

Section B
Edge Guide Sensor – Model EG-30A
Operators Manual

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B.1 Introduction

The Model EG-30A is a non-contact, electro-optical sensor for the detection of an edge position. The primary Model EG-30A Series application is for edge guiding of a process line, though with a strip with little side-to-side deflection the Model EG-30A could be used for center guide applications. The Model EG-30A is compatible with the following SCAN-A-LINE processing units: Model GPU Level 1 – Section R, Model PCPU Level 1 – Section P and Model TCPU Level 1 – Section Q.

B.1.a Model EG-30A Overview

The Model EG-30A analog output easily integrates into a Harris Instrument Corporation controller, a Programmable Logic Controller (PLC) system or a third party process controller. The SCAN-A-LINE™ Control Processing Units (Models TCPU Level 1 & Model PCPU Level 1) are designed to utilize the Model EG-30A sensors for single edge guide or centerguide applications. If the sensor output is routed to a PLC or third party control processor, a General Processing Unit (Model GPU Level 1) will be necessary to power the Model EG-30A sensors unless the third party process controller can supply the sensor power (See Section B.3.a for Model EG-30A power requirements).

The Model EG-30A sensor consists of an emitter with 7 linear foot [2.13m] 7-pin cable, a receiver with 7 linear foot [2.13m] 6-pin cable and an junction box with a 20 linear foot [6.1m] 6-pin cable {Figure B.1-1}. A junction box cable with up to 50 foot [15.2m] linear cable length is optionally available.

B.1.b Functional Description

The Model EG-30A Series emitter contains a scanned array of Light Emitting Diodes (LEDs) that light sequentially with an update rate of 660 samples per second. The receiver light detector is a silicon photocell. All of the light focused by the receiver lens onto the photocell generates an electrical current. The light coming from the emitter pulses at 20kHz, so the current generated in the receiver also pulses at 20kHz. This assists in preventing ambient light from interfering with the Model EG-30A.

When the Model EG-30A receiver is positioned to “see” all of the diodes in the emitter, the absence of light at the instant in time when a diode is being lit indicates that an object is blocking the light path at that diode. It is important to note that the position directly relates to the time in the scan cycle of the emitter array. Because the light from each diode is emitted in the form of an expanded cone of light rather than a beam, it is possible to detect the attenuation of light from a particular diode by an object long before the object completely blocks the light. By using sample and average techniques in the processing unit, the position of an object with respect to the array can be determined to a resolution ten to twenty times smaller than the spacing between the diodes in the array.

