

# Thermo Fisher Scientific - FirstDefender RMX



## GENERAL DESCRIPTION:

Thermo Scientific FirstDefender RMX is a Raman spectrometer for rapid, accurate identification of unknown chemicals directly in the field. Building on prior generation technology, enhancements have been made in speed, performance, mixture analysis and user interface incorporating extensive user feedback and the latest technical advances.

At 2.0 pounds (919g), the FirstDefender RMX unit is lightweight and portable, with a large, vivid display for ease of use in bulky protective gear. It is designed to meet the demanding requirements of elite military personnel and civilian first responders.



### Key Benefits:

- Fast, accurate identification. Based on Raman spectroscopy, quickly identifies unknown solid and liquid chemicals. Unit stores all data and can export in multiple formats.
- Built for field use. MIL-STD-810G and IP67 tested and certified.
- Improved automatic mixture analysis. Sophisticated chemometric algorithms automatically determine presence of mixed and contaminated chemicals.
- Point-and-shoot™ identification. Operates directly through sealed glass or plastic containers, avoiding exposure to potentially harmful substances.
- Extensive substance library. Identifies explosives, toxic industrial chemicals (TICs), chemical warfare agents (CWAs), narcotics, precursors, white powders and more.
- Fixed flex probe and optional tactical robot integration

## TECHNICAL DESCRIPTION:

Raman Spectroscopy is a vibrational spectroscopy technique, where an intense single wavelength laser is focused on a sample. The laser energy excites the bonds of a molecule and generates or scatters measurable light to identify the material in question. Raman is highly effective at extracting a reliable and accurate identification of an unknown substance based on its underlying chemistry. Raman spectroscopy is best used as a primary analysis technique for sampling aqueous solutions and white or light colored powders and scanning through sealed containers.

## Tier Selection

Final tier assignment is based on overall product score.

- Top Tier   ● Second Tier   ○ Third Tier
- ◐ Fourth Tier   ● Bottom Tier

### RANKINGS

	Biological	Chemical	Radiological
<b>FIELD USE System</b>	N/A	●	N/A
<b>MOBILE Laboratory</b>	N/A	◐	N/A
<b>DIAGNOSTIC Laboratory</b>	N/A	◐	N/A
<b>ANALYTICAL Laboratory</b>	N/A	◐	N/A

## Survey Source

Vendor Supplied Information

## CONTACT INFORMATION

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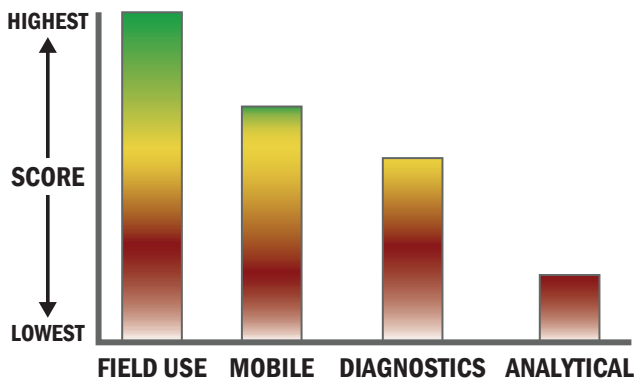
## COST

- \$55,000/system
- N/A/analysis



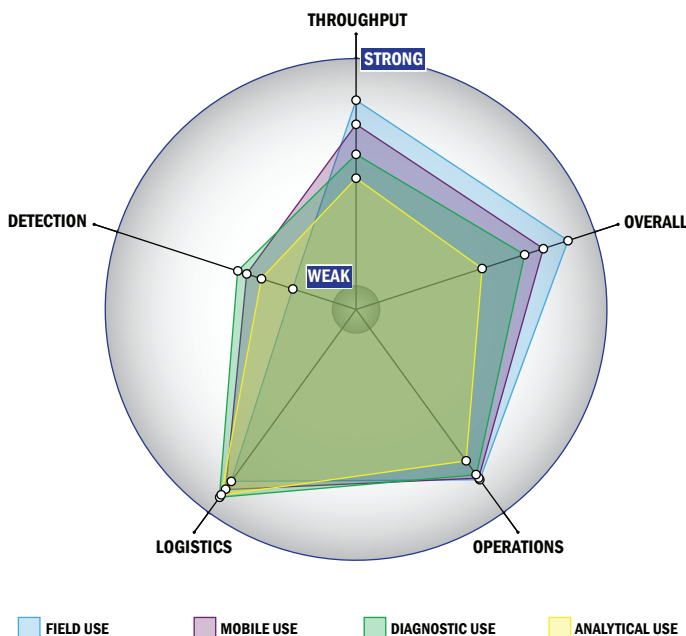
## Scoring Analysis

System scores are compared across the four scenarios and ranked from highest to lowest.



## Impact Chart

The Impact Chart is a spider graph representing specific categories and designed to give the reader a visual depiction of how a particular system is expected to operate across the four different scenarios. The score for each of the seven categories is presented as the percentage of the total possible score. Higher category scores extend the spokes of a graphic toward the outer edge of the chart. The area graphed for each of the four scenarios relates to how well the system performed in that scenario. Graphics for each of the four scenarios are super-imposed for ease of comparison.



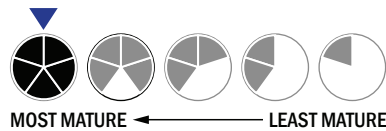
## Evaluation Criteria

### Throughput:

- 2 minutes or less for detection
- 1 sample, >10 tests/sample per run
- 95-32 samples every 2 hours
- The system could be adapted to a semi-automated system with some effort
- Device or system is intended for multiple detection assays
- 0-1 solutions, buffer, eluents, and/or reagents
- 0 components
- Less than 5 minutes is required for set-up
- 1-2 steps are required for detection

### Logistics:

- An afternoon of training and some technical skills required
- Approximately the size of a soda can
- Less than 1 kg
- System or device uses batteries
- 4-8 hours battery life



### Operations:

- Can be used from  $-21^{\circ}\text{C}$  to  $42^{\circ}\text{C}$  (All temperatures)
- Performance is not influenced by relative humidity
- 5-10 years expected life
- Results cannot be viewed in real-time
- The system is not capable of autonomy
- The system software is closed and not available for modification
- The system hardware is closed and not available for modification

### Detection:

- Possible the system could receive 510K clearance, no current efforts at this time
- Possible the system could receive FDA approval, no current efforts at this time
- Greater than 250  $\mu\text{L}$
- Good specificity. System has a consistently low level of false alarms (2-5%)
- >1 ppt
- System currently can identify liquid chemical agent