

# Alcohol analyzer «Hunter™ Professional»

AF-01-20090810

Operations manual  
INTK431412.001 RE

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## Introduction

This guide introduces the user to the structure, operation rules (intended use, maintenance, reparation, storage and transportation) of the product alcohol analyzer «Hunter™ Professional» (hereinafter referred to as - APPLIANCE).

The appliance is a portable device, assigned for the individual monitoring of alcohol presence in exhaled air.

The operating principle of the appliance is based on the alcohol detection by the breath sensor, sensitive to ethanol vapor. Testing and display of the results is accompanied by sound and digital indication what simplifies to the maximum the use of the device.

**Attention!** Product readout is not the proof could be shown to Traffic Police officers, or other official bodies. Information obtained by using the product, is only for the personal state control of a person being tested.

**Attention!** Measuring should be performed no earlier than 15 minutes after taking alcohol, alcohol containing beverages, food and drugs. Otherwise, the test result may be overstated under the influence of the alcohol being on the mucosal surface of the mouth.

**Attention!** It is recommended measuring should be performed not later than 30-60 minutes since last alcoholic drink. Approximately this amount of time alcohol needs to enter the blood

**Attention!** Blood alcohol can be detected not only after consuming beverages containing it. Some drugs, hygiene items and food products (yogurt, kvass, pickled fruits and berries, etc.) contain alcohol. In

addition, the human body has its own individual endogenous levels of alcohol (alcohol produced by the main body).

**Attention!** In order to ensure a long, successful and safe operation of the purchased appliance, please consult the manual.

Observance of manual rules, restrictions and guidelines will prolong appliance's life and will help to use it most effectively.

Violation of storage and maintenance rules will abort the manufacturer's warranty.

After keeping the product in a cold place or winter transportation, the appliance should be kept at room temperature for two hours before using it.

## Appliance description and operation

### 1. Alcohol in the organism.

Consumed alcohol is absorbed by the stomach walls, colon and small intestine, after the alcohol enters the human's bloodstream. Part of the alcohol is absorbed by the mucous membrane of the mouth, so after a few minutes the alcohol can be registered in the blood and, respectively, in the exhaled air. Most rapidly are absorbed rather weak alcoholic beverages (beer, wine, cocktails, gin and tonic). Strong drinks (vodka, whiskey, brandy) can block the stomach's valve and delay the entering of alcohol into the blood for 20-30 minutes. Taking of alcohol with food or filled stomach can delay the process of alcohol's entering from the stomach into the blood, but after 30-60 minutes the concentration of alcohol reaches its steady value. The blood delivers alcohol throughout the body, and first of all, to the brain, slowing its normal processes. The process of removing alcohol from the body runs at a certain speed. On average, one hour of alcohol concentration in the blood drops to 0.1-0.2 ppm or by the exhaled air concentration goes down to 0,050-0,1 mg / l per hour. The concentration of alcohol in blood is determined by the amount of consumed alcohol and the weight of a person. The bigger is the weight of a person, the lower alcohol concentration is registered in the body. Weight- drink doses number - alcohol concentration ratio of a person is shown in Table 1.

Table 1

Body weight, kg	Concentration of ethanol in the exhaled air, depending on the number of doses taken, mg / l							
	1	2	3	4	5	6	7	8
55	154	308	462	616	770	924	1078	1298
65	132	264	396	528	660	792	924	1056
70	110	231	341	462	572	693	803	902
80	99	198	308	407	506	616	715	825
90	88	187	275	363	462	550	649	737
100	77	165	253	330	418	495	583	671

One dose of alcohol roughly corresponds to a 0,33 l can of beer or glass of vodka, whiskey (30-40 ml) or half a glass of wine (100ml).

Note: 1 ppm - 0.5 mg / l (500 mg / l).

### Alcohol influence on a person.

Even on the verge of XIX - XX centuries it was experimentally proved that the initial influence on the psyche can be already observed after taking 7-8 g of pure alcohol, and clear - after taking 20-30 g. In high doses, alcohol consumption affects the central nervous system as a depressant. This means it slows down the processes of the higher brain centers, contributing to the visual appearance of the alcohol intoxication symptoms, such as:

- loss of fine motor coordination;
- loss of ability to maintain balance;
- loss of space orientation ability;
- hearing impairment;
- detraction, amnesia;
- distraction;

The result of the influence on a person's eyesight can be registered in the form of:

- narrowing of the peripheral field of vision (tunnel vision effect);
- black and white view;
- an aggressive reaction to the blinding light;
- need of longer adaptation to illumination changes;
- wrong perception of speed and distance;
- color vision deterioration, especially distinguishing red color;
- twilight deterioration;

