Pyxis

UC-100S

with

ST-600 – Sodium Hypochlorite Concentration

ST-720 – Conductivity/TDS

ST-725 – Ultralow Conductivity

User Manual

Pyxis Lab Inc.

July **2024**

Related Statements

The manufacturer shall not be liable for direct, indirect, special, incidental or consequential damages resulting from any deficiency or omission in this manual. The manufacturer reserves the right to make changes to this manual and the products described in it at any time without notice or liability. Revised versions can be found on the manufacturer's website.

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 personal injury to the operator or damage to the equipment.

Use of Danger Information

Danger
Indicates a potentially or urgent dangerous situation that, if not avoided, will cause death or serious injury.

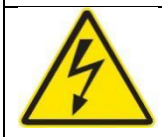
Warning
Indicates a potentially or very dangerous situation that, if not avoided, may cause serious personal injury or death.

Warning
Indicates a potentially dangerous situation that may cause a certain degree of personal injury.

Attention
Indicates conditions that if not avoided, will cause damage to the instrument. This is information that needs special emphasis.

Warning Label

Please read all labels and marks attached to the instrument. Failure to follow the instructions on these safety labels may result in personal injury or damage to the instrument.

	If this symbol appears in the instrument, it means refer to the operation and/or safety information in the instruction manual.
	If there is this mark on the instrument housing or insulator, it means there is a risk of electric shock or death from electric shock.
	Static electricity can damage the delicate internal electronic components, resulting in reduced performance or eventual failure of the instrument.
	Electrical equipment marked with this symbol cannot be disposed of through the European public waste system after August 12, 2005. In order to comply with European regional and national regulations (EU Directive 2002 / 98 / EC), European electrical equipment users must now return abandoned or expired equipment to the manufacturer for disposal without any cost.

Pyxis

Catalog

1. Specifications

Items	UC-100S
P/N	43047
Compliance	EPA-180.1/334.0
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; 75 W
Input	RS-485 Modbus - RTU
Output	4 x 4-20 mA / RS-485 Modbus - RTU / Modbus TCP /2 Relay
USB	1 x USB host, for data downloading and screen upgrade
Internet	RJ-45 socket, Modbus-TCP
Panel Operational	40 – 113°F (4-45 °C)
Storage Temperature	Instrument: -4 – 131°F (-20 – 55°C) / Sensors 32 – 122°F (0 – 50°C)
Sample Water	40 – 104°F (4-40°C)
Sample Water Pressure	7.25 – 30 psi (0.05 – 0.2Mpa)
Rating	IP-65 Panel-Display / IP-67 Sensors
Regulation	CE / RoHS
Relative Humidity	20% - 90% (No Condensation)
Altitude	<6,561 feet (<2,000 Meter)
Approximate Product	~ 10 kg

Items	ST-600
Part Number	50231
Conductivity Range	0%-16%
Conductivity Precision	±0.5% absolute error or ±2%FS relative error
Resolution	0.2%
Measurement Method	Optical method, built-in RTD temperature compensation
Recommended Flow Rate	0-2m/s
Working Voltage	22-26 VDC, Power ~2W
Output Signal	4-20mA analogue output / RS-485 digital output
Cable Connector	IP67 aircraft style connector, cable length 1.5m (4.5ft)
Working Pressure	≤6.9Bar（100psi）
Working Temperature	0~50℃(32~122℉)
Storage Temperature	-20~60℃(-4~140℉)
Sensor Material	Case: CPVC; Detection channel: optical quartz tube
Sensor Size	L172.7mm×Ø36.6mm
Typical Lifetime	≧2 years
Sensor weight	170g（0.37lbs）
Installation	3/4" Tee mount, socket or NPT threaded connection
Rating	IP67
Regulation	CE / RoHS / UKCA
Warranty Time	13 months

Items	ST-720
Part Number	53101
Conductivity Range	0-100,000μS/cm
Conductivity Precision	±10 μS/cm or 1% of the value
Refresh Frequency	≤600ms
Temperature Compensation	PT100, automatic temperature compensation (ATC)
Working Voltage	22-24 VDC, Power ~2W
Output Signal	4-20mA analogue output / RS-485 digital output
Cable Connector	IP67 aircraft style connector, cable length 1.5m (4.5ft)
Working Pressure	≤6.9Bar（100psi）
Working Temperature	0~49℃(32~120℉)
Storage Temperature	-20~60℃(-4~140℉)
Sensor Material	Case: CPVC; Electrode: Graphite
Sensor Size	L172mm×Ø36.6mm
Typical Lifetime	≧2 years
Sensor Weight	170g（0.37lbs）
Installation	3/4" Tee mount, socket or NPT threaded connection
Rating	IP67
Regulation	CE / RoHS / UKCA
Warranty Time	13 months

Items	ST-725
Part Number	53108
Conductivity Range	0.02–200.0 μS± /cm
Conductivity Precision	0.1 μS/cm or 1% of the value
4–20mA Range for Temp	32–212 °F (0–100 °C)
Temperature Precision	1% of the value
Cell Constant (K)	0.3
Sample Pressure	Up to 100 psi (0.7 MPa)
Power Supply	22–26 VDC, Power Consumption 2W
Dimension (L x W x H)	Length 8.46 inch (215 mm), body diameter 1.32 Inch (33.6 mm)
Installation	3/4” NPT
Body Material	304 stainless steel
Weight	530 g (1.16 lbs)
Operational Pressure	100 psi (6.9 Bar)
Operating Temperature	40–120 °F (4–49 °C)
Storage Temperature	20–140 °F (-7–60 °C)
Outputs	3Pin - Isolated 4–20 mA Analog Output & Isolated RS-485 Digital Output
Wet Material	HASTELLOY
Rating	IP67, Fully Dustproof & Water
Regulation	CE / RoHS / UKCA
Cable Length	5 ft (1.5 m) - (Extension Cables)

NOTE *- Pyxis Lab is consistently updating technologies, as such, specifications may change without notice.*

2. UC-100S Controller Features

The UC-100S controller integrates a touch screen display/data logger interface for sensor calibration. The display/data logger provides 4 x 4-20mA Outlets, as well as RS-485 and TCP-IP. The sensors are all connected to the display/data logger via RS-485 modbus (RTU), allowing in the monitor touch screen Integrated sensor calibration interface and diagnostics

