

## BL120 and BL121

### pH/ORP Swimming Pool and Spa Controllers with Built-In Chemical Feed Pumps

The BL120 and BL121 are an all-in-one solution for automatic control of pH and chlorine levels in swimming pool, hot tub, and spa water.

The BL120 and BL121 Swimming Pool Controller is a complete system designed for maintaining swimming pool, hot tub, and spa disinfection water quality. These controllers are available in two configurations. The basic version is the in-line model which allows for direct installation of probe and chemical injection fittings into existing piping. A panel mounted version with a bypass flow cell is also available. The bypass flow cell allows for calibration and maintenance of the probe without having to shut down the recirculation pump.

The BL120 and BL121 use a multiparameter digital HI1036-1802 probe that incorporates pH, ORP, and temperature sensors along with a matching pin. All readings are measured within the probe and the data transferred to the controller by a digital connection. Both a digital connection and matching pin provide for stable, reliable measurements. Without these two components, electrical noise from recirculation pumps and ground loops can interfere, causing erratic readings and premature probe failure.

These controllers have two built-in peristaltic chemical feed pumps that are proportionally controlled with adjustable flow rates. One of the pumps is used to dose acid while the other is used to dose chlorine. The effectiveness of the available chlorine, as determined by ORP, is inversely related to the water's pH value. A pool with a fixed concentration of chlorine

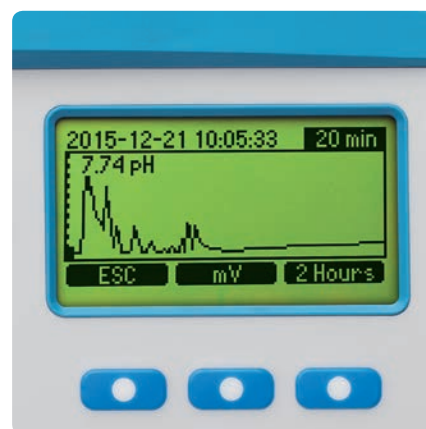
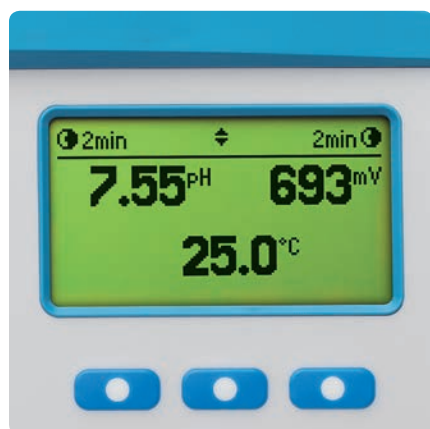
will show a decrease in ORP as the pH of the water increases. The BL120 and BL121 utilize a dosing consent feature that will not dose chlorine until the pH value is first corrected, since it is possible to have a low ORP value even though there is sufficient chlorine. The dosing consent feature will prevent chemical wastage and having a higher chlorine concentration level than desired.

For compliance monitoring, BL120 and BL121 have a built-in datalogger. Measurement readings are logged every 10 seconds with a new log starting for each new day or when the instrument is calibrated. Logged data include pH, ORP, and temperature values, last calibration data, setup configuration, and any event data.

For BL121 models, three 4-20mA analog outputs are available for users that wish to connect to an external chart recorder or datalogger to monitor any of the three measured parameters. The outputs are scalable, offering increased flexibility and better resolution as needed.

Additional features of the BL121 include LED indicators for dosing, meter status and service, real-time graph display, programmable alarms, and password protection.

These controllers are an all-in-one solution for automatic control of pH and chlorine levels in swimming pool, hot tub, and spa water.



### Three Display Modes

The versatile display of the BL120 and BL121 allows for three display modes. The LCD can display all three parameters at one time, a 3-second cycle of single parameters, or a real-time plot screen with options for parameter selection, zooming, and log recall.



### Peristaltic Dosing Pumps

BL120 and BL121 are equipped with two peristaltic dosing pumps with replaceable chemical resistant tubing. A problem that occurs with chlorine dosing pumps is the formation of chlorine gas. When using a diaphragm pump, chlorine gas can collect in the pump head and cause the pump to lose prime; the buildup of chlorine gas is not a problem with peristaltic pumps that use rollers and tubing.