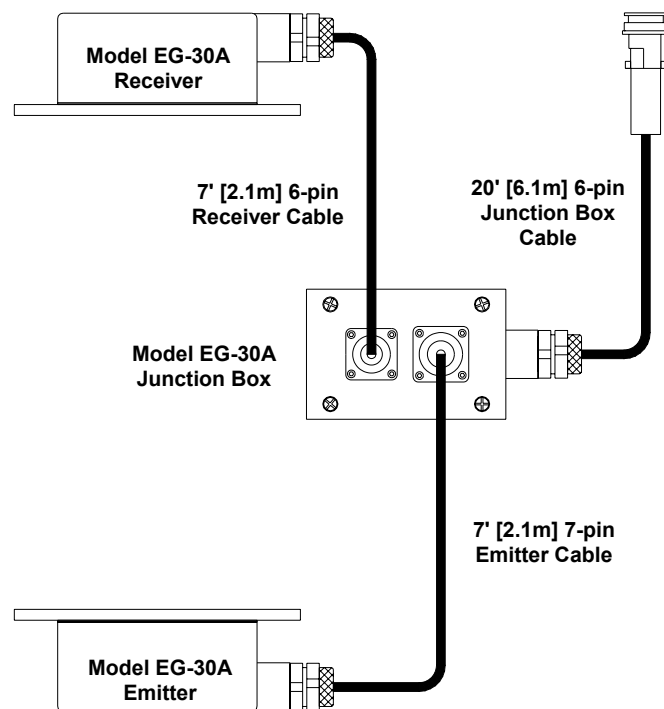


Figure B.1-1: Model EG-30A Components

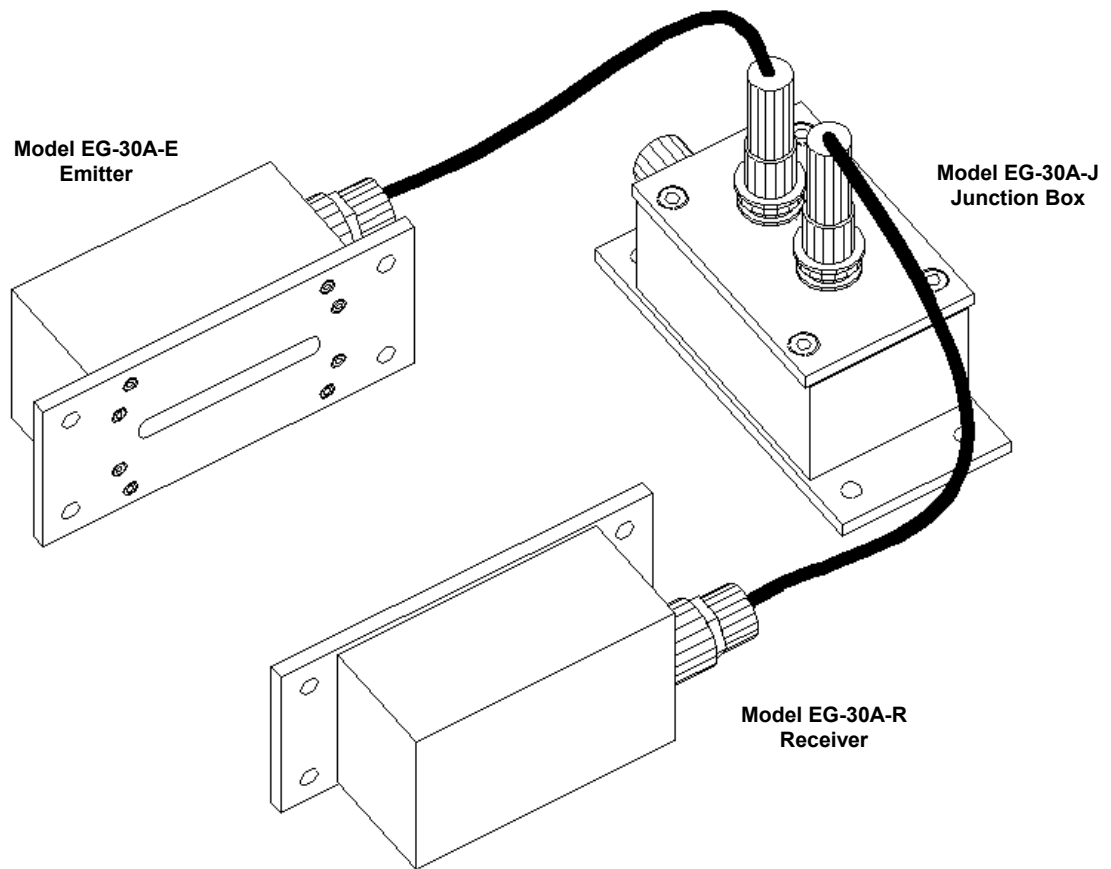


Figure B.1-2: Model EG-30A Sensor System

B.2 Operational Considerations

The Model EG-30A is highly resistant to most of the industrial environments that can cause problems with edge sensing equipment. The operating temperature for the Model EG-30A is 32°F to 122°F [0°C to 50°C]. Operations outside this range are possible with special provisions made to protect the equipment, such as heat shields and water jackets.

