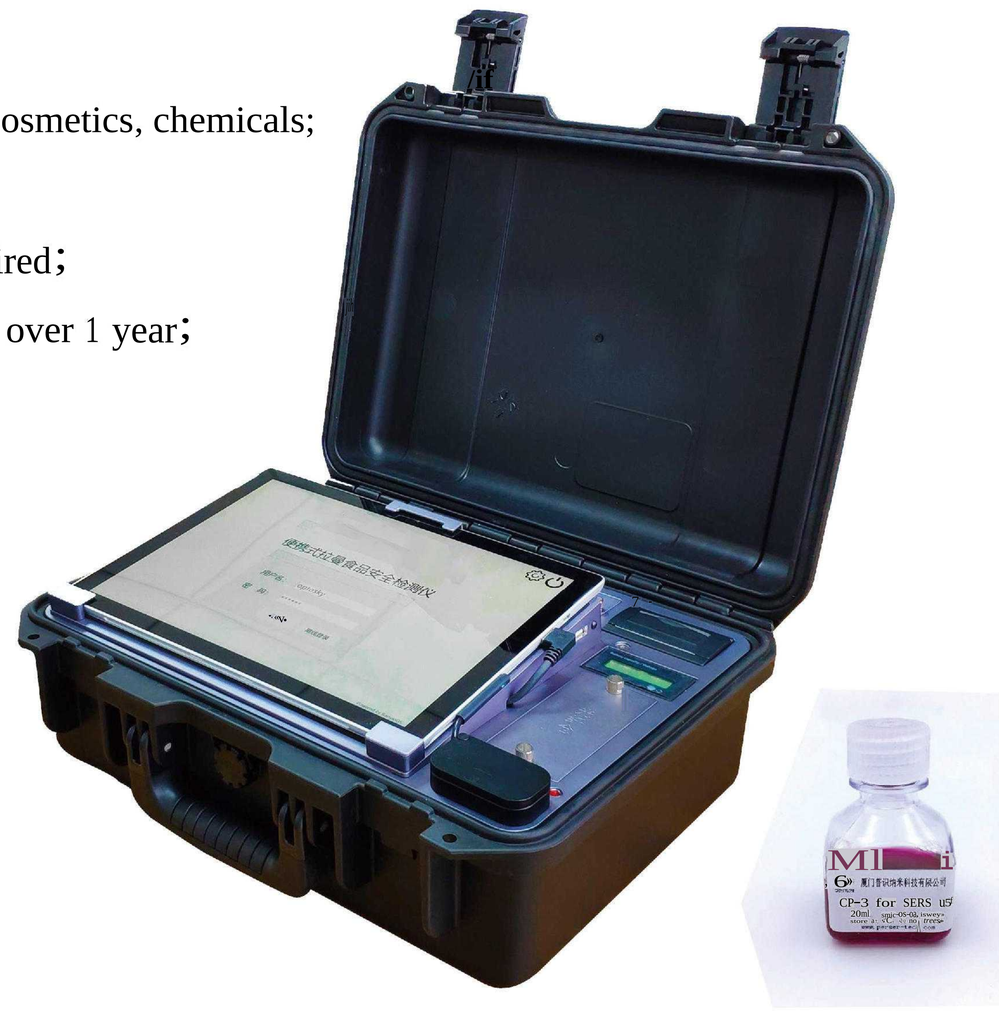
# Portable Raman Spectrometer For Food Safety

# DTR3000FD

## Features



- Over 140 models detected, including drugs,dietary supplement, cosmetics, chemicals;
  Detect limits reach up to ppb level；
  Accurate auto-identification algorithm， no manual readout required；
  High performance, high stable SERS enhanced reagent, life span over 1 year；
  Sample state Ⅰ Solid, powder, thin film, liquid；
  Touchscreen！ 12inch；
  Stable Windows 10 operation system ；
  USB 2.0, Bluetooth, WIFI, 4G modules (optional)；
  Touch screen and keyboard input；
  Friendly interface；
  Battery life> 5hrs；
  IP67；

## Description

- Raman spectroscopy is a fast, non-detructive, safety detection technology. It possessed fast, accurate, good repeatabilities. And their samples can be easily pretreated with a compact size multiple functions pretreatment instrument. DTR3000FD combines SERS with Raman Spectrometer technology, It provides fast identification, in-field detect food pesticide residues, veterinary drugs residues, non-edible chemical substance trace, abuse of food additives, illegal additives drugs for health care.

| Models | Range (cm-1) | Resolution (cm-1) |
|---|---|---|
| DTR3000FD-27 | 250-2700 | 4-6 |
| DTR3000FD-35 | 200-3500 | 6-8 |
| DTR3000FD-43 | 200-4300 | 8-10 |

Remark：
Reference to ASTM E2529-06 Method Test；
Special customization can improve resolution, but less sensitivity.

