Environics

User and Maintenance Manual

ChemProX

Environics

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1 Introduction of ChemProX

The ChemProX is the latest installment of Environics Oy's state-of-the-art handheld detection and identification systems with an intuitive User Interface which can be operated with just one hand. The detector has been designed to detect Chemical Warfare Agents (CWAs) and Toxic Industrial Chemicals/Materials (TICs/TIMs).

The ChemProX detection technology is based on proven and tested Aspiration Ion Mobility Spectrometry (IMS) and orthogonal sensors. The detector has been designed with low operating and life cycle costs, having no consumables apart from a dust filter.

Operators are not alone in the field, therefore shared real-time location and detection information between the team members and the Command Centre can be crucial for a successful result. ChemProX is the only chemical detector of its class which allows a full real-time situational-awareness during field operations. Each detection network group can have up to 10 detectors exchange data between themselves by secure radio. Each detection network group exchanges data with the Command Centre by secure Wi-Fi.

The ChemProX can be used in both real and simulated situations, forgoing the need for extra training devices or expensive simulators. ChemProX has a built-in simulation mode where a chemical alarm can be triggered using Bluetooth sources, and more complex simulations can be created using Mobile C&C and Training Software without endangering the users.

This document covers ChemProX handheld chemical detector's general information, normal operation and operator level maintenance tasks.

1.1 Declarations

Tab. 1-1 Declarations

DECLARATIONS
General

Strictly follow the Instructions for Use

Any use of the instrument requires full understanding and strict observation of these instructions. The Instrument is to be used only for purposes specified here. Environics Oy accepts no liability for any consequential loss, injury or damage resulting from the use or misuse of the supplied information, or from any errors or omissions to this manual.

It shall be the sole responsibility of the purchaser to ensure the suitability of the product for a particular application. It is also the purchaser's responsibility to use and maintain the product in accordance with the procedures and recommendations described in this User and Maintenance Manual.

Liability for proper function or damage

The liability for the proper function of the instrument is irrevocably transferred to the owner or operator to the extent that the instrument is serviced or repaired by personnel not employed or authorized by Environics Service or if the instrument is used in a manner not conforming to its intended use.

Environics Oy cannot be held responsible for damage caused by noncompliance with the recommendations given above.

The warranty and liability provisions of the terms of sale and delivery of Environics Oy are likewise not modified by the recommendation given above.

DECLARATIONS

Radio communication

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and
(2) This device must accept any interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equpment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autoriséeaux deux conditions suivantes:

1) L'appareil ne doit pas produire de brouillage;
2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Restrictions

	NO	This device is not allowed to be used within a 20 km radius of the centre of Ny-Ålesund at Svalbard, Norway.

The SAR values found for the ChemProX Handheld gas detector are below the maximum recommended levels of 4 W/kg as averaged over any 10 g tissue according to the EN standard EN 50566.

1.2   Specifications and Precautions

1.2.1   ChemProX

Tab. 1-2 ChemProX specifications and precautions

ChemProX
Specifications

Model	ChemProX	Networking and communication	- LAN - Wi-Fi - Bluetooth - Radio data - Real-time geolocation with GPS
FCC ID	FCC ID: 2ATAB-CHMPRX		
IC	IC: 25121-CHMPRX		
Size (H x W x D)	160mm x 100mm x 50mm (6.3" x 3.9" x 2.0")		
Weight	770g (1.70 lb)	**Maximum altitude**	4572m (15 000ft)
Pollution degree	PD4	**Water tightness**	IP67 with the air inlet closed

Audible alarm	**Field upgradeable**
Visual alarms (display / LED)	**Programmable storage of alarms**
Integrated self-test	**Intended for indoor and outdoor use**
Built-in training mode	**Rugged design**
Integrated quick reference guide with chemical database and dynamic event information	**Web user interfaces**

ChemProX

Radioactive material

The ChemProX uses a radioactive ionizing source of low activity. The source is Americium-241 that has an activity level of 160µCi (5,9MBq). An optional Nickel-63 source with a source activity of 2,4mCi (90MBq) is available. The source is contained in a lead-shielded, tamper-proof module and poses no threat to the end user. Environics Oy manufactures the detectors in a carefully controlled process. The ionizing source in use can be seen in the radiation warning label at the back of the device.

It is the user's responsibility to ensure that the device is operated in compliance with all appropriate regulations.

Explosion hazard

Do not use the detector in an environment with an explosion hazard without fully knowing all national and local level laws and regulations.

This instrument is tested for handheld use in areas where combustible or explosive gas mixtures are likely to occur according to MIL-STD-810G, Method 511.6 procedure 1.

Operation in unusual environments

- During handheld operation in rain, it is recommended that the device inlet is tilted slightly upwards with the rain cap attached to prevent water from entering the air inlet
- During sand / dust storm and with the *Low air flow* FAULT active, turn the device off until the storm recedeeds and change the filter afterwards
- During extreme cold, the keyboard may stiffen and can be relaxed by briefly warming it with hands
- Sudden changes in air pressure can trigger flow adjustment:
    - Indicated by *Wait, stabilizing air flow* message
    - Lasts typically 1... 2 seconds but in rare cases up to 2 minutes
        - Sample detection is disabled during this time
    - This is typically caused by blockages or sudden increases in air flow that are common in laboratory testing

ChemProX
Handling precautions

When handling the detector, the following should be kept in mind:

- Operating temperature range is -32... +55ºC (-26... 131ºF)
- Operating relative humidity range is up to 95%
- Avoid sampling high concentrations of silicone, acid vapors, solvents or paints
- Avoid handling the detector's inlet area if your hands could be contaminated with chemicals (e.g. after handling gasoline or fuels, etc.)
- Avoid using, placing or storing the equipment in places subject to strong sunlight or high temperatures, such as the dashboard or trunk (boot) of a car
- When changing the dust filter, ensure that your hands are clean or use protective gloves if the filter could be contaminated. Used filters are to be disposed of in accordance with applicable local laws and regulations
- Do not place the confidence check tube, used filters or anything with strong odors to the foam filled storage area of the carrying case
- When wearing the detector in harness, the inlet faces downwards without rain cap
- Keep the battery hatch closed

Storage precautions

- Storage temperature range is from -40... +71ºC (-40... +160ºF)
- Recommended storage temperature range is from +10... +30ºC (+50... 86ºF)
- Recommended relative humidity range is from 30%... 90% (Without condensation)
- When storing the device for three months or less, keep the battery in and charge it to at least 50%
    - An internal super capacitor preserves the settings while it has charge. To maintain the super capacitor charge, keep a battery unit with charge equipped
- When storing the device for three months or more, remove the battery unit from the device
- You should store the device in a cool, dry place with temperatures around a typical household level
- Avoid using, placing or storing the equipment in places subject to strong sunlight or high temperatures, such as the dashboard or trunk (boot) of a car
- Do not store the equipment in humid or dusty areas
- Keep the battery hatch closed
- Do not place the confidence check tube, used filters or anything with strong odors to the foam filled storage area of the carrying case
- After storage, you should fully recharge the battery before using it

Environics

ChemProX
Other safety precautions

Before using the detector, please ensure that you read the described safety precautions of the user and maintenance manual. Always ensure that the detector is operated correctly.

The safety precautions ae intended to instruct you in the safe and correct operation of the detector and its accessories to prevent injuries or damage to yourself, other persons and equipment.

Equipment refers to the detector, lithium-ion battery, battery pack (AA) and optional accessories (sold separately).

General:

- Do not attempt to disassemble or alter any part of the equipment that is not expressly described in this manual
- Be careful not to bang the detector or subject it to strong impact or shocks that could lead to injury or damage the equipment when wearing or holding it
- Stop operating the equipment immediately if it emits smoke or noxious fumes
- Do not let any liquids enter the device or air channel:
    - If liquids enter the device, remove the battery unit and power supply
    - If liquids enter the air channel, let the device run in a warm environment
- The sides of the detector can heat up during charging. Please be aware of this and take care when operating the detector
- Only use cables provided by Environics Oy for power and data connections
- Return the ChemProX to the manufacturer, Environics Oy, for disposal

Contamination:

- If the device needs to be cleaned, see the correct tools, materials and methods in chapter 4.1: Cleaning
- If the device needs to be decontaminated, see the correct tools, materials and methods in chapter 4.2: Decontamination
- Do not place the confidence check tube, used filters or anything with strong odors to the foam filled storage area of the carrying case
- When changing the dust filter, ensure that your hands are clean or use protective gloves if the filter could be contaminated. Used filters are to be disposed of in accordance with applicable local laws and regulations
- To avoid unwanted indications, do not start up the device in a contaminated environment
- Toxic substances may be present in the system components if the equipment has been used in an actual chemical attack or in live testing of chemical agents. Use appropriate care when handling a detector which might be contaminated

Maintenance:

- Maintenance performed without training by Environics Oy will void warranty
- An internal super capacitor preserves the date, time and other settings while the battery unit is unequipped. The super capacitor lasts a few hours before the settings are lost

1.2.2 ChemProX Power Supply Options

Tab. 1-3 ChemProX power supply options and precautions

ChemProX power supply options
Supply voltage 5VDC (USB)

Supply voltage 5VDC (USB) specifications:

- **Input voltage**   5VDC
- **Typical power**   5W with a fully charged battery
  9W with an empty battery

Recommended power supply:

- Mains power adapter (Environics Oy)
  - USB type A socket

Mains power adapter specifications:

- **Input voltage**   100... 240VAC
- **Input current**   0.2... 0.4A
- **Input frequency**   50... 60Hz
- **Output voltage**   5VDC
- **Output current**   2.4A

Required cable:

- USB charger cable (Environics Oy)
  - USB type A plug
  - ChemProX power and data connector with 16 pins

Note! When not using the recommended mains power adapter but a 3rd party power supply, follow these guidelines:

- It needs to have a USB type A socket
- Its recommended minimum output current should be at least 2A

Supply voltage 9... 36VDC

Supply voltage 9... 36VDC specifications:

- **Input voltage**   9... 36VDC
- **Typical power**   5W with a fully charged battery
  19W with an empty battery
  35W peak during start-up

Required cable:

- Connection cable (Environics Oy)
  - ChemProX power and data connector with 16 pins
  - Open ended on the other side

ChemProX power supply options

Warnings

Failure to comply with the following warning could result in an accident or collision resulting in death or serious injury:
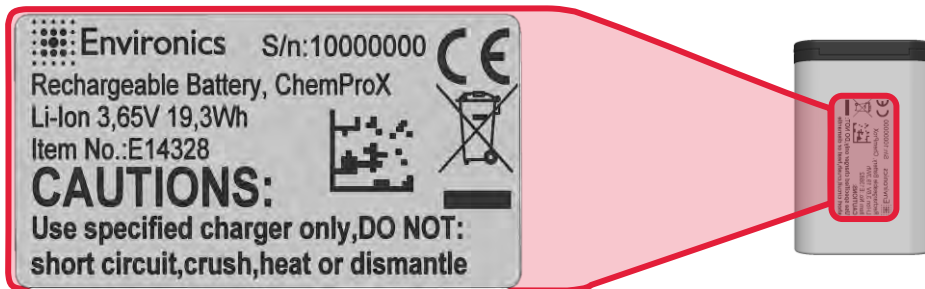
- Use of equivalent 3rd party 5VDC power supplies is possible
- When supplying the detector directly without Environics Oy mains power adapter or USB charger cable, the voltage needs to be 9… 36VDC and Environics Oy connection cable must be used
- Do not cut, damage, alter or place heavy items on the power cord
- Do not handle the power cord if your hands are wet for continued use of the equipment may result in fire or electrical shock
- Do not allow metal objects (such as pins or keys) or dirt to contact the charger terminals or plug for such conditions could lead to fire, electrical shock or other damage
- Ensure that the battery charger or the mains power adapter is plugged into a power outlet of the specified rating, not over the specified rating. Do not use if the power cord or plug is damaged, or if not fully plugged into the outlet

1.2.3 Lithium–ion Battery

Tab. 1-4 Li-ion battery specifications and precautions

Lithium-ion battery
Specifications

Type	Rechargeable, li-ion battery	**Voltage**	3.65V
Charging temp.	-30… 35ºC (-22… 95ºF)		
Recharge time	When within the charging temperature, the battery can be fully recharged in approximately: ▪ 6h with mains power adapter and the detector turned off ▪ 2… 6h with supply voltage of 9… 36VDC and the detector turned off **Note!** Higher supply voltage enables faster charging		
Battery capacity	19.3Wh **Note!** The battery capacity decreases over time and through repeated use. If the battery capacity has shortened significantly, it is probably time to replace it		
Operating time	The operating time can be even 8 hours depending on the settings and environmental conditions. **Note!** See the settings that affect the operating time for more information. **Note!** The operating time is affected by the conditions and environment during operation and storage.		

