

Gas Analysers

NDIR / Laser / Zirconia / Paramagnetic / Thermal Conductivity

Reliable gas solutions for gas analysis,
proven know-how and state-of-the-art technology



Product Variety to Meet Your Needs

CEMS

Continuous Emission Monitoring Systems Long-Term superior stability

Simultaneous measurement of up to 14 components in flue gas

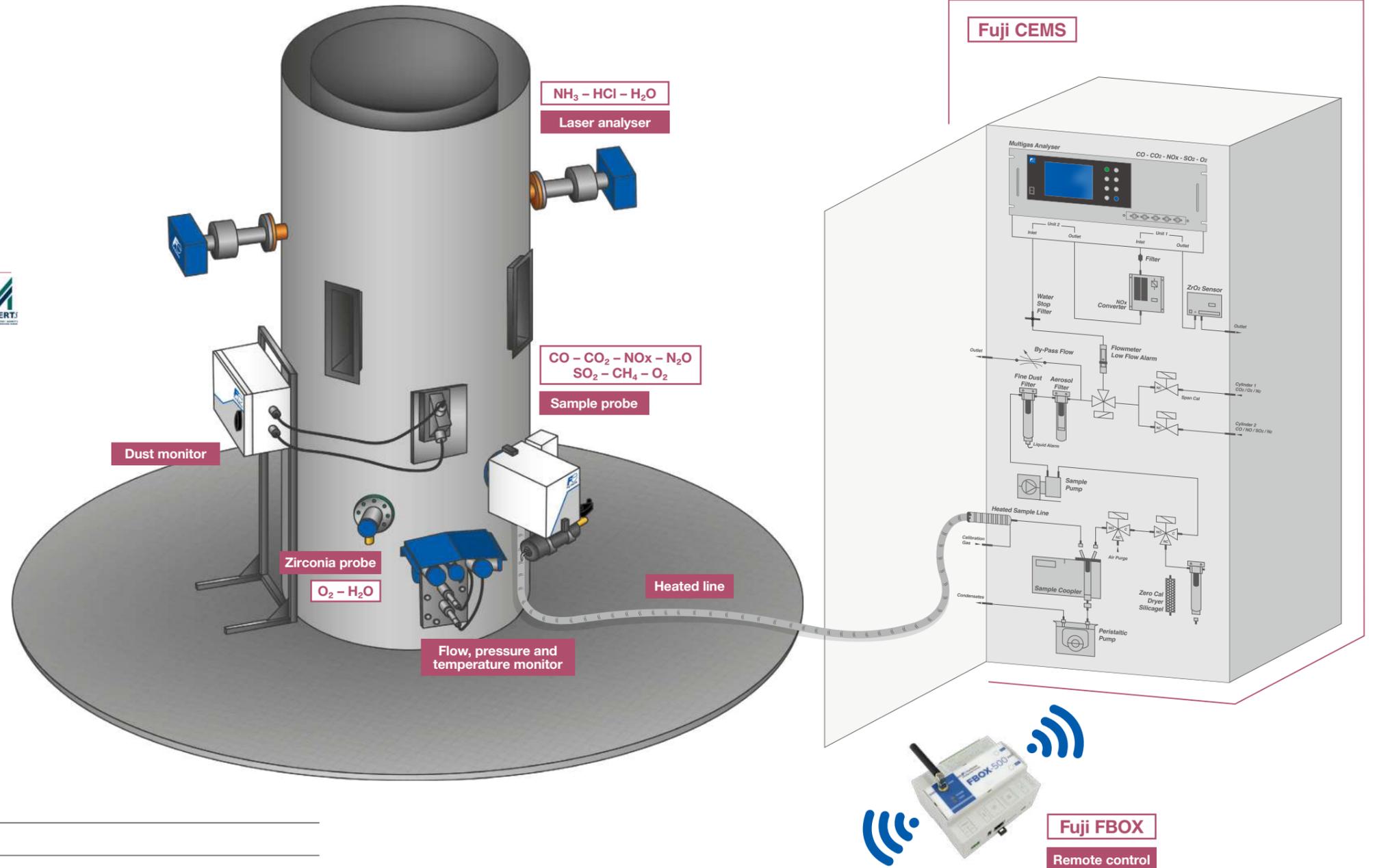
CO CO₂ NO_x N₂O SO₂ NH₃ HCl CH₄
O₂ H₂O Pressure Temperature Flow Dust



Fuji CEMS CE TÜV Rheinland QAL1 EN 14181 MCERTS

Features

- For boilers, motors & gas turbines
- CE marked System
- QAL1 certified (TÜV / MCERTS)
- QAL2 validated
- QAL3 automatic
- Single beam or Dual beam NDIR
- Multi-sampling system
- Easy installation and maintenance
- Fuji DAHS ready
- FBOX for remote control & maintenance



General specifications

Measurable components	CO, CO ₂ , NO _x , N ₂ O, SO ₂ , NH ₃ , HCl, CH ₄ , O ₂ , H ₂ O Pressure, Temperature, Flow / velocity, Dust concentration
Measuring principles	CO, CO ₂ , NO _x , N ₂ O, SO ₂ , CH ₄ : NDIR O ₂ : zirconia, paramagnetic or electrochemical / H ₂ O: differential ZrO ₂ NH ₃ , HCl, H ₂ O: laser Dust: LED light scattering (others as option) Flow: Microventuri (others as option) / Pressure: Capacitive / Temperature: Pt100
Response time (t90)	< 200s (NDIR) < 5s (laser)
User interface	10" touchscreen interface with Fuji CEMS Manager ^{VT} software module
Output / communication	Modbus TCP/IP as a standard. Options: 4-20mA, Profibus, Modbus RTU, Internet / GSM (F-BOX) Status: Autocalibration running, maintenance, normal operation, stack under monitoring Alarms: General alarm, low flow, condensates, sample probe, heated line, cooler, analysers
Contact output	General alarm as standard and specific alarms (see list above) as options
Contact input	Boiler unit running (for multisampling mode and Fuji DAHS use)
Optional functions	Automatic calibration, automatic backflush Automatic QAL3 (combined with Fuji ACE Data QAL3 software module)
Multisampling	Up to 4 stacks as a standard. Up to 8 stacks as an option.
Sampling System	Sample probe, heated line, filters, coolers and pumps designed according to customer application: humidity, quantity and type of dusts, pressure & flow rate, corrosion, stack size, etc.
Calibration gases (supplied locally)	Zero Calibration: N ₂ or dry clean air Span calibration: CO, CO ₂ , NO, SO ₂ , CH ₄ , N ₂ O, NH ₃ , HCl: 90% of each measured component in N ₂ O ₂ zirconia: 21% O ₂ in N ₂ and 2% O ₂ in N ₂
Power supply	100, 110, 115, 200 or 230 VAC, 50/60 Hz
Dimensions (mm)	Single stack standard indoor cabinet: 600 (W) x 800 (D) x 1800 (H) - others according to application

Specific performances

Analyser Type	ZRE: NDIR Single Beam		ZKJ: NDIR Dual Beam	
	Component	Range	Component	Range
NDIR measurement ranges (see available combinations on analyser datasheet)	NO _x	0 - 200 / 0 - 5000 ppm	NO _x	0 - 50 / 0 - 5000 ppm
	SO ₂	0 - 200 / 0 - 5000 ppm	SO ₂	0 - 50 / 0 - 5000 ppm
	CO	0 - 200 / 0 - 5000 ppm	CO	0 - 50 / 0 - 5000 ppm
	CH ₄	0 - 500 / 0 - 5000 ppm	CH ₄	0 - 200 / 0 - 5000 ppm
Other measurement ranges	CO ₂	0 - 10 ... 20 %	N ₂ O	0 - 200 / 0 - 5000 ppm
	NH ₃	0 - 15 / 0 - 5000 ppm	CO ₂	0 - 10 ... 20 %
	Dust	0 - 10 / 0 - 1000 mg/Nm ₃		
	Pressure	800 - 1200 mbar		
	O ₂	0 - 10 ... 25 %		
	HCl	0 - 10 / 0 - 5000 ppm		
Repeatability	Velocity	3 - 30 m/s (others as option)		
	Temperature	0 - 300°C		
Linearity		≤ ±0.5 % FS (NDIR & ZrO ₂) ≤ ±1 % FS (laser)		
Zero drift		≤ ±2 % FS per week (NDIR)		≤ ±1 % FS per week (NDIR)
		≤ ±2 % FS per month (ZrO ₂) ≤ ±2 % FS per 6 months (laser)		≤ ±2 % FS per month (ZrO ₂) ≤ ±2 % FS per 6 months (laser)
Span drift		≤ ±2 % FS per week (NDIR)		
		≤ ±2 % FS per month (ZrO ₂) ≤ ±2 % FS per 6 months (laser)		

DAHS

Data Acquisition and Handling Systems

CEMS cabinet automation & Automatic QAL3 system

Atmospheric emissions data collection, calculations and reporting system

CO CO₂ NO_x N₂O SO₂ NH₃ HCl CH₄ O₂ H₂O Pressure Temperature Flow Dust

Fuji DAHS CE

Features

- For boilers, motors & gas turbines
- Fuji CEM System^{v7} Software Suite including :
 - Fuji CEMS Manager^{v7}
 - Fuji CEMS Remote^{v7}
 - Fuji CEMS Backup^{v7}
 - Fuji CEMS Report^{v7}
- Fuji ACE Data^{QAL3} automatic QAL3 system
- Fuji FBOX controller and remote maintenance

Compliance

- EN17255:2019 European standard compliant
- Continuously upgraded to stick with regulation evolution

Adaptability

- Any brand of boiler CEMS
- Any fuel type fired boiler
- Single stack and also designed for multi-sampling CEMS

Design

- Developed and maintained by Fuji Electric Engineers in France
- Software & Hardware robustness proven over 17 years

Data safety & security

- Data safety: Triple data saving system
- Data security: FBOX highly secured cloud data



Heart of the Fuji CEM System^{v7}, the newest EN17255 compliant Fuji DAHS

Fuji FBOX

Features

- Control and automation of the CEMS
- Combined with required inputs / outputs modules
- Powerful Machine-to-Machine (M2M) PLC :
 - Ethernet/Internet or GSM communication
 - Exchange files, send e-mails and SMS

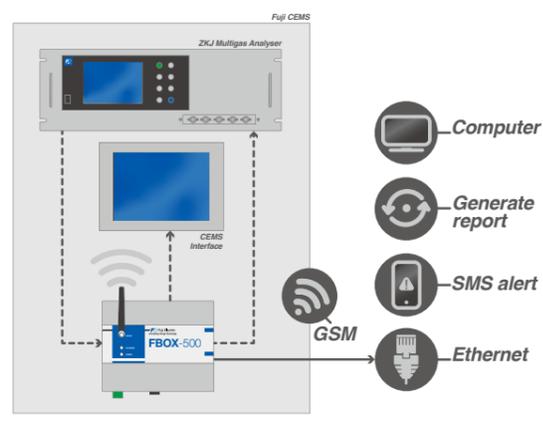
Functions

- Send alarms (SMS, email):
 - CEMS fault, ELV overpassed, etc.
- Allow remote diagnostic and remote maintenance
- Remote CEMS control, upgrades, maintenance preparation
- VPN for remote secured Emission Reports handling



Principle

Fuji FBOX in CEMS



Fuji CEM System^{v7} Software Suite performs acquisition, handling and reporting of emissions data. It is composed with 4 modules: Manager, Remote, Backup and Report

Fuji CEMS Manager^{v7}

Control, automation and communication hub of the Fuji CEMS

- CEMS configuration and operation control with Fuji FBOX
- Data display (digital & graph) and safety (1st storage level on SD card)
- Alarms / status display and output through Modbus communication and/or digital outputs
- Operations selection : maintenance, calibration, QAL2, QAL3
- Data handling according to European Environmental Regulation including EN17255



Fuji CEMS Report^{v7}

Features

- Generation and display of Emission Reports
- Generated and displayed locally or remotely
- French & European regulations Compliant
- Concentration and mass reports
- NOC & OTNOC separated reports
- Daily, Monthly and Yearly reports

Fuji CEMS Backup^{v7}

Features

- Launch of automatic backups
- Management of backups history
- > 10 years backup data on 3 storage levels:
 - FBOX internal memory
 - PC operation HD drive
 - PC backup SSD drive

All functions available locally on the CEMS cabinet interface are also available remotely on any PC web browser

Fuji CEMS Remote^{v7}

Features

- Same functions as Fuji CEMS Manager^{v7}
- Remote control from any connected PC

