**Product - Introduction**

**NovaTestTM P100 Portable GC (Product Introduction)**

NovaTestTM P100 is the first portable two-dimensional gas chromatography system developed for rapid analysis of complex volatile organic compounds (VOCs) with high sensitivity. The P100 is designed with the user in mind, in order to achieve optimal results without sacrificing efficiency or ergonomics. The unit boasts a superior detection limit of a few picogram (10-12 gram) for benzene, toluene, ethylbenzene, and xylene, which is equivalent to a few parts-per-trillion (ppt) concentration in 1-liter of air sample.Meanwhile, the lightweight and compact design comes with a built-in carrier gas cartridge and rechargeable battery that can last ??? hrs for high mobility and portability.

The system is fully automated and requires minimal user input to operate. Testing can be initiated quickly and easily using one of several built-in methods based on the target application. This allows for anyone to effectively use the P100 system without extensive knowledge of GC theory. Simplistic instructions along with a streamlined software will generate an intuitive and customizable report on the detected gases and their respective concentrations.

Users can also customize and run their own methods using the ‘Advanced Test’ function for specific applications.

The versatility of the P100 is simply unmatched and can analyze the analytes in various media such as vapor and liquid. This alone solidifies the NovaTestTM P100 as a much more accessible solution to any GC application compared to other commercially available gas chromatography devices.

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| **Portable.**  Innovative MEMS (Micro Electro Mechanical Systems) as and microfluidic technologies are employed to achieve a compact size and light weight of the P100. This makes field testing easy, fast, and accurate.  **Dimensions:**  14 in × 12 in × 6 in  (36 cm × 30 cm × 15 cm)  **Weight:** 15 lb (7 kg)  **Built-in carrier gas** | **Powerful.**  Most VOCs are separated in the primary column and detected by the primary PID. Using the P100, those co-eluted VOCs that cannot be separated by the primary column will be automatically collected reinjected to the secondary columns having a different separation mechanism, for further analysis  **Separation capability**:  More than 50 VOCs | **Rapid.**  The P100 utilizes a cutting-edge PID module to further enhance its capabilities in gas chromatography. The highly sensitive microfluidic PID has a virtually zero dead volume, and consequently, the response time is shortened considerably. |

**Product Description**

1. **Sensitive.** Detection limit of NovaTestTM P100 reaches a level of sub-ppb. See my texts above
2. **Rapid.** NovaTestTM P100 can analyze tens of VOCs effectively within as fast as several minutes.
3. **Stable.** The auto-cleaning set-up prevents NovaTestTM P100 from any interference of residual samples.
4. **Powerful.** Coeluted peaks from the first-dimensional column can be further separated and analyzed in 2D columns.
5. **Reconfigurable.** The number and the properties of the second-dimensional columns can be reconfigured. The corresponding detectors are replaceable and upgradable

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**How to set up NovaTestTM P100 Portable GC**

Congratulations on the purchase of your new NovaTestTM P100! It’s an innovative device that likens complex gas chromatography analysis to the operation of an auto focus camera. Installation is simple, and there is no need to be a GC expert to achieve optimal results. If there’s still any trouble, we’d love to send a technician to help you with any aspect of the device you might be having trouble with.

If you choose to set up the device by yourself, please carefully unpack your NovaTestTM P100, and make sure you have received all the items necessary to operate the device. Below is a simple checklist to ensure you can account for all the parts of your P100.

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| **Packaging checklist** | | |
| **Item** | **Qty** | **Description** |
| User Manual | 1 |  |
| USB cable | 1 | Plastic bag packaging, 1.5 m, black, part# |
| Sampling filter | 10 | Plastic bag packaging, 25 mm, 0.1 um, white, part# |
| Sampling tube | 1 | Plastic bag packaging, blue, part# |
| Carrier gas cartridge | 1 | In carrier gas cabin, part# |
| Software USB | 1 | Flash drive, part# |
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**Installation Guidelines:**

