error)

After a limit value infringement, the limit value relay of the G module will not switch before the delay set here has elapsed. This delay ensures that a short-term limit value infringement will not trigger an error message.

Delay (Contact)

As soon as a contact is connected externally to a contact input K of the M module, DULCOMARIN® II sets the outputs to “0” for as long as this contact is connected and for a subsequent delay period (contact) (provided it is set).
DULCOMARIN® II suppresses the fault processing procedure for as long as the contact is closed. As soon as the contact is opened, DULCOMARIN® II assumes the troubleshooting procedure – once the delay (contact) has elapsed (if set).
After the contact opens, the outputs remain set to “0” for the duration of the delay (contact).
The delay (contact) must be set such that, for example, sample water with the current process concentration flows up to the sensor within this time.
The delay (contact) for “Pause control” has a higher priority than the delay (contact) for “Sample water”.
The outputs 0/4-20 mA (standard signal outputs) for measured value or correction value are not affected by this function.

Delay (Alarm Limits)

Following an infringement of the alarm threshold, DULCOMARIN® II will not trigger an error message before the delay set here has elapsed. This function is intended to ensure a short-term infringement of the alarm threshold will not trigger an error message.

Controlling

The controller DULCOMARIN® II can be used either as P, PI or PID controller. This depends on the setting of the control parameters.

The control variable is calculated once per second.

This controller cannot be used in control circuits which require a rapid compensation of control deviations (smaller than approx. 30 seconds).

The control function (output of a control variable) can be deactivated via the control input Pause.

The calculation of the control variable starts again with expiry of the pause.

Abbreviations of control measures:

x: control variable, actual value (e.g. pH value)
K_{PR}: proportional coefficient
x_p: 100 %/K_{PR} (inverse proportional coefficient)
X_{max}: maximum actual value of the controller (e.g. pH 14)
y: control variable (e.g. pulse frequency to pump)
Y_h: control range (e.g. 180 pulses/min)
y_p: control variable of the P controller [%]
w: Reference variable or setpoint (e.g. pH 7.2)
e: control deviation, e = w-x
x_w: control deviation, x_w = x-w
T_i: reset time of the I controller [s]
T_d: rate time of the D controller [s]

Controller equations:

Standard

A measuring value is compared with a setpoint. In case of a controller deviation (difference of setpoint minus actual value), a control variable is calculated which counteracts the controller deviation.

The following controller types exist:

P controller: Is used for controlled systems which have an integrating effect (e.g. batch neutralisation).

PI controller: Can be used for non-integrating controlled systems (e.g. continuous neutralisation).

PID controller:

Is used for controlled systems where peaks occur which have to be compensated.

With dead zone

In case of a dead zone control (neutral zone controlling), two setpoints must be specified. If the measuring value is within the dead zone, no control variable is issued.

Setpoint 2 must be larger than setpoint 1!

Manual

IMPORTANT

The controller does not exist this operating mode automatically.
The operating mode 'Manual' may only be used for commissioning and for test purposes.

There is no controlling.
A control variable is specified manually:
Control variable: 0...+100 % (command output raising active)
Control variable: -100...0 % (command output lowering active)

This function serves the examination of actuators.

Additive base load
A base load is added to the present control variable.
By applying an additive base load, e.g. a constant gradient can be compensated for.

Y_{Tot} = Yp + 15 % (additive base load = 15 %)

Example 1 (one-sided control):
Y_{Tot} = 85 % + 15 %
Y_{Tot} = 100 %

Example 2 (two-sided control):
Y_{Tot} = -75 % + 15 %
Y_{Tot} = -60 %

Eco!Mode

In Eco!Mode, a second parameter set for controlling can be switched to active temporarily in order to save energy. This can e.g. be done together with reducing the circulation rate. As soon as a contact at the contact input K3 of the M module switches, the Eco!Mode becomes active or inactive. The Eco!Mode is available for all measured variables of the M module, in controlled:

- pH
- ORP
- Chlorine, free
- Chlorine, combined
- Temperature
- Flocculants

As soon as the second parameter set is activated, the central menu option shows a green identifier ‘ECO’.

Pause

Upon closing of a pause contact, the DULCOMARIN® II sets the command outputs to “0” as long as the pause contact remains closed. The DXC calculates the P ratio in the background while the pause contact remains closed.

Access Code (Password)

The access to the controller can be extended level by level by adjusting the access code correspondingly. Upon delivery, the controller DULCOMARIN® II has the access codes according to the table in chapter 3.2

Technical changes reserved.

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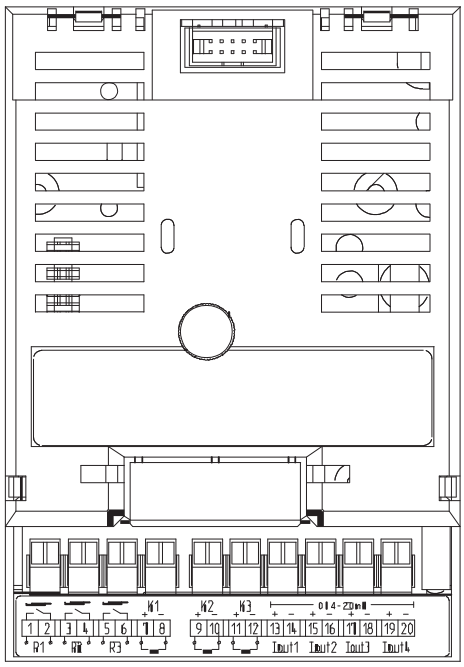
Hopewell, VA Section 2
Dulconet Analog output modules



DXMa _____

Please enter the identcode of your module!

___ ___ ___

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!

These operating resp. supplementary instructions apply only in conjunction with the following ticked operating resp. supplementary instructions:

- ☑ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa Part 1: Mounting and Installation
- ☑ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller DXCa Part 2: Operation
- ☑ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II Disinfection Controller DXCa Part 2: Operation
- ☐ Supplementary Instructions DULCOMARIN® II Videographic Recorder Operation
- ☐ Supplementary Instructions DULCOMARIN® II, M Module (Measurement Module for pH, Redox/ORP, Temperature) DXMaM Operation
- ☐ Supplementary Instructions DULCOMARIN® II, M Module (Measurement Module for pH, Redox/ORP, Temperature) DXMaM Connection
- ☐ Supplementary Instructions DULCOMARIN® II, A Module (Actuator Module, Pumps and Standard Signal Outputs mA) DXMaA
- ☐ Supplementary Instructions DULCOMARIN® II, N Module (Power Supply Module without Relays) DXMaN
- ☐ Supplementary Instructions DULCOMARIN® II, P Module (Power Supply Module with Relays) DXMaP
- ☐ Supplementary Instructions DULCOMARIN® II, I Module (Current Input Module, Standard Signal Inputs mA) DXMaI

Imprint:
Supplementary Instructions
DULCOMARIN® II, A Module
(Actuator Module, Pumps and Standard Signal Outputs mA)
DXMaA

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Identcode

The identcode describes the external modules for the **DULCOMARIN® II, series DXM**

DXMa | Measurement module for DULCOMARIN® II, series DXM

Module:
A | A-module, actuator module: 3 pump and 4 standard signal outputs mA

Type of mounting:
W | Wall mounting (IP 65)
H | Mounting rail (IP 20)
E | Retrofit module (installation module for DXCa, IP 20)

Version:
2 | Without controls
3 | Without controls (only mounting type “E” and “H”)

Application:
0 | Standard

Language:
00 | No controls [2)]

Approval:
01 | CE mark

[2)] only with Version: 2, no operator control

DXMa A W 2 0 00 01

Only the measurement module in the mounting type W “wall-mounted” is available with controls and different languages.

DXMa Internal modules for DULCOMARIN® II, series DXC
These modules can be ordered via the identcode of the DXC (see “Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation”).

1 About this Module

The actuator module DXMaA provides to the DULCOMARIN® II with the control options for 3 dosing pumps via pulse frequency, e.g. to raise and lower the pH value or to dose disinfectants.

The actuator module DXMaA is equipped with the following outputs:

- 4 standard signal outputs 0/4…20 mA, user-programmable and scalable for the measuring values of e.g. pH value, redox/ORP, concentration of free chlorine or total chlorine or combined chlorine or temperature.
- 3 frequency outputs for controlling dosing pumps, e.g. to raise and lower the pH value or to dose disinfectants.

and the following inputs:

- 3 digital inputs for evaluating the alarm relay of the dosing pumps and for monitoring of the tank level.

2 Safety Chapter

The actuator module DXMaA may only be used as component part of the DULCOMARIN® II.
The installation may only be performed by specially trained personnel!

3 Storage and Transport

Only store and transport the module in its original packaging.

CAUTION

Also protect the packaged module against humidity and exposure to chemicals.

Environmental conditions for storage and transport:

Temperature: - 10 °C to 70 °C

Climate: Permissible relative humidity: 95%, non-condensing (DIN IEC 60068-2-30)

4 Mounting and Installation

WARNING

- ***The installation may only be performed by specially trained personnel!***
- ***Please carefully read the instructions in the "Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation" before carrying out any mounting and installation work!***

CAUTION

The standard signals can be distorted, which might have consequences for the process!

Only devices with own electrical isolation of the individual standard signal inputs (e.g. standard signal inputs of a recorder, …) may be directly connected to the standard signal outputs!

If a multi-channel standard signal input module of a PLC is to be connected to several standard signal outputs of the DXMaA module, each standard signal line is to be routed via a 3-way standard signal separator (a 3-way standard signal separator electrically isolates the input, the output and the supply voltage).

In case of several standard signal lines, a multi-channel isolating amplifier can be used. ProMinent recommends 4-channel isolating amplifiers of the type LC-TV-4I.4I of the company of Rinck (www.rinck-electronic.de) or of the type 6185D of the company of PR Electronics (www.prelectronics.de) to connect up to 4 standard signal lines.

NOTE

The terminal connection diagram is enclosed at the end of these supplementary instructions.

Carry out the CAN connection as described in the "Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation".

5 Technical Data

Electrical data

Frequency outputs (Opto-MOS relay) for pump control (R1, R2, R3): Contact type: make contact with series inductance, interference-suppressed
Load rating: 400 V peak, 250 mA switching current, max. 0.8 W
maximum frequency: 8.33 Hz (500 strokes/min.)
Close/open time: 5 ms

Digital inputs (K1, K2, K3) (Kl. 9 – 14): galvanically isolated among each other
Insulation voltage: 500 V
max. switch frequency: 2 kHz

Connectable contacts: mechanical relays
max. connectable cable length: 20 m

Standard signal outputs mA (I out 1 - I out 4): Insulation voltage: 500 V
Output range: 0/4-20 mA (programmable)
23 mA for error message
maximum load: 400 Ω
Accuracy: 0.5% of the output range
For the installation, Chap. 4 “Mounting and installation” must be observed!

Environmental conditions

Storage temperature: -10...70 °C

Type of protection IP 20 (within the housing DXM: IP 65)

Humidity: Permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

Materials

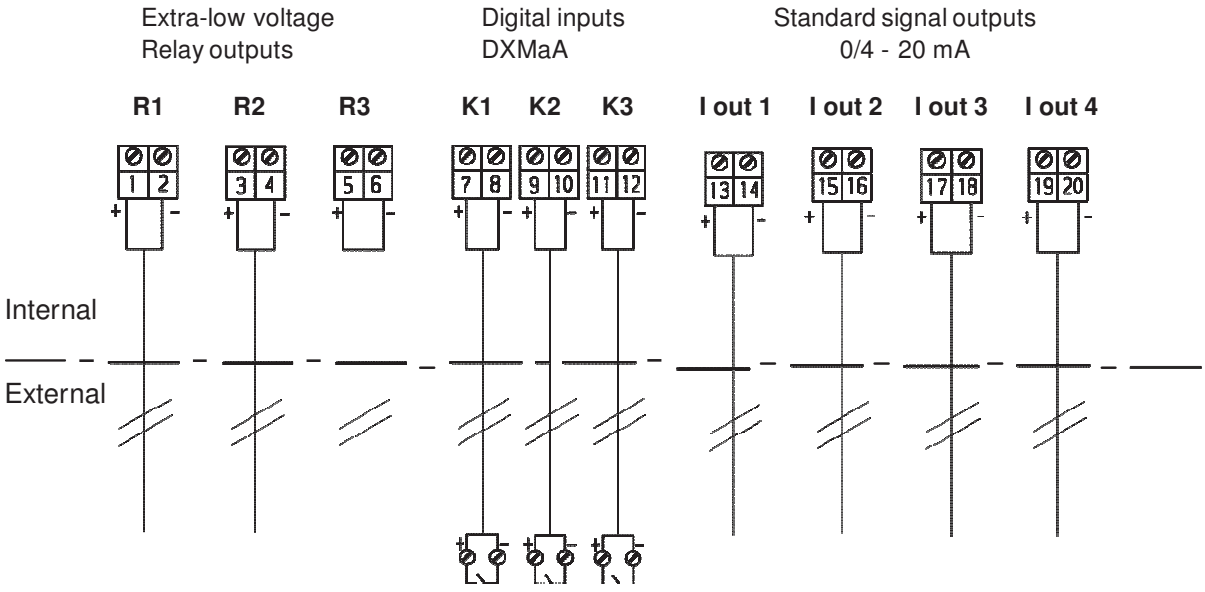
Housing: PPE-GF 10

6 Terminal Assignment

Description	Terminal description	Terminal no.	Pole	Function
Frequency output 1	**R 1**	1	+	pH lowering pump (control)
		2	-	pH raising pump
Frequency output 2	**R 2**	3	+	chlorine pump (control)
				redox pump
		4	-	acid pump
Frequency output 3	**R 3**	5	+	flocculant pump
				redox pump
		6	-	chlorine pump
Digital input 1	**K 1**	7	+	error pump
		8	-	
Digital input 2	**K 2**	9	+	error pump
		10	-	
Digital input 3	**K 3**	11	+	error pump
		12	-	
Power output 0/4-20 mA 1	**I out 1**	13	+	pH value
		14	-	control variable pH lowering
				control variable pH raising
				control variable chlorination
				control variable flocculation
				control variable redox/ORP
				(recorder connection)

Description	Terminal description	Terminal no.	Pole	Function
Power output 0/4-20 mA 2	**I out 2**	15	+	redox/ORP value control
		16	-	variable pH lowering control
				variable pH raising control
				variable chlorination control
				variable flocculation control
				variable redox/ORP
				(recorder connection)
Power output 0/4-20 mA 3	**I out 3**	17	+	chlorine value
		18	-	control variable pH lowering
				control variable pH raising
				control variable chlorination
				control variable flocculation
				control variable redox/ORP
				(recorder connection)
Power output 0/4-20 mA 4	**I out 4**	19	+	combined chlorine control
		20	-	variable pH lowering control
				variable pH raising control
				variable chlorination control
				variable flocculation control
				variable redox/ORP
				(recorder connection)

7 Terminal Connection Diagram



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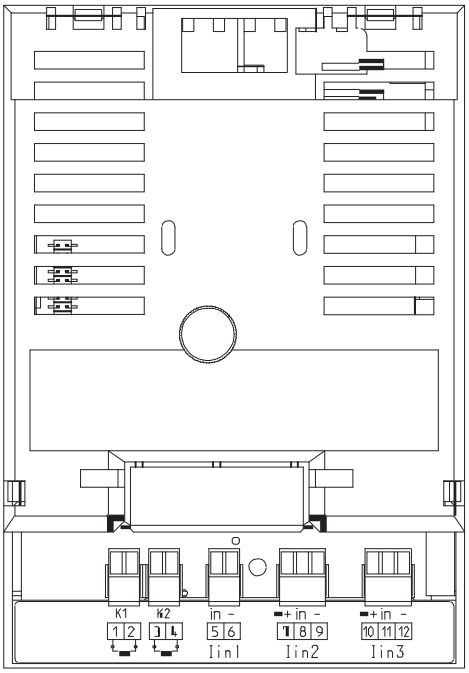
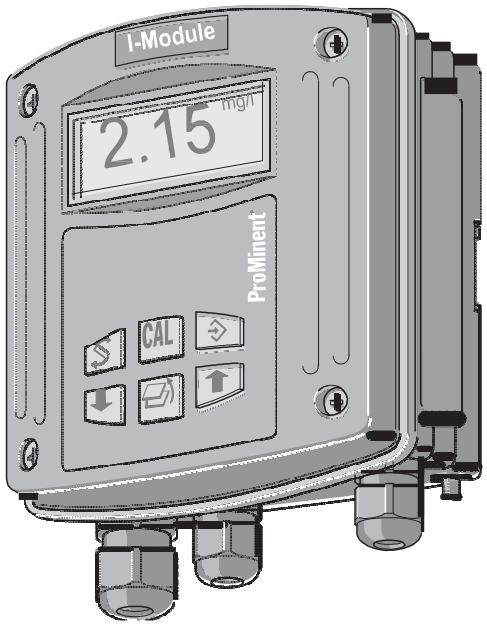
Hopewell, VA Section 3
Analog Input modules





DXMa _____

Please enter the identcode of your module! ___ ___ ___

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!

These operating resp. supplementary instructions apply only in conjunction with the following ticked operating resp. supplementary instructions:

- [x] Operating Instructions Multi-Channel Measuring and Control System
  DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa
  Part 1: Mounting and Installation
- [ ] Operating Instructions Multi-Channel Measuring and Control System
  DULCOMARIN® II System (pool) Controller DXCa
  Part 2: Operation
- [x] Operating Instructions Multi-Channel Measuring and Control System
  DULCOMARIN® II Disinfection Controller DXCa
  Part 2: Operation
- [x] Supplementary Instructions DULCOMARIN® II Videographic Recorder
  Operation
- [ ] Supplementary Instructions DULCOMARIN® II, M Module
  (Measurement Module for pH, Redox/ORP, Temperature) DXMaM
  Operation
- [ ] Supplementary Instructions DULCOMARIN® II, M Module
  (Measurement Module for pH, Redox/ORP, Temperature) DXMaM
  Connection
- [ ] Supplementary Instructions DULCOMARIN® II, A Module
  (Actuator Module, Pumps and Standard Signal Outputs mA) DXMaA
- [ ] Supplementary Instructions DULCOMARIN® II, N Module
  (Power Supply Module without Relays) DXMaN
- [ ] Supplementary Instructions DULCOMARIN® II, P Module
  (Power Supply Module with Relays) DXMaP
- [ ] Supplementary Instructions DULCOMARIN® II, I Module
  (Current Input Module, Standard Signal Inputs mA) DXMaI

Imprint:
Supplementary Instructions
DULCOMARIN® II, I Module
(Current Input Module, Standard Signal Inputs mA)
DXMaI

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Identcode

The identcode describes the external modules for the **DULCOMARIN® II, series DXM**

DXMa	External module for DULCOMARIN® II, series DXM
	Module:
I	I-module, Current input module: 3 analogue inputs
	Type of mounting:
W	Wall mounting (IP 65)
E	Retrofit module (installation module for DXCa, IP 20)
	Version:
0	With controls
2	Without controls
3	Without controls (only mounting type “E”)
	Application:
0	Standard
S	system (pool)
D	Potable water/Desinfection
	Language:
00	No controls [1]
DE	German
EN	English
	Approval:
01	CE mark

[1] only with Version: “2”, no operator control

DXMa	I	W	0	D	00	01

Only the sensor module and the current input module in the mounting type W “wall-mounted” are available with controls and then with different languages.

DXMa Internal modules for DULCOMARIN® II, series DXC

These modules can be ordered via the identcode of the DXC (see “Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation”).

1 About this Module

With the current input module DXMal, 2 switches / relays and 3 sensors can be connected via the mA inputs 0/4...20 mA of the DULCOMARIN® II.

The control module DXMal is equipped with the following inputs:

- contact inputs for sample water monitoring and pause
- 3 standard signal inputs 0/4 - 20 mA
  The mA values of the sensors for flow, turbidity, UV intensity, conductive conductivity, dissolved oxygen, and ammonia are recorded as treated (compensated and calibrated).
  The mA values of the sensors for ClO_2, H_2O_2, PES, fluoride, and chlorite can be temperature-compensated. For this purpose, a PT1000 sensor with mA transformer must be connected to a mA input.

2 Safety Chapter

The current input module DXMal may only be used as component part of the DULCOMARIN® II.

The installation may only be performed by specially trained personnel!

3 Storage and Transport

Only store and transport the module in its original packaging.

CAUTION

Also protect the packaged module against humidity and exposure to chemicals!

Environmental conditions for storage and transport:

Temperature: - 10 °C to 70 °C

Climate: Permissible relative humidity: 95%, non-condensing (DIN IEC 60068-2-30)

4 Mounting and Installation

WARNING

- ***The installation may only be performed by specially trained personnel!***
- ***Please observe the notes in the "Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation" before carrying out any mounting and installation work!***

NOTE

The terminal connection diagram is enclosed at the end of these supplementary instructions.

Carry out the CAN connection as described in the "Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation".

5 Technical Data

Electrical data

Digital inputs (K1 - K2): 2 inputs: for contacts, switching transistors and for analogue PLC outputs according to DIN EN 61131-2

Insulation voltage:	500 V
Input resistance:	3.5 kΩ
Off-load voltage:	10 V ... 12 V
Switching point:	passive: 1.750 Ω, typical
	active: 3.15 mA, typical
Input current:	4 mA (0 V)
	5.8 mA (30 V)
Input capacity:	100 nF
Switching hysteresis:	20 µA
Max. switching frequency:	1 kHz

Standard signal outputs mA (I out 1 - I out 3):

3 inputs:	0/4 ... 20 mA, electrically isolated
Insulation voltage:	500 V
Input resistance:	50 Ω
Load rating:	30 mA
2 inputs with 2-wire connection (loop supply) (I out 2, I out 3):	
	Supply voltage 22.0 V - 25.0 V
Measuring accuracy:	± 0.5 % of the measuring range (at 25 °C)
Representation:	1/215

Environmental conditions

Storage temperature: -10...70 °C

Type of protection Type of protection: as internal module IP 20

as external module, wall-mounted	IP 65 pursuant to IEC 60529, DIN EN 60529, VDE 0470
as external module, control panel-mounted	IP 54 pursuant to IEC 60529, DIN EN 60529, VDE 0470

Humidity: Permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

Materials

Housing: PPE-GF 10

6 Terminal Assignment

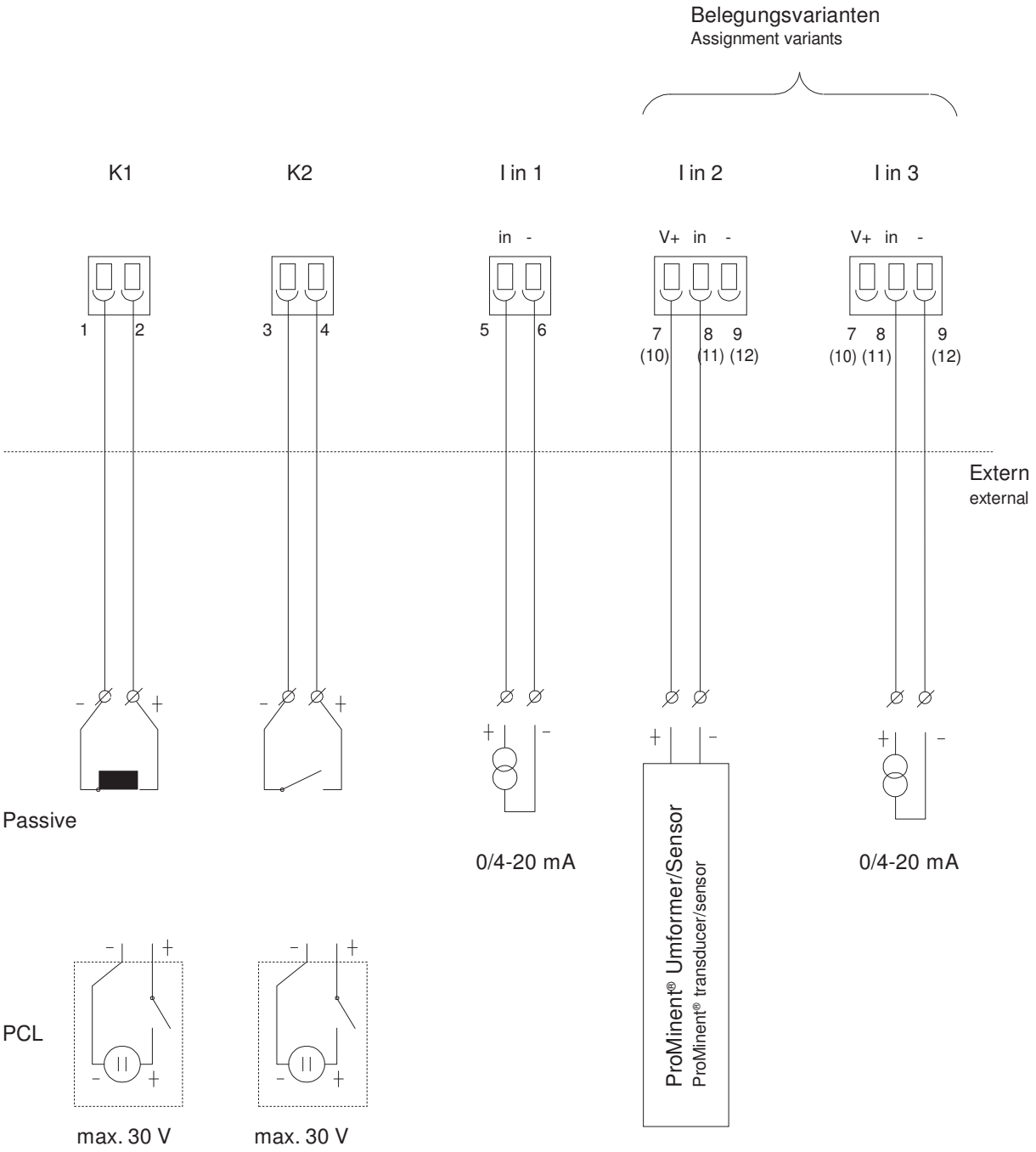
Description	Terminal description	Terminal no.	Polarity	Function
Contact input 1	**K 1**	1	-	**Fault measuring water**
		2	+	
Contact input 2	**K 2**	3	-	**Pause control**
		4	+	**(e.g. backwashing)**
Analogue input 1	**I out 1**	5	out	**Flow (turbidity)**
		6	GND (-)	
Analogue input 2	**I out 2**	7	V+	**Fluoride**
		8	out	**(O_2, ClO_2, ClO_2^-,**
		9	GND (-)	**H_2O_2, NH_4OH)**
Analogue input 3	**I out 3**	10	V+	**Temperature**
		11	out	**(UV, turbidity,**
		12	GND (-)	**conductivity, ClO_2^-)**

For the measured variables via the terminal “I out 2”, the software includes the following functionalities:

	F^-	O_2	ClO_2	ClO_2^-	H_2O_2
Controlling *	-	-	X	X	X
Calibration	X	-	X	-	X

* Configure a pump in advance (see “Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II Disinfection Controller, DXCa, Part 2: Operation)

7 Terminal Connection Diagram



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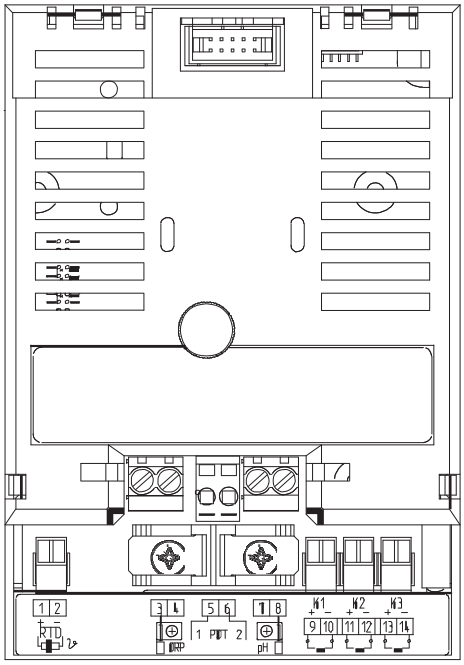
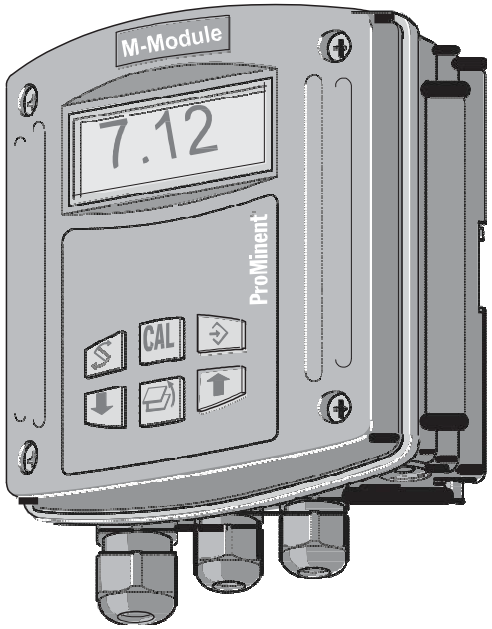
Hopewell, VA Section 4
Measurement modules





DXMa _____ ___ ___ ___

Please enter the identcode of your module!

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!

These operating resp. supplementary instructions apply only in conjunction with the following ticked operating resp. supplementary instructions:

- ☑ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa Part 1: Mounting and Installation
- ☑ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller DXCa Part 2: Operation
- ☑ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II Disinfection Controller DXCa Part 2: Operation
- ☐ Supplementary Instructions DULCOMARIN® II Videographic Recorder Operation
- ☑ Supplementary Instructions DULCOMARIN® II, M Module (Measurement Module for pH, Redox/ORP, Temperature) DXMaM Operation
- ☐ Supplementary Instructions DULCOMARIN® II, M Module (Measurement Module for pH, Redox/ORP, Temperature) DXMaM Connection
- ☐ Supplementary Instructions DULCOMARIN® II, A Module (Actuator Module, Pumps and Standard Signal Outputs mA) DXMaA
- ☐ Supplementary Instructions DULCOMARIN® II, N Module (Power Supply Module without Relays) DXMaN
- ☐ Supplementary Instructions DULCOMARIN® II, P Module (Power Supply Module with Relays) DXMaP
- ☐ Supplementary Instructions DULCOMARIN® II, I Module (Current Input Module, Standard Signal Inputs mA) DXMaI

Imprint:
Supplementary Instructions
DULCOMARIN® II, M Module
(Measurement Module for pH, Redox/ORP, Temperature)
DXMaM: Connection

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Identcode

The identcode describes the external modules for the **DULCOMARIN® II, series DXM**

DXMa | Measurement module for DULCOMARIN® II, series DXM

Module:

M	M-module, measurement module: pH, ORP, temperature

Type of mounting:

W	Wall mounting (IP 65)
H	Mounting rail (IP 20)
E	Retrofit module (installation module for DXCa, IP 20)

Version:

0	With controls (only M module, mounting type W) [1]
2	Without controls
3	Without controls (only mounting type “E” and “H”)

Application:

S	system (pool) (only M module)

Language:

00	No controls [2]
DE	German
EN	English
ES	Spanish
FR	French
IT	Italian

Approval:

01	CE mark

[1] only with Installation: “W”

[2] only with Version: 2, no operator control

DXMa M W 0 S 00 01

DXMa Internal modules for DULCOMARIN® II, series DXC

These modules can be ordered via the identcode of the DXC (see “Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation”).

About this Module

The measurement module DXMaM provides the following functions to the DULCOMARIN® II e.g.:

- Measurement and control of the pH value
- Measurement and display (optional control) of the redox/ORP
- Measurement and display of the temperature of the sample water
- Monitoring of the sample water throughput

The measurement module DXMaM is equipped with the following inputs:

- 1 temperature input for PT1000 (PT100, automatic sensor detection)
- 2 sensor inputs for pH or redox/ORP measurement with equipotential bonding
- 3 digital inputs for pause, changeover of parameter sets, sample water monitoring

Mounting and Installation

CAUTION

- ***The installation may only be performed by specially trained personnel!***
- ***Please carefully read the instructions in the "Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation" before carrying out any mounting and installation work!***

NOTE

The terminal diagram is enclosed at the end of these supplementary instructions.

Technical Data

Electrical data

Pt1000/Pt100 input (RTD) (Kl. 1, 2):
Input range: -20 ... 150 °C
Accuracy: ± 0.5 °C
Representation: 0.1 °C

Sensor input (ORP) Kl. 3, 4) for redox/ORP:
Input resistance: > 10^{12} Ohm
All reference electrodes with diaphragm can be connected.
Input range: redox/ORP: -1200 mV ... +1200 mV
Accuracy: ± 0.5 % of the input range
Representation: 1 mV (0.01pH)
Connection of reference electrode through shield connection
Connection options for an liquid reference potential electrode

Sensor input (pH) (Kl. 7, 8) for pH:
Input resistance: > 10^{12} Ohm
Input range: pH: -1 ... 15 (0 ... 100 °C)
Representation: 0.01 pH
Further data as "Sensor input (ORP)".

Digital inputs (K1, K2, K3) (Kl. 9 – 14):
galvanically isolated among each other
Insulation voltage: 500 V
max. switch frequency: 2 kHz
Connectable contacts: mechanical relays
max. connectable cable length: 20 m

Environmental conditions

Storage temperature: -10...70 °C

Type of protection: IP 20 (within the housing DXM: IP 65)

Climate: Permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

Materials

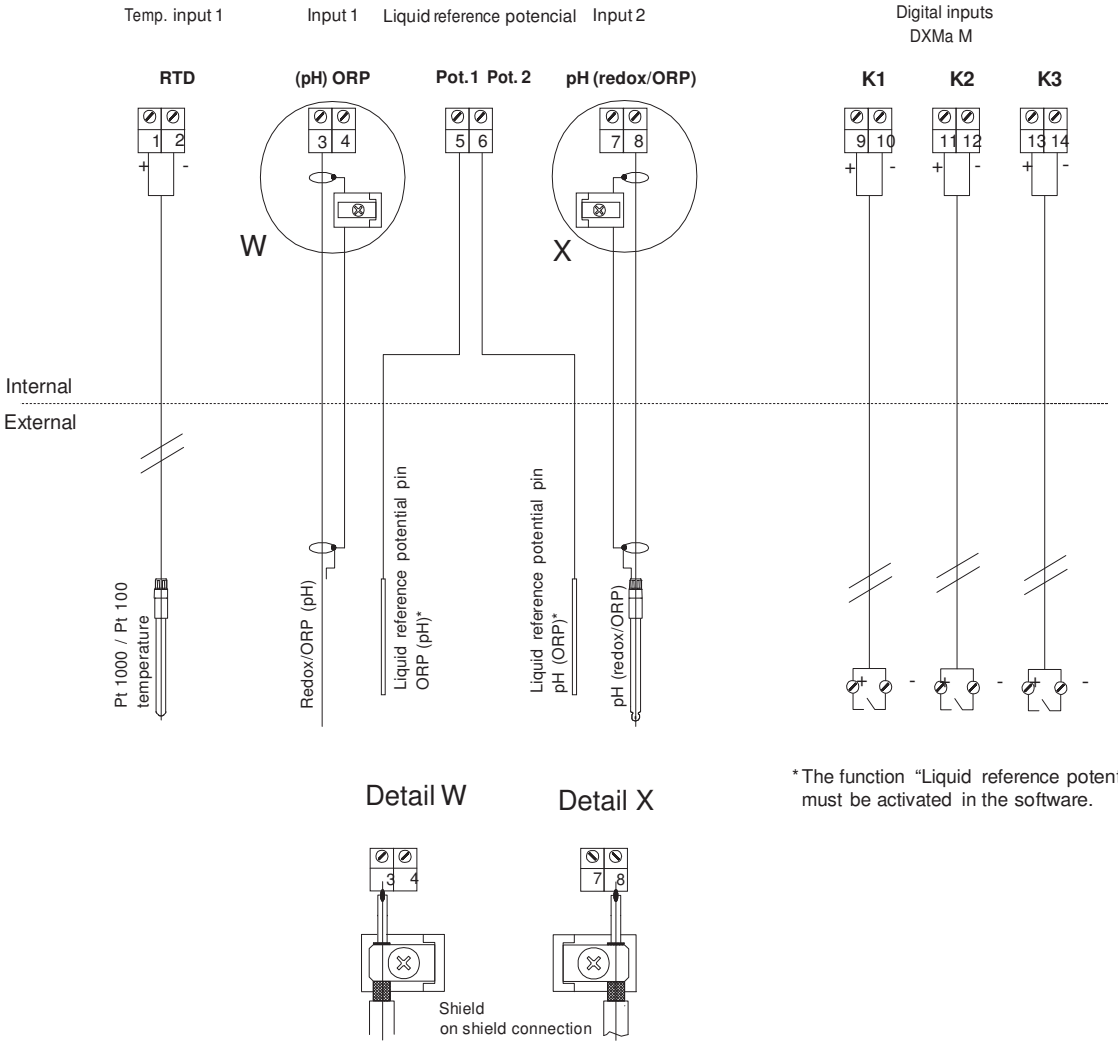
Housing: PPE-GF 10

Terminal Assignment

Description	Terminal designation	Terminal no.	Pole	Function
Temp. input **PT1000**/100	**RTD**	1	+	PT1000/100 (temp. sensor)
		2	-	
pH/**ORP** input 1	**(pH) ORP**	3	Ref.	ORP sensor
		4	meas. sig.	
Liquid reference potential 1	**POT 1**	5		
Liquid reference potential 2	**POT 2**	6		pH sensor
pH/ORP input 2	**pH (ORP)**	7	Ref.	
		8	meas. sig.	
Digital input 1	**K 1**	9	+	Sample water (error)
		10	-	
Digital input 2	**K 2**	11	+	Pause control (backflushing)
		12	-	
Digital input 3	**K 3**	13	+	ECO! Mode
		14	-	

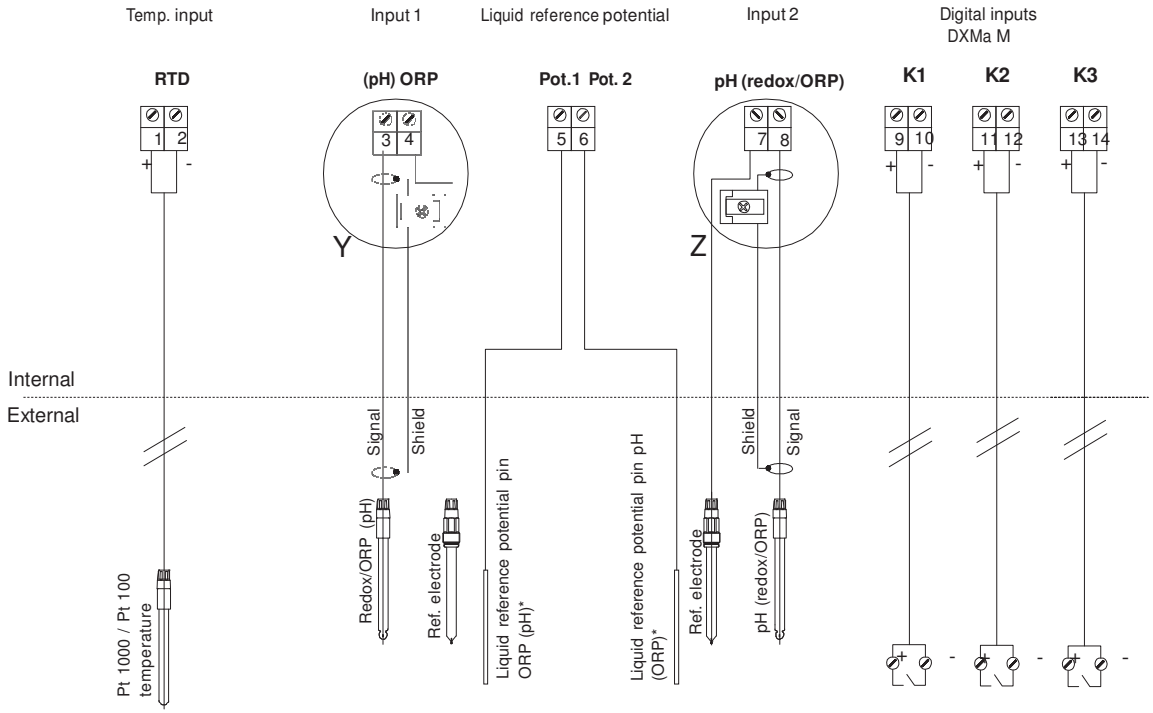
Terminal Diagram

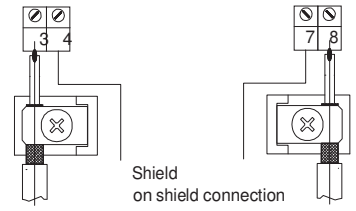
Terminal diagram combination probe



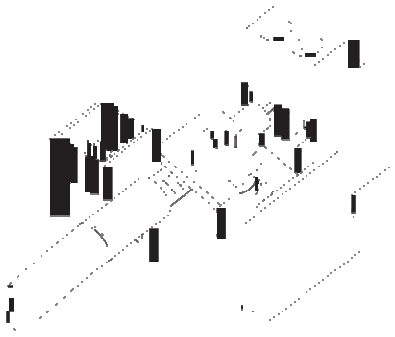
*The function "Liquid reference potential" must be activated in the software.

Terminal diagram two-probe measuring chain





* The function “Liquid reference potential” must be activated in the software.



3713_DXC

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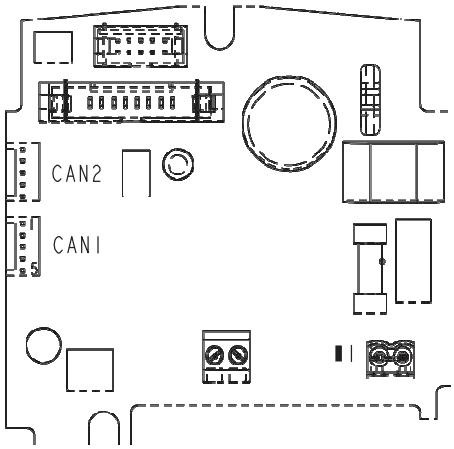
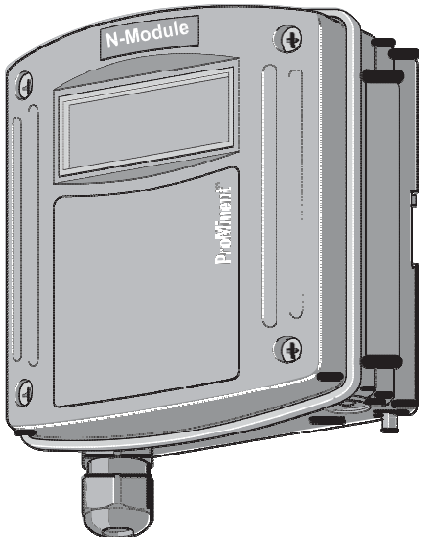
Hopewell, VA Section 5
N – boost power supplies



Internal module



External module

DXMa _____

Please enter the identcode of your module! ___ ___ ___

Please carefully read these supplementary instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!

These operating resp. supplementary instructions apply only in conjunction with the following ticked operating resp. supplementary instructions:

- [x] Operating Instructions Multi-Channel Measuring and Control System
  DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa
  Part 1: Mounting and Installation
- [ ] Operating Instructions Multi-Channel Measuring and Control System
  DULCOMARIN® II System (pool) Controller DXCa
  Part 2: Operation
- [ ] Operating Instructions Multi-Channel Measuring and Control System
  DULCOMARIN® II Disinfection Controller DXCa
  Part 2: Operation
- [ ] Supplementary Instructions DULCOMARIN® II Videographic Recorder
  Operation
- [ ] Supplementary Instructions DULCOMARIN® II, M Module
  (Measurement Module for pH, Redox/ORP, Temperature) DXMaM
  Operation
- [ ] Supplementary Instructions DULCOMARIN® II, M Module
  (Measurement Module for pH, Redox/ORP, Temperature) DXMaM
  Connection
- [ ] Supplementary Instructions DULCOMARIN® II, A Module
  (Actuator Module, Pumps and Standard Signal Outputs mA) DXMaA
- [ ] Supplementary Instructions DULCOMARIN® II, N Module
  (Power Supply Module without Relays) DXMaN
- [ ] Supplementary Instructions DULCOMARIN® II, P Module
  (Power Supply Module with Relays) DXMaP
- [ ] Supplementary Instructions DULCOMARIN® II, I Module
  (Current Input Module, Standard Signal Inputs mA) DXMaI

Imprint:
Supplementary Instructions
DULCOMARIN® II, N Module
(Power Supply Module without Relays)
DXMaN

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Identcode

The identcode describes the external CANopen modules for the DULCOMARIN® II

DXMa | **Measurement module for DULCOMARIN® II, series DXM**

	Module:
N	N module, power supply module without relays [1) 2)]
	Type of mounting:
W	Wall mounting (IP 65)
	Version:
2	Without controls
	Application:
0	Standard
	Language:
00	No controls [2)]
	Approval:
01	CE approval

[1)] only with Installation: "W" wall mounting

[2)] only with Version: 2, no operator control

DXMa N W 2 0 00 01

1 About this Module

The N module DXMaN (power supply module without relays) supplies modules of a DULCOMARIN® II system with electrical voltage.

2 Safety Chapter

CAUTION

- ***The N module DXMaN must only be used as a power supply module for the DULCOMARIN® II!***
- ***The N module DXMaN must only be used as a part of a DULCOMARIN® II system!***
- ***Only trained and qualified personnel are permitted to install the N module DXMaN!***

3 Storage and Transport

Only store and transport the module in its original packaging.

CAUTION

Also protect the packaged module against humidity and exposure to chemicals.

Environmental conditions for storage and transport:
Temperature: -10 °C to 70 °C
Climate: Permissible relative humidity: 95%, non-condensing (DIN IEC 60068-2-30)

4 Mounting and Installation

WARNING

- ***Only trained and qualified personnel are permitted to install the N module DXMaN!***
- ***Please carefully read the instructions in the "Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation" before carrying out any mounting and installation work!***

NOTE

- ***The terminal connection diagram is enclosed at the end of these supplementary instructions.***
- ***The CPU does not assign NodeIDs to the N modules. They are not an active part of the bus system.***

Carry out the CAN connection as described in the "Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation" before carrying out any mounting and installation work!

Arrange power supply modules in main branch of CAN-bus DULCOMARIN® II DULCO-Net)

There is always one power supply module in the CPU (central unit).

Divide the number of system (pool)s by "2"; round off if there is a remainder:

Number of system (pool)s	Additional N or P modules	Number of of system (pool)s	Additional N or P modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8

(Exception: Number of system (pool)s = 2)

The two light-emitting diodes LED 1 and LED 2 (see chapter 8 “Terminal connection diagram“) indicate the load on the 24 V power supply for the CAN-bus.

Flash code LEDs, power supply monitoring DULCOMARIN® II (N and P module)

Operating status	LED 1 (H2, current)	LED 2 (H3, voltage)	Current	Remark
Normal	OFF	Green	< 1.1 A	Everything OK
Limit load	Red	OFF	> 1.1 A	Loop in a further power supply module
Overload/short-circuit	Red, flashing	OFF	> 1.35 A	Check wiring

5 Repairs

WARNING

- ***Only the fuse may be replaced by specially trained personnel. All other repairs may only be carried out by the customer service!***
- ***The fuse may only be replaced after the device or system has been disconnected from the power supply and has been secured against re-activation! Take into account effect on system!***
- ***Only use genuine fuses (Order no. 712030)***
- ***Otherwise, all general safety regulations apply.***

6 Technical Data

Electrical data

Nominal voltage (X1):	90 - 253 V AC (50/60 Hz)
Maximum power intake:	500 mA at 90 V AC 180 mA at 253 V AC
Fuse protection on inside:	Fine fuse 5 x 20 mm 630 mA, 250 V slow-blow

The N module DXMaN is a 24 V DC power supply unit (24 V DC, 1 A).

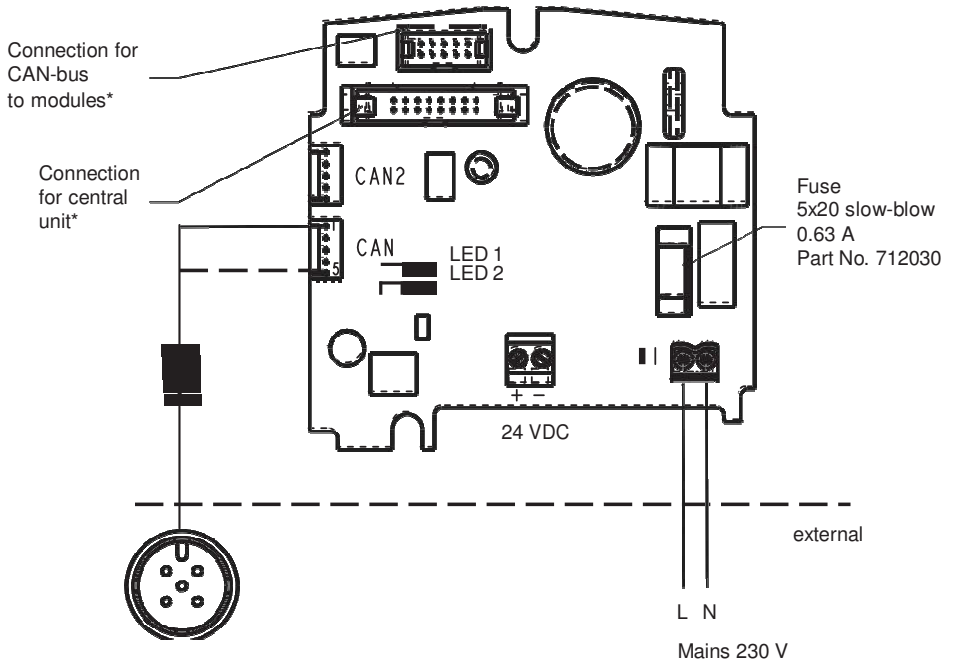
Environmental conditions

Storage temperature:	-10...70 °C
Type of protection	IP 20 (within the housing DXM: IP 65)
Climate: Permissible relative humidity:	95 %, non-condensing (DIN IEC 60068-2-30)

7 Terminal Assignment

Description	Terminal description	Terminal no.	Pole
Mains	X 1	11	N
		12	L(1)

8 Terminal Connection Diagram



CAUTION

- ***External fuse protection required!***
- ***The fuse holder is also under voltage (live) when mains voltage is applied!***

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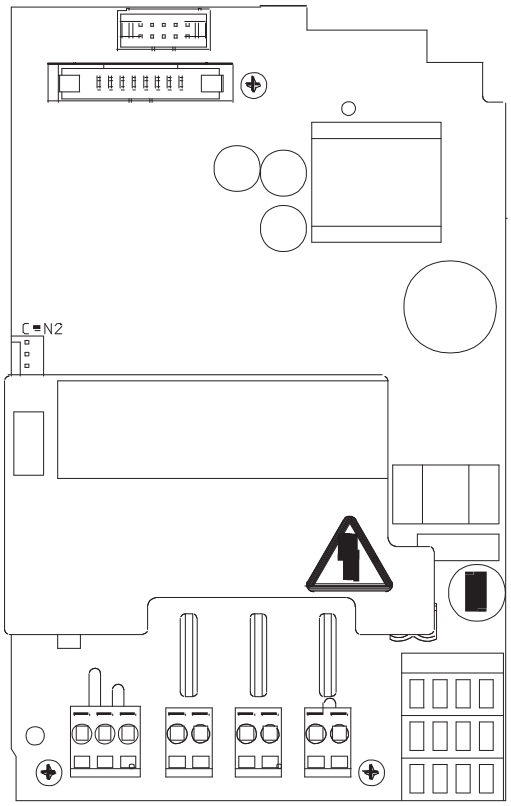
Hopewell, VA Section 6
DULCOMARIN® II, P Module



DXMa _____

Please enter the identcode of your module!

