SMARTSCAN INFORMATION

T4 SERIES
LIGHT CURTAINS
HANDBOOK

www.smartscan.com

INTRODUCTION

The T4 series safety light curtain from Smartscan is a full feature solution for 'high risk' machine guarding applications such as presses and injection moulding machines.

It provides the ideal solution for machine guarding applications requiring finger, hand or body protection with Scanning ranges from 0.5m to 20m. The model range includes detection lengths from 141mm up to 2391mm and 14mm, 30mm and 40mm Object Detection Capability (ODC). In addition the T4 series also includes a range of body detection light curtains for guarding around the perimeter of a dangerous machine.

The T4 series has an integrated dip switch to allow the user to select from a range of functions. A typical example would include the need to configure the floating blanking function when there is a requirement for an object to be positioned in the detection area of the T4 series light curtain.

To meet the demanding control requirements of the modern automation market the T4 series has a full range of sophisticated control features including, fixed blanking, floating blanking, muting, muting timers (mute time out, mute delay off and mute beam disparity), partial / learn fixed muting, External Device Monitoring (EDM), automatic or latched restart and restart interlock.

T4 Series Safety Light Curtains

The T4 series has a IP65 rating and includes flexible mounting brackets as standard. The Smartscan design team have positioned the status indication LEDs at the top of the safety light curtain where they provide greater visibility and ease of use for the operator.

In addition we have also designed a range of dedicated safety relay output units, the RY4 series. Included in the range is an innovative option with RJ45

INTRODUCTION

connection for a simple plug & play link between the light curtain and the safety relay unit. The unit is designed to simplify connection and help reduce installation time and costs for the customer.

The T4 series meets the very highest standards for safety – Third Party Approved for compliance to the latest European Standards including BS EN 61496-1 and BS IEC 61496-2. Rated as a Type 4 device the T4 series is suitable for ALL machine applications including those categorised 'high risk'.

T4 series safety light curtains – offer a full feature solution for all your 'high risk' industrial machine safety applications.

Typical machine safeguarding applications include:

❑ Press brakes
❑ Power presses
❑ Mechanical presses
❑ Robotic work cells
❑ Wood working machines
❑ Guillotines
❑ Metal folding machines
❑ Injection moulding machines

T4 series safety light curtains comply with British and International Safety Standards for safety light curtains BS EN 61496-1 and BS IEC 61496-2 Type 4. They are normally used in situations which demand a high level of safety integrity, where the risk assessment for the safety related parts of a control system, as indicated in EN ISO 13849 – 1, EN 62061 and (BS EN 954-1) determines a requirement up to and including PL e, SIL 3 and (Category 4) control equipment.

❑ **EC Type Examined**
❑ **Safety integrity classification EN ISO 13849 – 1, PL e, EN 62061 SIL 3**
❑ **Simple installation and alignment**
❑ **Up to 20m scanning range (model dependent)**
❑ **One year manufacturers warranty**

Features

- Integrated dip switch for function selection

- Muting inputs

- Dynamic floating blanking

- Fixed blanking (Individual beam blanking)

- Dual channel, fail-safe electronic safety outputs

- Partial muting

- Up to 20m scanning range (model dependent)

- Safety monitoring – External Device Monitoring (EDM)

- Automatic / Manual restart and restart interlock

- Flexible mounting options

- Diagnostic & status indication located at the top of the light curtain for greater visibility

- EN ISO 13849 – 1 PL e, EN 62061 SIL 3 and EN 954-1 Category 4

- EN 61496-1 & IEC 61496-2 Type 4

- Muting timers (mute time out, mute delay off and mute beam disparity)

- 2 auxiliary (non-safety) electronic outputs

- Robust twin chamber housing and IP65 rating for harsh wet environments

- Safety relay output unit with RJ45 connection to the light curtain for reduced installation time and cost

T4 SERIES SAFETY LIGHT CURTAIN

The Smartscan T4 series safety light curtain consists of the transmitter and receiver head and two connection cables that link the system.

