

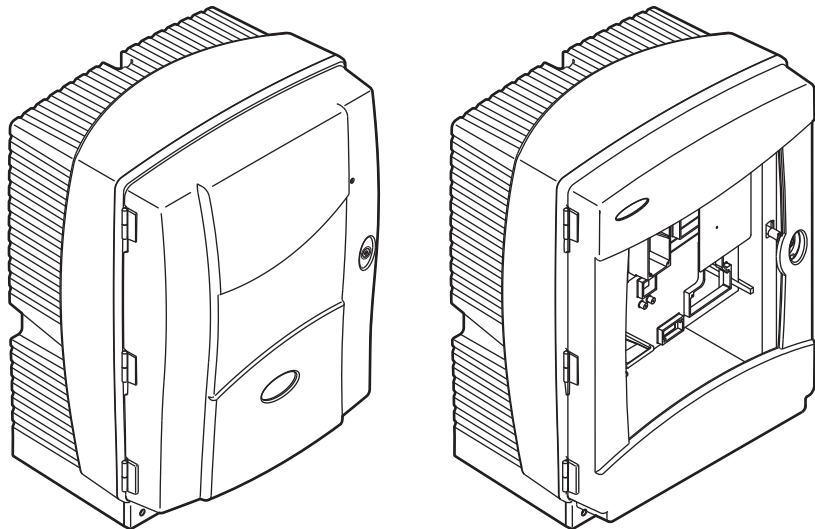


DOC026.53.00025

AMTAX sc, AMTAX indoor sc

USER MANUAL

05/2021, Edition 9



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Section 1 Specifications

Specifications are subject to change without notice.

Enclosure rating	AMTAX sc: IP55 AMTAX indoor sc: IP54
Enclosure material	ASA/PC UV-resistant
Measuring method	GSE (Gas-Sensitive Electrode)
Measuring range	0.02 to 5.0 mg/L NH ₄ -N
	0.05 to 20 mg/L NH ₄ -N
	1 to 100 mg/L NH ₄ -N
	10 to 1000 mg/L NH ₄ -N
Detection limit	0.02 mg/L NH ₄ -N (0.02 to 5.0 mg/L NH ₄ -N Measuring Range)
	0.05 mg/L NH ₄ -N (0.05 to 20 mg/L NH ₄ -N Measuring Range)
	1 mg/L NH ₄ -N (1 to 100 mg/L NH ₄ -N Measuring Range)
	10 mg/L NH ₄ -N (10 to 1000 mg/L NH ₄ -N Measuring Range)
Measuring accuracy (with standard solution)	≤ 1 mg/L: 3 % + 0.02 mg/L
	>1 mg/L: 5 % + 0.02 (0.02 to 5.0 mg/L NH ₄ -N Measuring Range)
	3 % + 0.05 mg/L (0.05 to 20 mg/L NH ₄ -N Measuring Range)
	3 % + 1.0 mg/L (1 to 100 mg/L NH ₄ -N Measuring Range)
Repeatability (with standard solution)	4.5 % + 10 mg/L (10 to 1000 mg/L NH ₄ -N Measuring Range)
	3 % + 0.02 mg/L NH ₄ -N (0.02 to 5.0 mg/L NH ₄ -N Measuring Range)
	2 % + 0.05 mg/L (0.05 to 20 mg/L NH ₄ -N Measuring Range)
	2 % + 1.0 mg/L (1 to 100 mg/L NH ₄ -N Measuring Range)
Response time (90 %)	2 % + 10 mg/L (10 to 1000 mg/L NH ₄ -N Measuring Range)
	Measuring Range: 0.02 to 5 mg/L NH ₄ -N
	0.02 to 0.2 mg/L NH ₄ -N: 3 measurements (shortest 15 minutes)
	0.2 to 5 mg/L NH ₄ -N: 1 measurement (5 minutes)
Adjustable measuring interval	Measuring Ranges: 0.05 to 20 mg/L; 1 to 100 mg/L and 10 to 1000 mg/L NH ₄ -N
	< 5 minutes
	5 to 120 minutes
Power supply	Power supply with power cable only using the sc1000 controller (analyzer, Filter Probe sc and drain tubing: 115 V versions or 230 V versions)
Data transmission	Data transmission with data cable on the sc1000 controller
Electrical power consumption	500 VA
Electrical fuse protection	Via sc1000 controller Maximum of 2 analysis instruments for each sc1000 controller.
Outputs	Relay, current outputs, bus interface via sc1000 controller
Operating temperature	AMTAX sc: -20 to 45 °C (-4 to 113 °F); 95 % relative humidity, non-condensing AMTAX indoor sc: 5 to 40 °C (41 to 104 °F); 95 % relative humidity, non-condensing
Storage temperature	-20 to 60 °C (-4 to 140 °F); 95 % relative humidity, non-condensing 4 to 55 °C (39 to 131 °F); 95 % relative humidity, non-condensing (electrode)
Sample temperature	4 to 40 °C (39 to 104 °F)
Sample pressure	With continuous sample preparation -30 mbar to +50 mbar at overflow vessel
Sample flow	Range: 1.0 L/h-20.0 L/h
Sample quality	Ultra filtrated or comparable
Sample level	Level of liquid in basin with filtration probe must be below analyzer

Specifications

Permissible pH value of the sample	5 to 9
Permissible hardness range	≤ 50 °dH 8.95 mMol/L
Permissible chlorid range	≤ 1000 mg/L Cl ⁻
Dimensions (Figure 1, page 7, Figure 2, page 8)	AMTAX sc: (W × H × D) 540 × 720 × 390 mm (21,25 × 28,35 × 15,35 in.) AMTAX indoor sc: (W × H × D) 540 × 720 × 370 mm (21,25 × 28,35 × 14.5 in.)
Data and power cable lengths	2 m (80 in.) (from edge of enclosure)
Weight	AMTAX sc: Approx. 31 kg, without Filter Probe sc and without chemicals AMTAX indoor sc: Approx. 29 kg, without Filter Probe sc and without chemicals
Certifications	CE conform. Listed to UL and CSA safety standards by TUV.
Altitude	2000 m
Pollution Degree	2

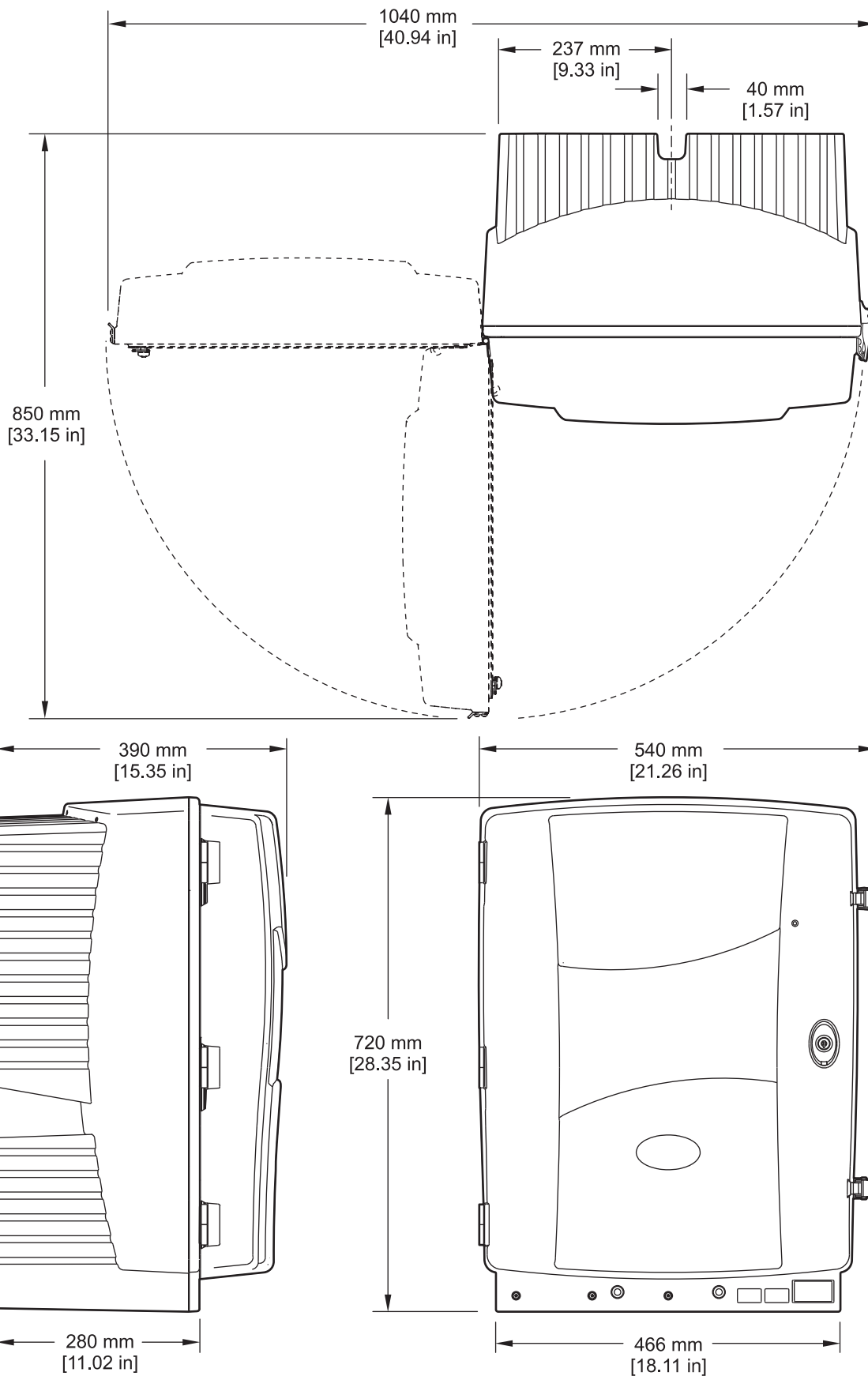


Figure 1 Instrument dimensions AMTAX sc

Specifications

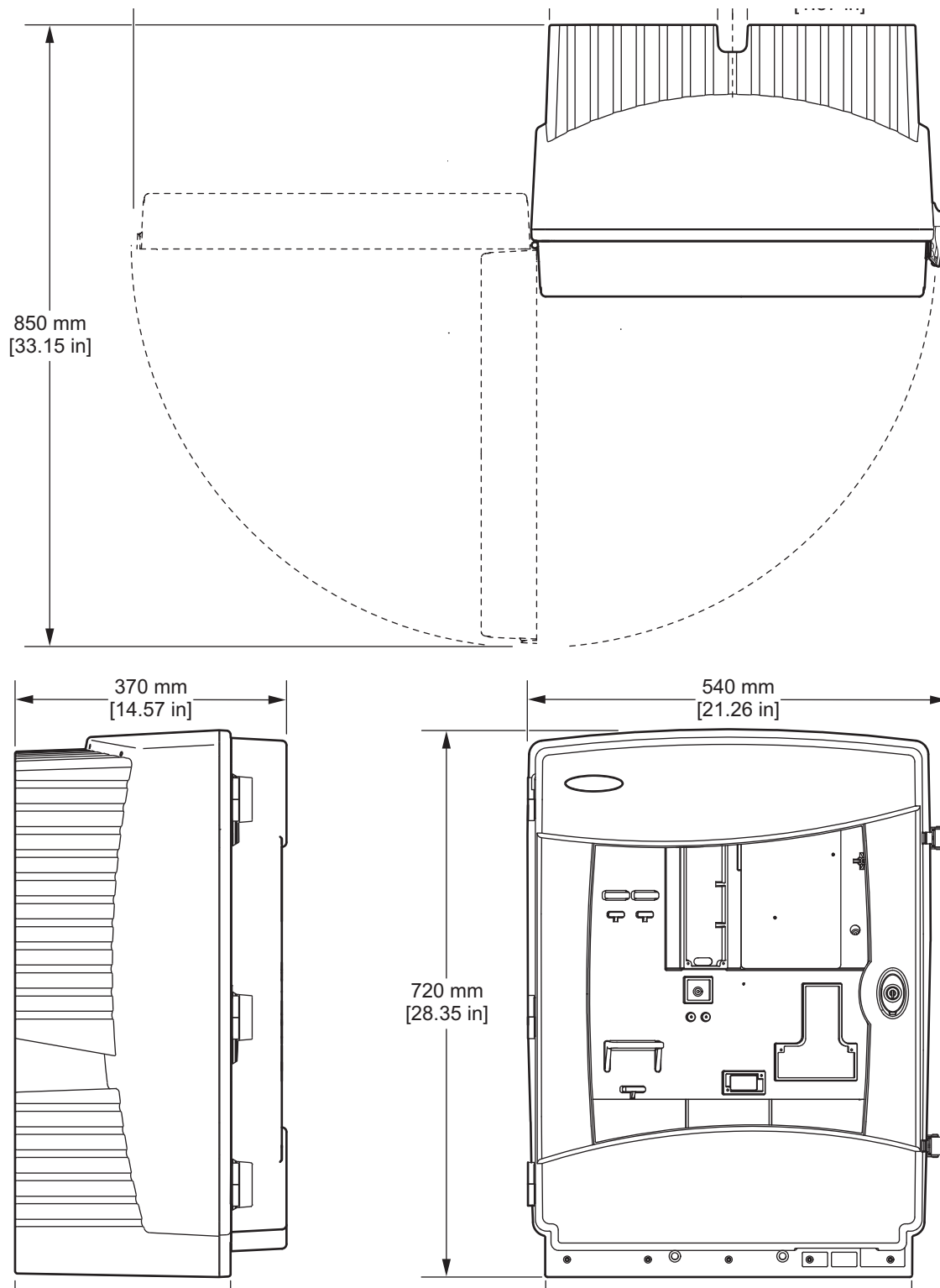


Figure 2 Instrument dimensions AMTAX indoor sc

Section 2 General Information

2.1 Safety information

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that specified in this manual.

2.1.1 Use of hazard information

DANGER

Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION








Indicates a potentially hazardous situation that may result in minor or moderate injury.

Important Note: Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.





Note: Information that supplements points in the main text.

2.1.2 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol, if noted on the instrument, will be included with a danger or caution statement in the manual.

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. Note: For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories and all auxiliary items for proper disposal.
	This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists.
	This symbol, if noted on the product, indicates the need for protective eye wear.
	This symbol, when noted on the product, identifies the location of the connection for Protective Earth (ground).
	This symbol, when noted on the product, identifies the location of a fuse or current limiting device.
	This symbol, when noted on the product, indicated that the marked item can be hot and should not be touched without care.

General Information

	This symbol, when noted on the product, 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, when noted on the product, indicated the presence of devices sensitive to Electro-static Discharge (ESD) and indicated that care must be taken to prevent damage with the equipment.
	When carrying or transporting the instrument/instrument components and if the total weight is more than 18 kg, make sure that suitable lifting equipment is used and/or that the instrument/instrument components are carried by 2 people.
	Danger! Do not reach into the device!

2.1.3 Change instrument labels

Several safety labels (3 in the analytical section) are applied to the instrument. If necessary, apply the correct language label over the existing safety labels.

2.2 Product overview

The AMTAX sc (Figure 3, Figure 4) measures the ammonium ions present in treated aqueous solutions (waste water, process water and surface water). The measured value is displayed in mg/L $\text{NH}_4\text{-N}$ on the controller. The AMTAX sc must be used in combination with the sc1000 controller. The sc1000 controller is used to configure, power and output the measured values.

Conversion formula: $\text{NH}_4\text{-N} : \text{NH}_4^+ = 1 : 1.288$

The AMTAX sc can operate using single or dual channel modes. Operation with the Filter Probe sc is single channel only. The sc analyzer can be converted from a single channel operation to dual channel operation. Contact the manufacturer for more information.

Dual channel operation is only possible with continuous sample preparation, e.g. FILTRAX or Ultrafiltration. Sample preparation and filtration must be provided before installing the analysis instrument.

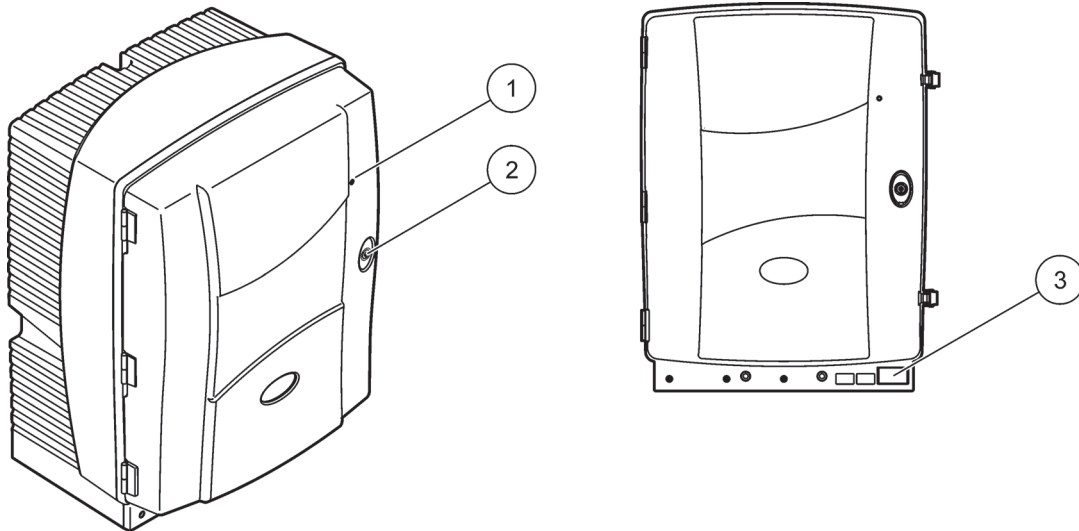


Figure 3 AMTAX sc enclosure

<p>1 LED for operating state. Refer to Table 9, page 57 for more information.</p>	<p>2 Door lock</p>	<p>3 Rating plate with model number, serial number, voltage and frequency information and power consumption information</p>
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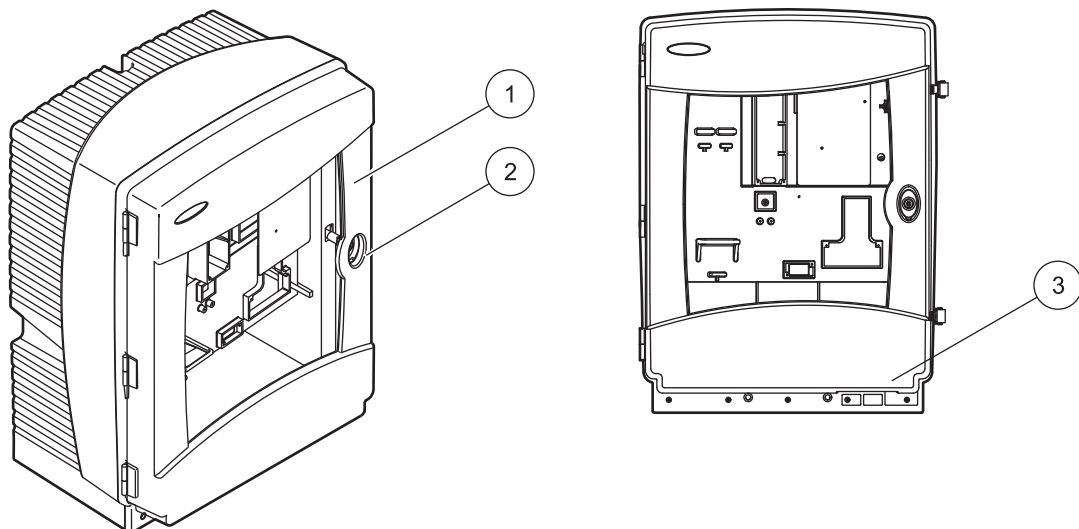


Figure 4 AMTAX indoor sc enclosure

<p>1 LED for operating state. Refer to Table 9, page 57 for more information.</p>	<p>2 Door lock</p>	<p>3 Rating plate with model number, serial number, voltage and frequency information and power consumption information</p>
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DANGER

Only qualified personnel should conduct the tasks described in this section of the manual.

CAUTION

The enclosure may tip forwards if it has not been fixed in place. Only open the enclosure if the enclosure is properly mounted.

DANGER

Potential danger in the event of contact with chemical/biological materials. Handling chemical samples, standards and reagents can be dangerous. Familiarize yourself with the necessary safety procedures and the correct handling of the chemicals before the work and read and follow all relevant safety data sheets.

Normal operation of this instrument may involve the use of hazardous chemicals or biologically harmful samples.

- **Observe all cautionary information printed on the original solution containers and safety data sheet prior to their use.**
- **Dispose of all consumed solutions in accordance with national regulations and laws.**
- **Select the type of protective equipment suitable to the concentration and quantity of the dangerous material at the respective work place.**

3.1 Basic installation overview

1. Unpack the instrument ([section 3.2](#)).
2. Mount the instrument ([section 3.3, page 14](#)).
3. Remove any transport locks ([section 3.4.2, page 19](#)).
4. Install the collecting tray and the humidity sensor ([section 3.4.3, page 21](#) and [section 3.4.4, page 22](#)).
5. Determine the appropriate installation option ([section 3.4.5, page 23](#)).
6. Mount the Filter Probe sc or Filtrax, if necessary. Refer to the appropriate manual for more information.
7. Connect the Filter Probe sc or Filtrax to the AMTAX sc, if necessary. Refer to [section 3.5.3, page 26](#) for the Filter Probe sc. Refer to the Filtrax manual for more information.
8. Connect the Drain Heating Connection, if necessary.
9. Make all plumbing connections ([Appendix A Plumbing and Connection Options, page 75](#)).
10. Install the reagents and prepare the Electrode and Electrolyte ([section 3.6, page 29](#) and [section 3.7.1, page 32](#)).
11. Connect the AMTAX sc to the sc1000 controller to supply power to the system ([section 3.8, page 34](#)).
12. Connect the data network ([section 3.9, page 35](#)).

3.2 Unpack the instrument

CAUTION

Pay attention to the weight (approximately 31 kg) of the instrument. Do not try to carry the instrument without assistance. Use only suitable lifting tackle for transport.

Open the shipping container while it is on its end and then slide the analyzer out of the cardboard. The items supplied will vary depending on the order. Standard items supplied for a minimal configuration include:

- AMTAX sc and user manual
- Collecting tray
- Initial set of reagent and cleaning solutions
2 standard solutions and electrolyte / membrane caps
- Fastening bracket and angle bracket
- Accessories for tubing and flow-through variant
- Plug set

3.3 Mechanical installation

Select a suitable place to install the instrument. Plan the mechanical installation before positioning posts or drilling holes. Refer to [Figure 1, page 7](#), [Figure 2, page 8](#) for instrument dimensions.

Make sure that the fastening has sufficient load bearing capacity (approximately 160 kg). The wall plugs must be selected and approved to suit the properties of the wall.

Plan cable and tubing routes to avoid sharp bends and tripping hazards.

When connecting two analyzers (e. g. for measuring two parameters with a FILTRAX or Ultrafiltration), plan where the instruments are to be installed and consider the length of the heated drain tubing (2 m).

3.3.1 Mount the instrument

The AMTAX sc can be mounted in three different ways:

- Wall Mount ([section 3.3.1.1](#)),
- Rail Mount; refer to the instruction sheet supplied with the Rail Mounting Hardware.
- Stand Mount; refer to the instruction sheet supplied with the Rail Mounting Hardware.

3.3.1.1 Wall mount

Refer to [Figure 5](#), [Figure 6](#) and following instructions to mount the analyzer to a wall.

1. Align and install the fastening bracket to the wall.
2. Attach the angle bracket to the instrument using the supplied screws.

3. Slide the bottom of the enclosure onto the fastening bracket.
4. Attach the enclosure to the fastening bracket.
5. Attach the angle bracket on the enclosure to the wall.

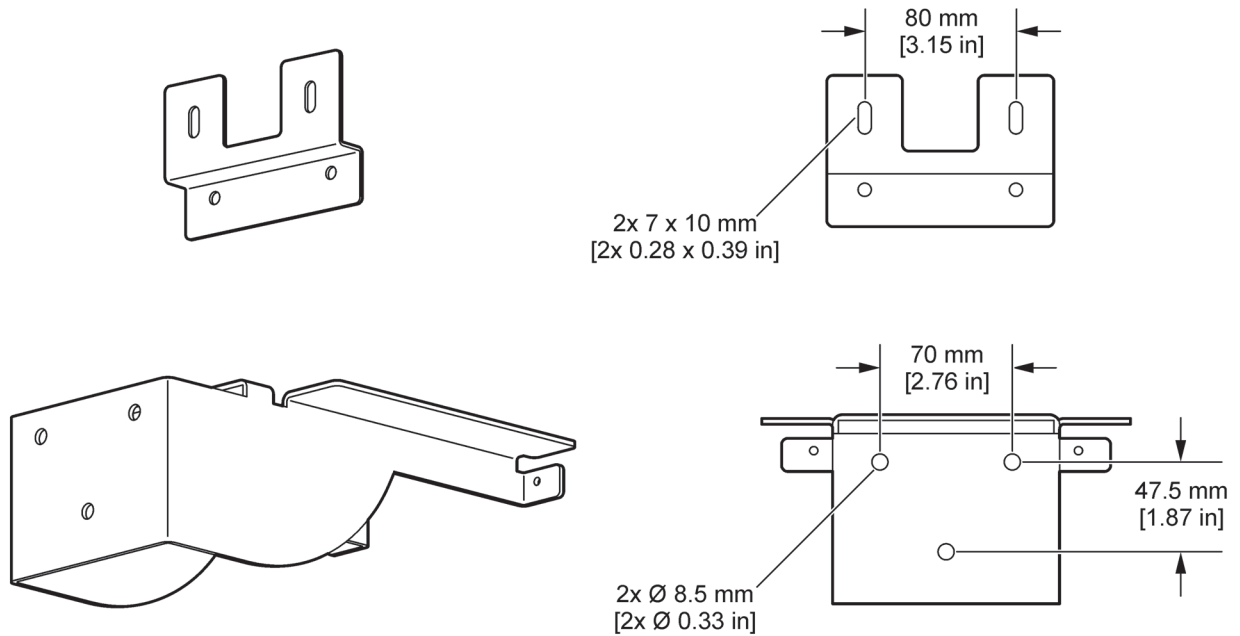


Figure 5 Bracket dimensions for wall mounting

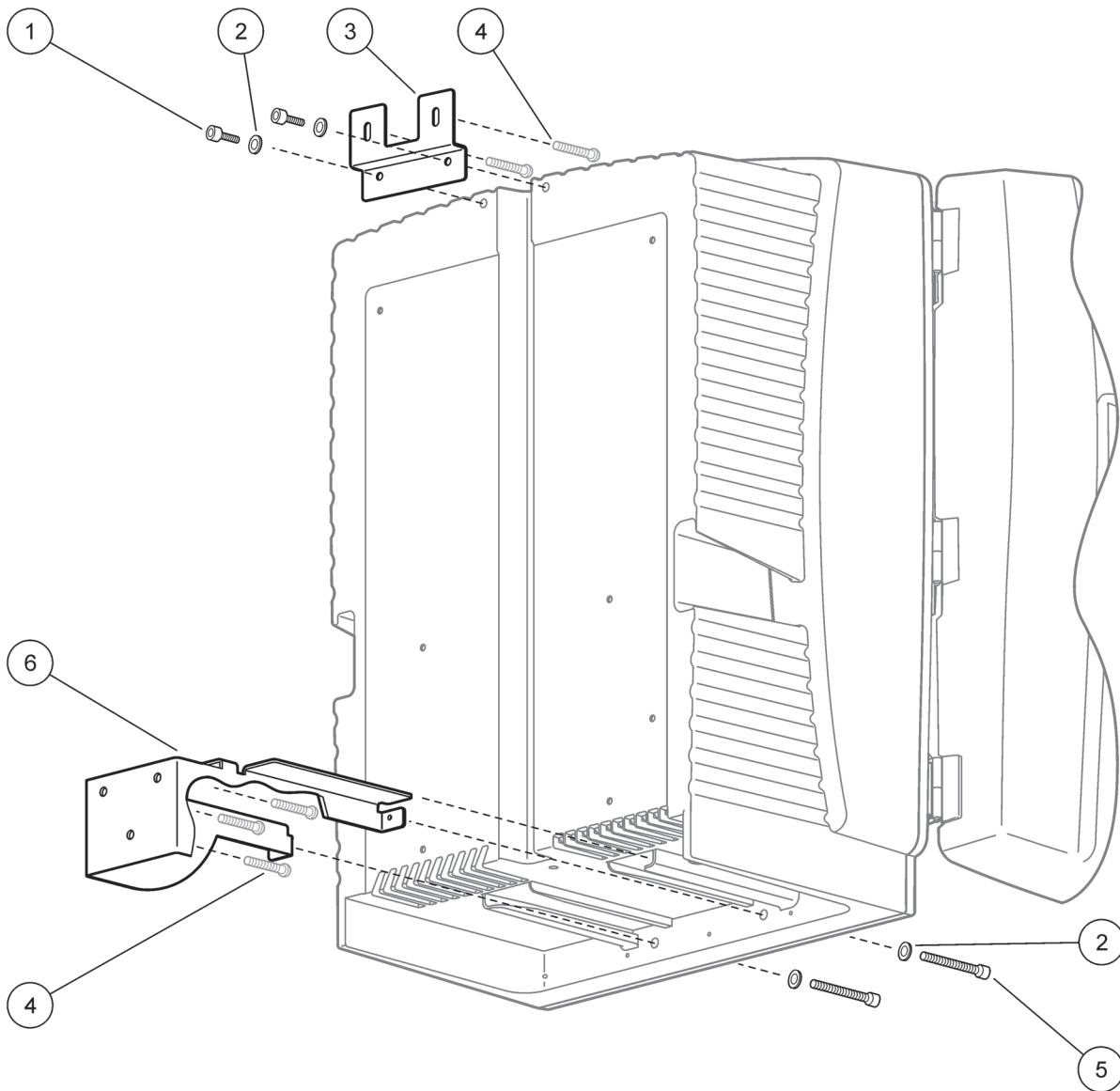


Figure 6 Wall mounting the analyzer

1	Socket head cap screw, M5 X 8 (2X)	4	Screw, customer supplied
2	Washer, M5 (4X)	5	Socket head cap screw, M5 X 40 (2X)
3	Angle bracket	6	Fastening bracket

3.4 Initial instrument setup

3.4.1 Open the enclosure

DANGER

To reduce the risk of electrical shock, make sure that no water can enter the enclosure or come into contact with circuit boards.

CAUTION

The enclosure may tip forwards if it has not been fixed in place. Only open the enclosure if the enclosure is properly mounted.

1. Unlock the instrument (item 4, Figure 7, item 3, Figure 8).
2. Open the side latches and release the door catch.
3. Open the door and secure the door using the hook or completely remove the door.

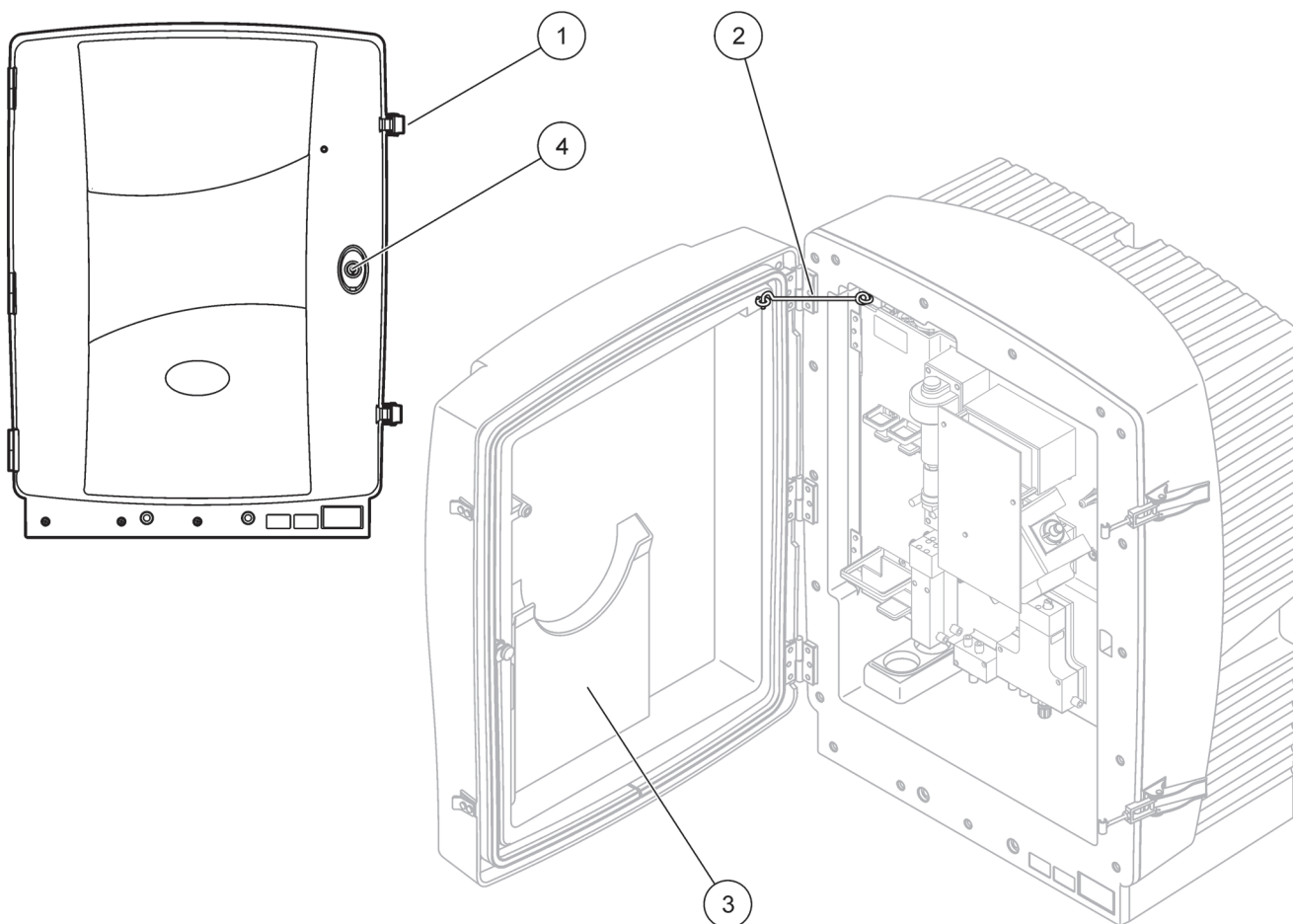


Figure 7 Open the enclosure AMTAX sc

1	Latches	3	Pocket for user manual
2	Door hook	4	Lock with key

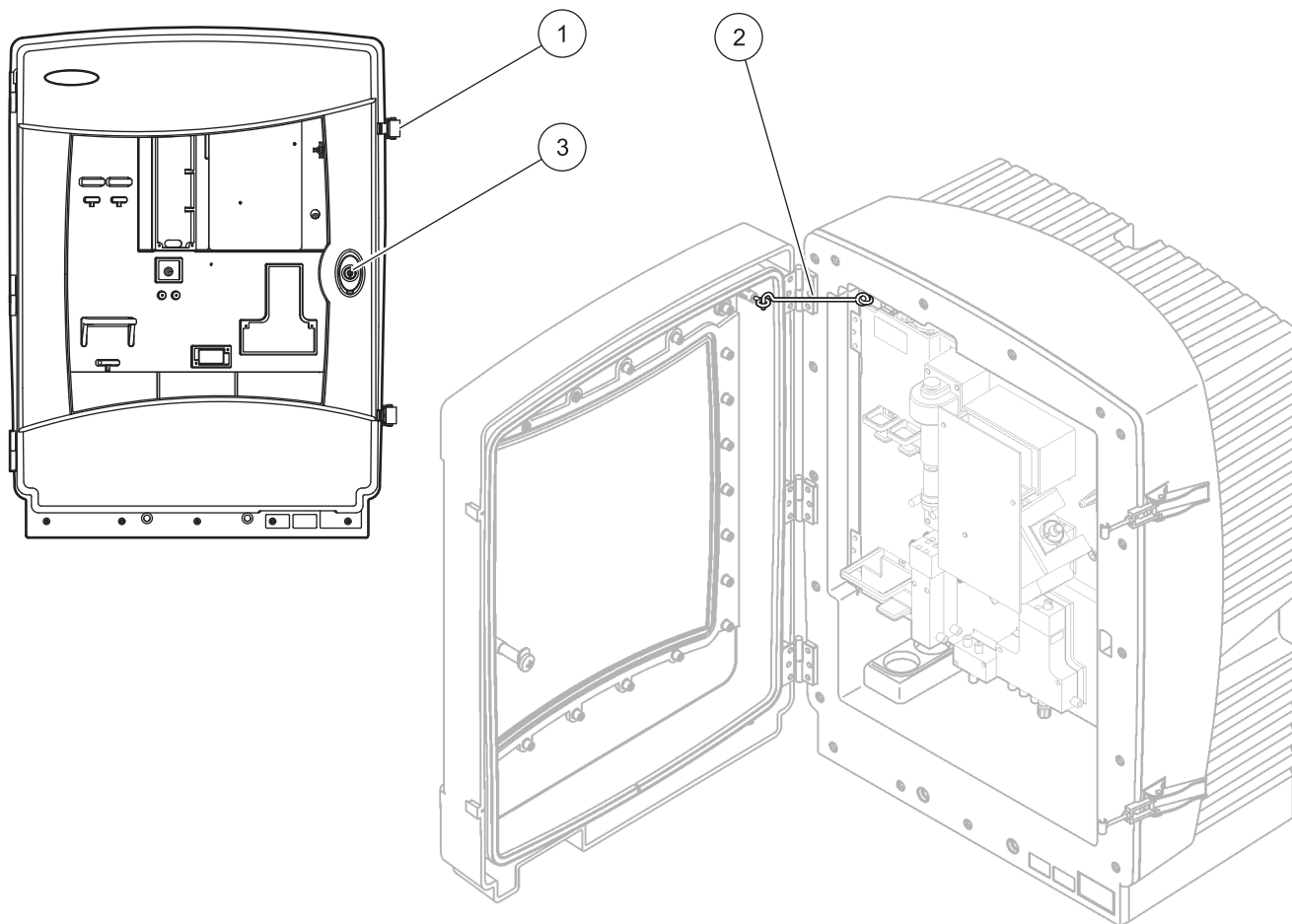


Figure 8 Open the enclosure AMTAX indoor sc

1 Latches	3 Lock with key
2 Door hook	

3.4.2 Remove the shipping transport locks

Prior to system start-up, the shipping transport locks must be removed from the sc analyzer.

