Quality is more than a word

ESPEC

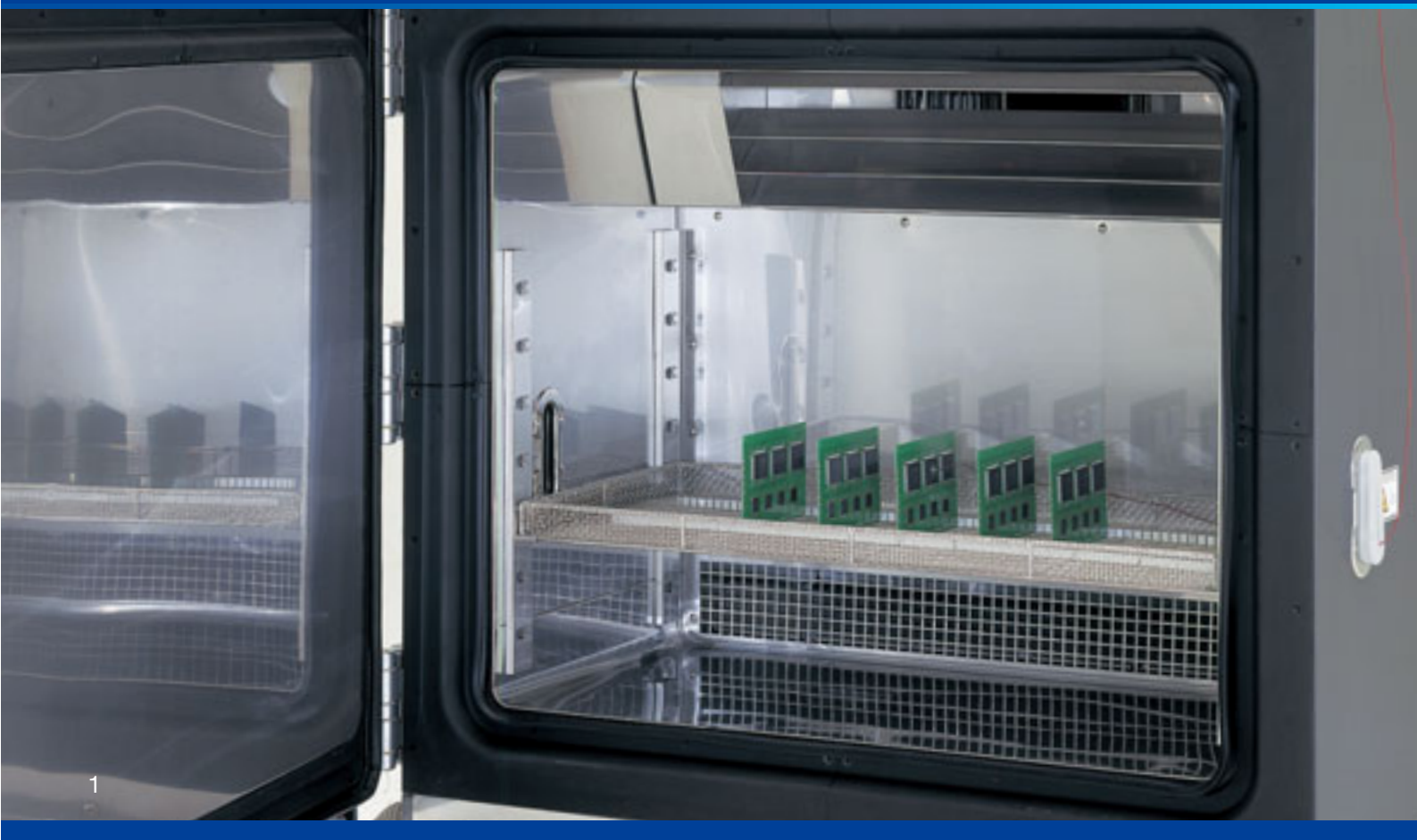
Rapid-Rate Thermal Cycle Chamber

TCC-150W

CAT.NO.E06132-X1203

High temperature rate of change with uniformity and reproducibility

Covering various applications from JEDEC and IEC test standards to screening, the Rapid-Rate Thermal Cycle Chamber is ideally suited for specimen test requiring quick changes of temperature.
It is equipped with advanced technologies such as the specimen temperature control, that allows linear specimen temperature rates of change during rapid thermal cycling, or accurate temperature ramp control.
ESPEC once again dedicates its great experience in environmental test business to fully satisfy its customers.