Settings that affect the operating time

- Turn the screensaver on according to chapter 2.6: Settings
- Turn the background and LED intensities down according to chapter 2.6: Settings
- Turn off all communication and data transfer options according to chapter 3.3: Communication and Data Transfer Options
- Shut down the interfaces according to chapter 3.4: External Interface

Lithium-ion battery

Long-term storage

- When storing the device for three months or less, keep the battery in and charge it to at least 50%
  - An internal super capacitor preserves the settings while it has charge. To maintain the super capacitor charge, keep a battery unit with charge equipped
- When storing the device for three months or more, remove the battery unit from the device
- You should store the device in a cool, dry place with temperatures around a typical household level
- After storage, you should fully recharge the battery before using it

Warnings

Failure to comply with the following warnings could result in an accident or collision resulting in death or serious injury:

- Do not short circuit the battery
- Do not expose the device or battery to fire, explosion, or other hazards
- Do not disassemble, modify, remanufacture, puncture or damage the device or battery
- Do not place the device or battery in high temperature environments, such as a clothes dryer
- Do not change or recharge lithium-ion batteries in areas where combustible or exposive has mixtures are likely to occur

Note! If these guidelines are not followed, batteries may experience a shortened life span or may present a risk of damage to the device, fire, chemical burn, electrolyte leak, and/or injury.

Notices

Failure to comply with the following notices could result in personal or property damage, or negatively impact the device functionality:

- Do not immerse the battery in water or other liquids
- Do not charge or change the battery in rain or underwater
- Do not leave the device exposed to a heat source or in a high-temperature location, such as in the sun in an unattended vehicle. To prevent the possibility of damage, remove the device from the vehicle or store it out of direct sunlight, such as in the glove box or the carrying case
- Do not operate the device outside of the temperature ranges specified in this manual
- When storing the device for an extended time period, store within the temperature ranges specified in this manual
- Do not use a power and/or data cable that is not approved or supplied by Environics Oy
- Contact your local waste disposal department to dispose of the battery in accordance with applicable local laws and regulations

1.2.4   Battery Pack (AA)

Tab. 1-5 Battery pack (AA) specifications and information

Battery pack (AA)
Specifications
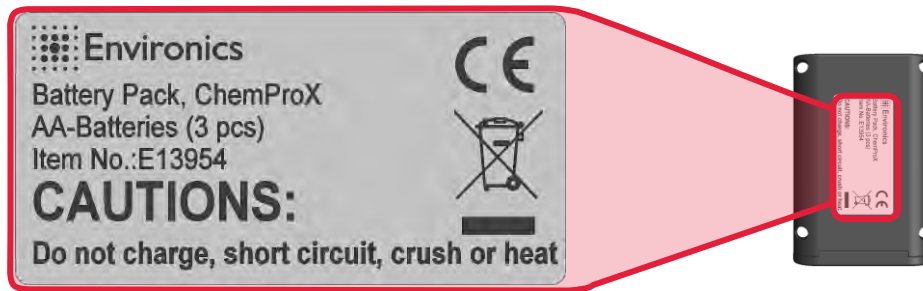
Batteries	Three AA-batteries
	Note! The best performance can be achieved with three quality lithium AA-batteries

Warnings

Failure to comply with the following warnings could result in an accident or collision resulting in death or serious injury:

- Use only recommended batteries and accessories
- Do not disassemble, modify, remanufacture, puncture or damage the battery pack (AA) or batteries
- Do not place the battery pack (AA) or batteries near a heat source or expose them to a direct flame
- Do not immerse the battery pack (AA) or batteries in water or sea water
- Do not change the battery pack (AA) or recharge the batteries in areas where combustible or explosive gas mixtures are likely to occur

Note! Use of batteries not expressly recommended for this equipment may cause explosions or leaks, resulting in fire, injury and damage to the surroundings. In the event that a battery leaks and the eyes, mouth, skin or clothing contact these substances, immediately flush with water and seek medical assistance.

Notices

Failure to comply with the following notices could result in personal or property damage, or negatively impact the battery pack (AA) functionality:

- Before you discard a battery, cover the terminals with tape or other insulators to prevent direct contact with other objects for contact with the metallic components of other materials in waste containers may lead to fire or explosions
- Keep objects that are sensitive to magnetic fields (such as credit cards) away from the battery pack (AA) for they may lose data or stop working
- AA-batteries cannot be charged inside the detector

1.3 Definition of Terms

Tab. 1-6 Abbreviations

Reference documents	
ED -code	Name
AP	Access point
BIT	Built-in Test
CCT UI	Mobile C&C and Training UI
CWA	Chemical Warfare Agent
DHCP	Dynamic Host Configuration Protocol
DPGME	Di (Propylene Glycol) Methyl Ether
EC	Electrochemical
FCC	Federal Communications Commission
GPS	Global Positioning System
IC	Industry Canada
IMS	Ion Mobility Spectrometry
RED	Radio Equipment Directive (EU)
RMA	Return Material Authorization
SAK	Standard Accessory Kit
SAR	Specific Absorption Rate
SOP	Standard operating Procedure
TIC	Toxic Industrial Chemical
TIM	Toxic Industrial Material
XIP	ChemProX User Interface Program

1.4   Reference Documents

Tab. 1-7 Reference documents

Reference documents	
ED -code	Name
TBD	ChemProX Technical Description
TBD	ChemProX User Interface Program User Manual
TBD	ChemProX Mobile C&C and Training UI User Manual
ED29401	ChemProX Illustrated Spares & Consumables
ED29343	ChemProX Illustrated Special Tools and Test Equipment

1.5   Technical Description

The ChemProX is based on proven multisensory technology:

- Miniaturized IMS sensor
- Semiconductor sensors
- Pressure sensor
- Humidity sensor
- Temperature sensor
- Flow sensor
- EC sensor (optional)

Data from these sensors is rapidly integrated which leads to real-time reporting of hazard information.

The ion mobility cell, patented by Environics Oy, is a modified aspiration type IMS. The IMS spectral fingerprints are measured with multiple electric fields and selectivity is based on the mass, cross-sectional area and charge of the ion i.e. ion mobility. Airflow through the cell is continuous.

The semiconductor/MOS cell surface absorbs sample gas molecules which changes its electrical resistance. The resulting resistance changes are reflected in the output of the sensor.

Information from each sensor is integrated within the processing algorithm that uses the decision-making capabilities of learning vector quantization and fuzzy logic. This intelligent processing system leads to a very accurate detection performance and significantly enhances interferent rejection.

1.5.1 Simplified RED EU Declaration of Conformity

Hereby, Environics Oy declares that the radio equipment type handheld gas detector is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address:

[LINK TBD]

Tab. 1-8 RED Technical data

RED Technical data			
Transmission power	Max. 22dBm	**Transmission frequency**	2400... 2483.5MHz

1.6 Key Elements

Tab. 1-9 Key elements

Key elements
ChemProX
1. Utility connector
2. Color display
3. Right button (ON/OFF)
4. Menu button
5. Left button
6. Battery latch
7. Battery hatch
8. Air inlet with rain cap
9. Air inlet switch
10. Status LED
11. Power and data connector
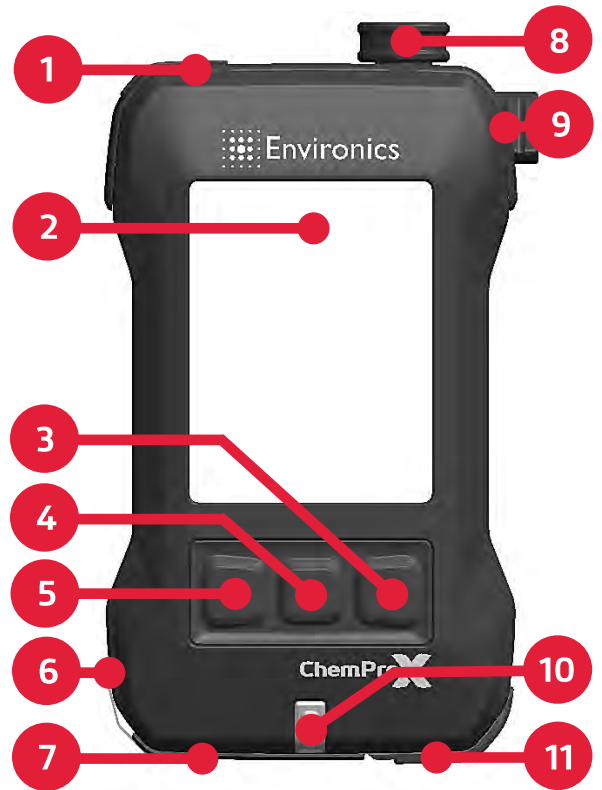
Fig. 1-1 Key elements

1.7 Equipment Description

The ChemProX is delivered in a rugged case with the Standard Accessory Kit (SAK). The exact configuration of the SAK can vary. Mobile C&C and Training kit is an expanded version of the SAK for instructors.

The case has a plastic exterior and is lined with specially designed foam with low vapor emission. The case also has a pressure-equalizing valve below the handle which equalizes the interior pressure of the case with the outside. The valve will automatically equalize the air pressure during transportation.

Two heavy latches hold the case closed. The case can also be secured with lock and key if necessary.

Tab. 1-10 Standard accessories kit

1.	ChemProX Chemical Detector*	E13846000
	Standard Accessories Kit (SAK)**	E13890000
2.	Confidence Check Tube	E13473000
3.	Dust Filter (3 pcs)	E14246000
4.	Li-ion Battery	E13682000
5.	Mains Power Adapter	E13891000
6.	Mains Power Plug Mix	E13892000
7.	USB Charger Cable	E13341000
8.	Carrying Pouch	E13893000
9.	Quick Reference Guide, English	E14017000
10.	User Manual, English	TBD
11.	Transit Case	E14117000
12.	USB Data Adapter Cable	E13344000
13.	Rain Cap (3 pcs)	E13861000
14.	Monitoring Tube (3 pcs)	E14016000

*) The detector contains one li-ion battery
**) The SAK contains one li-ion battery
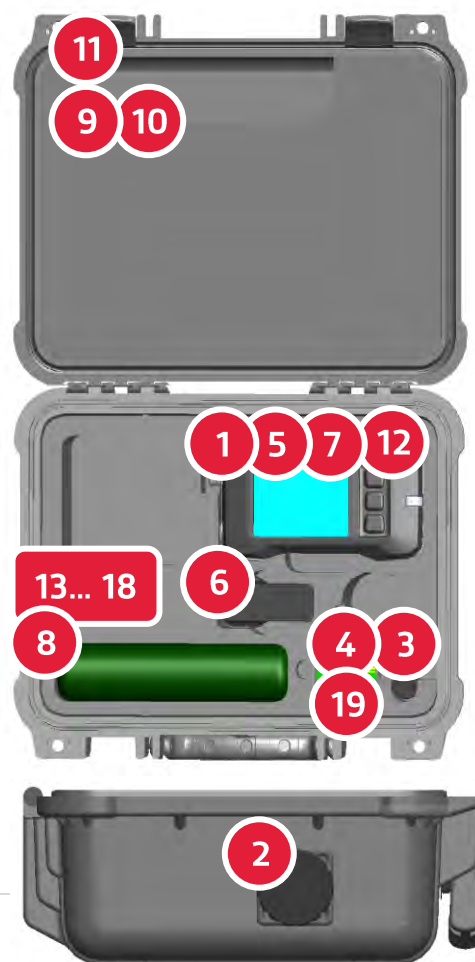
	Mobile C&C and Training Kit***	E14047000
15.	Simulation Source - Nerve	E14043000
16.	Simulation Source – Blood	E14044000
17.	Simulation Source – Blister	E14045000
18.	Simulation Source – Toxic	E14046000
19.	Li-ion Battery	E13667000

***) The contents listed below are in addition to regular SAK contents

1.7.1 Optional Accessories

Tab. 1-11 Optional accessories

OPTIONAL ACCESSORIES	
Name and description	**Picture**
E13954000 Battery Pack (AA) Battery pack (AA) is an alternative power source for the detector. The best performance can be achieved by using three quality lithium AA-batteries.	
E14043000 Simulation Source – Nerve **E14044000 Simulation Source – Blood** **E14045000 Simulation Source – Blister** **E14046000 Simulation Source – Toxic** Bluetooth devices to simulate chemicals in training mode.	
E14300000 EC Sensor – Phosgene The detector can be furnished with an electrochemical sensor. Electrochemical sensors are generally very selective and sensitive.	
E14230 EC Sensor Confidence Check Tube – Phosgene The EC sensor needs a separate test chemical for confidence checks. The EC sensor confidence check tube for Phosgene contains 25% ammonia solution.	
Bluetooth Earpiece Single earpiece allows the operator to listen detector signals covertly. The earpiece communicates with the detector via Bluetooth. The exact type is subject to change and the picture is a representative example.	
Tablet Computer The tablet can be used for various purposes including monitoring, training and updating. The tablet is especially useful for instructors when training basic functions of the detector or building training scenarios in web user interfaces.	