## Parameters

| DTR3000FD System | |
|---|---|
| Interface | USB 2.0/LAN |
| Touch Screen | 12” Touch Screen |
| Evidence Picture | 3-mega Camera |
| Operating System | Windows 10 |
| Battery life | >5h |
| Integration Time | 4ms - 120s |
| Power Voltage | DC 19V(+/-5%) |
| Operating Temp | -25～60 °C |
| Operating Humidity | < 95% |
| Storage Condition | -35~75 C, <95% |
| Size (L*W*H) | 35x24.5x15.2 cm3 |
| Weight | 9Kg |

| | |
|---|---|
| **Reliability** | |
| **Spectral Reliability** | **a/p <0.5% (COT 8 hours)** |
| **Temp Reliability** | **Shift≤ 1 cm-1 (10-40 C)** |
| **Spectral Intensity Change (in5 ∧40 0C)** | **<±5%** |
| **Optical Parameters** | |
| **Spectral Range** | **250-2700 cm-1 (Customized)** |
| **Resolution** | **4-6 cm-1 (Customized)** |
| **SNR** | **>570: 1** |
| **Optical Path** | **f/4, Crossed C-T** |
| **Focus Distance** | **98 mm for incidence and output** |
| **Detector** | |
| **Model** | **Cooled CCD** |
| **Detector Range** | **200-1100nm** |
| **Effective Pixels** | **2048** |
| **Dynamic Range** | **1300: 1** |
| **Sensitivity** | **130 Photon @ 400 nm; 60 Photon @ 600 nm** |
| **Laser** | |
| **Central Wavelength** | **785nm (+/-lnm)** |
| **FWHM** | **0.08 nm** |
| **Laser Output** | **>550 mW** |
| **Power Stability** | **<±0.2%** |
| **Raman Probe** | |
| **Working Distance** | **6 mm** |
| **Rayleigh Scatter Resistant** | **OD>8** |
| **NA** | **0.3** |
| **Aperture** | **7mm** |

## Test Items

**1.Application:**

(1)Raman technology is suitable for a wide range of unknown chemical substances;

(2)The database can be used to measure a wide range of chemical substances including aqueous solution. Sample shape: constant solid, powder, film, liquid;

(3)System weight < 10 kg, size < 20cm * 30cm * 40cm.

**2.Technical Parameter**

(1)Wavelength range: 250-2700 cm-1；

(2)Resolution: 6cm-l (Half peak width);

(3)2048 pixel CCD detector with refrigeration;

(4)The fully integrated Raman food safety analyzer system based on OEM adopts planar reflection grating spectrometer and Raman laser, and adopts high coupling efficiency and high sensitivity Raman signal coupling and collection;

(5)Weight: ≤10kg,; operation interface: 12 inch industrial true color display screen, multi touch capacitive screen, full Chinese operating system, software can automatically analyze. Automatic analysis of Raman spectrum, intelligent identification of mixture, automatic analysis of mixture composition, without the help of external software and computer processing;

(6)Laser: 785 nm narrow linewidth Raman laser, linewidth better than 0.08 nm, < 500 mW,. The laser power is adjustable;

(7)Battery: equipped with 10000 mA lithium battery and lithium battery charging circuit, the battery service time is more than 4 hours;

(8)Scanning mode: non contact scanning and vial sampling mode;

(9)Working temperature: _ 10℃ - 40℃. Working humidity: humidity < 90%.

(10)The circuit board requires Bluetooth module, wireless network card and Unicom 4G communication card;

(11integrated USB interface 2, integrated buzzer;

( 12) Spectrum library: Raman enhanced spectrum of illegal additives in drugs, food and health care products.

