



■ Description

The OS3101 OptoShield is an advanced, scanning laser, safety sensor with the ability to accommodate both irregular 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 a hazardous machinery. The outputs of the OptoShield source 625 mA to activate larger safety relays.

The OptoShield provides diagnostic communications never before available in a safety scanner. These include 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.

OptoShield® OS3101

Laser Light Safety Scanner

- Safety range of 4 m
- Configured via easy-to-use software
- Intrusion indicators immediately identify where the safety zone is encroached
- Two-digit numeric display for diagnostic codes
- LED indicators for status and diagnostics
- Two separate detection sets (each with one safety zone and one warning zone) can be externally selected
- Choice of two scanning configuration modes: graphic coordinate or sculpting
- Two PNP safety outputs designed to directly switch machine primary control elements (MPCE) at 625 mA, 24 VDC
- Auxiliary output for Warning Zone
- Operating Modes: Automatic Start, Start Interlock and Start/Restart Interlock
- EDM/MPCE monitoring
- No separate control box required
- Response time as fast as 80 ms
- Compact size – 155 x 182 x 156 mm (6.1 x 7.2 x 6.1 in.)

Options

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

■ Key Features

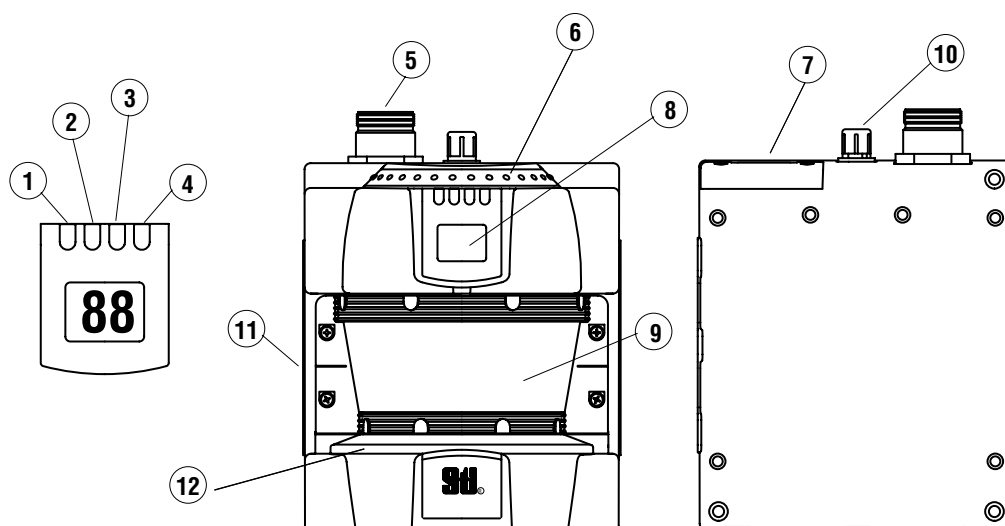
Diagnostic/Indicators

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



■ System Components

System Components and Indicators	Description
1 Machine Run (green)	Status indicator: green LED will light when no intrusion is detected in safety zone
2 Machine Stop (red)	Status indicator: red LED will light when an intrusion is detected in the safety zone
3 Interlock (yellow)	Status indicator: yellow LED will light (interlock) 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 14-pin mini-type 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 interface
8 Status/Diagnostic Display	Two 7-segment displays are provided for status and diagnostic information
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)
11 Scan Plane Indicator	This mark (arrow) indicates the exact location of the scan plane
12 Dust Ring	Dust detector cover with reflective surface



■ Specifications

Performance
Response Time: < 80 ms (2 scans), add 40 ms for each additional scan (up to 15 additional scans max.)
Light Source (Wave Length): Laser diode 905 nm
Protection Zone Sets: 2
Object Resolution: 62 mm @ 4 m
Max. Safety Radius: 4 m
Max. Warning Radius: 15 m
Measurement Angle: 180°
Angle Resolution: 0.36°
Max. Measurement Error: 135 mm
Laser Safety: Class 1 per IEC-60825.1 (2001) and CFR 21 1040.10 & 1040.11
Min. Object Reflectivity: 1.8% (diffuse) @ 4 m
Electrical
Input Voltage (V_{in}): 24 VDC ± 20%
Input Power: 20 watts (without load on the outputs)
Safety Output Ratings: Two PNP outputs sourcing 625 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)
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)
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. Omron STI part number 40128 or equivalent.

