WQA-Hardness

Hardness Water Quality Analyzer

User Manual V1.0

2024.10 Edition

Document edition

Edition number	Revision date	Firmware version	Note
V1.0	October 31, 2024	V01B1	●

Table of contents

1 Specification

Specification	Detail
Principle	Titrimetric colorimetric method
Parameter	Total hardness
Range	0.21-534.0 mg/L (ppm) $CaCO_3$
Accuracy	±5 % of the upper measured value of the respective reagent used
Analysis time	Minimum time about 2 min, analysis time depends on water quality and flushing time
Auto. Interval time	Default: 15 min, minimum 1 min
Dimension	300×300×180 mm (11.81×11.81×7.09 inch)
Weight	4.0 kg
IP rating	IP54
Power supply	100- 240 VAC, 50/60 Hz
Power	25 W
Operating temperature	5 - 45 °C (41 – 113 °F)
Storage temperature	5 - 45 °C (41 – 113 °F)
Humidity	20 % - 95 %, indoor installation
Pressure	0.2 - 2 bar
Cable length	6 m (6.56 ft), Please contact us for other sizes
Tubing requirements	Inlet/Outlet: 6 mm outer diameter
Analog output	0/4 – 20 mA
Digital input	1
Digital output	2 relays
Communication Interface	Modbus RTU，RS485
Wireless communication	WiFi / 4G (optional Configurations)
Data storage	32 GB SD card
Warranty period	One year

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation.

2 General information

2.1 Safety information

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment. Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

2.1.1 Use of hazard information

DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.
NOTICE
Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

2.1.2 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	This symbol indicates that a risk of electrical shock and/or electrocution exists.
	This symbol indicates a laser device is used in the equipment.
	This symbol indicates the need for protective glasses are required.
	This symbol indicates the connection location of protective earth.

Note: This series of products are mainly used in industrial environments and indoors, which will cause potential electromagnetic interference to the environment.

This series of products meet the relevant requirements of the standards EN 61326-1: 2013 and EN 61326-2-3: 2013.

2.2 Product overview

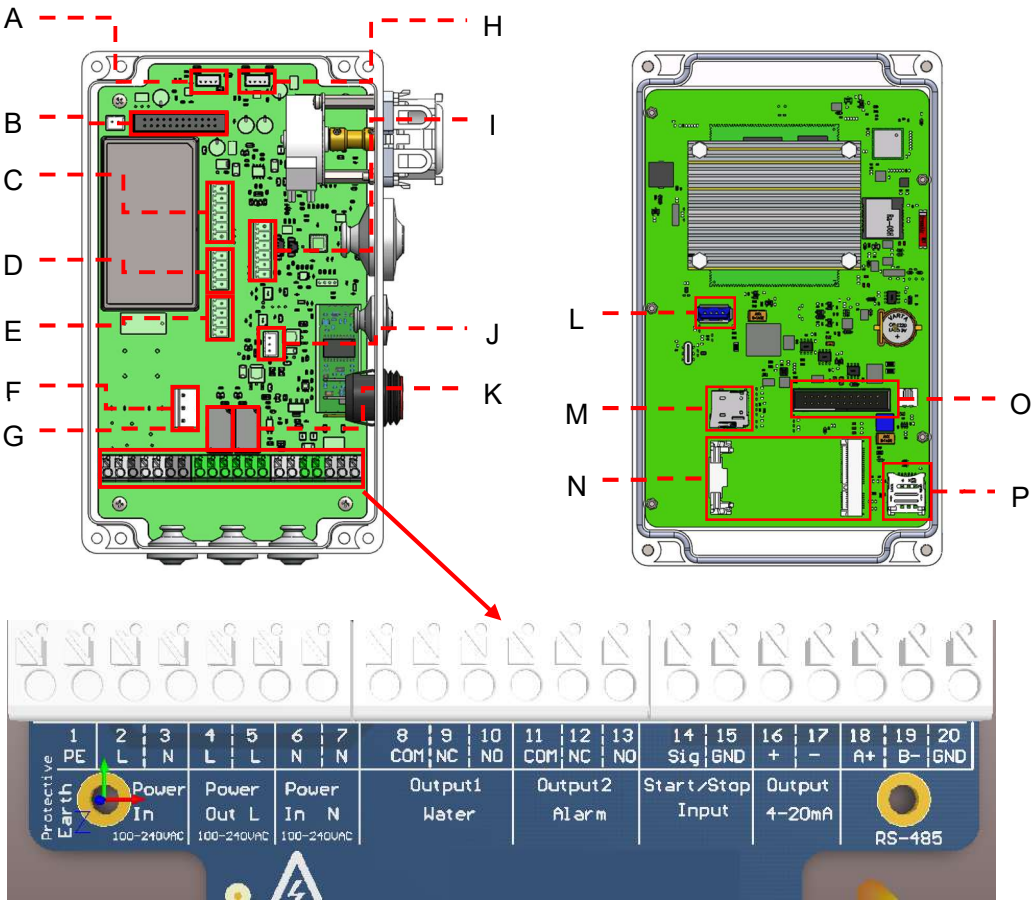
The WQA-Hardness is an on-line water quality analyzer that measures the hardness of water by titration and colorimetry. Pump the reagent into the water sample to initiate the reaction， determine the reaction endpoint using colorimetry, and then calculate the hardness concentration in the water based on the amount of reagent added. By selecting different reagents, the analyzer can measure different concentrations of hardness.

2.3 Product selection

No.	Reagent type	mg/L(ppm) $CaCO_3$	°dH	°f	mmol/L
6101	WAR-Hardness-T01	0.21-2.14	0.012-0.12	0.021-0.214	0.002-0.021
6102	WAR-Hardness-T02	0.53-5.34	0.03-0.3	0.053-0.534	0.005-0.053
6103	WAR-Hardness-T03	1.60-16.0	0.09-0.9	0.160-1.602	0.016-0.160
6104	WAR-Hardness-T04	5.34-53.4	0.3-3.0	0.534-5.340	0.053-0.534
6105	WAR-Hardness-T05	16.0-160.0	0.9-9.0	1.602-16.02	0.160-1.602
6106	WAR-Hardness-T06	26.7-267.0	1.5-15	2.670-26.70	0.267-2.670
6107	WAR-Hardness-T07	53.4-534.0	3.0-30	5.340-53.40	0.534-5.340

2.4 Electrical connection

Warning	
	Only authorized personnel may perform electrical connection work in accordance with applicable regulations. When connecting circuits, all wiring must be de-energized.

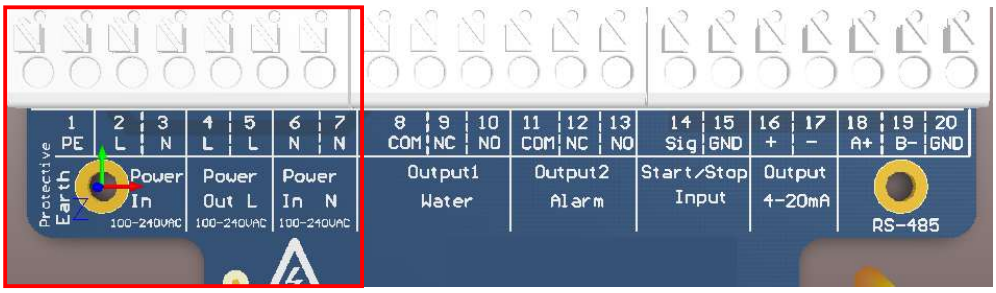


No.	Description	No.	Description	No.	Description
A	Stepper motor port	B	Connecting the motherboard cable connector	C	Sensor port
D	2-way DC motor port	E	2-way solenoid valve port	F	Power switch port
G	Relay 1	H	Stepper motor port	I	Sensor port
J	Flow meter interface	K	Relay 2	L	USB3.0 port
M	SD card slot	N	4G module port	O	Connects to the backplane cable connector
P	SIM card slot				

Port	No.	Description
Power In 100-240 VAC	1	PE
	2	Live wire
	3	Neutral wire
Power Out L 100-240 VAC	4	Power out L
	5	Power out L
Power In N 100-240 VAC	6	Power in N
	7	Power in N
Output 1 Water	8	COM: common connection
	9	NC normally closed
	10	NO normally open
Output 2 Alarm	11	COM common connection
	12	NC normally closed
	13	NO normally open
Start/Stop Input	14	Sig signal input
	15	GND grounding
Output 4-20 mA	16	Positive pole
	17	Negative pole
RS485	18	A+
	19	B-
	20	GND

2.4.1 Connection of supply voltage

Warning	
	The maximum connected capacity of all loads must not exceed 250 VAC / 1 A.



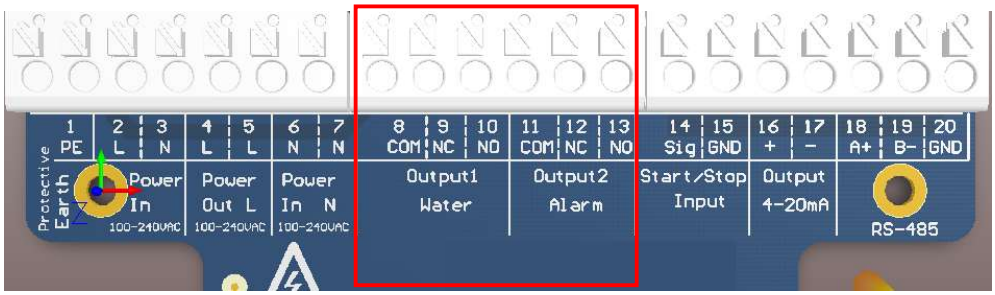
Connection of supply voltage

Terminal designation	Description
1 PE	**Earth**
2 L (Power IN)	Live wire
3 N (Power IN)	Neutral wire
6 N (Power in N)	Power in N
7 N (Power in N)	Power in N

Output terminals which are connected via the device switch

Terminal designation	Description
4 L (Power Out L)	Power out L
5 L (Power Out L)	Power out L

2.4.2 Connection of the relay outputs



The relays are designed as change-over contacts, with a common connection and the switching outputs NC and NO.

Output 1 water (relay 1): Water hardness notification

Terminal designation	Description
8 COM	Relay 1 COM common connection
9 NC	Relay 1 NC normally closed
10 NO	Relay 1 NO normally open

Output 1 / relay 1 function (notification of water hardness):

If the measured value of the sample falls below the limit set in the SYCON, relay 1 is deenergised and a connection from COM to NC is established. In addition, the symbol R1 is not marked in the display.

If the measured value of the sample exceeds the limit set in the SYCON, relay 1 is energised and a connection from COM to NO is established. In addition, the symbol R1 is highlighted in black on the display.