Users can label more than 50 chemicals in the database. If the detected substance contains the marked chemical substance, the system will display the information containing the prohibited substance. It has the function of adding database items manually;

(13)Data export: report can be exported through SD card;

(14)24-hour spectrum technical support to help users solve technical problems;

(15)The detection limit reached ppb level, and the detection items included drugs, health care drugs, cosmetics and chemicals;

(16)Sample shape: constant solid, powder, film, liquid;

(17)Detection of illegal additives, agricultural and veterinary hormone residues and adulterated harmful substances in micro trace food;

(18)Detection of illegal additives in micro trace health food；

(19)Ppb level detection can be achieved by nano enhancement reagent;

(20)The stability of nano enhanced reagent was more than 12 months.

**Test items (at least, but not limited to the following items, the instrument can expand the test items infinitely)**

| NO | Item | Common food (scope of application) Abuse of food additives | Detection time /min | Limit mg/kg |
|---|---|---|---|---|
| 1 | Erythrosine | Drinks, etc | 5 | 0.02 |
| 2 | Saccharin sodium | Liquor, etc. | 5 | 0.1 |
| 3 | Aspartame | Drinks, etc | 5 | 0.5 |
| Non edible chemicals | | | | |
| 4 | Urotropine | Bean products such as bean curd sticks | 15 | 0.01 |
| 5 | Sudan I | Chili oil, chili powder, etc | 15 | 0.2 |
| 6 | Rhodamine B | Chili oil, chili powder, etc | 15 | 0.2 |
| 7 | Auramine O | Bean products, yellow croaker, etc | 15 | 0.1 |
| 8 | Morphine | Seasoning, etc | 15 | 0.1 |
| 9 | Basic orange 21 | Bean products such as bean curd sticks | 15 | 0.1 |
| 10 | Basic orange 22 | Bean products such as bean curd sticks | 15 | 0.1 |
| 11 | Melamine | Milk and dairy products | 10 | 0.2 |
| 12 | Sodium thiocyanate | Liquid milk | 10 | 0.05 |
| 13 | Bengal Rose | Drinks | 10 | 0.1 |
| 14 | Fuchsia S | Drinks | 10 | 1 |
| 15 | Sodium fluorescein | Drinks | 10 | 0.1 |
| 16 | Fluorescent Pink B | Drinks | 10 | 1 |
| 17 | Patent blue | Drinks | 10 | 5 |
| Pesticide residue | | | | |
| 18 | Malathion | Vegetables, fruits | 20 | 0.1 |
| 19 | Fenitrothion | Vegetables, fruits | 20 | 0.5 |
| 20 | Parathion methyl | Vegetables, fruits | 20 | 0.1 |
| 21 | Parathion | Vegetables, fruits | 20 | 0.2 |
| 22 | Trisulfite | Vegetables, fruits | 20 | 0.1 |
| 23 | Phorate | Vegetables, fruits | 20 | 0.2 |

