WERNER Dosiertechnik

Operating instructions

Swimming - pool controller

AC2000

Please read carefully these instructions before installing and commisioning the ontroller. Make sure that all the advices given in these manual are followed.

Hettlinger Strasse 17
D 86637 Wertingen- Geratshofen
Tel. +49 (0) 8272/ 98697-0
Fax +49 (0) 8272/ 98697-19
www.werner-dosiertechnik.de
info@werner-dosiertechnik.de

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1. Front view

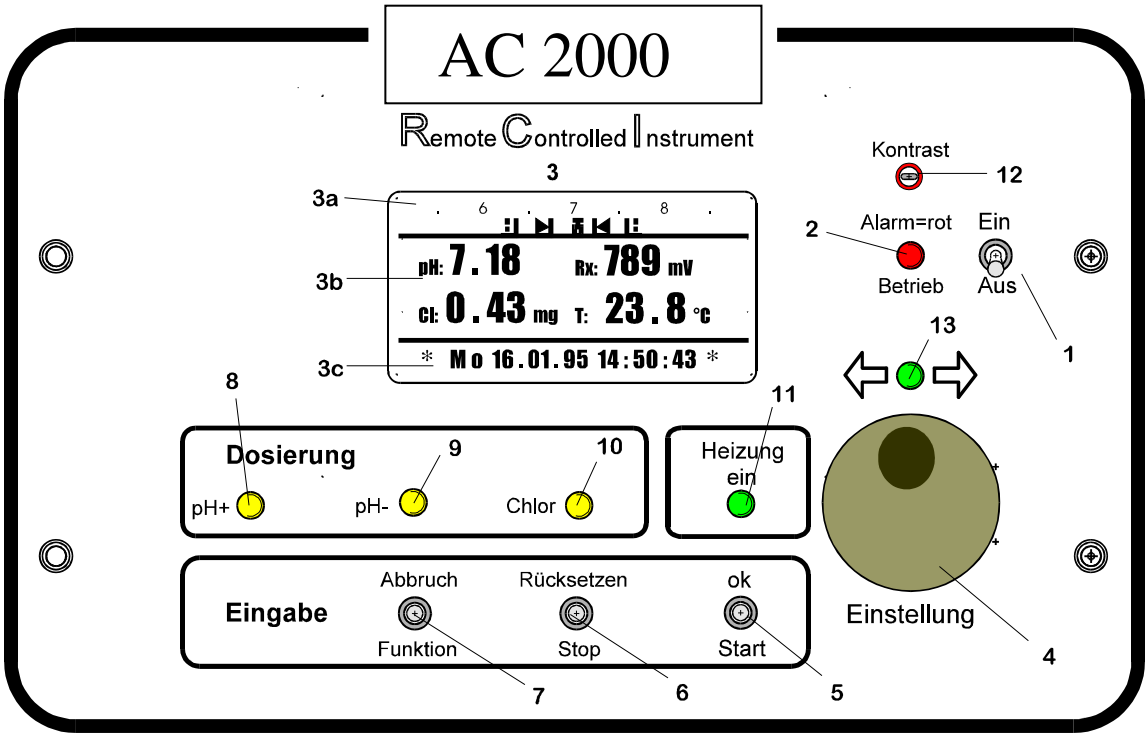


Image.: front view PolyTrop

Nr.	Description
1	ON / OFF - Switch
2	LED to indicate operation mode
3	LCD-display area: a) Analogue scale; b) numeric display area; c) date/time/alarm messages
4	Turn - knob for all parameters
5	OK / Start - push button
6	Reset - push button
7	Escape / function push button
8	Dosing indication LED pH+
9	Dosing indication LED pH-
10	Dosing indication LED Cl+
11	Heater indication LED
12	Turn knob for contrast of LCD display
13	Control LED for settings turn knob

2. Functional description

2.1. Description of terms

2.1.1. Output signal / Controller output

The output signal (= controller output) is the output quantity, which is being calculated by the controller, to reach a given setpoint. Depending on the dosing equipment it can be a pulse width modulated signal with variable ON/OFF intervalls for motorpumps, a variable frequency for frequency controlled metering pumps or an aperture angle for motor valves.

2.1.2. Proportional control

To control a quantity, e.g. concentration of free chlorine in water, the proportional controller generates an output signal, meaning here the amount of added chlorine, which is proportional to the deviation between the measurement and the setpoint.

In this context the ***proportional band (P-band)*** is specified as the deviation from the setpoint at which the output signal is maximal

Example: A chlorine controller having a proportional band of 0.1 mg/l and a setpoint of 0.4 mg/l regulates a frequency controlled dosing pump with a maximum of 6000 strokes per hour (st/h). At a measurement of 0.3 mg/l the output signal will be 6000 st/h. At a measurement of 0.35 mg/l the output signal will be 3000 st/h.

2.1.3. Integral control Reset time T_R

For the regulation of an output quantity the integral controller generates an output signal, which is proportional to the sum of the past deviations from the setpoint. The output signal of the integral controller increases at a constant deviation form the setpoint at decreases only after the setpoint has been passed. The integral controller is adjusted with the parameter ***Reset time*** $\mathbf{T_R}$. The Reset time is the time span, which is needed by the integral controller to generate the same output signal as the one beeing immediatly generated by the proportional controller. The longer the reset time, the smaler is the influence of the integral controller to the entire Proportional-Integral (PI) regulation.

Example: A chlorine controller having a proportional band of 0.1 mg/l and a setpoint of 0.4 mg/l regulates a frequency controlled dosing pump with a maximum of 6000 strokes per hour (st/h). At a measurement of 0.35 mg/l the output signal from the P-controller will be 3000 st/h. Having a reset time of 10 minutes, the Integral controller will, at a constant deviation of 0.05 mg/l, generate an output signal of 3000 st/h. The entire PI regulation will generate then an output signal of 6000 st/h.

