

# Thermal Shock Chambers

## TSA Series



# In pursuit of Eco-friendly, User-friendly and Utility-friendly Performance

Thermal shock testing performance should consistently meet customers' stringent requirements.

The new TSA Series offer numerous user-friendly features providing the impressive performance required for today's testing.

This thermal shock testing system features shorter temperature recovery and heat-up and pull-down rates, reduced energy consumption, ozone-friendly HFC refrigerant, marked to make recyclable materials (for molded plastic parts), and reduced noise and space requirements.

TSA - 71



TSA - 101



\*The recorder, caster, automatic door and total cycle counter are optional items.

## Low energy consumption, preservation of the ozone layer and protection of natural resources Environmental technologies resulting from heightened environmental awareness.



Time signal part (material marked)



Cable port plug (material marked)

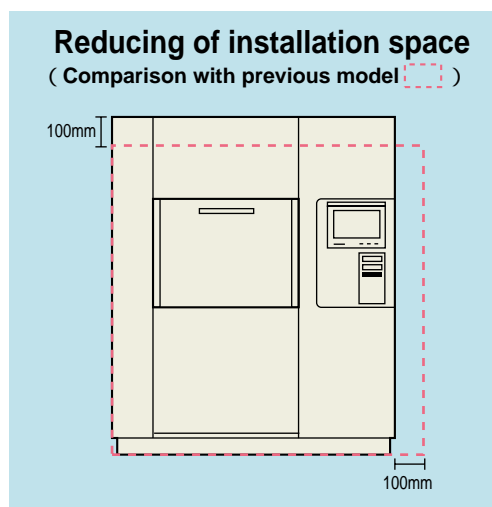
### Full load current

Model	Current model	Previous model	Contrast
TSA - 71H	112A	135A	- 23
TSA - 71S	80A	109A	- 29
TSA - 101S	80A	123A	- 43
TSA - 201S	130A	154A	- 24
TSA - 41L	43A	49A	- 6
TSA - 71L	60A	78A	- 18
TSA - 101L	60A	83A	- 23
TSA - 301L	130A	154A	- 24

### Minimum required electricity

Model	Current model	Previous model
TSA - 71H	125A	150A
TSA - 71S	100A	125A
TSA - 101S	100A	150A
TSA - 201S	150A	175A
TSA - 41L	50A	60A
TSA - 71L	75A	100A
TSA - 101L	75A	100A
TSA - 301L	150A	175A

\*The data above are example of AC200V.



### Low energy consumption

ESPEC has enhanced performance by redesigning the series and developing a new refrigeration control system.

These steps have significantly improved energy efficiency by reducing energy consumption by as much as 37% (compared with previous model (AC200V)).

### Ozone layer protection

The HFC refrigerant used is completely safe for the ozone layer.

### Recycling

Material of recyclable molded resin are all clearly marked.

### Reduced load current

A lower full-load-current means less stress on customers' power system.

### Efficient space utilization

The space required by the controller unit has been reduced by 100 mm to reduce installation space. A vertically sliding door is used for the test area to improve space efficiency. Also equipment weight has been reduced by modifying component parts.

### Reduced operating noise

Operating noise has been reduced to less than 65 dB to improve user comfort.

( Measurement location: 1 m from front of chamber  
1.2 m height  
Measurement conditions: Characteristic set A  
May vary depending on environmental conditions. )

# User-friendly

## "Faster testing" Improved performance and high uniformity. Makes testing faster and more reliable.

### ● Temperature recovery improved

Temperature recovery performance has been improved by shortening the temperature recovery time and the temperature heat-up and pull-down rates, which in turn reduces testing times.

A temperature recovery time of less than five minutes has been achieved for the upstream air of 2-zone (+150 / -65 ) and 3-zone operation (temperature recovery time for TSA-201S and TSA-301L is less than 10 minutes).

### ● Superior uniformity

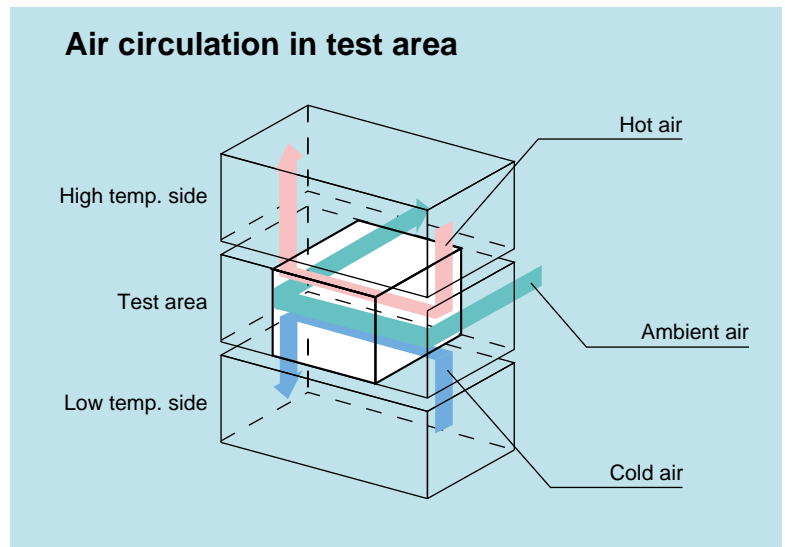
The side-flow system in which air flows horizontally through the test area provides superior specimen temperature uniformity performance.

### ● Faster set-up times

When using the built-in timer to precondition the chamber for use, the system automatically uses the shortest time required to save energy.

### ● Paperless Recording (optional)

The paperless recorder records temperature of each section such as the temperature inside the chamber to memory card (Compact Flash).



