Sensors
Proximity, Photoelectric, and Ultrasonic Sensors, Limit Switches, Pressure Sensors, Machine Safety, Encoders, RFID, and Machine Cabling
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### Light curtains

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<tr>
<th>Applications</th>
<th>Machine tool, material handling, automotive, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions</td>
<td>Finger protection: 0.55 in. (14 mm), or hand protection: 1.18 in. (30 mm)</td>
</tr>
</tbody>
</table>

### Device

<table>
<thead>
<tr>
<th>Light curtains, type 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-beam, infrared transmission, light curtains (1 transmitter-receiver pair)</td>
</tr>
</tbody>
</table>

#### Optimum Type

#### Universal Type

### Conformity

<table>
<thead>
<tr>
<th>Product standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI/RIA R15.06, ANSI B11.19-1990, OSHA 1910.217(C), OSHA 1910.212, EN/IEC 61496-1 and EN/IEC 61496-2 and IEC 61508-1, 2 (Type 4 ESPE)</td>
</tr>
</tbody>
</table>

#### European directives

| Machinery directive 98/37/EC, Work equipment directive 89/655/EEC and EMC directive 89/336 EEC |
| ROHS directive 2002/95/EC |

### Conformity

<table>
<thead>
<tr>
<th>Product certifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE, TUV, UL, CSA</td>
</tr>
</tbody>
</table>

### Degree of protection

| IP 65 |

### Cross-section

| 1.50 x 1.97 in. (38 x 50 mm) |

### Protected height

<table>
<thead>
<tr>
<th>Conforming to EN 999</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 to 53.5 in. (280 to 1360 mm) (finger protection)</td>
</tr>
<tr>
<td>12.6 to 83.5 in. (320 to 2120 mm) (hand protection)</td>
</tr>
</tbody>
</table>

### Nominal sensing distance

| 1 to 23 ft (finger protection) |
| 1 to 65 ft (hand protection) |

### Response time

| Depending on height protected: 23 to 41 ms (finger protection) |
| Depending on height protected: 23 to 32 ms (hand protection) |

### Type of outputs

<table>
<thead>
<tr>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 solid-state PNP outputs (N.O.)</td>
</tr>
<tr>
<td>Short-circuit protection</td>
</tr>
</tbody>
</table>

#### Auxiliary

| 1 solid-state 100 mA, 24 V, PNP or NPN output depending on the model |

### Main functions

| Auto/manual |
| Test (External Devices Monitoring) |
| Auto/manual |
| Test (External Devices Monitoring) |
| EDM (External Devices Monitoring) |
| Light beam coding |
| EDM (External Devices Monitoring) |
| Light beam coding |
| Blankling (fixed and floating) |
| Blankling (floating) |
| Cascadable (up to 4 segments) |
| Muting |

### Muting function

| Inhibition of the light curtain Detection function |

### Supply voltage

| 24 V ± 20%, 2 A |

### Catalog numbers

| XUSLB | XUSLD |

### Pages

<p>| 7/10 | 7/11 |</p>
<table>
<thead>
<tr>
<th>Applications</th>
<th>Packaging, conveyor systems, materials handling, warehousing, stocking, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions</td>
<td>Body protection (300, 400, 500 and 600 mm)</td>
</tr>
<tr>
<td>Device</td>
<td>Light curtains, type 4</td>
</tr>
<tr>
<td></td>
<td>1 to 6 beam light curtains with infrared transmission</td>
</tr>
<tr>
<td></td>
<td>(1 transmitter-receiver pair)</td>
</tr>
<tr>
<td></td>
<td>Type 4 model, solid-state output</td>
</tr>
<tr>
<td>Conformity</td>
<td>ANSI/RIA R15.06, ANSI B11-19-1990, OSHA 1910.217(C), OSHA 1910.212,</td>
</tr>
<tr>
<td></td>
<td>type 4 (ESPE) conforming to IEC 61496-1 and 2</td>
</tr>
<tr>
<td></td>
<td>Machinery directive 98/37/EC, Work equipment</td>
</tr>
<tr>
<td></td>
<td>directive 89/655/EEC and EMC directive 89/336/EEC</td>
</tr>
<tr>
<td>Product certifications</td>
<td>CE, TUV, UL, CSA</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 67</td>
</tr>
<tr>
<td>Cross-section</td>
<td>2.05 x 2.17 in. (52 x 55 mm)</td>
</tr>
<tr>
<td>Protected height</td>
<td>Conforming to EN 999</td>
</tr>
<tr>
<td></td>
<td>29.53–70.87 in. (750–1800 mm)</td>
</tr>
<tr>
<td></td>
<td>(1 to 6 light beams)</td>
</tr>
<tr>
<td>Nominal sensing distance</td>
<td>0.8–20 m or 0.8–70 m dpg. on configuration</td>
</tr>
<tr>
<td></td>
<td>0.8–8 m for light curtains with passive receiver</td>
</tr>
<tr>
<td>Response time</td>
<td>&lt; 16 to &lt; 24 ms, depending on the light beam coding selected</td>
</tr>
<tr>
<td>Type of outputs</td>
<td>Safety</td>
</tr>
<tr>
<td></td>
<td>2 solid-state PNP outputs (N.O.)</td>
</tr>
<tr>
<td></td>
<td>--- 24 V, ≤ 650 mA</td>
</tr>
<tr>
<td></td>
<td>Short-circuit protection</td>
</tr>
<tr>
<td></td>
<td>Auxiliary</td>
</tr>
<tr>
<td></td>
<td>1 solid-state 100 mA, --- 24 V PNP output</td>
</tr>
<tr>
<td>Main functions</td>
<td>Functions integrated in the light curtain:</td>
</tr>
<tr>
<td></td>
<td>Auto/Manual start and manual 1st cycle,</td>
</tr>
<tr>
<td></td>
<td>- EDM (external devices monitoring),</td>
</tr>
<tr>
<td></td>
<td>- test input,</td>
</tr>
<tr>
<td></td>
<td>- 3 light beam codings available,</td>
</tr>
<tr>
<td></td>
<td>- Muting via external module</td>
</tr>
<tr>
<td>Muting function</td>
<td>(inhibition of the light curtain Detection function)</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>--- 24 V ± 20%, 2 A</td>
</tr>
<tr>
<td>Catalog numbers</td>
<td>XUSLP</td>
</tr>
<tr>
<td>Pages</td>
<td>7/29</td>
</tr>
</tbody>
</table>
### Safety detection solutions

#### Light curtains

<table>
<thead>
<tr>
<th>Applications</th>
<th>Packaging, conveyor systems, materials handling, warehousing, stocking, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions</td>
<td>Hand protection (30 mm)</td>
</tr>
</tbody>
</table>

#### Device

<table>
<thead>
<tr>
<th>Light curtains, type 2</th>
<th>Multi-beam light curtains with infrared transmission (1 transmitter-receiver pair)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slim, compact model, solid-state output</td>
<td>Automatic or manual start</td>
</tr>
</tbody>
</table>

#### Conformity

<table>
<thead>
<tr>
<th>Product standards</th>
<th>IEC 61496-1 and IEC 61496-2 type 2 (ESPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>European directives</td>
<td>Machinery directive 98/37/EC, Work equipment directive 89/655/EEC and EMC directive 89/336/EEC</td>
</tr>
</tbody>
</table>

#### Product certifications

<table>
<thead>
<tr>
<th>CE, TUV, UL, CSA</th>
</tr>
</thead>
</table>

#### Degree of protection

<table>
<thead>
<tr>
<th>IP 65</th>
</tr>
</thead>
</table>

#### Cross-section

<table>
<thead>
<tr>
<th>1.12 x 1.26 in. (28.5 x 32 mm)</th>
</tr>
</thead>
</table>

#### Protected height

<table>
<thead>
<tr>
<th>Conforming to EN 999 5.91–59.06 in. (150–1500 mm) (hand protection)</th>
</tr>
</thead>
</table>

#### Nominal sensing distance

<table>
<thead>
<tr>
<th>0.98–49.21 ft (0.3–15 m)</th>
</tr>
</thead>
</table>

#### Response time

<table>
<thead>
<tr>
<th>14–24 ms</th>
</tr>
</thead>
</table>

#### Type of outputs

<table>
<thead>
<tr>
<th>Safety</th>
<th>2 solid-state PNP outputs (N.O.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 24 V, ≤ 500 mA Short-circuit protection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary</th>
<th>1 x 100 mA, ≤ 24 V PNP alarm output</th>
</tr>
</thead>
</table>

#### Main functions

<table>
<thead>
<tr>
<th>Functions integrated in the light curtain:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- automatic or manual start, depending on the version</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>- Muting via external module</th>
</tr>
</thead>
</table>

#### Supply voltage

<table>
<thead>
<tr>
<th>≤ 24 V ± 20%, 2 A</th>
</tr>
</thead>
</table>

#### Catalog numbers

<table>
<thead>
<tr>
<th>XUSLNG5C, XUSLNG5D</th>
</tr>
</thead>
</table>

#### Pages

<table>
<thead>
<tr>
<th>7/37</th>
</tr>
</thead>
</table>
### Packaging, conveyor systems, materials handling, warehousing, stocking, etc.

#### Body protection

**Light curtains, type 2**

- Single-beam, infrared transmission, light curtains (Preventa® safety monitoring module plus 1–4 thru-beam photoelectric sensors)

**Type 2 model, relay outputs (N.O.)**

<table>
<thead>
<tr>
<th>IEC 60947-1, EN 61496-1, EN 60825-1, UL 508, type 2 (ESPE) conforming to IEC 61496-1 and 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery directive 98/37/EC, Work equipment directive 89/655/EEC and EMC directive 89/336/EEC EN 60825-1 (emission class 1)</td>
</tr>
<tr>
<td>CE type approval BIA/Cologne. UL, CSA</td>
</tr>
<tr>
<td>IP 67</td>
</tr>
<tr>
<td>Ø of sensors: 18 mm</td>
</tr>
<tr>
<td>29.5 to 47.2 in. (750 to 1200 mm) (1–4 light beams)</td>
</tr>
<tr>
<td>26.2 ft (8 m)</td>
</tr>
<tr>
<td>&lt; 20 ms (sensors + safety module)</td>
</tr>
</tbody>
</table>

**Solid-state PNP Preventa® safety module XPSCM outputs**

- 2 guided contact relays, each 1 N.O.
- AC-15: C300, 1800 VA inrush, 180 VA maintained
- DC-13: = 24 V/1.5 A, L/R = 50 ms
- Maximum thermal current = 2.5 A

| = 24 V, 20 mA |

**Muting integrated in the safety monitoring module XPSCM**

| Safety module XPSCM: = 24 V (19–29 V) |
| Sensors XU2S: = 24 V (10–30 V) |

**XU2S + XPSCM**

7/50
Introduction

Protection of personnel

Light curtains are electro-sensitive protection equipment (ESPE) designed to help protect persons operating or working in the vicinity of machinery, by stopping the dangerous movement of parts as soon as one of the light beams is broken. In particular, they help provide protection for personnel operating dangerous machinery (annex IV of 98/37/EC) but they are equally suitable for use with many other types of machines. They make it possible to help protect personnel while allowing free access to machines.

The absence of a door or guard reduces the time required for loading, inspection or adjustment operations, and makes access easier.

Directives and standards

Conformity to standards

These light curtains conform to the following:

- Low Voltage Directives 73/23/EEC and 93/68/EEC and also, the Electromagnetic Compatibility Directive 89/336/EEC,
- Standard EN/IEC 61496-1, EN/IEC 61496-2 (electro-sensitive protection equipment: ESPE),
- Standard EN 60825 (emission power),
- Standard EN 999/ISO 13855 (installation positioning).

These light curtains are UL, CSA and TÜV certified.

Applications

Main applications

- Applications for type 2 products:
  - assembly and packaging lines,
  - conveying and handling lines,
  - warehousing and storage systems,
  - waste disposal skips.

- Types of machine requiring the use of type 4 products:
  - presses (all types), shears and trimmers,
  - hoisting equipment,
  - saws (all types),
  - machine tools (lathes, milling machines, machining centers),
  - woodworking machines (planing machines, lathes, spindle molding machines, side and face milling cutters),
  - textile machinery (carding machines, weaving looms, steam rooms),
  - assembly machines,
  - assembly robots.

Safety requirements

Detection of anomalies

Detection of anomalies liable to compromise safety, and stopping of the machine

The design of the machine and its control system must be to the same level of safety as that of the light curtain in order to provide the immediate stopping of the machine’s dangerous movement as soon as the hazardous zone (protected by the light curtain) is entered.

It must not be possible to enter the protected zone without breaking the protective light beams. The light curtain must therefore be installed in such a manner that the light beams cannot be avoided. The machine can only be restarted if no danger exists and no personnel are present in the hazardous zone. The risk that persons might be inside the protected zone but out of the protective light beams must be addressed.
Safety detection solutions
Light curtains

<table>
<thead>
<tr>
<th>Functions</th>
<th>Protection mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO/MAN (automatic/manual): This is what standard EN/IEC 61496 calls start (or restart) interlock of the light curtain:</td>
<td></td>
</tr>
<tr>
<td>■ In Auto mode: Upon power-up or after the beams have been cleared, the light curtain resets itself automatically (closing of the OSSD output safety circuits),</td>
<td></td>
</tr>
<tr>
<td>■ In Manual mode: Upon power-up or after the beams have been cleared, the light curtain keeps its output safety circuits in the Open position. Pressing and releasing the reset button will reset the light curtain and close its OSSD output safety circuits.</td>
<td></td>
</tr>
</tbody>
</table>

Note: In all cases, a general start instruction for the machine will trigger its actual start-up.

<table>
<thead>
<tr>
<th>Monitoring the external switching devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Also called EDM (external device monitoring) by standard EN/IEC 61496, this consists of monitoring the state (open or closed) of the machine’s power switching components, along with the time taken to reach that state.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where configurable (XUSLM/XUSLP), this is a low power solid-state output for signaling to the automation system. This output closes when the light curtain switches to run mode.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is a low power solid-state output for signaling to the automation system. This output closes when the light curtain switches to alarm mode.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signaling</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED display of operating modes and alarm.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alignment aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display by visible infrared LED of each beam broken.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Muting (inhibition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>When activated, the Muting function inhibits the Detection function of the light curtain. Activation (or deactivation) is achieved by means of standard sensors (photoelectric or other). When activated, a signal is sent to the automation system. This function is used to allow objects to access the hazardous zones during the process. Signaling informs the operator or operators that they are not protected.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>While the Muting function inhibits all beams in the light curtain from detecting objects, the Blanking function inhibits a selected group of light beams. This allows objects to be present during process operations. Blanking is adaptable to the size of the objects present. Blanking effectively increases the Minimum Object Sensitivity (MOS). This imposes a greater safety distance, increasing the minimum distance between the light curtain and the hazard. Also, additional protection on each side of the object present must be provided, in order to prevent any intrusion into the free areas.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Floating blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>This function makes it possible to inhibit one or two light beams (adjacent or otherwise), anywhere in the light curtain. This configuration is used, for example, for metal plate feeding applications on folding presses or shears.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blanking plus floating blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Blanking function (fixed inhibition of light beams) and Floating Blanking function (moving inhibition of one or two light beams) can be combined.</td>
</tr>
</tbody>
</table>
## Specifications

### Safety detection solutions

**Safety light curtains, type 4**

Optimum XUSLB and Universal XUSLDM with solid-state output

### Light curtain type

<table>
<thead>
<tr>
<th>XUSLBQ6A</th>
<th>XUSLDMQ6A</th>
<th>XUSLBR5A</th>
<th>XUSLDMY5A</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.55 in. (14 mm)</td>
<td>1.18 in. (30 mm)</td>
<td>1.18 in. (30 mm)</td>
<td>1.18 in. (30 mm)</td>
</tr>
</tbody>
</table>

### Environmental specifications

**Conformity to standards**

ANSI/RIA R15.06, ANSI B11.19-1990, OSHA 1910.217(C), OSHA 1910.212, EN/IEC 61496-1 and EN/IEC 61496-2 and IEC 61508-1, 2 (Type 4 ESPE)

**Certifications**

CE, TUV, UL, CSA

**European directives**

Machinery directive 98/37/EC, Work equipment directive 89/655/ECC, EMC directive 89/336 EEC and IEC 61496-1, 2

**Maximum safety level**

Category 4 conforming to IEC 61496-1 and 2.

**Reliability data B_{ph}**

\[ PFH_{d} = 4.9 \times 10^{-6} \text{ h} \]

**Ambient air temperature**

<table>
<thead>
<tr>
<th>Temperature</th>
<th>°F</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating</td>
<td>14 to +131</td>
<td>-10 to +55</td>
</tr>
<tr>
<td>Storage</td>
<td>13 to +167</td>
<td>-25 to +75</td>
</tr>
</tbody>
</table>

**Relative humidity**

95% maximum, without condensation

**Degree of protection**

IP 65

**Shock and vibration resistance**

Conforming to IEC 61496-1

Shock resistance: 10 g, impulse 16 ms

Vibration resistance: 10–55 Hz, amplitude: 0.35 ± 0.05 mm

**Materials**

Casing: aluminium with electrostatically applied red (RAL 3000) polyester paint finish;

end caps: 20% fiberglass impregnated polycarbonate.

Lens: PMMA (polymethyl methacrylate).

**Mounting**

End brackets (included)

### Optical specifications

**Minimum detection capacity (MOS)**

0.55 in. (14 mm) (finger) 1.18 in. (30 mm) (hand)

**Nominal sensing distance (Sn)**

<table>
<thead>
<tr>
<th>Distance</th>
<th>ft</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating</td>
<td>1–23 (0.3–7) or 9.8 (3) with PDM (2)</td>
<td>1–26.2 (0.3–8) or 65.6 (20) with PDM (2)</td>
</tr>
</tbody>
</table>

**Effective aperture angle (EAA)**

2.5° at 9.8 ft (3 m) (3° when used with IP 67 protection tube)

**Light source**

GaAlAs LED, 880 nm

**Immunity to ambient light**

Conforming to IEC/EN 61496-2

### Electrical specifications

**Response time**

<table>
<thead>
<tr>
<th>Time</th>
<th>ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter</td>
<td>23–41</td>
</tr>
<tr>
<td>Receiver</td>
<td>23–32</td>
</tr>
</tbody>
</table>

**Power supply**

<table>
<thead>
<tr>
<th>Supply</th>
<th>mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter</td>
<td>24 V ± 20% (2 A) conforming to EN/IEC 61496 and EN/IEC 60204-1</td>
</tr>
<tr>
<td>Receiver</td>
<td>285</td>
</tr>
</tbody>
</table>

**Maximum current consumption (no-load)**

<table>
<thead>
<tr>
<th>Load</th>
<th>mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter</td>
<td>285</td>
</tr>
<tr>
<td>Receiver</td>
<td>450</td>
</tr>
</tbody>
</table>

**Immunity to interference**

Conforming to EN 61496-1

**Safety outputs OSSD (Output Signal Switching Devices)**

2 solid-state PNP (N/O) outputs ≤ 625 mA, ≤ 24 V (Short-circuit protected)

**Auxiliary output**

1 solid-state output 100 mA, ≤ 24 V, PNP or NPN (depending on the model)

**Monitoring activation of output switching devices (MPCE/EDM)**

50 mA, ≤ 24 V and start/restart 10 mA

**Signaling**

<table>
<thead>
<tr>
<th>Signaling</th>
<th>mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter</td>
<td>1 LED (power supply)</td>
</tr>
<tr>
<td>Receiver</td>
<td>4 LEDs (stop, run, interlock, ECS/B Blanking or FB Floating Blanking)</td>
</tr>
</tbody>
</table>

**Connections (3)**

<table>
<thead>
<tr>
<th>Connections</th>
<th>Transmitter</th>
<th>Receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light curtains</td>
<td>M12, 5-pin, female connector</td>
<td>M12, 5-pin, female connector</td>
</tr>
<tr>
<td>Segments XUSLDS</td>
<td>M12, 4-pin, female connector on flying lead</td>
<td>M12, 4-pin, female connector</td>
</tr>
<tr>
<td>Pre-wired connectors c.s.a.</td>
<td>22 AWG (0.32 mm²) conductors with M12, 5-pin, male connector</td>
<td>22 AWG (0.32 mm²) conductors with M12, 8-pin, male connector</td>
</tr>
<tr>
<td>Jumper cables c.s.a.</td>
<td>22 AWG (0.32 mm²) conductors with M12, 4-pin, male/female connectors</td>
<td></td>
</tr>
</tbody>
</table>

**Cable resistance of pre-wired connectors**

<table>
<thead>
<tr>
<th>Resistance</th>
<th>Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-wired connectors with cable lengths of 16.4, 32.8, 49.2, and 98.4 ft (5, 10, 15 and 30 m) are available separately. The maximum cable length is 196.9 ft (60 m), depending on the load current and power supply.</td>
<td></td>
</tr>
</tbody>
</table>

---

(1) Using an appropriate and correctly connected control system.

(2) PDM: Programming and Diagnostic Module, available as an option. See page 7/14.

(3) Pre-wired connectors must be ordered separately. See page 7/14.
### Specifications (continued)

**Safety detection solutions**

*Optimum XUSLB and Universal XUSLDM with solid-state output*

<table>
<thead>
<tr>
<th>Light curtain type</th>
<th>XUSLB</th>
<th>XUSLDM</th>
</tr>
</thead>
</table>
| Functions Accessible by cabling alone (1) | □ Automatic start  
□ Auxiliary output (PNP, status signaling)  
□ Test (MTS: Monitoring Test Signal)  
□ Alignment aid by display of each light beam broken  
□ LED display of operating modes and anomalies | |
| Functions Accessible via programming and diagnostic module | □ Auto/Manual  
□ Monitoring of the external switching devices (EDM: external device monitoring)  
□ Light beam coding (A or B)  
□ Sensing distance (short, long)  
□ Programming and downloading the configuration settings, via programming and diagnostic module (PDM)  
□ Display of operating modes and anomalies by LED or PDM (2) | □ Auto/Manual, manual 1st cycle  
□ Monitoring of the external switching devices (EDM: external device monitoring)  
□ Blanking (ECS/B)  
□ Monitored Blank (FB)  
□ Reduction of resolution  
□ Response time (normal, slow)  
□ Light beam coding (A or B)  
□ Sensing distance (short, long)  
□ Auxiliary output (alarm or status signaling, PNP or NPN)  
□ Start button (N/O or N/C, 0 V or 24 V)  
□ Muting (see page 7/7)  
□ Cascadable versions with up to 4 segments total (256 light beams max., modular finger/hand) using XUSLDS segments  
□ Programming and downloading the configuration settings, via programming and diagnostic module (PDM)  
□ Display of operating modes and anomalies by LED or PDM (2) | |
| Monitoring the external switching devices (EDM: external device monitoring) | Monitoring of the function (open or closed) as well as the response time of the power components. | |
| Test function | Initiates the stop instruction of the light curtain by opening the contact (simulated intrusion) | |
| Muting function (inhibition) | □ With external module XPSLCM1150 | □ Integrated when using connection module XPSLCM1 for connecting sensors and Muting indicator light  
□ or with module XPSLCM1150 |

(1) Not requiring use of PDM.
(2) PDM: Programming and Diagnostic Module, available as an option. See page 7/14.
Transmitter-receiver pairs for finger protection (1)
Detection capacity: 0.55 in. (14 mm).
Sensing distance: 1 to 22.9 ft (0.3 to 7 m), or 9.8 ft (3 m) with PDM.

