XUS-LT

Safety light curtain type 4
Barrière immatérielle de sécurité type 4
Unfallschutz-Lichtvorhang Type 4
Barrera inmaterial de seguridad tipo 4
Barriera immateriale di sicurezza tipo 4
Barreira imaterial de segurança tipo 4

User's manual
Manuel d'instructions
Bedienungsanleitung
Instrucciones de servicio
Istruzioni d'uso
Manual do utilizador

English
Français
Deutsch
Español
Italiano
Português

a brand of Schneider Electric

Telemecanique

XUS-LT

Safety light curtain type 4

English

User’s manual

a brand of Schneider Electric

Telemecanique

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.

CONTENTS

English

English

English

English

SECTION 1: QUICK START INSTRUCTIONS

This section has been prepared to help you get your XUS-LT Safety Light Curtain into service quickly. It is not intended as a substitute for the User's Manual and does not cover installation of accessories such as Lexan protection, shock mount kits, or mirrors. Please consult the appropriate sections of this manual for complete information when installing, wiring, and programming the light curtain and accessories.

The steps covered in Section 1 are:

1. Configuring the DIP Switches
2. Mounting and Wiring the Light Curtain
3. Start Up
4. Checking the LEDs and Aligning the Transmitter and Receiver
5. Programming ECS/Blanking (Optional)
6. Troubleshooting

Parts List

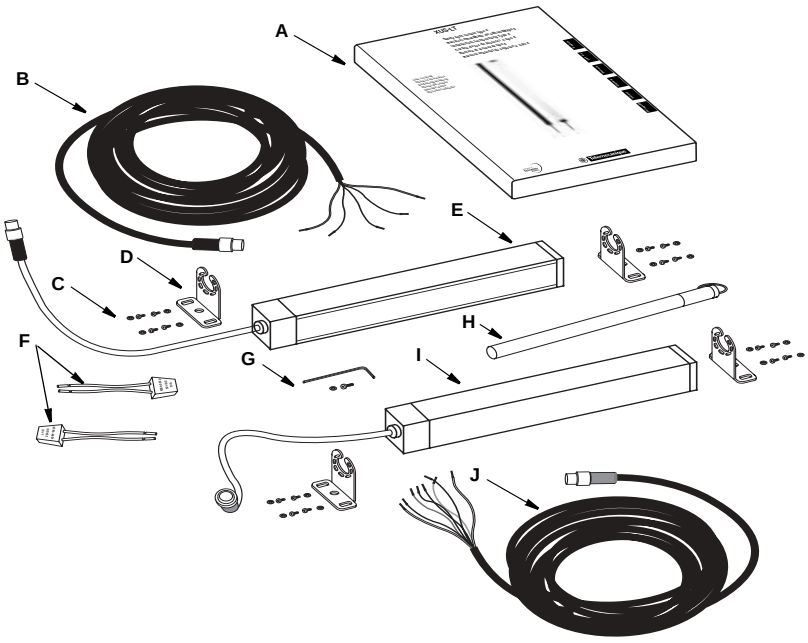


Figure 1: XUS-LT Parts

A. User's Manual
B. Transmitter Cable XSZTCT (ordered separately)
C. Mounting Bracket Hardware (4 sets)
D. Mounting Brackets (4)
E. Transmitter
F. Arc Suppressors (2)
G. Programming Button Security Screw Tool and Extra Security Screw
H. Testing Object
I. Receiver
J. Receiver Cable XSZTCR (ordered separately)

English

Step 1: Configuring the DIP Switches

⚠ DANGER

HAZARDOUS VOLTAGE

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

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

The DIP switches are factory set for Automatic start, EDM/MPCE[1] not active, and Exact Channel Select/Blanking not active (see the tables on page 11). If these settings are suited to your application, proceed to “Step 2: Mounting and Wiring the Light Curtain” on page 12.

You must remove the receiver end cap to access the DIP switches. Configure the DIP switches before attaching the mounting brackets to the receiver; otherwise you will not be able to remove the end cap.

To access the DIP switches:

1. Loosen four screws (**C**) and remove the receiver end cap (**B**).
2. The DIP switches are on the inside of the end cap. Refer to the illustration and tables on page 11 for information on setting the operating mode, the EDM/MPCE options, and the detection options. Refer to Sections 6–8, beginning on page 24, for complete information on modes and options.
3. After configuring the DIP switches, replace the end cap. Ensure that the 32-pin connector (**A**) connects securely to the end of the receiver before tightening the end cap screws.

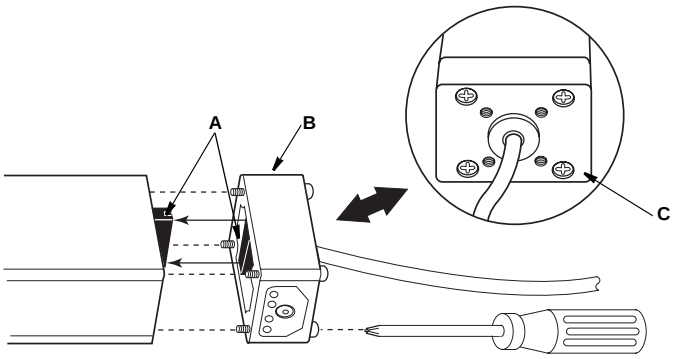


Figure 2: End Cap Removal

1. External Device Monitoring/Machine Primary Control Element

NOTE:
Settings other than those described in the tables below will result in an alarm condition.

Any mismatch between the settings of Switch Bank A and Switch Bank B will also result in an alarm condition.

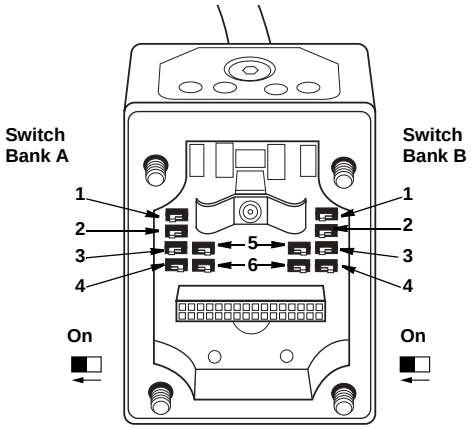


Figure 3: DIP Switches (Default Settings Shown)

Operating Modes:	Switch Bank A		Switch Bank B	
	1	2	1	2
Automatic Start[1]	On	On	On	On
Start Interlock	Off	On	Off	On
Start/Restart Interlock	Off	Off	Off	Off

1 Default Setting

EDM/MPCE States:	Switch Bank A	Switch Bank B
	3	3
Active	Off	Off
Not Active[1]	On	On

1 Default Setting

Detection Options:	Switch Bank A			Switch Bank B		
	4	5	6	4	5	6
Exact Channel Select/Blanking (ECS/B) Active	On			On		
Exact Channel Select/Blanking (ECS/B) Inactive[1]	Off			Off		
One-Channel Floating Blanking (FB) Active		On	Off		On	Off
Two-Channel Floating Blanking (FB) Active		Off	On		Off	On
Floating Blanking (FB) Inactive[1]		Off	Off		Off	Off

1 Default Setting

English

Step 2: Mounting and Wiring the Light Curtain

⚠ DANGER

HAZARDOUS VOLTAGE

Turn off all power before working on this equipment.

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

To mount the light curtain:

1. Install the mounting brackets (**A**) on both ends of the receiver (**B**) and transmitter (**C**) with the mounting screws and washers (**F**) provided.
2. Connect the cables to the receiver and the transmitter. The receiver cable ends (**D**) have red 8-pin connectors, and the transmitter cable ends (**E**) have black 5-pin connectors.
3. Install the receiver and the transmitter on the machine in the same plane and at equal height. Refer to page 18 for alignment considerations. **Refer to "Section 10: Safe Mounting Distance" beginning on page 35 and to "Section 11: Installation" beginning on page 41 for complete installation instructions.**
4. Wire the light curtain as illustrated on page 13 (wiring with final switching devices) or page 14 (wiring with an XPS safety relay module). Refer to "Section 12: Connecting to the Machine Control Circuit" beginning on page 47 for complete wiring information.

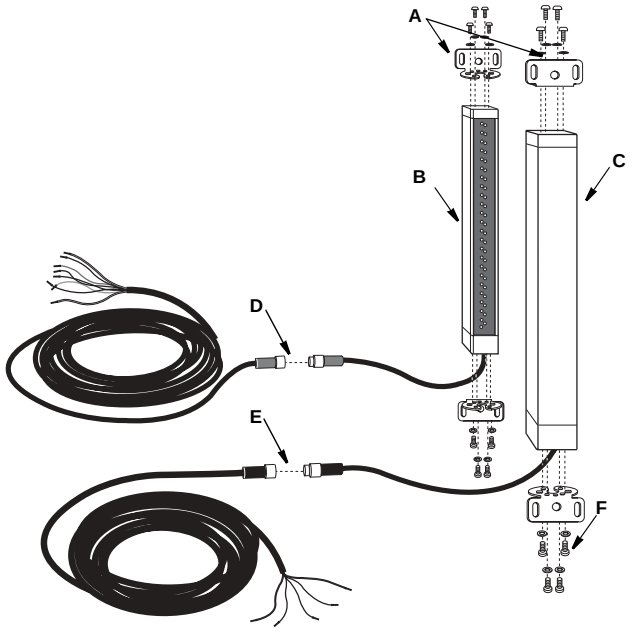
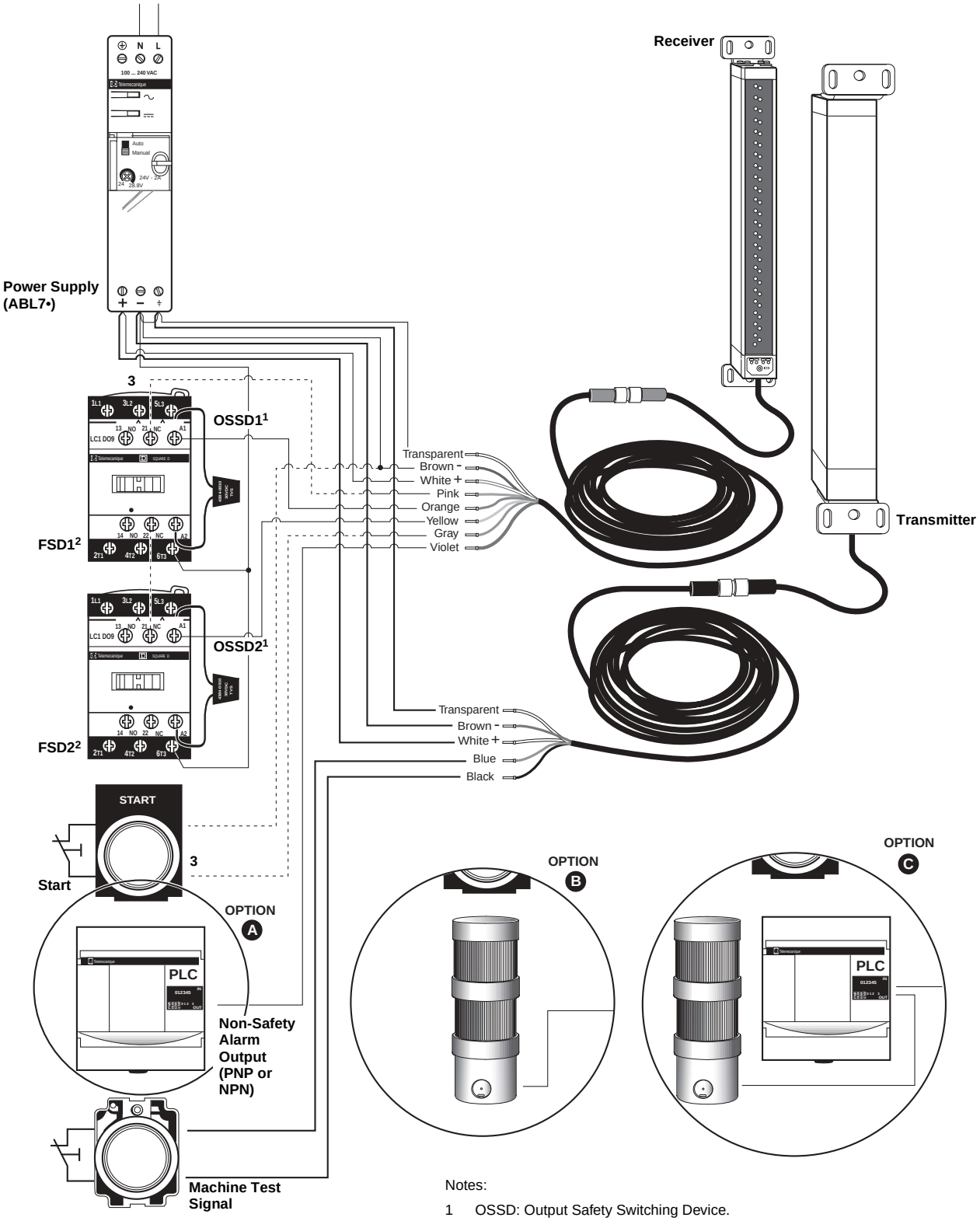


Figure 4: Mounting the Light Curtain

English

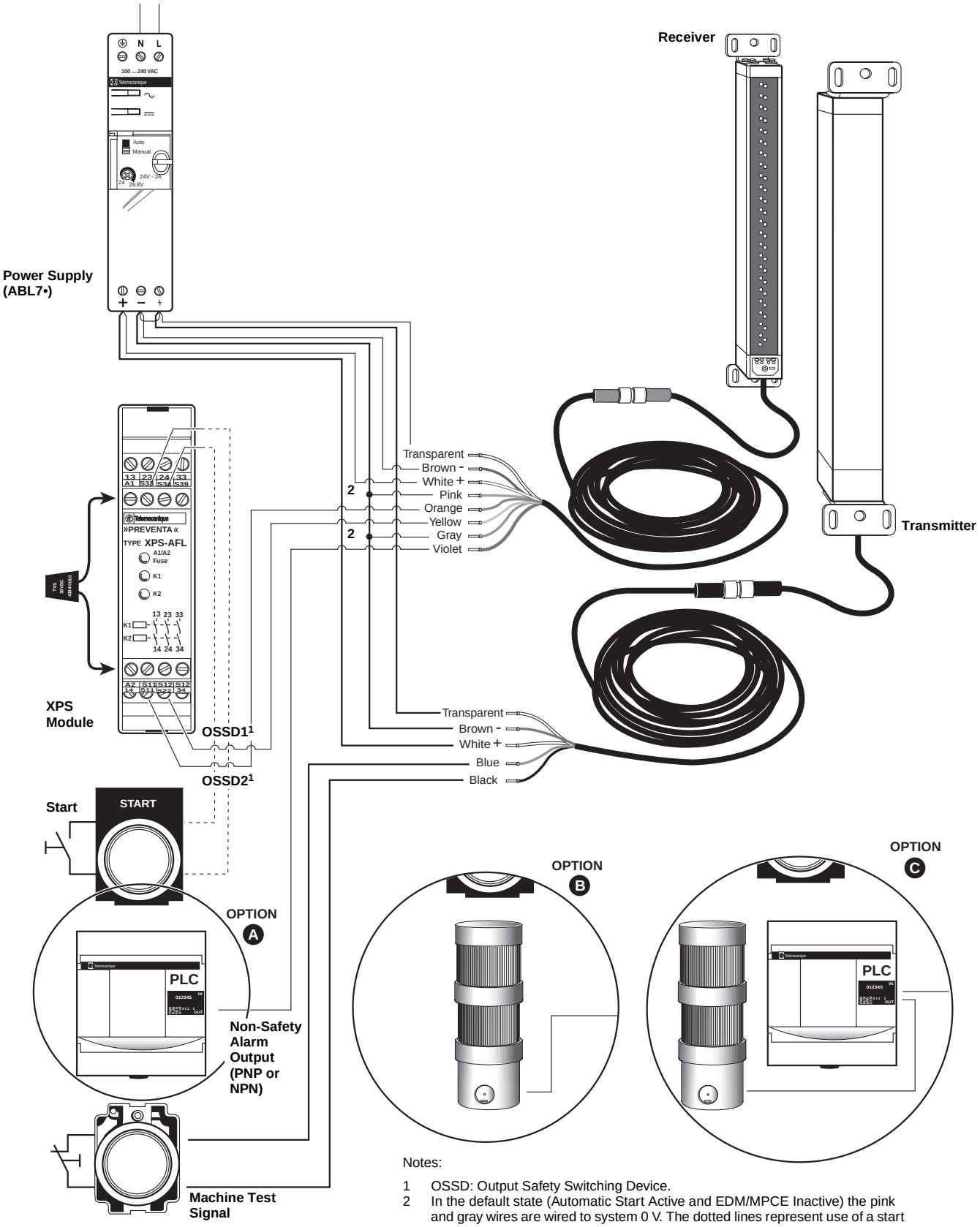


Notes:

1 OSSD: Output Safety Switching Device.
2 FSD: Final Switching Device.
3 In the default state (Automatic Start Active and EDM/MPCE Inactive) the pink and gray wires are wired to system 0 V. The dotted lines represent use of a start button and EDM/MPCE active.

