

70 Series Modular Photoelectric Sensors

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The Cutler-Hammer® 70 Series by Eaton's electrical business offers a wide choice of sensor heads, control units, output devices, logic modules, and accessories to solve virtually any problem.

Sensor Heads are connected by cables to the control unit, and can be mounted up to 1000 ft. away. They are available in thru-beam, reflex, diffuse reflective, fiber optic, Curtain-of-Light and slot-style optical modes.

Self-Contained Control Units are available in 4 circuitry types and work with all sensor heads unless noted. Output devices (required for all but Analog) and optional logic modules are contained in a sealed enclosure.

- Standard: General purpose control.
- High Power: 3 times the power of the standard control unit in normal gain mode and 27 times in high gain mode. Gain modes are switch selectable.
- Differential: Compares the signal from 2 separate sensor heads via direct analog signal subtraction. The output is activated when sensor "A" receives more signal than "B." Cannot be used with the 1471A-6501 Curtain-of-Light sensor head.
- Analog: Provides a voltage level output proportional to the amount of light received. Most commonly used with the 1471A-6501 Curtain-of-Light sensor head.



Unless otherwise noted, the products contained in this document are not designed or intended for use in human safety applications.

High Performance Modular Sensors to Solve the Toughest Sensing Problems

Unique Sensing Heads



Thru-Beam



Curtain-of-Light



Slot Sensor

Powerful Control Units



Self-Contained



Modular



DIN Rail Mount

Flexible Logic Modules and Output Devices



Logic Modules



Output Devices

Product Features

- Modular design allows you to customize a sensor to solve any application problem
- Control units feature a variety of capabilities and housings
- Logic modules provide added functions including time delays, one-shot outputs and stopped motion detection
- A variety of output devices available for switching AC or DC loads from a few milliamps to 10 Amps
- Unique Curtain-of-Light Sensor Head is ideal for web loop control (when used with the analog control unit) and detection of small parts (when used with 8171B control unit and low contrast module)
- Slot Sensor Head combined with the DIN Rail Mount Control Unit is an easy solution for web guiding or centering applications
- Standard: General Purpose Control Unit
- Enhanced: Time-delay and one shot functions available

Modular Control Units are compact, plug-replaceable units designed for dry locations or mounting within a separate enclosure. An LED indicator provides alignment and beam status. Optional output devices and logic modules are available as separate modular units.

- Standard: General purpose control unit
- Enhanced: Time-delay and one-shot functions available

The **DIN Rail Mount Control Unit** is an analog control unit that provides a voltage output signal which varies proportional to target movement, position or translucence. It is ideal for use with the 1372A-6501 slot sensor head for web guiding or centering.

For Customer Service in the U.S.
call **1-877-ETN CARE (386-2273)**,
in Canada call **1-800-268-3578**.
For Application Assistance in the
U.S. and Canada
call **1-800-426-9184**.

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Model Selection — 70 Series Sensor Heads (Connection is by 9-foot cable) ^①

| | Sensing Range by Control Unit ^{②③} | | | | Field of View | Material of Construction | Operating Temperature; Enclosure Rating | Infrared Sensing Beam Wavelength | Catalog Number |
|--|---|--------------------------------------|----------------------------------|----------------------------------|---|---|--|----------------------------------|--|
| | A 8171B in High Gain Mode | B 8171B in Normal Gain Mode | C 8170A, 8771A or 8772A | D 8172A or 8173A Analog | | | | | |
| Thru-Beam Right-Angle Viewing Threaded Housing  | 15 feet (4.5m) | 5.5 feet (1.6m) | 3 feet (0.9m) | — | Source: 25° Detector: 45° Effective Beam: 0.10 inch (3 mm) | Housing: Stainless Steel Lens: Plastic | -40° to 176°F (-40° to 80°C) NEMA 4,13 | 925 nm | Source: 1179A-6501 Detector: 1279A-6501 |
| Thru-Beam Forward Viewing Smooth Housing  | 32 feet (9.7m) | 10.2 feet (3.1m) | 6 feet (1.8m) | — | Source: 10° Detector: 25° Effective Beam: 0.15 inch (4 mm) | Housing: Aluminum Lens: Glass | -40° to 212°F (-40° to 100°C) NEMA 1 | 880 nm | Source: 1170A-300 Detector: 1270A-300 |
| Thru-Beam Forward Viewing Threaded Housing Short Range  | 31.2 feet (9.5m) | 10.2 feet (3.1m) | 6 feet (1.8m) | — | Source: 10° Detector: 25° Effective Beam: 0.15 inch (4 mm) | Housing: Stainless Steel Lens: Lexan (Acrylic) | -40° to 176°F (-40° to 80°C) NEMA 3, 4, 6, 12, 13 | 940 nm | Source: 1173A-300 Detector: 1273A-300 |
| Thru-Beam Forward Viewing Threaded Housing Medium Range  | 369 feet (112m) | 123 feet (37.5m) | 71 feet (21.6m) | — | Source: 2° Detector: 2° Effective Beam: 0.55 inch (14 mm) | Housing: Aluminum Lens: Glass | -40° to 176°F (-40° to 80°C) NEMA 4, 6, 13 | 880 nm | Source: 1173A-100 Detector: 1273A-100 |
| Thru-Beam ^④ Forward Viewing Threaded Housing Long Range  | 743 feet (226m) | 248 feet (75.6m) | 143 feet (43.6m) | — | Source: 1° Detector: 1° Effective Beam: 0.88 inch (22.4 mm) | Housing: Aluminum Lens: Glass | -40° to 176°F (-40° to 80°C) NEMA 4, 6, 13 | 880 nm | Source: 1173A-200 Detector: 1273A-200 |
| Reflex (Includes Retroreflector)  | Do not use in this mode | 23 feet (7m) | 15 feet (4.5m) | — | 0.75 inch (19 mm) diameter at 24 inches (610 mm) | Housing: Cast Zinc Lens: Acrylic | -40° to 176°F (-40° to 80°C) NEMA 1 | 940 nm | 1470A-6501 |

^① See Control Unit specification **Page 6** on for restrictions on longer length cables, see Accessories for extension cable.^② Sensing ranges are based on a 3-inch retroreflector for reflex; 90% reflectance white card for diffuse reflective.^③ For gain graphs and additional specifications, see **Page 6**.^④ Precise alignment must be maintained for this model. Catalog Number 6142A or 6168A mounting brackets shown on **Page 9** are recommended.
 Fast turn product with typical one business day lead-time to shipment.

