



OptoShield® OS3100

Laser Light Safety Scanner

- Safety range of 4 m
- Intrusion indicators immediately identify where the safety zone is encroached
- Two separate detection sets (each with one safety zone and one warning zone) can be externally selected
- Configured via easy-to-use software
- Two PNP safety outputs designed to directly switch machine primary control elements (MPCE) at 625 mA, 24 VDC
- Auxiliary output for Warning Zone
- Two-digit numeric display for diagnostic codes
- LED indicators for status and diagnostics
- Response time as fast as 80 ms
- EDM/MPCE monitoring
- No separate control box required
- Choice of two scanning configuration modes: graphic coordinate or sculpting
- Operating Modes: Automatic Start, Start Interlock and Start/Restart Interlock
- Compact size – 155 x 156 x 177 mm (6.10 x 6.16 x 6.97 in.)

Options

- RM-2AC module, power supply with relay safety outputs
- Adjustable mounting brackets and stands
- DeviceNet interface



■ Description

The OS3100 OptoShield is an advanced scanning laser safety sensor with the ability to accommodate both irregularly and changing hazardous areas. It introduces advancements over similar types of sensors by providing superior interface options and advanced diagnostic communications.

Interface innovations include EDM/MPCE monitoring so that the OptoShield is safely integrated into the control panel of the hazardous machinery. The outputs of the OptoShield source 625 mA to activate the larger safety relays.

The OptoShield provides diagnostic communications never before available in a safety scanner. These includes a two-digit numeric display, DeviceNet interface and standard LED status indicators. The patented Intrusion Indicators identify where the safety zone is encroached without the need for an external computer display. The indicators glow red when an object enters the Safety Zone within the corresponding scanning sector.

The OptoShield features two detection sets which can be externally selected to monitor changing hazardous areas. This is achieved without additional external control units. The OptoShield is an excellent choice for safeguarding hazardous work cells, transfer lines, robot stations, internal press monitoring, irregularly shaped or changing areas and automated guided vehicles.

■ Key Features

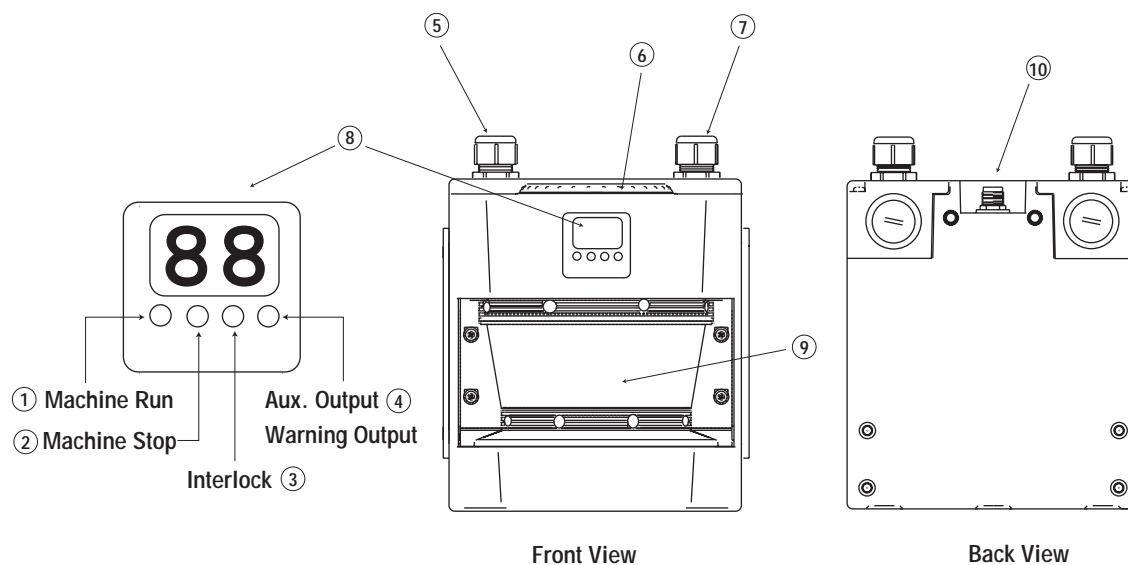
Diagnostic/Indicators

- Intrusion Indicators, which are similar to Individual Beam Indicators on STI light curtains
- 4 LEDs – Stop, Run, Interlock and Warning
- Two 7-segment displays



