

PCA300 Family Chlorine, pH, ORP and Temperature Analyzers

- Alarm
 - Alarm and warning system
- 2 point calibration
 - One to two-point calibration
- Backlight
 - Backlit, LCD display



In regards to swimming pool treatment, disinfection or sanitizing basically means to rid the pool of bather contamination, destroy bacteria, and control nuisance organisms like algae, which may occur in the pool, filtration equipment, and piping. Of the many techniques used (chlorine, bromine and iodine dosing systems), chlorine is the most common.

Chlorine

Chlorine is a strong oxidizing agent that destroys mostly organic pollutants and bacteria and can combine with nitrogen containing compounds, forming chloramines. When dosing chlorine for disinfection, only a portion of the dosed chlorine remains active to actually continue the disinfection process.

When free chlorine combines with a nitrogen containing compound it becomes a less efficient disinfectant called chloramines. The addition of these two parts gives total chlorine. The target is to keep free and total chlorine equal, and thus to maintain the combined chlorine concentration (chloramines) near zero. The presence of chloramines is not desired because of the distinctive 'swimming pool' smell caused by combined chlorines like di-chloramines. Beside this unpleasant odor, chloramines can irritate the eyes and the mucous membranes.

Commercial chlorine for disinfection may be available as a gas (Cl_2), a liquid like sodium hypochlorite or bleach (NaOCl) or in a solid state like calcium hypochlorite, chloro-hydantoin or chloro-cyanuric acid compounds. These compounds, once dissolved in water do establish equilibrium between the hypochlorous acid (HOCl) and the hypochlorite ions (OCl^-). Although both forms are considered free chlorine, it is the hypochlorous acid that provides the strongest disinfecting and oxidising characteristic of chlorine solutions; the amount of hypochlorous acid in chlorinated water depends upon the pH value of the solution. Changes in pH value will affect the HOCl equilibrium in relation to the hydrogen and hypochlorite ion; HOCl decreases and OCl^- increases as pH increases. At a low pH, almost all

the free chlorine is in the molecular form HOCl and at a pH of around 7.5, the ratio between HOCl and OCl^- is 50:50. Since the ionic form OCl^- is a slow acting sanitizer while the molecular HOCl is a fast acting, it is important to regularly measure the pH. As a general rule a pH of about 7.2 is recommended to maintain fast acting disinfection conditions.

Measurement and Control Cycle

The PCA has a control time cycle that can be set by the user according with the dimensions of the controlled system. The control process, dosing commands and alarms can be performed according to this time cycle. The range of cycle timing is from 3 to 90 minutes.

Chlorine Control

Four chlorine level set points can be adjusted by the operator: a proportional dosing set point, two alarm set points and a minimum level for dosing. The proportional dosing factor ($1/\Delta$) is user selectable with a delta between 0.1 and 2 pH. Chlorine dosing system controls a SPST relay. Each alarm can be enabled or disabled.

pH Control

Three pH level set points can be adjusted by the operator: a control set point and two alarm set points. The pH control mode is user selectable; on/off or proportional dosing. The proportional dosing factor ($1/\Delta$) is user selectable with a delta between 0.1 and 2 pH. The on/off dosing hysteresis is user selectable between 0.05 and 2.00 pH. The pH dosing system controls a SPST relay.

Each pH, ORP and temperature alarm can be enabled or disabled, and two alarm levels can be set by the user also for temperature and ORP. Alarm condition controls a SPDT relay. The system error feature activates a relay to signal the need for operator intervention. System error condition controls a SPST relay.

Analog Output

Two current outputs of 4-20 mA 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 chloride and acid/alkaline dosing. The analog output is fully programmable and can be proportional with chlorine concentration, pH, ORP or temperature value. The limits of the analog output is selectable for each parameter.

Logging

The analyzers can store up to 3500 readings (at least 7 days at 3 minutes sampling interval), that can be available for consulting or downloading. Logged records contain the time stamp, full information about the parameter values and the alarm status at the time.

