AQUASOL
DIGITAL

TDS/Conductivity Controller

OPERATION GUIDE

RAKIRO

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CONTENTS

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	Conductivity, TDS , Temperature
Model	AOC-TDS-01
Range	0 to 19.99µS/cm, 0 to 999.9µS/cm, 0 to 9999µS/cm, 0 to 300mS/cm, 0 to 10000 PPM , 0 to 100 Deg C
Display	LCD
Resolution	0.01 µS/cm, 0.1 µS/cm, 1 µS/cm, 1mS/cm, 1 PPM, 0.1 Deg C
Accuracy	± 1% FS, 0.2 Deg C
Linearity	± 0.1% of Range
Repeatability	± 0.1% of Range
Temp Comp	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 Ω)
Alarm	Programmable High & Low Alarm
Power Supply	220 VAC @ 50 Hz
Enclosure Rating	IP 54
Dimensions	96 × 96 × 110 mm
Mounting Details	1/4 DIN Panel Mount (Cutout Size : 92 x 92 mm)
Weight	500 Gm
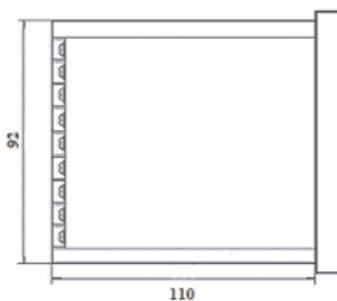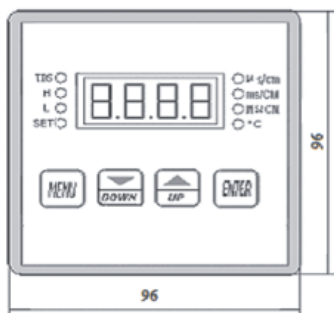
DIMENSIONS
The panel cut-out for mounting the unit should be 92 mm x 92 mm (+1.0 – 0.0). Two screw clamps are supplied and are fitted from the back of the instrument.

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.
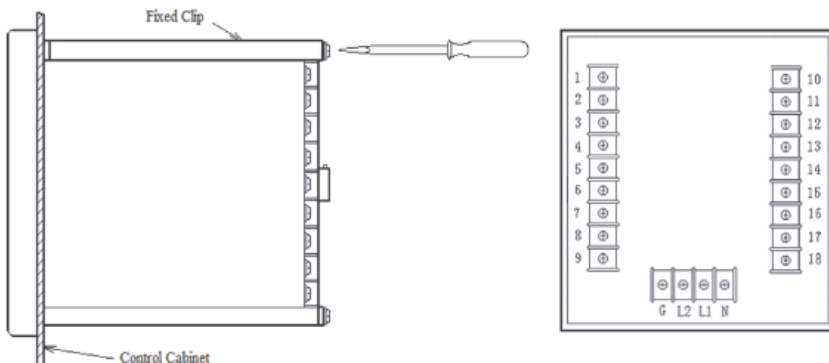

DIMENSIONS

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.

1. Conductivity sensor line A (red)
2. Conductivity sensor line B (yellow)
3. Temperature sensor 1 (blue)
4. Temperature sensor 2 (black)
5. 4~20mA current output (+)
6. 4~20mA current Output (-)
7. Spare
8. Spare
9. Spare

