



**Multi Spectrum  
ElectroMagnetic Analyzer  
EMA-3  
Operator Manual**

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## REVISION RECORD

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# 1 SAFETY INSTRUCTIONS - WARNINGS

READ THESE INSTRUCTIONS BEFORE WORKING WITH THE DEVICE.

## 1.1 General warnings

- Read this manual carefully before installing, operating or carrying out maintenance on the device. Keep the manual in a safe place for future reference, and in perfect condition.
- Follow the instructions contained in this manual for all operations relating to installation, use and maintenance of the device.
- CEIA cannot be held responsible for any damage resulting from procedures which are not expressly indicated in this manual, or from any lack of attention, either partial or total, of the procedures described therein.
- All personnel operating with or performing operations on the device must have an adequate preparation and shall know the procedures described in this manual.
- Observe current regulations regarding electrical and personal safety for both the operator and the installer when installing the device.
- Any modification to the configuration setup by CEIA is forbidden and voids all warranties and certifications.
- This manual must accompany the device described therein in the case of change of ownership, and until the device is broken up.

## 1.2 Safety Warnings

### Compliance with standards for human exposure to electromagnetic fields

CEIA products comply with regulatory requirements for human exposure to electromagnetic fields. CEIA submits its devices to testing by bodies qualified to check compliance with the emission limits of the main standards currently in force, which are listed in the section "Conformity to Regulations – Human Exposure to Electromagnetic Fields" (documentation available on request).

CEIA is not responsible for direct or indirect harm to people or things due to incorrect use of the equipment.

## 1.3 Correct and Forbidden Use of the Device – Operating Limits

### 1.3.1 Correct use

EMA-3 is a compact bench top machine (the dimensions of a small desktop printer) designed to quickly analyze bottles of commercial beverages in order to detect the possible presence of dangerous substances such as explosive mixtures and their precursors, combustible, flammable, explosive liquids, acids and oxidizers.

### 1.3.2 Forbidden use

Any use different from that described in this manual is forbidden.

### 1.3.3 Operating Limits

Degree of protection: IP 20 (IEC 60529)

Overall Dimensions:

470x317x330 mm ; 545x317x330mm, external probe included

Weight: 17,5kg

Power supply:

115/230V~ ±15%, 50 / 60 Hz ±10%, 15 W

Environmental conditions

Working temperature: 0 ... +40°C.

Storage temperature : -10 ... +60°C.

Working relative humidity: 0 ... 95%, without condensation.

Storage relative humidity: 0 ... 98%, without condensation.

## **1.4 Use warnings**

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- **The final user is responsible for selecting the appropriate programming settings for their application. After this selection has been made, and programming has been adjusted accordingly, it is also the final user's responsibility to verify calibration using appropriate test object(s). Additionally, this test should be carried out periodically to insure no changes have occurred in the equipment.**
- **The final user is responsible for determining and implementing the appropriate inspection procedures and for the training of personnel involved in carrying them out.**
- **The information contained in this manual is provided only as a technical reference for use and maintenance, and does not contain operational procedures.**
- Handle the device with care and without excessive force during use.
- In case of damage to the Power Supply Adapter, input and output cables included, the unit should be returned to a CEIA qualified Technical Assistance Centre or directly to CEIA Headquarters for proper repair or replacement. Do not open, tamper with or attempt to repair the power supply unit or any other part of the device.
- If the device is stored for a long period in temperatures outside the operating range, wait for the temperature of the device to come back within that range before switching on
- Whenever there is any suggestion that the level of protection has been reduced, the device should be taken out of service and secured against any possibility of unintentional use, and authorised service technicians should be called.  
The level of protection is considered to have been reduced when:
  - the device shows visible signs of deterioration;
  - the device does not operate correctly;
  - the device has been stored for a long period in sub-optimal conditions;
  - the device has suffered mechanical or electrical stress (shocks, bumps, etc.);
  - the device has suffered severe stress during transport;
  - the inside of the device has come into contact with liquids
- Always remove the plug by hand when disconnecting the power supply cable, never by pulling on the cable.
- The standard power-supply adapter is not waterproof: place it in a ventilated position where it is protected from water (rain, condensation, liquid detergents)! There is a risk of electric shocks for people and damage to the equipment.
- This device contains electrical and electronic components, and may therefore be susceptible to fire. Do not install in explosive atmosphere or avoid the inner components coming in contact with inflammable material. Do not use water or foam in the case of fire when the device is powered up.
- Do not use in an explosive atmosphere. Avoid contact with inflammable or explosive material!

## **1.5 Maintenance warnings**

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- Do not wash the device with water, liquid detergents or chemical substances. Use a slightly moist, non-abrasive cloth for cleaning.
- The device must be disconnected from all power sources before undergoing any maintenance or cleaning, and before being moved.
- Read the chapter "Maintenance" carefully before calling the service centre. Whatever the problem, only specialised service personnel authorised to work with CEIA equipment should be called.
- Any damaged parts of the device should be replaced by original components only.

- Any maintenance or repair involving the device being opened while powered should be avoided as far as possible: if this becomes inevitable, the operation must be carried out only by qualified personnel who are fully aware of the risks involved.

## 1.6 Disposal warnings

- Disposal of parts with environmental impact: follow the regulations in force in the country where the device is being used.

## 1.7 Regulatory Information

The device described in this manual conforms to the following standards (documentation available on request):

### Electrical Safety

- Canadian Standard - CSA C22.2 NO 61010-1 3rd Edition, 2017 Safety Requirements for Measurement, Control and Laboratory Use, Part 1: General Requirements.
- US Standard - UL 61010-1 Edition 3 Edition Date: May 11, 2012 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, Part 1: General Requirements.
- International Standard - IEC 61010-1 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, Part 1: General Requirements.
- OSHA Regulation 1910.147 De-energizing Equipment.

### Mechanical Tests

- IEC 60068-2-27 Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
- IEC 60068-2-29 Environmental testing. Part 2: Tests. Test Eb and guidance: Bump
- IEC 60068-2-64 Environmental testing - Part 2: Test methods - Test Fh: Vibration, broad-band random (digital control) and guidance
- IEC 60529 Degrees of protection provided by enclosures (IP Code).

### Electromagnetic Compatibility

- EN61000-6-1:2001 "Electromagnetic compatibility (EMC) - Part 6-1: Generic Standards - Immunity for residential, commercial and light-industrial environments"
- EN61000-6-3:2001 "Electromagnetic compatibility (EMC) - Part 6-3: Generic Standards - Emission standard for residential, commercial and light-industrial environments"
- EN55022:1998+A1:2000 "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement";
- EN61000-4-6:1996 +A1 "Electromagnetic compatibility - Basic immunity Standard - Conducted disturbances induced by radio-frequency fields - Immunity test"
- EN61000-4-4:1995 +A1+A2 "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques- Section 4: Electric fasts transient. Immunity test EMC Publication".
- ENV50204:1995 "Radiated electromagnetic field from digital radio telephones - Immunity test".
- EN 61000-4-3:1996 +A1+A2 "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques - Section 3: Radiated, radio-frequency, electromagnetic field immunity".
- EN61000-4-2:1995 +A1+A2 "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques- Section 2: Electrostatic discharge immunity test Basic EMC Publication"
- EN61000-4-5:1995 +A1 "Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test"
- EN61000-4-11:1995 +A1 "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests"
- EN61000-3-2:2000 "Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)"
- EN61000-3-3:1995 +A1 "Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current  $\leq 16$  A per phase and not subject to conditional connection"
- FCC 47 CFR, Part 15, Subpart B: 1998, Class B for Power Line Conducted Emissions.
- FCC 47 CFR, Part 15, Subpart B: 1998, Class B for Radiated Emissions.

### Human Exposure to Electromagnetic Fields

- ACGIH, 2001 Threshold Limit Value (TLV) for "Sub-Radiofrequency (30 kHz and below) Magnetic Fields"




- IEEE C95.1-1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
- ICNIRP Guidelines 1998 Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic, And Electromagnetic Fields (Up To 300 GHz)", International Commission on Non-Ionizing Radiation Protection, Health Phys. 1998 April, Vol.74, No.4, 494-522
- EC Directive 2004/40/EC of the European Parliament and of the Council on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields), 29. April 2004
- EN 50366 : Household and similar electrical appliances. Electromagnetic fields. Methods for evaluation and measurement
- European Council Recommendation 1999/519/EC on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz), 12. July 1999
- Safety Code 6, 1999: Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency range from 3 kHz to 300 GHz, Health Canada
- CFR PART 1910.97 Occupational Safety and Health Standards – Nonionizing radiation.