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!

These operating resp. supplementary instructions apply only in conjunction with the following ticked operating resp. supplementary instructions:

- [x] Operating Instructions Multi-Channel Measuring and Control System
  DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa
  Part 1: Mounting and Installation
- [x] Operating Instructions Multi-Channel Measuring and Control System
  DULCOMARIN® II System (pool) Controller DXCa
  Part 2: Operation
- [x] Operating Instructions Multi-Channel Measuring and Control System
  DULCOMARIN® II Disinfection Controller DXCa
  Part 2: Operation
- [ ] Supplementary Instructions DULCOMARIN® II Videographic Recorder
  Operation
- [ ] Supplementary Instructions DULCOMARIN® II, M Module
  (Measurement Module for pH, Redox/ORP, Temperature) DXMaM
  Operation
- [ ] Supplementary Instructions DULCOMARIN® II, M Module
  (Measurement Module for pH, Redox/ORP, Temperature) DXMaM
  Connection
- [ ] Supplementary Instructions DULCOMARIN® II, A Module
  (Actuator Module, Pumps and Standard Signal Outputs mA) DXMaA
- [ ] Supplementary Instructions DULCOMARIN® II, N Module
  (Power Supply Module without Relays) DXMaN
- [ ] Supplementary Instructions DULCOMARIN® II, P Module
  (Power Supply Module with Relays) DXMaP
- [ ] Supplementary Instructions DULCOMARIN® II, I Module
  (Current Input Module, Standard Signal Inputs mA) DXMaI

Imprint:
Supplementary Instructions
DULCOMARIN® II, P Module
(Power Supply Module with Relays)
DXMaP

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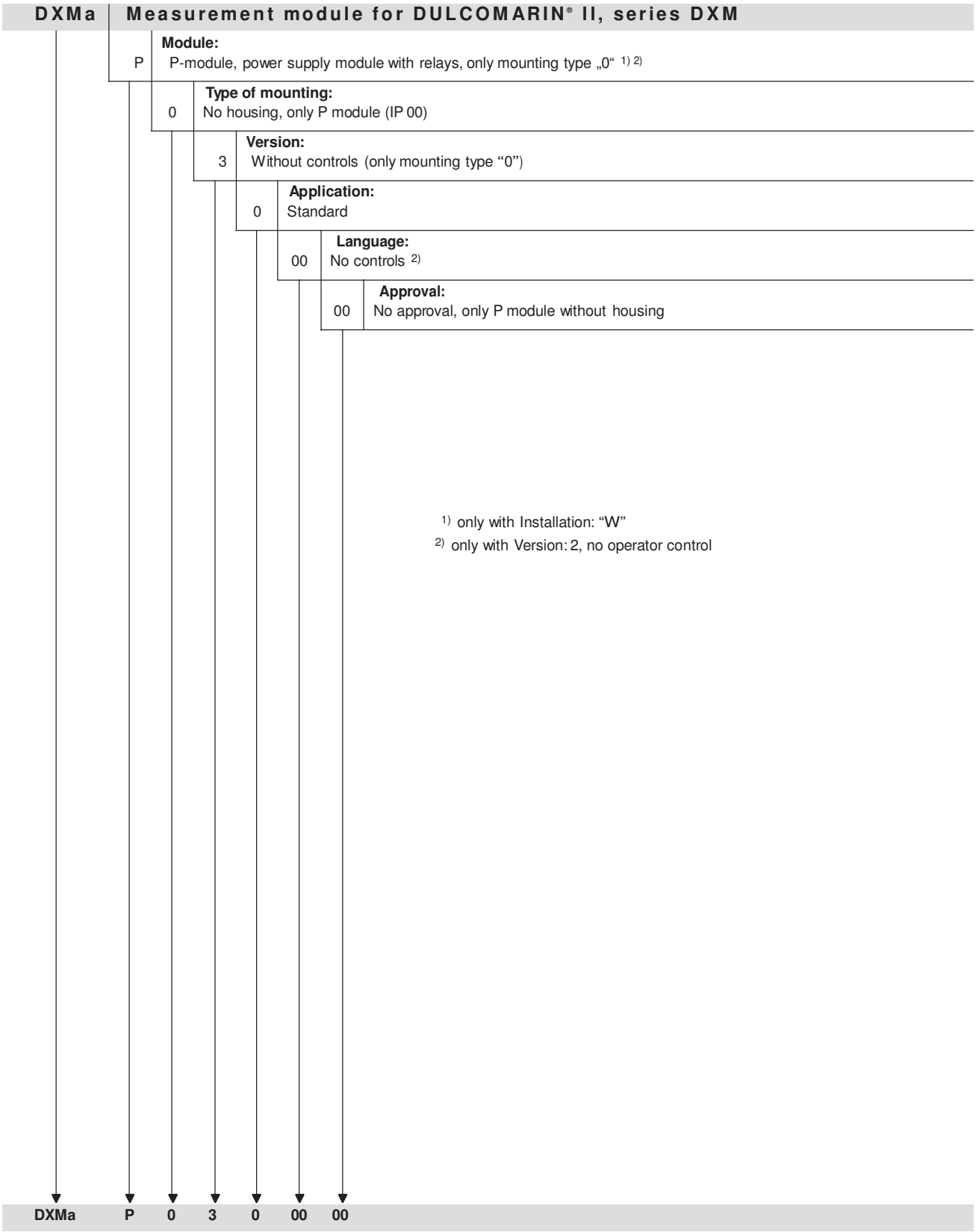
Identcode

The identcode describes the external modules for the **DULCOMARIN® II, series DXM**



DXMa Internal modules for DULCOMARIN® II, series DXC.

These modules can be ordered via the identcode of the DXC (see “Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation”).

1 About this Module

The power supply module DXMaP with alarm relay and solenoid valve relay provides power to the DULCOMARIN® II compact and facilitates control of 3 solenoid valves or peristaltic pumps via pulse frequency, e.g. to raise and lower the pH value, to dose disinfectants or flocculants, to minimise combined chlorine.

The power supply module DXMaP is equipped with the following outputs:

- power relay output for alarm signalling
- power relay output for solenoid valve or peristaltic pump (pH correction)
- power relay output for solenoid valve or peristaltic pump (disinfectant)
- power relay output for peristaltic pump (flocculant) or relay output (minimizing combined chlorine)

and a power input.

2 Safety Chapter

CAUTION

- ***The power supply module DXMaP may only be used for controlling alarm horns, solenoid valves, and peristaltic pumps as well as for voltage supply to the DULCOMARIN® II DXCa.***
- ***The power supply module DXMaP may only be used as component part of the DULCOMARIN® II.***
- ***The installation may only be performed by specially trained personnel!***

3 Storage and Transport

Only store and transport the module in its original packaging!

IMPORTANT

Also protect the packaged module against humidity and exposure to chemicals.

Environmental conditions for storage and transport:

Temperature: -10 °C to 70 °C

Humidity: Permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

4 Mounting and Installation

WARNING

- ***The installation may only be performed by specially trained personnel!***
- ***Please carefully read the instructions in the "Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation" when mounting and installing the module!***

NOTE

The terminal connection diagram is enclosed at the end of these supplementary instructions.

Carry out the CAN connection as described in the "Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Mounting and Installation".

Arrange power supply modules in main branch of CAN-bus DULCOMARIN® II DULCO-Net)

There is always one power supply module in the CPU (central unit).

Divide the number of system (pool)s by "2"; round off if there is a remainder:

Number of system (pool)s	Additional N or P modules	Number of of system (pool)s	Additional N or P modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8

(Exception: Number of system (pool)s = 2)

The two light-emitting diodes LED 1 and LED 2 (see last illustration in Section 8 “Terminal connection diagram“) indicate the load on the 24 V power supply for the CAN-bus.

Flash code LEDs, power supply monitoring DULCOMARIN® II (N and P module)

Operating status	LED 1 (H2, current)	LED 2 (H3, voltage)	Current	Remark
Normal	OFF	Green	< 1.1 A	Everything OK
Limit load	Red	OFF	> 1.1 A	Loop in a further power supply module
Overload/short-circuit	Red, flashing	OFF	> 1.35 A	Check wiring

5 Repairs

WARNING

- ***Only the fuse may be replaced by specially trained personnel. All other repairs may only be carried out by the customer service!***
- ***The fuse may only be replaced after the module or device has been disconnected from the power supply and has been secured against re-activation (effect on plant?)***
- ***System voltage may be present at the terminals P1 - P4 even when the power supply has been switched off.***
- ***Only use genuine fuses (Order no. 712030)***
- ***Otherwise, all general safety regulations apply.***

6 Technical Data

Electrical data

Power relay output for alarm signalling (P1): Contact type: changeover contact with varistors, interference-suppressed
Load rating: 250 VAC, 3 A max., 700 VA
Contact lifetime: > 10^5 switching cycles (at 3 A)

Power relay output for controller output signalling or limit value signalling (P2 - P4): Contact type: make contact with varistors, interference-suppressed
Load rating: 250 VAC, 3 A max., 700 VA
Contact lifetime: > 20 x 10^6 switching cycles

Nominal voltage (X1): 90 - 253 VAC (50 / 60 Hz)
Maximum consumption: 500 mA at 90 VAC
180 mA at 253 VAC
Protection from internal with: miniature fuse 5 x 20 mm
630 mA, 250 V, slow
Electrical power consumed: 30 W

The power supply module with relais DXMaP is equipped with the 1A DC power supply unit, 24 VDC.

Environmental conditions

Storage temperature: -10...70 °C

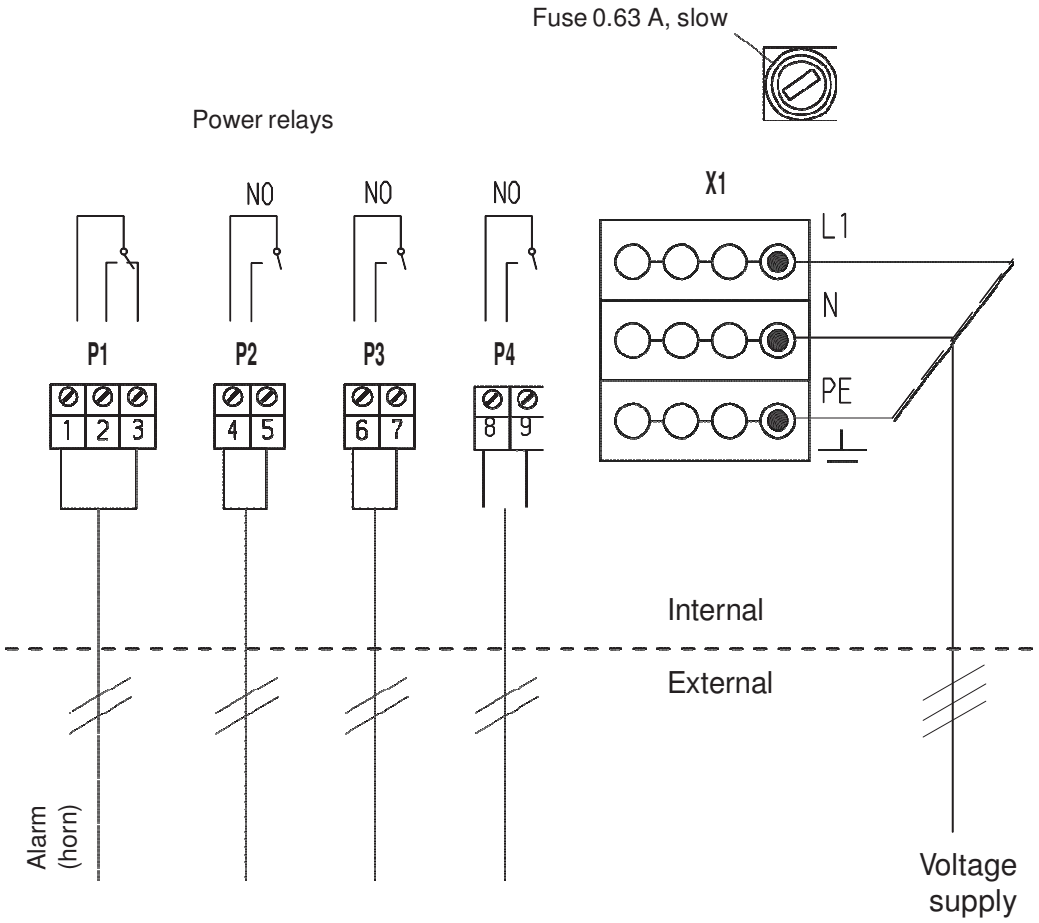
Type of protection: IP 20

Climate: Permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

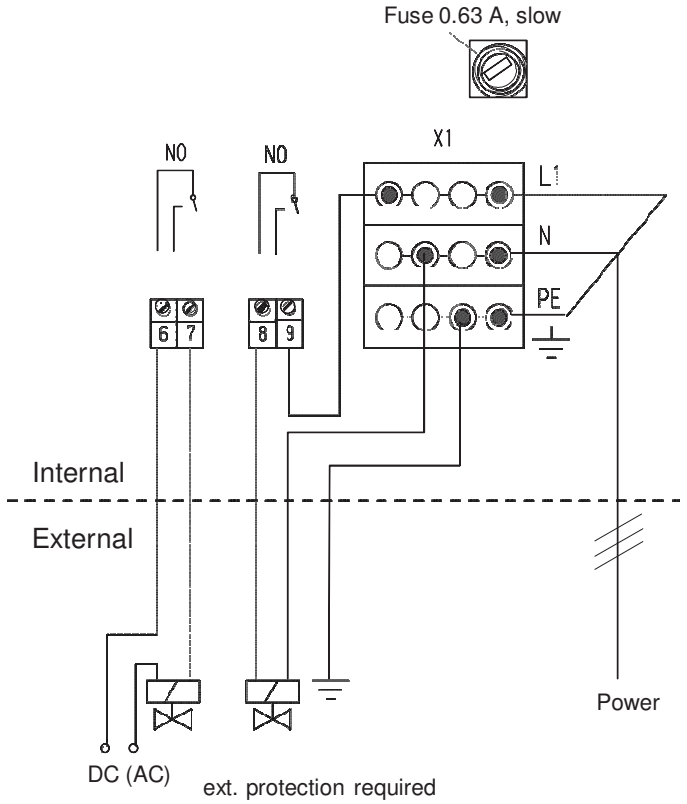
7 Terminal Assignment

Description	Terminal designation	Terminal no.	Pole	Function
Alarm relay	**P 1**	1		Signal-horn (control)
		2		
		3		
Power relay 1	**P 2**	4		PWM acid (control solenoid valve (dulco®flex))
		5		PWM alkaline (control)
Power relay 2	**P 3**	6		PWM pH lowering PWM alkaline (control) (Control solenoid valve dulco®flex)
		7		
Power relay 3	**P 4**	8		Enabling UV plant PWM chlorine (control) PWM ORP (control) Enabling heater
		9		
Voltage supply	**X 1**	10	PE	
		11	N	
		12	L(1)	

8 Terminal Connection Diagram

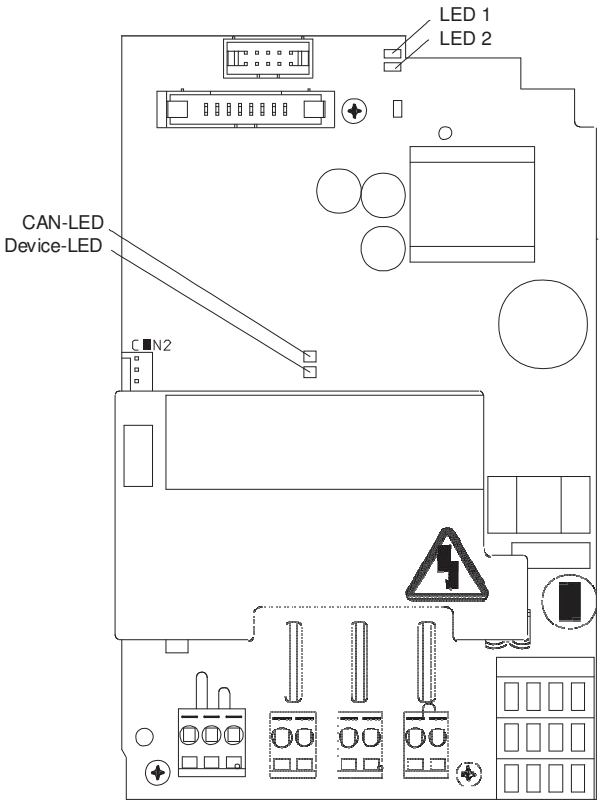


Example for the connection of a solenoid valve (or peristaltic pump DULCO®flex DF2a or motor dosing pump alpha)



IMPORTANT

External protection required!



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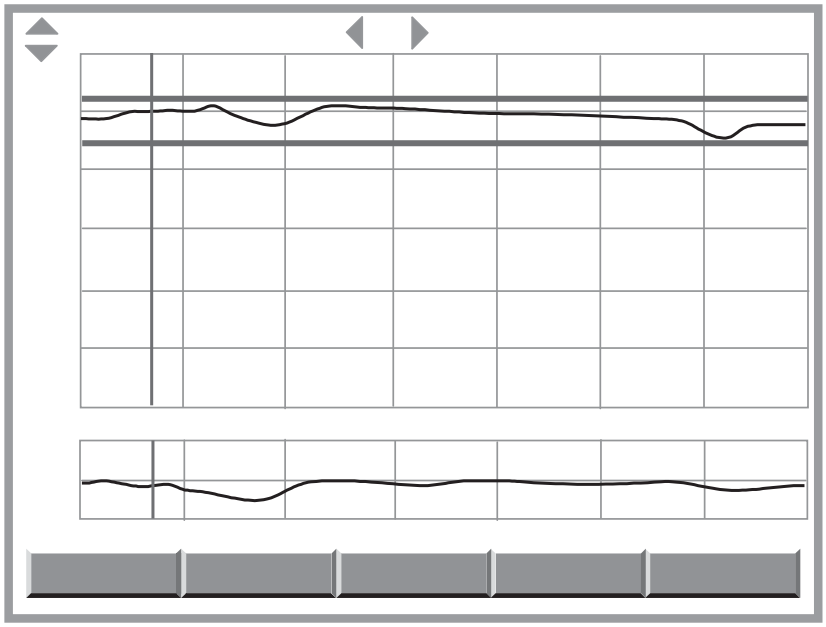
Hopewell, VA Section 7
Videographic recorder



Please read through the whole of these instructions to begin with! · Do not discard them!
The operator shall be liable for any damage caused by installation or operating errors!

Part No. 986790 **ProMinent Dosiertechnik GmbH · 69123 Heidelberg · Germany** BA DC 045 12/08 GB

These operating resp. supplementary instructions apply only in conjunction with the following ticked operating resp. supplementary instructions:

- ☐ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa Part 1: Mounting and Installation
- ☑ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller DXCa Part 2: Operation
- ☑ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II Disinfection Controller DXCa Part 2: Operation
- ☐ Supplementary Instructions DULCOMARIN® II Videographic Recorder Operation
- ☑ Supplementary Instructions DULCOMARIN® II, M Module (Measurement Module for pH, Redox/ORP, Temperature) DXMaM Operation
- ☐ Supplementary Instructions DULCOMARIN® II, M Module (Measurement Module for pH, Redox/ORP, Temperature) DXMaM Connection
- ☐ Supplementary Instructions DULCOMARIN® II, A Module (Actuator Module, Pumps and Standard Signal Outputs mA) DXMaA
- ☐ Supplementary Instructions DULCOMARIN® II, N Module (Power Supply Module without Relays) DXMaN
- ☐ Supplementary Instructions DULCOMARIN® II, P Module (Power Supply Module with Relays) DXMaP
- ☑ Supplementary Instructions DULCOMARIN® II, I Module (Current Input Module, Standard Signal Inputs mA) DXMaI

Imprint:
Supplementary Instructions
DULCOMARIN® II, Videographic Recorder

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1 About this Product

The videographic recorder for the system (pool) controller DULCOMARIN® II is a software solution that makes an expensive peripheral device superfluous. Designed as a 16-way, 2 x 5-channel recorder, it displays the measured values for pH value, redox value, concentration for free Cl and combined Cl and temperature, together with the corresponding control variables (not for temperature) for each of up to 16 system (pool)s. Without an SD card the measurement results for a 24 h period can be stored; with an SD card the measurement results for periods of 35 days to
12 years can be stored, depending on specific requirements.

The simple TXT-files on the SD card can be copied to a PC and edited as graphics using EXCEL, for example.

2 Storage and Transport

The standard delivery includes the DXCa update kit consisting of:

- SD card, 64 MB
- card reader

CAUTION

- ***Store and transport the card reader and SD card in the original packaging!***
- ***Also protect the entire DXCa update kit from damp and the effects of chemicals!***

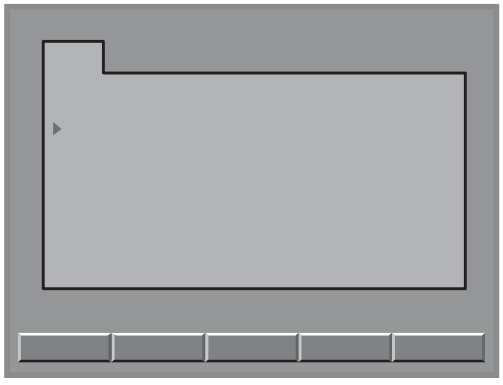
Environmental conditions for storage and transport

Temperature: 0 °C ... 45 °C

Humidity: 10 % ... 90 % relative humidity, non-condensing

3 Setting up the Videographic Recorder

Fig. 1: The PLOT tab on an inactive videographic recorder



If the icon for the videographic recorder is not present on the far left in the central menu item, proceed as follows:

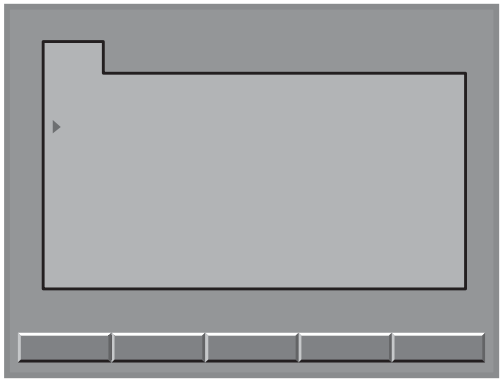
- ► Press the F4 CONFIG function key in the central menu item
- ► Press the F2 OPTION function key in the Configure menu item
- ► Press the ENTER key on the PLOT tab (enter the access code, if required)
- ► Use the UP and DOWN arrow keys to choose the “active” selection and press the ENTER key
- ► Press the F5 SAVE function key
- ► Press the ESC key repeatedly to return to the main menu option.

NOTE

The videographic recorder does not start working until the start-up routine of the DULCOMARIN® II is complete (this takes approx 4 min.).

Setting up the videographic recorder interface

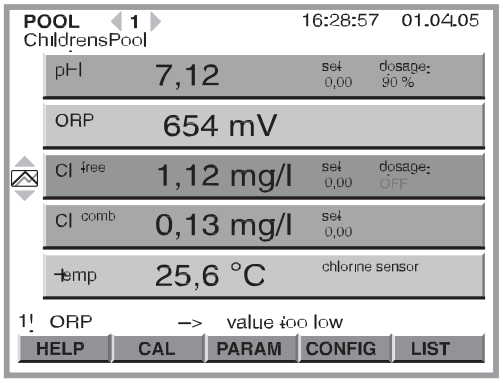
Fig. 2:
The PLOT tab on an active videographic recorder



- ► Press the F4 CONFIG function key in the central menu item
- ► Press the F2 OPTION function key in the Configure menu
- ► On the PLOT tab, choose either the “pen width” selection or the “Grid lines” selection (arrow keys) (enter the access code, if required)
- ► Press the ENTER key
- ► Use the UP and DOWN arrow keys to make the required selection and press the ENTER key
- ► Press the F5 SAVE function key
- ► Press the ESC key repeatedly to return to the main menu option.

Looking at the charts

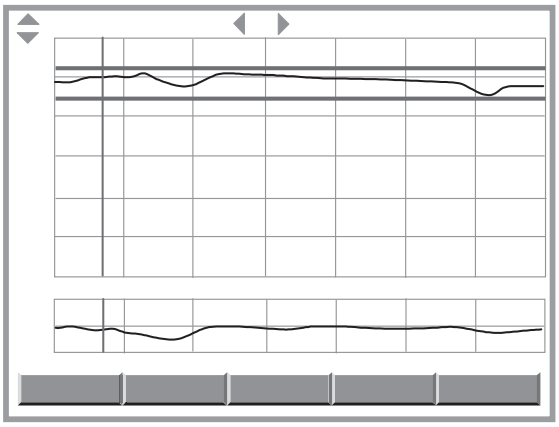
Fig. 3:
The central menu item on an active videographic recorder



- ► Press the UP or DOWN arrow keys in the central menu item – the charts for the pH value appear first.

4 Structure and Function of the Videographic Recorder

Fig. 4: Structure of the recorder window



The recorder window is made up of:

- Designation of the parameter
- System (pool) number and system (pool) name (for several system (pool)s)
- Chart for the parameter
- Chart for the control variable of the parameter
- Information line for the selected measured value
- Bar with function keys

Designation of the parameter

Select the parameter using the UP and DOWN arrow keys.

System (pool) number and system (pool) name

Select the system (pool) using the LEFT and RIGHT arrow keys.

Chart for the parameter

The chart for the parameter shows the y-axis with the units on the far left. Between the chart for the parameter and the chart for the control variable is the time axis (x-axis). It always displays 24 hours. Times are only displayed where there are also measured values. Otherwise it shows “00:00”.

The red lines indicate the set limits (in the Set Parameter menu: Parameter Alarm)
If the measured values infringe the limit, the trace appears red there.

The blue line is a cursor that you can use to move onto individual measured values to read their exact value (see below “Information line for the selected measured value” and “Bar with function keys”). The cursor is positioned exactly on the y-axis to begin with.

Chart for the control variable of the parameter

The diagram for the control variable of the parameter shows the y-axis with the units (%) on the far left. Between the chart for the parameter and the chart for the control variable is the time axis (x-axis). It always displays 24 hours.

Information line for the selected measured value

The information line for the selected measured value displays its exact value. You select a measured value with the cursor (see below “Bar with function keys”).

The sequence of the displayed values is:

- No. of the measured value
- Measured value
- Value of the control variable
- Date of the measurement
- Time of the measurement
- (Display number)

Bar with function keys

By pressing the function key ARCHIVE, the measuring values of past days can be accessed at the DULCOMARIN® II for up to one week in arrears. This requires a SD card.

The bar with the function keys includes the function key ARCHIVE and the function key pairs F2 ZOOM- / F3 ZOOM+ and F4 <CURSOR / F5 CURSOR>:

You can use the F2 ZOOM- / F3 ZOOM+ pair of function keys to zoom in and out of the y-axis for the parameter.

NOTE

When the recorder receives the next measured value, the view jumps back to the normal view again (after 5 min. at the latest). The view also reverts back to the normal view each time you change to a different display.

You can use the F4 <CURSOR /F5 CURSOR> pair of function keys to move the blue cursor in the chart for the parameter (it might be positioned on the y-axis to begin with).

More information

The time interval at which the DULCOMARIN® II records the measured values is 5 min.
When the trace has reached the full chart width, an old value disappears on the left for each new value that appears on the right.

The DULCOMARIN® II stores the current day’s measured values.
The DULCOMARIN® II stores the previous day’s measured values from 0 h to 24 h as files for each parameter and for each system (pool).
When an SD card is fitted, the DULCOMARIN® II stores these files on the SD card until it is full.

By pressing the function key ARCHIVE, measuring values of past days can be accessed at the DULCOMARIN® II for up to one week in arrears. In Archive, use the function keys "<<" and ">>" to go from day to day. The numbers of the days are shown at the top right of the display.

5 Using the SD Card

Requirement:
A PC with Windows 98 or later and a USB adaptor is required.

Use the SD card when the measured values must be stored for longer than 24 hours (or if you don’t want the “!Please insert SD card!!” error message to be displayed)

The SD card storage capacity required depends on the number of days to be stored and the number of system (pool)s (see Table 1 in the “Technical data” section). The SD card supplied has a capacity of 64 MB.

CAUTION

When the recorder is in service, an empty card must be fitted in good time before the number of days that can be stored - from Table 1 - runs out (except for the current day’s files)!

Otherwise the files for subsequent days will be lost as the DULCOMARIN® II cannot erase data on the SD card!

The SD card must be formatted as FAT 16 or FAT 32.

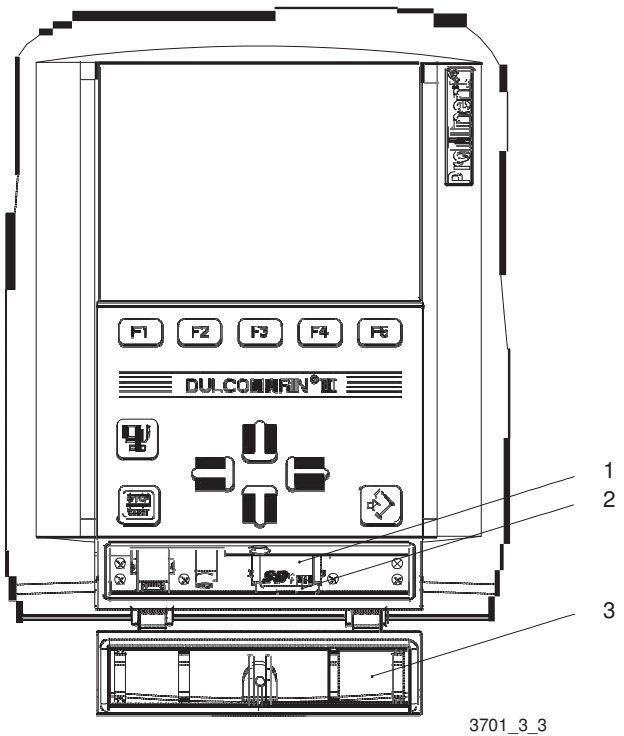
The DULCOMARIN® II cannot use the FAT 12 format that is standard with digital cameras. However, FAT 12 formatted cards can be reformatted using the card reader. Formatting erases all data on the SD card!

NOTE

The videographic recorder shows the measuring values of the last 24 hours. Older measuring values can be accessed by pressing the function key ARCHIVE or at a PC (see following section).

Fitting the SD card

Fig. 5: The interfaces with the interface cover of the DXCa open



1 Card slot
2 SD card
3 Interface cover

CAUTION

The SD card must be emptied (except for the current day's files)!

Otherwise the number of days that can be stored - from Table 1 – cannot be achieved, as the DULCOMARIN® II cannot erase data on the SD card!

- ► To fit the SD card, open the transparent interface cover (3) at the bottom of the DULCOMARIN® II case (shown open in Fig. 5).
- ► If the SD card is being replaced by another SD card, always perform a reset before fitting the new card. Press: F4 CONFIG, F2 OPTION and F3 RESET in sequence.
  If you forget to reset before fitting the card, totally erase the SD card and then perform the reset.
- ► Slide the SD card (2) into the card slot (1), until it clicks into place. An "SD" identifier on a green background then appears at the top right of the LCD screen. The "!Please insert SD card!!" error message clears as well.
  If the DULCOMARIN® II has already stored data, it then copies the previous day's files and the current day's measured values to the SD card with the next measured value (delay time up to 5 min.) – the "SD" identifier appears on a red background. Do not take the SD card out at this time!

CAUTION

After the transparent interface cover (3) in Fig. 5 has been opened, it must be screwed firmly back in place to ensure a moisture-proof seal. Otherwise IP 65 protection is not achieved!

Analysing the SD card files

- ▶ To take the SD card out, open the transparent interface cover (3) at the bottom of the DULCOMARIN® II case (shown open in Fig. 5).
  Only pull the SD card (2) out of the card slot (1) if the "SD" identifier at the top right of the LCD screen has a green background – not if it has a red background. The recorder is storing data at this time. Wait for a short time in this case.
  When the SD card has been taken out, the "SD" identifier at the top right of the LCD screen disappears. The "!Please insert SD card!!" error message also appears in both the permanent display and the central menu item.
- ▶ Copy the SD card files to the PC using the card reader and erase the data on the SD card.
- ▶ Refit the SD card (see above "insert SD card").

The file names have the following format:

YYMMDDPP.txt

where YY = year, MM = month, DD = day, P or PP = system (pool) number

To save the measured data, the DULCOMARIN® II stores the files "read-only". So only work with copies and remove the write-protect under "Properties" on the PC.

Opening the file in EXCEL:

- ▶ Open the file with "File" - "Open" - "Files of type: All Files" - select file - "Open".
- ▶ Click "Next" In the Text Import Wizard that appears.
- ▶ In the next window, under "Separators", check the Tab box and click "Finish".
- ▶ If the number columns are left-justified, select them and set the cell format to "Number".
- ▶ To create charts, only use the "XY (scatter)" chart type.

CAUTION

If you have the changed the DULCOMARIN® II clock over to or back from summertime, take this into account in the analysis!

6 Troubleshooting

Error message	Cause	Remedy
"!Please insert SD card!!"	Recorder is activated but no SD card fitted.	Fit SD card
"! Unformatted SD card!!"	SD card not formatted as FAT 16 or FAT 32	Format SD card as FAT 16 or FAT 32. All data on the SD card will be erased!
"!SD card write-protected!!"	Small switch on the side of the SD card is set at LOCK	Move the switch on the side of the SD card away from LOCK
"!SD card full. Please replace!!"	SD card is full	Copy all data from the SD card to PC and erase the data on the SD card
After changing the SD card, the traces do not show the values immediately after 24:00 h	No reset was performed before changing the SD card	Perform a reset! Press: F4 CONFIG, F2 OPTION and F3 RESET in sequence.

7 Technical Data

Recorder type: 16-way 2 x 5-channel recorder (16 system (pool)s, measured variable and control variable, 5 measured variable

Environmental conditions for storage and transport: DXCa update kit

Temperature: 0 °C … 45 °C

Humidity: 10 % … 90 % relative humidity (non-condensing)

in service: Card reader

Temperature: 0 °C … 45 °C

Humidity: 20 % … 85 % relative humidity (non-condensing)

SD card

Temperature: -25 °C … +85 °C

Storage capacity: without SD card: 24 h

with SD card:

Table 1: Relationship between number of days that can be stored, SD card storage capacity and number of system (pool)s

Storage capacity in MB	**32**	**64**	**128**	**256**
Number of system				
1	564	**1128**	2256	4512
2	282	**564**	1128	2256
3	188	**376**	752	1504
4	141	**282**	564	1128
5	112	**224**	448	896
6	94	**188**	376	752
7	80	**160**	320	640
8	70	**140**	280	560
9	62	**124**	248	496
10	56	**112**	224	448
11	51	**102**	204	408
12	47	**94**	188	376
13	43	**86**	172	344
14	40	**80**	160	320
15	37	**74**	148	296
16	35	**70**	140	280

SD card format: FAT 16 or FAT 32

File name format: YYMMDDPP.txt

8 Accessories

	Order No.
DXCa update kit (included in standard delivery)	1025885
consisting of SD card, 64 MB, for temperatures between -25 °C … +85 °C and card reader	
SD memory card, 64 MB, -25 °C … +85 °C	732483

We reserve the right to make technical modifications.

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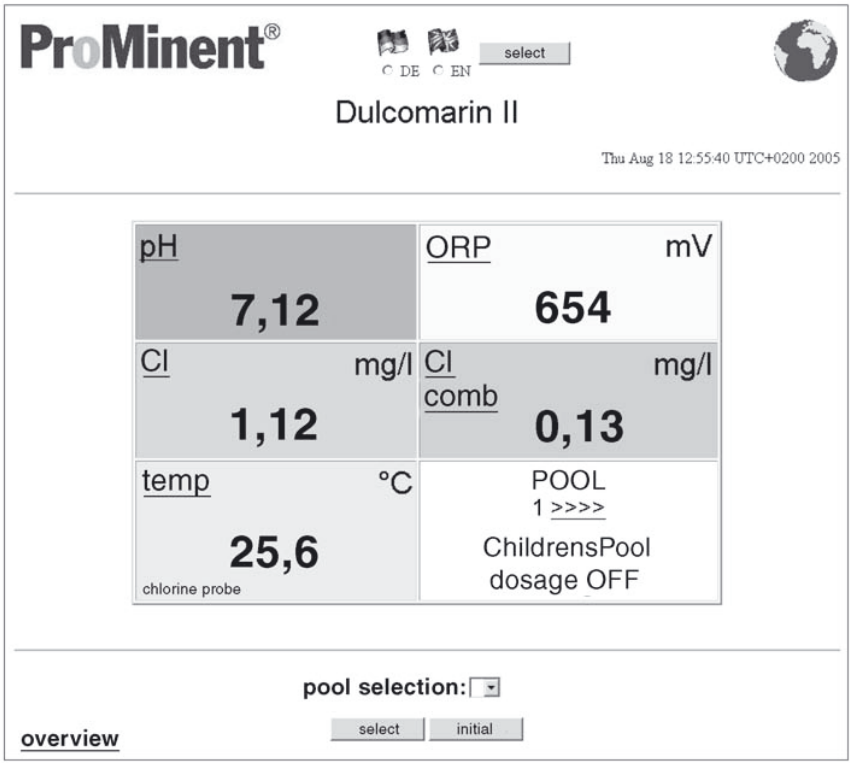
Preliminary

ProMinent®

Hopewell, VA Section 8
Embedded Web server



These operating instructions are only valid in conjunction with the "Operating Instructions DULCOMARIN® II system (pool) controller, Part 2: Operation."

Please read through the whole of these operating instructions to begin with! Do not discard them! The warranty is invalidated in the event of damage due to incorrect operation!

Legal notice: Supplementary
instructions Embedded Web
Server, LAN for DULCOMARIN®
II DULCO®-Net

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Printed in Germany

General notes for the user

Please read through the following notes for the user! When you are familiar with them, you will get a lot more out of the operating instructions.

In the text, particular emphasis is placed on:

- Lists

- Instructions

Operating notes:

NOTE

Notes are designed to make your work easier

and Safety notes:

CAUTION

Indicates a possibly dangerous situation.
Failure to comply can result in slight or minor injuries!

ATTENTION

Indicates a possibly harmful situation.
Failure to comply can result in damage to property and equipment!

1 About this product

The Embedded Web Server in the DULCOMARIN® II DULCO®-Net allows the central unit of the DULCOMARIN® II to be remotely monitored via a PC. Additionally, the setpoints can be changed via the PC and the dosing stopped and started.
The central unit of the DULCOMARIN® II and the PC can be connected via a LAN.

Access to the Embedded Web Server can be password-protected.

The Embedded Web Server is available with the DULCOMARIN® II DULCO®-Net with the identity code feature “Communication interfaces: 5, 8, 9 Embedded Server, LAN” in the identity code of the central unit (DXCa_ _5 1 _ _ _ _ _ _01).

NOTE

To check the identity code, press the F1 HELP function key in the central menu.

2 Safety

CAUTION

Swimmers can be endangered due to excess chlorinity, excess acidity or hygienic shortcomings in the system (pool) water, if unqualified or unauthorised persons (even hackers) adjust the setpoints of the DULCOMARIN® II or switch the dosing on or off!

Ensure that the required security is provided there when connecting the system to a LAN!

Protect the Embedded Web Server with 2 secure passwords with the maximum character length (use both numbers and special characters).

The central unit of the DULCOMARIN® II itself must be protected by secure passwords (numeric codes)!

The “PIN card” - available from ProMinent (Order No. 986894)- helps in noting down several numeric codes easily and securely.

ATTENTION

The connection between the DULCOMARIN® II and a PC must be set up only by specialist staff who are very familiar with networks!

Usage clause

Before commissioning the DULCOMARIN® II network connection and within the bounds of the Operator's duty of care, a check must be made on whether the installation can lead to particular interactions with existing data processing systems.

In addition, the central unit of the DULCOMARIN® II must be protected against unauthorised access by entering a number of secure passwords (using the maximum number of characters) and the DULCOMARIN® II Web server must be protected against unauthorised access by entering two secure passwords (using the maximum number of characters). If the customer fails to enter a secure password, he indemnifies ProMinent from all claims for damages that can be attributed to unauthorised or faulty data transfer and use.

Furthermore, the Operator must ensure appropriate security of existing data both before the initial commissioning and during day-to-day operation. All reasonable security measures must be taken in the event of a suspected error.

ProMinent accepts no liability for damages caused by force majeure (civil unrest, war, natural phenomena) or by other incidents that ProMinent are not responsible for (power failures, traffic interruptions, maintenance and repair work, as well as functional faults on DP systems and Internet links).

3 Installation and setup

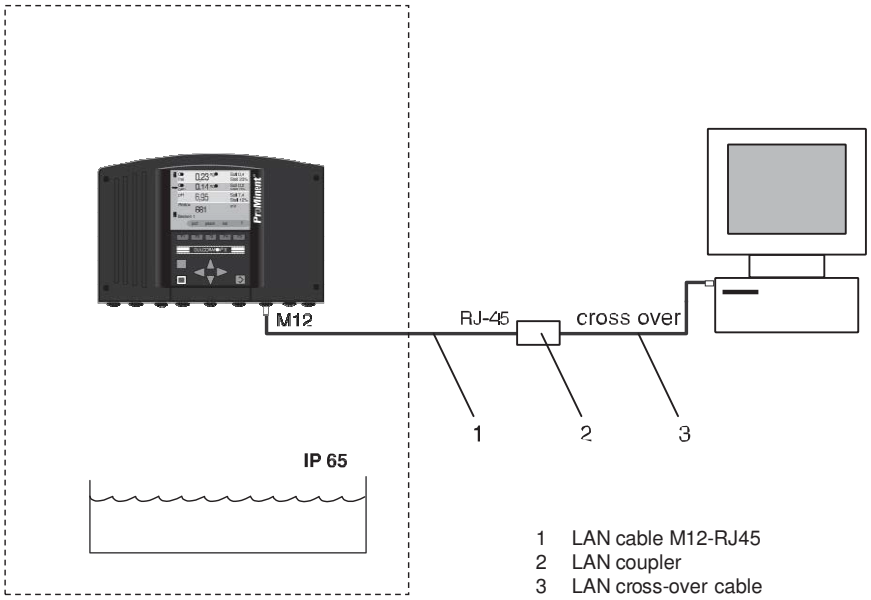
PC requirements

Browser (e.g. *Microsoft® Internet Explorer*): must be running
Network card: must be available

First of all, physically connect the central unit of the DULCOMARIN® II to the PC as suggested in the following sections.

3.1 Via direct connection

Fig. 1: Direct connection between DULCOMARIN® II and PC



1 LAN cable M12-RJ45
2 LAN coupler
3 LAN cross-over cable

The DULCOMARIN® II can be directly connected to the PC via the LAN cable M12-RJ45 (1), together with a LAN coupler (2) and a LAN cross-over cable (3).

Installation

ATTENTION

- ***Special LAN cable M12 - RJ45 is required at the DULCOMARIN® II (included in delivery package)!***
- ***On the LAN cable M12 - RJ45, only the M12 gland is dampproof, and only when it is screwed on!***
  So, in damp areas, always protect the M12 connection of the DULCOMARIN® II with the protective cap supplied whenever the cable is not connected! For this reason, the LAN cable must only be disconnected for a short time in damp areas!
- ***Connect the DULCOMARIN® II to the PC via the LAN cable M12-RJ45 (1) together with a LAN coupler and a LAN cross-over cable (3).***
  When the connection is physically present, the LAN LED illuminates at the DULCOMARIN® II (the furthest right of the four LEDs).

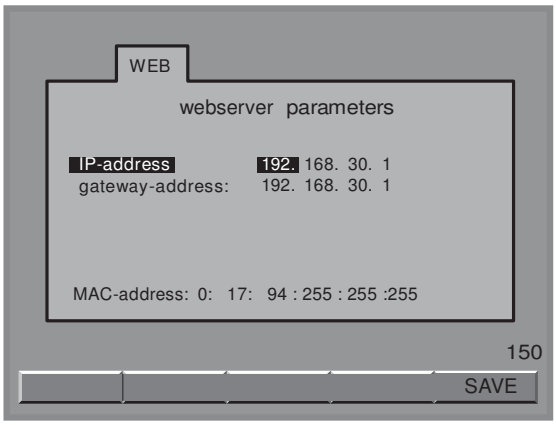
Installation material	Order No.
LAN cable M12 - RJ45, 5.0 m	supplied
LAN cable M12 - RJ45, 10 m	1026716
LAN cross-over cable RJ45, 3.0 m	1027859
LAN coupler, RJ45	1027860

Microsoft® Internet Explorer is a registered trademark or brand of Microsoft® Corporation in the USA and/or other countries

Setup

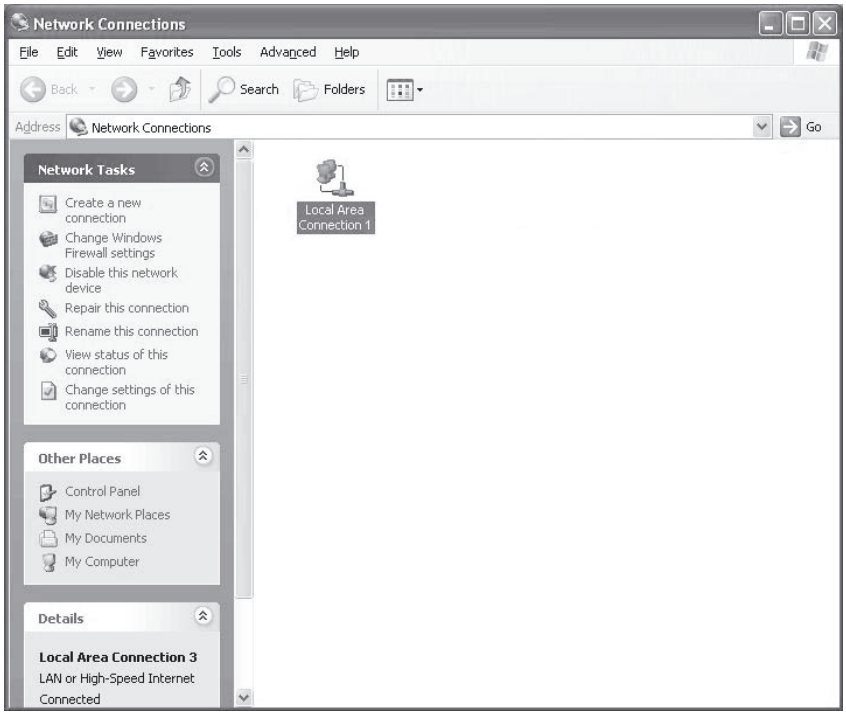
- At the central unit of the DULCOMARIN® II, use the ENTER key to change from the permanent display to the central menu.
- In the central menu, access the WEB tab with F4 CONFIG and F2 OPTION.

Fig. 2:
Web server
IP address settings



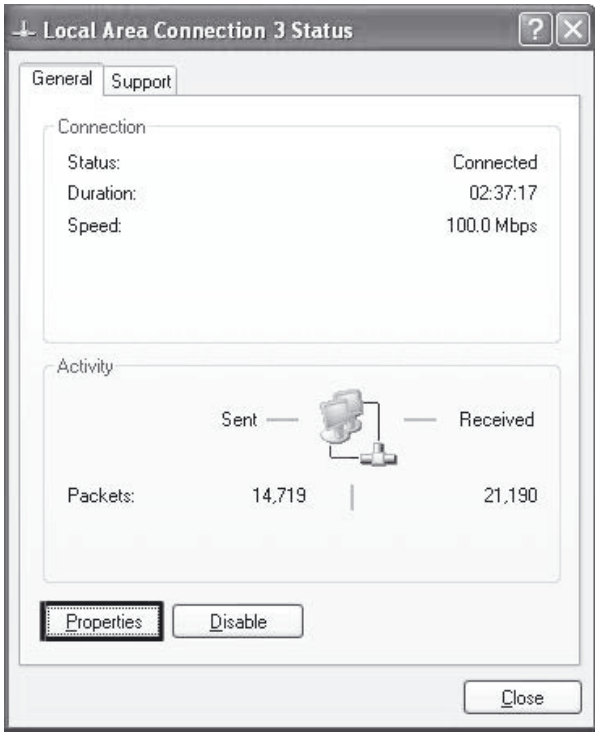
- Check the IP address of the DULCOMARIN® II "192.168.30.1". The gateway address must be identical with it for this type of installation.
- At the PC, go to the menu for setting the IP (also refer to the documentation of your PC operating system). The path there, for example, in *Microsoft® Windows XP Professional SP2* is like: "Start" (bottom left, on the taskbar) – "Settings" – "Control Panel" – "Network Connections":

Fig. 3:
Network Connections



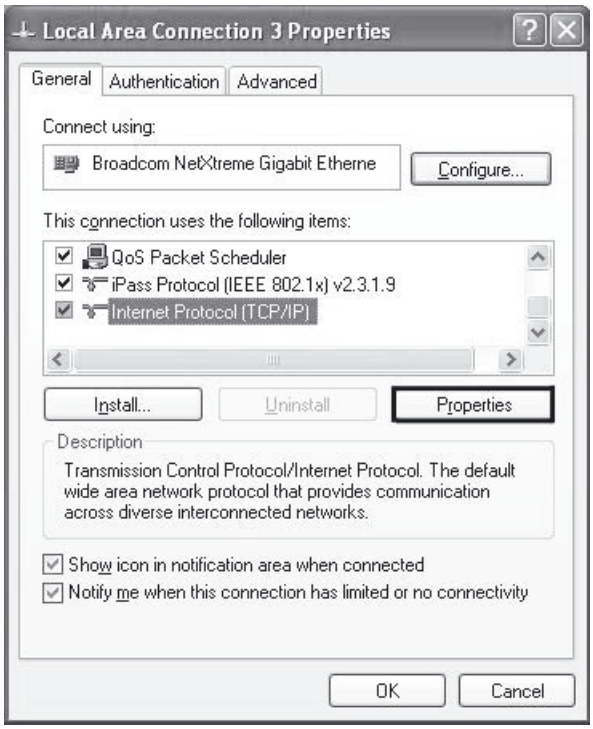
- Click the “LAN connection” icon in this window - “Status of LAN Connections” appears:

Fig. 4: Status of LAN connections



- Click “Properties” in this dialog box - “LAN Connections Properties” appears.

