

TINY-EYE® Miniature DC-Powered Sensors



Description

The new TINY-EYE Miniature Photoelectric Sensor "unlocks the door" to big cost savings with its unique capability to perform more industrial sensing tasks than any other photoeye on the market. Change the lens, change the sensing model, TINY-EYE is compatible

with the highly efficient lensed optical blocks used on our popular MITY-EYE® sensor line. These highly efficient "quick-change" lenses allow TINY-EYE sensors to be used in all sensing modes.

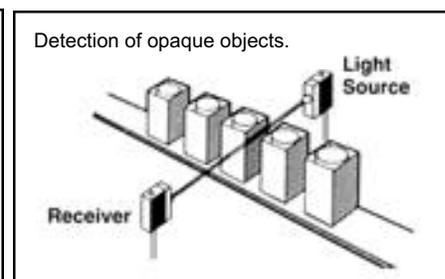
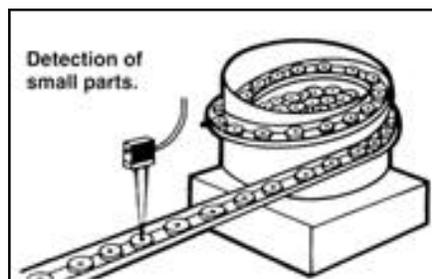
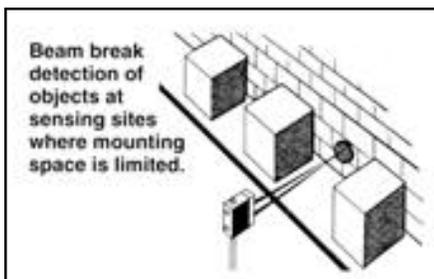
BIG PERFORMANCE

- 500 μ sec Speed of Response
- 10 to 30 VDC Operating Voltage
(5 VDC Operating Voltage available. Consult Factory.)
- Pulse Modulated
- Reverse Polarity Protected
- Both NPN and PNP Outputs
- Red or Infrared Light Sources
- Step-Function Remote Sensitivity Adjustment
- Rugged and Waterproof
- Made in the U.S.A.

BIG CAPABILITY

- Wide Beam Proximity
- Long Range Proximity
- One or Two Inch Convergent
- Retroreflective
- Polarized Retroreflective
- Opposed (Separate Light Source/Receiver)
- Fiberoptics

Typical Application



TINY-EYE® Miniature DC-Powered Sensors

Unique Interchangeable Optical Block

TINY-EYE's unique lensed optical blocks are molded of solid optical grade, high-impact plastic. This innovation concept helps to prevent condensation or fog build up on the inside of the lens. Multiple varieties of optical blocks are available for operating the TINY-EYE in either the retroreflective, polarized (non-glare), proximity, opposed, fiber optic, or convergent sensing modes. A simple change of the optical block can be very useful in determining the best sensing mode for use in your specific sensing task. These inexpensive, interchangeable optical blocks reduce the inventory burden of replacement parts and eliminate the need for discarding a complete sensor in the case of damage to the optical block.

Designed for Trouble-Free Operation

Many design features have been incorporated into the TINY-EYE to prevent mechanical or electrical damage, and to provide trouble-free operation. The rugged case is molded of high-impact polycarbonate. To prevent electrical mishaps, the sensors are protected from reverse polarity.

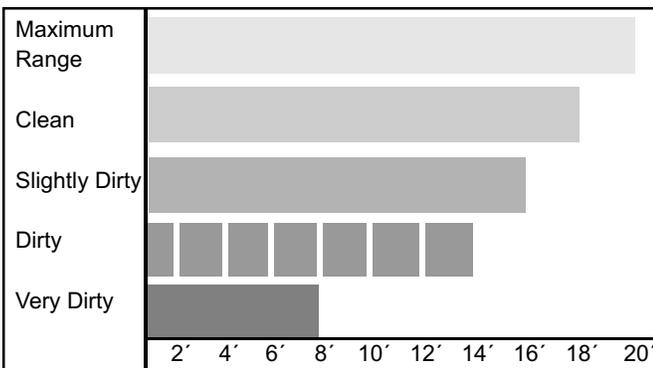
Guidelines for Determining Useful Range

To estimate useful range in your environment, simply decrease the specified maximum range by the percentage indicated in the following table.

