MS4600

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MS4600

MiniSafe® Light Curtains

Rev. 6.13

- Resolution: 14 mm (0.55 in.), 19 mm (0.75 in.) or 30 mm (1.18 in.) resolution
- Range: 7.5 m (25 ft.) range for the 14 mm resolution, 20 m (65 ft.) range for the 19 and 30 mm resolutions
- Protected Heights: 14 mm and 19 mm resolutions from 263 to 1393 mm (10 to 55 in.); or 30 mm resolution from 351 to 2095 mm (14 to 83 in.)
- Compact size —35 x 50 mm (1.4 x 2 in.)
- No cable required between transmitter and receiver
- Individual Beam Indicators

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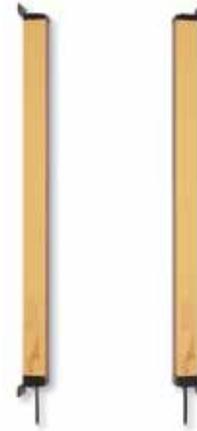
Specifications for Transmitter and Receiver

Performance	
Protected Height:	14 and 19 mm — 263 to 1393 mm in 86 mm increments (10.3 to 54.5 inches in 3.4 inch increments)
	30 mm — 350 to 2090 mm (13.8 to 82.6 in.)
Operating Range	MS46SR: 0.3 to 7.5 m (1 to 25 ft.) for 14 mm resolution 0.3 to 9 m (1 to 30 ft.) for 19 mm and 30 mm resolutions
	MS46LR: 0.3 to 20 m (1 to 65 ft.)/Not available with 14 mm resolution
Resolution:	14 mm (0.55 in.), 19 mm (0.75 in.) or 30 mm (1.18 in.). Use of Exact Channel Select and/or Floating Blanking may increase this value.
Response Time (varies by protected height):	See tables at right
Input Voltage (V_{in}):	24 VDC ± 20%
Input Power:	14 watts (without load on the outputs)
Safety Output Ratings:	Two PNP outputs sourcing 500 mA max @ V_{in} (see note 1). Short circuit protected.
Auxiliary (Non-Safety) Output Ratings:	One NPN output sinking 100 mA max @ V_{in} or one PNP output sourcing 100 mA @ V_{in} (see notes 1 and 2)
Power Supply:	24 VDC ± 20%. The rating depends on the current requirements of the loads attached to the outputs (see note 3). The power supply must meet the requirements of IEC 60204-1 and 61496-1. STI part number 42992 or equivalent.
MPCE Monitoring Circuit:	50 mA steady state @ 24 VDC
Start/Restart Input:	N.C. or N.O. momentary contact (20 mA consumption)
Effective Aperture Angle:	±2.5° maximum, transmitter and receiver at operating range greater than 3 m (9.8 ft.).
Light Source:	GaAIAs Light Emitting Diode, 850 nm
Indicators	Transmitter: Power applied (Yellow) Receiver: Machine Stop (Red), Machine Run (Green), Interlock or Alarm Indicator (Yellow), Blanking Indicator (Amber)
Mechanical	
Enclosure:	Polyurethane powder-painted aluminum
Cable Length:	Optional cables are available in 10, 15, 30 and 50 m lengths
Cable Connections (M12):	Receiver: 8-pin Transmitter: 3-pin standard, 5-pin with MTS
Environmental	
Protection Rating:	NEMA 4, 12; IP65
Operating Temperature:	0 to 55°C (32 to 131°F)
Relative Humidity:	95% maximum, non-condensing
Vibration:	5-60 Hz maximum on all three axis
Shock:	10 g for 0.016 seconds, 1,000 shocks for each axis on two axis
Approvals	ESPE Type 4 (IEC 61496-1/ -2) Category 4 / PL e (EN ISO 13849-1) SIL3 / SIL3 CL3 (IEC 61508 / EN 62061) UL508, UL1998, CAN/CSA-C22.2 No. 14, CAN/CSA-C22.2 No. 0.8, CAN/CSA-C22.2 No 0, CAN/CSA-C22.2 No 205