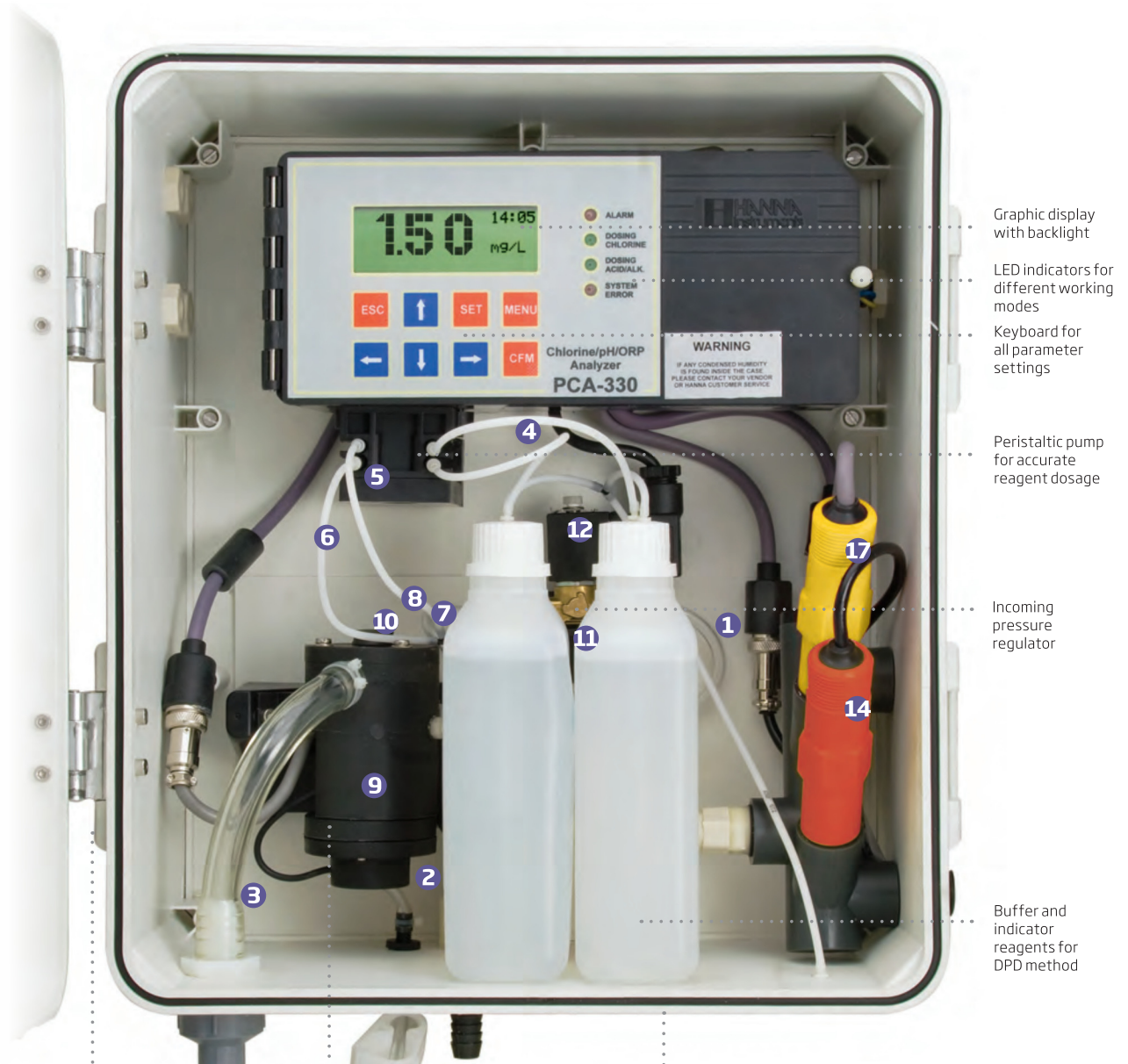
Alarm and Warning System

Through the system, users have the ability to enable or disable the low and high level of alarms for all parameters. The system also offers overdosing protection that generates an alarm if something within the system is not working properly. The system will stop processes until the error is corrected by the user. Time is displayed on the main panel and time related reminders are available for "old calibration", "reagent expired", and "SIM expired". All these warnings are generated based on user settings.

Mounting

These controllers are offered in an easy to access, wall mounted casing that offers outstanding chemical, mechanical and temperature resistance.

