Dioxin Sampler

HV-1000R（Dioxin）

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- History and Regulation of Dioxins issue in Japan
- Related products

Ⅰ .*About HV-1000R*

An earlier model is on the manual because of the revision just before it was discontinued. The successor is the same basic performance and better in use.

HV-1000F

HV-1000R

HV-1000R Main specifications

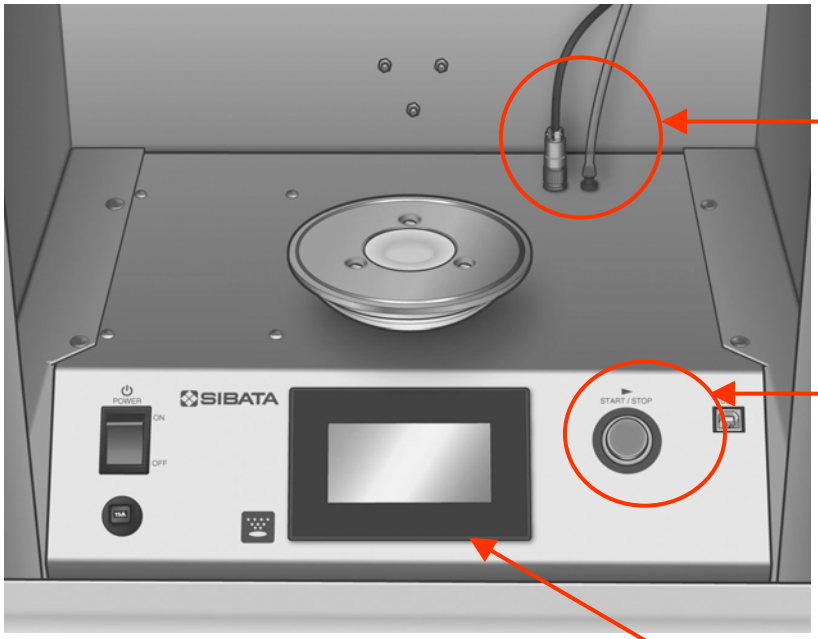
Item Code	080130-23	080130-22	080130-098
Model	HV-700R(for dioxins)	HV-1000R(for dioxins)	HV-1000F(for dioxins)
Configurable Flow Rate Range	100～700L/min	500～1200L/min	300～1200L/min
Accuracy of Constant Flow Rate	Within ±5% of the set flow rate		
Flow Rate Detection	Differential pressure detection method		
Flow Rate Correction Function	1 atm at 20/1 atm at 25/Actual Flow Rate		1 atm at 20/1 atm at 25
temperature sensor	semiconductor sensor		–
Atmospheric pressure sensor	silicon		–
Suction Pump	Brushless blower		
Screen	Touch panel LCD(backlit)		LED 5 digits
Recording Function	The past 5 sampling results can be checked		–
Recording Item	Calibration time/ Cumulative rate/ Cumulative flow rate/ Configurable flow rate/Average flow rate/ atmospheric pressure/ Temprature/ Error		–
Error Item	Power error/Flow rate error/Temperature error/Pressure error/Blower error		–
Operating Temperature Range	0～40℃		
Leak Check	Leak check mode		–
Remedy for power failure	After the recovery of a power failure, the opearting state before the power failure is continuied		
Usage conditions/ Weight	575(W)×575(D)×1420(H) / Approx. 31kg		
Accessories	Shuttle tube, 1; filter case, 1; Qualtz fiber filters, 10; polyurethane foam, 10		

HV-1000R　Outside

Fold up design

HV-F series (Discontinued)

