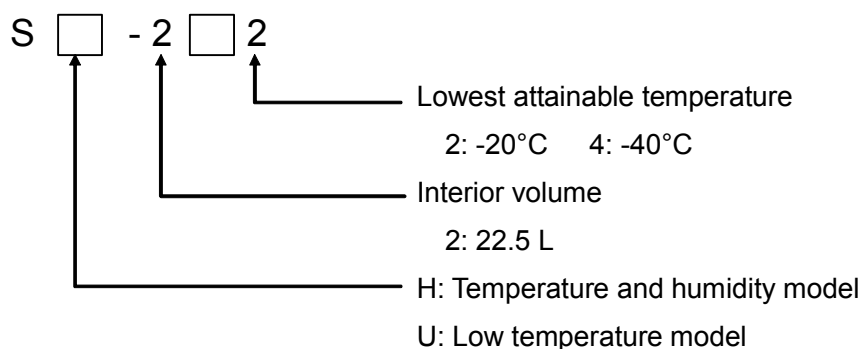


SPECIFICATIONS

Product name Bench-top type temperature (and humidity) chamber	No.	4009301000231	
	PREP.	07.19.2013	Sonobe
	REV.	01.09.2015	Yamada

1. Model



Selection				
	SH-222	SH-242	SU-222	SU-242

2. Power supply

Selection				
	standard	option		
Power supply voltage	100V AC 1Ø 50/60 Hz	115V AC 1Ø 60 Hz	220V AC 1Ø 50/60 Hz (CE spec.)	230V AC 1Ø 50 Hz (CE spec.)
Voltage fluctuation	90 to 110V (±10%)	103 to 126V (±10%)	198 to 242V (±10%)	219 to 241V (±5%)

3. Maximum load current

Figures given for an ambient temperature of +23°C and rated voltage supply.

	SH-222	SH-242	SU-222	SU-242
100V AC	14.5 A		12.5 A	
115V AC	14.0 A		12.0 A	
220V AC	10.0 A		9.0 A	
230V AC	9.5 A		8.5 A	

4. System

SH-222	SH-242	SU-222	SU-242
Balanced temperature and humidity control system		Balanced temperature control system	

5. Allowable conditions

Ambient temperature	+5 to +35°C
Ambient humidity	up to 75%rh

6. Noise level 42dB to 52 dB
Noise level was measured in an anechoic room at a height of 1.2 m from the floor and a distance of 1 m from the chamber front panel (ISO 1996-1:2003 A-weighted sound pressure level). Actual noise emissions may increase because of surrounding reverberations in the place of installation, therefore use caution in selecting a place of use.
7. Performance The performance values are based on IEC60068-3-5:2001, JTM K07:2007 and IEC60068-3-6:2001, JTMK09; 2009. Performance figures are given for a +23°C ambient temperature, relative humidity 65%rh, rated power supply and no specimens inside the test area. However, the lowest attainable temperature is given for a max ambient temperature of +30°C.
Heat up time is the achieved time from lowest temperature to highest temperature within temperature range.

7.1

Temperature performance	SH-222	SU-222	SH-242	SU-242
Temperature range	-20 to +150°C		-40 to +150°C	
Temperature fluctuation	±0.3°C (-20/-40°C to +100°C) ±0.5°C (+100.1°C to +150°C)			
Temperature gradient	2.5°C (-20/-40°C to +100°C) 4.0°C (+100.1°C to +150°C)			
Temperature variation in space	2.5°C (-20/-40°C to +100°C) 4.0°C (+100.1°C to +150°C)			
Temperature rate of change Heat up rate	(from -3°C to +133°C) 3.2°C/min		(from -21°C to +131°C) 3.2°C/min	
Temperature rate of change Pull down rate	(from +133°C to -3°C) 2.1°C/min		(from +131°C to -21°C) 2.1°C/min	
Temperature extreme achievement time Heat up time	From -20°C to +150°C(Setting:+153°C) Within 55min		From -40°C to +150°C(Setting:+153°C) Within 60min	
Temperature extreme achievement time Pull down time	From +20°C to -20°C(Setting:-23°C) Within 20min		From +20°C to -40°C(Setting:-43°C) Within 50min	
Lowest attainable temperature	-20°C		-40°C	

