

# **Instruction Manual**

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## **Chamber Scanner System SY-320A/321A**



**IWATSU ELECTRIC CO., LTD.**





# Preface

- ◇ Thank you for purchasing the Chamber Scanner System SY-320A/321A and please regularly use lastingly in future.
- ◇ Please read this manual before using this instrument, then keep the manual handy for future reference.
- ◇ This instruction manual describes operating precautions, operating procedures, and specifications of this instrument (chamber scanner system: SY-320A/321A). For B-H analyzer itself, the remote control software: SY-810, and the chamber, refer to the instruction manual for each.
- ◇ In this manual, the constant temperature chamber is written "chamber".

## Important Safety Precautions

To ensure safe operation of this instrument and to prevent injury to the user or damage to property, read and carefully observe the WARNING  and CAUTION  in the following sections.

### Definition of WARNING and CAUTION used in this manual

 <b>WARNING</b>	Incorrect operation or failure to observe the WARNING may result in death or serious injury.
 <b>CAUTION</b>	Incorrect operation or failure to observe the CAUTION may result in injury or damage to instrument.

### Notices

- ◇ Parts of the contents of this manual may be modified without notice for improvements in specifications and functions.
- ◇ Reproduction or reprinting of the contents of this manual without prior permission from IWATSU is prohibited.
- ◇ If any question about this instrument arises, contact Iwatsu at the address listed at the end of this manual or our sales distributors.
- ◇ For inquiry about options described in this manual, contact IWATSU listed at the end of this manual or our sales distributors.

### Revision History

- ◇ Oct 2014: 1st edition
- ◇ Jul 2015: 2nd edition
- ◇ Aug 2016: 3rd edition
- ◇ Aug 2018: 4th edition

## Read the following safety information.

Read the next page.



### WARNING

- **Never touch the connection cable during excitation; otherwise, an electric shock could occur.**

The measurement POD of the B-H analyzer is connected with this instrument (scanner unit) through the chamber cable SY-910.

If the power amplifier for excitation is used, the maximum voltage or current of it may be applied to the terminal of the measurement terminal base or the sample. To prevent the danger, put the provided POD cover on the POD of the B-H analyzer and close the door of the chamber before starting measurement.

If removal of the POD cover or open of the door is detected, supply of the excitation current is cut immediately and electricity to the sample stops.

- **Do not press the door switch on the chamber intentionally. If touching the inside of it while pressing the switch, an electric shock could occur.**

Intentional press of the door switch is recognized as the door closed, causing supply of the excitation current not to be cut; i.e. very dangerous.

- **Do not use in an environment with explosive gases.**

It may cause an explosion.

- **If you notice smoke, foul odor or abnormal noise, immediately power off this instrument and remove the power plug from the receptacle.**

Continued use under these circumstances may result in an electric shock or fire. Turn off the main power switch (on the right side) of the chamber, turn off the power switch of the scanner unit, remove each power plug from the receptacle and then contact IWATSU or our sales distributors for repair. Do not attempt to repair this instrument yourself.

- **Make sure no water gets on or inside this instrument.**

Do not use this instrument if wet, otherwise an electric shock or fire could occur. If water gets on or inside this instrument, turn off the main power switch (on the right side) of the chamber, turn off the power switch of the scanner unit, remove each power plug from the receptacle and then contact IWATSU or our sales distributors for repair.

- **Do not place this instrument on an unstable support such as shaky base or inclined plane.**

Dropping or falling-down of this instrument could result in an electric shock, injury, or fire. If this instrument is dropped or its cover is broken, turn off the main power switch (on the right side) of the chamber, turn off the power switch of the scanner unit, remove each power plug from the receptacle and then contact IWATSU or our sales distributors for repair.

## Read the following safety information.

Read the next page.



### **WARNING** (continued)

- **Do not expose this instrument to excessive vibration or shock.**

Dropping or falling-down of this instrument could result in injury.

- **An impact by dropping or falling-down of this instrument could result in injury to your body or damage to your property.**

The maximum weight of the chamber is about 135kg for SY-321A and about 85kg for SY-320A. When installing or transporting it, a hand cart should be used as much as possible and 4 persons or more should carry it.

When installing or transporting it by one person or a few people, an injury could occur.

In addition, when installing or transporting it, remove the sample, turn table, cable, and power cord and care should be taken not to drop it.

- **Use 3-Prong power cord.**

If not, an electric shock or fire may occur.

- If power is supplied from the 2-wire receptacle using the 3-Prong/2-Prong conversion adapter, connect the ground terminal of the 3-Prong/2-Prong conversion adapter to the ground.
- If power is supplied from the 3-wire receptacle using the provided 3-Prong power cord, grounding is made by the ground line of the power cord.

- **Always use this instrument with a specified power supply voltage.**

If not, an electric shock, fire, or failure may occur. The range of operating voltage to be used is stated on the rear panel.

Chamber part

Operates with single-phase power supply, 50/60Hz, and 100VAC.

Scanner unit part

Operates with single-phase power supply, 50/60Hz, and 100\_120VAC.

- **Strictly observe items below when handling the power cord.**

If not, an electric shock or fire may occur. If the power cord is damaged, contact IWATSU or our sales distributors for repair.

- Do not modify the power cord.
- Do not forcibly bend the power cord.
- Do not twist the power cord.
- Do not bundle the power cord.
- Do not pull the power cord.
- Do not heat the power cord.
- Do not let the power cord get wet.
- Do not put heavy objects on the power cord.

- **Do not touch the plug of the power cord with wet hands.**

If not, an electric shock may occur.

**Read the following safety information.**

Read the next page.

 **WARNING** (continued)

- **Do not make metal touch the blade of the power plug.**

If not, an electric shock or fire may occur.

- **Do not plug too many leads into a single receptacle.**

If not, a fire or overheating may occur.

- **If thunder sounds, remove the power plug of this instrument from the receptacle and do not use it.**

- **Do not remove the operation panel.**

Since a high-voltage part exists inside, touching it may result in an electric shock. When inspecting, calibrating, repairing this instrument, contact IWATSU or our sales distributors.

- **Do not modify this instrument.**

Modification of it could result in an electric shock, fire, or failure. Repair of a modified instrument may be refused.

- **Do not use this instrument when being failed.**

If not, an electric shock or fire may occur. For a failure, contact IWATSU or our sales distributors for repair.

- **Do not put any metallic material or inflammable object through the ventilation port.**

If any foreign object is put through the ventilation port, an electric shock, fire, or failure may occur. If any foreign object enters this instrument, turn off the main power switch (on the right side) of the chamber, turn off the power switch of the scanner unit, remove each power plug from the receptacle and then contact IWATSU or our sales distributors for repair.

- **Do not put any object near to the exhaust port or ventilation port of this instrument.**

If not, heat accumulates inside this instrument, causing an electric shock, fire, or failure.

- **Before inserting the power plug into the receptacle, confirm no dust attached to it. In addition, remove the power plug and adapter from the receptacle and inspect / clean them once a half year or a year.**

Dust may cause an electric shock, fire, or failure.

**Read the following safety information.**

Read the next page.



**WARNING** (continued)

- **For safety, do not open the door and do not work when the inside of the chamber scanner system is a high temperature.**

Work in a state where the chamber scanner system is a high temperature must cause a burn and never work in such a state.

- **For safety, work by bare-handed in the chamber scanner system.**

There is danger of causing the caught accident in the equipment etc. when working with cotton work gloves etc. Work by bare-handed.

- **For safety, bring neither finger nor the thing close to the turntable drive part (warm gear).**

The finger and the thing are rolled when driving part is moved by mistake and it causes the injury and the accident.

## Read the following safety information.

Read the next page.

### CAUTION

- **Turn off the main power switch (on the right side) of the chamber and turn off the power switch of the scanner unit before connecting or disconnecting the power cord.**

Connecting or disconnecting the power cord while the power switch of each is ON may result in an electric shock or failure.

- **Insert the power plug into the receptacle firmly.**

If not, an electric shock, fire, or failure may occur.

