Pyxis®

www.pyxis-lab.com

USER MANUAL

IK-1600 SERIES

Fluid Chemistry Analyzer for AI Critical Cooling Distribution Units

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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.

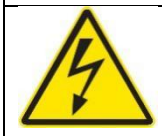
Warning
Indicates a potentially or very dangerous situation that, if not avoided, may cause serious personal injury or death.

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 refers 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

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1. Description

The IK-1600 Series are pre-engineered Turn-Key analyzers designed specifically for data center Coolant Distribution Units (CDUs). They integrate multiple Pyxis smart sensors and touch-screen display onto a single stainless-steel analyzer panel to provide continuous, real-time measurement of critical coolant quality parameters required for reliable thermal management of high-density IT loads.

The IK-1600 Series provide continuous, real-time visibility into the critical coolant chemistry parameters that directly impact the reliability, efficiency, and lifespan of data center cooling infrastructure. By simultaneously measuring pH, temperature, conductivity, turbidity, and glycol concentration, the IK-1600 enables operators to detect chemical imbalance, contamination, fouling, or coolant degradation before these conditions escalate into thermal performance loss or equipment damage.

Accurate pH and conductivity measurement ensures corrosion control strategies remain effective and help verify inhibitor health in mixed-metal cooling loops. Turbidity monitoring provides early indication of particulate ingress, corrosion byproducts, or biological growth that can foul cold plates, microchannels, and heat exchangers. Glycol concentration measurement confirms freeze protection, heat transfer efficiency, and correct coolant formulation, which is especially critical for CDU secondary loops serving high-density AI and HPC workloads.

By combining these measurements into a single, panelized monitoring solution, the IK-1600 delivers actionable intelligence rather than isolated data points. Operators gain the ability to trend coolant quality over time, correlate chemistry changes to system events, and integrate alarms directly into CDU controls, BMS, EPMS, or DCIM platforms. The result is improved uptime, reduced unplanned maintenance, longer equipment life, and increased confidence that cooling systems are operating within design limits as IT heat loads continue to rise.

Turn-Key Installation

The IK-1600 combines proven Pyxis inline smart sensors and the UC-80-PLUS micro-processor-based touch screen interface into a factory-assembled analyzer solution specifically suited for critical coolant chemistry monitoring. Each sensor includes an embedded transmitter with 4–20 mA and RS-485 Modbus outputs and is pre-wired to the UC-80-PLUS providing live sensor data display, data logging, digital calibration interface and sensor diagnostics while offering easy integration with CDU controls, PLCs, BMS, EPMS, or DCIM platforms via Modbus RTU and TCP output interface. The panelized analyzer approach simplifies installation, reduces field wiring, and ensures consistent measurement performance across deployments.

Features

- The ST-722 is a stainless-steel inline conductivity sensor designed for continuous monitoring of dissolved solids in critical cooling and coolant distribution systems. By simultaneously measuring conductivity and temperature, the ST-722 provides real-time insight into coolant chemistry stability, contamination events, and inhibitor dilution. Automatic temperature compensation ensures accurate readings across varying operating conditions, while the integrated transmitter with 4–20 mA and RS-485 Modbus outputs enables direct integration with CDU controls, PLCs, and BMS platforms. Its robust 316L stainless-steel construction makes it well suited for long-term operation in high-pressure, high-reliability data center cooling environments.
- The ST-730SS-T is an inline optical turbidity sensor engineered to detect particulate matter, corrosion byproducts, and fouling potential in CDU coolant loops. Turbidity is a critical early-warning indicator in liquid-cooled data centers, as even small increases can degrade heat transfer efficiency and threaten cold plate or microchannel performance. The tee-style, service-friendly design allows the sensor to be removed for maintenance without shutting down the system. With real-time NTU measurement, integrated temperature compensation, and native analog and digital outputs, the ST-730SS-T enables proactive maintenance strategies and protects mission-critical cooling infrastructure.
- The ST-710SS is a precision inline pH sensor designed to maintain optimal chemical balance in closed-loop and secondary cooling systems. Accurate pH control is essential to minimizing corrosion, scaling, and material degradation in mixed-metal CDU loops. The ST-710SS features a replaceable electrode assembly for simplified maintenance and long service life, along with automatic temperature compensation for stable measurements under dynamic operating conditions. Built-in 4–20 mA and RS-485 Modbus communications allow seamless integration into CDU logic and facility monitoring systems, supporting both real-time control and long-term trending.
- The RT-100 Series PRISM™ sensors are inline digital refractometers that provide direct, highly accurate measurement of ethylene or propylene glycol concentration in cooling fluids. Glycol concentration is a critical parameter affecting freeze protection, heat transfer efficiency, and overall coolant performance. The RT-100 Series uses optical refractive index measurement combined with internal temperature compensation algorithms to deliver precise concentration readings across the full operating range. This sensor platform is offered in two formats. With onboard display and data logging (RT-100) or no display and no data logging (RT-110L) both sensor versions offer and 4–20 mA / RS-485 Modbus outputs and enable operators to verify coolant formulation in real time and avoid risks associated with over- or under-concentration.
- The ST-009-03 three-sensor flow cell is a compact stainless-steel housing designed to mount and hydraulically condition multiple inline Pyxis sensors within a single CDU side-stream. By providing controlled flow, proper sensor immersion, and standardized process connections, the ST-009 ensures consistent measurement performance across all installed analyzers. The modular design supports simplified installation, easy sensor removal for calibration, and compatibility with high-pressure CDU applications.
- Convenient and simple to install stainless steel panel with ¼-inch OD Swagelok Compression tubing for rapid and easy installation. Truly a plumb and power to go platform with intense factory setup, testing and sensor calibration prior to shipment.
- UC-80-PLUS touch screen color display/data logger prewired to the Pyxis sensor via RS-485 with calibration interface. Display/data logger offers 8x 4-20mA, RS-485 and TCP Modbus output with sensor diagnosis and parameter adjustment.

2. Specifications

Item	IK-1600
P/N	40704
Glycol Sensor	RT-100
pH/Temp Sensor	ST-710SS
Conductivity/Temp Sensor	ST-722
Turbidity Sensor	ST-730SS-T (Infrared)
Range of Measure	Refractive Index: 1.31700–1.5100 Mono-Ethylene/Mono-Propylene Glycol: 0.00–100.00% 0.00 –14.00 pH 0.02–10,000 µS/cm 32 - 212 °F (0 - 100 °C) 0.00 –100.00 NTU
Precision	Refractive Index: ±0.0001 Glycol: ±0.1% ±0.01pH or 1% of the Value ±0.2µS/cm or 1% (<500µS) ±1% of the Temperature Value 0.1NTU
Sample Operating Temperature	4 °C – 49 °C (40 – 120 °F)
Sample Maximum Pressure	100 psi (6.9 Bar)
Sample Inlet / Outlet	1/4 - inch OD Swagelok Compression
Suggested Flow Rate	100 – 2,000 mL/minute
Sensor Body Material	316L Stainless Steel
Sensor Response Time	T95≤5s
Sensor Measurement Interval	Every 4 Seconds – Customizable If Desired
Sensor Power Supply	24V DC (1.5W)
Sensor Installation	ST-009-03 (316L) Three Sensor Flow Cell Included
Sensor Wet Material	316L SS / Fluorelastomer / EPDM / PEEK / CPVC / POM / Quartz / Sapphire
Sensor Signal Output	(2) 4-20mA and RS-485 Modbus – 8Pin – M12 Connector
Dimension (H x W x D)	Panel (IK-1600) ~ 657H x 437W x 256D mm
Approximate Weight	Panel (IK-1600 Series) ~ 16-20 kg
Rating	IP-67 Sensors / IP-64 UC-80-PLUS Display
Regulation	CE Marked / RoHS
Typical Electrode Service Life	2 years
Electrode Warranty (pH)	6 Months
UC-80-PLUS Display	7-inch LCD Color Industrial Capacitive Touch Screen
UC-80-PLUS Storage Capacity	Built-In 128MB of Ram for Storing up to 1-Million Data/Event Records
UC-80-PLUS Power Requirement	96-260VAC / 50-60 Hz; 60 W
UC-80-PLUS Output	8x 4-20 mA / RS-485 Modbus-RTU + TCP
UC-80-PLUS Input	4x 4-20 mA / RS-485 Modbus - RTU
UC-80-PLUS USB	1 x USB host, for data downloading and screen upgrade
UC-80-PLUS Relay	2x 24VDC Relays (Passive Output or Active Output – User Selected)
UC-80-PLUS Relative Humidity	20% - 90% (No Condensation)

NOTE *- Pyxis Lab is consistently updating technologies, as such, specifications may change without notice. Contact info@pyxis-lab.com for details or www.pyxis-lab.com .*

3. Order Information

Order Information	P/N
IK-1600 *(CDU Coolant Analyzer Turn-Key Using RT-100 with Glycol Display)*	40704

Optional / Replacement Accessories Information	P/N
ST-710SS *(Replacement pH + Temperature Smart Sensor)*	53030
ST-722 *(Replacement Conductivity + Temperature Smart Sensor)*	53103
ST-730SS-T *(Replacement InfraRed Turbidity Sensor)*	56377
RT-100 *(Replacement Refractometer with Display for IK-1500)*	55105
UC-80-PLUS- Display Interface *(Replacement Touch Screen Display)*	72875
EH-710 *(Replacement Electrode Head for ST-710SS)*	53033
ST-009-03 *(Replacement ST-009-3 Stainless Steel Flow Cell for 3 Sensors)*	24397
Pyxis pH Combo Calibration Pack *(pH 4-7-10 Calibration Solution 3-Pack - 500mL ea.)*	57007
TURB-2-PG25 *(2NTU Calibration Solution with Glycol 500mL)*	36828
TURB-10-PG25 *(10NTU Calibration Solution with Glycol 500mL)*	36777
TURB-100-PG25 *(100NTU Calibration Solution with Glycol 500mL)*	34210
Conductivity Ref Solution 100uS/cm *(500mL)*	39047
Conductivity Ref Solution 1,000uS/cm *(500mL)*	57008

