# **User's Guide**

AOC-PH-01

# **AQUASEL DIGITEL** pH / ORP Controller



# **OPERATION GUIDE**





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# **INTRODUCTION**

PH / ORP / TDS / Conductivity are the primary controlling parameters for any process used in a wide variety of industries ranging from water, chemical, pharmaceutical, food processing etc. Our online controllers are used to monitors these process parameters continuously and helps to take corrective action with its relay & current outputs. These reliable, accurate and robust meters are designed with a compact housing which fits in standard industry panel. Also these meters can be easily calibrated and can display multiple parameters at the same time.

# **TECHNICAL SPECIFICATIONS**

Parameter	PH , ORP , Temperature
Model	AOC-PH-01
Range	0 to 14.00 PH, 0 to 2000 mv, 0 to 100 Deg C
Display	LCD
Resolution	0.01 PH, ± 1 mv, 0.1 Deg C
Accuracy Linearity Repeatability	± 1% FS, 0.2 Deg C ± 0.1% of Range ± 0.1% of Range
Temperature Compensation	Automatic / Manual (0 to 100 Deg C)
Output Relay	2 Programmable Relay Outputs (250V/10A) With User Defined Hysteresis Adjustments
Current Output	Isolated DC 4 to 20 mA Output Max Load : 750 ?
Alarm	Programmable High & Low Alarm
Power Supply	220 VAC @ 50 Hz
Enclosure Rating	IP 54
Dimensions	96 × 96 × 110 mm
Mounting Details	Panel Mount (Cutout Size : 92 x 92 mm)
Weight	500 Gms

#### DIMENSIONS

The panel cut-out for mounting the unit should be 92 mm x 92 mm (+1.0 - 0.0). Two screw clamps are supplied and are fitted from the back of the instrument.



#### INSTALLATION & CONNECTION

The panel-mounting version is designed to be flush mounted and sealed in a square cut-out in a panel, and is held in place with the two screw clamps provided.



- (1) pH or ORP sensor central line
- (2) Spare
- (3) Temp sensor(1)
- (4) Temp sensor(2)/ pH or ORP sensor Shield (13) Low alarm relay(N/O, normally open)
- (5) 4~20mA Output (+)
- (6) 4~20mA Output (-)
- (7) Spare
- (8) Spare
- (9) Spare
- BNC connector for pH or ORP sensor input
- (G) Ground
- · (L2) Spare
- (L1) Power supply terminal: Connect AC110 ~ 220V
- (N) Power supply terminal: Connect the power supply phase

#### **CAUTION:**

The specified performance of the controller is entirely dependent on correct installation. For this reason, the installer should thoroughly read the instructions before attempting to make any electrical connections to the unit.



- (10) High/Low alarm relay(Common)
- (11) Spare
- (12) High alarm relay(N/O, normally open)
- (14) Spare
- (15) Spare
- (16) Spare
- (17) Spare
- (18) Spare

MENU	STRU	ICTURE
0100	MENU	
1	MENU	ENTER Set high alarm value
	MENU	E H Set high alarm hysteresis
-	MENU	ENTER Set low alarm value
-	MENU	EL Set low alarm hysteresis
-	MENU	Auto calibration 4.00pH
-	MENU	P 5.8 6 Auto calibration 6.86pH
		Auto Return
- 00.00		- P1.00 Auto calibration 7.00oH
Ĩ	MENU	
-	[]	P 9. 18 ENTER Auto colibertion 9.18pH
	MENU	Auto Return
		PIDD Auto calibration 10 0pH
-	MENU	Auto Return
-	MENU	Manual calibration low pH value
-		
	MENU	Manual calibration mid pH value
-		
-	MENU	Manual calibration high pH value
	MENU	Manual calibration low mV value
-	MENU	Manual calibration zero mV value
-	MENU	Manual calibration high mV value
-	MENU	Auto calibration low Temp. <u>value</u>
	BENH	Auto calibration high Temp. value
-	[	Temperature compensation type
	HENU	ENTER 0=Auto / 1=Manual
	[	E E ENTER Set Temperature componention coefficient
	MENU	

## 



### SETTING AND OPERATION



#### Front Panel Description:

- (1) **HH** alarm light, (spare)
- (2) H alarm light, (Under the conditions of setting high alarm, when the measured pH value of the solution is higher than the value of High alarm, the H alarm light will be turned on and the high relay (N/O) close; When the measured pH value of the solution is lower than the value of High alarm, furthermore lower than the hysteresis, the H alarm light will be turned off and the high relay (N/O) open.
- (3) L alarm light, (Under the conditions of setting low alarm, when the measured pH value of the solution is lower than the value of low alarm, the L alarm light will be turned on and the low relay (N/O) close; When the measured pH value of the solution is higher than the value of low alarm, furthermore higher than the hysteresis, the L alarm light will be turned off and the low relay (N/O) open.
- (4) LL alarm light, (spare)
- (5) LCD digital Monitor, displayed the measured values (pH mV °C, and can also be displayed prompt function, parameter values and error codes in interactive.

