

APH20

Chlorine / pH / Temp / Turbidity Analyzer Panel



**READ THE ENTIRE OPERATING MANUAL
PRIOR TO INSTALLATION AND USE.**



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SAFETY INFORMATION

Please read this manual completely before unpacking, installing, and operating this equipment. In particular, pay attention to all dangers, warnings, and precautions, otherwise, it may cause serious injury to the operator or damage to the equipment.

Symbol	Description
	Warning (Risk of electric shock)
	Caution (Refer to the user's guide)
	Ground, Protective Conductor Terminal

Note: When in doubt regarding your electrical installation, contact a licensed electrician.

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1.0 Introduction

Congratulations on purchasing the APH20 Multi-Parameter Analyzer.

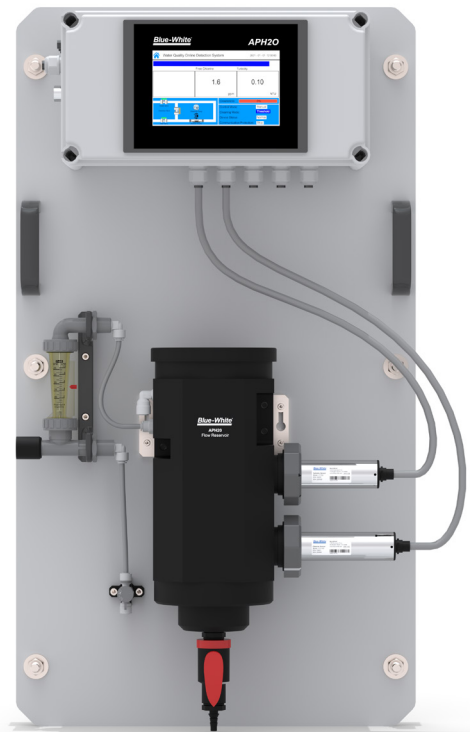
Your APH20 Analyzer is pre-configured and calibrated for use. The APH20 features reagent-less and membrane-less technology making it easy to operate and simple to maintain!

[Click to watch an overview video on Blue-White Analyzers](#)



1.1 What's in the box

- One APH20 Panel Assembled and Complete with 110VAC Power Supply Cord, including:
 - TS10 Touch Screen display/ Data Logger with pre-wired Sensors
 - WR20 Dual Sensor Flow Reservoir
 - UT700 Ultra Low Turbidity Sensor
 - FC700 Chlorine/pH/Temp Sensor
 - Inlet Flow meter, installed
 - Isolation Valve, installed
 - Inlet Tubing, 1/4" O.D. (5 ft)
 - Outlet Tubing, 3/4" I.D. (5 ft)
 - Rear FRP channel strut (3) and hardware
 - Concrete Anchors (6)
 - Electrical Schematics



1.2 System Features

- Turn-Key Monitoring Solution for Clean Water Applications
- Highly Accurate, Real-Time Measurement, Display, and Data-Logging
- Ultra-Low Turbidity, Chlorine (Free or Total), pH, and Temperature
- Touch Screen Display and Data-Logging Terminal
- Ultra-low resolution UT700 turbidity sensor offers a detection light source using warm white LED in 90-degree surface scatter format in accordance with USEPA 180.1 standards.
- FCL700 three-parameter composite sensor for residual chlorine, pH and temperature in compliance with USEPA 334.0 guidelines. Advanced sensor PCB offers built-in temperature and pH parameter compensation (up to pH 9.0) algorithms.
- Unique Bare-Gold electrode technology for residual chlorine measurement eliminates membranes and electrode solution replenishment commonly associated with conventional sensors.
- Dual-Sensor flow reservoir provides sample calming for dissipation of air-bubbles and settling of suspended solids, foam or other impurities commonly observed in drinking water influent. Allows highest level of turbidity resolution on the market, and greatly extends the maintenance cycle of the sensor while providing a large buffer capacity to mitigate pressure fluctuations.

2.0 Engineering Specifications

Item	APH20
Turbidity Wavelength	Warm White
Light Source	LED
Turbidity Dual Range	0.001 – 10 / 10 - 40.00 NTU
Turbidity Accuracy	+/- 0.005 NTU or 2% <10NTU
Turbidity Repeatability	+/- 0.001 NTU or 0.5% <10NTU
Chlorine Method	Bare Gold - Electrochemical Method
Chlorine Range	0.01 – 5.00 ppm, 0.01 - 10.00 (Free or Total)
pH Method	Electrochemical Method
pH Range	0.01 – 14.00 pH
Measurement Accuracy	0.001 NTU or \pm 1% Full Scale +/- 0.01 ppm or 1% Full Scale w/pH compensation to 9.0 +/- 0.01 pH
Minimum Resolution	0.001 NTU 0.01 ppm 0.01 pH
Response time	4s after immersion - Turbidity T95 \leq 60s – Free Chlorine T95 \leq 5s - pH
Compliance	EPA-180.1/334.0
Measurement Interval	Continuous Measurement
Display	7-inch LCD Color Industrial Capacitive Touch Screen
Storage Capacity	Built-In 4GB of Ram for Storing up to 1-Million Data/Event Records
Power Requirement	96-260VAC / 50-60 Hz; 10A Fuse; 200 W
Output	3 x 4-20 mA (NTU, Cl, and pH) / RS-485 Modbus - RTU / Modbus TCP
Input	3 x 4-20 mA / RS-485 Modbus - RTU (from sensor)
USB	1 x USB host, for data downloading and screen upgrade
Internet	RJ-45 socket, Modbus-TCP
Panel Operational Temperature	40 – 113°F (4-45 °C)
Storage Temperature	Instrument: -4 – 131°F (-20 – 55°C) / Sensors 32 – 122°F (0 – 50°C)
Sample Water Temperature	40 – 104°F (4-40°C)
Sample Water Pressure	7.5 – 30 psi (0.05 – 0.2MPa) - (or as needed to provide required flow rate)
WR20 Sample Water Flow Rate	9.5 - 15.5 GPH (600-1,000mL /Minute)
WR20 Line Size	1/4" Inlet / 3/8" Overflow / 3/4" Outlet / 1/2" Drain
Rating	IP-65 Panel-Display / IP-67 Sensors
Regulation	CE / RoHS
Relative Humidity	20% - 90% (No Condensation)
Altitude	<6,561 feet (<2,000 Meter)
Dimensions (HxWxD)	Panel 36 H x 20 W x 9.42 D inches
Approximate Product Weight	45 lbs
Shipping Dimensions	42" x 26" x 16" (1067H x 661W x 407D mm)

2.1 Materials of Construction

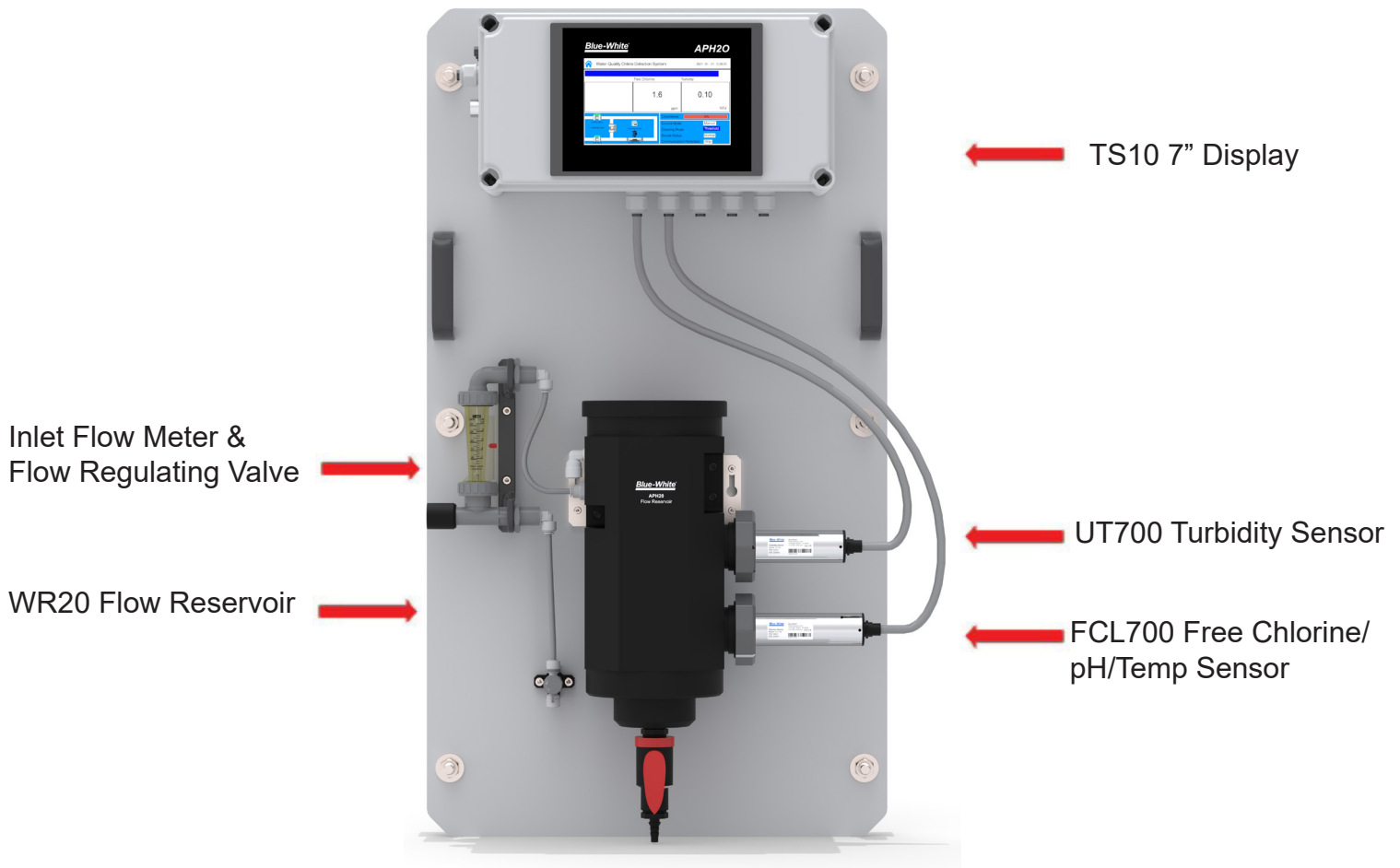
- Mounting Panel - Marine Grade HDPE, 1/2", Polyethylene
- Mounting Strut Channel - FRP
- Mounting Hardware - Stainless Steel / Galvanized
- Inlet Tubing - 1/4" O.D. PE
- Outlet Tubing - 3/4" I.D. PVC
- Flow Meter - Polysulfone / 316SS
- Tubing adapters and valves, Polypropylene

3.0 Layout

The APH20 multi-parameter online water analyzer is specifically designed as a 'Turn-Key' monitoring solution for clean water applications including drinking water networks, secondary water supply and decorative/swimming water applications.

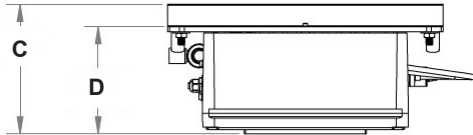
The APH20 series offers highly accurate, real-time measurement, display and data-logging of Ultra-Low Turbidity, Free Chlorine, pH and Temperature utilizing proprietary smart sensor technology, coupled with a touch screen display and data logging terminal.

The APH20 Analyzer Panel is offered in a convenient and easy to integrate panel mounted format for rapid installation and simple maintenance.

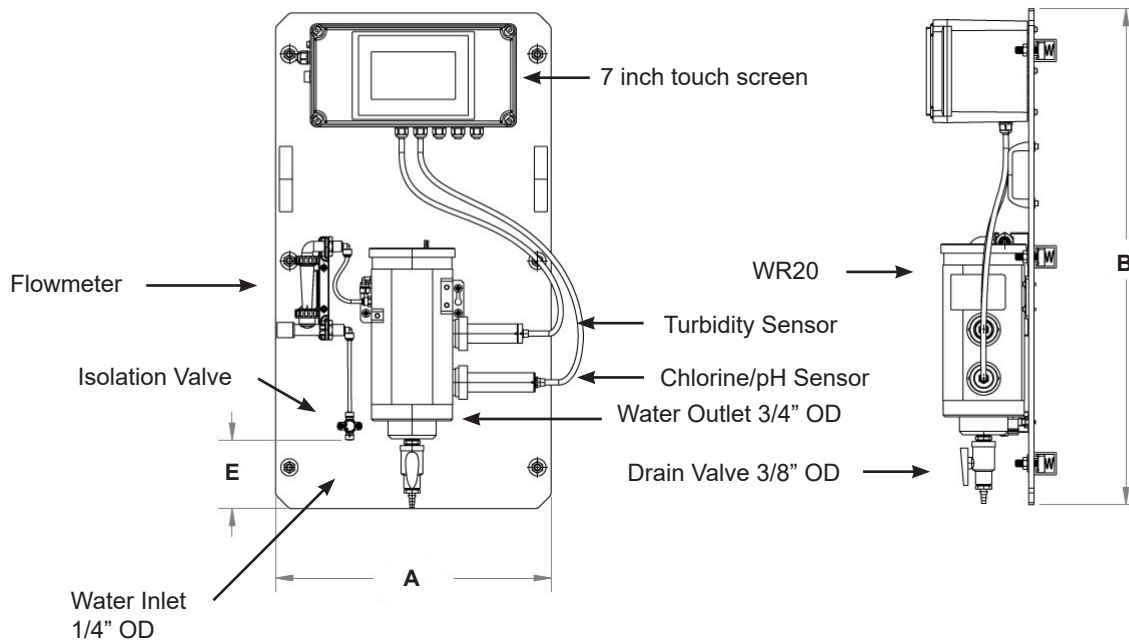


4.0 Dimensions

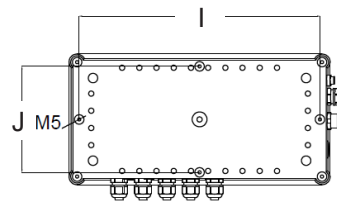
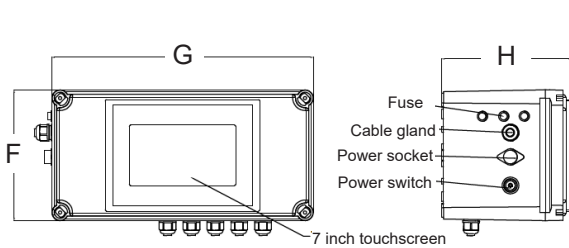
APH20 Panel Dimensions



