

# HORIBA

Explore the future



## 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



- Non-leaded solder used for Printed Circuit Boards.
- Product has been reduced to about 52% the size and 28% the mass of older similar products.
- Uses 25% less electricity (200 VA) than older similar products.

# 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>

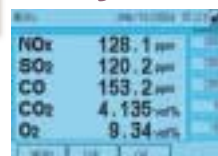
Over 100,000 systems installed and 30 years of quality and experience. That is the base on which HORIBA's new ENDA-5000 series of stack-gas analysis systems is built. These systems have a smaller footprint, and use cross-flow modulated non-dispersive infrared (NDIR) detection with a magnet-pneumatic 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 systems 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 where pollution standards are being met.



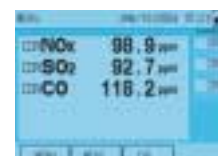
## EASY

Features an intuitive touch panel.

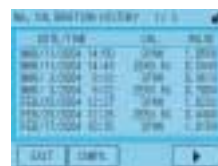
## Easy to use



Measured concentration



Converted concentration



Correction history



Alarm history

The ENDA-5000 series systems use a large-format LCD touch panel that can display all five critical components (NO<sub>x</sub>, SO<sub>2</sub>, CO, CO<sub>2</sub>, O<sub>2</sub>) simultaneously. The touch panel also allows the operator to view the density variations of multiple components at once. The operator can easily switch between the corrected and converted density settings screens or view alert information with the touch of a single button.

## COMPACT

Uses half the space of previous models.

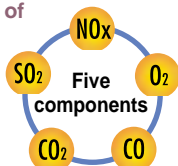
## Compact (all maintenance can be done from the front)

The ENDA-5000 series systems takes up only half the space of older similar systems (such as 3-cylinder type systems), and are the smallest of any stack-gas analysis systems available in the world.\* As a result, anyone, including those who previously gave up on stack-gas analysis for lack of space, can now use them. They 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). Thanks to the ENDA-5000 series system's small size, they help save space even when permanently installed, and free up valuable floor area for other equipment.

\* As of 2003, according to HORIBA's research.

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

The ENDA-5000 series can measure up to five components, thanks to HORIBA's innovative optical technology. Measurements of up to five components can be made in any combination.



## Correction for interference

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



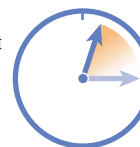
## Better alerts and extra alerts

In addition to the alert functions available in the past, the ENDA-5000 series systems 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.



## 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 system's dry base method, correction takes only three minutes.

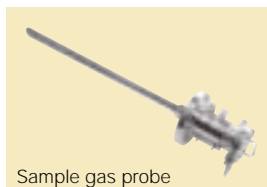


# offers options for a variety of uses, all based on HORIBA

## Sampling sections

The ENDA-5000 series's 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



- An innovative dehumidifying system minimizes loss of soluble components.
- A mist catcher in the sample flow path removes  $\text{SO}_3$  and prevents damage and line blockage.
- Long-lasting, low-temperature ( $180^\circ\text{C}$ )  $\text{NO}_2 \rightarrow \text{NO}$  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