CAUTION

The enclosure may tip forwards if it has not been fixed in place. Only open the enclosure if the enclosure is properly mounted.

Important note: The electrode insulation for the measuring unit is NOT a transport lock. Do NOT remove the cover on the measuring unit.

1. Open the enclosure door and secure with the door hook.
2. Remove the transport lock on the analyzer panel (Figure 9).

Note: If the instrument is operated with a Filter Probe sc, it is equipped with an internal compressor.

3. Remove the cable tie and pull out the compressor transport lock to the left (Figure 10).

Note: Keep the transport locks for transporting and storage.

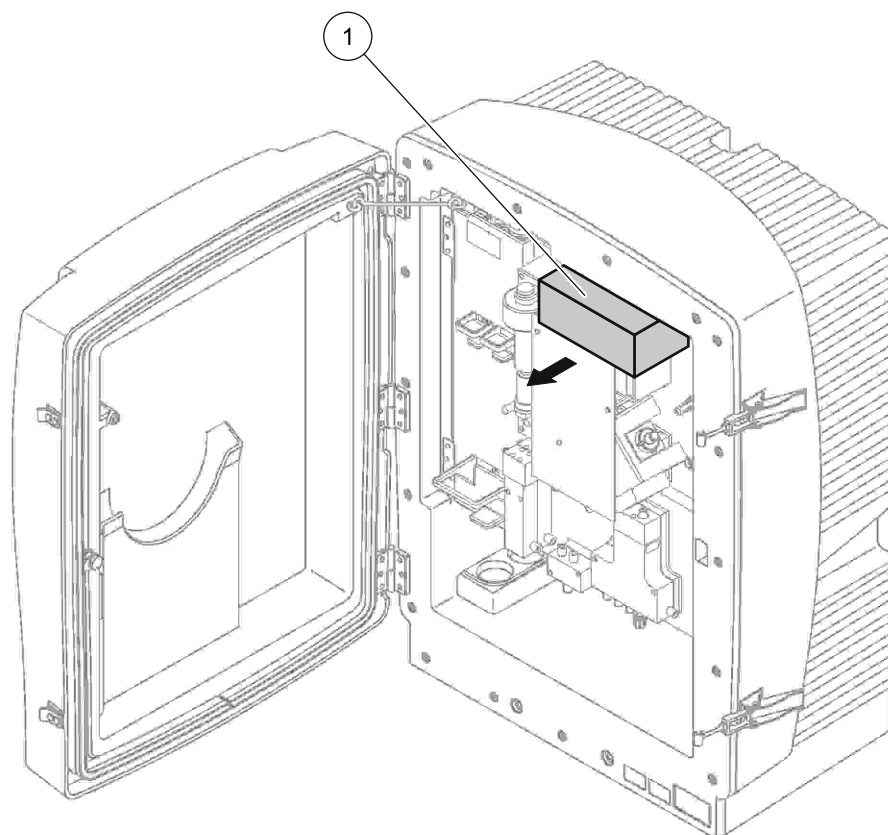


Figure 9 Remove the analyzer panel transport locks

1 Transport lock

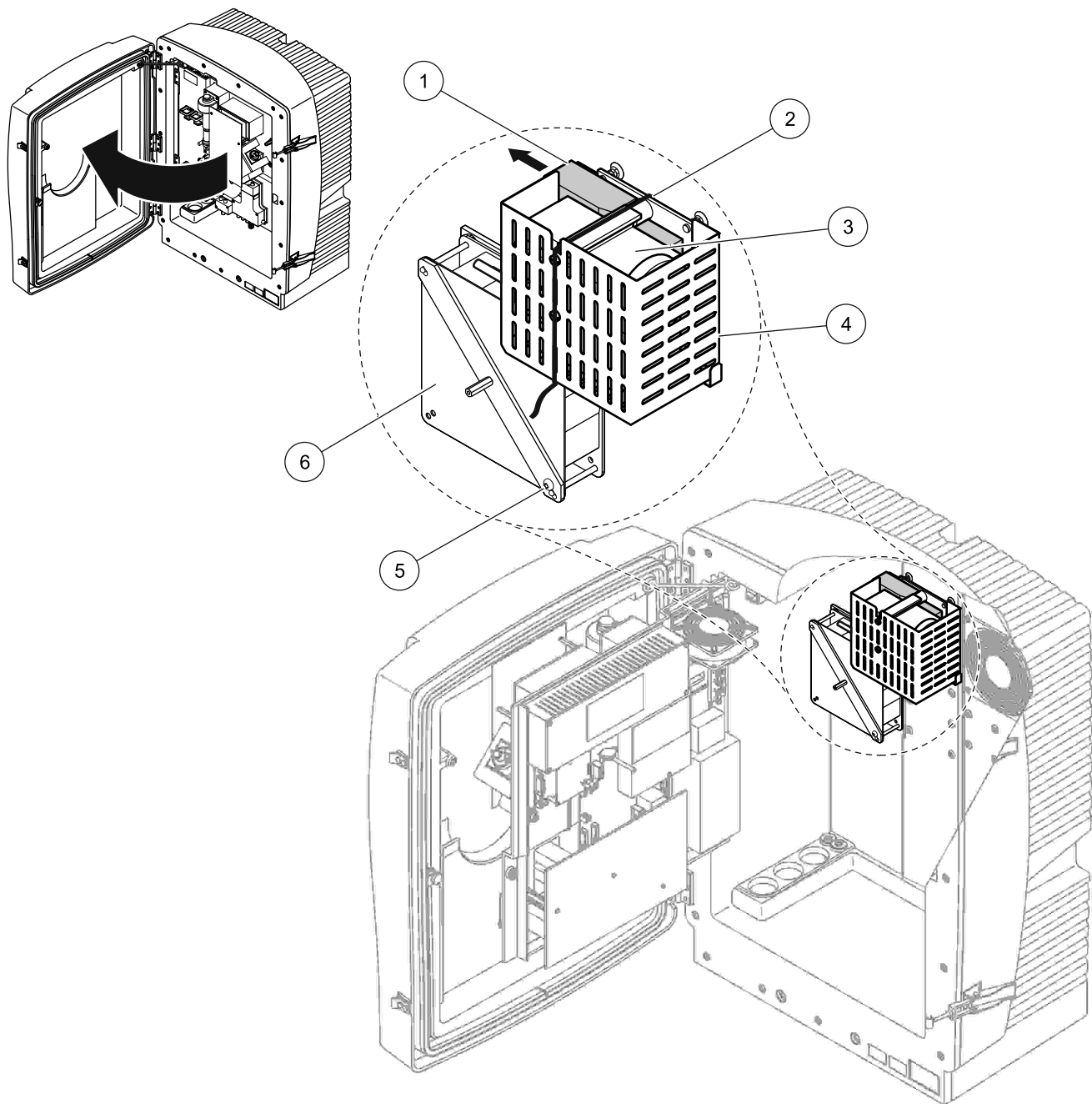


Figure 10 Compressor transport lock removal¹

1 Compressor transport lock	4 Protective cover for compressor
2 Cable tie	5 Fan locking screw
3 Compressor	6 Fan

¹ The compressor, compressor transport lock and cable tie only apply to sc analyzers that operate using the Filter Probe sc.

3.4.3 Installation of the collecting tray

CAUTION

The enclosure may tip forwards if it has not been fixed in place. Only open the enclosure if the enclosure is properly mounted.

1. Open the enclosure door and secure with the door hook.
2. Slide the collecting tray into the bottom of the enclosure (Figure 11).

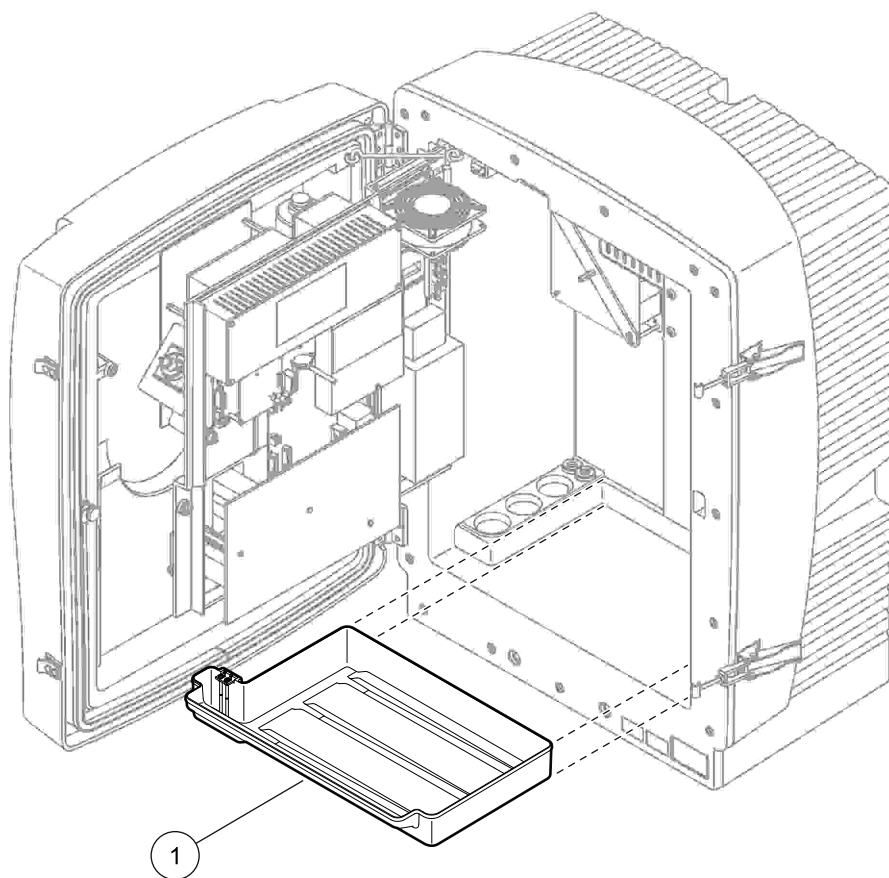


Figure 11 Installation of the collecting tray

1 Collecting tray

3.4.4 Connect the humidity sensor

CAUTION

The enclosure may tip forwards if it has not been fixed in place. Only open the enclosure if the enclosure is properly mounted.

1. Remove power from the instrument.
2. Open the enclosure door and secure with the door hook.
3. Connect the humidity sensor wires to the terminal screws on the collecting tray (Figure 12).

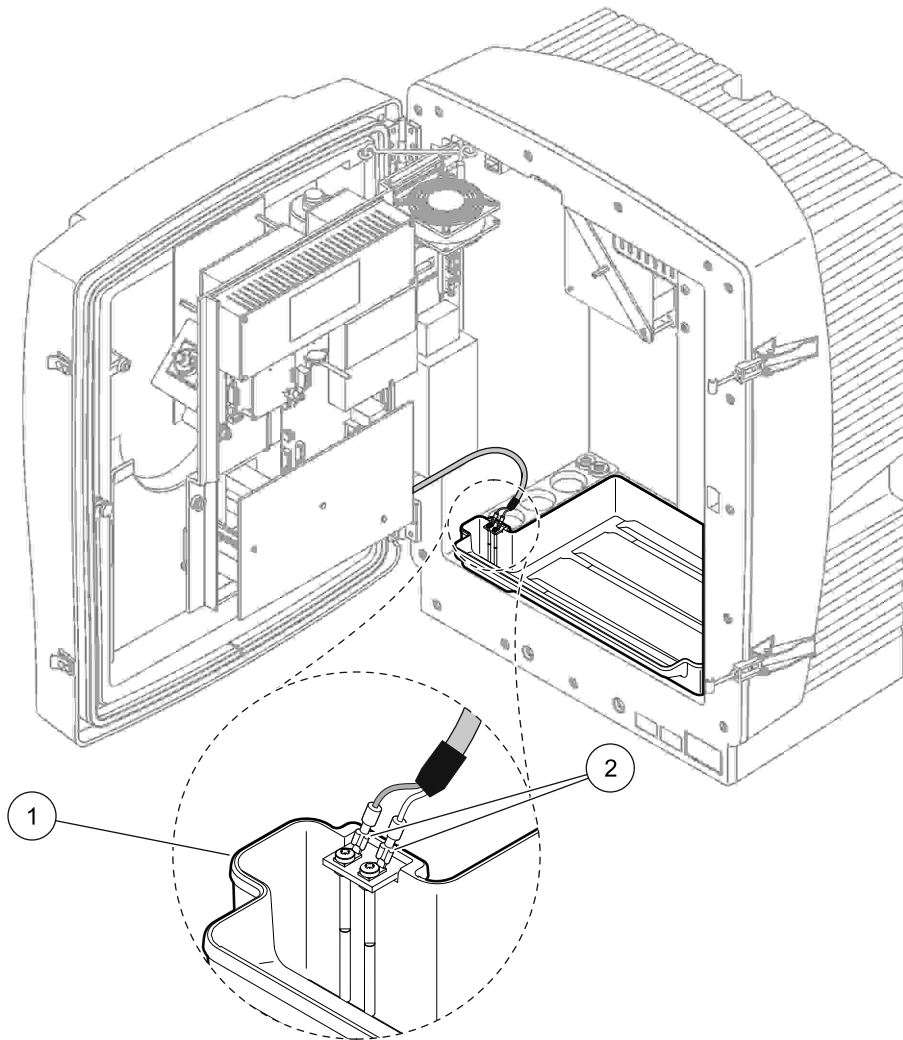


Figure 12 Connect the humidity sensor

1 Collecting tray

2 Humidity sensor connections

3.4.5 Determine the appropriate installation option

Before connecting tubing or cables, determine the option number that corresponds the system configuration. Refer to [Table 1](#). Based on the option number, determine the sealing plug that will be used to seal the enclosure openings, refer [Table 2](#).

When the option number is determined, refer to [Appendix A Plumbing and Connection Options, page 75](#) for installation information.

Table 1 System configuration options

Location	Filtration	Drain	Number of analyzers	Sample lines (Ch1, Ch2)	Number of parameter ¹	Option	
						#	Refer to the following section for more information:
OUTDOOR	Filter Probe sc	Any	1	1	1	1	A.5, page 78
	Filter Probe sc	Heated	1	1	1	2	A.6, page 80
	FILTRAX	Heated	1	1	1	3	A.7, page 82
	FILTRAX	2 heated	2	1	2	4	A.8, page 84
	2 FILTRAX	Heated	1	2	1	5	A.9, page 86
	2 FILTRAX	2 heated	2	2	2	6	A.10, page 88
INDOOR	Filter Probe sc	Unheated	1	1	1	7	A.11, page 90
	FILTRAX	Unheated	1	1	1	8 a	A.12, page 92
			2	1	2	8 b	A.13, page 94
	2 FILTRAX	Unheated	1	2	1	9 a	A.14, page 96
			2	2	2	9 b	A.15, page 98
	Continuous sample feed	Unheated	1	1	1	10 a	A.16, page 100
			2	2	2	10 b	A.17, page 102
	2 continuous sample feeds	Unheated	1	2	1	11 a	A.18, page 104
			2	2	2	11 b	A.19, page 106

¹ For 2-parameter options, refer to [Connect a 2-parameter option, page 76](#).

Table 2 Sealing plug types

Option	Analysis instrument 1			Analysis instrument 2		
	Opening 1	Opening 2	Opening 3	Opening 1	Opening 2	Opening 3
1	Plug 2	Plug 3	Plug 3	—	—	—
2	Plug 2	Plug 1	Plug 3	—	—	—
3	Plug 1	Plug 1	Plug 3	—	—	—
4	Plug 1	Plug 1	Plug 3	Plug 1	Plug 1	Plug 3
5	Plug 1	Plug 1	Plug 1	—	—	—
6	Plug 1	Plug 1	Plug 1	Plug 1	Plug 1	Plug 3
7	Plug 2	Plug 3	Plug 3	—	—	—
8	Plug 1	Plug 3	Plug 3	Plug 3	Plug 3	Plug 3
9	Plug 1	Plug 1	Plug 3	Plug 3	Plug 3	Plug 3
10	Plug 3	Plug 3	Plug 3	Plug 3	Plug 3	Plug 3
11	Plug 3	Plug 3	Plug 3	Plug 3	Plug 3	Plug 3

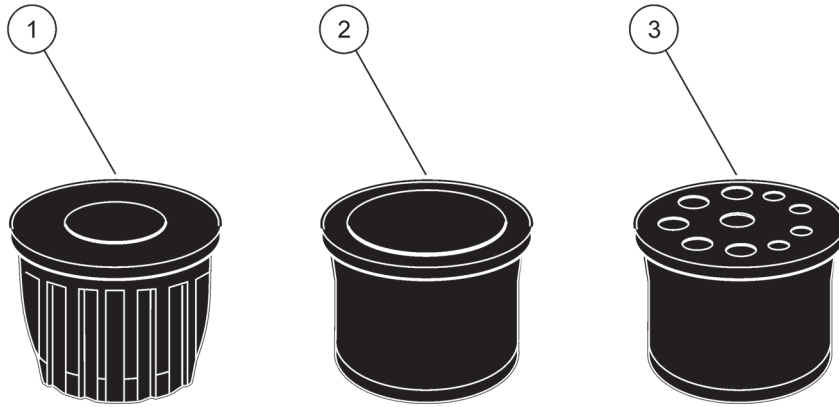


Figure 13 Sealing plug types

1	Sealing plug type 1
2	Sealing plug type 2
3	Sealing plug type 3

3.5 Electrical installation

DANGER

High voltage wiring connections are present under the protective cover. The protective cover must remain in place unless a qualified installation technician is installing wiring for the Filter Probe sc or the heated drain.

See [Figure 14](#) for protective cover removal.

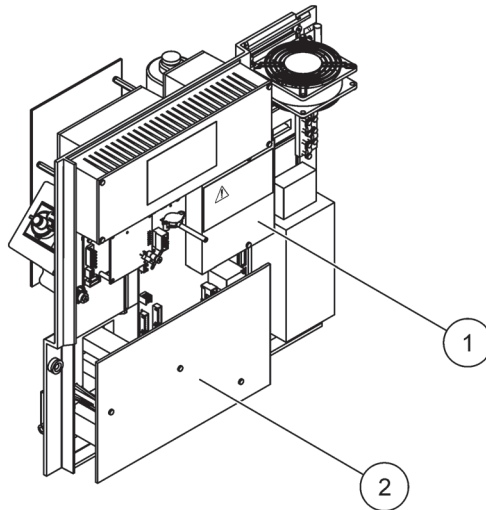


Figure 14 Remove the protective covers

1	Protective cover for AC mains circuits (Back view)
2	Protective cover for main PCB

3.5.1 Electrostatic Discharge (ESD) Considerations

Important Note: To minimize hazards and ESD risks, maintenance procedures not requiring power to the analyzer should be performed with power removed.

Delicate internal electronic components can be damaged by static electricity, resulting in degraded instrument performance or eventual failure.

The manufacturer recommends taking the following steps to prevent ESD damage to the instrument:

- Before touching any instrument electronic components (such as printed circuit cards and the components on them) discharge static electricity. This can be accomplished by touching an earth-grounded metal surface such as the chassis of an instrument or pipe or a metal conduit.
- To reduce static build-up, avoid excessive movement. Transport static-sensitive components in anti-static containers or packaging.
- To discharge static electricity and keep it discharged, wear a wrist strap connected by a wire to earth ground.
- Handle all static-sensitive components in a static-safe area. If possible, use anti-static floor pads and work bench pads.

3.5.2 Enclosure breakouts

There are four main enclosure openings to insert tubing and cables ([Figure 15](#)).

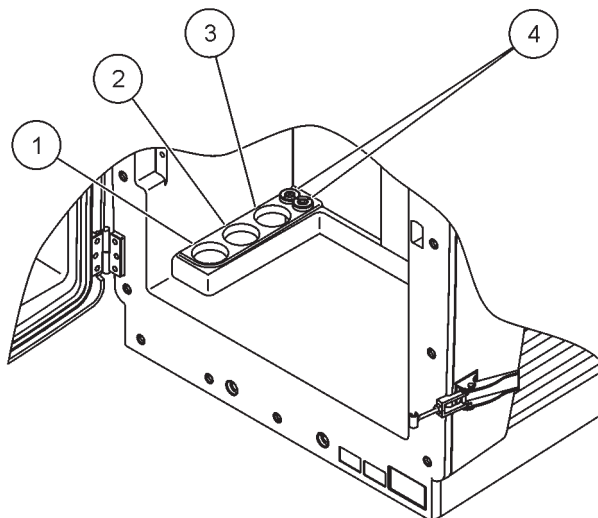
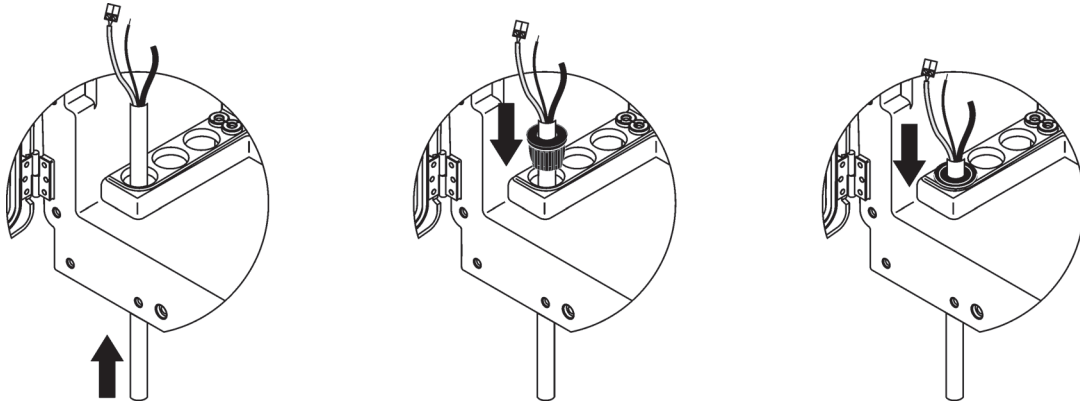


Figure 15 Enclosure breakouts

1 Sample feed or refer to Table 1, page 23 for tubing options.	2 Refer to Table 1, page 23 for tubing options.	3 Refer to Table 1, page 23 for tubing options.	4 Power and data cables
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3.5.3 Insert tubing and/or cables



- 1 Guide the tubing or cables through the enclosure openings (Figure 15).
- 2 Push the plug from the top onto the tubing or onto the cable.
- 3 Pull down the plug with the tubing or the cables. Seal any unused entry with Plug #3.

3.5.4 Connect the Filter Probe to the analyzer

CAUTION

The enclosure may tip forwards if it has not been fixed in place. Only open the enclosure if the enclosure is properly mounted.

DANGER

Disconnect power from the sc analyzer at the sc1000 before removing the protective covers in the analyzer.

Important Note: Make sure that for the use of a filter probe, the level of the water in which the filtration probe is submersed, is below the level of the analyzer.

1. Open the enclosure door and secure with the door hook.
2. Open the analyzer panel.
3. Remove the two screws from the protective cover and remove the cover (item 1, Figure 14, page 24).
4. Connect the earth ground (green/yellow) wire (item 9, Figure 16, page 28) from the Filter Probe sc to the ground terminal (item 5, Figure 16, page 28).
5. Connect the power connector to the appropriate terminal connection (items 4 and 11, Figure 16, page 28).
6. Remove the three screws securing the bottom panel cover. (item 2, Figure 14, page 24). Remove the panel.
7. Connect the data connector (item 10, Figure 16, page 28) to the main board (item 12, Figure 16, page 28).
8. Install all covers and panels.
9. Connect the white air tubing (item 8, Figure 16, page 28) from the Filter Probe sc to the air tubing connection on the analyzer (Figure 16, page 28).
10. For sample and drain line connections refer to A.4, page 77.

3.5.5 Connect the optional heated drain

CAUTION

The enclosure may tip forwards if it has not been fixed in place. Only open the enclosure if the enclosure is properly mounted.

DANGER

Disconnect power from the sc analyzer at the sc1000 before removing the protective covers in the analyzer.

Refer to [Figure 16](#) and the following procedure to connect the heated drain.

1. Open the enclosure door and secure if necessary.
2. Open the analyzer panel.
3. Remove the protective cover ([Figure 14, page 24](#)).
4. Connect the earth ground wire (green/yellow) to the ground wire terminal strip.
5. Connect the cables for the heated drain (item 6, [Figure 16, page 28](#)) to the terminal block (item 3, [Figure 16, page 28](#)).
6. Connect the drain tube as described in the appropriate Option Configuration, refer to [section A.5, page 78](#) for more information.
7. Place the drain tube to the appropriate drain or basin.
8. Install all covers and panels.

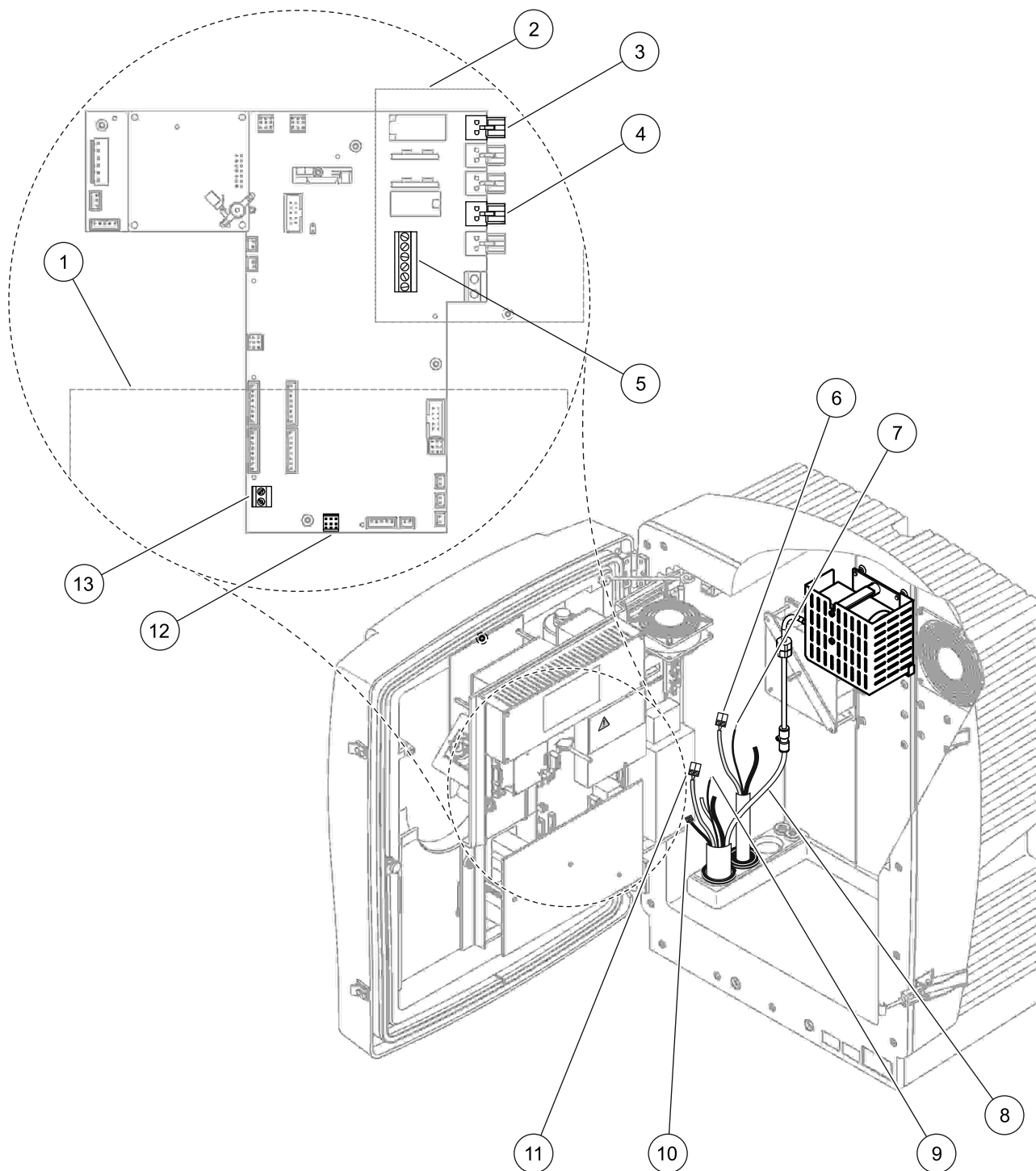


Figure 16 Connect the Filter Probe sc and optional heated drain

1	Bottom panel cover	8	Filter Probe sc air tube (white)
2	Protective cover	9	Filter Probe sc ground wire
3	Heated drain (optional) power connector	10	Filter Probe sc data cable connector
4	Filter Probe sc power connector	11	Filter Probe sc power cable connector
5	Ground wire terminal strip	12	Filter Probe sc data connector
6	Heated drain power cable connector	13	Remote control input (15–30 V DC) (Refer to section B.3 , page 110)
7	Heated drain ground wire		

3.6 Installation of reagents

DANGER

Potential danger in the event of contact with chemical/biological materials. Handling chemical samples, standards and reagents can be dangerous. Familiarize yourself with the necessary safety procedures and the correct handling of the chemicals before the work and read and follow all relevant safety data sheets.

Normal operation of this instrument may involve the use of hazardous chemicals or biologically harmful samples.

- *Observe all cautionary information printed on the original solution containers and safety data sheet prior to their use.*
- *Dispose of all consumed solutions in accordance with national regulations and laws.*
- *Select the type of protective equipment suitable to the concentration and quantity of the dangerous material at the respective work place.*

CAUTION

Avoid unnecessary contact with sample flows of unknown concentration. This can produce hazards due to trace chemicals, radiation or biological effects.

CAUTION

The enclosure may tip forwards if it has not been fixed in place. Only open the enclosure if the enclosure is properly mounted.

Important Note: *Always lay the drain tubing so that there is a continuous fall (minimum 3°), the outlet is clear (not pressurized) and the drain tubing is not longer than 2 meters. For more information refer to [Appendix A, page 75](#).*

Important Note: *Incorrect use of the reagents can damage the instrument. Carefully read the labels on the containers to make sure that there are no mistakes.*

The reagents and chemicals supplied are ready to use. The reagents need to be placed in the analysis instrument and tubings connected. Refer to [Table 3](#) to determine the correct standards.

Installation

Table 3 Reagents and measuring ranges

Reagent	Lid color		Measuring range 1 0.02–5 mg/L		Measuring range 2 0.05–20 mg/L		Measuring range 3 1–100 mg/L		Measuring range 4 10–1000 mg/L	
	EU	US	EU	US	EU	US	EU	US	EU	US
CAL 1: Standard 1 (low)	transparent	gray	BCF1148	25146-54	BCF1010	28941-54 (1 mg/L)	BCF1020	28943-54 (10 mg/L)	BCF1012	28258-54 (50 mg/L)
CAL 2: Standard 2 (high)	light blue		BCF1149	25147-54	BCF1011	28943-54 (10 mg/L)	BCF1021	58958-54 (50 mg/L)	BCF1013	28259-54 (500 mg/L)
Reagent	orange		BCF1009	28944-52	BCF1009	28944-52	BCF1009	28944-52	BCF1009	28944-52
Cleaning solution	gray		LCW867	28942-46	LCW867	28942-46	LCW867	28942-46	LCW867	28942-46

1. Place the reagent containers in the instrument (Figure 17).
2. Insert the tubing in the reagent containers.
3. Screw the reagents to the supplied caps.

