PCA310, PCA320, PCA330, PCA340

Chlorine, pH, Temperature, ORP Analyzers

PCA 330
CHLORINE,
pH & ORP
ANALYZER

HANNA®
instruments

Dear Customer,

Thank you for choosing a Hanna Instruments product.

Please read this instruction manual carefully before using the instrument.

This manual will provide you with the necessary information for correct use of the instrument, as well as a precise idea of its versatility.

If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com or view our worldwide contact list at www.hannainst.com.

This instruction manual has been written for the following:

PCA340 — Chlorine, pH, temperature analyzer with 2 analog outputs
PCA330 — Chlorine, pH, temperature, ORP analyzer with 1 analog output
PCA320 — Chlorine, pH, temperature analyzer with 1 analog output
PCA310 — Chlorine analyzer with 1 analog output

The analyzers have features such as: automatic chlorine measurement, pH, temperature and ORP measurement, chlorine and pH dosing regulator, selectable sampling periods, alarm system, data link through GSM network, user friendly interface, serial communication through RS485, recorder output, 4-20 mA dosing output, Nema 4X enclosure.

The ordering code for chlorine analyzers is:

PCA3a0-b

a =   1 - Chlorine analyzer with 1 analog output
        2 - Chlorine, pH, temperature analyzer with 1 analog output
        3 - Chlorine, pH, temperature, ORP analyzer with 1 analog output
        4 - Chlorine, pH, temperature analyzer with 2 analog outputs
b =   1 - 115 VAC 50-60 Hz
        2 - 230 VAC 50-60 Hz

Note: If the instrument is set for free chlorine analysis, the software will report at startup Free Chlorine and if it is set for total chlorine, the software will report at startup Total Chlorine.

TABLE OF CONTENTS

TABLE OF CONTENTS

Remove the analyzer from the packing material and examine it carefully to make sure that no damage has occurred during shipping. Notify your nearest Hanna Customer Service Center if damage is observed.

Each analyzer is supplied complete with:

- 2 pcs. reagent bottles (1 pc. indicator and 1 pc. buffer solution)
- 2 pcs. reagent bottle caps
- 5 pcs. DPD compound powder
- tubing
- Instruction Manual

Note: Save all packing materials until you are sure that the instrument functions correctly. Any damaged or defective items must be returned in their original packing materials together with the supplied accessories.

Warning: The PCA310 - PCA340 series of Chlorine, pH and ORP Analyzers are not designed for use with samples that are inflammable or explosive in nature. If any sample solution other than water is used with these products, test the sample/product compatibility to assure user safety and proper product performance.

Safety Precautions: Please take the time to read the safety precautions carefully wherever they appear in this manual. They are provided to prevent personal injury and damage to the instrument. This safety information applies to the operators and service personnel and the following two captions are used:

CAUTION: identifies conditions or practices that could result in damage to the instrument or persons.

Warning: Identifies conditions or practices that could result in personal injury or loss of life.

Note: Because of the inherent dangers in handling chemical samples, standards and reagents, HANNA Instruments strongly recommends users of this product to review the Material Safety Data Sheets and become familiar with safe handling procedures and proper usage prior to handling any chemicals.

The Hanna Instruments PCA310, PCA320, PCA330 and PCA340 series of chlorine, pH, ORP and temperature analyzers are microprocessor controlled, process analyzers which continuously monitor a sample stream for chlorine content, pH, ORP and temperature values.

The PCA310 - PCA340 monitor the free chlorine or total chlorine in the 0.00 to 5.00 mg/L range depending on the factory settings and used reagents.

In the DPD Colorimetric method, N, N-Diethyl-p-phenylenediamine indicator and a buffer are mixed with the sample.

The resulting chemical reaction causes a magenta color to form. The color intensity is proportional to the concentration of chlorine. The color intensity is measured photometrically (with a light beam and a photodetector) and converted to chlorine concentration, in mg/L, which is displayed on the front panel.

Indicator and buffer reagent bottles are placed directly into the instrument case. With a sampling period of 5 minutes, reagents need to be replenished about once a month. The reagent bottles are easily visible through the transparent window allowing the operator to check the reagent levels.

PCA320, PCA330 and PCA340 analyzers use a HI1005 probe to continuously measure the pH of the sample stream in the range of 0.00 to 14.00 pH. The sample temperature is measured in the 5.0 to 75.0 °C range.

pH and temperature are displayed on the front panel. The pH measurement is temperature corrected.

PCA330 analyzer use HI2008 platinum ORP electrode to continuously measure the sample ORP value.

```
pH   6.02        08:11
Cl   0.15 mg/L
T    15.0 °C
ORP 184   mV
```

The pH/temperature combined sensor and the ORP sensor are placed inside the case, directly in the sample stream.

The case of PCA310 - PCA340 analyzers meet NEMA 4X, 12 and 13 standards. The molded fiberglass polyester case has outstanding chemical and temperature resistance.

The case provides wall mounting capability and door gasket assures a watertight and dust-tight seal.

The electrical and hydraulic connections are made through the side of the enclosure.

The front cover is secured with two lockable latches.

Four chlorine level setpoints can be adjusted by the operator: a proportional dosing setpoint, two alarm setpoints and a minimum level for dosing. The proportional dosing factor (1/∆ is user selectable with a delta between 0.1 and 5.0 mg/L (ppm)). Chlorine dosing system controls a SPST relay.

Each chlorine alarm can be enabled or disabled.

Three pH level setpoints can be adjusted by the operator: a dosing setpoint and two alarm setpoints. The pH control mode is user selectable: on/off or proportional dosing.

The proportional dosing factor (1/∆) is user selectable with a delta between pH 0.1 and 2.0 . The on/off dosing hysteresis is user selectable between pH 0.05 and 2.00.
pH dosing system controls a SPST relay.

Each pH alarm can be enabled or disabled.

For temperature and ORP, two alarm levels can be set by the user.

Each temperature or ORP alarm can be enabled or disabled.

Alarm condition controls a SPDT relay.

A system error feature provides relay activation to signal the need for operator intervention.

System error condition controls a SPST relay.

For PCA310 - PCA330 series the voltage output ranges of 0-10 mV, 0-100 mV, 0-1 V or a current output of 4-20 or 0-20 mA are available to drive an external device such as a chart recorder.

The analyzer can drive a proportional dosing pump through the 4-20 mA output, for chlorine or for acid/alkali dosing.

PCA340 has two current outputs of 4-20 or 0-20 mA are available to drive external devices such as chart recorders.

The analyzer can drive two dosing pumps through the 4-20 mA outputs for chlorine and for acid/alkali dosing.

The analog output is fully programmable and could be proportional with chlorine concentration, pH, ORP or temperature value. The limits of the analog output are selectable for each parameter.

The analyzer can store up to 3500 readings (at least 7 days at 3 minutes sampling interval). Stored history is available to download.

The PCA310 - PCA340 analyzers can be monitored or controlled through RS485 or GSM network connection.

Errors, alarms and warnings are sent through SMS (using GSM module HI504900).

The analyzer state can be interrogated by a simple call using a GSM phone.

Time is displayed on the main panel and a time related warning system for "Old calibration", "Reagent expired" and "SIM expired" is available.

The language for user interface can be easily changed without restarting the analyzer.

FRONT VIEW   SIDE VIEW   REAR VIEW

338,9
13.34"

228,5
8,99"

388,9
15,31"

274,6
10,81"

236
9.29"

86
3.38"

373,1
14,68"

345,5
13.60"

310,6
12.22"

360,1
14.17"
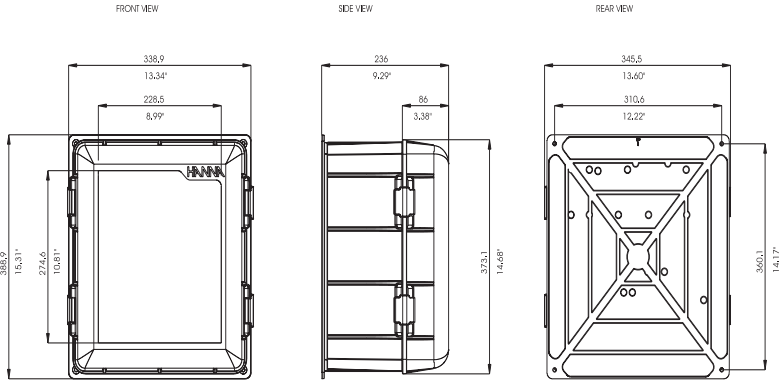
Case dimensions in mm & inches

1. Alarms, dosing, system error LED's
2. Character Display
3. Cable glands
4. Keypad
5. Peristaltic Pump
6. Sample Tubing
7. Access Point to Cell
8. Vent Tube
9. Measuring Cell
10. Drain Tube
11. Output Port
12. Drain Port Valve
13. Drain Port of Measuring Cell
14. Pressure Regulator Output Port
15. Incoming Pressure Regulator
16. Buffer Bottle
17. Indicator Bottle
18. Sample Inlet Port
19. Electrodes Holder
20. pH Electrode (not included)
21. Sample Output Port
22. Electrovalve
23. ORP Electrode (not included)
24. Reagent Tubing
25. Line Input

DISPLAY

KEYPAD

ALARM
DOSING CHLORINE
DOSING ACID/ALK
SYSTEM ERROR

LEDS

ESC ↑ SET MENU
← ↓ → CFM

Chlorine/pH/ORP Analyzer
PCA-330

DISPLAY

The display contains 4 lines with 20 characters on one line. The information and error messages are clearly displayed in plain language, without error codes.

The display has back light for better visibility.

The analyzer is in main panels mode when displays a panel that contains the measured values. Several main panels could be selected by pressing the up and down arrow keys. The PCA310 does not have the main mode for the display.


```
MANUAL          16:35
   1.35 mg/L    2 mV
                6.98 pH
   pH Out of Range >
```

2 ─── 3 ─── 1 ─── 4
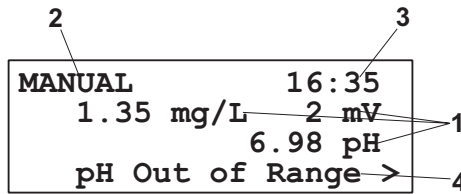
1 - measured values

2 - controller status

3 - current time

4 - message line

The display indicates chlorine (mg/L), pH, ORP (mV) or temperature and secondary information related to it. Several display views with different secondary information can be selected by pressing the up or down arrow keys.

When the display is in one of the above modes, the measuring units, the current time and the alarm or error status are also displayed. PCA310 is always displays chlorine concentrations.

```
                          16:35
                1.35   mg/L    Alarm
      <Cl   Calibration      Old>
      Min:0.00      Max:5.00
```
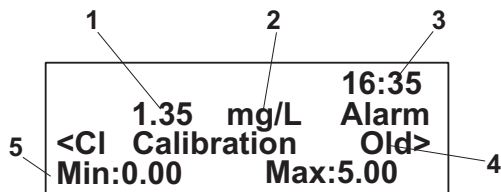
1 - measured value (chlorine, pH, ORP or temperature)

2 - measurement units (mg/L, pH, mV, °C or °F)

3 - current time in format HH:MM

4 - warnings, alarms and errors, displayed one at a time

5 - secondary information.

LEDs

Three or four LEDs are present on the front panel:

ALARM LED (red) , signals the presence of at least one alarm and the closing of the Alarm relay. When the alarm is present, the LED blinks. When the analyzer is in MANUAL mode, the LED is on but not blinking.

DOSING CHLORINE LED (green), signals the closing of the chlorine dosing relay. When dosing stops, the LED is turned off.

DOSING ACID/ALK. LED (green), signals the closing of the acid/alkali dosing relay. When dosing stops, the LED is turned off (PCA320, PCA330 and PCA340 only).

SYSTEM ERROR LED (red), signals the presence of an error and the closing of the System error relay. When the error is present, the LED blinks. When in STANDBY mode, the led is on but not blinking.

For PCA310 the system error LED is moved in the dosing ACID/ALK. LED position.
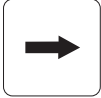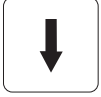
KEYPAD   The keypad has 8 keys with the following signification:

UP and DOWN ARROWS

- select the main display appearance,
- select the menu,
- select an item from a list,
- edit values.

LEFT and RIGHT ARROWS

- select an error message,
- select an item to edit,
- select the current digit for editing.

MENU enter the menu mode.

CFM confirm the selected menu and edited values.

SET starts editing the selected item.

ESC

- return to the previous menu,
- exit from operation without saving.

CHLORINE MEASUREMENT AND DOSING (All models)

Range	0.00 to 5.00 mg/L
Resolution	0.01 mg/L
Accuracy	$\pm$ 8% or $\pm$ 0.05 mg/L whichever is greater
Calibration	1 point
Minimum detectable level	0.05 mg/L
Sampling rate	adjustable from 3 to 90 minutes
Dosage	proportional relay or 4-20 mA output
Delta ($\triangle$)	selectable 0.1 to 5 mg/L

pH MEASUREMENT AND DOSING (PCA320, PCA330 and PCA340)

Range	0.00 to 14.00 pH
Resolution	0.01 pH
Accuracy	$\pm$ 0.05 pH
Calibration	one or two points or in-line calibration
Dosing rate	adjustable from 3 to 120 seconds
Dosage	On/Off or proportional, relay or 4-20 mA output
Delta ($\triangle$)	selectable from 0.10 to 2.00 pH
Hysteresis	selectable from 0.05 to 2.00 pH

ORP MEASUREMENT (PCA330)

Range	0 to 2000 mV
Resolution	1 mV
Accuracy	$\pm$ 1 mV

TEMPERATURE MEASUREMENT (PCA320, PCA330 and PCA340)	
Range	5.0 to 75.0 °C (41.0 to 167.0 °F)
Resolution	0.1 °C (0.1 °F)
Accuracy	$\pm$ 0.5 °C ($\pm$ 1.0 °F)
OTHERS (All models)	
Recorder output	0-10 mV, 0-100 mV, 0-1 V, 4-20 mA, 0-20 mA (PCA310, PCA320, PCA330) 4-20 mA, 0-20 mA (PCA340)
Serial communication	RS485, galvanic separated
Baud rate	1200; 2400; 4800; 9600 bps
Display	character LCD 4 lines x 20 characters
Languages	English, Italian, Portuguese, Spanish
Log	3500 log records
GSM alarm	2 numbers, alarm SMS, info SMS, warning SMS
Alarm relay	SPDT contact with 5A, 230V resistive load
Dosing relays	SPST contact with 5A, 230V resistive load
System error relay	SPST contact with 5A, 230V rezistive load
Sample inlet pressure	0.07 to 4 bar
Sample flow rate	100 to 300 mL/min
Sample temperature	5 to 40 °C
Sample inlet	12 mm ($1/2$") male NPT fitting
Sample outlet	12 mm ($1/2$") male NPT fitting

Drain connection	10 mm ($^3/_8$") barb
Process pH/temp probe	HI1005
Process ORP probe	HI2008
Power supply	115 VAC $\pm$ 10% or 230 VAC $\pm$ 10%; 50-60 Hz; 20 VA
Case	NEMA-4X

CHLORINE MEASUREMENT

Referring to the drawing on page 11 and the Fluidic Diagram on page 18, the Sample Line is connected to the instrument at the Sample Port (#18); an internal Regulator (#14) reduces the inlet pressure from a maximum of 4 bar (57.2 psi) down to 1 bar (14.3 psi); from the Regulator a PVC tube is connected to the input of the Electrovalve (#22). The output of the Electrovalve goes to the Measuring Cell (#9). An optional Filter can be installed to the sample port if the stream is excessively turbid.