Output 2 alarm (relay 2): Device error notification

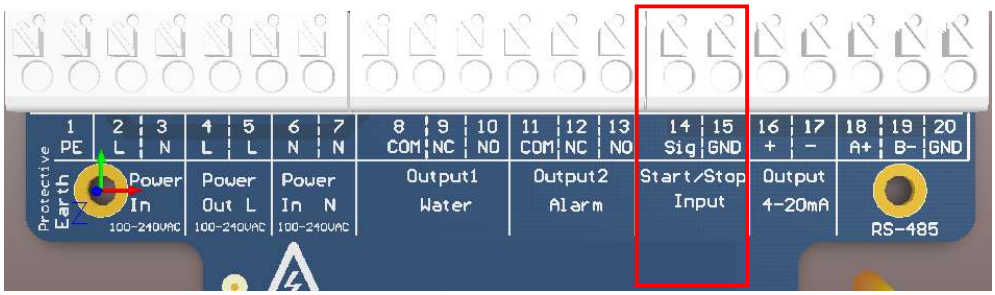
Terminal designation	Description
11 COM	Relay 2 COM common connection
12 NC	Relay 2 NC normally closed
13 NO	Relay 2 NO normally open

Output 2 / relay 2 function (device error notification):

If a device error occurs or the device is switched off, the relay 2 is deenergized (connection from COM to NC). In addition, the symbol R2 is not marked in the display.

The relay 2 is energized in the error-free state of the device (connection from COM to NO), this serves the wire break safety. In addition, the symbol R2 is highlighted in black on the display.

2.4.3 Input contact



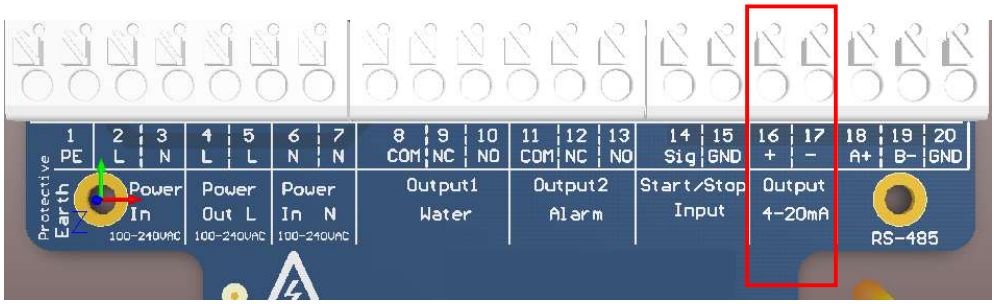
Start/Stop Input: Start input contact for analysis / flow switch / Interval reset

Terminal designation	Description
14 Signal	Signal input
15 GND	Ground connection for the + 24 V connection

Input contact function:

A flow switch or other potential-free switches can be connected to the input contact. If the input contact is closed, the symbol IN is highlighted in black on the display.

2.4.4 Current interface contact



Output 0/4 – 20 mA: Current interface

Terminal designation	Description
16 +	**+** Output 0 - 20 mA or 4 - 20 mA
17 -	**-** Output 0 - 20 mA or 4 - 20 mA

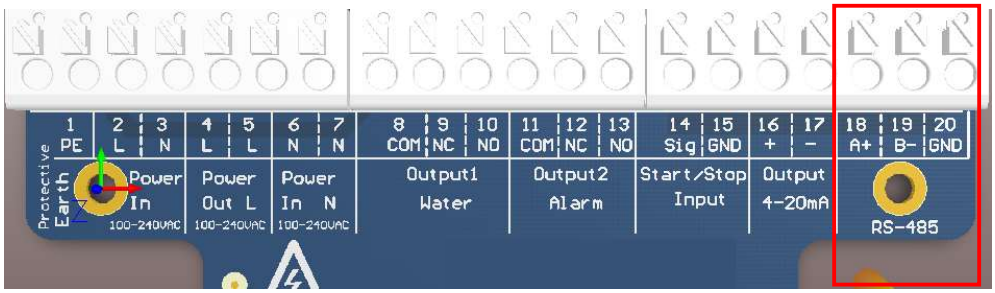
Current interface function:

The current interface is used to provide the present water hardness or device status as current output. The current range can be selected between the settings 0 - 20 mA or 4 - 20 mA. The maximum load is 750 Ω.

Selection options for current interface type:

- From
- 0 – 20 mA value
- 4 – 20 mA value
- 0 – 20 mA status
- 4 – 20 mA status

2.4.5 Digital signal output

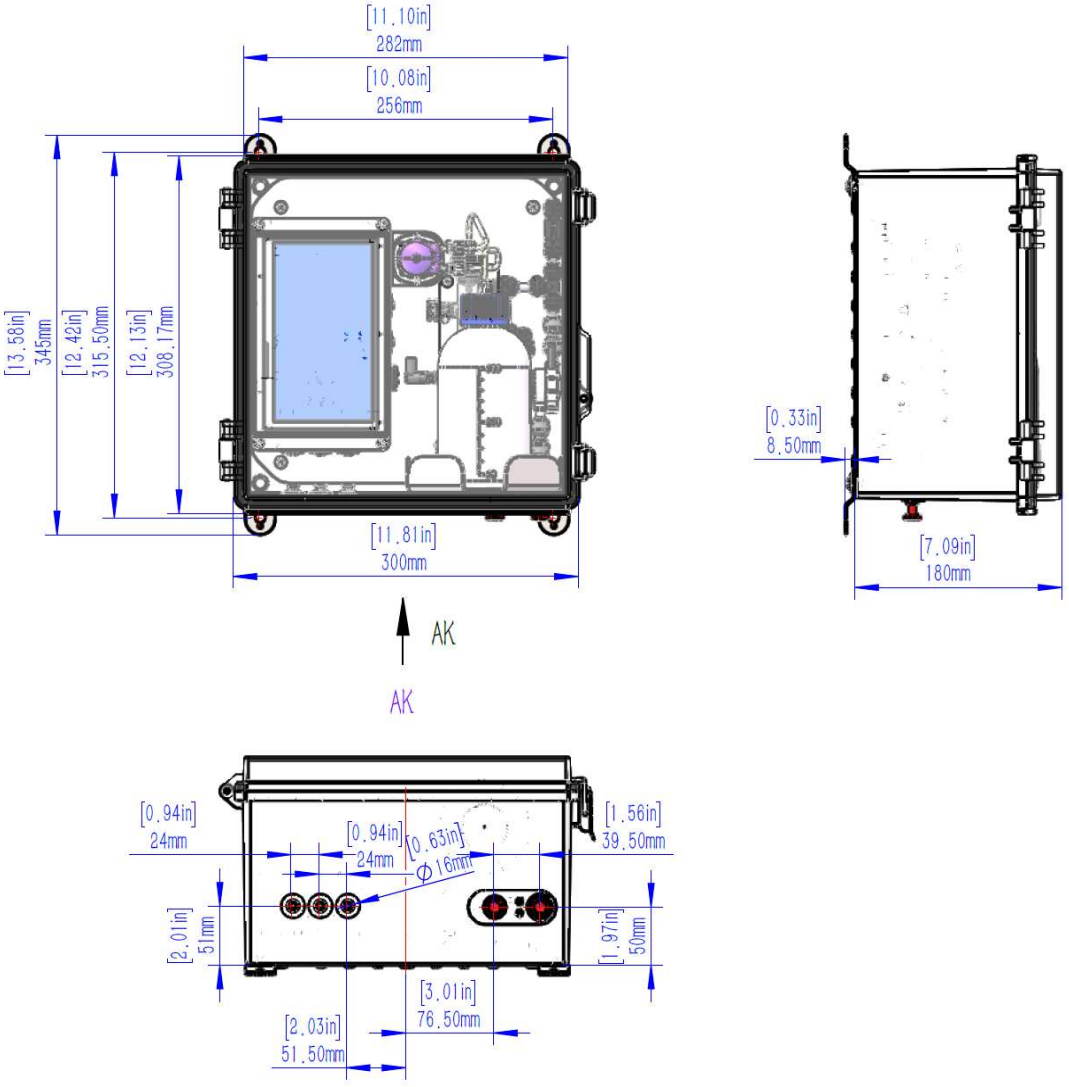


Output RS485

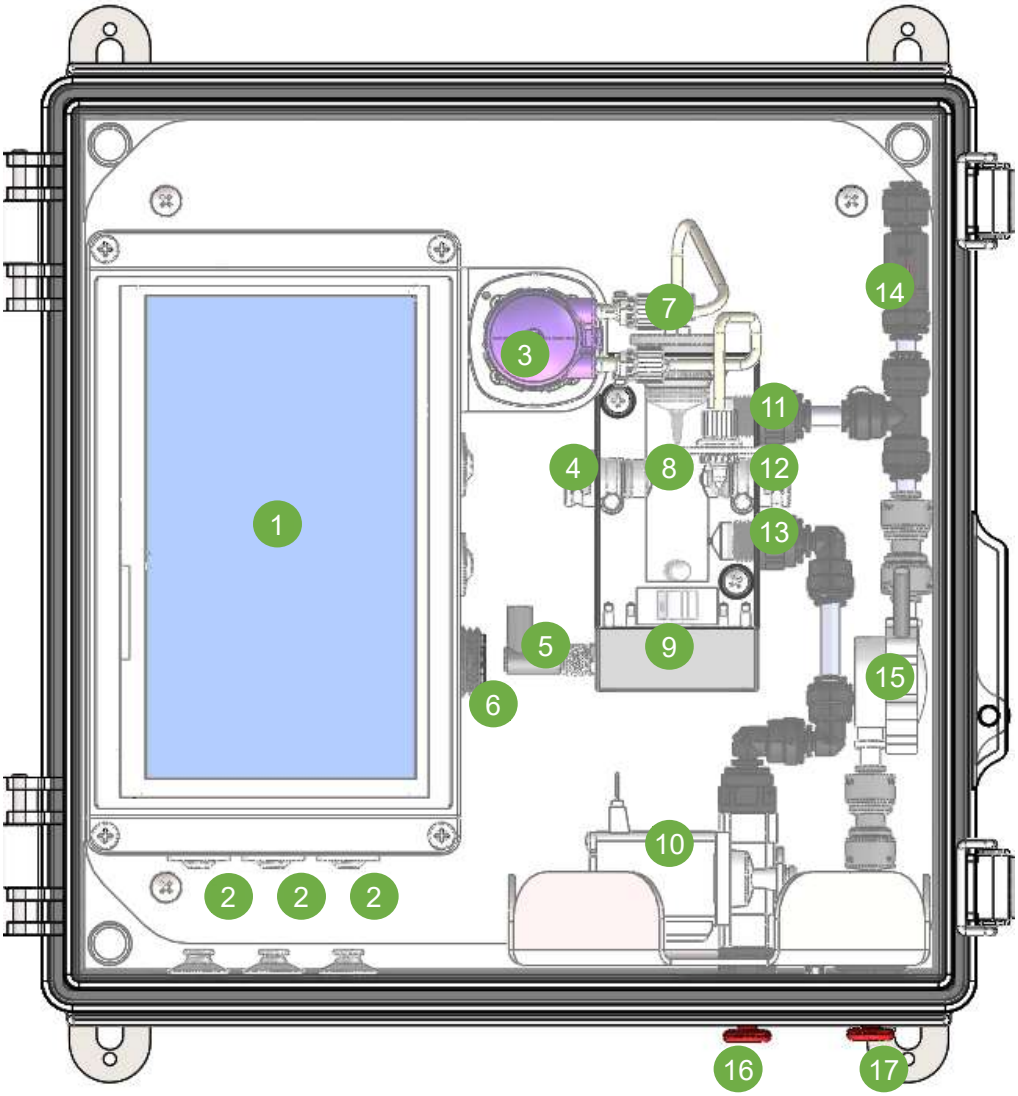
Terminal designation	Description
18 A+	RS485A
19 B-	RS485B
20 GND	Ground

