

# User Manual

ENG

EMS Marker Locator EML9



## IMPORTANT:

Read carefully before use. Keep for future reference.

**English**

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## 1 Safety notes

To avoid possible harm, read and follow these instructions.



**ATTENTION:** This device produces a magnetic field that is considered safe for professional use. To avoid harm, it is recommended to keep pacemakers, metallic implants and magnetic data media at a distance of at least 60 cm from the working device.

## 2 General description

### 2.1 Intended use

The Vesala Electronic Marker Locator EML9 is an affordable EMS tracer. EML9 supports all nine industry standard EMS marker types coded according to the industry. Besides EMS marker locating, EML9 has a metal detector feature: Metal manhole and pit covers can be located up to 20 cm deep under dirt, asphalt or ice.

EML9's operation is based on activating passive underground EMS markers by a stimulus signal through the EA3 search coil. A stimulated marker induces a small responsive field around it, which EML9 correspondingly detects.

Electronic EMS (Electronic Marker System®) and Omnimarker® markers are available in different shapes, such as balls, rings and plugs, and they are widely used especially in telecom and electric branch. They can be used to mark various underground objects, such as cable route corners, cable junctions and end points. In other industries they are used in a similar manner to mark specific objects, such as pipes and manholes. The markers have an industry standard colour coding, see section "3.3 Start-up and changing operating mode".

*Electronic Marker System® and Omnimarker® are trademarks of their respective owners.  
See the technical data for more information about your tracer device.*

## 2.2 Specifications

### **EML9-LV Transceiver**

Operating temperature	-10°C ... +40°C
Humidity	10...90 % RH, non-condensing
Storage temperature	-20°C ... +40°C, no batteries or with FR6 batteries, +5°C... +30°C, LR6 batteries
Level of protection	IEC 60529 IP55
Batteries	6 pcs 1.5 V IEC LR6, FR6 or HR6
Current consumption	30...500 mA, average 100 mA
Nominal battery voltage	9 V
Enclosure material	ABS+PC
Enclosure dimensions	155 x 90 x 52 mm
Weight	442 g, with batteries
Maximum output power	<250 mW
Maximum magnetic flux density	<40 $\mu$ T
Effective antenna diameter	39 cm
Operating frequency ranges	See "2.3 Operating distances by marker type"
Electromagnetic environment	ETSI TR 101 651: Class 3 - outdoor locations
International standards this product is in conformance with	EN 300 330 EN 301 489-1 EN 301 489-3 EN 303 454

## 2.3 Operating distances by marker type

<b>Operating mode</b>	<b>Frequency [kHz]</b>	<b>Detection distance, unlimited power [m]</b>	<b>Detection distance, limited power [m] *)</b>	<b>Unlimited magnetic field strength (10m) [dBμA/m]</b>	<b>Limited *) magnetic field strength (10m) [dBμA/m]</b>
Power	169.8	1.4	0.6	41	-5.0
Water	145.7	1.5	1.3	43	37.7
European Power	134.0	1.6	1.6	45	45
Sanitary	121.6	1.6	1.6	47	47
Telephone/Telecoms	101.4	1.7	1.6	47	42
Fiber optic	92.0	1.7	1.5	47	42
Gas	83.0	1.7	1.7	48	48
Cable TV	77.0	1.7	1.4	49	42
General/Non-potable water	66.36	1.5	1.3	50	42
Metal detector**)	66.36	0.18	0.18	42	42

\*) This is the typical maximum detection depth/distance with ball markers, when the power limiter jumper is in its place and the equipment meets the requirements of ETSI EN 300 330-1 V1.7.1 standard.

\*\*\*) 300x300x1 mm steel plate used as a reference piece.

## 2.4 Package contents

The following items are supplied in the package:

- EMS Transceiver EML9-LV (V11738)



- Crutch-type carrying shaft, with a cradle for the transceiver EML9-KV (V17810)



- BNC antenna cord AK1 (V15201)



- 90 degree adapter for the antenna cord BNC-KA (X25930)



- Search coil antenna, diameter 40 cm (V14303)

