Seres OL

SOL-96.110.041 / 260422

TOPAZ Total Alkalinity

Operator's Manual

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Operator's Manual

This document describes the main steps for instrument setup, operation and maintenance.

1. Safety Instructions

General

The instructions included in this chapter explain the potential risks associated with instrument operation and provide important safety practices designed to minimize these risks.

If you carefully follow the information contained in this chapter, you can protect yourself from hazards and create a safer work environment.

More safety instructions are given throughout this manual, at the respective locations where observation is most important. Strictly follow all safety instructions in this publication.

Target audience

Operator: Qualified person who uses the equipment for its intended purpose.

Instrument operation requires thorough knowledge of applications, instrument functions and software as well as all applicable safety rules and regulations.

OM location

Keep the Operator's Manual in proximity of the instrument.

Qualification, training

To be qualified for instrument installation and operation, you must:

- read and understand the instructions in this manual as well as the Material Safety Data Sheets and
- know the relevant safety rules and regulations.

1.1. Warning Notices

The signal words and symbols used for safety-related notices have the following meaning:

DANGER

Your life or physical wellbeing are in serious danger if such warnings are ignored.

- Follow the prevention instructions carefully.

WARNING

Severe injuries or damage to the equipment can occur if such warnings are ignored.

- Follow the prevention instructions carefully.

CAUTION

Damage to the equipment, minor injury, malfunctions or incorrect process values can be the consequence if such warnings are ignored.

- Follow the prevention instructions carefully.

Mandatory signs

The mandatory signs in this manual have the following meaning:

Safety goggles

Safety gloves

Warning signs The warning signs in this manual have the following meaning:


Electrical shock hazard


Corrosive


Harmful to health


Flammable


Hot surface


General warning

1.2. General Safety Regulations

Spare parts and disposables

Use only official Seres OL spare parts and consumables. If other parts are used during the normal warranty period, the manufacturer's warranty is voided.

Modifications

Modifications and instrument upgrades shall only be carried out by an authorized service technician. Seres OL will not accept responsibility for any claim resulting from unauthorized modification or alteration.

Local regulations

All wiring and connections (electrical, hydraulic) may only be carried out by qualified personnel and in accordance with the local regulations of the respective country.

WARNING

Electrical shock hazard

- If proper operation is no longer possible, the instrument must be disconnected from all power lines, and measures must be taken to prevent inadvertent operation.
- To prevent from electrical shock, always make sure that the protective earth wire is connected.
- Service shall be performed by authorized personnel only.
- Whenever electronic service is required, disconnect the instrument from power.

WARNING

Chemical exposure hazard

- When handling chemicals or performing maintenance work on hydraulic parts of the analyzer, wear suitable protective equipment.
- Read the Material Safety Datasheets (MSDS) of the chemicals carefully.

WARNING

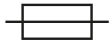
Do not use this instrument in presence of flammable liquids or vapors as this may pose a safety hazard.

1.3. Handling Precautions

Position the box correctly (up/down). Carefully unpack the analyzer and check it for visible damage. If the analyzer shows any visible damage, do not connect it to power and contact customer service immediately.

1.4. International Symbols Used

The symbols found on the instrument have the following meaning:


Electrical fuse


Ground


Equipotentiality


Alternating current


Hot surface


General attention


Electrical hazard

2. Product Description

Application range

The TOPAZ Total Alkalinity is a complete monitoring system for the measurement of total alkalinity TA in potable water, demineralized water production and process water.

Measuring principle

Acid-base titration method:
The total alkalinity is titrated with sulfuric acid (concentration depending on measuring range) and a color indicator, the TAC indicator.

Configurations

The instrument is available in the following configurations:

- Three measuring ranges:
  - 5 to 50 ppm $CaCO_3$
  - 10 to 200 ppm $CaCO_3$
  - 10 to 500 ppm $CaCO_3$
- Available with one, two, four or six measuring channels (common measuring range)

Signal outputs

Two signal outputs per measuring channel.
Current loop: 4–20 mA

Relays

Five potential-free contacts per measuring channel with the following functions:

- two thresholds (high/high, low/high or low/low)
- sample flow alarm
- indication of the active measuring channel
- maintenance indication

Maximum load: 1 A/24 V

Alarm relay

One summary alarm for “analyzer failure”.
Maximum load: 1 A/24 V

Digital inputs

One digital input per measuring channel to select the active sample stream and one digital input to stop measurement.
To use the digital inputs, select control mode 3 (see Configuration of the Analyzer, p. 42).

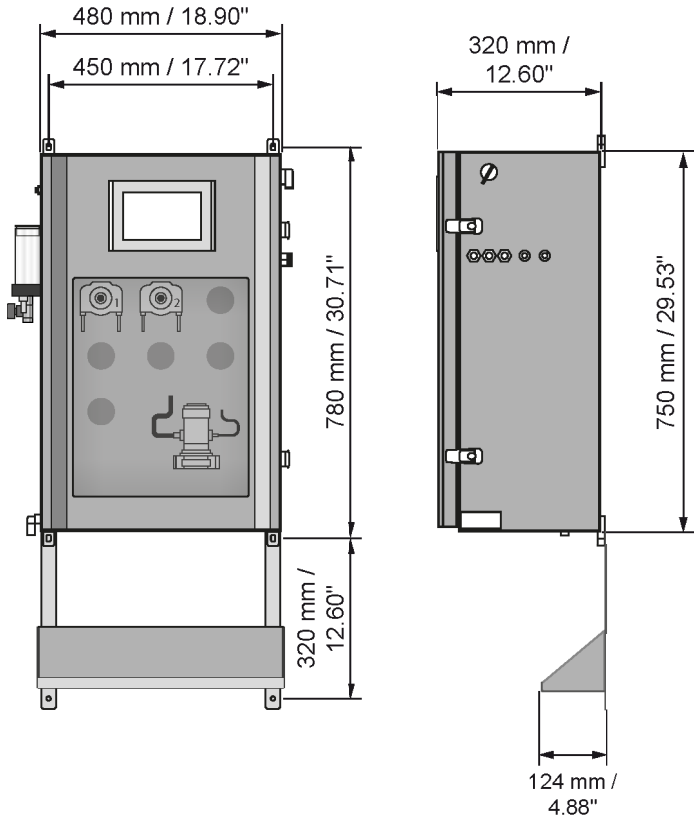
2.1. Instrument Specifications

Power supply	Voltage:	110–240 VAC 50/60 Hz
	Power consumption:	150 VA typical, 300 VA maximum
Environmental conditions	Temperature:	5–40 °C
	Relative humidity:	10% to 80%
	Pollution level:	2
	Installation category:	II
	Maximum altitude:	2000 m
	Do not use this instrument in presence of flammable liquids or gases. Protect it from bad weather, humidity, corrosive substances and dust.	
Process connections	Sample inlet:	1/4" BSP F
	Sample outlet:	soft tubing D INT 9 (single channel) soft tubing D INT 19 (multi channel)
	Sample outlet waste:	soft tubing D INT 12
Sample requirements	Flow rate:	min. 30 l/h (opt. 40 l/h)
	Temperature:	5–40 °C
	Inlet pressure:	0.1–2 bar
	Outlet pressure:	pressure-free
	Particle size:	<20 µm
Air cleaning	Inlet:	6 mm tubing
	Required air flow:	50 l/h minimum of clean and dry air
	Air cleaning can be used to protect the analyzer from a corrosive environment.	
Measuring range	**Range selection:**	**5–50 ppm $CaCO_3$**
	Limit of detection:	≤5 ppm
	Repeatability:	≤±5% FS or ±5 ppm (whichever is greater)
	Accuracy:	≤±5% FS or ±5 ppm (whichever is greater)
	Range selection:	**10–200 ppm $CaCO_3$**
	Limit of detection:	≤10 ppm
	Repeatability:	≤±5% FS or ±5 ppm (whichever is greater)
	Accuracy:	≤±5% FS or ±5 ppm (whichever is greater)
	Range selection:	**10–500 ppm $CaCO_3$**
	Limit of detection:	≤10 ppm
	Repeatability:	≤±5% FS or ±5 ppm (whichever is greater)
	Accuracy:	≤±5% FS or ±5 ppm (whichever is greater)