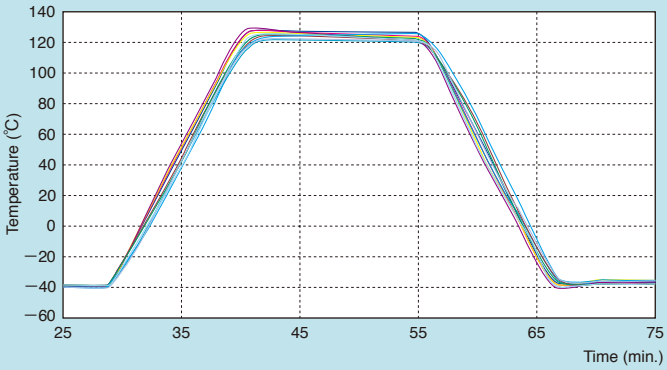


*The emergency stop switch, paperless recorder and casters are optional.

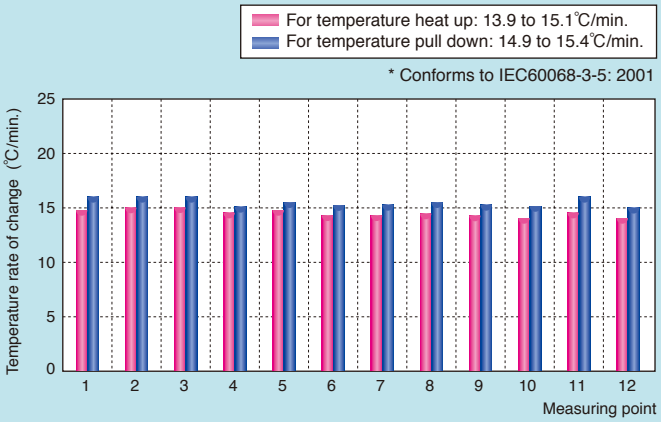
Performance

Temperature change (example)

■ Temperature change measurement data



■ Temperature rate of change at twelve measuring points (Average)

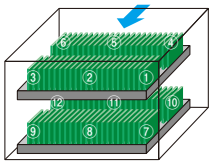


Test conditions

High temp. soak : +125℃
Low temp. soak : −40℃
Ramp rate : 15℃/min.
Control point : Air outlet sensor
Specimen : Printed Circuit Board, 145 × 130 mm, 90 pcs.

Measurement method

As shown on the right, thermocouples are attached to the specimens at twelve measuring points.



Uniform and reproducible temperature rate of change

Through simulation of wind volume and wind speed, the TCC-150W achieves minimum specimen temperature variations, enabling more accurate quick temperature change testing. For specimen temperature, the ramp rate is 15℃/ min. For air temperature, the ramp rate is 23℃/ min. (temperature heat up average)

Meets International standards

Designed to comply with major environmental test standards like IEC, JEDEC, SAE… (p.7)

Performance

Temperature ramp control function

To maintain a constant temperature rate of change for specimens testing, the TCC-150W uses a sensor (positioned by the user) for specimen temperature measurement, and a high-speed controller that enables accurate control. High-speed measurement and control processing are now possible. The TCC-150W also uses dedicated technologies for specimen temperature ramp control, such as:

- Technology to increase refrigeration capacity at low temperatures;
- Conditioning technology to minimize differences between specimen temperature and air temperature in the chamber;
- Technology to ensure airflow speed uniformity so that specimen temperature variations can be minimized.