## 1.8 Harmlessness

The Analyzer uses very low power electromagnetic fields, completely harmless for the operator and with no effect on the liquid to inspect.

The equipment does not use any ionizing radiation emitter or radioactive sources.

### SYMBOLS

	The device is marked with this symbol whenever the operator or the maintenance personnel, in order to avoid possible damage, have to refer to the present manual. The same symbol appears in the booklet at points where warnings or particularly important instructions are given - instructions that are vital to a safe and correct use of the device.
	The device is marked with this symbol in those areas where a dangerous amount of voltage is present. <b>Only specialized maintenance personnel should make adjustments in these areas.</b>
	<b>This sign in the manual indicates tips for optimizing the device's performance.</b>

### CUSTOMER SATISFACTION REPORT

C.E.I.A. objective is the maximum quality of products and services offered to the customer. Any comments and suggestions useful for achieving this objective will be highly appreciated and can be sent to us by compiling and returning the form available at:

<http://www.ceia.net/security/satisfaction>

### WARRANTY

The warranty on all CEIA products, extended to the period agreed with the Sales Department, is applicable to goods supplied from our factory, and for every constituent part thereof, with the exception of the batteries. Any form of tampering with the device, and in particular opening its container, is strictly forbidden and will invalidate the warranty.

CEIA reserves the right to make changes, at any moment and without notice, to the models (including programming), their accessories and optionals, to the prices and conditions of sale.

## 2 DESCRIPTION

### 2.1 General Description

The **EMA-3** is an **Electromagnetic Analyzer** designed to check sealed bottles carried by people in transit through Security Checkpoints, in order to verify whether their characteristics meet the requirements needed to access sensitive areas.

The device can inspect all types of consumable liquids in most general use, such as:

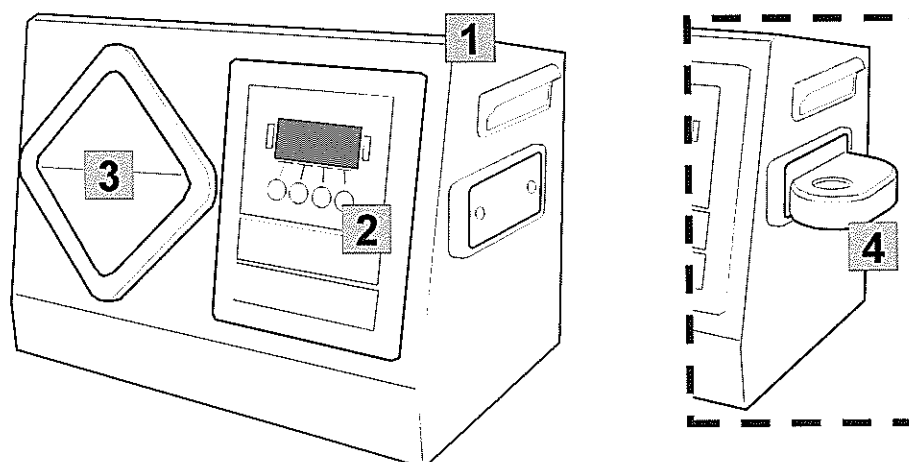
- water
- non-alcoholic drinks (fruit juices, lemonades, ...)
- slightly alcoholic drinks (beer, cider, ..)
- wine
- medium and high strength spirits.

contained in bottles having a volume capacity between 100 ml to 2000 ml.

The content of the bottles is analyzed without the need to open the container, as the detection of dangerous substances is effected using non-ionizing electromagnetic fields in the R.F band. The housing of the analyzer, which is extremely robust, durable and easy to clean, is made of Stainless Steel and anti-friction plastic.

The Analyzer consists of a **main body (1)**, a **control panel (2)** and an **inspection compartment (3)**.

In case of open containers such as cups and thermos, it is possible to carry out the analysis by means of an **optional external probe (4)**, using disposable small plastic sample cups.



#### 2.1.1 Main features

- EMA-3 is able to analyze bottles independently of their shape. The EMA-3's sensors are designed to easily inspect the liquid inside bottles when they are inserted into the inspection compartment.
- The size of EMA-3 inspection compartment and the sensors position allow a wide range of bottles with different capacity to be analyzed.
- EMA-3 is able to analyze bottles made of clear or coloured plastic or glass, as used for instance in wine or champagne bottles.
- EMA-3 is able to analyze the liquids without opening the bottle because the plastic or glass containers are permeable to the energy used by the sensors.
- EMA-3 is able to analyze labelled bottles without removing the labels.
- EMA-3 is able to provide Automatic Signalling of metal containers.



## DESCRIPTION

## 2.2 Operating Principle

When the operator places the bottle in the inspection cavity, its presence is automatically detected and the inspection process starts. After a few seconds, the unit provides a result message without requiring any data interpretation by the operator. Calibration is carried out automatically by the unit.

The analysis is performed simultaneously on multiple electromagnetic spectra.

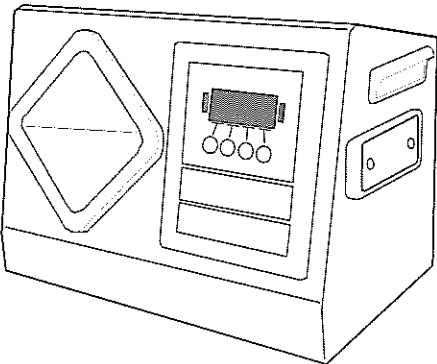

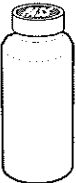
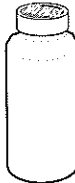
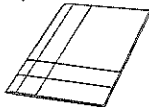
The electromagnetic fields, confined in the inspection cavity, are weak in intensity and non-ionizing, therefore completely safe for the liquids and for the operator.

The fields interact with the content of the bottle and the EMA-3 measures its RF Broadband Complex Electromagnetic Impedance.

If the results of the measurements correspond to the characteristics of innocuous liquids (e.g. soft drinks, water, wine, liquor), EMA-3 returns the "OK" message and a green light is displayed. **If the results of the measurements do not conform to the characteristics of innocuous liquids**, EMA-3 provides a "prohibited product" acoustic and optical signal.

## 2.3 Composition

The device consists of:

<p>Probe complete with control unit</p> 	<p>Power Cord</p> 
<p>"PASS" test sample (green "PASS" label on the cap)</p> 	<p>"NO PASS" test sample (red "NO PASS" label on the cap)</p> 
<p>Operator Manual</p> 	



## 2.4 Accessories

### 2.4.1 External Probe

EMA-3 is designed for the analysis of beverages in their original container.

In case of open containers such as cups and thermos flasks, it is possible to carry out **the analysis by means of an optional external probe, using small disposable plastic sample cups.**

The external probe is installed on the right side of the device.



### 2.4.2 Transport Case

Easy to manage, the case has wheels and a telescopic handle, as well as two side handles for easy carrying by two people. It is exceptionally resistant to impact, corrosion, water, dust, and atmospheric agents in general. The case body is made of thick plastic resin. Sealing neoprene O-ring

Pressure valve quickly adjusts internal pressure in case of sudden changes in height or temperature.

Ergonomic handle; strong pressure locks can be padlocked. Can be stacked.

Dimension: 580mm x 440mm x 330mm. Weight: 11.7kg



## 2.5 Technical Features

### Probe

Designed and built using advanced technological criteria, the probe is extremely robust and stable, yet elegant and fully protected against the effects of wear-and-tear. The device is completely housed in AISI 304 Stainless steel.

**Degree of protection:** IP 20 (IEC 60529)

### Overall Dimensions:

470x317x330 mm

545x317x330mm, external probe included

**Weight:** 17,5kg

### Inputs/Outputs:

- **Power supply:**  
115/230V~ ±15%, 50/60 Hz ±10%, 15W
- RS-232C Serial interface.
- Ethernet interface (optional).

### Environmental conditions

Working temperature:

0 ... +40°C.

Storage temperature :

-10 ... +60°C.

Working relative humidity:

0 ... 95%, without condensation.