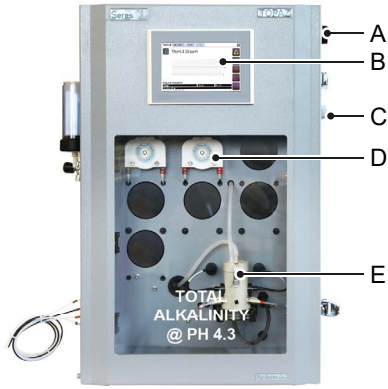
Wall cabinet

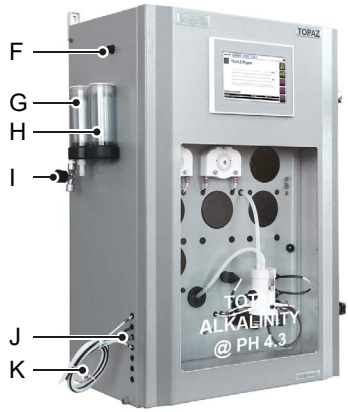
Material:	Stainless steel SS316L
Screws:	4x M6 (6x M6 with reagent shelf)
Weight:	35 kg
Protection degree	IP55

Reagent shelf made of SS316L available as an option.



2.2. Instrument Overview





A *Power switch*
B *Touchscreen*
C *Cable glands*
D *Peristaltic pumps*
E *Photometer*
F *Air cleaning inlet*
G *Pressure reducing device*
H *Calibration vessel*
I *Sample inlet tap*
J *Reagent tubes*
K *Drain*

3. Installation

3.1. Before Installation

Unpacking

Carefully unpack the analyzer and check it for visible damage.

On-site requirements

Verify the electrical and hydraulic connections available at the installation site against the requirements in Instrument Specifications, p. 9.

3.2. Mounting the Wall Cabinet

Mounting requirements

Mount the instrument in vertical position. The display should be at eye level to simplify operation and maintenance.

For dimensions see drawing on 10.

Reagent bottles

Reagent bottles must be stored outside the analyzer. Provide a suitable storage area near the analyzer.

As an option, a reagent shelf is available that can be installed directly below the analyzer.

3.3. Hydraulic Connections

For hydraulic connections, refer to the separate hydraulic scheme.

3.4. Electrical Connections

WARNING

Risk of electrical shock

Always turn off power before manipulating electric parts. Only operate the instrument from a power outlet which has a protective earth connection.

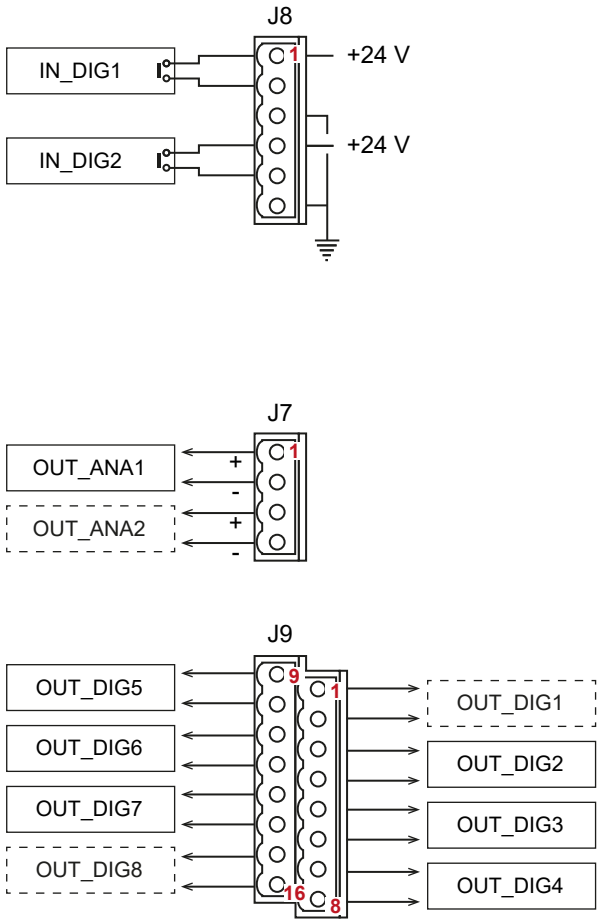
Overview of electrical connections

A *I/O board*[1)] *(relays, analog signal outputs, digital inputs)*
B *RS485 interface*
C *AC power*

[1)] In multi-channel instruments, there is an I/O board for each measuring channel. The I/O boards are arranged from left to right in ascending order according to their channel number.

3.4.1 Connections on I/O Board

Connection scheme



Note:

- *Relays OUT_DIG1 and OUT_DIG8 are used to control internal components of the analyzer. Do not connect anything else to these contacts.*
- *Analog signal output OUT_ANA2 is reserved for customized versions of the analyzer that provide a second value.*

Digital inputs

Name	Available on	Description
IN_DIG1	all measuring channels	Activates or deactivates the measuring channel. ◆ Open contact: Measuring channel will be measured according to the programmed channel sequence. ◆ Closed contact: Measuring channel will be skipped and the user will be informed via a message on the screen.
IN_DIG2	channel 1	Closing the contact will complete the current measurement cycle and then stop the measurement.

Both digital inputs can be used with dry (potential-free) or wet contacts (0/+24 V).

***Note:** It is strongly recommended to use dry contacts to avoid electrical problems.*

If dry contacts are used, connect them to terminals 1/2 and 4/5 of connector J8 as shown in the connection scheme.

If control is provided by wet contacts, connect the reference to pin 3 (6) and the selection voltage 0/+24 V to pin 2 (5) of connector J8. Leave pins 1 and 4 unconnected.

Analog signal outputs (4–20 mA)

Name	Available on	Description
OUT_ANA1	all measuring channels	Total alkalinity TA. 4 mA corresponds to low range measurement and 20 mA to high range measurement.
OUT_ANA2	all measuring channels	Reserved.

Relays

Name	Available on	Description
OUT_DIG2	all measuring channels	Sample flow alarm
OUT_DIG3	all measuring channels	Threshold 1
OUT_DIG4	all measuring channels	Threshold 2
OUT_DIG5	all measuring channels	Indication of the active sample stream
OUT_DIG6	channel 1 only	Analyzer failure
OUT_DIG7	channel 1 only	Maintenance

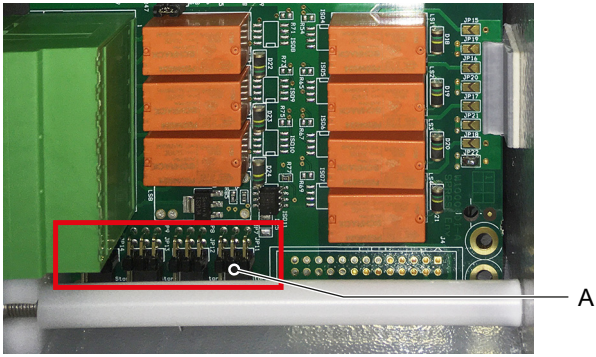
Rating: 1 A / 24 V.

To configure thresholds 1 and 2, see Configuration of the Analyzer, p. 42.

Setting jumpers

Relays OUT_DIG2 to OUT_DIG7 can be configured as normally open or normally closed by setting the corresponding jumpers on the I/O board.