Model Selection — 70 Series Sensor Heads (Connection is by 9-foot cable) ① (Continued)

| | Sensing Range by Control Unit ②③ | | | | Field of View | Material of Construction | Operating Temperature; Enclosure Ratings | Infrared Sensing Beam Wavelength | Catalog Number |
|--|--|---|----------------------------------|----------------------------------|---|---|--|----------------------------------|---|
| | A 8171B in High Gain Mode | B 8171B in Normal Gain Mode | C 8170A, 8771A or 8772A | D 8172A or 8173A Analog | | | | | |
| Reflex Curtain-of-Light (Retroreflector sold separately)  | — | 6 feet (1.8m) (Requires 8215A Low Contrast module) | — | 6 feet (1.8m) | 6° by 60° fan- shaped sensing zone | Housing: Aluminum Lens: Acrylic | -5° to 158°F (-20° to 70°C) NEMA 1, 3, 4, 6, 12, 13 | 940 nm | Sensor Head: 1471A-6501 Retroreflector: 6210A-6501 |
| Diffuse Reflective  | 36 inches (914 mm) | — | 7 inches (177 mm) | — | 2 inch (50 mm) diameter at 7 inches (177 mm) | Housing: Cast Zinc Lens: Glass | -40° to 212°F (-40° to 100°C) NEMA 1 | 940 nm | 1370A-6501 |
| Diffuse Reflective Fixed Focus  | 2.5 ± 0.25 inches (63.5 ± 6 mm) | — | — | — | 0.12 inch (3 mm) diameter at 2.5 inches (63.5 mm) | Housing: Delrin Lens: Glass | -40° to 212°F (-40° to 100°C) NEMA 1, 3, 4, 12, 13 | 940 nm | 9082A-6501 |
| Slot Sensor Head  | — | — | — | 2 inch (50 mm) slot | Fan-shaped zone 2.75 inches (70 mm) wide at base | Housing: Aluminum Lens: Acrylic | -32° to 140°F (-0° to 60°C) NEMA 1 | 880 nm | 1372A-6501 |
| Glass Fiber Optic For diffuse reflective sensing (order both parts for a complete system)  | Do not use in this mode | 1.5 inches (38 mm) | 1 inch (25 mm) | — | 30° | Sensor: Anodized Aluminum Glass fiber: ABS, Brass | -40° to 212°F (-40° to 100°C) NEMA 1 | 940 nm | Source: 1571A-6501 Fiber: 6276A-6501 |
| Glass Fiber Optic Adapter  | Adapts the 1173A-300 and 1273A-300 Thru-beam sensor heads for use with any E51KF-style glass fiber optic cable (see PG.05E.15.T.E) for thru-beam or diffuse reflective sensing. To use order two adapters, one 1173A-300 source head, one 1273A-300 detector head, and the appropriate fiber optic cable(s). | | | | | | | | 6221A-7501 |

 ① See Control Unit specification on **Page 6** for restrictions on longer length cables, see Accessories on **Page 9** for extension cable.

② Sensing ranges are based on a 3-inch retroreflector for reflex; 90% reflectance white card for diffuse reflective.

 ③ For gain graphs and additional specifications, see **Page 6**.

Fast turn product with typical one business day lead-time to shipment.

Stocked product, typical order quantities guaranteed in stock.

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Model Selection — Control Units (See **Page 7** and **Page 8** for logic modules and output devices) ^{①②}

| | | Maximum Cable Length | | Response Time | | Output | Operating Temp. Enclosure Rating | Power Input | Catalog Number |
|--|---|----------------------|--|--|--|--|---|---|------------------------------|
| | | Source | Detector | Light-to-Dark | Dark-to-Light | | | | |
| Control Unit Self-Contained ④ |  | 1000 feet (304m) | 75 feet (22m) | 3 mS (5 mS maximum) | 0.5 mS (1.5 mS maximum) | Requires Output Module | 32° to 158°F (0° to 70°C) NEMA 3, 4, 6, 12, 13 | 115V AC, 50/60 Hz 230V AC, 50/60 Hz | 8170A-6501 8170A-6502 |
| Self-Contained Control Unit without Enclosure (circuit board only) ③④ | | 1000 feet (304m) | 75 feet (22m) | 3 mS (5 mS maximum) | 0.5 mS (1.5 mS maximum) | Requires Output Module | 32° to 158°F (0° to 70°C) | 115V AC, 50/60 Hz 230V AC, 50/60 Hz | 8170A-6504 8170A-6505 |
|  Control Unit Self-Contained High Power | | 1000 feet (304m) | High Gain: 36 feet (11m) Normal Gain: 250 feet (76m) | High Gain: 14 mS Normal Gain: 3 mS | High Gain: 4.5 mS Normal Gain: 1.5 mS | Requires Output Module | 4° to 131°F (-20° to 55°C) NEMA 3, 4, 6, 12, 13 | 95 – 130 V _{RMS} , 50/60 Hz 190 – 260 V _{RMS} , 50/60 Hz | 8171B-6501 8171B-6502 |
| Control Unit Self-Contained Differential ② |  | 1000 feet (304m) | 150 feet (45m) | 3 mS — Sensor A to B 5 mS — Sensor B to A | | Requires Output Module | 32° to 158°F (0° to 70°C) NEMA 3, 4, 6, 12, 13 | 115V AC, 50/60 Hz | 9072A-6501 |
| Control Unit Self-Contained Analog ① |  | 250 feet (76m) | 100 feet (30m) | Difference between actual output and equilibrium value is halved every 12 mS ± 3 mS for a step input change. 5% setting time is 40 mS ± 15 mS | | Output voltage is field adjustable from -15V to +10V DC. Can be isolated with analog isolation module accessory | 14° to 131°F (-10° to 55°C) NEMA 3, 4, 6, 12, 13 | 90 – 130V AC, 60 Hz or 100 – 125V AC, 50 Hz 190 –260V AC, 60 Hz or 200 – 250V AC, 50 Hz | 8172A-6501 8172A-6502 |
| Control Unit Modular ⑤ (Requires 11-pin panel mount socket 8905A- 6501 for installation, See Page 10) |  | 1000 feet (304m) | 150 feet (45m) | 3 mS maximum | 0.5 mS maximum | Complementary open collector transistor outputs Sink: 150 mA (ON) or standoff 30V DC (OFF) ⑤ | -5° to 122°F (-15° to 50°C) NEMA 1 | 9 – 18V DC, 135 mA max. (see PG.05.06.T.E for regulated DC power supply) | 8771A-6501 |
| Control Unit ⑤ Modular Enhanced With time delay or one-shot function (adjustable from 0.02 to 15 seconds) (Requires an 11-pin panel mount socket 8905A-6501 for installation, See Page 10) |  | 1000 feet (304m) | 150 feet (45m) | 3 mS maximum | 0.5 mS maximum | Complementary open collector transistor outputs Sink: 150 mA (ON) or standoff 30V DC (OFF) ⑤ | -5° to 122°F (-15° to 50°C) NEMA 1 | 9 – 18V DC, 170 mA max. (see PG.05.06.T.E for regulated DC power supply) | 8772A-6501 |
| Control Unit⑥ DIN Rail Mount Analog |  | 250 feet (76m) | 100 feet (30m) | 20 mS for 10 – 90% of signal range at ±10V output | | 15 mA sourcing and sinking maximum | 32° to 131°F (0° to 55°C) | +15V DC 0.1A max. and -15V DC 0.05A max. | 8173A-6507 |