4. Dimension and Mounting

4.1. IK-1600 Dimension (mm)

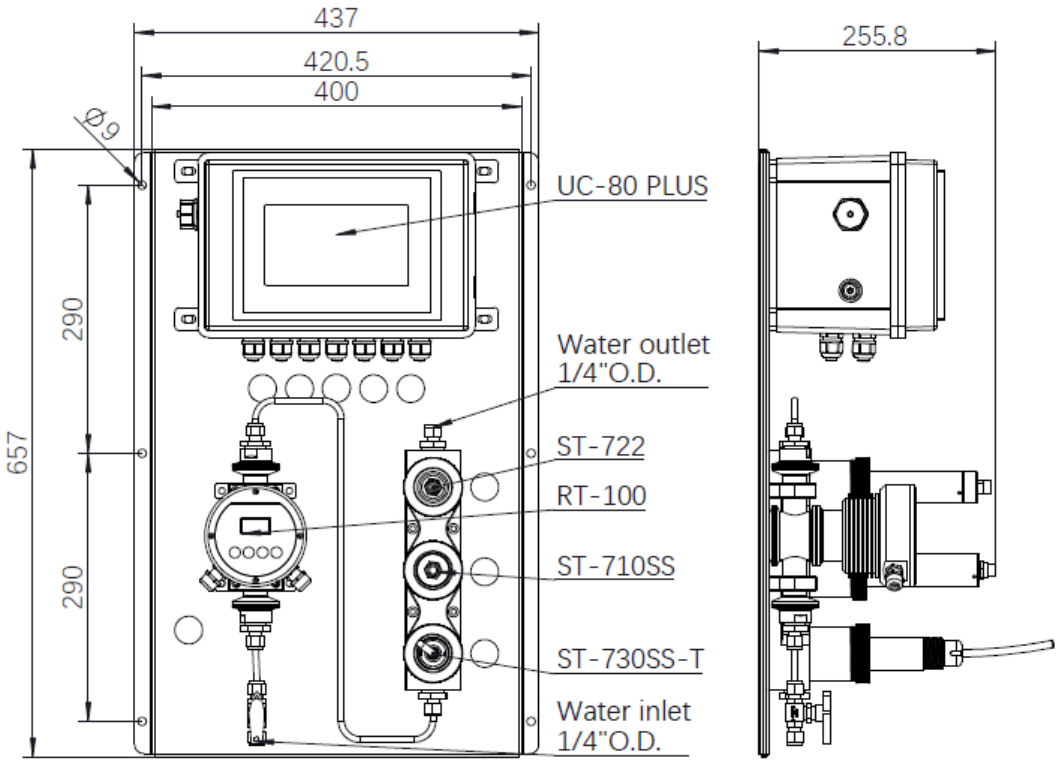


Figure. 1 – IK-1600

4.2. ST-722 Sensor (mm)

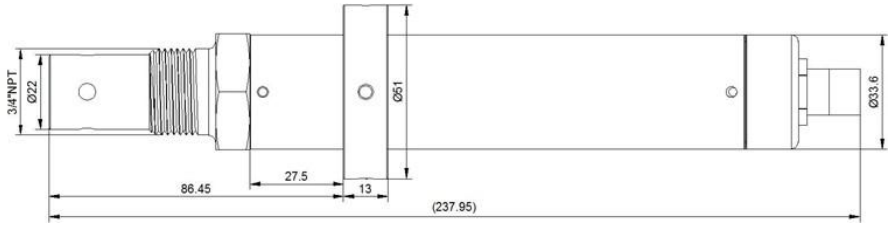


Figure. 2 - ST-722

4.3. ST-710SS Sensor (mm)

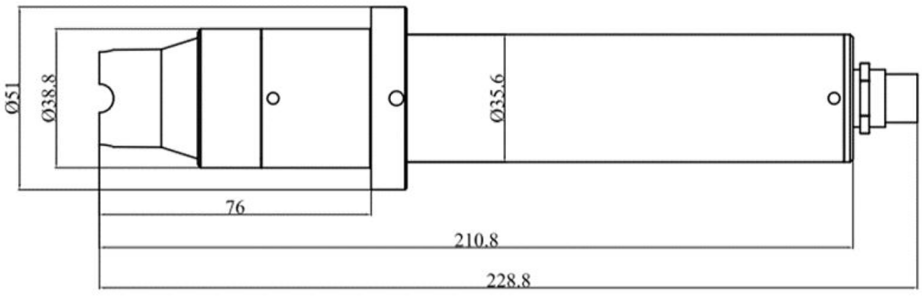


Figure. 2 - ST-710SS

4.4. ST-730SS-T Sensor (mm)

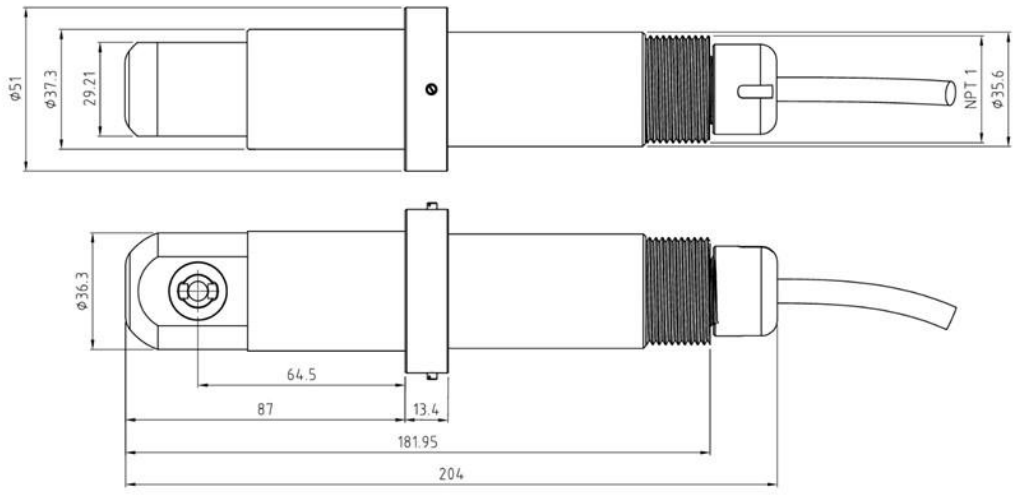


Figure. 4 - ST-730SS-T

4.5. RT-100 Sensor (mm)

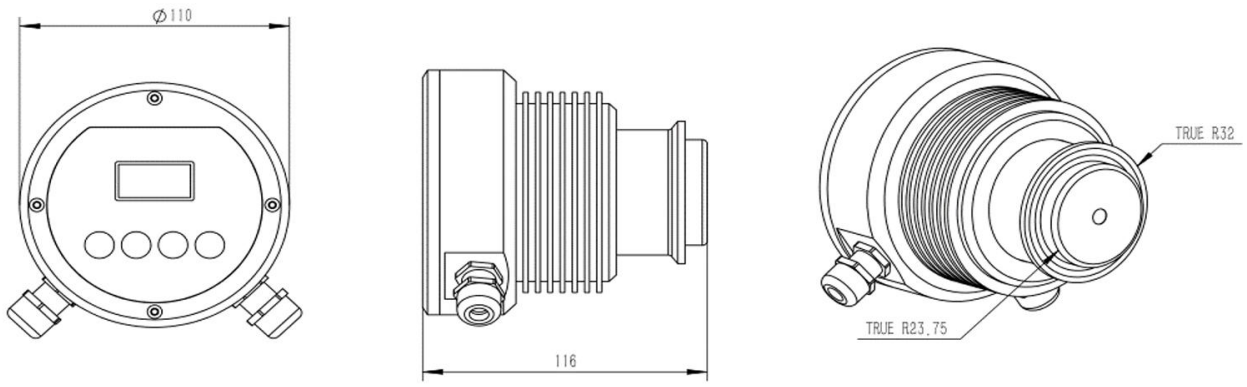


Figure. 5 - RT-100

4.6. UC-80-PLUS (mm)

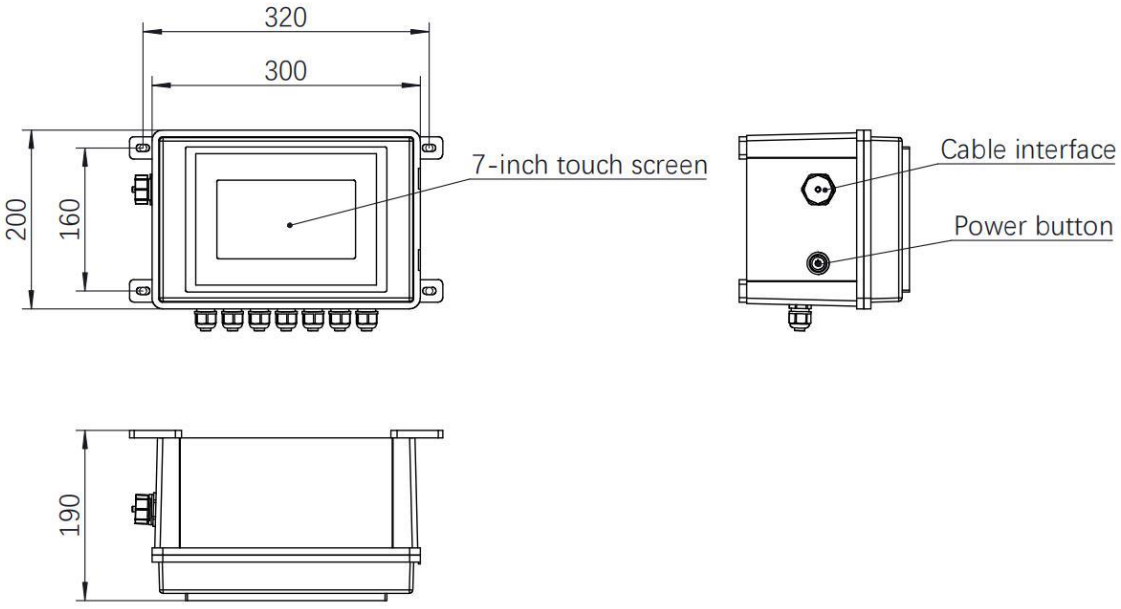


Figure. 6 – UC-80-PLUS

5. Analyzer Installation

5.1. Installation Requirements

Power Supply: 96-260VAC / 50-60 Hz; 60 W

Inlet Water Supply: The inlet water pressure should be from 7.25 – <100 psi with ¼-inch O.D.

Outlet Water Line: The outlet is a ¼-inch O.D. to lower pressure zone of the process.

Sample Water Flow Rate: Functional in stagnant water. Recommended flow is 100 – 2,000mL/Minute.

Wall Mount Space: The Integrated Water Analyzer panel size is roughly 657H x 437W x 256D(mm) in dimension. Please leave at least 0.5m of installation space around the equipment for later maintenance.

Wall Mount Weight: Approximately 20kg. Please use appropriate mounting hardware.

5.2. Sample Water Connection

1. **Process Water Inlet:** Connect the inlet water to a ¼-inch O.D.
2. **Water Outlet:** Connect the outlet water to a ¼-inch O.D.

5.3. Terminal Wiring

After the installation of the equipment, you need to connect the site power to the equipment terminal block, XT1 to L, XT2 to N, XT3 to PE