2 Basic Operation of ChemProX

2.1 Standard User Interface

ChemProX user interface is clean and simple to read:

Tab. 2-1 Standard user interface

Standard user interface	
Features and descriptions	Picture
### Status bar: ▪ **Status bar icons reflect the current status and settings** ▪ **The status bar background color indicates the current status** ### Standard view: ▪ **Status** ▪ Measuring, fault or alarm ▪ **Status specific symbol** ▪ Measuring, fault or alarm group ▪ **Description** ▪ Mode and sensitivity level during measuring or alarm ▪ Description when a fault is active ▪ There may be an extra line to describe non-fatal faults or other uncommon statuses ### Navigation bar: ▪ **Navigation bar icons indicate the current button functions** ### Audible signals: ▪ **Audible signals alert the operator to a change in status**	
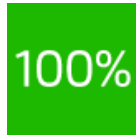
NOTE
Trend, map and group views are described in advanced operation and can be activated from advanced settings.

2.1.1   Status Bar

Icons are listed in order they appear from left to right. Some icons such as volume and power have mutually exclusive icons and others are only visible if an abnormal status or an optional mode or method is active. The status bar color also indicates the current status of the detector.
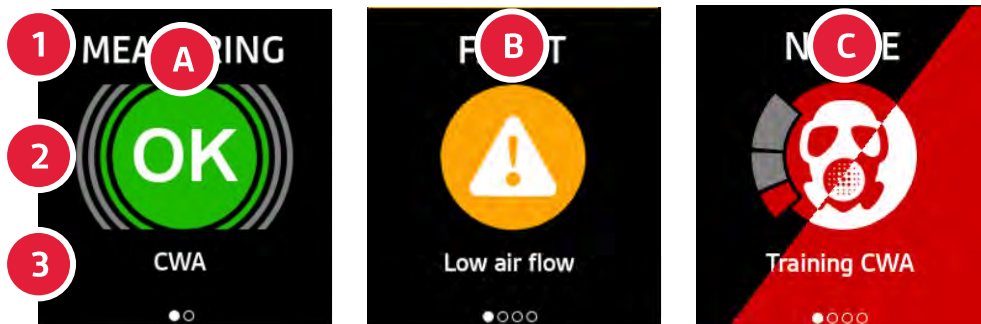
Tab. 2-2 Status bar icons and colors

Status bar icons							
Training	Fault	Wireless options					
Training mode	Fault (non-fatal)	GPS	Radio data	WLAN (client)	WLAN (Access point)	Bluetooth	Earpiece
Volume		Power				Time	
Volume level	Mute	Battery charge	Plugged in	Battery (li-ion)	Battery pack (AA)	Time	

Status bar colors		
Normal	Fault	Alarm
GREEN	YELLOW	RED

2.1.2   Standard View – Detection

Tab. 2-3 Standard view – Detection

Standard view – Detection
Status views

No.	Description	A	B	C
1.	Status*	MEASURING	FAULT	ALARM
2.	Symbol**			
3.	Description	Detection mode and sensitivity	Fault description	Detection mode and sensitivity

*) Alarm specifies chemical group or gives a generic Chemical detected message
**) Alarm symbols are varied and they also have alarm thresholds. More information about the alarm symbols can be found in the table on the next page

NOTE
Sudden changes in air pressure can trigger flow adjustment which lasts typically 1... 2 seconds. Measuring is disabled during flow adjustment.

See *Notifications* in the info menu for instructions and relevant information about fault and alarm events.

Background flashes red during alarms.

ChemProX has a wide variety of different messages and symbols that have been programmed to appear when their corresponding chemicals are detected.

Tab. 2-4 Alarm types

Alarm types			
Chemical alarm groups			
Chemical Warfare Agents (CWAs)	Toxic Industrial Chemicals (TICs) with acute toxicity	TICs with oxidizing properties	TICs with corrosive properties
Generic alarm			
Generic alarm	**Generic alarm message is possible when:** ▪ The chemical is not covered by the currently active detection mode ▪ The environmental conditions are very unusual ▪ A mixture of chemicals is detected		

Detection performance can be limited when:

- The detector is started in a contaminated environment
- Concentration rises to the alarm level very gradually
    - Normally a contaminated area is entered from a relatively clean one which leads to a steep rise in concentration

NOTE
Additional custom icons can be created when necessary.

2.1.3 Navigation Bar

Tab. 2-5 Navigation bar functions

Navigation bar functions					
Home (no alarm)			Home (alarm)		
Info menu	Main menu	Next screen	Mute	Main menu	Next screen
Parent menu (main menu) (submenu available)			Parent menu (no submenu available)		
Home	Enter menu	Next field	Back	Cycle	Next field
Submenu (toggle options)			Submenu (increase sensitivity or volume)		
Back	Toggle	Next field	Back	Accept	Increase
Exception (password)			Exception (username)		
Back	Increase	Next digit	Accept letter	Move down	Move right

NOTE

The training mode is indicated by its symbol in the status bar and blue background in the navigation bar.

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2.1.4 Audible Signals

Tab. 2-6 Audible signals

Audible signals	
Event	**Signal**
Initialization done	
Functional exception	
Alarm at toxic concentration (mode dependent)	
Alarm at non-toxic concentration (mode dependent)	

NOTE
In trend view the sound frequency increases with the sum response time.
Alarms can be acknowledged with the left button.

2.2 Charging the Battery

The li-ion batteries are delivered with a storage charge level and should be charged to full:

1. Plug the mains power supply into 110... 240VAC and 50... 60Hz
2. Open the bottom lid
3. Connect the output of the mains power supply to the connector
4. Fully charge the li-ion battery

Fig. 2-1 Connecting mains power adapter

NOTE
Do not charge the battery pack (AA).
Charge the battery in temperature range of -30... 35ºC (-22... 95ºF).

ChemProX

2.3 Start–up

Starting up the detector is a simple and straightforward process:

1. Start up the detector by holding the right button down for 3 seconds
2. ChemProX logo appears
3. Open the air inlet by turning its switch 180º counter-clockwise to **OPEN** position
4. Wait for the automatic starting procedures to finish:
   - Initialization screen is displayed while the built-in test (BIT) runs
   - Initialization lasts between 1… 3 minutes depending on previous use and ambient temperature
   - Status LED turns green with an audible signal when the detector becomes operational

Fig. 2-2 Start-up

NOTE
Start the detector in a clean environment.

2.4 Confidence Check

The confidence check ensures that the detector's IMS, multisensor board and pump are functioning at full capacity. When the confidence check should be performed depends on the context and the detector use.

When the detector enters a limited detection state, the operator should perform the confidence check to verify the functionality and to clear the limited detection state.

First responders tend to use the detector on nearly daily basis and hence the confidence check is recommended to be done once a week e.g. at the beginning of each service week. This ensures that the chemical detector is in full functioning capacity and good to go whenever there is a need.

Military and police applications tend to keep the detector stored until a need arises and hence the confidence check is recommended to be done before each mission e.g. hazmat or chemical surveillance. This ensures that the chemical detector is fully functional before each mission.

To ensure reliable test results, pay attention to the following items:

- In windy conditions, cover the air inlet with a clean hand while applying check gas
- In cold conditions, warm the confidence check tube in your hands to +20ºC (+68ºF)
- After a long storage period, let the detector run for at least 20 minutes before confidence check

When conducting confidence checks for multiple detectors, ensure that they are not exposed to confidence check tube vapor mixture or any other chemicals before being checked. Keep the detectors that are either checked or waiting their turn separated from the test area i.e. more than 5 meters (18 feet) away or preferably in another room.

WARNING
Do not place the confidence check tube, used filters or anything with strong odors to the foam filled storage area of the carrying case.

NOTE
The confidence check should be performed in a clean environment.
Let the detector run for at least 8 minutes after the confidence check to clear the system of the high dosage of the test chemical. It is recommended that the run is extended if the time allows it.
The confidence check tube contains a mixture of two chemicals: 1-Propanol and Di (Propylene Glycol) Methyl Ether (DPGME).
The detector does not require periodical confidence checks during storage. Although the detector might have been fully functional before going to storage, it is still highly recommended that the confidence check is performed after the storage period.

2.4.1   Process

The confidence check process goes basically as follows:

1. Start the confidence check from the main menu
   - Follow the on-screen instructions through the process

The confidence check process goes basically as follows:

2. Remove the confidence check tube from the case and prepare for the process:
   - Check the sample chemical level inside the tube and if the level is not visible, use another tube
   - In cold temperatures [<5°C] heat the tube in your hands for 2 minutes
   - Remove the rain cap from the air inlet if equipped with one
3. Release the sample chemical
   - Place the tube in the air inlet
   - Release the sample chemical until the check is finished
   - Remove the tube
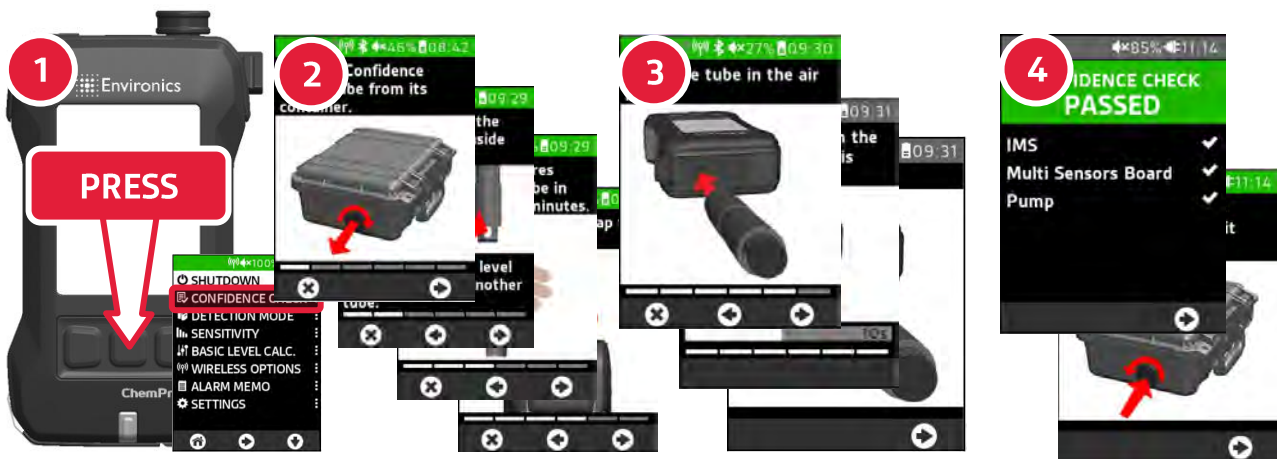4. See the following chapter on how to interpret the results

Fig. 2-3 Confidence check process

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2.4.2 Results

When the result of the check is a PASS:

A. *Confidence check PASSED* message is displayed
  - The system has detected the confidence check test tube chemicals and all sensors have performed correctly
  - Wait for the signal to stabilize and tightly secure the confidence check test tube in its place
  - Finish the remaining steps to return to home view

When the result of the check is a FAIL:

