# ESPEC

# Temperature Cycling Chambers
## Global-N Series



ESPEC NORTH AMERICA, INC.

# Faster test chambers ...

**The Global-N series chambers from ESPEC provide the temperature cycling and humidity performance you need to validate quality and reliability for increasingly sophisticated electronics and other products.**

The 800-liter (28 cu. ft.) model fits in a space 1.3m by 2.2m (51 by 85 inches), except -15NW models.

The 380-liter (12 cu. ft.) model's width is just 0.9 meters (35 inches), fitting thru a standard doorway.

# Global Features

## World-standard performance and features on a minimal footprint

The Global-N chambers have temperature change rates from 5 to 20°C per minute. In addition, controlled humidity from 10 to 95% is an available feature. There are two sizes, with interior volumes of 380 and 800 liters (12 and 28 cubic feet). They are compact, requiring the least amount of floor space for this level of performance.

These chambers feature the classic ESPEC look of stainless steel with a modern style. The control console is on the door, making the footprint of the unit even more compact. A simple, but secure, door latch is easier than ever to use.

## International applications

Global-N chambers meet Mil-Std, JEDEC, IEC, and other international test performance standards. The units can be installed around the world for consistent testing at different facilities, supported by your local ESPEC service group.

## Designed for serviceability and safety

For safety and worldwide compliance, Global-N series are UL 508A certified or CE-marked.

The refrigeration service panels are hinged for fast access. Analog refrigeration gauges help you monitor system performance and pinpoint service needs.

All models feature three levels of overheat protection, plus two levels of overcool protection. The fully-integrated system controller provides alarm messages with specific troubleshooting help to quickly resume testing.

## Standard features:

- Stainless steel exterior and interior
- Foam-insulated door for rigidity and long life
- High performance refrigeration utilizing reliable Scroll compressors (except -15NW models)
- Hinged service panels for easy access
- Unique non-metalic thermal breaks around the doorframe and cable ports
- Specimen power relay for interlocking test samples or external devices to chamber power for safety
- One 100mm (4") cable port, one shelf & casters included



Innovative high-speed airflow suited for fast temperature cycling applications.



Advanced refrigeration design is especially compact for high performance test chambers.

# Performance

## Temperature cycling up to 20 degrees per minute

Global-N series has twenty different models to allow you to choose the size and performance best suited for your test applications. Temperature cycling rates from 5 to 20°C/min. are possible. Two different ultimate low temperatures are available: -40°C or -70°C.

Models EGNL & EGNX also control humidity, for expanded testing options beyond temperature cycling.

Global-N chambers are capable of meeting the performance requirements of JEDEC, IEC, Mil-Std, and other international environmental test performance standards.

## Get a performance evaluation to help select your model

For better assurance of performance for your temperature cycling application, ESPEC can provide a guaranteed performance calculation based on your submitted requirements.

Please use these questions (at right) as a guide to define your test plan. You can then give this information to your local sales representative, or submit at www.espec.com, for review by an ESPEC engineer. A recommended model with appropriate refrigeration size will be returned.

## Air-cooled models available

High performance test chambers usually mean water cooling utilities are required. Global-N models with 4 or 6-hp refrigeration are available with integrated air-cooling. The condenser is mounted on top with low speed fans for minimal noise impact.
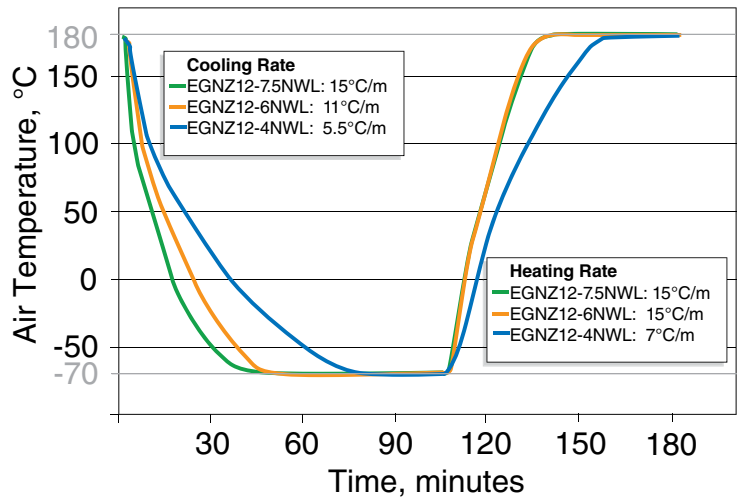