<table>
<thead>
<tr>
<th>Protected height</th>
<th>Response time</th>
<th>Number of light beams</th>
<th>Auxiliary output</th>
<th>Catalog number (2)</th>
<th>Weight (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>in. (mm)</td>
<td>ms</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>11 (280)</td>
<td>23</td>
<td>24</td>
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<tr>
<td>12.6 (320)</td>
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<td>32</td>
<td>PNP</td>
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<tr>
<td>14.2 (360)</td>
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<td>36</td>
<td>PNP</td>
<td>XUSLB6A0360</td>
<td>4.74</td>
</tr>
<tr>
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<td>23</td>
<td>44</td>
<td>PNP</td>
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<tr>
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<td>23</td>
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<td>76</td>
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<tr>
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<td>96</td>
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<td>XUSLB6A0960</td>
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<td>40.9 (1040)</td>
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<tr>
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<td>136</td>
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<td>XUSLB6A1360</td>
<td>13.62</td>
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</table>

(1) Includes a test rod, 2 sets of 2 brackets with mounting hardware, a user guide with the certificate of conformity on CD-ROM, and 1 arc suppressor set. Programming and Diagnostic Module (if required) and pre-wired connectors must be ordered separately. See page 7/14.

(2) To order a receiver only, add the letter R to the end of the catalog number for the corresponding transmitter-receiver pair. Example: XUSLB6A0280 becomes XUSLB6A0280R for the receiver only.
To order a transmitter only, add the letter T to the end of the catalog number for the corresponding transmitter-receiver pair. Example: XUSLB6A0280 becomes XUSLB6A0280T for the transmitter only.

Transmitter-receiver pairs for hand protection (1)
Detection capacity: 1.18 in. (30 mm).
Sensing distance: 1 to 26.2 ft (0.3 to 8 m), or 65.6 ft (20 m) with PDM.

<table>
<thead>
<tr>
<th>Protected height</th>
<th>Response time</th>
<th>Number of light beams</th>
<th>Auxiliary output</th>
<th>Catalog number (2)</th>
<th>Weight (lb)</th>
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<td>in. (mm)</td>
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<td></td>
<td></td>
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<td>14.2 (360)</td>
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<td>18</td>
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<tr>
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<td>106</td>
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</tbody>
</table>

(1) Other versions
Combining type 4 safety light curtains with external module for Muting function. See page 2/218 of the Machine Safety Products catalog, MKTED208051EN-US.

Separate components and accessories: page 7/14
### Transmitter-receiver pairs for finger protection (1)
Detection capacity: 0.55 in. (14 mm).
Sensing distance: 1 to 22.9 ft (0.3 to 7 m) or 9.8 ft (3 m) with PDM.

<table>
<thead>
<tr>
<th>Protected height</th>
<th>Response time Normal</th>
<th>Number of light beams</th>
<th>Auxiliary output</th>
<th>Catalog number</th>
<th>Weight (lb/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>in. (mm)</td>
<td>ms</td>
<td>ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 (280)</td>
<td>23</td>
<td>38</td>
<td>24</td>
<td>XUSLDMQ6A0280</td>
<td>3.95 (1.790)</td>
</tr>
<tr>
<td>12.6 (320)</td>
<td>23</td>
<td>38</td>
<td>32</td>
<td>XUSLDMQ6A0320</td>
<td>4.34 (1.970)</td>
</tr>
<tr>
<td>14.2 (360)</td>
<td>23</td>
<td>38</td>
<td>36</td>
<td>XUSLDMQ6A0360</td>
<td>4.74 (2.150)</td>
</tr>
<tr>
<td>17.3 (440)</td>
<td>23</td>
<td>38</td>
<td>44</td>
<td>XUSLDMQ6A0440</td>
<td>5.51 (2.500)</td>
</tr>
<tr>
<td>20.5 (520)</td>
<td>23</td>
<td>38</td>
<td>52</td>
<td>XUSLDMQ6A0520</td>
<td>6.39 (2.900)</td>
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<td>23.6 (600)</td>
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<tr>
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<td>34.6 (880)</td>
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<table>
<thead>
<tr>
<th>Weight (lb/kg)</th>
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<tr>
<td>3.95 (1.790)</td>
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<td>4.34 (1.970)</td>
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<td>13.01 (5.900)</td>
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<tr>
<td>14.59 (6.820)</td>
</tr>
</tbody>
</table>

(1) Includes a test rod, 2 sets of 2 brackets with mounting hardware, user guide with certificate of conformity on CD-ROM and 1 arc suppressor set.

(2) Programming and Diagnostic Module (if required) and pre-wired connectors must be ordered separately. See page 7/14.

### Transmitter-receiver pairs for hand protection (1)
Detection capacity: 1.18 in. (30 mm).
Sensing distance: 1 to 65.6 ft (0.3 to 20 m), or 26.2 ft (8 m) with PDM.

<table>
<thead>
<tr>
<th>Protected height</th>
<th>Response time Normal</th>
<th>Number of light beams</th>
<th>Auxiliary output</th>
<th>Catalog number</th>
<th>Weight (lb/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>in. (mm)</td>
<td>ms</td>
<td>ms</td>
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<td>53</td>
<td>82</td>
<td>XUSLDMY5A1640</td>
<td>17.35 (7.870)</td>
</tr>
<tr>
<td>67.7 (1720)</td>
<td>32</td>
<td>53</td>
<td>86</td>
<td>XUSLDMY5A1720</td>
<td>18.14 (8.230)</td>
</tr>
<tr>
<td>70.9 (1800)</td>
<td>32</td>
<td>53</td>
<td>88</td>
<td>XUSLDMY5A1800</td>
<td>18.94 (8.590)</td>
</tr>
<tr>
<td>75.6 (1920)</td>
<td>32</td>
<td>53</td>
<td>96</td>
<td>XUSLDMY5A1920</td>
<td>20.11 (9.120)</td>
</tr>
<tr>
<td>83.5 (2120)</td>
<td>32</td>
<td>53</td>
<td>106</td>
<td>XUSLDMY5A2120</td>
<td>22.09 (10.020)</td>
</tr>
</tbody>
</table>

(1) Includes a test rod, 2 sets of 2 brackets with mounting hardware, user guide with certificate of conformity on CD-ROM and 1 arc suppressor set.

(2) To order a receiver only, add the letter R to the end of the catalog number for the corresponding transmitter-receiver pair.

Example: XUSLDMQ6A0280 becomes XUSLDMQ6A0280R for the receiver only.

To order a transmitter only, add the letter T to the end of the catalog number for the corresponding transmitter-receiver pair.

Example: XUSLDMQ6A0280 becomes XUSLDMQ6A0280T for the transmitter only.

### Other versions
Combining type 4 safety light curtains with external module for Muting function. See page 2/218 of the Machine Safety Products catalog, MKTED208051EN-US.

### Separate components and accessories: page 7/14
### Segments for cascadable Universal light curtains

Cascadable versions with up to 4 segments total (256 light beams max., modular finger/hand), using XUSLDS segments

#### Configuration of XUSLDS segments

<table>
<thead>
<tr>
<th>Two segments</th>
<th>Number of light beams</th>
<th>Response time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 65</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>66 to 120</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>121 to 174</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>175 to 229</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>230 to 256</td>
<td>59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Three segments</th>
<th>Number of light beams</th>
<th>Response time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 59</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>60 to 114</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>115 to 168</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>169 to 223</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>224 to 256</td>
<td>59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Four segments</th>
<th>Number of light beams</th>
<th>Response time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 53</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>54 to 108</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>109 to 162</td>
<td>41</td>
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<tr>
<td></td>
<td>163 to 217</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>218 to 256</td>
<td>59</td>
</tr>
</tbody>
</table>

#### Separate components and accessories: page 7/14

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**Introduction**

**Safety detection solutions**

**Safety light curtains, type 4**

**XUSLDS segments for Universal XUSLDM light curtains**

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Safety detection solutions
Safety light curtains, type 4
XUSLDS segments for Universal XUSLDM light curtains

Transmitter-receiver pairs for finger protection (1)
Detection capacity: 0.55 in. (14 mm).
Sensing distance: depends on XUSLDM light curtain used.

Segments for cascadable Universal light curtains (2)

<table>
<thead>
<tr>
<th>Protected height (in. (mm))</th>
<th>Number of light beams</th>
<th>Catalog number (3)</th>
<th>Weight (lb (kg))</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 (280)</td>
<td>24</td>
<td>XUSLDSQ6A0280</td>
<td>3.95 (1.790)</td>
</tr>
<tr>
<td>12.6 (320)</td>
<td>32</td>
<td>XUSLDSQ6A0320</td>
<td>4.34 (1.970)</td>
</tr>
<tr>
<td>14.2 (360)</td>
<td>36</td>
<td>XUSLDSQ6A0360</td>
<td>4.74 (2.150)</td>
</tr>
<tr>
<td>17.3 (440)</td>
<td>44</td>
<td>XUSLDSQ6A0440</td>
<td>5.51 (2.500)</td>
</tr>
<tr>
<td>20.5 (520)</td>
<td>52</td>
<td>XUSLDSQ6A0520</td>
<td>6.33 (2.870)</td>
</tr>
<tr>
<td>23.6 (600)</td>
<td>60</td>
<td>XUSLDSQ6A0600</td>
<td>7.10 (3.220)</td>
</tr>
<tr>
<td>28.3 (720)</td>
<td>72</td>
<td>XUSLDSQ6A0720</td>
<td>8.29 (3.760)</td>
</tr>
<tr>
<td>29.9 (760)</td>
<td>76</td>
<td>XUSLDSQ6A0760</td>
<td>8.69 (3.940)</td>
</tr>
<tr>
<td>34.6 (860)</td>
<td>88</td>
<td>XUSLDSQ6A0880</td>
<td>9.85 (4.470)</td>
</tr>
<tr>
<td>36.2 (920)</td>
<td>92</td>
<td>XUSLDSQ6A0920</td>
<td>10.25 (4.650)</td>
</tr>
<tr>
<td>37.8 (960)</td>
<td>96</td>
<td>XUSLDSQ6A0960</td>
<td>10.65 (4.830)</td>
</tr>
<tr>
<td>40.9 (1040)</td>
<td>104</td>
<td>XUSLDSQ6A1040</td>
<td>11.44 (5.190)</td>
</tr>
<tr>
<td>44.1 (1120)</td>
<td>112</td>
<td>XUSLDSQ6A1120</td>
<td>12.21 (5.540)</td>
</tr>
<tr>
<td>47.2 (1200)</td>
<td>120</td>
<td>XUSLDSQ6A1200</td>
<td>13.01 (5.900)</td>
</tr>
</tbody>
</table>

(1) Includes 2 sets of 2 brackets and hardware.
(2) Jumper cables must be ordered separately. See page 7/14.
(3) To order a receiver only, add the letter R to the end of the catalog number for the corresponding transmitter-receiver pair.
Example: XUSLDSY5A0320 becomes XUSLDSY5A0320R for the receiver only.
To order a transmitter only, add the letter T to the end of the catalog number for the corresponding transmitter-receiver pair.
Example: XUSLDSY5A0320 becomes XUSLDSY5A0320T for the transmitter only.

Separate components and accessories: page 7/14
Separate components
Power supplies, 90° mirror adapters, protective covers, anti-vibration kit, mounting bases, laser alignment tool
See pages 7/15 and 7/40 to 7/47.

Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>For use with</th>
<th>Length ft (m)</th>
<th>Catalog number</th>
<th>Weight lb (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming and Diagnostic Module (PDM)</td>
<td>XUSLB/LDM</td>
<td></td>
<td>XUSLPDM</td>
<td>0.62 (0.280)</td>
</tr>
<tr>
<td>Holder mount</td>
<td>Programming and diagnostic module XUSLPDM</td>
<td></td>
<td>XUSLZPDM</td>
<td>0.09 (0.040)</td>
</tr>
<tr>
<td>Pre-wired connectors for light curtains</td>
<td>Transmitter type</td>
<td>16.4 (5)</td>
<td>XSZBCT05</td>
<td>0.86 (0.390)</td>
</tr>
<tr>
<td>XUSLB/XUSLDM</td>
<td>Transmitter type</td>
<td>32.8 (10)</td>
<td>XSZBCT10</td>
<td>1.52 (0.690)</td>
</tr>
<tr>
<td></td>
<td>Transmitter type</td>
<td>49.2 (15)</td>
<td>XSZBCT15</td>
<td>2.27 (1.030)</td>
</tr>
<tr>
<td></td>
<td>Transmitter type</td>
<td>98.4 (30)</td>
<td>XSZBCT30</td>
<td>4.25 (1.930)</td>
</tr>
<tr>
<td>Receiver type</td>
<td>Receiver type</td>
<td>16.4 (5)</td>
<td>XSZBCR05</td>
<td>0.99 (0.450)</td>
</tr>
<tr>
<td></td>
<td>Receiver type</td>
<td>32.8 (10)</td>
<td>XSZBCR10</td>
<td>1.72 (0.780)</td>
</tr>
<tr>
<td></td>
<td>Receiver type</td>
<td>49.2 (15)</td>
<td>XSZBCR15</td>
<td>2.43 (1.100)</td>
</tr>
<tr>
<td></td>
<td>Receiver type</td>
<td>98.4 (30)</td>
<td>XSZBCR30</td>
<td>5.03 (2.290)</td>
</tr>
<tr>
<td>Jumper cables for XUSLDS segments M12 male/female, 4-pin, straight</td>
<td></td>
<td>16.4 (5)</td>
<td>XSZDCT05</td>
<td>0.11 (0.050)</td>
</tr>
<tr>
<td></td>
<td>Transmitter type</td>
<td>16.6 (2)</td>
<td>XSZDCT020</td>
<td>0.46 (0.210)</td>
</tr>
<tr>
<td></td>
<td>Transmitter type</td>
<td>9.9 (3)</td>
<td>XSZDCT030</td>
<td>0.66 (0.300)</td>
</tr>
<tr>
<td></td>
<td>Receiver type</td>
<td>16.4 (5)</td>
<td>XSZDCT050</td>
<td>1.08 (0.490)</td>
</tr>
<tr>
<td></td>
<td>Receiver type</td>
<td>32.8 (10)</td>
<td>XSZDCT100</td>
<td>2.09 (0.950)</td>
</tr>
<tr>
<td>Jumpers for replacing XUSLT light curtains with XUSLB or XUSLDM</td>
<td>Transmitter type</td>
<td>1 (0.3)</td>
<td>XSZTBDMCT003</td>
<td>0.13 (0.060)</td>
</tr>
<tr>
<td></td>
<td>Transmitter type</td>
<td>1.6 (0.5)</td>
<td>XSZTBDMCT05</td>
<td>0.15 (0.070)</td>
</tr>
<tr>
<td></td>
<td>Receiver type</td>
<td>1 (0.3)</td>
<td>XSZTBDMCR003</td>
<td>0.13 (0.060)</td>
</tr>
<tr>
<td>Replacement caps for M12 connector (Sold in lots of 10)</td>
<td>XUSLD light curtains and XUSLDS segments</td>
<td>XUSLZ600</td>
<td>0.002 (0.001)</td>
<td></td>
</tr>
<tr>
<td>Replacement caps for M8 connector (programming and diagnostic module XUSLPDM connection to light curtains) (Sold in lots of 10)</td>
<td>XUSLB/LDM light curtains and XUSLDS segments</td>
<td>XUSLZ610</td>
<td>0.02 (0.010)</td>
<td></td>
</tr>
<tr>
<td>Mounting kit (2 brackets)</td>
<td>XUSLB/LDM light curtains and XUSLDS segments</td>
<td>XUSLZ228</td>
<td>0.22 (0.100)</td>
<td></td>
</tr>
<tr>
<td>Sliding nuts (4 nuts) for rear or side mounting with XUSLZ228</td>
<td>XUSLB/LDM light curtains and XUSLDS segments</td>
<td>XUSLZ330</td>
<td>0.06 (0.040)</td>
<td></td>
</tr>
<tr>
<td>Arc suppressor (pair)</td>
<td>All light curtain types</td>
<td></td>
<td>XUSLZ500</td>
<td>0.04 (0.020)</td>
</tr>
<tr>
<td>IP 67 protection tube (see page 7/15)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User guide on CD-ROM</td>
<td>All light curtain types</td>
<td></td>
<td>XUSLZ450</td>
<td>0.02 (0.010)</td>
</tr>
<tr>
<td>Connection module for sensors XUSLD light curtains and muting indicator light (see page 7/22)</td>
<td></td>
<td></td>
<td>XPSLCM1</td>
<td>0.32 (0.150)</td>
</tr>
</tbody>
</table>
**Specifications, Catalog Numbers**

**Safety detection solutions**

Safety light curtains, type 4
XUSLB/XUSLDM protection tubes for light curtains with solid-state output and XUSLDS segments

---

### Environmental specifications

<table>
<thead>
<tr>
<th>Environmental specifications</th>
<th>XUSLZD7*****</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 67 protection tubes for XUSLB/XUSLDM light curtains and XUSLDS segments</td>
<td>XUSLZD7*****</td>
</tr>
<tr>
<td><strong>Air temperature</strong></td>
<td><strong>°F (°C)</strong></td>
</tr>
<tr>
<td>Operating</td>
<td>32 to +104 (0 to +40)</td>
</tr>
<tr>
<td>Storage</td>
<td>−13 to +158 (−25 to +70)</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>IP 67 conforming to IEC 60529</td>
</tr>
<tr>
<td><strong>Material</strong></td>
<td>Acrylic</td>
</tr>
<tr>
<td><strong>Sensing distance (Sn) reduction coefficient</strong></td>
<td>0.90</td>
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**Environmental chemicals**

<table>
<thead>
<tr>
<th>Chemical resistance</th>
<th>Aliphatic hydrocarbons</th>
<th>Resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkalis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aqueous solutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detergents and cleaners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inorganic diluted acids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorinated or aromatic hydrocarbons</td>
<td>Limited resistance</td>
<td></td>
</tr>
<tr>
<td>Esters</td>
<td></td>
<td></td>
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<tr>
<td>Ketones</td>
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**Environmental resistance**

<table>
<thead>
<tr>
<th>Environmental resistance</th>
<th>Adverse weather, sunlight (UV)</th>
<th>Resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity</td>
<td>Immersion in water</td>
<td></td>
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</tbody>
</table>

**Catalog numbers of IP 67 protection tubes**

<table>
<thead>
<tr>
<th>Description</th>
<th>For use with</th>
<th>Height in. (mm)</th>
<th>Catalog number</th>
<th>Weight lb (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XUSL5*****A0280</td>
<td>11.2 (284.4)</td>
<td>XUSLZD70280</td>
<td>5.84 (2.650)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A0320</td>
<td>12.8 (324.8)</td>
<td>XUSLZD70320</td>
<td>6.19 (2.810)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A0360</td>
<td>14.4 (364.5)</td>
<td>XUSLZD70360</td>
<td>6.53 (2.960)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A0440</td>
<td>17.5 (443.9)</td>
<td>XUSLZD70440</td>
<td>7.21 (3.270)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A0520</td>
<td>20.6 (523.4)</td>
<td>XUSLZD70520</td>
<td>7.89 (3.580)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A0600</td>
<td>23.8 (604.1)</td>
<td>XUSLZD70600</td>
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<td></td>
</tr>
<tr>
<td>XUSL5*****A0680</td>
<td>26.9 (683.6)</td>
<td>XUSLZD70680</td>
<td>9.24 (4.190)</td>
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<tr>
<td>XUSL5*****A0720</td>
<td>28.5 (724)</td>
<td>XUSLZD70720</td>
<td>9.59 (4.350)</td>
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</tr>
<tr>
<td>XUSL5*****A0760</td>
<td>30 (763)</td>
<td>XUSLZD70760</td>
<td>9.92 (4.500)</td>
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</tr>
<tr>
<td>XUSL5*****A0880</td>
<td>34.8 (882.8)</td>
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<tr>
<td>XUSL5*****A0920</td>
<td>36.3 (922.5)</td>
<td>XUSLZD70920</td>
<td>11.28 (5.120)</td>
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</tr>
<tr>
<td>XUSL5*****A0960</td>
<td>37.9 (963.6)</td>
<td>XUSLZD70960</td>
<td>11.62 (5.270)</td>
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</tr>
<tr>
<td>XUSL5*****A1040</td>
<td>41.1 (1042.9)</td>
<td>XUSLZD71040</td>
<td>12.30 (5.580)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A1120</td>
<td>44.2 (1122.3)</td>
<td>XUSLZD71120</td>
<td>12.99 (5.890)</td>
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</tr>
<tr>
<td>XUSL5*****A1200</td>
<td>47.4 (1203.8)</td>
<td>XUSLZD71200</td>
<td>13.67 (6.200)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A1360</td>
<td>53.6 (1362)</td>
<td>XUSLZD71360</td>
<td>15.01 (6.810)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A1400</td>
<td>55.2 (1401.7)</td>
<td>XUSLZD71400</td>
<td>15.37 (6.970)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A1520</td>
<td>59.9 (1521.5)</td>
<td>XUSLZD71520</td>
<td>16.38 (7.430)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A1560</td>
<td>61.5 (1563.3)</td>
<td>XUSLZD71560</td>
<td>16.71 (7.580)</td>
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</tr>
<tr>
<td>XUSL5*****A1640</td>
<td>64.6 (1641.3)</td>
<td>XUSLZD71640</td>
<td>17.89 (7.890)</td>
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</tr>
<tr>
<td>XUSL5*****A1720</td>
<td>67.7 (1720.8)</td>
<td>XUSLZD71720</td>
<td>18.08 (8.200)</td>
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</tr>
<tr>
<td>XUSL5*****A1800</td>
<td>71 (1802.9)</td>
<td>XUSLZD71800</td>
<td>18.76 (8.510)</td>
<td></td>
</tr>
<tr>
<td>XUSL5*****A1920</td>
<td>75.7 (1922.8)</td>
<td>XUSLZD71920</td>
<td>19.78 (8.970)</td>
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</tr>
<tr>
<td>XUSL5*****A2120</td>
<td>83.5 (2120.7)</td>
<td>XUSLZD72120</td>
<td>21.47 (9.740)</td>
<td></td>
</tr>
</tbody>
</table>

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(1) Sensing distance reduction coefficient must be taken into account for each pair of IP 67 protection tubes used.
### Dimensions

**Safety detection solutions**

**Preventa®**

Safety light curtains, type 4

Optimum XUSLB and Universal XUSLDM

with solid-state output

---

**Light curtains**

**XUSLB**

<table>
<thead>
<tr>
<th>Light curtains</th>
<th>XUS</th>
<th>b</th>
<th>b1</th>
<th>H</th>
<th>Protected height</th>
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<tbody>
<tr>
<td>LBS0280</td>
<td>11.2 (284.4)</td>
<td>16.6 (420.4)</td>
<td>15 (381.7)</td>
<td>11 (280)</td>
<td></td>
</tr>
<tr>
<td>LBS0320</td>
<td>12.8 (328.8)</td>
<td>18.1 (460.8)</td>
<td>16.6 (422.1)</td>
<td>12.6 (320)</td>
<td></td>
</tr>
<tr>
<td>LBS0360</td>
<td>14.4 (364.5)</td>
<td>19.7 (490.5)</td>
<td>19.2 (461.6)</td>
<td>14.2 (360)</td>
<td></td>
</tr>
<tr>
<td>LBS0440</td>
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**XUSLDM**

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### Specifications:

- **Catalog Numbers:**
- **Dimensions:**
- **Wiring Diagrams:**

---

**Catalog Numbers:**

(1) 2 elongated holes, 0.73 x 0.27 in. (18.5 x 6.8 mm).

(2) 4 elongated holes, 0.91 x 0.27 in. (23.2 x 6.8 mm).

(3) M12 male connector on 10.6 in. (270 mm) pigtail.