B. *Confidence not verified* message is displayed and corresponding icon appears in the status bar
  - The system has not detected the confidence check test tube chemicals, or some sensors have performed incorrectly
  - Wait for 5 minutes before trying the check again
  - If the check still fails, wait for 5 minutes before trying the check again with another test tube
  - If the check still fails, tightly secure the confidence check tubes to their places and contact Environics Oy at technical.support@environics.fi
C. *Limited detection capability* message is displayed and corresponding icon appears in the status bar
  - The system has detected the sample gas but some sensors have not performed correctly
  - Wait for the signal to stabilize and wait for 5 minutes before trying the check again
  - If the check still fails, wait for 5 minutes before truing the check again with another tube
  - If the check still fails, tightly secure the confidence check tubes to their places and contact Environics Oy at technical.support@environics.fi
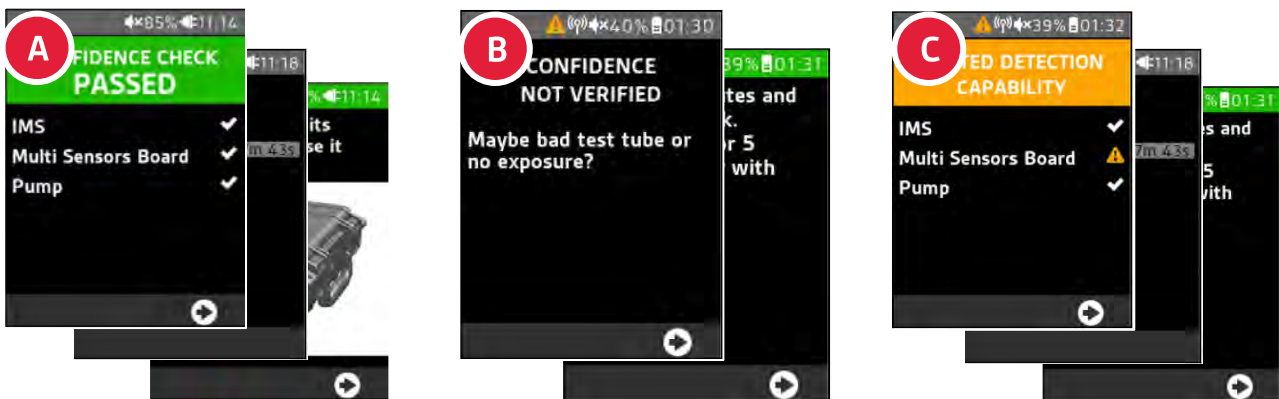
Fig. 2-4 Confidence check results

WARNING
Do NOT put the confidence check tube or anything with strong odors to the foam filled storage area of the carrying case.

NOTE
Let the detector run for at least 8 minutes after confidence check to clear the system.
If any of the confidence checks resulted in a pass, the detector is considered fully operational.
After a failed confidence check the detector will be placed in "Limited detection capability" state until the check is carried out successfully.

2.5 Shutdown

Shutting down the detector is a simple and straightforward process:

1. Enter the shutdown screen by holding the right button down for 3 seconds or by choosing *Shutdown* in the main menu
2. The contents of the shutdown screen depend on the previous use:
    a. If the detector has not been exposed to chemicals or confidence check gas, the shutdown screen will ask for confirmation
    b. If the detector has been exposed to chemicals or confidence check gas, the shutdown screen will show the recovery process and offers force shutdown option that is not recommended
3. Close the air inlet by turning its switch 180º clockwise to **CLOSED** position
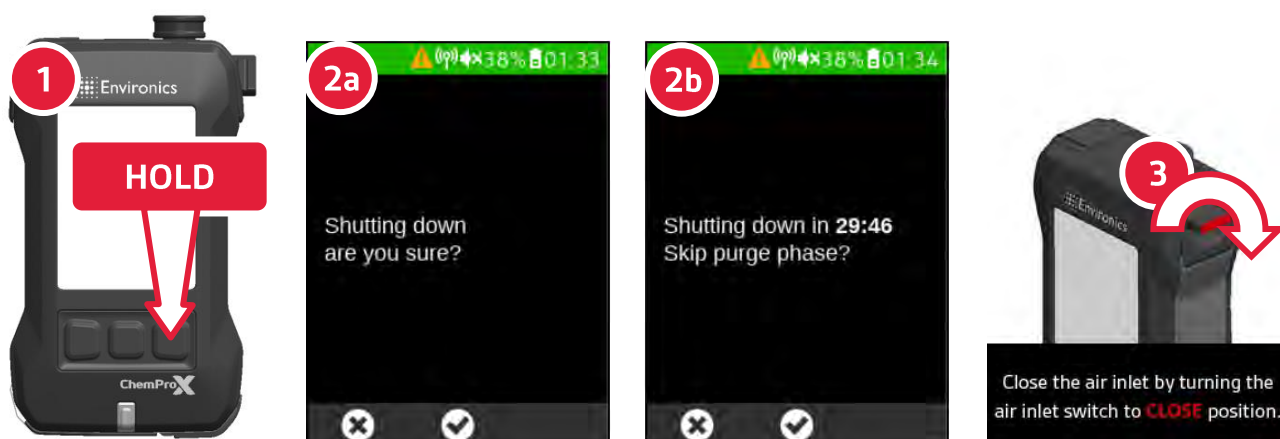
Fig. 2-5 Shutting down the detector

WARNING
Forcing the shutdown can permanently reduce the performance of the sensors!

NOTE
During shutdown, the detector stores current settings in memory.
Let the detector run for at least 30 minutes after exposure to clear the system.
The detector should be stored with the air inlet closed to prevent contamination during storage.

2.6 Settings

Fig. 2-6 Settings
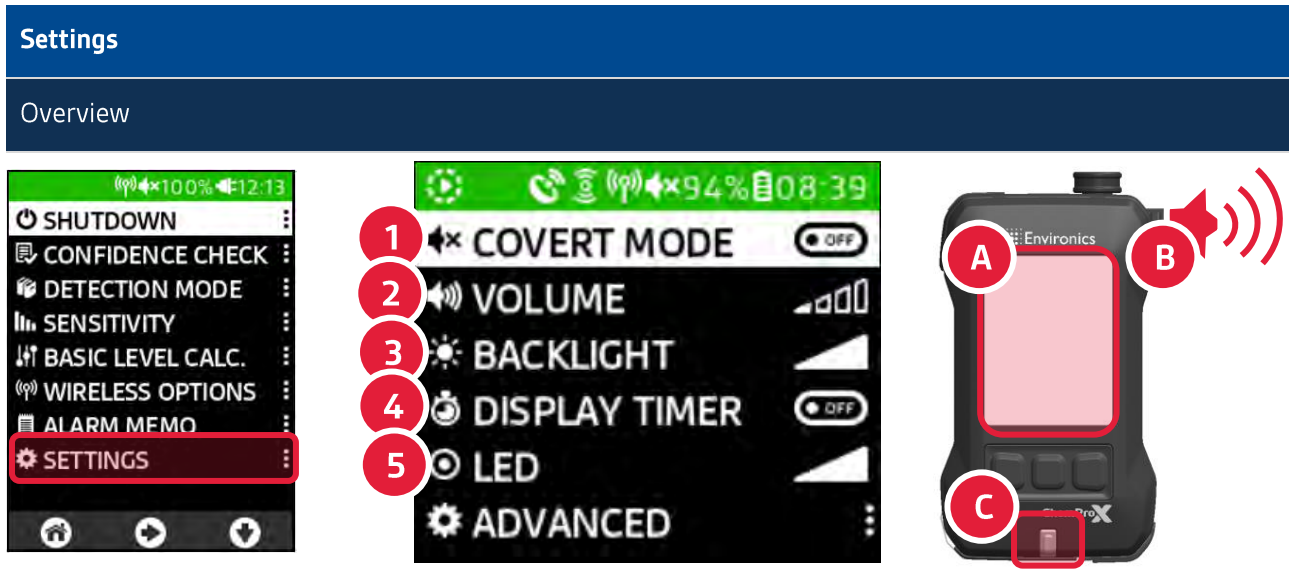
Settings options affect the volume level (**A**), backlight intensity (**B**) or status LED intensity (**C**). Enter the *Settings* from the main menu and choose the setting to be toggled or adjusted

Setting	Description	Affects
1. **Covert mode**	Toggles the cover mode on or off Covert mode allows the operator to monitor the surroundings without drawing attention by disabling status LED and sound (excluding Bluetooth devices).	BC
2. **Volume**	Adjusts the volume level	B
3. **Backlight**	Adjusts the backlight intensity	A
4. **Screensaver**	Toggles the automatic screensaver on or off (30 second countdown)	A
5. **LED**	Adjusts the status LED intensity	C

NOTE

Covert mode disables sound and status LED regardless of their settings. When covert mode is turned off, the chosen settings take effect.

Pressing any button during screensaver will turn the display back on.

2.7   Hotkeys

Fig. 2-7 Hotkeys

Hotkeys
Overview
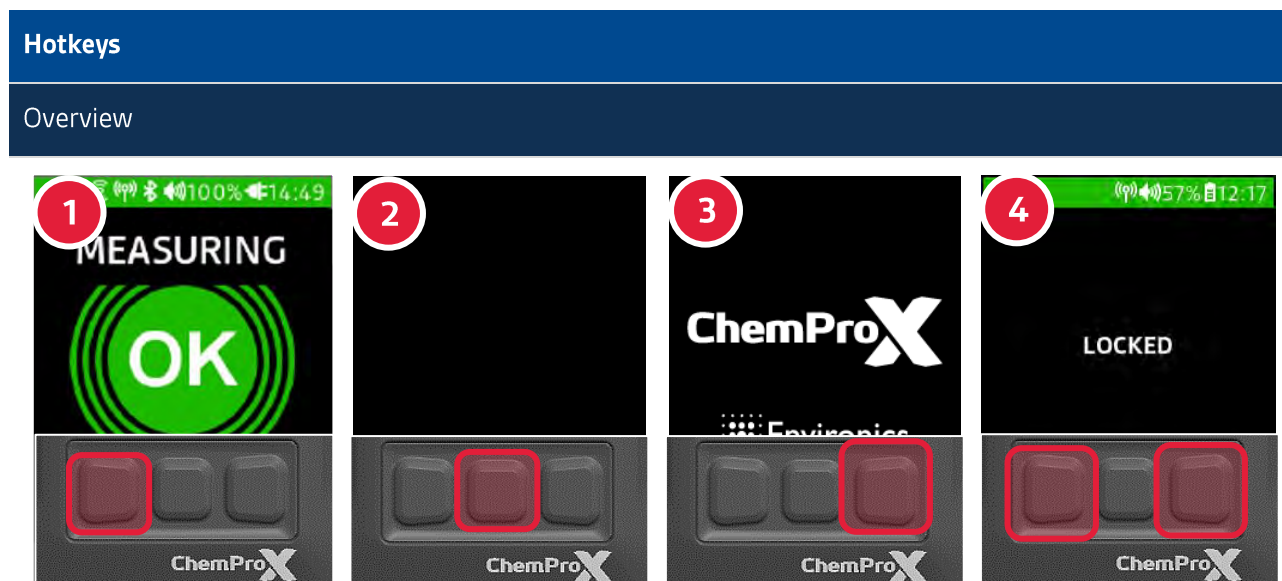
1. **Return home** — Returns to the home view (detector is on)

2. **Manual screensaver** — Turns the display off

3. **On/off** — Turns the detector on / enters the shutdown screen (depends on the current status)

4. **Keylock** — Locks or unlocks the keypad (depends on the current status

NOTE
The hotkey buttons need to be help for approximately 3 seconds for them to take effect.
Pressing any button during screensaver will turn the display back on.

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3 Advanced Operation of ChemProX

3.1 Detection Modes and Sensitivity Levels

Detection modes describe the amount of chemicals in the air and improve the detection accuracy by focusing the detection range to fit the situation. When the active detection mode matches the situation, detection rates are very high.

