Static

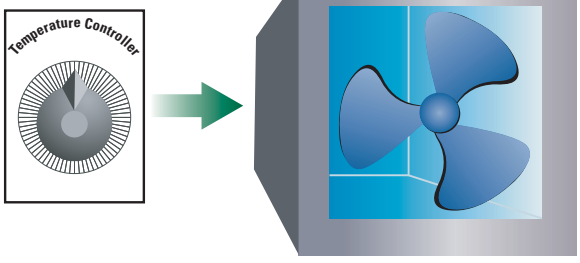
Static Temperature Controlled

EMMA®, EMMAQUA®, and EMMAQUA with Nighttime Wetting

Advantages

- The static system helps overcome effects of starting tests at different times of year (winter vs. summer)
- Greatly reduces temperature intermittency effects
- Manages maximum temperatures throughout the test to a user defined set-point
- Increases exposure temperature if desired
- Increases morning and afternoon exposure temperatures
- May improve acceleration factors by increasing thermal degradation
- Can be used in conjunction with standard EMMA or other temperature controlled products

How it works



- **A controller,** similar to the thermostat in your home, **is programmed by the operator to the desired temperature**
- **A temperature sensor,** such as a black panel or a test material with an imbedded thermocouple, **is mounted in the exposure target area**
- **The controller speeds up the cooling blower** if the target temperature sensor is hotter than the "set" temperature or will slow down the cooling blower if the target temperature is lower than the "set" temperature
- **The target board exposure maintains the "set" temperature** throughout the day and throughout different seasons
- **Multiple static controlled EMMA devices may be used in conjunction** to vary the desired temperature

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For more information on Temperature Controlled EMMAQUA contact your local Atlas representative.

