PORTABLE EXPLOSIVE DETECTOR

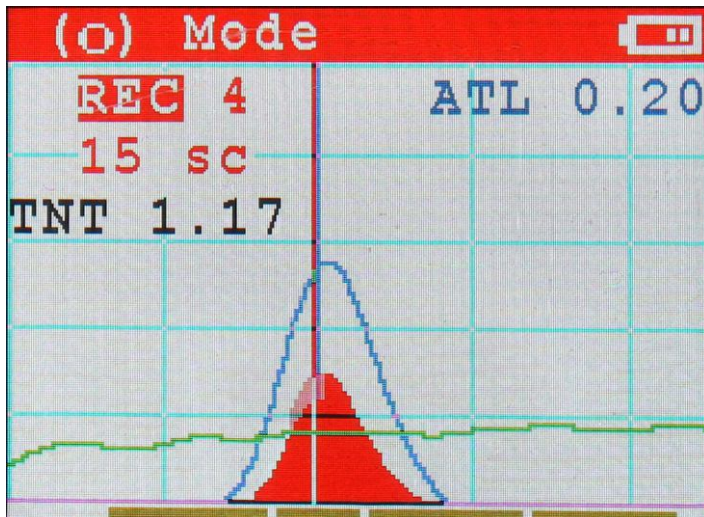# MO-2M

BRIEF TECHNICAL DESCRIPTION

СИБЕЛ SIBEL®

APPLICATION

The MO-2M is a handheld explosives detector designed to detect the presence of explosives on persons and their belongings, in luggage in mass transit systems (airports, train and metro stations), in vehicles, freight and cargo as well as on the premises of buildings, offices and apartments.

During inspections, the MO-2M samples and analyzes the ambient air to detect the presence of vapors of explosives. When used in conjunction with its TVIN thermal chamber, the MO-2M can detect both vapors and particles of explosives.

When explosives are detected, the detector generates audible and visible (graphs, text) alarms.

ionogram on MO-2M display
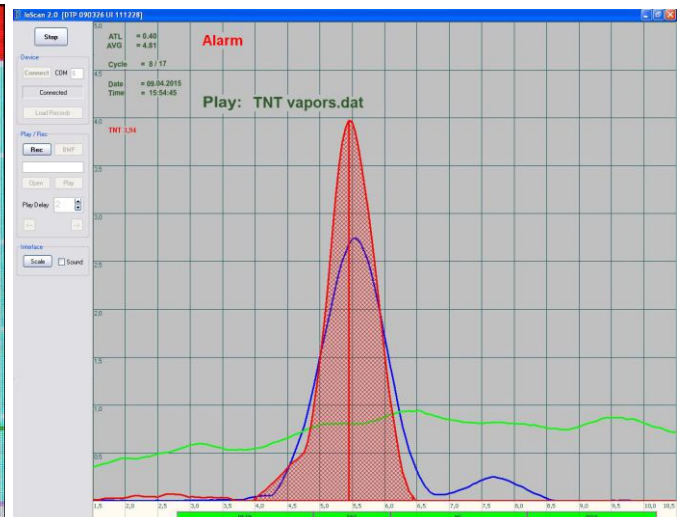
ionogram on PC display

The MO-2M is a hand-held, rapid-response explosives detector.

It utilizes today's most advanced technology developed in Russia by scientists and engineers of the Institute of Applied Physics and known as Non Linear Dependence of ion Mobility (NLDM) on an electric field. This technology has made possible to design an extremely sensitive device capable of simultaneously sampling and detecting explosives vapors in real time. A vapor concentration less than 10^{-13} g/cm^3 can be easily detected.

The MO-2M is a completely automatic, real-time portable detector that does not require any carrier gas or calibration accessories.

During analysis, the detector automatically recalibrates to constantly adjust the ions separation conditions during to any change in environment air being analyzed.

