Chang Ai · Gas Analyzers Specialist

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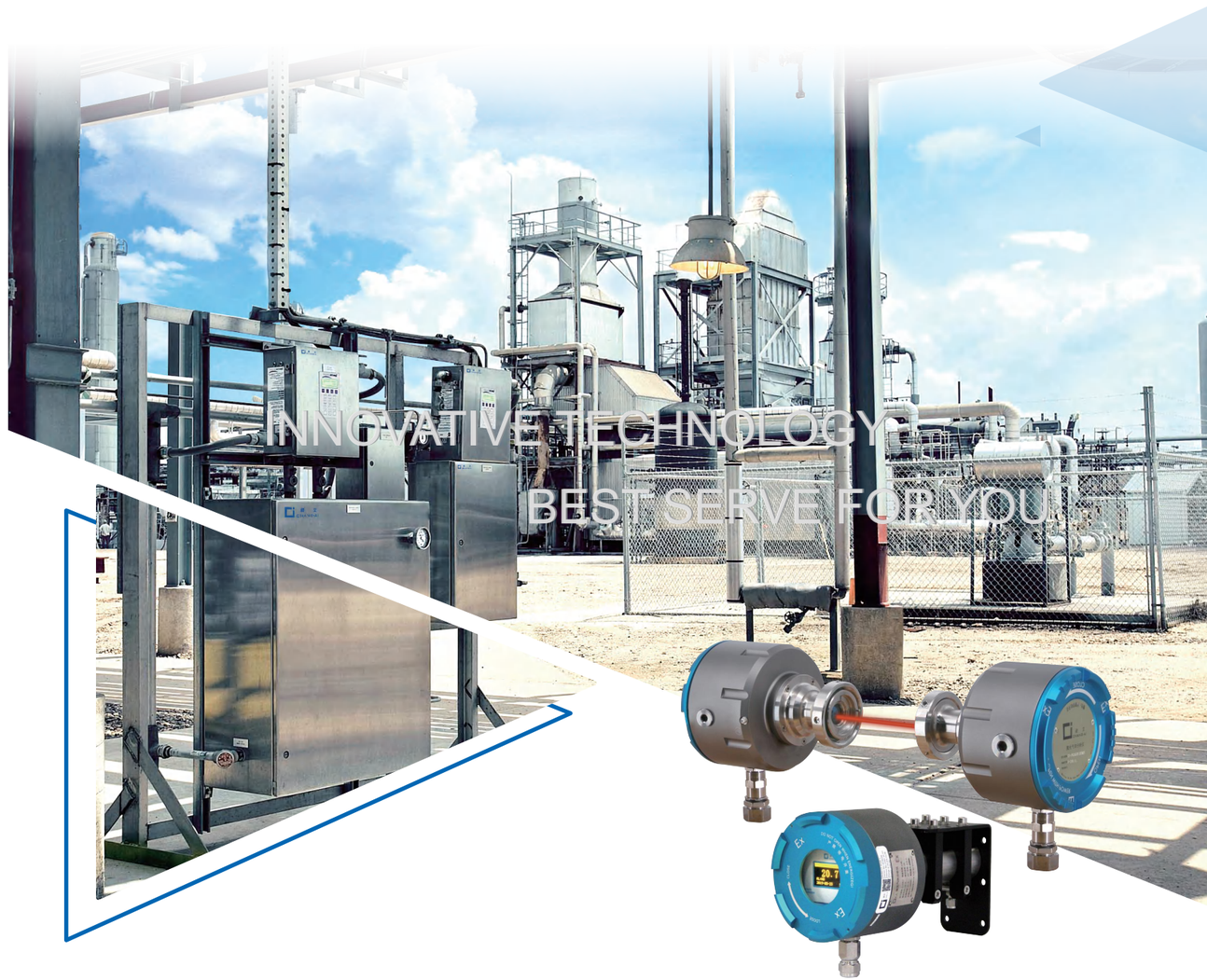
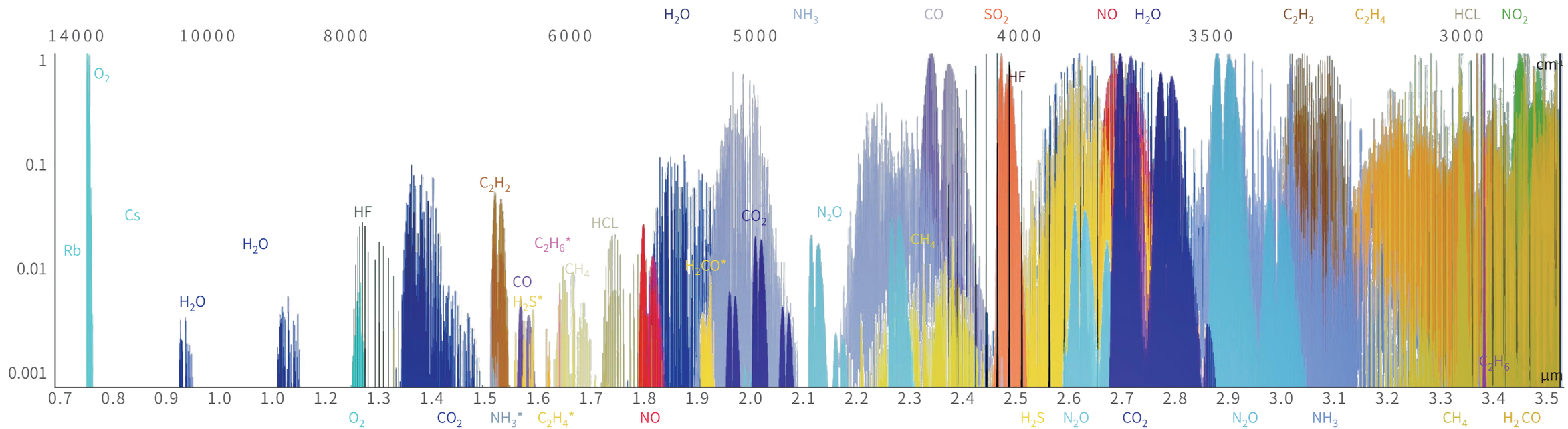