Detection performance depends on the detection mode in use that is further enhanced with sensitivity levels that determine the alarm threshold:

- Detection modes: *CWA* or *TIC*
- Sensitivity levels:
    - CWA sensitivity levels: *Standard*, *Sensitive* or *High Sensitive*
    - TIC sensitivity levels: *Detection*, *Classification* or *Confirmation*

Changing detection mode and sensitivity level:

1. Select *Detection mode* in the main menu
2. Select the desired detection mode from the list
3. Select *Sensitivity* in the main menu
4. Select the desired sensitivity level
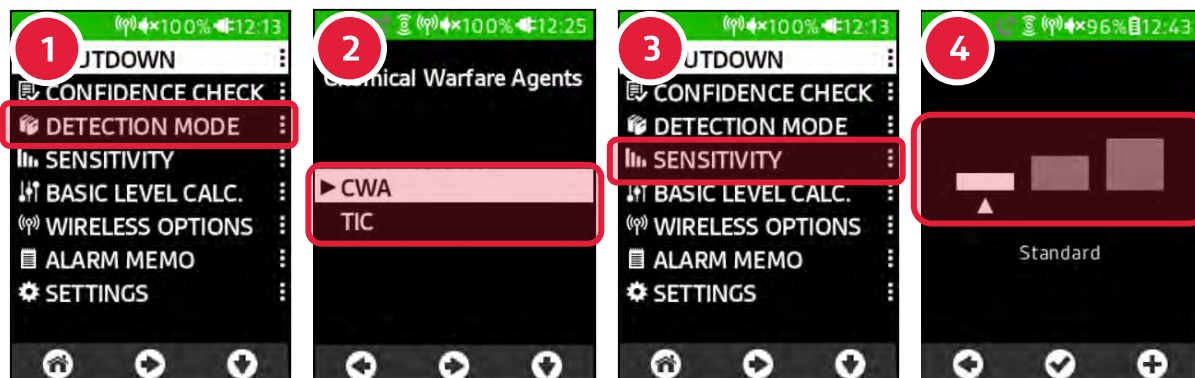
Fig. 3-1 Changing detection mode and sensitivity level
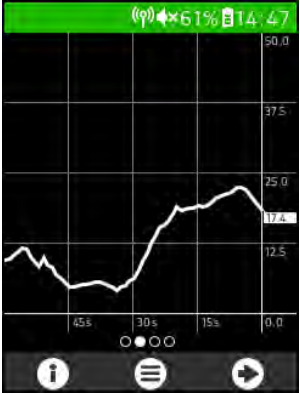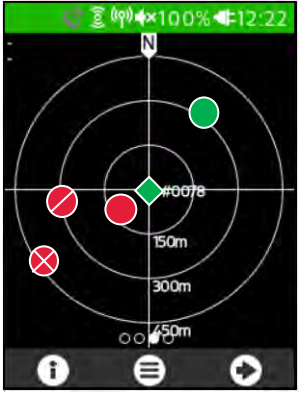
NOTE

All modes are active in the background which allows the operator to switch between the modes seamlessly.

Alarms are either general *Chemical detected* or specified by a chemical family such as Blood. More information about the detected chemical can be found in the context menu.

3.2 Optional Views

Tab. 3-1 Optional views

Optional views		
Trend	Map	Group
Optional	Optional	Optional

How to enable optional views:

1. Navigate to the *UI settings* menu
   - Select *Settings* in the main menu
   - Select *Advanced* in the settings menu and enter the security PIN (default 0000)
   - Select *UI settings* in the advanced menu
2. Press *Enable* on each optional view you wish to enable

3.2.1 View – Trend

The trend view is a graphical presentation of sensor responses as a function of elapsed time. The trend value in the view is a weighted combination from all sensor responses. The trend value unit is arbitrary, thus providing semi-quantitative information of sample air changes over time:

- Useful for monitoring air quality over time
- Sound frequency increases with the sum response value

Tab. 3-2 Attributes of the trend view

Trend view attributes			
Description	Horizontal axis	Vertical axis	View
Indication	Time	Combined value of sensor responses	
Range	0… 60 seconds	0… 100	
Sections	15 seconds	12.5*	

) Scales up if the trend value > 50

3.2.2 View – Map

The map view shows the locations of the device and the other devices on the same channel:

- North is fixed to the top side of the view
- The device in use is indicated by a diamond
- Other devices are indicated by circles
- Can be centered on the device in use or so that the device group fits the screen
- Background map can be turned on or off
    - When map is turned off, expanding circles indicate the distance

The status indications are explained in the table below.

Tab. 3-3 Status indications in map view

Map view status indications			
Status	The device in use	Other devices	View
Normal	🔷 (green diamond)	🟢 (green circle)	
Fault	🔶 (yellow diamond)	🟡 (yellow circle)	
LOW alarm	🔴 (red diamond)	🔴 (red circle)	
MED alarm	(red double diamond)	(red slashed circle)	
HIGH alarm	(red quad diamond)	(red crossed circle)	
Disconnected	(gray diamond)	(gray circle)	

NOTE
The north is fixed to the top side of the view and the map does not rotate with the user.
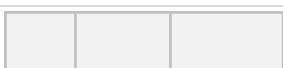
3.2.3 View – Group

The group view lists the other devices on the same channel

- Shows whether the training mode is enabled
- Shows the username
- Shows the status alternating between message and bar (when applicable)

The status indications are explained in the table below.

Tab. 3-4 Status indications in group view

Group view status indications				
Status	Background	Message	Bar (when applicable)	View
Normal	**GREEN**	MEASURING		
Fault	**YELLOW**	FAULT		
LOW alarm	**RED**	C GROUP		
MED alarm	**RED**	C GROUP		
HIGH alarm	**RED**	C GROUP		
Disconnected	**GREY**	DISCONNECTED		

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3.3 Communication and Data Transfer Options

Tab. 3-5 Communication and data transfer options and overview

Communication and data transfer options	
Option	**Description**
LAN	Connects the detector to an existing LAN network or directly to a PC
USB	Allows the detector to transfer data to and from a USB data storage device
Radio data	Connects the detector to the designated radio data channel which enables the channel members to share status and location information between themselves
WLAN	Connects to a WLAN access point (or hosts one) to enable the use of a web UI
Client	Assign the detector as a client which communicates with a WLAN access point
Access point	Assign the detector as an access point to which other WLAN devices connect to
Bluetooth	Connects the detector with a supported Bluetooth device
GPS	Determines the location (longitude, latitude and elevation) of the detector

NOTE
Wireless options can be toggled on or off in the *Wireless options* menu of the main menu.
Communication settings persist through shutdown.
Environmental conditions affect the functional range of the wireless communication methods.
Save batteries by turning off unneeded communication methods.
ChemProX User Interface Program (XIP) can be used to change settings.
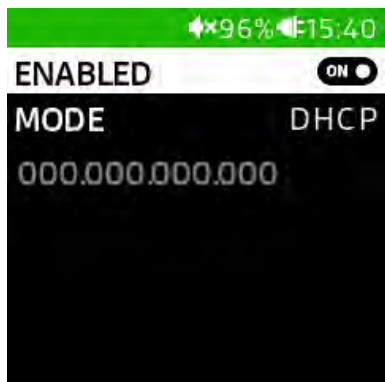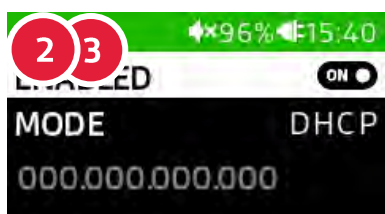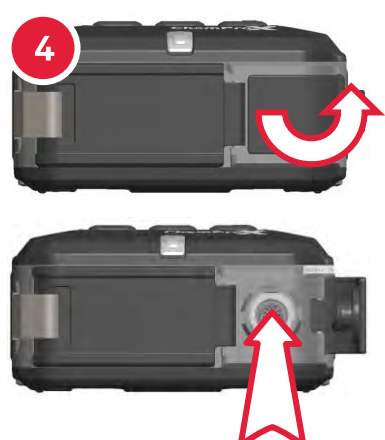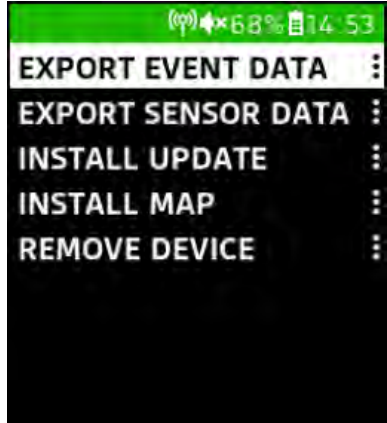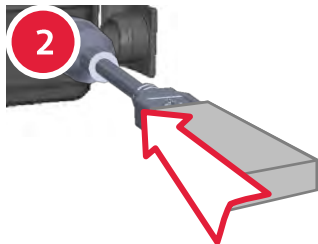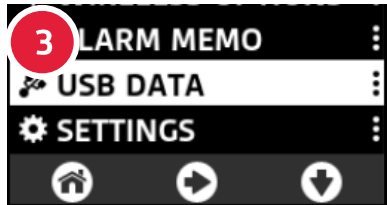
3.3.1   LAN Options and Set-up
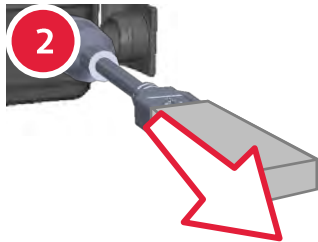
Tab. 3-6 LAN options and set-up

LAN options	
Options and descriptions	**Picture**
LAN menu options: **Enabled** - Toggles the LAN option on or off **Mode** - Cycles through the available options - Static IP is used when a specific IP address is desired - DHCP is used when connecting to an existing network - Gateway is used when connecting directly to a PC **Static IP address** - Sets the static IP address that is used that in that mode	
How to connect to an existing LAN network	
Description	**Picture**

1. Navigate to *LAN* menu:
   ▪ Select *Settings* in the main menu
   ▪ Select *Advanced* and enter the security PIN (default 0000)
   ▪ Select *Communication*
   ▪ Select *LAN*	

2. Enable the LAN if not already enabled 3. Choose a mode to fit the situation **Note!** Do not use Gateway mode when connecting to an existing network	
4. Connect the Ethernet/power cable to the detector	

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3.3.2 USB Data Options and Set–up
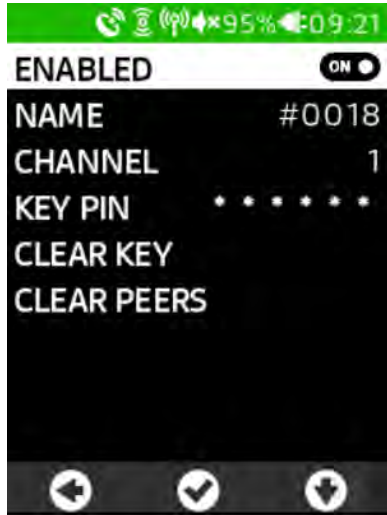
Tab. 3-7 USB data options and set-up

USB data options	
Options and descriptions	**Picture**

## USB data menu options: 	
 	
- **Export event data**
  - Exports all event data to the USB data storage device
- **Export sensor data**
  - Exports all sensor data to the USB data storage device
- **Install update**
  - Install a software update from the USB data storage device
- **Install map**
  - Install a map from the USB data storage device
- **Remove device**
  - Safely removes the USB data storage device from the detector	

How to access a USB data storage device	
Description	**Picture**
1. Attach the USB data adapter cable to the detector **Note!** The detector and the USB data storage device must be attached in the correct order	
2. Attach the USB data storage device to the USB data adapter cable	
3. Select *USB data* in the main menu **Note!** USB data menu becomes visible in the main menu when the USB data storage device is connected	

How to remove a USB data storage device	
Description	**Picture**
1. Select *USB data* in the main menu 2. Press *Remove device* to disconnect the USB data storage device	INSTALL UPDATE INSTALL MAP **REMOVE DEVICE**
3. Remove the USB data storage device from the USB data adapter cable **Note!** The USB data storage device and the detector must be removed in the correct order	(2)
4. Remove the USB data adapter cable from the detector	(1)

3.3.3 Radio Data Options and Set-up
Tab. 3-8 Radio data options and set-up

Radio data settings	
Settings and descriptions	**Picture**
Radio data menu options: ■ **Enabled** ■ Toggles the radio data option on or off ■ **Name** ■ Sets the nickname used in simulator and radio network ■ **Channel** ■ Sets the radio channel to which the device belongs to ■ **Key PIN** ■ Sets the channel key PIN that is a 6-digit code used to generate the radio data encryption key ■ **Clear key** ■ Erases key PIN ■ **Clear peers** ■ Erases the list of devices that have been observed. This can be used to remove devices that are no longer part of the group	ENABLED ON NAME #0018 CHANNEL 1 KEY PIN •••••• CLEAR KEY CLEAR PEERS

How to set up a radio data group

Description	Picture

1. Navigate to *Radio data* menu:
   ■ Select *Settings* in the main menu
   ■ Select *Advanced* and enter the security PIN (default 0000)
   ■ Select *Communication*
   ■ Select *Radio data*	

2. Enable the radio data if not already enabled
3. Customize the radio data settings
   ■ Set the radio data channel
   ■ Set the radio data channel key PIN
   ■ Set the nickname (optional)
 	
Note! If you wish to change the channel key PIN, press *Key PIN* to start from the beginning
 	
Note! If the channel key PIN number has not been set before, you will be prompted to set it now	

