# SC-410/SC-411
## Opto-electronic Control Unit


### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|---|---|---|---|---|
| SC | 410 | 230V | AC | SP |

## Application Examples

- Long distance proximity sensing of objects on conveyors.
- Crane and hoist protection on over travel.
- Gap detection on mechanical handling systems.
- Pile-up detection on mechanical handling systems.
- Automatic initiation of vehicle washing systems.
- Level control of solids and granular substances (e.g. brick manufacturing).
- Control of security gates on both domestic and industrial properties.
- Contrast sensing between dark and light (e.g. coding stripes on material handling systems).
- Single beam safety barrier for a access control to certain hazardous areas.
- Edge control on material alignment.
- Material measurement control.

## Features

- Failsafe feature.
- Directly interfaces with the R02 Detechtor range of rectangular and tubular opto-electronic sensors.
- 10 metre sensing distance with the appropriate barrier heads.
- Programmable for dark or light response.
- Adjustable on and off response delay of 0-5 seconds.
- Signal modulated beam to stop foreign light source interference.
- Adjustable light intensity.
- High speed solid state (NPN) open collector output.
- Direct interface with solid state relays.
- Opto sensor cable fault detection (SC-411 only).
- 10A SPDT relay output.

## Description of Operation

The **SC-410** and **SC-411** are specifically designed for opto-electronic sensing applications. Operating in conjunction with the infra-red proximity or barrier heads type R02, the SC-410/411 provides remote sensing of objects up to 10 metres.

**Sensing:** The unit provides a modulated current to the infra-red light transmitter. It simultaneously monitors the signal returning from the receiver. If the transmitted light reaches the receiver, the module records a valid signal. Signals generated by a foreign light source such as the sun will be ignored. The light intensity of the transmitter can be adjusted on the SC-410/411 to compensate for semi-transparent objects or to fine tune the system in reflective (proximity) sensing applications.

**Output:** The unit features three types of outputs:
- An NPN open collector output for switching electronic process control equipment (e.g. counters, PLC's etc.).
- An output capable of driving a solid state relay.
- A relay contact output suitable for switching loads.

**Programming:** For failsafe operation, the output of the unit can be inverted via the programming key for either dark response or light response.

**Light response:** In this mode the relay will energise and the output transistor will conduct when the light beam is sensed (i.e. light barrier not blocked or light reflected by target).

**Dark response:** In this mode the relay will energise and the output transistor will conduct when the light beam is interrupted (i.e. light barrier blocked or no reflective target present).

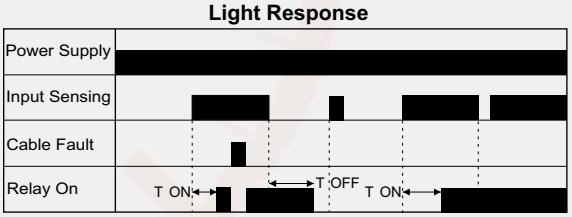
**Response delay:** The ON/OFF response of the relay and output transistor can be delayed up to 5 seconds. Both delays can be adjusted separately, thus providing extended operation of the output for fleeting targets (gap detection) or ignoring signals of insufficient duration (pile-up control).

**Cable fault:** Cable fault detection on the receiver and transmitter ensures failsafe operation. A short or open circuit on either the transmitter or receiver cables will cause a cable fault. In the event of a cable fault the relay will de-energise.

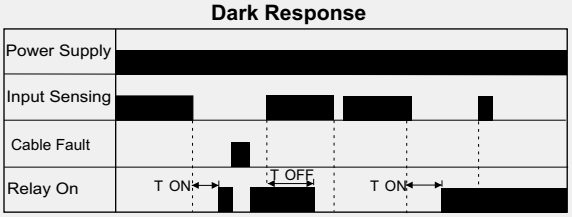
***Note (SC-411):*** *If the full loop impedance of the transmitter cable exceeds 2.5 ohms. a cable fault will be detected. Ideally a screened cable of 0.25 ohms/ metre or less should be used.*

## Operational Diagrams

**Light Response**

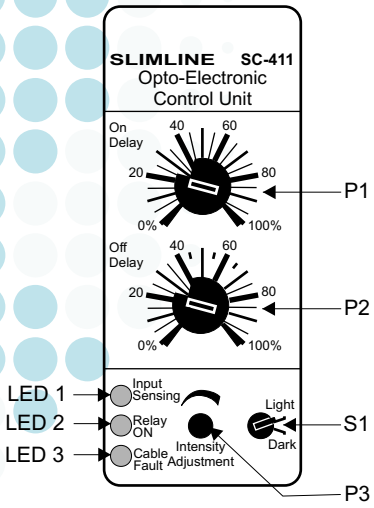



**Dark Response**




*T ON = ON-delay (adjustable up to 5 seconds)*
*T OFF = OFF-delay (adjustable up to 5 seconds)*

## Description of Controls




P1: The **ON-response Delay** is adjusted on P1.