- Ethernet / Internet communication
- Web browser interface

Fuji Auto Check Extensive Data

Fuji ACE Data^{QAL3}

Features

- QAL3 protocol configuration tool
- Designed for boilers / turbines emissions
- Quality assurance measurements control:
 - CO, NO_x, SO₂, CO₂, NH₃, O₂
 - H₂O, Dust, Flow
- Manual and Automatic versions
 - Manual: adapted to any CEMS brand
 - Automatic: controlled by Fuji FBOX
- CUSUM type Control Chart
- QAL3 Reports on demand



Biogas Analyser Systems

Continuous accurate measurement of biogas composition

Simultaneous and continuous measurement of up to 4 components in biogas

CH₄ CO₂ O₂ H₂S Pressure Temperature Flow

ZPSB CE



Applications

- Landfill site, ultimate waste storage site
- Upstream & downstream gas treatment biogas
- Digester and fermenters
- Sewage treatment plants and laboratories

Global Fuji Solution

Part of the global FUJI Biogas solution

- The Biogas ZPSB analyser system is a part of the Fuji Biogas global solution including:
 - Instrumentation, measurements, software, control
 - Service: installation, commissioning, training, maintenance contracts

Low maintenance

Low operation cost & high reliability

- Fuji Electric CH₄ and CO₂ NDIR optical benches famous for reliable and accurate industrial measurements
- Specific protection of optical components to resist to H₂S and other aggressive components
- Fuji Electric Sample Switching Technology for long life time of the H₂S cell, without dilution
- Automatic calibration (option)

Precise

Proven high performances of Fuji analysers

- ZPAF Biogas analyser using latest Fuji Electric NDIR technology
- Cross-interferences minimized

Compact

Simultaneous & Continuous measurement of CH₄, CO₂, O₂ and H₂S

- Wall-mounted or standalone analyser cabinet depending on selected options
- Easy and fast installation and commissioning

Flexibility

Flexible and adaptable customized solutions site by site

- Polyester or metal cabinet for outdoor installation
- Industrial & biogas specific sampling system (high humidity, dust and corrosion) designed for each application
- Two measurement ranges for each component
- Multipoint sampling system with Fuji Electric touchscreen POD interface (option)
- ATEX sample heated line (option)

Safety options

- LEL detection, light alarm, mains power shut-down and biogas inlet closure
- Flame arrestor at biogas inlet

General specifications

ZPSB Biogas Analyser System based on Fuji ZPAF analyser

Measured components	1 to 4 measured components: CH ₄ / CO ₂ / O ₂ / H ₂ S	
Technology	CH ₄ / CO ₂	NDIR
	O ₂	Galvanic cell sensor
	H ₂ S	Constant potential electrolytic sensor
Measurement Ranges	CH ₄ / CO ₂	0 – 20 %vol 0 – 100 %vol
	O ₂	0 – 10 %vol 0 – 25 %vol
	H ₂ S	0 – 500 ppm 0 – 2000 ppm
		0 – 500 ppm 0 – 5000 ppm
Power supply	100 to 240 V AC 50/60 Hz	
Display	Backlit LCD display (Standard) Fuji touch panel interface (Multipoint Sampling Option)	
Displayed information	Standard: Measured components, concentrations, alarms, configuration menus, calibrations and advanced diagnostics	
	Option: Advanced functions with multipoint sampling (see multipoint system option)	
Dimensions	Standard Single Point Wall mounted cabinet: 750(W) x 750(H) x 500 (D)	
Weight	Standard Single Point Wall mounted cabinet: 50 kg	
Structure	Standard Single Point Wall mounted cabinet: consolidated polyester cabinet for outdoor use	

Performances

Response time	CH ₄ / CO ₂ / O ₂	≤ 30 sec
	H ₂ S (0 – 2000 ppm)	≤ 180 sec
	H ₂ S (0 – 5000 ppm)	≤ 300 sec
Repeatability	CH ₄ / CO ₂ / O ₂	≤ ± 0,5% PE
	H ₂ S	≤ ± 2% PE
Linearity	CH ₄ / CO ₂ / O ₂	≤ ± 1% PE
	H ₂ S	≤ ± 2% PE

Inputs/outputs

Analog Outputs	4 – 20 mA (one analog output per component)
Communication	Standard: Concentration measurements and status signals (alarms, calibrations) RS485 Modbus RTU
	Option: Ethernet Modbus IP (multipoint sampling)
Digital Outputs	Standard: Dry contact general alarm including analyser fault and sampling system fault General Alarm light indicator on cabinet front door

Environment conditions

Ambient temperature	-5°C to +40°C
Ambient humidity	90% RH max

Biogas sample conditioning

Sampling	PTFE or Stainless Steel tube 4 to 6 mm internal diameter Option: ATEX heated line
Biogas Pressure	Sampling pump for ambient pressure or low pressure biogas (< 100 mbar g) High pressure biogas: system with pressure reducer
Single point system	Continuous measurement of a single stream: sampling, dryer, filtration, bypass, flow adjustment, H ₂ S absorption (option)
Multipoint system (Optional)	Additional advanced features: - Fuji Touchscreen interface and PLC - Configuration of the number of components measured (max. 4) - Configuration of the number of biogas streams analyzed (max. 6) - Configuration of stream switching sequence, measurement times, purge times - Automatic or manual switching setting - Display of the 4 (max) measured components concentrations of the 6 (max) analyzed streams - Display of sampling and analyser alarms - Modbus output of the measurement, status and alarms - Analog outputs and digital outputs (option)

Multipoint ZPSB

Fuji Touchscreen interface and PLC



Marine CEMS

Ships on board Continuous Emission Monitoring Systems

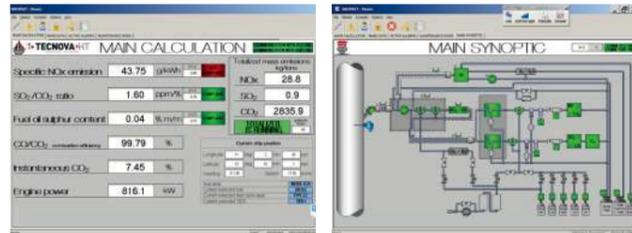
Monitor up to 7 components + marine specific calculations
IMO / MARPOL certified by DNV-GL / LLOYD / RINA / Class NK

CO CO₂ NOx SO₂ HC O₂ Dust Specific Calculations

S-Keeper7 CE RINA DNV-GL ClassNK

Software and Calculations

Large & easy Touchscreen interface:



Features

- According to MARPOL Annex VI Reg.13 and MEPC 177(58), 184(59)
 - Calculation of NOx g/kWh vs Tier I, Tier II, Tier III limits
 - Monthly NOx compliance test report
- According to MARPOL Annex VI Reg.14 and MEPC 177(58), 184(59)
 - Calculation SO₂/CO₂ ratio
 - Calculation of Fuel Oil Sulphur content (% wt/wt) vs Reg.14 limits
- According to MEPC 177(58), 184(59) HC total Hydrocarbons load (ppm or g/kWh) is measured
- Reports according to ISO 14001 of totalized mass NOx / SOx / CO₂ emissions (kg/tonne)
- Reports according to MEPC Circ. 471 of CO₂ Emission Index (gCO₂ / tonne n.m.)
- Combustion Efficiency monitoring by CO₂ / (CO₂+CO) ratio
- Types EASY-N, LITE-N, LITE designed for LNG powered units
- O₂ (%) & Particulate (mg/m³ or g/kWh) analysis as additional options
- Multiple stack management

Main Supply

Qty#1	Integrated Cabinet
	Sample probe & tube
	Sample line
	Bottles set (according to analyzed components)

Ambient Conditions

Main Integrated Cabinet	Ambient Temperature +5 / +55°C* ; 95% RH Max *50°C at 60Hz
Sample Probe	Ambient Temperature +5 / +55°C; 95% RH Max
Particulate Analyser (option)	Ambient Temperature +5 / +55°C; 95% RH Max

Dimensions & Weight

Main integrated cabinet	Sample line	Oxygen analyser (optional)
1050(W) x 1990(H) x 800(D)mm, 550 kg	Length TBD , 0.9 Kg/m	Integrated in main cabinet
Sample probe	Calibration bottle	Particulate analyser (optional)
Housing 251(W) x 297(H) x 168(D) mm, 9 kg, Length TBD	360(H) x 90(DN) mm, 1.1 kg	Flanged housing 342(L) x 74(DN) mm, 1.7 kg, Insertion length TBD

Modular System Selection table

Type	MARPOL Annex VI		MEPC 177 (58) 184 (59)	Analyzed Components					Tier I/II/III Limits	MEPC Circ. 471	ISO 14001	Analytical Options
	Reg.13	Reg.14		NOx	CO ₂	SO ₂	CO	HC				
EASY-N	✓	✗	✓	✓	✓	✗	✗	✗	✓	✓	✓	O ₂ , Particulate
EASY-S	✗	✓	✓	✗	✓	✓	✗	✗	✗	✓	✓	O ₂ , Particulate
EASY	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	O ₂ , Particulate
LITE-N	✓	✗	✓	✓	✓	✗	✓	✗	✓	✓	✓	O ₂ , Particulate
LITE-S	✗	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	O ₂ , Particulate
LITE	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓	O ₂ , Particulate
FULL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	O ₂ , Particulate

Integrated Fuji Instruments



Fuji ZFK7 Oxygen ZrO₂ Analyser
Extremely robust Zirconium Oxide O₂ Analyser
Linked to ZPA multigas Analyser



Fuji ZPA Multigas NDIR Analyser
Simultaneous and accurate measurement of up to 5 gas components among : CO, CO₂, NOx, SO₂, O₂



Fuji ZDL NOx Converter
Very high efficiency NOx converter 220°C controlled temperature for best selectivity

Technical Specifications

Analyzed components measuring method	- NOx, SO ₂ , CO, CO ₂ : NDIR (NO with NO ₂ to NO converter) - HC: H-FID heated flame ionization detector
Auxiliary inputs	Engine speed and Torque, Air inlet flow, Fuel flow, Ambient temperature, Pressure & Humidity sensors as per "NOX Technical Code 2008", Ship GPS Global Positioning System
Software	- Windows®-based Emissions Reporting software - Easy self-explaining graphical interface with Process Flow Diagram and real-time parameters - Multilevel Password Protection and Data Encryption to ensure safest tamperproof procedure I/O
Connections	1 x Ethernet RJ45, 1 x RS-485, 1 x SPDT contact

Oxygen Analyser (Option)

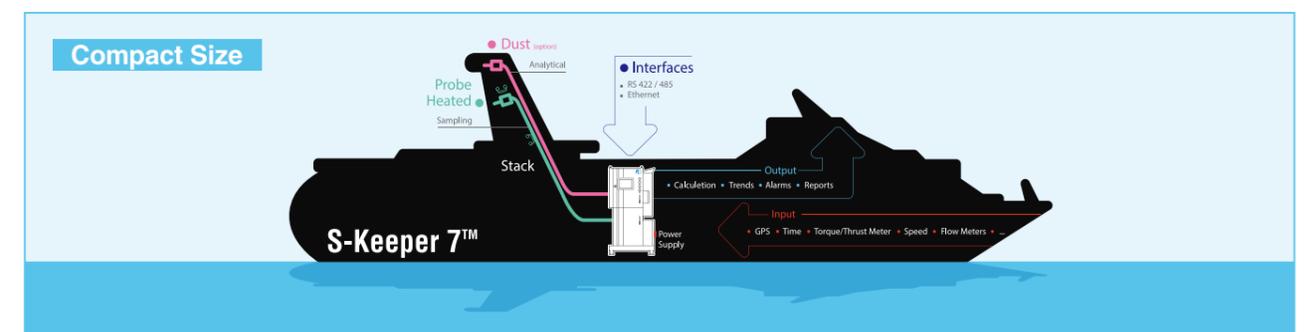
Measurement method	Zirconium oxide
Measurement range	0 ÷ 25 % (dry)
Installation	Integrated in main cabinet

Sampling System

Sample conditioning system	According to "NOX Technical Code 2008" with system condition monitoring and maintenance indicators
Sample probe technical specifications	- Operative Conditions: max. 200 kPa, 180°C - Filter element: Bonded Silicon Carbide (CSi) - Wetted parts: SS316Ti, CSI, Viton® - Flanged Process Connection: DN 65 PN 6 DIN 2573 - Housing: SS304, IP43 rating
Sample line technical specifications	- Operative Temperature 190°C/Max 210°C/Peak 250°C - Maximum Operating Pressure 2.8 barg@200°C - Wetted parts PTFE material - External diameter 43 mm - End Caps diameters 48 mm - Minimum Allowable Bending Radius 200 mm - External insulation Fiberglass

Particulate Analyser (Option)

Measurement method	Inductive Electrification
Measured particle size	0.3 µm or higher
Measurement range	Lowest value 0.1 mg/m ³
Installation	In-Situ, flanged to stack



Marine Laser SO₂-CO₂ Analysers

Ships Scrubbers Laser Gas Analyser

Continuous monitoring of SO₂ and CO₂ in severe environment
IMO Resolution MEPC.259 (68) certified by DNV-GL & Class NK

CO₂ SO₂

ZQS DNV-GL ClassNK

Benefits

Laser Gas Analyser has mainly 3 benefits for any ship:
Compact, low running cost and easy maintenance. Emission control has become more stringent to reduce sulfur oxides (SO_x) emitted from ships. The ZQS laser gas analyser developed by Fuji Electric, will meet the customer needs by providing accurate monitoring of exhaust gases and by saving space and maintenance.