Dynamic

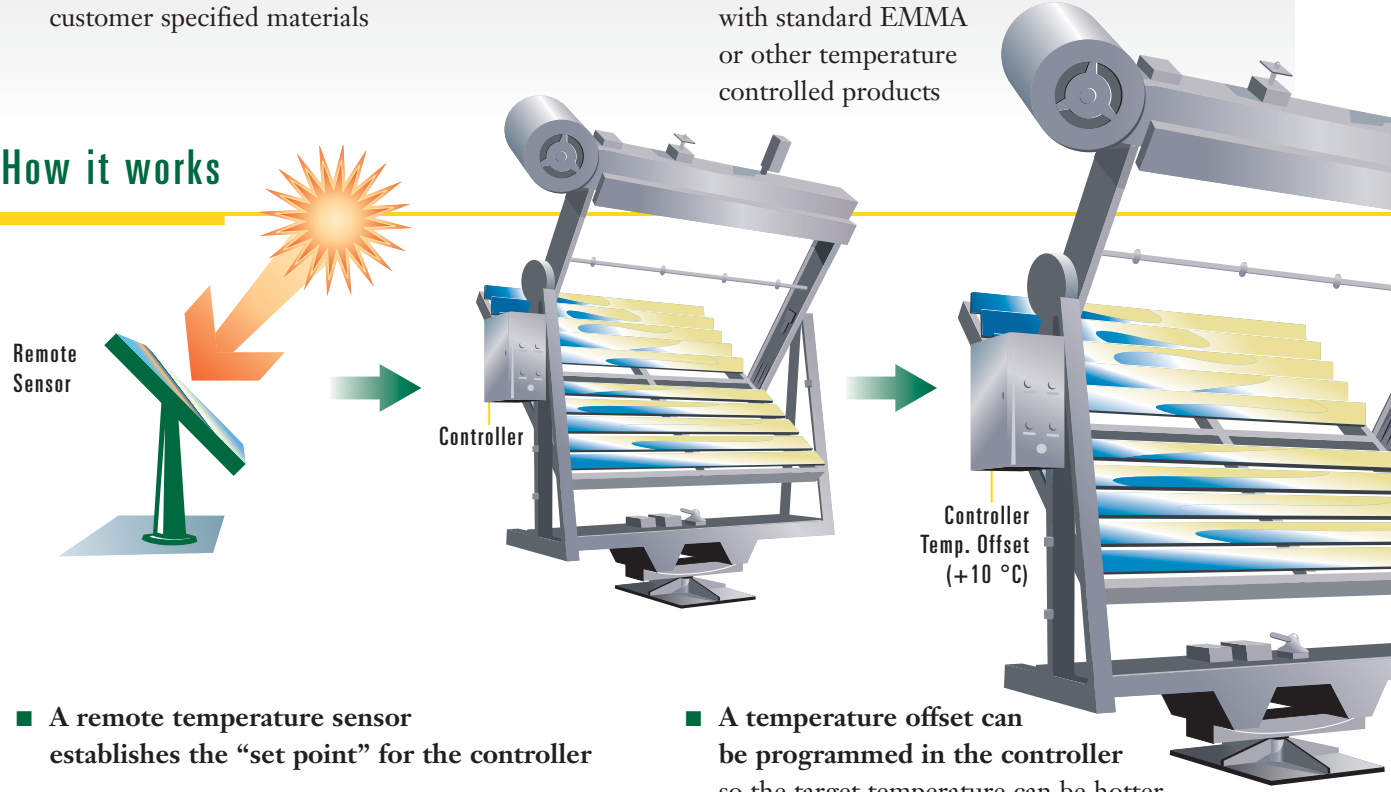
Dynamic Temperature Controlled

EMMA®, EMMAQUA®, and EMMAQdfUA with Nighttime Wetting

Advantages

- The dynamic system approximates intermittent temperature patterns found in natural exposures on an accelerated test
- The remote temperature sensor may be black panels, end use materials on exposure racks, and even full-scale installations
- Target area temperature sensors can be mounted as standard black panels or even customer specified materials
- The system can incorporate a variety of temperature offsets while maintaining natural environmental temperature patterns
- The system can be used to link multiple EMMA devices in a “chain” or “daisy” configuration for designed experiments or enhanced temperature repeatability
- Can be used in conjunction with standard EMMA or other temperature controlled products

How it works



- **A remote temperature sensor establishes the “set point” for the controller**
- **The controller compares the temperature** on the target exposure area and the remote sensor and adjusts the cooling blower speed until the target sensor temperature equals the remote sensor temperature
- **The remote sensor changes with the environmental patterns of the day** and these patterns are duplicated on the target area. This is why it is called “dynamic” temperature control.
- **A temperature offset can be programmed in the controller** so the target temperature can be hotter by a specified amount and still duplicate the temperature pattern of the environment
- **The remote sensor can be installed in a static exposure near the EMMA** such as a car hood, a roof section or simply a piece of material in a static rack
- The remote sensor can also be mounted on an adjacent EMMA to **thermally link EMMA devices**

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Night

Night Temperature Controlled

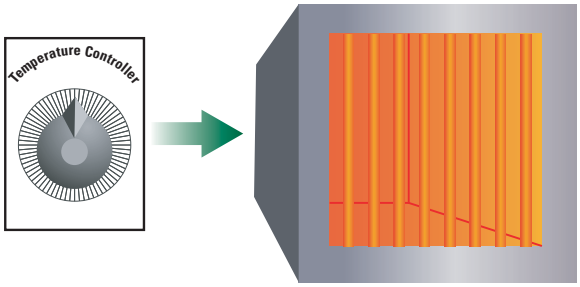
EMMA®, EMMAQUA®, and EMMAQUA with Nighttime Wetting