A reasonably uniform buildup of dust, dirt or oil will not affect the operation or accuracy of a SCAN-A-LINE™ sensor. Dust, dirt and oil build-up can attenuate the sensor signal by over 90% before any loss of accuracy occurs. Large pieces of material or opaque coatings of paint or heavy grease can completely block the beam or attenuate it below tolerable limits. To avoid erratic readings or maintenance difficulty, care should be taken to install the emitter and receiver where the danger of such contamination is minimized. A simple air wipe installed over the emitter viewing window can be helpful where contamination cannot be avoided.

Since sensing an edge position is a factor of time and not of signal amplitude with SCAN-A-LINE™ sensors, low level vibration is of little or no consequence. In very high vibration applications, simple vibration dampening will solve most vibration problem encountered. Because the Model EG-30A is producing and looking for light modulated at approximately 20kHz, it is unlikely that most ambient light sources will be a problem. It is best to avoid placing a direct light source in the receiver view path. A bright light source can overload the receiver photocell and prevent it from detecting the emitter light. When special conditions require them, special filters can be provided to reduce the problem. Special filters are also required when measuring incandescent, hot worked metals to remove the infrared spectrum energy.

Even though the Model EG-30A sensor is tolerant of most ambient light situations, high-intensity strobe lights can also cause receiver photocell overload, producing false edge detection's. Because of the high frequency pulsing of strobe lights, the receiver can interpret the strobe pulses as an extra edge.

NOTE:

Care should be taken when installing the Model EG-30A sensor to locate the sensor as far as possible from any strobe light(s) or other reciprocating light sources.

Common sense considerations for protection and maintenance of the Model EG-30A sensor will ensure it's operation for years to come. If any welding is to be performed near the Model EG-30A sensor, COVER THE VIEWING WINDOWS with a protective material (i.e. metal plate, wood sheet, etc.) to prevent the welding flash from coming in contact with the glass in the window. Such welding flash is hot enough to melt the glass, causing pitting of the window that can show up as deviant edge readings in the sensor. Also, if welding is performed anywhere on the process line where the Model EG-30A is installed, DISCONNECT ALL CABLES from the Model EG-30A. This prevents a system overload from the high current generated by the welding.

In installations where strip collisions are frequent, the *ULTRA-TOUGH™* option (UT Option) provides excellent protection with heavy duty enclosures.

B.3 Specifications for the Model EG-30A

The emitter and receiver electronics for the Model EG-30A are housed in cast aluminum FS-style deep device boxes with ½ inch [12.7mm] aluminum cord connectors. The interconnect junction box is housed in a cast aluminum shallow device box with ½ inch [12.7mm] aluminum cord connectors. All housings are painted with corrosive resistant polane paint. All interconnect cables are Belden 8777 or equivalent with MS-style circular connectors.

B.3.a Power Requirements

The Model EG-30A requires plus +12VDC at 250mA and -12VDC at 50mA operating power. Power can be supplied by a SCAN-A-LINE™ controller (Model TCPU Level One or PCPU Level One), a General Processing – Model GPU or by a third party process controller. When the Model EG-30A is to be used with a third party process controller, it is necessary to ensure that the voltage regulators are adequate in the controller. The tolerance for power on the Model EG-30A is twenty percent, but the voltage MUST BE STABLE. Any drift in either the plus or minus voltage supply will be reflected in the output signal of the Model EG-30A sensor.

A good system earth ground can be helpful in reducing the possibility of interference from other electrical equipment. Care should be taken to ensure that the SCAN-A-LINE™ earth ground is separate from the grounds used by other systems. This is most important when high current (i.e. welding equipment) and high voltage (i.e. DC/AC drives) is involved.

B.3.b Signal Output

Sensor output for the Model EG-30A is 0VDC to 10VDC at 10mA maximum analog current with a 5VDC analog as the centerpoint. If there is no material in the sensor view path, there will be a zero volt analog output. A fully blocked path will result in a ten volt analog output.

NOTE:

Signal COMMON for this analog output is +5VDC. DO NOT CONNECT THIS COMMON SIGNAL TO EARTH GROUND as it will damage the processing unit.

