

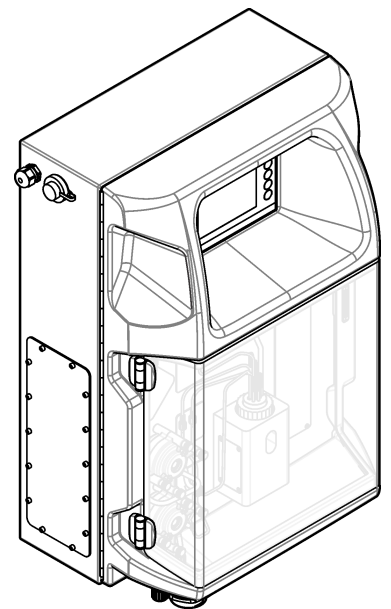


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EZ-series

User Manual

05/2024, Edition 8



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Section 1 Legal information

Manufacturer: AppliTek NV/SA

Distributor: Hach Lange GmbH

The translation of the manual is approved by the manufacturer.

Section 2 Specifications

Specifications are subject to change without notice.

Table 1 General specifications

Specification	Details
Dimensions (W x H x D)	460 × 688 × 340 mm (18.11 × 27.09 × 13.39 in.)
Enclosure	Enclosure rating: IP44; indoor use only Enclosure material: ABS, PMMA and coated steel
Weight	25 to 40 kg (55 to 88 lb) (based on analyzer model)
Power requirements	110–240 VAC ±10%, 50/60 Hz ¹
Power consumption	150 VA maximum ¹
Installation category	II
Pollution degree	2
Operating temperature	10 to 30 °C (50 to 86 °F); 5 to 95% relative humidity, non-condensing, non-corrosive
Storage temperature	-20 to 60 °C (-4 to 140 °F), ≤ 95% relative humidity, non-condensing
Instrument air feed	Dry and oil free according to ISA-S7.0.01-1996 quality standard for instrument air Minimum pressure: 6 bar (600 kPa or 87 PSI)
Demineralized water	For rinsing and/or dilution
Drain	Atmospheric pressure, vented, minimum Ø 64 mm
Earth connection	Dry and clean grounding pole with low impedance (< 1 Ω) with an earth cable of > 2.5 mm ² (13 AWG)
Analog inputs	Electrodes, temperature, conductivity, colorimeter
Analog outputs	Two to four 4–20 mA; maximum load: 500 Ω, galvanically isolated ²
Digital inputs	Four digital inputs: remote start/stop (potential-free contact) (optional)
Digital outputs	Four potential-free digital outputs (FCT) to control internal valves/pumps; 24 VDC Four powered digital outputs to control external valves/pumps; 24 VDC, 500 mA
Communication	USB port for data transfer Optional: Ethernet, Modbus
Relay	Five power relays (PCT), contact loading maximum 24 VDC, 0.5 A (resistive load) Five potential free contact (FCT), maximum loading 24 VDC, 0.5 A (resistive load)
Ethernet connection	Controller: Intel 82551ER Transfer rate: 10/100 Mbps Connector: RJ45 twisted pair (10 Base T / 100 Base T) Cables: S/STP (category 5)
Alarms	Malfunctioning alarm (potential free contact)
User interface	IP65 flat color TFT touch screen (5.7 in.) Ethernet 10 M (RJ45) NE 2000 compatible, Compact flash slot
System clock	Battery life 4 years (approximately)
Certifications	CE, ETL certified to UL and CSA safety standards, UKCA
Warranty	USA: 1 year, EU: 2 years

¹ Power requirements and consumption are based on the analyzer model, refer to the analyzer serial number plate for detailed information.

² Optional modules are available to add a maximum of 10 analog outputs to the analyzer.

Specifications

Table 2 Ethernet configuration (optional)

Specification	Description
Connection	Remote TCP/IP server
IP address	192.168.10.180 ³
Service port	502
Modbus point type	40001–...
Read/write protocol	Holding register

Table 3 RS232/485 configuration (optional)

Specification	Description
Baud rate	9600
Parity	None
Data bits	8 (word length)
Stop bits	1
Protocol	None
Modbus point type	40001–40100 (holding register)
Transmission mode	RTU
Device ID (default)	1

³ Standard value, user-programmable

Section 3 General information

In no event will the manufacturer be liable for damages resulting from any improper use of product or failure to comply with the instructions in the manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

3.1 Safety information

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

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.

3.1.1 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.
⚠ CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.
NOTICE
Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

3.1.2 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 is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. If on the instrument, refer to the instruction manual for operation or safety information.
	This symbol indicates the need for protective eye wear.
	This symbol indicates the need for protective gloves.
	This symbol indicates the need for safety footwear.


General information

	This symbol indicates the need for protective clothing.
	This symbol identifies a risk of chemical harm and indicates that only individuals qualified and trained to work with chemicals should handle chemicals or perform maintenance on chemical delivery systems associated with the equipment.
	This symbol indicates that a risk of electrical shock and/or electrocution exists.
	This symbol indicates that the marked item can be hot and should not be touched without care.
	This symbol indicates that a risk of fire is present.
	This symbol identifies the presence of a strong corrosive or other hazardous substance and a risk of chemical harm. Only individuals qualified and trained to work with chemicals should handle chemicals or perform maintenance on chemical delivery systems associated with the equipment.
	This symbol indicates the presence of a harmful irritant.
	This symbol indicates that the marked item should not be opened during operation.
	This symbol indicates that the marked item should not be touched.
	This symbol indicates a potential pinch hazard.
	This symbol indicates that the object is heavy.
	This symbol indicates the presence of devices sensitive to Electro-static Discharge (ESD) and indicates that care must be taken to prevent damage with the equipment.
	This symbol indicates that the marked item requires a protective earth connection. If the instrument is not supplied with a ground plug on a cord, make the protective earth connection to the protective conductor terminal.
	Electrical equipment marked with this symbol may not be disposed of in European domestic or public disposal systems. Return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.

3.1.3 Icons used in illustrations

					
Manufacturer supplied parts	User supplied parts	Look	Do steps in reverse order	Use fingers only	Use two people

3.1.4 Chemical and biological safety

⚠ DANGER	
	Chemical or biological hazards. If this instrument is used to monitor a treatment process and/or chemical feed system for which there are regulatory limits and monitoring requirements related to public health, public safety, food or beverage manufacture or processing, it is the responsibility of the user of this instrument to know and abide by any applicable regulation and to have sufficient and appropriate mechanisms in place for compliance with applicable regulations in the event of malfunction of the instrument.

3.1.5 Ozone precautions

⚠ CAUTION	
	Ozone inhalation hazard. This instrument produces ozone that is contained within the equipment, specifically within the internal plumbing. The ozone could be released under fault conditions.

It is recommended to plumb the exhaust gas port to a fume hood or to the building exterior in accordance with local, regional and national requirements.

Exposure to even low concentrations of ozone can damage delicate nasal, bronchial and pulmonary membrane. In sufficient concentration, ozone can cause headaches, coughing, eye, nose and throat irritation. Immediately, move the victim to uncontaminated air and seek first aid.

The type and harshness of symptoms are based on the concentration and exposure time (n). Ozone poisoning includes one or more of the symptoms that follow.

- Irritation or burning of the eyes, nose or throat
- Lassitude
- Frontal headache
- Sensation of sub-sternal pressure
- Constriction or oppression
- Acid taste in mouth
- Asthma

In case of more severe ozone poisoning, the symptoms can include dyspnea, cough, choking sensation, tachycardia, vertigo, lowering of blood pressure, cramping, chest pain, and generalized body pain. Ozone can cause a pulmonary oedema one or more hours after exposure.

3.2 Intended use

The Hach EZ-series analyzers are intended for use by individuals who measure multiple water quality parameters in samples from industrial and environmental applications. The Hach EZ-series analyzers do not treat or alter water and are not used to control procedures.

3.3 Product overview

NOTICE

Perchlorate Material—Special handling may apply. Refer to www.dtsc.ca.gov/perchlorate. This perchlorate warning applies only to primary batteries (provided singly or installed on this equipment) when sold or distributed in California, USA.

The Hach EZ-series analyzers are on-line analyzers that measure one or multiple parameters in water samples from industrial and environmental applications. Refer to [Figure 1](#).

The sample line moves the sample into the analyzer. The analyzer uses pumps, valves and syringes to move the sample and reagents to the measuring cell on the analytics panel. When the measurement cycle is complete, the analyzer discards the sample through the drain line. The analysis results shows on the display of the data processing panel. The data processing panel controls and configures the analyzer. The data processing panel saves the analyzer data (i.e., trends , alarms, analysis results and data log files).

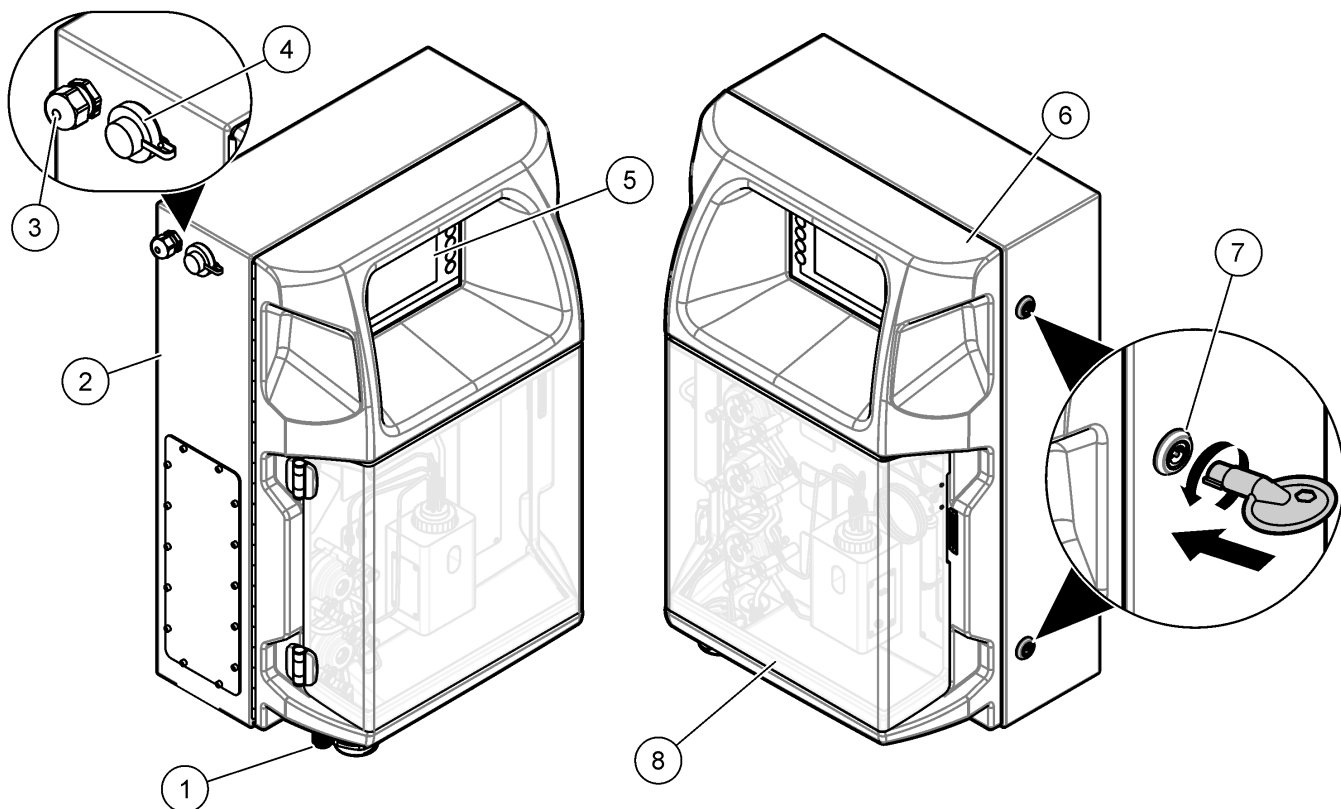
A set of reagent bottles is supplied with the analyzer to hold the reagent and solutions. Sample preconditioning could be necessary based on the analysis technology. Optional sample preconditioning panels are available for the sample line.

There are different analyzer series available with different measurement technology and measured parameters:

- EZ 1000 series—On-line colorimetric analyzers for general water analysis (chemical parameters) and nutrient analysis (i.e., nitrate, phosphate, ammonia)
- EZ 2000 series—On-line colorimetric analyzers with digestion for general water analysis (chemical parameters) and nutrient analysis (i.e., nitrate, phosphate, ammonia)
- EZ 3000 series—On-line ion-selective (ISE) analyzers for general water analysis
- EZ 4000 series—On-line titrimetric analyzers for general water analysis (chemical parameters)
- EZ 5000 series—Multiparametric on-line titrimetric analyzers for general water analysis (chemical parameters)
- EZ 6000 series—On-line voltammetry analyzers for heavy/trace metal analysis (e.g., Ag, As, Cr, Hg, Pb, Se)
- EZ 7x00 series—On-line analyzers for industrial applications (e.g, COD, TOC, Total Nitrogen, Total Phosphorus, volatile fatty acids FOS/TAC, influent toxicity, international bitternes units, Adenosine Triphospahte)

The EZ-analyzer has different options such as: Sample detection, level detection for reagent bottles, remote Start/Stop, auto-validation, auto-calibration, auto-cleaning, RS232 and Modbus.

Figure 1 Product overview



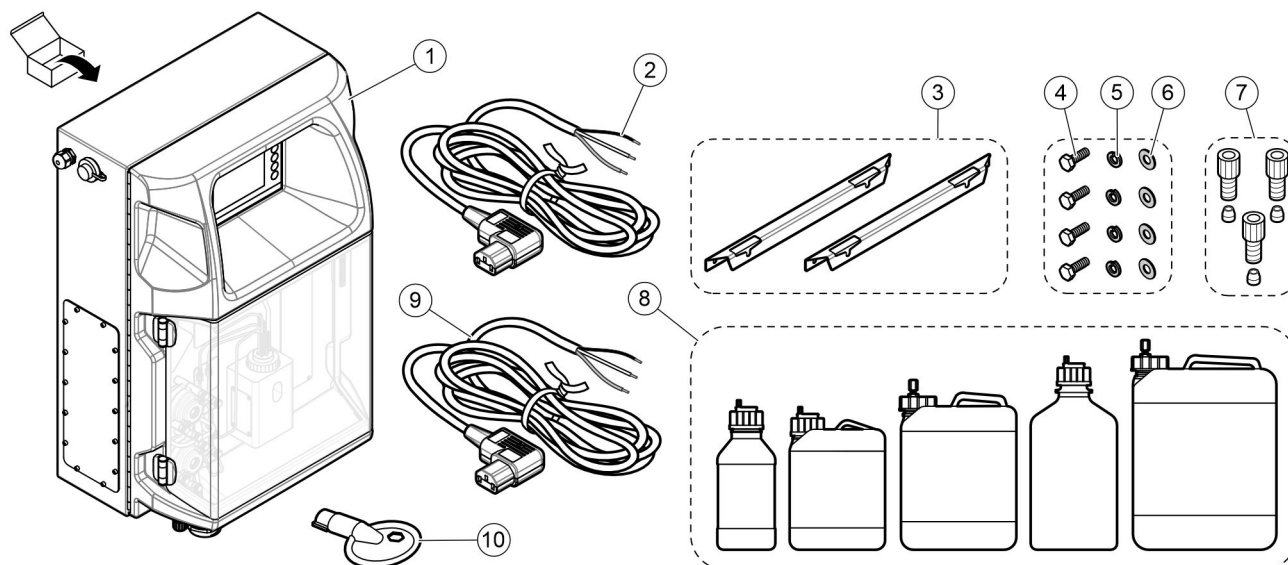
1 Electrical connectors and plumbing access ports	4 USB port for data transfer	7 Door lock for electrical compartment
2 EZ analyzer	5 Keypad and display	8 Analysis panel cover
3 M20 cable gland for power cord	6 Analyzer door	

3.4 Product components

Make sure that all components have been received. Refer to [Figure 2](#). If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

General information

Figure 2 Product components



1 EZ analyzer	5 Lock washer, M8 (4x)	9 Power cord (EU)
2 Power cord (USA and Canada)	6 Flat washer, M8 (4x)	10 Key for electrical compartment
3 Mounting brackets (2x)	7 Tube fittings and ferrules ⁴	
4 Hex bolt, M8 × 16 (4x)	8 Reagent and solution bottles ⁴	

⁴ Quantity and type is based on the supplied analyzer.