① An output device is required for Self-Contained Control Units (except Analog), and when using Modular Control Units to switch AC loads. Logic modules are optional and not used with Analog Control Units. 8272X-6501 Isolated Output option available for 8172A Analog Control.

② For additional specifications, see **Page 6**.

③ For mounting in existing enclosure, or for use when multiple units are installed in a central location. Mount 2 inches apart minimum to avoid crosstalk.

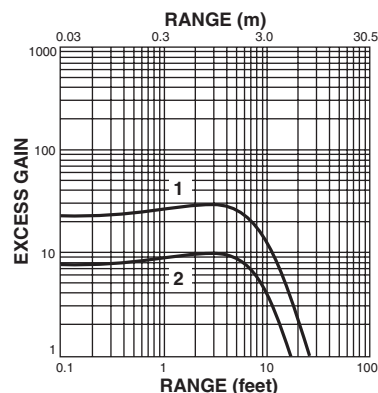
④ Cannot be used with Curtain-of-Light Sensor Head, Catalog Number 1471A-6501.

⑤ Optional output devices can be used for switching AC loads.

⑥ Requires user supplied linear regulated power supply. Control unit rise time is 20 mS for 10 – 90% of signal range at ±10V output.

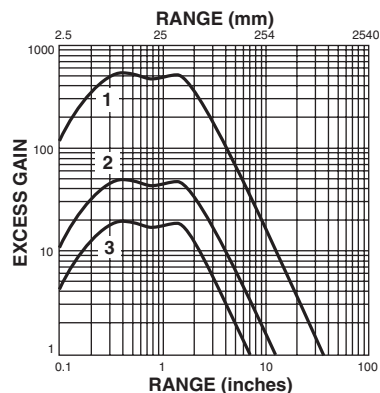
 Fast turn product with typical one business day lead-time to shipment.

Excess Gain



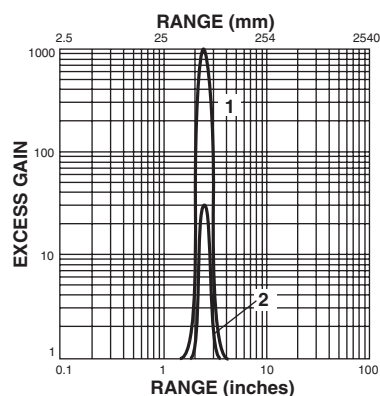
Reflex
(3 Inch diameter Retroreflector)

1. 1470A Sensor Head with 8171B Control Unit
2. 1470A Sensor Head with 8170A, 8771A or 8772A Control Unit



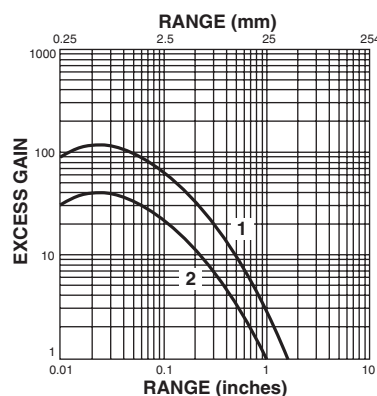
Diffuse Reflectance
(90% Reflective White Card)

1. 1370A with 8171B Control Unit in High Gain Mode
2. 1370A with 8171B Control Unit in Normal Gain Mode
3. 1370A with 8170A, 8771A or 8772A Control Unit



Fixed Focus
(90% Reflectance White Card)

1. 9082A-6501 with 8171B Control Unit in High Gain Mode
2. 9082A-6501 with 8171B in Normal Gain Mode, 8170A, 8771A or 8772A Control Unit



Fiber Optic Diffuse Reflective
(90% Reflectance White Card)



1. 1571A/6276A with 8171B Control Unit in Normal Gain Mode
2. 1571A/6276A with 8170A, 8771A or 8772A Control Unit

Specifications — Sensor Heads and Control Units

| | Sensor Heads | Control Units | | |
|------------------------------------|--|--|---------------------|---------------------|
| | | Self-Contained | Modular | DIN Rail Analog |
| Power Dissipation | — | Analogue: 18 VA max. All others: 12 VA max. | 2.5 Watts max. | 2 Watts max. |
| Sensitivity Adjustment | — | 20:1 ratio | 20:1 ratio | — |
| Sunlight Immunity | Depends upon control unit used (Curtain-of-Light: 7,500 foot-candles when used with 8171B control unit) | 10,000 foot-candles | 6,000 foot-candles | 10,000 foot-candles |
| Relative Humidity (non-condensing) | Thru-beam, fiber optic: 98% Reflex, diffuse reflective: 95% | 98% | 90% | 90% |
| Vibration | 10g or 0.06 inch displacement, whichever is less, over 10 Hz (20 Hz for slot sensor) to 2 kHz | 5g up to 1 kHz | 5g up to 4 kHz | — |
| Shock | 15g minimum for 1 mS | — | 15g min. for 1 mS | — |
| Case Material | See Model Selection Table | Aluminum | Lexan® and phenolic | — |