Different Global-N models can heat and cool at different rates. Shown above are change rates for EGNZ12 models, following IEC 60068 3-5 standard, with the sensor in the supply air.

**Questions for performance evaluation request:**

| 1. Chamber type |
| --- |
| Desired size: 12 or 28 cu. ft.? |
| Local power: 50Hz or 60Hz? |
| Humidity control: Yes or no? |

| 2. Your Sample |
| --- |
| Sample description and type of material(s) |
| Total mass per test, including any racks or cabling |
| Heat output of samples, in watts, if powered during test |

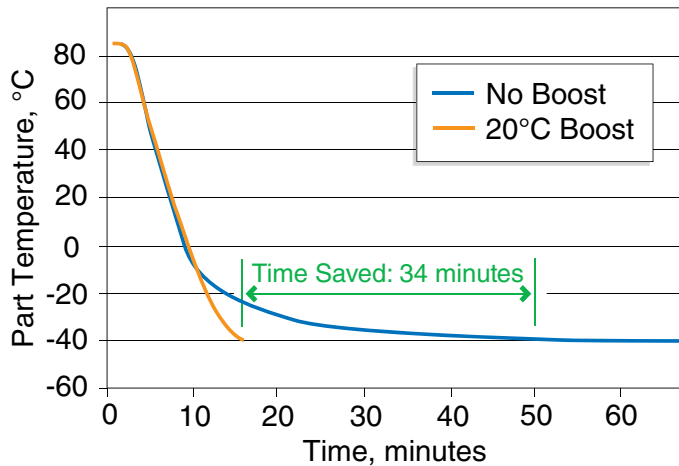| 3. Your Test Plan |
| --- |
| Test method, if a published standard (e.g. JEDEC JESD22-A104C) |
| Start temperature for cycling |
| End temperature for cycling |
| Ramp rate or time allowed between start and end temperatures |
| Ramp rate measured in the air or on the product |



Air-cooled condenser on top of the chamber saves utility and installation cost. Adds 350mm (14") to the exterior height.

# Advanced Control



The door-mounted console includes the P-300 programmer, USB port, product temperature protector, and chamber light (option).

## Enhanced performance and USB access with P-300 touch-screen controller

The exclusive ESPEC P-300 programmer/controller brings energy savings, user-friendly operation, and expanded data access to the Global-N chambers. Tabs on the updated user interface allow faster access to any screen. Standard USB and optional Ethernet interfaces make programming and data acquisition much simpler. In addition, improved algorithms make operation more energy efficient, as well as faster and smoother.

- Store up to forty programs, as well as three constant-mode configurations.
- Multilingual display in English, Japanese, Chinese, or Korean.
- Alarm history and diagnostics, plus a 'back trace' feature for troubleshooting.

Sophisticated future-looking algorithms make temperature ramping faster and smoother. They also improve energy efficiency and make tests more repeatable.

NEW: Standard USB port for upload/download of programs and test data. Test programs can be edited and stored on a PC using included software, then uploaded via USB. Operation data can be downloaded for review, graphing, or exporting to Excel.



Product temperature control generates faster ramp-rates for test samples, as well as significant time savings for soak periods.

## Optional product temperature control

- Monitors product temperature
- Enables faster product change rates
- Shortens testing time

During normal cycling tests, product temperature can lag behind air temperatures by up to 20 degrees. The optional product temperature control is a valuable feature for high performance testing in Global-N chambers. This feature drives faster change rates by directly monitoring product temperature and automatically boosting air-temperature setpoints until the sample approaches the desired temperature.

