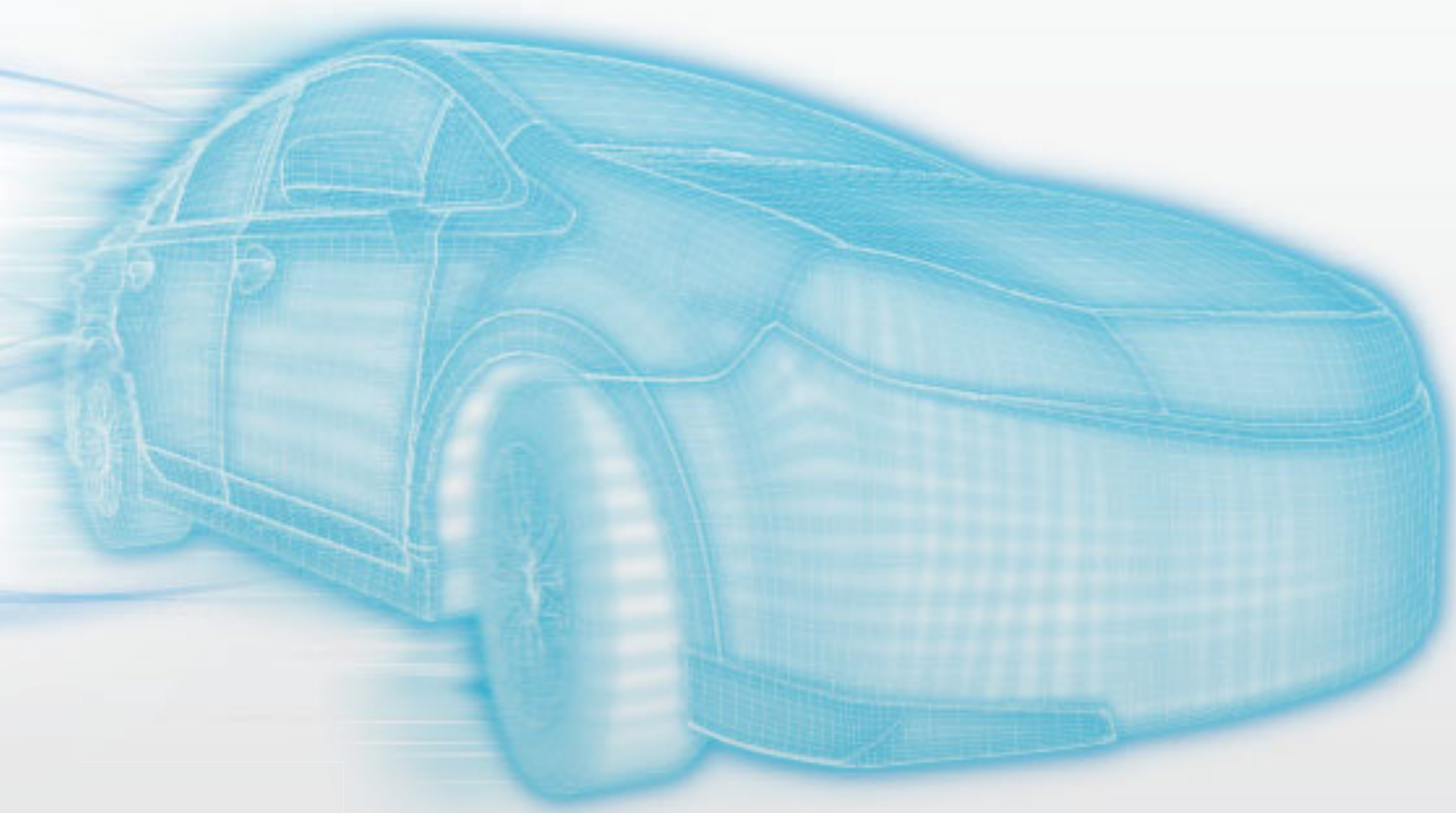
HORIBA
Automotive Test Systems

MOTOR EXHAUST GAS ANALYZER

MEXA-ONE

HORIBA ONE PLATFORM

Accelerate



Welcome to MEXA-ONE

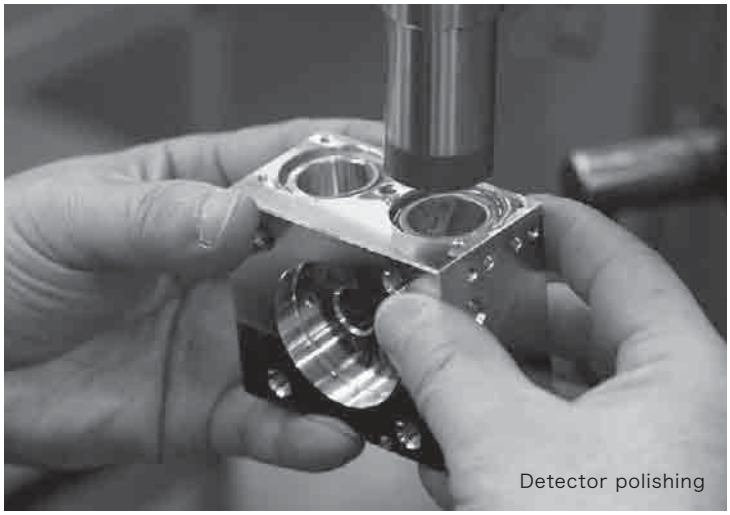
With over 8,500 MEXA analytical systems supplied to emission laboratories and test cells around the world, HORIBA is recognized as the global leader in emission measurement technology.
Today, nearly 50 years after launching its first MEXA unit, HORIBA introduces the next standard in analytical systems technology. Decades of expertise, customer input and regulatory experience are now distilled into one highly accurate, reliable emissions measurement solution.

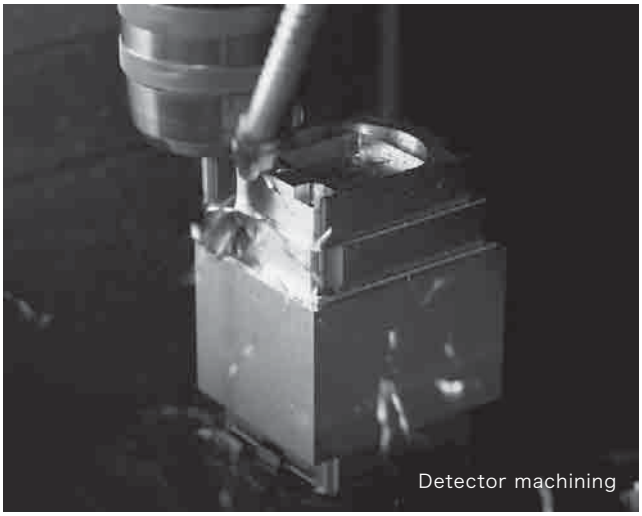
Precision • Performance • Accuracy

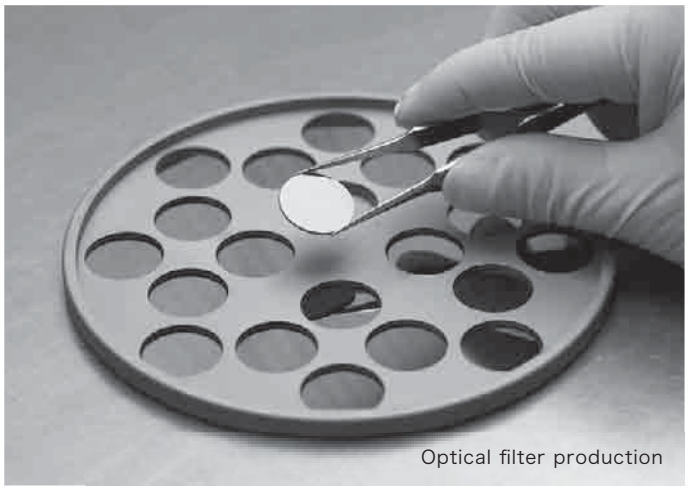
These essential qualities allow an analytical system to produce reliable and repeatable test data.
By controlling every aspect of the engineering and manufacturing process - from design through material selection, assembly and quality inspection - HORIBA is uniquely positioned to produce exceptional analyzers and systems.
Once complete, every MEXA-ONE system undergoes a thorough adjustment process to guarantee detector, analyzer, and system integrity. This is one of many steps taken to ensure reliable analysis and long-term stability.