Figure 5: Wiring with Final Switching Devices

English



Notes:

1 OSSD: Output Safety Switching Device.
2 In the default state (Automatic Start Active and EDM/MPCE Inactive) the pink and gray wires are wired to system 0 V. The dotted lines represent use of a start button.

Figure 6: Wiring with XPS Safety Relay Module

Step 3: Start Up

1. Apply power to the system.
2. Check the LEDs as described in “Step 4: Checking the LEDs and Aligning the Transmitter and Receiver” below.
3. Adjust the alignment of the transmitter and the receiver using the beam indicators. See “Step 4: Checking the LEDs and Aligning the Transmitter and Receiver” and “Step 6: Troubleshooting” on page 18.

Step 4: Checking the LEDs and Aligning the Transmitter and Receiver

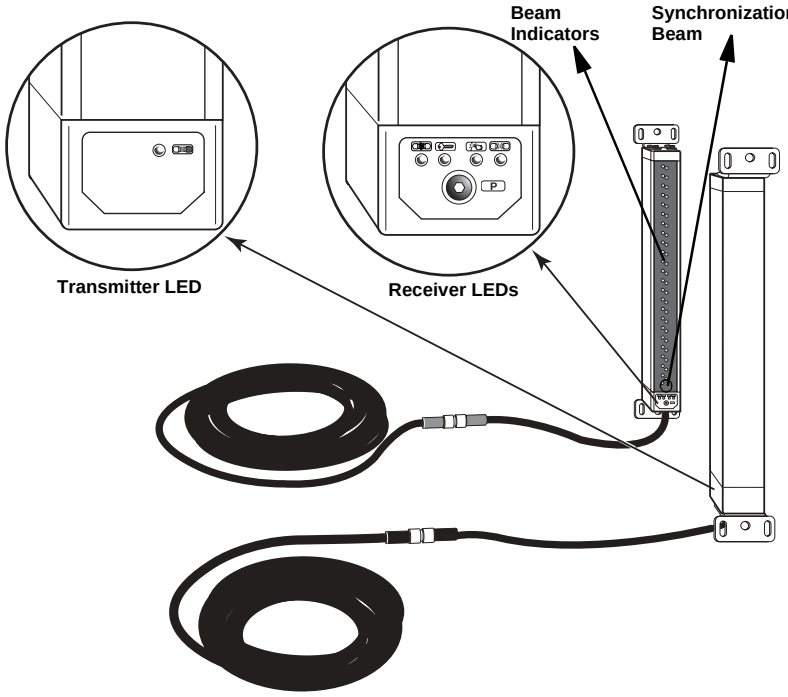


Figure 7: LEDs and Beam Indicators

Table 1: 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, and 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 Blanking
FB: Floating blanking

Table 2: Alignment of Transmitter and Receiver

Beam Indicators	Synchronization Beam
When the whole bank of indicators is illuminated, the transmitter and receiver are not in alignment. When individual indicators are illuminated, the associated safety beams are blocked.	This beam supplies an optical synchronization signal between the transmitter and receiver. When this beam is blocked, the system enters the machine stop state and illuminates the beam indicators.

English

The following table lists normal system states at power up and the associated LED indications. If you do not achieve the LED designations listed in the table, refer to the Troubleshooting section beginning on page 18.

Table 3: LED Indications at Power Up

These LED Patterns:		With These Detection Options:		Indicate These System States:
Transmitter LED Illuminated	**Receiver LEDs Illuminated**	**ECS/Blanking Active[1]**	**Floating Blanking Active**	
Yellow	Red	NO	NO	Transmitter and receiver are not in alignment.
Yellow	Green	NO	NO	Transmitter and receiver are in alignment.
Yellow	Amber and Green	YES	NO	Transmitter and receiver are in alignment with the programmed obstruction.
Yellow	Amber and Green	NO	YES	Transmitter and receiver are in alignment.
Yellow	Amber and Green	YES	YES	Transmitter and receiver are in alignment with the programmed obstruction.
Yellow	Amber and Red	YES	NO	Transmitter and receiver are in alignment with the programmed obstruction removed.
Yellow	Amber and Red	YES	YES	Transmitter and receiver are in alignment with the programmed obstruction removed.

1 Refer to page 11 for programming ECS/Blanking.

Step 5: Programming ECS/Blanking (Optional)

Refer to “Section 6: System Operation” on page 24 for complete information on ECS/Blanking. To program an ECS/Blanking pattern:

1. Ensure that the DIP switches are configured for ECS/Blanking. See page 11.
2. Ensure that the XUS-LT system is in the machine stop state. The red LED on the receiver will be illuminated.
3. Access the programming button (**P**) by removing the security screw (**A**) with the tool provided (**B**).
4. Block the appropriate area of the detection zone. For self learning, press then release the programming button (**P**).
5. Replace the programming button security screw (**A**).
6. After programming the ECS/Blanking pattern, the Amber, Red, and Yellow LEDs on the receiver will illuminate.
7. To enter machine run mode, press and release the Start button, or cycle the power. The Amber and Green LEDs on the receiver will illuminate, indicating that the system is in the run mode.
8. Check that the blanked beams are illuminated when the object is withdrawn.

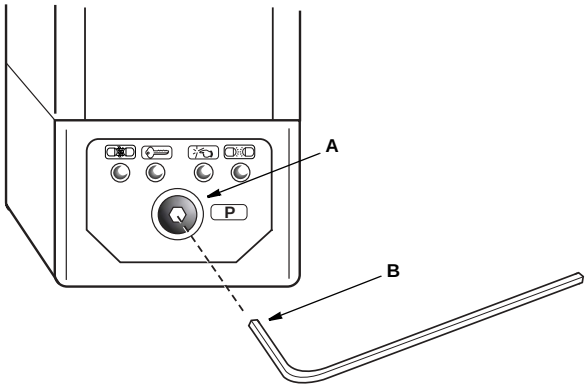


Figure 8: Accessing the Programming Button

English

English

Step 6: Troubleshooting

Receiver Yellow LED Is Blinking:

1. Check the configuration for EDM/MPCE monitoring.
   - — If EDM/MPCE is not active, ensure that the pink wire from the receiver is connected to the system ground.
   - — If EDM/MPCE is active, ensure that the pink wire from the receiver is connected to the N.C. contacts of the guarded machine's output safety switching devices (OSSDs) or to the monitor terminal of the safety module.
2. Ensure that the DIP switches in the receiver end cap are set properly and that the settings of Switch Bank A and Switch B match.
3. Verify that the power supply is 24 Vdc ±20%, 2 A (conforming to IEC 60204-1).
4. Verify that the orange and yellow wires from the receiver are properly connected to the guarded machine's OSSDs or to the safety module.
5. Verify that the OSSDs or the safety module are within the operating limits of the light curtain safety outputs (two PNP outputs, 500 mA at 24 Vdc).

Alignment Considerations

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 ECS\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 that the synchronization beam (see Figure 9) is not obstructed.

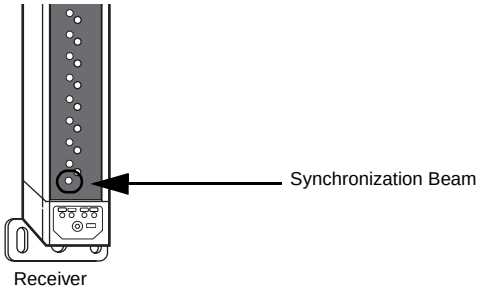


Figure 9: Synchronization Beam

Transmitter Yellow Status LED Is Off or Blinking:

If the Yellow status LED is off:

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

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

SECTION 2: IMPORTANT SAFETY WARNINGS

⚠WARNING

IMPROPER SETUP OR INSTALLATION.

Read all responsibilities and requirements listed below before installing the XUS-LT system.

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

An XUS-LT system is a general purpose presence sensing device designed to guard personnel working around moving machinery.

Meeting Full Compliance

Whether a specific machine application and XUS-LT system installation complies with safety regulations depends on the proper application, installation, maintenance, and operation of the XUS-LT system. These are the responsibility of the user, purchaser, installer, and employer. This product is designed to comply with:

- IEC 61496
- UL Type 4 requirements
- EN60954-1
- ANSI B11.19
- The relevant Essential Health and Safety Requirements (EHSRs) of the European Machinery Directive (98/37/EC)
- The relevant requirements of the Low Voltage Directive (73/23/EEC as amended by 93/68/EEC)
- The Essential Protection Requirements of the Electro Magnetic Compatibility (EMC) Directive (89/336/EEC, 92/31/EEC, and 93/68/EEC)

Employer Responsibilities

The employer is responsible for selecting and training the personnel necessary to properly install, operate, and maintain the machine and its safeguarding systems. The XUS-LT system must 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)

Additional Requirements

To use an XUS-LT 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.
- Severe smoke, particulate matter, and corrosives may degrade the efficiency of a safety light curtain. Do not use the XUS-LT system 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 a failure.
- Additional guarding may be required for access to dangerous areas not covered by the XUS-LT system.

- Perform the test procedures on page 66 at installation and after maintenance, adjustment, repair, or modification to the machine controls, tooling, dies or machine, or to the XUS-LT system.
- Perform only the test and repair procedures outlined in this manual.
- Follow all procedures in this manual for proper operation of the XUS-LT 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 B11.19).
- Electro-sensitive protective equipment (ESPE) must not be used as a lock-out device to meet Occupational Safety & Hazard Administration (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 his machinery.

SECTION 3: CATALOG NUMBERS

Refer to the following table for a key to interpreting XUS-LT Safety Light Curtain catalog numbers. This table is intended as an aid for interpreting product catalog numbers. It is not to be used for creating catalog numbers which may not exist. Transmitter and receiver cable lengths are sold separately.

Operation	Photoelectric	**XU**								
Light Curtain	Safety		**SL**							
Body Style		50.8 x 35 mm (2 x 1.37 in.) Frame size	**T**							
Sensing Distance				0.3 to 7.5 m (0.98 to 24.6 ft.)	**Q**					
				0.3 to 9 m (0.98 to 29.5 ft.)	**R**					
				0.3 to 20 m (0.98 to 65.7 ft.)	**Y**					
Resolution						Finger protection	**6**			
						Hand protection	**5**			
Non-safety Alarm Output								PNP alarm output	**A**	
								NPN alarm output	**B**	
								Transmitter only	**E**	
Protection Height (mm)									**XUSLT•6•**	**0260**
										0350
										0435
										0520
										0610
										0700
										0785
										0870
										0955
										1045
										1130
										1215
										1305
										1390
									XUSLT•5•	**0350**
										0520
										0700
										0870
										1045
										1215
										1390
										1570
										1745
										1920
										2095
								Transmitter only		**T**
								Receiver only		**R**

English

SECTION 4: STANDARD FEATURES

- External Device Monitoring (EDM/MPCE Monitoring)
- Automatic Start Mode
- Start Interlock Mode
- Start/Restart Interlock Mode
- Adjustable Mounting Brackets
- Floating Blanking
- Exact Channel Select\Blanking
- Two Safety (PNP) Outputs
- Non-safety Alarm Output
- All intelligence is in the transmitter and receiver. No separate control box required.
- Machine Test Signal (MTS)
- Non-safety Alarm Output Configuration Option (PNP or NPN)

SECTION 5: SYSTEM COMPONENTS AND INDICATORS

Refer to Figure 10 on page 23 for the location of the components and indicators listed in Table 4.

