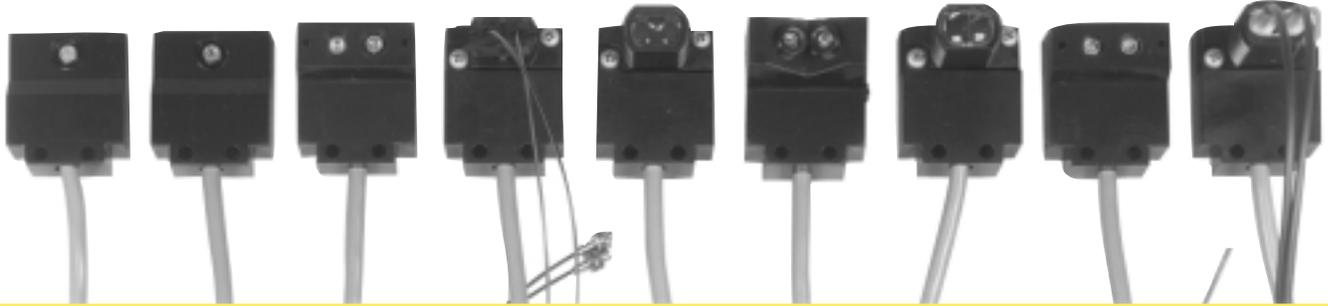




# ECONO-BEAM® Sensors

Miniature Self-Contained DC Sensors

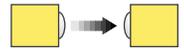


## ECONO-BEAM Features

- Small, low cost, self-contained sensors engineered to provide reliable sensing, primarily in straightforward OEM applications
- Simple installation with no adjustments
- 10 to 30V dc operation
- Bipolar outputs (one NPN and one PNP); each output rated at 150 milliamps
- Choose models for light operate or dark operate
- Totally solid-state and epoxy-encapsulated for unlimited life
- Very compact, yet rugged enough to withstand tough sensing environments; rated IP66, NEMA 4X



Due to their small size, right-angle design, and unique shape, this sensor pair is ideal for mounting against the side rails of conveyors for use in flow control and product sensing, and are an excellent choice for use on supermarket checkout stands. They may be bolted face-to-face to form a powerful slot sensor for edgewise sensing of opaque materials or for sensing gear teeth, timing rings, or "flags," with enough excess gain to operate even in the dirtiest sensing environments.



Infrared, 880 nm

## ECONO-BEAM Opposed Mode Emitter (E) and Receiver (R)

| Models*          | Range         | Cable      | Supply Voltage | Output Type              | Excess Gain | Beam Pattern |
|------------------|---------------|------------|----------------|--------------------------|-------------|--------------|
| SE61E<br>SE61R   | 1.8 m<br>(6') | 2 m (6.5') | 10-30V dc      | Bipolar<br>NPN/PNP<br>LO |             |              |
| SE61E<br>SE61RNC |               |            |                | Bipolar<br>NPN/PNP<br>DO |             |              |

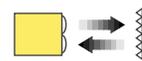
\*NOTES:

- 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., SE61RNC W/30).
- High-speed models may be ordered by adding suffix "MHS" to the model number of any standard ECONO-BEAM dc sensor (e.g., SE61EMHS). Response time for these sensors decreases to 1 millisecond; faster response comes at the expense of lower excess gain.

# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors



The 1/2" diameter effective beam of retroreflective model SE612LV, measured at 1' from the lens, makes it a good choice for sensing relatively small objects when opposed sensing is not possible. The visible beam simplifies alignment to the retroreflective target. Use the largest retroreflective target possible. If sensing materials with shiny surfaces, scan at an angle of at least 10° to the shiny surface to minimize false light return ("proxing" effect).



Visible red, 650 nm

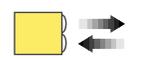
## ECONO-BEAM Non-Polarized Retroreflective Mode

| Models*   | Range†      | Cable      | Supply Voltage | Output Type        | Excess Gain | Beam Pattern |
|-----------|-------------|------------|----------------|--------------------|-------------|--------------|
| SE612LV   | 4.5 m (15') | 2 m (6.5') | 10-30V dc      | Bipolar NPN/PNP LO |             |              |
| SE612LVNC |             |            |                | Bipolar NPN/PNP DO |             |              |

† Specified using model BRT-3 retroreflector (3" diameter). Actual range may vary depending on retroreflector size and efficiency.