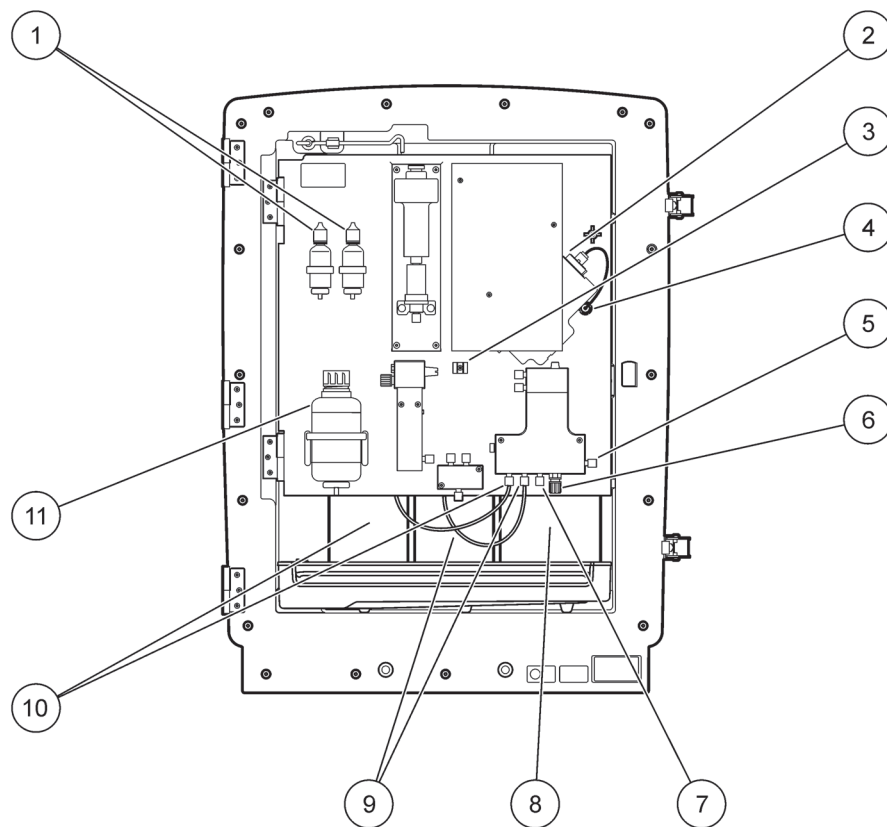


Figure 17 Chemicals and reagents in the AMTAX sc (Refer to Table 3, page 30 for more information)

1	Electrolyte solution replacement bottles	7	Sample line
2	Electrode assembly	8	Reagent
3	Fastener for membrane cap	9	Standard solution: High standard
4	Electrode panel connector	10	Standard solution: Low standard
5	Connection to cuvette	11	Cleaning solution
6	Drain		

3.7 Gas-sensitive electrode

Important Note: Before using the AMTAX sc for the first time, the electrode has to be filled with the supplied electrolyte, see [section 3.7.1.1](#).

The ammonium in the sample is converted into (dissolved) ammonia gas by adding sodium hydroxide solution. This dissolved ammonia gas content will be converted into a measurable pH shift in the electrode.

3.7.1 Installation of the electrode and electrolyte

The electrode body and the glass electrode are sold as a unit (Refer to [section 8.4, page 66](#)). Use the electrode only in the supplied enclosure. To prevent inaccurate readings or instrument malfunction, do not use a different enclosure than that supplied by the manufacturer.

3.7.1.1 Fill the electrode with electrolyte

CAUTION

Review all SDS/MSDS information and use recommended safety measures to prevent exposure to potential chemical hazards.

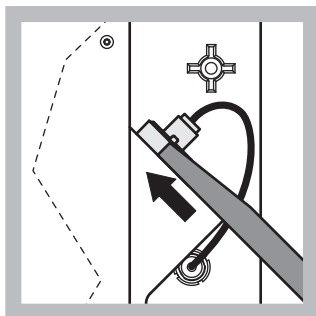
Important Note: Never lubricate the membrane cap or the electrode with grease, silicone oil or Vaseline. This will cause damage to the Teflon membrane which will cause poor performance.

Pre-requisites:

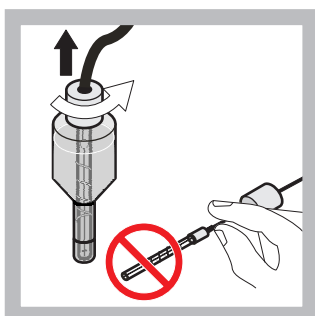
- The items required to fill the electrode are located in the bag attached to the base of the enclosure.
- Before the electrolyte can be added to the electrode, open the instrument enclosure and disconnect the electrode cable from the analyzer panel.

To fill the electrode with electrolyte:

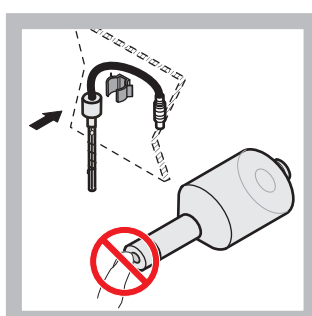
Note: Use the electrolyte kit (see [section 8.1, page 65](#)) which contains a bottle with the correct amount of electrolyte.



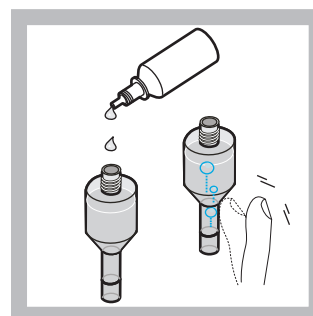
- 1 Pull the electrode plug. Carefully slide the electrode key (refer to [section 8.2, page 65](#)) under the electrode assembly and pull to remove. Do not apply excessive pressure.



- 2 Carefully pull the electrode straight out of the electrode body. Do not touch the electrode with fingers.

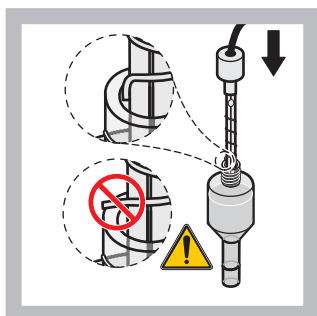


- 3 Secure the electrode in the fastening clamp on the front of the panel. Be careful not to touch the membrane.

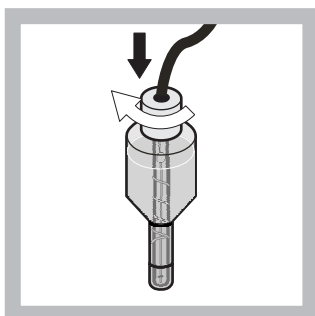


- 4 Remove the cap from the electrolyte and fill the body with an entire bottle of electrolyte (11 mL). Gently tap the side of the body to remove any air bubbles.

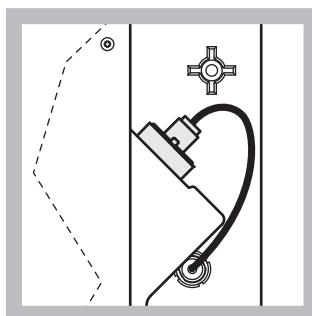
Note: To prevent inaccurate results, the electrolyte volume should be between 4 mL and 11 mL during operation.



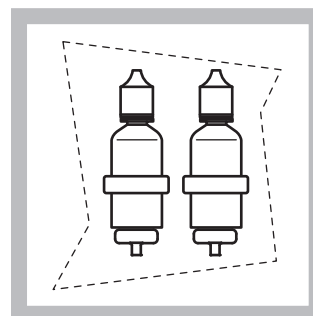
- 5 Carefully insert the electrode into the body, making sure the electrode tip is not bent.



- 6 Tighten the sealing cap.



- 7 Slide the electrode back into the cell, towards the resistance of the o-ring of the measuring chamber, until it snaps into place and reconnect the electrode cable to the panel.



- 8 Place the bottles of electrolyte into the brackets on the analyzer panel. Close the enclosure door.

Note: The electrode is temperature sensitive. Keep the enclosure door closed during calibration and measurements. Otherwise, fluctuations in temperature may cause measurement errors.

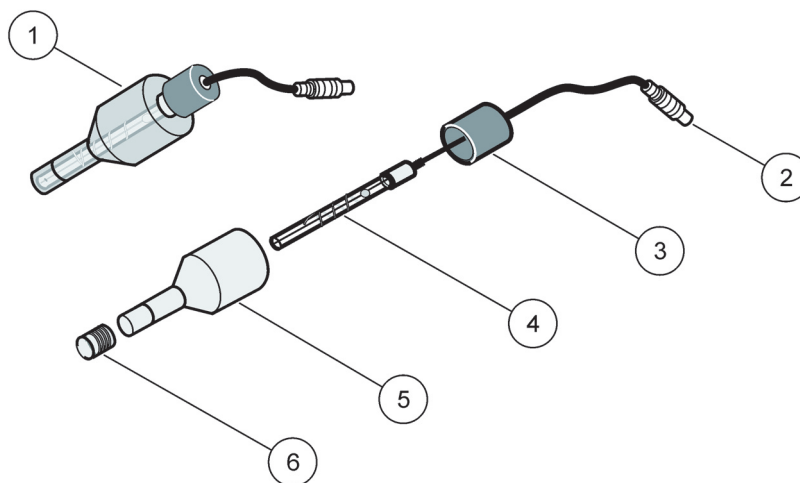


Figure 18 Electrode assembly

1	Electrode assembly	3	Sealing cap	5	Electrode body
2	Connector	4	Electrode	6	Membrane cap

3.8 Supply power to the analyzer

DANGER

Only connect the AMTAX sc to the sc1000 power supply when the instrument is completely wired internally and it is correctly earthed.

DANGER

Always connect a ground fault interrupt circuit (GFIC) or a residual current circuit breaker (trigger current maximum at 30 mA) between the main power supply and the sc1000.

DANGER

Do not use the controller power sockets as general mains sockets. They are only designed to provide power for the analyzers.

Important Note: *In addition to supplying power, the power plug also serves to isolate the device quickly from the mains where necessary.*

Therefore make sure that the sockets to which the device is connected are easy to reach by each user at all times.

Important Note: *Unless the sc1000 that connects to the AMTAX sc analyzer is already fitted with ac mains overvoltage (surge) protection device, surge protection must be provided between the mains connection of the sc1000 and the AMTAX sc analyzer if it is demanded by the local regulation.*

Only supply power to the instrument after all plumbing connections, reagent installations and system start-up procedures have been completed.

sc1000 power sockets can only be connected if a wide range 115/230 V power supply is built into the sc1000 controller. This

does not work with 24 V versions of the sc1000 because it does not provide the appropriate connectors for the analyzers.

Refer to the sc1000 manual for more information on connecting power.

Please note the input voltage of the device. The device is available in two non-adjustable voltage variants (115 V or 230 V).

The output voltage supplied by the controller at the outlets corresponds to the mains voltage that is customary in the country in question and to which the controller is connected.

A device designed for 115 V must not be connected to a controller with a higher mains voltage.

1. Remove the power socket from the sc controller.
2. Connect the plug from the AMTAX sc to the power socket on the sc controller.

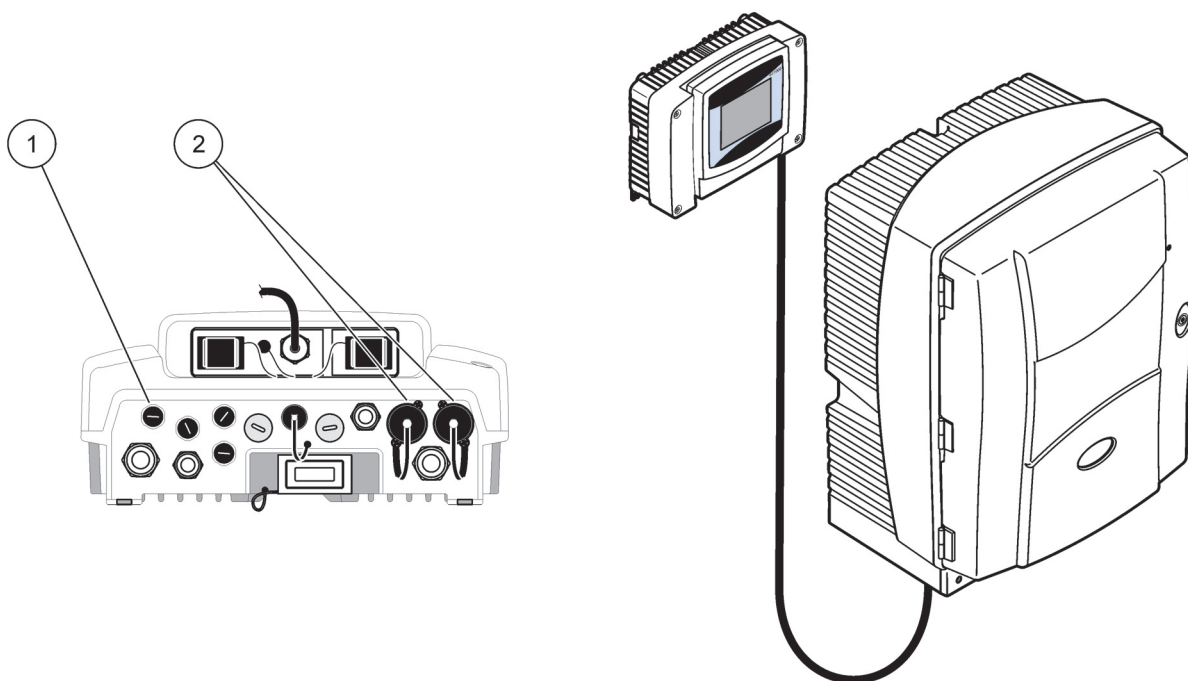


Figure 19 Connect the AMTAX sc to the sc1000 power supply

1	Data connector
2	Power connectors

3.9 Connect the data network

Refer to the sc1000 controller user manual for more information on connecting the data network (item 1, [Figure 19](#)).

Section 4 System Start Up

4.1 Initializing the instrument

Important note: *The instrument only can work correctly if it is at operating temperature. Let the instrument warm up for a minimum of an hour so the inside of the enclosure, chemicals and electrode are at operating temperature.*

1. Make sure the AMTAX sc is registered in the sc1000 system. If necessary, initiate the controller to search for the analyzer. Refer to the sc1000 user manual for more information. When the analyzer is switched on for the first time, a menu for the correct measurement range opens automatically.

Important Note: *Use the correct standard solutions for the selected range (Table 3, page 30).*

2. Configure the analyzer in the SENSOR SETUP menu and note the settings. Refer to [section 5.2, page 39](#) for more information. The factory settings (default setting) are appropriate for most typical applications.
3. From SENSOR SETUP, select AMTAX sc>MAINTENANCE>TEST/MAIN.
4. Select the PREPUMP ALL function and confirm.
5. Wait until the analyzer returns to the service state (displayed in TEST/MAIN.>PROCESS) after the prepumping sequence is completed.
6. Select REPLACE ELECTRO. from the maintenance menu to activate the electrode and to start the calibration.
7. Confirm all menu points. The date for the electrode maintenance counter will be updated automatically. The instrument warms up the electrode and calibrate two times. Then the analyzer starts the standard operation.

Important Note: *After inserting a new electrode or restarting the instrument, the values for the standard calibration change greatly, but after approximately two days the mV-values for the standards should increase slight with the evaporation of the elctrolyte. The slope remains constant while both standard values increase parallel.*

Section 5 Operation

The AMTAX sc can only be operated with an sc1000 controller. For further information, see the sc1000 User Manual.

An LED on the door indicates the current operating state. Refer to the sc1000 User Manual and [section 7.2.1, page 57](#).

Instrument, chemicals and electrode are temperature-sensitive. To prevent incorrect measurements, only operate the instrument with the door closed.

5.1 Sensor diagnostics menu

SELECT AMTAX sc (if more than one sensor or analyzer is attached)

AMTAX sc	
ERROR LIST	Displays all errors currently present in the sensor
WARNING LIST	Displays all warnings currently present in the sensor

5.2 Sensor setup menu

SELECT AMTAX sc (if more than one sensor or analyzer is attached)

CALIBRATION (see 5.3, page 44)	
CORR. FACTOR	Displays the correction factor
LOCATION 1	Displays location1 which is adjusted in the CONFIGURE menu
GAIN CORR	Adjusts the correction factor for channel 1
LOCATION2	Available with the 2-channel version.
GAIN CORR	Available with the 2-channel version.
CALIBRATE	Triggers an automatic calibration, then measuring mode
CAL.-CLEAN	Triggers an automatic calibration with subsequent automatic cleaning, then measuring mode.
SETTINGS	
SET OUTMODE	Value that is output during a calibration and the following discarded values. HOLD = last measured value, SET TRANSFER = value to be entered.
AUTOCAL	
SET INTERVAL	Time interval between two calibrations
START	Start time for the calibration (In case of more than one calibration per day: Enter start time for the first calibration.)
DISCHARGE	Number of measured values that are discarded after a calibration.
SEL ADJ METHOD	Select the calibration method
ADVANCED	Default calibration method for software version ≥ 1.60 (For best accuracy with lowest measuring values.)
CONVENTIONAL	Calibration method for software version < 1.60 is available for compatibility reasons (Not selectable in the measuring range 0.02–5 mg/L.).
DEFAULT SETUP	Resets to factory default settings.
CONFIGURE	
LOCATION 1	Settings for location 1
EDIT NAME	Enter the name for the measuring location as required.
SET PARAMETER	Select output: ammonium or ammonium nitrogen
SELECT UNITS	Select output: mg/L or ppm
QUANTITY CH 1	Number of measurements in succession (= measurements on channel 1 + DISCHARGE VAL 1 channel 1). Available with the 2-channel version.

5.2 Sensor setup menu (continued)

CONFIGURE (continued)	
DISCHARGE VAL 1	Number of discarded values after switching from channel 1 to channel 2. Available with the 2-channel version.
LOCATION 2	
EDIT NAME	Enter the name for the measuring location as required. Available with the 2-channel version.
SET PARAMETER	Select output: ammonium or ammonium nitrogen. Available with the 2-channel version.
SELECT UNITS	Select output: mg/L or ppm. Available with the 2-channel version.
QUANTITY CH 2	Number of measurements in succession (= measurements on channel 2 + DISCHARGE VAL 2 channel 2). Available with the 2-channel version.
DISCHARGE VAL 2	Number of discarded values after switching from channel 2 to channel 1. Available with the 2-channel version.
MEASURING	
SET INTERVAL	Enter measurement interval (Time interval between two measurements). ATTENTION with filtration probe and 5 min operation: increased pump speed in the filtration probe, annual filtration probe maintenance is necessary.
START BY BUS:	
START BY BUS:	YES/NO; option whether the instrument is measuring continuously or measurements are triggered by field-bus. "Fieldbus" must be activated under "TEST/MAINT". Instrument will switch to 5 min interval when activated.
NUMBER OF MEAS.:	Number of measurements after a bus activation.
DISCHARGE:	Number of discharged values that precede the measurements.
AVERAGE:	Number of measurements that are averaged. (Affects only the bus triggered measurements)
CLEANING	
SET INTERVAL	Number of hours between the cleanings
START	Start time for the cleaning (In case of more than one cleaning per day: Enter start time for the first cleaning.)
DISCHARGE	Number of measured values that are discarded after a cleaning operation.
SET OUTMODE	Value that is output during a cleaning operation and the following discarded values. HOLD = last measured value, SET TRANSFER = value to be entered.
CUVETTE TEMP.	Temperature for cuvette and electrode Recommended: Select 45 °C at air temperature: up to 35 °C, 50 °C at air temperature: up to 40 °C, 55 °C at air temperature: up to 45 °C, at 55 °C reduced accuracy and shortened electrode service life may occur.
TUBE HEATING	
ON	Probe tube heating switches on at the start of the selected month when using the Filter Probe sc.
OFF	Probe tube heating switches off at the end of the selected month when using the Filter Probe sc.
REAG. WARNING	
REAG. WARNING	On/Off When On is selected: determines the warning output if the reagent levels are low
WARNING	Determines the level below which the reagent must drop to trigger the warning.
STAT. MODUL.WAR.	
40 %, 30 %, 15 %	Warning is released: when a filter probe is installed and the status of filtration modules fall below level
STATUS MODUL.ERR	
14 %, 10 %, 8 %, OFF	An error is generated: when a filter probe is installed and the status of filtration modules fall below level. When switched to OFF, a deactivated sample detection will be switched to "warning".

5.2 Sensor setup menu (continued)

CONFIGURE (continued)	
SAMPLE DETECTION	
OFF/WARNING/ERROR	Determines instruments reaction when amount of available sample is too low. When instrument is in filter probe mode, deactivating the sample detection will switch a deactivated "STATUS MODUL.ERR" to 14 %
EXHAUST CONTROL	
ON/OFF	Determines instrument reaction when drain is blocked
ELECTROLYTE	
WARNING/OFF	Determines whether a warning is initiated when electrolyte level is low/ last change of membrane is more than 90 days ago.
FALSE ELEC DATA	
ERROR/OFF	Determines whether an error is initiated when the mV-Zero value of the electrode is not within a certain range (see list of errors)
DEFAULT SETUP	Resets factor and settings to factory settings.
LAST CHANGE	Indication of the last change of a setting in the configuration menu.
MAINTENANCE	
INFORMATION	
LOCATION 1	Indication of measuring location 1
LOCATION 2	Indication of measuring location 2 on two-channel version
TYPE	Indication of instrument type
SENSOR NAME	Indication of instrument name
SERIAL NUMBER	Indication of serial number
RANGE	Indication of measuring range
OPTION	Indication of instrument option (filtration probe/1-channel/2-channel)
SOFTWARE PROBE	Filtration probe software
SOFTW. AMTAX	Instrument software
LOADER	Detailed information on the software in the instrument
APPL	Detailed information on the software in the instrument
STRUCTURE	Detailed information on the software in the instrument
FIRMWARE	Detailed information on the software in the instrument
CONTENT	Detailed information on the software in the instrument
LANGUAGE	List of languages that are supported by the installed language package.
CALIB. DATA	
LOCATION1	Indication of measuring location 1
GAIN CORR	Indicates the correction factor set for correcting the measured values at measuring location 1.
DATE	Indicates the date of the last change to the correction factor.
LOCATION2	Available with the 2-channel version.
GAIN CORR	Indicates the correction factor set for correcting the measured values at measuring location 2.
DATE	Indicates the date of the last change to the correction factor.
mV ZERO	Electrode signal at the zero point
mV STANDARD 1	Electrode signal with standard 1
mV STANDARD 2	Electrode signal with standard 2
mV SLOPE	Electrode signal change per decade
LAST CALIBRAT.	Time of the last calibration
mV ACTIVE	Current electrode potential

5.2 Sensor setup menu (continued)

MAINTENANCE (continued)	
PROCESS	Information what instrument is currently doing (measurement, calibration etc.)
REMAINING TIME	Remaining time for current process, counting down to zero
LIST OF VALUES	List of the last 10 measured values
MAINT. COUNTER	Counter for reagent and consumables
OPERATING HOURS	Indicates the instrument's operating hours.
REAGENT	Displays the current level of the reagent.
CLEANING SOL.	Displays the current level of the cleaning solution.
STANDARD SOL.	Displays the current level of the standard.
REPLACE ELECTRO.	Date of the last electrode change
CHANGE MEMBRAN	Last electrode membrane and electrolyte change.
AIR FILTER PADS	Days left until the next air filter change/clean.
PISTON PUMP	Days left until the next pump piston and cylinder replacement (AMTAX piston pump)
REAGENT PUMP	Number of pump strokes performed by the reagent metering pump
CLEANING PUMP	Number of pump strokes performed by the cleaning metering pump
STATUS MODULES	Only if filtration probe is registered: indicates the state of the modules.
CLEANING MODULS	Only if filtration probe is registered: last filter module cleaning.
NEW MODULES	Only if filtration probe is registered: last filter module replacement.
PUMP MEMBRANE	Only if filtration probe is registered: date of the last pump membrane replacement (filtration probe sample pump).
COMPRESSOR	Only if filtration probe is registered: days left until the replacement of the air compressor.
ELECTROLYTE	counts down from 90 days. Negative values indicate that electrolyte change is overdue. Reset by "CHANGE MEMBRANE" or "CHANGE ELECTRODE" process
TEST/MAINT	Maintenance processes
SIGNALS	
PROCESS	Indication of what the instrument is doing.
REMAINING TIME	Indication of the time left for the currently ongoing process
mV ACTIVE	Current electrode potential (For electrode data ranges refer to Table 10, page 62).
CUVETTE TEMP.	Current measuring cell temperature
ENCLOSURE TEMP	Current temperature in the instrument
COOLING	Current speed of the enclosure fan in %
HEATING	Current enclosure heating power
PRESSURE ANALY	Current pressure in the metering system of the valve block in mbar
HUMIDITY ANALY	Indication of whether there is liquid in the collecting tray
STATUS MODULES	Only if filtration probe is registered: shows status of filtration modules (0–100 %)
PRESSURE P. MIN	Only if filtration probe is registered :shows the averaged minimum pressure at the filter modules
PRESSURE PROBE	Only if filtration probe is registered: shows the actual minimum pressure at the filter modules
PROBE HEATING	Only if filtration probe is registered: indication of switching state of sample tubing heating
HUMIDITY PROBE	Only if filtration probe is registered: indication of whether there is moisture in the probe enclosure
DRAIN HEATING	only in 1 or 2 channel mode: shows status of drain heating
PROCESS	Indication of what the instrument is doing.
REMAINING TIME	Indication of the time left for the currently ongoing process
SERVICE MODE	Instrument can be adjusted to service mode (system free of liquids, thermal management and compressor for filter probe (if installed) active

5.2 Sensor setup menu (continued)

MAINTENANCE (continued)	
SET OUTMODE	Value that is output in the service state. HOLD = last measured value, SET TRANSFER = Transfer value that is programmed on SC controller
START	Leave service mode, start measurement
REAGENT	Resets the maintenance counter after reagent change
CLEANING SOLU.	Resets the maintenance counter after changing the cleaning solution.
STANDARD SOL.	Resets the maintenance counter after changing the standards.
AIR FILTER PADS	Menu-based process for changing the air filter pads, resetting the maintenance counter
CHANGE MEMBRAN	Menu-based process for membrane-cap change of the electrode, sets new date in the maintenance counter and resets electrolyte counter
REPLACE ELECTRODE	Menu-based process for electrode change, sets new date in the maintenance counter
PISTON PUMP	Days left until the next pump piston and cylinder replacement (AMTAX piston pump), reset after replacement of the pump
REAGENT PUMP	Number of pump strokes performed by the reagent metering pump, reset after replacement of the pump
CLEANING PUMP	Number of pump strokes performed by the cleaning metering pump, reset after replacement of the pump
PREPUMPING	
PREPUMP ALL	All liquids are pre-pumped in succession.
PREPUMP REAG.	The reagent is pre-pumped.
PREPUMP CLEAN.	The cleaning solution is pre-pumped.
PREPUMP STANDARD	The standards are pre-pumped.
PREPUMPING PROBE	Only if filtration probe is registered: The filtration probe and modules are bled and pre-pumped.
PREPUMP SAMPLE	Only if filtration probe is registered: sample is pumped from the filtration probe for 1 minute
MODULE CLEAN.	Menu-based process for cleaning the filter modules, automatically resetting the maintenance counter. With filtration probe.
NEW MODULES	Only if filtration probe is registered: last filter module replacement.
PUMP MEMBRANE	Only if filtration probe is registered: shows the days left until the next change of pump membrane (Filter Probe sc sample pump), Rest of the counter.
COMPRESSOR	Only if filtration probe is registered: days left until the replacement of the air compressor. Reset of the counter.
CLEANING	Trigger an automatic cleaning, then start measurement
FLUSHING	Pumps all liquids in succession. Put all tubings that go to reagents, standards and cleaning solutions into deionised water and start FLUSHING prior to taking instrument out of operation
RESET ERROR	Reset all error messages
CHANGE RANGE	Software changes to another measuring range: ATTENTION, the appropriate standards must be used!
UPDATE PROBE	Enables the filtration probe software to be updated.
Elec. Type Change	Not used at the moment
FIELDBUS	ENABLED/DISABLED: Enable external control of instrument by Fieldbus. NOTE: When instrument is put into SERVICE MODE by menu, the Fieldbus control is temporarily disabled.
OPTION	Sets the instrument to filter-probe/ 1channel/ 2channel mode. Switching the options needs modification of hardware!
VALIDATION	Menu based process to measure external samples. When "Modification required" is displayed: Disconnect sample tubing from overflow vessel, plug overflow vessel and put sample tubing into external sample. After process: Unplug overflow vessel and reconnect sample tube.

5.2.1 System setup menu

For more information on System Setup (current outputs, relays and network interfaces), refer to the sc1000 user manual.

5.3 Calibration process

Note: Make sure that all solutions are available to avoid incorrect measurements.

1. To start an automatic calibration select CALIBRATION>CALIBRATE>AUTOCAL>SET INTERVAL.

OR

1. To start a calibration manually select CALIBRATION>CALIBRATE.

Note: Press START to confirm and start the calibration process.

After the next measurement and the 5 minutes waiting time, the calibration will automatically start and proceed with all necessary standards.

Depending on the number of standards requiring calibration, a cycle may take up to 40 minutes. After a successful calibration, the instrument automatically returns to the measurements.

Note: When the instrument detects and displays a warning, the measurement process will continue. Refer to [section 7.2.3, page 60](#) to troubleshoot the warning.

Note: When the instrument detects and displays an error, the instrument stops measuring. Refer to [section 7.2.2, page 57](#) to troubleshoot the error.

5.4 Cleaning process

For information about the cleaning interval refer to [Table 4, page 47](#).

Note: Make sure that the cleaning solution is available that the instrument can work properly.

1. To configure an automatic cleaning interval select CONFIGURE>CLEANING>SET INTERVAL.

OR

1. To start a manual cleaning cycle select MAINTENANCE>CLEANING.

Note: Press START to confirm and start the cleaning process.

A cleaning cycle may take up to 10 minutes and then the instrument returns automatically to the measuring mode.

5.5 Measurement process

Note: Make sure that all solutions are available to avoid incorrect measurements.

After start up, the instrument needs to warm up to automatically initialize the measurement process. This process takes approximately 15 minutes when the instrument temperature is $>15\text{ }^{\circ}\text{C}$ ($>59\text{ }^{\circ}\text{F}$).

Note: Lower instrument temperatures prolong the warming-up phase.

Note: From the service mode press START to confirm the inquiry to start the measurement.

Note: The instrument calibrates before starting the measurement when the last calibration is at least one day old.

An optimal measurement cycle may take 5 minutes.

DANGER

Only qualified personnel should conduct the tasks described in this section of the manual.

DANGER

Potential danger in the event of contact with chemical/biological materials. Handling chemical samples, standards and reagents can be dangerous. Familiarize yourself with the necessary safety procedures and the correct handling of the chemicals before the work and read and follow all relevant safety data sheets.

Normal operation of this instrument may involve the use of hazardous chemicals or biologically harmful samples.

- *Observe all cautionary information printed on the original solution containers and safety data sheet prior to their use.*
- *Dispose of all consumed solutions in accordance with national regulations and laws.*
- *Select the type of protective equipment suitable to the concentration and quantity of the dangerous material at the respective work place.*

6.1 General maintenance

- Regularly check the entire system for mechanical damage.
- Regularly check all connections for leaks and corrosion.
- Regularly check all cables for mechanical damage.

6.1.1 Clean the analyzer

Clean the system with a soft, damp cloth. Use a commercially available cleaning agent for stubborn soiling.

6.1.1.1 Cleaning interval

The cleaning interval (Refer to [section 5.2, page 39](#) for more information.) is based on the hardness of the water in the sample (see [Table 4](#)).

Note: *The drain can block if the cleaning interval is too long for the hardness of the sample.*

Table 4 Cleaning interval

Water hardness			Cleaning interval	Consumption of cleaning solution (includes calibration)
ppm as CaCO ₃	in °dH	in mMol/L (alkaline earth ions)	in hours (or more often)	in mL/month
≤ 270	≤ 15	≤ 2.685	24	80
≤ 360	≤ 20	≤ 3.58	12	150
≤ 450	≤ 25	≤ 4.475	8 (pre-set)	220
≤ 540	≤ 30	≤ 5.37	6	290
≤ 630	≤ 35	≤ 6.265	3	570
>720	> 35	> 6.265	1	1700

6.1.2 Replace the fan filter

The filter air pads must be cleaned or replaced regularly. Refer to [section 6.3, page 49](#) for more information.

The cooling fan must be stopped before completing any filter maintenance.

To stop the cooling fan:

1. From the MENU select SENSOR SETUP>AMTAX SC and press ENTER.
2. Select MAINTENANCE>TEST/MAINT>AIR FILTER PADS and press ENTER.
3. Select START and press ENTER.

The process is started and the cooling fan stops.

Important Note: Open the instrument door to prevent overheating.

CAUTION

Avoid injury. Keep hands clear. Although the fan is stopped, work carefully to avoid injury in case of failure.

To change the fan filter:

1. Open the analyzer enclosure and the analysis panel.
2. Press ENTER.

The instrument counts the remaining time in seconds down to zero and goes to SERVICE STATE.

3. Change the air filter pads as described on the controller.
4. Remove the fan locking screw and slide the retaining strap to the top and remove ([Figure 10, page 20](#)). If necessary, press the fan down to remove the retaining strap.
5. Slide the fan from the holding screws.
6. Clean the filter with soap and water and reposition.
7. Press ENTER.
8. Replace the fan. Make sure that the fan opening is positioned downward. Attach the retaining strap (hold down the fan) and install the fan locking screw.
9. Close the analyzer enclosure and the analysis panel.
10. Press ENTER.

The instrument will reset the maintenance counter and will start the analyzer again.

6.1.3 Fuse replacement

The fuses for the power supply are found in the sc1000 controller. Refer to the sc1000 User Manual for fuse replacement information.

6.2 Reagent replacement

The chemicals must be changed or renewed at regular intervals. Refer to [Table 5](#) for information on the life of the chemicals.