- **When disconnecting the power cord from the receptacle, pull it out by grasping the plug.**

If not, an electric shock or fire may occur.

- **Before moving this instrument, confirm that external connection lines such as the power cord and cables are removed.**

The power cord and cable may be damaged causing a fire or electric shock.

- **Never replace the fuse inside this instrument. Contact IWATSU or our sales distributors for replacement.**

- **Use 3-Prong power cord in accordance with the power supply voltage.**

If not, a fire may occur. In addition, if a 2-Prong power cord is used, a fire may occur.

Unless specified when purchasing this instrument, the power cord suitable for 100V system (center voltage: 100V to 120V) is attached. If the power supply voltage is 200V system (center voltage: 200V to 240V), the slide transformer (power supply voltage conversion) is required. If it is to be purchased, contact the IWATSU sales staffs.

- **Do not open the door of the chamber when the inside of the chamber is less than room temperature.**

The inside of the chamber builds up condensation, and it causes the corrosion of the metal part title. Confirm that the temperature in the chamber is the vicinity of the room temperature when you open the door of the chamber. Wipe off with a promptly dry cloth etc. when the inside of the chamber builds up condensation by any possibility.

- **Do not place any object on this instrument.**

Otherwise, the cover may contact the internal circuits causing an electric shock, fire, or failure.

- **Always use this instrument only within the rated operating range.**

If used over the rated range, a failure may occur. The allowable range is as follows:

- Only indoor use
- Temperature: +5°C to +35°C
- Humidity: 85% RH (+35°C, no dew condensation)

- **Do not expose this instrument to direct sunlight or high humidity.**

If not, heat may accumulate inside this instrument, resulting in a fire.



## Read the following safety information.



### **CAUTION** (continued)

- **Do not place this instrument in a location with excessive moisture or dust.**  
If not, an electric shock or fire may occur.
- **Do not expose this instrument to oil smoke or steam; e.g. beside cooking table or humidifier.**  
A fire or electric shock may occur.
- **Do not use any damaged cable or adaptor.**  
Otherwise, an electric shock or fire may occur.
- **If this instrument will not have been used for a long time, remove the power plug from the receptacle for safety.**
- **When transporting this instrument, remove the sample and the turn table from this instrument and use the packing material provided at the time of purchase or the packing material equivalent at least.**  
Excessive vibration or shock applied to this instrument during transportation may cause it to malfunction, resulting in a fire. The case where a failure or damage occurs when transporting this instrument with the sample or the turn table attached to it **shall not be guaranteed**.  
If there is not a proper packing material/ shock absorber, contact IWATSU or our sales distributors. When having this instrument transported by a shipping company, write "Precision Instrument - Handle With Care" on each side of the packing box.
- **When cleaning this instrument, remove the power plug from the receptacle for safety. Use dry cloth to wipe water drops away.**  
If not, an electric shock or failure may occur.
- **Normally, regular inspection and calibration per year are recommended.**  
If the inside of this instrument will not have been cleaned for a long time, a fire or failure could occur.  
For inspection and calibration, contact IWATSU or our sales distributors.

# Verify packed Items

When receiving this instrument, verify the packed items referring to components below (for the Unpacking chart, see the next page). If there is a lacked item or an item damaged during transportation, immediately contact IWATSU or our sales distributors.

## Components

### Chamber scanner system SY-320A or SY-321A

Chamber (see ① in Unpacking chart) .....	1
Scanner unit (see ① in Unpacking chart) .....	1
Turn table (see ② in Unpacking chart) .....	1

### Accessories

Standard sample (SY-320A: TypeB / SY-321A: TypeC) .....	1
Knob screw .....	1
Nylon washer .....	1
GP-IB cable 408JE-101 .....	1
Chamber cable SY-910 (see ③ in Unpacking chart) .....	1
Power cord (for the scanner unit) .....	1
Cord strap .....	1
Instruction manual (SY-320A/SY-321A) .....	1
Accessories of Espec Corp. chamber .....	1 set

Note 1: The power supply cord of Espec Corp. chamber is put out from the inside of the chamber.

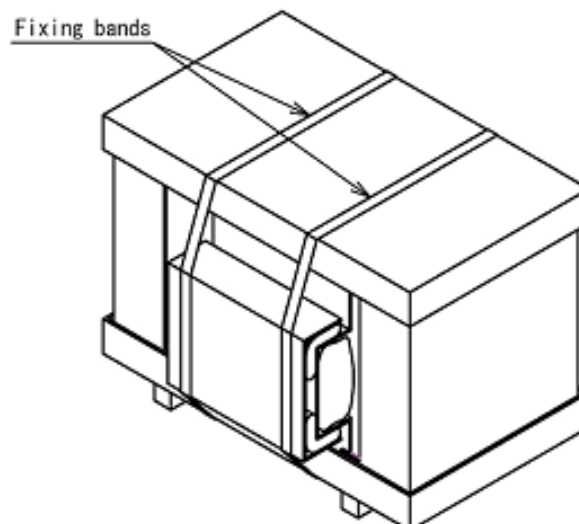
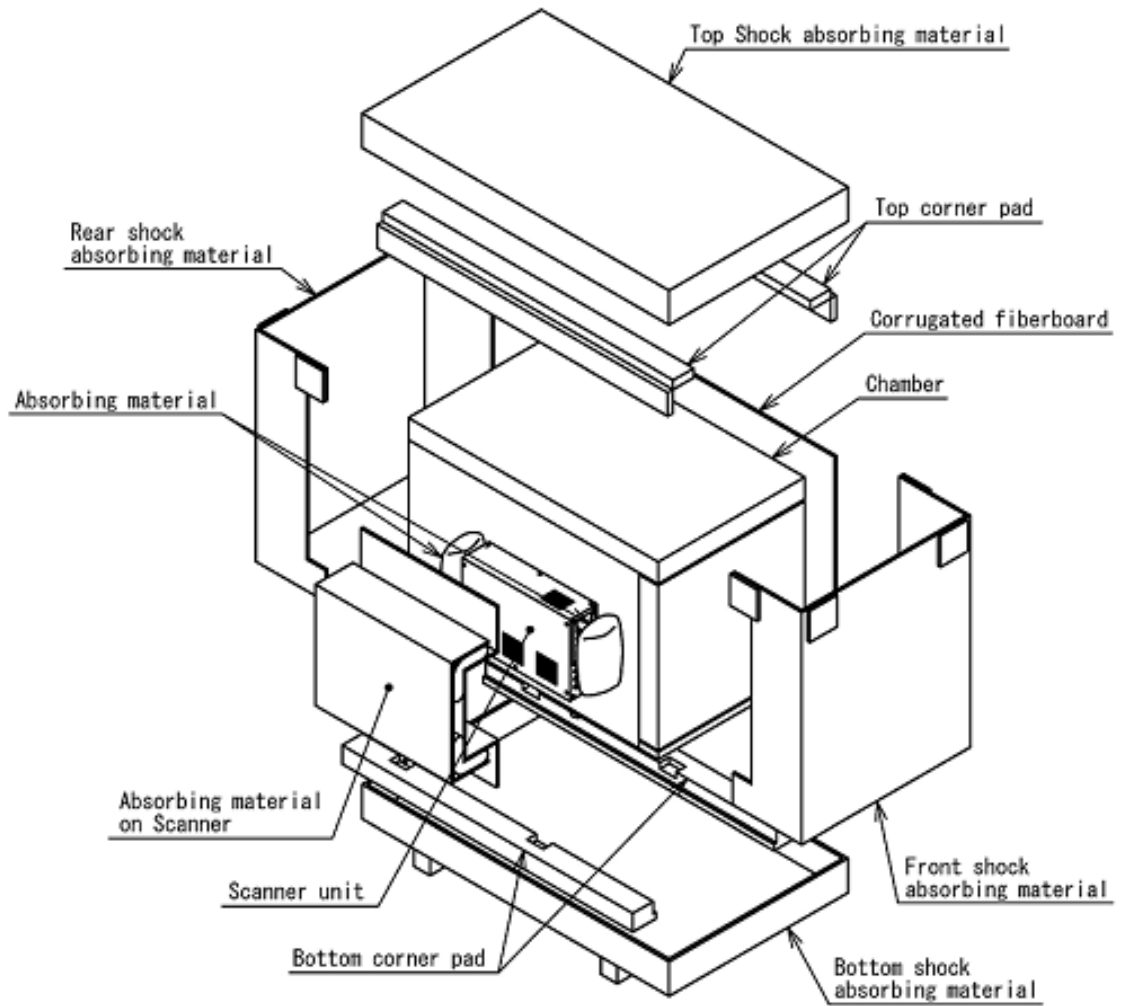
Note 2: ESPEC Corp. chamber includes its instruction manual; therefore for its accessories, see the manual.