Test area (101 type)



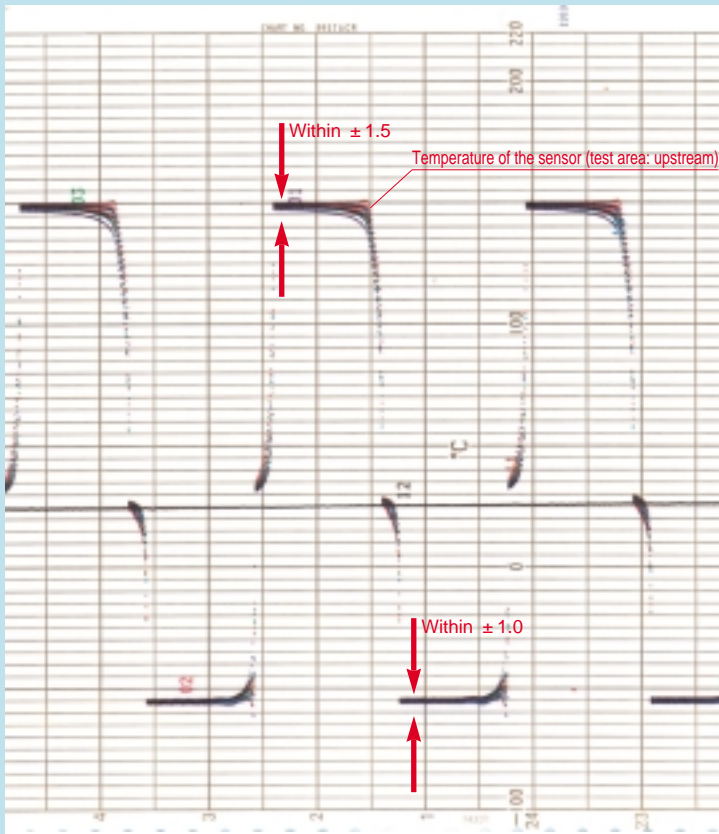
Paperless recorder (optional) \*The recorder screen is image.

## ● Temperature uniformity performance Measurement example from TSA-71L-A

### Test conditions

High-temp exposure: + 150 for 30 min  
Ambient temp exposure: 5 min  
Low-temp exposure: - 55 for 30 min  
Specimens: Plastic molded ICs 2.5 kg

Temperature uniformity measurement method  
Thermocouples were embedded in 10 plastic molded ICs (16-pin DIPs), which were then placed on two levels in each of the corners and in the center of a specimen basket.



## ● High performance (temperature uniformity)

The excellent temperature uniformity results in superior specimen temperature control, ensuring that uniform stress is applied on the specimen.

## ● Less defrosting saves time

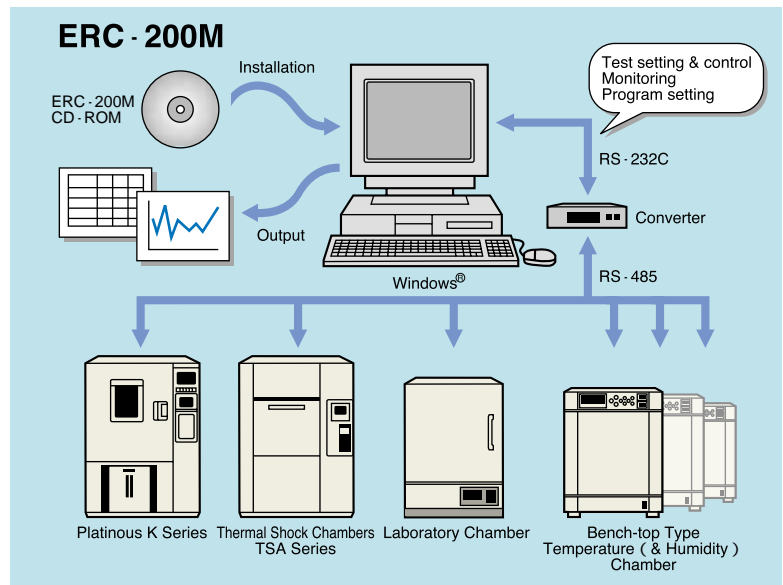
The formation of frost on the cooling unit has been minimized by improving its structure and insulation. This greatly reduces time lost for defrosting, thus enhancing the testing time.

## ● Compatibility

The test data is fully compatible with earlier TSA series .

## Communication Network of Environmental Test Chambers

Thermal shock chamber incorporates the communication port RS-485 as standard to cope with the [ E-PILOT 21 ], which is a newly developed centralized control system. [ E-PILOT 21 ] not only serves as a system for centralized control of environmental chambers, but also establishes an open network including specimen measurement function and remote chamber main-tenance function.



### E . PILOT《ERC-200M》

Control, monitoring, programming, and datalogging for up to 16 ESPEC chambers can be performed through a single PC. RS-485 from ESPEC chambers connect via a serial bus converter to RS-232C on the PC.  
(Monitoring only for thermal shock chambers)

#### Remote operation

Have full control of test chambers while sitting in your office.

#### E-BUS version available

For existing units with E-BUS system, ERC-100M is available.

### E . PILOT《ERC-300M》

Set up an Intranet Web-PILOT site to allow monitoring of up to 16 chambers (as for Thermal shock chamber up to 4 chambers) through one PC (possible with E-BUS communications system). Monitor the settings and operation of your chambers from any PC on the Intranet. Web-based method allows display of chamber information across many computer platform types.

\* The series of application softwares and network systems are provided on a separate basis from the chamber.

### E . PILOT《Lab-VIEW》

Provides an interlocking system of testing and measuring devices that allows customers currently using Lab-VIEW to link to ESPEC chambers, opening new horizons for environmental testing. Optional E-BUS communications interface is required.