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File No. LR90200

Response Times for Systems with 14 mm and 20 mm Resolutions

Protected Height (mm/in.)	No. of Beams	Response Time (seconds)
263/10.4	24	<0.016
350/13.8	32	<0.017
437/17.2	40	<0.019
524/20.6	48	<0.021
611/24.1	56	<0.023
698/27.5	64	<0.025
785/30.9	72	<0.027
872/34.3	80	<0.031
959/37.7	88	<0.033
1046/41.2	96	<0.035
1133/44.6	104	<0.035
1220/48.0	112	<0.037
1306/51.4	120	<0.039
1393/54.9	128	<0.040

Response Times for Systems with 30 mm Resolutions

Protected Height (mm/in.)	No. of Beams	Response Time (seconds)
350/13.8	16	<0.014
524/20.6	24	<0.016
698/27.5	32	<0.017
872/34.3	40	<0.019
1046/41.2	48	<0.021
1220/48.0	56	<0.023
1393/54.9	64	<0.025
1570/61.8	72	<0.027
1741/68.6	80	<0.029
1915/75.4	88	<0.031
2090/82.3	96	<0.033

Specifications are subject to change without notice.

Note 1: Voltage available at the outputs is equal to V_{in} - 2.0 VDC.

Note 2: Total current required by the two solid-state outputs and the aux. output should not exceed 1.1 A.

Note 3: Total system current requirement is the sum of the transmitter 285 mA and receiver 1.4 A max. (Receiver 300 mA + OSSD1 load + OSSD2 load + Aux. output load)
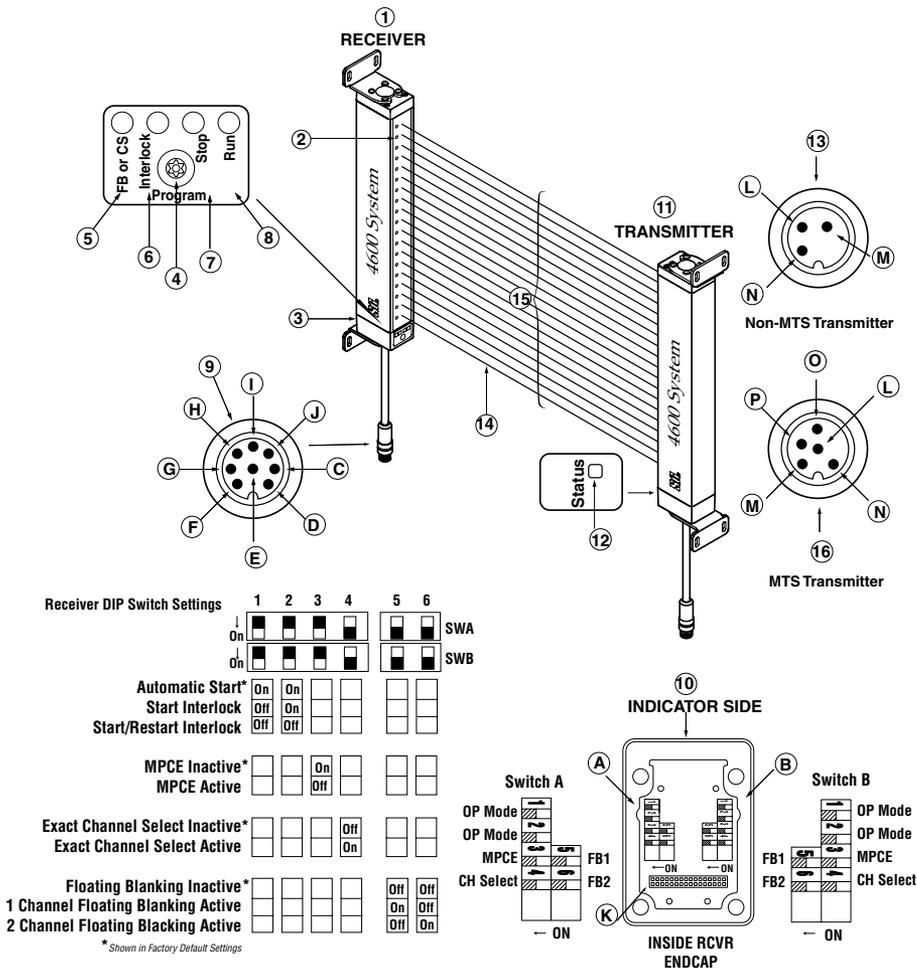
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Wiring

