

CES

SENSORS

INSTALLATION AND MAINTENANCE MANUAL (IMM)

PLC Sensors

Control Devices



205 CES Rev5



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INSTALLATION & MAINTENANCE MANUAL CES SENSORS	REV 5
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1 INTRODUCTION

1.1 GENERAL

1. Please read these instructions carefully to prevent any possible of injury or equipment damage.
2. Installer must be a qualified and experienced service technician.
3. Verify the product ratings to confirm that this product will satisfy your requirements and application.

1.2 OVERVIEW

The CES sensors monitor ambient light levels and provide an analog DC signal to various microprocessors and energy management systems for the purpose of lighting control.

CES sensors are available in 16 basic varieties. There are 4 different styles with 4 different possible ranges.

Styles Include: Indoor, Outdoor, Atrium and Skylight

Range: 0-5V, 1-5V, 0-10V & 1-10V

All 16 varieties require a Class 2 Low Voltage Power Supply providing 12-24VDC input power to operate properly. It is also possible to order a CES sensor that operates on 5VDC or 10VDC power but the full scale output signal will be reduced to approximately 1V less than the input power. The four different styles of CES sensors have different mounting and installation requirements. **(See Figure 1A-1E).**

2 INSTALLATION

2.1 Indoor Sensor (Ceiling)

Mount the Indoor sensor in a 1/2" hole in the false ceiling tile using the adhesive backing. For most general applications the sensor should be mounted between 6-8 feet of the window area, central to the area illuminated by the electrical lighting that will be controlled. In all cases the sensor must be mounted so that it looks at reflected light only and not at any direct light. **(See Figure 1A)**

2.2 Indoor Sensor (Reflecting Wall)

Mount the Indoor sensor at reflecting wall. When sconces are in place in the light well, make sure not to mount sensor in direct level as the sconces. Place sensor 18" from the bottom corner of the ceiling. Remember, the Fresnel lens will see light with a field of view that is 1.15 times the distance to the wall. No direct lighting should be within the field of view. **(See Figure 1C)**

2.3 Outdoor Sensor

Mount the Outdoor sensor in a standard threaded 1/2" conduit or 1/2" knockout. Locate the sensor on the roof or somewhere that is exposed to full daylight and is not shadowed or directly exposed to any night time illumination. Sensor must be mounted horizontally, facing North, with the hooded portion on top. **(See Figure 1E)**

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2.4 Atrium Sensor

Mount the Atrium Sensor in a standard threaded 1/2" conduit or 1/2" knockout. Locate the sensor at the opposite side of the window mounting the sensor against the wall or ideally in the middle of the atrium glass facing towards the Atrium glass. **(See Figure 1B)**

2.5 Skylight Sensor

Mount the Skylight sensor in a standard threaded 1/2" conduit or 1/2" knockout. Locate the assembly near the center of the skylight well (at least 12" from the side) that is exposed to full daylight and is not shadowed. For the best results, use unistrut with a 1/4" angle support, making sure the top of the light sensor is level with top of skylight curb. Sensor must be mounted vertically with the domed portion facing up. **(See Figure 1D)**

3 CONNECTION

CES sensors are a three-wire device that can provide analog DC voltage inputs to a variety of controllers and microprocessors. In most cases, a 12-24 VDC power source must be supplied to the RED and BLACK wires on the sensor. The sensor will draw 11324mW of power. The DC signal voltage is returned to the controller through the YELLOW wire. Wiring the sensor to the controller should be done with 18-22 AWG stranded wire. Do not route the low voltage wire with or near power wiring. For long wire runs or where there is excessive electrical noise, shielded cable or cable in conduit is required. Cable lengths should not exceed 500 ft. butt splices are recommended but wire nuts are acceptable. Wiring should be performed with all relevant power switched off.

- RED: Input Voltage (+12-24VDC)
- BLACK: Input Return/Output common (+12-24VDC)
- YELLOW: Output Signal to Controller (0-5, 1-5, 0-10, 1-10VDC)
- WHITE/GREEN: This wire loop controls the sensor sensitivity gain;
(IL versions only) Leave intact for factory set max, cut for a lower range.
(See Table 1 and Figure 4)

4 CALIBRATION

CES sensors have a variable gain that can be adjusted by turning the trim pot screw that is accessible through the small hole in the side of the sensor housing. However, making field adjustments are strongly discouraged as most field technicians do not have the equipment to do the job with any degree of precision. The CES sensors are factory calibrated to values that are time tested for their applications. If the factory calibration has been altered, a recalibration fee will be charged to return the sensor to factory settings. If a field adjustment must be made, the following information should prove useful.