Section 4 Installation

DANGER



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

4.1 Installation guidelines

WARNING



Fire hazard. The user is responsible to make sure that sufficient precautions are taken when the equipment is used with methods that use flammable liquids. Make sure to obey correct user precautions and safety protocols. This includes, but is not limited to, spill and leak controls, proper ventilation, no unattended use, and that the instrument is never left unattended while power is applied.

CAUTION



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

CAUTION



Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

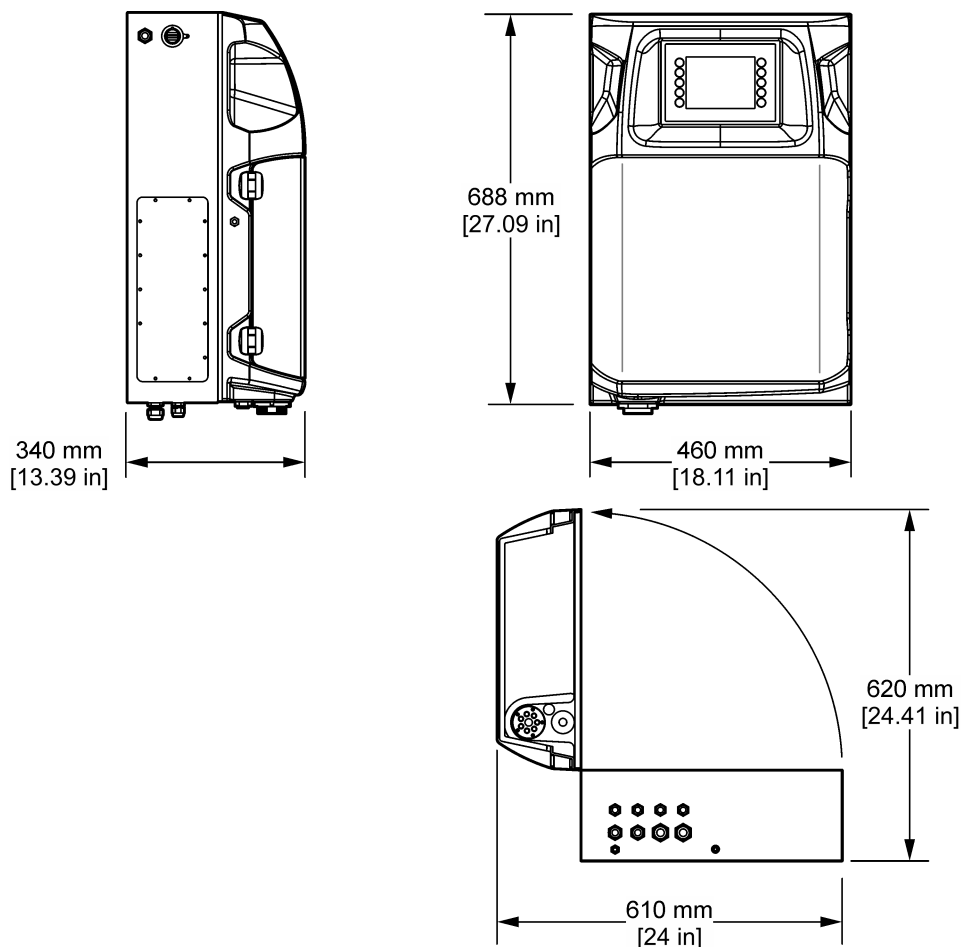
- Install the analyzer indoors, in a non-hazardous environment.
- Install the analyzer in an environment that is protected from corrosive fluids.
- Install the analyzer in a clean, dry, well-ventilated and temperature-controlled location.
- Install the analyzer as near to the sampling point as possible.
- Do not install the analyzer in direct sunlight or near a heat source.
- Make sure that there is sufficient clearance to make plumbing and electrical connections.
- Make sure to leave sufficient space in front of the analyzer to open the analyzer door. Refer to [Analyzer dimensions](#) on page 14.
- Make sure that the ambient conditions are within operating specifications. Refer to [Specifications](#) on page 5.

Although the analyzer is not designed for use with flammable samples, some EZ-analyzers use flammable reagents. If the analyzer uses flammable reagents, make sure to obey the safety precautions that follow:

- Keep the analyzer away from heat, sparks and open flame.
- Do not eat, drink or smoke near the analyzer.
- Use a local exhaust ventilation system.
- Use spark and explosion-proof appliances and lighting system.
- Prevent electrostatic discharges. Refer to [Electrostatic discharge \(ESD\) considerations](#) on page 17.
- Fully clean and dry the instrument before use.
- Wash hands before breaks and at the end of the working period.
- Remove contaminated clothing. Wash clothing before reuse.
- These fluids must be handled in accordance with local regulatory agency requirements on permissible exposure limits.




4.2 Analyzer dimensions

Figure 3 Analyzer dimensions

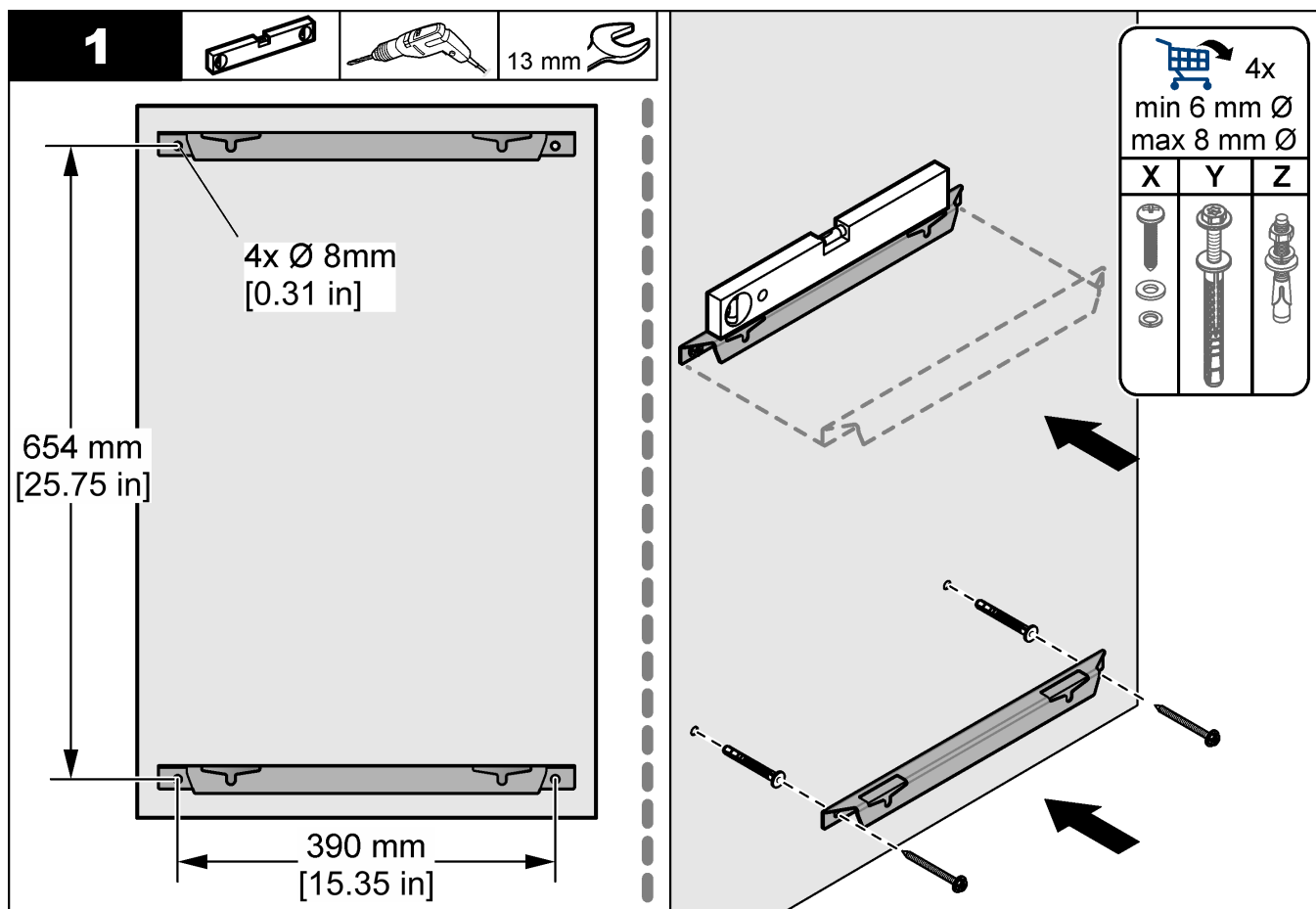


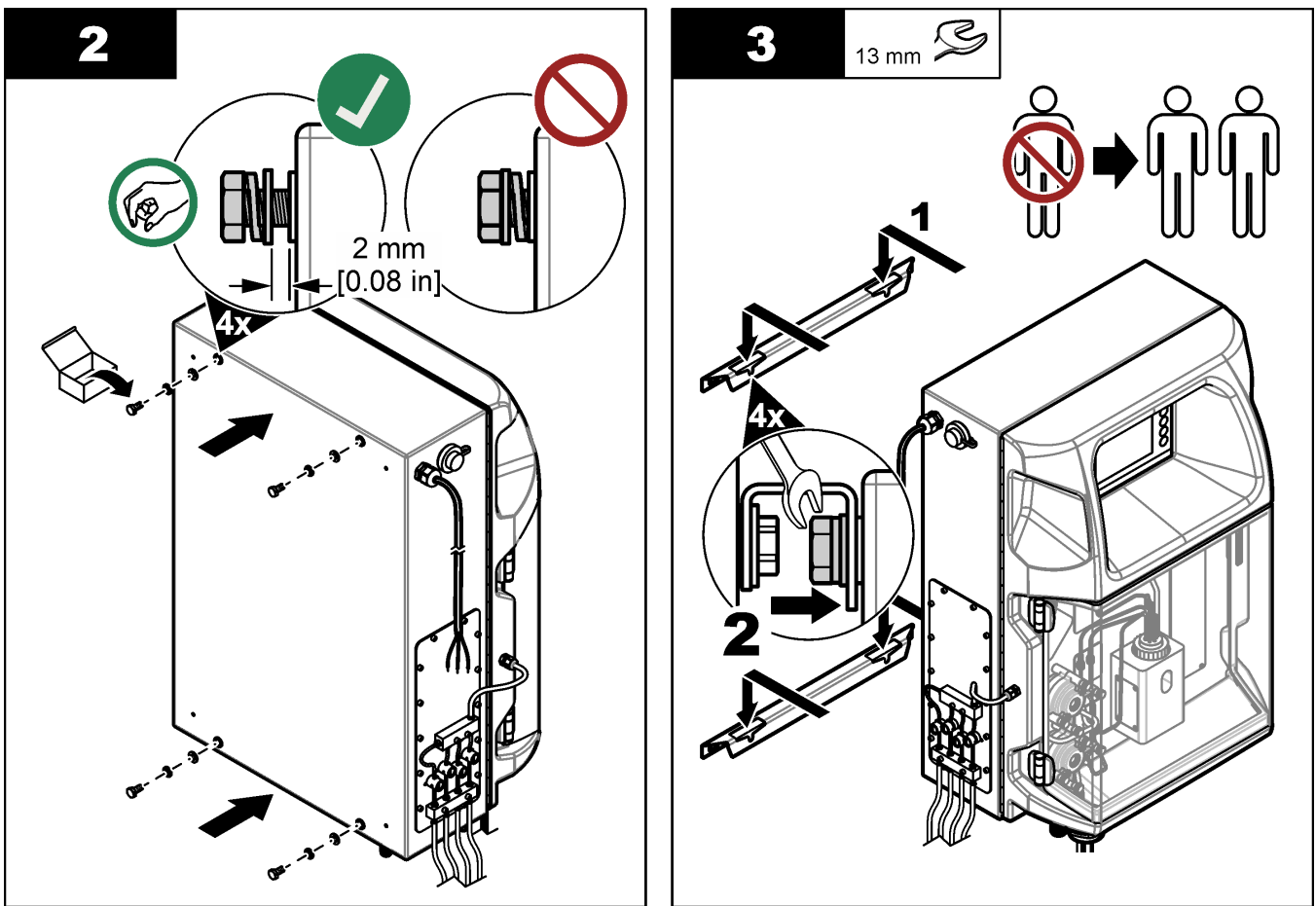
4.3 Mechanical installation

4.3.1 Attach the instrument to a wall

⚠ WARNING	
	Personal injury hazard. Make sure that the wall mounting is able to hold 4 times the weight of the equipment.
⚠ WARNING	
	Personal injury hazard. Instruments or components are heavy. Use assistance to install or move.
⚠ WARNING	
	Personal injury hazard. The object is heavy. Make sure that the instrument is securely attached to a wall, table or floor for a safe operation.

Attach the instrument upright and level on a flat, vertical wall surface. Install the instrument in a location and position where the user can easily disconnect the instrument from the power source. Refer to the illustrated steps that follow. Mounting hardware is supplied by the user. Make sure that the fastening has sufficient load bearing capacity (approximately 160 kg, 353 lb). The wall plugs must be selected and approved to suit the properties of the wall.

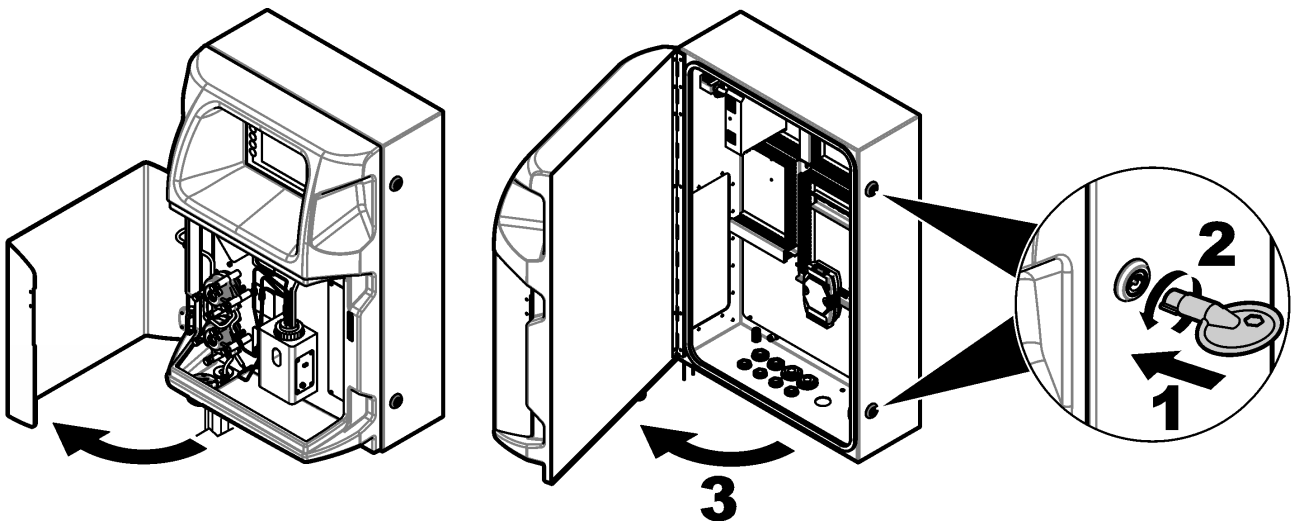




4.3.2 Open the analyzer door

Use the supplied key to unlock the two locks on the side of the analyzer. Open the analyzer door to get access to the wiring connections and plumbing. Refer to [Figure 4](#). Make sure to close the door before operation to maintain the enclosure and safety rating.