Note 3: There are four packing boxes.

- Unpacking chart ① to ③ (See next pages.) : 3 boxes
- For accessories (excluding chamber cable SY-910) : 1 box

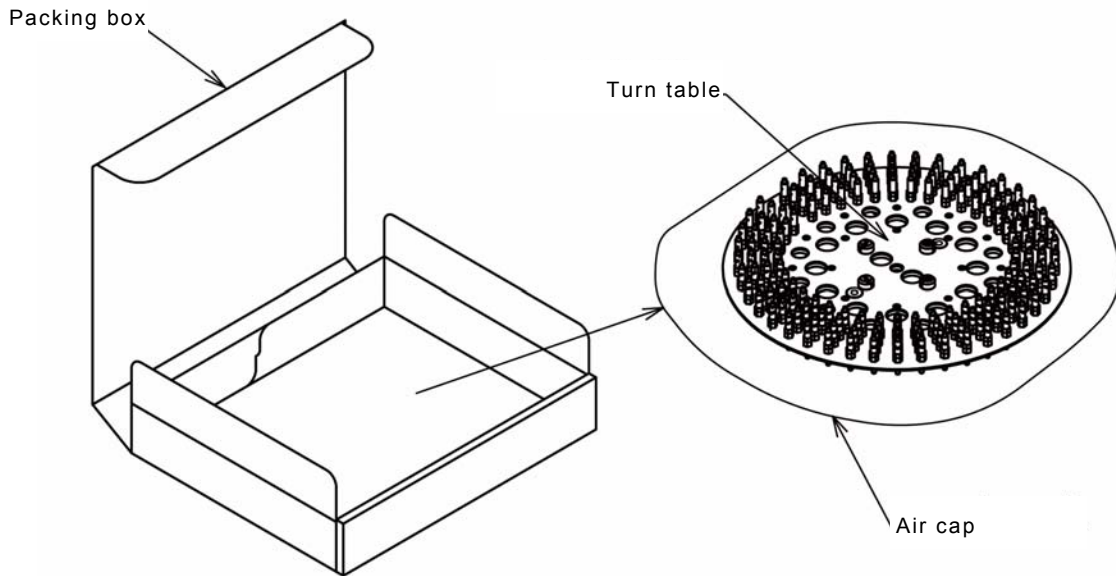
# Unpacking chart

- ① Chamber scanner system
  - Chamber
  - Scanner unit

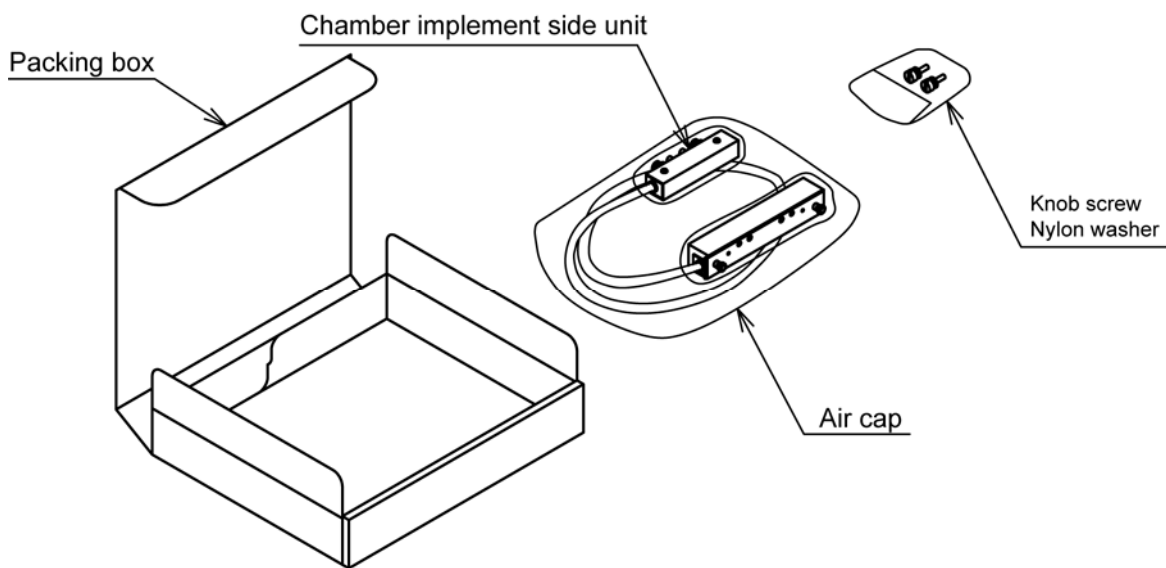


② Chamber scanner system

- Turn table



③ Chamber cable SY-910



## Management of instrument

When disposing of this instrument, it is necessary to recycle or dispose of it properly in accordance with a local law or regulation. When disposing of it, request a recycle company to dispose of it in accordance with a local law or regulation.

## Repair and sending of instrument

If a failure occurs, return this instrument to our service center. Any failure which occurs in the term of guarantee and for which IWATSU is responsible should be repaired without any cost.

When returning a instrument to be repaired, clearly write the instrument name, serial number (in the label on the rear of this instrument), and description of the failure, name, division, and telephone number of the responsible person.

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## Chapter 1 Introduction

This instruction manual describes only the functions of the chamber scanner system SY-320A and SY-321A; i.e. duplication of the standard measurement functions of the B-H analyzer is omitted. For them, refer to the Instruction manual of it.

### ■ 1.1 Outline

- Combination of the chamber scanner system SY-320A or SY-321A with the B-H analyzer, PC, and the remote control software SY-810 allows multiple samples in the chamber to be automatically measured while controlling the chamber and the B-H analyzer.

**Note:** This product does not support the B-H analyzer SY-8232, SY-8217, and SY-8258.

### ■ 1.2 Features

- The chamber scanner system SY-320A or SY-321A has the features below:
  - ① SY-321A can automatically measure up to 41 samples and SY-320A can automatically measure up to 20 samples in the chamber.  
(The remote control software SY-810 separately sold is required.)
  - ② Adoption of the scanner method which allows measurement while rotating the turn table reduces deviation of the parasitic capacitance and inductance which occur outside the sample; i.e. high-accurate measurement can be made.
  - ③ Adoption of the push clamp method connection terminals makes sample connection easy and ensures sure connection.
  - ④ Measurement can be made in the wide range of temperature from  $-30^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$ .

# Chapter 2 Connection of equipments and settings

## 2.1 Connection of equipment

- The following shows connection among measurement equipments including the chamber scanner system.

**Note:** Broken lines show the recommended products which are required separately.

**Note:** The chamber scanner system must be connected and used with the B-H analyzer which is combined and adjusted with it. Even if the other B-H analyzers are connected, the measurement accuracy is not guaranteed.