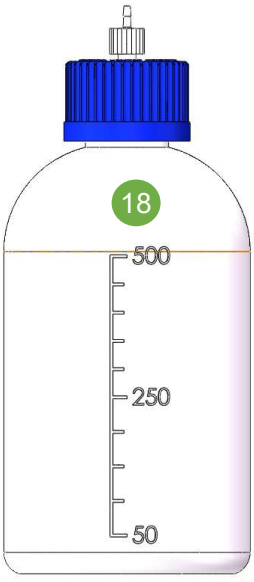
2.5 Structure and dimensions

2.5.1 Dimensions



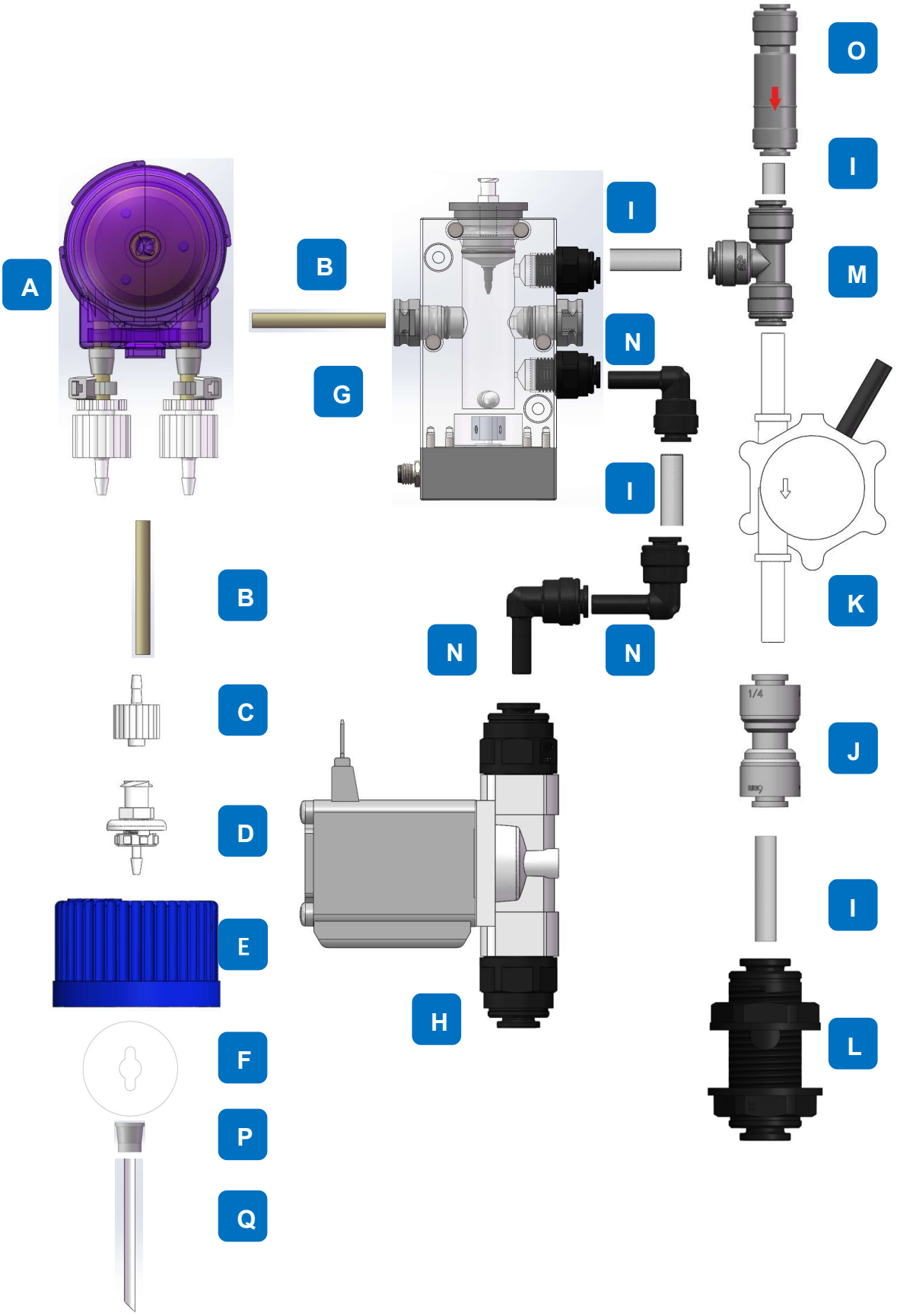
2.5.2 Structural components





No.	Description	No.	Description
1	Controller	2	Cable threading holes
3	Dosing pump	4	Optical receiver
5	Cable of magnetic agitator	6	On/off switch
7	Dosing plugs (reagent plugs)	8	Measurement chamber
9	Magnetic agitator	10	Solenoid
11	Measurement chamber outlet	12	Light source
13	Measurement chamber inlet	14	Ventilation check valve
15	Flow meter	16	Water inlet (6 mm tube)
17	Water outlet (6 mm tube)	18	Reagent bottle (500mL)

2.5.3 Accessories and consumables



Accessory list

No.	Name	Qty. per set	Encodings
A	Pump head	1	PRT010485
B	Reagent hose	3	PRT010663
C	Luer female fittings	1	SPZL001439
D	Luer bulkhead fitting	1	PRT010386
E	Bottle cap GL32	1	PRT010392
F	Luer bulkhead fitting mounting tab	1	PRT010863
H	Solenoids	1	PRT007784
I	6mm tube	1	SPZL002657
J	Pneumatic joint	1	SPZL002373
K	Flow meter	1	SPZL001486
L	Bulkhead joints	1	SPZL001536
M	Equal elbow (6 mm)	1	SPZL001851
N	Rod elbow (6 mm)	3	SPZL001538
O	Check valves	1	PRT008483
P	Countersunk ferrule	1	PRT014821
Q	PTFE tube	1	PRT014338

Colorimetric module

No.	Name	Qty. per set	Encodings
G	Colorimetric module	1	ASM001497

Note:

The colorimetric module contains the optical receiver (6), measurement chamber (10), magnetic agitator (11), drain plug (13), light source (14), and inlet plug (15) as described in Section 2.5.2.

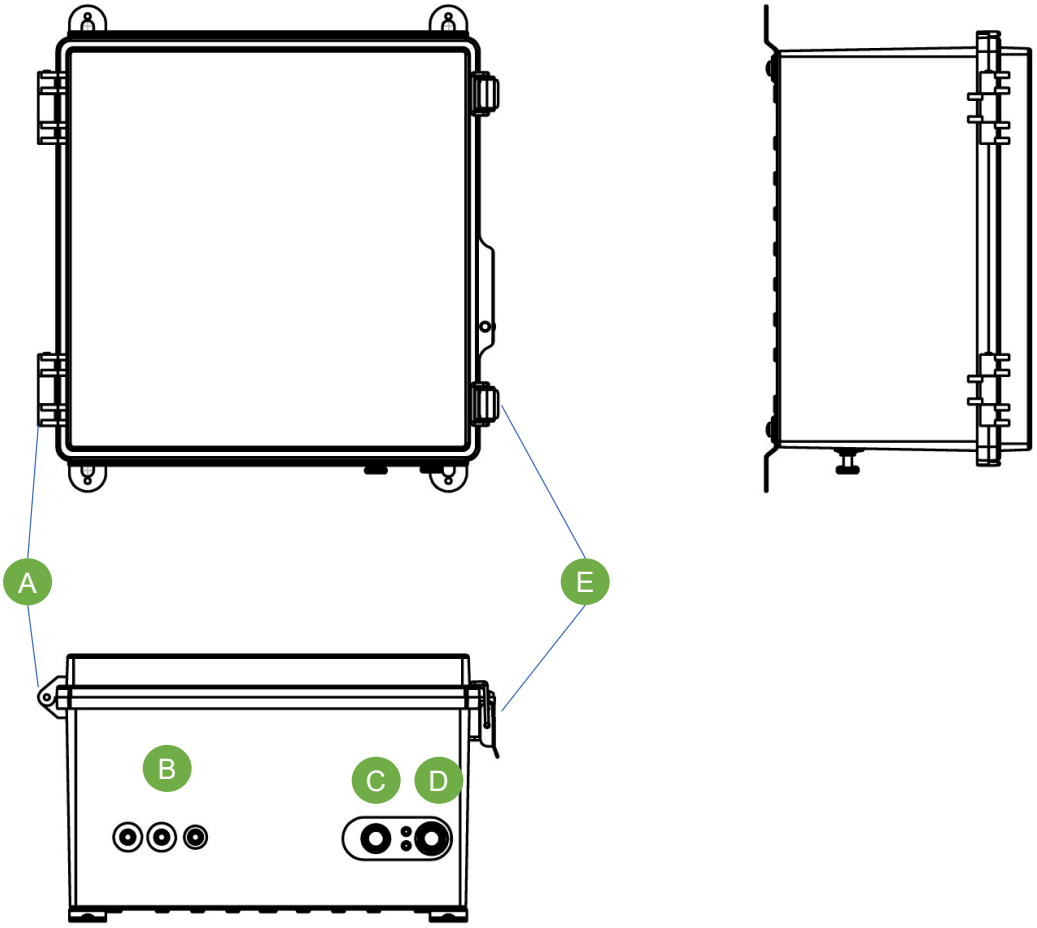
There is already a colorimetric module in the original product, the colorimetric module is not part of the accessories and consumables included in the above, if you need to replace the original colorimetric module, or if you need more colorimetric modules, please contact us to purchase separately.

3 Installation

WQA-Hardness is wall-mounted and the unit must be mounted vertically. Refer to section 2.5.1 for mounting dimensions.