Storage relative humidity:

0 ... 98%, without condensation

Positioning:

maximum inclination of the support  
surface: ±5°

### Signalling

- Detection of an anomalous object
- Internal self-diagnosis

Type of signalling

- Visual:
  - message on the display
  - optical indicator:
    - GREEN: allowed product
    - RED: not allowed product (alarm of high intensity)
    - YELLOW:
      - not allowed product (alarm of medium intensity);
      - self-diagnosis
- Acoustical: intermittent.

## SPECIAL FEATURES

### Technology

- High integrated SMT
- 32-bit flash-based microcontroller
- 32-bit DSP
- Low power and high reliability
- Very low power inspection field, confined in the inspection compartment, completely safe for both the operator and the liquid.
- No ionizing radiation.
- No radioactive sources.

### Programmability

- Programmability of all the parameters protected by passwords.

### Analysis

- Very reduced analysis time for a rapid flow-rate (typical value : 5 seconds).
- Very reduced start-up time (15 seconds max.)
- Analysis of liquids contained in bottles having a volume capacity of 100ml to 2000ml.
- Substances to inspect conforming to the EU requirements for checking liquids in airports.

### Remote control

- Capacity for total remote control through an RS-232C serial line.

### Installation and maintenance

- Automatic adjustment to environmental parameters and absence of initial or periodic calibrations.
- Operational tests can be carried out using the test samples provided
- Firmware upgradeable via RS232 or Ethernet interface.

### Certification and conformity

- Conforms to the international standards currently applicable for electrical safety and EMC, and to the applicable EC Regulations.
- NATO STOCK NUMBER: 6665-151805236

## 3 USE

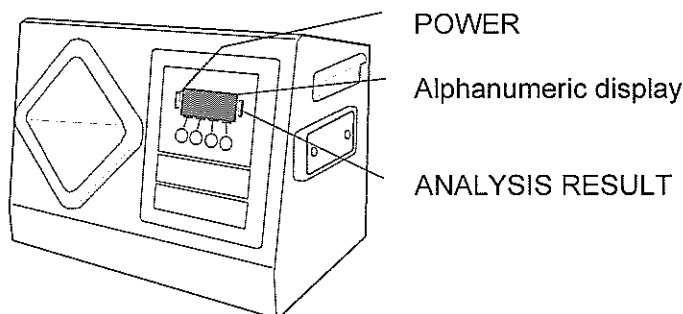
### 3.1 Indicators

#### 3.1.1 Optical indicators

The optical indicators are located on the control panel:

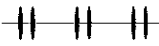




- POWER:** this indicator is on when the device is switched on. Colour: white.
- DISPLAY:** this alphanumeric display provides the operator with guiding messages during use. NOTE: when the unit is not used for several second, the display goes automatically in low power mode (indicated by a reduced contrast).
- ANALYSIS RESULT:** this indicator is normally off. It lights on at the end of an analysis or when the built-in self-diagnosis system detects a fault:

Colour	Meaning
GREEN	Analysis completed with "allowed product" result
RED	Analysis completed with "Not allowed product" result (alarm of high intensity)
YELLOW	<ul style="list-style-type: none"> <li>Self-diagnosis</li> <li>Analysis completed with "Not allowed product" result (alarm of medium intensity)</li> </ul>



#### 3.1.2 Acoustic indicators

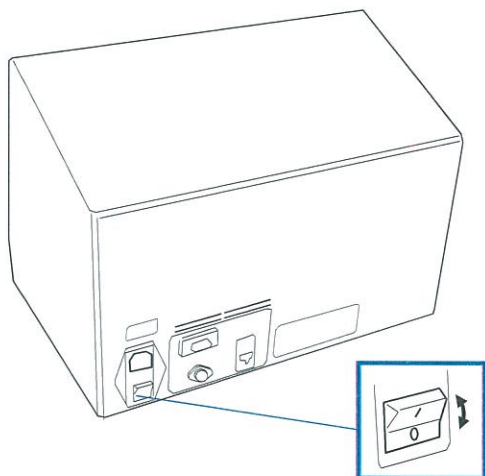
A sounder is located inside the device. It is activated at the end of an analysis, when the built-in self-diagnosis system detects a fault or when the attention/action of the operator is required.

Sound	Meaning
	Repeated double beep.
	Double beep.
	Triple prolonged beep.
	Uninterrupted sequence of "beeps".
	Low frequency intermittent tone.

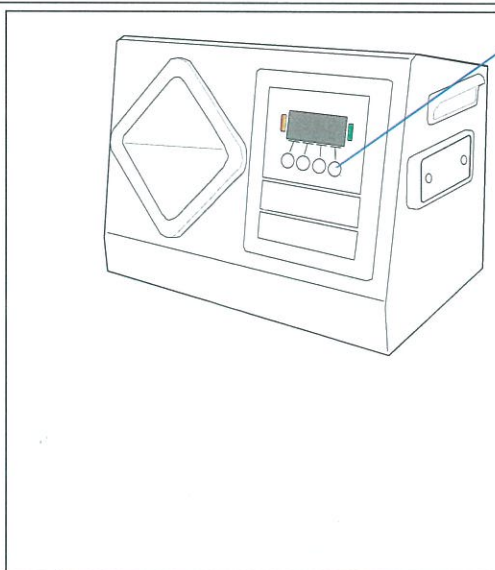
## 3.2 Controls

### 3.2.1 Main switch

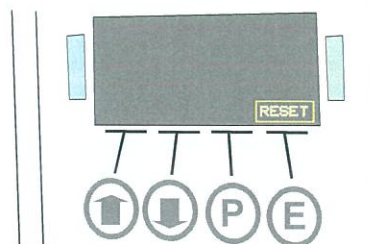
The main switch is located on the rear of the device.



### 3.2.2 Keypad



The normal function of the keys can change, if necessary, assuming the meaning indicated on the display:



In the example above the **E** key (normal meaning: exit from programming), assumes the meaning “acknowledge the alarm result of an analysis” (“RESET”).

### 3.3 Switching power on

#### Check List

1	Clearance	Verify that no objects are in direct contact with the unit housing Verify that no objects are under the unit. Verify that no objects are on top of the unit.
2	Cavity emptiness	Verify that both the analysis compartments are empty.
3	Cavity cleanliness	Verify that both the analysis compartments are clean.
4	Operational test	At the end of the start-up / log-on phase, verify the unit operation by means of the PASS/NOPASS test samples.

**1**

> 5cm  
> 2"

**1**

NO!

**1**

NO!

**2**

**3**

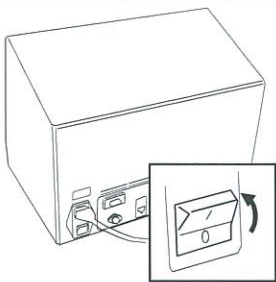
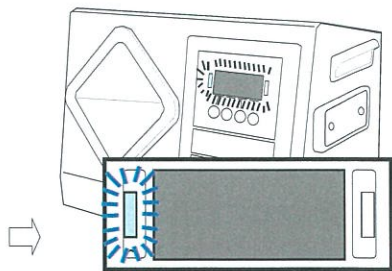

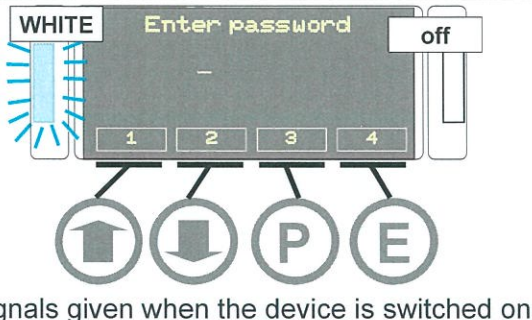
PASS  
sample  
(green)

NO PASS  
sample  
(red)

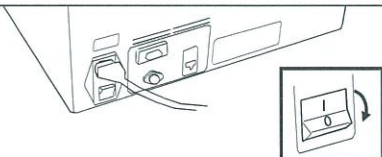
**4**



### 3.3.1 Start-up

Switch on the power switch at the rear of the analyzer.		
The power indicator LED and the display screen come on.  A repeated double beep is emitted.		
At the end of the start-up phase (lasting max. 15 seconds), the ALARM indicator turns off:		

### 3.4 Switching power off

	Switch off the power switch at the rear of the analyzer.
-------------------------------------------------------------------------------------	----------------------------------------------------------

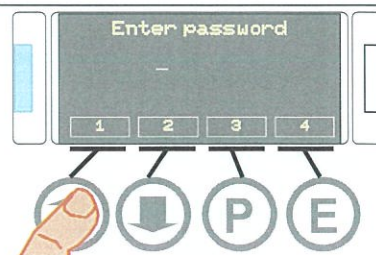
### 3.5 Operator Log-On and Log-Off

#### 3.5.1 Operator Log-On

After the start-up phase the device requests a password to be entered.  
The password is entered by pressing the keys, which during this phase, assume the meaning of the characters "1", "2", "3" and "4".