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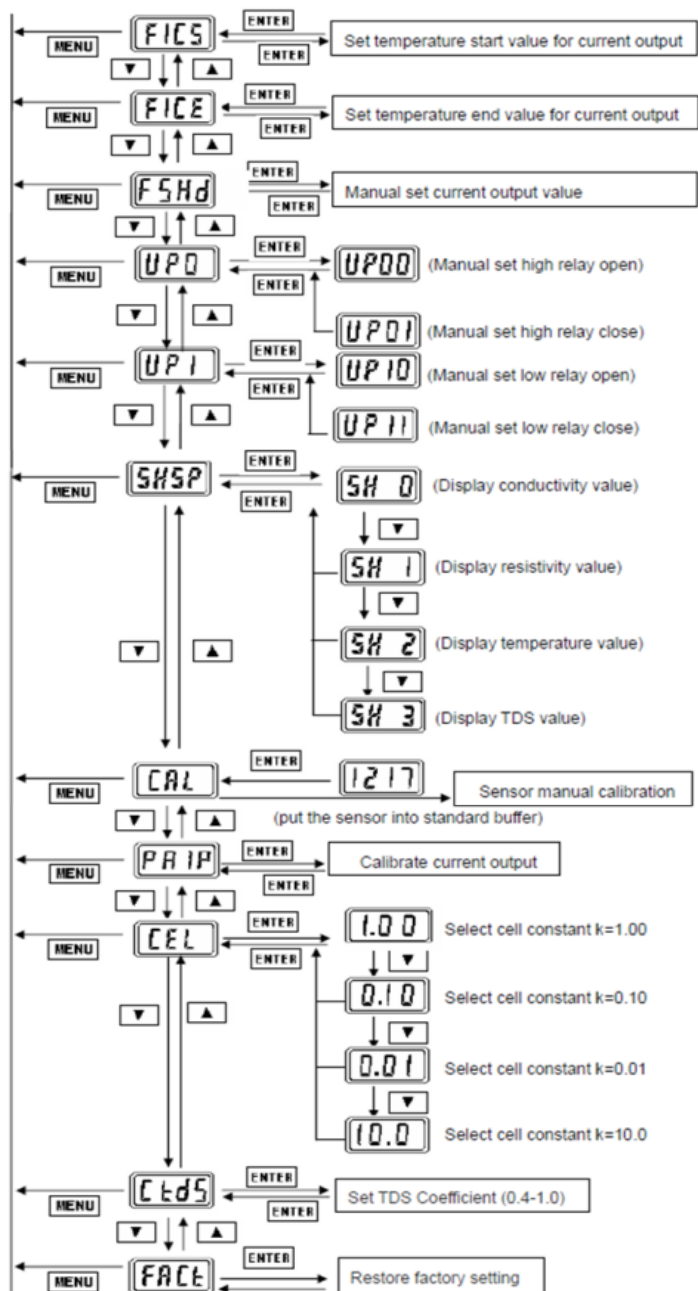17. Spare
18. Spare

- (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.

MENU STRUCTURE

Menu item	Description
AH	Set high alarm value
EH	Set high alarm hysteresis
AL	Set low alarm value
EL	Set low alarm hysteresis
C0 → 001.0	Auto calibration low Temp. value
C100 → 100.0	Auto calibration high Temp. value
CC → CC 1	(Manual Temperature compensation)
CC → CC 0	(Auto Temperature compensation)
C -C	Set Temperature compensation coefficient
CH	Set Manual temperature compensation value
FS1S	Set current output start value
FS1E	Set current output end value
FS1 → FS 0	(The input for current output is conductivity)
FS1 → FS 1	(The input for current output is temperature)
F19S	Set conductivity start value for current output
F19E	Set conductivity end value for current output

Display	ENTER action	Description
FICS	ENTER / ENTER	Set temperature start value for current output
FICE	ENTER / ENTER	Set temperature end value for current output
FSHd	ENTER / ENTER	Manual set current output value
UP0	ENTER → UP00	(Manual set high relay open)
	ENTER → UP01	(Manual set high relay close)
UP1	ENTER → UP10	(Manual set low relay open)
	ENTER → UP11	(Manual set low relay close)
SHSP	ENTER → SH 0	(Display conductivity value)
	▼ → SH 1	(Display resistivity value)
	▼ → SH 2	(Display temperature value)
	▼ → SH 3	(Display TDS value)
CAL	ENTER → 1217	Sensor manual calibration (put the sensor into standard buffer)
PR1P	ENTER / ENTER	Calibrate current output
CEL	ENTER → 1.00	Select cell constant k=1.00
	▼ → 0.10	Select cell constant k=0.10
	▼ → 0.01	Select cell constant k=0.01
	▼ → 10.0	Select cell constant k=10.0
Ctds	ENTER / ENTER	Set TDS Coefficient (0.4-1.0)
FACt	ENTER	Restore factory setting

SETTING AND OPERATION
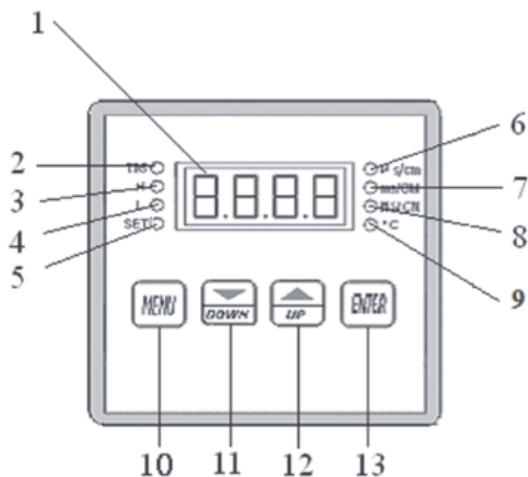
Front panel description:

(1) LCD digital Monitor，displayed the measured values，and can also be displayed prompt function, parameter values and error codes in interactive.

