

## CELESTIAL CES

### Light Sensors for Energy Management Systems

#### DESCRIPTION

The **CES** belongs to a family of sensors that monitor either task or ambient light levels precisely. The light level measured is converted to an analog signal that is sent to the controller of the Energy Management System (EMS).

The **CES** allows the Heating Ventilation Air Conditioning Energy Management System (HVAC/EMS) to control area lighting by switching banks of lights on and off, or provide continuous signals to electronic dimming ballasts for fluorescent fixtures.

#### ADJUSTABILITY

The sensor sensitivity is adjustable. The maximum output voltage can be matched to the maximum light level, in order to provide the highest resolution signal to the EMS. Model measurement ranges include 0 to 750, 2,500, or 7,500 FC. The **CES** sensor is available in several input voltages (5, 10, 12, & 24VDC). The voltage output is available in either 5 or 10VDC, and can be ordered with a zero or one volt minimum. (See selector table).

#### CONSTRUCTION

To achieve the highest degree of performance and reliability, all components are of computer grade quality and are assembled on a fiberglass epoxy circuit board.

The electronic circuit of all exterior sensor models is encased in a clear, glass-like epoxy and sealed with an electronic grade, non-corrosive urethane resin. Skylight and outdoor models are housed in Cicolac T (TM) for UV stabilization.

#### SENSORS FOR ALL APPLICATIONS

All indoor sensors have a flat Fresnel lens that looks downward in a 60 degree cone of reference to measure actual light on the work surface. The Fresnel lens is used to reduce the influence of stray light striking the sensor from nearby windows or incidental side lighting.

The Outdoor sensor is enclosed in a weatherproof housing with a visor for shading and lens protection.

The Atrium and Skylight sensors both use diffusing dome lenses to provide a 180 degree angle of photodiode response.



#### FEATURES

- Adjustable maximum output voltage for high resolution in 10 to 7,500 FC range.
- Output minimum voltage selection of zero or offset.
- Indoor sensor with 60 degree clear Fresnel Lens, Adhesive mounting to ceiling, facing down. Sensor range 0/5-750 FC.
- Outdoor sensor with flat clear lens. Sensor range: 0/5-75FC. 1/2" IPT connection for horizontal mounting. Weather proof housing.
- Atrium sensor with opaque dome lens filters 33% of light level in upper atrium. Sensor range: 2/200-2,500 FC. 1/2" IPT connection for upward mounting.
- Skylight Sensor with dark dome lens filters 90% of light level in skylight. Sensor range: 10/1,000 TO 7,500 FC in skylight. 1/2" IPT connection to for upward vertical mounting.
- Interfaces with any EMS equipment.
- Sensor matched to human eye response range.
- Fully patented technology.
- 2 year warranty.

# PLC MULTIPOINT, INC.

## CES TECHNICAL DATA

**Accuracy:** +/- 1% at 70 F (21 C) Derated to +/- 5% at 120F or at 0 F (-18 C to 49 C)

**Operating Temp:** 13 F to +140 F (-11 C to 60 C)

**Sensor Type:** Blue-enhanced Photo Diode.

**Sensor Ranges:** Housing Minimum Adjustable Maximum

<b>CES/I</b>	Indoor	0 FC	5-750 FC
<b>CES/O</b>	Outdoor	0 FC	5-750 FC
<b>CES/A</b>	Atrium	2 FC	200-2,500 FC
<b>CES/S</b>	Skylight	10 FC	1,000-7,500 FC

**Input Voltage:** 5,10,12,24 VDC. (See ordering example)

**Output Voltage:** 5 VDC or 10 VDC full output

**Output Offset:** 0 VDC or 1 VDC at total darkness

**Wiring:** Three conductor 18 ga. stranded cable

**Red:** Pos. DC input

**Black:** DC common

**Yellow:** Output to EMS

## CES SENSOR SELECTION

Product	Lens	Filter	Mounting	Housing	Orient.	Height	Dia.
CES/I	Fresnel	Clear	Ceiling	Indoor	Down	2.00"	1.23"
CES/O	Flat	Clear	1/2" IPT	Outdoor	Horiz..	1.85"	1.28"
CES/A	Dome	Opaque	1/2" IPT	Atrium	Up	2.25"	1.28"
CES/S	Dome	Dark	1/2" IPT	Skylight	Up	2.25"	1.28"

## ORDERING EXAMPLE

CES / A - 12 - 1 - 5

Housing	Input	Min Output	Max Output
I=Indoor	5V	0	5
O=Outdoor	10V	1	10
A=Atrium	12V		
S=Skylight	24V		

## SPECIFICATION

### PHOTODIODE SENSOR

The photoelectric device shall be a Class 2, low voltage, ambient light sensor designed to interface directly with the analog input of the Energy Management System. The sensor shall supply an analog signal to the EMS system proportional to the light measured. The sensor output shall provide for zero or offset based signal. The sensor shall be capable of a fully adjustable response in the range between 0 and 10,000 footcandles with a +/-1% accuracy at 70 degrees F (21 deg.C).

