SolarEvaluation™

1 Solar Monitoring—SolarEvaluation

A successful, automated WindowManagement® control system requires a detailed view and analysis of the current sky on a minute-by-minute basis. The most successful systems have the ability to predict in real time the position of the sun in the sky, from sunrise to sunset, and the position of the solar ray at any point on earth or building facade. They also have, to some extent, the ability to anticipate the changing sky conditions surrounding the building under consideration. Finally, a successful system must have complete information about the current sky conditions surrounding the building.

Precise sky monitoring should not result in excessive shade or louver positioning. Hysteresis and user-defined threshold timers prevent over-reactive and distracting window-shade movement, as ever-changing sky conditions and the position and intensity of the solar ray continue being tracked in real time.

New systems in development will increase the predictive accuracy of a building's sky condition.

1.1 Solar Monitoring Systems

Two solar-monitoring methods are currently in use:
1. SolarEvaluation, which utilizes total-solar radiometers that measure +/-98% of solar radiation.
2. Daylight Measuring, which uses photometers (also called photosensors, lux sensors, or daylight sensors) that measure only the visible-light portion of the solar spectrum or 49% of total solar radiation.

1.1.1 Radiometer and Photometer: The Difference

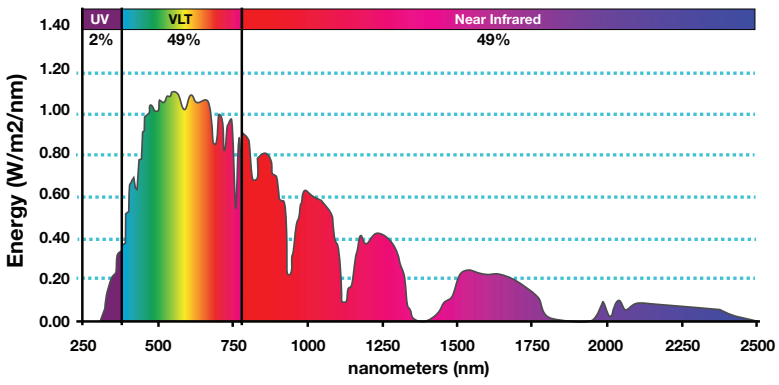
A radiometer measures the total ultraviolet (UV), visible light (VL), and heat (IR) portion of the solar spectrum from 0.25 to 43.0 microns, representing the light and heat that affect a building and 98% of the sun's radiant energy. According to the ASTM solar spectrum charts and graphs (see below), the measured energy of the VL (daylight) portion of the solar spectrum—that portion measured by a photometer—is approximately 49% of the total solar-energy spectrum of the sun. The solar energy measured by a radiometer represents approximately 98% of the total solar-energy spectrum of the sun.

A photometer measures the VL portion of the solar spectrum from 0.4 to 0.7 microns, 21% of UV, and 49% of the total radiation of the solar spectrum.

An effective automated system must compare a building's measured, microclimatic radiation with the ASHRAE clear-sky radiation (energy-value) curve to accurately evaluate the current sky and determine if a clear or cloudy condition exists. Another aspect is that, in most climates, there are intermittently alternating cloudy and clear conditions. The system must evaluate these clear and cloudy conditions to determine if the system should adjust to a clear or cloudy condition.

MechoSystems' SolarEvaluation process analyzes real-time sky data against ASHRAE's clear-sky model to provide solar protection or window-covering adjustments.

ASTM E 891 Solar Spectrum



Energy Distrubition - Total Solar
UV - 2%
VLT - 49%
IR - 49%
VLT + IR = 98%

FRASERSHADING SYSTEMS
MechoSystems Design with light.™
Unit 101-5219 192nd St. Surrey, BC, Canada, V3S 4P6 | Phone: 604-881-4881 | Fax: 604-881-4882