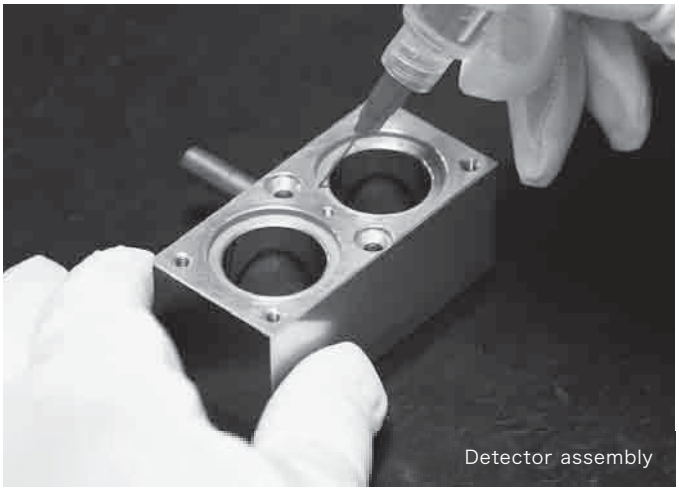
At One with the Environment

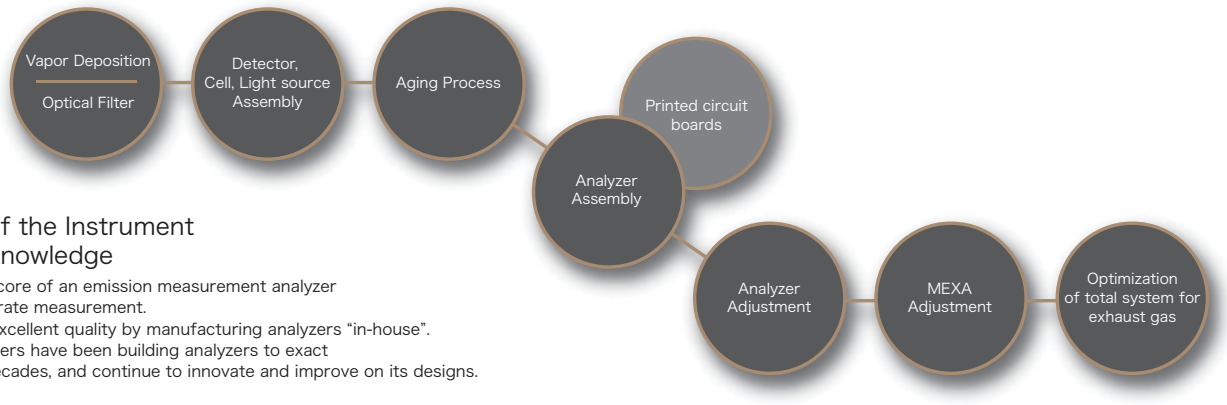
As a recognized leader in environmentally-friendly manufacturing and design, HORIBA uses parts which meet strict ecological standards.
Every effort is made in the manufacturing process to reduce energy consumption and the use of hazardous substances.


Detector polishing


Detector machining


Optical filter production


Detector assembly



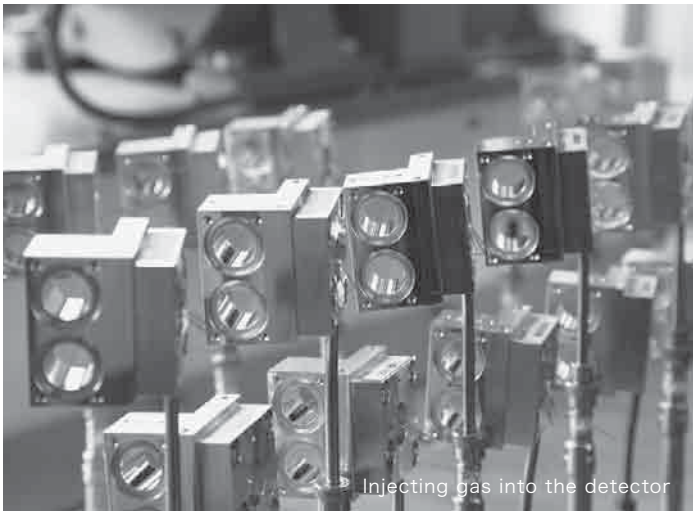
At the Core of the Instrument — In-House Knowledge

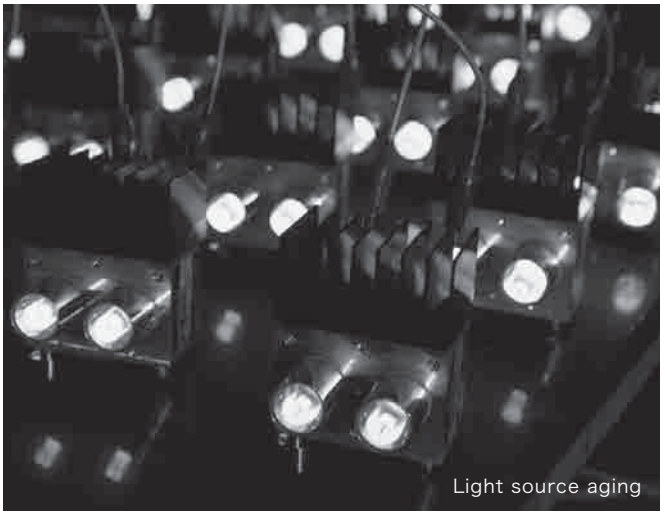
The detector is the core of an emission measurement analyzer and the key to accurate measurement.
HORIBA maintains excellent quality by manufacturing analyzers “in-house”.
Highly skilled engineers have been building analyzers to exact specifications for decades, and continue to innovate and improve on its designs.

The World Leader
in Emission Measurement Systems

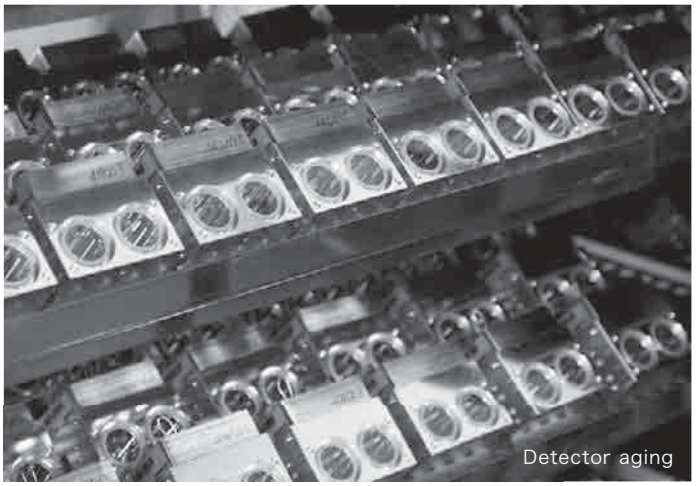
Through MEXA technology, HORIBA has attained a reputation for long-term support of its emission measurement systems. A result of continuous development, MEXA-ONE analyzes a wide, dynamic range of exhaust emission concentrations from engines running on a variety of fuel types. The system also supports the full range of sampling requirements for raw exhaust, dilute exhaust, EGR, and trace gas measurements. A variety of MEXA-ONE configurations are available to suit a wide range of applications.

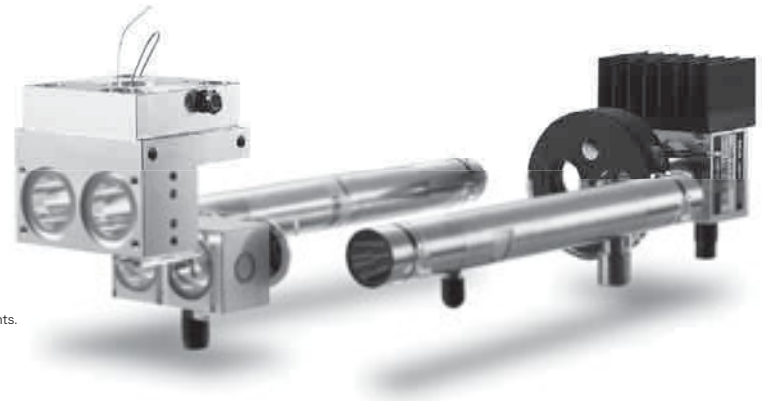
The next generation of technology has been established ; MEXA-ONE maintains HORIBA's reputation as the world standard for emission measurement systems.


Injecting gas into the detector


Light source aging


Optical filter


Detector aging



Non-dispersive Infrared analyzer

The MEXA-ONE Non-dispersive Infrared (NDIR) analyzers measure CO, CO_2 as well as other components. The detector lies at the heart of the NDIR.

A Long History of Proven Results

Introduced in 1964, HORIBA's first MEXA system pioneered automotive emission measurement and established new standards for vehicle emission analysis and a healthier environment. MEXA-ONE is the result of 50 years of experience and partnership with industry, academia and regulatory bodies.

◉ Fundamental technology for the MEXA Series : Infrared gas analysis

・Medical-use, exhaled-gas analyzer

1964
MEXA-1

・The first motor exhaust gas analyzer in Japan

234units

1966
MEXA-13

・The first mass-produced motor exhaust gas analyzer with 4 NDIR

94units

1970
MEXA-77

・Multiple components gas analyzer with NDIR, FID and CLD

416units

1972
MEXA-2000

・Bypass-flow system and electric system modules

The Heritag

2012
MEXA-ONE

4,489units

2011
MEXA-7000 Ver.4

2006
MEXA-7000 Ver.3

- A series of key enhancements to respond to new requirements including low concentration measurement and regulation requirements.

