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<th>Revision date</th>
<th>Section</th>
<th>Change page(s)</th>
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<td>09/08/2017</td>
<td>13.1</td>
<td>V8-T13-1–V8-T13-5</td>
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Overview
The sensor applications on the following pages range from basic problems to complex problems that can be solved only with specific sensors from Eaton’s electrical sector.

The solution is summarized along with the catalog numbers of suggested models to be used. Note that many sensors are interchangeable; slight differences in the application may dictate the choice of one sensor over another. When full catalog numbers are listed, that specific model is suggested. Where no suffix is given (for example, 1451E) or only one family is listed, the choice of a specific model within the suggested type would be determined by operating voltage, sensing range, choice of cable or connector base, and so on.

Sensor Applications

### Broken Tool Detection
An E58 Harsh Duty Perfect Prox sensor is used to sense for the presence of the bit on a mill. The high sensing power and background rejection of the Perfect Prox allows reliable detection through high levels of cutting fluids, while ignoring objects just beyond the bit. The rugged harsh duty sensor survives constant exposure to lubricants, cutting fluids and flying metal chips.

### Broken Bit Detection
A tubular E57 proximity sensor is used to detect the presence of a drill bit—should the drill bit be broken the sensor would signal a controller.

### Machining Processes
A ferrous only sensor is used in a process where aluminum is being machined. The ferrous only sensor ignores the aluminum (non-ferrous) chips from the machining process and only detects the ferrous target.

### Tool Position
A tubular E57 proximity sensor is used to detect the position of a tool chuck.

For assistance with these or other applications, call us at 1-800-426-9184.
13.1 Sensor Applications

Sensing Solutions Summary

### Bottle Filling Detection

A clear object sensor is used to sense the presence of bottles at a filling operation. The sensor offers high reliability in sensing clear bottles of different colors and thicknesses.

### Jam Detection

A reflex control with a time delay module set for “delay dark” ignores momentary beam breaks. If the beam is blocked longer than the delay period, the output energizes to sound an alarm or stop the conveyor.

### Stack Height Control

A set of thru-beam sensors determines the height of a scissor lift. For example, when the control is set for “dark-to-light” energize, the lift rises after a layer has been removed and stops when the next layer breaks the beam again.

### Box Counting

A Prism right-angle reflex sensor detects boxes anywhere on a four foot wide conveyor. Interfacing the control with a programmable controller provides totals at specific time intervals. Polarized reflex optics prevent false triggering on shiny objects, while the high optical power burns through box dust and contamination.

### Process Control

A capacitive proximity sensor used to verify fill level of bottled water on a filling process line.

### Conveyor System Control

A tubular inductive proximity sensor is used to detect the presence of metal carriers holding parts to be machined.

### Carton Fill-Level Detection

Two sensors work together to inspect the fill level in cartons on a conveyor. A reflex sensor senses the position of the carton and energizes the Perfect Prox or background suppression sensor located over the contents. If the Perfect Prox sensor does not “see” the fill level, the carton does not pass inspection.

### Cookie Motion Detection

High temperature environments are accommodated by the use of fiber optics. Here conveyor motion in a 450°F (232°C) cookie oven is detected. If the motion stops, the one-shot logic module detects light or dark for too long, and the output device shuts the oven down.

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## Lid Detection

A pair of tubular proximity sensors used to, a) detect the presence of a can on a conveying line, and b) check for presence of a lid.

### Description

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>E57 product family or iProx</td>
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## Garage Door Control

A safe and secure garage is achieved through the use of thru-beam controls interfaced to the door controller. The door shuts automatically after a car leaves, and if the beam is broken while the door is lowering, the motor reverses direction and raises the door again.