### Automatic Proportional Pump Control

BL120 and BL121 feature proportionally controlled dosing pumps. Based on the sensitivity of the process to chemical addition, these controllers allow the user to adjust a proportional band. This setting determines the amount of time that the pumps are dosing as a percentage of the deviation from the set point. For example, a large body of water will use a small proportional band; having a small band (e.g., 0.1 pH) will ensure the pumps are dosing more often when the reading is close to the set point. For smaller bodies of water such as hot tubs or spas, it is more useful to set a larger proportional band (e.g., 1.0 pH); when the reading is close to the set point, the amount of time that the dosing pump is on is minimal to avoid large swings of pH or ORP. This valuable feature allows for very fine control in maintaining the desired set point.

### Adjustable Flow Rate

The flow rate from the dosing pumps is adjustable from 0.5 to 3.5L/h. Larger bodies of water require more chemical to be dosed than small bodies since it takes more chemical to see a change in the reading. The adjustable flow rate, like the proportional band, allows for better control in maintaining a desired set point.

### ORP (Chlorine) Dosing Consent

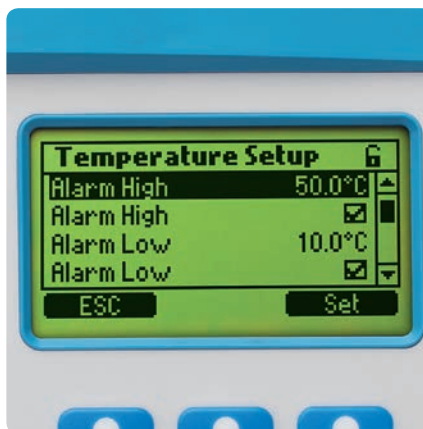
Both pH and ORP meters are commonly used with swimming pools. With chlorine disinfection there is an inverse relationship between pH and ORP. As the pH level increases, the ORP level decreases. The BL120 and BL121 utilize a dosing consent feature that will not dose chlorine until the pH value is first corrected since it is possible to have a low ORP value even though there is sufficient chlorine. The dosing consent feature prevents wastage of chemicals and avoids a higher than necessary chlorine concentration.

### Acid and Chlorine Tank Level Inputs

The BL120 and BL121 allow for a connection to an optional level controller. This input is used to disable the dosing pumps when there is no chemical left in the reservoir tank.

### Hold Input

It is possible to connect a flow switch mounted in-line or a mechanical relay that is connected to the recirculation pump power source to the hold input of these controllers. With no flow or when no power is applied to the recirculation pump, the hold circuit will disable the dosing pumps. This will prevent any dosing of chemical when there is no movement of water in the system.



### Programmable Alarm System

These controllers allow users to enable or disable the low and high level of alarms for all parameters: pH, ORP, and temperature. When an alarm is activated, all dosing will stop. The alarm system also offers overdosing protection in that if the value is not corrected within a specified time interval then the meter will go into alarm status.



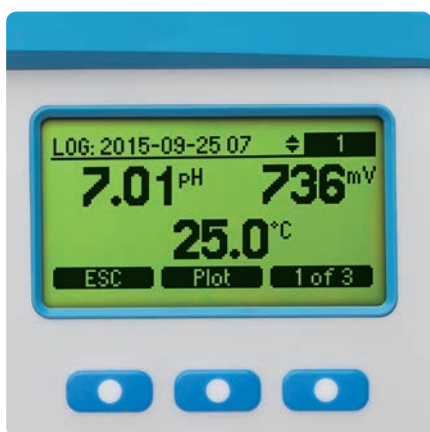
### Multicolored LED Indicators

BL120 and BL121 offers multiple LED indicators for status, servicing, and pump operation. The STATUS LED changes color based on operational state; a green LED means the water is within the desired parameter ranges, a yellow LED means that the controller needs attention, and a red LED identifies a problem in the system such as high and low pH, ORP and/or temperature readings. The SERVICE LED indicates any alarms and process errors experienced by the controller.



### BL121 Analog Outputs

The BL121 controller offers three 4-20 mA outputs. Each output can be disabled or connected to an external recording device. Each of the three measured parameters (pH, ORP, and temperature) can be assigned to an analog output where the current signal will be proportional to the measured value. For more flexibility and better resolution, the analog output can be scaled; users can define any two points within a parameter range to correspond to the analog output span. For example, the controller assigns 0 pH to 4 mA and 14 pH to 20 mA as a default. The user can adjust the pH range to assign pH 6 to 4 mA and pH 8 to 20 mA. This adjustment allows better resolution in the range of interest.



