

# SP12 Series High Power Modulated Remote Barrel Sensors

for use with MAXI-AMP CD Series Modules



- Leakproof NEMA 6P threaded-barrel opposed mode remote sensor pairs; VALOX® or stainless steel housing
- Compact and powerful: 1/2" (12mm) in diameter by 2" long; 200-foot sensing range. Apertures are available.
- Special preamplified circuit design for noise immunity equal to that of self-contained sensors

Banner SP12 Series sensors are a family of powerful, modulated, totally-encapsulated opposed mode remote sensor pairs in compact, threaded-barrel type housings. They are the ideal choice for applications that require high excess gain together with small size in difficult sensing environments. SP12 Series sensors are especially effective at penetrating heavy contaminants when used at close range.

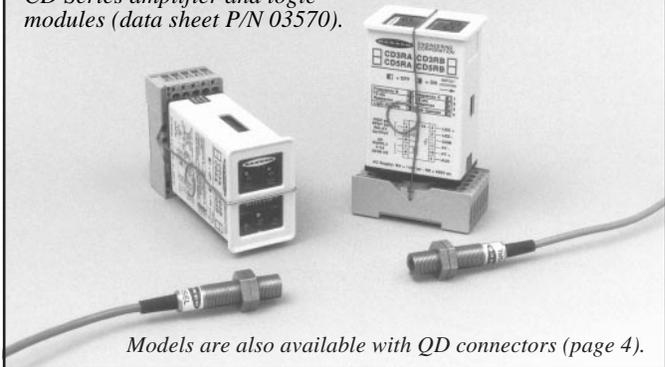
The preamplified design of these sensors results in exceptional noise immunity. Signals carried along remote receiver cables are often subject to interference (from electrical noise sources) that can be as strong as (or stronger than) the desired light signal. The severity of this problem often worsens with increasing sensor cable length. SP12 Series receivers contain a preamplifier that immediately boosts the received light signal to a high level before sending it down the cable to the rest of the sensing system.

SP12 Series sensors are designed for use with the Banner CD Series MAXI-AMP™ modules. CD Series modules provide sensor power, additional amplification, a choice of several programmable timing logic functions (CD5 models), and output circuitry for interfacing to a load. They also allow two different programmable sensor modulation frequencies, making it possible to use multiple high-powered sensor pairs in close proximity to each other without optical crosstalk. CD Series modules are available for a wide range of supply voltages. Each CD module powers one SP12 emitter/receiver pair. See data sheet 03570 for information.

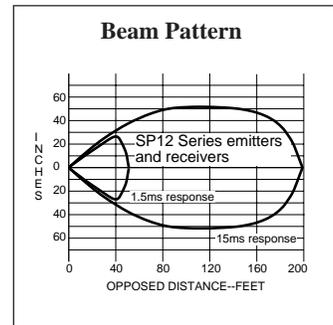
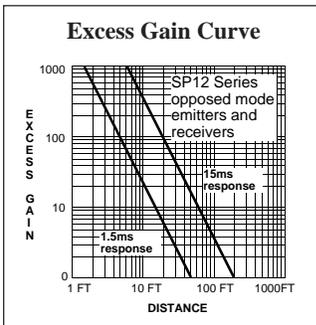
SP12 sensors are rated NEMA 6P (IEC IP67) for use in wet locations. There is a choice of either VALOX® or stainless steel housing style (see table, below). Positive sealing at both ends of the sensors, with no exposed epoxy interfaces, eliminates all leak paths (including capillary leakage). Electronics are fully encapsulated for maximum resistance to mechanical shock and vibration. Lenses are acrylic, and quad-ring sealed. These sensors may be used with watertight, thread-on apertures to create very narrow, very powerful effective beams (see page 2).

A 1/2" clearance hole is required for mounting. Alternatively, the Banner model SMB12MM mounting bracket may be used (page 2). SP12 Series sensors are supplied with 6-1/2 feet of PVC-covered attached cable, or with 4-pin eurofast™ QD fittings. Options for models with attached cable are summarized below. See page 4 for QD models. The maximum recommended emitter or receiver cable length is 100 feet (each). See pages 2 and 3 for wiring and hookup information.

SP12 Series sensors (foreground) shown with MAXI-AMP™ CD Series amplifier and logic modules (data sheet P/N 03570).



Models are also available with QD connectors (page 4).