1. **Install the software.** Plug in the flash drive, open the install file and follow the instructions. (.exe for Microsoft system and .dmg for iOX system) The software should open automatically.
2. **Connect the NovaTestTM P100 with your computer using the provided USB cable.** Software should automatically open following installation, but can also be opened manually.
3. **Activate your ‘Advanced Test’ if you have also purchased this function.** Enter the code you received for advanced testing. If you wish to purchase one, click on ‘Don’t have a code?’ and you will be redirected to the purchase link (internet access required).
4. **Open the cabin of NovaTestTM P100 and attach the carrier gas cartridge tightly to the regulator.** Make sure the seal is tight.
5. **Attach the sampling filter to the sampling port; then, attach the sampling tube to the filter.** The sampling port is located at the upper left corner in the front of the device. Double check all connections to ensure tight seals.
6. **Turn on the power switch.** If the battery is low, use the provided power cord to connect your device with power source through the power port on the back of the device.
7. **Turn on the carrier gas** by turning the carrier gas adjuster. The adjuster is located at the upper right corner in the front of the device. The indicator should show approximately 10 psi for most applications.
8. **Run a control test to check if your device is in good condition.** A simple way to gauge the if the system is working correctly is to simply use ambient air. Point the sampling syringe into the air and follow Testing Guidelines below to conduct a test. You can also run a test with any standard gas or a calibration run. Please refer to ***User Manual*** if you choose to run a standard test or a calibration.

Refer to ***Troubleshooting in User Manual*** or contact customer service if you experience any issues regarding installation.

**Testing Guidelines:**

1. **Connect.**

Connect your NovaTestTM P100 to your computer.

Connect your sample NovaTestTM P100.

1. **Open.**

Open the carrier gas.

Open the software on your computer.

1. **Select.**

Click ‘Run Test’ on home page.

Select a method.

1. **Test.**

Input the sample name & sampling time.

Click ‘Start’.

**Footer introduction**

Nanova Environmental, Inc. (NEI) provides advanced Technologies, Products, and Services for Environmental Monitoring and Environmental Protection. Our goal is to continually improve our products beyond the industry standards with the help of our brilliant engineers and rigorous researches. Our vision is “Better Life Through Innovation”.

**Applications**

The following compounds and chemicals can be identified by NovaTest TM P100. Knowing what problems you have in your business, home, workplace or local environment can help you gather support for addressing those issues.

**TVOC**

Total volatile organic compounds (TVOC), encompass a variety of VOCs that are characteristically defined with low boiling points.

VOCs are widely present almost everywhere, either being released from natural gas and oil, generated by plants and animals, or simply produced as a result of human activity. Some VOCs are important to production and bio-communication, but others have negative effects to environment and human health, even at low concentrations in air or water.

The US government has approved various regulations toward the emission of VOCs, while TVOCs are measured for the sake of simplicity, especially when the concentration of each VOC is relatively low.

**BTEX**

BTEX represents the combination of benzene, toluene, ethylbenzene and xylene (o-xylene, m-xylene, p-xylene). These chemicals are colorless, can be highly flammable and have a strong odor. They are aromatic hydrocarbons commonly found in refinery and chemical industries relating to petroleum, and can be found in many everyday household products, as well as the ambient air as a result of fuel combustion.

Though the components of BTEX are essential in the manufacturing of various petrochemical products such as plastics, foams, metals, textiles, and medicines, they are found to have long-term negative effects on human health. BTEX can lead to irritation of eyes, nose and skin, nervous system problems and even various forms of cancer. Benzene itself is known to cause leukemia and other forms of cancer with prolonged exposure.

**MTBE**

MTBE represents methyl tertiary butyl ether, which is a colorless, flammable and volatile liquid commonly used as a gasoline additive and oxygenate. It is one of the main sources of underground water solution with odor and an unpleasant flavor at very low concentration, and is thus forbidden by the US government as fuel additive.

However, MTBE is widely used as a substitute solvent for diethyl ether, and in some cases, it is used to decrease the risk of explosion from peroxides. It’s also used to dissolve gallstones by direct injection to human body. MTBE demand is hard to define and its presence is difficult to find or identify; thus, the monitoring of this VOC requires considerable effort.

**TCE/PCE**

TCE, or trichloroethylene, is a popular solvent with a sweet smell. It is a nonflammable liquid used widely in the extraction of vegetable oil and caffeine, anesthesiology, dry cleaning, metal degreasing, and many other applications. However, TCE has been classified as a carcinogen by the US Environmental Protection Agency (EPA). It can cause problems within the central nervous system and can be quite harmful if present in the water or air.

