Sensing edges ........................................ 459
Sensing edges with V profile construction .... 460
Control units for sensing edges and safety mats . 461
Wireless control system .............................. 461
Safety mats ........................................... 462
Heavy duty Armormats .............................. 464
Very heavy duty mats ................................. 464
Tapeswitch edges and mats utilise ribbon switch technology. Ribbon switches provide a reliable normally open switch that is manufactured to the customer’s required length.

When pressure is applied to any point along the top of the edge or mat, the contacts are forced together closing the switch. Wires are connected to the end of the switch and sealed to provide an IP65 rating, various connection options allow signalling or safety switching to be achieved. The diagram below shows the simple but effective construction.

Safety applications
To achieve fail safe switching Tapeswitch products must be used with a safety control unit.

The diagram below illustrates the principle of using a 4 wire switch with a controller to achieve fail safe switching.

Current limiting function
The 24V d.c. supply with a current limiting function provides power to the safety circuit and output relays, via the Tapeswitch switch. If the switch is actuated or a connection lost the reset circuit and relays are de-energised.

Failsafe 2 wire control
Failsafe 2 wire control can be achieved by fitting a resistor or zener diode inside the ribbon switch. The control unit monitors this value and if the switch is actuated or goes open circuit the control unit de-energises the relays and reset circuit.

Some manufacturers only supply safety mats in standard sizes, so customers often compromise between their actual requirements and the size of mats available.

With Tapeswitch safety mats, you don’t need to compromise. All their safety mats can be manufactured to the exact size you need. Odd shapes are also possible. UK production ensures lead times are short enough to satisfy most projects and end-user requirements.
TS sensing edges

TS sensing edges are pressure sensitive devices designed to protect personnel and equipment from being trapped or crushed by moving parts.

Consisting of a continuous ribbon switch within a flexible outer housing, they are all fitted using an aluminium mounting channel (supplied with each switch).

Range features

- 2- or 4-wire safety wiring
- Simple, reliable technology
- Durable construction
- Simple to install
- Made in Britain and quickly supplied, finished to required length
- Supplied with a flat, aluminium mounting channel as standard (other mounting options are available)
- All edges are supplied with end caps

Range technical specification

Protection rating: IP65
Operating temperature: -20 to +50°C
Recommended max voltage: 30V d.c.
Switching current: 1A max
Housing material: PVC
Typical weight: 300g/m

Description | Order Code | Basic Cost | Cost per m |
---|---|---|---|
2-wire sensing edge | TS6/LCA/XXXX/2W/BLACK | £66.70 | £23.82 |
4-wire sensing edge | TS6/LCA/XXXX/4W/BLACK | £66.70 | £23.82 |

The order code for a 4-wire, 2m sensing edge would be: TS6/LCA/2000/4W/BLACK and the list price would be: £114.34 (XXXX is your required length in mm)

TS6 – 16mm, low profile

A low profile, mini edge designed for pinch point applications which require a pressure sensitive switch, but with added cushioning.

Technical specification

Actuating force: <55N (5.5kg)
Overtravel movement to 250N: 1mm
Actuating distance: approx. 3.5mm
Housing material: PVC
Typical weight: 300g/m

TS16S – 22mm

A small sensing edge which is ideal for control and safety based applications where space is restricted.

Technical specification

Actuating force: <120N (12kg)
Overtravel movement to 250N: 2mm
Actuating distance: approx. 3.5mm
Housing material: PVC
Typical weight: 350g/m

TS47 – 52mm

A highly sensitive, durable sensing edge typically used in applications which require immediate activation with considerable overtravel.

Technical specification

Actuating force: <120N (6kg)
Overtravel movement to 250N: 24mm
Actuating distance: approx. 2mm
Housing material: Santoprene
Typical weight: 1100g/m

Control units

PSR/2 | PSRU/4

See page 461
TS sensing edges with V profile construction

TS sensing edges with V profile construction are pressure sensitive devices that respond to head-on or side activation. Consisting of a continuous ribbon switch within a flexible outer housing, they are all fitted using an aluminium mounting channel (supplied with each switch).