The default setting is normally open (jumper in the right position).

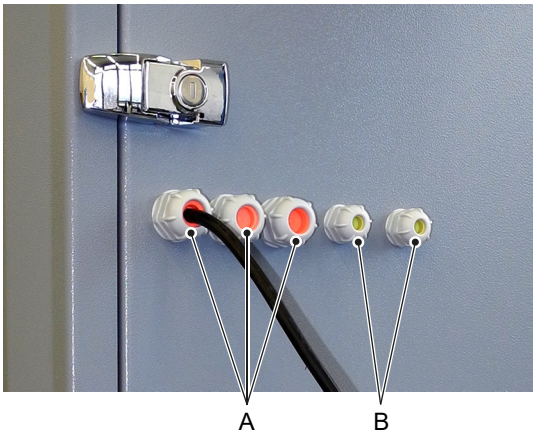


A *Location of jumpers on I/O board*

Name of jumper	Relay
JP8	OUT_DIG2
JP9	OUT_DIG3
JP10	OUT_DIG4
JP11	OUT_DIG5
JP12	OUT_DIG6
JP13	OUT_DIG7

3.4.2 Cable thicknesses

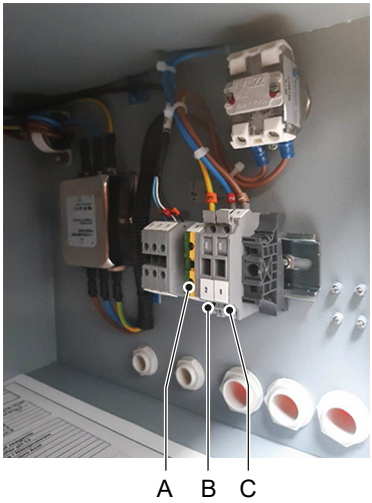
In order to comply with IP55, use the following cable thicknesses:



A *Outer diameter of cable: 7.5–13 mm*
B *Outer diameter of cable: 4–8 mm*

Note: *Seal cable glands that are not in use.*

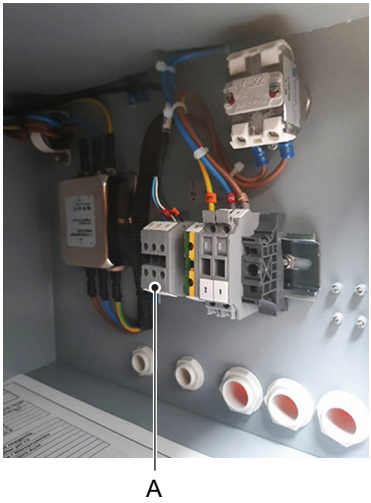
3.4.3 AC power



A *Protective earth (PE), terminal 3*
B *Neutral conductor, terminal 2*
C *Phase conductor, terminal 1*

Ferrite Wrap the mains cable two times around the supplied ferrite.

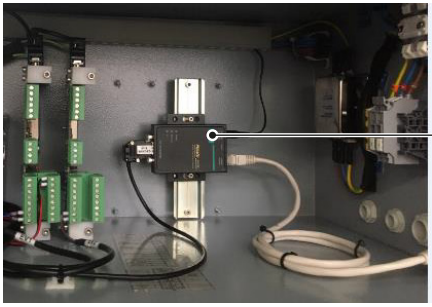
3.4.4 Jbus via RS485



A *RS485 interface*

Terminals Terminal 1: data B (+), terminal 2: data A (-).

3.4.5 Jbus via TCP/IP (Option)



A *Converter*

Connecting the Ethernet cable

If the “Ethernet interface (TCP/IP)” option has been ordered, a converter has been installed in the upper part of the analyzer.

The connection is made via the Ethernet port located on the right side of the analyzer exterior. Mount the supplied connector onto the Ethernet cable and connect it to the port.

Addressing modes

The converter can be configured to obtain the IP address automatically via DHCP or a fixed IP address can be configured. Clarify in advance which type of IP address assignment is to be used at the installation site.

4. Startup

4.1. Installing the Reagent Bottles

WARNING

Multiple hazards

For safe handling of reagents, you must read and understand the Material Safety Data Sheets (MSDS). Wear appropriate protective equipment.

Preparation of reagent tubes and bottles

1 Check that the ends of all reagent tubes are cut at an angle. This will prevent the tube ends from lying flat on the bottom of the bottles.

2 Check that there are two holes in the lid of each reagent bottle:
- one hole to feed the reagent tube through and
- one small hole that allows air to enter.

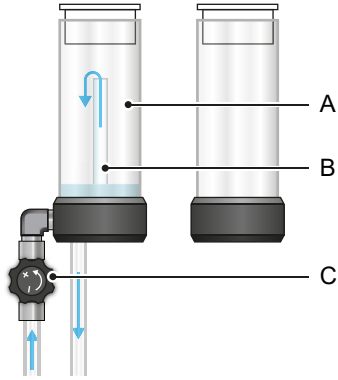
3 If necessary, drill additional holes.

Preparing the reagents

1 Prepare the reagents according to the separate method sheet and place the filled reagent bottles on the designated storage area outside the analyzer.

2 Insert the reagent tubes all the way to the bottom of the corresponding bottles (see Reagent tube numbering, p. 34).

4.2. Starting Sample Flow



A *Pressure reduction device*
B *Inner tube*
C *Sample inlet tap*

Open the sample tap [C] so that a part of the sample overflows into the pressure reduction device [A].

4.3. Priming the Reagent Tubes

Note:

- *Before priming the reagent tubes, make sure that the sample inlet tap is open.*
- *To avoid chemical reactions in the photometer, fill the reagent tubes one after the other, not simultaneously.*

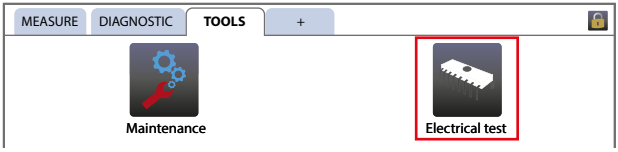
Enter the Electrical test menu

1 Turn the power switch to the ON position.

⇒ *The peristaltic pumps are automatically readjusted and the panel PC starts.*

2 Stop the measuring cycle by pressing the button and entering the password “0712”.

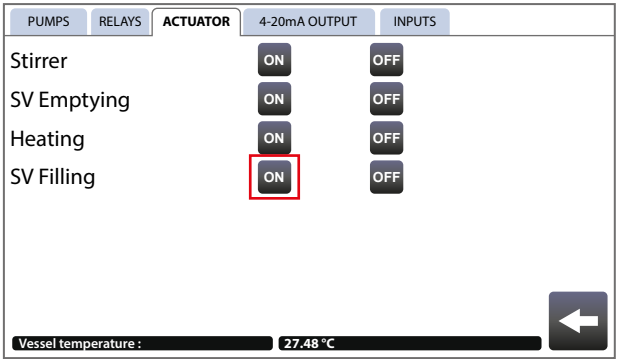
3 Open the <TOOLS> tab and press the <Electrical test> button.



Check reagent tubes

To check the flow through the reagent tubes, perform the following steps:

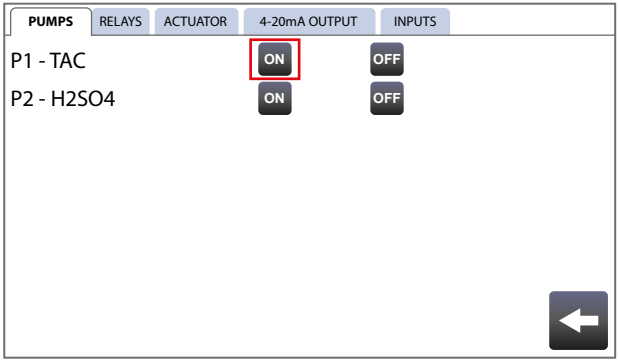
4 Open the <ACTUATOR> tab and set “SV Filling” to <ON>.