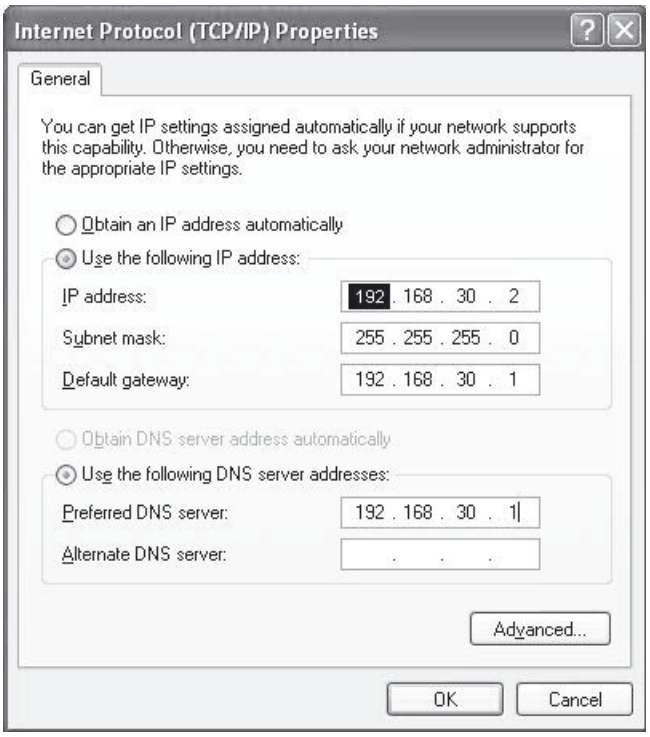
Fig. 5: LAN Connections Properties



Windows® XP Professional screenshots reprinted with permission from *Microsoft® Corporation*

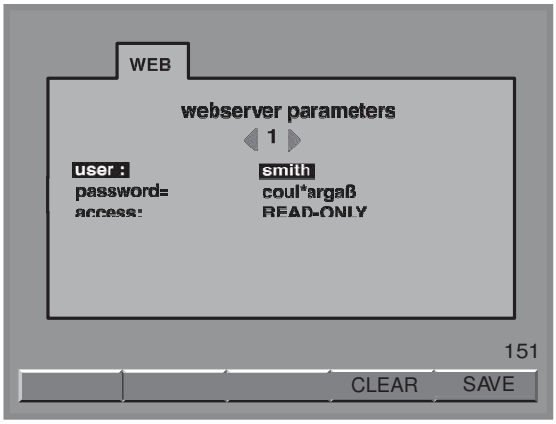
- Select “Internet Protocol (TCP/IP)” in this dialog box.
- Click “Properties” – “Properties of Network Protocol (TCP/IP)” appears:

Fig. 6: Internet Protocol Properties (TCP/IP)



- In this dialog box, enter:
  - IP address: 192.168.30.2 (pay attention to the “2” at the end – it must differ from the IP address of the DULCOMARIN® II in this position)
  - Subnet mask: 255.255.255.0
  - Default gateway (don’t change, this depends on your network.)
- Click “OK” and then close all Control Panel dialog boxes once again.
- At the DULCOMARIN® II, in the WEB tab, change to WEB for password tab with F4 PASSW:

Fig. 7: Web server password settings (DULCOMARIN® II)



- You must enter a user (user name) and password (code) that differs from the standard settings. To do this, press ENTER and use the arrow keys to select the characters, then press ENTER again.
- Press F5 SAVE – otherwise the entries are lost.
- In the central menu, access the WEB tab with F4 CONFIG and F2 OPTION and press the F3 RESET key to activate the changed data. The system restarts again.

Windows® XP Professional screenshots reprinted with permission from *Microsoft® Corporation*

The Embedded Web Server can be protected by two passwords. Eight users can be set up (use the maximum character length for these too)

Under “Access” In the WEB for passwords tab, you can set whether the password allows ‘Read only’ or ‘Write only’ or both.

The required characters can be selected with the UP and DOWN arrow keys.

ATTENTION

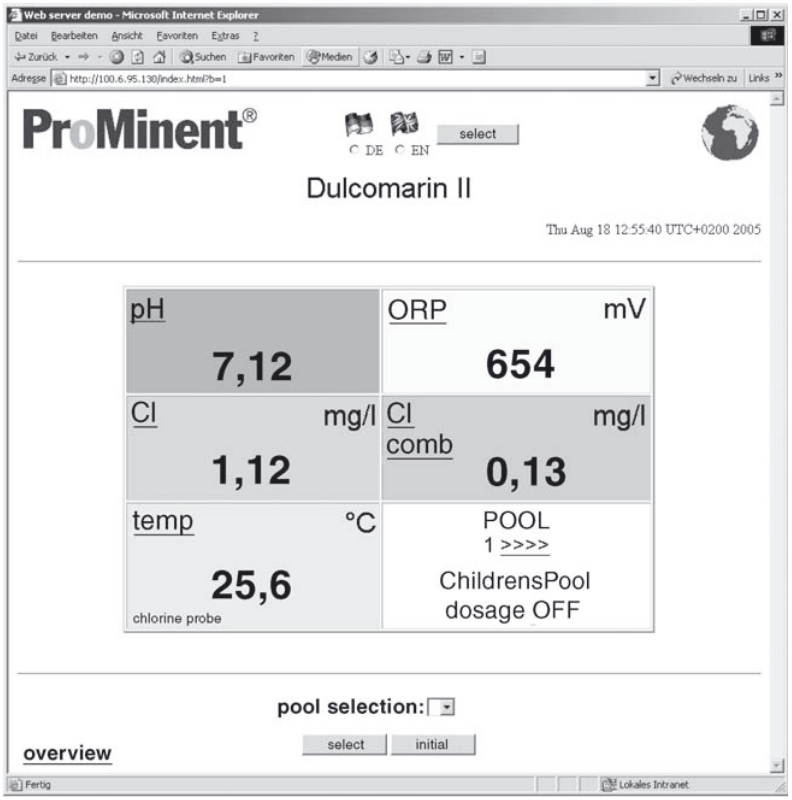
- ***The DULCOMARIN® II can only be operated with a password!***
- ***Use two passwords to protect the DULCOMARIN® II more securely (one for read and one for change)!***
- ***Observe the current standard rules for secure passwords!***

Success check

Once everything is successfully installed and set up, proceed as follows:

- At the PC, open the browser (e.g. *Microsoft® Internet Explorer*) and at the top, in the address line, enter the IP address of the DULCOMARIN® II: 192.168.30.1 – an Authentication dialog box appears.
- In the Authentication dialog box, enter the user name and password (code) - the Web interface of the DULCOMARIN® II appears on the PC screen with the permanent display:

Fig. 8: Web interface (DULCOMARIN® II)



If the Web interface does not appear:

Check that *Microsoft® Internet Explorer* is not using any proxy servers: in the browser, under the “Tools”- “Internet Options” tab - “Connections” – “LAN Settings”, check that there is no check mark against “Proxy server”. If there is, clear the check mark, quit the menu with OK and then enter the IP address of the DULCOMARIN® II again in the address line at the top and click on “Change to”.

3.2 Via LAN

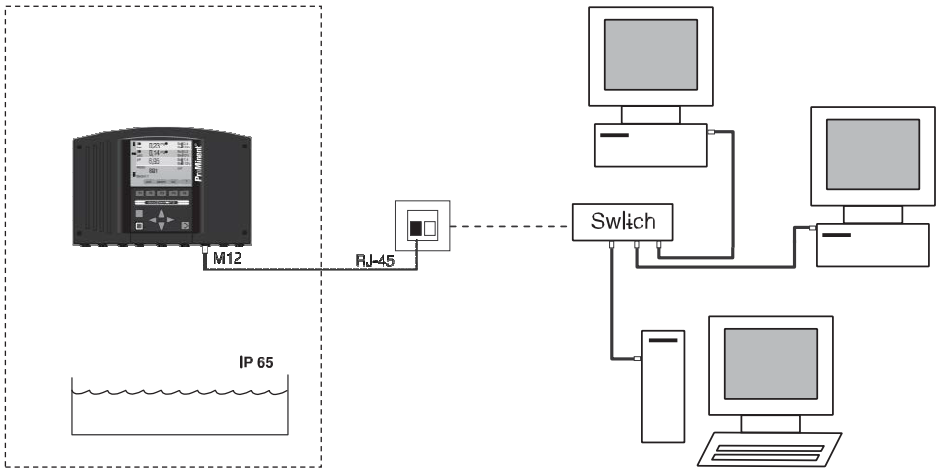


Fig. 9: DULCOMARIN® II and PC connected via LAN

The DULCOMARIN® II can be connected in a LAN like a conventional Web server.

CAUTION

- ***The connection can and must only be set up by the specialist who set up the LAN, or who is responsible for it.***
- ***Call in a network specialist if you have network problems!***
- ***Call ProMinent if you have problems with the DULCOMARIN® II.***

NOTE

The following section only provides the information that the specialist needs to install and set up the DULCOMARIN® II Embedded Web Server.

Installation

ATTENTION

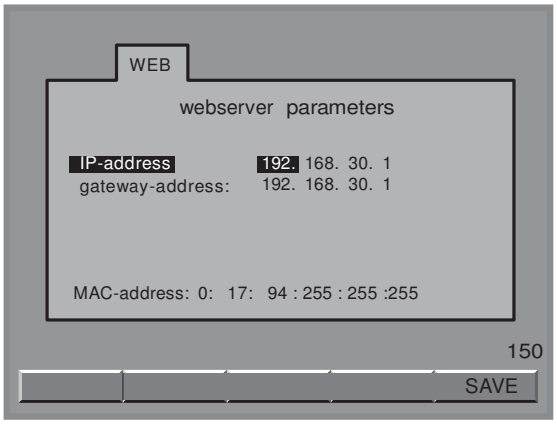
- ***Special LAN cable M12 - RJ45 is required at the DULCOMARIN® II (included in delivery package)!***
- ***On the LAN cable M12 - RJ45, only the M12 gland is dampproof, and only when it is screwed on!***
  So, in damp areas, always protect the M12 connection of the DULCOMARIN® II with the protective cap supplied whenever the cable is not connected! For this reason, the LAN cable must only be disconnected for a short time in damp areas!
- ***Connect the DULCOMARIN® II to the network switch via the LAN cable M12-RJ45 and an Ethernet socket.***
  When the connection is physically present, the LAN LED illuminates at the DULCOMARIN® II (the furthest right of the four LEDs).

Installation material	Order No.
LAN cable M12 - RJ45, 5.0 m	supplied
LAN cable M12 - RJ45, 10 m	1026716

Setup

- At the central unit of the DULCOMARIN® II, use the ENTER key to change from the permanent display to the central menu.
- In the central menu, access the WEB tab with F4 CONFIG and F2 OPTION.

Fig. 10:
Web server
IP address settings



The WEB tab displays:

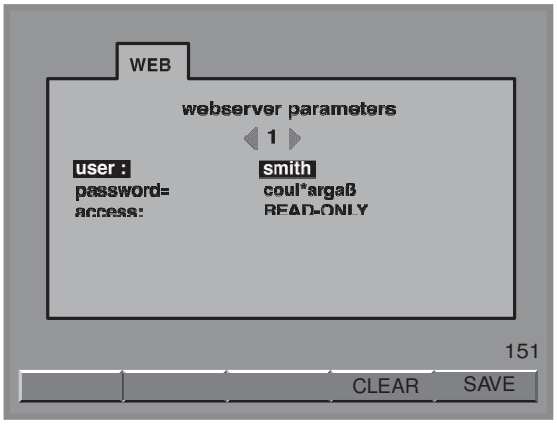
- The IP address of the DULCOMARIN® II (factory setting: 192.168.30.1)
- The gateway address (factory setting: 192.168.30.1)

- The settings can be changed with the ENTER key and the arrow keys.
- Save the settings with F5 SAVE.
- At the PC, move to the menu for setting the IP (also refer to the documentation of your PC operating system)
  The path there, for example, in *Microsoft® Windows* is often like:
  "Start" – "Settings" – "Control Panel" – "Network Connections" – "LAN connections" – "Properties" – "Internet Protocol" – "Properties".
- In this dialog box, enter:

- IP address
- Subnet mask
- standard gateway

- At the DULCOMARIN® II, in the WEB tab, change to the WEB for password tab with F4 PASSW:

Fig. 11:
Web server password settings (DULCOMARIN® II)



- Enter the required user (user name) and passwords (codes) for the DULCOMARIN® II: to do this, press ENTER and then use the arrow keys and press ENTER again.
- Press F5 SAVE – otherwise the entries are lost.

Microsoft® Windows XP Professional is a registered trademark or brand of Microsoft® Corporation in the USA and/or other countries

The Embedded Web Server can be protected by two passwords. Eight users can be set up (use the maximum character length for these too)

Under “Access” In the WEB for passwords tab, you can set whether the password allows ‘Read only’ or “Change only” (Write) or both.

The required characters can be selected with the UP and DOWN arrow keys.

ATTENTION

- ***The DULCOMARIN® II can only be operated with a password!***
- ***Use two passwords to protect the DULCOMARIN® II more securely (one for read and one for change)!***
- ***Observe the current standard rules for secure passwords – especially as the DULCOMARIN® II is connected to a LAN!***

4 Operation

4.1 Controls

The Web interface is designed for navigation using the mouse. The ESC key of the DULCOMARIN® II functions as a “Back” link (climbing the hierarchy of the operating menu).

NOTE

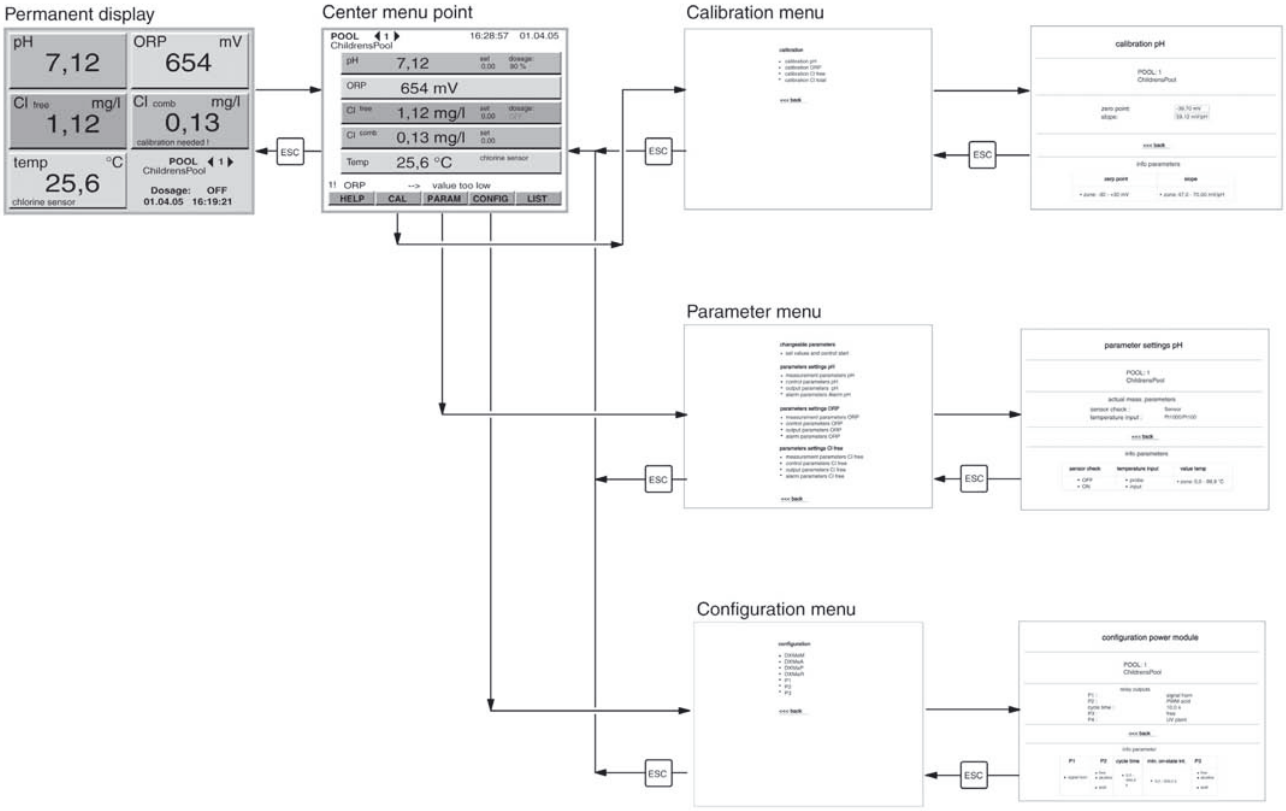
If the mouse has to be omitted, the Tab key and the ENTER key can also be used for navigation.

4.2 Operating language

- Go to the Web interface in the permanent display.
- Preselect the operating language via the radio buttons under the two flags.
- Press “Select” to select the language.

4.3 Operating menu structure

Fig. 12:
Operating menu structure with the Web interface



The operating menu structure of the Web interface is essentially the same as the operating menu structure of the DULCOMARIN® II itself. However, in the central menu, you can also go directly to the parameter summary of a process variable (broadly equivalent to the Tabs for the process variables).

4.4 Read

The permanent display and the central menu of the Web interface look almost the same as their DULCOMARIN® II counterparts. They display almost the same number of instantaneous readings and control variables as well as the state of the dosing for a particular system (pool).

A different system (pool) can also be selected here.

NOTE

If the "Change not possible ...." message appears, someone is working in the operating menu directly on the instrument (exceptions: the Help and Logger displays)

Only with "Recorder active": the "overview" link appears bottom left in the permanent display. The assigned page shows the readings, setpoints and the state of the controller for all system (pool)s (updated every 5 min.).

ATTENTION

- ***Error messages only appear in the error list (LIST)!***
- ***When the error list is open, it is not automatically updated! Update the error list manually via the browser's "Refresh" function!***
- ***Time and date differences between the Web interface and the DULCOMARIN® II are possible (also with the switch to summer time, for example)! The time and date displayed by the Web interface come from the PC, not the DULCOMARIN® II!***

- ***The DULCOMARIN® II updates the displayed values automatically every 20 s. The values can also be updated manually via the browser's "Refresh" function.***

Click on any link in the permanent display to change to the central menu.

The operating menu branches off in the central menu.

The following Web interface displays subdivide the data in the same way as the DULCOMARIN® II into:

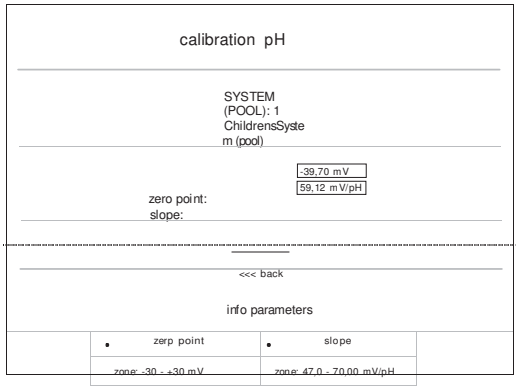
- Calibration
- Parameter setting
- Configuration

Data within the data displays is split into two areas:

- The top area displays the set parameters
- The bottom area displays the range of the parameters

A central area just has the "Setpoints adjustment …." display for the adjustable parameters.

Fig. 13: Areas of a display (DULCOMARIN® II): set parameters - top ranges - bottom



4.5 Write (Change)

You can adjust the state of the controller and the setpoints in the "Setpoints adjustment …." display.

ATTENTION

The set value becomes effective only after you click the "Select" key.

NOTE

If the "Change not possible …." message appears, someone is working in the operating menu directly on the instrument (exceptions: the Help and Logger displays).

5 Accessories

	Order No.
LAN cable M12 - RJ45, 5.0 m	1026715 (supplied)
LAN cable M12 - RJ45, 10 m	1026716
LAN cross-over cable RJ45, 3.0 m	1027859
LAN coupler, RJ45	1027860
LAN adaptor IP67 DXC, complete	1024835
PIN card	986894

We reserve the right to make technical modifications.

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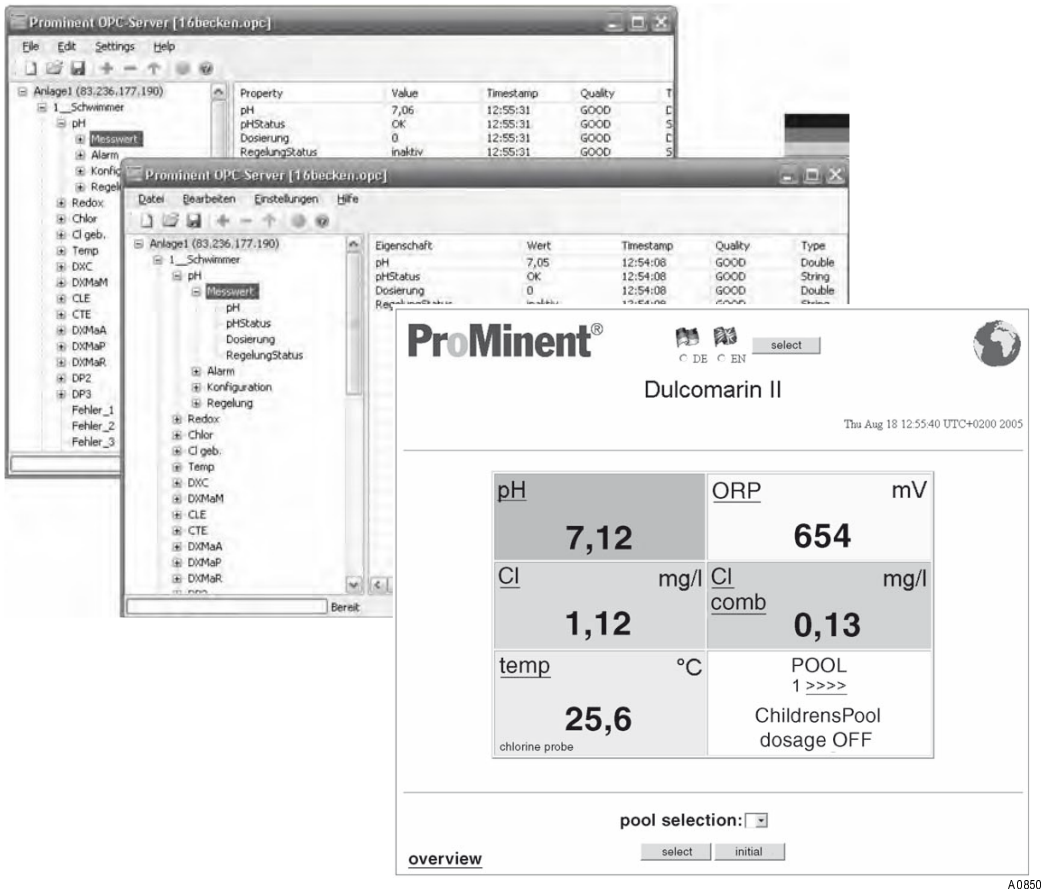
Hopewell, VA Section 9
ProMinent OPC-Server / Embedded Web Server LAN for DULCOMARIN® II DULCO®-Net



Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

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986712, 1, en_GB

Further applicable documents

This software manual is only valid in combination with the following operating and supplementary instructions:

- Multi-channel measuring and control system operating instructions DULCOMARIN® II System (pool) Controller and Disinfection Con - troller DXCa Part 2: Operation

General non-discriminatory approach

In order to make it easier to read, this document uses the male form in grammatical structures but with an implied neutral sense. It is aimed equally at both men and women. We kindly ask female readers for their understanding in this simplification of the text.

Supplementary information

Please read the supplementary information in its entirety.

The following are highlighted separately in the document:

- Enumerated lists
  - Instructions
    - Outcome of the instructions

Information

This provides important information relating to the correct operation of the system or is intended to make your work easier.

Safety information

The safety information includes detailed descriptions of the hazardous situation.

Windows® XP professional

Reproduction of Windows® XP professional screen-shots with the kind permission of the Microsoft® Corporation.

Table of contents

1 Embedded Web Server, LAN for DULCOMARIN II DULCO-Net

1.1 About this product

To read out the identity code, press the function key F1 [HELP] in the central menu item.

By use of the Embedded Web Server in the DULCOMARIN® II DULCO®-Net the central unit of the DULCOMARIN® II can be remotely controlled from a PC.

Moreover, the PC can be used to change the setpoints and stop and start dosing.

The central unit of the DULCOMARIN® II and the PC can be linked together via a LAN. Access to the embedded web server is password-protected.

The embedded web server is available with the DULCOMARIN® II DULCO®-Net with identity code characteristic “communication interfaces:
5, 8, 9 Embedded Server, LAN” in the identity code of the central unit (DXCa_ _5 1 _ _ _ _ _ _01).

1.2 Network security

WARNING!

Excess chlorine, acidification or hygiene deficits
Possible incorrect operation of the controller due to external attack on the LAN.

Remedy: When connecting to a LAN, ensure there is sufficient security. Observe the basic rules relating to network security.

Protect the embedded web server with 2 secure passwords of maximum character length (use numbers and special characters as well).

The central unit of the DULCOMARIN® II must be protected by secure passwords. The PIN card (order no. 986894), assists in recording multiple passwords.

Usage clause

Before commissioning the DULCOMARIN® II network connection, it must be checked as part of the operator's duty of care, whether the installation can cause particular interactions with existing data processing systems.

In addition, the central unit of the DULCOMARIN® II must be protected against unauthorised access by the entry of secure passwords and the DULCOMARIN® II Web server by the entry of two secure passwords. If the customer does not enter a secure password, then he releases ProMinent from any claim for damages, which can be traced back to unauthorised or incorrect data transfer and data utilisation.

The operator is responsible for ensuring appropriate backing up of existing data prior to first commissioning and during ongoing operation. In the event of a suspected error all conceivable protection measures must be taken.

ProMinent is not liable for damages due to force majeure (civil disturbances, war, natural disasters) or arising from other events which are not the responsibility of ProMinent (power cut, traffic congestion, maintenance or repair work of malfunctions of IT systems and Internet connections).

1.3 Installation and set-up

Microsoft® Internet Explorer is a registered trademark or trade name of the Microsoft® Corporation in the USA and/or other countries.

PC requirements

- Browser (e.g. Microsoft® Internet Explorer): must be running
- Network card: must be fitted

Firstly physically connect the DULCOMARIN® II central unit to the PC, as described in the following chapters.

1.3.1 Via a direct connection

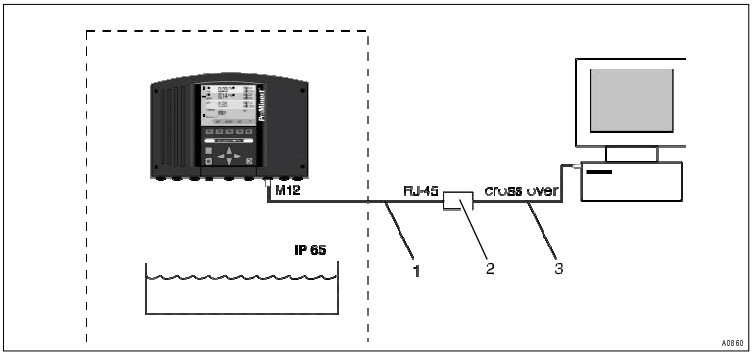

Fig. 1: Direct connection of the DULCOMARIN® II and PC

The DULCOMARIN® II can be directly connected to the PC, using the LAN M12-RJ45 patch cable (1) together with a LAN coupler (2) and a cross-over cable (3).

Installation

LAN M12-RJ45 patch cable, necessary for connection of the DULCOMARIN ® II (contained in the scope of supply).

The M12 threaded connector of the LAN M12-RJ45 patch cable is only moisture-tight when tightened up. Therefore in wet areas, protect the M12 connector of the DULCOMARIN ® II with the supplied protective cap until the LAN patch cable is properly connected.

If the DULCOMARIN® II is connected to the PC via the LAN cable, then the LAN LED illuminates on the DULCOMARIN® II (the rightmost of the four LEDs).

Installation equipment	Part no.
LAN M12 - RJ45 patch cable, 5.0 m	in the scope of supply
LAN M12 - RJ45 patch cable, 10 m	1026716
LAN RJ45 patch cable, cross-over, 3.0 m	1027859
LAN coupler, RJ45	1027860

Adjustment

NOTICE!

You can operate the DULCOMARIN® II with only one password.

Use two passwords to provide stronger protection of the DULCOMARIN® II. One password each for read and write access.

You can protect the " Embedded Web Server" with two pass- words. You can set up a maximum of 8 users (also use the maximum number of characters for this purpose).

Under the [WEB] tab for passwords, you can set under [Access], whether the password only allows [Read] , or [Write] access or both. Using the [UP] and [DOWN] keys you can select the desired characters.

1. Change to the central unit of the DULCOMARIN® II by pressing the [ENTER] key of the continuous display in the central menu item.

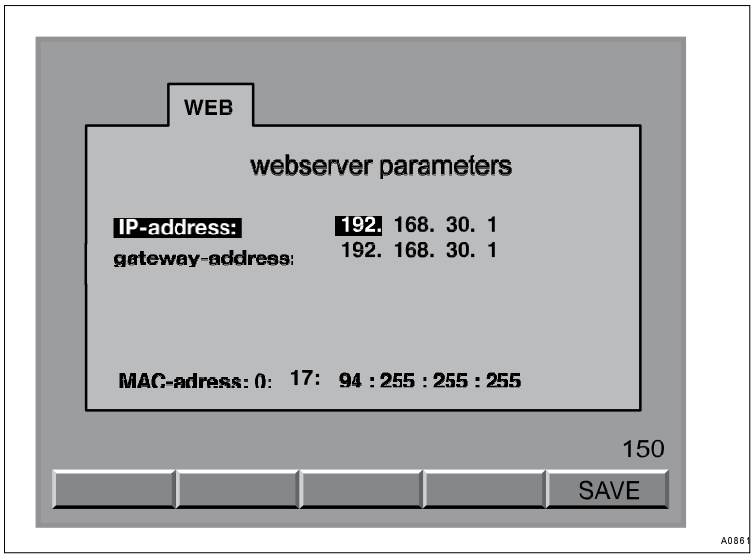

Fig. 2: Web server settings IP address (DULCOMARIN® II)

2. From the central menu item, press F4 [CONFIG] and F2 [OPTION] to call up the [WEB] tab
3. Check the IP address of the DULCOMARIN® II [192.168.30.1]. The gateway address must be identical to it for this type of installation

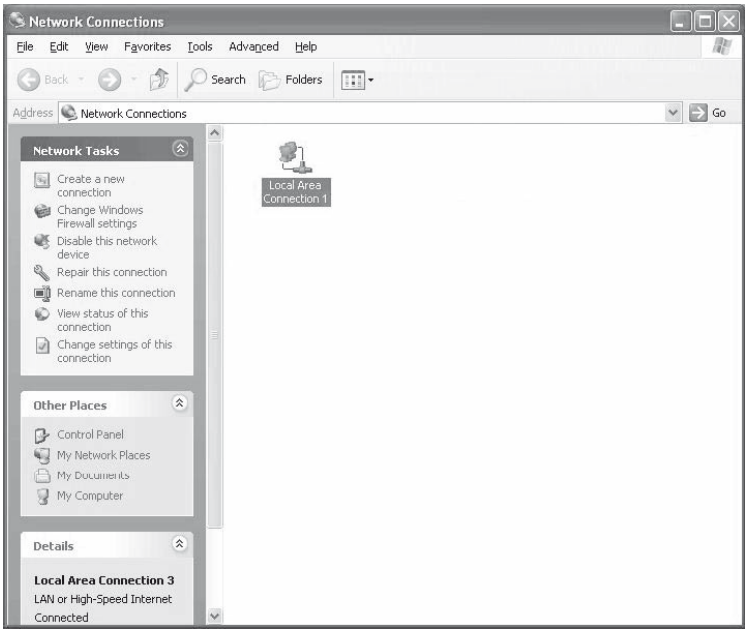

Fig. 3: [Network connections]

4. Access the PC IP settings menu (see the documentation for your PC operating system).

   For example, the path for Microsoft® Windows XP Professional SP2 is: [Start] ➡ [Control Panel] ➡ [Network and Internet Connections] ➡ [Network Connections]:

5. In this Window click on the icon [LAN or High-Speed Internet]
   - [The status of the LAN connections] appears under [General].

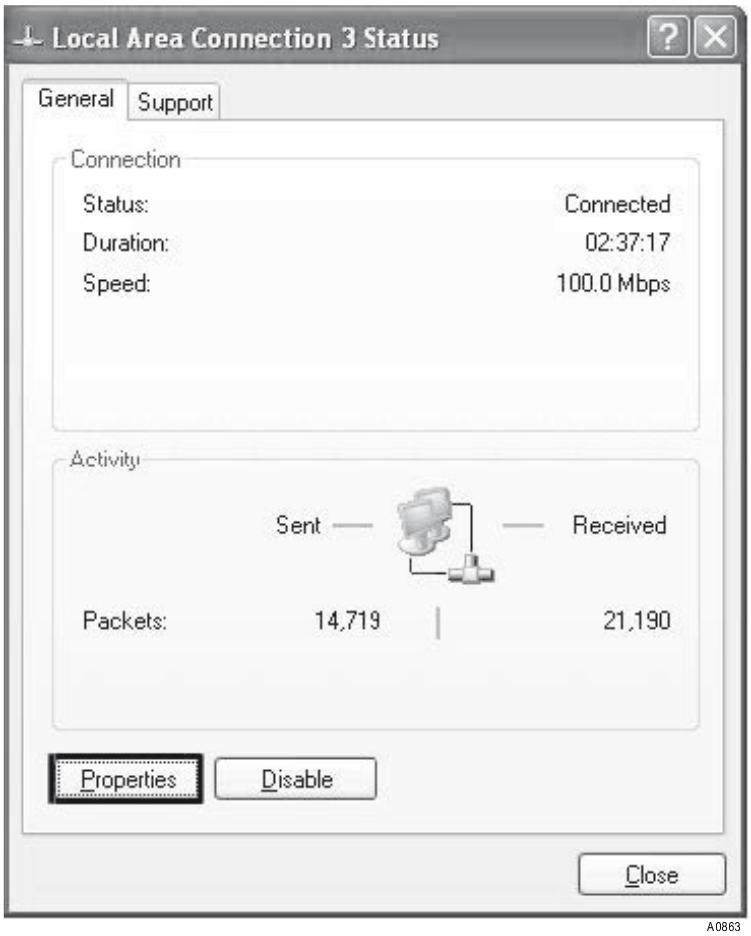

Fig. 4: Status of LAN connections.

6. In this Window click on the [Properties] ➡

   ð [The LAN connection properties] appear.

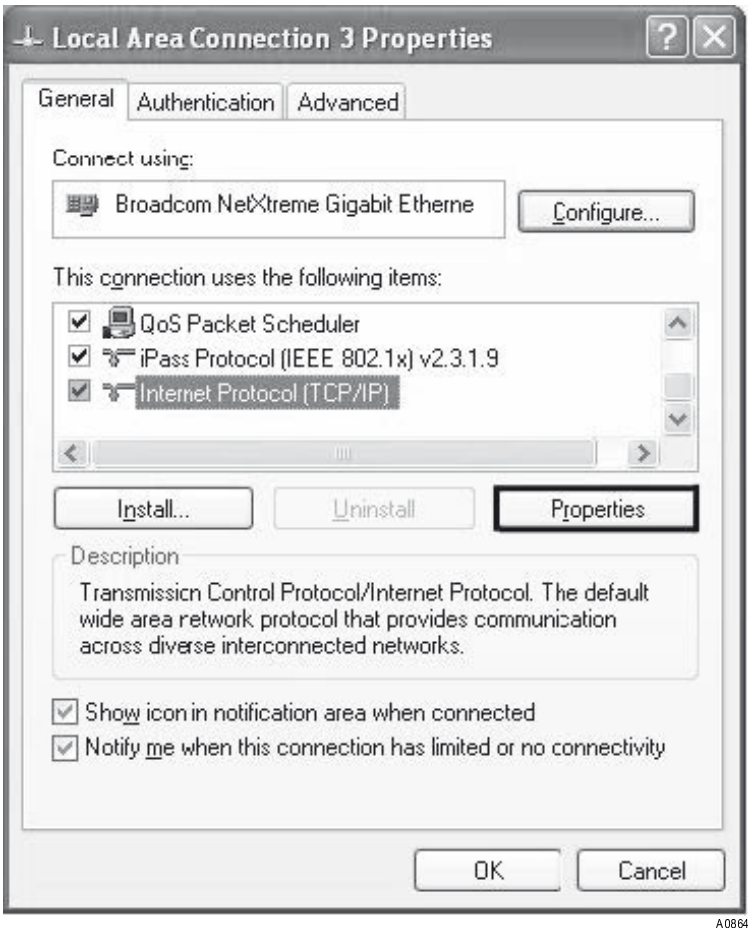

Fig. 5: LAN connection properties.

7. In this Window select [Internet Protocol (TCP/IP)]

8. Click on [Properties]
   - ð [The Internet Protocol (TCP/IP) properties] appear

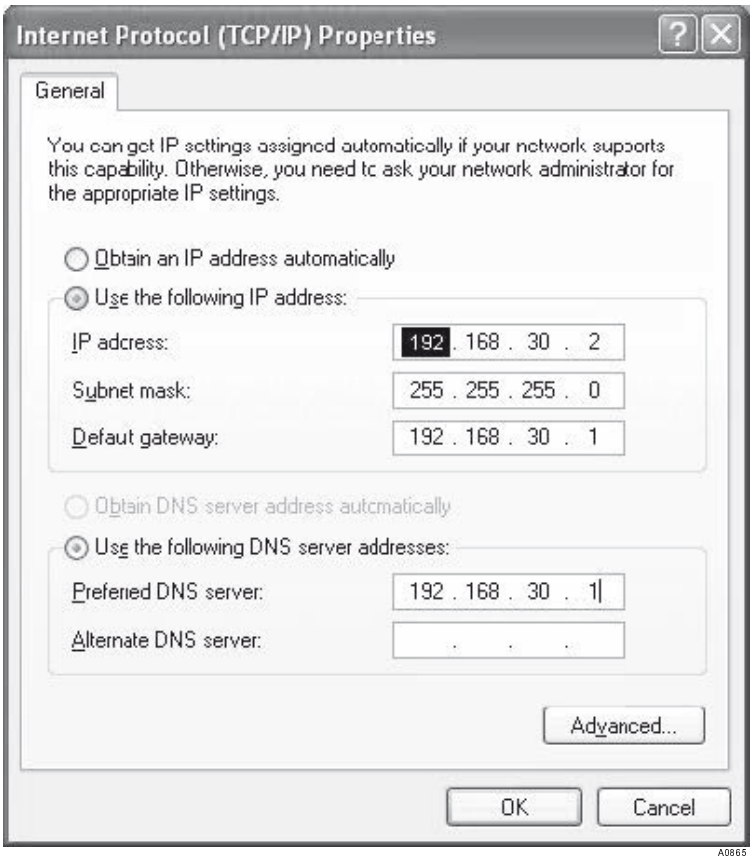

Fig. 6: Internet Protocol (TCP/IP) properties

9. Enter the following values in this window:
   - [IP address]: [192.168.30.2] (Note here that the [2] at the end must be different from the corresponding value of the IP address of the DULCOMARIN® II in this position)
   - [Subnet mask]: [255.255.255.0]
   - Do not change the [Default gateway]. The [Default gateway] is dependent on your network.
10. Click [OK].
11. Close all the Control Panel windows
12. Change to the DULCOMARIN® II to the [WEB] tab and press the F4 key [PASSW] to access Password entry
13. You must enter a User and Password that differ from the default settings for the DULCOMARIN® II.

    To do this, press the [ENTER] key, then use the arrow keys to select the characters

    Press the [ENTER] key again
14. Then press F5 [SAVE]
    - ð otherwise the entries are lost.

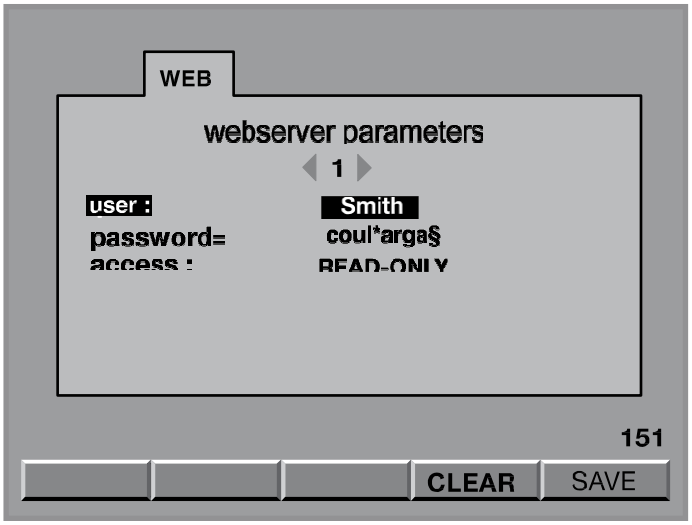

Fig. 7: Web server settings Password (DULCOMARIN® II)

15. From the central menu item, press F4 [CONFIG] and F2 [OPTION] to call up the [WEB] tab.

    Press the F3 [RESET] key to activate the changed data.

    ð The system restarts.

Results checking

If you have successfully installed and adjusted everything up until now, proceed as follows:

1. Open the PC browser (e.g. Microsoft® Internet Explorer)
2. Then in the address line enter the IP address of the DULCOMARIN® II: [192.168.30.1]
   - ð an authentication window appears.
3. Enter the username [User] and password [Password] in the authentication window
   - ð The web interface of the DULCOMARIN® II with the continuous display appears on the PC screen

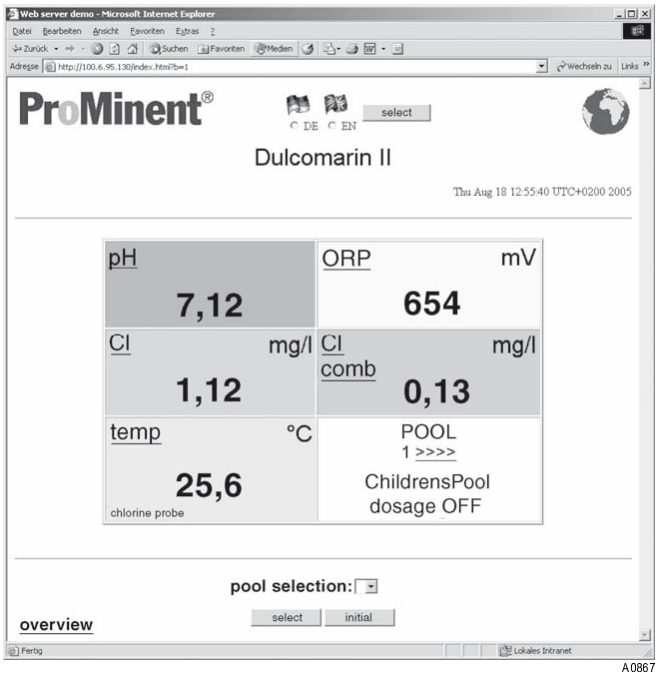

Fig. 8: Web interface (DULCOMARIN® II)

If the web interface does not appear:
Check that Microsoft® Internet Explorer is not using a proxy server. In the Browser under [Tools] ➡ [Internet options] ➡ tab: [Connections] ➡ [LAN settings] check that the [Proxy server] check box is not ticked. If it is, then remove the tick and exit the menus by clicking [OK] and then re-enter the IP address of the DULCOMARIN® in the address line and click [Change to].

1.3.2 Via a LAN

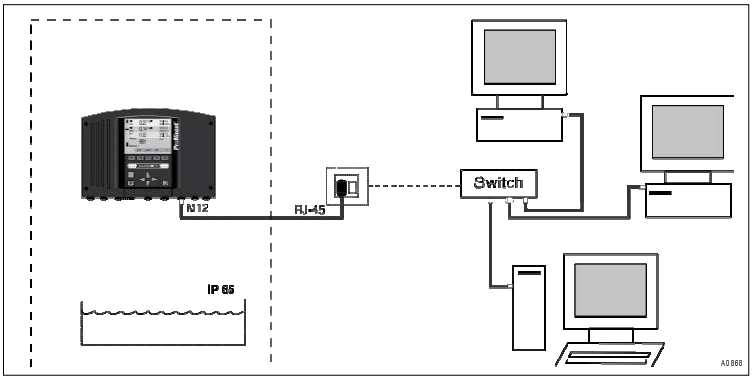

Fig. 9: Connection of the DULCOMARIN® II and PC via a LAN

The DULCOMARIN® II can be connected to the PC like a normal web server.

NOTICE!
Only the network supervisor (specialist) who is normally responsible for the LAN may make the connection.

Only he will have sufficient knowledge of the LAN and the necessary specialist know-how.

The following text contains information about the DULCOMARIN® II that will only be needed by network specialists to install and set it up.

Installation

NOTICE!

You can operate the DULCOMARIN® II with only one password.

Use two passwords to provide stronger protection of the DULCOMARIN® II. One password each for read and write access.

You can protect the "Embedded Web Server" with two passwords. You can set up a maximum of 8 users (also use the maximum number of characters for this purpose).

Under the [WEB] tab for passwords, you can set under [Access], whether the password only allows [Read] , or [Write] access or both. Using the [UP] and [DOWN] keys you can select the desired characters.

LAN M12-RJ45 patch cable, necessary for connection of the DULCOMARIN ® II (contained in the scope of supply).

The M12 threaded connector of the LAN M12-RJ45 patch cable is only moisture-tight when tightened up. Therefore in wet areas, protect the M12 connector of the

DULCOMARIN ® II with the supplied protective cap until the LAN patch cable is properly connected.

If the DULCOMARIN® II is connected to the PC via the LAN patch cable and an Ethernet socket is connected to the net - work switch, the LAN LED then illuminates on the DULCOMARIN® II (the rightmost of the four LEDs).

Installation equipment	Part no.
LAN M12 - RJ45 patch cable, 5.0 m	in the scope of supply
LAN M12 - RJ45 patch cable, 10 m	1026716

1. Change to the central unit of the DULCOMARIN® II by pressing the [ENTER] key of the continuous display in the central menu item.
2. From the central menu item, press F4 [CONFIG] and F2 [OPTION] to call up the [WEB] tab

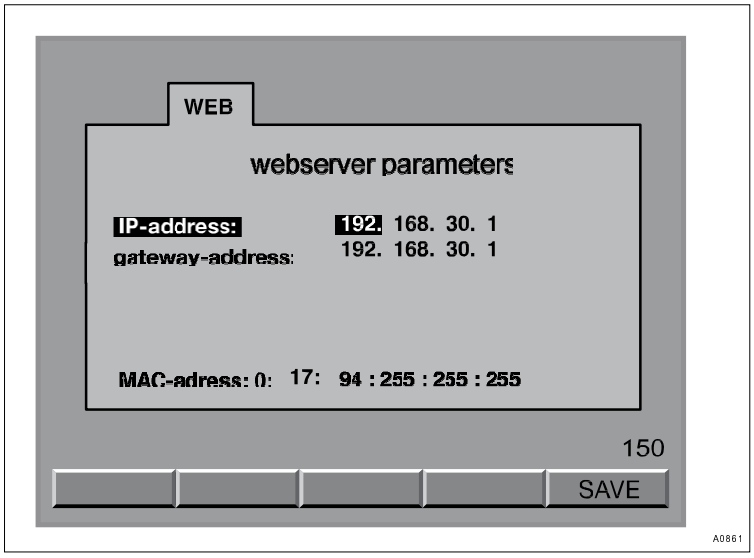

Fig. 10: Web server settings IP address (DULCOMARIN® II)

3. The tab WEB indicates:
   - the IP address of the DULCOMARIN® II (ex works: 192.168.30.1)
   - the gateway address (ex works: 192.168.30.1)
4. Use the [ENTER] key and the arrow keys to change the settings
5. Save the settings by pressing F5 [SAVE]
6. Access the PC IP settings menu (see the documentation for your PC operating system).

   For example, the path for Microsoft® Windows XP Professional SP2 is: [Start] ➡ [Control Panel] ➡ [Network and Internet Connections] ➡ [Network Connections] ➡ [LAN Connections] ➡ [Properties] ➡ [Internet Protocol] ➡ [Properties]

7. Enter the following values in this window:
   - [IP address]
   - [Subnet mask]
   - [Default gateway]
8. Click [OK].
9. Close all the Control Panel windows
10. Change to the DULCOMARIN® II to the [WEB] tab and press the F4 key [PASSW] to access Password entry

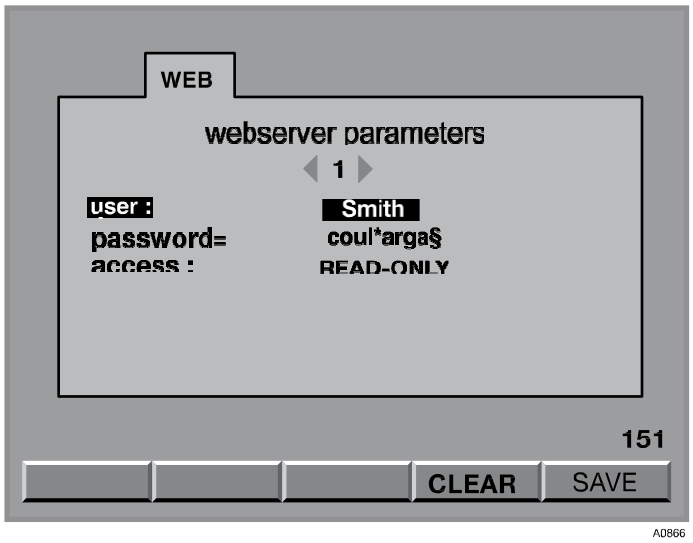

Fig. 11: Web server settings Password (DULCOMARIN® II)

11. Enter the desired user (Username) and password (Password) for the DULCOMARIN® II.

    To do this, press the [ENTER] key and use the arrow keys. Press the [ENTER] key again
12. Then press F5 [SAVE]

    ð otherwise the entries are lost.

1.4 Operation

1.4.1 Operating elements and operating language

Operating elements

If the mouse is faulty, you can also use the [Tab] key and [ENTER] key to navigate.

The web interface is designed for navigating using the mouse. The function of the [ESC] key of the DULCOMARIN® II acts as a link [back] (jumps up in the operating menu hierarchy).

Setting the operating language

1. Jump to the web interface in the continuous display
2. Select the operating language using the radio buttons beneath the two flags.
3. To make a selection press the [Select] key

1.4.2 Layout of the operating menu

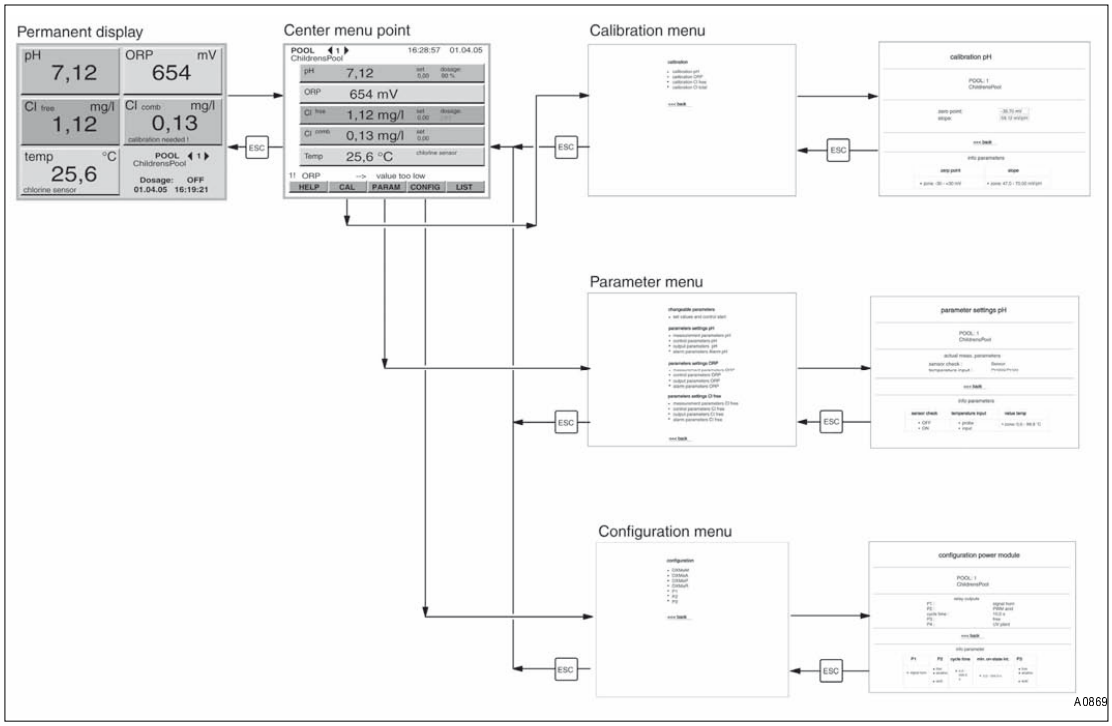

Fig. 12: Layout of the web interface operating menu

The layout of the web interface operating menu is essentially the same as the layout of the layout menu of the DULCOMARIN® II itself.

However it is also possible to jump directly to the parameter configuration of a measured variable directly from the central menu item (roughly analo
- gous to the measured variable tabs).

1.4.3 Read

If the following message appears [Change not possible ...] , then someone is operating the device directly from the oper - ating menu.

