



**MACHINERY SAFETY SYSTEMS**

**T4 (053) SERIES  
SAFETY LIGHT CURTAINS**

**INSTALLATION GUIDE**

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**Important!**

Failure to read and follow the instructions provided on the Installation Sheet and Installation Guide can lead to the incorrect application or use of the T4 (053) series safety light curtain. This could lead to personal injury and damage to equipment. All applicable machine safety standards and regulations should be taken into account when installing the T4 (053) series safety light curtain or any machine safety product.

The Installation Sheet and Installation Guide can be downloaded from our web site at [www.smartsan.co.uk](http://www.smartsan.co.uk)

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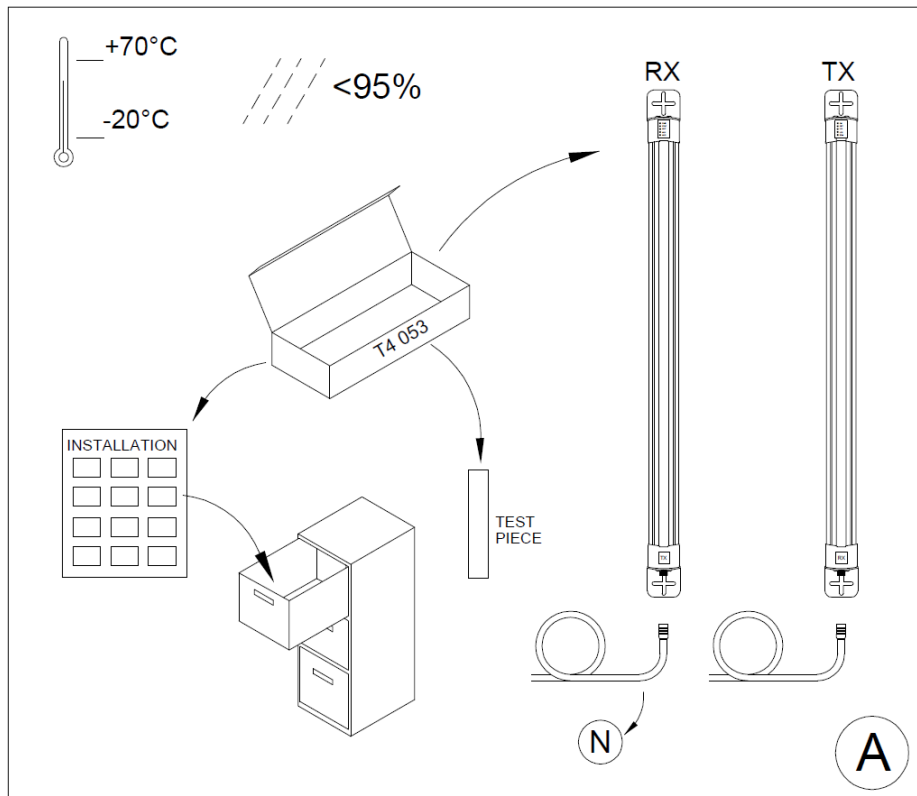
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## T4 Series (Model No. 053-xxxx) Safety Light Curtain Installation Sheet (CD267/240113)

### Figure A - Unpacking

- ❑ Remove all packaging material and retain it
- ❑ Locate and keep the delivery note
- ❑ Inspect all items for transit damage
- ❑ Match goods supplied to those specified on the delivery note
- ❑ Keep the Installation Sheet in a safe place



### Each T4 (053) series supplied would normally include:

- ❑ Safety Light curtain
- ❑ Test piece (excluding 053-6xx)
- ❑ Installation sheet
- ❑ Service questionnaire form

### Storage requirements:

- ❑ Humidity - <95%
- ❑ Temperature range between -20°C and +70°C

**Figure B – Cable Conductors**

Signal		Core	Colour		Current (I)
TX	RX		SSL (BK)	LUM(OR)	
+24V DC	+24V DC	1	Red (RD)	White (WH)	INPUT 1.3 A
0V DC	0V DC	2	Grey (GY)	Brown (BN)	INPUT 1.3 A
MUTE 1 (MU1)	RESET	3	Brown (BN)	Green (GN)	INPUT 3mA
MUTE 2 (MU2)	EDM	4	Orange (OR)	Yellow (YE)	INPUT 3mA
MUTE (MUT)	OSSD 1	5	Yellow (YE)	Grey (GY)	OUTPUT 500mA
STATUS	OSSD 2	6	Green (GN)	Pink (PK)	OUTPUT 500mA
R IN	T OUT	7	Blue (BU)	Blue (BU)	DATA
T OUT	R IN	8	Violet (VI)	Red (RD)	DATA
		SH	TAIL (SH)	SH	

The diagram shows a top view of an 8-pin M12 connector with pins numbered 1 through 8. To the right is a side view of the connector with an arrow pointing to the LUM (OR) core. A circled letter 'B' is located in the bottom right corner of the diagram area.

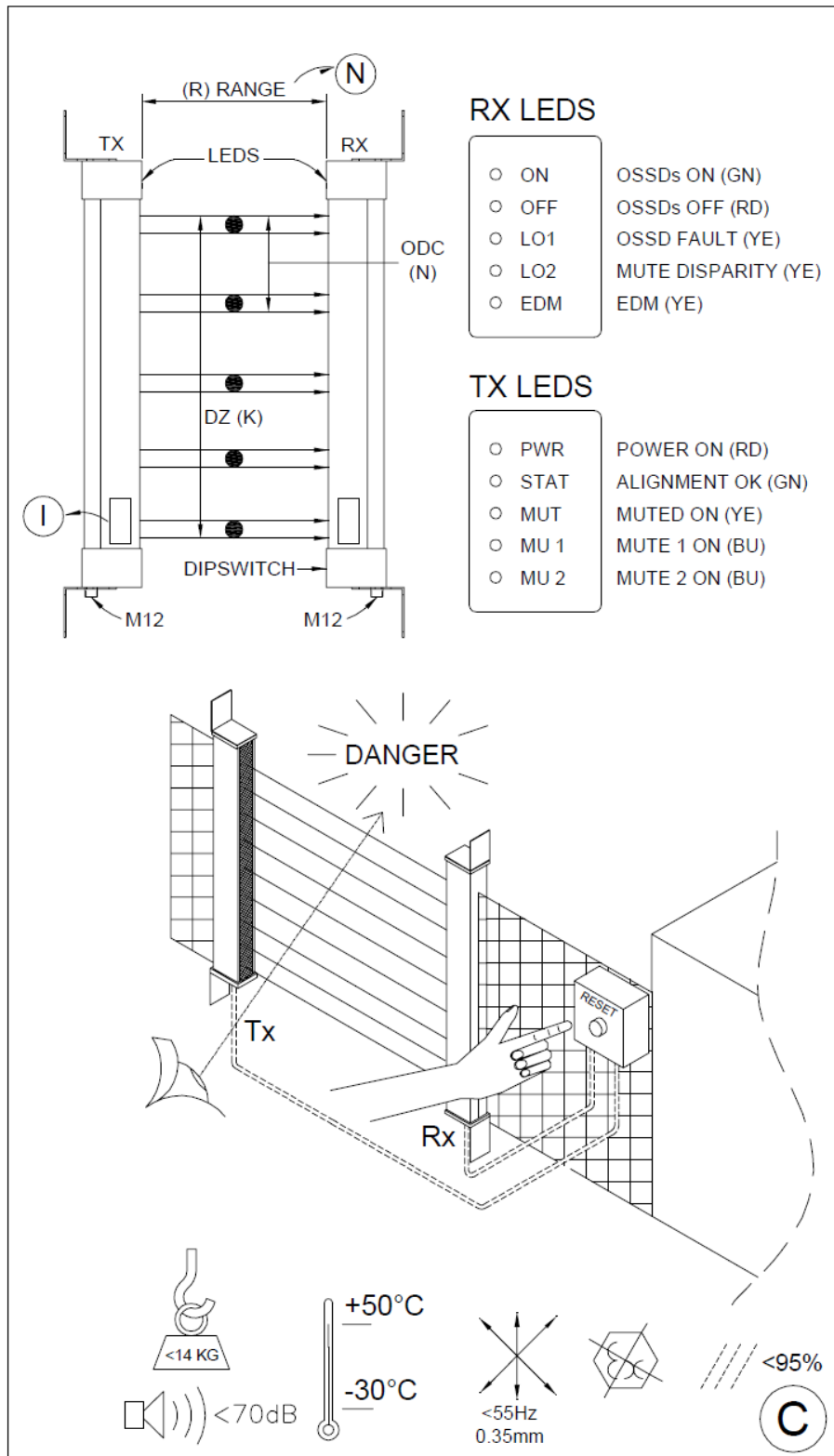
The picture above shows the M12 connector pin out, the colour coding for the cable cores, the signal function for the corresponding cable core, and the current rating for input/output signals. The standard cable supplied will use the LUM colour code shown above.



T4 (053) series (LUM) cable showing M12 connector

The T4 (053) series safety light curtain requires a connection cable on the Transmitter (TX) head and a connection cable on the Receiver (RX) head. They are connected via the M12 (8 way) socket located on the bottom end cap. The M12 socket also forms a locator for the mounting bracket.

Figure C – Operating Requirements



- Humidity <95%
- Temperature range between 0°C and +50°C
- Vibration: Frequency <55Hz Max. Movement <0.35mm
- Do not use equipment in explosive atmospheres (contact the manufacturer for further advice).

#### Detection Zone width (DZ) (K)

The detection zone width or protected height must be of a suitable size for each application to prevent personnel access to the danger area. This can be over, under or around the light curtains detection zone.

#### Object Detection Capability (ODC) (N)

The minimum size of object guaranteed to be detected when placed in the light curtain's infrared sensing field. A test piece of appropriate size is provided to test that the light curtain object detection capability is within the parameter specified for the particular model number. Transparent objects are not detected.

#### Range (R)

This is the maximum scanning range of the light curtain between the Transmitter (TX) head and Receiver (RX) head. Ensure the light curtain is capable of satisfying the range requirement for the particular application it is being used for.

#### Reset Location

Reset devices must be located such that the danger area can be seen to be clear of persons before the system is activated. The reset device should not be accessible from inside the danger area.

## Status Indicators

LED indicators located in the top end cap of both the Transmitter (TX) head and the Receiver (RX) head are used for status indication and diagnostics.

The LED Status Indicators are listed below.

### Transmitter (TX)

**PWR** (Power) - RED LED on = Power connected

**STAT** (Status) - GREEN LED on = Alignment ok

**MUT** (Mute) – YELLOW LED on = Muted

**MU1** (Mute1) – BLUE LED on = Mute 1 on

**MU2** (Mute2) – BLUE LED on = Mute 2 on

### Receiver (RX)

**ON** – GREEN LED on = Light curtain safety reset and OSSDs on

**OFF** – RED LED on = Light curtain safety off

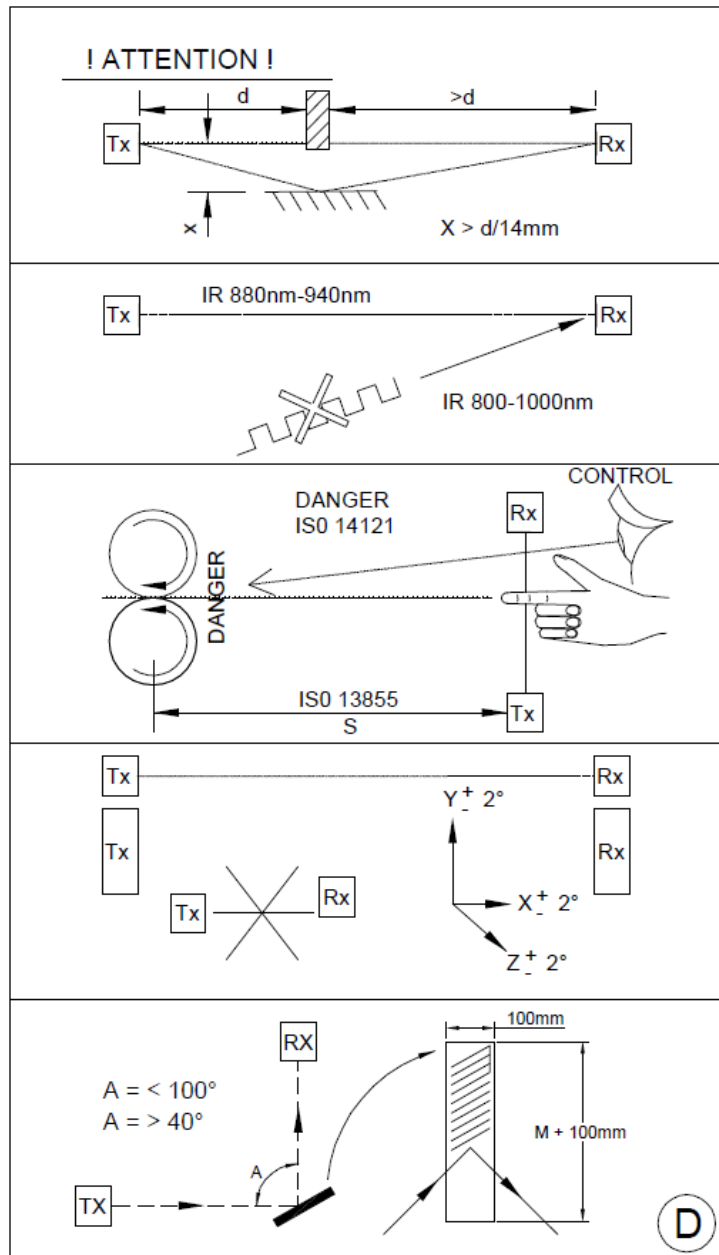
**LO1** (Lockout 1) – YELLOW LED on = OSSD fault

**LO2** (Lockout 2) – YELLOW LED on = Mute disparity fault (MU1 & MU2)

**EDM** (External Device Monitoring) – YELLOW LED on = EDM on

### Figure D – Important Installation Considerations

1. Consider reflective surfaces that may give rise to an optical 'short circuit' from the direct path of the safety light curtain's infrared beams as shown in the first illustration of Fig. E. To ensure the safety light curtain is mounted far enough away from reflective surfaces use the formula provided to calculate the minimum distance (X) between the light curtain and reflective surface.