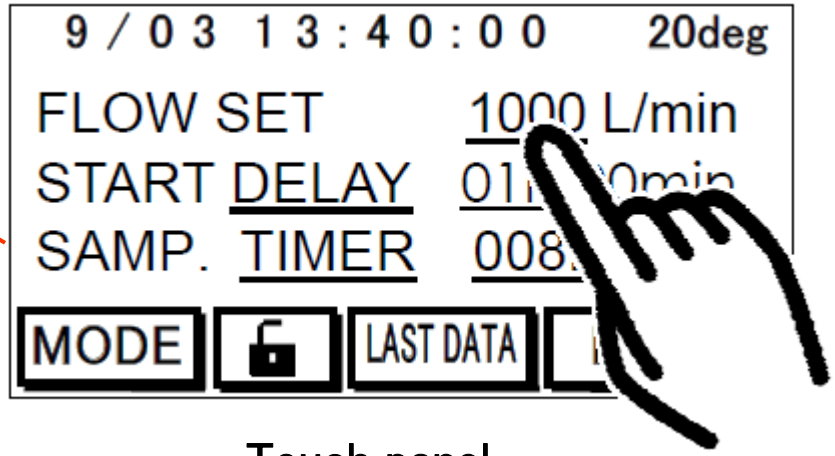
HV-1000R Control Panel



Atmospheric pressure sensor tube

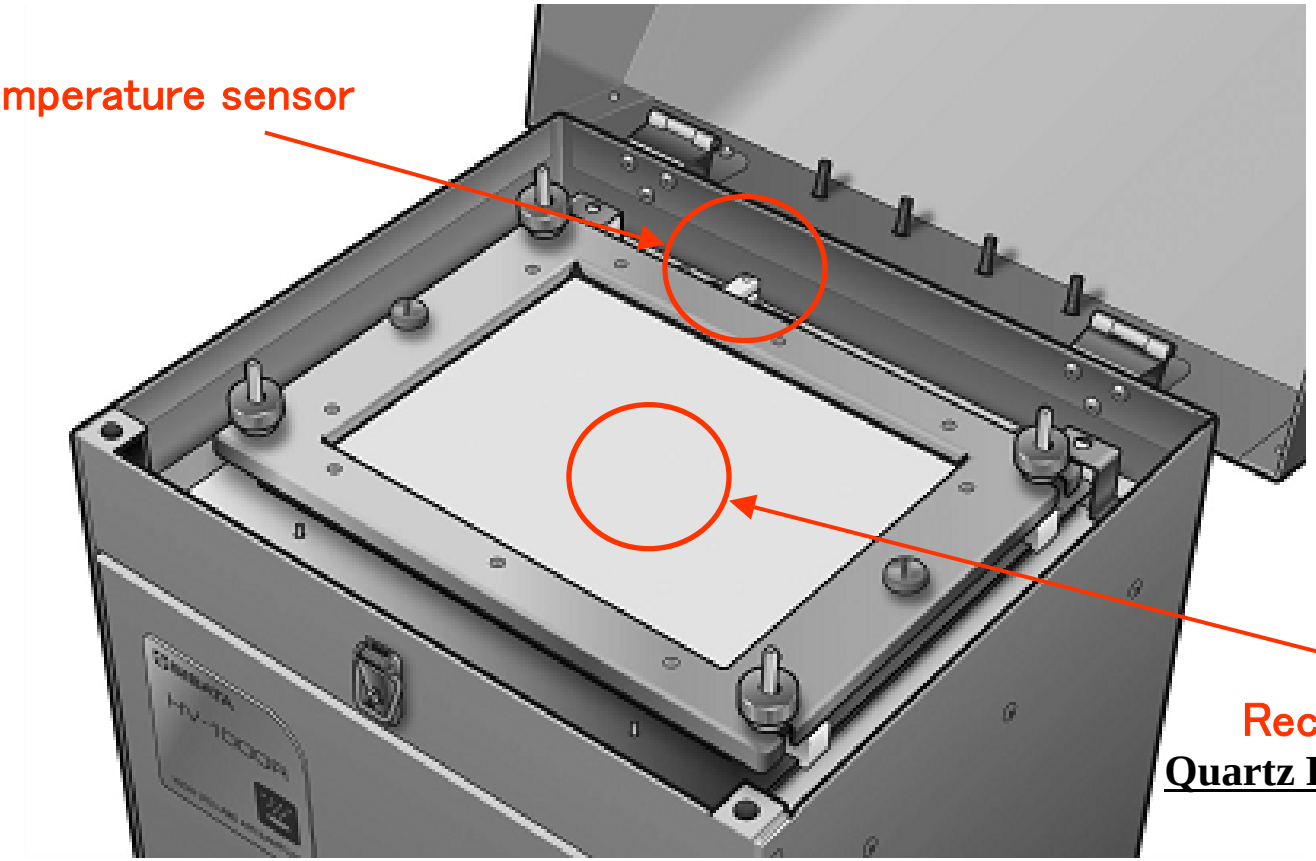
Temperature sensor connector

Start/Stop button

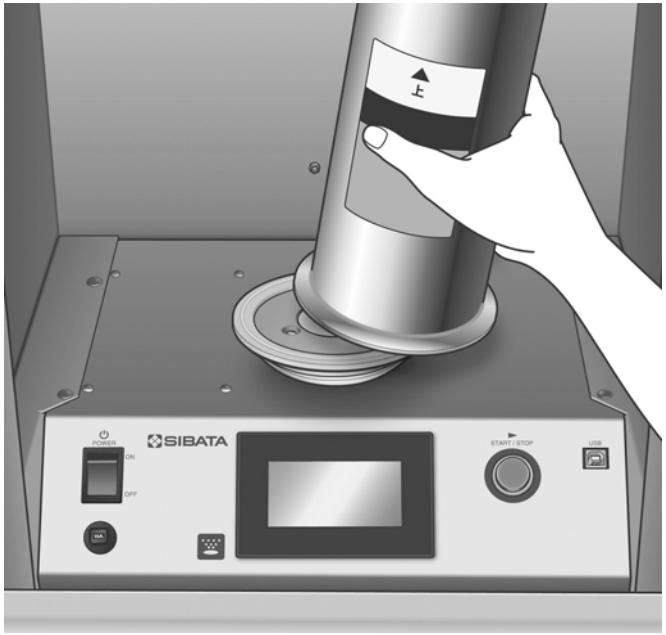


Touch panel

HV-1000R Filter



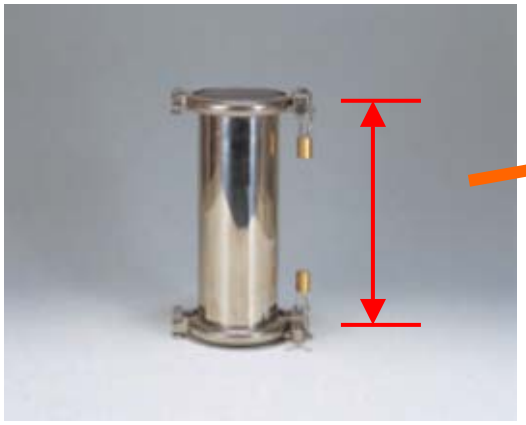
HV-1000R Shuttle tube



Polyurethane foam (PUF) : 8.4 cm Dia., 5 cm thick.

How to carry and preserve samples

Short Holder



The height is 3／4 of the shuttle tube.

Short Holder

Ⅱ. Feature of HV-1000R

Dimension and outside

HV-1000R

575(D)×575(W)×1420(H)mm

HV-1000R Folded up

575(D)×575(W)×960(H)mm

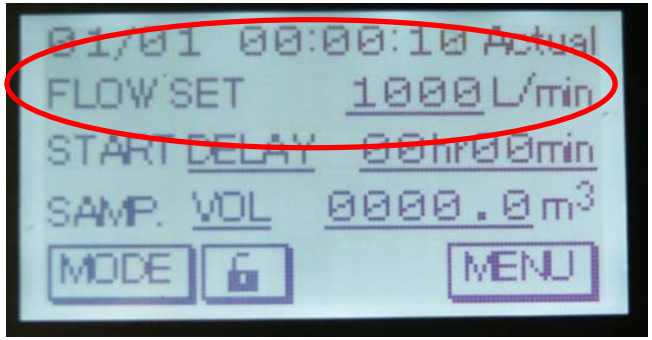
Flow rate range and the setting

HV-1000R

500～1200L/min

To sample 1000m^3 :

1000L/min × 17 hours

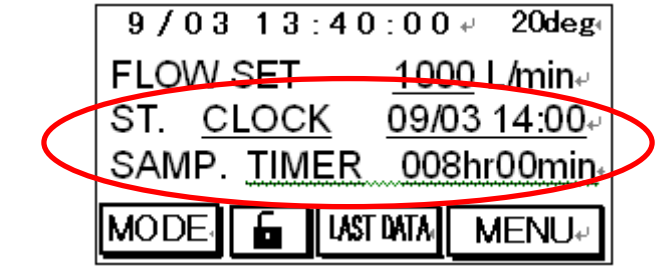


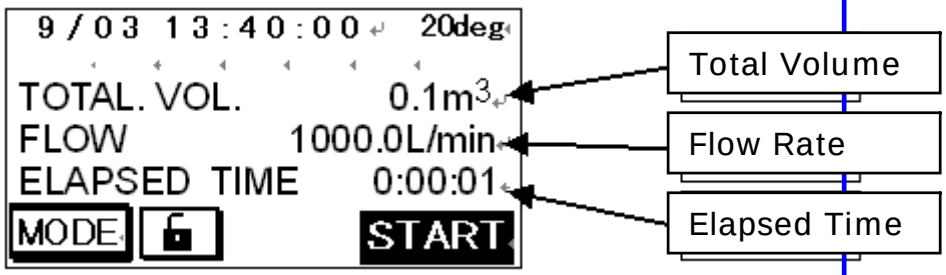
Set the flow rate by touching the panel directly.

Time setting and elapsed time

HV-1000R

Set the start and sampling time.



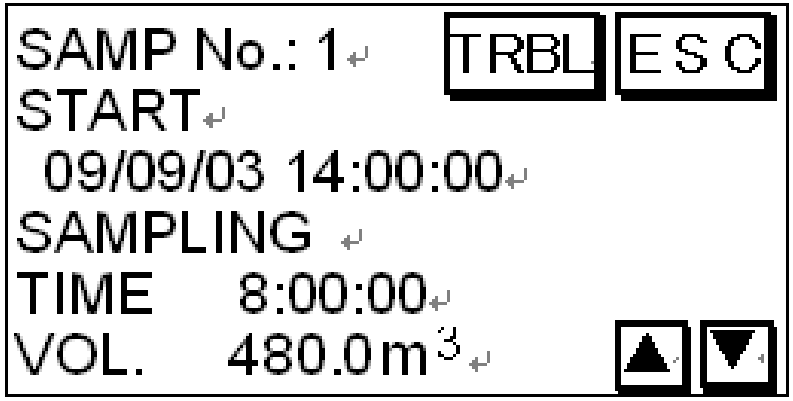


Total volume and flow and elapsed time are displayed on a touch panel.

Flow collection of 1 atm at 25 ℃

HV-1000R

Instantaneous and cumulative flow rate values collected automatically are displayed digitally.