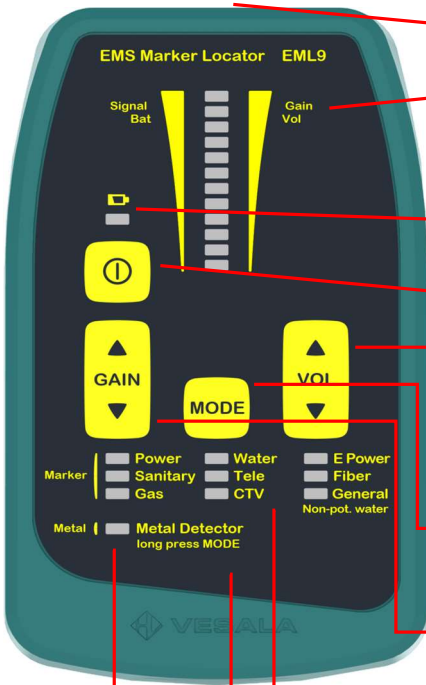


- 1,5 V alkaline battery LR6 (J01576), 6 pcs.



- User manual

## 2.5 EML9 parts and functions



**Antenna connector:** To connect EA3 search coil antenna with AK1 cord and adapter.

**LED bar display:** Displays received signal level, battery voltage level, gain setting and audio volume setting.

**Power LED:** Power LED indicates when device is ON. If Power LED blinks, batteries are low.

**Power button:** Turning the device on and off. Also battery voltage check (on LED bar) when briefly pressed during use. A two second press during start up inhibits the automatic shut-off, which otherwise turns the device off after 20 minutes inactivity.

**VOL buttons:** Up/down buttons to adjust the speaker volume. LED bar display indicates chosen volume level.

**MODE button:** Changes operating mode according to the marker type. A long press activates metal detector mode.

**GAIN-buttons:** Up/down buttons to adjust the receiving sensitivity. LED bar display indicates chosen gain level.

**MODE LEDs:** 9 LEDs to display which operating mode is active.

**Speaker:** Internal signal sounds and received tracing signal sound indication. Tracing signal sound volume and pitch follow the received signal level: The higher signal level the louder volume and higher pitch, as well as the higher LED bar display.

**Metal detector LED:** Displays that metal detector mode is active.

**Battery compartment** is located at the back of the device. Device operates with six 1.5V LR6 (AA) batteries. If batteries are low, Power LED will blink. Rechargeable NiCd or NiMH cells can be used with certain limitations, see section 3.1.



## 3 Operating Marker Locator EML9

### 3.1 Inserting batteries to EML9

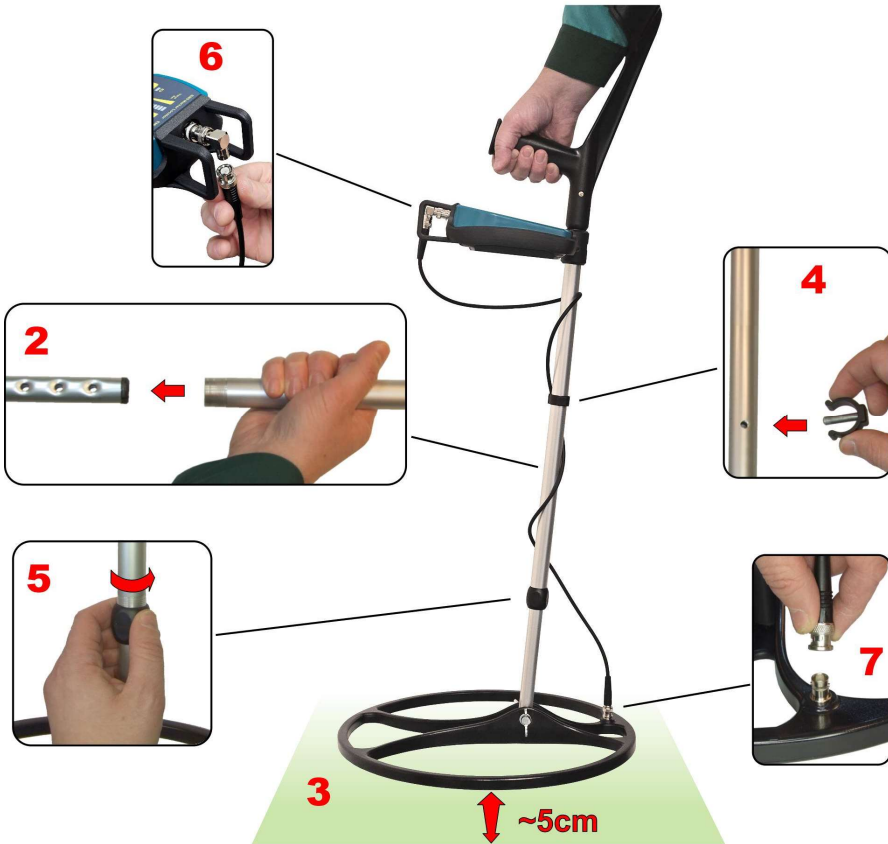
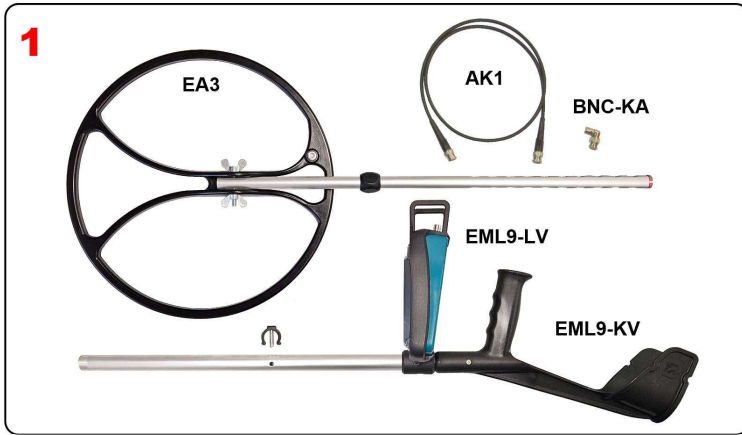
EML9-LV transceiver uses 6 pcs. LR6 (size AA) alkaline batteries, which are in the battery compartment at the bottom of the enclosure. Opening the battery lid screws requires a screwdriver. The device does not have to be removed from its cradle for battery change.