**Range features**
- 2- or 4-wire safety wiring
- Simple, reliable technology
- Durable construction
- Simple to install
- Made in Britain and quickly supplied, finished to required length
- Supplied with a flat, aluminium mounting channel as standard (other mounting options are available)
- All edges are supplied with end caps

**Range technical specification**

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>Basic Cost</th>
<th>+</th>
<th>Cost per m</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire sensing edge</td>
<td>TS26/LCA/XXXX/2W/BLACK £113.98 £47.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-wire sensing edge</td>
<td>TS26/LCA/XXXX/4W/BLACK £113.98 £47.34</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A compact and durable sensing edge ideal for a wide range of safety applications.

**TS26C – 39mm**

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>Basic Cost</th>
<th>+</th>
<th>Cost per m</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire sensing edge</td>
<td>TS26/LCA/XXXX/2W/BLACK £113.98 £47.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-wire sensing edge</td>
<td>TS26/LCA/XXXX/4W/BLACK £113.98 £47.34</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The order code for a 4-wire, 2m sensing edge would be: TS26/LCA/2000/4W/BLACK and the list price would be: £208.66 (XXXX is your required length in mm)

**TS28 – 44mm**

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>Basic Cost</th>
<th>+</th>
<th>Cost per m</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire sensing edge</td>
<td>TS28/LCA/XXXX/2W/BLACK £119.84 £53.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-wire sensing edge</td>
<td>TS28/LCA/XXXX/4W/BLACK £119.84 £53.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The order code for a 4-wire, 2m sensing edge would be: TS28/LCA/2000/4W/BLACK and the list price would be: £226.24 (XXXX is your required length in mm)

**TS48 – 55.5mm**

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>Basic Cost</th>
<th>+</th>
<th>Cost per m</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire sensing edge</td>
<td>TS48/LCA/XXXX/2W/BLACK £119.56 £60.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-wire sensing edge</td>
<td>TS48/LCA/XXXX/4W/BLACK £119.56 £60.74</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The order code for a 4-wire, 2m sensing edge would be: TS48/LCA/2000/4W/BLACK and the list price would be: £241.04 (XXXX is your required length in mm)

**TS sensing edges with V profile**

Some of the options available:
- Sensing edge colour
- Connection type/lead length
- Mounting options and material
- Signalling edges for non-safety applications
- Built-in LED indication
- Custom branding

Please call 01254 685900 to discuss your requirements

**CUSTOM DESIGNS AVAILABLE**

Safety standards are applicable when sensing edges are used with Tapeswitch control units.

**TS sensing edges with V profile**

TS sensing edges with V profile construction are pressure sensitive devices that respond to head-on or side activation. Consisting of a continuous ribbon switch within a flexible outer housing, they are all fitted using an aluminium mounting channel (supplied with each switch).

**Range features**
- 2- or 4-wire safety wiring
- Simple, reliable technology
- Durable construction
- Simple to install
- Made in Britain and quickly supplied, finished to required length
- Supplied with a flat, aluminium mounting channel as standard (other mounting options are available)
- All edges are supplied with end caps

**Range technical specification**

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>Basic Cost</th>
<th>+</th>
<th>Cost per m</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire sensing edge</td>
<td>TS26/LCA/XXXX/2W/BLACK £113.98 £47.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-wire sensing edge</td>
<td>TS26/LCA/XXXX/4W/BLACK £113.98 £47.34</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A compact and durable sensing edge ideal for a wide range of safety applications.