The cables are connected via industry standard 8 pin M12 connectors to the bottom of the transmitter and receiver head. Adjustable mounting brackets are included as standard providing flexible mounting and adjustment. The diagram below shows the basic connection and status indication.
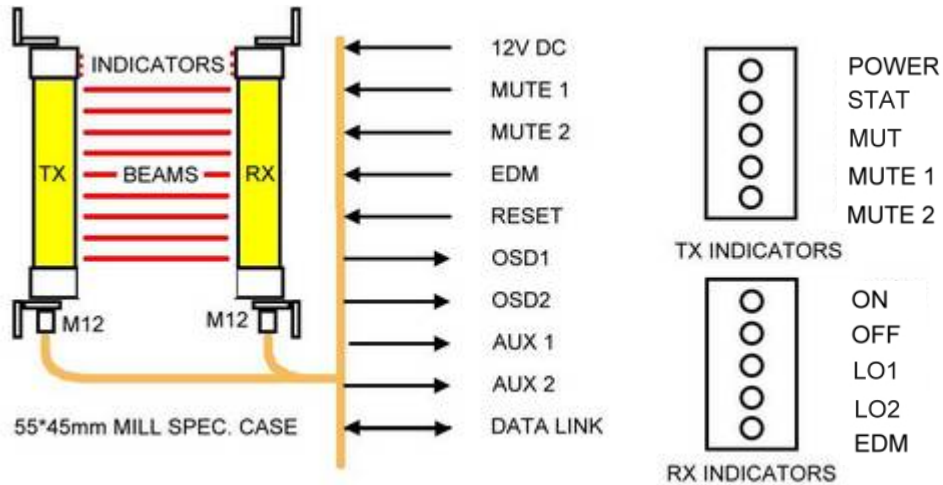
Relay Output Option

The T4 series incorporates two fail-safe electronic output switches as standard. If there is a requirement for relay output switching we provide a selection of dedicated units in the RY4 series or the Multifunction safety unit (MFU) 011-160.

The RY4 series of relays have been designed to provide easy connection of the T4 series. The units mirror the T4 series functions and offer a different number of normally open safety contacts.

In addition the RY4C offers simple RJ45 connection from the T4 series to the relay unit significantly reducing installation time and further simplifying connection.

Please refer to the Accessories Section for more information.

SPECIFICATION

T4 Series Light Curtains

Number of beams	2 - 128
Object detection	14mm, 30mm, 40mm plus perimeter guarding systems
Detection height	141 – 2391 mm
Range	Perimeter guard - 4 - 20 metres 0.5 - 6 metres 14 mm guard - 0.5 - 4 metres 30 mm guard - 0.5 - 6 metres 40 mm guard - 3 - 15 metres
Light type	Infra-Red 880nm
Response time	20ms
Operating temperature	0°C to +50°C
Light curtain enclosure	IP65 (H x W x D) H x 55 x 45
Status indicators	TX – Red LED = Power on (POWER) TX – Green LED = status indication on (STAT) TX – Yellow LED = muted (MUT) TX – Blue LED = mute 1 on (MUTE 1) TX – Blue LED = mute 2 on (MUTE 2) RX – Green LED = OSSDs on (ON) RX – Red LED = OSSDs off (OFF) RX – Yellow LED = lockout (LO1) RX – Yellow LED = lockout (LO2) RX – Yellow LED = EDM on (EDM)
Power supply requirement	24V DC 1A ±10%
Current consumption	500mA maximum
Light curtain connection	M12 - 8 way pin - IP65
Finish	Aluminium chromate treated, yellow polyester powder coated
Classification	BS EN 61496-1 Type 4 BS IEC 61496-2 Type 4 EN ISO 13849 – 1 PL e BS EN 62061 SIL 3 BS EN 954-1 Category 4
Warranty	1 Year

OUTPUTS	
Safety outputs OSSD1 & OSSD2	Electronic 50 mA
Status output	Electronic 50 mA
Mute output	Electronic 50 mA
Status and mute indication	Status & condition LEDs on the light curtain

SPECIFICATION

INPUTS	
Safety monitoring (EDM)	ON = +24V DC (3mA)
Reset	ON = +24V DC (3mA)
Mode select	Auto restart with EDM, manual (latched) restart, floating blanking, fixed blanking, mute delay off time, mute disparity, mute time out, partial / fixed muting, and restart interlock.
Muting	ON = +24V DC (3mA) Dual Mute Inputs

LIGHT CURTAIN MODEL LIST

T4 Range of Light Curtains 14mm ODC (0.5 - 4 metres range)