Specimen temperature control and air temperature control

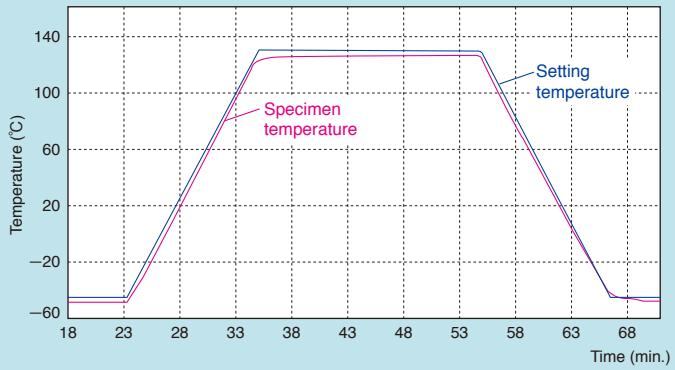
The TCC-150W chamber offers two temperature control modes:

- A specimen temperature control mode allowing a specimen temp. ramp rate to 15℃ / min. conforms to JEDEC standard requirements;
- An air temperature control mode to be used for temperature cycling tests.

This chamber supports a wide range of applications and covers various standard tests and screening.

Specimen temperature ramp control (Example)

■ Specimen temperature control data



Test conditions

High temp. soak	: +130℃
Low temp. soak	: −45℃
Ramp rate	: 15℃/min.
Control point	: Front center specimen on the lower level
Specimen	: Printed Circuit Board, 145 × 130 mm, 90 pcs.

Measurement method

45 specimens placed in two rows on two levels in the specimen basket, with thermocouples attached to the surface of each specimen at the control point.

Utility

Test area

Specimen temperature input terminal (Left)
Specimen power supply control terminal (Right)

Cable port

Paperless recorder (Option)

Boast of large test area capacity

The test area large capacity allows to test up to 60 B-5 size (vertical position) printed circuit boards at once.

Easy wiring access

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

Door hinge with auto-closing prevention

The door is equipped with hinges preventing auto-closing. When the door is open or closed, the chamber temporarily stops at 60 and 120 degrees to ensure greater safety.

Comprehensive safety system

Various safety devices and functions ensure secured use of the equipment: for example, attempting to start operation without locking the door properly will result in the triggering of an alarm buzzer.

Material labeling for easy recycling

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

Paperless recorder (option)

A built-in paperless recorder is available to record temperatures from various sources, such as test area temperature. Recording is possible on Compact Flash Card or via USB port.

Control operation

Color LCD interactive touch-screen system

Operation and settings simplified by the use of a touch-screen LCD display (instructions displayed on-screen). At-a-glance confirmation of test patterns, test area temperatures, temperature cycles, upstream / downstream control, and trend graphs display.

Three operation modes

The TCC-150W features three operation modes: Program Operation, Constant Operation, and Cycle Operation, allowing easy operation of various test patterns.

Door-mounted instrumentation

Instrumentation including the touch-screen controller is incorporated into the door. It reduces the overall footprint and frees up both sides of the chamber for easy access.

Setting	Interactive key input by touch panel
Display	TFT Color LCD (6.5 inch)
Temperature control function	Air temperature, Specimen temperature
	PID control
Setting resolution	Temperature: 1°C
Input	Thermocouple type T (Copper/ Copper-Nickel)
Operation mode	Program operation Constant operation Cycle operation
Setting and indication ranges	Constant operation Temperature: −75 to +185℃ Program operation Temperature: −75 to +185℃ Time: 0 to 999 hours 59 min. Cycle operation High temperature soak: +60 to +180℃ Low temperature soak: −70 to 0℃ Soak time: 1 min. to 99 hours 59 min. Ramp rate: 5℃/ min. to 15℃/ min.
Test patterns	Program operation User's pattern: 10 programs Fixed pattern: 10 programs Cycle operation User's pattern: 10 programs
Accessory functions	Timer preset High/ Low temp. limit alarm Chamber/ specimen temp. control Soak control Quick soak Power failure/ recovery operation selection Program memory Programmed time display Test suspension Test completion mode selection Trend graph Alarm history display Sensor offset RS-485 communication