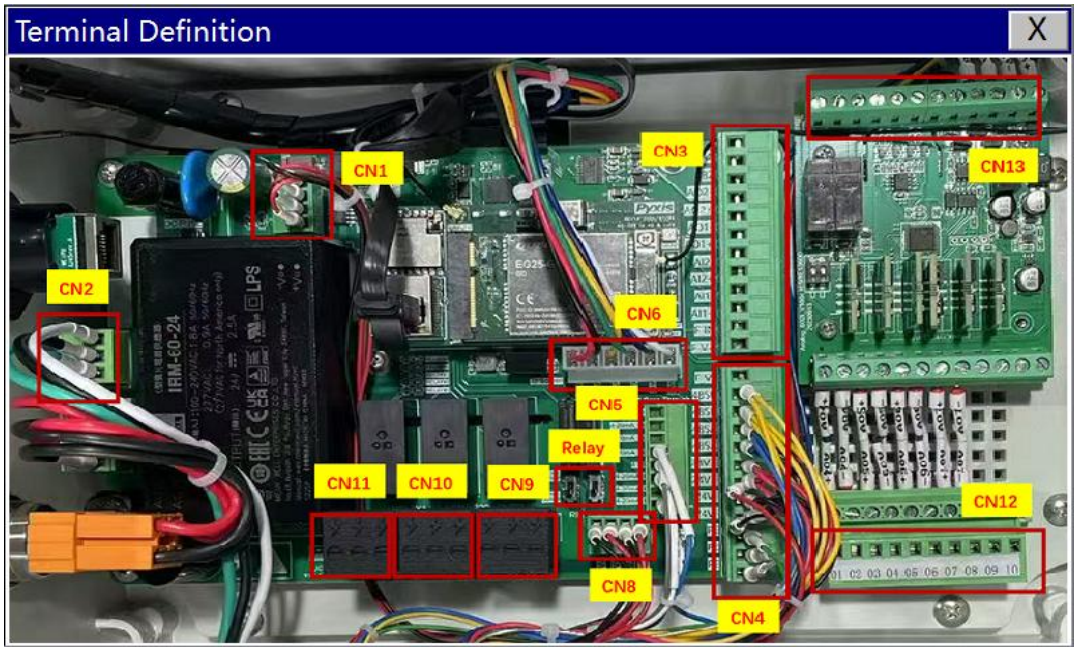


Figure. 3 - Terminal Layout Diagram

	Terminal Number	Definition
CN1	0V	/
	V2	/
	0V	/
	V1	/
CN2	Terminal Number	Definition
	N	AC110~220V 50/60Hz : N
	L	AC110~220V 50/60Hz : L
	PE	PE
CN3	Terminal Number	Definition
	A2	DCS:485A
	B2	DCS:485B
	AO2-	4-20mA- DCS:nD_RT-100
	AO2+	4-20mA+ DCS:nD_RT-100
	AO1-	4-20mA- DCS:Conc_RT-100
	AO1+	4-20mA+ DCS:Conc_RT-100
	AI2-	/
	AI2+	/
	AI1-	/
	AI1+	/
	F_IN	/
	F_V+	/
CN4	Terminal Number	Definition
	F_V-	/
	485B	B(RT-100)(ST-710SS)(AI Module)
	485B	B(ST-730SS-T)(ST-722)
	485A	A(RT-100)(ST-710SS)(AI Module)
	485A	A(ST-730SS-T)(ST-722)
	24V+	24V+(RT-100)(ST-710SS)(AI Module)
	24V+	24V+(ST-730SS-T)(ST-722)
	24V-	24V-(RT-100)(ST-710SS)(AI Module)
	24V-	24V-(ST-730SS-T)(ST-722)
	PE	PE(RT-100)(ST-710SS)
	PE	PE(ST-730SS-T)(ST-722)
	PE	/
CN5	Terminal Number	Definition
	4-20mA-	/
	4-20mA Out#1	/
	4-20mA Out#2	/
	4-20mA Out#3	/
	4-20mA-	/
	4-20mA IN#1	/
	4-20mA IN#2	/
	4-20mA IN#3	/
CN8	Terminal Number	Definition
	24V-	/
	24V+#1	/
	24V-	/
	24V+#2	/

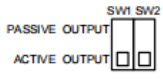
	Terminal Number	Definition
CN9	AC_L#3	/
	AC_N#3	/
	PE	/
CN10	Terminal Number	Definition
	AC_L#2	/
	AC_N#2	/
	PE	/
CN11	Terminal Number	Definition
	AC_L#1	/
	AC_N#1	/
	PE	/
CN12	Terminal Number	Definition
	XT1	4-20mA+ DCS:pH
	XT2	4-20mA- DCS:pH
	XT3	4-20mA+ DCS:Turbidity
	XT4	4-20mA- DCS:Turbidity
	XT5	4-20mA+ DCS:Conductivity
	XT6	4-20mA- DCS:Conductivity
	XT7	/
	XT8	/
	XT9	/
	XT10	/
CN13	Terminal Number	Definition
	+24V	24V+(CN4)
	GND	24V-(CN4)
	485A	485A(CN4)
	485B	485B(CN4)
	AI1+	/
	AI1-	/
	AI2+	/
	AI2-	/
	Y0	/
	COM	/
	Y1	/
	COM	/
Relay		ACTIVE OUTPUT / PASSIVE OUTPUT 

Figure. 4 - Terminal Wiring Diagram

6. Touch Screen Operation

6.1. Main Screen

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

Figure. 5 - Main Screen

6.2. 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.

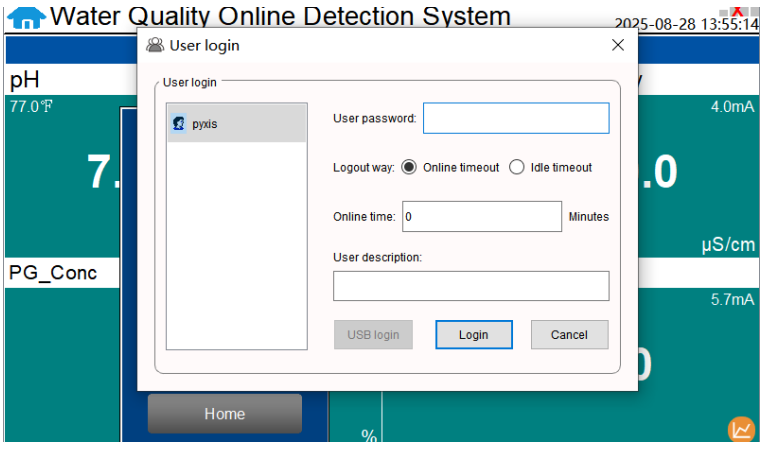


Figure. 6 - User Login Screen

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.

6.3. 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.

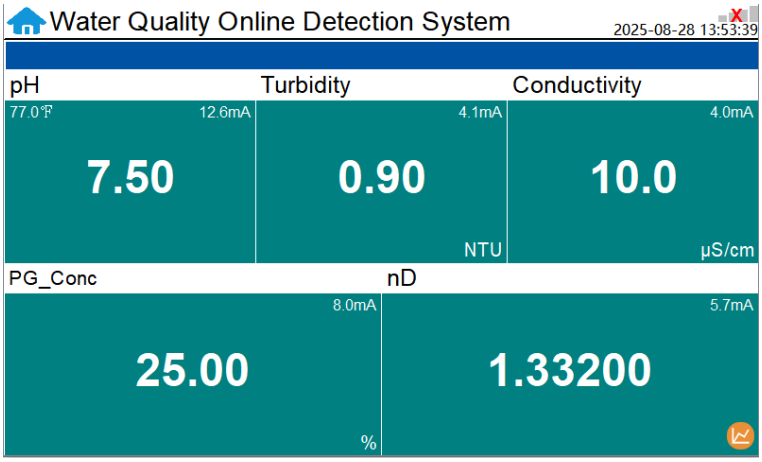


Figure. 7 - Real-time monitoring screen

Click on the time in the upper right corner, the screen pops up the time setting window.

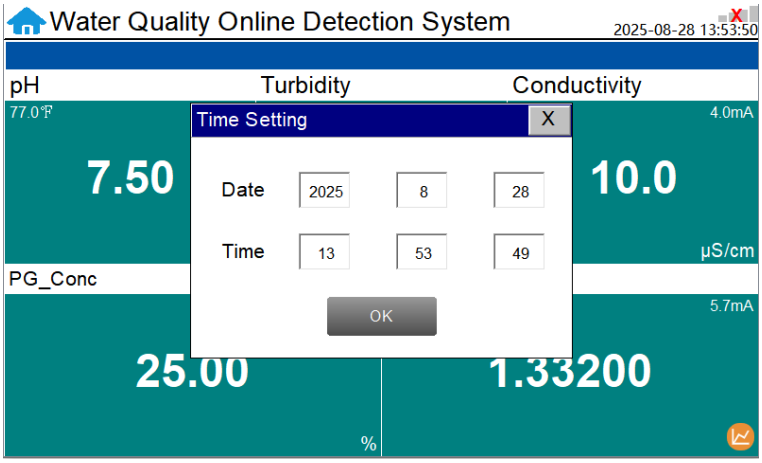


Figure. 8 - Time Setting

Click the orange icon located in the lower-right corner to access the real-time curve interface.

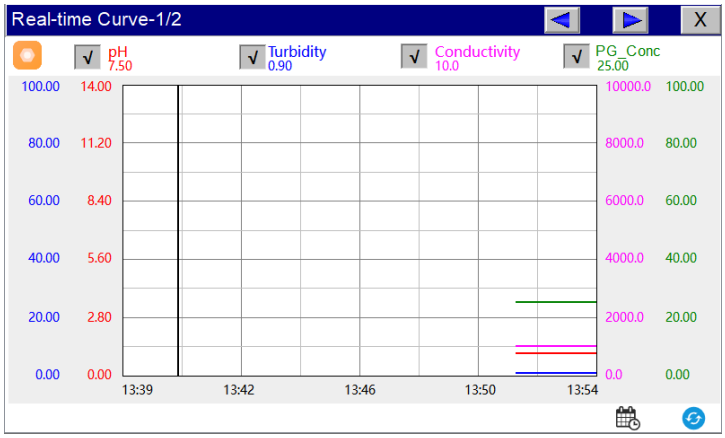


Figure. 9 - Real-time Curve

By clicking the calendar icon at the lower right corner, users can set the parameters of the X-axis.

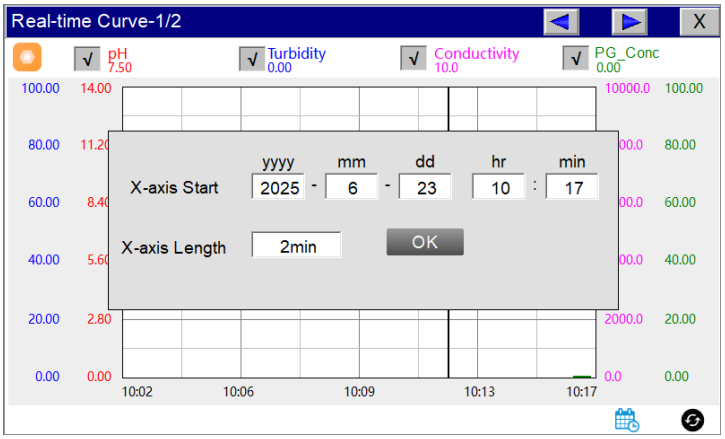


Figure. 10 - X-axis Range

Clicking on the orange icon in the upper left corner, the user can set the parameters of the Y-axis.

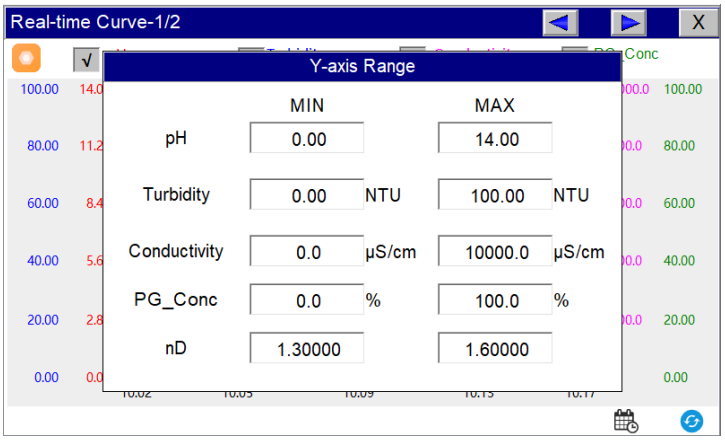


Figure. 11 - Y-axis Range

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.