The output signal of the Integral controller will decrease only when the measurement passes the setpoint. With such a summing (=integrating) property, the Integral controller can determine e.g. the actual chlorine consumption and the necessary base dosing, ensuring that the setpoint will be maintained with a high accuracy.

2.1.4. Dosing time limit

In order to prevent dangerous over dosing or even wrong dosing due to electrode failure, it is possible to limit the maximum dosing time of the controller. The maximum dosing time is the time span in which the setpoint has to be reached. If the setpoint is not reached within the maximum, an error in the dosing system is assumed (e.g. dosing pump failure, dosing tube failure, electrode failure, cable disconnect...) and dosing is stopped.

2.1.5. Start-up delay

If the flow of measurement water is stopped, the properties of the water are not the same as the ones of the pool water, meaning that the measurement is not representative. When the measuremnt flow starts up again, it will take some time until the water in the measurement circle is representative for the pool water. The purpose of the start-up delay is to prevent a wrong dosing during this time span.

The start-up delay is activated at every start, not depending on how the controller was started (manual start, switching the controller ON, external start through a contact)

2.2. Measurement and control

The swimming - pool controller AC 2000 is measuring the pH-value, the chlorine content, the redox potential (ORP) and the temperature of the water. The controller is controlling the pH-value, the chlorine content and the temperature in accordance to the preset parameters (setpoint, P - range, I - time ...)

The controller for pH and chlorine are PI-controller.. Depending on the deviation from the setpoint dosing pumps are actuated with a varaible frequency (frequnecy controlled dosing pumps) or with a puls width modulated (PWM) signal (motorpumps, solenoid valves). In case of chlorine gas dosing, a chlorine gas motor valve with position feedback can be regulated.

The proportional - integral (PI) control property ensures with a correct setting a fast (proportional part) and an exact (integral part) regulation. Due to these properties the base dosage required is determined automatically by the PI controller.

2.3. Tank level switches

It is possible to connect three tank - level switches to the swimming - pool controller to ensure that dosing will be stopped when one of the tanks is empty (run dry protection). Only the dosage corresponding to the tank which is indicating emptyness will be switched of. A closed contact is indicating an empty tank. An alarm is raised when one or more tanks are empty.

2.4. External locking / enabling

The controller has additional to the possibilty to connect three tank - level switches another entry for external locking of the controller in case of a too little flow in the flow armature and releasing it again when flow is back (contact between terminal 36 and 37 closed ⇒ controller locked=stopped). This contact can be used for external locking during a filter backwash. Authorized maintainance personal can configure this contact as an enabling contact as well, meaning that the controller is stopped when the contact between the terminals 35 and 36 is open. This feature gives the opportunity to adapt this controller to many different water treatment systems for swimming pools.

2.5. Timer

The AC 2000 has a week timer integrated actuacting a power relay (max. 230V, 2A).

This timer can be used for regulation of an external filter control together with the external locking contact. The timers relay can then give the start-stop-signal for the filter control. The controller can be locked then through the external locking contact (see 2.4.), in case the filter is stopped, or during a filter backwash.

2.6. Alarm delay

Alarms are raised and reset after a short delay in order to prevent false or frequent alarms under unfavourable conditions. Extremely short disturbances like electromagnetic pulses will not raise an alarm. The alarm delay is about 30 sec.

2.7. Start - up after power failure

All settings and operational modes will not be lost in case of power failure , meaning that the controller will start - up with the last settings in the *a)measuring and control* mode when power is back. In case the controller was in the start - up delay in the moment of power failure, the start - up delay will be reseted, meaning it will wait the entire pre - set start - up delay before actuating any dosing equipment. In case the controller was stopped in the moment of power failure, it wil remain stopped when power is back. The timer will resume in the same mode as it was before power failure, but the dosing time limit will be set to zero, meaning that a connected dosing pump which has been actuated for 20 min. with a dosing time limit of 30 min. will be stopped only after another 30 min. dosing when power is back.

2.8. Date and time

The AC 2000 has software implemented clock and calendar. Clock and calendar are stopped during mains power failure or while turned off. After mains power recovery the displayed time in the bottom line of the LC-Display (3c) is blinking until you enter the correct time.

2.9. Password / Authorizationcode

To protect the paramater memory against unauthorized modifications, you must authorize first. This authorization is also necessary when accessing the PolyTrop via the serial interface. The authorizationcode consists of the digits „0“ to „9“ and the alphas „a“ to „f“ and is entered in four groups with the turning knob. (see also Einstellen/Warten)

e.g.: „0. 0. 0. 0“, „89.ab.cd.ef“, „16.05.19.68“, „ff.ff.ff.ff“

The authorizationcode is set in the submenü *„Network“* .

The default authorization code is „0. 0. 0. 0 “.

2.10. Remote Control (optional)

The Polytrop has integrated software for remote access. You can read and modify parameters, read the measurements and start or stop the controller. To use this option, you need to install a serial interface card. (RS485 for Network operation / 232 for point-to-point connection or lineprinter)

The network operation gives you the option to control up to 31 units in a single two-wire Network with a single PC.

3. Installation

You have to mount the AC 2000 in dry and ventilated room. The temperature should not exceed 45° C.

The AC 2000 is designed for AC operation (230V / 50Hz). The Installation should only be made by properly instructed personnel in accordance to local regulations. To be safe, you have to install a 30mA fault current-switch.

A locking of the dosing pumps or the controller via the filtering system or the flow control is absolutely necessary.

4. Sensors and cables

Connect the sensors with the according cable to the AC 2000. The cables should kept away from mains power lines, magnetic contactors and electrovalves. If you have to cross a mains power line, try to cross them orthogonal.

5. Usage

5.1. Overview

The Usage of the AC 2000 is very simple. You control it with the settings knob (turning knob) and thre push-buttons.

There are two main operating modes: a) measuring and controlling, and b) setting up.

After powering up, the AC 2000 is in the operation mode a) measuring and controlling. It can be started or stopped, depending on the controllers state when powered down last, or it can be locked (e.g. by the flow control).

