

The background features a pattern of blue circles of varying sizes, arranged in a grid that appears to be receding into the distance. Overlaid on this are several thin, curved blue lines that create a sense of depth and movement.

pioneering leadership  
in sinewave dimming



# Hear the music. Not the lights.

For lighting applications requiring the quietest and most versatile dimming the entertainment industry offers: Sensor+ SineWave. The newest member of the ETC family of dimming systems is a different approach to dimming. By controlling the amplitude of the AC sine wave, Sensor+ SineWave eliminates filament noise and achieves complete silence at the lamp. No acoustical interference. Plus, SineWave provides quiet dimming of any load – even ballasted HMI fixtures and low-wattage LEDs.

## Benefits of Sensor+ SineWave dimming

- Lamp filament noise eliminated
- Less than 1% harmonic distortion reduces power costs
- Unity Power Factor
- Minimum 97% efficiency – load dependant
- Control over wide variety of loads in a system – resistive, inductive or capacitive
- Ability to dim ballasted loads such as HMI fixtures<sup>1</sup>
- No minimum load – perfect dimming curve even with very low wattage loads like LED's
- Total short circuit and overload protection without breaker tripping
- Extended lamp life due to elimination of load switching and reduced peak voltage

## The success of Sensor with the silence of SineWave

Sensor+ SineWave is the latest generation of Sensor dimming systems and represents the future of quiet dimming. The quiet attributes of sine wave technology combined with Ethernet data and status feedback make it ideal for installed dimming situations. The Sensor+ SineWave rack (SW24+) also matches the appearance and design of current Sensor products and can be added easily to existing systems. The new SineWave dimmer module (D20SW) is a dual, plug-in module for use in the Sensor+ SineWave racks.

<sup>1</sup>Assuming the unit is designed to be dimmed. Any load that does not dim can safely be turned on and off with a Sensor+ SineWave Dimmer.



# Introducing Sensor+ SineWave...!

Professional features, exceptional reliability. Sensor+ SineWave technology — with Ethernet control, comprehensive status and reporting are all available now for installed dimming systems. Sensor+ SineWave racks are engineered with the best of Sensor rack technology — easy to install, simple to use, and inexpensive to service. Sensor+ SineWave racks are shipped fully assembled — no additional assembly required by the contractor. Convenient front access, with readily accessible line, load, neutral and control terminations, makes ETC's dimmer racks the choice of contractors and installers. Constructed of heavy gauge steel and extruded aluminum, with components designed to a precise fit, these racks are Sensor-rugged, reliable and low maintenance.

## Sensor+ SineWave Racks

- 24-module rack configuration
- Front-access installation with easily accessible line, load, neutral and control terminations
- Single or bussed power feeds (Busses to standard Sensor racks)
- Rated for 100,000 AIC with listed modules
- Direct Ethernet control signal input as well as two DMX inputs (ETCNet2 native device) — (ACN when available)
- Includes Advanced Features (AF)

## Sensor SineWave Dimmer Modules

The SineWave Dimmer Module provides effective and quiet dimming of any load: resistive, inductive or capacitive. SineWave dimmers are even able to dim ballasted loads such as HMI fixtures and low-wattage loads like LEDs. The design features high-density modular assembly, tool-free insertion and removal, fully magnetic 100% rated circuit breakers, and electronic low-end set controls via the CEM+ control module.

- Two 2.4kW dimmers per module
- Complete control of a wide range of loads including dimmable electronic ballasts, LED's, motors and conventional incandescent lamps
- Voltage, current and temperature sensors in each dimmer
- Fully magnetic circuit breakers
- 100% duty cycle at full rating
- Electronic low-end set controls via the CEM+
- Includes Advanced Features (AF)





# Total flexibility in system layout: centralized, distributed, or mixed dimming

In centralized dimming systems, dimmers are rack mounted and located in 'dimmer rooms,' with a planned and implemented wiring installation. Additions or alterations may add costs and complexity. In a distributed dimming scheme dimmers can be attached to lighting bars, either permanently or on a temporary basis. ETC's SineWave technology is available in centralized or distributed dimming formats, or even in a mixed system with networked communication providing full integration.