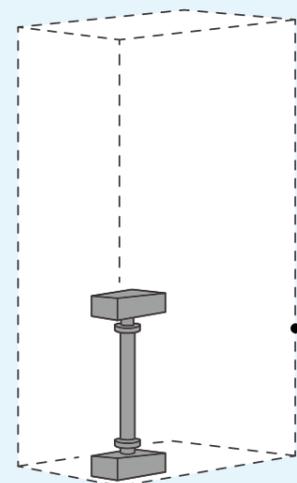
Features

- Laser Technology
- SO₂ and CO₂ continuous monitoring
- Calibration required only once a year
- CE marked and IMO certified analyser
- Compact size
- Low running cost
- Easy maintenance, only filter replacement



Compact Size

We have succeeded in reducing the size 1/10 of the infrared type. Therefore, it can be easily installed even in a narrow space inside a ship. It is suitable for either the retrofit of existing in-service ships or new ships.

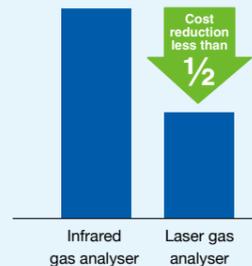


Volume ratio
1/10

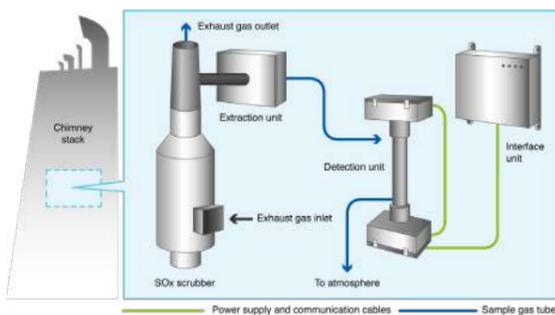
Infrared gas analyser
(Compared to ZQS Laser Analyser)

Low running cost

Compared to infrared gas analysers, the maintenance cost can be reduced to less than 1/2 because the number of replacement parts is small and its calibration is required only once a year.



Equipment Configuration



Technical Specifications

Components and ranges	SO ₂ : 0 to 300 ppm CO ₂ : 0 to 10 vol%
Principle	Laser TDL (CO ₂) + Laser QCL (SO ₂)
Measuring method	Gas extraction method
Measuring object	SO _x scrubber outlet flue (dedicated) for marine engine exhaust gas
Light source	Semiconductor laser
Laser class	CLASS 1 (laser devices are Class 1 and Class 3B)
Dimensions (W×H×D)mm	Detection unit: 330 (W) × 880 (H) × 255 (D) mm Extraction unit: 400 (W) × 300 (H) × 323 (D) mm *Depth varies with the diameter of the duct Interface unit: 500 (W) × 400 (H) × 166 (D) mm
Weight (except cables)	Detection unit: 30 kg Extraction unit: 18 kg Interface unit: 20 kg
Enclosure	Indoor use, IP44 (totally enclosed, splash-proof) Only the extraction unit fan: IPX4
Materials	Detection unit: Stainless steel Extraction unit: Stainless steel Interface unit: Stainless steel
Materials of gascontacting parts	SUS316L, CaF ₂ , FKM, Silicone, PTFE, Glass, PVDF
Power supply	100-240 V AC, 50/60 Hz
Power consumption	Max. rated power: 1,000 VA
Display	LED indicator lamps
Display content	Warm-up, measurement, maintenance request, standby, analyser error
Communication functions	Ethernet / Protocol: Modbus TCP
Cable length	Between the receiver unit and the transmitter unit: 1 m Between the detection unit and the interface unit: ≤ 15 m Between the extraction unit and the interface unit: ≤ 20 m
Analog output (AO)	4 to 20 mA DC, 3 points Insulated from the grounding line and the internal circuit. Not insulated between signals. Load resistance: ≤ 300 Ω Output contents: SO ₂ concentration, CO ₂ concentration, SO ₂ /CO ₂ ratio Output is held at 0% during maintenance and during suspension of scrubber
Analog input (AI)	4 to 20 mA DC, 1 point Insulated from the grounding line and the internal circuit Not insulated between signals Input contents: exhaust gas temperature
Digital output (DO)	SPST-NO relay contact, 4 points Contact capacity: 30 V DC, 1 A (resistive load) Insulated from the internal circuit. Contacts are not insulated each other (shared COM) Output contents: maintenance, warm-up, sampling suspension, maintenance request, analyser error (extraction unit error, detection unit error), power interruption
Digital input (DI)	Voltage contact input, 4 points Contact ON at 18 to 25 V input Insulated from the internal circuit Contacts are not insulated each other (shared COM) Input contents: maintenance, EGCS on/off

Performance

Accuracy	Not more than ±2.0% rdg or ±0.3% FS whichever is larger
Precision	2.5 times the standard deviation of 10 repetitive responses: ≤ ±1.0%FS
Noise	≤ 2.0% FSp-p
Zero drift	≤ ±2.0% FS for 6 months
Span drift	≤ ±2.0% FS for 6 months
Response time (90% FS response)	≤ 180 s
Warm-up time	≤ 120 min
Other gas interference	Within the error in the case of any of the following interfering gases flowing: ≤ ±2.0% FS (1) 500 ppm NO (2) 200 ppm NO ₂ (3) 2000 ppm CO (4) 10 ppm NH ₃ (5) 10 ppm CH ₄ (6) 60°C saturated H ₂ O Nitrogen (N ₂) is used for diluting these gases

Installation Environment

Ambient temperature	Extraction unit: 0°C to 65°C Detection unit: 0°C to 55°C Interface unit: 0°C to 45°C However, air purge is necessary between 40°C to 45°C. Sample gas tube: 0°C to 65°C
Ambient humidity	≤ 90%RH (No condensation)
Vibration	≤ 0.2 G (1.9 m/s ²)
Storage environment	Ambient temperature: -20°C to 70°C Ambient humidity: ≤ 100%RH (No condensation)
Flange	JIS 5K65A (Others on request)
Requirements on instrument air	Flow rate: ≤ 150 L/min Pressure: 0.3 to 0.4 MPaG

Requirements on Exhaust Gas

Condition	Exhaust gas after cleaning with a SO _x scrubber
Gas temperature	5°C to 60°C
Exhaust gas mist concentration	There should be none *Even if mist production is unavoidable, measurement is possible. However, the higher the mist concentration, the higher the likelihood of adverse effects such as extraction unit piping corrosion and premature filter clogging
Water vapor	≤ 20 vol% (below 60°C dew point)
Pressure	-10 kPa to 10 kPa
Gas composition	SO ₂ ≤ 300 ppm CO ₂ ≤ 10 vol% NO _x ≤ 1000 ppm CO ≤ 2000 ppm O ₂ 1 vol% to 21 vol% CH ₄ ≤ 10 ppm NH ₃ ≤ 10 ppm Others N ₂ , H ₂ O

Calibration

Calibration interval (recommended)	1 year
Calibration method	Standard gases flow through the detection unit gas cell. - Zero gas (Conforms to NO _x Technical Code 2008) Pure nitrogen: impurities ≤ 1ppm C ≤ 1ppm CO ≤ 400ppm CO ₂ ≤ 0.1ppm NO - Span gas (Conforms to NO _x Technical Code 2008) SO ₂ concentration: 240 - 300 ppm CO ₂ concentration: 8 - 10 vol%

Complied Standards

IMO Resolution MEPC.259 (68)
"2015 Guidelines for Exhaust Gas Cleaning Systems."
IMO Resolution MEPC.177 (58)
"NO_x Technical Code 2008."

Industrial Process Gas Analyser Systems

Hardware & Software tailor made analytical systems according to customer specific process requirements

Simultaneous and continuous measurement of up to 13 gas components

CO CO₂ NO NO₂ NO_x N₂O SO₂ NH₃ HCl CH₄ O₂ H₂O H₂

Industrial sectors 

With a wide range of available analytical technologies, combined with internal PLC & software developments, as well as internal engineering teams, Fuji Electric France supply turnkey analytical solutions for :

- Metal industry
- Pulp & Paper
- Oil & Gas
- Biogas
- Food & Beverage
- Energy / Combustion Control
- Incineration / Furnace Control
- Glass & Ceramic
- Textile

Application examples

CO CO₂ O₂ H₂O H₂

Continuous Galvanizing Line Control

15 Streams Multisampling system



NH₃ H₂S Pressure Temperature Flow

Methanization scrubber exhaust control

Laser in-situ NH₃ ppm continuous monitoring



Laser extractive H₂S ppb continuous monitoring
Dedicated acquisition and interface software



Flue Gas Humidity Monitors

Continuous measurement of humidity in highly dusts loaded flue gas through dry and wet zirconia oxygen measurements

In-situ or extractive O₂ + H₂O monitors depending on the application

O₂ dry O₂ wet H₂O

Delta-O₂ 

Features

- O₂ and H₂O flue gas monitoring
- Measurements :
 - Wet O₂ concentration
 - Dry O₂ concentration
 - H₂O concentration (option)
- Perfect for dusty applications
- Delta-O₂ IS: in-situ version for indoor applications :
 - stand alone all-in-one instrument
 - compact and light design
 - short response time
- Delta-O₂ SA : extractive version for outdoor and adaptable to a very wide range of applications

Applications

- Combustion plant atmospheric emissions monitoring
- Wet biomass combustion control

Specifications

Delta-O ₂ Type	In-situ : Delta-O ₂ IS	Extractive : Delta-O ₂ SA
Measuring principle	Fuji Electric ZFK8 zirconium oxide	
Measuring ranges	Wet O ₂ : 0 / 25 % Dry O ₂ : 0 / 25 % H ₂ O : 0 / 100 % (option)	
Main components	In-situ flow guide tube ZKM transmitter + ZFK8 probe for wet O ₂ Dusts and tar filter and sample pump Cooler and peristaltic pump ZKM transmitter + ZFK8 probe for dry O ₂	Heated sample probe + heated sample line ZKM transmitter + ZFK8 probe for wet O ₂ Sample pump Cooler and peristaltic pump ZKM transmitter + ZFK8 probe for dry O ₂
Mouting type	Stand-alone cabinet fixed on flow guide tube	Sample probe on stack + remote cabinet
Flue gas temperature	300°C max.	
Ambient temperature	+5 / +40°C	-20 / +50°C
Output signals	4-20 mA DC and for wet O ₂ 4-20 mA DC for dry O ₂ 4-20 mA DC H ₂ O (option)	
Response time	< 10s	< 30s
Display	Backlit LCD	
Options	Fuji Electric Touch Screen interface H ₂ O concentration calculation H ₂ O 4-20 mA additional analog output Alarm outputs Modbus RTU or Modbus IP communication Automatic calibration and/or automatic backflush Cabinet heater and/or cabinet cooler	
Power supply	100-120 V AC or 200-240 V AC, 50/60 Hz	



Delta-O₂ IS

Flue Gas Dust Monitors

Robust and accurate back scattering dust monitor for rough industrial installations

QAL1 certified continuous monitoring of particulates concentration

Dusts

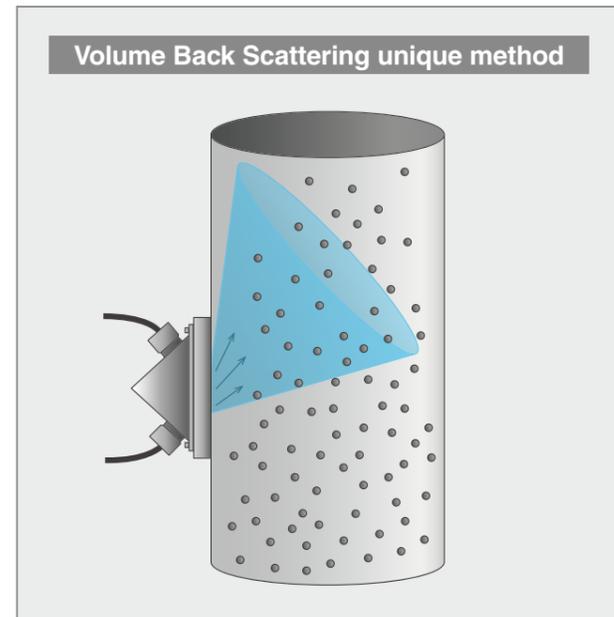


Features

- LED Technology
- Volume Back Scattering principle
- Very high sensitivity
- Single scanner head for easy installation
- Adapted to very low dust concentration levels
- Automatic contamination monitoring and compensation
- Permanent full self-diagnosis functions