Figure 4 Open the analyzer door



4.4 Electrical installation

⚠ DANGER	
	Electrocution hazard. Always remove power to the instrument before making electrical connections.

4.4.1 Electrostatic discharge (ESD) considerations

NOTICE	
	Potential Instrument Damage. Delicate internal electronic components can be damaged by static electricity, resulting in degraded performance or eventual failure.

Refer to the steps in this procedure to prevent ESD damage to the instrument:

- Touch an earth-grounded metal surface such as the chassis of an instrument, a metal conduit or pipe to discharge static electricity from the body.
- Avoid excessive movement. Transport static-sensitive components in anti-static containers or packages.
- Wear a wrist strap connected by a wire to earth ground.
- Work in a static-safe area with anti-static floor pads and work bench pads.

4.4.2 Electrical access

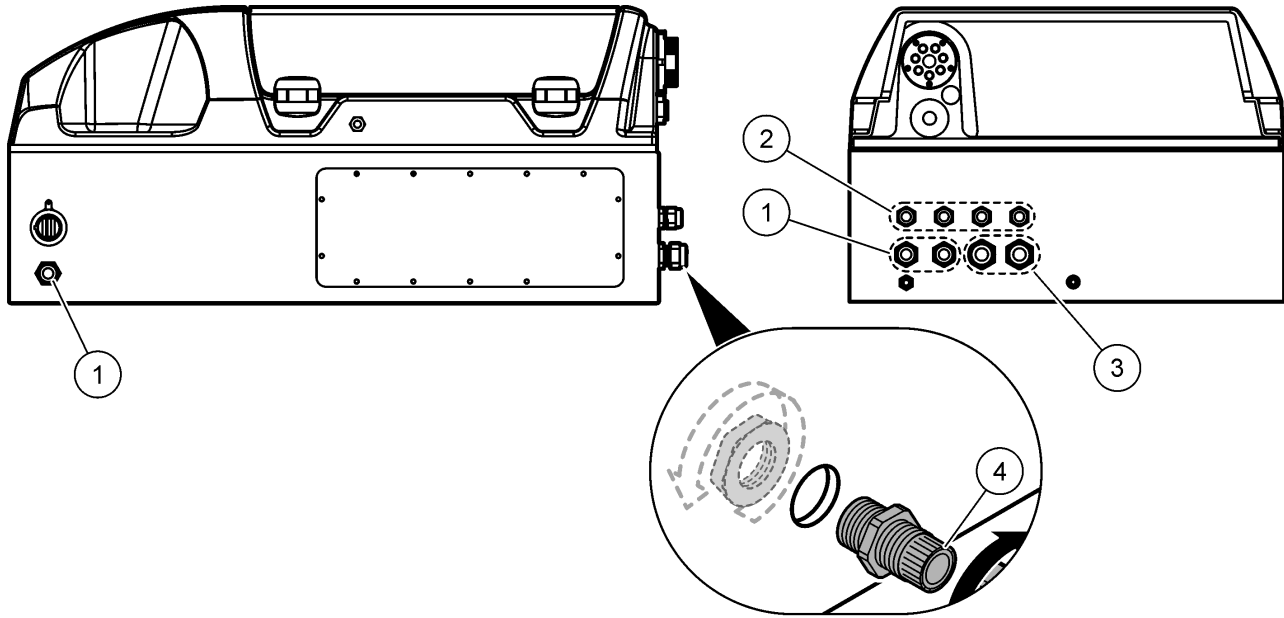
Connect external cables to the communications, relay or input/output module terminals through the electrical access ports. Refer to [Figure 5](#). Refer to [Specifications](#) on page 5 for wire gauge requirements. Keep the plugs in the electrical access ports that are not used.

Open the door to get access to the electrical connections. Refer to [Figure 6](#) for the electrical overview.

The power switch is a circuit breaker that automatically cuts off the main power supply from the AC power line if an overcurrent (short circuit for example) or overvoltage condition occurs.

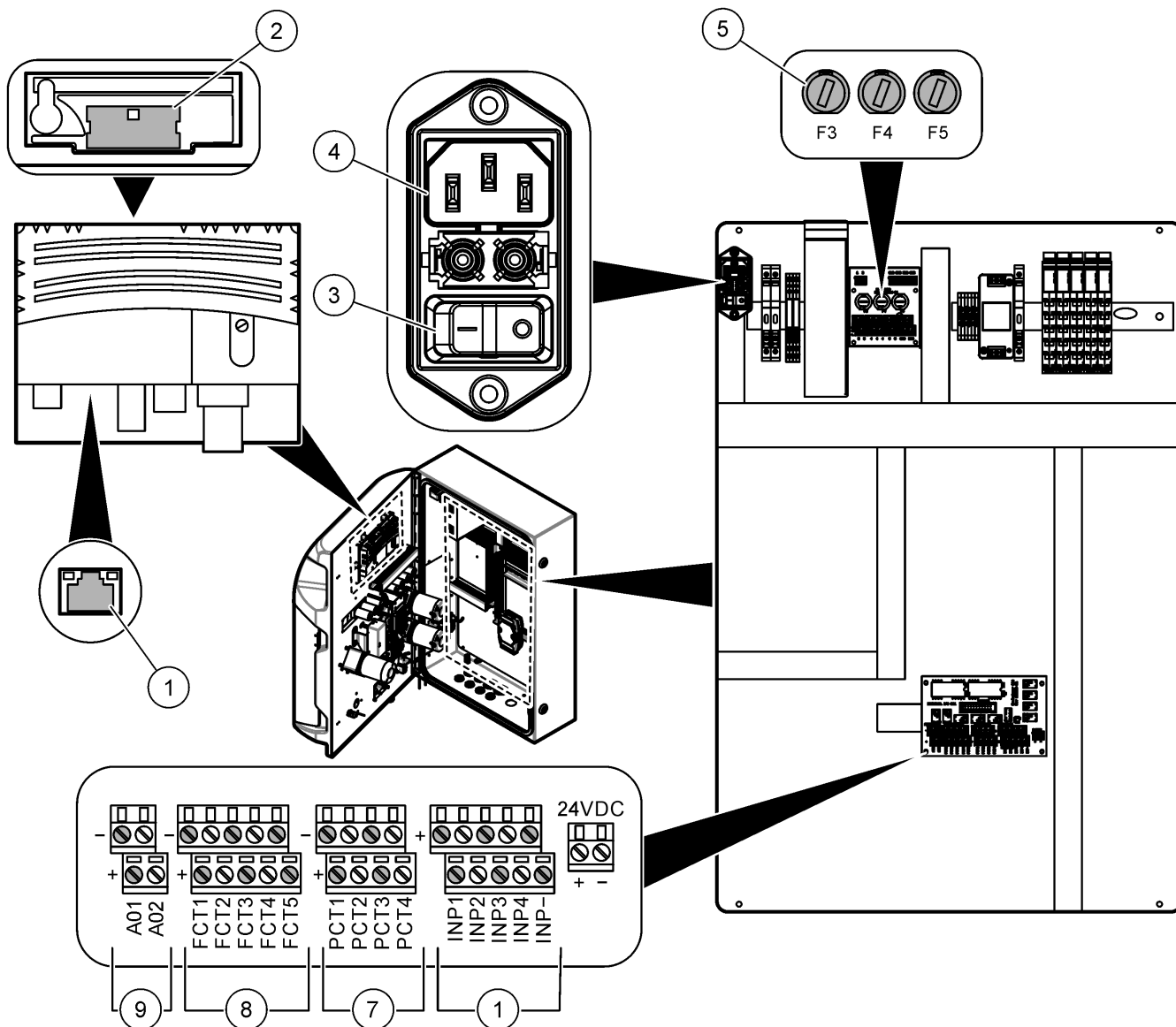
Installation

Figure 5 Electrical access ports



1 M20 cable glands	3 M25 cable glands
2 M16 cable glands	4 Plug

Figure 6 Electrical overview



1 Ethernet connection	4 Power receptacle	7 Power contacts (digital outputs)
2 Battery cover	5 Fuses	8 Free contacts (digital output)
3 Power switch	6 Digital inputs	9 Analog outputs

4.4.3 Connect to AC power

⚠ DANGER

Make sure that the supplied cord meets the applicable country code requirements.

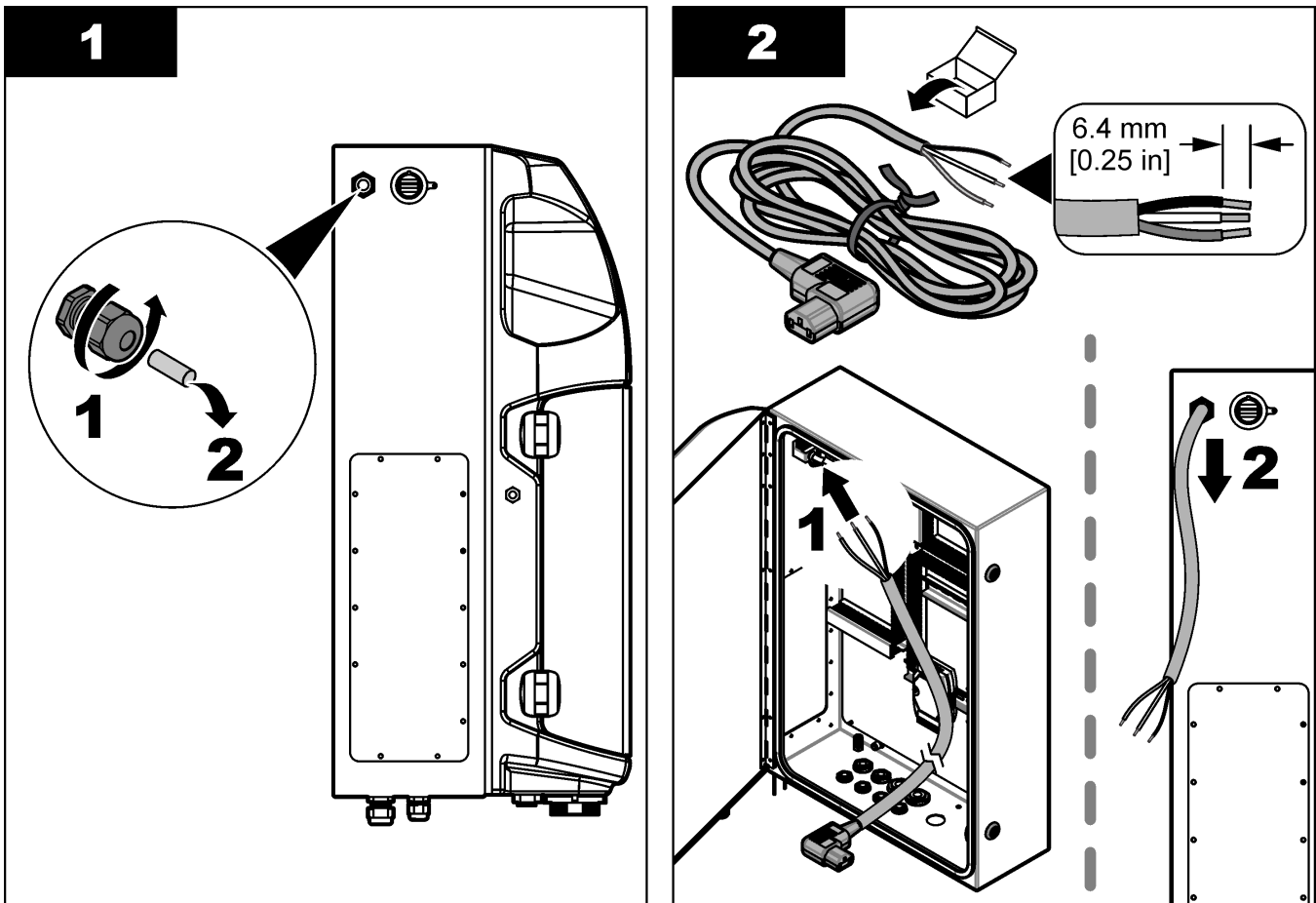
Connect to AC power with the supplied AC power cord. Make sure that a circuit breaker with sufficient electrical current capacity is installed in the power line.

Installation with a power cord

- Connect the power cord to an electrical box with applicable rated switch and protective earth ground.
- Connected through a cable gland (strain relief) that holds the power cable securely and seals the enclosure when tightened.
- Connect equipment in accordance with local, state or national electrical codes.

Refer to the power requirements in [Specifications](#) on page 5. The analyzer must have a dedicated, unswitched circuit. Do not connect the analyzer to a circuit that supplies power to other equipment, so power is not accidentally removed from the analyzer. Connect the AC power as follows:

1. Open the analyzer. Refer to [Open the analyzer door](#) on page 16.
2. Put the power cord through the strain relief fitting for the AC power cord. Refer to the illustrated steps that follow and [Table 4](#).
3. Tighten the strain relief fitting.
4. Close the analyzer.