Table 4: System Components Identification

Item No.	Description		Item No.	Description	
1	RECEIVER		10	Inside Receiver End Cap	
2	Blocked beam indicator (one for each beam)			A	Switch Bank A
3	Removable End Cap, access to configuration switches			B	Switch Bank B
4	Program Button (must remove security screw)			K	Connector
5	ECS\Blanking or Floating Blanking Indicator – Amber LED		11	TRANSMITTER	
6	Interlock or Alarm Indicator – Yellow LED		12	Status Indicator – Yellow LED	
7	Machine Stop Indicator – Red LED		14	Synchronization Beam	
8	Machine Run Indicator – Green LED		15	Detection Zone	
9	Receiver Connections		16	Transmitter Connections (with Machine Test Signal)	
	I	Start – Grey Wire		L	Drain – Uninsulated Wire
	J	OSSD2 – Yellow Wire		M	+24 V ⎓ – White Wire
	C	OSSD1 – Orange Wire		N	0 V ⎓ – Brown Wire
	D	0 V ⎓ – Brown Wire		O	MTS – Blue Wire
	E	Drain – Uninsulated Wire		P	MTS Return – Black Wire
	F	+24 V ⎓ – White Wire			Orange wire unused
	G	Non-safety Alarm Output – Violet Wire			
	H	EDM/MPCE – Pink Wire			
		Red wire unused			

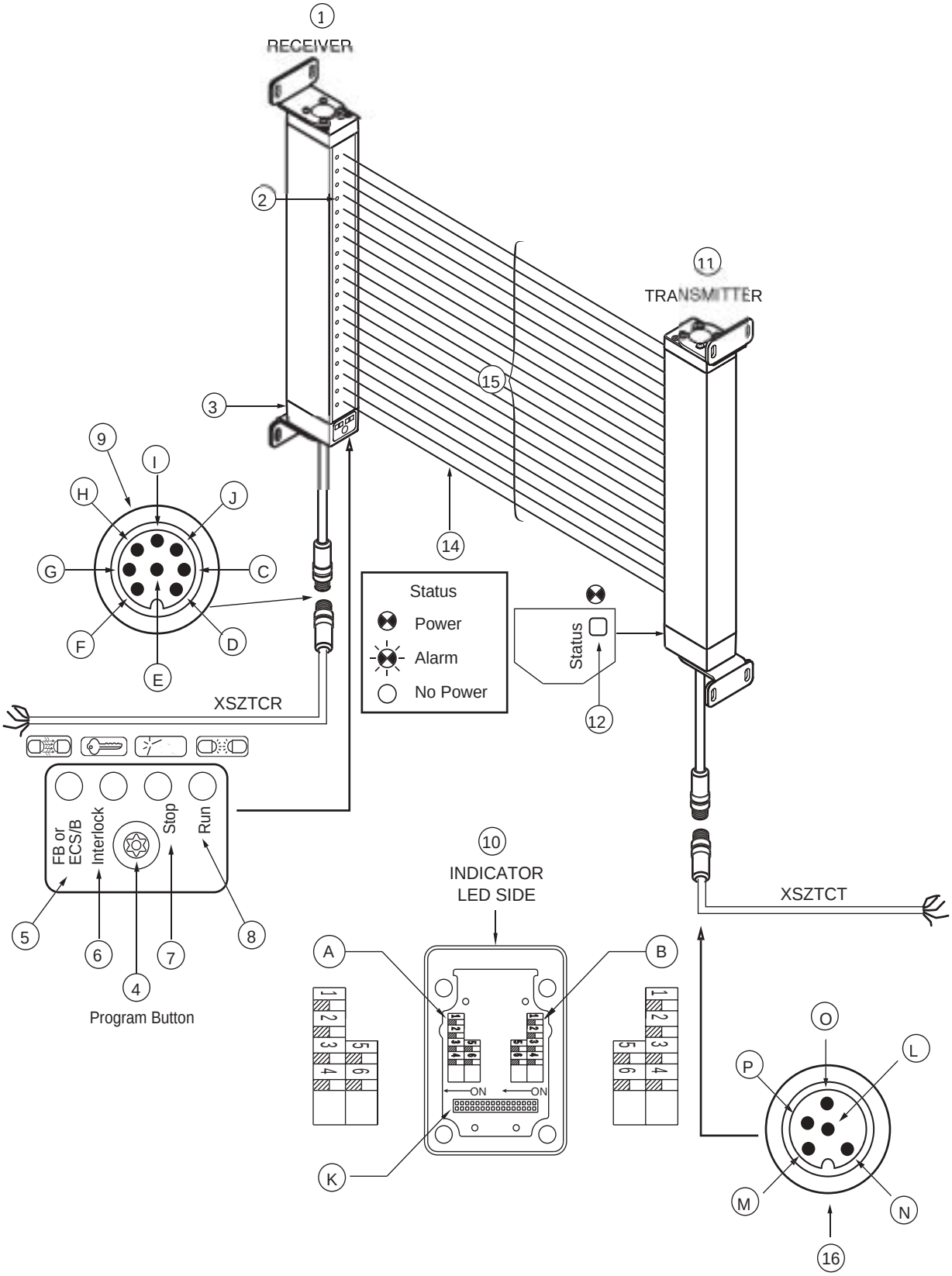


Figure 10: System Drawing

SECTION 6: SYSTEM OPERATION

An XUS-LT system is a microprocessor-controlled, infrared transmitted-beam safety light curtain. The system consists of a receiver assembly and a transmitter assembly. The receiver and transmitter assemblies are not physically interconnected.

An XUS-LT system is often used where personnel protection is required. Typical applications include mechanical power presses, robotic work cells, filter presses, injection molders, food processing equipment, and automated assembly equipment.

Operating States

The operating condition of an XUS-LT system is described in terms of states. The following operating states exist for the XUS-LT system.

Machine Run 
(ON State)

The two receiver safety outputs are in the ON state, the green LED machine run indicator is lit, and the non-safety alarm output is in a state consistent with its configuration. See “Non-Safety Alarm Output” on page 34. The protected machine is allowed to operate. Pressing and releasing the Start button has no effect.

Machine Stop 
(OFF State)

The two receiver safety outputs are in the OFF state, the red LED machine stop indicator is lit, and the non-safety alarm output is in a state consistent with its configuration. See “Non-Safety Alarm Output” on page 34. The protected machine is not allowed to operate.

Interlock 

The two receiver safety outputs are in the OFF state, the red LED machine stop indicator and yellow LED interlock indicator are lit. The non-safety alarm output is in a state consistent with its configuration. See “Non-Safety Alarm Output” on page 34. The interlock state does not allow the protected machine to operate until the detection zone is clear of obstructions and the Start button is pressed and released.

Alarm

The two receiver safety outputs are in the OFF state, the red LED machine stop indicator is lit, the yellow LED interlock indicator is flashing, and the non-safety alarm output is in the ON state. The alarm state does not allow the protected machine to operate. The primary difference between alarm and interlock is that the XUS-LT system will remain in the alarm state until the alarm is corrected, regardless of power cycling or a Start button press and release.

Operating Modes

System operating modes determine the start-up and operating behavior of an XUS-LT system. Operating mode definitions rely on the operating states presented above. Operating mode selection is performed via configuration switches in the removable cap on the bottom of the receiver.

NOTE: If internal alarms are detected by the XUS-LT system during power-up or operation, it will enter the alarm state with its safety outputs in the OFF state.

Automatic Start

An XUS-LT system will power-up with its safety and non-safety alarm outputs OFF, and, if the detection zone is not obstructed, enter the machine run state. In this state, when an object is sensed entering the detection zone, the XUS-LT system will change from machine run to machine stop and remain in this state until the obstruction is removed. Once the detection zone is clear, the XUS-LT system will automatically change from machine stop to machine run.

Start Interlock

The XUS-LT system will power-up with its safety outputs OFF, and, if no alarms are detected, enter the interlock state. To enter the machine run state, the detection zone must be clear [or an Exact Channel Select\Blanking pattern satisfied], and then the operator must press and release the Start button. In the machine run state, when an object is sensed entering the detection zone, the XUS-LT system will change from machine run to machine stop. Once the detection zone is clear, the XUS-LT system will automatically change from machine stop to machine run.

Start / Restart Interlock

An XUS-LT system will power-up with its safety outputs OFF, and, if no alarms are detected, enter the interlock state. To enter the machine run state, the detection zone must be clear (or an Exact Channel Select\Blanking pattern satisfied), and then the operator must press and release the Start button. In the machine run state, when an object is sensed entering the detection zone, the XUS-LT system will change from machine run to interlock. The XUS-LT system will remain in the interlock state even after the obstruction is removed from the detection zone. 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 XUS-LT system will remain in the interlock state.

NOTE: See “Section 12: Connecting to the Machine Control Circuit” on page 47 for Start button wiring.

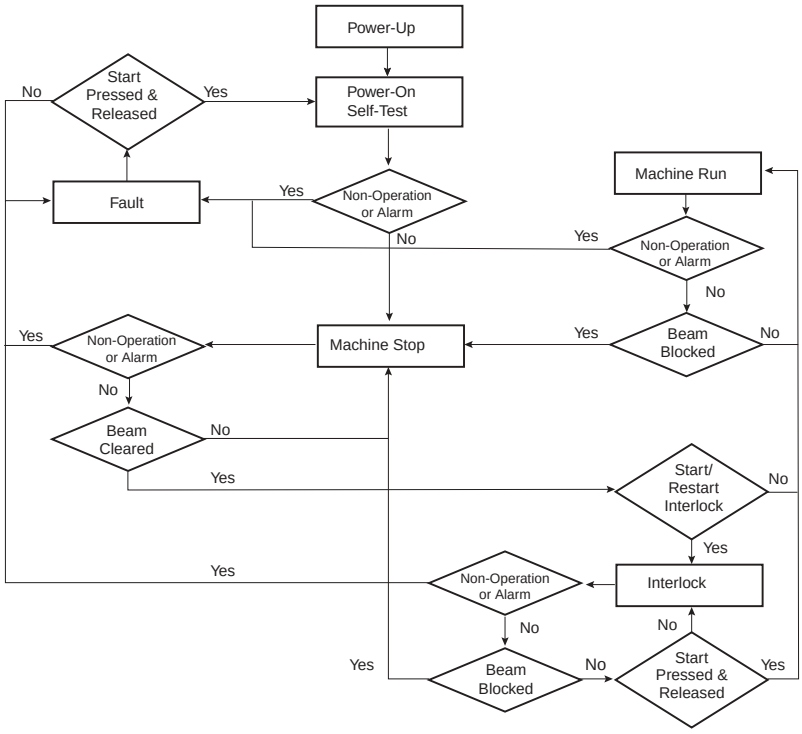


Figure 11: Functional Flow Diagram

English

Operating Mode Selection

The operating mode is selected by setting positions 1 and 2 of Switch Banks A and B, located inside the receiver end cap. Refer to Table 5. **Any mismatch between the settings of Switch Banks A and B will result in an alarm condition.** To access the switch banks, remove the four captive screws which secure the largest receiver end cap. Set these switches before mounting the receiver. See item 3 in Figure 10 on page 23.

⚠DANGER

HAZARDOUS VOLTAGE

- Disconnect power before removing the end cap.
- Replace the endcap before re-applying power.

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

Table 5: Operating Mode Switch Settings

	SWITCH BANK A		SWITCH BANK B	
OPERATING MODE	**1**	**2**	**1**	**2**
Automatic Start (default setting)	ON	ON	ON	ON
Start Interlock	OFF	ON	OFF	ON
Start/Restart Interlock	OFF	OFF	OFF	OFF
Not Allowed	ON	OFF	ON	OFF

SECTION 7: DETECTION OPTIONS

Using Exact Channel Select\Blanking with Floating Blanking is an advanced feature. All situations which may occur to the XUS-LT system detection zone must be carefully considered. Read this section carefully.

⚠WARNING

LACK OF SENSITIVITY

- Exact Channel Select\Blanking and/or Floating Blanking create unprotected passages in the detection zone and make the XUS-LT safety light curtain less sensitive to objects in the detection zone. Improper use of either feature can result in severe hazard to personnel. Read “Section 7: Detection Options” carefully.
- To prevent unauthorized modification of the detection zone, the system controller should be installed 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 on page 66 to verify the correct configuration.
- After programming or activating Channel Select or Floating Blanking, to avoid unexpected areas where the system may not sense an intrusion into the detection zone, use the test object supplied with the light curtain to perform the Test Procedure.

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

Initial Switch Settings

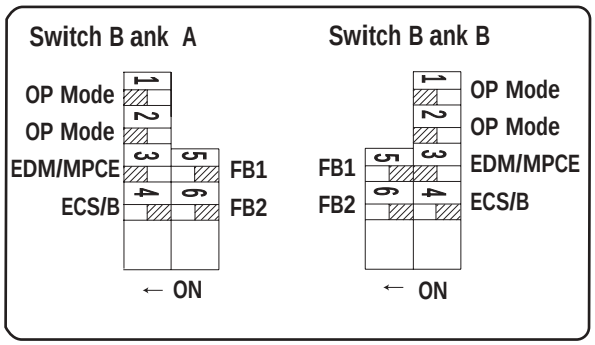


Figure 12: Initial Setting of the DIP Switches

The initial switch settings are:

- Automatic start
- EDM/MPCE not active
- ECS/Blanking not active
- FB/Floating blanking not active

Exact Channel Select (ECS\Blanking)

ECS\Blanking disables selected, fixed areas of the detection zone by masking off specific, fixed beam locations. ECS\Blanking is helpful when stationary objects such as tooling and fixtures permanently obstruct a portion of the detection zone.

ECS\Blanking requires that any portion of the detection zone which is blocked remain blocked. If the obstruction is removed, the XUS-LT system will enter a machine stop state. The synchronization beam (the beam nearest to the cable) cannot be selected. Also, one additional beam must remain unblocked. A channel is defined as one transmitter/receiver pair or beam.

See Table 6 on page 28 for a diagram of XUS-LT system response during operation with ECS\Blanking active.

English

English

Table 6: System Response to ECS\Blanking

Exact Channel Select Status	Inactive	Inactive	Active	Active	Active
Channel 1	○	○	○	⊗	○
Channel 2	○	○	⊗	⊗	⊗
Channel 3	○	⊗	⊗	⊗	△
Channel 4	○	○	⊗	⊗	⊗
Channel 5...	○	○	○	○	○
Safety Output Status	run	stop	run	stop	stop

Floating Blanking

Up to two channels can be disabled at any location in the detection zone (except for the synchronization beam) without the XUS-LT system going to the machine stop state. The disabled channels are not fixed at a single location but “float” through the detection zone. See Table 7 for a diagram of XUS-LT system response during operation with Floating Blanking active.

Table 7: System Response to Floating Blanking

Number of Channels 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
Channel 1	○	○	○	○	○	○	○	○	○	○	○	⊗
Channel 2	○	○	○	⊗	⊗	○	○	⊗	⊗	⊗	⊗	○
Channel 3	⊗	○	⊗	⊗	○	○	⊗	⊗	○	⊗	○	⊗
Channel 4	○	○	○	○	⊗	○	○	○	⊗	⊗	⊗	○
Channel 5...	○	○	○	○	○	○	○	○	○	○	⊗	⊗
Channel 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 8: Icon Key for Tables 6 and 7

Symbol	Description
○	Optical channel is not blocked.
⊗	Optical channel is blocked.
△	Optical channel is selected by ECS\Blanking.
⊗	Optical channel is selected by ECS\Blanking and is blocked.

Using ECS\Blanking with Floating Blanking

⚠WARNING

LACK OF SENSITIVITY

- Using ECS\Blanking with Floating Blanking is an advanced feature. All situations which may occur to the XUS-LT system detection zone must be carefully considered.
- Improper use of ECS\Blanking and/or Floating Blanking will make the XUS-LT system less sensitive to objects in the detection zone.
- ECS\Blanking may require a hard barrier guard (see “Additional Guarding” on page 43).
- The XUS-LT system may be less sensitive to objects in the detection zone. ECS\Blanking or Floating Blanking may require an increase in the safety distance.
- Read the following section carefully.

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

When both ECS\Blanking and Floating Blanking are selected, the floating channels are allowed to occur anywhere within the detection zone (except for the beam nearest the cable), even within the area selected by ECS\Blanking. In these areas, a channel that should normally be blocked is allowed to be clear.