Example: password "1234".

Press the first key (during this phase it assumes the meaning of the "1" character).



Press the second key (during this phase it assumes the meaning of the “2” character).	
Press the third key (during this phase it assumes the meaning of the “3” character).	
Press the fourth key (during this phase it assumes the meaning of the “4” character).	
The password “1234” has been completed: the device enters the operating mode and requests insertion of an object to be analysed.	

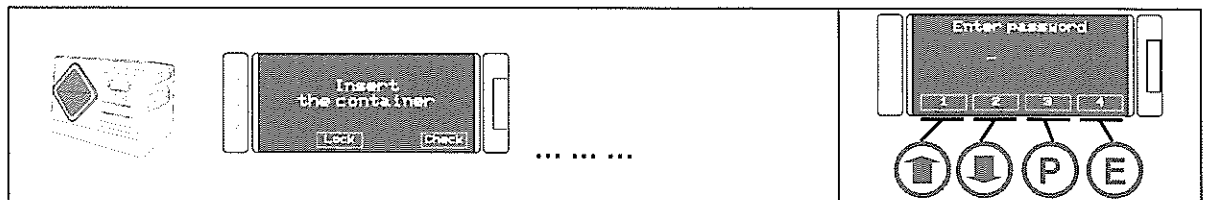
## NOTES

If no password is entered, the device keeps waiting indefinitely.	
When needed, a start-up phase is automatically repeated after entering a password (for instance, after a prolonged inactivity time).	
<p>In case of a wrong password a message is given asking the operator to re-enter it correctly:</p> <ul style="list-style-type: none"> <li>Wait until the “Wrong password” disappears.</li> <li>Re-enter the password correctly.</li> </ul>	




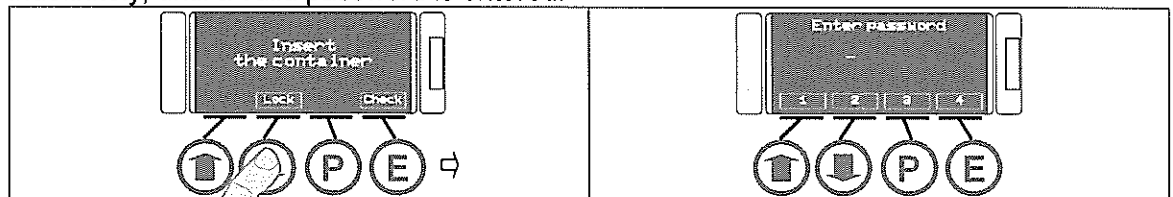
### 3.5.2 Automatic log-off in case of prolonged inactivity

If no analyses are performed within a pre-selected period, the device disables itself automatically, requesting the password again before analysis can be performed again. The unit remains in this status indefinitely, until a valid password is entered. The function can be disabled by programming.



### 3.5.3 Manual lock of the device

The device can be locked manually by pressing the  (decrease/LOCK) key. After that, the device disables itself, requesting the password again. The unit remains in this status indefinitely, until a valid password is entered.



### 3.5.4 Exiting the locked mode and re-entering the operating mode

If the device has been set to the locked status, either by manual operation or if the inactivity timeout occurs, it can be restarted by performing the same procedure used at start-up. Refer to the "Operator Log-On" section above.

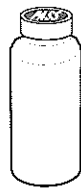
## 3.6 Use of the device

### 3.6.1 Operational check

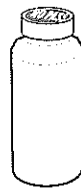
In order to verify the correct functionality of the device a quick operational check can be carried out by the operator by means of the PASS and NO PASS test samples.

This test should be carried out under the following circumstances:

- at power-up times (wait for completion of the start-up phase!).
- when a new shift comes on duty.
- any time there is the need to verify that the unit is functioning properly.



PASS test sample



NO PASS test sample



The NO PASS test sample contains a substance completely harmless to the operator!

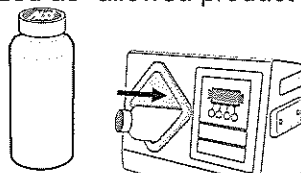
#### 3.6.1.1 Verification using the PASS and NO PASS test samples



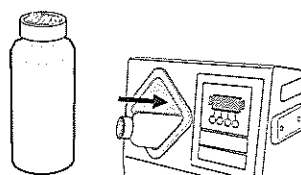
Before carrying out the test, always verify that the analysis compartment and the test samples are clean and dry.

The test consists of the simple analysis of each test sample. The test is passed successfully when:

- the PASS sample is recognized as "allowed product" (**NO ALARM status**) and



- the NO PASS sample is recognized as "not allowed product" (**ALARM status**).

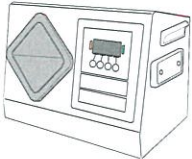

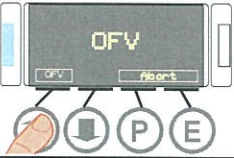
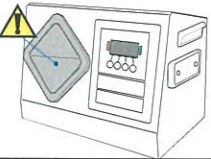

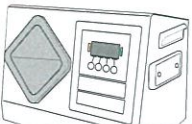

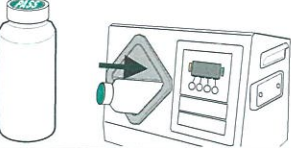

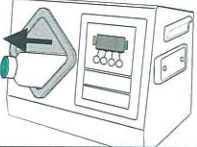

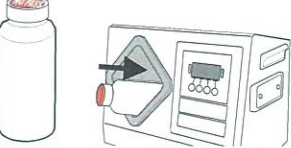

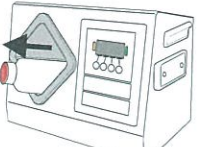

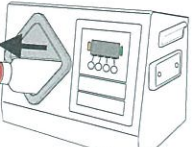




### 3.6.1.2 Verification through the OFV Test procedure



Before carrying out the test, always verify that the analysis compartment and the test samples are clean and dry.

This procedure, totally guided, uses the same test samples.

Phase	Visual and audio signals	Status/Action
	 	<p>The device is ready to operate.</p> <p>Press the “UP” key (“OFV”) and press it again to confirm.</p> <p>NOTE: press the E key (“Abort”) to quit.</p>
		Check that the inspection compartment is empty.
		Wait.
		Insert the <b>PASS</b> test sample and confirm.
		Remove the test sample and confirm.
		Insert the <b>NO PASS</b> test sample and confirm.
		Remove the test sample and confirm: the result will be signalled.
		OFV test passed: green lamp ON.
		<p>OFV test failed: red lamp ON. Repeat the procedure correctly.</p> <p>Verify that the test samples and the cavity are clean and dry; if the warning appears again, contact the service department.</p>

### 3.6.2 Intended Use of the device

The **EMA-3** is an **Electromagnetic Analyzer** designed to check sealed bottles carried by people in transit through Security Checkpoints, in order to verify whether their characteristics meet the requirements needed to access sensitive areas.

The device can inspect all types of consumable liquids in most general use, such as:

- water
- non-alcoholic drinks (fruit juices, lemonades, ...)
- slightly alcoholic drinks (beer, cider, ..)
- wine
- medium and high strength spirits.

contained in bottles having a volume capacity between 100 ml to 2000 ml.

### 3.6.3 Inspection procedure

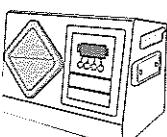
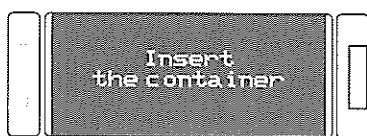
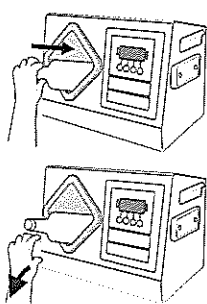


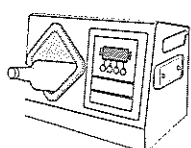

The analysis is not invasive: the container only has to be placed in an inspection compartment in the device. Once the analysis has been completed, the device signals whether or not the contents of the bottle are within acceptable limits.