Ideal for applications where the target's reflectivity and profile are sufficient to return a large percentage of the emitted light back to the sensor. Divergent diffuse model SE612W is particularly useful for sensing transparent or translucent objects (clear plastic or glass) and for dependable sensing of irregular surface features; its excess gain falls off sharply beyond 1". As a result, it may be used when it is necessary to ignore background objects.

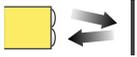


Infrared, 880 nm

## ECONO-BEAM Diffuse Mode

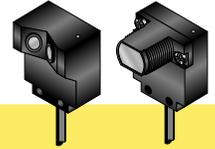
| Models*                  | Range       | Cable      | Supply Voltage | Output Type        | Excess Gain  | Beam Pattern |
|--------------------------|-------------|------------|----------------|--------------------|--|--------------|
|                          |             |            |                |                    | Performance based on 90% reflectance white test card |              |
| SE612D                   | 200 mm (8") | 2 m (6.5') | 10-30V dc      | Bipolar NPN/PNP LO |  |              |
| SE612DNC                 |             |            |                | Bipolar NPN/PNP DO |  |              |
| <b>Divergent Diffuse</b> |             |            |                |                    |  |              |
| SE612W                   | 76 mm (3")  | 2 m (6.5') | 10-30V dc      | Bipolar NPN/PNP LO |  |              |
| SE612WNC                 |             |            |                | Bipolar NPN/PNP DO |  |              |

# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors



Infrared, 940 nm  
Visible red, 650 nm

Mechanical convergent-beam sensor's light source and receiver opto-elements are positioned in the housing so that sensing takes place where the optical patterns cross. The sensing beam is intense at the 0.5" convergent point, excellent for sensing materials of low reflectivity and very small targets such as wire or thread; also effective for reflective sensing in areas where background suppression is a requirement. Visible red models are useful in some high-contrast color registration applications.



## ECONO-BEAM Convergent Mode

| Models*  | Focus                              | Cable      | Supply Voltage | Output Type        | Excess Gain  | Beam Pattern |
|--|------------------------------------|------------|----------------|--------------------|--|--------------|
|  |                                    |            |                |                    | Performance based on 90% reflectance white test card |              |
| <b>Mechanical Convergent Mode; Infrared 940 nm</b> |                                    |            |                |                    |  |              |
| SE612C   | 12 mm (0.5")                       | 2 m (6.5') | 10-30V dc      | Bipolar NPN/PNP LO |  |              |
| SE612CNC   |                                    |            |                | Bipolar NPN/PNP DO |  |              |
| <b>Convergent Mode; Visible Red 650 nm</b>         |                                    |            |                |                    |  |              |
| SE612CV  | 16 mm (0.65")                      | 2 m (6.5') | 10-30V dc      | Bipolar NPN/PNP LO |  |              |
| SE612CVNC  | Spot Size at Focus: 1.2 mm (0.05") |            |                | Bipolar NPN/PNP DO |  |              |

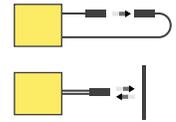
**\*NOTES:**

- 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., SE612C W/30).
- High-speed models may be ordered by adding suffix "MHS" to the model number of any standard ECONO-BEAM dc sensor (e.g., SE612CMHS). Response time for these sensors decreases to 1 millisecond; faster response comes at the expense of lower excess gain.

# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors



Ideal for situations where hostile environments or space restrictions prohibit placing the sensor itself in the sensing position. The response time required by model SE612F is 10 milliseconds (0.01 seconds). If fast-moving objects are to be detected, select a fiber optic assembly which senses the object for a long period of time. (For example, a bifurcated fiber optic with a rectangular bundle termination like model BR2.53S may be positioned so that the object is detected while it passes along the entire length of the rectangular sensing area.) Not recommended for applications requiring bending or repeated flexing of fibers.



Infrared, 880 nm

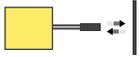
## ECONO-BEAM Glass Fiber Optic

| Models*  | Range  | Cable      | Supply Voltage | Output Type        | Excess Gain   | Beam Pattern |
|----------|--|------------|----------------|--------------------|---|--------------|
|          |  |            |                |                    | Diffuse mode performance based on 90% reflectance white test card |              |
| SE612F   | Range varies by sensing mode and fiber optics used | 2 m (6.5') | 10-30V dc      | Bipolar NPN/PNP LO |   |              |
| SE612FNC |  |            |                | Bipolar NPN/PNP DO |   |              |

\*NOTES:

- 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., SE612F W/30).
- High-speed models may be ordered by adding suffix "MHS" to the model number of any standard ECONO-BEAM dc sensor (e.g., SE612FMHS). Response time for these sensors decreases to 1 millisecond; faster response comes at the expense of lower excess gain.

# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors



Visible red, 650 nm

An excellent option where sensing must be accomplished in tight, inaccessible or volatile areas. Fibers withstand vibration and shock and are immune to electrical noise. Plastic fibers function well at temperatures between -30° and +70°C (-20°F to +158°F), and stand up to repeated flexing. Most are easy to shorten in the field, to develop custom installations. Not recommended for severe environments.



## ECONO-BEAM Plastic Fiber Optic

| Models*   | Range  | Cable      | Supply Voltage | Output Type        | Excess Gain   | Beam Pattern |
|-----------|--|------------|----------------|--------------------|---|--------------|
|           |  |            |                |                    | Diffuse mode performance based on 90% reflectance white test card |              |
| SE612FP   | Range varies by sensing mode and fiber optics used | 2 m (6.5') | 10-30V dc      | Bipolar NPN/PNP LO |   |              |
| SE612FPNC |  |            |                | Bipolar NPN/PNP DO |   |              |

**\*NOTES:**

- 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., SE612FP W/30).
- High-speed models may be ordered by adding suffix "MHS" to the model number of any standard ECONO-BEAM dc sensor (e.g., SE612FPMHS). Response time for these sensors decreases to 1 millisecond; faster response comes at the expense of lower excess gain.

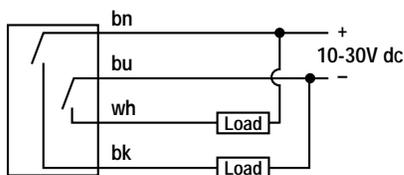
# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors

## ECONO-BEAM DC Specifications

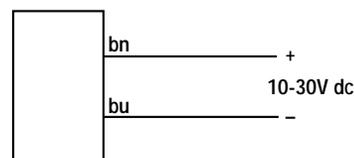
|                             |  |
|-----------------------------|--|
| Supply Voltage and Current  | 10 to 30V dc (10% maximum ripple) at less than 20 mA (exclusive of load)   |
| Supply Protection Circuitry | Protected against reverse polarity and transient voltages  |
| Output Configuration        | Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor  |
| Output Rating               | 150 mA maximum each output<br><b>Off-state leakage current</b> less than 1 microamp<br><b>Output saturation voltage</b> (PNP output) less than 1 volt at 10 mA and less than 2 volts at 150 mA<br><b>Output saturation voltage</b> (NPN output) less than 200 millivolts at 10 mA and less than 1 volt at 150 mA |
| Output Protection Circuitry | Protected against false pulse on power-up  |
| Output Response Time        | Less than 10 milliseconds ON and OFF; independent of signal strength<br>(NOTE: 100 millisecond delay on power-up: outputs do not conduct during this time.)<br><b>MHS Models:</b> 1 millisecond (Faster response comes at the expense of lower excess gain.)   |
| Repeatability               | 0.4 ms; MHS models 0.06 ms; independent of signal strength.  |
| Indicators                  | All models except emitter-only units have a top-mounted LED indicator that lights whenever the receiver "sees" its modulated light source.   |
| Construction                | Reinforced thermoplastic polyester (models LV, CV, F and FP) or polycarbonate (other models) housing, totally encapsulated for protection against moisture, vibration and corrosion.   |
| Environmental Rating        | Meets NEMA standards 1, 3, 3S, 4, 4X, 12, and 13; IEC IP66   |
| Connections                 | PVC-jacketed 4-wire 2 m (6.5') or 9 m (30') cables   |
| Operating Conditions        | <b>Temperature:</b> 0° to +50°C (+32° to 122°F)<br><b>Maximum relative humidity:</b> 90% at 50°C (non-condensing)  |
| Certifications              |   |

