

Quality is more than a word

ESPEC

Bench-Top Type Temperature (& Humidity) Chamber

SH·SU



Compact design for personal use, to network with your computer.

The Bench-top Type Temperature (& Humidity) Chamber Series features environmental testing performance in a compact design. Available in 20L and 60L capacities, these models offer temperature ranges as low as -20 , -40 , or -60°C , and achieve excellent performance rates, as well as communication interface compatibilities to collect test data.

Espec offers you the best in terms of advanced testing equipment.





* The viewing window is optional.



Test area (60L model)

● Light and small structure

The chamber structure is optimized to save space while offering a wide test area (22.5L for 1st model). Its relatively light weight allows setup almost everywhere. (78kg_ SU-221 / 241 models)

● Full-size chamber performance in a compact design

The SH-661 model achieves -60 to $+150^{\circ}\text{C}$ temperature range and 30 to 95%rh for humidity in a small structure. It shows undoubtedly better performance than any other previous bench-top model.



Stacked chambers (on stands)

● Full variation to select from

With 3 different temperature range patterns (-20 , -40 , or -60°C), and 2 sizes (20 and 60L), the Bench-top chamber series offers 10 models with either temperature or temperature/humidity configurations, to fulfill customers' needs.

● Ion migration evaluation

The Bench-top chamber can be combined with ESPEC's Ion Migration Evaluation System (AMI) to ensure even more accurate evaluation results.

With its 3 temperature range patterns (to -60 , -40 or -20°C), and 2 volumes (20 and 60L) selection, the Bench-top chambers offer 10 models in temperature or temperature/humidity configuration, to fulfill customers' needs.



Example: Bench-top Type Temperature (& Humidity) Chamber connected with the Ion Migration Evaluation System (sold separately)

Eco-friendly

- **A refrigeration system that reduces energy consumption by 55%**

Our exclusive refrigerator system with capacity control achieves 55% reduction in power consumption compared to our previous model. (SH/SU-221·241 models)

- **Layout arrangement thanks to additional stand (option)**

L and H stands are equipped with casters, and allow easy storage to optimize your testing zone. L stand is lower to fit under H stand and stack chambers. (L=Low, H=High)

* It is recommended to secure stands to the floor with provided anchor bolts.

- **Material labeling for easy recycling**

Plastic molded components are labeled and easily detachable to make recycling easier for future disposal of the equipment.

- **Paperless recorder (option)**

Portable type, to record temperatures from various sources, such as test area temperature. Recording is possible on Compact Flash Card or via USB port.



Stands (option)



Cable port plug (Material marked)



Paperless recorder Portable type (option)

User-friendly



- **Easy wiring access**

The chamber features free access to the test area. Cable ports are provided on both right and left side to allow easy wiring of specimens for measurement or voltage application.

- **Easy water supply**

Water is supplied from the front side tank (equipped with a level sensor). Auxiliary water tank circuit (option) is also available for extended operation time. (SH model)

- **Right-opening door (option)**

The door opening can be reversed to fit your installation space.

- **Viewing window (option)**

An optional viewing window can be added to check specimens and wiring during testing.
(W215 × H215mm for 20L model, W215 × H315mm for 60L model)



Water supply tank



Right-opening door (option)



Viewing window (option)

Control operation



● Key input setting

Easy setting of temperature and humidity values, but also upper and lower temperature (& humidity) limit alarms, by mechanical key input.

● Program operation up to 9 steps

Besides constant setting, program operation is available by setting different patterns (9 step/ pattern) of heat up and pull down temperatures, to meet requirements of temperature characteristic test or temperature (& humidity) cycling. The instrumentation additionally offers various functions.

● Flexible communication interface

An RS-485 connector is equipped as standard, but RS-232C or GP-IB is also available as option.

● Remote control from your PC

Please contact us for details on using a PC to monitor and remotely control the equipment.