The continuous display and the central menu item of the web interface are equivalent to their counterparts in the DULCOMARIN® II.

They display almost the same number of instantaneous measured values, control variables and also the dosing state for a certain system (pool). Here it is also possible to select another system (pool).

Only with [Recorder active]: At the bottom left of the continuous display the link [System overview] appears. The allocated page shows the measured values for all system (pool)s (actual values), the setpoints and the control state (updated every 5 minutes).

Error messages only appear in the error list [LIST].

The opened error list does not update automatically. Use the browser [Update] function to manually update the error list.

Time and date differences between the web interface and DULCOMARIN® II are possible (for example when changing over to summer time). The time and date displayed originate from the PC, not the DULCOMARIN® II.

The DULCOMARIN® II automatically updates the displayed values every 20s. The values can also be manually updated using the browser [Update] function.

To change to the central menu item, you must click any link in the continuous display.

In the central menu item the operating menu branches out.

The following displays of the web interface subdivide the data in a manner analogous to the DULCOMARIN ® II into:

- Calibration
- Parameterisation
- Configuration

Within the data displays, the data divides into two areas:

- The top area shows the set parameters
- The bottom area shows the value ranges of the parameters

Only the [Setpoint Setting ...] display has a middle area for the settable parameters.

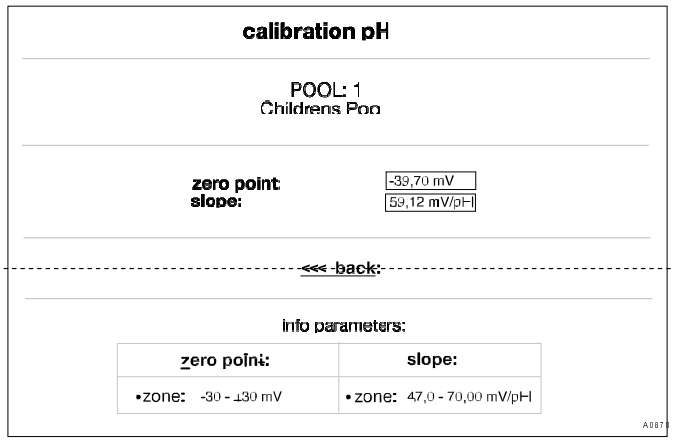

Fig. 13: Areas of a display (DULCOMARIN® II): set parameters - top, value ranges - bottom

1.4.4 Write (Change)

The set value only becomes effective upon clicking the key [Select].

If the following message appears [Change not possible ...] , then someone is operating the device directly from the oper - ating menu.

In the display [Setpoint setting...] the control state can be changed and the setpoints adjusted.

1.5 Accessories

	Part no.
LAN M12 - RJ45 patch cable, 5.0 m	1026715 (in the scope of supply)
LAN M12 - RJ45 patch cable, 10 m	1026716
LAN RJ45 patch cable, cross-over, 3.0 m	1027859
LAN coupler, RJ45	1027860
LAN adapter IP67 DXC, complete	1024835
PIN card	986894

2 Manual ProMinent OPC-Server

2.1 OPC Foreword

Purpose of the manual

This user manual forms part of the documentation for the ProMinent OPC server software The purpose of the manual is to guide the user through:

- Software installation
- Software commissioning
- Software configuration

Manual revision

The manual revision is 31/03/2011.

Extent of validity of the manual

The manual applies to the ProMinent OPC-Server Version 1.0.4.1

2.2 Introduction

You can find more information about OPC technology under: www.opcfoundation.org

2.2.1 What is OPC?

OPC stands for Openness, Productivity, Collaboration (formerly OLE for Process Control) and is used to describe a uniform software interface independent of specific manufacturers.

OPC Data Access (OPC DA) is based on Windows technology COM (Component Object Model) and DCOM (Distributed Component Object Model).

OPC XML, by contrast, is based on the internet standards XML, SOAP and HTTP.

2.2.2 What is DCOM?

For communication between individual applications, OPC currently mainly uses Microsoft DCOM technology (Distributed Component Object Model). DCOM extends COM by adding network functionality.

The installation CD also includes a more detailed document from the OPC-Foundation with fundamental information on the use of DCOM under Windows XP and system configuration.

2.2.3 What is XML-DA?

Advice on operation with XML-DA
The OPC server cannot be started via the OPC client if XML-DA is used. This is technically not feasible.

The OPC server should also not be started using DCOM, if XML-DA is to be used, as the ending of all COM-DA clients also closes the OPC server.

To use XML-DA, manual starting of the OPC server is rec

-

ommended.

Communication over DCOM is limited to the local network.

Data exchange via XML enables communication using the platform independent SOAP protocol via Internet/intranet. OPC-XML-DA represents the first creation of a web service based interface.

The functionality is similar to the normal data access interface, which is the first, and remains the most important OPC interface.

Using the web service, OPC is also available on other platforms such as Linux. Many manufacturers of OPC servers initially developed adapters, which simply map OPC XML-DA calls to the existing COM OPC DA servers.

In contrast to DCOM, web services use port 80 (HTTP) which also makes its easier to communicate through firewalls or to tunnel data traffic.

2.3 ProMinent OPC-Server installation

2.3.1 Operating diagram and operating elements

System requirements:

- Supported operating systems: Windows 2000 Service Pack 3; Windows Server 2003; Windows XP Service Pack 2; Windows Vista; Win
  - dows
    7
- Windows Installer 3.0
- .NET Framework 2.0
- 512 MB RAM is recommended as a minimum.

The OPC server supports the following OPC standards:

- Data access DA, DA2, DA3
- XML-DA (must be activated by USB hardlock)

Scope of installation:

- The installation requires approximately 3.5 MB.
- In addition, several OPC system components such as Softing License Manager are installed.

2.3.2 Installation

Start the setup by double-clicking [OPCServer-Setup.exe]. A wizard guides you through the installation step by step. If not already installed, . [NET Framework 2.0 setup], which is included on the installation CD, will be run during the installation process.

2.4 Quick start

2.4.1 Basic principles

The OPC server essentially comprises two components; namely the actual OPC Server which is started by the OPC Client and with which it exchanges data. This is done in operation with a visualisation or soft PLC mainly in the background, i.e. invisible to the user. For the OPC server to exchange data, it must first be configured. To carry this out, the OPC server provides a user-friendly graphical Windows user interface as the second component. Once the OPC server has been configured, the user interface is primarily only needed for commissioning, not for operation using an OPC client.

The configuration and data communication between OPC client and OPC server is accomplished in three consecutive steps:

Starting

- Start the ProMinent OPC server by double-clicking on the desktop icon or from the start menu under All Programs ➡ ProMinent OPC-Server ➡ ProMinent OPC-Server

Adding a device

1. Click on the [+] icon in the toolbar or select [Add device] from the [Edit] menu.
2. In the following dialogue, enter the device name, the required user name, the password as well as the IP address and the port of the device which are required for access.

   ð Confirm all entries by pressing [OK].

3. The device is now included in the project structure, finally the device configuration is loaded. Loading of the device configuration takes between a few seconds and one minute, depending on the size of the system.

Saving the project

- To save the project select [Save] from the [File] menu or press the key combination [Ctrl+S].

  ð The configuration is saved as an XML file the file type [OPC].

Linking the OPC client

The project structure (OPC namespace) can now be accessed via the OPC client and you can now start to further process the data or portray it using visualisation software.

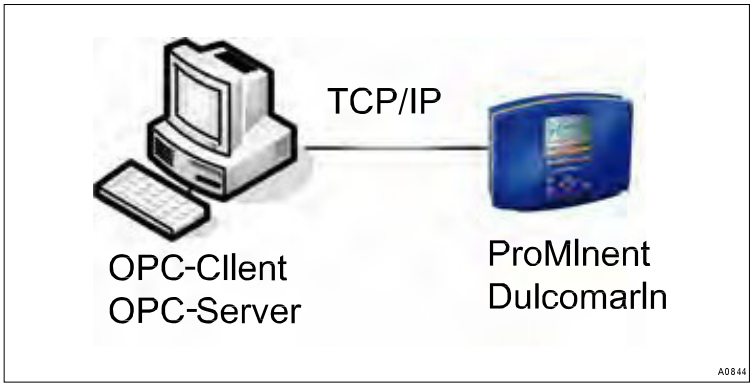

Fig. 14: OPC server and client installed on one PC.

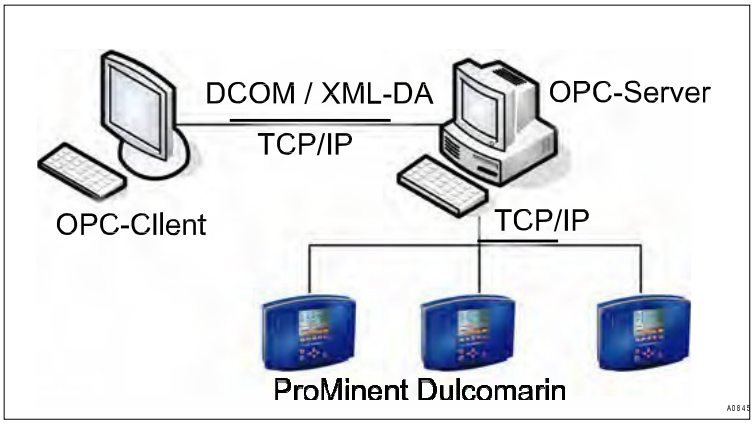

Fig. 15: OPC server and client installed on networked PCs.

2.5 Program functions

2.5.1 Main interface

Configuration of the OPC server takes place in a clearly laid-out window similar to a window used by MS-Windows' Windows Explorer. The portrayal of the devices up to and including the measured values is achieved using a tree structure.

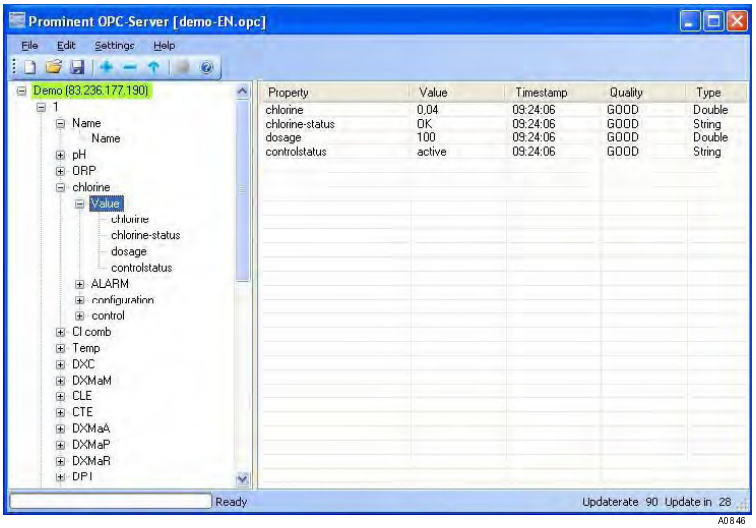

Fig. 16: Main interface

The program window is divided into four areas:

- The menu and toolbar at the top
- The tree structure with devices and their data points are shown on the left
- Details relating to the data points are shown on the right.
- The status bar is shown at the bottom of the window

the devices with their data points are presented in the left window area. Clicking a [+] icon expands the tree structure. The selection of possible tool and menu functions changes dependent on whether a device itself or a data point has been selected.

Details relating to the relevant selected data point are shown in the right part of the window. If a group of measured values was selected in the left window area, e.g. [Measured value], the list of the measured values with description, [Property], actual value [Value], timestamp [Timestamp], quality [Quality] and data type [Type] is displayed in the right window area.

If a measured value itself was selected, its specific properties [Property] are shown on the right window side.

[Property] on the right window side identifies the measured value concerned. The column [Value] shows the current value for this measured value. The column [Timestamp] indicates when this value last changed.

[Quality] indicates how reliable the value is. A [GOOD] quality means the value was successfully updated during the last update. If the quality is [BAD] the value was not received by the device. The quality [LAST_KNOWN] indicates that no data point update has taken place since loading of the configuration and that the measured value thus originates from the locally saved configuration file.

The column [Type] shows the data type of the measured value. The data type [String] is a simple character string; [Double] refers to high internal accuracy floating point numbers. The data types [Int] or [UInt] may occur infrequently; these are integers in certain value ranges.

The status of the device is also indicated by the colour highlighting of the device name in the tree view on the left side.

- Green
  - Updating of the data points was successful
- Red

– An error occurred during updating of the data points. There is possibly no longer a connection to the device.

2.5.2 Menu

File menu

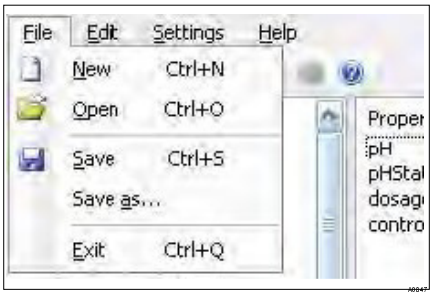

Fig. 17: File menu

New	Creates a new project. Unsaved changes are lost
Open	Loads an existing project
Save	Saves the current project
Save as...	Saves the current project under a specified name
End	Closes the OPC server

Edit menu

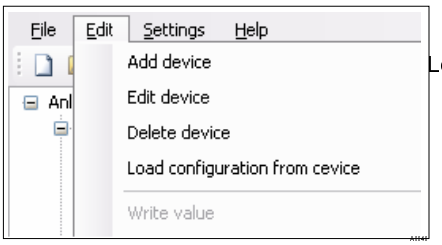

Fig. 18: Edit menu

Add device	Opens the add new device dialogue
Delete device	Deletes the selected device from the project
Load device configuration	Loads the current configuration of the selected device
Write value	Opens a dialogue to change the value of the data point. Only available for data points with write access
Read value	Starts a ready query for the selected data point

Settings menu

Fig. 19: Settings menu

Basic settings	Opens the Basic settings dialogue
Language	Selects the programming language. The OPC server must be restarted following a language change.

Help menu

Fig. 20: Help menu

Contents	Opens the help function
About...	Displays program and version information

2.5.3 Toolbar

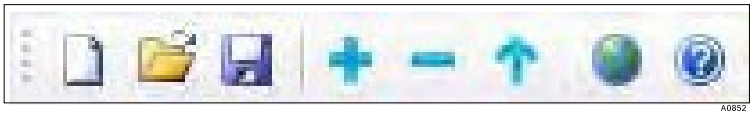

Fig. 21: Toolbar

Icon	Description	Function
	New project	Creates a new project, unsaved changes are lost
	Open project	Loads an existing project
	Save project	Saves the current project
	Add device	Opens the add new device dialogue
	Delete device	Deletes the selected device from the project
	Load device configuration	Loads the current configuration of the selected device
	Access device website	Opens the device website in the web browser.
	Help	Opens the help function

2.5.4 Basic settings

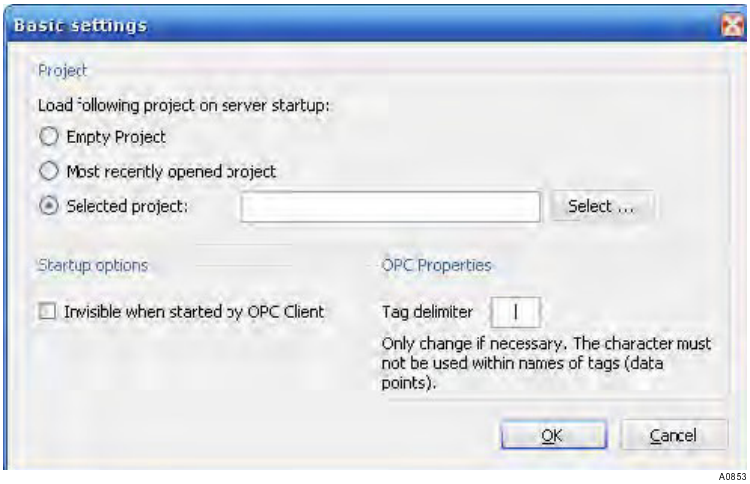

Fig. 22: Basic settings

In basic settings you can define which project should be loaded when the OPC server is loaded. The default setting is load [Most recently opened project]. If this option is selected, the last opened or saved project is loaded. Alternatively you can specify a project which should always be loaded. To do this, select [Selected project:] and then click on [Select...] to specify the desired project.

The start option [Invisible when started by OPC client] allows an invisible start of the OPC server by the OPC client. This makes sense if the user of the system is not to have direct access to configuration of the OPC server via the Windows task bar.

The OPC property [Tag delimiter] defines which character is used by the OPC server to separate the names of the data points. Analogously to the [Backslash (\)] in a file path the [delimiter] must not occur in data points. The [delimiter] should only be changed if an OPC client encounters a problem with the basic default setting.

2.5.5 Add device

After adding a device, the project must be saved and the OPC server restarted.
Only after the OPC server is restarted is the OPC name-space regenerated and the data points of the new device updated so that they are visible to the OPC client.

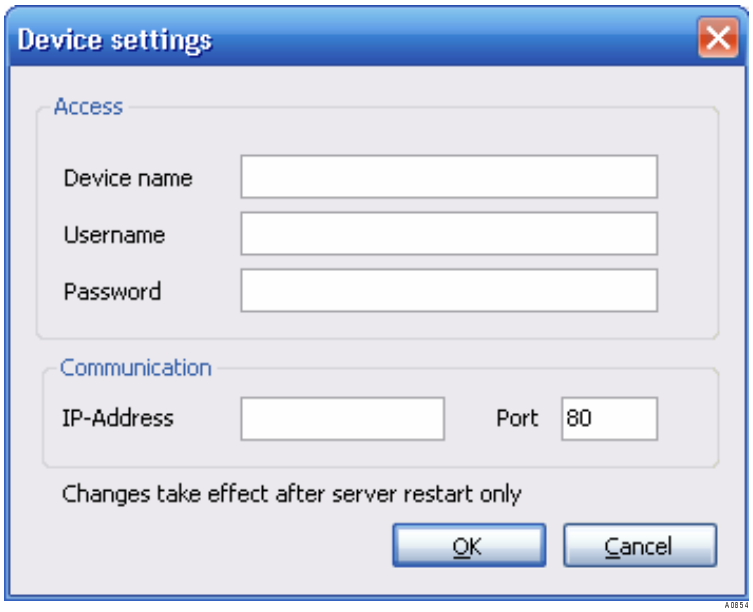

Fig. 23: Add device

In the add device dialogue, only the [Port] is specified by default. You can choose any device name. However the [Device name], should not be changed after commissioning because otherwise the data points in all linked OPC clients would have to be adapted to match it.

The [Username] and [Password] of the device must be entered as otherwise no access to the device data points is possible. The same applies to the device [IP-Address]. Instead of the [IP-Address] you can also enter the host name of a device, provided a host name was assigned in the network.

2.5.6 Edit device

After editing a device, the project must be saved and the OPC server restarted.

Only after the OPC server is restarted is the OPC name - space regenerated and the changes visible to the OPC client.

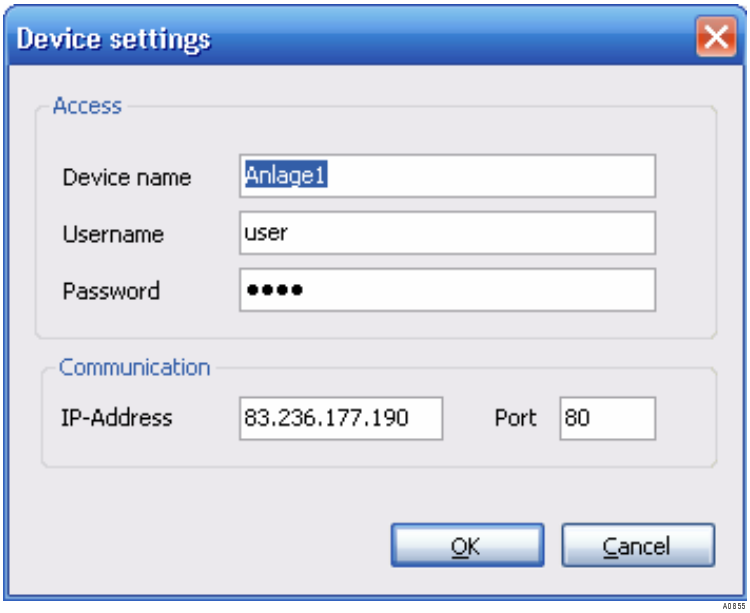

Fig. 24: Edit device

In the edit device dialogue, the device settings are already specified. The [Device name] should only be changed if no OPC clients have already been configured with data points.

Otherwise changing the device name means that OPC clients will no longer be able to access the device values. For security reasons the device [Password] is shown only as dots.

Instead of the [IP-Address] you can also enter the [Host name] of a device, provided a host name was assigned in the network.

2.5.7 Delete device

After deleting a device, the project must be saved and the OPC server restarted.

Only after the OPC server is restarted is the OPC name - space regenerated and the device deletion visible to the OPC client.

1. Select the device for deletion from the left area of the program window
2. Click on [Delete device] in the [Edit] menu or click the [-] icon in the toolbar
3. In response to the query as to whether you really want to delete the device, click on [Yes]

2.5.8 Program information (About...)

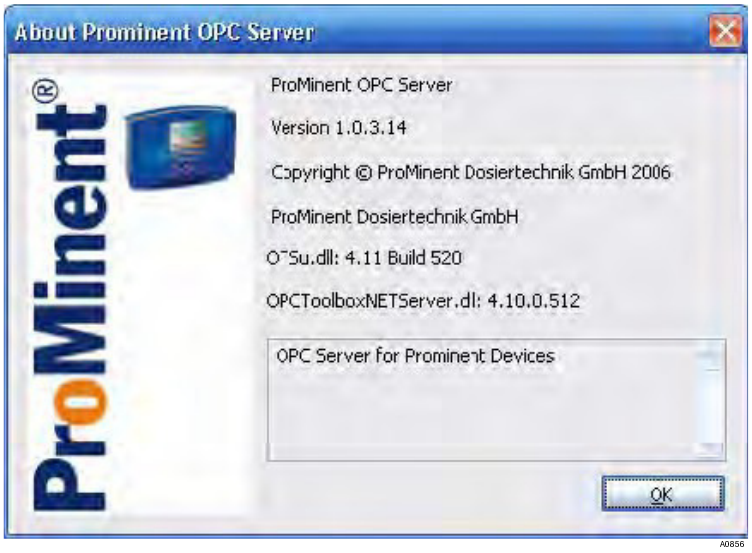

Fig. 25: Program information (About...)

You can all the dialogue [About...] from the [Help] menu. The program ver - sion and the versions of the OPC toolkit libraries are displayed. If you require technical support, all three version numbers must be given.

2.5.9 Status bar

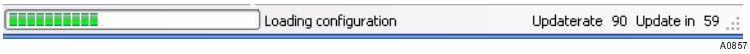

Fig. 26: Status bar [Loading configuration]

The status bar shows the present program activity.

- The progress bar shows the progress of the current process
- A description of the current work process is displayed directly alongside the bar. If an error occurs during a process, an error message is displayed here.
- The right side of the status bar displays:
  - The actual update rate of the selected device
  - A countdown to the next value update

Possible status messages in the status bar:

Status message	Explanation
Ready	The OPC server is ready for operation
Loading configuration	The configuration is being loaded by a device
Processing data	The configuration or data points of a device are being processed
Server available after restart	Changes were made to the OPC server configu - ration and a restart is necessary to implement the changes. Unsaved changes must be saved
Updated data points	The data points are loaded by the device and are now updated in the OPC server
Logon	The OPC server tries to logon to a device
Logout	The OPC server logs off from a device
Error when accessing the device	The OPC server could not access the device. For possible reasons, please read trouble-shooting Ä Chapter 2.6.1 “ Error messages ” on page 31 in the appendix

2.5.10 Context menus

Device menu

Right-clicking a device in the tree view displays the corresponding context menu.

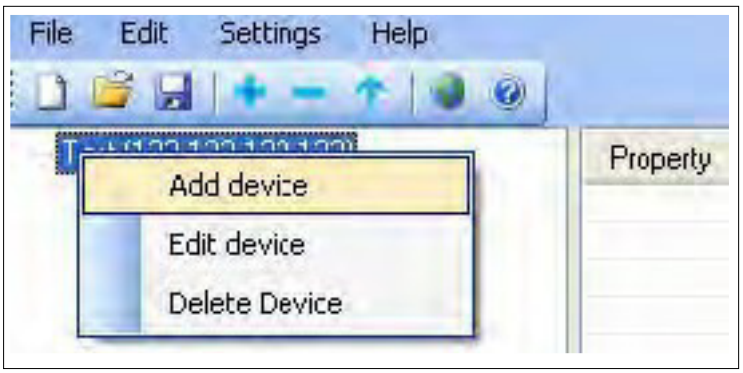

Fig. 27: Context menu - device menu

You can select the following options from the context menu:

- [Add device]
- [Edit device]
- [Delete device]

Here, Edit and Deleter refer to the currently selected device, which Add adds a new, independent device.

Data point menu

Right-clicking a data point in the tree view displays the corresponding context menu.

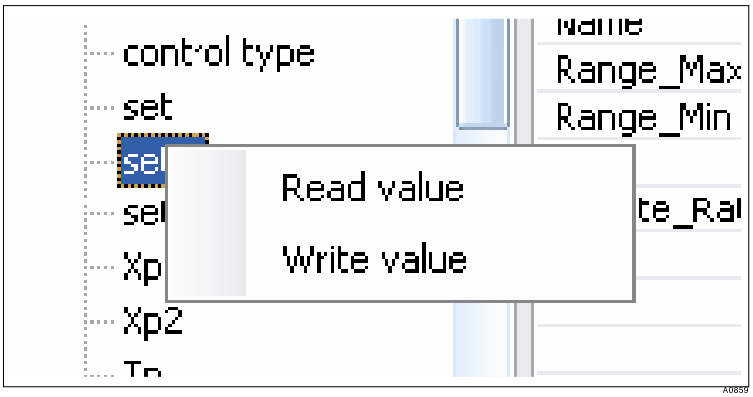

Fig. 28: Context menu - data point menu

You can select the following options from the context menu:

- [Read value]
- [Write value]

[Write value] is only available if the data point has the [rw] attribute and thus can be written to the device.

2.6 Appendix

2.6.1 Error messages

Message	Meaning	Source
There already exists a device with this IP address and port	The configuration already includes a device with this IP address and port. There can be only one device with the same IP/port combination per configuration.	Dialogue Add / Edit device
Enter an IP address	The input field for the IP address is blank. The device requires a valid IP address to enable communication with it.	
Enter a device name	The input field for the device name is blank. A unique device name is required for the device to be addressed through the OPC client.	
Enter a port. (standard port: 80)	The input field for the port number is blank. An IP address and the corresponding port are always required for communication. If you are unsure, used the default value of 80.	
Could not open the file [example.opc].	The system tried to load a project, but the specified file does not exist. Check the program settings for the project to be loaded.	Upon program start, it a project is to be loaded.
Invalid IP or host address.	The IP address or the host name entered in the input field for the device IP address is invalid or contains invalid characters. A valid IP address consists of four number groups between 0 and 255 each of which are separated by a dot each. (Example: 192.168.172.5)	Dialogue Add / Edit device
Port must be a number between 1 and 65535.	The entered port number is outside the valid range. Valid port numbers can only be set in the range 1 to 65535.	
There already exists a device with this name	The device name used already exists in the configuration The name for each device in the configuration must be unique, please select another name.	
Error when accessing the device	This message is displayed if there were problems accessing the device. Possible causes: the device is not switched on, the IP address at the device is incorrectly configured, the IP address in the server is incorrectly entered or the network is not available.	Main program window in the status bar
The OPC namespace was already initialised. A new initialisation is only possible after reboot of the server.	The list of the data points or the data point structure in the OPC server can only be generated once upon starting of the OPC server. Thereafter no further changes are possible. To load another project and activate it in the OPC server, the OPC server must be restarted with this project.	Create new project, load project
A client is still connected. Exiting the server may cause problems in the client or server. Do you want to exit?	The server should in principle only be exited if no OPC clients are connected to it. However it may happen than an OPC client is unexpectedly closed and no message has been received by the OPC server to inform it. In this case, the server can be exited by selecting the option [Yes].	Message when closing the OPC server
One or several clients are still connected. Changes to the configuration are no longer possible.	Changes to the OPC server configuration are no longer possible, once OPC clients are connected to it. Please first disconnect all OPC client connections and restart the OPC server to make changes to the configuration.	Create new project, open project, add device, remove device, edit device, load device configuration
The application has to be rebooted for the change in language to become effective.	A change in the language settings can only be activated after restarting the application. Please restart the OPC server to activate the changed language setting.	Menu settings / Language

2.6.2 Support

Should OPC server problems occur, the trace functionality can be used to make troubleshooting easier for the support team. Support requests should always be accompanied by the files [trace.txt] and [trace.txt.bak] (if available). In addition, the program version as well as the version numbers of both toolkit libraries should be stated. The version numbers are shown in the Help menu under the option [About...]. The trace file is located in the program directory of the OPC server corresponding to the directory speci- fied during installation.

Trace file

Trace functionality can be activated/deac

-

tivated manually:

Trace output is activated as standard, the trace file is created in the pro-

gramme directory of the OPC server.

1. Open the file [settings.xml] in the programme directory of the OPC server using any text editor (e.g. Notepad)
2. Search for a line reading as follows: <Trace>false</Trace>
3. Change the setting to [TRUE] to activate the trace output.

   or

   Change the setting to [FALSE] to deactivate the trace output.

The trace file [trace.txt] is renamed to [trace.txt.bak] as soon as the file exceeds 256 KB to prevent any the hard disk become overfull. This over

- writes any possibly already existing [trace.txt.bak].

3 Index

Hopewell, VA Section 10
DULCOMARIN® II, G Module
(Limit value and alarm generator module)
DXMaG

DXMa _____ ___ ___ ___

Please enter the Identcode of your device!

Please completely read through operating instructions! · Do not discard!
The operator shall be liable for any damages caused by installation or operating errors!

Imprint

These operating resp. supplementary instructions apply only in conjunction with the following ticked operating resp. supplementary instructions:

- ☑ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa Part 1: Mounting and Installation
- ☑ Operating Instructions Multi-Channel Measuring and Control System DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa Part 2: Operation
- ☐ Supplementary Instructions DULCOMARIN® II Videographic Recorder Operation
- ☑ Supplementary Instructions DULCOMARIN® II, M Module (Measurement Module for pH, Redox/ORP, Temperature) DXMaM Operation
- ☐ Supplementary Instructions DULCOMARIN® II, M Module (Measurement Module for pH, Redox/ORP, Temperature) DXMaM Connection
- ☐ Supplementary Instructions DULCOMARIN® II, A Module (Actuator Module, Pumps and Standard Signal Outputs mA) DXMaA
- ☐ Supplementary Instructions DULCOMARIN® II, N Module (Power Supply Module without Relays) DXMaN
- ☐ Supplementary Instructions DULCOMARIN® II, P Module (Power Supply Module with Relays) DXMaP
- ☑ Supplementary Instructions DULCOMARIN® II, I Module (Current Input Module, Standard Signal Inputs mA) DXMaI

Imprint:
Supplementary Instructions
DULCOMARIN® II, G Module
(Limit value and alarm generator module)
DXMaG

ProMinent Dosiertechnik GmbH
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www.prominent.com

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Printed in Germany

Identcode

The identcode describes the external modules for the DULCOMARIN® II, series DXM

DXMa	DXMa	External modules for DULCOMARIN® II, series DXM
	G	**Module:** G module, limit and alarm module [1) 2)]
	W	**Mounting type:** wall-mounted (IP 65)
	2	**Design:** without controls
	0	**Applications:** standard
	00	**Language:** no operation [2)]
	01	**Approvals:** CE approval

[1)] only in mounting type "W" wall-mounted
[2)] only in version "2" without operation

DXMa G W 2 0 00 01

1 About this device

The limit value and alarm generator module DXMaG with two limit or alarm relays, signals alarm overshoots, general faults and measurement faults.

2 Safety chapter

ATTENTION

- ***The limit value module DXMaG may only be used as an alarm generator to transfer alarm states, e.g. to a PLC.***
- ***The limit value module DXMaG may only by used as a constituent of the multi-channel measuring and control system DULCOMARIN® II System (pool) and Disinfection Controller DXCa.***
- ***The installation may only be carried out by technically trained personnel!***

3 Storage and transport

Only store and transport the module in its original packaging!

CAUTION

Also protect the packaged module against humidity and exposure to chemicals!

Environmental conditions for storage and transport:

Temperature:	-10 °C ... 70 °C
Max. permissible relative humidity:	95%, non-condensing (DIN IEC 60068-2-30)

4 Mounting and installation

WARNING

- ***The installation may only be carried out by technically trained personnel!***
- ***When assembling and installing this device, observe the information in the operating instructions - DULCOMARIN® II System (pool) Controller and Disinfection Controller DXCa, Part 1: Assembly and Installation!***

NOTE

- ***The description of operation of the G module is contained in the operating instructions for the multi-channel measuring and control system DULCOMARIN® II System (pool) and Disinfection Controller DXC Part 2: Operation, page 109.***
- ***The wiring diagram is at the end of these operating instructions.***

Fabricate the CAN connection in accordance with the “Operating Instructions DULCOMARIN® II System (pool) and Disinfection Controller DXCa, Part 1: Assembly and Installation”.

Description of the G module, DXMaG

The G module is a limit value module or alarm generator module. It has 2 potential-free changeover relays for signalling alarm conditions.

Each of the two relays has different adjustment options, which can have effects on the relay.

Both relays offer the same adjustment options.

Consequently through the use of various delay periods, pre-warning or shut down signals can be generated.

5 Technical data

Electrical data

Power relay output (P1, P2):

Contact type:	changeover contact with varistors, interference-suppressed
Load rating:	250 V ac, 3 A max., 700 VA
Contact lifetime:	> 20 x 10^5 switching cycles

Ambient conditions

Storage temperature:	-10 ... 70 °C
Type of protection	IP 65
Max. permissible relative humidity:	95 %, non-condensing (DIN IEC 60068-2-30)

Materials

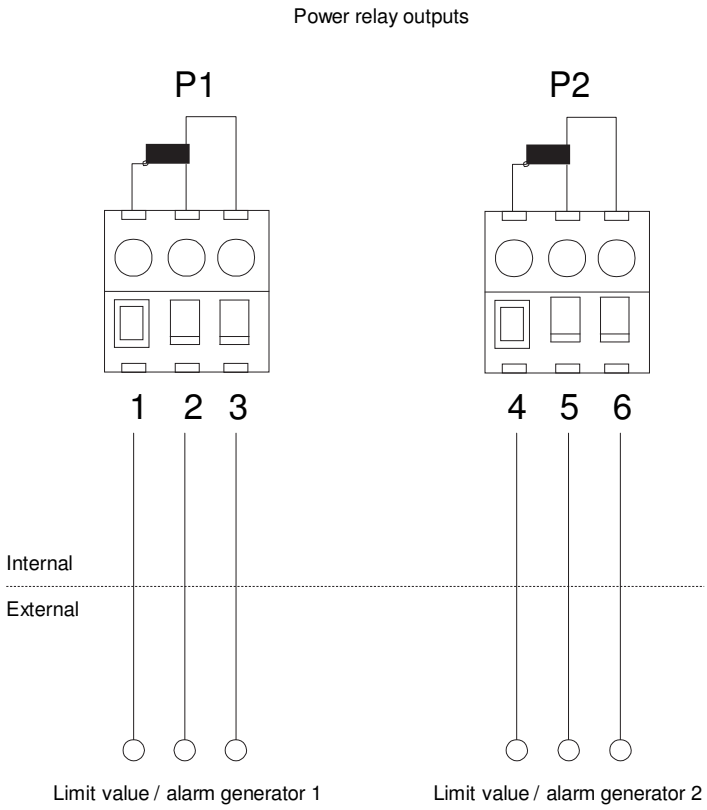
Housing:	PPE-GF 10

6 Terminal assignment

Designation	Terminal designation	Terminal no.	Pole	Function
Power relay output 1	P1	1	C	Limit value / alarm generator 1
		2	NO	
		3	NC	
Power relay output 2	P2	4	C	Limit value / alarm generator 2
		5	NO	
		6	NC	

Terminals XR have no function.

7 Terminal diagram



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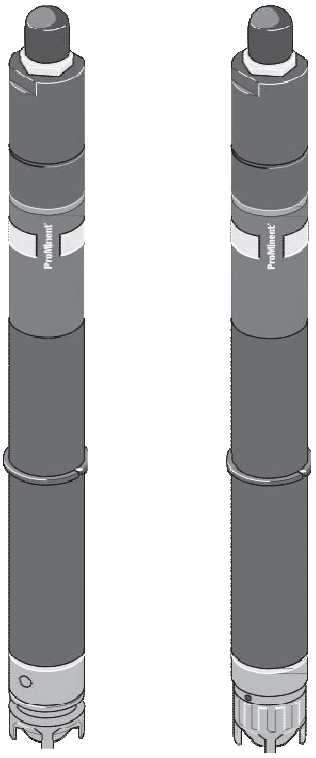
Hopewell, VA Section 11
CGE –Can Chlorine sensor
Supplement instructions

Type CLE 3-CAN-10 ppm
CLE 3.1-CAN-10 ppm
CTE 1-CAN-10 ppm
CGE 2-CAN-10 ppm
BRE 3-CAN-10 ppm



Typ/Type CLE 3-CAN-10 ppm
Typ/Type CLE 3.1-CAN-10 ppm
Typ/Type CTE 1-CAN-10 ppm
Typ/Type CGE 2-CAN-10 ppm
Typ/Type BRE 3-CAN-10 ppm

Teile Nr./Part No.: 986507 **ProMinent Dosiertechnik GmbH · 69123 Heidelberg · Germany** BA DT 090 05/08 G/GB/F/E

These supplementary instructions apply only in conjunction with the "Operating Instructions DULCOMARIN® II System (pool) Controller, Part 1: Mounting and Installation!"
Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!

User guidelines

These supplementary instructions contain the safety guidelines identified with symbols:

CAUTION

Non-observance of the safety instructions could result in injury to persons or property.

IMPORTANT

Non-observance of the safety instructions could result in injury to property.

NOTE

Working guidelines.

These supplementary instructions provide CAN-specific information on the operating instructions of the DULCOTEST® chlorine sensors. In case of doubt, the information contained in these supplementary instructions shall have priority. Information is grouped according to the relevant chapters.

1 Application

Proper use

The sensors with CAN connection may only be connected to the CANopen bus of DULCOMARIN® II.

IMPORTANT

Do not try to open the adapter! The electronics parts inside might be damaged!

2 Design and function

In the upper part of the shaft the amplifier electronics is embedded in a plastics compound. This amplifier electronics converts the primary sensor current into a CAN bus signal for the DULCOMARIN® II. The voltage is supplied via the CAN bus cable.

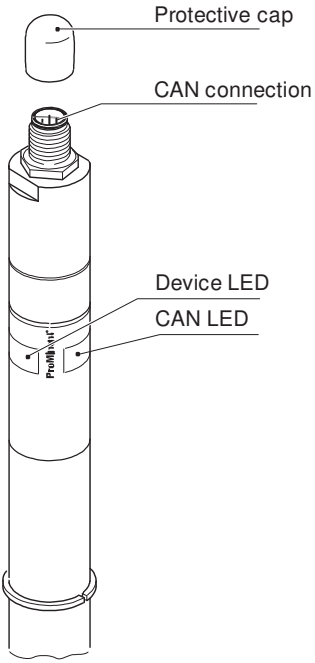


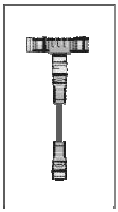
Fig. 1: Design of the sensor

3 Installation

Installation, electrical

Connect the CAN connector to the socket (for further information see "DULCOMARIN® II System (pool) Controller, Part 1: Mounting and Installation").

Fig. 2: CAN connection of two (several) chlorine sensors



3 Chlorine sensor CLE
4 Chlorine sensor CTE
5 T-distributor
6 M12 load resistor coupling
7 M12 load resistor plug
8 CAN connecting cable (spur line 0.5 m)
9 CAN connecting cable

4 Troubleshooting

Left LED
(Device LED)

Colour	Flash code	Cause	Result	Remedy
red	**illuminated**	Electronics error	Sensor faulty	Return chlorine sensor or contact customer service
red	**flashing***	Start-up phase	No measuring value communication	Wait briefly
red	**slowly flashing****	Calibration incorrect	Measuring value incorrect	Re-calibrate
red	**double flashing*****	0 ppm > measuring value > 10 ppm	Measuring value too high / too low	Check chlorine content of sample water
		Measuring value <> limit value	Violation of limit value	Clarify cause; reset values, if required
		No correction value pH	Correction value pH missing	Check parameters and configuration. Check pH sensor
green	**illuminated**	No device defect present	Standard operation chlorine sensor	-
-	**dark**	No supply voltage not functioning	Chlorine sensor connections	Check cable

Right LED
(CAN-open LED)

Colour	Flash code	Cause	Result	Remedy
red	**any**	Bus error	No measuring value communication	Contact customer service
green	**illuminated**	Bus status OPERATIONAL	Standard operation bus	-
green	**flashing**	Bus status PRE-OPERATIONAL	Presently no measuring value communication	Wait briefly

Ignore the flash codes for approx. 2min (acknowledge alarm, if any) after connecting the chlorine sensor.
If the LEDs repeatedly start to send one and the same sequence of flash codes, the bus has to supply too many devices.
In this case, loop a (further) N module into the bus (see operating instructions DULCOMARIN® II Part 1, Mounting and Installation).
In case of all other flash codes, contact the customer service!

5 Order information

Complete kit

CLE 3-CAN-10 ppm**	Order no. 1023425
CLE 3.1-CAN-10 ppm**	Order no. 1023426
CTE 1-CAN-10 ppm**	Order no. 1023427
CGE 2-CAN-10 ppm**	Order no. 1024420
BRE 3-CAN-1 ppm**	Order no. 1029660

**For diaphragm caps and electrolytes for chlorine sensors see the product catalogue

Accessories

T-distributor, M12, 5P, CAN	Order no. 1022155
Load resistor M 12 coupling	Order no. 1022154
Load resistor M 12 connector	Order no. 1022592
Connecting cable - CAN, M12, 5P, 0.3 m	Order no. 1024568
Connecting cable - CAN, M12, 5P, 0.5m	Order no. 1022137
Connecting cable - CAN, M12, 5P, 1 m	Order no. 1022139
Connecting cable - CAN, M12, 5P, 2 m	Order no. 1022140
Connecting cable - CAN, M12, 5P, 5 m	Order no. 1022141
Connecting cable - CAN, by the metre	Order no. 1022160
Connecting cable CAN, M12, 5P, screw terminal	Order no. 1022157
Connector CAN, M12, 5P, screw terminal	Order no. 1022156

6 Technical data

Measuring ranges Chlorine 0.01...10 mg/l

Resolution 0.01 mg/l

7 Guidelines and standards complied with

CAN standards and specifications complied with
The controller meets the standardised CAN specification for hardware 2.0 (ISO99-1, ISO99-2). This includes the CAN protocol (ISO 11898-1) and details about the physical application layer in accordance with ISO 11898-2 (high speed CAN to 1Mbit/sec.) and ISO 11898-3 (low speed CAN to 125kBit/sec.).

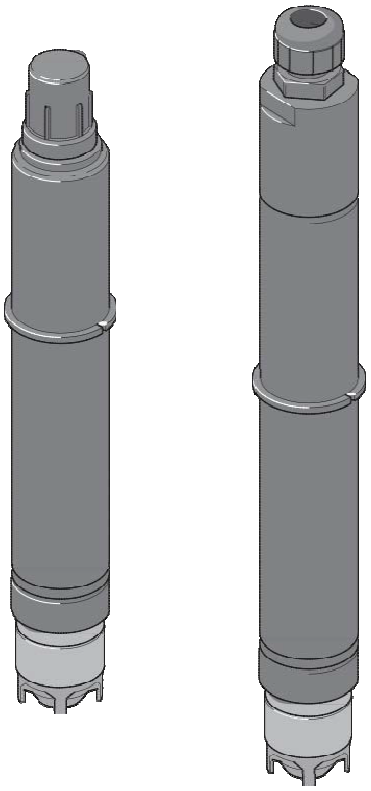
The device complies with the CAN-Open specification CIA-DS401, the basis of the European Standard EN50325-4.

It complies with the controller device profile CiA-404.

Hopewell
Section 12
Chlorine instruction

Type CGE 2-mA-2 ppm
CGE 2-mA-10 ppm
CGE 2-4P-10 ppm

Chlorine measuring cell for organic bound chlorine



User guidelines

This operating instructions manual contains the product information in the main text,

- enumerated points

- highlighted points

and safety guidelines identified with symbols:

CAUTION

Non-observance of the safety instructions could result in injury to persons or property.

IMPORTANT

Non-observance of the safety instructions could result in injury to property.

NOTE

Working guidelines.

1 Application

IMPORTANT

- ***Use the measuring only cell for the purpose of determining free chlorine or cyanuric acid chlorine in system (pool) water or water of similar quality.***
- ***To guarantee the flow parameters, the sensor should be used only in the following in-line probe housing models: DLG III A (914955), DLG III B (914956) or DGM (25 mm module).***

  We cannot accept liability if any other type of inline probe housing is used.
- ***The power supply to the measuring device (and the sensor) must not be interrupted. If the power supply is interrupted for a long time (> 2 h), the device should be recommissioned (see chapter 7.1).***
- ***Connect the CGE 2-4P-10 ppm measuring cell only to ProMinent® controllers equipped with a corresponding connection, e.g. DULCOMETER® D_4a for chlorine.***

2 Safety

We do not accept liability for injury to persons or damage to property if the safety advice has not been followed.

CAUTION

- ***When installing this equipment abroad, the user must comply with local regulations for maintenance and calibration periods.***
- ***Wear safety goggles and protective clothing when handling water or solutions that contain chlorine.***
- ***Ensure the measuring cell and its peripherals are only operated by specifically trained and authorized operating personnel!***
- ***Do not operate the measuring cell outside the specified measuring range!***
- ***Avoid skin contact and swallowing the electrolyte. The electrolyte is slightly toxic and can be harmful to health.***
- ***Avoid getting air bubbles in the water sample as this causes incorrect dosage.***
  Air bubbles adhered to the diaphragm of the measuring cell can cause a measured value that is too low and thus lead to incorrect metering.

- ***Avoid uncontrolled dosage caused by a probe defect. Switch off secondary control systems or adjust them to manual operation before assembling the probe. A probe defect can result in an incorrect input variable for the controller/measuring device and cause uncontrolled dosage.***
- ***Depressurise the system before assembling the probe. Close stop valves in front of and behind the in-line probe housing. Fluid could escape if the probe is assembled under pressure.***
- ***In case of an emergency, first switch off the controller at the mains. If fluid escapes from the in-line probe housing (DGM/DLG), close the stop valves installed on-site at the batching in-flow and out-flow.***
- ***Follow the plant operator's safety advice before opening the DGM/DLG.***
- ***Do not exceed the maximum operating pressure of 1 bar (DLG) or 3 bar (DGM).***
- ***Do not allow the flow to fall below the minimum rate. Monitor the flow in the connected measuring device/ controller. If the measured variable is used as a control, switch off the controller or adjust it to constant load when the flow rate falls below the minimum.***
- ***Check the probe regularly for dirt, algae and air bubbles. Eliminate air bubbles by tapping the probe against the DLG/DGM. Eliminate dirt by cleaning the probe in a jet of water.***
- ***Once the sensor has been put into operation, it must be kept damp.***

3 Design and function

Design The CGE chlorine sensor consists of 2 main components, the electrode adaptor and the membrane cap. The membrane cap filled with electrolyte constitutes the measuring compartment into which the electrodes are dipped. A microporous membrane isolates the compartment from the sample medium.

The probe has integrated temperature compensation.

The amplifier electronics are located in the upper part of the adaptor, embedded in plastic. The amplifier electronics:

mA-Variant - convert the probe's primary current to an output signal of 4-20 mA.

The mA model is a probe with a passive 4-20 mA two-wire interface, i.e. the power supply comes from an external controller, e.g. DULCOMETER® D1C, D2C, DULCOMARIN®.

4P-Variant - Converted for the D_4a controller. The voltage is supplied by the D_4a controller.

Measured variable Free chlorine (HOCl, OCl) and organically bound chlorine (to cyanuric acid in the form of trichloroisocyanuric acid or sodium dichloroisocyanurate-bound chlorine).

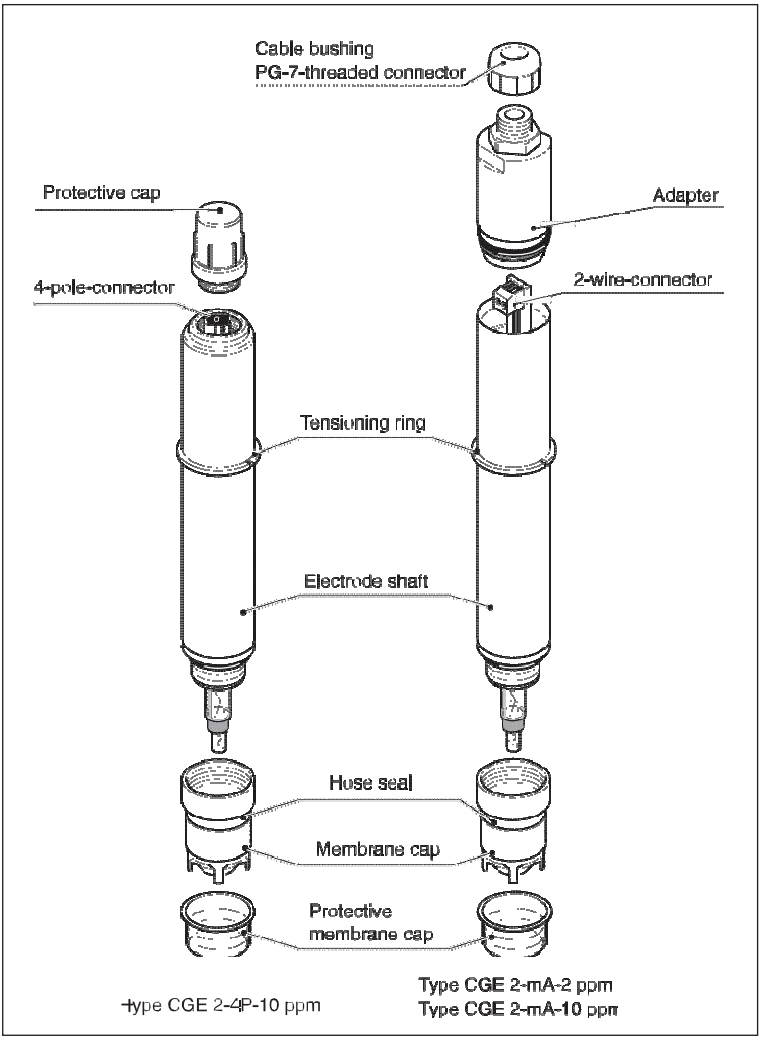
Function

The CGE chlorine sensor is a membrane capped amperometric two-electrode probe. A platinum cathode is used as the collector and a silver-coated anode is used as the counter electrode (principle of amperometric measurement).

The sensor signal is almost independent of pH in the probe's operating range. The current conduction is converted into an output signal by the amplifier electronics and displayed.

The measured signal of the CGE probe follows DPD-1 determination. The chlorine content available for disinfection can thus be determined.

Fig. 2
Sensor designs



4 Transport and storage

NOTE

The probe should be transported only in its original packaging.
Keep the packaging, including the polystyrene, and use it to return the probe if repair becomes necessary.

Contents

- CGE measuring cell complete with diaphragm cap.
- Bottle containing electrolyte (50 ml)
- Nozzle for bottle
- Membrane cap, spare membrane cap
- Operating instructions
- Small screwdriver

Storage

• Storage period for the probe including the membrane in the original packaging	1 year
• Storage period for the electrolyte in the original bottle (order no. 792892)	max. 1 year
• Storage and transport temperature	+5 to +50 °C
• Humidity	max. 90 % rel. humidity, non-condensing

5 Assembly

CAUTION

Wear safety goggles and protective clothing when handling water or solutions that contain chlorine.