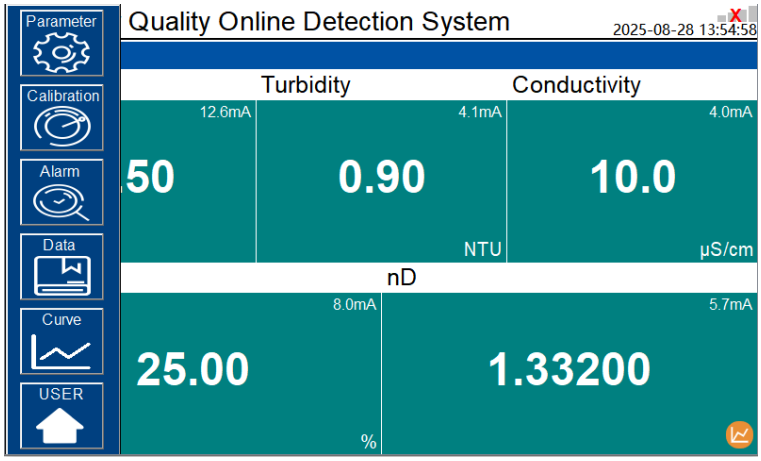


Figure. 12 - Menu Bar

6.5. Configurable Parameters

Click the **"Parameter"** button in the menu bar. Here you can select a list of options to include enter **Alarm Parameters** / **Conc Selection** / **User Defined** /**Information Service/4-20mA Output** and **Comm Setup**.

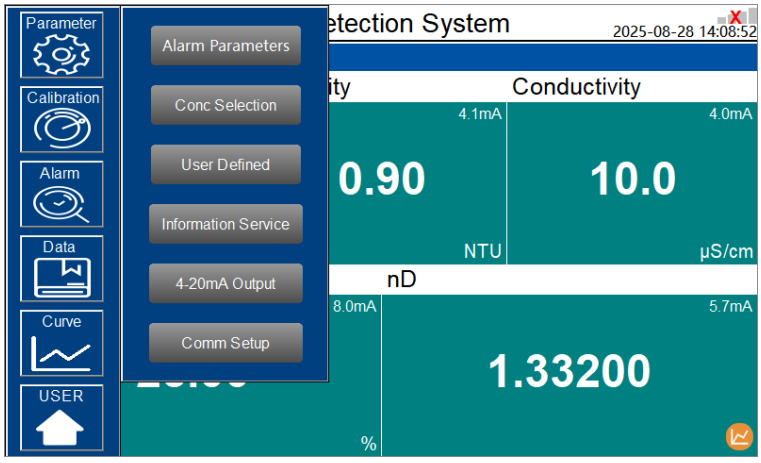


Figure. 13 - Parameter

6.5.1. 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 right of the corresponding parameter list.

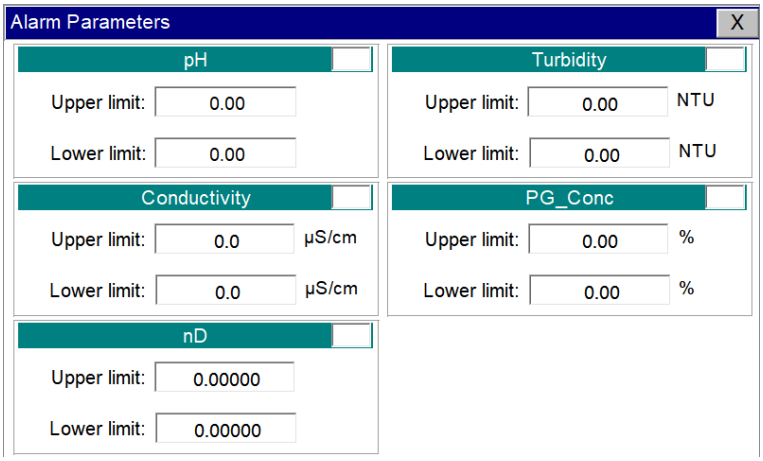


Figure. 14 - Alarm Parameter Setting

6.5.2. Concentration (Conc) Selection

The RT-100 measures the core refractive index of the same as nD. If desired, users can manually select the an alternate unit of measure curve preloaded into the RT-100. There are 6-preloaded product concentration curves to choose from. There will be a prompt to clear the data before switching the options.

PG = Propylene Glycol **Brix** = Sugar **ALV** = Advanced Low Viscosity Fluid

EG = Ethylene Glycol **GEO** = Geo Fluid **ALV+** = Advanced Low Viscosity PLUS Fluid

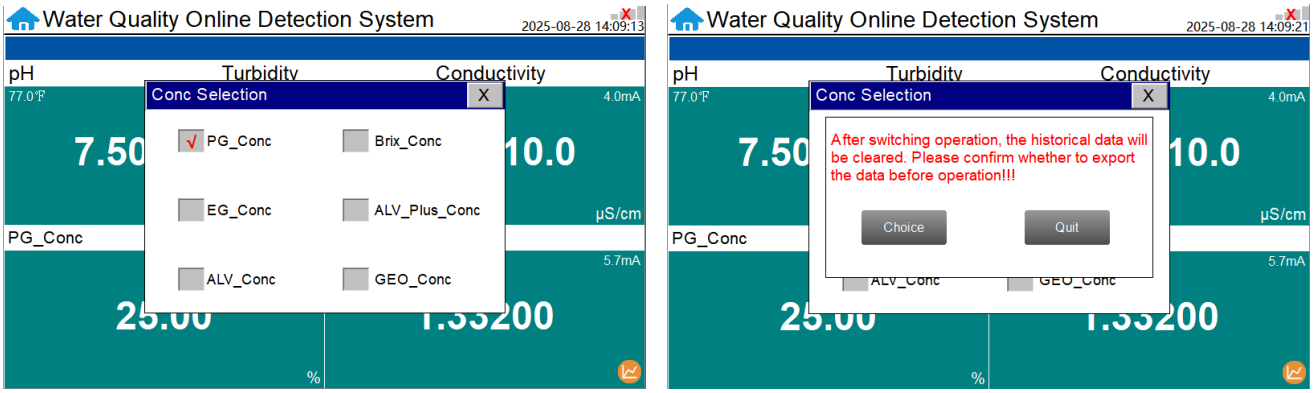


Figure. 15 - Concentration Selection

6.5.3. User Defined

Click the **"User Defined"** button in the menu bar. Here you can select a list of options to include enter **Name Definition** and **Unit Switching**.

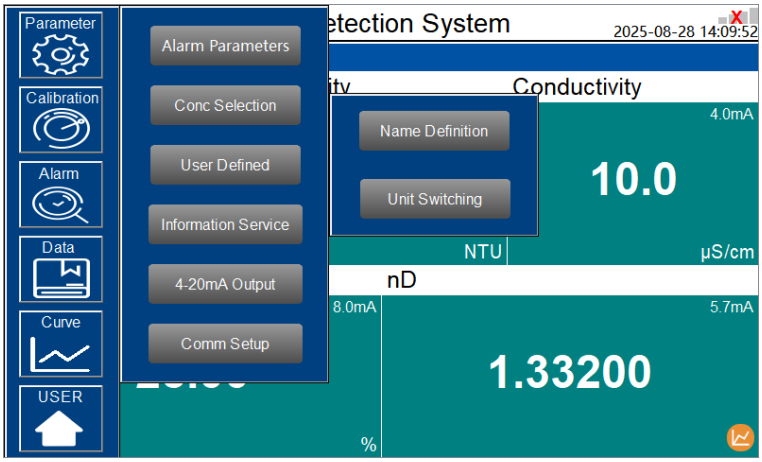


Figure. 16 - User Defined

Name Definition

Click the orange dialog box to customize the sensor name.

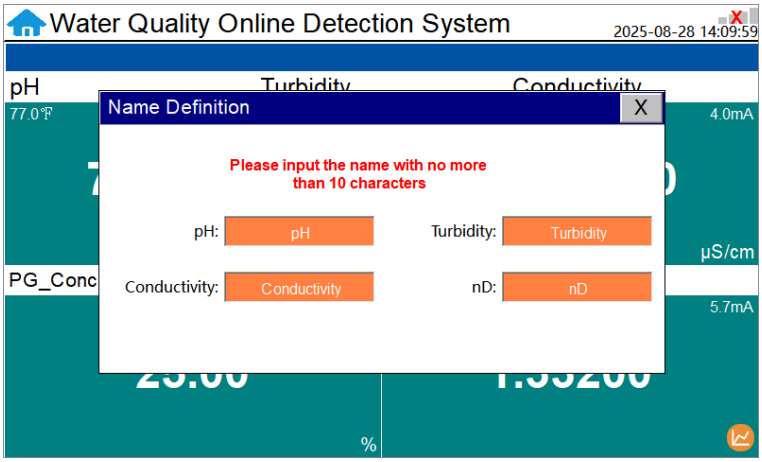


Figure. 17 - Name Definition

Unit Switching

Users can change the unit of temperature and flow rate in **"Unit Switching"**.

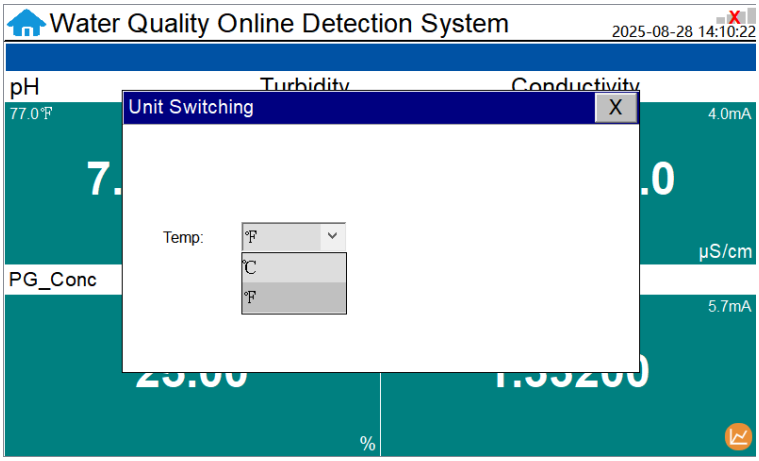


Figure. 18 - Unit Switching

6.5.4. Information Service

Clicking on **"Information Service "** opens a sub-menu for **Diagnostic Data**, **IO Monitoring**, **Terminal Definition** and **IoT info**.

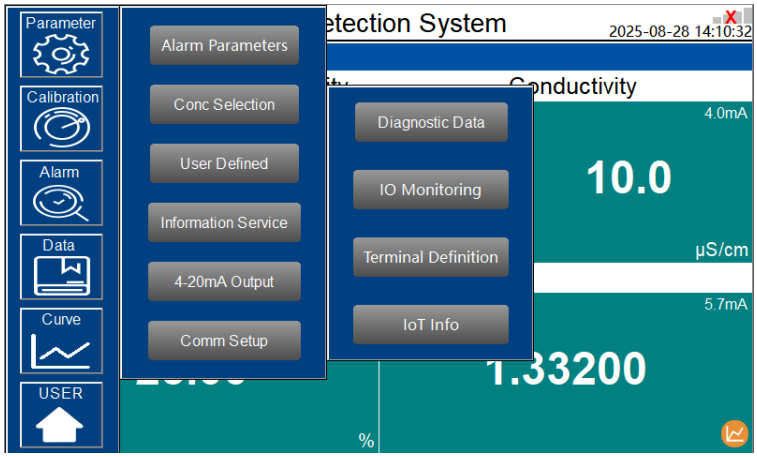


Figure. 19 - Information Service

Diagnostic Data

Click **"Diagnosis Data"** to the diagnosis page. In the diagnosis page, the raw data measured by the probe is displayed. To help troubleshooting 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.