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Model Selection — Logic Modules (Optional, not used with analog control units)

| | Description | For Control Units | Selectable Ranges | Signal Input Voltage | | Input Power | Output Type and Ratings | Catalog Number |
|--|---|-------------------------|---|-----------------------|--------------|------------------------------|---|-------------------|
| | | | | HI | LO | | | |
| Logic Modules for Self-Contained Control Units 8171B & 8170A (Modules mount to circuit board within control unit enclosure)  | Time Delay ON and OFF time delays from 0.01 to 35 seconds. Independent adjustment of ON-delay and OFF-delay. | 8170A 8171B 9072A | Timing Ranges: ① 0.01 to 0.2 seconds 0.1 to 2.0 seconds 1.0 to 15.0 seconds 2.0 to 35.0 seconds | — | — | Provided by Control Unit | See Specifications for Selected Output Device | 8212B-6501 |
| | One-Shot Produces a pulse of preset time when triggered. Switch-select to trigger on leading or trailing edge of object. | 8170A 8171B 9072A | Pulse Width: ① 0.02 to 0.5 seconds 0.3 to 2.0 seconds 1.0 to 18.0 seconds 10.0 to 30.0 seconds | — | — | Provided by Control Unit | See Specifications for Selected Output Device | 8213B-6501 |
| | Stopped Motion Retriggerable one-shot. Start-up delay adjusts from 0.1 to 11 seconds to allow machine to come up to speed. Control can be reset from remote location. | 8170A 8171B 9072A | Retrigger Interval: ① 30 to 430 RPM 430 to 5,000 RPM | — | — | Provided by Control Unit | See Specifications for Selected Output Device | 8216A-6501 |
| | Low Contrast Responds to slight but abrupt signal variation while ignoring slower changes. Response Time: 0.1 mS. | 8171B | Output one-shot time: 20 mS to 2.5 seconds (After this point it becomes a latch function.) | — | — | Provided by Control Unit | See Specifications for Selected Output Device | 8215A-6501 |
| Logic Modules for Modular Control Units (Lexan® cover with phenolic base, rated NEMA 1)  | Time Delay Provides ON and OFF delay timing, with independent adjustment of ON-delay and OFF-delay. | 8771A 8772A | Timing Range: 0.5 to 15 seconds | V supply 4V min. | 0.4V max. | 9 – 18V DC, 13.3 mA max. | Open Collector, 110 mA sink, 30V DC maximum protected for load spikes above 35V | 8712A-6501 |
| | One-Shot ③ Produces a pulse of preset time when triggered. Jumper-selected retriggerable mode for stopped motion detection. | 8771A 8772A | Pulse Width: ① 0.02 to 0.325 seconds 0.2 to 6.5 seconds | V supply 3.5V min. | 3V max. ② | 11 – 15.5V DC, 40 mA max. | Open Collector, 110 mA sink, 30V DC maximum protected for load spikes above 35V | 8713A-6501 |
| | Shift Register ③ ④ Delays the response to a beam break (or beam completion) by a preset number of clock pulses, usually generated by a pulse generator on a conveyor. | 8771A 8772A | Register Length: 1 to 64 clock pulses | — | — | 10 – 15.5V DC, 60 mA max. | Complementary open collector NPN transistor; On-state: 150 mA max. with 1V max. drop Off-state: 1 µA max. leakage at 30V DC | 8730A-6501 |

① Once range is selected, exact value is adjusted via potentiometer.

② Driving device must be capable of sinking 1.6 mA maximum to ground.

③ Clear pin input (allows outputs to be cleared or held, in untriggered state, independent of input).

One-Shot — Voltage HI: 1.0V minimum; Voltage LO: 0.4V maximum.

Shift Register — Voltage HI: 2/3 input voltage minimum; Voltage LO: 1/3 input voltage maximum.



Pulse width: 20 mS (voltage must not exceed input voltage).

④ Clock and date inputs

Shift Register — Rate: 600 Hz maximum fast mode, 30 Hz maximum slow mode; Pulse Width (data): 0.75 mS minimum fast mode, 15 mS minimum slow mode (voltage must not exceed input voltage); Logic level 1 (HI): 2/3 input voltage minimum; Logic level 0 (LO): 1/3 input voltage maximum.

■ Fast turn product with typical one business day lead-time to shipment.

Model Selection — Output Devices (Required for Self-Contained Control Units [except analog] and when switching AC loads with Modular Control Units)

| | Description | Input | | Output | | | | | Catalog Number |
|---|---|--|--|--|--|--|------------------------------|-------------------|----------------|
| | | Operating Voltage | Current | Type | ON-State Current | OFF-State Leakage | ON-State V Drop | One Cycle Surge A | |
|  | Output Devices for 8170A and 9072A Control Units | DPDT Relay For low frequency general purpose switching of control power loads | Supplied by Control Unit | — | DPDT | Contact Ratings: AC Load: 5A at 115V AC or 230V AC DC Load: 5A at 30V DC Contact Life: 100,000 operations at rated load | | | 8526A-6501 |
| | Isolated Triac For high rate switching of resistive or inductive AC loads | Supplied by Control Unit | — | SPST Normally open triac | 2 A _{RMS} continuous | 5 mA at 100V AC | 1.7 V _{RMS} or less | 20A peak | 8570A-6501 |
| | Triac, PC Compatible Optically isolated solid-state relay for switching non-capacitive AC loads. Response is 100,000 operations/hour | Supplied by Control Unit | — | SPST Normally open triac | 5 – 500 mA _{RMS} at 70°C | 1.5 mA at 120V AC | 1.7V maximum | 6A peak | 8574A-6501 |
| | Optical Isolator Driver Drives a user supplied remote optical isolator for a solid-state interface. Isolator can then be used to switch DTL, TTL, CMOS, etc. | Supplied by Control Unit | — | PNP output drive to a remote optical isolator | 20 mA | — | — | — | 8580A-6501 |
| | Isolated NPN Transistor Optically isolated NPN SPST transistor switch | Supplied by Control Unit | — | Optically isolated NPN transistor switch | 20 mA at V _{SAT} less than 0.2V | 0.01 mA maximum at 30V DC | — | — | 8582A-6501 |
| Output Device for 8172A Control Unit (optional) | Analog Isolation Module Eliminates ground loop problems and induced noise between the control unit and other system components | Supplied by Control Unit | — | Converts the 8172A's output to an isolated analog output, allowing the control unit to interface with solid-state AC motor controllers with control circuitry at the AC line potential. Bi-directional output: 30 mA from E2 to E1; 20 mA from E1 to E2; 10.75V DC ± 1.0V maximum. | | | | | 8272A-6501 |
|  Polycarbonate Housing (requires an 8-pin panel mount socket Catalog Number 8907A-6501 for installation when used with 8771A or 8772A Control Units, See Page 10) | Output Devices for 8171B, 8771A and 8772A Control Units | DPDT Relay Plug-in industrial control relay | 12V DC nominal. Supplied by Control Unit | 75 mA at 75°F 12V DC | DPDT | Contact Ratings: Resistive Load: 10A, 1/4 hp maximum at 110/220V AC, 10A maximum at 28V DC Inductive Load: 7A maximum at 110/220V AC, 7A maximum at 28V DC Contact Life: 500,000 operations at rated load | | | 8530A-6501 |
| | Isolated Triac Optically isolated, solid-state relay for switching non-capacitive AC loads. Response is 100,000 operations/hour | 3 – 20V DC Supplied by Control Unit | — | SPST Normally open triac | 2 A _{RMS} at 25°C, 1 A _{RMS} at 65°C | 5 mA at 100V AC, 9 mA at 200V | 1.7 V _{RMS} or less | 60A peak | 8572A-6501 |
| | Triac, PC Compatible Optically isolated, solid-state relay for switching non-capacitive AC loads. Response is 100,000 operations/hour | 8 – 20V DC Supplied by Control Unit | 9.5 – 20 mA | SPST Normally open triac | 5 – 500 mA _{RMS} at 70°C | 1.5 mA at 120V AC | 1.7V maximum | 6A peak | 8573A-6501 |
| | Isolated NPN Transistor Optically isolated, NPN SPST transistor switch | 12V DC nominal | 20 mA typical | Optically isolated NPN transistor switch | 20 mA at V _{SAT} less than 0.2V, 500 mA at V _{SAT} less than 1V ^① | 10 μA maximum at 30V DC ^② | — | — | 8586A-6501 |