2. To prevent intermittent tripping of the safety light curtain ensure that extraneous infrared energy between 800 and 1000 nanometres is not directed towards the Perspex window of the receiver unit (RX). Extraneous sources would include infrared sensors, infrared remote controls, scanning systems or sunlight.

3. Ensure the mounting position of the safety light curtain in respect to the nearest danger point meets the requirements of European Standard ISO 13855. The Separation distance of the safety light curtain from the danger point of the machine must be met at all times for safe operation. In order for the machine to be guarded by the safety light curtain, the machine must be capable of stopping at any point in the machine cycle.

To prevent personnel from reaching the danger point of the machine additional mechanical guarding may be required so that any access has to be through the sensing field of the safety light curtain. The safety light curtain must be

positioned so as to prevent any overreach or under reach to the danger point. It must not be possible to stand between the safety light curtain and the danger point.

The protection afforded by the safety light curtain should correspond to the machine Risk Assessment under ISO 14121 for the machine being guarded.

4. Ensure the light curtain transmitter (TX) and receiver (RX) units are mounted accurately in-line with each other and are both perpendicular and parallel to each other within the parameters shown for each axis.
5. If utilising mirrors to deflect the light curtain ensure the mirror length is 50mm longer at either end of the light curtain detection zone width and mounted centrally to the zone. To ensure reliable operation the light curtain deflection angle (A) from the mirror must not be less than 40 degrees or greater than 100 degrees. (See Appendix 3)

Environmental factors can affect the operation of a safety light curtain and proper consideration should be taken into account for mounting a system where fog, rain, smoke, dust, large temperature fluctuations etc. is a consideration.

Safety light curtains do not protect personnel from chemicals, heat, gases, radiation, flying parts etc. They are not a physical barrier.

The machine operators must be instructed in the use of the safety light curtain by the owner/provider of the machinery.



### Power Supply

Use a regulated power supply +24V DC  $\pm 10\%$  fused at 2A. The T4 (053) series light curtain current consumption is rated at 1.3A. The White wire on both the Transmitter (TX) and Receiver (RX) head cables must be connected to 24V DC (L+). The Brown wire on both the Transmitter (TX) and Receiver (RX) head cables must be connected to 0V DC (L-).

Before the power supply is applied to the light curtain ensure both TX and RX heads are aligned correctly. On power up the PWR LED on the Transmitter (TX) head will turn on to indicate power is connected.

PWR - Red LED ON = Power connected

If during set-up LED LO1 and LO2 start to flash alternately this is due to the Transmitter (TX) head cable not being connected.

If the Power LED starts to flash during set-up the Receiver (RX) head cable is not connected.

**Warning** 0V (L-) of the power supply unit (PSU) must be connected to ground. No signal should exceed +24V DC  $\pm 10\%$  (L+) or be less than 0V (L-)

**Warning** The shield on both the Transmitter (TX) and Receiver (RX) head cables must be connected to ground.

**Note:** Prior to initial power up of the light curtain check the following.

If the Smartscan system is connected directly to a 24V DC source supplied by the user, it must be emphasised that the supply should be regulated and suppressed to prevent transient voltages and other forms of electrical interference from affecting correct operation of the Smartscan equipment.

### Reset

The T4 (053) series provides a manual (latched) reset for applications where it is a requirement that the safety outputs cannot be reinstated without the operator first checking that the dangerous area is safe. The light curtain can then be reset and thus initiating machine run.

The reset switch must be a Normally Open spring-return contact block, either push button or key switch. The Green wire on the Receiver (RX) head cable needs to be connected to one side of the Normally Open contact block and the other side to 24V DC (L+).

However for the Automatic reset function the Green wire is no longer required and must be terminated to an individual isolated terminal block.

The Automatic and Restart Interlock options are selected via DIP switches, refer to the DIP switch setting guide later in this manual.

### **External Device Monitoring (EDM)**

An External Device Monitoring input facility is provided for monitoring customer external final switching devices to ensure those devices respond in unison with the safety outputs each and every time the light curtain is interrupted. Failure of the external final switching device during monitoring will not allow the light curtain to reset.

The EDM Yellow wire on the Receiver (RX) head should be connected via a normally closed (NC) contact of the external final switching device being monitored. The other side of the contact is connected to 24V DC. If the EDM is not being used the Yellow wire must be connected to a permanent 24V DC (L+).

A LED indicator located at the top of the Receiver (RX) head labelled as EDM shows the EDM status.

Yellow LED ON = EDM ON Yellow LED OFF = EDM OFF

### **Safety Outputs OSSD1 and OSSD2**

Two independent (PNP) electronic switching failsafe signal outputs (OSSDs) are provided for connection to the machine's stop control circuit. Interruption of the safety light curtains infrared sensing field (unless muted or blanked) will cause the OSSDs to go to an OFF state and initiate a machine stop condition. The connections are provided via the Grey wire (OSSD1) and the Pink wire (OSSD2) on the Receiver (RX) head cable.

Outputs ON = +24V DC (Light curtain clear)  
Outputs OFF = 0V DC (Light curtain blocked)

The electronic outputs are monitored and rated at a maximum switching rating of 24V DC, 500mA.

LED indicators located at the top of the Receiver (RX) head labelled as ON and OFF show the status of the OSSDs.

Green LED ON = OSSD1 and OSSD2 active ON  
Red LED ON = OSSD1 and OSSD2 inactive OFF

If the LO1 LED on the RX head turns on it shows that the light curtain safety outputs (OSSDs) have gone to a fault condition. This means that the light curtain

is in a lockout condition and will remain in this condition until the power to the light curtain is re-cycled. The lockout fault is caused by either the OSSD being shorted or the OSSD has been driven higher than the 500mA maximum specification.

### Mute Function

The Mute inputs MU1 (Mute 1) Green (GN) wire and MU2 (Mute 2) Yellow (YE) wire on the Transmitter (TX) head cable are for connecting external muting signals to the T4 series light curtain. Both mute input signals are monitored by the light curtain and must come from separate sources, so that a single fault cannot cause a failure of the protective function.

When both mute inputs are active ON (connected to 24V DC), the light curtain will mute (\*full mute or \*\*partial mute), e.g. the light curtain's safety outputs (OSSDs) will not respond to an interruption of the muted sensing field of the light curtain.

\* Full Mute: The entire sensing region of the light curtain will mute (Default).

\*\* Partial / Learn Fixed Mute: A window (specified number of beams) will be muted but the remainder of the light curtain remains active. To activate the Partial muting function it must be selected via the appropriate DIP switch settings in the Learn mode described later in the manual.

LED indicators located at the top of the Transmitter (TX) head labelled as MU1 (Mute 1) and MU2 (Mute 2) show the status.

MU1 - Blue LED ON = Mute 1 ON    Blue LED OFF = Mute 1 OFF  
MU2 - Blue LED ON = Mute 2 ON    Blue LED OFF = Mute 2 OFF

### Mute Output

An external electronic mute output signal is available from the Grey wire on the Transmitter (TX) head cable, mute ON = 24 V DC (500mA maximum) and mute OFF = 0 V DC. This can be used to drive an external relay for remote indication via a beacon and/or an input to a PLC.

A LED indicator located at the top of the Transmitter (TX) head labelled as MUT (light curtain Muted or Partial Muted) shows the status.

MUT - Yellow LED ON = Mute ON    Yellow LED OFF = Mute OFF

### Status Output

The status output is a NON-SAFETY output and should only be used for non-safety applications. E.g. connecting an indicator lamp or as feedback to a PLC. The status output is used to confirm that the safety light curtain has reset and the safety outputs (OSSDs) are ON.

The status output, Pink wire on the Transmitter (TX) head cable, energises when the safety outputs (OSSDs) = ON and de-energises when the safety outputs (OSSDs) = OFF. Status output energised = 24V DC (500mA maximum) and de-energised = 0V DC.

STAT LED on the Transmitter (TX) head will turn on to indicate that the light curtain is aligned correctly.

STAT -Green LED ON = Status ON   Green LED OFF = Status OFF

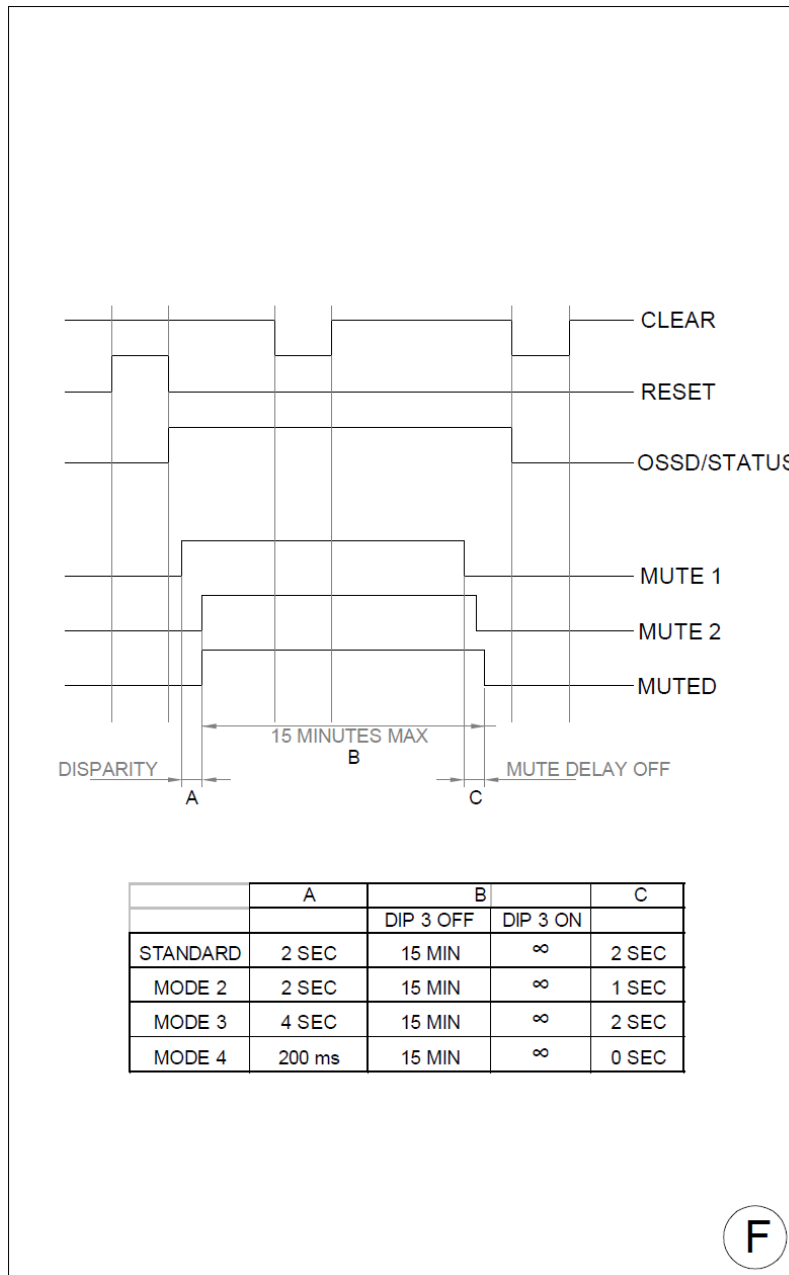
### Communication Link

The Transmitter (TX) and Receiver (RX) heads communicate via RS232. The Blue wire from the Transmitter (TX) head cable must be connected to the Blue wire from the Receiver (RX) head cable.

The Red wire from the Transmitter (TX) head cable must be connected to the Red wire from the Receiver (RX) head cable.