5 Wait until the photometer has been filled with fresh water. Then set “SV Filling” to <OFF>.

6 Open the <PUMPS> tab.

7 Press the <ON> button next to “P1 - TAC”.



8 Let the pump run until the fluid has reached the photometer and there is no more air in the tube.
⇒ *This takes approximately 2.5 minutes. The pump stops automatically.*

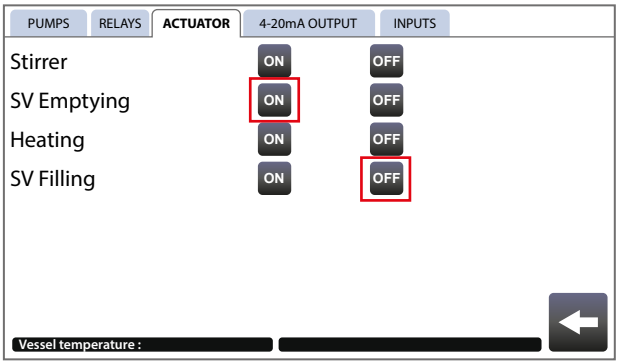
9 Repeat steps 7–8 with pump “P2 - H2SO4”.

Check stirrer

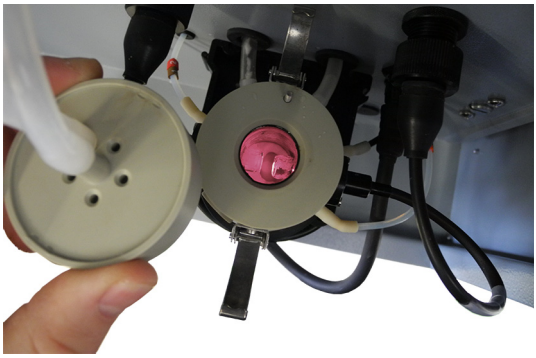
To check the proper function of the stirrer, perform the following steps:

10 Open the <ACTUATOR> tab.

11 Set “SV Emptying” to <ON> and “SV Filling” to <OFF> and wait until the instrument is empty.



12 Remove the lid from the photometer.



13 Check that the stirrer bar is turning.

14 Reinstall the lid on the photometer.

4.4. Run-in Period

1 Go back to the main screen.

2 Start measurement by pressing the ⏯ button.

3 Let the analyzer perform one or two measuring cycles before proceeding with the next steps.

4.5. Manual Measurement

1 Perform a manual measurement with a standard solution.

⇒ *If the result of the manual measurement is satisfactory, no calibration is necessary.*

2 Calibrate the analyzer if required.

For detailed descriptions, see Manual Measurement and Calibration, p. 38.

4.6. Programming

Program the following parameters, if applicable:

- Concentration values for thresholds 1 and 2
- Definition as “high/high”, “low/high” or “low/low” thresholds,
- Number of measuring cycles per channel
- Measuring interval
- If digital inputs are used or if the analyzer is to be controlled via JBUS, select the appropriate control mode
- JBUS slave ID (set to a number higher than 16)

For detailed descriptions of all configuration options see Configuration of the Analyzer, p. 42.

5. Operation

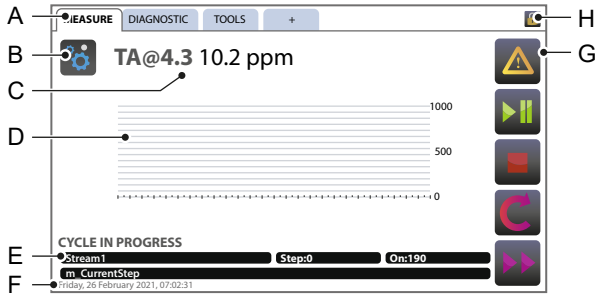
5.1. Access Levels

There are two predefined access levels:

- User access: Allows viewing data in the main window.
- Access with extended permissions: Allows stopping the measurement, changing settings and performing maintenance tasks.

The password for access with extended permissions is “0712”. After 10 minutes of inactivity, the password is requested again.

5.2. User Interface



A **Menu tabs:**
MEASURE tab: Displays measured values and the progress of the current measuring cycle.
DIAGNOSTIC tab: Displays raw values.
TOOLS tab: Access to user-relevant menus.
PLUS tab: Access to advanced menus (mainly for service technicians).

B **Parameter menu:**
Contains settings and information related to the measured parameter (e.g. thresholds, result of the last manual measurement).

C **Measured value**

D **Trend**

E **Measuring cycle information:**
Stream that is being measured
Number and description of step in measurement cycle
Total number of steps to be completed

F **Date and time**

G **Buttons:**

- Show alarms and errors
- Start/pause measuring cycle
- Stop measuring cycle immediately
- Finish current measuring cycle and then stop
- Switch to next sample stream

H **Access level:**

- User access
- Access with extended permissions

Tap the icon to lock/unlock.

6. Maintenance

6.1. Maintenance Schedule

Monthly	◆ Check fill levels in all reagent bottles.
As needed	◆ Prepare new reagents according to the separate method sheet. ◆ After connecting the new reagent bottles, perform a manual measurement with a standard solution. ⇒ *If the result is satisfactory, no calibration is needed.* ◆ If necessary, calibrate the instrument.
Every 3 months	◆ Replace all peristaltic pump tubes. ◆ After replacement of peristaltic pump tubes, perform a manual measurement with a standard solution. ⇒ *If the result is satisfactory, no calibration is needed.* ◆ If necessary, calibrate the instrument.
Annually	◆ Inspect and clean all sub-assemblies. ◆ Replace all silicone tubes. ◆ Replace the membrane of the emptying valve (SVA). ◆ If necessary, replace the membranes of the following solenoid valves: – Filling valve (SVB) – Channel selector valves on multi-channel instruments

6.2. Stop of Operation for Maintenance

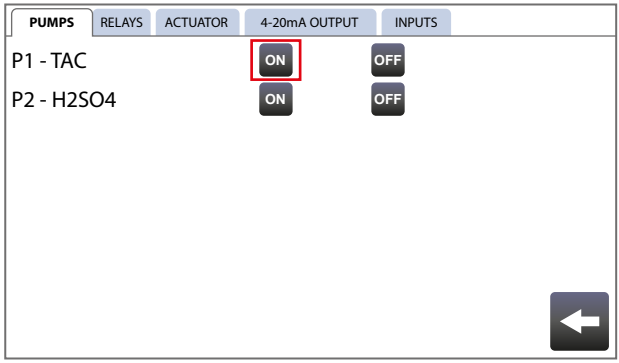
Before performing any maintenance work on reagent or pump tubes, it is recommended to flush the reagent system with deionized water.

Note:

- *Before flushing the reagent tubes, make sure that the sample inlet tap is open.*
- *To avoid chemical reactions in the photometer, flush the reagent tubes one after the other, not simultaneously.*

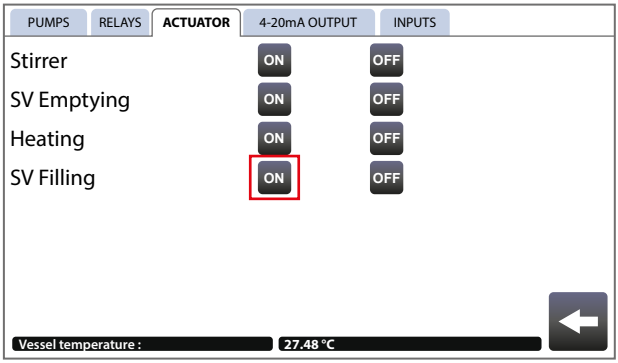
Proceed as follows:

1. Remove all reagent tubes from their bottles and place them in a beaker filled with deionized water.
2. Open the <PUMPS> tab.
3. Press the <ON> button next to “P1 - TAC”.