---

This document provided by Barr-Thorp Electric Co., Inc. 800-473-9123 www.barr-thorp.com
**Dimensions (continued)**

**Safety detection solutions Preventa®**

Safety light curtains, type 4

XUSLDS segments for Universal XUSLDM light curtains

Protection tube

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(1) Flexible 4.33 in. (0.11 m) cable.

**Catalog Numbers:**
- LZD70280
- LZD70320
- LZD70360
- LZD70440
- LZD70520
- LZD70600
- LZD70680
- LZD70720
- LZD70760
- LZD70880
- LZD70920
- LZD70960

**LZD70600 Dimensions:**
- Height: 1.46 in. (37.8 mm)
- Protection tube: 83.15 in. (211.5 mm)
- Protection tube: 4.86 in. (123.5 mm)
**Direct connection with XUSLB/LDM***

For testing prior to installation, you can select MPCE/EDM OFF (factory default setting). In that case, the MPCE/EDM line must be connected to the 0 V line of the system.

1. The auxiliary output connects to a PLC (optional).
2. If remote start is not used, connect the start line to the 0 V line.
3. The K1 and K2 coils must be protected using the arc suppressors included in the documentation kit.

**Note:** Relays K1 and K2 must have mechanically linked contacts.

**Connection via a Preventa® XPSAFL module**

For testing prior to installation, you can select MPCE/EDM OFF (factory default setting). In that case, the MPCE/EDM line must be connected to the 0 V line of the system.

1. The auxiliary output connects to a PLC (optional).
2. The light curtain must be configured with MPCE/EDM OFF and with automatic start.

**Note:** Relays K3 and K4 must have mechanically linked contacts.
Wiring diagrams (continued)

Safety detection solutions
Safety light curtains, type 4
Optimum XUSLB and Universal XUSLDM with solid-state output

### Transmitter

**Transmitter connector**

![Transmitter connector diagram]

**Transmitter status indicator**

1. Yellow LED

(1) Light curtain test input.

### Receiver

**Receiver connector**

![Receiver connector diagram]

**Receiver status indicator**

1. Blank: Orange LED
2. Interlock or Alarm: Yellow LED
3–4 Machine run: Green LED
   Machine stop: Red LED

### Programming and diagnostic module

**Description and connection to XUSLB/XUSLDM light curtains**

**XUSLPDM**

1. Screen
2. Navigation button for displaying menus and selecting functions
### Substitution table

**Light curtains with the closest functionalities**

## Safety detection solutions

**Safety light curtains, type 4**

Optimum XUSLB and Universal XUSLDM with solid-state output

### Optimum light curtains

**Detection capacity: 0.55 in. (14 mm).**

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**Detection capacity: 1.18 in. (30 mm).**

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*Note: The characteristics of the ranges (optics, connections, dimensions, mounting, functions, etc.) are not exactly the same. Please refer to the detailed characteristics of the XUSLB and XUSLD ranges and associated accessories when replacing a light curtain from the XUSLT range.*
# Substitution table

**Light curtains with the closest functionalities**

## Safety detection solutions

**Safety light curtains, type 4**

Optimum XUSLB and Universal XUSLDM with solid-state output

### Universal light curtains

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<td>XUSLTY5A1570, XUSLTY5B1570</td>
<td>XUSLDMY5A1560, XUSLDMY5A1640</td>
</tr>
<tr>
<td>XUSLTY5A1745, XUSLTY5B1745</td>
<td>XUSLDMY5A1720, XUSLDMY5A1800</td>
</tr>
<tr>
<td>XUSLTY5A1920, XUSLTY5B1920</td>
<td>XUSLDMY5A1920</td>
</tr>
<tr>
<td>XUSLTY5A2095, XUSLTY5B2095</td>
<td>XUSLDMY5A2120</td>
</tr>
</tbody>
</table>

*Note: The characteristics of the ranges (optics, connections, dimensions, mounting, functions, etc.) are not exactly the same. Please refer to the detailed characteristics of the XUSLB and XUSL ranges and associated accessories when replacing a light curtain from the XUSLT range.*

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This document provided by Barr-Thorp Electric Co., Inc. 800-473-9123 www.barr-thorp.com
Operating principle

Universal XUSLD light curtains have an integrated Muting function that is configurable using the XUSLPDM programming and diagnostic module. This function allows for the automatic passage of loaded pallets or parts for machining, without interrupting the transportation movement within the zone protected by the electro-sensitive protection equipment (ESPE) system. In addition to the safety light curtain, an XPSLCM1 connection module, which is connected directly to the top of the light curtain receiver, allows for the cabling of 2–4 muting sensors as well as an indicator light. In the event of a sequence error, the muting indicator light flashes (1 second interval); turning the Start key switch off and on restarts the system.

When the system is switched on by the start command, and the light curtain protection not interrupted, the main circuit is closed by the safety outputs of the XUSLD light curtain (solid-state safety outputs). In addition to the safety outputs, the light curtain incorporates signaling LEDs and an auxiliary output (alarm or status signaling) for sending system status information to the PLC. Four LEDs on the light curtain and one on the front face of the XPSLCM1 connection module provide information on the safety circuit status.

An interruption of the protection field monitored by the electro-sensitive protection equipment causes instantaneous opening of the safety outputs; the process PLC receives a stop command, and the LED display mounted on the front face indicates the change of state of the safety circuits. The Open state is maintained until the light beams are unobstructed and, if included in the light curtain configuration, the Start key switch operated.

The Muting function cannot be activated by energizing the muting sensors unless the safety outputs have been closed beforehand. To trigger the Muting function, the muting devices must be activated within the configurable time interval (50 ms to 5 seconds, in increments of 50 ms). During the activated muting phase, materials can be transported through the protection field without deactivating the safety outputs. In the event of intrusion into the hazardous zone, a person cannot activate the muting sensors in the same way, and the system stops.

While the Muting function is activated, a muting status indicator light is controlled by the XPSLCM1 connection module. The indicator light illuminates only when a muting signal is generated, and indicates the inhibition of the protection function. An indicator light error (short-circuit, open circuit) is immediately recognized and deactivates the Muting function.

Conditions to be observed for the Muting function

- The muting sensors must either be
  - thru-beam: XUK 0ARCTL2 (sensing distance 98.4 ft / 30 m) + XUK 0ARCTL2T
  - polarized reflex: XUK 0ARCTL2 (sensing distance 16.4 ft / 5 m) + reflector XUZ C50 or mechanical limit switches with contacts.
- \( dM \leq m \) to obtain continuous validation of the Muting function.
- Avoid the intrusion of persons during the muting phase. This phase is indicated by the indicator light connected to the muting indicator output of the XPSLCM1 connection module.
- A materials trolley must provide the muting signal before entering the protection field, and interrupt the muting signal on exiting once it has cleared all the sensors of the protection field.

ESPE: electro-sensitive protection equipment (light curtain)
A, B, D, C: muting sensors
m: trolley length
dM: distance between A, B and D, C
## Specifications

<table>
<thead>
<tr>
<th>Connection module type</th>
<th>XPSLCM1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum achievable safety level (1)</td>
<td>PL e/Category 4 conforming to EN/ISO 13849-1, SIL CL 3 conforming to EN/IEC 62061</td>
</tr>
</tbody>
</table>

### Conformity to standards

- EN/IEC 61496-1
- EN/IEC 61496-2
- EN/IEC 60204-1
- EN/IEC 60947-1
- EN/IEC 60947-5-1
- CE, TÜV, CSA, UL

### Certifications

- Product designed for max. use in safety related parts of control systems: Category 4

<table>
<thead>
<tr>
<th>Ambient air temperature</th>
<th>°F (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating</td>
<td>32 to +131 (0 to +55)</td>
</tr>
<tr>
<td>Storage</td>
<td>–13 to +167 (~25 to +75)</td>
</tr>
</tbody>
</table>

| Degree of protection conforming to IEC 529 | Terminals: IP 20 | Enclosure: IP 20 |

<table>
<thead>
<tr>
<th>Power supply by XUSLM light curtain</th>
<th>Voltage</th>
<th>mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>24 (±20%)</td>
<td></td>
</tr>
<tr>
<td>Maximum current</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum consumption</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated insulation voltage (Ui)</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated impulse withstand voltage (Uimp)</th>
<th>kV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shock resistance Conforming to IEC 68-2-6</th>
<th>gn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6 (10–55 Hz)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibration resistance Conforming to IEC 68-2-29</th>
<th>gn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 (16 ms)</td>
</tr>
</tbody>
</table>

### Number of light curtains that can be connected

- 1 transmitter-receiver pair

<table>
<thead>
<tr>
<th>Inputs for muting sensors</th>
<th>2–4 per Muting function</th>
</tr>
</thead>
<tbody>
<tr>
<td>- number of inputs to be monitored</td>
<td>2–4 per Muting function</td>
</tr>
<tr>
<td>- supply voltage of sensors</td>
<td>24</td>
</tr>
<tr>
<td>- output current of each sensor</td>
<td>&lt; 20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of muting sensors</th>
<th>Thru-beam, polarized reflex or sensors with volt-free contacts</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Synchronization time of muting sensors</th>
<th>ms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 to 500 (configurable in XUSLM light curtain in increments of 50 ms)</td>
</tr>
</tbody>
</table>

### Maximum muting time

- min: 2 or unlimited

### Safety outputs

- Number and type: 2 PNP (terminals 1 and 2)
- Breaking capacity of outputs: 30 V/100 mA

### Muting indicator light output

- 1 NPN

### Muting indicator light power

- W: 1 to 7 max.

### Muting indicator light type

- LED or filament bulb

### Signaling

- 1 LED

### Connection

<table>
<thead>
<tr>
<th>Type</th>
<th>1-wire connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without cable end</td>
</tr>
<tr>
<td></td>
<td>With cable end</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>2-wire connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without cable end</td>
</tr>
<tr>
<td></td>
<td>With cable end</td>
</tr>
</tbody>
</table>

((1) Using an appropriate and correctly connected control system.)
Description

XPSLCM1
To aid diagnostics, the connection module has 1 LED on the front face 1.

Catalog Numbers

<table>
<thead>
<tr>
<th>Description</th>
<th>Type of terminal block connection</th>
<th>Muting indicator light output</th>
<th>Supply</th>
<th>Catalog number</th>
<th>Weight oz (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection module for Muting function</td>
<td>Nonremovable</td>
<td>1 NPN</td>
<td>24 V</td>
<td>XPSLCM1</td>
<td>6.70 (0.190)</td>
</tr>
</tbody>
</table>

Spare parts

<table>
<thead>
<tr>
<th>Description</th>
<th>Power W</th>
<th>Catalog number</th>
<th>Weight oz (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muting indicator light kit (1)</td>
<td>5</td>
<td>XSZCM01</td>
<td>0.42 (0.012)</td>
</tr>
<tr>
<td>Replacement bulbs for muting indicator light kit comprising one lot of 10 replacement bulbs and 1 removal/insertion tool XBF X13</td>
<td>1 to 7</td>
<td>XSZCM02</td>
<td>0.56 (0.016)</td>
</tr>
</tbody>
</table>

Dimensions

XPSLCM1
Mounting on 35 mm rail

Muting indicator light kit XSZ CM01

(1) XVB or XVD with steady light LED or filament bulb can also be used.
Connection of XUSLDM light curtains with connection module XPSLCM1

Example configuration with XUSLDM light curtains

---

1. For testing prior to installation, you can select MPCE/EDM OFF (factory default setting). In that case, the MPCE/EDM line must be connected to the 0 V line of the system.
2. The auxiliary output connects to a PLC (optional).
3. If remote start is not used, connect the start line to the 0 V line.
4. The K1 and K2 coils must be protected using the arc suppressors included in the documentation kit.
Functional Diagrams

Safety detection solutions
Preventa® connection module XPSLCM1
for Muting function on
XUSLDM light curtains

Functional diagram of XUSLDM light curtain with connection module XPSLCM1
Start/Restart Interlock mode with 2 sensors

Configuration of module
Connection module alarm

Inputs
EDM/MPCE
Start (1)

Channel 1 inputs
Mutting sensor 2
OSSD
OSSD

Outputs
M-lamp

Outputs
OSSD
OSSD
Auxiliary
Auxiliary PNP
Alarm
Auxiliary PNP
Alarm

Power supply
1.50...500 ms
Inhibition: 2 min to = 1 Light curtain interrupted
1 < 3 s
1 < 1 ms
1 < 1 ms

(1) Press the Start button.

Override function

1st Sensor
2nd Sensor
Mutting indicator light
OSSD 1
OSSD 2
Start

Key 0 1

After 10 minutes
Functional diagrams (continued)

Safety detection solutions
Preventa® connection module XPSLCM1
for Muting function on
XUSLDM light curtains

Functional diagram of XUSLDM light curtain with connection module XPSLCM1
Start/Restart Interlock mode with 4 sensors

Configuration of module
Connection module alarm

Inputs
- EDM/MPCE
- Start (1)
- Muting sensor 1
- Muting sensor 2
- Muting sensor 3
- Muting sensor 4
- OSSD 1A
- OSSD 1B

Outputs
- OSSD A
- OSSD B
- Auxiliary
  - Auxiliary PNP
  - Alarm
- Outputs M-lamp 1

Override function
(1) Press the Start button.

After 10 minutes
1st Sensor
2nd Sensor
3rd Sensor
4th Sensor
Muting indicator light
OSSD 1
OSSD 2
Start

Key: 1

This document provided by Barr-Thorp Electric Co., Inc. 800-473-9123  www.barr-thorp.com
Safety detection solutions
Light curtains, type 4
XUSLP compact light curtains with solid-state output

Environmental specifications

| Light curtain type | XUSLPxxxx
|-------------------|-----------------
| Certifications | CE, TUV, UL, CSA
| European directives | Machinery directive 98/37/EC, Work equipment directive 89/655/EEC and EMC directive 89/336 EEC
| Maximum safety level (1) | Category 4 conforming to IEC 61496-1 and 2, PL = e, category 4 conforming to EN/ISO 13849-1 and EN/IEC 61508
| Reliability data BopEl | $PFH_{opEl} = 4.7 \times 10^{-9}$ h conforming to EN/IEC 61508
| Ambient air temperature | Operating \( ^\circ\)C \(+32\) to \(+131\) (0 to +55)
| Storage \( ^\circ\)C \(–13\) to \(+167\) (–25 to +75)
| Relative humidity | 95% maximum, without condensation
| Degree of protection | IP 65 and IP 67
| Shock and vibration resistance | Conforming to IEC 61496-1, Shock resistance: 10 g, impulse 16 ms, Vibration resistance: 10–55 Hz, amplitude: 0.35 \pm 0.05 mm
| Materials | Casing: aluminium with electrostatically applied red (RAL 3000) polyester paint finish; end caps: 20% fiberglass impregnated polycarbonate. Front cover: acrylic.
| Mountings | End brackets (included)

Optical specifications

| Minimum detection capacity | in. (mm) \(11.8, 15.7, 19.7, 23.6 (300, 400, 500, 600)\) and single beam (Body protection)
| Nominal sensing distance (Sn) | ft (m) 2.6 to 65.5 or 2.6 to 229.7 (0.8 to 20 or 0.8 to 70), depending on the configuration; and 2.6 to 28.2 (0.8 to 8) for light curtains with passive receiver
| Effective aperture angle (EAA) | 2.5° at 9.8 ft (3 m)
| Immunity to ambient light | Conforming to EN/IEC 61496-2

Electrical specifications

| Response time | ms < 16 to < 24, depending on the light beam coding selected
| Power supply | Transmitter mA \(\equiv 24 \pm 20\%\) 2 A conforming to EN/IEC 61496 and EN/IEC 60204-1, Receiver mA 100
| Maximum current power consumption (no-load) | Transmitter mA 100, Receiver mA 300
| Immunity to interference | Conforming to EN/IEC 61496-1
| Safety outputs OSSD (Output Signal Switching Devices) | 2 solid-state PNP (N.O.) outputs \(\equiv 650\) mA, \(\equiv 24\) V (short-circuit protected)
| Auxiliary output | 1 solid-state output 100 mA, \(\equiv 24\) V, PNP
| Monitoring activation of output switching devices (MPCE/EDM) | 50 mA, \(\equiv 24\) V
| Signaling | Transmitter 1 LED (power supply), Receiver 3 LEDs (stop, run, interlock) and a 2-digit display for diagnostics
| Connections (2) | Transmitter M12, 5-pin, male connector or terminal block, Receiver M12, 8-pin, male connector or terminal block
| Conductor | Transmitter/receiver pre-wired connector AWG (mm²) 22 \((0.35)\), tinned wires.
| Cable resistance | Transmitter/receiver \(\Omega\) 0.016 per ft (0.055 per m) for 22 AWG (0.35 mm²) wire
| Cable lengths | ft (m) Pre-wired connectors with cable lengths of 16.4, 32.8, 49.2 and 98.4 ft (5, 10, 15, and 30 m) are available separately. The maximum cable length is 394 ft (120 m), depending on the load current and power supply.

Functions

| Functions | Start: Auto/Manual, manual 1st cycle
| Monitoring the external switching devices (EDM = External Devices Monitoring) | Monitoring of the function (open or closed) as well as the response time of the power components. Parameters can be set using configuration switches.
| Test function | Initiates the stop instruction of the light curtain by opening the contact (simulated intrusion)
| Muting function (inhibition) | Possible with external module XPSLCM1150

Footnotes:
(1) Using an appropriate and correctly connected control system.
(2) Pre-wired female connectors must be ordered separately. See page 7/31.
Transmitter-receiver pairs for body protection (1)
Detection capacity: 11.8, 15.7, 19.7, 23.6 in. (300, 400, 500, 600 mm) and single beam.
Sensing distance: 2.6 to 65.5 ft or 2.6 to 229.7 ft (0.8 to 20 m or 0.8 to 70 m) (depending on the configuration).

<table>
<thead>
<tr>
<th>Detection capacity</th>
<th>Response time</th>
<th>Light beam coding</th>
<th>Number of light beams</th>
<th>Auxiliary output</th>
<th>Catalog number (2)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>in. (mm)</td>
<td>ms</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td></td>
<td>lb (kg)</td>
</tr>
<tr>
<td>19.69 (500)</td>
<td>&lt; 24 &lt; 20 &lt; 16</td>
<td>1</td>
<td>PNP</td>
<td>XUSLPZ1AM</td>
<td>9.92 (4.500)</td>
<td></td>
</tr>
<tr>
<td>23.62 (600)</td>
<td>&lt; 24 &lt; 20 &lt; 16</td>
<td>2</td>
<td>PNP</td>
<td>XUSLPZ2A0500M</td>
<td>13.89 (6.300)</td>
<td></td>
</tr>
<tr>
<td>15.75 (400)</td>
<td>&lt; 24 &lt; 20 &lt; 16</td>
<td>3</td>
<td>PNP</td>
<td>XUSLPZ3A0400M</td>
<td>15.87 (7.200)</td>
<td></td>
</tr>
<tr>
<td>19.69 (500)</td>
<td>&lt; 24 &lt; 20 &lt; 16</td>
<td>4</td>
<td>PNP</td>
<td>XUSLPZ4A0300M</td>
<td>18.08 (8.200)</td>
<td></td>
</tr>
<tr>
<td>11.81 (300)</td>
<td>&lt; 24 &lt; 20 &lt; 16</td>
<td>5</td>
<td>PNP</td>
<td>XUSLPZ5A0300M</td>
<td>20.94 (9.500)</td>
<td></td>
</tr>
<tr>
<td>11.81 (300)</td>
<td>&lt; 24 &lt; 20 &lt; 16</td>
<td>6</td>
<td>PNP</td>
<td>XUSLPZ6A0300M</td>
<td>22.93 (10.400)</td>
<td></td>
</tr>
</tbody>
</table>

(1) Includes 2 sets of 2 brackets with mountings and a user guide with certificate of conformity.
Pre-wired female connectors must be ordered separately. See page 7/31.

To order a receiver only, add the letter R to the end of the catalog number for the corresponding transmitter-receiver pair.
Example: XUSLPZ2A0600M becomes XUSLPZ2A0600MR for the receiver only.
To order a transmitter only, add the letter T to the end of the catalog number for the corresponding transmitter-receiver pair.
Example: XUSLPZ2A0600M becomes XUSLPZ2A0600MT for the transmitter only.

Transmitter-receiver pairs for body protection, with passive receiver (1)
Detection capacity: 19.7 and 23.6 in. (500 and 600 mm).
Sensing distance: 2.6 to 26.3 ft (0.8 to 8 m).

<table>
<thead>
<tr>
<th>Detection capacity</th>
<th>Response time</th>
<th>Light beam coding</th>
<th>Number of light beams</th>
<th>Auxiliary output</th>
<th>Catalog number (2)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>in. (mm)</td>
<td>ms</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td></td>
<td>lb (kg)</td>
</tr>
<tr>
<td>19.69 (500)</td>
<td>&lt; 24 &lt; 20 &lt; 16</td>
<td>1</td>
<td>PNP</td>
<td>XUSLPB2A500M</td>
<td>13.89 (6.300)</td>
<td></td>
</tr>
<tr>
<td>23.62 (600)</td>
<td>&lt; 24 &lt; 20 &lt; 16</td>
<td>2</td>
<td>PNP</td>
<td>XUSLPB2A600M</td>
<td>14.77 (6.700)</td>
<td></td>
</tr>
</tbody>
</table>

(1) Includes 2 sets of 2 brackets with mountings and a user guide with certificate of conformity.
Pre-wired female connectors must be ordered separately. See page 7/31.

To order a passive receiver, replace the letter M with the letter P at the end of the catalog number for the corresponding transmitter-receiver pair.
Example: XUSLPZ2A0600M becomes XUSLPZ2A0600MP for the passive receiver.
To order a transmitter only, add the letter T to the end of the catalog number for the corresponding transmitter-receiver pair.
Example: XUSLPZ2A0600M becomes XUSLPZ2A0600MT for the transmitter only.

Separate components and accessories: page 7/31
# Safety detection solutions

## Light curtains, type 4

XUSLP compact light curtains with solid-state output, with terminal block

### Transmitter-receiver pairs for body protection (1)

<table>
<thead>
<tr>
<th>Detection capacity</th>
<th>Response time A (ms)</th>
<th>Light beam coding</th>
<th>Number of light beams</th>
<th>Auxiliary output</th>
<th>Catalog number</th>
<th>Weight (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 24</td>
<td></td>
<td></td>
<td>PNP</td>
<td>XUSLPZ1AB</td>
<td>9.92 (4.500)</td>
</tr>
<tr>
<td>19.69 (500)</td>
<td>&lt; 24</td>
<td>&lt; 20</td>
<td>2</td>
<td>PNP</td>
<td>XUSLPZ2A0500B</td>
<td>13.89 (6.300)</td>
</tr>
<tr>
<td>23.62 (600)</td>
<td>&lt; 24</td>
<td>&lt; 20</td>
<td>2</td>
<td>PNP</td>
<td>XUSLPZ2A0600B</td>
<td>14.77 (6.700)</td>
</tr>
<tr>
<td>15.75 (400)</td>
<td>&lt; 24</td>
<td>&lt; 20</td>
<td>3</td>
<td>PNP</td>
<td>XUSLPZ3A0400B</td>
<td>15.87 (7.200)</td>
</tr>
<tr>
<td>19.69 (500)</td>
<td>&lt; 24</td>
<td>&lt; 20</td>
<td>3</td>
<td>PNP</td>
<td>XUSLPZ3A0500B</td>
<td>18.96 (8.600)</td>
</tr>
<tr>
<td>11.81 (300)</td>
<td>&lt; 24</td>
<td>&lt; 20</td>
<td>4</td>
<td>PNP</td>
<td>XUSLPZ4A0300B</td>
<td>18.08 (8.200)</td>
</tr>
<tr>
<td>11.81 (300)</td>
<td>&lt; 24</td>
<td>&lt; 20</td>
<td>5</td>
<td>PNP</td>
<td>XUSLPZ5A0300B</td>
<td>20.94 (9.500)</td>
</tr>
<tr>
<td>11.81 (300)</td>
<td>&lt; 24</td>
<td>&lt; 20</td>
<td>6</td>
<td>PNP</td>
<td>XUSLPZ6A0300B</td>
<td>22.93 (10.400)</td>
</tr>
</tbody>
</table>

(1) Includes 2 sets of 2 brackets with mountings and a user guide with certificate of conformity.