Applications

- Continuous particulates emissions monitoring:
- Coal, biomass, and other solid fuels fired boilers
- Oil fired boilers, diesel engines



Specifications

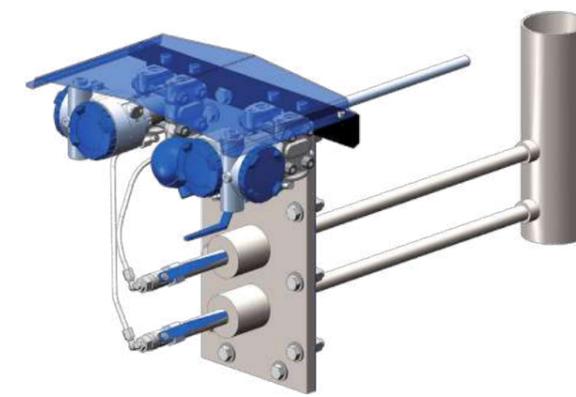
Analyser panel	
Housing	Epoxy metallic paint (option SS304L)
Power supply	230V ~ / 115V ~ (+10/-15%) 50 Hz / 60 Hz
Power consumption	50 VA
Operating temperature	-20 to +50°C
Stack diameter	400 mm to 8 m
Measuring range	0 to 1000 mg/Nm ³
Measuring scale	adjustable, minimum 10 mg/Nm ³
Display resolution	From 0.1 to 1 mg/Nm ³ according to scale
Twin measuring scale	Automatic scale switch-over
Analogue output	Three 4-20 mA for 750 Ohms
Digital processing	4 programmable relays on scale, threshold, fouling level and general fault
Certifications	CE mark, QAL1 (EN14181:2014)
Scanner head	
Shell	Stainless steel 304L
Heating element	Electric resistor 500 VA
Sweeping air pressure/flow rate	0.3 to 0.4 bars / 3 Nm ³ /h
Maximum flue gas temperature	350°C (high temperature 700°C option)
Automatic self-checks	Air presence and temperature control
Weight	4,8 kg
Fibre Optic	
Sensor tip and sheath	Stainless steel 304L
Standard length	2.20 m
Admissible temperature on fibres	-20 to 220°C

Flue Gas Flow Rate Monitors

Microventuri based continuous monitoring of flue gas flow rate, pressure and temperature

Designed for tough industrial applications with highly dusts loaded flue gas

Flow Pressure Temperature



Applications

- Environmental Monitoring :
 - Combustion plants
 - Incineration
 - District Heating
 - CEMS in a wide range of industry sectors

Fuji Electric Components

- Designed and manufactured by Fuji Electric France :
 - FKC very high performance Pressure Transmitters
 - Fuji Electric Hardware and Software (option) design

Adaptability

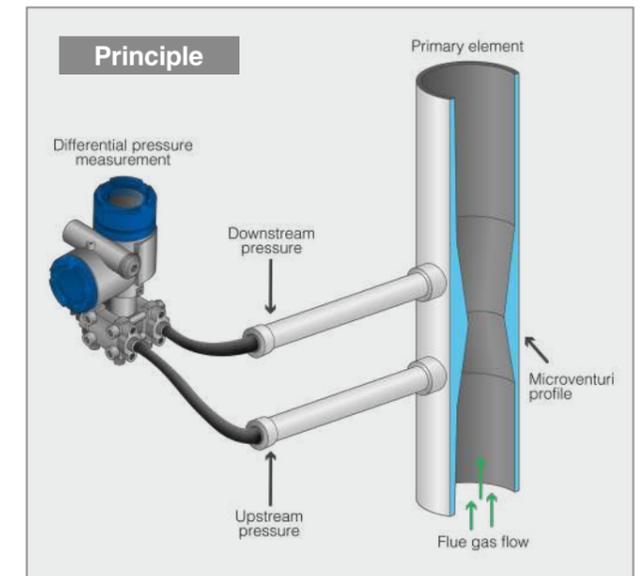
- Mounted on small or large diameter stacks
- Only one flange on only one side of the stack
- Perfect for very dusty applications :
 - No clogging possible
 - Biomass, coal or fuel fired boilers

Turnkey System

- One single flange on the stack – Three signals :
 - Differential pressure / Velocity
 - Static pressure
 - Temperature

Specifications

Measuring principles	MicroVenturi, differential pressure, Pt100
Measuring ranges	Flow: 0 / 1.000.000 m ³ /h Temperature : 0 / 300°C Differential pressure : 0 / 10 mbar Static pressure : 800 / 1200 mbar
Ambient temperature	Range: -20 / +50°C
Flue gas velocity	Minimum: 3 m/s
Output signals	Analog: 3 x 4-20 mA
Options	Fuji Electric Touch Screen interface Normalized flow calculation Alarm outputs Modbus communication Automatic backflush
Power Supply	110 VAC, 230VAC, 24 VDC



NDIR Multigas Analysers

Up to 5 gas components concentration measurement

Single beam NDIR analyser

CO CO₂ NO NO_x SO₂ CH₄ O₂

ZRE CE



Features

- Simultaneous and continuous measurement of up to 5 components
- Two ranges for each component can be selected and freely modified by the user
- Simple internal structure for ease of maintenance
- Compact and lightweight: 483 (W) × 133 (H) × 418 (D) mm, 8 kg
- Full choice of technologies for the O₂ measurement: electrochemical, paramagnetic or zirconia

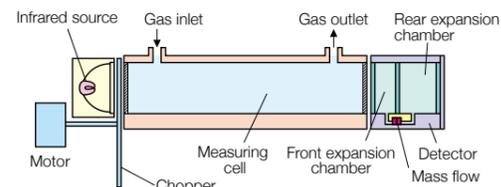
Measurement range

Component	Minimum range	Maximum range
NO	0 ... 200 ppm	0 ... 5000 ppm
SO ₂	0 ... 200 ppm	0 ... 10 vol%
CO ₂	0 ... 100 ppm	0 ... 100 vol%
CO	0 ... 200 ppm	0 ... 100 vol%
CH ₄	0 ... 500 ppm	0 ... 100 vol%
O ₂ - Built in fuel cell	0 ... 10 vol%	0 ... 25 vol%
O ₂ - Built-in paramagnetic - External zirconia	0 ... 5 vol%	0 ... 25 vol%

Main Specifications

Repeatability	±0.5% FS
Linearity	±1% FS
Zero drift	±2% FS / week (with auto zero calibration for ranges 500ppm or less)
Span drift	±2% FS / week
Response time (for 90%)	≤ 60 s
Output signal	4–20 mA DC or 0–1 V DC, up to 12 points
Contact input	Volt-free contact: remote range-switching, auto-calibration remote start, remote hold, average reset, pump on/off
Contact output	SPST-NO and SPDT contact: analyser error, calibration error, range identification, during auto-calibration, pump on/off, CO peak alarm, H/L limit alarm, power interruption
Communication (option)	RS485 (Modbus®)
Display	LED-backlit LCD, instantaneous value, O ₂ corrected instantaneous value, O ₂ corrected average value, O ₂ average
Power supply voltage	100–240 V AC, 50/60 Hz
Power consumption	100 VA
Dimensions and weight	483 (W) × 133 (H) × 418 (D) mm, 8 kg

Single beam NDIR principle



Detection principle

The mass flow sensor measures the amount of infrared light absorbed in the measurement cell.

Mass flow sensor

Converts the infrared absorption into an electrical signal. Excellent noise resistance thanks to the low impedance sensor. The absence of moving parts makes the device resistant to vibration.

Dual beam NDIR analyser

CO CO₂ NO NO_x N₂O SO₂ CH₄ O₂

ZKJ CE



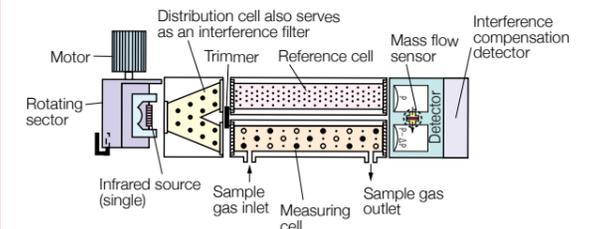
Features

- Dual beam reference cell principle allow highest performances
- Lowest ranges down to 0-20 ppm
- Excellent zero-point stability: ±1% FS per week
- Integrated interference detectors allow very low cross interferences
- Clear and easy user friendly interface with superior functionalities for diagnosis and calibrations

Measurement range

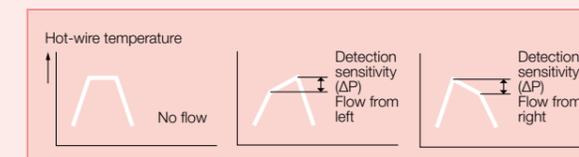
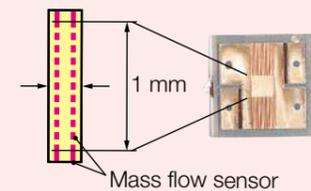
Component	Minimum range	Maximum range
NO	0 ... 50 ppm	0 ... 5000 ppm
SO ₂	0 ... 50 ppm	0 ... 10 vol%
CO ₂	0 ... 20 ppm	0 ... 100 vol%
CO	0 ... 50 ppm	0 ... 100 vol%
CH ₄	0 ... 200 ppm	0 ... 100 vol%
N ₂ O	0 ... 200 ppm	0 ... 2000 ppm
O ₂ - Built in - External zirconia	0 ... 5 vol%	0 ... 25 vol%

Dual beam NDIR principle



Main Specifications

Repeatability	±0.5% FS (± 1% FS for the ranges below 50 ppm)
Linearity	±1% FS
Zero drift	±1% FS per week (± 2% FS for the ranges below 50-200 ppm range)
Span drift	±2% FS per week (± 2% FS for the ranges below 50 ppm range)
Response time (for 90%)	≤ 60 s
Output signal	4–20 mA DC or 0–1 V DC, up to 12 points
Contact input	Volt-free contact: remote range-switching, auto-calibration remote start, remote hold, average reset, pump on/off
Contact output	SPST-NO and SPDT contact: analyser error, calibration error, range identification, during auto-calibration, pump on/off, CO peak alarm, H/L limit alarm, power interruption
Communication (option)	RS485 (Modbus®)
Display	LED-backlit LCD, instantaneous value, O ₂ corrected instantaneous value, O ₂ corrected average value, O ₂ average
Power supply voltage	100–240 V AC, 50/60 Hz
Power consumption	250 VA
Dimensions and weight	483 (W) × 177 (H) × 600 (D) mm, approx 22 kg



ZrO₂ Extractive Analysers

Zirconia sensor for ZRE and ZKJ extractive analysers

Robust, extra-long life and accurate O₂ extractive zirconia sensor

Linked to any Fuji Electric multigas analyser interface

O₂

ZFK7 CE



Features

- Controlled by Fuji Electric multigas analysers ZRE or ZKJ
- Very long life zirconia sensor, perfect stability
- Adapted to severe environment conditions such as shocks and vibrations

Mesuring ranges

Measurable Component	Range
O ₂	0 to 25 vol%

Specifications

Repeatability	Within ± 0.5% of full scale
Linearity	Within ± 1% of full scale
Zero drift	Within ± 1% of full scale/week
Span drift	Within ± 2% of full scale/week
Response time	Approx. 20 seconds (for 90% response)
Measured gas flow rate	0.5 ± 0.25 L / min
Gas inlet/outlet size	Rc ¼ or NPT ¼
Power supply	Rated voltage: 100 to 115V AC or 200 to 240V AC Rated frequency: 50 Hz/60Hz Max. rated power: 215VA (at start up) 65VA (during normal operation)
Enclosure	Steel casing, for indoor application
Indication	Temperature indication (LED)
Temperature alarm output	Contact output 1 from A contact, Contact capacity 220V AC, 1A (resistive load)
Outer dimensions	141(W) x 170 (H) x 190(D) mm
Weight	Approx. 3kg

NO_x Converters

NO₂ to NO converter for NO_x measurements

Combustion plants, incineration, steel plants, furnace control, CEMS, research labs

NO_x

ZDL05 CE



Features

- High NO₂ to NO conversion efficient catalyst
- Compact, easy to install and catalyst easy to replace

Specifications

Catalyst	Volume : 2 / 4 / 6 cm ³ Replacement cycle: Approx. every 12 months when O ₂ =5% and NO ₂ =10ppm
Temperature control	PXE4 temperature controller Temperature setting: 220°C; Thermocouple K
Materials in contact with the gas	Ceramic, Viton, glass wool, SS316
Conversion efficiency	95% or higher compliant with EN15267 / QAL1 requirements 0,5 l/min flow rate
Sample conditions	dust and condensates free 150°C or lower
Ambient temperature	-5°C to +45°C
Power Supply	110 to 240 VAC, 50/60Hz, Approx. 85VA
Contact output	Temperature alarm
Dimensions/Weight	212(H) x 148(W) x 130(D) mm / 1,2 kg