7.2

Humidity performance	SH-222	SH-242
Temperature & humidity control range	30 to 95%rh Relative humidity [%rh] Temperature [°C] 15°C 85°C 95%rh : Control range	
Humidity fluctuation	±3.0%rh	
Humidity gradient	8.0%rh	
Humidity variation in space	8.0%rh	

8. Construction

Exterior material	Cold rolled and rust-proofed steel plate (Melamine baked finish, Medium gray, Grayish violet)
Test area material	18-8 Cr-Ni stainless steel plate
Insulation	Chamber (Rigid polyurethane foam, glass wool) Door (glass wool)
Door	Single door (right handle, left-hinged)
Instrumentation panel	Controller, overheat and overcool protector

9. Dimensions and weight

9.1 Inside dimensions W 300 x H 300 x D 250 mm (Excluding protrusions)

9.2 Outside dimensions

SH	W 440 x H 690 x D 695 (747) mm
SU	W 440 x H 620 x D 695 (747) mm

* Figures in () include protrusions.

9.3 Capacity 22.5 L

10. Weight

SH	78 (83) kg
SU	73 (78) kg

* Weight in () is for 115V, 220V and 230V.

11. Heater Nichrome strip wire heater: 400 W

12. Humidifier 18-12-2.5 Cr-Ni-Mo stainless steel, cartridge heater 200W (SH only)

13. Refrigeration

Refrigeration	Mechanical single-stage refrigeration system
Cooler	Plate fin cooler: x 1
Refrigerator	Compressor: Air-cooled, hermetically sealed; Condenser: Air-cooled condenser Expansion system: Capillary tube system
Refrigerator capacity	400W
Refrigerant	R404A

14. Controller

Name	N-instrumentation P-200	
Components	UI unit, Main unit, I/O unit	
UI unit function	Touch panel, 4.3 inches color LCD	Backlight LED (Service life: 10000 hours) Display type: TFT No. of pixels: 480 x 272 (WQVGA)
	Status indicator LEDs	External memory indicator, communication indicator, timer preset indicator, power supply indicator, operation indicator
	Hardware switch	Power switch with power supply indicator (push type)
Control function	Temperature/humidity control	Control system PID control Temperature input Test area temperature (Thermocouple type T) Humidity input Test area wet and dry bulb temperature input (Thermocouple type T) Input functions 200 ms high-speed sampling, wire break detection Adjustment function Temperature calibration setting Adjustable range: $\pm 5.0^{\circ}\text{C}$ Setting resolution: Up to one decimal
Operation modes	Constant, program, remote, stop	

Name	N-instrumentation P-200	
Setting	Constant value mode setting	No. of settings: 3 patterns Setting range and resolution Temperature SU/SH-222: -25.0°C to +160.0°C in 0.1°C increments SU/SH-242: -45.0°C to +160.0°C in 0.1°C increments Humidity: 0%rh to 100%rh in 1%rh increments Settings Humidity control OFF, refrigerator, time signal, upper/lower limit absolute alarm, upper limit deviation alarm
	Program mode setting	No. of settings: 8 patterns (99 steps) Setting range and resolution Temperature SU/SH-222: -25.0°C to +160.0°C in 0.1°C increments SU/SH-242: -45.0°C to +160.0°C in 0.1°C increments Humidity: 0%rh to 100%rh in 1%rh increments Time: 0 hour 1 minute to 9999 hours 59 minutes in 1 minute increments Settings (The following settings are available in addition to the settings for the constant value mode.) Start condition, temperature (and humidity) control setting, temperature gradient, humidity gradient, exposure time, pause, counter (A, B), completion mode selection (program chain possible), graph display
Language	Japanese, English, Chinese (simplified/traditional), Korean (Can be selected without restarting via display setup.)	
Accessory functions	Standard	Basic functions Operation, alarm, information, accessory (integrating hour-meter), alarm help, test area monitor (temperature/humidity, external output), Back-trace, quick access Management setting functions Timer, protect, hour meter with reset, alarm history display, version display, notification Maintenance functions Interface (LAN setting), chamber operation setting (power failure recovery operation, backup operation, operation when door is open), attainment setting, time signal name registration, chamber advanced setting (refrigerator control mode, continuous water supply to wick, automatic switching of humidification reservoir water, external alarm output, humidification delay), instrumentation interlock setting, user password, date/time setting recorder setting