IMPORTANT

- ***Do not touch or damage the membrane or electrodes.***
- ***The electrolyte is susceptible to oxidation: always keep the electrolyte bottle sealed after use. Do not put the electrolyte into other transparent containers.***
- ***The electrolyte should not be stored for more than 1 year and should not be yellow (see the label for the date of manufacture).***
- ***Avoid air bubbles when pouring the electrolyte.***
- ***The membrane cap must be used only once.***

Filling the cap with electrolyte

- Open the electrolyte bottle and unscrew the nozzle.
- Squeeze out excess air.
- Fill the membrane cap with electrolyte avoiding air bubbles:
  Place the electrolyte bottle completely over the membrane cap (see figure 2) and slowly squeeze the electrolyte out of the bottle in one movement.
  At the same time, pull the bottle back steadily.
  The cap is completely full when the electrolyte can be seen at the lower thread.

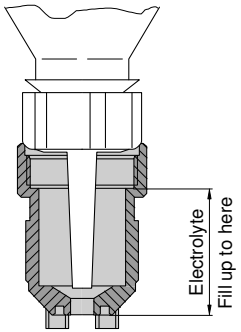


Figure 2: Membran cap

Assembling the sensor

- Place the electrode adaptor on the full membrane cap in a vertical position.
- Do not touch the rubber seal with your fingers.
- Turn the membrane cap by hand as far as it will go.
  Excess electrolyte will escape through a hole below the rubber seal in the groove of the membrane cap while you are turning it.
- Wipe away any electrolyte with a soft paper towel or other similar item.
- Thoroughly remove gel from the grommet using clean, warm water.

IMPORTANT

- **Depressurise the system before putting the sensor into the in-line probe housing. Close the stop valves in front of and behind the in-line probe housing.**
- **The probe should be pushed into and pulled out of the in-line probe housing slowly.**

Insert sensor into the in-line probe housing:

DLG

- Push the O-ring from below over the sensor as far as the terminal block.
- Place the sensor in the DLG.
- Secure the sensor with packaging.

DGM

- Push the O-ring from below over the sensor as far as the terminal block; leave a washer in the DGM.
- Place the sensor in the DGM and secure it with a terminal screw until the O-ring seals: the terminal block determines the depth to which the probe should be inserted.

6 Installation

IMPORTANT

- ***The sensor should be installed in such a way that the power supply is never interrupted.***
- ***Do not switch off the measuring system if it is not being operated continuously.***
- ***It may be necessary to delay switching on the dosing equipment.***

When using with external equipment (mA-Variant):

IMPORTANT

- ***Do not allow the power supply to fall below 16 V DC, not even for a short period. The power source must be able to bear a minimum load of 35 mA at 16 V DC. Do not switch off the measuring system if it is not being operated continuously.***

  It may be necessary to delay switching on the dosing equipment. If the power supply is too low, the measured variable will be incorrect and this can lead to a dangerous chlorine overdose.
- ***Ensure that nobody else is using the same voltage. The measuring device and monitor must not use the same voltage as either the probe or power supply.***

The mA model is a probe with a passive 4-20 mA two-wire interface, i.e. the power supply is external, i.e. from the controller. When it is connected to a ProMinent controller (e.g. DULCOMARIN®, DULCOMETER® D1C or D2C), the interface's safety requirements are met automatically.
Observe the following when connecting it to external equipment:

Power source: 16-24 V DC, min. 35 mA with 16 V DC

Max. load: 1 W

Electric installation:

mA-Variant

- Turn the upper part of the sensor a quarter of a turn anticlockwise and remove it.
- Loosen the PG-7 threaded connector and guide the 2-lead cable through, providing a spare 5 cm of bare cable inside the sensor.
- Connect the cable to the terminal: 1 = plus, 2 = minus.
- Tighten the PG-7 threaded connection.
- Push the upper part of the sensor right into the housing and turn it clockwise as far as it will go.

4P-Variant Put the 4-pole plug in the socket.

IMPORTANT

Connect the 4P variant only to ProMinent controllers with a corresponding connection plug (e.g. DULCOMETER® D_4a for chlorine).

7 Operation

The probe can be calibrated after a run-in period. We recommend that you repeat the calibration 24 hours later.

CAUTION

Do not switch off during interval operation of the measuring system!
After any operation without chlorine, running-in periods are to be reckoned with. If required, switch on metering unit time-delayed!
If no chlorine is metered for a longer period, the sensor must be disconnected from the power supply and stored in a dry place.

7.1 Run-in period

The probe needs to be run in so that a stable reading can be obtained.

First commissioning:	24 hour run-in period recommended
Recommissioning:	approx. 12-24 hours

7.2 Calibration

IMPORTANT

- ***If installing the sensor abroad, please comply with the local regulations for calibration periods.***
- ***Carry out a slope test every time the membrane is changed.***

Requirements

- The flow in the in-line probe housing must correspond with the ”Technical data” in chapter 15.
- pH value within the permitted range
- The sample medium and the probe should be at the same temperature.

Zero point calibration

Not necessary

Slope test

- Determine the chlorine content according to the DPD-1 method using an appropriate instrument for measuring chlorine.
- Set the controller/measuring device to the value obtained in accordance with the operating instructions.
- Repeat calibration at regular intervals.

8 Troubleshooting

Fault	Possible Cause	Action
Sensor cannot be calibrated – readings from measuring device/ controller higher than DPD-1 calibration	Run-in period too short	• See chapter 7.1 ”Run-in period”
	Membrane cap damaged	• Replace membrane cap, break in sensor, calibrate
	Contaminants in the water (see ”cross sensitivity” in chapter 15 ”Technical data”)	• Examine water for contaminants and take action
	Short circuit in the leads	• Trace short circuit and eliminate it
	DPD chemicals too old	• Use new DPD chemicals, repeat calibration
	pH value < 5.5	• Increase pH value to 5.5-9.5
Sensor cannot be calibrated – readings from measuring device/ controller lower than DPD-1 calibration	Run-in period too short	• See chapter 7.1 ”Run-in period”
	Coating on membrane cap	• Remove coating (see chapter 9 ”Maintenance”), replace membrane cap, run in sensor, calibrate
	Flow of water sample too low	• Correct flow (see chapter 15 ”Technical data”)
	Air bubbles on outer part of membrane	• Remove bubbles by tapping and increase flow if necessary
	Surfactants in the water (membrane is transparent)	• Eliminate surfactants and replace membrane cap, break in sensor and calibrate, use CDP sensor if necessary
	pH value > 9.5	• Reduce pH to 5.5-9.5
	No electrolyte in membrane cap	• Pour in fresh electrolyte (see ch. 5 ”Assembly”, ch. 7.1 ”Run-in period” and ch. 7.2 ”Calibration”)
	Electrolyte forced into water sample by gas bubbles	• Consult ProMinent
Reading is ”zero”	Chlorine content below lower measuring range limit	• Add chlorine and repeat calibration, use a suitable sensor
	Sensor connected to controller incorrectly	• Connect sensor correctly
	Run-in period too short	• Run for at least 3 h before calibration
	Sensor defective	• Replace sensor
Reading is unstable	Air bubbles on outer part of membrane	• Remove bubbles by tapping and increase flow if necessary
	Membrane damaged	• Replace membrane cap, break in sensor, calibrate
	Fault with controller	• Repair the fault

When you have tried everything: check to ensure that the ring-shaped counter electrode at the tip of the electrode stem is not a brown/grey or yellow/greenish colour but rather silvery white. If it is the latter, it is worn out and can be replaced by ProMinent.

9 Maintenance

IMPORTANT

- ***Service the sensor regularly to avoid overdosing if it stops working.***
- ***Please comply with current national regulations for maintenance periods.***
- ***Do not touch the electrodes or allow them to come into contact with greasy substances.***

Service intervals Daily/weekly depending on application.

Maintenance work

- Check the sensor's reading on the controller using an appropriate instrument for measuring chlorine (e.g. DPD-1).
- If necessary, recalibrate the sensor (see chapter 7.2 "Calibration").

Cleaning the membrane

If the membrane is contaminated and the sensor cannot be calibrated, you can try to clean the membrane carefully.

First dismantle the sensor. Follow the safety advice.

Remove the dirt gently:

- Rinse the membrane under a soft, cold jet of water.

IMPORTANT

Do not use cloths, abrasive paper, scouring agents, chemical cleaning agents or acids!

Changing the membrane

If it is not possible to calibrate the sensor even after the membrane has been cleaned, or if the membrane is damaged, the membrane cap must be changed (see chapter 5 "Assembly", chapter 7.1 "Run-in period" and chapter 7.2 "Calibration").

10 Repairs

The sensor can be repaired only at the factory. Send it to us in its original packaging. Prepare it for the repairs (as described in chapter 11 ”Decommissioning”).

11 Decommissioning

Decommission the sensor: follow all of the safety instructions in chapter 5 ”Assembly”.

- Disconnect the sensor from the electricity supply (compare chapter 6 ”Installation”)
- Depressurise the in-line probe housing
- Loosen the terminal screw
- Pull the sensor out of the in-line probe housing slowly
- Unscrew the membrane cap over a sink and empty it
- Throw away the membrane cap
- Thoroughly remove all traces of gel from the electrodes using clean, warm water and allow to dry free of dust
- Screw on a new membrane cap loosely to protect the electrodes
- Put on the membrane’s protective cap to protect the membrane cap

12 Disposal

Electrolyte The electrolyte can be poured into a drain.

Sensor

IMPORTANT

- ***Electronic rubbish is classed as hazardous waste.***
- ***Please comply with the current regulations in your country.***

13 Ordering guidelines

Standard contents of delivery

- CGE measuring cell complete with diaphragm cap.
- Bottle containing electrolyte (50 ml)
- Nozzle for bottle
- Membrane cap, spare membrane cap
- Operating instructions
- Small screwdriver

Complete set

The sensors can be ordered only as a complete set:

• CGE 2-mA-10 ppm	order no. 792842
• CGE 2-mA-2 ppm	order no. 792843
• CGE 2-4P-10 ppm	order no. 792838

Spare parts and accessories

• 2 membrane caps (CGE 2-mA-2/10 ppm and CGE-2-4P-10 ppm) 1 electrolyte bottle (50 ml)	order no. 740048
• 1 membrane cap, complete (CGE 2-mA-2/10 ppm and CGE-2-4P-10 ppm)	order no. 792862
• 1 electrolyte bottle (50 ml)	order no. 792892

Assembly set

• for DLG III	order no. 815079
• for DGM	order no. 791818

Accessories

• Two-wire lead for mA-Variant (2 x 0.24 mm², Ø 4 mm)	order no. 725122
• Test lead for chlorine sensors 4P model (2 m)	order no. 818455
• Test lead for chlorine sensors 4P model (5 m)	order no. 818456
• Test lead for chlorine sensors 4P model (10 m)	order no. 818470

14 Technical Data

Measured variable	Free chlorine and organically bound chlorine
Area of application	Drinking water, system (pool) water and water of a similar quality
Measuring range	CGE 2-mA-2 ppm 0.02-2.0 mg/l CGE 2-mA-10 ppm 0.1-10 mg/l CGE 2-4P-10 ppm 0.1-10 mg/l
pH range	5.5 - 9.5
Temperature range	5 - 45 °C, Temperature compensation No sharp rises in temperature
Storage temperature	Frost-free between 5 and 50 °C
Resolution	Corresponds with the value at the lower end of the measuring range
Max. pressure	DLG III A/B: 1 bar (free flow) DGM: 3 bar (no pressure surges!)
Flow	DLG III and DGM in-line probe housing Optimum: 30 l/h Minimum: 20 l/h Maximum: 100 l/h
Cross sensitivity	Bromine, iodine, ozone, ClO_2 chloramines and other oxidising agents lead to measurement errors
Conductivity Test water	30 µS/cm - 10.000 µS/cm
Operating life Membrane cap	Typically 1 year depending upon the water quality
Materials	Membrane cap: PPE Electrode holder: PMMA Electrode adaptor: PVC Electronics: Electronic components
Power supply	16 - 24 V DC; min 35 mA at 16 V DC
Output signal	4 - 20 mA (mA-Variant) 0 - 2 V (4P-Variant)
Enclosure rating	IP 65

15 Guidelines and Standards

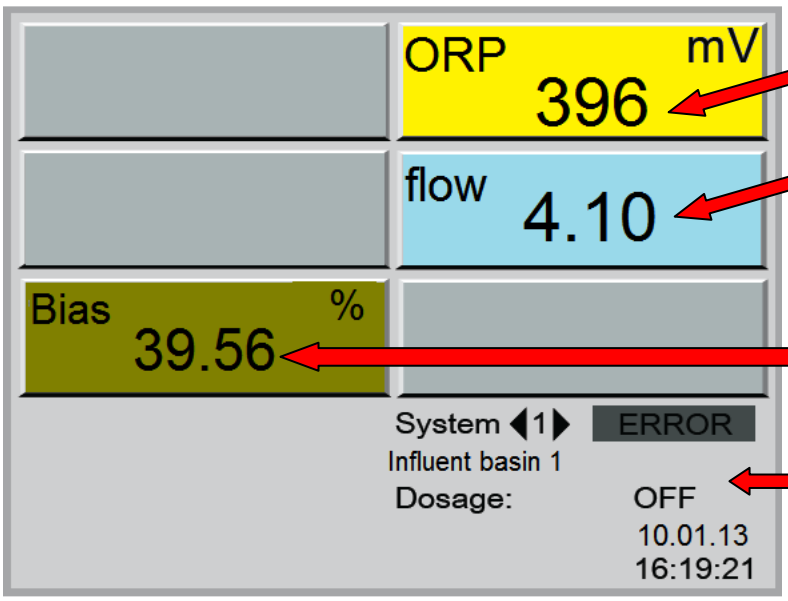
EU guidelines	EU-EMC guideline 89/336/EEC
	91/263/EEC, amended version 92/31/EEC
International standards	EN 50 081-1/2
	EN 50 082-1/2

Hopewell, VA Appendix

11/07/2013 – RWD & ETO

Index by section

Section 1 Screen shots



ORP Sensor Value in mV

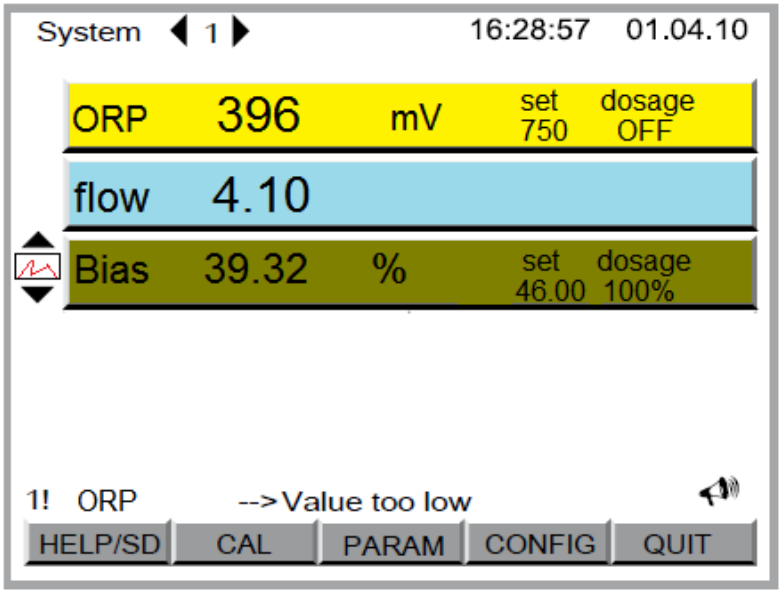
Flow Rate Value in MGD

ORP/10 expressed as Bias value %

System [probe] number, location, dosage status, time and Date

Note: System 4 has the same display for Basin #2.

Pressing ESC or Enter will progress to this screen

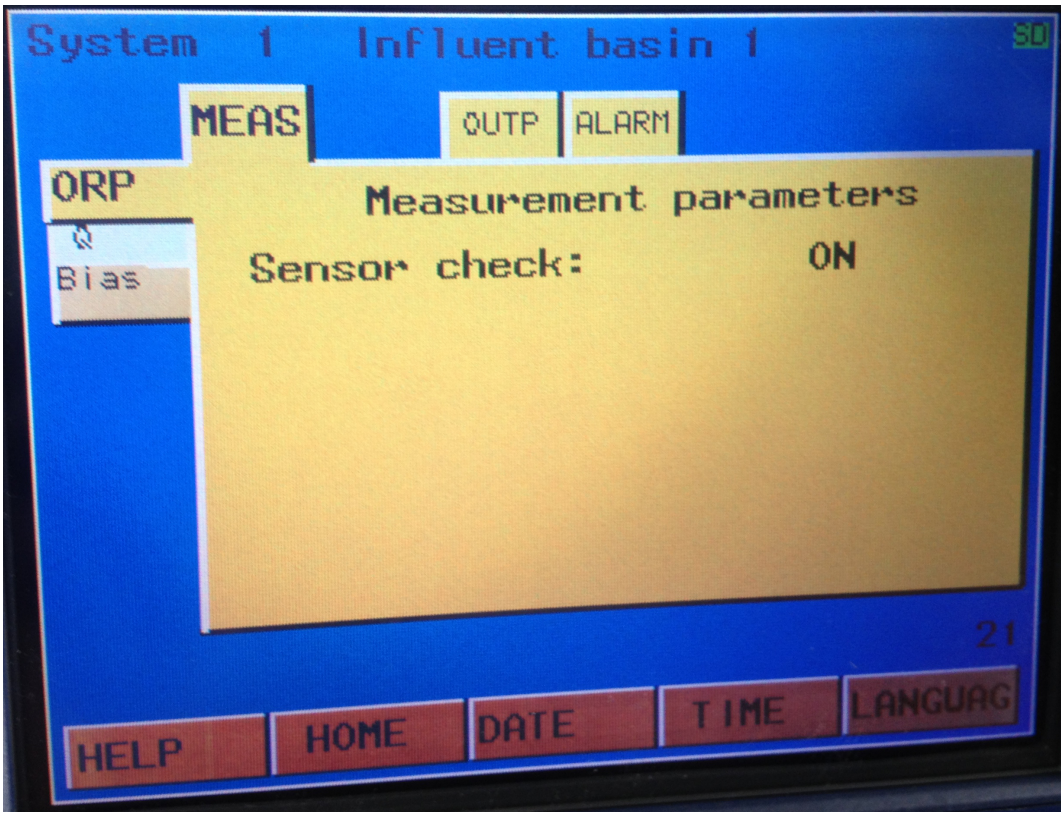


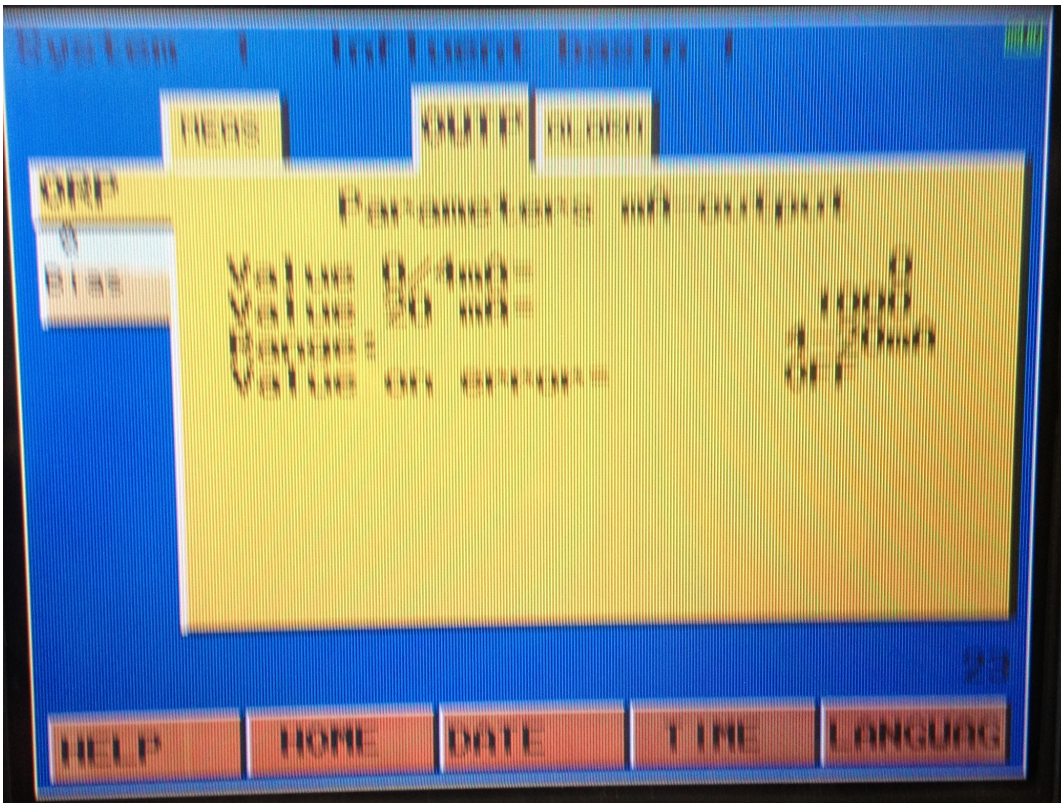
Additional information about the control of the process is shown here

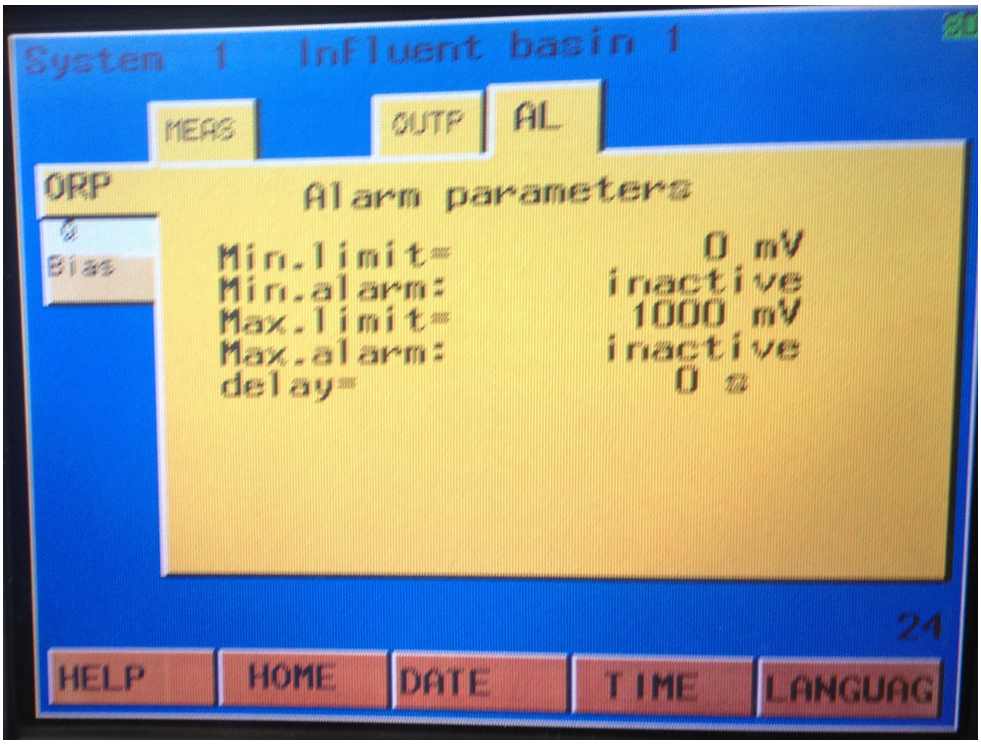
Set indicates the setpoint for control. Dosage is expressed as a positive or negative % output to the chemical pumps

Dynamic function button labels are shown above their respective buttons. CAL is for calibrations, PARAM is for process tuning, CONFIG is for programming of I/O functions.

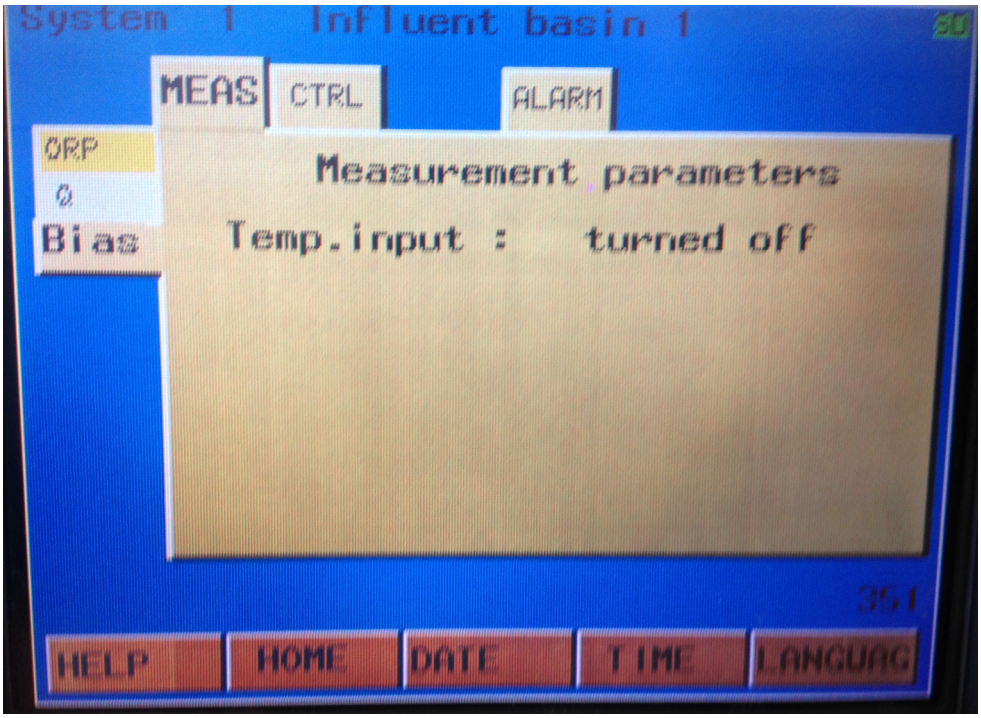
The following screens show the configuration of the controller on 4/26/2013.

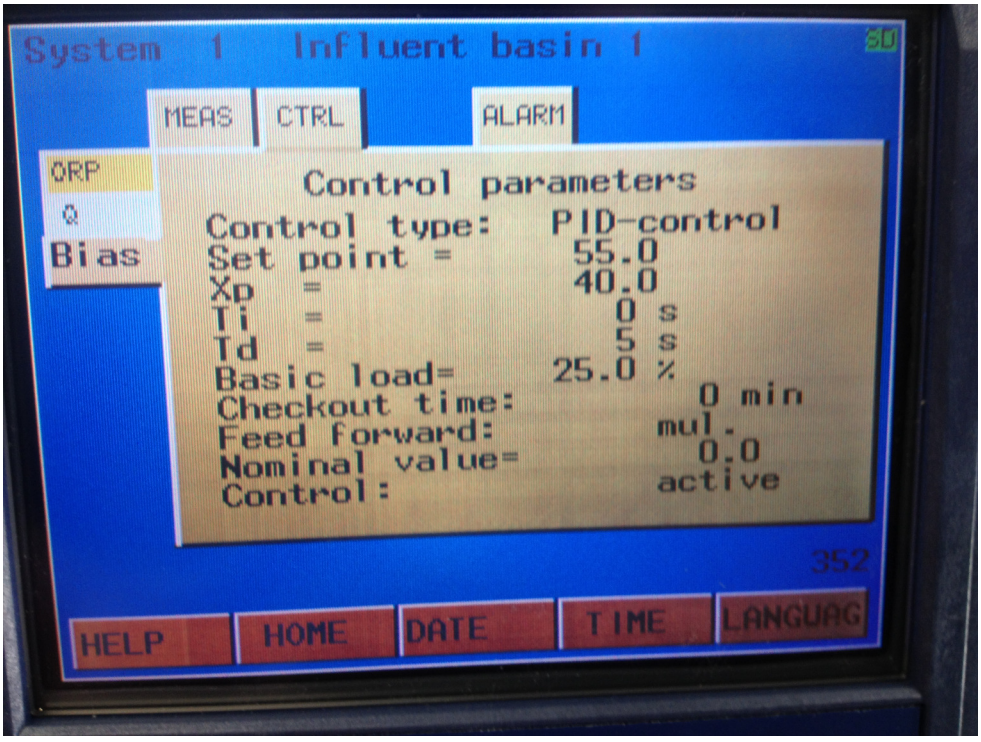

System 1 Influent basin 1
MEAS
OUTP
ALARM
ORP
Bias
Measurement parameters
Sensor check: ON
21
HELP
HOME
DATE
TIME
LANGUAG

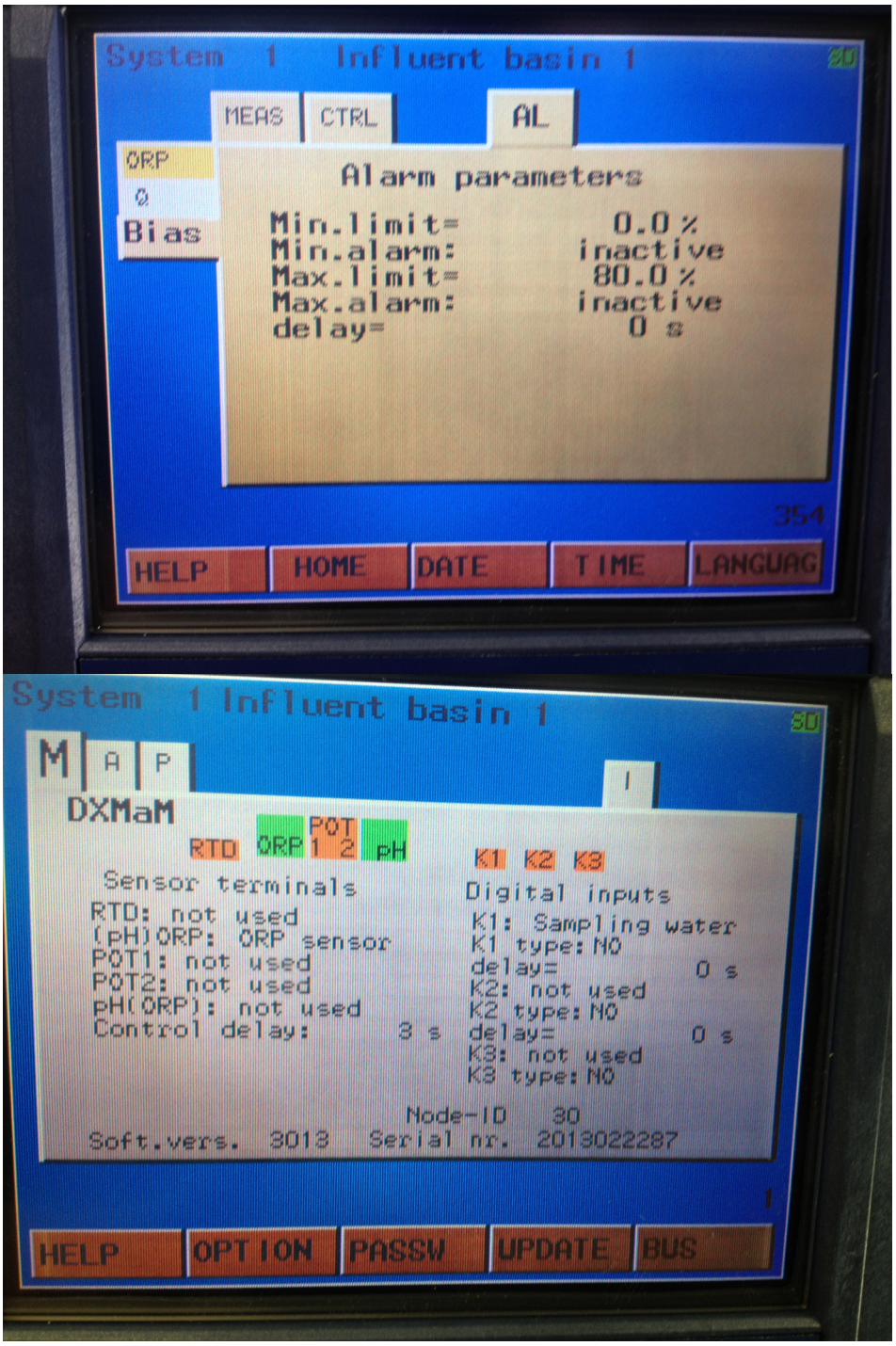

MEAS
OUTP
ALARM
ORP
Bias
HELP
HOME
DATE
TIME

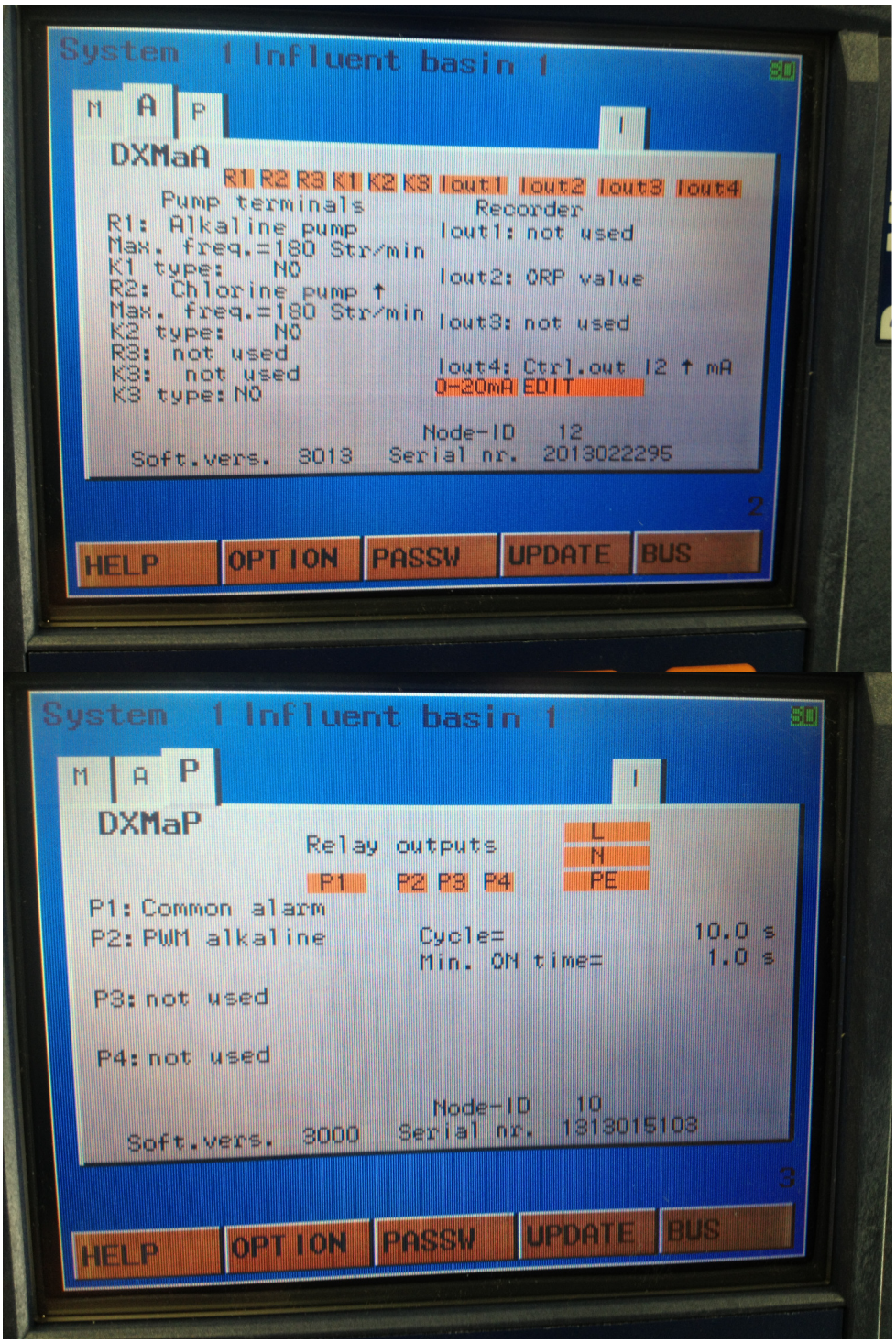

System 1 Influent basin 1
MEAS
OUTP
AL
ORP
Alarm parameters
Bias
Min.limit= 0 mV
Min.alarm: inactive
Max.limit= 1000 mV
Max.alarm: inactive
delay= 0 s
24
HELP
HOME
DATE
TIME
LANGUAG

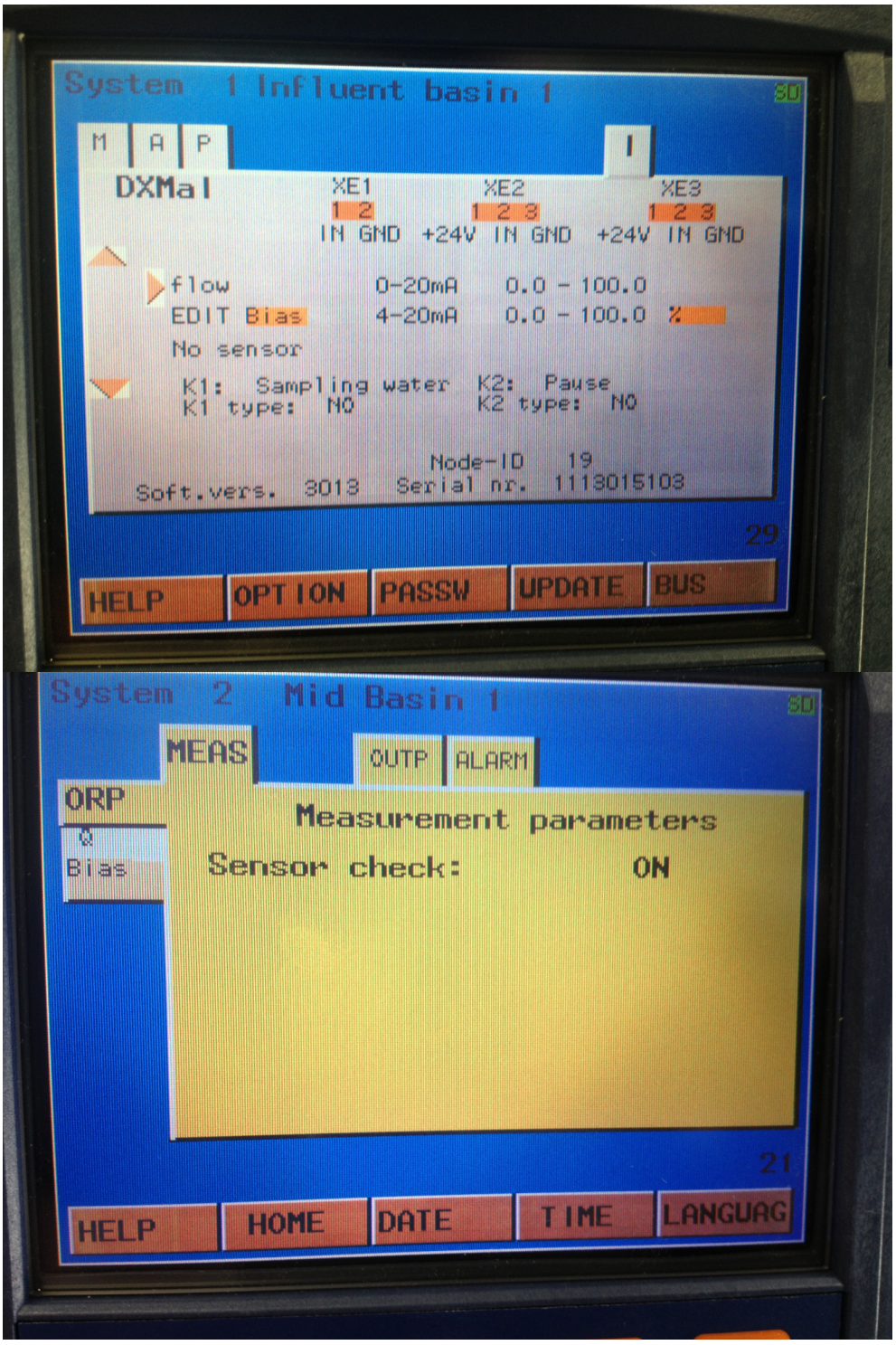

System 1 Influent basin 1
AL
ORP
Q
Alarm parameters
Min.limit= 0.0
Min.alarm: inactive
Max.limit= 80.0
Max.alarm: inactive
delay= 0 s
Control off: inactive
314
HELP
HOME
DATE
TIME
LANGUAG

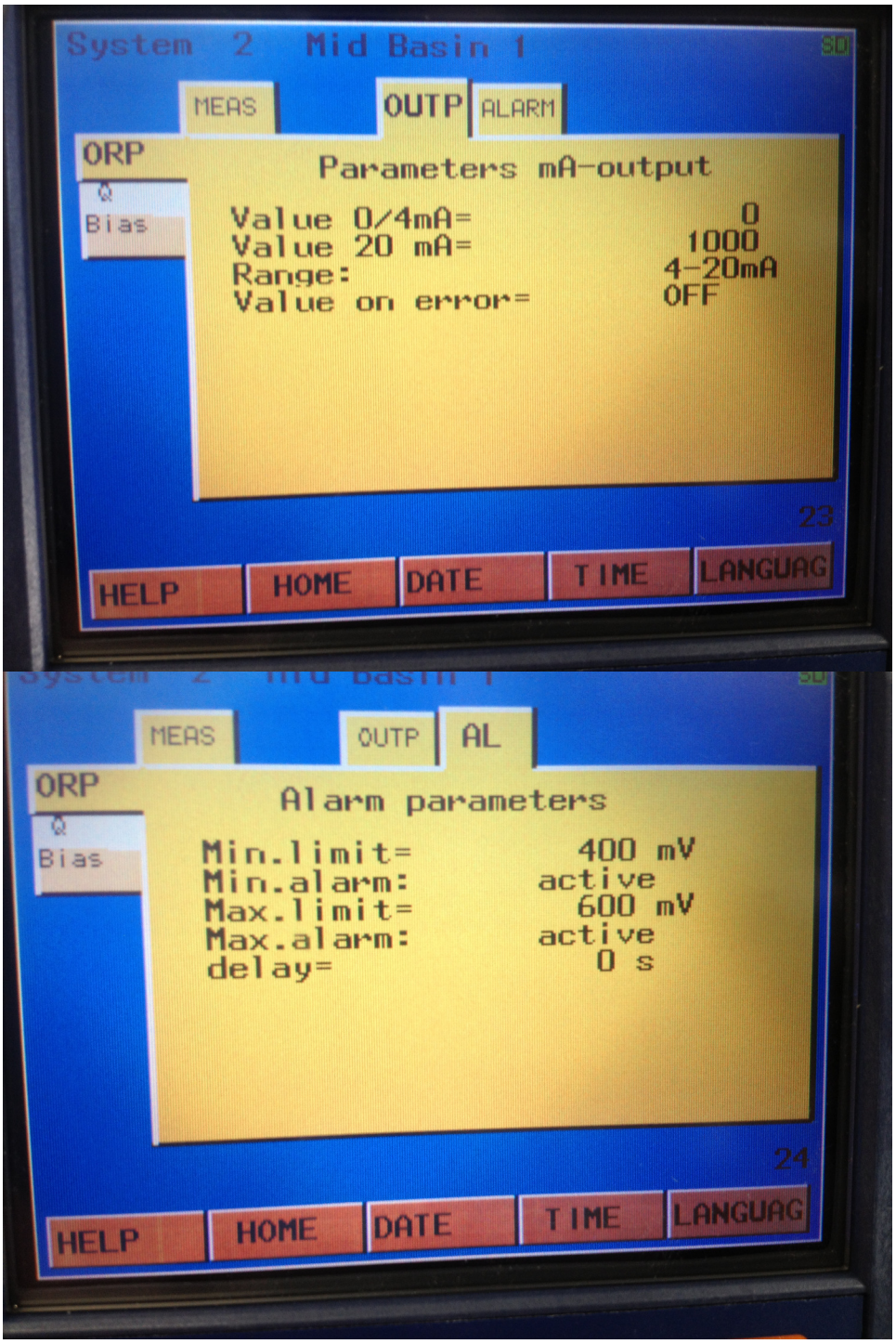

System 1 Influent basin 1
MEAS
CTRL
ALARM
ORP
0
Bias
Measurement parameters
Temp.input : turned off
351
HELP
HOME
DATE
TIME
LANGUAG

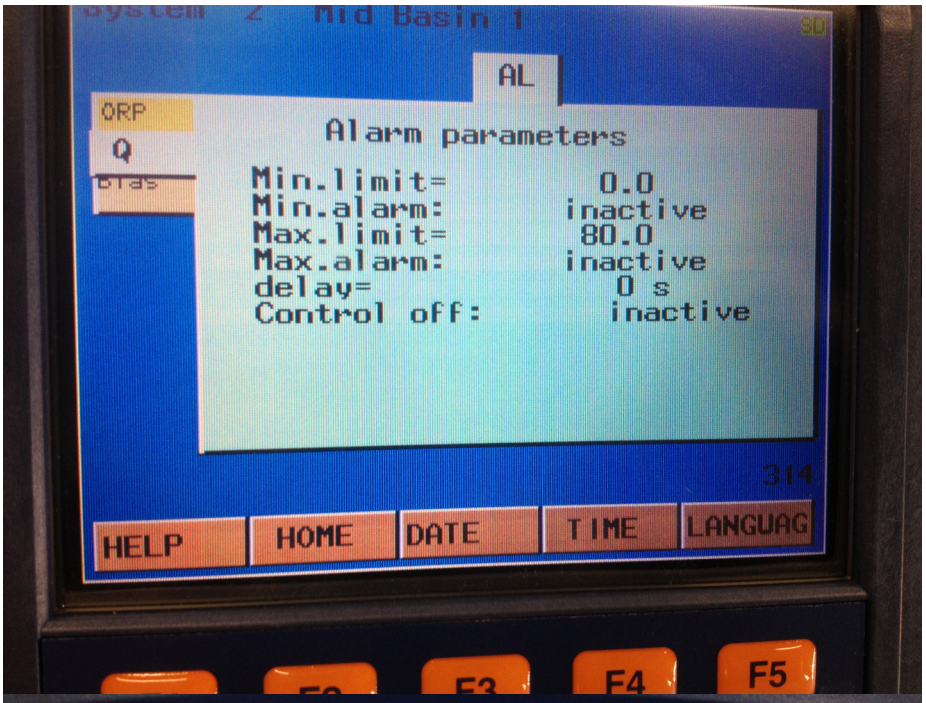

System 1 Influent basin 1
MEAS
CTRL
ALARM
ORP
0
Bias
Control parameters
Control type: PID-control
Set point = 55.0
Xp = 40.0
Ti = 0 s
Td = 5 s
Basic load= 25.0 %
Checkout time: 0 min
Feed forward: mul.
Nominal value= 0.0
Control: active
352
HELP
HOME
DATE
TIME
LANGUAG


System 1 Influent basin 1
MEAS
CTRL
AL
ORP
0
Bias
Alarm parameters
Min.limit= 0.0 %
Min.alarm: inactive
Max.limit= 80.0 %
Max.alarm: inactive
delay= 0 s
354
HELP
HOME
DATE
TIME
LANGUAG
System 1 Influent basin 1
M
A
P
I
DXMaM
RTD
ORP
POT 1 2
pH
K1 K2 K3
Sensor terminals
RTD: not used
(pH)ORP: ORP sensor
POT1: not used
POT2: not used
pH(ORP): not used
Control delay: 3 s
Digital inputs
K1: Sampling water
K1 type: NO
delay= 0 s
K2: not used
K2 type: NO
delay= 0 s
K3: not used
K3 type: NO
Mode-ID 30
Soft.vers. 3013 Serial nr. 2013022287
1
HELP
OPTION
PASSW
UPDATE
BUS

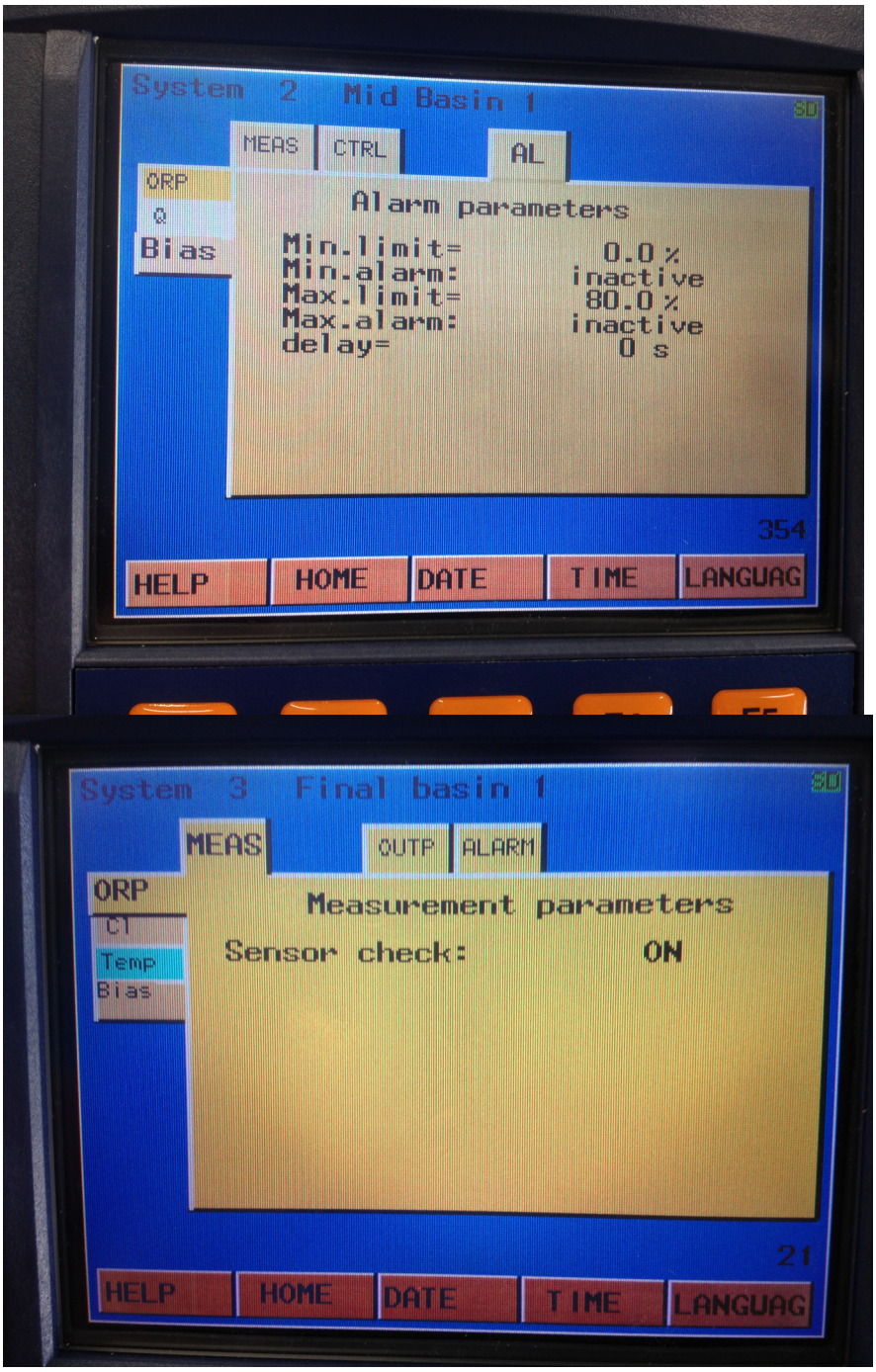

System 1 Influent basin 1
M A P
I
DXMaA
R1 R2 R3 K1 K2 K3 Iout1 Iout2 Iout3 Iout4
Pump terminals
R1: Alkaline pump
Max. freq.=180 Str/min
K1 type: NO
R2: Chlorine pump ↑
Max. freq.=180 Str/min
K2 type: NO
R3: not used
K3: not used
K3 type: NO
Recorder
Iout1: not used
Iout2: ORP value
Iout3: not used
Iout4: Ctrl.out 12 ↑ mA
0-20mA EDIT
Node-ID 12
Soft.vers. 3013 Serial nr. 2013022295
2
HELP OPTION PASSW UPDATE BUS
System 1 Influent basin 1
M A P
I
DXMaP
Relay outputs
L
N
PE
P1 P2 P3 P4
P1: Common alarm
P2: PWM alkaline
Cycle= 10.0 s
Min. ON time= 1.0 s
P3: not used
P4: not used
Node-ID 10
Soft.vers. 3000 Serial nr. 1313015103
3
HELP OPTION PASSW UPDATE BUS