■ System Components

ID	Components and Indicators	Description
1	Machine Run (green)	Status indicator: green LED will light when no intrusions are detected in safety zone
2	Machine Stop (red)	Status indicator: red LED will light when an intrusion is detected
3	Interlock (yellow)	Status indicator: yellow LED will light when waiting for restart signal
4	Auxiliary/Warning Zone Output (amber)	Status indicator: amber LED will light when an intrusion is detected in warning zone or the auxiliary output is activated
5	Power & Controls Connector	A DB-15 connector is provided for power and control connections
6	Intrusion Indicators	These LEDs will light when an intrusion is detected in the sector; 16 sectors total; Each sector = 11.25°
7	Serial Port Connector	A DB-9 connector is provided for RS-232
8	Diagnostic Display	Two 7-segment displays are provided for status and diagnostics
9	Scan Window	The window where the light is emitted and received
10	DeviceNet Connector	A 5-pole, M-12, male connector for DeviceNet interface (optional)



■ Specifications

Performance	Inputs
Response Time: < 80 ms (2 scans), add 40 ms for each additional scan (up to 15 additional scans max.)	EDM/MPCE Monitor: 50 mA @ 24 VDC
Light Source (Wave Length): Laser diode 905 nm	Start/Restart: 20 mA @ 24 VDC
Protection Zone Sets: 2	Zone Select 1 & 2: 20 mA @ 24 VDC
Object Resolution: 62 mm @ 4 m	Status Indicators: Machine Run, Machine Stop, Interlock, Aux. Out/Warning
Max. Safety Radius: 4 m	Two 7-segment displays for diagnostics
Max. Warning Radius: 15 m	16 Intrusion Indicator LEDs
Measurement Angle: 180°	Data Interface
Angle Resolution: 0.36°	Serial Port: RS-232 or RS-422 (optional); 9.6 K, 19.2 K, and 38.4 K Baud Rates
Max. Measurement Error: 135 mm	DeviceNet: For diagnostic data only (optional)
Laser Safety: Class 1 per IEC-60825.1 (2001) and CFR 21 1040.10 & 1040.11	Environmental
Min. Object Reflectivity: 1.8% (diffuse) @ 4 m	Operating Temperature: 0 to 50°C
Electrical	Storage Temperature: -25 to 70°C
Input Voltage (V_{in}): 24 VDC \pm 20%	Enclosure Rating: IP65
Input Power: 20 watts (without load on the outputs)	Relative Humidity: 95% max., noncondensing
Safety Output Ratings: Two PNP outputs sourcing 625 mA max @ V_{in} (see note 1). Short circuit protected.	Enclosure: Polyester powder painted die cast aluminum
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)	Dimensions: 155 x 177 x 156 cm
Warning zone (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)	Vibration: 5 to 60Hz maximum on all 3 axes in accordance with IEC 60028-2-6
Power Supply: 24 VDC \pm 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 40128 or equivalent.	Shock: 10g for 0.016 seconds, 1,000 shock for each axis on two axes in accordance with IEC 60028-2-29
	Weight: 4.35 kg.
	Maximum Cable Lengths
	RS-232: 15 m
	RS-422: 100 m
	DeviceNet: 6 m
	Controls and Outputs: 30 m
	Approvals/Conformities
	Approvals: CE, TUV, UL and CSA Category 3 EN954-1, Type 3 IEC 61496-3, UL 508

Specifications are subject to change without notice.

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

Note 2: Total current required by the two solid-state outputs, aux. output and the warning output should not exceed 1.45 A.

