RESONON

Hyperspectral Imaging Solutions

NEW Pika L-F

Page 4

High-Speed VNIR Imaging for Machine Vision applications

Product Catalog

FEBRUARY 2024

Product Catalog

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Hyperspectral Cameras

Pika L & Pika L-F

L: 400 – 1000 nm
L-F: 420 – 980 nm
Visible + Near Infrared (VNIR)

See page 4.

The Pika L is small and lightweight, ideal for drone-based remote sensing.

The Pika L-F has a fast maximum frame rate, ideal for machine vision applications.

Pika XC2

400 – 1000 nm
Visible + Near Infrared (VNIR)

See page 5.

The Pika XC2 is very high precision, used for cutting-edge research applications.

Pika IR & Pika IR+

900 – 1700 nm
Near Infrared (NIR)

See page 6.

The Pika IR and Pika IR+ are fast and affordable. They are ideal for ground-based research and for machine vision applications.

Pika IR-L & Pika IR-L+

925 – 1700 nm
Near Infrared (NIR)

See page 7.

The Pika IR-L and Pika IR-L+ are light-weight, compact imagers with very high spectral resolution. They are ideal for drone-based remote sensing applications.

Pika UV

330 – 800 nm
Near Ultraviolet + Visible
(NUV + VIS)

See page 8.

The Pika UV is capable of sensing in the NUV spectral range, offering unique spectral information for applications in both research and industrial settings.

Pika L and Pika L-F

Visible + Near Infrared (VNIR)

Pika L

400 – 1000 nm

The Pika L is lightweight, compact, and cost-effective. It is ideal for drone-based remote sensing applications.

Pika L-F

420 – 980 nm

The Pika L-F has a high maximum framerate (585 fps at 8-bit pixel depth) with fewer spectral and spatial channels than the Pika L.

It is designed for machine vision applications running Resonon RVS machine vision software or OEM applications.

See page 10 for objective lens options.

	Pika L	Pika L-F
Spectral range	400 – 1000 nm	420 – 980 nm
Spectral channels	281	224
Spectral bandwidth	2.1 nm	2.1 nm
Spectral resolution (FWHM)	2.7 nm	3.1 nm
Spatial channels	900	720
Max frame rate	249 fps	585 fps (@ 8-bit)
Interface	USB 3.0	USB 3.0
Weight, no lens	0.64 kg	0.64 kg
Dimensions (with mount plate)	115 x 104 x 66 mm	115 x 104 x 66 mm
Part Number	**20-10031**	**23-10073**

Pika L Airborne Remote Sensing System (page 15)

Pika XC2

400 – 1000 nm
Visible + Near Infrared (VNIR)

Pika XC2

The Pika XC2 has very high spatial and spectral resolutions. It is popular for laboratory and ground-based research requiring very high precision.

Pika XC2 Outdoor System
(page 17)

See page 11 for objective lens options.

	Pika XC2
Spectral range	400 – 1000 nm
Spectral channels	447
Spectral bandwidth	1.3 nm
Spectral resolution (FWHM)	1.9 nm
Spatial channels	1600
Max frame rate	165 fps
Interface	USB 3.0
Weight, no lens	2.51 kg
Dimensions	265 x 106 x 75 mm
Part Number	**20-10034**

Pika XC2 Benchtop System
(page 18)

Pika IR and Pika IR+

900 – 1700 nm
Near Infrared (NIR)

Pika IR

The Pika IR is a high-speed, cost-effective infrared imager, ideal for machine vision applications.

Pika IR+

The Pika IR+ has high spatial resolution and very high spectral resolution, providing excellent data quality.

See page 11 for objective lens options.

	Pika IR	Pika IR+
Spectral range	900 – 1700 nm	900 – 1700 nm
Spectral channels	168	336
Spectral bandwidth	4.8 nm	2.4 nm
Spectral resolution (FWHM)	8.8 nm	5.6 nm
Spatial channels	320	640
Max frame rate	508 fps	240 fps
Interface	GigE	GigE
Weight, no lens	2.95 kg	2.95 kg
Dimensions	264 x 115 x 88 mm	264 x 115 x 88 mm
Part Number	**20-10032**	**20-10033**

Pika IR/IR+ Airborne UAV System (page 15)

Pika IR-L and Pika IR-L+

925 – 1700 nm
Near Infrared (NIR)

Pika IR-L

The Pika IR-L is a high-speed, light-weight infrared imager, ideal for drone-based remote sensing applications.

Pika IR-L+

The Pika IR-L+ has high spatial resolution and very high spectral resolution, providing outstanding data quality.

See page 12 for objective lens options.