Table 5 Chemicals for the AMTAX sc

Chemical (section 8.1, page 65)	Measuring range 1 (0.02–5 mg/L)	Measuring range 2 (0.05–20 mg/L)	Measuring range 3 (1–100 mg/L)	Measuring range 4 (10–1000 mg/L)
Reagent	2500 mL for 3 month	2500 mL for 3 months	2500 mL for 2 months	2500 mL for 2 months
Standards (2 liters):	0.5 and 2.5 mg/L for 2 month on daily calibration	1 and 10 mg/L for 3 months on daily calibration	10 and 50 mg/L for 3 months on daily calibration	50 and 500 mg/L for 3 months on daily calibration
Cleaning and calibration	250 mL for 1 month on 3 cleanings and calibrations per day (default) 250 mL for 3 months on daily cleaning and calibration			
Electrolyte and membrane cap	11 mL Electrolyte for 1–1.5 months; Membrane cap: 2–3 months (depending on the membrane soiling)	11 mL Replace with membrane every 2–3 months (depending on the membrane soiling)	11 mL Replace with membrane every 2–3 months (depending on the membrane soiling)	11 mL Replace with membrane every 2–3 months (depending on the membrane soiling)

6.3 Routine maintenance schedule

The maintenance schedule is given for standard applications. Deviant applications may cause different maintenance intervals.

Table 6 Routine maintenance schedule

Description	3 months (Customer task)	6 months (Service task)	12 months (Service task)	24 months (Service task)
Visual check analytical compartment, manual cleaning if necessary.	X ¹	X		
Check filter pads, clean/ replace if necessary, particularly on fan side.	X ¹	X		
Check reagents, replace if necessary.	X ¹	X		
Check cleaning solution, replace if necessary.	X ¹	X		
Check maintenance counters.	X ¹	X		
Check standard solutions, replace if necessary.	X ¹	X		
Visual check of electrode, replace membrane cap and electrolyte if necessary	X ¹	X		
Check system for air impermeability.		X		
Function check of both fans.		X		
Function check heating for analyser enclosure.		X		
General function check.		X		
Read out and analyse event log. Read out and check data log if necessary.		X		
Check electrode (slope with intact membrane cap: –55mV to –67mV), check every 6 months after 12 months of use.		(X) ²	X	

Maintenance

Table 6 Routine maintenance schedule (continued)

Description	3 months (Customer task)	6 months (Service task)	12 months (Service task)	24 months (Service task)
Replace pump head for air pump.			X	
Check magnetic stir bar, replace if necessary.			X	
Replace reagent pump.			X	
Check cleaning pump and replace if necessary (check every 6 months after 12 months of use)		(X) ²	X	
Check stirring motor, replace if necessary.				X

¹ Recommended maintenance interval, especially for reagents. The actual reagent and electrolyte (AMTAX sc) exchange intervals depend on configuration.

² Maintenance cycles are given for standard applications. Deviant applications may cause different maintenance intervals.

6.4 Scheduled maintenance

[Table 7](#) lists items, except the electrode, that need to be maintained by service personnel ONLY. Contact the manufacturer for more information.

Table 7 Repair maintenance items

Description	When to replace	Warranty
Reagent pump for sc analyzer (Valve pumps)	1 year	1 year
Pump head piston pump 10 mL (Pre-greased cylinder and piston)	1 year	1 year
Switchable Compressor 115/230V	2 years recommended	2 years
Solenoid stirring bar	1 year	1 year
Electrode	Check continuously after 1 year. Electrode is OK, when slope with new membrane cap and electrolyte is in the range of -57 to -67 mV after 24 h of membrane cap replacement.	1 year

6.5 Replace the membrane cap, electrolyte and electrode

Important Note: Never lubricate the membrane cap or the electrode with grease, silicone oil or Vaseline. This will cause damage to the Teflon membrane which will cause poor performance.

Note: The service life of the Teflon membrane will be reduced by tensides or organic solvents in the waste water.

For optimal performance, replace the the membrane cap, electrolyte and electrode regularly (refer to [Table 6, page 49](#)).

While operating the instrument, the amount of electrolyte should be between 4 mL and 11 mL. With less amount of electrolyte, the accuracy will be reduced for low measured values in the related

measuring range. To determine how much electrolyte remains in the electrode body, refer to Figure 20.

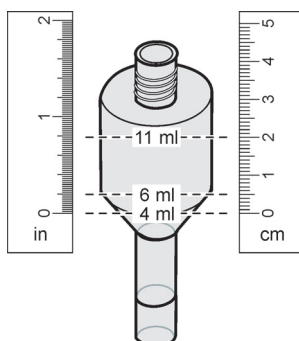


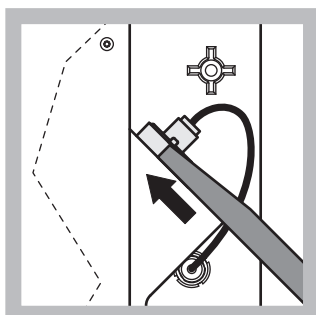
Figure 20 Determine the electrolyte volume in the electrode body with a measuring tape

To replace the membrane cap and the electrolyte and/or electrode:

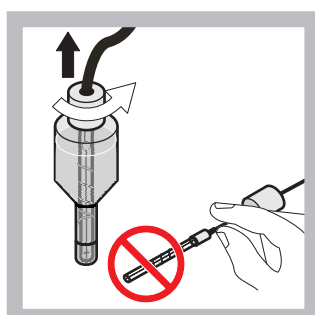
1. Select MAINTENANCE>TEST/MAINT.>CHANGE MEMBRANE.

OR

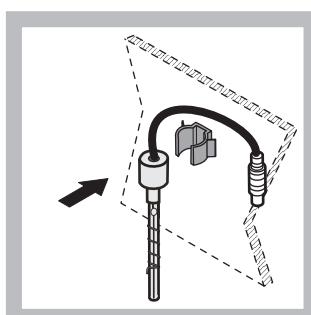
1. Select MAINTENANCE>TEST/MAINT.>REPLACE ELECTRODE.



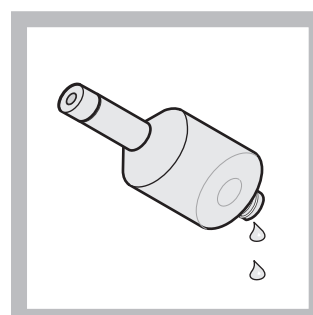
- 1 Pull the electrode plug. Carefully slide the electrode key under the electrode assembly and pull to remove. Do not apply excessive pressure.



- 2 Carefully pull the electrode straight out of the electrode body. Do not touch the electrode with fingers. Rinse the glass electrode and the electrode body with distilled water to remove any crystallation that may have occurred, because of complete evaporation.

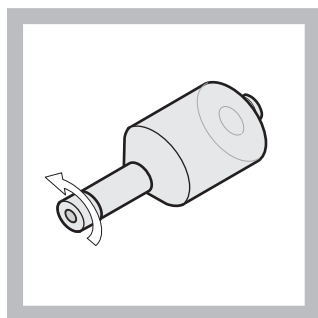


- 3 Secure the electrode to the clamp on the analyzer panel. Do not touch the membrane.

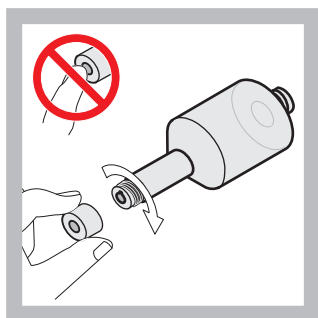


- 4 Drain the electrolyte from the electrode body.

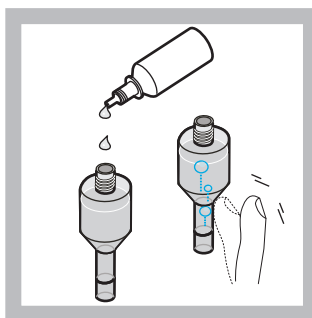
Important Note: Never add new electrolyte on top of old electrolyte. Always empty the electrode body completely and use a new bottle of electrolyte, otherwise the concentration of the electrolyte will increase and the measuring accuracy will be reduced.



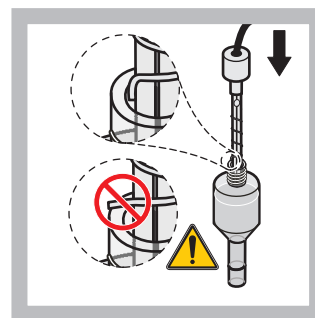
- 5 Unscrew and discard the membrane cap.



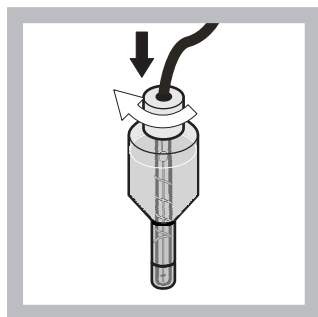
- 6 Place the membrane cap on the electrode body. Do not touch the membrane! To prevent the electrolyte from leaking, hand-tighten the electrode cap.



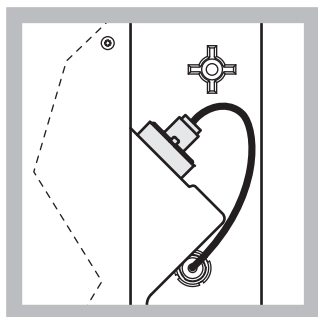
- 7 Remove the cap from the electrolyte and fill the body with an entire bottle of electrolyte, (11 mL). Gently tap the side of the body to remove any air bubbles.



- 8 Carefully insert the electrode into the body making sure the tip is not bent.



- 9 Tighten the sealing cap.



- 10 Slide the electrode back into the cell, towards the resistance of the o-ring of the measuring chamber, until it snaps into place and reconnect the electrode cable to the panel. Close the enclosure door.

Membrane cap and electrolyte replacement:

Note: After the membrane cap and electrolyte are replaced, it takes up to 6 hours before optimum performance is achieved.

The instrument calibrates for the first time after warming up the sample and reagent in the measuring chamber for 5 minutes. After a second calibration one hour later, the instrument changes to the adjusted calibration cycle.

Electrode replacement:

Note: After inserting a new electrode the instrument needs up to 12 hours (one night) to achieve the optimum performance.

The instrument calibrates two times after warming up the sample and reagent in the measuring chamber for 5 minutes. After two hours operating time in the measuring mode the next calibration

follows and after four hours it calibrates for the last time. Then the instrument changes to the adjusted calibration cycle.

Note: *There is no warning concerning the electrode slope during the membrane and electrode replacement process. If there is an electrode slope outside the range from -50 mV to -67 mV, an error message may occur.*

Important Note: *After inserting a new electrode or restarting the instrument, the values for the standard calibration change greatly, but after approximately two days the mV-values for the standards should increase slight with the evaporation of the electrolyte. The slope remains constant while both standard values increase parallel.*

6.6 Validation (Analytical quality assurance)

Regular validation checks of the complete instrument must be completed to make sure the analysis results are reliable.

Required parts:

- Blind plug LZY193 (Plugging set LZY007)
- Beaker (for example 150 mL)
- Standard solution for validation

Follow the internal menu steps for the validation.

1. From the MENU select SENSOR SETUP>AMTAX SC and press ENTER.
2. Select MAINTENANCE>TEST/MAINT>VALIDATION>DISCHARGE.
3. Enter the number of measurements which should be discharged before starting the measurements of the validation. (Default value: 3; value range: 2 to 5)
4. Select NUMBER OF MEAS..
5. Enter the number of measurements which should be used for the validation measurements. (Default value: 3; value range: 2 to 10)
6. Select START after adjusting both parameters and the analyzer is going into the service state. The remaining time is displayed in seconds.

The OUTMODE is set to HOLD.

7. Select ENTER to modify the analyzer (Figure 21, page 55):
 - a. Unscrew the fitting (item 2) of the sample tube (item 5) which connects the overflow vessel (item 1) and the valve block (item 4) at the overflow vessel.
 - b. Screw in the blind plug (item 3) in the thread of the overflow vessel (item 1) and insert the sample tube in a beaker (for example 150 mL) with standard solution for the validation.

Note: *To receive stable measurement values, close the door of the analyzer.*

8. Press ENTER to start the validation.

Note: *The remaining time is displayed in seconds:*

(Discharge value + measurement value) × 5 minutes = remaining time/sec

9. Press ENTER to escape.

The results are displayed to note down.

- The discharge value and the Conc value are counted down to zero.
- The validation is finished when the process shows the service mode and the remaining time is 0 seconds.
- For the adjusted number of validation measurements, the values are listed and the calculated average of this value is displayed.

Note: *The event log records the validation values and average value from the analyzer.*

10. Press ENTER to proceed.

Note: *Press START to confirm the inquiry to return to the measurement process or to the service mode.*

11. Select ENTER and modify the instrument to the original analyzer configuration.

12. Start the measurement mode or hold the service mode.

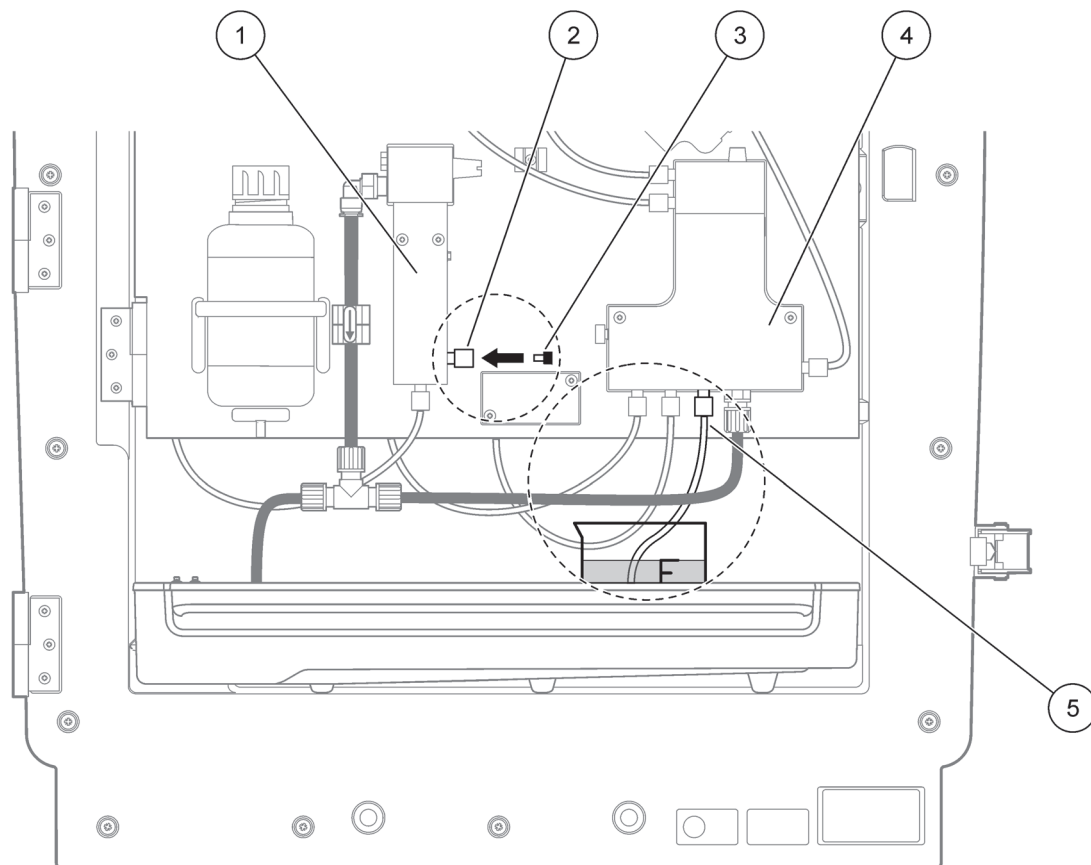


Figure 21 Modification of AMTAX sc

1	Overflow vessel	4	Valve block
2	Fitting of sample tube	5	Sample tube
3	Blind plug		

6.7 Shut the analyzer down

No special measures are necessary for taking out of operation for a short period (up to a week in frost-free ambient conditions).

Important note: If the power supply to the controller is interrupted, frost damage may occur. Make sure that the instrument and tubing cannot freeze.

1. Interrupt the measurement and switch the instrument to the service state (MAINTENANCE>TEST/MAINT.>SERVICE MODE).
2. Disconnect the AMTAX sc from the controller.

6.7.1 Shut the analyzer down for an extended period

Important note: Always wear safety equipment when handling chemicals.

Use the following procedure if the instrument is to be taken out of operation for an extended period or in the case of frost.

1. Immerse the tubing for reagent, cleaning and both standard solutions in distilled water.
2. On the controller TEST/MAINT menu, start a cleaning cycle with distilled water using the FLUSHING function.
3. Clean the canister lid with distilled water.
4. Take the tubing out of the water and start the FLUSHING function to pump the tubing and the analysis instrument empty.
5. Wipe the canister lids dry and seal the canisters with the corresponding lids (Table 3, page 30).
6. Remove the canisters and store them in a frost-free place and in accordance with local regulations.
7. Remove power from the instrument and data network.
8. Pull the electrode connector off the analyzer panel.

CAUTION

The electrode body is very hot (up to 60 °C [140 °F]). Let the enclosure cool down before touching.

9. Pull the electrode carefully and straight out of the electrode body (section 3.7.1, page 32).
10. Drain the electrode body as per the applicable regulations.
11. Rinse the electrode body and the electrode with distilled water.
12. Insert the electrode in the rinsed enclosure and then insert the electrode body in the electrode cell on the AMTAX sc.
13. Reconnect the electrode cable to the analyzer panel.
14. When using a Filter Probe sc, refer to the Filter Probe sc User Manual for storage information.
15. Install all transport locks (Figure 9, page 19).
16. Depending on the duration, remove the system from its mounting and wrap the system in a protective film or dry cloth. Store the system in a dry place.

6.8 Modify from single channel to dual channel

The sc analyzer can be converted from single channel to dual channel operation and/or continuous sampling. Contact the manufacturer for more information. Refer to Table 8 for configuration options.

Table 8 Conversions

From	To	With	Conversion kit
1-channel operation	2-channel operation	AMTAX sc, PHOSPHAX sc	LZY170
Filter Probe sc	Continuous sampling	AMTAX sc, PHOSPHAX sc	LZY241
Continuous sampling	Filter Probe sc	AMTAX sc, PHOSPHAX sc	LZY242

Section 7 Troubleshooting

7.1 Troubleshooting the controller

If entries are only implemented with a delay or are not accepted for a short time, the delay may be caused by a busy data network. Refer to the troubleshooting section in the sc1000 User Manual.

If, in normal operation, problems occur that are apparently caused by the controller, restart the system.

After a software update, a system expansion or after an interruption in the power supply, it may be necessary to set the system parameters again.

Note all the values that are changed or entered so all the necessary data can be used to configure the parameters again.

1. Save all important data.
2. Isolate the supply of power and wait for 5 seconds.
3. Reapply power to the controller.
4. Check all relevant settings.
5. If the problem still occurs, contact Technical Support.

7.2 Troubleshooting the analyzer

If the complete analysis instrument is not working, check whether the humidity sensor has tripped. Fix the damage, dry the humidity sensor and restart the system.

If the problems still occurs, contact Technical Support.

7.2.1 LED status

Table 9 LED status and definition

LED status	Definition
green LED	No errors or warnings
red LED	Error
orange LED	Warning
LED flashing	No communication with controller

7.2.2 Error messages

Error displayed	Instrument reaction	Cause	Solution	Reset error
TEMP. < 0 °C/ 32 °F?	Warms up and goes into the service state	Instrument was below 4 °C (39 °F) on power up	Check whether instrument is frozen (Cleaning solution/ sample/reagent/ standards/electrode). If necessary use pre-warmed reagents. Thaw electrode, delete error. Instrument will then continue to warm up and start	Reset error manually TEST/MAINT>RESET ERROR

Troubleshooting

7.2.2 Error messages (continued)

Error displayed	Instrument reaction	Cause	Solution	Reset error
ANALYZ. TO COLD	Instrument goes into the service state	Instrument interior has been below 4 °C (39 °F) for more than 5 minutes	Close instrument, check heating	Reset error manually TEST/MAINT>RESET ERROR
NO HEAT UP	Instrument goes into the service state	Instrument cannot heat interior adequately. (internal temperature < 20 °C (68 °F) for 30 min)	Close instrument, check heating	Reset error manually
COOLING FAILED	Service state, starts automatically after cooling down	Instrument interior is too warm (> 47 °C (117 °F) with electrode temp. 45 °C (113 °F) > 52 °C (126 °F) with electrode temp. 50 °C (122 °F) or >57 °C (135 °F) with electrode temp. 55 °C (130 °F))	Check air filter and clean/replace, check fan.	Manual reset or when temperature falls 2 °C (3.6 °F) below limit
HUMIDITY ANALY	Service state	There is liquid in the collecting tray	Identify cause and rectify	Reset error manually
HUMIDITY PROBE	Service state, the filtration probe sc is isolated from the mains	There is liquid in the filtration probe enclosure	Immediately take filtration probe sc out of operation and contact service. Take the filtration probe sc out of the tank and store the filter modules so that they remain moist. (See operating instructions for the filtration probe sc).	Reset error manually
PROBE MISSING	Service state, the filtration probe sc is isolated from the mains	The filtration probe sc is faulty or not connected	Immediately take filtration probe sc out of operation and contact service. Take the filtration probe sc out of the tank and store the filter modules so that they remain moist. (See operating instructions for the filtration probe sc).	Reset error manually
TEMPSENS DEFECT	Service state, fan running, heating off	The temperature sensor for the internal instrument temperature is faulty	Immediately switch off instrument, contact service, replace main circuit board	Reset error manually
CUVSENSOR DEFECT	Service state, cuvette heating off	The temperature sensor for the cuvette is faulty	Contact service, replace cuvette/sensor	Reset error manually
CUVHEAT DEFECT	Continued measurement	The cuvette is not being heated adequately	Close instrument door and wait 10 minutes if error occurs again, contact service	Reset error manually

7.2.2 Error messages (continued)

Error displayed	Instrument reaction	Cause	Solution	Reset error
CUV TOO HOT	Service state, cuvette heating off!	The cuvette/sample is over-heated.	Check if incoming sample is in the specified range and increase the cuvette temperature setpoint (CONFIGURE> CUVETTE TEMP.) Use lowest possible cuvette temperature. Call service if error continue	Reset error manually
ELECTRODE SLOPE	Service state	The error occurs if the electrode slope is not in the range of -50mV to -70mV	Change membrane and electrolyte, if there is still a problem, check standards, measurement range and chemistry, check flow rate. If all OK, but error still present, fit new electrode	Reset error manually
FALSE ELEC DATA	Service state	The mV value for Zero related to Standard 1 is not within the allowed range. Allowed range for (Uzero-UStandard1) depending on measurement range: Low (0.05 to 20 mg): 5mV to 200mV Medium (1 to 100 mg): 20mV to 265mV High (10 to 1000 mg): 50mV to 315mV	Check cleaning solution (level and delivery) and sample delivery, check Standard 1 (level and if correct for measurement range), change membrane and elektrolyte. Error may occure when sample has very unusual properties. In this case the error can be switched to "OFF" in the configuration menue.	Manual or automatically when the CHANGE MEMBRANE or REPLACE ELCTRODE pocess is started
MODULES CONTAM.	Continued measurement	Filter modules heavily soiled	Clean filter modules immediately	Reset error manually
DRAIN BLOCKED	Service state	Drain is blocked (lime?)	Check drain line. Adapt cleaning interval to water hardness.	Reset error manually
SAMPLE1 / SAMPLE2	Continued measurement	the amount of sample is not sufficient (channel1 / channel2) This occurs as error if SAMPLE DETECTION is set to ERROR	Check sample delivery, make sure that sample line has no negative pressure, check tightness of piston pump, check overflow and air valve, check tightness of system.	Automatic reset when enough sample is available or manuell reset

Troubleshooting

7.2.3 Warnings

Warning displayed	Instrument reaction	Cause	Solution	Reset warning
WARMUP PHASE	Instrument is warming up sample tubing after start (de-frosting)	If there is a risk that the sample tubes are frozen, a warning is displayed	As far as possible, wait until end of the warm-up phase (except if certain there is no frost), to cancel place instrument in service state and start the measurement again	Automatic
COOLING DOWN	Fan 100 % , standstill until cool enough	Instrument is cooling down after start using ventilation, if it was heated excessively	Wait until instrument has cooled down enough	Reset, automatically as soon as cool
ANALYZER TO COLD	Measurement	Interior of instrument is cooler than 15 °C (59 °F)	Close instrument door, if necessary check heating	Reset, automatically as soon as warmer
ANALYZER TO WARM	Measurement, but no more air cleaning	At very high internal temperature, the air cleaning of the filter modules is disabled so as to generate less heat. internal temp = target temp of cuvette	Change/clean air filter, check air ducts for blockage, check enclosure fan, is ambient temperature allowed? If necessary increase electrode temperature	Reset, automatically as soon as cool
CUV TOO COOL	Continued measurement	The cuvette is not being heated adequately 2 min after sample change: temp. = ((target temp. of cuvette) –1 °C (34 °F))	Close instrument door, check/fit cuvette insulation. Attention: If this warning occurs during the calibration, there is a risk of incorrect measurements, for this reason close door during calibration!	Automatic
ELECTRODE SLOPE	Continued measurement	The warning occurs if the electrode slope is not in the range of –55mV to –67mV	Change membrane and electrolyte, if there is still a problem, check standards and chemistry, check flow rate. If all OK, but warning still present, fit new electrode	Automatic
MODULES CONTAM.	Continued measurement	Filter modules soiled	Clean filter modules soon	Automatic
SERVICE MODE	Service state	The instrument is in the service state or is switching to this state	–	Automatic when the service state is left

7.2.3 Warnings (continued)

Warning displayed	Instrument reaction	Cause	Solution	Reset warning
REAGENT LEVEL	Continued measurement	Amount of reagent has dropped below warning level set	Check reagent level and replace if necessary, then reset reagent level. The level is indicated mathematically and can only function reliably if the counter is only reset when the solution is changed	On the menu MAINTENANCE/TEST/MAINT./REAGENT
CLEAN SOLU LEVEL	Continued measurement	Amount of cleaning solution has dropped below warning level set	Check cleaning solution level and replace if necessary, then reset cleaning solution level. The level is indicated mathematically and can only function reliably if the counter is only reset when the solution is changed	On the menu MAINTENANCE/MAINT. COUNTER/CLEANING SOLU.
STANDARDS LEVEL	Continued measurement	Amount of standard solution has dropped below warning level set	Check standard level and replace if necessary, then reset standard level. The level is indicated mathematically and can only function reliably if the counter is only reset when the solution is changed	On the menu MAINTENANCE/MAINT. COUNTER/STANDARD
ELECTROLYTE	Continued measurement	Elektrolyte level may be to low or last CHANGE MEMBRANE has been more than 90 days ago.	Check amount of electrolyte, exchange electrolyte completely if level is low. Use process CHANGE MEMBRANE . DO NOT add new electrolyte to old electrolyte.	Reset warning manually or automatic reset after use of CHANGE MEMBRANE, CHANGE ELECTRODE or CHANGE MEASUREMENT RANGE in menu TEST/MAINT.
SAMPLE1 / SAMPLE2	Continued measurement	the amount of sample is not sufficient (channel1 / channel2) This occurs as warning if SAMPLE DETECTION is set to WARNING	Check sample delivery, make shure that sample line has no negative pressure, check tightness of piston pump, check overflow and air valve	Automatic reset when enough sample is available or manuell reset

7.3 Troubleshooting the Electrode

The electrode data are saved in the AMTAX sc CALIB. DATA menu or in the event logger.

Typical electrode values (note sign):

Table 10 contains typical electrode data for a new inserted electrode with new electrolyte and membrane cap.

The zero value is always the most positive value and the standard 2 value is always the most negative value in a calibration. The standard 1 is always between the zero value and the standard 2 value.

When starting up an electrode, the slope increases to the final value (ideal between -58 and -63 mV) and remains there with minor fluctuations.

Table 10 Typical electrode values

Description	MR 1 (0.02–5 mg/L NH4–N)	MR 2 (0.05–20 mg/L NH4–N)	MR 3 (1–100 mg/L NH4–N)	MR 4 (10–1000 mg/L NH4–N)
Slope	–55 to –67 mV			
Slope warning	–50 to –55 mV or –67 to –70 mV			
Slope error	0 to –50 mV or –70 to –150 mV			
mV zero	–205 to +5 mV	20 to 120 mV	20 to 120 mV	20 to 120 mV
mV standard 1	–200 to –140 mV	–30 to 30 mV	–25 to –85 mV	–70 to –130 mV
mV standard 2	–240 to –180 mV	–30 to –90 mV	–70 to –130 mV	–130 to –190 mV

The error descriptions for the electrode in Table 11 and Table 12 are related to the error/warning "electrode slope" or "false elec. data".

Table 11 Error messages

Error description	Diagnostics	Solution
The calibration values for the standards are both above the mV zero value.	- Reagent empty - Reagent pump faulty - Fittings leaking	- New reagent - Replace reagent pump - Tighten fittings
The calibration values for the two standards and the mV zero value are all indicating very similar values.	- Electrode faulty - Electrolyte empty	- Re-new electrolyte - Insert new electrode
Only the mV standard 1 value is above the mV zero value.	- Standard 1 empty - Piston pump leaking	- New standard 1 - Replace piston & cylinder (piston pump)
Only the mV standard 2 value is above the mV zero value.	- Standard 2 empty - Piston pump leaking	- New standard 2 - Replace piston & cylinder (piston pump)
The mV zero value is in the negative range.	- Cleaning solution empty - Cleaning pump faulty - Fittings leaking	- New cleaning solution - Replace cleaning pump - Tighten fittings

Table 11 Error messages (continued)

Error description	Diagnostics	Solution
The electrode slope is between –60 and –65 mV and the 3 calibration values are all significantly offset to the positive range.	<ul style="list-style-type: none"> - The electrolyte is almost empty - electrode body leaking - Membrane cap leaking 	<ul style="list-style-type: none"> - Electrolyte almost completely evaporated after extended operation - Tighten membrane cap - Leaking electrode body: order new electrode
All mV values for the calibration data only differ in the figures after decimal separator (almost constant).	<ul style="list-style-type: none"> - Amplifier board faulty 	<ul style="list-style-type: none"> - Fit new amplifier board

Refer to [Table 12](#) for additional errors messages.

Table 12 Additional error messages

Error description	Diagnostics	Solution
The calibration values fluctuate excessively	<ul style="list-style-type: none"> - Electrode faulty 	<ul style="list-style-type: none"> - Replace electrolyte and membrane cap
The slope is between –40 and –45 mV after the calibration	<ul style="list-style-type: none"> - The measuring range 0.05–20 mg/L NH₄-N is adjusted and the wrong standard solutions 10 and 50 mg/L NH₄-N are used. 	<ul style="list-style-type: none"> - Insert the right standard solutions and complete the procedure for changing the measuring range in the service menu.
The slope decreases, the membrane can be damaged. The values of the electrode slope can decrease after 1–2 weeks to –40 mV and –50 mV.	<ul style="list-style-type: none"> - Membrane is damaged (for example with silicone oil). 	<ul style="list-style-type: none"> - Remove the measurement chamber completely - Clean it thoroughly
A large continuous drift is on the measured values (up to 2 mg in 24 h).	<ul style="list-style-type: none"> - Electrode cap is damaged. The electrolyte crystallize on the cover/cap and evaporate very quickly. 	<ul style="list-style-type: none"> - Re-new electrolyte - Insert new electrode
Fluctuations of measured values and interference of the calibration in the lower measuring range.	<ul style="list-style-type: none"> - Insufficient sample when sample is required for the determination of the zero value 	<ul style="list-style-type: none"> - Make sure that sufficient sample is available
All three electrode values increase within 24 h over 8 mV to positive values.	<ul style="list-style-type: none"> - The electrolyte level dropped out below 4 mL. 	<ul style="list-style-type: none"> - Empty the electrode body, rinse it with distilled water and fill it with new electrolyte.