Ⅲ. Features of HV-1000R

- Features

①Recording function of sampling data

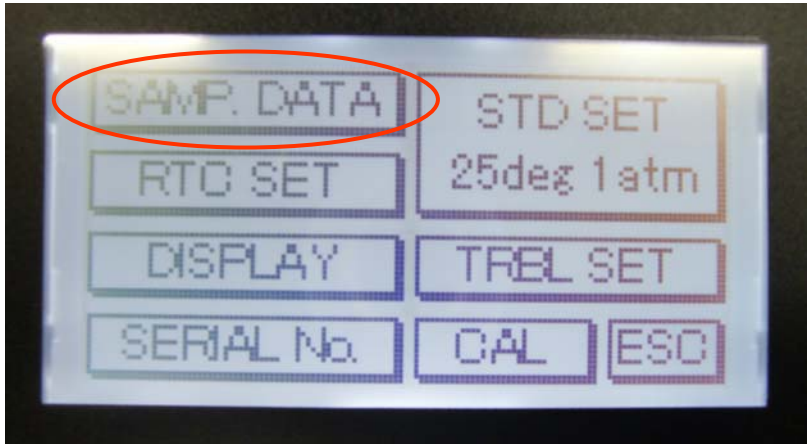
②Automatic restoration mechanism from power outage

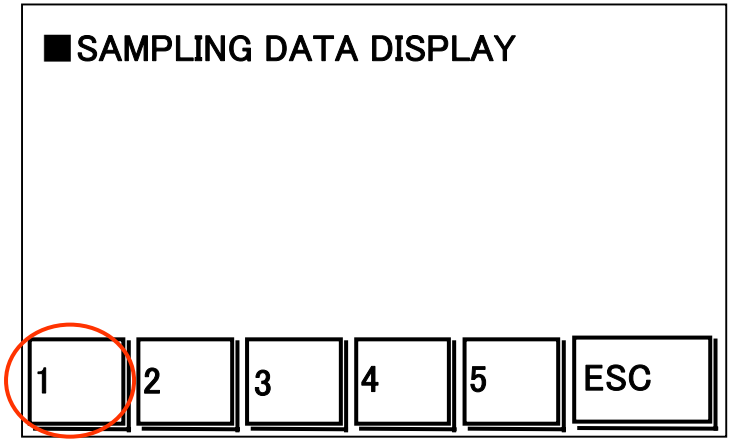
③Mounted temperature & pressure sensor

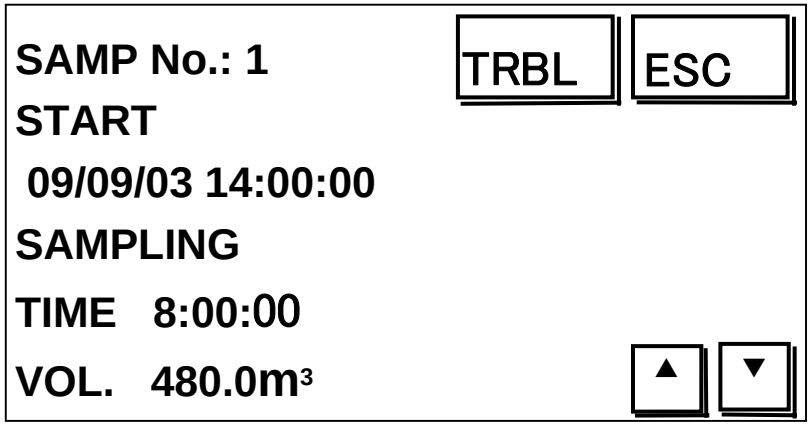
④Sampling with accurate flow rate

Feature ① Recording function of sampling data

- It can review previous 5 times sampling data



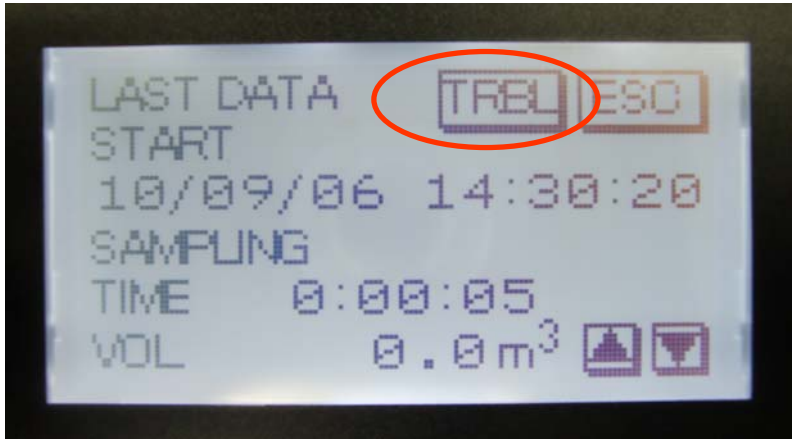


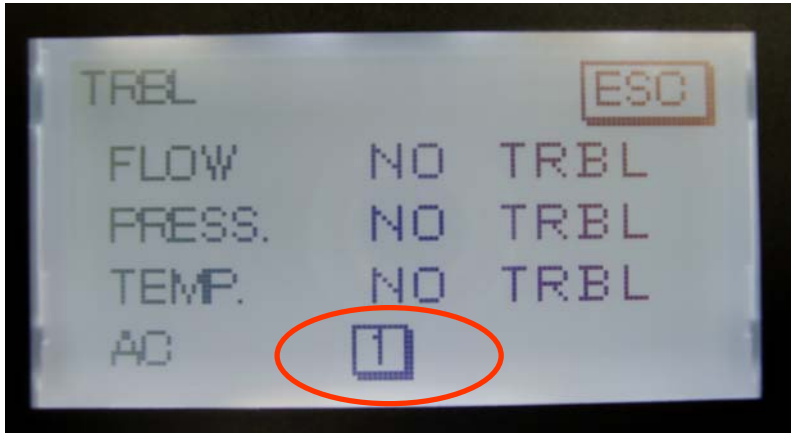


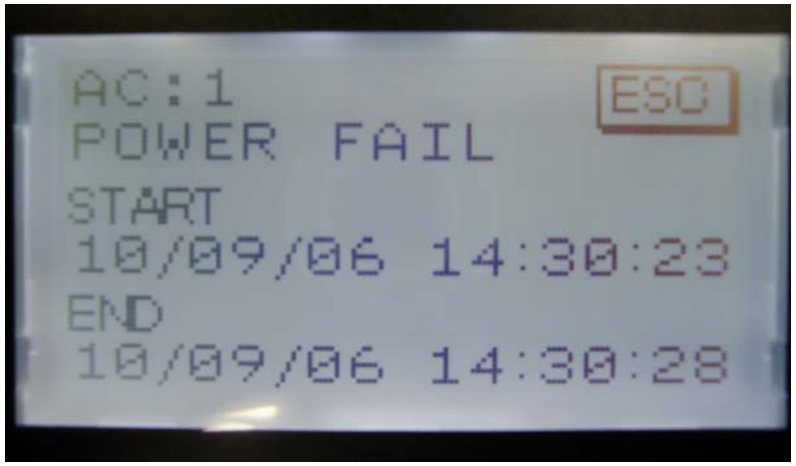
Recording Item
- * Sampling start time
- * Sampling time
- * Cumulative flow volume
- * Setting flow rate
- * Average flow rate
- * Flow rate correction method
- * Atmospheric pressure (Max., Min., Ave.)
- * Atmospheric temperature(Max., Min., Ave.)
- * Error status

～Recording function of error Item～

- It can view detailed error information







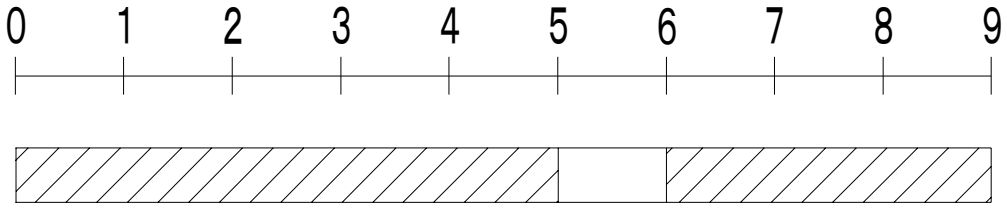
Recording item

Flow rate, Suction pressure,
Temperature, Power
(Last 5 errors are logged)
Blower(Blower error has occurred)