## Specifications, SP12 Sensors

**SUPPLY VOLTAGE:** sensors are powered from a Banner CD Series MAXI-AMP™ module.

**RANGE:** up to 200 feet in opposed mode (see gain curve, above).

**RESPONSE SPEED:** selectable for 1.5 or 15 milliseconds; a function of the MAXI-AMP CD Series module.

**LIGHT BEAM:** infrared LED, 880nm. Effective beam diameter: 3/8".

**CONSTRUCTION:** NEMA 6P. 12mm diameter tubular threaded VALOX® or stainless steel housing; positive sealing at both ends, quad-ring sealed acrylic lens. Electronics fully epoxy-encapsulated. Two jam nuts are provided: VALOX® for VALOX® units; stainless steel for stainless steel units. Mounting requires 1/2" diameter clearance hole.

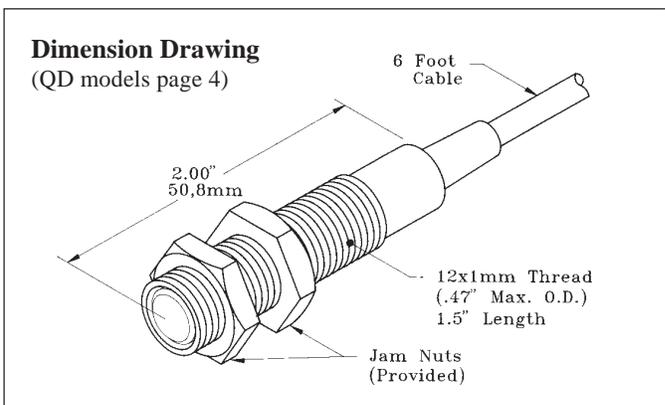
**OPERATING TEMPERATURE:** -40 to +70°C (-40 to +158°F).

**CABLE:** sensors are supplied with 6-1/2 feet of PVC-covered 2- or 3-conductor cable. Models with QD fittings are available (page 4).

VALOX® is a registered trademark of General Electric Co.

SP12 Series Barrel Sensors (cabled models)		
Model	Type	Housing Material
SP12SEL	Emitter	Stainless steel
SP12PEL	Emitter	VALOX®
SP12SRL	Receiver	Stainless steel
SP12PRL	Receiver	VALOX®

**NOTE: Models with 30-foot attached cable** are available (contact factory for information). 2- and 3-conductor 50- and 100-foot extension cables (without connectors) are also available. For 2-conductor (emitter) cable: order model EC12E-50 (50') or model EC12E-100 (100'). For 3-conductor (receiver) cable: order model EC12R-50 (50') or model EC12R-100 (100').



## Hookup to MAXI-AMP™ CD Series Modules

CD Series modules combine power supply, modulated photoelectric amplifier, timing logic (CD5 models), and a solid-state output switch or electromechanical relay in a single compact module. Only an 11-pin wiring socket (model RS-11) is needed to complete the system.

The CD series contains models with either SPDT electromechanical or SPST solid-state relay outputs and either with or without programmable timing logic (models are listed in the tables at the right). See product data sheet 03570 for further information.

One SP12 Series sensor pair may be connected to each module.

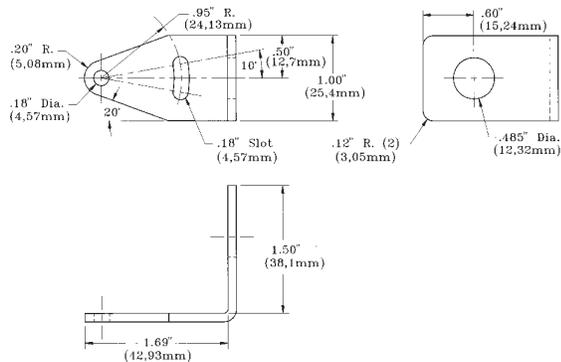
*NOTE: to power the MAXI-AMP from a dc power supply, connect +12 to 28V dc at  $\geq 70\text{mA}$  to terminal #3 and dc common to terminal #1. Make no connections to terminal #7 or #8 when powering a CD module from a dc supply.*

### Wiring Guidelines

- 1) Avoid running remote sensor cables in wireways together with power-carrying conductors.
- 2) Avoid running remote sensor cables through areas of known extreme electrical interference (electrical "noise").
- 3) When splicing, never combine emitter and receiver wires into a common cable. (The result may be electrical "crosstalk" within the cable, which causes a "lock-on" condition of the amplifier.)

### Model SMB12MM Mounting Bracket

Model SMB12MM is a stainless steel mounting bracket for SP12 Series sensors. The sensor mounts to the bracket using the two jam nuts supplied with the sensor. This rugged, slotted bracket allows  $\pm 10$  degrees of lateral movement. Bracket is 12-gauge stainless steel. The bracket mounting holes accommodate #8 hardware.