	Pika IR-L	Pika IR-L+
Spectral range	925 – 1700 nm	925 – 1700 nm
Spectral channels	236	470
Spectral bandwidth	3.3 nm	1.7 nm
Spectral resolution (FWHM)	5.9 nm	3.8 nm
Spatial channels	320	640
Max frame rate	364 fps	176 fps
Interface	GigE	GigE
Weight, no lens	1.01 kg	1.01 kg
Dimensions	210 x 68 x 63 mm	210 x 68 x 63 mm
Part Number	**20-10039**	**20-10040**

Pika IR-L/IR-L+, part of the Fully-Integrated Airborne System (page 14)

Pika UV

330 – 800 nm
Near Ultraviolet + Visible (NUV + VIS)

Pika UV

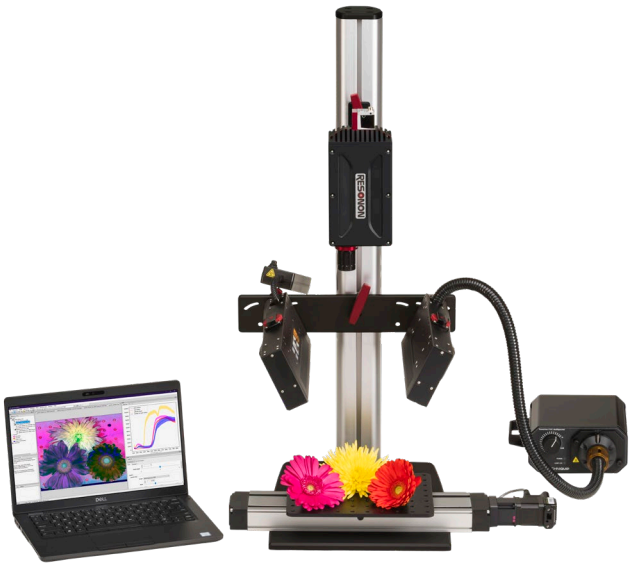
The Pika UV is a unique hyperspectral camera that measures ultraviolet light and the complete visible spectrum at the same time.

Many materials that appear similar to the human eye have distinct UV signals. Plant science, entomology and ornithology are a few of the research areas where UV light plays a significant role.

See page 12 for objective lens options.

True-color image (LHS) and 360 nm image (RHS) showing "bullseye"

	Pika UV
Spectral range	330 – 800 nm
Spectral channels	255
Spectral bandwidth	1.84 nm
Spectral resolution (FWHM)	2.8 nm
Spatial channels	1500
Max frame rate	142 fps
Interface	USB 3.0
Weight, no lens	2.27 kg
Dimensions	230 x 107 x 85 mm
Part Number	**20-10035**



Pika UV Benchtop System
(page 18)

NOTE: Because halogen lights do not emit below 355 nm, an additional ultraviolet light is used to augment the standard halogen line light in the benchtop system.

UV Lighting Add-On to Benchtop Kit	
Part Number	**20-10062**

Objective Lenses

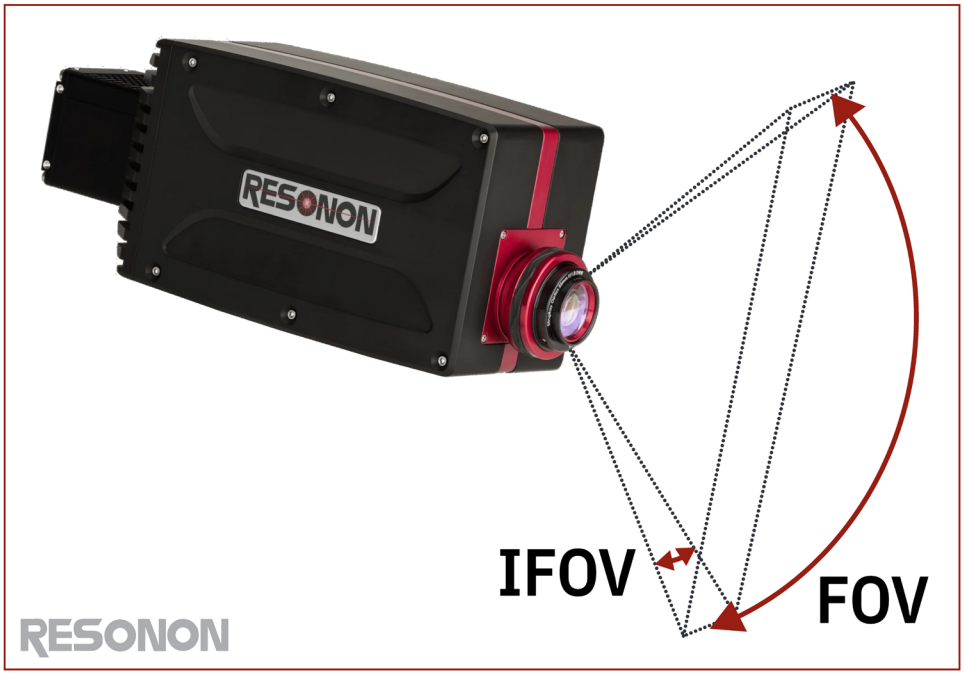
Objective lenses determine the field of view for each hyperspectral camera.