Note 3: Total system current requirement of the OptoShield is 2.3 A max. (scanner 850 mA + OSSD1 load + OSSD2 load + aux. output load + warning zone output)



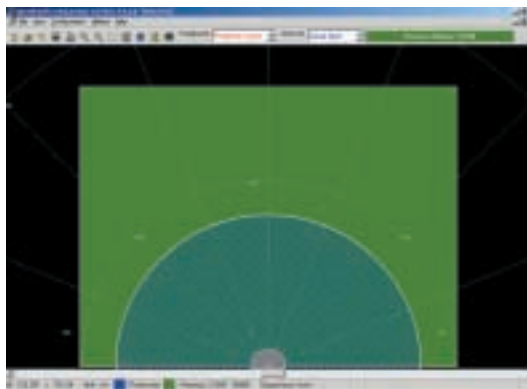
Go to the Engineering Guide
For in-depth information on safety standards and use.



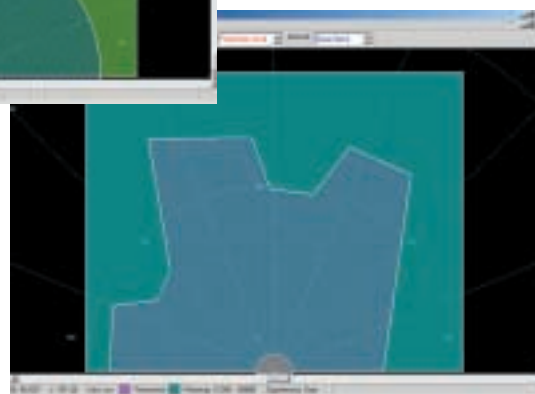
■ Configuration Parameters

The configuration parameters of the OptoShield are extremely versatile. There are two detection sets available, each one containing both a Warning Zone and a Safety Zone.

All zones can be created as a semicircle, a rectangle or even as a polygon created with multiple points. The semicircle and rectangle definitions can be changed with the input of actual dimensional data or by modification on the setup screen. A fourth method of zone definition is “sculpting” were the area is created as the OptoShield learns its environment. This learned zone can be further modified in the polygon editing process.

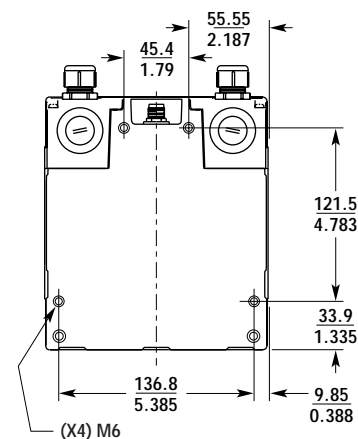
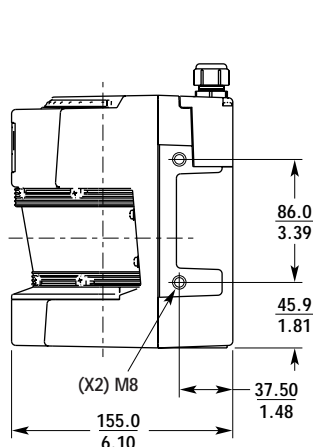
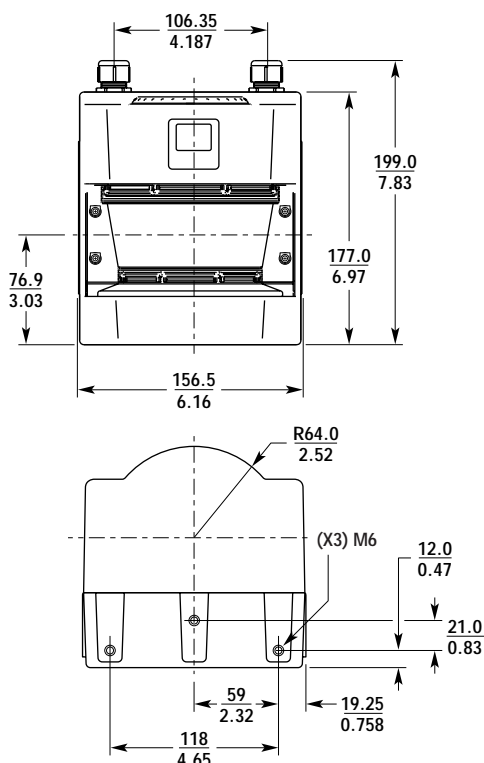


This screen illustrates a zone set with a semi-circle safety zone and a rectangular warning zone.