Section 8 Replacement Parts and Accessories

8.1 Standards and reagents

Description	Cat. No. EU customer	Cat. No. US customer
Set of reagents AMTAX sc with standard solution (Measurement range 1: 0.02–5 mg/L NH ₄ –N)	LCW889	–
Reagent AMTAX sc (2.5 L) for all measuring ranges	BCF1009	28944-52
CAL1: Standard 0.5 mg/L NH ₄ –N (2 L) (Measurement range 1: 0.02–5 mg/L NH ₄ –N)	BCF1148	25146-54
CAL2: Standard 2.5 mg/L NH ₄ –N (2 L) (Measurement range 1: 0.02–5 mg/L NH ₄ –N)	BCF1149	25147-54
Set of reagents AMTAX sc with standard solution (Measurement range 2: 0.05–20 mg/L NH ₄ –N)	LCW865	–
Reagent AMTAX sc (2.5 L) for all measuring ranges	BCF1009	28944-52
CAL1: Standard 1 mg/L NH ₄ –N (2 L) (Measurement range 2: 0.05–20 mg/L NH ₄ –N)	BCF1010	28941-54
CAL2: Standard 10 mg/L NH ₄ –N (2 L) (Measurement range 2: 0.05–20 mg/L NH ₄ –N)	BCF1011	28943-54
Set of reagents AMTAX sc with standard solution (Measurement range 3: 1–100 mg/L NH ₄ –N)	LCW871	–
Reagent AMTAX sc (2.5 L) for all measurement ranges	BCF1009	28944-52
CAL1: Standard 10 mg/L NH ₄ –N (2 L) (Measurement range 3: 1–100 mg/L NH ₄ –N)	BCF1020	28943-54
CAL2: Standard 50 mg/L NH ₄ –N (2 L) (Measurement range 3: 1–100 mg/L NH ₄ –N)	BCF1021	28958-54
Set of reagents AMTAX sc with standard solution (Measurement range 4: 10–1000 mg/L NH ₄ –N)	LCW866	–
Reagent AMTAX sc (2.5 L) for all measurement ranges	BCF1009	28944-52
CAL1: Standard 50 mg/L NH ₄ –N (2 L) (Measurement range 4: 10–1000 mg/L NH ₄ –N)	BCF1012	28258-54
CAL2: Standard 500 mg/L NH ₄ –N (2 L) (Measurement range 4: 10–1000 mg/L NH ₄ –N)	BCF1013	28259-54
Cleaning solution AMTAX sc (250 mL)	LCW867	28942-46
Set of electrolyte and membrane caps (3 electrolyte and 3 membrane caps) for measurement ranges 2, 3 and 4	LCW868	61825-00
Set of electrolyte (3 electrolyte) for measuring range 2, 3 and 4	LCW882	–
Set of electrolyte and membrane caps (3 electrolyte and 3 membrane caps) for measurement range 1	LCW891	29553-00
Set of electrolyte (3 electrolyte solutions) for measuring range 1: 0.02–5 mg/L NH ₄ –N	LCW890	–
One bottle of electrolyte for measuring range 1: 0.02–5 mg/L NH ₄ –N	–	25148-36

8.2 Analyzer accessories

Description	Cat. No.
Accessories for AMTAX/PHOSPHAXsc for continuous sampling (1 or 2 channel)	LZY189
Cutter for tubing	LZY201
Heated drain hose, 230 V	LZY302
Heated drain hose, 115 V	LZY303
Set of connectors for sc analyzers	LZY190
Set of sealing plugs (rubber) for sc analyzer, type 1 (3), type 2 (1), type 3 (3)	LZY007
Set of screws for sc analyzer, M3x6 (4), M3x25 (2); M3x50 (2)	LZY191
Electrode key, AMTAX sc	LZY330

8.3 Mounting hardware and accessories

Description	Cat. No.
Wall mount kit, includes 4 wood screws 5 X 60 plus 4 wall plugs	LZX355
Mounting Kit for sc analyzer, includes fastening, angle bracket and screws	LZY044
Set of screws for fastening and angle bracket	LZY216
Set of screws for sc analyzer	LZY223
Set of screws for Rail Mounting LZY285 and LZY316	LZY220
Rail mounting, analyzer with controller	LZY285
Rail mounting, analyzer without controller	LZY316
Stand mounting, sc analyzer with controller	LZY286
Stand mounting, sc analyzer without controller	LZY287

8.4 Replacement parts

(Refer to [Figure 22, page 68](#)–[Figure 26, page 72](#))

Item	Description	Cat. No.
1	Door for sc analyzer enclosure, includes 4 instrument labels	LZY143
1	Door for sc analyzer enclosure (indoor), includes 4 instrument labels	LZY682
1	Instrument labels	LZY144
2	Door hook	LZY148
3	Enclosure for sc analyzer without door	LZY145
4	Set of filter pads (2 pieces)	LZY154
5	Clamping lock for sc analyzer	LZY147
6	Fence, includes screws M3 x 6	LZY157
7	Compressor switchable 115V/230V	LZY149
8	Fan for incoming air	LZY152
9	Air tubing for compressor, includes non-return valve, fitting,	LZY151
10	Collecting tray for sc analyzer	LZY146
11	Hinge, includes screws	LZY155
12	Gasket for sc analyzer door	LZY187
13	Door lock, sc analyzer	LZY188
14	Mounting plate for sc analyzer	LZY161
15	Analyzer panel of AMTAX sc for all ranges	LZY162
16	Solenoid stirring stick (8x3 mm)	LZP365
17	Special electrode with one membrane cap AMTAX sc	LZY069
17	Special electrode AMTAX sc including electrolyte and membrane cap set for measurement range 1, 2 and 3	LZY070
18	Measuring cell AMTAX sc all ranges, includes sealing	LZY184
18	Set of seals for measuring cell AMTAX sc (3 O-rings)	LZY196
19	Stirrer motor AMTAX sc	LZY182
20	Valve block for AMTAX sc, includes valves for all ranges	LZY169
21	Valve block for AMTAX sc, all ranges	LZY173
22	Upper part of valve block	LZY174
23	Upper part of valve block with valve	LZY175
24	Valve 2/2 ways	LZY168
25	Tubing, 3.2 mm (2 m), sc analyzer	LZY195

8.4 Replacement parts

(Refer to [Figure 22, page 68](#)–[Figure 26, page 72](#))

Item	Description	Cat. No.
26	Set of fittings, 3.2 mm, (4 pieces)	LZY111
27	Fitting for tubing 4/6mm	LZY134
28	Blind plug	LZY193
29	Valve block 2-channel switch, includes valve for sc analyzer	LZY267
29 and 39	Conversion kit from 1-channel into 2-channel sc analyzer	LZY170
30	Valve block 2-channel switch for sc analyzer	LZY172
31	Valve 3/2 ways	LZY171
32	Conversion kit from 1-channel > Filter Probe sc analyzer, AMTAX sc/PHOSPHAX sc	LZY242
33	Bottom part of overflow vessel	LZY165
34	Upper part of overflow vessel	LZY166
35	Upper part of overflow vessel, includes valve	LZY167
36	Locking screw	LZY150
37	Conversion kit from Filter Probe sc > 1-channel sc analyzer, AMTAX sc/PHOSPHAX sc	LZY241
38	Upper part of overflow vessel for 1 or 2-channel instrument	LZY268
39	Overflow vessel for 2-channel instrument	LZY269
40	Safety plate for sc analyzer	LZY179
41	Insulation cover for GSE AMTAX sc, all ranges	LZY224
42	Holder for piston pump	LZY180
43	Pump head for air pump, 10 mL	LZY181
44	Piston pump for sc analyzer	LZY177
45	Cover for reagent pump	LZY178
46	Set of fittings 1.6 mm, (4 pieces)	LZY192
47	Tubing 1.6 mm (2 m), sc analyzer	LZY194
48	Reagent pump for sc analyzer (valve pump)	LZY176
49	Fan for air recirculation for sc analyzer	LZY153
50	Heating for analyzer enclosure, includes connectors	LZY156
51	Cover	LZY270
52	Cover for processor card	LZY159
53	Cover for power supply	LZY158
54	Power supply, 100–240 VAC	YAB039
55	Amplifier card for AMTAX sc	YAB044
56	Processor card for sc analyzer	YAB099
57	Sealing for valve block	LZY199
58	Sealing for overflow vessel	LZY198
59	Card with temperature sensor, AMTAX sc/PHOSPHAX sc	YAB089
60	Air filter/silencer for compressor	LZY332
61	Air filter	LZY493
62	Check valve	LZY470
63	T-fitting	LZY133
64	Protective cover for compressor	HAH041

Exploded view drawings

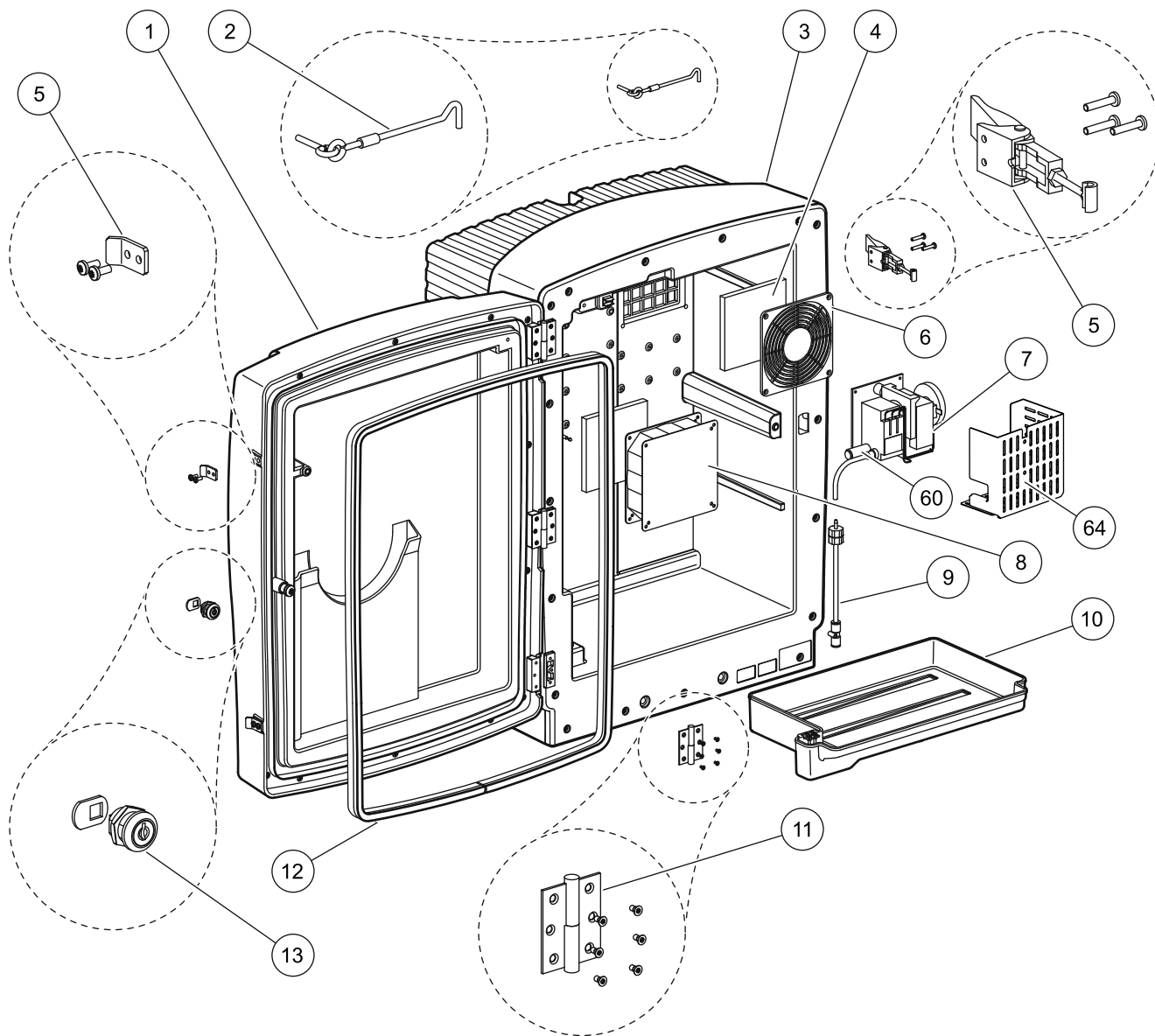


Figure 22 Analyzer enclosure AMTAX sc

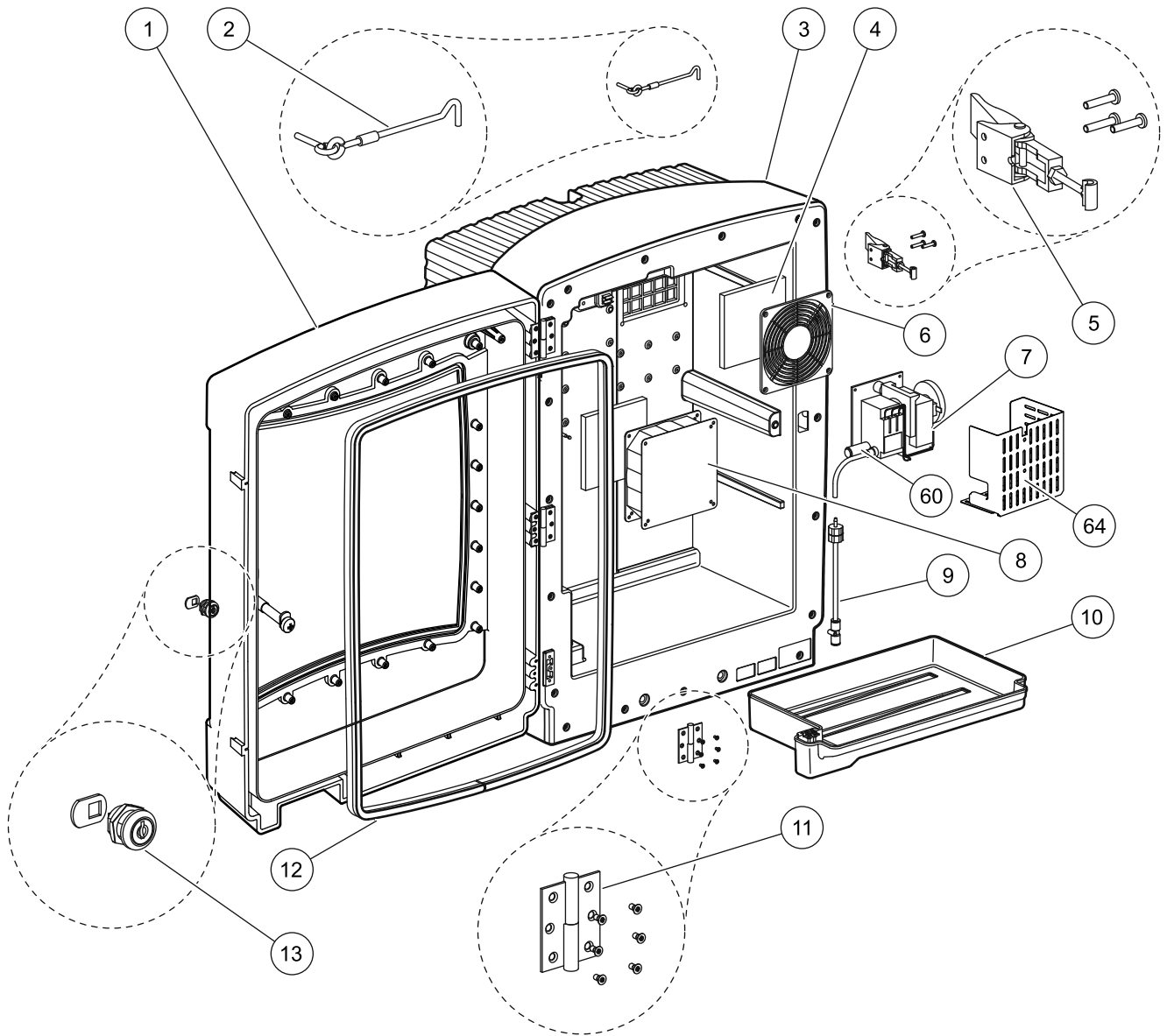


Figure 23 Analyzer enclosure AMTAX indoor sc

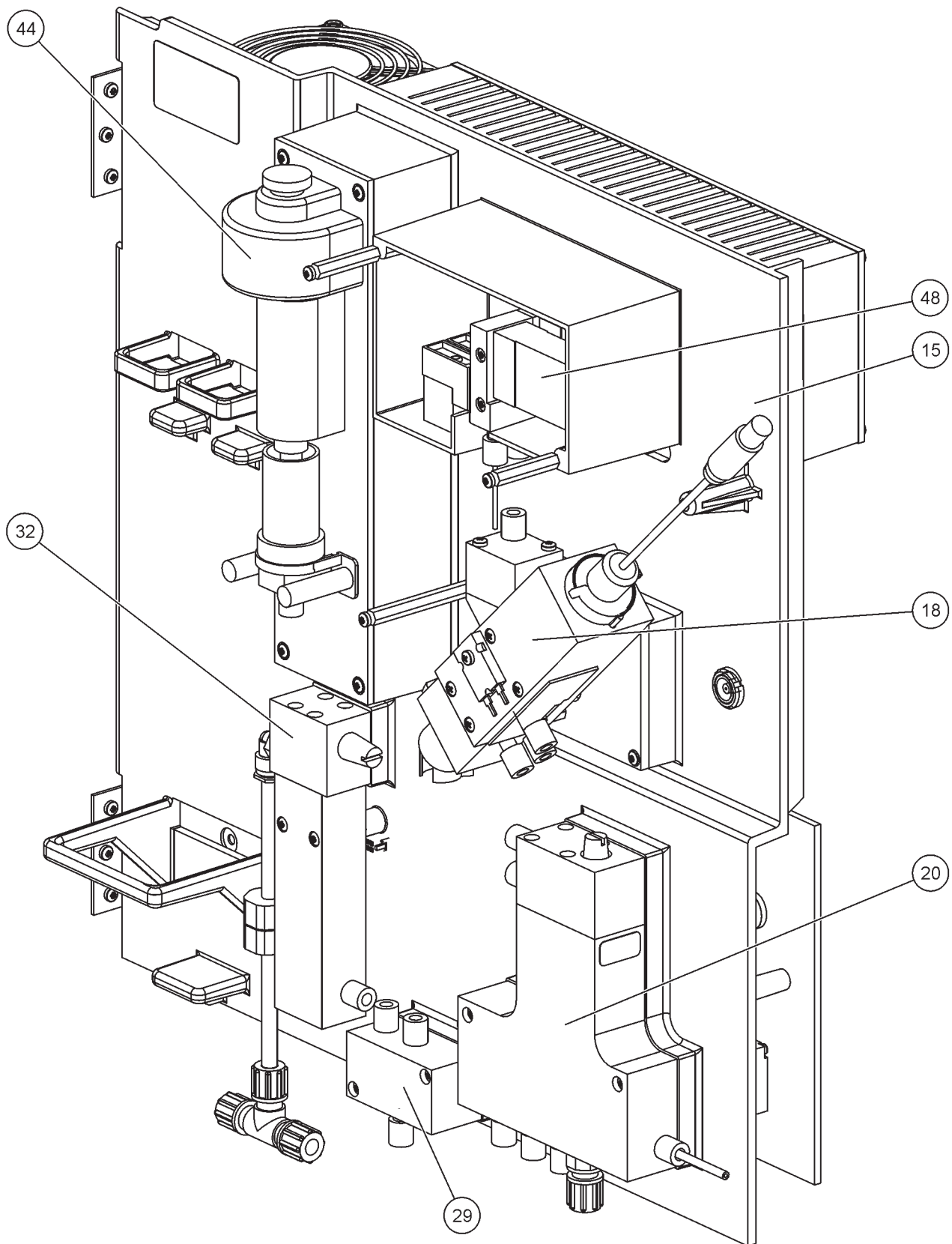


Figure 24 Analyzer panel overview

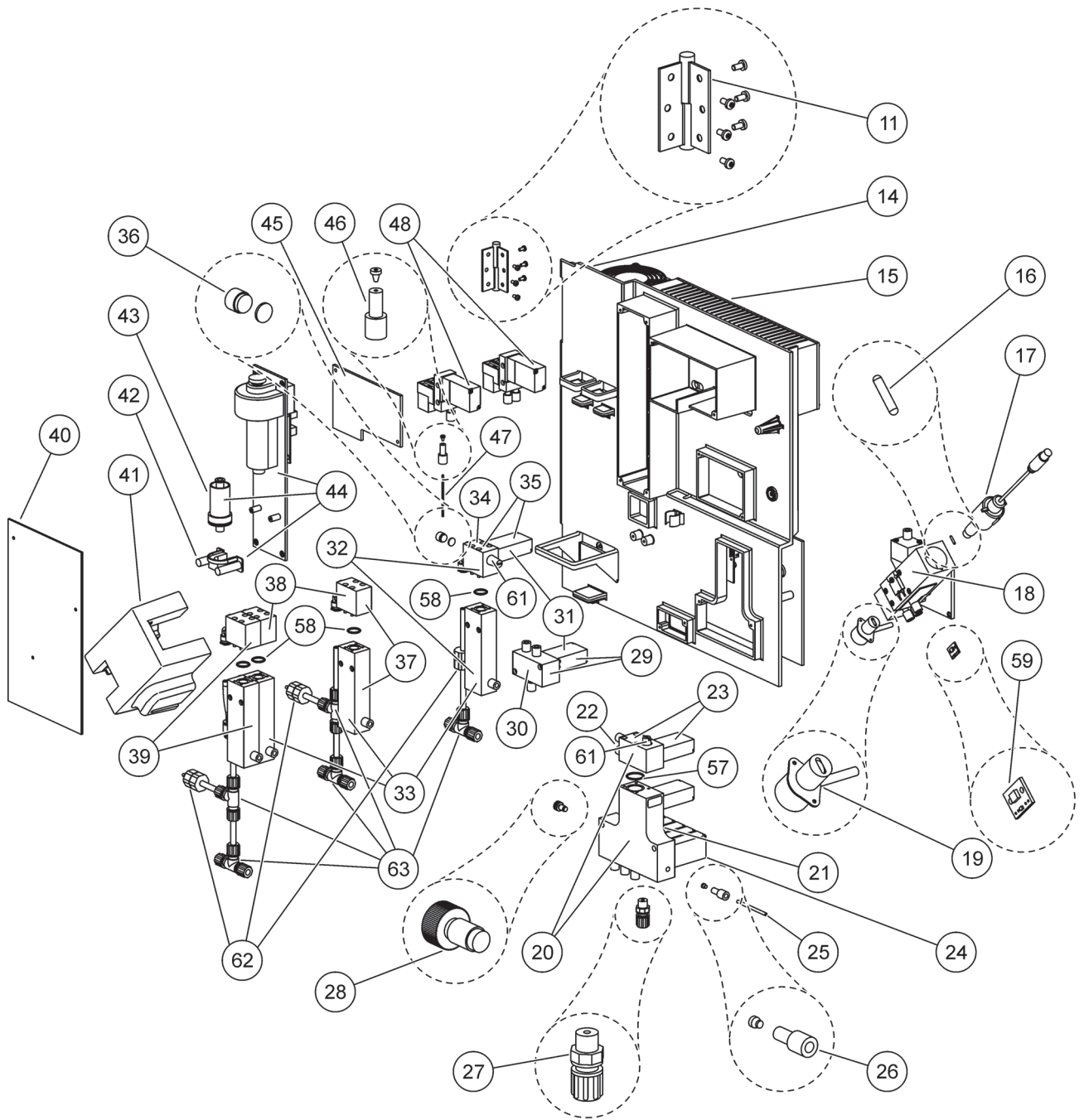


Figure 25 Analyzer panel front view details

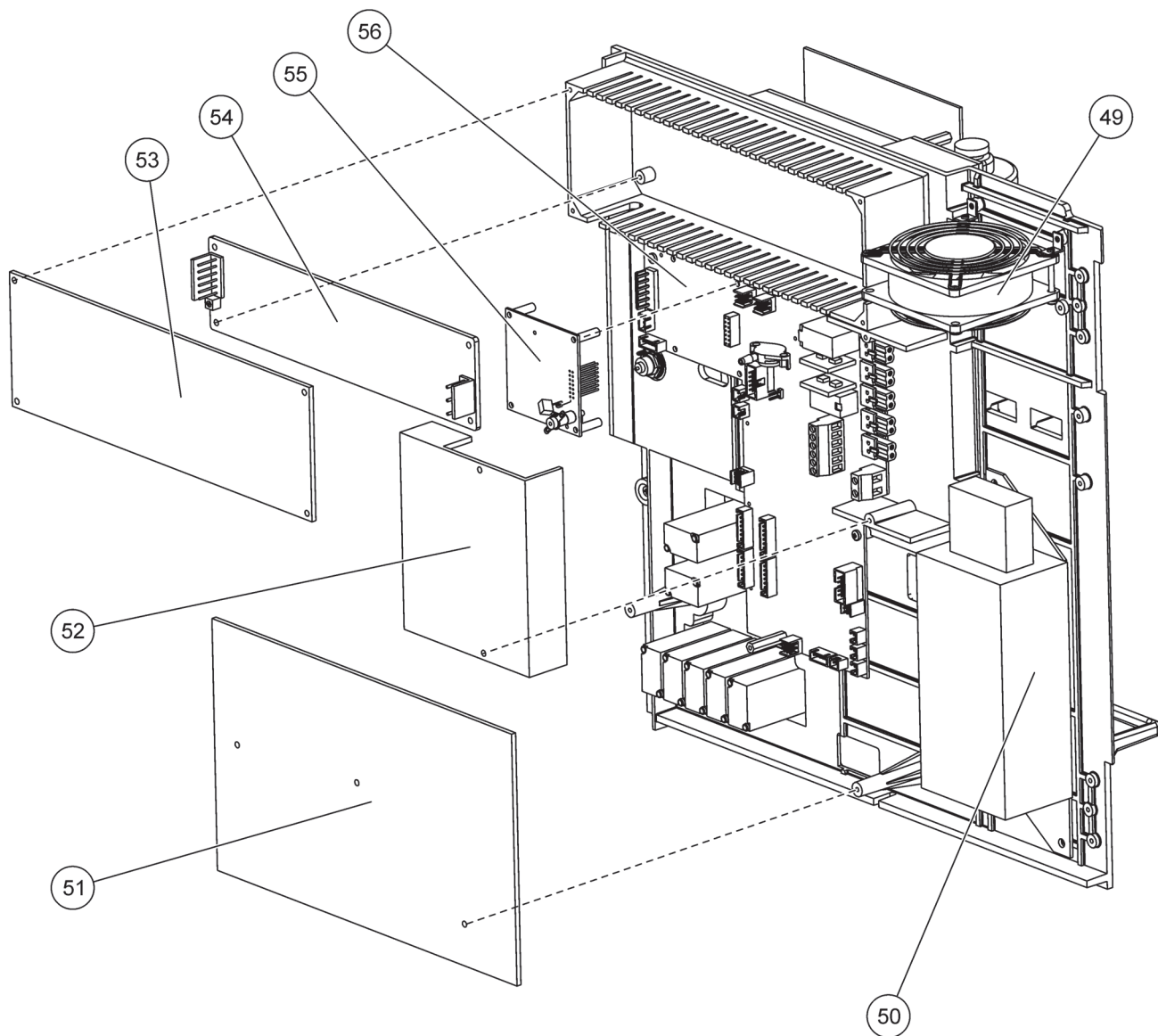


Figure 26 Analyzer panel back view details

Section 9 Limited Warranty

Hach Company warrants its products to the original purchaser against any defects that are due to faulty material or workmanship for a period of one year from date of shipment unless otherwise noted in the product manual.

In the event that a defect is discovered during the warranty period, Hach Company agrees that, at its option, it will repair or replace the defective product or refund the purchase price excluding original shipping and handling charges. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

This warranty does not apply to consumable products such as chemical reagents; or consumable components of a product, such as, but not limited to, lamps and tubing.

Contact Hach Company or your distributor to initiate warranty support. Products may not be returned without authorization from Hach Company.

Limitations

This warranty does not cover:

- Damage caused by acts of God, natural disaster, labor unrest, acts of war (declared or undeclared), terrorism, civil strife or acts of any governmental jurisdiction
- Damage caused by misuse, neglect, accident or improper application or installation
- Damage caused by any repair or attempted repair not authorized by Hach Company
- Any product not used in accordance with the instructions furnished by Hach Company
- Freight charges to return merchandise to Hach Company
- Freight charges on expedited or express shipment of warranted parts or product
- Travel fees associated with on-site warranty repair

This warranty contains the sole express warranty made by Hach Company in connection with its products. All implied warranties, including without limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

Some states within the United States do not allow the disclaimer of implied warranties and if this is true in your state the above limitation may not apply to you. This warranty gives you specific rights, and you may also have other rights that vary from state to state.

This warranty constitutes the final, complete, and exclusive statement of warranty terms and no person is authorized to make any other warranties or representations on behalf of Hach Company.

Limitation of Remedies

The remedies of repair, replacement or refund of purchase price as stated above are the exclusive remedies for the breach of this warranty. On the basis of strict liability or under any other legal theory, in no event shall Hach Company be liable for any incidental or consequential damages of any kind for breach of warranty or negligence.

Appendix A Plumbing and Connection Options

A.1 Safety information

When making any plumbing or wiring connections, the following warnings must be adhered to, as well as any warnings and notes found throughout the individual sections. For more safety information, refer to [Safety information, page 9](#).

DANGER

Always disconnect power to the instrument when making any electrical connections.

CAUTION

The enclosure may tip forwards if it has not been fixed in place. Only open the enclosure if the enclosure is properly mounted.

A.1.1 Electrostatic Discharge (ESD) Considerations

Important Note: To minimize hazards and ESD risks, maintenance procedures not requiring power to the analyzer should be performed with power removed.

Delicate internal electronic components can be damaged by static electricity, resulting in degraded instrument performance or eventual failure.

The manufacturer recommends taking the following steps to prevent ESD damage to the instrument:

- Before touching any instrument electronic components (such as printed circuit cards and the components on them) discharge static electricity. This can be accomplished by touching an earth-grounded metal surface such as the chassis of an instrument or a metal conduit or pipe.
- To reduce static build-up, avoid excessive movement. Transport static-sensitive components in anti-static containers or packaging.
- To discharge static electricity and keep it discharged, wear a wrist strap connected by a wire to earth ground.
- Handle all static-sensitive components in a static-safe area. If possible, use anti-static floor pads and work bench pads.

A.2 Connect a 2-parameter option

The 2-parameter configuration is required for Options 4, 6, 8b, 9b, 10b and 11b.

When using a continuous sample the AMTAX sc can measure one parameter: $\text{NH}_4\text{-N}$. To operate a second parameter with the same continuous sample (i.e. phosphate measured by the PHOSPHAX sc) the sample line must be connected to the overflow vessel of the first instrument in the row. For this purpose, the first instrument must be modified to the 2-parameter variant.

Note: The 2-parameter configuration applies to outdoor and indoor options and to one and two-channel options (Ch1 + Ch2).

Refer to [Figure 27](#) and following instructions to connect a 2-parameter configuration.

1. Remove the small blind plug (item 1, [Figure 27](#)) from the top hole on the overflow vessel. Remove the large fitting (item 2) from the bottom hole on the overflow vessel. Discard the plug and fitting.
2. Slide the small fitting (union and ferrule, item 3) over the tubing (item 5). Cut the tubing flush with the ferrule.
3. Install the small fitting to the top hole on the overflow vessel to take the sample to the second analyzer.
4. Close the bottom hole with the large blind plug and sealing washer (item 4).

Note: Always connect the front overflow vessel for the first instrument to the front overflow vessel for the second instrument.

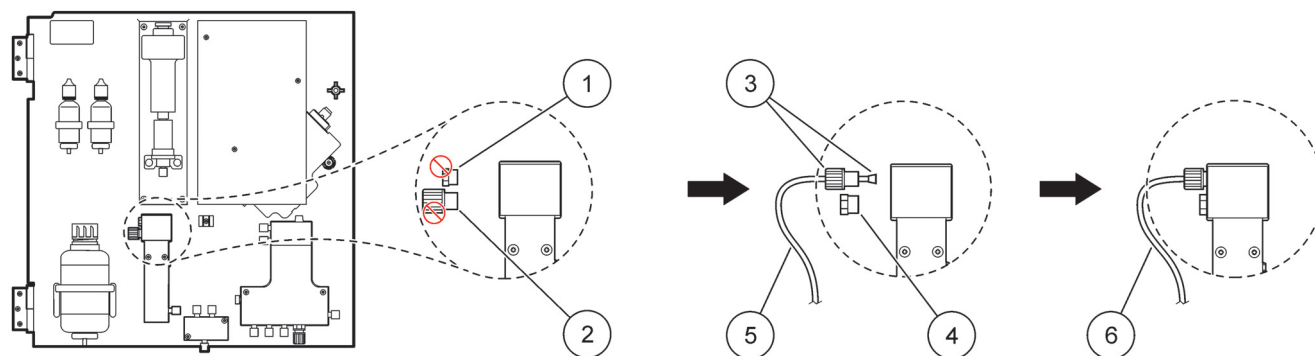


Figure 27 2-parameter option configuration

1	Small plug	4	Large plug LZY193
2	Large fitting	5	Tubing LZY195
3	Small fitting and ferrule LZY111	6	To second analyzer

A.2.1 Remove the T-fitting

When using the 2-parameter configuration, the T-fitting from the first analyzer drain tube must be removed and reused to connect the drain tube from the first analyzer to the second analyzer.

The T-fitting is used to connect the drain tube. To remove the T-fitting refer to [Figure 28](#) and the following steps:

1. Remove the drain tube from both ends of the T-fitting.
2. Remove the drain tube assembly.
3. Reconnect the T-fitting as described in Options 4, 6, 8b, 9b, 10b and 11b.

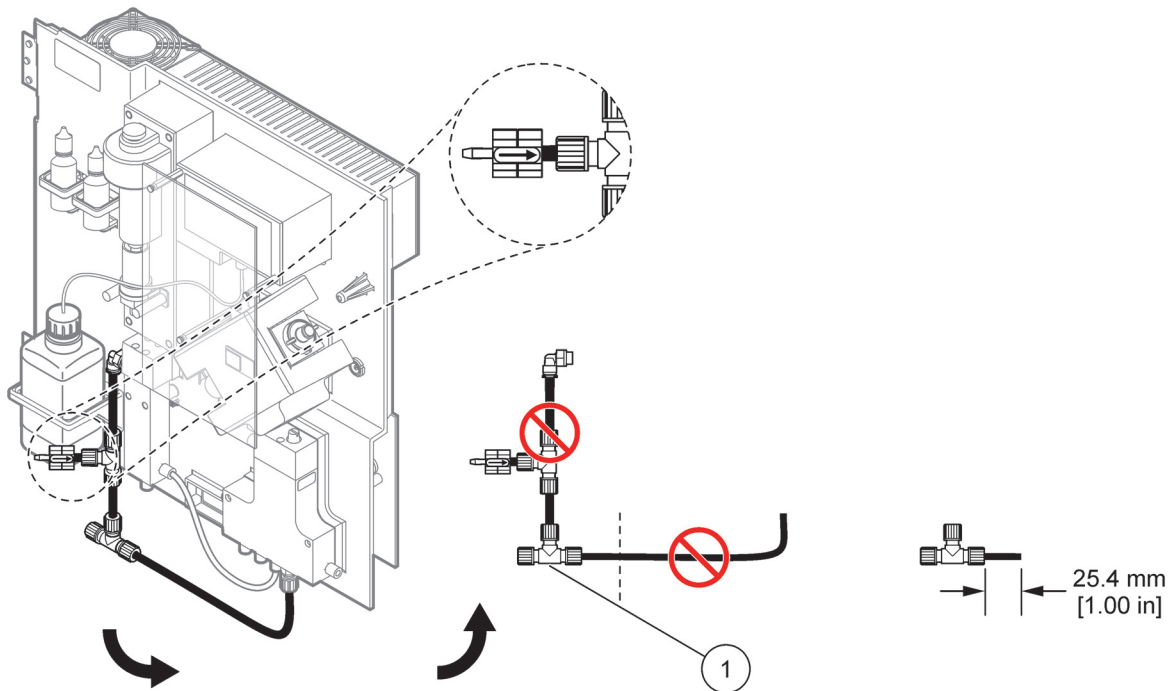


Figure 28 Removing the T-fitting

1 T-fitting to be removed

A.3 Drain line considerations

Always place the drain tubing so that there is a continuous fall (min. 3 degrees) and the outlet is clear (not pressurized). Make sure the drain tubing is no longer than 2 meters.

A.4 Tubing considerations

The AMTAX sc uses four different tubing types for plumbing connections. The type of tubing used depends on the system configuration option:

- Ø 3.2 mm: sample line tubing
- Ø 6 mm: unheated drain tubing
- Ø 22 mm: heated drain tubing
- Ø 32 mm: tubing for the Filter Probe sc

A.5 Option 1 plumbing and connections

Option 1 is used with an sc analyzer and the Filter Probe sc. The waste from the analyzer is discharged back into the basin using the Filtration Kit. Use the drain tube inside the Filter Probe sc or the optional heated drain tube to discharge the waste stream from the sc analyzer.

Refer to [Figure 29](#) and the following instructions for Option 1:

1. Install the Filter Probe sc into the sample stream. Refer to the Filter Probe sc User Manual for more information.
2. Feed the Filter Probe sc hose (sample lines, electrical cables and drain tube) through the analyzer opening (item 5, [Figure 29](#)). Use Seal Plug #2 to secure.
3. Seal the unused openings with Seal Plug #3.
4. Connect the Filter Probe sc data cable and power connections. Refer to [section 3.5.4, page 26](#) and [Figure 16, page 28](#).
5. Connect the air tube to the compressor (item 3). Refer to [section 3.5.5, page 27](#).
6. Connect the drain tube to the Filter Probe sc ([Figure 29, page 79](#)).
7. Connect the sample line to the sample inlet on the overflow vessel using the fittings.