Description of program function

Program function	Pattern
Step program	
Temperature gradient program	
Termination program	

*1 Sets a program repetition frequency between a range of 1 and 99.

*2 Selects HOLD, CONST or OFF when a program is over.

Temperature (& humidity) program indicator controller

Setting	Mechanical key input
Display	7 segment LED display
Operating mode	Program operation, constant operation
Control	PID control
Setting and indication	Temp. : 0.1°C Humid. : 1%rh (SH only) Time : 1 minute
Setting and indication ranges	Temp. : -25 to +155°C (SH-221, SU-221) -45 to +155°C (SH-241/641, SU-241/641) -65 to +155°C (SH-261/661, SU-261/661) Humid. : 0 to 100%rh (SH only) Time : 0 to 99 hours 59 minutes, 100 to 999 hours
Indication accuracy *	Temp. : 0.5°C (Typ.) Humid. : ±2%rh (Typ.) (SH only) Time : within 30 sec. per month
Program memory capacity	9 steps per pattern (1 to 99 times)
Communication	RS-485
Auxiliary functions	Input-burnout detection Upper and lower temp. (& humid.) limit alarm Self-diagnostic (watchdog timer) Alarm indication Power cut protection Refrigerator capacity automatic control
Battery	Lithium battery × 1

* At ambient temperature +23°C

Model	SH-221	SH-241	SH-261	SH-641	SH-661		
System	Balanced Temperature & Humidity Control system (BTHC system)						
Performance *1	Temp. range *2	-20 to +150°C (-4 to +302°F)	-40 to +150°C (-40 to +302°F)	-60 to +150°C (-76 to +302°F)	-40 to +150°C (-40 to +302°F)	-60 to +150°C (-76 to +302°F)	
	Humidity range *2	30 to 95% rh					
	Temp. fluctuation *2	±0.3°C (-20 to +100°C) [±0.54°F (-4 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (-40 to +100°C) [±0.54°F (-40 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (-60 to +100°C) [±0.54°F (-76 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (-40 to +100°C) [±0.54°F (-40 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (-60 to +100°C) [±0.54°F (-76 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	
	Humidity fluctuation *2	±3.0%					
	Temp. uniformity *2	±0.5°C (-20 to +100°C) [±0.9°F (-4 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (-40 to +100°C) [±0.9°F (-40 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (-60 to +100°C) [±0.9°F (-76 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (-40 to +100°C) [±0.9°F (-40 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (-60 to +100°C) [±0.9°F (-76 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	
	Humidity uniformity *2	±3.0%					
	Temp. heat up time	-20 to +150°C within 55 min.	-40 to +150°C within 60 min.	-60 to +150°C within 70 min.	-40 to +150°C within 70 min.	-60 to +150°C within 80 min.	
	Temp. pull down time *3	+20 to -20°C within 20 min.	+20 to -40°C within 50 min.	+20 to -60°C within 70 min.	+20 to -40°C within 60 min.	+20 to -60°C within 90 min.	
	Lowest attainable temp. *3	-20°C (-4°F)	-40°C (-40°F)	-60°C (-76°F)	-40°C (-40°F)	-60°C (-76°F)	
	Construction	Exterior material	Cold-rolled rust-proofed steel plate				
Interior material		18-8 Cr-Ni Stainless steel plate (2B finish)					
Insulation		Rigid polyurethane foam, glass wool					
Door		Manually operated door with lock (hinge on left, handle on right)					
Heater		Nichrome strip wire heater					
Humidifier		Sheathed heater					
Refrigeration unit		System	Mechanical single-stage refrigeration system	Mechanical cascade refrigeration system (air-cooled condenser)			
		Refrigerator	Hermetically sealed compressor				
		Refrigerator capacity	400W	[Unit 1: 400W ×1, Unit 2: 400kW ×1]			
		Expansion mechanism	Capillary tube system				
	Refrigerant	R404A	R23, R404A				
Cooler	Plate fin cooler						
Air circulator	Propeller fan						
Fittings	Cable port ID φ 25mm (×2), specimen power supply control terminal, temperature-humidity recorder terminal, external alarm terminal, external output terminal, power cable, water tank, drain hose, plug for humidifying tray drainage, socket for water tank level sensor drain						
Capacity L	22.5			64			
Chamber total load resistance kg	20						
Inside dimensions mm (inch)	W300×H300×D250 (W11.81×H11.81×D9.84)			W400×H400×D400 (W15.75×H15.75×D15.75)			
Outside dimensions mm (inch)	W440×H630×D695/722 (W17.32×H24.80×D27.36/28.43)		W440×H690×D785/812 (W17.32×H27.18×D30.91/31.97)	W540×H730×D920/930 (W21.26×H28.74×D36.22/36.61)			
Weight kg	83 (78 for 100V type)		105	130			
Utility requirements	Allowable ambient conditions	+5 to +35°C (+41 to +95°F)					
	Power supply *4	100V AC 1φ50/60Hz	13.5 A	15.0 A	18.0 A		
		115V AC 1φ60Hz	13.0 A	14.5 A	—		
		200V AC 1φ50/60Hz	—		10.5 A		
		220V AC 1φ50/60Hz	8.0 A	9.5 A	10.0 A		
		230V AC 1φ50Hz CE marking	7.5 A	9.5 A	10.0 A		
	Noise level *5 dB	55	59	61			
Exhaust heat quantity kJ/h (kcal/h)	3500 (836)		4000 (955)	5040 (1204)			