Driver software to connect test chambers are provided for free

Lab VIEW drivers are available to give the basic building blocks for addressing ESPEC equipment. Drivers required for connecting ESPEC products to a personal computer is provided for free. For further information, please contact your nearby ESPEC sales office.

### CMS . J30

This is a fully customizable system that provides centralized control, centralized monitoring, remote operation and specimen data management of ESPEC products (up to 32 units of which 16 are dedicated to centralized monitoring) by the use of a PC. (E-BUS compatible)

\* Please contact us for further information.

# Control operation

**Automated preheating / precooling settings and timer settings.  
Interactive 10.4 inch color touch-panel screen for ease of use.**



Temperature recorder is optional.

- The 10.4 inch diagonal (26cm) screen allows easy confirmation of testing patterns, test area temperature, number of testing cycles, upstream and downstream air flow control, remaining exposure time, and the test completion time.
- The upstream and downstream air flow temperature in the test area can be displayed in real time on a graph.
- Includes 20 standard test patterns with an additional 40 test patterns able to be stored.
- If a test is interrupted, the test resume function allows the user to restart the test from the point of interruption or from the beginning.
- If a problem arises, the details are displayed together with advice for correction or recovery.

Setting	Interactive key input by touch panel
Display	TFT Color LCD (10.4 inch)
Temperature control function	Test area: exposure temp High-temp chamber: pre-heating temp Low-temp chamber: pre-cooling/defrosting temp
	PID control
Setting and indication resolution	Temperature: 1 Time: 1 minute (Time left display in 1second)
Input	Thermocouple type T (Copper/Copper-Nickel)
Setting range	Exposure time: 1min ~ 99 hours 59 min Test cycle: 1 ~ 9999 cycles
Test patterns	RAM mode: 40 patterns (writable) ROM mode: 20 standard test patterns (registered)
Accessory function	<ul style="list-style-type: none"> <li>• Timer preset function</li> <li>• Test continuity selection function</li> <li>• Overheat/overcool protection function</li> <li>• Up-stream/down-stream sensor selection function</li> <li>• Stable time control function</li> <li>• Exposure time reducing function</li> <li>• Power failure/recovery operation selecting function</li> <li>• Automatic defrosting function</li> <li>• Temperature recovery time setting function</li> <li>• Preconditioning/after conditioning function</li> <li>• Dry operation function</li> <li>• Program memory function</li> <li>• Automatic power shut-off function</li> <li>• Programmed time display function</li> <li>• Test halt function</li> <li>• Test completion mode selecting function</li> <li>• Trend graph function</li> <li>• Alarm history display function</li> <li>• Sensor calibration function</li> <li>• RS-485 communications</li> </ul>



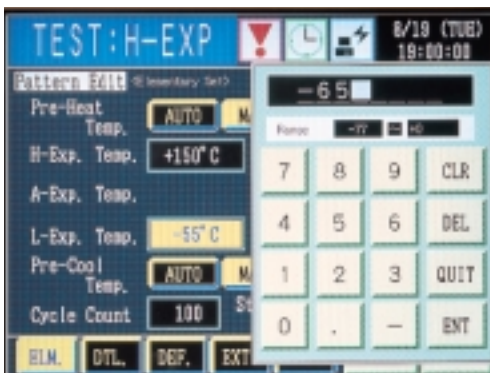
### ● Test detail monitor

This screen displays the test details while the test is in progress.



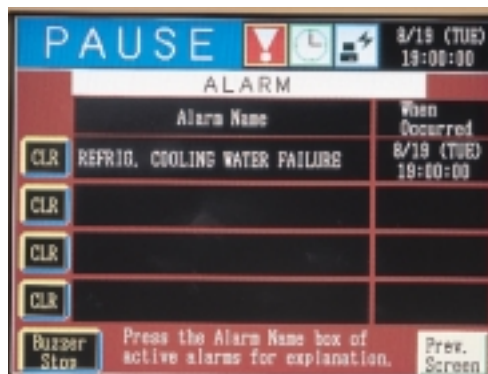
### ● Test settings

This is a screen to set test parameters.



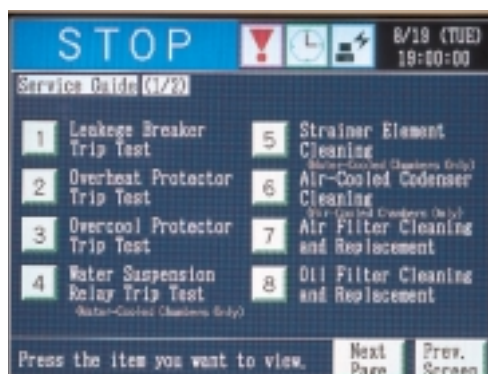
### ● Alarm

If a problem occurs, "ALARM" flashes on the screen and a buzzer sounds. If the Alarm Name is pressed during this state, the problem details, cause and advice on how to correct it are displayed.



### ● Service guide

When an inspection item is selected, a description of the required maintenance steps is displayed. This is useful before commencing tests or to aid periodic maintenance.