Sensor	Style	Fixed Corresponding fc Min	Adjustable Corresponding fc Ranges	Factory Set Max	Cut Loop Wire
CES/I	Indoor	0fc	70-750fc	100fc	N/A
CES/O	Outdoor	0fc	50-750fc	250fc	N/A
CES/A	Atrium	0fc	200-2,000fc	1,000fc	N/A
CES/S	Skylight	0fc	1,000-7,500fc	2,000fc	N/A
CES/IL	Indoor Low	0fc	40-60fc	40fc	20fc
CES/ILF	Indoor Low	0fc	40-65fc	60fc	25fc
CES/ILD2	Indoor Low	0fc	50-75fc	50fc	25fc
CES/OD	Outdoor Dark	0fc	500-7,500fc	1,000fc	N/A

TABLE 1 SENSOR SELECTION

The Maximum range of a CES sensor should be at least 50% higher than the highest setpoint of interest in the lighting control zone that is controlled by the sensor.

To increase the output signal voltage at a given light level, rotate the trim pot screw clockwise.

To decrease the output signal voltage at a given light level, rotate the trim pot screw counter-clockwise.

The signal response of a CES sensor is very linear. If an accurate reading of the foot-candle level that the sensor is exposed to is available, the maximum range can be set using some basic math. See Figure 2 below.

Example: If the sensor is exposed to 150FC and 300FC Maximum is desired, adjust the trim pot until the signal voltage is 5VDC for a 0-10V sensor.

When calibration is complete, be sure to replace the plastic screw and washer to seal the hole from dust and water. If there does not seem to be enough information here to adjust the sensor's gain, you should rely on the factory setting or call the factory for additional help.

NOTE: Field adjustment of the sensor's gain is not recommended.

5 OPERATION

The CES sensor is functioning when the EMS system analog status changes as the sensor detects light. Once calibrated, the sensor will need no further attention. Except for the calibration hole there are no switches or other user controls on the sensor.