4. Repeat actions 1... 3 for all detectors of the group **Note!** Detectors on the same channel and with the same channel key PIN automatically connect and correctly translate messages	

How to change the nickname

Description	Picture

1. Navigate to *Radio data* menu:
   ■ Select *Settings* in the main menu
   ■ Select *Advanced* and enter the security PIN (default 0000)
   ■ Select *Communication*
   ■ Select *Radio data*	
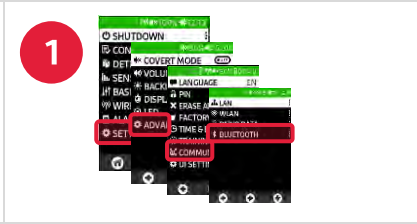
2. Press *Name* to proceed
3. Type in and accept the new nickname
   ■ Navigate with the arrow buttons
   ■ Accept letters with the left button
   ■ Navigate to the *Name* field and accept the name
 	
Note! You can delete letters in the name field
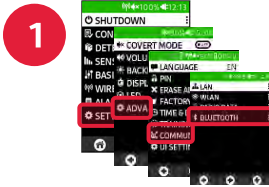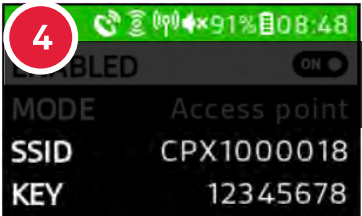 	
Note! The default nickname is the last four digits of the serial number #XXXX	

3.3.4 WLAN Options and Set-up

Tab. 3-9 WLAN access point options and set-up
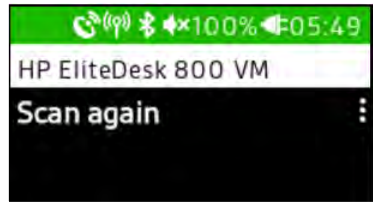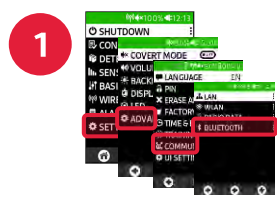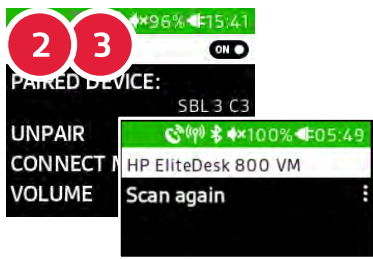
WLAN options	
Options and descriptions	Pictures

WLAN mode options:

- **Enabled**
  - Toggles the WLAN option on or off
- **Mode**
  - Toggles between client and access point modes

Access point mode options:

- **SSID**
  - Sets the WLAN network name
- **Key**
  - Sets the WLAN network security key
- **AP IP**
  - Displays the access point IP address

Client mode options:

- **Connection status**
  - Shows whether the client is connected or disconnected
- **New connection**
  - Finds available WLAN networks
- **Forget connection**
  - Removes and disconnect the currently connected WLAN network
- **IP**
  - Displays the device IP that comes automatically from DHCP service or has been set manually

New connection options (client mode):

- **Hidden SSID**
  - Type in a hidden SSID address to find it
- **Scan**
  - Rescans available WLAN networks
- **Found networks**
  - List of available WLAN networks

Note! Hidden WLAN networks are hidden from the public eye and cannot be found by scanning

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How to host a WLAN network access point

Description	Pictures

1. Navigate to *WLAN* menu:
    ▪ Select *Settings* in the main menu
    ▪ Select *Advanced* and enter the security PIN (default 0000)
    ▪ Select *Communication*
    ▪ Select *WLAN*	

2. Enable the WLAN if not already enabled 3. Set the mode to access point	

4. Customize the WLAN network access point settings (optional)
    ▪ Set the WLAN network name
    ▪ Set the WLAN network security key	

How to connect to an existing WLAN network

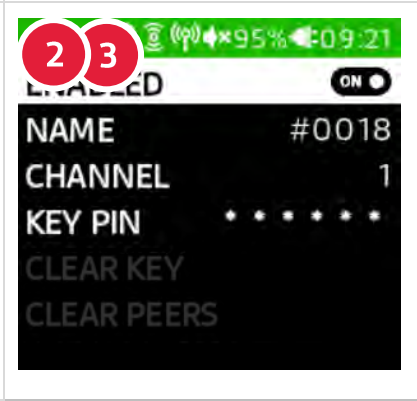| Description	Picture

1. Navigate to *WLAN* menu:
    ▪ Select *Settings* in the main menu
    ▪ Select *Advanced* and enter the security PIN (default 0000)
    ▪ Select *Communication*
    ▪ Select *WLAN*	

2. Enable the WLAN if not already enabled 3. Set the mode to client 4. Press *New connection* to scan for available networks	
5. Choose a network from the list or connect to a hidden network by entering its SSID (WLAN network name) **Note!** If you wish to change the network, press *New connection* to start from the beginning **Note!** Hidden WLAN networks are hidden from the public eye and cannot be found by scanning	
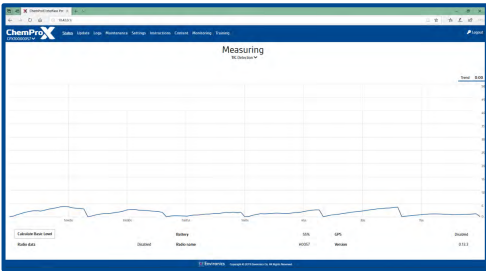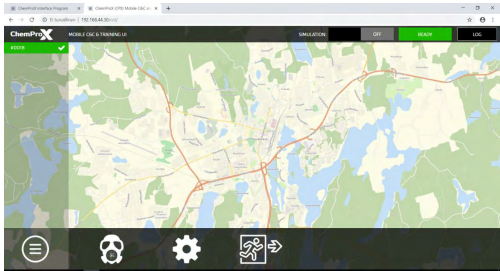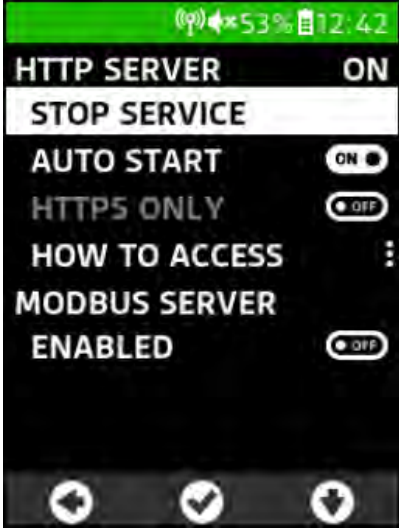
3.3.5 Bluetooth Options and Set-up

Tab. 3-10 Bluetooth options and set-up
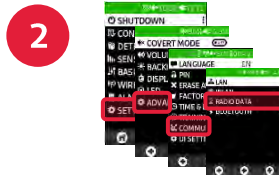
Bluetooth options	
Options and descriptions	Picture

## Bluetooth menu options: 	
 	
■ **Enabled**
  ■ Toggles the Bluetooth option on or off
■ **Paired device**
  ■ Name of the paired device
■ **Pair / unpair**
  ■ While unpaired, scans the area for available Bluetooth devices
  ■ While paired, removes and disconnects the current pairing
■ **Connect manually**
  ■ Attempts to reconnect manually when connection to the paired Bluetooth device has been lost
■ **Volume**
  ■ Adjusts the volume of the paired Bluetooth device
 	
## Pairing options: 	
 	
■ **Found devices**
  ■ List of available Bluetooth devices
■ **Scan again**
  ■ Rescans for available Bluetooth devices	

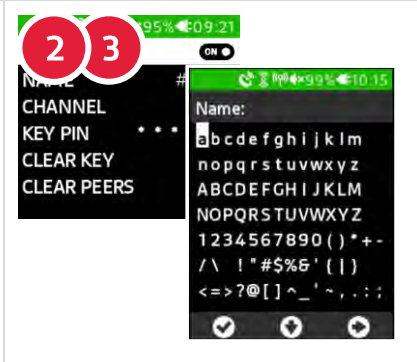| How to set up the Bluetooth	
Description	Picture

1. Navigate to *Bluetooth* menu:
  ■ Select *Settings* in the main menu
  ■ Select *Advanced* and enter the security PIN (default 0000)
  ■ Select *Communication*
  ■ Select *Bluetooth*	

2. Press *Pair* to scan for available devices and choose one 3. Press *Volume* to adjust the volume of the device **Note!** If you wish to change the paired device, press *Unpair* to start from the beginning	

3.4 External Interface Options and Set-up
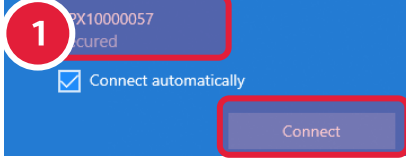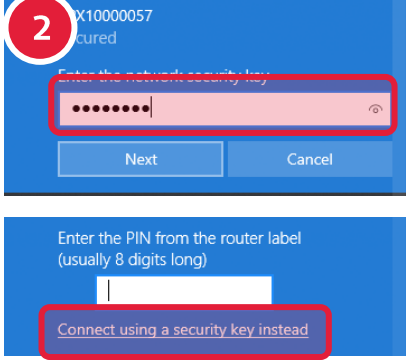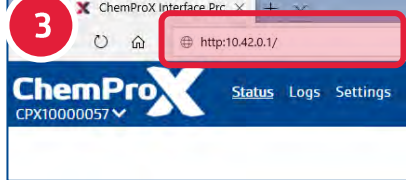
Tab. 3-11 External interface options and set-up

External interfaces
Web user interfaces

ChemProX Interface Program (XIP)	Mobile C&C and Training UI (CCT UI)

Interface options	
Options and descriptions	Picture

Web user interfaces (http):

- **Start / stop service**
  - Toggles the http server on or off
- **Auto start**
  - Toggles whether the http server starts with the detector
- **Https only**
  - Toggles whether the server is https only
- **How to access**
  - Instructs the user on how to proceed

Serial communication protocol (Modbus):

- **Enabled**
  - Toggles the Modbus server on or off

How to host a web user interface	
Description	**Picture**
1. Connect the detector to a network according to either: ▪ Chapter 3.3.1: LAN Options and Set-up ▪ Chapter 3.3.4: WLAN Options and Set-up **Note!** When connecting to an interface device through WLAN, the device with the browser needs to have WLAN capability	
2. Navigate to *Interfaces* menu ▪ Select *Settings* ▪ Select *Advanced* and enter the security PIN (default 0000) ▪ Select *Communication* ▪ Select *Interfaces*	
3. Press *Start service* to the host a http server **Note!** Http server can be set to automatically start with the detector and/or be https only	

How to access a web user interface	
Description	**Picture**
1. Scan for WLAN networks and connect with the ChemProX access point **Note!** The network name is CPX with the device's serial number e.g. CPX10000057	
2. Enter the network security key (default 12345678) **Note!** The network may ask for a PIN code by default. There should be an option to use security key instead	
3. Open a web browser and type in the address: ▪ XIP LAN http://192.168.44.30 and WLAN http://10.42.0.1 ▪ CCT UI addresses are the same but with */cct* appendix **Note!** XIP may not work correctly with older browser versions, Internet Explorer in particular	

3.4.1 ChemProX Interface Program (XIP)

ChemProX Interface Program (XIP) is a web user interface that is used for monitoring, training, maintenance, software updates and laboratory tests due to its tools and detailed logs. Interface shows only the currently selected device. XIP updates along with the software so its features may change between versions.

For instructions on how to use XIP, see its user manual in the instructions tab.