Laser gas analyzer

Chang Ai technology
Products ‖ Solution customization ‖ Technical support

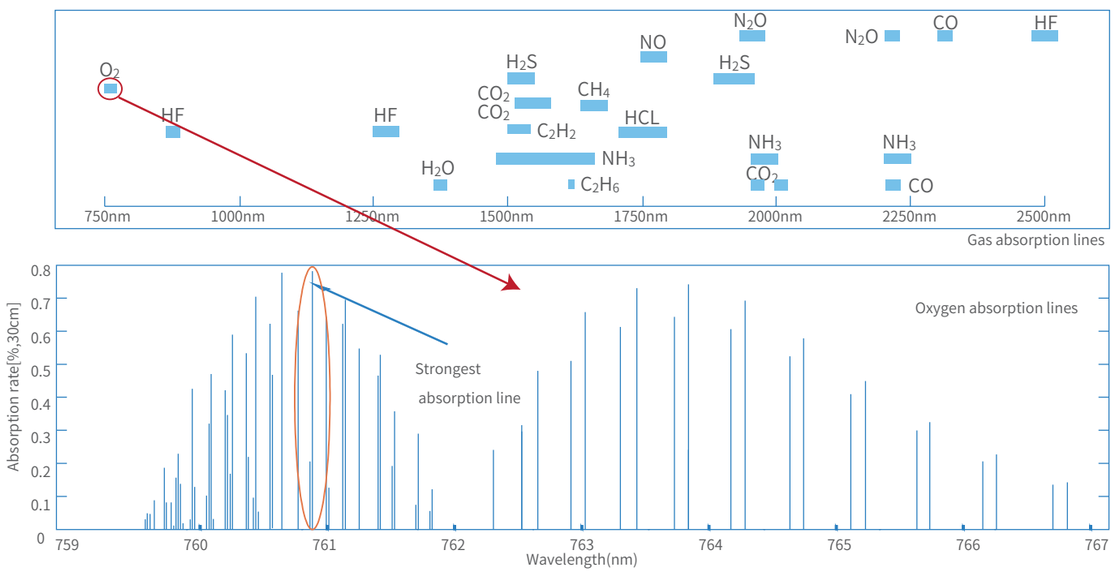
Make the gas visible

We are committed to providing professional solutions
and technical services for industrial customers



Principle

In nature, each gas absorbs light of a specific wavelength, when the light beam with specific wavelength that emitted by the spectrum pass through the measuring tube, it is absorbed by the measured gas frequency-selectively, resulting the attenuation of the light intensity, and the output light will be weakened or missing wavelength composition. In spectroscopy, the component of the substance can be distinguished through the absorption spectral line of gases. Therefore the system utilize the Beer-lamber relationship between characteristic of absorption spectral line in gases composition and the infra-red/laser absorption spectrum, through checking the absorption rate from the absorption spectral line(the rate of light attenuation), then the concentration of the sample gas can be obtained.



