

# BL-28 Laser Photoelectric Sensor

## DESCRIPTION

The BL-28 series photo-electric sensors use a modulated visible red, 670 nanometer wavelength, Class II laser diode emitter that visually aids in alignment. The unit has an adjustable intensity control that allows it to be used as a long range retro-reflective [50m(160ft.)], polarized short range retro-reflective, or diffuse sensor depending on the circumstances of the application. The collimated laser beam is small in diameter [approx. 2mm @ 300mm(12in.)] and is capable of discerning small objects, small features on an object, or precision detection of edges.

There are both a PNP(sourcing) and an NPN(sinking) output operating simultaneously. Each is rated for a 200ma load, and over current and transient protected. The mode of operation of the outputs is determined by the "light-on/dark-on" switch on the rear of the case. A RED indicator LED on the rear of the case turns "on" when the outputs are "on".

The power source may be any voltage from +10VDC to +30VDC. A GREEN "power on" indicator LED is located on the top of the case which also serves as a laser emission indicator.

Power and output signals are accessed through a four (4) pin PICO (M8x1) style connector at the rear of the unit or a pre-wired 6 inch pigtail with micro connector.

## MOUNTING

Select a mounting location on a solid flat surface free of vibration. The greater the sensing distance the more critical this is. Orient the sensor and the reflector so that the face of the sensor aperture window is parallel to the face of the reflector. One nut is supplied with each unit for secure mounting in a suitable thruhole or bracket. A lock washer is recommended where vibration may loosen sensor. Route the quick disconnect cable so that it is located in a position where it cannot be damaged or subjected to excessive electrical noise. Connect the cable to the sensor.

## ALIGNMENT

### *Retro-reflective sensing mode*

1. Set the output mode switch to "dark-on" (in some cases the user may require a logic inversion in which case "light-on" should be substituted for "dark-on").
2. Apply power and turn the intensity control clockwise until the red laser spot is visible either on the

reflector or a surface near by (if there is too much ambient light and the distance is very long, there may be some difficulty in seeing the spot).

3. Rotate the sensor left and right, and up and down until an area is found where the output indicator LED turns off (in dark-on mode). Set the sensor halfway between the left and right positions where the LED turns off and the up and down positions where the LED turns off. The sensor should now be centered in the area where it is sensing the light being returned from the reflector. Tighten the mounting screws.

4. Adjust the laser intensity potentiometer counter-clockwise (decreasing intensity) until the output indicator turns on (dark-on). Slowly turn the potentiometer clockwise (increasing intensity) again until the output indicator turns off again, and then turn approximately another 1/8th turn.

5. Test the various objects to be detected to be sure they block the light and do not return light to the sensor. If the intensity is set to near maximum for long range sensing it is recommended that physical barriers be set up to prevent access to the area at least 3 ft. in front of the sensor to prevent proxing of light colored/ reflective objects that may be placed in the sensing path of the retroreflective version. The above statement will not apply when using the polarized version. This sensor uses a polarized lens which minimizes unwanted reflections from shiny objects.

### *Diffuse sensing mode*

1. Select a mounting position giving a clear view of the object to be sensed while avoiding reflections from the background in the absence of the object. If there is an unavoidable reflective background attempt to darken it with a flat black paint, flat black felt, paper, foam, or other suitable material. If the background surface is smooth and highly reflective, under certain circumstances it may be sufficient to slightly angle the sensor to the surface so that the reflected light beam misses the sensor receiver window. Care should be exercised to avoid unwanted reflections into the eyes of personnel or the receivers of other sensors.

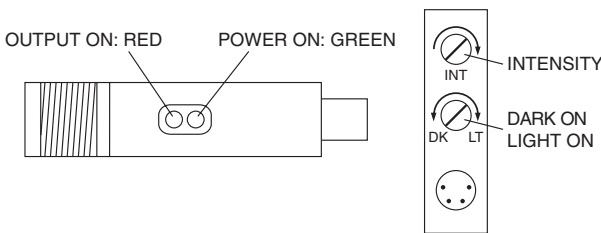
2. Set the output mode switch to "light-on" (in some cases the user may require a logic inversion in which case "dark-on" should be substituted for "light-on").