The Effect of ECS\Blanking and Floating Blanking on Minimum Object Resolution

When ECS\Blanking and/or Floating Blanking is active, the safety distance is affected. ECS\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 XUS-LT system increases, the minimum safe distance must increase. Use the minimum object sensitivity given in Tables 9 and 10 to determine the new figure to use when computing the safety distance.

English

Table 9: Sample S and D_{pf} Factors for XUSLTQ6 (14 mm finger detection) System

Total Number of Beams Disabled by ECS\Blanking and/or Floating Blanking	Minimum Object Resolution S	Depth Penetration Factor, D_{pf} for use with ANSI Formula D_{pf} = 3.4 (S–0.276) in.[1]
None	14 mm (0.55 in.)	0.94 in. (24 mm)
1 Beam	25 mm (0.98 in.)	2.40 in. (61 mm)
2 Beams	36 mm (1.41 in.)	3.89 in. (99 mm)
3 Beams	47 mm (1.85 in.)	5.35 in. (136 mm)
4 Beams	58 mm (2.28 in.)	6.81 in. (173 mm)
5 Beams	69 mm (2.71 in.)	8.30 in. (211 mm)
Etc ...		

1 The ANSI formula for the depth penetration factor, Dpf, is for the USA only.

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

14 mm + 11 mm = 25 mm (0.98 in.)

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

14 mm + 11 mm + 11 mm = 36 mm (1.41 in.)

Table 10: Sample S and D_{pf} Factors for XUSLT•5 (30 mm hand detection) System

Total Number of Beams Disabled by ECS\Blanking and/or Floating Blanking	Minimum Object Resolution S	Depth Penetration Factor, D_{pf} for use with ANSI Formula D_{pf} = 3.4 (S–0.276) in.[1]
None	30 mm (1.18 in.)	3.07 in. (78.0 mm)
1 Beam	52 mm (2.05 in.)	6.03 in. (153.2 mm)
2 Beams	74 mm (2.91 in.)	8.96 in. (227.6 mm)
3 Beams	96 mm (3.78 in.)	11.91 in. (302.5 mm)
4 Beams	118 mm (4.65 in.)	14.87 in. (377.7 mm)
5 Beams	140 mm (5.51 in.)	17.80 in. (452.0 mm)
Etc ...		

1 The ANSI formula for the depth penetration factor, Dpf, is for the USA only.

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

30 mm + 22 mm = 52 mm (2.05 in.)

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

30 mm + 22 mm + 22 mm = 74 mm (2.91 in.)

Activating and Programming ECS\Blanking

ECS\Blanking is activated by setting position 4 of Switch Banks A and B, located inside the receiver end cap. Refer to Table 11. **Any mismatch between the settings of Switch Banks A and B will result in an alarm condition.** To access the switch banks, remove the four captive screws which secure the largest receiver end cap. Set these switches before mounting the receiver.

⚠ DANGER

HAZARDOUS VOLTAGE

- Disconnect power before removing end cap.
- Replace end cap before re-applying power.

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

To program an ECS\Blanking pattern, the XUS-LT system must be in the machine stop state. An ECS\Blanking pattern is stored by blocking the appropriate area of the detection zone and pressing, then releasing, the Program button (see Table 4 on page 22 for its location).

The XUS-LT system will then enter the interlock or machine stop condition, regardless of the operating mode. The Start button may be pressed and released or power may be cycled to enter the machine run state. Subsequent power cycles will result in operation in accordance with the configured operating mode.

A new ECS\Blanking pattern is recorded when the system is in the machine stop state with no alarms, the configuration switches are correctly set, and the Program button is pressed and released. If the configuration switches are subsequently set to disable ECS\Blanking, the stored ECS\Blanking pattern is cleared.

NOTE: The Program button is accessed by removing a tamper-resistant screw. A wrench which matches this screw is provided in the receiver hardware package. This wrench should be kept under supervisor control.

CAUTION

LOSS OF ENVIRONMENTAL INTEGRITY

The tamper-resistant screw must be replaced to maintain the environmental integrity of the XUS-LT system.

Failure to follow this instruction can result in equipment damage.

Table 11: Detection Option Switch Settings

	SWITCH BANK A			SWITCH BANK B		
OPERATING MODE	**4**	**5**	**6**	**4**	**5**	**6**
Exact Channel Select\Blanking Active	ON			ON		
Exact Channel Select\Blanking Inactive (default setting)	OFF			OFF		
One-Channel Floating Blanking Active		ON	OFF		ON	OFF
Two-Channel Floating Blanking Active		OFF	ON		OFF	ON
Floating Blanking Inactive (default setting)		OFF	OFF		OFF	OFF
Not Allowed – Alarm Condition		ON	ON		ON	ON

English

Activating Floating Blanking

Floating Blanking (either one- or two-beam) is activated by setting positions 5 and 6 of Switch Banks A and B located inside the receiver end cap. Refer to Table 11. **Any mismatch between the settings of Switch Banks A and B will result in an alarm condition.** To access the switch banks, remove the four captive screws which secure the largest receiver end cap. Set these switches before mounting the receiver.

NOTE: When ECS\Blanking or Floating Blanking is active, the amber FB or ECS/B Indicator will illuminate to indicate that the XUS-LT system is operating in a less sensitive state.

Additional Guarding When Using ECS\Blanking or Floating Blanking

Both ECS\Blanking and Floating Blanking create “holes” in the detection zone. These “holes” are required for certain applications. If an obstruction does not completely fill these “holes” one of two actions will need to happen:

1. The safe mounting distance will need to be increased to account for the larger opening in the curtain.
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 13 for an example.

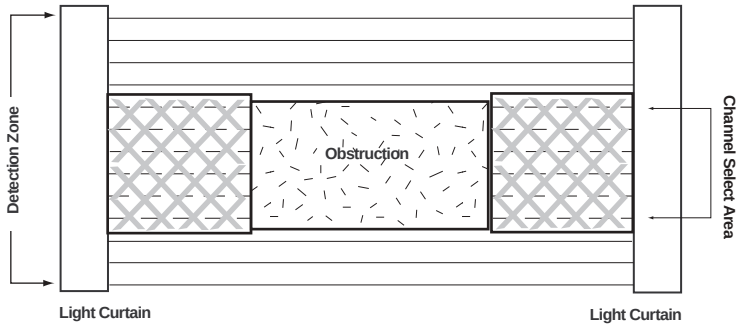


Figure 13: Adding Hard Guarding to Light Curtain When Using Exact Channel Select\Blanking

SECTION 8: DIAGNOSTIC AND TEST FEATURES

Synchronization Beam

Synchronization between the XUS-LT system transmitter and receiver is optical. The beam closest to the cable connector supplies this signal. When this beam is blocked, the system will enter a machine stop state. When the beam is cleared, the system will resynchronize itself and enter a state consistent with its operating mode.

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

EDM/MPCE monitoring is an important safety function. It monitors the XUS-LT system interface to the guarded machine and checks to ensure that the control elements are responding correctly to the light curtain and to detect any inconsistency between the two machine MPCEs/EDMs. This is necessary to detect a malfunction within the interface which prevents a stop signal from reaching the machine controller.

Connections for EDM/MPCE monitoring are made at the receiver. On power-up, the XUS-LT system looks for an EDM/MPCE closed condition. If this is found, it will enter a state consistent with the selected operating mode. When the XUS-LT system enables its safety outputs, it monitors the EDM/MPCE for a closed-to-open transition. This transition must occur within 300 ms or the XUS-LT system considers the EDM/MPCE alarmed. The XUS-LT system will then enter an alarm state. Additionally, if the EDM/MPCE connectors are incorrectly wired, the XUS-LT system will enter an alarm state.

NOTE: For proper operation of the XUS-LT system when EDM/MPCE is not active, the EDM/MPCE input must be wired to the XUS-LT system ground.

Activating and Deactivating EDM/MPCE Monitoring

EDM/MPCE monitoring is activated by setting position 3 of Switch Banks A and B located inside the receiver end cap. Refer to Table 12. **Any mismatch between the settings of Switch Banks A and B will result in an alarm condition.** To access the switch banks, remove the four captive screws which secure the largest receiver end cap. Set these switches before mounting the receiver.

⚠ DANGER

HAZARDOUS VOLTAGE

- Disconnect power before removing end cap.
- Replace end cap before re-applying power.

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

Table 12: EDM/MPCE Switch Settings

	SWITCH BANK A	SWITCH BANK B
EDM/MPCE MONITORING ACTIVE OR NOT ACTIVE	**3**	**3**
Active	OFF	OFF
Not Active (default setting)	ON	ON

English

Blocked Beam Indicators

The XUS-LT system has a visible, red blocked beam indicator adjacent to each infrared beam on the receiver. The blocked beam indicator lights when the infrared beam fails to meet the conditions necessary for the XUS-LT system to remain in the machine run state. When the synchronization beam is broken, all the blocked beam indicators will light.

Blocked beam indicators are not safety critical components. A beam indicator failure will not cause an alarm condition and the XUS-LT system will continue to operate.

Machine Test Signal (MTS)

Some applications require that 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. The MTS feature on the transmitter provides this capability.

MTS is provided by placing a normally-closed switch across the MTS and MTS return lines of the transmitter. When the transmitter recognizes a close-to-open transition on this switch, a beam block state will be simulated on the transmitter and the receiver will enter the machine stop state. MTS is active as long as the switch is held open. The external MTS switch must be closed during power-up or, if MTS is not used, the input must be grounded.

SECTION 9: OUTPUTS

Safety Outputs

⚠WARNING

IMPROPER GROUNDING

- This product is designed for use on a 24 V ⎓, negative ground (protective earth) electrical system only.
- Never connect the XUS-LT light curtain 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, resulting in severe operator injury.

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

The XUS-LT 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 500 milliamps of current at 24 V ⎓. In the machine stop state, the outputs are not electrically conducting.

Non-Safety Alarm Output

This is not a safety output. The XUS-LT system supplies one non-safety alarm output.

NPN, Alarm

In the on state this NPN output will sink up to 100 mA at 24 V ⎓. This configuration will be on only when the XUS-LT system is in the alarm state. If the system is in any other state the non-safety alarm output will be off. The letter **B** will appear in the model number.

PNP, Alarm

In the on state this PNP output will source up to 100 mA at 24 V ⎓. This configuration will be on only when the XUS-LT system is in the alarm state. If the system is in any other state the non-safety alarm output will be off. The letter **A** will appear in the model number.

SECTION 10: SAFE MOUNTING DISTANCE

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

⚠WARNING

IMPROPER SETUP

Never install an XUS-LT system without regard to the safety distance. If the XUS-LT system is mounted too close to the point of operation hazard, the machine may not stop in time to prevent an operator injury.

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

The XUS-LT system must be mounted far enough from the machine danger zone so that the machine will stop before a hand or other body part reaches the hazardous area. This distance is called the safety distance. It is a calculated number based on a formula. See Figure 14 for an illustration of the safety distance.

Regardless of the calculated distance, an XUS-LT system should never be mounted closer to point of operation hazard than specified. This is required by Table 0-10 in OSHA 1910.217.

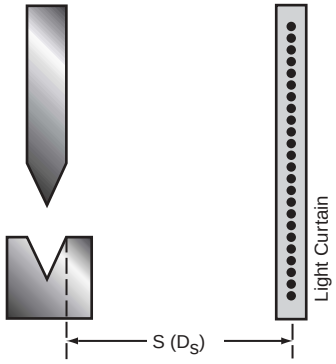


Figure 14: Safe Mounting Distance

English

European Safe Distance Formula

The minimum safe distance between the light curtain and the danger zone is based on European standard EN 999. This section discusses **perpendicular approach** to the danger zone, illustrated in Figure 15.

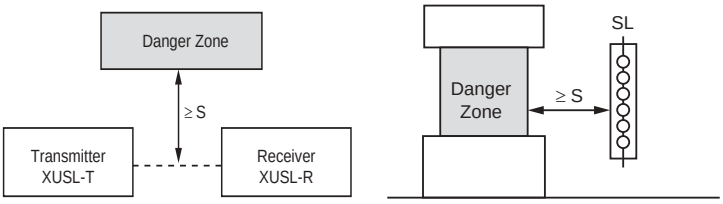


Figure 15: Perpendicular Approach to Danger Zone

For perpendicular approach to the danger zone, use the following guidelines for calculating minimum safe distance. If there is a C type standard for the machine that is to be protected, use the distance specified by this standard. (C type standards call for additional distance in minimum safe distance calculations based on the detection capability of the safety device.) Otherwise, use the following general formula defined by European standard EN 999 for calculating the safe distance:

$$S = K (t_1 + t_2) + C$$

Where:

S = (mm) the minimum safe distance between the danger zone and the axis of the light curtain.

t_1 = (s) the response time of the light curtain (in seconds). The time t_1 is given on the nameplate of the apparatus.

t_2 = (s) the time needed to stop the dangerous movements of the machine (in seconds).

K = (mm/s) the theoretical speed of approach of the body or body part.

C = (mm) additional safety distance = 8(d – 14 mm)

d = detection capacity

d (mm)	C (mm)
14	0
30	128

Using the general formula and parameters “K” and “C” that correspond to the light curtain, calculate the minimum safe distance “S”.

- If “S” is calculated at 500 mm (19.68 in.), this value should be retained. ***Note: S must be at least 100 mm (3.94 in.).***
- If “S” is calculated as a value greater than 500 mm (19.68 in.), recalculate “S” with the following alternate formula:

$$\textbf{For mm: } S = 1600 (t_1 + t_2) + C$$

$$\textbf{For in.: } S = 63 (t_1 + t_2) + C$$

Table 13: Calculation Examples

Minimum Distance	First Calculation	Second Calculation S > 500 mm (19.7 in.)
S = 100 mm S = 3.94 in.	For mm: $S = 2000 (t_1 + t_2) + C$ For in.: $S = 79 (t_1 + t_2) + C$	For mm: $S = 1600 (t_1 + t_2) + C$ For in.: $S = 63 (t_1 + t_2) + C$

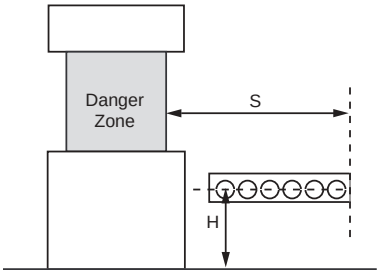
⚠WARNING

IMPROPER SET UP

If the distance “S” calculated 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.

When the direction of approach is **parallel** to the detection area, the minimum safe distance “S” between the dangerous zone and the beam furthest away from the dangerous zone depends on the height “H” at which the light curtain is installed. This safety distance “S” must be calculated using the formulas shown in Figure 16.