① For 3-wire connection. For 2-wire connection, 100mA at V_{SAT} less than 1.2V.

② For 3-wire connection. For 2-wire connection, 0.1 µA maximum at 30V DC.

Fast turn product with typical one business day lead-time to shipment.

Stocked product, typical order quantities guaranteed in stock.

Specifications — Output Devices

| | DPDT Relays | | Triacs | | Others |
|-----------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | 8526A-6501 | 8530A-6501 | Isolated | PC Compatible | |
| Operating Temperature | -40° to 140°F (-40 to 60°C) | -4° to 131°F (-20° to 55°C) | -4° to 149°F (-20° to 65°C) | -4° to 149°F (-20° to 65°C) | -4° to 149°F (-20° to 65°C) |
| Response Time | 15 mS | 25 mS maximum | 1 mS maximum | | Instantaneous |
| Off-to-On (pull-in) | 5 mS | 25 mS maximum | 1/2 cycle of line voltage | | Instantaneous |
| On-to-Off (drop-out) | | | | | |
| Pull-In Voltage | 8 – 9.6V | 8 – 9.6V | 3V minimum | 8 – 20V | — |
| Drop-Out Voltage | 1.2 – 2V | 1.2 – 2V | 0.8V maximum | — | — |




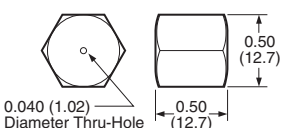
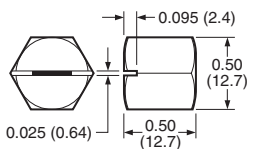

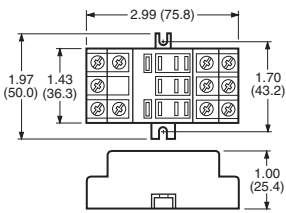
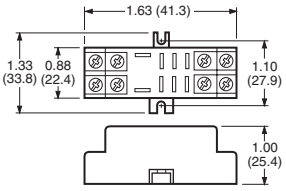
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Model Selection — Accessories

| | Description | Catalog Number | Approximate Dimensions in Inches (mm) Except Where Noted | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|---|--|---|-------------|-------------|-------------|-------------|---|---|---|---|------|-------------|-------------|------------|-------------|-------------|-------------|-------------|-------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | For a selection of mounting brackets for use with tubular sensor heads | See PG.05.03.T.E | | | | | | | | | | | | | | | | | | | | | | | | | |
| L-Shaped Mounting Bracket | For horizontal or vertical mounting of Catalog Number 1370A and 1470A reflex sensor heads | 6177A-6501 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mounting Clip | Stainless steel, for Catalog Number 1170A and 1270A sensor heads, two per package | 6170A-6501 | NOTE: Dimensions in Inches | | | | | | | | | | | | | | | | | | | | | | | | |
| 6° Mounting Block | Converts 70 Series 3/4 inch thru-beam heads to high gain diffuse reflective sensor. Chromate finished aluminum | 6162A-6501 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Metal Ball Swivel Mount | Allows 5.5° rotation with screw lock to fix final position. Extremely rugged, made from zinc plated steel/Celenex®. Electrically isolates the sensor to prevent noise pick-up caused by poor grounding. | 6168A-6501 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Plastic Ball Swivel Mount | Allows 10° rotation on X and Y axes with a clamping action to hold adjustment. Noryl — avoid exposing to chlorinated halogenated or aromatic hydrocarbons. Operating temperature: -40° to 160°F. | <div>18 mm (3/4 inch) 6142A-6501</div> <div>8 mm (3/8 inch) 6143A-6501</div> <div>(11/1273A-300)</div> | <table><thead><tr><th>Size</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>G</th></tr></thead><tbody><tr><td>8 mm</td><td>1.96 (49.8)</td><td>1.56 (39.6)</td><td>0.20 (5.1)</td><td>0.40 (10.2)</td><td>0.80 (20.3)</td><td>1.05 (26.7)</td><td>0.375 (9.5)</td></tr><tr><td>18 mm</td><td>2.80 (71.1)</td><td>2.25 (57.2)</td><td>0.275 (7.0)</td><td>0.50 (12.7)</td><td>1.00 (25.4)</td><td>1.64 (41.7)</td><td>0.75 (19.1)</td></tr></tbody></table> | Size | A | B | C | D | E | F | G | 8 mm | 1.96 (49.8) | 1.56 (39.6) | 0.20 (5.1) | 0.40 (10.2) | 0.80 (20.3) | 1.05 (26.7) | 0.375 (9.5) | 18 mm | 2.80 (71.1) | 2.25 (57.2) | 0.275 (7.0) | 0.50 (12.7) | 1.00 (25.4) | 1.64 (41.7) | 0.75 (19.1) |
| Size | A | B | C | D | E | F | G | | | | | | | | | | | | | | | | | | | | |
| 8 mm | 1.96 (49.8) | 1.56 (39.6) | 0.20 (5.1) | 0.40 (10.2) | 0.80 (20.3) | 1.05 (26.7) | 0.375 (9.5) | | | | | | | | | | | | | | | | | | | | |
| 18 mm | 2.80 (71.1) | 2.25 (57.2) | 0.275 (7.0) | 0.50 (12.7) | 1.00 (25.4) | 1.64 (41.7) | 0.75 (19.1) | | | | | | | | | | | | | | | | | | | | |

 Stocked product, typical order quantities guaranteed in stock.