The analyzer can be fitted with an optional housing. Four mounting ears with 8.5 mm holes are fixed to the rear of the housing.

To open the device, the available free space should be at least 450 x 350 mm (W x H).



Position	Description
A	Door stop
B	Cable bushings for the electrical connection
C	Water inlet connection for hose with 6 mm outer diameter
D	Water outlet connection for hose with 6 mm outer diameter
E	Door locks

Note：

Maintenance and repair works should only be carried out by qualified personnel.

Before starting work, make sure that all lines are depressurized.

Hoses, connections, and gaskets must be regularly checked and, if necessary, preventively replaced, even if they show no visible damage. Maintenance intervals must be complied with.

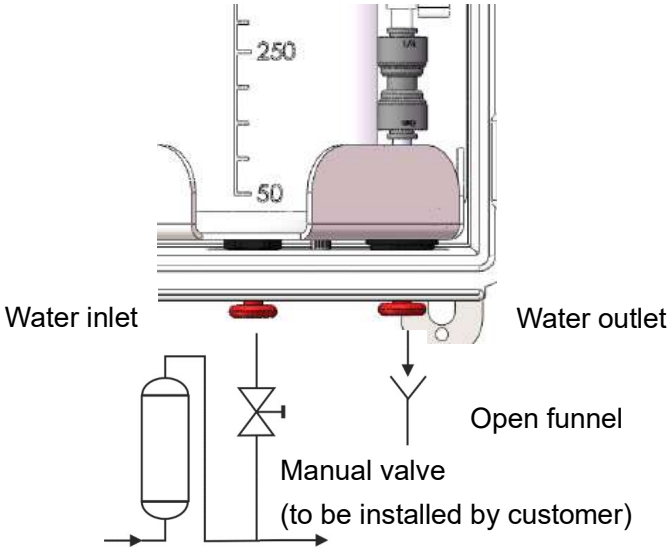
Before commissioning after maintenance, make sure all connections, threaded fittings, and gaskets are properly installed. Check that all housing parts are closed and filters or other parts connected to the device are installed correctly.

Remove all tools, spare parts or other materials required for maintenance prior to commissioning.

Clean the device, take any leaked fluids, and leave the device in a clean condition.

Check that all safety devices are present and ready for operation.

The analyzer has two ports: a water inlet on the left side and a water outlet on the right side. These ports can be connected to plastic hoses with an outer diameter of 6 mm.



The inlet pressure of the water sample must be between 0.5 and 5.0 bar.

The recommended inlet pressure of the water sample should be between 1 and 2 bar.

The hose length of the water outlet must not be longer than 2 m and must lead away vertically downwards. The system must be able to relax freely against the atmospheric pressure. There must be no back pressure greater than the inlet pressure. The water is drained without pressure in an open funnel or drain.

4 Communication

4.1 Communication parameters

WQA-Hardness series analyzer uses standard RS485 serial bus communication, the default bus communication parameters are as follows:

- Baud rate: 9600.
- Parity bit: None.
- Data bits: 8.
- Stop bits: 1.

The communication protocol is the standard Modbus RTU protocol, the sensor is used as a slave, and the relevant communication parameters are as follows:

- Slave address: the default is 0x20 (32), and the range is [0x01: 0xFD] (1~253).

  Note: 0xFE (254) is the broadcast address of all WQA series sensors. It is forbidden to use 0xFE (254) as Modbus RTU communication slave address. when multiple WQA series sensors are mounted on the unified bus.

4.2 WQA-Hardness register table

WQA-Hardness series analyzer support PLC address access, 0x9000 address corresponds to 49001, and other address are accessed by offset.

WQA-Hardness register table

Register name	Addr.	R/W	Data type	Explanation	Note
SysOn_Ts	0x9000 0x9001	R	U32	Continuous working time, (unit: sec) 0x8007 is high 16-bit data 0x8006 is low 16-bit data	[0x0-0xFFFFFFFF]
RunFlagL	0x9002	R	U16	Run flag low 16-bits	Refer to：RunFlagL definition
RunFlagH	0x9003	R	U16	Run flag high 16-bits	Refer to：RunFlagH definition
Hardness	0x9004 0x9005	R	F32	Hardness, Unit: mg/L	
Hardness	0x9006 0x9007	R	F32	Hardness, Unit: °dH	
Hardness	0x9008 0x9009	R	F32	Hardness, Unit: °f	
Hardness	0x900A 0x900B	R	F32	Hardness, Unit: mmol/L	
PumpingTimes	0x900C 0x900D	R	F32	Number of dosages	
Flow	0x900E 0x900F	R	F32	Sampling flow rate	

Note: (32-bit data are all CDAB type)

R/W means readable and writable, R means read only, W means write only.

R: When reading, use the 0x03 command of Modbus RTU protocol.

W: When writing, use Modbus RTU's 0x06 (write a single register) or 0x10 (write multiple registers) command.

U16: Refers to a 16-bit unsigned integer.

U32: Refers to a 32-bit unsigned integer.

The high address register is the high 16-bit data

The low address register is the low 16-bit data

Combined into 32-bit uint type data

F32: Refers to a 32-bit floating point number.

The high address register is the high 16-bit data

The low address register is the low 16-bit data

Combined into 32-bit float type data

RunFlagL definition

Bit	Status	Explanation	Mark
bit0	1/0	Auto Mode	On / Off
bit1	1/0	Reserve	
bit2	1/0	Measurement state	Measuring / standby
bit3	1/0	Relay 1 status	On / Off
bit4	1/0	Relay 2 status	On / Off
bit5	1/0	Status of Start/Stop Input	On / Off
bit6	1/0	SD card status	Inserted / not inserted
bit7	1/0	USB status	Inserted / not inserted
bit8	1/0	Sampling flow rate status	Abnormal(flow rate too low) / normal
bit9	1/0	Overdose status	Overdose / normal
bit10	1/0	Limit exceeded	Exceeded/normal
bit11	1/0	Reagent fill level < 10% status	Low / normal
bit12	1/0	Zero Calibration Flag	Abnormal / normal
bit13	1/0	SAC value read status	Abnormal / normal
bit14	1/0	Dosing wait timeout flag	Timeout/ normal
bit15	1/0	Peripheral Exception[1]	Abnormal / normal

RunFlagH definition

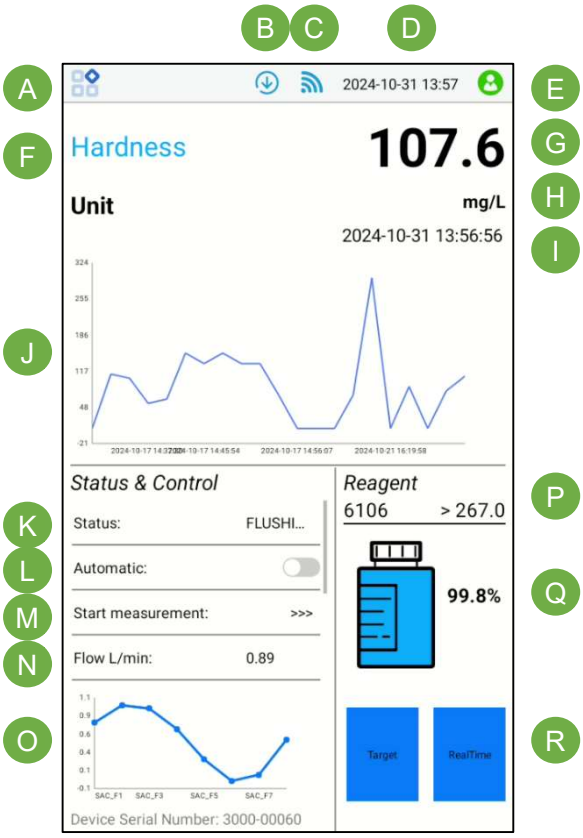
Bit	status	explanation	Mark
bit0	1/0	Reserve	
bit1	1/0	Reserve	
bit2	1/0	Reserve	
bit3	1/0	Reserve	
bit4	1/0	Reserve	
bit5	1/0	Reserve	
bit6	1/0	Reserve	
bit7	1/0	Reserve	
bit8	1/0	Reserve	
bit9	1/0	Reserve	
bit10	1/0	Reserve	
bit11	1/0	Reserve	
bit12	1/0	Reserve	
bit13	1/0	Reserve	
bit14	1/0	Reserve	
bit15	1/0	Reserve	

1: Control panel communication interface status.

5 Operation

5.1 Control panel

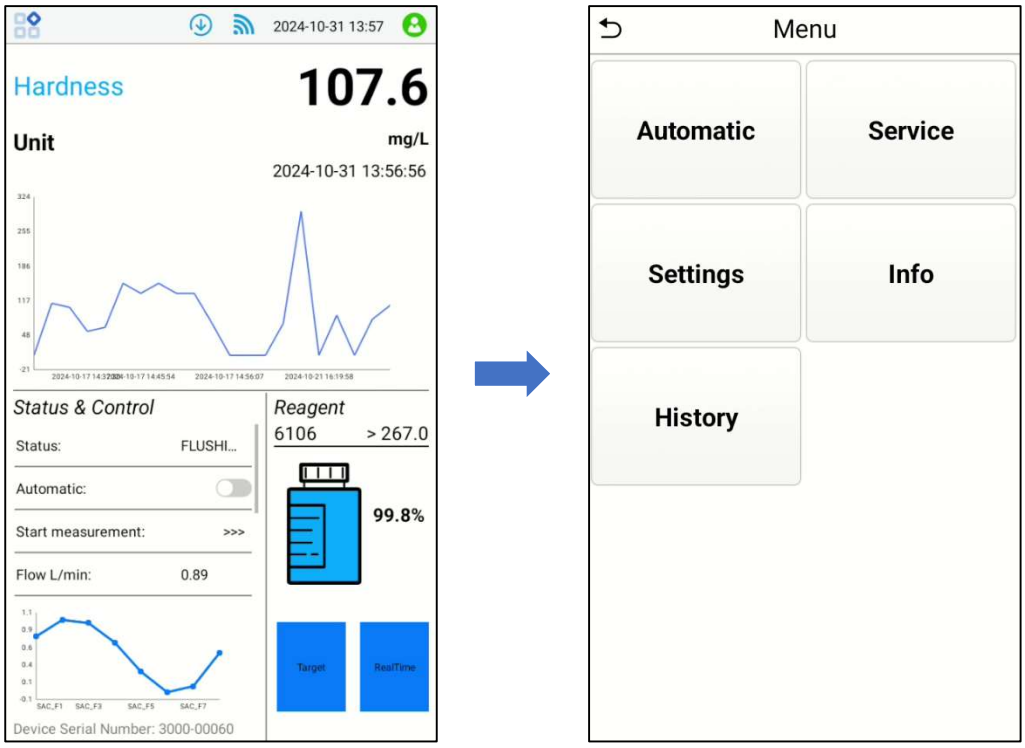
NOTICE
The control panel buttons are all touch buttons, do not press hard, use the force as a cell phone can be.



