

**Perbandingan Performance Raman Spectrum
Brand Nanoram vs Methrom vs Agilent vs Bruker**

No	Parameter	Perbandingan Performance			
		Nanoram	Methrom	Agilent	Bruker
1	Brand	Nanoram	Methrom	Agilent	Bruker
2	Model	BWS456	Mira P Advanced	Vaya Raman	Raman Bravo
3	Spectral Range	176 cm ⁻¹ to 2500 cm ⁻¹	400 – 2,300 cm ⁻¹	350 to 2000 cm ⁻¹	300 cm ⁻¹ to 3200 cm ⁻¹
4	Laser	1064 nm / 420 +/- 30 mW at 100%, adjustable in 10% increments	785 nm ± 0.5 nm, ≤ 100 mW, 50 mW at sample 5 adjustable laser powers down to 10 mW	830 nm	785 nm and 852 nm (Duo LASER with TRADEMARK) with the SSE™ – Patented fluorescence mitigation
5	Battery	Rechargeable Li-ion, >4 hrs continuous operation or CR123 battery option	2 AA Batteries (Lithium ion) ≥ 4 hours Hot Zone swappable PowerPack ≥ 8 hours	Lithium-ion battery pack >4 hours operation time	2 battery with High capacity 2 x 7.2 V Lithium batteries 5h battery life (Rechargeable). At frequent data acquisition 4 hours operation time is achieved
6	Laser Class	Class 3B	Class 1A, 3B	Class 3	Class 1
7	Spectral Resolution	11 cm ⁻¹	8 to 10 cm ⁻¹ (FWHM) across range	on average	10-12 cm ⁻¹
8	Display and Memory	High brightness & high resolution touch screen	3.7" TFT LCD color touch screen High visibility Glove compatible Clear PASS or FAIL results	Tough, high-visibility LCD screen	High resolution display with touchscreen (15.0 × 9.4 cm) 7" Back-lit IPS HD Display, Resolution 1280x800 (219 ppi, 178 degree viewing angle)
9	Wavelength accuracy	< 0.2nm	N/A	Operational validity range is therefore set as < ± 1.5cm ⁻¹ for all peaks	Unmatched wavenumber accuracy achieved of ± 1 cm ⁻¹ in the fingerprint and 2 cm ⁻¹ in the CH stretching region
10	Operating System and software	NOS-1064 (embedded), NID EX (PC)	N/A	Windows 10 O.S.	Min. Windows 10 for OPUS
11	Fluorescence	Fluorescence mitigation (spectrum of dark, heavily pigmented, or highly fluorescent excipients like microcrystalline cellulose, gelatin and heavily colored raw material)	N/A	Fluorescence (organic raw materials)	SSE™ – Patented fluorescence mitigation
12	Dimension	9.8 x 4.3 x 2.4 in (250 x 110 x 60 mm)	W 88.2 mm (3.47 in) D 45.3 mm (1.78 in) H 125.5 mm (4.94 in)	257 × 127 × 60 mm (test piece fitted)	27.0 (W) x 15.6 (D) x 6.2 (H) cm
13	Detector	TE-Cooled Linear InGaAs Array	Charge-Coupled Device (CCD) linear array detector	Charge-Coupled Device (CCD)	Charge-Coupled Device (CCD)
14	Weight	1.54 Kg	705 g to 752 g	1.86 Kg	1.5 Kg
15	Operating Temperature	(-10°C to +50°C)	-20 to +50 °C	-5 °C to + 35 °C	5-35°C (41°F to 95 °F)
16	Operating relative humidity	0-90% RH non-condensing	0-90% RH non-condensing	Up to 95% non condensing at +30 °C	0-95% non-condensing
17	Instrument qualification	21 CFR Part 11 Compliant /	21 CFR Part 11 Ph. Eur. 2.2.48	21 CFR Part 11, UPS and EP	USP 1120, EP 2.2.48, ASTM