Inputs
EDM/MPCE Monitor: 50 mA @ 24 VDC
Start/Restart: 20 mA @ 24 VDC
Zone Select 1 & 2: 20 mA @ 24 VDC
Status Indicators: Machine Run, Machine Stop, Interlock, Aux. Out/Warning
Two 7-segment displays for diagnostics
16 Intrusion Indicator LEDs
Data Interface
Serial Port: RS-232 or RS-422 (optional); 9.6 K, 19.2 K, and 38.4 K Baud Rates
DeviceNet: For diagnostic data only (optional)
Environmental
Operating Temperature: 0 to 50°C
Storage Temperature: -25 to 70°C
Enclosure Rating: IP65
Relative Humidity: 95% max., noncondensing
Enclosure: Polyester powder painted die cast aluminum
Dimensions: 155 x 182 x 156 mm (6.1 x 7.2 x 6.1 in.)
Vibration: 5 to 60 Hz maximum on all 3 axes in accordance with IEC 60028-2-6
Shock: 10 g 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} - ≤2.0 VDC.

Note 2: Total current required by the two solid-state outputs, auxiliary 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 + auxiliary output load + warning zone output)

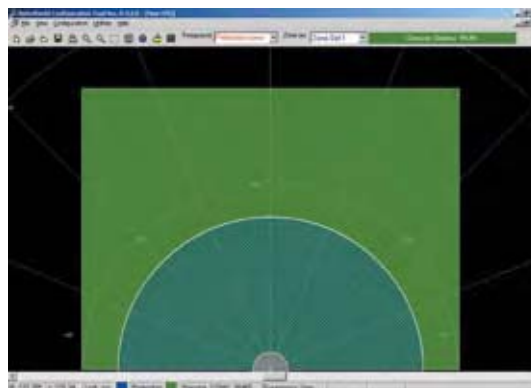


Go to the Engineering Guide
For in-depth information on safety standards and use.

■ Configuration Parameters

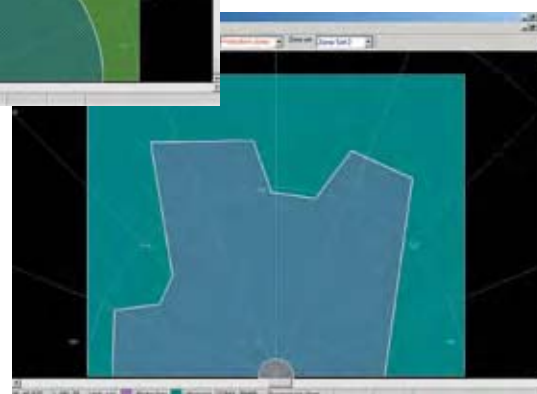
The configuration parameters of the OptoShield are extremely versatile. There are two detection sets available, each one containing both a Warning Zone and a Safety Zone.

All zones can be created as a semicircle, a rectangle or even as a polygon created with multiple points. The semi-circle 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” where the area is created as the OptoShield learns its environment. This learned zone can be further modified in the polygon editing process.

