# ATHB200 series

# UV Differential Optical Absorption Spectrometer (UV-DOAS)

# Spectra Measurement Solution



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## 1. Solution Introduction:

ATHB200 series ultra-low emission online continuous monitoring flue gas analysis is a new generation of environmental monitoring products for the monitoring of fixed source flue gas emissions. It can continuously measure SO2, NH3, NO, NO2, H2S, CS2, CH3SCH3 in flue gas online. C6H6, CH2O, COS, O3, etc. The ATHB200 series has a lower limit of emission detection of 1 mg/m 3 , which fully meets the requirements for ultra-low emission testing in various regions.

## 2. Absorbance measurement condition

The gas detection analysis method is differential optical absorption spectrometer (DOAS), and the theoretical basis for quantitative analysis is Lambert Beer's law. The main advantage of differential spectroscopy is that it can measure their absolute concentration without being interfered by the chemical behavior of the object, such as some chemically active gases: OH, NO3, BrO, etc. In addition, differential absorption spectroscopy. The concentration of several gases can be measured simultaneously by overlapping absorption spectra of several gases in the same band.

## 3. Detect range

1）Suitable for high humidity, low SO2, ammonia escape smoke composition analysis;

2） Determination of the efficiency of various types of desulfurization and denitration VOC removal equipment;

3）Determination of SO2, NH3, NO, NO2 and H2S emission concentrations in various boilers and industrial furnaces

4）Determination of emission concentrations of olefins, aromatic hydrocarbons, aldehydes and ketones, thiol sulfides, amine amides and heterocyclic organic compounds in various production processes (optional).

## 4. Structure of Monitoring System

The ultraviolet flue gas analyzer is mainly composed of light source, gas chamber, spectrometer and data processing, and the rest of the structure is auxiliary to form a system. The relationship between them is shown in Figure 1:
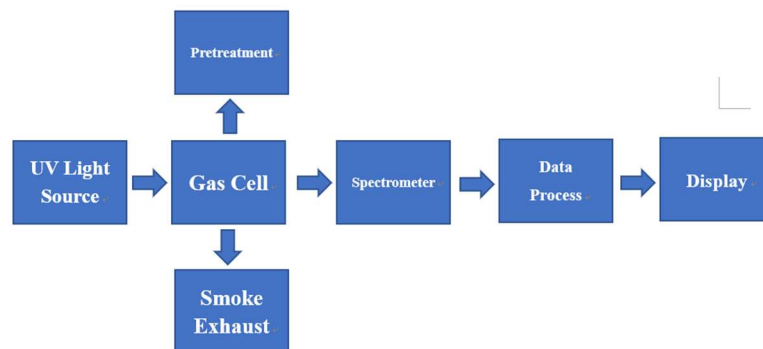
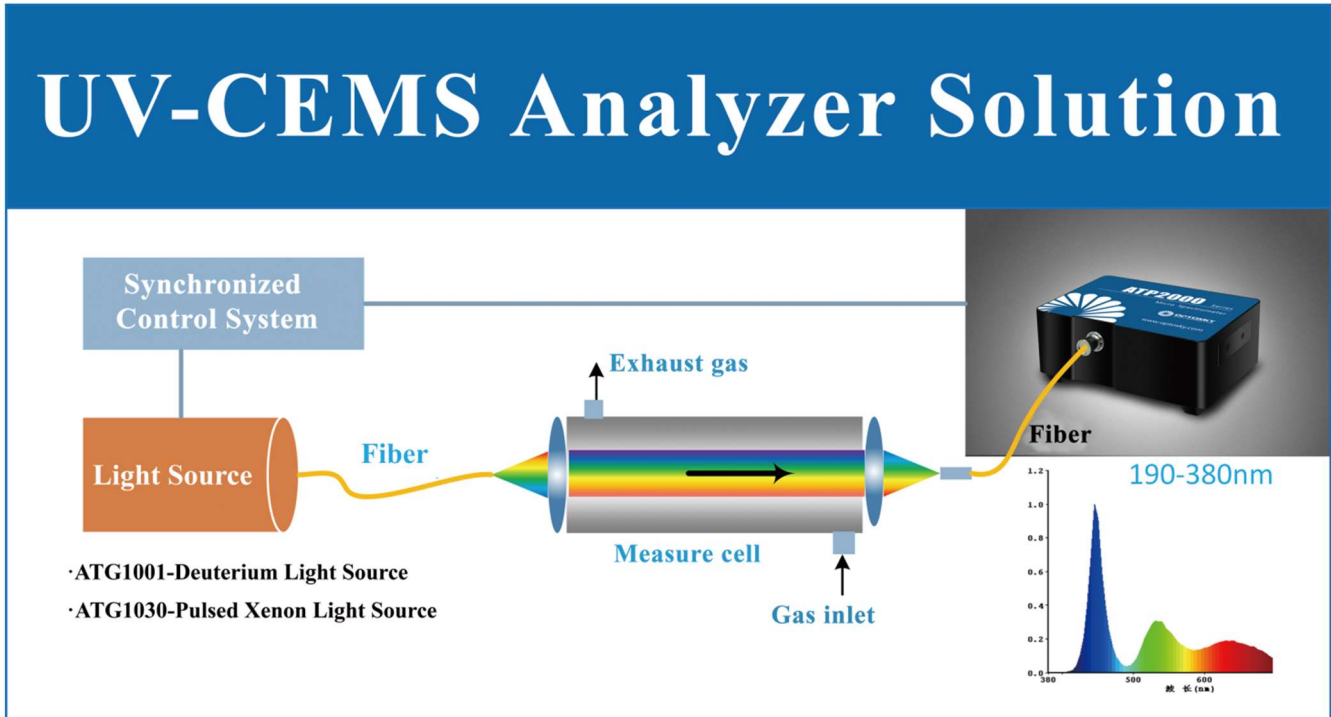Figure 1 UV smoke analyzer system structure diagram