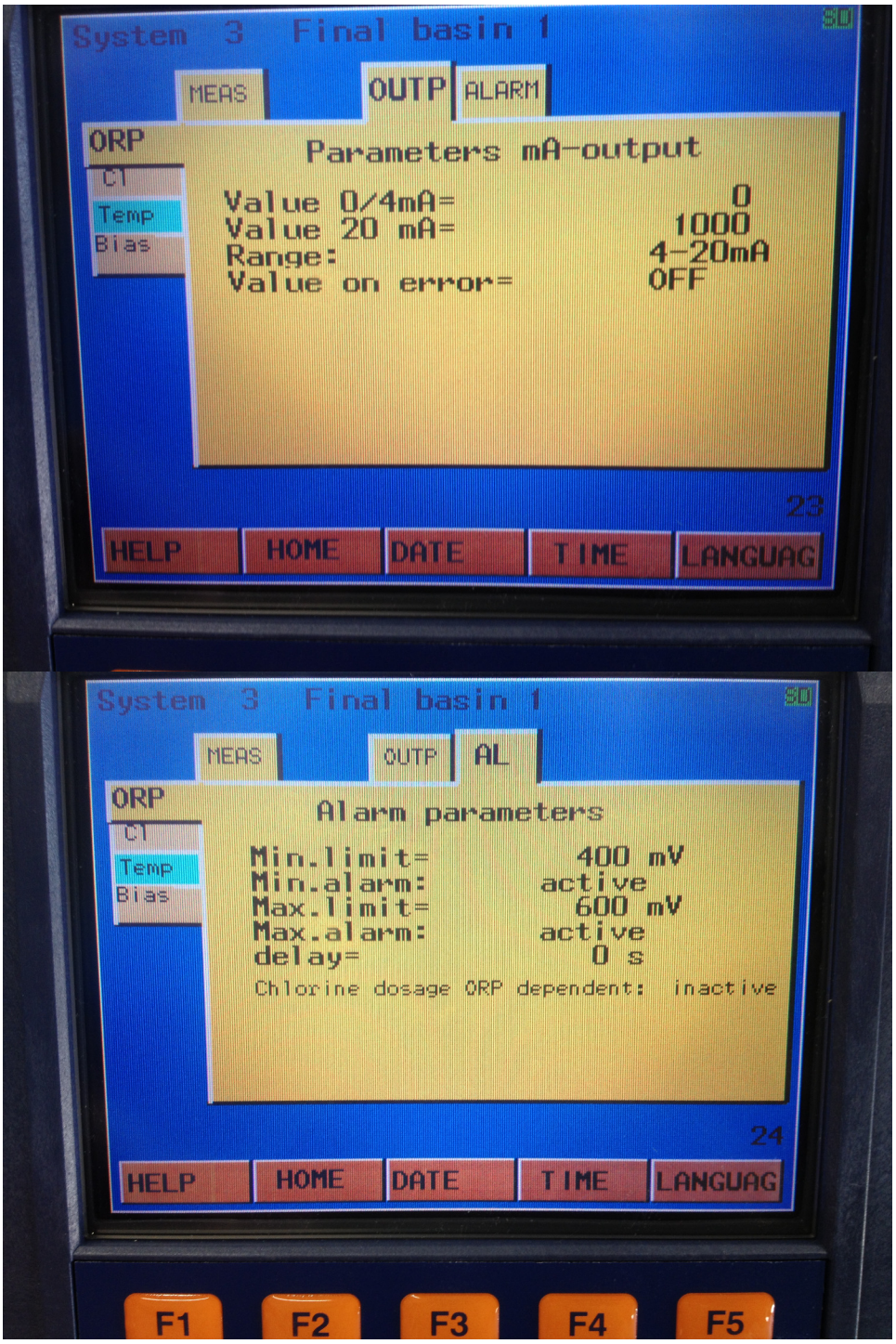

System 1 Influent basin 1
M
A
P
I
DXMal
XE1
1 2
IN GND
XE2
1 2 3
+24V IN GND
XE3
1 2 3
+24V IN GND
flow
0-20mA
0.0 - 100.0
EDIT Bias
4-20mA
0.0 - 100.0 %
No sensor
K1: Sampling water
K1 type: NO
K2: Pause
K2 type: NO
Node-ID 19
Soft.vers. 3013
Serial nr. 1113015103
29
HELP
OPTION
PASSW
UPDATE
BUS
System 2 Mid Basin 1
MEAS
OUTP
ALARM
ORP
Bias
Measurement parameters
Sensor check: ON
21
HELP
HOME
DATE
TIME
LANGUAG

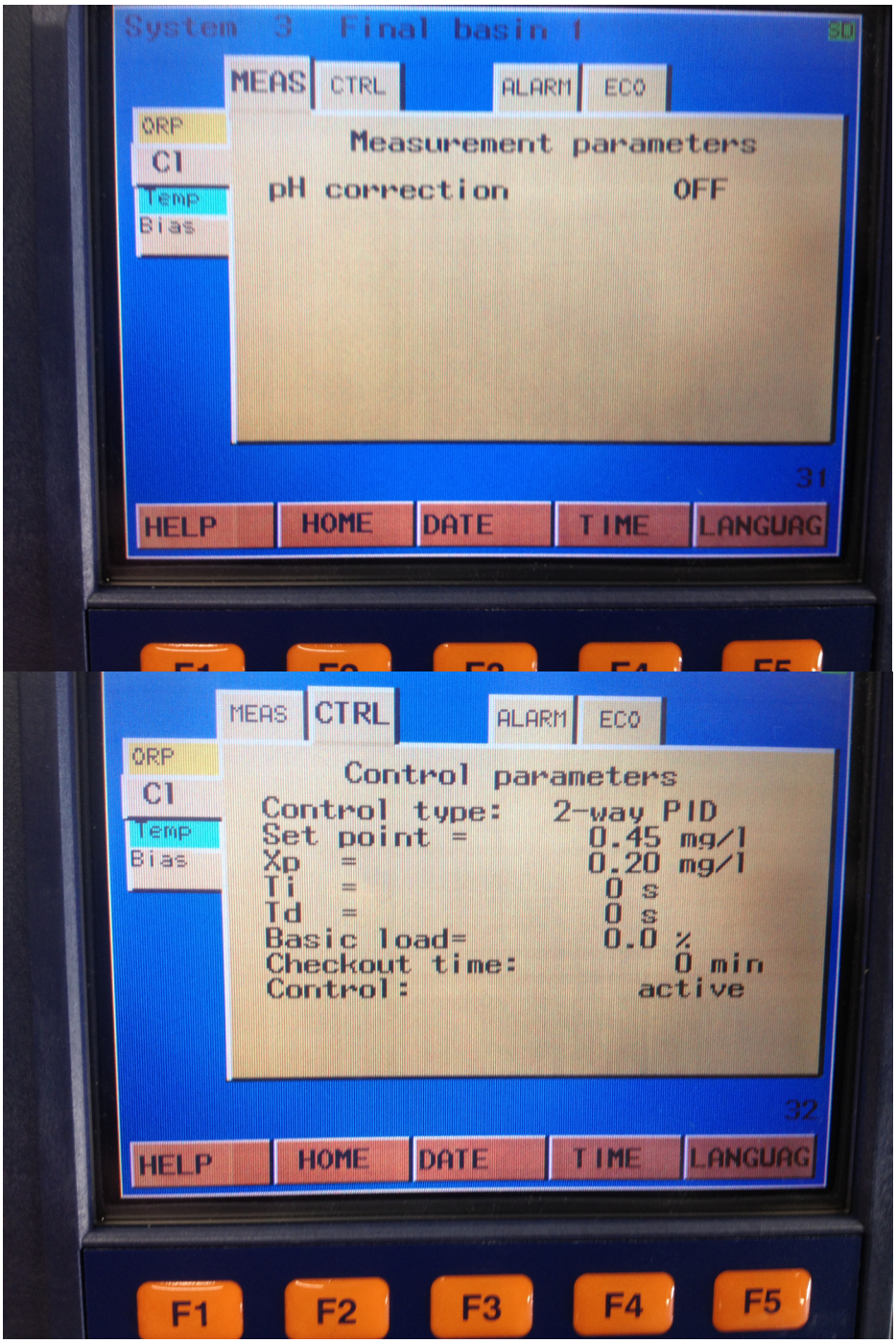

System 2 Mid Basin 1
MEAS
OUTP
ALARM
ORP
Parameters mA-output
Bias
Value 0/4mA= 0
Value 20 mA= 1000
Range: 4-20mA
Value on error= OFF
23
HELP
HOME
DATE
TIME
LANGUAG
MEAS
OUTP
AL
ORP
Alarm parameters
Bias
Min.limit= 400 mV
Min.alarm: active
Max.limit= 600 mV
Max.alarm: active
delay= 0 s
24
HELP
HOME
DATE
TIME
LANGUAG

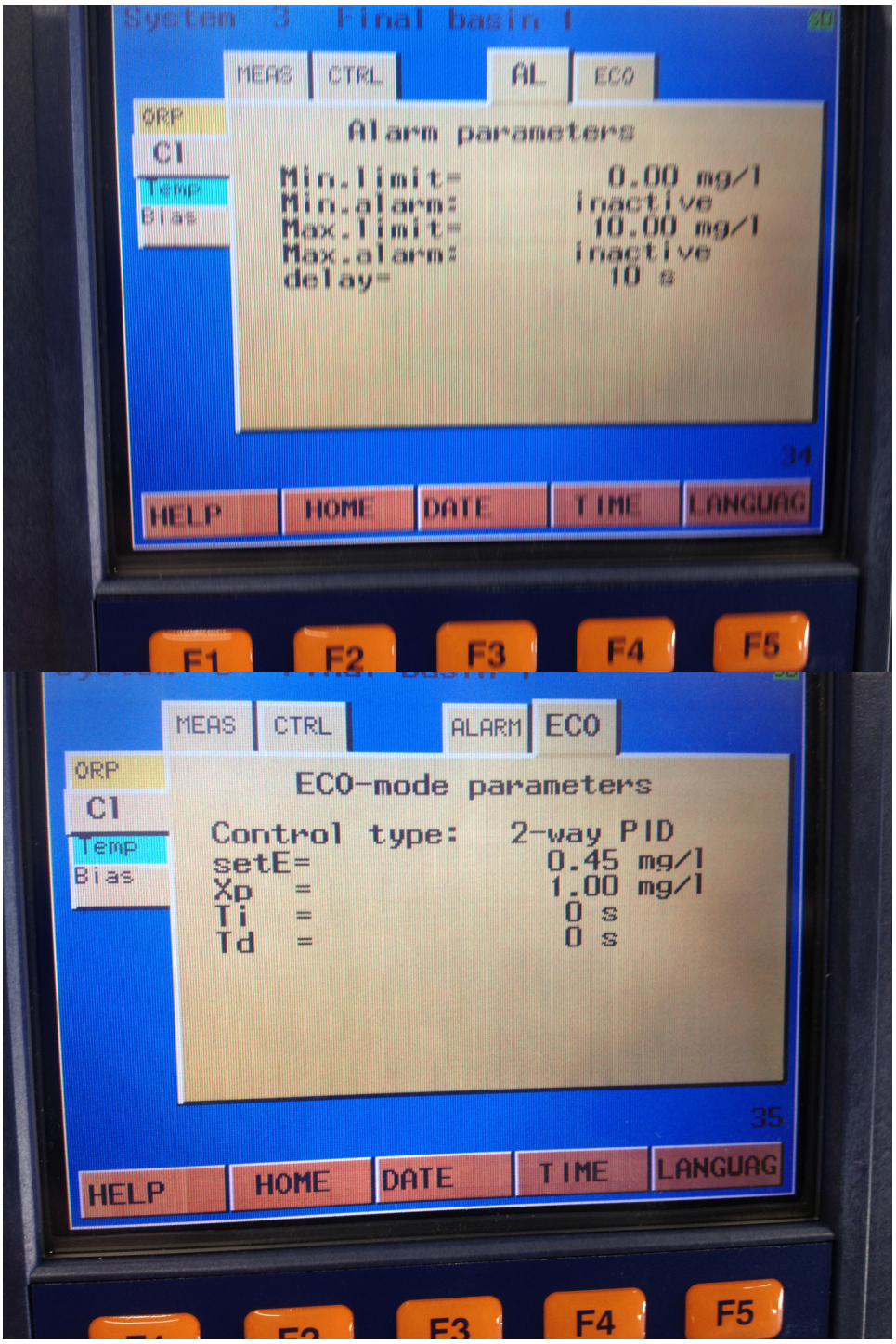

Mid Basin 1
AL
ORP
Q
Alarm parameters
Min.limit= 0.0
Min.alarm: inactive
Max.limit= 80.0
Max.alarm: inactive
delay= 0 s
Control off: inactive
314
HELP
HOME
DATE
TIME
LANGUAG
F4
F5

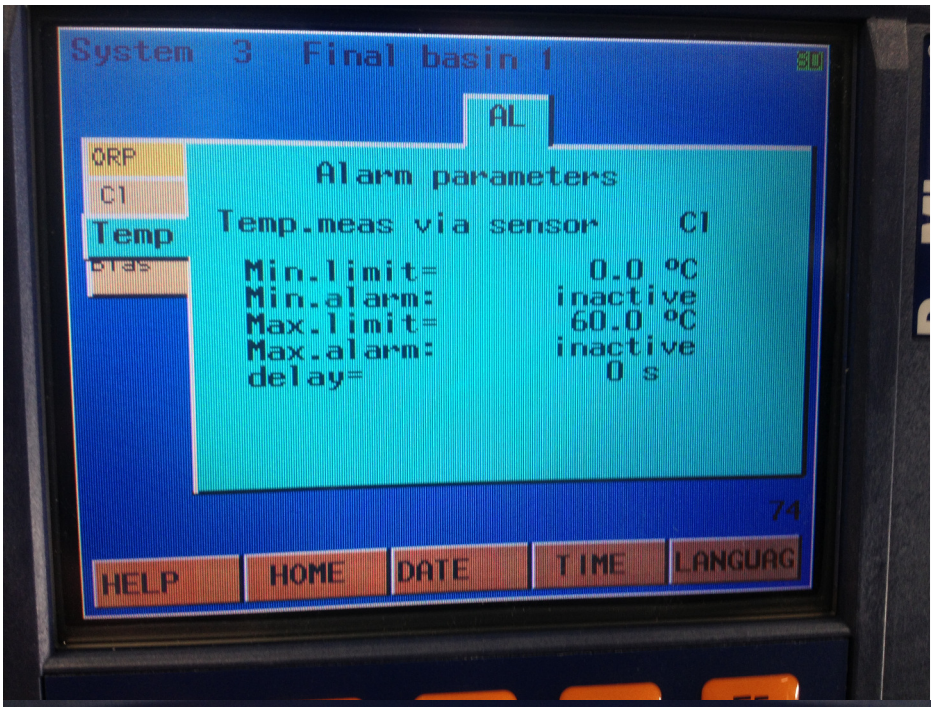

System 2 Mid Basin 1
MEAS
CTRL
ALARM
ORP
0
Bias
Control parameters
Control type: PID-control
Set point = 48.0
Xp = 50.0
Ti = 9600 s
Td = 2400 s
Basic load= 25.0 %
Checkout time: 0 min
Feed forward: mul.
Nominal value= 0.0
Control: active
352
HELP
HOME
DATE
TIME
LANGUAG
F1
F2
F3
F4
F5

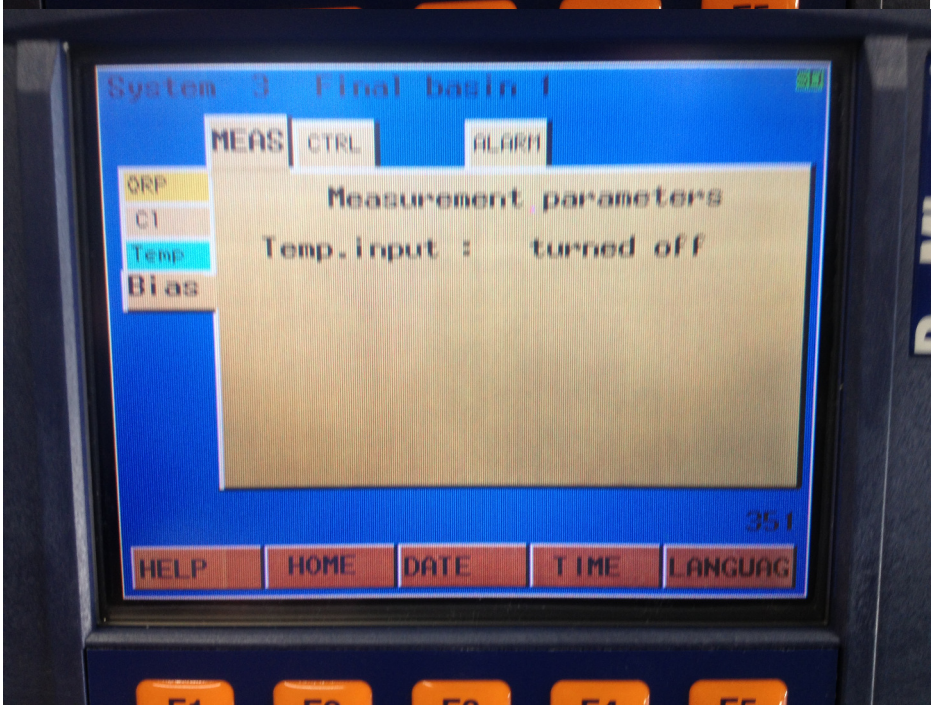

System 2 Mid Basin 1
MEAS
CTRL
AL
ORP
0
Bias
Alarm parameters
Min.limit= 0.0 %
Min.alarm: inactive
Max.limit= 80.0 %
Max.alarm: inactive
delay= 0 s
354
HELP
HOME
DATE
TIME
LANGUAG
System 3 Final basin 1
MEAS
OUTP
ALARM
ORP
Cl
Temp
Bias
Measurement parameters
Sensor check: ON
21
HELP
HOME
DATE
TIME
LANGUAG

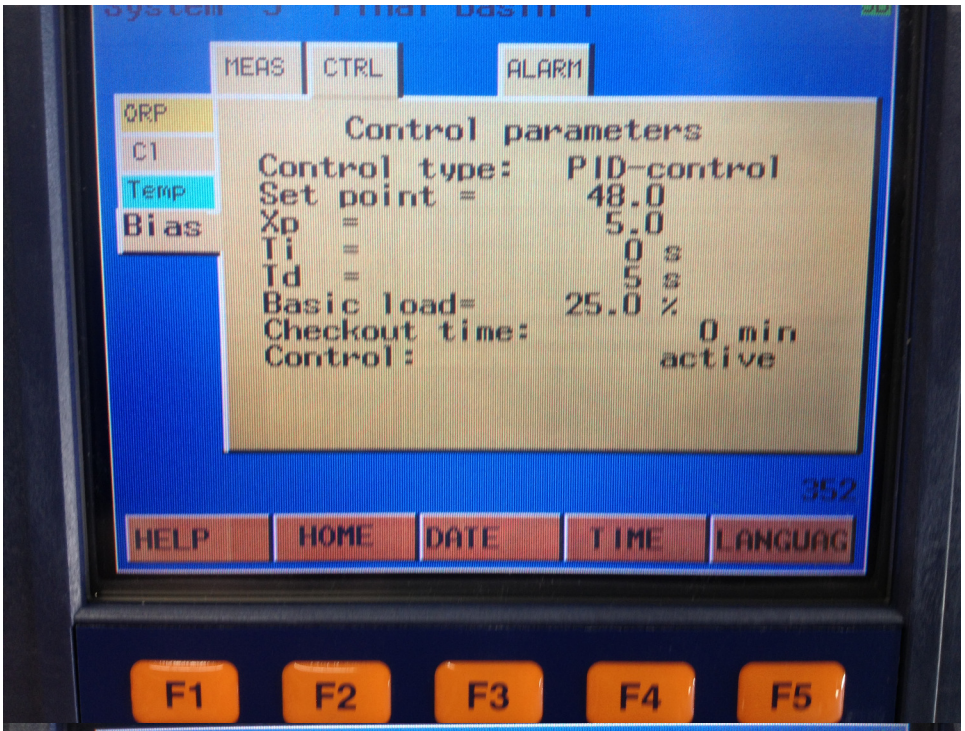

System 3 Final basin 1
MEAS
OUTP
ALARM
ORP
Cl
Temp
Bias
Parameters mA-output
Value 0/4mA= 0
Value 20 mA= 1000
Range: 4-20mA
Value on error= OFF
23
HELP
HOME
DATE
TIME
LANGUAG
System 3 Final basin 1
MEAS
OUTP
AL
ORP
Cl
Temp
Bias
Alarm parameters
Min.limit= 400 mV
Min.alarm: active
Max.limit= 600 mV
Max.alarm: active
delay= 0 s
Chlorine dosage ORP dependent: inactive
24
HELP
HOME
DATE
TIME
LANGUAG
F1
F2
F3
F4
F5

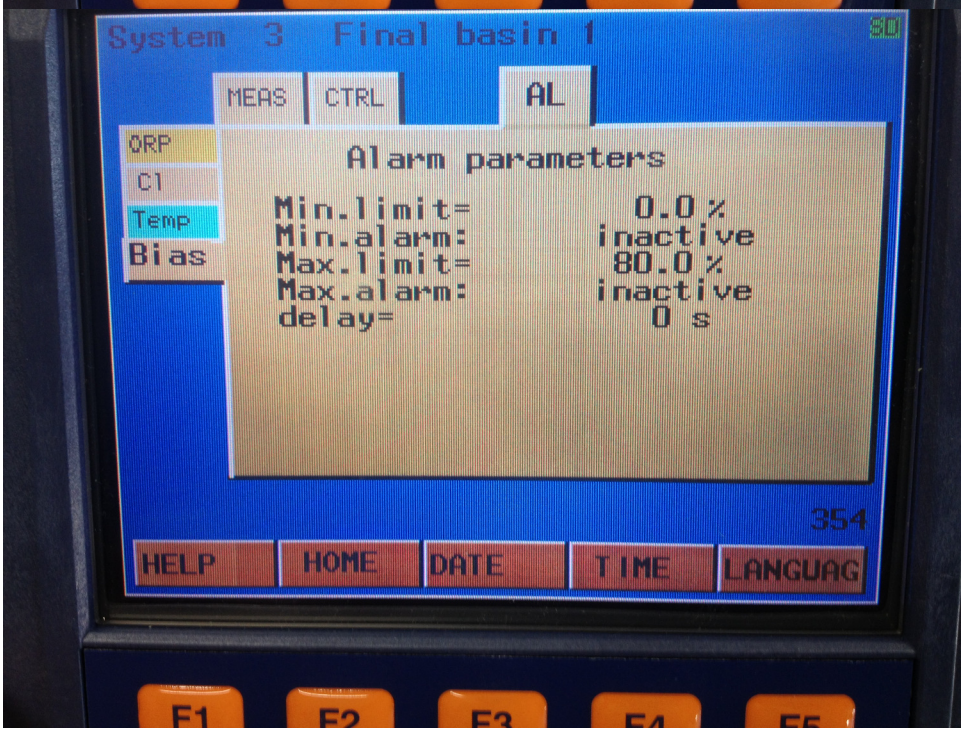

System 3 Final basin 1
MEAS
CTRL
ALARM
ECO
ORP
Cl
Temp
Bias
Measurement parameters
pH correction OFF
31
HELP
HOME
DATE
TIME
LANGUAG
MEAS
CTRL
ALARM
ECO
ORP
Cl
Temp
Bias
Control parameters
Control type: 2-way PID
Set point = 0.45 mg/l
Xp = 0.20 mg/l
Ti = 0 s
Td = 0 s
Basic load= 0.0 %
Checkout time: 0 min
Control: active
32
HELP
HOME
DATE
TIME
LANGUAG
F1
F2
F3
F4
F5

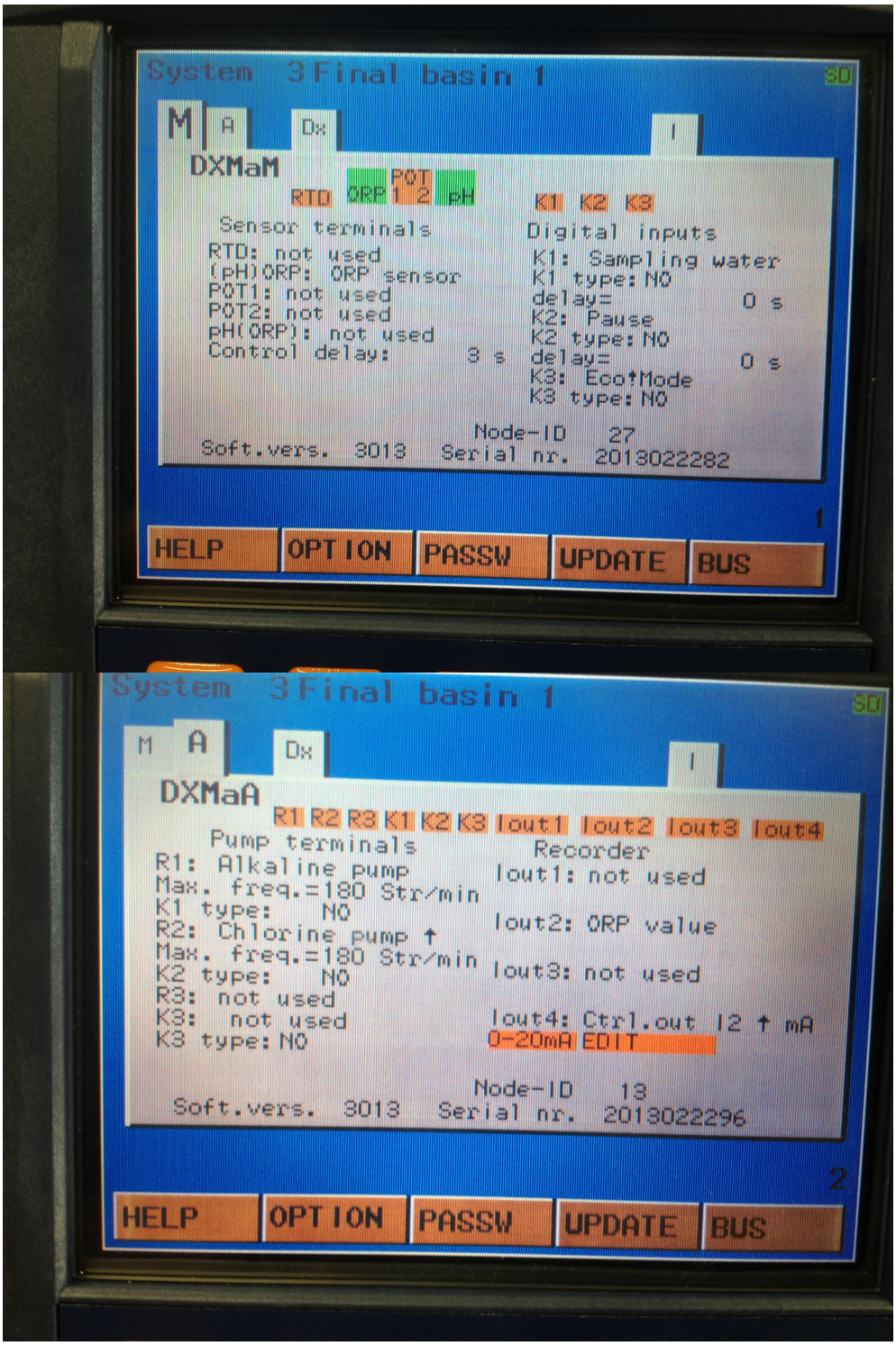

System 3 Final basin 1
MEAS
CTRL
AL
ECO
ORP
Cl
Temp
Bias
Alarm parameters
Min.limit= 0.00 mg/l
Min.alarm: inactive
Max.limit= 10.00 mg/l
Max.alarm: inactive
delay= 10 s
34
HELP
HOME
DATE
TIME
LANGUAG
F1
F2
F3
F4
F5
MEAS
CTRL
ALARM
ECO
ORP
Cl
Temp
Bias
ECO-mode parameters
Control type: 2-way PID
setE= 0.45 mg/l
Xp = 1.00 mg/l
Ti = 0 s
Td = 0 s
35
HELP
HOME
DATE
TIME
LANGUAG
F3
F4
F5

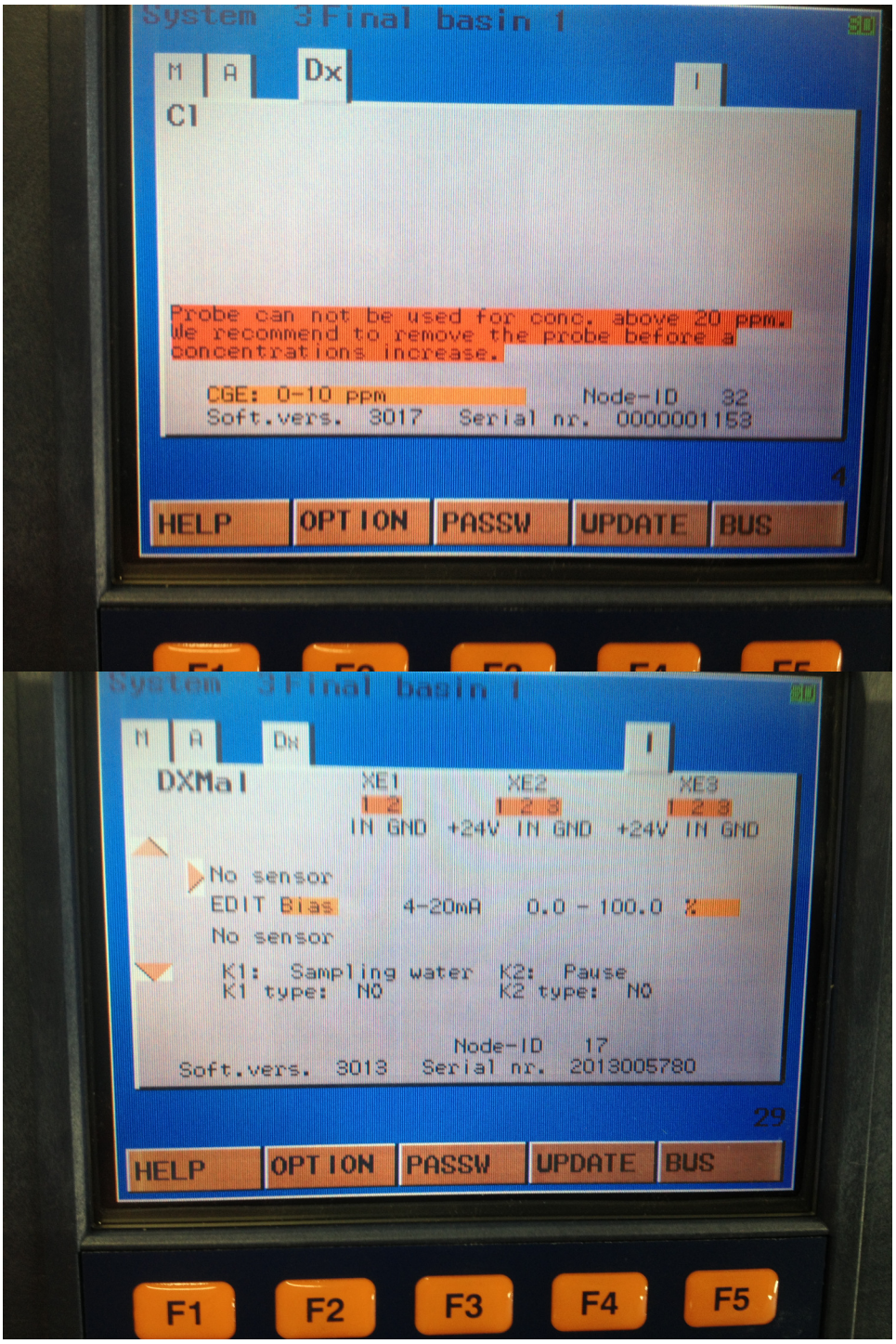

System 3 Final basin 1
AL
ORP
Cl
Temp
Bias
Alarm parameters
Temp.meas via sensor Cl
Min.limit= 0.0 °C
Min.alarm: inactive
Max.limit= 60.0 °C
Max.alarm: inactive
delay= 0 s
74
HELP
HOME
DATE
TIME
LANGUAG

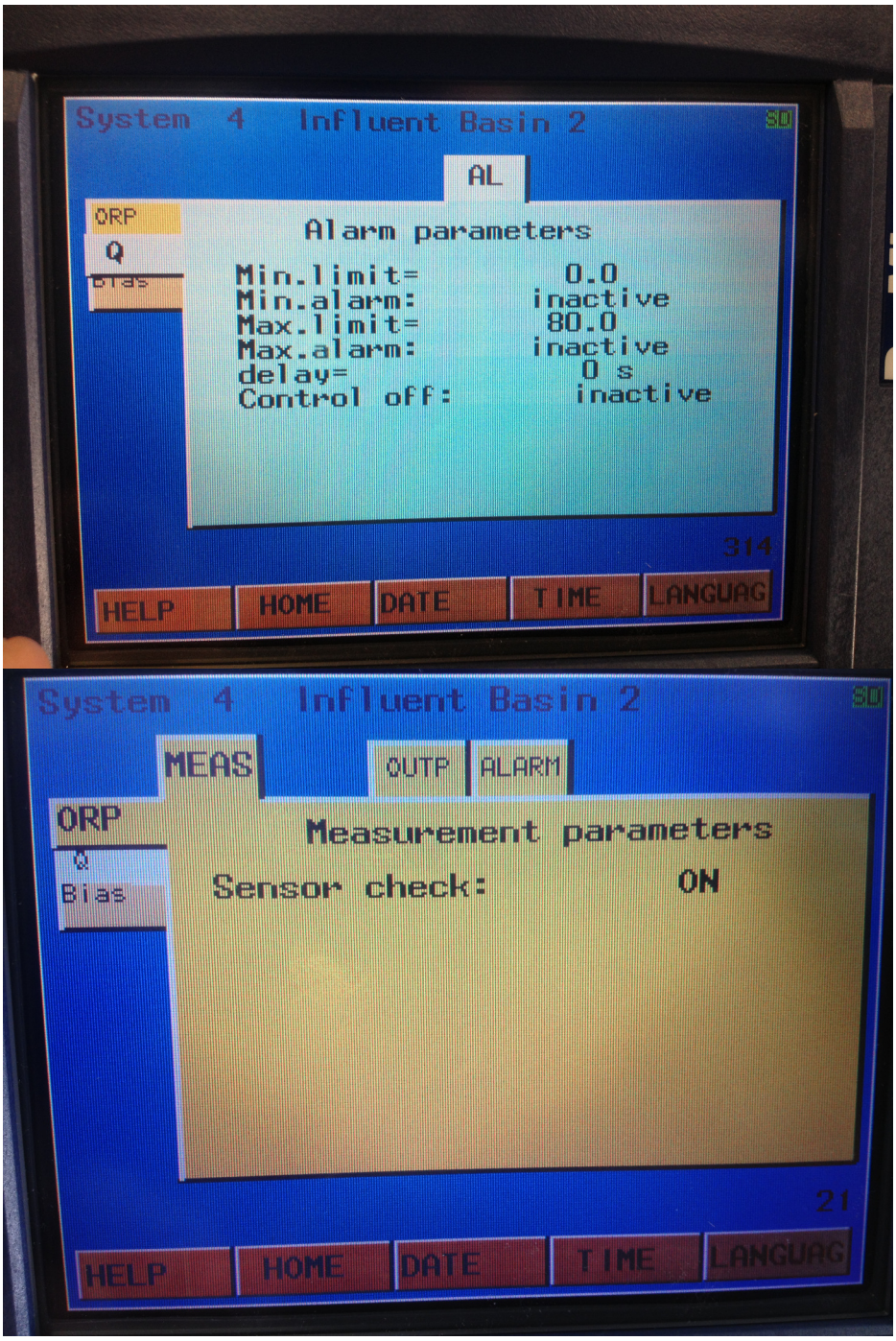

System 3 Final basin 1
MEAS
CTRL
ALARM
ORP
Cl
Temp
Bias
Measurement parameters
Temp.input : turned off
351
HELP
HOME
DATE
TIME
LANGUAG

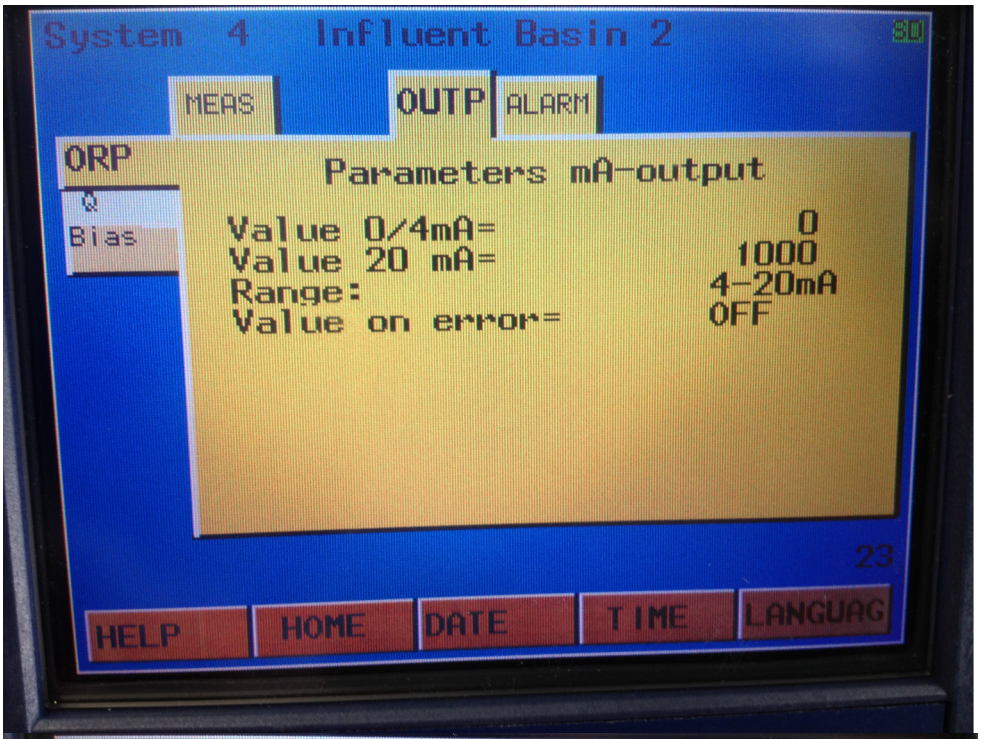

MEAS
CTRL
ALARM
ORP
Cl
Temp
Bias
Control parameters
Control type: PID-control
Set point = 48.0
Xp = 5.0
Ti = 0 s
Td = 5 s
Basic load= 25.0 %
Checkout time: 0 min
Control: active
352
HELP
HOME
DATE
TIME
LANGUAG
F1
F2
F3
F4
F5

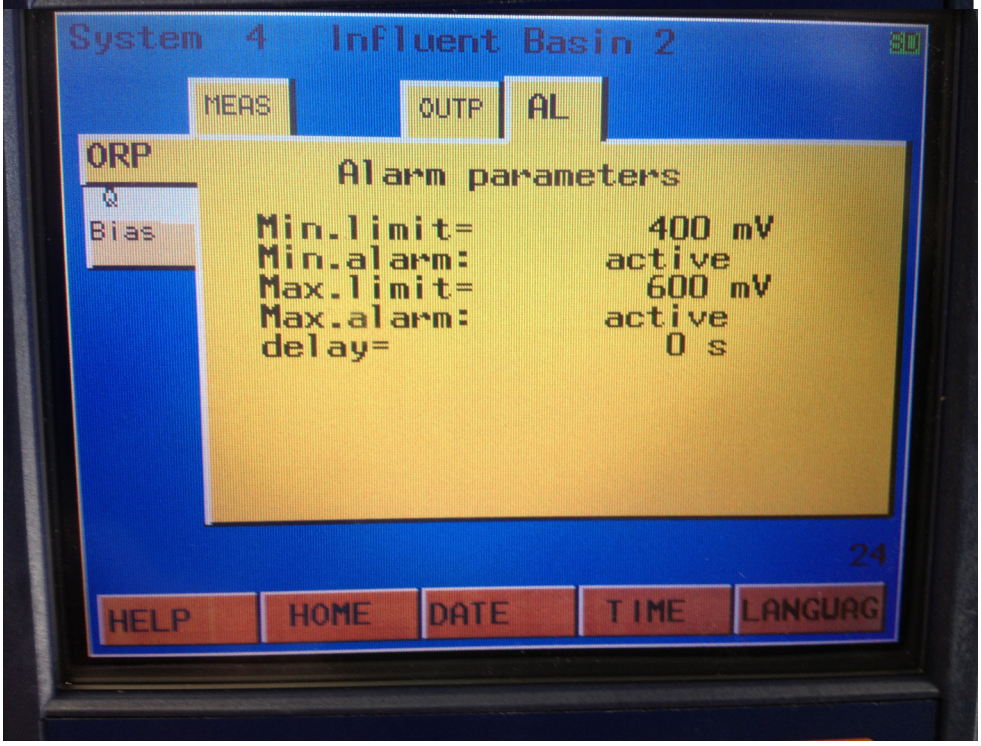

System 3 Final basin 1
MEAS
CTRL
AL
ORP
Cl
Temp
Bias
Alarm parameters
Min.limit= 0.0 %
Min.alarm: inactive
Max.limit= 80.0 %
Max.alarm: inactive
delay= 0 s
354
HELP
HOME
DATE
TIME
LANGUAG

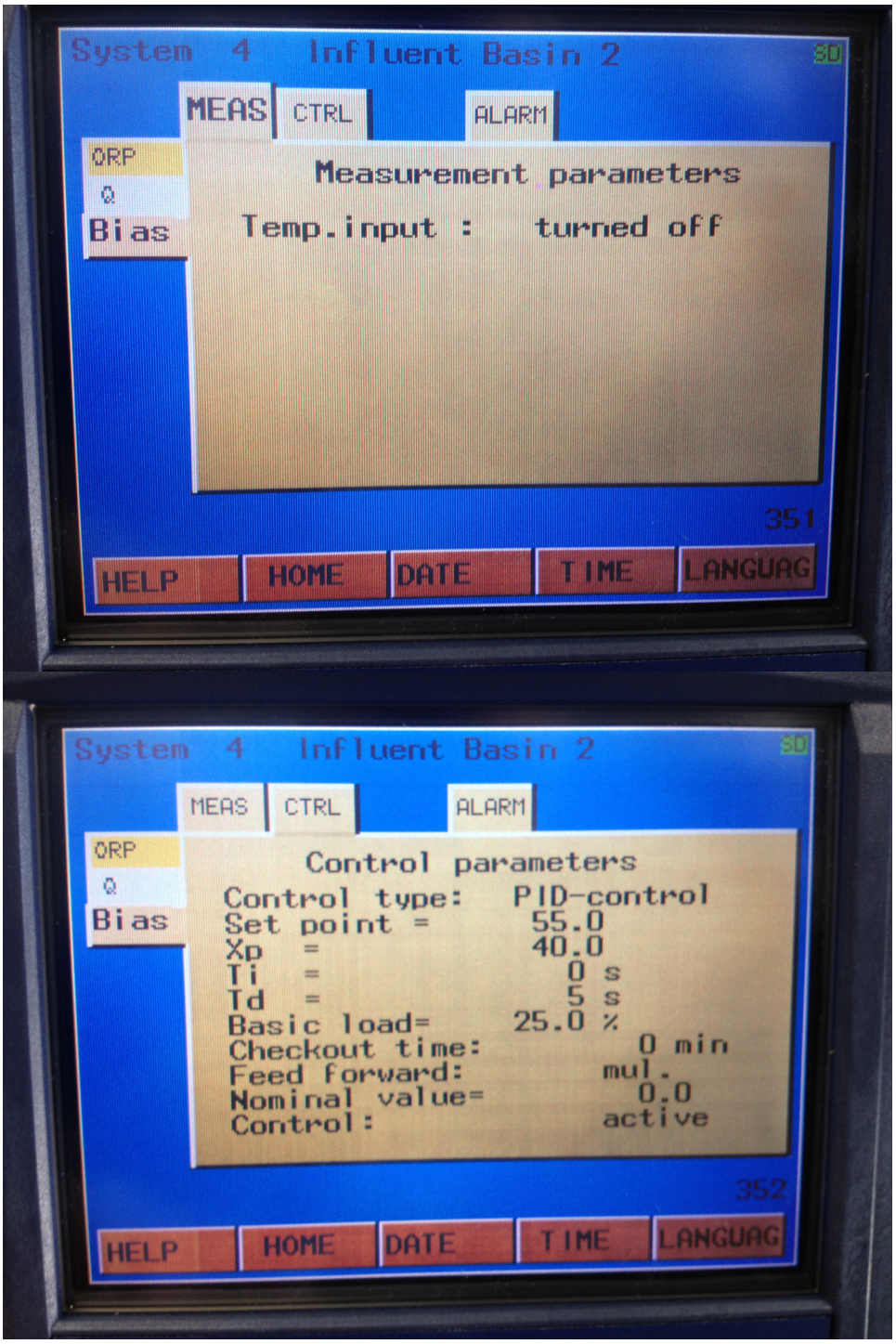

System 3Final basin 1
M A Dx I
DXMaM
RTD ORP POT 1 2 pH
K1 K2 K3
Sensor terminals
RTD: not used
(pH)ORP: ORP sensor
POT1: not used
POT2: not used
pH(ORP): not used
Control delay: 3 s
Digital inputs
K1: Sampling water
K1 type: NO
delay= 0 s
K2: Pause
K2 type: NO
delay= 0 s
K3: Eco?Mode
K3 type: NO
Node-ID 27
Soft.vers. 3013 Serial nr. 2013022282
1
HELP OPTION PASSW UPDATE BUS
System 3Final basin 1
M A Dx I
DXMaA
R1 R2 R3 K1 K2 K3 Iout1 Iout2 Iout3 Iout4
Pump terminals
R1: Alkaline pump
Max. freq.=180 Str/min
K1 type: NO
R2: Chlorine pump ↑
Max. freq.=180 Str/min
K2 type: NO
R3: not used
K3: not used
K3 type: NO
Recorder
Iout1: not used
Iout2: ORP value
Iout3: not used
Iout4: Ctrl.out I2 ↑ mA
0-20mA EDIT
Node-ID 13
Soft.vers. 3013 Serial nr. 2013022296
2
HELP OPTION PASSW UPDATE BUS

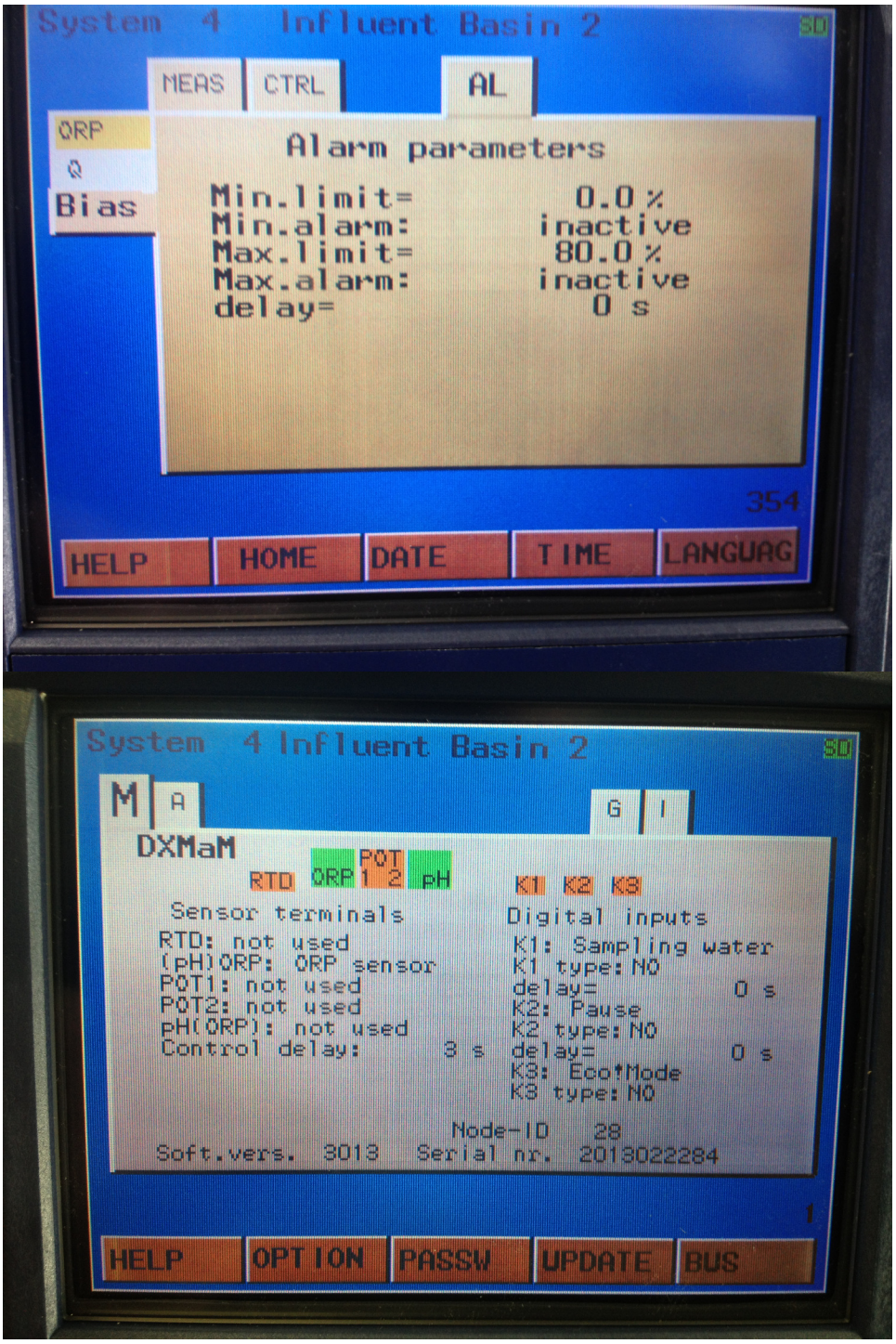

System 3Final basin 1
M
A
Dx
I
Cl
Probe can not be used for conc. above 20 ppm.
We recommend to remove the probe before a
concentrations increase.
CGE: 0-10 ppm
Node-ID 32
Soft.vers. 3017
Serial nr. 0000001153
4
HELP
OPTION
PASSW
UPDATE
BUS
F1
F2
F3
F4
F5
System 3Final basin 1
M
A
Dx
I
DXMal
XE1
XE2
XE3
IN GND +24V IN GND +24V IN GND
No sensor
EDIT Bias
4-20mA
0.0 - 100.0 %
No sensor
K1: Sampling water
K1 type: NO
K2: Pause
K2 type: NO
Node-ID 17
Soft.vers. 3013
Serial nr. 2013005780
29
HELP
OPTION
PASSW
UPDATE
BUS
F1
F2
F3
F4
F5