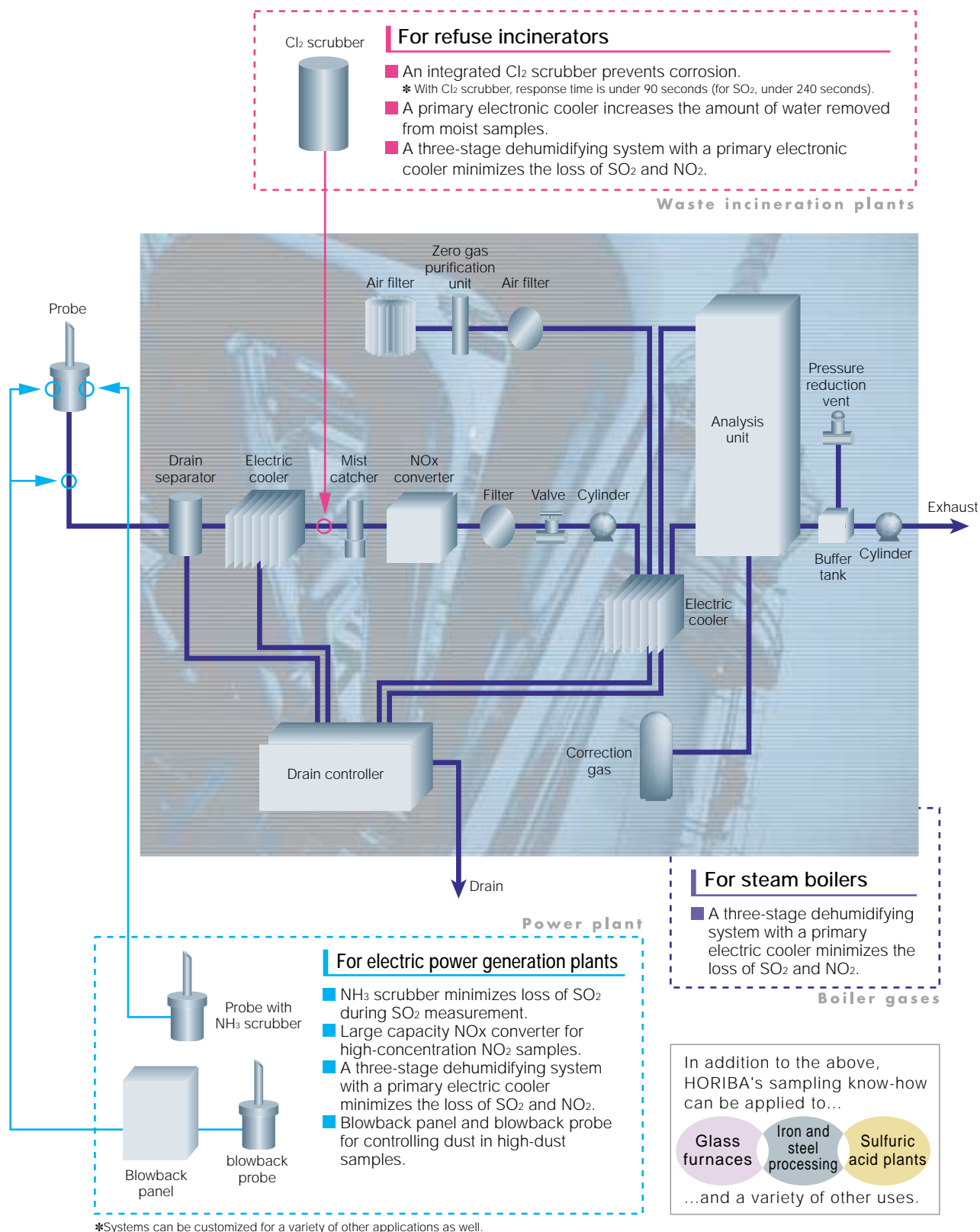
In the past, a large blowback panel was necessary to control dust when measuring high-dust gas samples. HORIBA has used its innovative technology to reduce the size of the blowback panel by almost 25% (to 350 [W] x 550 [H] x 180 [D] mm). The panel is also lighter, and can be mounted on a wall. The new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



HORIBA has a great reputation and over 30 years in the stack-gas analysis field. We will be happy to tailor the sampling section and options of the ENDA-5000 system to suit your particular needs. We look forward to answering your questions about everything from installation to full-time use.



# 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 is mixed with a reference gas in a single sample cell. 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 systems output the difference between the measured gas and the reference gas each time measurement occurs (once a second), the zero point is extremely stable.

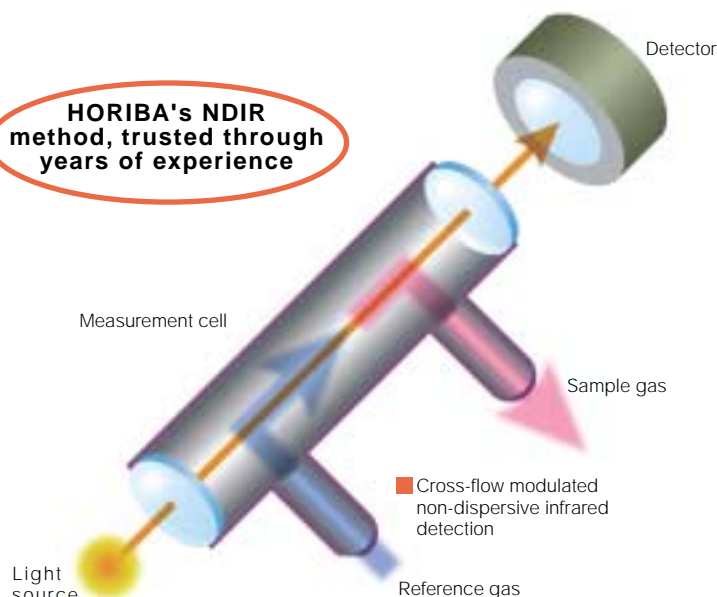
#### 3 Continuous cleaning keeps the cell clean

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.

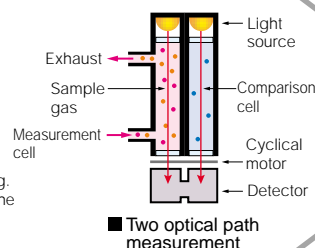
**HORIBA's NDIR method, trusted through years of experience**



#### (Dual optical path comparison)

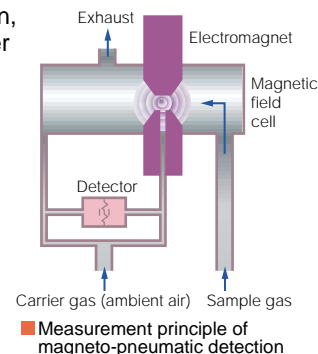
The sample gas and reference gas are each put in a different cell for measurement.