B.3.c Sensor Specification

The Model EG-30A sensor has a repeatability of 0.02 inches [0.51mm] over a 2.8 inch [71.1mm] sensing range at a twenty-inch [50.8cm] emitter-to-receiver separation and a three inch [7.62cm] product passline under optimum conditions.

B.3.d Physical Dimensions

The Model EG-30A emitter and receiver measure 7.4 inches [188mm] long by 3 inches [76mm] wide by 2.4 inches [61mm] tall. Each one integrates a mounting plate into the faceplate of the emitter and receiver. The Model EG-30A junction box is mounted separately from the sensor and measures 6.3 inches [160mm] long by 3 inches [76mm] wide by 2.845 inches [72mm] tall.

The Model EG-30A emitter and receiver are also available in the *ULTRA-TOUGH™* enclosure (Model EG-30A-UT). The *ULTRA-TOUGH™* emitter and receiver measure 8 inches [203mm] long by 4 inches [102mm] wide by 4.6 inches [117mm] tall {Figure B.3-3}. Included with the *ULTRA-TOUGH™* Model EG-30A are a 7 foot [2.13m] emitter cable, a 7 foot [2.13m] receiver cable, and an interconnect junction box and 20 foot [6.1m] cable. See the 1200000 series drawings in Section R.7 for more drawings showing sensor dimensions.

B.3.e Optional Configurations

The Model EG-30A is available in several optional configurations to meet a variety of application requirements. The emitter and the receiver may be housed in the standard aluminum housings or in the *ULTRA-TOUGH™* enclosures. The various configurations may be specified as follows:

Model Number & Suffix	Description
EG-30A	<i>Designates the standard sensor, with emitter, receiver and junction box connected by standard cabling. The emitter and receiver are housed in the standard aluminum enclosures with borosilicate glass viewing windows sealed with RTV-108 sealant, neoprene gaskets and polane painted exterior surfaces.</i>
CR	<i>Indicates that the emitter and receiver are built with Teflon sealant compound gasketing, stainless steel screws and sealed connectors. The borosilicate viewing window is sealed with epoxy. Only available with the ULTRA-TOUGH™ option.</i>
IF	<i>Indicates the receiver is built with special filters to eliminate ambient or infrared light interference.</i>
IR	<i>Indicates the emitter is configured with infrared LEDs for operation with light sensitive materials or for use in hazy or smoky environments.</i>
LRR	<i>Indicates the sensor is fitted with special lenses for operational emitter-to-receiver separation up to eight feet [2.44m].</i>
E	<i>Designates the unit is a Model EG-30A emitter</i>
R	<i>Designates the unit is a Model EG-30A receiver</i>
UT	<i>Indicates the emitter and receiver are housed in the ULTRA-TOUGH™ enclosures instead of the standard housings. Enclosures are cast aluminum with a thick extruded aluminum bezel and heavy-duty borosilicate viewing window sealed with RTV-108.</i>

Table B.1-1: Optional Configurations of the Model EG-30A

B.4 Installation

The Model EG-30A emitter face is mounted parallel to the receiver face. The wedge of light from the emitter should be perpendicular to the receiver mounting plate. The wedge of light is approximately 30° wide. The receiver lens system has a more narrow angle (10°) and may require mounting adjustment. More emitter-to-receiver separation creates a greater requirement for proper aim adjustment of the sensor {Figure B.4-1}.

Product passline spacing for the Model EG-30A is 1 inch [25.4mm] minimum up to one-half the emitter-to-receiver separation with a maximum of 30 inches [762mm] (or 4 feet [1.22m] with special lenses). Spacing the product passline closer than 1 inch [25.4mm] will degrade the 0.01 inch [0.25mm] resolution. Operation of the passline closer to the receiver than half the emitter-to-receiver separation will result in a serious loss of overall operating range.