Field of View (FOV)

The Field of View defines the long dimension of the line imaged by the hyperspectral camera, reported in units of degrees. The user can change the FOV by changing the objective lens. See the tables below to identify the lens that provides the optimal FOV for each application.

Instantaneous Field of View (IFOV)

The Instantaneous Field of View defines the narrow dimension of the line imaged by the hyperspectral camera, reported in units of milli-radians.



Objective Lenses: Specifications

	Part Number	Notes	FOV (degrees)	IFOV (milliradians)
Pika L (page 4)				
70 mm	10-10218		4.3	0.17
50 mm	10-10217		6.0	0.24
25 mm	23-11002	apochromatic (high-performance option)	12.0	0.47
23 mm	10-10216	standard on benchtop and outdoor systems	13.1	0.52
17 mm	10-10215	standard on airborne systems	17.6	0.71
12 mm	10-10214		24.8	1.0
8 mm	23-11000	apochromatic (high-performance option)	36.5	1.5
8 mm	10-10213	achromatic (baseline)	36.5	1.5
6 mm	10-10212		47.4	2.0
Pika L-F (page 4)				
70 mm	10-10218		4.0	0.22
50 mm	10-10217		5.7	0.30
25 mm	23-11002	apochromatic (high-performance option)	11.3	0.60
23 mm	10-10216		12.3	0.66
17 mm	10-10215		16.6	0.88
12 mm	10-10214		23.4	1.3
8 mm	23-11000	apochromatic (high-performance option)	34.4	1.9
8 mm	10-10213	achromatic (baseline)	34.4	1.9
6 mm	10-10212		44.9	2.5

Objective Lenses: Specifications

	Part Number	Notes	FOV (degrees)	IFOV (milliradians)
Pika XC2 (page 5)				
70 mm	10-10218		7.7	0.17
50 mm	10-10217		10.7	0.24
25 mm	23-11002	apochromatic (high-performance option)	21.2	0.47
23 mm	10-10216	standard on benchtop and outdoor systems	23.1	0.52
17 mm	10-10215	standard on airborne systems	30.8	0.71
12 mm	10-10214		42.7	1.0
8 mm	23-11000	apochromatic (high-performance option)	60.8	1.5
8 mm	10-10213	achromatic (baseline)	60.8	1.5
Pika IR (page 6)				
100 mm	20-10055		5.5	0.3
75 mm	10-10201		7.3	0.4
50 mm	10-10220		11.0	0.6
25 mm	10-10219	standard on all systems	21.7	1.2
16 mm	23-11001		33.4	1.9
8 mm	23-11000		61.9	3.8
6 mm	10-10016		77.3	5.0
Pika IR+ (page 6)				
100 mm	20-10055		5.5	0.15
75 mm	10-10201		7.3	0.2
50 mm	10-10220		11	0.3
25 mm	10-10219	standard on all systems	21.7	0.6
16 mm	23-11001		33.4	0.9
8 mm	23-11000		61.9	1.9
6 mm	10-10016		77.3	2.5

Objective Lenses: Specifications

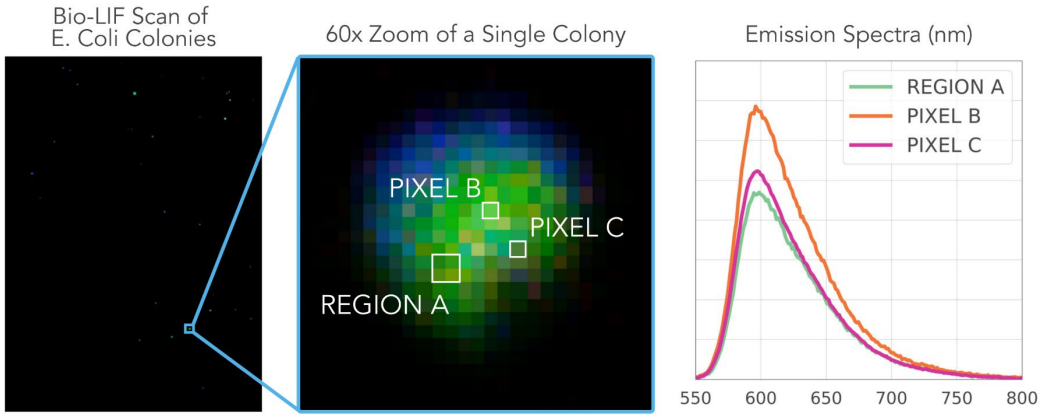
	Part Number	Notes	FOV (degrees)	IFOV (milliradians)
Pika IR-L (page 7)				
100 mm	20-10055		5.5	0.3
75 mm	10-10201		7.3	0.4
50 mm	10-10220		11.0	0.6
25 mm	10-10219	standard on all systems	21.7	1.2
16 mm	23-11001		33.4	1.9
8 mm	23-11000		61.9	3.8
6 mm	10-10016		77.3	5.0
Pika IR-L+ (page 7)				
100 mm	20-10055		5.5	0.15
75 mm	10-10201		7.3	0.2
50 mm	10-10220		11.0	0.3
25 mm	10-10219	standard on all systems	21.7	0.6
16 mm	23-11001		33.4	1.9
8 mm	23-11000		61.9	3.8
6 mm	10-10016		77.3	2.5
Pika UV (page 8)				
60 mm	20-10054		8.4	0.4
24 mm	20-10037	standard on all systems	20.5	1.0