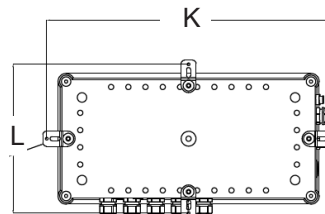
Dim	Inch	cm
A	20.00"	50.8
B	36.00"	91.4
C	9.42"	23.9
D	7.80"	19.8
E	4.98"	12.6



TS10 Controller Dimensions

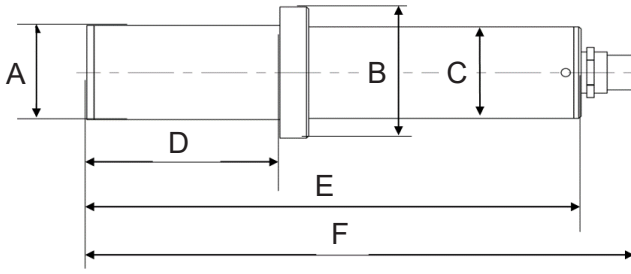


Installation Method 1



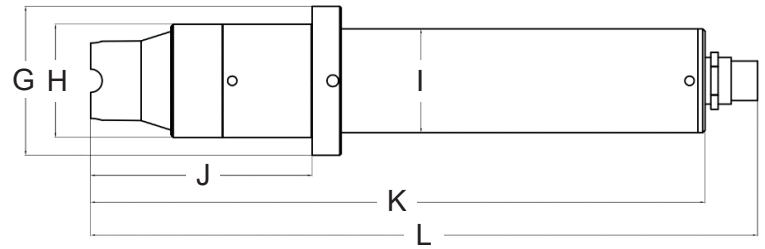
Dim	Inch	cm
F	7.48"	19.0
G	14.96"	38.0
H	7.42"	18.85
I	13.78"	35.0
J	6.02"	15.4
K	16.22"	41.2
L	8.5"	21.6

APH20 Series Sensor Dimensions



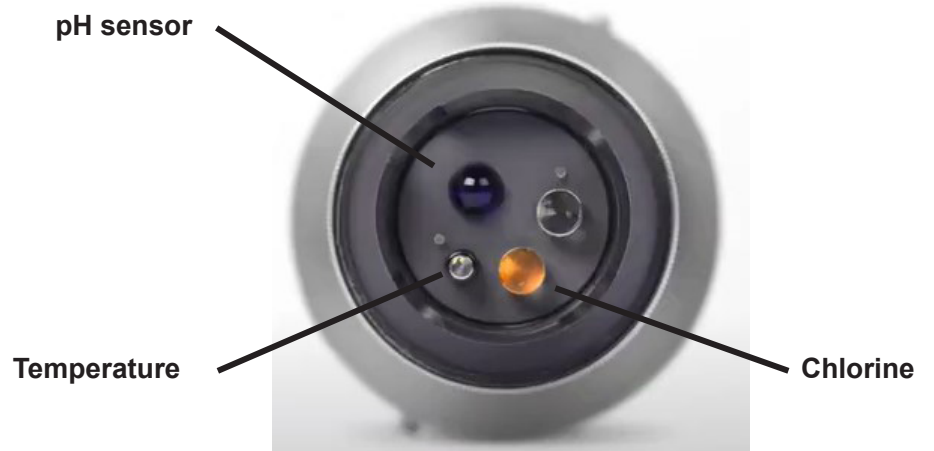
UT700 Turbidity Sensor

Dim	Inch	cm	Dim	Inch	cm
A	1.44"	3.66	D	2.63"	6.68
B	2.0"	5.1	E	6.73"	17.1
C	1.38"	3.5	F	7.44"	18.9



FCL700 Chlorine + pH Sensor

Dim	Inch	cm	Dim	Inch	cm
G	2.0"	5.1	J	3.0"	7.6
H	1.53"	3.88	K	8.3"	21.08
I	1.4"	3.56	L	9.0"	22.88



FCL700 Sensor End

5.0 Installation

5.1 Installation Requirements

Power Supply: 100~240VAC 50/60Hz (110V power cord provided)

Water Supply: Inlet water pressure should be from 7 – 30 psi (0.05-0.2MPa) with an inlet feedwater line diameter of ¼-inch O.D. Tubing. The APH2O is provided with an inlet Rotameter and flow regulating valve for sample water inlet flow control and limited pressure regulation. The range of inlet flow for the WR20 should be consistently maintained between 600 and 1,000 mL per minute.

Drainage: The WR20 outlet tube (¾” ID Tubing) located on the bottom of the WR20, as well as the WR20 weir overflow (⅜-inch O.D. Tubing) located on the top of the WR20, should both be connected to a discharge drain via gravity flow.

Wall Mount Space: The APH20 analyzer panel size is roughly 24” H x 36” W x 10” D in dimension. Please accommodate sufficient space for mounting. The panel is equipped with pre-installed rear unistrut for simple wall mounting.

Wall Mount Weight: Approximately 45 lbs (20kg). Please use appropriate mounting hardware.

5.2. Tube connections

Inlet Water: Connect the ¼-inch inlet water tubing to the quick adapter provided. Consistent flow of 600-1,000mL is required.

Weir Overflow: Connect the ⅜-inch weir overflow tubing to the quick adapter provided. This line must be diverted to drain.

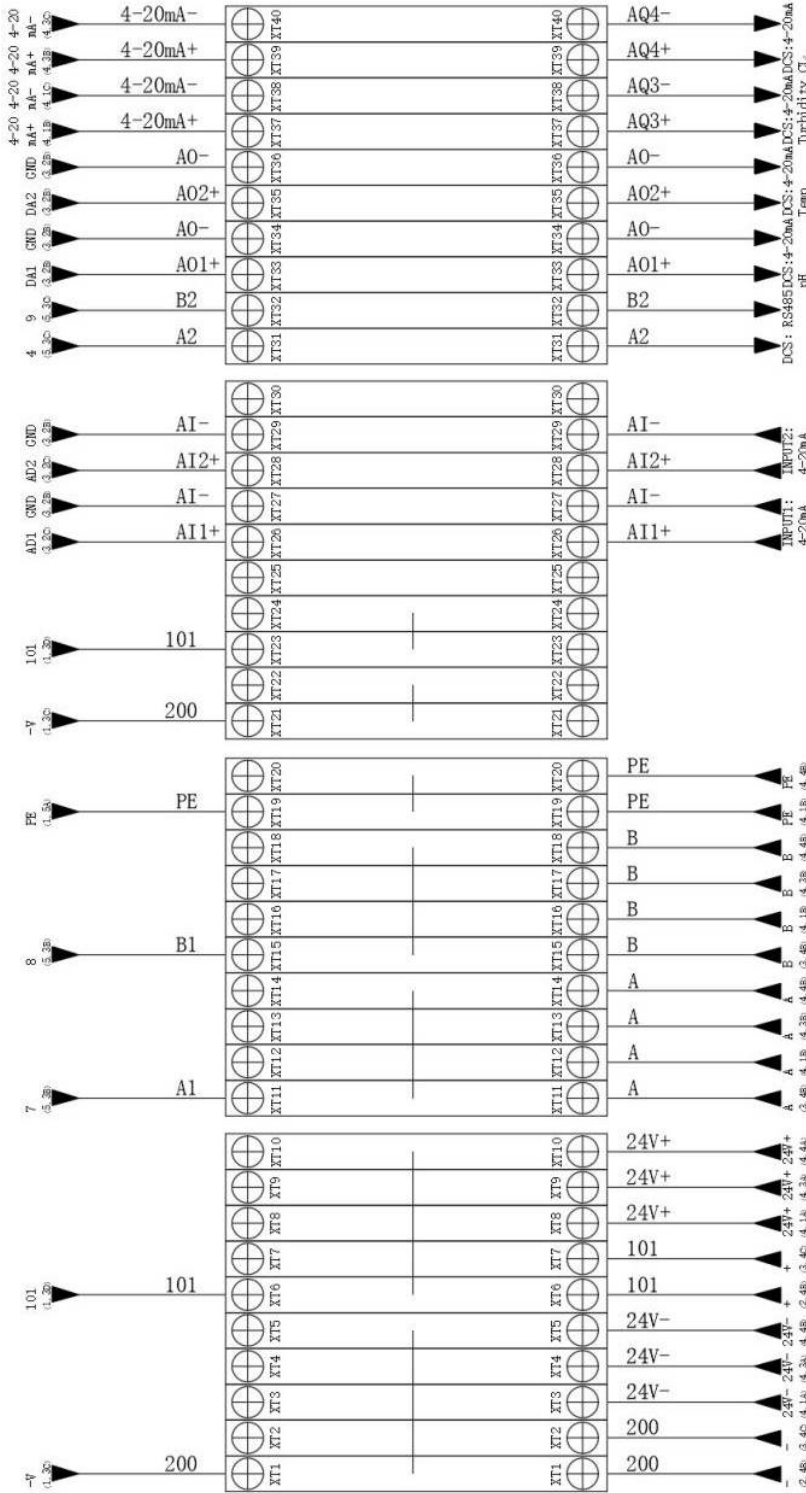
Outlet Line: Connect ¾” tubing to the outlet drain. This is the sample water outlet flow. This line must be diverted to drain.



Always wear protective clothing, face shield, safety glasses and gloves when working on your Analyzer. Use caution when lifting and mounting equipment. When in doubt, contact factory for assistance.

5.3 Wiring

The APH20 analyzer has universal AC power supply equipment allowing users simply to plug the power supply into a 100~240V AC 50/60Hz power outlet for normal operation. Note: All 4-20ma outputs are active (AO-, AO1+, AO2+, AO3+, AO4+)



The process of electrical connection to contact the 220V single-phase power supply, should be operated by personnel with an electrician's license. Failure to operate according to the electrical code of practice may result in electric shock injury or even death. **Note: When in doubt regarding your electrical installation, contact a licensed electrician.**

6.0 Start-Up and Operation


6.1 Powering Up

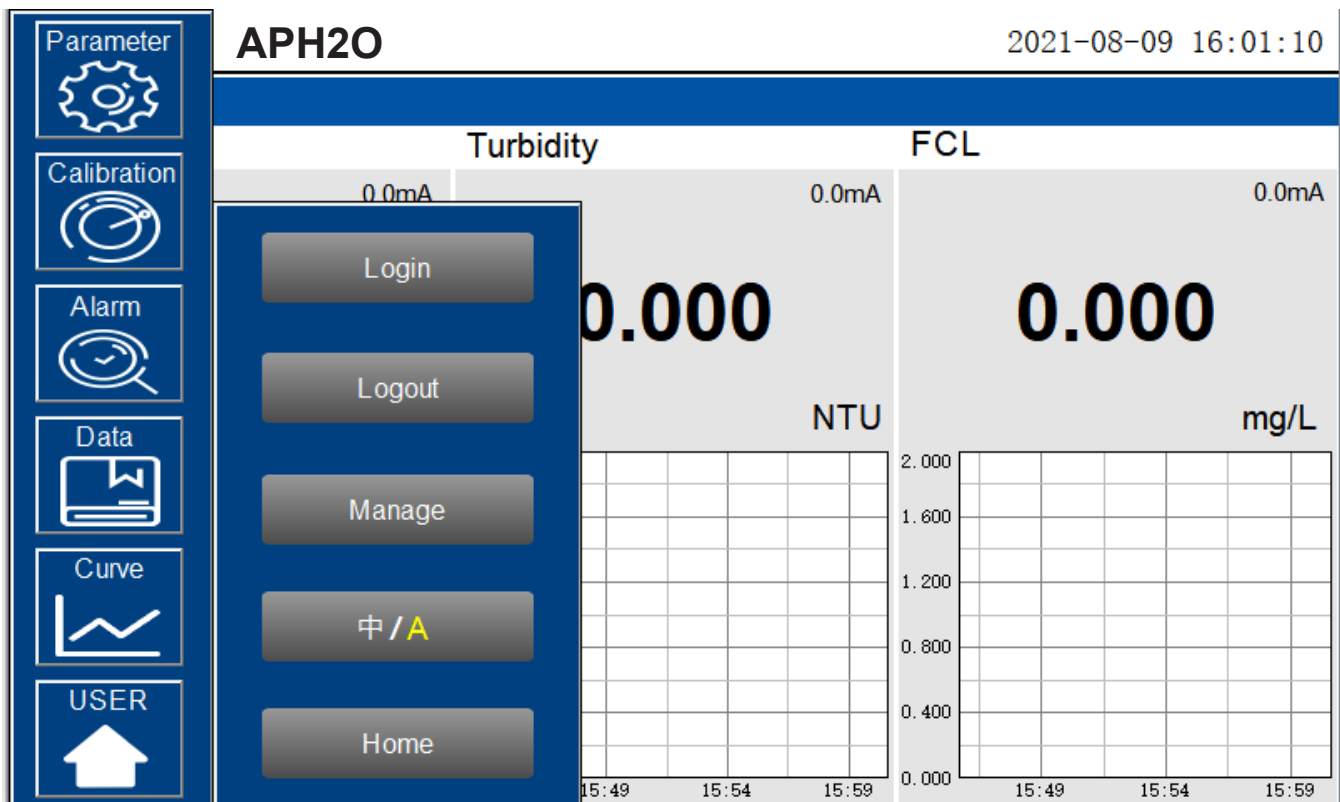
After the system is powered on (using the power button, located on the left side of the TS10), an introduction screen will appear and then immediately proceed to Real Time Monitoring screen (6.3)