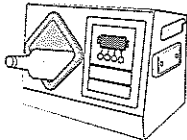
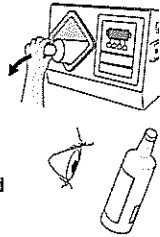
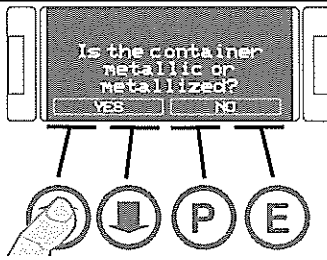
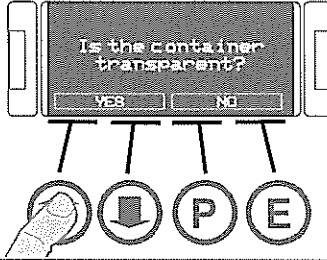
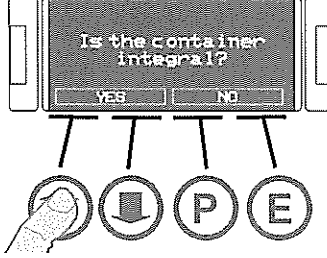
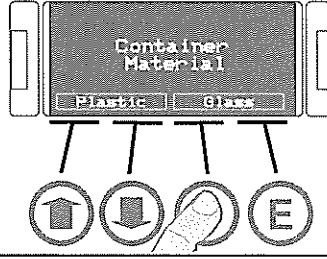

The EMA-3 Analyzer performs the automatic inspection of liquids in commercial containers, in order to detect the possible presence of dangerous substances.

When the operator places the bottle in the inspection cavity, its presence is automatically detected and the inspection process starts. After a few seconds, the unit completes the analysis and provides an "OK" or a "Not allowed product" message.




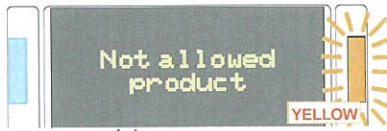





Sometimes the operator might be asked to input additional container data needed to complete the analysis. The result will be signalled after the data input.

Below a description of the analysis phases with actions carried out by the operator and visual and acoustical signals provided by the device.

Phase	Visual and acoustical signals	Status/Action
<b>1 - Device Ready to operate</b> 		The device is ready to operate.
<b>2 - Bottle insertion</b> 	 	Insert the object slowly inside the cavity until it touches the bottom and remove the hand.
<b>3 - Analysis</b> 		<p>The analysis is activated automatically.</p> <p>During the analysis the display shows the analysis progress.</p> <p>NOTE: if the analysis does not start and the unit returns to step 1, requiring a new container to be inserted, the object is not analyzable (for instance, an unfilled and/or very irregularly-shaped container).</p>

Phase	Visual and acoustical signals	Status/Action
<b>3.1 – Data request</b>  		<p>The device can ask for additional information, if necessary to complete the analysis of some kind of containers.</p> <p><b>NOTE</b> During this phase the container can be removed from the inspection compartment to search for information about it. The analysis result will be provided with no need to reinsert the container in the compartment.</p> 
<b>3.1.1</b> <u>Metal container</u>		<p>Select YES for:</p> <ul style="list-style-type: none"> <li>metal containers</li> <li>metal foil containers, such as Tetrapack®</li> <li>metallized containers</li> </ul> <p>Select NO for:</p> <ul style="list-style-type: none"> <li>Non-metal containers</li> <li>Only partially metal containers, such as yogurt cups</li> </ul>
<b>3.1.2</b> <u>Transparent container</u>		<p>Select YES for:</p> <ul style="list-style-type: none"> <li>transparent containers</li> </ul> <p>Select NO for:</p> <ul style="list-style-type: none"> <li>opaque containers</li> </ul>
<b>3.1.3</b> <u>Integral container</u>		<p>Select YES for:</p> <ul style="list-style-type: none"> <li>Container that hasn't been opened or tampered</li> </ul> <p>Select NO for:</p> <ul style="list-style-type: none"> <li>Container that has been opened or tampered</li> </ul>
<b>3.1.4</b> <u>Plastic or glass container</u>		<p>Select the type of material.</p>
<b>3.1.5</b> <u>Container capacity or weight, depending on the measure indicated on its label.</u>		<p><u>Selection of a data:</u></p> <ul style="list-style-type: none"> <li>Change the value using the arrow key</li> <li>Confirm the value by pressing ENTER.</li> </ul>



Phase	Visual and acoustical signals	Status/Action
<b>4 - Analysis completed:</b> 	  Double beep	<b>NO ALARM</b> If the container content is identified as <b>conforming</b> , the “OK” message and a GREEN light are displayed. A short “double beep” is emitted by the internal sounder.
	  Triple prolonged beep	<b>ALARM</b> <b>Alarm of medium intensity.</b> A YELLOW light and an ALARM message are displayed. A burst of prolonged “beeps” is emitted by the internal sounder.
	  Repeated beeps	<b>ALARM</b> <b>Alarm of high intensity.</b> A RED light and an ALARM message are displayed. An uninterrupted sequence of “beeps” is emitted by the internal sounder.
<b>5 – Removing the container</b> 		Remove the container, if it is still in the inspection compartment: the unit turns to the ready condition, waiting for a new object.

NOTE 1: the ALARM message on the display can be adjusted by programming.

NOTE 2: the YELLOW ALARM can be disabled by programming: in this case a RED ALARM is signalled.

### 3.6.3.1 Manual Reset

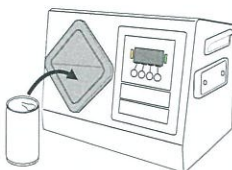
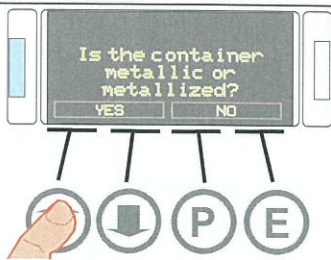
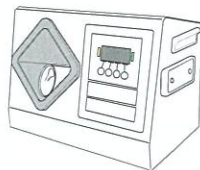
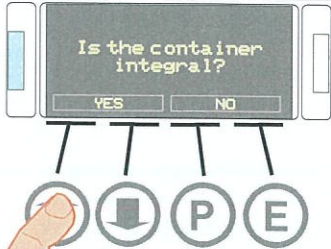
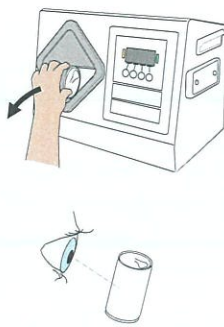

The equipment can be pre-programmed for a Manual Reset operation: in this case, after an ALARM result, the operator must press “E” key (RESET) to acknowledge the alarm.



### 3.6.3.2 Verification of metal containers

The device can be programmed to inspect metal containers, such as, for instance, commercial metal cans. In this case the device checks the conformity / correspondence of the inspected container, with respect to the original product. In case of conformity an OK message is provided. Otherwise, an "ALARM" message is given: a "YELLOW" status is displayed, if this kind of signal has been enabled by programming; otherwise, a "RED" status is indicated.

The analysis is assisted by the operator.