| | | | | |
|---|---|---|---|---|
| 24 | Phoxim | Vegetables, fruits | 20 | 0.2 |
| 25 | Thiophos | Vegetables, fruits | 20 | 0.25 |
| 26 | Methamidophos | Vegetables, fruits | 20 | 0.1 |
| 27 | Acephate | Vegetables, fruits | 20 | 0.1 |
| 28 | Imiphos | Vegetables, fruits | 20 | 0.5 |
| 29 | Fenthion | Vegetables, fruits | 20 | 0.05 |
| 30 | Chlorpyrifos | Vegetables, fruits | 20 | 0.5 |
| 31 | Chlorpyrifos methyl | Vegetables, fruits | 20 | 0.5 |
| 32 | Triazophos | Vegetables, fruits | 20 | 0.5 |
| 33 | Isocarbophos | Vegetables, fruits | 20 | 0.5 |
| 34 | Dicofol | Vegetables, fruits | 20 | 1 |
| 35 | Difenoconazole | Vegetables, fruits | 20 | 0.1 |
| 36 | Pyridaben | Vegetables, fruits | 20 | 0.1 |
| 37 | Carbaryl | Vegetables, fruits | 20 | 1 |
| 38 | Paraquat | Vegetables, fruits | 20 | 0.01 |
| 39 | Triadimefon | Vegetables, fruits | 20 | 0.1 |
| Veterinary drug residues | | | | |
| 40 | Malachite green | Aquatic products, fish | 15 | 0.01 |
| 41 | Hidden malachite green | Aquatic products, fish | 15 | 0.01 |
| 42 | Enrofloxacin | Aquatic products, fish | 15 | 0.02 |
| 43 | Sodium pentachlorophenol | Aquatic products, fish | 10 | 5 |
| 44 | Crystalloid violet | Aquatic products, fish | 10 | 0.01 |
| Illegally added in health products | | | | |
| 45 | Sibutramine | Slimming health care drugs | 10 | 0.5 |
| 46 | Ephedrine | Slimming health care drugs | 10 | 0.5 |
| 47 | Sildenafil | Anti fatigue health care drugs | 10 | 0.1 |
| 48 | Tadalafil | Anti fatigue health care drugs | 10 | 0.1 |
| 49 | Edenafil citrate | Anti fatigue health care drugs | 10 | 0.5 |
| 50 | Reddenafil | Anti fatigue health care drugs | 10 | 1 |
| 51 | Vardenafil | Anti fatigue health care drugs | 10 | 0.05 |
| 52 | Pseudo Vardenafil | Anti fatigue health care drugs | 10 | 1 |
| 53 | Triazolam | Tranquilizing and sleeping care drugs | 10 | 0.1 |
| 54 | Diazepam | Tranquilizing and sleeping care drugs | 10 | 0.1 |
| 55 | Oxazepam | Tranquilizing and sleeping care drugs | 10 | 0.1 |
| 56 | Clozapine | Tranquilizing and sleeping care drugs | 10 | 0.1 |
| 57 | Clonazepam | Tranquilizing and sleeping care drugs | 10 | 0.1 |
| 58 | Alprazolam | Tranquilizing and sleeping care drugs | 10 | 0.1 |
| 59 | Captopril | Antihypertensive health care drugs | 10 | 0.5 |
| 60 | Clonidine hydrochloride | Antihypertensive health care drugs | 10 | 0.5 |
| 61 | Prazosin hydrochloride | Antihypertensive health care drugs | 10 | 0.5 |
| 62 | Nifedipine | Antihypertensive health care drugs | 10 | 0.5 |
| 63 | Atenolol | Hypoglycemic health care drugs | 10 | 0.1 |
| 64 | Glipizide | Hypoglycemic health care drugs. | 10 | 1 |
| 65 | Gliclazide | Hypoglycemic health care drugs | 10 | 0.5 |
| 66 | Glibenclamide | Hypoglycemic health care drugs | 10 | 0.5 |
| 67 | Repaglinide | Hypoglycemic health care drugs | 10 | 1 |
| 68 | Metformin hydrochloride | Hypoglycemic health care drugs | 10 | 0.1 |
| 69 | Pioglitazone hydrochloride | Hypoglycemic health care drugs | 10 | 0.5 |
| 70 | Phenformin hydrochloride | Hypoglycemic health care drugs | 10 | 0.1 |
| 71 | Rosiglitazone maleate | Hypoglycemic health care drugs | 10 | 0.1 |

**Other Accessories**

For the first order, 200 times of SERS enhancement reagents were purchased as gifts;

**Successful Application Cases**

| Time | Customer | Item | Application |
|---|---|---|---|
| August2017 | Weifang Public Security Bureau | Raman integrated rapid screening equipment for food safety | Rapid screening of food safety |
| September2017 | Haizhou District, Lianyungang | Raman integrated rapid screening system for food safety | Rapid screening of food safety |
| December 2017 | Dezhou City, Shandong Province | Raman integrated food safety screening system | Rapid screening of food safety |
| December 2017 | Sichuan food and Drug Administration | Food safety emergency rapid inspection equipment | Rapid screening of food safety |

**Optional Accessories**

Optional: The DTFD030 multi-functional pretreatment equipment, which is specially used for surface enhanced Raman detection, integrates the functions of ultrasonic extraction, centrifugation and volatile concentration. It is portable, automatic and easy to operate. It can be used for the separation and enrichment of complex system in the process of surface enhanced Raman detection of actual samples.

Physical diagram of DTFD030 (vehicle mounted) portable multifunctional pretreatment instrument