



## Stack-gas Analysis System

### ENDA 5000 series

**NO<sub>x</sub>, SO<sub>2</sub>, CO, CO<sub>2</sub>, O<sub>2</sub>**  
Continuous simultaneous 5-component analysis

#### **C**OMPACT

Uses half the space of previous models.

#### **E**ASY

Features an intuitive touch panel.

#### **L**ONG-TERM STABILITY

Uses NDIR for better long-term stability and reliability.

Steam boilers

Iron and steel processing

Refuse incinerators

Electric power generation plants

Sulfuric acid plants

Glass furnaces

MEAS.	JAN/13/2004 15:21	
NO <sub>x</sub>	128.1 ppm	RANGE 200
SO <sub>2</sub>	120.2 ppm	RANGE 200
CO	153.2 ppm	RANGE 200
CO <sub>2</sub>	4.135 vol%	RANGE 5
O <sub>2</sub>	9.34 vol%	RANGE 10
MENU COR. CAL.		

# offers options for a variety of uses, all based on HORIBA

## Sampling sections

The ENDA-5000 series' sampling sections use cost-effective parts for maintenance, and offer a variety of sample gas conditioning systems, each suitable for a different kind of gas. HORIBA's know-how has created the best possible system for every type of sample gas measurement.

- Sample gas probe with easy-to-change filter element



Sample gas probe

- An innovative dehumidifying system minimizes loss of soluble components.
- A mist catcher in the sample flow path removes SO<sub>3</sub> and prevents damage and line blockage.
- Long-lasting, low-temperature (180°C) NO<sub>2</sub> → NO converter prevents corrosion.

### New pressure control \*

The new pressure control method is compatible with Daily start-up and shut-down and other intermittent operations.

\* Older models used a water filled pressure trap.

### Blowback panel reduced in size



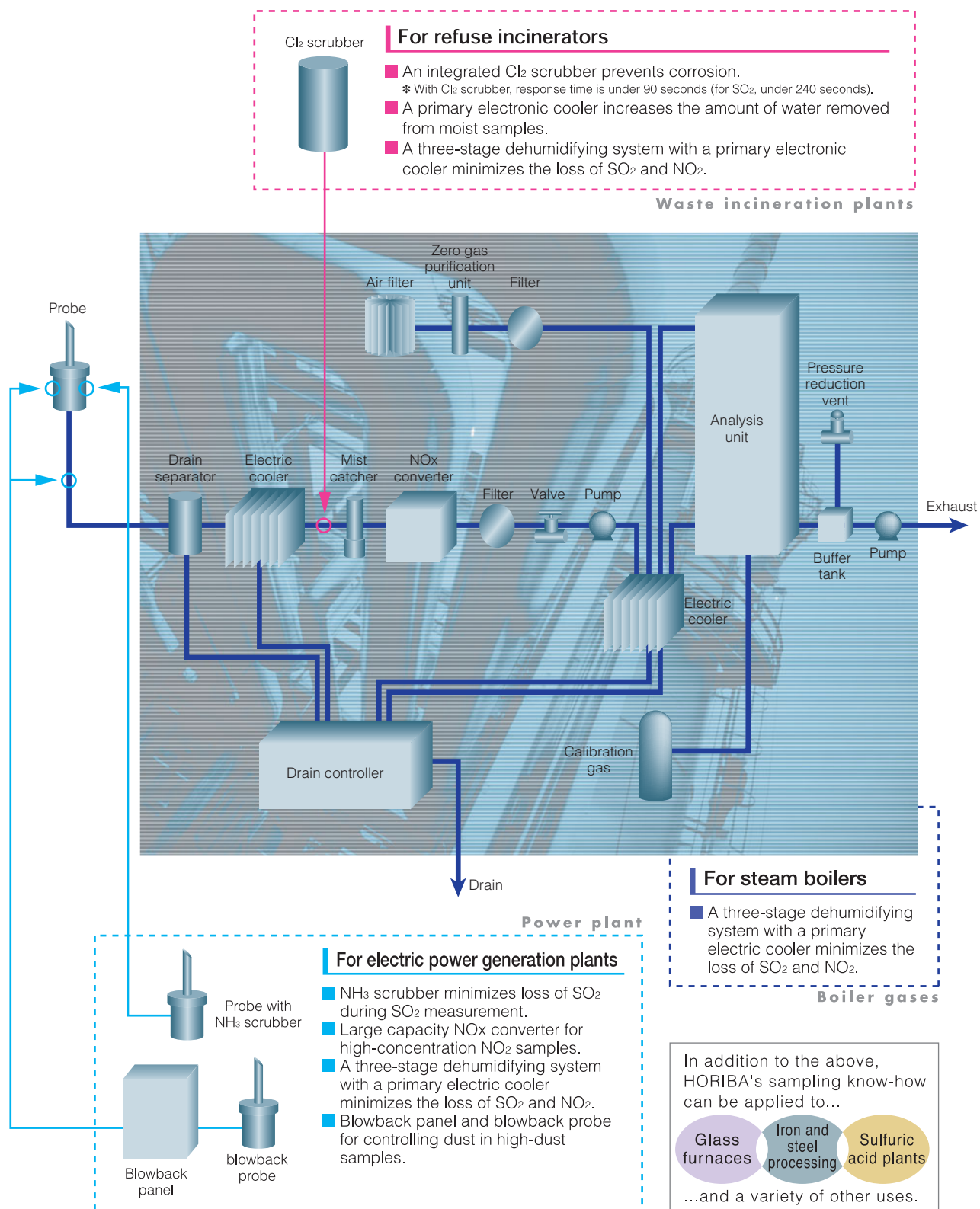
In the past, a large blowback panel was necessary to control dust when measuring high-dust gas samples. HORIBA has used its innovative technology to reduce the size of the blowback panel by almost 25% (to 350 [W] x 550 [H] x 180 [D] mm). The panel is also lighter, and can be mounted on a wall. The new blowback panel can be used even in extremely small spaces.