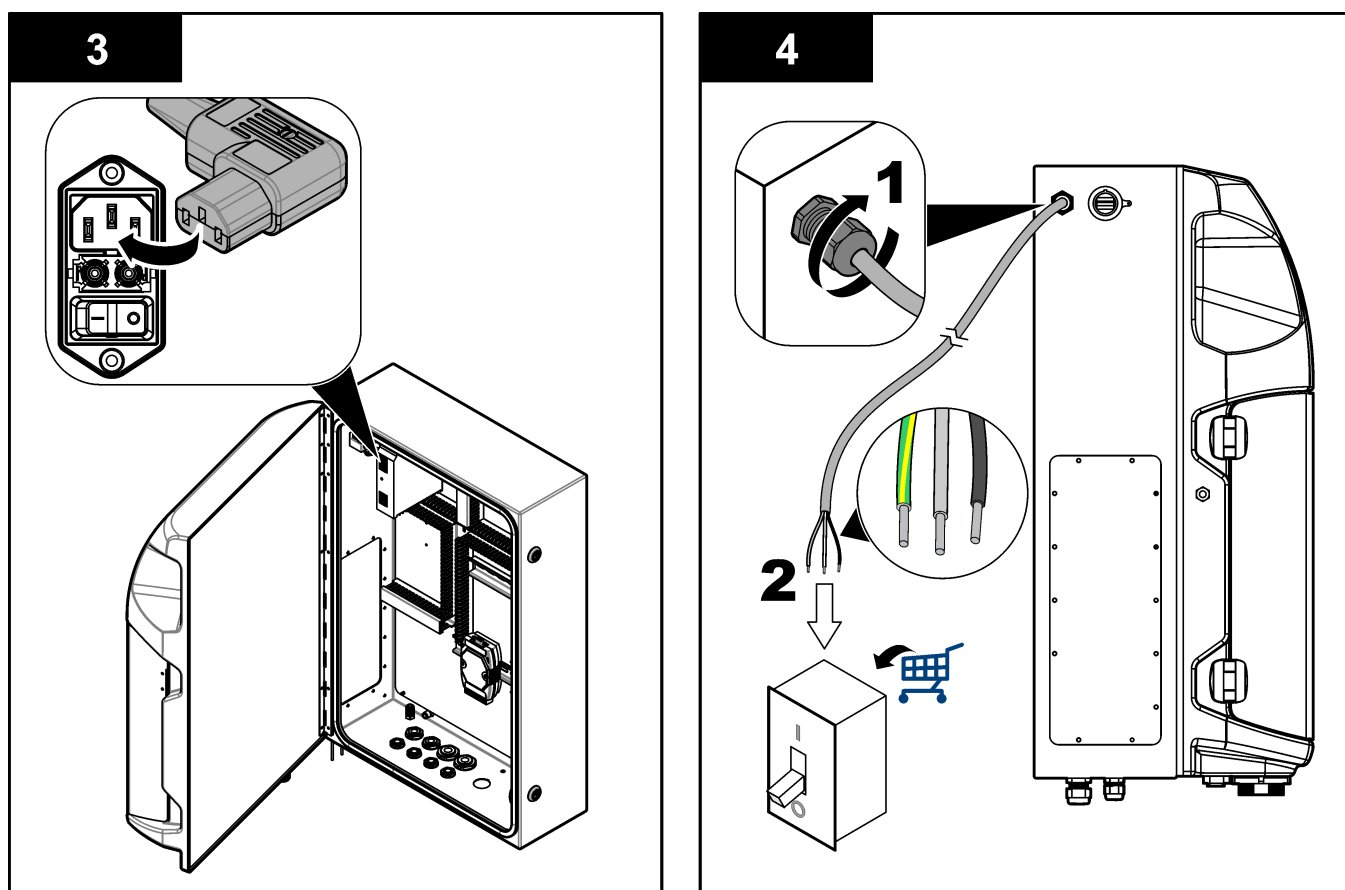



Table 4 Wiring information—AC power

Terminal	Description	Cable color—North America and Canada	Cable color—EU
L	Hot/Line (L)	Black (1)	Blue
N	Neutral (N)	White (2)	Brown
	Protective earth ground (PE)	Green with yellow stripe	Green with yellow stripe

4.4.4 Connect the signal and control cables

Connect external devices to the signal and control terminals (e.g., sample level detection). The analyzer has two analog outputs, five relay contacts, four digital outputs and four digital inputs. Refer to [Figure 6](#) on page 19 and [Table 5](#).

Table 5 Wiring—Signal terminals

Pin	Description
AO1–AO2 ⁵	Analog outputs: 4–20 mA, active current, maximum load 500 Ω
FCT1–FCT5	Free contacts (digital output): Relay output, contact loading maximum 24 VDC, 0.5 A
PCT1–PCT4	Power contacts (digital outputs): 24 VDC, 0.5 A output
INP1–INP4	Digital inputs: 24 VDC, trigger with external potential free contact

4.4.5 Modbus connection (optional)

Optional TCP/IP or RS232/485 outputs are supplied with the analyzer for communication with external devices.

⁵ Optional modules are available to add a maximum of 10 analog outputs to the analyzer.

Installation

4.4.5.1 Modbus TCP/IP

The Modbus TCP/IP option uses an Ethernet cable for communication. Use one cable strain relief fitting to install the Ethernet cable in the analyzer. Connect the Ethernet cable at the Ethernet port at the rear side of the display. Refer to [Figure 6](#) on page 19. The LEDs on the ethernet port shows the connection status. Refer to [Table 6](#). [Table 7](#) shows the pin assignments on the RJ45 twisted pair connection. Refer to [Specifications](#) on page 5 for the Modbus TCP/IP configuration. Change the IP address of the analyzer to agree with the domain requirements.

Table 6 Ethernet—LEDs

LED	Color	Status	Description
ACT	Orange	On	No Ethernet activity on bus
		Blinking	Ethernet activity on bus
LNK	Green	On	Link to the remote station successful

Table 7 Ethernet—Interface

Pin	Description
1	RXD: receive signal
2	RXD\: receive signal inverted
3	TXD: transmit signal
4	Termination
5	Termination
6	TXD\: transmit signal inverted
7	Termination
8	Termination

4.4.5.2 Modbus RS232/485

For Modbus RS232/485 communication, install a RS232/485 converter in the electrical compartment of the analyzer. Connect the data+ and data– cables at the RS485 terminals on the RS232/485 converter. Refer to [Specifications](#) on page 5 for the Modbus RS232/485 configuration.

[Table 8](#) shows an example of the dedicated configuration of the Modbus protocol. Refer to the manufacturer's website for additional information about the actual protocol settings.

Table 8 Standard UPA3.X protocol

		Envirolyzer™	R/W	Length
40001	Remote start	V	W	1
40002	Remote stop	V	W	1
40003	Remote Abort	V	W	1
40004	Start Cleaning	V	W	1
40005	Start calibration	V	W	1
40010	Malfunctioning	V	R	1
40011	Set Master/Slave	V	R/W	1
40020	STR1 Ready		R	1
40021	STR2 Ready		R	1
40022	STR3 Ready		R	1

Table 8 Standard UPA3.X protocol (continued)

		Envirolyzer TM	R/W	Length
40023	STR4 Ready		R	1
40024	STR5 Ready		R	1
40025	STR6 Ready		R	1
40026	STR 7 Ready		R	1
40027	STR8 Ready		R	1
40028				
40029				
40030	Remote start CH1	V	W	1
40031	Remote start CH2		W	1
40032	Remote start CH3		W	1
40033	Remote start CH4		W	1
40034	Remote start CH5		W	1
40035	Remote start CH6		W	1
40036	Remote start CH7		W	1
40037	Remote start CH8		W	1
40038	Remote start CH9		W	1
40039	Remote start CH10		W	1
40040	Result CH1	V	R	1
40041	Result CH2		R	1
40042	Result CH3		R	1
40043	Result CH4		R	1
40044	...			
40080	Result Slope		R	1
40081	Result Offset		R	1
40082	Result Time		R	4
40086	Result Calibration Time		R	4
40090-40099	Specific Alarms		R	1

4.5 Plumbing

4.5.1 Sample line guidelines

⚠ CAUTION	
	Fire hazard. This product is not designed for use with flammable samples.


Select a good, representative sampling point for the best instrument performance. The sample must be representative of the entire system.


- Make sure that the sample flow is higher than the flow to the analyzer.

- Make sure that the sample line is at atmospheric pressure if the analyzer uses a peristaltic pump to move the sample into the analysis vessel.
- Make sure that the sample line collects sample from a small overflow vessel near to the analyzer.

The sample in the overflow vessel must be continuously refreshed. If the size of solids in the sample is too high, sample filtration is also recommended.

4.5.2 Drain line guidelines

⚠ WARNING	
	Fire hazard. The user is responsible to make sure that sufficient precautions are taken when the equipment is used with methods that use flammable liquids. Make sure to obey correct user precautions and safety protocols. This includes, but is not limited to, spill and leak controls, proper ventilation, no unattended use, and that the instrument is never left unattended while power is applied.

⚠ CAUTION	
	Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

NOTICE	
Do not connect the drain lines to other lines because backpressure or damage to the analyzer can occur. Make sure that the drain lines are open to air.	

NOTICE	
To prevent backpressure and damage to the analyzer, make sure that the analyzer is higher than the facility drain(s) used and that the drain line has a constant downward slope. Install the drain lines with a 2.54 cm (1 inch) or more vertical decrease for each 0.3 m (1 ft) length of tubing.	

The analyzer uses the drain line to release the sample and reagents after analysis. Correct installation of the drain lines is important to make sure that all of the liquid is removed from the instrument. Incorrect installation can cause liquid to go back into the instrument and cause damage. A floor or sink drain is sufficient for the drain line. The recommended external diameter for the drain tube is 32 mm.



- Make the drain lines as short as possible.
- Make sure that the drain is lower than the analyzer.
- Make sure that the drain lines have a constant slope down.
- Make sure that the drain lines do not have sharp bends and are not pinched.
- Make sure that the drain lines are open to air and are at zero pressure.
- Make sure that the drain lines are closed to the ambient of the installation room.
- Do not block or submerge the drain line.

A water connection is also recommended so that the drain sink and drain tubing are regularly flushed with clean water to prevent blockage by crystallization.

If the analyzer uses flammable reagents, make sure to obey the safety precautions that follow:

- Do not plumb the drain line to a floor drain.
- Dispose of waste in accordance with local, state and national environmental regulations.

4.5.3 Vent line guidelines

⚠ WARNING	
	Fire hazard. The user is responsible to make sure that sufficient precautions are taken when the equipment is used with methods that use flammable liquids. Make sure to obey correct user precautions and safety protocols. This includes, but is not limited to, spill and leak controls, proper ventilation, no unattended use, and that the instrument is never left unattended while power is applied.
⚠ CAUTION	
	Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.
NOTICE	
Do not connect the vent line (exhaust gas port) to other lines because backpressure or damage to the analyzer can occur. Make sure that the vent line is open to air at the building exterior.	
NOTICE	
To prevent backpressure and damage to the analyzer, make sure that the analyzer is higher than the facility vent(s) used and that the vent line has a constant downward slope. Install the vent line with a 2.54 cm (1 inch) or more vertical decrease for each 0.3 m (1 ft) length of tubing.	


The analyzer uses the vent line to keep the analysis vessel at atmospheric pressure. Correct installation of the vent line is important to make sure that during the pump operation no liquid enters the analysis vessel from the vent line. Incorrect installation can cause gas to go back into the analyzer and cause damage. The recommended external diameter for the header tube of the vent line is 32 mm.

- Make the vent line as short as possible.
- Make sure that the vent line has a constant slope down.
- Make sure that the vent line does not have a sharp bend and is not pinched.
- Make sure that the vent line is closed to the ambient of the installation room and is at zero pressure.
- Do not block or submerge the vent line.

If the analyzer uses flammable reagents, make sure to obey the safety precautions that follow:

- Do not plumb the vent line to a floor drain.
- Dispose of waste in accordance with local, state and national environmental regulations.

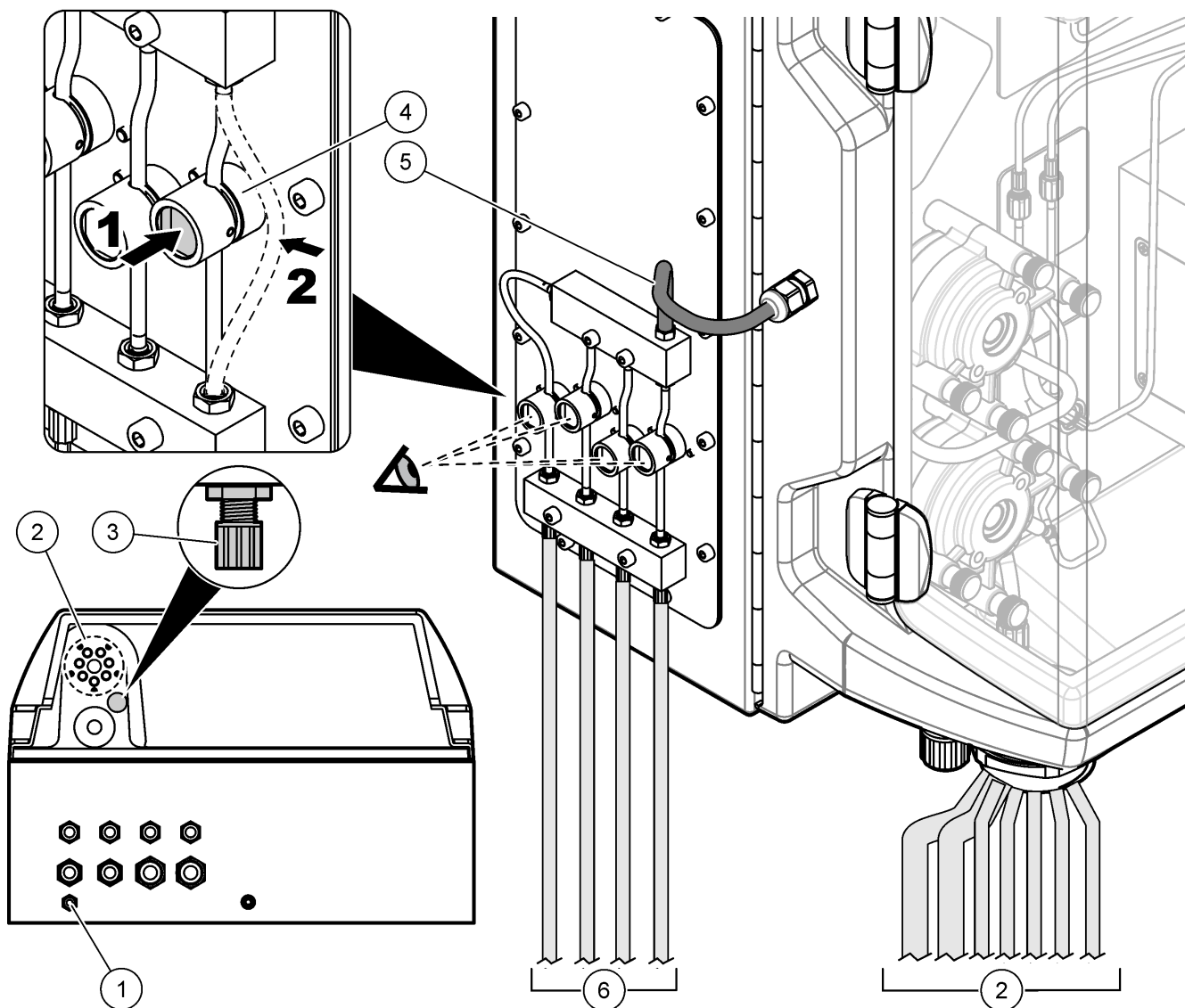
4.5.4 Plumb the analyzer

⚠ CAUTION	
	Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

Reagents, standards and cleaning solutions are supplied by the user. The tubing is factory installed. Read the label on each tube to identify the correct plumbing connection. Do the steps that follow to install all of the necessary fluid connections.

1. Use 1/8-in. or 1/4-in. OD tubing (PFA based on the application) to connect the sample line. If a selection pinch valve is used, make sure to pull the tubes into the pinch valve. Refer to [Figure 7](#), number 6.
2. Use 1/8 in. OD tubing to connect the rinse line to the rinse selection valve. The rinse solution is de-mineralized water.
Note: There are pre-installed tubes for the rinse line, reagents, validation and drain connections at the fluid connections port on the bottom of the analysis panel. Refer to [Figure 7](#), number 2.
3. Use 1/8-in. OD tubing to connect the reagents and validation solutions line. Connect the reagent line to the applicable bottle. Refer to [Figure 7](#) number 2 and [Install the bottles](#) on page 27.
4. Use 1/4-in. OD tubing to connect the drain line. Refer to [Figure 7](#) number 2 and [Drain line guidelines](#) on page 24.
5. Use 1/4-in. OD tubing to connect the instrument air feed. Use the instrument air is used to purge the analyzer and prevent corrosion caused by gases (e.g., chlorine gas) from outside the analyzer. The instrument air is also used to operate the external sample valves on the preconditioning panel (if installed). Refer to [Figure 7](#), number 1.
6. Use 3/8-in. OD tubing to connect the overflow tube. The overflow tube drains the analysis compartment if there are leakage of sample fluids or reagent fluids in the compartment. Use the same guidelines as the drain line to install the overflow tube. Refer to [Figure 7](#), number 3.
7. Push on the pinch valve to manually open the pinch valve and install the tubing. Refer to [Figure 7](#), number 4.