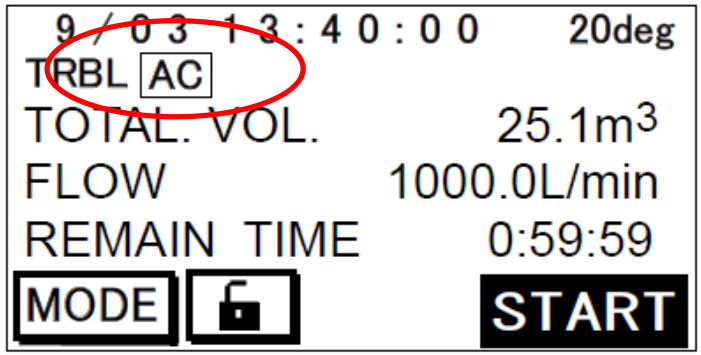
Features ② Automatic restoration mechanism from power outage

- If a power outage occurs during operation, the product will turn OFF and stop operating. However, the remaining sampling will be continued after power is restored.

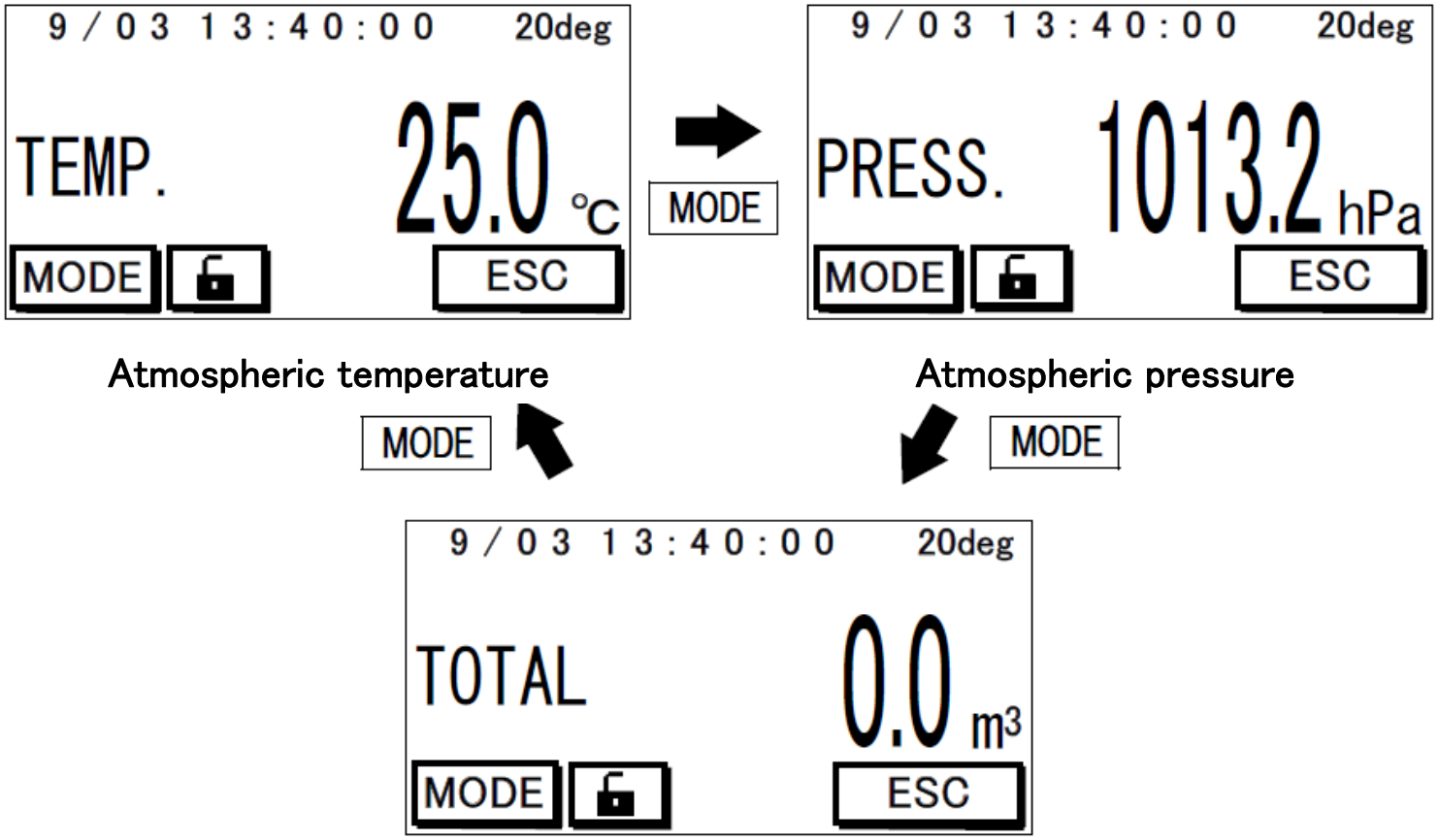
E.g.) If an 8 hours sampling period has been set, and a 1 hour power outage occurring during this time, sampling will be delayed by 1 hour, but the full 8 hours of sampling will be completed. (In this case, sampling will finish 9 hours after it started.)



1 hour power outage



Features ③ Mounted temperature, pressure sensor



Cumulative flow volume for the most recent operating period

*The system returns to this screen after operations are completed.

Features ④ Sampling with accurate flow rate

- HV-R series find a Flow Rate with measuring a Differential Pressure by high precision cylindrical sensors.

  * Method of US EPA

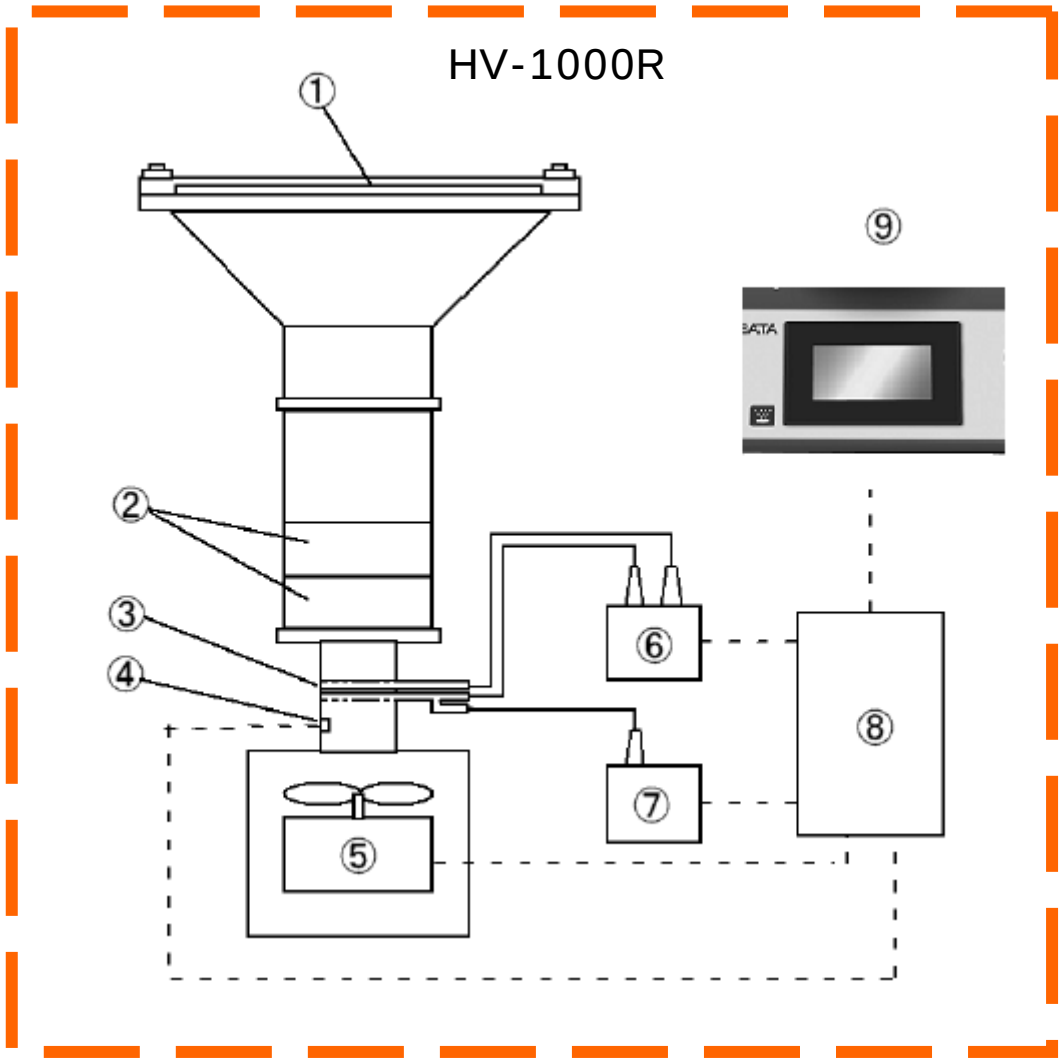
- HV-R series correct the Flow Rate automatically depend on Temp. & Atmospheric Pressure at the site.