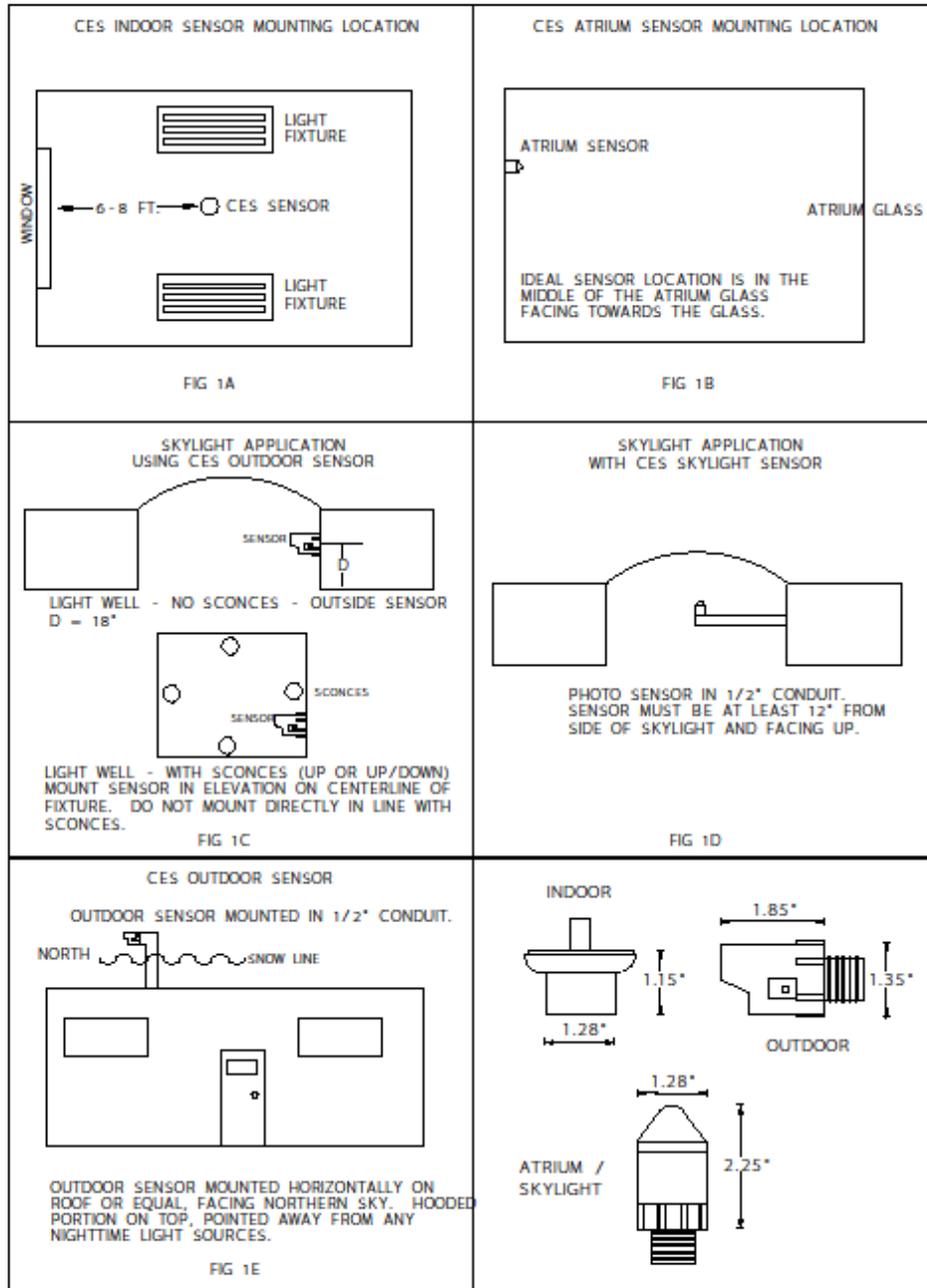


Figure 1: CES SENSOR MOUNTING LOCATION

6 MAINTENANCE

Every 2 months wipe the lens clean with a non-scratching clean cloth and ensure that no foreign debris remains. Check the housing for damage such as cracks, burns or other deformations. Check that no moisture has penetrated the sensor, as this will likely render it inoperable.