Features

No cross interference

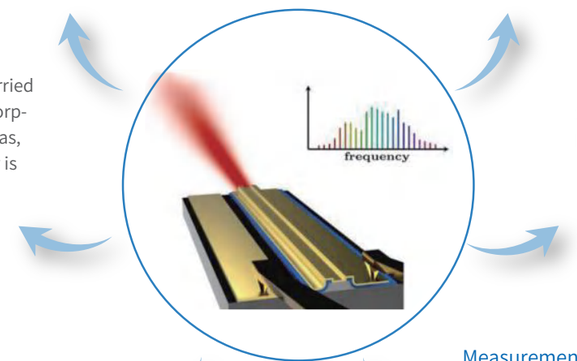
Using the laser wavelength corresponding to the measured gas, it is not affected by the interference of other gases, and it is easy to detect the specific components in the mixed gas;

Quick response

The response speed is about 1-5 seconds (high-speed specification is about 1-2 seconds), compared with other detection methods (electrochemical, semiconductor infrared, etc.), the response time is greatly shortened;

High precision

Concentration monitoring is carried out through the resonance absorption of specific wavelength by gas, and the measurement accuracy is extremely high;



Stability

Excellent long-term stability
±2%FS/ half a year (zero drift);

Low maintenance

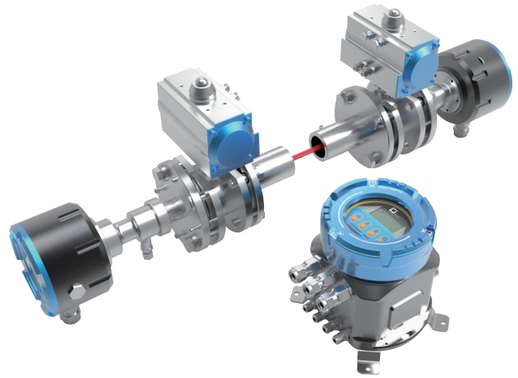
No longer need cumbersome maintenance, easy to use and calibrate, does not require professional operators;

Measurement method

Only laser irradiation during detection → suitable for high temperature, strong corrosion and harsh environment, dusty environment, and compatible with humid gas.

CI-PC651/6500
Laser gas analyzer

High performance single channel (through beam) laser gas analyzer designed for a wide range of emisions monitoring and process control. It is a high-perfomance optical analyzer utilizing the latest tunable diode laser (TDL) technology. Its response time is fast,generally less than 2 seconds in in-situ measurement,which can eliminate the delay time of any sampling system.



Features

- A new generation of intelligent laser technology, SIL2 safety certification;
- Advanced EPC flow control technology saves nitrogen;
- Fully automatic optical path protection system, not only stable, but also more accurate;
- Explosion-proof touch screen technology, not afraid of raindrops and oil pollution;
- The response to the control system is measured in seconds;
- Customized development for measurement process;
- Only laser irradiation during detection → suitable for high temperature, strong corrosion and dusty environments.

Technical Index

Performance index

Linear error:	±2%FS
Repeatability:	≤1%
Range drift:	±1%FS/half a year
Response time:	T_{90}<10s
Maintenance period:	≤2 times/year, clean the optical lens
Calibration period:	≤2 times/year

Analog signal

Quantity:	1 group
Analog output:	4-20mA
Allowable load:	<500Ω

Alarm output

Quantity:	2 groups (1 group of concentration alarm, 1 group of status alarm)
Relay contact capacity:	DC 24V,0.2 A

Communication

Quantity:	1 group
Communication mode:	RS485(standard)/RS232(optional)

Working environment

Ambient temperature:	-20~+60°C
Ambient humidity:	<90%RH

Mechanical information

Ex-mark:	Exd IIC T6 Gb
Safety certification:	SIL2

Technical Index

Weight:	Transmitting unit + receiving unit + calibration tooling: net weight about 13.5kg; Purge unit: net weight about 8.0kg

Electrical information

Power supply:	DC 24V(default) AC 100~240V, 50/60Hz (optional)
Consumption:	<20VA

Gas line connection:

Tracheal interface :	G1/4 " -Φ6 stainless steel pipe connector (optional)

Specification

Gas components and measure range:

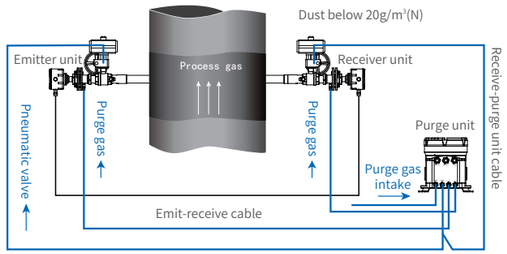
Gas	Measurement lower limit	Measuring range	Selection code
O_2	0~1.00%Vol.	0~99.99%Vol.	A
CO_2	0~1.00%Vol.	0~99.99%Vol.	B
CO	0~8000ppm	0~2.00%Vol.	C
CO/CO_2	0~10.00%Vol.	0~99.99%Vol.	D
CH_4	0~100ppm	0~99.99%Vol.	E
C_2H_2	0~1000ppm	0~50.00%Vol.	F
C_2H_4	0~1000ppm	0~50.00%Vol.	G
C_2H_6	0~1000ppm	0~50.00%Vol.	H
H_2	0~5.00%Vol.	0~99.99%Vol.	I
HF	0~10ppm	0~1000ppm	J
H_2O	0~100ppm	0~40.00%Vol.	K
H_2S	0~500ppm	0~10000ppm	L
HCL	0~100ppm	0~1000ppmVol.	M
NH_3	0~100ppm	0~10.00%Vol.	N
HCN	0~10ppm	0~1.00%Vol.	O
C_2H_4O	0~500ppm	0~10.00%Vol.	P
SO_2	0~300ppm	0~2000ppm	Q
NO	0~50ppm	0~2000ppm	R