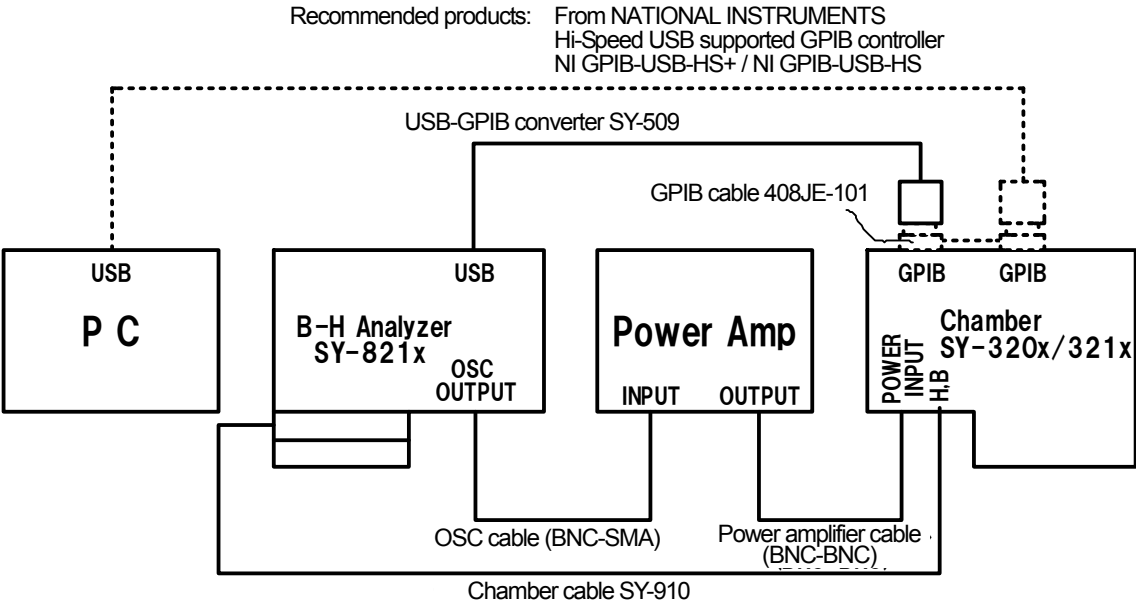


Fig.2-1 Connection of measurement equipment including the chamber scanner system

## ■ 2.2 Names and functions of main parts

- SY-321A is used as an example to describe names and functions of main parts on the chamber scanner system.

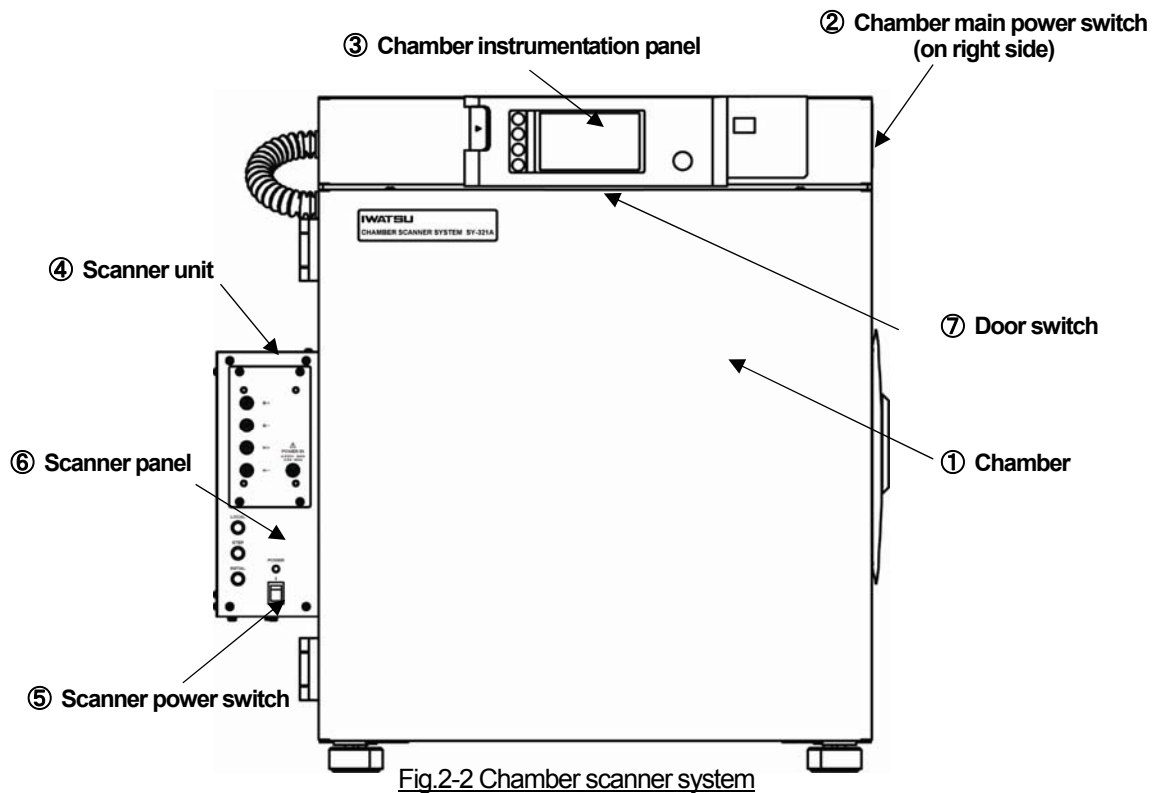


Fig.2-2 Chamber scanner system

### ① Chamber

- It is the chamber with the turn table.

### ② Chamber main power switch

- It is the main power switch of the chamber on the right side of the front.

### ③ Chamber instrumentation panel

- It shows various settings and statuses of the chamber.

### ④ Scanner unit

- It controls the turn table and the measurement system.

### ⑤ Scanner power switch

- It is the main power switch of the scanner unit.

### ⑥ Scanner panel

- It operates the turn table.

### ⑦ Door switch

- It detects open/close status of the door.



## ■ 2.3 Connection of chamber cable SY-910

- The following describes connection of the provided chamber cable SY-910.

- ① Confirm that the B-H analyzer is **powered OFF** surely.
- ② Remove the measurement terminal base from the measurement POD.  
Use the Phillips screwdriver to remove two M3 screws on the terminal base (see Fig.2-3).
- ③ Hold the terminal base knobs with both hands and pull up them (see Fig.2-4).

**Note:** Be sure to keep M3 screws.

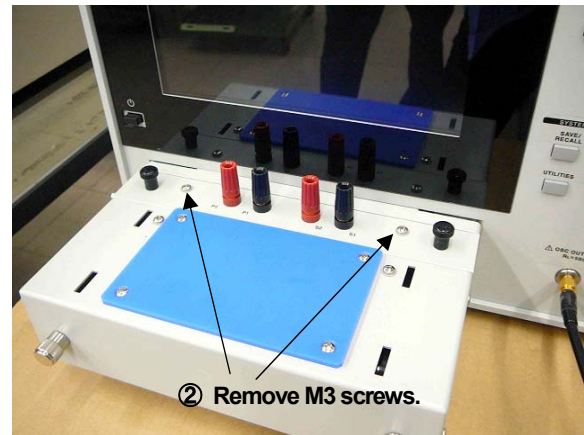


Fig.2-3 Connection of chamber cable

- ④ Install the measurement terminal base of the chamber cable SY-910.

Align the terminal base guide with the measurement POD guide (see Fig.2-5 and 2-6).

Push down the terminal base **slowly** along the guide vertically (see Fig.2-6).