3. Dimension and Mounting

3.1. Dimension

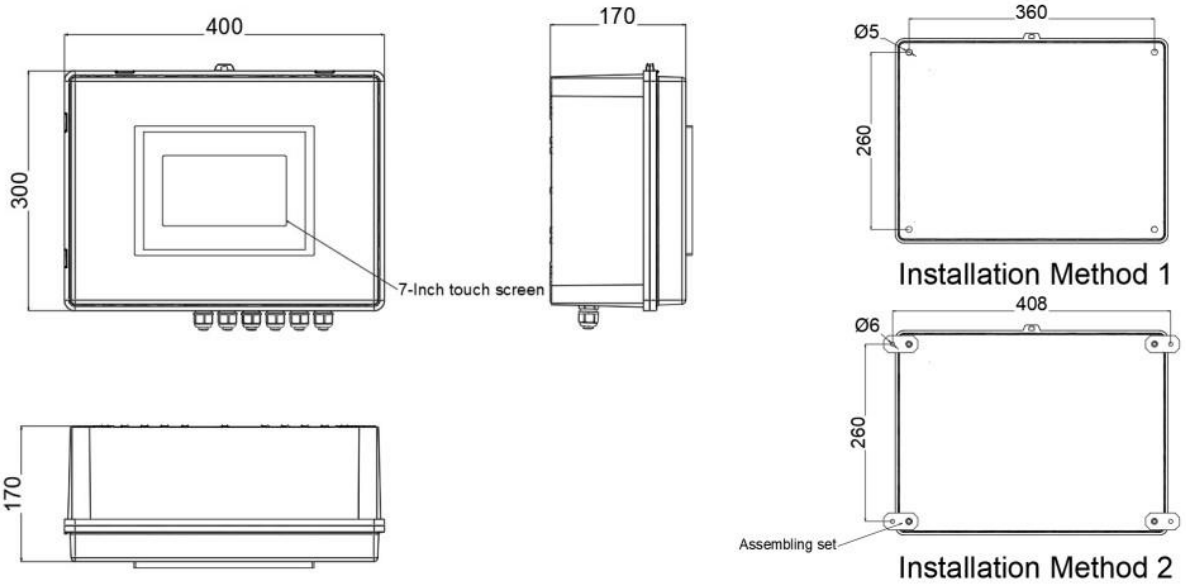


Figure. 1 - UC-100S controller size and installation size

3.2. Terminal Wiring

Before use, you need to connect the power cable to the controller terminal according to the wiring diagram.

XT1 to L
XT2 to N
XT3 to PE.

Warning

⚠ 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.

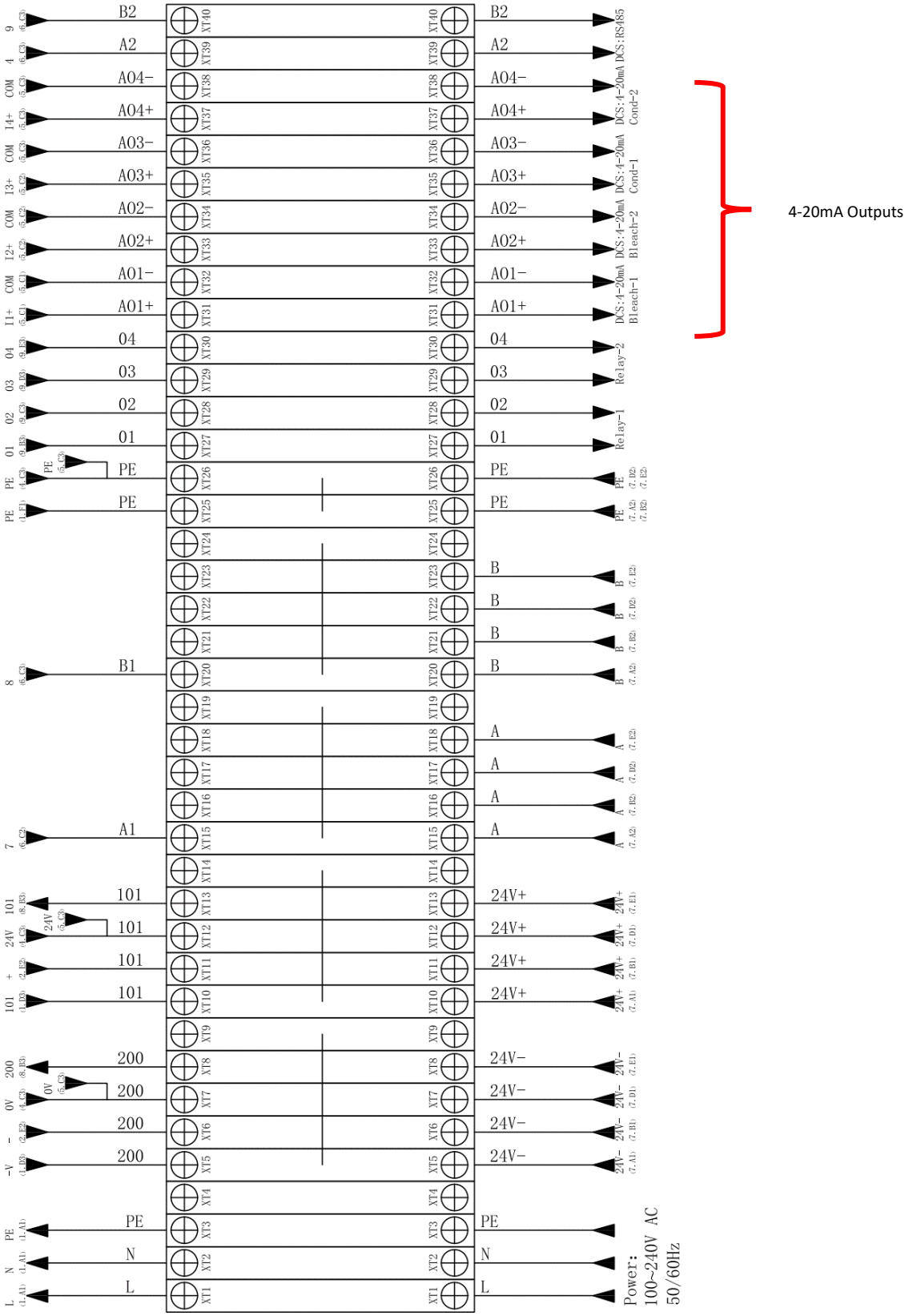


Figure. 2 - Terminal Wiring Diagram

4. Touch Screen Operation

4.1. Main Screen

After the system is powered on an initial screen allows the user to log into the system.

Figure. 3 - Main Screen

4.2. User Login

After powering on the system, log in with the username and password to be able to change system settings. Click the "**User Login**" button, select the user "**pyxis**", enter the password: "**888888**" in the user password field. A new user can be added via "User Management" in interface of the menu.

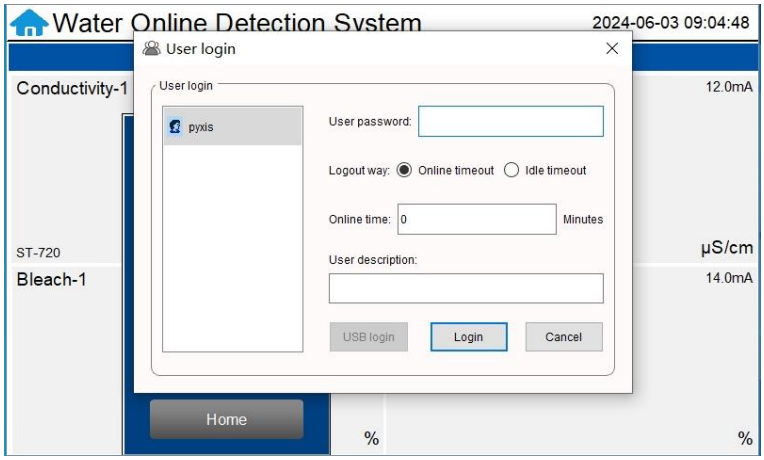


Figure. 4 - User Login Screen

If you do not need a password, or want to change the user, you can enter the system and manage in the "**User Management**" screen of the menu.