Note: 1. The table above indicates gas components and their measure range, other gases can be customized according to user needs;
2. The specific measure range can be set according to user needs;
3. Measuring gas temperature is optional from 0-1200°C, and the conventional type is 0-400°C;
4. The concentration minimum/maximum range in the table is when the measurement optical path length(flue/process pipe) is 1m.

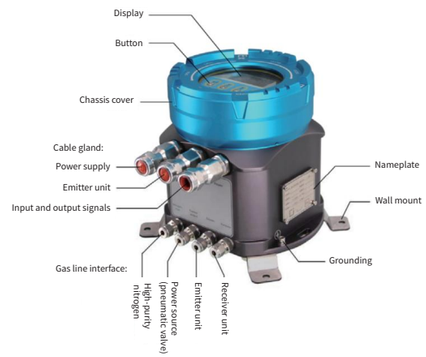
Won the Made in China Beauty Silver Award IP66 SIL Ex

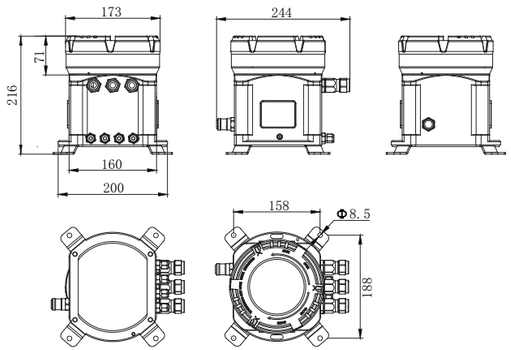
Advanced EPC Purging Technology

- The best purge flow rate ratio can be obtained to achieve the best protection;
- Digital closed-loop control, ultra-high control accuracy, repeatability and reliability, to ensure that the optical system is not polluted;
- Stepless pressure adjustment to provide stable purge gas pressure for the optical path system;
- Not affected by the pressure fluctuation of the gas source, an alarm command is issued when the purge gas source is shut off or malfunction, the optical path system is automatically closed at the same time.



Control Unit

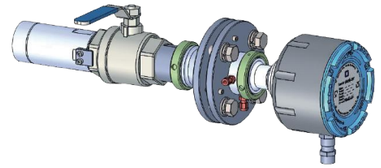




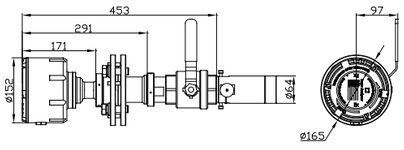
The purging unit not only provides the purging gas source for the transmitting unit and the receiving unit, but also has data processing and control, which can display the measured gas concentration, modify the parameters of the analyzer, output analog signals, alarm signals and communication signals, etc. .

Receiving/Emitting Unit

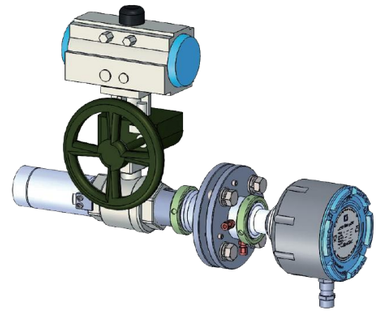
Standard type



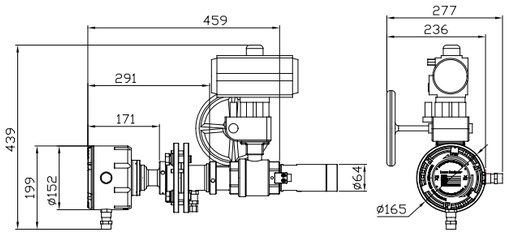
Features: When cleaning or other maintenance on the receiving/emitting unit of the analyzer, the valve group at the bottom of the flange can effectively isolate the process pipeline and close the optical path system to prevent dangerous gas leakage and contamination of the optical path system, which may cause maintenance.