## Specifications, MAXI-AMP™ CD Series Modules

**RESPONSE SPEED:** programmable for 1.5 or 15 milliseconds on/off (15 millisecond setting produces maximum excess gain).

**MAXIMUM SENSOR LEAD LENGTH:** 100 feet (30 meters) *each* for emitter and receiver. To avoid "cable crosstalk", always use *separate* cable for emitter and receiver.

**OPERATING TEMPERATURE RANGE:** 0 to +50 degrees C (+32 to +122 degrees F).

MODEL	SUPPLY VOLTAGE	OUTPUT	LOGIC
CD3A	105 to 130V ac, or 12 to 28V dc	SPST solid-state contact for switching ac loads up to 250V ac and 3/4 amp, plus solid-state contact for switching dc loads up to 30V dc and up to 50mA.	ON/OFF
CD3B	210 to 250V ac, or 12 to 28V dc		
CD5A	105 to 130V ac, or 12 to 28V dc		12 timing functions
CD5B	210 to 250V ac, or 12 to 28V dc		

MODEL	SUPPLY VOLTAGE	OUTPUT	LOGIC
CD3RA	105 to 130V ac, or 12 to 28V dc	SPDT electro-mechanical relay, plus NPN transistor solid-state switch	ON/OFF
CD3RB	210 to 250V ac, or 12 to 28V dc		
CD5RA	105 to 130V ac, or 12 to 28V dc	SPDT electro-mechanical relay (5 amp contact rating)	12 timing functions
CD5RB	210 to 250V ac, or 12 to 28V dc		

### Apertures

Rectangular and circular thread-on watertight apertures are available for SP12 sensors. Apertures are used to shape and size the sensor's effective beam and to protect the sensor's lens. Use of apertures with these high-gain sensors makes it possible to create very narrow, concentrated sensing beams for demanding applications. **Aperture Kit AP12SC** includes three round apertures with openings of .02", .04", and .10" diameter. **Aperture Kit AP12SR** has three rectangular apertures .02", .04", and .10" wide. Both include lens, o-rings, and thread-on housing.



**WARNING** These photoelectric sensing devices 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 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.

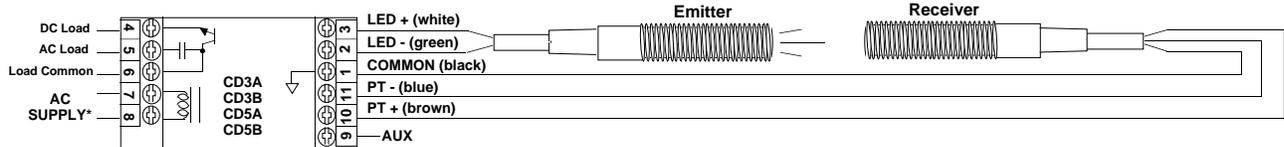
# SP12 Series Sensors

## SP12 Sensor Hookup to CD Series MAXI-AMP™ Modules

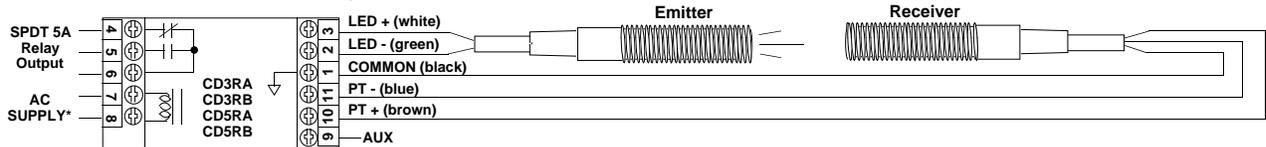
### 1) Hookup of SP12 Series Sensors (all models)

SP12 Series sensors are especially designed for use with CD Series modules. The basic hookup is given here. Each MAXI-AMP™ CD Series module supports use of one pair of SP12 Series sensors. CD5 Series module models also support use of a GATE or INHIBIT sensor at pin #9 (below, this page).