  * Flow rate is changed by temperature and atmospheric pressure.

- HV-R series correct the Flow Rate automatically depend on Suction Pressure.

  * Prevent the decreased flow rate by clogged filter

Constant Flow Rate System



Configuration Diagram of Constant Flow Rate System

①Filter

②Polyurethane Form

③Flow Rate detecting part

④Temp. Sensor

⑤Blower

⑥Pressure sensor (Differential Pressure)

⑦Pressure sensor(Atmospheric & Suction Pressure)

⑧Constant Flow Rate Control Circuit

⑨Control Panel

Constant Flow Rate Control System & Correction System for Temp. and Atmospheric Pressure

- Accurate Flow ＝ Precise Concentration!
  - Constant Flow Rate Control System

    −200.0hPa(Gage pressure when the atmospheric pressure is 1013.25hPa)

    Maintain a setting flow rate

  - Integrated Flow Volume System

    Setting Flow Rate × Sampling Time＝Total Sampling Volume ×

    Integrated Instantaneous Flow Rate＝Total Sampling Volume ○

  - Correction System for Temp. & Atmospheric Pressure

Difference in 10℃ leads to the error of 3%.

Difference in 50hPa leads to the error of 5%.

Stuck dust on a filter will change the flow rate.

Instantaneous Flow Rate × Sampling time ≠ Total Sampling Volume

Ⅳ.Calibration method

*Flow rate

*Temperature

*Atmospheric pressure

Standard flow meter for daily management

- Orifice flow meter, OF-1S
- Feature
  - Range of flow
    :20～1200L/min
  - OF-1S:for HV-700F、

Attached 3 type of orifice.
It is possible to change to 1S and 1C by changing the adaptor.

Calibration of Orifice flow meter

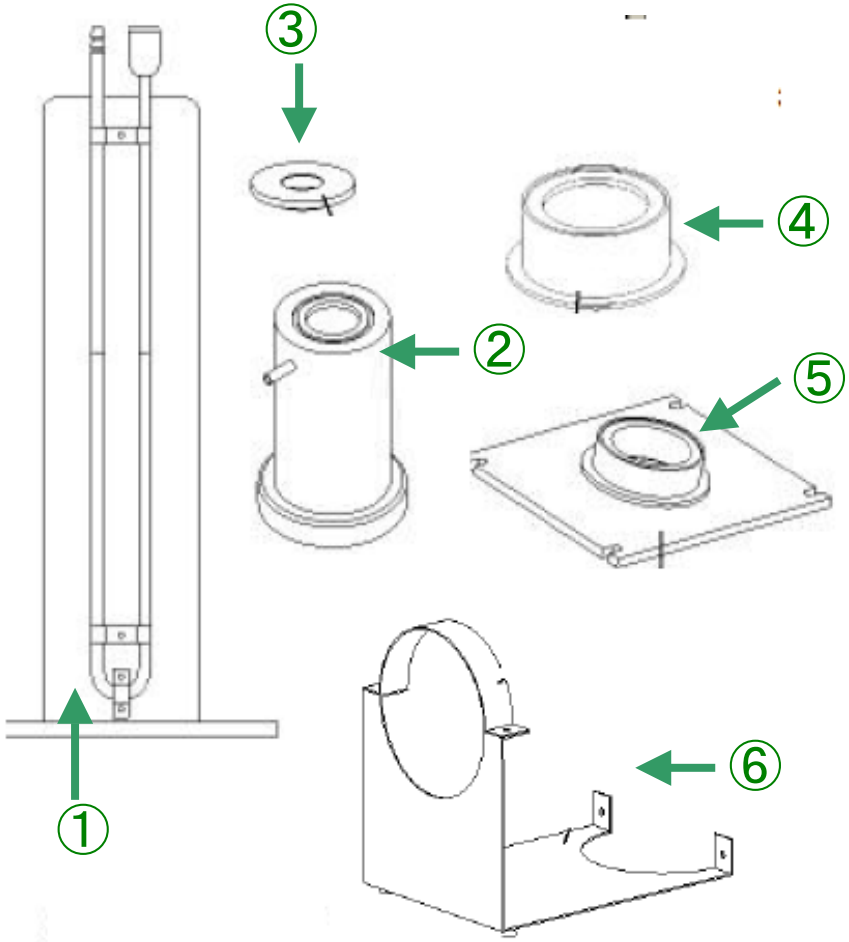
- We calibrate orifice flow meter using the traced roots meter for a national standard.

Orifice flow meter

Calibration System in SIBATA

Composition of Orifice flow meter

① Manometer
② Main body
③ Orifice(3 kinds)
④ Round type adaptor (for model OF-1C)
⑤ Square type adaptor (for model OF-1S)
⑥ L type stand
(for model OF-1C)