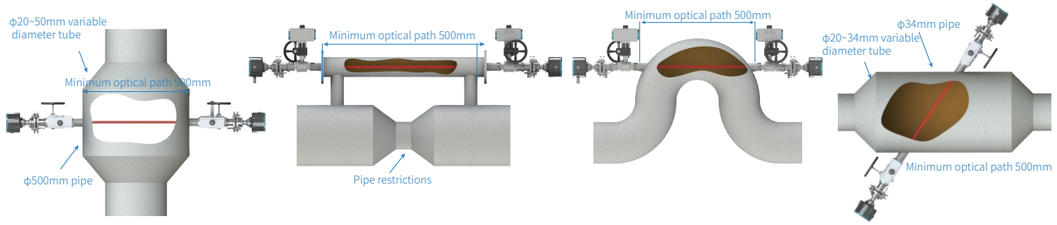
Enhanced



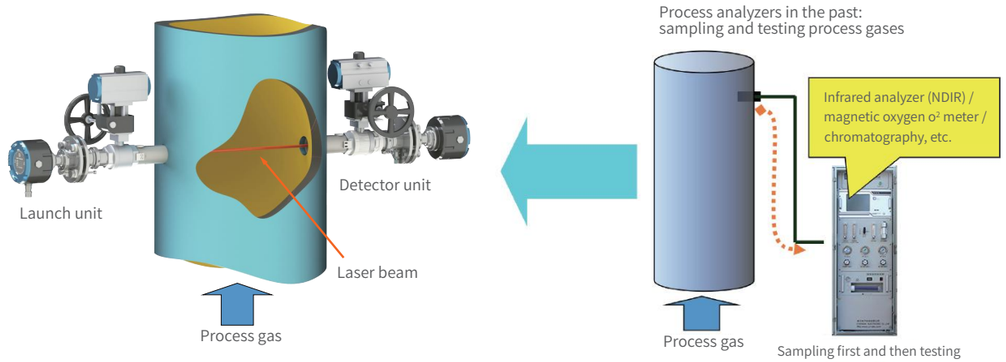
Features: When the purge air source is shut off or fails, an alarm command is issued, and the receiving/emitting unit is automatically turned off at the same time, which effectively protects the optical system from pollution, prolongs the service life of the receiing/emiting unit, and reduces maintenance costs.



In-situ Installation



Why In-situ Measurements Are Your First Choice



- Rapid response: the response to the control system is calculated in seconds;
- On-site direct analysis of process gases;
- Customized development for measurement process;
- Provide true and representative measured gas concentration;
- Simple structure, no moving parts, no loss parts→ maintenance-free;
- Only laser irradiation during detection → suitable for high temperature, strong corrosion, and dusty environments.

- Sampling delay: control reaction to monitoring in minutes (long lag);
- The system is complex and the failure rate is high;
- Require frequent calibration;
- Complex structure, consumables → probe corrosion, blockage → need maintenance;
- Sampling causes process gas composition to vary → not true process state (with error).

Furnace combustion optimization high temperature 1400℃

Cyclohexanone ammoximation (petrochemical)

Pharmaceutical intermediates

Chloromethane process

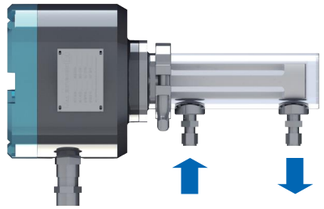
CDQ engineering

CI-PC68/-1 Reflective laser

Tunable diode lasers are gaining popularity in chemical, petrochemical, and refining industries. Its high reliability and low maintenance requirements make it the gas analysis technology of choice for users, and it is a non-contact optical measurement method using a solid-state laser light source. As a result, the light source is immune to pollutants and corrosive gases, requiring no routine maintenance.

Sampling Type TDL

Sampling gas measurement systems often play an important role in ensuring process safety and inert effect at every moment. Therefore, they must be able to withstand the most demanding environments, condensed water, dust, corrosive gases, vibrations, etc..In safety monitoring, the reliability of the analyzer is of paramount importance. In order to maintain its performance at the best level, the weakest part in sampling analysis must be overcome while reducing maintenance effort.



Advantage

Resistant to corrosive chemical gases: resistant to extreme humidity and even liquid water;

Low maintenance;

Heated optical surfaces prevent condensation;

Fast response time (<1s), improve safety;

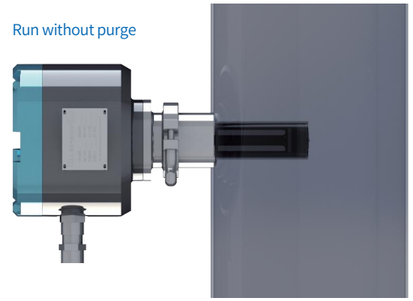
Online maintenance when necessary;

Has a diagnostic output for preventive maintenance.