**TS26C – 39mm**

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>Basic Cost</th>
<th>+</th>
<th>Cost per m</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire sensing edge</td>
<td>TS26/LCA/XXXX/2W/BLACK £113.98 £47.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-wire sensing edge</td>
<td>TS26/LCA/XXXX/4W/BLACK £113.98 £47.34</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The order code for a 4-wire, 2m sensing edge would be: TS26/LCA/2000/4W/BLACK and the list price would be: £208.66 (XXXX is your required length in mm)

**TS28 – 44mm**

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>Basic Cost</th>
<th>+</th>
<th>Cost per m</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire sensing edge</td>
<td>TS28/LCA/XXXX/2W/BLACK £119.84 £53.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-wire sensing edge</td>
<td>TS28/LCA/XXXX/4W/BLACK £119.84 £53.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The order code for a 4-wire, 2m sensing edge would be: TS28/LCA/2000/4W/BLACK and the list price would be: £226.24 (XXXX is your required length in mm)

**TS48 – 55.5mm**

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>Basic Cost</th>
<th>+</th>
<th>Cost per m</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire sensing edge</td>
<td>TS48/LCA/XXXX/2W/BLACK £119.56 £60.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-wire sensing edge</td>
<td>TS48/LCA/XXXX/4W/BLACK £119.56 £60.74</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The order code for a 4-wire, 2m sensing edge would be: TS48/LCA/2000/4W/BLACK and the list price would be: £241.04 (XXXX is your required length in mm)

**TS sensing edges with V profile**

Some of the options available:
- Sensing edge colour
- Connection type/lead length
- Mounting options and material
- Signalling edges for non-safety applications
- Built-in LED indication
- Custom branding

Please call 01254 685900 to discuss your requirements
Control units for sensing edges and safety mats

**Features**
- Replaces vulnerable cable runs
- Ideal for sliding gates/roller shutter doors
- Interfaces with Tapeswitch's 2-wire safety edges
- Accepts test pulses from most door control systems
- Up to 6 transmitters can communicate with each receiver
- Easy to install

**Range technical specification**
- Safety performance: $\text{PFH}_d = 1.03 \times 10^{-7}$
- Operating temperature: $-10 \text{ to } +50^\circ\text{C}$
- Reset function: Auto or manual
- Supply voltage: 24V d.c.
- Device type: Safety relay
- Rating: 5A @ 240V a.c.
- Maximum sensor length: 100m
- Enclosure protection rating: IP20
- Mounting: DIN rail
- Monitoring: Self-monitored

**Technical specification**

<table>
<thead>
<tr>
<th>Feature</th>
<th>PSSR/2</th>
<th>PRSU/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response time</td>
<td>13mS</td>
<td>30mS</td>
</tr>
<tr>
<td>Contacts</td>
<td>2 N/O (safety), 1 N/C (monitor)</td>
<td>3 N/O (safety), 1 N/C (monitor)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>$h 84 \times w 22.5 \times d 119 \text{mm}$</td>
<td>$h 114.5 \times w 22.5 \times d 114.5 \text{mm}$</td>
</tr>
</tbody>
</table>

Safety standards are applicable when control units are used with Tapeswitch sensing edges.

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSSR/2 for 2-wire sensing edge</td>
<td>PSSR/2</td>
<td>£177.56</td>
</tr>
<tr>
<td>PRSU/4 for 4-wire sensing edge</td>
<td>PRSU/4</td>
<td>£178.60</td>
</tr>
</tbody>
</table>

PSSW wireless control system

The wireless transmitter is mounted on the gate or door and connects to the safety edge. The battery operated transmitter has a specified 10m range (a range of over 40m is typical). The receiver is normally mounted next to the gate and wired into the gate control circuit. To maintain safety integrity a test pulse is required to check the system performance.

**Technical specification**

**Transmitter**
- Power supply: 3V d.c.
- Supply range: 9-35V d.c./8-28V a.c.
- Operating frequency: 868.90MHz
- Operating temperature: -20 to +55°C
- Protection rating: IP66
- Dimensions: $h 160 \times w 53 \times d 20 \text{mm}$

**Receiver**
- Power supply: 12/24V a.c./d.c.
- Supply range: 9-35V d.c./8-28V a.c.
- Operating frequency: 868.90GHz
- Operating temperature: -20 to +55°C
- Protection rating: IP66
- Dimensions: $h 190 \times w 83 \times d 40 \text{mm}$

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter</td>
<td>920062</td>
<td>£85.77</td>
</tr>
<tr>
<td>Receiver</td>
<td>920061</td>
<td>£104.82</td>
</tr>
</tbody>
</table>
Introduction to . . .
Tapeswitch safety mats

Safety mats guard the floor area around dangerous machinery. They can provide primary guarding where other types of guards are not practical or they can be used as secondary guarding in conjunction with other safeguards such as interlocked fences or light curtains.