Sensing Environment	Percentage of Decrease		
	Opposed	Retroreflective	Proximity
Clean	-5%	-10%	-10%
Slightly Dirty	-10%	-15%	-25%
Dirty	-20%	-30%	-50%
Very Dirty	-40%	-60%	-75%

Example: Model TILR4 (Retroreflective)

If the maximum range of a retroreflective sensor is rated at 20 feet and your sensing site environment is dirty, the specified maximum range would decrease by 30%, to a useful range of 14 feet.



"Quick Reference" Range* Guidelines

OPTICAL BLOCK TYPES	TINY-EYE® MODELS	
	TIL/TID (Infrared)	TRL/TRD (Red)
O4 Proximity	2 inches	1.5 inches
O5 Proximity	18 inches	16 inches
R4 Retroreflective	20 feet	20 feet
R5 Polarized Retroreflective	12 feet	12 feet
V4 Convergent	1 inch	1 inch
V6 Convergent	1-1/2 inches	1-1/2 inches
Type F5 with .125 inch dia. Glass Fiber Optic Bundle		
Proximity	1-1/2 inches	1 inch
Proximity w/ UAC-15 Lens	8 inches	6 inches
Opposed	6 inches	3 inches
Opposed w/ UAC-15 Lens	15 feet	15 feet
Type F5 with .040 inch dia. Plastic Fiber Optics		
Proximity	N/A	1/2 inch
Opposed	N/A	2 inches
Opposed w/ HLA-1 Lens	N/A	4 feet
Type T4 Opposed Mode...Light Source/Receiver		
Light Source	Receiver	Max. Range
STIT4	RTLT4	25 feet
STIT4	RTDT4	25 feet
STRT4	RTLT4	20 feet
STRT4	RTDT4	20 feet

NOTES: PROXIMITY tests utilizes a 90% reflective white target.

RETROREFLECTIVE tests utilizes a 3" dia. round reflector Model AR-3.

*Maximum ranges at 24 VDC. (Varies with supply voltage)

Specifications

POWER REQUIREMENTS

- Sensors 10 - 30 VDC @ 35 MAMax
- Receivers 10 - 30 VDC @ 15 MAMax
- Light Source 10- 30 VDC @ 20 MAMax

5 VDC Models Available. Consult Factory.

NOTE: All devices equipped with reverse polarity protection

OUTPUT TRANSISTORS(SENSORS/ RECEIVERS)

- NPN (1) and PNP(1) Output Transistors provided
- NPN: Sink up to 100 mA
- PNP: Source up to 100 mA

• RESPONSE TIME: (SENSORS/RECEIVERS)

500 microseconds (light or dark)

• LIGHT IMMUNITY: (SENSORS/RECEIVERS)

Pulse modulated to provide extremely high immunity to ambient light

• SENSING RANGE:

Sensing range determined by model type, mode of sensing, optical block selected, and supply voltage

• SENSITIVITY/RANGE ADJUSTMENT:

Adjusting light source intensity by termination of designated wire lead (Blue for Sensors/Green for Light Sources) determines sensitivity/range setting

Maximum Range - connect wire lead to POSITIVE. (24 VDC Supply)

Mid-Range - no connection required. (10 - 30 VDC Supply)

Low Range - connect wire lead to NEGATIVE. (10 - 3- VDC Supply)

NOTE: Continuous adjustment can be accomplished by connecting the wire lead to a remote potentiometer. Consult factory

AMBIENT TEMPERATURE:

- -30°C to 70°C (-22°F to 158°F)

RUGGED CONSTRUCTION:

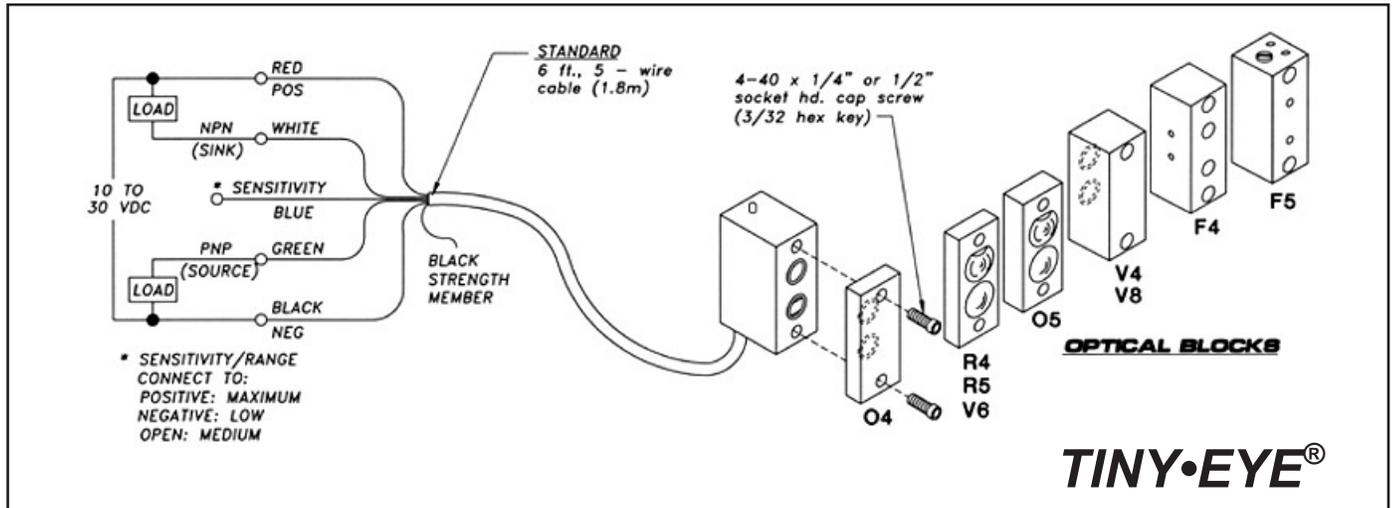
- High impact polycarbonate housing
- Waterproof, NEMA4X, 6P and IP67
- Epoxy encapsulated for mechanical strength

LED LIGHTSOURCE WAVELENGTH:

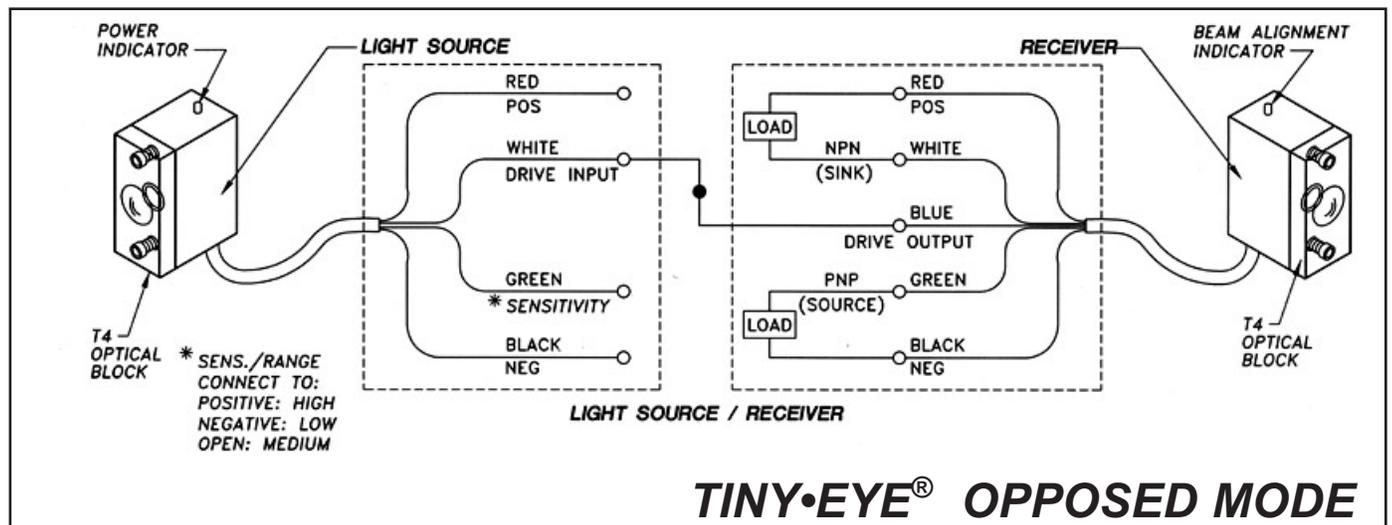
- Infrared = 880 nm
- High intensity red = 650 nm