4.3. Real-Time Monitoring

Click the "Enter System" button on the main interface to enter the real-time monitoring screen of the system. The data detected by the Pyxis sensors will be displayed in real-time.

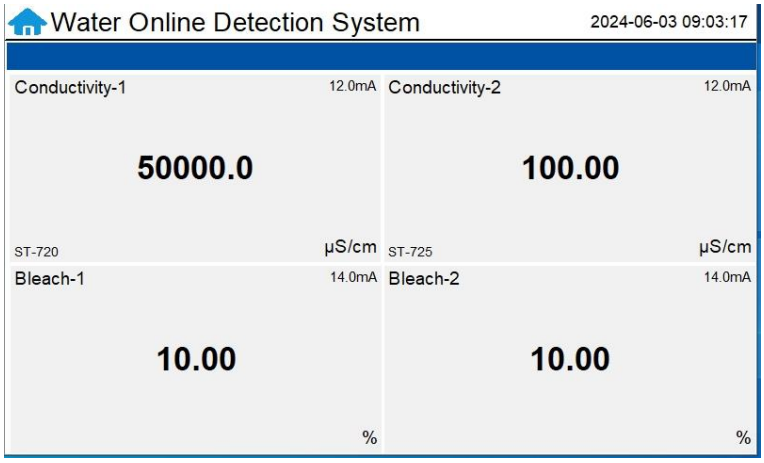


Figure. 5 - Real-time Monitoring Screen

4.4. Connecting Duplicate Sensors For Modbus Matching

When the sensors are connected for the first time, they need to be matched one by one. Ensure that the sensor model is the same as the sensor model on the screen. Otherwise, the matching will fail. First connect the sensor, click **"Matching"** on the screen, wait for the match to succeed, then restart the controller. Then connect another sensor, click **"Matching"**, wait for the match to succeed, then restart the controller again.

NOTE *When* ***"*******"*** *appears on the interface, it means that the sensor is abnormal or the communication fails.*

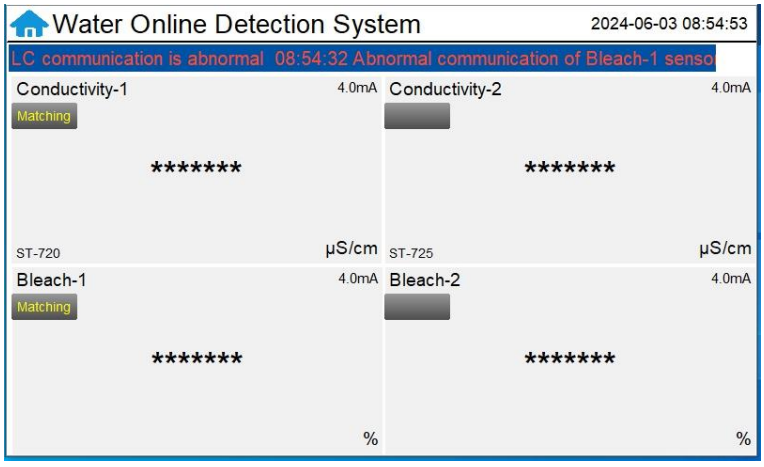


Figure. 6 - Loss of Sensor Signal

After replacing the new sensor and confirming the connection, click **"Matching"** in the upper left corner of the corresponding interface, and you will be prompted to confirm the connection again.

Figure. 7 - Confirm Sensor Replacement

After clicking **"Confirm"**, the system will start to match the sensors and wait for the matching to complete.

Figure. 8 - Matching in Progress

When the prompt **"Please power cycle the sensor! "** indicates that the sensor is successfully matched, close the prompt box and then restart controller.

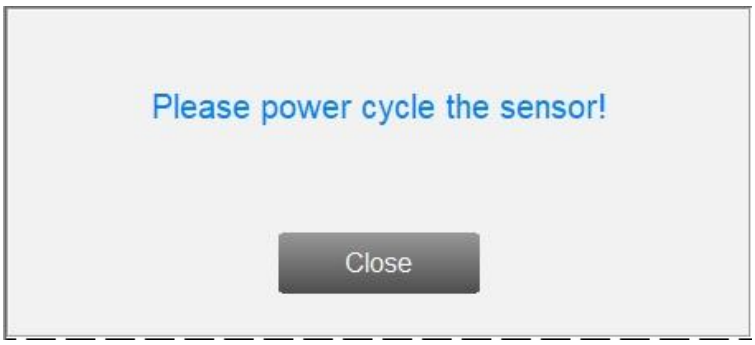


Figure. 9 - Match Complete

When it prompts **"Sensor is not matched,please check sensor model!"**, it means that the matching fails. Check whether the sensor model is the same as that of the sensor model under the button **"Matching"**.

Figure. 10 - Match Timeout

When it prompts **"Sensor communication error,please check sensor cable!"**, it means that the matching fails. Check whether the sensor cable is properly connected

Figure. 11 - Match Timeout

The above information applies only to replacement or damaged sensors. ***NOTE*** *If the sensor is removed on site and the same sensor is reconnected, the controller will automatically connect without this operation.*

4.5. 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.

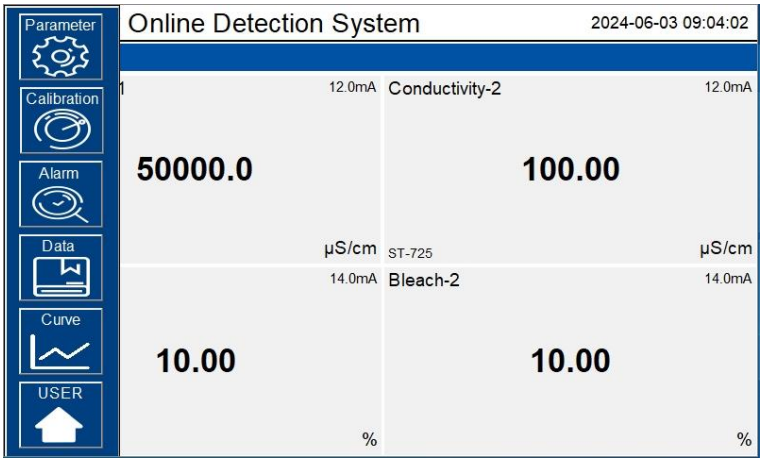


Figure. 12 - Menu Bar

4.6. 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.