Emitter-to-receiver separation for the Model EG-30A is anywhere from 10 inches [25.4mm] to 5 feet [1.5m] {Figure B.4-2}. Special lenses may be optionally provided for the Model EG-30A (Model EG-30A-LR) to increase the separation up to 8 feet [2.44m].

The maximum sensing range for the Model EG-30A is 2.8 inches [71.1mm]. However, operational considerations such as product passline variation can lessen that range. For example, an Model EG-30A as depicted in Figure B.4-2 will have an effective range of approximately 2.1 inches [53.3mm]. The Model EG-30A sensor should be placed on the line where the edge position is relatively stable to prevent loss of range from excessive passline variation.

Be sure to mount the Model EG-30A in a position where the edge of the strip to be detected is located at the optimal mid-point of the Model EG-30A emitter. This ensures that the sensor is able to detect the edge over its entire detection range when the strip deviates from one side to the other.

When installing the Model EG-30A sensor, some common sense procedures to protect the sensor from any line collision should be taken. Damage to sensors from line collisions is the primary cause of SCAN-A-LINE™ sensor failures. Install the sensor in a position on the line where it is protected from strip collisions. Many times, a simple deflection bar mounted above the sensor components will prevent such collisions. Once properly installed and protected, the Model EG-30A will provide a lifetime of reliable operation. In cases where strip collisions are unavoidable, the *ULTRA-TOUGH™* enclosures will help prevent sensor damage due to material collision.