6.2 User Login

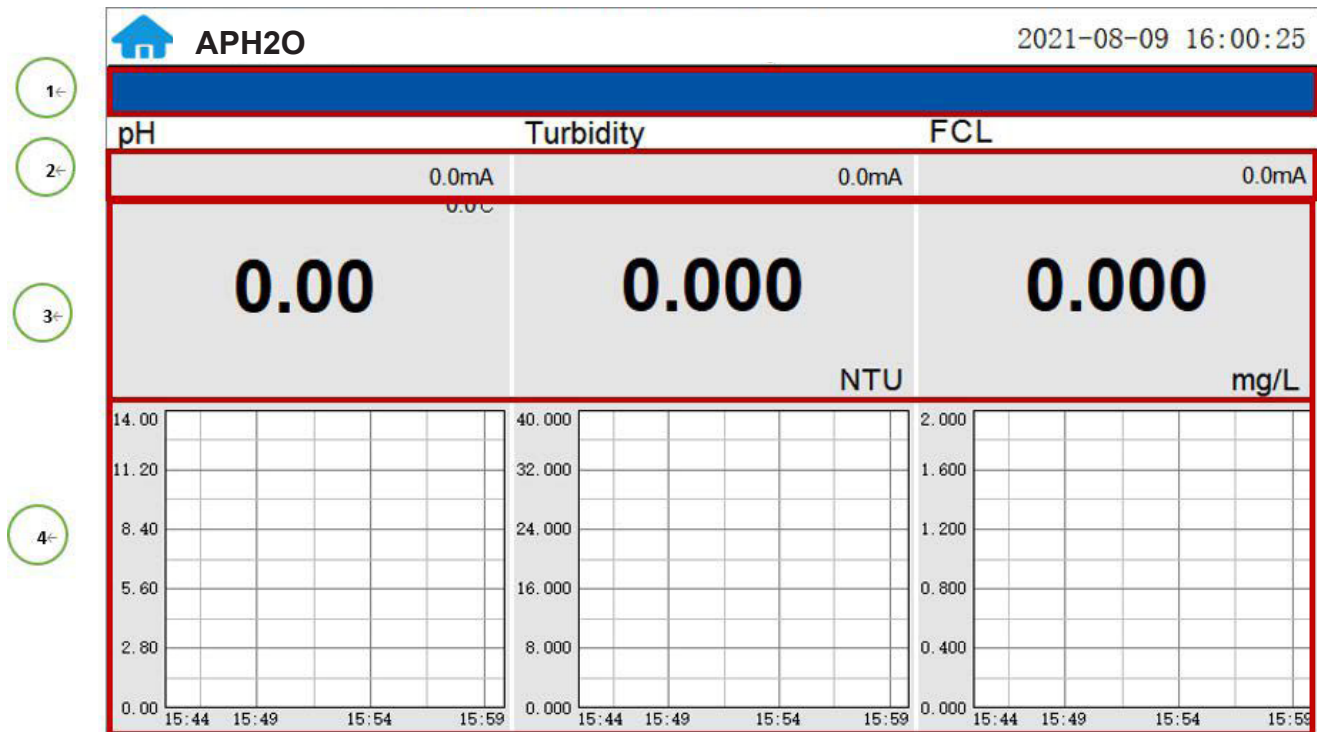
The system does not require "User Login" to view real time monitoring of the system. "User Login" is only necessary when changing parameter settings or performing calibrations. To access this now,

press the Home  icon and refer to section 6.11 User Management for more instructions regarding login and user management options. Note: Default password "888888".



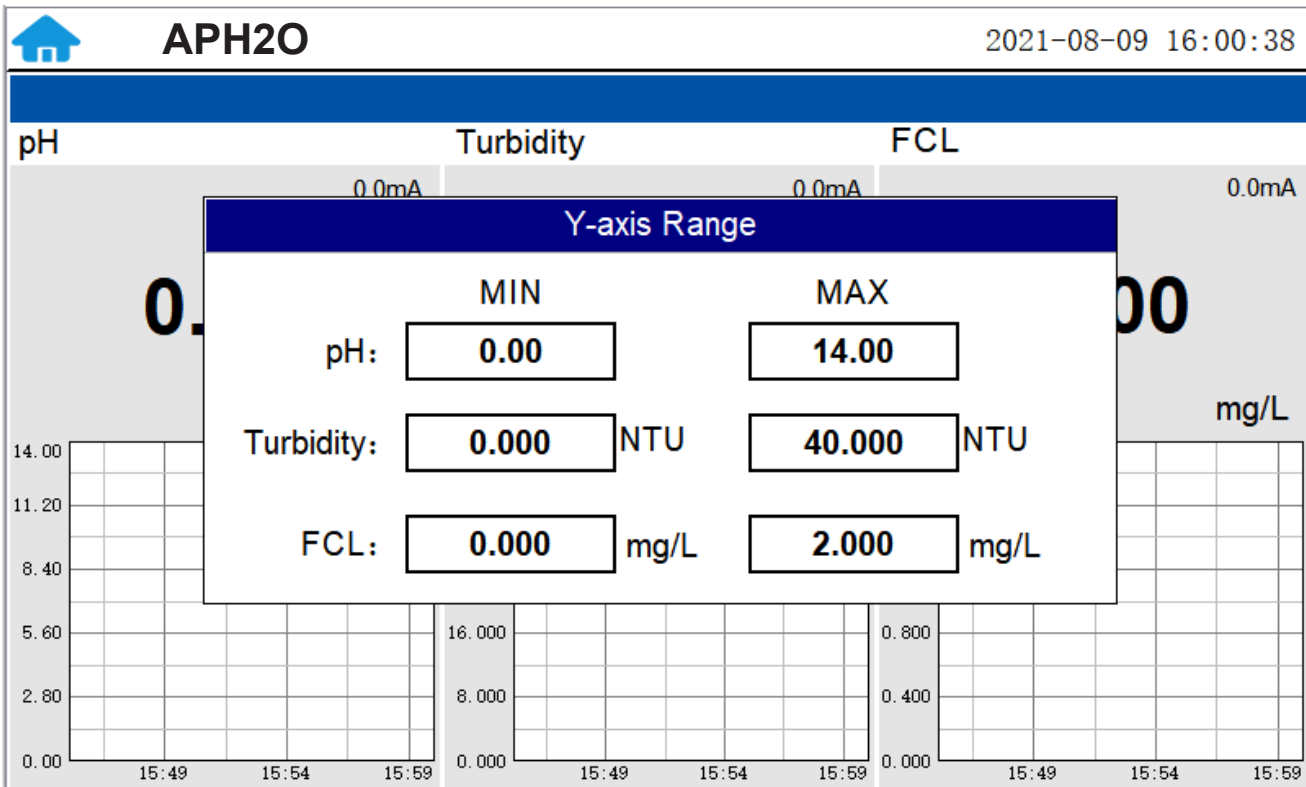
6.3 Real Time Monitoring

Upon start-up, the main interface screen will appear showing real-time monitoring of the system. The data detected by the Blue-White sensors will be displayed in real-time. See a functional overview of each section of this screen highlighted below. (numbers 1-4)




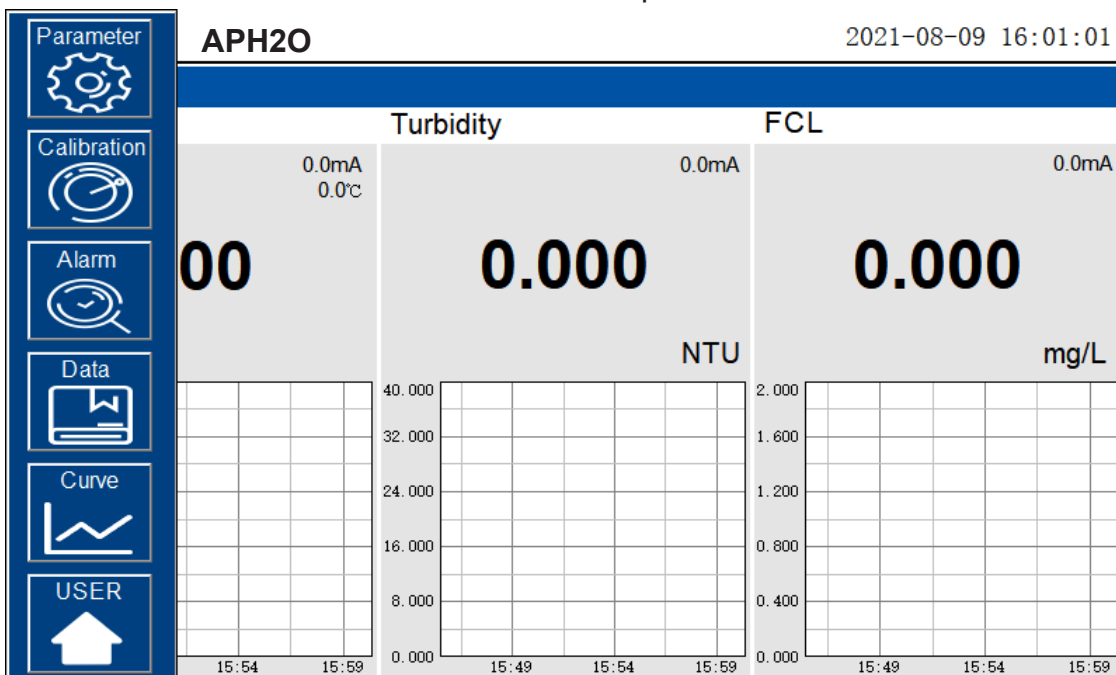
Section Number	Functional Overview
1	The blue area will scroll any alarm information in real time until the alarm is cleared.
2	Real-time display of the current sensor's 4-20mA signal value.
3	Real-time display of current sensor measurement value.
4	Historical data is recorded as a live curve, with the horizontal coordinate being the time and the vertical coordinate being the measured value.

Change Screen Scale. Press and hold the curve area for 2 seconds and then let go, the Y-axis curve range setting dialog box will appear. Users may change the display value range of Y-axis for each measurement index curve. Click the outer area of the screen to save and exit the setting screen after modifications are made.



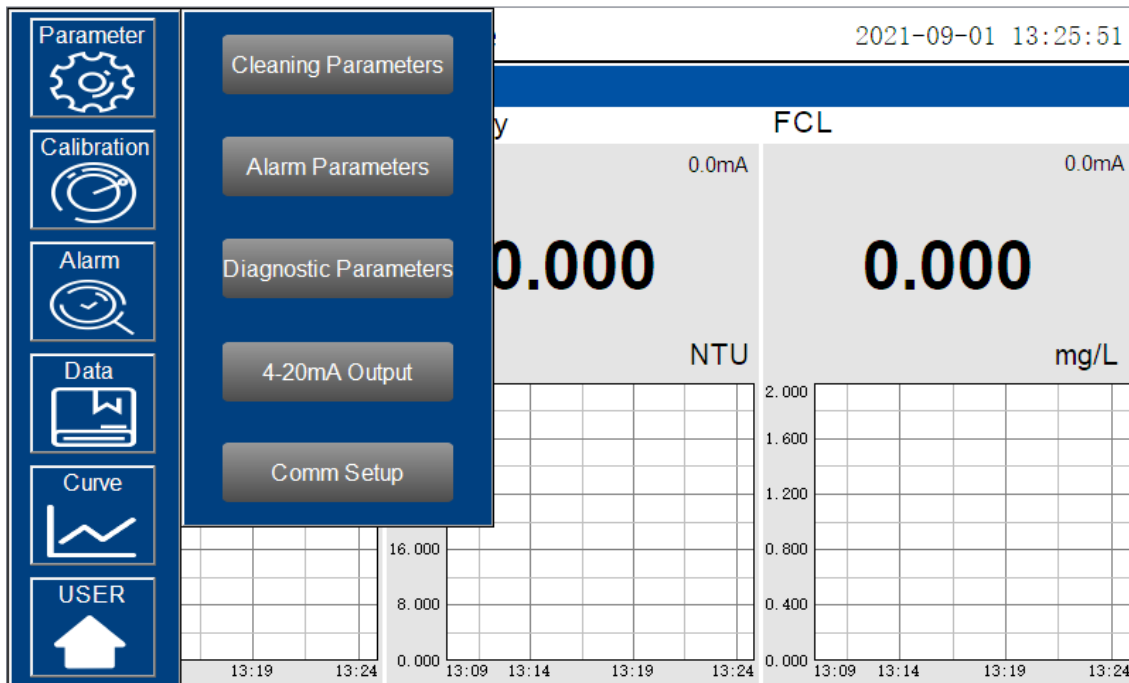
6.4. Menu Bar

Click the  button in the upper left corner of the screen to enter the system's menu interface, where the user can select to enter the desired operation interface.



6.5. Configurable Parameters

Click the "Parameter" button in the menu bar. Here you can select to enter "Alarm Parameters" and "4- 20mA Output" setting interface etc.



6.5.1. Cleaning Parameters Setting - Not used on APH2O

6.5.2. Alarm Parameters Setting

Users can set the upper and lower alarm limits. Click "Alarm Parameters" to enter the alarm parameter settings. When the measured sensor value is lower than the set lower limit (the XX lower limit alarm) or when the measured value is higher than the set upper limit (the XX upper limit alarm), the corresponding sensor alarm will be displayed on the real-time monitoring screen. The user can also choose to turn the alarm display on or off at the top left of the corresponding parameter list.

The screenshot displays the "Alarm Parameters" window with three parameter cards. Each card has a "Close" button and a dropdown menu. The "Turbidity" card shows "Upper limit: 0.000 NTU" and "Lower limit: 0.000 NTU". The "FCL" card shows "Upper limit: 0.000 mg/L" and "Lower limit: 0.000 mg/L". A third card is partially visible on the left, showing "Upper limit: 0.00" and "Lower limit: 0.00".

Parameter	Upper limit	Lower limit
Turbidity	0.000 NTU	0.000 NTU
FCL	0.000 mg/L	0.000 mg/L
(Unlabeled)	0.00	0.00

6.5.3. Diagnostic Parameters

Click “Diagnosis Parameters” to the diagnosis page. In the diagnosis page, the raw data measured by the sensor is displayed. To help troubleshooting possible issues with the sensor, please save an image of this data when the sensor is placed in a clean water sample (tap water or deionized water), in a standard, and in the sample that the sensor is intended for.