**Warning**    The Data wires R IN and T OUT are communication links at RS232 voltage levels (+/-9V). They MUST NOT be connected to any other voltage source.

The maximum total cable length from the Transmitter (TX) head to the Receiver (RX) head must not exceed 40m.

**Figure F – Muting Timers**

The table above shows the muting timer options for the T4 series.

The 3 timing elements of the muting function are explained below.

#### Mute Input Disparity Time (A)

All guards are supplied with the default mute disparity setting of 2 seconds. Both mute inputs (mute 1 and mute 2) signals must be supplied to the light curtain within 2 seconds of each other for the light curtain to go into a muted condition. If the disparity is greater than 2 seconds then the LO2 LED on the Receiver (RX) head will turn on. To remove the fault both mute inputs have to be removed and LO2 LED on the Receiver (RX) head will then turn off.

Other mute beam disparity options can be selected via DIP switch modes 2, 3 and 4 in the Learn mode.

#### Mute Time Out Period (B)

This is the maximum pre-determined time that the light curtain will remain in a muted condition. The default is 15 minutes or it can be changed to infinite via DIP switch 3 in the Direct Settings mode. Use of the infinite mute time out must be subject to the detailed risk assessment.

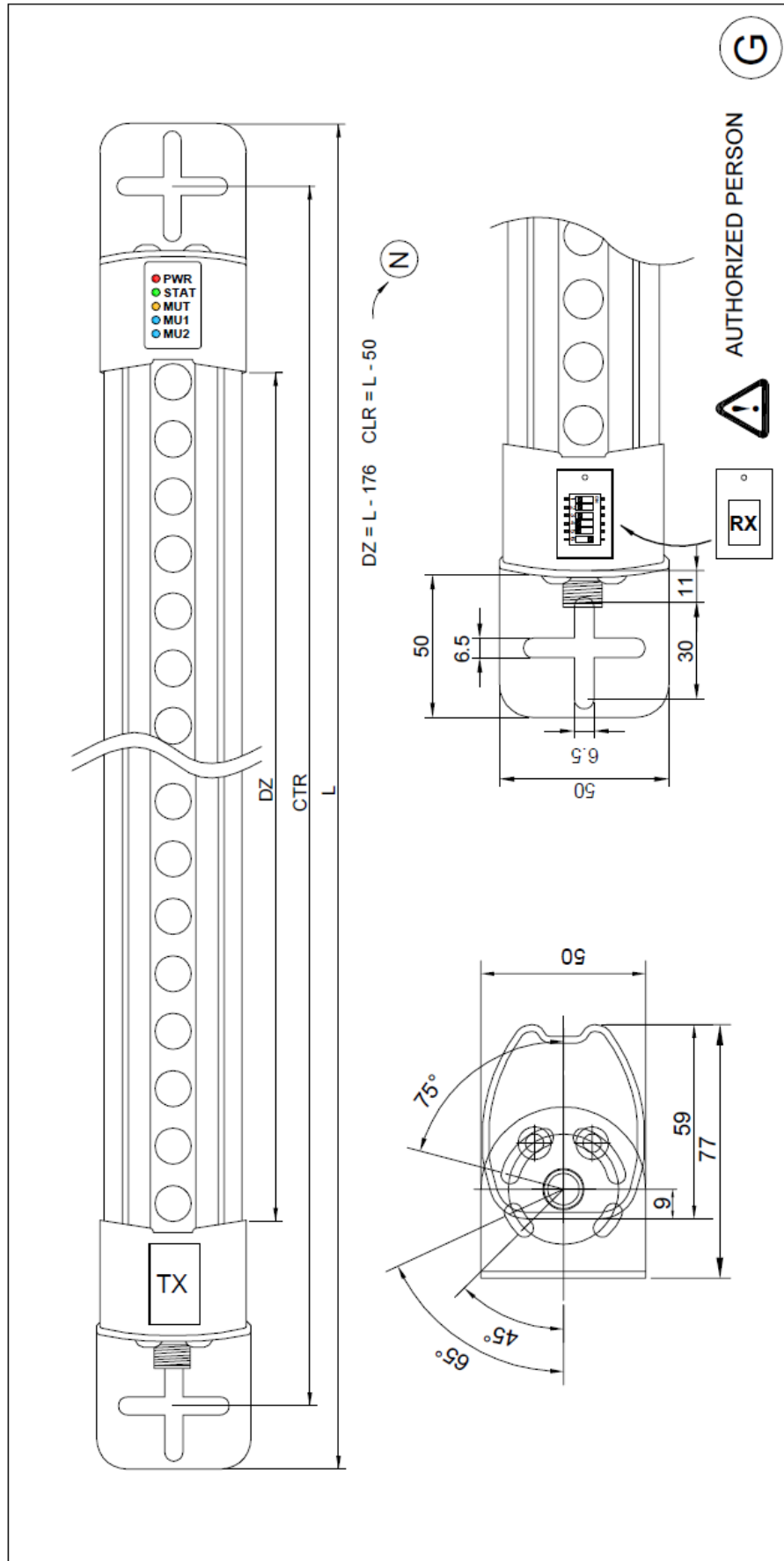
#### Mute Delay Off Time (C)

This is the pre-determined time (2 second default) that the light curtain will remain in a muted condition following de-activation of one or both of the mute input signals. Other mute delay off options can be selected in the Learn mode.

The T4 (053) series is supplied with the following default settings:

Mute Input Disparity Time (A)	2 seconds
Mute Time Out Period (B)	15 minutes
Mute Delay Off Time (C)	2 seconds
Partial Muting	Off
Fixed Beam Blanking	Off
Floating Beam Blanking	Off

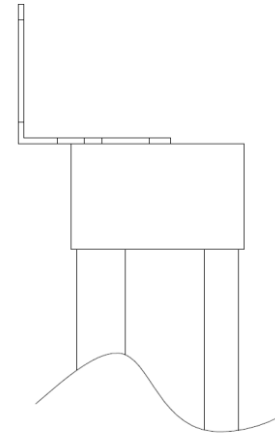
Figure G – Mechanical Information



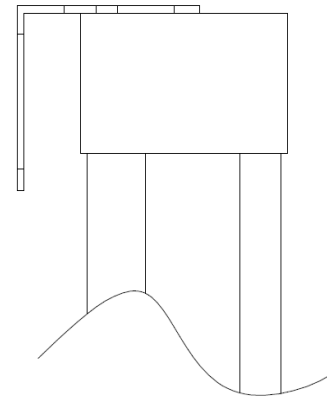
The T4 (053) series safety light curtain is supplied with mounting brackets fitted as standard in an up position. The mounting bracket may be fixed at 90 degrees, with a  $\pm 20^\circ$  adjustment, before the brackets are fully tightened. Use 6mm bolts for mounting the light curtain. The mounting bracket may be reversed to the down position where installation space is at a premium. Please ensure the washers are in place to maintain the seal where any adjustment is made to the mounting brackets.

Measurements are shown for the light curtain end caps and end caps with mounting brackets. These can be used for working out the space required for mounting the T4 (053) series safety light curtain. The light curtain's dimensions including the mounting bracket are overall length (L) x 50mm width x 73mm depth. The overall length (L) in millimetres for each individual model is listed in Figure N.

The light curtain mounting centres (CTR) in millimetres can be calculated for each T4 (053) series by using the formula shown above in conjunction with the measurements for overall length (L). The calculation for the detection zone width (DZ), shown above, is also calculated using the overall length (L) measurements.



Standard Bracket Arrangement



Bracket Reversed

### Figure H – Floating Blanking

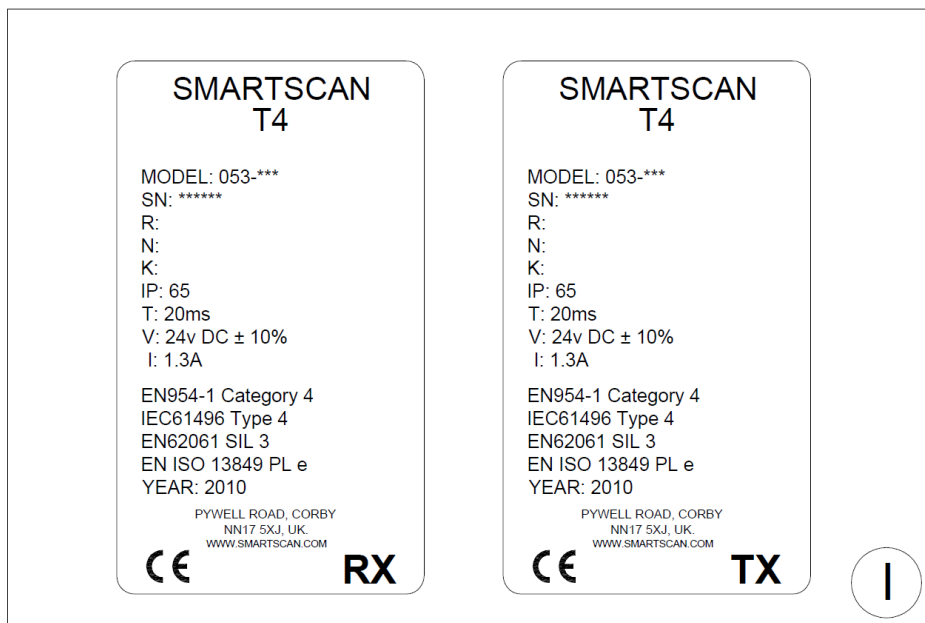
The table below shows the change in the Object Detection Capability (ODC) with 1, 2 and 3 beams floating blanking selected. E.g. 30mm ODC with 2 beam floating blanking will detect an object of 80mm or greater.

BEAMS BLANKED ODC (mm)			
0	1	2	3
14	24	33	43
30	55	80	105
40	63	88	113

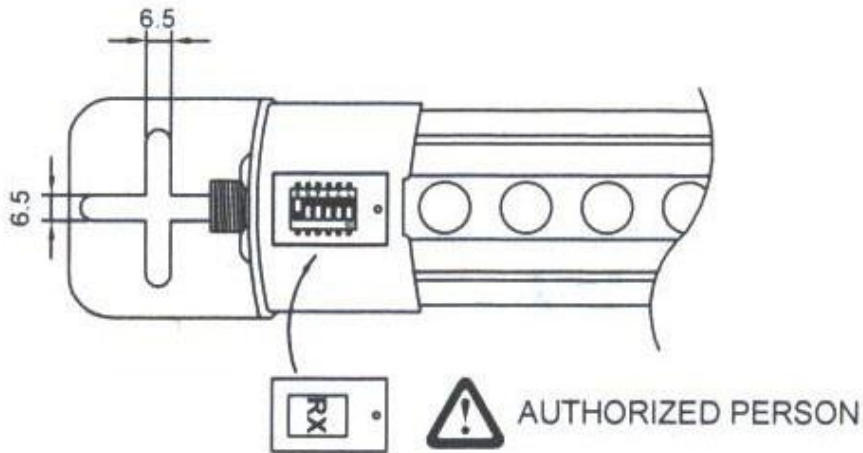
(H)

### Figure I – Identification Labels

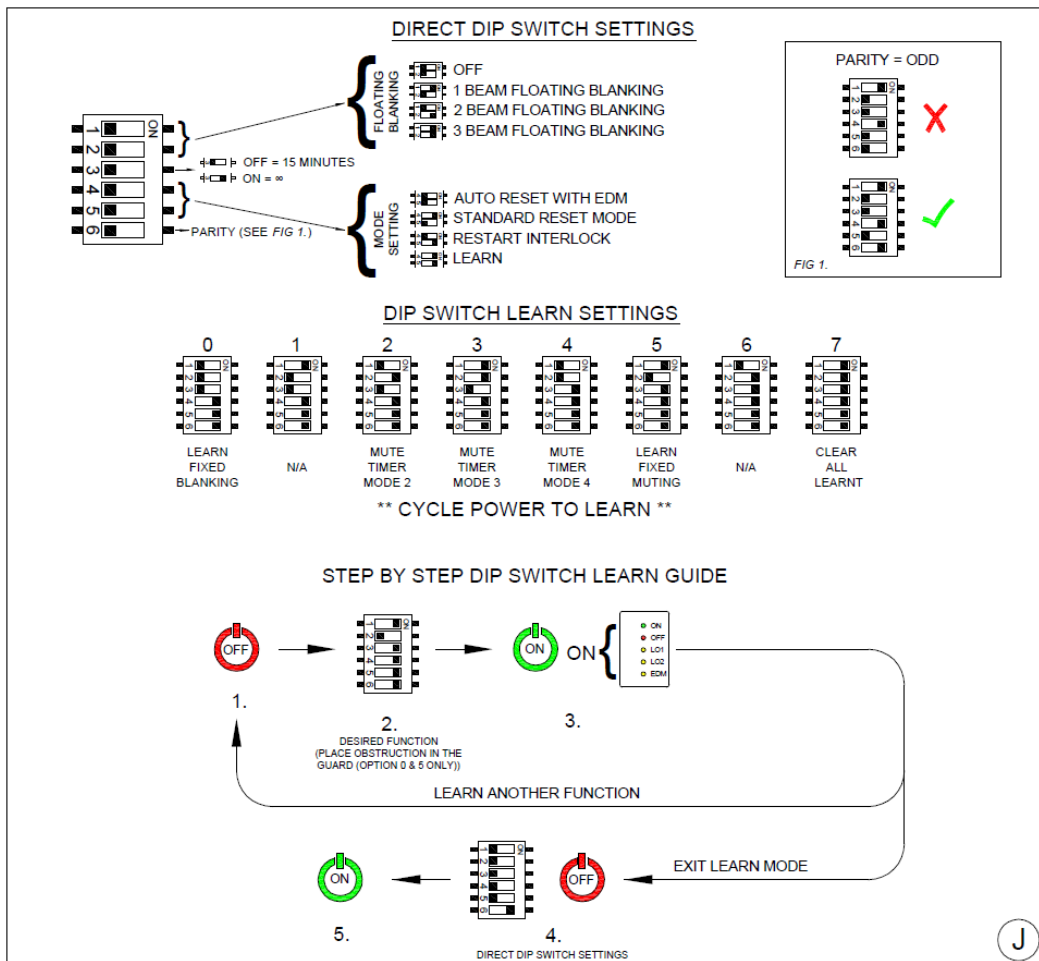
Examples are shown below of the identification labels that are affixed to the bottom of the transmitter (TX) and receiver (RX) columns.