Instrumentation

Program setting

Test settings

Alarm

Error description

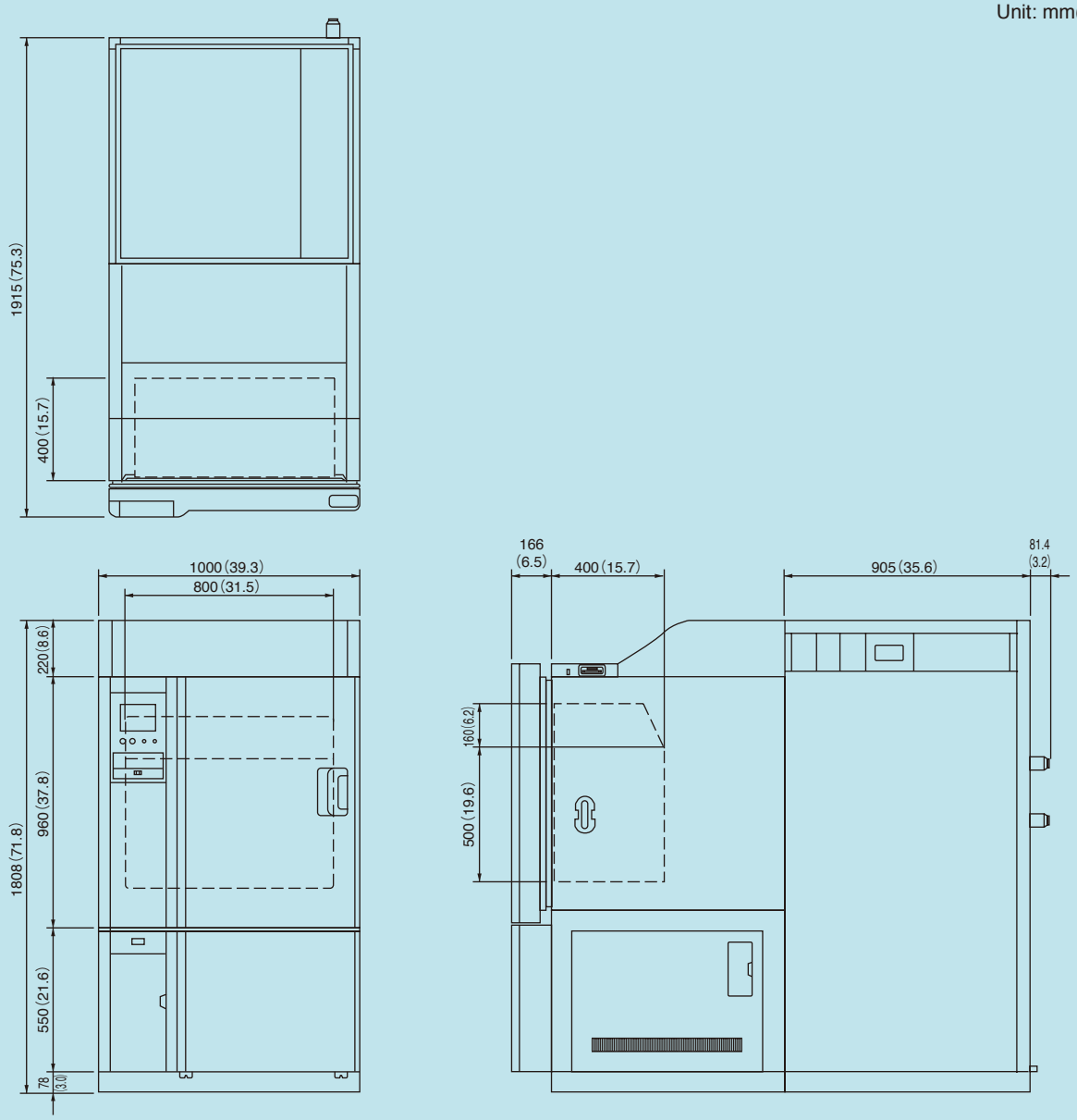
Service guide

TEST STANDARD (TCC-150W COMPATIBILTY)