System Configuration

ID	Components & Indicators	
1	Receiver	
2	Individual Beam Indicators (one for each beam) — Red	
3	Removable End Cap, Access to configuration switches	
4	Program Button (must remove security screw)	
5	Channel Select or Floating Blanking Indicator — Amber	
6	Interlock or Alarm Indicator — Yellow	
7	Machine Stop Indicator — Red	
8	Machine Run Indicator — Green	
6	Receiver Connections	
	I	Start — Grey Wire
	J	OSSD 2 — Yellow Wire
	C	OSSD 1 — Green or Orange Wire
	D	0 VDC — Brown Wire
	E	Drain — Uninsulated Wire
	F	+24 VDC — White Wire
	G	Auxiliary Out — Blue or Violet Wire
	H	MPCE — Pink Wire
10	Inside Receiver End Cap	
	A	Switch A
	B	Switch B
	K	Connector

ID	Components & Indicators	
11	Transmitter	
12	Status Indicator — Yellow	
13	Transmitter Connections (without Machine Test Signal)	
	L	Drain — Uninsulated Wire
	M	+24 VDC — White Wire
	N	0 VDC — Brown Wire
14	Synchronization Beam	
15	Detection Zone	
16	Transmitter Connections (with Machine Test Signal)	
	L	Drain — Uninsulated Wire
	M	+24 VDC — White Wire
	N	0 VDC — Brown Wire
	O	MTS — Blue Wire
	P	MTS Return — Black Wire

Receiver DIP Switch Settings	1	2	3	4	5	6	
On							SWA
On							SWB

	1	2	3	4	5	6
Automatic Start*	On	On				
Start Interlock	Off	On				
Start/Restart Interlock	Off	Off				
MPCE Inactive*			On			
MPCE Active			Off			
Exact Channel Select Inactive*				Off		
Exact Channel Select Active				On		
Floating Blanking Inactive*					Off	Off
1 Channel Floating Blanking Active					On	Off
2 Channel Floating Blacking Active					Off	On