Name	N-instrumentation P-200	
External memory function	Interface: Conforming to USB 2.0 (Connector A type)	Bus power: 500 mA (maximum) Applicable device: Flash memory of USB Mass Storage Class Supported file format: FAT16/FAT32 Supported functions: - Sampling setting/writing - Program pattern writing/reading - Back-trace writing - Add-ons/system updating Available/supported PC application Pattern Manager Lite *Pattern Manager Lite can be downloaded from Product Registration Membership Service of Test Navi website.
Network function	Interface: Ethernet port (100 base TX)	Protocol TCP/IP(HTTP, SMTP, IPv4) Web application Monitor, setting Operation, data collection Management, maintenance e-mail notification Supported browser Windows Internet Explorer 10
PC communication function	Ethernet port	Ethernet port can be connected to one PC. (One-to-one)
Operating environment	Performance guaranteed environment	Temperature: +23°C ±5°C, Humidity: 30%rh to 90%rh (no condensation)
	Operation guaranteed environment	Temperature: 0°C to +60°C, Humidity: 30%rh to 90%rh (no condensation)
	Storage environment	Temperature: -20°C to +70°C, Humidity: 20%rh to 95%rh (no condensation)
Indication accuracy	Temperature (Thermocouple type T)	At ambient temperature of +23°C ±1°C Measurement accuracy: ±0.3°C Display accuracy (Full span): ±(0.07% F.S. +1 digit)
	Time	Within 60 seconds per month +23°C ±5°C
Safety standard	RoHS directive (100% compliant) Pb free	

15. Power supply leakage breaker

Rated voltage	100 to 240V AC				
Rated sensitivity current	30mA				
Trip time	Within 0.1 sec				
Rated current		SH-222	SH-242	SU-222	SU-242
	100V AC	20A		15A	
	115V AC	15A		15A	
	220V AC	15A		10A	
	230V AC	10A			
Included mechanisms	Leakage shutoff test mechanism				

16. Air circulator

Driver	Direct coupled motor, propeller fan (Ø150 mm, 6 blades)		
Motor	20W, 2P	x 1	

17. Condenser air circulator

Propeller fan 4W, 4P x 1

18 Water supply (SH only)

Water supply system: Water pump type
Location of water tank: In the water circuit box
Capacity: Effective size approximately 5.0L

19. Equipment

Temperature-Humidity recorder terminal	Temperature: Thermocouple type T (Copper/Copper-Nickel) or equivalent starting current Humidity: 1 to 5V DC/0 to 100%rh (Humidity capabilities only for SH)
Specimen power supply control terminal	For charging specimens. Relay contact opens if chamber trouble occurs. Terminal capacity: 250V AC, 1 A x 1 ch
External alarm terminal	Relay contact closes if chamber trouble occurs. Terminal capacity: 250V AC, 1 A x 1 ch
External output terminal	Select signal between "time signal", "target temperature attainment" and "program end" from operating panel. Terminal capacity: 250V AC, 1 A x 1 ch
Cable port	I.D. Ø50 mm x1 (Chamber right side)
Power cable	Length from chamber: about 2.5 m (with 3 P plug) x 1
Water supply tank	Detachable internal tank x 1 (SH only)
Humidifying tray drain plug	For draining humidifying tray / wick pan x 1 (SH only)
Drain hose	I.D. Ø12 mm x O.D. Ø18 mm vinyl hose, length from chamber: 1.2 m x 1
Drain socket for water sensor box	For draining water sensor box x 1 (SH only)
Ethernet port (LAN port)	For network function and PC communication function x 1
External memory port	External memory function (Internal memory data input/output and add-ons) x 1
Synchronize measurement instrumentation output terminal	4 points
Synchronize measurement instrumentation input terminal	1 point