The sample coming from the line normally flows through the Measuring Cell (#9). It goes out from the Measuring Cell through the Drain Tube (#10).

The Measuring Cell is accessible from the capped port placed on the top (#7) for speedy cleaning and maintenance.

During the 100 seconds preceding the sampling, the analyzer solenoid input valve is open to allow sample flow to flush the colorimeter cell. Every 3 to 90 minutes (user selectable), the electrovalve closes stopping the sample flow and leaving the sample cell full of fresh sample. Cell volume is controlled by an overflow gateway.

As the sample inlet electrovalve closes, a series of measurements (with LED on and off) of the unreacted sample is taken to determine an average blank level prior to reagent addition.

The measurement of sample blank signal permits compensation for any turbidity or natural color, and provides the zero reference point for the measurement.

The two channel Peristaltic Pump (#5) starts rotating dosing a precise quantity of buffer and indicator (#16 and #17) to enter the colorimeter sample cell. Here a magnetically coupled stirrer mixes the reagents with the sample.

After a delay for the color development, a series of measurements (with LED on and off) are taken (sample level) to determine an average chlorine concentration measurement. The reacted sample signal is then measured and displayed.

This sequence is repeated every 3 to 90 minutes (user-selectable).

METHOD OF ANALYSIS

Free available chlorine oxidizes the DPD indicator reagent at a pH between 5.5 and 6.0 to form a magenta-colored compound. The intensity of the resulting color is proportional to the concentration of chlorine in the sample. The purpose of the buffer solution is to maintain the proper pH.

To measure total residual chlorine (free available chlorine plus combined chlorine) the PCA adds potassium iodide. The chloramines in the sample cause iodide ions to become iodine which then act with free chlorine to oxidize the DPD indicator. After the chemical reaction is complete, the optical signal at 555 nm is compared to the signal measured through the sample (before the reagents were added). From these measurements total chlorine concentration is calculated.
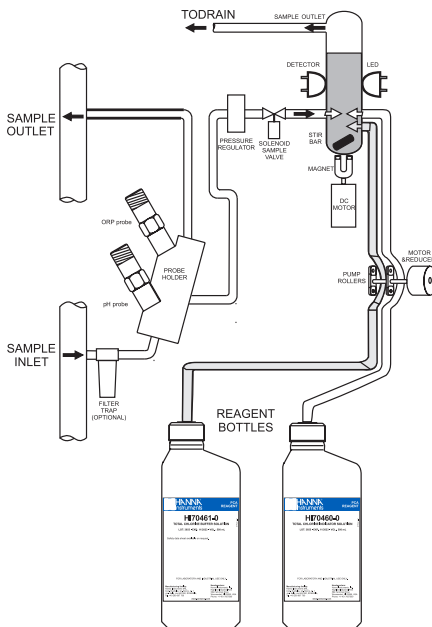
pH AND TEMPERATURE MEASUREMENT

The HI1005 pH/temperature probe provides a potential proportional with the pH. The temperature is measured with Pt100 platinum sensor.

For increased accuracy the pH is corrected for the effects of temperature. Up to 2 buffers can be used for calibration.

The temperature can be displayed in °C or °F.

The probe can withstand pressure up to 6 bar (87 psi).

ORP MEASUREMENT

The HI2008 probe provides at the out port a potential proportional with the ORP value. The value is directly displayed in mV. The probe can withstand pressure up to 6 bar (87 psi).

INSTALLATION PERSONNEL

Installation of the PCA310 - PCA340 Chlorine, pH, ORP and temperature analyzers should be undertaken by persons with technical knowledge of the dangers associated with chemical exposure and electrical shock.

Hanna Instruments assumes that persons performing the installation tasks are aware of the appropriate safety procedures.

CAUTION: Review the Material Safety Data Sheets (MSDS) before handling the supplied chemical reagents.

LOCATION OF THE INSTRUMENT

Analyzer Location

Locate the analyzer as close as is reasonably possible to the point where the sample is withdrawn from the product stream (referred to as the sampling point).

The instrument should be mounted indoors, out of direct sunlight. Instrument operating temperature is 5 to 40 °C (41 to 104 °F).

Sampling Point Location

Locate the sampling point to obtain a representative sample from the product stream. For example, be sure the sampling point is well downstream from a Chlorine and acid/alkali feed. This ensures that adequate mixing and reaction of reagents has occurred.

HYDRAULIC CONNECTIONS

Note: Hydraulic connections should be installed only by qualified personnel to assure conformity to applicable plumbing codes.

Sample Line Installation

Direct routing of sample lines is recommended.

If the large process pipes are horizontal, taps should be inserted vertically in the middle of the pipe to avoid pulling sediment from the bottom or air bubbles from the top of the pipe into the sample line.
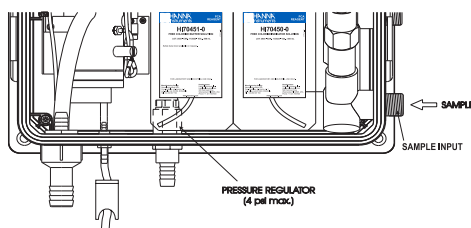
A $^1/_2$ BSP sample input fitting allows direct connection to the optional input filter.

Sample line pressure should be between 0.07 and 4 bar (1 and 57.2 psi) with an ideal pressure of 0.7 bar (10 psi).

It is recommended to assure that the water inlet come at 1 m above the instrument sample input piping. For maintenance issues is also recommended to install valves on both sampling pipes.
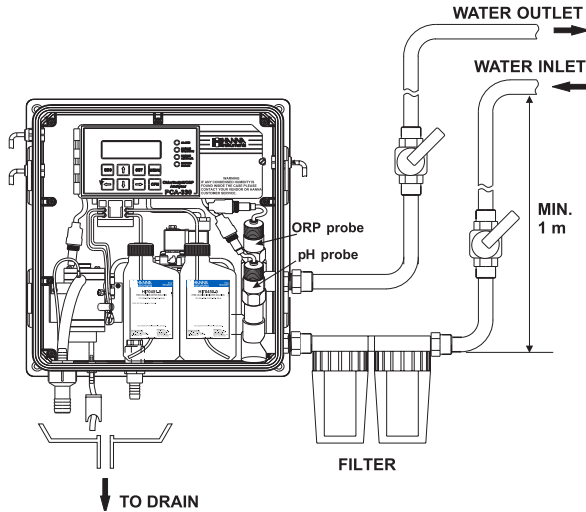
Drain Line Installation

The drain hose fitting is a 20 mm ($^3/_4$") hose barb on the bottom of the instrument enclosure. An air gap between the end of the drain hose and the drain is recommended to prevent any back flow into the instrument in the event of drain blockage.
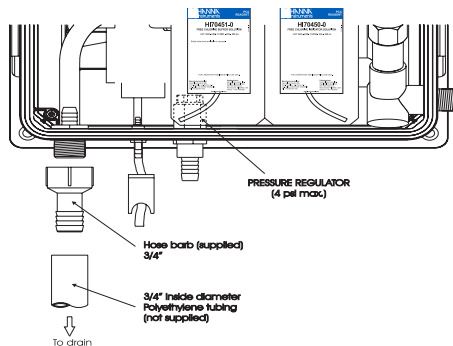
Return Line Installation

The return hose fitting is a 12 mm ($^1/_2$") hose barb on the bottom of the regulator output port and should always be connected even when pressure is below 1 bar.

INSTALLING THE INPUT FILTER

In order to ensure maximum accuracy of measurements, it is recommended to have always clear sample, with suspended particles smaller than 0.5 μm. This can be achieved by installing two filters before the sample input.

The type of filters depends on the quality of the water: the first filter should have 50-100 μm pore size, whereas in any case the second filter, the one closer to the analyzer, has to be 0.5 μm.

For correct instaling procedure and maintenance, see the instructions of filters.
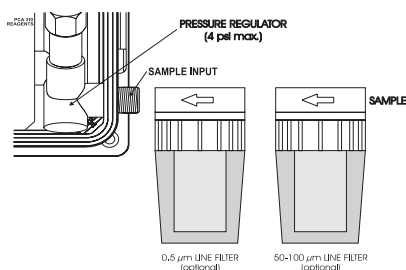
INSTALLING THE pH AND ORP PROBES

To mount the pH and ORP probes, first turn off the analyzer.

Unscrew the closing caps from the electrode holder and remove the protective cap from electrodes and electrodes connectors.
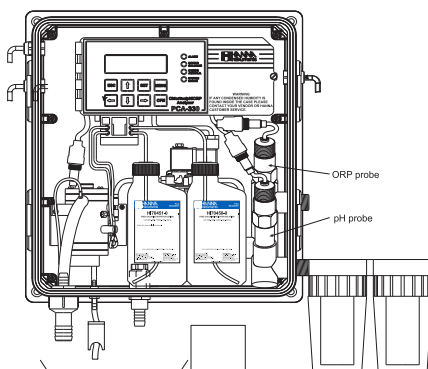
Screw the pH probe (HI1005) in the lower position and the ORP probe (HI2008) in the higher position and assure that no leakage occurs.

Only after the probe is in final position connect the probe to the dedicated connector. Lock the connector with the built in nut.

⚠ **Warning:** Never connect or disconnect the probes when the analyzer is powered on.

INSTALLING THE PUMP TUBES

Locate the analyzer reagent tubes in the accessory kit. Each tube is composed of three sections. The sections are joined together by plastic connectors with plastic collars at the ends of the center section.
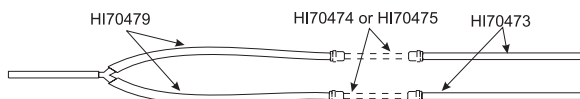
Locate the peristaltic pump.

Feed one tube from the shorter end section behind the pump rollers from the right side of the pump. Seat the plastic collar at the right end of the center section of tubing into the lower right notched hole of the pump face.

Grasp the other plastic collar and pull, stretching the center section, and place the grommet in the lower left notched hole.
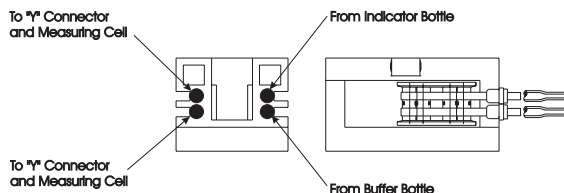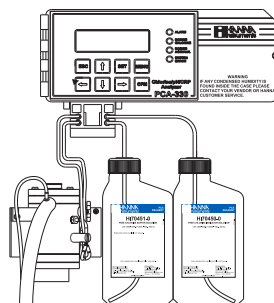
Repeat this process with the second pump tube, placing it in the upper notched holes.

Separate reagent caps are provided in the accessory kit. Put the supplied caps onto each reagent bottle prior to installing them. The tubes inserted in the bottle caps must be placed inside the bottles. The tubes have different lengths. Attach the longer tube to the bottle in the right side. Ensure the tubes reach the bottom of the bottles.
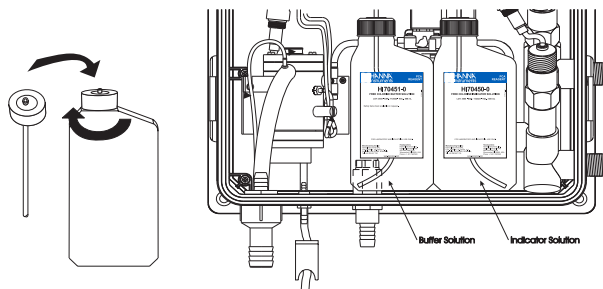
Place the indicator bottle (HI70450 for free chlorine and HI70460 for total chlorine) on the right and the buffer bottle (HI70451 for free chlorine and HI70461 for total chlorine) on the left.

Note: Add the content of 5 HI70452 sachets, DPD Compound, to the Indicator Solution prior to installing it.

Connect the tubes mounted on the bottles to the right side of the pump. The tubing assembly with "Y" connector has to be mounted between the measuring cell and pump.

The tubes (1, 3) and the "Y" connector (2) are placed on the measuring cell holder (4) in vertical position. Fix the tubes vertically and insert one by one in the holder. The "Y" connector has to be positioned below the holder.
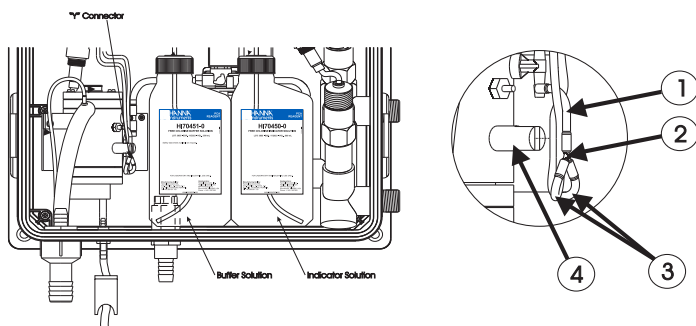
ELECTRICAL CONNECTIONS

A power cable (3 mt.) is provided with your analyzer. However, if access to the terminal block is required, see below.

Warning: Electrical connections should be installed only by qualified personnel to assure conformity to applicable electrical codes.

Unplug the meter before any electrical connection.

Power Connection

Power connections are made at a terminal block located in the center of the electrical compartment to the right of the fuses.

Hard wiring with 13 mm ($^1/_2$") conduit is recommended and usually required by most municipal electrical codes.

⚠️ **Warning:** For PCA310 - PCA340 before connecting the instrument to the line:

1) Check the label near the fuses for proper voltage.

2) Be sure the power cord is not connected to the line.

Remove (1) #10-32 screw here

Remove (4) M4 screws here
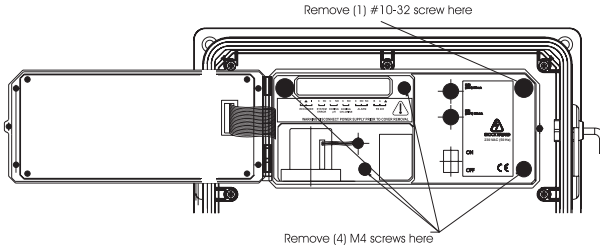
3) Open front panel.