- (6) pH indicator light. When the light is lit in the measuring state, means the measured value is pH; when the light is lit in the setting state, means the input parameter is pH.
- (7) mV indicator light. When the light is lit in the measuring state, means the measured value is mV; when the light is lit in the setting state, means the input parameter is mV.
- (8) Indicator light. When the light is lit in the measuring state, means the measured value is Temperature; when the light is lit in the setting state, means the input parameter is Temperature.
- (9) SET indicator light, the light will be turned on when entering the setting state.
- (10) MENU, Press the MENU key to enter or exit the setting state.
- (11) DOWN, In the setting state, using the DOWN key the user can cycle through the next menu. To adjust a value, the DOWN key is used to select a digit .
- (12) UP, In setting state, using the UP key the user can cycle through the front menu. To adjust a value, the UP key is used to increment the digit. In measurement state, the UP key is used to switch the display of temperature or pH/ORP.
- (13) **ENTER** key is the enter button to confirm enter the menu and store the setting parameters.

#### PARAMETER SETTING AND OPERATION

When the instrument is powered security, after a brief self-test program, pH indicator lights and displays the pH value, example "7.00" as Figure 6. Indicates that the instrument is working in the measurement state.



#### SETALARM

The monitor has two alarm outputs designated high alarm (H) and low alarm (L). The alarm value and alarm hysteresis can be set within the currently selected measuring range.

Code	Content	Set range	Unit
AH	High alarm value	0~14.00/-2000~2000	pH/mV
EH	High alarm hysteresis	0~14.00/-2000~2000	pH/mV
AL	Low alarm value	0~14.00/-2000~2000	pH/mV
EL	Low alarm hysteresis	0~14.00/-2000~2000	pH/mV

#### Alarm Reley

During normal operation when the alarm is not active, the alarm output will be in its NORMAL condition, the N/O (normal open) contact will be open. When the alarm is active, the alarm output will be in its ALARM condition and therefore the N/O contact will be closed.

#### Alarm Hysteresis

In a normal condition an alarm turns on and off at the same value. For example, if a high alarm turns on at 10.00pH the alarm occurs when the reading increases to 10.00pH. When it decreases through 10.00pH the alarm turns off. Some applications may demand that the alarm turns off at a different value, for a high alarm this would be value lower than the alarm value, and for a low alarm this would be a value higher than the alarm value. The hysteresis value determines the difference between the alarm switch on point and the alarm switch off point. In the case of a high alarm, hysteresis causes the alarm to turn off at a value that is less than the alarm value. For a low alarm, hysteresis causes the alarm to turn off at a value greater than the alarm value.



# CALIBRATION

#### **Calibration Intervals**

The Monitor and Sensor combination once calibrated will require calibration checking/recalibration at 3-6 monthly intervals, however this does depend on the application. The calibration of the instrument can be effected by seasonal variations in the measured effluent, however only knowledge of the application can determine the re-calibration interval required.

#### P4.00, P6.86, P7.00, P9.18, P10.0 — pH Sensor Auto Calibration

Specific operations: first select P4.00 or P6.86 or P7.00 or P9.18 or P10.0 in the menu and put the dry and clean sensor into the corresponding standard buffer solution, press ENTER key to enter its settings program, then wait for the flashes display value is stable, each automatic calibration process automatically will return to setting mode when it completed. Press the MENU key to return to measurement mode.

Code	Content	Direction
P4.00	Auto calibrate pH=4.00	Use pH=4.00 buffer to calibrate
P6.86	Auto calibrate pH=6.86	Use pH=6.86 buffer to calibrate
P7.00	Auto calibrate pH=7.00	Use pH=7.00 buffer to calibrate
P9.18	Auto calibrate pH=9.18	Use pH=9.18 buffer to calibrate
P10.0	Auto calibrate pH=10.0	Use pH=10.0 buffer to calibrate

\*Note: The above solution temperature is 25°C

General sensor calibration, two-point calibration method and three-point calibration method can be use as needed. In the use of two or three points calibration method should be the zero calibration first (pH = 7 or 6.86)

#### PAPL、 PAP7、 PAPH — pH sensor manual calibration

#### PAOL, PAO0, PAOH – ORP sensor manual calibration

Besides the previously mentioned standard buffer used for automatic calibration, also the other known pH solutions can be used for manual calibration.