2001
MEXA-7000 Ver.2

1995
MEXA-7000

- Centralized control system
- Downsized and low flow rate

1,674units

1986
MEXA-9000

- First fully digital analyzer

1,294units

1978
MEXA-8000

- Attained the position of industry standard

ge of MEXA

Setting a New Standard in Emission Testing

MOTOR EXHAUST GAS ANALYZER
MEXA-ONE

TEST SYSTEM CONCEPT

Reliable • Efficient • Expandable

MEXA-ONE offers an intuitive user interface with a highly efficient hardware and software design.
This results in increased testing efficiency and economical facility operation,
while enhancing reliability and accuracy. These advancements are possible because the MEXA-ONE software employs
new HORIBA ONE PLATFORM. This platform integrates the test devices in an emission cell
into a single user interface, increasing efficiency and optimizing user control over the entire testing process.

Improved Test Facility Operation

More efficient facility operations
due to enhanced durability
and maintainability

Reliable

Expandable

Efficient

Increased Test Efficiency

Faster response,
optimized functionality
and reduced running cost

Wide Application Range

New functions and features provide
highly accurate measurement

KEY FEATURES

SOFTWARE

A New Generation of Instrument Integration

HORIBA ONE PLATFORM

The newly developed software is an integrated operating platform for MEXA-ONE and other devices. Each emission measurement device can be integrated into a single controller, also supporting connections to non-HORIBA products.

- Integration of test cell devices
- Common interface
- Future expandability

HORIBA ONE PLATFORM

HARDWARE

Improved Data Quality and Uptime with Low Maintenance Design

Maximum System Availability

Sample handling is enhanced through improved filtration, water removal efficiency and component selection for improved availability and data quality. System maintenance can be easily performed via front access. This leads to a reduction of the overall required footprint for the system, providing flexibility of the laboratory layout.

- Durable and robust
- Reduced analyzer signal noise
- Sampling enhancements
- Application specific filtration
- Advanced GDC-ONE feature
- Remote, heated EGR measurements
- Advanced backflushable, dual auto switch filters

MOTOR EXHAUST GAS ANALYZER

MEXA-ONE

Increased Test Efficiency

HORIBA Technology

MEXA-ONE incorporates HORIBA's leading-edge technology to enhance reliability and performance beyond today's expectations. Improved durability and maintenance assure efficient test facility operation, reducing overall test duration and accelerating engine and vehicle development.

Faster Response and Shorter Test Times

Fully automated, customer-defined, pre-test routines ensure system readiness for testing. Overall test duration is minimized by reducing analyzer response and wait times between measurements.

- 50% reduction in analyzer response times (t_{99}) ※
- 30% reduction in analyzer calibration waiting times ※
- Optimization of analyzer purging times

※ By comparison with HORIBA's conventional products

Lower Cost of Ownership

Savings are realized through reduced operational costs, with a focus on reduction of consumables and facility requirements.

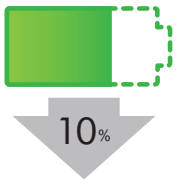
- 10% reduction in power consumption ※
- Filter element replacement is eliminated due to the use of the automatic purge function for the back flushing filter
- 30% reduction in analyzer calibration gas consumption ※

※ By comparison with HORIBA's conventional products

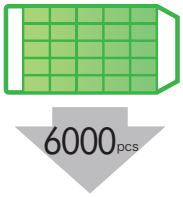
Reduction in Consumables

Example

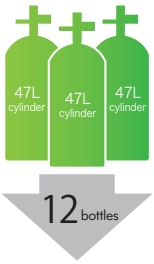
For a 12 hours per day operation and total of 200 days per year, the following savings in running cost can be achieved. (This example is based on 10 systems)



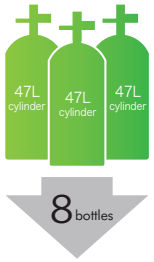
Electricity : Reduced by 10%



Filter : Reduction of 6000 pieces



$CO \cdot CO_2 \cdot O_2 \cdot NO \cdot CH_4 \cdot C_3H_8$
Calibration gas : Reduction of 12 bottles in total



CO_2 gas for leak check : Reduction of 8 bottles

Based on the condition of ;
・Calibration / zero and span check conducted every 2 hours
・Leak check conducted every 8 hours
・Filter element replaced every 4 hours

Improved Test Facility Operation

Continuous and Stable Measurement

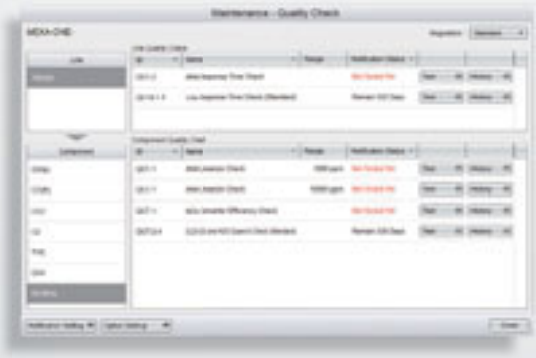
Enhanced Maintenance Support

MEXA-ONE incorporates highly efficient functions to ensure measurement accuracy and precision. Periodic quality checks and preventative maintenance work are essential for consistently accurate performance of emission analyzers. MEXA-ONE's reliable and stable operation assures minimal unexpected downtime and maximizes test cell efficiency.

Ensuring Accurate Measurement

Quality Control (QC) Management

Automatic notifications of periodic inspections and adjustments are generated as required by emission regulations in accordance with a user-defined schedule. Inspections and adjustments can also be started from the control window.



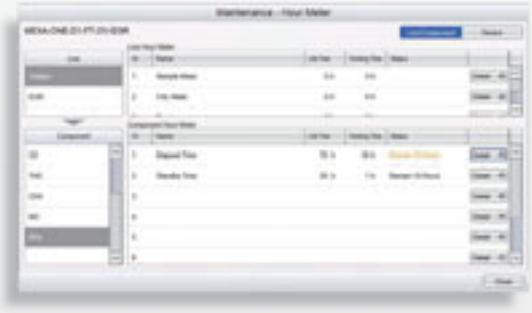
QC Menu

QC Sequence

Preventative Maintenance Feature

Self-diagnostic Function (Hour Meter Notification)

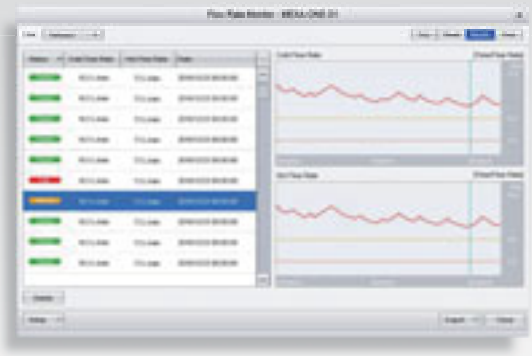
This automatic function provides advanced notification for the replacement of consumable parts. This process enables proactive maintenance to be performed.



Hour Meter Notification

MEXA-ONE automatically monitors analyzer sensitivity and displays the request for readjustment before exceeding the permissible range.

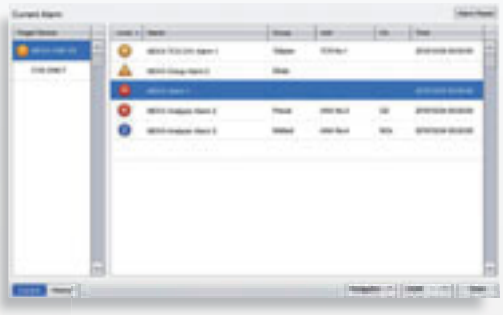
Sensor Sensitivity Monitor



Flow Rate Monitor

Effective Troubleshooting

When an alarm occurs, the MEXA-ONE not only displays details of the alarm but also generates a display with troubleshooting instructions. Quick alarm resolution enables effective testing.

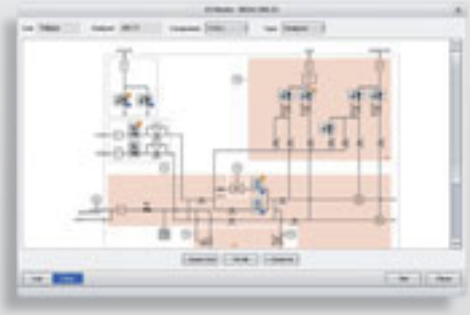


Alarm Information

Troubleshooting (Alarm Detail)

I/O Monitor

The ON/OFF status of the solenoid valves and pumps are monitored in real-time and displayed in a flow diagram.



I/O Monitor

High Performance and Durability

MEXA-ONE exceeds the durability seen in about 4,500 MEXA-7000 units in operation around the world. For example, the entire sample handling system has undergone a major upgrade to optimize sample flow and to reduce pump load.