Tapeswitch safety mats comprise of an array of ribbon switches sandwiched between 2 other layers (see diagram opposite). A system consists of a CKP mat sensor and a PRSU/4 safety control unit. When a person stands on the mat, one or more switches are operated, transmitting a stop signal to the machine control system.

They can be used as trip devices i.e. to stop dangerous movement when someone stands on a mat, or as presence sensing devices to prevent dangerous motion from being started when someone is standing on a mat.

Separation distances for safety mats

The positioning of a safety mat is of primary importance.
When used as a trip device, the mat must extend far enough from the machine to ensure that it can stop before the person can reach any dangerous parts (bearing in mind that the operator can take a full stride on to the mat before being detected).

**System response time**
The overall system response time in milliseconds (T) is calculated by:

\[ T = t_1 + t_2 \]

Where \( t_1 \) is the maximum response time between actuation of the safety device and generation of a stop signal and \( t_2 \) is the response time of the machine between receiving the stop signal and the dangerous parts coming to rest.

The size and position of the safety mat must ensure that a person cannot reach the dangerous parts before they have stopped moving.

EN ISO 13855 states that the minimum separation distance \( S \) in millimetres (i.e. the distance to the farthest part of the mat) should be:

\[ S = (1.6 \times T) + 1200 \]

**Secondary guarding**

When a mat is used to provide secondary guarding (as a presence sensing device), the above formula does not apply. However, the mat must completely cover the area between the primary guarding device and the machine so that a person cannot remain undetected in a dangerous position. A Tapeswitch safety mat can be made in almost any size and shape to suit these specific applications.

Tapeswitch safety mats can be made to your exact size and requirements
Call LC Automation on 01254 685900 for details and to specify the right mat for your application.

---

**Call Blackburn – 01254 685900 or Chippenham – 01249 460099**
How to order your safety mats ...

Tapeswitch mats are available in any customised size you want (up to the maximum stated size).

Simply decide on the specification and sizing of the mat you want. You can complete the order code as described here and call LC Automation on 01254 685900 for pricing and delivery information.

Select your cable outlet position

Select your cable outlet position

Order code generator

Example

CKP/S1 / SE / LD / 1500 X 1000 X 2000

Mat type __________

CKP/S1, CKP/Solo, Armormat, DPM

Mat edge preparation

SE Square edge

RE Ramped edge

Cable outlet position

LD Long edge, dual leads

LLS Long edge, left side, single lead

LRS Long edge, right side, single lead

SD Short edge, dual leads

SLS Short edge, left side, single lead

SRS Short edge, right side, single lead

Length of longest edge (max. 2400mm)

Length of shortest edge (max. 1200mm)

Lead length (standard 2000mm)

CKP – Durable safety mats

CKP safety mats have been manufactured by Tapeswitch for over 20 years, building an excellent record for durability and reliability.

Order code example:
A rectangular mat with two 2-core connection leads suitable for connecting a number of mats in series or connecting a single mat to a control unit.

CKP range features

- Durable construction
- Chemical and abrasion resistant
- Non-slip ribbed surface
- Low activation pressure
- Can be manufactured to the exact size and shape you require
- AE13 aluminium edging is available to securely fix your CKP safety mats

CKP/Solo additional features

- AS-Interface compatible
- Volt-free, normally closed contacts

Technical specification

- Colour .................. Black
- Surface pattern ........... Ribbed
- Material .................. KoroSeal PVC
- Actuation force .......... < 300N (30kg) with 80mm test piece
- Maximum length ........ 2.4m
- Maximum width .......... 1.2m
- Protection rating ........ IP65
- Weight .................. approx 26kg/m²
- Static load (max) ........ 75kg/cm²
- Operating temperature ... 0 to +50°C
- Connection lead (standard) ...... 2m

Safety standards are applicable when safety mats are used with the Tapeswitch PRSU/4 control unit.

