



# FAQ

## UL 325-2016 Standard for Safety Frequently Asked Questions

Transition to UL 325-2016 - effective for gate operators  
manufactured after January 11, 2016

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## Frequently asked questions about UL 325-2016, which requires external monitored entrapment protection sensors - effective for gate operators manufactured after January 11, 2016

### **Q1** What UL 325 changes become mandatory on January 12, 2016?

**A:** Not much and a lot. The primary change now **mandates** that all external sensors intended to protect against entrapment must be monitored for presence and correct operation at least once per gate cycle. Since 2000, UL 325 required that gate operators have two independent means of entrapment protection, which serve to protect the open and close directions of gate travel. However, there is a broad exception to monitored entrapment protection for barrier arm gates where the arm does not move within close proximity to a rigid object. For most gate operators, one of the two required means of protection is the Inherent Sensor (Type A) within the gate operator and the second means of entrapment protection is typically the external sensor(s) that are installed at the time of system installation. Any external entrapment protection sensor that protects against entrapment in the open and/or close directions of gate travel must be monitored by the gate operator for presence and correct operation. A constant hold input will be required if an entrapment protection sensor is not installed or has failed. The constant hold input, such as from a three-button station, ensures that the person pushing the button is monitoring the entrapment zones.

### **Q2** How many external entrapment protection sensors (as a combination of photo eyes and edge sensors) are required in a typical automated gate installation?

**A:** That depends on the number of entrapment zones that must be protected. Most of the time, a minimum of two external entrapment protection sensors will be required. Typically, this will be one sensor to protect against entrapment in the open direction of gate travel and one sensor for the closed direction of gate travel. If you use edge sensors on a swing gate, HySecurity recommends use of a wraparound edge sensor which serves to protect in both directions of travel. Some sliding gate configurations may allow installation of one long-range photo eye to protect the entire travel area of a slide gate. UL 325 sets a minimum standard that both directions of slide gate travel must be protected with external sensors, however the installer must assess each specific site and install sensors that protect all potential entrapment zones.

### **Q3** What choices did manufacturers have in order to comply with the UL 325 mandate for monitored sensors? Did it require significant changes to their operators?

**A:** Manufacturers had a choice of three different routes to monitor external sensors for presence and proper operation.

- a. Connecting sensors to gate operators with a NC (Normally Closed) circuit.
- b. Detecting a frequency or pulse generated by the sensor (2 or 4 wire).
- c. Detecting a resistor, typically 10k ohm which allows a small current to bleed through the circuit.

Each of these methods has advantages and disadvantages. HySecurity selected the NC, Normally Closed solution to monitor external sensors because it allowed use of the existing Smart Touch and Smart DC control boards with no hardware changes whatsoever and minimal software adaptations, thus allowing the use of the same boards that our customers have become familiar with over many years. More details at the end of this FAQ.

## Q4 How many monitored external sensors can I connect to a HySecurity gate operator?

**A:** All HySecurity control boards have three function programmable external entrapment sensor inputs. The inputs are marked Sensor 1, Sensor 2 and Sensor 3. **Only one sensor can be connected to each input**, so a maximum of three external sensors can be used. If you need to have more external sensors, an adapter made by Miller Edge named The Solution (part number MIM-62) can be added. The Solution module has six inputs and two outputs, which would be wired to HySecurity's Sensor 1 and Sensor 2 inputs. Together with the still available Sensor 3 input, the maximum number of external sensors that can be connected is seven.



## Q5 Since an edge sensor is a normally open (NO) contact, how is it possible to monitor this?

**A1:** Miller Edge has modified their edge sensors to add a 10k ohm resistor across the end of the edge opposite the wire connection. This resistor allows a small current to pass through the edge which is how the edge will be monitored. This change also means that old edge sensors without the 10k resistor cannot be monitored, therefore you must be certain to buy edge sensors with a 10k resistor. Miller Edge will mark all edges of a 10k resistor with a blue band of tape on the wire near the edge.

**A2:** For wired edges, you will also need to add an interface module - Miller Edge part number GEM-104. Each edge sensor must have a 10k ohm resistor and be connected to a GEM-104 module, which monitors the 10k Ohm resistor in the edge sensor and outputs a normally closed (NC) contact. The GEM module output will be connected to one of the three Sensor inputs on HySecurity's control board (either Smart Touch or Smart DC controller).