Position	Description	Position	Description
A	Menu	B	Update
C	WiFi	D	System time
E	User	F	Parameter name
G	Parameter value	H	Parameter unit
I	Parameter refreshing time	J	Historical curve
K	Status display	L	Automatic switch
M	Manual measurement button	N	Flow
O	Spectral curve	P	Reagent type
Q	Reagent level	R	Spectral curve legend

5.2 Menu

NOTICE
After entering the main menu, the analyzer quits the measuring mode if it is in the measuring mode.

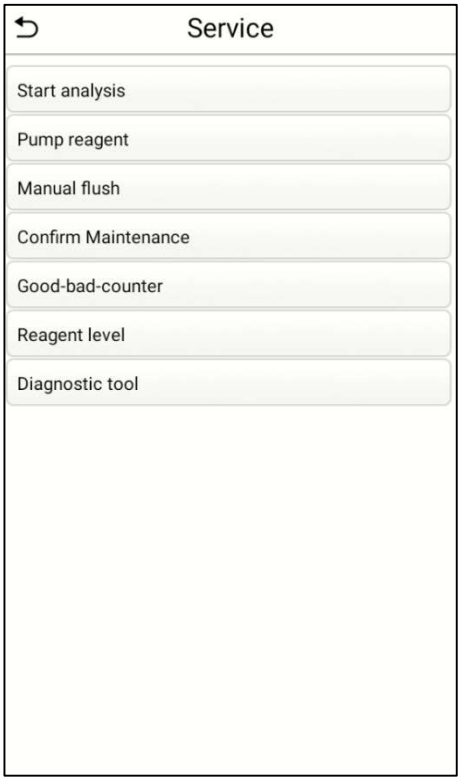


Click on icon , enter the main menu.

Item	Description
Automatic	Enables and disables automatic analysis.
Service	Start analysis (manual), pump reagent (new bottle inserted), manual rinse, confirm maintenance, reset good and bad counter, reagent level, diagnostic program.
Setting	All analyzer settings can be made under this menu item.
Info	Informs about: Hardware and software versions, analysis counter, maintenance counter, maintenance date, good and bad measurements.
History	Display historical data graph.

5.3 Service

NOTICE
After entering the service menu, the analyzer exits the automatic measurement mode.

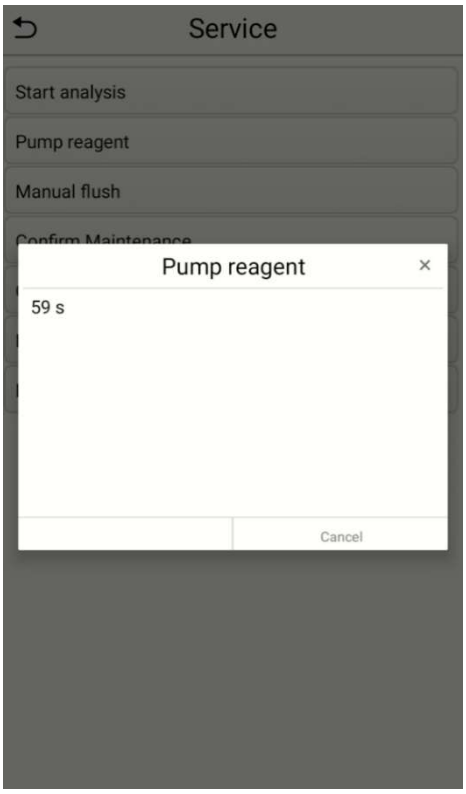


After entering the main menu, click on [Service] to enter the **s**ervice menu.

5.3.1 Start analysis

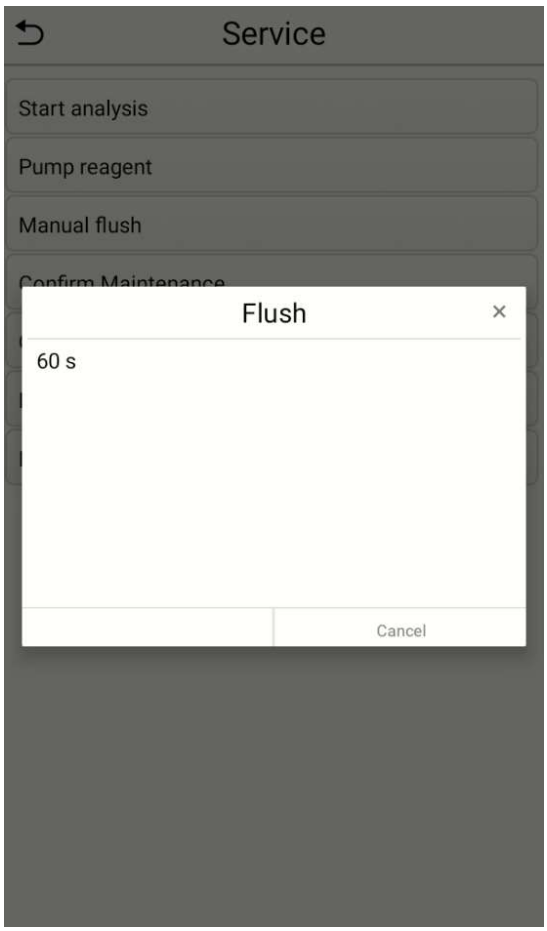
After clicking [**Start analysis**], the device will take one measurement.

5.3.2 Pump reagent



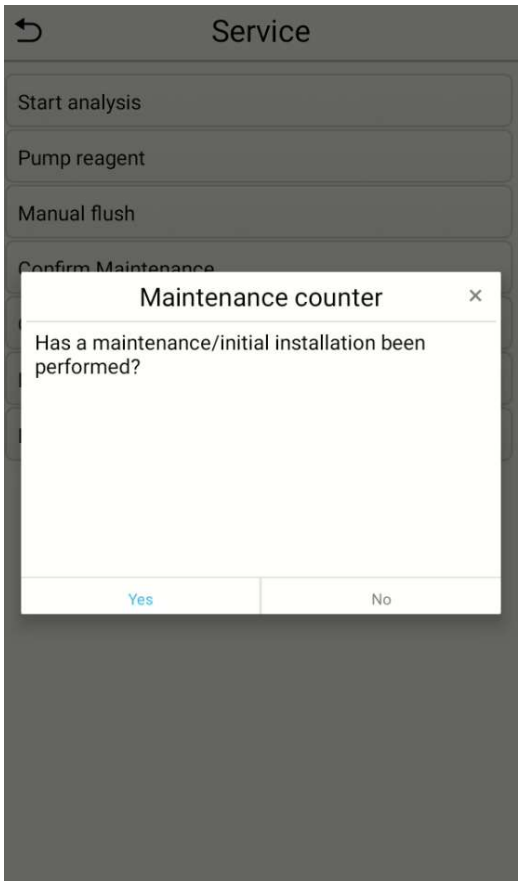
Clicking on [**Pump reagent**] will pump the reagent for 60 s. After canceling or pumping the reagent, you will be prompted, [Reagent bottle replaced?]
Click [**OK**] and the reagent level will be reset.
Clicking [**Cancel**] will not change the reagent level.

5.3.3 Manual flush



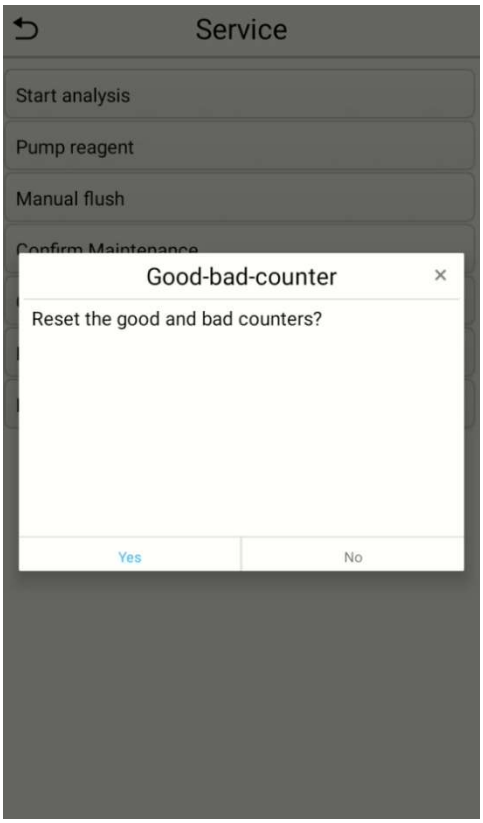
Clicking [**Manual flush**] will open the unit's solenoid valve and the water sample will flush the unit for 60 seconds.

5.3.4 Confirm maintenance



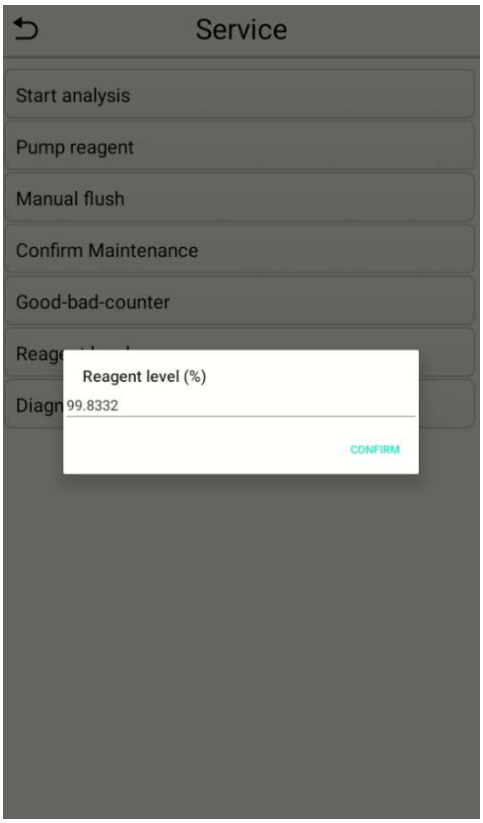
Click [Confirm Maintenance] and you will be prompted [Has a maintenance / initial installation been performed?]
Click [**Yes**] and the maintenance reminder countdown will be reset.