Test standard		Temperature setting		Temperature change rate	Soak time	Number of cycles
		High temperature (℃)	Low temperature (℃)			
IEC 60749-25 (JESD22-A104-D)	G	+125 (+15, −0)	−40 (+0, −10)	Specimen temperature, 15℃ / min. or less	1, 5, 10, 15 min.	Not specified
	I	+115 (+15, −0)	−40 (+0, −10)			
	J	+100 (+15, −0)	0 (+0, −10)			
	K	+125 (+15, −0)	0 (+0, −10)			
	L	+110 (+15, −0)	−55 (+0, −10)			
	N	+80 (+15, −0)	−30 (+0, −10)			
	O	+125 (+15, −0)	−25 (+0, −10)			
IEC 60068-2-14 Nb (JIS C 60068-2-14 Nb)		+175 ±2 +155 ±2 +125 ±2 +100 ±2 +85 ±2 +70 ±2 +55 ±2 +40 ±2 +30 ±2	−65 ±3 −55 ±3 −40 ±3 −25 ±3 −5 ±3 +5 ±3	1±0.2℃ / min. 3±0.6℃ / min. 5±1.0℃ / min. (AVG) Average for up to five minutes	3 hours, 2 hours, 1 hour, 30 min., 10 min. 3 hours if not specified in product specifications	2
IEC-61747-5 (EIAJ ED-2531A)		+100 ±2 +95 ±2 +90 ±2 +85 ±2 +80 ±2 +75 ±2 +70 ±2 +65 ±2 +60 ±2 +55 ±2 +50 ±2 +45 ±2 +40 ±2 +35 ±2 +30 ±2	−50 ±3 −45 ±3 −40 ±3 −35 ±3 −30 ±3 −25 ±3 −20 ±3 −15 ±3 −10 ±3 −5 ±3 −0 ±3	1±0.2℃ / min. 3±0.6℃ / min. 5±1.0℃ / min. (AVG) Average for up to five minutes	3 hours, 2 hours, 1 hour, 30 min., 10 min. 3 hours if not specified in product specifications	2
JESD22-A105-B	A	+85 (+10, −0)	−40 (+0, −10)	6.25℃ / min.	10 min.	1000
	B	+125 (+15, −0)	−40 (+0, −10)	5.5℃ / min.		
IPC-9701	TC1	100	0	Specimen temperature, 20℃ / min. or less	Specimen temperature, 10 min.	200 500 1000 3000 6000
	TC2	100	−25			
	TC3	125	−40			
	TC4	125	−55			
	TC5	100	−55			
IPC-TM-650 2.6.6	A	+125 (+3, −0)	−65 (+0, −5)	——	30 min.	5
	B	+85 (+3, −0)	−55 (+0, −5)			
SAE-J1211		+85～+150	−40	4 to 6℃ / min.	Low temperature, 4 hours	——

DIMENSIONS

Unit: mm(inch)



SPECIFICATIONS

Model			TCC-150W				
System			Balanced Temperature Control system (BTC system)				
Performance *1	Temperature range		−70 to +180℃ (−94 to +356°F)				
	Temperature fluctuation		±0.5℃ −70 to +180℃ (−94 to +356°F), after temperature stabilization				
	Temperature change	Temperature range	−45 → +155℃ *2 Target temp.: −70 → +180℃	+155 → −45℃ *2 Target temp.: +180 → −70℃	−23.5 → +108.5℃ Target temp.: −40 → +125℃	+108.5 → −23.5℃ Target temp.: +125 → −40℃	+108.5 ⇔ −23.5℃ Target temp.: +125 ⇔ −40℃
		Specimen	None	None	None	None	Yes *3
		Control target	Chamber temp.	Chamber temp.	Chamber temp.	Chamber temp.	Chamber temp. or Specimen temp.
		Ramp control	Off	Off	Off	Off	On
		Performance	23℃ / min.	18℃ / min.	26℃ / min.	20℃ / min.	15℃ / min.
	Allowable heat load		8 kW (−20℃ or more)				
Construction	Exterior material		Cold-rolled rust-proofed steel plate				
	Interior material		18-8 Cr-Ni Stainless steel plate				
	Insulation		Chamber body: Foamed polyurethane, glass wool Door: Glass wool, formed resin				
	Door		Single door (hinge on left, handle on right)				
	Heater		Nichrome strip wire heater				
	Refrigeration unit	System	Mechanical cascade refrigeration system (water-cooled condenser)				
		Compressor	Scroll-type				
		Expansion system	Electronic expansion valve				
		Refrigerant	R404A, R23				
	Cooler		Plate fin cooler				
	Air circulator		Sirocco fan				
Fittings			Cable port ϕ 25 × 100mm (×2), right & left side, specimen power supply control terminal, specimen temperature input terminal, time signal terminal, cooling tower interlock terminal, integrating hour-meter, RS-485 connector				
Chamber total load resistance			50 kg				
Inside dimensions			W800 × H500 × D400 mm (W31.50 × H19.69 × D15.75 inch)				
Outside dimensions *4			W1000 × H1808 × D1915 mm (W39.37 × H71.18 × D75.39 inch)				
Capacity			160 L				
Weight			950 kg				