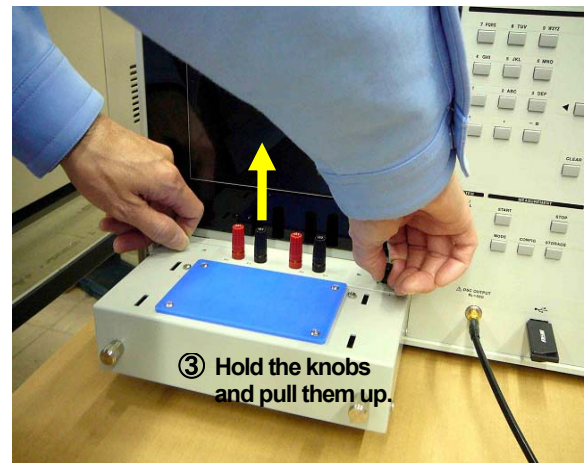


Fig.2-4 Connection of chamber cable

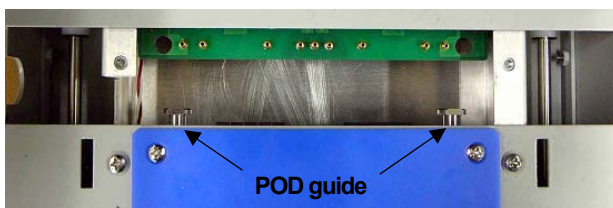


Fig.2-5 Connection of chamber cable

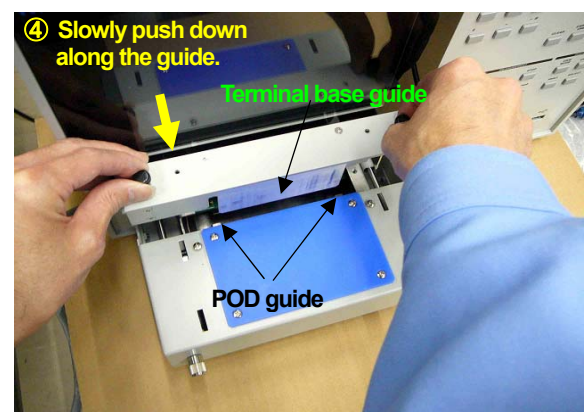


Fig.2-6 Connection of chamber cable

- ⑤ Confirm that the terminal base is surely installed on the measurement POD, and use provided two terminal base screws to fix the terminal base with the measurement POD (see Fig.2-7).
- ⑥ Install the chamber cable SY-910 measurement connector to the scanner unit. Mate four BNC connectors (see Fig 2-8).
- ⑦ Fix the connector by rotating the lever **clockwise** (See Fig.2-9).

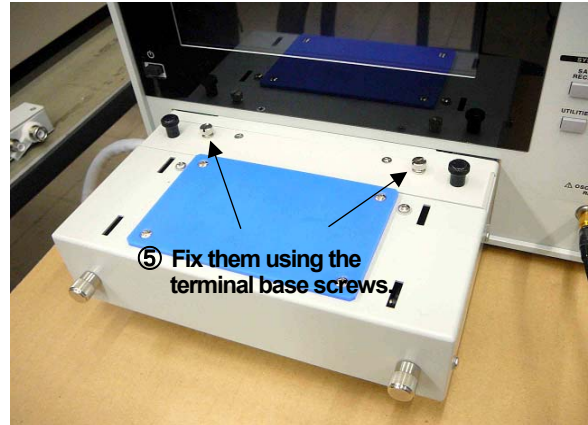


Fig.2-7 Connection of chamber cable



Fig.2-8 Connection of chamber cable

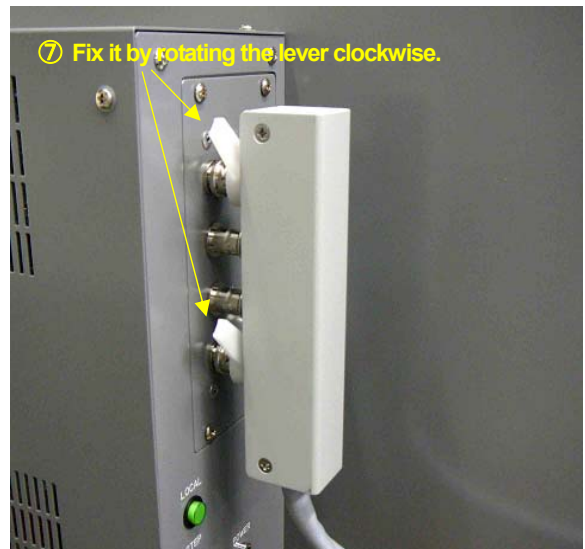


Fig.2-9 Connection of chamber cable

## ■ 2.4 Connection of Door switch (DOOR SW)

- Confirm connection of the door switch which detects open/close status of the chamber door.

① As shown in Fig.2-10, confirm that BNC cable is connected from the chamber to the door switch on **the rear of the scanner unit.**

**Note:** If used without connection, door open/close status **cannot be detected**; therefore, **very dangerous**.

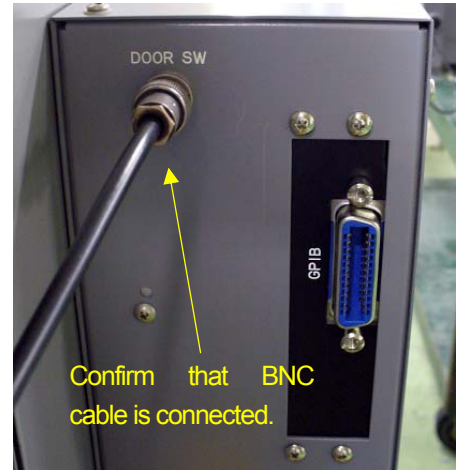


Fig.2-10 Door switch (DOOR SW)

## ■ 2.5 GPIB settings

- Confirm that GPIB settings are as follows:

Table 2-1 GPIB interface settings

Connected equipments	GPIB interface settings
B-H analyzer	Address: 1 Delimiter: CR+LF <b>Note:</b> For settings, see Fig. 2-11.
Chamber	GPIB: ON Address: 5 Delimiter: CR+LF <b>Note:</b> For settings, see ESPEC's chamber instruction manual.

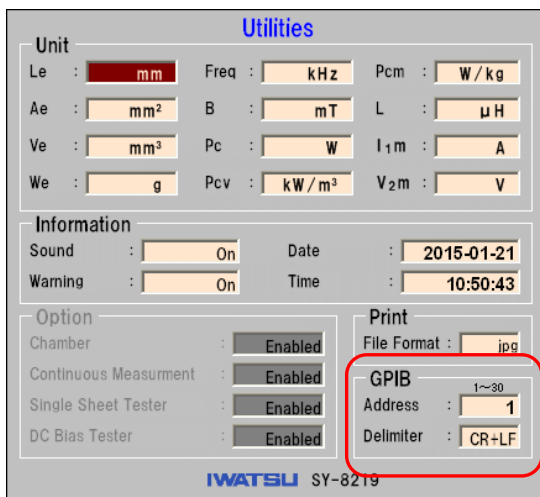


Fig.2-11 B-H analyzer Utilities screen

## ■ 2.6 Power supply of chamber

- The following describes how to power on the chamber.

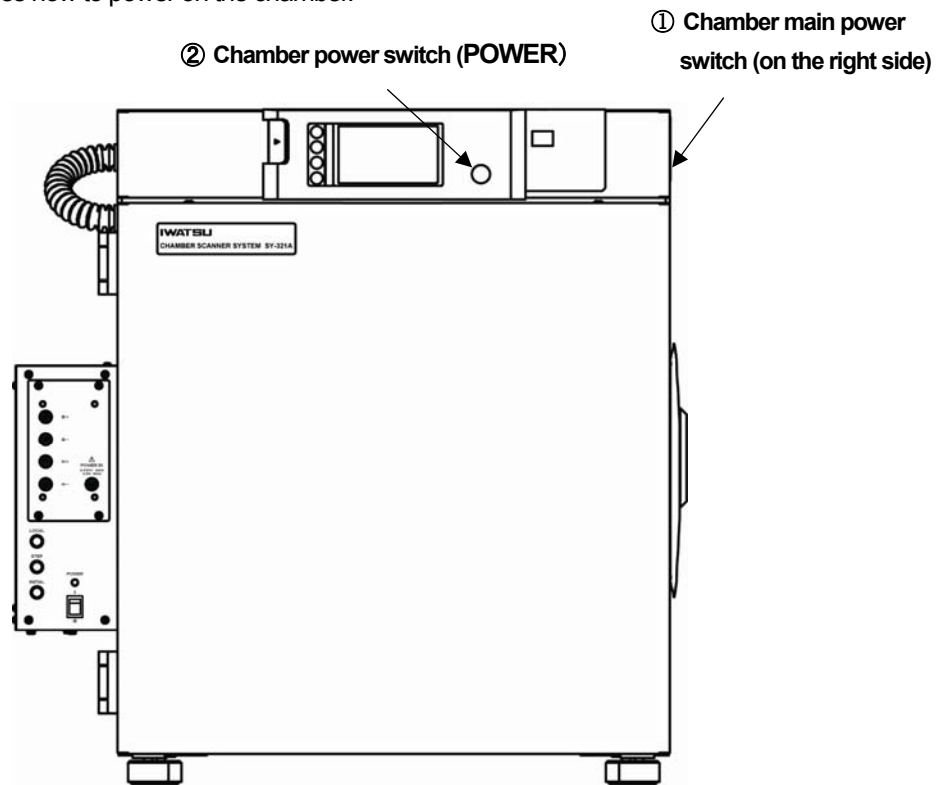


Fig.2-12 Power supply of chamber

- ① Turn on the main power on the right side.
- ② Press the power switch (POWER) on the instrumentation panel.