5.3.5 Good-bad-counter



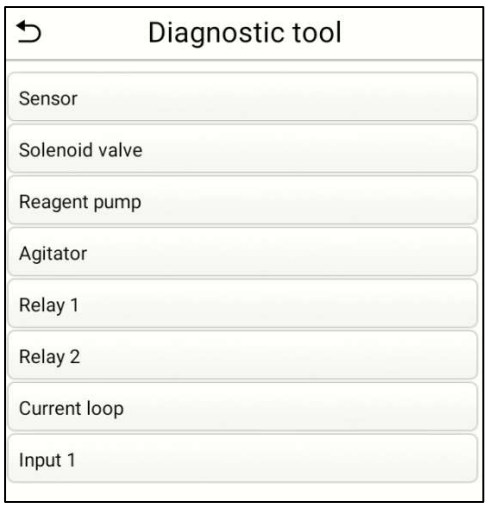
You can reset the normal and abnormal measurement counters by clicking [Good-bad-counter].

5.3.6 Reagent level



Click on “Reagent level” to view the reagent level and set the percentage of reagent level.

5.3.7 Diagnostic tool



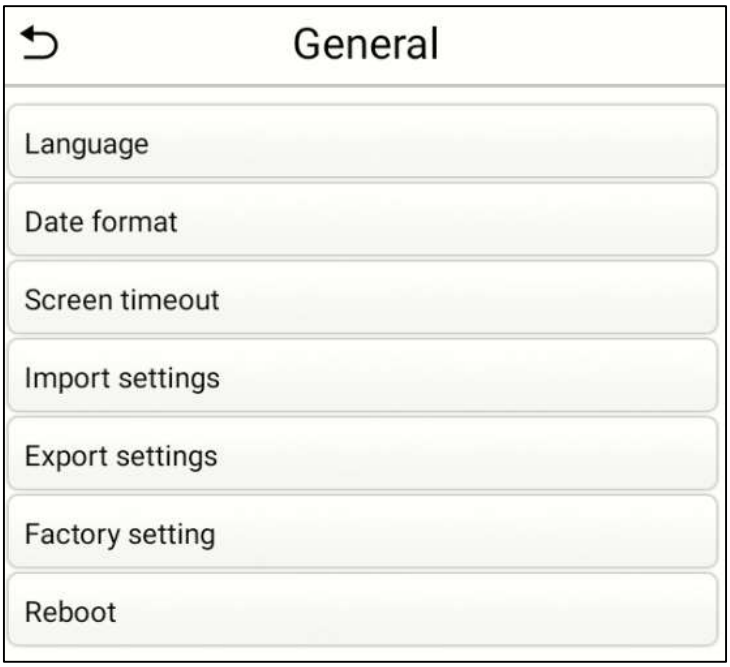
Item	Description
Sensor	The LED in the measuring chamber is switched on and off. If this is not the case, check the electrical connection of the LED on the actuator plug and in the device. If the connectors are properly seated, the actuator must be replaced. To exit, press the [⮌] key.
Solenoid valve	The solenoid valve in the water inlet can be opened and closed via the [**OK]** key. If this is not the case, check the electrical connection of the solenoid valve in the device. If the connectors are properly seated, measure the voltage with "valve open" between the connections on the valve. This should be at 24 VDC. If this is the case, a fault in the electronics is to be excluded and the solenoid valve is defective. To exit, press the [**Exit]** key.
Reagent pump	When starting the reagent pump, the peristaltic pump cartridge is driven for 2 seconds. Here, rotation of the rollers in the peristaltic pump cartridge is visible and the turning of the motor can be heard. If this is not the case, check the four-pole connection of the motor on the circuit board. If only the noise is noticeable, the peristaltic pump cartridge is defective. Otherwise, a fault of the motor or the control circuit board is possible. To exit, press the [**Exit**] key.

Stir bar	The agitator blade in the measuring chamber is actuated and slowly increases its speed to the maximum. If the agitator blade does not turn, check the correct seating of the drive motor connector on the control circuit board (red plug connector). Remove the measuring chamber and check whether the drive disc (which has two silver-coloured magnets) in the agitator does not drag or rest on the motor housing. If none of these causes can be determined, the drive motor must be replaced. To exit, press the [**Exit**] key.
Relay 1 and Relay 2	When the diagnostic function relay is started, the selected relay is switched between the two contacts NC and NO via the [**Switch**] key. Use a continuity tester to check the contact between the COM and NC connection and COM and NO connection. If the switching operations are not measurable, replace the control circuit board. To exit, press the [**Exit**] key.
Current loop	An ammeter is required to test the current interface. Measurements are made between terminals **16** (+) and terminal **17** (-). The output current is shown in the display as I = xx mA. The same value should also be measured at the two terminals. Tolerance ± 0.3 mA. Please note the accuracy of your current ammeter. Pressing the [**+2 mA**] key increases the output current by 2 mA respectively, until the maximum value of 20 mA is reached. To exit, press the [**Exit**] key.
Input 1	To test the input, you will need a ladder or multimeter that is set for continuity testing. If there is no jumper between terminals **14** and **15**, the display shows "opened". If a jumper is set between terminals **14** and **15**, the display shows "closed". (Should you wish to make the jumper with a multimeter, the COM port of the multimeter must be connected to terminal **1**4 and the Volt port of the multimeter must be connected to terminal **15**. Otherwise, no bridge will be made by the multimeter. To exit, press the [**Exit**] key.

5.4 Setting

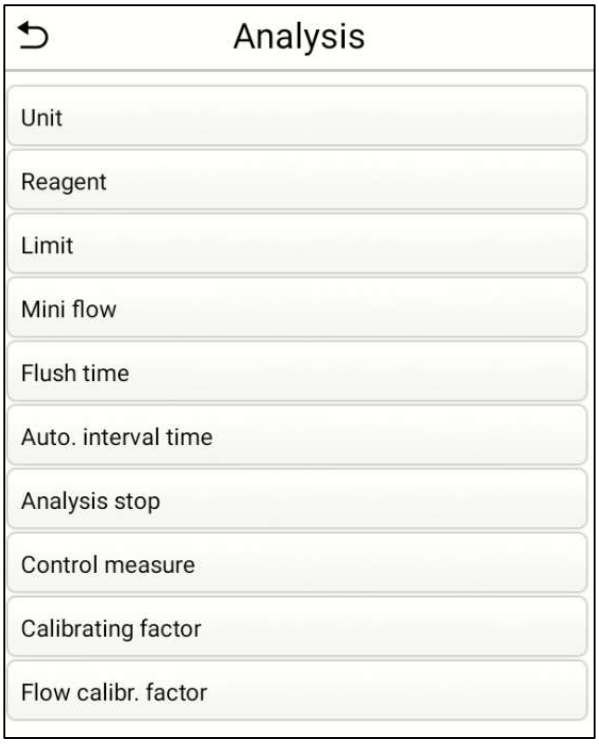
Item	Description
General	Language, Date format, Screen timeout, Import settings, Export settings, Factory setting, Reboot
Analysis	Unit, Reagent, Limit, Mini flow, Flush time, Auto. Interval time, Analysis stop, Control measure, Calibration factor, Flow calibr. factor
Input	Disable, Start analysis, Interval reset
Outputs	Current loop type, Current loop calibr., relay 1, relay 2, Modbus RS485

5.4.1 General



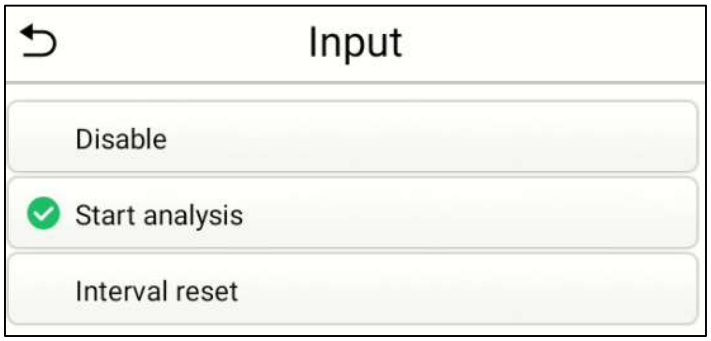
Item	Description
Language	English, Russian, Chinese
Date format	Set date format yyyy-MM-dd，MM-dd-yyyy，dd-MM-yyyy
Screen timeout	Screen timeout settings
Import settings	Importing configuration files
Export settings	Exporting configuration files
Factory setting	Restore factory settings
Reboot	Reboot

5.4.2 Analysis



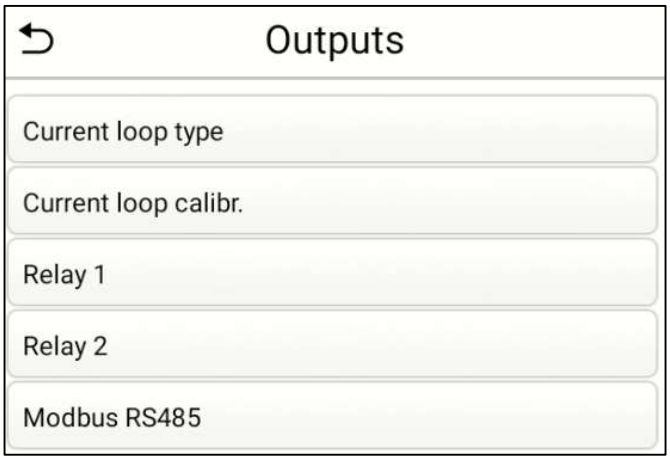
Item	Description
Unit	mg/L $CaCO_3$, ppm, °dH, °f, mmol/L
Reagent	Reagent type, refer to chart 2.3 Product selection
Limit	Setting the upper measurement limit according to the reagent type
Mini flow	If the flow rate is less than the set value, stop the analysis
Flush time	15-1800 s. Default: 120 seconds
Auto. Interval time	Setting the analysis interval, 1-10080 min, Default:15 min
Analysis stop	Whether to stop the analysis when the analysis result exceeds the limit
Control measure	Set the number of control measurements that should be performed before a limit exceedance is reported. These measurements are taken at 3-minute intervals after the limit is exceeded to avoid false alarms caused by the counter-ion effect of the softening system.
Calibrating factor	Coefficient between displayed and analyzed results
Flow calibr. factor	Coefficient between displayed and analyzed results of flow

5.4.3 Input



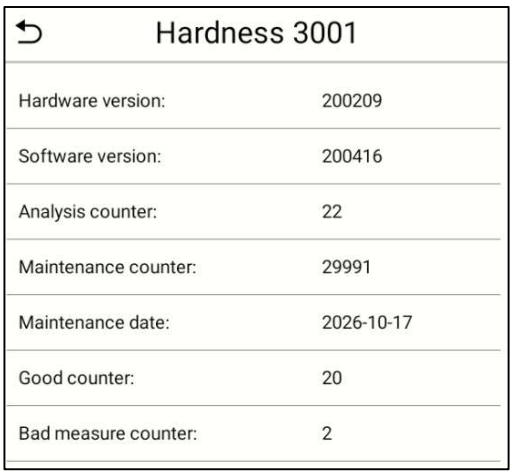
Item	Description
Disable	/
Start analysis	Start analysis
Interval reset	Interval reset