TINY-EYE® Miniature DC-Powered Sensors

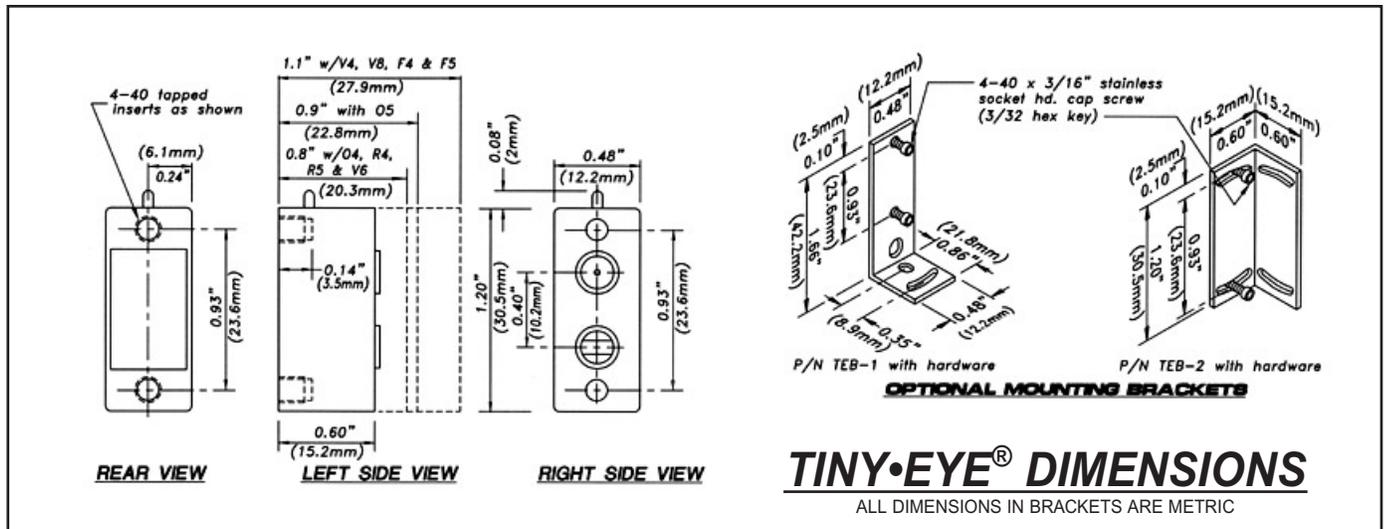
Connections - Sensor Models



Connections - Light Source / Receiver Models



Dimensions - All Models



TINY-EYE® Miniature DC-Powered Sensors

Light Source Selection

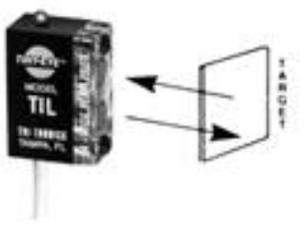
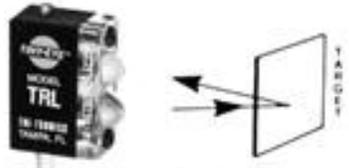
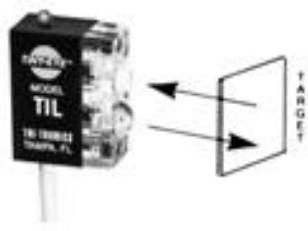
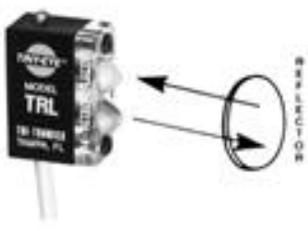
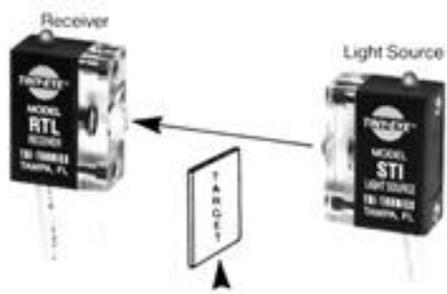
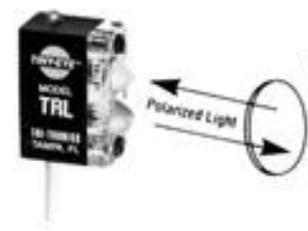
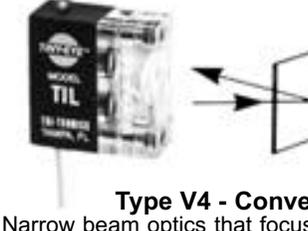
TINY-EYE Sensors offer a selection of either Infrared (invisible), or High Intensity Red (visible) light sources.

Infrared . . . invisible light source recommended for opaque object sensing. The IR LED provides long-range sensing capabilities and maximizes the ability to penetrate contaminated lenses.

High Intensity Red . . . recommended for long-range proximity sensing and for use with plastic fiber optic light guides.

Optical Block Selection

Each TINY-EYE is equipped with your selection of an interchangeable optical block from those shown below.

 <p style="text-align: center;">Type O4</p> <p style="text-align: center;">Type O4 - Proximity Wide beam optics useful for short-range sensing of translucent or irregular shaped shiny objects.</p>	 <p style="text-align: center;">Type V6</p> <p style="text-align: center;">Type V6 - Convergent 1 1/2" ("V" Axis) Narrow beam optics that focus at a sensing range of 1 1/2". Useful for sensing small parts. Also useful for proximity sensing (range of 1" to 6") to minimize response to reflected light from background objects.</p>
