

XUSLB/XUSLDM

Safety Light Curtain

Instruction Bulletin
30072-451-85



English

HAZARD CATEGORIES AND SPECIAL SYMBOLS

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label on the product indicates that an electrical hazard exists which will result in personal injury or death if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result** in death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result** in death, serious injury, or equipment damage.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result** in minor or moderate injury, or equipment damage.

CAUTION

CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result** in equipment damage.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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SECTION 1— SAFETY REQUIREMENTS

PRECAUTIONS

WARNING

IMPROPER SETUP OR INSTALLATION

- This equipment must only be installed and serviced by qualified personnel.
- Read, understand, and follow Meeting Full Compliance below before installing the XUSLB/XUSLDM light curtain.

Failure to follow these instructions can result in death or serious injury.

MEETING FULL COMPLIANCE

Whether a machine and XUSLB/XUSLDM light curtain system complies with safety regulations depends on the proper application, installation, maintenance, and operation of the XUSLB/XUSLDM system. These are the responsibilities of the purchaser, installer, and employer.

The employer is responsible for selecting and training the personnel necessary to properly install, operate, and maintain the machine and its safeguarding systems. The XUSLB/XUSLDM system should only be installed, checked, and maintained by a **qualified** person. A qualified person is defined as “a person or persons who, by possession of a recognized degree or certificate of professional training, or who, by extensive knowledge, training and experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work” (ANSI B30.2-1983).

To use an XUSLB/XUSLDM system, the following requirements must be met:

- The guarded machine **must** be able to stop anywhere in its cycle. Do not use a safety light curtain on a press with a full-revolution clutch.
- The guarded machine must not present a hazard from flying parts.
- The guarded machine must have a consistent stopping time and adequate control mechanisms.
- Heavy smoke, particulate matter, and corrosives may degrade the efficiency of a safety light curtain. Do not use XUSLB/XUSLDM light curtains in this type of environment.
- All applicable governmental and local rules, codes, and regulations must be satisfied. This is the user's and employer's responsibility.
- All safety-related machine control elements must be designed so that an alarm in the control logic or failure of the control circuit does not lead to an XUSLB/XUSLDM system failure.
- Additional guarding may be required to prevent access to dangerous areas not protected by the XUSLB/XUSLDM system. See Additional Guarding When Using Exact Channel Select (Fixed) Blanking, Monitored Blanking, or Floating Blanking on page 30.
- Perform the test procedure beginning on page 113 at installation and after maintenance, adjustment, repair, or modification of the machine controls, tooling, dies or machine, or to the XUSLB/XUSLDM system.
- Perform only the test and repair procedures outlined in this manual.

- Follow all procedures in this manual for proper operation of the XUSLB/XUSLDM system.
- All safety-related machine control circuit elements, including pneumatic, electric, or hydraulic controls must be control-reliable. Control reliable is defined as: "The device, system, or interface shall be designed, constructed, and installed such that a single component failure within the device, interface, or system shall not prevent normal stopping action from taking place, but shall prevent a successive machine cycle..." (ANSI B11.19¹).
- Electro-sensitive protective equipment (ESPE) must not be used as a lock-out device to meet Occupational Safety and Health Administration² (OSHA) lock out/tag out requirements.

The enforcement of these requirements is beyond the control of Schneider Electric. The employer has the sole responsibility to follow the preceding requirements and any other procedures, conditions, and requirements specific to the machinery.

PRODUCT SUPPORT

For information about products and services in your country, visit www.Telemecanique.com.

¹ American National Standards Institute

² OSHA is administered by the U.S. Department of Labor.

SECTION 2— PRODUCT DESCRIPTION

XUSLB/XUSLDM FEATURES

The XUSLB/XUSLDM system is for use where personnel protection is required. Typical applications include finger and hand detection around hazardous equipment such as:

- Robotic work cells
- Transfer lines
- Assembly lines
- Turret punch presses
- Palletizers
- Filter presses
- Welding stations
- Roll handling equipment
- Coilers and uncoilers
- Automated equipment

Table 1 displays the standard features of the XUSLB and XUSLDM light curtains. An “X” in the table indicates that the feature is present in the corresponding light curtain model.

Table 1: XUSLB/XUSLDM Light Curtain Features

Feature	XUSLB	XUSLDM
Flex bus, multi-segmented head configurations		X
Scan code for cross-talk mitigation	X ¹	X ¹
EDM/MPCE (External Device Monitoring/Machine Primary Control Element) monitoring	X ²	X ²
PDM (Programming/Diagnostic Module) port	X	X
Adjustable mounting brackets and T-slots	X	X
Non-shielded main cables	X	X
2-box design	X	X
Two PNP safety outputs	X	X
Operating mode	X ¹	X ¹
Machine Test Signal (MTS)	X ¹	X ¹
Auxiliary output (PNP or NPN)	X (PNP/Follow Only)	X ¹
Muting through XPSLCM1 wiring module		X ¹
Floating blanking		X ¹
Exact Channel Select (Fixed) blanking		X ¹
Monitored blanking		X ¹
Reduced resolution		X ¹
Range selection	X ¹	X ¹
Start input type		X ¹
Response time adjustment		X ¹

¹ Configurable via the use of the Programming and Diagnostic Module (PDM).

² Configurable via the PDM or wiring connection.

NOTE: The XUSLDM light curtain configurations are universal and can be changed using an external unit called the Programming and Diagnostic Module (PDM). The XUSLB light curtains are basic units and fewer features can be changed using the PDM.

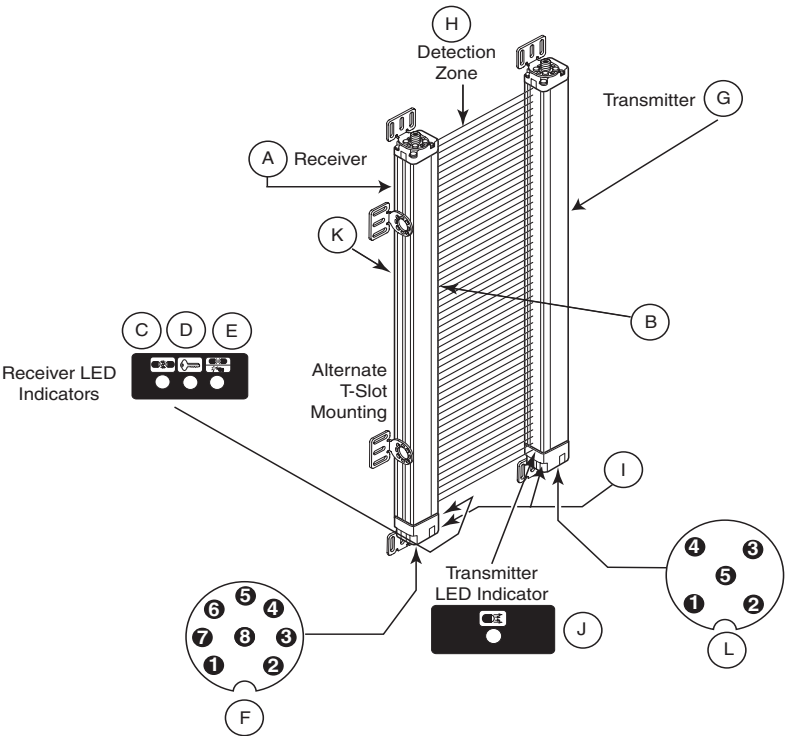
SYSTEM COMPONENTS

Refer to Figure 1 for the location of the components listed in Table 2.

Table 2: System Components Identification

Item No.	Description		Item No.	Description	
A	Receiver		G	Transmitter	
B	Individual beam indicator (one for each beam)—Red		H	Detection zone	
C	Blanking active—Amber		I	Programming port for the PDM	
D	Interlock or Alarm indicator—Yellow		J	Status indicator—Yellow	
E	Machine Run/Stop indicator—Green/Red		K	Side mounting T-Slot	
F	Receiver connections M-12 (male)		L	Transmitter connections M-12 (male)	
	1	+24 Vdc		1	0 Vdc
	2	0 Vdc		2	+24 Vdc
	3	Ground		3	MTS
	4	OSSD2		4	MTS Return
	5	Start or EDM		5	Ground
	6	EDM			
	7	Auxiliary Output			
	8	OSSD1			

Figure 1: XUSLB/XUSLDM System Components



XUSLB/XUSLDM DEFAULT SETTINGS

The XUSLB/XUSLDM default settings are separated into two categories: default settings for the XUSLB Optimum light curtain, and default settings for the XUSLDM Universal light curtain.

The XUSLB Optimum light curtain is the basic light curtain model. The XUSLB does not ship from the factory with a PDM; however, a PDM may be ordered separately. This light curtain does not support any muting functions.

The XUSLDM Universal light curtain is the advanced light curtain model and it is fully functional.

For a list of standard features, refer to XUSLB/XUSLDM Features beginning on page 11.

Some of the light curtain default settings include settings for electrical components. For wiring color, location, and connection, refer to the general connection diagram shown in Figure 24 on page 51.

XUSLB Optimum Light Curtain

- Automatic start
- EDM (External Device Monitoring) is enabled if the yellow (Start) wire is connected to + 24 V ³.
- Detection distance: 7 m finger detection and 8 m hand detection
- MTS: Enabled. Connect the blue wire to the black wire with or without a test button for correct functionality.
- Auxiliary follow output type: PNP
- Scan code: A ⁴

XUSLDM Universal Light Curtain

- Automatic start
- EDM enabled if the yellow wire (Start) is connected to + 24 V. ³
- Detection distance: 7 m finger detection and 20 m hand detection
- MTS: Disabled
- Auxiliary follow output type: PNP ⁵
- Scan code: A ⁴
- Exact Channel Select (Fixed) blanking and Monitored blanking: Disabled
- Floating blanking: Disabled
- Reduced resolution: Disabled
- Response time: Normal
- Muting: Disabled

NOTE: All functions of XUSLDM Universal light curtain can be set up with the PDM.

³ In Manual Start mode, the yellow wire (Start) must be connected to 0 V, and the start button must be the normally closed (NC) type. In this case, the EDM function can only be activated by the PDM.

⁴ The scan code selection is only possible with the PDM.

⁵ NPN, Follow, and Alarm modes are available through the PDM.

CATALOG NUMBERS

Refer to the following tables for a key to interpreting XUSLB/XUSLDM Safety Light Curtain catalog numbers. The tables list all possible values for each field of the catalog number.

XU	SL	B	Q	6	A	0280	T
①	②	③	④	⑤	⑥	⑦	⑧

① Operation

XU	Photoelectric
----	---------------

② Light Curtain Type

SL	Safety
----	--------

③ System Type

B	Optimum model
DM	Universal model
DS	Segmented universal model

④ Operating Range

Q	Optimum or Universal model	0.3–7.0 m (0.98–22.96 ft) ¹
R	Optimum model	0.3–20.0 m (0.98–65.62 ft) ²
Y	Universal model	0.3–20.0 m (0.98–65.62 ft) ²

¹ The units are configurable to a shorter range of 0.3–3.0 m (0.98–9.84 ft) using a PDM.

² The units are configurable to longer ranges of 0.3–20 m (0.98–65.62 ft) or to a shorter range of 0.3–8 m (0.98–26.25 ft) using a PDM.

⑤ Detection

6	14 mm (0.55 in.) finger detection
5	30 mm (1.18 in.) hand detection

⑥ Non-Safety Auxiliary Output

A	Static output (PNP or NPN dependent on version)
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⑦ Protected Height

mm (in.)	mm (in.)	mm (in.)
0280 (11.02) Version Q	0760 (29.92) Version R & Y	1520 (59.84) Version R & Y
0320 (14.17) Version Q, R, & Y	0880 (34.65) Version Q, R, & Y	1560 (61.41) Version R & Y
0360 (14.17) Version Q, R, & Y	0920 (36.22) Version Q, R, & Y	1640 (64.56) Version R & Y
0440 (17.32) Version Q, R, & Y	1040 (40.94) Version Q, R, & Y	1720 (67.71) Version R & Y
0520 (20.47) Version Q, R, & Y	1120 (44.09) Version Q	1800 (70.86) Version R & Y
0600 (23.62) Version Q, R, & Y	1200 (47.24) Version Q, R, & Y	1920 (75.59) Version R & Y
0680 (26.77) Version R & Y	1360 (53.54) Version Q, R, & Y	2120 (83.46) Version R & Y
0720 (28.35) Version R	1400 (55) Version R & Y	

NOTE: Inches are given in this table for reference.

The catalog number field expresses protection height in millimeters only.

⑧ Device Type

T	Transmitter
R	Receiver

SYSTEM TYPE

The XUSLB/XUSLDM system is a microprocessor-controlled, infrared transmitted-beam safety device. The system consists of a receiver assembly and a transmitter assembly. The transmitter and receiver assemblies are not physically interconnected.

OPERATING STATES

The following terms are used to describe the operating states of the XUSLB/XUSLDM light curtains:

Machine Run



Machine Run is the normal operating state. In the Machine Run state, the two receiver safety outputs are in the On state, the green Machine Run indicator is lit, and the auxiliary output is in a state consistent with its configuration (see Table 16 on page 54). The protected machine is allowed to operate.

Machine Stop



Machine Stop state occurs when a beam is interrupted. In the Machine Stop state, the two receiver safety outputs are in the Off state, the red Machine Stop indicator is lit, and the auxiliary output is in a state consistent with its configuration. The protected machine is not allowed to operate.

Interlock



Interlock state occurs when the system is in Start Interlock mode (see page 16) and the beam is interrupted. In the Interlock state, the two receiver safety outputs are in the Off state, the red Machine Stop and yellow interlock indicators are lit, and the auxiliary output is in a state consistent with its configuration. When the system is in the Interlock state, the protected machine is not allowed to operate until the detection zone is clear of obstructions, and the start button is pressed and released.

Alarm



Alarm state occurs when the system is in Start/Restart Interlock mode (see page 16) and the beam is interrupted. In the Alarm state, the two receiver safety outputs are in the Off state, the red Machine Stop indicator is lit, and the yellow interlock indicator is flashing. The auxiliary output is in a state consistent with its configuration. When the system is in the Alarm state, the protected machine is not allowed to operate. The primary difference between Alarm and Interlock states is that the XUSLB/XUSLDM system will remain in the Alarm state until the fault is corrected, regardless of power cycling or pressing and releasing the start button.

OPERATING MODES

The operating mode determines the start-up and operating behavior of the XUSLB/XUSLDM system. The operating mode descriptions in this section draw on the operating state definitions in “Operating States” on page 15.

Automatic Start

In **Automatic Start** mode, the system enters the Machine Run state on startup without operator intervention, as long as the detection zone is not blocked. When the XUSLB/XUSLDM system is powered up in Automatic Start mode, its safety and auxiliary outputs are Off; if the detection zone is not obstructed, it enters the Machine Run state (see page 15). In this state, when the XUSLB/XUSLDM system senses an object entering the detection zone, it changes from Machine Run to Machine Stop (see page 15) state, and remains in the Machine Stop state until the obstruction is removed. Once the detection zone is clear, the XUSLB/XUSLDM system automatically changes from Machine Stop to Machine Run.

Start Interlock

When the XUSLDM system is powered up in **Start Interlock** mode, its safety outputs are Off; if no faults are detected, it enters the Interlock state (see page 15). To enter the Machine Run state from the Interlock state, the detection zone must be clear, and then the operator must press and release the Start button. Once in the Machine Run state, if the XUSLDM system senses an object entering the detection zone, it changes from Machine Run to Machine Stop state. Once the detection zone is clear, the XUSLDM system automatically changes from Machine Stop to Machine Run state.

Start/Restart Interlock

When the XUSLB/XUSLDM system is powered up in **Start/Restart Interlock** mode, its safety outputs are Off; if no faults are detected, it enters the Interlock state. To enter the Machine Run state, the detection zone must be clear, and the operator must press and release the Start button. Once in the Machine Run state, if the XUSLB/XUSLDM system senses an object entering the detection zone, it changes from Machine Run to Machine Stop state. After the obstruction is removed from the detection zone, the XUSLB/XUSLDM system changes to the Interlock state. To enter the Machine Run state, the operator must press and release the start button. If any obstruction is present in the detection zone when the Start button is pressed and released, the XUSLB/XUSLDM system remains in the Machine Stop state.

XUSLDM CASCADED FUNCTION

The XUSLDM safety light curtain can become the master in a cascaded system. A cascaded XUSLDM with XUSLDS light curtain system allows multiple transmitters and receivers to be daisy-chained, which gives the XUSLD the flexibility to guard multiple areas of a machine.

Features and Requirements

- Offered in protective heights ranging from 280 mm to 1360 mm for 14 mm resolutions, and from 360 mm to 2120 mm for 30 mm resolution.
- The maximum size of the system is based on the number of beams. A single master segment cannot exceed 180 beams, and the total of the combined segments cannot exceed 256 beams.
- A single XUSLDM light curtain can be converted to a master cascaded system.
- XUSLDS segments with different resolutions can be mixed within an XUSLDM system.
- A single slave segment cannot exceed 128 beams.
- Up to four segments can be daisy-chained as long as the total number of beams does not exceed 256.
- The maximum cable length between any two segments is 10 m.

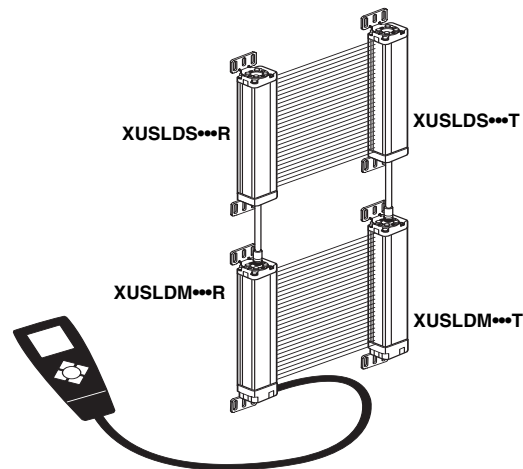
Segment Reduction Restart Procedure

When you reduce the number of cascaded segments, you cause a flex bus fault. The XUSLDM master will enter a fault condition, indicated by error code “95” on the PDM and on the IBIs (Individual Beam Indicators) as well.

After cycling power to the system to clear the flex fault, fault code “100” will display. This fault code indicates a reduction in the number of cascaded segments.

The fault can be cleared and operation restored on the reduced size XUSLDM master by using either the PDM or the start input line as described below.

Figure 2: Cascaded Segments



Clearing the Fault with the PDM

Load the configuration from the light curtain and save the new reduced system configuration.

Clearing the Fault with the Start Input Line

1. Press the user-supplied start switch while the power is applied. The three indicator LEDs (red, yellow, amber) will flash for approximately three seconds.
 2. Release the start switch while the LEDs are flashing to clear the fault.
- Since the XUSLDM has a configurable start input, take care to ensure that the correct contact configuration is used and that it is wired properly. The transmitter will not enter a fault state if the number of segments is reduced. However, to operate normally, the transmitter must always match the receiver in the number of segments and beams.

SECTION 3— DETECTION OPTIONS

Exact Channel Select (Fixed) Blanking used with Floating Blanking is reserved for specific applications. All situations that can occur in the XUSLDM system detection zone must be carefully considered. Read this section carefully.

WARNING

LACK OF SENSITIVITY

- Exact Channel Select (Fixed) Blanking and/or Floating Blanking create unprotected passages in the detection zone and make the XUSLDM safety light curtain less sensitive to objects in the detection zone.
- To prevent unauthorized modification of the detection zone, install the system controller in an enclosure with supervisor-controlled access.
- If the object to be ignored by the Channel Selected beams does not completely prevent access to the hazardous area, then either use a hard guard or other means to block access or increase the minimum safe distance as required by the proper formula.
- Any beams which are not in alignment at the time of Channel Select programming may be inadvertently deselected. Use the Test Procedure beginning on page 113 to verify the correct alignment.
- After programming or activating Exact Channel Select (Fixed) Blanking or Floating Blanking, use the test object supplied with the light curtain to perform the Test Procedure beginning on page 113. Performing the test procedure will help eliminate areas where the system may not sense an intrusion into the detection zone.

Failure to follow these instructions can result in death or serious injury.

EXACT CHANNEL SELECT (FIXED) BLANKING (XUSLDM ONLY)

Exact Channel Select (Fixed) Blanking disables selected, fixed areas of the detection zone by masking off specific, fixed beam locations. Exact Channel Select (Fixed) Blanking is helpful when stationary objects such as tooling and fixtures permanently obstruct a portion of the detection zone.

Exact Channel Select (Fixed) Blanking requires that any portion of the detection zone which is blocked remain blocked. If the obstruction is removed, the XUSLDM system will enter the Machine Stop state.

A fixed blanking pattern may consist of more than one fixed blanked area. Individual fixed blanked areas must be separated by at least one beam that is always clear. A fixed blanking area may not crossover between flexible segment boundaries.

Each fixed blanked area has a tolerance of ± 1 beam to allow for slight position variance. Only the two beams on the edges of the blanked area are allowed to vary. Because of this position tolerance, the optical resolution is reduced on the border area of fixed blanking patterns. This reduction comprises two beams. See Table 3. This tolerance also allows the number of blocked beams to vary ± 1 . For example, a fixed blanked area of 8 blanked beams is allowed to increase to 9 beams or decrease to 7 beams with the light curtain remaining in the Machine Run state. There is an exception when there are two beams separating fixed blanked areas. For this case only, no positional tolerance is allowed on the beam closest to the entry endcap. If it is blocked, the light curtain will enter Machine Stop state. If there is only one beam separating fixed blanked areas, there is no positional tolerance on that beam and it must always be clear. With three or more beams separating fixed blanked areas, the normal ± 1 beam tolerance is applied. See Table 3 for a diagram of operation with Exact Channel Select (Fixed) Blanking active.

Table 3: Diagram of Exact Channel Select (Fixed) Blanking Operation

No Exact Channel Select (Fixed) Blanking	Exact Channel Select (Fixed) Blanking Enabled	Exact Channel Select (Fixed) Blanking Enabled	Exact Channel Select (Fixed) Blanking Enabled	Exact Channel Select (Fixed) Blanking Enabled	Exact Channel Select (Fixed) Blanking Enabled
○	○	○	○	⊗	○
○	⊗	○	○	⊗	⊗
○	⊗	○	●	⊗	●
●	⊗	⊗	⊗	⊗	⊗
○	○	○	⊗	○	○
Machine Stop	Machine Run	Machine Run	Machine Run	Machine Stop	Machine Stop

Table 4: Icon Key for Table 3

Symbol	Description
○	Clear optical channel
●	Blocked optical channel
⊗	Optical channel is selected by Exact Channel Select (Fixed) blanking
⊗	Blocked optical channel is selected by Exact Channel Select (Fixed) blanking

The minimum number of beams in a fixed blanking area is one. If only one beam is blocked, that beam must remain blocked; however, the number of blocked beams can be increased to two.

The fixed blanking pattern must not prevent the light curtain from synchronizing. This means that the size of the blanked object cannot exceed certain limits. On an XUSLDM system with 12 or fewer beams, six consecutive beams must always remain clear (not blanked). On an XUSLDM system with more than 128 beams, ten consecutive beams must always remain clear (not blanked). Refer to Table 17 on page 55.

Exact Channel Select (Fixed) blanking is allowed during all modes of operation (Automatic Start, Start Interlock, and Start/Restart Interlock).

**EXACT CHANNEL SELECT (FIXED)
BLANKING USING A PDM
(XUSLDM ONLY)**

To activate Exact Channel Select (Fixed) Blanking:

1. Place an obstruction in the detection zone. This causes the receiver to go into Machine Stop state.
2. Connect the PDM to the receiver.
3. Log in with the supervisor access level.

Refer to the information contained in Programming and Diagnostics Module (PDM) beginning on page 76. This section contains information regarding PDM navigation buttons, screen descriptions, menu functions and structures, diagnostics, and so forth.

With the PDM connected and login complete:

1. Load the light curtain's configuration to the PDM.
2. Navigate to the Edit Configuration menu.
3. Exact Channel Select (Fixed) Blanking On. The system enters a configuration state.
4. Save the configuration to the light curtain.
5. Navigate to the Fixed Blanking Programming menu.
6. Select the Program option. Wait until the LEDs start flashing.
7. Select Finish. The light curtain will automatically restart.

See Table 5 for the effective resolution when Exact Channel Select (Fixed) Blanking is active.

Table 5: Effective Resolution with Exact Channel Select (Fixed) Blanking

Standard Resolution	Effective Resolution at Ends of Exact Channel Select (Fixed) Blanked Area
14 mm	34 mm
30 mm	60 mm

NOTE: The tolerance does not reduce the resolution of the entire light curtain, only the ends of the Exact Channel Select (Fixed) Blanked Areas.

FLOATING BLANKING (XUSLDM ONLY)

With floating blanking, up to two channels can be blanked at any location in the detection zone without the XUSLDM system going to the Machine Stop state. The blanked beams are not fixed at a single location but float through the detection zone.

For two-beam floating blanking, the two obstructed beams do not have to be adjacent. See Table 6 for possible system responses during operation with Floating Blanking active.

Table 6: System Response to Floating Blanking

Number of Beams Selected	0	1	1	1	1	2	2	2	2	2	2	2
Floating Blanking Status	Inactive	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active
Beam 1	○	○	○	○	○	○	○	○	○	○	○	⊗
Beam 2	○	○	○	⊗	⊗	○	○	⊗	⊗	⊗	⊗	○
Beam 3	⊗	○	⊗	⊗	○	○	⊗	⊗	○	⊗	○	⊗
Beam 4	○	○	○	○	⊗	○	○	○	⊗	⊗	⊗	○
Beam 5...	○	○	○	○	○	○	○	○	○	○	⊗	⊗
Beam Blocked	1	0	1	2	2	0	1	2	2	3	3	3
Safety Output Status	stop	run	run	stop	stop	run	run	run	run	stop	stop	stop

Table 7: Icon Key for Table 6

Symbol	Description
○	Beam is not blocked.
⊗	Beam is blocked.

See Table 8 for the effective resolution when floating blanking is active.

Table 8: Effective Resolution with Floating Blanking Active

Floating Blanking Effects on Minimum Object Resolution		
Minimum Object Resolution with No Floating Blanking	Minimum Object Resolution with 1 Beam Floating	Minimum Object Resolution with 2 Beam Floating
14 mm	24 mm	34 mm
30 mm	50 mm	70 mm

Activating Floating Blanking (XUSLDM ONLY)

Floating Blanking (either one- or two-beam) is activated by using the PDM. Only an authorized user can activate the Floating Blanking function on the XUSLDM light curtain.

To activate Floating Blanking:

1. Place an obstruction in the detection zone. This causes the receiver to go into Machine Stop state.
2. Connect the PDM to the receiver.
3. Log in with the supervisor access level.

Refer to the information contained in Programming and Diagnostics Module (PDM) beginning on page 76. This section contains information regarding PDM navigation buttons, screen descriptions, menu functions and structures, diagnostics, and so forth.

With the PDM connected and login complete:

1. Load the light curtain's configuration to the PDM.
2. Navigate to the Edit Configuration menu.
3. Select Floating Blanking On. The system enters a configuration state.
4. Choose one- or two-beams.
5. Save the configuration to the light curtain.
6. The light curtain will automatically restart.

This will cause the PDM to request that the receiver perform a reset. The receiver then enters the Power-On Self Test state. If no faults are detected, the receiver then enters the Interlock or Machine Run state depending upon the selected operating mode. Upon successful completion of the self test, the receiver Blanking Active LED will turn on.

USING EXACT CHANNEL SELECT (FIXED) BLANKING WITH FLOATING BLANKING

WARNING

LACK OF SENSITIVITY

- Read this section carefully.
- Use of Exact Channel Select (Fixed) Blanking with Floating Blanking is reserved for specific applications.
- Improper use of Exact Channel Select (Fixed) Blanking and/or Floating Blanking will make the XUSLDM system less sensitive to objects in the detection zone.
- Use of Exact Channel Select (Fixed) Blanking may require a hard barrier guard.
- With Exact Channel Select (Fixed) Blanking or Floating Blanking, the XUSLDM system may be less sensitive to objects in the detection zone, necessitating an increase in the safe mounting distance. See Section 4 beginning on page 31.

Failure to follow these instructions can result in death or serious injury.

When both Exact Channel Select (Fixed) Blanking and Floating Blanking are selected, the floating channels are allowed to occur anywhere within the detection zone, with the exception of the area selected by Exact Channel Select (Fixed) Blanking.

See Table 9 for possible blanking function combinations which can be used at the same time, and the effect on resolution during light curtain operation. As an example, Exact Channel Select (Fixed) Blanking can be used in combination with Floating Blanking; however, the resolution will be reduced.

Table 9: Possible Blanking Function Combinations

Function	Exact Channel Select (Fixed) Blanking	Floating Blanking	Monitored Floating Blanking	Reduced Resolution
Exact Channel Select (Fixed) Blanking	N/A	Yes	No	No
Floating Blanking	Yes	N/A	Yes	No
Monitored Floating Blanking	No	Yes	N/A	No
Reduced Resolution	No	No	No	N/A

The Effect of Exact Channel Select (Fixed) Blanking and Floating Blanking on Minimum Object Resolution (XUSLDM Only)

When Exact Channel Select (Fixed) Blanking and/or Floating Blanking is active, the safe mounting distance is affected. See Section 4 beginning on page 31 for information regarding safe mounting distance. Exact Channel Select (Fixed) Blanking and Floating Blanking desensitize the light curtain and increase the size of the minimum object detected. The increase is equal to the channel spacing distance for each channel that is disabled.

If the size of the object detected by the XUSLDM system increases, the minimum safe distance must increase. See European Safe Mounting Distance Formula on page 32, US Safe Distance Formula ANSI B11.1 on page 36, or US Safe Distance Formula OSHA CFR 1910.217 (c)(3)(iii)(e) on page 38 for information regarding minimum safe distance. Use the minimum object sensitivity given in Tables 10 and 11 to compute the safe mounting distance.