5.4.4 Outputs



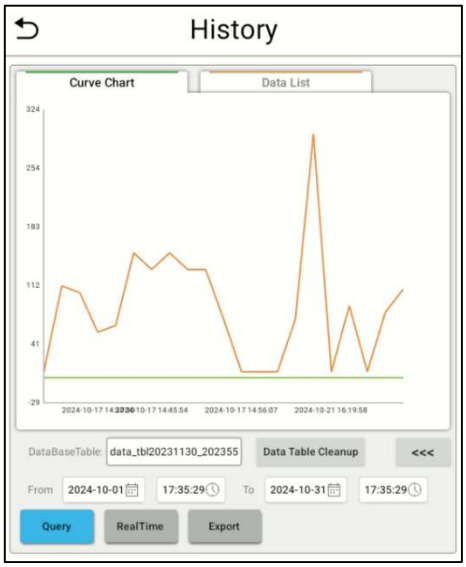
Menu item	Description
Current loop type	0…20 mA value, 4 ... 20 mA values, 0…20 mA, 4…20 mA
Current loop calibr.	Enter the value corresponding 20 mA
Relay 1	Duration: When the analysis result exceeds the limit, Relay 1 will continue to output a signal until the analysis result falls below the limit. Impulse: When the analysis result exceeds the limit, relay 1 will output a signal until the set time is reached.
Relay 2	Reporting of errors
Modbus RS485	Modbus RS485 communication settings

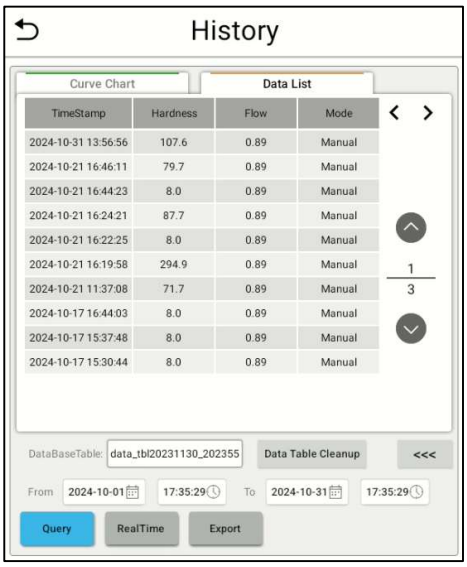
5.5 Info



Menu item	Description
Hardware version	Hardware version number
Software version	Software version number
Analysis counter	Number of analyses since operation
Maintenance counter	Remaining number of analyses Peristaltic pump cartridge life: When confirming maintenance in the Service menu, it will be set to 30,000 analyses.
Maintenance date	Peristaltic pump cartridge uses expiration date: Set to 2 years when confirming maintenance in the service menu.
Good counter	Analysis counts that have not exceeded the limit can be reset in the Good-bad-counter under the **Service menu**.
Bad measure counter	The analysis count that has exceeded the limit can be reset in Good-bad-counter under the **Service menu**.

5.6 History

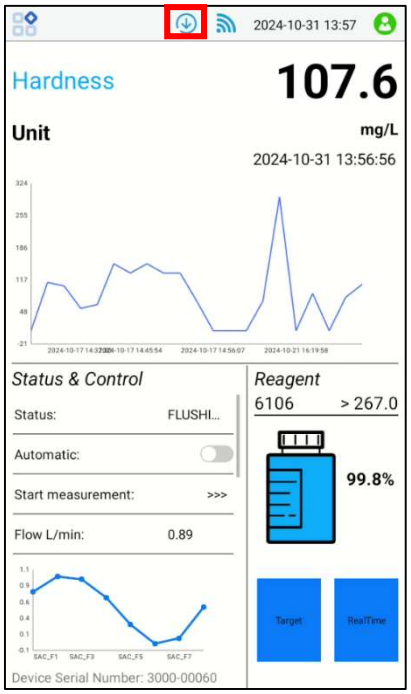




This page displays graphs and charts of the various data curves, making it easy for users to view data trends.

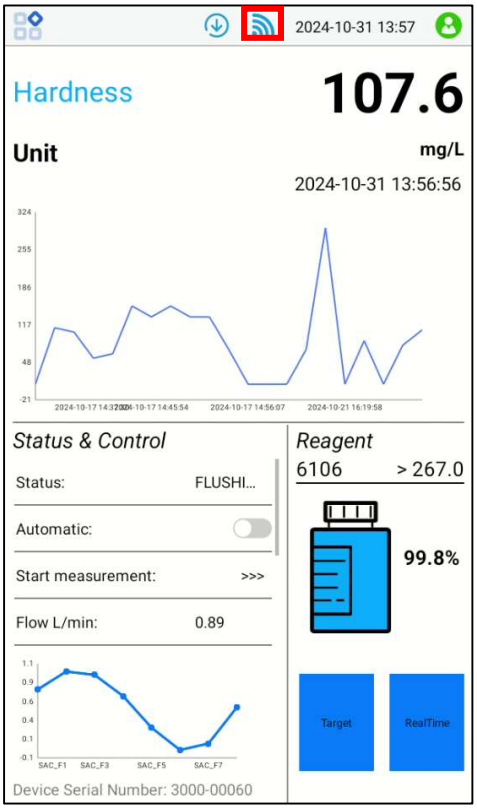
- Click on the ">>>" button on the right side to open the list of legends, click on a legend to show and hide the corresponding curve.
- Click on the "All" button to select all panel data and the "Select None" button to cancel all.
- Click on the "Query" button to display historical data for a specified period.
- Click on the “RealTime” button to display the most recent day's data and refresh it regularly.
- Click on the “Data Table Cleanup” button to clear the historical data.
- Click on the 'Export' button to export historical data for a specified period of time.

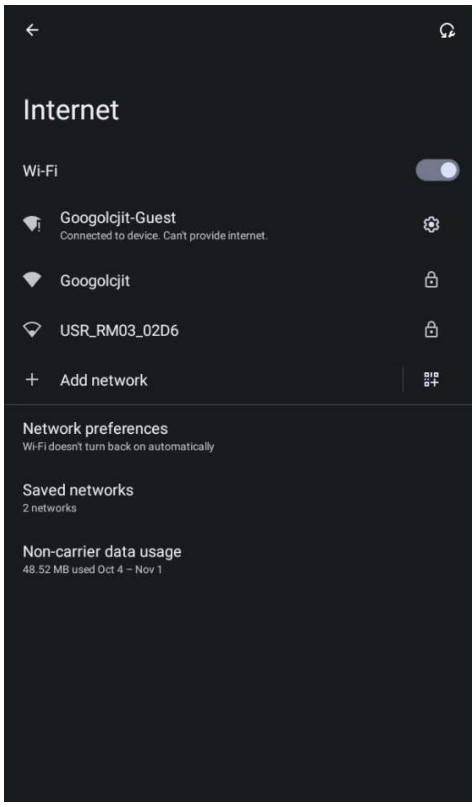
5.7 Update



Click on for the latest firmware version.

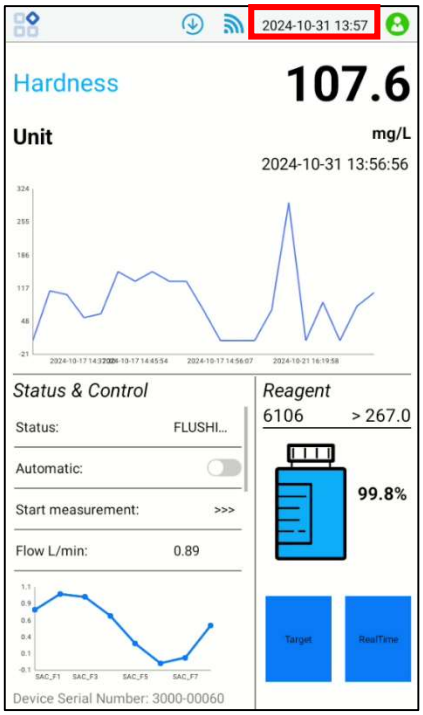
5.8 Internet

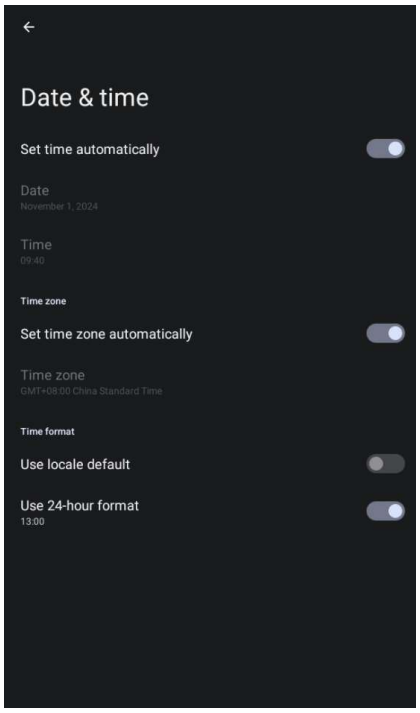




Click the icon [ ] in the upper right corner to set the network.

5.9 Date & time

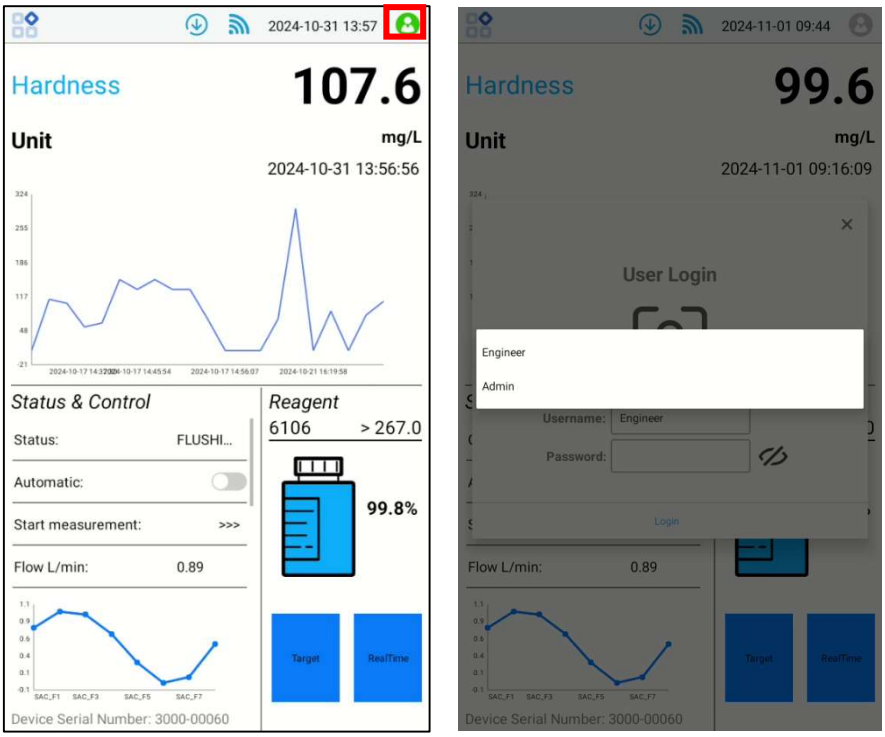




Click on the time in the upper right corner to go to the time settings.