Bio-LIF™ System

Hyperspectral Imaging of Laser-Induced Fluorescence

The Bio-LIF system combines Laser-Induced Fluorescence and Hyperspectral Imaging to yield unparalleled spectral resolution of emission data and insight into biological samples.

- 335 spectral channels for each pixel
- Automated scan routine with built-in spectral calibration and auto-exposure
- Tray carrier accepts 90mmØ dishes or standard 96-well microplates (127mm x 86mm)
- 25-second scan time for an entire microplate
- Bio-LIF software (an application-specific version of Resonon's Spectronon)
- High-resolution, publication-ready data



	Bio-LIF
Laser Excitation Wavelength	532 nm (others possible)
Spectral range	550 – 1000 nm
Spectral channels	335
Spectral resolution (FWHM)	1.9 nm
Image Resolution (pixels)	1600 x 2065
Spatial Resolution	60 µm
Signal-to-Noise Ratio (peak)	255
Weight	28.0 kg
Dimensions	692 x 470 x 279 mm
Part Number	**22-10044**

Bio-LIF system kit components

Fully-Integrated Airborne System

Resonon is excited to announce our partnership with Vision Aerial, manufacturer of USA-made industrial drones.

Fully-Integrated System Components:

- Pika L, Pika IR-L, or Pika IR-L+ Airborne System
  - Details and system components next page
- Standard Objective Lens
- Vision Aerial Vector Hexacopter kit:
  - Vector Hexacopter
  - Pelican transport case with custom foam insert
  - 2x Flight batteries (two used per flight)
  - High-capacity AC dual charger (1-hour charge)
  - Ground control station with internal battery
  - Mission planning software (no subscription fee)
  - 1-year manufacturer warranty

Vector Hexacopter with Pika IR-L

Vector Hexacopter System Components

Vector Add-on Options:

- Indefinite Flight Package: 4x batteries & charger
- HereLink Blue: NDAA & TAA compliant (USA-made)
- First Person View (FPV) Pilot Camera
- Other payloads (LiDAR, Inspection, Thermal)
- Drone training (option to include along with HSI training in Bozeman or at customer site)
- Additional year of warranty

Vector Hexacopter with a Pika L

Vector Hexacopter System bundled with:	Part Number
Pika L Airborne Kit, 17mm Objective Lens, Standard GPS/IMU	Bundle Pika L Vector
Pika IR-L Airborne Kit, 25mm Objective Lens, Standard GPS/IMU	Bundle Pika IR-L Vector
Pika IR-L+ Airborne Kit, 25mm Objective Lens, Standard GPS/IMU	Bundle Pika IR-L+ Vector
Pika L Airborne Kit, 17mm Objective Lens, High-Precision GPS/IMU	Bundle Pika L Vector HP
Pika IR-L Airborne Kit, 25mm Objective Lens, High-Precision GPS/IMU	Bundle Pika IR-L Vector HP
Pika IR-L+ Airborne Kit, 25mm Objective Lens, High-Precision GPS/IMU	Bundle Pika IR-L+ Vector HP

* Kit includes full airborne system (details next page) integrated to Vector drone, drone system components listed above, and standard objective lens.

Airborne Systems

Complete hyperspectral imaging systems for remote sensing.
Includes all hardware and software necessary for georegistered hyperspectral data.

Standard Kit Components:

- Data Acquisition Unit
- Ellipse N GPS/IMU
- Georectification Software
- Post-Processing & Analytical Software
- System Mount (UAV Standard)
- Radiometric Calibration & Calibration Target
- Protective Travel Case

Options (details on next page):

- M300/350 or Piloted Aircraft Mount Kit
- High-Precision Ellipse D dual antenna GPS/IMU
- Emlid RTK Base Station and Compatible Radio (for centimetric positioning and increased orientation accuracy)
- Downwelling Irradiance Sensors
- Training Services

* The Pika L used in the airborne system has a GigE output for reliable operation in the electronically-noisy environment found on many small UAV systems.

	Part Number
Airborne kit, no imager or lens, Standard GPS/IMU	Kit-Air-Std
Airborne kit, no imager or lens, High Precision GPS/IMU	Kit-Air-HP

Complete System Weight (kg/lb)	
Pika L *	1.83 / 4.03
Pika XC2	3.84 / 8.47
Pika IR/IR+	4.33 / 9.55
Pika IR-L/IR-L+	2.23 / 4.91
Pika UV	3.60 / 7.93

Pika L Airborne UAV System

Pika IR-L/IR-L+ Airborne UAV System

Pika IR-L Piloted Aircraft System

Airborne Systems: Options

Various options are available to tailor the airborne system for your customers needs.