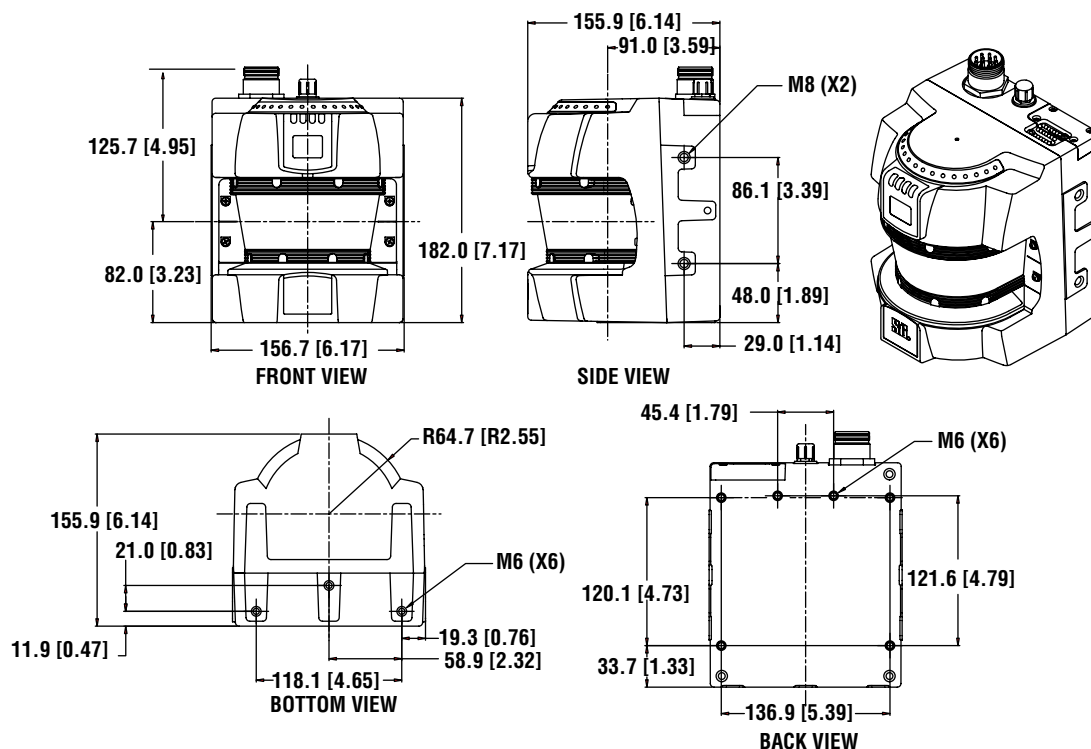


This screen illustrates a zone set with a semi-circle safety zone and a rectangular warning zone.