Mounting instruction to HV-1000R

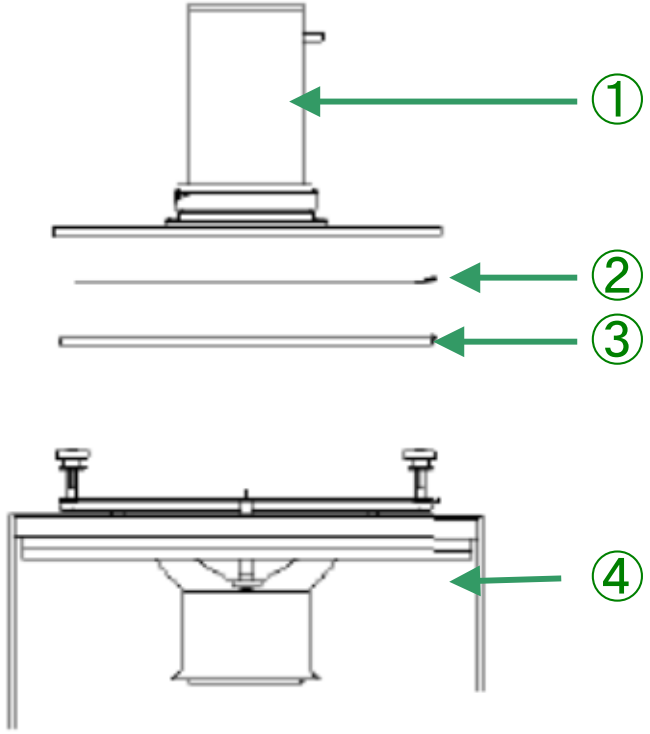
- Name of part

① OF－1S main body

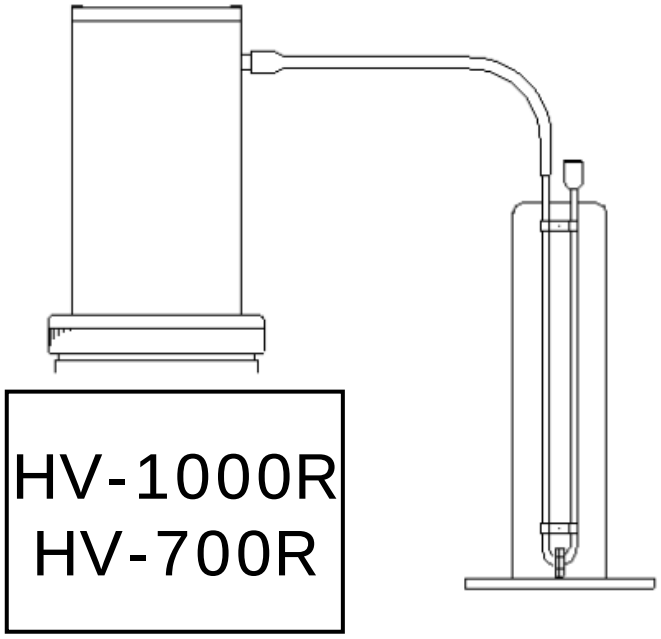
② Filter paper

③ Filter support

④ HV－700F



Calibration method of HV.

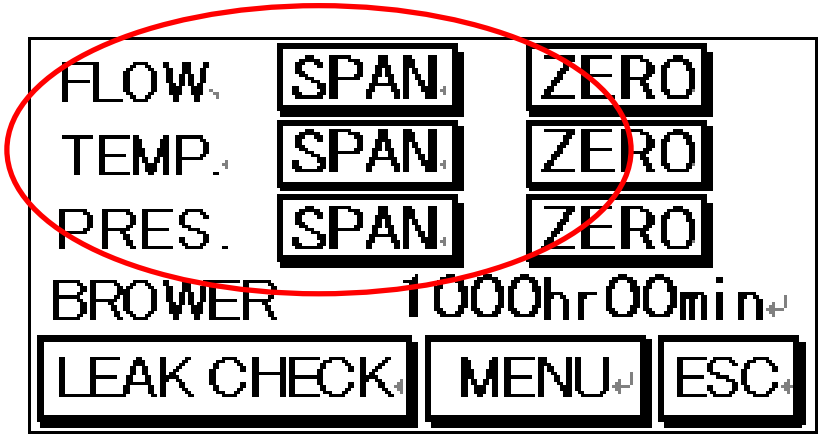


※ It is one pint calibration.
Please set the operating flow rate for calibrate and maintenance.

1. Set the HV flow span value to 1.00.
2. Operate the HV by desired flow rate.
3. Calculate Actual flow volume from the reading of orifice flow meter and flow calibration sheet.
4. To get span value, divide the Actual flow volume and setting flow rate of HV.
5. Put in the span value to HV.

Calibration mode screen of HV-1000R

Flow rate, Temperature, and Atmospheric pressure can be calibrated by entering Span Value which is provided by comparing with standard instruments.



Summary

- HV-1000R is compliant with Japan, Taiwan Dioxins Sampling Manual.
- HV-1000R is High Volume Dioxin Sampler.
- HV-1000R provides a high accuracy flow rate, which is calculated automatically with temperature & atmospheric pressure correction.
- SIBATA Orifice Flow Meter is traceable to National Standard.

Ⅴ. Dioxins Sampling Method of Japan

Dioxins Sampling in Ambient Air

- Method
  - High Volume Air Sampler with a filter and urethane form
- Measurement Site
  - Outdoor（All-weather sampler）
- Polyurethane Form
  - Polyether Type、Density：0.016g/cm3、

    Size：Dia. 9～10cm、Thickness：5cm
- Filter
  - Size：Approx. 20×25cm、Quartz Fiber Filter