For mm: $S \geq 1600 (t_1 + t_2) + 850$
For in.: $S \geq 63 (t_1 + t_2) + 33.5$

if 875 mm < H ≤ 1000 mm
if 34.45 in. < H ≤ 39.37 in.

or

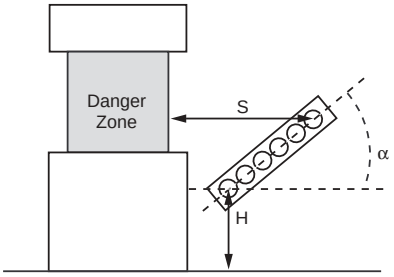
For mm: $S \geq 1600 (t_1 + t_2) + (1200 - 0.4 H)$
For in.: $S \geq 63 (t_1 + t_2) + (47.2 - 0.4 H)$

if 0 mm < H ≤ 875 mm
if 0 in. < H ≤ 34.45 mm

The maximum height allowed “H” is 1000 mm (39.37 in.). Once the height “H” is above 300 mm (11.81 in.) additional protective devices must be used.

Figure 16: Parallel Approach to Danger Zone

When the operator’s direction of approach and the detection area form an **angle**, α, as illustrated in Figure 17, the formulas used to calculate the safe distance “S” depends on this angle.



- When the angle, α, is greater than 30°, the formulas given for the perpendicular direction of approach to the detection area must be used.
- When the angle, α, is less than or equal to 30°, the formulas given for the parallel direction of approach to the detection area must be used.

Figure 17: Angular Approach to the Danger Zone

English

US Safe Distance Formulas: ANSI B11.1

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

The ANSI B11.1 formula applies specifically to mechanical power presses, but it is typically used on other applications as well.

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

D_s = Minimum safe distance between the light curtain sensing area to the nearest point of operation potential hazard.

K = Hand speed constant of 63 inches per second. This is the standard minimum accepted value for both ANSI and OSHA. ANSI recognizes that this constant may not be optimal, and that the user should consider all factors before deciding on the value of the K factor to use in the formula.

T_s = Stop time of the machine (press), as measured from the final control element. It is measured at the maximum velocity of the press, usually at 90° of press rotation on the downstroke.

T_c = Response time of the control circuit to activate the braking system.

Note: Ts and Tc are usually measured as one value by a stop time measurement device.

T_r = The response time of the XUS-LT control, in seconds. This response time is less than 40 ms for all models.

T_{bm}= Additional time allowed for the brake monitor to compensate for wear and variations in the stopping time. Brake monitors will stop the machine (press) when the stop time of the machinery exceeds a pre-set limit.

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

⚠WARNING

IMPROPER SET UP

When using an XPS Preventa module (XPS AFL) with the XUS-LT control, add 20 ms to the response time.

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

D_{pf} Penetration depth factor, to provide for the possibility that fingers or hands will penetrate through the sensing field before detection occurs. This value is determined by the Penetration Depth Factor Chart from ANSI B11.1 (see Figure 18 below). Alternately, the following ANSI formula can be used: $D_{pf} = 3.4 (S–0.276)$, where S = minimum object sensitivity.

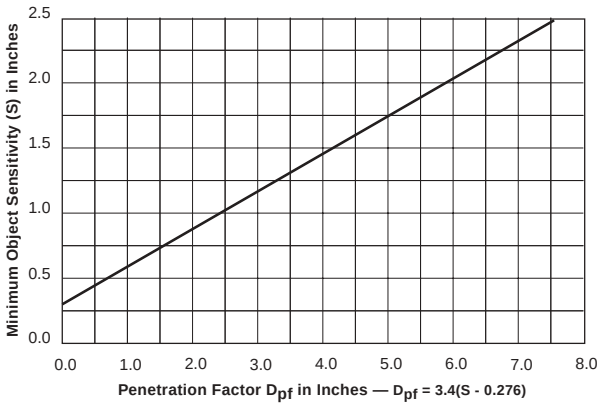


Figure 18: Penetration Depth Factor

English

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

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

D_s = 63 in. per second x T_s

Where:

D_s = Minimum safety distance (inches)

63 in. per second = hand speed constant

T_s = Stopping time of the press measured at approximately 90° position of the crankshaft rotation (seconds). Stop time of the machine (press), as measured from the final control element. It is measured to determine worst case time and maximum velocity of the press. Usually at 90° of press rotation on the downstroke.

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

Table 14: OSHA 1910.217 Table O-10

Distance of Opening from Point of Operation Hazard (inches)	Maximum Width of Opening (inches)
1/2 to1-1/2	1/4
1-1/2 to 2-1/2	3/8
2-1/2 to 3-1/2	1/2
3-1/2 to 5-1/2	5/8
5-1/2 to 6-1/2	3/4
6-1/2 to 7-1/2	7/8
7-1/2 to 12-1/2	1-1/4
12-1/2 to 15-1/2	1-1/2
15-1/2 to 17-1/2	1-7/8
17-1/2 to 31-1/2	2-1/8

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.

D_{pf} Penetration depth factor, to provide for possible penetration through the sensing field by fingers or hands before detection occurs. This value is determined by the Penetration Depth Factor Chart from ANSI B11.1 (see Figure 18 on page 39). Alternately, the following ANSI formula can be used: $D_{pf} = 3.4 (S-0.276)$, where S = minimum object sensitivity.

SECTION 11: INSTALLATION

⚠DANGER

HAZARDOUS VOLTAGE

Turn off all power before working on this equipment.

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

⚠WARNING

IMPROPER SETUP OR APPLICATION

- Read this information completely before starting the installation procedure.
- An XUS-LT system should only be installed, checked, and maintained by a qualified person as defined in “Employer Responsibilities” on page 19.
- It is important that the user be familiar with the installation requirements, safe mounting distance, controls, and features before using the XUS-LT system.

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

English

Reflective Surface Interference

A reflective surface adjacent to the detection zone can deflect the optical beam and may cause an obstruction in the zone not to be detected. The reflective surface may be part of the machine, mechanical guard, or workpiece. Therefore, a minimum distance (d) must exist between the reflective object and the center line of the XUS-LT detection zone. The Test Procedure on page 66 must be used to test for this condition.

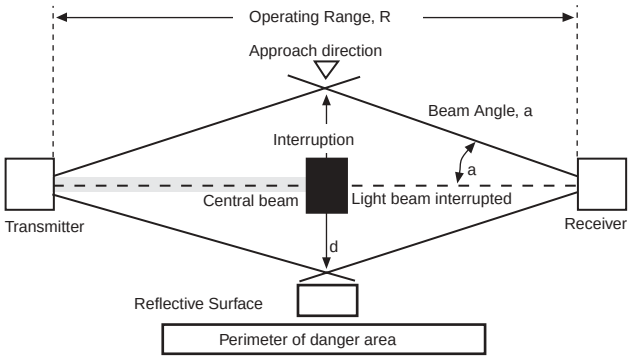


Figure 19: Correct Mounting Example with Proper Alignment

In Figure 19, the interruption is clearly detected. The reflective object is outside of the beam angle.

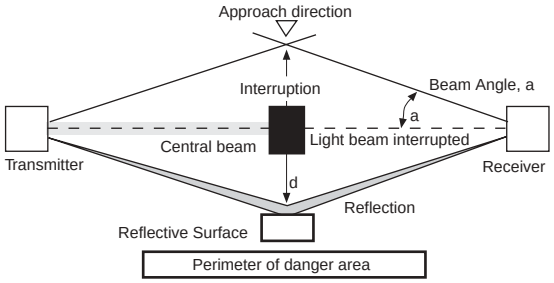


Figure 20: Unsafe Mounting Example

In Figure 20, the interruption is not detected because of the reflection. The reflective object is inside the beam angle.

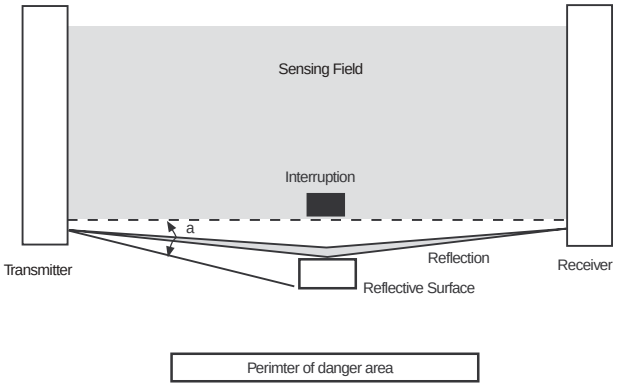


Figure 21: Unsafe Mounting Example

In Figure 21, interruption is not detected because of the reflection. Reflective surface interference may also appear above and below the sensing field.

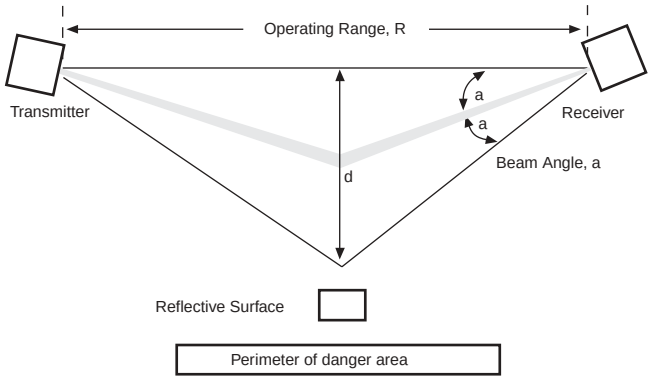


Figure 22: Worst Case Alignment Example

The example in Figure 22 shows the minimum distance from the reflective surface, d, to one side of the beam center line.

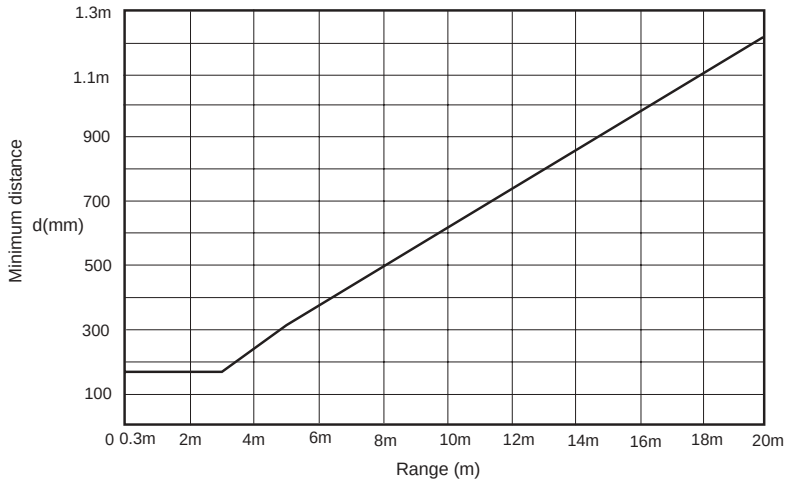


Figure 23: Minimum Distance From a Reflective Surface as a Function of Range

General Considerations

Additional Guarding

Areas of access to the point of hazardous operation not guarded by the XUS-LT system must be protected by suitable means such as a fixed barrier guard, an interlocked guard, or a safety mat. See Figure 24.

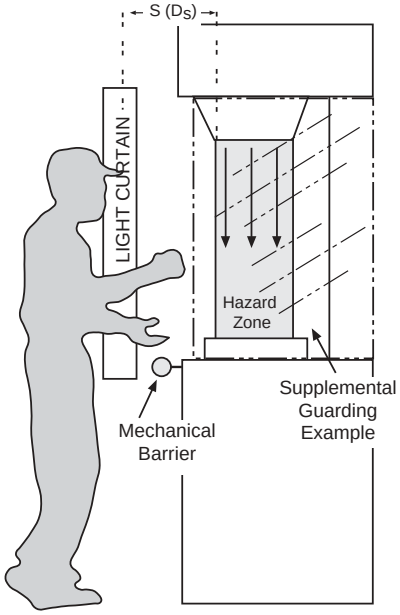


Figure 24: Correct Light Curtain Installation Example

English

Installation of Multiple Systems

When two or more XUS-LT systems are mounted in close proximity and in alignment with each other, precautions should be taken to avoid one curtain interfering with another. This can be corrected by mounting the transmitters and receivers back-to-back or stacked. See Figure 25.

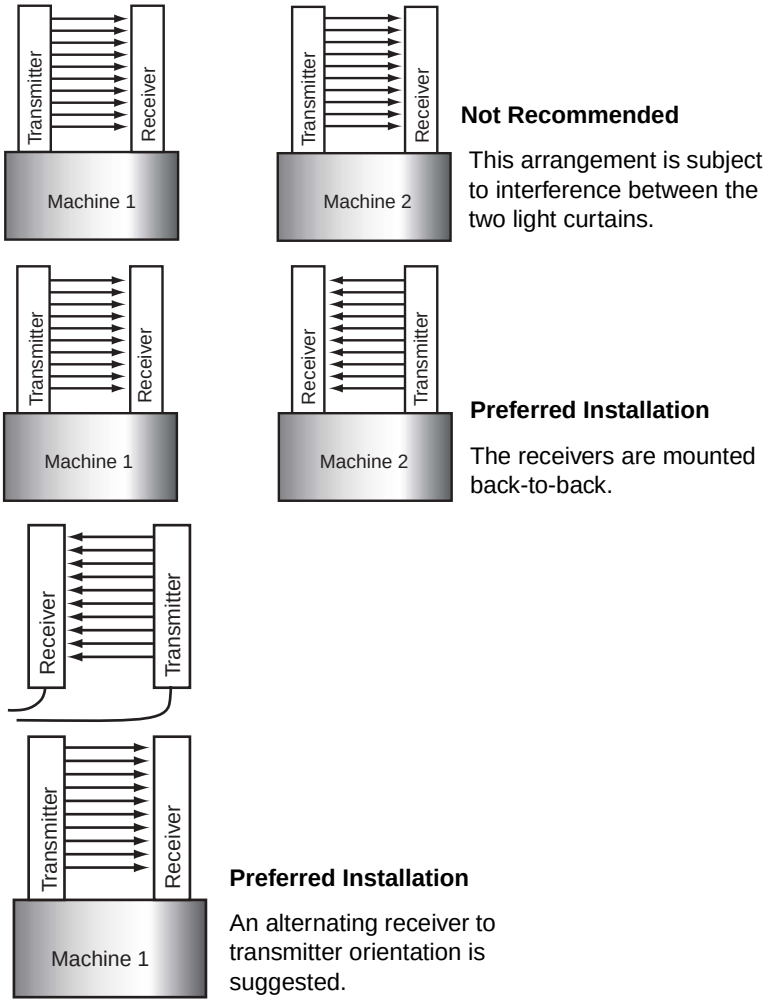


Figure 25: Multiple Light Curtain Installation Configurations

Access to Configuration Switches

Switches to configure the XUS-LT system operating features are located inside the end cap of the receiver and ECS\Blanking is programmed via a push button accessed from the front of this end cap. If it will be necessary to change the configuration or ECS\Blanking program during operation, access to this cap must be maintained. When reinstalling end caps, tighten the four slotted end cap screws in a diagonal pattern to a torque of 0.8 to 1 Nm (7 to 9 lb-in).

⚠ DANGER

HAZARDOUS VOLTAGE

Disconnect power before removing the end cap.