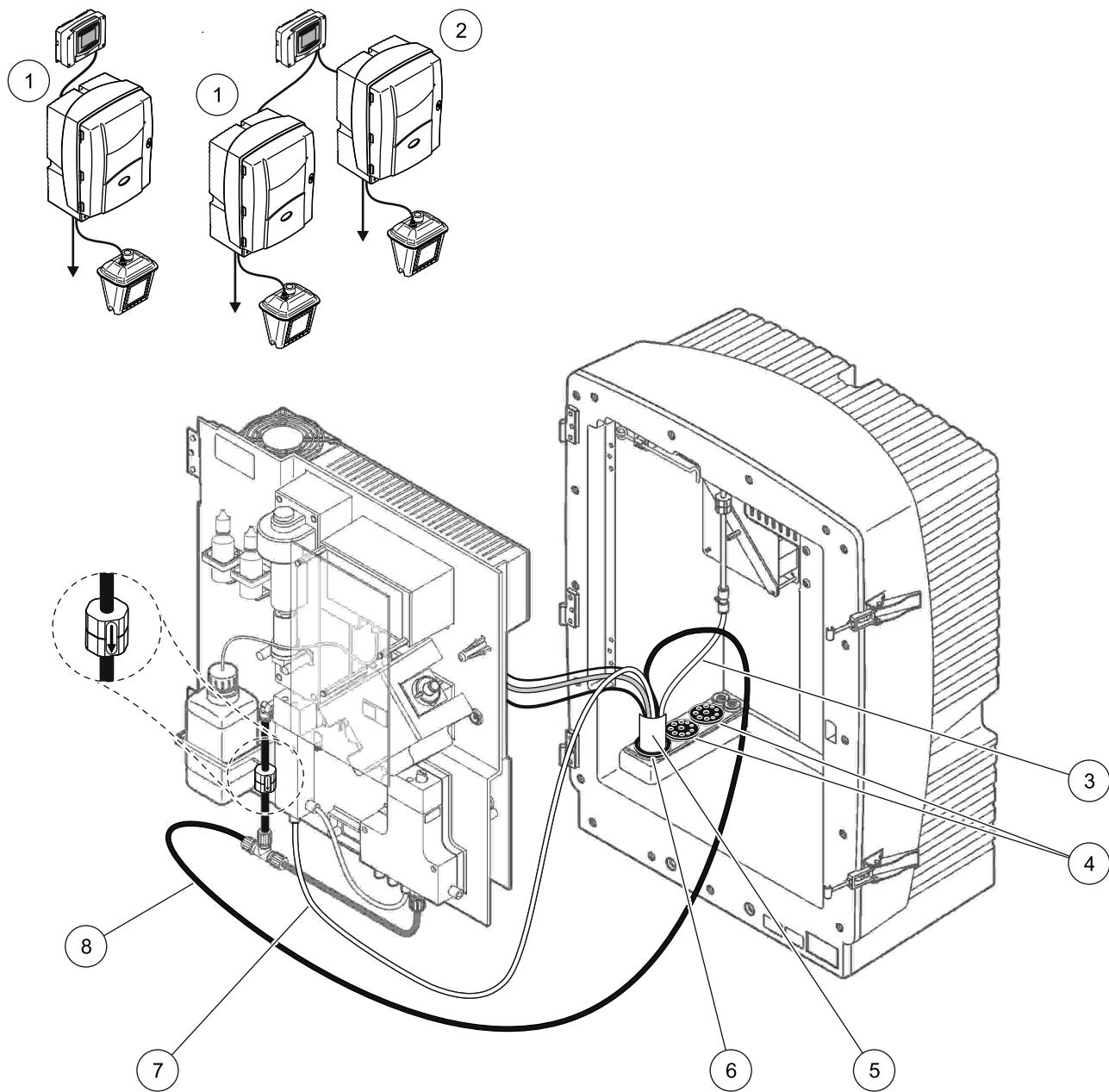


Figure 29 Option 1 setup

1	AMTAX sc analyzer	5	Filter Probe sc hose
2	PHOSPHAX sc analyzer	6	Seal plug #2
3	Air tube	7	Sample line to overflow vessel
4	Seal plug #3	8	Drain tube

A.6 Option 2 plumbing and cable connections

Option 2 uses an sc analyzer with the Filter Probe sc. The waste from the analyzer is discharged back into the drain through the optional heated drain hose LZY302 (230V) or LZY303 (115V).

Refer to [Figure 30](#) and the following instructions for Option 2:

1. Install the Filter Probe sc into the sample stream. Refer to the Filter Probe sc User Manual for more information.
2. Feed the Filter Probe sc hose (sample lines, electrical cables, drain tube) through the analyzer opening (item 9, [Figure 30](#)). Use Seal Plug #2 to secure.

Note: *The drain tube from the Filter Probe sc is not used.*

3. Feed the heated drain hose through the analyzer opening (item 7). Use Seal Plug #1 to secure.

Note: *The two samples lines of the heated drain hose are not used.*

4. Seal the remaining opening with Seal Plug #3.
5. Connect the Filter Probe sc data cable and power connections. Refer to [section 3.5.3, page 26](#).
6. Connect the heated drain power connections. Refer to [section 3.5.5, page 27](#).
7. Connect the air tube to the compressor (item 5).
8. Connect the Filter Probe sc heated drain tube to the sample outlet T-fitting.
9. Connect the sample line to the sample inlet on the overflow vessel using the fittings.

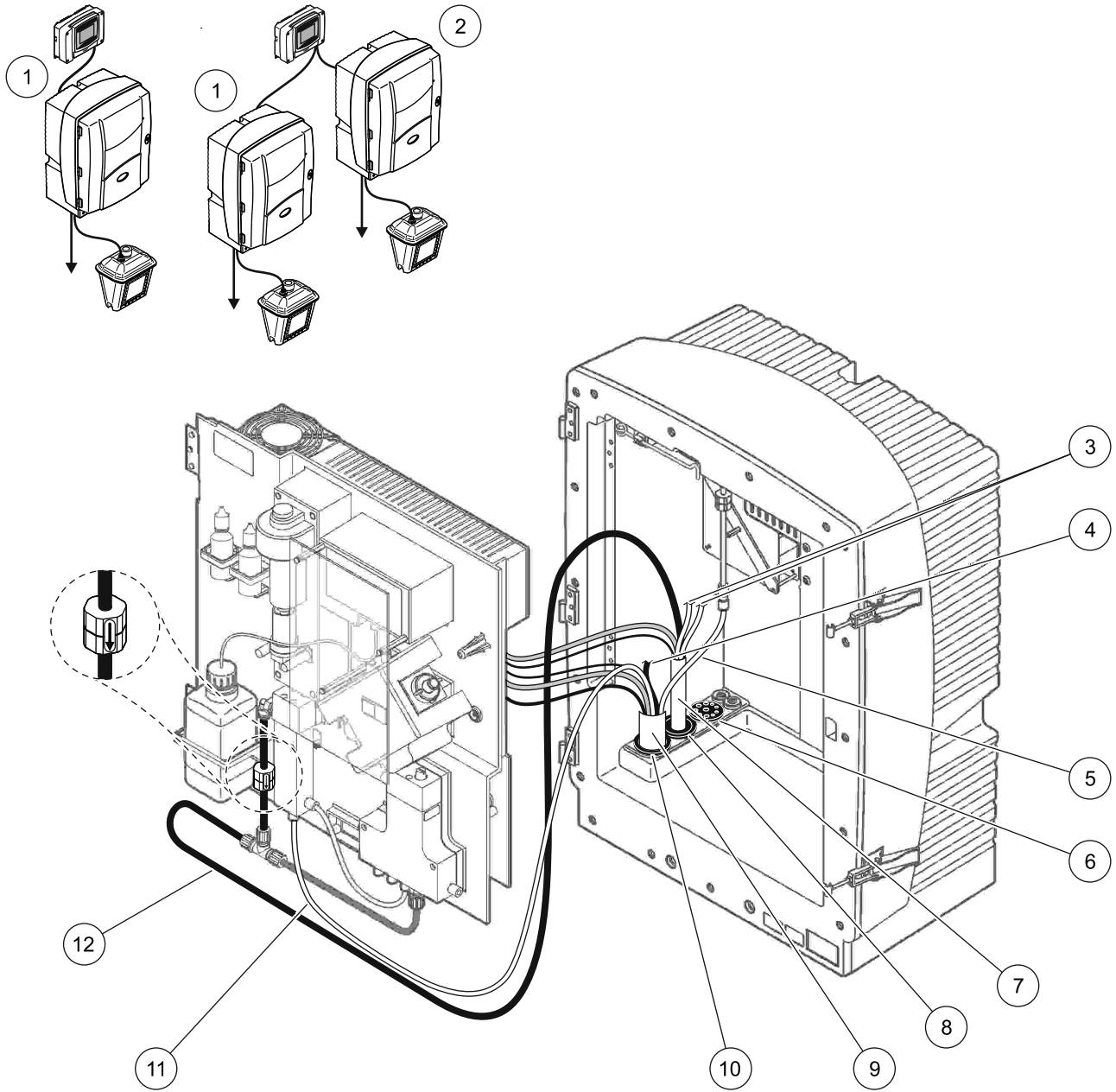


Figure 30 Option 2 setup

1	AMTAX sc analyzer	7	Heated drain tube
2	PHOSPHAX sc analyzer	8	Seal plug #1
3	Unused heated drain sample lines	9	Filter Probe sc hose
4	Unused Filter Probe sc drain tube	10	Seal plug #2
5	Air tube	11	Filter Probe sc sample line
6	Seal plug #3	12	Heated drain

A.7 Option 3 plumbing and connections

Option 3 uses an sc analyzer with the FILTRAX. The waste from the analyzer is discharged back into the drain through the optional heated drain hose LZY302 (230 V) or LZY303 (115 V).

Refer to [Figure 31](#) and the following instructions for Option 3:

1. Install the FILTRAX into the sample stream. Refer to the FILTRAX User Manual for more information.
2. Feed the heated hose from the FILTRAX through the analyzer opening ([Figure 31](#), item 5). Use Seal Plug #1 to secure.
3. Feed the heated drain hose through the analyzer opening (item 3). Use Seal Plug #1 to secure.

Note: The two samples lines of the heated drain hose are not used.

4. Seal the remaining opening with Seal Plug #3.
5. Connect the heated drain power connections. Refer to [section 3.5.5, page 27](#).
6. Connect the heated drain tube to the sample outlet T-fitting.

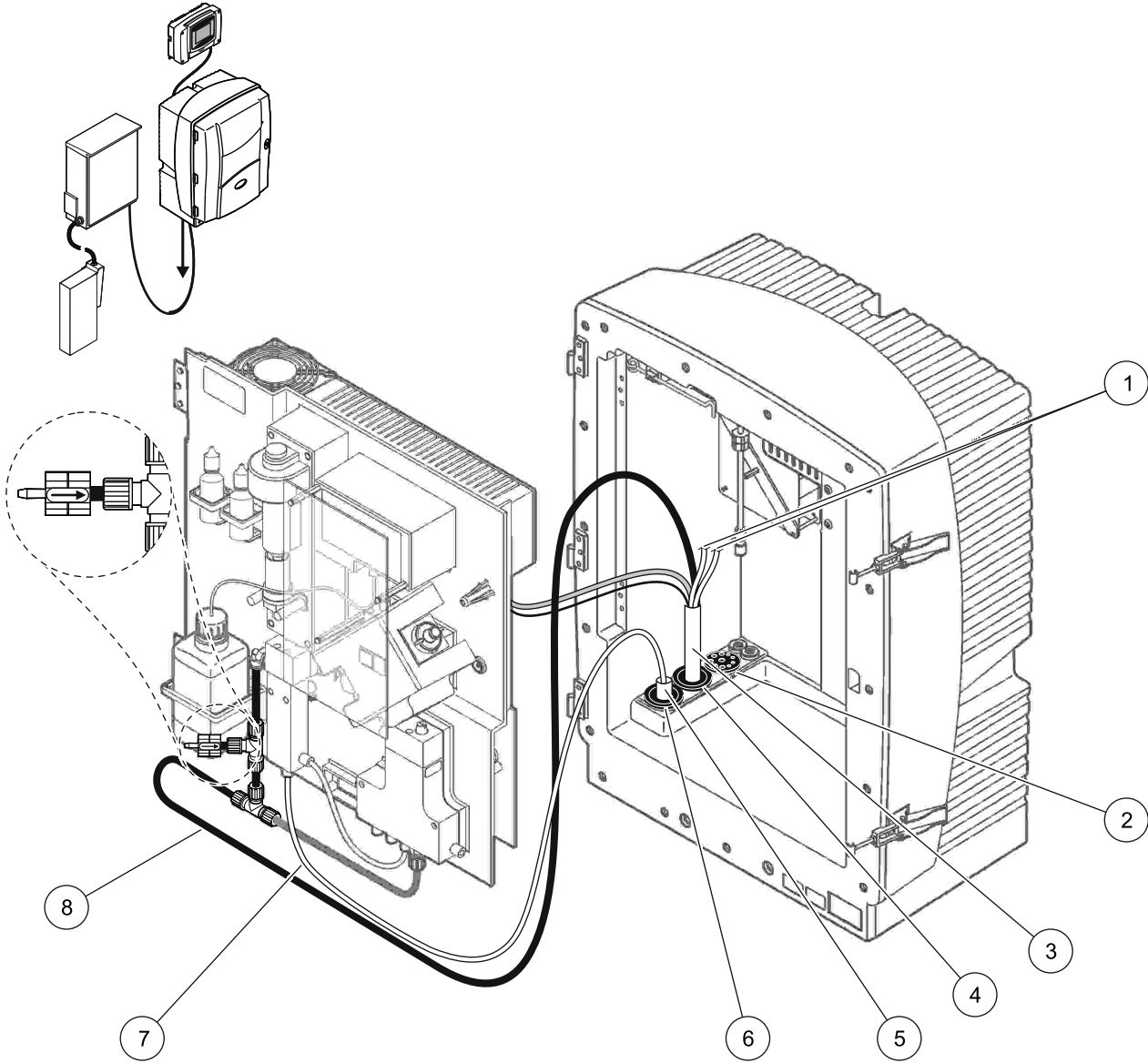


Figure 31 Option 3 setup

1	Unused heated drain sample lines	5	FILTRAX heated hose
2	Seal plug #3	6	Seal plug #1
3	Heated drain hose	7	FILTRAX sample line
4	Seal plug #1	8	Heated drain tube

A.8 Option 4 plumbing and connections

Option 4 uses two sc analyzers with the FILTRAX. The sample from the FILTRAX goes to the first analyzer which needs to change to a 2-parameter configuration (see [Connect a 2-parameter option, page 76](#)). The heated drain hose connects both sc analyzers. The waste from both analyzers is discharged back into a drain through the second heated drain hose.

Refer to [Figure 32](#) and the following instructions for Option 4:

1. Install the FILTRAX into the sample stream. Refer to the FILTRAX User Manual for more information.
2. Install the first sc analyzer (Analyzer 1):
 - a. Feed the heated hose from the FILTRAX through the analyzer opening ([Figure 32](#), item 15). Use Seal Plug #1 to secure.
 - b. Feed the heated drain hose through the analyzer opening (item 17). Use Seal Plug #1 to secure.
 - c. Seal the remaining opening with Seal Plug #3.
 - d. Connect the heated drain power connections. Refer to [section 3.5.5, page 27](#).
 - e. Remove the pre-installed drain tube attached to the valve block and remove the T-fitting from the drain tube (item 7). Retain for reuse with Analyzer 2.
 - f. Connect the heated drain tube to the valve block connector.
 - g. Connect the sample line from the FILTRAX to the bottom inlet on the overflow vessel using the fittings.
 - h. Change the analyzer to the 2 parameter configuration. Refer to [Connect a 2-parameter option, page 76](#).
 - i. Connect one of the sample lines from the heated drain to the overflow vessel.
3. Install the second sc analyzer (Analyzer 2):
 - a. Feed the heated drain hose from Analyzer 1 through Analyzer 2 (item 12). Use Seal Plug #1 to secure.
 - b. Feed the second heated drain hose through Analyzer 2 (item 11). Use Seal Plug #1 to secure.
 - c. Seal the remaining opening with Seal Plug #3.
 - d. Connect the heated drain power connections. Refer to [section 3.5.5, page 27](#).
 - e. Cut 25 mm from the drain tube that was removed from Analyzer 1. Connect the 25 mm piece of tubing to the T-fitting on Analyzer 2. Connect the other end of the tubing to the T-fitting that was removed from Analyzer 1. Refer to [Figure 28, page 77](#) for T-fitting removal.
 - f. Connect the drain tube from Analyzer 1 and the drain tube from Analyzer 2 to the T-fitting.
4. Connect the sample line from Analyzer 1 to the bottom inlet on the overflow vessel.

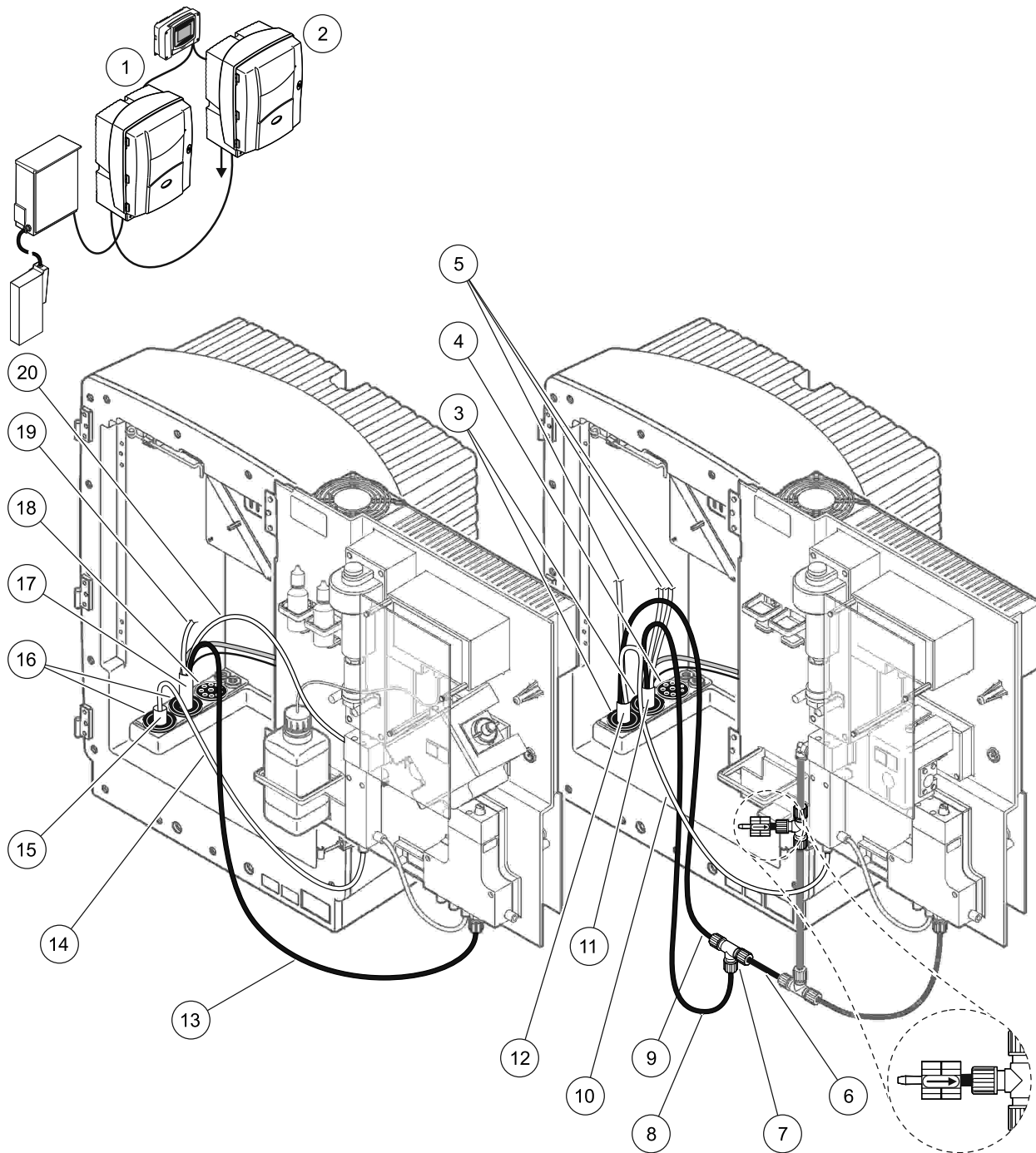


Figure 32 Option 4 setup

1	AMTAX sc analyzer	8	Heated drain tube	15	FILTRAX heated hose
2	PHOSPHAX sc analyzer	9	Heated drain tube from analyzer 1	16	Seal plug #1
3	Seal plug #1	10	Sample line from analyzer 1	17	Heated drain hose
4	Seal plug #3	11	Heated drain hose	18	Seal plug #3
5	Unused heated drain sample lines	12	Heated drain hose from analyzer 1	19	Unused heated drain sample line
6	Drain tube cut from analyzer 1	13	Heated drain tube	20	Heated drain sample line
7	T-fitting from analyzer 1	14	FILTRAX sample line		

A.9 Option 5 plumbing and connections

Option 5 uses an sc analyzer as a 2-channel analyzer with two FILTRAX (FILTRAX 1 and FILTRAX 2), supplying two continuous sample streams. The waste from the analyzer and both FILTRAX is discharged back into the drain through the optional heated drain hose LZY302 (230V) or LZY303 (115V).

Refer to [Figure 33](#) and the following instructions for Option 5:

1. Install both FILTRAX into the sample stream. Refer to the FILTRAX User Manual for more information.
2. Feed the heated hose from FILTRAX 1 through the analyzer opening ([Figure 33](#), item 7). Use Seal Plug #1 to secure.
3. Feed the heated hose from FILTRAX 2 through the analyzer opening (item 6). Use Seal Plug #1 to secure.
4. Feed the heated drain hose through the analyzer (item 5). Use Seal Plug #1 to secure.

Note: The two samples lines of the heated drain hose are not used.

5. Connect the heated drain power connections. Refer to [section 3.5.5, page 27](#).
6. Connect the heated drain tube to the T-fitting (item 8).
7. Connect the sample line from FILTRAX 1 to the bottom inlet on Overflow Vessel 1 using the fittings (item 11).
8. Connect the sample line from FILTRAX 2 to the bottom inlet on Overflow Vessel 2 using the fittings (item 12).

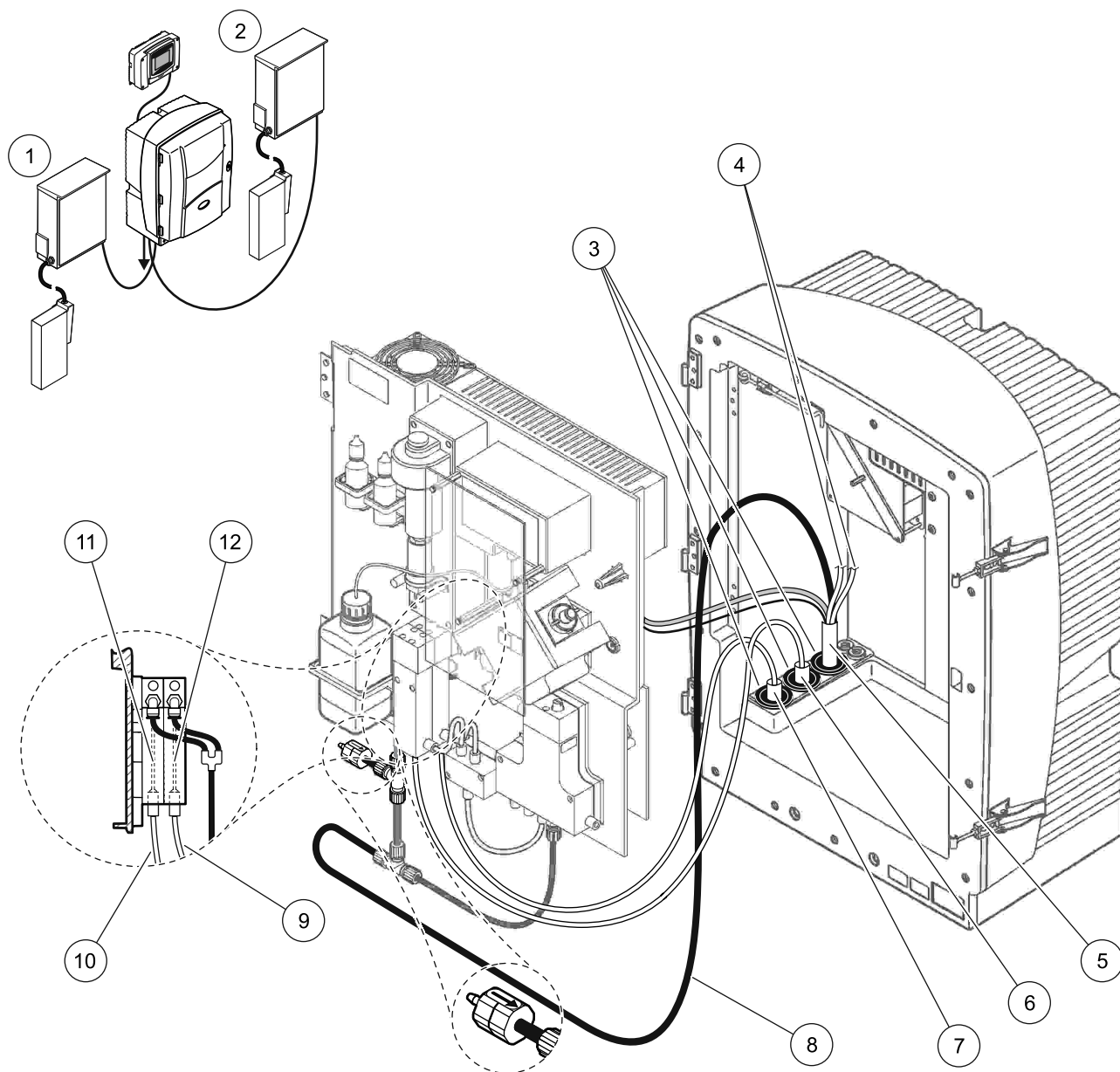


Figure 33 Option 5 setup

1	FILTRAX 1	7	FILTRAX heated hose 1
2	FILTRAX 2	8	Heated drain hose tube
3	Seal plug #1	9	FILTRAX 2 sample line
4	Unused heated drain sample lines	10	FILTRAX 1 sample line
5	Heated drain hose	11	Overflow vessel 1
6	FILTRAX heated hose 2	12	Overflow vessel 2

A.10 Option 6 plumbing and connections

Option 6 uses two sc analyzers with two FILTRAX (FILTRAX 1 and FILTRAX 2). Samples from both FILTRAX are going into Analyzer 1 using the 2-parameter configuration. The heated drain hose connects both sc analyzers. The waste from both analyzers is discharged into a drain through the heated drain hose.

Refer to [Figure 34](#) and the following instructions for Option 6:

1. Install both FILTRAX into the sample stream. Refer to the FILTRAX User Manual for more information.
2. Install the first sc analyzer (Analyzer 1):
 - a. Feed the heated hose from FILTRAX 1 through the analyzer ([Figure 34](#), item 25). Use Seal Plug #1 to secure.
 - b. Feed the heated hose from FILTRAX 2 through the analyzer (item 27). Use Seal Plug #1 to secure.
 - c. Feed the heated drain hose through the analyzer (item 28). Use Seal Plug #1 to secure. Connect the heated drain power connections. Refer to [section 3.5.5, page 27](#).
 - d. Remove the pre-installed drain tube attached to the valve block and remove the T-fitting from the drain tube. Retain for reuse with Analyzer 2.
 - e. Connect the heated drain tube to the valve block connector.
 - f. Connect the sample line from FILTRAX 1 to the bottom inlet on Overflow Vessel 1 using the fittings (item 20).
 - g. Connect the sample line from FILTRAX 2 to the bottom inlet on Overflow Vessel 2 using the fittings (item 19).
 - h. Change the analyzer to the 2-parameter configuration. Refer to [Connect a 2-parameter option, page 76](#).
 - i. Connect Sample Line 1 from the heated drain to Overflow Vessel 1. Connect Sample Line 2 from the heated drain to Overflow Vessel 2.
3. Install the second sc analyzer (Analyzer 2)
 - a. Feed the heated drain hose from Analyzer 1 through Analyzer 2 (item 13). Use Seal Plug #1 to secure.
 - b. Feed the heated drain hose through the analyzer (item 8). Use Seal Plug #1 to secure. Connect the heated drain power connections. Refer to [section 3.5.5, page 27](#).
 - c. Seal the remaining opening with Seal Plug #3.
 - d. Cut 25 mm from the drain tube that was removed from Analyzer 1. Connect the 25 mm piece of tubing to the T-fitting on Analyzer 2. Connect the other end of the tubing to the T-fitting that was removed from Analyzer 1. Refer to [Figure 28, page 77](#) for T-fitting removal.
 - e. Connect the drain tube from Analyzer 1 and the drain tube from Analyzer 2 to the T-fitting.
4. Connect Sample Line 1 from Analyzer 1 to Overflow Vessel 1 using the fittings (item 16). Connect Sample Line 2 from Analyzer 1 to Overflow Vessel 2 using the fittings (item 17).

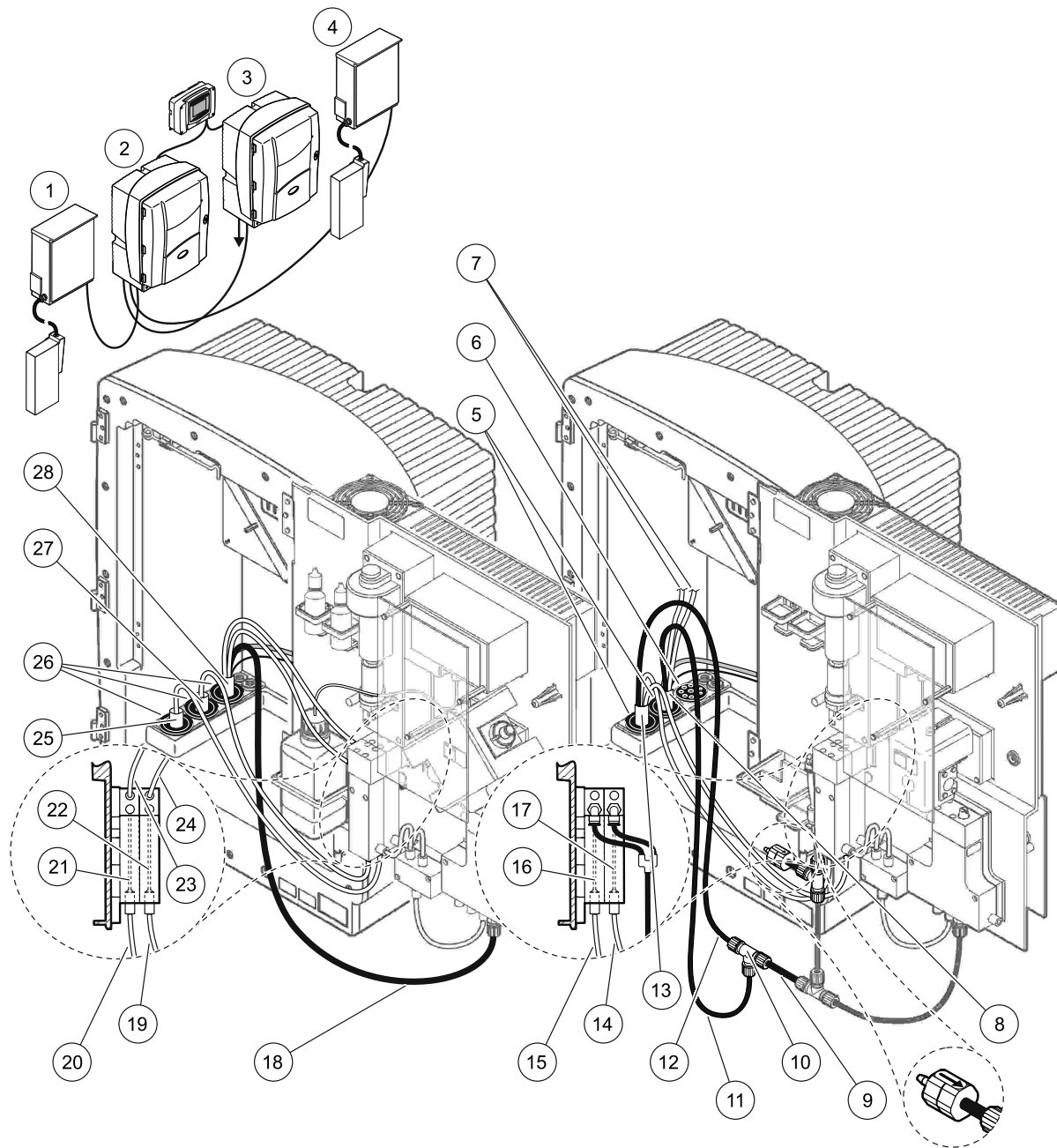


Figure 34 Option 6 setup

1	FILTRAX 1	11	Heated drain tube	21	Overflow vessel 1
2	AMTAX sc analyzer	12	Heated drain hose from analyzer 1	22	Overflow vessel 2
3	PHOSPHAX sc analyzer	13	Heated drain hose from analyzer 1	23	Heated drain 1 sample line
4	FILTRAX 2	14	Heated drain sample 2 from analyzer 1	24	Heated drain 2 sample line
5	Seal plug #1	15	Heated drain sample 1 from analyzer 1	25	FILTRAX 1 heated hose
6	Seal plug #3	16	Overflow vessel 1	26	Seal plug #1
7	Unused heated drain sample lines	17	Overflow vessel 2	27	FILTRAX 2 heated hose
8	Heated drain hose	18	Heated drain tube	28	Heated drain hose
9	Drain tube cut from analyzer 1	19	FILTRAX 2 sample line		
10	T-fitting from analyzer 1	20	FILTRAX 1 sample line		

A.11 Option 7 plumbing and connections

Option 7 is used with an sc analyzer and the Filter Probe sc. The waste from the analyzer is discharged back into the basin using the Filtration Kit. Use the drain tube inside the Filter Probe sc or the optional heated drain tube to discharge the waste stream from the sc analyzer.

Refer to [Figure 35](#) and the following instructions for Option 7:

1. Install the Filter Probe sc into the sample stream. Refer to the Filter Probe sc User Manual for more information.
2. Feed the Filter Probe sc hose (sample lines, electrical cables, drain tube) through the analyzer opening ([Figure 35](#), item 6). Use Seal Plug #2 to secure.
3. Seal the unused openings with Seal Plug #3.
4. Connect the Filter Probe sc data cable and power connections. Refer to [section 3.5.5, page 27](#).
5. Connect the air tube to the compressor (item 4).
6. Connect the drain tube and feed it out the analyzer through Seal Plug #3 to a drain.
7. Connect the sample line to the sample inlet on the overflow vessel using the fittings (item 8).