(2) To order a receiver only, add the letter **R** to the end of the catalog number for the corresponding transmitter-receiver pair.

Example: XUSLPZ2A0600B becomes XUSLPZ2A0600BR for the receiver only.

To order a transmitter only, add the letter **T** to the end of the catalog number for the corresponding transmitter-receiver pair.

Example: XUSLPZ2A0600B becomes XUSLPZ2A0600BT for the transmitter only.

### Other versions

Combining type 4 light curtains with an external module for the muting function. See page 2/218 of the Machine Safety Products catalog, MKTED208051EN-US.

### Separate components and accessories: page 7/31
Catalog Numbers (continued)

Safety detection solutions
Light curtains, type 4
XUSLP accessories for compact light curtains

Separate components
Power supplies, 90° mirror adapters, protective covers, anti-vibration kit, mounting bases
See pages 7/40 to 7/47.

Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Usage</th>
<th>Length</th>
<th>Catalog number</th>
<th>Weight (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mountings kit (2 brackets)</td>
<td>For XUSLP light curtains</td>
<td>–</td>
<td>XUSLZ219</td>
<td>0.99 (0.450)</td>
</tr>
<tr>
<td>Pre-wired female connectors</td>
<td>Transmitter type 16.40 (5)</td>
<td>XSZ PCT05</td>
<td>0.77 (0.350)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>32.81 (10)</td>
<td>XSZ PCT10</td>
<td>1.54 (0.700)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>49.21 (15)</td>
<td>XSZ PCT15</td>
<td>2.25 (1.020)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>98.43 (30)</td>
<td>XSZ PCT30</td>
<td>4.45 (2.020)</td>
<td></td>
</tr>
<tr>
<td>Receiver type</td>
<td>16.40 (5)</td>
<td>XSZ PCR05</td>
<td>0.77 (0.350)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>32.81 (10)</td>
<td>XSZ PCR10</td>
<td>1.54 (0.700)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>49.21 (15)</td>
<td>XSZ PCR15</td>
<td>2.25 (1.020)</td>
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</tr>
<tr>
<td></td>
<td>98.43 (30)</td>
<td>XSZ PCR30</td>
<td>4.45 (2.020)</td>
<td></td>
</tr>
<tr>
<td>Sliding nuts for side mounting</td>
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<td>–</td>
<td>XUSLZ320</td>
<td>0.99 (0.450)</td>
</tr>
<tr>
<td>User guide on CD-ROM</td>
<td>All light curtain types</td>
<td>–</td>
<td>XUSLZ450</td>
<td>0.04 (0.020)</td>
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<tr>
<td>Arc suppressor (pair)</td>
<td>All light curtain types</td>
<td>–</td>
<td>XUSLZ500</td>
<td>0.04 (0.020)</td>
</tr>
</tbody>
</table>

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### Dimensions

#### Safety detection solutions

Light curtains, type 4

XUSLP compact light curtains with solid-state output

<table>
<thead>
<tr>
<th>XUS</th>
<th>b (in. (mm))</th>
<th>b1 (in. (mm))</th>
<th>G (in. (mm))</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPZ1A</td>
<td>9.12 (231.6)</td>
<td>—</td>
<td>8.69 (220.7)</td>
</tr>
<tr>
<td>LPZ2A0500</td>
<td>28.80 (731.6)</td>
<td>19.69 (500)</td>
<td>28.37 (720.7)</td>
</tr>
<tr>
<td>LPZ2A0600</td>
<td>32.74 (831.6)</td>
<td>23.62 (600)</td>
<td>32.31 (820.7)</td>
</tr>
<tr>
<td>LPZ3A0400</td>
<td>40.61 (1031.6)</td>
<td>15.75 (400)</td>
<td>40.19 (1020.7)</td>
</tr>
<tr>
<td>LPZ3A0500</td>
<td>48.49 (1231.6)</td>
<td>19.69 (500)</td>
<td>48.06 (1220.7)</td>
</tr>
<tr>
<td>LPZ4A0300</td>
<td>44.93 (1141.1)</td>
<td>11.81 (300)</td>
<td>44.12 (1120.7)</td>
</tr>
<tr>
<td>LPZ5A0300</td>
<td>56.36 (1431.6)</td>
<td>11.81 (300)</td>
<td>55.56 (1411.2)</td>
</tr>
<tr>
<td>LPZ6A0300</td>
<td>68.17 (1731.6)</td>
<td>11.81 (300)</td>
<td>67.37 (1711.2)</td>
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</table>

Dual Dimensions: in. (mm)
## Safety detection solutions

**Light curtains, type 4**

XUSLP compact light curtains with solid-state output

### Light curtains

<table>
<thead>
<tr>
<th>XUS</th>
<th>b</th>
<th>b1</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in. (mm)</td>
<td>in. (mm)</td>
<td>in. (mm)</td>
</tr>
<tr>
<td>LPB2A500M</td>
<td>30.75 (781.1)</td>
<td>19.69 (500)</td>
<td>29.95 (760.7)</td>
</tr>
<tr>
<td>LPB2A600M</td>
<td>34.69 (881.1)</td>
<td>23.62 (600)</td>
<td>33.89 (860.7)</td>
</tr>
</tbody>
</table>

**Dimensions (continued)**

Dual Dimensions:
in. (mm)
Safety detection solutions
Light curtains, type 4
XUSLP compact light curtains with solid-state output

Direct connection with XUSLP

(1) For testing prior to installation, you can select MPCE/EDM OFF (factory default setting). In that case, the MPCE/EDM line must be connected to the 0 V line of the system.
(2) The auxiliary output connects to a PLC (optional).
(3) If remote start is not used, connect the start line to the 0 V line.

Connection via a Preventa® XPSAFL module

(1) The auxiliary output connects to a PLC (optional).
(2) The light curtain must be configured with MPCE/EDM OFF and with automatic start.
Safety detection solutions
Light curtains, type 4
XUSLP compact light curtains with solid-state output

<table>
<thead>
<tr>
<th>XUSLPZ/LPBP</th>
<th>Transmitter status indicator</th>
<th>Configuration indicator XUSLPZ</th>
<th>Configuration indicator XUSLPB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-wired connector of transmitter (XUSLPZ)</td>
<td>Transmitter status indicator XUSLPZ</td>
<td>Configuration indicator XUSLPB</td>
<td></td>
</tr>
<tr>
<td>MTS return</td>
<td>GN</td>
<td>Yellow LED</td>
<td></td>
</tr>
<tr>
<td>BK</td>
<td>BU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>WH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ 24 V</td>
<td>0 V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Receiver status indicator</th>
<th>Configuration indicator XUSLPZ and XUSLPB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-wired connector of receiver (XUSLPZ) and pre-wired connector of transmitter-receiver (XUSLPB)</td>
<td>Receiver status indicator XUSLPZ and XUSLPB</td>
<td></td>
</tr>
<tr>
<td>MPCE/EDM</td>
<td>Start</td>
<td>1 Interlock or Alarm yellow LED</td>
</tr>
<tr>
<td>PK</td>
<td>GY</td>
<td>2 Machine stop red LED</td>
</tr>
<tr>
<td>OSSD2</td>
<td>OSSD1</td>
<td>3 Machine run green LED</td>
</tr>
<tr>
<td>RD</td>
<td>WH</td>
<td>4 2-digit display</td>
</tr>
<tr>
<td>BN</td>
<td>+ 24 V</td>
<td></td>
</tr>
<tr>
<td>0 V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Connection to terminal block

Connection to M12 connector

---

Wiring Diagrams (continued)
Safety detection solutions
Light curtains, type 2
XUSLN slim, compact light curtains with solid-state output

<table>
<thead>
<tr>
<th>Environmental specifications</th>
<th>XUSLNG</th>
<th>1.18 in. (30 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conformity to standards</td>
<td>IEC 61496-1 and IEC 61496-2 (Type 2 ESPE)</td>
<td></td>
</tr>
<tr>
<td>Certifications</td>
<td>CE, TUV, UL, CSA</td>
<td></td>
</tr>
<tr>
<td>European directives</td>
<td>Machinery directive 98/37/EC, Work equipment directive 89/655/EEC and EMC directive 89/336 EEC</td>
<td></td>
</tr>
<tr>
<td>Maximum safety level (1)</td>
<td>Category 4 conforming to IEC 61496-1 and 2. PL = e, category 4 conforming to EN/ISO 13849-1 and EN/IEC 61508</td>
<td></td>
</tr>
<tr>
<td>Reliability data B10d</td>
<td>PFHd = 4.9E-6 1/h conforming to EN/IEC 61508</td>
<td></td>
</tr>
<tr>
<td>Ambient air temperature</td>
<td>Operating °F (°C) +32 to +131 (0 to +55)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Storage °F (°C) −13 to +167 (−25 to +75)</td>
<td></td>
</tr>
<tr>
<td>Relative humidity</td>
<td>95% maximum, without condensation</td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 65</td>
<td></td>
</tr>
<tr>
<td>Shock and vibration resistance</td>
<td>Conforming to IEC 61496-1</td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>Casing: aluminium with electrostatically applied red (RAL 3000) polyester paint finish; end caps: 30% fiberglass impregnated nylon; front cover: acrylic.</td>
<td></td>
</tr>
<tr>
<td>Mountings</td>
<td>End brackets (included)</td>
<td></td>
</tr>
</tbody>
</table>

Optical specifications

- Minimum detection capacity in. (mm) 1.18 (30) (Hand)
- Nominal sensing distance (Sn) ft (m) 1–49.3 (0.3–15)
- Protected height in. (mm) 5.29–57.87 in. (150–1500 mm)
- Effective aperture angle (EAA) 5° at 3 m conforming to IEC 61496-1 and IEC 61496-2 (Type 2 ESPE)
- Light source GaAlAs LED, 880 nm
- Immunity to ambient light Conforming to IEC/EN 61496-2

Electrical specifications

- Response time ms 14–24
- Power supply
  - Transmitter mA 24 V ± 20% 2 A conforming to IEC 61496 and IEC 60204-1 (−10% using the EDM function)
  - Receiver mA 1.09 (with maximum load)
- Maximum current power consumption (no-load)
  - Transmitter mA 50
  - Receiver mA 90
- Immunity to interference Conforming to EN 61496-1 and EN 61496-2
- Safety outputs OSSD (output signal switching devices) 2 solid-state PNP (N.O.) outputs ≤ 500 mA, ≤ 24 V (short-circuit protection)
- Signaling
  - Transmitter 2 LEDs (power supply and diagnostic)
  - Receiver 4 LEDs (stop, run, top alignment and bottom alignment)
- Connections (2)
  - Receiver M12, 4-pin, male connector
  - Receiver M12, 5-pin, male connector
- Pre-wired connectors Transmitter/Receiver AWG (mm²) 22 (0.25) Tinned wires.
- Cable resistance Transmitter/Receiver Ω 0.028 Ohm/ft (0.003 Ohm/m) for 22 AWG (0.25 mm²) wire
- Cable lengths ft (m) Pre-wired connectors with cable lengths of 9.84, 32.81, and 98.43 ft (3, 10, and 30 m) are available separately. The maximum cable length is 164 ft (50 m), depending on the load current and power supply.

Functions

- Functions
  - Start:
  - Automatic: model XUSLNG5C
  - Manual: model XUSLNG5D
  - Alignment aid using 2 LEDs
  - LED display of operating modes
  - Monitoring of the external switching devices EDM/MPCE
- Muting function (inhibition) Possible with external module XPSLCM1150

(1) Using an appropriate and correctly connected control system.
(2) Pre-wired female connectors must be ordered separately. See page 7/37.
Safety detection solutions
Light curtains, type 2
XUSLN slim, compact light curtains with solid-state output

Transmitter-receiver system for hand protection (1)

Detection capacity: 1.18 in. (30 mm). Sensing distance: 0.89 to 49.21 ft (0.3 to 15 m).

<table>
<thead>
<tr>
<th>Protected height (in. (mm))</th>
<th>Response time (ms)</th>
<th>Number of light beams</th>
<th>Alarm output</th>
<th>Catalog number (2)</th>
<th>Weight (lb (kg))</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.91 (150)</td>
<td>14</td>
<td>7</td>
<td>PNP</td>
<td>XUSLNG5C0150</td>
<td>5.95 (2.700)</td>
</tr>
<tr>
<td>11.81 (300)</td>
<td>15</td>
<td>14</td>
<td>PNP</td>
<td>XUSLNG5C0300</td>
<td>6.39 (2.900)</td>
</tr>
<tr>
<td>17.72 (450)</td>
<td>16</td>
<td>21</td>
<td>PNP</td>
<td>XUSLNG5C0450</td>
<td>7.05 (3.200)</td>
</tr>
<tr>
<td>23.62 (600)</td>
<td>17</td>
<td>28</td>
<td>PNP</td>
<td>XUSLNG5C0600</td>
<td>7.50 (3.400)</td>
</tr>
<tr>
<td>29.53 (750)</td>
<td>18</td>
<td>35</td>
<td>PNP</td>
<td>XUSLNG5C0750</td>
<td>7.94 (3.600)</td>
</tr>
<tr>
<td>35.43 (900)</td>
<td>19</td>
<td>42</td>
<td>PNP</td>
<td>XUSLNG5C0900</td>
<td>8.60 (3.900)</td>
</tr>
<tr>
<td>41.34 (1050)</td>
<td>20</td>
<td>49</td>
<td>PNP</td>
<td>XUSLNG5C1050</td>
<td>9.04 (4.100)</td>
</tr>
<tr>
<td>47.24 (1200)</td>
<td>21</td>
<td>56</td>
<td>PNP</td>
<td>XUSLNG5C1200</td>
<td>9.48 (4.300)</td>
</tr>
<tr>
<td>53.15 (1350)</td>
<td>22</td>
<td>63</td>
<td>PNP</td>
<td>XUSLNG5C1350</td>
<td>9.92 (4.500)</td>
</tr>
<tr>
<td>59.06 (1500)</td>
<td>23</td>
<td>70</td>
<td>PNP</td>
<td>XUSLNG5C1500</td>
<td>10.58 (4.800)</td>
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</table>

<table>
<thead>
<tr>
<th>Protected height (in. (mm))</th>
<th>Response time (ms)</th>
<th>Number of light beams</th>
<th>Alarm output</th>
<th>Catalog number (2)</th>
<th>Weight (lb (kg))</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.91 (150)</td>
<td>14</td>
<td>7</td>
<td>PNP</td>
<td>XUSLNG5D0150</td>
<td>5.95 (2.700)</td>
</tr>
<tr>
<td>11.81 (300)</td>
<td>15</td>
<td>14</td>
<td>PNP</td>
<td>XUSLNG5D0300</td>
<td>6.39 (2.900)</td>
</tr>
<tr>
<td>17.72 (450)</td>
<td>16</td>
<td>21</td>
<td>PNP</td>
<td>XUSLNG5D0450</td>
<td>7.05 (3.200)</td>
</tr>
<tr>
<td>23.62 (600)</td>
<td>17</td>
<td>28</td>
<td>PNP</td>
<td>XUSLNG5D0600</td>
<td>7.50 (3.400)</td>
</tr>
<tr>
<td>29.53 (750)</td>
<td>18</td>
<td>35</td>
<td>PNP</td>
<td>XUSLNG5D0750</td>
<td>7.94 (3.600)</td>
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<tr>
<td>35.43 (900)</td>
<td>19</td>
<td>42</td>
<td>PNP</td>
<td>XUSLNG5D0900</td>
<td>8.60 (3.900)</td>
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<td>41.34 (1050)</td>
<td>20</td>
<td>49</td>
<td>PNP</td>
<td>XUSLNG5D1050</td>
<td>9.04 (4.100)</td>
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<td>21</td>
<td>56</td>
<td>PNP</td>
<td>XUSLNG5D1200</td>
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<td>63</td>
<td>PNP</td>
<td>XUSLNG5D1350</td>
<td>9.92 (4.500)</td>
</tr>
<tr>
<td>59.06 (1500)</td>
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<td>70</td>
<td>PNP</td>
<td>XUSLNG5D1500</td>
<td>10.58 (4.800)</td>
</tr>
</tbody>
</table>

(1) Includes a test rod, 2 sets of 2 brackets with mountings, and a user guide with certificate of conformity and 1 arc suppressor set.

Pre-wired female connectors must be ordered separately. See below.

(2) To order a transmitter only, replace the letter C or D with E and add the letter T to the end of the catalog number for the corresponding transmitter-receiver pair.
Example: XUSLNG5C0150 becomes XUSLNG5E0150T for the transmitter only.
To order a receiver only, add the letter R to the end of the catalog number for the corresponding transmitter-receiver pair.
Example: XUSLNG5C0150 becomes XUSLNG5C0150R for the receiver only.

Other versions
Combining type 2 light curtains with external module for Muting function and monitoring 2–4 light curtains.
See page 2/218 of the Machine Safety Products catalog, MKTED208051EN-US.

Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>For use with</th>
<th>Length (ft (m))</th>
<th>Catalog number</th>
<th>Weight (oz (kg))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting kit (2 brackets)</td>
<td>XUSLN light curtains</td>
<td>–</td>
<td>XUSLZ218</td>
<td>0.99 (0.450)</td>
</tr>
<tr>
<td>Pre-wired female connectors</td>
<td>Transmitter type</td>
<td>XUSLN light curtains</td>
<td>9.84 (3) XSZ NCT03</td>
<td>1.50 (0.680)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.81 (10) XSZ NCT10</td>
<td>2.01 (0.910)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>98.43 (30) XSZ NCT30</td>
<td>3.00 (1.360)</td>
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</tr>
<tr>
<td></td>
<td>Receiver type</td>
<td>XUSLN light curtains</td>
<td>9.84 (3) XSZ NCR03</td>
<td>1.50 (0.680)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.81 (10) XSZ NCR10</td>
<td>2.01 (0.910)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>98.43 (30) XSZ NCR30</td>
<td>3.00 (1.360)</td>
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</tr>
<tr>
<td>Arc suppressor (pair)</td>
<td>All types of light curtains</td>
<td>–</td>
<td>XUSLZ500</td>
<td>0.04 (0.020)</td>
</tr>
<tr>
<td>User guide on CD-ROM</td>
<td>All types of light curtains and accessories</td>
<td>–</td>
<td>XUSLZ450</td>
<td>0.04 (0.020)</td>
</tr>
</tbody>
</table>

Separate components

Power supplies, 90° mirror adapters, anti-vibration kit and mounting bases
See pages 7/40 to 7/47.

Catalog Numbers

This document provided by Barr-Thorp Electric Co., Inc.  800-473-9123   www.barr-thorp.com
Safety detection solutions
Light curtains, type 2
XUSLN slim, compact light curtains with solid-state output

Dimensions
Slim, compact light curtains

<table>
<thead>
<tr>
<th>Model</th>
<th>b (in.)</th>
<th>b1 (in.)</th>
<th>H (in.)</th>
<th>Protected height (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNN0150</td>
<td>5.79 (147)</td>
<td>10.71 (272)</td>
<td>9.67 (245.6)</td>
<td>5.91 (150)</td>
</tr>
<tr>
<td>LNN0300</td>
<td>11.57 (294)</td>
<td>16.50 (419)</td>
<td>15.46 (392.6)</td>
<td>11.81 (300)</td>
</tr>
<tr>
<td>LNN0450</td>
<td>17.36 (441)</td>
<td>22.28 (566)</td>
<td>21.24 (539.5)</td>
<td>17.72 (450)</td>
</tr>
<tr>
<td>LNN0600</td>
<td>23.15 (588)</td>
<td>28.07 (713)</td>
<td>27.03 (686.6)</td>
<td>23.62 (600)</td>
</tr>
<tr>
<td>LNN0750</td>
<td>28.94 (735)</td>
<td>33.86 (860)</td>
<td>32.82 (833.6)</td>
<td>29.53 (750)</td>
</tr>
<tr>
<td>LNN0900</td>
<td>34.72 (882)</td>
<td>39.65 (1007)</td>
<td>38.61 (980.6)</td>
<td>35.43 (900)</td>
</tr>
<tr>
<td>LNN1050</td>
<td>40.51 (1029)</td>
<td>45.43 (1154)</td>
<td>44.39 (1127.6)</td>
<td>41.34 (1050)</td>
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<tr>
<td>LNN1200</td>
<td>46.30 (1176)</td>
<td>51.22 (1301)</td>
<td>48.30 (1214.6)</td>
<td>47.24 (1200)</td>
</tr>
<tr>
<td>LNN1350</td>
<td>52.09 (1323)</td>
<td>57.01 (1448)</td>
<td>55.97 (1421.6)</td>
<td>53.15 (1350)</td>
</tr>
<tr>
<td>LNN1500</td>
<td>57.87 (1470)</td>
<td>62.80 (1595)</td>
<td>61.76 (1568.6)</td>
<td>59.06 (1500)</td>
</tr>
</tbody>
</table>

(1) 1 elongated hole Ø 0.27 x 0.66 in. (Ø 6.75 x 16.75 mm.)
(2) M12 male connector.

Connections

Transmitter
Pre-wired connector of transmitter XSZ NCT
Transmitter status indicator
1 Interlock or Alarm yellow LED
2 Switch-on/Machine run green LED

Receiver
Pre-wired connector of receiver XSZ NCR
Receiver status indicator
1 Top alignment yellow LED
2 Bottom alignment yellow LED
3 Stop red LED
4 Run green LED
Direct connection with XUSLNG5D

(1) The K1 and K2 coils must be protected using the arc suppressors included in the documentation kit.
(2) For the EDM function, contactors LC1D and control relays CA4KBNW3, and CA3KNBD are recommended.

Connection of XUSLN5C light curtain via a Preventa® XPSAFL module

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This document provided by Barr-Thorp Electric Co., Inc. 800-473-9123 www.barr-thorp.com
90° mirror adapter for light curtains

Glass mirror (0.88 Sn) (/)

<table>
<thead>
<tr>
<th>Description</th>
<th>For use with light curtains</th>
<th>Height (2) in. (mm)</th>
<th>Catalog number</th>
<th>Weight lb (kg)</th>
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Stainless steel mirror (0.82 Sn) (/)

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<th>Weight lb (kg)</th>
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(1) Sensing distance reduction coefficient must be taken into account for each 90° mirror adapter used.
(2) Usable reflective height.