#### Models with isolated solid-state contacts



#### Models with electromechanical relay contacts

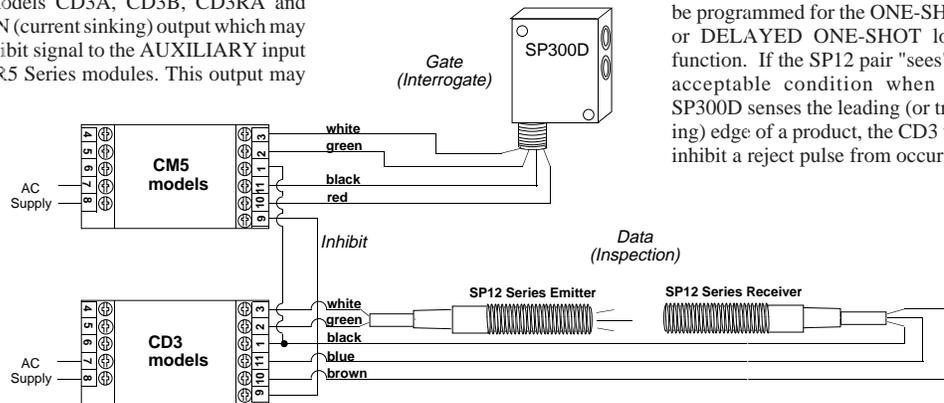


\*105 to 130V ac or 210 to 250V ac, 50/60Hz, depending on model. To power the MAXI-AMP™ module from a dc supply, connect +12 to 28V dc at  $\geq 70\text{mA}$  to terminal #3 and dc common to terminal #1. Make no connection to terminal #7 or #8.

### 2) Logic Level NPN Output (CD3 models)

The AUXILIARY terminal (#9) of models CD3A, CD3B, CD3RA and CD3RB modules offers a logic-level NPN (current sinking) output which may be used as a fast-response solid-state inhibit signal to the AUXILIARY input of MAXI-AMP CD5, CL5, CM5, or CR5 Series modules. This output may also serve as an input to any MICRO-AMP™, Plug Logic, or CL Series logic module. In addition, this output may interface to other dc devices or circuits like counters, rate meters, or programmable logic controllers. Switching capacity is 20mA maximum at 12V dc max.

The example here shows the use of SP12 Series sensors and a CD3 module to provide inspection information, with the SP300D functioning as a product (GATE) sensor.



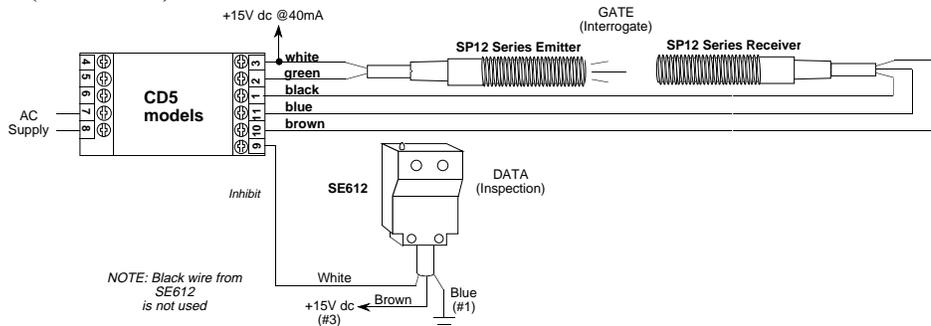
Typically, the CM5 module would be programmed for the ONE-SHOT or DELAYED ONE-SHOT logic function. If the SP12 pair "sees" an acceptable condition when the SP300D senses the leading (or trailing) edge of a product, the CD3 will inhibit a reject pulse from occurring.

See Hookup Diagram #1 (above) for load and power connection information.

### 3) Power for External Devices (all models)

External 10 to 30V dc devices such as self-contained sensors may be connected between terminals #3 (+) and #1 (-) of any CD series MAXI-AMP module. Terminal #3 offers 40mA maximum. This is sufficient to power most Banner self-contained dc sensors.

As the example at the right illustrates, the current sinking output of a self-contained sensor powered by the MAXI-AMP may be used as the input to the AUXILIARY terminal of a CD5 module.