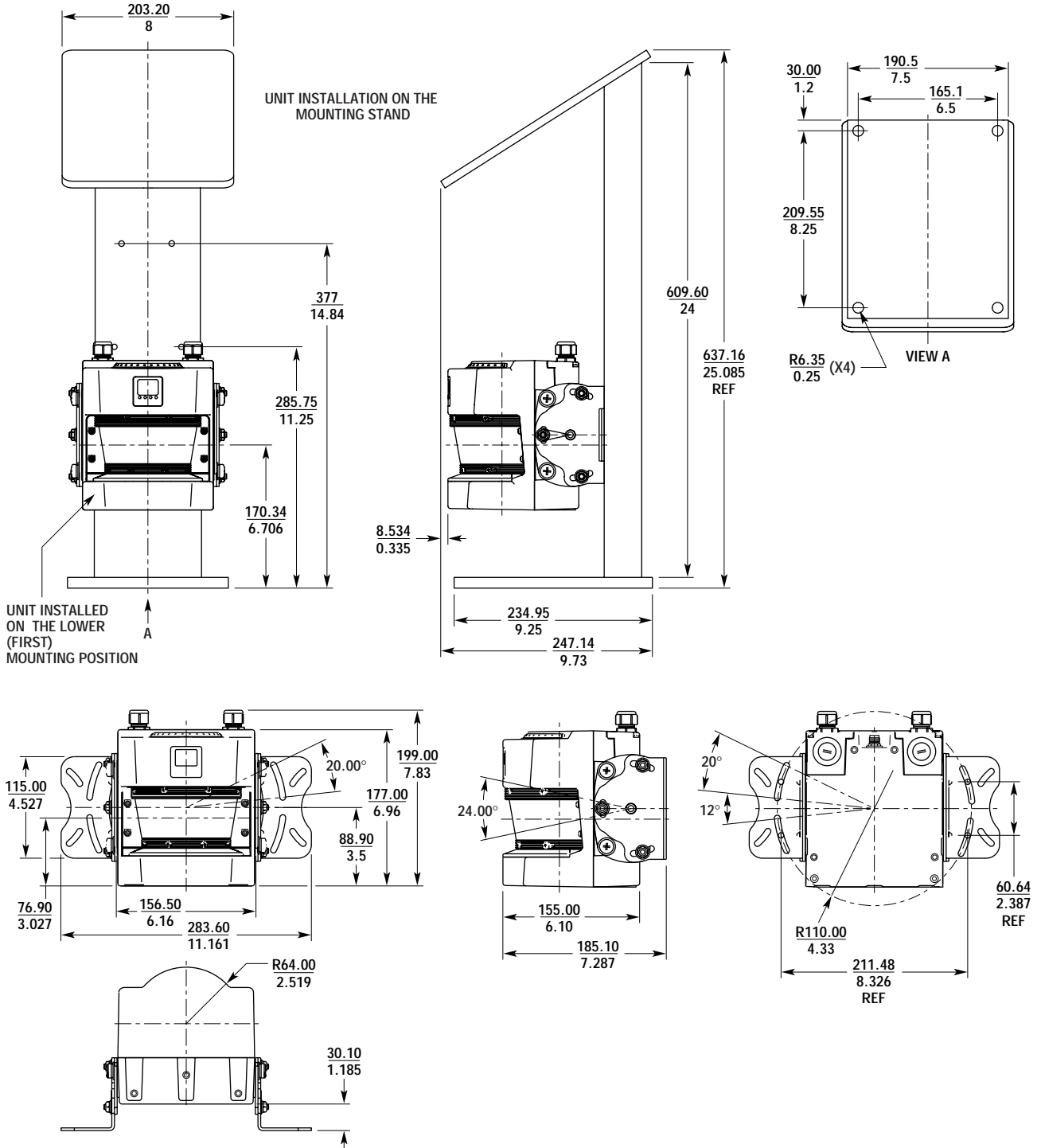
This screen illustrates a zone set with a polygon shaped safety zone and a rectangular warning zone.