In vapor mode, the air surrounding the objects being inspected is drawn into the analyzing head of the detector where it is ionized by radioactive source (Tritium) and introduced into the separation chamber. There, the ions are separated by asymmetrical electric fields and then captured on the collector, creating a current that is amplified and registered.

In particle mode, paper swipes are used to collect samples from the objects being inspected and MO-2M is fitted with a small thermal vapor intensifier (TVIN). When a swipe is introduced in the TVIN, the heat evaporates the residues of explosives and the detector analyzed their vapors.

Heating a sample increases its vapor pressure so that any explosives, even in negligible quantities can easily be detected.

The MO-2M is powered by rechargeable Li-Ion Battery. One Li-Ion battery provides for at least 5 hours of continuous operation in vapor mode and three batteries are included with each detector.

The MO-2M can also be powered from the main using its AC/DC converter (100-240 Volts, 50– 60 Hz).

The MO-2M is very easy to operate.

Once turned on, it takes less than 10 seconds for the MO-2M to be ready to operate.

TECHNICAL CHARACTERISICS

Detection principle	Non Linear Dependence of ion Mobility on an electric field – NLDM
Design philosophy	Contains 2 channels: -Analytical: to analyze air samples -Reference: the channel contains an internal standard (TNT cartridge) for autocalibration.
Explosive traces detection	Vapors and particles
Response time in direct air sampling	2 seconds
Threshold of sensitivity to TNT at +20°C and relative humidity 50%	Not less than 10^{-13} g/cm^3 in field conditions on vapors; Better than 500 picogram on particles (applied to the sampling grid).
Detectable substances	Trinitrotoluol (TNT), cyclotrimetilentrinitroamin (hexogen), pentaeritrotetranitrat (PETN), nitroglycerin, tetryl and explosives based on them.
Method of Ionization	Ionization by the radioactive sources based on Tritium, built-in inside each channel, with total activity up to 90.0 milliCurie (optionally up to 27 milliCurie).
Data transfer to the external PC	- USB-cable - built-in radio channel (BlueTooth)
Readiness for operation after switching on	Not more than 10 seconds
Alarm signals	Audible, LED, graphs (ionograms) on color display
Internal memory	10 000 ionograms
Power supply	Li-Ion storage battery 14.4 V 3.4 Ah (3 batteries in the complete set), or from main 100 ... 240V
Time of continuous operation from one storage battery	- at least 5 hours in vapor detection mode, - at least 3 hours in particles detection mode with the use of the TVIN evaporating chamber
Gas-carrier	Not required
Power consumption, no more	12 VA
Weight of the handheld unit	not more than 1.5 kg (with storage battery)
Weight of the complete set*	not more than 9.0 kg
Dimensions of the handheld unit (L x H x W)	not more than 305 x 120 x 86 mm
Dimensions of the packed complete set (L x W x H)*	not more than 515 x 430 x 150 mm
Operating temperature	+5°C to +55°C

* Dimensions and weight of the complete set in transportation package may vary depending on type of the package and completeness.

COMPLETE SET

1. Hand-held unit (MO-2M detector)
2. AC power adapter (100-240V/50-60Hz)
3. Three Li-Ion storage batteries (14.4V, 3.4Ah)
4. Battery charger
5. Thermal Vapor Intensifier(TVIN)
6. Sampling device
7. Three sample cards packages
8. Three sample trap packages
9. Conical air inlet extender
10. TNT vapor generator
11. Key
12. Cleaning ramrod
13. Air filter
14. Operating manual
15. IoScan 2.0 software
16. Interface USB cable
17. Collet
18. Container with 2 TNT reference cartridges
19. Rubber syringe
20. Special key
21. USB-Bluetooth module for PC
22. Case for transportation and storage