## TEST STANDARD AND COMPATIBLE MODELS

Test standard	Exposure temperature			Exposure time		Temp recovery time	Number of cycles	Test starting point	Model				
	High temp	Ambient temp	Low temp	High/low temp	Ambient temp				H type	S type	L type		
MIL-STD-883E (Method No.1010.7)	A	+ 85 +10 0	—	- 55 0 - 10	More than 10 min.	—	Worst case load temp within 15 min.	Minimum 10 cycles	Low temp or high temp	<input type="radio"/>	<input type="radio"/>	—	
	B	+ 125 +15 0								<input type="radio"/>	<input type="radio"/>	—	
	C	+ 150 +15 0		- 65 0 - 10						<input type="radio"/>	—	—	
	D	+ 200 +15 0								—	—	—	
	E	+ 300 +15 0		—						—	—		
	F	+ 175 +15 0		<input type="radio"/>						—	—		
MIL-STD-202G (Method No. 107G)	A	+ 85 + 3 0	+ 25 +10 - 5	- 55 0 - 3	Differs according to the weight of specimen: 28g and below 15 min. or 30min. 28 ~ 136g 30min. 136g ~ 1.36kg 60min. 1.36 ~ 13.6kg 120min. 13.6 ~ 136 kg 240min.	Max 5 min.	Upstream of specimen within 5 min.	5cycles 25cycles 50cycles 100cycles	Low temp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	B	+ 125 + 3 0								<input type="radio"/>	<input type="radio"/>	—	
	C	+ 200 + 5 0		<input type="radio"/>						—	—		
	D	+ 350 + 5 0		—						—	—		
	E	+ 500 + 5 0		—						—	—		
	F	+ 150 + 3 0		<input type="radio"/>						<input type="radio"/>	—		
JIS C 0025	+ 70 + 85 + 100 + 125 + 155 + 175 + 200	±2 ±2 ±2 ±2 ±2 ±2	Ambient temp	- 5 - 10 - 25 - 40 - 55 - 65	±3 ±3 ±3 ±3 ±3 ±3	3 hours 2 hours 1 hour 3 hours if not specified	2 to 3 min.	Within 10% of exposure time	5 cycles unless otherwise specified	Low temp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
JASO D 001	1	+ 85	Ambient temp	- 40	Less than 0.2kg/ 1 hour + 15min 0 0.2 ~ 0.8kg 2 hours + 15min 0 0.8 ~ 1.5kg 3 hours + 15min 0 more than 1.5kg 4 hours + 15min 0	As short as possible	Upstream of specimen within 5 min.	6 cycles	High temp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	2	+ 75								<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	3	+ 120								<input type="radio"/>	<input type="radio"/>	—	
EIAJ ED - 2531A	+ 60 + 65 + 70 + 75 + 80 + 85 + 90 + 95 + 100	±2 ±2 ±2 ±2 ±2 ±2 ±2 ±2 ±2	Ambient temp	0 - 5 - 10 - 15 - 20 - 25 - 30 - 35 - 40 - 45 - 50	±3 ±3 ±3 ±3 ±3 ±3 ±3 ±3 ±3	3 hours 2 hours 1 hour 3 hours if not specified	2 to 3 min.	Within 10% of exposure time	5 or 10 cycles	Low temp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

For further information, please contact us.

## CHAMBER AND UTILITY REQUIREMENTS

Model	H type	S type				L type			
	71H-W	71S-A	71S-W	101S-W	201S-W	41L-A	71L-A	101L-A	301L-W
	Water-cooled	Air-cooled	Water-cooled			Air-cooled			Water-cooled
Temperature range	+ 60 to + 200 ( + 140 to 392°F) - 70 to 0 ( - 94 to + 32°F)					+ 60 to + 200 ( + 140 to 392°F) - 65 to 0 ( - 85 to + 32°F)			
Test area mm (in)	W 410 (16.1) H 460 (18.1) D 370 (14.6)		W 650 (25.6) H 460 (18.1) D 370 (14.6)		W 650 (25.6) H 460 (18.1) D 670 (26.4)	W 240 ( 9.4) H 460 (18.1) D 370 (14.6)	W 410 (16.1) H 460 (18.1) D 370 (14.6)	W 650 (25.6) H 460 (18.1) D 370 (14.6)	W 970 (38.1) H 460 (18.1) D 670 (26.4)
Zone	2-zone or 3-zone system by means of damper switching								
Power supply	AC200V 3 3W 50 / 60Hz, AC220V 3 3W 60Hz, AC380V 3 4W 50Hz, AC400V/415V 3 4W 50Hz								
Maximum load current	200VAC	112A	80A		130A	49A	60A		130A
	220VAC	108A	77A		125A	47A	58A		125A
	380VAC	60A	50A		70A	27A	36A		70A
	400 / 415VAC	60A	50A		70A	27A	36A		70A
Air	0.4 ~ 0.7MPa (4 ~ 7kgf / cm <sup>2</sup> )								
Condensation load (KJ/h)	50Hz	87900	—	62800		87900	—	87900	
	60Hz	104600	—	73200		104600	—	104600	
Cooling water supply volume (at reference water temp + 25 )	2350L / h	—	1540L / h		2350L / h	—	2350L / h		
Water pressure	0.2~0.5MPa (2~5kgf / cm <sup>2</sup> )	—	0.2~0.5MPa (2~5kgf / cm <sup>2</sup> )			—	0.2~0.5MPa (2~5kgf / cm <sup>2</sup> )		
Outside dimensions mm (in)	W 1310 (51.6) H 1900 (74.8) D 1670 (65.7)	W 1310 (51.6) H 1900 (74.8) D 1370 (53.9)		W 1550 ( 61) H 1900 (74.8) D 1370 (53.9)	W 1550 ( 61) H 1900 (74.8) D 1670 (65.7)	W 1140 (44.9) H 1900 (74.8) D 1170 (46.1)	W 1310 (51.6) H 1900 (74.8) D 1370 (53.9)	W 1550 ( 61) H 1900 (74.8) D 1370 (53.9)	W 1870 (73.6) H 1900 (74.8) D 1670 (65.7)