*1 At ambient temperature +23°C, with no specimen. Lowest attainable temperature performance guaranteed to max. +30°C. (ambient temp.)

*2 Performance shown above conforms to JTM K01-1998

*3 At ambient temperature above +32°C (30°C for SH-221/241), temperature pull down performances decrease and the difference between each chamber increases. It is recommended to keep ambient temperature to a maximum of +30°C (28°C for SH-221/241)

*4 At ambient temperature +23°C. For SH-641/661, make sure to check the power capability of your installation beforehand.

*5 Measurements are to be taken in an anechoic room at a height of 1.2m from the floor and a distance of 1m from the chamber front panel (ISO 1996-1:2003 _A-weighted sound pressure level)

Model	SU-221	SU-241	SU-261	SU-641	SU-661		
System	Balanced Temperature Control system (BTC system)						
Performance ¹	Temp. range ²	-20 to +150°C (-4 to +302°F)	-40 to +150°C (-40 to +302°F)	-60 to +150°C (-76 to +302°F)	-40 to +150°C (-40 to +302°F)	-60 to +150°C (-76 to +302°F)	
	Temp. fluctuation ²	±0.3°C (-20 to +100°C) [±0.54°F (-4 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (-40 to +100°C) [±0.54°F (-40 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (-60 to +100°C) [±0.54°F (-76 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (-40 to +100°C) [±0.54°F (-40 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (-60 to +100°C) [±0.54°F (-76 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	
	Temp. uniformity ²	±0.5°C (-20 to +100°C) [±0.9°F (-4 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (-40 to +100°C) [±0.9°F (-40 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (-60 to +100°C) [±0.9°F (-76 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (-40 to +100°C) [±0.9°F (-40 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (-60 to +100°C) [±0.9°F (-76 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	
	Temp. heat up time	-20 to +150°C within 55 min.	-40 to +150°C within 60 min.	-60 to +150°C within 70 min.	-40 to +150°C within 70 min.	-60 to +150°C within 80 min.	
	Temp. pull down time ³	+20 to -20°C within 20 min.	+20 to -40°C within 50 min.	+20 to -60°C within 70 min.	+20 to -40°C within 60 min.	+20 to -60°C within 90 min.	
	Lowest attainable temp. ³	-20°C (-4°F)	-40°C (-40°F)	-60°C (-76°F)	-40°C (-40°F)	-60°C (-76°F)	
Construction	Exterior material	Cold-rolled rust-proofed steel plate					
	Interior material	18-8 Cr-Ni Stainless steel plate (2B finish)					
	Insulation	Rigid polyurethane foam, glass wool					
	Door	Manually operated door with lock (hinge on left, handle on right)					
	Heater	Nichrome strip wire heater					
	Refrigeration unit	System	Mechanical single-stage refrigeration system		Mechanical cascade refrigeration system (air-cooled condenser)		
		Refrigerator	Hermetically sealed compressor				
		Refrigerator capacity	400W		[Unit 1: 400W × 1, unit 2: 400kW × 1]		
		Expansion mechanism	Capillary tube system				
		Refrigerant	R404A		R23, R404A		
Cooler	Plate fin cooler						
Air circulator	Propeller fan						
Fittings	Cable port ID φ 25mm (×2), specimen power supply control terminal, temperature recorder terminal, external alarm terminal, external output terminal, power cable						
Capacity L	22.5			64			
Chamber total load resistance kg	20						
Inside dimensions mm (inch)	W300×H300×D250 (W11.81×H11.81×D9.84)			W400×H400×D400 (W15.75×H15.75×D15.75)			
Outside dimensions mm (inch)	W440×H560×D695/722 (W17.32×H24.8×D27.36/28.43)		W440×H620×D785/812 (W17.32×H24.41×D30.91/31.97)	W540×H660×D920/930 (W21.26×H25.98×D36.22/36.61)			
Weight kg	78 (73 for 100V type)		100	123			
Utility requirements	Allowable ambient conditions	+5 to +35°C (+41 to +95°F)					
	Power supply ⁴	100V AC 1φ 50/60Hz	11.0 A	15.0 A	18.0 A		
		115V AC 1φ 60Hz	10.5 A	14.5 A	—		
		200V AC 1φ 50/60Hz	—		10.5 A		
		220V AC 1φ 50/60Hz	7.0 A	9.5 A	10.0 A		
		230V AC 1φ 50Hz CE marking	6.5 A	9.5 A	10.0 A		
Noise level ⁵ dB	55	59	61				
Exhaust heat quantity kJ/h (kcal/h)	3500 (836)		4000 (955)	5040 (1204)			

*1 At ambient temperature +23°C, with no specimen. Lowest attainable temperature performance guaranteed to max. +30°C. (ambient temp.)

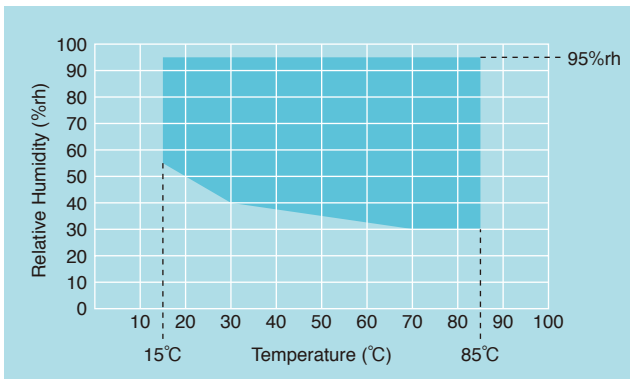
*2 Performance shown above conforms to JTM K01-1998

*3 At ambient temperature above +32°C (30°C for SU-221/241), temperature pull down performances decrease and the difference between each chamber increases. It is recommended to keep ambient temperature to a maximum of +30°C (28°C for SU-221/241)

*4 At ambient temperature +23°C. For SU-641/661, make sure to check the power capability of your installation beforehand.