■ Dimensions — mm/in.



■ Dimensions — mm/in. (continued)

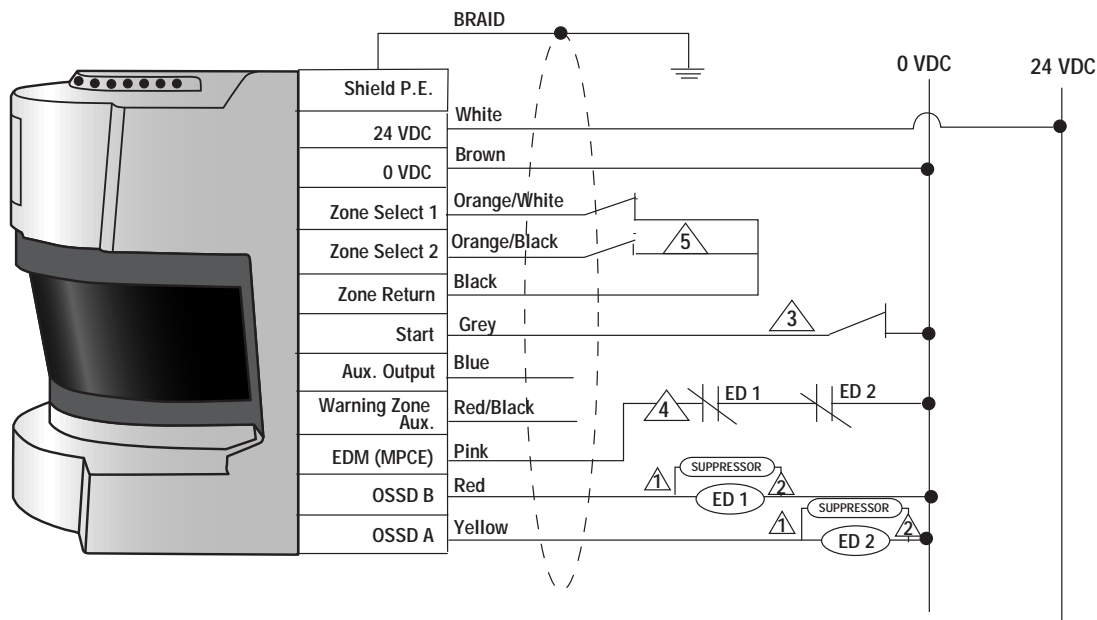
OS31-MT Mounting Stand



A Go to the Engineering Guide
For in-depth information on safety standards and use.