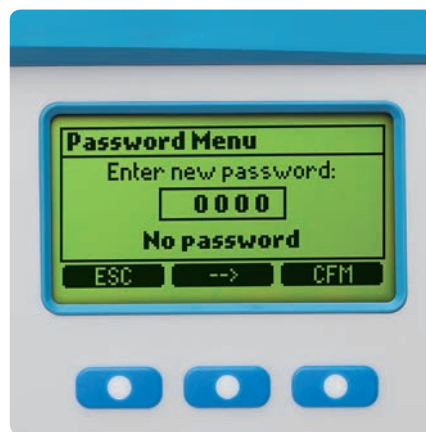
### Automatic Logging

The readings for each parameter are automatically logged every 10 seconds. A new log is started each time the instrument is calibrated or at the start of a new day. Logged data include pH, ORP, and temperature values, last calibration data, setup configuration, and any event data.



### USB Connectivity

For review and storage the users can easily transfer data to a PC using a flash drive and the USB port.



### Password Protected

BL120 and BL121 controllers feature a password protection solution that offers restricted access to calibration, setup, and review of logged data. The password can be set and enabled/disabled during general setup of the instrument.



## HI1036-1802 Multiparameter Digital pH, ORP, Temperature Probe

The HI1036-1802 is a digital combined probe that measures pH, ORP, and temperature. This probe also incorporates a potential matching pin. The matching pin is considered the "earth ground" connection and is used to prevent ground loop effects from causing erratic readings and damage to the system.

The pH glass has been chosen to produce stable quick equilibration even in low conductivity waters. Additionally, the pH sensor is designed to produce a mV value near pH 4 (not pH 7 like typical pH sensors) should it stop working. A broken pH electrode that produces a mV value near pH 7 would produce an alarm state and disable any pump activated.

The ORP sensing surface is a large smooth surfaced platinum band that encircles the circumference of the temperature probe. It is referenced to Ag/AgCl reference electrode (3.5M KCl).

The ORP and pH sensors and reference electrode use a differential measurement technique which is known to stay in service and provide accurate measurements under adverse conditions that may cause conventional pH probes to produce erroneous measurements. The HI1036-1802 probe with its differential amplifiers greatly reduces inaccuracies caused by ground loops which may exist between process and instrument grounds. With the differential technique, a ground loop current will flow through the low impedance path of the matching pin thus providing immunity to the measurement signals. Additionally the probe converts these measurements to a digital signal to eliminate noise and static due to high impedance signals carried by cable.

The HI1036-1802 with the BL120 or BL121 pool controller helps to promote the health and safety of pool and spa water.

### Multiple Configurations

BL120 and BL121 swimming pool controllers are available in one of two configurations. The basic version is the in-line model which allows for direct installation of the probe and chemical injection fittings into existing piping.

A panel mounted version of these controllers with a bypass flow cell is also available. The bypass flow cell allows for calibration and maintenance of the probe without having to shut down the recirculation pump.