Specifications	PCA310	PCA320	PCA330
Free and Total Chlorine	Range	0.00 to 5.00 mg/L (ppm)	0.00 to 5.00 mg/L (ppm)
	Resolution	0.01 mg/L (ppm)	0.01 mg/L (ppm)
	Accuracy	± 8% or ±0.05 mg/L whichever is greater	± 8% or ±0.05 mg/L whichever is greater
pH	Range	-	0.00 to 14.00 pH
	Resolution	-	0.01 pH
	Accuracy	-	±0.05 pH
ORP	Range	-	0 to 2000 mV
	Resolution	-	1 mV
	Accuracy	-	±1 mV
Temperature	Range	-	5.0 to 75.0 °C (41 to 167 °F)
	Resolution	-	0.1 °C
	Accuracy	-	±0.5°C
Additional Specifications	Chlorine Calibration	one point	
	Chlorine Sampling Rate	adjustable from 3 to 90 minutes	
	Chlorine Dosage	proportional	
	Chlorine Delta	selectable from 0.1 to 5 mg/L (ppm)	
	pH Calibration	one or two point or in line calibration	
	pH Sampling Rate	adjustable from 3 to 120 seconds	
	pH Dosage	ON/OFF or proportional, relay or 4-20mA output	
	pH Delta	selectable from 0.1 to 2 pH (hysteresis adjustable from 0.05 to 2 pH)	
	Recorder Output	4-20mA, 0-20mA	
	PC Connectivity	RS485 port, galvanically isolated	
	Baud Rate	1200, 2400, 4800, 9600 bps	
	Data Logging	up to 3500 data points	
	Alarm Relay	SPDT contact with 5A, 230V resistive load	
	Dosing Relay	SPDT contact with 5A, 230V resistive load	
	System Error	SPDT contact with 5A, 230V resistive load	
	Inlet Pressure	0.07 to 4 bar with no external pressure regulator (for pressure exceeding four bar an external pressure regulator is required)	
	Sample Flow	100 to 300 mL/min	
	Sample Temperature	5 to 40°C (41 to 104°F)	
	Sample Inlet/Outlet Connection	12mm (1/2") male NPT fitting	
	Drain Connection	10mm (3/8") barb	
Power Supply	115 VAC ±10% or 230 VAC ±10%; 50/60 Hz; 20 VA		
Enclosure	NEMA-4X standard, molded fiberglass polyester with transparent Lexan window		
Dimensions / Weight	318 x 267 x 159 mm (12.5 x 10.5 x 6.25") / 5 kg (11 lb.) without reagents		
Ordering Information	Each PCA300 series model is supplied with reagent bottles (2), reagent caps (2), 1 DPD compound powder, tubing and instructions.;		
	PCA310-1 Free & total chlorine analyzer/control (115V);	PCA320-1 Free & total chlorine analyzer/control, pH control, temperature (115V);	PCA330-1 Free & total chlorine analyzer/control, pH control, ORP monitoring, temperature (115V);
	PCA310-2 Free & total chlorine analyzer/control (230V);	PCA320-2 Free & total chlorine analyzer/control, pH control, temperature (230V);	PCA330-2 Free & total chlorine analyzer/control, pH control, ORP monitoring, temperature (230V)



Graphic display with backlight
LED indicators for different working modes
Keyboard for all parameter settings

