



# FAAS 8000 Factory automation analysis system

**EXPEC**  
TECHNOLOGY

# FAAS 8000

## Factory automation analysis system

### Industrial online monitoring requirements

Intelligent manufacturing is an important measure to implement China's strategy of becoming a strong manufacturing country. Accelerating the promotion of intelligent manufacturing is an important focus for accelerating the deep integration of industrialization and informatization in China, and promoting the supply-side structural reform of the manufacturing industry. It is of great significance for reshaping China's new competitive advantages in the manufacturing industry. In the *Guidelines for the Construction of National Intelligent Manufacturing Standard System*, it is stated that the focus of intelligent equipment standard construction includes the standards for the perception, collection, transmission, processing and feedback of technical process information. Therefore, an online monitoring system that can achieve automatic, real-time and continuous monitoring has become a key development direction of "intelligent perception" in intelligent factories.

In the actual process of industrial production, timely acquisition of material component data during the production process is crucial for product quality control. Traditional manual sampling and chemical analysis can no longer meet the needs of enterprises for automatic batching in the production process. Therefore, timely obtaining the component concentration data of production material is of great significance for stable production control.



### Industry status

At present, the production enterprises mainly adopt the on-site manual sampling or conventional instrument methods to monitor the relevant data. Due to the need for monitoring a large amount of data, the poor production site environment, and the high labor input, there are a series of problems such as poor real-timeness of data, poor sample representativeness, and large labor impact, which cannot fully meet the stable control requirements of the production process.



- **Low data real-timeness**

The sample circulation cycle is long and cannot reflect the changes in element concentration during the reaction process in a timely manner

- **Poor data validity**

The process of sample collection, preprocessing and analysis is greatly influenced by human factors, making it difficult to ensure the validity of the data

- **Poor sample representativeness**

Samples are prone to distortion during collection, storage and transportation due to the influence of temperature, adsorption, and other factors

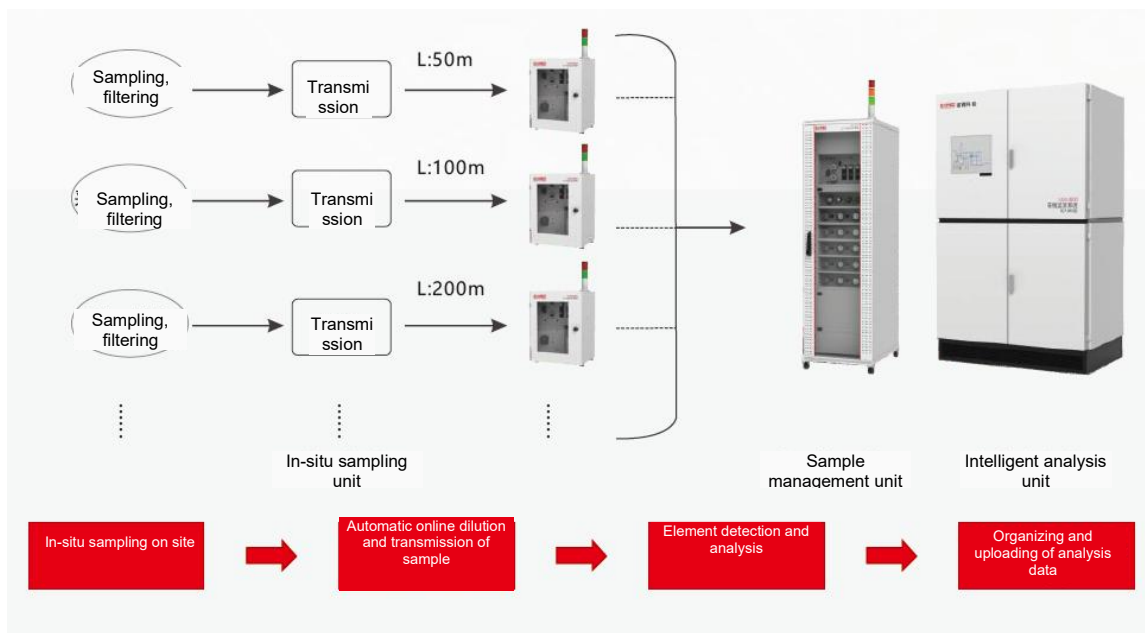
- **High labor cost**

The sample collection, pre-processing and analysis processes are all manually completed, with a high labor cost

In response to the current issue of manual monitoring in enterprise production, EXPEC Technology has launched the FAAS 8000 factory automation analysis system, which could achieve the real-time, continuous and online monitoring at multiple points during the process, as well as timely and accurately obtain the element concentration information at each process point. Thus, the investment in daily manual monitoring can be greatly reduced, and the automatic optimization control of production processes can be achieved through online data monitoring, further improving the automation, intelligence and informatization of the production process, thereby enhancing the stability of the production process.