## ECONO-BEAM DC Hookups

### All Sensors Except Emitters



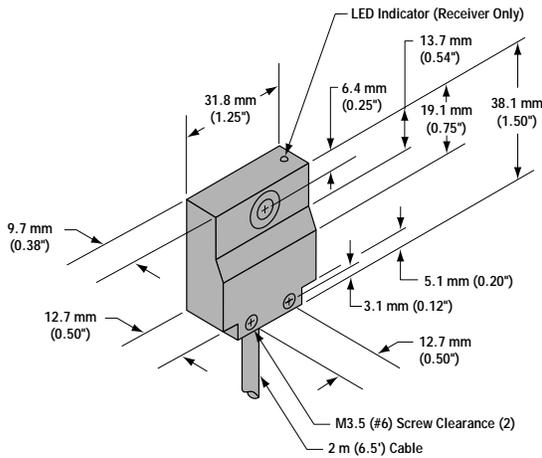
### SE61E Emitters



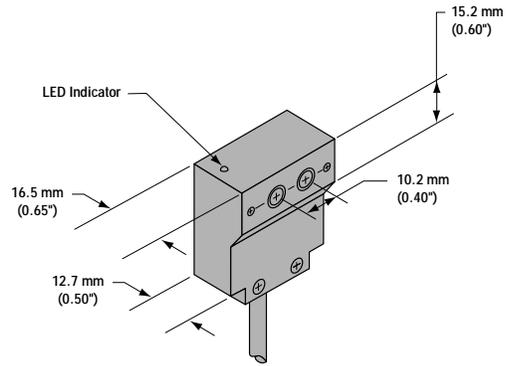
# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors

## ECONO-BEAM DC Dimensions

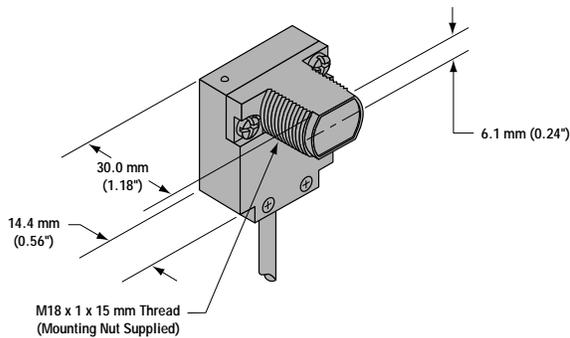
**Opposed Mode  
(model suffix E & R)**



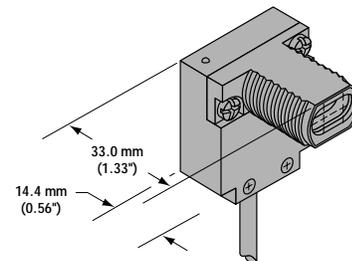
**Diffuse & Divergent Mode  
(model suffix D & W)**



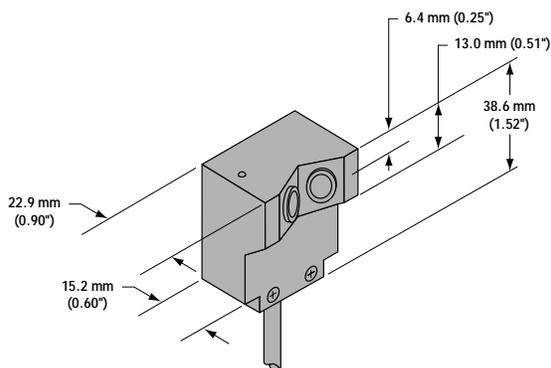
**Retroreflective & Convergent Mode  
(model suffix LV & CV)**



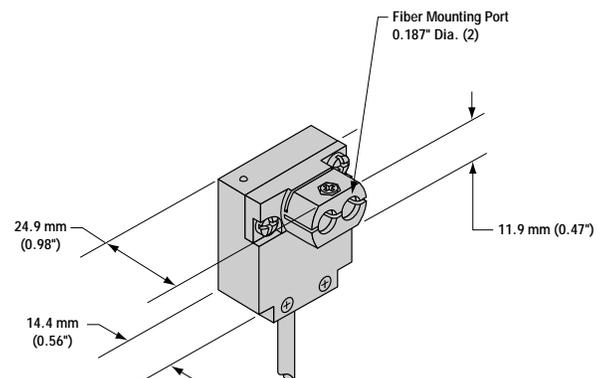
**Glass Fiber Optic  
(model suffix F)**