Principle：

1）after the gas passes through the flue gas pretreatment device, enters the gas chamber and is discharged from the flue gas discharge end;

2）The ultraviolet light passes through the gas chamber (gas of different kinds and different concentrations) and is received by the spectrometer, and the number of photons entering each wavelength band of the spectrometer is correspondingly reduced.

3）The change of the photon number can be reflected by the PC in the form of photon line graph, or directly converted into electric signal for data processing; Data processing is processed in real time by an effective algorithm to obtain various components of the gas. The concentration is displayed by the display end.

The relevant literature shows that the following wavelengths can be selected and the specific concentration of gas can be obtained by formula deduction:

1） S02：271．98nm；

2） N02：231．46nm；

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3) NO：225．94nm;

4) NH3：214．63nm

## 5.Solution



| | ATHB200 | ATHB200HS |
|---|---|---|
| | Low-Cost | High-sensitivity |
| Light | High stability xenon lamp | |
| Input | Ultra low loss large aperture UV fiber | |
| Lenses | Quartz glass, high performance UV optimized coating | |
| Aperture | 5 mm | |
| SPECTROMETER | | |
| Wavelength（nm） | 190-380 | 190-380 |
| SNR | 1200:1 | 3000:1 |
| Dynamic Range | 3000:1 | 10000:1 |
| Sensitivity （uV/e-） | 1300 V/(lx·s) | 6.5 （µV/e-） |
| Detector | Japan imported original line array detector | Original back-illuminated ultra-thin CCD produced by Hamamatsu Corporation of Japan |
| Cooled | Uncooled | Refrigeration to -10 ° C |
| Cooling method | Uncooled | Semiconductor refrigeration |
| Working T （ ℃） | -20-45 | -20-45 |
| Electronic resolution | 0.15 | 0.12 |

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| (nm) | | |
|---|---|---|
| Resolution（nm） | ＜0.2 | ＜0.17 |
| Supply Voltage（V） | 5VDC±5% | 5VDC±5% |
| Current（mA） | 260 | 1500 |