If the controller is started and unlocked, it will display the actual readings and after the pre-set delay time it will also start dosing. Otherwise (the controller is stopped and/or locked) the Display shows „Stop“.

5.1.1. OK-button

In operating mode a) the *OK/Start*-button(5) has the function of a START-button. Pressing this button will start the controller, if unlocked.

The delay-timer is started. If you press the *OK/Start*-button(5) a second time, the delay time is skipped and the dosing is startet immediately.

In operating mode b) the *OK/Start*-button is used as an enter-key, to select menuitems and to acknowledge settings.

5.1.2. Reset/Stop-button

In operating mode a) the *Reset/Stop*-button(6) has the function of a STOP-button. Pressing this button will stop the controller immediately. Pressing this button will stop the controller - all dosing outputs wil be turned off and a connected clorine valve will be closed.

In operating mode b) the *Reset/Stop*-button(6) is used as an Reset-key, to reset the current setting to its original value.

5.1.3. Abort / Function-button

To change Settings you have to change operating mode to mode b) „Setting up“. To enter mode b) just press the *Abort/Function*-button(7). Now the menu will be displayed in the LC-Display. You leave the menu (mode b) by pressing the *Abort/Function*-button(7) again.

You can use this button as an ABORT-button. Whatever you´re just doing, it will be aborted when pressing the *Abort* -button. If you´re entering a new parameter value and press *Abort*, the entered value is not stored and the operation is cancelled. If you are in a submenu, e.g. *Calibration*, you leave the menu by pressing *Abort*.

The menu-hierarchy of the PolyTrop is flat, but if you unfortunately *get lost* somewhere, you just press *Abort* repeatedly until you get back to mode a).

5.2. Mode b) setting up

The AC2000 menu has two levels. All major parameter are accessible in the first menu-level, only a few submenus exist for minor parameters and calibration. This prevents you from „navigating“ through a complex menu hierarchy and makes the usage easier.

To modify parameter values, press the *„Abort/Function“*-button to change to mode b) „*setting up*“. Choose a parameter or submenu (those Menuitems that end with *„...“* enter submenus) using the turning knob (4) and press *OK* to acknowledge your choice (e.g. Setpoint Cl).

You have to authorize yourself, before you can modify parameter values. The first time you try to access a parameter for modification, the display shows the authorization dialog:

„*Authorize:*

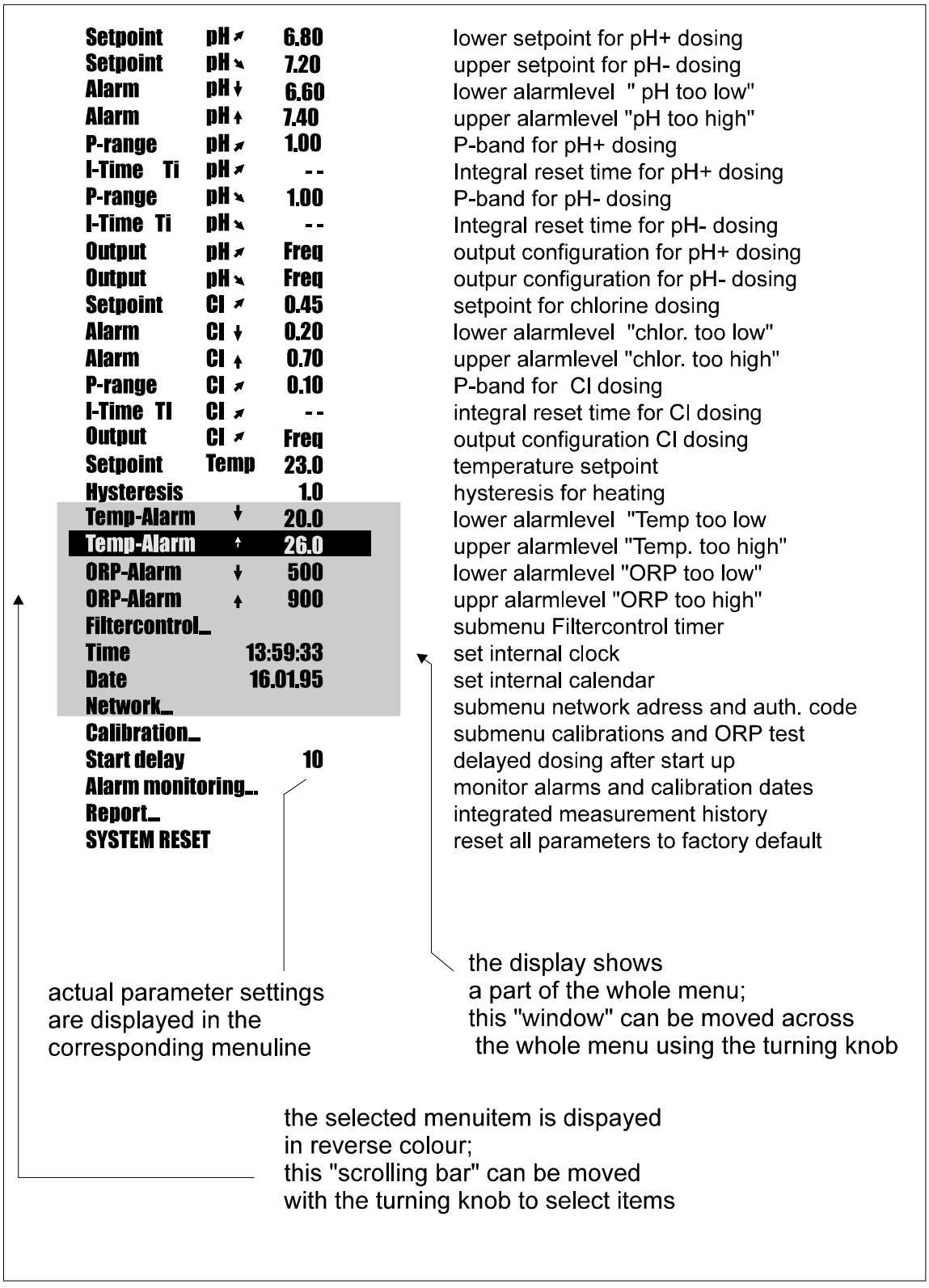
Code: 0“

You can enter the first part of the authorization code with the turning knob. When finished, press *OK* to enter the next part. After entering all four parts of your authorization code correctly, you´ll be authorized for all modifications until you leave the menu (pressing *Abort* to leave to mode a).