Dioxins Sampling in Ambient Air

- Sampling Condition
  - 24 hours Sampling

    24 hours at 700L/min

    ＝1,008m3
  - 1 week Sampling

    7 days at 100L/min or

    24 hours at 700L/min×7 times

    ＝ 1,008m3

※1 week Sampling is the favored and prevailed method now in Japan

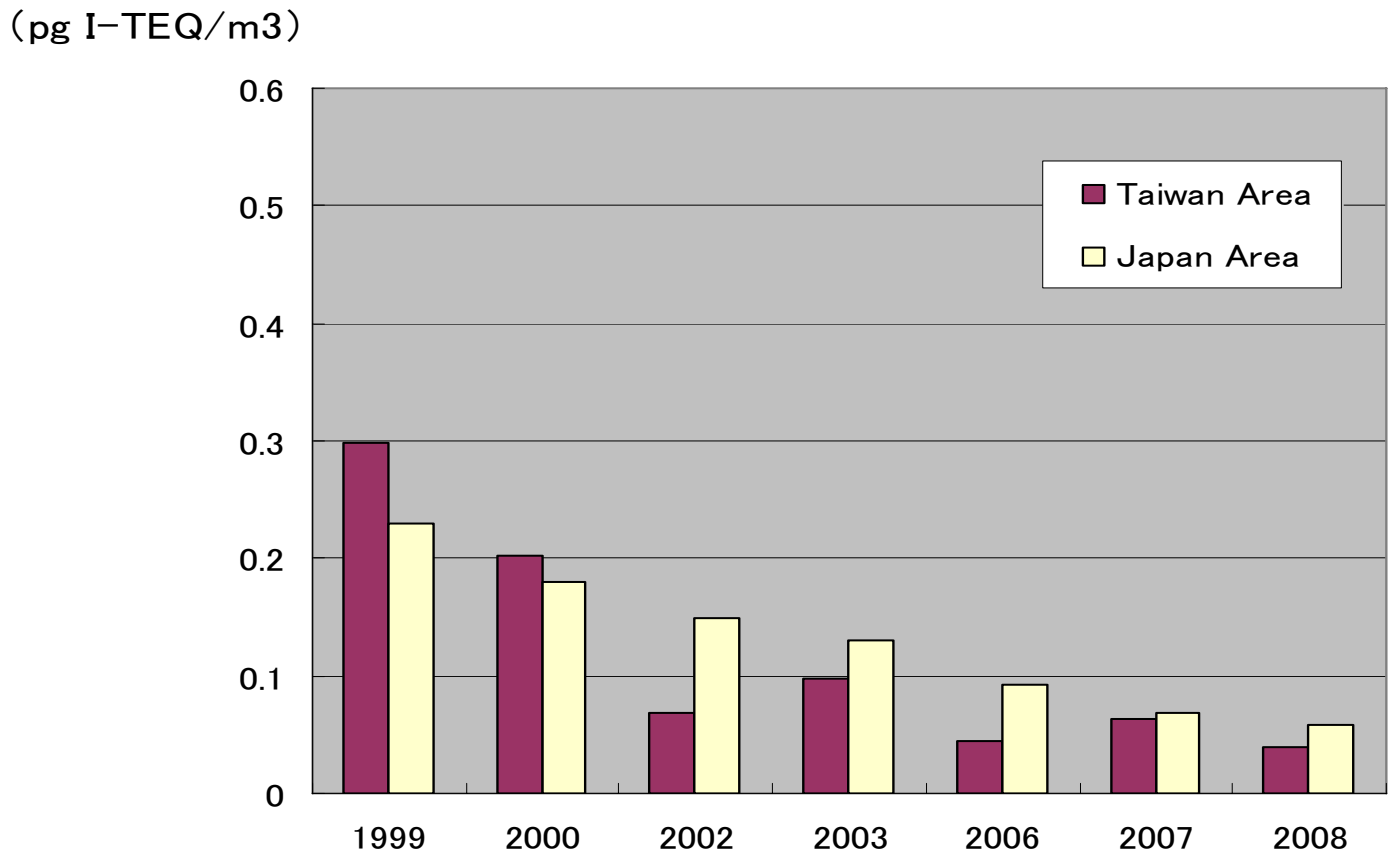
HV-700R

Flow rate:100L/min～700L/min

Dioxins Sampling Method of Taiwan and Japan

	Taiwan	Japan
Sampling flow rate	類型Ⅰ：225L/min 類型Ⅱ：100～1000L/min	①100L/min ②700L/min
Sampling time	More than 24 hours	①7 days running ②24 hours×7 times
Integrated flow rate	Less than 2300m^3	More than 1000m^3
Attainment value	－	0.6(pg-TEQ/m3)

The Trend of Concentration of Dioxin in Ambient Air



Sampling method for Dioxin

- How the Japanese Sampling Method should be?
  - Dioxin analysis will be a microanalysis. 1000m^3 and more sampling volume will be needed considering an analytical limit.
  - Set 24 hours as a sampling time and understand an one-day concentration in Environment. It makes easy to do a comparative evaluation and to consider a countermeasure.
    - Set 700L/min in order to sample 1000m^3 and more in 24 hours.
    - 7 days continuous sampling is also done to understand an average concentration in longer period.

- Dioxin concentration in Taiwan and Japan are in the same range. The climate and daily habit are also similar, and Japanese method may fit to Taiwan environment.

History and Regulation of Dioxins issue in Japan

History and Regulation of Dioxins issue in Japan

- 1998/4

  The Environment Agency revises the enforcement regulations of the Air Pollution Control Act and reinforces the discharge regulation of dust from waste incinerator.

- 1998/5

  WHO（World Health Organization） changes Dioxins TDI to 1～4pg-TEQ/kg bw/day (including Co-PCB) from 10pg-TEQ/kg bw/day.

- 1999/2

  TV coverage creates the arguments about vegetables from Tokorozawa area polluted by Dioxin.

- 1999/2

  Cabinet meeting of Dioxin control reports the readjustment of TDI and the development of Dioxin control including reinforcing the inspection system.

History and Regulation of Dioxins issue in Japan

- **1999/3**

  The government formulated the Basic Guideline of Dioxin Control Development, which aims to decrease 9% of Dioxins emissions over 1997 within 4 years.

- **1999/6**

  Belgian chicken is reported and formulated import curbs. （caused by feeding stuff which is manufactured by polluted fat.）

- **1999/6**

  The Cabinet Meeting of Dioxin control states that the TDI is 4pg-TEQ/kg bw/day including Co-PCB.

- **1999/7**

  The ruling and opposition parties lay together the Dioxins Special Measures Law, and it becomes law.

History and Regulation of Dioxins issue in Japan

2000/1

「Dioxins Special Measures Law」comes into force. The Environmental Standards are set for air, water and soil, and the emission standards for ambient air and water are set and reinforced.

「Special Measures Law for Dioxins」

1. Purposes (Article 1)

To adjust new framework which contains standards to from the basis of policies, necessary regulations, measures of contaminated soil and so on, in order to protect the people's health with planning to prevent Dioxins from environmental contamination and to remove Dioxins.

History and Regulation of Dioxins issue in Japan

Breakdown

(1) Standards to from the basis of policies concerning Dioxins

(2) Regulations related to exhaust gas and discharged water

(3) Disposal of dust and residue from waste residue

(4) Measures related to contaminated soil（Article 29 to 32）

(5) State program（Article 33）

(6) Duty to investigate and measure the pollution status

1 The pollution status of air, water, and soil need constant monitoring by governor.

2 Companies need measure the exhaust gas, discharged water, and dust from waste incinerator once a year or more, and inform its result to the governor. The governor announce the result.

History and Regulation of Dioxins issue in Japan

- 2001/4

  「Outline of protection measures of Dioxins exposure during operation in waste incineration facility」 is issued. The Occupational Safety and Health regulations are revised partially in order to protect workers, who are engaging in operation and maintenance in waste incineration facility and demolition work of the facility, from exposure and health problems.

Effectiveness of Special Measures Law for Dioxins

1998 2008

		1998	2000	2002	2004	2006	2008
AIR (pg-TEQ/m3)	Average	0.23	0.15	0.093	0.059	0.05	0.036
	range of concentration	0.0～0.96	0.0073～1.0	0.0066～0.72	0.0083～0.55	0.0053～0.40	0.0032～0.26
	Measuring point	458	920	966	892	763	721
River (pg-TEQ/L)	Average	0.5	0.31	0.24	0.22	0.21	0.2
	range of concentration	0.065～13	0.012～48	0.010～2.7	0.0069～4.6	0.014～3.2	0.013～3.0
	Measuring point	204	2,116	2,207	2,057	1,870	1,714
Ground water (pg-TEQ/L)	Average	0.17	0.092	0.066	0.063	0.056	0.048
	range of concentration	0.046～5.5	0.00081～0.89	0.011～2.0	0.0079～3.2	0.013～2.2	0.010～0.038
	Measuring point	188	1,479	1,310	1,101	878	634
Soil (pg-TEQ/g)	Average	6.5	6.9	3.8	3.1	2.6	3.1
	range of concentration	0.0015～61	0～1,200	0～250	0～250	0～330	0～190
	Measuring point	286	3,031	3,300	2,618	1,505	1,073

Need for QC system

Dioxins analysis will be a microanalysis. Especially in ambient air environment, the samples will be small quantities of 1pg-TEQ/m3 and below.

Reliable instruments and Advanced technical experts are needed to assure the result of analysis.

On another front, the reliability of instrument would not last forever, and periodical maintenance and repairs are needed.

To assure that Skill and Instrument reach a certain level, we apply following QC system in Japan.

QC System in Japan

- 【MLAP＝Specified Measurement Laboratory Accreditation Program】

  Jurisdiction：Ministry of Economy, Trade and Industry

  Outline： The Measurement Law was revised for reliability improvement of measurement certification for an extremely small amount of substance (Dioxin, chlordane, DDT, heptachlor), and MLAP was enacted. Updated for 3 years.

  Enacted：April, 2002

  Accreditation organizations：JAB、NITE、JCLA

  Testing method：Documentary examination and field investigation about quality and technology

  Accreditation criterion：Announcement of Ministry of Economy, Trade and Industry No. 77 based on the Measurement Law, article 121, 2.

  「Accreditation criterion of Specified Measurement Laboratory for Dioxins

  ※License to manage a Specified Measurement Laboratory

QC System in Japan

- License of taking the Environment Measurement and Investigation of Dioxins

  Jurisdiction：The Ministry of Environment

  Outline：License to participate a bid, done by the Ministry of Environment, for a contact of investigation including the Environment Measurement of Dioxins.