 <p style="text-align: center;">Type O5</p> <p style="text-align: center;">Type O5 - Proximity Narrow beam optics useful in long-range sensing of medium to large-size objects.</p>	<p style="text-align: center;">Type F4 for glass fiber</p>  <p style="text-align: center;">Type F5 for plastic fiber</p>  <p style="text-align: center;">Type F4 & F5 - Fiber Optic Adapts TINY-EYE for use with a wide variety of flexible fiber optic light guides for both the proximity and opposed sensing modes. Fiber optic light guides function as remote optics.</p>
 <p style="text-align: center;">Type R4</p> <p style="text-align: center;">Type R4 - Retroreflective Very narrow beam optics designed to sense reflectors or reflective materials at long range. Designed for beam break sensing.</p>	<p style="text-align: center;">Type T4</p>  <p style="text-align: center;">Type T4 - Opposed Uses separate Light Source/Receiver. Designed for extra long-range sensing.</p>
 <p style="text-align: center;">Type R5</p> <p style="text-align: center;">Type R5 - Polarized Anti-Glare Retroreflective Polarized to reduce response to "hot spot" glare from shiny surface of detecting object.</p>	
 <p style="text-align: center;">Type V4</p> <p style="text-align: center;">Type V4 - Convergent 1" ("V" Axis) Narrow beam optics that focus at a sensing range of 1". Useful for sensing small parts. Also useful for proximity sensing (range of 1" to 5") to minimize response to reflected light from background objects.</p>	

TINY-EYE® Miniature DC-Powered Sensors

Opposed Mode Light Source / Receiver Models

Light Source Model No.	Receiver Model No.	Source	Maximum Range*	Comments
STIT4	RTL4	Infrared, Light "On"	25 ft.	Order Separately
STIT4	RTDT4	Infrared, Dark "On"	25 ft.	
STR4	RTL4	Red, Light "On"	20 ft.	Use in Pairs
STR4	RTDT4	Red, Dark "On"	20 ft.	