4) Remove the cover screws (Allen head).

5) Do not remove peristaltic pump or motor.

6) Unplug all alarms and recorder jacks.

Feed the power cord through the watertight grommet and tighten the grommet nut. See the picture below for proper wire connections.

Main Power PCB   Line Filter   Transformer
Terminal block
Neutral
Watertight Grommet and Nut Assembly
Main Power Cord
Earth
Phase
Electrovalve
24 VAC
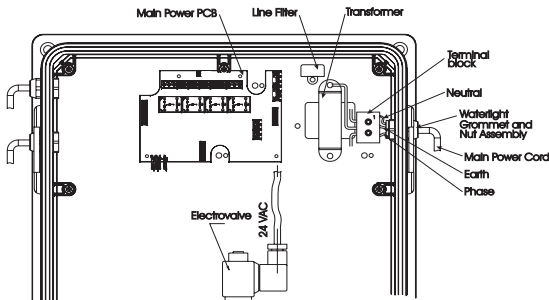
Recorder Output and Relay Access

Hard wiring for alarms and relays recorder output and serial communication can be accomplished through four watertight connectors on the left side of the enclosure, by passing wires through the rubber grommet and tightening the nut as described earlier.

Refer to the drawings for proper wire connections.

WARNING! DISCONNECT POWER SUPPLY PRIOR TO REMOVAL OF THIS COVER.

Cable access for All alarms "ONLY"

Watertight Grommet and Nut Assembly

Cable access for RS232 and Recorder Output Connections "ONLY"
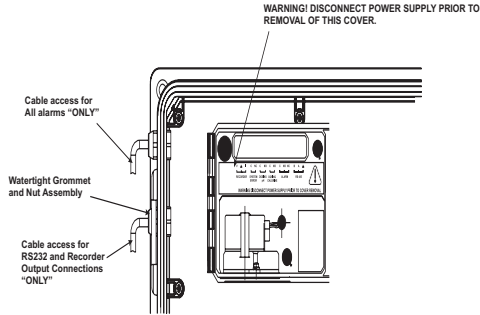
Alarm Relay

A system alarm feature provides relay activation to signal that the measuring value exceed the alarm setpoints. The alarm relay is closed (Common connect to Normal Close) if the value is lower than alarm low setpoint or higher than alarm high setpoint.

The ALARM LED blinks when alarm is active.
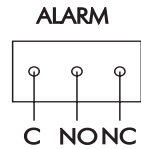
Note: The Alarm relay is power-fail safe and is closed when the analyzer is not powered.

System Error Relay

A system error feature provides relay activation to signal the need for operator intervention through an external device, such as a buzzer, a light or any other electrical equipment. When errors appears, the relay is closed (Common connect to Normal Close).

The SYSTEM ERROR LED blinks when a system error occurred.
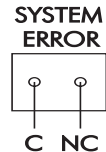
If the situation persists for more than a few samples, the operator should notify maintenance personnel for investigation of the problem.

Note: When the meter is in alarm mode or in system error mode, the user could directly view the alarm or error description on the display.

If GSM transmitter is installed and GSM mode is selected, the alarms and errors are sent as SMS message.
The System Error relay is power-fail safe and is closed when the analyzer is not powered.

Chlorine Dosing Relay

The chlorine dosing relay is activated (Common connected to Normal Open) when chlorine concentration is under the dosing setpoint. The chlorine dosing uses a proportional algorithm that depends on both, setpoint and delta (Δ).

The DOSING CHLORINE LED is turned on when the dosing relay is closed.

Note: The chlorine dosing is stopped when the concentration is over Alarm high setpoint or when a System Error related to chlorine measurement occurs.

Acid/alkali Dosing Relay

Acid/alkali dosing relay is activated (Common connected to Normal Open) depending on the setpoint and selected delta. If the analyzer is set to dose acid, the relay is active when the pH value is over the setpoint. If alkaline is dosed, the relay is activated when the pH value is under the setpoint.

The DOSING ACID/ALK. LED is turned on when the dosing relay is closed.

Note: The acid/alk dosing is stopped when system error related to pH occurs.
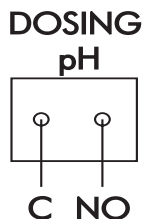
Recorder Output

The recommended recorder hookup uses a twisted pair shielded cable. The shield should be connected to the terminal at the instrument end and left open at the recorder end.

To operate with this hookup, the following conditions are required at the recorder end:

• The input to the recorder must be isolated from the chassis ground (earth) of the recorder;

• If the recorder has more than one input, they must be differential inputs.

For PCA310, PCA320 and PCA330 several type of outputs are available: 0-10 mV, 0-100 mV, 0-1 V, 0-20 mA or 4-20 mA. The recorder output could be assigned to Cl, pH, Temperature or ORP.(see the right figure)
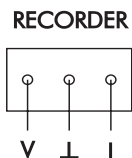
For PCA340 two types of outputs are available: 0-20 mA or 4-20 mA for each output. The recorder outputs could be assigned to Cl, pH, Temperature.(see the right figure)

RECORDERS

I_1 ⊥ I_2
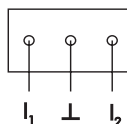
Proportional dosing pump

At PCA310, PCA320 and PCA330 a proportional dosing pump could be connected to the 4-20 mA output. The pump could be used to dose chlorine or acid/alkali as selected by the user. When the output is 4 mA, the pump must be stopped and when the output is 20 mA, the pump must provide the maximum output.

For PCA340 two proportional dosing pumps could be connected to the 4-20 mA outputs. The pump could be used to dose chlorine and acid/alkali as selected by the user. When the output is 4 mA, the pump must be stopped and when the output is 20 mA, the pump must provide the maximum output.

RS485

The analyzer has RS485 serial communication with selectable baud rate between 1200 and 9600 Bps. The GSM module HI504900 is also connected using the RS485 port.

RS 485

B A ⊥
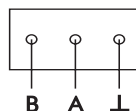
Note: The RS485 could use also the ground wire to prevent common mode voltages.

To power up the analyzer open the electronic box door and turn on the main switch.

When the analyzer is powered up, the display backlight is turned on and initialization takes place. In this phase, the integrity of the stored data is checked and the information regarding the language is loaded.
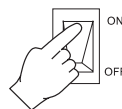
The display will show HANNA INSTRUMENTS, the name of the instrument and the software version.

```
HANNA INSTRUMENTS
PCA310  Ver. 1.2k
   Free Chlorine
Loading language..
```

or

```
HANNA INSTRUMENTS
PCA310  Ver. 1.2k
   Total Chlorine
Loading language..
```

Notes: If the instrument is set for free chlorine analysis, the software will report at startup Free Chlorine and if it is set for total chlorine, the software will report at startup Total Chlorine.
After initialization, the analyzer will show the main panel (or chlorine measuring panel for PCA310 and PCA340). The measured values are displayed. The chlorine concentration will be updated only after a full measuring cycle. The first reading is 0.00 mg/L and the dosing relay is not active.
After the first chlorine concentration is measured and displayed, the chlorine dosing relay is activated if necessary.
If the SMS feature is selected and correctly configured, the analyzer will send a SMS at each power up sequence.

PANELS ORGANIZATION

The PCA310 - PCA340 analyzers provide a friendly interface that display all important parameters of the analyzer. The appearance of the display could be selected by the user.

The panels are organized in circular loops. PCA330 has a main loop where panels with all measurements are displayed, chlorine measurement loop, pH measurement loop, temperature measurement loop and ORP measurement loop where only information related to the parameter is displayed.

PCA320 and PCA340 has the same structure but without the ORP measurement panels.

PCA310 has only the chlorine measurement panels.

Pressing up and down arrow keys will scroll in a continuous loop (after last panel, the first panel is displayed). Pressing **CFM** permits movement to a subpanel. Pressing **ESC** returns to the main panel.
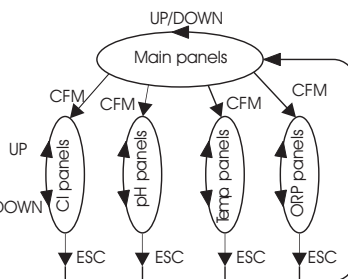
MAIN PANELS

At startup the display shows one of the main panels. This panel contains the chlorine, pH, ORP and temperature values and the related measuring units. The panel also contains the current time and the alarm/error status.

Other panels are available by pressing up or down arrow keys. On each of this panels one measurement is displayed on the left side and the others on the right side.

```
pH   5.94          08:10
Cl   0.15 mg/L Error
T    17.3 °C
ORP 187   mV
```

One row with messages is also displayed.

When the display shows one of these panels, pressing **CFM**, will enter in the panels related to the parameter displayed in the left side.

```
                   08:10
       6.29 pH     Error
<    Low ORP          >
Min:4.18  Max:7.00
```

Example: When pH is displayed on the left side and the chlorine, ORP and temperature on the right side, pressing **CFM** will go in one of the pH measure panels.

MEASURE PANELS

For each parameter, several measure panels are available.
One panel contains large digits for better visibility.

The measure panels contains:
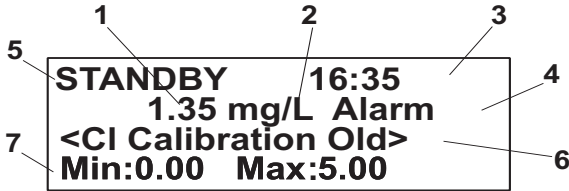
1 = the measured value (chlorine, pH, ORP or temperature)

2 = the measurement units (mg/L, pH, mV, $°C$ or $°F$)

3 = the current time in format HH:MM

4 = error or alarm indicator

5 = information about the operating mode.

6 = warnings, alarms and errors, displayed one at a time

7 = the last row displays less important information:

- Maximum and minimum value
- Sampling time
- Reagent doses left
- Alarm High and Alarm Low
- Regulator Setpoint and Delta or Hysteresis
- Analog output maximum and minimum
- Cl measuring phase

USER INTERFACE

Pressing CNF, the display shows an enlarged font of the selected parameter. This screen provides easier visualization at a distance and will remain on the display for approximately 4 minutes. The display returns in the panel where it was before.

Pressing ESC will return the display to the original default display panels mode.

```
┌─────────────────────────┐
│                  16:49  │
│  2.50                   │
│                  mg/L   │
└─────────────────────────┘
```
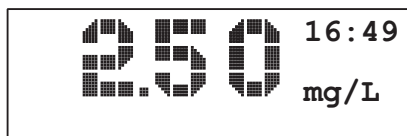
MESSAGES

When warnings, alarms or errors appears, the message line is displayed. The meanings of each message is explained in chapter ERRORS, ALARMS AND WARNINGS.

If many messages are present, the "<"and ">" signs are displayed on the left and/or the right side.

Pressing left or right arrow keys the messages are scrolled. If is no message in the left or right side, the corresponding sign "<" or ">" disappears.

When at least one alarm is active, the "Alarm" appears in the right side of the display. The ALARM LED will start to blink.

When errors or both, errors and alarms are active, "Error" appears in the right side of the display. The SYSTEM ERROR LED will blink.

The "MANUAL" or "STANDBY" information is displayed on the first line of the LCD.

MENU MODE

By pressing MENU key, the analyzer will enter in menu mode.

In this mode, the analyzer settings can be viewed or modified. The settings are organized and grouped by functions.

The menu is password protected.

PASSWORD PROCEDURE

When the MENU key is pressed, the analyzer ask for the password.

If the password is set to "0000" (default value) the analyzer will not ask for password.

```
┌─────────────────────────┐
│                         │
│  Enter password:0000    │
│                         │
└─────────────────────────┘
```

If correct password is entered and confirmed, the analyzer will go in menu mode.

If wrong password is entered, the analyzer displays "Password incorrect. Settings are not allowed!", and the user could only view the analyzer parameters.

NAVIGATING THROUGH MENU

The menu is organized as a list of options. Each line of this list:

- could contain a sub-menu;

- could display an analyzer parameter,

- could start a function.

```
■ General Menu
  Chlorine Menu
  pH Menu
≫ ORP Menu
  Temperature Menu
```
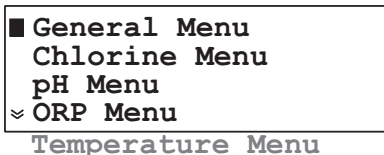
To select a menu line, press up or down arrow keys.

The selected line is signaled by a black square in the left side of the display.

If the menu continues outside the viewing area, a double up or down arrow is displayed on the first or last line of the display.

As a general rule, the **CFM** key open the menu of the highlighted selection and **ESC** key will return to a higher level.

Pressing **CFM** key will make the following actions:

- open the sub-menu.
- no action for parameter line.
- start the function for function line.

Pressing **ESC** key will make the following actions

- return in measure mode when in the main menu.
- return in the previous menu when in submenu.
- return from function before the normal ending when function is executing.
- exit from edit mode without saving.

MODIFY A PARAMETER

To modify a parameter, press **SET** key when an editable parameter is displayed.

The cursor will go to the first digit or letter of the parameter.

Note: If wrong password is entered, editing is not allowed.

The editing sequence depend upon the parameter type.

For list type parameter

In this case the cursor will blink and first letter alternates with a black square. To modify the value press up or down arrow key until the correct value appears.

```
 Setpoint :2.50 mg/L
■Delta    :0.1  mg/L
 Low Point:0.02 mg/L
 Low Point:Inactive
```

Press **CFM** to save the value or press **ESC** to end the editing without saving the value.

For single numeric values

In this case the cursor will blink by alternating the first digit and a black square.

Press right or left arrow key to focus on the digit that has to be edited.

To edit the current digit press up or down arrow keys.

Press **CFM** to save the value or press **ESC** to end the editing without saving the value.

For many numeric values on a row

In this case the cursor will go to the first digit of the first parameter. The cursor will blink but no black square will be displayed.

Select the parameter to be edited by pressing right or left arrow keys.

To edit the parameter press **SET** key again and the black square alternating with the first character appears, signaling that the parameter could be edited.

```
 Set Time:  10:31
■Set Date:2004/01/01
```

Depending on the parameter type, the edit procedure is as described for list type or single numeric value.

Press **CFM** to save the value or press **ESC** to end the editing without saving the value. The cursor will prompt the edited parameter.

Press right or left arrow keys to set another parameter.

Press ESC key to return to Menu.

Note: If the edited value is outside the allowed range, a warning panel appears when CFM is pressed. This panel contains the parameter limits. Pressing again CFM or ESC will return to the edit mode.

