VENUSLAB
OPTOELECTRONICS

Precision Meets Simplicity

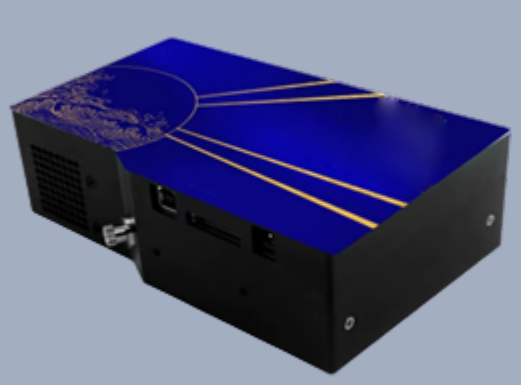
Fiber Spectrometers

CryoRange Ultra Spectrometer

Deeply Refrigerated Miniature Fiber Optic Spectrometer

- Deep refrigeration, low noise and high sensitivity
- Flexible configuration, precise regulation
- Efficient light filtering, suppression of stray light
- Rich interfaces, intelligent interaction

Applications: Advanced material science research, quantum dot analysis, and weak signal NIR detection.



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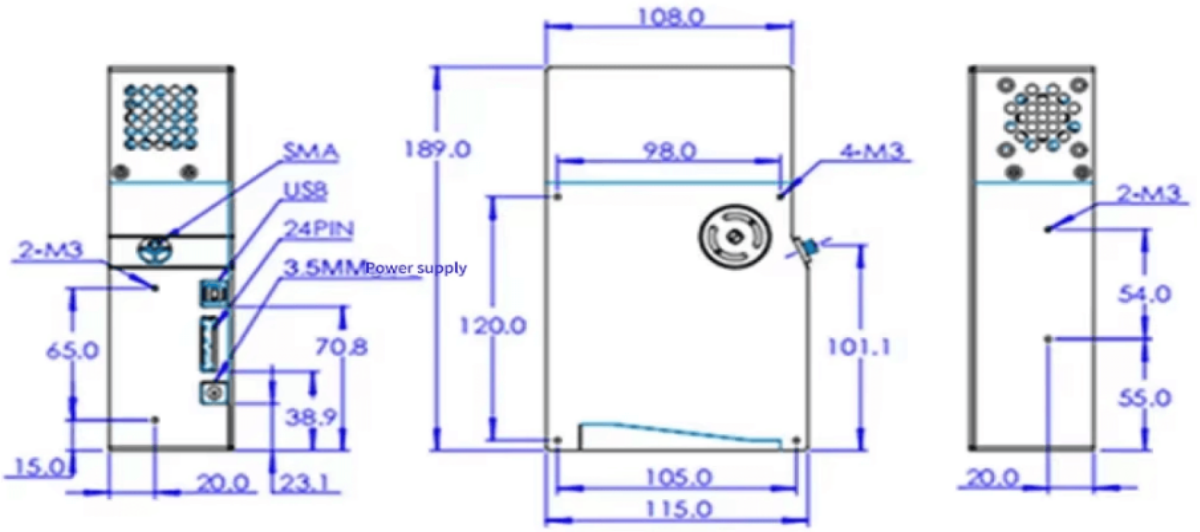
Overview

Introduction to CryoRange Ultra Spectrometer

It adopts 18-bit A/D conversion, featuring a high dynamic range of ≥38000:1 and a high signal-to-noise ratio of ≥1000:1, ensuring that the collected spectral data is accurate and reliable. In addition, the instrument is equipped with various communication interfaces such as USB and serial ports, as well as a 24PIN interaction interface, along with proprietary DAC and ADC, which can easily realize the enabling, intensity control and power feedback of the supporting light source. At the same time, multiple internal sensors are configured, and the software can real-time monitor the optical structure and the internal temperature of the detector, so as to adjust the device status in a timely manner and maintain the stability of detection performance.
In the agricultural field, through sunlight-induced chlorophyll fluorescence detection, it can evaluate plant photosynthesis efficiency, crop growth and yield, and assist in ecological monitoring and climate change research; in the research, development and production of solar cells, it can measure key parameters such as external quantum efficiency (EQE) and internal quantum efficiency (IQE) to support research and development as well as quality control; in gemstone identification, it can detect the transmittance/ reflectance of gemstones; in semiconductor manufacturing, it can real-time monitor plasma etching endpoints and parameters by means of optical emission spectroscopy (OES), optimize the process to ensure stability; it can also be used as a core component of a miniaturized Raman spectrometer for Raman spectroscopy detection.