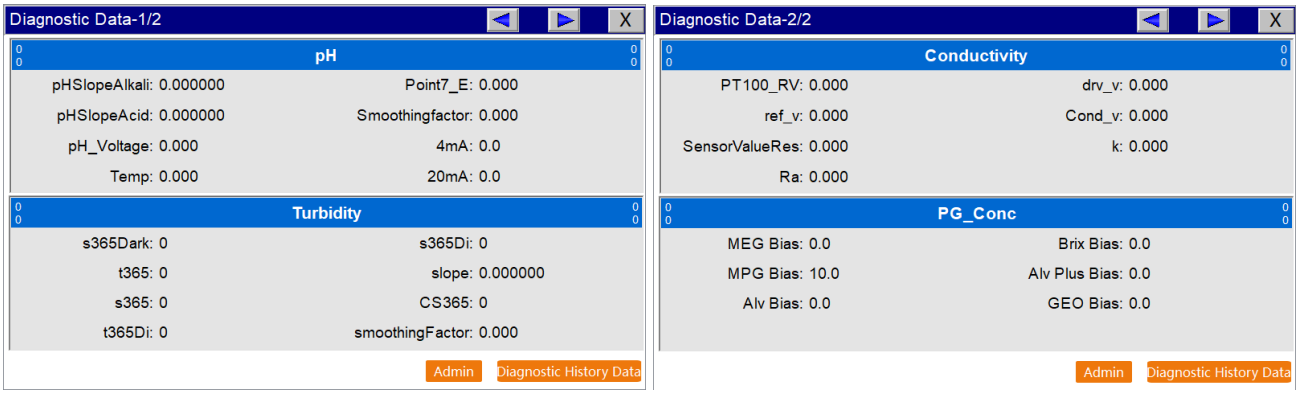


Figure. 20 - Diagnostic Parameters

Click on **"Diagnostic History Data"** in the lower right corner to access to view previous diagnostic parameters. Data can also be exported and made available for support from the Pyxis Lab Service Department.

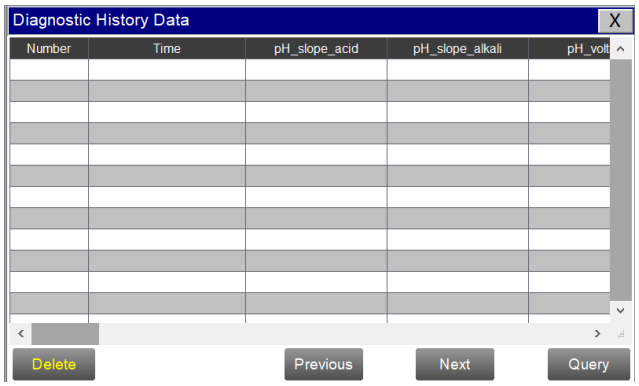


Figure. 21 - Diagnostic History Data

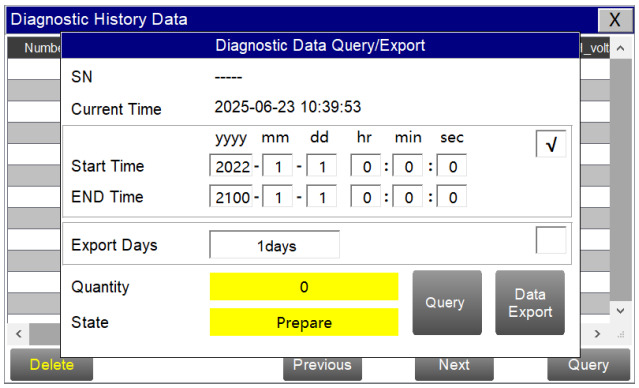


Figure. 22 - Diagnostic History Data Query

IO (Input/Output) Monitoring

On this interface, users can monitor power supply output status and I/O port conditions.

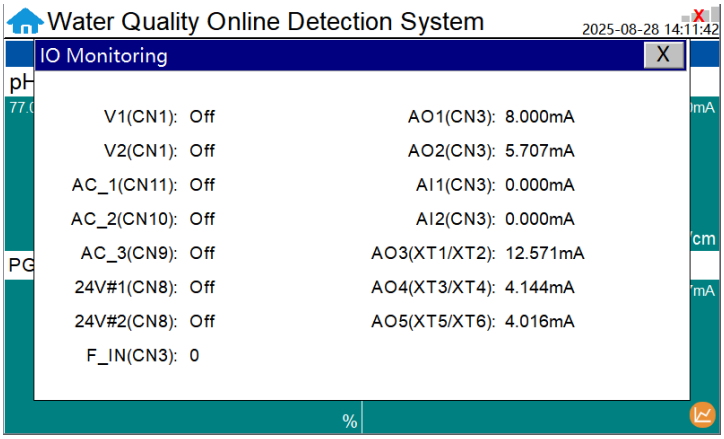


Figure. 23 - IO Monitoring

On the left side of the window is the power supply output status display. "OFF" indicates no power supply output, and "ON" indicates power supply output. The right side of the window displays the IO output status. The corresponding table of names and parameters is presented below.

Name	Parameter
AO1	Conc_RT-100
AO2	nD_RT-100
AO3	pH
AO4	Turbidity
AO5	Conductivity
AI1	Analog input
AI2	Analog input

Terminal Definition

This interface shows the terminal definitions of the terminal block.

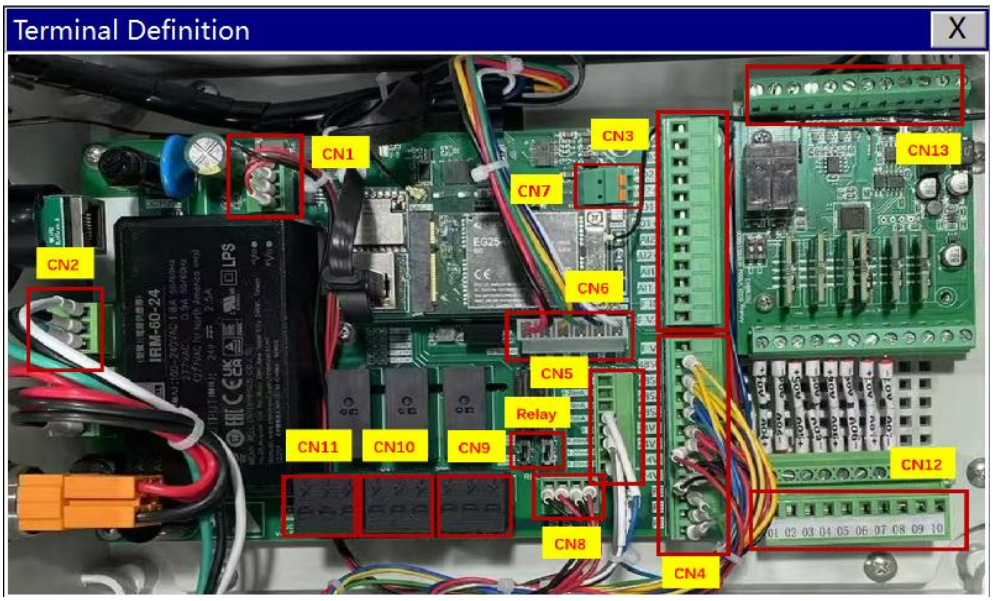


Figure. 24 - Terminal Definition

Clicking on the corresponding position can display the table defined by the corresponding terminal block.

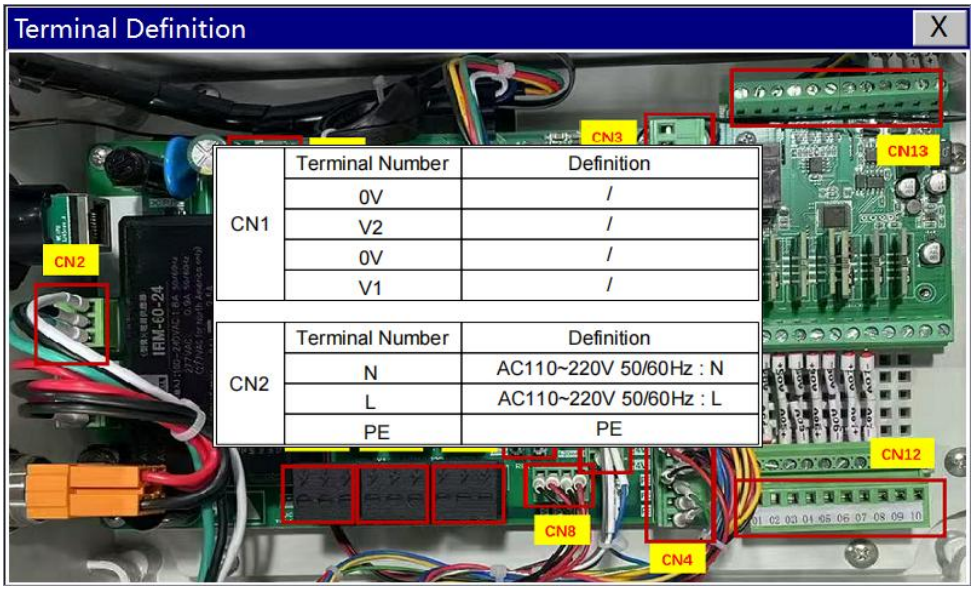


Figure. 25 - Terminal Definition Detail Diagram

IoT (Internet of Things) Info

This interface displays information related to the 4G gateway and the status of the connection.

IMPORTANT NOTE *– The gateway is deactivated and may only be activated by contacting service@pyxis-lab.com and agreement of the annual SIM card charge. Otherwise this device remains useless and may be removed if desired.*

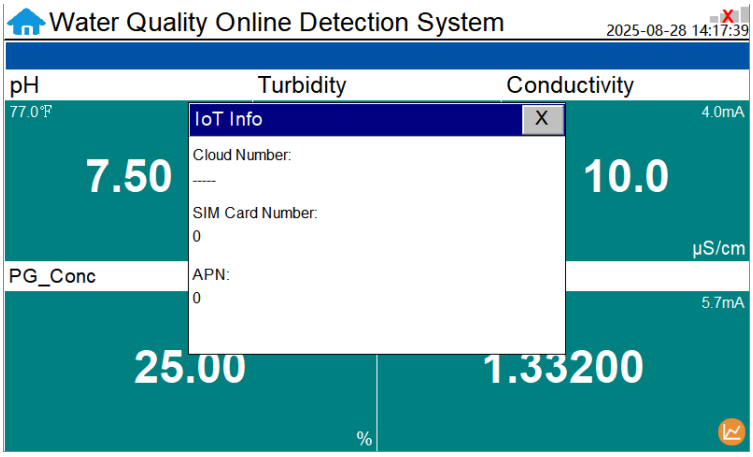


Figure. 26 - Iot Info

6.5.5. 4-20mA Output

Click **"4-20mA Output"** to enter the 4-20mA output parameter setting interface. The 4mA and 20mA output values should correspond to the lower and upper limits of the sensor range and are adjustable based on user desire. ***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 sensors.

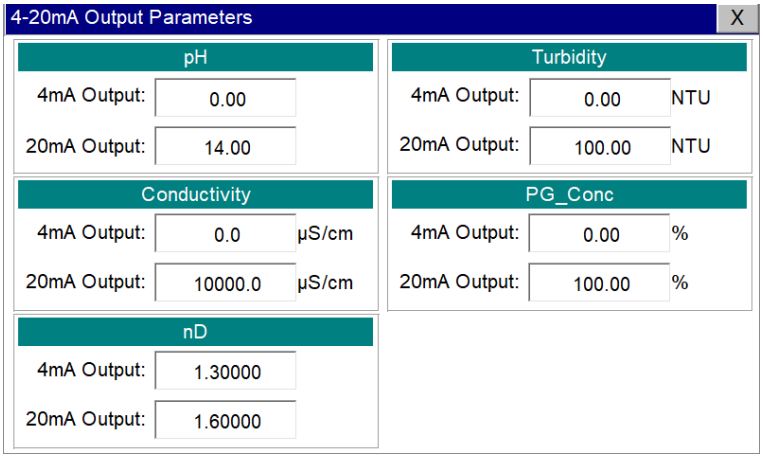


Figure. 27 - 4-20mA Output Setting

6.5.6. Comm Setup

If the site desires to connect the UC-80-PLUS outputs to a DCS (Distributed Control System) for the purposes of information and process control, users can connect the master station device to the UC-80-PLUS through the HMI (Human Machine Interface) terminal and read the data according to the parameter register table provided in Section 5.1 of this manual.