Thermal Vapor Intensifier   T V I N
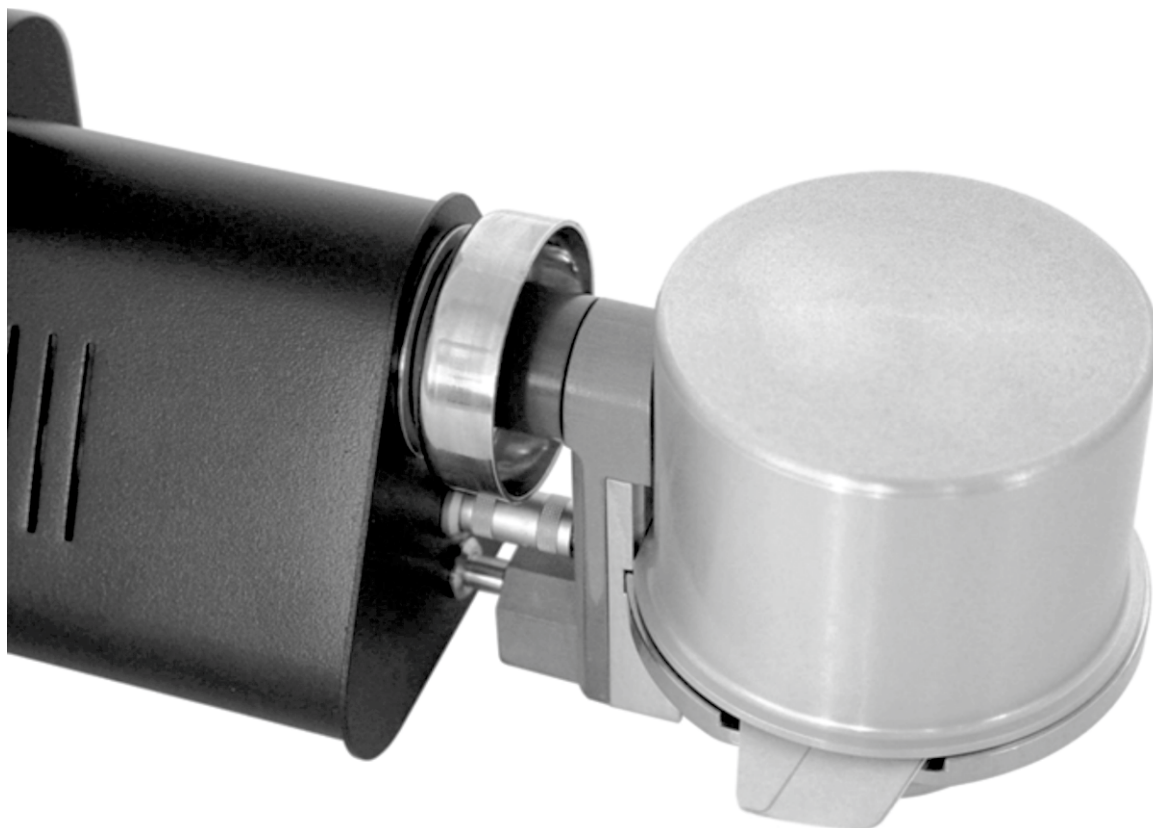
The TVIN is an accessory designed to enable the explosive vapor detector MO-2M to detect explosives in all three phases: gas (vapors), solid (particles) and liquid (solutions).

Using TVIN to heat samples allows to:

- significantly increase the vapor pressure so that any explosives, including low-volatility ones such as PETN, RDX, and other plastic explosives can be easily detected even when present in negligible concentration;

- reduce the dependence of explosives detection on weather and climatic conditions (humidity, temperature, wind);

- perform analysis of samples collected from various locations either on paper cards (swab) or on traps (using the Sampling Device).

SAMPLING DEVICE

The Sampling Device is designed to collect samples of explosives in dusty environment and places with high concentration of solvents.

Vapors and particles are collected from the inspected surface by drawing air through the sample trap and then are analyzed by MO-2M alone or fitted with the TVIN.

The Sampling Device is powered by built-in Ni-MH storage battery (7,2V; 3,6Ah). A fully charged battery provides for at least 12 hours of continuous operation.