Model number	Number of beams	Detection height (mm)	Overall length (L) mm	Weight (TX + RX) Kg
052-101	16	141	317	1.25
052-102	32	291	467	1.87
052-103	48	441	617	2.57
052-104	64	591	767	3.14
052-105	80	741	917	4.03
052-106	96	891	1067	4.78
052-107	112	1041	1217	5.43
052-108	128	1191	1367	6.29

T4 Range of Light Curtains 30mm ODC (0.5 - 6 metres range)

Model number	Number of beams	Detection height (mm)	Overall length (L) mm	Weight (TX + RX) Kg
052-301	6	141	317	1.15
052-302	12	291	467	1.72
052-303	18	441	617	2.32
052-304	24	591	767	2.88
052-305	30	741	917	3.50
052-306	36	891	1067	4.10
052-307	42	1041	1217	4.70
052-308	48	1191	1367	5.50
052-309	54	1341	1517	5.12
052-310	60	1491	1667	6.62
052-311	66	1641	1817	7.19
052-312	72	1791	1967	7.90
052-313	78	1941	2117	8.50
052-314	84	2091	2267	9.15
052-315	90	2241	2417	9.60
052-316	96	2391	2567	10.47

LIGHT CURTAIN MODEL LIST

T4 Range of Light Curtains 40mm ODC (3 -15 metres range)

Model number	Number of beams	Detection height (mm)	Overall length (L) mm	Weight (TX + RX) Kg
052-401	6	141	317	1.15
052-402	12	291	467	1.72
052-403	18	441	617	2.32
052-404	24	591	767	2.88
052-405	30	741	917	3.50
052-406	36	891	1067	4.10
052-407	42	1041	1217	4.70
052-408	48	1191	1367	5.50
052-409	54	1341	1517	5.12
052-410	60	1491	1667	6.62
052-411	66	1641	1817	7.19
052-412	72	1791	1967	7.90
052-413	78	1941	2117	8.50
052-414	84	2091	2267	9.15
052-415	90	2241	2417	9.60
052-416	96	2391	2567	10.47

T4 Range for Perimeter Guarding (Torso Detection) 4 - 20 metres range

Model Number	Number of beams	Detection Zone	Overall length (L) mm	Weight (TX + RX) Kg
052-612	Two x 6 beam clusters	600mm	776	2.75
052-613	Three x 6 beam clusters	900mm	1076	3.95
052-614	Three x 6 beam clusters	1200mm	1376	5.25

T4 Range for Perimeter Guarding (Torso Detection) 0.5 - 6 metres range

Model number	Number of beams	Detection Zone	Overall length (L) mm	Weight (TX + RX) Kg
052-605	Two x 6 beam clusters	600mm	776	2.75
052-606	Three x 6 beam clusters	900mm	1076	3.95
052-607	Three x 6 beam clusters	1200mm	1376	5.25

LIGHT CURTAIN MODEL LIST

Interconnect Cables – M12

Model number	Length (m)
051-005	5
051-010	10
051-020	20

Interconnect Cables – M12 / RJ45 for use with RY4C relay unit (020-015)

Model number	Length (m)
051-030	5
051-035	10
051-040	20

ACCESSORIES

The Smartscan RY4 series provides dedicated relay output switching options that may be used with the T4 series safety light curtain.

In addition the RY4 series relays have been designed to provide easy connection of the T4 series safety light curtain. The units mirror the T4 series functions for simple connection and offer a different number of normally open safety contacts for increased flexibility. The units when used in conjunction with the T4 series are suitable for all applications where the control system is rated as BS EN 954-1 Category 4, EN ISO 13849 – 1 PL e and EN 62061 SIL 3.

Model number	Description
020-005	RY4A Safety Relay for T4 series 2 N/O & 1 N/C
020-010	RY4B Safety Relay for T4 series 3 N/O & 1 N/C
020-015	RY4C Safety Relay for T4 series 3 N/O & 1 N/C RJ45 Connection

RY4A – The RY4A provides a simple low cost safety relay output option for the T4 series.

2 normally open safety relay contacts rated at 250V AC, 6A and 1 normally closed auxiliary (non-safety) contact rated at 250V AC, 6A. T4 series functions mirrored include, auto/manual reset, EDM, mute inputs, mute output and status.

RY4B – Additional contacts offer a more versatile safety relay option when integrating into more complex applications.