Table 10: Sample S and D_{pf} Factors for Finger Detection System

Total Number of Beams Disabled by Exact Channel Select (Fixed) and/or Floating Blanking	Minimum Object Resolution (S)	Depth Penetration Factor, D_{pf} for use with ANSI Formula (See page 36) ($D_{pf} = 3.4 (S - 0.276)$ in.)
None	14 mm (0.55 in.)	0.93 in. (24 mm)
1 Beam	24 mm (0.94 in.)	2.26 in. (57 mm)
2 Beams	34 mm (1.34 in.)	3.62 in. (92 mm)
3 Beams	44 mm (1.73 in.)	4.94 in. (125 mm)
4 Beams	54 mm (2.13 in.)	6.3 in. (160 mm)
5 Beams	64 mm (2.52 in.)	7.6 in. (193 mm)
> 5 Beams	>64 mm (2.52 in.)	36 in. (900 mm)

Table 11: Sample S and D_{pf} Factors for Hand Detection System

Total Number of Beams Disabled by Exact Channel Select (Fixed) and/or Floating Blanking	Minimum Object Resolution (S)	Depth Penetration Factor, D_{pf} for use with ANSI Formula (See page 36) ($D_{pf} = 3.4 (S - 0.276)$ in.)
None	30 mm (1.18 in.)	3.1 in. (78 mm)
1 Beam	50 mm (1.97 in.)	5.76 in. (146 mm)
> 1 Beam	>64 mm (2.52 in.)	36 in. (900 mm)

Minimum object sensitivity (MOS) is the largest allowable size of an interruption in the sensing field. An XUSLDM system with 14 mm (0.55 in.) minimum object resolution and one channel disabled has a minimum object sensitivity of:

$$14 \text{ mm} + 10 \text{ mm} = 24 \text{ mm (0.94 in.)}$$

An XUSLDM system with 14 mm (0.55 in.) minimum object resolution and two channels disabled has a minimum object sensitivity of:

$$14 \text{ mm} + 10 \text{ mm} + 10 \text{ mm} = 34 \text{ mm (1.33 in.)}$$

An XUSLDM system with 30 mm (1.18 in.) minimum object resolution and one channel disabled has a minimum object sensitivity of:

$$30 \text{ mm} + 20 \text{ mm} = 50 \text{ mm (1.96 in.)}$$

An XUSLDM system with 30 mm (1.18 in.) minimum object resolution and two channels disabled has a minimum object sensitivity of:

$$30 \text{ mm} + 20 \text{ mm} + 20 \text{ mm} = 70 \text{ mm (2.75 in.)}$$

MONITORED BLANKING (XUSLDM ONLY)

This feature allows a pre-determined object to move within the detection zone while the light curtain remains in the Run state. Monitored blanking is similar to Exact Channel Select (Fixed) blanking; it requires an object with a certain size to block a predetermined number of optical beams within the detection zone. It differs from Exact Channel Select (Fixed) blanking as it allows the object to move within the detection zone. Each system segment will allow only one monitored blanking area within its detection zone.

The minimum number of beams in a monitored blanking area is one. If only one beam is blocked, the number of blocked beams can be increased to two. A monitored blanking area larger than one beam has a size tolerance of +/- 1 beam. The size tolerance only applies to the beams on the edges of the floating area.

The blanking pattern must not prevent the light curtain from synchronizing. This means the size of the blanked object can not exceed certain limits. On a system with fewer than 12 beams, six consecutive beams must always remain clear (not blanked). On a system with more than 12 beams, ten consecutive beams must always remain clear (not blanked).

Blanking is allowed during all modes of operation (Automatic Start, Start Interlock, and Start/Restart Interlock).

Selecting Monitored Blanking (XUSLDM Only)

To select Monitored Blanking:

1. Place an obstruction in the detection zone. This causes the receiver to go into Machine Stop state.
2. Connect the PDM to the receiver.
3. Log in with the supervisor access level.

Refer to the information contained in Programming and Diagnostics Module (PDM) beginning on page 76. This section contains information regarding PDM navigation buttons, screen descriptions, menu functions and structures, diagnostics, and so forth.

With the PDM connected and login complete:

1. Load the light curtain's configuration to the PDM.
2. Navigate to the Edit Configuration menu.
3. Select Monitored Blanking Enable. This will record the state of each one of the optical beams that form the protected area.
4. With the obstruction placed at one limit of the desired monitored area, select Program Begin.
5. Without removing the obstruction from the detection zone, move the obstruction to the other limit of the desired monitored area, and select Program End.
6. Select Finish.
7. Save the configuration to the light curtain. The light curtain will automatically restart.

After you perform these steps, the PDM requests that the system perform a restart. If no faults are detected and the state of the optical beams matches the recorded monitored blanking pattern, the receiver enters the Interlock or Machine Run state depending upon the selected operating mode. The receiver Blanking Active LED will illuminate.

On subsequent power cycles, the receiver will operate in accordance with its configured starting and operation modes. A new floating object size is recorded only when the receiver is in Machine Stop state and the monitored blanking option is activated. If the monitored blanking option is disabled, the stored protected zone pattern is cleared from the system.

Operation with Monitored Blanking

The monitored blanking optical channel pattern is stored in memory and remains unchanged when power is cycled on the receiver. On power-up the receiver recalls the recorded monitored blanking pattern. If the protected zone blocked and unblocked beams do not match the selected monitored blanking pattern, the receiver transitions to the Machine Stop state. The stored pattern is cleared from memory whenever the monitored blanking feature is disabled. As factory-shipped, the receiver is configured with the monitored blanking feature disabled with no pre-recorded protected zone obstructions.

REDUCED RESOLUTION BLANKING (XUSLDM ONLY)

Reduced resolution blanking changes the sensing resolution of the light curtain. Reduced resolution blanking is selectable in one- or two-beam increments, allowing the light curtain to ignore the obstruction of one or two beams. There can be any number of ignored beams anywhere in the protection field, but no more than two adjacent blanked beams.

Selecting Reduced Resolution

To select reduced resolution:

1. Connect the PDM to the receiver.
2. Log in with the supervisor access level.

Refer to the information contained in Programming and Diagnostics Module (PDM) beginning on page 76. This section contains information regarding PDM navigation buttons, screen descriptions, menu functions and structures, diagnostics, and so forth.

With the PDM connected and login complete:

1. Load the light curtain's configuration to the PDM.
2. Navigate to the Edit Configuration menu.
3. Select Reduced Resolution Enable.
4. Enter the beam resolution of the unit.
5. Select the resolution reduction.
6. Save the configuration to the light curtain. The light curtain will automatically restart.

After you perform these steps, the PDM requests the XUSLDM receiver to perform a restart. If no faults are detected, any objects within the detection zone of less than the selected beam resolution will not be detected and the machine will enter an Interlock or Machine Run state depending upon the selected status mode. The XUSLDM receiver Blanking Active LED illuminates to indicate reduced resolution blanking.

Operation

When light curtains are being used for control purposes (such as stroke operation), an optical resolution greater than 30 mm is not allowed. When reduced resolution blanking is enabled, objects under a certain maximum size may enter into the light curtain detection zone and the light curtain will remain in the Machine Run state.

The light curtain offers reduced resolution blanking on systems with 14 mm and 30 mm minimum object resolution. The allowed beam reduction, the resulting effective resolution, and the maximum size of movable objects within the detection zone are shown in Table 12.

When reduced resolution blanking is enabled, fixed blanking, monitored blanking, and floating blanking are not allowed. The PDM is required to select and enable reduced resolution blanking.

Table 12: Optical Resolution

Reduced Resolution	14mm		30 mm	
	Effective Resolution	Maximum Undetected	Effective Resolution	Maximum Undetected
1 beam	24 mm	6 mm	47 mm	13 mm
2 beams	34 mm	16 mm	67 mm	33 mm
3 beams	44 mm	26 mm	87 mm	53 mm

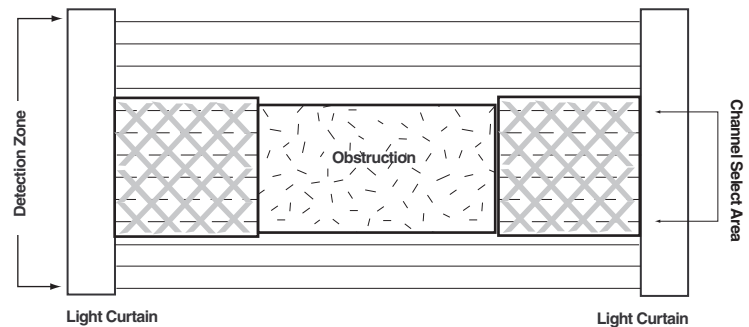
ADDITIONAL GUARDING WHEN USING EXACT CHANNEL SELECT (FIXED) BLANKING, MONITORED BLANKING, OR FLOATING BLANKING

Exact Channel Select (Fixed) Blanking, Monitored 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 are required:

1. The safe mounting distance must be increased to account for the larger opening in the curtain, or
2. 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. See Figure 3 for an example.

Figure 3: Adding Hard Guarding to Light Curtain When Using Exact Channel Select (Fixed) Blanking or Floating Blanking



SECTION 4— PREINSTALLATION CONSIDERATIONS

SAFE MOUNTING DISTANCE

NOTE: All quotations and statements from Occupational Safety and Health Administration (OSHA) and American National Standards Institute (ANSI) apply to the USA only.

⚠ WARNING

IMPROPER SETUP

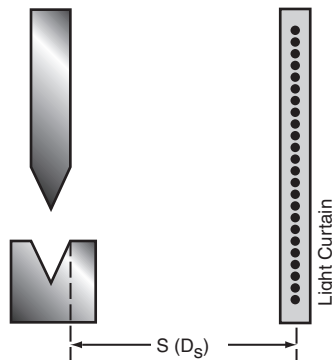
- Install the XUSLB/XUSLDM system at the safe mounting distance calculated using the appropriate formula.
- Ensure that the XUSLB/XUSLDM system is mounted far enough away from the operations hazard to fully accommodate the stopping time.

Failure to follow these instructions can result in death or serious injury.

The XUSLB/XUSLDM system must be mounted far enough from the machine's danger zone so the machine will stop before a hand or other body part reaches the hazardous area. This distance is called the minimum safe mounting distance (see Figure 4). It is a number calculated from a formula. Before installing the XUSLB/XUSLDM light curtain, you must determine the safe mounting distance.

Regardless of the calculated distance, never mount an XUSLB/XUSLDM system closer to a point of operation hazard than specified. This is required by Table 0-10 in OSHA 1910.217.

Figure 4: Safe Mounting Distance



EUROPEAN SAFE MOUNTING DISTANCE FORMULA

General Formula

The minimum safe mounting distance discussed in this section is based on European standard EN 999. This standard applies to light curtains used in industrial environments.

The minimum safe mounting distance is a value, **S**, calculated from the following formula:

$$S = (K \times T) + C$$

Where:

S = the minimum safe distance in millimeters between the danger zone and the detection point, line, plane, or zone.

K = the theoretical speed of approach of the body, or parts of the body, in millimeters per seconds.

T = the overall system stopping performance in seconds. **T** = **t**₁ + **t**₂, where:

t₁ = the maximum response time of the light curtain in seconds. This is the time it takes for the output signal switching devices to change to the Off state after the light curtain actuates. This value is listed on the light curtain nameplate.

t₂ = the maximum response time of the machine in seconds. This is the time it takes for the machine to stop or remove the risk after it receives the output signal from the light curtain.

C = an additional distance in millimeters based on the light curtain's minimum object sensitivity (MOS)⁶.

Applying the Formula

The values of variables **K** and **C** used in the general formula vary depending on how the light curtain is mounted. Three light curtain mounting schemes are discussed in this section. Refer to the section that is appropriate for your application, and use the safe distance formula given in that section.

- Normal (perpendicular) approach: the operator's direction of approach is perpendicular to the detection zone (see Figure 5).
- Parallel approach: the operator's direction of approach is parallel to the detection zone (see Figure 6).
- Angled approach: the operator's direction of approach is at an angle to the detection zone (see Figure 7).

⁶ Minimum object sensitivity (MOS) is the diameter in millimeters of the minimum sized object that will cause the light curtain to actuate. Minimum object sensitivity is called "detection capability" on the light curtain nameplate.

Figure 5: Normal (Perpendicular) Approach to the Detection Zone

S: Minimum safe distance

1: Danger zone

2: Detection zone

3: Direction of approach

4: Fixed guard

5: Beginning of the detection zone

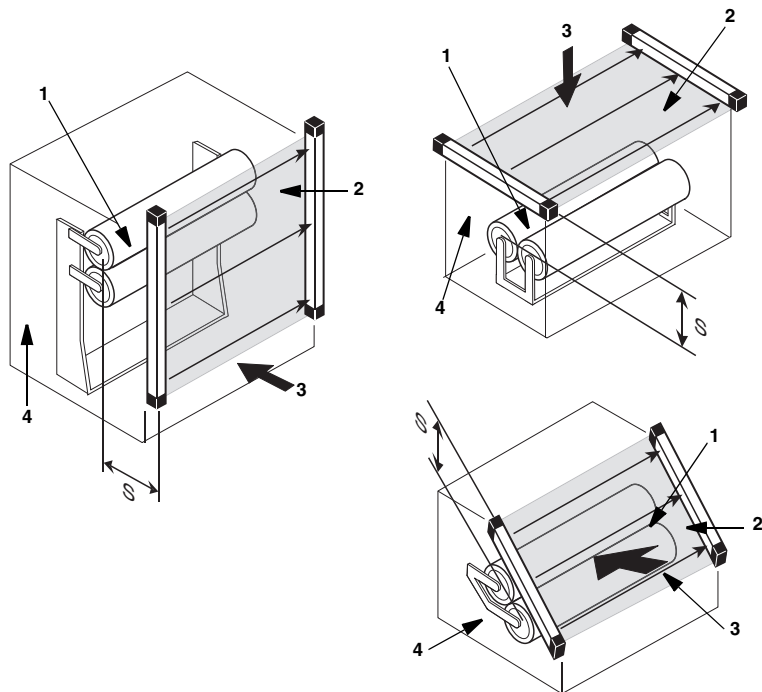


Figure 6: Parallel Approach to the Detection Zone

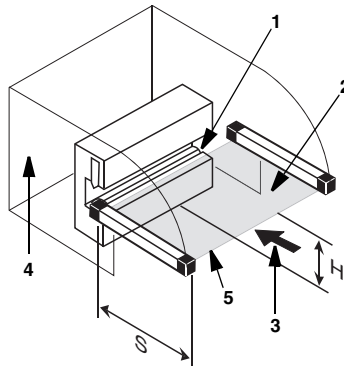
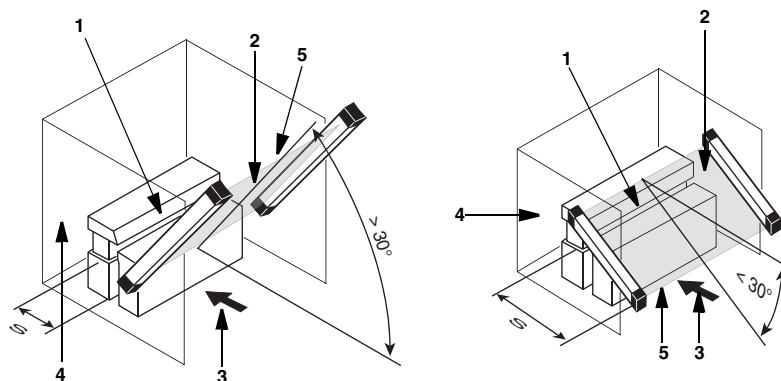


Figure 7: Angled Approach to the Detection Zone



Normal (Perpendicular) Approach

Minimum Object Sensitivity is
40 mm or Less

If the operator's approach is perpendicular to the detection zone (see Figure 5) and the minimum object sensitivity (MOS) of the system is 40 mm or less, use the following formula to calculate the safe mounting distance:

$$S = (K \times T) + C$$

$$S = (2000 \text{ mm/s} \times T) + 8(d - 14 \text{ mm})$$

$K = 2000 \text{ mm/s}$

$C = 8(d - 14 \text{ mm})$, but not less than 0. Where:

d = the minimum object sensitivity of the light curtain in millimeters.

Using this formula with values for T and d that are appropriate for the light curtain, calculate the minimum safe distance S .

- If the calculated value of S is greater than or equal to 100 mm (3.94 in.) and less than or equal to 500 mm (19.68 in.), use the calculated value for the minimum safe distance.
- If the calculated value of S is less than 100 mm, use 100 mm as the safe distance.
- If the calculated value of S is greater than 500 mm (19.68 in.), recalculate S as follows with an alternate value for K :

$$S = (1600 \text{ mm/s} \times T) + 8(d - 14 \text{ mm})$$

Parallel Approach

If the operator's direction of approach is parallel to the detection zone (see Figure 6), calculate the minimum safe distance, S , with the following formula:

$$S = (1600 \text{ mm/s} \times T) + (1200 \text{ mm} - 0.4H)$$

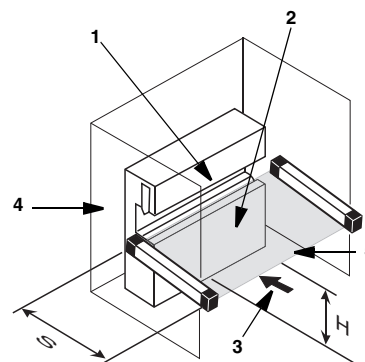
$K = 1600 \text{ mm/s}$

$C = 1200 \text{ mm} - 0.4H$, but not less than 850 mm. Where:

H = the height of the detection zone above the reference plane (for example, the floor) in millimeters.

The maximum allowable value for H is 1000 mm (39.37 in.). If the value of H exceeds 300 mm (11.81 in.), additional protective devices must be used.

Figure 8: Height of the Detection Zone



S : Minimum safe distance

1: Danger zone

2: Detection zone

3: Direction of approach

4: Fixed guard

5: Beginning of the detection zone

Angled Approach

When the operator's direction of approach is at an angle to the detection zone (see Figure 7), the minimum safe distance formula depends on the size of the angle.

- If the angle is greater than 30°, use the formulas in "Normal (Perpendicular) Approach" on page 34.
- If the angle is less than or equal to 30°, use the formula in "Parallel Approach" on page 34.

Calculation Example: Normal (Perpendicular) Approach

In this example, the machine has a stopping time of 60 ms (t_2). It is fitted with a light curtain having a minimum object sensitivity of 30 mm (d) and a response time of 30 ms (t_1). The light curtain is mounted in such a way that the operator's direction of approach is perpendicular to the detection zone (see Figure 5).

Using the formula for normal (perpendicular) approach with a minimum object sensitivity less than 40 mm, calculate the minimum safe mounting distance, S :

$$S = (2000 \text{ mm/s} \times T) + 8(d - 14 \text{ mm})$$

Where:

T = overall response time ($t_1 + t_2$) = (60 + 30) ms = 90 ms, or 0.09 s

d = 30 mm

So:

$$S = (2000 \text{ mm/s} \times 0.09 \text{ s}) + 8(30 - 14) \text{ mm}$$

$$S = 180 \text{ mm} + 128 \text{ mm}$$

$$S = 308 \text{ mm}$$

Factors Affecting the Safe Distance Formula

When light curtains are used for machine initiation, their minimum object sensitivity must be 30 mm or less according to the EN 999 standard. (This requirement may vary with other standards.) In machine initiation applications:

- Use the formula given in "Minimum Object Sensitivity is 40 mm or Less" on page 34 to calculate the safe mounting distance, except
- If the calculated value of S is less than 150 mm, use 150 mm as the safe mounting distance.

WARNING

IMPROPER SETUP

If the calculated distance S is such that an operator can stand between the barrier and the danger zone, additional protection is required, such as a physical guard or barrier comprising several parts. Consult all applicable standards.

Failure to follow this instruction can result in death or serious injury.

US Safe Distance Formula

US Safe Distance Formula ANSI B11.1

Two different formulas are used to calculate the minimum safe distance for light curtains that are mounted vertically. One formula, as outlined in OSHA 1910.217, applies to the guarding of mechanical power presses, but should serve as a guide for other machine applications. The American National Standards Institute (ANSI) standard uses a newer formula which takes into consideration more factors when calculating the minimum safe distance.

The basic formulas for calculating minimum safe mounting distances for light curtains mounted vertically are in this section. These formulas apply to all light curtains. ANSI B11.1 is listed below, OSHA 29 CFR 1910.217 is on page 38.

The ANSI B11.1 formula is shown on the next line, followed by a description of each variable.

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

- D_s:** The minimum safe distance between the light curtain sensing area and the nearest point of potential operation hazard.
- K:** A hand-speed constant of 63 inches per second. This is the minimum value accepted by ANSI standards. ANSI recognizes that this constant may not be optimal, and that the user should consider all factors before deciding on the value of **K** for use in the formula.
- T_s:** The stopping time of the machine, as measured from the final control device. T_s is measured at the maximum velocity.
- T_c:** The time it takes the control circuit to activate the braking system.
NOTE: T_s and T_c are usually measured together by a stop time measurement device.
- T_r:** The response time of the XUSLB/LDM light curtain in milliseconds. See Table 28 on page 87.
- T_{bm}:** The additional time that the brake monitor allows to compensate for wear and variations in the stopping time. (Brake monitors stop the machine when the stop time of the machinery exceeds a preset limit.)
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 allow approximately 20% to 25% additional stop time. To determine the actual value, contact the machine manufacturer.

⚠ WARNING

IMPROPER SET UP

When using an XPS Preventa module (XPS AFL) with the XUSLB/XUSLDM control, add 20 ms to the response time.

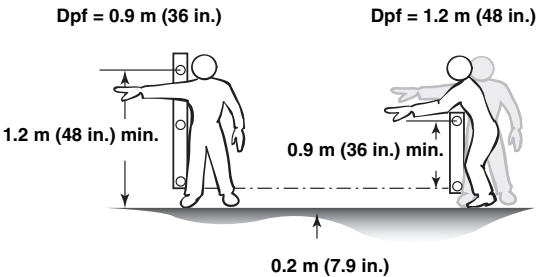
Failure to follow this instruction can result in death or serious injury.

Dpf: (Depth Penetration Factor) The maximum travel toward the hazard within the detection zone that may occur before a stop is signaled. Depth penetration factors vary depending on the light curtain model and the application.

Dpf is 0.9 m (36 in.) for an application that allows only a person's arm to reach through the detection zone—typically a model with three or more beams. See Figure 9.

Dpf is 1.2 m (48 in.) for an application that allows a person to bend over the detection zone and reach through it towards the hazard—typically a two-beam model. See Figure 9.

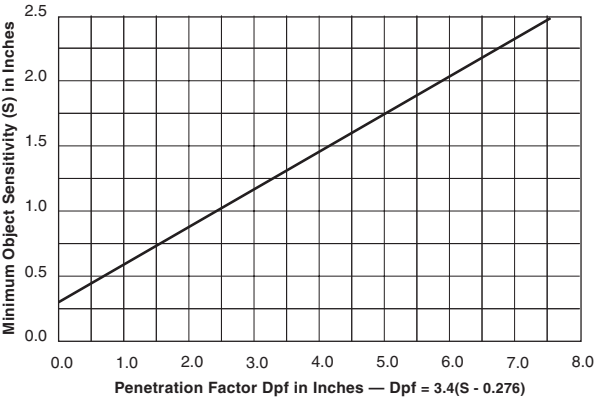
Figure 9: Depth Penetration Factor Calculation



The penetration depth factor is determined by using the Penetration Depth Factor Chart from ANSI B11.1 (see Figure 10). Alternately, the following ANSI formula can be used:

Dpf = 3.4 (S - 0.276), where
S = minimum object sensitivity.

Figure 10: Penetration Depth Factor



US Safe Distance Formula OSHA CFR 1910.217
(c)(3)(iii)(e)

The OSHA formula is shown on the next line, followed by a description of each variable.

$$D_s = 63 \text{ in. per second} \times T_s$$

Where:

D_s: Minimum safe mounting distance (inches)

63 in. per second = hand speed constant

T_s: 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. Table 13 shows the maximum width of openings allowed for a guard based on the distance from the light curtain to the point of operation hazard. The maximum width of the opening shown in Table 13 corresponds to the minimum object sensitivity of the light curtain.

Table 13: OSHA 1910.217 Table O-10

Distance of Opening from Point of Operation Hazard (inches)	Maximum Width of Opening (inches)
0.5–1.5	0.25
1.5–2.5	0.375
2.5–3.5	0.5
3.5–5.5	0.625
5.5–6.5	0.75
6.5–7.5	0.875
7.5–12.5	1.25
12.5–15.5	1.5
15.5–17.5	1.875
17.5–31.5	2.125

NOTE: If the guarded machine is not equipped with a stop time performance monitor, a percentage increase factor should be applied to the stop time of the machine to allow for braking system wear. Contact your machine manufacturer for information.

Dpf: (Depth Penetration Factor) provides a factor to cover the possibility that fingers or hands will penetrate through the sensing field before detection occurs. This value is determined using the Penetration Depth Factor Chart from ANSI B11.1 (see Figure 10 on page 37). Alternately, the following ANSI formula can be used:

Dpf = 3.4 (S - 0.276), where:

S = minimum object sensitivity

ADDITIONAL MOUNTING CONSIDERATIONS

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Whenever an end cap is removed:

- Disconnect power before removing the end cap.
- Replace the end cap before reapplying power.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

IMPROPER SETUP

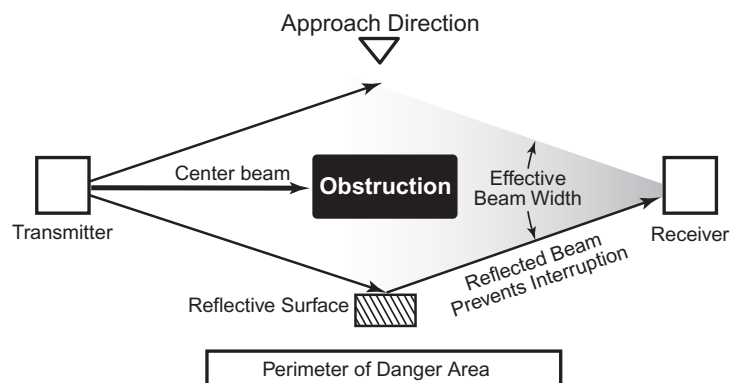
- Read the information in this section completely before starting the installation procedures beginning on page 46.
- An XUSLB/XUSLDM system should only be installed, checked, and maintained by a qualified person as defined in Meeting Full Compliance on page 9.
- The user must be familiar with the installation requirements, safe mounting distance, system controls, and features before using the XUSLB/XUSLDM system.

Failure to follow these instructions can result in death or serious injury.

Reflective Surface Interference

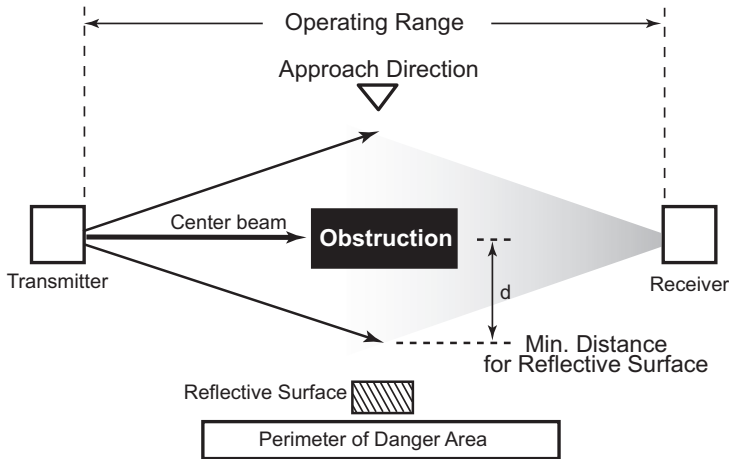
A reflective surface—such as a machine part, mechanical guard, or workpiece—near the detection zone can deflect the optical beam and prevent an obstruction in the protected zone from being detected. In Figure 11, for example, the obstruction is not detected because of the reflection. The reflective object is inside the beam angle.

Figure 11: Example of Reflective Surface Interference



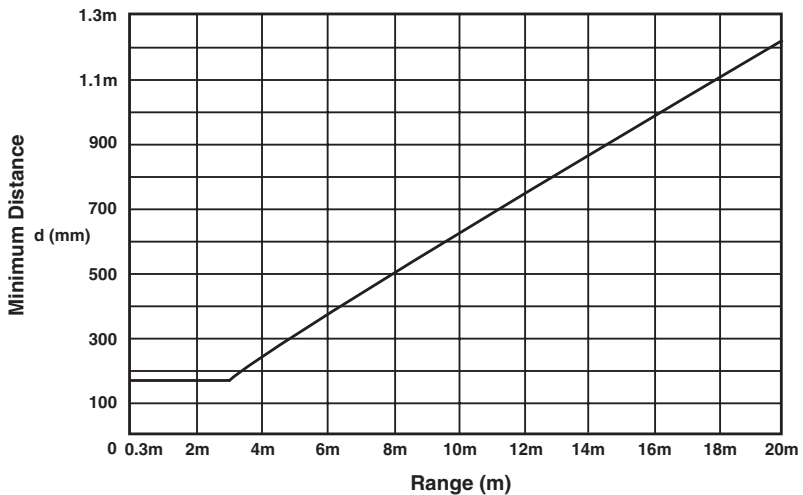
To prevent reflective surface interference, maintain a minimum distance (d) between the reflective object and the center line of the XUSLB/XUSLDM detection zone. Refer to Figure 12. In this example, the reflective object is outside of the beam angle, so the obstruction is clearly detected.

Figure 12: Minimum Distance Between Reflective Surface and Detection Zone Prevents Interference



Refer to Figure 13 for the minimum distances that must be maintained between the reflective object and the center line of the detection zone as a function of the light curtain's operating range. Use the test procedure beginning on page 113 to test for reflective surface interference.