4. Let the pump run until it stops automatically.
   ⇒ *This takes approximately 2.5 minutes.*
5. Repeat steps 3–4 with pump “P2 - H2SO4”.

6 Open the <ACTUATOR> tab and set “SV Filling” to <ON>.



7 Wait until the photometer has been filled with fresh water. Then set “SV Filling” to <OFF>.

6.3. Replacing Reagents

WARNING

Multiple hazards

For safe handling of the reagents, you must read and understand the Material Safety Data Sheets (MSDS). Wear appropriate protective equipment.

Note:

- *It is recommended to replace the reagents when there is approximately 2–3 cm of reagent left in each bottle. Do not use up the reagents completely!*
- *Keep the old reagents until you are sure that the instrument measures correctly with the new reagents.*
- *Do not reuse the reagent bottles as this poses a risk of contamination or dilution errors.*

Reagent consumption

At the standard measurement interval, approximately 0.6 liters of TAC indicator is consumed per month.

The consumption of sulfuric acid is proportional to the measured total alkalinity. The consumption is 10 liters per month in the middle of the measuring range and 20 liters per month at the upper limit of the measuring range.

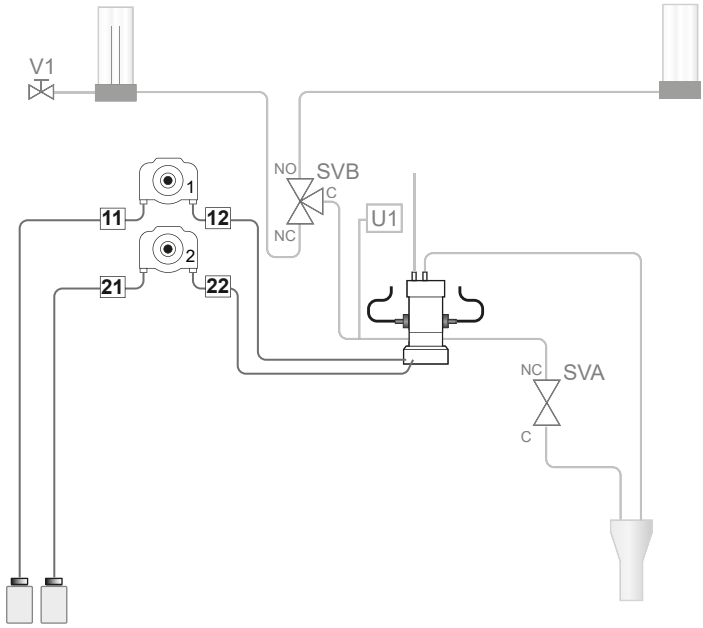
Replacing reagents

1. Prepare the reagents according to the separate method sheet.
2. Insert the reagent tubes all the way to the bottom of the corresponding bottles (see Reagent tube numbering, p. 34).
3. Check that there is an additional small hole in the lid of each bottle that allows air to enter.

Final steps

4. Prime the reagent tubes (see Priming the Reagent Tubes, p. 24).
5. Perform a manual measurement.
   ⇒ *If the result is satisfactory, no calibration is needed.*
6. If necessary, calibrate the instrument (see Manual Measurement and Calibration, p. 38).

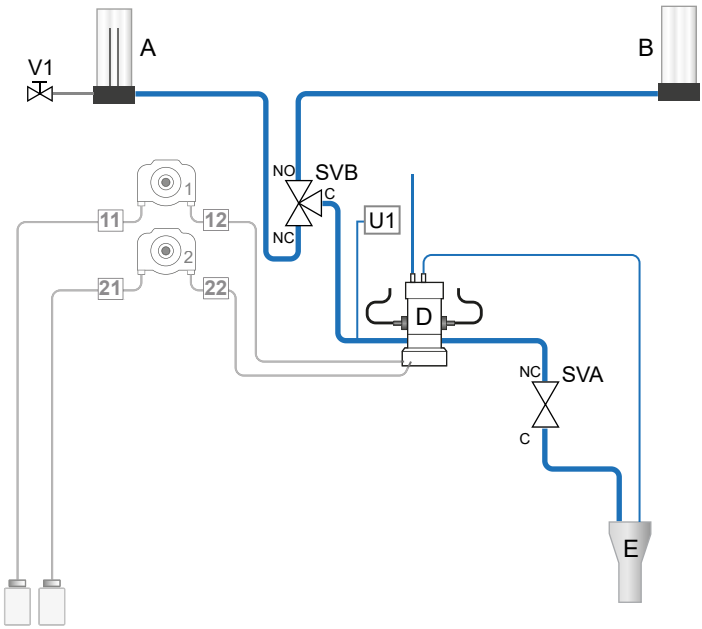
Reagent tube numbering



No.	Reagent	type
11	TAC indicator	PTFE 1.6×3.2
12	TAC indicator	PTFE 1.6×3.2
21	Sulfuric acid	PTFE 1.6×3.2
22	Sulfuric acid	PTFE 1.6×3.2

6.4. Replacing Sample Tubes

Overview of sample tubes



from	to	type
Pressure reducing device [A]	SVB (NC)	Silicone 5×8
Calibration vessel [B]	SVB (NO)	Silicone 5×8
SVB (C)	Sample inlet (right) of photometer [D]	Silicone 5×8
-	Water fault sensor [U1]	Silicone 2×5
Photometer sample outlet (left)	SVA (NC)	Tygon 5×8
SVA (C)	Waste [E]	Versinic 8×12
Photometer [D]	-	Silicone 5×8
Photometer [D]	Waste [E]	Silicone 4×8

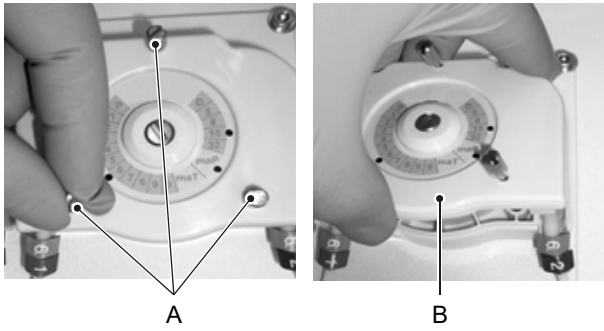
6.5. Replacing Peristaltic Pump Tubes

WARNING

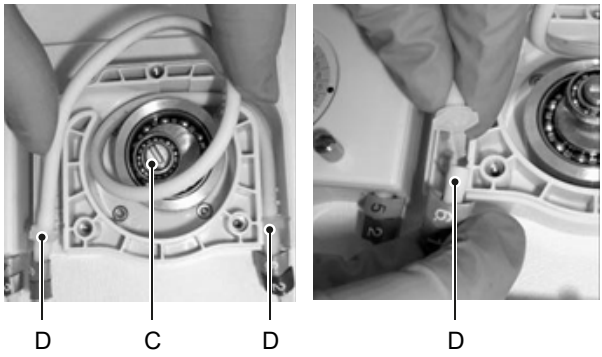
After rinsing with deionized water, reagent tubes may still contain traces of chemicals

Wear appropriate protective equipment (gloves, glasses, protective clothing).

1. Flush the reagent tubes with deionized water as described in Stop of Operation for Maintenance, p. 31.
2. Turn the power switch to the OFF position.
3. Loosen the three screws [A] on the front of the pump and remove the front cover [B].