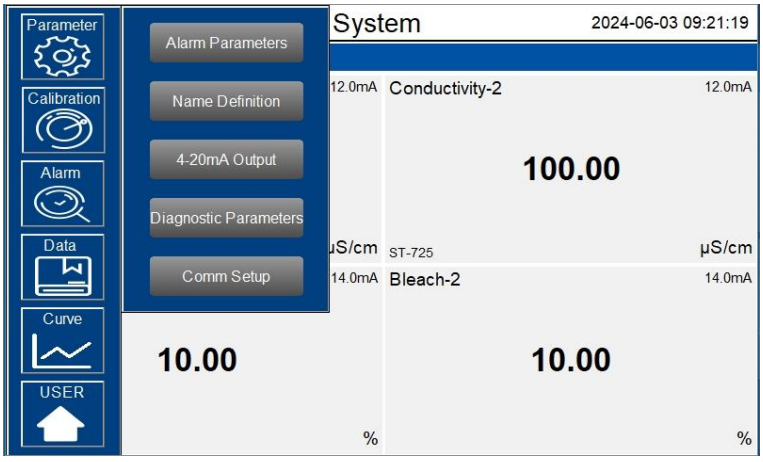


Figure. 13 - Parameter Settings

4.6.1. Alarm Parameters

When the online user has the right to operate the instrument, the upper and lower limits of alarm can be set. Click **"Alarm Parameters"** to enter the interface of setting alarm parameters. When the measured value is lower than the set lower limit, the "**** lower limit alarm" of the corresponding sensor will be displayed in the real-time monitoring screen; when the measured value is higher than the set upper limit, the "**** upper limit alarm" of the corresponding sensor will be displayed in the real-time monitoring screen. Users can also choose to turn on or off the alarm display function at the top of the corresponding parameter

Figure. 14 - Alarm Parameter Settings

4.6.2. Name Definition

Click "Name Definition" to enter the Name Definition parameter setting interface. Users can set the parameter name according to their own situation. **Note**: Please input the name with no more than 15 characters!

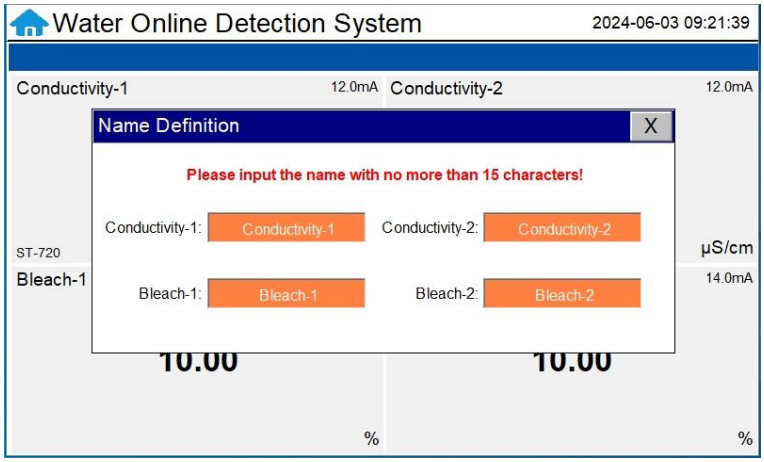


Figure. 15 - Name Definition setting

4.6.3. 4-20mA Output Parameter Setup

Click "4-20mA parameter" to enter the 4-20mA parameter setting interface. The 4mA output value corresponds to the lower limit of the sensor range value, and the 20mA output value corresponds to the upper limit of the range value. The closer the value setting is to the measured value, the more accurate it is recommended to set according to the sensor range.

Figure. 16 - 4-20mA Setting

4.6.4. Diagnostic Parameters

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

After clicking Diagnostic Historical Data, the interface will pop up the password input window.

Figure. 17 - Diagnostic Parameters interface

If the user enters an incorrect password, the window will indicate that the password error. Instead, the interface will jump to the diagnostic history data interface.

Figure. 18 - Password Input Interface

Figure. 19 - Password Error

Users can query historical data and export data after a set period of time.