Example order code (see Order code generator above)

<table>
<thead>
<tr>
<th>Description</th>
<th>Example Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CKP safety mat</td>
<td>CKP/S1/SE/LD/1500X1000X2000</td>
</tr>
</tbody>
</table>

This example order code is for a CKP/S1 mat, with a square edge and dual leads on the long edge.
Mat size: 1000 x 1500mm with standard 2000mm leads

Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE13 aluminium edging kit 2 x 2.5m lengths plus 4 corners</td>
<td>AE-13-DIY-KIT</td>
<td>£161.90</td>
</tr>
<tr>
<td>AE13 aluminium edging kit 3 x 2.5m lengths plus 4 corners</td>
<td>AE-13-DIY-KIT-5M+</td>
<td>£195.64</td>
</tr>
<tr>
<td>PRSU/4 control unit</td>
<td>PRSU/4</td>
<td>£178.60</td>
</tr>
</tbody>
</table>

See page 461 for full specification of the Tapeswitch control units
Armormat – Heavy duty safety mat

The Armormat combines all the features of the CKP/S1 mat with an extra heavy-duty layer, designed to minimise damage caused by impact from heavy, sharp objects.

The mat incorporates a rubber membrane and a layer of tough polycarbonate, which means the switching elements are protected even if the surface material is pierced. Armormats will easily withstand abuse that would destroy standard safety mats. They can be made in custom shapes, sizes and colours to suit your specific application.

### Features
- Durable construction
- Extremely heavy duty
- Chemical and abrasion resistant
- Non-slip ribbed surface
- Can be manufactured to the exact size and shape you require
- Optional colours are available as an extra cost option
- Supplied with AE13 aluminium edging

### Technical specification

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Black</td>
</tr>
<tr>
<td>Surface pattern</td>
<td>Ribbed</td>
</tr>
<tr>
<td>Material</td>
<td>Koroseal PVC</td>
</tr>
<tr>
<td>Actuation force</td>
<td>&lt;300N (30kg) with 80mm test piece</td>
</tr>
<tr>
<td>Maximum length</td>
<td>2.4m</td>
</tr>
<tr>
<td>Maximum width</td>
<td>1.2m</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP65</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx 21kg/m²</td>
</tr>
<tr>
<td>Static load (max)</td>
<td>75kg/cm²</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 to +50°C</td>
</tr>
<tr>
<td>Connection lead (standard)</td>
<td>2m</td>
</tr>
</tbody>
</table>

The DPM safety mat system has extremely high durability in harsh industrial environments.

The system comprises of a Tapeswitch safety mat fitted below an aluminium diamond plate, which is held in position by extruded aluminium edge strips. The system is manufactured to the required size and supplied in kit form for on-site assembly.

The mat gives excellent resistance to impacts and is particularly useful in applications where hot materials can fall.

### Features
- Durable construction
- Extremely heavy duty
- Chemical and abrasion resistant
- Non-slip diamond plate surface
- Excellent resistance to heat
- Can be manufactured to the exact size and shape you require
- Optional colours are available as an extra cost option
- Aluminium ramped edging included

### Technical specification

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface material</td>
<td>6061 T6 aluminium</td>
</tr>
<tr>
<td>Actuation force</td>
<td>&lt;300N (30kg) with 80mm test piece</td>
</tr>
<tr>
<td>Maximum length</td>
<td>2.4m</td>
</tr>
<tr>
<td>Maximum width</td>
<td>1.2m</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP65</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx 32kg/m²</td>
</tr>
<tr>
<td>Static load (max)</td>
<td>75kg/cm²</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 to +50°C</td>
</tr>
<tr>
<td>Connection lead (standard)</td>
<td>2m</td>
</tr>
</tbody>
</table>

See page 461 for full specification of the Tapeswitch control units.