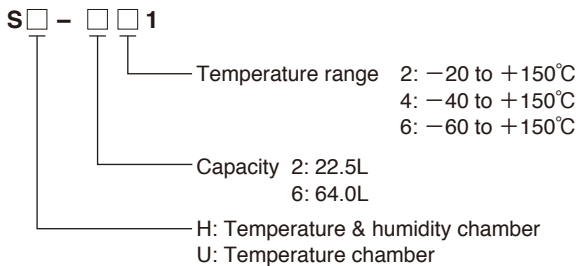
*5 Measurements are to be taken in an anechoic room at a height of 1.2m from the floor and a distance of 1m from the chamber front panel (ISO 1996-1:2003 _ A-weighted sound pressure level)

TEMPERATURE & HUMIDITY CONTROL RANGE (SH)



* At ambient temperature +23°C

MODEL



SAFETY DEVICES

- Leakage breaker
- Thermal fuse
- Boil dry protector (SH only)
- Control circuit short-circuit protective fuse
- Overheat and overcool protector
- Air circulator temperature switch
- Specimen power supply control terminals
- Refrigerator overload relay
- Refrigerator high pressure switch
- Test area door switch
- Upper and lower temperature (& humidity) limit alarms (Built-into temperature [humidity] controller)
- Burn-out detection circuit (Built-into temperature [humidity] controller)
- Watchdog timer (Built-into temperature [humidity] controller)
- Refrigerator automatic delay circuit (Built-into temperature [humidity] controller)

ACCESSORIES

- Shelf 1
 - Capacity
 - SH/ SU-221, 241, 261: 500g
 - SH/ SU-641, 661: 5kg
 - Max. number of shelves
 - SH/ SU-221, 241, 261 5 (Shelf pitch 35mm)
 - SH/ SU-641, 661 5 (Shelf pitch 50mm)
- Connector
 - 2P for connecting terminal for temp. & humid. recorder SH:2/ SU:1
 - 6P for connecting signal terminal 1
- Cable port plug 2
- Cartridge fuse 3A 1
- Socket adapter (100V, 115V on 20L type only) 1
- Wet-bulb wicks (box of 24; SH only) 1
- Humidifying tray drain hose 2m 1 (SH only)
- Water tank drain hose 0.3m 1 (SH only)
- User's manual 1



DANGER

- Do not use specimens which are explosive or inflammable, or which contain such substances. To do so could be hazardous, as this may lead to fire or explosion.
- Do not place corrosive materials in the chamber. If corrosive substances or liquid is used, the life of the unit may be significantly shortened specifically because of the corrosion of stainless steel, resin and silicone materials.



CAUTION

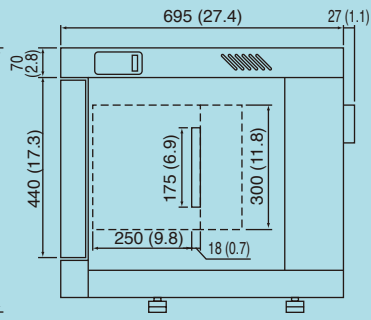
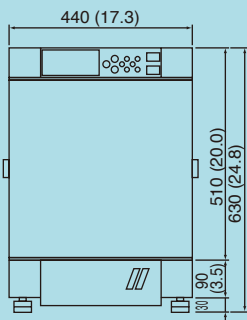
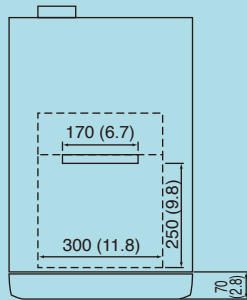
- Do not place life forms or substances that exceed allowable heat generation.

Be sure to read the user's manual before operation.