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

Detection Zone

The XUS-LT system detection zone is delineated by the inside edge of the transmitter and receiver endcaps. The area outside these marks is not protected. Position the XUS-LT system so that it is only possible to access the danger point through the detection zone.

Alignment

Physical alignment of the transmitter and receiver units is easiest when the XUS-LT system is in the automatic start operating mode with ECS\Blanking inactive. The units should be in the same plane and at equal height.

The transmitter and the receiver are aligned when all beam indicators are off. To ensure that the alignment position is stable, verify that a small deviation of the receiver (or the transmitter) around the alignment position does not cause any beam indicator to come on.

Cable Assemblies

Receiver cable connections are color coded red and transmitter cable connections are black. Details of the pin-out connections for the Telemecanique-supplied connector are provided in Table 4 on page 22.

Input Power Requirements/Connections

The XUS-LT system operates directly from 24 V ⎓ ±20%. Power to the XUS-LT system must come from a dedicated power supply which meets the requirements of IEC 60204-1 and IEC 61496-1. **The XUS-LT system internally generates voltages for its own use. No other devices should be connected to these voltages.**

Special Requirements for Perimeter Guarding

In perimeter guarding applications the XUS-LT system detection zone is placed around the outside perimeter of a guarded machine or robot. This placement leaves space for personnel to stand between the detection zone and the hazardous machine.

In this case, the guarded machine must only be restarted using a switch located outside and with a full view of the area of hazardous motion. Operation of the XUS-LT system in the start/restart interlock operating mode is suitable for perimeter guarding.

Marking Minimum Object Resolution

Serial number labels on the transmitter and receiver indicate three possible minimum object resolutions. During installation, use a permanent marker to obscure the object resolutions not set. This will depend on whether no floating blanking, 1-beam or 2-beam floating blanking is set. See “The Effect of ECS\Blanking and Floating Blanking on Minimum Object Resolution” on page 29 for information.

Presence Sensing Device Initiation/ESPE Used for Reinitiation of Machine Operation (IEC61496)

Using the light curtain to initiate a machine after an object is removed from the sensing area is called Presence Sensing Device Initiation (PSDI). Use of PSDI places additional requirements on the guarding and safety controls. It can restrict advanced light curtain features such as Floating Blanking and ECS\Blanking. Good sources of reference for PSDI include: ANSI RIA 15.06-1999, OSHA 1910.217(h), and ANSI B11.2-1995.

English

Other Infrared Transmitters

When using the light curtains in an environment containing other infrared transmitters, observe the recommendations in Figure 26 (per IEC 61496-2).

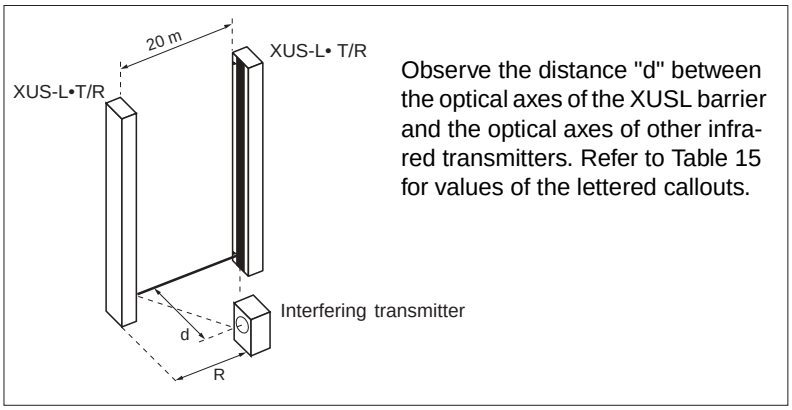


Figure 26: Use with Other Infrared Transmitters

Table 15: Distances Illustrated in Figure 26

Distance "R" (m/in.)	Min. Distance "d" (mm/in.)
0.5/19.68	270/10.63
0.75/29.52	260/10.24
1.5/59.05	260/10.24
3.0/118.11	250/9.84
5.0/196.85	420/16.54
10.0/393.70	840/33.07
15.0/590.65	1250/49.21

NOTE: The XUS-LT light curtains are insensitive to flashing lights, rotating flashing lights, welding sparks, and flashes.

SECTION 12: CONNECTING TO THE MACHINE CONTROL CIRCUIT

⚠WARNING

IMPROPER GROUNDING

- This product is designed for use on a 24 V ⎓, negative ground (protective earth) electrical system only.
- Never connect the XUS-LT light curtain 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 resulting is severe operator injury.

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

⚠WARNING

IMPROPER CONTROL

- Never use only a single safety output to control the machine.
- Should this single output fail, the machine may not stop.
- The machine must be connected using both safety outputs.

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

Connecting to a Safety Monitoring Device

The wiring from the XUS-LT system to the machine control circuit must be control reliable as described in ANSI B11.19-1990 and on page 19 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.

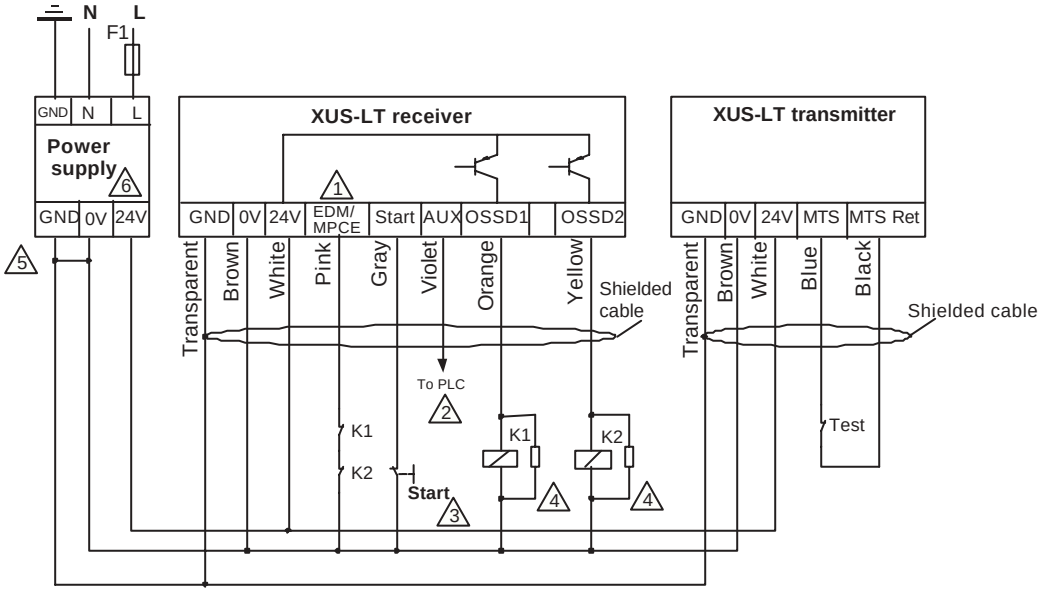
However, safety related monitoring devices are now available. Note that all safety inputs are directed to the monitoring device which also performs the EDM/MPCE monitoring function.

English

English

General Connecting

The K1 & K2 control relays must provide force guided relay outputs for machine control. OSSD safety outputs 1 and 2 are connected to the relays and provide the power necessary to energize the relays. See Figure 27 for the preferred connection method using the relays. The non-safety alarm output of the XUS-LT system can be used to signal light curtain status to a PLC.



1 For testing prior to installation, the user may select EDM/MPCE OFF (default factory setting). In this case the EDM/MPCE line (pink wire) must be connected to the system 0 V ⎓ line.

2 Non-safety alarm output connect to PLC (optional)

3 If remote start is not used, connect the start line (grey wire) to 0 V ⎓.

4 The EDM/MPCE coils must be suppressed with the arc suppressors provided in the documentation kit.

5 Install a wire between the 0 V input and the ground terminals.

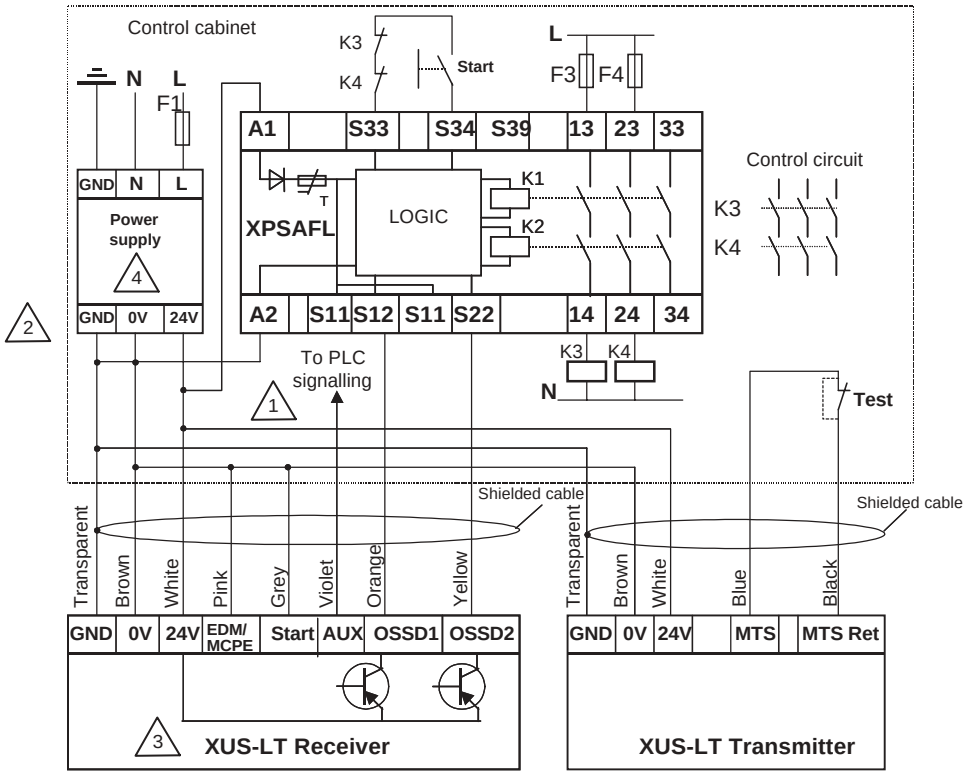
6 Power supply 24 Vdc / 2 A, complying with IEC 61496-1 and IEC 60204-1.

NOTE:
There must not be an unshielded link greater than 1 m
(start button, non-safety alarm outputs, power supply, EDM/MPCE, OSSD 1, OSS
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.

Figure 27: General Connection

Connecting Via XPS-AFL (Including Extension Cables XSZ-TCT, XSZ-TCR)



1 Auxiliary output connection to PLC (optional).

2 Install a wire between the 0 V and the ground terminal.

3 The light barrier must be configured with Automatic Start and EDM/MPCE inactive.

4 Power supply 24 V ⎓ / 2 A complying with IEC 61496-1 and IEC 60204-1.

NOTE: There must not be an unshielded link greater than 1 m (start button, auxiliary outputs, power supply, EDM/MPCE, OSSD 1, OSSD 2). The K1 and K2 relays must have force guided contacts.

Figure 28: Connecting Via XPS-AFL

English

SECTION 13: CHECKOUT AND TEST PROCEDURES

Checkout Procedure

Once the XUS-LT system has been configured, mounted, aligned, and properly connected to the machine control system, the initial checkout procedures detailed in Appendix A on page 65 must be performed by qualified personnel. A copy of the checkout results should be kept with the machine records.

⚠WARNING

IMPROPER MAINTENANCE

- The tests outlined in the Test Procedure in Appendix B (page 66) must be performed at installation, according to the employer's regular inspection program and after any maintenance, tooling change, set up, adjustment, or modification to the XUS-LT system or the guarded machine.
- Where a guarded machine is used by multiple operators or shifts, it is suggested that the test procedure be performed at each shift or operation change.
- Testing ensures that the light curtain and the machine control system work properly to stop the machine.

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

Test Procedure

The Test Procedure must be performed by qualified personnel. To test the XUS-LT system with ECS\Blanking and Floating Blanking disabled, use the Telemecanique-supplied test object. For applications where ECS\Blanking or Floating Blanking are enabled, see Tables 9 and 10 on page 30 to determine the proper size test object.

When using an XUS-LT system set for Automatic Start Mode operation, in conjunction with an XPS safety module, it is necessary to verify that the XPS outputs can properly change state by causing an intentional beam break at least once every change of shift or 24 hours of operation.

Test Object

When using the test object, guide it through the detection zone as shown in Figure 29.

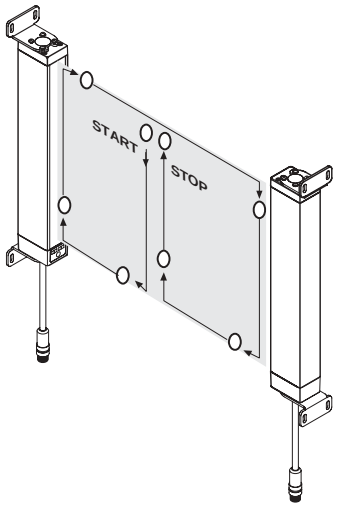


Figure 29: Test Object Pattern

SECTION 14: CLEANING

Accumulation of oil, dirt, and grease on the front filter of the XUS-LT transmitter and receiver can affect the system operation. Clean filters with a mild detergent or glass cleaner. Use a clean, soft, lint-free cloth. Painted XUS-LT surfaces may be cleaned with a mild de-greasing cleaner or detergent.