As shown in the example at left, achieving -40°C product temperature with a 20°C boost (air overshooting temporarily to -60°C) took just 16 minutes, compared for nearly 50 minutes with the chamber air set at -40°C.

## RANGE -70 TO 180°C Temp-only

|  | EGNZ12-4NWL EGNZ12-4NAL | EGNZ12-6NWL EGNZ12-6NAL | EGNZ12-7.5NWL |
|---|---|---|---|
| Temperature Range | -70 to 180°C (-94 to 354°F) | | |
| Cooling Capacity | 2 kW at -50°C | 3 kW at -50°C | 3.3 kW at -50°C |
| Refrigeration System | Cascade 4 hp Scroll | Cascade 6 hp Scroll | Cascade 7.5 hp Scroll |
| Heating System | 5 kW | 8 kW | 8 kW |
| Measured Airflow | 850 cubic meters per hour (500 CFM) | | |
| **Performance Example** (-70°C to 180°C, per IEC 60068 3-5, at supply air) | | | |
| Heating Rate | 7°C/m average | 15°C/m average | 15°C/m average |
| Cooling Rate | 6°C/m average | 11°C/m average | 15°C/m average |
| **Site Requirements** | | | |
| Power Supply | 380-415V 3Ø 50Hz (460V 3Ø 60Hz also available) | | |
| Cooling Water Maximum with 30°C Inlet | 34 LPM (9 GPM) (NWL suffix models) | 53 LPM (14 GPM) (NWL suffix models) | 72 LPM (19 GPM) |
| Heat to Room | 40,000 BTU/hr (NAL suffix models) | 60,000 BTU/hr (NAL suffix models) | — |

## DIMENSIONS - 12 cu. ft. models

| Workspace Volume | 380 L  (12 cu. ft.) | |
|---|---|---|
| Workspace (WxDxH) | 600 x 743 x 850 mm  (23.6" x 29.25" x 33.5") | |
| Exterior (WxDxH) | NWL suffix models | 889 x 2103 x 1768 mm  (35" x 83" x 70") |
|  | NAL suffix models | 889 x 2103 x 2129 mm  (35" x 83" x 84") |



12 cu. ft. model
(page 6 & 7)

**SPECIFICATION NOTES:**

- Please submit a performance evaluation request (see page 4) to ensure selection of the correct model for your test requirement.

- Cooling water requirements listed are maximum. Actual water demand varies with cooling demand and water temperature. Detailed cooling water demand charts are available.

- Site requirements also include a drain for condensate water from the chamber, and ample spacing for service and proper ventilation.

- These specifications are for reference only. Detailed and current specifications can be obtained from your sales representative or at espec.com.

## RANGE -70 TO 180°C Temp/Humidity

| | EGNX12-4NWL EGNX12-4NAL | EGNX12-6NWL EGNX12-6NAL | EGNX12-7.5NWL |
|---|---|---|---|
| Temperature Range | -70 to 180°C (-94 to 354°F) | | |
| Cooling Capacity | 2 kW at -50°C | 3 kW at -50°C | 3.3 kW at -50°C |
| Refrigeration System | Cascade 4 hp Scroll | Cascade 6 hp Scroll | Cascade 7.5 hp Scroll |
| Heating System | 5 kW | 8 kW | 8 kW |
| Humidity Range | 10 to 95% RH per chart below | | |
| Measured Airflow | 850 cubic meters per hour (500 CFM) | | |
| **Performance Example** (-70°C to 180°C, per IEC 60068 3-5, at supply air) | | | |
| Heating Rate | 7°C/m average | 15°C/m average | 15°C/m average |
| Cooling Rate | 6°C/m average | 11°C/m average | 15°C/m average |
| **Site Requirements** | | | |
| Power Supply | 380-415V 3Ø 50Hz (460V 3Ø 60Hz also available) | | |
| Humidity Water | De-ionized water, 0.2 to 10 µS/cm resistivity | | |
| Cooling Water Maximum with 30°C Inlet | 34 LPM (9 GPM) (NWL suffix models) | 53 LPM (14 GPM) (NWL suffix models) | 72 LPM (19 GPM) |
| Heat to Room | 40,000 BTU/hr (NAL suffix models) | 60,000 BTU/hr (NAL suffix models) | — |