Inline Type (In-situ TDL)

In-situ TDL are usually designed with a double-sided mount, but this cannot be ruled out. Inline TDL can effectively overcome the difficulties in installation. The probe is the part of the laser that inserted into the process gas. For inline TDL the diode laser and detector are located on the same side of the pipe. The emitted laser beam is reflected back to the detector by the mirror, thus realizing the work without optical path.

Run without purge

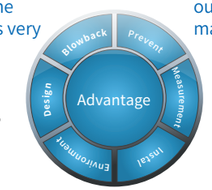


Advantage

No nitrogen back-flush is required, so the operating cost is very low;

Easy-to-use and compact design, minimum and utilization of space;

Can be used in harsh industrial environments, resistant to chemical corrosion, high dust, high moisture;



Has a diagnostic output for preventive maintenance;

The in-line installation method does not require a pretreatment device, and real-time rapid measurement;

Sampling installation minimizes handling requirements of sample gas.

SIL

Specification

Measuring components and measuring range

Gas	Measurement lower limit	Measuring range	Selection code
O_2	0.1%	0~99.9%Vol.	A
CO_2	0.05% 0.1%	0~2.00%Vol. 0~99.9%Vol.	B
CO	0.01% 0.1%	0~1.00%Vol. 0~99.9%Vol.	C
CO/CO_2	0.1%	0~99.9%Vol.	D
CH_4	0.01% 0.1% 0.1%	0~1.00%Vol. 0~10.00%Vol. 0~50.0%Vol.	E
C_2H_2	0.01% 0.1%	0~1.00%Vol. 0~50.0%Vol.	F
C_2H_4	0.01% 0.1%	0~1.00%Vol. 0~50.0%Vol.	G
C_2H_6	0.01% 0.1%	0~1.00%Vol. 0~50.0%Vol.	H
H_2	1.0%	0~99.9%Vol.	I
HF	0.005%	0~1.000%Vol.	J
H_2O	0.005% 0.1%	0~1.000%Vol. 0~40.0%Vol.	K
H_2S	1.0%	0~99.9%Vol.	L
HCL	0.01%	0~1.00%Vol.	M
NH_3	0.01% 0.1%	0~1.00%Vol. 0~10.00%Vol.	N
HCN	0.1%	0~5.0%Vol.	O
C_2H_4O	0.1%	0~10.0%Vol.	P

Note: 1. The above are part of the measured gas indicators, and other gases can be customized according to user needs;
2. The specific range can be set according to the needs of users.

Technical Index

Performance index

Linear error:	±1%FS
Zero drift:	±0.1%/year
Range drift:	±1%FS/half a year
Resolution:	0.1%
Pressure drift without pressure compensation:	0.8~1.2bar -2% reading 1.2~1.4bar -5% reading
Pressure compensation accuracy:	±0.25% of reading
Background gas compensation accuracy:	0~300g/m³water content (Td=80°C) ±1% of reading

Analog signal

Analog signal:	1 way
Analog output mode:	4-20mA/0-20mA/0-1V/0-5V/0-10V/1-5V
Allowable load:	Output mode supports software switching< 500Ω

Technical Index

Alarm output

Alarm point:	1
Relay contact capacity:	DC 24V, 0.2 A

Communication

Communication:	RS485(standard)/RS232 (optional)

Working environment

Working temperature:	Electrical enclosure:-20~+50°C Probe:-20~+80°C
Storage temperature:	-20~+60°C
Working pressure:	0.8~1.4 bar
Probe pressure:	Up to 5 bar
Ambient humidity:	< 90%RH

Mechanical data

Protection level:	IP65
Ex-mark:	Ex d II C T6 Gb
Safety certificate:	SIL2
Electrical enclosure:	Aluminum alloy material
Probe material:	316L stainless steel
Weight:	Sampling type:<7kg Flange:<5kg Diffuse type:<4kg

Electrical data

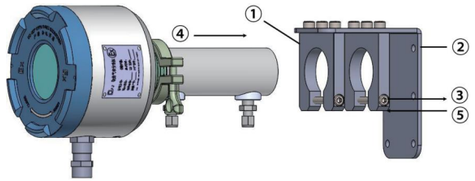
Power supply:	DC 24V, ⩾0.5A
Consumption:	<10VA

Connection

Cable connector:	1 cable gland
Tracheal interface:	G1/4"-Φ6 stainless steel pipe joint (optional)

Installation Example

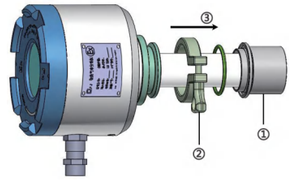
Installation with sampling chamber



The parts in the figure are numbered as follows:
① - Fix the two C-brackets inside the L-bracket;
② - Fix the L bracket on the wall or metal plate;
③ - Loosen the bolts at the opening of the C-shaped bracket;
④ - Put the sampling chamber into the "C position" of the C-shaped bracket, so that the bottom of the sampling chamber touches the vertical surface of the L-shaped bracket;
⑤ - Ti-ghten the bolts and the C-bracket clamps the sampling chamber;
The installation direction of the wall mount can be rotated 90° for installation.