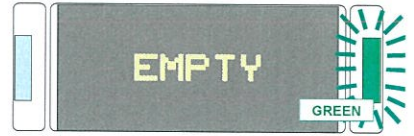
<p>The device can ask for additional information, if necessary to complete the analysis of some kind of containers.</p> <ul style="list-style-type: none"> <li>• Insert the container.</li> <li>• The operator can be asked to verify the container class.</li> </ul>		
<ul style="list-style-type: none"> <li>• Then the operator is asked to verify the container integrity.</li> </ul>		
<p>Then the operator must select the volume/weight of the contents:</p> <ul style="list-style-type: none"> <li>▪ Change the value using the arrow key</li> <li>▪ Confirm the value by pressing ENTER.</li> </ul> <p><b>NOTE</b> During this phase the container can be removed from the inspection compartment to search for information about it. The analysis result will be provided with no need to reinsert the container in the compartment.</p>		

Event	Status Indication	
	ANALYSIS RESULT lamp	Display Message
<ul style="list-style-type: none"> <li>• The equipment gives the result of allowed product (NO ALARM condition) or not allowed product (ALARM condition). In NO ALARM condition the operator is asked to verify that the container hasn't been opened or tampered, before considering it innocuous.</li> </ul>	GREEN	OK
	YELLOW (if enabled)	<p><i>One of the following messages:</i></p> <ul style="list-style-type: none"> <li>• Secondary Screening Required</li> <li>• Check the content</li> <li>• ATTENTION: Check the content</li> <li>• ALARM: Check the content</li> <li>• Not Allowed Product</li> <li>• ATTENTION: Not Allowed Product</li> <li>• ALARM: Not Allowed Product</li> <li>• Check the content. Metal Container</li> <li>• ATTENTION: Check the content. Metal Container</li> <li>• ALARM: Check the content. Metal Container</li> </ul>
	RED	




## 3.7 Other messages provided during use


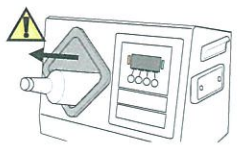
### 3.7.1 Empty inspection compartment

Sounder	Display	Event	Action
Double beep 		This message could be issued in the following cases: <ul style="list-style-type: none"> <li>When inspecting a plastic empty bottle in the inspection compartment.</li> <li>When inspecting an empty glass in the external probe.</li> <li>If a bottle has been inserted into the inspection compartment and immediately removed.</li> </ul>	Insert a non-empty container to be analyzed.

### 3.7.2 Releasing the container

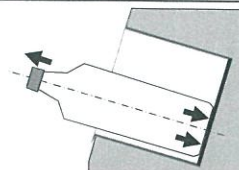


Sounder	Display	Event	Action
--		The operator is maintaining his hand on the bottle inserted in the analysis compartment.	Release the container and move the hand away from the analysis compartment.

### 3.7.3 Time out

Sounder	Event	Action
Low frequency Intermittent tone 	Object still in the inspection compartment 20 seconds after completion of an inspection.	Remove the container. 

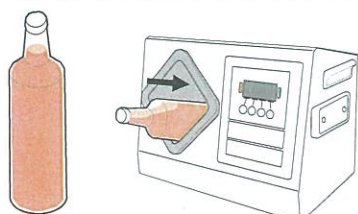
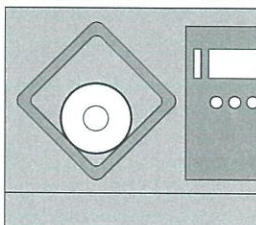
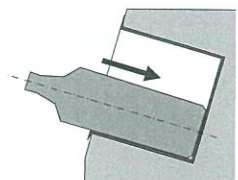
### 3.8 Positioning the container

In the following paragraphs, please find some general rules to be followed for the positioning of the containers in the inspection compartment, in order to achieve the best analysis performances of the device.

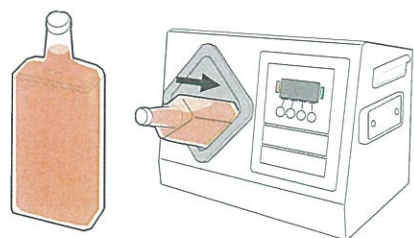
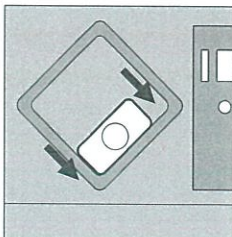
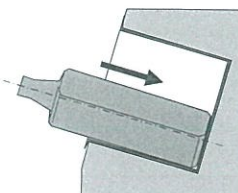
Main rules for positioning the container correctly	
<p>The maximum amount of the substance to be analyzed must be inside the compartment:</p> <ul style="list-style-type: none"> <li>insert the object inside the cavity until it touches the bottom</li> <li>the <b>bottle cap</b> must point always <b>outwards the cavity</b></li> </ul>	
<p>The object should be positioned so as to be <b>in as much contact as possible</b> with the lower faces of the compartment.</p>	
<p>Place the object taking care of the label orientation, if any.</p>	

Note: inserting a container according to different criteria does not decrease the security level but could generate a false positive “prohibited product” result.

#### 3.8.1 Cylindrical bottle

TYPE OF OBJECT	CORRECT INSERTION
	 <p>Front view</p>  <p>Lateral view (section)</p>

#### 3.8.2 Rectangular bottle

TYPE OF OBJECT	CORRECT INSERTION
	 <p>Front view</p>  <p>Lateral view (section)</p>



### 3.8.3 Bottles with labels

TYPE OF OBJECT	PREFERRED ORIENTATION
	 Front view
	 Front view

### 3.8.4 Irregularly-shaped containers

	IRREGULAR SHAPE	CORRECT INSERTION
BOTTLES	 irregular shape	 Lateral view (section)
	 "D" shape	 Front view
	 flat round shape	 Front view
TUBES		 <p>Remove any accessory part if its shape impedes the main body to touch the lower faces of the analysis compartment. Anyway take care that the content cannot leak out.</p> Front view  Lateral view (section)



### 3.9 Use main guidelines – Concept of Operations

The **EMA-3** is an **Electromagnetic Analyzer** designed to check sealed bottles carried by people in transit through Security Checkpoints, in order to verify whether their characteristics meet the requirements needed to access sensitive areas.

The device can inspect all types of consumable liquids in most general use, such as:

- water
- non-alcoholic drinks (fruit juices, lemonades, ...)
- slightly alcoholic drinks (beer, cider, ..)
- wine
- medium and high strength spirits.

contained in bottles having a volume capacity between 100 ml to 2000 ml.

The analysis is not invasive: the container only has to be placed in an inspection compartment in the device. Once the analysis has been completed, the device signals whether or not the contents of the bottle are within acceptable limits.

- In case of an **allowed product**, the equipment signals a **NO ALARM** condition (GREEN status).
- In case of a **not allowed product**, the equipment signals an **ALARM** condition.
  - The unit can be pre-programmed to signal this condition as a RED status or to distinguish two intensity levels of alarm (medium: YELLOW status; high: RED status), on the basis of the amplitude of the received signal. The alarm message shown by the display can be pre-programmed according to the security specifications in use.
  - The alarm condition, either a one-level-alarm (RED) or a two-level-alarm (YELLOW or RED), must always be managed according to the security specifications in use.

**TABLE A1 - Operation with one-level-alarms**

Status indication		Condition	Result of the Analysis
ANALYSIS RESULT lamp	Display Message		
<b>GREEN</b>	OK	<b>NO ALARM</b>	Allowed product
<b>RED</b>	<i>One of the following messages:</i> <ul style="list-style-type: none"> <li>• Secondary Screening Required</li> <li>• Check the content</li> <li>• ATTENTION: Check the content</li> <li>• ALARM: Check the content</li> <li>• Not allowed product</li> <li>• ATTENTION: Not allowed product</li> <li>• ALARM: Not allowed product</li> </ul>	<b>ALARM</b>	Not allowed product

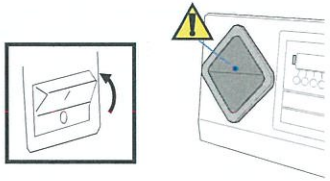
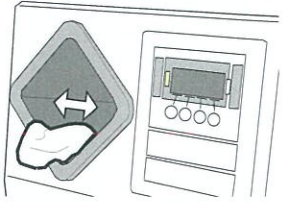

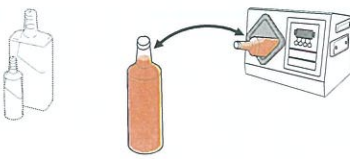
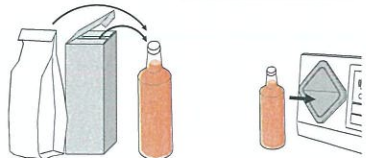


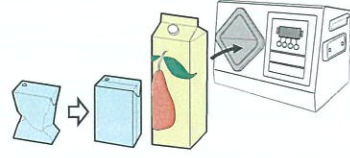

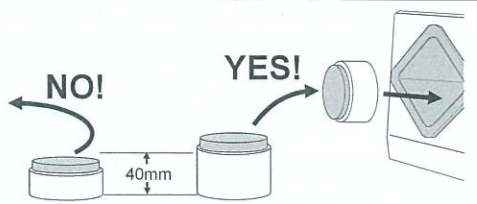
**TABLE A2 - Operation with two-level-alarms**