**Figure J – DIP Switch Settings and Operating Modes**



The DIP switches are located under the removable door on the bottom end cap (near the cable connector) of the receiver column (labelled RX).



There are two modes of DIP switch setting for the T4 series:

- Direct Settings**
- Learn Settings**

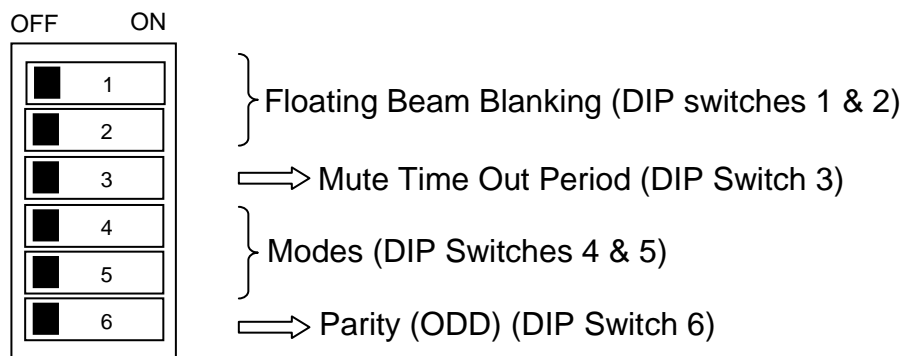
### Direct Settings

These are the functions that are available 'out of the box'. Place the DIP switches in the desired position and the functions are selected. There are four features available in the Direct Settings mode:

- 1) Floating Beam Blanking
- 2) Mute Time Out Period
- 3) Modes
- 4) Parity

**Note** To implement DIP switch settings or change the DIP switch settings requires the power to the light curtain to be turned off and then on again.

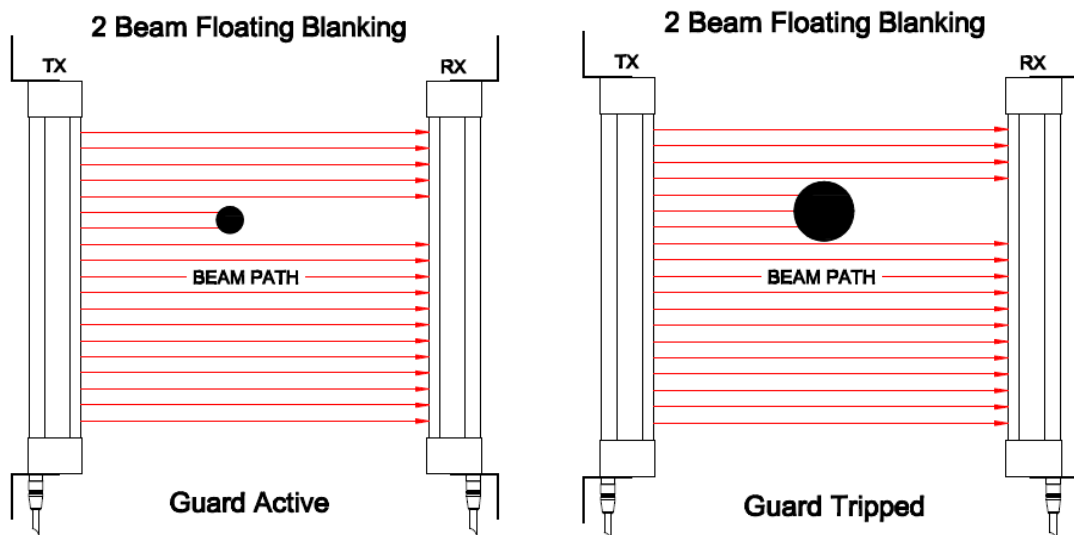
The diagram below shows the DIP switches for the Direct Settings mode.



**Note:** If the parity or any of the DIP switches are changed while the light curtain is in operation the OSSDs (safety outputs) will turn OFF and remain OFF. All DIP switch setting must be done with the power to the light curtain disconnected. Refer to the Parity setting section.

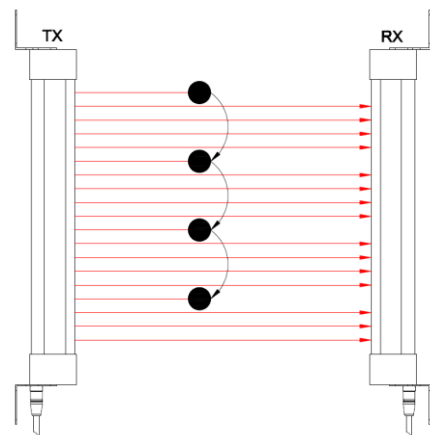
## 1) Floating Beam Blanking

Floating beam blanking allows the user to create a larger unprotected opening in the light curtain infrared field. The name floating beam blanking originated due to the fact that the disabled beams are not fixed at a specific location. The object can move or Float within the detection zone of the light curtain without initiating a stop signal providing the object does not interrupt more than the selected number of Floating beams.



The T4 (053) series safety light curtain will allow a specified number of beams (maximum of 3 adjacent beams) to be blocked without it sending a stop signal to the safe guarded machine. The examples above show 2 beam floating blanking in the T4 (053) series safety light curtain. The light guard will remain active with one or two beams blocked at a single point entry in the light curtain's detection zone. If any additional beams are blocked it will trip the guard and the safety outputs will go off sending a stop signal to the safe guarded machine.

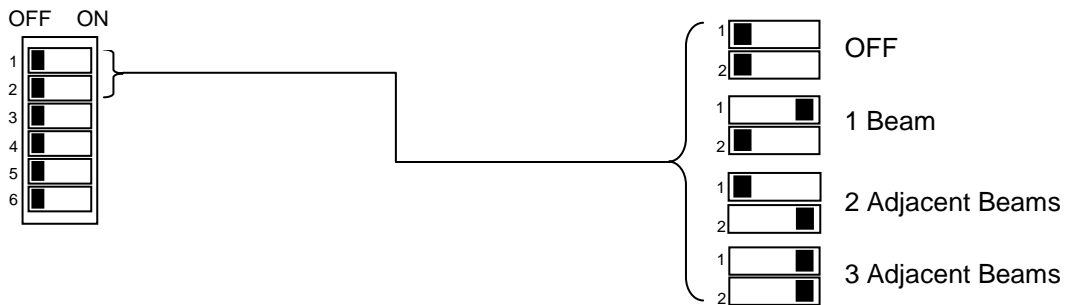
The object may also be required to move through the detection zone of the light curtain, e.g. from the top of the detection zone to the bottom of the detection zone. As long as the object does not block more than the number of beams blanked it can travel through the detection zone without tripping the guard and sending a stop signal to the machine.



There are four options,

- 1) OFF
- 2) 1 beam
- 3) 2 adjacent beams
- 4) 3 adjacent beams

These options are selectable at DIP switches 1 & 2 as shown in the diagram below in the direct settings mode.



The floating blanking function is particularly useful for those applications where, for example, a work piece is moving up and down within the infrared field of the light curtain as part of the manufacturing process. This allows the operator to manipulate the work piece safely without shutting down the machine.

Using the floating beam blanking function of the T4 (053) series safety light curtain will change the original Object Detection Capability (ODC). The table below shows the change to the original ODC (14mm, 30mm and 40mm) when using the 1, 2 or 3 beam floating blanking options.

Floating Beam Blanking (14 mm Detection Capability)				
Beams Blanked	0	1	2	3
Object Detection Capability (ODC)	14 mm	24 mm	33 mm	43 mm

Floating Beam Blanking (30 mm Detection Capability)				
Beams Blanked	0	1	2	3
Object Detection Capability (ODC)	30 mm	55 mm	80 mm	105 mm

Floating Beam Blanking (40 mm Detection Capability)				
Beams Blanked	0	1	2	3
Object Detection Capability (ODC)	40 mm	63 mm	88 mm	113 mm

**Warning** Floating Beam blanking increases the size of the object that the safety light curtain can detect resulting in an increased Object Detection Capability (ODC).

When selecting 1, 2 or 3 beam floating blanking the worst case ODC should always be taken into account during the risk assessment process. Check that the position of the light curtain in relation to the nearest danger point (Separation distance) meets the requirements of European Standard ISO 13855.

**Note:** If the parity or any of the DIP switches are changed while the light curtain is in operation the OSSDs (safety outputs) will turn OFF and remain OFF. All DIP switch setting must be done with the power to the light curtain disconnected. Refer to the Parity setting section.

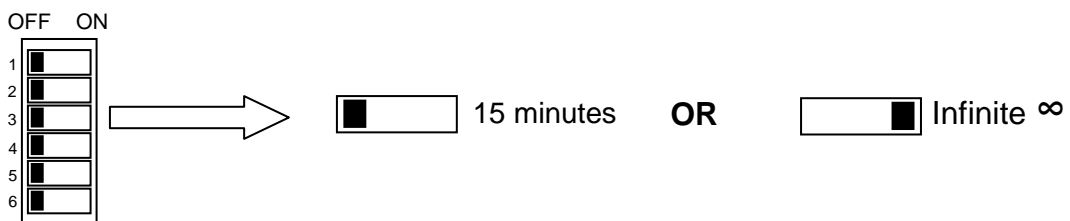
## 2) Mute Time Out Period

A maximum pre-determined time the light curtain will remain in a muted condition. The standard or default setting is 15 minutes. After the 15 minute mute time out period the light curtain's safety outputs (OSSDs) will turn OFF and initiate a machine stop condition. Use of the infinite mute time out must be subject to the detailed risk assessment.

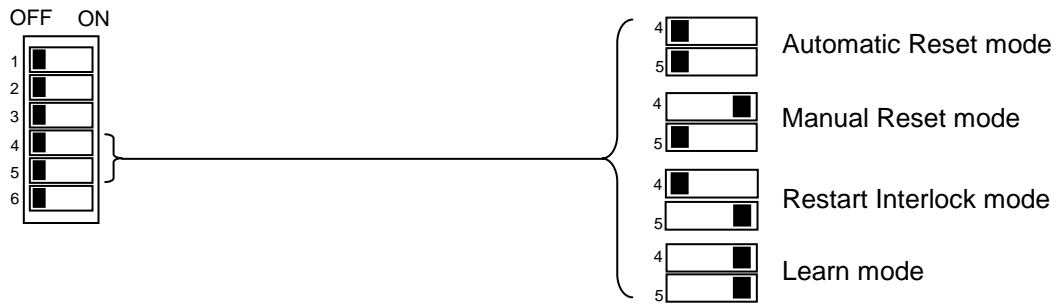
There are two options

- 1) 15 minutes
- 2) Infinite

These options are selectable at DIP switch 3 in the direct settings mode.



### 3) Modes



#### Automatic Reset mode:

After initial Power Up the light curtain's OSSDs become active (OSSDs are ON). If the light curtains sensing field is blocked the OSSDs turn OFF. Once the obstruction has been removed from the sensing field of the light curtain it automatically reactivates itself, (OSSDs turn ON).

#### Manual (Latched) Reset mode:

After initial Power Up the light curtain's OSSDs remain OFF until a Reset signal is applied. Once the reset signal is received, with the light curtain free of any objects, the OSSDs will turn ON. If the sensing field is interrupted, once the obstruction has been removed from the sensing field of the safety light curtain, the OSSDs will remain OFF until a reset signal is applied, upon which time the OSSDs will turn ON.