- 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.



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

The ENDA-5000 series uses 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.



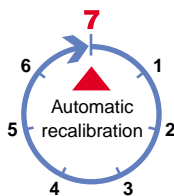
■ Continuous correction is provided by a sensor that is designed to detect CO<sub>2</sub> interference during NO<sub>x</sub> measurement.

■ 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.

## Specifications

Model	ENDA-5000				
Component	NOx	SO <sub>2</sub>	CO	CO <sub>2</sub>	O <sub>2</sub> *1
Measurement methods	NDIR	NDIR	NDIR	NDIR	Magneto-pneumatic detection
Range*2	Standard	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°)				
Response time *3	Within 60 seconds (Td + T90 from equipment intake area) (sample flow 0.6 L/min.) (within 240 seconds for SO <sub>2</sub> only)				
Overall interference from co-existing gases	± 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 ) *4			
	Humidity	85% 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 *5	NO: 500 ppm or less; NO <sub>2</sub> : 15 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% volume or less; H <sub>2</sub> O: 40% volume or less			
Sampling method	Dry sampling using an electric cooler				
Sample gas flow	2.5 L/min~3.0 L/min				
Sample inlet tube	Teflon 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 collection point filter	Flange: JIS 10K, 40 AFF; Sample probe tube length: 1000 mm; Material: SUS-316 stainless steel; 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 300 (D) mm (high pressure gas cylinders, 3.4 L cylinders, maximum of 3 cylinders): About 200 kg (not including cylinders)				
Materials in contact with sample gas	SUS-316 stainless steel, SUS-304 stainless steel, Teflon, 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: No carrier gas cylinder is required.

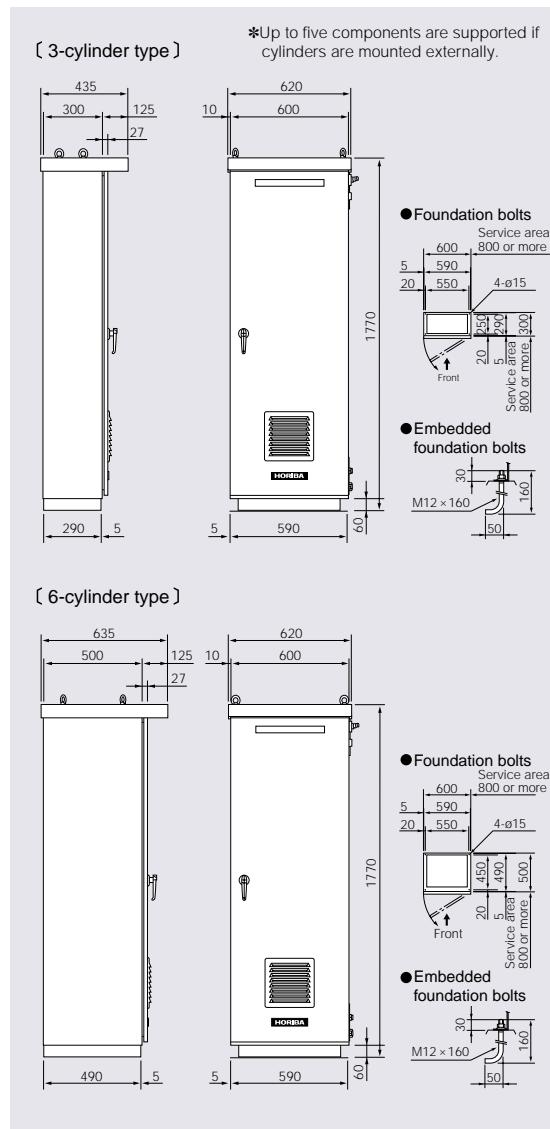
\*2: Up to two ranges are supported for each component.

\*3: Response time may vary depending on the sampling system composition.

\*4: Support is available for -15 to 40°C (cold-climate version) and 5 to 50°C.

\*5: An NH<sub>3</sub> scrubber is available as an option for cases where a combined gas includes NH<sub>3</sub>. SO<sub>2</sub> measurement corrected for CH<sub>4</sub> interference is available for cases where there is CH<sub>4</sub> in the sample gas for SO<sub>2</sub> measurement. CO measurement corrected for N<sub>2</sub>O interference is available for cases where there is N<sub>2</sub>O in the sample gas for CO measurement.

## Dimensions (unit: mm)



*Horiba continues to contribute to the preservation of the global environment through analysis and measuring technology.*



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

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