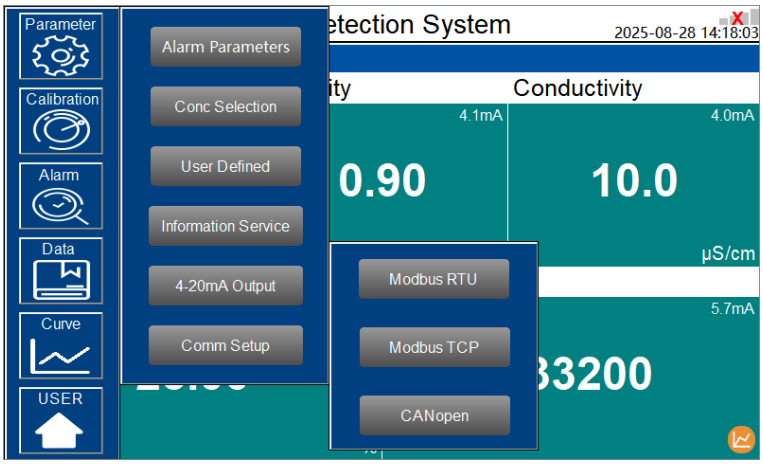


Figure. 28 - Comm Setup

Modbus RTU and Modbus TCP

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.

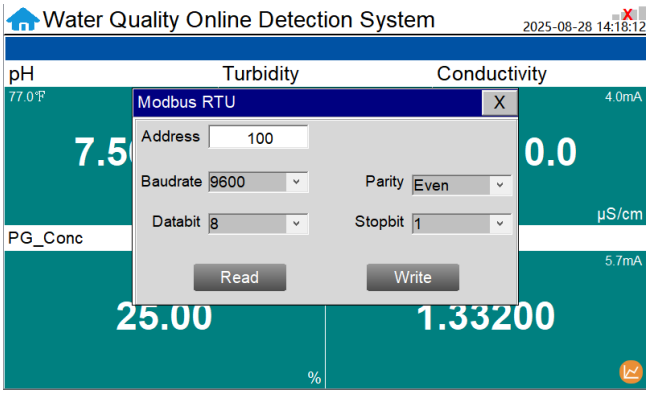


Figure. 29 - Modbus RTU

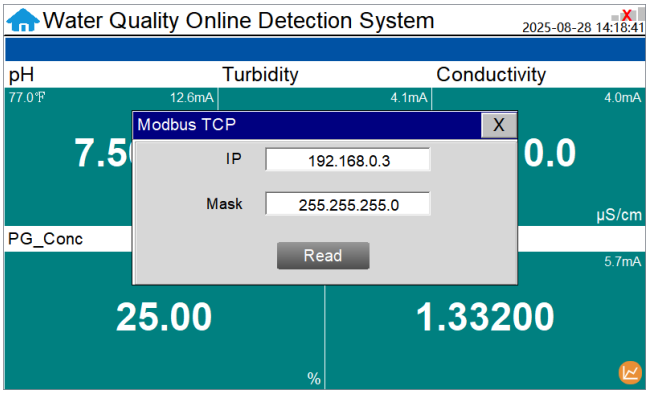


Figure. 30 - Modbus TCP

6.6. Calibration

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

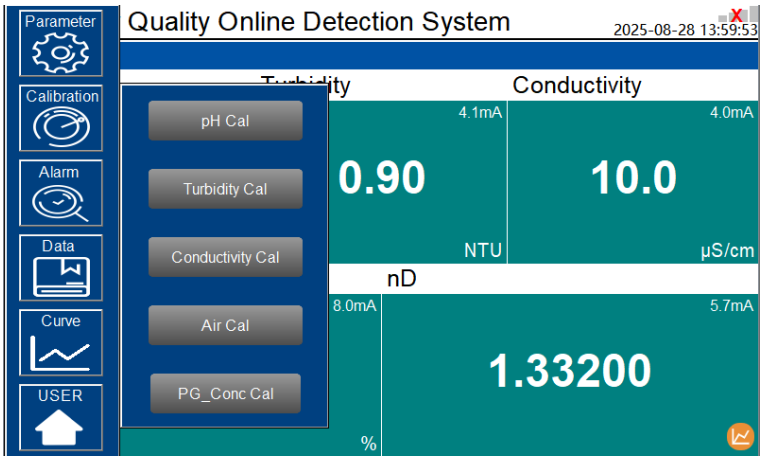


Figure. 31 - Sensor Calibration

6.6.1. pH Calibration (ST-710SS)

The pH sensor is calibrated at the Pyxis Lab 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 ST-710SS sensor as desired.

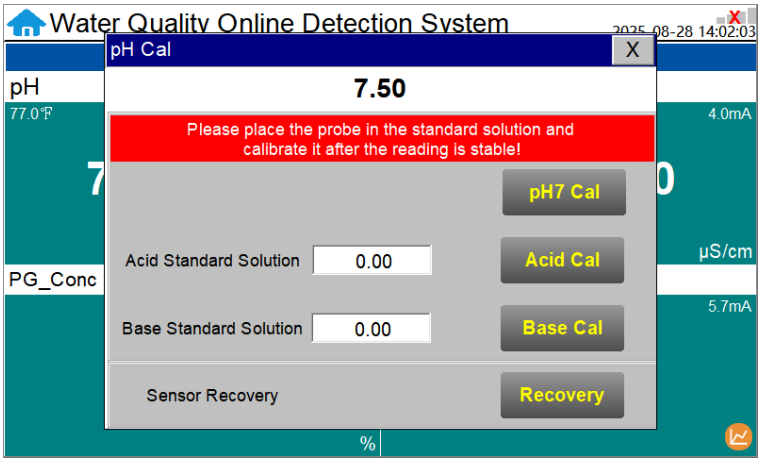


Figure. 32 - pH Calibration

Single Point pH Calibration

Remove the ST-710SS sensor and rinse three times 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"**.

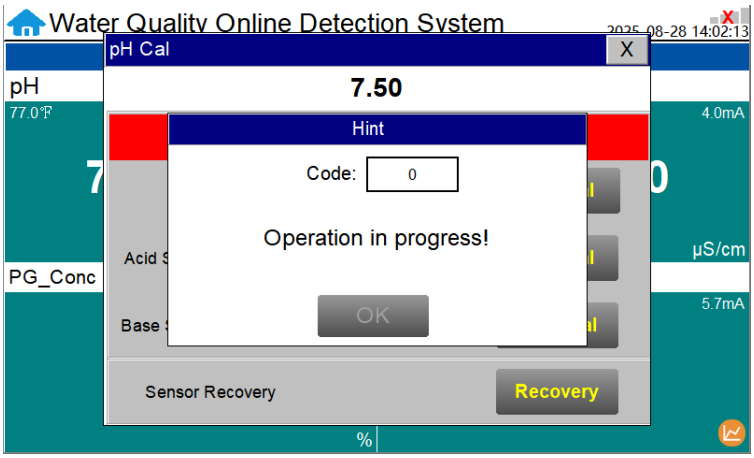


Figure. 33 - pH Calibration Success Prompt

Two Point pH Calibration

Remove the ST-710SS 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 three times 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.

Three Point pH Calibration

Remove the ST-710SS 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 for the second calibration point. If you choose acid calibration, clean the beaker three times 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 "Base 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 complete.

6.6.2. Conductivity Calibration (ST-722)

The conductivity sensor only needs to be calibrated once, put the sensor into the conductivity standard solution with known conductivity 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.

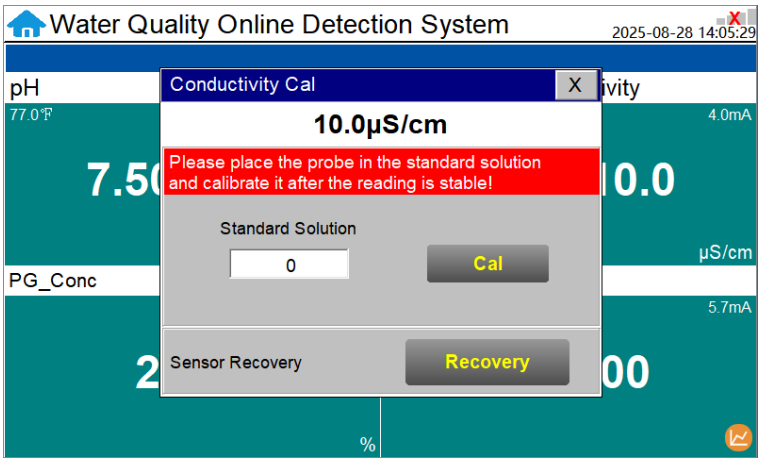


Figure. 38- Conductivity Calibration

6.6.3. Turbidity Calibration (ST-730SS-T)

Zero Calibration

Close the inlet valve, drain all the water from the pipeline, remove the sensor, place it in the calibration three-way connector, and rinse it 3 times with deionized water or tap water. Then add the ZERO calibration solution to the calibration three-way connector and input “0”on the screen. Please note it may take 1-2 minutes for the turbidity reading to come close to 0.Then click "Zero Cal" to start the calibration. Once the calibration success box appears, the calibration is complete. *NOTE* If deposits are present on the inside of the optical channel you may consider soaking the sensor in Pyxis Probe Cleaning Solution Kit (P/N SER-01) for 10 minutes, then brushing with the provided pipe cleaner in the kit.

Slope Calibration

Close the inlet valve, drain all the water from the pipeline, remove the sensor, place it in the calibration three-way connector, and rinse it 3 times with deionized water or tap water. Then add the turbidity standard solution to the calibration three-way connector and input the value of the standard solution on the screen. Then click "Slope Cal" to start the calibration. Once the calibration success box appears, the calibration is complete. *NOTE* If deposits are present on the inside of the optical channel you may consider soaking the sensor in Pyxis Probe Cleaning Solution Kit (P/N SER-01) for 10 minutes, then brushing with the provided pipe cleaner in the kit.

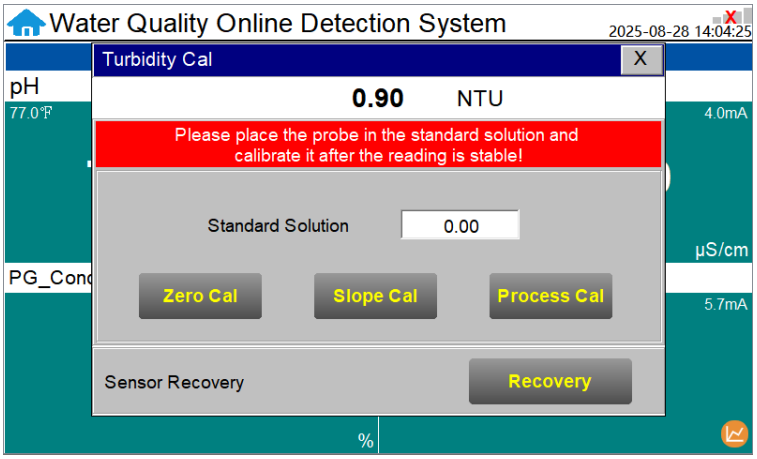


Figure. 39- Turbidity Calibration

Process Calibration

The process calibration function enables users to manually add an offset to the sensor measurement values to match the actual turbidity values in the process water or fluid. These values are typically obtained using a handheld turbidity meter. Enter the actual turbidity value measured by the handheld device on the screen, then click the "Process Cal" button and wait for the calibration to complete. Once the calibration is successful, the turbidity reading of the sensor will precisely match the actual turbidity value.