FCL		Turbidity	
It_WorkCurrentnA:	0.000nA	s365DiLow:	0.000
pH_Voltage:	0.000V	s365DiHigh:	0.000
RTDValue:	0.000Ω	s365Low:	0
Offset:	0.000	s365High:	0
		intercept:	0.000
		SlopeLow:	0.000
		SlopeHigh:	0.000
		dark:	0
		t365:	0

6.5.4. 4-20mA Output Parameters Setting

Click "4-20mA Output " to enter the 4-20mA output parameter setting interface. The 4mA and 20mA output values should corresponds to the lower and upper limits of the sensor range. ***NOTE*** The closer the value is set to the measurement value the more accurate the data. It is recommended to set according to the range of the sensor.

4-20mA Output Parameters		X
pH	Turbidity	
4mA output: <input type="text" value="0.00"/>	4mA output: <input type="text" value="0"/> NTU	
20mA output: <input type="text" value="0.00"/>	20mA output: <input type="text" value="0.000"/> NTU	
Temp	FCL	
4mA output: <input type="text" value="0.0"/> °C	4mA output: <input type="text" value="0"/> mg/L	
20mA output: <input type="text" value="0.0"/> °C	20mA output: <input type="text" value="0.000"/> mg/L	

6.5.5. Communication Setting

DCS communication parameters generally do not need to be changed. If the DCS communication station number and other parameters need to be changed on site, they can be changed on this interface.

APH20 2021-09-01 13:26:17

pH 0.00 Turbidity 000 FCL 0.0mA

Modbus RTU X

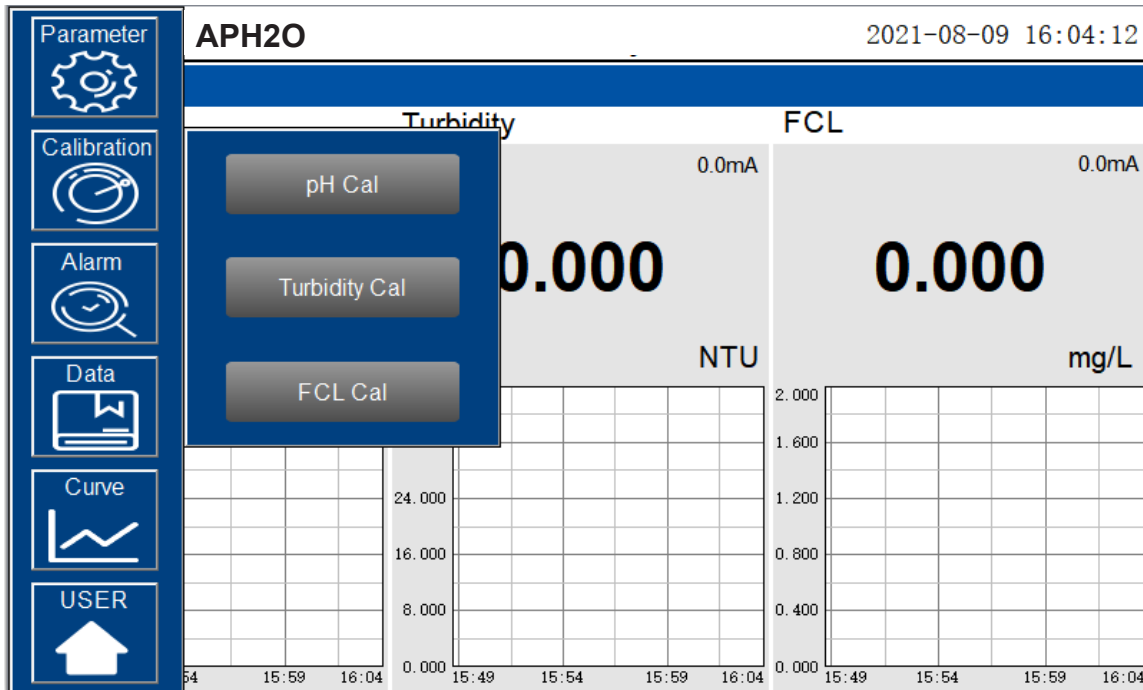
Address

Baudrate Parity

Databit Stopbit

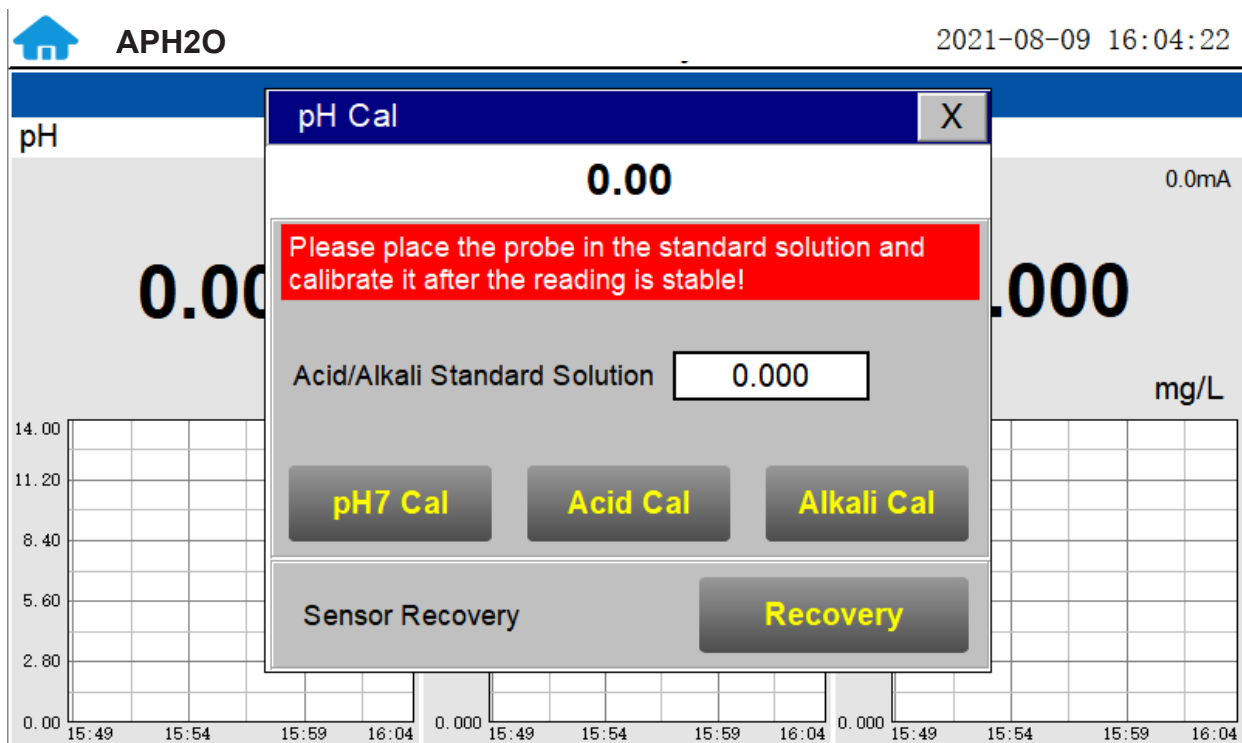
6.6. Calibration

Click on the "Calibration" button in the menu bar and select the sensor to be calibrated.



6.6.1. pH Calibration

The pH function is thoroughly calibrated at the factory. After checking with a pH standard buffer solution, if the sensor value has shifted, then the user may choose from single-point, two-point or three-point calibration to re-calibrate the pH portion of the FCL700 sensor as desired.



Single Point pH Calibration

Remove the FCL700 sensor and rinse 3x with DI water. Submerge the sensor into a beaker with pH=7 buffer solution. Click "pH7 calibration". A dialog box will pop up to confirm whether to perform this operation, click "OK" if the calibration operation is confirmed, if the calibration is successful the dialog box will show "calibration success".

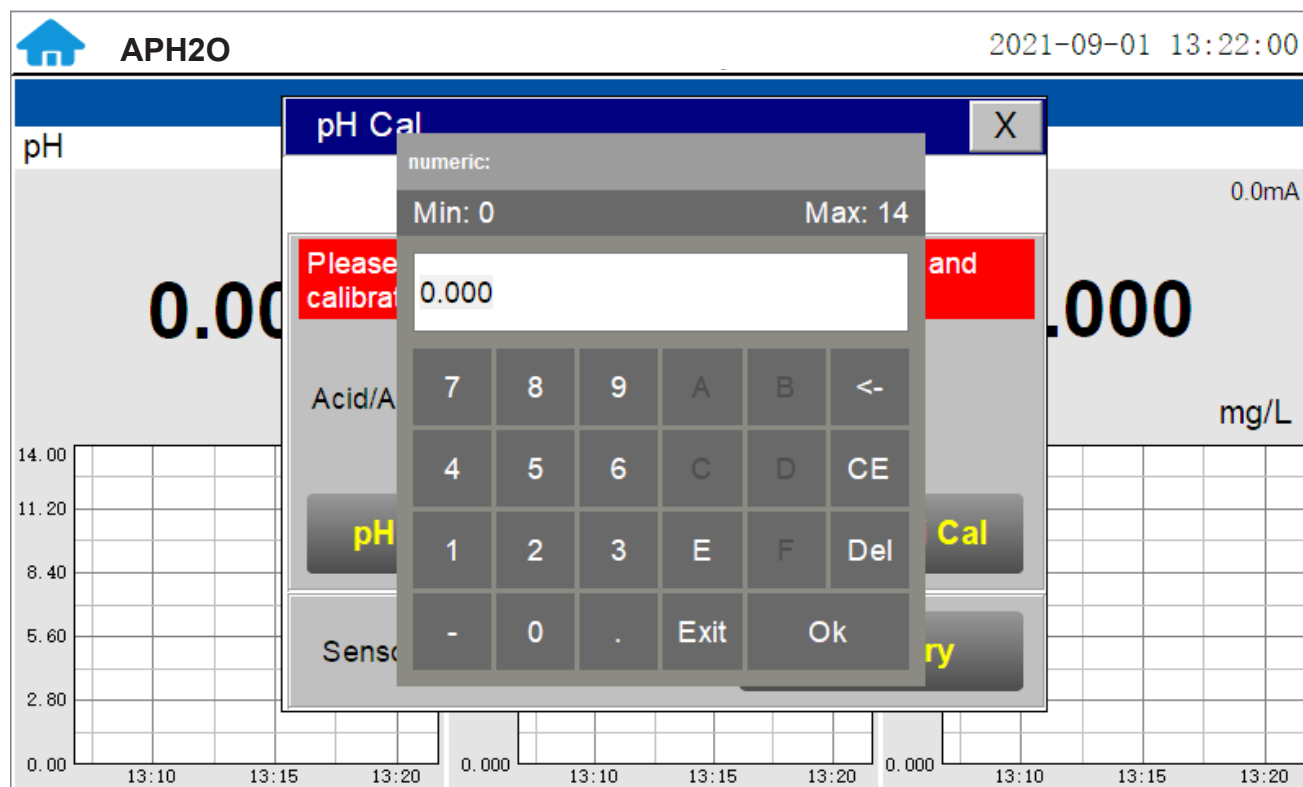


pH Calibration Success Prompt

Two Point pH Calibration

Remove the FCL700 sensor and rinse 3x with DI water. Submerge the sensor into a beaker with pH=7 buffer solution. Click "pH7 calibration". A dialog box will pop up to confirm whether to perform this operation, click "OK" if the calibration operation is confirmed, if the calibration is successful the dialog box will show "calibration success".

After pH7 is successfully calibrated, you can choose acid calibration or alkali calibration for the second calibration point. If you choose acid calibration, clean beaker 3x with deionized water. Fill the beaker with pH=4 buffer solution. Enter the value 4 in the calibration value dialog box, and click "Acid Calibration", then a dialog box will pop up to confirm whether to perform this operation. Click "OK" if the calibration operation is confirmed and the dialog box will show "Calibration Successful" if the calibration is successful. Similarly a pH=10 buffer solution can be selected for the second point calibration if desired.



pH Calibration Value Input

Three Point pH Calibration

Remove the FCL700 sensor and rinse 3x with DI water. Submerge the sensor into a beaker with pH=7 buffer solution. Click "pH7 calibration". A dialog box will pop up to confirm whether to perform this operation, click "OK" if the calibration operation is confirmed, if the calibration is successful the dialog box will show "calibration success".

After pH7 is successfully calibrated, you can choose acid calibration or alkali calibration for the second calibration point. If you choose acid calibration, clean the beaker 3x with deionized water. Fill the beaker with pH=4 buffer solution. Enter the value 4 in the calibration value dialog box, and click "Acid Calibration", then a dialog box will pop up to confirm whether to perform this operation. Click "OK" if the calibration operation is confirmed and the dialog box will show "Calibration Successful" if the calibration is successful.

After successful acid calibration, select pH=10 for alkali calibration. Clean the beaker 3x with deionized water. Fill the beaker with pH=10 buffer solution. Enter the value 10 in the calibration value dialog box, and click "Alkali Calibration", then a dialog box will pop up to confirm whether to perform this operation. Click "OK" if the calibration operation is confirmed and the dialog box will show "Calibration Successful" if the calibration is successful. The three-point calibration is completed.