**A3:** If the edge sensor is to be transmitted to the gate operator, you won't need the GEM-104 module, but instead a Wireless Link Kit will be required. Either the Miller Edge Rband RB-G-K10 Wireless Link Kit, or the iGAZE RE Kit are recommended. If you plan to transmit two edge sensors, such as the leading end and trailing end of a slide gate, you'll need an additional transmitter. Only one receiver is needed because the receiver has two input/output channels. Each channel can monitor up to 3 transmitters.

## Q6 Can the warn-before-operate audio alert be used as one of the UL 325 Entrapment Protection devices?

**A:** No. A warn-before-operate audio alert is no longer designated by UL 325 as an acceptable Entrapment Protection device. However, per UL 325, an alarm signal is still required upon two sequential activations of an entrapment protection device (see UL 325 Standard for Safety 31.1.2 for more information). Most HySecurity operators are built with a programmable warn-before-operate audio alert and we strongly recommend its use as an additional warning against potential entrapment.

## Q7 Can the vehicle loop be used as one of the UL 325 Entrapment Protection devices?

**A:** No. A vehicle "Safety" loop is not an entrapment protection device.

## Q8 Can I use the new blue-taped Miller edges with a 10k ohm resistor on 2015 and older gate operators without a monitoring circuit?

**A:** No. For 2015 and older gate operators, you must be certain to add the GEM-104 module as an interface or buy edge sensors without the 10k ohm resistor. Directly connecting an edge sensor, with a 10k ohm resistor, to HySecurity's controller is likely to falsely trigger the Edge sensor input.

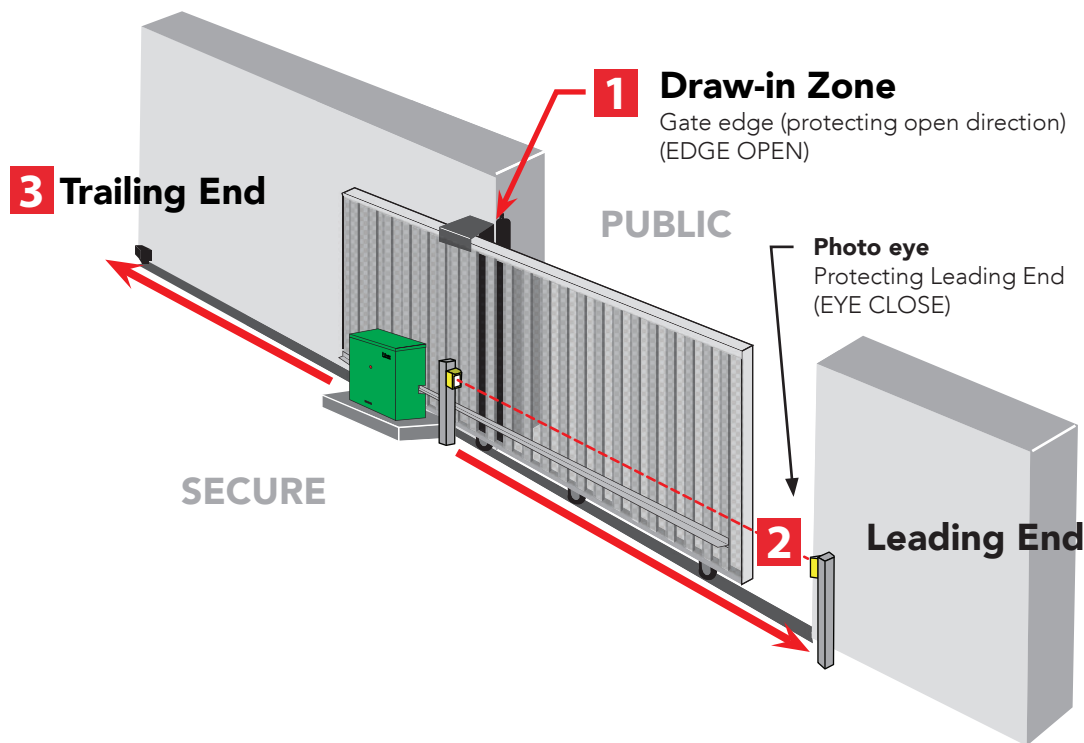
If an installer uses blue-taped 10k resistor Miller Edges on pre-2016 HySecurity gate operators, the installer must connect the Edge to a GEM-104 module and set the HySecurity Installer Menu "GC" GATE EDGE to "1," (Normally Closed).