To set the parameters press **MENU** while in the measure mode. The main Menu is displayed.

```
■ General Menu
  Chlorine Menu
  pH Menu
⌄ ORP Menu
    Temperature Menu
```

Select the appropriate entry as described in next pages.

The settings are stored in a nonvolatile EEPROM memory. If a power failure appears the settings are restored after power on.

When power is first time applied to PCA310 - PCA340 analyzers, the settings are set to factory default values.

At startup the EEPROM content is analyzed and, if some settings are corrupted, a restore procedure is started. The instrument displays the following screen:

```
EEP1 Errors found!
Press:
CFM -to try restore
SET -set to default
```

Press **CFM** to restore the settings that are out of range. In this case, the corrupt settings are set to defaultand all settings should have their values verified.

Press **SET** to restore to default settings.

In extreme situations when the LCD is blank at startup, is possible to reset the instrument by keeping the keys up + **SET** + **MENU** pressed while the instrument is powered on.

The analyzer settings, common for all measurements, are grouped in "General Menu".

For PCA310, PCA320 and PCA330 only one setting area is available, as shown in the next picture.

```
■ System Log
  Analog Output
  SMS Settings
≈ Serial & GSM Comm.
  Time and Date
  System Functions
  Language Change
```

For PCA340 two setting areas are available, as shown in the next picture.

```
■ System Log
  Analog Output1
  Analog Output2
  SMS Settings
≈ Serial & GSM Comm.
  Time and Date
  System Functions
  Language Change
```

CHANGING THE PASSWORD

The password is a numeric value with 4 digits.

To change the password, enter in "General Menu" - "System Functions" and edit the "Change Pass" line. Press **CFM** to save.

After new value is confirmed, the displayed password is set to 0000 to protect against unauthorized reading.

SETTING THE LANGUAGE

The PCA310 - PCA340 analyzers has 4 languages stored inside. The user could easily change the language without restarting the analyzer.

To select a new language, enter in "General Menu" - "Language Change" and select the new language. After pressing **CFM** key, the new language is loaded.

ANALYZER SERIAL NUMBER AND SOFTWARE VERSION

The unique serial number can be viewed by selecting the "General Menu" - "System Functions" - "Serial Nr.".
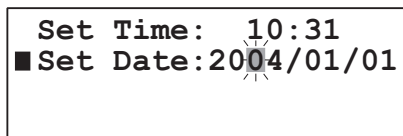
Serial number is not editable.

The software version is displayed each time the analyzer is turned on and lasts during the initialization phase.

TIME AND DATE

The PCA310 - PCA340 analyzers have a built-in real time clock. When the analyzer is in normal mode, the current time is displayed on the right side of the display in HH:MM format.

To set the time and date, select the "General Menu" - "Time and Date". Set the time and the date as described in the User interface chapter.

```
 Set Time:  10:31
■Set Date:2004/01/01
```

Three working modes could be selected for the analyzer. The selection is available in "General Menu" - "System Functions" - "Manual Commands" - "Work Mode".

The work mode could be set as AUTOMATIC, STANDBY or MANUAL.

```
■ Work Mode:AUTOMATIC
  Read On Demand
  Alarm Relay :ON
≫ Dose Cl Rel :ON
  Dose pH Rel :ON
  Sys.Err. Rel:OFF
  Stirrer     :OFF
  Valve       :OFF
  Cell Led    :OFF
  Reagent Pump:OFF
```

AUTOMATIC MODE

In this mode the analyzer performs the measurements continuously accordingly with the settings.

STANDBY MODE

When in standby, the sampling electrovalve is closed, the measurements are stopped and the peristaltic pump is activated for 2 seconds each 100 minutes to preserve the elasticity of the tubes.

The display will show "STANDBY" on the first line when in the measurement mode. The chlorine, pH, ORP, and temperature displayed values will remain the last measured ones.

The SYSTEM ERROR LED is always on (no blinking).

Note: When the analyzer exit from STANDBY, the relays and corresponding LED's are activated only after a new value is read.

MANUAL MODE

For testing, maintenances and setup purposes, the analyzer has the possibility to use direct manual commands.

In this operating mode, by setting the "Alarm Relay", "Dose Cl Rel.", "Dose pH Rel.", "Sys. Err. Rel", "Stirrer", "Valve", "Cell Led" and "Reagent Pump" as "ON" or "OFF" will turn on or off the corresponding device.

The display will show "MANUAL" on the first line when in the measurement panels. The displayed values will be the last measured ones and the measuring sequence is stopped.

When in manual mode the ALARM LED is always on (no blinking).

READ ON DEMAND

When this function is selected, ("General Menu" - "System Functions" - "Manual commands" - "Read On Demand") a new chlorine measuring cycle is immediately started.

This command is useful when calibrate or whenever an immediate result is needed.

Note: The read on demand function is active only when the analyzer is in automatic mode.

DIRECT READ

For rapid diagnostics of the measuring cell, the converter readings for dark (cell LED off) and blank (cell LED on) could be consulted.

To display the dark reading activate the "General Menu" - "System Functions" - "Dark Read" function. After confirmation the dark value is displayed.

To display the blank reading activate the "General Menu" - "System Functions" - "Blank Read" function. After confirmation the blank value is displayed.

```
■ Manual Commands
  Dark Read
  Blank Read
≫ Change Pass: 0000
```

If the cell works correctly, the values must be between -20000 and 20000 with a minimum difference blank — dark of 20000 converter points.

SYSTEM ERROR RELAY

The PCA320 - PCA340 controller has a single system error relay for all measured parameters.

To allow chlorine errors to activate the relay, set "Chlorine Menu" - "Alarm&Err Chlorine" - "Err.Relay" to Active.

For pH errors set the item "pH Menu" - "Alarms&Err pH" - "Err. Relay" to Active.

For ORP errors set the item "ORP Menu" - "Alarms&Err ORP" - "Err. Relay" to Active.

For temperature errors set the item "Temperature Menu" - "Alarms&Err Temp." - "Err. Relay" to Active.

The settings related to chlorine measurement are grouped in "Chlorine Menu". The following options are available:

```
■ Reagent Change
  Measure Settings
  Dosing Control Cl
≫ Alarms&Err Chlorine
   Analog Output Cl
   Cal. Measuring Cell
   Measure Info
```

REAGENT CHANGING

One set of reagents is enough for at least 16000 samples.

The remaining doses of reagent are displayed on one of the chlorine measuring panels.

```
■ Used Doses  : 0003
  Remaining   :15997
  Reset Reag. Counter
  Prime Reag. Circuit
```

When the reagent is changed, below listed actions must be performed:

Prepare the reagent and install the new bottles as described in initial preparation and installation chapter.

Prime the reagent pump if needed or simply reset the reagent counter.

Both used and remaining reagent doses can be viewed on the first two lines when in "Chlorine Menu" - "Reagent change".

If "Chlorine Menu" - "Reagent change" - "Reset Reag. Counter" function is selected and confirmed, the used doses become 0 and the remaining doses become 16000. This command does not perform a priming of the reagent pump.

If "Chlorine Menu" - "Reagent change" - "Prime Reag. Circuit" function is selected and confirmed, the dosing pump is turned on for 180 seconds. The remaining time is displayed on the right-down corner of the display.

```
  Priming in progress
  ...
                 168s
```

The process could be terminated by pressing **ESC** at any moment.

MEASUREMENT SETTINGS

Select "Chlorine Menu" - "Measure Settings" and set the "Period" between 3 and 90 minutes.

Period (sampling rate) is the elapsed time between two consecutive chlorine measurements. The sampling rate is also important when the analyzer is used for chlorine dosing. For larger pools, the period must be longer, and for smaller pools, the period must be shorter.

The sampling rate can be quickly consulted on one chlorine measuring panel.

MEASUREMENT INFO

The analyzer calculates the maximum and minimum concentration value since the first measurement.

The maximum and minimum can be quickly consulted on chlorine measuring panel.

To see information about these values, select "Chlorine Menu" - "Measure Info". The time stamp when maximum and minimum appears are also displayed in this menu.

To reset the maximum or minimum values, select the functions "Chlorine Menu"- "Measure Info" - "Clear Max. Value"or "Chlorine Menu"- "Measure Info" - "Clear Min. Value".

```
■ Max.Value:0.25 mg/L
  Date:04/01/16 22:45
  Min.Value:0.00 mg/L
≽ Date:04/01/03 00:16
    Clear Max. Value
    Clear Min. Value
```

The maximum (or minimum) value will be set to the current read value.

ANALOG OUTPUT

The type of analog output can be set as described in "Analog output" chapter. The analog output span for chlorine could be set in "Chlorine Menu" - "Analog Output Cl".

"Min. Rec" will set the recorder lower limit and "Max. Rec" will set the recorder higher limit.

The Max. Rec. value must be greater than Min. Rec. value.

```
■ Max. Rec:5.00 mg/L
  Min. Rec:0.00 mg/L
```

The output will be proportional with chlorine if the read value is between those limits.

Example: For PCA310 - PCA330 if the 0.0 to 1.0 V recorder output has been selected, the operator can select 0.0 V to correspond to a concentration of 3.00 mg/L (Min. Rec. setting) and 1.0 V to correspond to a concentration of 4.50 mg/L (Max. Rec. setting).

For PCA340 if the 0.0 to 20.0 mA recorder output has been selected, the operator can select 0.0 mA to correspond to a concentration of 3.00 mg/L (Min. Rec. setting) and 20.0 mA to correspond to a concentration of 4.50 mg/L (Max. Rec. setting).

The full scale span of the recorder would then be 1.5 mg/L, yielding a magnified view of the 3.00 to 4.50 mg/L concentration range on the recorder.

The analog output limits can be quickly consulted in one of the chlorine measuring panels.

CHLORINE DOSING

The PCA310 - PCA340 analyzers contain a simple proportional dosing algorithm. Proportional dosing establishes and maintains a controlled and consistent concentration level.

The analyzer has a relay for chlorine dosing and also the 4-20 mA output could be configured as a dosing output.
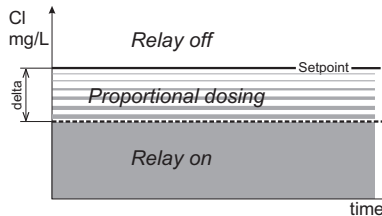
The equation for determining the time for relay on is:

dosing time = (set value - measured value)*Period/Delta

The analog output will have the value:

analog output [mA] = 4 + 16 * dosing time/Period [mA]

Note: If the measured concentration is lower than setpoint minus delta, the dosing will be continuous until the next measurement is taken (one period).

Example: For setpoint 3.00 mg/L, delta=0.5, sample rate 5 minutes and measured value 2.80 mg/L, the proportional dosing will be active for the initial 2 minutes and will stop for the remaining 3 minutes.

In fact: Time = (3-2.8)*5/0.5 = 2 minutes

Analog output = 4 + 16*2/5 = 10.4 mA

To modify the dosing setpoint, enter the "Chlorine Menu" - "Dosing control Cl" and edit the "Setpoint" line. The value must be between 0.10 and 4.90 mg/L.

```
■ Setpoint :2.50 mg/L
  Delta    :0.1  mg/L
  Low Point:0.01 mg/L
≫ Low Point:Inactive
  Max. ON  :060 min
```

To modify the Delta, edit the "Delta" line. The available values are 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0.

Note: The speed of the analyzer could be modified by changing the sampling rate. A new decision regarding the chlorine regulator is taken only after a new measurement.

The Setpoint and Delta could be quickly consulted on one of the chlorine measuring panels.

Low-reading protection

To prevent excessive chlorine dosing if the detector is not working properly or the reagent bottle is empty, a "Detector Error" is generated if the measured chlorine value is under the low-point value. This error is generated only if the low-point feature is set active.

The chlorine dosing is stopped and the SYSTEM ERROR LED starts blinking.

To enable this feature, edit "Chlorine Menu" - "Dosing control Cl" - "Low Point" value and set the "Low Point" status as "Active". The allowed value is 0.00 to 1.00 mg/L.

Overdosing protection

To prevent overdosing a "Detector Error" is generated if the dosing command is on for the Max. ON time and the read value is changing less than 0.05 mg/L.

The chlorine dosing is stopped and the SYSTEM ERROR LED starts blinking. The dosing could be resumed only by restarting the controller.

To modify this protection, edit "Chlorine Menu" - "Dosing control Cl" - "Max. ON" value. The allowed range is between 30 and 720 minutes.

ALARMS

Two alarm setpoints are available for chlorine: Alarm high and Alarm low.

The ALARM LED and alarm relay are activated when the chlorine concentration is higher than Alarm-high or lower than Alarm-low.

To modify the alarm setpoints, enter the "Chlorine Menu" - "Alarms & Err Chlorine" and edit "Alarm Hi" or "Alarm Lo" value.

```
■ Alarm Hi : 2.34mg/l
  Alarm Hi :Inactive
  Alarm Lo :00.00mg/l
≫ Alarm Lo :Inactive
    Err.Relay:Active
```

The alarms could be separately activated or inactivated.

To modify the alarms status, enter the "Chlorine Menu" - "Alarms & Err Chlorine" menu and edit "Alarm Hi" or "Alarm Lo" status. When the status is set to "Inactive", the alarm is ignored.

Note: The Alarm high must be greater than Alarm-low value. The analyzer displays a warning if the settings are incorrect.
The Alarm-high setpoint and Alarm-low setpoint could be quickly consulted on one of the chlorine measuring panels. When an alarm is disabled, the —.— is displayed instead of alarm value.

The PCA310 - PCA340 analyzers have the possibility to calibrate the measuring cell.

When a new calibration is performed, calibration factor is recalculated and all measurements are multiplied with it.

CALIBRATION DATE AND FACTOR

The last calibration date can be found in the "Chlorine menu" - "Cal. Measuring Cell" - "Cal. Date".

```
■ Cal.Value:0.14 mg/L
  Factor   :0.954
  Cal. Date:04/01/20
≫ Reset Cal. Factor
     Calibration Blank
```

Calibration date is in the YY / MM / DD format.

A warning "Cl Calibration Old" is displayed if one month has elapsed from the last calibration.

The calibrated date is updated after a new calibration has been done.

The calibration factor is displayed in "Chlorine menu" - "Cal. Measuring Cell" - "Factor".

The default calibration factor is 1.000. Each measurement result is multiplied with calibration factor.

The calibration factor could be reset to 1.000 by activating the "Chlorine menu" - "Cal. Measuring Cell" - "Reset Cal. Factor" function.

CALIBRATION PROCEDURE

To calibrate the measuring cell, follow the steps:

1. Withdraw a sample of the measured liquid directly from the drain port of the measuring cell (#12) by opening its valve (#11) - see figure on page 11.