Sensor Models

Light "On" Model No.	Dark "On" Model No.	Light Source	Maximum Range	Performance
----------------------	---------------------	--------------	---------------	-------------

Beam Make Mode Retroreflective (Type R4 or R5 Optical Block)

TILR4	TIDR4	Infrared	20 ft.	Narrow Beam/Long Range
TRLR4	TRDR4	Red	20 ft.	Narrow Beam/Long Range
TILR5	TIDR5	Infrared	12 ft.	Long Range
TRLR5	TRDR5	Red	12 ft.	Polarized / Long Range

Beam Make Mode Proximity, Diffused Beam (Type O4 or O5 Optical Block)

TILO5	TIDO5	Infrared	18 in.	Narrow Beam/Long Range
TRLO5	TRDO5	Red	16 in.	Narrow Beam "V" Axis
TILO4	TIDO4	Infrared	2 in.	Narrow Beam "V" Axis
TRLO4	TRDO4	Red	1.5 in.	Narrow Beam "V" Axis

Beam Make Mode Convergent Beam (Type V4 or V6 Optical Block)

			Focal Pt.	Proximity	
TILV6	TIDV6	Infrared	1.5 in.	.1 to 6 in.	Narrow Beam "V" Axis
TRLV6	TRDV6	Red	1.5 in.	.1 to 6 in.	Narrow Beam "V" Axis
TILV4	TIDV4	Infrared	1 in.	.1 to 5 in.	Narrow Beam "V" Axis
TRLV4	TRDV4	Red	1 in.	.1 to 5 in.	Narrow Beam "V" Axis

Fiber Optic Mode (Type F4 or F5 Optical Block)

Light "On" Models	Dark "On" Models	Light Source	Range w/.125" Glass Fibers		Range w/.04" Plastic Fibers	
			Proximity	Opposed	Proximity	Opposed
TILF4	TIDF4	Infrared	1.5 in. 8 in. with lens	3.5 in. 15 ft. with lens	N/A	N/A
TRLF4	TRDF4	Red	1 in. 6 in. with lens	3 in. 15 ft. with lens	N/A	N/A
TRLF5	TRDF5	Red	N/A	N/A	.5 in.	2 in. 4.5 ft. with lens

- NOTES:
- FIBER OPTIC tests utilized .125 in. diameter glass fiber bundles or .040 in. diameter bundles/
 - Fiber Optic extended range tests utilized Model UAC-15 lenses with glass fibers or Model HLA lenses with plastic fibers.
 - Maximum range is at 24V. Varies with supply voltage.
 - PROXIMITY tests utilized a 90% reflective target. RETROREFLECTIVE tests utilized a 3 in. diameter reflector, Model AR3.

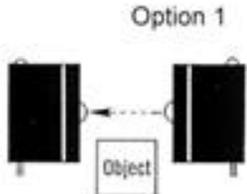
TINY-EYE Accessories

Model No.	Description	Model No.	Description
TEB-1	Vertical mount Tiny-Eye Mounting Bracket	O4	Proximity, Wide Beam Optical Block
TEB-2	Horizontal Mount Tiny-Eye Mounting Bracket	O5	Proximity, Long Range Optical Block
78P	4.4 in. x 1.9 in. Screw Mount Reflector	R4	Retroreflective Optical Block
UAC-15	Threaded Long Range Lens, Glass	R5	Polarized Retroreflective Optical Block
UAC-5	Threaded Spot Focus Lens, Plastic	V4	"V" Axis Optical Block, 1 in. Range
T4	Through-Beam Optical Block	V6	"V" Axis Optical Block, 1.5 in. Range
F4	Fiber Optic Optical Block for Glass Fibers	V8	"V" Axis Optical Block, .5 in. Range
F5	Fiber Optic Optical Block for Plastic Fibers .040 dia		

TINY-EYE® Selection Guidelines

OPAQUE OBJECT SENSING:

Preferred Mode:



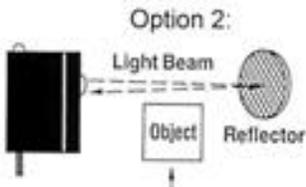
Beam Break

Opposed mode, uses separate light source / receiver. Provides long range sensing. Best choice for use in hostile environments.