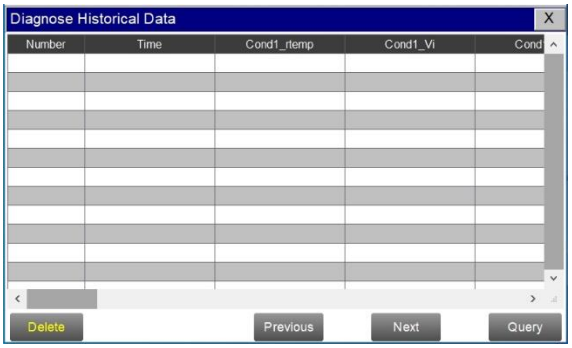


Figure. 20 - Diagnostic Historical Data

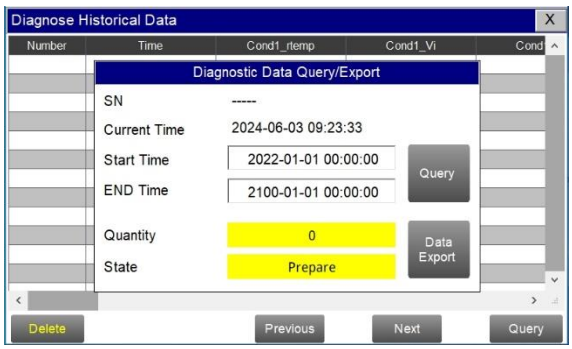


Figure. 21 - Diagnostic Data Query/Export

4.6.5. Modbus Communication Setup

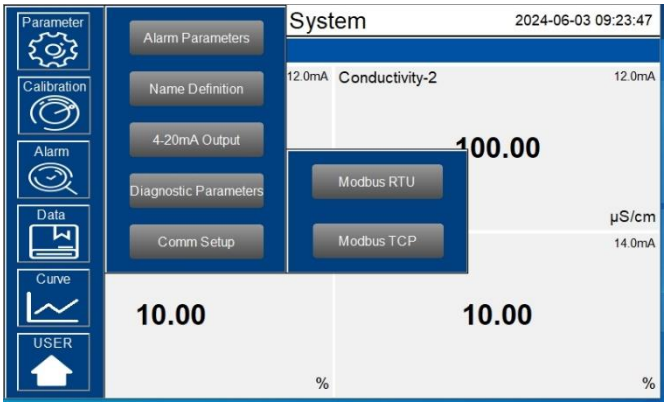


Figure. 22 - Communication Setup

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

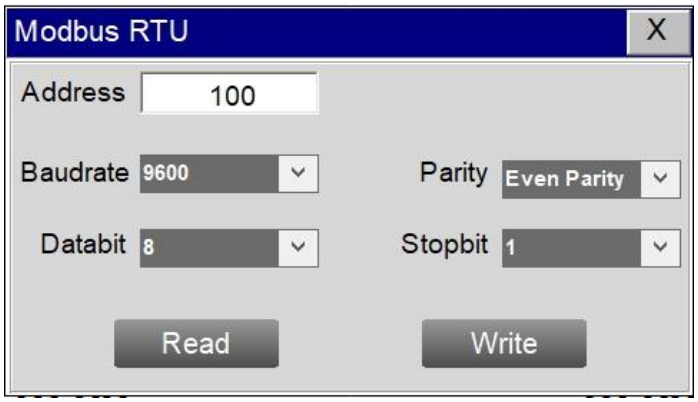


Figure. 23 - Modbus RTU

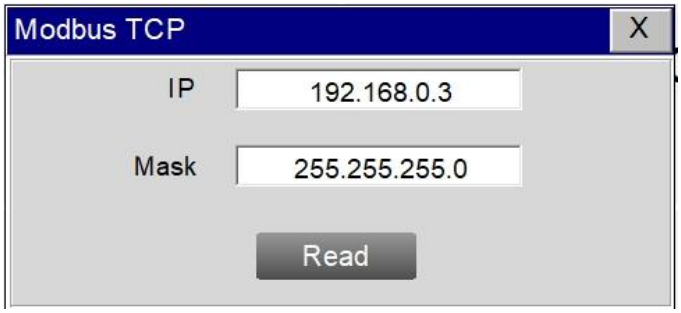


Figure. 24 - Modbus TCP

4.7. Calibration

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

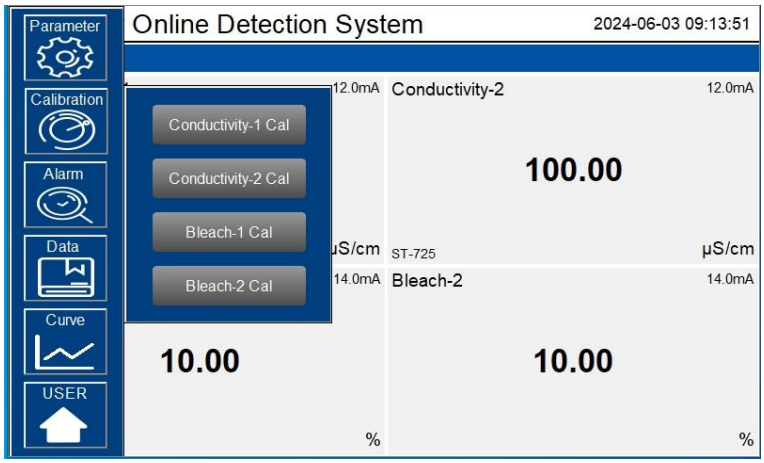


Figure. 25 - Sensor Calibration

4.7.1. Conductivity Calibration

The conductivity sensor only needs to be calibrated once, put the sensor into the standard solution with known standard solution value, enter the standard solution value in the interface, then click calibration, wait for the calibration completion prompt to pop up, which means the calibration is successful.

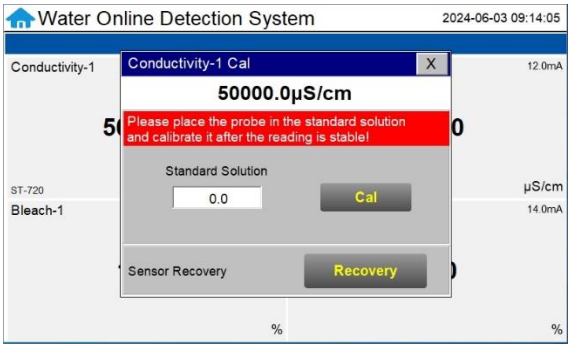


Figure. 26 - Conductivity Calibration

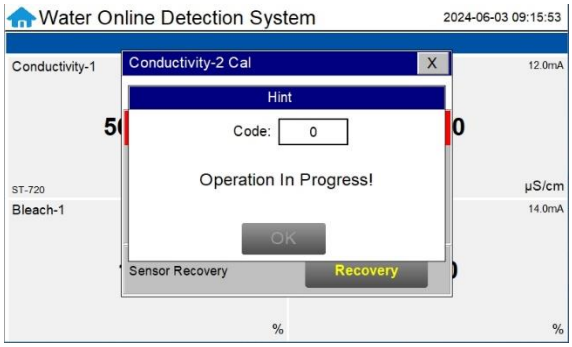


Figure. 27 – Operation In Progress

4.7.2. Bleach Concentration Calibration

From the Calibration screen,you can perform calibrations by pressing on Zero Calibration, High Point Calibration

NOTE *Before calibrating, remove the ST-600 sensor from the water and gently wipe it the sensor body with a damp cloth as well as the inner optical channel surfaces with a Q-Tip to remove debris and any fouling.*

Zero Point Calibration

After properly removing and cleaning the sensor and optical channel, install the sensor into a clean beaker with zero calibration standard solution (deionized water or ultra-pure water). Use only enough solution to submerge the optical channel completely. Pay close attention to avoid air bubbles in the beaker by pouring and inserting the sensor gently. Gently swirl the sensor while in the solution to dissipate and air bubbles int the optical detection channel of the sensor. Cover the beaker with a towel to remove light from the beaker. Allow the sensor to stabilize (about 1-minute), and then click on the "Zero Cal" after the displayed data is stable to execute the zero calibration.

High Point Calibration

When the zero calibration is finished, empty and dry out the beaker with a clean cloth. Fill the beaker to the sufficient level with the known concentration sodium hypochlorite solution being used as the calibration standard. Use only enough solution to submerge the optical channel completely. Pay close attention to avoid air bubbles in the beaker by pouring and inserting the sensor gently. Gently swirl the sensor while in the solution to dissipate and air bubbles int the optical detection channel of the sensor. Cover the beaker with a towel to remove light from the beaker. Allow the sensor to stabilize (about 1-minute). When the displayed data is stable, click "High Calibration" to carry out high calibration. Input the value of known concentration value of sodium hypochlorite standard liquid being used, click "High Calibration" on the page to execute high calibration. Return to the previous display page to observe the calibrated sensor value with this solution. High calibration is now completed.