M300/350 Integration Kit

The Pika L and Pika IR-L airborne systems are compact and lightweight, making them ideal to use with the popular DJI Matrice 300 and 350. The M300/350 Integration kit includes:

- A mount to attach to the DJI Dual Gimbal Mount
- A GNSS antenna mount and battery holder

Piloted Aircraft Integration Kit

Any of Resonon's imagers can be mounted to a piloted aircraft using our VIP (Vibration Isolation Pod), shown with a Pika IR-L on the previous page.

GPS/IMU

The High-Precision Ellipse 3D GPS/IMU is sold as an upgrade to the baseline Ellipse 3N. For details about choosing a GPS/IMU, please see this guide.

RTK (Real-Time Kinematic positioning)

The Emlid RTK base station and radio are used to generate centimetric positioning and increased orientation accuracy, providing the highest quality airborne data.

Downwelling Irradiance Sensors

Several different downwelling irradiance sensors are available to fit the needs of any airborne imaging system.

Training

Training can be in-person or virtual. Please contact us for details.

Airborne System Options	Part Number
UAV Mount	(included in airborne kit)
M300/350 Integration Kit	Mount Option – M300
Piloted Aircraft Integration Kit	Mount Option – Piloted
Airborne RTK System	22-10015
Downwelling Sensor - UV w/ 5in Fiber	22-10112
Downwelling Sensor - VNIR w/ 2M Fiber	10-10235
Downwelling Sensor - VNIR w/Direct Mount	10-10294
Downwelling Sensor - VNIR w/ 6in Fiber	10-10296
Downwelling Sensor – IR w/ 5in Fiber	23-10090

Outdoor Systems

Complete hyperspectral system designed for outdoor measurements.
Includes all hardware and software to acquire and analyze hyperspectral data.

The imager is mounted to a rotation stage on a tripod that rotates to scan the scene.

Standard Kit Components:

- Rotational Scanning Stage & Tripod
- Ruggedized Data Acquisition Laptop & Spectronon Software
- Radiometric Calibration
- Calibration Target
- Power Supply
- Protective Travel Case

The kit may be purchased without the computer.

	Part Number
Outdoor System Kit, no imager or lens	Kit-Out

Benchtop System:
Reflectance Configuration

Complete hyperspectral system designed for laboratory measurements.
Includes all hardware and software to acquire and analyze hyperspectral data.

The linear translation stage holds the sample and translates across the field of view.

Standard Kit Components:

- Linear Translation Stage
- 6-Fixture Halogen Light Assembly
- Mounting Tower and Baseplate
- Data Acquisition Computer & Spectronon Software
- Calibration Tile

Features:

- High-capacity, sealed, linear scanning stage
- Easily adjustable imager height, light height, and light angle

Options:

- High-Intensity, Stabilized Broadband Line Light or COBRA Hyperspectral LED Light in place of 6-Fixture Halogen Light
- See next page for assistance choosing a lighting system

The kit may be purchased without the computer.

	Part Number
Benchtop Reflectance System Kit, no imager or lens, with 6-Fixture Halogen light	Kit-Bench-Refl-Flood
Benchtop Reflectance System Kit, no imager or lens, with Halogen Line light	Kit-Bench-Refl-Halogen-Line
Benchtop Reflectance System Kit, no imager or lens, with COBRA LED light	Kit-Bench-Refl-LED-Line

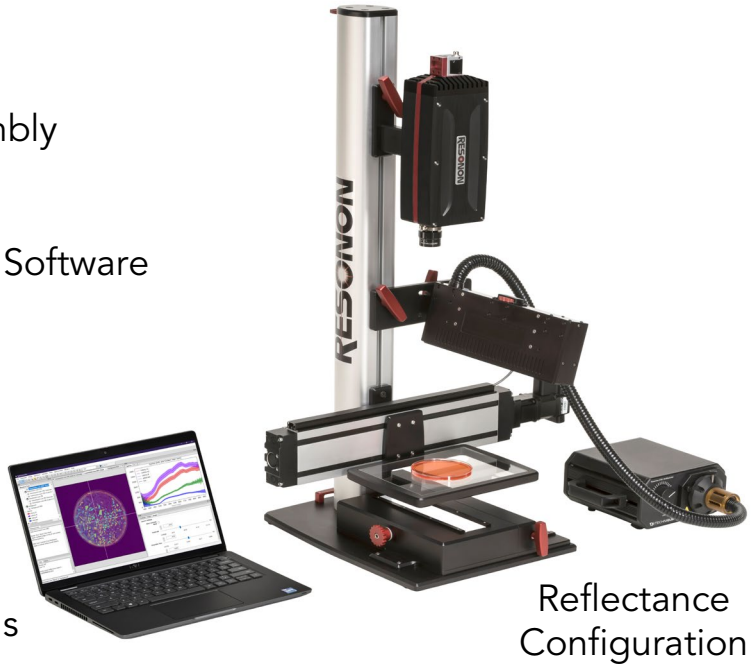
Benchtop System:
Reflectance-Transmission Configuration

Complete hyperspectral system designed for laboratory measurements.
Includes all hardware and software to acquire and analyze hyperspectral data.