Status indication		Condition	Result of the Analysis
ANALYSIS RESULT lamp	Display Message		
<b>GREEN</b>	OK	<b>NO ALARM</b>	Allowed product
<b>YELLOW</b>	<i>One of the following messages:</i> <ul style="list-style-type: none"> <li>• Secondary Screening Required</li> <li>• Check the content</li> <li>• ATTENTION: Check the content</li> <li>• ALARM: Check the content</li> <li>• Not allowed product</li> <li>• ATTENTION: Not allowed product</li> <li>• ALARM: Not allowed product</li> <li>• Non Analyzable</li> </ul>	<b>MEDIUM INTENSITY ALARM</b>	Not allowed product
<b>RED</b>	<i>One of the following messages:</i> <ul style="list-style-type: none"> <li>• Secondary Screening Required</li> <li>• Check the content</li> <li>• ATTENTION: Check the content</li> <li>• ALARM: Check the content</li> <li>• Not allowed product</li> <li>• ATTENTION: Not allowed product</li> <li>• ALARM: Not allowed product</li> </ul>	<b>HIGH INTENSITY ALARM</b>	Not allowed product



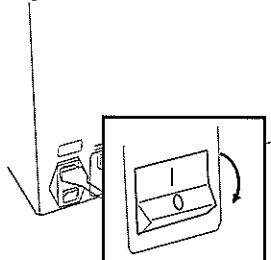
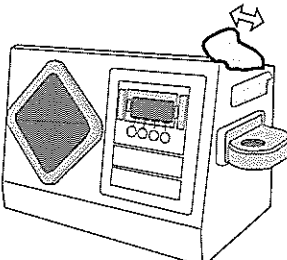
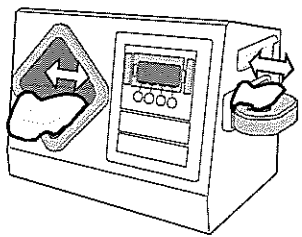
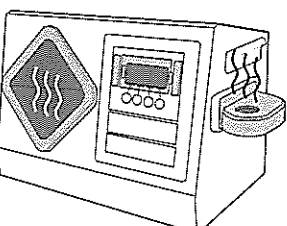
The following table gives some guidelines about the correct use of the device.

NOTE: analyzing an object non conforming the following notes does not decrease the security level: it might only cause an ALARM result.

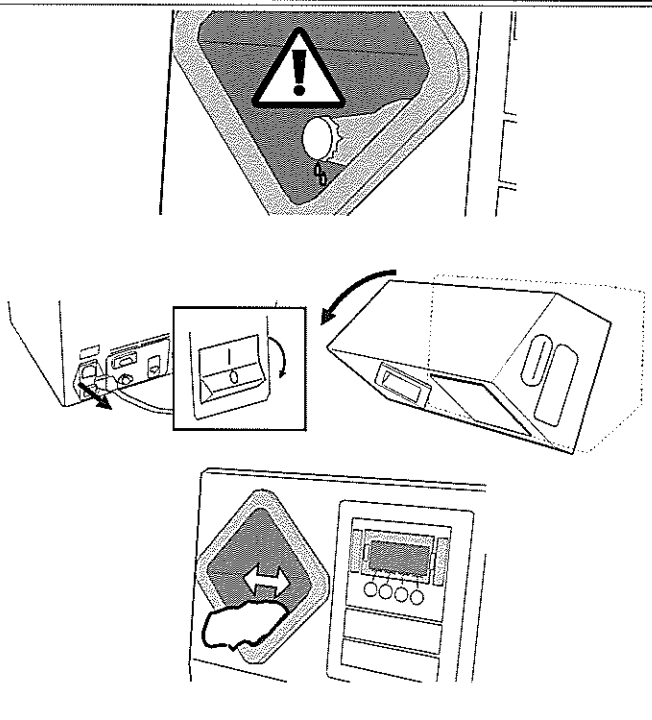
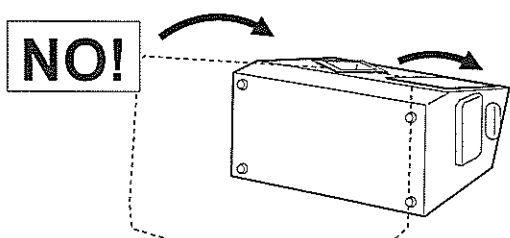
CONOPS		
 <p>During the start-up phase, ensure that the inspection compartment is empty</p>	 <p>Verify that the inspection compartment is clean. If necessary, use a slightly moist (with water), non-abrasive cloth.</p>	 <p>Remove any kind of dirt (dust, moisture, oil,...) before the analysis!</p>
 <p>Analyze always one object at a time.</p>	 <p>Remove any bottle accessory.</p>	 <p>Do not analyze containers with non removable accessories, which impede the liquid to be close to the walls and the base of the cavity.</p>
 <p>Verify that the container is sealed. Check that the cap is well sealed, to prevent the contamination of the inspection compartment from liquids!</p>	 <p>Carton containers can be analyzed after having restored the original shape, if necessary.</p>	 <p>Do not analyze non bottle-shaped containers</p>
<p>Do not analyze tub shaped container with height less than 40mm.</p> 		

## 3.10 Care

### 3.10.1 General Cleaning

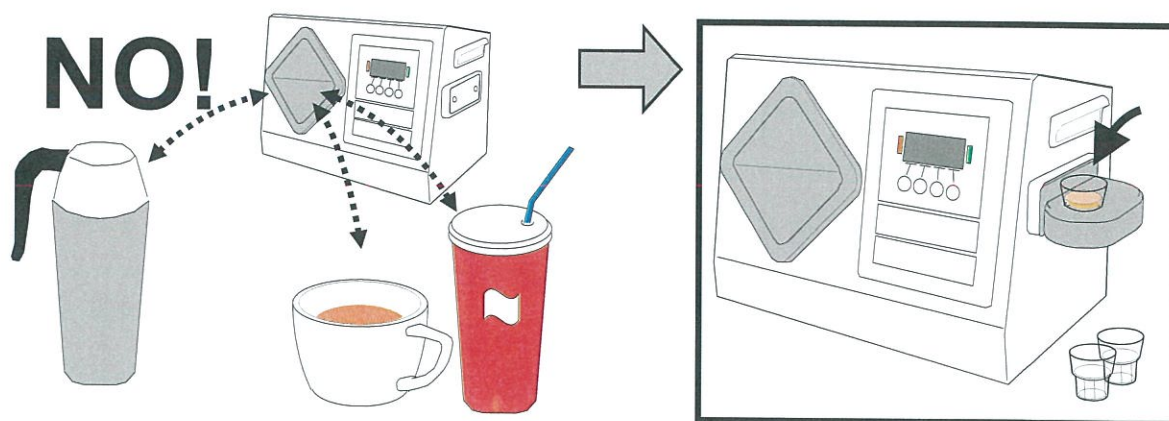
		<p>Switch off the unit. Clean the equipment , using a slightly moist (with water), non-abrasive cloth. Clean the inspection compartments, using a slightly moist (with water), non-abrasive cloth. Let the inspection compartment dry before use.</p> <p><b><i>Do not wash the device with water, liquid detergents or chemical substances.</i></b></p>
		

### 3.10.2 Cleaning the main analysis compartment in case some liquid drops into it

	<p>Should some liquid substance drop into the main inspection compartment, remove it as soon as possible and clean the cavity carefully:</p> <ul style="list-style-type: none"> <li>▪ switch off the unit and disconnect all cables from the rear panel</li> <li>▪ tilt the unit, to let the liquid drop down from the cavity aperture</li> <li>▪ clean the compartment carefully, using a moist (with water), non-abrasive cloth, until the leaked liquid is completely removed.</li> <li>▪ wipe the inspection compartment, using a dry, non-abrasive cloth</li> </ul>
	<p><b>REMARK!</b> Whenever some liquid substance is inside the inspection compartment, <b>do not tilt the unit backwards!</b></p>

### 3.11 Use of the external probe (accessory)

EMA-3 is designed for the analysis of substances in commercial containers. In case of loose substances, it is possible to carry out the analysis by means of an accessory external probe, using special disposable small plastic glasses. The probe can also be used to analyze substances carried in metal containers.