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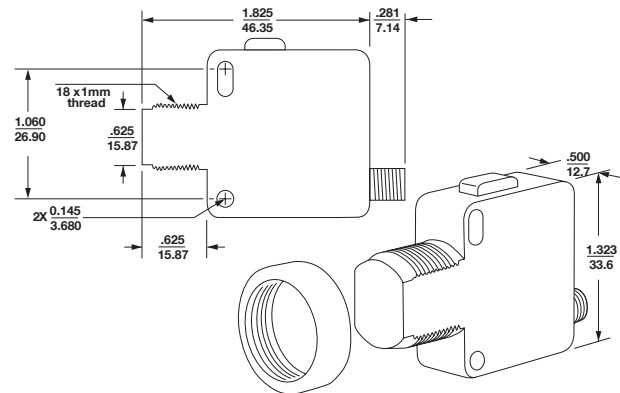
3. Apply power and turn the intensity control clockwise until the laser spot is visible on the object to be detected. Move the body of the sensor so that the laser spot is on the most desired feature to be detected. Tighten the mounting screws. Increase the intensity until the red output indicator turns "on". Remove the object and continue to increase the intensity (clockwise) until the background reflectance causes the output to turn "on". Decrease (counter-clockwise) the intensity control half-way between where the output turned on with the object in view and the previous position where the output turned on through background reflectance. If the output did not turn on when the intensity control was turned to maximum with no object present, decrease the intensity to halfway between maximum and where the output turned on with the object present.

4. If there will be variations in surface reflectivity and surface angle with respect to the laser beam, experiment with the worst case examples of objects and the angle of their surfaces to be detected and try to obtain the best compromise in intensity setting. Smooth, shiny surfaces may not be detected if they are even at a slight angle to perpendicular to the laser beam because they will reflect the highly directional laser light away from the sensor. If the shiny surface is irregular and uneven compared to the laser spot size, it may cause the sensor to turn on and off more than once for the same object. An external adjustable off-delay relay or time-out programmed into a programmable logic controller (PLC) may compensate for this problem under the right conditions.

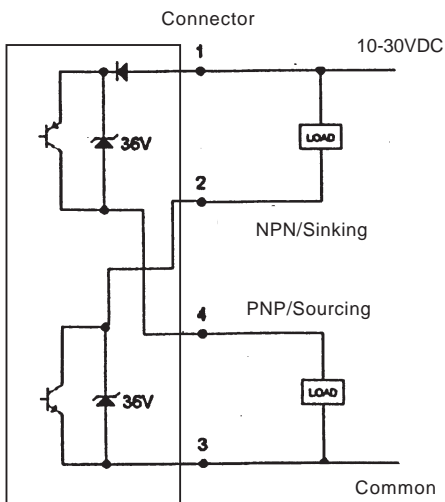
### Operating Diagram



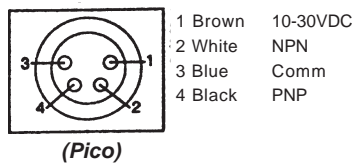
### Housing Dimensions



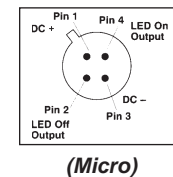
### Wiring Diagram



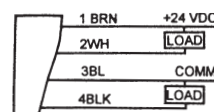
### Housing Connector



### Cable Connector



### Cable Wiring Diagram



P/N 7700-025-01-00

### CAUTION

**LASER RADIATION - DO NOT STARE INTO BEAM**  
 Visible Laser Diode  
 Wavelength 670 nm  
 1 mW max Output  
 Class II laser product