Model Selection — Accessories (Continued)

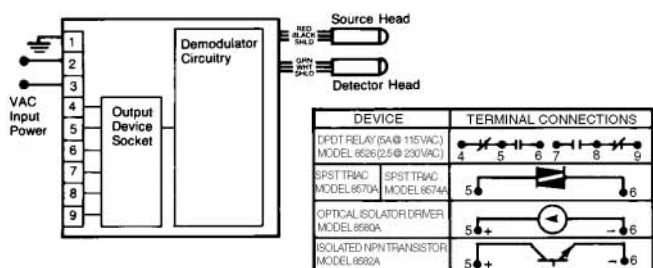
| | Description | Catalog Number | Approximate Dimensions in Inches (mm) |
|--|---|----------------------|---|
| Retroreflectors | Retroreflectors and retroreflective tape | See PG.05E.17.T.E | |
|  (see control unit specifications for maximum extended cable length) | Source extension cable Order quantity = Length in feet i.e. Qty. 20 of model 6503-xxx = One 20 foot length extension cable | 6503A-XXX | |
| | Detector extension cable Order quantity = Length in feet i.e. Qty. 20 of model 6503-xxx = One 20 foot length extension cable | 6507A-XXX | |
|  | Brass compression fitting for connecting Catalog Number 8903A-6501 flexible conduit to control unit | 8904A-6501 | |
|  | With 0.04 inch hole for small parts detection. Used with Catalog Number 1173A-300 and 1273A-300 sensor heads. | 6271A-6501 |  |
| | With 0.025 inch slot for small parts detection. Used with Catalog Number 1173A-300 and 1273A-300 sensor heads. | 6271A-6502 |  |
| Fiber Optic Cables | Glass fiber optic cables (for use with 6221A-7501 fiber optic adapters) | See PG.05E.15.T.E | |
|  | 11-pin panel mount socket for Catalog Number 8712, 8713 and 8730 Logic Modules, and 8771 and 8772 Modular Control Units | 8905A-6501 |  |
| | 8-pin panel mount socket for Catalog Number 8530, 8572, 8573 and 8586 Output Devices | 8907A-6501 |  |

 Stocked product, typical order quantities guaranteed in stock.

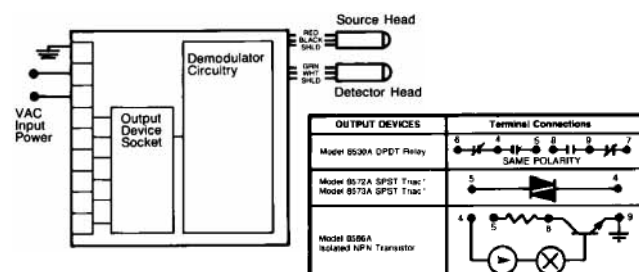
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Wiring Diagrams — Self-Contained Control Units

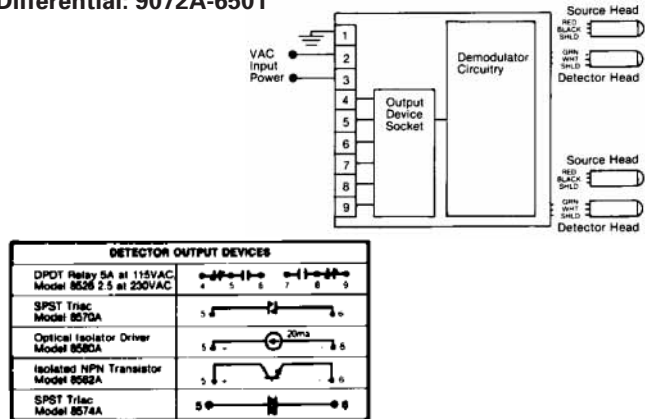
Standard: 8170A-6501, -6502, -6504 and -6505