PCE (perchloroethylene or tetrachloroethylene) is commonly used in dry cleaning applications. It is a colorless and nonflammable liquid with a strong sweet smell. It was also classified as a carcinogen, similar to TCE, for its potential to cause problems within the central nervous system and ability to cause cancer. What’s more, it contaminates soil easily, is hard to remove from water, and can be regarded as a toxic chemical to humans.

**Malodorous gases**

Malodorous gases are VOCs with an extremely unpleasant smell, as the name implies. They tend to be released during industrial production, sewage discharge, or waste combustion. Sewage treatment and garbage treatment sites, pharmaceutical industries, petrochemical industries, slaughterhouses, farms, paper mills, printing industries, and laboratories are all potential sources of these VOCs.

Malodorous gases are mainly comprised of ammonia, carbon disulfide, dimethyl sulfide, dimethyl disulfide, hydrogen sulfide, methanethiol, styrene, and trimethylamine with miscellaneous sources and toxicity. People exposed to malodorous gases are vulnerable to problems with the respiratory system, digestive system, endocrine system, nervous system and cardiovascular system. Many countries have established strict regulations and standards towards the emission of malodorous gases.

**Vehicles**

Some people may notice an unpleasant smell in their car, especially new cars. This can be attributed to the VOCs released from decorations, paint, and adhesives present in the interior of the vehicle. If exposed to strong sunlight and high temperatures, the organic materials inside the car can decompose and release VOCs. Meanwhile, VOCs brought in from the outside can be trapped in the air conditioning system and diffuse into the vehicle’s interior.

These VOCs mainly include acetaldehyde, acrolein, benzene, ethylbenzene, styrene, toluene, and xylene, most of which can cause cancer, or increase the risk of developing cancer long term. People briefly exposed may experience headaches, nausea, dizziness, and difficulty concentrating, which can increase the risk of an accident.

**Environment**

The source of pollutants in environmental air can vary greatly depending on combustion discharges and emission levels from manufacturing and power plants. Pollutants also come from fuel burning at agricultural plants, pesticide vaporization, burning and rotting trash, painting and decorative materials in construction, automobile exhaust, leaking of industrial gases, sites of manufacturing accidents, vaporization of chemicals, etc. Usually, the chemicals can diffuse, condense, react or be absorbed to spell any major concerns. However, if they are allowed accumulate and reach a critical concentration the negative effects must be treated and rectified immediately.

These pollutants may contain ammonia, sulfur dioxide, 1,2-dichlorobenzene, 1,2-dibromoethane, 1,1-dichloroethene, allyl chloride, benzene, xylene, styrene, toluene, dichloropropene, etc. These pollutants have negative effects to all forms of life, while some VOCs can become poisonous to animals and plants when exposed to sunlight, and contribute to the development of cancer in humans.

**Pollution**

Similar to those VOCs found in the air, pollutants can come from almost anywhere, but more specifically, they can result from industry discharges, combustion and sewage. VOCs can be found on sites of manufacturing accidents, in household sewage, agricultural waste, and so on. The pollutants from such sources are usually of high concentration, meaning humans are more susceptible to disease. These types of VOCs are very difficult to diffuse quickly and are some of the most dangerous.

These pollutants are usually acetone, anisole, benzaldehyde, benzene, butyl acetate, cyclopentanone, ethylbenzene, heptane, isopropanol, xylene, styrene, toluene, etc. Like many other VOCs previously listed, these chemicals are carcinogenic, and tend to damage the central nervous system.

**Water**

While water is a crucial building block to support life, VOC pollution of water can consequently affect the entire ecosphere. The sheer mobility of water makes it extremely easy to contaminate, as pollutants can easily be carried through the aquatic system and cause global pollution. Some of the pollutants can be degraded by microorganisms, which limit the damage they can cause, while others simply cannot. This is why water is a medium that must constantly be tested to remove harmful VOCs from contaminating the environment at an abnormally quick rate.

Common contaminants are 1,2-dichlorobenzene, 1,4-dichlorobenzene, benzene, chlorobenzene, dichloromethane, ethylbenzene, isopropylbenzene, xylene, styrene, toluene, trichloroethylene, etc. Benzene and its derivatives, as well as some halogenated hydrocarbons, are well known toxins and carcinogens. Living creatures in direct contact with such pollutions are extremely vulnerable to a myriad of health problems.