This product complies with 21 CFR Sub Chapter J

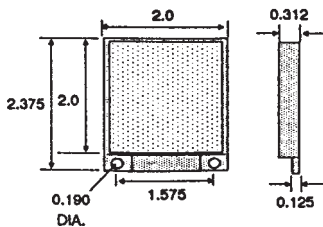
## BL-28 Laser Photoelectric Sensor

### Specifications

|                              |  |
|------------------------------|--|
| <b>Supply Voltage:</b>       | 10 to 30 VDC   |
| <b>Supply Current:</b>       | 30 mA maximum  |
| <b>Output Configuration:</b> | One current sourcing (PNP) and one current sinking (NPN) open collector transistor, both operating simultaneously  |
| <b>Output Mode:</b>          | Set by "Light-ON"/ "Dark-ON" switch  |
| <b>Output Rating:</b>        | 200mA max. each output. Output saturation less than 0.2 volts @ 10mA, less than 0.6 volts @ 200 mA   |
| <b>Output Protection:</b>    | Protected against current overload, inductive transients   |
| <b>Response time:</b>        | Less than 2 ms, > 500 Hz   |
| <b>Sensing Range</b>         |  |
| <b>Retroreflective:</b>      | 160 ft. (50 Meters) with 2" x 2" reflector, ATC P/N 0000-181-52-00 Minimum target object size 2" x 2" at reflector (At maximum intensity, the unit may white card prox out to 36") |
| <b>Polarized Retro:</b>      | 24 ft. max. with 2" x 2" reflector   |
| <b>Diffuse:</b>              | 12 in. (300 mm) with 0.25" x 0.25" Kodak 90% white card, hysteresis 15% typical  |
| <b>Indicators:</b>           | Power on - Green, Output on - Red  |
| <b>Adjustments:</b>          | Eight turn intensity control, two position Light operate or Dark operate switch  |
| <b>Emitted Beam:</b>         | 670 nm visible red laser diode   |
| <b>Average Light:</b>        | Less than 150 μw at max. intensity setting (2.4 mW peak @ 6.2% duty cycle)   |
| <b>Output Power:</b>         |  |
| <b>Housing:</b>              | Potted ABS, acrylic window, polycarbonate cover  |
| <b>Connector</b>             |  |
| <b>Pico:</b>                 | 4 pin M8x1. Pin 1- power, Pin 2 - NPN output, Pin 3 - common, Pin 4 - PNP output   |
| <b>Pigtail:</b>              | 4 pin micro connector, 6 in. cable, pvc .175 dia.  |
| <b>Operating Temp.:</b>      | 0° to 40° C (32° to 104° F)  |

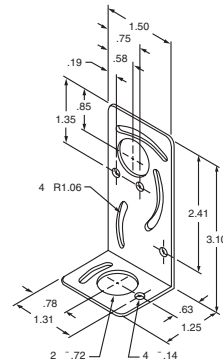
**Caution - use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.**

**Reflector**



**P/N 0000-181-52-00**

**Mounting Bracket P/N 7700-114-01-00**



**All lengths are in inches**

### CONVERSION FACTORS

| To Convert | Multiply by | To Convert |
|------------|-------------|------------|
| mm         | 0.03937     | in.        |
| M          | 3.281       | ft.        |
| g          | .0353       | oz.        |
| Kg cm      | .07         | ft. lb.    |

## BL-28 Laser Photoelectric Sensor

### Model BL-28 Ordering Code

| Sensor Type     | Model Number      | Diffuse Sensing Range | Retro Sensing Range | Connector Type |
|-----------------|-------------------|-----------------------|---------------------|----------------|
| Diffuse/Retro   | <b>BL-28D-Q8</b>  | 305mm (12")           | 48.8M (160')        | M8 - QD        |
|                 | <b>BL-28D-Q12</b> | 305mm (12")           | 48.8M (160')        | M12 - Pigtail  |
| Polarized Retro | <b>BL-28R-Q8</b>  | ---                   | 7.3M (24')          | M8 - QD        |
|                 | <b>BL-28R-Q12</b> | ---                   | 7.3M (24')          | M12 - Pigtail  |

All information is subject to change without prior notice.

<http://www.ramcosensors.com>