## Models and components measured

NO <sub>x</sub>	SO <sub>2</sub>	CO <sub>2</sub>	CO	O <sub>2</sub>	Model
●					ENDA-5120
	●				ENDA-5130
		●			ENDA-5140
			●		ENDA-5150
				●	ENDA-5160
●				●	ENDA-5220
	●			●	ENDA-5230
		●		●	ENDA-5240
			●	●	ENDA-5250
●	●				ENDA-5300
●		●			ENDA-5310
●			●		ENDA-5320
	●	●			ENDA-5340
	●		●		ENDA-5350
		●	●		ENDA-5370
●	●			●	ENDA-5400
●		●		●	ENDA-5410
●			●	●	ENDA-5420
	●	●		●	ENDA-5440
	●		●	●	ENDA-5450
		●	●	●	ENDA-5470
●	●	●			ENDA-5500
●	●		●		ENDA-5510
●		●	●		ENDA-5520
	●	●	●		ENDA-5530
●	●	●		●	ENDA-5600
●	●		●	●	ENDA-5610
●		●	●	●	ENDA-5620
	●	●	●	●	ENDA-5630
●	●	●	●		ENDA-5700
●	●	●	●	●	ENDA-5800

A's extensive know-how.



\*Systems can be customized for a variety of other applications as well.

# The ultimate in dependability and reliability

## LONG-TERM STABILITY

Cross-flow modulated non-dispersive infrared (NDIR) detection is renowned for long-term stability.

### Long-term stability

#### 1 No need for optical adjustments

With cross-flow modulated non-dispersive infrared (NDIR) detection, the sample gas and reference gas are introduced into a single measurement cell alternately to obtain modulation signal. Therefore there is no need to adjust two different optical paths so that they are balanced.

#### 2 A stable zero point

Since the ENDA-5000 series output the difference between the measured gas and the reference gas each time measurement occurs (once a second), the zero point is extremely stable.