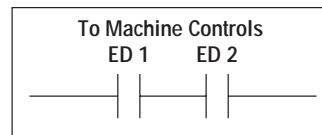
■ Wiring

Connecting Via Two Force-Guided Relays with EDM/MPCE Monitoring



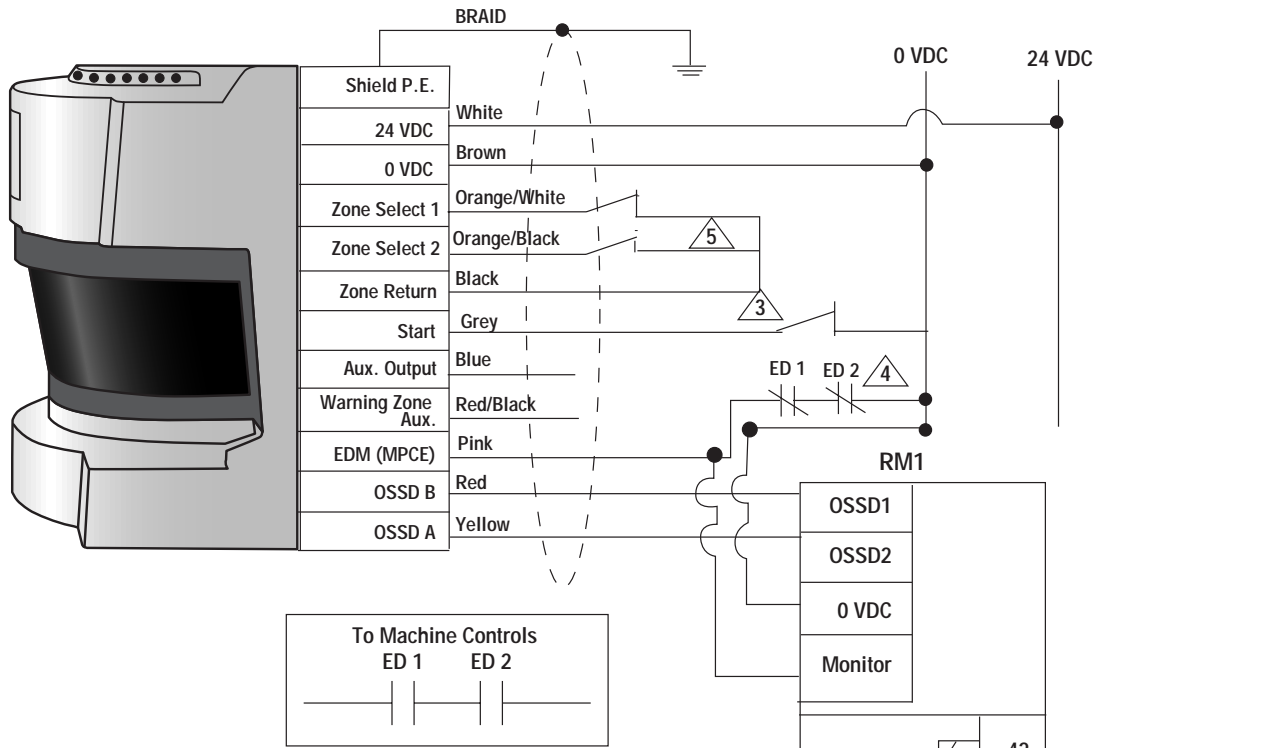
Notes:

- 1 The External Devices (ED1 & ED2) are force-guided relays
- 2 Verify that both External Devices are properly suppressed. Two Diodes-type (TVS) suppressors are provided with the Sensor
- 3 The Start input must be a Normally Closed switch
- 4 STI strongly recommends that the External Devices be monitored. In this example the External Devices (relays) are monitored by the OptoShield.
- 5 Refer to Section 8.1 in Manual - Installation and Configuration



■ Wiring (continued)