Accessories

Laser alignment tool

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<th>Description</th>
<th>Usage</th>
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Power supplies for XUSLP® light curtains

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<th>Input voltage</th>
<th>Secondary voltage</th>
<th>Nominal power</th>
<th>Nominal current</th>
<th>Output voltage</th>
<th>Nominal power</th>
<th>Nominal current</th>
<th>Reset</th>
<th>Conforming to standard EN 61000-3-2</th>
<th>Catalog number</th>
<th>Weight lb (kg)</th>
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<td>120 W</td>
<td>24-28.8 V</td>
<td>72 W</td>
<td>3 A Auto/manual</td>
<td>220 V</td>
<td>240 W</td>
<td>10 A Auto/manual</td>
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<tr>
<td>120 W</td>
<td>220 V</td>
<td>240 W</td>
<td>10 A Auto/manual</td>
<td>220 V</td>
<td>240 W</td>
<td>10 A Auto/manual</td>
<td>Yes</td>
<td>ABLRPS24050</td>
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<tr>
<td>220 V</td>
<td>240 W</td>
<td>240 W</td>
<td>10 A Auto/manual</td>
<td>220 V</td>
<td>240 W</td>
<td>10 A Auto/manual</td>
<td>Yes</td>
<td>ABLRPS24100</td>
<td>2.2 (1.000)</td>
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Specifications: page 7/6
Catalog Numbers: page 7/40
Dimensions: pages 7/44 and 7/47
Wiring diagrams: page 7/47
## Environmental specifications

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<th>Parameter</th>
<th>Specification</th>
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<td>Operating Temperature °F (°C)</td>
<td>32 to +131 (0 to +55)</td>
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<tr>
<td>Storage Temperature °F (°C)</td>
<td>−13 to +158 (−25 to +70)</td>
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<td>Material</td>
<td>Polycarbonate</td>
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## Environmental chemicals

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<th>Resistance</th>
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<td>Alcohols, Alkalis</td>
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<tr>
<td>Detergents and cleaners</td>
<td>Limited resistance</td>
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<tr>
<td>Greases and oils</td>
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<tr>
<td>Silicone oils and greases not containing alkaline products</td>
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<tr>
<td>Amines</td>
<td>Not resistant</td>
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<tr>
<td>Aromatic hydrocarbons</td>
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<td>Detergents and cleaners containing alkaline</td>
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<td>Esters</td>
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<td>Halogenated hydrocarbons</td>
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<td>Ketones</td>
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<tr>
<td>Silicone oils and greases containing alkaline products</td>
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## Catalog numbers of protective covers

<table>
<thead>
<tr>
<th>Description</th>
<th>Height in. (mm)</th>
<th>Weight lb (kg)</th>
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</thead>
<tbody>
<tr>
<td>Polycarbonate protective covers for transmitter-receiver pair (0.91 Sn) (1) (Sold in sets of 2)</td>
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<tr>
<td>XUSLB/DM280 12.2 (310)</td>
<td>XUSLZWB0280</td>
<td>0.6 (0.282)</td>
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<td>XUSLB/DM320 13.8 (350)</td>
<td>XUSLZWB0320</td>
<td>0.7 (0.318)</td>
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<td>XUSLB/DM360 15.4 (390)</td>
<td>XUSLZWB0360</td>
<td>0.8 (0.354)</td>
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<td>XUSLB/DM440 18.5 (470)</td>
<td>XUSLZWB0440</td>
<td>0.9 (0.426)</td>
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<td>XUSLB/DM520 21.7 (550)</td>
<td>XUSLZWB0520</td>
<td>1.1 (0.497)</td>
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<td>XUSLB/DM600 24.8 (630)</td>
<td>XUSLZWB0600</td>
<td>1.3 (0.569)</td>
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<td>XUSLB/DM680 28 (710)</td>
<td>XUSLZWB0680</td>
<td>1.4 (0.641)</td>
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<td>XUSLB/DM720 29.5 (750)</td>
<td>XUSLZWB0720</td>
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<td>XUSLB/DM760 31.1 (790)</td>
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<td>XUSLB/DM880 35.8 (910)</td>
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<td>XUSLB/DM920 37.4 (950)</td>
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<td>XUSLB/DM960 39 (990)</td>
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<td>2.0 (0.893)</td>
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<td>XUSLZWB2120</td>
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### Note

(1) Sensing distance reduction coefficient must be taken into account for each pair of polycarbonate protective covers used.
## Anti-vibration kit

### Selection according to weight and application

| Weight classes | Light curtain type | Height (in. (mm)) | Weight class | Type of mirror adapters
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<tr>
<td>Light curtain type</td>
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<td>Weight class</td>
<td>Type of mirror adapters</td>
<td>Height (in. (mm))</td>
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### Applications

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### Shock absorber specifications

<table>
<thead>
<tr>
<th>Characteristics per shock absorber</th>
<th>Compression mounted</th>
<th>Shear mounted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum load</td>
<td>Torque</td>
<td>Natural frequency</td>
</tr>
<tr>
<td>lb (kg)</td>
<td>lb•in (N•m)</td>
<td>Hz</td>
</tr>
<tr>
<td>XSZSMK</td>
<td>18.0 (8.16)</td>
<td>222.5 (25.16)</td>
</tr>
<tr>
<td>XSZSMK1</td>
<td>4.8 (2.177)</td>
<td>96.1 (10.86)</td>
</tr>
<tr>
<td>XSZSMK2</td>
<td>55.0 (24.94)</td>
<td>949.7 (107.39)</td>
</tr>
</tbody>
</table>

### Catalog numbers of anti-vibration kits

<table>
<thead>
<tr>
<th>Description</th>
<th>For use with</th>
<th>Catalog number</th>
<th>Weight (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-vibration kit</td>
<td>All light curtain types and kit consisting of 8 shock absorbers, stud mounting, 16 washers and 16 nuts included with kit.</td>
<td>XSZSMK</td>
<td>0.07 (0.030)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>XSZSMK1</td>
<td>0.04 (0.020)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>XSZSMK2</td>
<td>0.1 (0.045)</td>
</tr>
</tbody>
</table>

### Mounting kit for XUSLN

<table>
<thead>
<tr>
<th>Description</th>
<th>For use with</th>
<th>Catalog number</th>
<th>Weight (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-vibration kit</td>
<td></td>
<td>XUSLZZZ27</td>
<td>1.0 (0.450)</td>
</tr>
</tbody>
</table>
Catalog Numbers (continued)

Preventa®
Safety detection solutions
Accessories for safety light curtains types 2 and 4

Mounting base for light curtains and mirrors

Environmental specifications

<table>
<thead>
<tr>
<th></th>
<th>°F (°C)</th>
<th>°F (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient air temperature</td>
<td>–13 to 158 (–25 to +70)</td>
<td>–13 to 158 (–25 to +70)</td>
</tr>
<tr>
<td>Storage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Materials

- Mounting base: steel
- End protection: black polycarbonate, 20% fiberglass

Catalog Numbers

### Mounting bases

<table>
<thead>
<tr>
<th>Désignation</th>
<th>For use with</th>
<th>Protected height</th>
<th>Catalog number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Light curtains</td>
<td>Mirrors</td>
<td>IP 67 tube</td>
<td>Height</td>
</tr>
<tr>
<td>XUSZC</td>
<td>5.9 –35.4 (150–900)</td>
<td>7.2 –35.2 (182–894)</td>
<td>19.8 –38.6 (503–981)</td>
<td>47.2 (1200)</td>
</tr>
<tr>
<td>XUSZC</td>
<td>36.2 –59.1 (900–1500)</td>
<td>39.2 –59.2 (995–1503)</td>
<td>43.4 –63.8 (1102–1620)</td>
<td>70.9 (1800)</td>
</tr>
<tr>
<td>XUSZC</td>
<td>59.6 –70.9 (1520–1800)</td>
<td>63.2 –67.2 (1605–1706)</td>
<td>68.5 –76.3 (1740–1903)</td>
<td>82.7 (2100)</td>
</tr>
<tr>
<td>XUSZC</td>
<td>75.6 –82.5 (1920–2095)</td>
<td>75.2 (1910)</td>
<td>79.6 –84.3 (2021–2141)</td>
<td>94.5 (2400)</td>
</tr>
<tr>
<td>XUSZC</td>
<td>88.2 (2240)</td>
<td>92 (2336)</td>
<td>122 (3100)</td>
<td>XUSZC3100</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>For use with</th>
<th>Catalog number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting kit</td>
<td>Mounting base XUSZC</td>
<td>XUSZCA</td>
<td>1.0 (0.450)</td>
</tr>
<tr>
<td>Floor mounting kit</td>
<td>Mounting base XUSZC</td>
<td>XUSZCB</td>
<td>1.0 (0.450)</td>
</tr>
</tbody>
</table>
Preventa®
Safety detection solutions
Accessories for safety light curtains types 2 and 4

**Dimensions**

### 90° mirror adapters + Mounting clamps

<table>
<thead>
<tr>
<th>XUSZM***</th>
<th>XUSZA***</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Glass</th>
<th>Stainless steel</th>
<th>b</th>
<th>H</th>
<th>in. (mm)</th>
<th>in. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZM0102</td>
<td>ZA102</td>
<td>5.5 (140)</td>
<td>0.7 (182)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZM0152</td>
<td>ZA152</td>
<td>7.5 (191)</td>
<td>9.2 (233)</td>
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<td></td>
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<tr>
<td>ZM0305</td>
<td>ZA305</td>
<td>13.5 (343)</td>
<td>15.2 (386)</td>
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<td></td>
<td></td>
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<tr>
<td>ZM0457</td>
<td>ZA457</td>
<td>19.5 (495)</td>
<td>21.2 (538)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZM0508</td>
<td>ZA508</td>
<td>21.5 (546)</td>
<td>23.2 (589)</td>
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<td></td>
<td></td>
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<tr>
<td>ZM0610</td>
<td>ZA610</td>
<td>25.5 (648)</td>
<td>27.2 (690)</td>
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<td></td>
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<tr>
<td>ZM0711</td>
<td>ZA711</td>
<td>29.5 (749)</td>
<td>31.2 (792)</td>
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</tr>
<tr>
<td>ZM0762</td>
<td>ZA762</td>
<td>31.5 (800)</td>
<td>33.2 (843)</td>
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<td></td>
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<tr>
<td>ZM0813</td>
<td>ZA813</td>
<td>33.5 (851)</td>
<td>35.2 (894)</td>
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</tr>
<tr>
<td>ZM0914</td>
<td>ZA914</td>
<td>37.5 (953)</td>
<td>39.2 (995)</td>
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<tr>
<td>ZM1016</td>
<td>ZA1016</td>
<td>41.5 (1054)</td>
<td>43.2 (1097)</td>
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<tr>
<td>ZM1067</td>
<td>ZA1067</td>
<td>43.5 (1105)</td>
<td>45.2 (1148)</td>
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<tr>
<td>ZM1219</td>
<td>ZA1219</td>
<td>49.5 (1257)</td>
<td>51.2 (1300)</td>
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<tr>
<td>ZM1321</td>
<td>ZA1321</td>
<td>53.5 (1359)</td>
<td>55.2 (1402)</td>
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<tr>
<td>ZM1372</td>
<td>ZA1372</td>
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<td>57.2 (1452)</td>
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<tr>
<td>ZM1422</td>
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<td>59.2 (1503)</td>
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<tr>
<td>ZM1524</td>
<td>ZA1524</td>
<td>61.5 (1582)</td>
<td>63.2 (1605)</td>
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<tr>
<td>ZM1626</td>
<td>ZA1626</td>
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<td>67.2 (1706)</td>
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<tr>
<td>ZM1630</td>
<td>ZA1630</td>
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<td>75.2 (1910)</td>
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<tr>
<td>ZM2134</td>
<td>ZA2134</td>
<td>85.5 (2172)</td>
<td>87.2 (2214)</td>
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### Protective cover

<table>
<thead>
<tr>
<th>XUSZWS*** for XUL B/D</th>
<th>XUS</th>
<th>b in. (mm)</th>
<th>XUSZWS*** for XULP</th>
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</thead>
<tbody>
<tr>
<td>LZWB0280</td>
<td>12.2 (310)</td>
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<tr>
<td>LZWB0320</td>
<td>13.8 (350)</td>
<td></td>
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</tr>
<tr>
<td>LZWB0360</td>
<td>15.4 (390)</td>
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<tr>
<td>LZWB0440</td>
<td>18.5 (470)</td>
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<tr>
<td>LZWB0520</td>
<td>21.7 (550)</td>
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</tr>
<tr>
<td>LZWB0600</td>
<td>24.8 (630)</td>
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</tr>
<tr>
<td>LZWB0680</td>
<td>28 (710)</td>
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<tr>
<td>LZWB0720</td>
<td>29.5 (750)</td>
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<tr>
<td>LZWB0760</td>
<td>31.1 (790)</td>
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<tr>
<td>LZWB0880</td>
<td>35.8 (910)</td>
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<tr>
<td>LZWB0920</td>
<td>37.4 (950)</td>
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</tr>
<tr>
<td>LZWB0960</td>
<td>39 (990)</td>
<td></td>
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</tr>
<tr>
<td>LZWB1040</td>
<td>42.1 (1070)</td>
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<tr>
<td>LZWB1120</td>
<td>45.3 (1150)</td>
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<tr>
<td>LZWB1200</td>
<td>48.4 (1230)</td>
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<tr>
<td>LZWB1360</td>
<td>54.7 (1390)</td>
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<tr>
<td>LZWB1400</td>
<td>56.3 (1430)</td>
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<tr>
<td>LZWB1520</td>
<td>61 (1560)</td>
<td></td>
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</tr>
<tr>
<td>LZWB1660</td>
<td>62.6 (1590)</td>
<td></td>
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<tr>
<td>LZWB1640</td>
<td>65.7 (1670)</td>
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<tr>
<td>LZWB1720</td>
<td>68.9 (1750)</td>
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<tr>
<td>LZWB1800</td>
<td>72 (1830)</td>
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</tr>
<tr>
<td>LZWB1920</td>
<td>76.8 (1950)</td>
<td></td>
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</tr>
<tr>
<td>LZWB2120</td>
<td>84.6 (2150)</td>
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<td></td>
</tr>
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</table>

**Dual Dimensions:**
- Inches
- Millimeters
## Anti-vibration kits (1)

<table>
<thead>
<tr>
<th></th>
<th>XSZSMK</th>
<th>XSZSMK1</th>
<th>XSZSMK2</th>
</tr>
</thead>
<tbody>
<tr>
<td>XSZSMK</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>XSZSMK1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XSZSMK2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) The anti-vibration kit consists of 8 shock absorbers, 16 washers and 16 nuts.

### Mounting brackets for anti-vibration kit

XUSLZ227 and XUSLN

(1) 2 elongated holes Ø 0.2 x 0.7 in. (Ø 5.10 x 16.75 mm).
(2) 1 elongated hole Ø 0.3 x 0.7 in. (Ø 6.75 x 16.75 mm).
**Dimensions (continued)**

**Preventa®**

*Safety detection solutions*

*Accessories for safety light curtains types 2 and 4*

---

**Mounting base**

**XUSZC***

---

**Floor mounting kit (quantity 4) for mounting base XUSZC***

**XUSZCB**

Scale 2.5

1. Bolt  
2. 1 lock nut  
3. 3 washers  
4. Rubber insulator  
5. Spacer (tube)  
6. 2 standard nuts  
7. Rawplug

---

<table>
<thead>
<tr>
<th>XUS</th>
<th>b</th>
<th>in. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZC1200</td>
<td>4</td>
<td>47.3 (1200)</td>
</tr>
<tr>
<td>ZC1800</td>
<td>4</td>
<td>70.9 (1800)</td>
</tr>
<tr>
<td>ZC2100</td>
<td>4</td>
<td>82.7 (2100)</td>
</tr>
<tr>
<td>ZC2400</td>
<td>4</td>
<td>94.5 (2400)</td>
</tr>
<tr>
<td>ZC3100</td>
<td>4</td>
<td>122 (3100)</td>
</tr>
</tbody>
</table>

---

**Preventa®**

*Safety detection solutions*

*Accessories for safety light curtains types 2 and 4*
**Dimensions (continued), Wiring Diagrams**

**Preventa® Safety detection solutions**

Accessories for safety light curtains types 2 and 4

### Dimensions

| ABL8RPS24*** | 
| --- | --- |
| **common side view** |  |

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABL8RPS24030</td>
<td>4.7 (120)</td>
<td>1.7 (44)</td>
</tr>
<tr>
<td>ABL8RPS24050</td>
<td>4.7 (120)</td>
<td>2.2 (56)</td>
</tr>
<tr>
<td>ABL8RPS24100</td>
<td>5.5 (140)</td>
<td>3.3 (85)</td>
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</tbody>
</table>

### Internal wiring diagrams

<table>
<thead>
<tr>
<th>ABL8RPS24030</th>
<th>ABL8RPS24050</th>
<th>ABL8RPS24100</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Internal wiring diagram ABL8RPS24030]</td>
<td>![Internal wiring diagram ABL8RPS24050]</td>
<td>![Internal wiring diagram ABL8RPS24100]</td>
</tr>
</tbody>
</table>

---

*This document provided by Barr-Thorp Electric Co., Inc. 800-473-9123 www.barr-thorp.com*
Operating principle

XPSCM safety modules, when combined with XU2S single-beam photoelectric sensors (periodically tested), form a category 2 light curtain conforming to standards IEC/EN 61496 parts 1 and 2 and EN 60825-1. The connection of 1–4 pairs of XU2S photoelectric sensors makes it possible to create a protected space up to 47.2 in. (1200 mm) high, conforming to EN 999/ISO 13855, and 26.2 ft (8 m) long.

The built-in Muting function allows for the automatic passage of loaded pallets or parts for machining, without interrupting the transportation movement. When the system is engaged by the operating control (in series with the main circuit feedback loop) and the light protection is not interrupted, the main circuit is closed by the two safety relays of the XPSCM module.

An interruption of the protection field causes the safety outputs to open instantaneously, and the process PLC receives a stop command. The LED on the XPSCM front panel changes from green to red. The Open state is maintained until the module is restarted using the start button.

The Muting function allows the light protection to be inhibited (muted). This function allows a trolley transporting materials to pass through without triggering the main circuit. The Muting function cannot be activated by energizing the inhibition devices unless the safety outputs have been switched on beforehand.

To trigger the Muting function, the inhibition devices (muting sensors) must be activated within the 3-second interval. This synchronization time for the two inhibition inputs can be deactivated by connecting two configuration terminals. The Muting cycle has a maximum duration of 60 seconds. During this period, materials can be transported through the protection field without deactivating the safety outputs. The 60 second limit value of the muting cycle may be made infinite by connecting two configuration terminals.

During the muting operation process, a light indicating the muting state is controlled by the XPSCM module. The indicator light comes on when a muting signal is generated, and indicates the inhibition of the protection function. An indicator light error (short-circuit, open-circuit) will be recognized, and will deactivate the Muting function.

Conditions to be observed for the Muting function

- Muting sensors must be of the XU2 M18PP340 thru-beam or XU9 M18PP340 polarized reflex type or mechanical limit switches with contacts.
- $dM \leq m$ to obtain continuous validation of the Muting function.
- Avoid the intrusion of persons during the muting phase. This phase is indicated by an indicator light on the muting indicator output of the XPSCM module.
- A materials transportation trolley (i.e., automatically guided vehicle, or AGV) must generate the muting signal before it enters the protection field, and interrupt the muting signal on exiting once it has cleared all the sensors of the protection field.
Specifications

**Safety detection solutions**
Preventa® XPSCM safety modules and XU2S single-beam photoelectric sensors
With a test input associated with a built-in Muting function

### Specifications of safety modules

<table>
<thead>
<tr>
<th>Module type</th>
<th>XPSCM1144</th>
<th>XPSCM1144P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products designed for max. use in safety related parts of control systems conforming to EN IEC 954-1</td>
<td>Category 2 (type 2) conforming to IEC/EN 61496-1</td>
<td></td>
</tr>
<tr>
<td>Ambient air temperature°F (°C)</td>
<td>Operation: +14 to +131 (–10 to +55), Storage: –13 to +185 (–25 to +85)</td>
<td></td>
</tr>
<tr>
<td>Degree of protection conforming to IEC 529</td>
<td>Terminals: IP 20, enclosure: IP 40</td>
<td></td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>V min. 24, voltage limits: ±20%</td>
<td></td>
</tr>
<tr>
<td>Maximum power consumption W</td>
<td>&lt; 15, with thru-beam photoelectric sensors and muting signaling</td>
<td></td>
</tr>
<tr>
<td>Module fuse protection</td>
<td>Internal, electronic</td>
<td></td>
</tr>
<tr>
<td>Rated insulation voltage (Ui)</td>
<td>V 300 (degree of pollution 2 conforming to EN IEC 60947-5-1, DIN VDE 0110 parts 1 and 2)</td>
<td></td>
</tr>
<tr>
<td>Rated impulse withstand voltage (Uimp) kV</td>
<td>4 (overvoltage category 3, conforming to EN IEC 60947-5-1, DIN VDE 0110 parts 1 and 2)</td>
<td></td>
</tr>
<tr>
<td>Inputs for sensors</td>
<td>Number of inputs to be monitored 4 (terminals Z1, Z2, Z3, Z4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input voltage V min. 24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply voltage of sensors V min. 24 (terminal U+/U-)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply current of sensors mA &lt; 200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum current mA &lt; 200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Synchronization time for the activation of the MA/MB muting signal s 3 (+20%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Muting maximum duration s 60 (–10 to +30%)</td>
<td></td>
</tr>
<tr>
<td><strong>Single-beam thru-beam photoelectric sensors</strong> for input monitoring Z1-Z2-Z3-Z4</td>
<td></td>
<td></td>
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<tr>
<td>- sensors authorized for the protection field (max. 4)</td>
<td></td>
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<tr>
<td>- muting sensors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- sensor supply resistivity</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Safety outputs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- number and type 2 N.O. (terminals 13-14, 23-24), hard contacts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- solid-state output breaking capacity 4 N.O. 24 V/20 mA, (Y33-Y34, Y33-Y44, Y33-Y54, Y33-Y64)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- breaking capacity in AC-15 24 V1/2 A, L/R = 50 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- breaking capacity in DC-15 5.6 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- maximum thermal current (litho) 11 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- sum of maximum thermal current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- minimum current (volt-free contact)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- minimum voltage (volt-free contact)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- short-circuit protection 4 gG or 6 fast-acting fuse cartridge, conforming to EN IEC 60947-5-1 and DIN VDE 0110 parts 1 and 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Muting signaling sensors for incandescent lamp</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Number 1 (terminal H1), maximum power: 6.5 W/&lt; 200 V, minimum power: 4 W/24 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Response time on input change of state</strong> ms &lt; 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Electrical life</strong></td>
<td>See page 2/172 of the Machine Safety Products catalog, MKTED208051EN-US.</td>
<td></td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>4 LEDs</td>
<td></td>
</tr>
<tr>
<td><strong>Connection Type</strong></td>
<td>Captive screw clamp terminals</td>
<td></td>
</tr>
<tr>
<td>- 1-wire connection</td>
<td>Captive screw clamp terminals, separate, removable terminal block</td>
<td></td>
</tr>
<tr>
<td>Without cable ends</td>
<td>Solid or flexible cable: 24-14 AWG</td>
<td></td>
</tr>
<tr>
<td>With cable ends, without bezel</td>
<td>Flexible cable: 24-14 AWG</td>
<td></td>
</tr>
<tr>
<td>With cable ends, with bezel</td>
<td>Flexible cable: 24-16 AWG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexible cable: 24-14 AWG</td>
<td></td>
</tr>
<tr>
<td>- 2-wire connection</td>
<td>Solid or flexible cable: 24-18 AWG</td>
<td></td>
</tr>
<tr>
<td>Without cable ends</td>
<td>Flexible cable: 24-18 AWG</td>
<td></td>
</tr>
<tr>
<td>With cable ends, without bezel</td>
<td>Flexible cable: 24-18 AWG</td>
<td></td>
</tr>
<tr>
<td>With cable ends, double with bezel</td>
<td>Flexible cable: 22-14 AWG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexible cable: 22-14 AWG</td>
<td></td>
</tr>
<tr>
<td><strong>Specifications of photoelectric sensors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Product certification</strong></td>
<td>CE, conforming to EN IEC 61496-1/-2 and EN IEC 60825-1</td>
<td></td>
</tr>
<tr>
<td><strong>Ambient air temperature°F (°C)</strong></td>
<td>Operation: –13 to +131 (–25 to +55) (infrared transmission sensors), Storage: –40 to +158 (–40 to +70)</td>
<td></td>
</tr>
<tr>
<td><strong>Vibration resistance</strong></td>
<td>7 g (10–55 Hz), conforming to EN IEC 60668-2-6</td>
<td></td>
</tr>
<tr>
<td><strong>Shock resistance</strong></td>
<td>30 g, 3 axes: 3 times, conforming to EN IEC 60668-2-27</td>
<td></td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>IP 67 conforming to EN IEC 60529</td>
<td></td>
</tr>
<tr>
<td><strong>Connection</strong></td>
<td>PVC cable, diameter 0.20 in. (5 mm), 16.4 ft (5 m) long wire: 4 x 22 AWG (0.34 mm²) for thru-beam transmitter)</td>
<td></td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td>M12 male connector, 4-pin (suitable jumper cables and female connectors M12, 4-contact. See the Global Detection catalog.)</td>
<td></td>
</tr>
<tr>
<td><strong>Materials</strong></td>
<td>Case: nickel-plated brass (infrared transmission sensors). Lenses: PMMA</td>
<td></td>
</tr>
<tr>
<td><strong>Nominal sensing distance R (m)</strong></td>
<td>28.2 (6) (infrared transmission sensors)</td>
<td></td>
</tr>
<tr>
<td><strong>Rated supply voltage V</strong></td>
<td>min. 12–24 (with protection against reverse polarity)</td>
<td></td>
</tr>
<tr>
<td><strong>Voltage limits V</strong></td>
<td>min. 10–30 V (including ripple)</td>
<td></td>
</tr>
<tr>
<td><strong>Switching capacity (sealed) mA</strong></td>
<td>≤ 100 mA (with overload and short-circuit protection)</td>
<td></td>
</tr>
<tr>
<td><strong>Voltage drop, closed state V</strong></td>
<td>≤ 1.5</td>
<td></td>
</tr>
<tr>
<td><strong>Current power consumption, no-load mA</strong></td>
<td>≤ 35</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum switching frequency Hz</strong></td>
<td>500</td>
<td></td>
</tr>
<tr>
<td><strong>Delays</strong> ms</td>
<td>Response: ≤ 1; recovery: ≤ 1</td>
<td></td>
</tr>
</tbody>
</table>