**Alcohol concentration and degree of alcoholic intoxication influence ratio:**

BrAC, mg/l (in exhaled air)	Ppm, gr/l (of blood)	Influence degree:	Symptoms
0 — 0, 29	0 — 0, 4	Soberness	No obvious demonstration, but the person may be overly talkative and be in a good mood.
0, 15 — 0, 5	0, 3 — 1, 0	Euphoria	Increased self-confidence and ignoring of prohibitions. Inattention, hastiness and inadequate self-control due to poor coordination and slow-sensory perception.
0, 40 — 1, 0	0, 8 — 2, 0	Excitement	Emotional instability and lack of discretion. Poor perception and coordination (hence staggering gait). Slower reaction times, perhaps nausea occurrence and / or a strong desire to lie down
0, 70 — 1, 20	1, 40 — 2, 4	Confusion	Disorientation, mental insanity, and giddiness. Heightened fear, anger and grief. Loss of ability to distinguish colors correctly and perceive shapes, movement and dimension. Blunted sensation of pain. Failure to keep the balance and slurred speech. Possible coma.
1, 10 — 1, 60	2, 2 — 3, 2	Stupor	Apathy, general sluggishness, which can grow into paralysis. Lack of reaction to stimulation. Inability to stand or walk. Vomiting, urinary and fecal incontinence. Coma, sleep or stupor.
1, 50 — 2, 0	3, 0 — 4, 0	Coma	Loss of consciousness and coma. Depressed or absent reflexes. Hypothermia (low temperature). Circulatory and respiratory systems destruction. Possible fatal outcome.
1, 90+	3, 8+	Death	Fatal outcome caused by respiratory tracts paralisys.

It is clear that consumption of even small doses of alcohol by drivers or persons engaged in hairs can create a very dangerous situation. The situation is complicated by the fact that alcohol reduces human capacity for sober self-criticism. This is reflected in the fact that a drunk driver sincerely believes that he is driving his car better and safer than it happens in reality.

## 2. Technical features

The external appearance of the appliance can be seen on picture 1



Picture 1 – external appearance of the appliance

Overall appliance dimensions (without mouthpiece), no more than.....	105 x 58 x18, 5 mm
Product Weight with battery, no more than .....	0.12 kg
DC supply voltage (two batteries or accumulators type AAA), .....	from 2.0 to 3.2 V
Maximum appliance power consumption, VA, no more than .....	0.45
Appliance operates under the following climatic conditions:	
- Ambient air temperature. ....	-5 to +70 °C
- Relative air humidity (no condensate) .....	from 10% to 85%
Measurement range:	
- Mg / l .....	from 0 to 2.5
- Ppm .....	from 0.00 to 5.00
-% BAC .....	from 0.000 to 0.500
Measurement error... ..	± 10%
Air sample exhalation time, (sample volume at least 0.9 liters).....	5 ± 1sec
Response time, no more than .....	5 sec
Preparation time for reanalysis, no less than .....	15 sec
Setting-up procedures after switching on, no more than .....	50 sec
Mean appliance lifetime, no less than .....	5 years

## 3. Appliance parts

Appliance appearance and location of its main parts is shown on Picture 2. The appliance consists of shockproof ABS plastic body in position 1 with preinstalled:

- Membrane keypad, located on the front panel in position 2;
- OLED-display in position 3;
- With installed mouthpiece on the reaction chamber hole in position 4;
- Batteries pos.5 closed lid pos.6



Picture 2 – main parts location

#### 4. Components and operation

4.1 The appliance function is based on the change of semiconductor's sensor electrical conductivity, which is sensitive to ethanol vapor. Exhaled air containing alcohol is served through the mouthpiece into the reaction chamber where the semiconductor sensor is located.

Adsorption of ethanol on the sensitive layer surface changes the sensor's conductivity, which is converted into an equivalent electrical signal.

The measured electrical signal is recalculated and converted to ethanol concentration parameter in blood and breath. The concentration of ethanol in a sample of exhaled air is displayed on the display.

A sample of exhaled air should be introduced into the device without interruption for 5-6 seconds, the process is accompanied by an audible signal at the end.