**Note:** When powering off, steps above should be done in the reverse order.

## ■ 2.7 Operation of scanner unit

- The following describes operation of the scanner unit.

### ① Scanner power switch (POWER)

- It powers ON/OFF the scanner. Only when it is powered on, a sample can be measured and the turn table can rotate.

### ② Local switch (LOCAL)

- It makes change between local/ remote.
- When pressed, the switch lights up; i.e. local status allowing operation of ③ and ④ below.
- When pressed again, the switch goes off; i.e. remote status, allowing remote control by the remote control software SY-810 (option).

### ③ Step switch (STEP)

- Each time pressing this switch in the local status the turn table turns to the next position one by one.

### ④ Initial switch (INITIAL)

- Pressing this switch in the local status allows the turn table to rotate so that the position No.1 goes to the origin point (i.e. to the position of the contact holder for the measurement point).

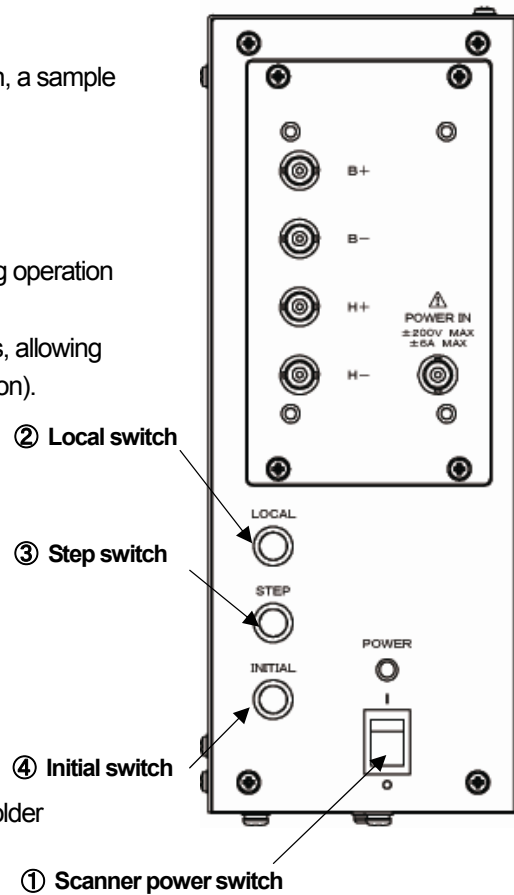


Fig. 2-13 Scanner unit

**Note:** When the door in the chamber is opened once while the manual measurement is operated by optional SY-810 remote control software, an electric connection to the sample is intercepted because of safety. Please push this initial switch when an electric connection is return.



## Chapter 3 Connection of sample

### ■ 3.1 Removal of turn table

- SY-321A is used as an example to describe the removal procedure of the turn table.

- ① Confirm the temperature in the chamber is always the vicinity of the room temperature.

**Note:** If the turntable is detached from high or low temperature controlled chamber, the turntable **transforms plasticity** by a rapid temperature change. In addition, detaching from the low temperature controlled chamber causes **dew condensation** in the turntable and the chamber, and **causes corrosion**. Moreover, work at the high temperature **causes the burn**, and never work.

- ② If the power amplifier is used, **be sure to turn off** the output of it.

- ③ Rotate counter clockwise and loosen four removal knobs (see Fig.3-1).

**Note:** SY-320A has only two knobs.

- ④ Surely grasp the front and back of the turn table with your both hands and while care is taken for the contact holder on the left, incline the turn table to the lower left a little along two guide pins and **slowly** pull it up vertically (see Fig.3-2).

**Note:** It is caught to the equipment etc. when working with **cotton work gloves** etc., and causes **the accident**.

- ⑤ After removing the turn table from the guide pins, while care is take for the contact holder on the left, incline the turn table to the lower left a little and remove it to the right **slowly** (see Fig.3-2 and 3-3).

**Note:** **Bring neither finger nor the thing close to** the turn table drive part (warm gear). The finger and the thing are rolled when driving part is moved by mistake, and it causes **the injury and the breakdown**.

- ⑥ Place the removed turn table on the stable support.

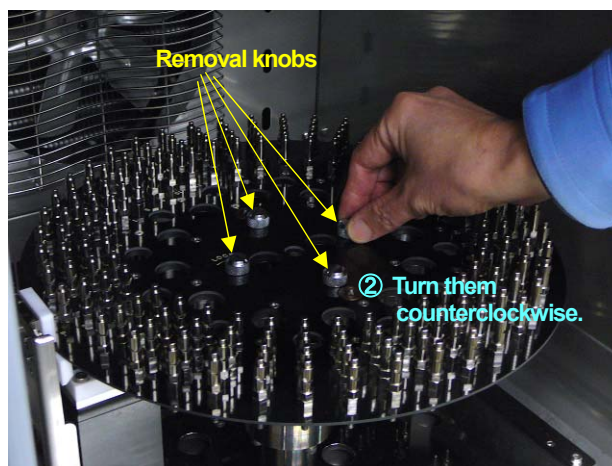


Fig.3-1 Removal of turn table

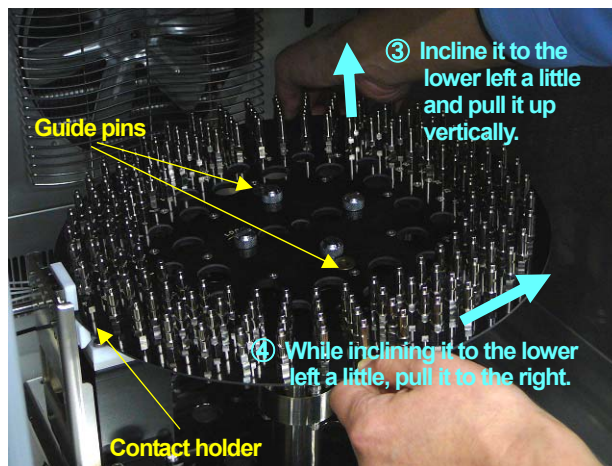


Fig.3-2 Removal of turn table

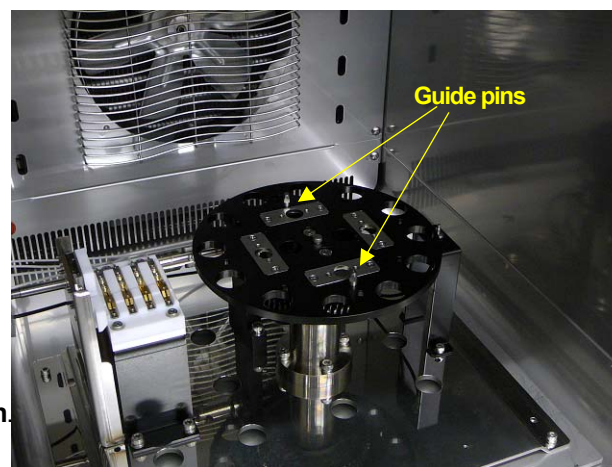


Fig.3-3 Removal of turn table

### ■ 3.2 Mounting sample

- SY-321A is used as an example to describe how to mount a sample.
- ① Confirm the position No. (controlled by remote software SY-810) on the turn table on which a sample is mounted.
  - ② Connect the primary turn and the secondary turn wound on the sample to the connection terminals as shown in Table 3-1.