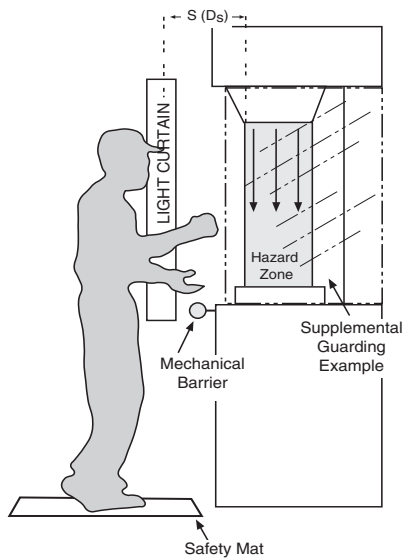
Figure 13: Minimum Distance from a Reflective Surface as a Function of Operating Range



Additional Guarding

Areas of the hazard zone that are not guarded by the XUSLB/XUSLDM system must be protected by another suitable means, such as a fixed barrier guard, an interlocked guard, or a safety mat. See Figure 14.

Figure 14: Additional Guarding



Multiple Systems

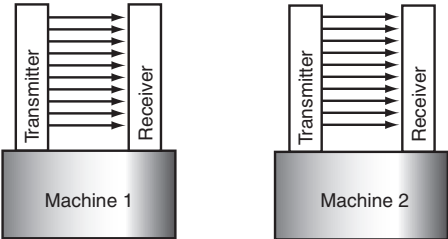
When two or more light curtain systems are mounted in close proximity and in alignment with each other, mount the transmitters and receivers back-to-back, or stack them to prevent one light curtain from interfering with another. See Figure 15.

Figure 15: Multiple Light Curtain Installation Configurations

1

Not Recommended

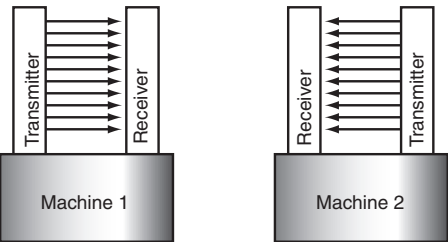
This arrangement is subject to interference between the two light curtains.



2

Recommended

The receivers are mounted back-to-back.

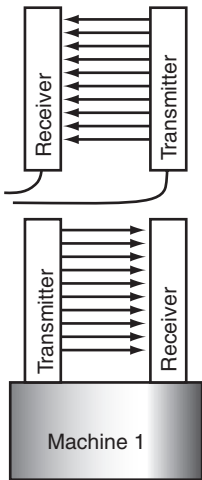


3

Recommended

The light curtains are stacked, with the transmitters facing in opposite directions.

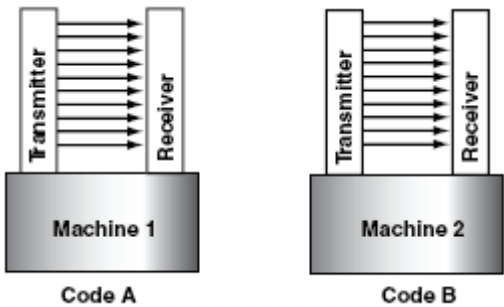
NOTE: Separate the light curtain system, not the flex unit extension.



Scan Coding

The XUSLB or XUSLDM scan coding feature allows you to mount light curtain systems in close proximity and in alignment with each other without interference. The receiver and transmitter can be set to one of two scan codes—A or B (see Start Up on page 53). The distinctive coding allows the system to operate without interference while in view of another system with different scan coding. See Figure 16. A PDM is required to change the scan codes.

Figure 16: Scan Coding



Other Infrared Transmitters

When using the XUSLB/XUSLDM light curtain in an environment containing other infrared transmitters, follow the recommendations in Figure 17 (according to IEC 61496-2).

Figure 17: Use with Other Infrared Transmitters

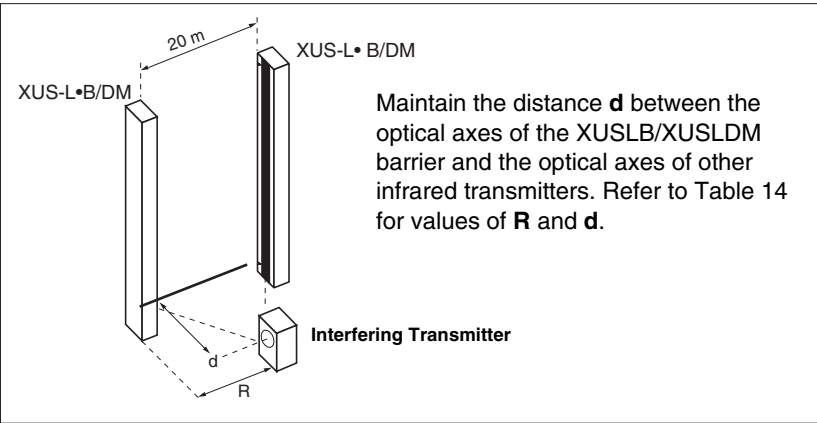


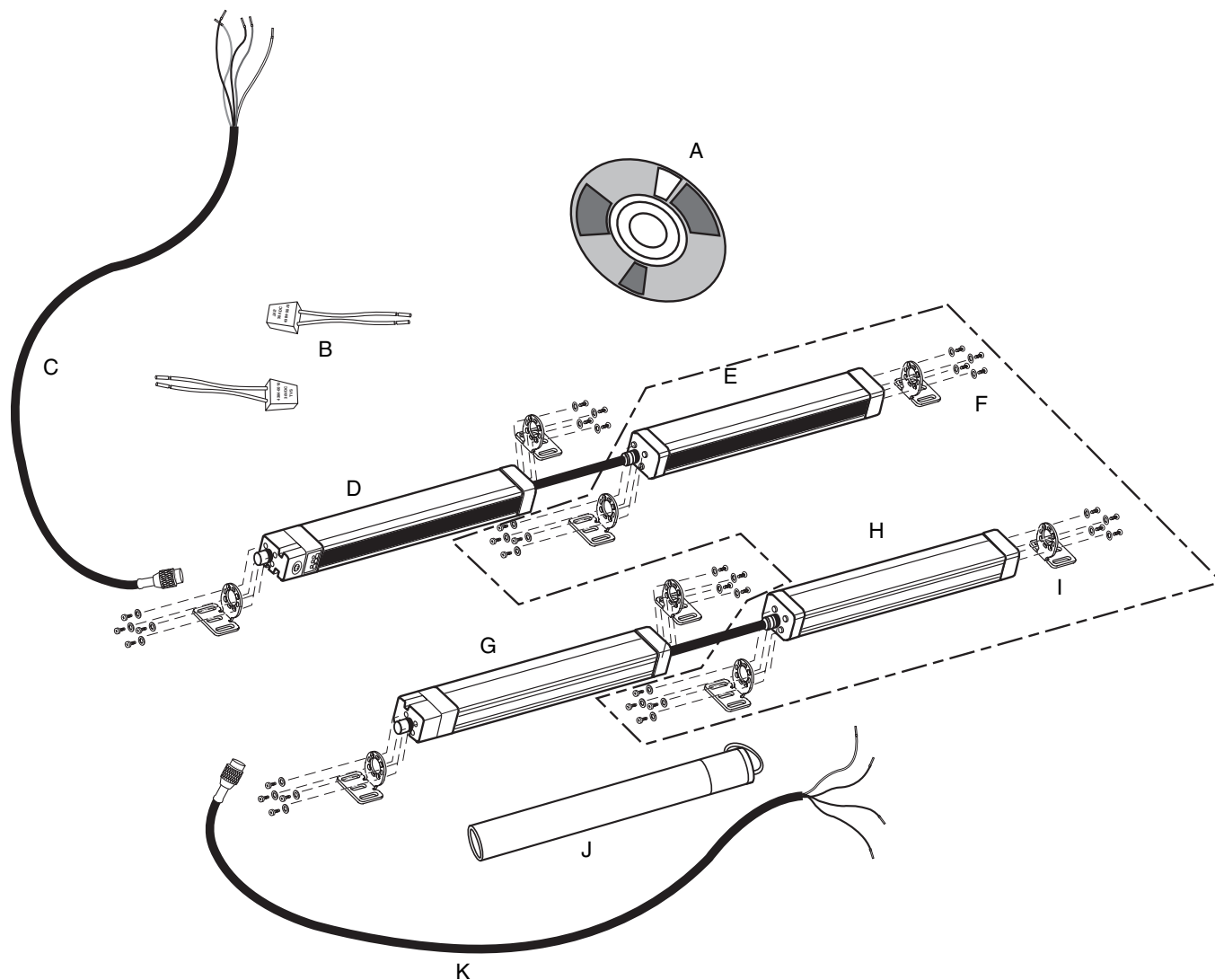
Table 14: Distances Illustrated in Figure 17

R m (in.)	d mm (in.)
0.5 (19.68)	270 (10.63)
0.75 (29.52)	260 (10.24)
1.50 (59.05)	260 (10.24)
3.0 (118.11)	250 (9.84)
5.0 (196.85)	440 (17.32)
7.0 (275.59)	620 (24.40)
8.0 (314.96)	700 (27.56)
10 (393.70)	840 (33.07)
15 (590.55)	1250 (49.21)

NOTE: The XUSLB/XUSLDM light curtains are not sensitive to flashing lights, rotating flashing lights, welding sparks, or flashes.

SECTION 5— INSTALLATION, WIRING, AND STARTUP

PARTS LIST



- A. Instruction bulletin CD ROM
- B. Arc suppressors (2)
- C. Receiver connection cable XSZBCR (ordered separately)
- D. XUSLB/DM receiver
- E. XUSLDS transmitter
- F. Mounting bracket hardware (4 sets)
- G. XUSLB/DM transmitter
- H. XUSLDS receiver
- I. Mounting brackets (4)
- J. Testing object
- K. Transmitter connection cable XSZBCT (ordered separately)

MOUNTING THE LIGHT CURTAIN

NOTE: Before mounting the light curtain, read “Safe Mounting Distance” on page 31.

To mount the light curtain (refer to Figure 18 for lettered callouts):

1. If you are installing the light curtain in a high-vibration environment, install a shock-mount kit (see Figure 19) on the mounting area before mounting the light curtain. Refer to Shock Mount Kit on page 107 to select the kit that is appropriate for your application.
2. Using the mounting hardware (**F**) provided, install the mounting brackets (**A**) on both ends of the receiver (**B**) and transmitter (**C**). Tighten the hardware to 6 lb-in (0.68 N•m).
3. Connect the cables to the receiver and the transmitter. The receiver cable end (**D**) has a red 8-pin connector, and the transmitter cable end (**E**) has a black 5-pin connector.
4. Observing the safe mounting distance, mount the receiver and the transmitter on the machine in the same plane and at equal height. Refer to page 55 for alignment considerations. Refer to Preinstallation Considerations beginning on page 31 for mounting considerations.
5. Wire the light curtain as illustrated on page 49 (wiring with final switching devices) or page 50 (wiring with an XPS safety relay module). Refer to Wiring the Light Curtain beginning on page 47 for complete wiring information.

Figure 18: Mounting the Light Curtain

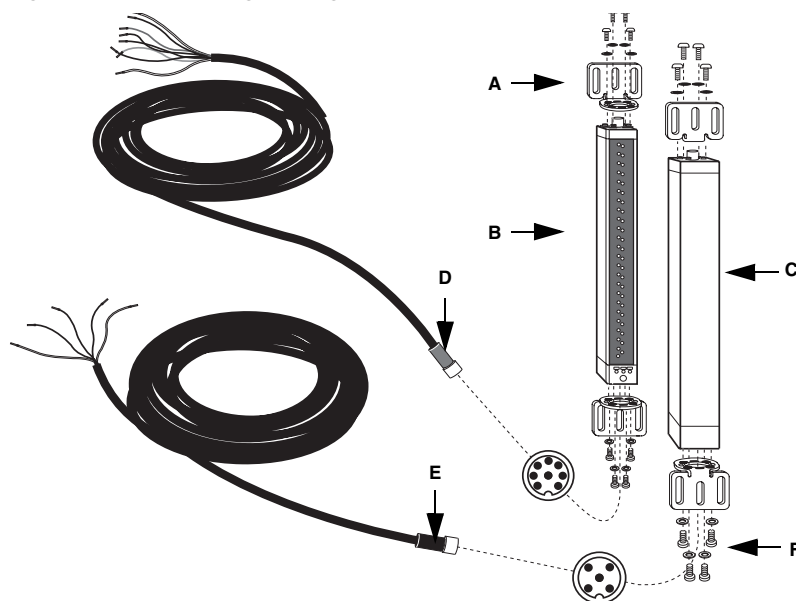
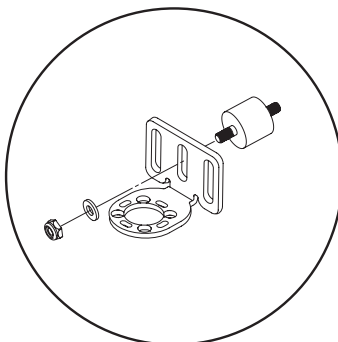


Figure 19: Shock-Mount Kit Detail



WIRING THE LIGHT CURTAIN

WARNING

IMPROPER CONNECTION

- The XUSLB/XUSLDM light curtain is designed for use only on a 24 Vdc negative ground (functional ground) electrical system.
- The XUSLB/XUSLDM light curtain safety outputs are designed for a 24 Vdc system.
- Never connect the XUSLB/XUSLDM light curtain to a positive ground (protective earth) system.

Failure to follow these instructions can result in death or serious injury.

WARNING

IMPROPER CONNECTION

- The XUSLB/XUSLDM light curtain must be connected using both safety outputs.
- Never use only a single safety output to control a machine.

Failure to follow these instructions can result in death or serious injury.

CAUTION

IMPROPER GROUNDING

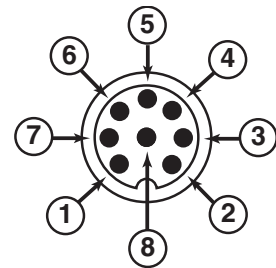
Never connect the earth ground of the power supply to 0 Vdc.

Failure to follow this instruction can result in equipment damage.

The XUSLB/XUSLDM system operates directly from a 24 Vdc $\pm 20\%$ power supply. The power supply must meet the requirements of IEC 60204-1 and IEC 61496-1. Telemecanique part number ABL8RPS24030 is recommended. **Never connect the earth ground to 0 Vdc.**

Electrical Connections

Figure 20: Receiver Connections (M12, 8-Pin)

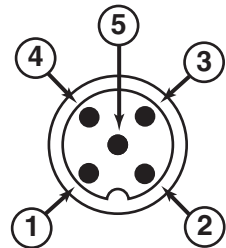


NOTE: As viewed from the M12 connection on the endcap of the receiver.

Pin–Wire Color	Description
1–Brown	+24 Vdc
2–Blue	0 Vdc
3–Green	Ground
4–White	OSSD 2
5–Yellow	Start
6–Red	EDM/MPCE
7–Pink	Auxiliary output
8–Black	OSSD 1

NOTE: OSSD = Output safety switching device

Figure 21: Transmitter Connections (M12, 5-Pin)



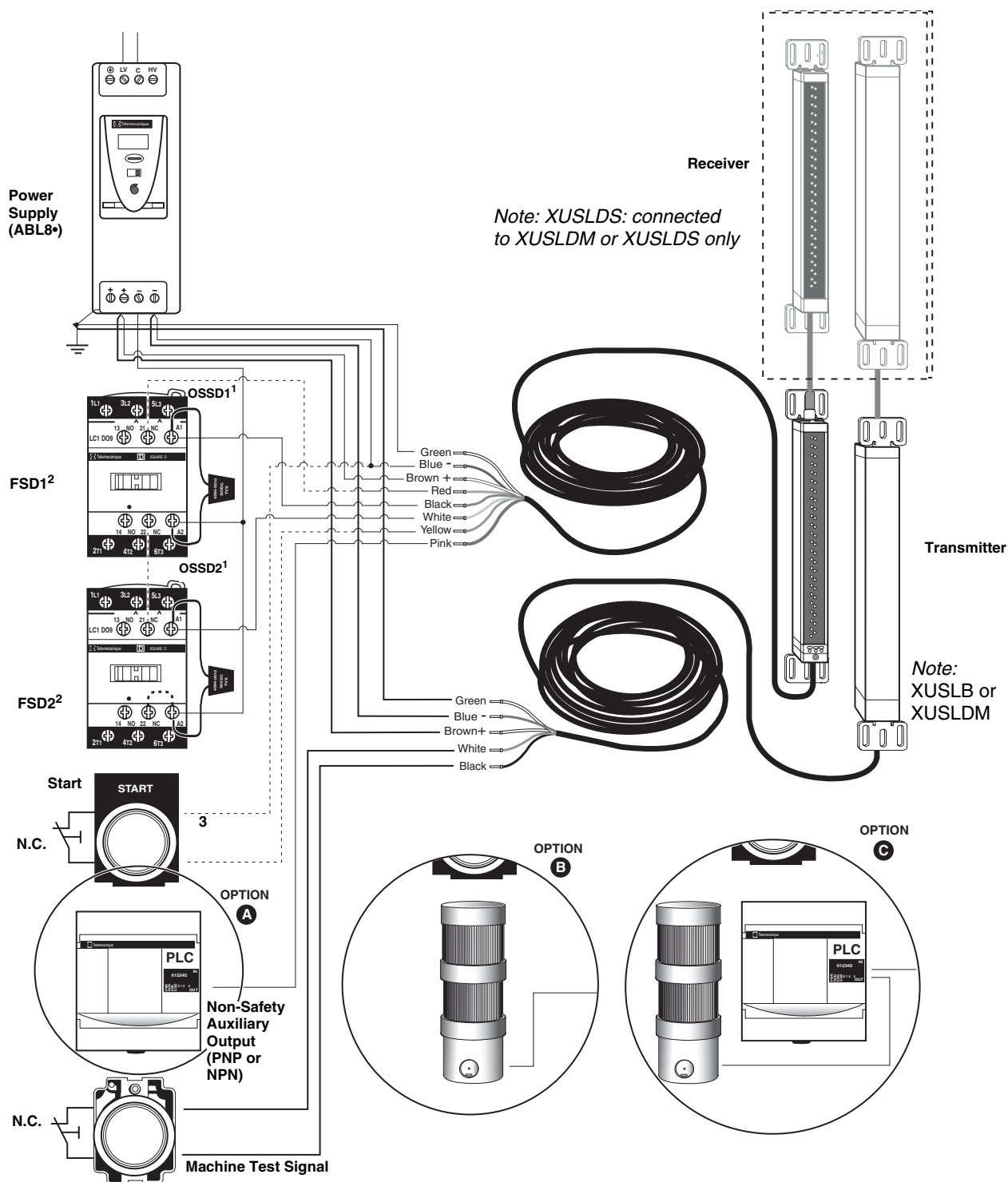
NOTE: As viewed from the M12 connection on the endcap of the transmitter.

Pin–Wire Color	Description
1–Blue	0 Vdc
2–Brown	24 Vdc
3–White	MTS
4–Black	MTS return
5–Green	Ground

NOTE: MTS = Machine test signal.

For connection schematics, refer to page 51.

Figure 22: XUSLB/DM/DS Wiring with Final Switching Devices



- 1 OSSD: Output safety switching device.
2 FSD: Final switching device.
3 In the default state (Automatic Start active and EDM/MPCE inactive) the red and yellow wires are wired to system 0 V. The dotted lines represent use of a start button and EDM/MPCE active.

Connection Schematics

Connecting to a Safety Monitoring Device

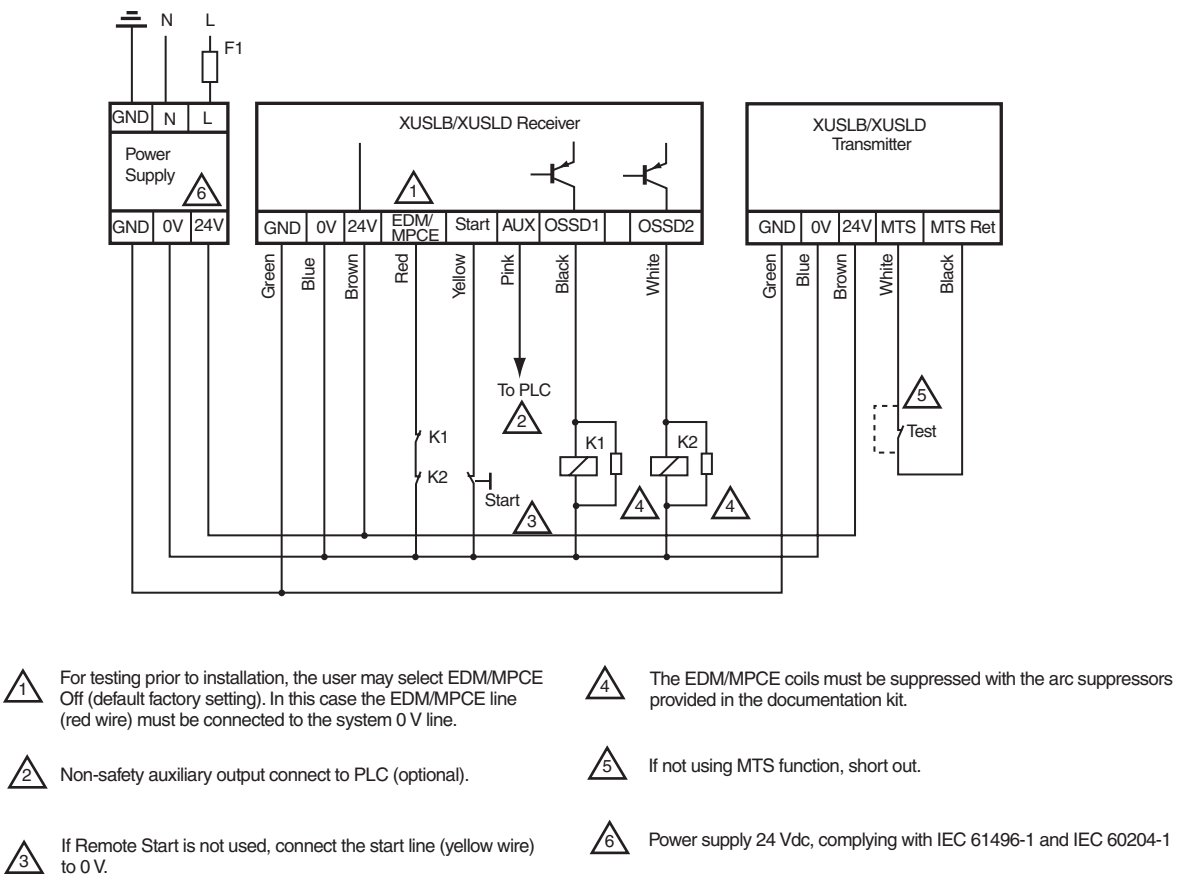
The wiring from the XUSLB/XUSLDM system to the machine control circuit must be control reliable as described in ANSI B11.19-1990 and on page 9 of this manual. Solid state outputs should be connected only to a control reliable, safety-rated PLC, or to a control reliable safety-rated machine system.

However, safety related monitoring devices are now available. Note that all safety inputs are directed to the monitoring device which also performs the EDM/MPCE monitoring function.

General Connection

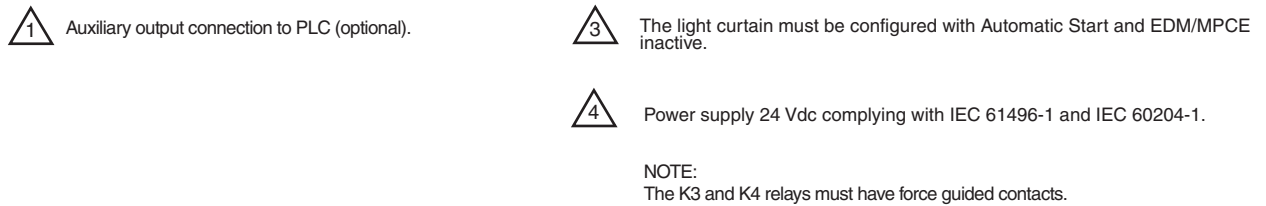
The K1 and K2 control relays must provide force guided relay outputs for machine control. OSSD safety outputs 1 and 2 are connected to the control relays and provide the power necessary to energize the relays. See Figure 24 for the preferred connection method using the relays. The non-safety alarm output of the XUSLB/XUSLDM system can be used to signal light curtain status to a PLC.

Figure 24: General Connection



NOTES:
The K1 and K2 relays must have force guided contacts.

When used close to a motor driven by a drive controller, verify that all frames (motor, drive controller, light barriers) are tied to the same ground connection.



START UP

- Before starting the XUSLB/XUSLDM Safety Light Curtain, perform the following steps:
1. Verify that the wiring, power supply voltage, and polarity of connections are correct.
 2. Apply power to the system.
 3. Check the LEDs as described in Checking the LEDs and Aligning the Transmitter and Receiver below.
 4. Adjust the alignment of the transmitter and the receiver using the beam indicators. See Checking the LEDs and Aligning the Transmitter and Receiver below and Troubleshooting on page 73.

Checking the LEDs and Aligning the Transmitter and Receiver

Figure 26: LEDs and Beam Indicators

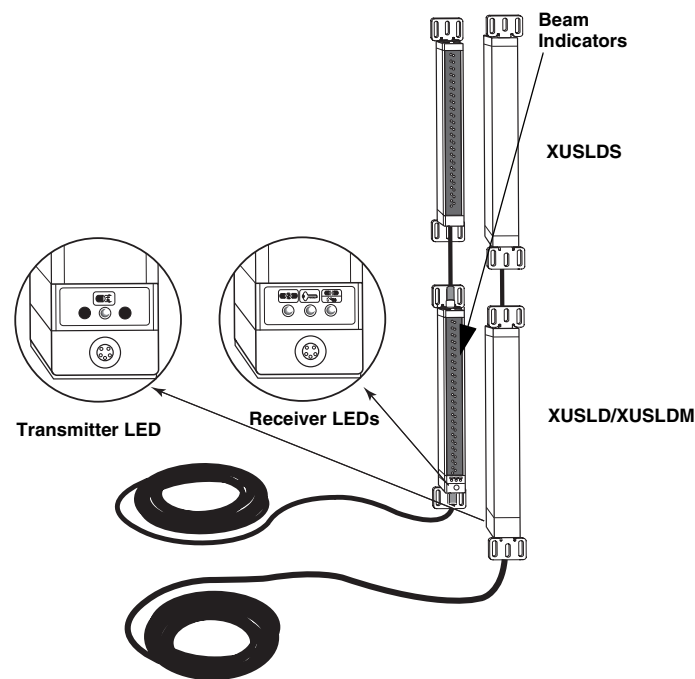







Table 15: LEDs

Transmitter LED	Receiver LEDs			
Yellow: Status 	Amber: FB or ECS/B ¹ 	Yellow: Interlock 	Red: Stop 	Green: Run 
When illuminated , the transmitter is emitting a beam. When blinking , the system is in an alarm condition.	When illuminated , the light curtain is operating in a reduced resolution mode.	When illuminated , the light curtain is waiting for the start button to be pushed; the guarded machine is not operating. When blinking , the system is in an alarm condition.	When illuminated , the light curtain is blocked and the guarded machine is not operating.	When illuminated , the guarded machine is operating.

¹ ECS/B: Exact Channel Select (Fixed) Blanking
FB: Floating blanking

Aligning the Transmitter and Receiver

The beam indicators and the optical synchronization beam indicators on the transmitter and receiver must be properly aligned before operation.

Beam Indicators

When the transmitter and the receiver are **not** aligned, every other individual beam indicator will be illuminated. When the transmitter and the receiver are aligned, none of the beam indicators will be illuminated. When any beam is blocked or out of alignment, the beam indicator of the blocked channel will be illuminated.

Table 16 lists normal system states at power up and the associated LED indications. If you do not achieve the LED designations listed in Table 16, refer to the Troubleshooting section beginning on page 73.

Table 16: LED Indications at Power Up

These LED Patterns:		With These Detection Options:			Indicate These System States:
Transmitter LED Illuminated	Receiver LEDs Illuminated	Exact Channel Select (Fixed) Blanking Active	Floating Blanking Active	Monitored Blanking Active	
Yellow	Red	No	No	No	Transmitter and receiver are not in alignment.
Yellow	Green	No	No	No	Transmitter and receiver are in alignment.
Yellow	Amber and Green	Yes	No	No	Transmitter and receiver are in alignment with the programmed obstruction.
Yellow	Amber and Green	No	Yes	No	Transmitter and receiver are in alignment.
Yellow	Amber and Green	Yes	Yes	No	Transmitter and receiver are in alignment with the programmed obstruction.
Yellow	Amber and Red	Yes	No	No	Transmitter and receiver are in alignment with the programmed obstruction removed.
Yellow	Amber and Red	Yes	Yes	No	Transmitter and receiver are in alignment with the programmed obstruction removed.
Yellow	Amber and Green	Yes	No	Yes	Transmitter and receiver are in alignment with the programmed obstruction.
Yellow	Amber and Red	Yes	No	Yes	Transmitter and receiver are in alignment with the programmed obstruction removed.
Yellow	Amber and Green	No	No	Yes	Transmitter and receiver are in alignment with the programmed obstruction.
Yellow	Amber and Red	No	No	Yes	Transmitter and receiver are in alignment with the programmed obstruction removed.

Optical Synchronization

Synchronization between the XUSLB/XUSLDM system transmitter and receiver is optical, which means, the system does not use one specific beam.

The system requires a predetermined number of consecutive clear beams within the first master segment to establish synchronization. If this requirement is not satisfied, the system will enter a Machine Stop state and every other individual beam indicators will illuminate. When the beams are clear, the system will re-synchronize and enter a state consistent with its operating mode. Once synchronization is established, it can be maintained as long as the required number of consecutive clear beams can be satisfied anywhere in the system (including flex systems).

When programming for fixed or monitored blanking, the size of the fixed or monitored blanking fields must comply with the number of consecutive clear beams within the first segment. Refer to Table 17. In addition, there must be at least one clear beam on each flex segment.

Table 17 displays the synchronization beam requirements for each light curtain beam count.

