

# SM512 Series Retroreflective Mode Sensors

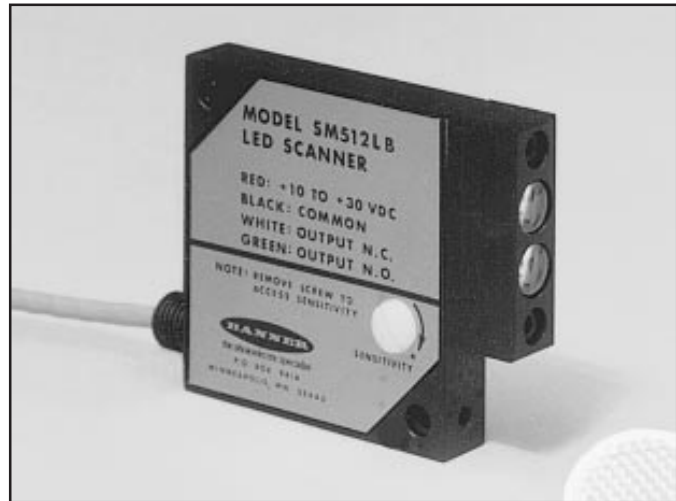
DC sensors with metal housings: SM502A, SM512LB



Banner SM512 Series dc retroreflective mode sensors are designed for reliable performance in hostile industrial environments. These sensors have totally-encapsulated circuitry within die-cast metal housings for superior resistance to moisture and physical abuse. Models include: SM502, SM512LB.

Model SM502A has a visible red sensing beam and a very fast response time and sensing repeatability. It is intended primarily for code reading applications. Model SM512LB has an infrared sensing beam and higher excess gain. It is especially suited to high speed sensing of small parts and precise positioning control.

SM512 Series sensors have *complementary* NPN transistor outputs (one normally open and the other normally closed), which connect directly to Banner MICRO-AMP and MAXI-AMP logic modules, as well as to most logic gates, small relays, and other similar dc loads.



## SPECIFICATIONS, SM512 Series Retroreflective Sensors

**RANGE:** See excess gain curves in individual product descriptions.

**SUPPLY VOLTAGE:** 10-30V dc for SM512LBD; 12-18V dc for SM502A. Maximum allowable ripple 10%; supply current is typically less than 40mA (exclusive of load).

**OUTPUT CONFIGURATION:** Complementary open-collector NPN transistors (one normally open and one normally closed), with continuous short-circuit protection. All models have reverse polarity protection.

**OUTPUT RATING:** Each output transistor is capable of sinking up to 250mA continuously. On-state saturation voltage less than 2 volts at full load and less than 1 volt at signal levels. Off-state leakage current less than 100 microamps. Outputs are reverse-polarity protected.

**RESPONSE TIME:** 1 millisecond on/off.

**REPEATABILITY:** See individual sensor specifications.

**OPERATING TEMPERATURE:** -40 to +70 °C (-40 to +158 °F).

**CONSTRUCTION:** Die-cast metal housing with stainless steel legend plate. Totally encapsulated; lens assemblies fully gasketed. NEMA 1, 2, 3, 3S, 4, 4X, 12, and 13. Cables are .15-inch diameter, PVC covered, and shielded (4 conductor, 6 feet long).

**INDICATOR LED:** Red LED indicator at rear of sensor (above cable exit) lights when the sensor is receiving a "light" signal.

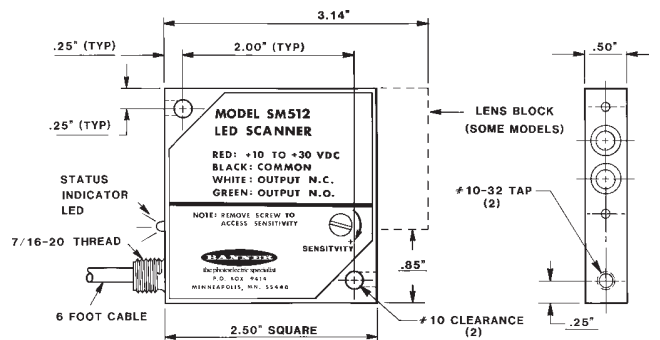
**SENSITIVITY ADJUSTMENT:** Single-turn adjustment, accessible by removing the nylon screw on the side of the sensor.