Dimension drawing



Specifications

Product Specifications

Feature	Specification
Model	CryoRange Ultra Spectrometer
A/D Sampling	18 bit
CCD Read Noise	≤12 (RMS at min integration time)
Dynamic Range	38000:1
SNR (Signal-to-Noise)	1500:1
Integration Time	8 ms - 30 min
Collection Modes	Single, Continuous, Software Triggered, Synchronous External Trigger, Asynchronous Reset External Trigger
Linearity	≥98%
Fiber Interface	Key-SMA905
Detector Pixels	1024 × 58 pixels
Stray Light	<0.3%
Data Interface	USB 2.0, RS232
Expansion Interface	24PIN (Matches the pinout diagram previously analyzed)
Weight	1.24 kg
Dimensions	181 × 111.5 × 55 mm
Operating Temp/Humidity	0°C~40°C / 20%-85%

1* CCD Readout Noise: Minimum Integration Time, RMS of CCD Readout Noise;2* CCD Dynamic Range: Dynamic range at minimum integration time, (saturation value - dark noise baseline)/CCD readout noise standard deviation, evaluation method refers to Oceanhood Enterprise Standards;3* Signal-to-noise ratio evaluation and calculation refer to Oceanhood Enterprise Standards rating method;4* Nonlinearity of response before calibration.

Specification	Wavelength Range (nm)	Res @ 10μm	Res @ 25μm	Res @ 50μm	Res @ 100μm
VL18Bit-350-1100	350 - 1100	-	1.60 nm	2.20 nm	3.50 nm
VL18Bit-795-1030	795 - 1030	-	0.60 nm	-	0.90 nm
VL18Bit-790-930	790 - 930	-	0.50 nm	0.80 nm	0.85 nm
VL18Bit-535-625	535 - 625	-	0.25 nm	0.35 nm	0.70 nm
VL18Bit-200-970	200 - 970	1.30 nm	1.80 nm	2.20 nm	3.50 nm
VL18Bit-650-800	650 - 800	0.30 nm	-	-	0.76 nm

Note：1. The above configurations are pre-configured. Customers can specify starting wavelength, cutoff wavelength, and slit width as needed.2. Oceanhood can also assist in configuring gratings and slits based on optical simulation.3. The actual spectral resolution is expected to exceed approximately 120% of the nominal value

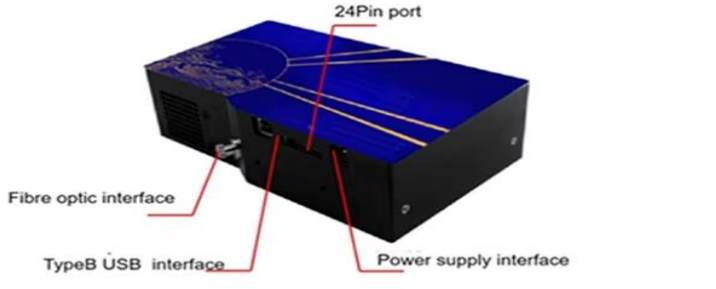
Interface Definition

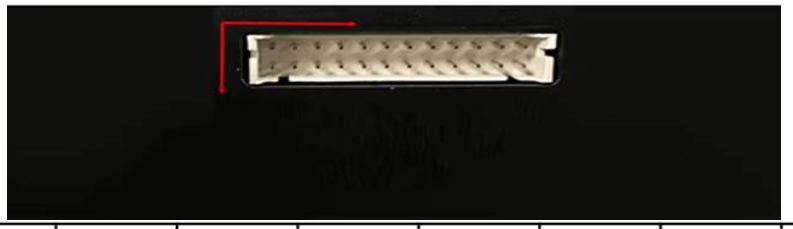
Interface description

The following figure shows the interfaces of CryoRange Ultra Spectrometer. The fiber optic interface is SMA905 interface, which is used to connect the reflectance probe, trans-reflectance bracket, liquid flow cell and other sampling accessories. TypeB USB interface is used to connect to the computer through the data cable.2.0MM-24P interface (24pin port) is used for the secondary development of the spectrometer. The power supply interface is used to connect the matching 5V 10A power adapter to supply power for it.