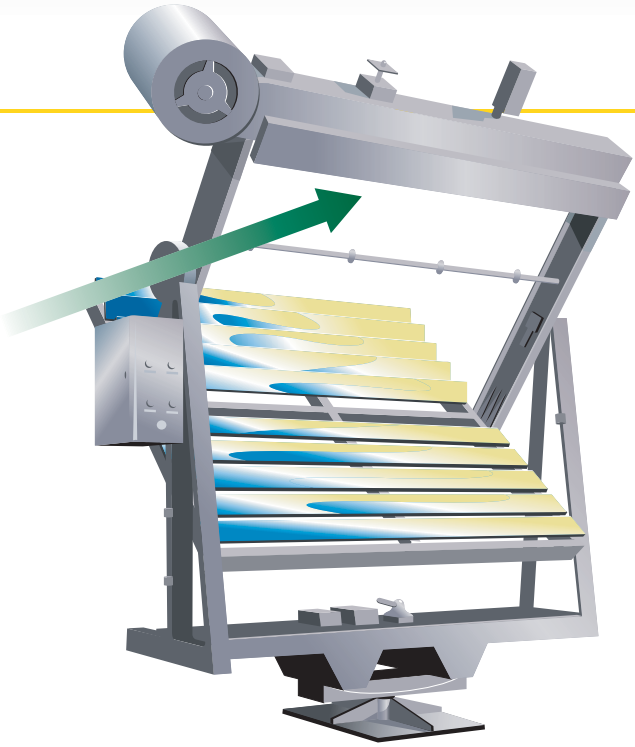
Advantages

- The night temperature system can approximate summer nighttime temperatures during winter exposures
- The system helps overcome effects of starting tests at different times of year (winter vs. summer)
- May enhance nighttime wetting degradation
- May improve acceleration factors by increasing thermal degradation

  Dependent on materials tested
- May improve dark time reaction degradation
- The system helps to counteract the heat absorbing night desert sky and low winter night material temperatures
- Can be used in conjunction with standard EMMA or other temperature controlled products

How it works





- **Special heater platens** are mounted behind specimens on the target area
- **Heater platens are connected to a thermostat with a set temperature**
- **Heating system is connected to a timer** that turns on at night and off in morning
- **Specimens in target area receive radiative, convective and conductive heating through unexposed side**
- **Customer can specify time, duration and set temperature of heating platens**

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Variable

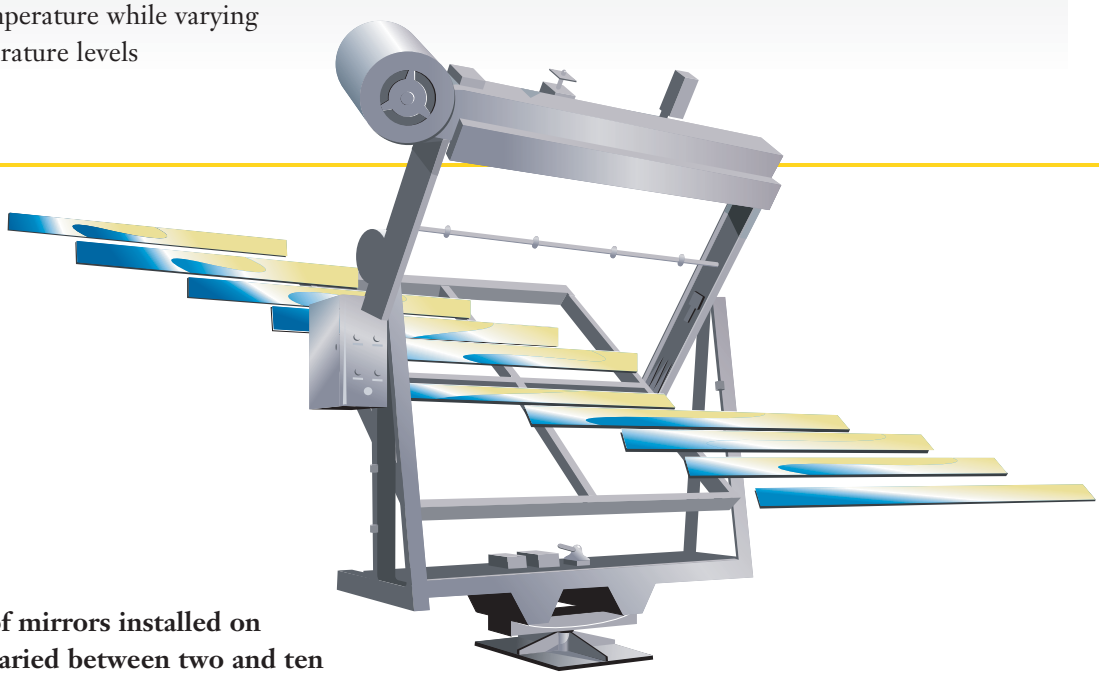
Variable Irradiance

EMMA®, EMMAQUA®, and EMMAQUA with Nighttime Wetting

Advantages

- The variable system allows temperature sensitive materials such as dark colored thermoplastics to utilize EMMA exposures at different levels of acceleration
- Allows investigation of effects from different solar and UV irradiance levels
- Allows investigation of a material's reciprocity characteristics
- Maintains natural intermittent patterns of light and temperature while varying light and temperature levels
- Can be used for very sophisticated and controlled weathering experiment design
- May allow better correlation between accelerated and end-use weathering exposures
- Reduces material exposure temperature below other Atlas Temperature Controlled EMMA products
- This system is most effectively used with Temperature Controlled EMMA products