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		IP65 Rated	USP 858, 1058, 1120, 1225, 1858	2.2.48, USP, USP	E2529-06, ASTM E1840-96, Software compliance 21 CFR Part 11
18	Calibration requirement	N/A	N/A	N/A	Certified reference materials according to ASTM E1840, USP & and Ph.Eur. 2.2.48 for comprehensive performance testing. Polystyrene reference certified traceable to NIST 1921b
19	Instrument Demonstration with Sample	N/A	N/A	N/A	Raman Bravo is able to read the raw material identification as follows: - Cyanocobalamine - Eurolake Sunset Yellow - Aerosil - Calcium Lactate - Microcell 101, Microcell 102 and Microcell 112
20	Price	Rp. 1.343.000.000 (after discount 15%, exclude PPN)	Rp. 1.258.000.000 (after discount 15%, exclude PPN)	Rp. 1.725.000.000,00 (after discount 25%, exclude PPN)	Rp. 1.620.024.150,00 (exclude PPN)
21	Distributor	PT. Methrom Indonesia	PT. Methrom Indonesia	PT. Unitama Analitika Perkasa	PT. Novatech Indonesia

**Perbandingan Performance Raman Spectrum
Brand Thermofischer vs China vs Anton Paar**

No	Parameter	Perbandingan Performance		
		Thermofischer	China	Anton Paar
1	Brand	Thermofischer	China	Anton Paar
2	Model	G3 TruScan	JINSP RS1500DI	Cora 101
3	Spectral Range	250 to 2875 cm ⁻¹	200 to 2500 cm ⁻¹	400 to 2300 cm ⁻¹
4	Laser	785 nm +/-0.5 nm, 2 cm ⁻¹ line width, stability	1064nm	785 nm
5	Battery	Rechargeable internal lithium ion battery > 3 hours operation	Lithium-ion battery pack 4 to 6 hours operation time	Rechargeable Li-ion, more than 12 hours of typical use with more than 500 measurements
6	Laser Class	Class 3B	Class 3B	Class 3B
7	Spectral Resolution	8 to 10.5 cm ⁻¹ (FWHM) across range	12 cm ⁻¹	< 10 cm ⁻¹
8	Display and Memory	High visibility, vibrant LCD display, interface mechanics touch screen, results pass/fail indicators. Reference method and thousands of individual measurement runs.	5" high sensitivity capacitive touch screen. Large, glove-friendly buttons and an intuitive human-machine GUI that directly displays match results, spectra overlays, and quick pass/fail indicators	Transmissive color TFT with LED backlighting
9	Wavelength accuracy	< 0.1cm ⁻¹ for all peaks	Unmatched wavenumber accuracy achieved of ± 1 cm ⁻¹ in the fingerprint and 2 cm ⁻¹ in the CH stretching region	Automated software calibration
10	Operating System and software	OS: Windows 10 and 11; Browsers: Edge and Chrome	Customized android OS is configure with custom human-machine interface. Easy operation in sampling booths, cleanrooms and receiving docks. FDA 21 CFR Part 11, GMP (CPOB/Chinese GMP). Role-based access, audit trail, electronic signature	Embedded Linux software kernel
11	Fluorescence	Fluorescence mitigation (like heavily colored materials, specific grades of microcrystalline cellulose or complex natural starches)	Fluorescence mitigation Biochemical API, Macromolecular excipients, Colored/pigmented material	Strongly Fluorescing or dark raw material (like certain starches, colored natural compounds or thick brown packaging)
12	Dimension	7.8 in x 4.6 in x 1.8 in (19.9cm x 11.8cm x 4.6cm)	176mm x 87mm x 33mm	16 cm x 8.5 cm x 2.8 cm (6.3 in x 3.3 in x 1.1 in)
13	Detector	Charge-Coupled Device (CCD)	Indium Gallium Arsenide (InGaAs)	Charge-Coupled Device (CCD) linear array detector
14	Weight	1.2 Kg	730 g	590 g
15	Operating Temperature	-20 °C to 50 °C	0 °C to 40 °C	-20 °C to +50 °C
16	Operating relative humidity	0-90% RH non-condensing	0-95% RH non-condensing	0-90% RH non-condensing
17	Instrument qualification	FDA 1040, 21 CFR Part 11, CE certification, Ph. Eur. 8.7	21 CFR Part 11, GMP	N/A
18	Calibration requirement	N/A	N/A	N/A
19	Instrument	Instrument demo using G3 TruScan and is	Instrument demo using RS1000 type and	N/A