Shown in Factory Default Settings
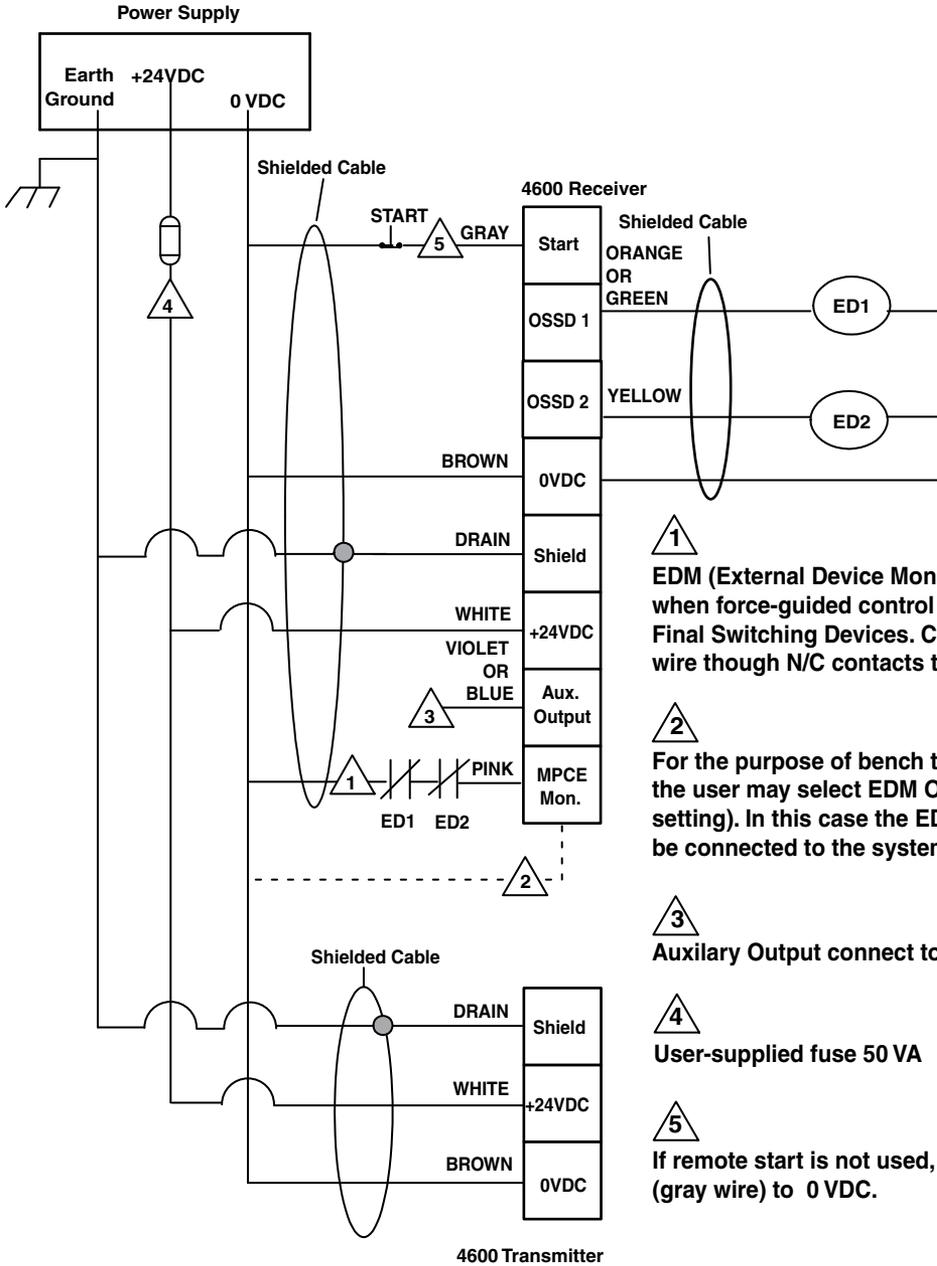
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Wiring (continued)

Using Solid-state Outputs

Connecting Via Two Force-Guided Relays

FGR series relays provide force-guided outputs for machine control.

1 EDM (External Device Monitoring) must be used when force-guided control relays are used as the Final Switching Devices. Connect the the Pink wire though N/C contacts to 0 VDC.

2 For the purpose of bench testing prior to installation, the user may select EDM OFF (default factory setting). In this case the EDM line (pink wire) must be connected to the system 0 VDC line.

3 Auxilary Output connect to PLC (optional)

4 User-supplied fuse 50 VA

5 If remote start is not used, connect the start line (gray wire) to 0 VDC.
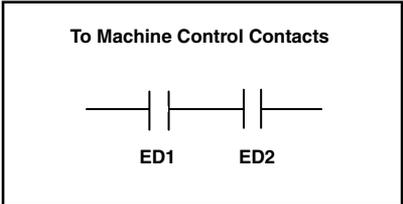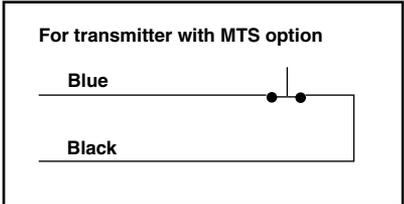
Dimensions