System 4 Influent Basin 2
AL
ORP
Q
Bias
Alarm parameters
Min.limit= 0.0
Min.alarm: inactive
Max.limit= 80.0
Max.alarm: inactive
delay= 0 s
Control off: inactive
314
HELP
HOME
DATE
TIME
LANGUAG
System 4 Influent Basin 2
MEAS
OUTP
ALARM
ORP
%
Bias
Measurement parameters
Sensor check: ON
21
HELP
HOME
DATE
TIME
LANGUAG

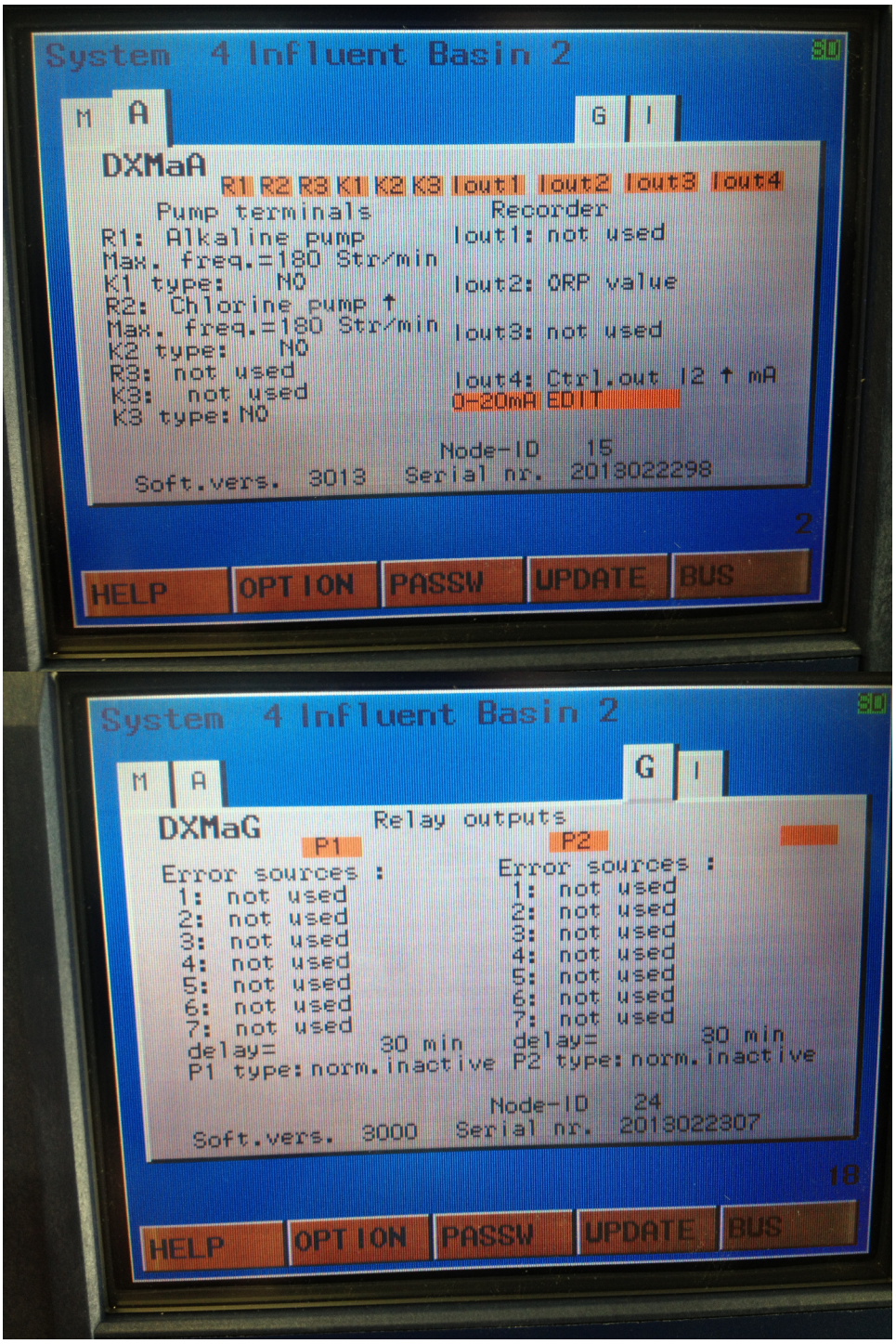

System 4 Influent Basin 2
MEAS
OUTP
ALARM
ORP
Parameters mA-output
Bias
Value 0/4mA= 0
Value 20 mA= 1000
Range: 4-20mA
Value on error= OFF
23
HELP
HOME
DATE
TIME
LANGUAG

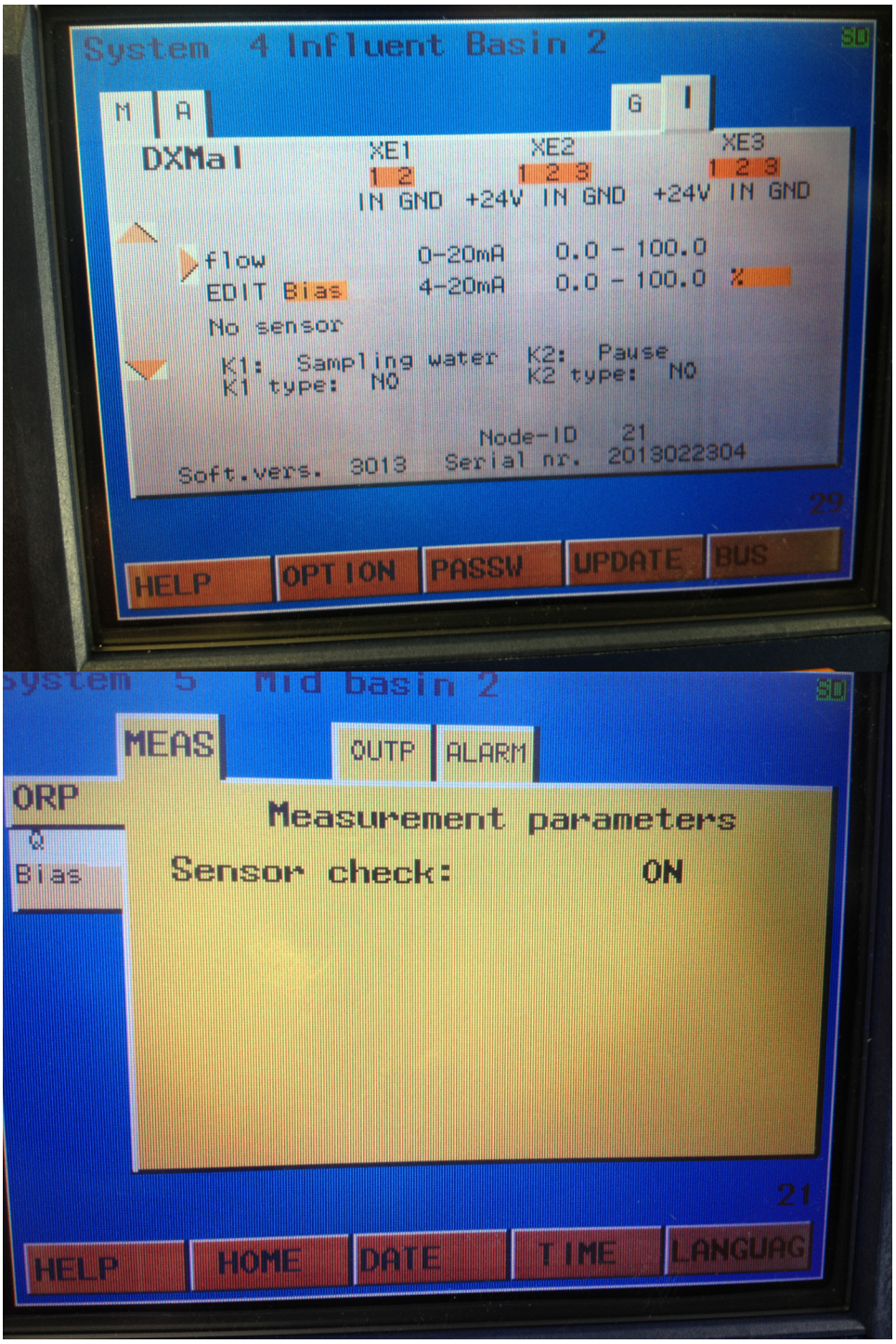

System 4 Influent Basin 2
MEAS
OUTP
AL
ORP
Alarm parameters
Bias
Min.limit= 400 mV
Min.alarm: active
Max.limit= 600 mV
Max.alarm: active
delay= 0 s
24
HELP
HOME
DATE
TIME
LANGUAG

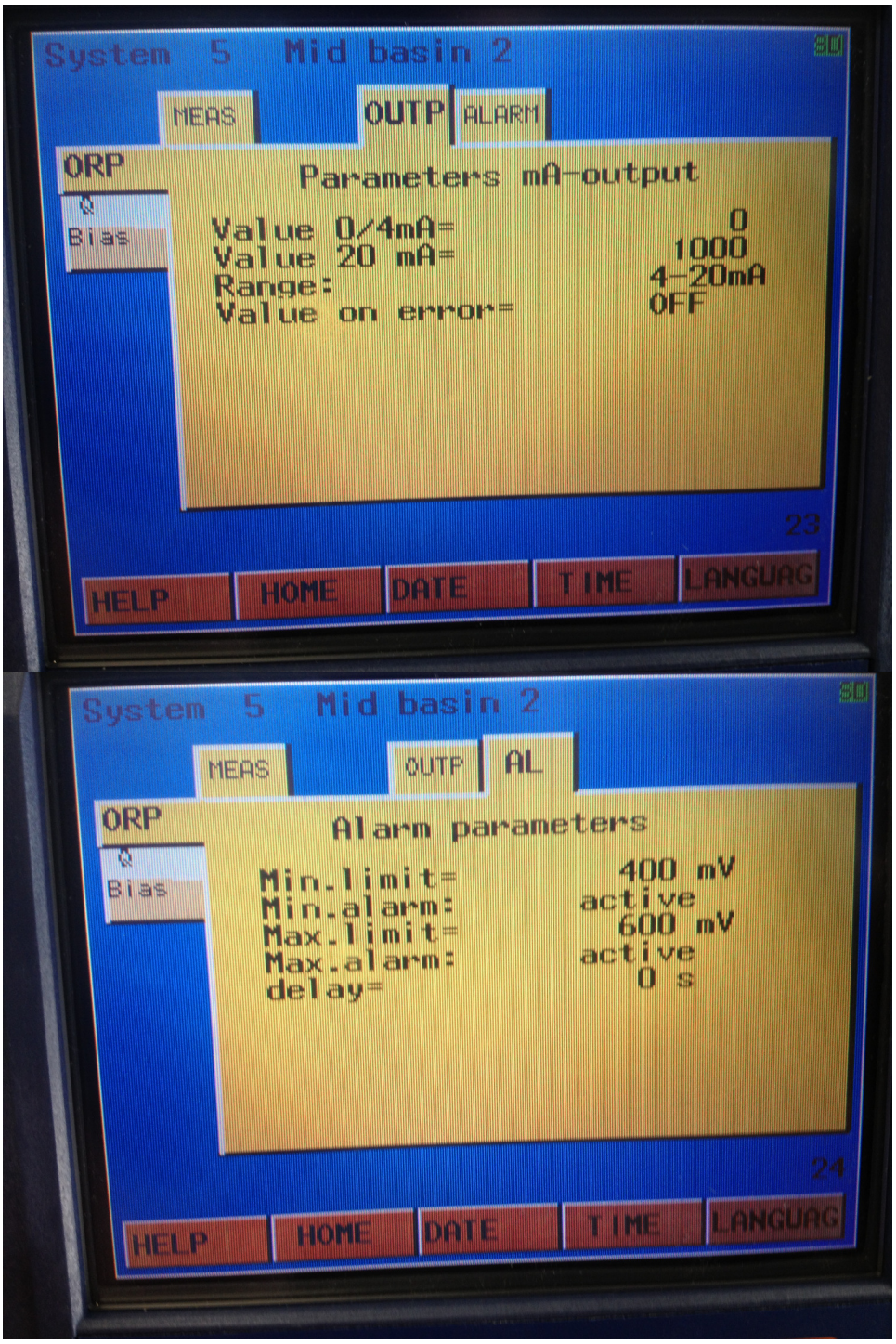

System 4 Influent Basin 2
SD
MEAS
CTRL
ALARM
ORP
0
Bias
Measurement parameters
Temp.input : turned off
351
HELP
HOME
DATE
TIME
LANGUAG
System 4 Influent Basin 2
SD
MEAS
CTRL
ALARM
ORP
0
Bias
Control parameters
Control type: PID-control
Set point = 55.0
Xp = 40.0
Ti = 0 s
Td = 5 s
Basic load= 25.0 %
Checkout time: 0 min
Feed forward: mul.
Nominal value= 0.0
Control: active
352
HELP
HOME
DATE
TIME
LANGUAG

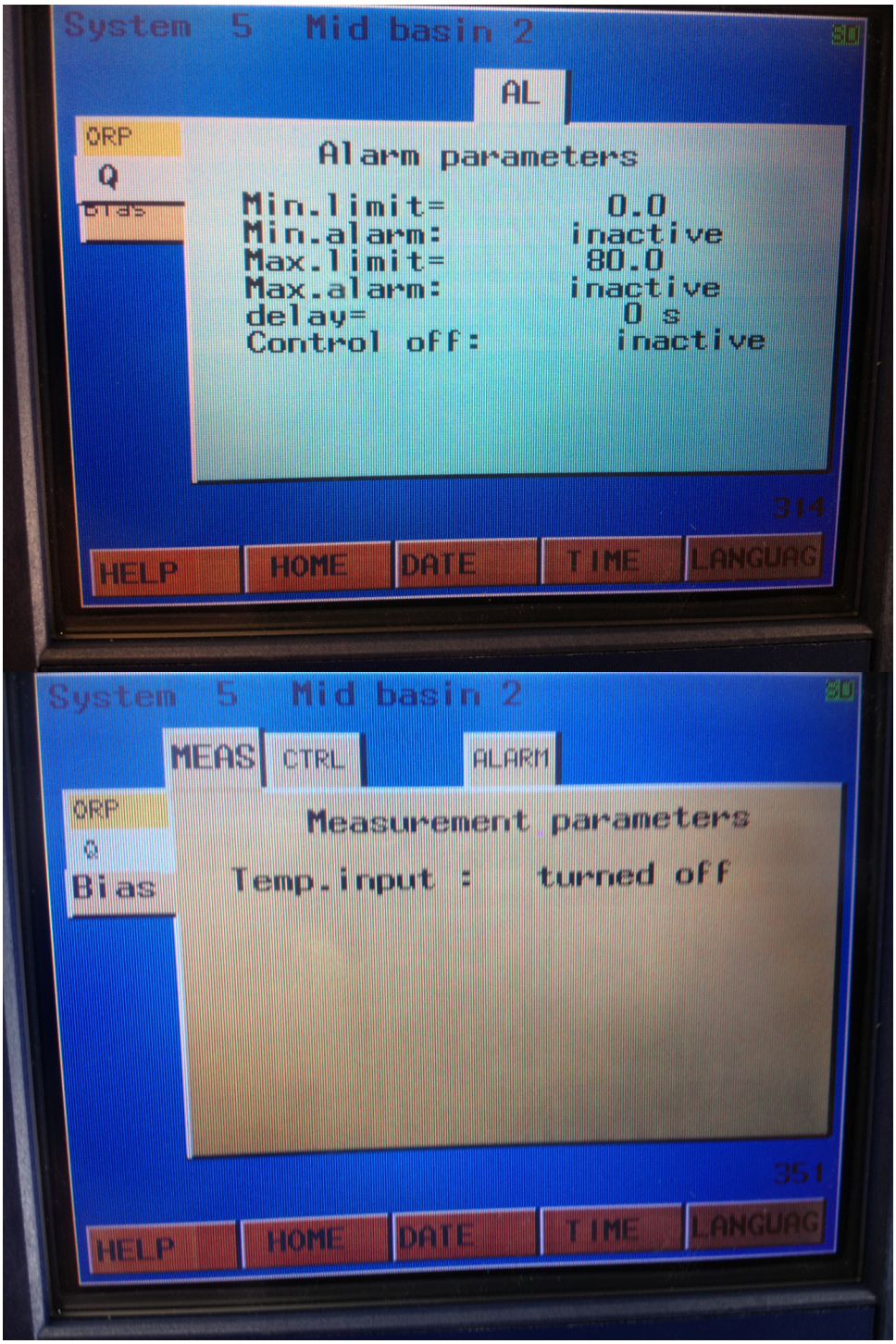

System 4 Influent Basin 2
MEAS
CTRL
AL
ORP
Q
Bias
Alarm parameters
Min.limit= 0.0 %
Min.alarm: inactive
Max.limit= 80.0 %
Max.alarm: inactive
delay= 0 s
354
HELP
HOME
DATE
TIME
LANGUAG

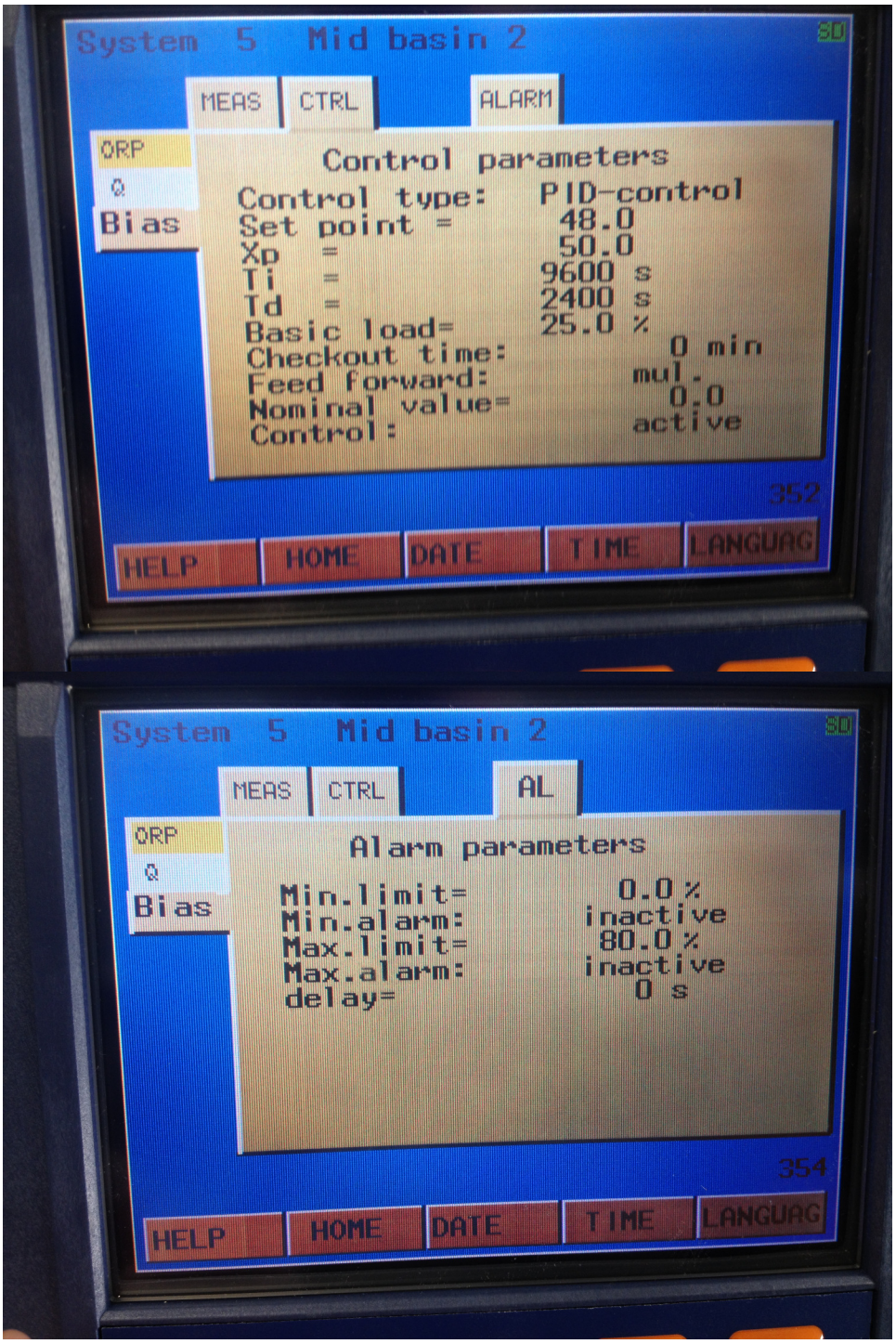
System 4 Influent Basin 2
M
A
G
I
DXMaM
RTD
ORP
POT 1
POT 2
pH
K1
K2
K3
Sensor terminals
RTD: not used
(pH)ORP: ORP sensor
POT1: not used
POT2: not used
pH(ORP): not used
Control delay: 3 s
Digital inputs
K1: Sampling water
K1 type: NO
delay= 0 s
K2: Pause
K2 type: NO
delay= 0 s
K3: Eco*Mode
K3 type: NO
Node-ID 28
Soft.vers. 3013 Serial nr. 2018022284
1
HELP
OPTION
PASSW
UPDATE
BUS

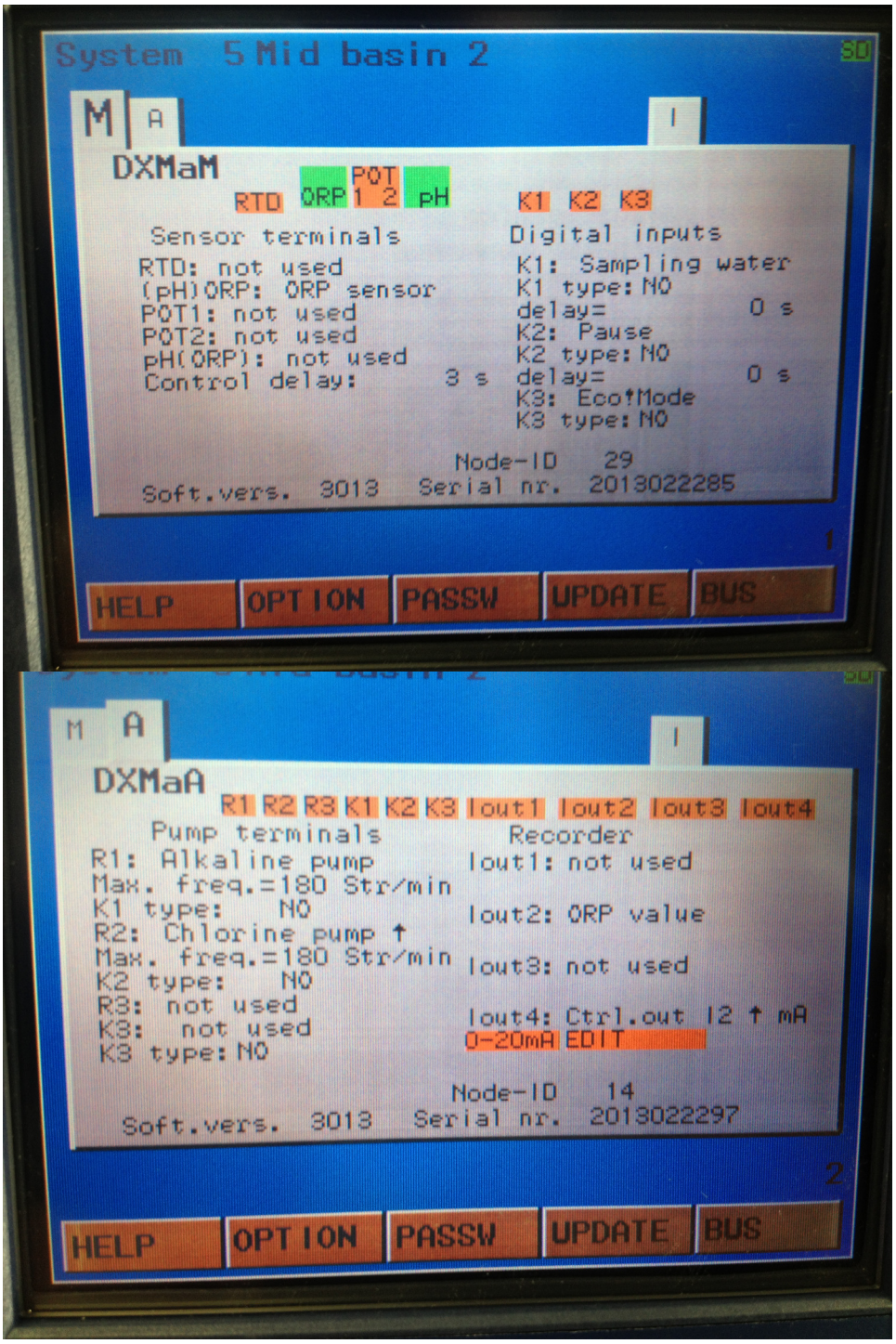

System 4 Influent Basin 2
M A G I
DXMaA
R1 R2 R3 K1 K2 K3 Iout1 Iout2 Iout3 Iout4
Pump terminals
R1: Alkaline pump
Max. freq.=180 Str/min
K1 type: NO
R2: Chlorine pump
Max. freq.=180 Str/min
K2 type: NO
R3: not used
K3: not used
K3 type: NO
Recorder
Iout1: not used
Iout2: ORP value
Iout3: not used
Iout4: Ctrl.out I2 mA
0-20mA EDIT
Node-ID 15
Soft.vers. 3013 Serial nr. 2013022298
HELP OPTION PASSW UPDATE BUS
System 4 Influent Basin 2
M A G I
DXMaG
Relay outputs
P1
Error sources :
1: not used
2: not used
3: not used
4: not used
5: not used
6: not used
7: not used
delay= 30 min
P1 type: norm.inactive
P2
Error sources :
1: not used
2: not used
3: not used
4: not used
5: not used
6: not used
7: not used
delay= 30 min
P2 type: norm.inactive
Node-ID 24
Soft.vers. 3000 Serial nr. 2013022307
HELP OPTION PASSW UPDATE BUS

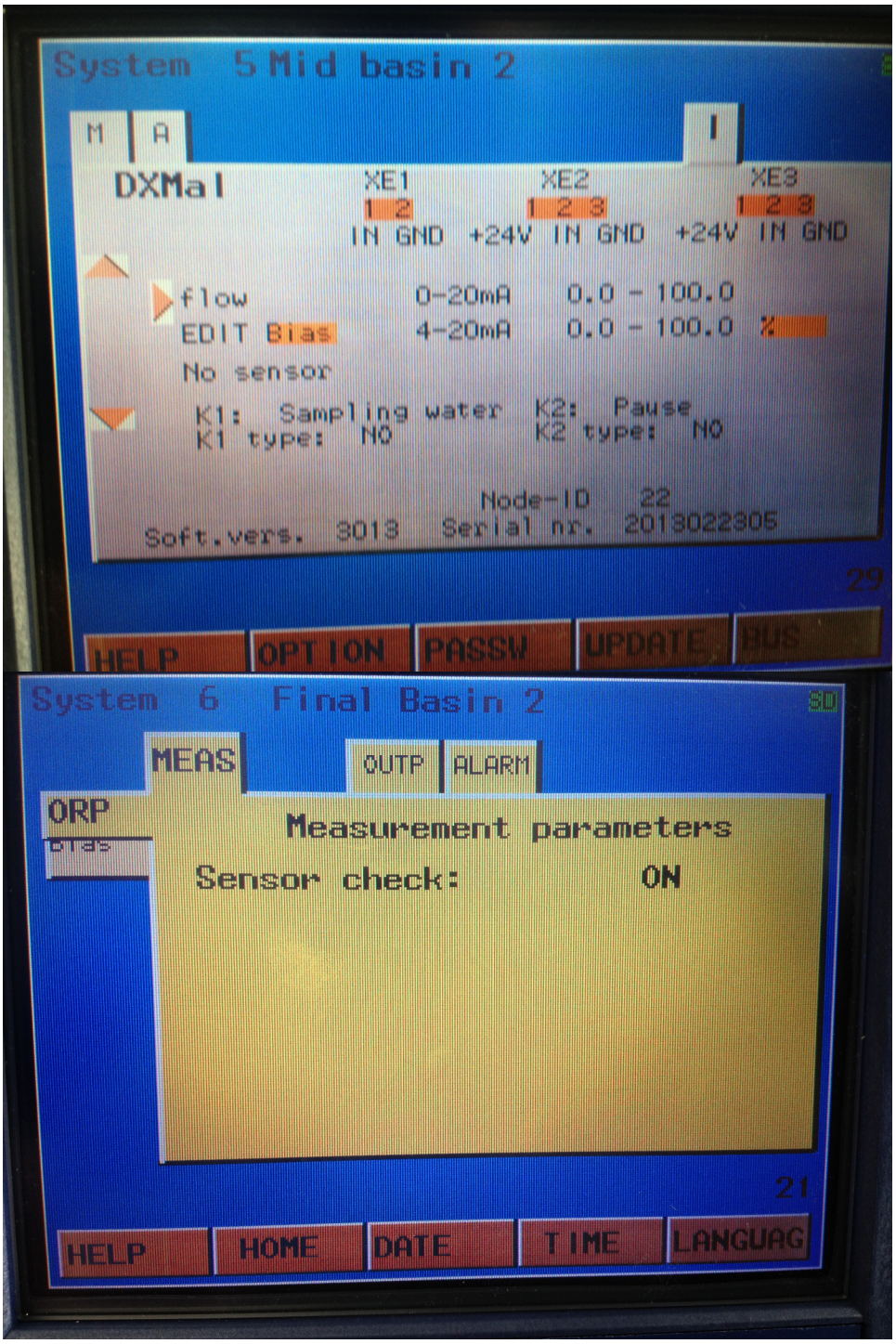

System 4 Influent Basin 2
M
A
G
I
DXMal
XE1
1 2
IN GND +24V
XE2
1 2 3
IN GND +24V
XE3
1 2 3
IN GND
flow
EDIT Bias
0-20mA
4-20mA
0.0 - 100.0
0.0 - 100.0 %
No sensor
K1: Sampling water
K1 type: NO
K2: Pause
K2 type: NO
Node-ID 21
Soft.vers. 3013
Serial nr. 2013022304
29
HELP
OPTION
PASSW
UPDATE
BUS
MEAS
OUTP
ALARM
ORP
Measurement parameters
Bias
Sensor check: ON
21
HELP
HOME
DATE
TIME
LANGUAG

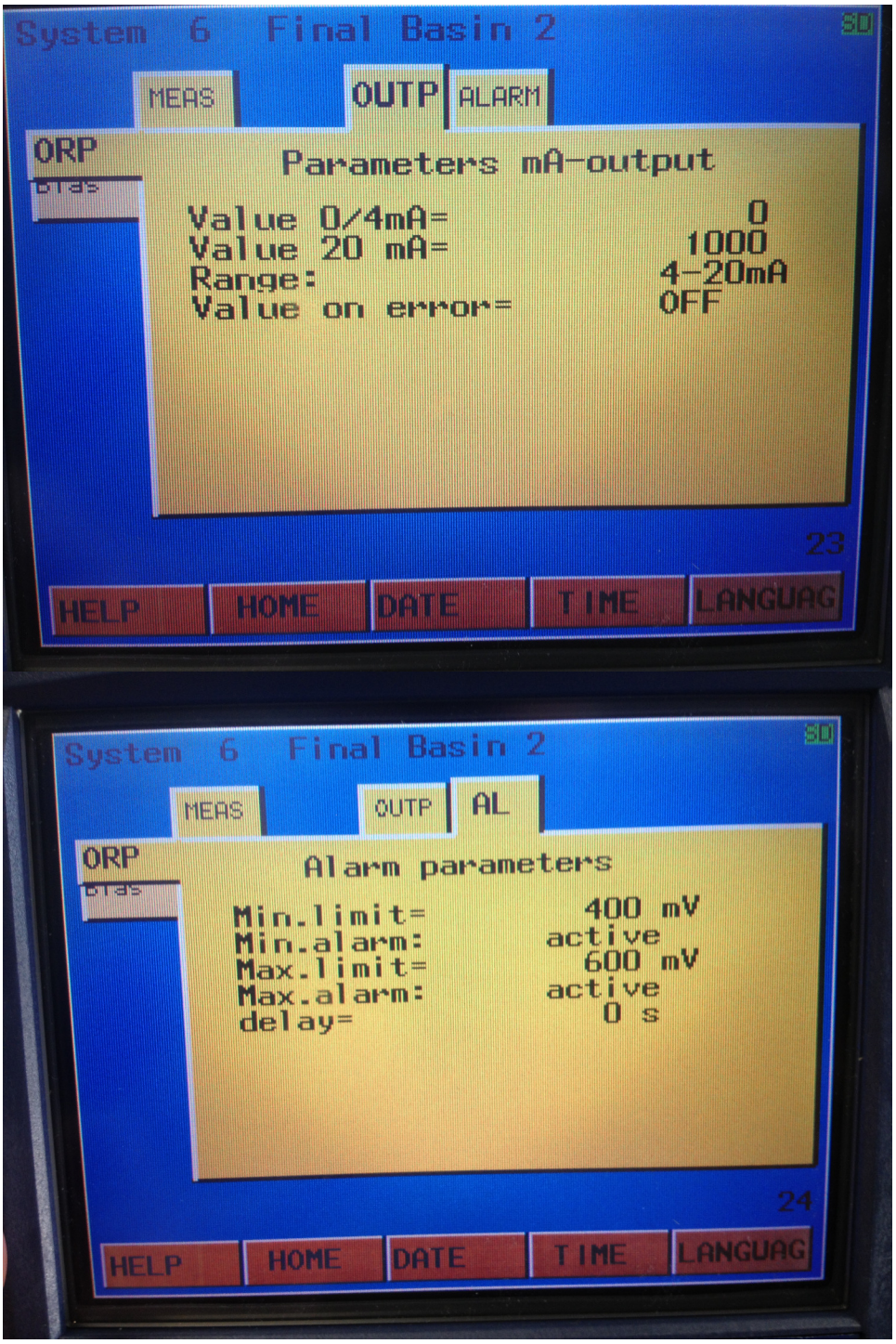

System 5 Mid basin 2
MEAS
OUTP
ALARM
ORP
Parameters mA-output
Bias
Value 0/4mA= 0
Value 20 mA= 1000
Range: 4-20mA
Value on error= OFF
23
HELP
HOME
DATE
TIME
LANGUAG
System 5 Mid basin 2
MEAS
OUTP
AL
ORP
Alarm parameters
Bias
Min.limit= 400 mV
Min.alarm: active
Max.limit= 600 mV
Max.alarm: active
delay= 0 s
24
HELP
HOME
DATE
TIME
LANGUAG

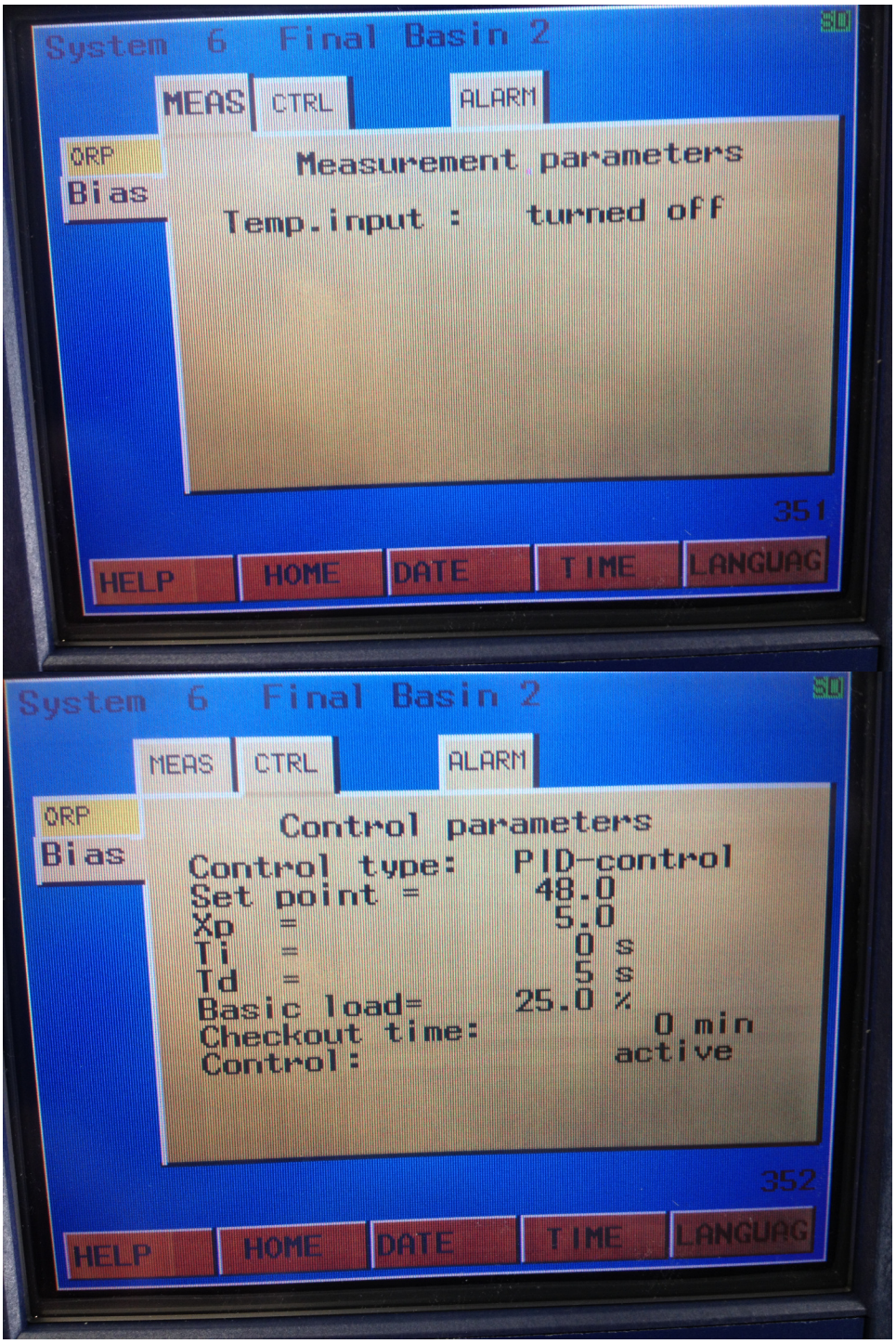

System 5 Mid basin 2
AL
ORP
Q
Alarm parameters
Min.limit= 0.0
Min.alarm: inactive
Max.limit= 80.0
Max.alarm: inactive
delay= 0 s
Control off: inactive
314
HELP
HOME
DATE
TIME
System 5 Mid basin 2
MEAS
CTRL
ALARM
ORP
Bias
Measurement parameters
Temp.input : turned off
351
HELP
HOME
DATE
TIME

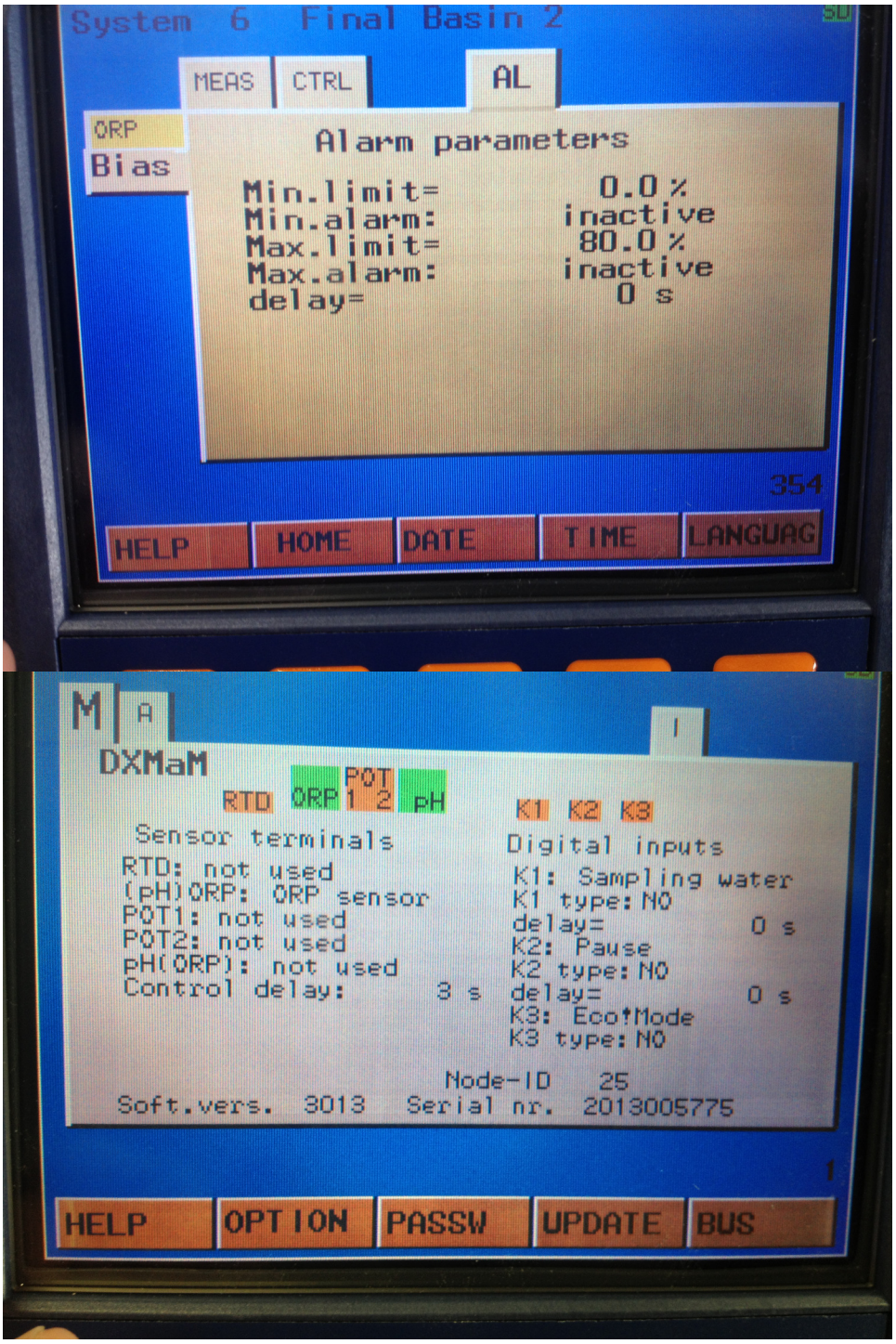

System 5 Mid basin 2
MEAS
CTRL
ALARM
ORP
0
Bias
Control parameters
Control type: PID-control
Set point = 48.0
Xp = 50.0
Ti = 9600 s
Td = 2400 s
Basic load= 25.0 %
Checkout time: 0 min
Feed forward: mul.
Nominal value= 0.0
Control: active
352
HELP
HOME
DATE
TIME
LANGUAG
System 5 Mid basin 2
MEAS
CTRL
AL
ORP
0
Bias
Alarm parameters
Min.limit= 0.0 %
Min.alarm: inactive
Max.limit= 80.0 %
Max.alarm: inactive
delay= 0 s
354
HELP
HOME
DATE
TIME
LANGUAG

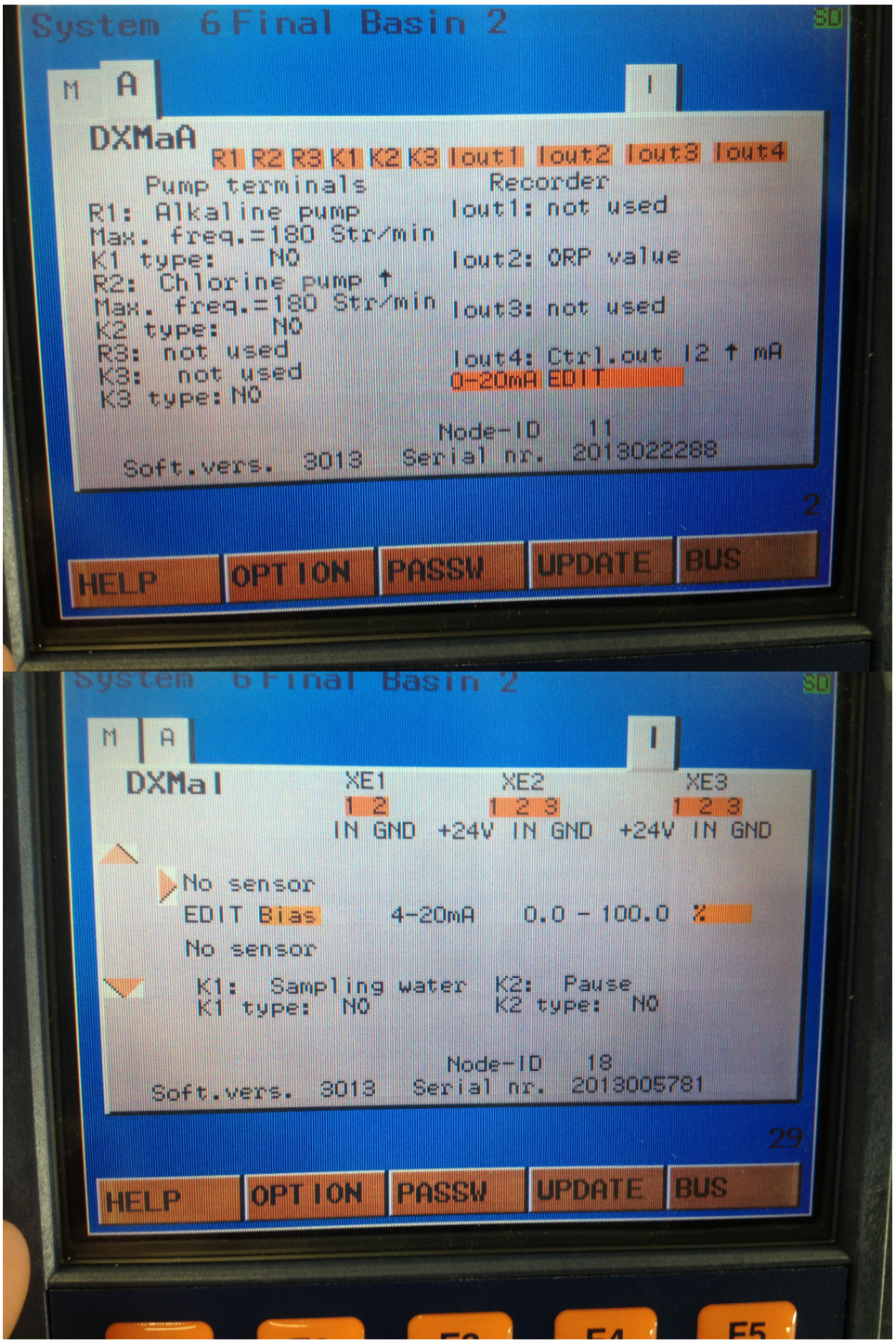

System 5 Mid basin 2
M A I
DXMaM
RTD ORP POT 1 2 pH
K1 K2 K3
Sensor terminals
RTD: not used
(pH)ORP: ORP sensor
POT1: not used
POT2: not used
pH(ORP): not used
Control delay: 3 s
Digital inputs
K1: Sampling water
K1 type: NO
delay= 0 s
K2: Pause
K2 type: NO
delay= 0 s
K3: Eco†Mode
K3 type: NO
Node-ID 29
Soft.vers. 3013 Serial nr. 2013022285
1
HELP OPTION PASSW UPDATE BUS
M A I
DXMaA
R1 R2 R3 K1 K2 K3 Iout1 Iout2 Iout3 Iout4
Pump terminals
R1: Alkaline pump
Max. freq.=180 Str/min
K1 type: NO
R2: Chlorine pump †
Max. freq.=180 Str/min
K2 type: NO
R3: not used
K3: not used
K3 type: NO
Recorder
Iout1: not used
Iout2: ORP value
Iout3: not used
Iout4: Ctrl.out I2 † mA
0-20mA EDIT
Node-ID 14
Soft.vers. 3013 Serial nr. 2013022297
2
HELP OPTION PASSW UPDATE BUS


System 5 Mid basin 2
M
A
I
DXMal
XE1
1 2
IN GND
XE2
1 2 3
+24V IN GND
XE3
1 2 3
+24V IN GND
flow
0-20mA
0.0 - 100.0
EDIT Bias
4-20mA
0.0 - 100.0 %
No sensor
K1: Sampling water
K1 type: NO
K2: Pause
K2 type: NO
Node-ID 22
Soft.vers. 3013
Serial nr. 2013022305
29
HELP
OPTION
PASSW
UPDATE
BUS
System 6 Final Basin 2
MEAS
OUTP
ALARM
ORP
Bias
Measurement parameters
Sensor check: ON
21
HELP
HOME
DATE
TIME
LANGUAG


System 6 Final Basin 2
MEAS
OUTP
ALARM
ORP
Parameters mA-output
Value 0/4mA= 0
Value 20 mA= 1000
Range: 4-20mA
Value on error= OFF
23
HELP
HOME
DATE
TIME
LANGUAG
System 6 Final Basin 2
MEAS
OUTP
AL
ORP
Alarm parameters
Min.limit= 400 mV
Min.alarm: active
Max.limit= 600 mV
Max.alarm: active
delay= 0 s
24
HELP
HOME
DATE
TIME
LANGUAG


System 6 Final Basin 2
MEAS
CTRL
ALARM
ORP
Bias
Measurement parameters
Temp.input : turned off
351
HELP
HOME
DATE
TIME
LANGUAG
System 6 Final Basin 2
MEAS
CTRL
ALARM
ORP
Bias
Control parameters
Control type: PID-control
Set point = 48.0
Xp = 5.0
Ti = 0 s
Td = 5 s
Basic load= 25.0 %
Checkout time: 0 min
Control: active
352
HELP
HOME
DATE
TIME
LANGUAG


System 6 Final Basin 2
MEAS
CTRL
AL
ORP
Bias
Alarm parameters
Min.limit= 0.0 %
Min.alarm: inactive
Max.limit= 80.0 %
Max.alarm: inactive
delay= 0 s
354
HELP
HOME
DATE
TIME
LANGUAG
M
A
I
DXMaM
RTD
ORP
POT 1 2
pH
K1 K2 K3
Sensor terminals
RTD: not used
(pH)ORP: ORP sensor
POT1: not used
POT2: not used
pH(ORP): not used
Control delay: 3 s
Digital inputs
K1: Sampling water
K1 type: NO
delay= 0 s
K2: Pause
K2 type: NO
delay= 0 s
K3: Eco?Mode
K3 type: NO
Node-ID 25
Soft.vers. 3013 Serial nr. 2013005775
1
HELP
OPTION
PASSW
UPDATE
BUS


System 6 Final Basin 2
SD
M A
I
DXMaA
R1 R2 R3 K1 K2 K3 Iout1 Iout2 Iout3 Iout4
Pump terminals
R1: Alkaline pump
Max. freq.=180 Str/min
K1 type: NO
R2: Chlorine pump ↑
Max. freq.=180 Str/min
K2 type: NO
R3: not used
K3: not used
K3 type: NO
Recorder
Iout1: not used
Iout2: ORP value
Iout3: not used
Iout4: Ctrl.out I2 ↑ mA
0-20mA EDIT
Node-ID 11
Soft.vers. 3013 Serial nr. 2013022288
2
HELP OPTION PASSW UPDATE BUS
System 6 Final Basin 2
SD
M A
I
DXMaI
XE1 XE2 XE3
1 2 1 2 3 1 2 3
IN GND +24V IN GND +24V IN GND
No sensor
EDIT Bias 4-20mA 0.0 - 100.0 %
No sensor
K1: Sampling water K2: Pause
K1 type: NO K2 type: NO
Node-ID 18
Soft.vers. 3013 Serial nr. 2013005781
29
HELP OPTION PASSW UPDATE BUS
F5

Section 2 – Interaction in control from system (Probes) 1, 2 & 3 and between Sys 4, 5 and 6

Sensor 1 and Sensor 4 are the first sensors in their respective disinfection basins, and are the first to measure and react to changes in ORP. Sensors 2 and 3 in Basin 1, and 5 and 6 in Basin 2 are used to trim the response of the upstream sensors in the basin. Process flow can also be used in conjunction with the ORP sensors, to help predict and moderate the upcoming changes in Oxidation. A Bias channel is used to pass this information from one sensor to another, to make the control algorithm more dynamic than conventional single sensor ORP + flow control.