Distributed dimmers are ideal in:

- multi-use facilities where placement of dimming circuits needs to be totally flexible
- existing traditional dimmer-per-circuit theaters where additional dimming circuits are desired
- smaller venues or studios where there is no place to install a dimmer rack
- existing facilities where the nearest electrical room is too far away to practically wire rack-mount dimmers to the loads
- temporary locations such as on sets and scenery or in orchestra pits



## Introducing SineWave Power Modules...!

SineWave Power Modules are the secret of effective distributed dimming. A perfect example of quiet power, the new Power Module doesn't interfere with acoustics and is suitable for distributed applications where the dimmer is located at or near the load in the performance space. The programming features of Power Module are among the most sophisticated available. And the control panel includes a backlit menu-driven LCD screen to set and review operational parameters, performance and status information. The option for an integrated Ethernet node expands the system with fully networked communication.

### SineWave Power Module

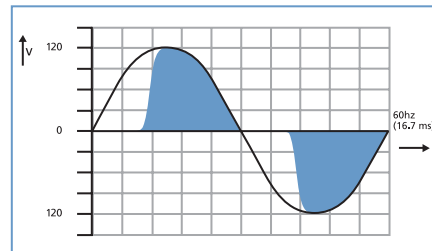
- Convection cooled – no fans!
- Choice of Stage Pin or Twistlok outlets
- Flying lead 10/5 feeder or panel-mount Twistlok inlet connector
- 20A, 3-phase 4-wire plus ground feed
- Top and bottom mounting channel for fixture support
- DMX IN and THRU, as well as 2 DMX universes via Ethernet
- UL508 listing



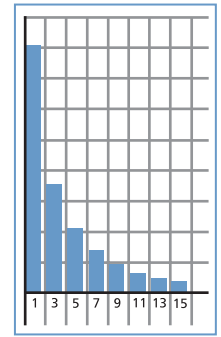
# Understanding the differences in dimming technologies

## Forward phase control (SCR, triac)

Forward phase control dimmers will remain the choice for budget-conscious dimming installations for the foreseeable future. The simple technique of varying the switch-on point of the lamp current each half-cycle is a lighting mainstay and is very cost effective. The disadvantages of the technique include noisy filaments that can buzz audibly and the potential for cross-interference between dimming and audio systems.



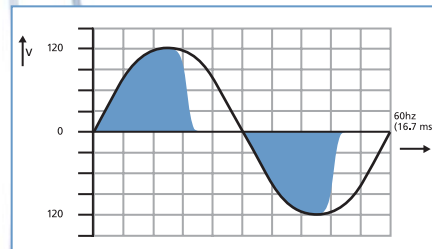
Forward phase dimmed waveform.



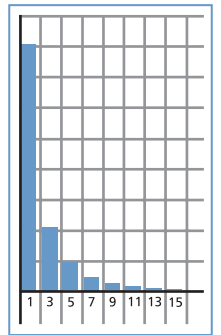
Typical harmonic spectrum for a forward phase dimmer.

## Reverse phase control (Transistors: IGBT, MOSFET)

Reverse phase control dimmers typically use a transistorized (IGBT) design to eliminate filter chokes. This type of dimmer emulates the switched output of an SCR dimmer, although the dimmer turns off during each half cycle rather than turning on, as in SCR designs. Reverse phase control designs offer some reduction in lamp noise – roughly equivalent to an SCR high-risetime dimmer – but can't compare to sine wave designs for true quietness in lamp filaments. Reverse phase control dimmers 'chop' the waveform, so harmonic currents and electrical interference are still present, even though filaments are somewhat less noisy.



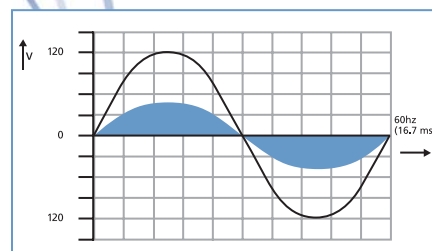
Reverse phase (IGBT) dimmed waveform.



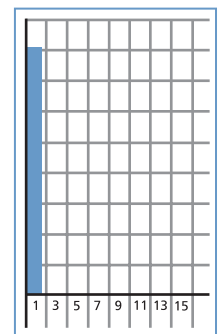
Typical harmonic spectrum for a reverse phase (IGBT) dimmer.