Wide Application Range

New Measurement Technologies

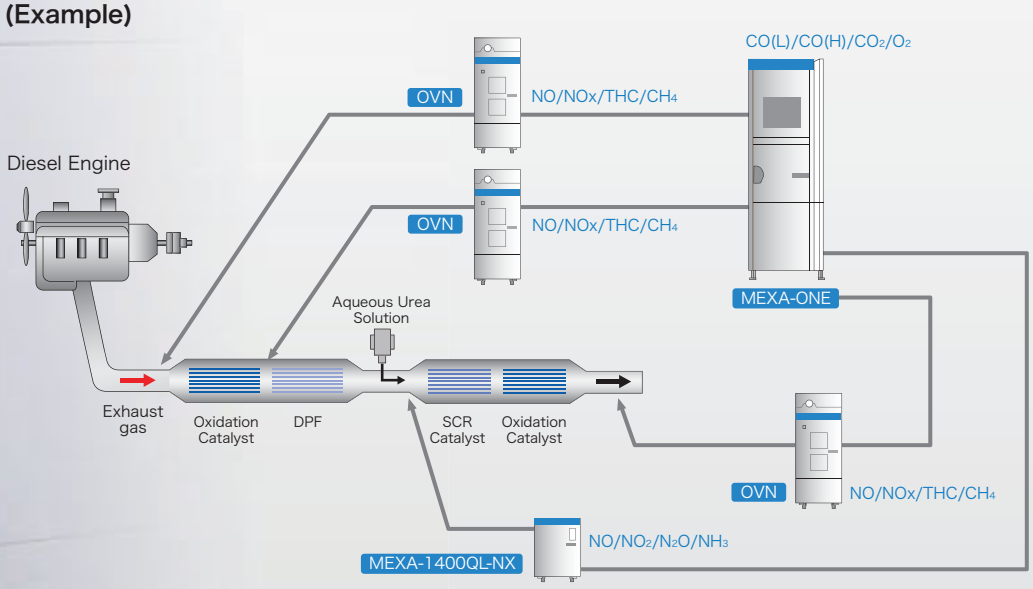
Evaluation of NOx After-Treatment Catalyst Systems

Measurement of nitrogen compounds (NO, NO_2, N_2O, NH_3) is essential for evaluation of NOx after-treatment systems. MEXA-ONE can be easily configured to provide optimum measurement capability based on the testing objective.

◉ Simultaneous Multi-point Sampling

Catalyst evaluation requires simultaneous real-time analysis of exhaust components at various sampling points. Users can measure from multiple points with a single MEXA-ONE, thus eliminating multiple tests and improving development testing efficiency.

(Example)



NO/NOx Measurement

Heated Analyzer Unit (OVN)

Dual-CLD method detects NOx and NO in the same time. MEXA-ONE can calculate NO_2 concentration through subtraction of the continuous concentration of NO from NOx. This calculation is performed simultaneously with the NOx and NO concentration measurements.
For optimum performance, the OVN may be located close to the engine or vehicle sample point. Alternatively, HORIBA provides a heated NO/NOx analyzer module integrated in the MEXA-ONE cabinet for customers who prefer this approach.

NO/NO_2/N_2O/NH_3 Measurement

Laser Spectroscopic Motor Exhaust Gas Analyzer MEXA-1400QL-NX

Using mid-infrared quantum cascade laser (QCL-IR) technology, the MEXA-1400QL-NX offers simultaneous measurement of 4 critical nitrogen compounds. Interference from other compounds is eliminated with the high resolution lasers.

Close-Coupled Transient EGR Measurement

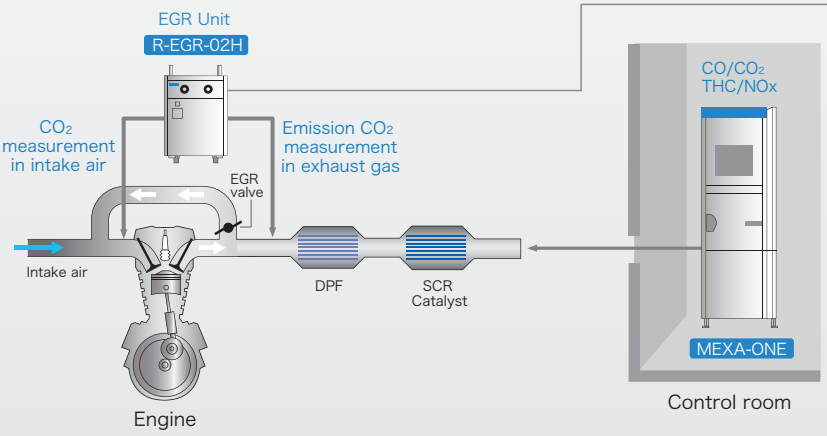
To deliver faster response and more accurate EGR measurement, MEXA-ONE incorporates new EGR sample handling and analysis in a compact cabinet.

- By combining the sampling system with the analyzers for CO_2 measurement from intake air and exhaust gas, MEXA-ONE reduces response time differences between both lines and eliminates transient response errors.
- For improved accuracy, HORIBA's patented, heated CO_2 analyzer (NDIR) for "wet" EGR measurement eliminates the need for water correction and water removal.
- For faster response, the compact cabinet can be located close to the engine.

EGR Unit

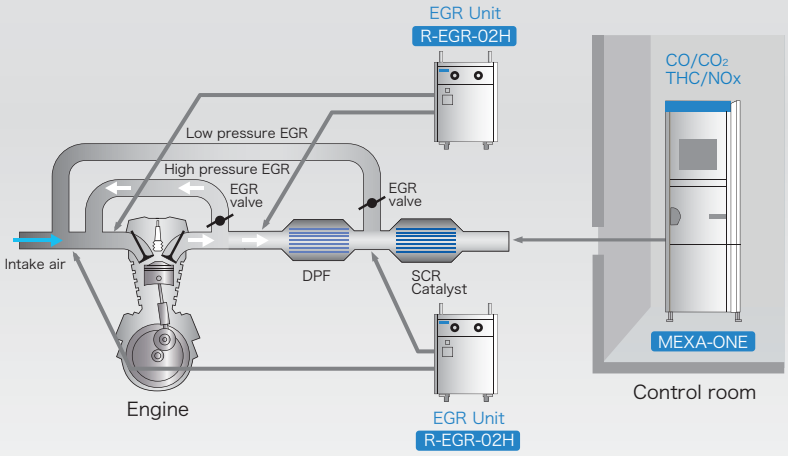
(R-EGR-02H)

- The remote EGR unit consists of the sampling system and two CO_2 analyzers

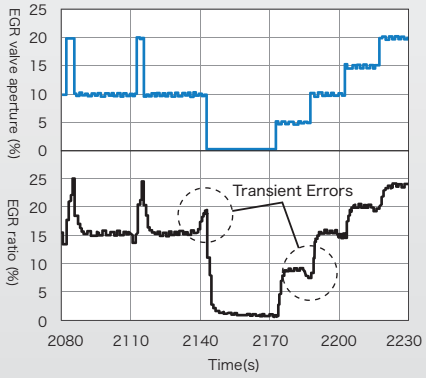


Multi-point EGR Measurement

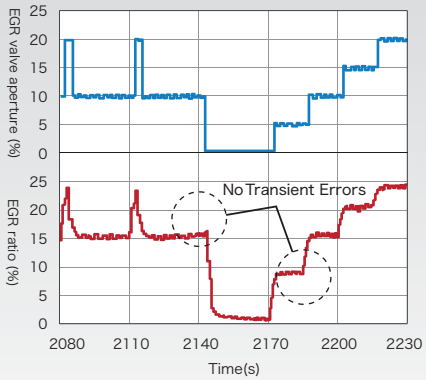
- Multi-point measurement can now be performed on complete EGR systems using MEXA-ONE's modular design.



Conventional System



R-EGR-02H



HORIBA ONE PLATFORM

The MEXA-ONE range of instruments is controlled by the Device Management Controller (DMC) that is built on HORIBA ONE PLATFORM.

Usability

Design Engineers created HORIBA ONE PLATFORM's Graphical User Interface (GUI) after thorough analysis of the emission testing process. HORIBA ONE PLATFORM benefits from an expanded variety of support features such as automated daily operation, status display of connected devices and help message functions. The flexible GUI makes HORIBA ONE PLATFORM intuitive for both new and experienced users.

- GUI design enables users to visualize device operation
- Simple touch operation
- Help function displays detailed operation guidance
- An on-demand remote maintenance function is included