P2: The **OFF-response Delay** is adjusted on P2.

P3: The **Light Intensity** is adjusted on P3, using a fine screwdriver. 20 Turns clockwise will adjust sensitivity from minimum to maximum.

S1: **Function Selection** is provided by S1. If set to "Light", the relay energises when the beam is sensed. If set to "Dark", the relay energises when the beam is interrupted.

LED1: The LED marked "**Input Sensing**" illuminates whenever the light beam is sensed by the receiver.

LED 2: The LED marked **"Relay On"** illuminates when the output has responded and the relay is energised.

LED 3: The LED marked **"Cable Fault"** light illuminates when a cable fault is detected.

## Wiring and Connection

### Power Supply

| | |
|---|---|
| Phase/Positive | 2 |
| Neutral/Negative | 10 |

### Relay Contacts

| | |
|---|---|
| Normally open | 1+3 |
| Normally closed | 1+4 |

### Solid State Transistor

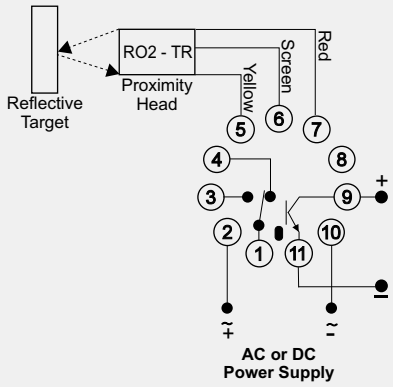
Negative (NPN emitter) to pin 11.
Positive (open collector) to pin 9.
***Note:***
*1. Pin 11 is internally linked to pin 6.*
*2. For DC power supply, pins 6,10 and 11 are common.*

### Solid State Relay

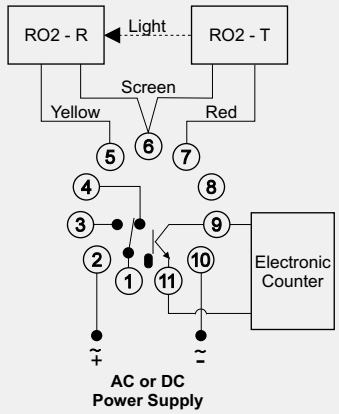
Control voltage to be tapped between pin 8 ("SR" + 12V) and pin 9.

### Sensor Heads

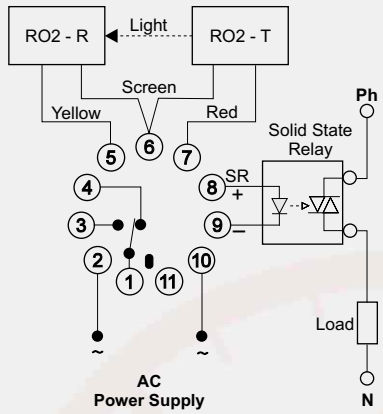
| | |
|---|---|
| Yellow (Receiver Input) | Pin 5 |
| Red (Transmitter Output) | Pin 7 |
| Screen (Negative, Common) | Pin 6 |




**APPLICATION 1**
**Proximity sensing:** Sensing a reflective target in conjunction with proximity sensor head.




**APPLICATION 2**
**Barrier sensing:** Sensing a target in conjunction with barrier (transmitter-receiver) heads. Transistor output feeding into and electronic counter.




**APPLICATION 3**
**Solid state relay:** Rapid switching of loads via external solid state relay.

## Technical Specifications

### Power Supply

AC: Supply voltage: 12, 24, 110, 230, 400, 415, 525V ±15%
Isolation (sensor input to power supply): 2kV
Power consumption: 3VA (approx.)
6VA for 415, 525V (approx.)

DC: Supply voltage: 10-30V, 48, ±15%
Isolation: no galvanic isolation (common negative)
Power consumption: 100mA (10-30V)
30mA for higher ranges.

### Response

ON - Delay = 0.03 - 5 seconds (adjustable)
OFF - Delay = 0.03 - 5 seconds (adjustable)

### Solid State Relay Output (PIN 8-9)

Maximum output source current: 8mA.
Open circuit output voltage: 12V DC.

### Transmitter (PIN 6-7)

Current pulse: 1.5A/25 microseconds.
Maximum wire impedance: 2,5 Ohms (use coaxial cable).
Short circuit current: 20 mA (average).

### Receiver (PIN 5-6)

Short circuit current: 3mA
Open circuit voltage: 8.2V

### Open Collector Transistor Output (PIN 9-11)

Type: NPN transistor.
Output sink current: 100mA.
Maximum voltage: 30V DC.