4. Remove the tube from the rotor [C] and disconnect it from both fittings [D].



5 Connect the new tube to the right side fitting and roll the tube around the rotor while turning it.

6 Connect the other tube end to the left side fitting.

7 Install the front cover on the pump.

8 Insert the reagent tubes all the way to the bottom of the corresponding bottles (see Reagent tube numbering, p. 34).

9 Prime the reagent tubes (see Priming the Reagent Tubes, p. 24).

6.6. Manual Measurement and Calibration

Methods of calibration

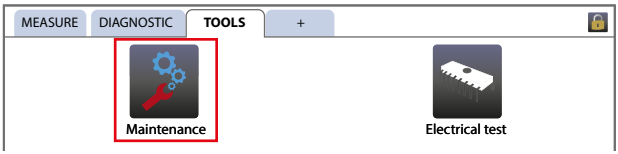
The TOPAZ Total Alkalinity supports two methods of calibration: A standard calibration or an online calibration. Seres OL recommends to use the standard calibration.

If you want to use the online calibration, contact customer service for details.

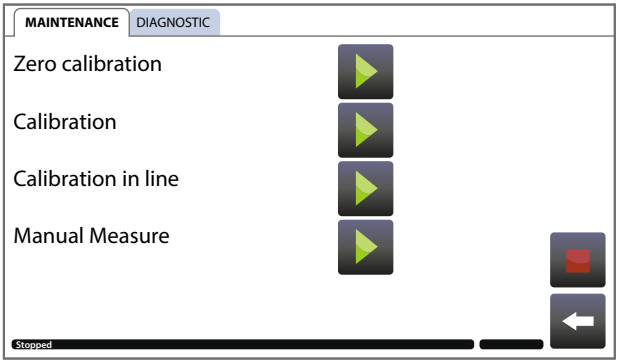
Entering the maintenance menu

1 To stop the current measuring cycle, press the button on the main screen and enter the password “0712”. In the next dialog, confirm with “OK”.

2 From the main screen, open the <TOOLS> tab and press the <Maintenance> button.



⇒ *The <MAINTENANCE> menu shows the following entries:*

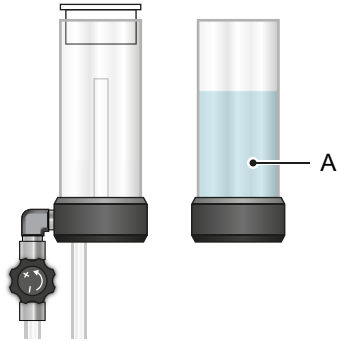


6.6.1 Manual Measurement

The <Manual measure> function can be used to verify the instrument performance using a standard solution. It is recommended to perform one or two manual measurements before each calibration to obtain a meaningful result.

1 Start the manual measurement by pressing the ▶ button.

2 When the message "Add standard" appears, fill 2/3 of the calibration vessel [A] with the standard.



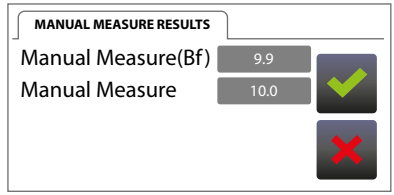
A *Calibration vessel*

3 Wait until the calibration vessel is empty and the message “Add standard” appears again.

4 Repeat steps 2 and 3 until the measurement starts automatically.

5 When the measurement is finished, add standard solution to the calibration vessel again as requested on the screen.

6 At the end of the manual measurement, a window displays the result of the current and the previous (“Bf”) manual measurement. Confirm by pressing the ✓ button.



Note: *The result of the latest manual measurement can later be viewed in the parameter menu.*

6.6.2 Zero Calibration

Note:

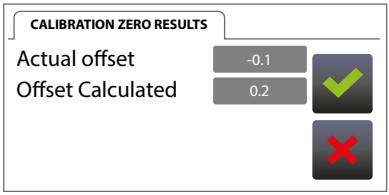
- *On multi-channel instruments, only calibrate sample stream 1.*

Procedure

The procedure is similar to the manual measurement procedure described in Manual Measurement, p. 39. Use deionized water instead of standard.

Results screen

At the end of the zero calibration, a window displays the previous (actual) and the new (calculated) offset. Confirm by pressing the ✔ button.



6.6.3 Standard Calibration

Note:

- *On multi-channel instruments, only calibrate sample stream 1.*

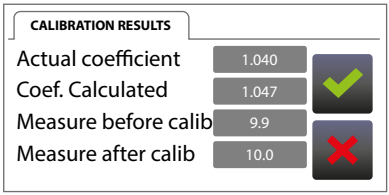
Procedure

The procedure is similar to the manual measurement procedure described in Manual Measurement, p. 39.

Begin calibration by entering the reference value of the standard used. Pay attention to the correct concentration unit (ppm by default. Then follow the instructions on the screen.

Results screen

At the end of the standard calibration, a window displays the previous (actual) and the new (calculated) calibration coefficient and the concentration measurement readings before and after calibration. Confirm by pressing the ✔ button.



6.7. Longer Stop of Operation

If the instrument is going to be switched off for a few days or longer, proceed as follows:

1. Prime the reagent system with deionized water as described in Stop of Operation for Maintenance, p. 31.
2. Clean the photometer thoroughly with diluted hydrochloric acid.

   Note: *Do not use a bottle brush, as this could scratch the optics.*
3. Remove algae and particles present in sample tubes.
4. Fill the sample tubes and the photometer with deionized water.

7. Configuration of the Analyzer

Options Menu

To access the options menu, open the <TOOLS> tab from the main screen and press the <Options> button. Enter password “0712” if necessary.

OPTIONS tab

Sleep mode (min) Set the time after which the display automatically turns off (tapping turns it back on). If 0 seconds are set, the display will never turn off.

temp. setpoint Setpoint of the regulated temperature in photometer.
Adjust this value only if instructed to do so by Seres OL customer service.

pressure setting Setpoint of the water fault sensor.
Adjust this value only if instructed to do so by Seres OL customer service.

Gain setpoint Setpoint of the electronic gain.
Adjust this value only if instructed to do so by Seres OL customer service.

JBUS slave ID Set the JBUS slave ID to a number higher than 16.

Control mode Select the appropriate control mode.
Status of relays, analog signal outputs and digital inputs in each mode:

Setting	Relays	4/20 mA	Digital inputs	Jbus
0 - Local	Activated	Activated	Frozen (stop/start on keyboard)	Reading
1 - Maintenance	Activated	Frozen	Frozen	Reading
2 - Jbus	Activated	Activated	Frozen	Reading, Writing
3 - Remote control	Activated	Activated	Activated	Reading

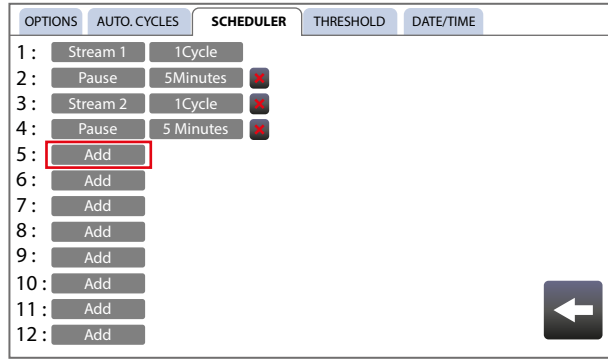
AUTO CYCLES tab

The AUTO CYCLES tab contains settings for performing automatic cycles (necessary for the method to work).

SCHEDULER tab

The SCHEDULER tab allows to configure the number measuring cycles per channel (multichannel configurations) or to extend the standard measurement interval by adding a pause between measurement cycles.