### APPLICATION WARNINGS:

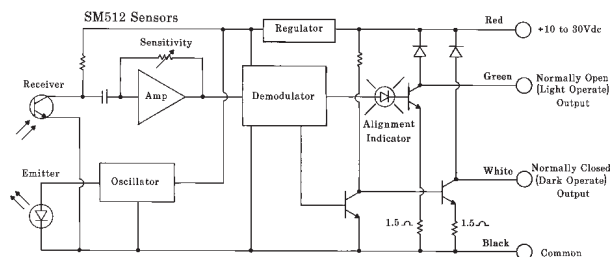
Outputs will not directly interface TTL logic, due to the reverse-polarity protection diode. Contact the factory for TTL interfacing instructions.

The short-circuit protection may de-energize the outputs with certain incandescent light bulb or capacitive loads. Contact the factory if these loads are anticipated.

## Dimension Drawing



## Functional Schematic



**WARNING** These photoelectric presence sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can result in *either* an energized or a de-energized sensor output condition.

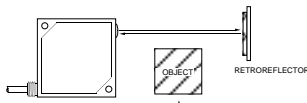
Never use these products as sensing devices for personnel protection. Their use as safety devices may create an unsafe condition which could lead to serious injury or death.

Only MACHINE-GUARD and PERIMETER-GUARD Systems, and other systems so designated, are designed to meet OSHA and ANSI machine safety standards for point-of-operation guarding devices. No other Banner sensors or controls are designed to meet these standards, and they must NOT be used as sensing devices for personnel protection.

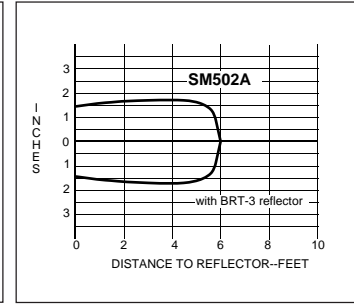
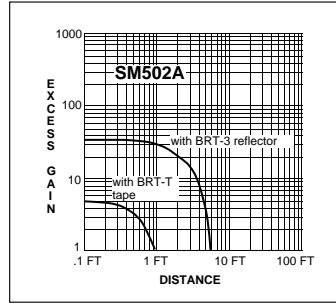
# SM512 Series Retroreflective Mode Sensors

## SM502A

Retroreflective mode



**VOLTAGE:** 12-18V dc  
**RANGE:** 6 feet (3 meters)  
**RESPONSE TIME:** 1 millisecond  
**REPEATABILITY:** 0.03 millisecond  
**SENSING BEAM:** visible red, 650nm

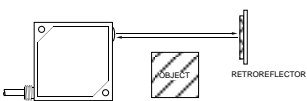


Model **SM502A** is a special-purpose retroreflective sensor with a **visible red LED light beam**. It is intended **primarily for code reading of retroreflective code plates** in automatic warehousing or identification systems. The beam angle is factory-calibrated to be within 1 degree of the mechanical axis of the sensor package, which permits multiple sensors to be mounted adjacent to one another without concern for optical "crosstalk" or individual alignment. The SM502A will reliably differentiate 1/4-inch wide retroreflective code marks on 1/2-inch centers to a distance of 6 inches, or 1/2-inch marks on 1-inch centers to 12 inches.