IMPORTANT NOTE *The Pyxis ST-600 Series sensors are factory calibrated using an ultra-pure form of sodium hypochlorite solution. There are no global standards for sodium hypochlorite quality, and as such, concentration values may vary from Pyxis factory calibration depending on the quality of sodium hypochlorite being measured in the field. Re-calibrating the sensor via the steps above to the known concentration of the actual sodium hypochlorite being used in the application will remedy any variance observed to factory.*

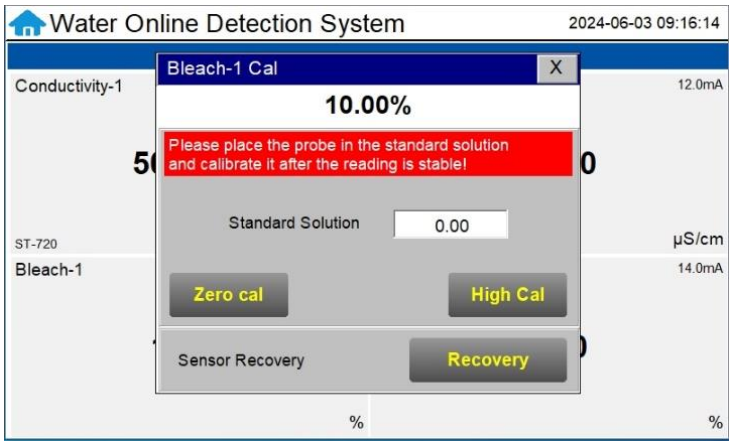


Figure. 28 - Bleach Concentration Calibration

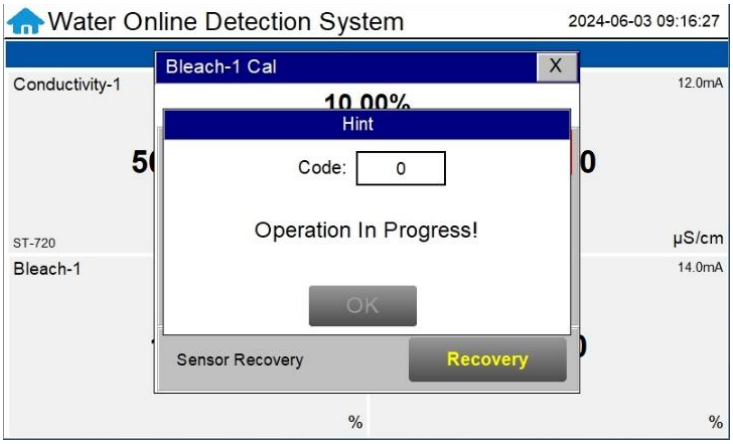


Figure. 29 - Operation In Progress

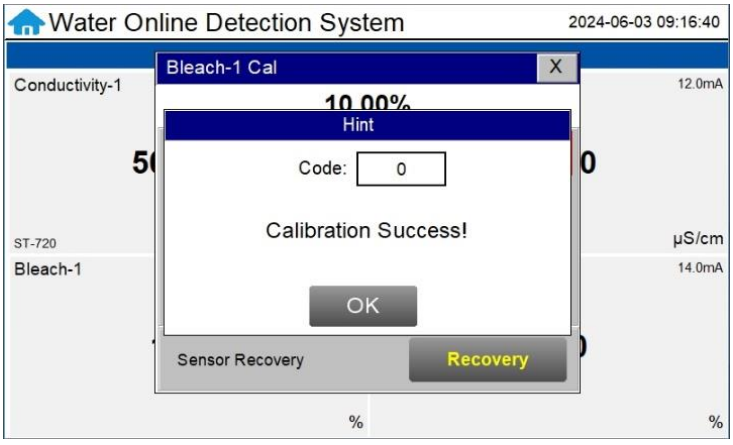


Figure. 30 – Calibration Success

4.8. Recovering Data

Click the restore button in the calibration interface of each sensor to restore the data of Conductivity sensor. If a user error is made during calibration and other operations, you may restore the factory settings of the sensor through the restore function.

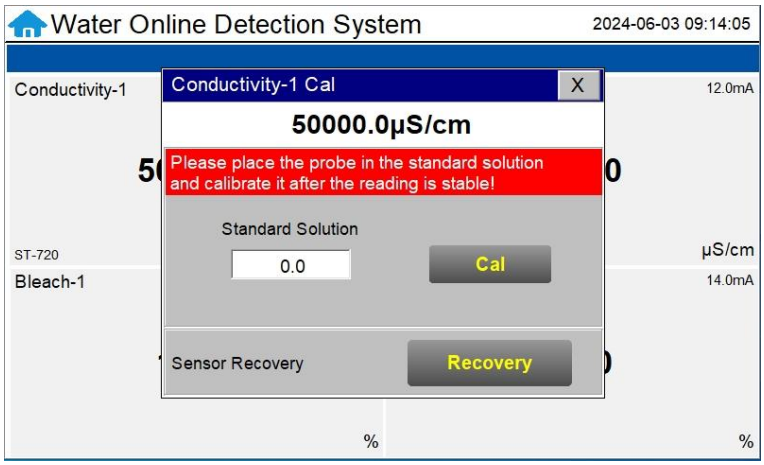


Figure. 31 - Data Recovery Screen

4.9. Alarm View

Click the "Alarm View" button on the main screen to enter the alarm view screen.

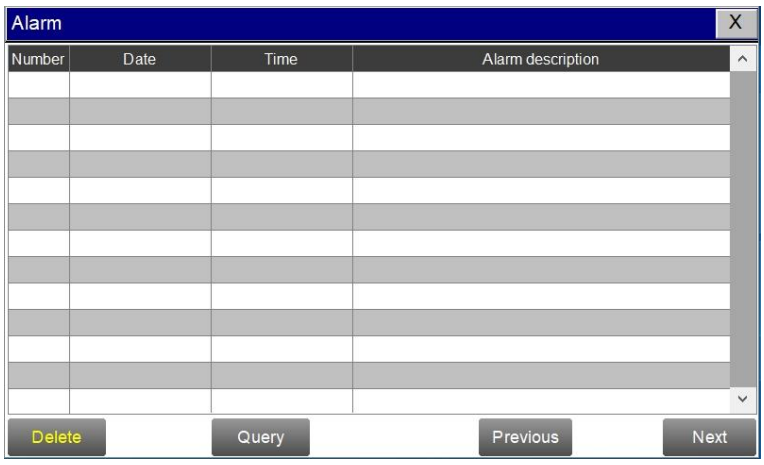


Figure. 32 - Alarm View

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.

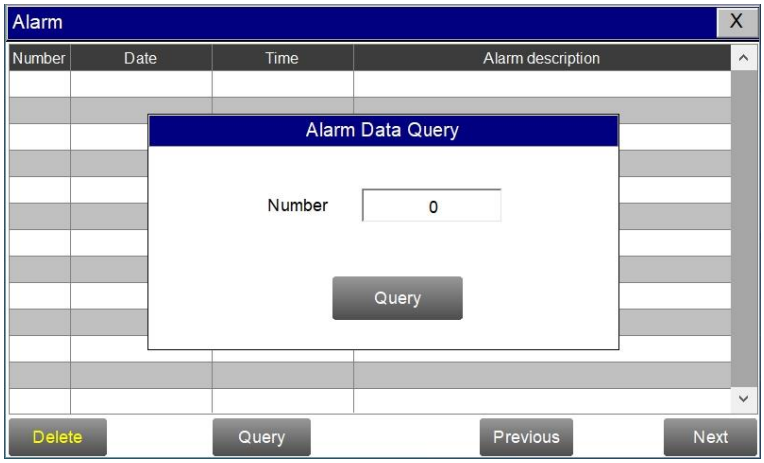


Figure. 33 - Alarm Data Query Screen

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.