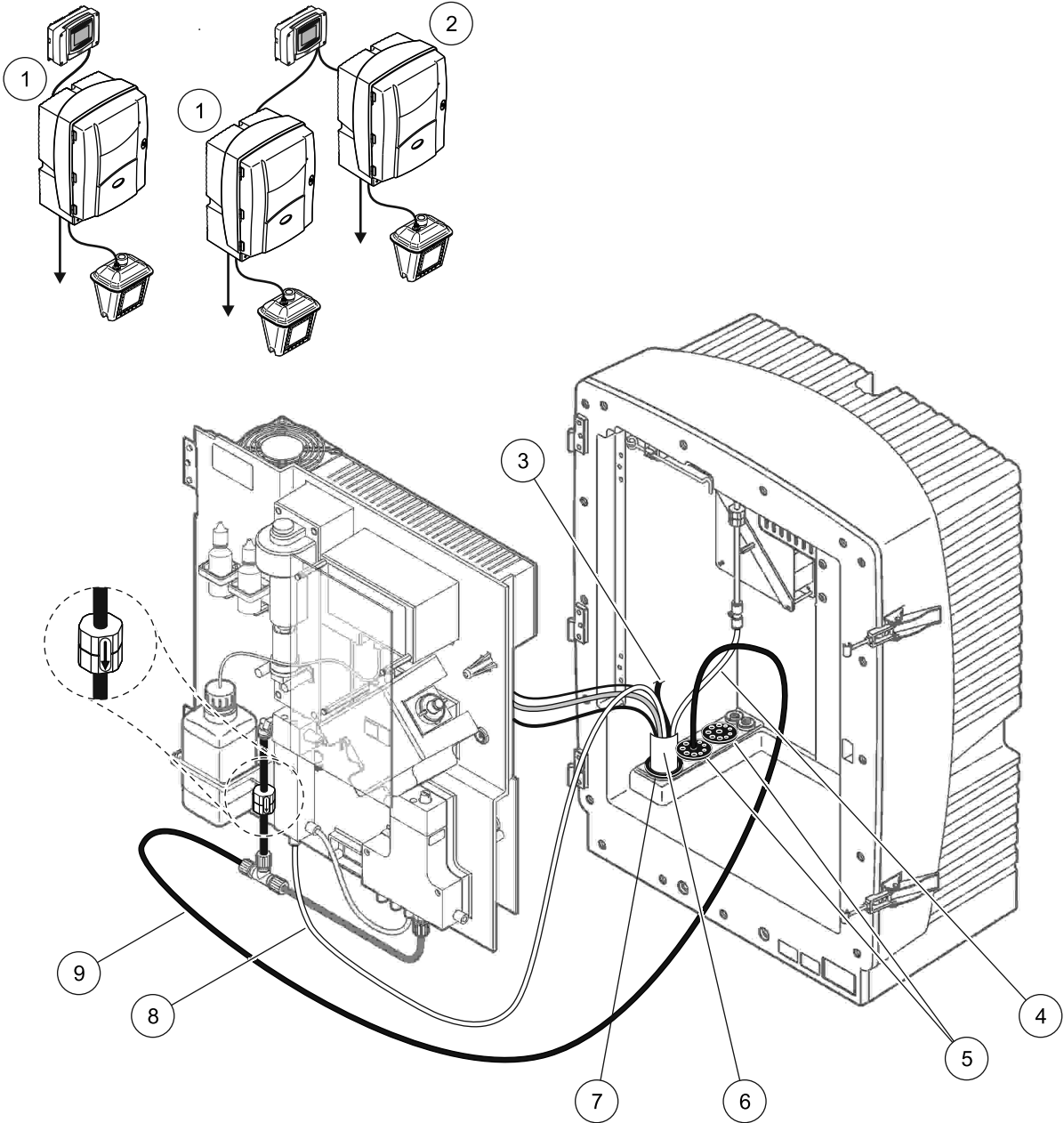


Figure 35 Option 7 setup

1	AMTAX sc analyzer	6	Filter Probe sc hose
2	PHOSPHAX sc analyzer	7	Seal plug #2
3	Unused Filter Probe sc drain tube	8	Sample line to overflow vessel
4	Air tube	9	Drain tube
5	Seal plug #3		

A.12 Option 8a plumbing and connections

Option 8a uses an sc analyzer with the FILTRAX. The waste of the analyzer is discharged back into an open drain.

Refer to [Figure 36](#) and the following instructions for Option 8a:

1. Install the FILTRAX into the sample stream. Refer to the FILTRAX User Manual for more information.
2. Feed the heated hose from the FILTRAX through the analyzer opening ([Figure 36](#), item 3). Use Seal Plug #1 to secure.
3. Feed the drain tube through the analyzer opening (item 5). Use Seal Plug #3 to secure.

Note: Tubes can be pushed through prepared holes on Seal Plug #3.

4. Connect the drain tube to the T-fitting.
5. Connect the FILTRAX sample line to the bottom inlet on the overflow vessel using the fittings (item 4).
6. Feed the drain tube to a lower drain (maximum 2 m/6.5 ft).

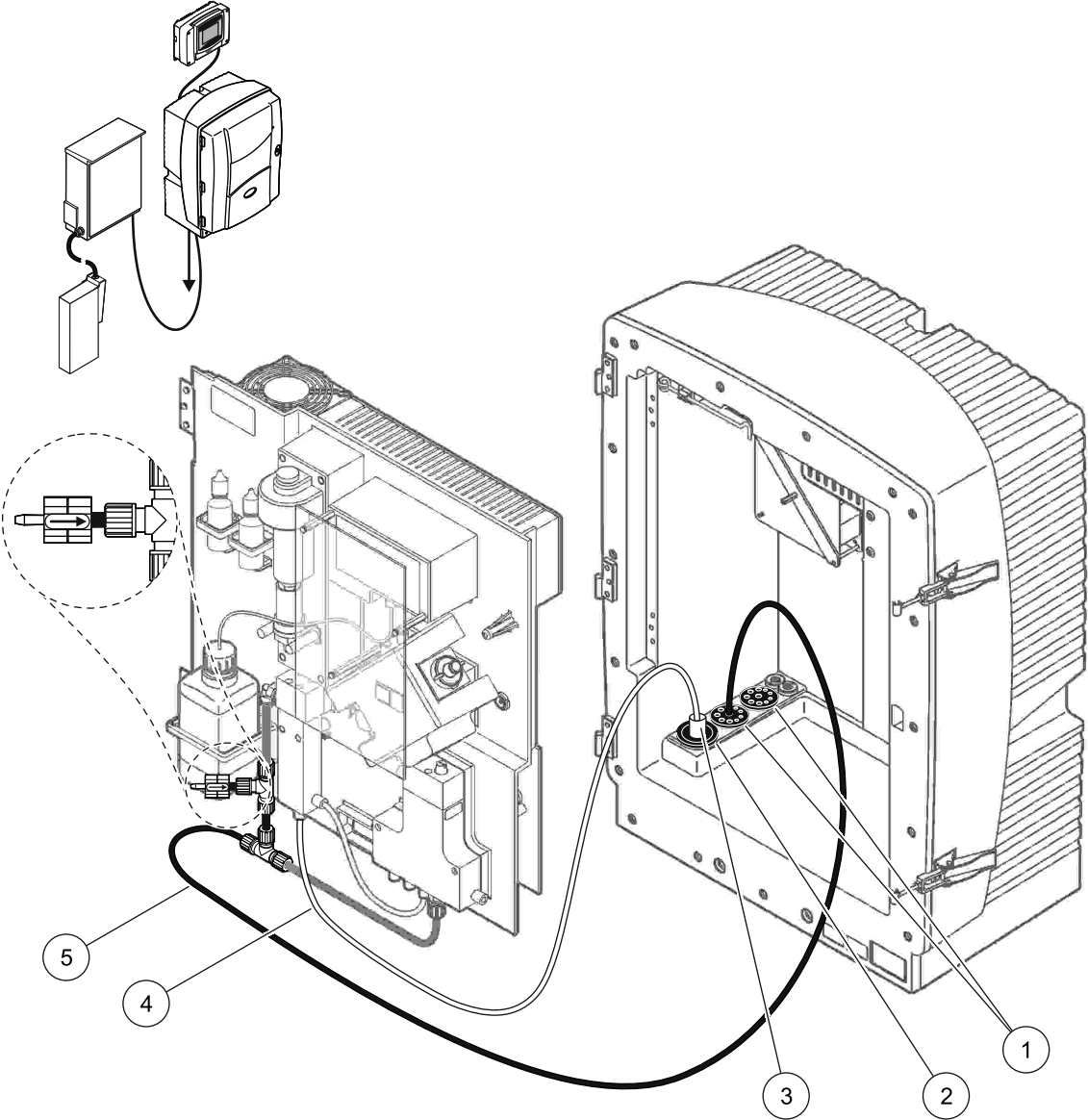


Figure 36 Option 8a Setup

1	Seal plug #3
2	Seal plug #1
3	FILTRAX heated hose
4	FILTRAX sample line
5	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)

A.13 Option 8b plumbing and connections

Option 8b uses two sc analyzers with the FILTRAX. The sample of the FILTRAX goes to the first sc analyzer. This analyzer must use the 2-parameter configuration (see [Connect a 2-parameter option, page 76](#)). Each sc analyzer discharges waste into an open drain.

Refer to [Figure 37](#) and the following instructions for Option 8b:

1. Install the FILTRAX into the sample stream. Refer to the FILTRAX User Manual for more information.
2. Install the first sc analyzer (Analyzer 1):
 - a. Feed the heated hose from the FILTRAX through the analyzer opening ([Figure 37](#), item 8). Use Seal Plug #1 to secure.
 - b. Feed the drain tube through the analyzer opening (item 6) and to an open drain below Analyzer 1. Use Seal Plug #3 to secure.
 - c. Change the analyzer to the 2-parameter configuration. Refer to [Connect a 2-parameter option, page 76](#).
 - d. Connect the reworked overflow of the overflow vessel to deliver the sample to Analyzer 2.
 - e. Feed the overflow vessel tubing (item 11) through Analyzer 1 to Analyzer 2. Use Seal Plug #3 to secure.
 - f. Remove the drain tube with the T-fitting from the valve block connector. This drain tube is not used.
 - g. Connect the drain tube to the valve block connector (item 6).
 - h. Connect the FILTRAX sample line to the bottom inlet on the overflow vessel using the fittings (item 7).
3. Install the second sc analyzer (Analyzer 2):
 - a. Feed the sample line from Analyzer 1 through Analyzer 2 (item 4). Use Seal Plug #3 to secure.
 - b. Feed the drain tube through Analyzer 2 to an open drain below. Use Seal Plug #3 to secure.
 - c. Use Seal Plug #3 to seal any unused openings.
 - d. Connect the drain tube to the T-fitting (item 5).
 - e. Connect the sample line from Analyzer 1 to the bottom inlet on the overflow vessel using the fittings.

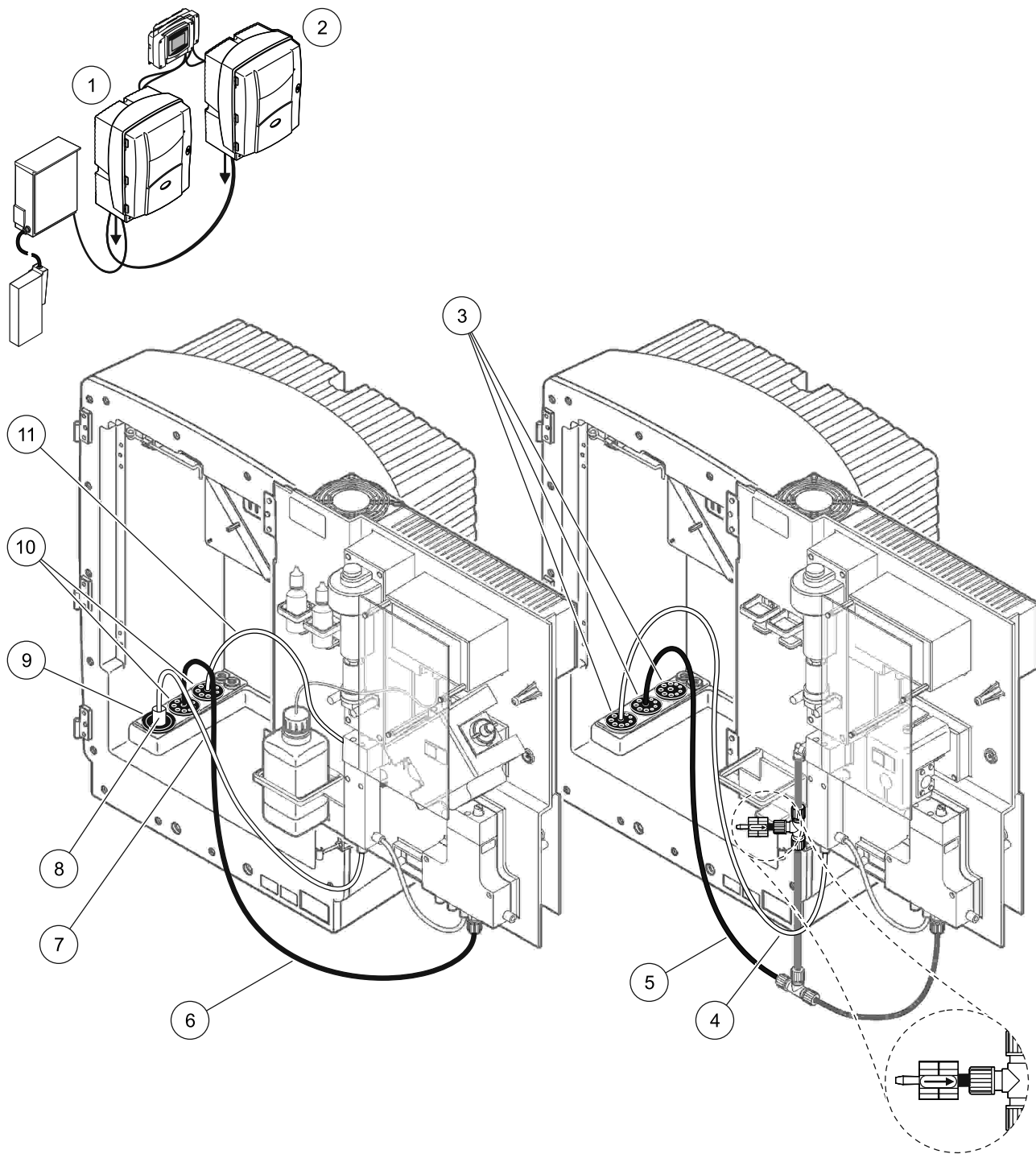


Figure 37 Option 8b setup

1	AMTAX sc analyzer	7	FILTRAX sample line
2	PHOSPHAX sc analyzer	8	FILTRAX heated hose
3	Seal plug #3	9	Seal plug #1
4	Sample line from analyzer 1 (maximum. 2 m/6.5 ft)	10	Seal plug #3
5	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)	11	Overflow vessel tube
6	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)		

A.14 Option 9a plumbing and connections

Option 9a uses an sc analyzer as a 2-channel analyzer with two FILTRAX (FILTRAX 1 and FILTRAX 2). The waste of the analyzer and both FILTRAX is discharged into an open drain.

Refer to [Figure 38](#) and the following instructions for Option 9a:

1. Install both FILTRAX into the sample stream. Refer to the FILTRAX User Manual for more information.
2. Feed the heated hose from FILTRAX 1 through the analyzer ([Figure 38](#), item 6). Use Seal Plug #1 to secure.
3. Feed the heated hose from FILTRAX 2 through the analyzer (item 5). Use Seal Plug #1 to secure.
4. Feed the drain tube through the analyzer (item 7). Use Seal Plug #3 to secure.
5. Connect the drain tube to the T-fitting.
6. Connect the sample line from FILTRAX 1 to Overflow Vessel 1 using the fittings. Connect the sample line from FILTRAX 2 to Overflow Vessel 2 using the fittings.

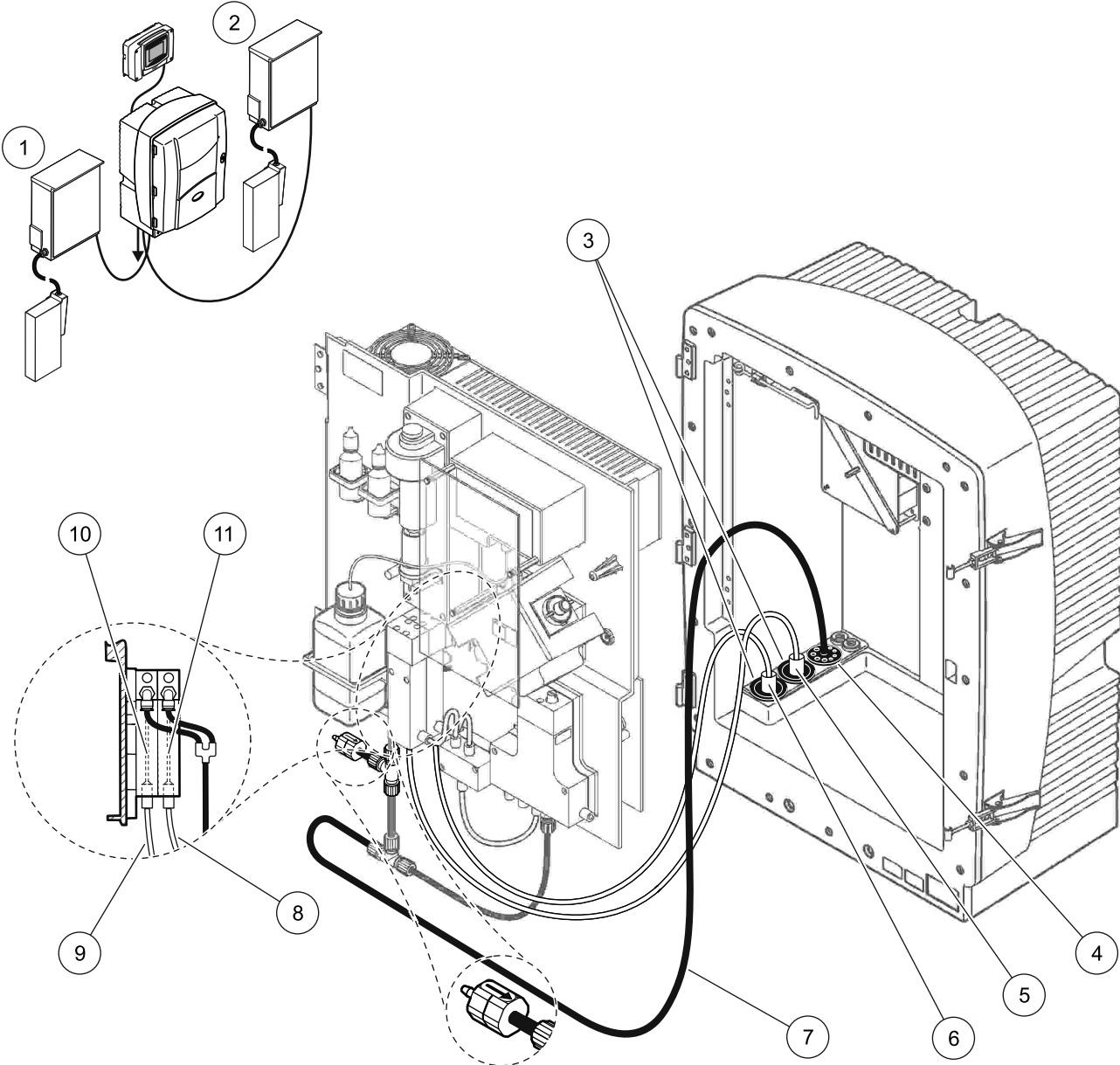


Figure 38 Option 9a setup

1	FILTRAX 1	5	FILTRAX 2 heated hose	9	FILTRAX 1 sample line
2	FILTRAX 2	6	FILTRAX 1 heated hose	10	Overflow vessel 1
3	Seal plug #1	7	Drain tube: Feed to a physically lower drain (maximum. 2 m/6.5 ft)	11	Overflow vessel 2
4	Seal plug #3	8	FILTRAX 2 sample tube		

A.15 Option 9b plumbing and connections

Option 9b uses two sc analyzers with two FILTRAX (FILTRAX 1 and FILTRAX 2). The samples of both FILTRAX go into the first sc analyzer. This analyzer must change to the 2-parameter configuration (see [Connect a 2-parameter option, page 76](#)). Two sample lines are going to both sc analyzers. Each sc analyzer is discharging waste to an open drain.

Refer to [Figure 39](#) and the following instructions for Option 9b:

1. Install both FILTRAX into the sample stream. Refer to the FILTRAX User Manual for more information.
2. Install the first sc analyzer (Analyzer 1):
 - a. Feed the heated hose from FILTRAX 1 through the analyzer ([Figure 39](#), item 18). Use Seal Plug #1 to secure.
 - b. Feed the heated hose from FILTRAX 2 through the analyzer (item 20). Use Seal Plug #1 to secure.
 - c. Feed two sample lines and one drain tube through the analyzer. Use Seal Plug #3 to secure.
 - d. Remove the drain tube with the T-fitting from the valve block connector.
 - e. Connect the drain tube to the valve block connector.
 - f. Connect the sample line from FILTRAX 1 to the bottom inlet on Overflow Vessel 1 using the fittings (item 13).
 - g. Connect the sample line from FILTRAX 2 to the bottom inlet on Overflow Vessel 2 using the fittings (item 12).
 - h. Change the analyzer to the 2-parameter configuration. Refer to [Connect a 2-parameter option, page 76](#).
 - i. Connect Sample Line 1 to the reworked overflow of Overflow Vessel 1. Connect Sample Line 2 to the reworked overflow of Overflow Vessel 2.
3. Install the second sc analyzer (Analyzer 2):
 - a. Feed the two sample lines from the two overflow vessels of Analyzer 1 through Analyzer 2. Use Seal Plug #3 to secure.
 - b. Feed the drain tube through Analyzer 2 (item 6). Use Seal Plug #3 to secure.
 - c. Use Seal Plug #3 to seal the unused opening.
 - d. Connect the drain tube to the T-fitting.
 - e. Connect Sample Line 1 from Analyzer 1 to the bottom inlet on Overflow Vessel 1 using the fittings.
 - f. Connect Sample Line 2 from Analyzer 1 to the bottom inlet on Overflow Vessel 2 using the fittings.

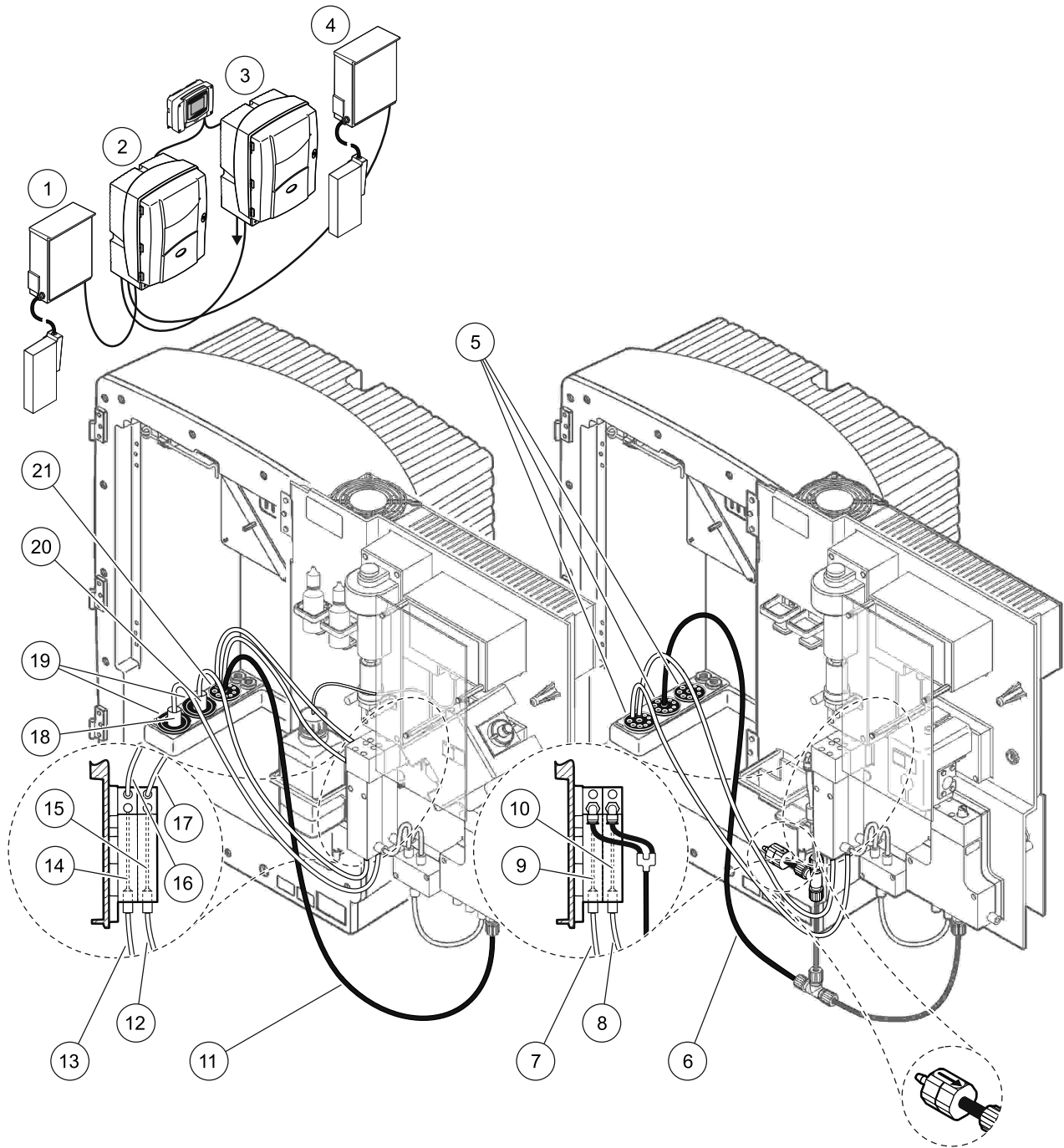


Figure 39 Option 9b setup

1	FILTRAX 1	8	Overflow vessel 2 tube from analyzer 1	15	Overflow vessel 2
2	AMTAX sc analyzer	9	Overflow vessel 1	16	Overflow vessel 1 tube
3	PHOSPHAX sc analyzer	10	Overflow vessel 2	17	Overflow vessel 2 tube
4	FILTRAX 2	11	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)	18	FILTRAX 1 heated hose
5	Seal plug #3	12	FILTRAX 2 sample line	19	Seal plug #1
6	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)	13	FILTRAX 1 sample line	20	FILTRAX 2 heated hose
7	Overflow vessel 1 tube from analyzer 1	14	Overflow vessel 1	21	Seal plug #3

A.16 Option 10a plumbing and connections

Option 10a uses an sc analyzer with any type of sample preparation that delivers a continuous sample stream that cannot be pressurized. The waste of the analyzer is discharged into an open drain.

Refer to [Figure 40](#) and the following instructions for Option 10a:

1. Install the sample preparation unit.
2. Feed the sample line from the sample preparation unit through the analyzer ([Figure 40](#), item 2). Use Seal Plug #3 to secure.
3. Feed the drain tube through the analyzer (item 3). Use Seal Plug #3 to secure.

Note: Tubes can be pushed through prepared holes on Seal Plug #3.

4. Seal any unused holes with Seal Plug #3.
5. Connect the drain tube to the T-fitting.
6. Connect the sample line from the sample preparation to the bottom inlet on the overflow vessel using the fittings.

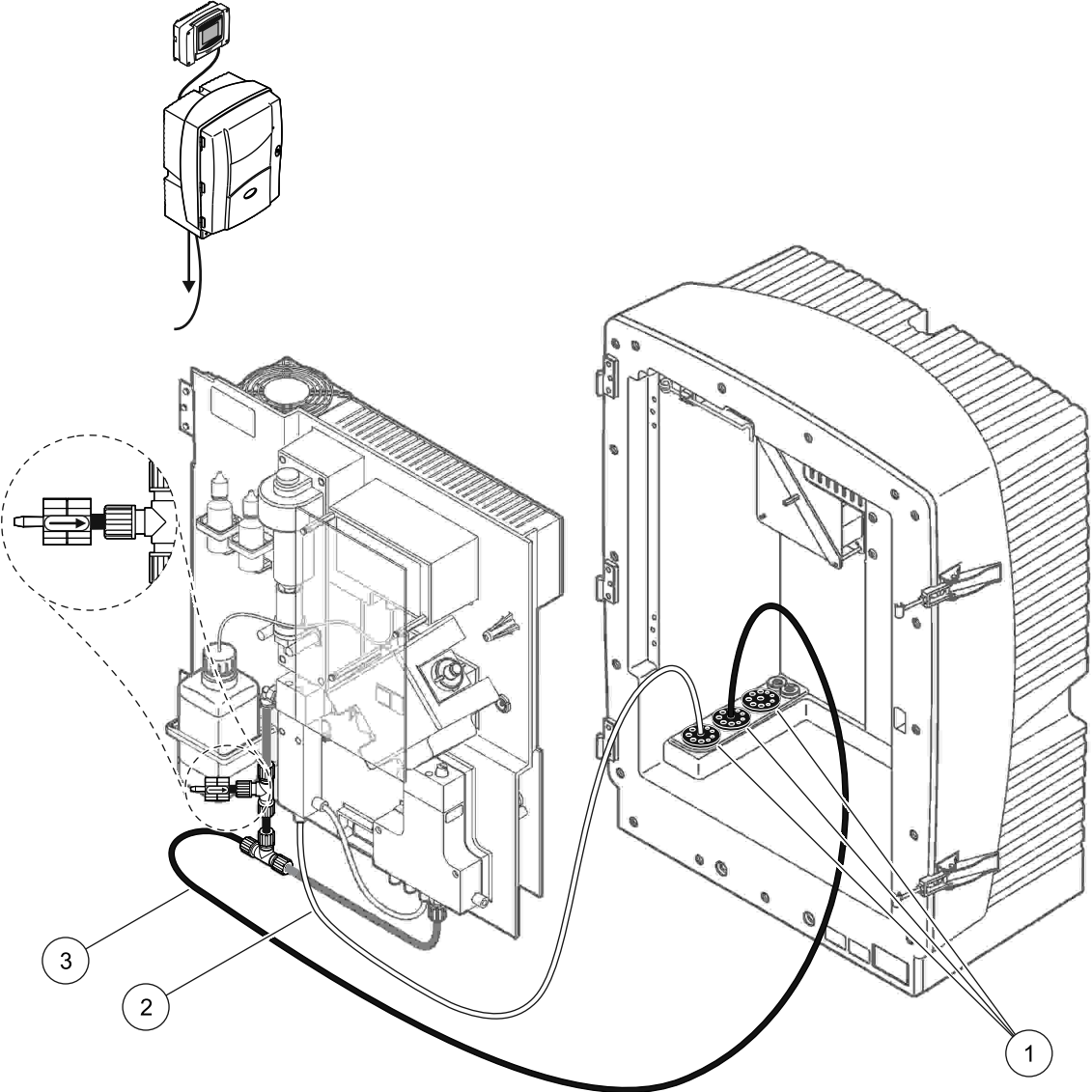


Figure 40 Option 10a setup

1	Seal plug #3
2	Sample line
3	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)

A.17 Option 10b plumbing and connections

Option 10b uses two sc analyzers with one sample preparation delivering a continuous sample stream that cannot be pressurized. The samples of the sample preparation is going into Analyzer 1. This analyzer must change to the 2-parameter configuration (see [Connect a 2-parameter option, page 76](#)). The sample line runs between both analyzers. Each sc analyzer discharges waste into an open drain.

Refer to [Figure 41](#) and the following instructions for Option 10b:

1. Install the sample preparation unit.
2. Install the first Analyzer (Analyzer 1):
 - a. Feed the sample line from the sample preparation unit through the analyzer ([Figure 41](#), item 7). Use Seal Plug #3 to secure.
 - b. Feed the drain tube through the analyzer (item 6). Use Seal Plug #3 to secure.
 - c. Remove the drain tube from the valve block connector.
 - d. Connect the sample line from the sample preparation unit to the overflow vessel (bottom inlet) using the fittings.
 - e. Change the analyzer to the 2-parameter configuration. Refer to [Connect a 2-parameter option, page 76](#).
 - f. Connect the sample line to the reworked overflow with the overflow vessel. Refer to [Connect a 2-parameter option, page 76](#).
3. Install the second Analyzer (Analyzer 2):
 - a. Feed the sample line from the overflow vessels on Analyzer 1 through Analyzer 2. Use Seal Plug #3 to secure.
 - b. Feed the drain tube through Analyzer 2. Use Seal Plug #3 to secure.
 - c. Connect the drain tube to the T-fitting.
 - d. Connect the sample line from Analyzer 1 to the bottom inlet on the overflow vessel of Analyzer 2 using the fittings.