*1 The performance values are based on IEC60068-3-5:2001JTM K07:2007, under the conditions of a +23℃ ambient temperature, cooling water temperature +25℃, rated voltage, and no specimen.

*2 Refer to Fig on page 10.

*3 Specimen: (glass epoxy PCB) 5kg + Jig: 4kg (ESPEC standard jig)

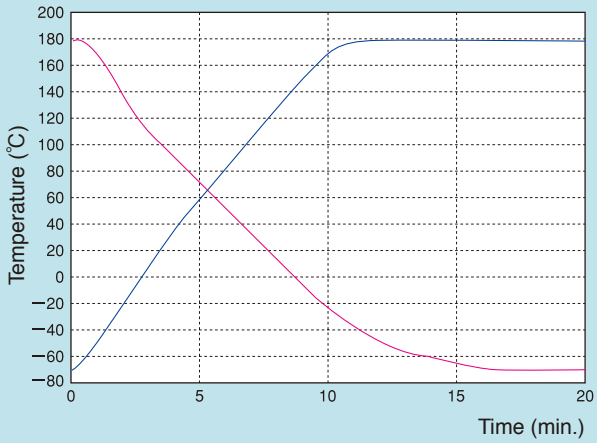
*4 Excluding protrusions.

SPECIFICATIONS

Model			TCC-150W
Utility requirements	Allowable ambient conditions		+5 to +35℃ (+41 to +95°F)
	Power supply	200V AC 3 ϕ 50/60Hz	115A
		208V AC 3 ϕ 60Hz *5	115A
		220V AC 3 ϕ 60Hz	111A
		380V AC 3 ϕ 50Hz	61A
		400V AC 3 ϕ 50Hz	60A
	Cooling water supply pressure *6		0.2 to 0.5 Mpa (2 to 5 kg/cm²G)
	Cooling water supply rate *7		4100L/h (at reference water temp. +25℃), 7850L/h (at reference water temp. +32℃)
	Piping connection size		Carbon steel pipe, ID 32 mm (drain and supply)
	Operating cooling water temp. range		+5 to +32℃ (+41 to +89.6°F)
Noise level *8			Max. 65 dB

*5 In compliance with the requirements of the National Electric Code (NFPA 70) for the United States of America (NEC spec.)
*6 Rate depends on the cleanliness of the heat exchanger
*7 A pressure regulator valve is required if the pressure exceeds 0.5MPa (5kg/ cm²G)
*8 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 (JIS-Z-8731:1999 A-weighted sound pressure level).

TEMPERATURE CHANGE GRAPH



Temperature range: — −45 to +155℃ (setting: −70, +180℃)
— +155 to −45℃ (setting: +180, −70℃)
Specimen load: None
Temperature control: Chamber temperature
Ramp control: Off
Performance: — Max. 9 min. (32℃ or more/min.)
— Max. 11 min. (18℃ or more/min.)

Safety precautions

- 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.
- Do not place life forms or substances that exceed allowable heat generation.
- Be sure to read the operation manual before operation.