(2) TDS indicator light. When the light is lit in the measuring state，means the measured value is TDS; when the light is lit in the setting state, means the input parameter is TDS.

(3) **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.

(4) **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.

(5) SET indicator light, the light will be turned on when entering the setting state.

(6) uS/cm indicator light. When the light is lit in the measurement state，means the measured value is conductivity, and unit is uS/cm.

(7) mS/cm indicator light. When the light is lit in the measurement state，means the measured value is conductivity, and unit is mS/cm.

(8) MΩ·cm indicator light. When the light is lit in the measurement state，means the measured value is resistivity, and unit is MΩ·cm.

(9) ⟦?⟧ indicator light. When the light is lit in the measurement state，means the measured value is Temperature; when the light is lit in the setting state, means the input parameter is Temperature.

(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 conductivity/resistivity/TDS.

(13) ⟦ENTER⟧ key is the enter button to confirm enter the menu and store the setting parameters.

PARAMETER SETTING AND OPERATION

After installation, check the connection is correct, then put the sensor into the test solution, preheat for 10 minutes, you can perform the following operations.

Switch Measuring and Setting Mode

Instrument has two states: measuring state and setting state. After powering up the device enters the measuring state automatically. In the measuring state, press ⟦MENU⟧ to enter the setting state. In the setting state, press ⟦MENU⟧ to return to the measuring state.

SET ALARM

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.

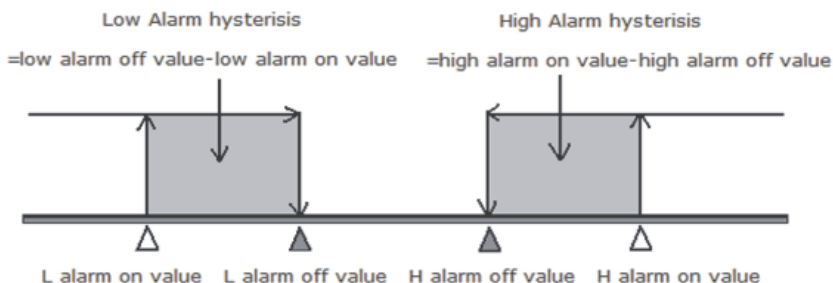| Code	Content	Set range	Unit
AH	High alarm value	0~18.00/0~100	MΩ·cm / mS/cm
EH	High alarm hysteresis	0~18.00/0~100	MΩ·cm / mS/cm
AL	Low alarm value	0~18.00/0~100	MΩ·cm / mS/cm
EL	Low alarm hysteresis	0~18.00/0~100	MΩ·cm / mS/cm

Note : The setting should meet AH-EH≥AL+EL

Alarm Relay

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 Hysterisis

In a normal condition an alarm turns on and off at the same value. For example, if a high alarm turns on at 2000 uS/cm the alarm occurs when the reading increases to 2000 uS/cm. When it decreases through 2000 uS/cm 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.

Low Alarm hysterisis
=low alarm off value-low alarm on value

High Alarm hysterisis
=high alarm on value-high alarm off value

L alarm on value   L alarm off value   H alarm off value   H alarm on 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.

CAL — Conductivity Sensor Manual Calibration

Preparing For Calibration：
- Value known conductivity buffer 100ml;
- Pure water 300~500ml;
- Use pure water to wash the sensor, and then make it dry;
- Use thermometer to measure the temperature of buffer;
- Select manual temperature compensation in the instrument menu and input the temperature value of buffer, set the temperature compensation coefficient is 0.

Specific operations: select CAL in the menu and put the dry and clean sensor into the known conductivity buffer solution, press ENTER 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 ENTER again, now only the first digit flashing in the display data means it is modify bit. Press DOWN to choose the modification bit, press   UP   key to modify the data, make the display value as same as the conductivity value of the solution, press ENTER to store the calibration data (This value is stored even after power failure), and return to the setting state.

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 Deg C) and boiling distilled water (100 Deg C). C0 is used to calibrate 0 Deg C. select C0 in the menu and put the sensor into 0 Deg C environment, press ENTER to store the calibration data, and return to the setting state.