#### 3 Continuous cleaning keeps the cell clean

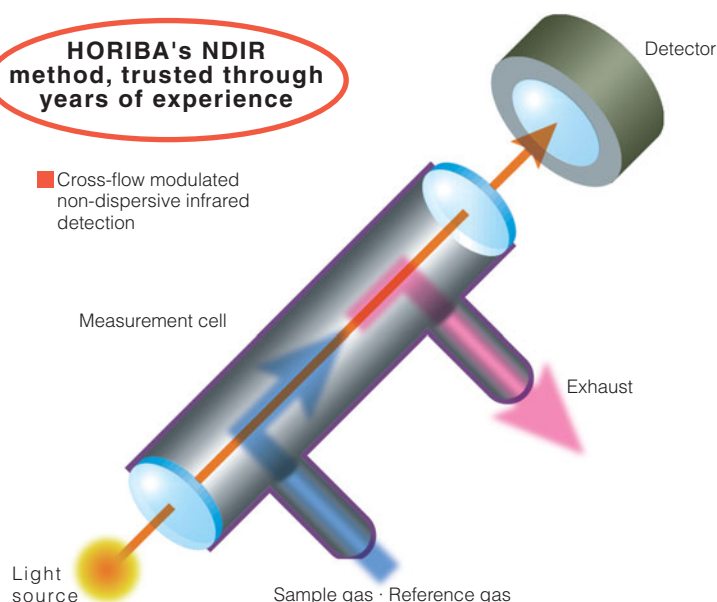
Since cleaning air is fed into the sample cell in between each batch of sample gas, the cell resists contamination and normally remains clean. This reduces span drift and makes the equipment safe and stable for long periods of time.

#### Other merits

- A CO<sub>2</sub> sensor constantly measures and makes corrections to compensate for CO<sub>2</sub> interference in NO<sub>x</sub> measurements.
- An interference compensation detector compensates for interference from H<sub>2</sub>O during NO<sub>x</sub> and SO<sub>2</sub> measurement.

**HORIBA's NDIR method, trusted through years of experience**

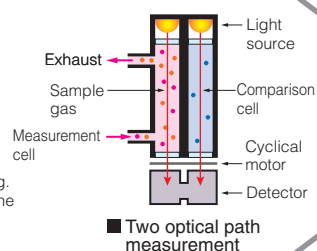
■ Cross-flow modulated non-dispersive infrared detection



#### (Dual optical path comparison)

The sample gas and reference gas are each put in a different cell for measurement.

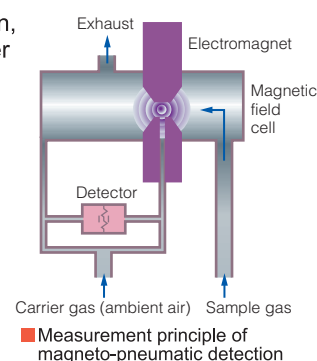
- This method is appropriate for laboratory use and other kinds of batch measurement.
- Differences in the cleanliness of the two optical paths result in signal variation.
- Keeping the cells clean requires periodic cleaning.
- During transport, and inspection, and whenever the unit is subject to vibrations, fine adjustment by a skilled service person is required.



■ Two optical path measurement

With magneto-pneumatic detection, there is no need for cylinder carrier gas.

The ENDA-5000 series use magneto-pneumatic detection to measure O<sub>2</sub>. Since the sample gas does not come into direct contact with the detector, there is no deterioration due to corrosion, which enables long-term stable operation. What's more, thanks to HORIBA's innovative technology, in which ambient air is used as a carrier gas, there is no need for a carrier gas supply, which translates into lower costs.



■ Measurement principle of magneto-pneumatic detection

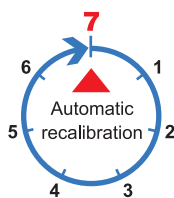
■ Continuous correction is provided by a sensor that is designed to detect CO<sub>2</sub> interference during NO<sub>x</sub> measurement.

■ The systems feature an automatic recalibration function that calibrates the system every seven days.

■ A variety of types functions (up to 12 kinds of output)

- Instantaneous output (NO<sub>x</sub>, SO<sub>2</sub>, CO, CO<sub>2</sub>, O<sub>2</sub>)
- O<sub>2</sub> calculated output values (NO<sub>2</sub>, SO<sub>2</sub>, CO)
- Moving average values (for one to four hours)

■ Ambient air is used as the carrier gas, which allows for installation in smaller spaces and lower running costs.