The default authorization code is „0. 0. 0. 0 “.

You have to select the parameter again, by pressing the *OK*-button once again.

Now you can modify the parameter value with the turning knob (4). Use the turning knob like the tuning knob or the volume control on a radio, it´s function is very similar, except it can be turned *endlessly* in any direction.



You can abort a modification by pressing the *Abort*-button and return to the menu or reset the parameter value to the old value and continue the setting. To confirm the modification and store the parameter, press *OK*.

You leave the menu (Mode b) „*setting up*“) by pressing *Abort*.

5.3. pH - controller

5.3.1. Setpoints

The pH-controller can raise and lower the pH-value. You enter an upper and lower setpoint. These Setpoints define a certain tolerance-intervall on the pH-scale. If the pH-value leaves this intervall, the controller starts dosing acid or alkaline liquid to correct the pH-value.

To set up the Setpoints, choose corresponding menuitem and press *OK*.

Enter the setpoint using the turning knob and press *OK*.

5.3.2. Alarmlevels

With upper and lower Alarmlevels, you can define the absolute maximum and minimum pH-values. If the pH-value leaves this interval, an alarm is generated. The Alarm contact closes and the corresponding message is displayed.

To set up the Alarmlevels, choose corresponding menuitem and press *OK*.

Enter the Alarmlevel using the turning knob and press *OK*.

5.3.3. P-range

The parameters *P-range pH↗* and *P-range pH↘* define the proportional band of the pH-controller. The unit for the proportional band is pH-steps, which is much more convenient than a percentage.

To set up the p-band, choose corresponding menuitem and press *OK*.

Enter the p-band using the turning knob and press *OK*.

5.3.4. Integral control Reset time T_i

The parameters *I-Time Ti pH↗* und *I-Time Ti pH↘* define the integral control reset time in minutes. To turn off the integral part of the controller, you have to choose „0“ for the reset time, which is actually an infinite reset time ($T_i=\infty$). The infinite reset time is symbolized by „--“ in the menu display.

To set up the reset time, choose corresponding menuitem and press *OK*.

Enter the reset time using the turning knob and press *OK*.

5.3.5. Dosing-outputs pH

You may choose the used dosing output with the menuitems *Output pH↗* and *Output pH↘*. With these menuitems you can define the type of dosing pump. You may choose „disabled“ („----“), a pulse width modulated output („Pulse“) for direct connection of 230V dosing pumps or a frequence modulated reed-contact („Freq“) for electromagnetic metering pumps. Depending on the chosen type, you´ll be asked in a second dialog to enter the period for PWM or the maximum frequence for metering pumps. A a third dialog you´ll be asked to enter the dosing time limit. To turn off the dosing time limit (infinite dosing) choose „0“ Minutes.

Remark: If you´ve chosen „disabled“ for output configuration, you have to explicitly turn off dosing time limit to avoid alarms.

5.4. Chlorine -Controller

5.4.1. Setpoint

The chlorine controller only raises the chlorine concentration. You set the chlorine concentration with the parameter *Setpoint Cl↗*. If the chlorine concentration falls below this value, the controller will start dosing.

To set up the chlorine concentration, choose corresponding menuitem and press *OK*.

Enter the concentration using the turning knob and press *OK*.

5.4.2. Alarmlevels

With upper and lower Alarmlevels, you can define the absolute maximum and minimum chlorine concentration. If the chlorine concentration leaves this interval, an alarm is generated. The Alarm contact closes and the corresponding message is displayed.

To set up the Alarmlevels, choose corresponding menuitem and press *OK*.

Enter the Alarmlevel using the turning knob and press *OK*.

5.4.3. P-range Cl

The parameter *P-range Cl↗* defines the proportional band of the chlorine controller. The unit for the proportional band is mg/l (ppm), which is much more convenient than a percentage.

To set up the p-band, choose corresponding menuitem and press *OK*.

Enter the p-band using the turning knob and press *OK*.

5.4.4. Integral control Reset time T_i

The parameter *I-Time Ti C↗* defines the integral control reset time in minutes. To turn off the integral part of the controller, you have to choose „0“ for the reset time, which is actually an infinite reset time ($T_i=\infty$). The infinite reset time is symbolized by „--“ in the menu display.

To set up the reset time, choose corresponding menuitem and press *OK*.

Enter the reset time using the turning knob and press *OK*.

5.4.5. Dosing-outputs Cl

You may choose the used dosing output with the menuitem *Output Cl↗*. With this menuitem you can define the type of dosing equipment. You may choose „disabled“ („----“), a pulse width modulated output („Pulse“) for direct connection of 230V dosing pumps, a frequence modulated reed-contact („Freq“) for electromagnetic metering pumps or a motor valve. Depending on the chosen type, you´ll be asked in a second dialog to enter the period for PWM, the maximum frequence for metering pumps or the maximum aperture angle for the motor valve. A a third dialog you´ll be asked to enter the dosing time limit. To turn off the dosing time limit (infinite dosing) choose „0“ Minutes.

Remark: If you´ve chosen „disabled“ for output configuration, you have to explicitly turn off dosing time limit to avoid alarms.

5.5. ORP measurement

The ORP is a supervisory measurement for the desinfection and the hygienic state of the water. It´s used to protect the chlorine controller from malfunctions (e.g. defective Cl-probe).

5.5.1. ORP Alarmlevels

With upper and lower alarmlevels, you can define the absolute maximum and minimum OR potential. If the ORP leaves this interval, an alarm is generated. The alarm contact closes and the corresponding message is displayed.