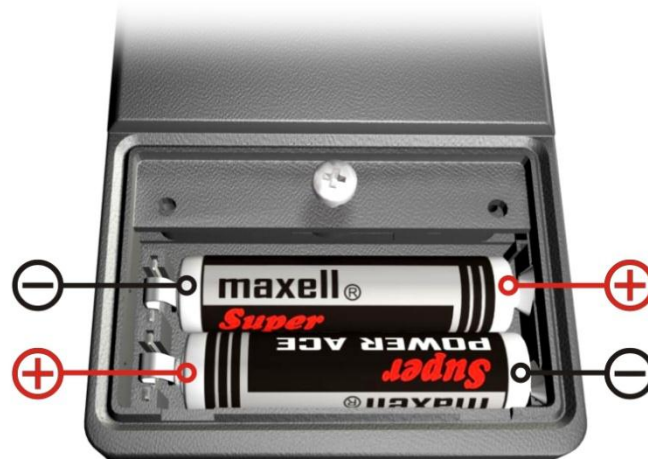
4.2 The product runs on the microcontroller, preinstalled with software, mounted in the body of the appliance.

4.3 Using the keyboard position 2 appliance can be switched on and off (button "ON / OFF"), units of measure choice (button "Mode"), and calibration of the appliance (button "ON / OFF" + "Mode button").

4.4 Information about setting up, measurement process, test results, errors is displayed on a graphical OLED-display in resolution of 132 x 64 pixels.

4.5 Power supply or accumulators Batteries pos.5 is shown

from two AAA batteries, of the same size. installation diagram in on Picture 3.



### Picture 3 – installing the batteries to the body of the appliance

04.6 Air supply should be realized through the hole on the top of the body using the mouthpiece preinstalled in pos.4

**WARNING:** appliance body and sensitive sensor should be protected from mechanical damage. Avoid blowing the sensor, dirt and liquids on its surface.

Using the appliance in a room, keep it away from cologne, perfume and other aromatic substances (alcohol, benzine, acetone, etc.).

**WARNING:** To avoid failure of the sensor is **not allowed**:

- Keeping the appliance in rooms with air containing flammable gases and vapors: methane, propane, butane, acetylene, ammonia, gasoline, alcohol, carbon dioxide, etc.
- Exhaling into the device when power is off or it is not set up in measurement mode;
- Disinfecting the surface of the appliance by fluids containing alcohol (ethanol).

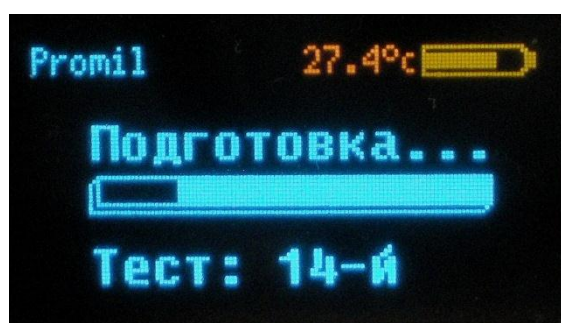
## 5. Functioning

5.1 Switch on by pressing the button "ON / OFF" and holding it for 2 seconds. When you switch the appliance, a short beep sounds, screen saver appears on display, as shown on Picture 4.



Picture 4

5.2 The appliance is preparing to measure and is heating the sensor (approximately 30sec), while the display is showing the image on Picture 5. As the sensor warms up, the scale level is getting filled. At the bottom of the screen is displayed the test serial number.



Picture 5

5.3 Completing the preparation for the measurement, a new picture appears on the display (Picture 6), 2 short sound beep and the arrow flashes - the device is ready to measure!



Picture 6

The characters that appear on the top line of the display from left to right, indicate correspondingly "unit", "sensor status", "temperature", "battery."

**Caution:** If the battery symbol is not filled, and the screen displays the words "replace battery", it is necessary to replace the old batteries, and you must: turn-off of the appliance (10 sec.) or force turning off (press and hold button "ON / OFF"), remove the battery lid away from the body, previously removing the screw.

5.4 To run the alcohol test, the tested person must produce a deep breath, then, without interruption, exhale air from the lungs through a mouthpiece into the reaction chamber, the exhalation should have a sufficient intensity. During the right exhalation of a person being tested, a continuous beep sounds for approximately 5-6 seconds. After completing the measurement 2 short beeps sound and the display shows "expect the result ...." and then the result of the test itself (Picture 7).



Picture 7 – test result in mg/l (of alcohol, contained in exhaled air)

It is also possible to display test result in % BAC (Picture 8), for that press "Mode" button



Picture 8 -test result in% BAC (blood alcohol content - result obtained by applying the ratio of 1% BAC = 0,05 mg / l)

You can also see test result in Ppm, for this operation press again "Mode" button.