Note: In pre-2016 gate operators, the GATE EDGE menu defaults to N.O. (Normally Open).

**Q9** I normally installed edges sensors on the leading and trailing end of a sliding gate. Isn't that the best way to protect against entrapment?

**A:** Not necessarily. While the leading and trailing ends of a sliding gate are within potential entrapment zones, the risk of entrapment, serious injury or death is significantly greater at the "Draw-In" zones. Common installer practice has been to prioritize installation of edge sensors on both ends of a sliding gate, while not protecting the "Draw-In" zones where the gate travels past a rigid object such as a wall, gate support posts or stationary fences. See slide gate illustration below:

**Most common areas requiring entrapment protection**



**Installers must assess each specific site and install sensors that protect all potential entrapment zones.**

**Q10** What happens if one of the external Entrapment Protection sensors becomes disconnected or fails in a HySecurity Gate Operator?

**A:** The operator will stop cycling in automatic mode. The gate operator monitors the "Presence" and "Correct Operation" of each entrapment protection sensor. When the operator no longer detects a properly functioning sensor, it will cease automatic operation only in the direction of the missing or failed sensor. The operator will still function, but only with a "Constant Hold Input" from an access control device.

**Q11** Does HySecurity recommend any specific type of edge sensors in certain applications?

**A:** Yes, HySecurity recommends Miller Edge Wraparound style edge sensors (MGS or MGR) on the leading end of a swing gate with a 2" frame. HySecurity makes this recommendation because these Wraparound style edge sensors allow one edge sensor to protect in both the open and close directions of swing gate travel. If your swing gate frame cannot fit 2" wraparound edge sensors, you will need to use at least two standard edge sensors.

## Q12 What photo eyes and edge sensors have been tested for use with HySecurity gate operators?

**A:** The following sensors have been shown in testing to provide the best performance when installed with HySecurity operators. HySecurity supports installers who install recommended sensors. Visit [www.hysecurity.com](http://www.hysecurity.com) for wiring diagrams or technical support. "Compatible Sensors" are still certified to meet UL 325 6th edition installation with HySecurity operators. Contact the sensor manufacturer for specific recommendations for use. This list will change as new products come to market and are tested for use with HySecurity gate operators. See current list on HySecurity's website, [www.hysecurity.com/gatesafety](http://www.hysecurity.com/gatesafety).


HySecurity Recommended Sensors				
	Mfg. Part #	Mfg.	Details	Hysecurity Part #
Photo Eyes (Retroreflective)	E3K-R10K4-NR	Omron	40 ft max range limit	MX000999
	NIR-50-325	EMX	45 ft max range limit	MX4257
	IRB-RET	EMX	53 ft max range limit	
	E-936-S45RRGQ	Seco-Larm	40 ft max range limit	
	E-931-S50RRGQ	Seco-Larm	46 ft max range limit	
Photo Eyes (Thru-Beam)	IRB-MON	EMX	65 ft max range limit	MX3990
	E-960-D90GQ	Seco-Larm	90 ft max range limit	
	Prime Guard PG-EM-100 & PG-RX-R	Miller Edge	50 ft max range limit (battery powered emitter)	
Edge Sensors	Sentir Series	ASO Safety	Various lengths and profiles with 10k resistor termination	
	CPT210-2U-#-T2	Miller Edge	10k resistor termination (replace # with length requirement in feet)	
Edge Sensor, Converters (10K to NC Contact)	GEM-104	Miller Edge	Edge converter, use one with each edge	MX3983
	Hy2NC	HySecurity	2-channel edge converter	MX4018
Edge, Wireless Kits	iGAZE RE Kit	Transmitter Solutions	50 ft line of sight max range limit	
	WEL-200 (kit with receiver and transmitter)	EMX	200 ft line of sight max range limit	
Multi-Input Module	The Solution – MIM-62	Miller Edge	6 inputs to 2 outputs	MX3987