Clear stage with option for both above (reflectance) and below (transmission) lighting.

System Components:

- Linear Translation Stage with Clear Tray
- High-Intensity, Stabilized Line Light Assembly
- Backlight Housing
- Mounting Tower and Baseplate
- Data Acquisition Computer & Spectronon Software
- Calibration Tile



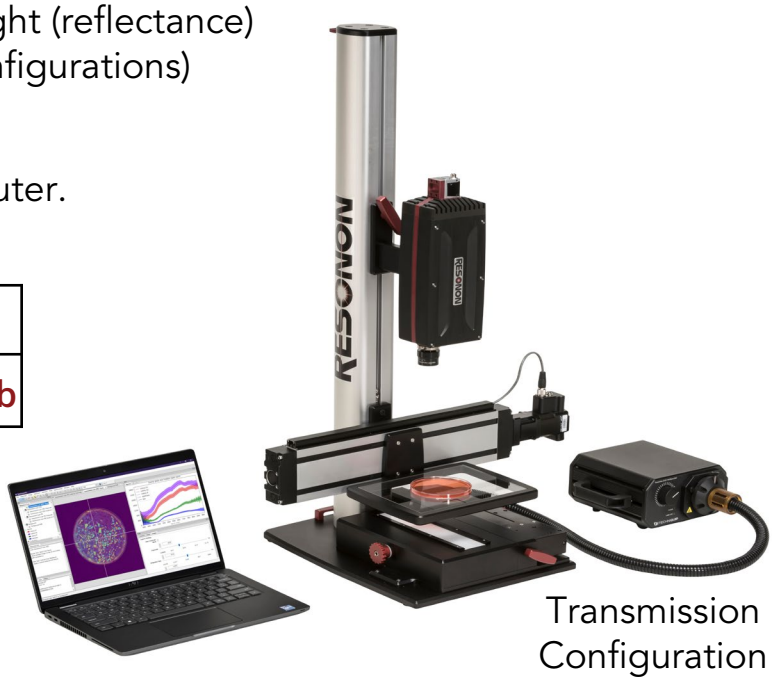
Reflectance Configuration

Features:

- High-capacity, sealed, linear scanning stage
- Line light quickly moves between transmission and reflectance configurations
- High-intensity stabilized line light
- Easily adjustable angle / height for the light (reflectance)
- Easily adjustable imager height (both configurations)

The kit may be purchased without the computer.

	Part Number
Benchtop Reflectance-Transmission System Kit, no imager or lens	Kit-Bench-Comb



Transmission Configuration

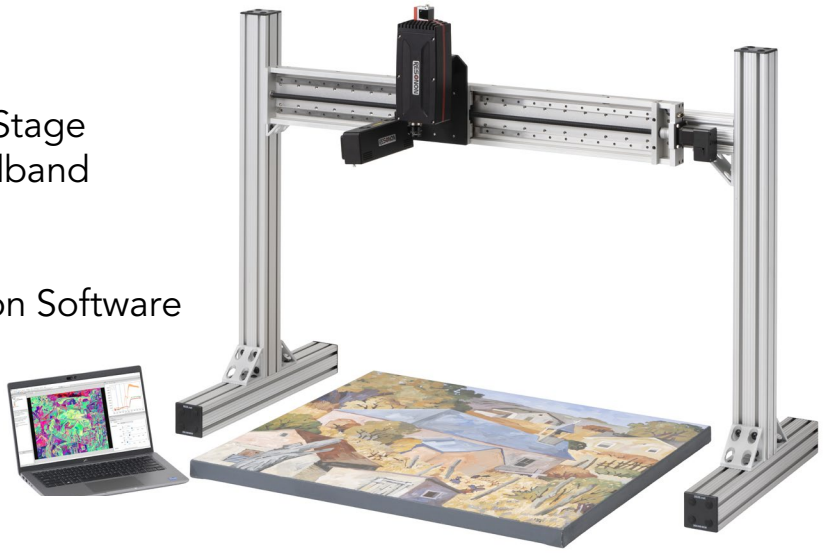
Benchtop System:
Large Sample Reflectance Configuration

Complete hyperspectral system designed for large stationary samples.
Includes all hardware and software to acquire and analyze hyperspectral data.

The imager and lighting are mounted to a long-travel stage that is mounted to a tower(s).
Both vertical and horizontal orientations are available.

