

Quality is more than a word

ESPEC

# Environmental Stress Chamber

AR series



# Advanced reliability

## Environmental Stress Chambers for tomorrow's environmental testing needs

Achieving reliability requires a system that delivers results quickly and reproduces environmental conditions accurately.

ESPEC's environmental stress Chamber can withstand heat loads generated by the specimen, and achieves improved temperature rate of change in an expanded temperature and humidity range.

Each chamber is also equipped with a specimen temperature control function to meet stringent testing demands typically required for automotive parts and mobile products.

ESPEC offers two temperature control ranges:  $-75^{\circ}\text{C}$  to  $+180^{\circ}\text{C}$  and  $-45^{\circ}\text{C}$  to  $+180^{\circ}\text{C}$ , and two chamber capacities: 680 L and 1100 L.

These models incorporate the most desirable features in temperature and humidity chambers.





ARL-0680



ARS-1100



\*Viewing window is optional.

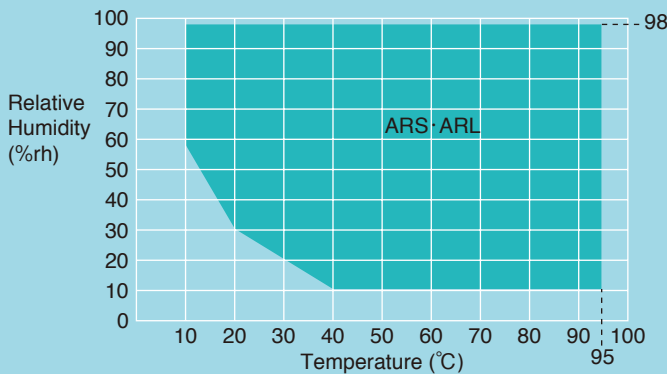
# Performance

## Temperature rate of change

Model	ARL/ARU-0680	ARL/ARU-1100	ARS/ARG-0680	ARS/ARG-1100
Temp. range	-45↔+180°C		-75↔+180°C	
Heating (°C/min.)	6.3	4.7	6.0	4.7
Cooling (°C/min.)	4.8	4.4	4.2	4.1

\*At ambient temperature, +20°C no specimen.

## Temperature & Humidity Control Range (ambient temperature at +20°C with no load)



\* Continuous operation at or below +40°C is limited because of frost formation on the cooler and dehumidifier.

## Superior temperature heating and cooling control at 3°C/min. with specimen load

Features temperature heating and cooling performance at 4°C/min. (no load), and can handle temperature cycle tests at 3°C/min. (with 50 kg load: -75 to +180°C).

## Highly uniform temperature distribution

Highly uniform temperature distribution minimizes variations in test results over multiple specimens.

## Reduced temperature and humidity stabilization time

Temperature and humidity stabilization time have been greatly reduced by minimizing hunting as the chamber approaches set-point. (under testing operation from RT to 85°C /85% rh).

## Wider control range for temperature and humidity

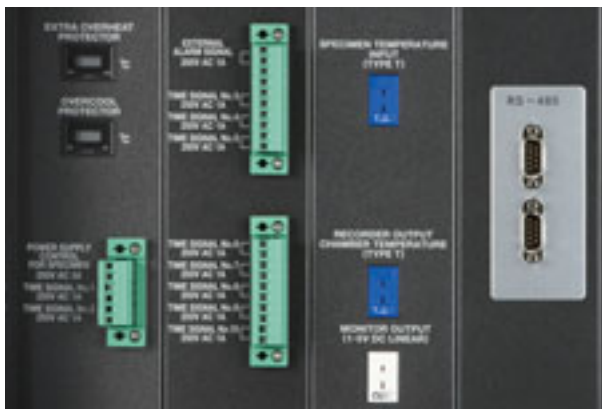
Features a wider control range of temperature and humidity, including stable control at 95°C /98% rh.

## Specimen temperature control function provides accurate testing

Uses a temperature control sensor (×1) to monitor and control the temperature of the specimen.