If the ORP raises above the upper alarmlevel, the chlorine controller will be locked to prevent an overdosing.

To set up the alarmlevels, choose corresponding menuitem and press *OK*.

Enter the alarmlevel using the turning knob and press *OK*.

5.6. Temperaturecontrol (optional)

5.6.1. Setpoint and hysteresis

The temperature setpoint is the average temperature between the ON- and OFF-levels of the heating. The hysteresis defines the distance between the ON- and OFF-temp.levels.

e.g.: Setpoint of 24°C; Hysteresis of 2° => Heating will be turned on, when temperature falls below 23° and will be turned off, when temperature raises above 25°C.

To enter setpoint and hysteresis, choose the corresponding menuitems and press *OK*.

Enter the temperature and / or hysteresis using the turning knob and press *OK*.

Remark: The temperature reading is used for temperature compensation of pH measurement. If there is no Pt 100 connected, the temp. compensation will be turned off.

5.6.2. Alarmlevels

With upper and lower alarmlevels, you can define the absolute maximum and minimum temperature. If the temperature leaves this interval, an alarm is generated. The alarm contact closes and the corresponding message is displayed.

To set up the alarmlevels, choose corresponding menuitem and press *OK*.

Enter the alarmlevel using the turning knob and press *OK*.

5.7. Manual control

You can control the dosing manualy by enabling the manual control.

To enable manual control, press the buttons *„Abort/Function“* and *„OK/Start“* simultanously. If you see a small iconized hand in the right bottom corner of the display, the manual control is enabled.

Now you can activate manual dosing by pressing one of the three buttons:

- *Abort/Function (7)* - turn on raise pH pump
- *Rücksetzen/Stop (6)* - turn on lower pH pump
- *OK / Start (5)* - turn on chlorine pump or open valve

The pumps stay turned on, as long as you keep the button pressed. When you release the button, the dosing will return to automatic control and the iconized hand disapears.

Remark: The manual control will be disabled during start-up-delay! Skip start-up-delay first by pressing „*OK/Start*“!

5.8. Filtercontrol (optional)

The Polytrop has software-implemented timer function with a relay contact. This can be used in combination with the external-locking-contact, to operate an external filter control unit. The submenu with the switching times is accessed from the main menu with the menuitem „*Filtercontrol*“.

Filter	ON	OFF
Mo	0:00	0:00
Tu	0:00	0:00
We	0:00	0:00
Th	0:00	0:00
Fr	0:00	0:00
Sa	0:00	0:00
Su	0:00	0:00

Fig.: Submenu for filtercontrol

You enter the switching times with the turning knob.

- Select the day, for which you want to enter a switching time.
- Press *OK*
- Enter minutes of the ON-time and press *OK*
- go ahead with hours of the ON-time an the OFF-time
- to leave the submenu press *„Abort“*

To disable the timer for a day, enter the same time for ON- and OFF-time.

5.9. Time

You enter the actual time of the software implemented clock/calendar with the menuitem *Time*.

Choose the menuitem and press *OK.*

Enter minutes with the turning knob and press *OK;* enter hours and press *OK;* finsihed.

During entering the minutes, you can use the 30 seconds-correction. When you press „*Reset/Stop*“ while you enter the minutes, the seconds will be set to „0“ and the minutes willbe rounded to the closest minute.

e.g.: 12:34:56 -> *Reset* -> 12:35:00
13:45:29 -> *Reset* -> 12:45:00

5.10. Date

You enter the actual date of the software implemented clock/calendar with the menuitem *Date.*

Choose the menuitem and press *OK*.

Enter successivly year, month and day of the actual time; press *OK* each time

The calendar processes automatically leap years and months with less than 31 days. If you increase/decrease the month above „12“ (below „1“) the year will be increased (decreased)! The same happens toi the month and year when you enter the day !

5.11. Network

Network...

Address : 0
Code : 2b.2b.2b.2b
Fig.: Submenu Network

Network-address and authorization-code can be accessed in the submenu *Network*.

The network address is a number between 0 and 255 and is entered with the turning knob. The serial Interface of the PolyTrop can be operated in two modes:

- Network: A network-address of 1 to 255 activates the network operation. The device is configured to operate under the chosen network adress in a network or a computer connection. In this mode, the PolyTrop is remotely controllable (see. Interface options)
- Printer-Log: A network adress of „0“ disables the network operation. You may connect a serial printer to the PolyTrop to log readings and alarms. Every 30 min the readings are dumped. Alarms are instantly logged with date-/timestamp.

The remote access to the PolyTrop over an Netwok or a computer connection is disabled until the correct authorization code is transmitted.

The authorizationcode consists of the digits „0“ to „9“ and the alphas „a“ to „f“ and is entered in four groups with the turning knob.

e.g.: „0. 0. 0. 0“, „89.ab.cd.ef“, „16.05.19.68“, „ff.ff.ff.ff“

To enter the authorization code select the menuitem with the turning knob and press *OK*.

Enter successively the four parts of the authorization code with the turning knob and press *OK* each time when you´re ready.

5.12. Calibration

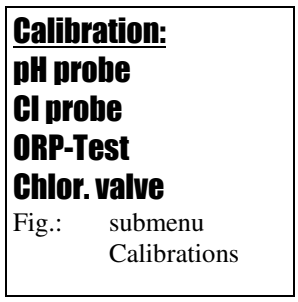


Fig.: submenu Calibrations

The calibrations for pH and chlorine probes, test for the ORP probe and calibration of the motor-valve are accessible in the submenu *Calibrations*.

Select the desired calibration and press *OK*.

5.12.1. pH-probe calibration

The pH probe is calibrated by the measurement of two different pH-buffer-solutions. One is a pH 7 buffer and the second can be one of pH 4-, pH 9- or pH 10 buffer. Follow the instructions in the LCD. During the calibration, the output of the pH unit is displayed as a number (cal: nnnn). As soon as the measurement is considered to be stable, the AC 2000 will finish the measurement itself. You can also finish it manually by pressing the *OK*-button, after the number is stable.