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

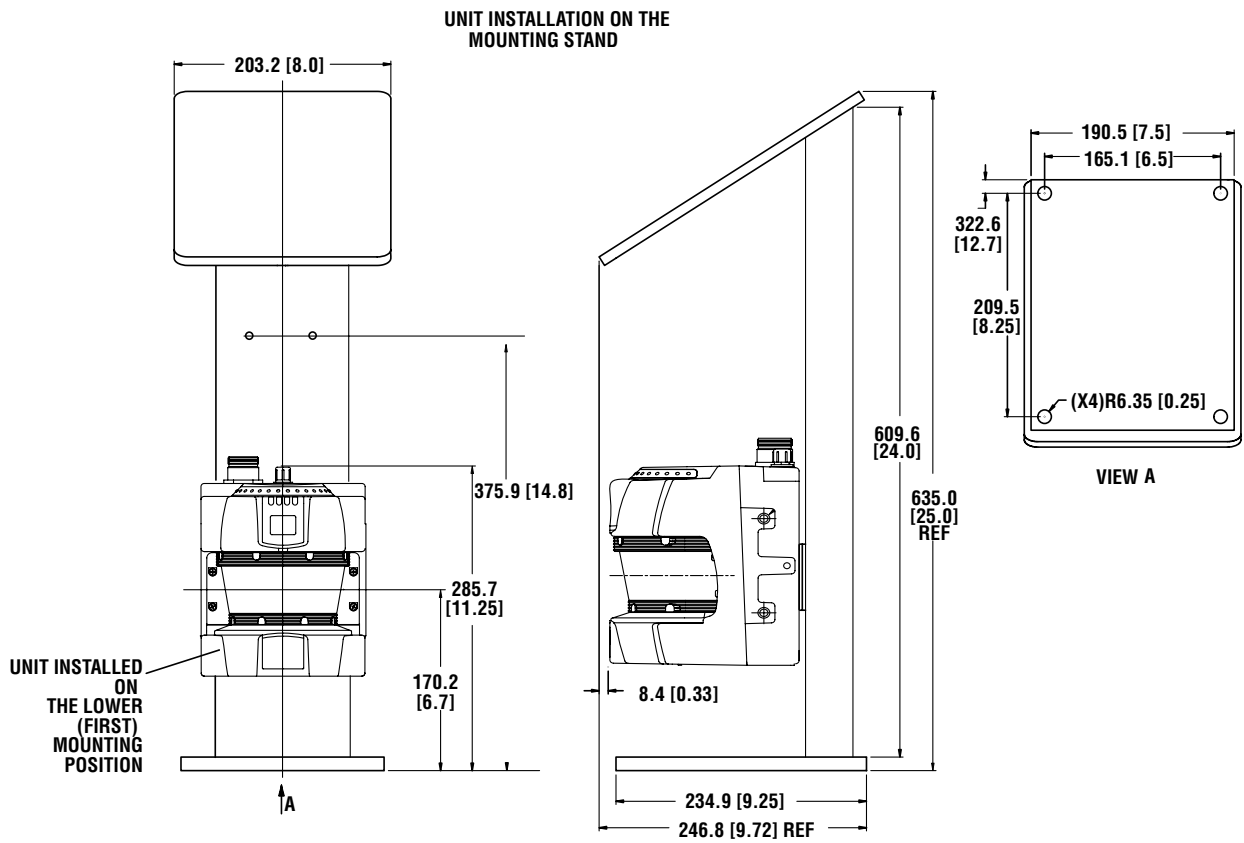


■ Dimensions — mm/in.



■ Dimensions — mm/in. (continued)