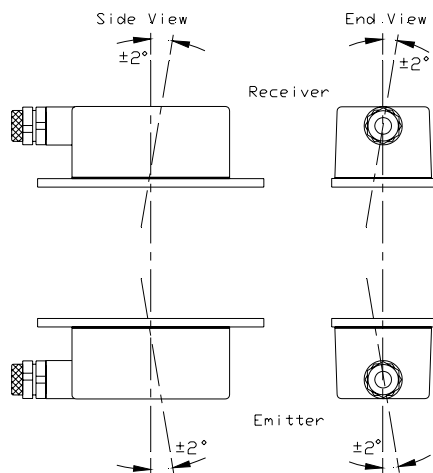


Figure B.4-1: Model EG-30 Alignment

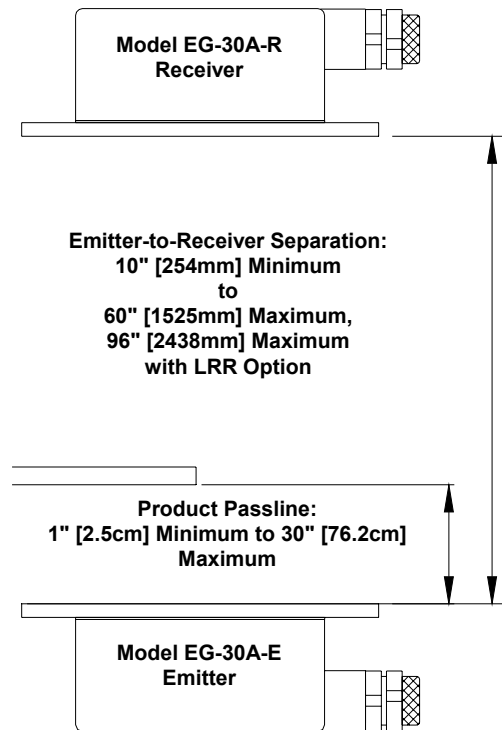


Figure B.4-2: Model EG-30A Separation

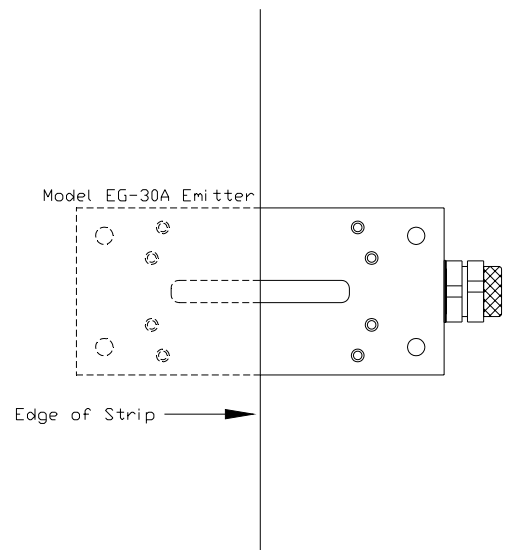


Figure B.4-3: Strip Position over Emitter

B.4.a Cable Connections

Single-sensor Model EG-30A systems connect to the top-right bulkhead on the bottom panel of the processing unit. Note that the cable connectors are keyed for one position. Dual-sensor systems connect one sensor (Sensor A) to the top-right bulkhead and the second sensor (Sensor B) to the bottom-right bulkhead {Figure B.4-4}.

- 1) Connect the emitter-to-junction box cable with the male 7-pin MS-style circular connector to the junction box 7-pin MS-style circular bulkhead and tighten securely.
- 2) Connect the receiver-to-junction box cable with the 6-pin MS-style circular connector to the junction box 6-pin MS-style circular bulkhead and tighten securely.
- 3) Connect the junction box-to-processing unit cable with the 6-pin MS-style circular connector to the processing unit upper-right 6-pin MS-style circular bulkhead and tighten.
- 4) For a dual-sensor application, perform step one through 3 for Sensor A. Repeat the procedure for Sensor B, except connect the male 6-pin MS-style circular connector end of Sensor B junction box-to-processing unit cable to the lower-right 6-pin female MS-style circular bulkhead on the bottom panel of the processing unit and tighten securely.

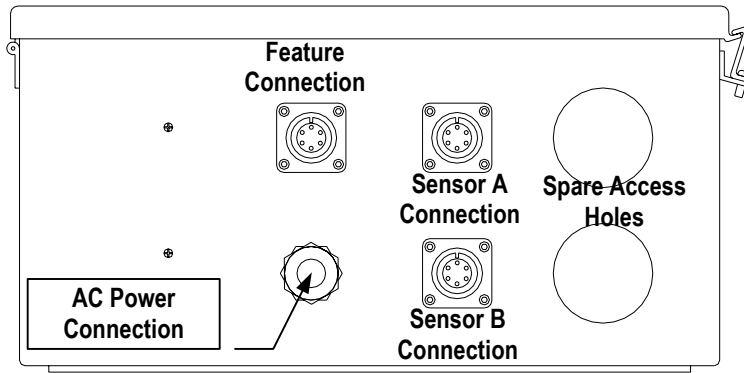


Figure B.4-4: Emitter Connections to Processing Unit

B.4.b Previous Version Compatibility

The Model EG-30A is an update of the Model EG-30, with new electronics and an improved sensor housing. The Model EG-30A mounting hole pattern is identical to the Model EG-30, though the overall emitter (and receiver) height is approximately two inches [50.8mm] shorter.

Included with the Model EG-30A is a set of four standoffs (not included with the *ULTRA-TOUGH™* option). These are supplied to allow the Model EG-30A to be retrofitted into existing Model EG-30 installations {Figure B.4-5}. All other aspects of the Model EG-30A (connectors, signal output, etc.) are the same as for the Model EG-30.

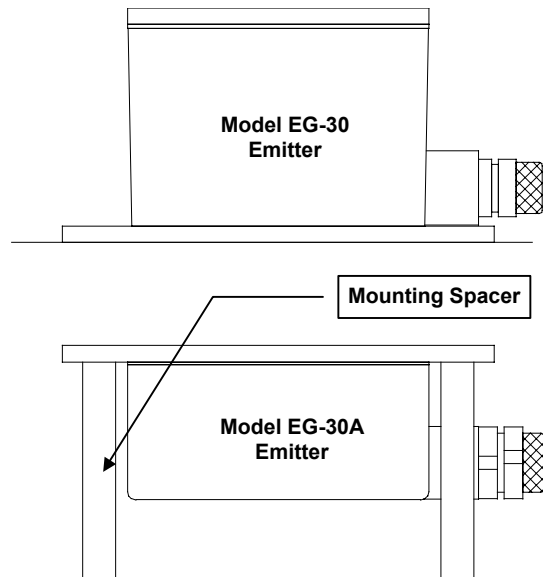


Figure B.4-5: Model EG-30A (bottom) Retrofitted into Model EG-30 Mounting (top)