Table 17: Synchronization Requirements

Light Curtain Beam Count	Synchronization Beam Requirement
12 – 16	6 consecutive clear beams
17 – 32	7 consecutive clear beams
33 – 64	8 consecutive clear beams
65 – 128	9 consecutive clear beams
129 – 256	10 consecutive clear beams

Alignment

Receiver Red LED Is Always Illuminated.

If the Yellow LED on the transmitter is illuminated:

1. Realign the transmitter and receiver:
 - Alignment of the transmitter and receiver is easiest when the system is in Automatic Start operating mode with Fixed Blanking inactive.
 - The transmitter and receiver must be in the same plane and at equal height.
 - The transmitter and receiver are aligned when the blocked beam indicators on the receiver are off.
 - Ensure that the alignment position is stable. Verify that a small deviation of the receiver or transmitter around the alignment position does not cause the blocked beam indicators to illuminate.
2. Verify the synchronization of the light curtain system.

If the Yellow LED on the transmitter is not illuminated:

1. Ensure that cable connections are secure.
2. Ensure that the power supply is 24 Vdc $\pm 20\%$.
3. Verify that the machine test signal (MTS) wiring is tied to the MTS return.

If the Yellow LED on the transmitter is blinking, the light curtain is in an alarm condition.

SECTION 6— MUTING (XUSLDM ONLY)

Muting bypasses the protective function on safety related control systems, such as the XUSLDM system, during a predetermined, non-hazardous portion of the machine's operation.

The mute mode is active only when the correct sequence of mute sensor input signals is achieved. The object of the correct muting sensor selection and orientation is to always recognize the presence of the work piece material as the intended means to start or stop the muting sequence. Any entry into the detection zone by any animate or inanimate object will result in a stop signal being sent to the guarded machine.

When the XUSLDM system is in the Mute state, an indicator lamp for each safety channel illuminates. These lamps must be visible to all personnel in the immediate area.

The XUSLDM light curtains provide a muting function through the use of an XPSLCM1 wiring module. The XPSLCM1 wiring module serves as a termination point for the muting sensors and muting lamp, and connects to the end connector of an XUSLDM receiver. See Figure 27.

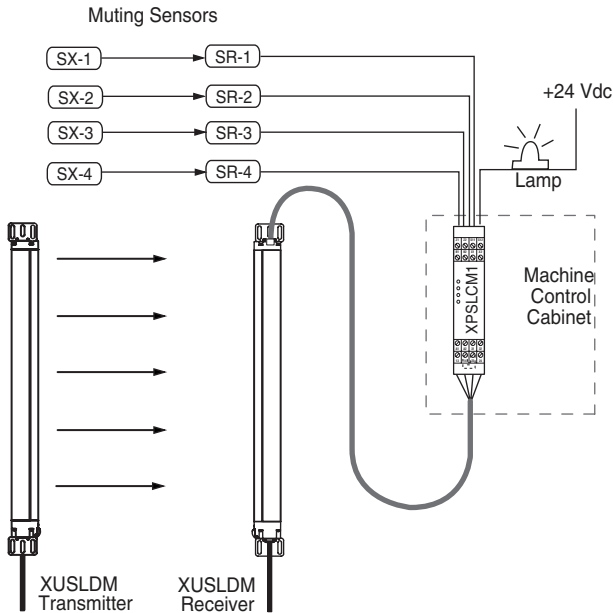
English

⚠ WARNING

UNEXPECTED OUTPUT OPERATION
Sensor position and sequence activation determine the muting function. Verify that muting is functioning before commissioning the light curtain.

Failure to follow these instructions can result in death or serious injury.

Figure 27: Muting Function using XPSLCM1 wiring module



Use of the muting function requires special precautions by the safety system machine controller, installer, operator, and employer. The following information is only a partial list of requirements for muting applications and is not intended to be a complete guide to muting standards. The employer must contact the local safety authority for specific requirements regarding the machine, machine controller, and safety-related control system.

Schneider Electric provides the following information for reference only, and makes no claim regarding its accuracy, completeness, or effectiveness for a specific application.

- Mute the light curtain only during the non-hazardous portion of the machine cycle.
- If the machine tool has reversing capability that could cause a muting hazard, provide a control scheme that includes an automatic method of preventing muting in the reverse direction.
- Provide one or more visual indicator(s) that illuminate when the light curtain is in a muted condition.
- Ensure that the light curtain cannot enter a mute condition when a fault is present.
- Ensure that the mute indicator(s) are visible from any normal machine operator position and from the position from which any muting adjustments are normally carried out.
- Provide at least two, independent muting signal sources with the XPSLCM1 wiring module. A single, simple cam-operated limit switch is inadequate as a muting signal source since its failure can remain undetected.
- Ensure that the guarded machine is able to stop anywhere in its cycle. Do **not** use an XUSLDM/DS as a cascaded system on a press with a full-revolution clutch.
- Ensure that additional guarding is used to limit access to any danger zone not covered by the safety device system. See Additional Guarding When Using Exact Channel Select (Fixed) Blanking, Monitored Blanking, or Floating Blanking on page 30

The enforcement of these requirements is beyond the control of Schneider Electric. The employer has the sole responsibility to follow the preceding requirements and any other procedures, conditions, and requirements specific to his machinery.

APPLICATIONS EXAMPLES

Application Information

This section contains several examples of how the XPSLCM1 wiring module may be used with various sensor arrangements to start and end the muting sequence.

Although photoelectric sensors are used in the example, other types of sensors, such as limit switches, inductive proximity sensors, and ultrasonic sensors may be used as sensor inputs to the XPSLCM1 wiring module.

Selection and Orientation of Muting Sensors

Select and orient the muting sensors so that they recognize the presence of the work piece as the condition for starting or stopping the muting sequence. The presence of any person in the detection zone of the muting sensors must never initiate a muting sequence.

The proper selection, installation, and orientation of the muting sensors are the sole responsibility of the employer and installer. The following recommendations must be observed, especially in applications involving conveyors.

- Ensure that the muting sensors detect the material, and not the transportation means, such as a pallet, cart, or other transport device.
- Ensure that a person on the transport device cannot initiate muting and enter the danger zone.
- Do not allow interruption in the sensing of the material while the material passes the muting sensors. The detection of the material should be continuous over its length.
- If using photoelectric sensors, do not allow reflective material to interrupt or cause optical paths among different sensors. Do not allow sensors in adjacent areas to interfere with each other or provide false indication.
- Position the sensors such that before a new load of material is detected by the first sensor, the prior material has passed the last sensor, and all muting sensors are deactivated for a period of time.
- Consider the overall speed and cycle of the material as it moves through the process. Allow time for evaluating the muting sensors' output before the material reaches the safeguarding device.
- Detect and prevent people from entering the hazardous area of the machine. The safeguarding device must be able to send a stop signal to the machine before a person enters the danger zone. Other safeguarding methods, such as physical barriers or fences, may be necessary.

Muting Options

When the XUSLDM is used with an XPSLCM1 it offers a full selection of muting configurations that are activated with the PDM. The following list includes available muting functions:

- Two-sensor muting
- Three-sensor muting
- Four-sensor muting: (bi-directional or uni-directional selectable)
- Dual four-sensor muting: (bi-directional or uni-directional selectable)
- Adjustable sensor input filtering: (50 to 500 ms)
- Mute Bypass allowed
- Mute Timeout limit: 2 minutes or no-timeout selectable

TWO-SENSOR MUTING SYSTEM

⚠ WARNING

IMPROPER SETUP OR INSTALLATION

Position the muting sensors in such a way that personnel cannot activate the sensors in a sequence which will permit them to pass through the light curtain protection field undetected.

Failure to follow these instructions can result in death or serious injury.

Figure 28 illustrates a conveyor belt muting system using a two-sensor configuration. The two-sensor configuration is bi-directional.

Figure 28: Two-Sensor System Diagram

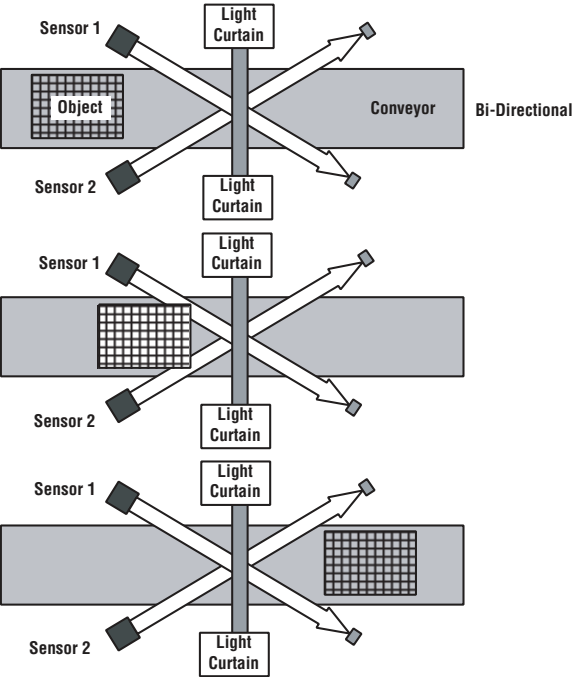


Table 18: Conditions Required to Transition to Muting State – Two Sensor System

State	Mute Enable	Sensor 1	Sensor 2	Sensor 3	Sensor 4	System Status
1	Off	X ¹	X ¹	X ¹	X ¹	Protected
2	On	Off	Off	XX ²	XX ²	Protected
3	On	Off	On	XX ²	XX ²	Protected
4	On	On	Off	XX ²	XX ²	Protected
5	On	On	On	XX ²	XX ²	Muted

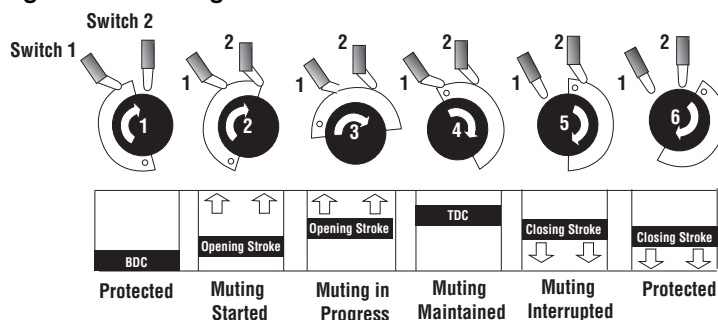
¹ The system status is not dependent on the state of this sensor.

² Under normal conditions, these sensor inputs should not be connected. When muting has been enabled through the PDM, if at anytime these sensor inputs become active, the muting system will transition to the Lockout (Fault) state.

Two Switch Muting System

The two switch muting system is a special muting application. Figure 29 illustrates muting on a mechanical press using two switches to sense when to enter the Muting state. Bottom dead center (BDC) is the point at which the tool is closest to the die. Top dead center (TDC) is the point at which the tool is furthest from the die.

Figure 29: Muting a Mechanical Press

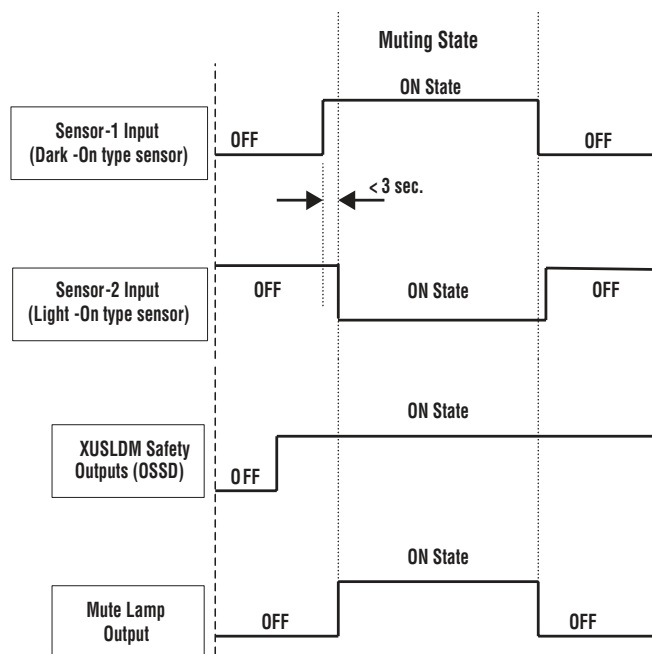


Two-Sensor System Requirements

In a two-sensor system, the following conditions must be met for the system to enter the Muting state:

- Sensor 1 must be a dark-on type sensor with a PNP-type output, or a switch that closes its contact to provide +24 Vdc when muting is permitted.
- Sensor 2 must be a light-on type sensor with a PNP-type output, or a switch that opens its contact when muting is permitted.
- In a two-sensor system, each sensor must transition to the On state within 3 seconds of each other for the Muting state to occur.

Figure 30: Two Sensor Muting System Waveform Diagram



THREE-SENSOR MUTING SYSTEM

⚠ WARNING

IMPROPER SETUP OR INSTALLATION

Position the muting sensors in such a way that personnel cannot activate the sensors in a sequence which will permit them to pass through the light curtain protection field undetected.

Failure to follow these instructions can result in death or serious injury.

The three-sensor muting system is an uni-directional system. In a three-sensor system, the following conditions must be met for the system to enter the muting state:

- Sensor 3 is used as a direction detector, and must transition to the On state prior to the activation of sensor pair 2 and 1.
- Sensor pair 2 and 1 must activate within 3 seconds of each other.
- Sensor 3 must turn Off before Sensor 2 or 1.

Figure 31 illustrates a muting system used in a three-sensor conveyor belt configuration.

Figure 31: Three-Sensor System Design

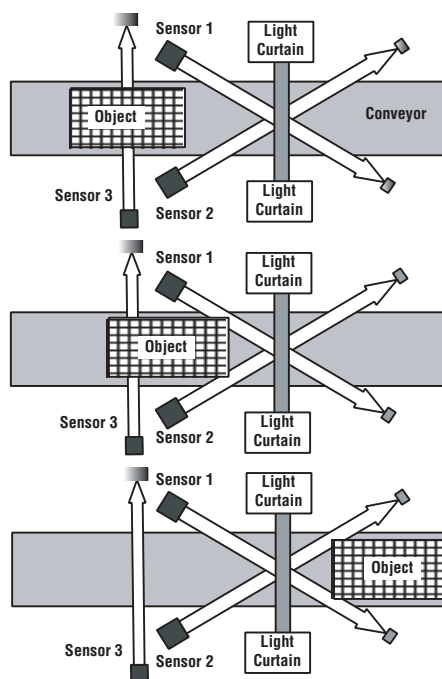


Table 19: Conditions Required to Transition to Muting State – Three-Sensor System

State	Mute Enable	Sensor 1	Sensor 2	Sensor 3	Sensor 4	System Status
1	Off	X ¹	X ¹	X ¹	X ¹	Protected
2	On	Off	Off	Off	XX ²	Protected
3	On	Off	Off	On	XX ²	Protected
4	On	On	On	On	XX ²	Muted ³
5	On	On	On	Off	XX ²	Muted ³

¹ The system status is not dependent on the state of this sensor.

² Under normal conditions, these sensor inputs should not be connected. When muting has been enabled through the PDM, if at anytime these sensor inputs become active, the muting system will transition to the Lockout (fault) state.

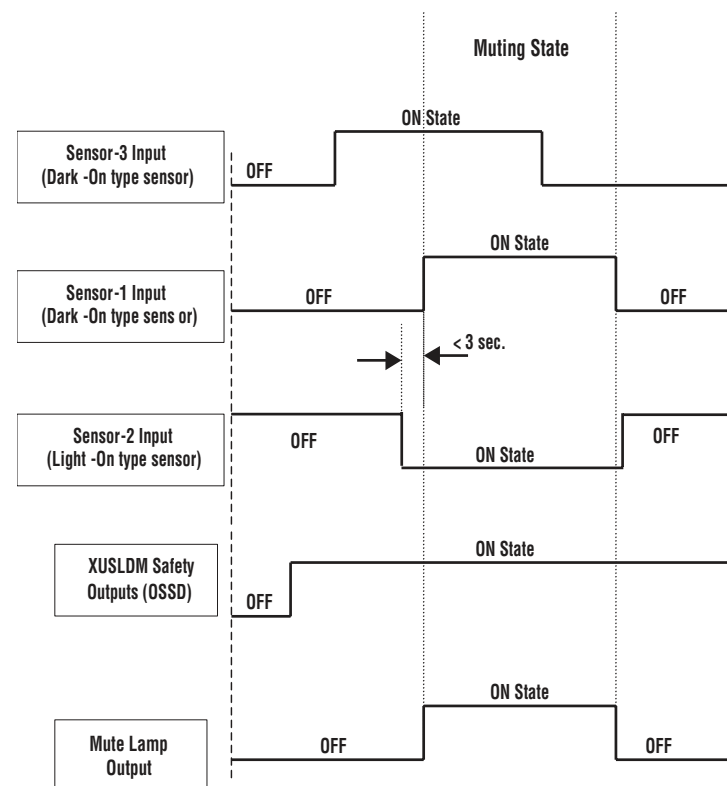
³ Muting will occur if sensor 3 is on in proper sequence as detailed in this section.

Three-Sensor System Requirements

In a three-sensor system, the following conditions must be met for the system to enter the muting state:

- Sensors 1 and 3 must be a dark-on type sensors with a PNP-type output, or a switch that closes its contact to provide +24 Vdc when muting is permitted.
- Sensor 2 must be a light-on type sensor with a PNP-type output, or a switch that opens its contact when muting is permitted.
- Sensor 3 must activate at least 0.05 seconds before sensors 1 and 2.
- Activation of both sensor 1 and 2 must be within 3 seconds of each other.
- Sensor 3 must remain active until both sensors 1 and 2 activate.

Figure 32: Three-Sensor Muting System Waveform Diagram



FOUR-SENSOR MUTING SYSTEM

⚠ WARNING

IMPROPER SETUP OR INSTALLATION

Position the muting sensors in such a way that personnel cannot activate the sensors in a sequence which will permit them to pass through the light curtain protection field undetected.

Failure to follow these instructions can result in death or serious injury.

The four-sensor muting systems is a bi-directional system. In a four-sensor system, sensor pair 1 and 2, or sensor pair 3 and 4 must transition to the On state and activate within 3 seconds of each other before the system can enter the muting state. Since the conveyor is bidirectional, either sensor 1 or 4 can activate first within the sequence.

Figure 33 illustrates a muting system used in a four-sensor conveyor belt configuration.

Figure 33: Four-Sensor System Diagram

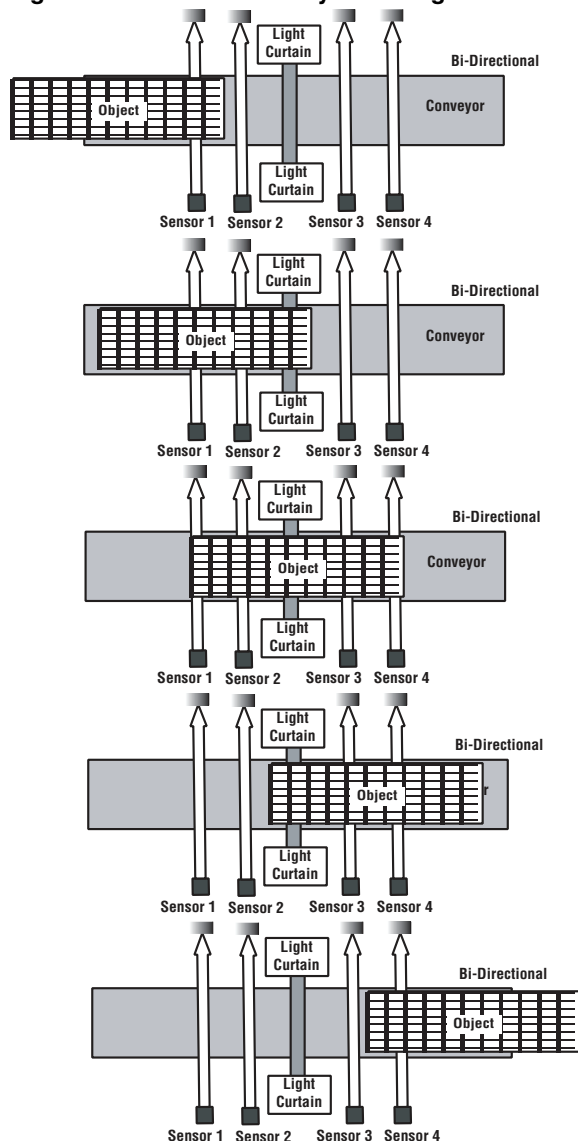


Table 20: Conditions Required to Transition to Muting State – Four-Sensor System

State	Mute Enable	Sensor 1	Sensor 2	Sensor 3	Sensor 4	System Status
1	Off	X ¹	X ¹	X ¹	X ¹	Protected
2	On	Off	Off	Off	Off	Protected
3	On	On	Off	Off	Off	Protected
4	On	On	On	Off	Off	Muted
5	On	On	On	On	Off	Muted
6	On	On	On	On	On	Muted
7	On	Off	On	On	On	Muted
8	On	Off	Off	On	On	Muted
9	On	Off	Off	Off	On	Protected

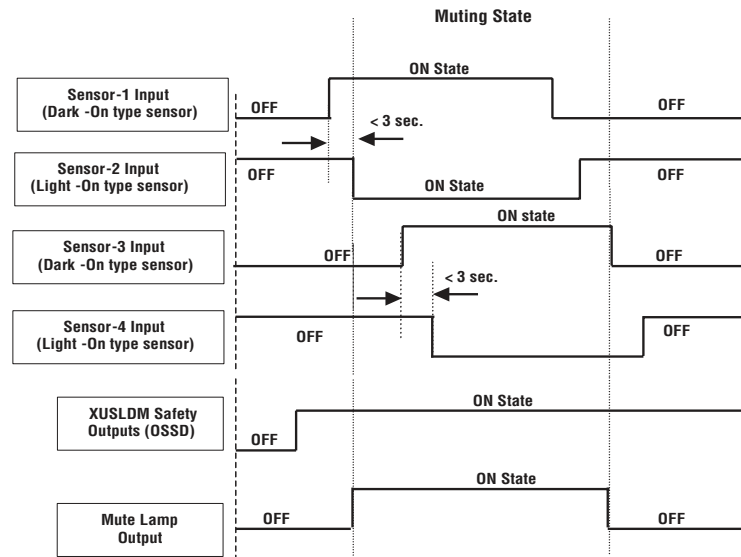
¹ The system status is not dependent on the state of this sensor.

Four-Sensor System Requirements


In a four-sensor system, the following conditions must be met for the system to enter or remain in the muting state:

- Sensors 1 and 3 must be dark-on type sensors with a PNP-type output, or a switch that closes its contact to provide +24 Vdc when muting is permitted.
- Sensors 2 and 4 must be light-on type sensors with a PNP-type output, or a switch that opens its contact when muting is permitted.
- Sensor pair 1 and 2 must activate within 3 seconds of each other. Sensor pair 3 and 4 must also activate within 3 seconds of each other.
- The sequence of sensor activation is as follows: sensor 1 must activate before sensor 2, followed by sensor 3, and finally, sensor 4; or, the sequence may be in reverse direction—sensor 4 activates before sensor 3, followed by sensor 2, and finally, sensor 1. The time lapse between sensor activation must be at least 0.05 seconds.
- To stay in muting state, sensor pair 1 and 2 must remain active until sensor pair 3 and 4 activate. In reverse direction, sensor pair 3 and 4 must remain active until sensor pair 1 and 2 activate.

Figure 34: Four-Sensor Muting System Waveform Diagram



DUAL FOUR-SENSOR MUTING SYSTEM

 **WARNING**

IMPROPER SETUP OR INSTALLATION

Position the muting sensors in such a way that personnel cannot activate the sensors in a sequence which will permit them to pass through the light curtain protection field undetected.

Failure to follow these instructions can result in death or serious injury.

The dual four-sensor muting systems is a bi-directional system. The dual four-sensor system does not require the same time sequence between sensor activation in each pair as the four-sensor (see page 64).

Figure 35 illustrates a dual four-sensor system.

Figure 35: Dual four-Sensor System Diagram

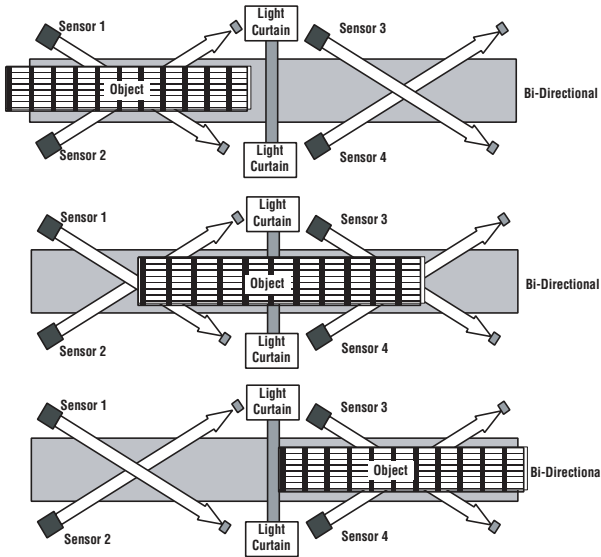


Table 21: Conditions Required to Transition to Muting State – Dual 4-Sensor System

State	Mute Enable	Sensor 1	Sensor 2	Sensor 3	Sensor 4	System Status
1	Off	X ¹	X ¹	X ¹	X ¹	Protected
2	On	Off	Off	Off	Off	Protected
3	On	On	Off	Off	Off	Protected
4	On	Off	On	Off	Off	Protected
5	On	On	On	Off	Off	Muted
6	On	On	On	Off	On	Muted
7	On	On	On	On	On	Muted
8	On	Off	On	On	On	Muted
9	On	Off	Off	On	On	Muted
10	On	Off	Off	Off	On	Protected
11	On	Off	Off	On	Off	Protected

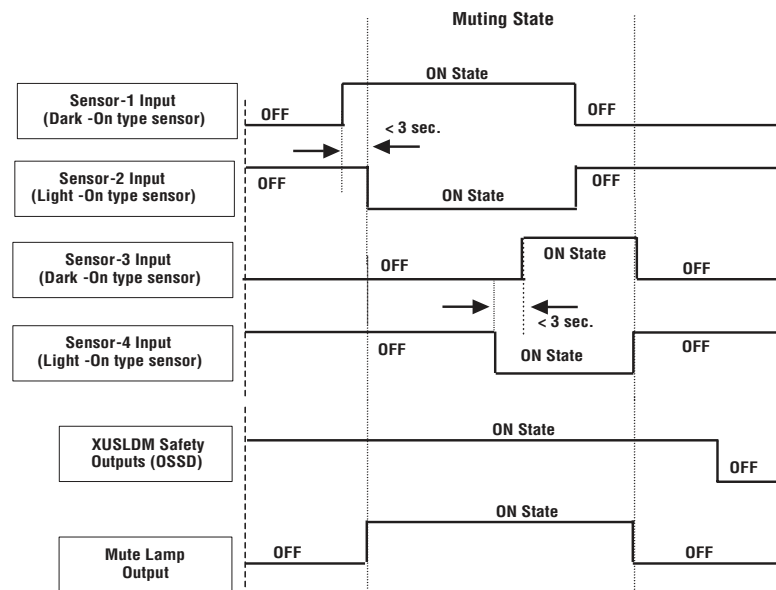
¹ The system status is not dependent on the state of this sensor.

Dual Four-Sensor System Requirements

In a dual four-sensor system, the following conditions must be met for the system to enter or remain in the muting state:

- Sensors 1 and 3 must be dark-on type sensors with a PNP-type output, or a switch that closes its contact to provide +24 Vdc when muting is permitted.
- Sensors 2 and 4 must be light-on type sensors with a PNP-type output, or a switch that opens its contact when muting is permitted.
- Sensor pair 1 and 2 must activate within 3 seconds of each other with either sensor within the pair activating first. Activation of sensor pair 3 and 4 must occur within 3 seconds of the first sensor pair with either sensor within the pair activating first.
- The sequence of sensor activation is as follows: sensor pair 1 and 2 must activate before sensor pair 3 and 4; or, the sequence may be in reverse direction—sensor pair 3 and 4 activates before sensor pair 1 and 2.
- Sensor pair 1 and 2 may activate before sensor pair 3 and 4, or sensor pair 3 and 4 may activate before sensor pair 1 and 2; however, for the system to remain in a muting state, the pair that activates first must remain active until the second pair activates.
- For the system to remain in a muting state, any sensor that has transitioned from an active to an inactive state must remain in the inactive state until the next pair of active muting sensors become inactive.

Figure 36: Dual Four-Sensor Muting System Waveform Diagram



English



BYPASS ALLOWED FEATURE

The Bypass Allowed feature provides a means for supervisory personnel to momentarily override the machine stop signal of the XUSLDM/XPSLCM1 system. This feature is for use when the processing sequence does not allow an automatic transition to the muting state, and the XUSLDM/XPSLCM1 safety outputs are in the Off state.

The XUSLDM/XPSLCM1 system will enter the Bypass Allowed state when the light curtain safety outputs (OSSD) are in the Off state and a minimum of one mute sensor is active.

The XUSLDM/XPSLCM1 signals that it is in the Bypass Allowed state by flashing the mute lamp at a 1 second interval.

To allow the XUSLDM/XPSLCM1 to transition to the muting state, the supervisory personnel must press and release the start button. When entering the muting state from the Bypass Allowed feature, the following will occur:

- The mute lamp will illuminate and stay illuminated.
- If the light curtain is clear of obstructions before all of the mute sensors have cleared, the system will leave the muting state and enter the Machine Run state.

NOTE: All mute sensors must be clear of obstruction for the XUSLDM/XPSLCM1 system to automatically enter the muting state during the next process cycle.

- If all mute sensors are clear of obstructions before the light curtain has cleared, the XUSLDM/XPSLCM1 system will leave the muting state and enter the Machine Stop state.
- When the muting state is entered from the Bypass Allowed state, the maximum time for the XUSLDM/XPSLCM1 to be continuously in the Muting state is 10 minutes.
- If the 10 minute time limit is exceeded, the XUSLDM/XPSLCM1 system will automatically change from the muting state to the Bypass Allowed state. There is no limit on the number of times the XUSLDM /XPSLCM1 system can enter the Bypass Allowed state and, with the press and release of the Start button, transition into the muting state.