Other HySecurity Compatible Sensors				
	Mfg. Part #	Mfg.	Details	HySecurity Part #
Photo Eyes (Retroreflective)	Reflecti-Guard RG-R	Miller Edge	Maximum suggested range = 25 ft	MX3985
	E-931-S33PRGQ	Seco-Larm	Maximum suggested range = 33 ft	
Photo Eyes (Thru-Beam)	Prime Guard PG-EM-50 & PG-RX-R	Miller Edge	Maximum suggested range = 25 ft	
	IRB-325	EMX	Maximum suggested range = 50 ft	
	Spacemaster 3000 Series (3012C w/3012)	Telco	Maximum suggested range = 30 ft	
	Albano IR-55	MMTC	Maximum suggested range = 50 ft	
Edge Sensors	MGR20-2U-#-T2	Miller Edge	10k resistor termination (replace # with length requirement in feet)	MX3981
	MGS20-2U-#-T2			MX3982
	MGO20-2U-#-T2			MX4037
	ME120-2U-#-T2			
Edge, Wireless Kits	Rband RB-G-K10 (kit with receiver and transmitter)	Miller Edge	50 ft line of sight max range limit	

### Q13 Can any UL Recognized or ETL Listed sensor be installed with any UL or ETL Listed gate operator?

**A:** No. In addition to UL component Recognition or an ETL Listing, a sensor must be tested together with the gate operator in order to meet 2016 UL 325 Standard of Safety. According to Underwriter Laboratories:

UL's component recognition service covers the evaluation of components or materials intended for use in a complete product or system. These components are intended only for incorporation into other end-use products that may be eligible for UL's Listing, Classification or Certificate Service.



You must consult your gate operator manual to determine the components that are tested for use with that specific gate operator. All entrapment protection sensors, such as photo eyes and edge sensors, must be tested by UL, ETL or another Independent Test Laboratory. Successfully passing a UL component test allows the component manufacturer to “Mark” the product with a label that looks like one of these:



**UL Recognized**  
This UL logo indicates that the component, in this case an EMX photo eye, was tested by UL and met the UL 325 standard for photo eyes.



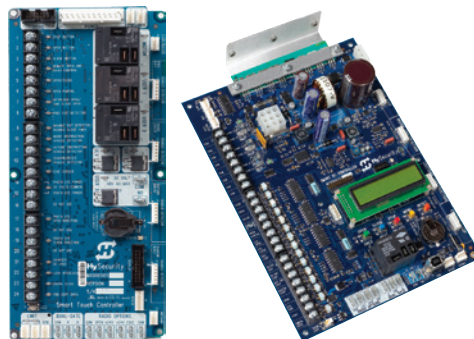
**ETL Listed**  
This circular ETL LOGO with a registration number below indicates that the component, in this case an EMX photo eye, was tested by Intertek and met the UL 325 standard for photo eyes.

However, neither “UL Recognized” nor “ETL Listed” as shown above fully qualifies a component to be used with a gate operator. Each sensor, brand and model, must still pass another test proving compatibility and functionality when connected to a UL 325 Listed or ETL Listed gate operator. All gate operator manufacturer’s installation instructions must list the sensors which are approved for connection to their gate operators.

### Q14 If a 2015 or older HySecurity Smart Touch or Smart DC board requires replacement, do I need to change the installation to comply with the new UL 325 2016 standard?

**A:** No. The requirements of the UL Standard are not retroactive to older operators. HySecurity’s control boards and software manufactured in 2016 and thereafter will be backwards compatible with pre-2016 HySecurity gate operators.

HySecurity Smart Touch & Smart DC Control Boards didn't change. They are backwards compatible with pre-2016 operators.



### Q15 Do gate operators manufactured prior to January 12, 2016 require Monitored Entrapment Protection Sensors?

**A:** No. Monitoring of external entrapment protection sensors is only **required** when the automatic gate operator is manufactured after January 11, 2016. However, it has always been the installers’ and end users’ responsibility to ensure that sufficient external entrapment protection sensors are installed to protect all entrapment zones, even if that demands more than the minimum UL 325 requirement.

## **Q16** Will I have to update previous installs or gate operators manufactured prior to 2016 to meet the requirements for Monitored Entrapment Protection Sensors?