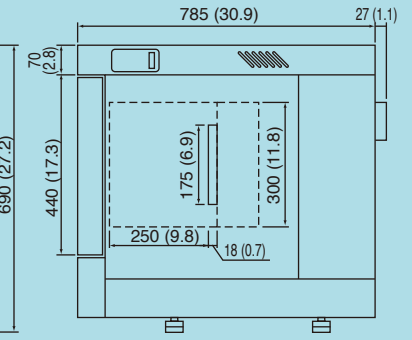
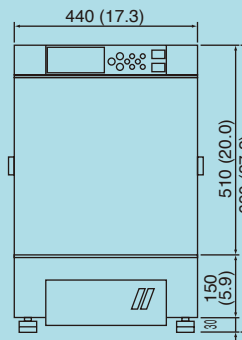
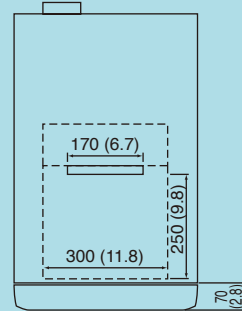
DIMENSIONS

unit:mm (inch)

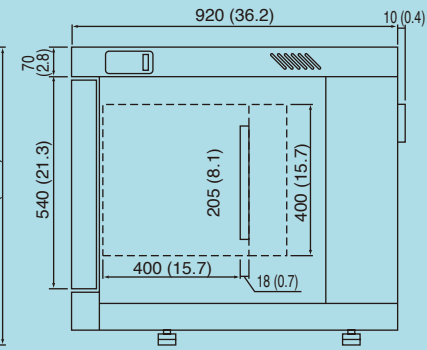
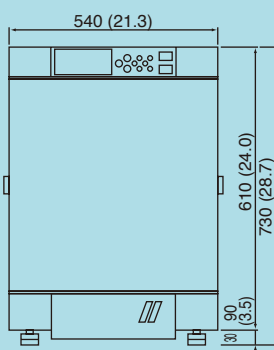
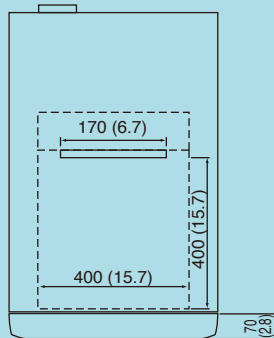
● SH-221·241