Peristaltic pump for accurate reagent dosage

Incoming pressure regulator

Buffer and indicator reagents for DPD method

Hinged cover with window for easy maintenance

Measurement cell with LCD light source

Port to quickly drain the measurement cell at the end of the cycle

External enclosure according to NEMA 4X standard for best protection



Parts

HI70473	PCA tubing kit, pressure regulator to drain (2). Each kit includes: transparent Tygon tubes 86L x 3.2ID mm (3.4 x 0.1") (Length x Internal Diameter) (1, 2) and 105 x 9.5 mm (4.1 x 0.4") (3)
HI70474	PCA peristaltic pump tubing kit (6). Each kit includes: non-transparent C-flex tubes 55L x 0.8ID mm (2.1 x 0.03") (5)
HI70475	PCA peristaltic pump tubing kit (2). Each kit includes: non-transparent C-flex tubes 55L x 0.8ID mm (2.1 x 0.03") (5)
HI70476	PCA reagent bottle tubing kit (6). Each kit includes: non-transparent C-flex tubes 155L x 0.8ID mm (6.1 x 0.03") (11)
HI70477	PCA tubing set for measuring cell (2). Each set includes: non-transparent C-flex tube 50L x 0.8ID mm (2.0 x 0.03") (8) and Y strainer (7)
HI70478	PCA tubing kit, bottle to pump (6). Each kit includes: non-transparent C-flex tube 150L x 0.8ID mm (5.9 x 0.03") (4)
HI70479	PCA tubing kit, pump to Y strainer (6 pcs). Each kit includes: non-transparent C-flex tube 150L x 0.8ID mm (5.9 x 0.03") (6)
HI70482	PCA filters. The kit includes 0.5 µm and 50 µm filters (13)
HI70496	Replacement filter, 0.5 µm (15)
HI70497	Replacement filter, 50 µm (16)
HI70483	PCA complete tubing kit. The kit includes: non-transparent C-flex tubes (4, 6) 150L x 0.8ID (5.9 x 0.03") (4 pcs), non-transparent C-flex tubes (5) 55L x 0.8ID (2.1 x 0.03") (2 pcs), non-transparent C-flex tubes (8) 50L x 0.8ID (2.0 x 0.03") and Y strainer (7)
HI70484	PCA complete tubing kit (3). Each kit includes: non-transparent C-flex tubes (4, 6) 150L x 0.8ID (5.9 x 0.03") (4 pcs), non-transparent C-flex tubes (5) 55L x 0.8ID (2.1 x 0.03") (2 pcs), non-transparent C-flex tubes (8) 50L x 0.8ID (2.0 x 0.03"), Y strainer (7)
HI70485	PCA stirrer motor
HI70486	PCA stirring bar (2)
HI70487/N	Measuring cell (9)
HI70488	Electrovalve, 24VAC/60Hz (12)
HI70489	Electrovalve, 24VAC/50Hz (12)
HI70492	Electrode holder (PCA330)
HI70493	Closing cap for electrode holder

Electrodes

HI1005	Amplified pH electrode with Matching Pin and Pt100 (14) (PCA320/330 only)
HI2008	Amplified ORP electrode with Matching Pin (17) (PCA330 only)

Reagent Sets

HI70431	Total Chlorine reagent set for PCA (buffer citrate), 500 mL (2)
HI70481	Total chlorine reagent set for PCA, 500 mL (2) + 5 powder sachets (DPD)
HI70491	Total chlorine reagent set for PCA, 500 mL (2) + 5 powder sachets (DPD)
HI70430	Free chlorine reagents set for PCA (the most stable), recommended for long term measurements, 500 mL (2) + 6 g powder
HI70480	Free chlorine reagents set for PCA, recommended for short term measurements, 500 mL (2) + 5 sachets (DPD)
HI70490	Free chlorine reagents set for PCA, 500 mL (2) + 5 sachets (DPD)
HI70452	DPD reagent, 5 sachets

Solutions

HI70460	Total chlorine indicator solution for PCA, 500 mL*
HI70461	Total chlorine buffer solution for PCA, 500 mL
HI70450	Free chlorine indicator solution for PCA, 500 mL*
HI70451	Free chlorine buffer solution for PCA, 500 mL
HI7004L	pH 4.01 buffer solution, 500 mL
HI7006L	pH 6.86 buffer solution, 500 mL
HI7007L	pH 7.01 buffer solution, 500 mL
HI7009L	pH 9.18 buffer solution, 500 mL
HI7010L	pH 10.01 buffer solution, 500 mL
HI7020L	200-275 mV buffer solution, 500 mL
HI7091L	Pretreatment reducing solution, 500 mL
HI7092L	Pretreatment oxidizing solution, 500 mL
HI70300L	Storage solution, 500 mL
HI7082	3.5M KCL electrolyte, 30 mL
HI7061L	Electrode cleaning solution, 500 mL

Software

HI92500	Windows® compatible software
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* After addition of 5 powder sachets (HI70452-0)