Set time automatically	When the device is connected to the Internet, it can automatically synchronize the Internet time.
Date	Set the date manually after turning off the automatic time setting.
Time	Set the time manually after turning off the automatic time setting.
Set time zone automatically	When the device is connected to the Internet, it automatically synchronizes with the local Internet time zone.
Time zone	Set the time zone manually after you turn off the automatic time zone setting.
Use locale default	Use the default language area, adjust to the local time format according to the system language, and adjust manually after closing, see section 5.4.1.
Use 24-hour format	Sets the time format to 24-hour format when turned on and 12-hour format when turned off.

5.10 User



Click on the icon in the upper right corner, log in to your account and click again to log out.

User	Description
Engineer	Password: 123456
Admin	Password: 12345678

6 Maintenance

⚠ WARNING

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

⚠ WARNING

Personal injury hazard. This is a laser-type device and the user may be injured by exposure to the laser. Do not look directly into the laser light source.

Notice

When performing maintenance, strictly follow the procedure below.

6.1 Maintenance schedule

Task	Frequency
Cleaning of the measuring chamber	6 months
Replacement of peristaltic pump inserts Replacement of peristaltic pump tubing	Every 30000 analysis or after 24 months

Accessory package

Order number	SPZL003160	
Name	**Model**	**Quantity**
Peristaltic pump head + Peristaltic pump tubing	WQA-Hardness	1
Bottle cap GL32	PBT, GL32, openable cap	1
Solenoid valve	VX212MYXNB	1
6 mm water tube	PE-0604-N (6mm) 36mm×3pcs 43mm×1pcs 56mm×1pcs	1
Pneumatic joint	PG1/4-6	2
Flow sensor	OKD-HZ06K (0.15-1.5L/min)	1
Bulkhead connector	PM1206E	1
Equal tee	PM0206E	1
Stem elbow 90°	PM220606E	3
Single check valve	6SCV	1
Straight adaptor	PM010612E	2

6.2 Calibration

The device is calibrated at the factory at a room temperature of 20 °C. When operating in very hot or cold places, we recommend to calibrate the device during commissoning.
To calibrate the device, proceed as follow:
Perform an analysis on the device. Water hardness of the sample must be within the measuring range of the reagent used. A reading such as < 0.012 °dH cannot be used.

Analyze the water in the laboratory in parallel.

Calculate the correction factor for the analyzer using the following formula:

$$Correction = \frac{Measured_{Laboratory}}{Measured_{Analyzer}} \times 100\ \%$$

Set the correction factor in the device under the specified path.
(Programming: Menu > Parameter > Analysis > Calibration factor)
Example of calculation:
Measured $_{Laboratory}$=0.55 °dH
Display value from the display = 0.61 °dH

$$Correction = \frac{0.55\ °dH}{0.61\ dH} \times 100\ \%$$

$$Correction = 90.1\ \%$$

90.1% rounded = > Correction factor = 90 %.
Only integers can be entered as input, so round off / round up and enter the correction factor in the input mask on the device.

6.3 Cleaning the measuring chamber

The cleaning of the measuring chamber takes about 30 minutes. Proceed as follows to clean the measuring chamber:

- Pause the measurement to flush the line using **Manual flush** in the **Service** menu, and remove the reagent bottle. (Menu > Service > Manual flush)
- Shut off water inlet. Go to the **Service menu**, click **Diagnostic tool**, and select **Solenoid valve**. Open the solenoid valve.
- Disconnect the water inlet hose, disconnect the water outlet hose, and allow the remaining water in the measurement chamber to drain naturally.
- Switch off the device.
- First pull out the locking pin of the reagent plug at the top of the measuring chamber, then pull out the reagent plug.
- Remove the water hose from the inlet and outlet of the measuring chamber.
- Pull out the locking pins of the light source and optical receiver, and then pull out the light source and optical receiver.
- Disconnect the magnetic agitator cable.
- Use a Phillips screwdriver to remove the measuring chamber screws and remove the chamber.
- Remove the rotor of the magnetic agitator in the measuring chamber.
- Clean the rotor with water and wipe it clean with a clean cloth.
- Wipe the inside of the measuring chamber with a clean cloth dampened with a detergent and rinse with clean water.
- Clean the measuring chamber and reagent plug with a clean cloth dampened with detergent, then rinse with clean water.
- Wipe the light source and optical receptor with a clean cloth that has cleaner on it.
- Return the rotor to the measuring chamber and secure the chamber to the back plate with the screws.
- Insert the light source, optical receiver, and reagent plug into the measuring chamber, taking care not to deform the O-ring.
- Insert all locking pins and connect the inlet and outlet hoses.
- Cable for connecting the magnetic agitator.
- After confirming that the plumbing and electrical connections are complete, turn on the water inlet.

- Switch on the device, select **Manual flush** to flush lines. (Menu > Service > Manual flush)
- Select [**Pump reagent**] (Menu > Services > Pump reagent) to pump the reagent.

  [Reagent bottle replaced?]

  Take a new bottle indicator and confirm with OK.

  Click [**OK**] and the reagent level will be reset.

  Clicking [**Cancel**] will not change the reagent level.
- Flush the line again with a manual flush. (Menu > Service > Manual flush)

Measurement chamber cleaning completed.

6.4 Reagent replacement

Use the device for the first time or change to a different reagent type, proceed as follows:

- Switch off the device.
- Unscrew the cap, and remove the old reagent bottle.
- Insert a new reagent bottle and tighten the cap.
- Switch on the device and manual flush the measuring chamber. (Menu > Service > Manual flush)
- After flush, click the **Menu**, click **Setting**, click **Analysis**, select **Reagent**, and select the correct model according to the reagent used. (Menu > Setting > Analysis > Reagent)
- Return to the **Menu**, select **Service**, select **Pump reagent**, and wait for reagent pumping to complete. Watch for reagents to be pumped into the measurement chamber; if no reagents enter after the pump reagent time expires, repeat this step until reagents are pumped into the measurement chamber. (Menu > Service > Pump reagent)

  [Reagent bottle replaced?]

  Take a new bottle indicator and confirm with OK.

  Click [**OK**] and the reagent level will be reset.

  Clicking [**Cancel**] will not change the reagent level.
- At the end of the previous step. Flush the line again with a manual flush. (Menu > Service > Manual flush)
- Return to the Analyze screen and click **Start measurement.**

To replacement the same type of reagent, proceed as follows:

- Switch off the device.
- Unscrew the cap, and remove the old reagent bottle.
- Insert a new reagent bottle and tighten the cap.
- Switch on the device and manual flush the measuring chamber. (Menu > Service > Manual flush)
- Click [**Pump reagent**]. **(**Menu > Service > Pump reagent**)**

  [Reagent bottle replaced?]

  Take a new bottle indicator and confirm with OK.

  Click [**OK**] and the reagent level will be reset.

  Clicking [**Cancel**] will not change the reagent level.
- Flush the line again with a manual flush. (Menu > Service > Manual flush)
- Return to the Analyze screen and click **Start measurement.**

6.5 Peristaltic pump head replacement

- Switch off the device.
- Remove the colorimetric module and loosen the two screws securing the colorimetric module to the backplane.
- Disconnect the pump head from the reagent bottle and reagent plug.
- Pull out the old pump head and replace it with the new one. And connect the piping.
- Installation of colorimetric module.
- Switch on the device and manual flush the measuring chamber. (Menu > Service > Manual flush)
- At the end of the previous step. Flush the line again with a manual flush. (Menu > Service > Manual flushing)
- Click [**Pump reagent**]. **(**Menu > Service > Pump reagent**)**
  [Reagent bottle replaced?]
  Take a new bottle indicator and confirm with OK.
  Click [**OK**] and the reagent level will be reset.
  Clicking [**Cancel**] will not change the reagent level.
- Flush the line again with a manual flush. (Menu > Service > Manual flush)
- Return to the Analyze screen and click **Start measurement.**

7 Troubleshooting

WARNING	
	In case of failure, please follow the recommended solution, or contact us for processing. It is strictly forbidden to disassemble the sensor without permission for maintenance, and the sensor will not be repaired without permission.

WARNING	
	If the logo is present on the unit, it represents a connection to earth.

Error messages	Reason
Analysis does not start	Check that the flow meter is configured and connected
	Check that water is flowing properly
	Check that the device controller is correctly connected to the device.
Error message E11 Indicator	Check whether there is still sufficient indicator in the indicator bottle.
	Check the connection hose between the indicator bottle and peristaltic pump for air bubbles. If necessary, pump indicator until the hose is completely filled with indicator.
	Check whether there is water in the measuring chamber.
	Check the dosing pump and stirrer assemblies.
	Check whether the water drain is free and that no foreign bodies have settled in the solenoid valve.
	When using a pump for sample delivery, check whether the pump is connected correctly.
	Check whether the inlet and outlet are connected in the correct direction.
	Check whether the stirring blade is in the measuring chamber.
	0 mA is output at the current output if the type "Value" is set at the current interface.

Error message E12 Water flow	Check whether there is line pressure at the device connection.
	Check the function of the magnetic valve.
	Check if the outlet is blocked.
	If necessary, check the function of the sample pump, stopcocks and valves.
	0 mA is output at the current output if the type "Value" is set at the current interface.
Error message E13 Optics	Check the measuring chamber for contamination.
	Check the measuring chamber for contamination.
	Check the correct position of the actuator plug.
	Check the color sensor in the diagnostic menu.
	0 mA is output at the current output if the type "Value" is set at the current interface.
Error message E14 Titration	Check whether there is still sufficient indicator in the indicator bottle.
	Check the connection hose between the indicator bottle and peristaltic pump for air bubbles. If necessary, pump indicator until the hose is completely filled with indicator.
	Check whether the inlet and outlet are connected the right way round.
	Check whether the programmed type of indicator corresponds to the type of indicator used.
	Check that the water outlet is free and that no foreign bodies have settled in the solenoid valve.
	Check the function of the dosing pump.
	Check the dosing plug and indicator tubes for foreign bodies.
	Check whether the blue O-ring on the dosing plug is present and correctly seated.
	0 mA is output at the current output if the type "Value" is set at the current interface.
Error message E15-Modbus communication	Check that the device is connected properly