Figure 7 Fluid connections



1 Air feed	4 Pinch valve
2 Fluids connections (reagents/rinse/drain)	5 Sample feed
3 Overflow	6 Multi-stream selection (sample/reagents)

4.5.5 Install the bottles

⚠ WARNING



Fire hazard. The user is responsible to make sure that sufficient precautions are taken when the equipment is used with methods that use flammable liquids. Make sure to obey correct user precautions and safety protocols. This includes, but is not limited to, spill and leak controls, proper ventilation, no unattended use, and that the instrument is never left unattended while power is applied.

⚠ CAUTION



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

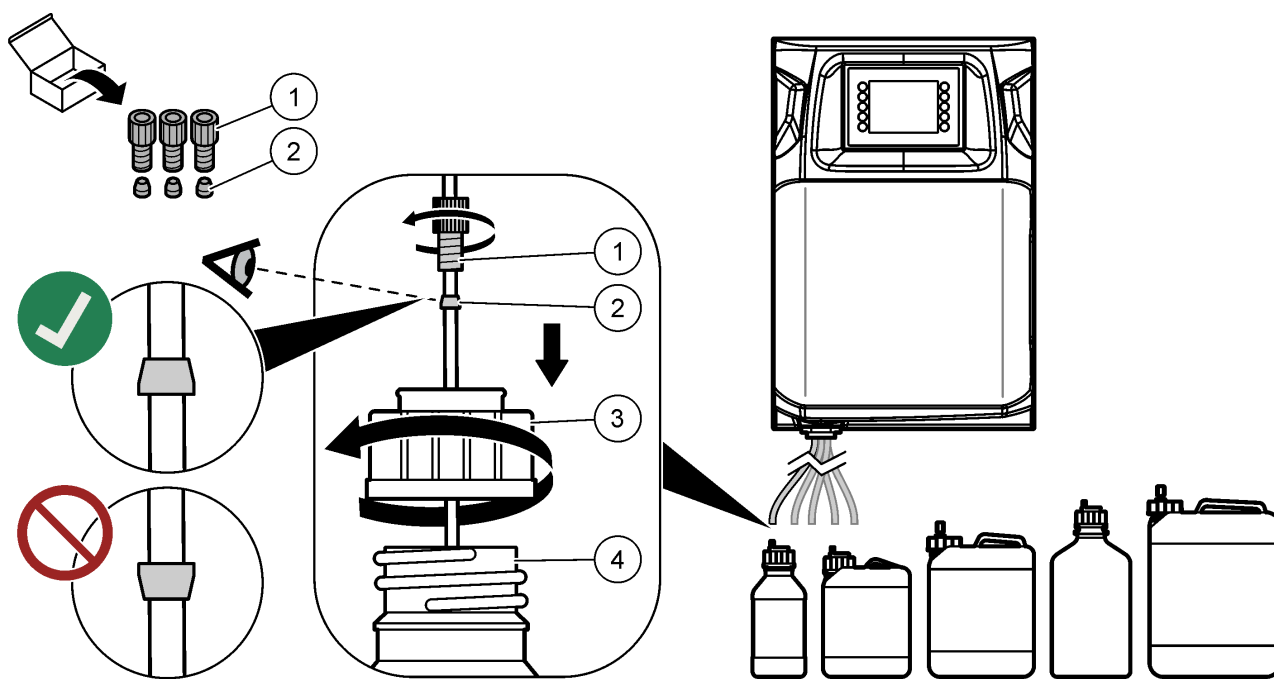
Pre-requisite: Reagents, standards and cleaning solutions are supplied by the user. Visit the manufacturer's website to get detailed information about all of the necessary chemical solutions based on the analyzer serial number.

Make sure that there is sufficient clearance below the analyzer to install the bottles. The tubing is factory installed. Install the bottles of reagents, standard solutions and the cleaning solution. Refer to [Figure 8](#).

If the analyzer uses flammable reagents, make sure to obey the safety precautions that follow:

- Use only manufacturer-supplied bottles for the reagents.
- Keep the reagent bottles in well-ventilated location and at 15 to 20 °C (50 to 86 °F).
- Keep the reagent bottles away from heat, sparks and open flame.
- Keep the reagent bottles and reagent away from oxidizing agents, reducing agents strong acids, strong bases, halogens and amines.
- Keep the reagent bottles closed when not in use.
- Obey the same precautions with uncleaned empty reagent bottles.

Figure 8 Solution bottle installation



1 Fitting	3 Bottle cap
2 Ferrule	4 Bottle

Section 5 User interface and navigation

NOTICE

Do not use writing tips of pens or pencils or other sharp objects to make selections on the screen or damage to the screen will occur.

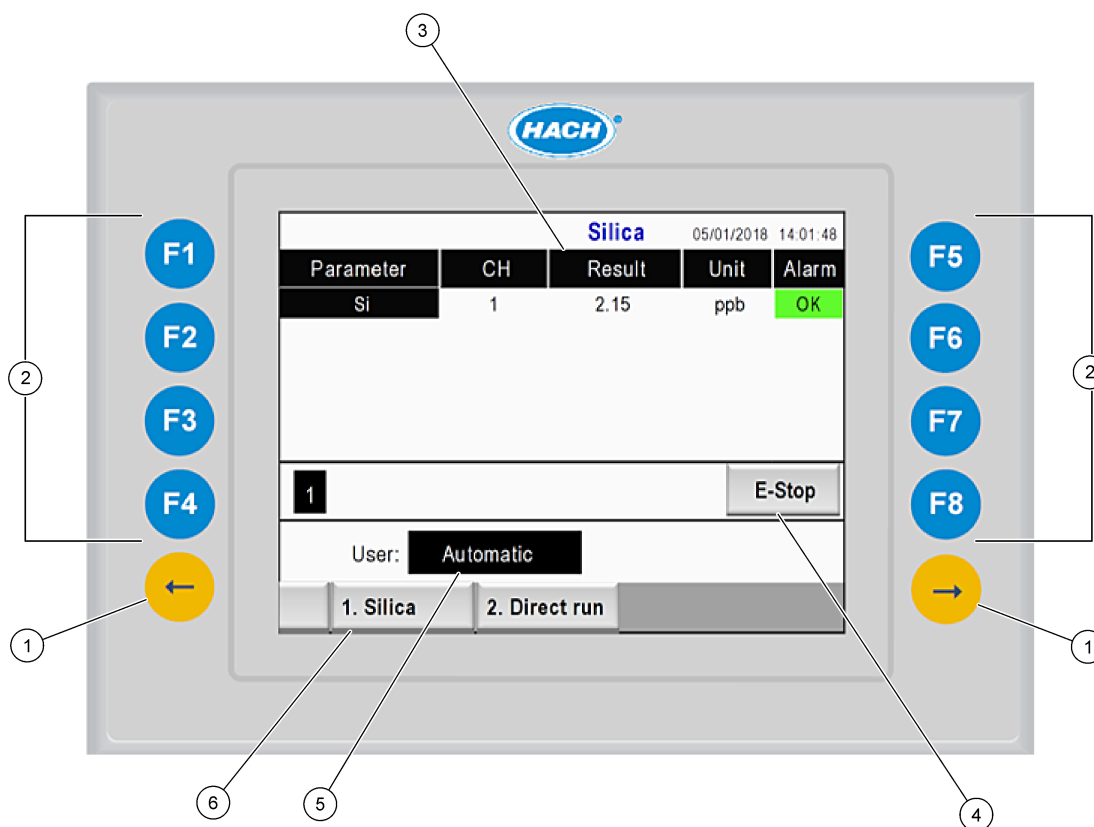
Figure 9 shows the keypad and an overview of the home screen. Refer to Table 9 for the functions of the keys on the keypad.

The instrument display is a touch screen. Only use a clean, dry finger tip to navigate the functions of the touch screen. A screen saver becomes active and the screen is automatically set to off after a period of inactivity. Touch the screen to set the screen back to operation again.

Note: Go to the Configuration menu to disable the screen saver or set the inactivity period.

Values that can be changed or entered show as white text on a blue background on the display. Push a field to change or enter a value.

Figure 9 Keypad and Home screen



1 LEFT and RIGHT arrow keys (submenu keys)	3 Last measurement data ⁶	5 User level selection
2 Soft keys (menu keys)	4 Emergency stop button	6 Method selection

⁶ The last ten results show. Press the right arrow key to see five more results. For each parameter, the display shows the sample stream (CH), result value, unit and alarm status.

Table 9 Keypad Description

Soft key	Description
F1	Shows the Home screen. The home screen shows the last measurement data, messages and alarm conditions. The user level ⁷ , method navigation and emergency stop are also selected on the Home screen.
F2	Shows the STATUS screen. The Status screen shows an icon representation of the analyzer components. The submenus are digital outputs (DO), analog outputs (AO), digital inputs (DI), analog inputs (AI), dispensers and modules.
F3	Shows the DATA menu. Shows the data saved on the analyzer: results, messages, history, M-values (raw measurements).
F4	Shows the Method menu. Sets the method configuration. The submenus are analysis, preconditioning, cleaning, priming, initialization and exit.
F5	Shows the Configuration menu. Configures the analyzer. The submenus are hardware, software, communication and options.
F6	Shows the Titration graph (if applicable). Shows a graph and table of the titration curve.
F7	Shows graphs and settings for voltametric measurements (if applicable).
F8	Shows spectrum and settings for spectrophotometer (if applicable).
RIGHT arrow	Shows the submenu screens. Push the RIGHT arrow to scroll through menu options.
LEFT arrow	Shows the submenu screens. Push the LEFT arrow to scroll through menu options.



⁷ Sets access levels to the menu items to prevent accidental changes to configuration values.

Section 6 Startup

Complete all electrical and plumbing connections before startup. When power is applied to the instrument, the instrument automatically starts an initialization process. Make sure to close the analyzer doors before operation,

1. Set the power switch to the on position. Refer to [Figure 6](#) on page 19.
2. Supply power to the analyzer.
Connect the AC power plug to an electrical outlet with earth ground.
3. Wait for the initialization procedure to complete.
The main screen shows on the display.

6.1 Do a test on the components

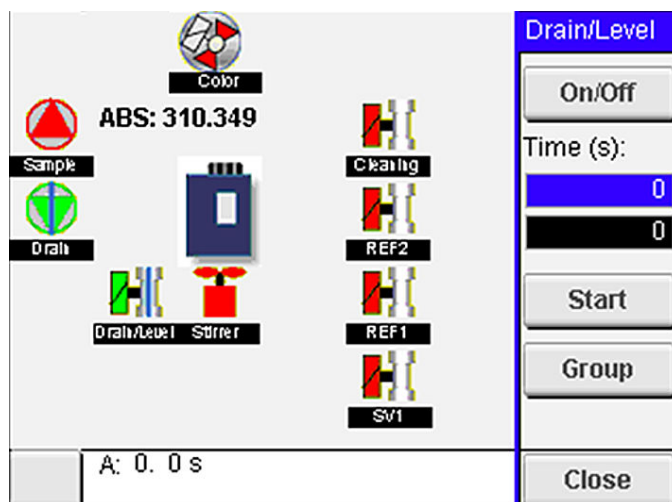
⚠ WARNING	
	Pinch hazard. Parts that move can pinch and cause injury. Do not touch moving parts.
⚠ CAUTION	
	Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

Do a test on the analyzer components before the analyzer is put into operation. Use the status menu to individually start each component to examine its operation.

Note: Make sure that the analyzer is in standby mode (i.e., all of the methods are stopped).

1. On the analyzer display, push **F2**.
An illustration of the analyzer components used in the chemical analysis compartment shows on the screen. Refer to [Figure 10](#).
2. Push the icon on the screen to control the component. A control panel based on the selected component shows on the right side of the screen.

Figure 10 Status screen



3. If external components do not show on the screen, push **F2** > **Right arrow** > **DO** and select the external component to see it.
4. Based on the analyzer model, do a test on the components that follow.

Startup

Component	Description
Peristaltic pump(s)	Sets the pump to on and off to examine the operation. If there is no flow, examine if there is a blockage in the pump tubing between the two pump halves. Keep the drain pump set to on during the test to let fluids drain.
Micropump(s)	Sets the micropump to on and off to examine the operation. If the micropump does not operate during the start-up, there may be a blockage in the micropump duckbill (e.g., caused by calcium carbonate). Carefully flush the micropump with a syringe filled with demineralized water while the micropump is active. Enter a number of pulses and push Pulse . If the blockage continues and the micropump does not activate, replace the micropump duckbills. Refer to Replace the micropump duckbills on page 47.
Dispenser(s)	Examine the dispensers operation with the empty and filling button. If the Emergency stop button was pushed, startup the dispensers with the INIT button.
Drain/Level pinch valve(s)	Sets the pinch valve and drain pump to on and off to examine the operation. When the pinch valve is set to off and the drain pump is set to on, the analysis vessel is drained. When the pinch valve and the drain pump are set to on, the level procedure is done. If the component is not operating correctly, make sure that the tubing is not clogged or there is a blockage. Examine the tube position in the pinch valve. The tubing in the rear side is for level procedure. The tubing in the front is for drain procedure.
Stirrer	Sets the stirrer to on and off to examine the operation.
Colorimetric sensor	Do the steps that follow to examine the operation: <ol style="list-style-type: none">1. Fill the analysis vessel with water.2. Set the voltage of the sensor output to 9.5 V.3. Do a calibration.4. Absorbance output value is ~0 mAU.5. Drain the analysis vessel.6. Absorbance output value is approximately 300 mAU. If there is no difference in the result values, the photometer operation is not correct.
Titrimetric and ion-selective analyzer unit	Do the steps that follow to examine the operation: <ol style="list-style-type: none">1. Do a calibration.2. Drain the analysis vessel.
Stream selection valve(s)	Sets the stream selection valve to on and off to examine the operation.

6.2 Do an input/output signal test

Do a test on the analyzer inputs/outputs before the unit is put into operation.

1. On the analyzer display, push **F2 > RIGHT** arrow.
A list with all of the installed components shows. Refer to [Figure 11](#).

Figure 11 Status submenus screen

DO		AO	DI	AI	
Nr	Name	Val.	Time	Meth.	
1	SP CW	Off	0	Free	▲
2	SP CCW	Off	0	Free	
3	DP CW	Off	0	Free	
4	DP CCW	Off	0	Free	E
5	DO5	Off	0	Free	
6	Stirrer	Off	0	Free	
7	Buffer	Off	0	Free	▼

< E-STOP >

2. Use the **LEFT** and **RIGHT** arrow keys to navigate the submenus.
3. Scroll down to select a component. Push the **E** button to open the control panel for the selected component.
4. Based on the analyzer model, do a test on the components in the table that follows.