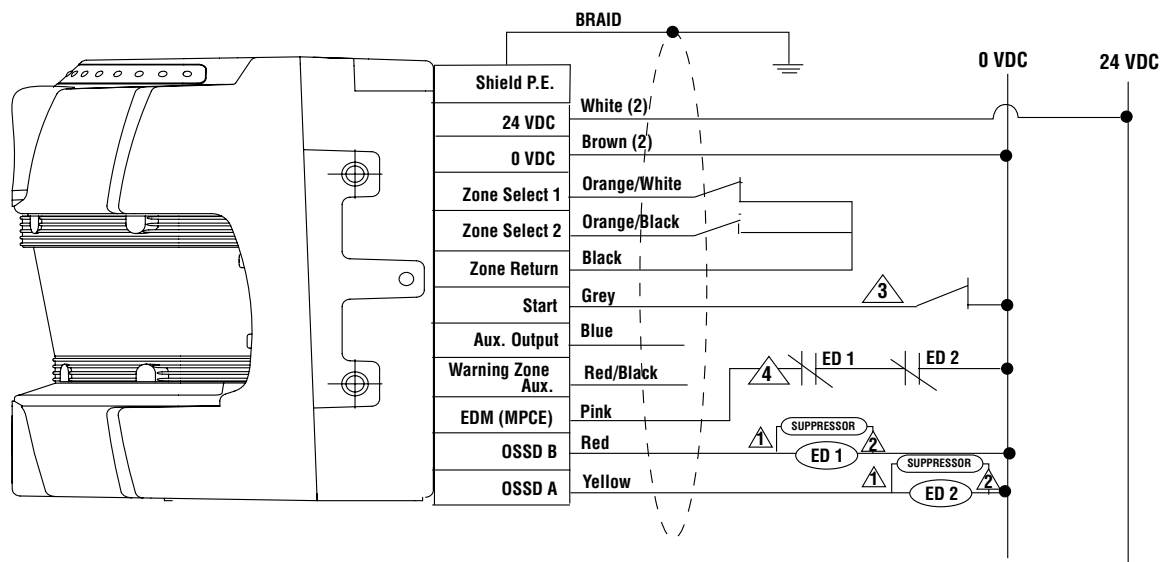
OS3101-MT Mounting Stand



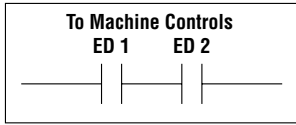
A **Go to the Engineering Guide**
For in-depth information on safety standards and use.

■ Wiring

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

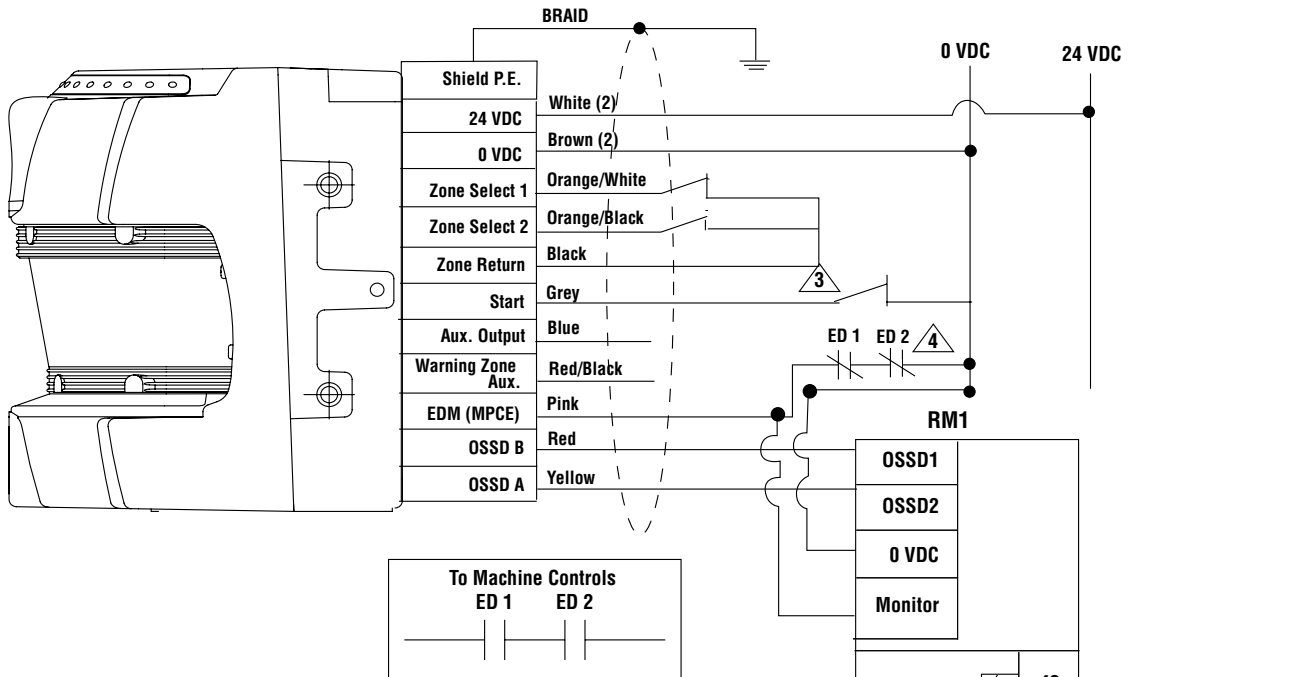


- Notes:**
- ⚠️ The External Devices (ED1 & ED2) are force-guided relays
 - ⚠️ Verify that both External Devices are properly suppressed. Two diode-type (TVS) suppressors are provided with the sensor
 - ⚠️ The Start input must be a Normally Closed switch
 - ⚠️ STI strongly recommends that the External Devices be monitored. In this example the External Devices (relays) are monitored by the OptoShield. Connect the pink wire to 0 VDC when EDM is not used.