NOTE: Black wire from SE612 is not used

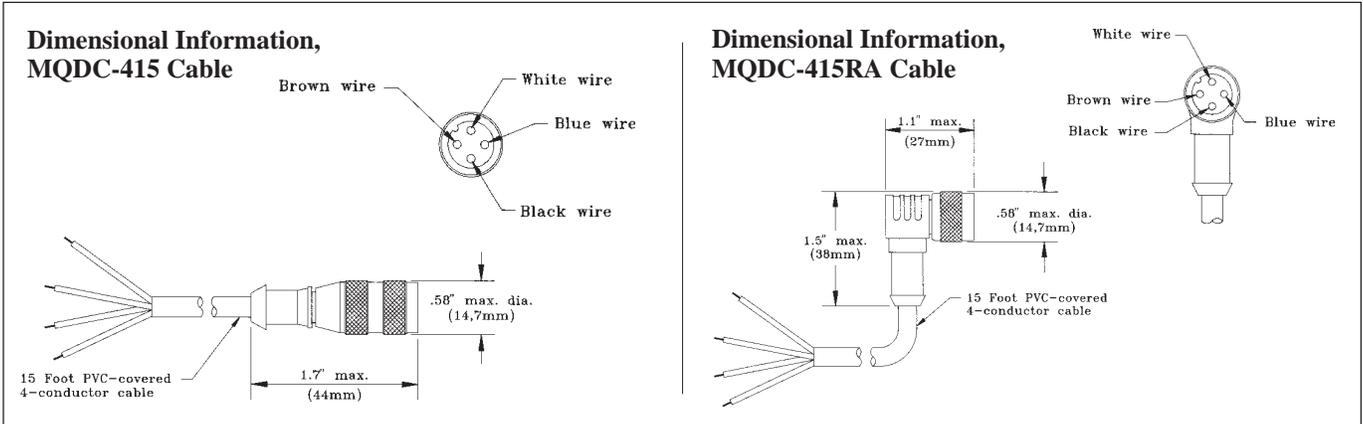
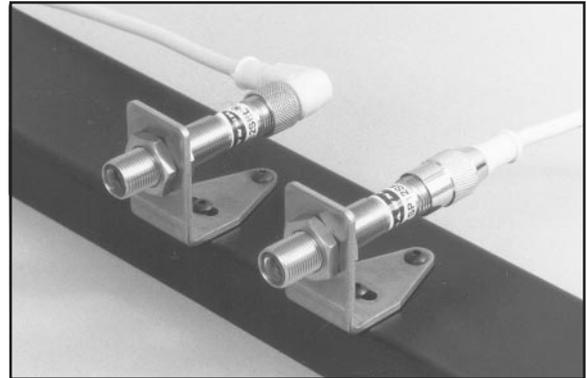
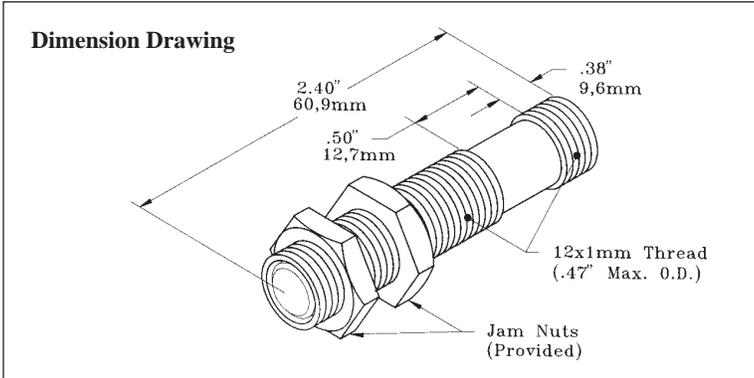
# SP12 Series Sensors

## SP12 Series Sensors with Quick Disconnect (QD) Cable Option

Stainless steel models of SP12 Series modulated remote barrel sensors may be ordered with a built-in connector designed to mate with *euromat*™ quick-disconnect (QD) cables. The resultant sensor model numbers are:

**SP12SELQD** (emitter), and **SP12SRLQD** (receiver).

Mating cables are ordered separately. Cables are available in 15 foot lengths with either of two styles of mating connector. Cable model MQDC-415 has a straight connector, and model MQDC-415RA has a right-angled connector (see drawings below). In both models, the plug body is molded to the PVC cable for waterproof integrity. Plug contacts are gold-plated.



### Hookup Information, SP12 Series QD sensors

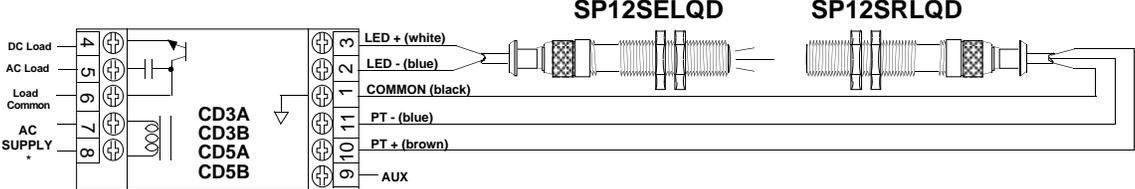
The wire colors of the MQDC Series QD cables used with the QD models of SP12 Series sensors are different from the wire colors used on the cabled sensor models. The hookups below show connection of SP12 Series QD sensors to MAXI-AMP CD Series modules.

\*105 to 130V ac or 210 to 250V ac, 50/60Hz, depending upon model.

To power the MAXI-AMP module from a dc supply, connect +12 to 28V dc at  $\geq 70$  mA to terminal #3 and dc common to terminal #1.

Make no connection to terminal #7 or #8.

#### Models with isolated solid-state contacts



#### Models with electromechanical relay contacts