Standard Kit Components:

- 890 mm Long-Travel Linear Translation Stage
- 6-Fixture High-Intensity Stabilized Broadband Lighting Assembly
- Mounting Towers and Baseplates
- Data Acquisition Computer & Spectronon Software
- Radiometric Calibration
- Calibration Standard



Horizontal Orientation:
Pointing Down

Horizontal Orientation:
Pointing Forward

The kit may be purchased without the computer.

Vertical Orientation

	Part Number
Benchtop Large Sample System Kit, no imager or lens, Vertical Orientation	Kit-Bench-Lg-Vert
Benchtop Large Sample System Kit, no imager or lens, Horizontal Orientation	Kit-Bench-Lg-Horz

Benchtop System:
Lighting Options

Benchtop Systems are offered with three lighting options.

6-Fixture Halogen Light

- Most versatile, recommended for most applications
- Default lighting option
- Provides diffuse illumination over a large area
- Best option for different surface-finishes or heights
- Only option for Large Format Systems
- Compatible with VNIR and IR cameras

Halogen Fiber Line Light

- Narrow line of light
- For applications where heat may impact objects being scanned or for objects with limited height range
- Used for Reflectance/Transmission Systems
- Compatible with VNIR and IR cameras

COBRA Hyperspectral LED Light

- Very bright, diffuse, stable, and low heat output
- Long lifetime
- Compatible with VNIR cameras only, LEDs have reduced spectral range of 405 – 970 nm.

For data showing the different lighting systems outputs, see here.

Benchtop System:
Lighting Add-On Kits

Each kit includes everything required to add one of the three available lighting systems to any new-style Benchtop Reflectance System. New-style benchtop systems have a smooth aluminum column while old-style benchtop systems have an 80/20 column.

Kit Components:

- Halogen Line Light or 6-Fixture Halogen Light or COBRA LED Light
- Appropriate Power Supply and Cables
- Mounting Bracket, Hardware and Instructions

Stabilized Halogen Line Light Add-On Kit

Stabilized Halogen 6-Fixture Light Add-On Kit

COBRA Hyperspectral LED Light Add-On Kit

	Part Number
Stabilized Halogen Line Light Add-On Kit	20-10046
Stabilized Halogen 6-Fixture Light Add-On Kit	23-10062
COBRA Hyperspectral LED Light Add-On Kit	23-10074

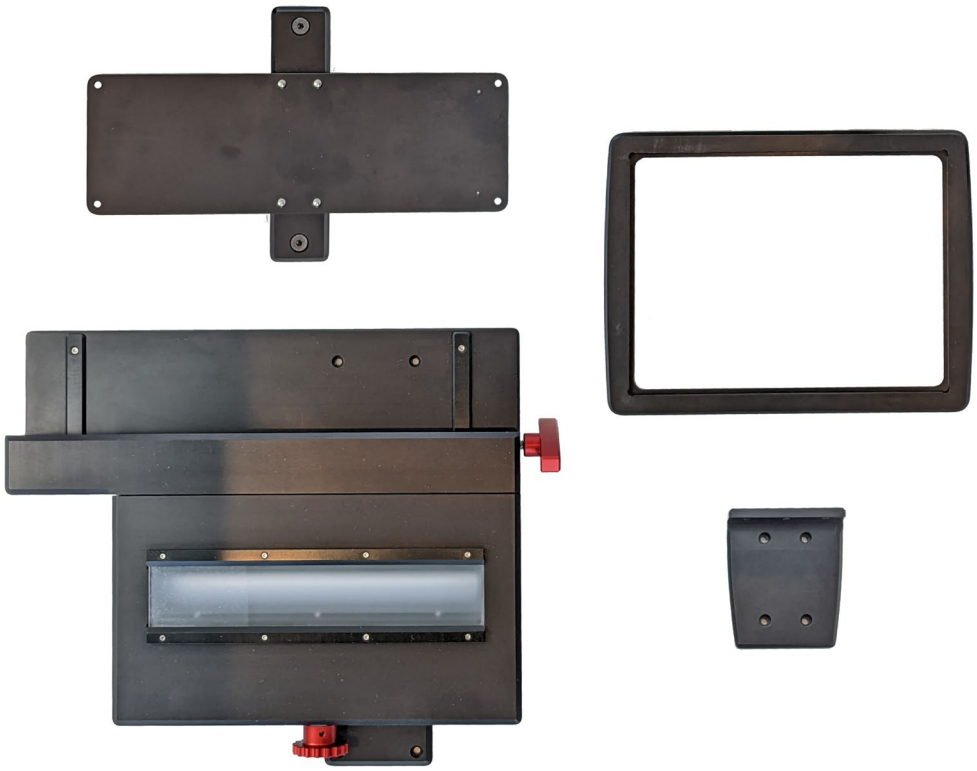
Benchtop System:
Transmission Benchtop Add-On Kit

Kit includes all hardware and instructions required to convert an existing Reflectance Configuration System **with the Halogen Line Light option** into a Reflectance-Transmission Configuration System.