#### Restart Interlock mode:

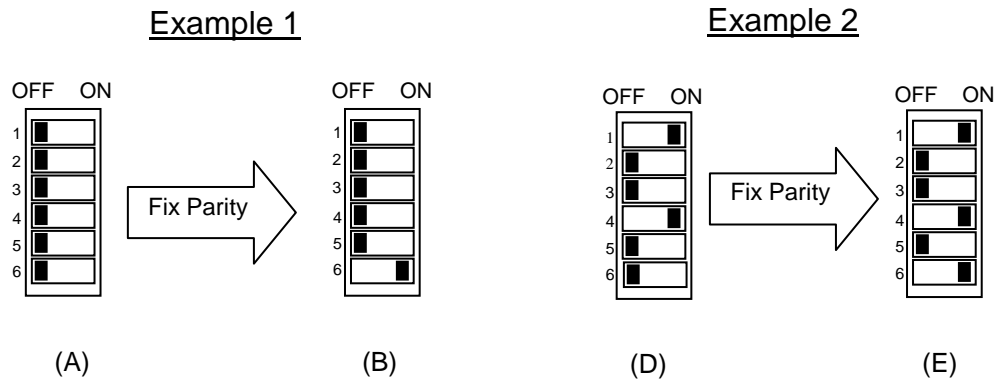
At initial Power Up, with the light curtain free of any objects in the infrared sensing field, the OSSDs become active (OSSDs turn ON). If the light curtains infrared sensing field is blocked the OSSDs turn OFF. Once the obstruction has been removed from the infrared sensing field of the safety light curtain the OSSDs will remain OFF until a reset signal is applied.

#### Learn Settings mode:

Allows the user to access the T4 (053) series safety light curtains additional functions. These functions include: fixed beam blanking, mute disparity options, mute delay off time options, partial or (learn fixed) muting and clear learned functions.

#### 4) Parity (ODD)

The parity switch (Position 6) is used as a functionality check for the DIP switches, making sure no DIP switch has failed. The light curtain counts how many of the 6 switches are in the ON position. This sum or number of DIP switches in the up or ON position must be an odd number. If the number is not odd then the safety light curtain's OSSDs will remain OFF. Listed below are 2 examples of setting the parity to ODD.



##### Example 1

Zero DIP switches are in the ON position (A). Zero is not a ODD number. **The OSSDs will remain OFF** until the parity switch is moved to the ON position (B).

##### Example 2

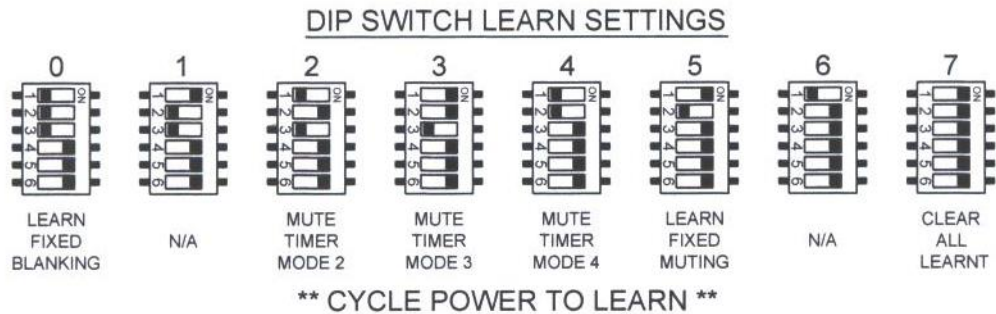
Two DIP switches are in the ON position (D). Two is not a ODD number. **The OSSDs will remain OFF** until the parity switch is moved to the ON position (E).

If the number of switches at positions 1 to 5, in the on position, equals an even number then the parity switch, position 6, must be set to the ON position. If the number of switches in the on position equals an odd number then parity switch, position 6, must be in the off position. Having set the switches in this way, if any switch subsequently fails, either on or off, the parity will go to an even number and the fault will be detected.

**Note** If the parity check is set incorrectly, changed or any of the DIP switches are changed while the light curtain is in operation the OSSDs (safety outputs) will turn OFF and remain OFF. Refer to the Parity setting section.

### Learn Settings

The 6 DIP switch settings available in Learn Settings are shown in the diagram below.



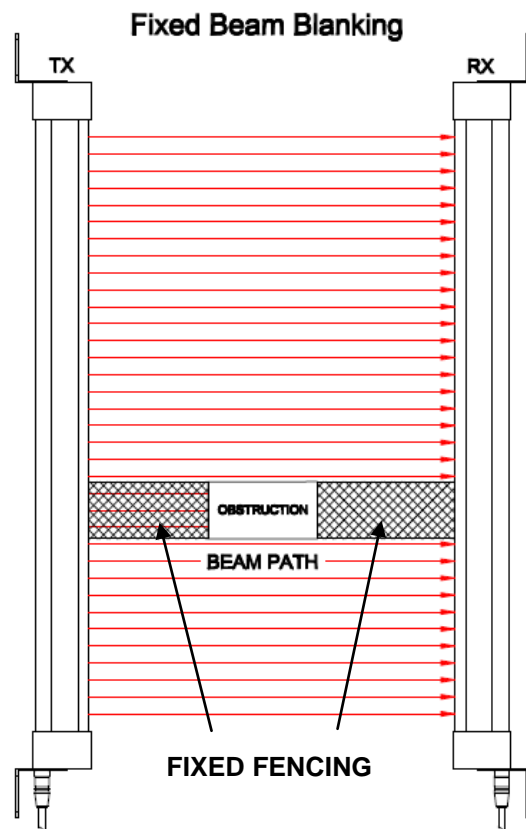
**Warning** The two hard-wired mute input connections to the light curtain must be disconnected when using the Learn mode.

**Note** During this time the safety outputs (OSSDs) will remain in the off state.

#### Learn Setting 0 - Fixed Beam Blanking

Fixed beam blanking allows the user to deselect a fixed area of beams in the light curtain’s sensing field. This is typically used where the application environment dictates that a stationary object or fixture is causing a permanent obstruction within a portion of the sensing field.

The remaining unobstructed area of the light curtain’s sensing field remains active (protecting). If something blocks the active part of the sensing field it will cause the safety outputs (OSSDs) to go to an OFF state and initiate a machine stop condition.



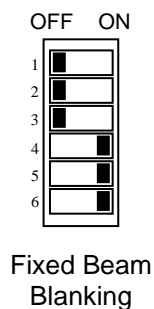
**Warning** If the fixed object located in the sensing region does not completely cover the light curtains sensing region additional guarding will be required.

**Note** Once the fixed blanking area has been set any removal of the object in that region will cause the safety light curtain's OSSDs to go into an OFF state and stay OFF.

**Note** Three beams must remain un-blanked in the sensing field of the safety light curtain, if not the OSSDs remain in the OFF state.

**Note** If using the fixed beam blanking and the partial / fixed muting functions then the fixed beam blanking function must be selected first.

Use the following steps to configure Fixed Beam Blanking:



1. Disconnect power to the light curtain.
2. Configure the DIP switches as per the diagram to the left (Learn mode / Fixed beam blanking).
3. Place the obstruction in the light curtain or the obstruction is already in place.
4. Reinststate power to the light curtain. All LEDs on the RX head are on to indicate that the number of beams to be blanked has been learnt.
5. Disconnect power to the light curtain.
6. Set DIP switches as per the Direct Setting requirements.
7. Reinststate power to the light curtain. All LEDs revert back to their normal functions and the blocked beams are ignored.

You may want to select another Learn mode function in which case you will need to follow the procedure for that function.

**Learn Setting - 1**

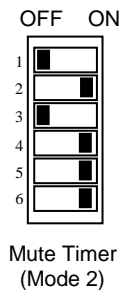
Not applicable (do not select).

**Learn Setting 2 - Mute Timer (Mode 2)**

Mode 2 gives the following mute timers:

Mute input disparity	2 seconds
Mute delay off	1 second

Use the following steps to configure Mute Timer mode 2:



1. Disconnect power to the light curtain.
2. Configure the DIP switches as per the diagram to the left (Learn mode / Mode 2).
3. Reinststate power to the light curtain. All LEDs on the RX head are on to indicate that mode 2 has been learnt.
4. Disconnect power to the light curtain.
5. Set DIP switches as per the Direct Setting requirements.
6. Reinststate power to the light curtain. All LEDs revert back to their normal functions and Mute Timer (Mode 2) is now activated.

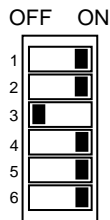
You may want to select another Learn mode function in which case you will need to follow the procedure for that function.

### Learn Setting 3 - Mute Timer (Mode 3)

Mode 3 gives the following mute timers:

Mute input disparity	4 seconds
Mute delay off	2 second

Use the following steps to configure Mute Timer (Mode 3):



Mute Timer  
(Mode 3)

1. Disconnect power to the light curtain.
2. Configure the DIP switches as per the diagram to the left (Learn mode / Mode 3).
3. Reinststate power to the light curtain. All LEDs on the RX head are on to indicate that mode 3 has been learnt.
4. Disconnect power to the light curtain.
5. Set DIP switches as per the Direct Setting requirements.
6. Reinststate power to the light curtain. All LEDs revert back to their normal functions and Mute Timer (Mode 3) is now activated.

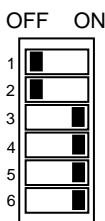
You may want to select another Learn mode function in which case you will need to follow the procedure for that function.

### Learn Setting 4 - Mute Timer (Mode 4)

Mode 4 gives the following mute timers:

Mute input disparity	200 milliseconds (ms)
Mute delay off	0 seconds

Use the following steps to configure Mute Timer (Mode 4):



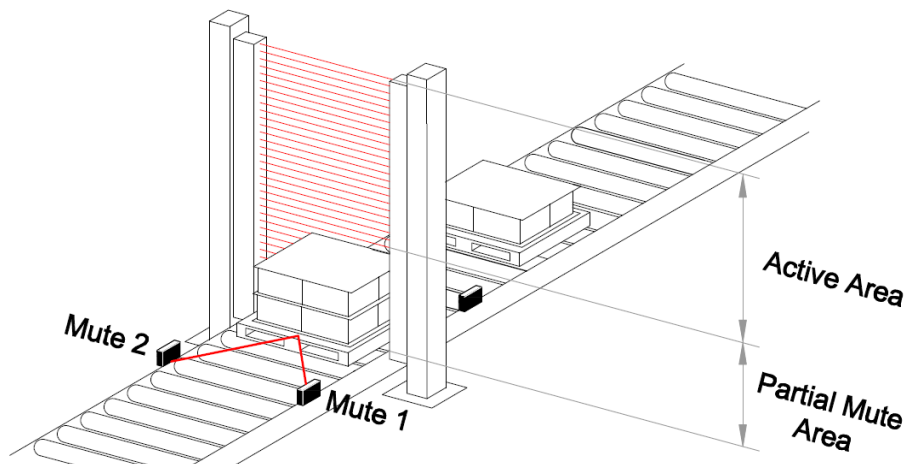
Mute Timer  
(Mode 4)

1. Disconnect power to the light curtain.
2. Configure the DIP switches as per the diagram to the left (Learn mode / Mode 4).
3. Reinststate power to the light curtain. All LEDs on the RX head are on to indicate that mode 4 has been learnt.
4. Disconnect power to the light curtain.
5. Set DIP switches as per the Direct Setting requirements.
6. Reinststate power to the light curtain. All LEDs revert back to their normal functions and Mute Timer (Mode 4) is now activated.

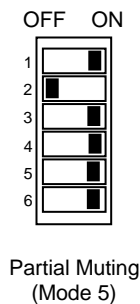
You may want to select another Learn mode function in which case you will need to follow the procedure for that function.

## Learn Setting 5 - Partial or Learn Fixed Muting

In the standard mute function, Mute 1 and Mute 2 inputs are used to enable the entire light curtain sensing field to be in a MUTED condition. The Partial muting function also uses mute 1 and mute 2 but in addition it allows the user to define a specified area, number of beams, of the light curtain to be muted. This can improve the safety by allowing a specific product to pass through the muted area while the rest of the sensing field remains active.



Use the following steps to configure Partial Muting:



1. Disconnect power to the light curtain.
2. Configure the DIP switches as per the diagram to the left (Learn mode / Partial muting).
3. Place the obstruction (product load) in the light curtain.
4. Reinststate power to the light curtain. All LEDs are on to indicate that the number of beams to be muted has been learnt.
5. Disconnect power to the light curtain.
6. Set DIP switches as per the Direct Setting requirements.
7. Reinststate power to the light curtain. All LEDs revert back to their normal functions. During the mute function only the selected beams will be ignored.

You may want to select another Learn mode function in which case you will need to follow the procedure for that function.

**Note** If using the fixed beam blanking and the partial / fixed muting functions then the fixed beam blanking function must be selected first.

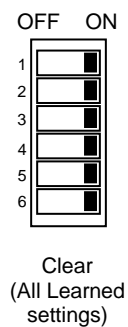
## Learn Setting - 6

Not applicable (do not select).