Specimen temperature control



Terminal area (including option)

# Utility

- **Supports heat loads up to 4500W. (During temperature testing)**

Supports electrically-charged specimens, and can withstand up to 4500W of heat load during temperature testing (or 500 W during temperature and humidity testing).

- **Large size chamber provides greater testing capacity**

Two types available with an inside capacity of 680 L and 1100 L.

- **User-friendly features**

Cable ports on both sides allow free access of the test area, water supply via the standard water tank and pure water service connections, large-sized casters, and an 18-8 Cr-Ni stainless steel plate exterior for resistance against rust and oil are some of the standard equipped features.

- **Meets International standards**

Designed to comply with major environmental test standards such as IEC60068 (2-1.2.3.14.30.38.78), or ISO16750-4 (5.3).

- **International safety standards**

The 400V type conforms to safety standards ISO12100-1, -2, and ISO14121; also to CE marking requirements based on EU directives: Low voltage directive, EMC directive, machinery directive, and pressure equipment directive.

- **Network solution**

Standard communication support is available with RS-485 or RS-232C interface.

To monitor with a PC or implement remote operation, consult with your ESPEC representative.



Cable ports on both sides



Water tank

- **Compatible Test Standards**

- IEC60068 2-1: Cold
- IEC60068 2-2: Dry heat
- IEC60068 2-3: Damp heat, steady state
- IEC60068 2-14 Nb: Change of temperature with specified rate of change
- IEC60068 2-30: Damp heat, cyclic (12+12h cycle)
- IEC60068 2-38: Composite temperature/ humidity cyclic test
- IEC60068 2-78: Damp heat, steady state
- ISO16750-4 5.3: Temperature cycling



# Control operation



Instrumentation

- **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.

- **Alarm buzzers and displays**

When an alarm triggers, alarm information, date and time of occurrence are displayed on screen. A second screen displays the cause and corrective actions.

- **Built-in timer functions**

Built-in timer functions enable automatic start-up or shut down of the chamber at preset times. The timer can be preset by month, date, day, and hour.

- **Programming detail monitor**



- **Program control settings**



- **Specimen temperature control settings**



- **Service guide**



Model	ARS-0680	ARS-1100	ARL-0680	ARL-1100	
System	Balanced Temperature & Humidity Control system (BTHC system)				
Temp. performance <sup>*1</sup>	Temp. range	-75 to +180°C (-103 to +356°F)		-45 to +180°C (-49 to +356°F)	
	Temp. fluctuation	±0.3K			
	Temp. deviation in space	±1.5K			
	Temp. gradient	3.0K			
	Temp. rate of change	Heating 6.0 K/min. or more	4.7K/min. or more	6.3K/min. or more	4.7K/min. or more
	Cooling 4.2 K/min. or more	4.1K/min. or more	4.8K/min. or more	4.4K/min. or more	
Temp. & humid. performance <sup>*1</sup>	Temp. & humid. range	+10 to +95°C (+50 to +203°F) / 10 to 98% rh			
	Temp. fluctuation	±0.3K			
	Temp. deviation in space	±1.0K			
	Temp. gradient	2.0K			
	Humid. fluctuation	±2.5%rh			
Construction	Exterior material	Cold-rolled rust-proofed steel plate			
	Interior material	18-8 Cr-Ni Stainless steel plate (2A finish)			
	Insulation	Foamed phenol, 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 cascade refrigeration system (air-cooled condenser)		Mechanical single-stage refrigeration system (air-cooled)
		Refrigerator	Scroll-type compressor		
	Refrigerator capacity	[Unit 1: 3.0kw ×1, Unit 2: 3.0kw ×1]	[Unit 1: 3.75kw ×1, Unit 2: 3.75kw ×1]	3.0kw	3.75kw
	Expansion mechanism	Electronic expansion valve			
	Refrigerant	R404A, R23		R404A	
Cooler	Plate fin cooler and dehumidifier				
Air circulator	Sirocco fan				
Fittings	Cable port ID φ 100mm (right side), φ 50mm (left side), specimen power supply control terminal, specimen temperature input terminal, time signal (×2), casters (×4), levelling feet (×4)				
Capacity L	680	1100	680	1100	
Chamber total load resistance kg	80	150	80	150	
Inside dimensions mm (inch) <sup>*2</sup>	W850×H1000×D800 (W33.46×H39.37×D31.50)	W1100×H1000×D1000 (W43.31×H39.37×D39.37)	W850×H1000×D800 (W33.46×H39.37×D31.50)	W1100×H1000×D1000 (W43.31×H39.37×D39.37)	
Outside dimensions mm (inch) <sup>*2</sup>	W1050×H1955×D1805 (W41.34×H76.97×D71.06)	W1300×H1955×D2005 (W51.18×H76.97×D78.94)	W1050×H1955×D1805 (W41.34×H76.97×D71.06)	W1300×H1955×D2005 (W51.18×H76.97×D78.94)	
Weight kg	615	700	510	600	
Utility requirements	Allowable ambient conditions	0 to +40°C (+32 to +104°F) / 75%rh max.			
	Power supply <sup>*3</sup>	200V AC 3φ50/60Hz	63 A	70 A	53 A
		220V AC 3φ60Hz	58 A	64 A	49 A
		380V AC 3φ50Hz	28 A	32 A	23 A
		400V AC 3φ50Hz <sup>*4</sup>	27 A	29 A	22 A
	Noise level <sup>*5</sup> dB	62	63	61	62
Allowable heat load	4.5 kw (-20°C [-4°F] or more) / 0.5kw (for Temp. & Humid. conditions, at 85°C / 85% rh)				
Exhaust heat quantity kJ/h (kcal/h)	39600 (9458)	46800 (11180)	32400 (7739)	39600 (9458)	