## RANGE -40 TO 180°C Temp/Humidity & Temp-only

| | EGNL12-4NWL EGNL12-4NAL | EGNL12-6NWL EGNL12-6NAL | EGNU12-4NWL EGNU12-4NAL | EGNU12-6NWL EGNU12-6NAL |
|---|---|---|---|---|
| Temperature Range | -40 to 180°C (-40 to 354°F) | | | |
| Cooling Capacity | 2.8 kW at -20°C | 3.6 kW at -20°C | 2.8 kW at -20°C | 3.6 kW at -20°C |
| Refrigeration System | Single-stage 4 hp Scroll | Single-stage 6 hp Scroll | Single-stage 4 hp Scroll | Single-stage 6 hp Scroll |
| Heating System | 5 kW | 8 kW | 5 kW | 8 kW |
| Humidity Range | 10 to 95% RH per chart below | | — | |
| Measured Airflow | 850 cubic meters per hour (500 CFM) | | | |
| **Performance Example** (-40°C to 180°C, per IEC 60068 3-5, at supply air) | | | | |
| Heating Rate | 8°C/m average | 15°C/m average | 8°C/m average | 15°C/m average |
| Cooling Rate | 8°C/m average | 12°C/m average | 8°C/m average | 12°C/m average |
| **Site Requirements** | | | | |
| Power Supply | 380-415V 3Ø 50Hz (460V 3Ø 60Hz also available) | | | |
| Humidity Water | De-ionized water, 0.2 to 10 µS/cm resistivity | | — | |
| Cooling Water Maximum with 30°C Inlet | 35 LPM (9 GPM) (NWL suffix models) | 55 LPM (14 GPM) | 35 LPM (9 GPM) (NWL suffix models) | 55 LPM (14 GPM) (NWL suffix models) |
| Heat to Room | 52,000 BTU/hr (NAL suffix models) | — | 52,000 BTU/hr (NAL suffix models) | 75,000 BTU/hr (NAL suffix models) |
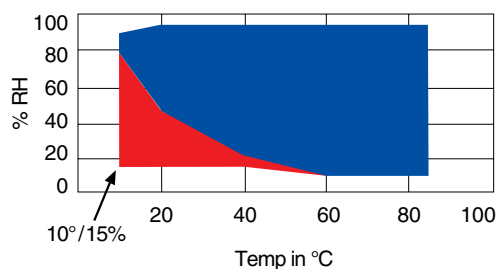
### Humidity Control Range



For EGNL & EGNX models:

Blue = Standard humidity range
Red = Optional low-humidity range

Guaranteed humidity control range without live load. Fluctuation is within ±3%, per IEC 60068 3-6.

7

## RANGE -70 TO 180°C Temp-only

| | EGNZ28-4NWL EGNZ28-4NAL | EGNZ28-6NWL EGNZ28-6NAL | EGNZ28-12NWL | EGNZ28-15NW |
|---|---|---|---|---|
| Temperature Range | -70 to 180°C (-94 to 354°F) | | | |
| Cooling Capacity | 2 kW at -50°C | 3 kW at -50°C | 4.2 kW at -50°C | 7.8 kW at -50°C |
| Refrigeration System | Cascade 4 hp Scroll | Cascade 6 hp Scroll | Cascade 12 hp Scroll | Cascade 15 hp Discus |
| Heating System | 10 kW | 10 kW | 15 kW | 20 kW |
| Measured Airflow | 1,350 cubic meters per hour (800 CFM) | | | |
| **Performance Example** (-70°C to 180°C, per IEC 60068 3-5, at supply air) | | | | |
| Heating Rate | 10°C/m average | 10°C/m average | 15°C/m average | 20°C/m average |
| Cooling Rate | 2.75°C/m average | 5.5°C/m average | 12.5°C/m average | 20°C/m average |
| **Site Requirements** | | | | |
| Power Supply | 380-415V 3Ø 50Hz (460V 3Ø 60Hz also available) | | | |
| Cooling Water Maximum with 30°C Inlet | 34 LPM (9 GPM) (NWL suffix models) | 53 LPM (14 GPM) (NWL suffix models) | 102 LPM (27 GPM) | 121 LPM (32 GPM) |
| Heat to Room | 40,000 BTU/hr (NAL suffix models) | 60,000 BTU/hr (NAL suffix models) | — | — |