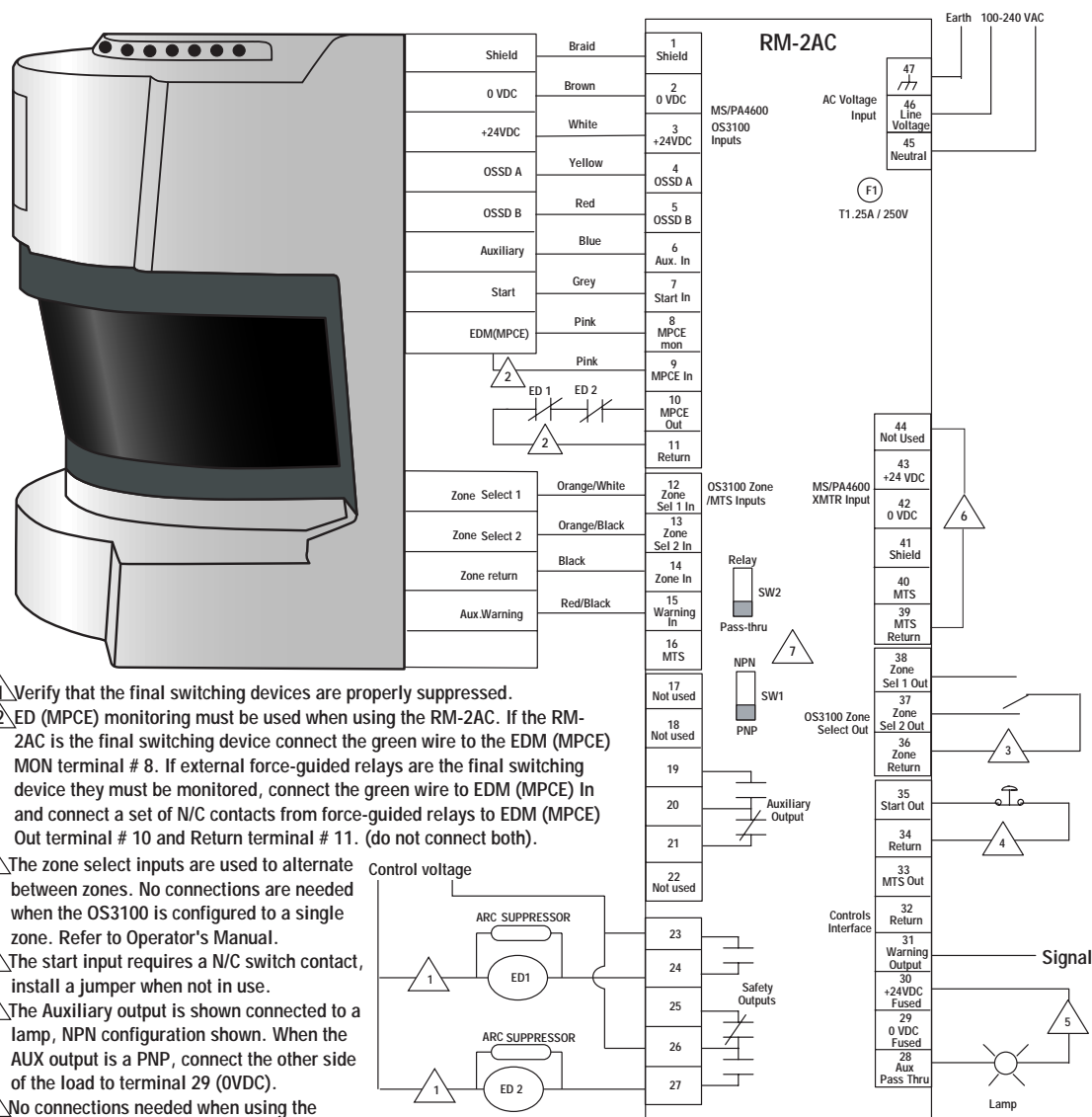
Connecting Via the RM-1 Module



- Notes:
- ⚠️ The External Devices (ED1 & ED2) are force-guided relays
 - ⚠️ Verify that both External Devices are properly suppressed. Two Diode-type (TVS) suppressors are provided with the Sensor
 - ⚠️ The Start input must be a Normally Closed switch
 - ⚠️ STI strongly recommends that the External Devices be monitored. In this example the RM-1 is monitored by the OptoShield. It is also possible for the OS3100 to monitor the external devices. Do not connect both.
 - ⚠️ Refer to Section 8.1 in Manual - Installation and Configuration

A Go to the Engineering Guide
For in-depth information on safety standards and use.

Connecting Via the RM-2AC Module



- 1 Verify that the final switching devices are properly suppressed.
- 2 ED (MPCE) monitoring must be used when using the RM-2AC. If the RM-2AC is the final switching device connect the green wire to the EDM (MPCE) MON terminal # 8. If external force-guided relays are the final switching device they must be monitored, connect the green wire to EDM (MPCE) In and connect a set of N/C contacts from force-guided relays to EDM (MPCE) Out terminal # 10 and Return terminal # 11. (do not connect both).
- 3 The zone select inputs are used to alternate between zones. No connections are needed when the OS3100 is configured to a single zone. Refer to Operator's Manual.
- 4 The start input requires a N/C switch contact, install a jumper when not in use.
- 5 The Auxiliary output is shown connected to a lamp, NPN configuration shown. When the AUX output is a PNP, connect the other side of the load to terminal 29 (0VDC).
- 6 No connections needed when using the OS3100.
- 7 Auxiliary output configuration switches.

■ Ordering an OS3100 System Kit

To order an OptoShield OS3100 system, simply fill in the fields in the model number sequence given below.