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	Demonstration with Sample	able to identify: - Calcium Lactate - Eurolake Sunset Yellow - Corn Starch - Microcell 102 - Cyanocobalamine But unable to read: - Aerosil	is able to identify: - Cyanocobalamine - Eurolake Sunset Yellow - Calcium Lactate - Corn Starch But spectrum result unstable and unable to read for samples as follows : - Aerosil - Microcell 102, Microcell 101, and Microcell 112	
20	Price	Rp. 1.275.000.000 (after discount 25%, exclude PPN)	Rp. 967,500,00 (exclude PPN)	Rp. 801.000.000 (after discount 25%, exclude PPN)
21	Distributor	PT. Wiralab Solusindo	PT. Deltasindo Global Scientific	PT. Equiva

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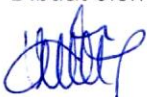
Kesimpulan :

1. Bruker lebih akurat pada saat mengidentifikasi sampel dengan tepat karena mempunyai rentang panjang gelombang yang sangat luas.
2. Jika membandingkan Raman yang mempunyai Dua laser dengan Raman yang menggunakan satu laser, Raman Bruker yang dilengkapi dengan dua laser menghasilkan rentang panjang gelombang yang lebih luas, Informasi yang diperoleh dari spektrum menjadi lebih akurat, Raman Bruker dapat mendeteksi bahan fluoresen atau berwarna berkat teknologi yang sudah dipatenkan (*trademark*) SSE.
3. Raman Bruker dapat digunakan dalam jangka waktu yang lebih lama karena kapasitas baterai yang lebih besar dan terdapat baterai cadangan sehingga analisa tetap bisa berjalan. Sangat cocok untuk penggunaan dengan jumlah sampel yang sangat banyak dengan waktu yang lebih singkat.
4. Raman Bruker mempunyai kapasitas memori yang sangat besar, mampu menyimpan data analisis sampai ratusan ribu data. Raman Bruker juga mempunyai display Layar sentuh dengan tampilan beresolusi tinggi yang memudahkan saat analisa dan kecepatan yang stabil. Ukuran tampilan yang lebih besar pada Raman Bruker memudahkan user dengan dapat melakukan perbandingan langsung antara spektrum sampel dan spektrum standar, serta menghasilkan spektrum yang lebih baik, juga meminimalisir kesalahan saat analisa.
5. Dengan akurasi tinggi, Raman Bruker mempunyai sistem auto transfer berbagai data analisa atau library. Ini dapat mempersingkat proses penggunaan raman secara umum.
6. Mampu mendeteksi sinyal Raman yang lemah dengan cara memisahkan fluoresensi yang intens secara real-time. Pada saat demo alat, Raman Bruker mampu melakukan pembacaan spektrum identifikasi bahan baku yang memiliki riwayat pengujian yang sulit seperti Cyanocobalamine, Aerosil, dan Microcell (tipe 102, 101, dan 112).
7. Raman Bruker mempunyai material standar yang resmi, tervalidasi dan tersertifikasi regulasi internasional. Ini sangat membantu saat uji performa alat (akurasi, repeatability, resolusi, dll). Memastikan kredibilitas analisa data dan Mengurangi resiko data ditolak oleh regulator.

Hasil Akhir:

Berdasarkan persyaratan regulasi USP 47 (858) Near-Infrared Spectroscopy pelaksanaan dilakukan pada panjang gelombang 780 nm sampai 2500 nm (atau 12,800 to about 4000 cm^{-1}) dan USP 47 (1858) Near-Infrared Spectroscopy—Theory and Practice bahwa panjang gelombang bisa digunakan 785 nm (bahan aktif yang murni) ataupun 1064 nm (ekspien zat pewarna dan bahan nabati) diusulkan menggunakan 2 panjang gelombang yaitu Raman Bravo ex. Bruker

Dibuat oleh :

 29/07/26

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