After the measurement, the AC 2000 asks you to enter the used buffer value. Enter the used buffer with the turning knob in the line: „**Buffer-value: pH4**“. Normally the AC 2000 recognizes the used buffer value itself and offer you the correct buffer value, you just press *OK* to confirm the buffer.

You´ll have to repeat this procedure with the second buffer solution.

If the calibration wasn´t successful, a message is displayed. The calibration has to be repeated. Check the buffer solutions and the probe, and replace them if necessary

After succesful calibration, the date of the calibration is stored. It can be displayed under the menuitem „*Alarm monitoring*“.

Remark: The buffer solutions should have ambient temperature (20°C-25°C) to get the best results.

5.12.2. Cl-probe calibration

The chlorine probe is is calibrated in one point only, the zero-point is already calibrated.

To calibrate the Cl probe you have to determin the Cl concentration using the DPD method and correct the PolyTrop´s chlorine reading.

Take your sampling water close to the location where the clorine probe is fixed. Select the menuitem *Cl-probe* in the submenu *Calibrations...* It´s strongly recommended to take the sampling water at the same time as the Calibration is selected to be sure to have the same chlorine concentration in the sampling water for DPD and the PolyTrop´s measurement.

After you determined the chlorine concentration with the DPD method, correct the PolyTrop´s reading using the turning knob and press *OK*.

If the calibration was successful, the date of the calibration is stored and can be displayed under the menuitem „*Alarm monitoring*“.

5.12.3. Test of the ORP-probe

You cannot calibrate the ORP-probe. The ORP unit is calibrated to measure voltages from 0 mV to 1000 mV. This is, because the ORP measurement is a supervisory measurement and you have to make sure that your ORP probe is always operational.

To test the ORP probe, select the menuitem „*ORP-Test*“ and follow the instructions. You test the probe with a 475 mV buffer solution and if the reading is differing for more than 30 mV from this value, the probe is considered to defective.

During the calibration, the output of the ORP unit is displayed as a number (cal: nnnn). As soon as the measurement is considered to be stable, the AC 2000 will finish the measurement itself. You can also finish it manually by pressing the *OK*-button, after the number is stable.

If the ORP test was succesful, the date of the test is stored and can be displayed under the menuitem „*Alarm monitoring*“.

5.12.4. Calibration of a motor valve

If want to use a motor valve for Cl_2 dosing you have to calibrate the upper and lower end for the feedback resistor.

To calibrate the motor valve´s feedback, choose the menuitem *Calibrations/Motor valve* and press *OK*. The calibration routine runs automatically. It opens and closes the valve and stores the characteristic of the valve´s feedback.

5.13. Start-up delay

To can change the start-up delay time , choose the menutitem and press *OK*.

Change the start-up delay using the turning knob and press *OK*.

Remark: During start-up delay the dosing-time-limit timer is stopped.

5.14. Alarm monitoring

Alarms can be monitored under the menuitem *„Alarm monitoring“*. If an alarm ist automatically reset, the alarm storage still holds the information, that there *has been* an alarm until you manually reset the alarm storage.

Choose the menuitem and press *OK*.

The alarm storage consist of three pages, that can be selected uning the turning knob. The last page contains the dates of the last calibrations, ORP-test, the controllers up-time and the time since the last alarm was generated.

You can reset the alarm storage using the *Reset*-button. You leave the alarm storage using the *Abort/Function*-button or the *OK*-button.

5.15. History / Report...

You can monitor the last measurements and alarms with the *Report...* menuitem. The history storage holds readings and alarms of the last 64 hours.

You can access sample-records of the last 10 minutes with resolution of 1 min. The last hour is stored as six records with 10 min. resolution. These records contain the average of 10 samples. The last 64 hours are stored as averages of the six 10-min. records of one hour.

You can use this history to analyze system malfunctions or to analyze the control process.

Select the menuitem and press *OK*.

You can scroll in the history using the turning knob. The top-line of the display will show the date-/timestamp of the record.

You leave the history by pressing the *Abort/Function*-button.

5.16. System Reset

Attention!

After a System Reset choose the right CL-probetype and right outputs for the connected units.

If the controller gets completely messed up (lightning discharge), you can reset it to the factory default settings using the menuitem *System Reset*.

Choose the menuitem and press *OK*.

If you really want to reset the controller, press *OK* again, otherwise press *Abort* to get back to the menu.

6. Apendix

6.1. Remark: Start up a control loop

The first time you close the control loop (starting the controller) the readings will differ more or less from the setpoints. If there is a big difference the integral-part of the controller can cause an overshoot. The dosing will continue even when the setpoints are reached or passed. The reason for this is the integral-sum of the deviation that is increasing rapidly when starting up a process with large deviation. This is the natural behaviour of the integral-part and is appreciated with small deviations, but causes overshoots with large deviations.

It recommended to start up a control loop with the integral-part turned off (Tr = ∞; I-Time 0) and turned on as soon as the readings get closer to the setpoints. Alternatively you may reset the integral-sum by pressing the *OK*-button.

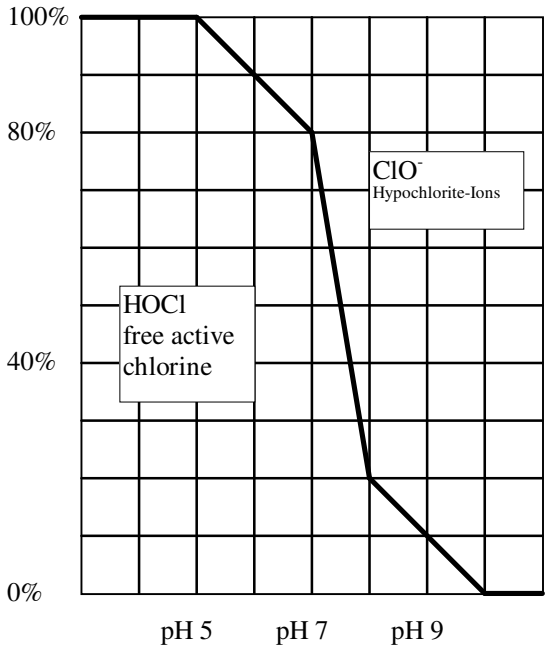
6.2. Remark: Temperature compensation

The pH-measurement is temperature compensated. If there is no Pt100 connected to the AC 2000, the compensation is turned off.