# H TYPE

## HIGH PERFORMANCE MODEL

Model		TSA-71H-W		
System		2-zone or 3 zone system by means of damper switching		
Operatable ambient temp. range		0 to +40 (+32 to +104°F)		
Performance	Test area	High temp. exposure range	+60 to +200 (+140 to +392°F)	
		Low temp. exposure range	-70 to 0 (-94 to +32°F)	
		Temperature fluctuation 1	±0.5 (±0.9°F)	
	High temp. chamber	Pre-heat upper limit	+200 (+392°F)	
		Temp heat-up rate 2	Ambient temp to +200 (+392°F) within 15 min	
		Pre-cool lower limit	-77 (-106.6°F)	
	Low temp. chamber	Temp. pull-down rate 2	Ambient temp to -75 (-103°F) within 50 min	
		Temp. recovery performance (MIL-STD-883E (METHOD 1010.7) Condition C)	Recovery conditions	<ul style="list-style-type: none"> <li>•2 zone:               <ul style="list-style-type: none"> <li>High-temp exposure +150 (set at +155) / +302°F (set at +311°F) 15 min</li> <li>Low-temp exposure -65 (set at -70) / -85°F (set at -94°F) 15 min</li> </ul> </li> <li>•Power supply normal voltage</li> <li>•Control sensor position Downstream of specimen</li> <li>•Specimen 10kg plastic molded ICs (DIP 16Pin)</li> </ul>
			Temp recovery time	Worst case load temp within 15 min
	Construction	Outer shell	Cold rolled rust proof treated steel plate (Melamine coating)	
Interior		18-8 Cr-Ni stainless steel plate (SUS304)		
Insulation		Glass wool, expanded polyurethane		
Heater		Stripped wire heater		
Cooler		Plate fin cooler and cold accumulator		
Air circulator		Sirocco fan		
Test area door		Hand-operated vertically sliding door		
Refrigerator unit	Refrigeration system	Mechanical cascade refrigeration system (water-cooled condenser)		
	Compressor	Hermetically sealed scroll compressor		
	Refrigerant	High temp chamber: R404A Low temp chamber: R23		
	Expansion mechanism	Electronic expansion valve, others		
Damper driving unit		Air cylinder		
Cable port		25 × 100mm slot on the left side of body		
Operating panel		Man-machine interface unit, overheat protector, overcool protector, integrating hour meter		
Test area load capacity		30kg (equally distributed load)		
Specimen basket load capacity		5kg (equally distributed load)		
Inside dimensions (W × H × Dmm / in)		410 × 460 × 370 / 16.1 × 18.1 × 14.6		
Outside dimensions (W × H × Dmm / in)		1310 × 1900 × 1670 / 51.6 × 74.8 × 65.7		
Weight		Approx 1250kg		
Utility requirement	Power supply	200VAC 3 3W 50/60Hz, 220VAC 3 3W 60Hz, 380VAC 3 4W 50Hz, 400V / 415VAC 3 4W 50Hz		
	Air	0.4 to 0.7MPa (4 ~ 7kgf / cm <sup>2</sup> )		
	Water pressure	0.2 to 0.5 MPa (2 ~ 5kgf / cm <sup>2</sup> )		
	Cooling water supply volume 4	2350L / h (at reference water temp +25) 4400L / h (at reference water temp +32)		
	Piping connection mouth	32A		
Operatable cooling water temp. range		+5 to +38 (+41 to +100°F)		

- 1 Performance shown above is conformable to JTM K01-1998.
- 2 When each chamber is operated independently.
- 3 At +23 ambient temperature.
- 4 The rate fluctuates when heat exchanger is unclean.

# S TYPE

## STANDARD PERFORMANCE MODEL

Model		TSA-71S-A/W	TSA-101S-W	TSA-201S-W	
System		2-zone or 3 zone system by means of damper switching			
Operatable ambient temp. range		0 to +40 (+32 to +104°F)			
Performance	Test area	High temp. exposure range +60 to +200 (+140 to +392°F)			
		Low temp. exposure range -70 to 0 (-94 to +32°F)			
		Temperature fluctuation 1 ±0.5 (±0.9°F)			
	High temp. chamber	Pre-heat upper limit +200 (+392°F)			
		Temp heat-up rate 2 Ambient temp to +200 (+392°F) within 15 min			
	Low temp. chamber	Pre-cool lower limit -75 (-103°F)			
		Temp. pull-down rate 2 Ambient temp to -75 (-103°F) Within 40 min      Within 50 min      Within 45 min			
	Temp. recovery performance	<ul style="list-style-type: none"> <li>• 3 zone: High-temp exposure +150 (+302°F) 30 min</li> <li>Ambient-temp exposure 5 min</li> <li>Low-temp exposure -65 (-85°F) 30 min</li> <li>• Supply voltage AC200V</li> <li>• Sensor position upstream of specimen</li> </ul>		<ul style="list-style-type: none"> <li>• 3 zone: High-temp exposure +150 (+302°F) 30 min</li> <li>Ambient-temp exposure 10 min</li> <li>Low-temp exposure -65 (-85°F) 30 min</li> <li>• Supply voltage AC200V</li> <li>• Sensor position upstream of specimen</li> </ul>	
		<ul style="list-style-type: none"> <li>• Specimen 6.5kg (plastic molded ICs 5kg shelf/shelf bracket 1.5kg)</li> </ul>		<ul style="list-style-type: none"> <li>• Specimen 7.5kg (plastic molded ICs 5kg shelf/shelf bracket 2.5kg)</li> </ul>	
	Temp recovery time		Within 5 min		Within 10 min
Construction	Outer shell	Cold rolled rust proof treated steel plate (Melamine coating)			
	Interior	18-8 Cr-Ni stainless steel plate (SUS304)			
	Insulation	Glass wool, expanded polyurethane			
Heater		Stripped wire heater			
Cooler		Plate fin cooler and cold accumulator			
Air circulator		Sirocco fan			
Test area door		Hand-operated vertically sliding door			
Refrigerator unit	Refrigeration system	Mechanical cascade refrigeration system Air-cooled condenser or water-cooled condenser      Water-cooled condenser			
	Compressor	Hermetically sealed scroll compressor			
	Refrigerant	High temp chamber: R404A    Low temp chamber: R23			
	Expansion mechanism	Electronic expansion valve, others			
Damper driving unit		Air cylinder			
Cable port		25 × 100mm slot on the left side of body			
Operating panel		Man-machine interface unit, overheat protector, overcool protector, integrating hour meter			
Test area load capacity		30kg (equally distributed load)	50kg (equally distributed load)		
Specimen basket load capacity		5kg (equally distributed load)		17kg (equally distributed load)	
Inside dimensions (W×H×Dmm/in)		410×460×370 / 16.1×18.1×14.6	650×460×370 / 25.6×18.1×14.6	650×460×670 / 25.6×18.1×26.4	
Outside dimensions (W×H×Dmm/in)		1310×1900×1370 / 51.6×74.8×53.9	1550×1900×1370 / 61×74.8×53.9	1550×1900×1670 / 61×74.8×65.7	
Weight		Approx 1050kg	Approx 1150kg	Approx 1400kg	
Utility requirement	Power supply	200VAC 3 3W 50/60Hz, 220VAC 3 3W 60Hz, 380VAC 3 4W 50Hz, 400V / 415VAC 3 4W 50Hz			
	Air	0.4 to 0.7MPa (4 ~ 7kgf / cm <sup>2</sup> )			
	Water pressure	0.2 to 0.5 MPa (2 ~ 5kgf / cm <sup>2</sup> ) (water-cooled type)		0.2 to 0.5 MPa (2 ~ 5kgf / cm <sup>2</sup> )	
	Cooling water supply volume 4	1540L / h (at reference water : +25 ) (water-cooled type) 2800L / h (at reference water : +32 ) (water-cooled type)		2350L / h (temp : +25 ) 4400L / h (temp : +32 )	
	Piping connection mouth	32A			
	Operatable cooling water temp. range	+5 to +38 (+41 to +100°F) (water-cooled type)		+5 to +38 (+41 to +100°F)	