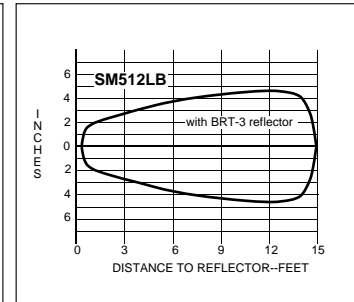
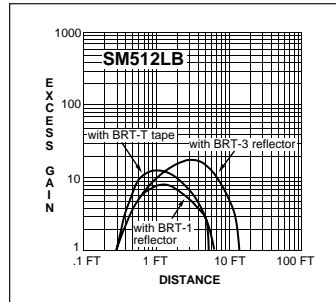
The SM502A is also the **first choice in this sensor family for general-purpose retroreflective applications at ranges out to 3 feet**. Required supply voltage is 12-18V dc, and outputs are protected against momentary short-circuits. The case is sealed but not encapsulated. For 24V dc operation, order special sensor model SM502A24V.

## SM512LB

Retroreflective mode



**VOLTAGE:** 10-30V dc  
**RANGE:** 15 feet (5 meters)  
**RESPONSE TIME:** 1 millisecond  
**REPEATABILITY:** 0.3 millisecond  
**SENSING BEAM:** infrared, 940nm



Model **SM512LB** is an **infrared** retroreflective sensor recommended for use in **general-purpose applications**, especially where high vibration or the presence of fluids, cutting oils, or other liquids dictate the use of a totally-encapsulated sensor. With its 10-30V dc supply voltage and short-circuit proof output transistors, it is nearly indestructible. It is particularly **well-suited to high-speed operation**, such as sensing small parts that move quickly through the sensing field. Its fast response time also permits precise positioning control of moving objects (such as in indexing applications), and the 1-millisecond response time is totally independent of received light signal strength.

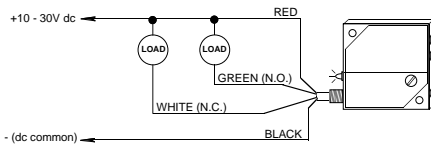
Due to a lens design that reduces "proxing", excess gain falls off rapidly at close ranges. If an application requires sensing a retroreflective target at a range of less than about 6 inches, consider model SM502A.

# SM512 Series Retroreflective Mode Sensors

## Hookup Diagrams

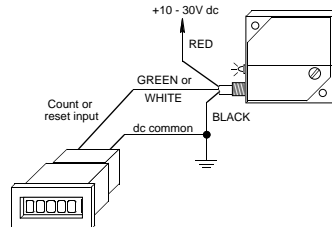
### Hookup of SM512 Series Sensor to Relay or Solenoid

SM512 Series sensors (including SM51RB and SM502A) offer two open collector NPN outputs in a complementary configuration (one normally open and one normally closed). The green output wire switches the load when the receiver "sees" its modulated light source (LIGHT operate). The white output wire switches in the dark condition (DARK operate). Both output circuits can switch up to 1/4 amp.



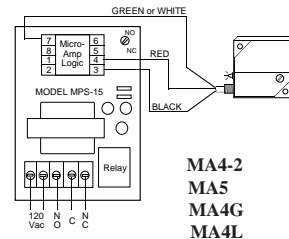
### Hookup of SM512 Series Sensor to Counter

Most counters, totalizers, rate meters, etc. accept either output of the SM512s. Hookup to a battery-powered LCD type is shown here. For other types, follow the counter's hookup instructions for an NPN or current sinking input device.



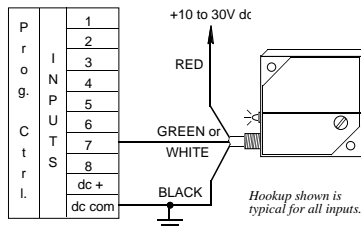
### Hookup to MICRO-AMP Logic (MPS-15 Chassis)

The output (green or white wire) of SM512 Series sensors connects directly to any input of Banner MICRO-AMP logic-only modules. These MICRO-AMP logic modules may be used:



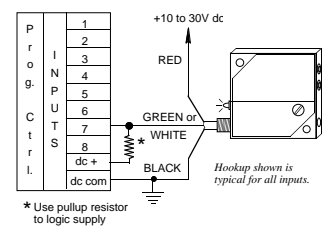
### Hookup of SM512 Series Sensor to Programmable Controller requiring current sink

Either sensor output is wired directly to any input of the PLC. Also, connect the negative of the sensor power supply to the negative of the PLC (input card) power supply (if they are separate supplies).