Component	Description
DO (digital output)	Sets the digital output to on and off to examine the operation. Set a time (in seconds) and push start . The digital output will then be active (on) during the set number of seconds. Use the pulse option for micropumps. Enter a number of pulses and push pulse . Note: If a DO is linked to a program, the DO cannot be controlled manually while the program is active.
AO (analog outputs)	Sets the value (mA) at the analog outputs to examine the connection. Enter a value between 4 and 20 and push the Accept . The AO output supplies the value as a mA signal.
DI (digital inputs)	Shows the digital inputs, their value (True/False) and the programs to which they are linked.
AI (analog inputs)	Shows the analog inputs, their actual values, their status (OK/Alarm), and the programs to which they are linked. Push E to control the selected analog input. The sensors (AI) can be calibrated on the next screen. Select the sensor to start a calibration. If applicable, enter the values of the pH buffers used to calibrate the pH electrode.

6.3 Prime the reagents

Prime the reagents during startup and reagent replacement. The prime procedure flushes the reagent micropump tubing.

1. Push **F1 > Method > Priming**.
2. Wait until the priming procedure is complete.

Section 7 Operation

⚠ WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

7.1 Select the user level

Set the user levels to prevent accidental changes to the settings. When the analyzer is first started, the 'Automatic' user level shows.

When the analyzer is locked, the METHOD (F4) and CONFIG (F5) menus are not accessible. Select a higher user level to make changes to the method or the analyzer configuration. Do the steps that follow to change the user level.

1. Push **F1** to go to the Home screen.
2. Push the user label to edit the user.
3. Enter the password to change the user level:

Option	Description
Automatic	Factory-configured user. The automatic user level is also used for online operation.
User 1	Password: a. This user level has access to all menus but F4 and F5.
User 2	Password: b. This user level has access to all menus and submenus but some submenus and configuration are locked.
Administrator	Password: not released. Only used by Technical support. <i>Note: The administrator can change the access by user level.</i>

7.2 Method overview

The analysis procedure is saved in the analyzer methods. Methods are factory-programmed based on the analyzer model (e.g, Main, Free AI, Total AI). A maximum of nine methods are saved and configured in the analyzer. The method is configured with all of the necessary steps for the analysis. Each method is divided into seven subroutines: analysis, preconditioning, cleaning, priming and initialization. Each subroutine is divided into the necessary steps to complete the analysis.

Note: Select the method on the Main screen. The name of the method shows on the top-left corner of the Method screen.

If necessary, change the method to do the analysis a specified number of times or a continuous on-line analysis. If applicable, select from the available sample streams.

1. Push **F1 > Method > Playlist > Automatic sequence**.
2. Select an option.

Option	Description
Module	Selects the Analysis from the available subroutines.
CH	Sets the number of the sample stream. Select between 1 and 8.
#Runs	Sets the number of times the automatic sequence of the method is done. After the sequence is complete, the analyzer goes to standby mode.

3. To start a method, push **F1 > Method > Playlist > Start**.
Note: Push "Start with calibration off" to start the method and skip the calibration step.
Note: Set #Runs to 0 to operate the analyzer in continuous mode. The sequence is done continuously until a stop command is entered.
4. To stop a method go to **F1 > Method**

- Push **Stop** to stop the analysis at the end of the analysis cycle and set the analyzer to standby mode.
- Push **Abort** to cancel the method. The analysis cycle immediately stops and all of the outputs are set to off.

7.3 Software emergency stop

To stop all methods when the analyzer is in operation, do the steps that follow:

1. Push **F1** to go to the Home screen.
2. Push **E-Stop**.
A confirmation windows shows. Push **Stop** to stop all methods.

Note: If the analyzer is set to remote control, the analyzer automatically changes to local control.

7.4 View data

NOTICE

Only use the USB port to export analyzer data. If the USB port is used for other functions, such as to supply power to other devices, damage to the analyzer can occur.

The analyzer saves the data of the last 1000 measurements (including sample stream, date and time), the last 30 titration curves and a record of the messages and alarms. Use the USB port to export the data to a flash drive. Refer to [Product overview](#) on page 10.

1. Push **F3 > Database**.
2. Select the method and push **E**. A list of the measurements shows.
3. Push **Export** to send the data to the connected flash drive.

7.5 Do a calibration

The standard⁸ calibration procedure has the steps that follow:

- Three calibration cycles (#runs) of reagent REF1 on stream 9
- Three calibration cycles (#runs) of reagent REF2 on stream 10

The concentration of the solutions REF1 and REF2 and the number of cycles is user-programmable.

1. Push **F1 > Method > Calibrate**.
2. Push **Calibrate** to start the calibration procedure.
3. Push **Cal hist** to see the calibration history. A list with calibration results shows with the slope (A1) and offset (A0) values.
4. Push **F5 > Software > Results**.
5. Scroll down to select a result and push **E** to access the settings for the result. Push **Calibration** on the edit window to see the full calibration cycle with the results.
Note: From this screen, the user can make changes on the calibration settings. To save the configuration, go to the Software menu (F5).
6. To set the solutions concentration and number of cycles, push **F5 > Software > Results > Calibration > RIGHT** arrow key.

⁸ This procedure is a standard two-point calibration procedure. In some analyzers, a different calibration procedure is necessary (e.g., one-point calibration).

7.6 Do a clean cycle

1. Push **F1 > Method**
2. Push **Cleaning** to start a cleaning procedure.
3. Wait until the cleaning procedure is complete and the analyzer stops.

7.7 Remote control

Remotely control the analyzer over a Local Area Network (LAN) with a PC and commonly available VNC Ethernet software.

Do the steps that follow to set the analyzer operation to local or remote:

1. Push **F1 > Method**.
2. Push **Is Master > Toggle** to change the analyzer operation to remote control.
When the analyzer shows "Is Slave" on the Method screen, the analyzer is in remote operation.
Note: When the analyzer is in remote operation, the method can only be started remotely (i.e., by a digital inputs or Modbus communication).
3. Push **Is Slave** to change the analyzer back to local control.
4. Push **Abort** and confirm to set the analyzer back to local control.

7.8 Analyzer settings

The wet part modules, digital inputs and outputs, analog inputs and outputs, date and time and more analyzer settings are configured in the Configuration (F5) menu.

When the analyzer is in operation, it is not possible to change the configuration. Make sure to save the configuration after changes are made.

1. Push **F5 > Hardware**.
2. Select an option.

Option	Description
Config DO	Sets the digital outputs.
Config DI	Sets the digital inputs.
Config AI	Sets the dark current value of colorimeter if used for first time

3. Push **F5 > Software**.
4. Select an option.

Option	Description
Constants	Sets the constants values in the calculation results (e.g., sample volume, concentration, titrant and molecular weight).
Algorithms	Changes the algorithm settings used for the analysis.
Results	Lists the results of the analysis. Changes the settings for the results.
Group DO	Selects and groups DO actions (e.g., drain, sample, flush or level).
Alarms	Shows a list of the programmed alarms and their status. Enables or disables the alarms.
Times	Shows tables of different operation times.
CH interval	Shows a list of the channel intervals. Configures a maximum of 20 channel intervals.

Option	Description
CH DO	Shows a list of the configured DO channels. Selects and activates different operations for the channel.
Frequencies	Shows a list of the configured frequencies.
Reagents	Sets the reagent counter.
Methods and sequences	Shows more setting options for each method.

5. Push **F5 > Com (Communications)** .

6. Select an option.

Option	Description
Ethernet	Changes the Ethernet communication settings: IP, subnetmask and Default gateway.
Modbus configuration	Changes the Modbus configuration settings: RS232 or TCP/IP






7. Push **F5 > Options** .

8. Select an option.

Option	Description
About	Shows the software version of the analyzer.
Date and Time	Sets the date and time of the analyzer.
Screen	Changes the display settings: brightness and screensaver time. Shows the CPU and analyzer temperature. <ul style="list-style-type: none">• Cleaning: Sets the screen to off for some seconds for cleaning.• Calibrate: Calibrates the touchscreen.• Screensaver: Sets the screensaver activation time. Set to 0 to disable the screensaver.
Files export	Exports the analyzer configuration, the database or the method.
Files import	Imports the analyzer configuration from a flash drive. Note: A security code is necessary to import analyzer configurations.

9. When changes are completed, push **F5 > Hardware > Save config** to save the configuration.

Section 8 Maintenance

⚠ DANGER	
	Electrocution hazard. Remove power from the instrument before doing maintenance or service activities.
⚠ WARNING	
	Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.
⚠ WARNING	
	Pinch hazard. Parts that move can pinch and cause injury. Do not touch moving parts.
⚠ CAUTION	
	Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.
⚠ CAUTION	
	Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

8.1 Maintenance schedule

Table 10 shows the recommended schedule of maintenance tasks. Facility requirements and operating conditions may increase the frequency of some tasks.

Table 10 Maintenance schedule

Task	1 day	7 days	30 days	90 days	365 days	As necessary
Show the active alarms on page 40	X					X
Examine for leaks and malfunctions on page 40	X					X
Prepare and replace the reagents on page 40		X	X			
Examine and clean the electrode on page 41		X				
Calibrate the pH electrode on page 41		X	X			
Calibrate the analyzer on page 41			X	X	X	
Clean the analyzer components on page 41		X	X			
Clean the drain tubing on page 42			X			
Replace the peristaltic pump tubing on page 42				X		
Replace the dispenser syringe on page 44					X	
Replace the dispenser valve on page 45					X	
Replace the tubing on page 46					X	
Replace the electrodes on page 46					X	
Calibrate the photometer with bi-distilled water on page 46					X	

Table 10 Maintenance schedule (continued)

Task	1 day	7 days	30 days	90 days	365 days	As necessary
Replace the micropump duckbills on page 47					X	
Replace the fuses on page 48						X

8.2 Show the active alarms



A red box for alarms and an orange box for messages shows on the Home screen for new messages or alarms. Do the steps that follow to show the messages or alarms that occurred:

1. To see the active messages and alarms, push **F3** > **RIGHT** arrow key (2x) > **Message**.
2. To reset an alarm, scroll to select a message or alarm, then push the **Acknowledge (A)** button.
Note: Some messages and alarms are automatically reset.
3. To see a list of the saved messages and alarms, push **F3** > **RIGHT** arrow key (3x) > **History** to see a list of all of the messages and alarms that occurred on the analyzer.

8.3 Examine for leaks and malfunctions

1. Make sure that all of the components in the analyzer cabinet are operating correctly (e.g, pumps, valves, dispensers, photometer/electrode and stirrer). Refer to [Do a test on the components](#) on page 31.
Do a measurement to examine the photometer/electrode measurement values. If the values are not the usual result, do a calibration.
2. Examine all of the components in the analysis compartment, the connectors and tubings for leaks.
3. Examine the reagent, zero, calibration and cleaning solutions and the sample stream connections. Make sure that the connections are tight and with no leaks.
4. Examine the air pressure connection. Make sure the air pressure is correct (6 to 7 bar for pneumatic valves activation or 1 to 2 bar for enclosure air purge).

8.4 Prepare and replace the reagents

⚠ WARNING	
	Fire hazard. The user is responsible to make sure that sufficient precautions are taken when the equipment is used with methods that use flammable liquids. Make sure to obey correct user precautions and safety protocols. This includes, but is not limited to, spill and leak controls, proper ventilation, no unattended use, and that the instrument is never left unattended while power is applied.
⚠ CAUTION	
	Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.
NOTICE	
Do not mix new reagents with old reagents. Discard the old reagents before new reagents are added to bottles.	

1. Reagents and solutions are supplied by the user. Use only reagents supplied by a certified company. As an alternative, follow the instructions from the Method&Reagent Sheet from the specific application (EZxxxx) on the manufacturer's website to prepare the reagents.
2. Discard the old reagents from the bottles. If necessary, rinse the bottles with tap water.
3. Fill the bottles with new reagents. Make sure that the tube touches the bottom of the bottle. Make sure that the tube is not twisted and does not have a blockage.

8.5 Examine and clean the electrode

The electrode maintenance is based on the type of electrode. Refer to the information supplied with the electrode.

8.6 Calibrate the pH electrode

The calibration procedure is based on the type of electrode. Refer to the information supplied with the electrode.

8.7 Calibrate the analyzer

The calibration procedure of the analyzer is based on the analyzer method. Refer to [View data](#) on page 36.

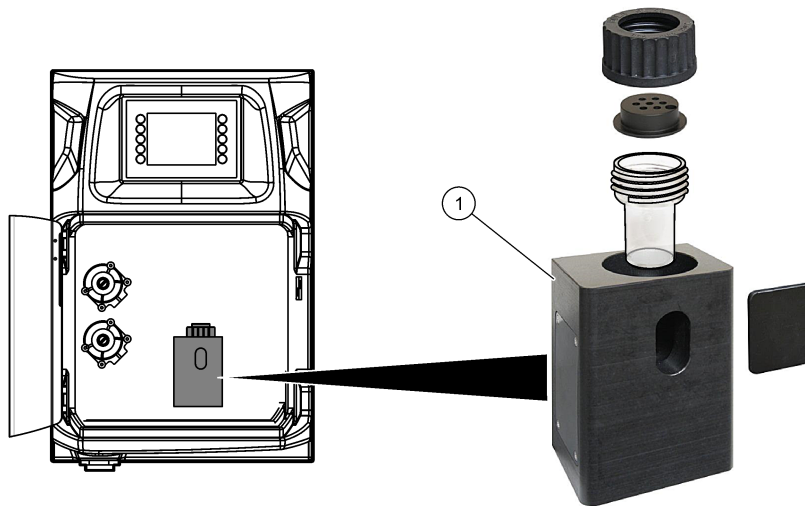
8.8 Clean the analyzer components

Do a cleaning cycle to automatically clean the analyzer components. Refer to [Do a clean cycle](#) on page 37.

If the cleaning cycle does not remove all of the dirt in the analyzer components or unclog the tubing and valves, do a manual cleaning as follows:

1. Use a syringe filled with demineralized water to flush tubings, pumps and valves to remove blockages.
Replace the tubing and valves that stay clogged.
Note: *If micropumps stay clogged, examine the micropump duckbills and replace if necessary. Refer to [Replace the micropump duckbills](#) on page 47.*
2. Drain and disassemble the analysis vessel. Clean the analysis vessel components with a moist cloth. Dry with a soft cloth. Refer to [Figure 12](#).
3. Make sure that all tubing connected to the analysis vessel is at the correct position after maintenance.

Figure 12 Analysis vessel



1 Analysis vessel

8.9 Clean the drain tubing

Make sure that the external drain tube does not have a blockage. Clean if necessary.