(mm/in.)
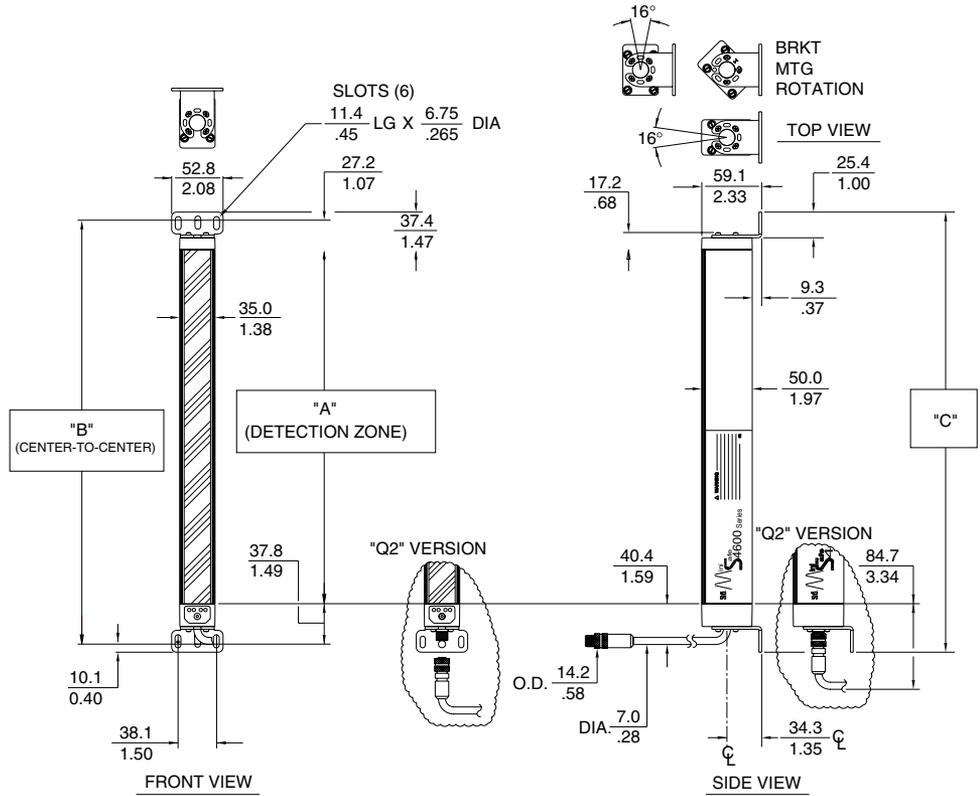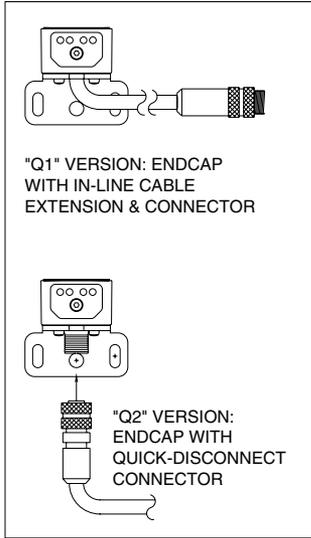
DIMENSIONS: $\dfrac{\text{mm } (+\backslash-.3)}{\text{INCHES } (+\backslash-.01)}$

A = DETECTION ZONE

B = A + $\dfrac{65.0}{2.56}$

C = A + $\dfrac{85.4}{3.36}$

How to Calculate Your System Dimensions:

Dimension A = Detection Zone (13.78 in./350 mm shown)
Dimension B = A + 256/65.0 ± 0.10/2.4
Dimension C = A + 3.36/85.4

MS4600 Series/Model*	A (mm)	A (in)
MS46-X/R-260- 14/20	262.9	10.35
MS46-X/R-350- 14/20/30	350.0	13.78
MS46-X/R-435- 14/20	436.9	17.20
MS46-X/R-520- 14/20/30	523.8	20.62
MS46-X/R-610- 14/20	610.9	24.05
MS46-X/R-700- 14/20/30	697.7	27.47
MS46-X/R-785- 14/20	784.6	30.89
MS46-X/R-870- 14/20/30	871.7	34.32
MS46-X/R-955- 14/20	958.6	37.74
MS46-X/R-1045- 14/20/30	1045.5	41.16
MS46-X/R-1130- 14/20	1132.8	44.60
MS46-X/R-1215- 14/20/30	1219.5	48.01
MS46-X/R-1305- 14/20	1306.3	51.43
MS46-X/R-1390- 14/20/30	1393.4	54.86
MS46-X/R-1570- 14/30	1567.4	61.71
MS46-X/R-1745- 14/30	1741.4	68.56
MS46-X/R-1920- 14/30	1915.4	75.41
MS46-X/R-2095- 14/30	2089.7	82.27

Ordering

To order a MiniSafe MS4600 system, simply fill in these fields.