Sensor: Model STIT4 Light source (infrared)
Model RTL4 Light "on" receiver or RTDT4 Dark "on" receiver.

Range: In excess of 20 ft.

Accessories: (Model TEB-1 (vertical mount) or TEB-2 (horizontal mount) bracket)



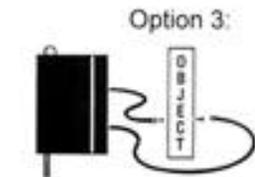
Polarized retroreflective mode is a cost effective mode to detect medium to large size shiny or non-shiny opaque objects. Use with reflector.

Sensor: Model TRLR5, Light "on" output. (red light source) or, TRDR5 Dark "on" output.

Reflector: Model 78P, Plastic, 4.4 in. X 1.9 in. screw mounted.

Sensing range: Up to 10 ft. (Dependent on size of reflector).

Accessories: Model TEB-1 (vertical mount) or TEB-2 (horizontal mount) bracket.



Fiber optic opposed mode is useful to detect any opaque object in hostile environment.

Sensor: Model TILF4, Light "on" operate (red light source) or, TIDF4, Dark "on" operate.

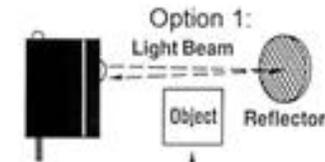
Fiber optic light guides: Model F-A-36T (use smaller fiber for smaller parts).

Sensing range: Up to 6 in. without lens. Up to 15 ft. with (2) UAC-15 lenses

Accessories: (Model TEB-1 (vertical mount) or TEB-2 (horizontal mount) bracket).

TRANSLUCENT OBJECT SENSING:

Preferred Mode:



Beam Break

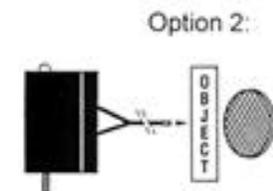
Polarized retroreflective mode.

Sensor: Model TRLR5, Light "on" operate (red light source) or TRDR5, Dark "on"

Reflector: Model 78P, Plastic, 4.4 in. x 1.9 in. screw mounted.

Sensing range: Up to 10 ft. (dependent on size of reflector)

Accessories: Model TEB-1 (vertical mount) or TEB-2 (horizontal mount) bracket.



Fiber optic retroreflective mode.

Sensor: Model TRLF4, Light "on" operate (red light source) or, TRDF4, Dark "on"

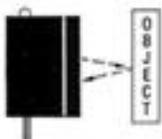
Fiber optic light guide: Model BF-A-36T

Reflector: Model 78P, Plastic, 4.4 in. x 1.9 in. screw mounted

Sensing range: Up to 4 ft. without lens. Up to 8 ft. with UAC-15 lens.

Accessories: Model TEB-1 (vertical mount) or TEB-2 (horizontal mount) bracket.

Alternate Mode:



Beam Make

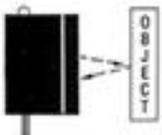
Sensor: Model TRLV6, Light "on" operate (red light source) or, TRDV6, Dark "on".

Sensing range: Up to 3 in. (dependent on size, shape and color).

Accessories: Model TEB-1 (vertical mount) or TEB-2 (horizontal mount) bracket.

TRANSPARENT OBJECT SENSING:

Preferred Mode:



Beam Make (Convergent / proximity)

Note: Totally transparent objects can still be very difficult to detect. A high performance sensor may be required. See SMART EYE® MARK II section for details.

Sensor: Model TRLV6, Light "on" operate (red light source) or, TRDV6, Dark "on".

Sensor range: Up to 2 in. dependent on size, shape and color.

Accessories: Model TEB-1 (vertical mount) or TEB-2 (horizontal mount) bracket.