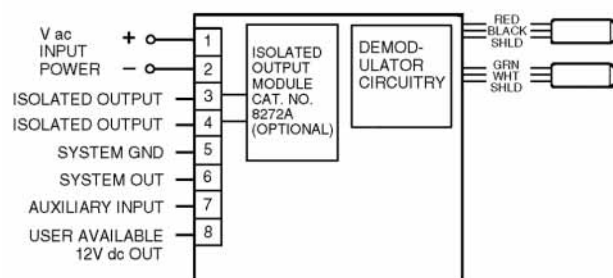
High Power: 8171B-6501 and -6502



Differential: 9072A-6501

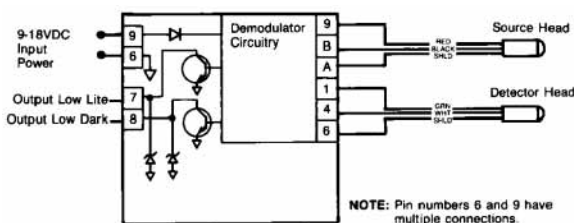


Analog: 8172A-6501 and -6502

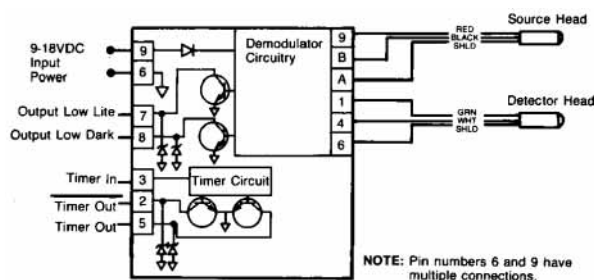


Wiring Diagrams — Modular Control Units

Standard: 8771A-6501

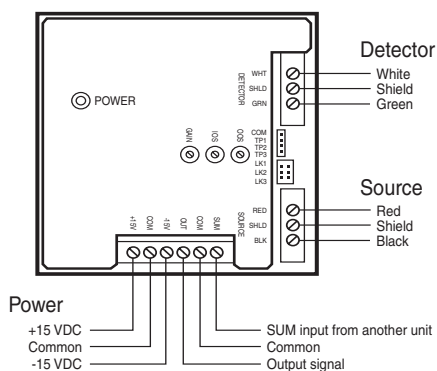


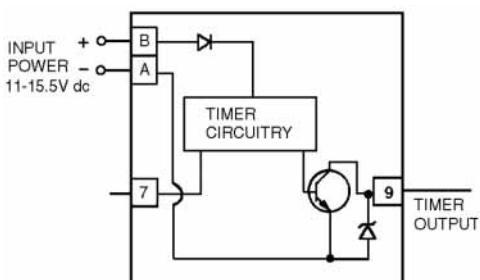
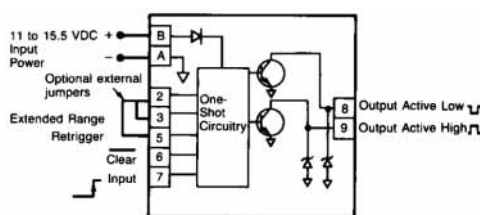
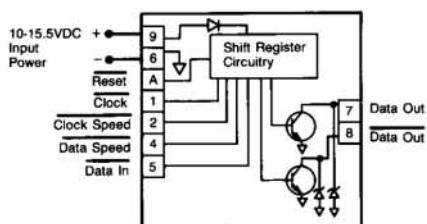
Enhanced with Time Delay or One-Shot: 8772A-6501



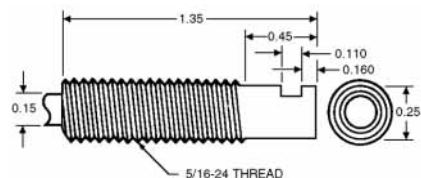
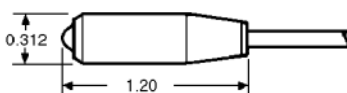
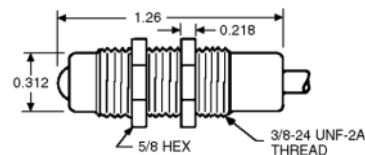
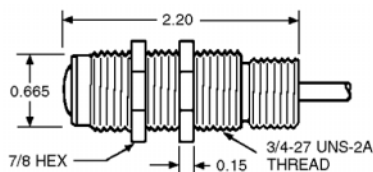
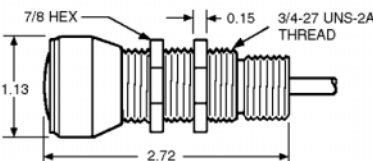
Wiring Diagram — DIN Rain Mount Analog Control Unit

8173A-6507



Wiring Diagrams — Logic Modules
Time Delay: 8712A-6501

One-Shot: 8713A-6501

Shift Register: 8730A-6501


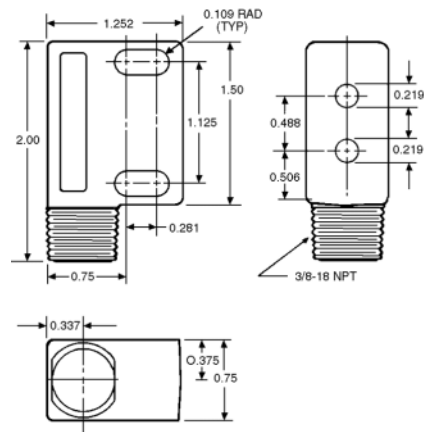
When connecting to relay contacts for clock and data signals, clock and data inputs have 15 mS of debounce filtering. Clock speed and data speed bypass the debounce filter but a jumper from clock speed to clock is required if a pull-up resistor is desired. The same applies to data speed and data inputs.

Approximate Dimensions in Inches — Thru-Beam Sensor Heads
Right-Angle Viewing: 1179A-6501 and 1279A-6501

Forward Viewing: 1170A-300 and 1270A-300

Forward Viewing: 1173A-300 and 1273A-300

Forward Viewing: 1173A-100 and 1273A-100

Forward Viewing: 1173A-200 and 1273A-200


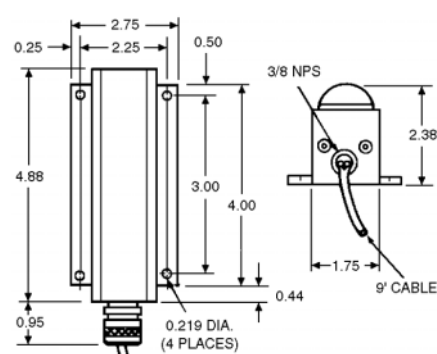
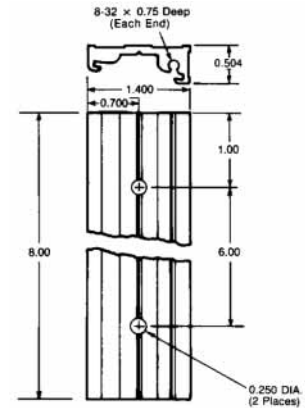
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Approximate Dimensions in Inches — Reflex Sensor Heads

Standard: 1370A-6501

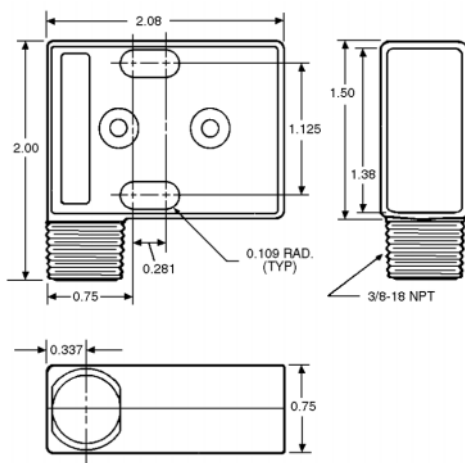


Curtain-of-Light: 1471A-6501

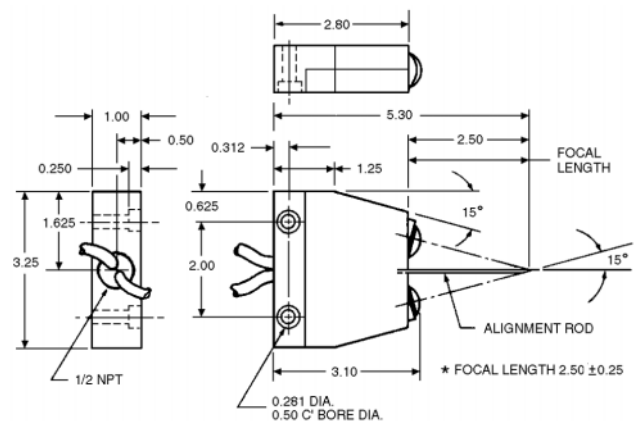
For Retroreflector
Curtain-of-Light: 6210-6501