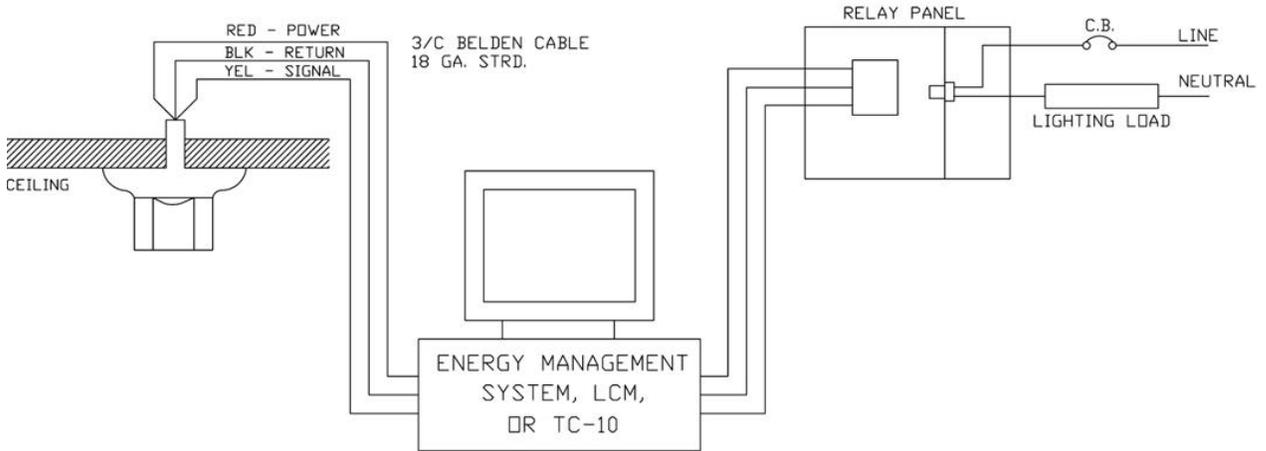


Figure 2: CONNECTION DIAGRAM

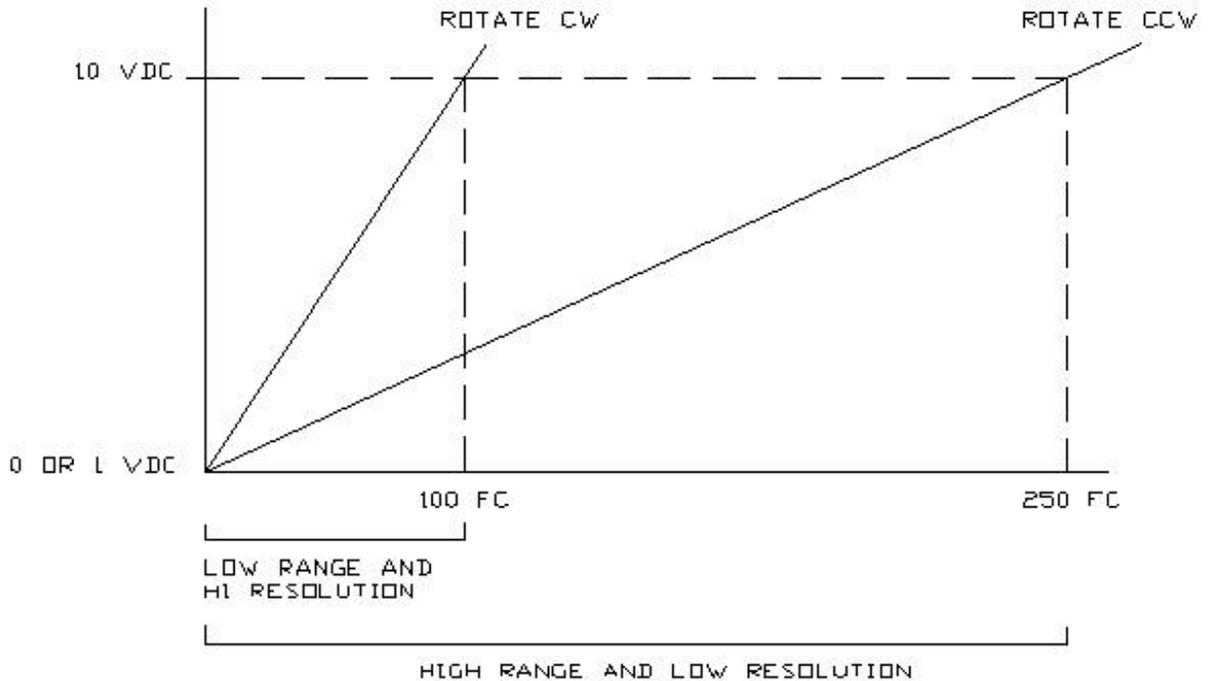


Figure 3: SENSITIVITY ADJUSTMENT

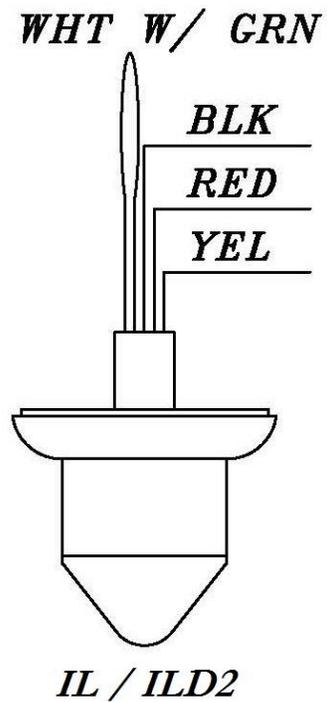


Figure 4a: CES-IL and CES-ILD2 Loop Wire Diagram

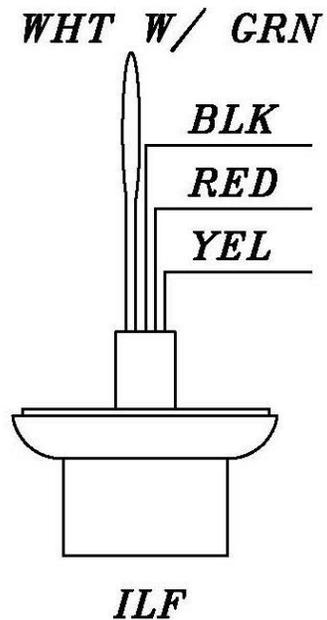


Figure 4b: CES-ILF Loop Wire Diagram