Section 3 Sensor Placement

Components:

DDC – Located in NaOCl Pump building
System 1 – Oxidation measurement & control System/sensor # 1
Basin #1 Influent– ORP (~15 Minutes)

System 2 – Oxidation monitor System/sensor #2

Basin #1 Center– ORP (~30 minutes)

System 3 – Oxidation monitor System/sensor # 3

Basin #1 Effluent– ORP (~45 minutes)
System 4 – Oxidation measurement & control System/sensor # 4
Basin #2 Influent– ORP (~15 Minutes)

System 5 – Oxidation monitor System/sensor #5

Basin #2 Center– ORP (~30 minutes)

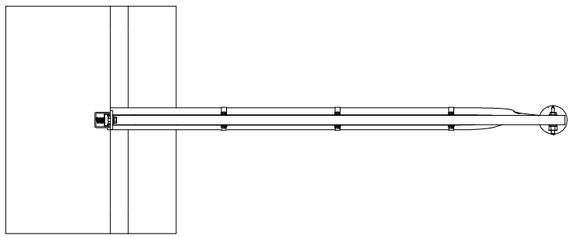
System 6 – Oxidation monitor System/sensor # 6

Basin #2 Effluent– ORP (~45 minutes)

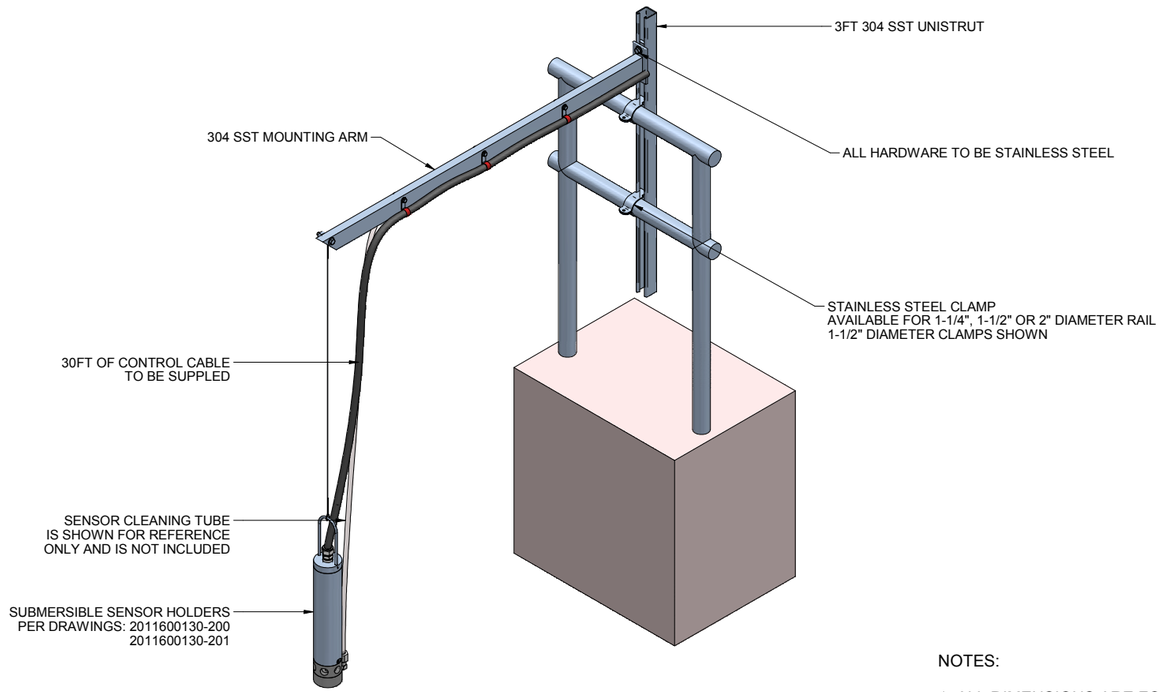
Section - 4 Set points and control settings

460 mV at System/Sensor 1 and 4, was performing well to satisfy coliform requirements through most of the spring and summer of 2013. Additional fine tuning monitoring and adjustments were performed by Heyward personnel throughout the same period.

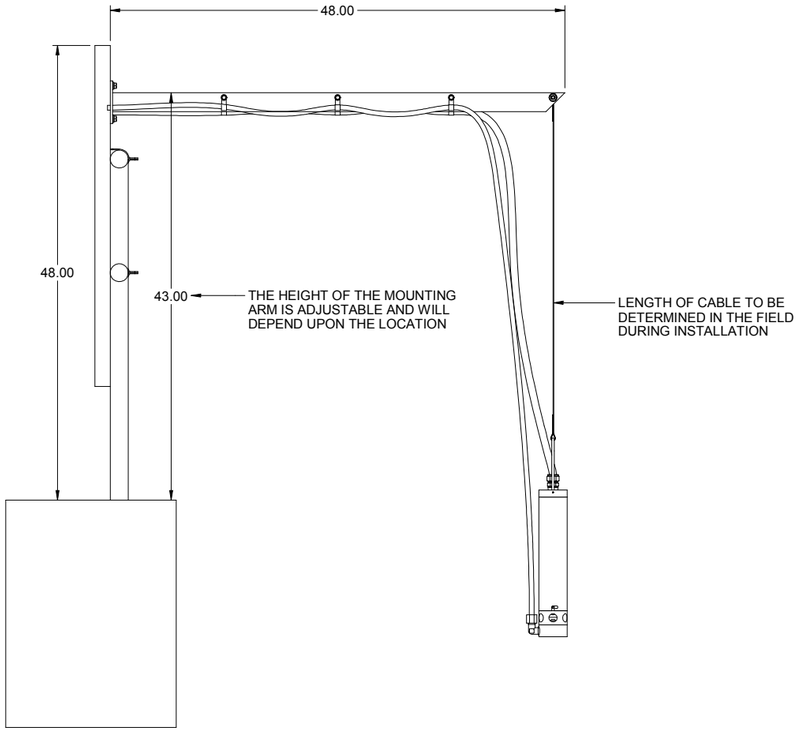
DWG No 2011600130-450 | REV 0



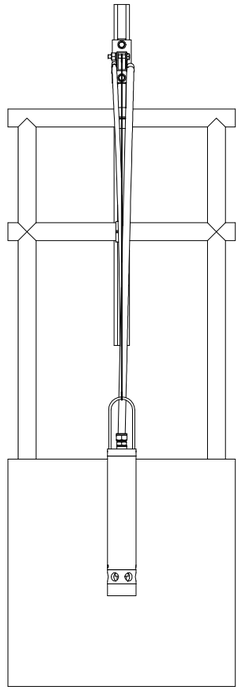
PLAN VIEW



ISOMETRIC VIEW



SIDE VIEW



FRONT VIEW

NOTES:

1. ALL DIMENSIONS ARE FOR REFERENCE ONLY AS THE FINAL DIMENSIONS WILL BE DETERMINED DURING INSTALLATION.
2. ALL DIMENSIONS ARE IN INCHES.
3. ALL MOUNTING HARDWARE IS STAINLESS STEEL.

REV	DATE	DESCRIPTION	BY	APPD	REVD
0	05/05/11	FIRST ISSUE	GJS		

REVISIONS

CUSTOMER: PROMINENT FLUID CONTROLS (HANGER ASSEMBLY)

JOB No: 2011600130 | PURCHASE ORDER No: 164641

TITLE: SUBMERSIBLE SENSOR HOLDER MOUNTING GENERAL ARRANGEMENT

ENGINEERS SEAL

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N1H 6J3
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PROMINENT FLUID CONTROLS INC.
RIDC PARK WEST
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PITTSBURGH P.A., USA. 15275
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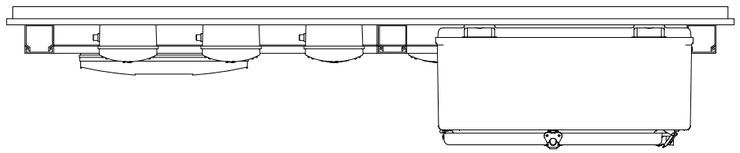
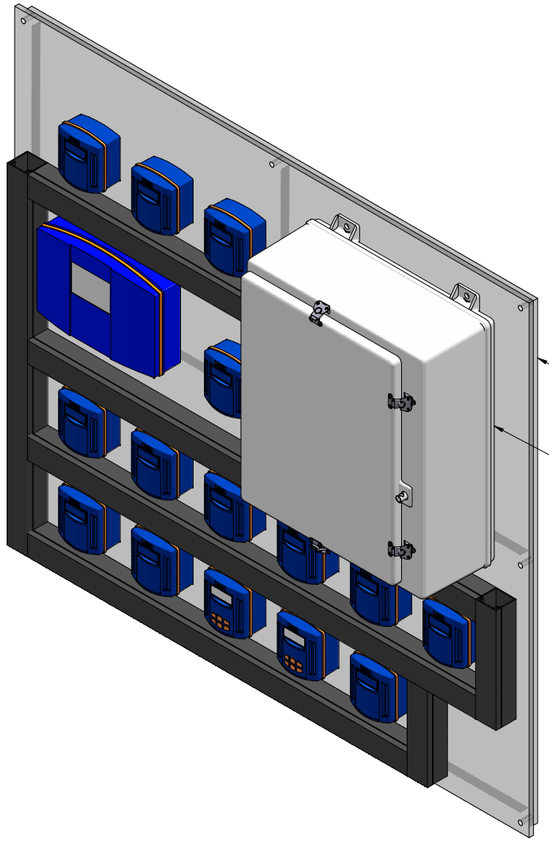
DESIGNED	GJS	APPROVED	
DRAWN	GJS	SCALE	N.T.S.
CHECKED	SMC	DATE	05/05/11

DWG No SK-2011600130-450 | REV 0 | PAGE 1/1

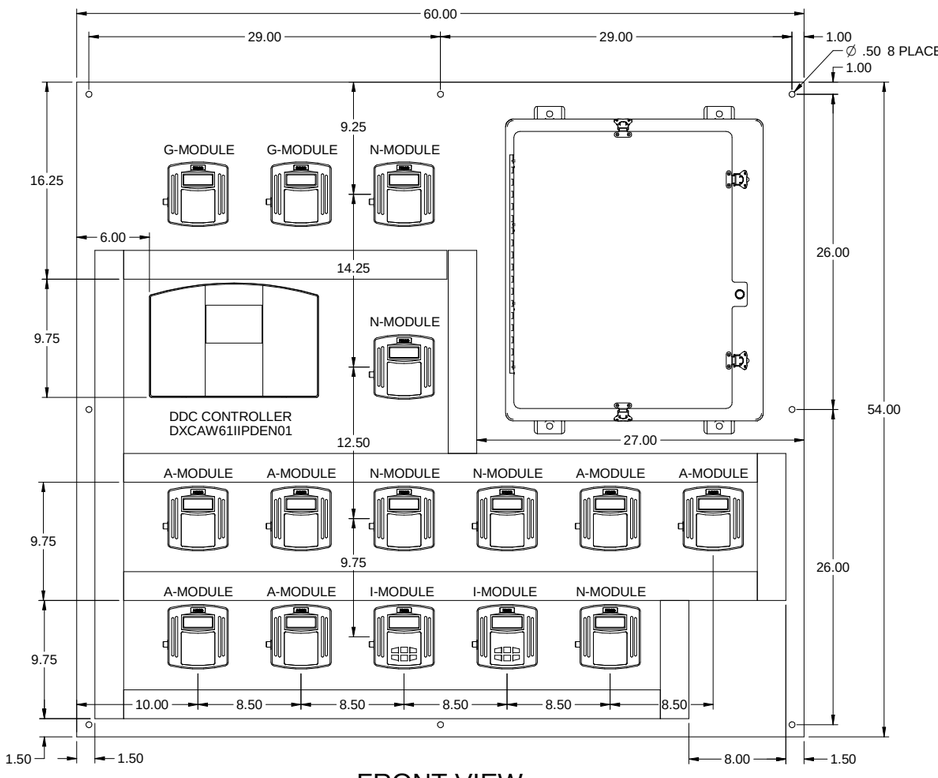
DWG No 2012601250-200 | REV 0



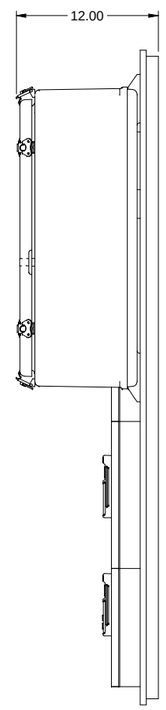
PLAN VIEW



ISOMETRIC VIEW



FRONT VIEW



SIDE VIEW

NOTES:

1. ALL DIMENSIONS ARE IN INCHES AND ARE SHOWN FOR REFERENCE ONLY.

REV	DATE	DESCRIPTION	BY	APPD	REVD
0	02/01/13	RELEASED FOR PRODUCTION	GJS		

REVISIONS

CUSTOMER: HEYWARD INC. (HOPWELLREGIONAL WWTP)

JOB No: 2012601250 | PURCHASE ORDER No: V12.1030

TITLE: DUCLONET CONTROLLER PACKAGE GENERAL ARRANGEMENT

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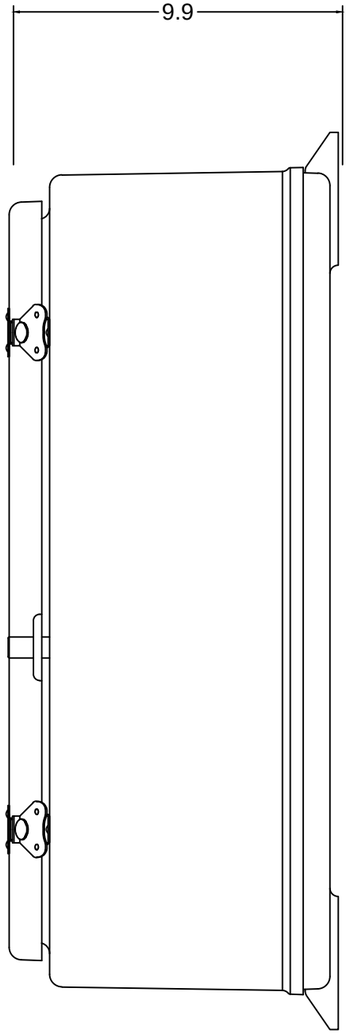
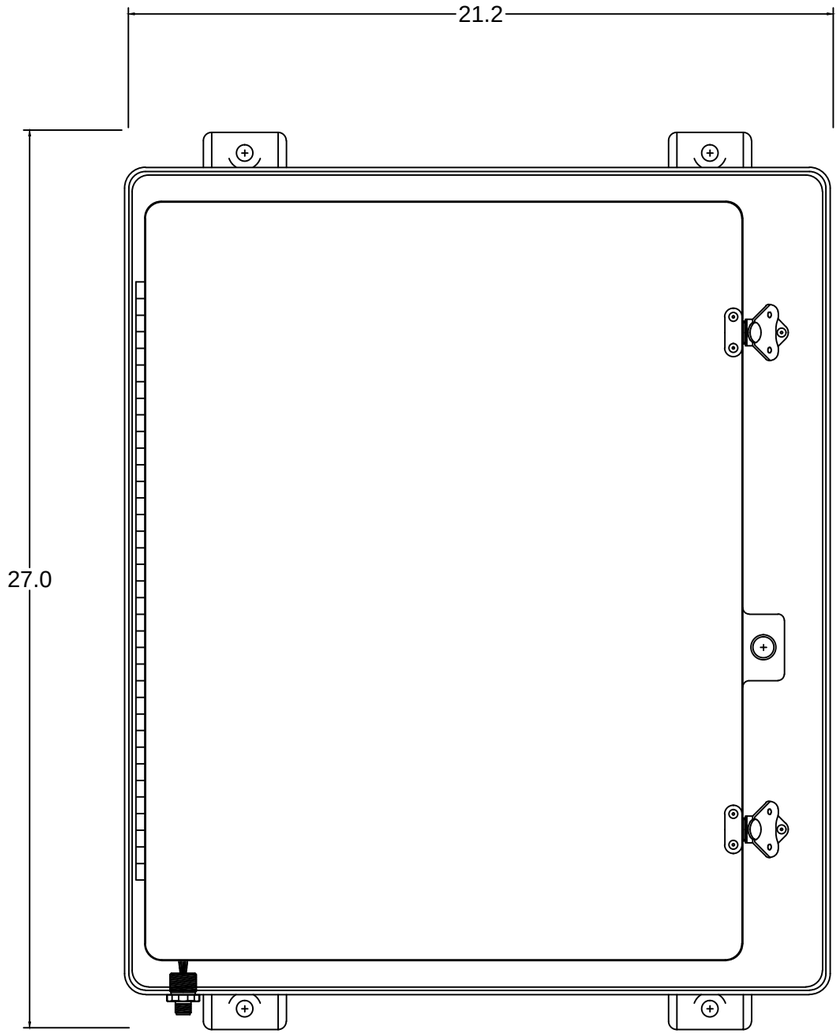
DRAWN	GJS	SCALE	N.T.S.
CHECKED	SEK	DATE	02/01/13

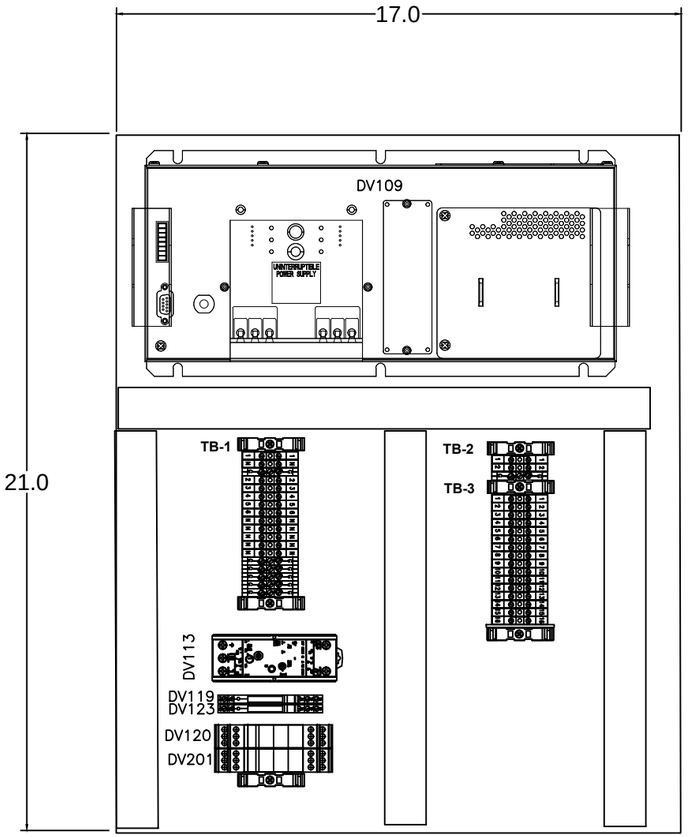
DWG No 2012601250-200 | REV 0 | PAGE 1/1

DWG No	REV
2012601250–300	A

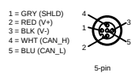




STAHLIN ENCLOSURE
N24208HWT



STAHLIN SUB PANEL
BP-2420



REV	DATE	DESCRIPTION	BY
		REVISIONS	
A	04–03–13	AS BUILT	GB
0	01–22–13	RELEASED FOR PRODUCTION	GB

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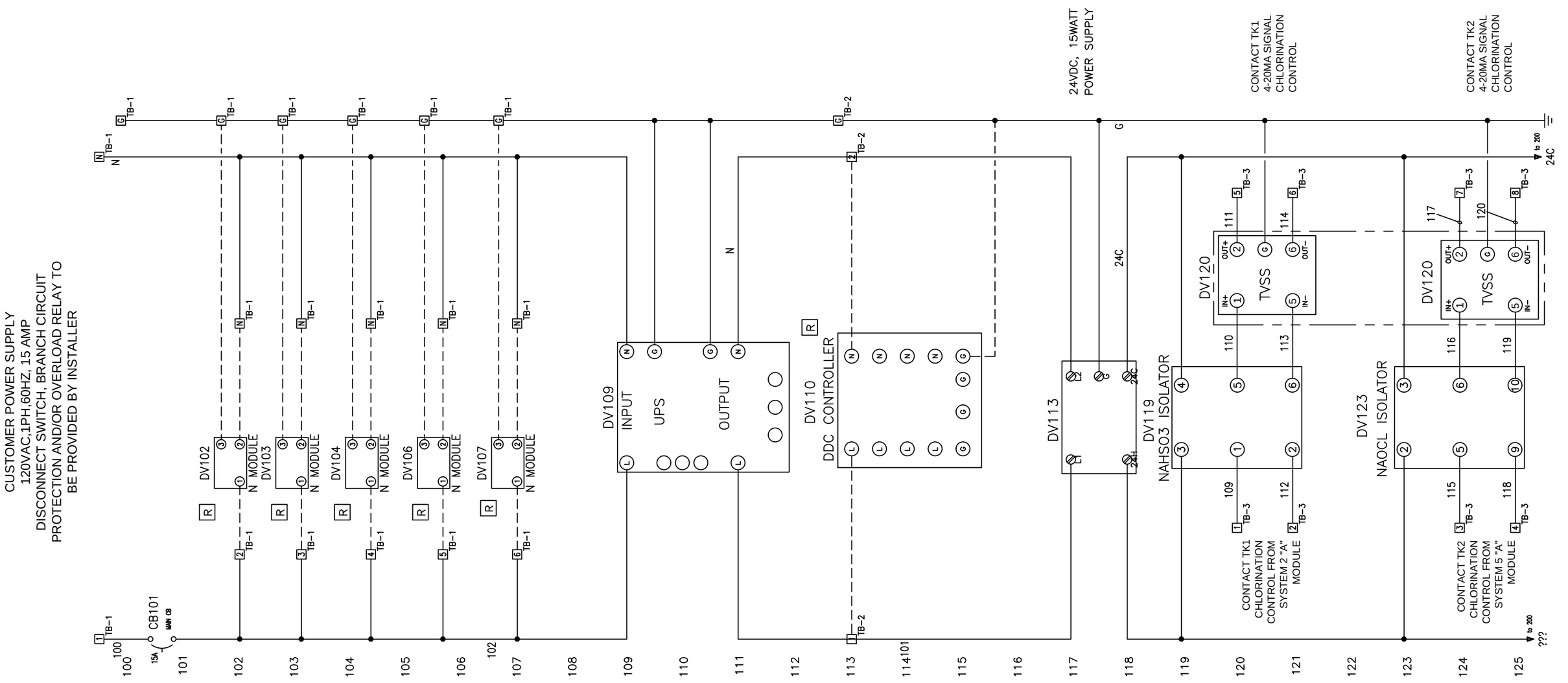
CUSTOMER	HEYWARD INC.
JOB No	2012601250
PURCHASE ORDER No	XX
DESIGNED	GB
DRAWN	GB
CHECKED	SEK
APPROVED	SEK
SCALE	NTS
DATE	01–22–13

TITLE: DXCaWD61MAPDEN01 CONNECTION PANEL ENCLOSURE AND SUB PANEL LAYOUT

DWG No: 2012601250–300 | REV: A | PAGE: 1/1

DWG No	REV
2012601250-301	A



NOTE FOR UL LABEL:
SOURCE 120VAC 1PH. 60HZ.
PANEL FLA - 12 AMPS
LARGEST MOTOR - NA
DRAWING SERIES 2012601250-30X
TYPE 4X SCCR 10K RMS SYM 120V MAX
FIELD TERMINATIONS COPPER CONDUCTORS ONLY

LEGEND

- CP WIRE
- SKID OR FIELD WIRE
- CP TERMINAL
- [R] REMOTELY LOCATED DEVICE

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CUSTOMER: **HEYWARD INC.**

JOB No	2012601250	PURCHASE ORDER No	XX
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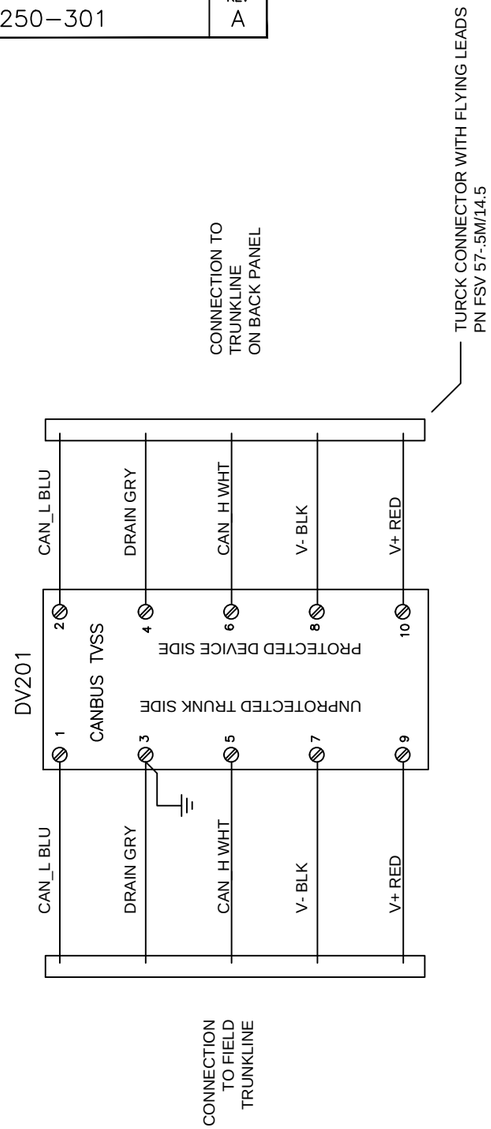
DRAWN	GB	SCALE	NTS
CHECKED	SEK	DATE	01-22-13

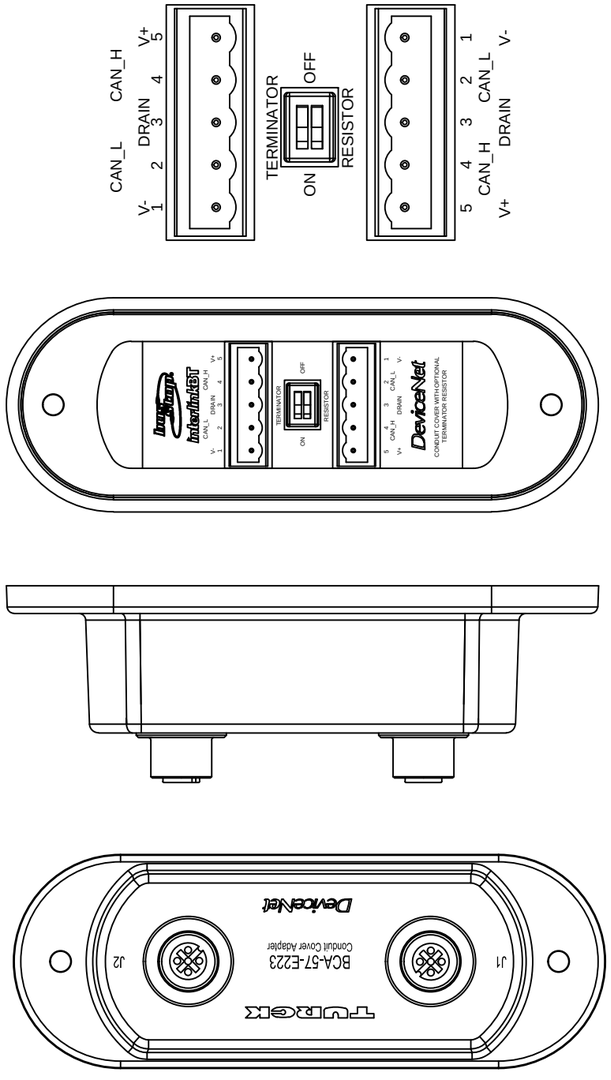
TITLE: DXCaWD61MAPDEN01 CONNECTION PANEL ELECTRICAL SCHEMATIC

DWG No: 2012601250-301 REV: A PAGE: 1/2

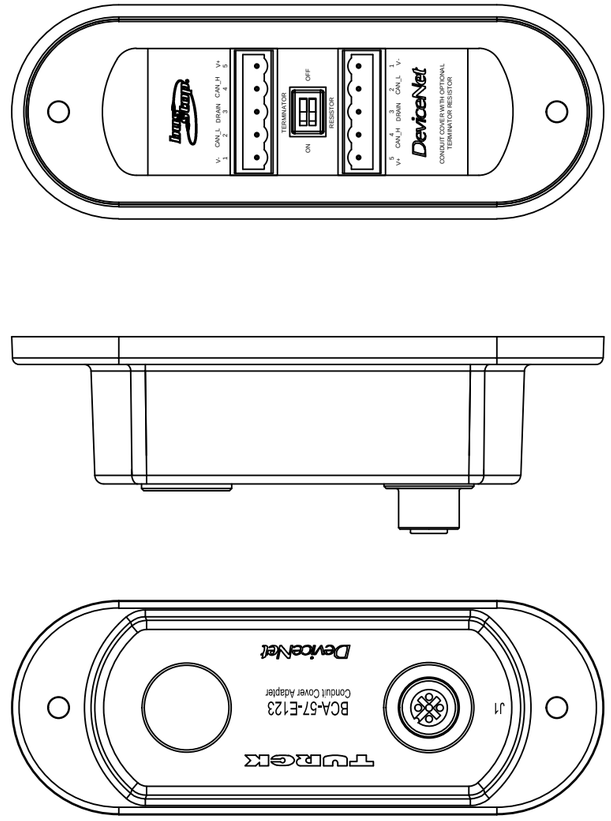
DWG No	REV
2012601250–301	A



FIELD CONNECTOR FOR CONDUIT RUN:
TURCK BCA-57-E223



FIELD CONNECTOR FOR CONDUIT RUN:
TURCK BCA-57-E123



200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225

REV	DATE	DESCRIPTION	BY
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JOB No 2012601250 | PURCHASE ORDER No XX

TITLE DXCaWD61MAPDEN01 CONNECTION PANEL ELECTRICAL SCHEMATIC

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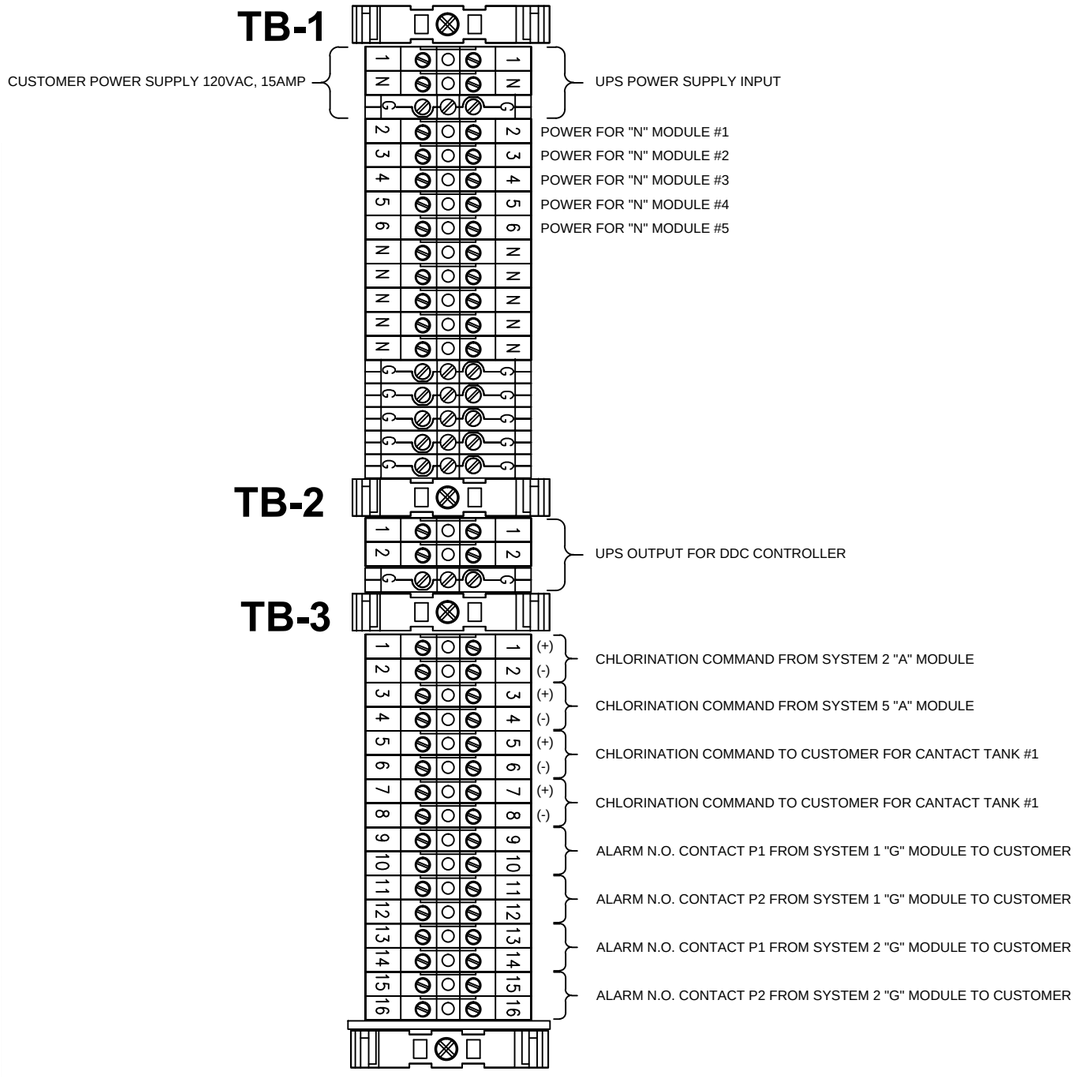
DWG No 2012601250–301 | REV A | PAGE 2/2

DWG No	REV
2012601250–302	A

TAGS	QTY	SUB	CATALOG	MFG	DESCRIPTION
	1		N24208HWT	STAHLIN	POLYCARBONATE ENCLOSURE WALL–MOUNT ENCLOSURE NEMA 3, 3R, 4, 4X, 12, 13 24" X20" X8" WATER/DUST TIGHT SEAL
	1		BP2420CS	STAHLIN	SUB PANEL SUB PANEL SUITED FOR N20208HWT ENCLOSURE PAINTED CARBON STEEL
CB101	1		7746222	CBI	CIRCUIT BREAKER – MINIATURE 1–POLE CIRCUIT BREAKER 20 AMPS,120 VAC, 10KAIR UL 489
DV109	1		1609–U500NS INDUSTRIAL	AB	INDUSTRIAL UPS 500VA 120VAC, 500VA, NOM 4.12A
DV113	1		PS5R–SB24	IDEC	SWITCHING POWER SUPPLY 120–240 VAC IN – 24VDC ADJUSTABLE OUTPUT 0.65 AMP OUTPUT, 15WATTS
DV201	1	*1	2819008	PHOENIX CONTACT	CANBUS/DEVICENET TVSS TYPE PT PE/S 1X2–24–ST MCR–PLUGTRAB PLUG
		*1	2856265	PHOENIX CONTACT	MCR PLUGTRAB BASE ELEMENT TYPE PT PE/S 1X2–BE MCR–PLUGTRAB HEADER
DV120	1	*1	2838228	PHOENIX CONTACT	SURGE VOLTAGE PROTECTION DEVICE PT2X2–24DC–ST 2 SEPARATE FLOATING SIGNALS, 24VDC
		*1	2839208	PHOENIX CONTACT	MCR PLUGTRAB BASE ELEMENT TYPE PT2X2–BE
DV119 DV123	2		2864406	PHOENIX CONTACT	MCR–SL–I–I ISOLATING AMPLIFIER PS 24VDC INPUT:4–20mA OUTPUT:4–20mA 3 WAY ISOLATION SCREW TERMINAL BLOCK
TB–1 TB–2 TB–3	30		7746748	PHOENIX CONTACT	UNIVERSAL TERMINAL BLOCK – UK 5 N FEED–THROUGH 41AMPS GRAY, 0.2–4MM^2, 30–10 AWG CLIPLINE – MODULAR SCREW TERMINAL BLOCK 3004362
		*1	7746749	PHOENIX CONTACT	ATP–UK 3/5 – UK5N END PLATE/DIVIDER SINGLE–LEVEL CLIPLINE– TERMINAL BLOCK WITH HYBRID SOLDER CONNECTION
		*6	7746751	PHOENIX CONTACT	END BRACKET – E/NS 35 N ACCESSORY END BRACKET GRAY, FOR THE NS 35 DIN RAIL 9.5MM WIDTH
TB–1 TB–2	7		7746750	PHOENIX CONTACT	UNIVERSAL GROUND TERMINAL BLOCK – USLKG 5 FEED–THROUGH GROUND GREEN–YELLOW, 0.2–4MM^2, 26–10 AWG CLIPLINE – MODULAR SCREW TERMINAL BLOCK
	1		FSV 57–.5M/14.5	TURCK	PASS THRU CANNBUS/DEVICENET CONNECTOR



REV	DATE	DESCRIPTION	BY
A	04–03–13	AS BUILT	GB
0	01–22–13	RELEASED FOR PRODUCTION	GB

REVISIONS

CUSTOMER

HEYWARD INC.

JOB No 2012601250 | PURCHASE ORDER No XX

TITLE DXCaWD61MAPDEN01 LOOP DIAGRAMS
TERMINAL DETAIL AND BILL OF MATERIAL

ENGINEERS SEAL

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TEL. 412 787 2484 FAX. 412 787 0704

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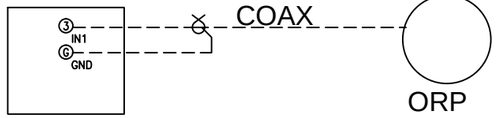
DRAWN	GB	SCALE	NTS
CHECKED	SEK	DATE	01–22–13

DWG No 2012601250–302 | REV A | PAGE 1/1

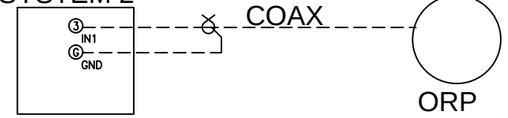
DWG No 2012601250–303 | REV A

SYSTEM 1



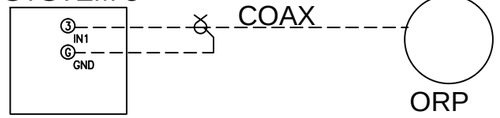
DXMAMW0DEN01
ORP INPUT

SYSTEM 2



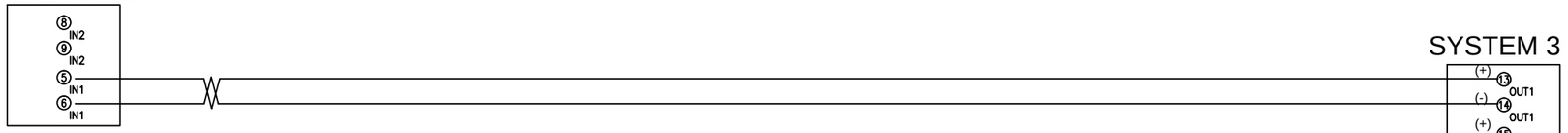
DXMAMW0DEN01
ORP INPUT

SYSTEM 3



DXMAMW0DEN01
ORP INPUT

SYSTEM 1



DXMAIW2DEN01
ANALOG INPUT

DXMAAW2DEN01
ANALOG OUTPUT

SYSTEM 3

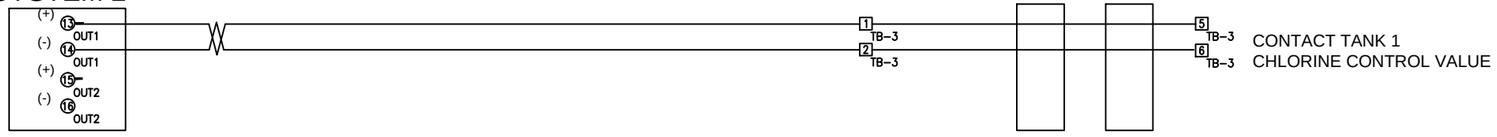
SYSTEM 2

DXMAIW2DEN01
ANALOG INPUT

SYSTEM 1

DXMAAW2DEN01
ANALOG OUTPUT

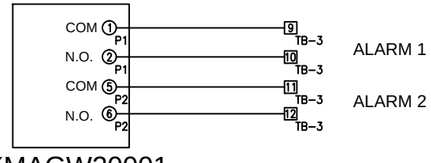
SYSTEM 2



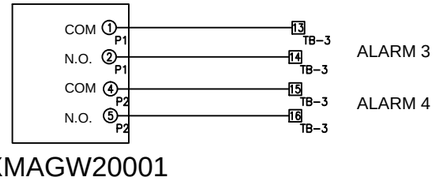
DXMAAW2DEN01
ANALOG OUTPUT

SIGNAL ISOLATOR

SIGNAL TVSS



DXMAGW20001
ALARM MODULE



DXMAGW20001
ALARM MODULE

USE UNSHIELDED TWISTED PAIR CABLE
PFC P/N 725122 FOR MODULE "A" TO
MODULE "I" WIRING

REV	DATE	DESCRIPTION	BY
		REVISIONS	
A	04–03–13	AS BUILT	GB
0	01–22–13	RELEASED FOR PRODUCTION	GB

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CUSTOMER **HEYWARD INC.**

JOB No 2012601250 | PURCHASE ORDER No XX

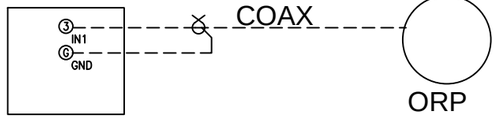
DESIGNED	GB
DRAWN	GB
CHECKED	SEK
APPROVED	SEK
SCALE	NTS
DATE	01–22–13

TITLE DXCaWD61MAPDEN01 LOOP DIAGRAMS
INTERCONNECTING DIAGRAM SYSTEM 1, 2, 3

DWG No 2012601250–303 | REV A | PAGE 1/2

DWG No 2012601250−303 | REV A

SYSTEM 4

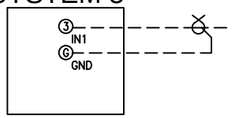


COAX

ORP SENSOR

DXMAMW0DEN01
ORP INPUT

SYSTEM 5

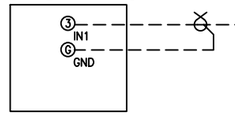


COAX

ORP SENSOR

DXMAMW0DEN01
ORP INPUT

SYSTEM 6

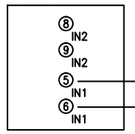


COAX

ORP SENSOR

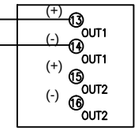
DXMAMW0DEN01
ORP INPUT

SYSTEM 4



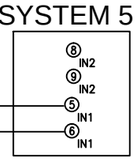
DXMAIW2DEN01
ANALOG INPUT

SYSTEM 6



DXMAAW2DEN01
ANALOG OUTPUT

SYSTEM 5



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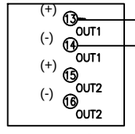
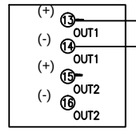
SYSTEM 4



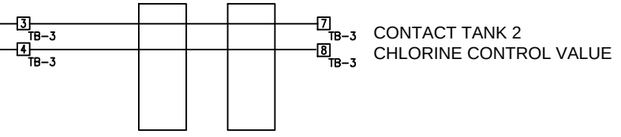
DXMAAW2DEN01
ANALOG OUTPUT

SYSTEM 5



DXMAAW2DEN01
ANALOG OUTPUT

SIGNAL ISOLATOR



CONTACT TANK 2
CHLORINE CONTROL VALUE

SIGNAL TVSS

USE UNSHIELDED TWISTED PAIR CABLE
PFC P/N 725122 FOR MODULE "A" TO
MODULE "I" WIRING

REV	DATE	DESCRIPTION	BY
A	04−03−13	AS BUILT	GB
0	01−22−13	RELEASED FOR PRODUCTION	GB

REVISIONS

CUSTOMER: **HEYWARD INC.**

JOB No 2012601250 | PURCHASE ORDER No XX

TITLE: DXCaWD61MAPDEN01 LOOP DIAGRAMS
INTERCONNECTING DIAGRAM SYSTEM 4, 5, 6

ENGINEERS SEAL

ProMinent®
THE PROMINENT GROUP OF COMPANIES

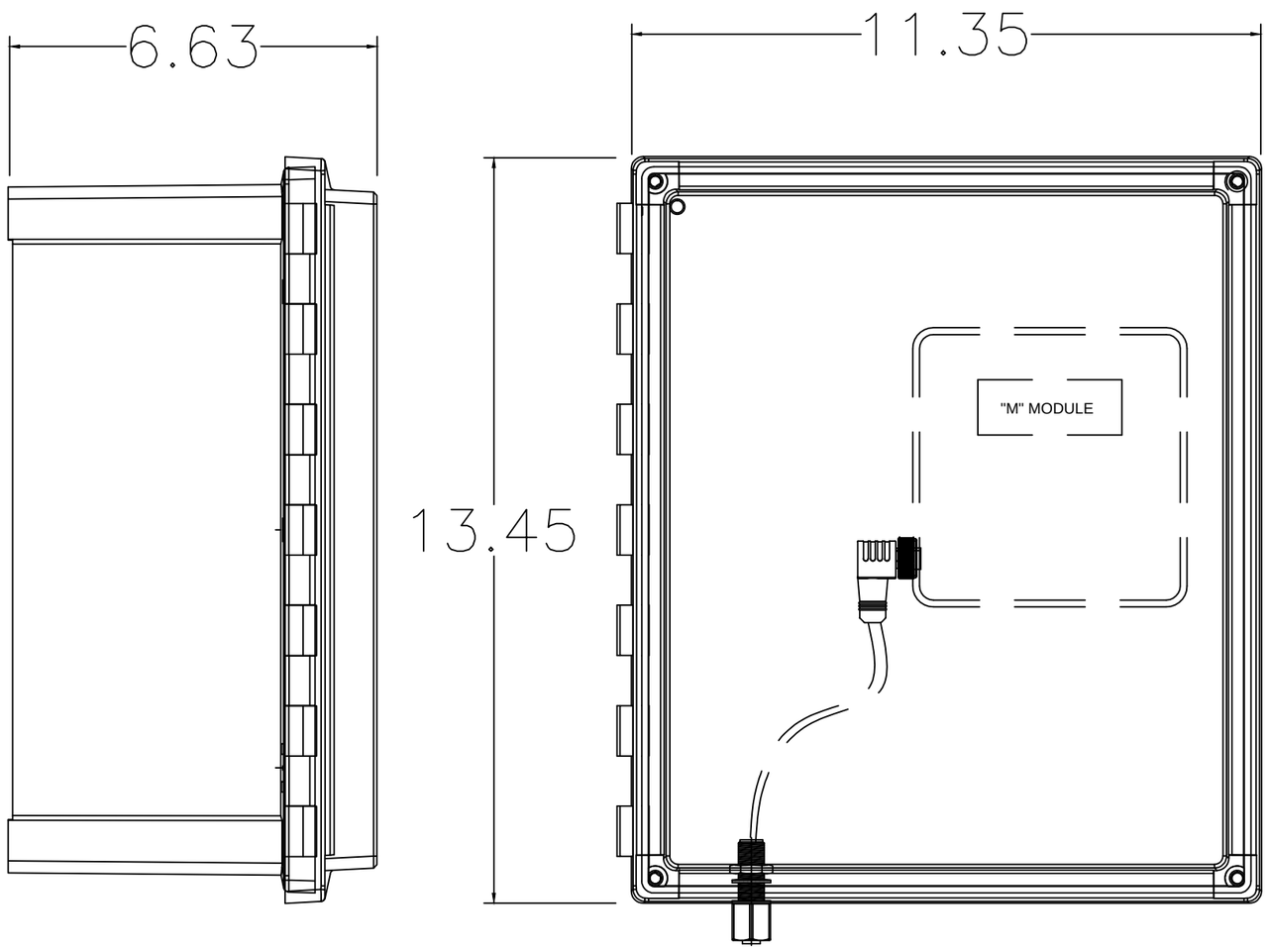
PITTSBURGH, PA USA WWW.PROMINENT.US

PROMINENT FLUID CONTROLS, INC.
ABC PARK WEST
136 INDUSTRY DRIVE
PITTSBURGH, PA 15275 USA
TEL. 412 787 2484 FAX. 412 787 0704

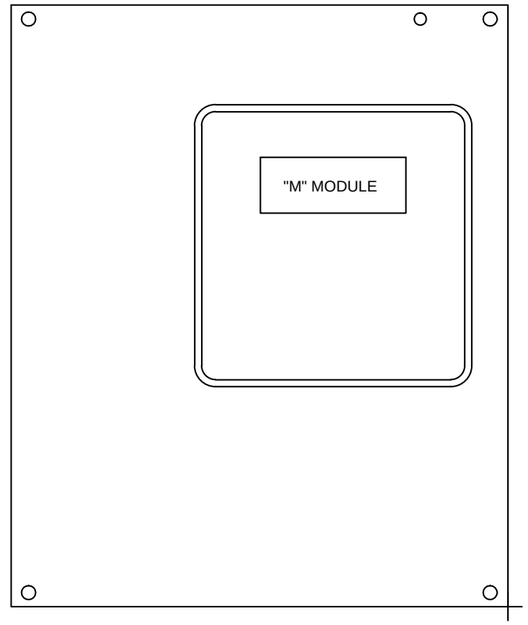
DESIGNED	GB
DRAWN	GB
CHECKED	SEK
APPROVED	SEK
SCALE	NTS
DATE	01−22−13

DWG No 2012601250−303 | REV A | PAGE 2/2

DWG No	REV
2012601250-310	0



FIBOX 12106
POLYCARBONATE
ENCLOSURE



FIBOX 12X10
SUB PANEL

TYPICAL OF 6 PANELS

QTY	PART NUMBER	DESCRIPTION
1	77462225	12X10X6 FIBOX UL LISTED ENCLOSURE
1	7746226	FIBOX SUB PANEL
1	FKV FSV 57/12M	TURCK DEVICENET FITTING
1	DXMaMW0DEN01	PFC "M" MODULE
1	RKM WKM 572-0.5M	TURCK DEVICENET CORD SET FEMALE TO FEMALE

REV	DATE	DESCRIPTION	BY
0	01-22-13	RELEASED FOR PRODUCTION	GB

REVISIONS

CUSTOMER: **HEYWARD INC.**

JOB No 2012601250 | PURCHASE ORDER No XX

TITLE: DXMaMW0DEN01 REMOTE PANEL ENCLOSURE AND SUB PANEL LAYOUT

ENGINEERS SEAL

ProMinent®
THE PROMINENT GROUP OF COMPANIES

PITTSBURGH, PA USA | WWW.PROMINENT.US

PROMINENT FLUID CONTROLS, INC.
RIDC PARK WEST
136 INDUSTRY DRIVE
PITTSBURGH, PA 15275 USA
TEL. 412 787 2484 FAX. 412 787 0704

DESIGNED	GB	APPROVED	PFC
DRAWN	GB	SCALE	NTS
CHECKED	SEK	DATE	01-22-13

DWG No 2012601250-310 | REV 0 | PAGE 1/1