    Note: Withdraw the sample just before the electrovalve stops the liquid flow to the measuring cell.

2. With the meter calibrated measure the sample. This is the calibration value.

3. Wait for the PCA to display the new reading.

4. Go in "Chlorine menu" - "Cal. Measuring Cell" and edit "Cal. Value" field.

5. Enter the calibration value and save with "CFM".

6. The calibration coefficient and the calibration date will be updated.

• Press repeatedly **ESC** to exit from menu mode. The displayed chlorine concentration will be equal with the calibration value.

Note: It is not recommended to calibrate the analyzer at values below 2 mg/L in order to maintain enough accuracy in the whole range. Calibration below 2 mg/L does not guarantee declared accuracy outside an interval of ±50% from the calibration value.

Settings related to pH measurement are grouped in "pH Menu". The following options are available:

```
 Dosing Control pH
 Alarm&Err pH
 Analog Output pH
≫Cal. pH Probe
   Measure Info
```

MEASUREMENT INFO

The analyzer calculates the maximum and minimum pH value since the first measurement.

The maximum and minimum can be quickly consulted on one of the pH measuring panels.

For detailed information select "pH Menu" - "Measure Info" The "Max. Value" and "Min. Value". The time stamp when maximum and minimum occurs is also displayed in this menu.

To reset the maximum or minimum values, select the functions "pH Menu" - "Measure Info" - "Clear Max. Value" or "pH Menu" - "Measure Info" - "Clear Min. Value".

```
■Max.Value:14.00 pH
 Date:03/01/01 14:39
 Min.Value:00.00 pH
≫Date:04/01/01 00:03
   Clear Max. Value
   Clear Min. Value
```

The maximum (or minimum) value is set to the current read value.

ANALOG OUTPUT

The type of analog output could be set as described in "Analog output" chapter. The analog output span for pH could be set in "pH Menu" - "Analog Output pH".

"Min. Rec" will set the recorder low limit and "Max. Rec" will set the recorder high limit. The Max. Rec. value must be greater than Min. Rec. value.

The output will be proportional with pH value if the read value is between those limits.

The analog output limits could be quickly consulted in one of the pH measuring panels.

pH DOSING

The PCA320 and PCA340 can use ON/OFF, or proportional dosing algorithm, to stabilize the pH .

The analyzer has a relay for acid or alkali dosing and also the 4-20 mA output could be configured as a dosing output.

To select the type of pH dosing edit the "pH Menu" - "Dosing Control pH" - "pH Control" line. The available options are Proportional and ON/OFF.

```
■ pH Control:On/Off
  Dosing Type:Acid
  Period   :003 sec
≈ Setpoint :07.00 pH
  Delta    :0.1
  Hysteresis:1.00 pH
  Max. ON  :060 min
```

The acid or alkali dosing is set in the "pH Menu" - "Dosing Control pH" - "Dosing Type". When "Acid" is selected, the analyzer will dose when the pH value is higher than the setpoint and when "Alk" is selected, the analyzer will dose when the pH value is lower than the setpoint.

Proportional dosing

The proportional dosing algorithm turns on the dosing relay proportionally with the difference between the setpoint and measured value.
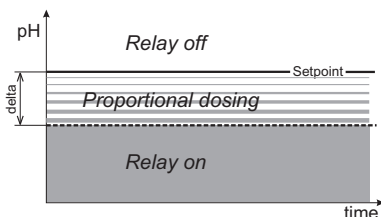
The equation for determining the time for relay on is:

dosing time = (set value - measured value)*Period/Delta

The analog output will have the value:

analog output [mA] = 4 + 16 * dosing time/Period [mA]

Note: If the measured pH is lower (or higher for acid dosing) than setpoint minus (plus) delta, the dosing will be continuous until the pH period has elapsed.

To modify the dosing setpoint, enter the "pH Menu" - "Dosing Control pH" edit the "Setpoint" line. The value must be between pH 2.00 and 12.00. To modify the Delta, edit the "Delta" line. The available values are 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.5, 2.0. To modify the dosing time edit the "Period" line.

The allowed values are between 3 and 120 seconds. The period is related only to the dosing process. The pH measurement takes place with a higher rate.

The speed of the analyzer could be modified by changing the regulator period. A new decision regarding the pH dosing is taken only after one period has elapsed.

The Setpoint and Delta could be quickly consulted on one of the pH measuring panels.

ON/OFF dosing

If this mode is selected the "Period" and "Delta" have no effect. The algorithm will use only "Setpoint" and "Hysteresis".

For alkaline dosing, the relay will stay on until the pH increases to the setpoint plus hysteresis value, then the relay stays off until the pH decreases to a value equal to setpoint.
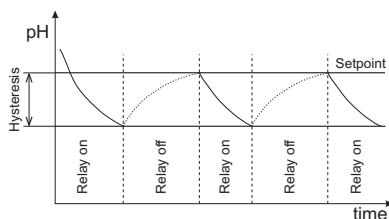
For acid dosing, the relay will stay on until the pH decreases to the setpoint minus hysteresis value, then the relay stays off until the pH increases to a value equal to setpoint.

To set the hysteresis, edit the "pH Menu" - "Dosing Control pH" - "Hysteresis" line. The hysteresis value must be between pH 0.05 and 2.00.

Overdosing protection

To prevent overdosing a "Detector Error" is generated if the dosing command is on for the "Max. ON" time and the read value is changing less than pH 0.1.

The acid/alkali dosing is stopped and the SYSTEM ERROR LED starts blinking. The dosing could be resumed only by restarting the controller.

To modify this protection, edit "pH Menu" - "Dosing control pH" - "Max. ON" value. The allowed range is between 30 and 720 minutes.

ALARMS

Two alarm setpoints are available for pH: Alarm high and Alarm low.

The ALARM LED and relay are activated when the pH value is higher than Alarm high or lower than Alarm low.

To modify the alarms setpoints, enter the "Alarms pH" menu and edit "Alarm Hi" value or "Alarm Lo" value.

The alarms can be separately activated or inactivated.

To modify the alarms status, enter the "pH Menu" - "Alarms pH" menu and edit "Alarm Hi" status or "Alarm Lo" status. When the status is set to "Inactive", the alarm is ignored.

Note: The Alarm-high value must be greater than Alarm-low value. The analyzer displays a warning if the settings are incorrect.
The Alarm-high Setpoint and Alarm-low setpoint could be quickly consulted on one of the pH measuring panels. When an alarm is disabled, the —.— is displayed instead of alarm value.

It is recommended to perform pH calibration when the probe is replaced and after any cleaning action. The analyzer can perform 2 points calibration, 1 point calibration or process pH calibration.

To perform any pH calibration enter in "pH Menu" - "Cal. pH Probe".

```
 Set Default pH Cal.
 Process pH Cal.
■Buffer pH Cal.
 Cal. Date :01/01/01
```

In this menu the last calibration date is displayed on the "Cal. Date" line. If the probe calibration is older than 1 month, a warning is displayed.

Initial Preparation

Pour small quantities of pH 7.01 (HI7007) and pH 4.01 (HI7004) or pH 10.01 (HI7010) solutions into individual beakers. If possible, use plastic beakers to minimize any EMC interference. Also NIST buffers of pH 6.86 or 9.18 could be used.

For accurate calibration use two different beakers for each buffer solution, the first one for rinsing the probe and the second one for calibration. By doing this, contamination between buffers is minimized.

Unscrew the probe from its position. Take care to stop the sample flow before removing the probe. If necessary, disconnect the probe from analyzer to prevent damaging the probe cable.

ONE-POINT CALIBRATION

Immerse the pH probe into the buffer solution (e.g. pH 7.01) until the metal ring is immersed, then stir gently.

Select the "pH Menu" - "Cal. pH Probe"-"Buffer pH Cal.".

Probe

pH 7.01

• The analyzer will prompt to select the first buffer. Select the buffer (e.g. pH 7.01) using up or down arrow keys and confirm.

• The analyzer checks for reading's stability. During this period, the "Wait for stabilize" message is displayed.
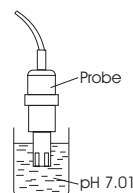
```
Buffer 1 pH:    7.01
Measured pH:    7.02
Temp.  [°C]:   25.1
Wait for stabilize
```

Note: If the read value, calculated with the default offset and slope, is different from the expected value with more than 1.15 pH (i.e. offset > 68 mV), the "Wrong calib. values" message is displayed. The message "Wrong calib. values" appears also if the pH probe is defective or not connected. The problem could be identified if the buffer set value is compared with the actual read value (first and second line of the display).

If the probe is inserted in the appropriate buffer, the measuring cycle is restarted automatically and message "Wait for stabilize" is displayed again.

If the temperature reading is wrong, the value is set to 25°C and a blinking "" is displayed near it, indicating that is not the real temperature value. The calibration procedure is not interrupted. When the reading has stabilized, the analyzer displays "Stable... press CFM".*

The analyzer prompts for the second buffer selection, and displays the message "Select buffer pH... or press SET for one point cal.".

Pressing **SET** key will end the one-point calibration procedure.

TWO-POINTS CALIBRATION

• To perform a two-points pH calibration follow the steps described at one-point calibration until the analyzer displays the message: "Select buffer pH... or press SET for one-point cal.".

• Immerse the pH electrode into the second buffer solution (e.g. pH 4.01) until the metal ring is immersed, then stir gently.

Probe
pH 4.01

• Press up or down arrow keys to select the second buffer from the list to continue the calibration and confirm with "CFM".

Note: To ensure calibration accuracy, the difference between the first and second buffer must be more than pH 1. Calibration using pH 7.01 and 6.86 or pH 10.01 and 9.18 is not allowed.
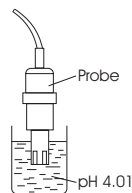
• The analyzer checks for reading's stability. During this period, the "Wait for stabilize" message is displayed.

• When the reading has stabilized, the instrument checks if the calculated slope is between 47.3 and 68 mV/pH. If the value is not within this range, the message "Wrong calib. values" is displayed. In this case it is necessary to perform a cleaning procedure (see "Electrode conditioning and maintenance" section) or to replace the probe.

• If the value is accepted, the analyzer displays "Stable... press CFM".

Pressing **CFM**, completes the two-point calibration.

PROCESS pH CALIBRATION

The PCA320, PCA330 and PCA340 have the possibility to calibrate the pH probe without using buffers and without dismounting the probe. For doing this calibration, a reference pH-meter must be used. To complete the process calibration, follow the steps:

1. Pour the sample in a beaker. Take the sample directly from the drain port of the measuring cell (#12) by opening it's valve (#11) to do this as described in the Calibration Procedure chapter.

2. Place the pH probe of the reference meter in the beaker and stir gently.

3. Wait for the reading to stabilize.

4. Enter in "pH Menu"- "Cal. pH Probe" - "Process pH Cal." and enter in the "Cal. Value" field the reading from the reference pH meter.

```
■Cal. Value:06.84 pH
```
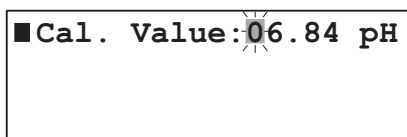
5. Press CFM key when the analyzer prompts for "Overwrite pH cal. ?".

6. The analyzer checks for reading's stability (see One-point calibration) and when the value has stabilised stable the message "Stable... press CFM" is displayed.

7. Pressing **CFM** key will complete the process pH calibration.

   Note: The calibration could be terminated at any time by pressing ESC. In this case the new calibration is not saved and the old one remains effective.

SET DEFAULT CALIBRATION

When a new probe is connected or for any reason the current calibration is wrong and new calibration can't be performed, the default calibration values could be set. In this case the slope is set to 59.16 mV/pH and the offset is set to 0 mV.

To accomplish that, select "pH Menu" - "Cal. pH Probe" - "Set Default pH Cal."

The analyzer will ask "Reset the pH cal. to default ?" and if **CFM** key is pressed will replace the existing calibration coefficients with the default values.

Settings related to temperature measurement are grouped in "Temperature Menu". The following options are available:

```
■ Units    :Fahrenheit
  Alarms&Err Temp.
  Analog Output Temp.
  Measure Info
```

UNITS

The analyzer displays the Temperature using Celsius or Fahrenheit temperature units.

To select the temperature units, edit the "Temperature Menu" - "Units" line. Select Celsius or Fahrenheit and confirm.

Note: The temperature values sent via SMS are always the Celsius values.

MEASUREMENT INFO

The analyzer calculates the maximum and minimum temperature values since the first measurement.

The maximum and minimum can be quickly consulted on one of the temperature measuring panels.

For more detailed information select "Temperature Menu" - "Measure Info". The "Max. Value" and "Min. Value" are displayed and also time stamp when maximum and minimum occurs are displayed in this menu.

```
 Max.Value:167.0 °F
 Date:04/01/18 00:00
 Min.Value: 41.0 °F
⌄Date:04/05/22 18:57
   Clear Max. Value
   Clear Min. Value
```

To reset the maximum or minimum values, select the functions "Temperature Menu" - "Measure Info" - "Clear Max. value" or "Temperature Menu" - "Measure Info" - "Clear Min. value"

The maximum (or minimum) value is set to current read value.

ANALOG OUTPUT

The type of analog output could be set as described in "Analog output" chapter. The analog output span for temperature could be set in the "Temperature Menu" - "Analog Output Temp.".

"Min. Rec" will set the recorder's lower limit and "Max. Rec" will set the recorder's higher limit. The Max. Rec. value must be greater than Min. Rec. value.

The output will be proportional with temperature value if the read value is between those limits.

```
■ Max. Rec.:167.0 °F
  Min. Rec.:041.0 °F


```

The analog output limits could be quickly consulted in one of the Temperature measuring panels.

ALARMS

Two alarm setpoints are available for temperature: Alarm high and Alarm low.

The ALARM LED and relay are activated when the temperature value is higher than Alarm high or lower than Alarm low.

To modify the alarms setpoints, enter the "Temperature Menu" - "Alarms Temperature" and edit "Alarm Hi" or "Alarm Lo" value.

```
■ Alarm Hi :086.0 °F
  Alarm Hi :Active
  Alarm Lo :068.0 °F
≫ Alarm Lo :Active
  Err.Relay:Active
```

The alarms could be separately activated or inactivated.

To modify the alarms status, enter the "Temperature Menu" - "Alarms Temperature" menu and edit "Alarm Hi" or "Alarm Lo" status.

Note: The Alarm-high value must be greater than Alarm-low value. The analyzer displays a warning if the settings are incorrect.
The Alarm-high setpoint and Alarm-low setpoint could be quickly consulted on one of the temperature measuring panels. When an alarm is disabled, the —.— is displayed instead of alarm value.