Multiple Measurement

Easy-to-understand icons

Global Flexibility

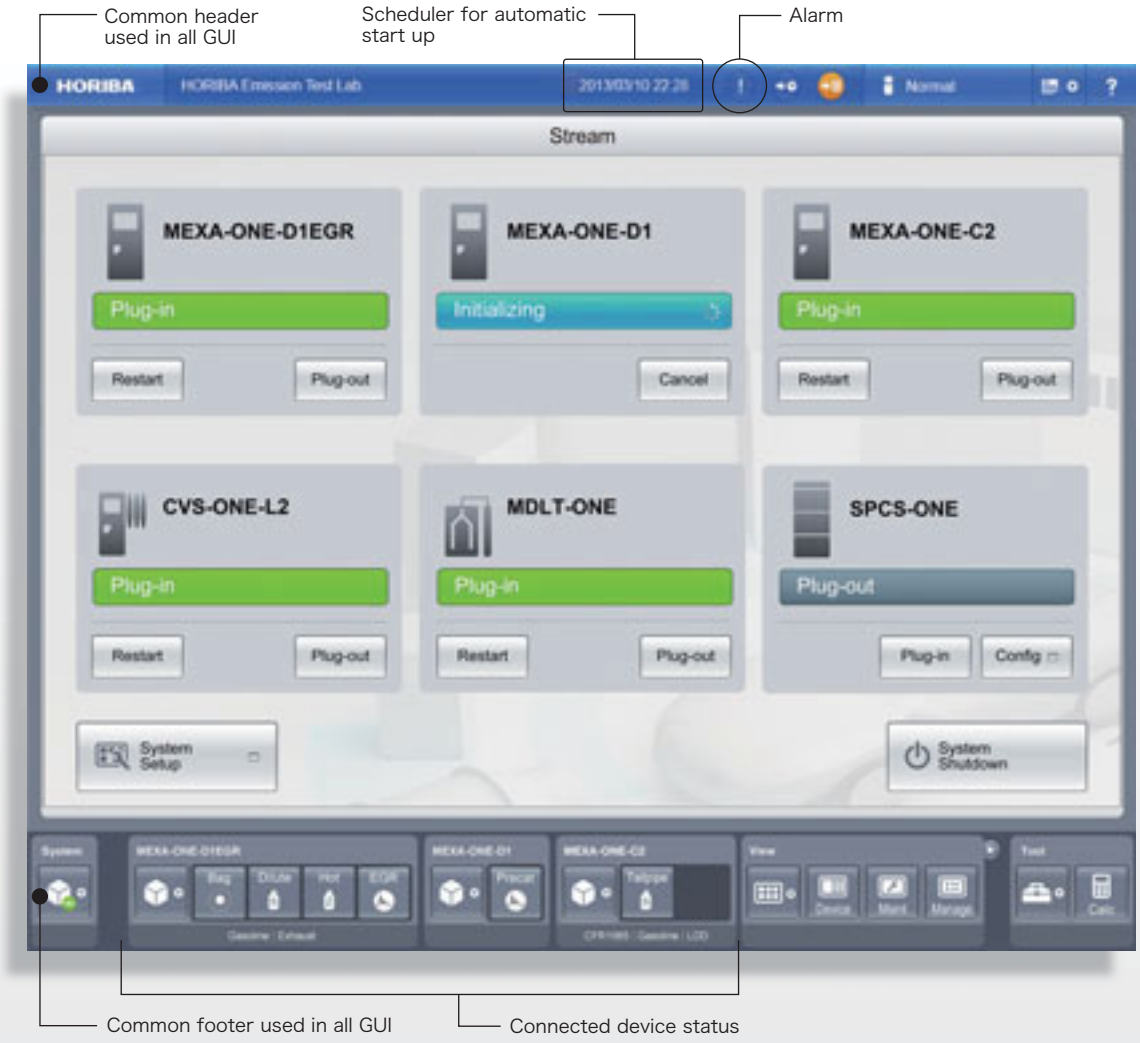
HORIBA ONE PLATFORM is a unified global platform for common operation of systems delivered anywhere in the world.

- The flexible platform allows the sharing and management of data, statistical data analysis and report preparation in conjunction with customer systems around the world
- Provides standard data analysis and calculations for emission measurement as well as specific, independent support for the regulatory demands of each country
- Offers engineering solutions for global and regional research and development programs
- Provides native language support (English, German, French, Japanese, Chinese and others)

English

German

Start Process Display



Scalability

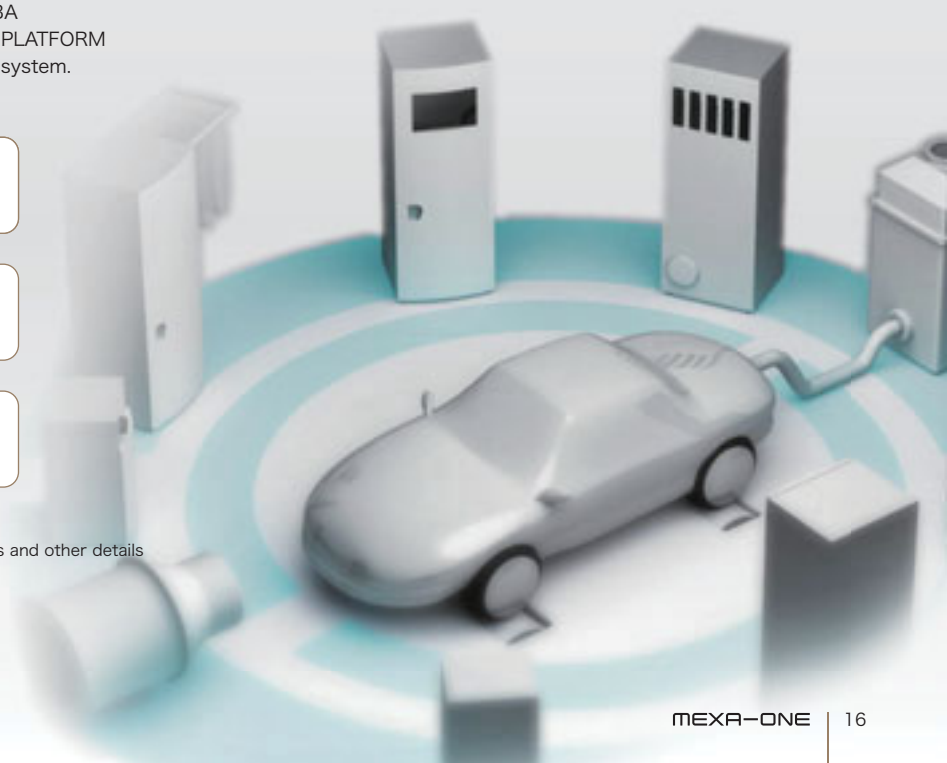
The flexible HORIBA ONE PLATFORM integrates a wide range of measurement equipment including HORIBA legacy products, new and future ONE series equipment, and non-HORIBA products. The integration capabilities of HORIBA ONE PLATFORM allow the user to operate separate devices as a single system.

The platform is capable of interfacing to equipment regardless of manufacturer ※1

Integrates existing HORIBA measurement equipment ※2

Continually maintained and updated in response to industry needs and technology advancements ※3

※1 Environmental setting is required in advance
※2 Please contact HORIBA regarding the connecting conditions and other details
※3 Updates are available at additional cost



Functionality in the Lab

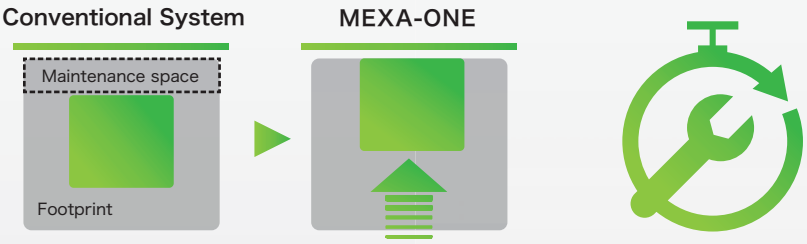
Reduction of Required Floor Space

MEXA-ONE incorporates a front access design that simplifies routine maintenance, adjustments, and cable/tubing connections. Floor space previously required for access to the side and rear of the enclosure is no longer needed, increasing user convenience and laboratory layout efficiency.

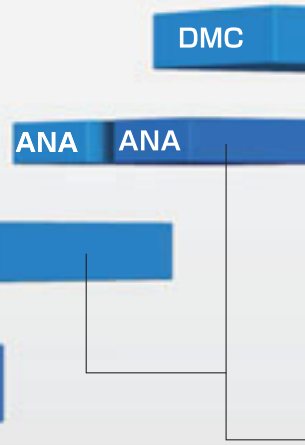
◉ Advantages of Front Access Design

Approximately 30% less floor space required

Increased operation availability through shorter maintenance time



Eliminates the need for rear access



Multi Gas Controller (MGC)

The MGC supplies and controls the operational and calibration gases to the analyzer modules. It is also used for the connection of the GDC modules for analyzer linearization and NOx Converter efficiency checking.

Span Gas Selector (SGS)

A user defined optional module allowing the connection of multiple calibration gases to a single analyzer (max. 5 gases), in accordance to the certification test requirements in North America.

Sample Handling System (SHS)

Including cold-type, heated-type and cold/heated combined type – choosing the optimum type can cover wide range of applications.

Gas Divider Controller (GDC-ONE)

A gas divider is an important calibration tool for maintaining the analyzer's high accuracy. The updated GDC-ONE uses a new model of the HORIBA developed and produced digital mass flow controller. It enables more accurate gas flow and multiple dividing points setting. Furthermore, by improving stability of the switching of the division ratio a shorter time for analyzer calibration can be realized.

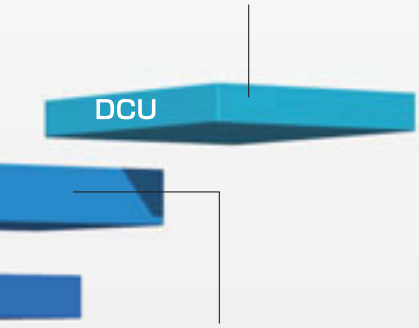
Flow rate accuracy : ±0.5% Dividing point : 1/1000
Controlled gases : 11 gases (NO・NO_2・N_2O・NH_3・H_2・CO・CO_2・O_2・CH_4・C_3H_8・n-C_6H_{14})

Module Concept

◉ Main Modules

Device Control Unit (DCU)

A control and communication module to interface the DMC to each module.



Device Management Controller (DMC)

Installed with the new HORIBA ONE PLATFORM, it features a user-friendly GUI that provides system function control and emissions measurement. User defined hardware options include desktop or rack-mounted solutions.