Approximate Dimensions in Inches — Diffuse Reflective Sensor Heads

Standard: 1470A-6501

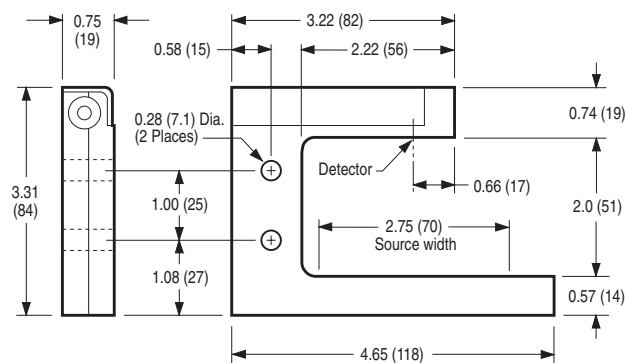


Fixed Focus: 9082A-6501



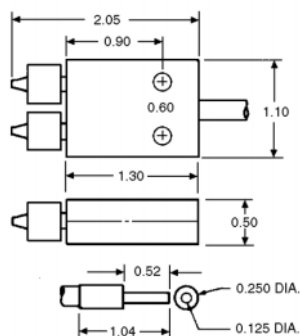
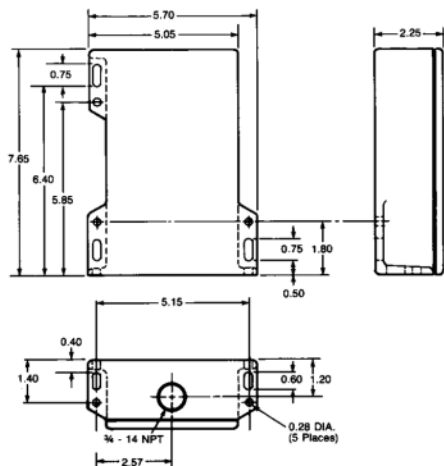
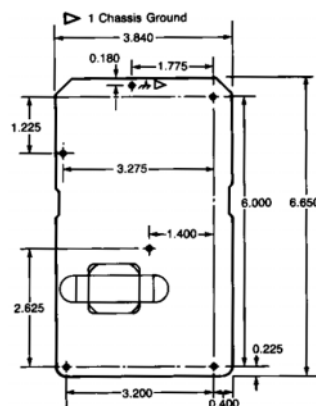
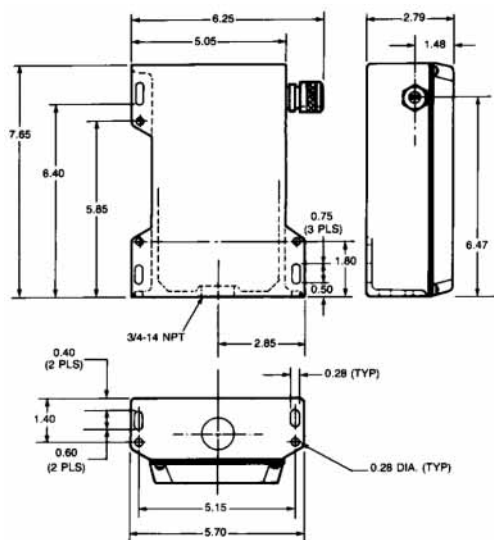
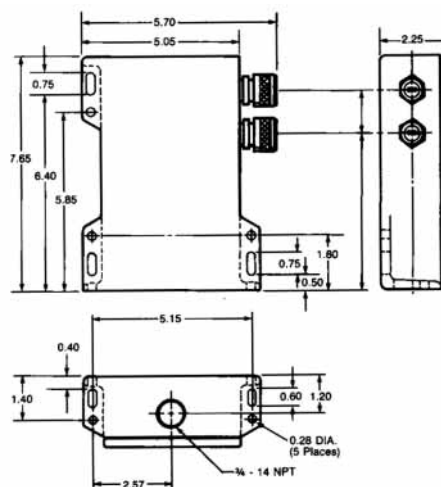
Approximate Dimensions in Inches (mm) — Slot Sensor Heads

1372A-6501

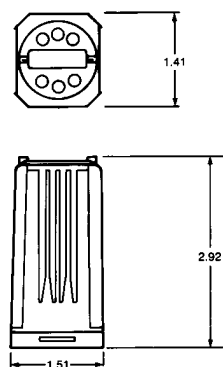
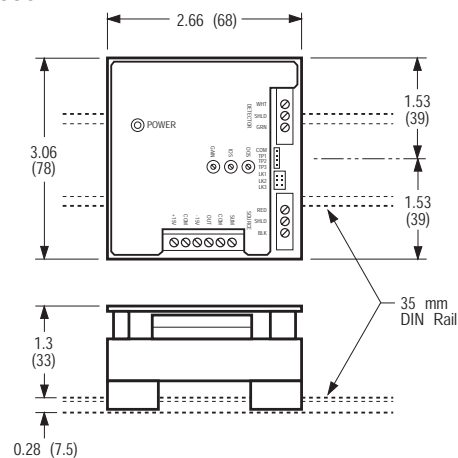
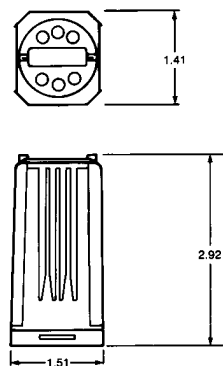


Approximate Dimensions in Inches (mm) Except Where Noted — Fiber Optic Sensor Heads
Glass Fiber Optic: 1571A-6501 and 6276A-6501

NOTE: Dimensions in Inches


Approximate Dimensions Shown in Inches — Self-Contained Control Units
Standard: 8170A-6501 and -6502

Standard without Enclosure: 8170A-6504 and -6505

**High Power and Analog: 8171B-6501 and -6502;
8172A-6501 and -6502**

Differential: 9072A-6501


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**Approximate Dimensions in Inches —
Modular Control Units****8771A-6501 and 8772A-6501****Approximate Dimensions in Inches (mm) Except Where Noted —
DIN Rail Mount Analog Control Unit****8173A-6507****Approximate Dimensions in Inches — Logic Modules****8712A-6501, 8713A-6501 and 8730A-6501**

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