**Mechanical Convergent Mode  
(model suffix C)**

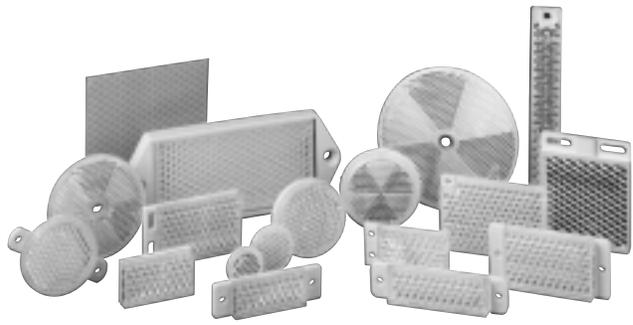


**Plastic Fiber Optic  
(model suffix FP)**



# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors

| Retroreflective Targets |                     |                     |                 |
|-------------------------|---------------------|---------------------|-----------------|
| Model                   | Reflectivity Factor | Maximum Temperature | Size            |
| BRT-3*                  | 1.0                 | 65°C (150°F)        | 84 mm diameter  |
| BRT-2A                  | 1.0                 | 65°C (150°F)        | 56 mm diameter  |
| BRT-50                  | 1.0                 | 65°C (150°F)        | 51 mm diameter  |
| BRT-1.5                 | 1.0                 | 65°C (150°F)        | 46 mm diameter  |
| BRT-1                   | 1.0                 | 65°C (150°F)        | 25 mm diameter  |
| BRT-.6                  | 1.0                 | 65°C (150°F)        | 20 mm diameter  |
| BRT-50D*                | 1.0                 | 65°C (150°F)        | 51 mm diameter  |
| BRT-42D                 | 1.0                 | 50°C (120°F)        | 42 mm diameter  |
| BRT-50R*                | 1.0                 | 50°C (120°F)        | 51 mm diameter  |
| BRT-25R                 | 1.0                 | 50°C (120°F)        | 25 mm diameter  |
| BRT-42A                 | 1.0                 | 50°C (120°F)        | 42 mm diameter  |
| BRT-100X55A             | 1.5                 | 50°C (120°F)        | 132 mm x 55 mm  |
| BRT-92X92C*             | 3.0                 | 50°C (120°F)        | 100 mm x 100 mm |
| BRT-77X77C*             | 2.0                 | 50°C (120°F)        | 85 mm x 85 mm   |
| BRT-100X50              | 1.5                 | 50°C (120°F)        | 101 mm x 51 mm  |
| BRT-2X2                 | 1.0                 | 50°C (120°F)        | 51 mm x 61 mm   |
| BRT-36X40BM             | 1.2**               | 50°C (120°F)        | 51 mm x 61 mm   |
| BRT-60X40C*             | 1.4                 | 50°C (120°F)        | 41 mm x 60 mm   |
| BRT-48X32               | 1.0                 | 50°C (120°F)        | 33 mm x 48 mm   |
| BRT-48X32A              | 1.0                 | 50°C (120°F)        | 33 mm x 65 mm   |
| BRT-48X32B              | 1.0                 | 50°C (120°F)        | 33 mm x 57 mm   |
| BRT-40X23               | 1.4                 | 50°C (120°F)        | 24 mm x 40 mm   |
| BRT-40X23B              | 1.4                 | 50°C (120°F)        | 24 mm x 48 mm   |
| BRT-35X20A              | 1.4                 | 50°C (120°F)        | 24 mm x 55 mm   |
| BRT-40X18A              | 1.0                 | 50°C (120°F)        | 18 mm x 60 mm   |
| BRT-53X19A              | 1.4                 | 50°C (120°F)        | 19 mm x 72 mm   |
| BRT-100X18A             | 1.4                 | 50°C (120°F)        | 19 mm x 120 mm  |
| BRT-L                   | 0.8                 | 65°C (150°F)        | 165 mm x 19 mm  |
| BRT-41AHT               | 1.0                 | 200°C (390°F)       | 41 mm diameter  |
| BRT-4HT***              | .15                 | 480°C (900°F)       | 100 mm x 100 mm |



NOTE: The range of all retroreflective sensors is specified using target model BRT-3. Sensing range and signal strength at any given sensor-to-target distance will vary due to target reflectivity and target area. A "Reflectivity Factor" is included for each target model to help predict sensor performance, relative to the excess gain curve plotted for target model BRT-3. Consider, also, target area when predicting performance.

\* Optional brackets are available; see Banner Photoelectric Product Catalog

\*\* Target has micro-prism geometry



## WARNING . . . Not To Be Used for Personnel Protection

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.

**WARRANTY:** Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. 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.