ATHB200 adds cooling technology to the sensor CCD, allowing the CCD to operate stably over a wider range of ambient temperatures, with a higher signal-to-noise ratio, while reducing system dark noise and increasing sensitivity, allowing measurement The result is more precise. Of course, for each series of spectrometers, you can customize the cooling or non-refrigeration according to your specific needs. All spectrometers can receive the SMA905 interface fiber input or free space input of the light to be measured, the integration time can be set, and the measurement result can be output through USB2.0 (high speed) or UART.
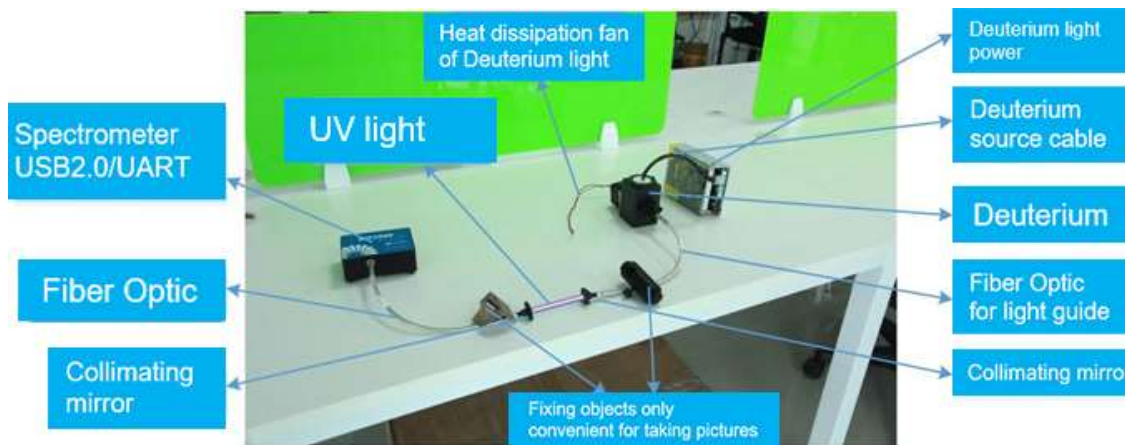


Fig 3 Solution Principle，User is only required to DC12V, sent order or read data via RS485 port

## 6. Test Results

The following is the measured result of ATHB200 (the performance of ATHB200HS is 2 times higher). As can be seen from the figure, ATHB200 has a very high signal to noise ratio.
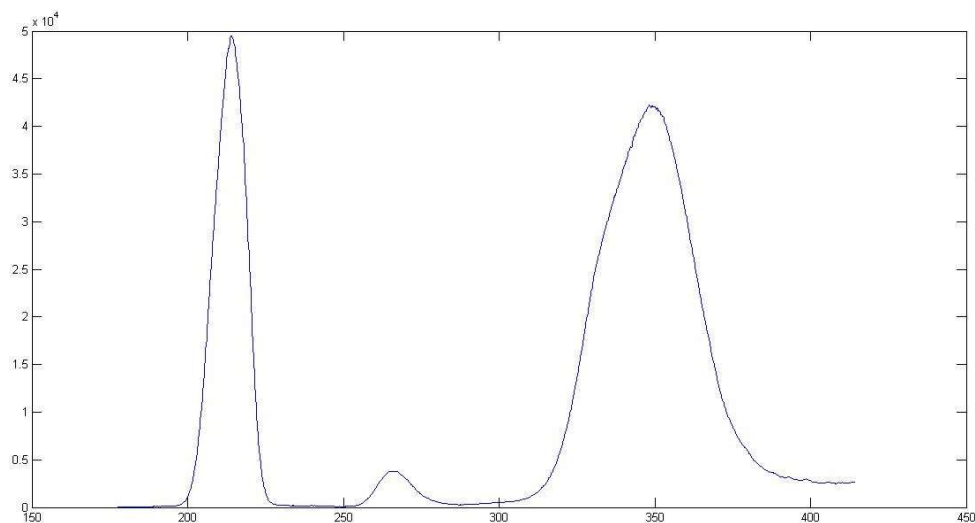
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Fig 3 spectra curve of SO2 after passing 10ppm