3 normally open safety relay contacts rated at 250V AC, 6A, and 1 normally closed auxiliary (non-safety) relay contact rated at 250V AC, 6A. T4 series functions mirrored include, auto/manual reset, EDM, mute inputs, mute output and status.

RY4C – Combines RJ45 cable connection for simple plug and play connection of the T4 series safety light curtain with additional contacts for a versatile safety relay option when integrating into more complex applications.

3 normally open safety relay contacts rated at 250V AC, 6A, and 1 normally closed auxiliary (non-safety) relay contact rated at 250V AC, 6A. T4 series functions mirrored include, auto/manual reset, EDM, mute inputs, mute output and status

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ACCESSORIES

MFU Relay

The Smartscan Multifunction Safety Unit (MFU) 011-160 can be used to provide a relay output option for the T4 series. The 011-160 allows two T4 Series safety light curtains to be connected to the one safety relay unit in addition to its control functions.

Model number	Description
011-160	Safety relay outputs with two dual safety light curtain inputs and E-Stop connection

MFU Type 011-160
It has two sets of inputs for connecting up to two T4 series safety light curtains. The monitored output switching contacts are rated at 250V AC, 2A with two additional electronic outputs for status indication etc. Other features include selectable auto/manual reset modes, external device monitoring (EDM), inputs for the emergency stop function and LED indicators for all input and output channels.

The unit is automatically self-testing and with simultaneous monitoring between related channels it ensures the unit can be used where the control system is rated as BS EN 954-1, CAT 4, EN ISO 13849 – 1 PL e and EN 62061 SIL 3

Reset Station

The reset station provides the user with a guard reset function and guard status indication. It is mounted in a robust enclosure with a bright LED lamp. 6 mm screw size mounting brackets are provided at the top and bottom. Each unit comes with an integrated 10m connection cable for interface via a RY4 series relay unit or the multifunction safety unit (MFU), 011-160.

| Model number	Description
012-302	Push button reset station with trip indication
012-303	Key reset station with trip indication

ACCESSORIES

Mirror Units

Two or three sides of a machine can be safeguarded with a single light curtain by using mirrors to deflect the light curtain's infra-red beams.

The Smartscan mirror system provides a sturdy floor mounting kit together with an aluminium column for mounting the mirror. The mirror assembly simply slots onto the column and can be adjusted to the height required for the application.

The special mounting stand enables the mirror unit to be rotated through 360 degrees while also allowing full adjustment in all axes.

Universal Mounting Column

Mirror Unit

Floor Stand
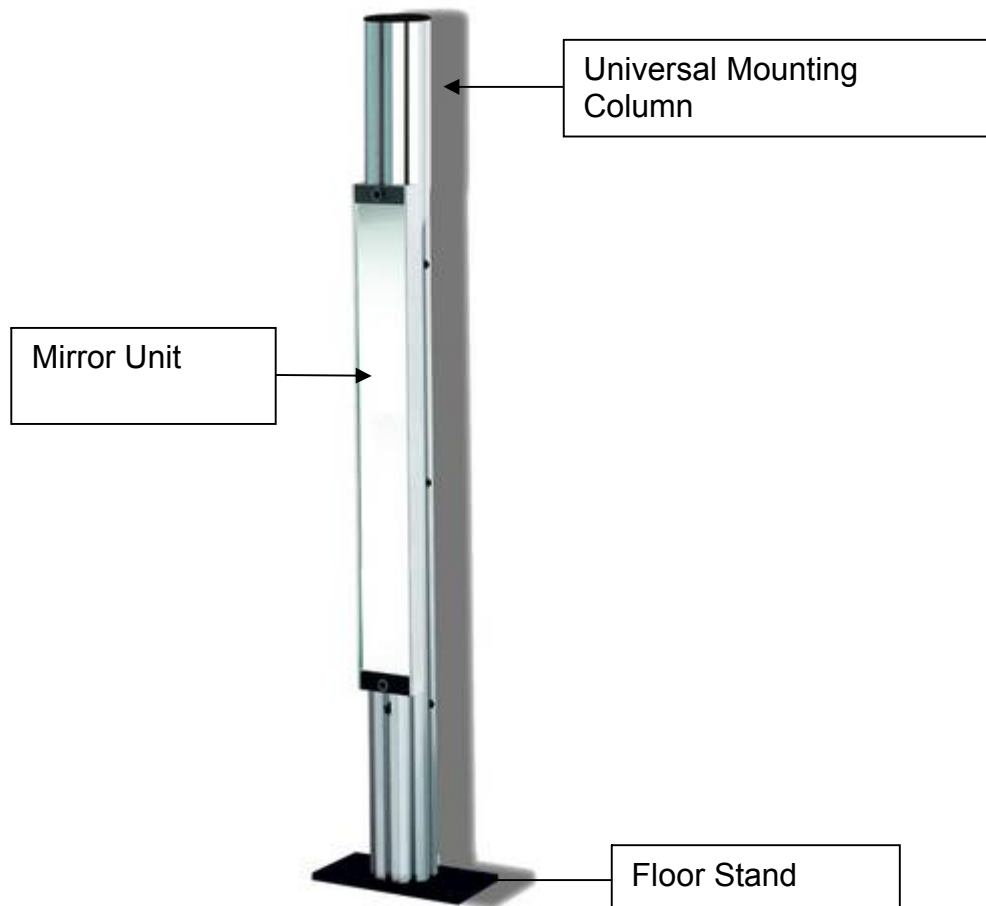
Note: Mirrors cause a reduction in optical efficiency, reducing the effective range of the light curtain. Contact Smartscan or your local Distributor for guidance.