Specific operations : first select <u>PAPL</u> (low value) or <u>PAP7</u> (median value) or PAPH (high-value) in the menu and put the dry and clean sensor into the corresponding solution, Press <u>ENTER</u> to enter its program, then the instrument displays the measured value of the solution, and in flashing mode which is different from the measurement states. After the measurement data is stable then Press <u>ENTER</u> again, now only the first digit flashing in the display data means it is modify bit. Press <u>DOWN</u> to choose the modification bit, press <u>UP</u> key to modify the data, make the display value as same as the pH value of the solution (Attention to maintaining the solution temperature 25<sup>°C</sup>), press <u>ENTER</u> to store the calibration data (This value is stored even after power failure), and return to the setting state. If the display state is set to the ORP measurement (i.e. mV), select <u>PAOL</u> (low value), <u>PAO0</u> (median value), <u>PAOH</u> (high-value) in the menu can set the ORP manual calibration. Method is similar to the pH, but the buffer should be replaced by the corresponding standard ORP buffer solution.

Code	Content	Direction
PAPL	Manual calibrate pH low value	Use pH=2~6 buffer to calibrate
PAP7	Manual calibrate pH zero	Use pH=6~8 buffer to calibrate
PAPH	Manual calibrate pH high value	Use pH=8~12 buffer to calibrate
PAOL	Manual calibrate ORP low value	Use ORP<-100mV buffer to calibrate
PAO0	Manual calibrate ORP zero	Use ORP=-100~+100mV buffer to calibrate
PAOH	Manual calibrate ORP high value	Use ORP>+100mV buffer to calibrate

Sensor Manual Calibration Program Content

#### C0, C100 — Temperature Calibration

The Monitor has temperature measurement function, for the automatic temperature compensation, and also can be displayed on the monitor. Temperature calibration requires a high and a low constant temperature environment. Such as ice water mixture (0°C) and boiling distilled water (100°C). <u>C0</u> is used to calibrate 0°C. Select <u>C0</u> in the menu and put the sensor into 0°C environment, press <u>ENTER</u> to store the calibration data , and return to the setting state. The Method of calibrate 100°C is as same as calibrate 0°C.

#### Temperature Calibration Program Content

Code	Content	Direction
C0	Auto calibrate temperature=0°C	Use Ice water mixture (0°C) to calibrate
C100	O Auto calibrate temperature=100°C Use boiling water (100°C) to calibrate	

# **TECHNICAL SPECIFICATIONS**

#### CC—Auto/Manual Temperature Compensation Switch

The Monitor has Auto and manual temperature compensation function. The user can select between two modes of compensation by the <u>CC</u> in the menu. Press <u>ENTER</u> into <u>CC</u> and display <u>CC0</u> or <u>CC1</u>. <u>CC0</u> is Auto temperature compensation, CC1 is manual temperature compensation. Press <u>UP</u> to switch it, then press <u>ENTER</u> to store and return to the setting state.

#### C--C — Set Temperature Compensation Coefficient

The temperature compensation coefficient is different for each type of solution, so the temperature compensation coefficient is designed to be adjustable (25 °C as the reference), and the range is  $-2 \sim +2\%/^{\circ}$ C. Select C--C in the menu, press ENTER into it and display the original value, use DOWN and UP to modify it, then press ENTER to store and return to the setting state. The temperature compensation coefficient works both in automatic and manual temperature compensation.

The Calculation Method of coefficient  $\varepsilon = \frac{pH35-pH25}{pH25^*(35-25)} \times 100\%$ 

Remark :  $pH25 = the pH value at t = 25^{\circ}C$ ;  $pH35 = the pH value at t = 35^{\circ}C$ 

#### **CH—Set Manual Temperature**

In this mode the instrument should be set with the "<u>CC1</u>" and the user can set the solution temperature (0~100) in the <u>CH</u> menu. Press <u>ENTER</u> into <u>CH</u> and display the original value, use <u>UP</u> and <u>DOWN</u> to modify it, then press <u>ENTER</u> to store and return to the setting state.