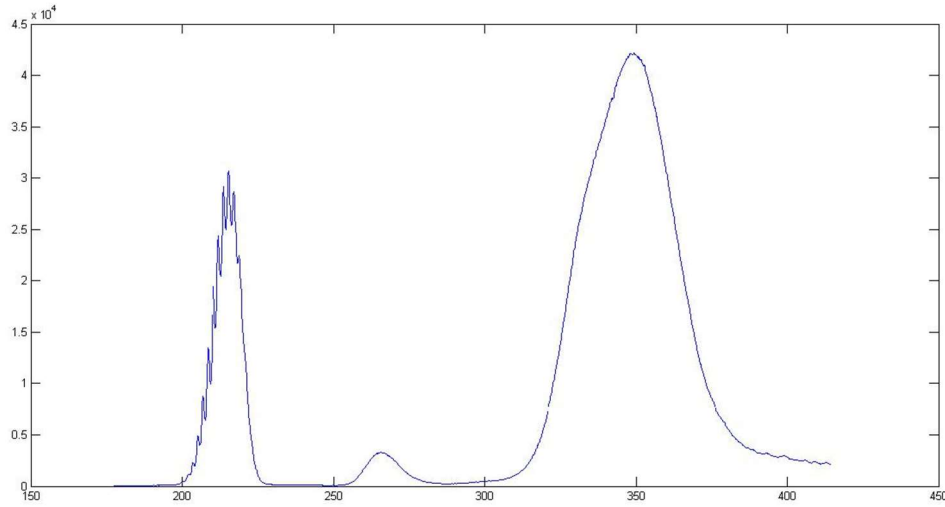

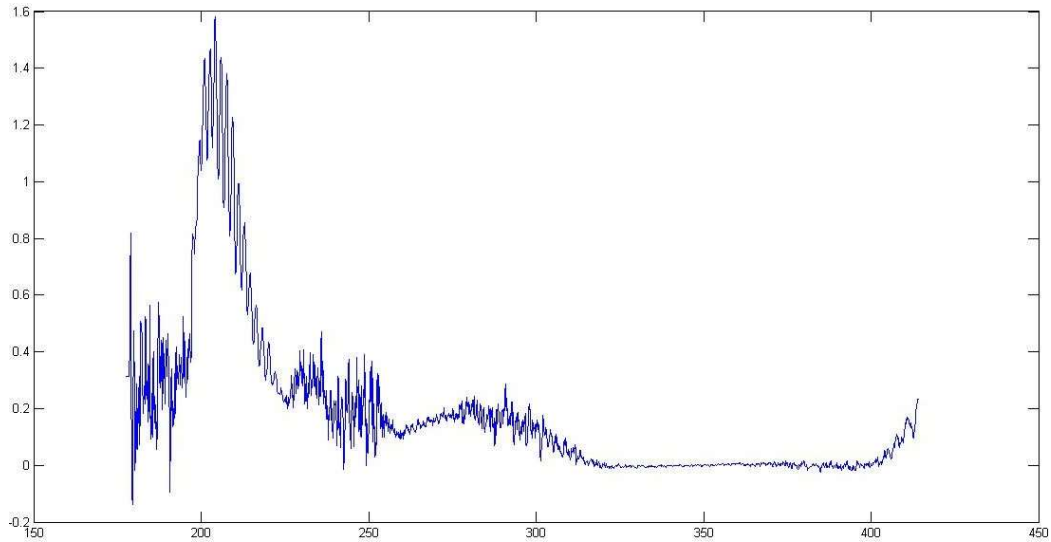Figure 4 shows the spectral of SO2curve after passing 10ppm (190-4150nm)



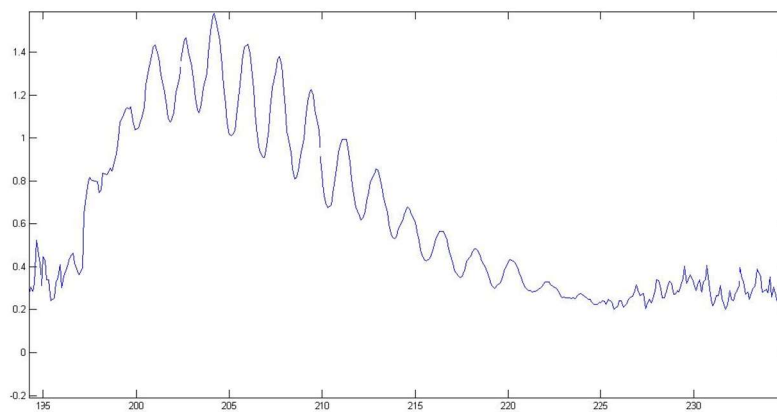Figure 5 Absorbance curve after passing 10ppm SO2 (190-4150nm)



Figure 6 Absorbance curve after passing 10ppm SO2 (195-235nm)