● SH-261



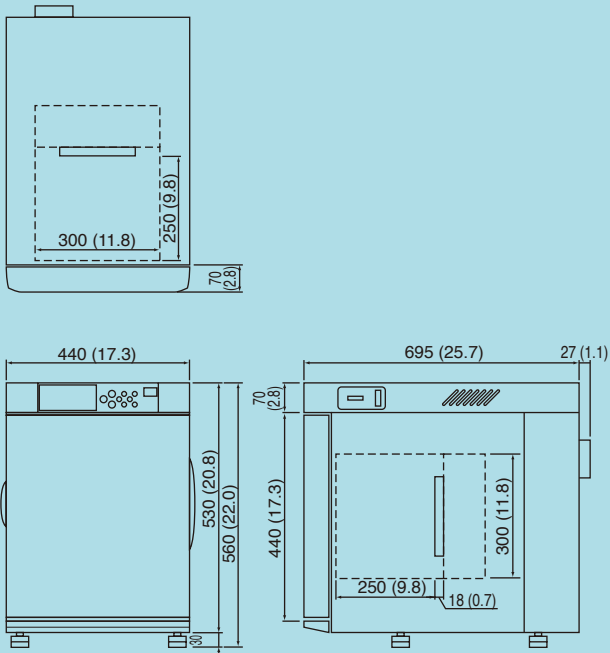
● SH-641·661



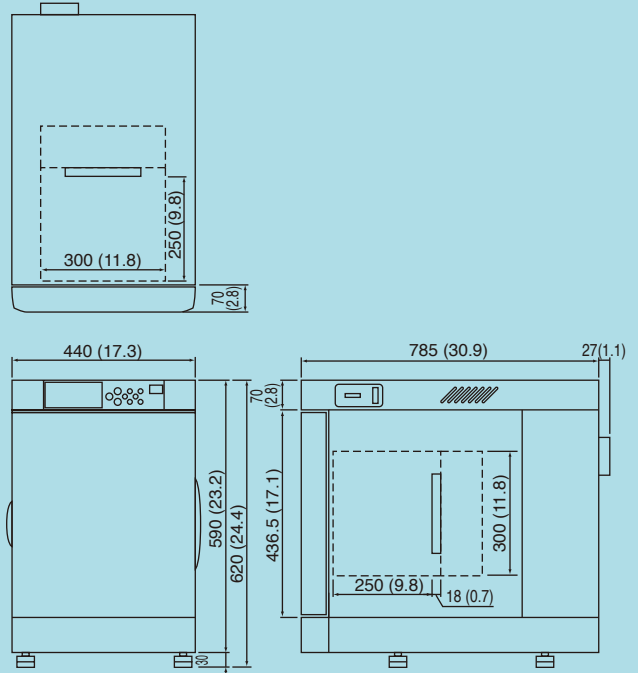
DIMENSIONS

unit:mm (inch)

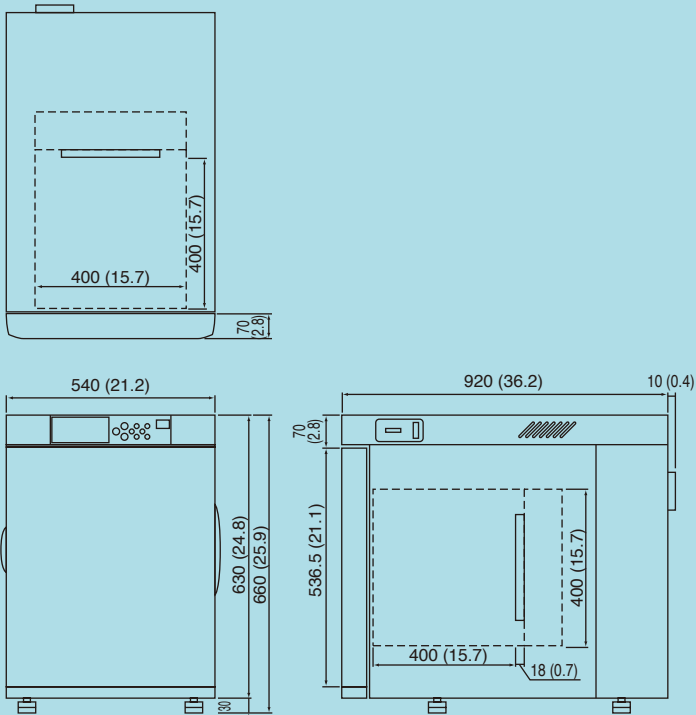
● SU-221•241



● SU-261



● SU-641•661



OPTIONS

Paperless recorder-Portable type

Records temperature of each section such as the temperature inside the chamber.

[Temperature type]

Temperature range: -100 to $+200^{\circ}\text{C}$

Number of inputs (Initial setting):

Temperature 1

(5 more channels can be turned ON)

Data saving cycle: 5 sec

Portable type

External recording media:

CF memory card (256MB)

USB port

Language support: ENG, JPN

[Temperature and humidity type]

Temperature range: -50 to $+150^{\circ}\text{C}$
 -100 to $+150^{\circ}\text{C}$

Humidity range: 0 to 100%rh

Number of inputs (Initial setting):

Temperature 1 / Humidity 1

(4 more channels can be turned ON)

Data saving cycle: 5 sec

Portable type

External recording media:

CF memory cord (256MB)

USB port

Language support: ENG, JPN



Paperless recorder Portable type

Temperature recorder (Portable type)

- SRJ25
- -100 to $+200^{\circ}\text{C}$
 - 100mm
 - Portable type
 - 6 dots
 - (Thermocouple type T
(Copper/ Copper-Nickel))
 - Free power supply
(100V AC to 240V AC)

Temperature & humidity recorder (Portable type)

- SRJ14
- -100 to $+150^{\circ}\text{C}$ /
0 to 100%rh (for SH)
- SRJ12
- -50 to $+150^{\circ}\text{C}$ /
0 to 100%rh (for SH)
 - 100mm
 - Portable type
 - 6 dots
 - (Temperature: 5 dots
Thermocouple type T
(Copper/ Copper-Nickel)
Humidity: 1 dot
DC1 to 5V)
 - Free power supply
(100V AC to 240V AC)



Wet-bulb temperature detecting terminal

For the test area wet-bulb temperature detection. A thermocouple type T (Copper/Copper-Nickel) or of equivalent thermoelectric capacity is used. Connector included.