The device is attached to the cradle with a tight fitting, and it comes off by lifting the receiver from the rear edge upwards.

If the Power LED is blinking, batteries are low and should be changed to ensure optimal functioning of the equipment. If batteries are very low, device switches off to avoid battery leak. We recommend using high quality alkaline batteries.

If rechargeable NiMH batteries are used, it should be noticed that EML9-LV could discharge the batteries so empty that they may get damaged. If rechargeable batteries are used, the user must take care of preventing deep discharge of the batteries by charging the batteries in a separate charger as soon as the Power-LED starts blinking.

### 3.2 Assembling the equipment



### 3.3 Start-up and changing operating mode

To turn EML9-LV on, press Power button until Power LED lights and a sound is heard. At the same time LED bar indicates the software version. When Power button is released, LED bar will display the battery level.

EML9-LV turns itself off after 20 minutes if not used. Pressing the Power button longer during start-up until a di-di sound is heard, prevents the automatic turn-off.

Device will always start and activate to the same mode that was used the previous time (not metal detector mode).

Operating mode is chosen according to the traced marker type by briefly pressing the MODE button. MODE LEDs display which mode is currently active. Available modes and their industry standard marker colours are listed below.

<b>Application</b>	<b>EML9-LV Mode</b>	<b>Marker colour</b>
Power	Power	Red
Water	Water	Blue
European Power	E Power	Blue/red
Sanitary	Sanitary	Green
Telephone/Telecoms	Tele	Orange
Fiber optic	Fiber	Yellow/black
Gas	Gas	Yellow
Cable TV	CTV	Orange/black
General/Non- potable water	General	Purple
Metal detector	Metal Detector	No marker, metal detector

To activate metal detector mode, press the MODE button until the Metal detector LED turns on.

**When Metal detector is active, EMS markers can't be located.**

### 3.4 Adjusting audio volume and receiving gain

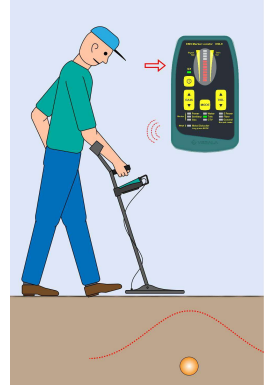
Device audio volume can be adjusted with the 4-step VOL adjustment.

Receiving gain (sensitivity) can be adjusted with the GAIN buttons. LED bar display shows which gain setting is on. It is recommended to use gain that makes the LED bar height to be approx. in the middle; that way changes in signal strength are easiest to notice.

### 3.5 Locating EMS markers

Turn EML9-LV on and choose the right operating mode according to the EMS marker type to be traced. Hold the EA3 search coil horizontally slightly above ground. Move the coil slowly around the area where there should be markers. An EMS marker is located underneath the spot where the LED bar is highest and sound signal is strongest.

Signal field shape depends on the marker type and depth, and with ring shaped markers also the marker's orientation underground.