Note: *Since the analyzer is designed for continuous operation, a maximum duration of 15 minutes is recommended for pauses.*



1 Press the “Add” button and select one of the following options:

- Pause
- Stream 1
- Streams 2, 3, 4, 5, or 6 (if applicable)

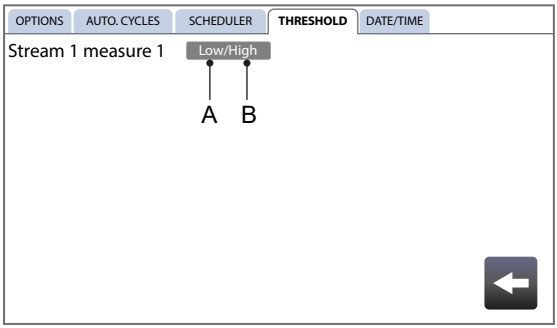
⇒ *An entry field for the number of cycles or pause duration appears to the right of the newly added entry.*

2 Tap on the entry field and set the required number of cycles or pause duration.

3 To remove an entry, press the ✖ button next to it.

THRESHOLD tab

The THRESHOLD tab allows to define whether the thresholds for relays OUT_DIG3 and OUT_DIG4 are high or low thresholds. The combinations high/high, low/high and low/low are possible.



A *Setting for threshold 1 / relay OUT_DIG3*
B *Setting for threshold 2 / relay OUT_DIG4*

The threshold values can be set in the parameter menu, see 45.

DATE/TIME tab

Set time and date.

Parameter Menu

To access the parameter menu, press the button on the main screen. The parameter menu allows user to make the following settings:

Threshold 1 Threshold value for relay OUT_DIG3.
The definition as high or low threshold value is made in the <THRESHOLD> tab of the <OPTIONS> menu.

Threshold 2 Threshold value for relay OUT_DIG4.
The definition as high or low threshold value is made in the <THRESHOLD> tab of the <OPTIONS> menu.

Min. 4–20mA Beginning point of the linear scale.

Max. 4–20mA End point of the linear scale.

Note: *In addition to the settings listed above, the Parameter menu contains further settings which are not documented in this manual. Adjust these values only if instructed to do so by Seres OL customer service.*

8. Troubleshooting

This chapter provides some hints to make troubleshooting easier. For detailed information on how to replace or clean parts refer to Maintenance, p. 30.

If you need help please contact your local distributor. Please have the serial number and the diagnostic values (see 58) ready.

8.1. What To Do If...

Instrument is not starting

Possible cause	Corrective action
No power on the socket	– Check mains power supply.
Power supply defective	– Check output voltage of the internal 24-volt power supply.
Panel PC not powered	– Check connections at the back of the panel PC.

Application is not launching

Possible cause	Corrective action
The instrument starts, but the panel PC does not.	– Check connections at the back of the panel PC.

Instrument shows error message “Water default” although there is sample flow

Possible cause	Corrective action
Filing solenoid valve (SVB) does not switch	– Check that the solenoid valve is plugged in correctly.
One or more sample tubes are blocked or pinched.	– Check condition of all sample tubes (inside and outside).

Vessel is not emptied and/or the vessel is overflowing through vent tube

Possible cause	Corrective action
Tubes are blocked	– Check condition of emptying tubes (inside and outside).
Emptying tube is pinched	– Make sure that the emptying tube is not pinched when closing the door.
Emptying solenoid valve (SVA) does not switch	– Check that the solenoid valve is plugged in correctly. – If necessary, change the membrane.

Photometer does not fill

Possible cause	Corrective action
Pump does not work properly	– Check that pump is connected correctly and that it is not blocked.
One or more tubes are blocked or pinched	– Check condition of all sample tubes.

Measured value is not updated

Possible cause	Corrective action
The same value was measured twice	– No action necessary.
Measurement was stopped or paused	– Start measurement again.

Screen does not work

Possible cause	Corrective action
The application does not react.	– Restart the analyzer.
Screen is damaged.	– Contact customer support.

Instrument shows unexpected measurement results

Possible cause	Corrective action
Bubbles in reagent tubes	– Check reagent tubes for leaks. – Prime the reagent system as described in Priming the Reagent Tubes, p. 24.
Reagents not pumped properly	– Check that the reagent tubes are cut at an angle and immersed all the way to the bottom of the bottles. – Check that there is a small air inlet in the lid of each bottle.
Problem related to reagents	– Check if the expiration date has passed or if the reagents have been stored incorrectly. If necessary, replace the reagents. – Check that the reagents are of "Analysis Use" quality (ask supplier).
Tubes connected to the wrong reagent containers	– Check whether the tubes have been connected to the correct reagent bottles as shown in Reagent tube numbering, p. 34.
One or more pumps not working correctly	– Open the peristaltic pumps as described in Replacing Peristaltic Pump Tubes, p. 36. – Check that all pump tubes are correctly positioned and without visible damage. If necessary, change the pump tubes. – If the problem persists, replace faulty pumps.
Photometer is not heated	– Check that the black connector of the photometer is correctly plugged in at the front of the door.

Possible cause	Corrective action
Stirrer does not rotate or is missing	– Remove the photometer lid and check that a magnetic stirrer bar is installed. – Activate the stirrer in the <ACTUATOR> tab of the <Electrical Test> menu. The magnetic stirrer bar should be rotating continuously. – Check that the black connector of the photometer is correctly plugged in at the front of the door. – If the error persists, contact customer service.
Sample is turbid or contains bubbles	– Check that the upstream filter system is working correctly (if present). – If no filter system is installed, it might be necessary to install one.
Water does not drain	– Check that the drain is pressure-free and not blocked. – Check condition of emptying tube (inside and outside). – Make sure that no tubes are pinched when closing the door.
Analyzer is poorly calibrated	– Check if the expiration date of the standard solution has passed or if it has been stored incorrectly. If necessary, replace the standard solution. – Recalibrate the analyzer.
Interference in the sample	– Contact customer service.
Condensation in the double cover of the photometer and/or the desiccant tablet is saturated with water	– Check desiccant tablets. – Check seal integrity.

8.2. List of Errors and Alarms

No.	Text shown on display	Corrective action
1	Unknown parameter or variable	– Contact customer support.
2	Error reading cycle configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
3	Error writing cycle configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
4	Error cycle execution	– Observe the “Live optical measure” value in the <DIAGNOSTIC> tab. With a functioning measuring card, the value changes continuously. – If the value does not change, restart the analyzer and check again. – If the error persists, contact customer support.
5	Error reading cycle zero configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
6	Error writing cycle zero configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
7	Error cycle zero execution	– Observe the “Live optical measure” value in the <DIAGNOSTIC> tab. With a functioning measuring card, the value changes continuously. – If the value does not change, restart the analyzer and check again. – If the error persists, contact customer support.
8	Error reading calibration cycle configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
9	Error writing calibration cycle configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.

No.	Text shown on display	Corrective action
10	Error calibration cycle execution	– Observe the “Live optical measure” value in the <DIAGNOSTIC> tab. With a functioning measuring card, the value changes continuously. – If the value does not change, restart the analyzer and check again. – If the error persists, contact customer support.
11	Error reading manual cycle configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
12	Error writing manual cycle configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
13	Error cycle execution	– Observe the “Live optical measure” value in the <DIAGNOSTIC> tab. With a functioning measuring card, the value changes continuously. – If the value does not change, restart the analyzer and check again. – If the error persists, contact customer support.
14	Error reading socket configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
15	Error writing socket configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
16	Error socket execution	– Restart the analyzer.
17	Error reading application configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
18	Error writing application configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.

No.	Text shown on display	Corrective action
19	Error application execution	– Observe the “Live optical measure” value in the <DIAGNOSTIC> tab. With a functioning measuring card, the value changes continuously. – If the value does not change, restart the analyzer and check again. – Check if all I/O boards work properly: – Navigate to <TOOLS>/ <Electrical test>/ – Open the <RELAYS> tab and test the relays. – Open the <INPUT> tab and test the digital inputs. – If the error persists, contact customer support.
20	Error reading on IO card	– Check if all I/O boards work properly: – Navigate to <TOOLS>/ <Electrical test>/ – Open the <RELAYS> tab and test the relays. – Open the <INPUT> tab and test the digital inputs. – If the error persists, contact customer support.
21	Error writing on IO card	– Check if all I/O boards work properly: – Navigate to <TOOLS>/ <Electrical test>/ – Open the <RELAYS> tab and test the relays. – Open the <INPUT> tab and test the digital inputs. – If the error persists, contact customer support.