Bypass Allowed Example

In this example, a conveyor, operated with an XUSLDM/XPSLCM1 system, has one light curtain and three mute sensors connected. The XUSLDM/XPSLCM1 system is set to Start Interlock mode and Bypass Allowed is enable.

Table 22: Bypass Allowed Example

Conveyor System Condition	Muting Sensor Condition			Light Curtain Condition	XPSLCM1 Response to Condition
	Sensor 1	Sensor 2	Sensor 3		
System power is restored	Clear	Clear	Blocked	Cleared	Powers-up, enters Interlock state, senses that sensor 3 is active.
Supervisor verifies that the system is safe to start, the XUSLDM/XPSLCM1 system Start button is pressed and released.	Clear	Clear	Blocked	Cleared	Enters Machine Run state, safety outputs (OSSD) switch to On state and conveyor motors start
Conveyor motors are running	Becomes blocked	Becomes blocked	Becomes clear	Becomes blocked	Enters Machine Stop (Bypass Allowed) state since muting sensor 3 was not inactive at power-up, safety outputs (OSSD) switch to Off state.
Conveyor motors stop	Blocked	Blocked	Clear	Blocked	XUSLDM/XPSLCM1 system indicates Bypass Allowed by a blinking mute lamp.
Supervisor verifies that the system is safe to bypass, the XUSLDM/XPSLCM1 system Start button is pressed and released.	Blocked	Blocked	Clear	Blocked	Enters Muting state, safety outputs (OSSD) switch to On state, mute lamp is illuminated
Conveyor motors are running	Blocked	Blocked	Clear	Becomes clear	Enters Machine Run state, mute lamp illuminates.
Conveyor motors are running	Becomes clear	Becomes clear	Clear	Cleared	Stays in Machine Run state and is ready to automatically enter Muting when next object passes through the sensors

SECTION 7— TROUBLESHOOTING

DIAGNOSTIC AND TEST FEATURES

Individual Beam Indicators

The XUSLB/XUSLDM system has a visible, red individual beam indicator (IBI) next to each infrared beam on the receiver. This indicator illuminates when the associated infrared beam fails to meet the conditions necessary for the XUSLB/XUSLDM system to remain in the Machine Run state. The IBIs are not safety critical components. A beam indicator failure will not cause an alarm condition, and the XUSLB/XUSLDM system will continue to operate. See Figure 1 on page 12 for component location.

Synchronization

Synchronization between the XUSLB/XUSLDM system transmitter and receiver is optical.

To establish synchronization the system needs to have a predetermined number of consecutive clear beams within the first master segment. If this requirement is not satisfied, the system will enter a Machine Stop state and every other individual beam indicator will illuminate. When the beams are clear, the system will re-synchronize and enter a state consistent with its operating mode.

Once the synchronization is established, it can be maintained as long as the required number of consecutive clear beams can be satisfied anywhere in the system (including flex systems). See “Optical Synchronization” on page 55.

External Device Monitoring (EDM) or Machine Primary Control Element (MPCE) Monitoring

EDM/MPCE monitoring is an important safety function. It monitors the XUSLB/XUSLDM system's interface to the guarded machine to confirm that the machine's primary control elements (switching devices, such as contactors) are responding correctly to the XUSLB/XUSLDM light curtains, and to detect any inconsistency between the two machine EDMs/MPCEs which prevents a stop signal from reaching the machine primary control elements.

XUSLB without a PDM

On the XUSLB (without a PDM), the EDM function is controlled through the External EDM Select feature using the start line connections to disable or enable the function as follows:

- If the start line is connected to 0 Vdc at start-up, the EDM function is disabled. The EDM line must be connected to 0 V.
- If the start line is connected to +24 V at start-up, the EDM function is enabled. The EDM line must be connected in series through the NC contacts on the final switching device.

When using the start line to configure the EDM function, the manual start input is not accessible.

XUSLDM and XUSLB with a PDM

On the XUSLDM and XUSLB (with PDM), the EDM function can be activated and deactivated using the PDM.

Connections for MPCE monitoring are made at the receiver (see Figure 22 on page 49). On power-up, the XUSLB/XUSLDM system looks for the MPCE to be in the closed condition—an Off state where the contacts are closed. When this is found, the system enters a state consistent with the selected operating mode (see “Operating Modes” on page 16).

When the XUSLB/XUSLDM system enables its safety outputs (enters the Machine Run state), it monitors the MPCE contacts for a closed-to-open

transition. This transition must occur within 300 ms or the XUSLB/XUSLDM system considers the MPCE to be in a faulted state causing the system to enter an Alarm state. Likewise, if the EDM or MPCE connectors are incorrectly wired, the XUSLB/XUSLDM system will enter an Alarm state.

Optional Machine Test Signal (XUSLB Only)

Some applications require the machine guarding system be tested by the machine controller during a non-hazardous portion of the machine cycle to verify that the guarding system is functioning properly. See Additional Guarding When Using Exact Channel Select (Fixed) Blanking, Monitored Blanking, or Floating Blanking on page 30.

To provide a Machine Test Signal (MTS), place a normally closed switch across the MTS and MTS Return lines of the transmitter. When the transmitter recognizes a closed-to-open transition on this switch, a beam blocked state is simulated and the receiver enters the Machine Stop state. The beam blocked state is simulated as long as the switch is held open. The external MTS contact must be closed during power-up. When the transmitter is configured with MTS disabled, the MTS input can be left with no connection (wire to 0 Vdc is not needed).

Start/Restart Selection Options

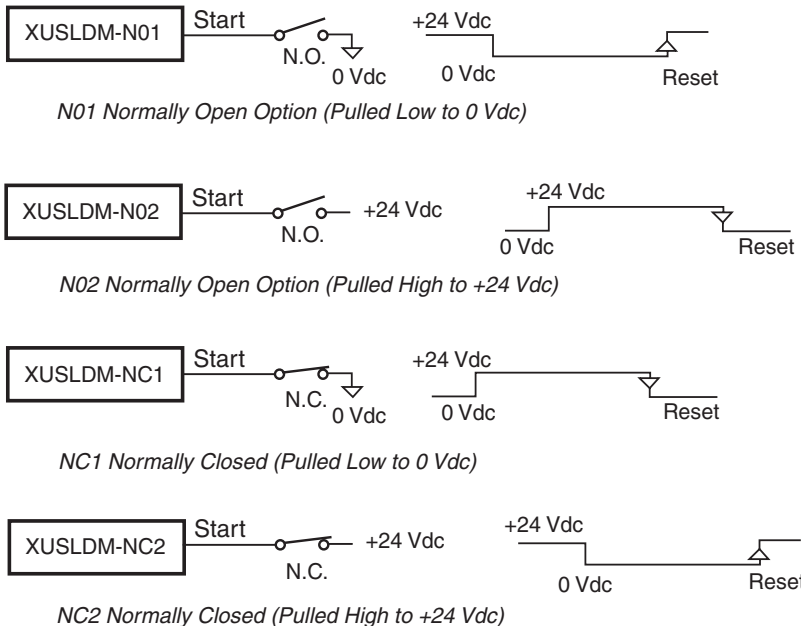
The XUSLDM offers four Start Restart input type selections, including:

- NO1—Normally Open (Pulled Low to 0 Vdc)
- NO2—Normally Open (Pulled High to +24 Vdc)
- NC1—Normally Closed (Pulled Low to 0 Vdc)
- NC2—Normally Closed (Pulled High to +24 Vdc).

The default setting is NC1 (Pulled Low). All four configurations reset on the trailing edge when the restart switch is pressed and released.

Refer to Figure 38 for a illustrated description of each start input.

Figure 38: Start/Reset Input Type Selections

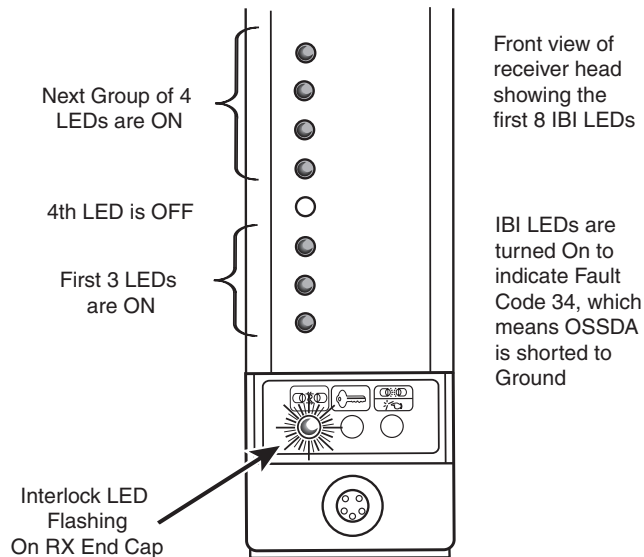


RECEIVER

Receiver Head Diagnostic Information

The receiver master (1st segment) head uses the IBI's (individual beam indicators) to indicate diagnostic codes. The IBI's only indicate diagnostic codes, when in the Fault state. In this state the yellow Interlock LED flashes and the first 10 IBI's are used to display the fault code, see Figure 39.

Figure 39: Example of IBI LEDs used to Show Fault Code



Receiver Endcap Indicator Lights

The Receiver endcap indicator lights include:

- Green—The guarded machine is operating.
- Red—The light curtain is blocked and the guarded machine is not operating.
- Yellow Interlock—The light curtain is waiting for the start button to be pushed. The guarded machine is not operating. If the LED is blinking, the light curtain is in a alarm condition.
- Amber FB or CS—The light curtain is operating in a reduced resolution mode. This applies to all blanking functions.

Receiver Troubleshooting

If the yellow Interlock LED is blinking:

1. Check the configuration for EDM/MPCE Monitoring. If EDM/MPCE Monitoring is inactive, the input (pink wire) must be connected to 0 Vdc. If EDM/MPCE is active, the input must be connected to the normally closed contacts of the control relays of the guarded machine or the monitor terminal of the XPSLCM1 Mute Module, if used.
2. Verify that the power supply is within specified limits.
3. Verify that the light curtain is properly connected to the control relays of the guarded machine.
4. Verify that the control relays are within the operating limits of the safety outputs.

NOTE: The pull-in voltage requirement of the relays must be satisfied. The XUSLB/XUSLDM provides $V = V_{supply} - 2\text{ V}$ on each solid-state safety output.

5. Verify that the cable lengths from the light curtain to the control relays are within specified limits.
6. Call your local Schneider Electric representative.

TRANSMITTER

Troubleshooting the Transmitter

If the yellow LED is off:

1. Verify that the cable is connected.
2. Verify that the power supply is within limits ($+24\text{ V} \pm 20\%$).
3. Call your local Schneider Electric representative.

If the yellow LED is blinking:

1. Verify that the power supply is within limits ($+24\text{ V} \pm 20\%$).
2. Call your local Schneider Electric representative.

PROGRAMMING AND DIAGNOSTICS MODULE (PDM)

The PDM can be used to access and program the operating parameters of the XUSLB/XUSLDM Safety Light Curtain. In addition to light curtain configuration, the PDM also serves as a diagnostics device, allowing the user to retrieve fault information.

The Programming and Diagnostic module:

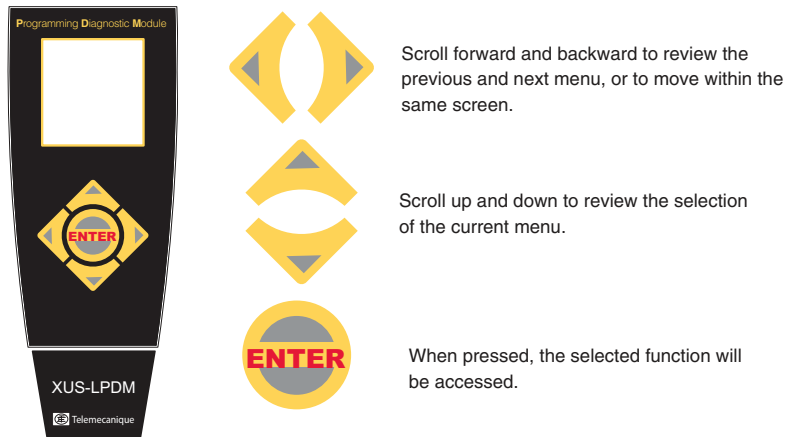
- Displays programming and diagnostics information on a multi-line LCD display.
- Supports a variety of languages including English, Spanish, German, French, and Italian.
- Housing is rated IP65 allowing permanent mounting near the light curtain.

The light curtain does not require the PDM to operate. The factory default settings allow for basic guarding operation.

PDM Navigation Buttons

The PDM has five buttons that allow navigation through the set-up menus. A description of these buttons is provided in Figure 40

Figure 40: PDM Navigation Buttons.



Status Screen Description

Table 23 contains the field names that appear on the PDM status screen followed by a description of the type of information which will appear in the field.

Table 23: Status Screen Description

Field Name	Description
State	Run-time state
Beams	Total number of beams
Segs/Code	Total number of segments/Scan Code ¹
Mute	Mute Status displays only if Mute Enable is On.
Sensors	Mute sensors are numbered 1 – 4 from left to right indicating B (Blocked) or C (Clear). Displays only if Mute Enable is On.
Fault	Fault information only displays if there is a fault.

¹ Alternates from number of segments to active scan code.

Table 24 is a sample of the information appearing on the status screen. Refer to Figure 41 for an illustration of the menu structure.

Table 24: Sample Status Screen

STATUS RXA 1.42
STATE: FAULT
BEAMS: 48 SEGS: 2
MUTE: OK
SENSORS: BBCC
FAULT: 42 EDM
LOGIN
PDM 1.17

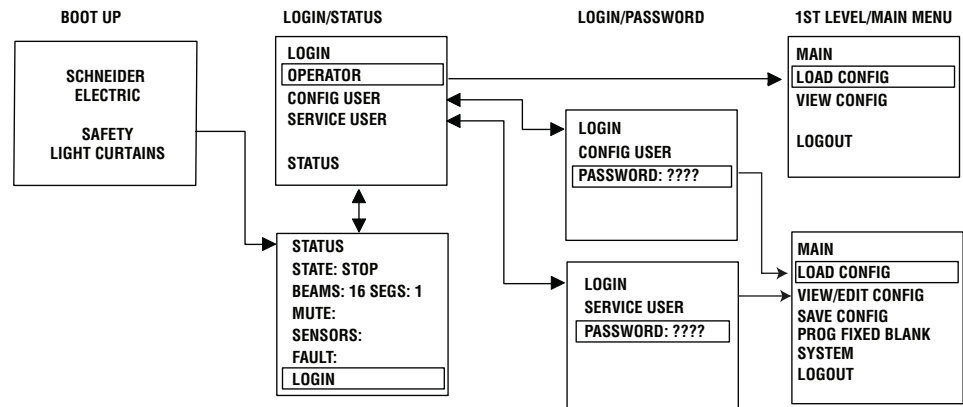
PDM Status Screen

The Boot Up screen allows any user, regardless of access level, to change the language of the text that displays on the screens. Once the preferred language is selected, the PDM will start up using that language.

NOTE: The language can be changed at any time using the Language Select screen.

Figure 41 is a representation of the menu structure within the PDM.

Figure 41: PDM Status Screen



Main Menu Functions

Refer to Figure 41, 1st LEVEL/MAIN MENU, for a representation of where the following menu selections fit into the PDM menu structure.

- Load Config—Load a configuration from 1 of the 3 sources:
 - Light curtain
 - Factory default
 - Custom configuration (saved by user)
- View/Edit Config—View configuration parameters. A user with supervisory access can also edit the configuration parameters. See The Password on page 83.
- Save Config—Save a new configuration to 1 of 2 destinations:
 - Light curtain
 - Custom configuration
- Prog Fixed Blank—Program the fixed blanking pattern using the sequence: Program and Finish.
- System—Access the maintenance functions.
- Logout—Exit the menu functions and return to the status screen.

VIEW CONFIG Menu

Table 25 includes receiver PDM selectable options found in the VIEW CONFIG menu. Refer to Figure 42 on page 80 for location of the VIEW CONFIG menu within the menu structure

Table 25: VIEW CONFIG Menu Options

Option Name	Description	Default
Operating Mode	Select from Automatic, Start Interlock, or Start/Restart Interlock modes.	Automatic
EDM (MPCE monitoring) ¹	Select from On, Off, or By Wire.	Default is by wire
RX Scan Code ¹	Select from code A or B	A
Response Time	Select from Normal or Slow.	Normal
Exact Channel Select (Fixed) Blanking/Monitored Blanking	Select from Off, Fixed Blanking (Exact Channel Select), or Monitored Blanking.	Off
Floating Blanking	Select from Off, 1-channel blanking, or 2-channel blanking.	Off
Reduced Resolution	Select from On or Off, and 1, 2, or 3 beam reduction.	Off
Mute Options	MUTE ENABLE—On or Off	Off
	MUTE MODE—2-sensor, 3-sensor, 4-sensor, dual 4-sensor, 4-sensor fwd, or 2X-sensor fwd	2-sensor
	MUTE TIMEOUT—2 min. or no time-out	2 min.
	MUTE BYPASS—On or Off	Off
Range ¹	Select operating range from Short or Long	Short
Start Input	Select from: NC 0 V NC 24 V NO 0 V NO 24 V	NC 0 V
Aux. Output	Select from: FOLLOW OSSD PNP FOLLOW OSSD NPN ALARM PNP ALARM NPN	Default is Follow OSSD PNP

¹ XUSLB only has access to EDM, Operating Mode, RX Scan Code, and Range.

Menu Structures

Figures 42 through 44 illustrate the menu structure of the three screens available from VIEW CONFIG. In the figures, the three screens are numbered to help you correlate them with corresponding figures supplying more detail. See Figures 43 and 44 on pages 81 and 82,

Figure 42: VIEW CONFIG Menu ①

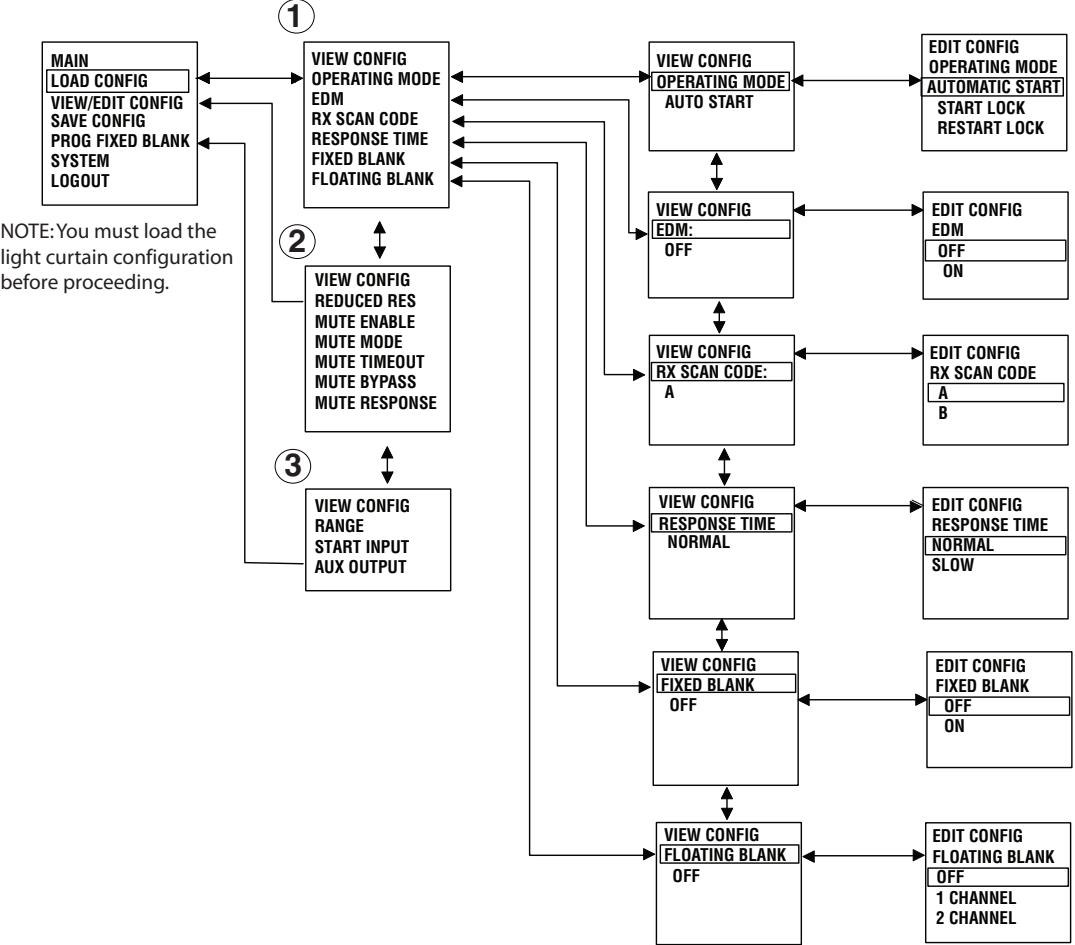


Figure 43: VIEW CONFIG Menu ②

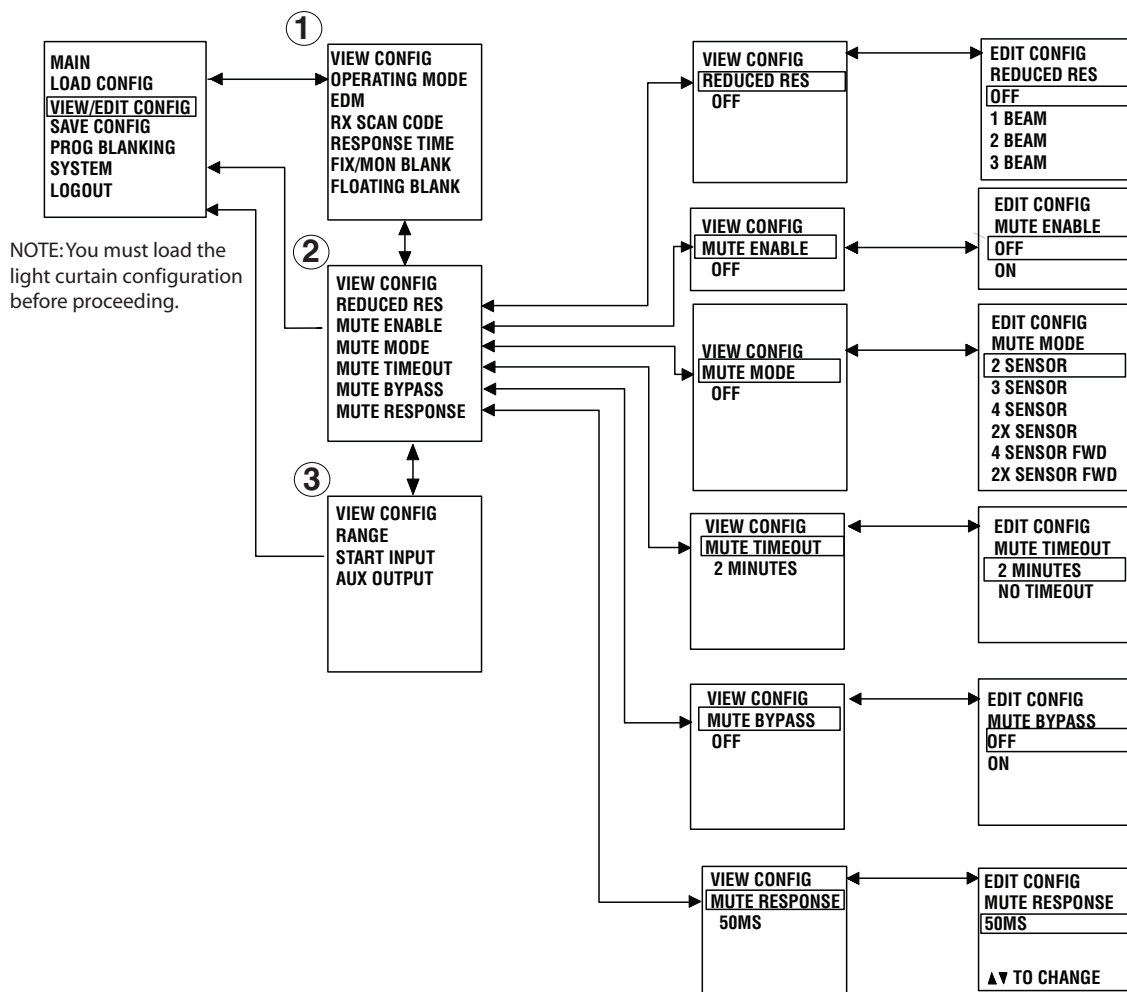
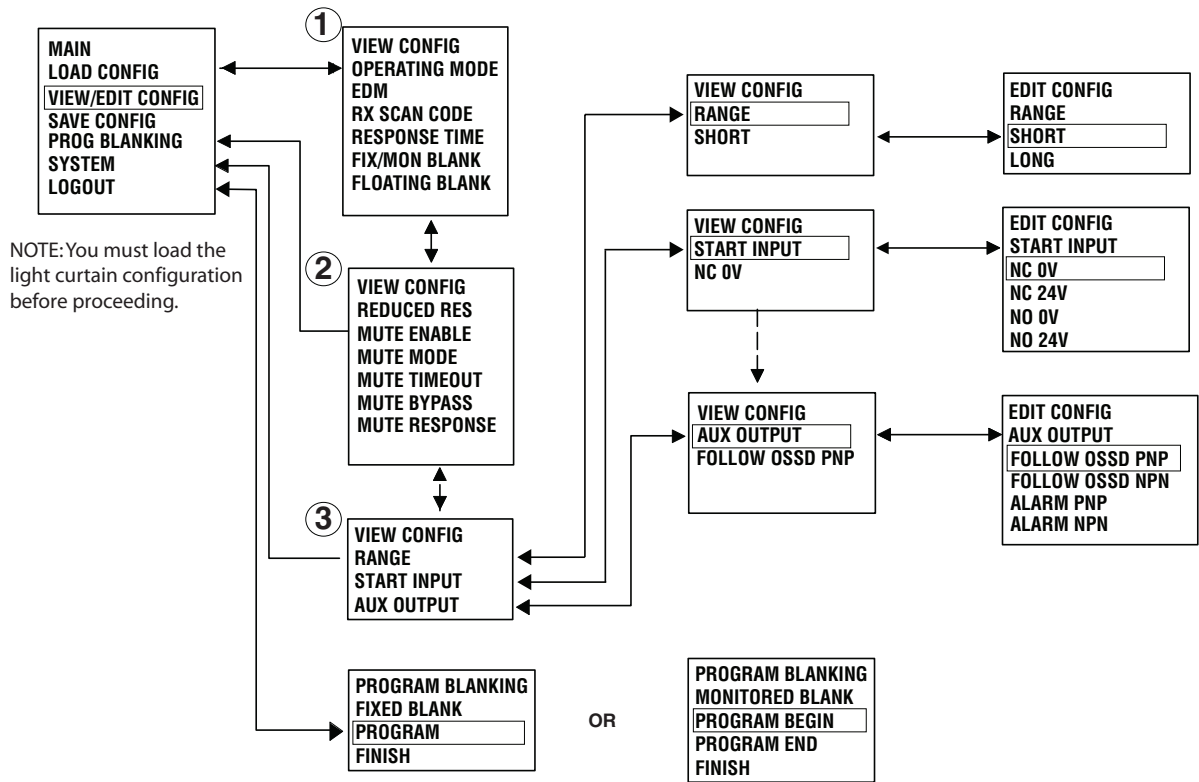


Figure 44: VIEW CONFIG Menu ③



Transmitter Options

Figure 45: PDM Transmitter Configuration/View and Edit

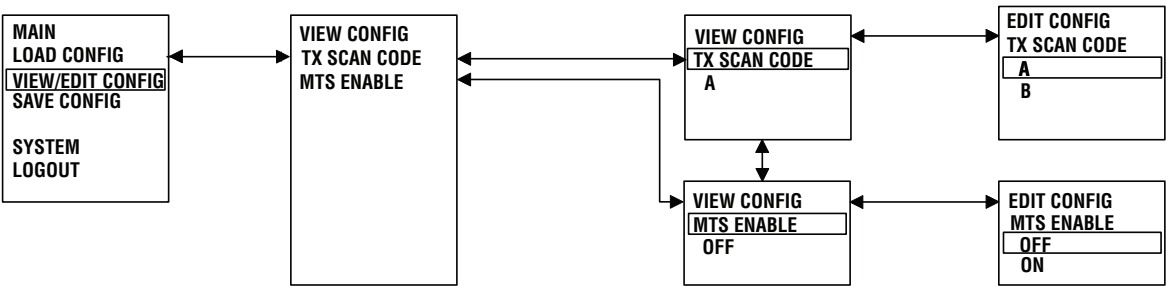


Table 26 includes selectable options of the XUSLB/XUSLDM Light Curtain Transmitter.

Table 26: Transmitter Selectable Options

Option Name	Description	Default
TX Scan Code	Select from code A or B	A
MTS Enable	Machine Test signal. Select from On or Off	Off

The Password

Due to the safety nature of the XUSLB/XUSLDM, it is required that all users with privileges to change the configuration log in with a password. The password grants the user the right to view and modify the configuration. The configuration includes all the parameters that have been defined to guard an application. The password is coded into the PDM and not the XUSLB/XUSLDM. The PDM is shipped with a default password of "0000."

There are two user access levels:

- **Operator Access**—The operator can access the XUSLB/XUSLDM in a monitoring mode. Because the operator cannot make any changes to the light curtain parameters in this mode, it does not require a password.
- **Supervisory (Config User) Access**—Supervisors and maintenance personnel may access the XUSLB/XUSLDM and perform a variety of functions. They may stop the light curtain, download, modify an existing configuration, or create a new one.

NOTE: Service User Access is reserved for Schneider Electric service personnel ONLY.