## System design

The FAAS 8000 factory automation analysis system is based on the laboratory analysis instruments and uses the system architecture of "distributed in-situ sampling + central analysis server", thus achieving the rapid online monitoring of multiple elements of liquid samples in industrial production process. Thereby, the key technologies of flow path, such as remote pneumatic sample delivery, second-level non-destructive transmission and high-precision online ten-thousand-fold dilution, were developed to achieve the real-time and rapid online monitoring of multi-element with long distance at multiple points, providing effective support for the production process optimization, product quality improvement, energy conservation and cost reduction of the enterprises.



## Product characteristics

### • Distributed in-situ sampling + central analysis server

A system supports the sampling at up to 15 sites, and is based on the laboratory analysis methods of ICP-OES, ICP-MS and AFS to achieve the online monitoring of industrial sites at the laboratory analysis level.

### • Full process automation

The system achieves the full process automation of sampling, preprocessing, transmission, analysis, quality control and reporting, to improve the level of process quality control.

### • Full-range multi-element synchronous analysis

The system can achieve the online analysis of up to 70 elements simultaneously, solving the problem of the industry being unable to monitor the multiple elements simultaneously.

### • Non-destructive and rapid sample transmission

The system utilizes the patented remote sample transmission technology to achieve the sample transmission analysis within a range of 300 meters for a minimum of 20 minutes, thus improving the production efficiency.



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### Analytical methods

• FAAS8000 supports the inductively coupled plasma optical emission spectroscopy (icp-oes), inductively coupled plasma mass spectrometry (icp-ms) and atomic fluorescence spectrometry (afs) to meet the analysis requirements of samples with different concentrations and characteristics.

• ICP-OES (Inductively Coupled Plasma Optical Emission Spectroscopy): To determine the concentration of 72 metal elements and some non-metallic elements from ppm to ppb level.

ICP-MS (Inductively Coupled Plasma Mass Spectrometry): To determine the concentration of 75 metal elements and some non-metallic elements from ppb to ppt level.

AFS (Atomic Fluorescence Spectroscopy): To determine the trace elements such as arsenic, antimony, bismuth, mercury, selenium, tellurium, germanium, etc.

### System composition

#### In-situ sampling unit

- Injection pump + multi-way valve combination
- Accurate quantification and online dilution
- Modular design
- Automatic cleaning of pipelines
- Positive pressure cabinet design
- Sample delivery by high pressure gas
- Sampling status detection



#### Sample management unit

- Status judgment of pipeline sample
- Automatic sample dilution
- Channel serialization management



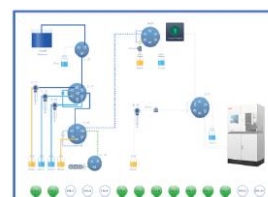
#### Intelligent analysis unit

- Based on ICP-OES, ICP-MS and AFS analysis techniques
- Automatic injection analysis
- Automatic online calibration/online quality control
- Standard integrated cabinet design