___ - ____ - ____ - ___ - ___X - ___R - ____ - ____ - ____ - ___
❶   ❷   ❸   ❹   ❺   ❺   ❻   ❼   ❽   ❾

❶ Information required. Represents the system operating range. For applications where the transmitter and receiver will be mounted less than 7.5 m (25 ft.) or 9 m (30 ft.) apart (depending on resolution), please select the SR version.

Designator	Description
MS46SR	0.3 to 7.5 m (1 to 25 ft.) for 14 mm resolutions 0.3 to 9 m (1 to 30 ft.) for 20 and 30 mm resolutions
MS46LR	0.3 to 20 m (1 to 65 ft.) for 20 and 30 mm resolutions (Not available for 14 mm)

❷ Information required. Represents the minimum object resolution of the system.

Designator	Minimum Object Resolution
14	14 mm (0.55 in.)
20	19 mm (0.75 in.)
30	30 mm (1.18 in.)

❸ Information required. Represents the coverage height of the detection zone.

Designator	Description
260*	263 mm (10.4 in.)
350	351 mm (13.8 in.)
435*	437 mm (17.2 in.)
520	524 mm (20.6 in.)
610*	611 mm (24.1 in.)
700	698 mm (27.5 in.)
785*	785 mm (30.9 in.)
870	872 mm (34.3 in.)
955*	959 mm (37.7 in.)
1045	1046 mm (41.2 in.)
1130*	1133 mm (44.6 in.)
1215	1220 mm (48.0 in.)
1305*	1306 mm (51.4 in.)
1390	1393 mm (54.9 in.)
1570**	1567 mm (61.8 in.)
1745**	1741 mm (68.6 in.)
1920**	1915 mm (75.4 in.)
2095**	2090 mm (82.3 in.)

* Not available in 30 mm resolutions

** Only available in 30 mm resolutions

❹ Information required. Represents the connector type for transmitter and receiver.

Designator	Description
Q1	In-line cable with quick disconnect (QD) connector (pig tail)
Q2	QD connector

❺ Information required. Represents transmitter (X) and receiver (R) cable length. Cables can be shortened in the field.

Designator	Description
10	10 m (33 ft.)
15	15 m (49 ft.)
30	30 m (99 ft.)
50	50 m (164 ft.)

❻ Information required. Represents the start/restart input type.

Designator	Description
NC	Normally closed
NO	Normally open

❼ Information required. Indicate the Auxiliary output configuration.

Designator	Description
FN	NPN output follow solid-state safety outputs
FP	PNP output follow solid-state safety outputs
AN	NPN output operate only in Alarm status
AP	PNP output operate only in Alarm status

❽ Information optional. Indicate optional MTS on transmitter.

Designator	Description
M	Include MTS
(Blank)	No MTS

❾ Information optional. Indicate optional RM relay module.

Designator	Description
RM1	Include RM-1 Resource Module
RM2	Include RM-2 Resource Module
RM2A	Include RM-2AC Resource Module
RM2AP	Include RM-2AC-IP Resource Module, IP65
RM3	Include RM-3 Resource Module
RM4	Include RM-4 Resource Module
RMX	Include RM-X Resource Module
(Blank)	Do not include Resource Module

Safety Standards and Precautions

All models of the MiniSafe MS4600 meet ANSI/RIA R15.06-1999 (R2009) and ANSI B11.19-2010. When used with mechanical power presses, OSHA industrial safety standards apply as stated in 1910.217(c). For other applications, the machine guarding requirements found in section 1910.212 apply. The MiniSafe MS4600 series meets ANSI control reliability requirements for point-of-operation presence sensing devices.

MS4600 systems have been EC type examined to the requirements of IEC 61496-1, -2 for a Type 4 ESPE.

The MiniSafe MS4600 should only be used on machinery that can consistently and immediately stop anywhere in its cycle or stroke. Never use a MiniSafe MS4600 on a full revolution clutched power press or machine. If the light curtain does not protect all access to the point of operation, the unprotected access must be guarded by other appropriate devices such as mechanical guards.

The purchaser, installer and employer have the responsibility to meet all local, state and federal government laws, rules, codes or regulations relating to the proper use, installation, operation and maintenance of this control and the guarded machine. See the Installation and Operation Manual for additional information.