Kit Components:

- Clear Tray
- Line Light Housing Assembly for Transmission Configuration
- Mounting Brackets, Hardware and Instructions

NOTE: This kit is only compatible with new-style benchtop systems, identified by the smooth aluminum column. Old-style benchtop systems had an 80/20 column.



	Part Number
Transmission Benchtop Add-On Kit	22-10014

Benchtop System:
Benchtop Enclosure (The “Black Box”)

The “Black Box”, created to easily eliminate unwanted ambient light without turning off the room lights, is an add-on accessory.

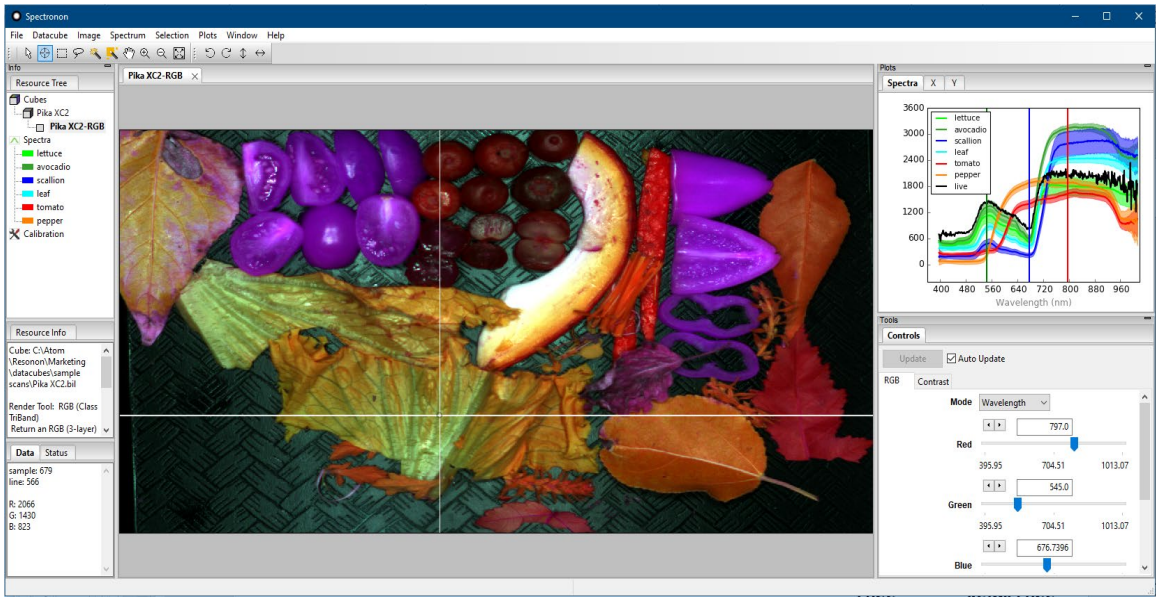
The “Black Box” benchtop enclosure

Features:

- The simplest means to control light incident on your sample
- Fits any standard Resonon Benchtop System
- Comes fully assembled; just pull from the box, place overtop your benchtop system, and begin obtaining data.

	Part Number
Benchtop Enclosure	23-10031

Software



Spectronon™ Hyperspectral Analysis Software

Spectronon software is used to control Resonon's benchtop and outdoor hyperspectral imaging systems. Spectronon features many data processing, analysis, and visualization tools for hyperspectral datacubes and enables user-written plugins.

Spectronon comes standard with the Benchtop, Outdoor, and Airborne Systems.

The full version of Spectronon (including controls for hyperspectral cameras and systems) is available at the downloads page on our website, along with sample data.

Spectronon runs on Windows 10 or 11 operating systems.

Software Development Kit (SDK)

Resonon provides for free a programming guidance document for integrating Resonon hyperspectral cameras using readily available SDKs in a number of different software languages and operating systems.

Support

Resonon strives to make products that are easy-to-use and very reliable. In the event that an issue arises with one of our products, Resonon Customer Support will work with you to solve any issues.

Please email support@resonon.com with a description of the issue and Resonon Customer Support will quickly reach out to assist you.

Recalibration

As with most precision instruments, Resonon recommends a wavelength and radiometric recalibration yearly, or after any rough handling or exposure to extreme temperatures. This ensures the best performance from your hyperspectral imaging system.

Warranty

All equipment comes with a 2-year warranty. An additional year of warranty can be purchased for 5% of the total price.

Official Terms and Conditions for Sale can be found here.
Details of our Warranty and Repairs policies can be found here.

Repairs

If repairs are required, please contact us. We will quickly issue an RMA number and provide shipping guidance.

If the system is under warranty, we will repair and return it. If the system is out of warranty, there is a $500 evaluation fee charged in addition to the customer paying for shipping costs. If the repair costs fall within $500, then no additional charges will apply. If the repair costs more than $500, the overage will be invoiced to the customer when the product is returned.