1 Performance shown above is conformable to JTM K01-1998.

2 When each chamber is operated independently.

3 At +23 ambient temperature.

4 The rate fluctuates when heat exchanger is unclean.

# L TYPE

## LIGHT PERFORMANCE MODEL

Model	TSA-41L-A	TSA-71L-A	TSA-101L-A	TSA-301L-W	
System	2-zone or 3 zone system by means of damper switching				
Operatable ambient temp. range	0 to + 40 ( + 32 to + 104°F)				
Performance	Test area	High temp. exposure range	+ 60 to + 200 ( + 140 to + 392°F)		
		Low temp. exposure range	- 65 to 0 ( - 85 to + 32°F)		
		Temperature fluctuation 1	± 0.5 ( ± 0.9°F)		
	High temp. chamber	Pre-heat upper limit	+ 200 ( + 392°F)		
		Temp heat-up rate 2	Within 10 min	Ambient temp to + 200 ( + 392°F) Within 15 min	
	Low temp. chamber	Pre-cool lower limit	- 75 ( - 103°F)		
		Temp. pull-down rate 2	Within 75 min	Within 45 min	Within 70 min
	Temp. recovery performance	Recovery conditions	<ul style="list-style-type: none"> <li>• 3 zone:                             <ul style="list-style-type: none"> <li>High-temp exposure + 150 ( + 302°F) 30 min</li> <li>Normal-temp exposure 5 min</li> <li>Low-temp exposure - 55 ( - 67°F) 30 min</li> </ul> </li> <li>• Supply voltage AC200V</li> <li>• Sensor position upstream of specimen</li> </ul>		
		Temp recovery time	Within 5 min	Within 10 min	
	Construction	Outer shell	Cold rolled rust proof treated steel plate (Melamine coating)		
Interior		18-8 Cr-Ni stainless steel plate (SUS304)			
Insulation		Glass wool, expanded polyurethane			
Heater	Stripped wire heater				
Cooler	Plate fin cooler and cold accumulator				
Air circulator	Sirocco fan				
Test area door	Hand-operated vertically sliding door				
Refrigerator unit	Refrigeration system	Mechanical cascade refrigeration system			
	Compressor	Hermetically sealed rotary compressor	Hermetically sealed scroll compressor		
	Refrigerant	High temp chamber: R404A Low temp chamber: R508A	High temp chamber: R404A Low temp chamber: R23		
	Expansion mechanism	Electronic expansion valve, others			
Damper driving unit	Air cylinder				
Cable port	25 × 100mm slot on the left side of body				
Operating panel	Man-machine interface unit, overheat protector, overcool protector, integrating hour meter				
Test area load capacity	30kg (equally distributed load)		50kg (equally distributed load)		
Specimen basket load capacity	2.5kg (equally distributed load)	5kg (equally distributed load)		17kg (equally distributed load)	
Inside dimensions (W × H × Dmm / in)	240 × 460 × 370 / 9.4 × 18.1 × 14.6	410 × 460 × 370 / 16.1 × 18.1 × 14.6	650 × 460 × 370 / 25.6 × 18.1 × 14.6	970 × 460 × 670 / 38.1 × 18.1 × 26.4	
Outside dimensions (W × H × Dmm / in)	1140 × 1900 × 1170 / 44.9 × 74.8 × 46.1	1310 × 1900 × 1370 / 51.6 × 74.8 × 53.9	1550 × 1900 × 1370 / 61 × 74.8 × 53.9	1870 × 1900 × 1670 / 73.6 × 74.8 × 65.7	
Weight	Approx 730kg	Approx 900kg	Approx 940kg	Approx 1420kg	
Utility requirement	Power supply	200VAC 3 3W 50/60Hz, 220VAC 3 3W 60Hz, 380VAC 3 4W 50Hz, 400V / 415VAC 3 4W 50Hz			
	Air	0.4 to 0.7MPa (4 ~ 7kgf / cm <sup>2</sup> )			
	Water pressure	————		0.2 to 0.5 MPa (2 ~ 5kgf / cm <sup>2</sup> )	
	Cooling water supply volume 4	————		2350L / h (at reference water temp : + 25 ) 4400L / h (at reference water temp : + 32 )	
	Piping connection mouth	————			
Operatable cooling water temp. range	————			+ 5 to + 38 ( + 41 to + 100°F)	