All application examples described are for illustration purposes only. Actual installations will differ from those indicated.

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Ordering (continued)

Spare Parts and Accessories

Transmitter Cables	
CBL-46TX-10M	Transmitter Cable, 10 meter (32.8 ft.)
CBL-46TX-15M	Transmitter Cable, 15 meter (49.2 ft.)
CBL-46TX-30M	Transmitter Cable, 30 meter (98.5 ft.)
MTS Version Transmitter Cables	
CBL-46TXM-10M	Transmitter Cable, 10 m (32.8 ft.)
CBL-46TXM-15M	Transmitter Cable 15 m (49.2 ft.)
CBL-46TXM-30M	Transmitter Cable, 30 m (98.5 ft.)
Receiver Cables	
CBL-46RX-10M	Receiver Cable, 10 meter (32.8 ft.)
CBL-46RX-15M	Receiver Cable, 15 meter (49.2 ft.)
CBL-46RX-30M	Receiver Cable, 30 meter (98.5 ft.)
Standard (Non-MTS) Transmitter	
CBL-46TXT-1M	Double-ended, Quick Disconnect, 1 meter (3.28 ft), Transmitter
CBL-46TXT-5M	Double-ended, Quick Disconnect, 5 meter (16.4 ft), Transmitter
CBL-46TXT-10M	Double-ended, Quick Disconnect, 10 meter (32.8 ft), Transmitter
CBL-46TXT-15M	Double-ended, Quick Disconnect, 15 meter (49.2 ft), Transmitter
CBL-46TXT-25M	Double-ended, Quick Disconnect, 25 meter (82.0 ft), Transmitter
CBL-46TXT-30M	Double-ended, Quick Disconnect, 30 meter (98.4 ft), Transmitter
MTS Double-ended Version Transmitter Cables	
CBL-46TXTM-1M	MTS Version Double-ended, Quick Disconnect, 1 meter (3.28 ft), Transmitter
CBL-46TXTM-5M	MTS Version Double-ended, Quick Disconnect, 5 meter (16.4 ft), Transmitter
CBL-46TXTM-10M	MTS Version Double-ended, Quick Disconnect, 10 meter (32.8 ft), Transmitter
CBL-46TXTM-15M	MTS Version Double-ended, Quick Disconnect, 15 meter (49.2 ft), Transmitter
CBL-46TXTM-25M	MTS Version Double-ended, Quick Disconnect, 25 meter (82.0 ft), Transmitter
CBL-46TXTM-30M	MTS Version Double-ended, Quick Disconnect, 30 meter (98.4 ft), Transmitter

Double-ended Receiver Cable	
CBL-46RXT-1M	Double-ended, Quick Disconnect, 1 meter (3.28 ft), Receiver
CBL-46RXT-5M	Double-ended, Quick Disconnect, 5 meter (16.4 ft), Receiver
CBL-46RXT-10M	Double-ended, Quick Disconnect, 10 meter (32.8 ft), Receiver
CBL-46RXT-15M	Double-ended, Quick Disconnect, 15 meter (49.2 ft), Receiver
CBL-46RXT-25M	Double-ended, Quick Disconnect, 25 meter (82.0 ft), Receiver
CBL-46RXT-30M	Double-ended, Quick Disconnect, 30 meter (98.4 ft), Receiver
Bulkhead Connectors	
PMC-46RX	Receiver Bulkhead Connector, 36 in. (914.4 mm) Leads
PMC-46TX	Transmitter Bulkhead Connector, 36 in. (914.4 mm) Leads
PMC-46TXM	MTS Version Bulkhead Connector, 36 in. (914.4 mm) Leads
Resource Modules	
RM-1	RM-1 Resource Module
RM-2	RM-2 Resource Module
RM-2AC	RM-2AC Resource Module/Power Supply
RM-2AC-IP	RM-2AC Resource Module/Power Supply, IP65 Metal Enclosure
RM-3	RM-3 Mute Module
RM-X	RM-X Safety Relay, 22.5 mm DIN enclosure

✎ For information on Resource Modules, see www.sti.com

✎ For information on safety light curtain accessories, see www.sti.com

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