### Description

<table>
<thead>
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<tbody>
<tr>
<td>E58-30TS</td>
<td>E58 Harsh Duty thru-beam source</td>
</tr>
<tr>
<td>E58-30TD</td>
<td>E58 Harsh Duty thru-beam detector</td>
</tr>
<tr>
<td>E67-LRDP</td>
<td>E67 long range Perfect Prox</td>
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### Note:

Thru-beam source/detector or the long range Perfect Prox diffuse sensor controls are used to time the toll gate. To eliminate toll cheating, the gate lowers the instant the rear of the paid car passes the control. The E67 Long Range Perfect Prox allows you to mount the sensor on one side, instead of both. Plus with Perfect Prox, the E67 will detect cars with different colors and finishes while ignoring all other background objects. The rugged control handles harsh weather, abuse and 24-hour operation.

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## Liquid Level Detection

A pair of E53 capacitive proximity sensors are used to sense high and low liquid levels in a tank through a sight glass. This arrangement starts a pump to fill the tank when the lower sensor is energized and shuts the pump off when the top sensor is energized.

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## Bulk Material Detection

A capacitive proximity is used to control fill level of solids such as plastic pellets in a hopper or bin.

### Description

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## Sensing Solutions Summary

### Table:

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>Tubular inductive proximity sensor</td>
<td>E57 product family or iProx</td>
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<tr>
<td>Enhanced 50 series thru-beam</td>
<td>1150E/SRC</td>
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<tr>
<td>thru-beam</td>
<td>1250E/RCVR</td>
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<tr>
<td>Tubular capacitive proximity sensor</td>
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<tr>
<td>Thru-beam source/detector or the long range Perfect Prox diffuse sensor controls</td>
<td>E58-30TS, E58-30TD, E67-LRDP</td>
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<td>Intellicview™ distance sensor with analog outputs</td>
<td>E75-DST</td>
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<tr>
<td>Limit switch inductive proximity sensor</td>
<td>E51 Product Family</td>
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<td>Comet Perfect Prox</td>
<td>1310</td>
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<tr>
<td>iProx inductive proximity sensor</td>
<td>E59-M</td>
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</tbody>
</table>

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13.1 Sensor Applications

Sensing Solutions Summary

Filter Paper Length Control

A focused diffuse reflective sensor interfaces with a programmable controller to measure a specific length of corrugated automotive filter paper. The control detects the presence or absence of a corrugation. When a predetermined number of corrugations has been detected, the programmable controller directs a shear to cut the paper.

Clear Plastic Web Break Detection

The clear web is detected by a wide beam diffuse reflective sensor. The wide beam helps it ignore reflection caused by fluttering of the web.

Paper Presence Detection

Right angle viewing and compact size allow the sensor to be mounted in the tight confines of paper handling systems. High gain and sharp optical cut-off ensure that background machinery will be ignored while paper will be detected regardless of color and texture.

Motion Control

A pair of tubular proximity sensors is used to determine full open and fully closed valve position.

Motion Position Detection

A tubular E57 proximity sensor is used to detect the presence of set screws on a shaft hub providing a control device with signals for speed regulation or detection of rotation.

Parts Detection

A Perfect Prox sensor with 4-inch range detects parts of various heights from 0.5 to 3 inches passing through a channel, while ignoring the channel bottom.

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Damage Warning

Source and detector are mounted at opposite ends of a long warehouse storage shelf with the beam situated a safe distance below overhead obstacles (lighting, conduit, gas lines, ducts, pipes, and so on). If a forklift operator interrupts the beam while moving a load, a siren or flashing light will warn him to stop before any damage occurs.

Zero Pressure Accumulation Conveyor

E68 Series or 200 Series sensors detect and control the movement of boxes on the conveyor, to maximize throughput and eliminate line pressure between boxes. The sensor contains all required logic with no need for a PLC.

Registration Mark Detection

A contrast sensor distinguishes between surfaces by their difference in reflectivity. Contrast sensors are frequently used in automated packaging applications for registration mark detection to automate the folding, cutting and sorting phases.

Inspection of Safety Seals

Luminescence sensors emit ultraviolet light, which is reflected at a higher wavelength from the target surface. Safety seals for pharmaceuticals and some food products contain a fluorescent die that can be detected using a luminescence sensor.

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