## Learn Setting 7 - Clear All Learnt

Clears all functions applied in the Learn mode, returning the system to its original factory settings.

Use the following steps to clear any learnt functions selected:



1. Disconnect power to the light curtain.
2. Configure the DIP switches as per the diagram to the left.
3. Reinststate power to the light curtain. All LEDs on the RX head are on to indicate that the Clear mode is active and all learnt functions have now been cleared.
4. Disconnect power to the light curtain.
5. Set DIP switches as per the Direct Setting requirements.
6. Reinststate power to the light curtain. All LEDs revert back to their normal functions and the original factory default settings are applied.

## Figure K – Test and Maintenance

### Testing the safety light curtain with the test piece

The test procedure should be carried out frequently as indicated by the risk assessment for the particular installation.

A test must be carried out at the initial installation and prior to the machine start-up.

Smartsan Ltd recommends the test should be carried out daily.

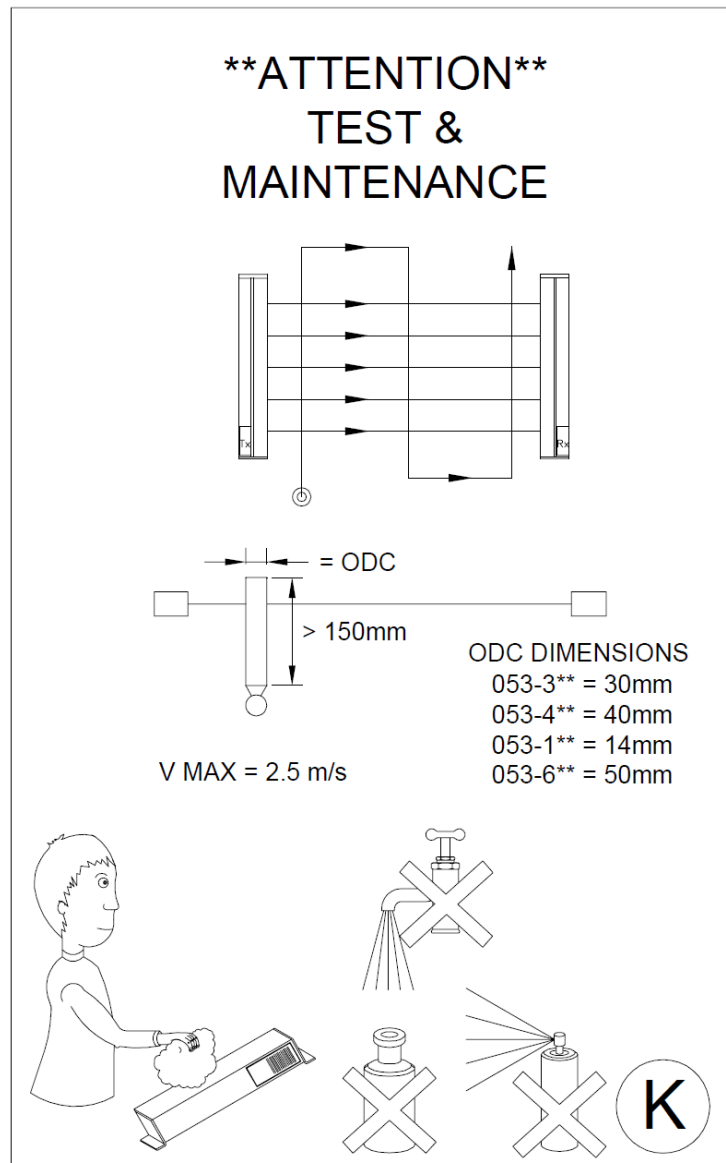
Any changes to the configuration of the safety light curtain must be followed by testing to check the system is still working correctly.

Regular function checking of the safety light curtain as well as at initial installation is required as part of the test and maintenance process.

The operating instructions for the safety light curtain and machine must be made available for the operator and those responsible for installation, maintenance and safety control at all times.

To test the safety light curtain power it up and activate the output switching circuits (OSSDs) to an ON condition.

Insert a test piece of appropriate size into the light curtain detection zone, at the bottom, 150mm from the transmitter unit. At this point the output switches will turn OFF. Sweep the test piece up through the detection zone parallel to the transmitter. Now sweep the test piece down through the detection zone equal distance between the transmitter and receiver. Now sweep the test piece up through the detection zone 150mm and parallel to the receiver unit. At no time during these tests should the output switches turn ON.



Now thrust the test piece anywhere in the light curtain detection zone and ensure the machinery stops without apparent delay.

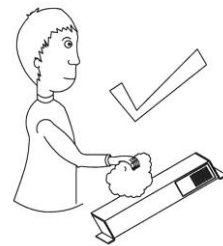
**Warning** The machine shall not start whilst the test piece is blocking the Detection Zone (K) of the light curtain. This is acknowledged by the RED indicator in the on-state and Green indicator in the Off-state. The machine shall remain in the stopped condition and/or prevent the machine from restarting. If it does then machine **MUST** be isolated until the reason has been investigated.

For light curtain models with an ODC above 40mm undertake the same tests as described. During these tests the output switches should only turn OFF as the test piece totally obscures each beam in the light curtain. Ensure that while the test piece is obscuring each beam the output switches are OFF.

### Maintenance

The Transmitter (TX) and Receiver (Rx) windows should be cleaned regularly as indicated on the Installation Sheet, Figure K.

Dirt build-up or scratching on the windows may lead to intermittent tripping or a totally blocked condition of the light curtain. Clear adhesive tape may be applied to the windows of curtains in dirty or abrasive conditions. Renew the clear adhesive tape periodically.



Dust particles can be attracted to the Perspex window due to static charges. This can be prevented by the use of an antistatic plastic cleaner and antistatic cloth.

Clean the windows with a clean damp cloth using a mild detergent. Never use abrasive, corrosive cleaners or spray detergents.

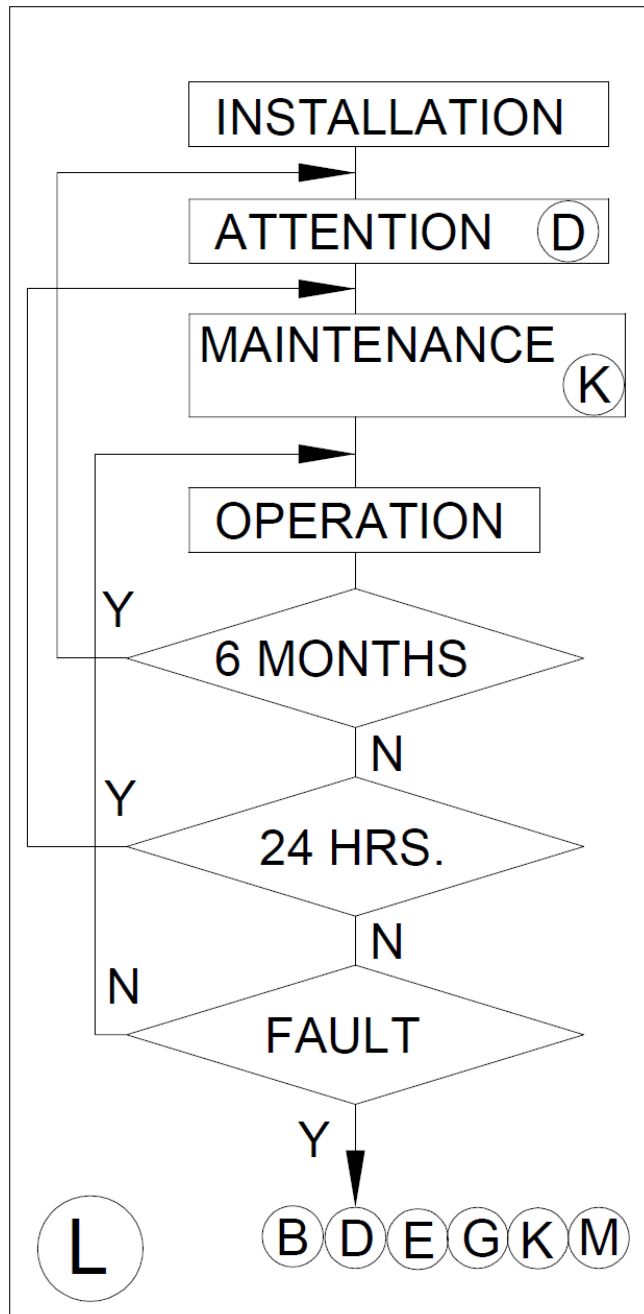


During the maintenance inspection of the safety device and the danger area checks include, damage and general wear, connection cables and the electrical connections, mountings and physical extrusion and Perspex. See also the Operation Cycle checks within this document.

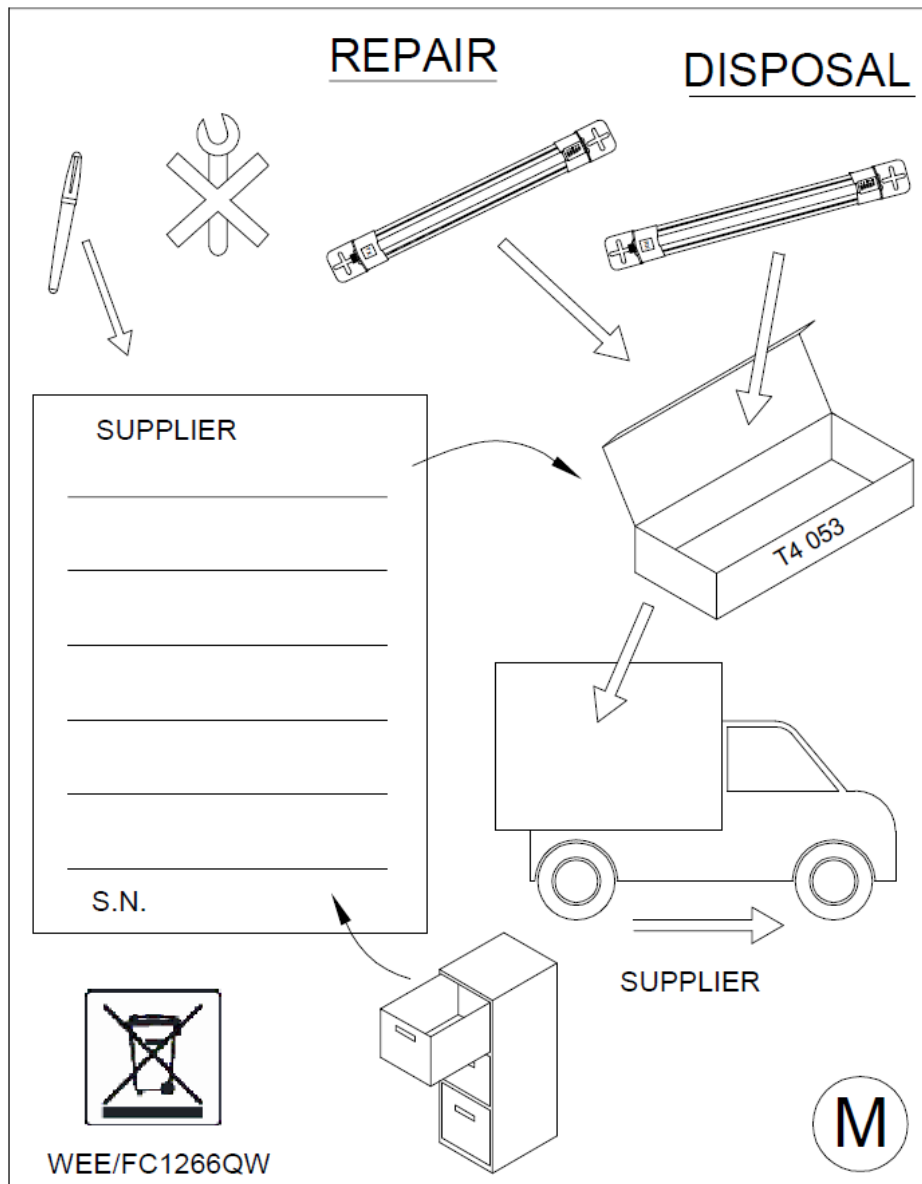
**Warning** There must not be any means of accessing the danger point without interruption to the infrared field of the safety light curtain.

**Figure L – Operation Cycle**

- ❑ Before installation read and understand the Installation Sheet provided paying particular attention to the information provided in Fig. D
- ❑ Refer to Fig. K for test and maintenance procedures
- ❑ Every 24 hours carry out tests as indicated in Fig. K
- ❑ Every 6 months check the entire installation paying particular attention to Fig. D
- ❑ If the equipment fails to operate as intended check the electrical connections as shown in Fig. E



**Figure M – Product Return Procedure**



If a fault occurs that cannot be resolved or the equipment is damaged return the equipment to the nearest Smartscan distributor or Smartscan Ltd. Indicate the nature of the fault and the symptoms displayed on the form provided.