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

TEMPERATURE COMPENSATION

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 CC in the menu. Press ENTER into CC and display CC0 or CC1. CC0 is Auto temperature compensation, CC1 is manual temperature compensation. Press UP to switch it, then press ENTER 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 ℃ as the reference), and the range is -2~+2%/℃. 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℃   pH35 = the pH value at t = 35℃

CH — Set Manual Temperature

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

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

SET CURRENT OUTPUT

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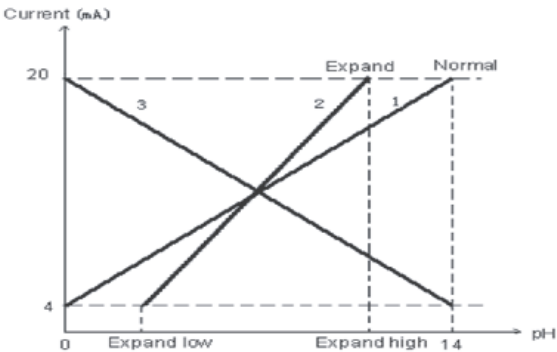
The output can be set work over the whole of selected measurement range (curve1) or a portion of it by setting of the output start and end values (curve2). It is also possible to configure the output to work reverse to normal, i.e. a 4 – 20 mA output where 20 mA corresponds to the zero display value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

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 method selects FSIE to set the current output end value.

FSI — Select The Input For The Current Output

Select FSI in the menu, press ENTER into it and display FS 0 or FS 1. FS 0 is conductivity as the input, FS 1 is temperature as the input. Press UP to switch it, then Press ENTER to store and return to the setting state.

Code	Content	Direction
FSIS	Current output start value	4.00~20.00 mA
FSIE	Current output end value	4.00~20.00 mA
FSI	The input for the current output	0 : conductivity 1 : temperature

FIgS, FIgE, FICS, FICE—Set Input Value Range for the Current Output

After selecting the input parameters, you can set its start value and end value. Select FIgS in the menu, press ENTER into it and display the original conductivity start value, use DOWN and UP to modify it, then press ENTER to store and return to the setting state. The same method selects FIgE to set the conductivity end value. Likewise, select FICS and FICE to set the temperature start and end value for current output.

Code	Content Range	
FIgS	Conductivity start value	0~9999uS/cm (k=1)
FIgE	Conductivity end value	0~9999uS/cm (k=1)
FICS	Temperature start value	0~100?
FICE	Temperature end value	0~100?

MEASUREMENT MODE

SHSP—Measurement Mode

The Monitor has conductivity, resistivity, TDS and temperature four modes of measurement and display functions, it can be selected in the SHSP program. Select SHSP in the menu, Press ENTER into it and display SH 0 or SH 1 or SH 2 or SH 3. SH 0 is conductivity mode, SH 1 is resistivity mode, SH 2 is TDS mode, SH 3 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	Cell constant	
SH 0	Display conductivity value	uS(mS)/cm lights	K=0.01/0.1/1.0/10
SH 1	Display resistivity value	M?·cm lights	K=0.01
SH 2	Display TDS value	TDS lights	K=0.1/1.0
SH 3	Display Temperature value	? lights	K=0.01/0.1/1.0/10

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.

CEL — Select Cell Constant

The Monitor can choose four models of sensor according to the measurement range, it can be selected in the CEL program. Select CEL in the menu, Press ENTER into it and display 1.00 or 0.10 or 0.01 or 10.0. Press UP to switch it, then Press ENTER to store and return to the setting state. The corresponding parameters in the setting also will automatically change.

Code	Content	Measurement Range
1.00	Choose constant = 1.0 sensor	0~9999uS/cm or 0~10000ppm
0.10	Choose constant = 0.1 sensor	0~999.9uS/cm or 0~1000ppm
0.01	Choose constant = 0.01 sensor	0~18 M?·cm or 0~19.99uS/cm
10.0	Choose constant = 10.0 sensor	0~100mS/cm

Ctds — Set TDS Coefficient

When SHSP = SH 2, select Ctds in the menu. The TDS coefficient is different for each type of solution, so the user can choose the coefficient between 0.4~1.0, then press ENTER to confirm.

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. All the error codes are described below.

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 FACt to restore factory setting 3. Suggest check or replace the sensor
Er03	Temperature sensor failure	Check whether the temperature sensor connected with the monitor properly Check whether the temp. compensation (menu CC) setting correct
Er04	Alarm setting error	Check whether the alarm setting correct, setting should meet AH━EH=AL➕EL 2. Enter menu FACt to restore factory setting
Er05	System error	Contact the supplier to repair
Er06	Calibration error	Check whether the calibration setting correct 2. Enter menu FACt to restore factory setting

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Warranty Card*

Customer Name/ Address : _____

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Dealer Name/ Address: _____

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Bill No. _____

Date -: _____

Product details

Dealer Stamp
& Sign

RAKIRO BIOTECH SYSTEMS PVT LTD
An ISO 9001 : 2008 Company