SECTION 15: SPECIFICATIONS AND ADDITIONAL INFORMATION

Table 16: Technical Specifications

		Self-Contained Models		
		XUSLTQ6•••• (14 mm)	**XUSLTR5••••• (30 mm)**	**XUSLTY5••••• (30 mm)**
Conformity/Approvals				
Conforming to standards	IEC 61496-1-2 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	CE / TUV BB60005157 0001; UL Listed 68DF E198201; CSA 219153			
Environment				
Ambient Air temperature	C F	For operation: 0 to + 55 °C, for storage: -25 to +75 °C For operation: 32 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		
Materials		Housing: polyester powder painted aluminum (RED color: RAL3000); End caps: polycarbonate; Front face: PMMA.		
Optical Characteristics				
Minimum object resolution (MOS) (Use of exact channel select will increase this value)	mm (In.)	14 mm (0.55 in.) no floating blanking) 25 mm (0.98 in.) 1-beam floating blanking 36 mm (1.41 in.) 2-beam floating blanking Etc. (See Table 9.)	30 mm (1.18 in.) no floating blanking 52 mm (2.05 in.) 1-beam floating blanking 74 mm (2.91 in.) 2-beam floating blanking Etc. (See Table 10.)	
Nominal Range	m (ft.)	0.3 to 7.5 m (1 to 24.6 ft.)	0.3 to 9 m (1 to 29.5 ft.)	0.3 to 20 m (1 to 65 ft.)
Protection heights	mm (in.)	263 to 1394 mm (10.4 to 54.9 in.)	351 to 2095 mm (13.8 to 82.5 in.)	
Effective aperture angle		+2.5° maximum, transmitter and receiver at operating range > 3 m (9.8 ft.)		
Light source		GaAlAs Light Emitting Diode, 850 nm		
Resistance to light		Per IEC 61496-2		
Electrical Characteristics				
Response time	ms	<20 ms (protected heights: 263,351,438) <25 ms (protected heights: 523,613,700) <30 ms (protected heights: 785,871) <35 ms (protected heights: 958,1046,1133) <40 ms (protected heights: 1219,1306,1394)	<20 ms (protected heights: 351,523,700,871) <25 ms (protected heights: 1046,1219,1394) <30 ms (protected heights: 1570,1746) <35 ms (protected heights: 1920,2095)	
Power supply	V	24 V ⎓ +/-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: 300 mA; Transmitter: 285 mA		
Resistance to interference		Level 3 according to IEC 61496-1		
Input power	A	Transmitter: 285 mA; Receiver: 1.4 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 (NO) outputs, 500 mA @ 24 V ⎓ (short circuit protection). See notes 1 and 2 below.		
Alarm outputs		1 NPN output 100 mA @ 24 V⎓ or 1 PNP output 100 mA @ 24 V ⎓. See note 1 below.		
EDM/MPCE monitor		50 mA @ 24 V ⎓ steady state		
Signals		Transmitter: 1 LED (power); Receiver: 4 LEDs (stop, run, interlock, floating blanking, or exact channel select\blanking)		
Connections		Transmitter: 5 pin male M12 connector Receiver: 8 pin male M12 connector		
Cable lengths		Extension cables are available separately in lengths of 10 (32.8), 15 (49.2), and 30 meters (98.4 ft.). Maximum cable length of 60 meters (196.8 ft.) is dependent on load current and power supply.		
Cable gauge		22 AWG (0.3117 mm^2); 20 AWG (0.4418 mm^2) for power and output safety switching device (OSSD) wires.		
Cable resistance		0.1686 Ω per ft. / 0.05531 Ω per m; 0.01190 Ω per ft. and 0.03903 Ω per m for the power and OSSD wires.		
Tightening torque		Cap screws: 0.9 Nm (8 lb-in)		

NOTE 1: The total current required by two solid-state outputs and the non-*safety alarm output should not exceed 1.1 A.*

NOTE 2: 24 V ⎓ is nominal. Drop out voltage is 2 V.

Specifications are subject to change without notice.

English

Table 17: Maximum Response Times (seconds)

Protected Height (mm/in.)	Max. Response Time (seconds)	
	XUSLTQ6 (14 mm)	XUSLT•5 (30 mm)
263/10.4	<0.020	
351/13.8	<0.020	<0.020
438/17.2	<0.020	
523/20.6	<0.025	<0.020
613/24.1	<0.025	
700/27.6	<0.025	<0.020
785/30.9	<0.030	
871/34.3	<0.030	<0.020
958/37.7	<0.035	
1046/41.2	<0.035	<0.025
1133/44.6	<0.035	
1219/48.0	<0.040	<0.025
1306/51.4	<0.040	
1394/54.9	<0.040	<0.025
1570/61.8		<0.030
1746/68.7		<0.030
1920/75.6		<0.035
2095/82.5		<0.035

English

English

Dimensions

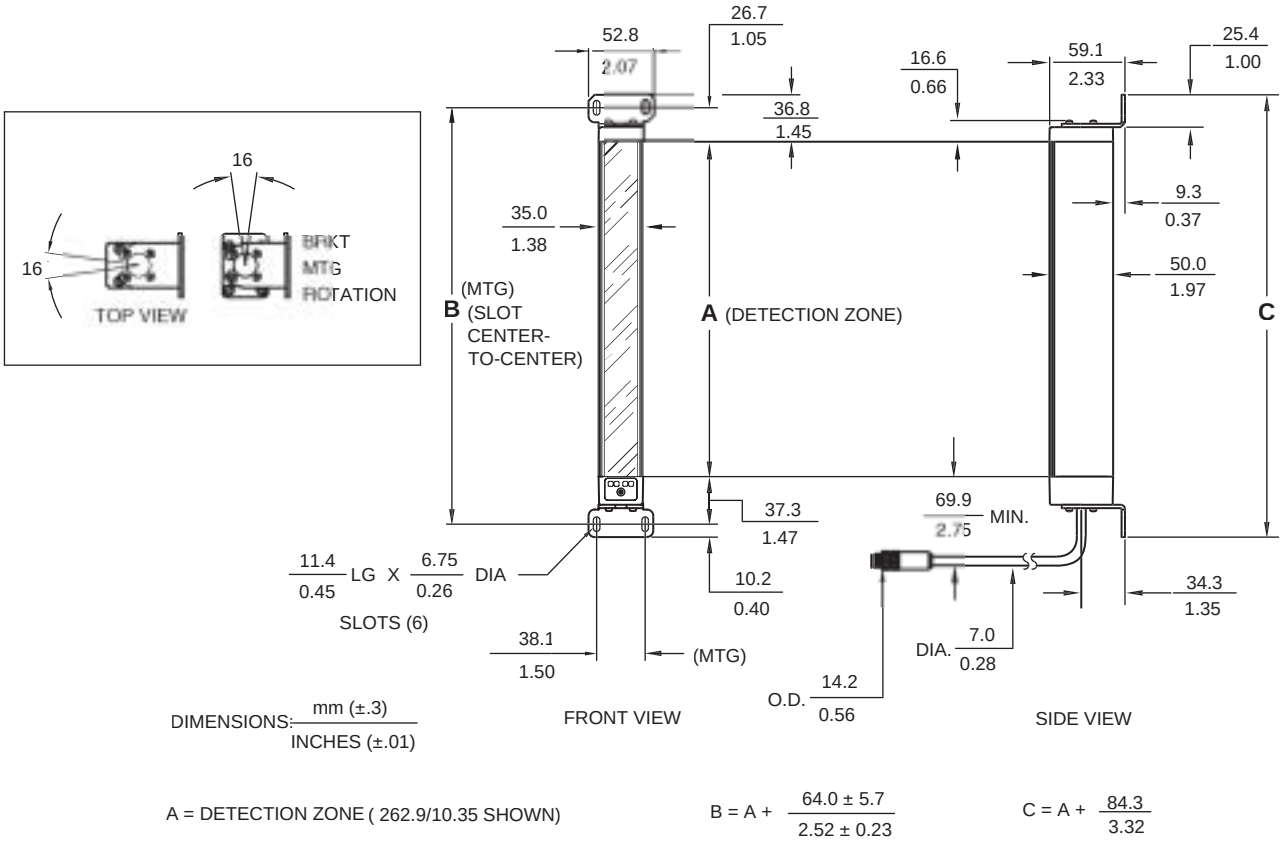


Figure 30: Dimensions (See Table 18 for Dimensions A, B, and C)

Table 18: Transmitter and Receiver Lengths, Detection Zone Dimensions (mm/in.)

Protected Height	260 mm	350 mm	435 mm	520 mm	610 mm	700 mm
A	263.0/10.4	351.0/13.8	438.0/17.2	523.0/20.6	613.0/24.1	700.0/27.6
B	327.0/12.9	415.0/16.3	502.0/19.8	587.0/23.1	677.0/26.7	764.0/30.1
C	347.3/13.7	435.3/17.1	522.3/20.6	607.3/23.9	697.3/27.5	784.3/30.9

Protected Height	785 mm	870 mm	955 mm	1045 mm	1130 mm	1215 mm
A	785.0/30.9	871.0/34.3	958.0/37.7	1046.0/41.2	1133.0/44.6	1219.0/48.0
B	849.0/33.4	935.0/36.8	1022.0/40.2	1110.0/43.7	1197.0/47.1	1283.0/50.5
C	869.3/34.2	955.3/37.6	1042.3/41.0	1130.3/44.5	1217.3/47.9	1303.3/51.3

Protected Height	1305 mm	1390 mm	1570 mm	1745 mm	1920 mm	2095 mm
A	1306.0/51.4	1394.0/54.9	1570.0/68.7	1746.0/68.7	1920.0/75.6	2095.0/82.5
B	1370.0/53.9	1458.0/57.4	1634.0/64.3	1810.0/71.3	1984.0/78.1	2159.0/85.0
C	1390.3/54.7	1478.3/58.2	1654.3/65.1	1830.3/72.0	2004.3/78.9	2179.3/85.8

Warranty

Consult your local sales representative for conditions of sale.

Repairs

Schneider Electric offers product repair service at the factory. If you need repairs made to any Schneider Electric light curtain product, contact our Customer Service Department.

Documentation Criteria

This publication has been carefully checked for accuracy and is believed to be fully consistent with the products it describes. However, Schneider Electric does not assume liability for the contents of this publication, the examples used within, or the use of any product described herein. Schneider Electric reserves the right to make changes to products and/or documentation without further notification.

SECTION 16: SPARE PARTS

Transmitters and Receivers

Spare transmitters and receivers are available through your local Schneider Electric distributor. See Tables 19 and 20 for model numbers.

Table 19: XUSLTQ6 (14 mm) Spare Transmitters and Receivers

Protected Height (mm/in.)	Transmitter Model No.	Receiver Model No.
263/10.4	XUSLTQ6E0260T	XUSLTQ6A0260R
351/13.8	XUSLTQ6E0350T	XUSLTQ6A0350R
438/17.2	XUSLTQ6E0435T	XUSLTQ6A0435R
523/20.6	XUSLTQ6E0520T	XUSLTQ6A0520R
613/24.1	XUSLTQ6E0610T	XUSLTQ6A0610R
700/27.5	XUSLTQ6E0700T	XUSLTQ6A0700R
785/30.9	XUSLTQ6E0785T	XUSLTQ6A0785R
871/34.3	XUSLTQ6E0870T	XUSLTQ6A0870R
958/37.7	XUSLTQ6E0955T	XUSLTQ6A0955R
1046/41.2	XUSLTQ6E1045T	XUSLTQ6A1045R
1133/44.6	XUSLTQ6E1130T	XUSLTQ6A1130R
1219/48.0	XUSLTQ6E1215T	XUSLTQ6A1215R
1306/51.4	XUSLTQ6E1305T	XUSLTQ6A1305R
1390/54.9	XUSLTQ6E1390T	XUSLTQ6A1390R
263/10.4	N/A	XUSLTQ6B0260R
351/13.8	N/A	XUSLTQ6B0350R
438/17.2	N/A	XUSLTQ6B0435R
523/20.6	N/A	XUSLTQ6B0520R
613/24.1	N/A	XUSLTQ6B0610R
700/27.5	N/A	XUSLTQ6B0700R
785/30.9	N/A	XUSLTQ6B0785R
871/34.3	N/A	XUSLTQ6B0870R
958/37.7	N/A	XUSLTQ6B0955R
1046/41.2	N/A	XUSLTQ6B1045R
1133/44.6	N/A	XUSLTQ6B1130R
1219/48.0	N/A	XUSLTQ6B1215R
1306/51.4	N/A	XUSLTQ6B1305R
1390/54.9	N/A	XUSLTQ6B1390R

English

Table 20: XUSLT•5 (30 mm) Spare Transmitters and Receivers

Protected Height (mm/in.)	Transmitter Model No.	Receiver Model No.	Transmitter Model No.	Receiver Model No.
351/13.8	XUSLTR5E0350T	XUSLTR5A0350R	XUSLTY5E0350T	XUSLTY5A0350R
523/20.6	XUSLTR5E0520T	XUSLTR5A0520R	XUSLTY5E0520T	XUSLTY5A0520R
700/27.5	XUSLTR5E0700T	XUSLTR5A0700R	XUSLTY5E0700T	XUSLTY5A0700R
871/34.3	XUSLTR5E0870T	XUSLTR5A0870R	XUSLTY5E0870T	XUSLTY5A0870R
1046/41.2	XUSLTR5E1045T	XUSLTR5A1045R	XUSLTY5E1045T	XUSLTY5A1045R
1219/48.0	XUSLTR5E1215T	XUSLTR5A1215R	XUSLTY5E1215T	XUSLTY5A1215R
1394/54.9	XUSLTR5E1390T	XUSLTR5A1390R	XUSLTY5E1390T	XUSLTY5A1390R
1570/61.8	XUSLTR5E1570T	XUSLTR5A1570R	XUSLTY5E1570T	XUSLTY5A1570R
1746/68.7	XUSLTR5E1745T	XUSLTR5A1745R	XUSLTY5E1745T	XUSLTY5A1745R
1920/75.6	XUSLTR5E1920T	XUSLTR5A1920R	XUSLTY5E1920T	XUSLTY5A1920R
2095/82.5	XUSLTR5E2095T	XUSLTR5A2095R	XUSLTY5E2095T	XUSLTY5A2095R
351/13.8	N/A	XUSLTR5B0350R	N/A	XUSLTY5B0350R
523/20.6	N/A	XUSLTR5B0520R	N/A	XUSLTY5B0520R
700/27.5	N/A	XUSLTR5B0700R	N/A	XUSLTY5B0700R
871/34.3	N/A	XUSLTR5B0870R	N/A	XUSLTY5B0870R
1046/41.2	N/A	XUSLTR5B1045R	N/A	XUSLTY5B1045R
1219/48.0	N/A	XUSLTR5B1215R	N/A	XUSLTY5B1215R
1394/54.9	N/A	XUSLTR5B1390R	N/A	XUSLTY5B1390R
1570/61.8	N/A	XUSLTR5B1570R	N/A	XUSLTY5B1570R
1746/68.7	N/A	XUSLTR5B1745R	N/A	XUSLTY5B1745R
1920/75.6	N/A	XUSLTR5B1920R	N/A	XUSLTY5B1920R
2095/82.5	N/A	XUSLTR5B2095R	N/A	XUSLTY5B2095R

Extension Cables

Use the part numbers listed below to order extension cables.