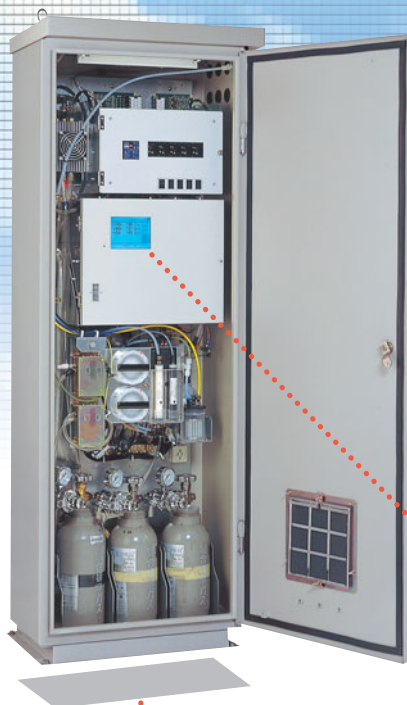


■ Environmentally friendly thanks to lower electrical draw

These systems use 25% less electricity (200 VA) than older similar models.

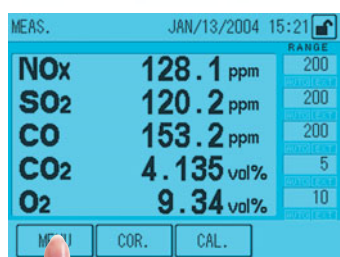


# The ENDA-5000 series of stack-gas analysis systems



## Continuous simultaneous and high-precision measurement of NO<sub>x</sub>, SO<sub>2</sub>, CO, CO<sub>2</sub>, and O<sub>2</sub>

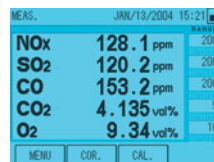
Over 100,000 systems installed and 30 years of quality and experience. That is the base on which HORIBA's new ENDA-5000 series of stack-gas analysis systems is built. These systems have a smaller footprint, and use cross-flow modulated non-dispersive infrared (NDIR) detection with a magnet-pneumatic detection method that is inherently drift-free. The ENDA-5000 series are superior continuous analysis systems that are perfect in the difficult field of exhaust gas measurement, where measurement errors cannot be tolerated. The series features a new intuitive touch panel that makes every operation available with the touch of a single button. The ENDA-5000 series are also designed for faster, more efficient maintenance. They are ideal for a variety of uses, including monitoring steam boiler, refuse incinerator, and electric power generation plant emissions to assure pollution standards are being met.



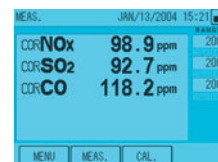
## EASY

Features an intuitive touch panel.

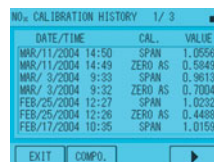
## Easy to use



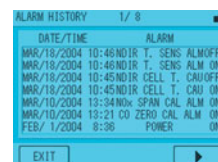
Measured concentration



Converted concentration



Correction history



Alarm history

## COMPACT

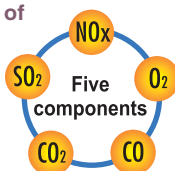
Body yields wider maintenance area  
**Compact** (all maintenance can be done from the front)

The ENDA-5000 series takes up only half the space of older similar systems (such as 3-cylinder type systems). ENDA-5000 can be installed almost anywhere, with ample room on all sides for easy access and much easier maintenance. The blowback panel has also been reduced by almost one-third (to about 77% of the old size). Downsizing of these equipments help save space even when permanently installed, and free up valuable floor area for other equipment.



## Continuous simultaneous measurement of up to five components with one system

HORIBA'S innovative optical technology enables ENDA-5000 series measure up to five components which can be arranged any combination.



## Correction for interference

The interference correcting sensor uses a unique interference filter to compensate for the influence of interference by other gases.



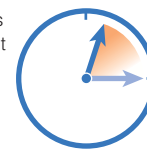
## Better alerts and extra alerts

In addition to the alert functions available in the past, the ENDA-5000 series feature extra alert functions. A continuous checking process can prevent the unit from stopping due to a failure, reducing the risk of failed measurements and assuring consistent operation. US Patent No. 5,966,676



## Dramatically reduced correction time for SO<sub>2</sub>

Corrections of SO<sub>2</sub> measurements using wet base methods of the past took a great deal of time (about 15 minutes), but with the ENDA-5000 series' dry base method, correction takes only three minutes.