**A:** No. Monitoring of external entrapment protection sensors is only required when the gate operator is manufactured on or after January 12, 2016.

## **Q17** Can I update an older HySecurity operator to meet the new 2016 UL 325 standard?

**A:** Yes, Very easily. Just upload new software version h4.50 (Smart Touch) or h5.50 (Smart DC) or later and add the necessary entrapment protection sensors that have been tested and approved by HySecurity.

## **Q18** What UL 325 inspired changes may impact my external sensor choices?

**A:** The UL 325 requirement for monitoring external sensors means that a monitored wireless transmitter/receiver will be required for any edge sensor that is not directly wired into the gate operator. Many installers have in the past used a simple edge transmitter with a standard receiver for wireless edge sensors, but the older edge transmitter/receiver cannot be monitored, so new monitored wireless transmitter/receiver hardware will be required. This is because ALL external entrapment protection sensors MUST now be monitored by the gate operator. The expense and complexity of a monitored wireless transmitter/receiver may mean that some installers decide to change their installation practices and choose locations for edge sensors that can be wired directly into the gate operator. Some installers may develop a preference to use photo eyes as entrapment protection sensors, because a photo eye may be easier to install and monitor than an edge sensor and because a photo eye offers non-contact protection.

## **Q19** In the past, I've had issues with photo eyes, especially reflective photo eyes that have falsely held a gate open. Is there something that I can do to assure of reliable photo eye performance?

**A:** Yes. Not all photo eyes are created equal. Be very careful about trusting the published photo eye maximum range. Manufacturers frequently do not tell the whole story when publishing the maximum range of their photo eyes. This is especially true for reflective style photo eyes. A photo eye must have significant "excess gain" to ensure reliability in outdoor applications, because fog, ice, snow and dirty optical surfaces all occur normally in outdoor environments. Unfortunately, most photo eye manufacturers do not publish their "excess gain" charts. They generally publish only a theoretical maximum range, which may suffice for indoor use. Be conservative when using photo eyes with longer gates. As a quick rule, limit the distance that you use a photo eye in an outdoor application to a maximum, of 75% of manufacturers' published range. Some photo eyes only reliably operate at 50% of their published range. If your gate location is subject to occasional heavy fog, we recommend you limit the distance spanned by a photo eye to 50% of its published range. The photo eyes approved for use with HySecurity Gate Operators are shown in the table above with our conservative ranges, based on the manufacturers' specifications.

## **Q20** If I download a software update from HySecurity into a pre-2016 gate operator, won't that force me to update to comply with UL 325 – 2016 and add monitored entrapment protection sensors?

**A:** No. HySecurity has added a special configuration menu into our software that will appear when loading our new software into a pre-2016 operator. This new menu will prompt the installer to enter the Build Year [BY x] and a by entering a setting of [BY 1] all future software will function the same as if it was a pre-2016 operator. If you wanted to update the operator, set the Build Year to [BY 2] and the operator will be configured as a post 2016 operator - it's that simple!. Of course, you will also have to add the required number of approved external entrapment protection sensors, which will be monitored.

## **Q21 Why did HySecurity choose the Normally Closed (NC) method to monitor external entrapment protection sensors?**

**A:** There were many good reasons that HySecurity choose Normally Closed (NC) monitoring.

1. This design allowed use of the existing Smart Touch and Smart DC control boards with no hardware changes whatsoever and minimal software adaptations.
2. Normally Closed (NC) monitoring allows the broadest selection of external sensors. Expect our list of authorized sensors to expand over time.
3. Since our Smart control boards cycle device power as part of the Normally Closed (NC) monitoring, they also turn off all power to the external sensors when the operator is not moving the gate. This energy savings is very important for all DC operators with UPS (battery backup) and extremely important for solar gate operators.
4. Normally Closed (NC) monitoring is safe and true monitoring because it fully tests the entire circuit and function of the device. We note that a for those using resistance monitoring that a 10k ohm resistor at the termination of a photo eye may not be able to detect any internal problems with the photo eye and may not detect a fault when the power to the photo eye has been disconnected.

**Visit [www.hysecurity.com/gatesafety](http://www.hysecurity.com/gatesafety) for more information**



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