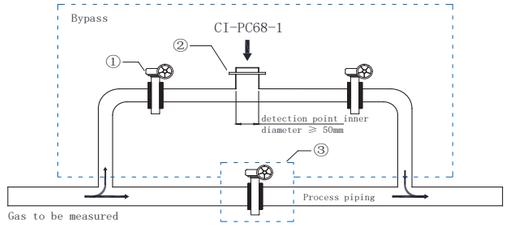
Installation Example

Inline install



The parts in the figure are numbered as follows:
① - Weld the inline kit on the inline device;
② - Insert the measuring probe into the inline kit;
③ - Fix the flanges with clamps, and seal rings must be placed between the flanges.

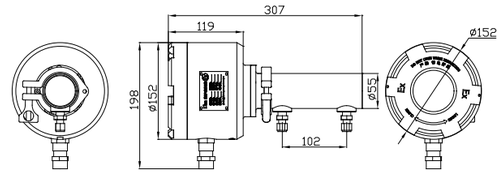
Bypass installation



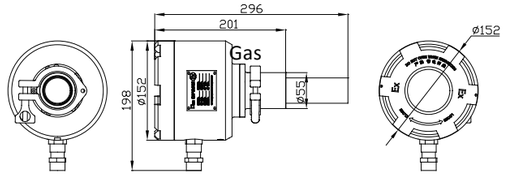
In the figure: ①- is the valve;
②- is an inline kit;
③- is the valve on the main pipe of the process pipeline.
Note: The flange used for inline installation is Chang Ai's special flange;
The diffusion installation method needs to be customized by the user, so please contact our technical engineers when ordering.

Dimensions

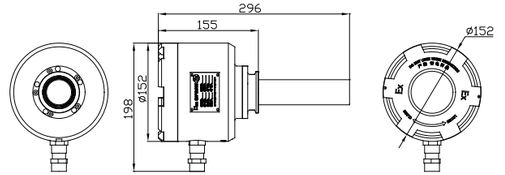
Sampling type CI-PC68-1 dimension drawing



Inline CI-PC68-1 dimension drawing



Diffusion type CI-PC68-1 dimension drawing



Laser Source And Detector Combined Into One

- No need to focus;
- Reduce installation costs and facilitate commissioning;
- Innovative filter design, no purge gas required;
- Stable measurement is achieved even in high dust environments.

Product Cases


Hydrogenation reactor process


Chemical process


Chemical caustic soda process


Hydrogenation reaction process


Chemical hydrofluoric acid process

Applications of laser analyzers

Typical Application

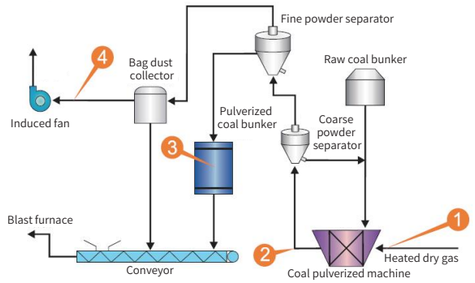
Industry	Industry process	Application fields	Gas measurement
Metallurgy	Blast furnace ironmaking	Blast furnace gas analysis	CO、CO_2、O_2、CH_4
		Safety management for pulverized coal injection of blast furnace	O_2、CO
		Flue gas analysis of hot blast stove	O_2、CO
	Converter furnace steelmaking	Converter gas recovery	O_2、CO
		Converter gas safety control	O_2
		Converter flue gas carbon determination	CO、CO_2、O_2
	Coking production	Electric detarring precipitator safety control	O_2
		Coke dry quenching (CDQ) cycle gas analysis	CO、CO_2、O_2
		Coke oven gas analysis	H_2S、NH_3
	Other	Calorific value analysis of gas	CO、CH_4
		Boiler flue gas analysis	CO、O_2
Petro-chemical	Petroluem refinery	Fluid catalytic cracking (FCC) regeneration flue gas analysis	CO、CO_2、O_2
		Hydrogen production from alkanes	CO、CO_2、CH_4
		Sulfur recovery	O_2
	Ethylene cracking	Reactor outlet, etc.	CO、CO_2, etc.
	EO/EG	Process gas	O_2、C_2H_4, etc.
	PE	Process gas	O_2
	PP	Process gas	O_2
	Ethylbenzene/ styrene monomer/PS	Process components	O_2,CO/CO_2, benzene in trace water
	PTA	Oxidation reactor control	CO、CO_2、O_2
	Coal gas production	Process gas	O_2
	Methanol/ synthetic ammonia/ urea	Process gas	O_2、CO、CO_2、NH_3, etc.
		Ammonia-to-carbon ratio of urea synthesis	NH_3、CO_2