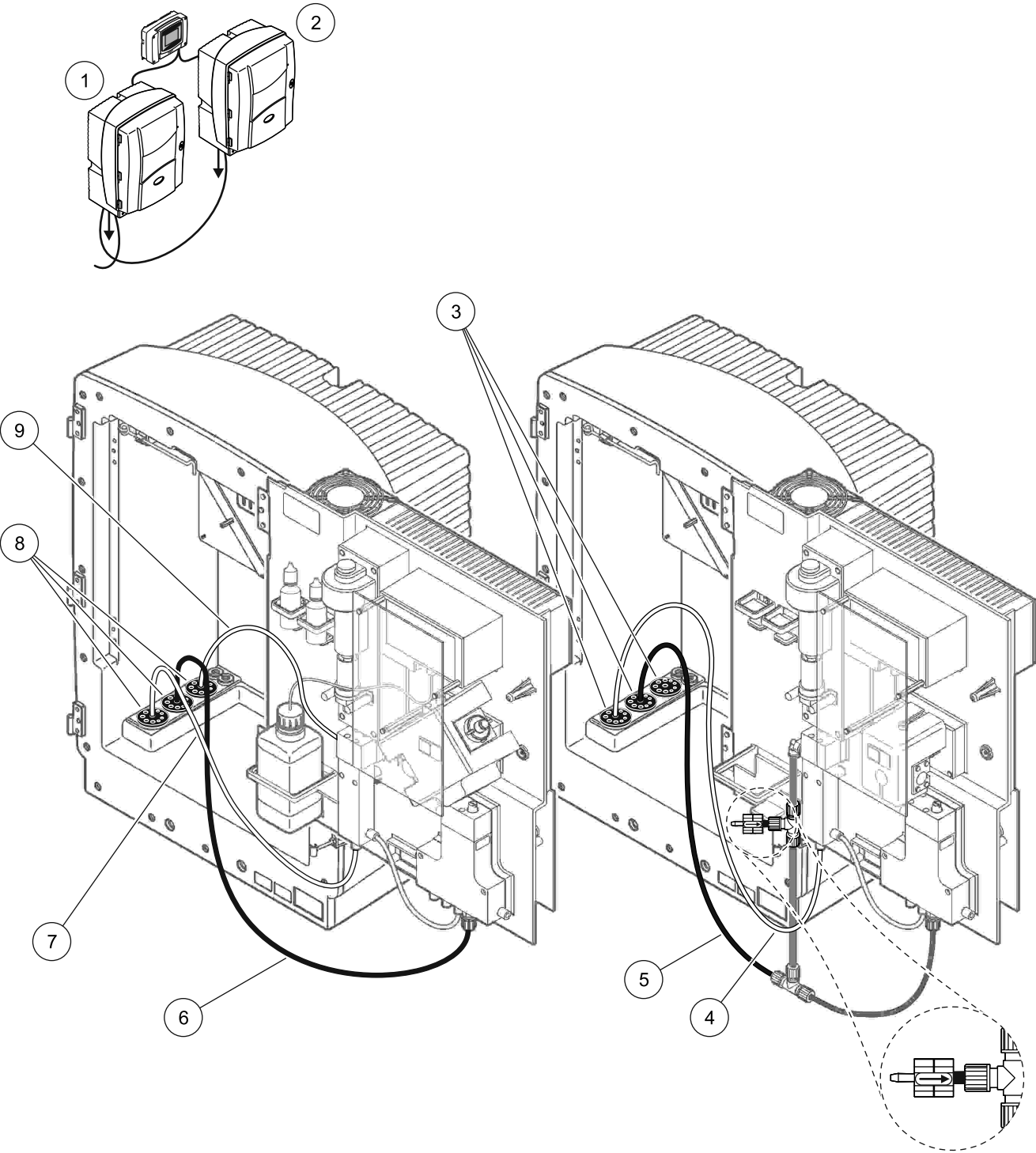


Figure 41 Option 10b setup

1	AMTAX sc analyzer	4	Sample line from analyzer 1	7	Sample line
2	PHOSPHAX sc analyzer	5	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)	8	Seal plug #3
3	Seal plug #3	6	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)	9	Overflow vessel tube

A.18 Option 11a plumbing and connections

Option 11a uses two units of any type of sample preparation that delivers a continuous sample stream. The waste of the analyzer is discharged to an open drain.

Refer to [Figure 42](#) and the following instructions for Option 11a:

1. Install the sample preparation units.
2. Feed the two sample lines from each sample preparation unit through the analyzer. Use Seal Plug #3 to secure.
3. Feed the drain tube through the analyzer using Seal Plug #3 ([Figure 42](#), item 2).
Note: Tubes can be pushed through prepared holes on Seal Plug #3.
4. Seal the unused opening with Seal Plug #3.
5. Connect the drain tube to the T-fitting.
6. Connect the sample line from Sample Preparation 1 to the bottom inlet on Overflow Vessel 1 using the fittings (item 4 and item 5).
7. Connect the sample line from Sample Preparation 2 to the bottom inlet on Overflow Vessel 2 using the fittings (item 3 and item 6).

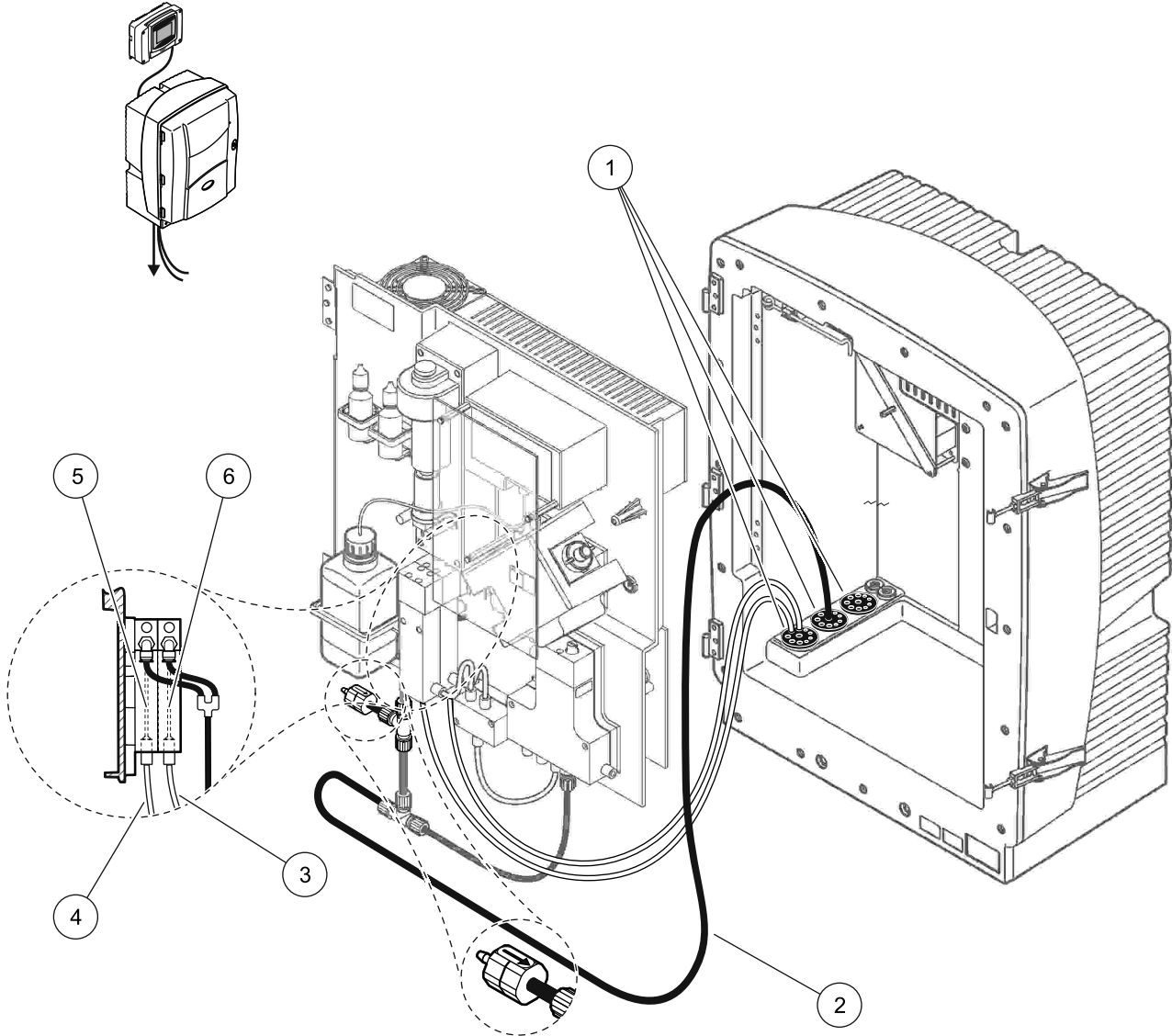


Figure 42 Option 11a setup

1	Seal plug #3	3	Sample line preparation 2	5	Overflow vessel 1
2	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)	4	Sample line preparation 1	6	Overflow vessel 2

A.19 Option 11b plumbing and connections

Option 11b uses two sc analyzers with two sample preparation units delivering continuous sample streams that cannot be pressurized. The samples of each sample preparation unit goes to the first analyzer. The analyzer must be changed to the 2-parameter configuration (see [Connect a 2-parameter option, page 76](#)). The sample lines are going from Analyzer 1 to Analyzer 2. Each analyzer discharges waste into an open drain.

Refer to [Figure 43](#) and the following instructions for Option 11b:

1. Install the sample preparation units.
2. Install the first Analyzer (Analyzer 1):
 - a. Feed the two sample lines from each sample preparation unit through the analyzer. Use Seal Plug #3 to secure.
 - b. Feed the two sample lines out from Analyzer 1. Use Seal Plug #3 to secure.
 - c. Feed the drain through Analyzer 1. Use Seal Plug #3 to secure.
 - d. Remove the drain tube with the T-fitting from the valve block connector. Connect the drain tube to the valve block connector. Discard the T-fitting.
 - e. Connect Sample Line 1 from Sample Preparation Unit 1 to the bottom inlet on Overflow Vessel 1 using the fittings.
 - f. Connect Sample Line 2 from Sample Preparation Unit 2 to the bottom inlet on Overflow Vessel 2 using the fittings.
 - g. Change the analyzer to the 2-parameter configuration. Refer to [Connect a 2-parameter option, page 76](#).
 - h. Connect Sample Line 1 to the reworked overflow to Overflow Vessel 1. Connect Sample Line 2 to the reworked overflow of Overflow Vessel 2.
3. Install the second Analyzer (Analyzer 2):
 - a. Feed the two sample lines from the overflow vessels of Analyzer 1 through Analyzer 2. Use Seal Plug #3 to secure.
 - b. Feed the drain tube through Analyzer 2. Use Seal Plug #3 to secure.
 - c. Seal the unused openings using Seal Plug #3.
 - d. Connect the drain tube to the T-fitting.
 - e. Connect Sample Line 1 from Analyzer 1 to the bottom inlet on Overflow Vessel 1 of Analyzer 2 using the fittings.
 - f. Connect Sample Line 2 from Analyzer 1 to the bottom inlet on Overflow Vessel 2 of Analyzer 2 using the fittings.

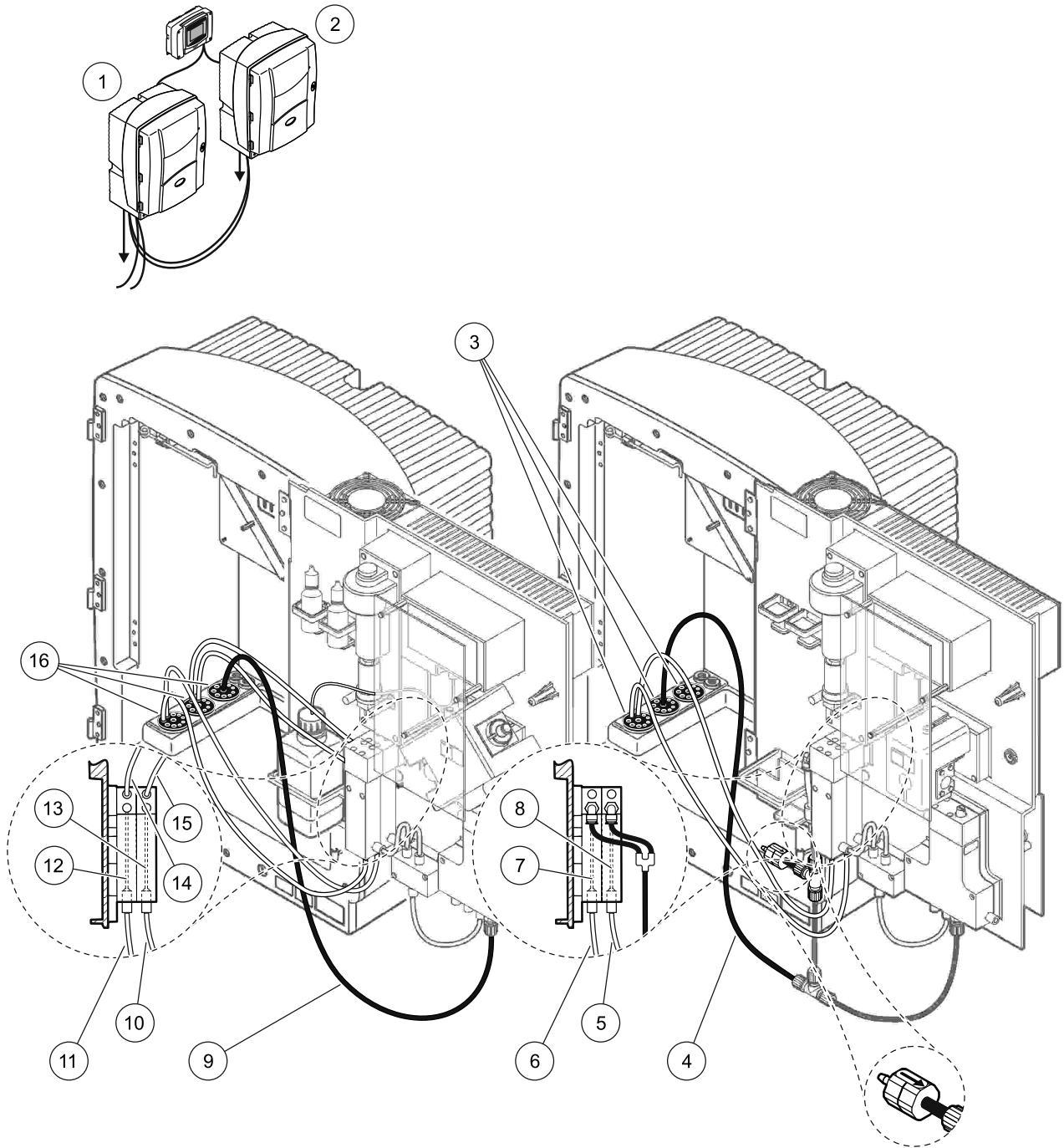


Figure 43 Option 11b setup

1	AMTAX sc analyzer	7	Overflow vessel 1	13	Overflow vessel 2
2	PHOSPHAX sc analyzer	8	Overflow vessel 2	14	Sample line to analyzer 2, overflow vessel 1
3	Seal plug #3	9	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)	15	Sample Line to Analyzer 2, overflow vessel 2
4	Drain tube: Feed to a lower drain (maximum. 2 m/6.5 ft)	10	Sample line preparation 2	16	Seal plug #3
5	Sample line from analyzer 1, overflow vessel 2	11	Sample line preparation 1		
6	Sample line from analyzer 1, overflow vessel 1	12	Overflow vessel 1		

Appendix B Fieldbus Communications

For general information about Fieldbus control, refer to the appropriate controller manuals and to the register list (Table 13, page 110). A configuration file is needed for the use with an OPC server. Contact the manufacturer for further information.

B.1 Fieldbus control

To start the Fieldbus control select
MAINTENANCE>TEST/MAINT>FIELDBUS>ENABLED.

Note: For safety reasons, the Fieldbus control is temporarily disabled when the AMTAX sc analyzer is set to the service state in the menu system. To enable the Fieldbus control, select START in the SERVICE menu.

When the service state of the instrument is activated through the Fieldbus, the Fieldbus control remains active.

Important Note: Before starting Fieldbus communications, make sure that no person is working on the analyzer.

The Fieldbus control registers (40048 to 40058) will be set to FFFFh (65635dec) if the Fieldbus is disabled.

To initiate an action, enter "1" to the register for the required action (40049 to 40058), then enter "1" to the control register 40048. The requested action is accepted when both registers return to "0". When the instrument is waiting between measurements (long measuring intervals) a measurement can be forced by entering "1" to register 40049 and 40048. The measurement will be initiated in 5 minutes.

Note: Ongoing internal processes like calibration and cleaning are interrupted by a forced measurement. The interrupted process will be started again after the forced measurement. A discharged value will be discarded before the measurement. A forced measurement during a calibration process may have higher deviations from the true value than during a normal operation. Internal processes like calibration and cleaning do not interrupt a measurement.

Important Note: Do not change the listed register addresses or other values, otherwise the instrument may malfunction or become inoperable.

B.2 Remote controlled measurement series

To take a remote controlled measurement series (no automatic measurement with fixed interval) start the following procedure.

1. Select MAINTENANCE>TEST/MAINT>FIELDBUS>ENABLED to enable the START BY BUS feature.
2. Select CONFIGURE>MEASURING>START BY BUS>YES.

Refer to menu system for other options. It is recommended to set AVERAGE either to "1" or to an even divider of NUMBER OF MEAS or to the same number as NUMBER OF MEAS to avoid measurements which are not averaged.

Note: For safety reasons, the Fieldbus control and START BY BUS are temporarily disabled when the AMTAX sc analyzer is set to the service state in the menu system. To enable START BY BUS select MAINTENANCE>TEST/MAINT>START.

When the service state of the instrument is activated through the Fieldbus, the Fieldbus control remains active.

Important Note: Before starting Fieldbus communications, make sure that no person is working on the analyzer.

Important Note: Do not try to change the listed register addresses, otherwise the instrument may malfunction or become inoperable.

The Fieldbus register contains FFFFh (65536dec) when the feature is disabled.

A measurement series is initiated with entering "1" to register 40111 (Enter "2" for 2-channel instruments to start measurements on channel 2). The register will return to "0" after the measurement series is done. The measurement results can be found at 40001 (channel 1) and 40165 (channel 2).

A value will appear every AVERAGE and at the end of a series if remind measurement(s) exist. **Example:** NUMBER OF MEAS is set to 5 and AVERAGE to 2. The result are 3 values, the first is the average of measurement 1 and 2, the second is the average of value 3 and 4, the last value is the reminding value of the 5th measurement

Note: Internal processes like calibration and cleaning will be interrupted from a measurement series. The interrupted process will start after the end of the measurement series. To use the START BY BUS feature, the sample has to be available for calibration, cleaning and rinsing purposes. An ongoing measurement series will not be interrupted by internal processes.

B.3 External trigger contact, Control by external signal

If the controller board is equipped with an external input terminal (optional board version), measurements can be issued by applying an external DC voltage of 15V to 30V to the terminal for longer than 3 seconds. When the field bus control is activated, the input will issue a forced measurement as described within Fieldbus control.

When the START BY BUS feature is activated, the external input will issue a measurement series as described within the START BY BUS section.

Note: Only measurements on channel 1 can be started with the external contact on 2 channel instruments.

B.4 Modbus register information

Table 13 Sensor Modbus registers

Tag name	Register #	Data type	Length	R/W	Discrete range	Min/Max range	Description
MEASURE VALUE 1	40001	Float	2	R	—	—	Actual measurement value from channel one
LOCATION1	40005	String	8	R/W	—	—	Name of LOCATION 1 (see menu system)
MEAS.UNITS 1	40013	Unsigned Integer	1	R/W	0/2	—	Measurement units for channel 1; 0=mg/L, 2=ppm
CUVETTE TEMP.	40014	Float	2	R		-50/99.99	Actual cuvette temperature in °C
CALIB.INTERVAL	40016	Unsigned Integer	1	R/W	0/1/2/3/4		Calibration interval; 0=OFF, 1=12h, 2=24h, 3=36h, 4=48h
CALIB.START	40017	Unsigned Integer	1	R/W	0/1/2/3/4/ 5/6/7/8/9/ 10/11/12/ 13/14/15/ 16/17/18/ 19/20/21/ 22/23	—	Acceleration time for calibration (24 hour format) 0=0 o'clock to 23=23 o'clock
ENCLOSURE TEMP	40020	Float	2	R	—	-50/99.9	Temperature inside the analyzer

Table 13 Sensor Modbus registers (continued)

Tag name	Register #	Data type	Length	R/W	Discrete range	Min/Max range	Description
mV STANDARD1	40022	Float	2	R	—	-3000/3000	Voltage in mV for one standard sample
mV STANDARD2	40024	Float	2	R	—	-3000/3000	Voltage in mV for two standard samples
mV ZERO	40026	Float	2	R	—	-3000/3000	Voltage in mV for the citro sample
mV SAMPLE	40028	Float	2	R	—	-3000/3000	Voltage in mV for sample (last measurement)
mV ACTIVE	40030	Float	2	R	—	-3000/3000	Voltage in mV for current sample (actual mV)
NH4-N VALUE 2	40032	Float	2	R	—	—	Measurement value for channel 2 as NH4-N
NH4 VALUE 2	40034	Float	2	R	—	—	Measurement value for channel 2 as NH4
NH4-N VALUE 1	40036	Float	2	R	—	—	Measurement value for channel 1 as NH4-N
NH4 VALUE 1	40038	Float	2	R	—	—	Measurement value for channel 1 as NH4
PROBE P. MIN	40040	Float	2	R	—	0/2.0	Integrated value of pressure at filtration probe, if not yet calculated: nan
PROBE PRESSURE	40042	Float	2	R	—	0/2.0	Actual value of pressure at filtration probe, if not yet calculated: nan
GAIN CORR. 1	40044	Float	2	R/W	—	0.01/100.00	Gain correction for channel 1
mV SLOPE	40046	Float	2	R	—	-3000/3000	SLOPE of electrode
BUSACTION ACTIVE	40048	Unsigned Integer	1	R/W	—	0/1	Enter 1 to start a BUS action (see Fieldbus control)
BUS ANALY.START	40049	Unsigned Integer	1	R/W	—	0/1	Start the analyzer about the BUS
BUS SERVICE	40050	Unsigned Integer	1	R/W	—	0/1	Start the service mode about the BUS
BUS CLEANING	40051	Unsigned Integer	1	R/W	—	0/1	Start the cleaning mode about the BUS
BUS CALIBRATION	40052	Unsigned Integer	1	R/W	—	0/1	Start the calibration mode about the BUS
BUS CLEAN/CAL.	40053	Unsigned Integer	1	R/W	—	0/1	Start the cleaning/calibration mode about the BUS
BUS PREPUMP REA.	40054	Unsigned Integer	1	R/W	—	0/1	Prepump reagent about the BUS
BUS PREPUMP CLEA	40055	Unsigned Integer	1	R/W	—	0/1	Prepump cleaning solution about the BUS
BUS PREPUMP STA.	40056	Unsigned Integer	1	R/W	—	0/1	Prepump standards about the BUS
BUS PREPUMP PRO.	40057	Unsigned Integer	1	R/W	—	0/1	Prepump the probe about the BUS
BUS PREPUMP ALL	40058	Unsigned Integer	1	R/W	—	0/1	Prepump all about the BUS

Table 13 Sensor Modbus registers (continued)

Tag name	Register #	Data type	Length	R/W	Discrete range	Min/Max range	Description
DISCHARGE CALIB.	40067	Unsigned Integer	1	R/W	—	0/10	Discharged values after a calibration
REMAINING TIME	40068	Unsigned Integer	1	R	—	0/65535	Remaining time of the current process
APPL.	40069	Float	2	R	—	0/3.4028 2347E+ 38	Version of application file
HEATING ON	40071	Unsigned Integer	1	R/W	0/1/2/3/4/ 5/6/7/8/9/ 10/11/12	—	Enter the month when the sample line heating is switched ON; 0 = always OFF, 1=January, 2=February to 12=December
HEATING OFF	40072	Unsigned Integer	1	R/W	1/2/3/4/5/ 6/7/8/9/1 0/11/12	—	Enter month when the sample line heating is switched OFF; 1=January, 2=February to 12=December
CLEANING MODULES	40073	Time2	2	R	—	—	Date of last filter module cleaning
SET PARAMETER 1	40075	Unsigned Integer	1	R/W	19/42	—	Select the parameter for channel one; 19=NH4-N, 42=NH4
AIR FILTER DISPL	40076	Integer	1	R	—	-32768/3 2767	Due day for cleaning/exchange of air filter pads. Negative values show overdue cleaning/exchange of air filter pads.
COOLING	40077	Unsigned Integer	1	R	—	0/100	Percentage of cooling fan power
ANALYZER HEATING	40078	Unsigned Integer	1	R	—	0/100	Heating of the analyzer
INTERVAL	40080	Unsigned Integer	1	R/W	0 to 23	—	Measurement interval; 0=5 minutes, 1=10 minutes, 2=15 minutes to 23=120 minutes, 35=3h, 47=4h, 59=5h, 71=6h, 83=7h, 95=8h, 107=9h, 119=10h, 131=11h, 143=12h, 155=13h, 167=14h, 179=15h, 191=16h, 203=17h, 215=18h, 227=19h, 239=20h, 251=21h, 263=22h, 275=23h, 287=24h
CLEANING START	40081	Unsigned Integer	1	R/W	0/1/2/3/4/ 5/6/7/8/9/ 10/11/12/ 13/14/15/ 16/17/18/ 19/20/21/ 22/23	—	Acceleration time for cleaning (24 hour format) 0=0 o'clock to 23=23o'clock
STATUS MODULES	40082	Unsigned Integer	1	R	—	0/100	Status of the modules as integer in percent
NEW MODULES	40083	Time2	2	R/W	—	—	Date of the last filter module exchange
CLEAN. INTERVAL	40085	Unsigned Integer	1	R/W	0/1/3/6/8/ 12/24	—	Cleaning interval ; 0=OFF, 1=1h, 3=3h, 6=6h, 8=8h, 12=12h, 24=24h

Table 13 Sensor Modbus registers (continued)

Tag name	Register #	Data type	Length	R/W	Discrete range	Min/Max range	Description
SET OUTMODE CAL.	40086	Unsigned Integer	1	R/W	0/1	—	Set output mode for calibration; 0=HOLD, 1= TRANSFER VALUE
DISCHARGE CLEAN.	40087	Unsigned Integer	1	R/W	—	0/10	Discharged values after a cleaning
SET OUTMODE CLE.	40088	Unsigned Integer	1	R/W	0/1	—	Set output mode for cleaning; 0=HOLD, 1= TRANSFER VALUE
SET OUTMODE SER.	40089	Unsigned Integer	1	R/W	0/1	—	Set output mode for service mode; 0=HOLD, 1= TRANSFER VALUE
LOCATION2	40090	String	8	R/W	—	—	Location for the measuring channel two for the sample
SET PARAMETER 2	40098	Unsigned Integer	1	R/W	19/42	—	Select the parameter for channel 2; 19=NH4-N, 42=NH4
GAIN CORR. 2	40099	Float	2	R/W	—	0.01/100.00	Gain correction for channel two
MEAS.UNITS 2	40101	Unsigned Integer	1	R/W	0/2	—	Measurement units for channel 2; 0=mg/L, 2=ppm
HUMIDITY ANALY	40102	Unsigned Integer	1	R	—	0/100	Humidity analyzer in percent
SOFTWARE PROBE	40103	Float	2	R	—	0/3.40282347E+38	Software version of the filtration probe
HUMIDITY PROBE	40105	Unsigned Integer	1	R	—	0/100	Humidity filtration probe in percent
PROCESS STATE	40107	Unsigned Integer	1	R	0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20	—	Process status is coded as enum list; enum value 0=service mode, enum value 1=citrocal in proc, cal1 in proc., cal2 in proc., measuring 1..., interval, initialisation, serv.in proc., cleaning, warm up phase, measuring 2..., prepump reag., prepump clean.,prepump standard, prepumping probe, flushing, start by BUS, warming up, reserved, prepump.sample; enum value 20=validation
LAST CALIBRAT.	40108	Time2	2	R	—	—	Date of the last calibration
START BY BUS	40110	Unsigned Integer	1	R/W	0/1	—	To set the analyzer to START BY BUS mode (see Start by BUS)
FIELD BUS	40111	Unsigned Integer	1	R/W	—	0/2	To trigger a measurement serie in START BY BUS mode (see Start by BUS)
NUMBER OF MEAS.	40112	Unsigned Integer	1	R/W	—	1/100	Number of measurements in a START BY BUS measurement series (see Start by BUS)
DISCHARGE BUS	40113	Unsigned Integer	1	R/W	—	3/10	Discharge values at the beginning of a START BY BUS series
AVERAGE	40114	Unsigned Integer	1	R/W	—	—	Number of measurement values that result in an average value in a START BY BUS measurement series.

Table 13 Sensor Modbus registers (continued)

Tag name	Register #	Data type	Length	R/W	Discrete range	Min/Max range	Description
NO.OF VALUES CH1	40115	Unsigned Integer	1	R/W	—	0/100	2 channel mode: how often is channel 1 measured before switching to channel 2
NO.OF VALUES CH2	40116	Unsigned Integer	1	R/W	—	0/100	2 channel mode: how often is channel 2 measured before switching to channel 1
DISCHARGE VAL1	40117	Unsigned Integer	1	R/W	—	0/3	Number of discharged values when switching from channel 1 to channel 2
DISCHARGE VAL2	40118	Unsigned Integer	1	R/W	—	0/3	Number of discharged values when switching from channel 2 to channel 1
REAG. WARNING	40119	Unsigned Integer	1	R/W	0/1	—	warning if the level of reagent is low; 0=OFF, 1=ON
TYPE	40125	String	6	R	—	—	Name of item/analyzer
SENSOR NAME	40131	String	8	R	—	—	User-assigned name for a sensor
STATUS MODULES	40140	Float	2	R	—	0/100	Status of the modules as float in percent; nan if not yet calculated
WARNING	40142	Unsigned Integer	1	R/W	20/15/10/5	—	Reagent warning level in percent
REAGENT LEVEL	40143	Unsigned Integer	1	R	—	0/100	Level of reagent in percent
CLEAN SOLU LEVEL	40144	Unsigned Integer	1	R	—	0/100	Cleaning solution level in percent
STANDARDS LEVEL	40146	Unsigned Integer	1	R	—	0/100	Level of standards in percent
REPLACE ELECTRO.	40148	Time2	2	R	—	—	Date of last electrode exchange
CHANGE MEMBRANE	40150	Time2	2	R	—	—	Date of last membrane exchange
PUMP DISPLAY	40154	Integer	1	R	—	-32768/32767	Left days until exchanging piston of pump, negative values show overdue of exchange
MEASURE VALUE 2	40165	Float	2	R	—	—	Last measurement value of channel 2
STRUCTURE	40167	Unsigned Integer	1	R	—	0/65535	Entry is for the device driver file; shows the version
FIRMWARE	40168	Unsigned Integer	1	R	—	0/65535	Entry is for the device driver file; shows the version
CONTENT	40169	Unsigned Integer	1	R	—	0/65535	Entry is for the device driver file; shows the version
LOADER	40170	Float	2	R	—	0/3.40282347E+38	Entry is for the application file; shows the version of the boot file
HEATING	40172	Unsigned Integer	1	R	0/1	—	Status of heating for sample tube; 0=OFF, 1=ON

Table 13 Sensor Modbus registers (continued)

Tag name	Register #	Data type	Length	R/W	Discrete range	Min/Max range	Description
OPERATING HOURS	40173	Unsigned Integer	2	R	—	0/999999 999	Operating hours of analyzer
PUMP MEMBR.DISP.	40177	Integer	1	R	—	-32768/3 2767	Remaining days for pump membrane in filter probe
COMPRESSOR	40186	Integer	1	R	—	-32768/3 2767	Remaining days for air compressor
LAST CHA.FACTOR1	40194	Time2	2	R/W	—	—	Date of the last correction factor for channel 1
LAST CHA.FACTOR2	40196	Time2	2	R/W	—	—	Date of the last correction factor for channel 2
SAMPLE DETECTION	40218	Unsigned Integer	1	R/W	0/1/2	—	Output if sample detection detects low sample amount; 0=Warning, 1=Error 2=OFF
ACTUAL MEAS.TIME	40224	Time2	2	R	—	—	Time of actual measurement value
LAST TIME	40226	Time2	2	R	—	—	Time of last measurement value
2.ND LAST TIME	40228	Time2	2	R	—	—	2.ND LAST TIME
3.RD LAST TIME	40230	Time2	2	R	—	—	3.RD LAST TIME
4.TH LAST TIME	40232	Time2	2	R	—	—	4.TH LAST TIME
5.TH LAST TIME	40234	Time2	2	R	—	—	5.TH LAST TIME
6.TH LAST TIME	40236	Time2	2	R	—	—	6.TH LAST TIME
7.TH LAST TIME	40238	Time2	2	R	—	—	7.TH LAST TIME
8.TH LAST TIME	40240	Time2	2	R	—	—	8.TH LAST TIME
9.TH LAST TIME	40242	Time2	2	R	—	—	9.TH LAST TIME
ACTUAL VALUE	40244	Float	2	R	—	0/15000	Actual measurement value, not channel dependent
LAST VALUE	40246	Float	2	R	—	0/15000	LIST OF VALUES
2.ND LAST VALUE	40248	Float	2	R	—	0/15000	LIST OF VALUES
3.RD LAST VALUE	40250	Float	2	R	—	0/15000	LIST OF VALUES
4.TH LAST VALUE	40252	Float	2	R	—	0/15000	LIST OF VALUES
5.TH LAST VALUE	40254	Float	2	R	—	0/15000	LIST OF VALUES
6.TH LAST VALUE	40256	Float	2	R	—	0/15000	LIST OF VALUES
7.TH LAST VALUE	40258	Float	2	R	—	0/15000	LIST OF VALUES
8.TH LAST VALUE	40260	Float	2	R	—	0/15000	LIST OF VALUES
9.TH LAST VALUE	40262	Float	2	R	—	0/15000	LIST OF VALUES
STAT. MODUL.WAR.	40266	Unsigned Integer	1	R/W	40/30/15	—	Configure the level of warning for the status of the modules
STATUS MODUL.ERR	40267	Unsigned Integer	1	R/W	14/10/8/0	—	Configure the level of error for the status of the modules
ENCLOSU.TEMP. MAX	40268	Float	2	R	—	-50/200	Maximum temperature inside the analyzer during the last 24 hours, intervall starts with power on
ENCLOSU.TEMP. MIN	40270	Float	2	R	—	-50/200	Minimum temperature inside the analyzer during the last 24 hours, intervall starts with power on

Table 13 Sensor Modbus registers (continued)

Tag name	Register #	Data type	Length	R/W	Discrete range	Min/Max range	Description
EXHAUST CONTROL	40272	Unsigned Integer	1	R/W	0/1	—	Analyzer checks the exhaust whether it is blocked; 0=OFF, 1=ON
ELECTROLYTE	40277	Integer	1	R	—	-32768/32767	Left days until next electrolyte change, negative values shows overdue
ELECTROLYTE	40278	Unsigned Integer	1	R/W	0/1	—	Sets if there is a warning when electrolyte has to be exchanged; 0=OFF, 1=WARNING
FALSE ELEC DATA	40279	Unsigned Integer	1	R/W	0/1	—	Sets if there is an error if the ZERO value is out of range; 0=OFF, 1=ON
ERROR LIST	40280	Unsigned Integer	2	R	—	—	Errors are coded bit wise. bit 0=TEMP. < 0 °C/ 32°F?, bit 1=ANALYZ. TO COLD, COOLING FAILED,HUMIDITY ANALY, HUMIDITY PROBE; PROBE MISSING, NO HEAT UP, CUVSENSOR DEFECT, TEMPSENS DEFECT, CUVHEAT DEFECT, CUV TOO HOT, ELECTRODE SLOPE, FALSE ELEC DATA, MODULES CONTAM., DRAIN BLOCKED, SAMPLE1, bit 16= SAMPLE2
WARNING LIST	40282	Unsigned Integer	2	R	—	—	Warnings are coded bit wise, bit 0=WARMUP PHASE, bit 1=COOLING DOWN, SERVICE MODE, REAGENT LEVEL, CLEAN SOLU LEVEL, ANALYZER TO COLD, ANALYZER TO WARM, CUV TOO COOL, MODULES CONTAM., STANDARDS LEVEL, ELECTRODE SLOPE, reserved,SAMPLE1, ELEKTROLYTE, bit 14=SAMPLE2
EDIT NAME	40285	String	8	R/W			Name of LOCATION (see menu system)
ELECTROLYTE	40293	Float	2	R			electrode drift per 24h in mV

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