Tab. 3-12 ChemProX interface program (XIP)

ChemProXIP
Overview

Features	Description
Status	Detection mode, trend and basic level calculation
Update	Version information and update link
Logs	Event information
Maintenance	Maintenance manual, fault- and hardware status flags
Settings	Same settings and advanced settings that are available from device interface
Instructions	Datasheets for detection modes User manuals for ChemProX, ChemProXIP and Mobile C&C and Training UI
SOP-editor	Standard Operating Procedure (SOP) info menu content
Monitoring	More detailed trend and measurement values
Training	Toggles for training mode and BLE sources Tools for controlling trend, faults, alarms and screen cast

3.4.2 Mobile C&C and Training UI (CCT UI)
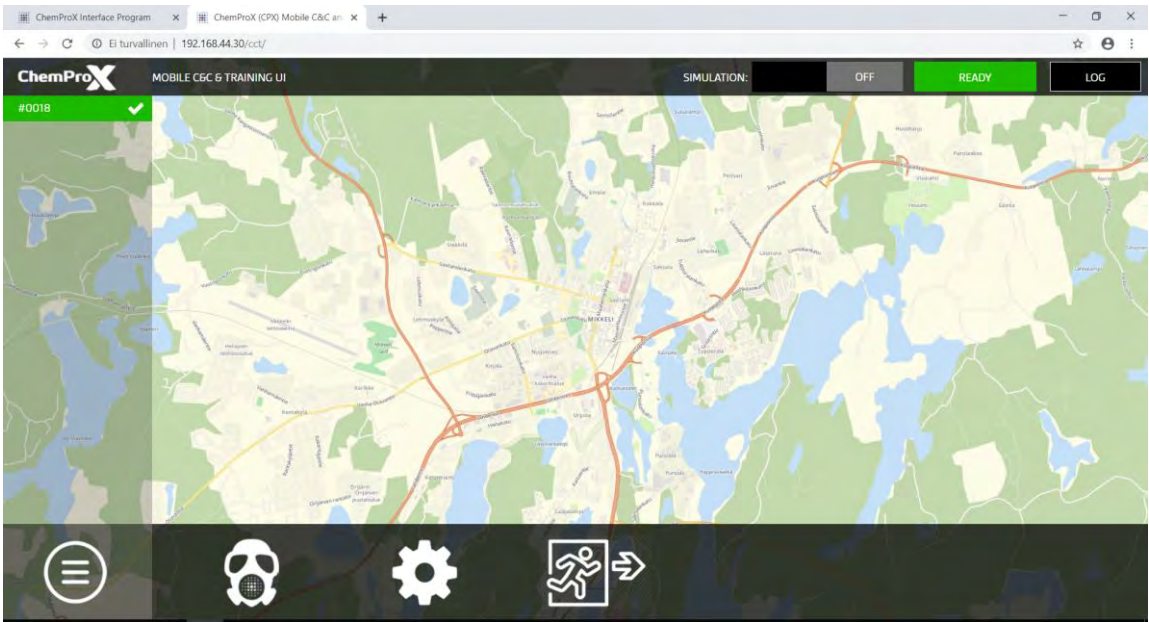
ChemProX Mobile C&C and Training UI (CCT UI) is a web user interface that is primarily used to maintain situational awareness and to simulate training scenarios. Interface shows all devices that are on the same radio data channel. CCT UI updates along with the software so its features may change between versions.

For instruction on how to use CCT UI, see its user manual in the XIP instructions tab.

Tab. 3-13 Mobile C&C and training UI (CCT UI)

Mobile C&C and training UI
Overview

Features	Description
Simulation	Invites or disinvites all channel devices to the training mode and toggles the simulated statuses and areas on or off
Ready	Shows whether the connection to the access point is operational
Log	Shows fault and alarm flags of channel devices
Device list	Can be used to set alarms and evacuation points
Drawing	Draw and erase alarm areas: ▪ Areas are chemical family specific ▪ Areas can be circular or polyangular
Application settings	GeoServer — Determines geodata sources About - Contains license and software information
Evacuation	Sends an evacuation order to all devices

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3.5 Training Options and Set-up

Training mode allows the operators to train the following aspects of their work:

- Operation – Train to better utilize the detector
- Teamwork – Train with others to better utilize interconnectivity between the devices
- Simulation – Train in simulated situations and missions

There are several different training methods available:

- Operators can search for hidden simulation sources
- Commander can set alarms to individual devices in the ChemProXIP Interface Program
- Commander can set alarm areas in the Mobile C&C and Training UI
  - Overlapping areas increase the detected concentration

Tab. 3-14 Training options and set-up

Training options	
Options and descriptions	Picture

### Training menu options: 	
 	
- **Enabled**
  - Toggles the training mode on or off
- **Use BLE sources**
  - Toggles the simulation source detection on or off	

How to set up the training mode	
Description	Picture

1. Navigate to *Training* menu:
  - Select *Settings* in the main menu
  - Select *Advanced* and enter the security PIN (default 0000)
  - Select *Training*	

2. Enable the training mode if not already enabled 3. Enable the detection of simulated sources (optional)	

NOTE
The training mode is indicated by its symbol in the status bar and blue background in the navigation bar.
Other detectors in the group view are marked with the training mode symbol if they have it enabled.
For more detailed information on how to access user interface programs, see chapter 3.4: External Interface.

3.6 Alarm Memo

The alarm memo feature allows the user to track history of detection events. This can be very useful when tracking exposures to toxic compounds in the field. Each detected alarm is saved as an individual entry that expands to display more information when selected.

Tab. 3-15 Alarm memo information

Alarm memo	
Information and descriptions	Picture
Information when collapsed: ▪ Alarm end time ▪ Alarm type ▪ Training mode icon if the mode was active during the alarm **Information when expanded:** ▪ Date ▪ Alarm start and end times ▪ Alarm type and concentration ▪ Active detection mode and sensitivity when the alarm started ▪ Time of acknowledgement ▪ Training mode icon if the mode was active during the alarm	
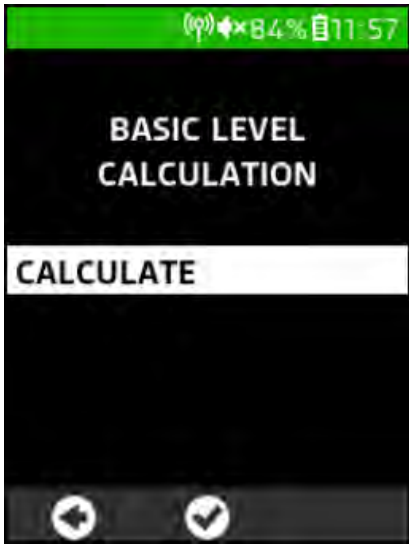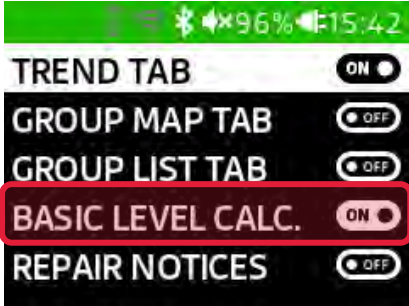
*) Depends on the Time & date settings in use
**) Detection mode is preceded by Training specifier if the training mode was active during the alarm

How to erase all data	
Description	Picture
1. Navigate to *Erase all data* feature ▪ Select *Settings* ▪ Select *Advanced* and enter the security PIN (default 0000) ▪ Select *Erase all data*	
2. Confirm the action to permanently erase all event history and raw sensor data	

3.7 Basic Level Calculation

Tab. 3-16 Basic level calculation

Basic level calculation	
Description	**Picture**
The user can establish new sensor basic levels for the local environment. **Note!** Basic level calculation zeroes the alarm level and the current signal level **Note!** Basic level calculation feature is only visible in the main menu if enabled from the *UI settings* menu **Note!** Basic level calculation is not necessary in normal use	

How to enable basic level calculation	
Description	**Picture**
1. Navigate to *UI settings* menu ▪ Select *Settings* ▪ Select *Advanced* and enter the security PIN (default 0000) ▪ Select *UI settings*	
2. Press *Basic level calculation* to toggle the feature on	

3.8 Advanced Settings

Fig. 3-2 Advanced settings

Navigate to *Main menu\Settings\Advanced settings* and enter the PIN code (default 0000).

Setting	Description
1. **Language**	Cycles through the available interface language options
2. **PIN**	Allows a new security PIN to be set
3. **Erase all data**	Erases all sensor and event data
4. **Factory reset**	Erases all sensor and event data and restores the default factory settings
5. **Time & date**	Allows the date, date format, time, time format and time zone to be set Allows manual or automatic GPS synchronization
6. **Training**	Toggles training mode and simulation source detection on or off
7. **Communication**	Allows a radio data channel and its key PIN to be set Allows a connection to LAN or WLAN network to be established Allows a http or Modbus server to be started Allows a Bluetooth connection to be established and volume level to be changed
8. **UI settings**	Allows the trend, map and group views to be toggled on or off Allows the basic level calculation in the main menu to be toggled on or off Allows the repair notices that are displayed during start-up to be toggled on or off
9. **Map & location**	Allows the background map in the map view to be toggled on or off Allows the map to be centered on the device in use or the channel group Allows a fixed location to be set

3.9 Menu Structure – Info

Tab. 3-17 Menu structure – Info

Info menu structure	
Menu	**Description**
Notifications	Contains relevant event information
Mode info	Explains the detection modes
CWA	Explains the basics of the CWA detection mode
TIC	Explains the basics of the TIC detection mode
Quick manual	Quick guides to basic elements and procedures of the device
Status top bar	Identifies the icons of the status bar
Shutdown	Instructions on how to shut down the device
Replacing inlet filter	Instructions on how to replace the inlet filter
Start-up	Instructions on how to start up the device
Main screen	Identifies the key elements of the main screen
Battery charging	Instructions on how to charge battery
Common misuse	Explains the most common ways to misuse the detector
Key elements	Identifies the key elements of the device
Device info	Contains the relevant information about the device and its settings
Device	Identifies the serial number, security code, SW version and detection build
Usage hours [h]	Includes the usage time of device, pump, multisensor board and EC cell Includes the elapsed time from the last confidence check
Pump	Identifies PWM, faults and warnings of the pump
Communication	Contains relevant information about the communication methods
Radio data	Identifies the number of connected devices and the device username
WLAN	Identifies the WLAN IP, mode (client or access point), SSID and key pin
LAN	Identifies the LAN IP
GPS	Identifies the latitude, longitude, altitude and direction of the detector. Also includes speed, quality and number of connected satellites
Agent database	Contains more information on the database agents
Nerve agent	Identifies the key elements of the nerve agents
Blister	Identifies the key elements of the blister agents
Blood	Identifies the key elements of the blood agents

3.10 Menu Structure – Operation

Tab. 3-18 Menu structure – Operation

Operation menu structure	
Menu	Description
Shutdown	Shut down the device
Confidence check	Perform the confidence check
Detection mode	Change the detection mode
Sensitivity	Change the sensitivity level
Basic level calculation	Recalculate the basic levels
Wireless options	Toggle the communication methods on or off
Alarm memo	View the alarm log
USB data	Export event and sensor data; import maps and updates
Settings	Proceed to the settings menu
Covert mode	Toggle the covert mode on or off
Volume	Change the volume level
Backlight	Change the backlight illumination level
Screensaver	Toggle the screensaver on or off
LED	Change the LED illumination level
Advanced	Proceed to the advanced menu
Language	Cycle through language options
PIN	Change the security PIN
Erase all data	Erase all data
Factory reset	Perform a factory reset
Time & date	Change the time & date
Training	Toggle the training mode and Bluetooth sources on or off
Communication	Change the settings of the communication methods
UI Settings	Toggle home views on or off Toggle basic level calculation and repair notices on or off
Map & location	Toggle background map on or off Choose whether the map is centered on self, group or a fixed location

3.11 Examples

Tab. 3-19 Examples

Examples
Scenario

How to make a radio data group:

- Enable radio data
- Customize settings of the intended group members

How to access external web interfaces:

- Connect to a device with a web browser via LAN or WLAN

How to connect with a Bluetooth device:

- Navigate to *Bluetooth* menu
- Press *Pair* to scan for available devices

How to install an update or a map with a USB data storage device:

- Connect the mains power supply and charge the battery level to 50% or higher
- Connect the USB data storage device
- Select *USB data* in the main menu
- Press *Install update* and choose the correct one from the available options
- **Note!** Interrupted installation may require factory maintenance afterwards
- **Note!** The installation can take up to 15 minutes

How to install an update or a map with a web interface:

- Access ChemProX User Interface Program (XIP)
- Follow the instructions in the XIP user manual that can be found inside the program
- **Note!** Interrupted installation may require factory maintenance afterwards
- **Note!** The installation can take up to 15 minutes

4 Maintenance and Troubleshooting

ChemProX has been designed to be rugged and reliable which results in only a small number of maintenance tasks that can be performed at the operator level. These tasks do not require special tools.

Maintenance tasks at the operator level are:

- Cleaning and decontamination
- Replacement of dust filter
- Replacement of battery unit

NOTE
Ensure that the device is powered off during maintenance, unless otherwise indicated.

4.1 Cleaning

The build-up of dirt and other organic materials (waxes, solvents etc.) on the surface of the device can degrade its detection capabilities. Ensure that the device is kept clean.