## RANGE -40 TO 180°C Temp-only

| | EGNU28-4NWL EGNU28-4NAL | EGNU28-6NWL EGNU28-6NAL | EGNU28-7.5NWL | EGNU28-12NWL |
|---|---|---|---|---|
| Temperature Range | -40 to 180°C (-40 to 354°F) | | | |
| Cooling Capacity | 2.8 kW at -20°C | 3.6 kW at -20°C | 4.3 kW at -20°C | 8.8 kW at -20°C |
| Refrigeration System | Single-stage 4 hp Scroll | Single-stage 6 hp Scroll | Single-stage 7.5 hp Scroll | Single-stage 12 hp Scroll |
| Heating System | 10 kW | 10 kW | 15 kW | 15 kW |
| Measured Airflow | 1,350 cubic meters per hour (800 CFM) | | | |
| **Performance Example** (-40°C to 180°C, per IEC 60068 3-5, at supply air) | | | | |
| Heating Rate | 10°C/m average | 10°C/m average | 20°C/m average | 20°C/m average |
| Cooling Rate | 4°C/m average | 8°C/m average | 12°C/m average | 15°C/m average |
| **Site Requirements** | | | | |
| Power Supply | 380-415V 3Ø 50Hz (460V 3Ø 60Hz also available) | | | |
| Cooling Water Maximum with 30°C Inlet | 35 LPM (9 GPM) (NWL suffix models) | 55 LPM (14 GPM) (NWL suffix models) | 79 LPM (19 GPM) | 106 LPM (27 GPM) |
| Heat to Room | 52,000 BTU/hr (NAL suffix models) | 75,000 BTU/hr (NAL suffix models) | — | — |

## DIMENSIONS - 28 cu. ft. models

| | | |
|---|---|---|
| Workspace Volume | 800 L (28 cu. ft.) | |
| Workspace (WxDxH) | 1000 x 800 x 1000 mm (39.4" x 31.5" x 39.4") | |
| Exterior (WxDxH) | NWL suffix models | 1290 x 2159 x 1920 mm (51" x 85" x 76") |
| | NAL suffix models | 1290 x 2159 x 2280 mm (51" x 85" x 90") |
| | NW suffix models | 1290 x 3074 x 2014 mm (51" x 121" x 79.5") |



28 cu. ft. model
(page 8 & 9)

## RANGE -70 TO 180°C Temp/Humidity

| | EGNX28-4NWL<br>EGNX28-4NAL | EGNX28-6NWL<br>EGNX28-6NAL | EGNX28-12NWL | EGNX28-15NW |
|---|---|---|---|---|
| Temperature Range | -70 to 180°C (-94 to 354°F) | | | |
| Cooling Capacity | 2 kW at -50°C | 3 kW at -50°C | 4.2 kW at -50°C | 7.8 kW at -50°C |
| Refrigeration System | Cascade 4 hp Scroll | Cascade 6 hp Scroll | Cascade 12 hp Scroll | Cascade 15 hp Discus |
| Heating System | 10 kW | 10 kW | 15 kW | 20 kW |
| Humidity Range | 10 to 95% RH per chart below | | | |
| Measured Airflow | 1,350 cubic meters per hour (800 CFM) | | | |
| **Performance Example** (-70°C to 180°C, per IEC 60068 3-5, at supply air) | | | | |
| Heating Rate | 10°C/m average | 10°C/m average | 15°C/m average | 20°C/m average |
| Cooling Rate | 2.75°C/m average | 5.5°C/m average | 12.5°C/m average | 20°C/m average |
| **Site Requirements** | | | | |
| Power Supply | 380-415V 3Ø 50Hz (460V 3Ø 60Hz also available) | | | |
| Humidity Water | De-ionized water, 0.2 to 10 µS/cm resistivity | | | |
| Cooling Water Maximum with 30°C Inlet | 34 LPM (9 GPM) (NWL suffix models) | 53 LPM (14 GPM) (NWL suffix models) | 102 LPM (27 GPM) | 121 LPM (32 GPM) |
| Heat to Room | 40,000 BTU/hr (NAL suffix models) | 60,000 BTU/hr (NAL suffix models) | — | — |