The sensitivity adjustment shall be at the sensor body, and outside of the sensor's viewing angle. The sensor housing shall be constructed from GE Cyclocac (R) ABS, shall be flame retardant and meet UL 94 HB standards.

### INDOOR

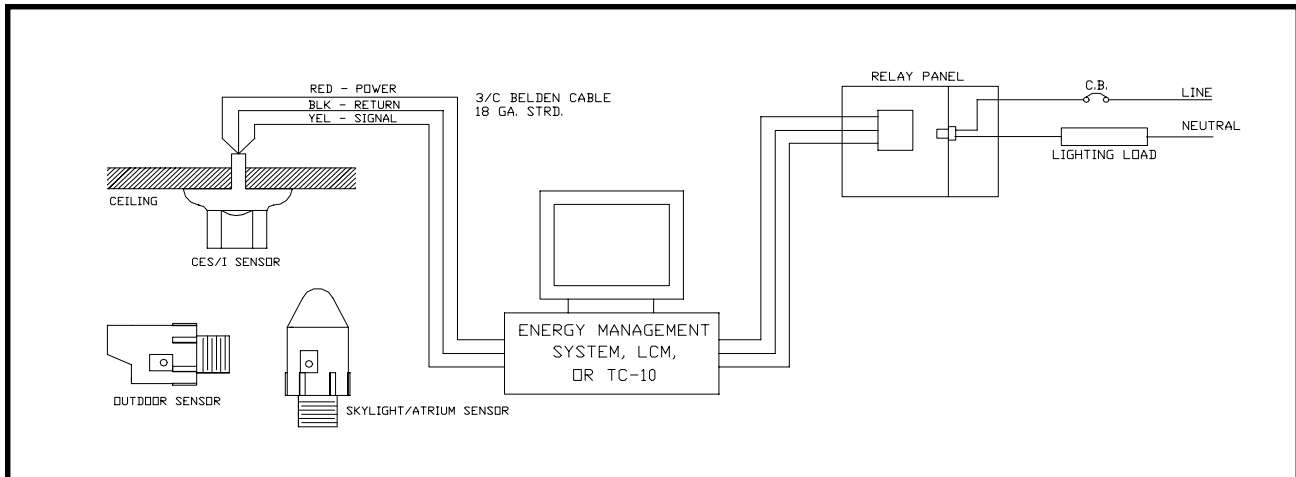
Indoor sensors shall have a Fresnel lens, with a 60 degree cone of response. Indoor sensors shall only require a penetration hole in the ceiling of 3/8" dia., and the sensor shall mount to the ceiling using adhesive tape. The indoor sensor range shall be between 0 and 750 FC. The indoor sensor shall be **PLC-MULTIPOINT CES/I**.

### OUTDOOR

Outdoor models shall have a hood over the aperture to shield the sensor from direct sunlight. The outdoor sensor circuitry shall be completely encased in an optically clear epoxy resin. Outdoor sensors shall mount to a standard threaded 1/2" conduit or fit a 1/2" knockout. The Outdoor sensor range shall be between 0 and 750 FC. The outdoor sensor shall be **PLC-MULTIPOINT CES/O**.

### ATRIUM or SKYLIGHT

The Atrium or Skylight sensors shall have a translucent dome with a 180 degree field of view. Atrium or Skylight sensors shall mount to standard threaded 1/2" conduit or fit a 1/2" knockout. Atrium sensor range shall be from 2 to 2,500 FC. Skylight sensor range shall be between 10 and 7,500 FC. The Atrium or Skylight sensors shall be **PLC-MULTIPOINT CES/A or CES/S**.



## PLC MULTIPOINT, INC.

3101 111th ST SW #F Everett Washington 98204

Tel: 866-998-5483 Fx: 425-353-3353

WWW.PLCMULTIPOINT.COM

## **CES/O APPLICATION NOTE**

---

### **ENERGY MANAGEMENT SYSTEM**

A building energy management system needed to control outdoor security and safety lighting. The lighting systems were required to turn on and off at different light levels using the building energy management system.

Photocells and mechanical timers were considered, but didn't provide the precise switching level controls required. The mechanical timers didn't allow for easy changes in schedules and daylight/standard time changes.

The **PLC-MULTIPOINT CES/O SENSOR** provided the energy management system with the lighting level signal required to control the outdoor safety and security lighting. The sensor was powered by the energy management system's 12VDC power supply source. The sensor signal provided a linear light level input into the energy management system. The **CES/O SENSOR'S** input range was set at 750 FC and the output was 0 to 10VDC providing a resolution of 13.3mv/FC or (75 FC/V) which was sufficient for the energy management system to control the lighting levels.

The ON and OFF switching setpoints were entered into the energy management system via the operator terminal. The minimum hold on time, transient filtering and output control was all handled through the energy management system. All of the above were displayed on the operator terminal, including the current light level from the **CES/O SENSOR**.

**PLC  MULTIPOINT, INC.**

3101 111th ST SW #F Everett Washington 98204

**Tel:** 866-998-5483 **Fx:** 425-353-3353

[WWW.PLCMULTIPOINT.COM](http://WWW.PLCMULTIPOINT.COM)

**CES SCHEMATIC**