Analyzer Module (ANA)

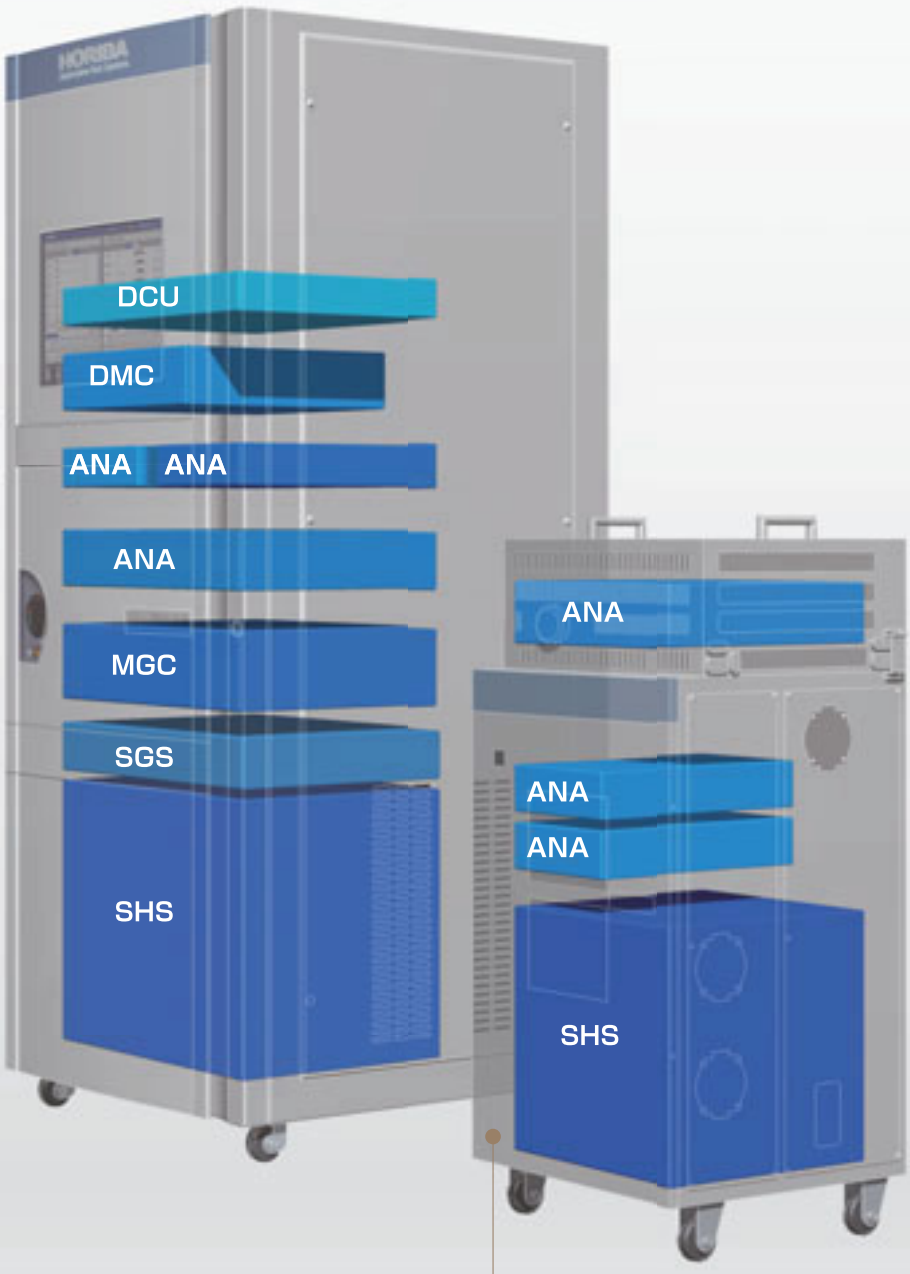
Flexible analyzer line-up for a range of measurement applications based upon components and analyzer type.

- **Cold Analyzer**

Installed in an analyzer rack located inside the main system cabinet.

- **Heated Analyzer**

Rack-mounted analyzer or HORIBA unique remote oven rack analyzers.



GDC-ONE

Mass Flow Controller (HORIBA STEC)

Separate Cabinets

HORIBA's Unique Design

OVN Type Heated Analyzer

A separate OVN type unit (heated chamber) has the advantage of minimizing the contamination effect of hydrocarbons (HC) contained in the sample gas.

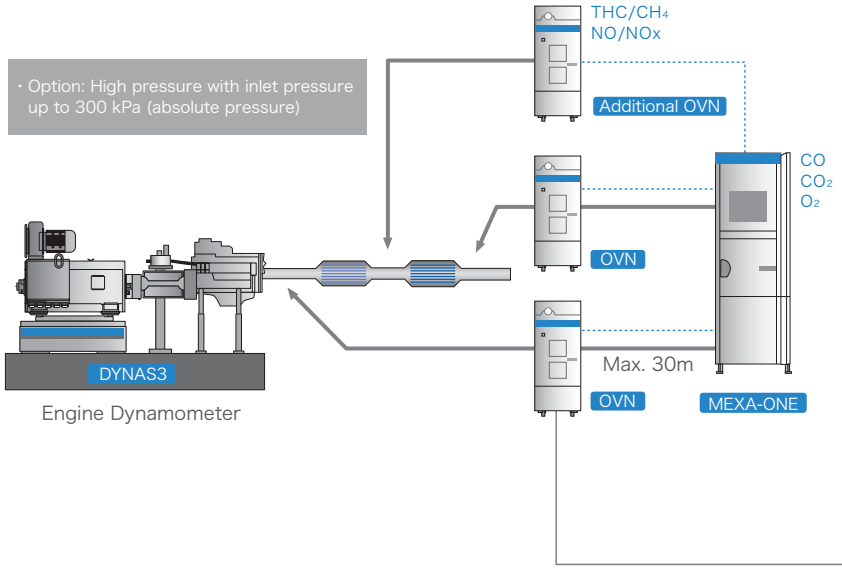
Close-coupled EGR Unit

A remote unit combining CO_2 analyzers and sampling system — suitable for transient EGR measurement.

New Sampling Technology and MEXA-ONE Configuration

◉One Rack + Heated Analyzer (OVN)

Up to four OVN Type Heated Analyzers units mounted in separate units can be added to the MEXA-ONE system. For example, the three-point real-time measurement of THC/CH_4/NO/NO_2 needed for after-treatment catalyst evaluation is achievable by adding an OVN to a two-line MEXA-ONE system. This is recommended for the evaluation test of individual catalysts where several catalysts are combined in an after-treatment system.



・Option: High pressure with inlet pressure up to 300 kPa (absolute pressure)

Engine Dynamometer

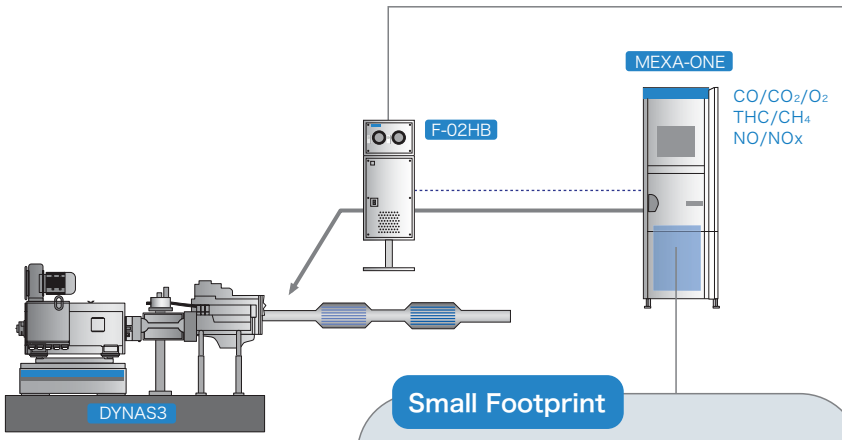
Up to four OVN heated analyzers units

OVN Type Heated Analyzer

- Equipped with analyzers and sampling unit which may be located close to the engine
- Measurement of THC and CH_4 without influence of hydrocarbon contamination
- Heated simultaneous measurement of THC, CH_4, NO, NOx and NO_2 is possible

◉One Rack

The combined heated/cold sampling system (SHS-01HC) is placed inside the main cabinet to reduce floor space requirements. With the combination of the heated filter and back flush purge, the measurement does not have to be interrupted for filter maintenance. This is an optional system for continuous operation such as durability testing.



Engine Dynamometer

Small Footprint

Combined Heated/ Cold Sample-Handling System

(SHS-01HC)

This sampling system supplies gas to both the cold and heated analyzer modules (rack-mounted type).