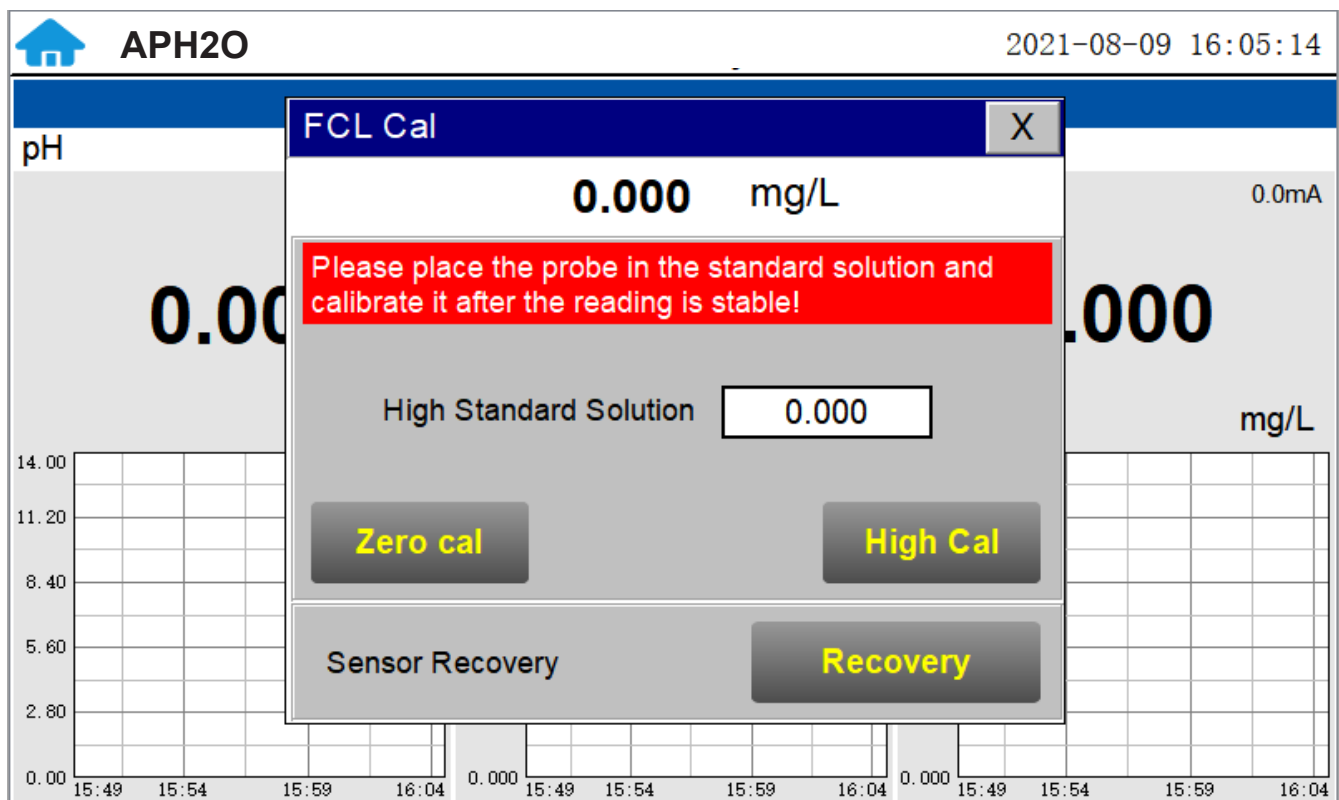
6.6.2. Residual Chlorine Calibration

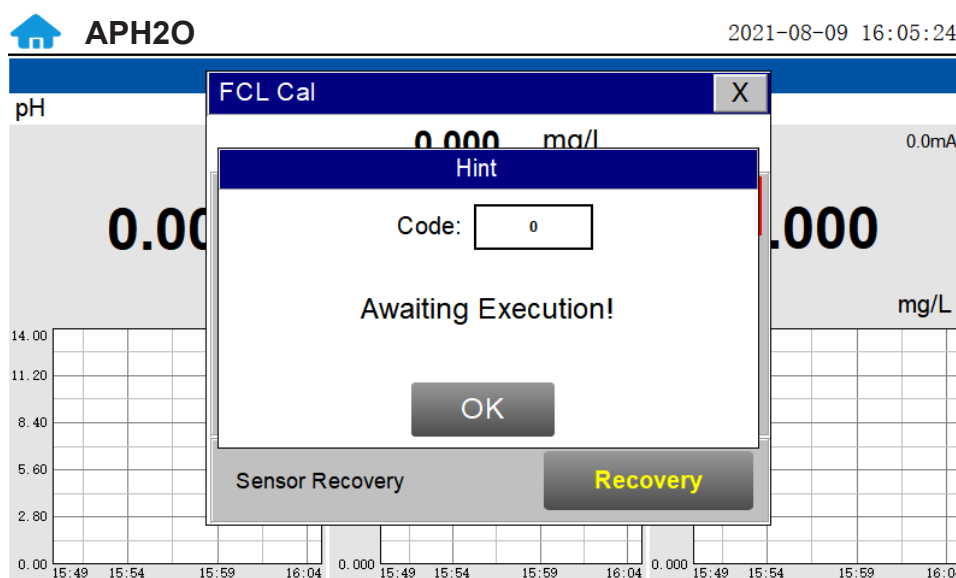
The residual chlorine measurement module of the FCL700 sensor is thoroughly calibrated at the factory. To calibrate, the user can perform a single-point or two-point calibration according to the requirements of the application. (USEPA-334.0 / ISO-7393 compliant methodology)

Single Point Residual Chlorine Calibration

Use a portable or laboratory colorimeter to test the active (flowing) water sample in the WR20 flow reservoir. DPD wet chemistry methodology is recommended. Once you have tested and confirmed the residual chlorine concentration value in the active (flowing) WR20 flow reservoir, enter the test result value of the portable or laboratory colorimeter in FCL Calibration Screen and click "High Point Calibration". A dialog box will pop up to confirm whether to perform this operation. If the calibration operation is confirmed, click "OK", and if the calibration is successful, the dialog box will show "Calibration Success".

**NOTE* As an alternative, a standard residual chlorine solution (DPD residual chlorine standard is recommended) can also be used for calibration of the FCL700 sensor while installed in the WR20 flow reservoir. In order to calibrate the sensor with this approach, an external recirculation pump is required to ensure that the WR20 flow reservoir is completely filled with the standard residual chlorine solution. A recirculation flow rate of 200-400ml/min is required for the FCL700 to be properly calibrated using a known standard residual chlorine solution.*





Awaiting execution Screen of Residual Chlorine Calibration

Two Point Residual Chlorine Calibration

The intercept in the FCL700 sensor residual chlorine concentration formula is non-zero from the factory, however the user can make a blank calibration to correct the intercept in the residual chlorine concentration formula according to application needs.

Blank Calibration Procedure:

To achieve blank calibration of the FCL700 sensor, close the water inlet valve and clean the WR20 flow reservoir with deionized water 2-3 times. Then fill the WR20 flow reservoir with the known zero calibration solution. After filling the WR20 with zero calibration solution or Conductivity Standard Solution (100 us/cm), wait for the FCL700 sensor residual chlorine display value to stabilize on the touch-screen display. Sensor stabilization should occur within 15-minutes. Click "Zero Calibration" and a dialog box will pop up confirm whether your desire to perform this operation. Click "OK" to confirm the calibration operation. If the calibration is successful, the dialog box will show "Calibration Success". The sensor is now blank-calibrated to the known zero calibration solution.

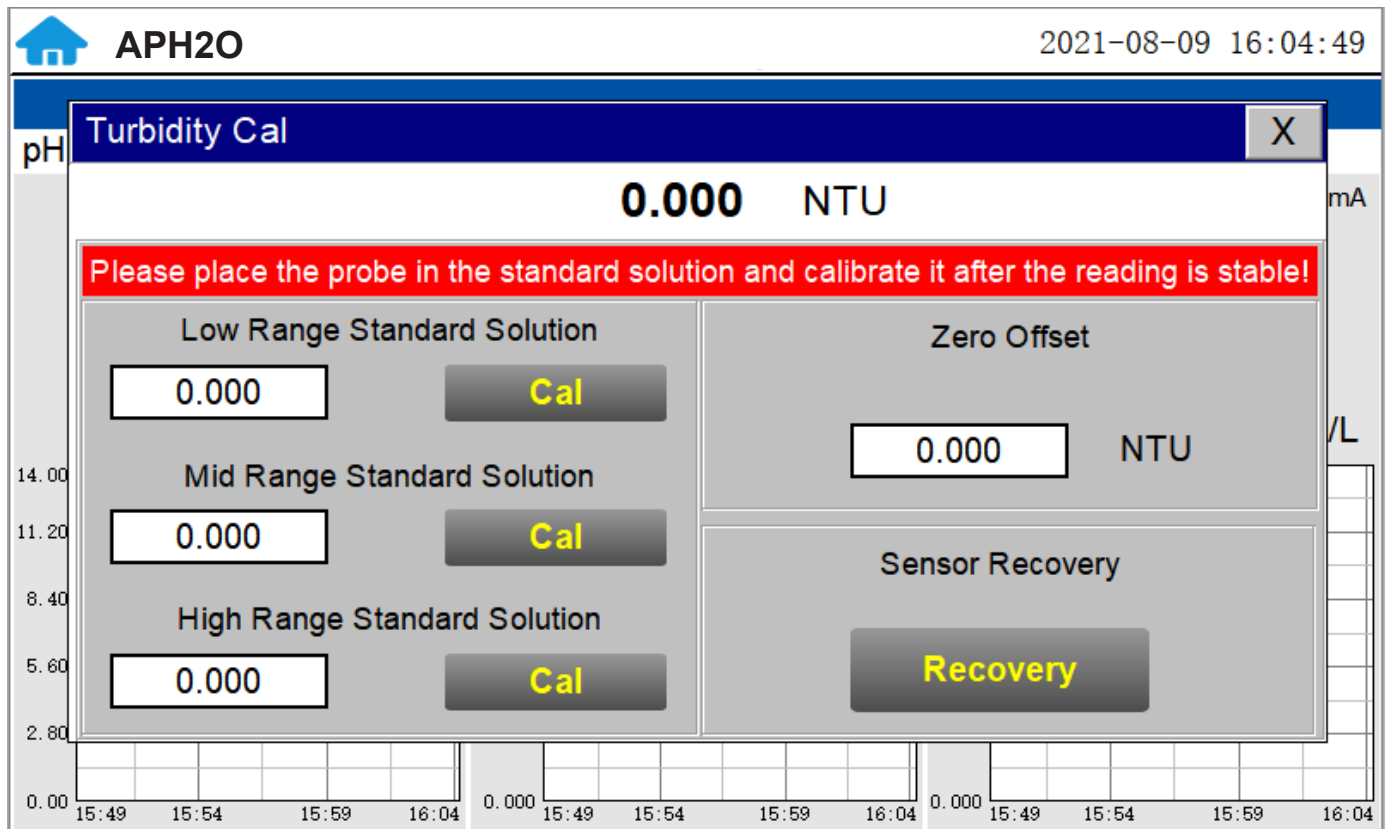
Slope Calibration Procedure:

Use a portable or laboratory colorimeter to test the active (flowing) water sample in the WR20 flow reservoir. DPD wet chemistry methodology is recommended. Once you have tested and confirmed the residual chlorine concentration value in the active (flowing) WR20 flow reservoir, enter the test result value of the portable or laboratory colorimeter in FCL Calibration Screen and click "High Point Calibration". A dialog box will pop up to confirm whether to perform this operation. If the calibration operation is confirmed, click "OK", and if the calibration is successful, the dialog box will show "Calibration Success".

**NOTE* As an alternative, a standard residual chlorine solution (DPD residual chlorine standard is recommended) can also be used for calibration of the FCL700 sensor while installed in the WR20 flow reservoir. In order to calibrate the sensor with this approach, an external recirculation pump is required to ensure that the WR20 flow reservoir is completely filled with the standard residual chlorine solution. A recirculation flow rate of 200-400ml/min is required for the FCL700 to be properly calibrated using a known standard residual chlorine solution.*

Turbidity Calibration

The UT700 Ultra Low Turbidity Sensor is rigorously calibrated at the factory. If the sensor is kept clean, the user will not need to calibrate the sensor for one year of operation. However, the user may calibrate the sensor as desired, or as required by site, local, or agency standards.. Prior to performing a calibration, the user can perform a diagnostic check on the sensor to determine if the sensor needs to be calibrated. To complete this task, the user must drain the WR20 flow reservoir and then wipe the WR20 flow cell and sensor surfaces with a dust-free cloth or paper towel to thoroughly clean them. Verify that there are no visible contaminants on the vessel walls or sensor surfaces. Once properly drained and cleaned, reinsert the UT700 Series sensor into the WR20 flow reservoir. Read the turbidity sensor display value on the touch screen display/data logger.



CAL700 Portable Liquid Formazin Turbidity Calibration Kit

As an option, and for ease in calibration, a CAL700 Calibration Kit is recommended for calibrating the UT700 Sensor. The CAL700 uses less standard and easier to clean, saving time and cost. (See page 28 for more instructions on the use of the CAL700.)