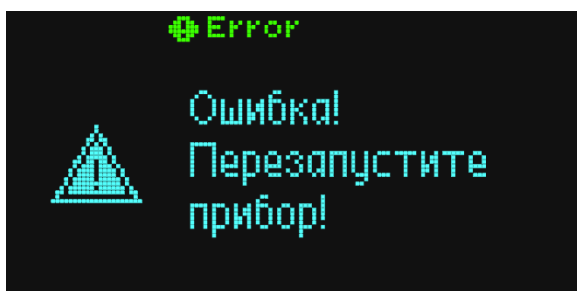




Picture 9 – test result in Ppm (blood alcohol content - the result is obtained by applying the relation: 1 ppm = 0.500 mg / l)

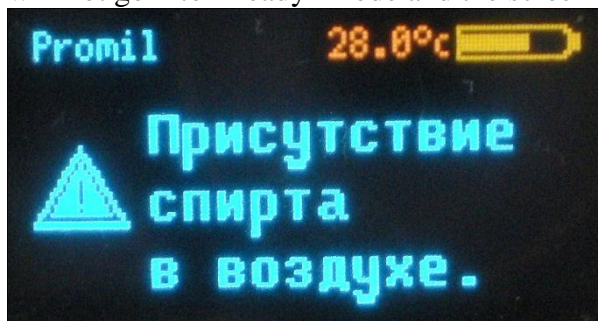
**NOTE:** The appliance expects the exhale for 2 minutes. If you don't exhale during this time, the device automatically turns off. While waiting, a significant part of battery power is being wasted. Therefore, it is not recommended to leave the appliance turned on for a long time.

5.5 If an ethanol sensor error occurs during the test preparation, the display shows the message shown on Picture 11.



Picture 11

5.6 If during test preparation alcohol vapor is in the and its concentration exceeds 0.3 ppm, the appliance will not go into "Ready" mode and the screen displays the inscription shown on Picture 12



Picture 12

5.7 Simply program a convenient measurement unit - and exhale into alcohol analyzer. If the concentration of alcohol does not exceed the limits, alcohol analyzer, apart from test results, will show the picture "OK on the steering wheel driving":



Picture 13

5.8 If after the result checking the appliance is not turned off by the user clicking "ON / OFF" button,



after 2 minutes it shuts off automatically.

**Caution:** Do not use old mouthpieces without preliminary disinfection.

*To disinfect a mouthpiece prepare the following desinfectant:*

- solve 3% solution of chloramine B in water (3 grams per 100ml of water);
- solve 1.7% hydrogen peroxide solution (perhydrol) in water;
- solve 0.5% solution of SD (synthetic detergent) in water (0.5 g CMC in 100 ml of water).

*1) In case of perhydrol solid form usage (tablets), take the portion of 17 g and dissolve it in 1 liter of water; if using 3% solution – add 13 ml of water for every 12 ml of the 3% solution.*

*DO NOT MIX hydrogen peroxide solutions and SD.*

*2) Disinfect all mouthpieces using chloramine B by keeping them in a solution for 1 hour, stirring sometimes the solution with the pieces.*

*3) Remove the mouthpieces from the solution of chloramine B, let the liquid drain off and dip them in a mixture of hydrogen peroxide solution and SD, pre-heating the solution to 35-40 ° C, keep the mouthpieces in this solution for 30 minutes.*

*4) Remove the items from the solution, rinse under warm, then cold water until complete removal of disinfectant solutions.*

*5) Dry the mouthpieces in the air until the water disappears or dry them with compressed air not containing moisture and oil.*

*Note –Please use once the above indicated solutions.*

It is allowed to use a cocktail pipe as a disposable individual mouthpiece.

5.8 The new test should be performed using a new (or sanitized) mouthpiece.

In the case of high alcohol concentration during test it is recommended to ventilate the sensor chamber, for that take the appliance in your hand and make a few hand motions from side to side.

**NOTE:** The exhaled air analysis of should be performed not earlier than 3 minutes after smoking. Please be aware that the sensor is very sensitive to exhaled carbon dioxide, so before performing the test in a room, it is recommended to make a few deep breaths far away from the appliance.

## **6. Package contents**

Package contents can be seen in Table 2.

Table 2

## 7. Maintenance

Maintenance consists in replacing the old battery or charging the battery, as well as periodical disinfection of the surface.

Disinfection of surfaces should be performed with a 3-percent solution of hydrogen peroxide with 0.5-

№	Item	Quantity	Note
1	Alcohol analyzer «Hunter™ Professional» ИНТК.431412.001	1	
2	Power supply type AAA	2	
4	Mouthpeace	5	
5	Packing box	1	
6	User's guide ИНТК. 431412.001РЭ	1	

percent of synthetic detergent (such as "Lotus") or 1-percent solution of chlorine bleach.