Changing the Password

The default password can be changed, allowing maintenance personnel to restrict the access of unauthorized persons. To change the password, the user must log-in at the supervisor (Config User) access level, using the default password (0000).

To change the password:

1. Navigate to "System - Change Password".
2. At the "ENTER NEW:???" prompt, set the password to a 4-digit decimal number, and press ENTER. Use the ^ and v buttons to change the selected digit as desired, use the > button to access the next digit.
3. At the "RE ENTER NEW:???" prompt, enter the new password again and press ENTER to confirm and save the new password.

Forgotten Password

If a password is forgotten, the default password can be activated as follows:

From the STATUS screen, press ^ 7 consecutive times and the password will be reset to the default.

PDM Diagnostic Codes

Table 27: Standard Diagnostic Codes

Code Group	Code Number	Description
Normal Operation	88/V#	During power-up all the segments light and the software version displays.
	—	Run state
	-0	Stop state
	-1	Interlock state, waiting for Start input
	-2	Floating blanking enabled
	-3	Exact Channel Select (Fixed) blanking enabled
	-4	Floating blanking and Exact Channel Select (Fixed) blanking enabled
	-5	Muting light curtain
Safety Output (OSSD) Faults	31	OSSD1 & OSSD2 are shorted together.
	32	OSSD1 is shorted to power.
	33	OSSD2 is shorted to power.
	34	OSSD1 is shorted to ground.
	35	OSSD2 is shorted to ground.
EDM Faults	41	EDM signal was in wrong state before entering Machine Run state.
	42	EDM signal was in wrong state after entering Machine Run state.
	43	EDM signal was in wrong state during power-up of the XUSLB/DM light curtain.
	44	Check the start input wire or EDM function selection.
Controller Fault	50	A fault internal to the XUSLB/DM light curtain has been detected.
Setup Error	60	A receiver in view of multiple transmitters is set to the same scan code.
Muting Faults	70	General muting fault. Check the wiring of unused mute sensors.
	71	Mute sensors are activated in the wrong sequence. Check the mounting of the mute sensors for correct sequence.
	72	Mute sensor activation time limit (300 ms) is exceeded. Sensor pairs must activate within 300 ms of each other. Adjust sensor mounting distance or process speed.
	73	System is muted for longer than the maximum time allowed. Check the mute sensors for blockage or misalignment.
	74	Mute lamp is burned out or is not connected. Check the status of the mute lamp.

Table 27: Standard Diagnostic Codes (continued)

Code Group	Code Number	Description
Cascaded System Faults	80	Configuration error. Call your local Schneider Electric representative for troubleshooting assistance.
	81	Second segment or mute module error. Check all cable connections. Call your local Schneider Electric representative for troubleshooting assistance.
	82	Third segment or mute module error. Check all cable connections. Call your local Schneider Electric representative for troubleshooting assistance.
	83	Fourth segment or mute module error. Check all cable connections. Call your local Schneider Electric representative for troubleshooting assistance.
	84	Mute module error. Check all cable connections to the mute module. Call your local Schneider Electric representative for troubleshooting assistance.
	85	Configuration error. Call your local Schneider Electric representative for troubleshooting assistance.
	86	Second segment or mute module firmware is not compatible with the first segment. Replace with a compatible component, or return the system to Schneider Electric for an upgrade.
	87	Third segment or mute module firmware is not compatible with the first segment. Replace with a compatible component, or return the system to Schneider Electric for an upgrade.
	88	Fourth segment or mute module firmware is not compatible with the first segment. Replace with a compatible component, or return the system to Schneider Electric for an upgrade.
	89	Mute module firmware is not compatible with the first segment. Replace with a compatible component, or return system to Schneider Electric for an upgrade.
	90	Incorrect segment type in position two, three, or four. Confirm that all the segments are of the same type—either all transmitters or all receivers.
	91	Segment 2 type does not match segment 1 type. Confirm that segment 2 is the same type (transmitter or receiver) as segment 1.
	92	Segment 3 type does not match segment 1 type. Confirm that segment 3 is the same type (transmitter or receiver) as segment 1.
	93	Segment 4 type does not match segment 1 type. Confirm that segment 4 is the same type (transmitter or receiver) as segment 1.
	95	Error during operation. Check the connections. Call your local Schneider Electric representative for troubleshooting assistance.
	96	Error in segment 2 during operation. Check the connections to segment 2. Replace segment 2 with a known good segment.
	97	Error in segment 3 during operation. Check the connections to segment 3. Replace segment 3 with a known good segment.
	98	Error in segment 4 during operation. Check the connections to segment 4. Replace segment 4 with a known good segment.
	100	Number of segments in the system has been reduced. Segment count is less than the original configuration. Add the required segment(s), or program the system for the current configuration.

Safety Outputs

⚠ WARNING

IMPROPER SETUP OR INSTALLATION

This product is designed for use on a 24 Vdc, negative ground (protective earth) electrical system only.

Never connect the XUSLB/XUSLDM system to a positive ground (protective earth) system. With a positive ground (protective earth) wiring scheme, certain simultaneous shorts of both safety outputs may not be detected and the guarded machine may not stop.

Failure to follow these instructions can result in death or serious injury.

The XUSLB/XUSLDM system receiver supplies two independent PNP-type, safety outputs to provide run/stop signals to the guarded machine. In the Machine run state, the safety outputs are electrically conducting and source 625mA of current at 24 Vdc. In the Machine Stop state, the outputs are not electrically conducting.

Auxiliary Output

This is not a safety output. The XUSLB/XUSLDM supplies one auxiliary output. The configuration of this output at time of order is PNP Follow. On XUSLDM systems, it can be switched to other configurations using the Programming and Diagnostics Module.

PNP Follow

In the On state, this PNP output sources up to 100 mA at 24 Vdc. In this configuration, the auxiliary output is on when the safety outputs are on.

NPN Follow

In the On state, this NPN output sinks up to 100 mA. In this configuration the auxiliary output will be on when the safety outputs are on.

PNP, ALARM

In the On state, this PNP output sources up to 100 mA at 24 Vdc. In this configuration, the auxiliary output is on only when the XUSLDM system is in the Alarm state.

NPN, ALARM

In the On state, this NPN output sinks up to 100 mA. In this configuration, the auxiliary output is on only when the XUSLDM system is in the Alarm state.

SECTION 8— TECHNICAL CHARACTERISTICS

SPECIFICATIONS

Specifications are subject to change without notice.

Table 28: Light Curtain Specifications

		XUSLB/DMQ6 *** (14 mm)	XUSLBR5*** (30 mm)	XUSLDMY5*** (30 mm)
Conformity/Approvals				
Conforming to standards	IEC/EN 61496-1, -2 and IEC 61508-1,-2 for TYPE 4 ESPE. ANSI/RIA R15.06, ANSI B11:19-1990, OSHA 1910.217(C), OSHA 1910.212. The ANSI and OSHA standards apply only to the USA.			
Other approvals	UL, CSA, CE / TUV, EU directives: 2002/95/EC (ROHS),2002/96/EC (WEEE), Machinery 98/37/EEC, Work equipment 89/655/EEC and EMC 89/336/EEC			
Environment				
Ambient Air temperature	C F	For operation: -10° to + 55 °C, for storage: -25 to +75 °C For operation: 14 to +131 °F, for storage: -13 to +167 °F		
Relative humidity	%	95% maximum, non-condensing		
Degree of protection		IP65		
Resistance to shock and vibration		According to IEC 61496-1, Shock: 10 g, impulse 16 ms, Vibration: 10 to 55 Hz, amplitude: 0.35 +/- 0.05 mm (0.0014 +/-0.00020 in.)		
Materials		Housing: aluminum with electrostatically applied polyester powder-paint (Red color: RAL3000); End caps: polycarbonate 20% fiberglass;		
Optical Characteristics				
Minimum object resolution (MOS) XUSLDM Only (Use of Exact Channel Select (Fixed) will increase this value.)	mm (in.)	14 mm (0.55 in.) no floating blanking 24 mm (0.94 in.) 1-beam floating blanking 34 mm (1.34 in.) 2-beam floating blanking Etc. (See Table 9 on page 25.)	30 mm (1.18 in.) no floating blanking 50 mm (1.97 in.) 1-beam floating blanking 70 mm (2.75 in.) 2-beam floating blanking Etc. (See Table 10 on page 26.)	
Nominal Range	m (ft)	0.3 to 7 m (0.3 to 3 m with PDM) (1 to 22.9 ft) (1 to 8.96 ft with PDM)	0.3 to 8 m (1 to 26.25 ft)	0.3 to 20 m (0.3 to 8 m with PDM) (1 to 65.62 ft) (1 to 26.25 ft with PDM)
Protection heights	mm (in.)	280 to 1360 mm (11 to 53.5 in.)	320 to 2120 mm (12.6 to 83.5 in.)	
Effective aperture angle		+2.5° maximum, transmitter and receiver at operating range > 3 m (9.84 ft) according to IEC 61496-2		
Light source		GaAlAs Light Emitting Diode, 880 nm		
Resistance to light		Per IEC/EN 61496-2		
Electrical Characteristics				
Response time	ms	<23 ms (protected heights: 280, 320, 360, 440, 520, 600) <32 ms (protected heights: 720, 760, 880, 920, 960, 1040, 1120, 1200) <41 ms (protected heights: 1360)	<23 ms (protected heights: 320, 360, 440, 520, 600, 680, 760, 880, 920, 1040, 1200, 1360, 1400) <32 ms (protected heights: 1520, 1560, 1640, 1720, 1800, 1920, 2120)	
Power supply	V	24 V \pm +/-20% 2 A. The power supply must meet the requirements of IEC 61496-1 and IEC 60204-1.		
Max. current consumption (no load)	mA	Receiver: 450 mA; Transmitter: 285 mA		
Resistance to interference		Level 3 according to IEC 61496-1		
Input power supply	A	Transmitter: 285 mA; Receiver: 1.8 A (with maximum load). The power supply must meet the requirements of IEC 60204-1 and IEC 61496-1.		
Safety outputs (OSSD)		2 solid state PNP outputs, 625 mA @ 24 V (short circuit protection). ^{1, 2}		
Auxiliary (non-safety) outputs		100 mA @ 24 V \pm . ¹		
Max. current Input consumption		EDM/MPCE monitor 50 mA @ 24 V, Start/restart: 10 mA		
Signals		Transmitter: 1 LED (power); Receiver: 4 LEDs (stop, run, interlock, blanking/floating blanking, and IBI (individual beam indicators))		
Connections		Transmitter: 5 pin male M12 connector Receiver: 8 pin male M12 connector		
Cable lengths		Unshielded extension cables are available separately in lengths of 5 (16.4 ft),10 (32.8 ft),15 (49.2 ft), and 30 meters (98.4 ft). Maximum cable length of 60 meters (196.8 ft) is dependent on load current and power supply.		

Table 28: Light Curtain Specifications *(continued)*

		XUSLB/DMQ6 *** (14 mm)	XUSLBR5*** (30 mm)	XUSLDMY5*** (30 mm)
Cable gauge		0.32 mm ² (22 AWG)		
Cable resistance		0.1686 per ft 0.05531 per m		

¹ The total current required by two solid-state outputs and the non-safety auxiliary output should not exceed 1.35 A.

² 24 V --- is nominal. Drop out voltage is 1 V.

Table 29: Ranges of XUSLB/D Systems

Schneider Electric Reference	Operating Range (m)	Detection Zone (mm)	Response Time (ms)	No. of Beams Use to Determine Response Time from Table 30	Minimum Object Sensitivity (mm)
XUSLBQ6A0280	7	280	23	28	14
XUSLBQ6A0320	7	320	23	32	14
XUSLBQ6A0360	7	360	23	36	14
XUSLBQ6A0440	7	440	23	44	14
XUSLBQ6A0520	7	520	23	52	14
XUSLBQ6A0600	7	600	23	60	14
XUSLBQ6A0720	7	720	32	72	14
XUSLBQ6A0760	7	760	32	76	14
XUSLBQ6A0880	7	880	32	88	14
XUSLBQ6A0920	7	920	32	92	14
XUSLBQ6A0960	7	960	32	96	14
XUSLBQ6A1040	7	1040	32	104	14
XUSLBQ6A1120	7	1120	32	112	14
XUSLBQ6A1200	7	1200	32	120	14
XUSLBQ6A1360	7	1360	41	136	14
XUSLBR5A0320	20	320	14	16	30
XUSLBR5A0360	20	360	23	18	30
XUSLBR5A0440	20	440	23	22	30
XUSLBR5A0520	20	520	23	26	30
XUSLBR5A0600	20	600	23	30	30
XUSLBR5A0680	20	680	23	34	30
XUSLBR5A0760	20	760	23	38	30
XUSLBR5A0880	20	880	23	44	30
XUSLBR5A0920	20	920	23	46	30
XUSLBR5A1040	20	1040	23	52	30
XUSLBR5A1200	20	1200	23	60	30
XUSLBR5A1360	20	1360	23	68	30
XUSLBR5A1400	20	1400	23	70	30
XUSLBR5A1520	20	1520	32	76	30
XUSLBR5A1560	20	1560	32	78	30
XUSLBR5A1640	20	1640	32	82	30
XUSLBR5A1720	20	1720	32	86	30
XUSLBR5A1800	20	1800	32	90	30
XUSLBR5A1920	20	1920	32	96	30
XUSLBR5A2120	20	2120	32	106	30
XUSLDMQ6A0280	7	280	23—99	28	14
XUSLDMQ6A0320	7	320	23—99	32	14
XUSLDMQ6A0360	7	360	23—99	36	14

Table 29: Ranges of XUSLB/D Systems *(continued)*

Schneider Electric Reference	Operating Range (m)	Detection Zone (mm)	Response Time (ms)	No. of Beams Use to Determine Response Time from Table 30	Minimum Object Sensitivity (mm)
XUSLDMQ6A0440	7	440	23—99	44	14
XUSLDMQ6A0520	7	520	23—99	52	14
XUSLDMQ6A0600	7	600	23—99	60	14
XUSLDMQ6A0720	7	720	32—99	72	14
XUSLDMQ6A0760	7	760	32—99	76	14
XUSLDMQ6A0880	7	880	32—99	88	14
XUSLDMQ6A0920	7	920	32—99	92	14
XUSLDMQ6A0960	7	960	32—99	96	14
XUSLDMQ6A1040	7	1040	32—99	104	14
XUSLDMQ6A1120	7	1120	32—99	112	14
XUSLDMQ6A1200	7	1200	32—99	120	14
XUSLDMQ6A1360	7	1360	41—99	136	14
XUSLDMY5A0320	20	320	14—99	16	30
XUSLDMY5A0360	20	360	23—99	18	30
XUSLDMY5A0440	20	440	23—99	22	30
XUSLDMY5A0520	20	520	23—99	26	30
XUSLDMY5A0600	20	600	23—99	30	30
XUSLDMY5A0680	20	680	23—99	34	30
XUSLDMY5A0760	20	760	23—99	38	30
XUSLDMY5A0880	20	880	23—99	44	30
XUSLDMY5A0920	20	920	23—99	46	30
XUSLDMY5A1040	20	1040	23—99	52	30
XUSLDMY5A1200	20	1200	23—99	60	30
XUSLDMY5A1360	20	1360	23—99	68	30
XUSLDMY5A1400	20	1400	23—99	70	30
XUSLDMY5A1520	20	1520	32—99	76	30
XUSLDMY5A1560	20	1560	32—99	78	30
XUSLDMY5A1640	20	1640	32—99	82	30
XUSLDMY5A1720	20	1720	32—99	86	30
XUSLDMY5A1800	20	1800	32—99	90	30
XUSLDMY5A1920	20	1920	32—99	96	30
XUSLDMY5A2120	20	2120	32—99	106	30
XUSLDSQ6A0280	7	280	23—99	28	14
XUSLDSQ6A0320	7	320	23—99	32	14
XUSLDSQ6A0360	7	360	23—99	36	14
XUSLDSQ6A0440	7	440	23—99	44	14
XUSLDSQ6A0520	7	520	23—99	52	14
XUSLDSQ6A0600	7	600	23—99	60	14
XUSLDSQ6A0720	7	720	32—99	72	14
XUSLDSQ6A0760	7	760	32—99	76	14
XUSLDSQ6A0880	7	880	32—99	88	14
XUSLDSQ6A0920	7	920	32—99	92	14
XUSLDSQ6A0960	7	960	32—99	96	14
XUSLDSQ6A1040	7	1040	32—99	104	14
XUSLDSQ6A1120	7	1120	32—99	112	14
XUSLDSQ6A1200	7	1200	32—99	120	14

Table 29: Ranges of XUSLB/D Systems *(continued)*

Schneider Electric Reference	Operating Range (m)	Detection Zone (mm)	Response Time (ms)	No. of Beams Use to Determine Response Time from Table 30	Minimum Object Sensitivity (mm)
XUSLDSR5A0320	20	320	14—99	16	30
XUSLDSR5A0360	20	360	23—99	18	30
XUSLDSR5A0440	20	440	23—99	22	30
XUSLDSR5A0520	20	520	23—99	26	30
XUSLDSR5A0600	20	600	23—99	30	30
XUSLDSR5A0680	20	680	23—99	34	30
XUSLDSR5A0760	20	760	23—99	38	30
XUSLDSR5A0880	20	880	23—99	44	30
XUSLDSR5A0920	20	920	23—99	46	30
XUSLDSR5A1040	20	1040	23—99	52	30
XUSLDSR5A1200	20	1200	23—99	60	30
XUSLDSR5A1360	20	1360	23—99	68	30
XUSLDSR5A1400	20	1400	23—99	70	30
XUSLDSR5A1520	20	1520	32—99	76	30
XUSLDSR5A1560	20	1560	32—99	78	30
XUSLDSR5A1640	20	1640	32—99	82	30
XUSLDSR5A1720	20	1720	32—99	86	30
XUSLDSR5A1800	20	1800	32—99	90	30
XUSLDSR5A1920	20	1920	32—99	96	30
XUSLDSR5A2120	20	2120	32—99	106	30

Table 30: Response Time of XUSLB/D Systems

Minimum Beam Count	Maximum Beam Count	Response Time (mS)	
		Normal	Slow ¹
One-Segment System (XUSLB or XUSLDM)			
0	16	14	23
17	71	23	38
72	126	32	53
127	180	41	68
181	235	50	83
236	256	59	99
Two-Segment System (XUSLDM + 1 XUSLDS)			
0	65	23	38
66	120	32	53
121	174	41	68
175	229	50	83
230	256	59	99
Three-Segment System (XUSLDM + 2 XUSLDS)			
0	59	23	38
60	114	32	53
115	168	41	68
169	223	50	83
224	256	59	99
Four-Segment System (XUSLDM + 3 XUSLDS)			
0	53	23	38
54	108	32	53
109	162	41	68
163	217	50	83
218	256	59	99

¹ Slow response time is programmed by PDM for the XUSLDM system only.

Table 31: Maximum Cable Lengths for Inputs/Outputs

RX or TX ¹	Signal Name	Minimum Wire Gauge AWG (mm ²)	Maximum Cable Length ft (m)
RX	OSSD A and B Outputs	22 (0.32)	300 mA load: 147 (45) 625 mA load: 72 (22)
RX	Auxiliary Output	22 (0.32)	164 (50)
RX	Start Input	22 (0.32)	164 (50)
RX	EDM/MPCE Monitor Input	22 (0.32)	164 (50)
RX/TX	24 Vdc Input Power	18 (0.70)	1.8 A load: 42 (13) 1 A load: 75 (23)

¹ RX: Receiver
TX: Transmitter

DIMENSIONS

Figure 46: XUSLB Dimensions

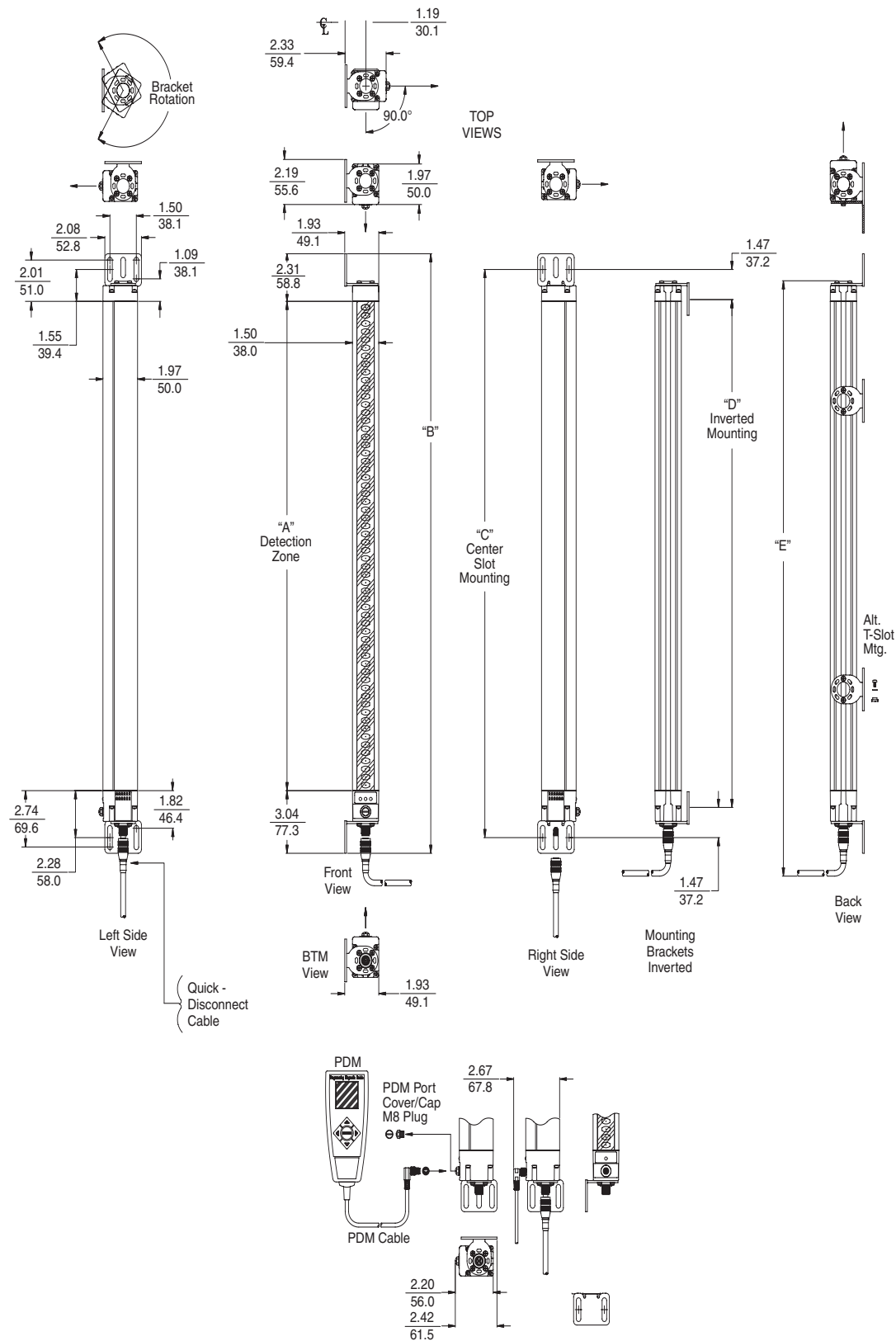


Table 32: XUSLB Dimensions (mm/in.) (Refer to Figure 46 for lettered items.)

14 mm		280mm	320mm	360mm	440mm	520mm	600mm	720mm	760mm
	A	284.4/11.2	324.8/12.8	364.5/14.3	443.9/17.5	523.4/20.6	604.1/23.8	724.0/28.5	763.0/30.0
	B	420.4/16.5	460.8/18.1	500.5/19.7	579.9/22.8	659.4/26.0	740.1/29.1	860.0/33.9	899.0/35.4
	C	381.7/15.0	422.1/16.6	461.8/18.2	541.2/21.3	620.7/24.4	701.4/27.6	821.3/32.3	860.3/33.9
	D	307.3/12.1	347.7/13.7	387.4/15.3	466.8/18.4	546.3/21.5	627.0/24.7	746.9/29.4	785.9/30.9
	E	371.3/14.6	411.7/16.2	451.4/17.8	530.8/20.9	610.3/24.0	691.0/27.2	810.9/31.9	849.9/33.5
	Weight (g)	1788	1965	2150	2504	2865	3219	3757	3934
	Weight (g) Packaged	2598	2775	2960	3314	3675	4234	4772	4949
		880mm	920mm	960mm	1040mm	1120mm	1200mm	1360mm	
	A	882.8/34.8	922.5/36.3	963.6/37.9	1042.9/41.1	1122.3/44.2	1203.8/47.4	1362.0/53.6	
	B	1018.8/40.1	1058.6/41.7	1099.6/43.3	1178.9/46.4	1258.3/49.5	1339.8/52.7	1498.0/59.0	
	C	980.1/38.6	1019.8/40.2	1060.9/41.8	1140.2/44.9	1219.6/48.0	1301.1/51.2	1459.3/57.5	
	D	905.7/35.7	945.4/37.2	986.5/38.8	1065.8/42.0	1145.2/45.1	1226.7/48.3	1384.9/54.5	
	E	969.7/38.2	1009.4/39.7	1050.5/41.4	1129.8/44.5	1209.2/47.6	1290.7/50.8	1448.9/57.0	
	Weight (g)	4472	4649	4825	5187	5540	5902	6617	
	Weight (g) Packaged	6652	6829	7005	7367	7720	8082	8797	
30 mm		320mm	360mm	440mm	520mm	600mm	680mm	760mm	
	A	324.8/12.8	364.5/14.3	443.9/17.5	523.4/20.6	604.1/23.8	683.6/26.9	763.0/30.0	
	B	460.8/18.1	500.5/19.7	580.0/22.8	659.4/26.0	740.1/29.1	819.7/32.3	899.1/35.4	
	C	422.1/16.6	461.8/18.2	541.3/21.3	620.8/24.4	701.5/27.6	781.0/30.8	860.4/33.9	
	D	347.7/13.7	387.4/15.3	466.8/18.4	546.3/21.5	627.0/24.7	706.5/27.8	785.9/30.9	
	E	411.7/16.2	451.4/17.8	530.8/20.9	610.3/24.0	691.0/27.2	770.5/30.3	849.9/33.5	
	Weight (g)	1965	2150	3314	2865	3219	3580	3934	
	Weight (g) Packaged	2775	2960	2504	3675	4234	4595	4949	
		880mm	920mm	1040mm	1200mm	1360mm	1400mm	1520mm	
	A	882.8/34.8	922.5/36.3	1042.9/41.1	1203.8/47.4	1362.0/53.6	1401.7/55.2	1521.5/59.9	
	B	1018.8/40.1	1058.6/41.7	1178.9/46.4	1339.8/52.7	1498.0/59.0	1537.7/60.5	1657.5/65.3	
	C	980.1/38.6	1019.8/40.2	1140.2/44.9	1301.1/51.2	1459.3/57.5	1499.0/59.0	1618.8/63.7	
	D	905.7/35.7	945.4/37.2	1065.8/42.0	1226.7/48.3	1384.9/54.5	1424.6/56.1	1544.4/60.8	
	E	969.7/38.2	1009.4/39.7	1129.8/44.5	1290.7/50.8	1448.9/57.0	1488.6/58.6	1608.4/63.3	
	Weight (g)	4472	4649	5187	5902	6617	6794	7332	
	Weight (g) Packaged	6652	6829	7367	8082	8797	8974	9512	
		1560mm	1640mm	1720mm	1800mm	1920mm	2120mm		
	A	1563.3/61.5	1641.3/64.6	1720.8/67.7	1802.9/71.0	1922.8/75.7	2120.0/83.5		
	B	1699.3/66.9	1777.3/70.0	1856.8/73.1	1938.9/76.3	2058.8/81.1	2256.0/88.8		
	C	1660.6/65.4	1738.6/68.4	1818.1/71.6	1900.2/74.8	2020.1/79.5	2217.3/87.3		
	D	1586.2/62.4	1664.2/65.5	1743.7/68.6	1825.8/71.9	1945.7/76.6	2142.9/84.4		
	E	1650.2/65.0	1728.2/68.0	1807.7/71.2	1889.8/74.4	2009.7/79.1	2206.9/86.9		
	Weight (g)	7509	7870	8224	8585	9116	10016		
	Weight (g) Packaged	9689	10050	10404	10765	11296	12196		

Figure 47: XUSLD Dimensions

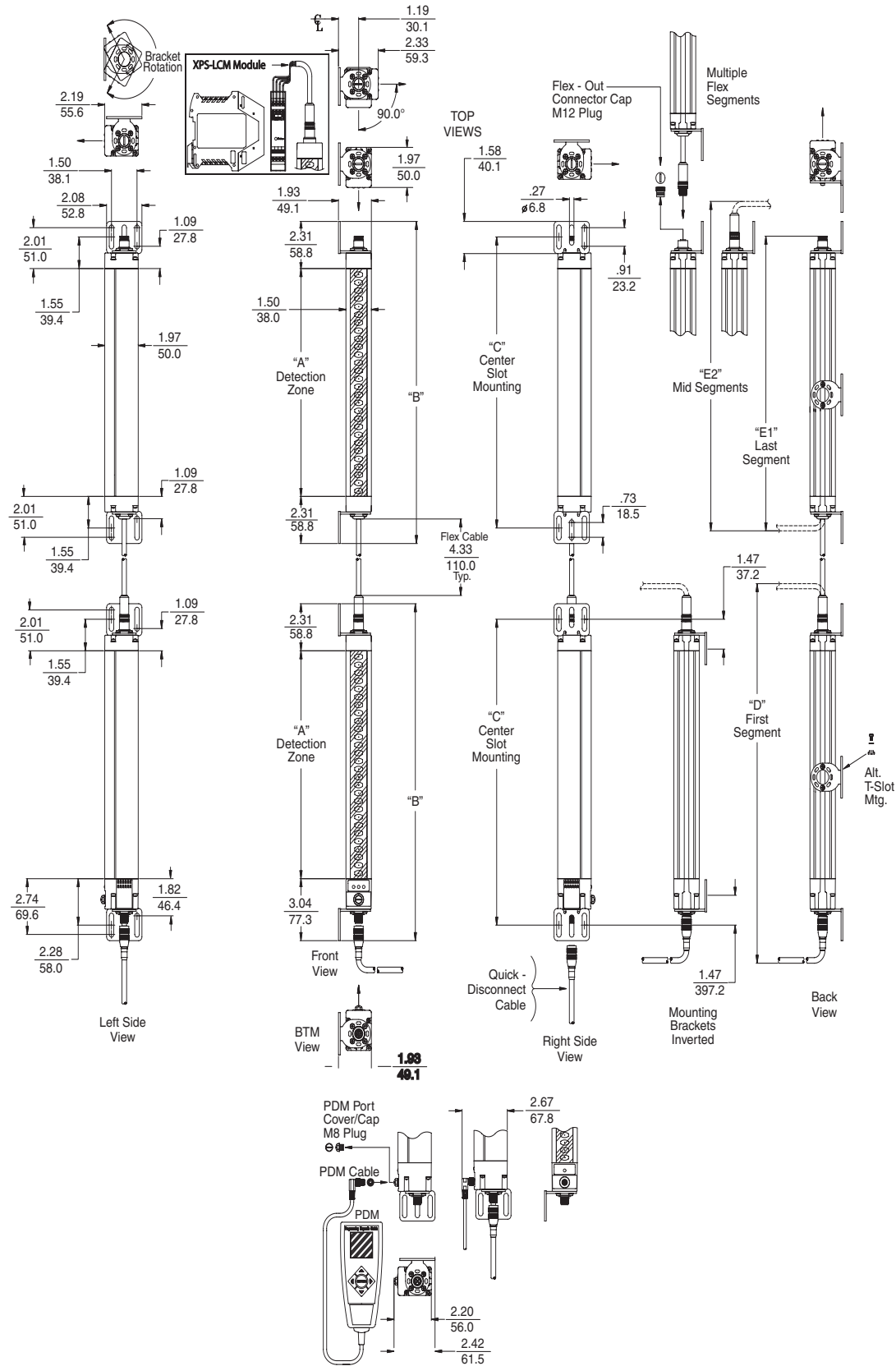


Table 33: XUSLD Dimensions (mm / in.) (Refer to Figure 47 for lettered items.)