■ Wiring (continued)

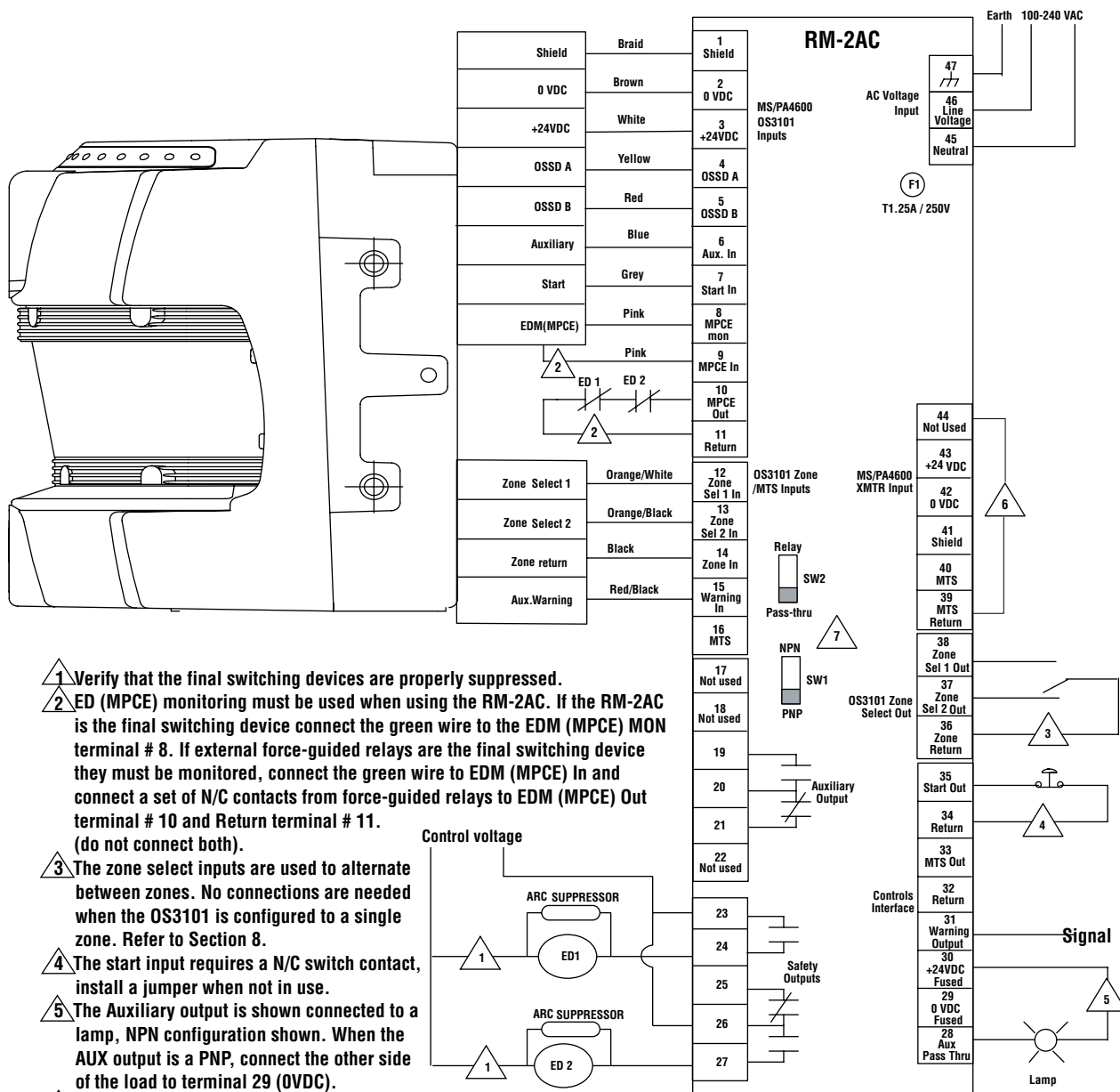
Connecting Via the RM-1 Module



- Notes:**
- ⚠ 1 The External Devices (ED1 & ED2) are force-guided relays
 - ⚠ 2 Verify that both External Devices are properly suppressed. Two diode-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 RM-1 is monitored by the OptoShield. It is also possible for the OS3101 to monitor the external devices. Do not connect both. Connect the pink wire to 0 VDC when EDM is not used.

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

Connecting Via the RM-2AC Module



■ Ordering an OS3101 System

To order an OptoShield OS3101 system, simply fill in the fields in the model number sequence given below.

OS3101 - - - - - - - -

1
 2
 3
 4
 5
 6
 7
 8

Example: OS3101-2-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.

Designator	Description
10PT	10 m cable
20PT	20 m cable
30PT	30 m cable

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
(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
RM2AP	RM-2AC-IP resource module, IP65
(blank)	No resource module

 For information on Resource Modules, see page D138

Safety Standards and Precautions

The OS3101 is a presence sensing device used only for area safeguarding applications, such as around robots and workcells. The OS3101 meets ANSI/RIA R15.06-1999 and EN999:1998 optical configuration requirements for area safeguarding devices. OS3101 systems have been EC type examined to the requirements of IEC 61496-3 for a Type 3 ESPE. The OS3101 also meets the control reliability requirements of ANSI/RIA R15.06-1999.