---

Schneider Electric

This document provided by Barr-Thorp Electric Co., Inc.   800-473-9123    www.barr-thorp.com
Safety detection solutions
Preventa® XPSCM safety modules and XU2S single-beam photoelectric sensors
With a test input associated with a built-in Muting function

### Safety modules

<table>
<thead>
<tr>
<th>Description</th>
<th>Type of terminal block connection</th>
<th>Number of safety circuits</th>
<th>Additional outputs</th>
<th>Supply</th>
<th>Catalog number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety modules for monitoring single-beam photoelectric sensors, with a test input associated with a built-in Muting function</td>
<td>Integrated in module</td>
<td>2</td>
<td>4</td>
<td>24 V</td>
<td>XPSCM1144</td>
<td>12.35 (0.350)</td>
</tr>
<tr>
<td>Separate, can be removed from module</td>
<td></td>
<td>2</td>
<td>4</td>
<td>24 V</td>
<td>XPSCM1144P</td>
<td>12.35 (0.350)</td>
</tr>
</tbody>
</table>
Safety detection solutions
Preventa® XPSCM safety modules and XU2S single-beam photoelectric sensors
With a test input associated with a built-in Muting function

<table>
<thead>
<tr>
<th>Description</th>
<th>Transmission type</th>
<th>Line of sight</th>
<th>Connection</th>
<th>Catalog number</th>
<th>Weight oz (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNP thru-beam pair (transmitter + receiver) Light or dark programmable switching</td>
<td>Infrared Sensing distance: 26.2 ft (8 m)</td>
<td>Along case axis</td>
<td>Pre-cabled L = 16.4 ft (5 m)</td>
<td>XU2S18PP340L5</td>
<td>17.11 (0.485)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M12 connector</td>
<td>XU2S18PP340D</td>
<td>5.47 (0.155)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90° to case axis</td>
<td>Pre-cabled L = 16.4 ft (5 m)</td>
<td>XU2S18PP340WL5</td>
<td>17.11 (0.485)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M12 connector</td>
<td>XU2S18PP340WD</td>
<td>5.47 (0.155)</td>
</tr>
<tr>
<td>Thru-beam transmitter alone (for XPSCM1144)</td>
<td>Infrared Along case axis</td>
<td>Pre-cabled L = 16.4 ft (5 m)</td>
<td>XU2S18KP340L5T</td>
<td>8.29 (0.235)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M12 connector</td>
<td>XU2S18KP340DT</td>
<td>0.65 (0.075)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>90° to case axis</td>
<td>Pre-cabled L = 16.4 ft (5 m)</td>
<td>XU2S18KP340WL5T</td>
<td>8.29 (0.235)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M12 connector</td>
<td>XU2S18KP340WDT</td>
<td>5.47 (0.155)</td>
<td></td>
</tr>
<tr>
<td>PNP thru-beam receiver alone (for XPSCM1144)</td>
<td>Infrared Along case axis</td>
<td>Pre-cabled L = 16.4 ft (5 m)</td>
<td>XU2S18PP340L5R</td>
<td>8.82 (0.250)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M12 connector</td>
<td>XU2S18PP340DR</td>
<td>2.82 (0.080)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>90° to case axis</td>
<td>Pre-cabled L = 16.4 ft (5 m)</td>
<td>XU2S18PP340WL5R</td>
<td>8.82 (0.250)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M12 connector</td>
<td>XU2S18PP340WDR</td>
<td>2.82 (0.080)</td>
<td></td>
</tr>
</tbody>
</table>
Safety detection solutions
Preventa® XPSCM safety modules and XU2S single-beam photoelectric sensors
With a test input associated with a built-in Muting function

### Functional diagram of XPSCM module

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Protection field free</th>
<th>Protection field interrupted</th>
<th>Protection field free</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminals A1-A2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensors Z1-Z4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start button</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output 13-14/23-24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid-state output Y33-Y34 (A1/A2—Fuse)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid-state output Y33-Y44 (Starting required)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid-state output Y33-Y54 (OSSD activated)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid-state output Y33-Y64 (muting error)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key:
- 1: Start

### Functional diagram of the XPSCM module with Muting function

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Protection field free</th>
<th>Muting MB activated</th>
<th>Protection field interrupted</th>
<th>Muting MB deactivated</th>
<th>MA muting activated</th>
<th>MA muting deactivated</th>
<th>Muting error</th>
<th>Protection field free</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminals A1-A2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensors Z1-Z4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output 13-14/23-24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid-state output Y33-Y34 (A1/A2 Fuse)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid-state output Y33-Y44 (starting required)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid-state output Y33-Y54 (OSSD activated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid-state output Y33-Y64 (muting error)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MB muting input</td>
<td>Start</td>
<td>&lt; 3 s</td>
<td>&lt; 60 s</td>
<td>&gt; 3 s</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lamp muting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key:
- 1: Start
- 2: Start

### Key to LEDs

1. A1-A2 supply voltage, electronic internal fuse status
2. Signaling for restarting
3. Safety output closed
4. Safety output open

---

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Safety detection solutions
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**Operation**

<table>
<thead>
<tr>
<th>Output state (PNP indicator, yellow LED (illuminated when sensor output is on))</th>
<th>Light switching</th>
<th>Dark switching</th>
</tr>
</thead>
<tbody>
<tr>
<td>No object in beam</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Object in beam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Curves**

- **Infrared detection curve**
- **Functional check**

**Dimensions**

- **XU2S18PP340L5, XU2S18PP340L5L**
- **XU2S18PP340D**

(Wiring Diagrams: page 7/53)

**Safety detection solutions**

Preventa® XPSCM safety modules and XU2S single-beam photoelectric sensors
With a test input associated with a built-in Muting function

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<table>
<thead>
<tr>
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<tr>
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<td>X</td>
</tr>
<tr>
<td>Object in beam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Curves**

- **Infrared detection curve**
- **Functional check**

**Dimensions**

- **XU2S18PP340L5, XU2S18PP340L5L**
- **XU2S18PP340D**

(Wiring Diagrams: page 7/53)

**Safety detection solutions**

Preventa® XPSCM safety modules and XU2S single-beam photoelectric sensors
With a test input associated with a built-in Muting function

**Operation**

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<thead>
<tr>
<th>Output state (PNP indicator, yellow LED (illuminated when sensor output is on))</th>
<th>Light switching</th>
<th>Dark switching</th>
</tr>
</thead>
<tbody>
<tr>
<td>No object in beam</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Object in beam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Curves**

- **Infrared detection curve**
- **Functional check**

**Dimensions**

- **XU2S18PP340L5, XU2S18PP340L5L**
- **XU2S18PP340D**

(Wiring Diagrams: page 7/53)
Safety detection solutions
Preventa® XPSCM safety modules and
XU2S single-beam photoelectric sensors
With a test input associated with a built-in
Muting function

Wiring Diagrams (continued)
Connection of XPSCM module with 4 pairs of XU2S single-beam sensors

XU2S sensors can be programmed for light switching or dark switching (dark switching with sensors 1 and 3 and light switching with sensors 2 and 4, for example).
ESC: external start conditions
Y1-Y2: feedback loop.
STM: for stopping time measurement.
(1) Protection field sensors
(2) Muting sensors
Safety detection solutions
Preventa® XPSCM safety modules and
XU2S single-beam photoelectric sensors
With a test input associated with a built-in
Muting function

Wiring Diagrams (continued)
Connection of XPSCM module with 1 pair of XU2S sensors
(dark switching)

Connection of XPSCM module with 2 pairs of XU2S sensors
(dark switching)

Connection of XPSCM module with 3 pairs of XU2S sensors
(2 for dark switching, 1 for light switching)

Connection of XPSCM module with 4 pairs of XU2S sensors
(2 for dark switching, 2 for light switching)
Protection of Personnel

Safety light curtains are electro-sensitive protective equipment (ESPE) designed to help protect personnel operating or working around industrial machinery, by sending stop signals to the machine control to stop the hazardous movement as soon as one of the light beams is broken.

In particular, they help provide protection for personnel operating hazardous machinery, but they are equally suitable for use with many other types of machines. They make it possible to help protect personnel while allowing free access to machines.

The absence of a door or guard reduces the time required for loading, inspection, or adjustment operations, and it makes access easier.

Directives and Standards—These Safety Light Curtains Conform to:

- Relevant essential health and safety requirements (EHSR’s) of the European Machinery Directive 98/37/EEC,
- Low Voltage Directives 73/23/EEC and 93/68/EEC,
- Standard EN 61496-1 (electro-sensitive protective equipment: ESPE),
- EN 954-1,
- ANSI B11-19,
- Draft standard EN 999 (installation conditions),
- UL 61496 Type 4 requirements.

Applications—The Main Applications Are:

For Type 2 Light Curtains:
- Packaging and Assembly Plants
- Conveyor and Mechanical Handling Systems
- Warehousing and Storage Systems
- Waste Disposal Skips
- Robot Areas

For Type 4 Light Curtains
- Presses (all types), Shears and Trimmers
- Hoisting Equipment
- Saws (all types)
- Machine Tools (lathes, milling machines, machining centers)
- Woodworking Machines (truing, lathes, spindle molding machines, side and face milling cutters)
- Textile Machinery (carding machines, weaving looms, steam rooms)
- Assembly Machines
- Assembly Robots

Safety Requirements—Detection of Anomalies that May Jeopardize Machine Safety and Stopping

The machine design and its controls must have the same level of safety as that of the safety light curtain so as to ensure that the machine is able to immediately stop its hazardous movement if something enters the zone protected by the safety light curtain.

It must be impossible to enter the protected zone without breaking the protective light beams. The safety light curtain must therefore be installed so that the light curtain cannot be avoided.

The restarting of the machine must only be possible when there is no hazard present and when there is no one in the hazardous zone.
## Safety Systems
Safety systems are comprised of many components. No one safety component will insure the safety of the system. The design of the complete safety system should be considered before you begin. It is very important to follow applicable safety standards when installing and wiring these components.

### Standards to be Followed—United States
Standards listed below refer to presses and other metal working and general equipment. This is not a complete listing of all applicable standards to be referenced when using light curtains. There may be other OSHA, ANSI, ANSI/RIA, NEC, NFPA, national, state, and local codes that may include requirements for installation of light curtains on machinery.

- OSHA 1910.211 - ANSI B11.1
- OSHA 1910.212 - ANSI B11.19
- OSHA 1910.217 - ANSI B11.20
- ANSI/RIA R15.06

### Directives and Standards to be Followed—Europe
Standards listed below refer to general machinery. This is not a complete listing of all applicable standards to be referenced when using light curtains. There may be other European and local codes that may include requirements for installation of light curtains on machinery.

- (NF) E09-010 - EN 811
- DIN 31001 - EN 999
- BS 5304 - EN 954-1
- EN 294 - EN 61496-1

## Light Curtains in the United States—Basic Requirements
- This device must be installed, set up, and serviced only by authorized personnel. ANSI defines Authorized Personnel in ANSI B30.2-1983.
- The user must follow all applicable codes, standards, and regulations. Standards specifically referenced in this document need to be followed: ANSI B11.1 through B11.20, OSHA 29 CFR 1910 standards, and ANSI/RIA R15.06 standard. There may be other national and local standards that may also need to be followed.
- Do not alter or modify this equipment.
- Light curtains must be securely mounted to a rigid surface using the provided mounting brackets.
- The machine must be capable of stopping immediately at any place in its stroke after receiving a stop signal.
- Light curtains must not be used as a lockout device to meet OSHA lock-out/tag-out requirements.
- Light curtains currently cannot be used as PSDI devices to initiate machine movement on mechanical power presses. For PSDI, refer to OSHA 29 CFR 1910.217 (h), the various appendices referenced on PSDI, and OSHA mandatory regulations requiring third party approval.

Using the light curtain to initiate a machine after an object is removed from the sensing area is called Presence Sensing Device Initiation (PSDI). Use of PSDI places additional requirements on the guarding and safety controls. It can restrict advanced light curtain features such as floating blanking and Exact Channel Selection (ECS) blanking. Contact your local sales office for further information. Other sources of references for PSDI include: ANSI RIA 15.06-1999, OSHA 1910.217(h), and ANSI B11.2-1995.
Minimum Safety Distance

Light Curtains in the United States (Vertical Mount)

The basic formulas for calculating minimum safety distances for light curtains mounted vertically are listed below. These formulas apply to ALL light curtains, including perimeter and point of operation light curtains. ANSI B11.1 is listed first, OSHA 29 CFR 1910.217 listed next.

**ANSI B11.1:**

This formula applies specifically to the guarding of mechanical power presses, but it is typically used for other applications as well.

\[
D_s = K \times (T_s + T_c + T_r + T_{bm}) + D_{pf}
\]

- \(D_s\) = Minimum safe distance between the light curtain sensing area to the nearest point of operation potential hazard.
- \(K\) = Hand speed constant of 63 in/s. This is the standard minimum accepted value for both ANSI and OSHA.
- ANSI recognizes that this constant may not be optimal, and that the user should consider all factors before deciding on the value of the \(K\) factor to use in the above formula.
- \(T_s\) = Stop time of the machine (press), as measured from the final control element. It is measured at the maximum velocity of the press, usually at 90° of press rotation on the downstroke.
- \(T_c\) = Response time of the control circuit to activate the braking system.
- \(T_r\) = Response time of the light curtain.
- \(T_{bm}\) = Additional time allowed for the brake monitor to compensate for wear and variations in the stopping time. Brake monitors will stop the machine (press) when the stop time of the machinery exceeds a pre-set limit.

**NOTE:** \(T_s\) and \(T_c\) are usually measured as one value by a stop time measurement device.

**NOTE:** If a brake monitor is not installed on the machine, a factor must be added to the measured stop time to include brake wear. Generally, brake monitors add approximately 20% to 25% additional stop time. To determine the actual factor to be used, contact the machine manufacturer.

\[
D_{pf} = 3.4 \times (S - 0.276)
\]

where \(S\) = minimum object sensitivity.

Example: For devices with minimum object sensitivity of 0.55 in. (14 mm):

\[
D_{pf} = 3.4 \times (0.55 - 0.276) = 0.94 \text{ in. (23.88 mm)}
\]

For devices with minimum object sensitivity of 1.18 in. (30 mm):

\[
D_{pf} = 3.4 \times (1.18 - 0.276) = 3.07 \text{ in. (77.98 mm)}
\]

Penetration Depth Factor

![Penetration Depth Factor Graph](image)

A = Finger Protection 0.55 in. (14 mm) has a \(D_{pf}\) of 0.94 in. (23.88 mm)
B = Hand Protection 1.18 in. (30 mm) has a \(D_{pf}\) of 3.07 in. (77.98 mm)
Minimum Safety Distance (continued)


This formula applies specifically to the guarding of mechanical power presses, but it is typically used for other applications as well.

\[ D_s = 63 \text{ in/s} \times T_s \]

Where:

- \( D_s \) = Minimum safety distance (in.)
- \( 63 \text{ in/s} \) = hand speed constant
- \( T_s \) = Stopping time of the press measured at approximately 90° position of the crankshaft rotation (seconds).

Stop time of the machine (press), as measured from the final control element. It is measured to determine worst case time and maximum velocity of the press, usually at 90° of press rotation on the downstroke.

In addition to the formula above, we recommend that OSHA 1910.217 Table O-10 be followed. Per OSHA, the table below shows the maximum width of openings allowed for a guard based on the distance from the guard (light curtain) to the point of operation hazard. The maximum width of opening in the table below corresponds to the minimum object sensitivity for a light curtain.

Example:

Using the formula: \( D_s = 63 \text{ in/s} \times T_s \)

if \( T_s = 0.10 \text{ sec} \)

\[ D_s = 63 \text{ in.} \times 0.10 = 6.3 \text{ in.} \]

- For an XUSL light curtain with a minimum object sensitivity of 0.55 in.: 
  
- Using the example above, the separation distance from the point of operation hazard to the light curtain would be 6.3 in. plus a minimum distance (from table O-10) of 3.5 in., for a total separation distance of 9.8 in.

The 3.5 in. was chosen from Table O-10 as the additional distance because the opening (minimum object sensitivity) is 0.55 in. Since 0.55 in. is larger than 0.50 in., the values for 0.50 in. cannot be used. Therefore the next larger opening, 0.625 in., must be used and the distance corresponding to the 0.625 in. opening is 3.5 in.

- For an XUSL light curtain with a minimum object sensitivity of 1.18 in.: 
  
- Using the example above, the separation distance from the point of operation hazard to the light curtain would be 6.3 in. plus a minimum distance (from table O-10) of 7.5 in., for a total separation distance of 13.8 in.

The 7.5 in. was chosen from Table O-10 as the additional distance because the opening (minimum object sensitivity) is 1.18 in. Since 1.18 in. is larger than 0.875 in., the values for 0.875 in. cannot be used. Therefore the next larger opening, 1.25, must be used, and the distance corresponding to the 1.25 opening is 7.5 in.

NOTE: 3.5 in. = 89 mm, and 7.5 in. = 191 mm.

---

OSHA 1910.217 Table O-10

<table>
<thead>
<tr>
<th>Distance of Opening from Point of Operation Hazard (in.)</th>
<th>Maximum Width of Opening (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 to 1 1/2</td>
<td>1/4</td>
</tr>
<tr>
<td>1 1/2 to 2 1/2</td>
<td>3/8</td>
</tr>
<tr>
<td>2 1/2 to 3 1/2</td>
<td>3/8</td>
</tr>
<tr>
<td>3 1/2 to 5 1/2</td>
<td>5/8</td>
</tr>
<tr>
<td>5 1/2 to 6 1/2</td>
<td>3/4</td>
</tr>
<tr>
<td>6 1/2 to 7 1/2</td>
<td>7/8</td>
</tr>
<tr>
<td>7 1/2 to 12 1/2</td>
<td>1 1/4</td>
</tr>
<tr>
<td>12 1/2 to 15 1/2</td>
<td>1 1/2</td>
</tr>
<tr>
<td>15 1/2 to 17 1/2</td>
<td>1 7/8</td>
</tr>
<tr>
<td>17 1/2 to 31 1/2</td>
<td>2 1/8</td>
</tr>
</tbody>
</table>

NOTE: If the light curtain is to be used on machinery that will be standardized throughout North America and Europe, then all minimum distance formulas in “Calculating Minimum Safety Distances” on pages 7/58 through 7/64 must be calculated, and the largest separation distance must be used.
Light Curtains in Europe (Vertical Mount)—Minimum Safety Distance

The minimum safety distance $D_s$ must be calculated using the following General Formula:

$$D_s \geq K (t_1 + t_2) + C$$

- $D_s$ = Minimum safety (separation) distance between the hazardous area and the light curtain.
- $K$ = Accepted general approach speed of a body or parts of the body. Generally accepted values are: 63 in/s (1600 mm/s).
- $t_1$ = Response time of the light curtain in seconds. This is the total time from detection of a beam broken to the switching of the outputs of the light curtain.
- $t_2$ = The time (in seconds) needed to stop all hazardous movements of the machine. This information is provided by the machine manufacturer. It is the time between the stop instruction of the light curtain and the actual stop of the hazardous machine components.
- $C$ = Additional safety distance. Generally accepted values are:
  - 0 in. (0 mm) for 0.55 in. (14 mm) minimum object sensitivity
  - 5.04 in. (128 mm) for 1.18 in. (30 mm) minimum object sensitivity

Using Individual Beam Sensors (XPSCM and XU2S Perimeter Light Curtain)

The formula above is modified from a security light curtain where the light beams are all mounted in the same enclosure. Typically, for a system with individual beam sensors, up to 4 photoelectric sensors are used.

General Formula: $D_s \geq K (t_1 + t_2) + C$

- $D_s$ = Minimum safety (separation) distance between the hazardous area and the light curtain.
- $K$ = Accepted general approach speed of a body or parts of the body. Generally accepted values are: 63 in/s (1600 mm/s).
- $t_1$ = Response time of the light curtain in seconds. This is the total time from detection of a broken beam to the switching of the outputs of the light curtain.
- $t_2$ = The time (in seconds) needed to stop all hazardous movements of the machine. This information is provided by the machine manufacturer. It is the time between the stop instruction of the light curtain and the actual stop of the hazardous machine components.
- $C$ = Additional safety distance. Generally accepted values are:
  - 33.5 in. (850 mm) when using several individual photoelectric beams
  - 47.3 in. (1200 mm) when using a single photoelectric beam

Presses and New Machines

For presses and new machines put into service in accordance with EEC European Machine Safety Directive 89/392, the following parameters and formulas must be used:

<table>
<thead>
<tr>
<th>K: in. (mm)</th>
<th>C: in. (mm) XUSL: 0.55 in. (14 mm)</th>
<th>C: in. (mm) XUSL: 1.18 in. (30 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN Standards</td>
<td>78.74 in. (2000 mm)</td>
<td>5.04 in. (128 mm)</td>
</tr>
</tbody>
</table>

Calculations should be made by using the General Formula and parameters $K$ and $C$ from the table above that correspond to the light curtain being used.

If $D_s$ is calculated to be $\leq 19.69$ in. (500 mm), calculate the distance using values from the table above.

If $D_s$ is calculated to be $> 19.69$ in. (500 mm), the calculation can be re-done using the **Alternate Formula** below. If this formula is used, the value for $D_s$ that may be used must be at least 19.69 in. (500 mm). The **Alternate Formula** is:

- For inches: $D_s \geq 63 (t_1 + t_2) + C$
- For millimeters: $D_s \geq 1,600 (t_1 + t_2) + C$
- $D_s$ must be at least 3.94 in. (100 mm)
Special Rules for Presses

The European standards specify that only light curtains or mechanical barriers must be used as safety devices so that, if a person enters the protected area while there are hazardous movements, the machine stops as quickly as possible. Quick Stopping means stopping the press ram before the operator can reach the hazardous area, when considering the speed at which an operator can move.