NDIR Biogas Analysers

Biogas composition multigas analysers

Continuous and simultaneous measurement of 4 components including H₂S

Landfill, waste storage, digesters, fermenters and sewage treatment plants

CH₄ CO₂ O₂ H₂S

ZPAF CE

Components and ranges

	1 st range	2 st range	Principle
CH ₄	0 ... 20 vol %	0 ... 100 vol %	Single-beam NDIR
CO ₂	0 ... 20 vol %	0 ... 100 vol %	
H ₂ S	0 ... 500 ppm	0 ... 2000/5000 ppm	Constant-potential electrolytic
O ₂	0 ... 10 vol %	0 ... 25 vol %	Galvanic fuel cell

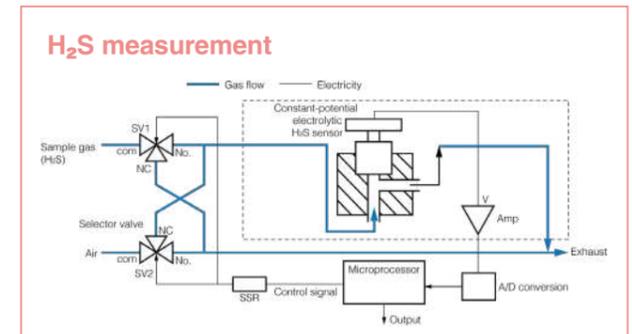
Specifications

Repeatability	±0.5% FS (H ₂ S: ±2.0% FS)
Linearity	±1.0% FS (H ₂ S: ±2.0% FS)
Zero drift	±2% FS per week
Span drift	±2% FS per week (H ₂ S: ±2.5% FS per week or ±5% FS per day)
Response time (for 90%)	10-30s (H ₂ S: 180s)
Output	4-20mA DC or 0-1V DC
Contact input	12-24V DC, ≤ 9 points
Contact output	SPDT, ≤ 15 points
Communication (option)	RS-485 (Modbus®)
Display	Backlit LCD
Power supply voltage	100-240 V AC, 50/60 Hz
Dimensions and weight	483 (W) x 133 (H) x 382 (D) mm, approx. 9 kg



Features

- Industrial and accurate biogas analyser
- Easy operation and maintenance



NDIR CO₂ Controllers

Greenhouses and ventilation CO₂ monitoring

Long term stability, accurate, robust and reliable CO₂ monitoring

CO₂

ZFP9 CE

Features

- Wall mount type
- Built-in pump and filter

Applications

- Protected horticulture
- Buildings ventilation systems
- Controlled atmosphere storage facilities



Specifications

Target	CO ₂ in air
Principle	Single-beam NDIR
Measurement range	0 ... 0.2 ... 20%
Repeatability	±1% FS
Zero drift	±10% per 6 months
Response time (for 90%)	≤ 10 s
Gas sampling	Suction pump and filter
Power supply voltage	100 V, 115 V, 200 V, or 230 V AC, 50/60 Hz
Dimensions and weight	220 (W) x 257 (H) x 85 (D) mm, approx. 3 kg

Thermal Conductivity Gas Analysers

Continuous TCD measurement of H₂, He, Ar, etc.

Reliable process control for furnaces, metal industry, semiconductor and gas separation

He Ar H₂ CO₂ CH₄

ZAF CE



Features

- Easy-to-see LCD
- RS-232C Modbus® (option)
- Auto calibration (option)
- Interference compensation (option)
- Concentration alarm output (option)
- Two switchable ranges (option)

Specifications

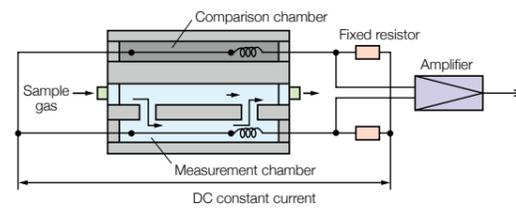
Principle	Thermal conductivity
Components	He, Ar, H ₂ , CH ₄ , CO ₂
Measurement range	Depends on components and ranges
Repeatability	±1% FS
Linearity	±2% FS
Response time (for 90%)	≤ 60 s (standard), ≤ 10 s (fast response version)
Output signal	4–20 mA DC, 0–1 V DC, or 0–10 mV DC
Contact output (option)	5 SPST-NO contacts: during calibration, H/L alarm, etc.

Measurable components and ranges

Sample gas	Reference gas ¹	Measurement range	Maximum range ratio
H ₂	N ₂ , (CO ₂ , Ar, He)	0 ... 3, 5, 10, 20, 50, 80, 100% 100 ... 90%, 100 ... 80%	1 : 10
He	N ₂ , (CO ₂ , Ar), O ₂ , Air	0 ... 5, 10, 20, 30, 40, 50, 80, 100% 100 ... 90%, 100 ... 80%	1 : 10
Ar	N ₂ , O ₂ , Air, (He)	0 ... 10, 20, 50, 80, 100% 100 ... 90%, 100 ... 80%	1 : 5
CH ₄	N ₂ , (CO ₂ , Ar, He)	0 ... 20, 40, 50, 60, 80, 100% 100 ... 80%	1 : 5
CO ₂	N ₂ , O ₂ , Air, (He)	0 ... 10, 20, 50, 100% 100 ... 90%	1 : 5

¹: Those in parenthesis need consultation. Measurement of H₂ included in O₂ is not available.

Principle



Because the thermal conductivity is different among gas components, when there is a change in the concentration of the component under measurement, the thermal conductivity of the sample gas will change to affect the temperature of the platinum wire. The analyser uses the temperature change to determine the gas concentration.

Contact input (option)	3 volt-free contacts; output hold, range switching, auto-calibration start
Display	Backlit LCD
Communication (option)	RS-232C Modbus®
Mounting	Panel mounting
Power supply voltage	100–240 V AC, 50/60 Hz
Dimensions	192 (W) × 240 (H) × 213 (D) mm
Weight	Approx. 5 kg

Paramagnetic Oxygen Analysers

Fast response unaffected by combustible gas
Combustion control in industrial furnaces and incinerators

Fast response within 2 seconds

Tolerant to interference

O₂

ZAJ CE



Features

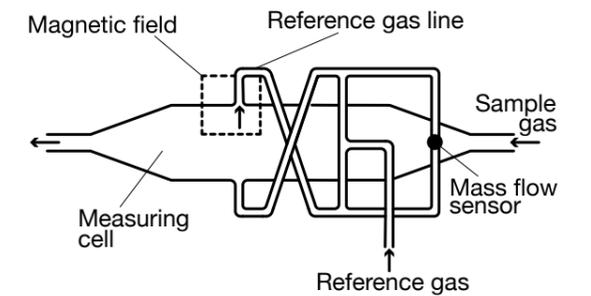
- Fast response within 2 seconds
- Tolerant to interference from other gas (H₂, CO₂, etc.)
- Suppressed ranges available (e.g. 21–100%O₂)
- No moving parts—low maintenance
- Automatic calibration, communication (option)

Interference effects

Background gas (100%)	Zero drift (%)
NO	+43
CO	+0.01
CO ₂	-0.27
CH ₄	-0.20
He	+0.30
H ₂	+0.24
HCl	-0.30
NH ₃	-0.26
SO ₂	-0.22
N ₂ O	-0.02
H ₂ O	-0.02

Principle

When the sample gas is placed in a magnetic field, oxygen molecules will be attracted. This gives rise to a pressure, which is detected by a mass flow sensor.



Specifications

Principle	Paramagnetic (pressure detection)
Measurement range	When reference gas is N ₂ : 0 ... 0.5 ... 100% O ₂ (configurable) When reference gas is air: 21 ... 23 ... 100% O ₂ When reference gas is 100% O ₂ : 100 ... 98 ... 0% O ₂ (configurable)
No. of ranges	2
Repeatability	±1% FS
Linearity	±1% FS
Response time (for 90%)	≤ 2 s
Output signal	4–20 mA DC
Contact output (option)	6 SPST-NO contacts: during calibration, etc. 4 SPDT contacts: H/L alarm, etc.
Contact input (option)	Remote range-switching, remote hold
Display	Backlit LCD
Communication (option)	RS-485 (Modbus®)
Installation	19" rack or panel mounting, or benchtop
Power supply voltage	85–264 V AC, 50/60 Hz

Portable NDIR Multigas Analysers

Up to 4 gas components concentration measurement

Compact and light
high performance multigas analyser

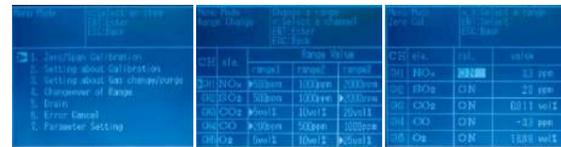
CO₂ CO CH₄ O₂

ZSVS Portable NDIR Analyser



Interactive interface

Simple operation assured by clear display



Menu screen Range switching screen Zero/span calibration

Specifications

Components	CO ₂ , CO, CH ₄ , O ₂
Principle	Single-beam NDIR + Galvanic O ₂ sensor
Measurement range	CO ₂ : 0 ... 200 ppm ... 100%
	CO: 0 ... 200 ppm ... 100%
	CH ₄ : 0 ... 1000 ppm ... 100%
	O ₂ : 0 ... 5/10/25%
Repeatability	±0.5% FS
Zero drift	±1% FS per day
Span drift	±1% FS per day
Response time (for 90%)	≤ 50 s
Output signal	4–20 mA DC or 0–1 V DC
Communication	RS-232C Modbus®
Standard functions	CP calculation, O ₂ correction, O ₂ corrected average, automatic light-off
Display	Backlit LCD
Power supply voltage	100–115 V AC or 200–240 V AC
Dimensions	365 (W) × 211 (H) × 527 (D) mm

Features

- Portable type with built-in pump, filter, and flowmeter
- CP calculation, O₂ correction, O₂ corrected average
- Easy-to-see LCD
- Single-beam system: long-term stability and low maintenance

Portable Multigas Analyser Systems

Up to 5 gas components sampling and measurement

Turnkey portable system including fully automatic sample handling
For exhaust gas measurement, biogas and R&D

CO₂ CO CH₄ O₂ NO_x SO₂

ZSVF Portable analyser system

Modular System

- Analysis unit and sampling unit can be separated for ease of move and installation



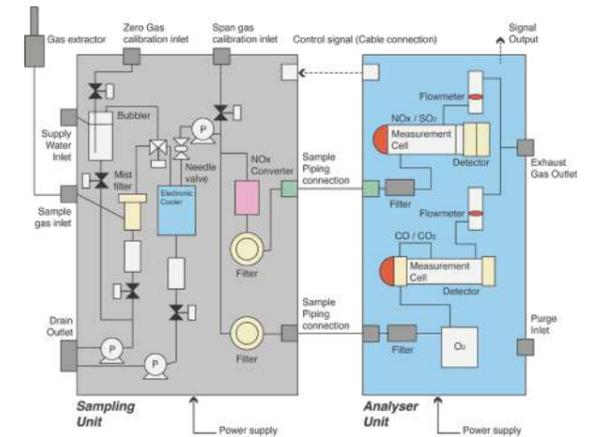
Features

- Monitoring of combustion gas, biogas, etc.
- Integrated NO_x converter
- No installation work
- Interactive interface
- Easy maintenance, automatic condensate removal

Major applications

- Tests for R&D such as combustion, biogas generation, and plant photosynthesis tests
- Simple measurement for control of exhaust gas from business places
- Control and check of CA storage atmosphere
- Combustion exhaust gas measurement control
- Comparison with gas analysers installed at site and backup

Configuration Example



Specifications

Measurable components	NO _x , SO ₂ , CO ₂ , CO, CH ₄ , O ₂
Principle	Single-beam NDIR + galvanic or paramagnetic O ₂ sensor
Measurement range	NO _x : 0 ... 500 ... 5000 ppm
	SO ₂ : 0 ... 500 ppm ... 1%
	CO ₂ : 0 ... 200 ppm ... 100%
	CO: 0 ... 200 ppm ... 100%
Repeatability	CH ₄ : 0 ... 1000 ppm ... 100%
	O ₂ : 0 ... 5/10/25%
Repeatability	±0.5% FS
Output signal	4–20 mA DC or 0–1 V DC Instantaneous value, O ₂ converted instantaneous value, O ₂ converted average value, CP calculation
Communication	RS-232C Modbus®
Power supply voltage	100–115 V AC or 200–240 V AC, 50/60 Hz
Dimensions	Analysis unit: 365 (W) × 211 (H) × 514 (D) mm Sampling unit: 365 (W) × 377 (H) × 514 (D) mm
Weight	Analysis unit: approx. 12 kg Sampling unit: approx. 18 kg
Gas extractor (option)	Fixed type with flange, or unfixed type