CONICAL AIR INLET EXTENDER

The Conical air inlet extender is useful for the inspection of envelopes, mail packages and other flat surfaces. It is easily snapped onto the air inlet of the detector; in this situation, it makes the sampling more effective. It is recommended to use the extender to shield inspected objects from air circulation when operating in windy conditions or under air drafts.

AC ADAPTER

The AC adapter is used power the detector from the mains.

The AC adapter converts the input AC voltage (100-240 V /50-60 Hz / 1.0 A) to output DC voltage (18V, 2.2 Ah). The wide range of AC adapter input voltage makes possible to power the detector from AC wall outlet almost everywhere in the world.

RECHARGEABLE BATTERIES

The battery is used to provide for autonomous power to the detector.

The detector can continuously operate for 5 hours in vapor mode and 3 hours in particle mode (within 1 year) when powered by a Li-Ion rechargeable battery. Three batteries are included with each detector set supplied by the manufacturer. The charging time is 2.5 hours per each battery.

BATTERY CHARGER

The Battery charger should be used for recharging Li-Ion storage batteries from the complete set of the detector, supplied by the manufacturer. The Battery charger is powered through the AC Adapter.

AIR FILTER

The filter is used to prevent contamination of analyzing channel by dust particles. The filter is recommended to use in dusty environment.

TNT VAPOR GENERATOR

The TNT vapor generator is supplied to easily and quickly verify that the detector is operating properly. It is a small metal vial with a tight cover. It contains a very small amount of TNT and used to generate TNT vapors.


TOOLS AND ACCESSORIES

Tools and accessories required for technical maintenance and repair are included in a service set placed in the transportation case of the detector.
The service set includes:

- cleaning ramrod (4) is a polychlorvinyle tube with a polyethylene handle at one end. It is used to clean the channel of the analyzing head when it is physically contaminated by dust or particles;
- collet (3) is used to remove the TNT reference cartridge.
- key (2) is used for the partial disassembling of the detector;
- container made from aluminum alloy (1) with 2 TNT reference cartridges is used hermetically to store the references during the transportation and storage of the MO-2M complete set. The reference cartridges are made of stainless steel, the weight of each cartridge is 2.5g.
  The weight of the container with the cartridges is 13g.
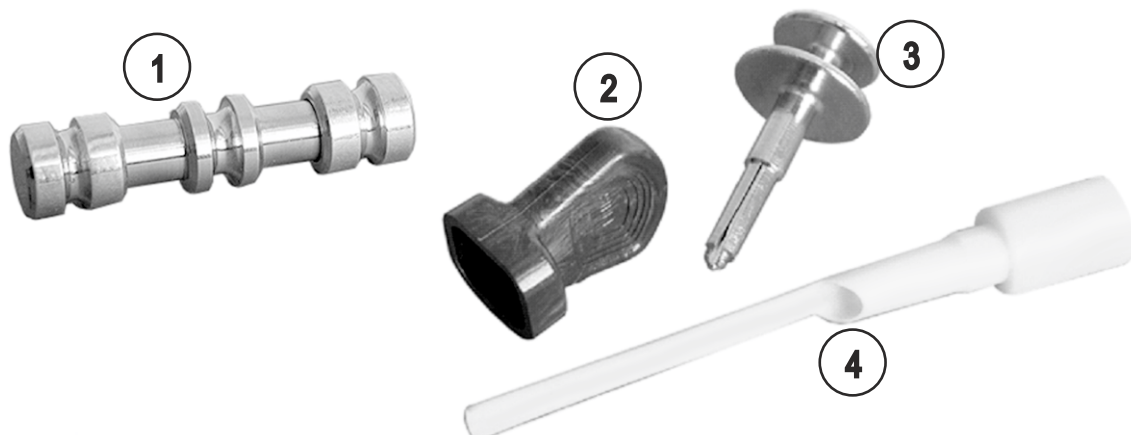
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