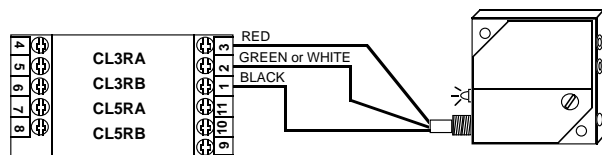
### Hookup of SM512 Series Sensor to Programmable Controller requiring current source

Either sensor output is wired to any input of the PLC. An external "pullup" resistor is connected between the input and +V of the PLC (input card) power supply. The value of the resistor is not critical: values from 1KΩ to 10KΩ, 1/4 watt or larger, will satisfy most inputs. Also, connect the negative of the sensor power supply to the negative of the PLC (input card) power supply (if they are separate supplies).



### Hookup to MAXI-AMP Logic (CL Series modules)

The output of an SM512 series sensor may be used as an input to Banner MAXI-AMP CL Series logic modules. The MAXI-AMP, when powered by AC voltage, offers a DC supply with enough capacity to power one SM512 Series sensor. An SM512 Series sensor may also be used as an input to the auxiliary input of a CL5 module.



## Modification Information for SM512 series Sensors

These modifications are available for SM512 Series sensors. They are not stocked, but are available on a "quote" basis:

#### HIGH SPEED Modification (model Suffix "MHS")

SM512 Series sensors with normal response speed of 1 millisecond may be modified for faster response. Modification "MHS" offers 300 microsecond (0.3 millisecond) on and off response time. This modification is most often used when very small targets must be

sensed. **Repeatability** of model SM512LBDMHS is 0.1 millisecond (.01 millisecond for SM502AMHS).

#### CABLE LENGTH Modification (30-foot cable)

Any of the SM512 Series sensors may be built with a cable longer than the standard 6-foot length. The most readily available length is 30 feet. Lengths longer than 30 feet may also be quoted.

# SM512 Series Retroreflective Mode Sensors

## Accessories and Modifications for SM512 Series Sensors



Universal steel mounting bracket for 512 Series sensors permits adjustment in both axes. Also available in stainless steel (order model SMB500SS).



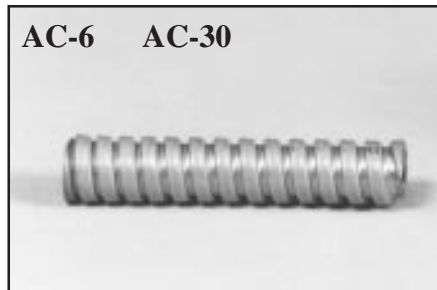
Right-angle beam deflector used to reflect the light beam at 90 degrees to the sensor package. Range is reduced by about 50% when using the RAR500. Use with SM502A only.



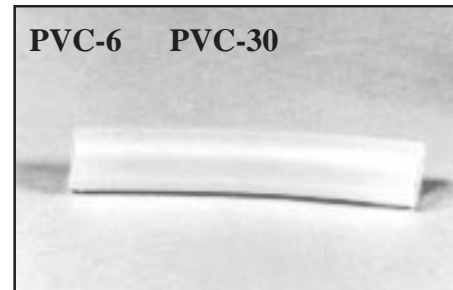
Aluminum compression fitting for the cable entrance at the rear of the 512 Series sensors. May be used with either plastic or flexible steel conduit (PVC-6 or AC-6).



Replacement lens block for the SM512LB.



These are 6 and 30-foot lengths of flexible steel conduit and may be used with any of the 512 Series sensors and the CF7-16 fitting to provide protection to the sensor cable. Size: I.D. = 5/16"; O.D. = 7/16".



These are 6 and 30-foot lengths of plastic (PVC) flexible tubing for use with the 512 Series sensors and the CF7-16 in food applications where flexible steel conduit is not allowed. Size: I.D. = 1/4"; O.D. = 3/8".

**WARRANTY:** Banner Engineering Corporation warrants its products to be free from defects for one year. Banner Engineering Corporation will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.