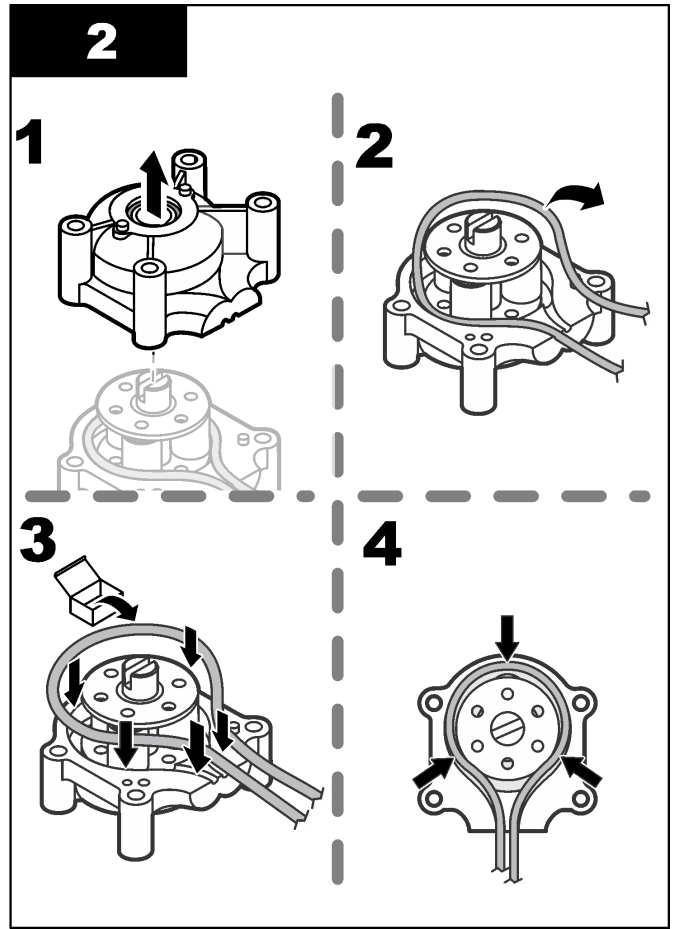
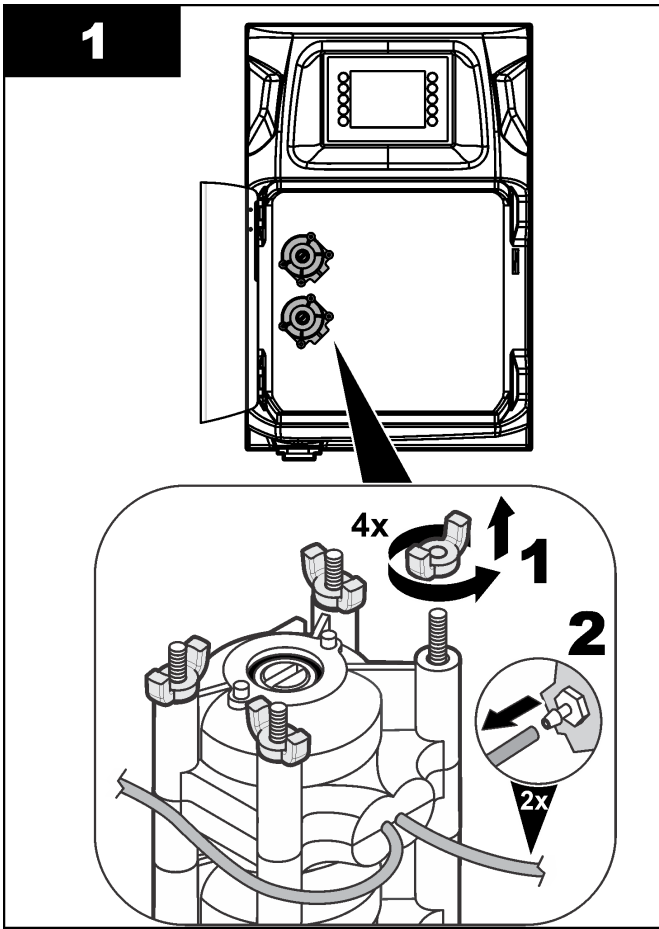
8.10 Replace the peristaltic pump tubing

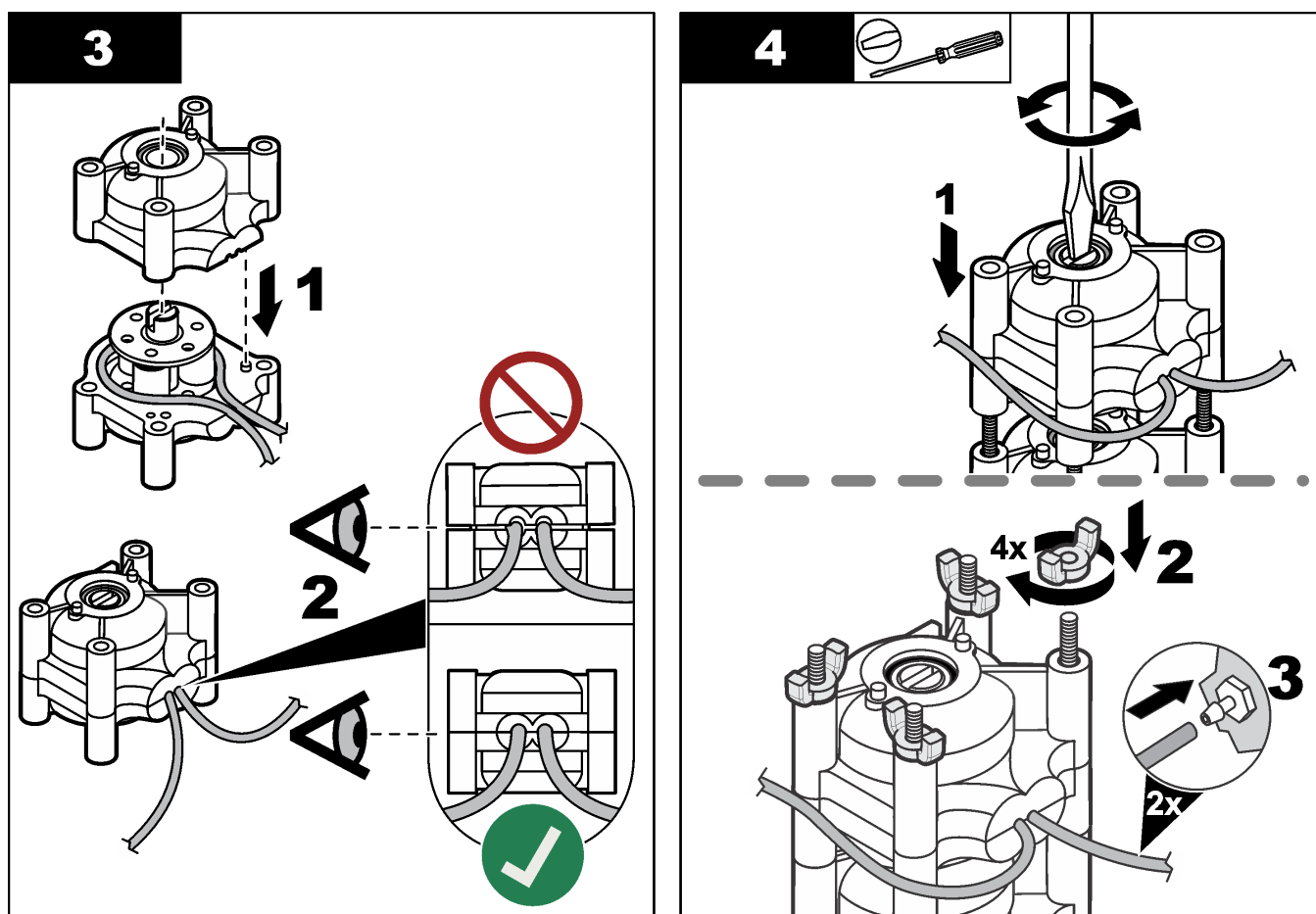
The peristaltic pump is used to:

- Drain and rinse the analysis vessel.
- Add the cleaning and validation solution and the sample.
- Remove the excess of sample when used as a leveling system.

The peristaltic pump has a motor and a peristaltic pump head. Replace the peristaltic pump tubing regularly for the best analyzer performance. Refer to the illustrated steps that follow.

Note: When the procedure is complete, set the pump to on to make sure the pump operates correctly.





8.11 Replace the dispenser syringe

⚠ CAUTION



Personal injury hazard. Glass components can break. Handle with care to prevent cuts.

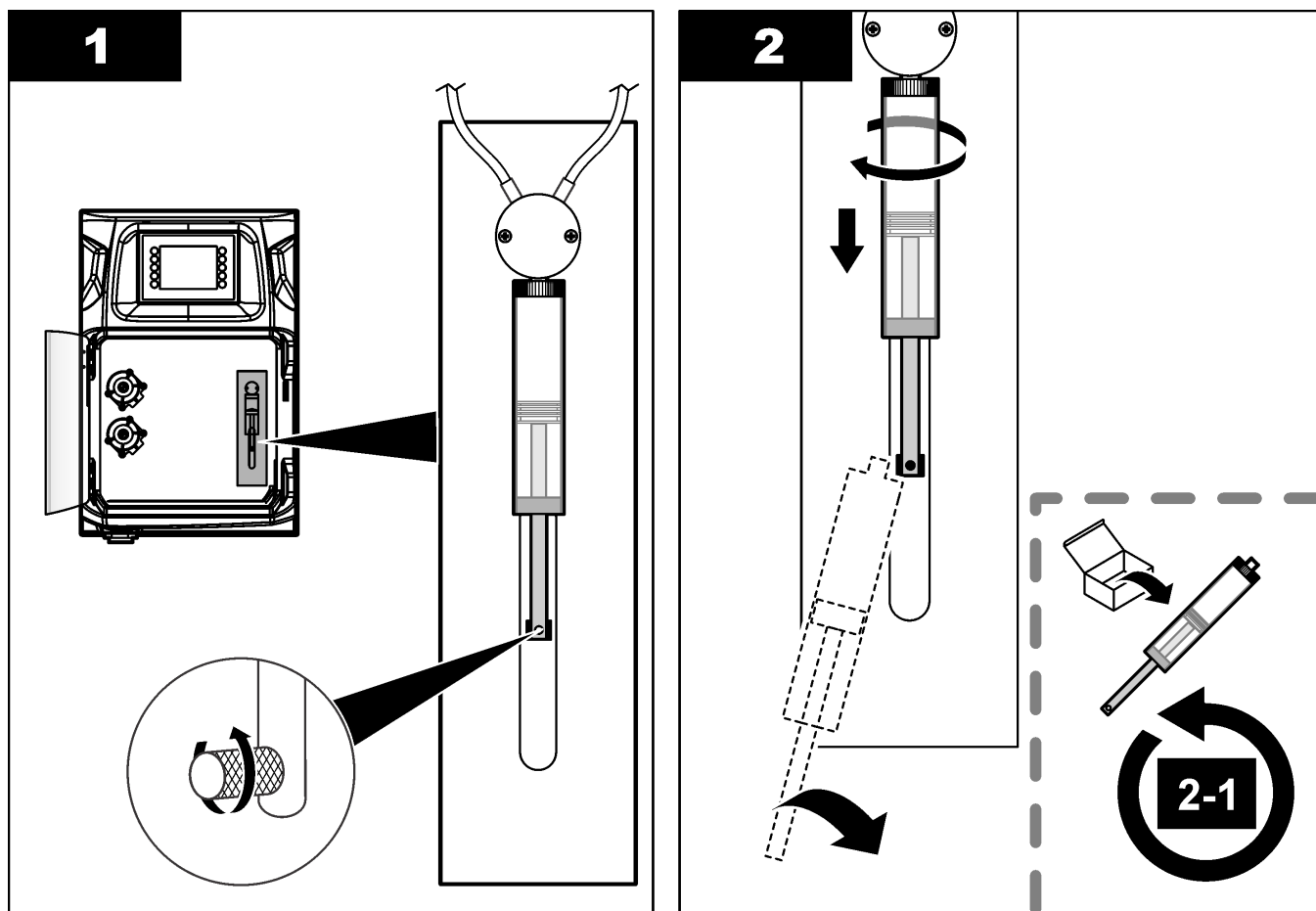
NOTICE

Carefully push the syringe upwards when a new piston is installed. The thread on the dispenser valve is easily damaged.

The analyzer uses the dispenser to accurately dose a volume of liquid during titration or dilution. The dispenser has a syringe, a valve and a stepper motor. The syringe has a glass cylinder and a plunger.

Do the steps that follow to replace the dispenser piston:

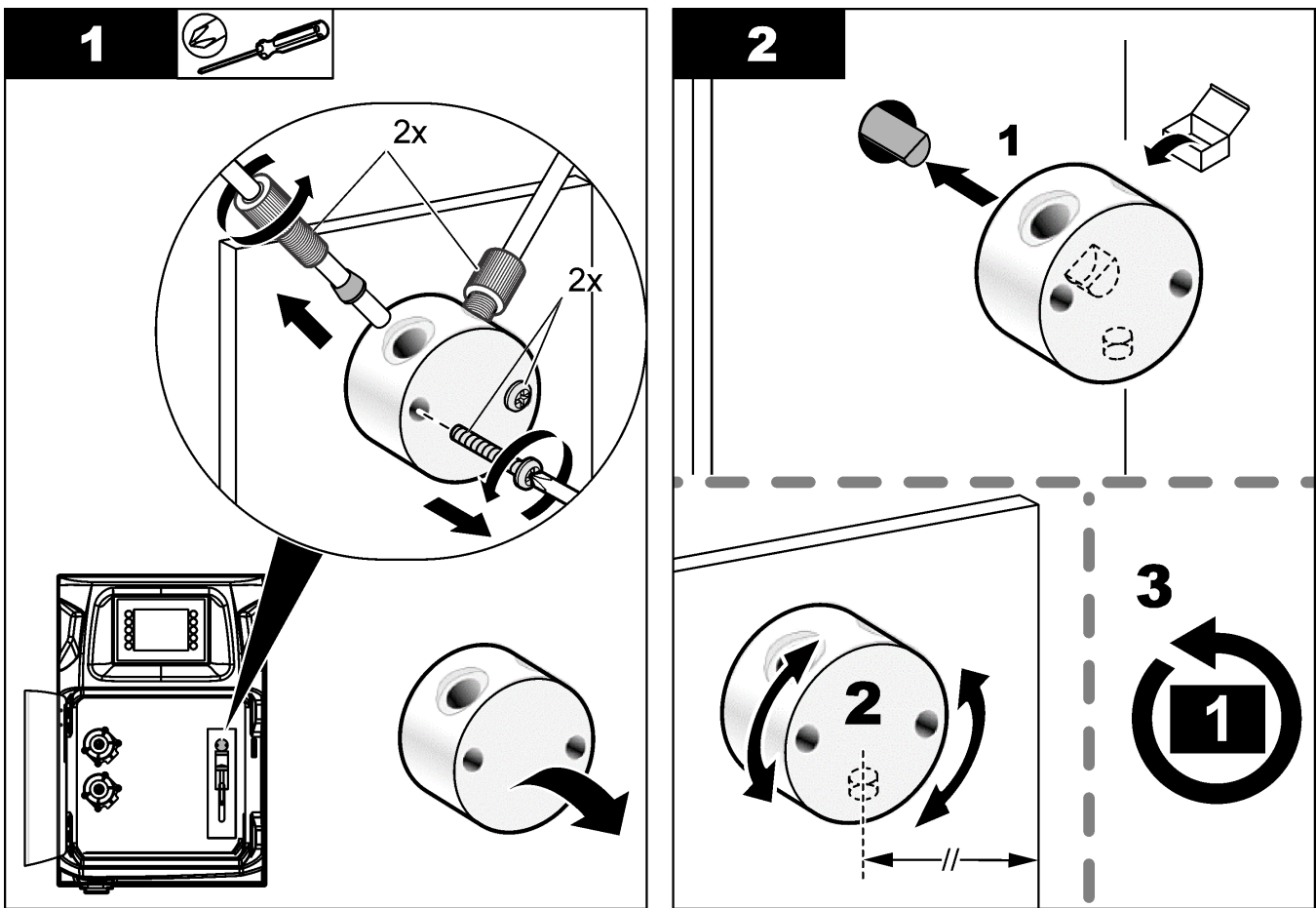
1. Flush the dispenser piston with deionized water to remove the reagent.
2. Fill the dispenser with air to remove the deionized water.
3. Dose half of the syringe volume to put the syringe plunger in the middle position.
Note: Set the drain pump to on during this step.
4. Do the steps in the illustrated steps that follow.
5. When the procedure is complete, push **F2** > **Dispenser** > [select dispenser] > **E** > **Init** to start the dispenser operation.