14mm		280mm	320mm	360mm	440mm	520mm	600mm	720mm	760mm
	A	284.4/11.2	324.8/12.8	364.5/14.3	443.9/17.5	523.4/20.6	604.1/23.8	724.0/28.5	763.0/30.0
	B1	420.4/16.6	460.8/18.1	500.5/19.7	579.9/22.8	659.4/26.0	740.1/29.1	860.0/33.9	899.0/35.4
	B2	401.9/15.8	442.3/17.4	482.0/19.0	561.4/22.1	640.9/25.2	721.6/28.4	841.5/33.1	880.5/34.7
	C1	381.7/15.0	422.1/16.6	461.8/18.2	541.2/21.3	620.7/24.4	701.4/27.6	821.3/32.3	860.3/33.9
	C2	363.1/14.3	403.5/15.9	443.2/17.4	522.6/20.6	602.1/23.7	682.8/26.9	802.7/31.6	841.7/33.1
	D	440.0/17.3	480.4/18.9	520.1/20.5	599.5/23.6	679.0/26.7	759.7/29.9	879.6/34.6	918.6/36.2
	E1	367.7/14.5	408.1/16.1	447.8/17.6	527.2/20.8	606.7/23.9	687.4/27.1	807.3/31.8	846.3/33.3
	E2	421.4/16.6	461.8/18.2	501.5/19.7	580.9/22.9	660.4/26.0	741.1/29.2	861.0/33.9	900.0/35.4
	Weight (g)	1788	1965	2150	2504	2865	3219	3757	3934
	Weight (g) Packaged	2598	2775	2960	3314	3675	4234	4772	4949
		880mm	920mm	960mm	1040mm	1120mm	1200mm	1360mm	
	A	882.8/34.8	922.5/36.3	963.6/37.9	1042.9/41.1	1122.3/44.2	1203.8/47.4	1362.0/53.6	
	B1	1018.8/40.1	1058.5/41.7	1099.6/43.3	1178.9/46.4	1258.3/49.5	1339.8/52.7	1498.0/59.0	
	B2	1000.3/39.4	1040.0/40.9	1081.1/42.6	1160.4/45.7	1239.8/48.8	1321.3/52.0	1479.5/58.2	
	C1	980.1/38.6	1019.8/40.2	1060.9/41.8	1140.2/44.9	1219.6/48.0	1301.1/51.2	1459.3/57.5	
	C2	961.5/37.9	1001.2/39.4	1042.3/41.0	1121.6/44.2	1201.0/47.3	1282.5/50.5	1440.7/56.7	
	D	1038.4/40.9	1078.1/42.5	1119.2/44.1	1198.5/47.2	1277.9/50.3	1359.4/53.5	1517.6/59.8	
	E1	966.1/38.0	1005.8/39.6	1046.9/41.2	1126.2/44.3	1205.6/47.5	1287.1/50.7	1445.3/56.9	
	E2	1019.8/40.2	1059.5/41.7	1100.6/43.3	1179.9/46.5	1259.3/49.6	1340.8/52.8	1499.0/59.0	
	Weight (g)	4472	4649	4825	5187	5540	5902	6617	
	Weight (g) Packaged	6652	6829	7005	7367	7720	8082	8797	
30mm		320mm	360mm	440mm	520mm	600mm	680mm	760mm	
	A	324.8/12.8	364.5/14.3	443.9/17.5	523.4/20.6	604.1/23.8	683.6/26.9	763.0/30.0	
	B1	460.8/18.1	500.5/19.7	579.9/22.8	659.4/26.0	740.1/29.1	819.6/32.3	899.0/35.4	
	B2	442.3/17.4	482.0/19.0	561.4/22.1	640.9/25.2	721.6/28.4	801.1/31.5	880.5/34.7	
	C1	422.1/16.6	461.8/18.2	541.2/21.3	620.7/24.4	701.4/27.6	780.9/30.7	860.3/33.9	
	C2	403.5/15.9	443.2/17.4	522.6/20.6	602.1/23.7	682.8/26.9	762.3/30.0	841.7/33.1	
	D	480.4/18.9	520.1/20.5	599.5/23.6	679.0/26.7	759.7/29.9	839.2/33.0	918.6/36.2	
	E1	408.1/16.1	447.8/17.6	527.2/20.8	606.7/23.9	687.4/27.1	766.9/30.2	846.3/33.3	
	E2	461.8/18.2	501.5/19.7	580.9/22.9	660.4/26.0	741.1/29.2	820.6/32.3	900.0/35.4	
	Weight (g)	1965	2150	2504	2865	3219	3580	3934	
	Weight (g) Packaged	2775	2960	3314	3675	4234	4595	4949	

Table 33: XUSLD Dimensions (mm / in.) (Refer to Figure 47 for lettered items.) (continued)

	880mm	920mm	1040mm	1200mm	1360mm	1400mm	1520mm
A	882.8/34.8	922.5/36.3	1042.9/41.1	1203.8/47.4	1362.0/53.6	1401.7/55.2	1521.5/59.9
B1	1018.8/40.1	1058.5/41.7	1178.9/46.4	1339.8/52.7	1498.0/59.0	1537.7/60.5	1657.5/65.3
B2	1000.3/39.4	1040.0/40.9	1160.4/45.7	1321.3/52.0	1479.5/58.2	1519.2/59.8	1639.0/64.5
C1	980.1/38.6	1019.8/40.2	1140.2/44.9	1301.1/51.2	1459.3/57.5	1499.0/59.0	1618.8/63.7
C2	961.5/37.9	1001.2/39.4	1121.6/44.2	1282.5/50.5	1440.7/56.7	1480.4/58.3	1600.2/63.0
D	1038.4/40.9	1078.1/42.5	1198.5/47.2	1359.4/53.5	1517.6/59.8	1557.3/61.3	1677.1/66.0
E1	966.1/38.0	1005.8/39.6	1126.2/44.3	1287.1/50.7	1445.3/56.9	1485.0/58.5	1604.8/63.2
E2	1019.8/40.2	1059.5/41.7	1179.9/46.5	1340.8/52.8	1499.0/59.0	1538.7/60.6	1658.5/65.3
Weight (g)	4472	4649	4825	5902	6617	6793	7332
Weight (g) Packaged	6652	6829	7005	8082	8797	8973	9512
	1560mm	1640mm	1720mm	1800mm	1920mm	2120mm	
A	1563.3/61.5	1641.3/64.6	1720.8/67.6	1802.9/71.0	1922.8/75.7	2120.0/83.5	
B1	1699.3/66.9	1777.3/70.0	1856.8/73.1	1938.9/76.3	2058.8/81.1	2256.0/88.8	
B2	1680.8/66.2	1758.8/69.2	1838.3/72.4	1920.4/75.6	2040.3/80.3	2237.5/88.1	
C1	1660.6/65.4	1738.6/68.4	1818.1/71.6	1900.2/74.8	2020.1/79.5	2217.3/87.3	
C2	1642.0/64.6	1720.0/67.7	1799.5/70.8	1881.6/74.1	2001.5/78.8	2198.7/86.6	
D	1718.9/67.7	1796.9/70.7	1876.4/73.9	1958.5/77.1	2078.4/81.8	2275.6/88.6	
E1	1646.6/64.8	1724.6/67.9	1804.1/71.0	1886.2/74.3	2006.1/79.0	2203.3/86.7	
E2	1700.3/66.9	1778.3/70.0	1857.8/73.1	1939.9/76.4	2059.8/81.1	2257.0/88.9	
Weight (g)	7509	7870	8224	8585	9116	10016	
Weight (g) Packaged	9689	10050	10404	10765	11296	12196	

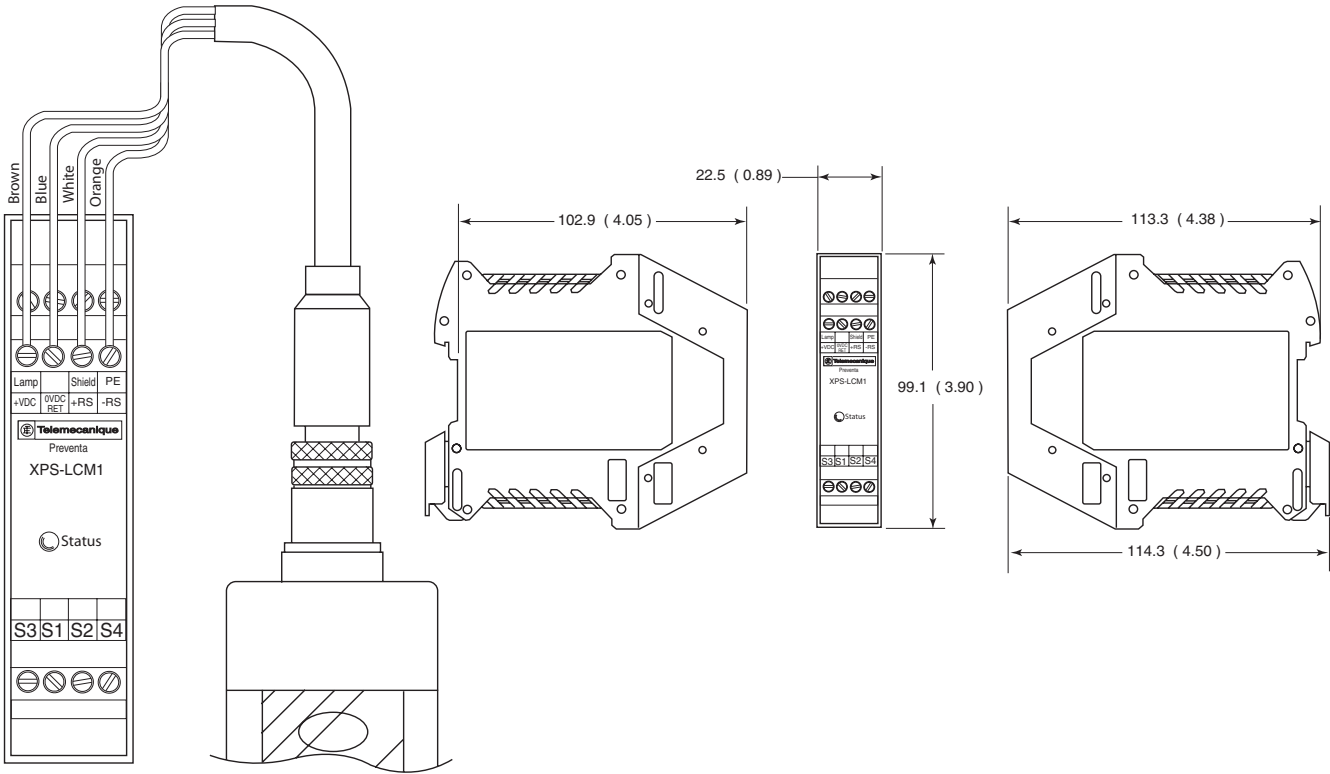
XPSLCM1 SPECIFICATIONS

Table 34: XPSLCM1 Environmental Specifications

Input Power	24 Vdc± 20 %, 30 mA max.
Temperature	0° C to 55° C
Humidity	Less than 95% non-condensing
Storage Temperature	-25° C to 75° C
Vibration	In accordance with IEC 68-2-6, 0.35 mm displacement, 10 to 55 Hz
Shock	In accordance with IEC 68-2-29, 1 Dg, 15 ms pulse, 1000/axis
Enclosure	IP20
Mute Sensor	PNP 24 Vdc (11 mA consumption)
Mute Lamp Output	10 – 100 mA (NPN), 30 Vdc max. ¹
Safety Category	Type 4 per IEC 61496-1

¹ The external lamp must provide a current load between 10 mA and 100 mA for the lamp monitoring circuit to sense proper operation of the mute lamp.

Figure 48: XPSLCM1 Dimensions in mm (in.)



REPLACEMENT PARTS AND ACCESSORIES

Replacement Transmitters and Receivers

Table 35: Transmitter, XUSLB, Basic Stand-alone

Transmitter	Description
XUSLBQ6A0280T	Transmitter, 7 m range, finger detection, 0280 mm protected height
XUSLBQ6A0320T	Transmitter, 7 m range, finger detection, 0320 mm protected height
XUSLBQ6A0360T	Transmitter, 7 m range, finger detection, 0360 mm protected height
XUSLBQ6A0440T	Transmitter, 7 m range, finger detection, 0440 mm protected height
XUSLBQ6A0520T	Transmitter, 7 m range, finger detection, 0520 mm protected height
XUSLBQ6A0600T	Transmitter, 7 m range, finger detection, 0600 mm protected height
XUSLBQ6A0720T	Transmitter, 7 m range, finger detection, 0720 mm protected height
XUSLBQ6A0760T	Transmitter, 7 m range, finger detection, 0760 mm protected height
XUSLBQ6A0880T	Transmitter, 7 m range, finger detection, 0880 mm protected height
XUSLBQ6A0920T	Transmitter, 7 m range, finger detection, 0920 mm protected height
XUSLBQ6A0960T	Transmitter, 7 m range, finger detection, 0960 mm protected height
XUSLBQ6A1040T	Transmitter, 7 m range, finger detection, 1040 mm protected height
XUSLBQ6A1120T	Transmitter, 7 m range, finger detection, 1120 mm protected height
XUSLBQ6A1200T	Transmitter, 7 m range, finger detection, 1200 mm protected height
XUSLBQ6A1360T	Transmitter, 7 m range, finger detection, 1360 mm protected height
XUSLBR5A0320T	Transmitter, 20 m range, hand detection, 0320 mm protected height
XUSLBR5A0360T	Transmitter, 20 m range, hand detection, 0360 mm protected height
XUSLBR5A0440T	Transmitter, 20 m range, hand detection, 0440 mm protected height
XUSLBR5A0520T	Transmitter, 20 m range, hand detection, 0520 mm protected height
XUSLBR5A0600T	Transmitter, 20 m range, hand detection, 0600 mm protected height
XUSLBR5A0680T	Transmitter, 20 m range, hand detection, 0680 mm protected height
XUSLBR5A0760T	Transmitter, 20 m range, hand detection, 0760 mm protected height
XUSLBR5A0880T	Transmitter, 20 m range, hand detection, 0880 mm protected height
XUSLBR5A0920T	Transmitter, 20 m range, hand detection, 0920 mm protected height
XUSLBR5A1040T	Transmitter, 20 m range, hand detection, 1040 mm protected height
XUSLBR5A1200T	Transmitter, 20 m range, hand detection, 1200 mm protected height
XUSLBR5A1360T	Transmitter, 20 m range, hand detection, 1360 mm protected height
XUSLBR5A1400T	Transmitter, 20 m range, hand detection, 1400 mm protected height
XUSLBR5A1520T	Transmitter, 20 m range, hand detection, 1520 mm protected height
XUSLBR5A1560T	Transmitter, 20 m range, hand detection, 1560 mm protected height
XUSLBR5A1640T	Transmitter, 20 m range, hand detection, 1640 mm protected height
XUSLBR5A1720T	Transmitter, 20 m range, hand detection, 1720 mm protected height
XUSLBR5A1800T	Transmitter, 20 m range, hand detection, 1800 mm protected height
XUSLBR5A1920T	Transmitter, 20 m range, hand detection, 1920 mm protected height
XUSLBR5A2120T	Transmitter, 20 m range, hand detection, 2120 mm protected height

Table 36: Transmitter, XUSLDM, Universal, Master

Transmitter	Description
XUSLDMQ6A0280T	Transmitter, Master, 7 m range, finger detection, 0280 mm protected height
XUSLDMQ6A0320T	Transmitter, Master, 7 m range, finger detection, 0320 mm protected height
XUSLDMQ6A0360T	Transmitter, Master, 7 m range, finger detection, 0360 mm protected height
XUSLDMQ6A0440T	Transmitter, Master, 7 m range, finger detection, 0440 mm protected height
XUSLDMQ6A0520T	Transmitter, Master, 7 m range, finger detection, 0520 mm protected height
XUSLDMQ6A0600T	Transmitter, Master, 7 m range, finger detection, 0600 mm protected height
XUSLDMQ6A0720T	Transmitter, Master, 7 m range, finger detection, 0720 mm protected height
XUSLDMQ6A0760T	Transmitter, Master, 7 m range, finger detection, 0760 mm protected height
XUSLDMQ6A0880T	Transmitter, Master, 7 m range, finger detection, 0880 mm protected height
XUSLDMQ6A0920T	Transmitter, Master, 7 m range, finger detection, 0920 mm protected height
XUSLDMQ6A0960T	Transmitter, Master, 7 m range, finger detection, 0960 mm protected height
XUSLDMQ6A1040T	Transmitter, Master, 7 m range, finger detection, 1040 mm protected height
XUSLDMQ6A1120T	Transmitter, Master, 7 m range, finger detection, 1120 mm protected height
XUSLDMQ6A1200T	Transmitter, Master, 7 m range, finger detection, 1200 mm protected height
XUSLDMQ6A1360T	Transmitter, Master, 7 m range, finger detection, 1360 mm protected height
XUSLDMY5A0320T	Transmitter, Master, 20 m range, hand detection, 0320 mm protected height
XUSLDMY5A0360T	Transmitter, Master, 20 m range, hand detection, 0360 mm protected height
XUSLDMY5A0440T	Transmitter, Master, 20 m range, hand detection, 0440 mm protected height
XUSLDMY5A0520T	Transmitter, Master, 20 m range, hand detection, 0520 mm protected height
XUSLDMY5A0600T	Transmitter, Master, 20 m range, hand detection, 0600 mm protected height
XUSLDMY5A0680T	Transmitter, Master, 20 m range, hand detection, 0680 mm protected height
XUSLDMY5A0760T	Transmitter, Master, 20 m range, hand detection, 0760 mm protected height
XUSLDMY5A0880T	Transmitter, Master, 20 m range, hand detection, 0880 mm protected height
XUSLDMY5A0920T	Transmitter, Master, 20 m range, hand detection, 0920 mm protected height
XUSLDMY5A1040T	Transmitter, Master, 20 m range, hand detection, 1040 mm protected height
XUSLDMY5A1200T	Transmitter, Master, 20 m range, hand detection, 1200 mm protected height
XUSLDMY5A1360T	Transmitter, Master, 20 m range, hand detection, 1360 mm protected height
XUSLDMY5A1400T	Transmitter, Master, 20 m range, hand detection, 1400 mm protected height
XUSLDMY5A1520T	Transmitter, Master, 20 m range, hand detection, 1520 mm protected height
XUSLDMY5A1560T	Transmitter, Master, 20 m range, hand detection, 1560 mm protected height

Table 36: Transmitter, XUSLDM, Universal, Master *(continued)*

Transmitter	Description
XUSLDMY5A1640T	Transmitter, Master, 20 m range, hand detection, 1640 mm protected height
XUSLDMY5A1720T	Transmitter, Master, 20 m range, hand detection, 1720 mm protected height
XUSLDMY5A1800T	Transmitter, Master, 20 m range, hand detection, 1800 mm protected height
XUSLDMY5A1920T	Transmitter, Master, 20 m range, hand detection, 1920 mm protected height
XUSLDMY5A2120T	Transmitter, Master, 20 m range, hand detection, 2120 mm protected height

Table 37: Transmitter, XUSLDS, Universal, Slave

Transmitter	Description
XUSLDSQ6A0280T	Transmitter, Slave, 7 m range, finger detection, 0280 mm protected height
XUSLDSQ6A0320T	Transmitter, Slave, 7 m range, finger detection, 0320 mm protected height
XUSLDSQ6A0360T	Transmitter, Slave, 7 m range, finger detection, 0360 mm protected height
XUSLDSQ6A0440T	Transmitter, Slave, 7 m range, finger detection, 0440 mm protected height
XUSLDSQ6A0520T	Transmitter, Slave, 7 m range, finger detection, 0520 mm protected height
XUSLDSQ6A0600T	Transmitter, Slave, 7 m range, finger detection, 0600 mm protected height
XUSLDSQ6A0720T	Transmitter, Slave, 7 m range, finger detection, 0720 mm protected height
XUSLDSQ6A0760T	Transmitter, Slave, 7 m range, finger detection, 0760 mm protected height
XUSLDSQ6A0880T	Transmitter, Slave, 7 m range, finger detection, 0880 mm protected height
XUSLDSQ6A0920T	Transmitter, Slave, 7 m range, finger detection, 0920 mm protected height
XUSLDSQ6A0960T	Transmitter, Slave, 7 m range, finger detection, 0960 mm protected height
XUSLDSQ6A1040T	Transmitter, Slave, 7 m range, finger detection, 1040 mm protected height
XUSLDSQ6A1120T	Transmitter, Slave, 7 m range, finger detection, 1120 mm protected height
XUSLDSQ6A1200T	Transmitter, Slave, 7 m range, finger detection, 1200 mm protected height
XUSLDSY5A0320T	Transmitter, Slave, 20 m range, hand detection, 0320 mm protected height
XUSLDSY5A0360T	Transmitter, Slave, 20 m range, hand detection, 0360 mm protected height
XUSLDSY5A0440T	Transmitter, Slave, 20 m range, hand detection, 0440 mm protected height
XUSLDSY5A0520T	Transmitter, Slave, 20 m range, hand detection, 0520 mm protected height
XUSLDSY5A0600T	Transmitter, Slave, 20 m range, hand detection, 0600 mm protected height
XUSLDSY5A0680T	Transmitter, Slave, 20 m range, hand detection, 0680 mm protected height
XUSLDSY5A0760T	Transmitter, Slave, 20 m range, hand detection, 0760 mm protected height
XUSLDSY5A0880T	Transmitter, Slave, 20 m range, hand detection, 0880 mm protected height

Table 37: Transmitter, XUSLDS, Universal, Slave *(continued)*

Transmitter	Description
XUSLDSY5A0920T	Transmitter, Slave, 20 m range, hand detection, 0920 mm protected height
XUSLDSY5A1040T	Transmitter, Slave, 20 m range, hand detection, 1040 mm protected height
XUSLDSY5A1200T	Transmitter, Slave, 20 m range, hand detection, 1200 mm protected height
XUSLDSY5A1360T	Transmitter, Slave, 20 m range, hand detection, 1360 mm protected height
XUSLDSY5A1400T	Transmitter, Slave, 20 m range, hand detection, 1400 mm protected height
XUSLDSY5A1520T	Transmitter, Slave, 20 m range, hand detection, 1520 mm protected height
XUSLDSY5A1560T	Transmitter, Slave, 20 m range, hand detection, 1560 mm protected height
XUSLDSY5A1640T	Transmitter, Slave, 20 m range, hand detection, 1640 mm protected height
XUSLDSY5A1720T	Transmitter, Slave, 20 m range, hand detection, 1720 mm protected height
XUSLDSY5A1800T	Transmitter, Slave, 20 m range, hand detection, 1800 mm protected height
XUSLDSY5A1920T	Transmitter, Slave, 20 m range, hand detection, 1920 mm protected height
XUSLDSY5A2120T	Transmitter, Slave, 20 m range, hand detection, 2120 mm protected height

Table 38: Receiver, XUSLB, Optimum Stand-alone

Receiver	Description
XUSLBQ6A0280R	Receiver, Basic, 7 m range, finger detection, 0280 mm protected height
XUSLBQ6A0320R	Receiver, Basic, 7 m range, finger detection, 0320 mm protected height
XUSLBQ6A0360R	Receiver, Basic, 7 m range, finger detection, 0360 mm protected height
XUSLBQ6A0440R	Receiver, Basic, 7 m range, finger detection, 0440 mm protected height
XUSLBQ6A0520R	Receiver, Basic, 7 m range, finger detection, 0520 mm protected height
XUSLBQ6A0600R	Receiver, Basic, 7 m range, finger detection, 0600 mm protected height
XUSLBQ6A0720R	Receiver, Basic, 7 m range, finger detection, 0720 mm protected height
XUSLBQ6A0760R	Receiver, Basic, 7 m range, finger detection, 0760 mm protected height
XUSLBQ6A0880R	Receiver, Basic, 7 m range, finger detection, 0880 mm protected height
XUSLBQ6A0920R	Receiver, Basic, 7 m range, finger detection, 0920 mm protected height
XUSLBQ6A0960R	Receiver, Basic, 7 m range, finger detection, 0960 mm protected height
XUSLBQ6A1040R	Receiver, Basic, 7 m range, finger detection, 1040 mm protected height
XUSLBQ6A1120R	Receiver, Basic, 7 m range, finger detection, 1120 mm protected height
XUSLBQ6A1200R	Receiver, Basic, 7 m range, finger detection, 1200 mm protected height
XUSLBQ6A1360R	Receiver, Basic, 7 m range, finger detection, 1360 mm protected height
XUSLBR5A0320R	Receiver, Basic, 20 m range, hand detection, 0320 mm protected height
XUSLBR5A0360R	Receiver, Basic, 20 m range, hand detection, 0360 mm protected height
XUSLBR5A0440R	Receiver, Basic, 20 m range, hand detection, 0440 mm protected height
XUSLBR5A0520R	Receiver, Basic, 20 m range, hand detection, 0520 mm protected height
XUSLBR5A0600R	Receiver, Basic, 20 m range, hand detection, 0600 mm protected height
XUSLBR5A0680R	Receiver, Basic, 20 m range, hand detection, 0680 mm protected height
XUSLBR5A0760R	Receiver, Basic, 20 m range, hand detection, 0760 mm protected height
XUSLBR5A0880R	Receiver, Basic, 20 m range, hand detection, 0880 mm protected height
XUSLBR5A0920R	Receiver, Basic, 20 m range, hand detection, 0920 mm protected height
XUSLBR5A1040R	Receiver, Basic, 20 m range, hand detection, 1040 mm protected height

Table 38: Receiver, XUSLB, Optimum Stand-alone (continued)

Receiver	Description
XUSLBR5A1200R	Receiver, Basic, 20 m range, hand detection, 1200 mm protected height
XUSLBR5A1360R	Receiver, Basic, 20 m range, hand detection, 1360 mm protected height
XUSLBR5A1400R	Receiver, Basic, 20 m range, hand detection, 1400 mm protected height
XUSLBR5A1520R	Receiver, Basic, 20 m range, hand detection, 1520 mm protected height
XUSLBR5A1560R	Receiver, Basic, 20 m range, hand detection, 1560 mm protected height
XUSLBR5A1640R	Receiver, Basic, 20 m range, hand detection, 1640 mm protected height
XUSLBR5A1720R	Receiver, Basic, 20 m range, hand detection, 1720 mm protected height
XUSLBR5A1800R	Receiver, Basic, 20 m range, hand detection, 1800 mm protected height
XUSLBR5A1920R	Receiver, Basic, 20 m range, hand detection, 1920 mm protected height
XUSLBR5A2120R	Receiver, Basic, 20 m range, hand detection, 2120 mm protected height