## Specifications

Model		ENDA-5000				
Component		NOx	SO <sub>2</sub>	CO *1	CO <sub>2</sub>	O <sub>2</sub> *2
Measurement methods		NDIR	NDIR	NDIR	NDIR	Magneto-pneumatic detection
Range	Standard	200~5000 ppm	200~5000 ppm	200~5000 ppm	5~25 vol%	10~25 vol%
	Optional	100 ppm~	50 ppm~	100 ppm~	—	—
Range Ratio		Within a factor of 10	Within a factor of 10	Within a factor of 10	Within a factor of 5	Within a factor of 2.5
Repeatability		Within 0.5% of full scale (with optional range, or during O <sub>2</sub> measurement, ±1.0% of full scale)				
Linearity (indicator error)		± 1.0% of full scale				
Zero drift		± 1.0% of full scale (assuming surrounding temperature is maintained within 5°C) (with optional range, or O <sub>2</sub> measurement, ± 2.0% of full scale)				
Span drift		± 2.0% of full scale/week (assuming surrounding temperature is maintained within 5°C)				
Response time		Within 60 seconds (Td + T90 from equipment intake area) (sample flow 0.6 L/min.) (within 240 seconds for SO <sub>2</sub> only)				
Interference		± 2.0% of full scale/week (within standard range, with standard gas formation)				
Display		Touch panel LCD (backlight) (four usable lines)				
Environment Condition	Temperature	-5 to 40°C (away from direct sunlight and radiation heat ) *3				
	Humidity	90% or less (no condensation)				
	Vibration	100 Hz, 0.3 m/S <sup>2</sup> or less				
	Dust	Standard environment or better				
Measuring Gas Condition	Temperature	250°C or lower				
	Dust	0.1 g/Nm <sup>3</sup> or less				
	Standard gas composition *4	NO: 500 ppm or less; NO <sub>2</sub> : 6 ppm or less; SO <sub>2</sub> : 1000 ppm or less; SO <sub>3</sub> : 50 ppm or less; CO: 200 ppm or less; CO <sub>2</sub> : 15 vol% or less; H <sub>2</sub> O: 40 vol% or less				
Sampling method		Dry sampling using an electric cooler				
Sample gas flow		2.5 L/min~3.0 L/min				
Sample inlet tube		PTFE tubing (ø8/ø6 mm)				
Sample gas pressure		± 4.9 kPa (three points selected) (with no sample gas back pressure)		(1) -1.96 to 4.9 kPa (2) ± 3.43 kPa (3) -4.9 to 1.96 kPa		
Pressure control		Pressure control uses a regulator and cylinder; Reduced pressure sampling; Control pressure: -4.9 kPa				
Output		DC 4 to 20 mA (absolute output) (DC 0 to 16 mA/DC 0 to 1 V/DC 1 to 5V optional) Max. 12 output systems				
External output		Analysis alerts, analysis warnings, range display, corrections, conservation, purging (option) Contact capacity: DC 30 V 1 A, AC 250 V 1 A resistance load				
Correction method		Dry correction, automatic correction (correction cycle: 7 days standard, can be adjusted to between 1 and 99 days), manual correction				
Calibration gas	Zero gas	With measurement method authorization: N <sub>2</sub> When there is no measurement method authorization: N <sub>2</sub> or ambient air				
	O <sub>2</sub> carrier gas	Ambient air				
	Span gas	Gas cylinder for each component measured (when there is no measurement method authorization: O <sub>2</sub> or ambient air can be used)				
Probe		Flange: JIS 10K, 40 AFF; Sample probe tube length: 1000 mm; Material: SUS-316 stainless steel;				
Primary filter		Filter element: SUS-304 stainless steel and 2µm-pleated quartz wool; Electric heater: 100 VA, with water droplet proof case				
Power supply		AC 100 V ± 15 V(85 V~115 V)				
Power frequency		50/60 Hz (switchable)				
Power consumption		About 800 VA (heated piping 30m: +1100 VA; heater in tray: +300 VA)				
Exterior dimensions /Mass		600 (W) x 1770 (H) x 300 (D) mm (high pressure gas cylinders, 3.4 L cylinders, maximum of 3 cylinders); About 180 kg (not including cylinders) 600 (W) x 1770 (H) x 500 (D) mm (high pressure gas cylinders, 3.4 L cylinders, maximum of 6 cylinders); About 200 kg (not including cylinders)				
Materials in contract with sample gas		SUS-316 stainless steel, SUS-304 stainless steel, PTFE, polypropylene, polyethylene, fluororubber, PVC, PVDF, and glass				
Enclosure		Independent outdoor installation Plate thickness: Main unit, doors, top plate, steel plate: 2.3 mm; Channel base: 3.2 mm; Doors: front opening; Interface: right front				
Color/Finish		Semi-gloss Munsell 5Y7/1 on all inner and outer surfaces				