Definition of the wiring pin

The 24pin port uses a 2.0MM-24P socket.



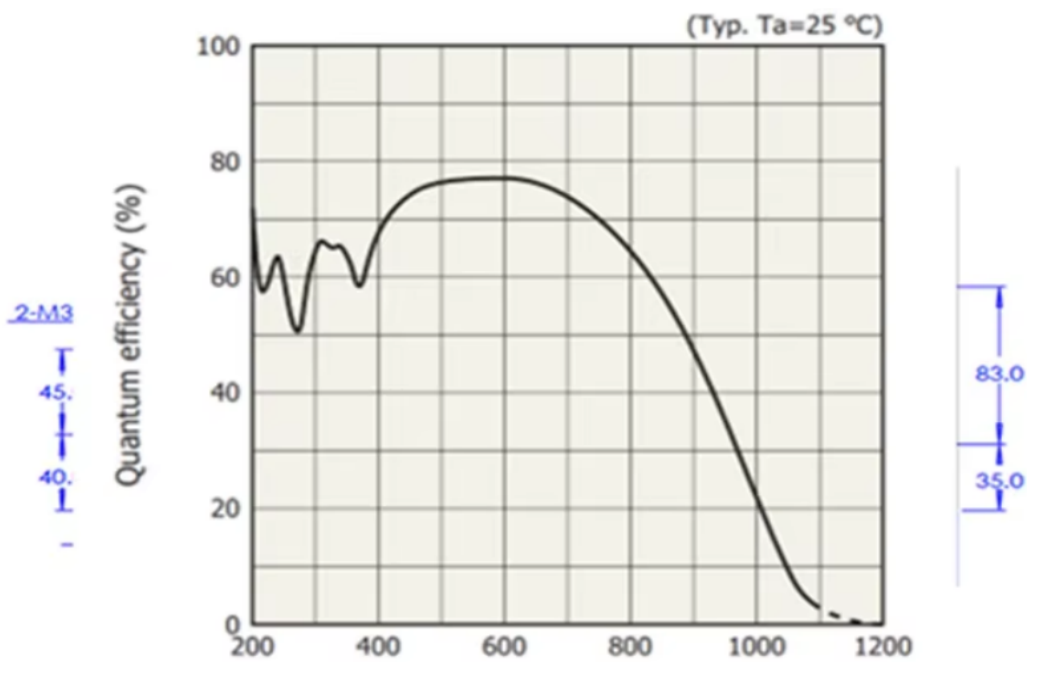


24	22	20	18	16	14	12	10	8	6	4	2
23	21	19	17	15	13	11	9	7	5	3	1

Physical diagram of spectrometer 24pin interface (note the interface direction)