\*1: At ambient temperature +20°C, no specimen. Performance shown above conforms to IEC 60068-3-5:2001.

\*2: Excluding protrusions.

\*3: Power supply voltage fluctuation to be ±10% of rated value.

\*4: Conforms to CE marking based on EU directives.

\*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	ARG-0680		ARG-1100		ARU-0680		ARU-1100		
System	Balanced Temperature Control system (BTC system)								
Temp. performance <sup>*1</sup>	Temp. range	-75 to +180°C (-103 to +356°F)				-45 to +180°C (-49 to +356°F)			
	Temp. fluctuation	±0.3K							
	Temp. deviation in space	±1.5K							
	Temp. gradient	3.0K							
	Temp. rate of change	Heating	6.0 K/min. or more	4.7K/min. or more	6.3K/min. or more	4.7K/min. or more	6.3K/min. or more	4.7K/min. or more	
	Cooling	4.2 K/min. or more	4.1K/min. or more	4.8K/min. or more	4.4K/min. or more	4.8K/min. or more	4.4K/min. or more		
Construction	Exterior material	Cold-rolled rust-proofed steel plate							
	Interior material	18-8 Cr-Ni Stainless steel plate (2A finish)							
	Insulation	Foamed phenol, glass wool							
	Door	Manually operated door with lock (hinge on left, handle on right)							
	Heater	Nichrome strip wire heater							
	Refrigeration unit	System	Mechanical cascade refrigeration system (air-cooled condenser)			Mechanical single-stage refrigeration system (air-cooled)			
		Refrigerator	Scroll-type compressor						
		Refrigerator capacity	[Unit 1: 3.0kw ×1, Unit 2: 3.0kw ×1]	[Unit 1: 3.75kw ×1, Unit 2: 3.75kw ×1]	3.0kw	3.75kw	3.0kw	3.75kw	
		Expansion mechanism	Electronic expansion valve						
		Refrigerant	R404A, R23			R404A			
	Cooler	Plate fin cooler							
	Air circulator	Sirocco fan							
Fittings	Cable port ID φ 100mm (right side), φ 50mm (left side), specimen power supply control terminal, specimen temperature input terminal, time signal (×2), casters (×4), levelling feet (×4)								
Capacity L	680		1100		680		1100		
Chamber total load resistance kg	80		150		80		150		
Inside dimensions mm (inch) <sup>*2</sup>	W850×H1000×D800 (W33.46×H39.37×D31.50)		W1100×H1000×D1000 (W43.31×H39.37×D39.37)		W850×H1000×D800 (W33.46×H39.37×D31.50)		W1100×H1000×D1000 (W43.31×H39.37×D39.37)		
Outside dimensions mm (inch) <sup>*2</sup>	W1050×H1955×D1805 (W41.34×H76.97×D71.06)		W1300×H1955×D2005 (W51.18×H76.97×D78.94)		W1050×H1955×D1805 (W41.34×H76.97×D71.06)		W1300×H1955×D2005 (W51.18×H76.97×D78.94)		
Weight kg	610		695		505		595		
Utility requirements	Allowable ambient conditions	0 to +40°C (+32 to +104°F) / 75%rh max.							
	Power supply <sup>*3</sup>	200V AC 3 φ 50/60Hz	63 A	70 A	53 A	56 A	63 A	70 A	
		220V AC 3 φ 60Hz	58 A	64 A	49 A	52 A	58 A	64 A	
		380V AC 3 φ 50Hz	28 A	32 A	23 A	25 A	28 A	32 A	
		400V AC 3 φ 50Hz <sup>*4</sup>	27 A	29 A	22 A	23 A	27 A	29 A	
	Noise level <sup>*5</sup> dB	62		63		61		62	
Allowable heat load	4.5 kw (-20°C [-4°F] or more)								
Exhaust heat quantity kJ/h (kcal/h)	39600 (9458)		46800 (11180)		32400 (7739)		39600 (9458)		