OS31 - - - - - - - -

1
 2
 3
 4
 5
 6
 7
 8

Example: OS31-2-PN-10PT-4C-B1

1 Information required. Represents the communication port configuration.

Designator	Description
2	RS-232

2 Information required. Represents the auxiliary output configuration.

Designator	Description
PN	PNP auxiliary

3 Information optional. Indicates DeviceNet interface option.

Designator	Description
RV	DeviceNet interface
(blank)	No DeviceNet interface

4 Information required. Represents the power/control cable length and mount type configuration.

Designator	Description
10PT	10 m cable with top mount
20PT	20 m cable with top mount
30PT	30 m cable with top mount

5 Information required. Represents the communication port cable length and mounting type configuration.

Designator	Description
2C	Com. port plug with 2 m removable cable
4C	Com. port plug with 4 m removable cable
5CT	5 m cable with top mount
(blank)	Com. port plug (only)

6 Information optional. Indicates DeviceNet cable.

Designator	Description
D	6 m DeviceNet cable
(blank)	No DeviceNet cable

7 Information optional. Indicates bracket kit.

Designator	Description
B1	Bracket kit
B2	Bracket kit with back plate
(blank)	No bracket kit

8 Information optional. Indicates RM resource module.

Designator	Description
RM1	RM-1 resource module
RMX	RM-X resource module
RM2A	RM-2AC resource module
(blank)	No resource module

 For information on Resource Modules, see page D100.

 For information on Accessories, see page D148.

Safety Standards and Precautions

The OS3100 is a presence sensing device used only for area safeguarding applications, such as around robots and workcells. The OS3100 meets ANSI/RIA R15.06-1999 and EN999:1998 optical configuration requirements for area safeguarding devices. OS3100 systems have been EC type examined to the requirements of IEC 61496-3 for a Type 3 ESPE. The OS3100 also meets the control reliability requirements of ANSI/RIA R15.06-1999.

The detection capability of the OS3100 is optimized for torso detection of personnel entering a hazardous area from the perimeter. It is not intended to be used for the detection of hands and fingers.

The OS3100 should only be used on machinery that can consistently and immediately stop anywhere in its cycle or stroke. Never use a OS3100 to guard the perimeter of a full revolution clutched power press or machine. If the OS3100 does not protect all access to the hazardous area, other appropriate devices such as mechanical guards must guard the unprotected access.

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.

■ Ordering an OS3100 in Spare Components

OptoShield OS3100

Part Number	Description
OS31-2-PN-0P	OptoShield with RS-232 serial port, PNP aux.output
OS31-2-PN-RV-0P	OptoShield with RS-232 serial port, PNP aux.output, DeviceNet

Optional Cables

Part Number	Description
OS31-10PT	Power cable w/ top mount connector 10 m long
OS31-20PT	Power cable w/ top mount connector 20 m long
OS31-30PT	Power cable w/ top mount connector 30 m long
OS31-5CT	Serial port cable with top mount connector, 5 m long
RS2-C4	4 m serial port cable (for temporary use only)
RS2-C2	2 m serial port cable (for temporary use only)
RV-6	DeviceNet cable 6 m (20 ft.)



OS31-5CT



RS2-C2 & RS2-C4

Mounting Hardware

Part Number	Description
OS31-BKT	OS31-BKT mounting bracket kit
OS31-BPT	OS31-BPT mounting back plate
OS31-MT	OS31-MT mounting stand



OS31-BKT



OS31-BPT



OS31-MT

Resource Modules

Part Number	Description
RM-1	Converts solid-state safety outputs to two safety relay outputs
RM-X	Converts solid-state safety outputs to one safety relay output
RM-2AC	Power supply, converts solid-state safety outputs to two safety relay outputs

Accessories

Part Number	Description
OS31-WIN-KT	OS31-WIN-KT window w/ gasket replacment kit
OS31-CLN-KT	OS31-CLN-KT window cleaning kit, anti-static cleaner
USB-RS2	USB-to-serial adapter
OS31-INST	OS3100 users manual
OS31-CFG	OS3100 configuration tool
OS31-CP	Communication port connector plug (spare)



OS31-CP



OS31-CLN-KT