Laser Gas Analysers

Insertion type offers high-speed measurement
Long-term stability and low maintenance

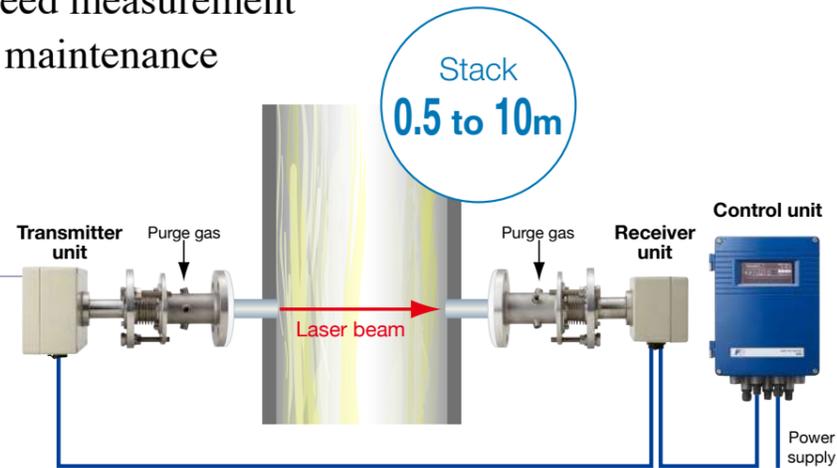
Waste incinerators, district heating
and industrial boilers, chemical plants

NH₃ HCl CO O₂ CO₂ CH₄

ZSS CE

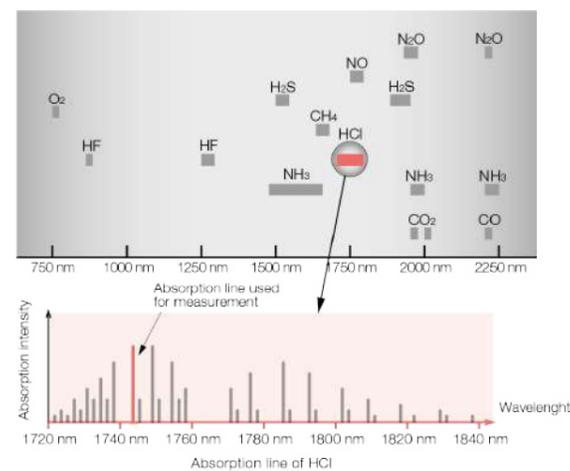
Features

- Laser Technology: high precision
- Compact size
- Easy maintenance
- Fast response



Absorption spectrum

The analyser uses near infrared semiconductor laser and measures the change in absorption wavelength to determine the gas concentration.



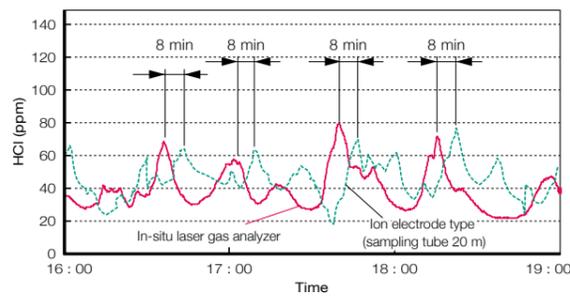
Zero point stability: $\pm 2.0\%$ FS per 6 months

Purge system reduces the risk of zero drift due to contamination

Fast response within 2 seconds

Compared to the ion electrode (sampling) method, the direct measurement provides remarkably faster response.

Comparison with sampling system



CO + O₂ analyser available

Simultaneous measurement of CO and O₂ enables precise control of air-fuel ratio while reducing the cost of installation and maintenance.

ppm CO + O ₂ (high-temperature)	vol% CO + O ₂	ppm CO + O ₂ (instrument air purge)
CO + CO ₂		

Instrument air purge available

O₂ analyser for combustion control accepts instrument air purge.

Energy saving and low maintenance

Energy consumption ≤ 80 VA

Maintenance work \leq twice a year

With no need for sampling devices and preconditioning, consumable parts and maintenance work are greatly reduced.

No sampling involved	No preconditioning
No filter	No catalyst

Specifications

General

Principle	Laser
Method	Cross-stack
Measurable components and ranges	See the table below
Light source	Near-infrared semiconductor laser
Laser class	CLASS 1 (O ₂ analysers of high-temperature version and instrument air purge version fall under CLASS 3B)
Power supply voltage	100–240 V AC, 50/60 Hz
Power consumption	80 VA
Calibration interval	every 6 months (depending on the operating environment)
Display	Backlit LCD
Display contents	Component, concentration (instantaneous value, average, O ₂ corrected instantaneous value, O ₂ corrected average value), alarm
Weight	Receiver unit and transmitter unit: approx. 10 kg each, control unit: approx. 8 kg
Dimensions (D x W x H)	Receiver unit (400 x 180 x 155 mm) Transmitter unit (400 x 240 x 160 mm) Control unit (137 x 255 x 440 mm)
IP rating	IP65

Performance

Response	≤ 4 s (≤ 2 s in high-speed version)
Repeatability	$\pm 1.0\%$ FS (depending on components and ranges) CO + O ₂ measurement: $\pm 2\%$ FS
Linearity	$\pm 1.0\%$ FS (depending on components and ranges) CO + O ₂ measurement: $\pm 3\%$ FS
Zero drift	$\pm 2.0\%$ FS per 6 months (depending on component and range) CO + O ₂ measurement: $\pm 4\%$ FS per 6 months
Interference effect	$\pm 2.0\%$ FS
Detection limit	1% of minimum range

Measurable components and ranges

	Measurable components	Min. range*	Max. range*	Gas temperature	Purge gas	4th code	
Single beam 1 component analyser	HCl	10 ppm	5000 ppm	$\leq 400^\circ\text{C}$	Instrument air	C	
	NH ₃	15 ppm	5000 ppm	$\leq 450^\circ\text{C}$		W	
	CO (high range)	2.0 vol%	100 vol%	$\leq 300^\circ\text{C}$		A	
	CO (low range)	200 ppm	1 vol%	$\leq 400^\circ\text{C}$		M	
	CO ₂	2.0 vol%	100 vol%	$\leq 300^\circ\text{C}$	N ₂	G	
	CH ₄	100 ppm	100 vol%	$\leq 300^\circ\text{C}$		R	
	O ₂	10 vol%	100 vol%	$\leq 300^\circ\text{C}$		P	
	O ₂ (high temperature)	4 vol%	100 vol%	$\leq 1200^\circ\text{C}$		Q	
Single beam 2 components analyser	O ₂ (instrument air purge)	25 vol%	100 vol%	400°C ... 1200°C	Instrument air	T	
	CO + CO ₂	2.5 vol%	100 vol%	$\leq 300^\circ\text{C}$	Instrument air	K	
Double beam 2 components analyser	ppm CO + O ₂ (instrument air purge)	CO	200 ppm	2 vol%	Instrument air	V	
		O ₂	25 vol%	100 vol%			
	ppm CO + O ₂ (high temperature)	CO	200 ppm	2 vol%	$\leq 1200^\circ\text{C}$	N ₂	U
		O ₂	5 vol%	50 vol%			
	vol% CO + O ₂	CO	2 vol%	50 vol%	$\leq 300^\circ\text{C}$	N ₂	S
		O ₂	10 vol%	100 vol%			

*The measurement ranges described above are for the optical path of 1 m.

Input/output signal

Analog output	4–20 mA DC or 1–5 V DC, 2 or 4 points Measured value and O ₂ corrected value. Switchable between instantaneous value and average value
Analog input	4–20 mA DC, 2 points Sample gas pressure, temperature, velocity, O ₂ concentration, water concentration, air purge pressure *Inputs are used for compensating concentration, O ₂ correction, and alarm output.
Digital output	Relay contact output, 6 points Low light transmission, H/L limit alarm, analyser error, during calibration / during hold, power interruption, environmental error
Digital input (option)	Voltage input received by photocoupler, 3 points Average value reset, switchover between instantaneous value and moving average value, remote hold

Installation environment

Ambient temperature	–20 to +55°C (Receiver unit, transmitter unit) –5 to +45°C (Control unit)
Ambient humidity	$\leq 90\%$ RH
Optical path length	0.5 to 10 m (0.5 to 5 m in CO + O ₂ measurement)
Standard flange	JIS10K, 50A, 100A, DN50/PN10 or ANSI # 150 2B
Purge gas	See the table below. Purge gas pressure: ≥ 0.3 MPa
Purge gas flow rate	≥ 20 L/min
Gas conditions	See the table below Moisture: ≤ 50 vol% (no condensation) Pressure: ± 10 kPa (Consult us for pressure above the limit.) Dust: Standard version: ≤ 5 g/m ³ (N) Dust resistant version: ≤ 20 g/m ³ (N)

Zirconia Oxygen Analysers

Simple, fast, robust and QAL1 certified

Ideal for combustion control in boilers, incinerators and furnaces
Lowering CO₂, SO_x, and NO_x emissions while saving energy

O₂ QAL1 EN 14181 TÜV Rheinland



IP66 Converter ZKMA CE
IP67 Converter ZKMB CE



Flow guide tube
Detector ZFK8 CE



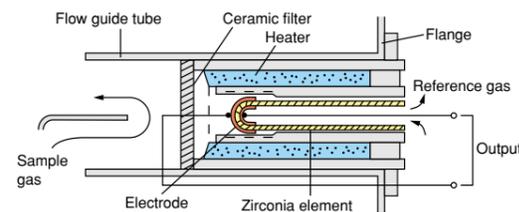
Bypass by ZTA ejector
Weather Protection cover CTK

Features

- Longest lifetime sensor
- Easily replaceable zirconia element reducing maintenance cost
- User friendly
- No instrument air required
- No Flue gas extraction required
- Fast response (4–7 seconds)
- Predictive and advanced diagnostics
- IP66 or IP67 enclosure
- RS-485 or HART communication

Principle

The analyser makes use of the property of zirconium oxide that conducts oxygen ion when heated. The analyser can obtain O₂ concentration by sensing the electromotive force generated by the difference of O₂ concentration between air and the sample gas.



Easily replaceable zirconia element

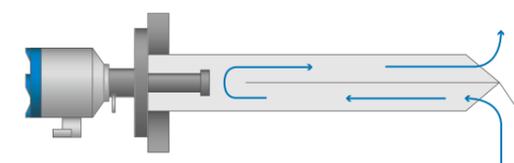


Specifications

Target	O ₂ in incombustible gas
Principle	Insertion type zirconia sensor
Range	0 ... 2 ... 50 vol% O ₂ (user configurable)
Repeatability	±0.5% FS
Linearity	±2% FS
Response time (for 90%)	4 s ... 7 s
Output signal	4–20 mA DC or 0–1 V DC
Contact output	6 points, SPST-NO contact: H/L limit alarm, during maintenance, during blowdown, during calibration, analyser error
Contact input	3 volt-free contacts: selection from 7 items
Display	Backlit LCD
Communication	RS-485 Modbus® or HART
Optional functions	Combustion efficiency display, blowdown, auto calibration, selector valve, flowmeter
Safety functions	Detecting a break of the thermocouple for heater control in the sensor unit, the analyser stop the power supply to the detector The power supply to the detector may also be stopped by external input in an emergency The key lock function prevents operational errors
Converter installation	Panel mount or pipe mount
Cable length between converter and detector	≤ 100m
Power supply voltage	100–120 V AC or 200–240 V AC, 50/60 Hz

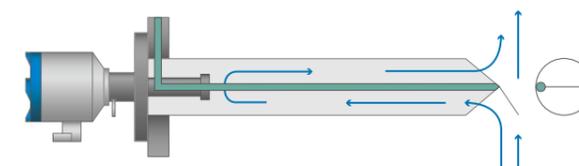
Standard applications

Standard guide tube

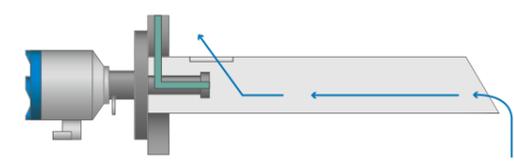


High particulate applications

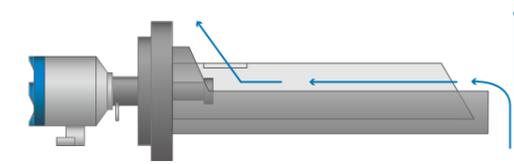
Guide tube with back purge



Direct tube for high particulate



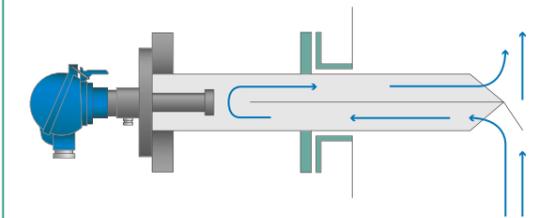
Direct tube for high particulate with deflector



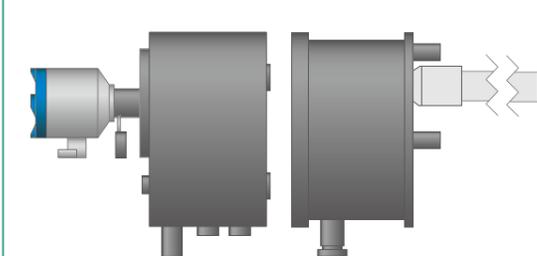
High temperature applications

Dual flange guide tube for high temperature

- high temperature ZFKH probe
- high temperature alloy tube

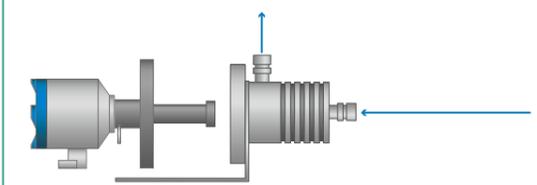


ZTA ejector module



Extractive applications

Flow Through Cell (FTC)



Model selection

Select the required modules combination according to the process conditions using below table.