### 3.6 Locating metal objects

With the EML9 metal detector feature large metal objects such as manhole and pit covers can be located under dirt, asphalt or ice. EML9 can't detect small metal objects such as coins or keys. When metal detector mode is active, EMS markers can't be traced simultaneously - and vice versa.

To ensure best sensitivity, adjust metal detection threshold with the GAIN buttons so that 1-3 Led bar LEDs are on. Manhole covers etc. can be located from max. 30cm depth under the spot where the LED bar is highest and sound signal is strongest



**ATTENTION:** Risk of property damage.

The device may detect an EMS antenna in a location where there is none. Incorrect detections can be caused by: Inductive loops, devices containing transformers, large cable reels, nearby different types of EMS markers. To reduce false detections, move interfering devices away, turn them off, or reduce the sensitivity of EML9.



**ATTENTION:** Risk of missed detection error due to electromagnetic conditions.

The device may fail to detect an EMS marker in a location where one is present. Missing indications can be caused by: Inductive loops, devices containing transformers, large cable coils, large metal objects nearby. Move the source of the interference further away or increase the sensitivity of EML9.

## 4 Taking care of your equipment

### 4.1 Maintenance

EMS electronic marker locator EML9 does not have any parts that require maintenance by the user, excluding changing of batteries and adjusting the power limiter.

### 4.2 Cleaning

If the device is dirty or wet, clean and dry the outer surface of the device with a soft cloth. Avoid getting dirt or water inside the device. A small amount of isopropanol can be used to remove stains. Battery contact surfaces inside the battery compartment should only be cleaned with isopropanol and a soft, lint free cloth.

### 4.3 Storing

It is recommended to store the device, batteries and accessories inside its original packaging in a dry, warm place.

### 4.4 Troubleshooting

EMS markers and their locating are susceptible to some environmental interference due to their simple electromagnetic operating principle.

In case of trouble, follow the table below for possible remedy.

<b>Problem</b>	<b>Possible explanations</b>	<b>Remedy</b>
The device does not power up or unexpectedly shuts down.	Batteries are weak.	Replace the batteries.
	Device is damaged.	Contact the supplier or representative.
Device does not find targets to be located.	Other equipment in close proximity cause interference.	Turn off interfering equipment or move them away from the locator work site.
	Antenna or antenna cable	Check antenna connectors, cable and the antenna for damage and loose connections.

A defective device must be delivered to the manufacturer for maintenance.

### 4.5 Modifying

Do not attempt to modify the device or accessories in any way. A modified device or accessory may work in an unpredictable way or may fail to work at all. Do not use accessories other than specified. Use only the original EA3 search coil and AK1 probe cord with EML9-LV.

## 4.6 Output power limiter

EML9-LV includes an output power limiter, which ensures that the equipment complies with the magnetic field strength limitations in the EU. The limiter is located under a sticker in the battery compartment. Removing the limiter may cause magnetic fields that exceed the magnetic field strength limitations and may hence cause interference to nearby radio and other equipment.

Power limiter should not be removed when using the equipment in the EU.

To remove the power limiter, punch the limiters cover sticker's grey circle and remove the jumper piece under it with pliers or tweezers. Be careful not to drop the jumper inside the enclosure.



**ATTENTION:** In EU countries, the transmission power of EML9 must be limited to comply with the limit values of the magnetic field strength in use in the EU region.

## 4.7 Misuse

Do not submerge the device. Do not use the device as a support, as a mechanical tool, to dig the ground or to move objects. Do not drop, throw or step on the device.

H. Vesala Oy shall not accept liability for any financial losses, harm or injury incurred to people, the environment, or property, caused by the use or non-use of the device.

## 4.8 Warranty

EML9 has one year warranty against material or manufacturing defects from the date of purchase. The warranty shall not cover batteries, normal wear and tear, misuse or faults resulting from modifying the product. In case of malfunctions and questions related to use, please contact the manufacturer.

## 4.9 Disposal

Do not discard this product with household or general waste after its end-of-life. Return it for recycling according to EU Waste Electrical and Electronic Equipment directive (WEEE). For more information contact your supplier or local agent.



## 5 Supplier contact information

Service, spare parts, replacement user manuals and technical support:

H. Vesala Oy

Peräsimentie 1, FI-03100 Nummela, Finland

Tel. +358 44 200 2005, [info@vesala.fi](mailto:info@vesala.fi), [www.vesala.fi](http://www.vesala.fi)