- \*1: The analyzer against N<sub>2</sub>O interference for CO analyzer applies the standard range of 200 ppm or more (no optional range).  
 \*2: No carrier gas cylinder is necessary.  
 \*3: For the temperature range of -15°C to 40°C (cold district) and for the specification of -5°C to 50°C, we will separately discuss the design.  
 \*4: When the coexisting gas contains NH<sub>3</sub>, NH<sub>3</sub> scrubber is prepared for an optional part.  
 When CH<sub>4</sub> coexists in the sample gas for SO<sub>2</sub> analyzer, the SO<sub>2</sub> analyzer of CH<sub>4</sub> interference compensation type is prepared.  
 When N<sub>2</sub>O coexists in the sample gas for CO analyzer, the CO analyzer of N<sub>2</sub>O interference compensation type is prepared.



**Please read the operation manual before using this product to assure safe and proper handling of the product.**

- The contents of this catalog are subject to change without prior notice, and without any subsequent liability to this company.
- The color of the actual products may differ from the color pictured in this catalog due to printing limitations.
- It is strictly forbidden to copy the content of this catalog in part or in full.
- All brand names, product names and service names in this catalog are trademarks or registered trademarks of their respective companies.

<http://www.horiba.com> e-mail: [info@horiba.co.jp](mailto:info@horiba.co.jp)

### ●HORIBA, Ltd.

**Head Office**  
 2 Miyahigashi, Kisshoin  
 Minami-ku, Kyoto, Japan  
 Phone: 81 (75) 313-8121  
 Fax: 81 (75) 321-5725

### Tokyo Sales Office

Kanda-Awaji-cho Nichome  
 Building 2-6, Awaji-cho,  
 Kanda, Chiyoda-ku, Tokyo,  
 Japan  
 Phone: 81 (3) 6206-4721  
 Fax: 81 (3) 6206-4730

### ●HORIBA (China) Trading Co., Ltd.

**Shanghai Office**  
 Unit D, 1F, Building A, Synnex  
 International Park, 1068  
 West Tianshan Road,  
 Shanghai, 200335 China  
 Phone: 86 (21) 6289-6060  
 Fax: 86 (21) 6289-5553

### Beijing Office

Room 1801, SK Tower,  
 Tower 1 No.6 Jia,  
 Jianguomenwai Ave.,  
 Chaoyang District, Beijing,  
 100022 China  
 Phone: 86 (10) 8567-9966  
 Fax: 86 (10) 8567-9066

### ●HORIBA Korea Ltd.

10, Dogok-Ro, 6-Gil,  
 Gangnam-Gu, Seoul,  
 135-860, Korea  
 Phone: 82 (2) 753-7911  
 Fax: 82 (2) 756-4972

### ●HORIBA Instruments (Singapore) Pte Ltd.

**Head Office**  
 10, Ubi Crescent #05-12  
 Lobby B Ubi Techpark  
 Singapore 408564  
 Phone: 65 (6) 745-8300  
 Fax: 65 (6) 745-8155

### Hanoi Office

Unit 10, 4 Floor, CMC tower,  
 Duy Tan Street, Dich Vong  
 Hau Ward, Cau Giay district,  
 Hanoi, Vietnam  
 Phone: 84 (4) 3795-8552  
 Fax: 84 (4) 3795-8553

### Jakarta Office

Menara Bidakara 2 Unit 11-04,  
 Jl. Jend. Gatot Subroto  
 Kav. 71-73, Jakarta  
 Selatan, 12870, Indonesia  
 Phone: 62 (21) 2906-9419  
 Fax: 62 (21) 2906-9421

### ●HORIBA India Private Limited

**Delhi Office**  
 246, Okhla Industrial Estate,  
 Phase 3 New Delhi - 110020,  
 India  
 Phone: 91 (11) 4646-5000  
 Fax: 91 (11) 4646-5020