If the head of the connection terminal is pressed, the clamp groove opens. Surely insert the turns until the end of the turn passes through the opening completely.

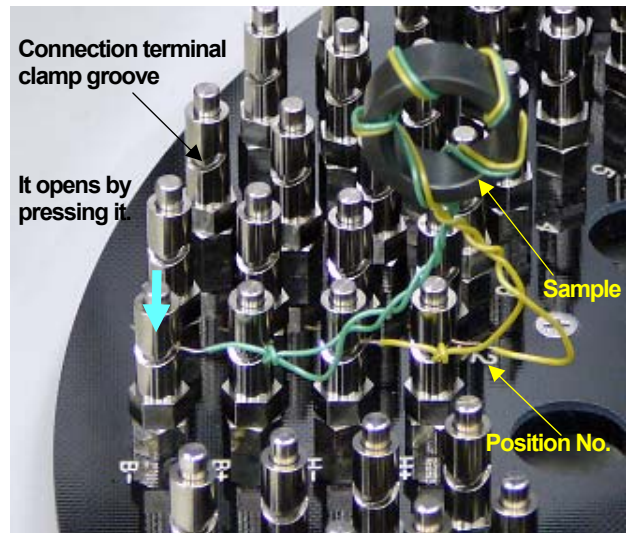


Fig.3-4 Mounting sample

When stopping press of the head, the turns are clamped to the connection terminal. Confirm that they are surely clamped by lightly pulling the turns.

Table 3-1 Connection method of samples

Terminal symbols	Connection 1	Connection 2
H+	Start of primary turn	End of primary turn
H-	End of primary turn	Start of primary turn
B+	Start of secondary turn	End of secondary turn
B-	End of secondary turn	Start of secondary turn

**Note:** When mounting the sample, **be sure to remove the turn table from the chamber** and place it on the stable support. Mounting of a sample in the chamber without removing the turn table is **very dangerous**.

**Note:** Do not come in contact the sample with other samples when installing it. It might be impossible to do a correct measurement because magnetic flux caused in the sample jumps into other samples.



### ■ 3.3 Installation of turn table

- SY-321A is used as an example to describe how to install the turn table.

① While inclining the turn table to the lower left a little, insert the left end of it into the groove of the contact holder and align two guide bushes with the guide pins (see Fig.3-5, 3-6, and 3-7).

② In this state, lower the turn table slowly along the guide pin (see Fig. 3-7).

**Note:** Sufficient care should be taken **not to touch the heat-proof cable and not to throw at the electrode plate spring** when installing it (See Fig. 3-6.).

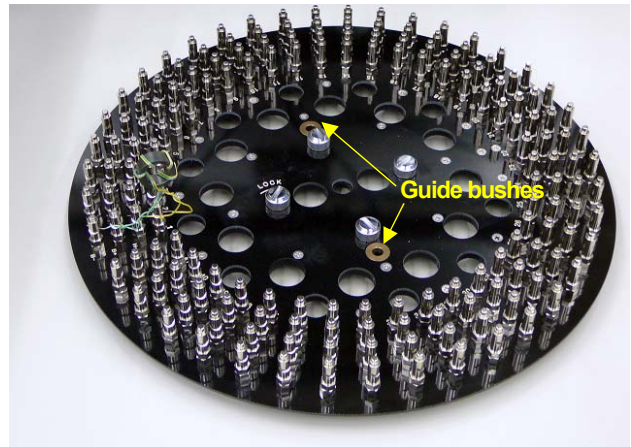


Fig.3-5 Installation of turn table

③ Rotate four removal knobs clockwise and fix the turn table (see Fig.3-8).

**Note:** SY-320A has only two knobs.

**Note:** **Never touch the electrode plate spring with bare hands.** Sebum is attached, causing corrosion and an error in measurement.

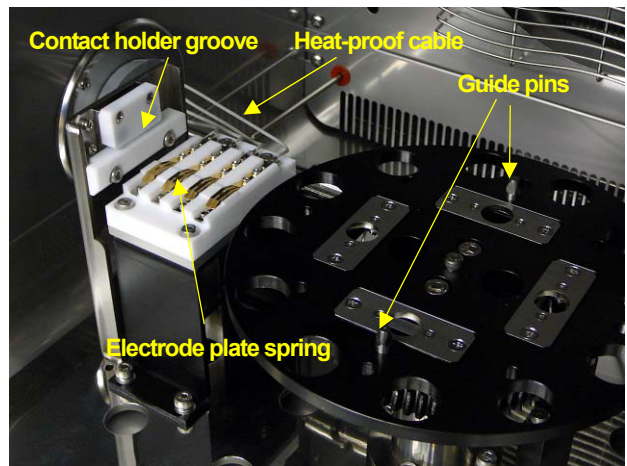


Fig.3-6 Installation of turn table

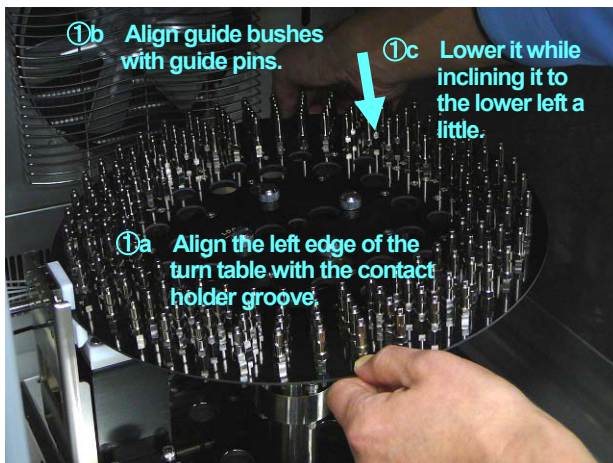


Fig.3-7 Installation of turn table

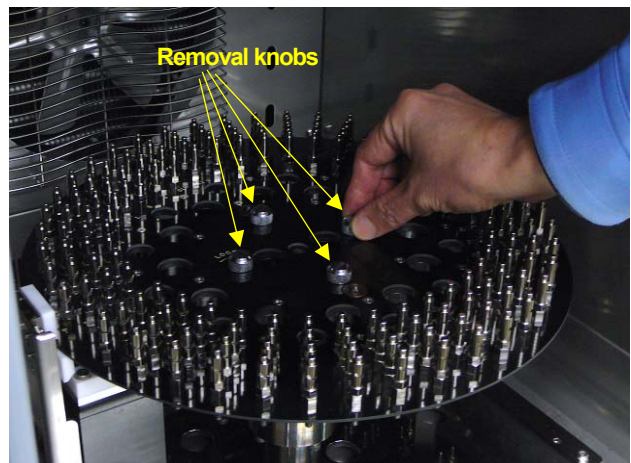


Fig.3-8 Installation of turn table



## Chapter 4 Maintenance

### ■ 4.1 Daily maintenance

- It is recommended to make daily maintenance as shown below in accordance with frequency of use.

- ① Diligently clean the inside of the chamber using a small cleaner. If a broken sample is left in it when using it, a **failure caused by a foreign object caught in the drive part of the turn table, wear on the electrode, or dirt could occur.**
- ② In particular, dirt on the electrode on the back of the turn table and on the contact holder (see Fig.4-1) could **cause the contact resistance to increase; resulting in an error in measurement.** Regularly use a soft cloth moistened with ethyl alcohol to clean the dirt.