B.5 General Maintenance

All SCAN-A-LINE™ sensors are highly reliable and tolerant to most industrial environments. Maintenance of the Model EG-30A after installation is extremely limited. Since there are no moving parts, there is nothing to lubricate.

NOTE:

If any form of maintenance is performed near the Model EG-30A sensor, be sure to cover the sensors view windows to protect the glass from hot flash or falling objects.

The only typical maintenance for the Model EG-30A sensor is:

- 1) Check all cable connections. All connections should be snug.
- 2) Clean the viewing window. Even though the Model EG-30A can operate with an almost 90% attenuation of the light source, cleaning the window will ensure constant and reliable edge detection's.
- 3) Check all mounting fixtures. Tighten if necessary. In high vibration environments, mounting plates can vibrate loose, which changes the emitter to receiver alignment. If vibration is causing problems, simple vibration dampening can solve most interference.

B.6 Trouble Shooting

The following procedures are designed to isolate problems that may occur in systems that are installed and have been operating properly. For installation problems, see the installation portion of this manual, or contact your SCAN-A-LINE™ representative.

- 1) Begin with a thorough visual inspection of the system under test. Before testing for circuit malfunctions, ensure the power switch is on and that power is supplied to the system.
- 2) Verify that the emitter and receiver lenses are unbroken, reasonably clean and free of foreign material. Cracked lenses, excessive dirt and foreign material on the lens can cause the system to perform incorrect detection's.
- 3) Examine all cables for cuts, nicks or crimps that could cause open or short circuits. Ensure that all connectors are secure and free of foreign material.

Further trouble shooting of the sensors is only possible with the sensor connected to the processing unit (Model GPU – Section R, Model PCPU – Section P and Model TCPU – Section Q). All diagnostics for the sensor relies upon the diagnostic circuitry in the processing unit. See the processing unit Operators Manual for more information.

B.7 Related Drawings

The following pages contain various drawings of components used in the Model EG-30A. They are for reference only. All mechanical drawings are available as AutoCAD® .DWG files for a minimal charge. Please contact Harris Instrument Corporation Sales.

Drawing #	Description	Drawing Format
<i>1295011 Rev. B Pg. 2</i>	<i>Model EG-30A ULTRA-TOUGH™ Receiver Dimensions</i>	<i>AutoCAD LT Rel. 3</i>
<i>1295028 Rev. A</i>	<i>Model EG-30A ULTRA-TOUGH™ Emitter Dimensions</i>	<i>AutoCAD LT Rel. 3</i>
<i>1295086</i>	<i>Model EG-30A Emitter Dimensions</i>	<i>AutoCAD LT Rel. 3</i>
<i>1295087</i>	<i>Model EG-30A Receiver Dimensions</i>	<i>AutoCAD LT Rel. 3</i>
<i>1295106</i>	<i>Model EG-30A Junction Box Dimensions</i>	<i>AutoCAD LT Rel. 3</i>
<i>3493014 Rev. A</i>	<i>Model EG-30A Composite Wiring Diagram</i>	<i>AutoCAD LT Rel. 3</i>
<i>3495169</i>	<i>Model EG-30A Receiver Cable Diagram</i>	<i>AutoCAD LT Rel. 3</i>
<i>3495170</i>	<i>Model EG-30A Junction Box Cable Diagram</i>	<i>AutoCAD LT Rel. 3</i>
<i>3495171</i>	<i>Model EG-30A Emitter Cable Diagram</i>	<i>AutoCAD LT Rel. 3</i>
<i>Table B.7-1: Drawing Information</i>		