Settings related to ORP measurement are grouped in "ORP Menu". The following options are available:

```
■ Alarms ORP
  Analog Output ORP
  Measure Info
```

MEASUREMENT INFO

The analyzer calculates the maximum and minimum ORP value since the first measurement.

The maximum and minimum can be quickly consulted on one of the ORP measuring panels.

For more detailed information select "ORP Menu" - "Measure Info" The "Max. Value" and "Min. Value" are displayed and also time stamps when maximum and minimum occurs are displayed in this menu.

```
■ Max.Value:2000 mV
  Date:04/01/14 14:51
  Min.Value:    0 mV
≫ Date:03/01/01 18:29
   Clear max. value
   Clear min. value
```

To reset the maximum or minimum values, select the functions "ORP Menu" - "Measure Info" - "Clear Max. Value" or "ORP Menu" - "Measure Info" - "Clear Min. Value"

The maximum or minimum value is set to current read value.

ANALOG OUTPUT

The type of analog output could be set as described in "Analog output" chapter. The analog output span for ORP could be set in the "ORP Menu" - "Analog output ORP".

"Min. Rec" will set the recorder's lower limit and "Max. Rec" will set the recorder's higher limit. The Max. Rec. value must be greater than Min. Rec. value.

The output will be proportional with ORP value if the reading is between those limits.

The analog output limits could be quickly consulted in one of the ORP measuring panels.

ALARMS

Two alarm setpoints are available for ORP: Alarm high and Alarm low.

The ALARM LED and relay are activated when the ORP value is higher than Alarm high or lower than Alarm low.

To modify the alarms setpoints, enter the "ORP Menu"-"Alarms ORP" menu and edit "Alarm Hi" value or "Alarm Lo" value.

```
■ Alarm Hi :1000 mV
  Alarm Hi :Active
  Alarm Lo :0200 mV
≫ Alarm Lo :Active
  Err.Relay:Active
```

The alarms could be separately activated or inactivated.

To modify the alarms status, enter "ORP Menu" - "Alarms ORP" menu and edit "Alarm Hi" status or "Alarm Lo" status. When the status is set to "Inactive", the alarm is ignored.

Note: The Alarm-high value must be greater than Alarm-low value. The analyzer displays a warning if the settings are incorrect.
The Alarm-high setpoint and Alarm-low setpoint could be quickly consulted on one of the ORP measuring panels. When an alarm is disabled, the — is displayed instead of alarm value.

The PCA310, PCA320 and PCA330 analyzers have two types of analog output: voltage output and current output. Only one output type is active at a time. If the voltage output is selected, the current output is set to 0 mA and if the current output is selected, the voltage output is set to 0 V.

The PCA340 analyzer has two current analog outputs. Each one can be configured as 0-20 mA, 4-20 mA or dosing type. Also they can be assigned to one of the measurement parameters: Cl, pH, Temp.

SELECTING THE ANALOG OUTPUT TYPE

To select the analog output type for PCA310, PCA320 and PCA330 enter in "General Menu" - "Analog Output".
To select the analog output type for each chanel available for PCA340, enter in "General Menu"-"Analog Output 1" or "Analog Output 2".

```
■ Out Param.:Chlorine
  Type      :Dosing
  Cal.Analog Out Max.
≈ Cal.Analog Out Min.
    Output Middle Range
```

The analog output could be assigned to one of the four measured parameters. To define this assignment, edit the "Out Param." field. "Chlorine" for PCA310, "Chlorine", "pH", and "Temper." for PCA320 and PCA340, "Chlorine", "pH", "ORP" and "Temper." for PCA330.
To select the analog output type edit the "Type" line. The available options are: 0-10 mV, 0-100 mV, 0-1 V voltage outputs and 0-20 mA , 4-20 mA current outputs for PCA310, PCA320, PCA330 and 0-20 mA , 4-20 mA current outputs for PCA340.

DOSING THROUGH 4-20 mA OUTPUT

Select "General Menu" - "Analog Output" - "Type" as Dosing to activate this feature. The output becomes 4-20 mA current type, proportional with pH or chlorine regulator output.
The 4 mA corresponds to pump being stopped and 20 mA corresponds to pump operating at full speed.

This mode should be selected when a proportional pump is attached to the analyzer.

Note: In this mode calibration is not allowed. If calibration menu is entered, the following message appears: "Analog output value cannot be changed when analog output type is dosing".

The analog output is factory calibrated. Recalibration is not needed when the output type is changed. If, for any reason, a new calibration has to be performed, each output type could be easily calibrated. For PCA310 - PCA330 series to calibrate the voltage type analog output follow below listed steps:

1. Connect a voltmeter to the pin s1 and 2 of the output connector.
2. Enter in menu mode and select "General Menu" - "Analog Output" sub-menu.
3. Assign the analog output type to one of the voltage output ranges 0-10 mV, 0-100 mV or 0-1 V.
4. Select "Cal. Analog Out Max" and press up and down arrows keys until the read value is equal with the maximum of the selected range (10 mV, 100 mV or 1 V).
5. Save the new coefficients by pressing **CFM** key.
6. Select "Cal. Analog Out Min" and press up and down arrows keys until the read value is equal with 0V.
7. Save the new coefficients by pressing **CFM** key.
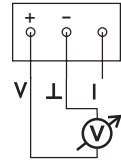
To calibrate the current type analog outputs, follow the below listed steps.

1. For PCA310, PCA320 and PCA330 connect an ammeter to the pins 2 and 3 of the output connector.
2. For PCA340 connect an ammeter to the pins 1 and 2 / pins 3 and 2 of the output connector.
3. Enter in menu mode and select "General Menu" - "Analog Output" sub-menu.
4. Assign the analog output type to one of the current types 0-20 mA or 4-20 mA.
5. Select "Cal. Analog Out Max" and press up and down arrow keys until the read value is equal with 20 mA.
6. Save the new coefficients by pressing CFM key.
7. Select "Cal. Analog Out Min" and press up and down arrow keys until the read value is equal with 0 mA or 4 mA. The analog output source current and when calibrating 0 mA, a positive value must be set for current (0.1 mA for example) and then the current must be slowly decreased to 0 mA.
8. Save the new coefficients by pressing **CFM** key.
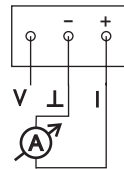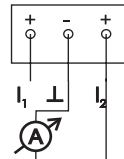
OUTPUT MIDDLE RANGE

To easily adjust a recorder offset, the analog output could be set to middle range. In this case the output is set to 5 mV, 50 mV or 500 mV for 0-10 mV, 0-100 mV or 0-1 V output and to 12 mA or 10 mA for 4-20 mA or 0-20 mA output.

To activate this option select "General Menu" - "Analog Output" - "Output Middle Range" function and press **CFM** key. The analyzer will display "Recorder output is set to middle value". Press **ESC** to exit from this function.

For PCA340 to activate this option select "General Menu" - "Analog Output1" or "Analog Output2" - "Output Middle Range" function and press **CFM** key. The analyzer will display "Recorder output is set to middle value". Press **ESC** to exit from this function.

Note: The analog output calibration is not allowed if the analog output type is set to "Dosing". Long press the arrow keys to increase analog output variation speed.

The PCA310 - PCA340 analyzers have a permanent logging function. Up to 3500 records could be stored. At a sampling interval of 3 minutes the log covers more than 7 days.

If the logging memory is full, the oldest record is lost when a new record is stored.

The record contains the date and time, the chlorine, pH, ORP and temperature value and the status of errors and alarms.

SETTING THE LOG

The data is stored after the chlorine measuring cycle has been completed. The log can be stored only after several chlorine cycles. The number of cycles between two logs is set in "General Menu" - "System Log" - "Log Cl cycles".

The allowed range is between 1 and 10 chlorine measuring cycles.

Example: If the sampling period for chlorine is set to 3 minutes and the log Cl cycle is set to 5, a new record is stored at each 15 minutes (3 x 5).

CLEARING SYSTEM LOG

To erase the system log activate the function "General Menu" - "System Log" - "Clear System Log".

VIEWING THE LOG

To consult the log, select "General Menu" - "System Log".

The searching criteria for viewing the log could be set by editing the "Search" field.

The following options are available:

- "All" meaning that all records will be displayed.
- "Alarms" meaning that only the records that contain alarms are displayed.
- "Errors" meaning that only the records that contain errors are displayed.
- "Err&Alr" meaning that both errors and alarms are displayed.

The records from one day are displayed. To set the searching date, edit the "Day", "Month" and "Year" fields.

The default searching date is the current date.

To display the log contents select the "View Records" function. The analyzer will find all records from specified date that match the searching criteria.

```
■ View Records
  Search  :All
  Day :28 Month :10
⌄ Year :2004
  Log Cl cycles:01
  Clear System Log
```

When the searching is in progress, the message "Searching Records" is displayed.

The search result could be:

- "No records found" meaning that no records were found with specified criteria.
- "No records stored" meaning that there is no record in log.
- Display the log.

The records will have the following structure:

```
        1          2           3
    14:38 1.00   5.86
  ■ 14:33 1.05   5.63 A        4
    14:27 1.20   4.99   E
    14:22 1.17   5.11 AE       5
```

1 - Time of the record

2 - Chlorine value

3 - pH value (only for PCA320, PCA330, PCA340)

4 - Alarm field (empty if no alarms)

5 - Errors field (empty if no errors)

The double arrow sign is present on the bottom line if the log continues outside the display.

Pressing up or down arrow key will scroll the log with one record up or down. Long press one of the up or down arrow keys to scroll one page at a time (interval of 4 seconds).

Press **CFM** when a record is highlighted for the record content to be displayed in detail.

The display contains:

```
          1                 2
    2004/01/19 06:13
  3  0.33 mg/L   5.85 pH     4
  5   205 mV       5.0 °C    6
      Temp. Out of Range>    7
```

1 - The log day

2 - The log hour and minute

3 - The chlorine concentration and units (mg/l)

4 - The pH value and units (pH)

5 - The ORP value and units (mV)

6 - The temperature value and units (°C or °F)

7 - The Errors and Alarms

If several errors or alarms are present, the "<" and ">" signs are displayed on the left or right side of the display. To select another message, press left or right arrow keys.

Press **ESC** three times to return to main Menu.

The PCA310 - PCA340 have one RS485 serial communication port. The serial communication is galvanically isolated from other analyzer parts.

The connector configuration for RS485 is shown here.

Two working modes are available for the serial communication: STANDARD and GSM.

RS 485

B A ⊥
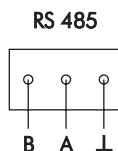
STANDARD MODE

Use RS485 to RS232 converter to connect the analyzer to PC. By using the HI92500 software, the analyzer data can be downloaded to the PC and also the analyzer parameters can be set from PC.

To allow our users access to the latest version of Hanna Instruments PC compatible software, we made the products available for download at http://software.hannainst.com. Select the product code and click **Download Now**. After download is complete, use the **setup.exe** file to install the software.

To set communication as PC type, select "General Menu" - "Serial & GSM Comm." and set the "Type" to STANDARD.

To establish connection with the PC the baud rate, the RS485 address and the password must be matched between the application and PCA310 - PCA340 analyzer.

The baud rate is set in the "General Menu" - "Serial & GSM Comm." - "Baud Rate" menu. Available values are 1200, 2400, 4800, 9600 bps.

Analyzer address is set in the "Address" line and could be between 0 and 32.

> Note: If several analyzers are connected in a RS485 network, each analyzer must have a unique address. When one parameter is edited by the user, the PC software is unable to modify it. Any other parameter can be modified by the PC software.

GSM MODE

If the "Type" is set to GSM, the analyzer will work with HI504900 GSM module. This connection enables the analyzer to send SMSs to one (or two) cellular phone(s) and through this feature the device can be monitored. Further, if an error occurs on the PCA3x0, an SMS is sent to the cellular phone(s) signaling the problem.

When the SMS feature is active, three types of SMS messages are sent to the selected cellular phone(s).

Alarm SMS which contains the Error, Alarm and Warning messages that are active on the analyzer, separated by ";". The events that generate the alarm SMS are user selectable from "General Menu" - "SMS Settings".

Info SMS which contains the Chlorine, pH, ORP and Temperature readings. Analyzer's error status and settings are also included as selected by the user from "General Menu" - "SMS Settings".

Warning SMS which contains information about the SIM card credit.

The settings related to GSM are grouped in "General Menu" - "Serial & GSM Comm.".

SETTING THE GSM FEATURE

To use the SMS feature, a SIM card able to make voice calls must be used.

It is necessary to enter the PIN code of the SIM card inserted in the GSM module. To do this, set the "General Menu" - "Serial & GSM Comm" - "PIN No.".

```
■ Type :STANDARD
  Baud Rate:9600
  Address: 01
≈ Send SMS :Inactive
  PIN No.  :0000
  Phone 1  :Inactive
  No1:--------------
  Phone 2  :Inactive
  No2:--------------
  Charge Inf:Inactive
  Exp.Date:2010/01/01
  Remaining:0000
  RepeatNo:2
  Delay   :05  min
  Remote  :Active
```

Note: For security reasons the PIN number is not visible after editing. The field will always show 0000.

One or two phone numbers associated with the service - to which the messages will be sent – must be set. The number has to be entered in the fields named "No1" and "No2". The space reserved for a phone number is 15 digits.

The phone numbers have to be inserted using the international format excluding the starting $+$ character and without any space inside the number.

Example: if the cellular number is $+39123456789$ ($+39$ is the country code), the number to be stored in the PCA310 - PCA340 is 39123456789.

The numbers could be activated or inactivated. The SMS is sent only to active numbers. If both numbers are inactive, no SMS is sent even if both numbers are correctly entered. To activate the phone numbers, set "Active" in the "Phone1" and "Phone2" fields.

The SMS sending has to be activated by selecting "Active" in the "Send SMS" field. If "Send SMS" is set to "Inactive" then no SMS will be sent even if the phone numbers are active.

The number of repeated alarm SMSs can be set in the field "RepeatNo". The range is between 0 and 5. If RepeatNo is set to 0 than only one SMS is sent.

The delay between two repeated SMSs is set in the "Delay" item. The range is between 5 and 60 minutes. If the "RepeatNo" is 0, this parameter has no effect.

GSM CONNECTION

After the correct settings are done, the SMS feature can be enabled by setting "General Menu" - "Serial & GSM Comm." - "Type" to GSM.

Note: Power the GSM module before first attempting to connect the analyzer to GSM network. If the PIN number is wrong, then it is not possible to make the cellular module connection. The "GSM Wrong PIN Code" message is displayed.
If the first attempt to initialize GSM engine fails because of a wrong PIN, then no other attempt will be allowed (to prevent sending three wrong PINs).
To make another attempt, a new PIN has to be entered and the analyzer has to be restarted. The analyzer attempts to initialize the GSM module at startup.