## RANGE -40 TO 180°C Temp/Humidity

| | EGNL28-4NWL<br>EGNL28-4NAL | EGNL28-6NWL<br>EGNL28-6NAL | EGNL28-7.5NWL | EGNL28-12NWL |
|---|---|---|---|---|
| Temperature Range | -40 to 180°C (-40 to 354°F) | | | |
| Cooling Capacity | 2.8 kW at -20°C | 3.6 kW at -20°C | 4.3 kW at -20°C | 8.8 kW at -20°C |
| Refrigeration System | Single-stage 4 hp Scroll | Single-stage 6 hp Scroll | Single-stage 7.5 hp Scroll | Single-stage 12 hp Scroll |
| Heating System | 10 kW | 10 kW | 15 kW | 15 kW |
| Humidity Range | 10 to 95% RH per chart below | | | |
| Measured Airflow | 1,350 cubic meters per hour (800 CFM) | | | |
| **Performance Example** (-40°C to 180°C, per IEC 60068 3-5, at supply air) | | | | |
| Heating Rate | 10°C/m average | 10°C/m average | 20°C/m average | 20°C/m average |
| Cooling Rate | 4°C/m average | 8°C/m average | 12°C/m average | 15°C/m average |
| **Site Requirements** | | | | |
| Power Supply | 380-415V 3Ø 50Hz (460V 3Ø 60Hz also available) | | | |
| Humidity Water | De-ionized water, 0.2 to 10 µS/cm resistivity | | | |
| Cooling Water Maximum with 30°C Inlet | 35 LPM (9 GPM) (NWL suffix models) | 55 LPM (14 GPM) (NWL suffix models) | 79 LPM (19 GPM) | 106 LPM (27 GPM) |
| Heat to Room | 52,000 BTU/hr (NAL suffix models) | 75,000 BTU/hr (NAL suffix models) | — | — |

### Humidity Control Range



For EGNL & EGNX models:

Blue = Standard humidity range
Red = Optional low-humidity range

Guaranteed humidity control range without live load.
Fluctuation is within ±3%, per IEC 60068 3-6.

### Cabinet Options

- Additional adjustable shelves, capacity 45 kg. (100 lbs.)

- Additional cable ports with cover and flexible port plug



50, 100, or 150 mm (2", 4", or 6") diameters available

- Viewing window with LED lighting
  12 cu. ft.: 175 x 260mm (7" x 10.5")
  28 cu. ft.: 290 x 380mm (11.5" x 15")

- Inner glass door



Includes hand ports to manipulate samples (12 cu. ft. size shown)

### Operational Options

- Attached air-cooled condenser for applications where water-cooling isn't practical. (see page 5)

- Liquid nitrogen (LN$_2$) cooling boost for faster ramping.

- Dry air purge - Keeps moisture in the chamber extremely low by purging with -40°C dewpoint air. Compressed air supply required.

- Spare parts kit

- Remote environmentally conditioned air (ECA)



Allows conditioning of remotely-located equipment that cannot be placed inside the chamber.

Overall performance and available interior space are reduced.

- Water purifying filter for humidity models

- Low humidity control systems (see chart on previous pages for range)

- Humidity water tank supply - has a recirculation mode and holds five gallons

### Instrumentation Options

- RS-232C computer interface for general purpose applications using serial data communication.