20. Accessories

Shelf	W200 x D150 mm x 1 Stainless wire Ø25 mm x P15mm Stage : 5 (pitch 35mm)
Connector	For temperature/humidity recorder terminals: x 2 (SU type: x1)
Cable port rubber plug	Ø50 mm silicon sponge rubber: x 1
Cartridge fuse	B type 250V 7A x 1
Socket adapter	For power cable: Adapter converting from 3P to 2P x 1 (100/115V AC specification chambers only)
Wet-bulb wick	Wick: 24 pcs: x 1 box (SH only)
Humidifying tray drain hose	For draining humidifying tray/wick pan, 2 m x 1 (SH only)
Drain hose for water sensor box	0.3 m x 1 (SH only)
Operation manual	x 1 set
Warranty card	x 1

21. List of consumable

Component name	Replacement period
Wet-bulb wick	After humidity control operation or 1 month

22. Safety devices

	Function	Purpose	Content
1	Cartridge fuse for control circuit short-circuit protection	Equipment protection	a
2	System error (Error)	Equipment protection	b
3	Room temperature compensation burnout detection circuit.	Equipment protection	b
4	Dry bulb temperature burnout detection circuit	Equipment protection	b
5	Absolute upper/lower temperature limit alarm (with built-in temperature/humidity controller)	Specimen protection	b
6	Temperature switch for air circulator	Equipment protection	b
7	Thermal fuse	Equipment protection	b
8	Temperature switch for condenser fan	Equipment protection	b
9	Overheat protector	Specimen protection	b
10	Overcool protector (OP)	Specimen protection	b
11	Wet bulb temperature burnout detection circuit (SH only)	Equipment protection	c
12	Refrigerator-1 error detection	Equipment protection	b
13	Humidifier dry heat protector (SH only)	Equipment protection	c
14	Humidifier water level detection (SH only)	Equipment protection	c
15	Temperature upper limit deviation alarm (with built-in temperature/humidity controller)	Specimen protection	d
16	Absolute upper/lower humidity limit alarm (with built-in temperature/humidity controller) (SH only)	Specimen protection	d
17	System error (Alarm)	Equipment protection	d
18	Water tank drought switch (SH only)	Equipment protection	f
19	Chamber door switch	Human protection	e

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Function		Purpose	Content
20	Water tank low-level switch (SH only)	Equipment protection	f
21	Specimen power supply control terminal	Specimen protection	g

- a: The equipment stops entirely.
- b: An alarm is displayed and an alarm buzzer sounds. The equipment stops operation.
- c: An alarm is displayed and an alarm buzzer sounds.
When the backup operation is set to OFF, the equipment stops operation.
When the backup operation is set to ON, the equipment continues temperature control operation.
- d: An alarm is displayed and an alarm buzzer sounds. The equipment starts specified protective operation.
- e: An alarm is displayed and an alarm buzzer sounds.
When the pause operation is set to OFF, the equipment continues operation.
When the pause operation is set to ON, the equipment pauses operation.
Turning the alarm display and alarm buzzer ON or OFF can be selected.
- f: An alarm is displayed and an alarm buzzer sounds. The equipment continues operation.
- g: When the equipment stops operation or operation is stopped by any safety device, voltage application to the specimen stops.