**Note** Please ensure that returned guards (Transmitter and Receiver heads) are matching serial number pairs.

**Figure N – Model List**

Fig. M shows the T4 (053) series safety light curtain model numbers with their corresponding number of Infrared beams, detection zone width (DZ), fixing centres (CTR), overall length (L), and object detection capability (ODC). A list of the operating ranges for the different model numbers is also provided.

<b>T4 SERIES MODEL LIST</b>				
Model 30mm ODC	Model 40mm ODC	Beams	DZ mm	L mm
053-301	053-401	6	141	317
053-302	053-402	12	291	467
053-303	053-403	18	441	617
053-304	053-404	24	591	767
053-305	053-405	30	741	917
053-306	053-406	36	891	1067
053-307	053-407	42	1041	1217
053-308	053-408	48	1191	1367
053-309	053-409	54	1341	1517
053-310	053-410	60	1491	1667
053-311	053-411	66	1641	1817
053-312	053-412	72	1791	1967
053-313	053-413	78	1941	2117
053-314	053-414	84	2091	2267
053-315	053-415	90	2241	2417
053-316	053-416	96	2391	2567

Model 14mm ODC	Beams	DZ mm	L mm
053-101	16	141	317
053-102	32	291	467
053-103	48	441	617
053-104	64	591	767
053-105	80	741	917
053-106	96	891	1067
053-107	112	1041	1217
053-108	128	1191	1367

Model	DZ mm	L mm	Range
053-605	600 (2 x 6 Beams)	776	0.5 - 6 m
053-606	900 (3 x 6 Beams)	1076	0.5 - 6 m
053-607	1200 (3 x 6 Beams)	1376	0.5 - 6 m
053-608	1500 (4 x 6 Beams)	1676	0.5 - 6 m
053-609	1800 (9 x 6 Beams)	1976	0.5 - 6 m
053-610	2100 (10 x 6 Beams)	2276	0.5 - 6 m
053-611	2400 (11 x 6 Beams)	2576	0.5 - 6 m
053-622	1800 (5 x 6 Beams)	1976	0.5 - 6 m
053-623	2100 (5 x 6 Beams)	2276	0.5 - 6 m
053-624	2400 (6 x 6 Beams)	2576	0.5 - 6 m


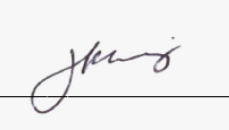
Model	DZ mm	L mm	Range
053-612	600 (2 x 6 Beams)	776	3 - 15 m
053-613	900 (3 x 6 Beams)	1076	3 - 15 m
053-614	1170 (3 x 6 Beams)	1346	3 - 15 m
053-615	1500 (4 x 6 Beams)	1676	3 - 15 m
053-616	1800 (9 x 6 Beams)	1976	3 - 15 m
053-617	2100 (10 x 6 Beams)	2276	3 - 15 m
053-618	2400 (11 x 6 Beams)	2576	3 - 15 m
053-619	1800 (5 x 6 Beams)	1976	3 - 15 m
053-620	2100 (5 x 6 Beams)	2276	3 - 15 m
053-621	2400 (6 x 6 Beams)	2576	3 - 15 m

Model	Length
051-005	Interconnect Cable - 5M
051-010	Interconnect Cable - 10M
051-020	Interconnect Cable - 20M

Model	Range
053-1**	0.5 - 4M
053-3**	0.5 - 6M
053-4**	3 - 15M

**Figure O – Declaration of Conformity**

	CD267/240113
<h2>EC Declaration of Conformity</h2>	
<b>Product:</b>	Smartsan T4 Light Curtain
<b>Manufacturer:</b>	Smartsan Limited, Pywell Road, Willowbrook Industrial Estate, Corby, Northamptonshire, NN17 5XJ, ENGLAND
Declares that the safety component(s) described serial numbers between 800 000 - 899 999 and T4 0001 – T4 9999, fulfils the following safety function: Electro-sensitive protective equipment – Active Opto-electronic Protective Device (safety light curtain).	
<b>Conforms to the following Directives:</b>	
Machinery Directive	2006/42/EC
Electromagnetic Conformity Directive	2004/108/EC
Low Voltage Directive	2006/95/EC
<b>Complies with the relevant requirements of the following Standards:</b>	
EN 61496-1, IEC 61496-2	Type 4
EN 954-1,	Category 4
IEC 62061	SIL 3
EN ISO 13849-1	PL e
<b>Uses the following standards:</b>	
ISO 12100-1, ISO 12100-2, EN 60204-1	
Complies with the examples to which the EC type examination certificate below relates, and is in conformity with the protection requirements of Council Directive 2004/108/EC, as amended, on the approximation of the laws of the Member States relating to electromagnetic compatibility.	
The component is of a type listed in Annex IV of the Machinery Directive. Examples have been submitted for type examination by the approved body identified below.	
Safenet Limited	Notified Body Number 1674
Address	Pywell Road, Corby, Northamptonshire, NN17 5XJ, England.
Certificate No.	1951060112
Signed: 	Date: 24.01.13
Title:	<b>Technical Director</b>




Figure P – Glossary of Words and Language Translation

ENGLISH	FRANCAIS	DEUTSCHE	ITALIANO	ESPAÑOL	SIENSKA	DANSK	DUTCH
ACTIVATE	ACTIVER	AKTIVIEREN	ATTIVAZIONE	ACTIVAR	ACTIVERING	AKTIVERE	ACTIVEREN
ATTENTION	ATTENTION	ACHTUNG	ATTENZIONE	ATENCIÓN	ATTENTION	ATTENTION	ATTENTIE
AUTHORISED PERSON	PERSONNE AUTORISÉE	AUTORISIERTE PERSON	PERSONALE AUTORIZZATO	PERSONA AUTORIZADA	BEHOORGE PERSON	PERSON MED AUTORITET	BEVOEGDE PERSON
BEAM	FAISCEAUX	GITTER	RAGGI	HACES	STRÅLAR	STRÅLE	STRALEN
BLACK	NOIR	SCHWARZ	NERO	NEGRO	SMART	SMART	ZWART
BLOCK	BLOQUEUR	UNTERBRECHEN	BLOCCATO	BLOQUE	BLOCCERA	BLOK	ONDERBROKEN
BLUE	BLEU	BLAU	BLU	AZUL	BLA	BLÅ	BLAUW
BROWN	MARRON	BRÄUN	MARRONE	MARRON	BRUIN	BRUIN	BRUIN
CABLE	CABLE	KABEL	CAVO	CABLE	KABEL	KABEL	KABEL
CLEAR	SECURITE	FREI	LIBERO	CLARO	KLAR	KLAR	VLUVELIG
CLOSE	FERME	SCHLIESSEN	CHIUSO	CERCA	INRA	LUKKE	SLUTEN
CONTROL	CONTROLE	AUSMERTGEPAET	CONTROLLO	CONTROLAR	KONTROLL	KONTROL	BESTURING
DANGER	DANGER	GEFAHR	PERICOLO	PELIGRO	FARA	FARE	GEVAAR
DETECTION CAPABILITY	CAPACITE DE DETECTION	AUFLOSUNG	RISOLUZIONE	CAPACIDAD DE DETECCION	UPPLÖSNING	OPPLÖSNING	DETECTIEVERMOESEN
DISPOSAL	DISPOSITION	ENTFERNEN	SMALTIMENTO	DISPOSICION	SLANGAS	RADIGHED	VERVALDEREN
ENABLE	ACTIVATION	MUTE BEDINGUNG	ABILITAZIONE	PARO DE EMERGENCIA	MOLLIGGOR	MULIG	ACTIVEREN
E-STOP	ARRET D'URGENCE	NOTSTOP	ARRESTO D'EMERGENZA	PARO DE EMERGENCIA	NOODSTOPP	E-STOP	NOODSTOP
FAULT	DEFAUT	FEHLER	GUASTO	INCIDENTE	FEL	FEJL	FOUT
FEATURE	DISPOSITIF	EIGENSCHAFT	CARATTERISTICA	CARACTERISTICA	EGENSKAPER	MULIGHEDER	EIGENSCHAP
GREEN	VERT	GRÜN	VERDE	VERDE	GRÖN	GRÖN	GRÖN
GREY	GRIS	GRAU	GRIGIO	GRIS	GRÅ	GRÅ	GRÅ
INDICATOR	INDICATEUR	ANZEIGE	INDICATORE	INDICADOR	INDIKERING	INDIKATION	INDICATOR
INPUT	ENTREE	INGANG	INGRESSO	ENTRADA	INGANG	INGANG	INGANG
INSTALLATION	INSTALLATION	INSTALLATION	INSTALLAZIONE	INSTALACION	INSTALLATION	INSTALLATION	INSTALLATION
LIGHT CURTAIN	BARRIERE	LICHTGITTER	BARRIERA OTTICA	CORTINA DE SEGURIDAD	LJUS BÄRRER	LICHTSCHERM	LICHTSCHERM
MAINTENANCE	ENTRETIEN	WARTUNG	MANUTENZIONE	MANTENIMIENTO	VEDLIGEHOLD	VEDLIGEHOLD	ONDERHOUD
MODE	MODE	BETRIEBSART	MODO	MODO	FUNKTIONSLAGE	MODE	MODUS
MODEL	MODELE	TYP	MODELLO	MODELO	MODEL	MODEL	MODEL
MODULE	MODULE	MODUL	MODULO	MODULO	MODUL	MODUL	MODUL
MONTHS	MOIS	MONATE	MESI	MESES	MANÄDER	MÄNED	MÄNÄDER
MUTE	OPPRESSION	MUTE	IMBIBIONE	MUTE	FORBODRØPLING	MUTE	ONDRØRUKKEN
OFF	OFF	AUS	NON ATTIVO	MUTE	FRAN	SLUKKE	UIT
ON	ON	EIN	ATTIVO	MUTE	TILL	TÆNDE	AAN
OPEN	OUVERT	OFFEN	APERTO	ABIERTO	OPPEN	OPEN	OPEN
OPERATION	OPERATION	IN BETRIEB	FUNZIONAMENTO	OPERACION	DRIFT	OPERATION	INBEDRUF
ORANGE	ORANGE	ORANGE	ARANCIO	NARANJA	ORANGE	ORANGE	ORANGE
OVERRIDE	ENFONCER	LIEBERBLEIKEN	INVALIDARE	OVERRIDE	OVERSTYRNING	OVERSTYRE	OVERBRUKING
OUTPUT	SORTIE	AUSGANG	USCITA	SALIDA	UTGANG	UTGANG	UTGANG
PINK	ROSE	ROSA	ROSA	ROSA	ROSA	ROSA	ROOS
RECEIVER	RECEPTEUR	EMPFANGER	RICEVITORE	RECEPTOR	MOTTAGARE	MOTTAGER	ONTVANGER
RATING	ESTIMATION	KLASSE	CLASSIFICAZIONE	GRADO	KLASSIFISERING	KLASSIFISERING	STANDARD
RELAY	RELAIS	RELAIS	RELE	RELE	RELA	RELAJ	RELAIS
REPAIR	REPARATION	REPARATUR	REPARAZIONE	REPARAR	REPARARE	REPARARE	ROOD
RESTART	REDEMARRAGE	WIEDERANLAUFSPERRE	RIAVVIO	REINICIALIZER	ATERSTART	HERSTART	ROOD
SAFETY	SECURITE	SICHERHEIT	SECUREZZA	SEGURIDAD	SAKERHET	SAKERHED	VELLIGHED
SHIELD	TERRE	ERDFABEN	SCHERMO	MALLA	SKARM	SKAERM	AARING
STATUS	STATUT	STATUS	STATO	ESTADO	STATUS	STATUS	STATUS
SUPPLIER	FOURNISSEUR	LIEFERANT	FORNITORE	PROVEEDOR	LEVERANTOR	LEVERANDOR	LEVERANCER
TEST	ESSAI	PRUEFUNG	PROVA	TEST	PROV	TEST	TEST
TRANSMITTER	EMETTEUR	SENDER	EMITTITORE	TRANSMISOR	SANDRE	SENDER	ZENDER
VIOLET	VIOLET	VIOLETT	VIOLETA	AMARILLO	VIOLETT	VIOLETT	VIOLETT
YELLOW	JAUNE	GELB	GIALLO	AMARILLO	GUL	GUL	GEEL
WHITE	BLANC	WEISS	BIANCO	BLANCO	VIT	HVID	WIT
MONITORING	SURVEILLANT	UBERWACHUNG	SORVEGLIANZA	EL VISILAR	OVERVAKNING	CHEK	BEWAAKT
CROSS-BEAM	RAYONS DIAGONALE	KREUZ STRAHL	RAGGI INCROCIATI	CHECK	KRYSS-STRÅLAR	KRYDS STRALE	DIAGONALE - STRALEN

P

### Appendix 1 – Important Safety Information

- ❑ Ensure that the Smartsan safety light curtain is installed by a competent person using the installation information provided.
- ❑ Smartsan safety light curtains are supplied as matching serial number pairs and must be used as matching serial number pairs.
- ❑ It is the responsibility of the employer that the safety light curtain is properly installed, operated and maintained as well as the suitable machinery on which the safety product is installed. All the applicable national and international legislation and technical standards for the corresponding machine application must be complied with.
- ❑ The safety light curtain is only one element in the overall machine safety circuit, the whole machine safety control circuit must be a fail-safe design.
- ❑ The stopping elements of the machine should be regularly checked to make sure the machine stop time performance is reliable and within the specified parameters.
- ❑ Do not repair or modify the Smartsan safety light curtain. Smartsan products can only be repaired by the manufacturer. Any work carried out on the product that is not done by the manufacturer will invalidate the warranty terms. All products being returned for repair must be matching serial number pairs.
- ❑ The Smartsan Product installation sheet and installation guide do not provide instruction or operation information for the machine that it is integrated to.
- ❑ The Smartsan Product Installation instructions should be kept with the safety light curtain during its entire working life.