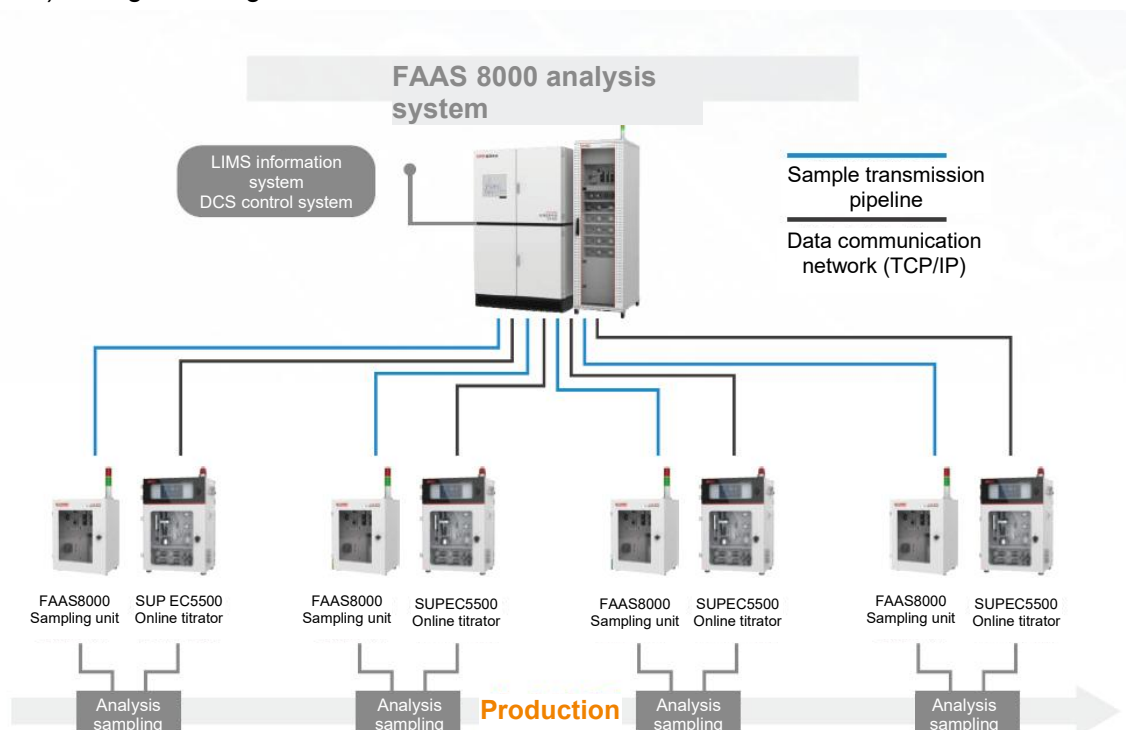
#### Central control unit

- Graphical system interface,
- Intelligent monitoring of the system operation status and sample status
- Automatic uploading of the data based on location, time, and other information
- Online real-time quality control to ensure the accuracy of monitoring data



## System integration

- The FAAS8000 factory automation analysis system can be integrated with the SUPEC5500 online titrator of EXPEC Technology to achieve the analysis of various factors in liquid samples from trace to macro-concentration during the factory production process.
- The FAAS8000 system supports multiple communication protocols such as TCP/IP and MODBUS. Analysis of concentration data can be seamlessly transmitted and interacted with system data of the existing laboratory information management systems (LIMS) and the distributed control systems (DCS) through heterogeneous communication.



## System performance

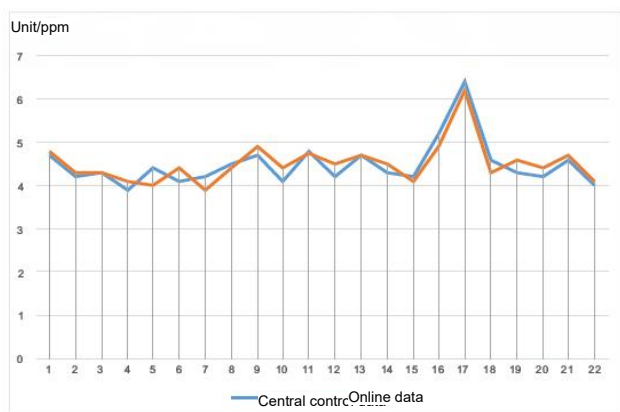
Performance	Indicators
Analytical methods	ICP-OES (ppb-level detection limit), ICP-MS (ppt-level detection limit), AFS (ppb-level analysis of arsenic, antimony, bismuth, etc.), and the titration method (macro-analysis)
Sampling capability	1 analysis unit could support 1-15 sampling units.
Sample transmission distance	≤ 300 meters
System analysis time	≤ 20 minutes
Communication interface	RS232/485 and RJ45 interfaces, supporting the standard protocol communication of the interfaces.

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## Application value

	Before use	After use
Manual sampling frequency	12-24 times/day	2-3 times/day
Data detection interval	2-4 hours	15-30 minutes
Production material loss	Unchanged	Reduced by 20%
Labor intensity of laboratory test	High	Supervision and verification

## Application effect



Monitoring chart of manganese concentration in the extraction process of an enterprise



## Industry applications

The FAAS 8000 system is applicable to the hydrometallurgy of non-ferrous metal, new energy battery, fine chemicals and pesticide production, and it can be extended to the special industries such as high-purity reagents to achieve the online analysis of liquid sample elements during the production.





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