Flow Cell for  
BL120-20 and  
BL121-20

## Specifications

## BL120/BL121

pH	Range	0.00 to 14.00 pH
	Resolution	0.01 pH
	Accuracy (@25°C/77°F)	±0.05 pH
	Calibration	pH buffer calibration: automatic, two-point (4.01, 7.01, 10.01 pH) pH process calibration: one-point, manual input
	pH Dosing	proportional with adjustable set point and proportional band; delay to start at power-on and overdosing protection
mV	Range	±2000 mV
	Resolution	1 mV
	Accuracy (@25°C/77°F)	±5 mV
	ORP (mV) calibration	one-point, manual input
	ORP Dosing	proportional with adjustable set point and proportional band; delay to start at power-on and overdosing protection; pH dosing interlocked
Temperature	Range	-5.0 to 105.0°C (23.0 to 221.0°F)
	Resolution	0.1°C (0.1°F)
	Accuracy (@25°C/77°F)	±1°C (±1.8°F)
Additional Specifications	Temperature Compensation	automatic, -5.0 to 105.0°C (23.0 to 221.0°F) for pH
	Pump Control	automatic and manual modes; adjustable flow rate from 0.5 to 3.5 L/h
	Log Feature	automatic logging of pH, ORP, and temperature measurements, GLP and events including alarms, errors and power failure; capacity for 60 days with 10 second sampling interval; all data .csv files are transferred by USB flash drive
	Alarms	high and low with enable/disable option for all parameters; alarm is triggered when 5 consecutive readings are over/under threshold
	Alarm System	intuitive alert system based on LEDs; alarm filtering options; alarm relay control based on user setup
	Password Protection	setup, calibration and log recall options features are password protected
	Storage Interface	USB
	GLP	pH/ORP calibration information including date and time for pH/ORP sensors
	Alarm Relay Output (1)	SPDT 5A/230 VAC; activated by pH/ORP/temperature selectable alarm conditions
	BL121 Analog Outputs (3)	4 to 20 mA, sourcing, configurable; output impedance ≤ 500 Ohm; accuracy < 0.5 % FS; galvanically isolated up to 50 V relative to earth ground
	Auxiliary Inputs (3)	low level in acid/base tank (contact open); low level in chlorine tank (contact open); hold input (contact open)
	Digital Probe Input (1)	galvanic isolated digital input HI1036-1802 pH/ORP/temperature/matching pin combined probe with DIN waterproof connector
	Power Supply	100 – 240 VAC
	Power Consumption	10 VA
	Environment	0 to 50°C (32-122°F); max 95% RH non-condensing
	Dimensions	245 x 188 x 55 mm (73 mm with pumps); 9.6 x 7.4 x 2.2" (2.9" with pumps)
	Weight	1700 g (60 oz.)
Ordering Information	<b>In-Line Configuration</b>	
	<b>BL120-10</b> pH/ORP/Temperature Pool Controller is supplied with HI1036-1802 pH/ORP/temperature digital probe with matching pin, 50 mm probe saddle (1), fitting for probe, chemical injectors (2), 50 mm saddle for injectors (2), peristaltic tubing (2), 5 m of injection tubing, aspiration filter (2), pH 7.01 buffer sachets, 20mL (3), pH 4.01 buffer sachets, 20mL (3), 470 mV test solution sachets (3), power cable and instruction manual.	
	<b>BL121-10</b> pH/ORP/Temperature Pool Controller with analog output is supplied with HI1036-1802 pH/ORP/temperature digital probe with matching pin, 50 mm probe saddle (1), fitting for probe, chemical injectors (2), 50 mm saddle for injectors (2), peristaltic tubing (2), 5 m of injection tubing, aspiration filter (2), pH 7.01 buffer sachets, 20mL (3), pH 4.01 buffer sachets, 20mL (3), 470 mV test solution sachets (3), power cable and instruction manual.	
	<b>User Panel Flow Cell Configuration</b>	
<b>BL120-20</b> pH/ORP/temperature pool controller with flow cell is supplied with panel mounted flow cell, HI1036-1802 pH/ORP/temperature digital probe with matching pin, 50 mm probe saddle (1), fitting for probe, chemical injectors (2), 50 mm saddle for injectors (2), peristaltic tubing (2), 5 m of injection tubing, aspiration filter (2), pH 7.01 buffer sachets, 20mL (3), pH 4.01 buffer sachets, 20mL (3), 470 mV test solution sachets (3), power cable and instruction manual.		
<b>BL121-20</b> pH/ORP/temperature pool controller with flow cell and analog output is supplied with panel mounted flow cell, HI1036-1802 pH/ORP/temperature digital probe with matching pin, 50 mm probe saddle (1), fitting for probe, chemical injectors (2), 50 mm saddle for injectors (2), peristaltic tubing (2), 5 m of injection tubing, aspiration filter (2), pH 7.01 buffer sachets, 20mL (3), pH 4.01 buffer sachets, 20mL (3), 470 mV test solution sachets (3), power cable and instruction manual.		
Accessories	<b>BL120-200</b>	pool controller aspiration filter
	<b>BL120-201</b>	pool controller injector, 1/2" thread
	<b>BL120-202</b>	aspiration and dispensing tubing (5m)
	<b>BL120-300</b>	pool controller peristaltic pump tubing Kit (2)
	<b>BL120-402</b>	flow cell tubing (5m)
	<b>BL120-163</b>	fittings Kit for 63 mm pipe diameter (saddle for injectors (2), saddle for probe (1))
	<b>BL120-175</b>	fittings Kit for 75 mm pipe diameter (saddle for injectors (2), saddle for probe (1))