For determining the minimum safety distance for particular machines, refer to the following European standards:

- Mechanical power presses: refer to EN692
- Hydraulic presses, pneumatic folding machines, shears, bending and shaping machines: refer to EN693.

Light Curtains Mounted Horizontally or at an Angle

There are applications which may require the light curtain to be mounted horizontally or at an angle instead of vertically. ANSI and OSHA do not include in their standards requirements when mounting light curtains in the horizontal or angular modes. European Standard EN999 does address this type of application.

When using light curtains at an angle of 30° or greater from horizontal, use the formulas listed in the sections for vertical installations. When using light curtains at an angle of less than 30°, use the formulas below.

Parallel Approach to the Hazardous Area

If the direction of approach is parallel to the detection area, the minimum safety distance \( D_s \) between the hazardous area and the beam furthest away from the hazardous area, depends on the height \( H \) at which the light curtain is installed. This safety distance \( D_s \) must be calculated using the following formula:

For in: \( D_s \geq K (t_1 + t_2) + 33.5 \)

For mm: \( D_s \geq K (t_1 + t_2) + 850 \)

\( D_s \) = Minimum safety (separation) distance between the hazardous area and the light curtain.

\( K \) = Accepted general approach speed of a body or parts of the body. Generally accepted values are: 63 in/s (1600 mm/s). 

\( t_1 \) = Response time of the light curtain in seconds. This is the total time from detection of a beam broken to the switching of the outputs of the light curtain.

\( t_2 \) = The time needed to stop all hazardous movements of the machine in seconds. This information is provided by the machine manufacturer. It is the time between the stop instruction of the light curtain and the actual stop of the hazardous machine components.

\( H \) = Height (distance) of light curtain from floor.

Or the following formula is used:

For in: \( D_s \geq 63 (t_1 + t_2) + (47.2 – 0.4H) \)

For mm: \( D_s \geq 1600 (t_1 + t_2) + (1200 – 0.4H) \)

If \( 0 < H \leq 34.45 \) in. (875 mm)

The maximum allowed height \( H \) is 39.39 in. (1000 mm)

Once the height \( H \) exceeds 11.81 in. (300 mm), additional protective devices must be used.

Angular Approach to the Hazardous Area

If the operator’s direction of approach and the detection area form an angle \( \alpha \), then the formulas used to calculate the safety distance \( D_s \) depends on this angle:

- If the angle \( \alpha \) is greater than 30°, the formulas used for perpendicular approach (vertical mounting) to the detection area must be used.
- If the angle \( \alpha \) is less than or equal to 30°, then the formulas given for the parallel direction of approach (horizontal mounting) to the detection area must be used.

Installation in an L Shape

This type of installation uses one light curtain mounted vertically and another light curtain mounted horizontally per the diagram to the left. The maximum allowed height \( H \) is 39.37 in. (1000 mm). If height \( H \) is greater than 11.81 in. (300 mm), additional protective devices must be used. Distance \( D_s \) is calculated from the formulas for light curtains mounted vertically (see page ).

NOTE: Europe uses the symbol \( S \) instead of \( D_s \). This catalog uses the symbol \( D_s \) for consistency and for ease of understanding.
Prevention of Access to Hazardous Area

Security light curtains can only be used on machines on which the movement of working components may be stopped at any time during the hazardous operation phase of the machine.

These light curtains provide a stop signal, not a control instruction. This stop signal must be stored.

The clearing of the light curtain must not result in the restarting of moving parts or hazardous operation.

Subsequent restarting must only be possible by means of deliberate operation of the appropriate control device, or a start-up procedure after having checked that there is no longer any hazard.

Electrical interfacing between the security light curtain and the machine circuits must meet all applicable codes where the machine will be used.

Where security light curtains do not provide an adequate degree of protection due to their location, additional suitable safety devices, guards, or additional security light curtains must be used to prevent operators from entering the protective light curtain and reaching the hazardous zone (EN 294, EN 811), or from remaining in the area between the hazardous zone and the security light curtain (EN 999).

The position and size of these additional safety devices must be such that it is impossible for operators to reach the hazardous zone in any way whatsoever (over the top, from beneath, from behind or from the side) without breaking the beams of the light curtain.

These additional safety devices must be:
- Either fixed (if possible, screwed or welded to the machine),
- Or moving (with continuous monitoring of their position if they have to open).

It must be impossible for operators to disconnect or turn off the switching circuits for these additional safety devices.

As well as conforming to standards EN 61496 and EN 699, they must also conform to the following European Standards:
- (NF) E 09-010
- DIN 31001
- BS 5304
- EN 294

Overview

Light curtain application and installation
Prevention of access to hazardous area
**Light Curtain Alignment**

Light curtains need to be firmly and securely mounted to the machine. The diagrams below show correct and incorrect mounting. Incorrect mounting as shown below will not allow correct alignment.

**Installation Near Reflective Surfaces**

The devices must be installed such that the transmitter and associated receiver are mounted facing each other and correctly aligned for both height and angle.

The effective aperture angle of the optics and transmitter/receiver alignment is 2.5° maximum > 3 m (9.8 ft). Reflective surfaces located near areas protected by light curtains could interfere with the proper operation of the light curtain. Reflective surfaces may include painted metal, shiny sheet metal, stainless steel, or plastic. These reflective surfaces may allow unwanted stray light rays to “go around” objects entering the sensing area of the light curtain. It is necessary to take into account a minimum distance D between the axes of the nearest beam and the reflective surface. This distance is measured from the mid-point between the transmitter and receiver.

European Standard EN 61496-1 specifies a minimum distance D where:

- for 0 < L < 9.84 ft (3 m), D = 5.16 in. (131 mm)
- for L > 9.84 ft (3 m), D = (0.035 x L) + 0.2 in. (5 mm), with a minimum value for D of 5.16 in. (131 mm)

D = minimum distance between the light curtain and reflective surface

L = sensing distance of the security light curtain.

**Mutual Interference**

Certain configurations may require the installation of 2 (or more) security light curtains side by side.

The products in the XUSL range are designed to provide maximum operating safety (coded infrared light beams).

Setup as illustrated to the left is recommended for maximum performance and safety.

**Environments Subject to Interference**

Industrial applications sometimes place products in extreme operating conditions, due in particular to:

- Electromagnetic interference generated by the close proximity of variable speed controllers, welding machines or walkie-talkies. The products in the XUSL range are designed to be immune to such interference. They conform to:
  - level 3 conforming to EN 61496-1 (fast transient/burst interference),
  - resistance to interference caused by variable speed controllers,
  - resistance to the emissions of walkie-talkies conforming to IEC 61004-3.
- Light interference at a low angle of incidence in relation to the optical axis. The products in the XUSL range are resistant in accordance with IEC 61496-2.
Using Mirrors

It is important to comply with the minimum safety distances throughout the protected area, and around the perimeter where the light curtain beams are being reflected by the mirrors. The distances relating to reflective surfaces must also be calculated and observed.

The use of mirrors will significantly reduce the sensing distance of any light curtain. Each mirror used will further reduce the sensing distance.

Reminder: any contamination on the mirror surfaces, such as dust or dirt, will further reduce the sensing distance. This should be considered when installing a light curtain with mirrors in an area where there will be dust, dirt or other contaminants. More frequent cleaning of the light curtain lenses and the mirrors may be required.

Mirror Configurations

The total nominal range between the transmitter (XUSL•T) and the receiver (XUSL•R) will be reduced according to the number of deflecting mirrors.

**Recommended Maximum Range for Glass Mirrors—XUSLB/XUSLD**

<table>
<thead>
<tr>
<th>No. of Mirrors</th>
<th>XUSLB/XUSLD Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 m (9.84 ft)</td>
</tr>
<tr>
<td>1</td>
<td>2.6 m (8.66 ft)</td>
</tr>
<tr>
<td>2</td>
<td>2.3 m (7.61 ft)</td>
</tr>
<tr>
<td>3</td>
<td>2.0 m (6.69 ft)</td>
</tr>
<tr>
<td>4</td>
<td>1.8 m (5.91 ft)</td>
</tr>
</tbody>
</table>

**Recommended Maximum Range for Stainless Steel Mirrors—XUSLB/XUSLD**

<table>
<thead>
<tr>
<th>No. of Mirrors</th>
<th>XUSLB/XUSLD Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 m (9.84 ft)</td>
</tr>
<tr>
<td>1</td>
<td>2.5 m (8.07 ft)</td>
</tr>
<tr>
<td>2</td>
<td>2.0 m (6.63 ft)</td>
</tr>
<tr>
<td>3</td>
<td>1.7 m (5.41 ft)</td>
</tr>
<tr>
<td>4</td>
<td>1.4 m (4.66 ft)</td>
</tr>
</tbody>
</table>

**Note:** When mirrors are used, the effects of vibration will be more noticeable. Proper alignment may require more time in the set-up of the light curtain and the associated mirrors. The mirrors must be firmly and securely mounted and be protected from shock, vibration, and other physical damage.
Minimum Object Sensitivity (MOS)

This is the smallest diameter (object) which a Type 4 security light curtain is capable of detecting.

\[ d = P + e \]

- \( d \): minimum object sensitivity
- \( P \): distance between the axes of 2 adjacent beams
- \( e \): diameter of the beams

<table>
<thead>
<tr>
<th>XUSL range</th>
<th>P in. (mm)</th>
<th>e in. (mm)</th>
<th>d in. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finger protection</td>
<td>0.30 in. (7.5 mm)</td>
<td>0.26 in. (6.5 mm)</td>
<td>0.55 in. (14 mm)</td>
</tr>
<tr>
<td>Hand protection</td>
<td>0.63 in. (16 mm)</td>
<td>0.59 in. (15 mm)</td>
<td>1.18 in. (30 mm)</td>
</tr>
</tbody>
</table>

Protected Height (HP)

According to EN 61496, this is the zone (or height) within which an object of equal diameter to the minimum object sensitivity \( d \) is always detected.

Test Rod

A test rod is included with each XUSL light curtain for the purposes of periodically testing the light curtain for proper operation. A test rod is the appropriate diameter for testing the light curtain it was shipped with.
Blanking

ECS (Blanking)

The blanking feature, or Exact Channel Select (ECS), can be used as an option to disable selected beams or channels in the safety light curtain’s sensing field. This option is accomplished by blocking the beams or channels at fixed locations in the sensing field. This feature is used when stationary objects, such as fixtures, conveyors, or tooling, obstruct fixed areas of the sensing field. Once the specific beams or channels have been blocked and the blanking feature has been activated, the selected beams must remain blocked. If the obstruction is removed, the light curtain will transmit a stop signal to the machine.

Floating Blanking

Floating blanking is an option for use with ECS (blanking) or as a stand alone feature. Floating blanking provides the ability for up to two beams or channels to be disabled at any position in the sensing field. The two beams or channels disabled with this feature are not fixed at a single position; they are allowed to float through the sensing field.

It is important to follow the instruction manual provided with the safety light curtain when using the ECS (blanking) and floating blanking optional features together.

If the ECS (blanking) or floating blanking feature is active, the minimum safe distance is affected by an increase in the light curtain’s minimum object sensitivity (MOS). According to the ANSI safety distance formula, if the object sensitivity of the light curtain increases, the minimum safe distance must increase.

Protection for the Functions of Blanking and Floating Blanking

The functions of ECS/blanking and floating blanking create “holes” in the detection zone. These holes are required for certain applications. If an obstruction does not completely fill these holes one of two actions will be required:

- The safe mounting distance will need to be increased to account for the larger opening in the detection zone.
- The area not filled by an obstruction must be guarded, typically by some method of hard guarding.

Hard guarding refers to mechanical barriers such as sheet or expanded metal.
**Test Procedure**

**Test Procedure for the United States**

The tests below must be performed by qualified personnel (per ANSI B30.2—1993) at or after the following:

- After installation and before the machine is commissioned,
- At regular inspections determined by the employer,
- After any maintenance, adjustment, or modification to the light curtain or machine,
- After tooling or fixture changes.

We also recommend that the following test procedure be performed daily or at each shift change.

**Test procedure:**

1. Turn off the machine. Turn on the light curtain.
2. Check the machine to make sure that all guarding is firmly in place, operates properly, and the only access to the hazardous area is through the area protected by the light curtain.
3. Check that light curtain mounting meets or exceeds the minimum safety distance from the nearest hazardous area (pinch point). Verify that the light curtain is mounted securely to a rigid mounting surface.
4. Check for damage to mounting brackets, mounting surface, wiring, or mirrors (if used). If any damage is found, the machine should be locked out until it is repaired.
5. Verify that operators cannot position themselves between the hazardous area (pinch point) and the light curtain. If this is possible, additional guarding must be installed.
6. Check the distance between the hazardous area and the light curtain sensing area to verify that it meets or exceeds the minimum safety distance.
7. Insert the test rod (the round rod included with each XUSL light curtain) into the protected (sensing) area and move the test rod throughout the entire protected area (top, bottom, sides, vertically up & down in the middle of the sensing area).
8. Remove the test rod and start up the machine. With the machine running, insert the test rod into the sensing area and verify that the machine stops immediately.
9. With the test rod still in the sensing area, verify that the machine cannot be restarted.
10. Remove the test rod from the sensing area and verify that the machine cannot be restarted except when the proper start-up sequence has been followed.
11. Check the stopping mechanisms (including brakes) to verify proper working condition.
12. If any of the above tests do not give the indicated results, the machine should be locked out until it is repaired. Then run the above tests again.

Follow OSHA 1910.147 for lock-out/tag-out procedures.
# Safety dialog solutions

## XY2 cable pull switches

### Applications

Cable Pull switches for:
- conveyor systems
- materials handling
- machine tools
- electrical testing stations

### Features

- For cable lengths up to 165 ft (50 m). Can be tripped by the operator at any point in the work zone
- For cable lengths up to 50 ft (15 m). Can be tripped by the operator at any point in the work zone

### Conformity to standards

| XY2CE: | EN/IEC 60947-5-1, EN/ISO 13850:2006, UL 508 and CSA C22-2 n° 14 (when specified H7) |
| XY2CH: | EN/IEC 60947-5-1, EN/ISO 13850:2006, UL 508 and CSA C22-2 n° 14 (when specified H7) |

### Protective treatment

| Special version, “TK” |
| Special version, “TK” |

### Ambient temperature

| Operating | -13 to +158 °F (–25 to +70 °C) |
| Storage | -40 to +158 °F (–40 to +70 °C) |

| Operating | -13 to +158 °F (–25 to +70 °C) |
| Storage | -40 to +158 °F (–40 to +70 °C) |

### Electric shock protection conforming to EN/IEC 61140

| Class I |
| Class I |

### Degree of protection conforming to EN/IEC 60529

| XY2CE: IP 65 |
| XY2CH: IP 65 |

### Positive operation conforming to EN/IEC 60947-5-1 Appendix K

| N.C. contacts with positive opening operation |
| N.C. contacts with positive opening operation |

### Rated insulation voltage conforming to EN/IEC 60947-1

| Ul = 400 V degree of pollution 3 conforming to EN/IEC 60947-1, Ul = 300 V conforming to UL 508, CSA C22-2 n° 14 |
| Ul = 400 V degree of pollution 3 conforming to EN/IEC 60947-1, Ul = 300 V conforming to UL 508, CSA C22-2 n° 14 |

### Rated impulse withstand voltage conforming to EN/IEC 60947-1

| Uimp = 4 kV |
| Uimp = 4 kV |

### Catalog numbers

| XY2CE |
| XY2CH |

### Pages

| 7/71 |
| 7/72 |
Operating Principle

XY2 Cable Pull Switches provide for a stop or emergency stop to be signaled at any point along a cable up to 165 feet (50 m) in length. This is many times preferred to installing many individual stop or emergency stop push button stations along a conveyor or around the machine, providing a more cost effective solution. Typical applications include conveyor systems, packaging, textiles, transfer machines, presses, woodworking equipment, paint lines, and test laboratories.

The cable pull switch is typically mounted at one end of a machine or conveyor, and the operating cable is routed along the conveyor or around the machine and secured at the other end. The operation of the XY2 is based on the taut cable principle—the cable must be tight and have appropriate tension applied to set or reset the switch. Once cable tension has been set, the device will open the N.C. control contacts if the cable is pulled or if it becomes slack due to stretching or breakage of the cable. Once the switch is tripped, it must be manually reset.

Two versions are available:

- Emergency stop versions have positive opening N.C. contacts that latch upon tripping (positive opening) and must be manually reset.
- Normal stop versions are used where a momentary, non-emergency signal is required at any point along a cable. These devices have snap acting contacts and are non-latching devices.

Features Include:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 cable entries 1/2&quot; NPT</td>
<td>Manual tripping force adjustment (XY2CE)</td>
</tr>
<tr>
<td>Positive latching (no teasing)</td>
<td>Adjustment indicator</td>
</tr>
<tr>
<td>Slow-make slow break for emergency stop</td>
<td>UL Listed and CSA Certified</td>
</tr>
<tr>
<td>Snap action contacts for momentary switch</td>
<td>XY2CH for applications up to 50 feet (15m)</td>
</tr>
<tr>
<td>Works properly even if spring is broken</td>
<td>XY2CH has two viewing windows to aid in setting and adjusting the switch</td>
</tr>
<tr>
<td>Padlock attachment</td>
<td>XY2CE for applications up to 165 feet (50m)</td>
</tr>
<tr>
<td>Doesn’t reset if out of adjustment</td>
<td>Positive opening N.C. contacts meet the IEC and EN requirements for positive opening contacts per IEC/EN 60947-5-1; and NEMA ICS-5, part 6 (direct opening action).</td>
</tr>
</tbody>
</table>

The use of an end spring is strongly advised when using cable pull devices on continuous duty mechanical handling equipment and systems.

The following standards allow the use of cable pull (pull cord) devices in e-stop circuits:

- IEC 60204-1: 10.7 AND 10.8
- ISO 13850
- NFPA 79 (2002): 10.7.2

Adjustment indicator linked to temperature variations

Positive Latching:
The N.C. contact opens the electrical circuit and mechanically latches until manually reset

2. Tension indicator showing the cable tension

3. Installation:
   Manual adjustment directly on the cam

Interior View of XY2CE
Specifications

Safety dialog solutions

XY2 cable pull switches

General Information:
Page 7/69

Screw clamp terminals. Min: 1#20 AWG (1 x 1.05 mm²), Max: 2#16 AWG (2 x 1.5 mm²)

Minimum Contact Rating Utilization category A300 and Q300. Operating rate: 3600 operations/hour. Load factor: 0.5.

Recommended Terminal Clamp Torque 7.0 in.lbs. (0.8 N•m)


Rated Thermal Current 10A conforming to UL 508, CSA C 22.2 N° 14, IEC/EN 60947-5-1, NFC 63140, VDE 0660-200.

Rated Insulation Voltage 300 Vac and Vdc conforming to UL 508, CSA C 22.2 N° 14, 500 V conforming to IEC 158-1, NFC 20-040, 300 V conforming to VDE 0660-207.

Enclosure Rating UL 508, 19-1, Class I conforming to IEC 60536 and NF C 20-030.

Recommended Contact Rating

<table>
<thead>
<tr>
<th>Designation</th>
<th>125 V</th>
<th>250 V</th>
<th>301 to 600 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make Break</td>
<td>Make Break</td>
<td>Make Break</td>
<td>Make Break</td>
</tr>
<tr>
<td>A300 10</td>
<td>60</td>
<td>6.00</td>
<td>3.00</td>
</tr>
</tbody>
</table>

DC Voltage and Current Ratings

<table>
<thead>
<tr>
<th>Contact Rating Designation</th>
<th>Thermal Continuous Test Current, Amperes</th>
<th>Maximum Make or Break Current, Amperes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voltage 120 V 240 V 480 V 600 V</td>
<td>Make or Break at 300 Volts or Less, Voltamperes</td>
</tr>
<tr>
<td>Q300 2.5</td>
<td></td>
<td>Make at 300 Volts or Less, Voltamperes</td>
</tr>
</tbody>
</table>

AC Voltage and Current Ratings 50–60 Hz

<table>
<thead>
<tr>
<th>Contact Rating Designation</th>
<th>Thermal Continuous Test Current, Amperes</th>
<th>Maximum Current, Amperes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voltage 120 V 240 V 480 V 600 V</td>
<td>Make Break Make Break Make Break</td>
</tr>
<tr>
<td>A300 10</td>
<td>60</td>
<td>6.00  3.00  -  -</td>
</tr>
</tbody>
</table>

DC Supply Power broken in W for 5 million operations

Slow Break Contact

AC supply 50–60 Hz

Power broken in W for 5 million operations

The product life expressed above is based on average usage and normal operating conditions. Actual operating life will vary with conditions. The above statements are not intended to nor shall they create any express or implied warranties as to product operation or life. For information on the limited warranty offered on this product refer to the Square D terms and conditions of sale found in the Digest.
**Emergency Stop**

Emergency Stop (Latching contact—reset by push button—positive + opening contacts)

Available only with slow break contacts.

The N.O. contacts close after the N.C. contacts open. They do not change state simultaneously.

The N.C. contacts only should be used in the safety control circuit. The N.O. contacts are provided solely for signaling—NOT for safety functions.

To conform with ISO 13850 of the European Union Machinery Directive, safety circuits must use emergency stop devices with 2 N.C. contacts in category 3 or 4 safety control systems. Using devices with 1 N.O. and 1 N.C. contact will not allow the system to meet category 3 or 4 as it would not meet the requirements for redundancy. Cable pull switches with 1 N.O. and 1 N.C. contact would be suitable for Category B, 1 or 2 safety control systems. XY2 cable pull switches are ideal choices for use with Preventa® XPS safety relays.

### Options for XY2CE

#### Description
- Corrosion resistant (only available on devices with booted push button on Emergency Stop devices and all Normal Stop devices)
- Not available on key operated emergency stop reset or mushroom head reset versions.
- The enclosure color is olive-blue instead of beige.
- Positive opening N.C. contacts meet the IEC and EN requirements for positive opening contacts per IEC/EN 60947-5-1; and NEMA ICS-5, part 6 (direct opening action).
- Positive opening N.C. contacts meet the IEC and EN requirements for positive opening contacts per IEC/EN 60947-5-1; and NEMA ICS-5, part 6 (direct opening action).
- Recommended for outdoor applications where icy conditions are likely.

#### Designator
- Provides a silicone boot, special finish, and copper/brass eyelet.
- For non-pilot-light devices:
  1. Add suffix TK to the part number
  2. Change A to C. Example: XY2CE1A250H7 changes to XY2CE1C250H7
- For pilot light devices:
  1. Add suffix TK to the part number
  2. Change A to E. Example: XY2CE1A256H7 changes to XY2CE1E256H7

#### Low Temperature
- -40 °F (-40 °C)
- The minimum temperatures listed are based on the absence of freezing moisture or water.