## 8. Troubleshooting

All troubleshootings and their fixing possibilities are presented in Table 3

Table 3

Troubleshooting description	Possible problem	How to fix
After turning on the device nothing appears on the display	Discharged batteries	Replace the batteries
	Defective item	Send the appliance to be repaired

## 9. Calibration

9.1 The initial calibration is performed by the manufacturer. With time using the device the sensor changes its characteristics, so after a certain number of tests (about 500) there is a need for additional calibration by the user.

**Attention!** The device gives by itself a notice to the user about the recalibration need – while preparing for the test "calibrate the appliance" notice appears on the screen. The test, thus, can be performed, as described above, but the accuracy of the test result is not guaranteed!

9.2 For the calibration you need:

Enter the calibration menu, by pressing the buttons: "ON / OFF" and "MODE". In the menu Calibration, click "ON / OFF" to select the device calibration type. Four types of regimes are predefined - "Cancel", "Clean Air", "Promille", "Manufacturer's original." To enter the selected type of calibration, press and hold "MODE" button for 2 seconds. To leave the calibration menu without saving the calibration results, turn off the device power using "ON / OFF" button for 2 seconds, or choose the calibration type "Cancel." Calibration must be performed in climatic conditions, close to normal, i.e. +20 ... +25 ° C and in relative humidity of 50-65%. Before the calibration, the appliance must be kept for 7 days in clean air and should not be used for tests. This condition is necessary for complete evaporation of unwanted gas impurities from the sensor.

### 9.3 Calibration of "Clean Air"

After selecting this type of calibration the device switches to the calibration mode, the screen start displaying image "Calibrating air 5:00." The device calibrates in this mode within 5 minutes. At the end of calibration the appliance will show exhalation result, which will be accepted as standard and will be saved appliance volatile memory. Number of tests performed is reset now and the counting begins again until the next calibration.

This type of calibration depends on relative humidity; it is used if there is no way to calibrate the appliance using the professional test generator, simulating the exhalation with different concentrations of alcohol. Therefore, this type of calibration is recommended to be used with great caution.

### 9.3 Calibration "Promille"

To perform this calibration, it is necessary to have a test generator and alcohol-air mixtures, simulating exhalation with different concentrations of ethanol. Before calibration it is necessary to measure the temperature of the alcohol-air mixture. You can measure the alcohol-air mixture temperature with digital thermometer at the generator outlet and set the measured temperature in calibration mode "TEMP" using "MODE" button.

Then enter menu section "Calibration Promille" and press "MODE" button to set ppm levels in blood. The device offers you to select values from 0.3 to 1.3 ppm, measurement pitch 0.05 ppm. You must select a value, corresponding the solution concentration of the test generator. It is recommended to perform the calibration with 0.6 ppm value pre-set.

After the device is set into calibration mode, the display shows a stripe and "Calibration" image on the bottom.

When the device is ready for work with generator, you will see a flashing arrow and the image «Blow», then you can start blowing into the inlet of the appliance using the generator.

After completing the calibration, the appliance displays the value of generator's ethanol vapor concentration and saves the calibration result in the nonvolatile memory of the device. The counter of tests performed has been reset and counting begins again until the next calibration.

You can also perform the calibration at the factory of origin, for that you may complete the application form on the web site (see below).

### 9.3 Calibration "Manufacturer's original"

In this mode, you can return the calibration data filed by the manufacturer during the calibration at the factory of origin. It is recommended to perform this type of calibration if the calibration in mode "Clean Air" and "Promille" was done incorrect.

As soon as you set up this type of calibration, the appliance turns on a normal test mode. The reminding message about the calibration need will remain after this calibration.

## **10. Package and transportation certificate**

In accordance to package contents in Table 2, each appliance is packed into the individual corrugated cardboard box. Moving of the item in the package is not in allowed. Packed products are fit into the shipping container - a box made of corrugated cardboard GOST 22 637.

Packaged goods can be delivered by road or by rail in boxcars or containers, also in pressurized module by air.

During transportation, the items must be protected from direct precipitations and solar radiation.

Terms of transportation:

- Ambient temperature from -50 to 50 °C;

- Relative humidity up to 95% at 25 °C;
- Atmospheric pressure from 84 to 107 kPa (630 to 800 mm Hg. Art.)
- Peak shock acceleration up to 147 m/s<sup>2</sup> (15 g) during shock acceleration duration of 10-15 ms.

The requirements of warning labels should be strictly complied when loading and delivering.