\*1: At ambient temperature +20°C, no specimen. Performance shown above conforms to IEC 60068-3-5:2001.

\*2: Excluding protrusions.

\*3: Power supply voltage fluctuation to be ±10% of rated value.

\*4: Conforms to CE marking based on EU directives.

\*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).



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

- Be sure to read the user's manual before operation.
- Please contact us for non-standard specification.



## TEMPERATURE AND HUMIDITY CONTROLLER

Setting	Interactive key input by touch panel
Display	TFT Color LCD (6.5 inch)
Operating mode	Program operation, constant operation
Setting and indication resolution	Temperature: 0.1°C Humidity: 1% rh (ARS, ARL) Time: 1 minute
Input	Thermocouple type T (Copper/Copper-Nickel)
Setting and indication ranges	Temperature: -80°C to +185°C (ARS, ARG) -50°C to +185°C (ARL, ARU) Humidity: 0 to 100% rh (ARS, ARL) Time: 0 to 999 hours 59 minutes
Program memory capacity	RAM patterns: 20 program patterns (-99 steps per pattern) (-Pattern linking possible) ROM patterns: 10 program patterns
Auxiliary functions	Chamber/ specimen temperature control selection Trend graph Target temperature status Refrigerator capacity automatic control Time signal Integrating hour meter (non-resettable, resettable) Specimen temperature control setting Sensor offset Exposure time control Pausing Complete time display Test completion mode selection Input burn-out detection Upper and lower temperature (and humidity) limit alarm Alarm and alarm history display Backup operation Power failure / recovery operation Automatic and manual drainage (ARS, ARL) Constant humidity measurement (ARS, ARL) Timer (automatic start-up and stop) Help feature

## SHELVES SIZE AND LOAD RESISTANCE

Model	0680	1100
Shelf size (mm)	W817×D750	W1067×D950
Shelf load resistance (evenly distributed load)	40 kg	50 kg
Shelf support load resistance	80 kg	100 kg
Chamber total load resistance	80 kg	150 kg

- Shelf weight is included in the load resistance value.