6.3. Remark: Chlorine measurent and pH-value

The amperometric measurement determines the concentration of free and active chlorine. This free active chlorine is represented as HOCl. The percentage of active chlorine HOCl decreases when the pH-value raises => you get a smaller chlorine reading, however the chlorine concentration stays the same. Chemically spoken, the chlorine Cl_2 dissociates in HOCl (that is measured) and ClO^- (Hypochlorite) ions. The HOCl has 150 times higher desinfection capability than ClO^-, so the chlorine reading is correct referring to the desinfection. However the DPD method is a pH stabilized measurement. The pH value of the sampling water is stabilized at a pH value of about pH6 resulting in a increasing deviation from the electrochemical determined concentration. You should keep this in mind if you compare a DPD measurement to the reading of the PolyTrop.

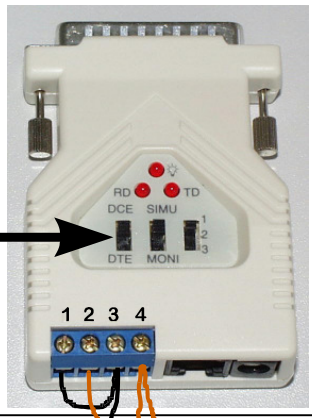
Chlorine dissociation curve

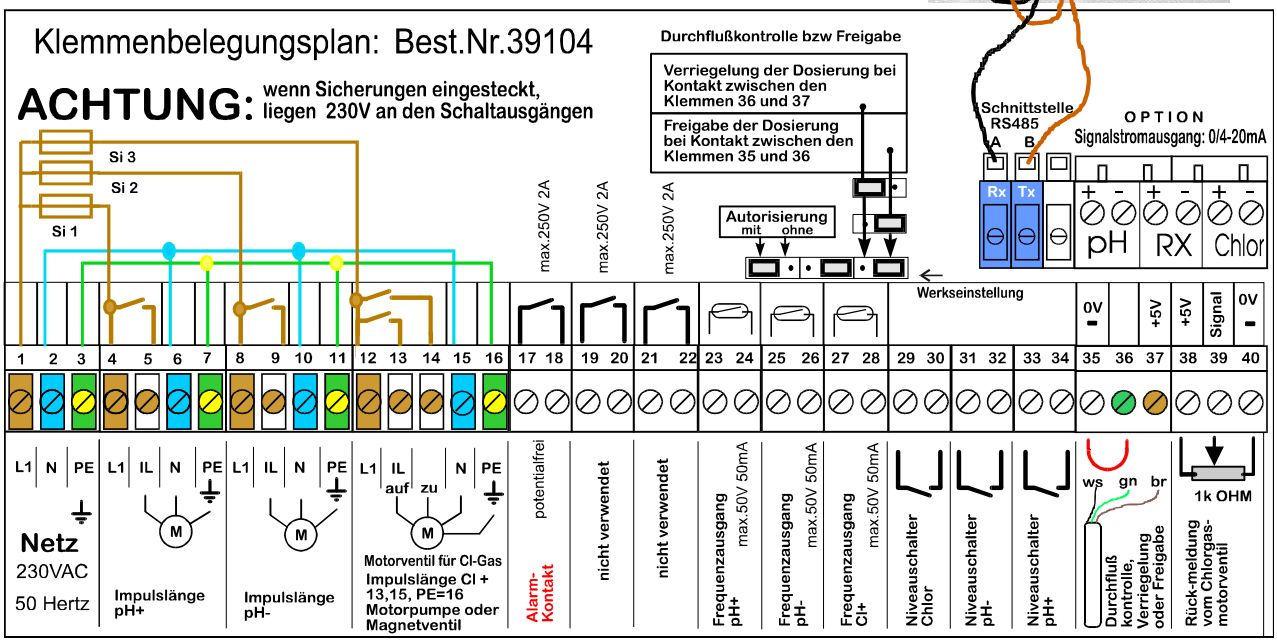


6.4. Terminals

Anschluß der RS485
Schnittstelle an PC:

Konverter RS485 auf
Serielle Schnittstelle PC:
Best.Nr.32156
Schalterstellung: DCE,MONI,1





6.5. Interface options

The serial interface of the AC 2000 can be configured as

- RS232
- RS485
- TTL
- 20 mA TTY

with a serial adapter card.

6.6. Protocol printer

You connect a serial printer to the AC 2000 to log the water quality and the operation of the control loop. The AC 2000 has to be equipped with the proper Interface card (RS232) and the network

adress has to be set to „0“. The PolyTrop then logs all readings 30 minute-intervals with a date-/timestamp. Alarms are logged instantly with a date-/timestamp.

6.7. Signal output / 20mA current loop

To use analog line recorders together with the AC 2000, it be equiped with a Signal current output for pH, ORP and Cl.

