Online Hyperspectral Field Spectrometer ATP9160

Features

- Field in-situ spectrometer, long-term real-time monitoring, unattended
- Multiple wavelength options: 350~1100 nm, 350-1700 nm, 350-2500 nm;
- Multi-channel input, real-time monitoring of sky light and plant reflection spectra
- Thermostatically controlled spectrometer with cooling for stable and reliable measurement results
- High sensitivity, detector quantum efficiency up to 60%, near-infrared sensitivity 40% higher than traditional PDA detectors
- Fast measurement speed, sampling time less than 10 milliseconds
- Real-time sky spectrum monitoring and compensation
- Powered directly by solar cells
- RS485, LAN, WIFI, 4G/5G IoT connectivity
- Dynamic dark current correction to reduce thermal noise impact
- Built-in tilt sensor, laser indication of detection position for easy adjustment
- 13-megapixel HD camera displaying the spectral capture area
- Customizable output of various observation indices, such as SIF, NDVI, etc.

Application

- Geological research and prospecting
- Petrochemicals:Oil & Energy
- Remote sensor
- Agriculture：Crop monitoring
- Environmental Science ： Forest research and oceanography

Description

The ATP9160 series field in-situ hyperspectral spectrometer (field spectral radiometer) is a high-performance ground-based spectrometer from Optosky. It covers wavelength ranges of 350~1100 nm, 350-1700 nm, and 350-2500 nm, measuring the reflectance spectra of terrestrial objects. By analyzing these spectra, various plant indices such as growth status, chlorophyll content, and yield estimation can be derived. This spectrometer is suitable for a wide range of applications, including remote sensing measurement, crop monitoring, forest research, and oceanography.

The ATP9160 can be powered by solar panels and features a built-in 32GB memory. Data can be transmitted to a data center (central control room) via Ethernet or 4G IoT, enabling months of unattended online monitoring. The spectrometer boasts high cost-effectiveness, rapid and accurate measurements, simple operation, and portability. It comes with a powerful software package that supports not only reflectance measurements but also radiometric, photometric, and colorimetric measurements.

Model	Description
ATP9160	General type，300-1100nm
ATP9160-17	Broad spectrum，300-1700nm
ATP9160-25	Broad spectrum，300-2500nm
ATP9160-25H	Broad spectrum, high resolution,, 300-2500nm
ATP9160-SIF	Sun-induced fluorescence
ATP9160-4CH	4-channel light input

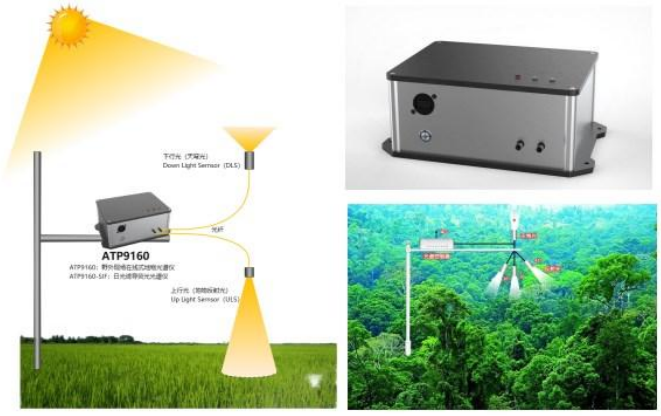

Figure 1:Photos and Schematic Diagrams of ATP9160 and ATP9160-4CH

1 Parameter

Detector					
Type	Linear array sensor / InGaAs sensor				
Detector	300~1100nm： 2048pixels 1100~1700nm： InGaAs 512 pixels dual-stage TEC cooling 1100~2500nm： InGaAs 512pixels dual-stage TECcooling 2.5~11 μm：Linear array pyroelectric senso				
Optical Parameters					
Model	ATP9160	ATP9160-17	ATP9160-25	ATP9160-25H	ATP9160-SIF
Spectral Range	300-1100nm	300~1700 nm	300~2500 nm	300~2500 nm	680-780nm
Resolution	0.8~1.5nm	0.8~1.5nm@756nm 3~5nm@1400nm	0.8~1.5nm@756nm 7~12nm@1400 &2100nm	0.8~1.5nm@756nm 3~5nm@1400nm 5~8nm@2100nm	0.12nm
Wavelength Repeatability	± 0.1nm @ VIS ± 0.5nm @ SWIR ± 3nm @ MWIR				
Wavelength Accuracy	± 0.5nm@ VIS，± 1.1 nm @ SWIR， ± 5nm @ MWIR				
Input	● Free space input ● Fiber optic input, 1.5m fiber bundle (25° field of view), optional front lens to change field of view, customizable fiber length				
FOV	Small field of view lens options: 1°/8°/15°/25°				
Maximum Radiation	VNIR: 2x sunlight / SWIR: 10x sunlight				
SNR	300~1000nm：>800，1000~2500nm：>16000				
Spectral Sampling Interval	Visible light：0.4nm，Shortwave infrare：1.0 nm	Visible light：0.4nm，Shortwave infrared:1.0 nm	Visible light：0.4nm，Shortwave infrared: ： 1.0 nm	Visible light：0.4nm，SWIR：1.0 nm MWIR：2.5 nm	
Spectral Averaging	Up to 100,000 times				
Interface	Standard：RS485、LAN； Optional：5G wireless data network				
Geolocation	Built-in GPS positioning system				
Power	12VDC@5A				