Application example	Process conditions		Modules selection				Detector type	
	Temperature	Dust	Tube material	backpurge	Tube type	Tube code (*)		
Gas boiler	≤ 600 °C	≤ 0,1 g/Nm ³	SS316	No	Standard guide tube	631B562-0#	ZFK8	
		≤ 5 g/Nm ³		Yes	Guide tube with backpurge	631B563-0#		
Biomass, Oil, Coal boiler /Incinerator	≤ 600 °C	≤ 25 g/Nm ³	SS316	Yes	Direct tube for high particulate	631B673-0#	ZFKH	
				Yes	Direct tube for high particulate with deflector	631B677-0#		
		≤ 1000 °C	≤ 0,2 g/Nm ³	SS310	No	Dual flange guide tube for high temperature		631B685-0#
			≤ 5 g/Nm ³		Yes	Dual flange guide tube for high temperature with backpurge		631B684-0#
Incinerator / Furnace / Glass / Metal industry	≤ 1500 °C	≤ 0,2 g/Nm ³	Kanthal	No	Guide tube for very high temperature	631B682-0#	ZFK8	
		≤ 5 g/Nm ³		Yes	Guide tube for very high temperature with backpurge	631B683-0#		
Incinerator / Furnace / Glass / Metal industry	≤ 800 °C	≤ 0,5 g/Nm ³	SS310	Yes	ZTA ejector module	ZTA2	ZFK8	
				≤ 1500 °C	Yes	ZTA ejector module		ZTA1

(*) The last digit of the tube code is dedicated to the tube insertion length as per below list:

'1' = 300mm '2' = 500mm '3' = 750mm '4' = 1000mm 'Z' = special length -> consult Fuji

- In case of very humid gas, keep the flange hot enough to prevent condensation
- In case of highly corrosive gas, please consult Fuji for special materials
- If the gas flow is lower than 5 m/s, use ejector module instead of flow tube

Automatic calibration and back-purge module

O₂ CE

Features

- Integration & additional protection of the ZKM controller
- ZKM functions (see ZKM/ZFK8 datasheet)
- Automatic calibration and back-purge (through ZKM)
- Manual operations also possible through press buttons
- Pressure control of the function gases
- Glass front door for a direct view
- 'P' option: solenoid valve and pressure tank mounted on the probe for a powerful back-purge

Notes

- The ZFCS cabinet supply scope does not include the ZKM controller, the ZFK8 probe, the probe tube, or the connection cables. These items may be purchased separately.
- The ZKM itself should be equipped with the automatic calibration and back-purge options.

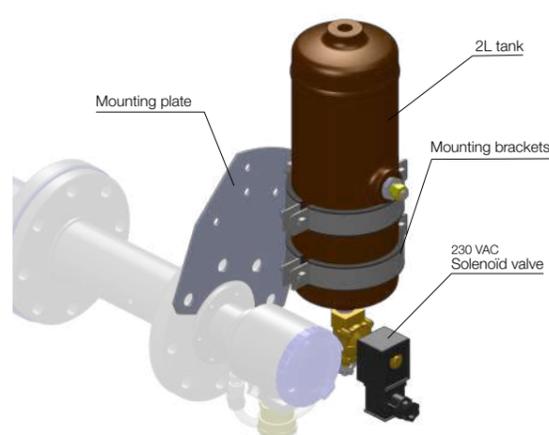
Specifications

Dimensions	90 x 475 x 210 mm
Materials	Polyester glass-fibered cabinet with glass front door
Weight	Approx. 18 Kg
Colour	Grey RAL7035
Protection class	IP 55
Temperature	Operation: 0 to 50 °C Storage: -20 to 70 °C
Flue gas temperature	See analyser specifications
Power mains	230 VAC / 50 Hz (other options available)
Startup power consumption	240 VA
Nominal consumption	125 VA
Compressed air pressure	5 bar min / 17 bar max
Mounting type	Wall-mounted, delivered with 4 mounting brackets
Gas connections	- 2 inlets for soft tube connection (ø6 mm) (compressed air, calibration gas) - 1 (ZFCS-P*) or 2 (ZFCS) outlets for soft tube connection (ø6 mm) (back-purge air, calibration gas) * With option 'P', the compressed air is directly offered to the solenoid valve mounted on the probe flange.

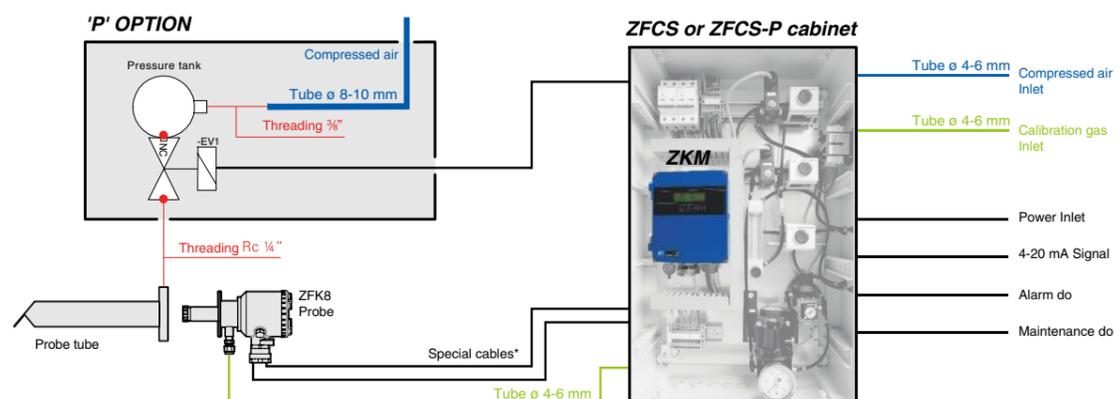
ZFCS



'P' OPTION



Description drawing



Flameproof type for hazardous applications

O₂ TIIS Ex NEPSA

Converter ZKME



Detector ZFKE



Direct tube for high particulate

Features

- Easily replaceable zirconia element
- Fast response (4–7 seconds)
- TIIS and NEPSI certified

Specifications

Target	O ₂ in incombustible gas
Principle	Insertion type zirconia sensor
Range	0 ... 2 ... 50 vol% O ₂ (user configurable)
Repeatability	±0.5% FS
Linearity	±2% FS
Response time (for 90%)	4 s ... 7 s
Output signal	4–20 mA DC or 0–1 V DC
Contact output	6 points, SPST-NO contact: H/L limit alarm, during maintenance, during blowdown, during calibration, analyser error
Contact input	3 volt-free contacts: selection from 7 items
Display	Backlit LCD
Communication	RS-485 (Modbus)
Optional functions	Combustion efficiency display, blowdown, auto calibration, selector valve, flowmeter
Converter installation	Panel mount
Cable length between converter and detector	≤ 100 m
Power supply voltage	100–120 V AC or 200–240 V AC, 50/60 Hz

ATEX version for hazardous applications

O₂ CE Ex IECEx

Detector ZFKX



Converter ZKMX



Features

- Field-replaceable Flame-arrester
- Compact & Light Design
- Fast response (4–7 seconds)
- Excellent accuracy and reliability
- Remote electronics and calibration
- ATEX/IECEx Zone1 IIB+H2 T3 Gb certified probe

Specifications

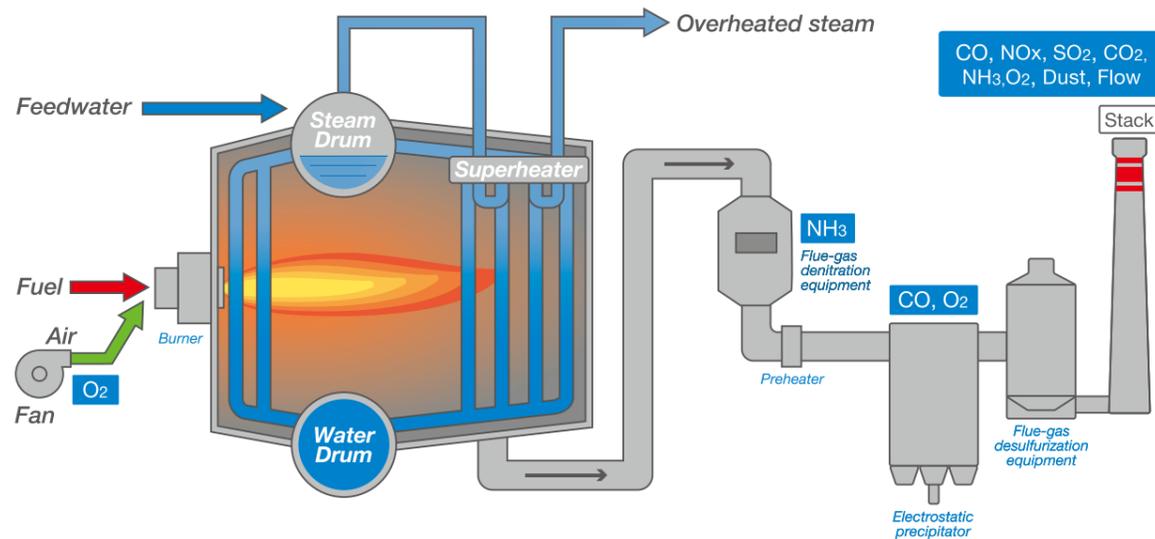
Target	O ₂ in incombustible gas Refinery process heaters Petrochemical reactor furnaces Industrial large scale boilers
Principle	Insertion type zirconia sensor
Probe Certification	II2G Ex d IIB+H2 T3 Gb (Ta: -20°C to +60°C) LCIE 13 ATEX 3045X IECEx LCIE 13.0027X
Insertion type zirconia sensor	II2G Ex d IIC T5 Gb (Ta: -20°C to +55°C) LCIE 13 ATEX 3066X
Range	0 ... 2 ... 50 vol% O ₂ (user configurable)
Measure gas pressure	-3 to +3kPa (-306 to +306mmH2O)
Repeatability	±0.5% FS
Linearity	±2% FS
Response time (for 90%)	4 s ... 7 s
Output signal	4–20 mA DC or 0–1 V DC
Contact output	6 points, SPST-NO contact: H/L limit alarm, during maintenance, during blowdown, during calibration, analyser error
Contact input	3 volt-free contacts: selection from 7 items
Maintenance functions	Blow Off, Auto-calibration, Output contacts, Output Hold
Display	Backlit LCD
Communication	RS-485 (Modbus)
Optional functions	Combustion efficiency display, blowdown, auto calibration, selector valve, flowmeter
Converter installation	Panel mount
Cable length between converter and detector	≤ 50 m
Power supply voltage	100–120 V AC or 200–240 V AC, 50/60 Hz

Applications examples

1

Large Industrial Boilers

Fuji Electric gas analysers enable optimal combustion of control boilers, which leads to reduction of both the fuel cost and atmospheric pollution.
Fuji Electric CEMS also allow a rigorous control of the emitted gases.