ACCESSORIES

Range of the light curtain	Maximum range through 1 mirror	Maximum range through 2 mirrors
3m – 15m	9m	6m

Mirrors

Model number	Description
044-252	600mm x 110mm wide mirror unit
044-249	900mm x 110mm wide mirror unit
044-250	1200mm x 110mm wide mirror unit
044-253	1400mm x 110mm wide mirror unit

Note: Mirror length must be a minimum of 100mm longer than the overall length of the light curtain to be installed.

Column & Floor Stand

Model number	Description
044-256	1.1m aluminium universal mounting column
044-257	1.3m aluminium universal mounting column
044-258	1.6m aluminium universal mounting column
044-247	1.8m aluminium universal mounting column
044-248	Floor stand

Note: A universal mounting column and floor stand is required for each mirror unit.

ACCESSORIES

Power Supply

If a suitable stabilised 24V DC, 2.5A power supply is not available the following unit is recommended.

Model number	Description
112-027	Power supply Input 85 - 264V AC Output 24V DC, 2.5A

Features
- High reliability
- High efficiency, low working temp
- Built in EMI filter, low ripple noise
- Compact size, lightweight
- Short circuit, over load, over voltage protection
- Approvals: UL, TUV, CB, and CE

Specification

Type	Switch mode
Input Voltage	85 - 264V AC
Input frequency	47-63HZ
Inrush current	Cold start, 24A, 115V & 50A, 230V
Output voltage/current rating	24V DC, 2.5A
Operating temperature	0°C to 50°C
Storage temperature	-10°C to +70°C
Connection	5P/9.5mm pitch terminal block
Enclosure	160x98x38mm Din rail mounting
Weight	0.5 Kg.

ACCESSORIES

Mounting Stands

Designed to accommodate our complete range of safety light curtains:

The **Adjustable Stand** (50mm x 50mm) offers the user a flexible mounting option. The stand has adjustable brackets that allow the safety light curtain to be mounted at different positions to suit a specific application.

The **Channel Stand** allows the user to mount the safety light curtain inside a protective housing. This provides protection on three sides to give a more robust installation. Channel stands would typically be used where the safety light curtain is at risk of damage from fork lift truck operations.