  Enacted：2001

  Testing organization： The Ministry of Environment

  Testing method：Documentary examination (and field investigation sometimes) about quality and technology

  Criterion：「Guideline of Quality Control concerning the Environment Measurement of Dioxins」

Entries in each QC System

- 【MLAP＝ Specified Measurement Laboratory Accreditation Program 】
  - Produce a record about following items

1. Name of instruments
2. Manufacturer, Model, Serial No., and other identifications
3. Record of pertinence evaluation for the instruments
4. Location
5. Date and result of Calibration and maintenance, and Date of next calibration
6. Identification of Standard material for the calibration
7. Record of maintenance engineering
8. Record of damage, malfunction, conversion, and repairs of instrument
9. Operation period & condition, and management system of instrument

Entries in each QC System

- License of taking the Environment Measurement and Investigation of Dioxins (enacted by the Ministry of Environment)
  - About the measurement instrument, organize them in accordance with the intended use, make sure if these fit for the stated measurement method, Record the manufacture's name, name of item, state of the calibration, and management condition of daily use. When repairs are done, record the details of the repairs with order form.

Other entries about Calibration of Flow Rate

- The Ministry of Environment:
  『Manual for Examining Dioxins in Ambient Air』

- A Flowmeter used for sampling should be calibrated regularly by a prescribed standard flowmeter, and provide Calibration Curve as required.

Related Products

Related SIBATA products for Dioxins Analysis

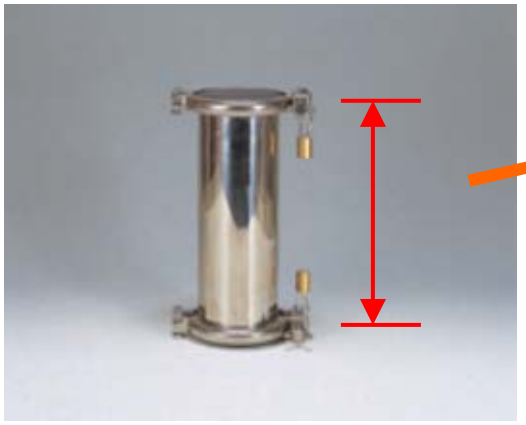
For Concentration

- Chiller for Concentration
  - Supply two Evaporators of coolant
  - Slimline body enables to save lab space.
  - Temp. setting range: −20℃～20℃
  - Generally, set temp. is 40℃ colder than water bath temp. (evaporator).

Cool Water Circulator, Model C-331
:SIBATA

Storing & Carrying samples by Closed Vessels

Urethane Holder, Short Type



Three fourths (3/4) length

Short Type

Pretreatment for Sampling & Analysis

Pretreatment

- Soxhlet Extraction
  - Quartz Filter

  For Sampling：Heating at 600℃

  For Analysis: Soxhlet Extraction, 16～24 hours, by toluene

  - Polyurethane Form

  For Sampling：Soxhlet Extraction, 16～24 hours, by acetone, fully drying at the end

  For Analysis: Soxhlet Extraction, 16～24 hours, by acetone

SIBATA Soxhlet Extraction, Large-size

:SIBATA

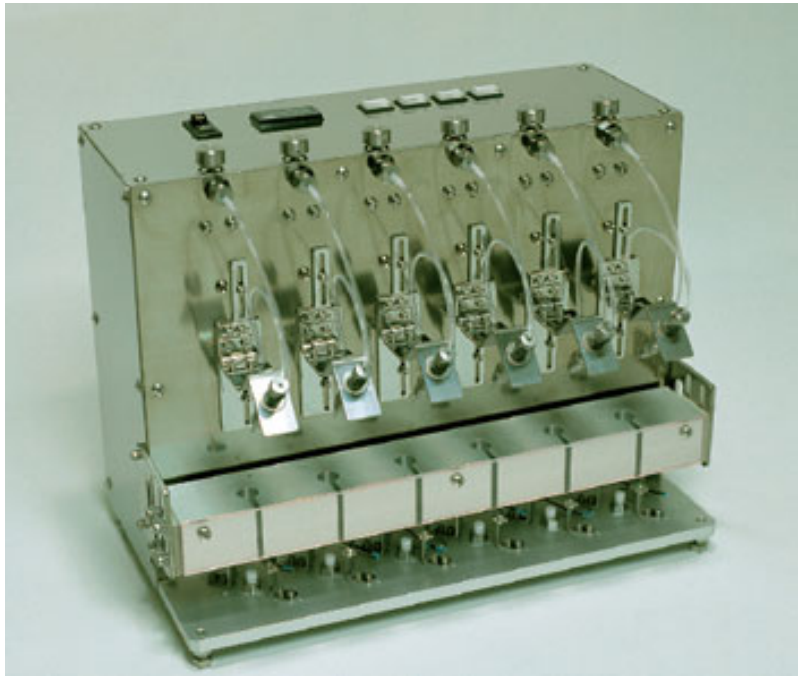
Pretreatment for Analysis

Pretreatment

- Final extraction after Soxhlet
  - After concentrate an extract liquid into approx. 5ml, evaporate most solvent in the concentrated liquid by nitrogen stream.

Automatic Concentrator

- Nitrogen concentration, 6 samples (or 12 samples) simultaneously and individually
- Fluid level sensor prevent evaporating to dryness



Automatic Concentrator, Model ACMD

:SIBATA

Grease for glassware will effect on the measurement

『Grease shall not be used for assembling glassware』

※「 Manual for Examining Dioxins in Ambient Air 」 Section 2, 2　2. 1

- Contamination during the pretreatment after sampling is the one of the factor of possible errors.

  However, we need to use grease to prevent contamination from joints of glassware.

- SPC Joint Glassware

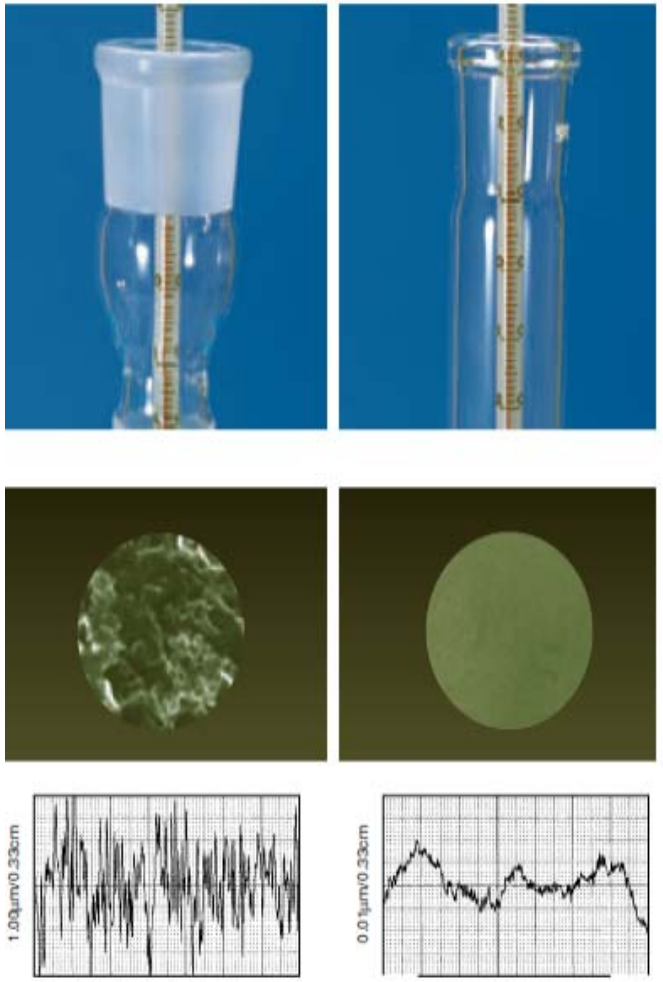
  is widely used for

  Dioxin analysis in Japan.

Grease for glassware will effect on the measurement

- Features of SPC Joint

1. The special processing provide its thick wall and smooth surface.
2. No Grease, High Airtightness, does not stuck in joint easily.
3. Prevent Residual Sample and Contamination from Joint
4. SPC＝SIBATA Precise Clear Joint



Thank you for your attention!