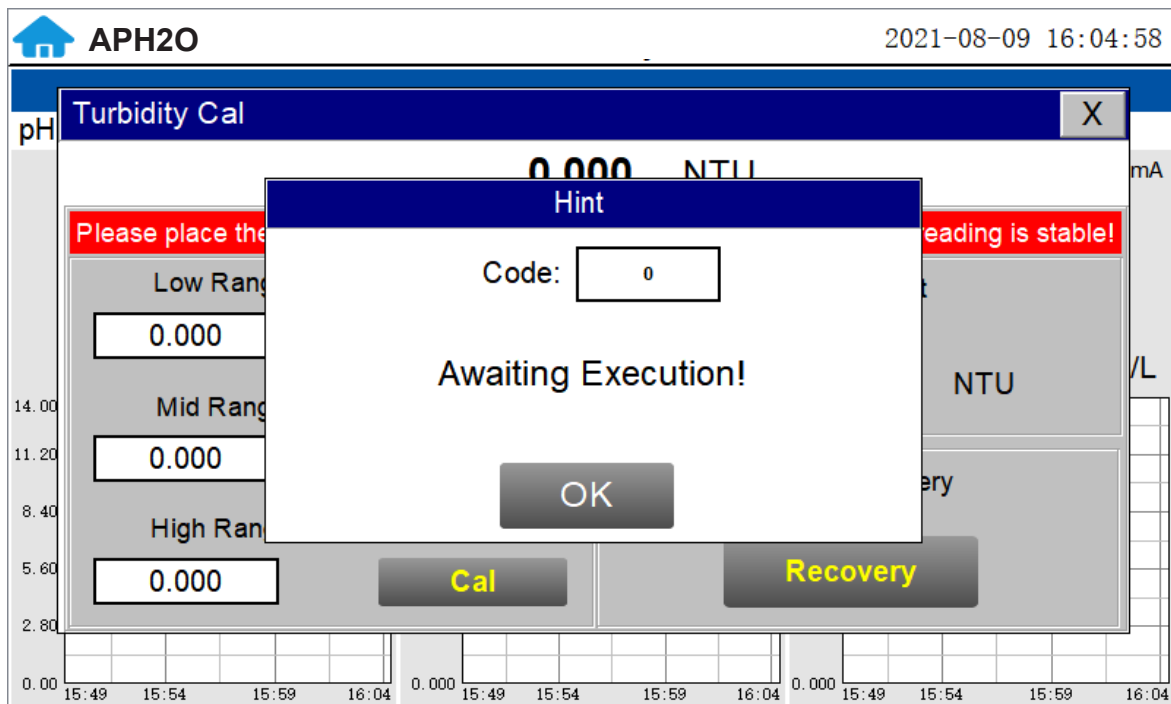
CAL700 Kit

Low-Range Calibration Procedure:

For Calibration in the WR20 reservoir, empty the WR20 flow cell and wipe the WR20 flow cell walls and turbidity sensor surfaces with a dust-free cloth or dust-free paper towel and verify that no contaminants are evident. Fill the WR20 flow cell with deionized water, then drain the contaminated deionized water. Repeat the cleaning operation as needed to ensure optimum cleanliness of the WR20 walls and sensor surfaces has been achieved. Then fill the WR20 flow cell with bubble free deionized water. (WR20 flow reservoir does not need to be completely filled, only fill reservoir above level of sensor.) After the displayed turbidity data is stable, enter “0.05” for the low-range calibration value and click on “Low Range Calibration”, a dialog box will pop up to confirm whether to perform this operation. Click “OK”, if the calibration is successful, the dialog box will show “Calibration successful”

For Calibration in the CAL700 reservoir, rinse and clean inside of CAL700 and turbidity sensor surfaces with a dust-free cloth or dust-free paper towel and verify that no contaminants are evident. Isolate the panel and drain the piping and inline Tee assemblies. Remove the UT700 sensor from the WR20 reservoir. Triple rinse the UT700 sensor surface, the WR20 flow reservoir internals and the CAL700 Portable Turbidity Calibration Kit with Deionized water. Insert the cleaned UT700 turbidity sensor into the CAL700 calibration vessel and position the CAL700 vessel vertically (with the sensor inserted in a horizontal position to the ground). Remove the top cap and fill the CAL700 vessel with 500mL of bubble free deionized water. After the displayed turbidity data is stable, enter “0.05” for the low-range calibration value and click on “Low Range Calibration”, a dialog box will pop up to confirm whether to perform this operation. Click “OK”, if the calibration is successful, the dialog box will show “Calibration successful”.

NOTE *Because there is no global standard for zero turbidity in the industry, Blue-White recommends 0.05 NTU as a target for Low-Point Calibration.*



Mid-Range Calibration:

After the low range calibration has been completed, fill the WR20 / CAL700 flow reservoir with known turbidity standard solution between 5NTU and 10NTU for mid-range calibration. After the displayed data is stable, enter the medium turbidity standard solution value and click on "Mid Range Calibration", a dialog box will pop up to confirm whether to perform this operation. Click "OK", if the calibration is successful, the dialog box will show "Calibration successful".

High-Range Calibration:

If a high-range calibration is not required, the user does not need to perform a high-range calibration of the UT700 series sensor. If a high calibration is required, proceed by filling the WR20 / CAL700 flow reservoir with known turbidity standard solution between 20NTU and 40NTU for high-range calibration. After the displayed data is stable, enter the high turbidity standard solution value and click on "High Range Calibration", a dialog box will pop up to confirm whether to perform this operation. Click "OK", if the calibration is successful, the dialog box will show "Calibration successful".

Troubleshooting Calibration Failed Messages

If you receive a "Calibration Fails" message during the calibration steps above, the following items should be checked:

- 1) Ensure your source of Deionized water is not contaminated with turbidity
- 2) Ensure your turbidity calibration standard solutions have not been contaminated
- 3) Ensure the UT700 sensor distillate end is not contaminated with debris or other substances
- 4) Ensure the WR20 / CAL700 flow reservoir is not contaminated or circulation blocked by debris or other materials.

CAL700 Portable Liquid Formazin Turbidity Calibration Kit

The calibration kit allows users to calibrate all ultra-low turbidity sensors using smaller volumes of Formazin turbidity calibration standards providing an affordable and reusable solution for long term sensor reliability. The unique design of the liquid calibration kit allows the UT700 sensor to be easily inserted and calibrated with the sensor in a horizontal position, allowing air bubbles to be evacuated through the integrated air-vent line ensuring superior accuracy of the sensor calibration. The kit has an easy to remove lid allowing users to fill and empty the calibration kit with DI water for vessel/sensor cleaning and Formazin calibration standards for sensor calibration.

The precision, resolution and the low detection limit of the UT700 sensors are not affected by the calibration method, regardless of using certified Formazin standards and the kit. The calibration only affects the turbidity sensor accuracy. The nature of turbidity measurement makes an absolute turbidity value not easily obtainable for any sensor manufacturer although proper standards and methods are followed. For example, turbidity values greater than 1.0 NTU measured on real-world samples with different sensors, even from the single manufacturer, could differ significantly. For ultra-low turbidity (less than 0.3 NTU) measurement using the same methods (ISO-7027 or EPA-180.1), it is likely that the values from different sensors can agree within 0.05 NTU. As such, the user should choose a calibration method and remain with the same calibration method for consistency.

Insert Sensor



Tighten Sensor Nut



Position Vertically and Remove Lid



Preclean by adding DI-Water (200mL)



Insert Lid



Gently Shake Then Empty Contents



Add Calibration Standard (500mL)



Insert Lid and Remove Air Bubble Vent Line Cap



* Sensor brace included for stability.

In this screen users can browse all logged alarms. Drag the right scroll bar up and down to view the history of alarms. Click "Previous" and "Next" to advance to the next page. Click "Query" then enter the alarm number in the pop-up box to query that alarm.

The screenshot shows a software interface for managing alarms. At the top is a blue header bar with the title "Alarm" and a close button "X". Below the header is a table with the following columns: "Number", "Date", "Time", and "Alarm description". The table is currently empty. A modal window titled "Alarm Data Query" is open in the center, featuring a text input field labeled "Number" containing the value "0" and a "Query" button. At the bottom of the interface, there are four buttons: "Delete" (highlighted in yellow), "Query", "Previous", and "Next".

The Delete button in the lower left corner will delete all alarm records. After clicking delete, you must exit the screen and reenter before the historical data within the data report will be cleared.

6.9. Historical Data

Click the "Historical Data" button in the menu bar to enter the data report interface.

The screenshot shows a software interface for viewing historical data. At the top is a blue header bar with the title "Data" and a close button "X". Below the header is a table with the following columns: "Number", "Time", "pH", "Turbidity", "FCL", and "Temp". The table contains three rows of data:

Number	Time	pH	Turbidity	FCL	Temp
1	2021-08-09 16:02:27	0.00	0.000 NTU	0.000 mg/L	0.0 °C
2	2021-08-09 16:01:27	0.00	0.000 NTU	0.000 mg/L	0.0 °C
3	2021-08-09 16:00:27	0.00	0.000 NTU	0.000 mg/L	0.0 °C

At the bottom of the interface, there are five buttons: "Delete" (highlighted in yellow), "Previous", "Next", "Periodicity", and "Query".

In the data report, the user can view the stored data of all parameters. The system records sensor readings every 4 seconds by default but this can be edited by the user if desired. Drag the scroll bar on the right to slide up or down or click "Previous" and "Next" to view historical data records. The data record can save up to 100,000 data entries. New data will overwrite the previously saved data after recording 100,000 data entries. The user can click the "Periodicity" button to change the data recording time interval.

The screenshot shows a window titled "Data" with a close button (X) in the top right corner. Below the title bar is a table with the following columns: Number, Time, pH, Turbidity, FCL, and Temp. The table contains three rows of data:

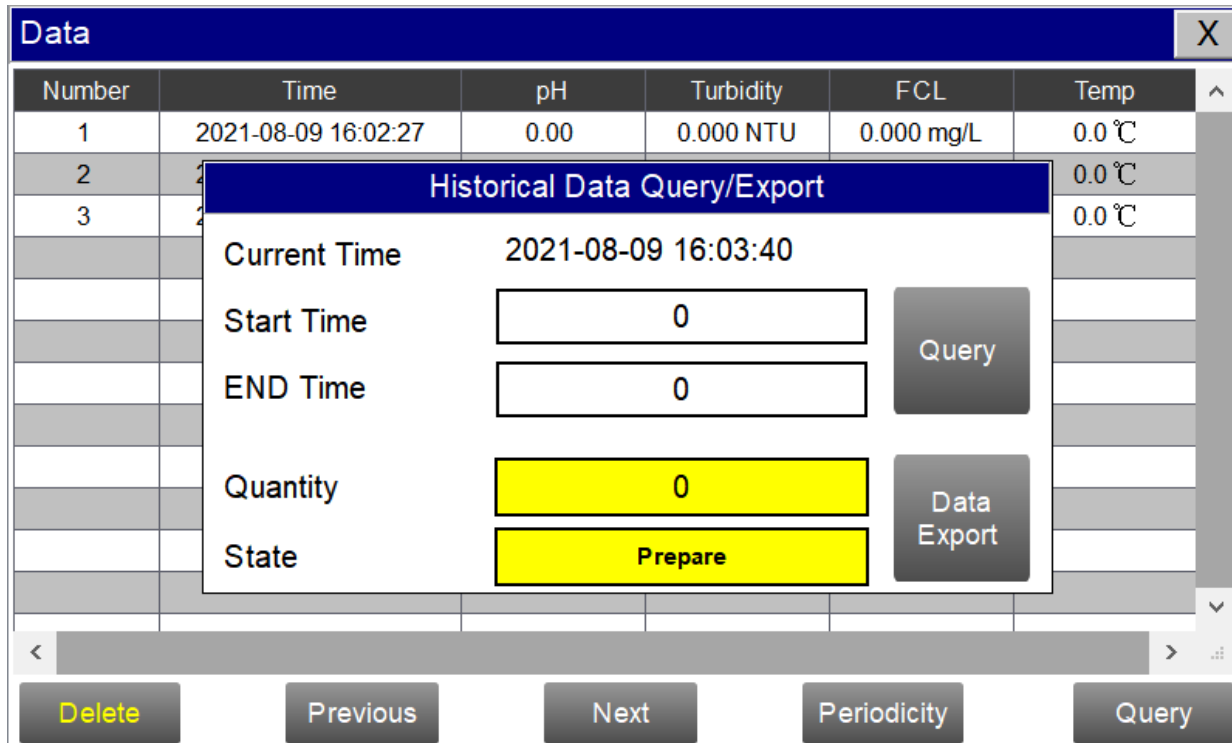
Number	Time	pH	Turbidity	FCL	Temp
1	2021-08-09 16:02:27	0.00	0.000 NTU	0.000 mg/L	0.0 °C
2	2021-08-09 16:01:27	0.00	0.000 NTU	0.000 mg/L	0.0 °C
3	202				0.0 °C

A dialog box titled "Data Storage Period" is overlaid on the table. It contains a label "Periodicity" and a text input field containing the value "60S". Below the dialog box is a horizontal scrollbar. At the bottom of the window, there are five buttons: "Delete" (highlighted in yellow), "Previous", "Next", "Periodicity", and "Query".

Click "Delete" in the lower left corner. After entering the retention time, click the "Delete" button to clear all historical data within the retention time range.

The screenshot shows the same "Data" window as above, but with a dialog box titled "Historical Data Deletion" overlaid. The dialog box contains a label "Retention Time" and a text input field containing the value "0" followed by the letter "h". Below the input field is a "Delete" button (highlighted in yellow). The "Delete" button at the bottom left of the window is also highlighted in yellow.

Click the “Query” button in the lower right corner, enter the start time and end time and then click the “Query” button. Note that the start time and end time must be filled in exactly and completely according to the system time format.



The screenshot displays a data management interface. At the top, a blue header bar contains the word "Data" and a close button "X". Below the header is a table with the following columns: Number, Time, pH, Turbidity, FCL, and Temp. The table contains three rows of data:

Number	Time	pH	Turbidity	FCL	Temp
1	2021-08-09 16:02:27	0.00	0.000 NTU	0.000 mg/L	0.0 °C
2					0.0 °C
3					0.0 °C

A dialog box titled "Historical Data Query/Export" is overlaid on the table. It contains the following fields and buttons:

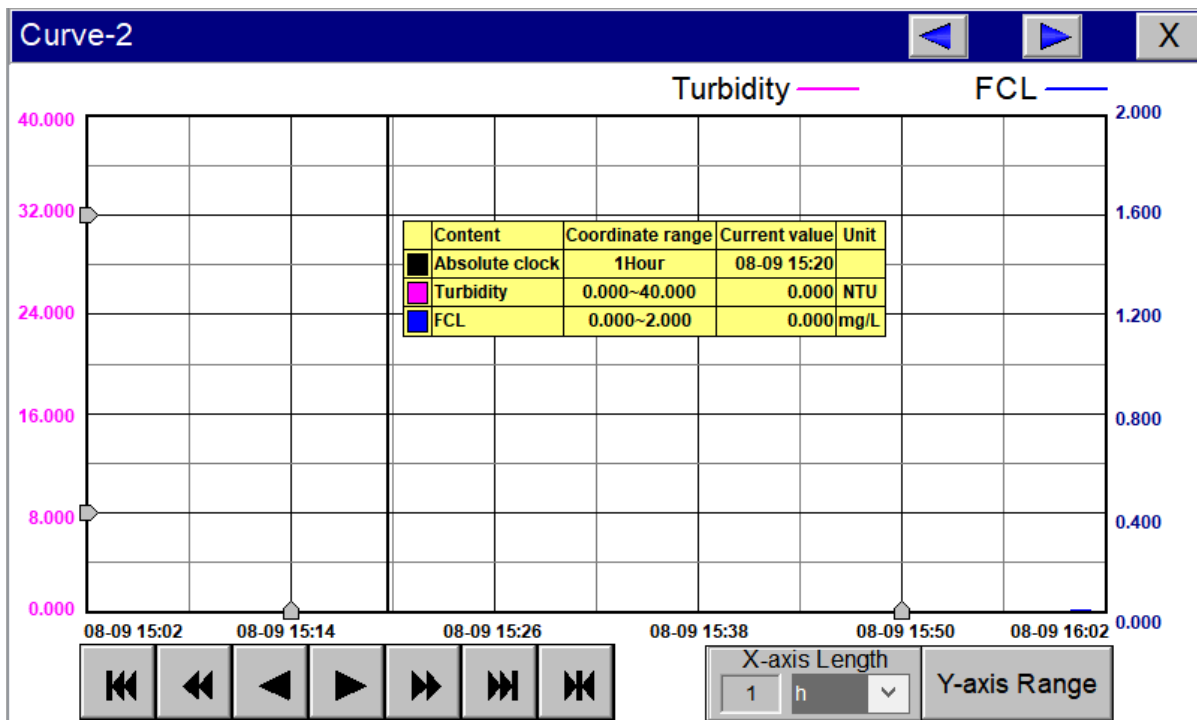
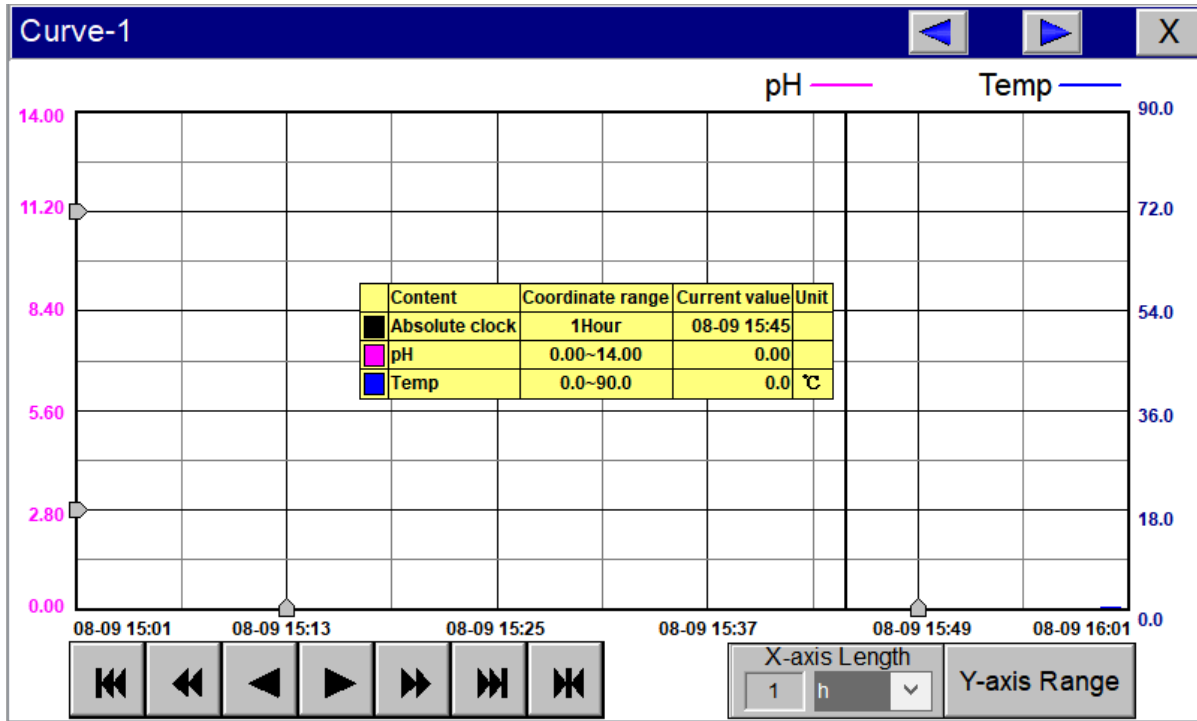
- Current Time: 2021-08-09 16:03:40
- Start Time:
- END Time:
- Quantity:
- State:
- Buttons: Query, Data Export

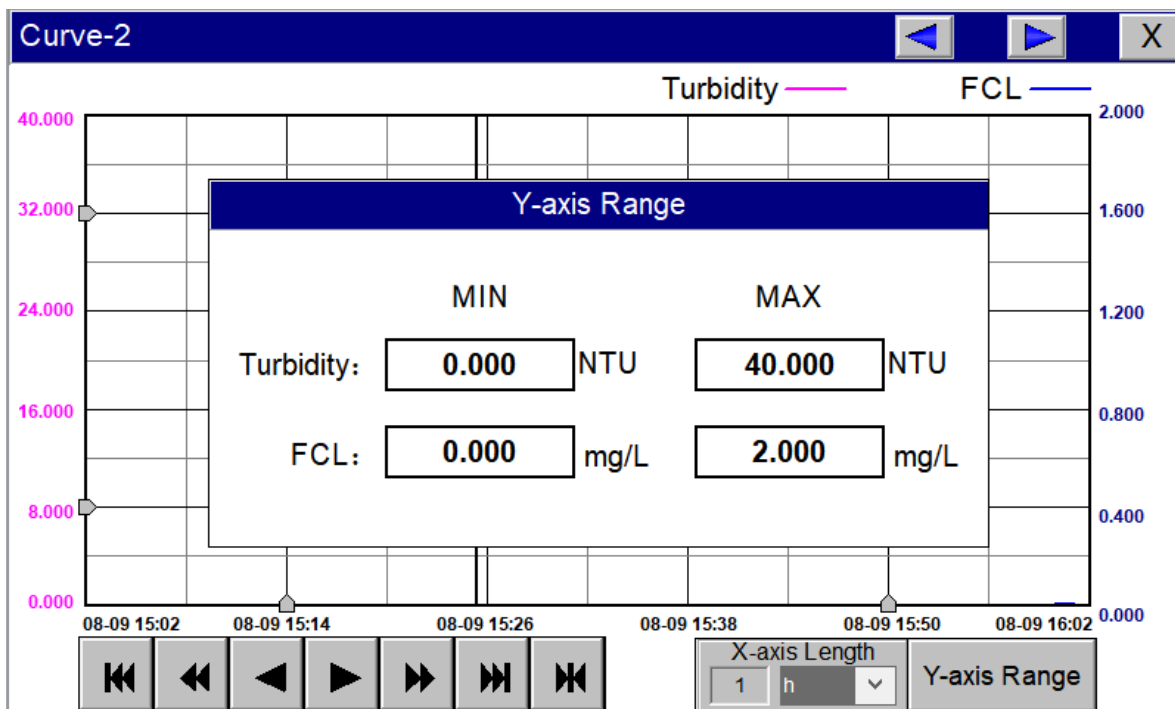
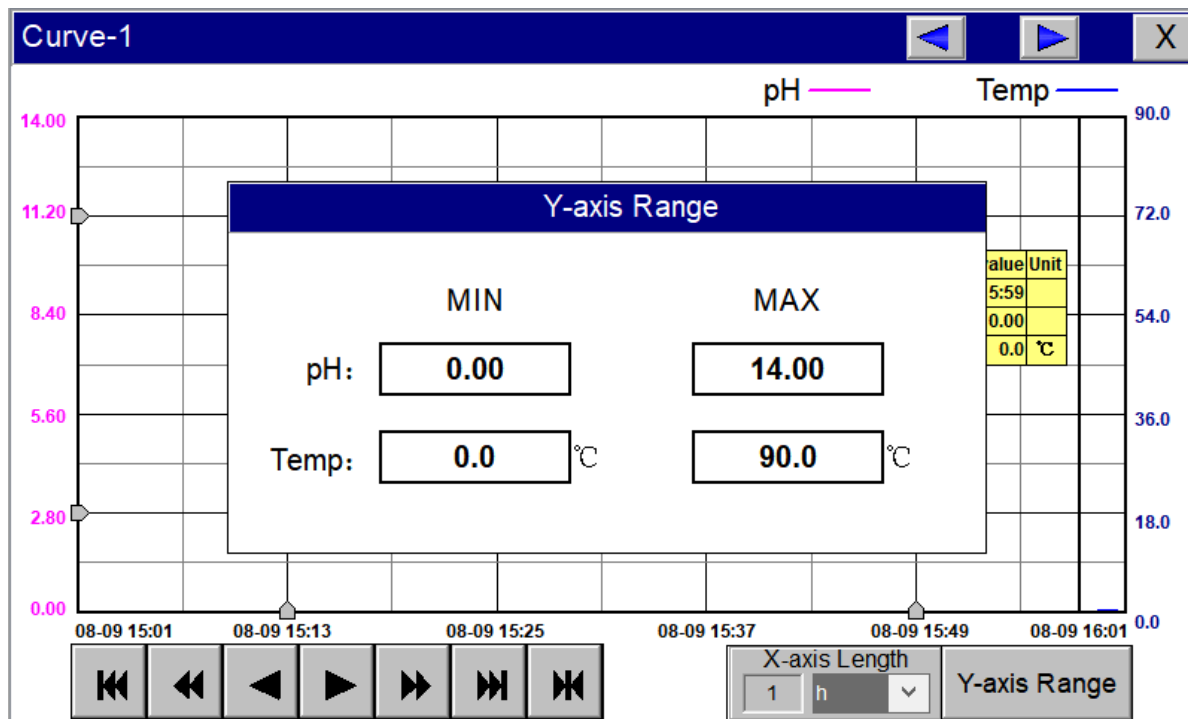
At the bottom of the interface, there is a navigation bar with the following buttons: Delete, Previous, Next, Periodicity, and Query.

Insert a USB disk behind the display screen and enter the time range of the data to be exported in the query area. Click on the “Data Export” to download the data to the USB disk. The data quantity will be shown as a positive number if data export is successful. If the data export was not successful, please check whether the time format is correct.

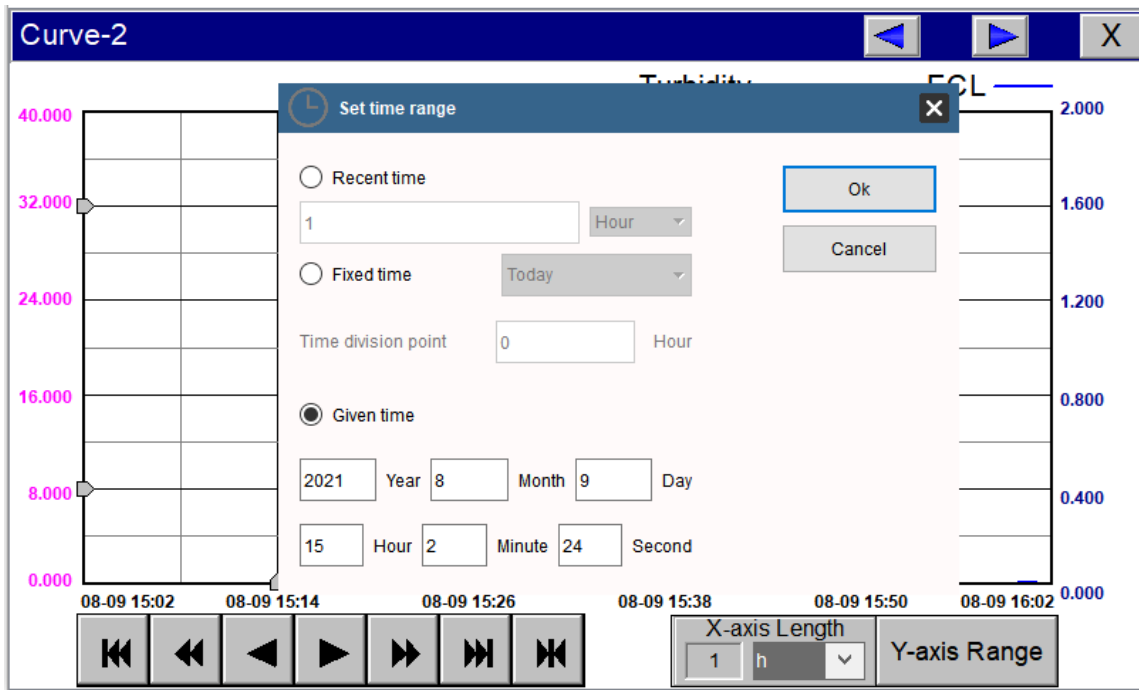
6.10. Historical Data Curves

Click the "Historical Curve" button in the menu bar to enter the trend curve interface. You can click the buttons below the X-axis to browse and view the values in a different time range. Click on Y-axis Range to change the minimum and maximum Y-axis values for a proper range.