How it works



- **The number of mirrors installed on an EMMA is varied between two and ten** depending on the exposure requirements of the material
- **The UV radiant exposure is calculated and reported** according to the number of mirrors
- **The reduction in solar concentration results in reductions in heating of materials** and allows temperature sensitive materials to be successfully exposed
- **The number of mirrors may be changed at different times of year** to account for seasonal variances in irradiance. For instance, more mirrors during colder winter exposure and fewer mirrors during hotter summer exposure.
- **A temperature control system (static or dynamic) is typically used in conjunction** with this system for temperature compensation and finer control

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Moisture

Moisture Controlled

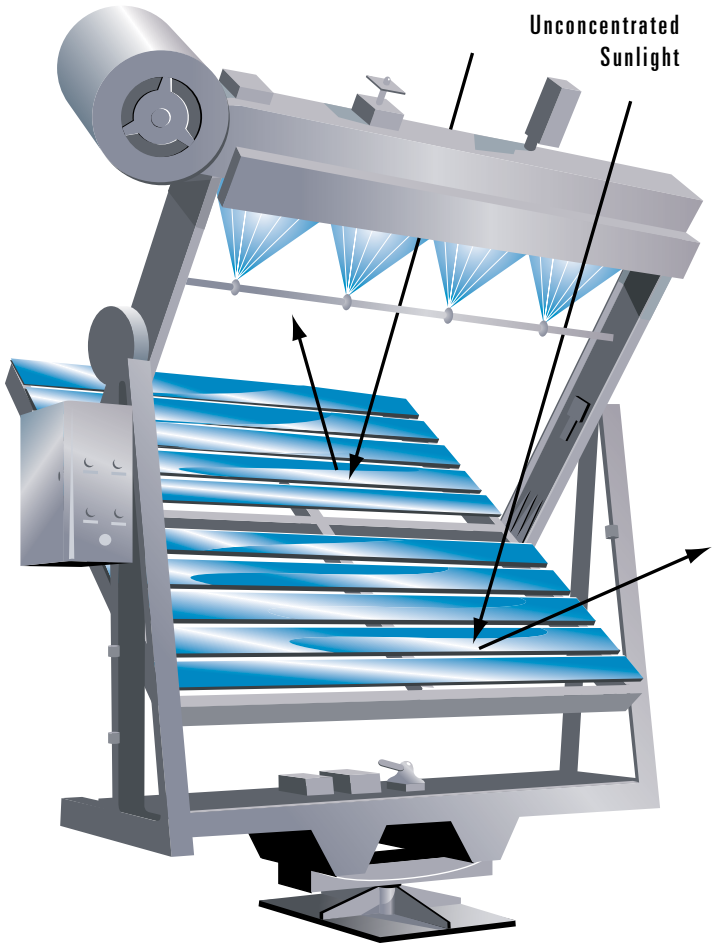
EMMA®, EMMAQUA®, and EMMAQUA with Nighttime Wetting

Advantages

- Customization of spray cycles at varying frequency and duration to meet specific material needs
- Ability to overcome "lensing" and thermal shock effects of wetting specimens in concentrated sunlight
- Fine tuning of ratios of light dose to wet time to more closely simulate end use conditions and/or accelerated degradation rates
- Design of custom wetting cycles to accommodate different water absorption rates for different materials

How it works

- **Customers define the frequency and duration of water spray in a 24-hour period** for material exposure and whether water spray is applied with or without concentrated natural sunlight
- **The target area rotates out of the concentrated sunlight** prior to spraying the specimens
- **Blown air cools test specimens** to ambient temperatures
- **Specimens are sprayed with ultra-pure water** for a customized length of time
- **The programmable logic controller rotates the test samples back into focus** at the end of the water spray cycle
- **A radiometric-tracking algorithm automatically accounts for the correct radiant exposure specimens receive** as they cycle in and out of concentrated sunlight



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