* Not available for SU.

Thermocouple

Attached to specimens to measure specimen temperature.

- Thermocouple type T without ball
(Copper / Copper-Nickel)

* Same as accessory items

Viewing window

SH/SU-221, 241, 261 W215×H215mm
 SH/SU-641, 661 W215×H315mm

When equipped with a viewing window, chamber performance are as follow:

Temperature uniformity :

$\pm 1.0^{\circ}\text{C}$ (-20 to $+100^{\circ}\text{C}$)

$\pm 1.5^{\circ}\text{C}$ (-100.1 to $+150^{\circ}\text{C}$)

Humidity uniformity : $\pm 5.0\%$ rh

Temp. heat up rate:

Std rate +10 min. (or less)

Temp. pull down rate:

Std rate +10 min. (or less)

($+20$ to -35°C)

Std rate +30 min. (or less)

($+20$ to -60°C)



W215×H215mm

Inner door

Glass door provided inside the chamber, to observe the conditions of the specimens.

* A wiper is included for SH models.

* This option is not compatible with a viewing window or right-opening door.

* Used for observation of the specimens inside the chamber.



SU model

OPTIONS

Right-opening door

Door can be changed for a reverse one (hinges on the right, handle on the left)

* This option is not compatible with inner glass door option.



Additional cable port

Provided in addition / replacement of the standard cable ports.

25, 50 or 100 mm diameter, or flat cable port

* Each cable port is equipped with a silicone sponge rubber plug.

* Basic specification of the chamber may not be met when equipped with a cable port.



25mm diameter type

flat type

Cable port rubber plug

Prevents air leakage from the cable port.

Auxiliary water tank circuit (SH)

Used to automatically refill the standard tank with the auxiliary water tank.

- Pure water supply (electrical conductivity 0.1 to 10 μ S/cm)
- Water supply pressure: 4.9 to 19.6KPa (Gauge)

Auxiliary water tank (SH)

Used to refill the standard tank.

Tray for auxiliary tank (SH)

Prevents water leakage during standard tank refill process.

Shelf

Equivalent to standard accessory:

SH/SU-221, 241, 261

- Effective size W200×D150 mm
- Load resistance 500gr.

SH/SU-641, 661

- Effective size W300×D300 mm
- Load resistance 5kg.

Specimen basket

Equivalent to standard accessory.

- Material: Stainless steel (5 mesh)



Stand

Enhances the mobility of the chamber, and facilitates load/ unload of specimens.

L stand can fit under the H stand to save space.

* Be sure to secure the stand to the floor with the provided anchor bolts.

- L stand

SH/SU-221, 241:

W440×H450×D750mm (25kg)

SH/SU-261:

W440×H390×D750mm (21.5kg)

SH/SU-641, 661:

W540×H350×D860mm (28kg)

- H stand

SH/SU-221, 241, 261:

W630×H1140×D815mm (36kg)

SH/SU-641, 661:

W730×H1140×D925mm (40kg)



L stand



Two chambers stacked (L and H stands)

OPTIONS

Interface

- GPIB
- RS-232C

* Select one, instead of standard RS-485

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ISO 9001/JIS Q 9001

Quality Management System Assessed and Registered

ESPEC CORP. has been assessed by and registered in the Quality Management System based on the International Standard ISO 9001:2008 (JIS Q 9001:2008) through the Japanese Standards Association (JSA).

* Registration : ESPEC CORP.
(Overseas subsidiaries not included)

ISO 14001 (JIS Q 14001)

Environmental Management System Assessed and Registered

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