4.10. Historical Data

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

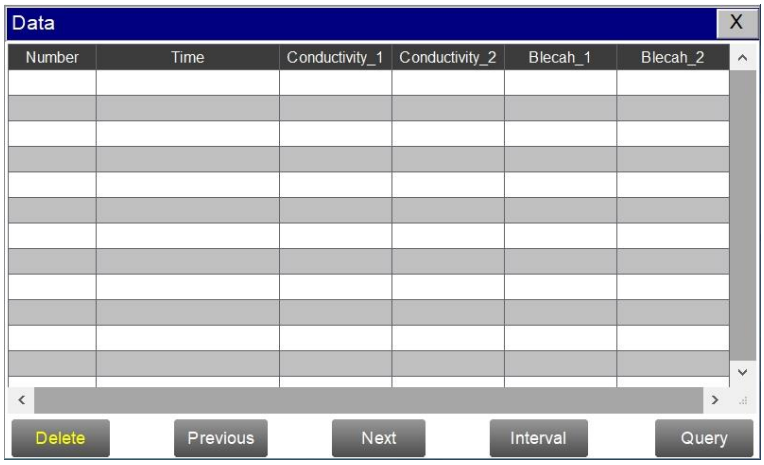


Figure. 34 - Historical Data Screen

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.

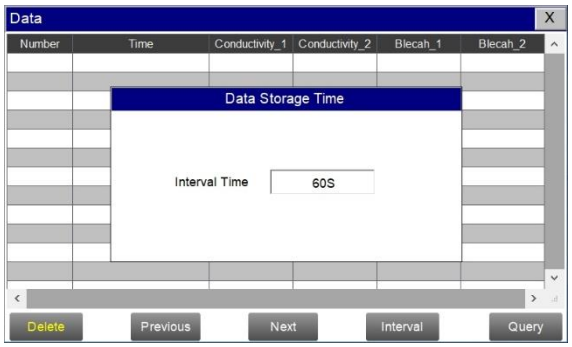


Figure. 35 - Data Storage Cycle Time Setting

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.

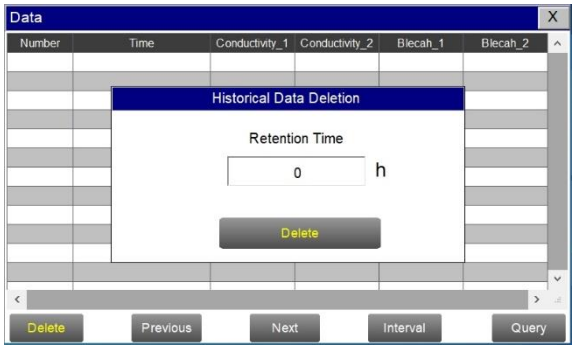


Figure. 36 - History Data Deletion Screen

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.

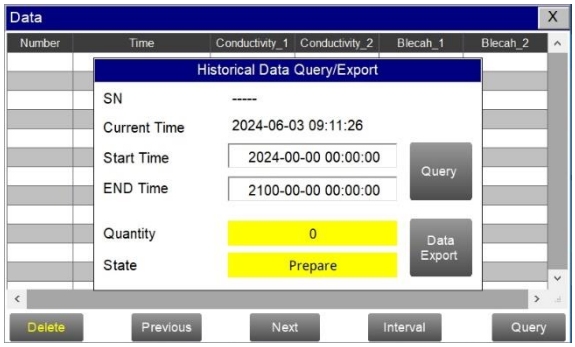


Figure. 37 - Historical Data Query and Export Screen

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.

4.11. 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.

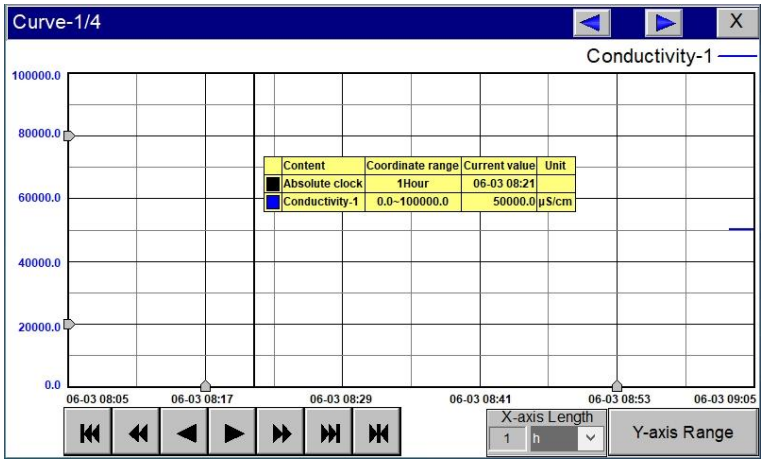


Figure. 38 - History Curve Screen

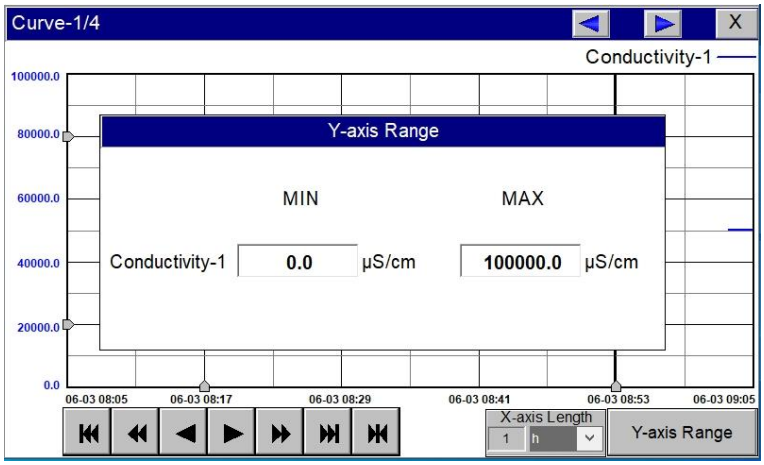


Figure. 39 - Y-axis Range Setting

- 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

Figure. 40 - Button Function Review

4.12. User Management

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

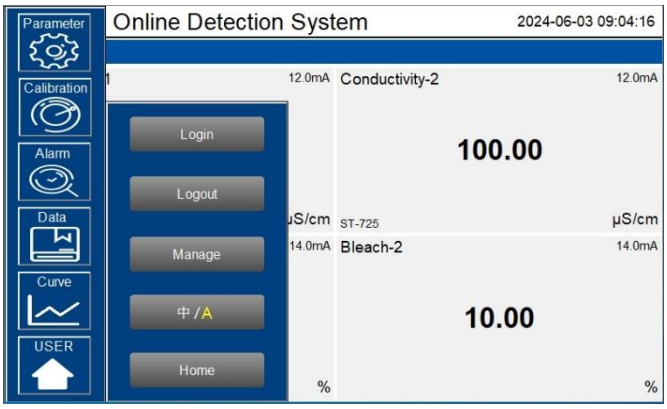


Figure. 41 – User Management

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 group can set parameters such as calibration.