General cleaning tools and materials:

- Hand operated sprayer
- Cleaning tissues and towels
- Mild soap-water solution containing mild soap or unscented dish washing liquid
    - For lightly stained external surfaces
- 70% ethanol solution
    - For grease stained external surfaces

A proven method to clean lightly stained external surfaces:

1. Wipe the external surfaces of the device by using a towel dampened with the mild soap-water solution
    - The device is operational after a short drying period

A proven method to clean grease stained surfaces:

1. Wipe the external surfaces of the device by using a towel dampened with the ethanol solution
    - The device is operational after a short drying period

It is recommended that the detector is kept in its transit case when not in use. Make sure that the air inlet is closed before storage.

WARNING
Maintenance
Ensure that the device is powered off and the air inlet is closed for the duration of the cleaning and decontamination.
Do not use high-pressure cleaning equipment, only hand-operated sprayers.
Do not spray liquid to the inlets, outlets or connectors.
Do not immerse the device in solutions.

4.2 Decontamination

Before handling a device, make sure that the unit has not been contaminated with hazardous compounds. If reliable information about the safety of the unit is not available, perform decontamination on it.

Decontamination is generally a combination of mechanical and chemical cleaning methods. The build-up of dirt and other organic materials (waxes, solvents etc.) on the surface of the device can degrade its detection capabilities. Ensure that the device is kept clean.

WARNING
Contamination

The ChemProX should be allowed to run for at least 30 minutes in clean air after chemical exposure to clean the system and to ensure that the sensors remain fully operational.

Ensure that the device is powered off and the air inlet is closed for the duration of the cleaning and decontamination.

Decontamination procedures should be performed outdoors or in well-ventilated rooms while wearing an adequate level of protection.

The towels and water should be treated as hazardous waste and handled in accordance with national regulations and instructions.

If the decontamination results in a failure or cannot be verified, send the device to the manufacturer for more throughout decontamination.

Before sending the product to Environics Oy for service, you must fill the form described in chapter 5: Products Pre-Service Declaration Form.

Do not use high-pressure cleaning equipment, only hand-operated sprayers.

Do not spray liquid on inlets, outlets or connectors.

Do not immerse the device in solutions.

4.2.1 General Light Decontamination

General decontamination tools and materials:

- Hand-operated sprayer
- Several disposable gloves
- Cleaning tissues or towels
- Soap-water solution containing mild soap or unscented dish washing liquid

A proven method to clean lightly contaminated external surfaces:

1. Wipe the external surfaces of the device by using a towel dampened with the mild soap-water solution
   - The device is operational after a short drying period

More specialized cleaning methods are described in the following chapters.

4.2.2 Chemical Contamination

When the system has been moderately or heavily contaminated with CWA, the external and internal surfaces of the device need to be decontaminated.

The external surfaces and internal tubes and flow channels are mostly coated with Teflon because it is resistant and non-adsorptive to most of the chemicals and CWAs. Additionally, the open-loop construction of the detector is open to the atmosphere at all times which helps to prevent internal contamination and to quickly dissipate even small residues.

Decontamination tools and materials:

- Hand-operated sprayer
- Several disposable gloves
- Cleaning tissues or towels
- Spoap-water solution containing mild soap or unscented dish washing liquid
- 5% sodium hypochlorite solution
- Fume hood

A proven method to decontaminate external surfaces heavily contaminated with chemicals:

1. Wipe the external surfaces of the device by using a towel dampened with the mild soap-water solution
   - Change the disposable gloves and towels to avoid cross-contamination
2. Wipe the external surfaces of the device by using a towel dampened with the sodium hypochlorite solution
   - Let the sodium hypochlorite solution take effect for 30 minutes
   - Change the disposable gloves and towels to avoid cross-contamination
3. Wipe the external surfaces of the device by using a towel with the mild soap-water solution
   - Change the disposable gloves and towels to avoid cross-contamination
4. Verify the decontamination results with another ChemProX and repeat the steps 1… 3 as required

A proven method to decontaminate internal surfaces heavily contaminated with chemicals:

5. Place the device inside a fume hood with the outlet connected to ventilation
6. Run clean air through the device for at least twelve hours
   - The air temperature inside the fume hood can be increased to be 10… 20ºC above the ambient temperature to increase the effectiveness of the decontamination
   - The air humidity inside the fume hood can be increased (before condensation point) to increase the effectiveness of the internal decontamination
7. Verify the decontamination results with another ChemProX and repeat the steps 5… 6 as required

After decontamination, the performance of the device can be verified with a confidence check described in chapter 2.4: Confidence Check.

4.2.3 Biological Contamination

When the system has been moderately or heavily contaminated with potentially biohazardous material, decontaminate the external surfaces of the device by using biological decontamination detergents.

Decontamination tools and materials:

- Hand-operated sprayer
- Several disposable gloves
- Cleaning tissues or towels
- Soap-water solution containing mild soap or unscented dish washing liquid
- 1% Virkon® S solution

A proven method to decontaminate external surfaces heavily contaminated with potentially biohazardous materials:

1. Wipe the external surfaces of the device by using a towel dampened with the mild soap-water solution
   - Perform this step twice and change the disposable gloves and towels in between and after to avoid cross-contamination
2. Wipe the external surfaces of the device by using a towel dampened with the Virkon® S solution
   - Let the Virkon® S solution take effect for 30 minutes
   - Change the disposable gloves and towels to avoid cross-contamination
3. Wipe the external surfaces of the device by using a towel with the mild soap-water solution
   - Change the disposable gloves and towels to avoid cross-contamination
4. Verify the decontamination results with a suitable system and repeat the steps 1… 3 as required

4.2.4 Radiological Contamination

When the system has been moderately or heavily contaminated with radioactive material, mechanically decontaminate the surfaces of the device. Basically, all radiation exceeding the normal background radiation should be taken into account.

Decontamination tools and materials:

- Vacuum cleaner, brush or wetted towel
- Several disposable gloves
- Cleaning tissues or towels
- Soap-water solution containing mild soap or unscented dish washing liquid

Mechanical decontamination should be carried out systematically and special attention should be paid to places where radioactive dust may stick. If there is a part that cannot be decontaminated, it needs to be replaced.

A proven method to decontaminate external surfaces heavily contaminated with radioactive materials:

1. Clean the external surfaces of the device by using vacuum cleaner, brush or wetted towel
   - Change the disposable gloves and towels to avoid cross-contamination
2. Wipe the external surfaces of the device by using a towel with the mild soap-water solution
   - Change the disposable gloves and towels to avoid cross-contamination
3. Verify the decontamination results with a suitable system and repeat the step 2 as required
   - Different isotopes pose a different level of danger and therefore it is recommended to use an identifying radiation detector

Send the device to the manufacturer for internal decontamination.

WARNING
Contamination

Do not use pressurized air while cleaning to avoid dust dispersion.

Radiological decontamination does not destroy the radiation, only removes it from the surface.

Contaminated parts should be treated as hazardous waste and handled in accordance with national regulations and instructions.

4.3 Replacement of the Dust Filter

Fig. 4-1 Dust filter

Tab. 4-1 Replacement of the dust filter

INFORMATION
Preliminary information

Required spare parts:

- E13667000 Dust filter

Preliminary tasks:

- Shut down the detector according to chapter 2.5: Shutdown

Final tasks:

- Dispose of all waste in accordance with local, state and national regulations

Warnings and precautions:

- Use of protective gloves is recommended when handling a used dust filter
- Decontaminate the device if it has been exposed to hazardous materials
- Do not place the confidence check tube, used filters or anything with strong odors to the foam filled storage area of the carrying case

REPLACEMENT – REMOVAL AND INSTALLATION	
Description	Picture
1. Open the air intake by rotating the switch 180º counter-clockwise 2. Press the air inlet switch and continue rotating until it loosens up	
3. Pull the dust filter out	
4. Push a new dust filter in	
5. Press the air inlet switch and rotate it clockwise until it tightens 6. Close the air intake by rotating the switch 180º clockwise	

4.4 Replacement of the Battery Unit

Fig. 4-2 Battery unit

Tab. 4-2 Replacement of the battery unit

INFORMATION
Preliminary information

Required spare parts:

- E13682000 Li-ion battery OR
- E13954000 Alkaline battery pack (AA)

Preliminary tasks:

- Shut down the detector according to chapter 2.5: Shutdown or attach an external power supply

Final tasks:

- Dispose of all waste in accordance with local, state and national regulations

Warnings and precautions:

- Decontaminate the device if it has been exposed to hazardous materials
- Use specified charger only with the li-ion battery
- Do not short circuit, crush, heat or dismantle the li-ion battery
- Do not charge, short circuit, crush or heat the battery pack (AA)
- The detector has an internal super capacitor for maintaining the date, time and other settings while the battery is unequipped. The super capacitor lasts a few hours before the settings are lost

REPLACEMENT – REMOVAL AND INSTALLATION

Description	Picture
1. Open the battery clip and open the latch	
2. Pull the battery unit out	
3. Replace the battery unit and push it inside with the lead-in and hatch track aligned	
4. Close the hatch and fasten the battery clip	

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4.5 Troubleshooting DRAFT

ChemProX has been designed with an integrated high-level self-test that alerts the user to any potential hardware or software failures. These failures can affect operational performance and therefore entering the normal operation mode will be prevented.

ChemProX has been designed to be rugged and reliable which results in only a small number of maintenance tasks that can be performed at the operator level. These tasks do not require special tools.

WARNING
Maintenance

DO NOT attempt to open or modify ChemProX. The detector contains radioactive material and can only be repaired by personnel trained and authorized to do so.

As long as the detector turns on, most of the possible errors are shown on-screen. The active errors cycle on the screen and each of them has more information available in the context menu. If instructions given in the context menu do not resolve the issue, it is recommended that the device is returned to the manufacturer for maintenance.

Tab. 4-3 Troubleshooting

TROUBLESHOOTING
The detector will not start

Possible causes include but are not limited to:

- Battery has no charge

Possible solutions include but are not limited to:

1. Connecting the detector to its mains power adapter
    I. If the detector starts with the mains power supply attached, charge the battery for 4 hours
    II. If the battery does not charge despite being connected, try with another li-ion battery
2. Restarting the detector
    I. Remove the li-ion battery
    II. Reinstall the battery while holding down the Right -button
    III. Release the Right -button and try to start the detector

If this does not resolve the issue, contact an authorized service or the manufacturer for further instructions.

TROUBLESHOOTING

The detector will not start in a cold environment

Possible causes include but are not limited to:

- Battery is too cold to provide enough energy for start-up

Possible solutions include but are not limited to:

1. Warming up the battery in hands or otherwise
2. Using warm alkaline battery pack (AA)

If this does not resolve the issue, contact an authorized service or the manufacturer for further instructions.

The li-ion battery will not charge

Possible causes include but are not limited to:

- Lithium ion batteries have a finite amount of recharge cycles (typically several hundred)

Possible solutions include but are not limited to:

1. Connecting the detector to its mains power adapter
    - Confirm that the status LED -light illuminates green
2. Allowing a heated mains power adapter to cool down
    - The adapter has an internal protection switch for overheating
3. Recharging the li-ion battery with an optional battery charger, if available
4. Replacing the li-ion battery

If this does not resolve the issue and the status message is displayed again, contact an authorized service or the manufacturer for further instructions.

FAULT specifications

Sensor failure:	Flow error:
- Let the device run for 30 minutes with the air intake open	- Ensure that the air inlet is properly opened - Check the dust filter for possible blocks
Pump warning:	Check air intake:
- Ensure that the air inlet is properly opened - Check the dust filter for possible blocks	- Ensure that the air inlet is properly opened - Check the dust filter for possible blocks

If this does not resolve the issue, refer to the expanded instructions inside the web user interface; contact an authorized service or the manufacturer for further instructions.

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5 Products Pre–Service Declaration Form

You can request the products pre-service declaration form from customer.services@environics.fi and fill it according to the instructions provided within. Alternatively, you can fill it at http://www.environics.fi/pre-service-declaration-form/.

Before sending products to Environics Oy for service, you must inform the company of the hazardous substances you have used or measured with our product. This information is fundamental for the safety of our service employees and will determine the procedures employed to service your equipment.

The pre-service declaration has to be completed and a copy must be sent via email, fax or post. You can declare multiple equipment with one form, if they have been in contact with the same substances.

After reception of the completed form, Environics Oy will contact you and give you an **RMA** number (Return Material Authorization) and instructions on delivering the device(s) to service. Attach one copy of the filled form including the **RMA** number with the device(s) to be sent to Environics Oy.

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5-2

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