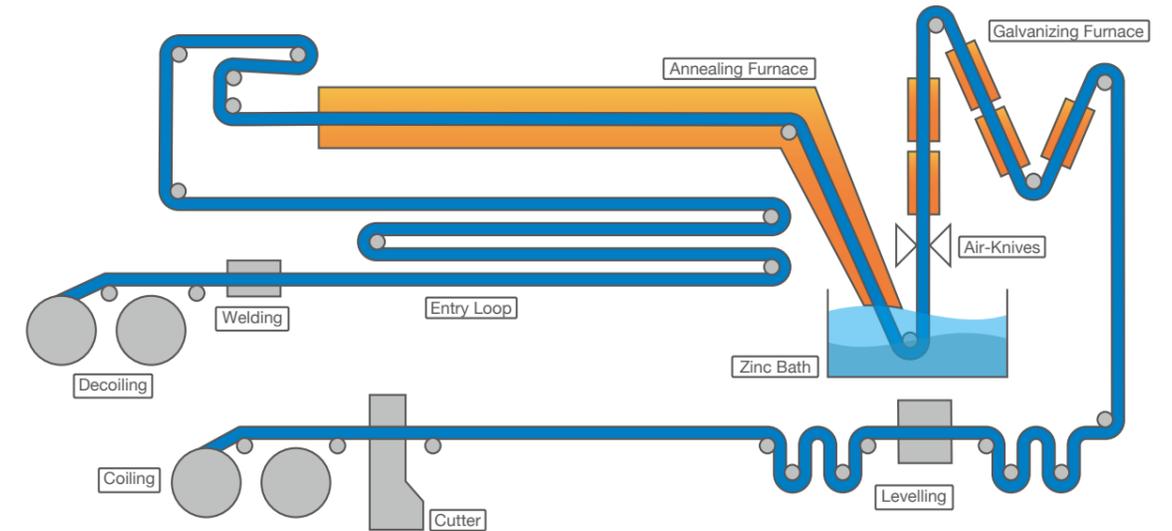


3

Metal industry example: Galvanizing Line Process

Fuji Electric gas analysers are used for a wide range of metal industrial processes such as converter Furnaces and Heat Treatment. They also control the Continuous Galvanizing Lines (CGL) with multiple sampling points before, during and after the furnaces.

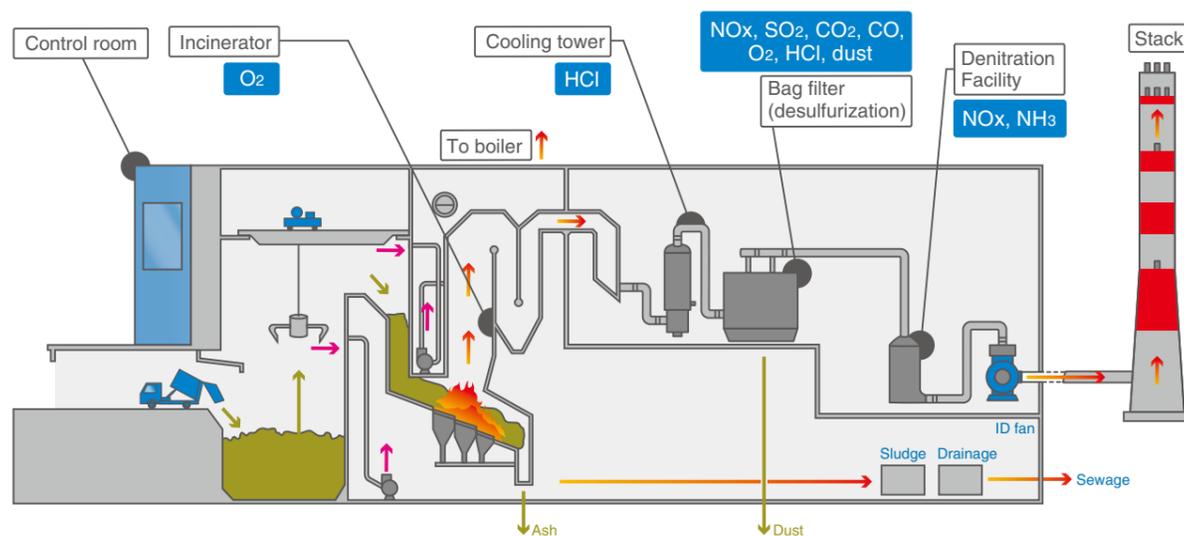
CO CO₂ O₂ H₂ H₂O NO_x NH₃



2

Waste Incineration Plants

Fuji Electric gas analysers are used to optimize the combustion in waste incinerator facilities. And with fast and robust monitoring of the flue gas treatment system, they reduce the emissions while lowering significantly the operating costs of the plant.

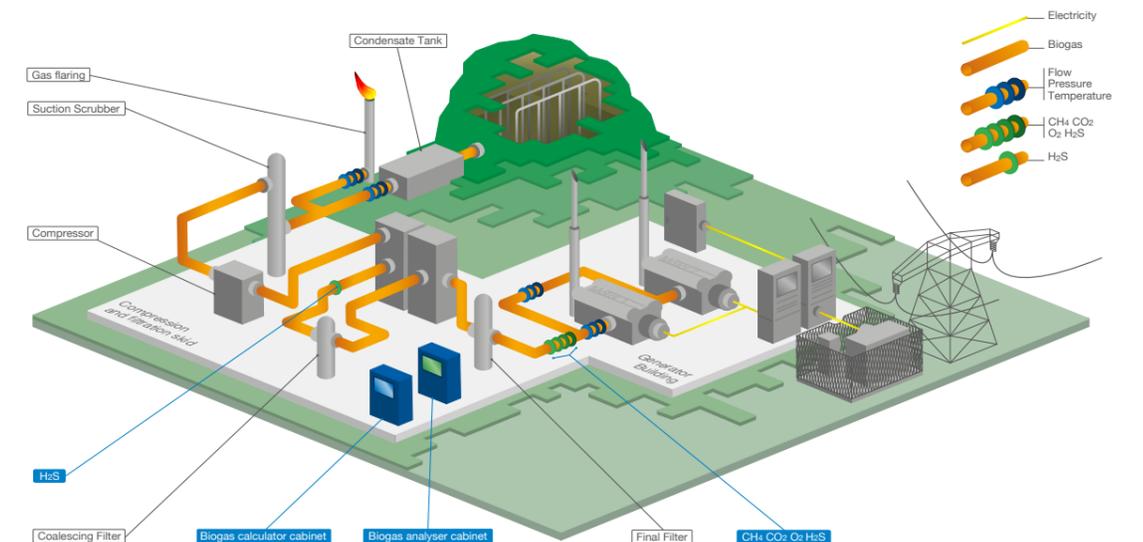


4

Biogas Waste to Energy Plants

Fuji Electric instruments and gas analysers play an important role in the renewable energy production worldwide. Metering the energy generated by the biogas plants is one example. Measuring the biogas composition also allows to optimize the process and reduce the operation costs.

CH₄ CO₂ O₂ H₂S Flow Energy



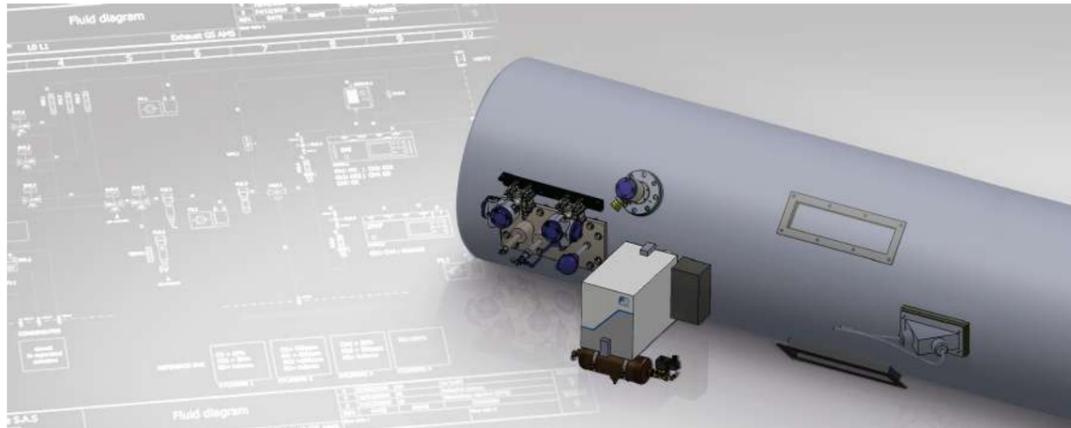
Engineering & Services



System Solutions Engineering

- Simple analyser panel
- Stand alone or wall-mounted cabinet
- Indoor or outdoor analytical skid
- Tropicalized and air-conditioned shelter

Fuji Electric France Technical Center provide state-of-the-art analytical solutions. Combining the most reliable technologies with tailor made automation and software solutions, Fuji Electric designs analyser systems adapted to each customer application.



Service Centers

- Spare parts local stock & fast deliveries
- Fuji Electric repair centers
- Remote technical support through chat, phone or video calls
- Gas analyser rentals

Fuji Electric France Technical Center includes a wide stock of spare parts necessary for any maintenance or repair of the local installed base. The local availability of spare parts, combined with Fuji Electric repair engineers as well as authorized and highly skilled partners, ensure quick and efficient operations, minimizing down time for our customers process.



On-site Service

- Systems commissioning
- Field service support
- Preventive maintenance
- Field expertise, diagnoses and repair

Fuji Electric engineers, as well as long term partners, are proven experts who daily visit our customers' facilities according to their expectations and provide technical support, maintenance and calibration all along the analyser system life cycle.



Training

- End-user technical operation & maintenance training
- Distributor operation, maintenance and repair expert training
- Products, technologies and applications training
- Environmental regulations technical training

Every day, a Fuji Electric authorized trainer is instructing users, distributors or integrators how to use, maintain, repair, adjust our gas analyser systems. Together with the highest quality products and solutions, the deep training of related staff leads to the highest benefit for our customers.



Quality & Environment



Quality

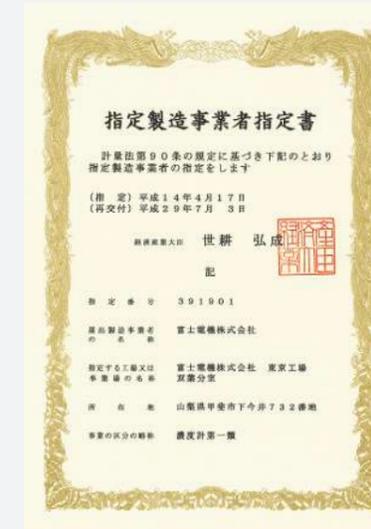
Fuji Electric has proven over almost 100 years a continuous care for its organizations Quality Assurance. Fuji Electric France subsidiary company itself is deeply engaged in a continuous improvement process according to the ISO 9001 and ISO 14001 international reference bases.



Environment

The environmental care at Fuji Electric France is in addition somehow natural as the Gas Analyser products ranges is mostly designed for our customers wishing to reduce energy consumption, optimize energy production, and control atmospheric emissions footprint.

Satisfactory products for customers will be delivered under strict quality control.



Japanese Measurement Law:
Designated Manufacturing
Business Operator (No. 391901)

■ ISO 14001
Certificate No. EC97J1059
Tokyo Factory

■ ISO 9001
Certificate No. JMI-0122
Tokyo Factory



■ ISO 14001
Certificate No. 2014/59264.6
Fuji Electric France S.A.S.

■ ISO 9001
Certificate No. 1997/8402.16
Fuji Electric France S.A.S.



AFNOR
Management System Certification

Find out more about our gas analysers.

Gas Analysers - Fuji Electric
<https://www.fujielectric.fr/en/gas-analysis>

QUALITY MANAGEMENT



ENVIRONMENTAL CARE



METROLOGICAL PERFORMANCE



■ EN15267: 2014 Continuous Emission Monitoring System QAL1 Certification

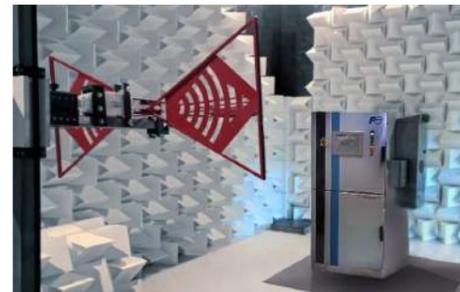
MARINE TYPE APPROVAL



■ IMO MARPOL MEPC guidelines certification of Fuji Electric Marine Emissions Gas Analysers



Fuji CEMS are tested, certified and continuously controlled and audited according to the EN15267.



Both multigas marine emission monitoring system S-Keeper 7™ and dual Laser ZQS marine gas analyser are tested and certified.

ACCREDITATIONS

- Explosive atmospheres
 - ATEX (Europe)
 - TIIS / NEPSI (Asia)
 - IECEx (Global)
- Product conformity
 - CE Mark (Europe)
 - Metrological certificates (Russia)
- Environmental approvals
 - QAL1
 - Marine type approval

CALIBRATION

All our gas analysers may be provided with a multipoint calibration record from Fuji Electric metrology laboratory in Clermont-Ferrand (France) factory.





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