OPTION

Heated Filter with back flush purge

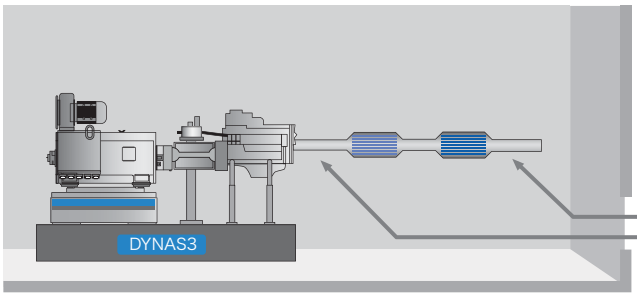
(F-02HB)

- Automatic recycling function by running purge
- Purge gas is not returned to the exhaust system, eliminating the possibility of after treatment system influence
- Combination with OVN type heated analyzer is also available

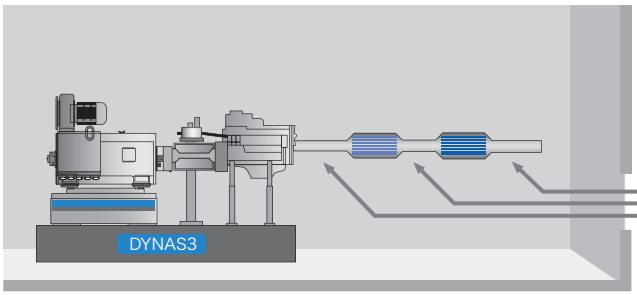
◉One Rack + Heated Sample-Handling System

The heated sampling system can sample exhaust gas from a maximum of seven points. Exhaust gas in a single cylinder unit of a multi-cylinder engine or exhaust gas from multiple cells can be analyzed with a single MEXA-ONE system.

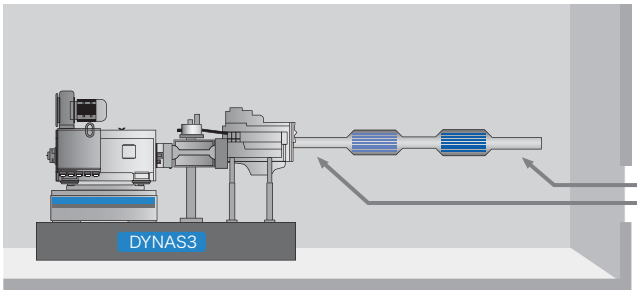
Test Cell No.1



Test Cell No.2



Test Cell No.3

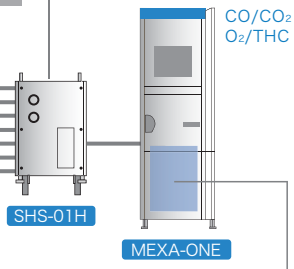


Supports high pressure requirements

Heated Sample-Handling System (SHS-01H)

- Used with rack-mounted heated analyzer modules
- Removes contamination in sampling exhaust gas near sampling point
- Supports the high pressure sampling requirements of catalyst evaluation
- Built-in back flushing filter

- Option: High pressure with inlet pressure up to 300 kPa (absolute pressure) with built-in back flushing filter

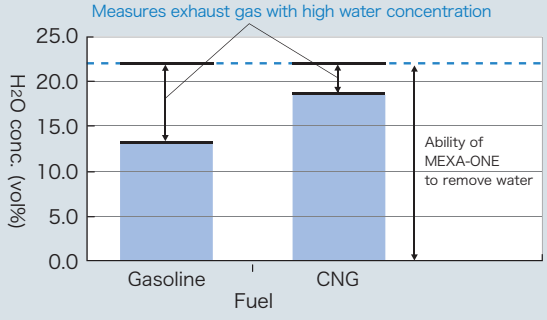


Applicable for alternative fuels with samples containing large concentrations of water

Cold Sample-Handling System (SHS-01/02)

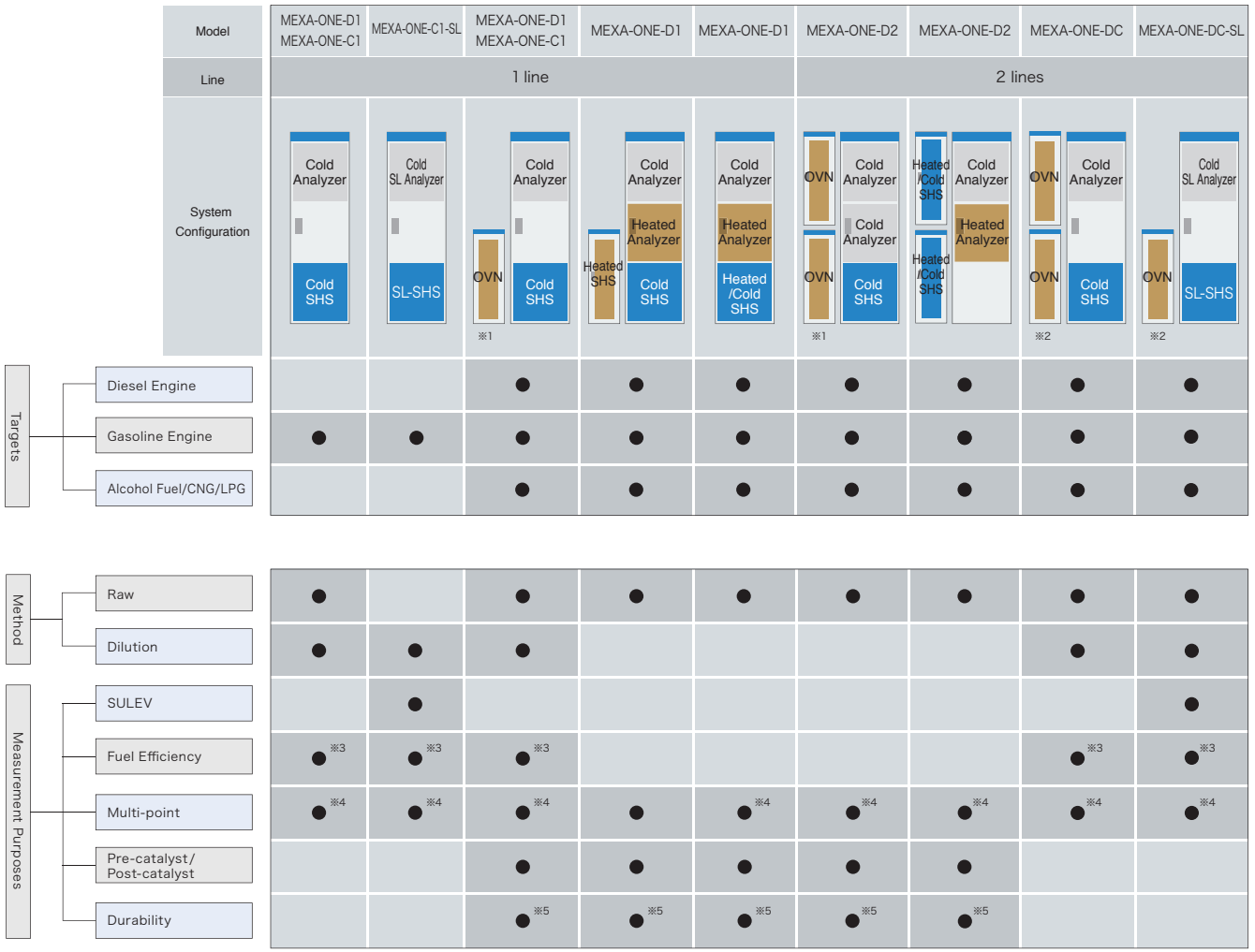
- Equipped with a high-performance cooler
- Gas sampling and pretreatment (removing impurities and water)
- Measures the exhaust from CNG and other fuels, which tend to have high water concentration in the exhaust gas

Water concentration in emission of each fuel



MEXA-ONE System Line-up

MEXA-ONE is a flexible system allowing configuration for a wide range of applications.



※1 Oven is equipped with heated analyzers and Heated Sample-Handling System
※2 The necessity of oven depends on specifications
※3 Analyzer for CO_2 low measurement (AIA-22) is available
※4 Optional unit (HSPS-0X) is required
※5 Heated Filter with back flush purge is recommended･･･refer to p.19

OPTION / FUNCTION

- Remote EGR (R-EGR-01)
- Remote EGR (R-EGR-02H)
- Remote Tracer (R-TR-01)

- Heated Filter with back flush purge (dual type) (F-02HB)
- Heated Filter (F-01H)

- Heated Sample Point Selector (HSPS-0X)

- Span Gas Selector (SGS)
- Remote Multi Gas Controller (MGC-0XM)

- Gas Divider and Converter Checker Unit (high accurate type) (GDC-ONE)
- Gas Divider and Converter Checker Unit (GDC-703)
- Leak Checker (LCK-01)
- Heated Bubbler (HCU-700)

Analyzer Specifications

※1 **NDIR** : Non Dispersive Infrared Detector
FID : Flame Ionization Detector
GC-FID : Flame Ionization Detector with Gas Chromatography
NMC-FID : Flame Ionization Detector with Non Methane Cutter
CLD : Chemiluminescence Detector
(Type : Wet, Dry, Wet/Dry Switchable)
MPD : Magnetopneumatic Detector