#### Options for Pilot Light
- Non-pilot-light versions
  - Change A to C: silicone boot
  - Ex: XY2CE1A150H7 changes to XY2CE1C150H7
- Pilot light versions
  - Change A to E: silicone boot
  - Ex: XY2CE1A196H7 changes to XY2CE1E196H7

#### N.O. + N.C. contact
- Change the 8th digit to 3: Ex: XY2CE1A150H7 changes to XY2CE1A153H7
- Change the 8th digit to 4: Ex: XY2CE1A150H7 changes to XY2CE1A154H7

#### N.O. + N.C. contact
- Change the 8th digit to 3: Ex: XY2CE1A150H7 changes to XY2CE1A153H7
- Change the 8th digit to 4: Ex: XY2CE1A150H7 changes to XY2CE1A154H7

#### Key operated emergency stop reset
- Change the 8th digit to 4. Ex: XY2CE1A150H7 changes to XY2CE1A154H7

#### Mushrooms resets
- Change the 8th digit to 3. Ex: XY2CE1A150H7 changes to XY2CE1A153H7

### Wiring Diagrams

- Provides a silicone boot, special finish, and copper/brass eyelet.
**XY2CH Cable Pull for up to 50 ft (15 m) cable length**

Cable and accessories must be selected and ordered separately from pages 7/73 and 7/74.

**Emergency Stop**

Emergency Stop (Latching contact—reset by push button—positive + opening contacts)  
Available only with slow break contacts.

The N.O. contacts close after the N.C. contacts open. They do not change state simultaneously.

Only the N.C. contacts should be used in the safety control circuit. The N.O. contacts are provided solely for signaling—**NOT** for safety functions.

To conform with ISO 13850 of the European Union Machinery Directive, safety circuits must use emergency stop devices with 2 N.C. contacts in category 3 or 4 safety control systems. Using devices with 1 N.O. and 1 N.C. contact will not allow the system to meet category 3 or 4 as it would not meet the requirements for redundancy. Cable pull switches with 1 N.O. and 1 N.C. contact would be suitable for Category B, 1 or 2 safety control systems. XY2 cable pull switches are ideal choices for use with Preventa® XPS safety relays.

**Reset**

- **Standard push button**  
  N.O. + N.C.  
  No  
  XY2CH13150H7

- **Booted push button**  
  N.O. + N.C.  
  No  
  XY2CH13250H7

- **Mushroom head push button**  
  N.O. + N.C.  
  No  
  XY2CH13350H7

- **Key operated emergency stop (uses Ronis Key No. 421)**  
  N.O. + N.C.  
  No  
  XY2CH13450H7

**Options for XY2CH**

- **Corrosion resistant** (only available on devices with booted push button on Emergency Stop devices and all Normal Stop devices). Not available on key operated emergency stop reset or mushroom head reset versions. The enclosure color is olive-blue instead of beige.

- **Silicone bellows**  
  Change the 7th digit to 4  
  Example: XY2CH13150H7 changes to XY2CH13154H7

- **N.C. + N.C. contact**  
  Change the 9th digit to 7 (for emergency stop only)  
  Example: XY2CH13150H7 changes to XY2CH13157H7

- **Pilot light (not UL/CSA)**  
  Bulb is included, replacement bulbs available on page 7/73

  - For 24 V, change the 10th digit to 3
  - For 48 V, change the 10th digit to 4
  - For 120 V, change the 10th digit to 5
  - For 230 V, change the 10th digit to 7

**Reset Contact Pilot Light**

- **Standard push button N.O. + N.C.**  
  No  
  XY2CH13150H7

- **Booted push button N.O. + N.C.**  
  No  
  XY2CH13250H7

- **Mushroom head push button N.O. + N.C.**  
  No  
  XY2CH13350H7

- **Key operated emergency stop (uses Ronis Key No. 421) N.O. + N.C.**  
  No  
  XY2CH13450H7

**Normal Stop**

Normal stop (momentary action, no reset, no positive - opening contacts)  
Available only with snap action contacts. Not for use in safety circuits.

**Options for XY2CH**

- **Silicone bellows**  
  Change the 7th digit to 4  
  Example: XY2CH13150H7 changes to XY2CH13154H7

- **N.C. + N.C. contact**  
  Change the 9th digit to 7 (for normal stop only)  
  Example: XY2CH13150H7 changes to XY2CH13157H7

- **Silicone boot and special finish**  
  1. Add suffix TK to the catalog number
  2. Change the seventh character to 4
  Example: XY2CH13150H7 changes to XY2CH13150TK

- **Normal stop devices are not UL/CSA.**

**Acceptable Wire Sizes**  
14-24 AWG

**Recommended Terminal Clamp Torque**  
13 lb-in

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This document provided by Barr-Thorp Electric Co., Inc. 800-473-9123 www.barr-thorp.com
### XY2CE Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Sold in lots of</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>End spring for cables longer than 83 ft (25m) +</td>
<td>1</td>
<td>XY2CZ702</td>
</tr>
<tr>
<td>Can also be used on shorter length cables.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Padlock attachment (Yellow)</td>
<td>1</td>
<td>XY2CZ816</td>
</tr>
<tr>
<td>Contains padlock attachment and two tamper proof cover mounting screws with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>special key</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnbuckle to tighten actuating cable. Threaded eye bolt is M8 x 70 +</td>
<td>1</td>
<td>XY2CZ404</td>
</tr>
<tr>
<td>locknut</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tensioning device. Used instead of a turnbuckle, provides for easy</td>
<td>1</td>
<td>XY2CZ203</td>
</tr>
<tr>
<td>adjustment right on the switch.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tensioning device + support. Used instead of a turnbuckle, provides for</td>
<td>1</td>
<td>XY2CZ917</td>
</tr>
<tr>
<td>easy adjustment right on the switch, and also provides the first cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>support for the actuating cable.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### XY2CE Spare Parts

<table>
<thead>
<tr>
<th>Description</th>
<th>Sold in lots of</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot light body</td>
<td>1</td>
<td>XY2CZ906</td>
</tr>
<tr>
<td>Direct voltage to 130 V, bulb not included</td>
<td>1</td>
<td>XY2CZ907</td>
</tr>
<tr>
<td>Pilot light head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BA9s incandescent bulb</td>
<td>1</td>
<td>DL1CE024</td>
</tr>
<tr>
<td>24 V, 2.6 W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48 V, 2.6 W</td>
<td>1</td>
<td>DL1CE048</td>
</tr>
<tr>
<td>130 V, 2.6 W</td>
<td>1</td>
<td>DL1CE130</td>
</tr>
<tr>
<td>Dust and damp protecting bellows</td>
<td>1</td>
<td>XY2CZ901</td>
</tr>
<tr>
<td>Polychloroprene (std.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silicone</td>
<td>1</td>
<td>XY2CZ904</td>
</tr>
</tbody>
</table>

* This lamp is used in both 120 V and 230 V applications. For 230 V application, a pilot light body with resistor (XY2CZ907) is used in the switch.

### XY2CH Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Sold in lots of</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>End spring *</td>
<td>1</td>
<td>XY2CZ703</td>
</tr>
<tr>
<td>Pilot light Yellow (Not UL/CSA)</td>
<td>1</td>
<td>XY2CZ0024H4</td>
</tr>
<tr>
<td>24 V</td>
<td>1</td>
<td>XY2CZ0048H4</td>
</tr>
<tr>
<td>120 V</td>
<td>1</td>
<td>XY2CZ0130H4</td>
</tr>
<tr>
<td>220–240 V</td>
<td>1</td>
<td>XY2CZ0230H4</td>
</tr>
</tbody>
</table>

### XY2CH Spare Parts

<table>
<thead>
<tr>
<th>Description</th>
<th>Sold in lots of</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust and damp protecting bellows</td>
<td>1</td>
<td>XY2CZ902</td>
</tr>
<tr>
<td>Polychloroprene (std.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silicone</td>
<td>1</td>
<td>XY2CZ903</td>
</tr>
<tr>
<td>Pilot light bulb</td>
<td>10</td>
<td>DL1AA0034</td>
</tr>
<tr>
<td>Screw fitting for XY2CH Max. diameter 17 mm Length 34 mm</td>
<td>10</td>
<td>DL1AA048</td>
</tr>
<tr>
<td>24 V, 6 W</td>
<td>10</td>
<td>DL1AA127</td>
</tr>
<tr>
<td>230 V, 6 W</td>
<td>10</td>
<td>DL1AA220</td>
</tr>
</tbody>
</table>

* The use of an end spring is strongly advised when using cable pull devices on continuous duty mechanical handling equipment and systems.
**Accessories (suitable for both XY2CE and XY2CH)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Sold in lots of</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable kits</td>
<td></td>
<td>XY2CZ9310</td>
</tr>
<tr>
<td>Contains:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 cable: XY2CZ301, 34.4 ft (10.5 m)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1 cable clamp: XY2CZ503</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>1 end spring: XY2CZ703</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>83.7 ft (25.5 m) (For use with XY2CE in medium length applications)</td>
<td>1</td>
<td>XY2CZ9325</td>
</tr>
<tr>
<td>Contains:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 cable: XY2CZ302, 83.7 ft (25.5 m)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4 cable clamps: XY2CZ523</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>1 turnbuckle: XY2CZ404</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3 cable end protectors: XY2CZ701</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>1 cable support: XY2CZ601</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>1 end spring: XY2CZ702</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>165.6 ft (50.5 m) (For use with XY2CE in maximum length applications)</td>
<td>1</td>
<td>XY2CZ9350</td>
</tr>
<tr>
<td>Contains:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 cable: XY2CZ305, 165.6 ft (50.5 m)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4 cable clamps: XY2CZ523</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>1 turnbuckle: XY2CZ404</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3 cable end protectors: XY2CZ701</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>1 cable support: XY2CZ601</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>1 end spring: XY2CZ702</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Galvanized steel cable with red jacket 1/8 in. (3.2 mm) diameter. The red cable jacket meets EN requirements for emergency stop actuators to be red.</td>
<td>1</td>
<td>XY2CZ301</td>
</tr>
<tr>
<td>Length 34.4 ft (10.5 m)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Length 83.7 ft (25.5 m)</td>
<td>1</td>
<td>XY2CZ302</td>
</tr>
<tr>
<td>Length 165.6 ft (50.5 m)</td>
<td>1</td>
<td>XY2CZ305</td>
</tr>
<tr>
<td>Cable clamps</td>
<td></td>
<td>XY2CZ503</td>
</tr>
<tr>
<td>Single: 0.138 in. (3.5 mm) diameter cable (max.)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Double: 0.138 in. (3.5 mm) diameter cable (max.)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Clamp: 0.138 in. (3.5 mm) diameter cable (max.)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Cable support</td>
<td></td>
<td>XY2CZ513</td>
</tr>
<tr>
<td>Fixed (5/16 in. coarse thread, 0.35 in. deep)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Swiveling</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pulley support (to be used with Pulley XYZCZ708)</td>
<td>1</td>
<td>XY2CZ705</td>
</tr>
<tr>
<td>Pulley, 0.2 in. (5 mm) max. diameter cable (to be used with XYZCZ705 Pulley Support)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Wire and protective guard for 0.118–0.138 in. (3–3.5 mm) diameter cable. Guard is used to protect cable when securing to the switch, turnbuckles, and end springs, etc. The cable is placed in the groove of the guard so the guard comes in contact with the switch, turnbuckle, or end springs—instead of the cable itself. Reduces stress and strain on cable.</td>
<td>10</td>
<td>XY2CZ701</td>
</tr>
<tr>
<td>The use of an end spring is strongly advised when using the cable pull devices on continuous duty mechanical handling equipment and systems.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Spare Parts (suitable for both XY2CE and XY2CH)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Sold in lots of</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact block</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slow break, N.O. + N.C. (emergency stop)</td>
<td>0</td>
<td>Not available separately</td>
</tr>
<tr>
<td>Slow break, N.C. + N.C. (emergency stop)</td>
<td>0</td>
<td>Not available separately</td>
</tr>
<tr>
<td>Snap action, N.O. + N.C. (normal stop)</td>
<td>1</td>
<td>XESP2151</td>
</tr>
<tr>
<td>Reset operators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flush with marking R</td>
<td>1</td>
<td>ZA2BA639</td>
</tr>
<tr>
<td>Booted</td>
<td>1</td>
<td>ZA2BP6</td>
</tr>
<tr>
<td>Emergency stop head 30 mm diameter, blue</td>
<td>1</td>
<td>ZA2BC64</td>
</tr>
<tr>
<td>Key operated emergency stop, blue (Ronis Key No. 421)</td>
<td>1</td>
<td>ZA2BS06212</td>
</tr>
<tr>
<td>Key</td>
<td>1</td>
<td>Q99900911</td>
</tr>
</tbody>
</table>
**XY2CH**

**Without pilot light**  
**With pilot light**

(1) Maximum extension.  
(3) 4.76 in. (121 mm): 24 V and 48 V versions. 5.16 in. (131 mm): 130 V and 230 V versions.

**XY2CE**

**XY2CE Ass., XY2CE Ass.**  
**XY2CE Ass. + XY2 CZ708 (tensioner + bracket)**

(2) Maximum extension.  
Ø: 4 elongated holes Ø 0.24 in. (6 mm).

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**XY2 CZ05**

**XY2 CZ08**

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This document provided by Barr-Thorp Electric Co., Inc. 800-473-9123 www.barr-thorp.com
Note: An end spring (8) is recommended at the far end of the cable (1) allowing the cable to be moved right or left, especially for cables 80 ft or longer. The use of an end spring is strongly advised when using the cable pull devices on continuous duty mechanical handling equipment and systems.

XY2CE  Operating Principles

Normal Position
The cable (1) is tightened by the turnbuckle (2) and held in a normal position by the spring (3). As the turnbuckle is turned, the cam (4) moves from left to right, and allows the actuator (5) to be positioned according to the particulars of the desired setting (see page 7/80).

The mechanical latch is unlocked when the N.C. contact is in the locked position.

Tripping the Device
Operating or breaking the cable results in the cam shifting position.

The active part of the cam presses down the actuator (5), simultaneously causing the N.C. contact (7) to open and the mechanical latch (6) to maintain it in its open position. Cable supports ensure the transmission of the cable tension into the axis of the switch cam.

Definitions
The value of the tension (F) along the cable which trips the switch. Adjustable value according to cam position (see table on page 7/77).

The value of the traction force (F1) applied by the operation perpendicular to the cable which trips the switch. Adjustable value according to the table on page 7/77.

The distance (f) traveled by the operator (i.e., the operator’s hand), between the normal position and the tripping point. Adjustable value according to the table on page 7/77.

General Purpose Adjustment Method

XY2CE—Cable Traction Force
Adjust either directly when mounting the cable or using a turnbuckle positioned near the switch but after the first cable support. For standard adjustment the tension indicator should be in the middle of the range.

Operating Travel
The tripping point is adjusted by the rotating cam marked by letters A to F. Position A corresponds to the minimum travel. Position F corresponds to the maximum travel.

NOTE: The switches are delivered from the factory in position A.

XY2CH
XY2CH has two viewing windows to aid in adjusting cable tension and resetting the switch. When the cable tension indicator is in mid-range in its viewing window, the reset button should be pushed to reset the device. When reset, a green indicator is visible in the contact viewing window. When the switch is tripped, a yellow indicator is visible in the contact viewing window and the cable tension indicator is at the edge of its viewing window.
When the travel or tripping force is specified, the cable tension and the cam position should be adjusted based on the values below. (Refer to General Purpose Adjustment Method on page 7/76.) For each position of the cam, the values of the operating travel and force (F1) corresponding to the minimum and maximum cable tension are tabulated below.

Cable characteristics: length = 165 ft (50 m); maximum elongation of cable must be no more than 0.00834 in./ft (0.7 mm/m), equivalent to a maximum co-efficient of expansion of 0.07%, based on a 108 °F (60 °C) temperature variance.

<table>
<thead>
<tr>
<th>Switch Type</th>
<th>Cam Position</th>
<th>Cable Tension (Axial) Min.</th>
<th>N lb-f</th>
<th>mm in.</th>
<th>2 m Between Supports</th>
<th>Tripping Force (Axial) Min.</th>
<th>N lb-f</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Min.</td>
<td>145</td>
<td>32.6</td>
<td>94.0</td>
<td>3.7 59 13.2</td>
<td>160 6.30 20 4.5</td>
<td>323</td>
</tr>
<tr>
<td></td>
<td>Max.</td>
<td>195</td>
<td>43.9</td>
<td>81.3</td>
<td>57 12.8 60.30 32</td>
<td>160 6.30 20 7.2</td>
<td>333</td>
</tr>
<tr>
<td>B</td>
<td>Min.</td>
<td>150</td>
<td>33.8</td>
<td>81.4</td>
<td>83 18.7 170 6.69 24</td>
<td>175 6.89 38 8.6</td>
<td>333</td>
</tr>
<tr>
<td>C</td>
<td>Min.</td>
<td>152</td>
<td>34.2</td>
<td>114.3</td>
<td>90 20.2 180 7.09 28</td>
<td>190 7.48 44 9.9</td>
<td>372</td>
</tr>
<tr>
<td></td>
<td>Max.</td>
<td>215</td>
<td>48.4</td>
<td>106.7</td>
<td>83 18.7 190 7.48 44</td>
<td>190 7.48 44 9.9</td>
<td>372</td>
</tr>
<tr>
<td>D</td>
<td>Min.</td>
<td>155</td>
<td>34.9</td>
<td>124.5</td>
<td>96 22.0 190 7.48 32</td>
<td>200 7.87 48 11.0</td>
<td>402</td>
</tr>
<tr>
<td>E</td>
<td>Min.</td>
<td>160</td>
<td>36.0</td>
<td>134.6</td>
<td>109 24.6 200 7.87 35</td>
<td>210 8.27 56 12.6</td>
<td>402</td>
</tr>
<tr>
<td></td>
<td>Max.</td>
<td>235</td>
<td>52.9</td>
<td>124.5</td>
<td>104 23.5 210 8.27 56</td>
<td>210 8.27 56 12.6</td>
<td>421</td>
</tr>
<tr>
<td>F</td>
<td>Min.</td>
<td>165</td>
<td>37.1</td>
<td>144.8</td>
<td>117 26.4 205 8.07 39</td>
<td>220 8.66 60 13.5</td>
<td>421</td>
</tr>
<tr>
<td></td>
<td>Max.</td>
<td>245</td>
<td>55.1</td>
<td>134.6</td>
<td>111 24.9 220 8.66 60</td>
<td>220 8.66 60 13.5</td>
<td>421</td>
</tr>
<tr>
<td>XY2CH</td>
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<td>100</td>
<td>22.5</td>
<td></td>
<td></td>
<td>160 6.30 20 4.5</td>
<td>-</td>
</tr>
</tbody>
</table>
Setup

XY2CH

XY2CE

XY2CE + XY2CZ917

Application and Installation Recommendations

The XY2 cable pull switches are based on the taut cable principle, which means the cable must be tight and have a tension applied to allow the switch to be reset and work properly. This is different from slack cable switches where the cable is normally slack and is only tight when pulled. The benefit of the taut cable principle is that the operator knows that if the cable is taut, the machine can be shut down. If slack cable switches are used, the operator is not assured the cable is affixed properly at the switch and may be unsure that when the cable is pulled the machine will stop.

The distance an operator must pull the cable on a slack cable switch depends on the operator’s distance from the switch and the amount of slack in the cable. An operator close to the switch needs to take up much less slack in the cable before tripping the switch than an operator at the far end of the installation. With a taut cable switch, the operating force and distance the cable needs to be pulled is the same throughout the installation. The taut cable style of device is more reliable in an emergency situation.

Effects of Friction

To operate properly, the cable must be tight with tension on it, and the cable must have a minimum of friction. Care must be taken in the machine design to ensure that the system avoids ANY friction between the cable on the machine parts or components, and moving parts on the machine or material handling system.

- The cable must be free of motion on its supports. It should not lay against the supports nor rub on them except when the cable is pulled by an operator.
- The cable must not have weights attached nor applied to it as a standard part of the application.
- The application must be designed to reduce friction as low as possible. This is accomplished by using reduced friction pulleys and guides.
- The cables should never be run through conduit or tubing.
**Cornering**

The operating cable should be installed so that the cable run is straight, but this cable can also be routed around corners using pulleys. If the cable deviates from a straight line, pulleys must be used. The effects of friction could be more noticeable if the cable is not installed correctly and with a minimum of friction.

- **DO NOT** allow the cable to turn corners or change direction using only cable supports.
- A pulley must be used when routing cable around corners, regardless of the angle. Use a pulley whenever direction is changed even slightly. The pulley must have freedom of movement on its mounting to maintain the self-alignment of the cable.
- If a fixed pulley is used, a cable support should be positioned within 4 in. (10 cm) of both sides of the pulley.
- The total sum of the angles for the cable bends or turns should be no more than 180°.
  - qty of two 90-degree angle turns is acceptable.
  - qty of three 60-degree angle turns is acceptable.
  - qty of three 90-degree angle turns is not acceptable.

**Temperature**

Temperature variations in the area where the cable pull switch is installed can affect the adjustment of the switch. The cable expands (becomes longer) when temperature increases, and contracts (shrinks) when temperature decreases. Wide temperature variations should be avoided where possible. If temperature variations are significant, the adjustment of the cable and switch must be checked at regular intervals. If the switch is not adjusted properly during installation, temperature variations could affect cable length and trip the switch without operator intervention. If this occurs, the switch needs to be readjusted.

Temperature variances can come from any of the following:

- Seasonal temperature changes in non-climate controlled areas.
- Freezers and refrigeration equipment which are cold during production but are brought to room temperature for cleaning.
- Equipment that is used to heat treat or cook material during production but is brought to room temperature for cleaning.
- Equipment which is at room temperature (or lower temperatures) for production but is cleaned with hot water or steam.
- Equipment placed near windows and large glass areas: sunlight could cause an expansion of the cable where an overcast day may cause a contraction of the cable.

**General Guidelines**

- Be sure the cable remains accessible and visible to the operators for its entire length.
- The switch, cable supports, and other hardware must be rigidly mounted on the machine or application. If these mountings are not secure and rigid, the tension on the cable could be changed and the switch will trip. Mounting points must not move when the cable is pulled.
- Supports are not to be placed on moveable parts of the application.
- Cable lengths used must not exceed maximum lengths listed for the particular cable pull switch.
- The turnbuckle allows for the proper adjustment of the switch, and must be mounted close to the switch to ease and simplify adjustment of the system.
- The turnbuckle locknuts should be tightened securely.
- The first cable support should be within 4 in. (10 cm) of the switch.
- The sheath around the end of the cable must be removed when inserted into the cable clamps to assure metal-to-metal contact. Failure to remove sheathing could cause the cable to slip, thus reducing cable tension, and switches may not perform to published specifications.
For the versions with two contact blocks, the left one is identified as A, and the right one is identified as B. The markings are permanently inscribed on the mounting fixture above the contact blocks. Ex. B 21-22 is the normally closed contact of the right contact block.

Note: When the emergency stop switch operates in conjunction with solid-state controls, e.g. PLCs, the supply for the safety functions must be disconnected independently of the PLC.

**Operating instructions**

**Indicator Displays**

The indicators define the maximum cable tension adjustment zone. The cable tension is adjusted via the turnbuckle. **The device will not function outside this zone.** For general purpose adjustment, the indicator should be in the middle of the window.

**Adjustment Limits for Effective Operating**

In a normal position, adjustments must be made so that there is a play (J) between the actuator and the conical parts of the cam.

**Cable Supports**

It is recommended that you space supports along the entire length of the cable at 6–16 ft (2–5 m) intervals. **Cable supports ensure the transmission of the cable tension in the axis of the switch cam.** The first one after the switch is mandatory for correct operation (4.0 in., 100 mm). Also, if pulleys are used to change the direction of the cable, **cable supports at 4 in. (100 mm) before and after the pulley are mandatory.**

**Cable Characteristics**

Recommended cable diameter is 1/8 in. (3.2 mm). However, any galvanized steel cable (aircraft type) less than 9/32 in. (7 mm) diameter can be used, provided it meets the following criteria: Maximum elongation of cable to be no more than 0.00834 in. per ft (0.7 mm/m), which is equivalent to a maximum co-efficient of expansion of 0.07%, based on a 140 °F (60 °C) temperature variance.