Supply					
Power Consumption	ATP9160：25W ATP9160-17：40W ATP9160-25：45W ATP9160-25H：60W				
Storage Temperature	-20°C ～ +65°C				
Working Temperature	-10 ～ 50 oC				
Working Humidity	< 90% RH(non-condensing)				
Physical Parameters					
Waterpro of Rating	IP67				
Dimensions	290×140×141 mm	350×300×170m m	350×300×170m m	350×300×170m m	290×140×141 mm
Weight	4.5 Kg	7.5Kg	7.8 Kg	9.8 Kg	7.5Kg

2 Customizable Vegetation Indices Output

No.	Abbreviation	Vegetation Index Name
1	NDVI	Normalized Difference Vegetation Index
2	SR/RVI	Ratio Vegetation Index
3	EVI	Enhanced Vegetation Index
4	ARVI	Atmospherically Resistant Vegetation Index
5	SG	Summed Greenness Index
6	NDVI705	Red-edge Normalized Difference Vegetation Index
7	mSR705	Modified Red-edge Simple Ratio Index
8	mNDVI705	Modified Red-edge Normalized Difference Vegetation Index
9	VOG1	Vogelmann Red Edge Index 1/Vogelmann Index1
10	VOG2	Vogelmann Red Edge Index 2
11	VOG3	Vogelmann Red Edge Index 3
12	PRI	Photochemical Reflectance Index

13	SIPI	Structure Insensitive Pigment Index
14	NDNI	Normalized Difference Nitrogen Index
15	NDLI	Normalized Difference Lignin Index
16	CAI	Cellulose Absorption Index
17	PSRI	Plant Senescence Reflectance Index
18	CRI1	Carotenoid Reflectance Index 1
19	CRI2	Carotenoid Reflectance Index 2
20	ARI1	Anthocyanin Reflectance Index 1
21	ARI2	Anthocyanin Reflectance Index 2
22	WBI	Water Band Index
23	NDWI	Normalized Difference Water Index
24	MSI	Moisture Stress Index
25	NDII	Normalized Difference Infrared Index
26	CSI	Chlorophyll Spectral Index
27	PSI	Phycocyanin Spectral Index
28	MSI	Macrophyte Spectral Index
29	ARNI	Average Reflectance in Near-Infrared Index
30	EXG	Excess Green Index
31	NGRDI	Normalized Green-Red Difference Index
32	NGBDI	Normalized Green-Blue Difference Index
33	RGRI	Red-Green Ratio Index
34	GNDVI	Green Normalized Difference Vegetation Index
35	VDVI	Visible Difference Vegetation Index
36	DVI	Difference Vegetation Index
37	SAVI	Soil Adjusted Vegetation Index
38	RDVI	Renormalized Difference Vegetation Index
39	MSR	Modified Simple Ratio
40	TVI	Triangular Vegetation Index
41	OSAVI	Optimized Soil Adjusted Vegetation Index

42	MSAVI	Modified Soil Adjusted Vegetation Index
43	MNDVI	Modified Normalized Difference Vegetation Index
44	MNDSI	Three-band Modified Normalized Difference Spectral Index
45	MCARI	Modified Chlorophyll Absorption Ratio Index
46	NDI674	Red-edge Normalized Difference Index
47	MTVI	Modified Triangular Vegetation Index
48	DLAI	D-type Leaf Area Index
49	DSI760	Difference Spectral Index 760
50	NVI	New Vegetation Index
51	GM1	Greenness Pigment Ratio Index 1
52	VARI	Visible Atmospherically Resistant Index
53	GRVI	Green Ratio Vegetation Index
54	WDRVI	Wide Dynamic Range Vegetation Index
55	RRWVI	Red-edge Resistant Water Vegetation Index
56	NDCI	Normalized Difference Cloud Index
57	RES	Red-edge Symmetry Index
58	CIred-edge	Red-edge Chlorophyll Index
59	GI	Greenness Index
60	NPCI	Normalized Pigment Chlorophyll Index
61	NRI	Nitrogen Reflectance Index
62	TCARI	Transformed Chlorophyll Absorption Ratio Index
63	PHRI	Physiological Reflectance Index
64	RVSI	Red-edge Vegetation Stress Index
65	LMI	Leaf Moisture Index
66	YI	Yellow Index
67	More indices can be customized	

3 Accessories

Standard Accessories	
1	USB data cable
2	Field fiber optic patch cords, 3m long, 2 pieces
3	Dedicated PC software
4	Charging adapter 5V/3A
5	Cosine correction light collection lenses, 2 pieces
Optional Accessories	
1	Field of view lenses, options，1°/5°/8°/10°/15°/25°;
2	Leaf clip, for vegetation reflectance measurement
3	Reflectance probe, for reflectance measurement
4	12V halogen lamp accessory / ATG1021
5	Test stand + integrating sphere for transmittance measurement
6	Cuvette for water quality absorbance testing
7	360° rotating pan-tilt head

4 Image