

## Portable Raman Spectrometer For Food Safety

## ATR3000FD

### 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 : Solid, powder, thin film, liquid;
- Touch screen: 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-destructive, safety detection technology. It possessed fast, accurate, good repeatabilities. And their samples can be easily pretreated with a compact size multiple functions pretreatment instrument.

ATR3000FD 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 <sup>-1</sup> )	Resolution (cm <sup>-1</sup> )
ATR3000FD-27	250-2700	4-6
ATR3000FD-35	200-3500	6-8
ATR3000FD-43	200-4300	8-10

### Remark:

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



## 1.1 Specification

ATR3000FD System	
Interface	USB 2.0/LAN
Touch Screen	12" Touch Screen
Evidence Picture	3-mega Camera
Operating System	Windows 10
Battery life	>5 h
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)	35×24.5×15.2 cm <sup>3</sup> ▲
Weight	9 Kg
Reliability	
Spectral Reliability	$\sigma/\mu < 0.5\%$ (COT 8 hours)
Temp Reliability	Shift $\leq 1 \text{ cm}^{-1}$ (10-40 °C)
Spectral Intensity Change (in 5 ~ 40 °C)	<±5%
Optical Parameters	
Spectral Range	250-2700 cm <sup>-1</sup> (Customized)
Resolution	4-6 cm <sup>-1</sup> (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	200-1100 nm
Effective Pixels	2048
Dynamic Range	1300: 1
Sensitivity	130 Photon @ 400 nm; 60 Photon @ 600 nm
Laser	
Central Wavelength	785nm (+/-1nm)
FWHM	0.08 nm
Laser Output	≥550 mW
Power Stability	$\sigma/\mu < \pm 0.2\%$
Raman Probe	

Working Distance	6 mm
Rayleigh Scatter Resistant	OD>8
NA	0.3
Aperture	7mm

## 1.2 Test Items

Portable Raman Spectrometer	<p><b>1.Application:</b></p> <p>(1) Raman technology is suitable for a wide range of unknown chemical substances;</p> <p>(2) The database can be used to measure a wide range of chemical substances including aqueous solution. Sample shape: constant solid, powder, film, liquid;</p> <p>(3) System weight <math>\leq 10</math> kg, size <math>\leq 20\text{cm} * 30\text{cm} * 40\text{cm}</math>.</p> <p><b>2.Technical Parameter</b></p> <p>(1) Wavelength range: <math>250\text{-}2700\text{ cm}^{-1}</math> ;</p> <p>(2) Resolution: <math>6\text{cm}^{-1}</math> (Half peak width);</p> <p>(3) 2048 pixel CCD detector with refrigeration;</p> <p>(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;</p> <p>(5) Weight: <math>\leq 10\text{kg}</math>;; 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;</p> <p>(6) Laser: 785 nm narrow linewidth Raman laser, linewidth better than 0.08 nm, <math>\leq 500</math> mW,. The laser power is adjustable;</p> <p>(7) Battery: equipped with 10000 mA lithium battery and lithium battery charging circuit, the battery service time is more than 4 hours;</p> <p>(8) Scanning mode: non contact scanning and vial sampling mode;</p> <p>(9) Working temperature: <math>- 10\text{ }^{\circ}\text{C} - 40\text{ }^{\circ}\text{C}</math>. Working humidity: humidity <math>\leq 90\%</math>.</p> <p>(10) The circuit board requires Bluetooth module, wireless network card and Unicom 4G communication card;</p> <p>(11) Integrated USB interface 2, integrated buzzer;</p> <p>(10) Spectrum library: Raman enhanced spectrum of illegal additives in drugs, food and health care products.</p>
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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;

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

(12) 24-hour spectrum technical support to help users solve technical problems;

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

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

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

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

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

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

**3. ★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)	Detection time / min	Limit mg/kg
Abuse of food additives				
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	Antihypertensive 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

## 1.3 Other Accessories

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



## 1.4 Successful Application Cases

Time	Customer	Item	Application
August 2017	Weifang Public Security Bureau	Raman integrated rapid screening equipment for food safety	Rapid screening of food safety
September 2017	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

## 1.5 Optional Accessories

**\*Optional:** The ATFD030 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.



Fig. 1 Physical diagram of ATFD030 (vehicle mounted) portable multifunctional pretreatment instrument