Cable Length (m/ft.)	Transmitter Cable Part Numbers	Receiver Cable Part Numbers
10/32.8	XSZTCT10	XSZTCR10
15/49.3	XSZTCT15	XSZTCR15
30/98.5	XSZTCT30	XSZTCR30

Additional Spare Parts

Part Number	Description
XUSLZ100	Security screw and tool for XUS-LT programming button
XUSLZ213	Mounting brackets and hardware for XUS-LT
XUSLZ222	Receiver end cap with cable and screws
XUSLZ500	Arc suppression kit

English

SECTION 17: ACCESSORIES

XUS-LT Lexan Protection

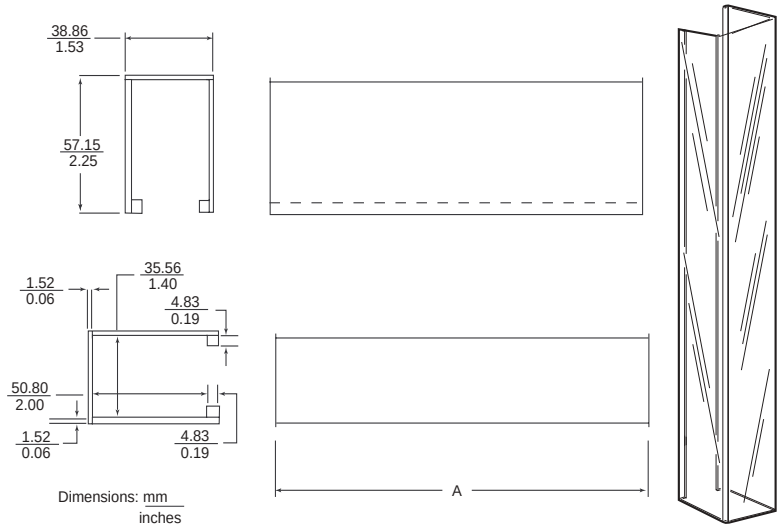


Figure 31: XUSZWS Lexan Protection (Refer to Table 21 for "A")

Table 21: Dimension "A"

Lexan Protection Part Number	"A" (mm/in.)	For Light Curtain:
XUSZWS0260	279/11.0	XUSLT…0260
XUSZWS0350	371/14.6	XUSLT…0350
XUSZWS0435	452/17.8	XUSLT…0435
XUSZWS0520	528/20.8	XUSLT…0520
XUSZWS0610	627/24.7	XUSLT…0610
XUSZWS0700	716/28.2	XUSLT…0700
XUSZWS0785	800/31.5	XUSLT…0785
XUSZWS0870	886/34.9	XUSLT…0870
XUSZWS0955	973/38.3	XUSLT…0955
XUSZWS1045	1062/41.8	XUSLT…1045
XUSZWS1130	1148/45.2	XUSLT…1130
XUSZWS1215	1234/48.6	XUSLT…1215
XUSZWS1305	1321/52.0	XUSLT…1305
XUSZWS1390	1410/55.5	XUSLT…1390
XUSZWS1570	1585/62.4	XUSLT…1570
XUSZWS1745	1758/69.2	XUSLT…1745
XUSZWS1920	1930/76.0	XUSLT…1920
XUSZWS2095	2108/83.0	XUSLT…2095

Shock Mount Kit

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

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

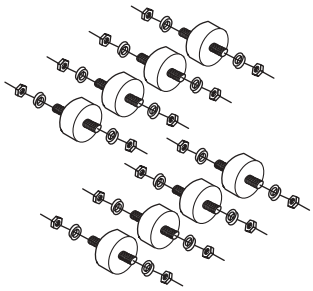


Figure 32: Shock Mount Kit

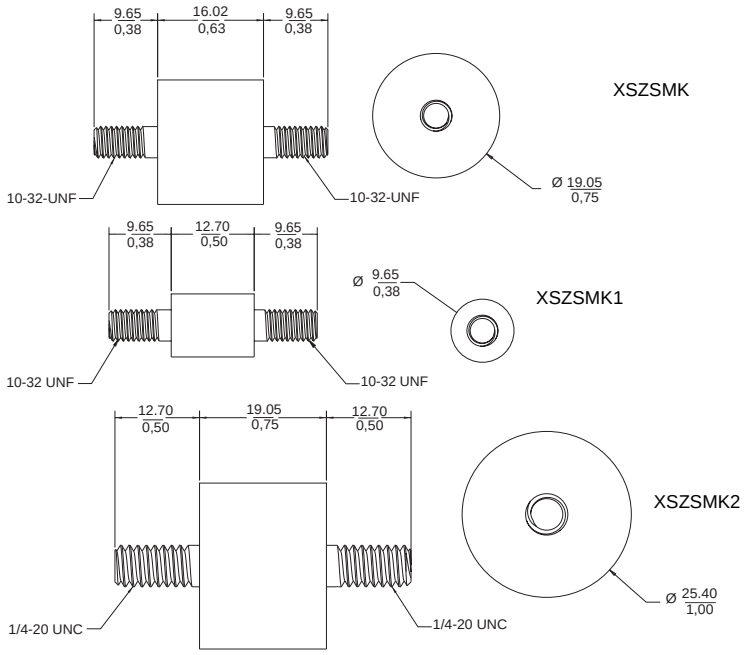


Figure 33: Shock Mount Kit Dimensions (mm/in)

Table 22: 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

English

Table 23: Weight Classes

	Weight Class			
Product (Lengths in mm)	**1**	**2**	**3**	**4**
XUSLTQ, Lengths 260–1045		X		
XUSLTQ, Lengths 1130–1390			X	
XUSLTR/Y, Lengths 350–870		X		
XUSLTR/Y, Lengths 1045–1390		X		
XUSLTR/Y, Lengths 1570–2095			X	
XUSZM, Length 102	X			
XUSZM, Lengths 152–457		X		
XUSZM, Lengths 508–711			X	
XUSZM, Lengths 762–1016				X
XUSZM, Lengths >1016	**Use of shock mount kits is not recommended**			
XUSZA, Length 102	X			
XUSZA, Length 152–1067		X		
XUSZA, Length 1219–1626			X	
XUSZA, Length 1829 –2134				X

Table 24: 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 Low frequency, high amplitude applications, such as punch presses, where strong shock can be present.

Table 25: 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 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 safety distances throughout the protected zone, including the distances to possible reflective surfaces.

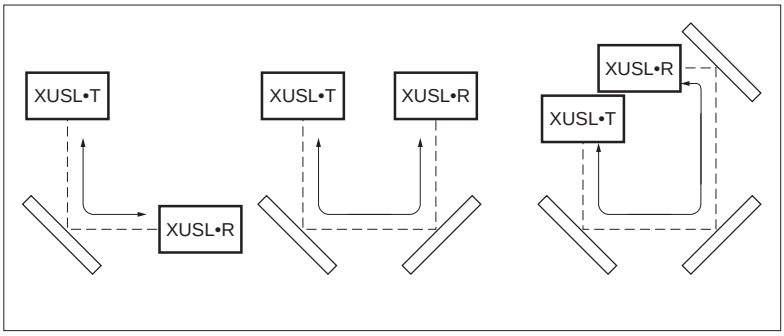


Figure 34: Mirror Configurations

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

Table 26: Recommended Maximum Range for Glass Mirrors

No. of Mirrors	XUSLTQ6••••	XUSLTR5••••	XUSLTY5••••
1	6.6 m (21.65 ft.)	7.9 m (25.9 ft.)	17.6 m (57.74 ft.)
2	5.7 m (18.70 ft.)	6.9 m (22.6 ft.)	15.4 m (50.52 ft.)
3	5.1 m (16.73 ft.)	6.1 m (20.01 ft.)	13.6 m (44.62 ft.)
4	4.5 m (14.76 ft.)	5.4 m (17.71 ft.)	12 m (39.37 ft.)

Table 27: Recommended Maximum Range for Stainless Steel Mirrors

No. of Mirrors	XUSLTQ6••••	XUSLTR5••••	XUSLTY5••••
1	6.1 m (20.01 ft.)	7.6 m (24.93 ft.)	16.4 m (53.80 ft.)
2	5.0 m (16.40 ft.)	6.0 m (19.68 ft.)	13.4 m (43.96 ft.)
3	4.1 m (13.45 ft.)	4.9 m (16.07 ft.)	11 m (36.09 ft.)
4	3.7 m (12.14 ft.)	4.0 m (13.12 ft.)	9 m (29.52 ft.)

English

Mirror Dimensions

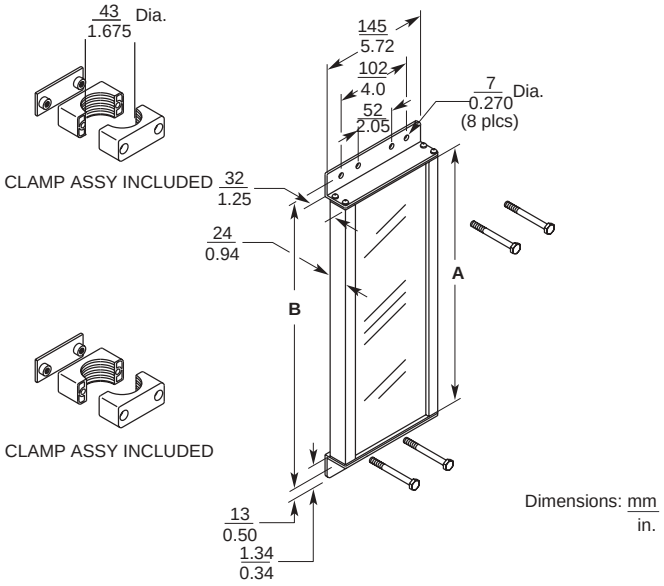


Figure 35: Mirror Dimensions (See Table 28 for Dimensions A and B)

Table 28: Dimensions A and B

Part Number		Dimension A (mm/in.)	Dimension B (mm/in.)
Glass	**Stainless Steel**		
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 18: GLOSSARY

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

Channel: a pair of beams between an XUS-LT transmitter and receiver.

C Type Standards: C type standards call for additional distance in minimum safe distance calculations based on the detection capability of the safety device.

Detection Zone: The zone within which a specified test piece will be detected by the XUS-LT system.

ECS/B: Exact Channel Select/ Blanking. Disables a selected, fixed area of the detection zone.

EDM/MPCE: A means by which the electro-sensitive protective equipment (ESPE) monitors the state of control devices which are external to the ESPE. The electrically powered element directly controls the normal operation of a machine in such a way that it is the last (in time) to function when machine operation is to be initiated or arrested.

FB: Floating Blanking. One or two channels disabled at any location in the detection zone.

Minimum Object Sensitivity (MOS): The largest allowable size of an interruption in the sensing field.

OFF State: The state in which the output circuit is interrupted and does not permit current to flow.

OSHA: Occupational Safety & Hazard Administration. A US government agency.

ON State: The state in which the output circuit is complete and permits the flow of current.

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

Test Object: An opaque cylindrical object used to verify the detection capability of the XUS-LT system.

SECTION 19: TROUBLESHOOTING

Receiver Endcap Indicator Lights

1. GREEN—The guarded machine is operating.
2. RED—The light curtain is blocked and the guarded machine is not operating.
3. 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 an alarm condition.
4. AMBER Floating Blanking or ECS/Blanking—The light curtain is operating in a reduced resolution mode.

Receiver Troubleshooting

If the yellow interlock LED is blinking:

1. Check the configuration for EDM/MPCE Monitoring. If EDM/MPCE Monitoring is inactive (via receiver endcap DIP switches), the input (pink wire) must be connected to system ground. 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 XPS module. See “Section 12: Connecting to the Machine Control Circuit” on page 47 for an example.
2. Make sure that both DIP switches in the receiver endcap have been set properly and identically. See Tables 5, 10, and 12 on pages 26, 30, and 33.
3. Verify that the power supply is within specified limits, see Table 16 on page 52.
4. Verify that the light curtain is properly connected to the control relays of the guarded machine. If the light curtain is not intended to be connected to the control relays, see “Connecting to a Safety Monitoring Device” on page 47 of the manual for instruction.
5. Verify that the control relays are within the operating limits of the safety outputs. See “Section 15: Specifications and Additional Information” on page 52.

   NOTE: The pull-in voltage requirement of the relays must be satisfied. The XUS-LT system provides $V=V_{supply}–2V$ on each solid-state safety output.
6. Verify that the cable lengths from the light curtain to the control relays are within specified limits. See Table 16 on page 52.

If the red LED is always on:

1. Verify that the yellow LED on the transmitter is on.
2. Realign the light curtain.
3. Verify that the first beam (synchronization beam) is not obstructed.

Transmitter Endcap Indicator Lights

Yellow – The Transmitter is active. If the LED is blinking, the light curtain is in an alarm condition.

Transmitter Troubleshooting

If the yellow LED is off:

1. Verify that the cable is connected.
2. Verify that the power supply is within limits (+24 V ± 20%).
3. Verify that the Machine Test Signal (MTS) wiring is correct (MTS tied to MTS Return).

APPENDIX A: CHECKOUT PROCEDURE

The Checkout Procedure in Table 29 must be performed by qualified personnel during the initial installation and at least once every three months thereafter or more frequently depending on a machine usage and company guidelines.

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

Machine Identification:_____

Date:_____

Table 29: Checkout Procedure

Item	Condition	Comments
1. Verify that the guarded machine is compatible with the type of machine which may be used with the XUS-LT system. See “Section 2: Important safety Warnings” on page 19 for further information.	❑ Pass ❑ Fail	
2. Verify that the mounting distance of the XUS-LT system is equal to or greater than the minimum safe distance from the danger point. See “Section 10: Safe Mounting Distance” on page 35 for more information.	❑ Pass ❑ Fail	
3. Determine that all access to the danger point not protected by an XUS-LT 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.	❑ Pass ❑ Fail	
4. Make sure the operator is not able to stand between the XUS-LT system detection zone and the machine danger point. Verify that the light curtain can only be reset from a position outside and within view of the hazardous machine area.	❑ Pass ❑ Fail	
5. Inspect the electrical connections between the guarded machine control system and the XUS-LT system. Verify that they are properly connected to the machine such that a stop signal from the XUS-LT system results in an immediate halt of the machine's cycle. See “Section 12: Connecting to the Machine Control Circuit” on page 47.	❑ Pass ❑ 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 XUS-LT system should enter an alarm condition. Remove the temporary jumper. Press and release the Start button.	❑ Pass ❑ Fail	
7. Record the test results in the machine log. Then perform the Test Procedures on page 66.		❑ Recorded results

Comments_____
_____
_____
_____
_____

Technician Signature:_____

APPENDIX B: TEST PROCEDURES

The tests described in Table 30 must be performed by qualified personnel during initial XUS-LT system installation, according to the employer's regular inspection program, and after any maintenance, adjustment or modification to the XUS-LT system or the guarded machine.

Testing ensures 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 XUS-LT system, use the correct size test object.

Table 30: Test Procedures

Item	Condition	Comments
1. Disable the machine to be guarded. Turn power on to the XUS-LT system.	❑ Pass ❑ Fail	
2. Visually inspect the machine to ensure that access to the danger point is only through the XUS-LT 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.	❑ Pass ❑ Fail	
3. Verify that the mounting distance of the XUS-LT system is equal to or greater than the calculated minimum safe distance from the danger point. See "Section 10: Safe Mounting Distance" on page 35 for further information. Ensure that the operator is not able to stand between the XUS-LT detection zone and the danger point.	❑ Pass ❑ Fail	
4. Check for signs of external damage to the XUS-LT system, the machine, and the electrical cables and wiring. If damage is found, lockout the machine i n an off condition and report to the supervisor.	❑ Pass ❑ Fail	
5. Interrupt the XUS-LT 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 start light is lit. If in start/restart interlock mode, verify that the red machine stop and yellow interlock lights are on. Press and release the Start button before proceeding to step 6.	❑ Pass ❑ 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.	❑ Pass ❑ 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 point.	❑ Pass ❑ Fail	
8. If the safety devices or the machine fail any of these tests, do not run the machine. Immediately tag or lockout the machine to prevent its use and notify the supervisor.		

Comments:_____
_____
_____
_____
_____

English