- Fill the glass at least half full of the substance to analyze.

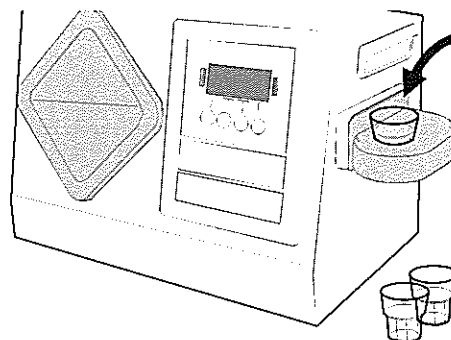



During the analysis the probe hole and the external surface of the glass must be **dry and clean**! Take care not to make dirty the external surface of the glass when pouring the liquid: in this case discard the glass and repeat the operation with a new one.

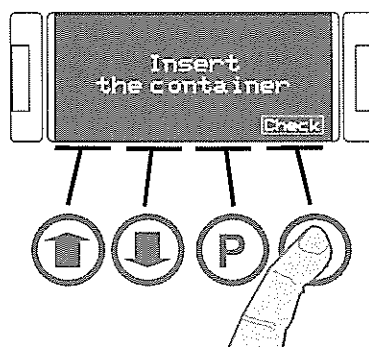


- Place the glass into the probe hole.

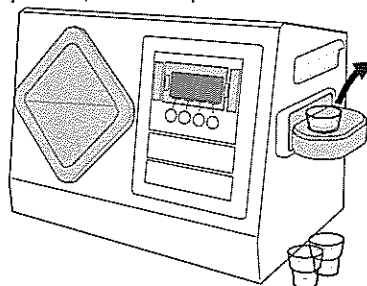




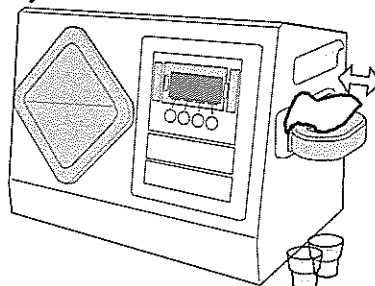
- The analysis starts manually, by pressing the  key.



- At the end of the analysis the device provides the result.  
NOTE: the display can supply additional information on the detected substance to be taken in account according to the applicable security specifications
- Remove the glass from the probe, and dispose it.



- Clean the probe, if necessary.

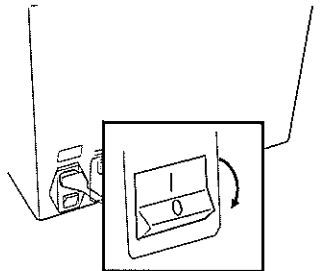
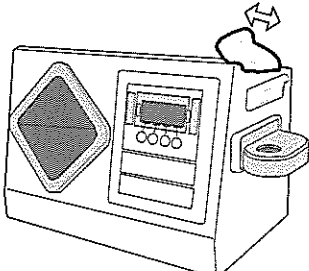
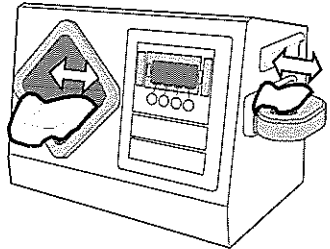
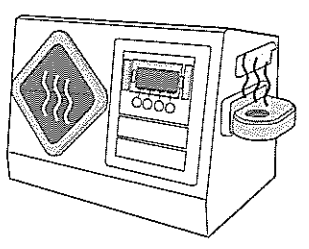


## 4 MAINTENANCE



Before working with the device read the warnings and instructions in this section and in the paragraph "SAFETY INSTRUCTIONS - WARNINGS" carefully. Please note that CEIA is not responsible for any damage that may result from installations that do not follow these guidelines.

### 4.1 Periodic Maintenance

		<b>General Cleaning</b>  Switch off the unit. Clean the equipment , using a slightly moist (with water), non-abrasive cloth. Clean the inspection compartments, using a slightly moist (with water), non-abrasive cloth. Let the inspection compartment dry before use. Do not wash the device with water, liquid detergents or chemical substances.
		

#### Verification using the PASS and NO PASS test samples

In order to verify the correct functionality of the device a quick operational check can be carried out by the operator by means of the PASS and NO PASS test samples.

This test should be carried out under the following circumstances:

- at power-up times (wait for completion of the start-up phase!).
- when a new shift comes on duty.
- any time there is the need to verify that the unit is functioning properly.



PASS test sample





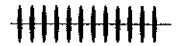
NO PASS test sample

For detailed information about the verification procedure, refer to section "Use - Verification using the PASS and NO PASS test samples".

#### Verification of the Calibration

To verify the calibration of the device, a CEIA certified technician qualified for the Verification of the Calibration is required. This test should be performed every 6 months.

## 4.2 Troubleshooting

Fault	Fault indication	Possible cause	Recommended action
Display off	Display off	Fault in the supply section or in the display control card	<ul style="list-style-type: none"> <li>Check all the power connections (mains cable, fuse (1A 250V time delay))</li> <li>If the power connections are correct, discontinue equipment use and contact CEIA Service for replacement of the defective part.</li> </ul>
Power comes on and goes off in succession	-	Power supply voltage unstable or too low.	<ul style="list-style-type: none"> <li>Contact CEIA Service for checking the power supply voltage with instruments.</li> </ul>
The device does not complete the start-up phase	Display: sequence of the start-up messages repeated indefinitely  Display: <b>SCD FAULT SC FAULT</b>  ANALYSIS RESULT Lamp: yellow  Sounder:  Low frequency Intermittent tone:	<ul style="list-style-type: none"> <li>Dirty analysis compartment</li> <li>Analysis compartment not empty</li> <li>Object in direct contact with the housing</li> <li>Object under the housing</li> <li>Fault in an internal section</li> </ul>	<b>Procedure:</b> <ul style="list-style-type: none"> <li>Switch off the unit.</li> <li>Verify that the analysis compartment is clean.</li> <li>Verify that the analysis compartment is empty.</li> <li>Verify that no objects are in direct contact with the unit housing.</li> <li>Verify that no objects are under the unit.</li> <li>Switch on the unit.</li> <li>Perform the operational test using the PASS / NO PASS test pieces.</li> </ul> <p><i>If the procedure is passed successfully, the unit is operative.</i>            Otherwise, discontinue equipment use and contact CEIA Service for replacement of the defective part.</p>
Self-diagnosis message	Display: <b>ALM FAULT SPM FAULT</b>  ANALYSIS RESULT Lamp: yellow  Sounder:  Low frequency Intermittent tone:	<ul style="list-style-type: none"> <li>Momentary power loss.</li> <li>Fault in an internal section</li> </ul>	<b>Procedure:</b> <ul style="list-style-type: none"> <li>Switch off the unit.</li> <li>Verify the power supply connections.</li> <li>Switch on the unit.</li> <li>Perform the operational test using the PASS / NO PASS test pieces.</li> </ul> <p><i>If the procedure is passed successfully, the unit is operative.</i>            Otherwise, discontinue equipment use and contact CEIA Service for replacement of the defective part.</p>
OFV test failed	Display: <b>OFV failed</b>  ANALYSIS RESULT Lamp: red  Sounder:  Uninterrupted sequence of "beeps"	<ul style="list-style-type: none"> <li>OFV test failed</li> </ul>	<b>Procedure:</b> <ul style="list-style-type: none"> <li>Switch off the unit.</li> <li>Verify that the analysis compartment is clean, dry and empty.</li> <li>Switch on the unit.</li> <li>Perform the operational test using the PASS / NO PASS test pieces.</li> </ul> <p><i>If the procedure is passed successfully, the unit is operative.</i>            Otherwise, discontinue equipment use and contact CEIA Service for replacement of the defective part.</p>

If the source of the interference is still not clear, please contact our Technical Department and we will give you all the information you need.

### 4.2.1 Self-diagnosis system

The self-diagnosis system is always active and provides the operator with an alert message whenever a malfunction occurs. Once activated, the message is retained indefinitely until the unit is switched off.

The operator can identify the cause of the fault by carrying out the check procedures illustrated in the table above. Once the cause of a fault signalled by the self-diagnosis system has been corrected and the equipment has passed the operational test successfully, using the PASS / NO PASS test pieces, **the equipment is fully operative and is ready to use!**