Typical Application

Industry	Industry process	Application fields	Gas measurement
Petro-chemical	Chlor-alkali/ PVC	Trace water in CL2	H_2O
		Trace water in EDC	H_2O
		Recycle syngas	O_2、CO_2、C_2H_4, etc.
		Oxychlorination process	O_2、CO_2、C_2H_4, etc.
		VCM exhaust gas recovery	O_2
	Hydrogen peroxide (H_2O_2)	Oxidation process	O_2
	Sulfur acid production	Oxidation process	O_2
	TDI	Water gas	O_2
Environ-mental Protection	Smoke emission	Waste incineration flue gas analysis	HCL、HF、CO、CO_2、O_2
		Flue gas denitrification process control	NH_3、NO、NO_2
		Combustion process control	O_2、CO、CO_2
Cement	Cement production	Combustion process control of Rotary kiln inlet and outlet	O_2、CO、CO_2
		Safety monitoring of coal injection (mill, pulverized coal chamber)	O_2、CO
		Combustion control of preheater and cyclone heater	O_2、CO、CO_2
Power	Coal-fired power generation	Combustion control	O_2、CO
		Coal injection (mill, pulverized coal chamber) safety monitoring	O_2、CO

Application

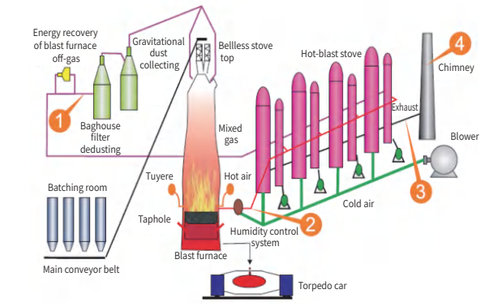
Coal injection process application



Application

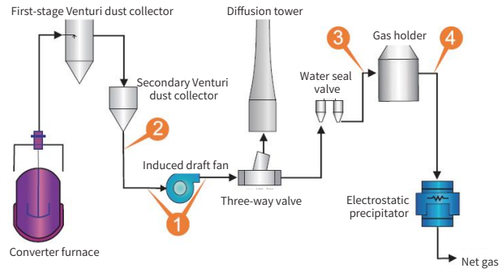
Serial number	Monitoring points	Gas composition measurement	Monitoring purpose
1	Coal mill entrance	CO、O_2	Safety monitoring, explosion prevention
2	Coal mill exit	CO、O_2	Safety monitoring, explosion prevention
3	Pulverized coal bunker	CO、O_2	Safety monitoring, explosion prevention
4	Outlet of bag house filter	CO、O_2	Safety monitoring, explosion prevention

Blast furnace process application



Serial number	Monitoring points	Gas composition measurement	Monitoring purpose
1	Outlet of bag house filter	CO、CO_2、O_2、H_2、CH_4	Safety monitoring, combustion control
2	Hot air main	O_2	Combustion conditions monitoring, regulating of devices, production optimization
3	Exhaust gas from hot blast stove	CO、O_2	Combustion efficiency control
4	Discharge chimney	NOx、SO_2	On-line monitoring of exhaust emissions

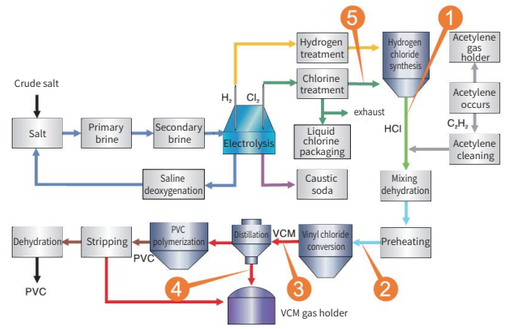
Converter process application



Application

Serial number	Monitoring points	Gas composition measurement	Monitoring purpose
1	Before/after the induced draft fan	CO、O_2	Safety monitoring, gas recovery
2	After the second stage Venturi dedusting	CO、O_2	Steelmaking controls, regulating of devices, production optimization
3	Before the gas holder	CO、O_2	Safely control
4	After the gas holder	CO、O_2	Safely control

Chlor-alkali process application



Serial number	Monitoring points	Gas composition measurement	Monitoring purpose
1	HCl main line	HCl、Cl_2	Safely control
2	Entrance of VCM synthesis furnace	HCl、C_2H_2	Process control to improve production efficiency
3	Exit of VCM synthesis furnace	HCl、C_2H_2	Process control to improve production efficiency
4	VCM main pipe	O_2	Safely control
5	After chlorine press	H_2O	Process control to protect the chlorine press