※2 Other ranges on request

	Measurement component	Model	Analyzer unit	Principle ※1	Range ※2
Standard	CO	AIA-11	Half 19 Inch	NDIR	0-50 to 0-5000 ppm
	CO	AIA-31	Half 19 Inch	NDIR	0-0.5 to 0-12 vol%
	CO	AIA-41	Half 19 Inch	NDIR	0-3 to 0-20 vol%
	CO_2	AIA-22	Half 19 Inch	NDIR	0-0.1 to 0-6 vol%
	CO_2	AIA-32	Half 19 Inch	NDIR	0-0.5 to 0-20 vol%
	CO_2	AIA-42	Half 19 Inch	NDIR	0-3 to 0-20 vol%
	HC	AIA-14	Half 19 Inch	NDIR	0-100 to 0-5000 ppm
	HC	AIA-34	Half 19 Inch	NDIR	0-5000 to 0-10000 ppm
	N_2O	AIA-15	Half 19 Inch	NDIR	0-100 to 0-5000 ppm
	O_2	MPA-01	Half 19 Inch	MPD	0-1 to 0-25 vol%
	THC	FIA-01	Half 19 Inch	FID	0-10 to 0-30000 ppmC
	NO/NO_X	CLA-01	Half 19 Inch	CLD	0-10 to 0-10000 ppm
	CH_4	GFA-01	Half 19 Inch	GC-FID	0-10 to 0-3000 ppm
	THC	FIA-01H	19 Inch	Heated-FID	0-10 to 0-60000 ppmC
	THC, CH_4, NMHC	FIA-02H-ND	19 Inch	Heated-FID NMC-FID	THC 0-50 to 0-60000 ppmC CH_4 0-50 to 0-25000 ppm NMHC is measured by dual detector
	NO/NO_X	CLA-01HV	19 Inch	Heated-CLD	0-10 to 0-10000 ppm
	NO, NO_X, NO_2	CLA-02HV	19 Inch	Dual heated-CLD	NO 0-10 to 0-10000 ppm NOx 0-10 to 0-10000 ppm NO_2 is measured by dual detector
	THC	FIA-01O	OVN	Heated-FID	0-10 to 0-60000 ppmC
	THC, CH_4, NMHC	FIA-02O-NC	OVN	Heated-FID NMC-FID	THC 0-10 to 0-5000 ppmC CH_4 0-10 to 0-5000 ppm NMHC is measured by dual detector
	THC, CH_4, NMHC	FIA-02O-ND	OVN	Heated-FID NMC-FID	THC 0-50 to 0-60000 ppmC CH_4 0-50 to 0-25000 ppm NMHC is measured by dual detector
	NO/NO_X	CLA-01OV-2	OVN	Heated-CLD	0-10 to 0-10000 ppm
	NO, NO_X, NO_2	CLA-02OV-3	OVN	Dual heated-CLD	NO 0-10 to 0-10000 ppm NOx 0-10 to 0-10000 ppm NO_2 is measured by dual detector
Low Emission Measurement	CO	AIA-11SL	19 Inch	NDIR	0-10 to 0-1000 ppm
	THC	FIA-01SL	Half 19 Inch	FID	0-1 to 0-500 ppmC
	NO/NO_X	CLA-01SL	Half 19 Inch	CLD	0-1 to 0-500 ppm
	CH_4	GFA-01SL	Half 19 Inch	GC-FID	0-1 to 0-500 ppm
Remote Type	CO_2	R-EGR-01	Remote	NDIR (Dry)	0-10 to 0-20 vol%
	CO_2	R-TR-01	Remote	NDIR (Dry)	0-10 to 0-20 vol%
	CO_2	R-EGR-02H	Remote	Dual NDIR (Wet)	0-10 to 0-20 vol%

System Specifications

・Dimensions
-Standard 19 inch Rack･･･655(W) × 855(D) × 1970(H) mm
-Oven Type Heated Analyzer･･･430(W) × 550(D) × 1100(H) mm
-R-EGR/R-TR･･･380(W) × 400(D) × 560(H) mm
・Mass･･･Depends on the system. (e.g. MEXA-ONE-D1(OVN-type) = Approx. 350 kg)
・Ambient temperature･･･5 deg.C to 40 deg.C
・Ambient humidity･･･80% or less as relative humidity
・Atmospheric pressure･･･80 kPa to 102 kPa (abs)
(Altitude : below 2000 m above sea-level)

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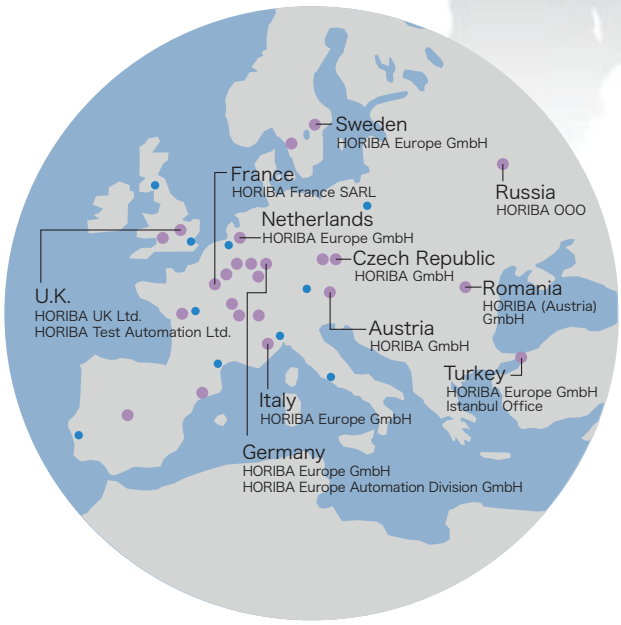

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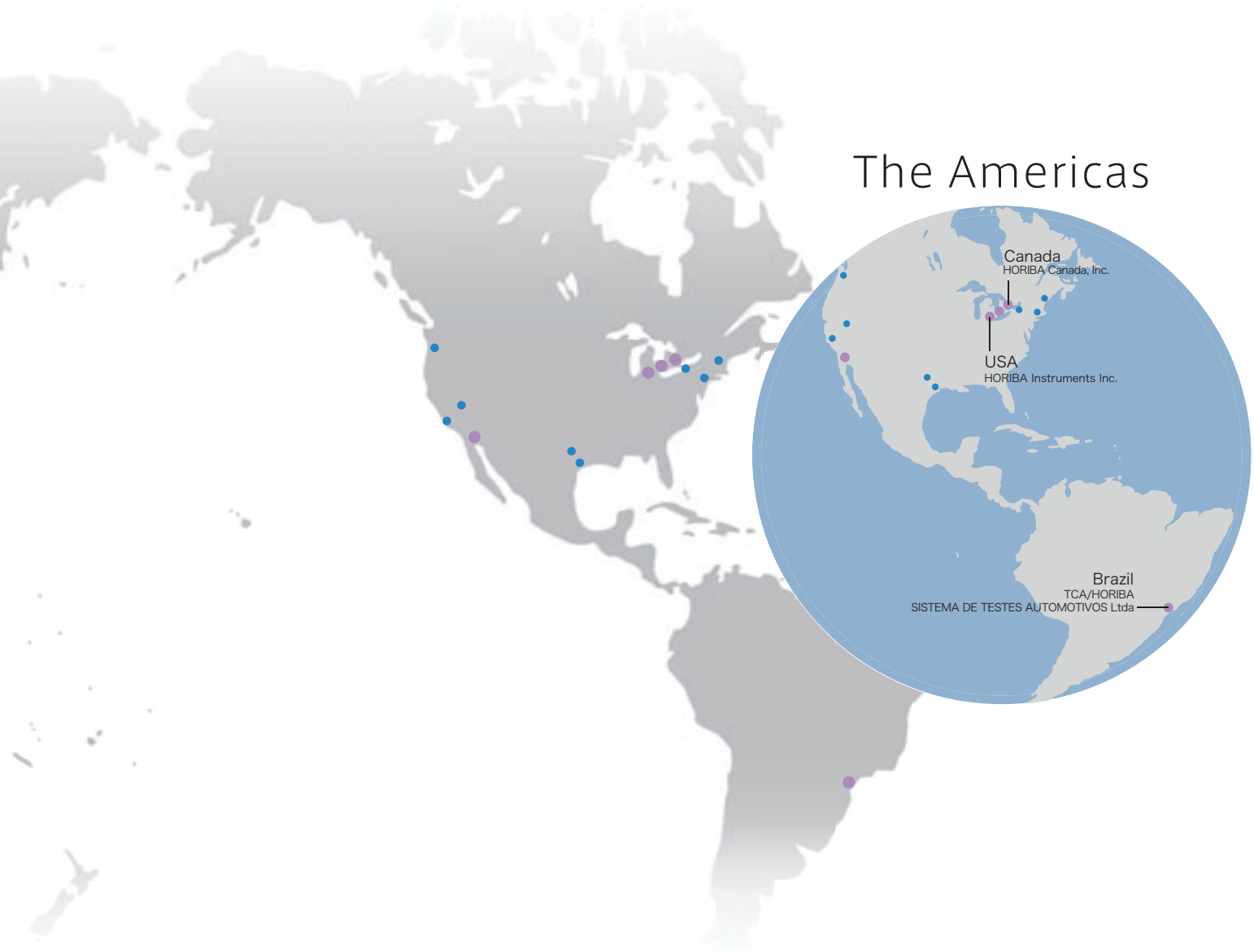

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