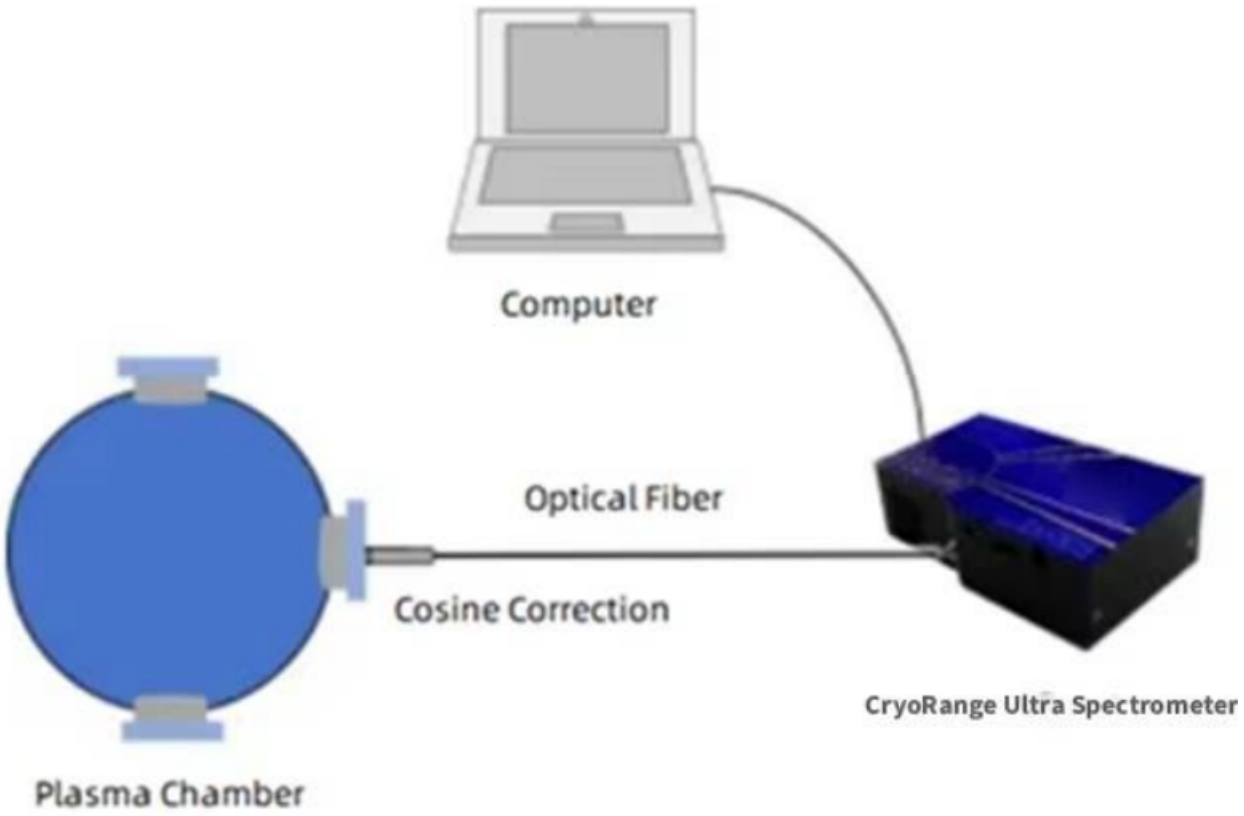
Pin	Function	Description
1	DAC1output	Digital-to-Analog Output 1
2	ADC1input	Analog-to-Digital Input 1
3	DAC2output	Digital-to-Analog Output 2
4	ADC2input	Analog-to-Digital Input 2
5	Reserved	-
6	BT_Status	Bluetooth device status pin
7-10	IO1-IO4	Configurable GPIO (3.3V/0V)
11	BT_Mode	Bluetooth control mode pin
12	Reserved	-
13	UART_TX	TTL/232 Serial Transmit
14	I2C_SCL	I2C Clock (Reserved)
15	UART_RX	TTL/232 Serial Receive
16	I2C_SDA	I2C Data (Reserved)
17	FPGA_Out	FPGA Signal Output Pin
20	FPGA_In	FPGA Signal Input Pin
21, 23	5V+	Power Supply (+5V)
22, 24	GND	Power Ground

Application



Semiconductor Plasma Etching Endpoints

Optical Emission Spectroscopy (OES) is the mainstream endpoint detection technology widely used at present, OES is a kind of analytical method to determine the composition and characteristics of the substance by measuring the spectrum emitted under specific conditions, it is a kind of real-time in-situ analytical technology, which will not disturb the plasma etching process. OES can detect the endpoint of the etching in real time, and the changes of the parameters in the plasma etching process.



Explore Series

ModelSpectral	Resolution (50μm)	Spectral Resolution (25μm)	Spectral Resolution (100μm)	Refrigeration temperature (°C)	Spectral Region (nm)	Spectral Resolution (10μm)
VL18Bit-350-1100	2.20 nm	1.60 nm	3.50 nm	-25	350-1100	-
VL18Bit-795-1030	-	0.60 nm	0.90 nm	-25	795-1030	-
VL18Bit-790-930	0.80 nm	0.50 nm	0.85 nm	-25	790-930	-
VL18Bit-535-625	0.35 nm	0.25 nm	0.70 nm	-25	535-625	-
VL18Bit-200-970	2.20 nm	1.80 nm	3.50 nm	-25	200-970	1.30 nm
VL18Bit-650-800	-	-	0.76 nm	-25	650-800	0.30 nm

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