## Appendix 2 - Certifications

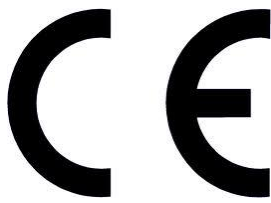
### Company



ISO9001  
FM27829

Smartsan Limited has a certified quality assurance system in compliance with ISO 9001-2008. Certificate number FM27829.

### Products



Smartsan safety light curtains are developed and manufactured in compliance with the European Machinery Directive 2006/42/EC and International Legislation and Standards. Smartsan products are Third Party approved by the Notified Body Safenet Limited, Notified Body number 1674.

### Appendix 3 - Mirrors

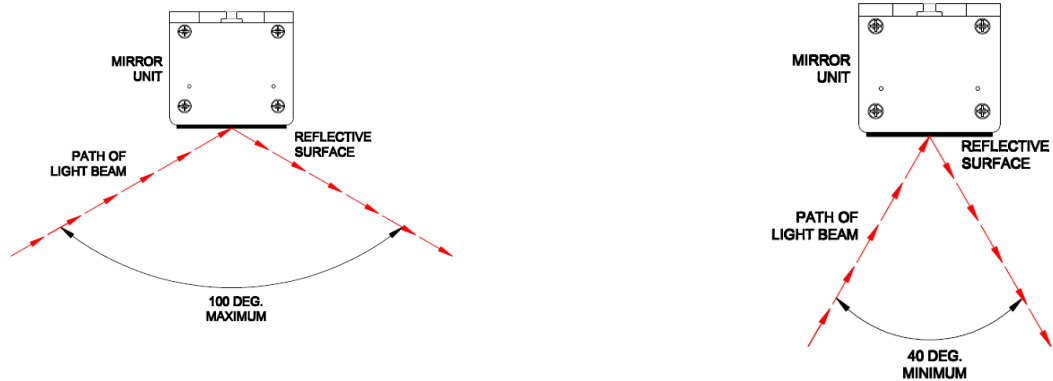
Reflector mirrors can be provided enabling two or three sides of a machine to be safeguarded with, what is effectively a single light curtain.

When mirrors are employed it is essential that the mounting of the transmitter unit, receiver unit and mirrors themselves are sufficiently rigid. Alignment becomes increasingly critical as the range and number of mirrors increase. Mirrors cause a reduction in optical efficiency, reducing the effective range. A guide to the practicality of using mirrors is given below.

Range of the light curtain	Maximum range through 1 mirror	Maximum range through 2 mirrors
3m – 15m	11m	8m

Total Light Path	1 Mirror	2 Mirror
3m	Easy	Easy
6m	Easy	Medium
8m	Medium	Hard
11m	Hard	Not Feasible

Based upon a 053-612

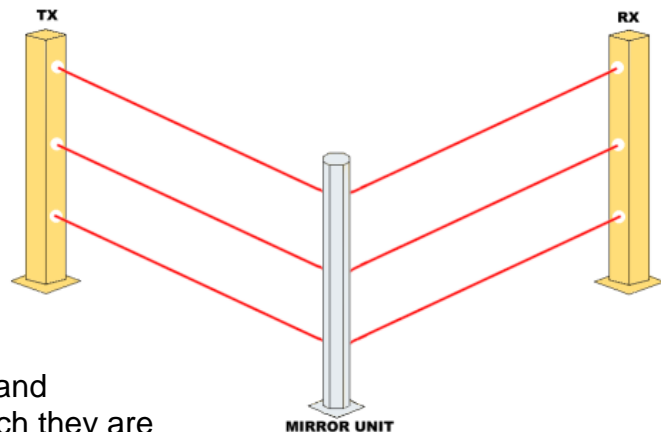


The angle of the infrared beams from the light curtain striking the reflective surface must be within defined limits as per the drawings above. See Fig. D in this guide.

**Note** The mirror length must be a minimum of 100mm longer than the detection zone (K) of the light curtain to be installed e.g. 50mm above and 50mm below either end of the light curtains detection zone (K).

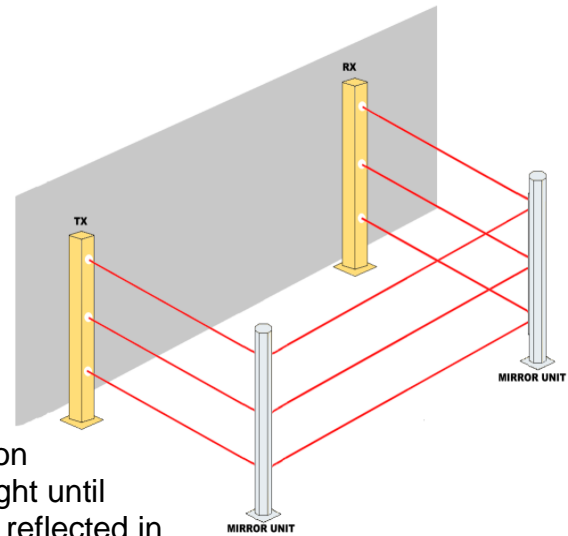
Perimeter curtains will be easier to align, curtains over 900mm may be more difficult to align. Check with the Smartsan technical department prior to ordering for a particular application, support@smartsan.com, Tel: +44 (0) 1536 401 313, Fax: +44 (0) 1536 268 954

## Alignment through one mirror



1. Secure the transmitter, receiver and mirror units in the position in which they are intended to be used.
2. Ensure all units are perfectly upright in all planes by using a spirit level.
3. If the units are floor mounted on stands ensure the floor is even. Shim the floor mounts if necessary to ensure the units are all upright.
4. With one eye looking over the top of the receiver unit in line with the centre of the extrusion look towards the reflective surface of the mirror, in a similar manner to looking through a gun sight.
5. A second person must adjust the mirror to the left and right until the Perspex window of the transmitter unit can be seen reflected in the mirror.
6. If the light curtain is scanning over a long range it may be difficult to see the reflection of the transmitter units Perspex window in the mirror. If so, cut a piece of white paper to the size of the Perspex window and mount directly in front of the window. Now repeat step 5.
7. If the reflection of the white paper is difficult to see in the mirror then employ a third person to hold a flashlight in front of the transmitter unit with the light beam pointing directly in line with the Perspex window towards the mirror. Now repeat step 5.
8. Use shims to ensure the mirror is accurately aligned to enable the infra red beams in the light curtain to reach the receiver. Alternatively, fabricate mirror mountings to include some form of adjustment to enable movement both left and right and also forward and backwards from the central axis of the mirror.

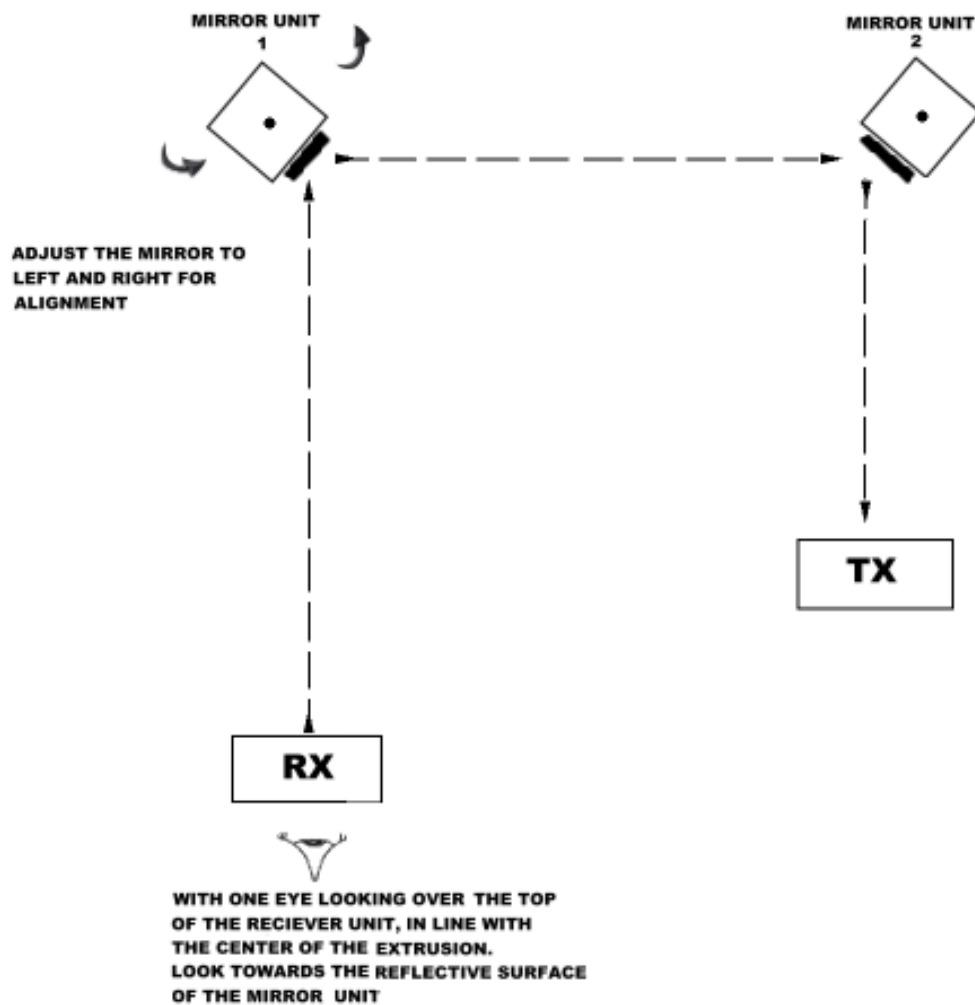
## Alignment through two mirrors



9. Follow instruction 1-4
10. A second person must adjust the position of the first mirror to the left and to the right until the entire length of the second mirror is reflected in the first mirror. If difficulties are experienced in seeing the reflection on the second mirror in the first mirror then use a piece of white paper cut to size and position in front of the second mirror.
11. If the reflection of the white paper is difficult to see in the first mirror then employ a third person to hold a flashlight in front of the second mirror with the light beam pointing directly in line with its mirror housing towards the first mirror. Secure the first mirror.
12. Again follow instructions 1 to 4.
13. The second person must adjust the position of the second mirror to the left and to the right until the entire length of the transmitter unit is reflected through both the first mirror and the second mirror. If difficulties are experienced in seeing the reflection of the transmitter unit through both the first then the second mirrors then use a piece of white paper cut to size and position in front of the transmitter unit.
14. If the reflection of the white paper is still difficult to see through the first and second mirrors then employ a third person to hold a flashlight in front of the transmitter unit with the light beam pointing directly towards the second mirror. Secure the second mirror.
15. Ensure the mirrors are directly aligned thus enabling the infra- red beams of the transmitter to reach the receiver. Alternatively, fabricate mirror mountings to include some form of adjustment to enable movement both left and right and also forwards and backwards from the central axis of each mirror.

- Now turn on the power to the light curtain and check that the green LED beam indicator, mounted on the receiver unit is 'on'. If not, it may be necessary to finely adjust each mirror in turn to ensure the infra-red energy from the transmitter unit is being reflected through the mirror(s) to the corresponding receiver unit.

#### Alignment of the light curtain using mirrors



**Note:** The mirror length must be a minimum of 100mm longer than the overall length of the light curtain to be installed e.g. 50mm above and 50mm below either end of the light curtain.

## Appendix 4 – Specification Table

<b>SPECIFICATION TABLE</b>	
Number of beams	2 - 128
Object detection	14mm, 30mm, 40mm plus perimeter guarding systems
Detection height	141 – 2391 mm
Range	Perimeter guard - 4 – 15m 0.5 – 6m 14 mm guard - 0.5 – 4m 30 mm guard - 0.5 – 6m 40 mm guard - 3 – 15m
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
Power supply requirement	24V DC 1A ±10%
Current consumption	1.3A 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

<b>INPUTS</b>	
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

<b>OUTPUTS</b>	
Safety outputs OSSD1 & OSSD2	Electronic 500 mA
Status output	Electronic 500 mA
Mute output	Electronic 500 mA
Status and mute indication	Status & condition LEDs on the light curtain