Table 39: Receiver, XUSLDM, Universal, Master

Receiver	Description
XUSLDMQ6A0280R	Receiver, Advanced Master, 7 m range, finger detection, 0280 mm protected height
XUSLDMQ6A0320R	Receiver, Advanced Master, 7 m range, finger detection, 0320 mm protected height
XUSLDMQ6A0360R	Receiver, Advanced Master, 7 m range, finger detection, 0360 mm protected height
XUSLDMQ6A0440R	Receiver, Advanced Master, 7 m range, finger detection, 0440 mm protected height
XUSLDMQ6A0520R	Receiver, Advanced Master, 7 m range, finger detection, 0520 mm protected height
XUSLDMQ6A0600R	Receiver, Advanced Master, 7 m range, finger detection, 0600 mm protected height
XUSLDMQ6A0720R	Receiver, Advanced Master, 7 m range, finger detection, 0720 mm protected height
XUSLDMQ6A0760R	Receiver, Advanced Master, 7 m range, finger detection, 0760 mm protected height
XUSLDMQ6A0880R	Receiver, Advanced Master, 7 m range, finger detection, 0880 mm protected height
XUSLDMQ6A0920R	Receiver, Advanced Master, 7 m range, finger detection, 0920 mm protected height
XUSLDMQ6A0960R	Receiver, Advanced Master, 7 m range, finger detection, 0960 mm protected height
XUSLDMQ6A1040R	Receiver, Advanced Master, 7 m range, finger detection, 1040 mm protected height
XUSLDMQ6A1120R	Receiver, Advanced Master, 7 m range, finger detection, 1120 mm protected height
XUSLDMQ6A1200R	Receiver, Advanced Master, 7 m range, finger detection, 1200 mm protected height
XUSLDMQ6A1360R	Receiver, Advanced Master, 7 m range, finger detection, 1360 mm protected height
XUSLDMY5A0320R	Receiver, Advanced Master, 20 m range, hand detection, 0320 mm protected height
XUSLDMY5A0360R	Receiver, Advanced Master, 20 m range, hand detection, 0360 mm protected height
XUSLDMY5A0440R	Receiver, Advanced Master, 20 m range, hand detection, 0440 mm protected height
XUSLDMY5A0520R	Receiver, Advanced Master, 20 m range, hand detection, 0520 mm protected height
XUSLDMY5A0600R	Receiver, Advanced Master, 20 m range, hand detection, 0600 mm protected height
XUSLDMY5A0680R	Receiver, Advanced Master, 20 m range, hand detection, 0680 mm protected height

Table 39: Receiver, XUSLDM, Universal, Master *(continued)*

Receiver	Description
XUSLDMY5A0760R	Receiver, Advanced Master, 20 m range, hand detection, 0760 mm protected height
XUSLDMY5A0880R	Receiver, Advanced Master, 20 m range, hand detection, 0880 mm protected height
XUSLDMY5A0920R	Receiver, Advanced Master, 20 m range, hand detection, 0920 mm protected height
XUSLDMY5A1040R	Receiver, Advanced Master, 20 m range, hand detection, 1040 mm protected height
XUSLDMY5A1200R	Receiver, Advanced Master, 20 m range, hand detection, 1200 mm protected height
XUSLDMY5A1360R	Receiver, Advanced Master, 20 m range, hand detection, 1360 mm protected height
XUSLDMY5A1400R	Receiver, Advanced Master, 20 m range, hand detection, 1400 mm protected height
XUSLDMY5A1520R	Receiver, Advanced Master, 20 m range, hand detection, 1520 mm protected height
XUSLDMY5A1560R	Receiver, Advanced Master, 20 m range, hand detection, 1560 mm protected height
XUSLDMY5A1640R	Receiver, Advanced Master, 20 m range, hand detection, 1640 mm protected height
XUSLDMY5A1720R	Receiver, Advanced Master, 20 m range, hand detection, 1720 mm protected height
XUSLDMY5A1800R	Receiver, Advanced Master, 20 m range, hand detection, 1800 mm protected height
XUSLDMY5A1920R	Receiver, Advanced Master, 20 m range, hand detection, 1920 mm protected height
XUSLDMY5A2120R	Receiver, Advanced Master, 20 m range, hand detection, 2120 mm protected height

Table 40: Receiver, XUSLDS, Universal, Slave

Receiver	Description
XUSLDSQ6A0280R	Receiver, Slave, 7 m range, finger detection, 0280 mm protected height
XUSLDSQ6A0320R	Receiver, Slave, 7 m range, finger detection, 0320 mm protected height
XUSLDSQ6A0360R	Receiver, Slave, 7 m range, finger detection, 0360 mm protected height
XUSLDSQ6A0440R	Receiver, Slave, 7 m range, finger detection, 0440 mm protected height
XUSLDSQ6A0520R	Receiver, Slave, 7 m range, finger detection, 0520 mm protected height
XUSLDSQ6A0600R	Receiver, Slave, 7 m range, finger detection, 0600 mm protected height
XUSLDSQ6A0720R	Receiver, Slave, 7 m range, finger detection, 0720 mm protected height
XUSLDSQ6A0760R	Receiver, Slave, 7 m range, finger detection, 0760 mm protected height
XUSLDSQ6A0880R	Receiver, Slave, 7 m range, finger detection, 0880 mm protected height
XUSLDSQ6A0920R	Receiver, Slave, 7 m range, finger detection, 0920 mm protected height
XUSLDSQ6A0960R	Receiver, Slave, 7 m range, finger detection, 0960 mm protected height
XUSLDSQ6A1040R	Receiver, Slave, 7 m range, finger detection, 1040 mm protected height
XUSLDSQ6A1120R	Receiver, Slave, 7 m range, finger detection, 1120 mm protected height
XUSLDSQ6A1200R	Receiver, Slave, 7 m range, finger detection, 1200 mm protected height
XUSLDSY5A0320R	Receiver, Slave, 20 m range, hand detection, 0320 mm protected height
XUSLDSY5A0360R	Receiver, Slave, 20 m range, hand detection, 0360 mm protected height
XUSLDSY5A0440R	Receiver, Slave, 20 m range, hand detection, 0440 mm protected height
XUSLDSY5A0520R	Receiver, Slave, 20 m range, hand detection, 0520 mm protected height
XUSLDSY5A0600R	Receiver, Slave, 20 m range, hand detection, 0600 mm protected height
XUSLDSY5A0680R	Receiver, Slave, 20 m range, hand detection, 0680 mm protected height
XUSLDSY5A0760R	Receiver, Slave, 20 m range, hand detection, 0760 mm protected height
XUSLDSY5A0880R	Receiver, Slave, 20 m range, hand detection, 0880 mm protected height

Table 40: Receiver, XUSLDS, Universal, Slave

Receiver	Description
XUSLDSY5A0920R	Receiver, Slave, 20 m range, hand detection, 0920 mm protected height
XUSLDSY5A1040R	Receiver, Slave, 20 m range, hand detection, 1040 mm protected height
XUSLDSY5A1200R	Receiver, Slave, 20 m range, hand detection, 1200 mm protected height
XUSLDSY5A1360R	Receiver, Slave, 20 m range, hand detection, 1360 mm protected height
XUSLDSY5A1400R	Receiver, Slave, 20 m range, hand detection, 1400 mm protected height
XUSLDSY5A1520R	Receiver, Slave, 20 m range, hand detection, 1520 mm protected height
XUSLDSY5A1560R	Receiver, Slave, 20 m range, hand detection, 1560 mm protected height
XUSLDSY5A1640R	Receiver, Slave, 20 m range, hand detection, 1640 mm protected height
XUSLDSY5A1720R	Receiver, Slave, 20 m range, hand detection, 1720 mm protected height
XUSLDSY5A1800R	Receiver, Slave, 20 m range, hand detection, 1800 mm protected height
XUSLDSY5A1920R	Receiver, Slave, 20 m range, hand detection, 1920 mm protected height
XUSLDSY5A2120R	Receiver, Slave, 20 m range, hand detection, 2120 mm protected height

Cables and Accessories

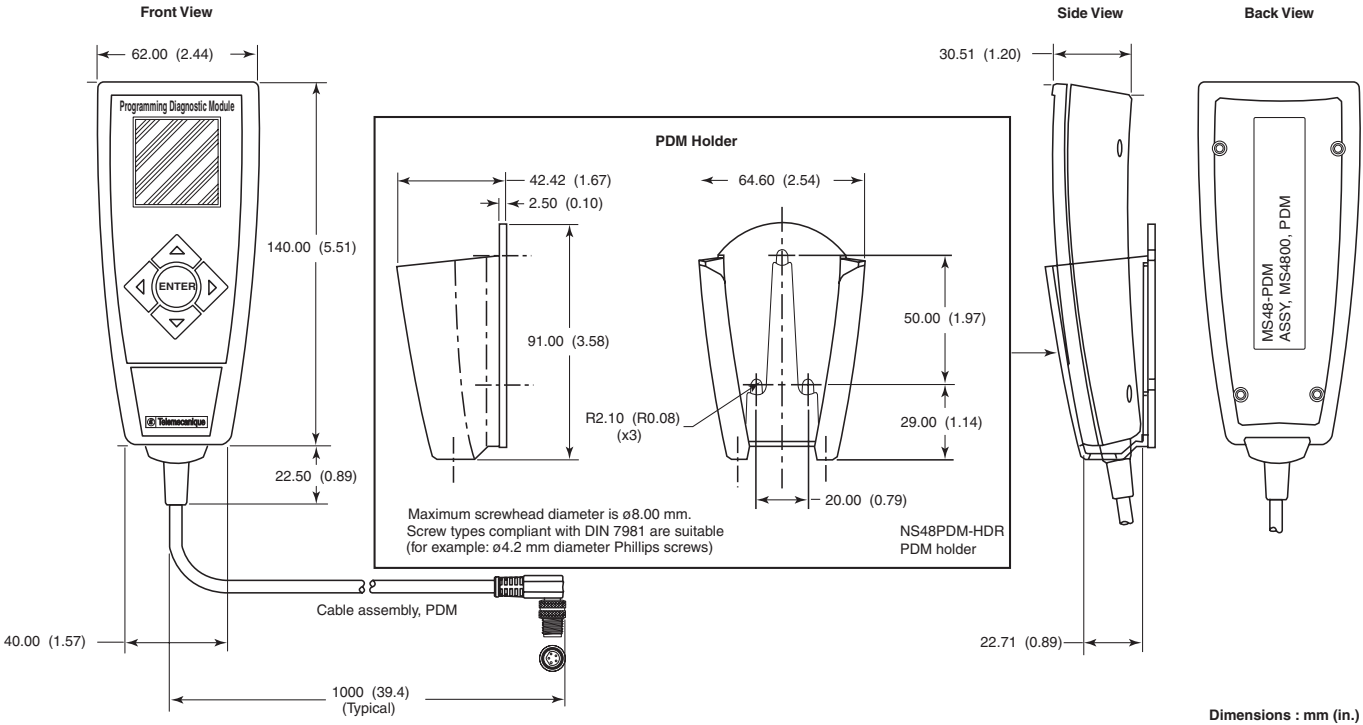
Table 41: Cables and Accessories

Catalog Number	Description
XSZBCT05	Cable, Main Receiver, 5 meters
XSZBCT10	Cable, Main Receiver, 10 meters
XSZBCT15	Cable, Main Receiver, 15 meters
XSZBCT30	Cable, Main Receiver, 30 meters
XSZBCR05	Cable, Main Transmitter, 5 meters
XSZBCR10	Cable, Main Transmitter, 10 meters
XSZBCR15	Cable, Main Transmitter, 15 meters
XSZBCR30	Cable, Main Transmitter, 30 meters
XSZDCT003	Cable, Flex Extension, TX, 0.3 meters
XSZDCT005	Cable, Flex Extension, TX, 0.5 meters
XSZDCT010	Cable, Flex Extension, TX, 1 meters
XSZDCT020	Cable, Flex Extension, TX, 2 meters
XSZDCT030	Cable, Flex Extension, TX, 3 meters
XSZDCT050	Cable, Flex Extension, TX, 5 meters
XSZDCT100	Cable, Flex Extension, TX, 10 meters
XSZDCR003	Cable, Flex Extension, RX, 0.3 meters
XSZDCR005	Cable, Flex Extension, RX, 0.5 meters
XSZDCR010	Cable, Flex Extension, RX, 1 meters
XSZDCR020	Cable, Flex Extension, RX, 2 meters
XSZDCR030	Cable, Flex Extension, RX, 3 meters
XSZDCR050	Cable, Flex Extension, RX, 5 meters
XSZDCR100	Cable, Flex Extension, RX, 10 meters
XSZDCRM10	Cable, XPSLCM1 connect, 10 meters
XSZDCRM15	Cable, XPSLCM1 connect, 15 meters
XSZDCRM30	Cable, XPSLCM1 connect, 30 meters
XUSLZ450	CD ROM Manual
XUSLPDM	Handheld Programing Device
XPSLCM1	Wiring Module
XUSLZ610	KIT, XUSLPDM Connector Cover (qty. 10)
XUSLZPDM	XUSLPDM Holder
XUSLZ228	Kit, XUSLB/D One Head Mounting
XUSLZ330	Kit, XUSLB/D T Slot-Mount Hardware, 2 heads
XUSLZ600	Kit, Flex Out Connector Cover (qty. 10)
XUSLAT1	Laser Alignment Tool
XUSLZD70280	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0280 mm protected height
XUSLZD70320	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0320 mm protected height
XUSLZD70360	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0360 mm protected height
XUSLZD70440	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0440 mm protected height
XUSLZD70520	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0520 mm protected height
XUSLZD70600	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0600 mm protected height
XUSLZD70680	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0680 mm protected height
XUSLZD70720	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0720 mm protected height
XUSLZD70760	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0760 mm protected height
XUSLZD70880	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0880 mm protected height
XUSLZD70920	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0920 mm protected height
XUSLZD70960	IP67 Mounting Kit, XUSLB/D, (qty. 2), 0960 mm protected height
XUSLZD71040	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1040 mm protected height

Table 41: Cables and Accessories (continued)

Catalog Number	Description
XUSLZD71120	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1120 mm protected height
XUSLZD71200	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1200 mm protected height
XUSLZD71360	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1360 mm protected height
XUSLZD71400	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1400 mm protected height
XUSLZD71520	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1520 mm protected height
XUSLZD71560	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1560 mm protected height
XUSLZD71640	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1640 mm protected height
XUSLZD71720	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1720 mm protected height
XUSLZD71800	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1800 mm protected height
XUSLZD71920	IP67 Mounting Kit, XUSLB/D, (qty. 2), 1920 mm protected height
XUSLZD72120	IP67 Mounting Kit, XUSLB/D, (qty. 2), 2120 mm protected height

Figure 49: PDM Module with Holder



SHOCK MOUNT KIT

This kit is used to isolate mirrors from sources of vibration. It can also be used to shock-mount the transmitters and receivers. Eight shock mounts are included.

Table 42: Shock Mount Kits

Part Number	Description
XSZSMK	XSZSMK and XSZSMK1 shock mounts secured with 10-32 studs
XSZSMK1	
XSZSMK2	XSZSMK2 shock mount secured with 1/4-20 studs

Figure 50: Shock Mount Kit

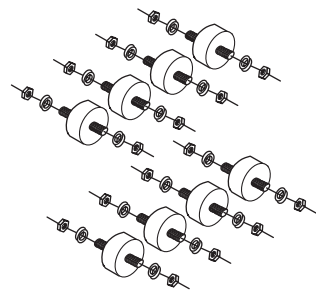


Figure 51: Shock Mount Kit Dimensions (mm/in)

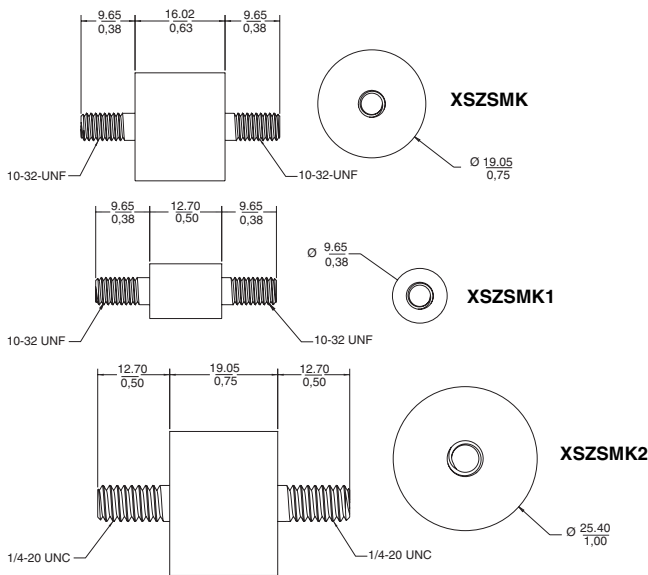


Table 43: Recommended Mounting Methods

Shock Mount Kit	Compression Mount					Shear Mount				
	Max. Load		Torque (K)		Natural Freq. (Hz)	Max. Load		Torque (K)		Natural Freq. (Hz)
	lb	kg	lb-in	N•m		lb	kg	lb-in	N•m	
XSZSMK	18.0	8.16	222.5	25.16	11.0	3.0	1.36	27.7	3.13	9.5
XSZSMK1	4.8	2.177	96.1	10.86	14.0	2.5	1.13	20.7	2.34	9.0
XSZSMK2	55.0	24.94	949.7	107.39	13.0	23.0	10.43	132.2	14.94	7.5

Table 44: Weight Classes

Product	Weight Class			
	1	2	3	4
XUSL•Q, Lengths 280–1040 mm		X		
XUSL•Q, Lengths 1120–1200 mm			X	
XUSL•Q, Lengths 1360 mm				X
XUSL•R/Y, Lengths 320–680 mm		X		
XUSL•R/Y, Lengths 760–1200 mm		X		
XUSL•R/Y, Lengths 1360–2120 mm			X	X
XUSZM, Length 102 mm	X			
XUSZM, Lengths 152–457 mm		X		
XUSZM, Lengths 508–711 mm			X	
XUSZM, Lengths 762–1016 mm				X
XUSZM, Lengths >1016 mm	Use of shock mount kits is not recommended			
XUSZA, Length 102 mm	X			
XUSZA, Length 152–1067 mm		X		
XUSZA, Length 1219–1626 mm			X	
XUSZA, Length 1829–2134 mm				X

The symbol “•” in these catalog numbers indicates part of the number that varies between B or DM.

Table 45: Shock Applications ¹

Mounting Method	Weight Class 1		Weight Class 2		Weight Class 3		Weight Class 4	
Shear Mounted	XSZSMK	Using two mounts per head	XSZSMK	Using two or four mounts per head	XSZSMK	Using four mounts per head	XSZSMK	Using four mounts per head
	XSZSMK1		XSZSMK1		XSZSMK1		XSZSMK1	
					XSZSMK2	Using two or four mounts per head	XSZSMK2	Using two or four mounts per head
Compression Mounted	Not Recommended				XSZSMK	Using two mounts per head	XSZSMK	Using two mounts per head
			XSZSMK1	Using two mounts per head	XSZSMK1	Using two or four mounts per head	XSZSMK1	Using four mounts per head

1. Shock applications are low frequency, high amplitude applications, such as punch presses, where strong shock can be present.

Table 46: Vibration Applications ²

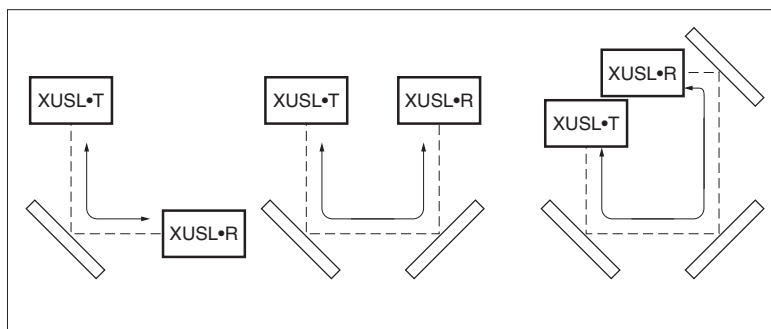
Mounting Method	Weight Class 1		Weight Class 2		Weight Class 3		Weight Class 4	
Shear Mounted	XSZSMK	Using two or four mounts per head	XSZSMK	Using two or four mounts per head	XSZSMK	Using two or four mounts per head	XSZSMK	Using four mounts per head
	XSZSMK1		XSZSMK1		XSZSMK1	Using four mounts per head	XSZSMK1	
			XSZSMK2	Using two mounts per head	XSZSMK2	Using two or four mounts per head	XSZSMK2	Using two or four mounts per head
Compression Mounted			XSZSMK	Using two mounts per head	XSZSMK	Using two or four mounts per head	XSZSMK	Using two mounts per head
	XSZSMK1	Using two mounts per head	XSZSMK1	Using two or four mounts per head	XSZSMK1	Using four mounts per head	XSZSMK1	Using four mounts per head

2. Vibration applications are high frequency, low amplitude applications, such as offset printing machines, where constant vibration can be present.

MIRRORS

Mirrors must be firmly mounted and protected against shocks. Observe safe mounting distances throughout the detection zone, including the distances to possible reflective surfaces (see “Reflective Surface Interference” on page 39).

Figure 52: Mirror Configurations



The total nominal range between the transmitter and the receiver will be reduced according to the number of mirrors.

Table 47: Recommended Maximum Range for Glass Mirrors: m (ft)

Number of Mirrors	XUSLB/XUSLDM Range			
	3 (9.84)	7 (21.34)	8 (26.25)	20 (60.96)
1	2.64 (8.66)	6.16 (18.78)	7.04 (23.50)	17.60 (53.64)
2	2.32 (7.61)	5.42 (16.52)	6.2 (20.30)	15.40 (46.94)
3	2.04 (6.69)	4.77 (14.54)	5.45 (17.90)	13.60 (41.45)
4	1.8 (5.91)	4.20 (12.80)	4.8 (15.75)	12 (36.58)

Table 48: Recommended Maximum Range for Stainless Steel Mirrors: m (ft)

Number of Mirrors	XUSLB/XUSLDM Range			
	3 (9.84)	7 (21.34)	8 (26.25)	20 (60.96)
1	2.46 (8.07)	5.74 (17.50)	6.60 (21.50)	16.40 (49.99)
2	2.02 (6.63)	4.71 (14.35)	5.4 (17.60)	13.40 (40.84)
3	1.65 (5.41)	3.86 (11.76)	4.90 (14.50)	11 (33.53)
4	1.36 (4.46)	3.16 (9.65)	3.6 (11.90)	9 (23.43)

Figure 53: Mirror Dimensions (See Table 49 for Dimensions A and B)

NOTE: Clamp assemblies are included in the mirror kit.

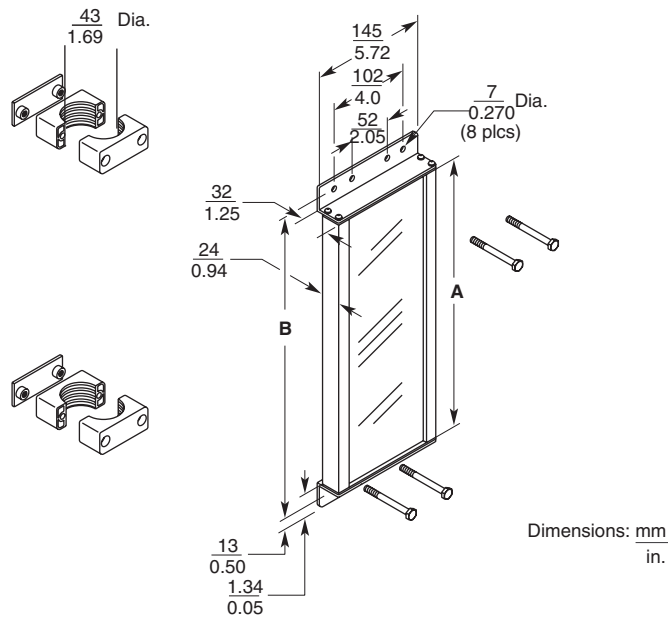


Table 49: Dimensions A and B

Part Number		A mm (in.)	B mm (in.)
Glass	Stainless Steel		
XUSZM0102	XUSZA0102	140 (5.5)	182 (7.18)
XUSZM0152	XUSZA0152	191 (7.5)	233 (9.18)
XUSZM0305	XUSZA0305	343 (13.5)	386 (15.18)
XUSZM0457	XUSZA0457	495 (19.5)	538 (21.18)
XUSZM0508	XUSZA0508	546 (21.5)	589 (23.18)
XUSZM0610	XUSZA0610	648 (25.5)	690 (27.18)
XUSZM0711	XUSZA0711	749 (29.5)	792 (31.18)
XUSZM0762	XUSZA0762	800 (31.5)	843 (33.18)
XUSZM0813	XUSZA0813	851 (33.5)	894 (35.18)
XUSZM0914	XUSZA0914	953 (37.5)	995 (39.18)
XUSZM1016	XUSZA1016	1054 (41.5)	1097 (43.18)
XUSZM1067	XUSZA1067	1105 (43.5)	1148 (45.18)
XUSZM1219	XUSZA1219	1257 (49.5)	1300 (51.18)
XUSZM1321	XUSZA1321	1359 (53.5)	1402 (55.18)
XUSZM1372	XUSZA1372	1410 (55.5)	1452 (57.18)
XUSZM1422	XUSZA1422	1461 (57.5)	1503 (59.18)
XUSZM1524	XUSZA1524	1562 (61.5)	1605 (63.18)
XUSZM1626	XUSZA1626	1664 (65.5)	1706 (67.18)
XUSZM1830	XUSZA1830	1867 (73.5)	1910 (75.18)
XUSZM2134	XUSZA2134	2172 (85.5)	2214 (87.18)

SECTION 9— APPENDIX

GLOSSARY

ANSI: American National Standards Institute. Administrator and coordinator of the US private sector standardization system.

Channel: One transmitter/receiver pair of beams.

Detection Zone: The zone within which a specified test piece will be detected by the XUSLB/XUSLDM system.

Exact Channel Select (Fixed) Blanking: A system with blocked beams in an exact stored pattern.

External Device Monitoring/Machine Primary Control Element Monitoring (EDM/MPCE): A means by which the light curtain monitors the state of external control devices.

Final Switching Device (FSD): The output of the safety light curtain that interrupts the machine primary control element (EDM/MPCE) as a response to the output safety switching device (OSSD) transitioning to the Off state.

Minimum Object Sensitivity (MOS): The diameter in millimeters of the minimum-sized object that will actuate the light curtain. Minimum object sensitivity is called “detection capability” on the light curtain nameplate.

Off State: The state in which the output circuit is interrupted (open) and does not permit current to flow.

On State: The state in which the output circuit is complete (closed) and permits the flow of current.

OSHA: Occupational Safety and Health Administration. A U.S. government agency.

Output Safety Switching Device (OSSD): The component of the safety light curtain connected to the machine control system which, when the light curtain detection zone is interrupted, responds by going to the Off state. Also known as a safety output.

Test Object: An opaque cylindrical object used to verify the detection capability of the XUSLB/XUSLDM system.

CHECKOUT PROCEDURE

Qualified personnel must perform the Checkout Procedure in Table 50 during the initial installation and at least once every three months thereafter or more frequently depending on machine usage and company guidelines.

Make a copy of the checkout procedure form, use the copy as the checkout log, and store it with the machine records. Use caution when working around hazardous voltages which may be present during this procedure.

Machine Identification: _____

Date: _____

Table 50: Checkout Procedure

Item	Condition	Comments
1. Verify that the guarded machine is compatible with the type of machine that may be used with the XUSLB/XUSLDM system. See Precautions on page 9 for further information.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
2. Verify that the mounting distance of the XUSLB/XUSLDM system is equal to or greater than the minimum safe distance from the danger zone. See Mounting the Light Curtain on page 46 for more information.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
3. Determine that all access to the danger zone not protected by an XUSLB/XUSLDM system is guarded by other means, such as gates, fencing, wire, or other approved methods. Verify that all additional guarding devices are installed and operating properly.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
4. Ensure that the operator is not able to stand between the XUSLB/XUSLDM system detection zone and the machine danger zone. Verify that the light curtain can only be reset from a position outside and within view of the hazardous machine area.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
5. Inspect the electrical connections between the guarded machine's control system and the XUSLB/XUSLDM system. Verify that they are properly connected to the machine such that a stop signal from the XUSLB/XUSLDM system results in an immediate halt of the machine's cycle.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
6. If the EDM/MPCE monitoring feature is not used, proceed to Step 7. To test the EDM/MPCE feature, verify that the feature has been enabled. Turn the machine power on. Cycle the machine. Place a temporary jumper wire between the EDM/MPCE connections. The XUSLB/XUSLDM system should enter an Alarm state. Remove the temporary jumper. Press and release the start button.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
7. Record the test results in the machine log. Then perform the Test Procedure beginning on page 113.	<input type="checkbox"/> Results recorded	

Comments _____

Technician Signature: _____

TEST PROCEDURE

Qualified personnel must perform the test procedure in Table 51 during initial XUSLB/XUSLDM system installation, according to the employer's regular inspection program, and after any maintenance, adjustment, or modification of the XUSLB/XUSLDM system or the guarded machine.

Testing confirms that the light curtain, safety system, and the machine control system work together to properly stop the machine. Failure to test properly could result in serious injury to personnel. To test the XUSLB/XUSLDM system, use the proper-size test object.

Table 51: Test Procedure

Item	Condition	Comments
1. Disable the machine to be guarded. Apply power to the XUSLB/XUSLDM system.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
2. Visually inspect the machine to ensure that access to the danger zone is only through the XUSLB/XUSLDM detecting zone. If not, additional guarding, including mechanical barriers, may be required. Verify that all additional guarding devices and barriers are installed and operating properly.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
3. Verify that the mounting distance of the XUSLB/XUSLDM system is equal to or greater than the calculated minimum safe distance from the danger zone. See Mounting the Light Curtain on page 46 for further information. Ensure that the operator is not able to stand between the XUSLB/XUSLDM detection zone and the danger zone.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
4. Check for signs of external damage to the XUSLB/XUSLDM system, the machine, and the electrical cables and wiring. If damage is found, lock the machine off and report the damage to the supervisor.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
5. Interrupt the XUSLB/XUSLDM system detection zone with the proper-size test object. Move the test object inside the perimeter (along the top, sides, and bottom) of the detection zone and up and down through the center. At least one individual beam indicator must be lit while the test object is anywhere in the detection zone. If in automatic start mode, verify that the red Machine Stop LED is lit. If in start/restart interlock mode, verify that the red Machine Stop and yellow interlock LEDs are lit. Press and release the Start button before proceeding to step 6.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
6. Start the machine. While the machine is in motion, interrupt the detection zone with the test object. The machine should stop immediately. Never insert the test object into the dangerous parts of the machine. With the machine at rest, interrupt the detection zone with the test object. Verify that the machine will not start with the test object in the detection zone.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
7. Verify that the braking system is working properly. If the machine does not stop fast enough, adjust the braking system or increase the distance from the detection zone to the danger zone.	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
8. If the safety devices or the machine fail any of these tests, do not run the machine. Immediately tag or lock out the machine to prevent its use, and notify the supervisor.		

Comments _____

Schneider Electric

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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