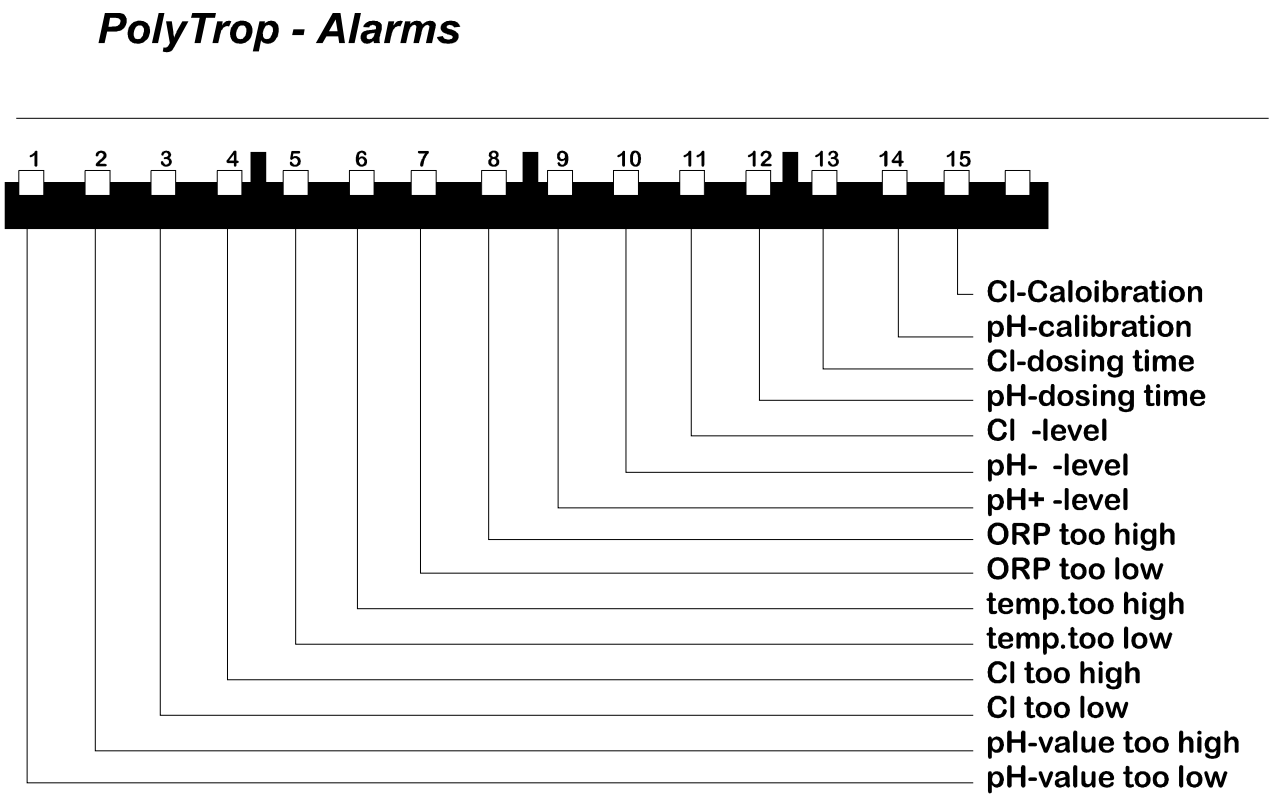
Following ranges correspond to 0/4-20mA signal current: pH: 2 - 12, Cl: 0 - 2.0mg/l, ORP: 0 - 1000mV

The signal outputs can be configured for 0-20mA or 4-20mA operation by setting a Jumper (refer to *Terminals*).

6.8. Alarms in the history display

To save display space the alarms in the history-display under the menuitem „*Report...*“ are displayed as a exclamation mark symbol on an alarm-scale.

please refer to the following table:



Commissioning report CPR-Compact AC2000

Please note that, when you make a *„System Reset“* **(Troubleshooting), it will change all Parameters to the factory settings. We advise to note the modified Parameters. Please check and adapt all necessary Parameters after the** „System Reset“!

Commission: ..... Pool: .....

Serial Nr.: ..... Program version: .....

	Reset parameter	commissioning	1. modification	2. modification
Parameter pH				
Setpoint pH↗	**7.10**			
Setpoint pH↘	**7.30**			
Alarm pH↓	**6.90**			
Alarm pH↑	**7.40**			
P-range pH↗	**0.50**			
I-time Ti pH↗	**--**			
D-time Td pH↗	**--**			
P-range pH↘	**0.50**			
I-time Ti pH↘	**--**			
D-time Td pH↘	**--**			
Output pH↗	**Freq**			
Menu Freq				
max. dosing freq.	**6000/h**			
min. dosing	**0%**			
Dosing time limit	**90 Min**			
Menu Puls				
PWM-cycle	**10 s**			
min. dosing	**0%**			
max. dosing	**100%**			
Dosing time limit	**90 Min**			
Menu 2P				
Dosing time limit	**90 Min**			
Output pH↘	**Freq**			
Menu Freq				
max. dosing freq.	**6000/h**			
min. dosing	**0%**			
Dosing time limit	**90 Min**			
Menu Puls				
PWM-cycle	**10 s**			
min. dosing	**0%**			
max. dosing	**100%**			
Dosing time limit	**90 Min**			
Menu 2P				
Dosing time limit	**90 Min**			

	Reset parameter	commissioning	1. modification	2. modification
Setpoint Chlorine				
Setpoint Cl↗	**0.40**			
Alarm Cl↓	**0.25**			
Alarm Cl↑	**0.75**			
P-range Cl↗	**0.10**			
I-time Ti Cl↗	**--**			
D-time Td Cl↗	**--**			
Output Cl↗	**Freq**			
Menu Freq				
max. dosing freq.	**6000/h**			
min. dosing	**0%**			
Dosing time limit	**90 Min**			
Menu Puls				
PWM-cycle	**10 s**			
min. dosing	**0%**			
max. dosing	**100%**			
Dosing time limit	**90 Min**			
Menu 2P				
Dosing time limit	**90 Min**			
Menu 3P-V				
min. Dosing	**0%**			
max. Dosing	**100%**			
Dosing time limit	**90 Min**			
Cl-probetyp **Please adapt the correct Probetyp !!!**	**Membran**	**Opened**		
Setpoint ORP - Redox				
ORP Alarm↓	**600**			
ORP Alarm↑	**800**			
Network…	**Adress 43** **Code 0.0.0.0**			
Printertype	**1**			
Dump interval	**30**			
Signal output	**0-20mA**			
Start delay	**2 Min**			
Language	**Deutsch**			

notes:

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date	**assembler**	**operator**