## SAFETY DEVICES

- Control circuit overcurrent protection
- Control circuit short circuit protection cartridge fuse
- System trouble
- Reverse-prevention relay
- Thermal fuse
- Air circulator temperature switch
- Air circulator short circuit protection cartridge fuse
- Ambient temperature input burn-out detection circuit
- Dry-bulb temperature input burn-out detection circuit
- Specimen temperature input burn-out detection circuit (only when using specimen temperature control)
- Condenser fan short circuit protection
- Condenser fan overload protection
- Refrigerator temperature sensor burned-out detection circuit
- Refrigerator short circuit protection
- Refrigerator overcurrent protection
- Refrigerator discharge pipe temperature switch
- Refrigerator high/ low pressure switch
- Refrigerator frost detection circuit
- Refrigerator circuit temperature out of range
- Refrigerator frost trouble detection temperature switch (ARS, ARG)
- Refrigerator discharge pipe temperature trouble detection circuit (ARS, ARG)
- Heater (humidifier) over current protection
- Wet bulb burn-out circuit (ARS, ARL)
- Humidifier boil-dry protector (ARS, ARL)
- Humidifier water level detector (ARS, ARL)
- Water tank empty switch (ARS, ARL)
- Water tank low level switch (ARS, ARL)
- Dry wick detection (ARS, ARL)
- Overheat protector
- High deviation temperature alarm (built into temperature and humidity controller)
- High/ low absolute temperature (humidity) alarms (built into temperature and humidity controller)
- Specimen power supply control terminal
- Chamber door switch

## ACCESSORIES

- Cable port rubber plug  $\phi$  50 mm,  $\phi$  100 mm ..... 1 each
- Shelf brackets ..... 1 set  
stainless steel (18-8 Cr-Ni stainless steel plate CP grade)
- Shelf ..... 1  
stainless steel wire (18-8 Cr-Ni stainless steel plate)
- Cartridge fuse (type A, 250 V 0.4 A, 5 A, 8 A) ..... 1 each
- Wet-bulb wick (ARS, ARL) ..... 1 box
- Specimen temperature measuring thermocouple (type T, 3m) ..... 1
- Specimen temperature input connector ..... 1
- User's manual ..... 1

## 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: Temperature 1

(5 more channels can be turned ON)

Data saving cycle: 5 sec.

External recording media:

CF memory card (256MB)

USB port

Language support: ENG, JPN

[Temperature and humidity type]

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

Humidity range: 0 to 100%rh

Number of inputs:

Temperature 1 / Humidity 1

(4 more channels can be turned ON)

Data saving cycle: 5 sec.

External recording media:

CF memory card (256MB)

USB port

Language support: ENG, JPN



### Temperature recorder (digital)

• SRJ25  $-100$  to  $+200^{\circ}\text{C}$  6 dots

• Portable type

### Temperature and humidity recorder (digital)

• SRJ15  $-100$  to  $+200^{\circ}\text{C}$  / 0 to 100%rh  
6 dots

• Portable type



### Temperature sensor terminal

Terminal board for dry-bulb temperature sensor in the chamber.



### DC output terminal

Outputs temperature, humidity, and temperature of the specimen from the test area.

### Relay contact output

Up to 8 contacts can be added to the standard 2 relay contacts (time signals).

### Additional cable port

Provided in addition / replacement of the standard cable ports.

• 50 or 100mm diameter

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



### Cable port rubber plug

Prevents air leakage from the cable port.

### Humidifier delay control

To protect specimens from condensation, humidity control starts after temperature reaches the set value. (ARS, ARL only)

### Viewing window

Used for observation of the specimens inside the chamber.

Dimensions: W340×H440 mm



## OPTIONS

### Shelf, shelf bracket

Equivalent to standard accessory.

### Heavy-duty shelf

Used to hold heavy specimens exceeding the load capacity of the standard shelf.

- Load capacity 50kg (max. 2 shelves)

\*ARS, ARL, ARG, ARU-0680 only

### Condenser filter

Prevents condenser fins from clogging.

### 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.

### Trouble buzzer

If a trouble occurs, the buzzer will alert you of the situation.

### 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.



### Rotating type warning signal light

The lamp lights up when alarm triggers. (Available in red or yellow)



### Water purifier

Water purifier with reverse osmosis membrane. Produces approx 6.6L per hour (at primary water temp. +10°C).

- WS-1



When installing chamber on upper floor with water purifier, a water leak detector (sold separately) is recommended to be equipped in case water leaks.

### Portable tank

Used to refill the standard tank. (ARS, ARL only)

### Interface

Computer interface

- GPIB

\*Select instead of standard RS-485 or RS-232C

### Power cable

- 2.5, 5, 10m

\*The chamber does not come with a power cable.

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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**

ESPEC CORP.