Adjustable Mounting Stands

Straight stands

Model number	Description	Height
044 – 408	Pair of adjustable straight stands (with complete bracket set)	2m
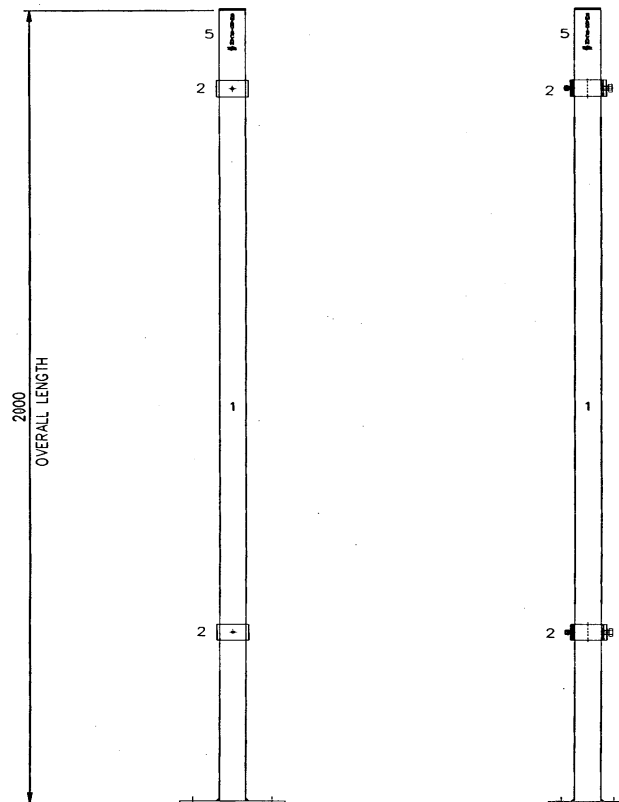
ACCESSORIES

Channel Mounting Stands

Straight stands

Model number	Description	Height
044 - 118	Pair of channel floor stands (straight)	1.5m
044 – 218	Pair of channel floor stands (straight)	2m

ø5 HOLE THRO'

DESIGN A

SECTION SHOWN
FOOT AS SHOWN
WELD 4mm TOP PLATE AT 'B'
WELD 4mm PLATE AT 'C'
BASE 12mm OR
1/2" THICK

H1

110

20

SLOT 20 WIDE x
60 LONG THROUGH
BOTH WEBS
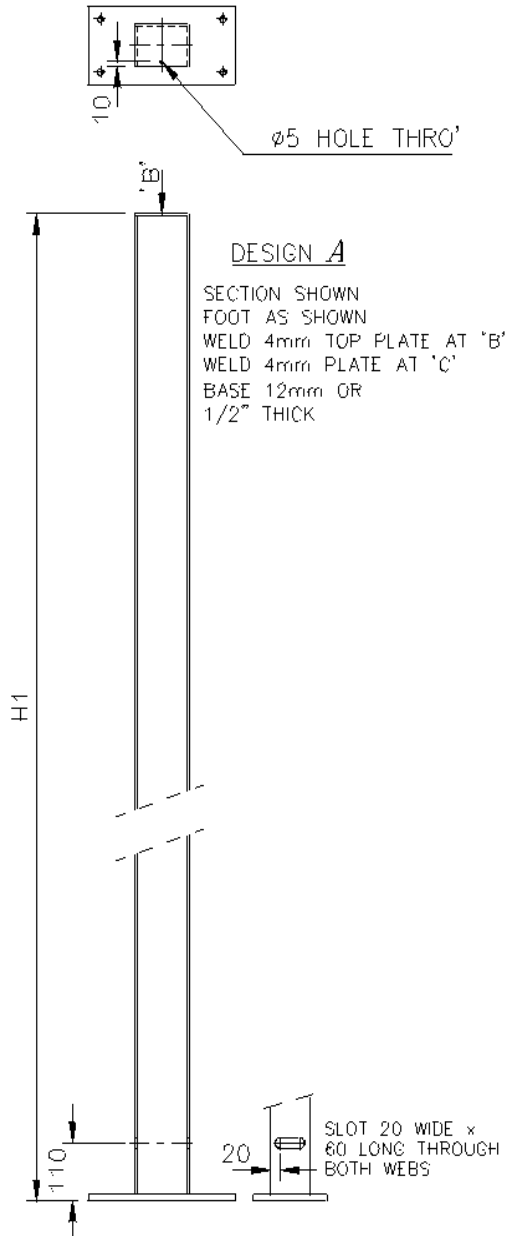
SAFETY SYSTEM SOLUTIONS

Smartscan recognise the difficult balance that customers have to make between meeting Health & Safety legislation requirements and managing their demanding production needs.

Smartscan design and manufacture systems to meet the particular needs of the customer's safety applications - from single machines to full production lines.

We provide our customers with a total service, from initial safety advice through to regular maintenance of their safety systems.

Expert Advice	Risk Assessment
Safety System Design	Product Specification
Safety System Installation	System Maintenance