## Sine wave control

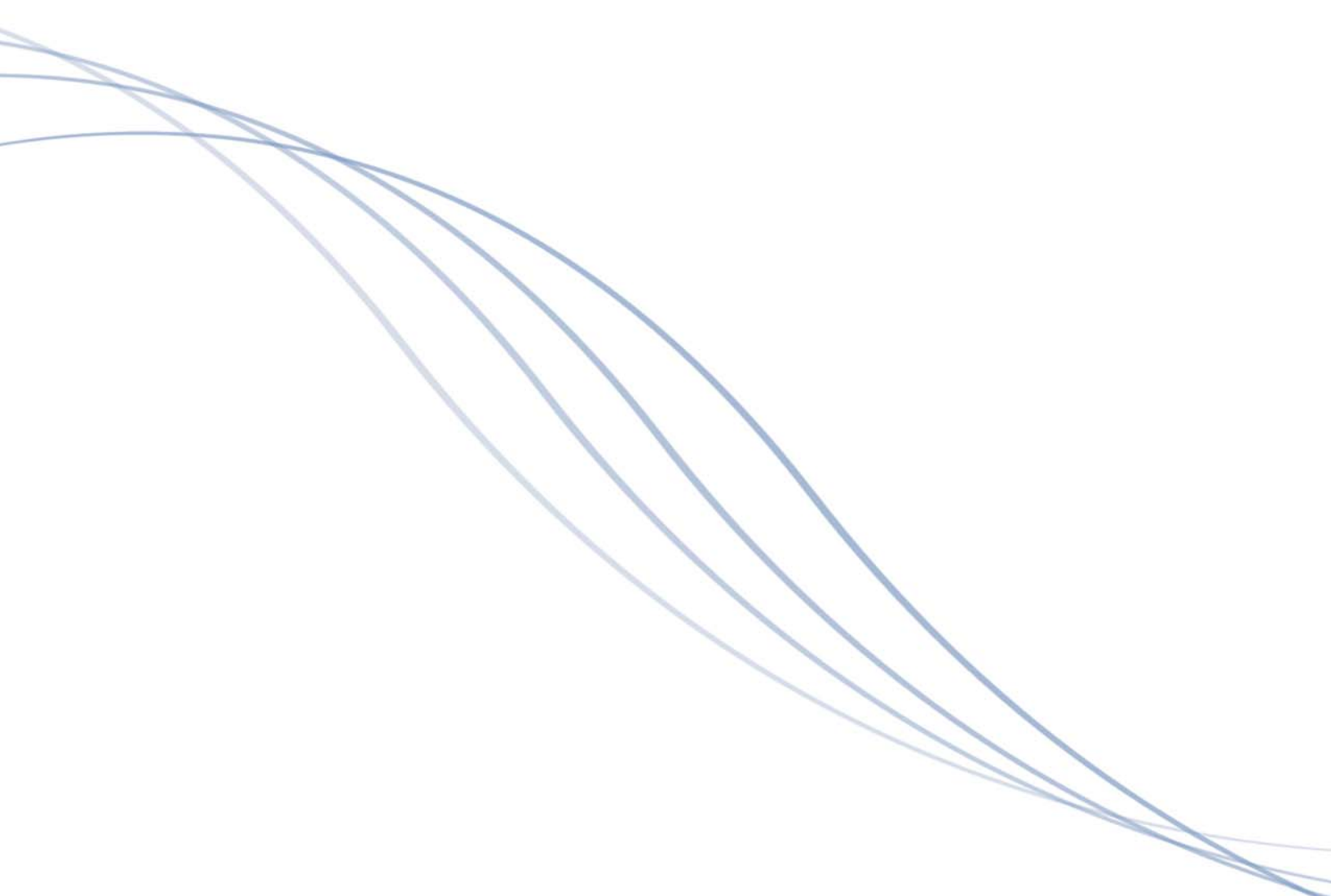
The future of dimming systems – sine wave dimmers produce a pure sinusoidal output, which delivers complete silence and energy efficiency. These dimmers offer the ultimate in reduction of lamp noise and power line harmonics. A lamp connected to a sine wave dimmer produces no more filament noise than a lamp connected directly to the power line. This technology has less than 1% harmonic distortion, resulting in a completely silent dimmer with a remarkable capacity for dimming almost any load. The lack of harmonic currents means that electricity costs are reduced (no more reactive power to be paid for), no more K-rated transformers, local transformers have a longer working life, and the cable infrastructure – usually overrated by 40% for conventional dimming systems – is much simpler and more economical to install.



Sine wave dimmed waveform.



Typical harmonic spectrum for a sine wave dimmer.



[www.silentdimming.com](http://www.silentdimming.com)



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