No.	Text shown on display	Corrective action
22	Error execution on IO card	– Check if all I/O boards work properly: – Navigate to <TOOLS>/ <Electrical test>/ – Open the <RELAYS> tab and test the relays. – Open the <INPUT> tab and test the digital inputs. – If the error persists, contact customer support.
23	Error reading JBUS slave card configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
24	Error writing JBUS slave card configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
25	Error reading on JBUS slave card	– Check request compliance with JBUS protocol.
26	Error treatment on JBUS slave card	– Check request compliance with JBUS protocol.
27	Error reading measuring card configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
28	Error reading measuring card configuration	– Reset analyzer configuration to factory defaults by pressing the <Recover> button in the <+> tab.
29	Temperature setpoint not reached	– Check that the ambient and/or the sample temperature does not exceed the temperature setpoint.
30	Vessel temperature unstable	– Check that the ambient and/or the sample temperature does not exceed the temperature setpoint.

No.	Text shown on display	Corrective action

31	Water default	– Check that the analyzer is supplied with water.
		– Check if the filling valve (SVB) switches. If this is not the case, perform the following steps:
		  – Check that the cable is correctly plugged in at the back of the solenoid valve.
		  – If necessary, replace the membrane.
		– Check sample tubes.

32	Pressure measure default - Measure < 0	– Check that the analyzer is supplied with water.
		– Check if the filling valve (SVB) switches. If this is not the case, perform the following steps:
		  – Check that the cable is correctly plugged in at the back of the solenoid valve.
		  – If necessary, replace the membrane.
		– Check sample tubes.

33	Optical setting Default - Info setting not received	– Observe the “Live optical measure” value in the <DIAGNOSTIC> tab. With a functioning measuring card, the value changes continuously. – If the value does not change, restart the analyzer and check again. – If the value changes, launch a new cycle and check if the error is still displayed. – If the error persists, contact customer support.
34	Measure default - measure < 0 (optical measure higher than baseline measured at beginning of measuring cycle).	– Check if the reagents have been stored incorrectly. – Check that reagents are correctly pumped into the photometer. – Check that the stirrer turns.
35	Measure stability default	– Check that the optical fibers are well connected to their holder on the door.

No.	Text shown on display	Corrective action
36	Division by zero - Measure = 0	– Check that the optical fibers are well connected to their holder on the door.
37	Offset out of range	– Ensure that deionized water with the required degree of purity has been used. – If necessary, replace the deionized water. – Perform a new zero calibration.
38	Concentration = 0 - calibration coeff. = 0	– Check that the calibration coefficient is not equal to zero. – Make a new calibration.
39	Concentration out of range	– Perform a manual measurement to check if the analyzer is correctly calibrated.

40	Division by zero - Concentration after linearization = 0 or Calibration Coeff. = 0	– Check if the calibration coefficient is equal to zero. In this case, make a new calibration.
		– Check if the final absorbance is equal to zero. If this is the case, the reaction has not occurred. Perform the following steps:
		  – Check that the reagents are well injected into the photometer.
		  – Check that the stirrer turns.

41	Calibration coefficient outside tolerances (new coefficient differs from the previous one by more than 50 %)	– Check that standard concentration entered at the beginning of calibration matches the real standard concentration. – Check that the standard solution been prepared and stored correctly. – Check that reagents are correctly pumped into the photometer. – Check that the stirrer turns.

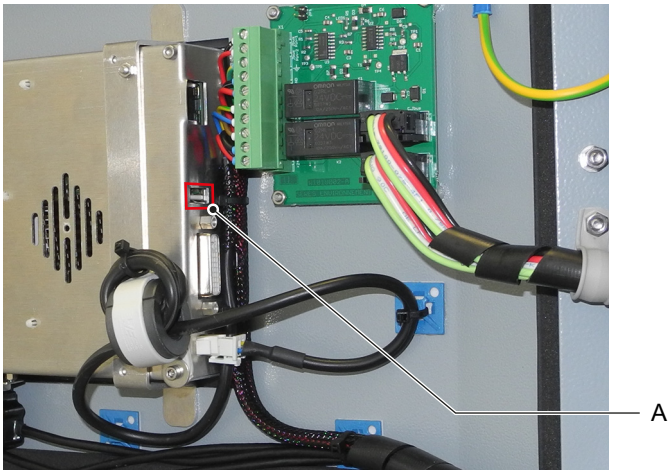
No.	Text shown on display	Corrective action
42	Division by zero - Absorbance = 0 or Current Calibration Coeff. = 0	– Check if the calibration coefficient is equal to zero. In this case, perform a new calibration. – Check if the final absorbance is equal to zero. If this is the case, the reaction has not occurred. Perform the following steps: – Check that the reagents are well injected into the photometer. – Check that the stirrer turns.
43	Division by zero - Absorbance = -999998.0	– Check that the optical fibers are well connected to their holder on the door.
44	Value out of range	– Check that the analyzer is well calibrated, check standard solution concentration by a manual measure cycle.
45	Division by zero - Absorbance = -999998.0	– Check that the optical fibers are well connected to their holder on the door.
46	Incorrect projector power	– Contact customer service
47	Threshold 1 exceeded	– Check process – Check programmed value for threshold 1
48	Threshold 2 exceeded	– Check process – Check programmed value for threshold 2
49	Optical setting incorrect (analyzer cannot adjust the optical gain)	– Check that the optical fibers are well connected to their holder on the door. – Check that the photometer is not dirty. – Check that the analyzer is supplied with water. – Check that the stirrer turns.

No.	Text shown on display	Corrective action
50	Optical setting incorrect - G=0 (analyzer cannot adjust the optical gain)	– Check that the optical fibers are well connected to their holder on the door. – Check that the photometer is not dirty. – Check that the analyzer is supplied with water. – Check that the stirrer turns.
51	Optical setting incorrect - G=255 (analyzer cannot adjust the optical gain)	– Check that the optical fibers are well connected to their holder on the door. – Check that the photometer is not dirty. – Check that the analyzer is supplied with water. – Check that the stirrer turns.
54	[Sample&Add1] < [Add1]	– Check liquid level in the vessel. – If OK, check reagents validity and reagents are injected when stirrer is active.
55	Threshold delta < setpoint	– Check liquid level in the vessel. – If OK, check reagents validity and reagents are injected when stirrer is active.

8.3. Saving Diagnostic Data to USB Stick

The TOPAZ Total Alkalinity permanently records measurement and diagnostic data and stores it in a non-volatile memory. If required, this data can be transferred to a USB stick.

Transfer to USB stick



A *USB port*

To transfer the measurement and diagnostic data to a USB stick, proceed as follows:

1. Open the analyzer door.
2. Insert the USB stick into the USB port [A] on the back of the panel PC.
3. Open the <TOOLS> tab and press the <Log files copy> button. Enter the password “0712”, if necessary.
4. On the next screen, press OK to start data transfer.

Contents of the USB stick

After the data transfer, you will find a folder named "CRISTAL_LOG" on the USB stick, which contains the following subfolders:

- CristalErrorPrgLog: Alarms and errors.
- CristalLog: Measured values with date, time, channel number and diagnostic data. In case of support requests, please have these files ready.
- UserLogFileDir: Measured values with date, time and channel number

9. Notes

Seres OL

SOL-96.110.041 / 260422

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