If a wrong PIN was entered three times, the user has to extract the SIM card and manually enter the PUK number using his own cellular phone to unlock the SIM card.

Note: There is no need to modify the default baud rate (1200) of the serial link when enabling the GSM feature. It will be switched to 9600 automatically.

SETTING SMS FEATURE

In order to avoid sending frequent SMSs or rapid use of the GSM credit when one measuring channel does not work correctly, the user can customize his/her SMS sending options.

The options are available in the "General Menu" - "SMS Settings".

To select the events that generate alarm SMS, set the "Cl Events", "pH Events", "ORP Events" or "Temp. Event" as Active or Inactive. When one of them is active the corresponding alarms and errors will generate an alarm SMS. When alarm SMS is sent, all current alarms and errors are sent, even if are not the ones that initiated the SMS.

```
■   --Alarms SMS--
 Cl Events :Inactive
 pH Events :Inactive
⩗ORP Events:Inactive
 Temp.Event:Inactive
    --Info SMS --
 Set       :Inactive
 Errors    :Inactive
```

To customize the info SMS, two options are available:

• "Errors" - when active, will include in the info SMS all alarms and errors currently active on the analyzer.

• "Set" - when active, will include in the info SMS alarm and dosing setpoints.

Alarm SMS

When errors or alarms appear, alarm SMS is sent to the active phone numbers. Alarm SMS is sent without special request. The events that generate alarm SMSs can be selected as described in Setting SMS Feature paragraph. Alarm SMS is sent once per chlorine cycle.

30 seconds after alarm SMS has been sent, a phone call is made by the analyzer to the programmed number(s). This is done because the SMSs can be received with a considerable delay due to network overload, while the phone call takes place immediately.

The phone call advises the user that something has happened on the PCA analyzer and an SMS is going to be received. Is not necessary to answer the phone call and it is advisable to stop it without any answer.

A confirmation of the alarm message reception is awaited by the analyzer. The confirmation can be done by simply calling the PCA analyzer phone number (number of the GSM module). The analyzer will hang up without answering and will send Info SMS (this confirmation is managed as an information request; see further on for details). Info SMS don't need confirmation.

If "RepeatNo" is more than 0, the instrument sends repeated (1 to 5 times) alarm messages if confirmation is not received. This feature prevents loss of message due to phone network being overloaded. The "0" is associated with no repetition: only one message will be sent and no confirmation awaited.

The delay (5 to 60 minutes) between two subsequent messages can be set on the "Delay" line.

Note: A remote connection will cancel the confirmation awaiting. Also, the analyzer events occurred during a remote connection will not generate any alarm SMSs, even after the remote connection ends.

Example of alarm SMS: "Temp Err;L Ph;H Temp;Pwr rst;" (see Errors, Alarms and Warnings chapter for details).

Info SMS

When the instrument receives a phone call (coming from one of the programmed cellular numbers), it reads the calling as an information request and reacts by hanging up and sending an info SMS.

The maximum number of characters for an SMS is 160, so, if the message text is longer, many messages will be sent. In this case a message header is added with information about the message type and the current / total number of SMSs (for example INF1/2:).

It is possible to ask the PCA310 - PCA340 for Info SMS from a cellular phone different from the one(s) set in the analyzer. This is accomplished by sending to the instrument the SMS: "PxxxxAWE", where xxxx is the analyzer's password (the one used for settings).

The instrument will recognize the command and reply by sending the Info SMS.

Note: If the analyzer is waiting for confirmation after sending an alarm SMS, the received SMS will be just stored on the SIM until the confirmation is received or all the repeated alarm SMSs are sent.

The info SMS will always contain the Chlorine, pH, ORP and Temperature readings and the Settings and Errors if enabled. Also, the remaining SMSs number will be added if "Chk. Charge" is active.

Example of info SMS: "Temp Err; L Ph; H Temp; READINGS: ReagRem＝8413; Cl＝2.05; pH＝7.02; Orp＝700; Temp＝25.2;"

Example of info SMS (splitted): "INF1/2: Temp Err; L Cl; L Ph; H Temp; Cl Cal; SET: Cl (SP=2.00; AIH=2.70; AIL=150); pH(SP=7.00; AIH=8.00; AIL=6.00); ORP (AIH=800; AIL=200); Temp (AIH=30.0; AIL=20.0);"

"INF2/2: READINGS: ReagRem=8413;Cl=1.35;pH=5.02; ORP=280; Temp=75.0; Remaining SMS=321;"

Warning SMS

The information about SIM charge and expiration date is not saved on the SIM card but is managed by the network operator; the analyzer can not get the information directly.

To prevent an unnoticed discharge of the SIM card, the user has to configure manually (according to the credit stored on the SIM card), the maximum number of SMSs that can be sent. The item is "Remaining" (SMS) in the "General Menu" - "Serial & GSM com." menu.

If the "General Menu" - "Serial & GSM com." - "Charge Inf"is set "Active", every time an SMS is submitted, the "Remaining" item is updated and will always indicate the remaining number of messages that the analyzer can send.

With "Chk.Charge" set "Active", the number of remaining SMSs is checked and when the counter is going to reach zero, a warning SMS containing the text "Maximum number of SMS reached. Please check the cellular SIM card charge level" is sent.

```
Charge Inf:Active
 Exp.Date:2010/01/01
 Remaining:0000
RepeatNo:2
```

This particular situation is managed as an error occurrence and a confirmation of the SMS reception is awaited. After that, a "GSM no credit" warning appears on the display signaling that no other SMS can be sent.

In this case the user is supposed to extract the SIM card from the cellular module as soon as possible and check the remaining credit (using its own cellular phone and calling the network operator).

Every time a recharge of the cellular module SIM card is performed, the corresponding expiration date has to be manually updated – item "Exp.Date" in the "General Menu" - "Serial & GSM com.".

If the "Chk.Charge" item is set "Active", a check is performed daily between the current date and the expiration date. Two weeks before the expiration date, the warning SMS "The cellular SIM card will expire on: DD-MM-YYYY. Please recharge or substitute it" is sent to the programmed phone number(s). This message is sent both one week and one day before expiration date.

Note: This particular warning message does not need confirmation.
In this case the user has to recharge or substitute the SIM card. The sending of the repeated warning messages will be reset when the expiration date is changed. If the expiration date is reached without any updating of the expiration date, then the message "GSM Card expired" appears on the display and no more SMSs will be sent by the analyzer until the error is deactivated. To deactivate this error it is necessary to update the SIM expiration date.
If the user has unlimited credit on the SIM card, the "Chk. Charge" must be set "Inactive". In this case the value of remaining messages will not be decremented and no check will be performed on the SIM card expiration date. Moreover, in the info SMS the remaining-messages information will not be present.
If a problem related to GSM feature occurs during the normal functioning of the analyzer, the "GSM Not Respond", "GSM Init failed" or "GSM Network Error" will be displayed and the analyzer will try repeatedly to initialize the cellular engine. The error will be deactivated only after a successful initialization.

MODEM CONNECTION

Modem connection can be established between PCA310 - PCA340 and a remote computer. The connection allows the user to remotely interrogate the analyzer, about its status and measurements and to change analyzer parameters. Also the log could be downloaded through remote connection.

A SIM card able to receive data calls must be used in HI504900 GSM module.

To enable the answer to data request, the item "Remote" from "General Menu" - "Serial & GSM com." must be set to "Active".

To make the data transfer between PCA310 - PCA340 and remote PC, the HI92500 software must be installed on the PC, and a modem must be connected between PC and phone line.

```
⌃ Remaining:0000
  RepeatNo:2
  Delay   :05  min
■ Remote  :Active
```

To allow our users access to the latest version of Hanna Instruments PC compatible software, we made the products available for download at **http://software.hannainst.com**. Select the product code and click **Download Now**. After download is complete, use the **setup.exe** file to install the software.

The baud rate, the password and the RS485 address must the same on PCA and on PC application.

Note: If the PC stops the communication for 4 minutes, the GSM call is interrupted by the analyzer to free the line.

PCA310 - PCA340 analyzers incorporate several technologies to minimize the maintenance.

Also, if the GSM module is connected, the warnings, alarms and errors are sent to the operator, making the maintenance even simpler.

The analyzer status could be sent via SMS messages after a call from operator.

Calibration of the chlorine measuring circuits is not normally required. The DPD technique for measuring chlorine concentration is well established and consistent. Also, by measuring the sample blank absorbency to establish the zero reference of each measurement, the accuracy of the analyzer is assured.

If, for any reason, the Chlorine measurements are inaccurate proceed with the calibration procedure.

A visual check of the hydraulic compartment can detect leaks, pump tubing fatigue or breakage. These periodic checks help ensure reliable analyzer performance.

PCA310 - PCA340 analyzers warn the user with the "Low reagent" message, when the reagents level reaches approximately 20%.

Working at maximum capacity (3 minutes sampling rate), the analyzers can operate for 1.5 more days.

The alarm system is based on an internal counter that has to be reset every time the reagents are replaced.

The counter keeps track of the number of measurements taken and informs the user when it reaches the 16000th sample with the message "No reagent".

The pH, ORP and Temperature measurements are done with standard techniques that assure reliability and accuracy. However if a problem occurs on those measuring channels, an SMS is sent to the user.

Furthermore, if the relation between chlorine, pH and ORP is known for a certain application, one of those readings could be used to check the others, for example check the chlorine and pH by reading the ORP values.

ELECTRODE CONDITIONING AND MAINTENANCE

Preparation

Remove the probe protective cap.

Do not be alarmed if any salt deposits are present.

This is normal with probes and they will disappear when rinsed with water.

During transport tiny bubbles of air may have formed inside the glass bulb. The probe cannot function properly under these conditions. These bubbles can be removed by "shaking down" the probe as you would do with a glass thermometer.

If the bulb and/or junction are dry, soak the probe in HI70300 Storage Solution for at least one hour. If the probe does not respond to pH changes, electronics may be down and the electrode should be replaced.

Test measurement

Rinse the probe tip with distilled water.

Immerse the probe in the Hanna Instruments pH buffer 7.01 (HI7007) until the solution is in contact with the metal ring and stir gently for 30 seconds. The reading must be near pH 7.01. Repeat the operation for pH 4.01 solution (HI7004). The difference from the previous reading must be near pH 3.

Storage

To minimize clogging and ensure a quick response time, the glass bulb and the junction should be kept moist and not allowed to dry out. This can be achieved by installing the input lines in such a way that the probe holder is kept filled with sample.

When not in use, dismount the probe and keep in the protective cap with a few drops of HI70300 Storage Solution or HI7082 (KCl 3.5 M Solution).

Follow the Preparation Procedure before remounting the probes.

Note: Never store the probe in distilled or deionized water.

Periodic maintenance

Inspect the probe and the cable. The cable used for the connection must be intact and there must be no points of broken insulation on the cable, or cracks on the probe stem or bulb.

Cleaning procedure

General   Soak in Hanna Instruments HI7061 General Cleaning Solution for approximately $1/2$ hour.

Removal of films, dirt or deposits on the membrane/junction:

Protein   Soak in Hanna Instruments HI7073 Protein Cleaning Solution for 15 minutes.

Inorganic   Soak in Hanna Instruments HI7074 Inorganic Cleaning Solution for 15 minutes.

Oil/grease   Rinse with Hanna Instruments HI7077 Oil and Fat Cleaning Solution.

IMPORTANT: After performing any of the cleaning procedures, rinse the probe thoroughly with distilled water then soak the electrode in HI70300 Storage Solution for at least 1 hour and recalibrate before reinstalling it.

Troubleshooting

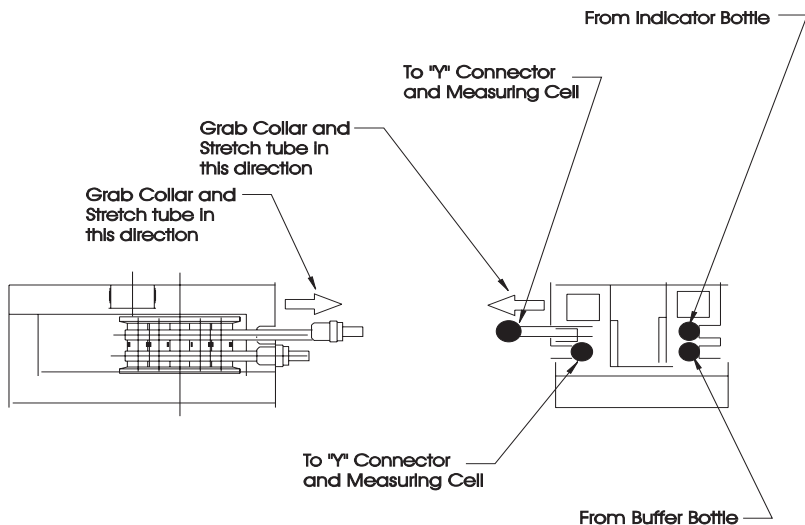Evaluate your probe performance based on the following.

- Noise (Readings fluctuate up and down) could be due to clogged or dirty junction: refer to the Cleaning Procedure above.

- Dry Membrane/Junction: soak in Storage Solution HI70300 for at least 1 hour. Check to make sure the installation is such that it forms a well for the probe bulb to constantly remain moist.

- Drifting: soak the probe tip in warm Hanna Instruments Solution HI7082 for one hour and rinse tip with distilled water.

- Low Slope: refer to the cleaning procedure above.

- No Slope:
     - Check the probe for cracks in glass stem or bulb (replace the probe if cracks are found).
     - Make sure cable and connections are not damaged.

- Slow Response/Excessive Drift: soak the tip in Hanna Instruments Solution HI7061 for 30 minutes, rinse thoroughly in distilled water and then follow the Cleaning Procedure above.

- For ORP probe: polish the metal tip with a lightly abrasive paper (paying attention not to scratch the surface) and wash thoroughly with water.

CHANGING PERISTALTIC PUMP TUBING

It is recommended that the peristaltic pump tubes are changed on a regular basis depending on sampling period and operating time.

For a 3-5 minutes sample interval and continuous operation, changing of the tubes every month is recommended. For best results however, change the tubings every time the reagents are replaced.

Note: Rubber gloves and eye protection must be worn while handling reagent tubing to prevent contact with reagent chemicals. Read MSDS documents before proceeding.
Grasp the plastic collar of one of the pump tubes and pull the fitting away from the pump toward the front of the case until it clears the retaining indentation.
Then move the fitting sideways, away from the pump until the tube clears the slot.
Release the tube and fitting. The fitting on the other end of the pump tube may now be easily removed from the pump body.