The detection capability of the OS3101 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 OS3101 should only be used on machinery that can consistently and immediately stop anywhere in its cycle or stroke. Never use a OS3101 to guard the perimeter of a full revolution clutched power press or machine. If the OS3101 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 OS3101 as Individual Components

OptoShield OS3101

Part Number	Description
OS3101-2-PN-0P	OptoShield with RS-232 serial port, PNP auxiliary output
OS3101-2-PN-RV-0P	OptoShield with RS-232 serial port, PNP auxiliary output, DeviceNet

Optional Cables

Part Number	Description
OS3101-CBL-10PT	Power cable, 10 m
OS3101-CBL-20PT	Power cable, 20 m
OS3101-CBL-30PT	Power cable, 30 m
OS3101-CBLXT-10M	Double-ended, quick-disconnect cable, 10 m
OS3101-CBLXT-20M	Double-ended, quick-disconnect cable, 20 m
OS3101-CBLXT-30M	Double-ended, quick-disconnect cable, 30 m
OS3101-PMC-2M	Bulkhead connector, 2 m leads
F39-RS2-C4	Serial port cable, 4 m (for temporary use only)
F39-RS2-C2	Serial port cable, 2 m (for temporary use only)
RV-6	DeviceNet cable, 6 m

Mounting Hardware

Part Number	Description
OS3101-BKT	OS3101-BKT mounting bracket kit
OS3101-BPT	OS3101-BPT mounting back plate
OS3101-MT	OS3101-MT mounting stand

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
RM-2AC-IP	Power supply, converts solid-state safety outputs to two safety relay outputs, IP65 enclosure

Accessories

Part Number	Description
OS3101-WIN-KT	OS3101-WIN-KT window with gasket replacement kit
OS3101-CLN-KT	OS3101-CLN-KT window cleaning kit, anti-static cleaner
USB-RS2	USB-to-serial adapter
OS3101-INST	OS3101 installation and operating manual
OS3101-CFG	OS3101 configuration tool
OS3101-DST-KT	OS3101-DST-KT dust ring window with gasket replacement kit



F39-RS2-C4 & F39-RS2-C2



OS3101-BKT



OS3101-BPT



OS3101-MT



OS3101-CLN-KT