- RS-485 interface for applications requiring full duplex and/or higher speed data transmission.

- GPIB/IEEE-488 digital interface particularly suited for instrument applications, especially LabView.

- Web Controller for remote Ethernet/web access (see next page).

- Product temperature control (see page 5)

- Recorders



- Chino paperless recorders with Ethernet and SD storage
- Honeywell circular-chart
- Chino strip-chart

- Solid state humidity sensor in lieu of wet/dry bulb (humidity models)

- Additional six time signals for controlling external devices

- Emergency-stop button

## Performance P-300 Programmer/Controller Specification

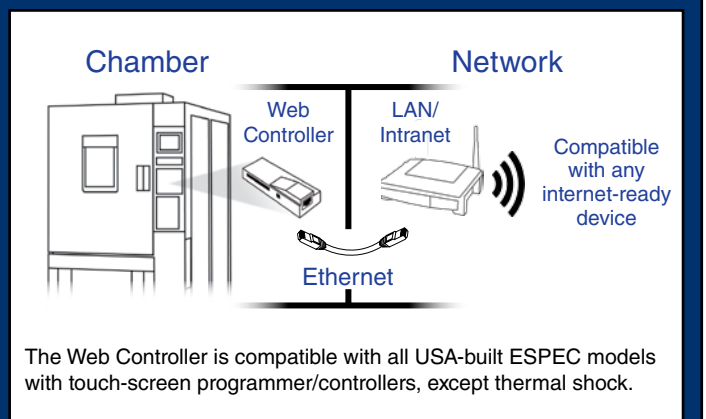| | |
|---|---|
| Display | Color touch-screen, 6.5 inch diagonal, 640x480 resolution<br>Multilingual display in English, Japanese, Chinese, or Korean |
| Communications | Standard: USB external memory port<br>Optional: RS-232, RS-485, GP-IB, Ethernet |
| Operating Modes | STOP: chamber off, programmer on<br>PROGRAM: RUN runs selected test profile<br>CONSTANT: runs at set value continually |
| Program Capacity | 40 programs, 99 steps per program |
| Control Method | PID (Proportional. Integral, Derivative) plus<br>WRTC (Window Reference Trajectory Control) |
| Programming Capabilities | • Create or copy programs<br>• Upload and download programs via USB<br>• Copy, edit, insert, and delete steps<br>• Two nested loops to repeat steps up to 999 times<br>• Selectable end-of-test modes<br>• Create pause steps within programs<br>• Soak control delays timer until setpoint is reached |
| Additional Functions | • Alarm report lists last 1000 alarms and time occurred<br>• Time signal relay control (with naming capability)<br>• High/low limit alarm functions<br>• Audible alarm with on-screen explanation<br>• Selectable restart modes after power failure<br>• Automatic start and stop functions<br>• Keylock protection and configuration lock-out<br>• Service guide and help screens<br>• Three settable reminder alarms for PM<br>• Integrated running time meter<br>• RoHS directive lead-free compliant |
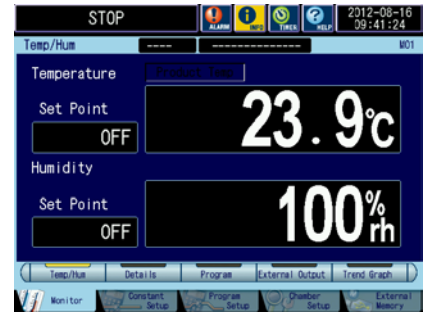
## P-300 Remote operation via Ethernet

Ethernet/LAN remote operation is possible via ESPEC's Web Controller. A straight-forward web-browser interface allows remote monitoring, programming and data logging via your local network. Email notice of alarms is also possible.

**NEW:** The Web Controller allows direct access to P-300 command protocol, bypassing the web interface. Custom programming and integration with other test equipment are now possible via Ethernet.

Learn more and try a live demonstration:

**www.espec.com/wc**

The Web Controller is compatible with all USA-built ESPEC models with touch-screen programmer/controllers, except thermal shock.

11