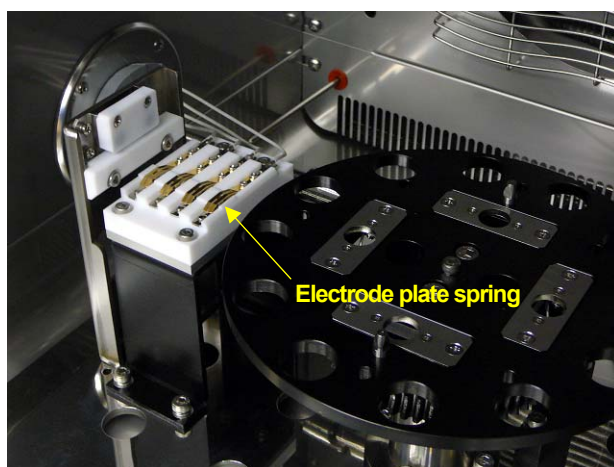


Fig.4-1 Electrode plate spring

## Chapter 5 Specifications

### ■ 5.1 Chamber part

Model	SY-320A	SY-321A
Power supply voltage	AC100V	
Frequency range	50Hz/60Hz	
Power supply current	Max. 12.5A	Max. 21.0A
Temperature setting range	-30°C to +150°C	
Interface	GPIB. Can be controlled by the remote control software SY-810.	

### ■ 5.2 Scanner unit part

	Model	SY-320A	SY-321A
Power supply	Power supply voltage	AC100V to 120V	
	Frequency range	50Hz/60Hz	
	Power consumption	28VA	
Measurement	Measurement frequency	10Hz to 5MHz (when SY-8218 is connected) 10Hz to 1MHz (when SY-8219 is connected)	
	No. of measurement samples	Max. 20 samples	Max. 41 samples
Signal detection	Current detection resistance	Approx. 1Ω	
	Max. measurement current	±6A	
	Max. measurement voltage	±200V	
Measurement accuracy	Phase angle	±0.15 deg (Typical value in f = 100 kHz, 50 mA, 50 mV range or more and the amplitude of 80% or more of use range)	
	Amplitude	±2 % (Typical value in f = 1 kHz, 50 mA, 50 mV range or more)	
	Core loss	±5.6 % (Typical value ; presumption value of phase angle =80° in f = 100 kHz, 50 mA, 50 mV range or more)	
Interface		GPIB. Can be controlled by the remote control software SY-810.	

### ■ 5.3 Environmental specifications

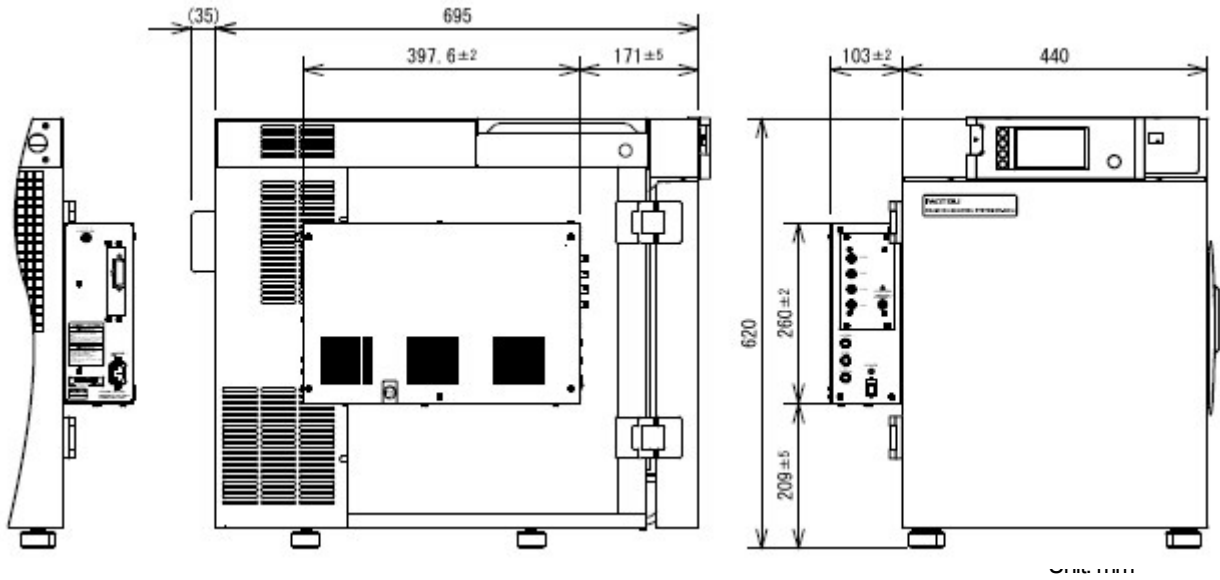
Model	SY-320A	SY-321A
Operating temperature	+5°C to +35°C	
Performance ensured temperature	+18°C to +28°C	
Operating humidity	85%RH (+35°C, no dew condensation)	

### ■ 5.4 Physical characteristics

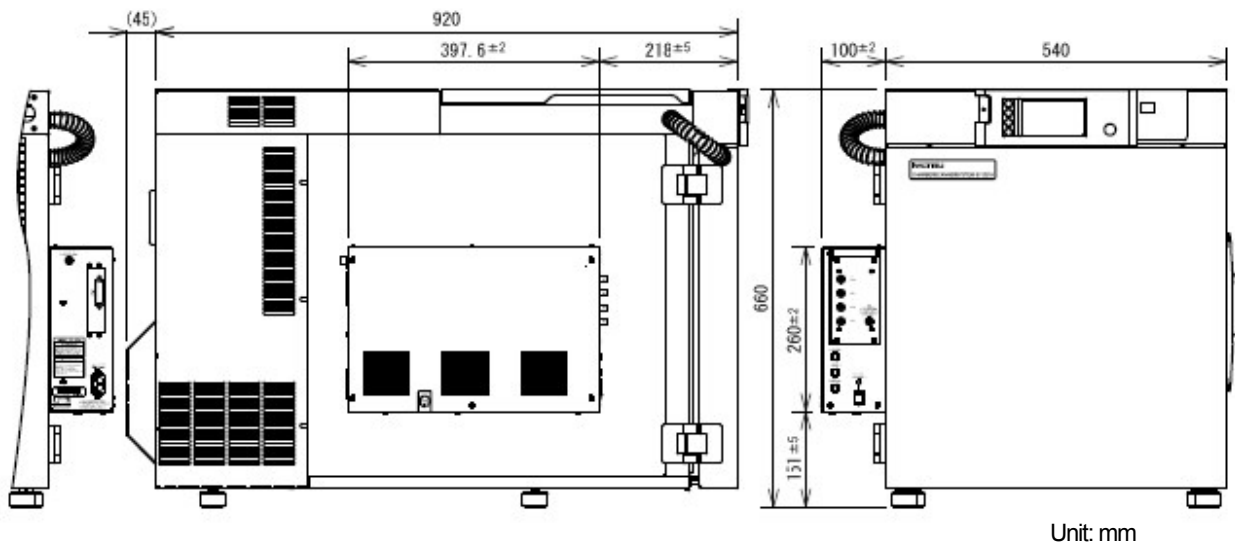
Type NO,	SY-320A	SY-321A
Outside dimensions	543(W)×695(L)×620(H) (Excluding protrusions)	640(W)×920(L)×660(H) (Excluding protrusions)
Weight	Approx. 85 kg	Approx. 135 kg

■ 5.5 Outside appearance

SY-320A



SY-321A



Memo

## **IWATSU ELECTRIC CO., LTD.**

### **Contacts Us**

Overseas Sales Sect. Sales Dept. No.2

**Address** : 7-41 Kugayama 1-chome Suginami-ku Tokyo, 168-8501 Japan

**Phone** : +81 3 5370 5483

**Facsimile** : +81 3 5370 5492

**URL** : <http://www.iti.iwatsu.co.jp>

**E-mail** : [info-tme@iwatsu.co.jp](mailto:info-tme@iwatsu.co.jp)

**SY-320A/ SY-321A**

**IWATSU ELECTRIC CO., LTD.**