Code	Content	Direction
СС	Auto/manual temp. compensation switch	0 = Auto/1 = manual
CC	Temp. compensation coefficient setting	Range : -2~+2%/ °C
СН	Manual temperature setting	Range : 0~100 °C

Temperature Calibration Program Content

#### SET CURRENT OUTPUT

The Monitor has one  $4\sim20$ mA current output. The user can select the input source: pH/ORP or temperature. And the current output can be set work over the whole range of the input source.



The output can be set work over the whole of selected measurement range (curve1) or a portion of it by setting of the output start and end values (curve2). It is also possible to configure the output to work reverse to normal, i.e. a 4 - 20 mA output where 20 mA corresponds to the zero display value and 4 mA corresponding to the full scale value. (curve3).

#### FSI — Select the input for the current output

Select FSI in the menu, press ENTER into it and display FSIP or FSIC. FSIP is pH/OPR as the input, FSIC is temperature as the input. Press UP to switch it, then Press ENTER to store and return to the setting state.

#### FSIS, FSIE — Set current output start and end value

Select FSIS in the menu, press ENTER into it and display the original current output start value, use DOWN and UP to modify it, then press ENTER to store and return to the setting state. The same methods select FSIE to set the current output end value.

Code	Content	Direction
FSI	The input for the current output	P : pH/ORP & C : temperature
FSIS	Current output start value	4.00~20.00 mA
FSIE	Current output end value	4.00~20.00 mA

#### FPIS, FPIE—Set input value range for the current output

After selecting the input parameters, you can set its start value and end value. Select <u>FPIS</u> in the menu, press <u>ENTER</u> into it and display the original input start value, use <u>DOWN</u> and <u>UP</u> to modify it, then press <u>ENTER</u> to store and return to the setting state. The same method select FPIE to set the input end value. Please note that each parameter has a different range as below.

Code	Content	PH range	ORP range	Temp. range
FPIS	Input start value	0.00~14.00	-2000~2000	0~100 °C
FPIE	Input end value	0.00~14.00	-2000~2000	0~100 °C

#### **MEASUREMENT MODE**

The Monitor has pH, ORP and temperature three modes of measurement and display functions, it can be selected in the SSPP program. Select SSPP in the menu, Press ENTER into it and display SSP0 or SSP1 or SSP2. SSP0 is pH mode, SSP1 is ORP mode. SSP2 is temperature mode. Press UP to switch it, then Press ENTER to store and return to the setting state. The indicator light also changes to indicate that the display state changes. The corresponding parameters in the setting also will automatically change.

\*NOTE : The sensor should be changed when switch the measurement mode.

Code	Content	Indicator light	Available sensor
SSP0	Display pH value	pH lights	pH sensor
SSP1	Display ORP value	mV lights	ORP sensor
SSP2	Display Temp. value	°C lights	Temp. sensor

The In addition, when in measurement mode press UP it can display the temperature value, and the Temp. indicator will light. After a few seconds automatically return to the original measurement mode.

# **RESTORE FACTORY SETTING**

Select FACt in the menu, press ENTER into it and display HHHH. At this moment the instrument is being restored factory setting, about 10 seconds it will automatically returns to FACt, restore factory setting is completed. After this process, all value the user set before becomes the factory calibration value. This function is generally used for replace with new sensor or data confusion. Generally after restored factory setting, it need recalibration before using.

#### **ERROR CODES**

When the instrument detects an error condition, an error code will be displayed.

Code	Content	Solve methods
Er01	Measurement value out of range	Confirm the measuring solution within the measuring range of the instrument
Er02	Sensor signal failure	Check whether the sensor connected with the monitor properly, (Reference 7.4 cable connection.) 2. Enter menu <u>FACt</u> to restore factory setting 3. Suggest check or replace the sensor
Er03	Temperature sensor failure	Check whether the temperature sensor con nected with the monitor properly Check whether the temp. compensation (menu <u>CC</u> ) setting correct
Er04	Alarm setting error	Check whether the alarm setting correct, setting should meet AH - EH=AL + EL 2. Enter menu <u>FACt</u> to restore factory setting
Er05	System error	Contact the supplier to repair
Er06	Calibration error	Check whether the calibration setting correct 2. Enter menu <u>FACt</u> to restore factory setting

All the error codes are described below.

AQUASOL Digital	pH / ORP Controller
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# Warranty Card\*

Dealer Name/ Address:		
Bill No.		
Date -:		
Product details	Dealer Stamp & Sign	

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