23. Safety standards

The chamber comply to the following international standards:

Safety of machinery	ISO 12100
Low voltage	IEC 60204
EMC	IEC 61000-6-2, IEC 61000-6-4

220 and 230 V AC spec. are in compliance with the requirements of the European Community Directives (hereinafter referred to as CE spec.)

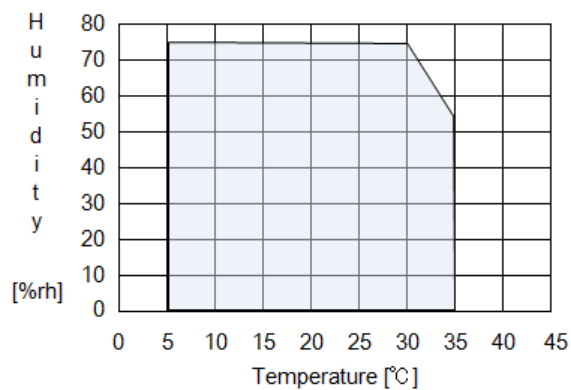
Machinery Directive	2006/42/EC
Low Voltage Directive	2006/95/EC
Electromagnetic Compatibility Directive	2004/108/EC
Pressure Equipment Directive	1997/23/EC
RoHS	2011/65/EU

24. Utilities

24.1 Installation site

Select installation location satisfying the following conditions:

- On a flat, level floor strong enough to bear the weight of the chamber
- Place subject to minimal mechanical vibrations
- Place of minimum airborne contaminants
- Place free from moisture
- Place free from inflammable materials in the vicinity
- Place free from combustible or corrosive gases
- Place not exposed to direct sunlight but of good ventilation
- Where the ambient temperature is between +5 to +35°C, humidity is max. 75% rh range shown below (+23°C is optimum).



- Place where ambient temperature does not change suddenly (like 5°C / min. or more)
- Not directly underneath a fire alarm
- Not near a heat source which generates high temperature
- Close to power, water and drainage utilities
- Altitude not higher than 1000m

Minimum interval required for installation (mm)

Type	SH/SU
Front	440
Top	600
Right side	150
Left side	
Back	300

24.2 Water quality Conductivity: 0.1 to 10μS/cm

* Do not use water of an electrical conductivity lower than 0.1 μS/cm. It acts like a strong solvent and can deform the chamber's water circuit parts.

24.3 Drain

Drain water is required to connect to the drainage or drainage tray.

24.4 Heat exhaust 3500kJ/h (Ambient temperature: +23°C)

24.5 Primary power supply

Reference table of power utility

	Power supply voltage	Max.current* (A)	Fuse capacity (A)	Min.power cable size (mm ²)
SH-222,242	100V AC 50Hz/60Hz 1Ø 2W	14.5(15.0)	20	2.0
	115V AC 60Hz 1Ø2W	14.0(14.5)	15	2.0
	220V AC 50Hz/60Hz 1Ø 2W	10.0(10.5)	15	0.75
	230V AC 50Hz 1Ø 2W	9.5(10.0)	10	0.75
SU-222,242	100V AC 50Hz/60Hz 1Ø 2W	12.5(13.0)	15	2.0
	115V AC 60Hz 1Ø 2W	12.0(12.5)	15	2.0
	220V AC 50Hz/60Hz 1Ø 2W	9.0(9.5)	10	0.75
	230V AC 50Hz 1Ø 2W	8.5(9.0)	10	0.75

* () shows current for the chamber with viewing window option.

* 115, 220 and 230V AC power supplies are optional.

25. Specimen restrictions

The following substances cannot be tested with this chamber:

- Volatile or flammable substances or anything which contains such substances
- Corrosive substances
- Living things

26. Items out of scope of estimation

Transport and installation work
Primary power supply work
Water supply and draining work

27. Warranty period

3 years (if installed in the countries outside Japan, in which the authorized Distributor/Agent of ESPEC exists)