- The curve will scroll back (to the left of the X-axis) one page
- The curve will scroll back (to the left of the X-axis) half the page of the curve
- The curve will scroll backward (to the left of the X-axis) to a position where the main line is drawn
- The curve will scroll forward (to the right of the X-axis) to a position where the main line is drawn
- The curve will scroll forward (to the right of the X-axis) half the page of the curve
- The curve will scroll forward (to the right of the X-axis) one page
- A dialog box will pop up to reset the starting time of the curve

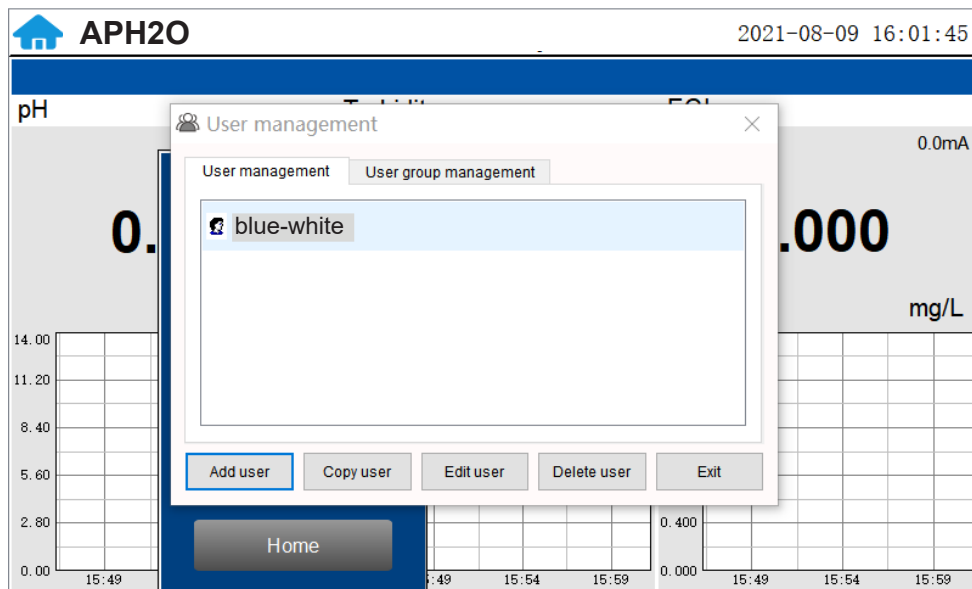


6.11. User Management

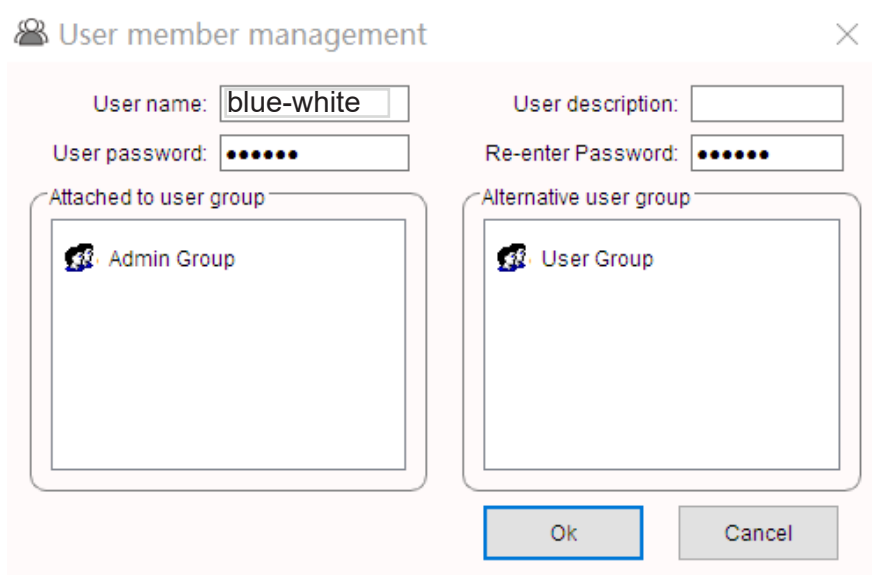
Click the “User Management” button on the menu bar and then you can select “Login”, “Logout” and “Manage” operations.

The screenshot displays the main monitoring interface. At the top right, the date and time are shown as '2021-08-09 16:01:10'. The interface is divided into two main sections: 'Turbidity' (left) and 'FCL' (right). Both sections show a current value of '0.000'. The 'Turbidity' section also includes the unit 'NTU'. The 'FCL' section includes the unit 'mg/L'. On the left side, there is a vertical menu bar with icons for 'Parameter', 'Calibration', 'Alarm', 'Data', 'Curve', and 'USER'. The 'USER' menu is currently expanded, showing buttons for 'Login', 'Logout', 'Manage', '中/A', and 'Home'. The background of the main display area is a light gray grid.

Logout enables the user to log out of the logged-in state and only view the real-time readings, but cannot perform operations such as parameter settings. Click “Manage” to enter the user management interface, where you can add users, change passwords and other operations. Users can set their own user name and password and select the user group they belong to. Only users in the administrator user group can set parameters such as calibration. **Note: Default password “888888”**



Password: Select the user you want to change, then click Modify User button, enter the user's own password in the User Password column and Confirm Password column, and click Confirm to modify successfully. **NOTE* If you do not want to set the password, you can delete the password and save it.*



6.12 Other Settings

To modify system settings, such as Time, Date, TCP, Display, press a finger on touchscreen while to unit is powering on. With unit off, press and hold finger on screen and press power button. Hold finger on screen until system settings window appears. Do not change settings if unsure of their use. Consult factory for guidance. After saving settings, close window and press “run” button to resume monitoring.

NOTES:

7.0 Maintenance

7.1. Correspondence Address

Serial Number	Definition	Address	Format	Mode	Unit	Note
1	pH	1	float	Read Only	pH	
2	Turbidity	3	float	Read Only	NTU	
3	Residual Chlorine	5	float	Read Only	mg/L	
4	pH Upper Limit Alarm	7	unit	Read Only		0=Normal 1=Alarm
5	pH Lower Limit Alarm	8	unit	Read Only		0=Normal 1=Alarm
6	Turbidity Upper Limit Alarm	9	unit	Read Only		0=Normal 1=Alarm
7	Turbidity Lower Limit Alarm	10	unit	Read Only		0=Normal 1=Alarm
8	Residual Chlorine Upper Limit Alarm	11	unit	Read Only		0=Normal 1=Alarm
9	Residual Chlorine Lower Limit Alarm	12	unit	Read Only		0=Normal 1=Alarm
10	Residual Chlorine / pH Sensor Communication Abnormalities	13	unit	Read Only		0=Normal 1=Alarm
11	Turbidity Sensor Comm Abnormalities	14	unit	Read Only		0=Normal 1=Alarm
12	Temperature	15	float	Read Only		0=Normal 1=Alarm
13	PLC Comm Error	17	unit	Read Only		0=Normal 1=Alarm
14	Cleaning Module Comm Error	18	unit	Read Only		0=Normal 1=Alarm
15	Brush Working Error	19	unit	Read Only		0=Normal 1=Alarm
16	4-20mA Comm Error	20	unit	Read Only		0=Normal 1=Alarm
Communication Protocol: Standard Modbus-RTU						
Communication Parameters: Baud Rate - 9600, Data Bit - 8, Stop Bit - 1, Parity Bit - Even						
Station Number: 100						
Communication Protocol: Standard Modbus-TCP						
Communication Parameters: IP:192.168.0.3 (can be set); port 502						
Station Number: 1						

7.2. Operation and Maintenance

After the analyzer is installed by a qualified technician, it can begin to monitor water quality. The APH20 online detection system is designed to be simple to operate, but still requires some regular maintenance. Actual system maintenance may vary depending on the installation conditions and usage. Please refer to the table below as a general recommended maintenance schedule. Minimal operator intervention is required during normal operation.

Required Services	Recommended Frequency
Cleaning Inlet Water Filter	Monthly or Cleaned As Needed
Cleaning of WR-20 Flow Reservoir and Photoelectric Pole	Monthly
pH Calibration	Every 6 Months
Turbidity Calibration	Every 6 Months
Residual Chlorine Calibration	Every 6 Months Required Services

7.3. Instrument Alarms and Descriptions

Please refer to the instrument alarms and descriptions table when troubleshooting the APH2O online inspection system issues an alarm or indicates abnormal measurement data.

Alarms	Description	Symptoms	Solutions/Recommendations
PLC Communication Abnormalities	PLC without Communication		Check if the wiring inside the PLC and control box is loose
Turbidity Sensor Communication Abnormality	Turbidity Sensor without Communication	No Turbidity Measurements	Check the connection between the sensor and the circuit board. If the problem persists, contact factory.
pH / Residual Chlorine Sensor Communication Abnormalities	pH / Residual Chlorine Sensor without Communication	No pH and Residual Chlorine Measurements	
pH Upper Limit	pH above the Alarm	Information Only	Compare with manual measurement readings. Check and clean line valves. Check that water flow is normal. Check that the sensor is clean.
pH Lower Limit Alarm	pH below the Alarm Setting	Information Only	
Turbidity Upper Limit Alarm	Turbidity above the Alarm Setting	Information Only	
Turbidity Lower Limit Alarm	Turbidity below the Alarm Setting	Information Only	
Residual Chlorine Upper Limit Alarm	Residual Chlorine above the Alarm Setting	Information Only	
Residual Chlorine Lower Limit Alarm	Residual Chlorine below the Alarm Setting	Information Only	
Turbidity Calibration Failure Code 259	Low Calibration Standard Solution out of Range	Turbidity Calibration Failure	Check that the flow cell and sensor are clean and that the standard solution is not contaminated
Turbidity Calibration Failure Code 260	Mid Calibration Standard Solution out of Range	Turbidity Calibration Failure	
Turbidity Calibration Failure Code 261	High Calibration Standard Solution out of Range	Turbidity Calibration Failure	
Turbidity Calibration Failure Code 262	Slope f1 out of Range	Turbidity Calibration Failure	
Turbidity Calibration Failure Code 263	Slope f2 out of Range	Turbidity Calibration Failure	
pH/Residual Chlorine Calibration Failure Code 2		Calibration Failure	Check whether the water flow is normal, whether the sensor is clean, whether the standard liquid is contaminated
pH/Residual Chlorine Calibration Failure Code 3	Standard Solution Value out of Range	Calibration Failure	
pH/Residual Chlorine Calibration Failure Code 5	Wrong Data Type for the Liquid Value	Calibration Failure	

NOTES:

8.0 WARRANTY

8.1 LIMITED WARRANTY

Your new AP Analyzer is a quality product and is warranted for 13 months from date of purchase (proof of purchase is required). Electrodes are warranted for 6 months. The unit will be repaired or replaced at our discretion. Failure must have occurred due to defect in material or workmanship and not as a result of operation of the product other than in normal operation as defined in the manual. Warranty status is determined by the serial label and the sales invoice or receipt. The serial label must be on the unit and legible. The warranty status of the unit will be verified by Blue-White or a factory authorized service center.

8.2 WHAT IS NOT COVERED

- Wear items.
- Unit removal, or re-installation, and any related labor charge.
- Freight to the factory, or service center.
- Units that have been tampered with, or in pieces.
- Damage to the unit that results from misuse, carelessness such as chemical spills on the enclosure, abuse, lack of maintenance, or alteration which is out of our control.
- Units damaged by faulty wiring, power surges or acts of nature.

8.3 PROCEDURE FOR IN WARRANTY REPAIR

Contact the factory to obtain a RMA (Return Material Authorization) number. Carefully pack the unit to be repaired. Please enclose a brief description of the problem as well as the original invoice or sales receipt, or copy showing the date of purchase. Prepay all shipping costs. COD shipments will not be accepted. Warranty service must be performed by the factory or an authorized service center. Damage caused by improper packaging is the responsibility of the sender. When In-Warranty repair or replacement is completed, the factory pays for return shipping to the dealer or customer.

8.4 PRODUCT USE WARNING

Blue-White products are manufactured to meet the highest quality standards in the industry. Each product instruction manual includes a description of the associated product warranty and provides the user with important safety information. Purchasers, installers, and operators of Blue-White products should take the time to inform themselves about the safe operation of these products. In addition, Customers are expected to do their own due diligence regarding which products and materials are best suited for their intended applications. Blue-White is pleased to assist in this effort but does not guarantee the suitability of any particular product for any specific application as Blue-White does not have the same degree of familiarity with the application that the customer/end user has. While Blue-White will honor all of its product warranties according to their terms and conditions, Blue-White shall only be obligated to repair or replace its defective parts or products in accordance with the associated product warranties. BLUE-WHITE SHALL NOT BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE WHETHER DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING OUT OF OR RELATED TO THE FAILURE OF ANY OF ITS PARTS OR PRODUCTS OR OF THEIR NONSUITABILITY FOR A GIVEN PURPOSE OR APPLICATION.

17.5 CHEMICAL RESISTANCE WARNING

Blue-White offers a wide variety of wetted parts. Purchasers, installers, and operators of Blue-White products must be well informed and aware of the precautions to be taken when injecting or measuring various chemicals, especially those considered to be irritants, contaminants or hazardous. Customers are expected to do their own due diligence regarding which products and materials are best suited for their applications, particularly as it may relate to the potential effects of certain chemicals on Blue-White products and the potential for adverse chemical interactions. Blue-White tests its products with water only. The chemical resistance information included in this instruction manual was supplied to Blue-White by reputable sources, but Blue-White is not able to vouch for the accuracy or completeness thereof. While Blue-White will honor all of its product warranties according to their terms and conditions, Blue-White shall only be obligated to repair or replace its defective parts or products in accordance with the associated product warranties. BLUE-WHITE SHALL NOT BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE, WHETHER DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING OUT OF OR RELATED TO THE USE OF CHEMICALS IN CONNECTION WITH ANY BLUE-WHITE PRODUCTS.

9.0 Product Information

APH20 Analyzer Panel

Model Number

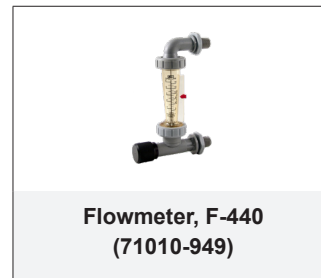
APH20 Multi-Parameter Online Analyzer Panel (Chlorine, Turbidity, pH, Temperature)

Includes: TS10 7" Touchscreen Display, WR-20 Dual Sensor Flow Reservoir, UT700 Turbidity Sensor, FCL700 Chlorine/pH/Temperature Sensor, Assembled Panel with Flowmeter, 110VAC Power Cord.

- Power Requirement 96-260 VAC / 50-60 Hz: 10A Fuse: 200W

- CE, RoHS, EPA-180.1/334.0

Replacement Parts and Accessories



*500ml 10 NTU Calibration Standard (90008-973)

*500ml 20 NTU Calibration Standard (90008-974)

Sensor Cleaning Solution, 500 mL (90008-988)

AP-MA1.5-CR 1.5 meter Short Cable - 8Pin x Flying leads (90008-954)

pH Calibration Combo Pack (4, 7, 10 pH), 500 mL (90008-983)

NOTES:



Users of electrical and electronic equipment (EEE) with the WEEE marking per Annex IV of the WEEE Directive must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to them for the return, recycle, recovery of WEEE and minimize any potential effects of EEE on the environment and human health due to the presence of hazardous substances. The WEEE marking applies only to countries within the European Union (EU) and Norway. Appliances are labeled in accordance with European Directive 2002/96/EC.

Contact your local waste recovery agency for a *Designated Collection Facility* in your area.

Blue-White[®]