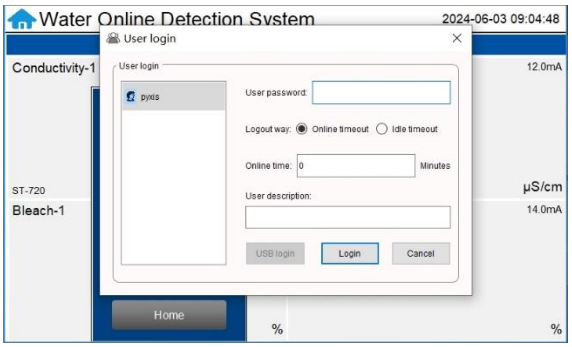


Figure. 42 - User Management Screen

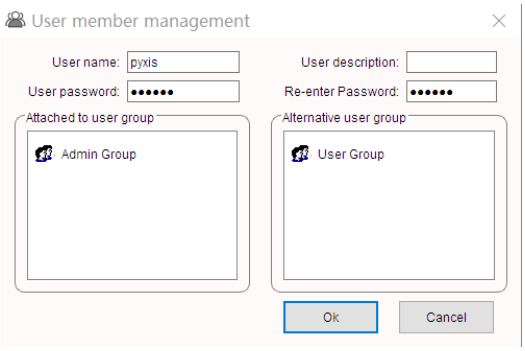


Figure. 43 - Modifying the User Screen

ModifyPassword: 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.*

5. Daily Maintenance

5.1. Modbus Correspondence Address

Number	Definition	Address	Format	Mode	Unit	Note
1	Conductivity_1	1	float	Read Only	µS/cm	Data format: ABCD
2	Conductivity_2	3	float	Read Only	µS/cm	
3	Bleach_1	5	float	Read Only	%	
4	Bleach_2	7	float	Read Only	%	
5	Conductivity-1 Lower Limit Alarm	9	unit	Read Only		0=Normal 1=Alarm
6	Conductivity-1 Upper Limit Alarm	10	unit	Read Only		
7	Conductivity-2 Lower Limit Alarm	11	unit	Read Only		
8	Conductivity-2 Upper Limit Alarm	12	unit	Read Only		
9	Bleach-1 Lower Limit Alarm	13	unit	Read Only		
10	Bleach-1 Upper Limit Alarm	14	unit	Read Only		
11	Bleach-2 Lower Limit Alarm	15	unit	Read Only		
12	Bleach-2 Upper Limit Alarm	16	unit	Read Only		
13	Conductivity-1 Sensor Comm	17	unit	Read Only		
14	Conductivity-2 Sensor Comm	18	unit	Read Only		
15	Bleach-1 Sensor Comm Abnormalities	19	unit	Read Only		
16	Bleach-2 Sensor Comm Abnormalities	20	unit	Read Only		
17	PLC Comm Error	21	unit	Read Only		
18	Cond1_rtemp	101	float	Read Only		
19	Cond1_Vi	103	float	Read Only		
20	Cond1_Vv	105	float	Read Only		
21	Cond1_RG	107	float	Read Only		
22	Cond1_RES	109	float	Read Only		
23	Cond1_k	111	float	Read Only		
24	Cond1_smoothingfactor	113	float	Read Only		
25	Cond2_rtemp	115	float	Read Only		
26	Cond2_Vi	117	float	Read Only		
27	Cond2_Vv	119	float	Read Only		
28	Cond2_RG	121	float	Read Only		
29	Cond2_RES	123	float	Read Only		
30	Cond2_k	125	float	Read Only		
31	Cond2_smoothingfactor	127	float	Read Only		
32	Bleach1_ct365	129	uint	Read Only		
33	Bleach1_t365	130	uint	Read Only		
34	Bleach1_s365	131	uint	Read Only		
35	Bleach1_t365Di	132	uint	Read Only		
36	Bleach1_s365Di	133	uint	Read Only		
37	Bleach2_ct365	134	uint	Read Only		
38	Bleach2_t365	135	uint	Read Only		
39	Bleach2_s365	136	uint	Read Only		
40	Bleach2_t365Di	137	uint	Read Only		
41	Bleach2_s365Di	138	uint	Read Only		
Communication Protocol: Standard Modbus-RTU						
Communication Parameters: Baud Rate - 9600, Data Bit - 8, Stop Bit - 1, Parity Bit - Even						
Station Number: 100						

Table. 1 - Correspondence Address

5.2. Operation and Maintenance

After the analyzer is installed by a qualified technician, it can begin to monitor water quality. The equipment inline 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 guidelin. Little operator intervention is required during normal operation.

Required Services	Recommended Frequency
Conductivity Calibration	Every 6 Months
Bleach Calibration	Every 6 Months

Table. 2 - Maintenance Intervals

5.3. Instrument Alarms and Descriptions

Please refer to the instrument alarms and descriptions table when troubleshooting the UC-100S 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
Conductivity Sensor Communication Abnormality	Conductivity Sensor without Communication	No Conductivity Measurements	Check the connection between the sensor and the circuit board. If the problem persists, contact Pyxis.
Bleach Sensor Communication Abnormalities	Bleach Sensor without Communication	No Bleach Measurements	
Conductivity Upper Limit Alarm	Conductivity above the Alarm Setting	Information Only	Compare with manual measurement readings. Check and clean line valves. Check that water flow is normal. Check that the sensor is clean.
Conductivity Lower Limit Alarm	Conductivity below the Alarm Setting	Information Only	
Bleach Upper Limit Alarm	Bleach above the Alarm Setting	Information Only	
Bleach Lower Limit Alarm	Bleach below the Alarm Setting	Information Only	

Table. 3 - Common Alarms

5.4. Sensor Cleaning with Pyxis Probe Cleaning Kit

In the event of heavy inorganic deposition of any Pyxis sensors, users may conduct an off line chemical cleaning using the Pyxis Probe Cleaning Kit (P/N: SER-01). Remove the sensor and inspect the internal components of the tee assembly. If necessary flush the tee assembly thoroughly with clean water until adequately clean. Fill the provided beaker and soak the lower half of the sensor in 100 mL of Pyxis Probe Cleaning Solution for 10-15 minutes. Gently wipe the sensor electrode head with the provided Q-tips. If an optical sensor (i.e. ST-600), use the provided pipe cleaning brushes to gently brush the inner surfaces of the optical channel itself. If the surfaces ar not entirely clean, continue to soak the sensor for an additional time until clean. Rinse the sensor with distilled water. Pyxis Lab Probe Cleaning Kit can be purchased at our online Estore/Catalog at https://www.pyxis-lab.com/product/inline-sensor-cleaning-kit/

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