8.12 Replace the dispenser valve

Do to the steps that follow to replace the dispenser valve:

1. Flush the dispenser piston with deionized water to remove the reagent.
Note: Set the drain pump to on during this step.
2. Remove the deionized water from the dispenser (fill the dispenser with air).
Note: Set the drain pump to on during this step.
3. Remove power to the analyzer.
4. Remove the syringe. Refer to [Replace the dispenser syringe](#) on page 44.
5. Replace the valve. Refer to the illustrated steps that follow.
6. Apply power to the analyzer. Set the analyzer to on.
7. Fill the dispenser with reagent. Examine for leaks.
8. When the procedure is complete, push **F2 > Dispenser > [select dispenser] > E > Init** to start the dispenser operation.



8.13 Replace the tubing

Replace all of the analyzer tubing: pinch valve tubing, sample tubing, reagents tubing, drain and rinse tubing. Tubing sets are available based on the analyzer model.

1. Replace the tubing and make the connections at the same fittings.
2. When the procedure is complete, start the analyzer and look for leaks.

8.14 Replace the electrodes

The usual lifespan of an electrode is approximately one year with standard laboratory use, but the actual lifespan of the sensing module can change based on the type of samples. Replace the electrode when the slope decreases and readings start to drift. Before an electrode is replaced, make sure that the unusual measurements are caused by a defective sensing module.

Refer to the documentation supplied with the electrode for additional information.

8.15 Calibrate the photometer with bi-distilled water

1. Fill the analysis vessel with demineralized water.
2. Set the voltage of the sensor output to 9.5 V.
3. Do a calibration.
The absorbance output value is ~0 mAU.
4. Drain the analysis vessel.

The absorbance output value is approximately 300 mAU.

5. If no difference is seen between the two absorbance output values, the photometer is not operating correctly.

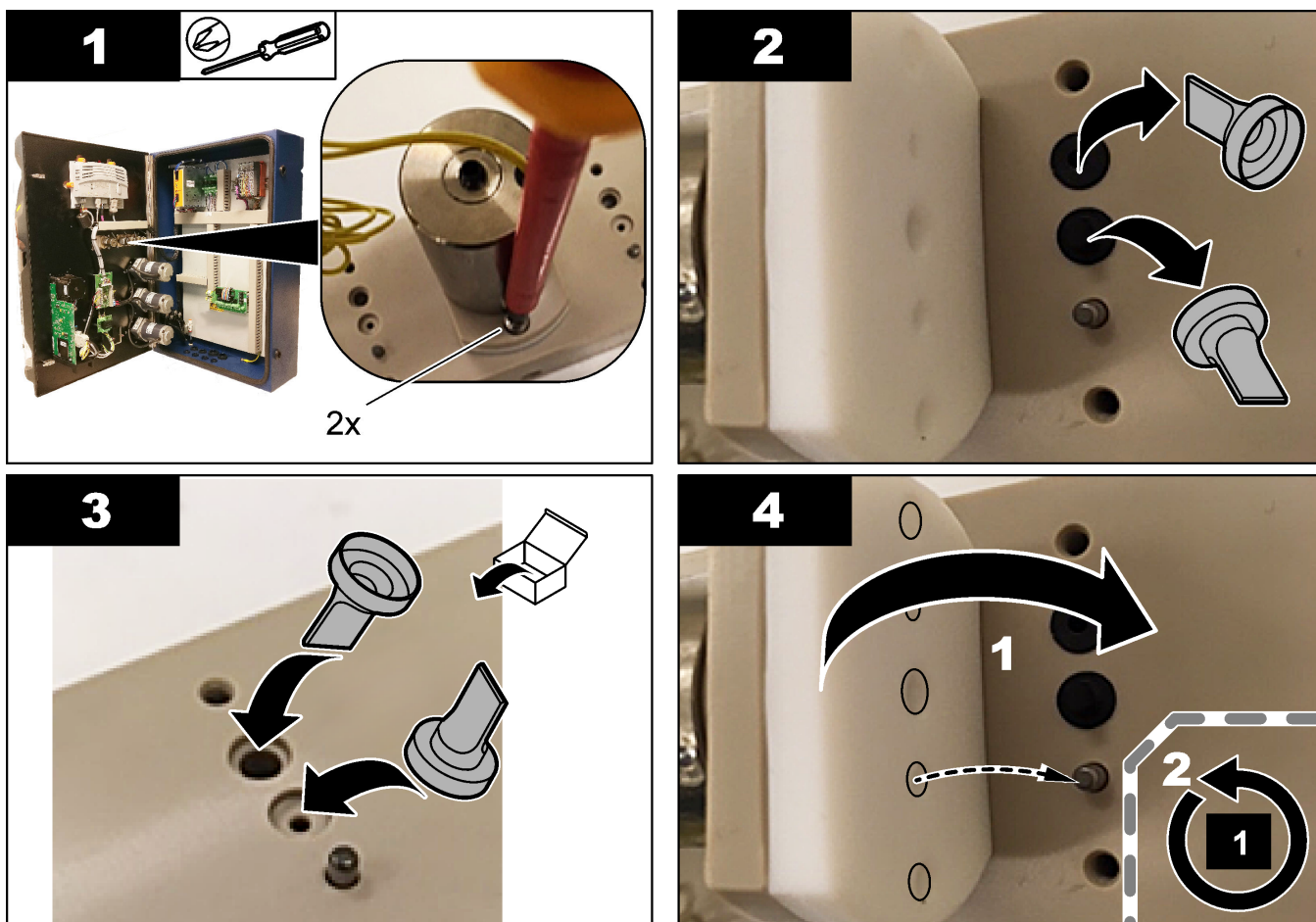
8.16 Replace the micropump duckbills

Micropumps are used to dose the reagents into the analysis vessel or to dilute the sample. Each pulse of the micropump doses about 50 μl ($\pm 1\%$) of liquid. There are two types of micropumps available: standalone or installed on a manifold.

When the micropump duckbills are replaced, make sure the duckbill valves stay in the correct position or the micropump will not operate correctly.

1. Open the electrical cabinet.
2. Remove the micropump valve.
3. Remove and discard the micropump duckbills.
4. Select the position for the micropump on the manifold. Put a duckbill valve with the top down in the upper position on the manifold. In the lower position, place the duckbill with the top pointed towards the outside.
5. Install the micropump motor. Use the metal pin on the manifold to install the motor in the correct position.

Note: The metal pin on the manifold only fits on the micropump in one way.



8.17 Replace the fuses

⚠ DANGER



Electrocution hazard. Remove power from the instrument before this procedure is started.

⚠ DANGER

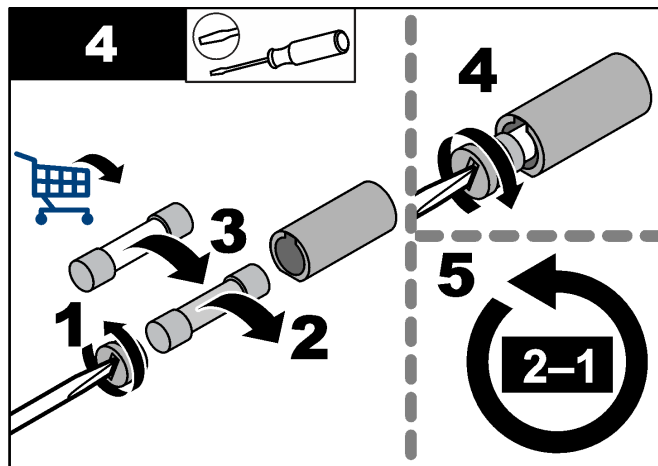
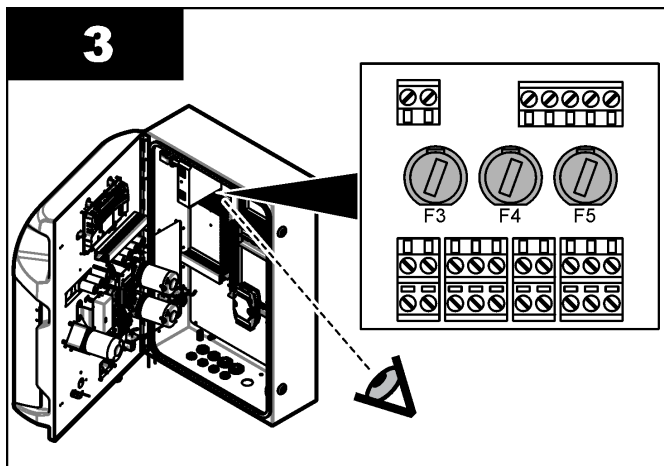
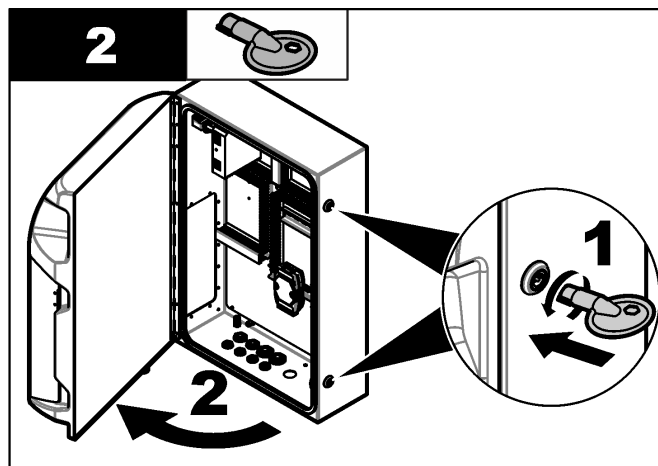
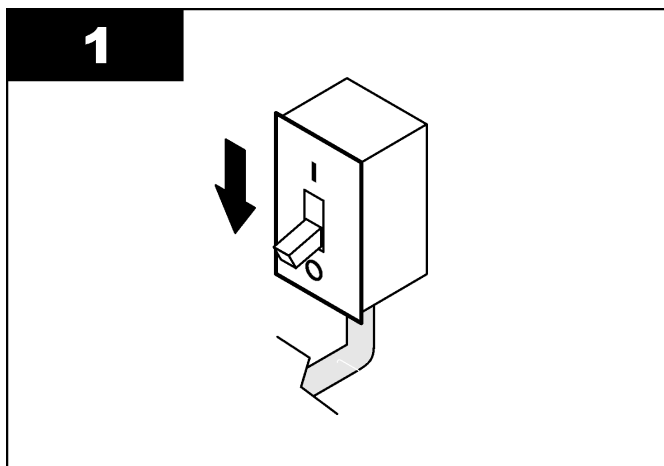


Fire hazard. Use the same type and current rating to replace fuses.

Use only fuses that have the specified current and triggering characteristics. An incorrect fuse can cause injury and damage. Find the cause of a blown fuse before the fuse is replaced. The analyzer has the three fuses that follow:

- F3: Fuse for the power supply, the PC and the controller, 1 A
- F4: Fuse for the power supply for the valves and pumps, 3.15/4 A
- F5: Fuse for the sensor, 500 mA

Refer to the illustrated steps that follow to replace a fuse.



8.18 Shut down the analyzer

Do the steps that follow to prepare the analyzer to be stopped for a long period (more than 3 days):

1. Rinse the sample tubing, reagent tubing, dispenser and analysis vessel with de-mineralized water or a cleaning solution.
2. Drain the analyzer to remove all of the liquid.
3. Remove power from the analyzer.
4. Remove the electrodes from the analysis vessel. Keep the electrodes with the supplied electrode cap. Fill the electrode cap with electrolyte so the electrode does not become dry during storage.
5. Close the filling gap with the supplied plug to prevent evaporation of the electrolyte.
Note: For storage, do not keep the electrodes in de-mineralized water. Demineralized water significantly decreases the lifespan of the electrodes.

Section 9 Troubleshooting

Refer to the following table for common problem messages or symptoms, possible causes and corrective actions.

Error/Warning message	Possible cause	Solution
Analysis results are unstable	Micropump is defective	Make sure the reagents are dosed correctly and there is no air in the tubing.
	Peristaltic pump is defective	Make sure that the drain and sample pump are operating correctly.
	Valve is defective	Make sure that the valves (sample, REF1, REF2, clean) are operating correctly.
	Stirrer is defective	Examine if there is a magnetic stirrer bar in the analysis vessel and if the solution is stirred during analysis.
	Dispenser is defective	Make sure that the dispenser piston is filled with liquid and that there is no air in the tubing.
	The position of tubes in the analysis vessel is not correct	Examine the position of the tubing in the analysis vessel. Make sure that the drain tubing is at the back side of the analysis vessel and in the ringlets. Other tubing should be above the liquid level.
	The reagents have expired.	Prepare a new set of reagents when the reagent bottles are empty. Flush/Prime all tubing before a measurement is started.
E-stop/ Reinitialize the dispenser!	When Emergency stop is pushed, the dispenser stops and must be started again.	Examine the dispenser. Push F2 > Dispenser to start the dispenser again.
Sensor pH/mV error	The pH or mV electrode are defective or not connected.	Examine if the electrode is connected correctly. Examine the electrolyte level in the electrode, refill if necessary.
Titration error	The titration did not measure an EP or the maximum amount of titration solution was added without getting an endpoint pH or mV.	<ul style="list-style-type: none"> Examine if sample solution goes into the vessel. Examine if the dispenser is filled. Make sure that the sensing part of the electrode is fully in the sample. Make sure that the electrode is filled with electrolyte solution. Examine the level of reagents and titrant solution. Fill if necessary.
Result alarm	The measured result is too high or lower than the set values in the results (F5 > Software > Results > Alarm).	<ul style="list-style-type: none"> Identify if the previous calibration measured correctly (slope ok?). Make sure that the sample concentration is correct. Identify if the vessel is clean. Clean if necessary.

Troubleshooting

Error/Warning message	Possible cause	Solution
Sample alarm	No sample found in the analysis vessel at the start of the analysis.	<ul style="list-style-type: none"> Examine if there is sample in the sample line. Make sure that there is not a blockage in the tubing. Make sure that the valves are operating correctly. Examine if the pinch valve tubing has a leakage or does not stay closed. Make sure that there is sufficient sample in the vessel and the photometer operates correctly.
Dispenser alarm	Dispenser is defective	Examine the dispenser. Push F2 > Dispenser to start the dispenser again.
Event alarm (No air pressure)	There is no pressurized air.	Examine if the pressurized air is connected and set to on.
DI Alarm (No air pressure, flow alarm)	The external components are defective (e.g., flow sensor, air pressure sensor)	Examine the connection and status of the components.
Calculation alarm	There is a mistake in the programming of the calculation result or when the infinite result was measured (divide by 0).	Examine the calculation formulas and the measurement (AI).
No stream selected	The method was started with no streams selected in the automatic sequence.	Push F1 > Method > Playlist > Automatic sequence and select one or more stream for the method.
Battery discharged	The battery in the display is discharged. Time and date settings can be lost when power is removed.	Replace the battery in the display. Refer to Figure 6 on page 19.

Section 10 Replacement parts and accessories

WARNING



Personal injury hazard. Use of non-approved parts may cause personal injury, damage to the instrument or equipment malfunction. The replacement parts in this section are approved by the manufacturer.

Note: *Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.*

Refer to the manufacturer's website to find the replacement parts and accessories based on the analyzer part number.

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