1 Performance shown above is conformable to JTM K01-1998.

2 When each chamber is operated independently.

3 At + 23 ambient temperature.

4 The rate fluctuates when heat exchanger is unclean.

## SAFETY DEVICES

Leakage breaker  
 Distribution compartment door switch  
 Temperature switch for overheat protection of high temperature chamber  
 Temperature switch for overheat protection of low temperature chamber  
 Overheat protector for high-temp.chamber  
 (Built-in controller)  
 Overheat protector for low-temp.chamber  
 (Built-in controller)  
 Test area overheat and overcool protector  
 (Built-in controller)  
 Test area overheat and overcool protector (optional)  
 Wiring circuit breaker  
 Refrigerator high and low pressure switch  
 Compressor built-in protector (except TSA-41L)  
 Current sensing relay for compressor (TSA-71L/101L only)  
 Temperature switch for compressor  
 Thermal relay for compressor (TSA-41L only )  
 Thermal relay for air circulator  
 Motor temperature switch  
 Motor reverse-prevention relay  
 Air pressure switch  
 Test area door switch  
 Air purge valve  
 Fuse  
 Specimen power supply control terminal  
 Water suspension relay (Only for water-cooled type)  
 Cooling tower interlock terminal (Only for water-cooled type)

## MODEL

<b>TSA -</b>	-	• Condenser A : Air-cooled W : Water-cooled
	-	• Performance H : High performance S : Standard performance L : Light performance
	-	• Inside capacity 41 : 40L 71 : 70L 101 : 110L 201 : 200L 301 : 300L

## ACCESSORIES

Specimen basket (18-8 Cr-Ni stainless steel: 5 mesh metal basket)	
TSA-41 (W230 x H40 x D356mm/load capacity 2.5kg)	2
TSA-71 (W400 x H40 x D356mm/load capacity 5kg)	2
TSA-101 (W640 x H40 x D356mm/load capacity 5kg)	2
TSA-201 (W640 x H40 x D656mm/load capacity 17kg)	2
TSA-301 (W960 x H40 x D656mm/load capacity 17kg)	2
Shelf bracket	2
Fuse ( Cartridge fuse: 3A, 7A, 10A, 15A)	1 each
Nipple (for water-cooled condenser only)	1
Strainer ( for water-cooled condenser only)	1
Strainer element ( for water-cooled condenser only)	1
Instruction 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 humidifying water is used, the life of the unit may be significantly shortened.



CAUTION

Be sure to read the instruction manual before operation.

## OPTIONS

### Paperless recorder

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

Temperature range: - 100 to + 220

Number of inputs:

PL1S: 1 (5 more but turned OFF\*)

Data saving cycle: 1 sec

PL3S: 3 (3 more but turned OFF\*)

Data saving cycle: 1 sec

PL3L: 3 (3 more but turned OFF\*)

Data saving cycle: 5 sec

External memory media :

CF memory card (32 MB)

Language: English

\* Settings may be modified.



Paperless recorder

### Temperature recorder (digital)

- 100 to + 220 /100mm

• RK-61 1pen

• RK-63 3 pens

• RK-64 6 dots



Temperature recorder

### Temperature recorder for future installation

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

### Recorder terminal

Serves to output the temperature within test area, high temp chamber, low temp chamber.



Terminal for recorder

### Auxiliary cooling injector (LCO<sub>2</sub>)

Used to reduce the temperature recovery time of low temperature exposure by injecting liquefied carbon dioxide at beginning of exposure.

### Auxiliary cooling injector (LN<sub>2</sub>)

Used to reduce the temperature recovery time of low temperature exposure by injecting liquefied nitrogen at beginning of exposure.

### Additional overhear protector

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

### External alarm terminal

If the safety device of the chamber activates, the external alarm terminal will notify a remote alarm.

### Emergency stop switch

Stops the chamber immediately.

### Total cycle counter

Indicates cycle counts.

- Display range 1~99999999 (with resetting function)

### Exposure signal output

A signal is output via a contact switch when test area temperature is within the user-selected range. This signal can be used to control peripheral instruments, such as to apply a voltage to specimens only during high temperature exposure, or monitor test operation from a remote point.



Exposure output

### Thermocouple

Thermocouple measures the temperature of specimens.

- JIS T with ball attached.



## OPTIONS

### Caster

Installed for mobility.

- 6 casters (4 casters for TSA-41L)
- 4 adjuster-feet

### Built-in air compressor

Select when there is no air supply source.

### Automatic door

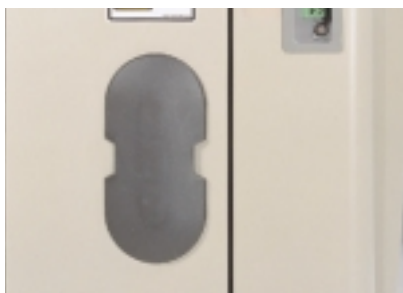
Automatic vertically sliding door operates at the touch of a button. Equipped with two safety features, a photoelectric sensor, a touch sensor and a door stop switch.



Automatic door

### Additional cable port

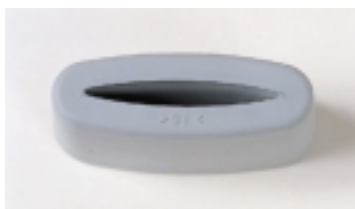
Provided in addition to the standard equipped cable port. Choose the addition of one or two. (25 × 100mm slot)



cable port

### Cable port rubber plug

Prevents air leakage from the cable port.