### Pune Office

502, 5th Floor, Purushottam  
 Plaza, Baner Road, Baner,  
 Pune - 411045 India  
 Phone: 91 (20) 4076-6000  
 Fax: 91 (20) 4076-6010

### ●HORIBA Instruments Incorporated

**Irvine Office**  
 9755 Research Drive,  
 Irvine, CA 92618, U.S.A.  
 Phone: 1 (949) 250-4811  
 Fax: 1 (949) 250-0924

### Alvin, TX Office

5318 W.FM517 Rd, Alvin,  
 TX 77511, U.S.A.  
 Phone: 1 (281) 482-4334  
 Fax: 1 (281) 614-0303

### ●HORIBA Instruments Brasil, Ltda.

Avenida das Nações Unidas,  
 21.735 PT QD 17 - Jurubatuba  
 - Sao Paulo - SP - CEP  
 04795-100 Brazil  
 Phone: 55 (11) 55 45 1500  
 Fax: 55 (11) 55 45 1570

### ●HORIBA UK Limited

**Northampton Office**  
 Kyoto Close  
 Moulton Park, Northampton  
 NN3 6FL, UK  
 Phone: 44 (1604) 542-500  
 Fax: 44 (1604) 542-699

### ●HORIBA (Austria) GmbH

**Northampton Office**  
 Kaplanstrasse 5  
 A-3430 Tulln,  
 Austria  
 Phone: 43 (2272) 65225  
 Fax: 43 (2272) 65230

**HORIBA Czech**  
 Prumyslova 7, CZ-10200,  
 Praha 10,  
 Czech Republic  
 Phone: 420 (2) 460-392-65

### ●HORIBA Europe GmbH

**Head Office**  
 Hans-Mess-Str.6  
 D-61440 Oberursel  
 Germany  
 Phone: 49 (6172) 1396-0  
 Fax: 49 (6172) 1373-85

**Leichlingen Office**  
 Julius-kronenberg Str.9  
 D-42799 Leichlingen  
 Germany  
 Phone: 49 (2175) 8978-0  
 Fax: 49 (2175) 8978-50

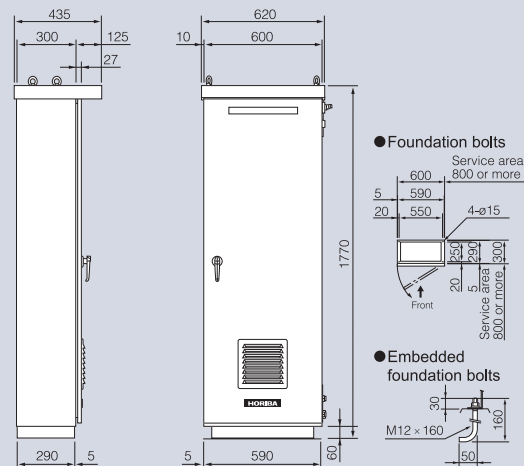
### ●HORIBA France Sarl

12, Av des Tropiques Hightech  
 Sud, F-91955 Les Ulis,  
 France  
 Phone: 33 (1) 69-29-96-23  
 Fax: 33 (1) 69-29-95-77

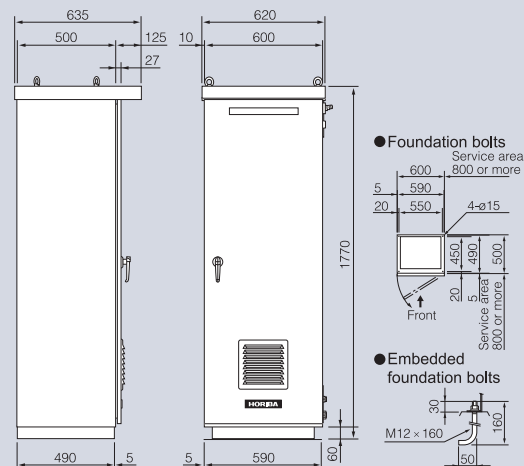
Bulletin:HRE-2406C

## Dimensions (unit: mm)

### [ 3-cylinder type ]



### [ 6-cylinder type ]



The EMC Directive : EN61326 Compliant  
 European Standard compliant : EN15267, EN14181  
 Pattern Approved, Metrology Law (China) : 2006-C118

Printed in Japan TM-TF(SK)33