6.6.4. Air Calibration (RT-100)

1. Clean the sapphire lens of the Prism RT-100 with a soft tissue.

2. If there are stubborn deposits on the sensor lens, the sensor lens can be pre-immersed in Pyxis probe cleaning solution (part Number: SER-01) for 10-15 minutes, then rinse with clean water, wipe with a soft paper towel, and then measure the refractive index Air calibration.

3. After correctly cleaning the sensor lens, remove any residual liquid from the sapphire lens

4. Cover the lens with a dark towel to avoid interference from ambient light.

5. Click the **Cal** option to start the air calibration.

6. After calibration is completed, the interface will prompt: **"Calibration Success"**.

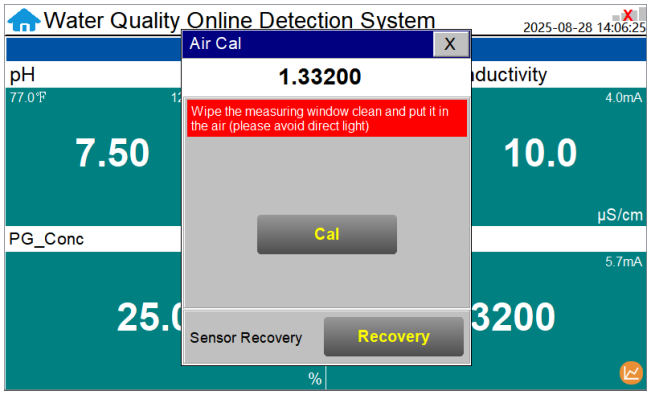


Figure. 40 - Air Calibration

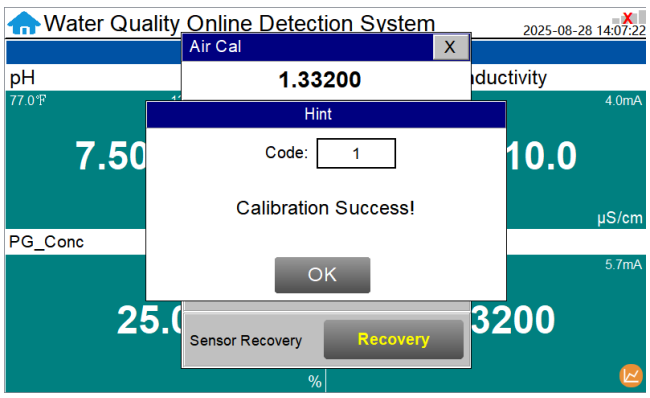


Figure. 41 - Air Calibration Success

6.6.5. PG (Propylene Glycol) Concentration Calibration

The refractive index and temperature values will be converted and displayed as the required liquid concentration units selected by the user on the sensor interface. If necessary, the displayed liquid concentration unit value can be calibrated against a known solution. The steps are as follows:

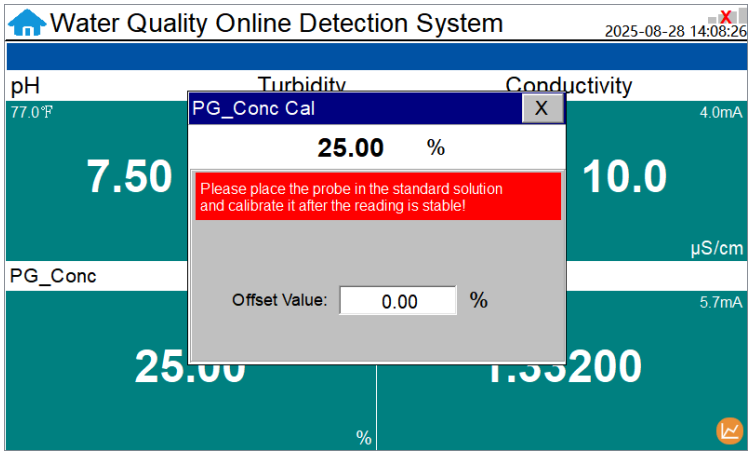


Figure. 42 - PG Concentration Calibration

1. Place the prism RT-100 into a calibration liquid of known concentration and ensure that the sensor is not disturbed by ambient light by covering with a dark towel.
2. Input the concentration corresponding to the known sample solution.
3. Wait for successful calibration.

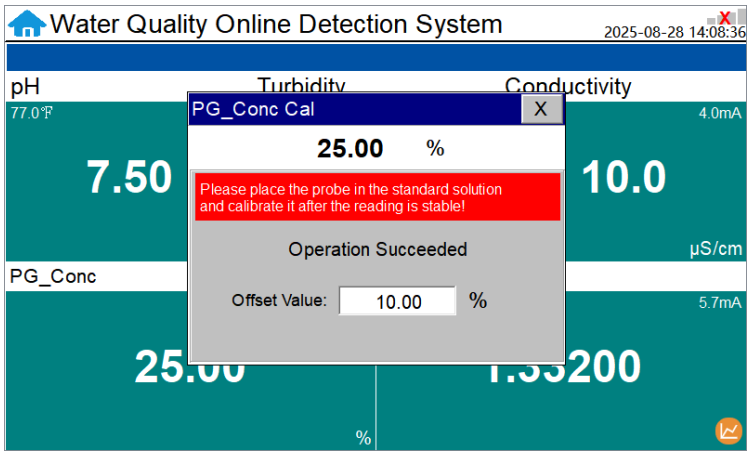


Figure. 43 - PG Concentration Calibration Succeeded

6.6.6. Recovering Data

Click the restore button in the calibration interface of each sensor to restore the data of pH/chlorine sensor and turbidity 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.

6.7. Alarm

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

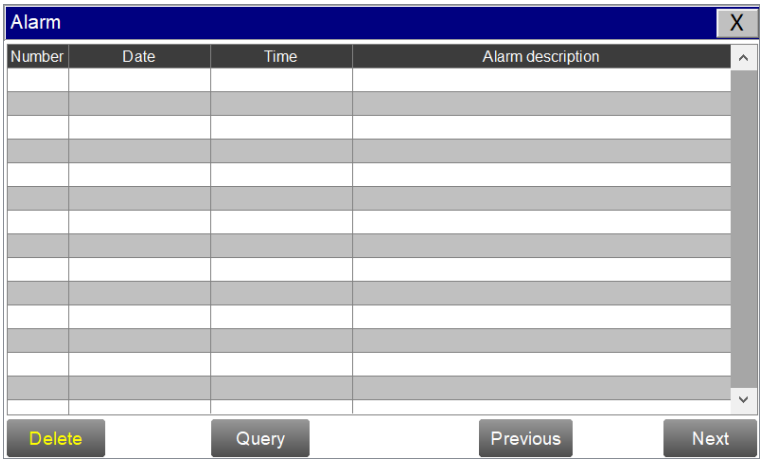


Figure. 34 - Alarm View

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.

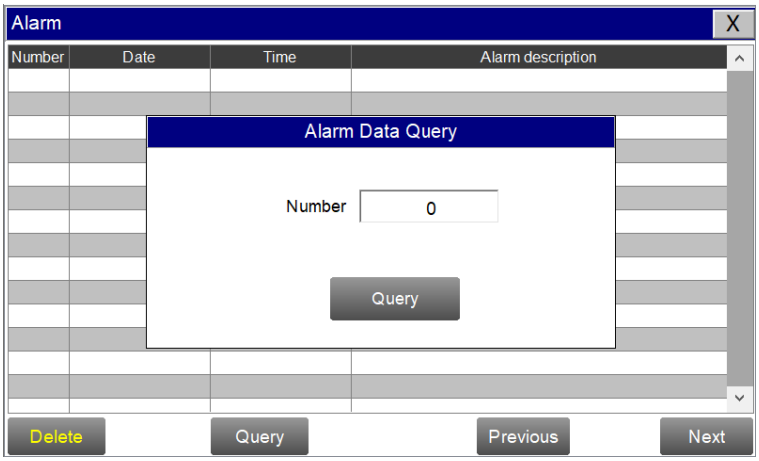


Figure. 35 - Alarm Data Query Screen

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.

6.8. Data

Click on **"Data"** to view historical data and calibration logs.

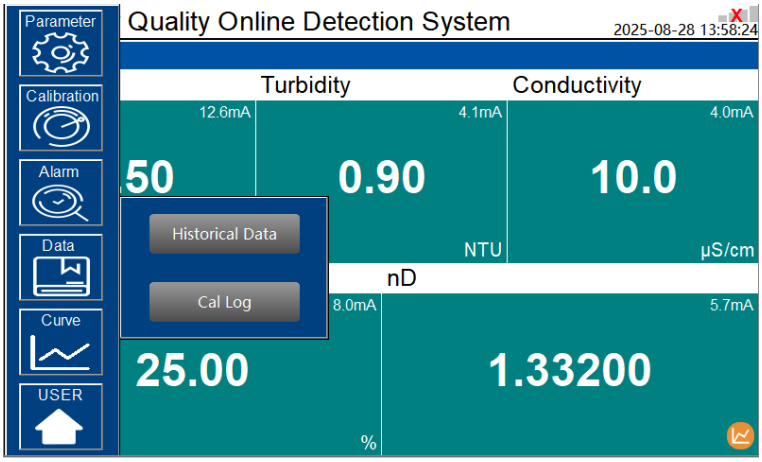


Figure. 36 - Data

6.8.1. Historical data

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

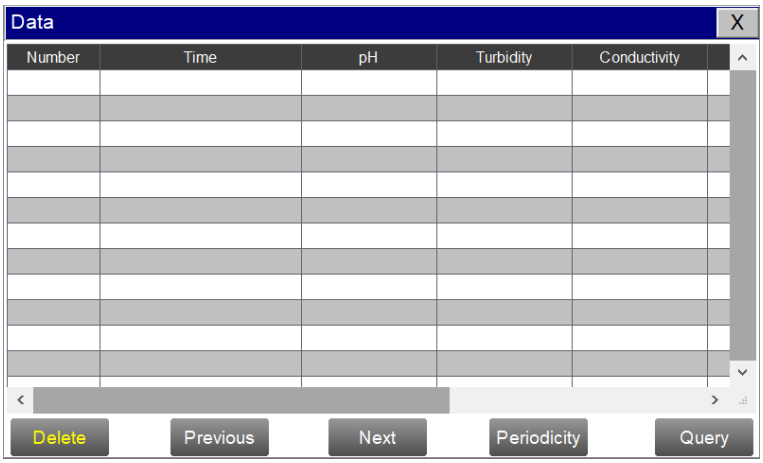


Figure. 37 - Historical Data Screen

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.