Cable port rubber plug

### Specimen basket / shelf bracket

Equivalent to standard accessory.

- Material: Stainless steel (5 mesh)

### Heavy-duty shelves (load capacity 30kg)

Used to hold heavy specimen exceeding the load capacity of the standard specimen basket.

### Chamber dew tray

Prevents water leaks from the chamber onto the floor.  
(Casters are recommended)

### Fixture for securing body

Used to bolt the chamber to the floor.

### Exhaust duct

This pair of exhaust ducts directs hot air from the chamber towards the front. It is used when clearance between the chamber top panel and the room ceiling is 600mm or less, or when hot air exhaust rate of exhaust equipment is 2,700m<sup>3</sup>/h or less. (Air cooled specification chambers only)

- Included hardware 2
- Location
  - Top panel of chamber
  - mechanical parts compartment
- Exhaust direction Front

### Power cord

5, 10m

\*Not applicable for optional 200VAC power supply specification.

### Color specifications

Chamber can be painted to a desired color according to a color sample.

### Communication functions

Computer interface

- GP-IB
- RS-232C
- E-BUS

\*Select one other than standard RS-485.

### Communication cables

- RS-485 5, 10m
- GP-IB 2, 4m
- RS-232C 1.5, 3, 5, 10m  
1.5, 3, 5, 10m for extension
- E-BUS 5, 10m

For chamber with watercooled condenser

When installing chamber with water-cooled condenser on upper floor, Water Leak Detector (sold separately) is recommended to be equipped in case of water leakage.

Some photographs listed in this catalog contain Japanese display.

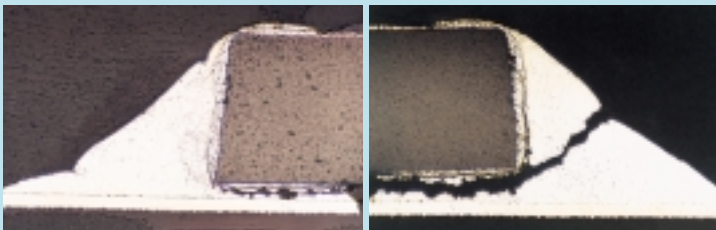
# Printed Wiring Board /Solder Conductor Resistance Evaluation System

AMR

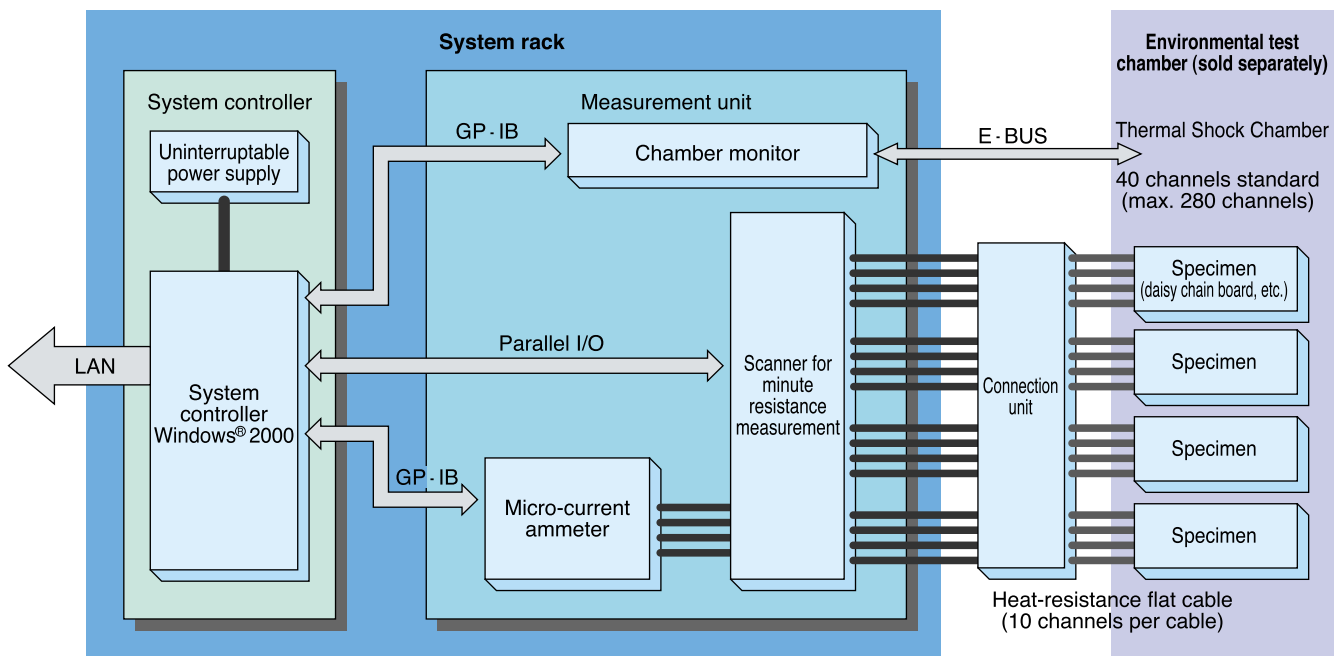


AMR measures minute resistance in solder joints and connector contact conductors continuously with increased accuracy in a low temperature-high temperature cycle environment. Automatic measurement, data recording and data processing are all systemized with a PC.

- Crack in SMD soldered joint  
(Observation example of section under stereomicroscope)



- System Block Diagram



Chambers must be equipped with a E-BUS port when using with evaluation system.



JIS Q 9001:2000  
Registration Number  
JSAQ 004



JAB Certificate Number  
R001

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EMS Accreditation  
RE 009



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