From Indicator Bottle

To "Y" Connector and Measuring Cell

Grab Collar and Stretch tube in this direction

Grab Collar and Stretch tube in this direction

To "Y" Connector and Measuring Cell

From Buffer Bottle

Remove the reagent tubing from one end of the pump tube fitting and pull the pump tube from behind the pump rollers.

Replace the pump tube with a new one and reassemble in reverse order. Repeat for the other pump tube.

TUBING REPLACEMENT

The remaining tubing in the analyzers should be replaced every two months.

When installing new tubing it is helpful to dip them in hot water before making the connections.

It is also recommended that the tubes are removed and replaced one at a time.

Note: DPD reagent tubing may darken before the scheduled replacement time, but this will not affect the instruments performance.

HI70479   HI70474 or HI70475   HI70473
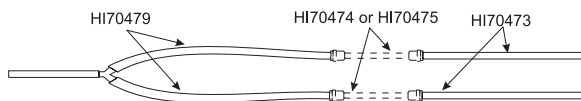
CLEANING MEASUREMENT CELL

In order to maintain the maximum measurement reliability, it is recommended to periodically clean the measurement cell. In fact, the measurement cell could collect sediment or develop a film growth on the inside walls. When the automatic dirt compensation system detects the deposits, the analyzer will show "Dirty cell" message.

The measurement can continue but cleaning is recommended to avoid deposits that are harder to clean.

Thorough cleaning with a dilute acid solution and a cotton swab is recommended monthly. Depending on sample conditions at individual locations and absence of input filters, it may be necessary to clean the cell on a weekly basis. This can be determined by observing the cell condition when reagents are changed.

It is also highly recommended to clean the cell every time you turn the meter off. By doing this, scaling and mold growth are prevented. Otherwise, subsequent cleaning might become more difficult.

For cleaning procedure, remove the plastic cap placed on the top of the measuring cell.

Add a few drops of 19.2N Sulfuric Acid solution or alcohol to the cell.

Allow sulfuric acid to stand in the measuring cell for 15 minutes to dissolve any foreign materials adhering to the cell walls. Wipe the cell interior with a cotton-tipped swab. After wiping, set the electrovalve to open so that it can start rinsing the cleaning solution from the measuring cell.

CHANGING MEASURMENT CELL

To change the measuring cell (#8 page 11) with a new one (HI704871) in the PCA310 - PCA340 analyzers, follow below listed steps:

1. Stop the analyser by turning off the main switch.
2. Remove the reagent and buffer bottles to free space.
3. Disconnect the reagent and buffer tubes from the cell body.
4. Disconnect the sample inlet tube from the cell body. This tube is between electrovalve (#21 pag 11) and cell.
5. Disconnect the drain tube (#9 on page 11) from the cell.
6. Unplug the cell connector.
7. Unscrew the cell from its support by using hexagonal wrench.
8. Put the new cell in its place and screw it in position. Take care to position the electrical cable first.
9. Reconnect the electrical wires and the pneumatic circuit as it was at the dismounted cell.
10. Power on the PCA310 - PCA340 analyzer.
11. Go to menu mode "Chlorine Menu" - "Cal measuring Cell" and start the "Calibration Blank" function.

- When "Start the blank calibration!" is displayed press the **CFM** key to confirm.
- Wait for the end of the procedure.
- If the message Press **CFM** appears, the procedure was successful and pressing **CFM** will save the coeficients for the new cell.
- If the message "failed" appears, the cell is not working properly. Check the electrical cable connection and if the error persists contact your local Hanna Instruments Office.
- Prime the reagent pump - see page 41 for details.
- Wait 3 cycles for the measurement to stabilize.
- Calibrate the measuring cell as described at page 47.

Note: Before start measuring ensure that a stirring bar (HI70486) is present in the cell.

The possible errors, alarms and warning messages are described below with a short suggestion about required action to remove the error.

The pH and temperature related messages are present only on PCA320, PCA330, PCA340 and the ORP related messages are present only on PCA330.

The warning messages appear on LCD and some of them are sent via SMSs. The warning messages do not stop the measuring process.

Alarm conditions generate messages on the LCD, send SMSs (if enabled), activate the alarm relay and the ALARM LED.

Error conditions generate messages on the LCD, send SMSs (if enabled), activate the system error relay, the SYSTEM ERROR LED and block the dosing.

Error messages

"**No Reagent**" on LCD and "**No Reag.**" on SMS
The reagent counter reached 0.
At each measurement the reagent counter is decreased with one unit.
Change the reagent bottle and reset the reagent counter. The reagent counter is reset also when the "prime reagent pump" command is executed.

"**Hardware Error**" on LCD and "**Hw Err**" on SMS
Error on the hardware. The writing in EEPROM failed or the analog to digital converter is not working; Contact your local Hanna Instruments Office.

"Detector Error" on LCD and "Det Err" on SMS

This error appears in the following situation:

The light does not reach the detector. The light source is broken or the inner cell wall is dirty.

The light that reaches the detector with lamp off is too high. The light source circuit or the detector circuit is broken.

The difference between the detector response with light on and light off is too small. The cell is dirty, the water is too turbid or the detector circuit is defective.

The chlorine reading is below "Low point". This could be caused by absence of chlorine in water, low pressure in the water inlet, malfunction of the sample valve, stir bar missing, missing reagent, detector malfunction.

The chlorine value does not increase at least with 0.05 ppm even if the chlorine dosing pump is running full time for "Max On time". In this particular case, the error is cleared only when the controller is restarted. This could be caused by absence of the chlorination agent, the malfunction of the dosing pump or malfunction of the detector.

Check the presence of the magnet bar, check the reagent level, check the reagent pump tubes, clean cell, observe the sample flow in the cell, edit the "Low Point". If value still does not increase, check the chlorine dosing pump and as last resort replace the cell.

"pH Out of Range" on LCD and "pH Err" on SMS

pH value is outside range (pH 0.00 to 14.00).

Verify the connections; Change the pH probe.

"ORP Out of Range" on LCD and "ORP Err" on SMS

ORP value is outside range (0 to 2000 mV).

Verify the sample ORP; verify ORP probe connections, Change the ORP probe.

"Temp. Out of Range" on LCD and "Temp Err" on SMS

Temperature value is outside range (0.0 °C to 75.0 °C).

Verify the sample temperature, verify the pH probe connector; change the pH probe.

"Conc. Out of Range" on LCD and "Cl Err" on SMS

Chlorine value is outside range (0.00 to 5.00 mg/L).

The chlorine concentration is too high.

Alarm messages

"High Chlorine" on LCD and "H Cl" on SMS

The concentration is over the Alarm-High setpoint.

Change the setpoint; verify the chlorine dosing.

"Low Chlorine" on LCD and "L Cl" on SMS

The concentration is under the Alarm-Low setpoint.

Change the setpoint, verify the chlorine dosing, wait for PCA to adjust the value.

"**High pH**" on LCD and "**H pH**" on SMS

The pH is over the Alarm-High setpoint.

Change the setpoint; verify the pH dosing; verify if acid/base dosing is correctly set; wait for PCA to stabilize the value.

"**Low pH**" on LCD and "**L pH**" on SMS

The pH is under the Alarm-Low setpoint.

Change the setpoint; verify the pH dosing; verify if acid/base dosing is correctly set; wait for PCA to adjust the value.

"**High ORP**" on LCD and "**H ORP**" on SMS

The ORP is over the Alarm-High setpoint.

Change the setpoint, verify the ORP probe.

"**Low ORP**" on LCD and "**L ORP**" on SMS

The ORP is under the Alarm-Low setpoint.

Change the setpoint, verify the ORP probe.

"**High Temperature**" on LCD and "**H Temp**" on SMS

The Temperature is over the Alarm-High setpoint.

Change the setpoint, verify the pH probe.

"**Low Temperature**" on LCD and "**L Temp**" on SMS

The Temperature is under the Alarm-Low setpoint.

Change the setpoint, verify the pH probe.

Warning messages

"**Dirty Cell**" on LCD and "**Drt Cell**" on SMS

The light level is too low. The light source current is near the highest value. The cell is dirty or the water is too turbid.

Check the water quality; check the water flow; clean the cell.

"**Reagent Low Level**" on LCD and "**L Reag**" on SMS

The reagent has reached the 20% of the initial quantity. The reagent level is based on a "blind" counting of the completed measurements. A difference between reagent counter and real reagent level could appear.

Change the reagent or reset the reagent counter.

"**Cl Calibration Old**" on LCD and "**Cl Cal**" on SMS

Cell calibration is older than 1 month.

Calibrate the cell.

"**Reagent Expired**" on LCD and "**Reag Exp**" on SMS
Reagent is older than 3 months. The reagent expiration time is started when reagent counter is reset or "prime reagent pump command is executed.
Change the reagent and reset the reagent counter.

"**GSM Wrong PIN Code**": appears on LCD
Wrong PIN code was entered.
Set the correct pin code and restart the analyzer.

"**GSM Init failed**": appears on LCD
The GSM modem was not successfully initialized.
Wait for auto retry. Verify other messages related to GSM.

"**GSM Card Expired**": appears on LCD
The SIM expiration date is reached.
Recharge the SIM card and change the expiration date or set the "Chk. Charge" Inactive.

"**GSM No Credit**": appears on LCD
The number of remaining SMSs is 0.
Recharge the SIM card and change the "Remaining" SMS value, or set the "Chk.Charge" Inactive.

"**GSM Not Respond**": appears on LCD
The GSM modem does not respond.
Check the data cable between GSM module and PCA, check the GSM module power supply and wait for auto retry.

"**GSM Network Error**": appears on LCD
The GSM network does not respond.
Check the GSM module antenna and wait for auto retry.

"**Pwr rst**": appears on SMS
There was a reset on the analyzer.
Check the main power supply for the cause of dropout.

"**pH calibration Old**" on LCD and "**pH Cal**" on SMS
The pH calibration is older than 1 month.
Calibrate the pH probe.

"**No pH Calibration**" appears on LCD
The pH channel was not calibrated.
Appears after "Set Default pH Cal." or after EEPROM error. In the last case, contact your local Hanna Instruments Office.

"**No ORP Calibration**" on LCD and "**No ORP Cal**" on SMS
The ORP channel was not calibrated.
Appears after EEPROM error. Contact your local Hanna Instruments Office.
"**No Temp. Cal**" on LCD and "**No T Cal**" on SMS
The Temperature channel was not calibrated.
Appears after EEPROM error. Contact your local Hanna Instruments Office.

Code	Description
HI98501	Digital Thermometer (-50.0 to 150.0 °C/-58.0 to 302 °F)
HI98128	pH meter (-2.00 to 16.00 pH)
HI98201	ORP tester ($+$/-999 mV)
HI1005	pH/temperature process probe
HI2008	ORP process probe
HI70474	PCA peristaltic pump tubing kit (6 pcs.)
HI70475	PCA peristaltic pump tubing kit (2 pcs.)
HI70476	PCA reagent bottle tubing kit (6 pcs.)
HI70477	PCA tubing set for measuring cell (2 pcs.)
HI70478	PCA tubing kit, bottle to pump (6 pcs.)
HI70479	PCA tubing kit, pump to Y strainer (6 pcs.)
HI70480	Free Cl_2 reagent set (HI70450, HI70451, HI70452)
HI70481	Total Cl_2 reagent set (HI70460, HI70461, HI70452)
HI70482	0.5/50 μm filter system
HI70483	PCA complete tubing kit
HI70484	PCA complete tubing kit (3 sets)
HI70485	PCA stirrer motor
HI70486	Stirring bar (2 pcs.)
HI704871	Colorimetric cell

HI70488	Electrovalve (24Vac/60Hz)
HI70489	Electrovalve (24Vac/50Hz)
HI70492	Electrode holder PCA330
HI70493	Closing cap for electrode holder
HI70494	Calibration port tap
HI70496	Replacement filter 0.45um (1 pcs.)
HI70497	Replacement filter 50um (1 pcs.)
pH Solutions	
HI7004M or HI7004L	pH 4.01 Buffer solution, 230 or 500 mL bottle
HI7006M or HI7006L	pH 6.86 Buffer solution, 230 or 500 mL bottle
HI7007M or HI7007L	pH 7.01 Buffer solution, 230 or 500 mL bottle
HI7009M or HI7009L	pH 9.18 Buffer solution, 230 or 500 mL bottle
HI7010M or HI7010L	pH 10.01 Buffer solution, 230 or 500 mL bottle
ORP Solutions	
HI7021M or HI7021L	ORP test solution, 240 mV @25 °C, 230 or 500 mL bottle
HI7022M or HI7022L	ORP test solution, 470 mV @25 °C, 230 or 500 mL bottle
HI7091L	Reducing pretreatment solution, 500 mL bottle +14 g (set)
HI7092M or HI7092L	Oxidizing pretreatment solution, 230 or 500 mL bottle
Electrode Storage Solutions	
HI70300M or HI70300L	Storage solution, 230 or 500 mL bottle
HI7082	3.5M KCl Electrolyte, 4x30 mL
Electrode Cleaning Solutions	
HI7061M or HI7061L	General cleaning solution, 230 or 500 mL bottle
HI7073M or HI7073L	Protein cleaning solution, 230 or 500 mL bottle
HI7074M or HI7074L	Inorganic cleaning solution, 230 or 500 mL bottle
HI7077M or HI7077L	Oil & Fat cleaning solution, 230 or 500 mL bottle
HI92500	Windows compatible application software

Certification

All Hanna Instruments conform to the CE European Directives.

Disposal of Electrical & Electronic Equipment. The product should not be treated as household waste. Instead hand it over to the appropriate collection point for the recycling of electrical and electronic equipment which will conserve natural resources.

Disposal of waste batteries. This product contains batteries, do not dispose of them with other household waste. Hand them over to the appropriate collection point for recycling.

Ensuring proper product and battery disposal prevents potential negative consequences for the environment and human health, which may be caused by inappropriate handling. For more information, contact your city, your local household waste disposal service, the place of purchase or go to www.hannainst.com.

CE

RoHS compliant

Recommendations for users

Before using this product, make sure it is entirely suitable for your specific application and for the environment in which it is used. Any variation introduced by the user to the supplied equipment may degrade the meter's performance. For yours and the meter's safety do not use or store the meter in hazardous environments.

Warranty

The PCA310, PCA320, PCA330, PCA340 are warranted for two years against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. Probes are warranted for a period of six months. Damage due to accidents, misuse, tampering or lack of prescribed maintenance is not covered.

If service is required, contact your local Hanna Instruments Office. If under warranty, report the model number, date of purchase, serial number and the nature of the problem. If the repair is not covered by the warranty, you will be notified of the charges incurred. If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization (RGA) number from the Technical Service department and then send it with shipping costs prepaid. When shipping any instrument, make sure it is properly packed for complete protection.

World
Headquarters

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