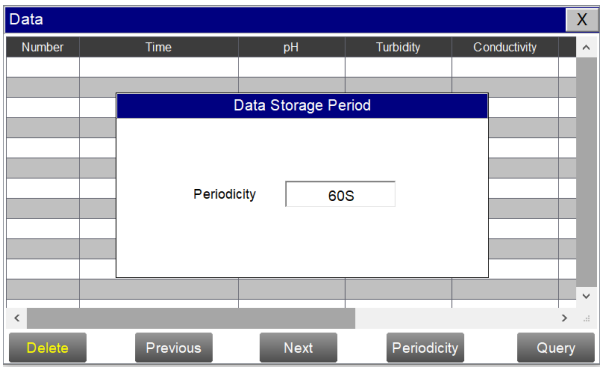


Figure. 48 - Data Storage Cycle Time Setting

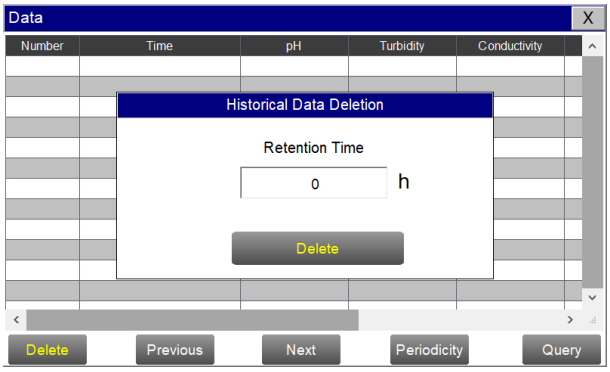


Figure. 49 - History Data Deletion Screen

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.

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.

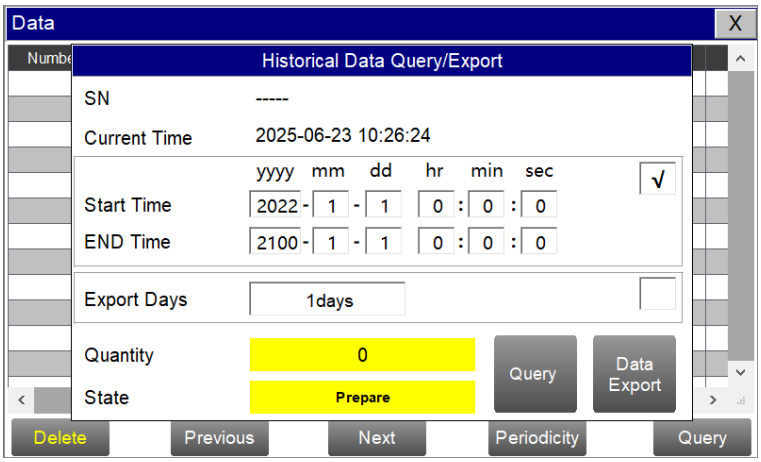


Figure. 38 - Historical Data Query and Export Screen

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.

6.8.2. Calibration Log

The calibration log can be viewed in the calibration log interface, and when the export operation is performed, the diagnostic parameters, historical data, and calibration log will be exported simultaneously.

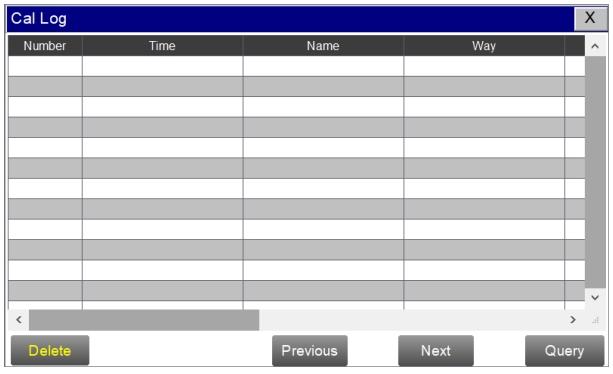


Figure. 39 - Calibration Log

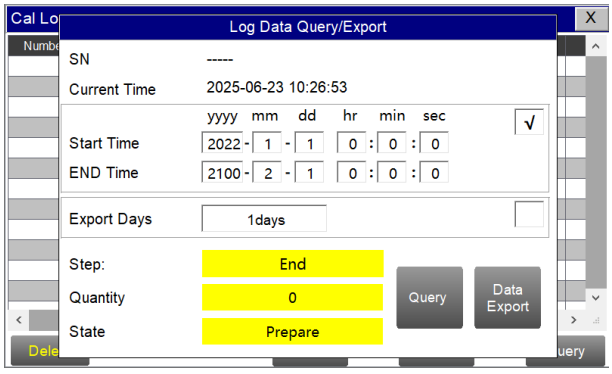


Figure. 40 - Calibration Log Query/Export

6.9. Curve

Click the "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.

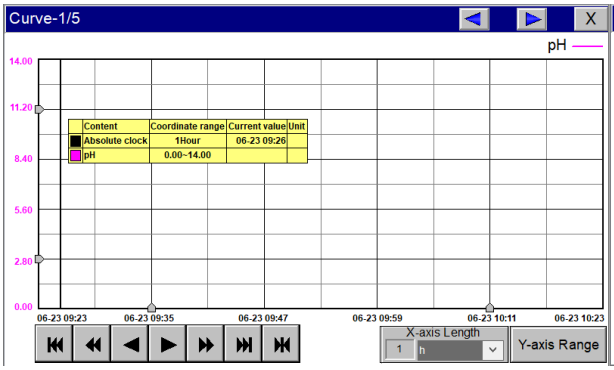


Figure. 41 -History Curve Screen

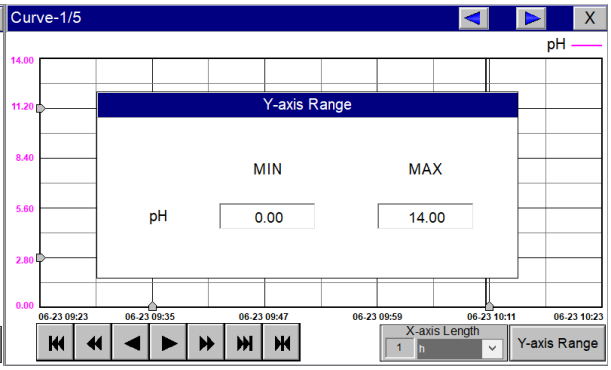


Figure. 42 - Y-axis Range Setting

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. 43 - Button Function Review

6.10. User Management

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

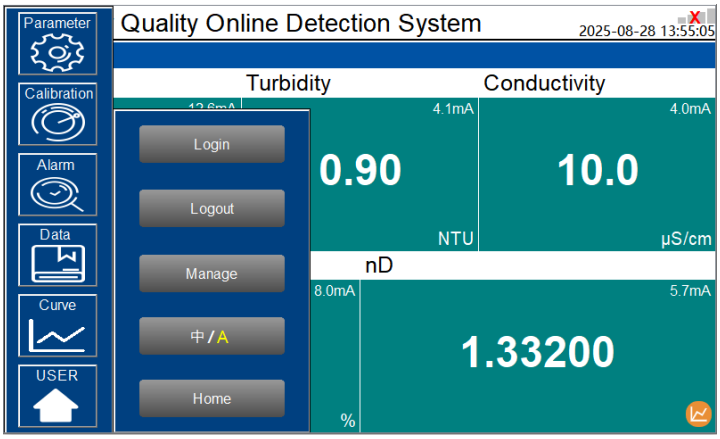


Figure. 44 - User Management

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 username and password and select the user group they belong to. Only users in the administrator group can set parameters such as calibration.

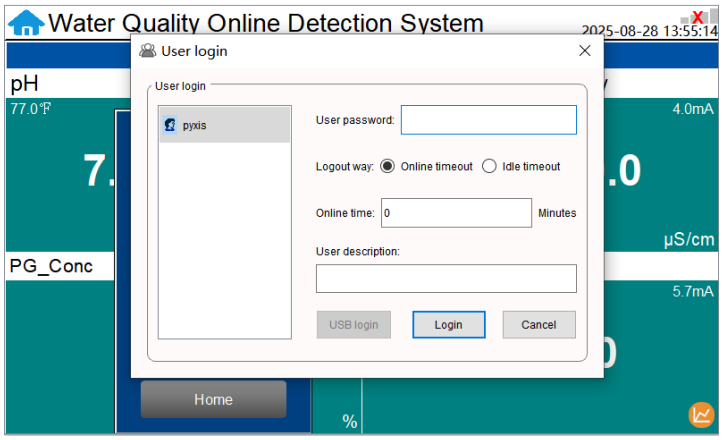


Figure. 45 - User Management Screen

Modify 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.*

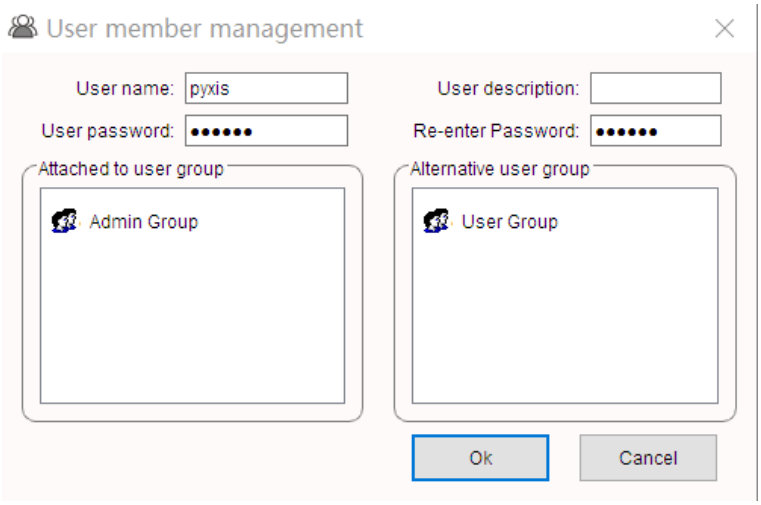


Figure. 58 - Modifying the User Screen

7. Modbus Register Table & Analyzer Maintenance

7.1. Modbus Correspondence Address

Number	Definition	Address	Format	Mode	Unit	Note
1	pH	1	float	read only	pH	Data format ABCD
2	Turbidity	3	float	read only	NTU	
3	Conductivity	5	float	read only	μS/cm	
4	Concentration (Glycol)	7	float	read only	%	
5	nD (Refractive Index)	9	float	read only	nD	
6	Temperature	11	float	read only	°F / °C	
7	pH upper limit alarm	13	uint	read only		0: normal 1: Alarm
8	pH lower limit alarm	14	uint	read only		
9	Turbidity upper limit alarm	15	uint	read only		
10	Turbidity lower limit alarm	16	uint	read only		
11	Conductivity upper limit alarm	17	uint	read only		
12	Conductivity lower limit alarm	18	uint	read only		
13	Concentration upper limit alarm	19	uint	read only		
14	Concentration lower limit alarm	20	uint	read only		
15	nD upper limit alarm	21	uint	read only		
16	nD lower limit alarm	22	uint	read only		
17	pH sensor communication abnormal	23	uint	read only		
18	Turbidity sensor communication is abnormal	24	uint	read only		
19	Conductivity sensor communication is abnormal	25	uint	read only		
20	Refractometer sensor communication is abnormal	26	uint	read only		
21	Anomaly in communication of the analog module	27	uint	read only		
22	Anomaly in communication of the relay module	28	uint	read only		
23	Anomaly in communication of the control output module	29	uint	read only		
24	Anomaly in communication of the frequency acquisition module	30	uint	read only		
25	Anomaly in communication of the analog module - Time_2	31	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						
Communication protocol: standard Modbus-TCP						
Communication parameters: IP: 192.168.0.3 (can be set); port: 502						
Station number: 1						

8. Contact Pyxis Lab

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