SAFETY DEVICES

- Leakage breaker (200, 220, 380V AC)
- Circuit breaker (208, 400V AC)
- Electrical compartment door switch
- Chamber door switch
- Thermal fuse
- High & low temperature limit alarm (Built into temperature controller)
- Overheat protector
- Circuit breaker
- Refrigerator thermal relay
- Refrigerator high/ low pressure switch
- Temperature switch for compressor
- Cooling water pressure switch
- Thermal relay for air circulator
- Circuit breaker for heater
- Motor reverse-prevention relay
- Cartridge fuse
- Specimen power supply control terminal
- Cooling tower interlock terminal

ACCESSORIES

- Flat cable port rubber plug (Silicone sponge rubber) 2
- Specimen basket (18-8 Cr-Ni stainless steel: 5 mesh per inch) 2
  W700×H40×D346 mm/ load capacity 5kg
- Shelf brackets (7 positions available, pitch 60mm) ..... 2 sets
- Cartridge fuse
  - 200V AC
    - Class A, 250V 3A 2
    - Class A, 250V 6A 1
  - 208V AC
    - Class A, 250V 7A 2
    - Class A, 250V 6A 1
  - 220V AC, 380V AC, 400V AC
    - Class A, 250V 4A 1
    - Class A, 250V 5A 1
    - Class A, 250V 6A 1
- Specimen temperature measuring thermocouple 1
- Specimen temperature input connector 1
- 3-pole socket (208V AC spec.only) 3
- Strainer R1¼ in. (32mm) 1
- Nipple R1¼ in. (32mm) 1
- Strainer element R1¼ in. (32mm) 1
- Operation manual ..... 1 set

OPTIONS

Paperless recorder

Records temperature of each section such as the temperature inside the chamber.
Number of inputs (Initial setting):
2 (4 more channels can be turned ON)
Data saving cycle: 5 seconds
Temperature range: −100 to +200℃
External memory media:
CF memory card (256 MB)
USB port
Language support: ENG/ JPN

Paperless recorder

Temperature recorder (digital)

−100 to +220℃ /100 mm
- RK-63: 3 pens
- RK-64: 6 dots

Temperature recorder

Recorder wiring

Preparation of a power cable, temperature sensor, and a grounding wire for additional installation in the future.

OPTIONS

Recorder terminal

Used to output the temperature within test area and specimen temperature.

Thermocouple

Attached to specimens to measure specimen temperature.
・Thermocouple type T without ball (Copper/ Copper-Nickel)
* Same as accessory items

Temperature attainment output

When the temperature in the chamber reaches the set values, the chamber sends out a contact signal.

Integrating hour meter with reset

Additional accessory to the standard hour meter, allowing reset.

Additional overheat protector

Additional preventive measures can be taken for excessive temperature rise in the chamber, in addition to the standard equipped overheat protector.

Overcool protector

If the temperature inside the chamber decreases excessively, the chamber stops operating to prevent the specimens from being damaged.

External alarm terminal

If the safety device of the chamber is activated, the external alarm terminal will notify it to a remote point.

Emergency stop pushbutton

Stops the chamber immediately.

Additional cable port

Provided in addition to the standard cable ports. (Right & left sides)
Location: Right & left side of the main unit
Internal diameter: ϕ25 × 100 mm
* This cable port cannot be retrofitted on the field.

Cable port rubber plug

Prevents air leakage from the cable port.

Specimen basket / shelf bracket

Equivalent to standard accessory.
・Material: Stainless steel (5 mesh)

Anchoring fixtures

Used to bolt the chamber to the floor.

Casters

Installed for mobility.
Casters: 4
Levelling-feet: 4

Chamber dew tray

Prevents water leaks from the chamber onto the floor.
* The use of casters is recommended to facilitate operation.

Interface

・RS-232C
・GPIB
* Select one instead of standard RS-485.

Communication cables

・RS-485 5m/ 10m/ 30m
・RS-232C 1.5m/ 3m/ 6m
・GPIB 2m/ 4m

Power cable

・5 m
・10 m
* Not applicable for optional 208V, 220V, 380V and 400V AC power supply specification.

■Some photographs presented in this catalog contain Japanese display.

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

ISO 14001 (JIS Q 14001)
Environmental Management System Assessed and Registered

ESPEC CORP.

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