



**MACHINERY SAFETY SYSTEMS**

## **8K3 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 8K3 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 8K3 series safety light curtain or any machine safety product.

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

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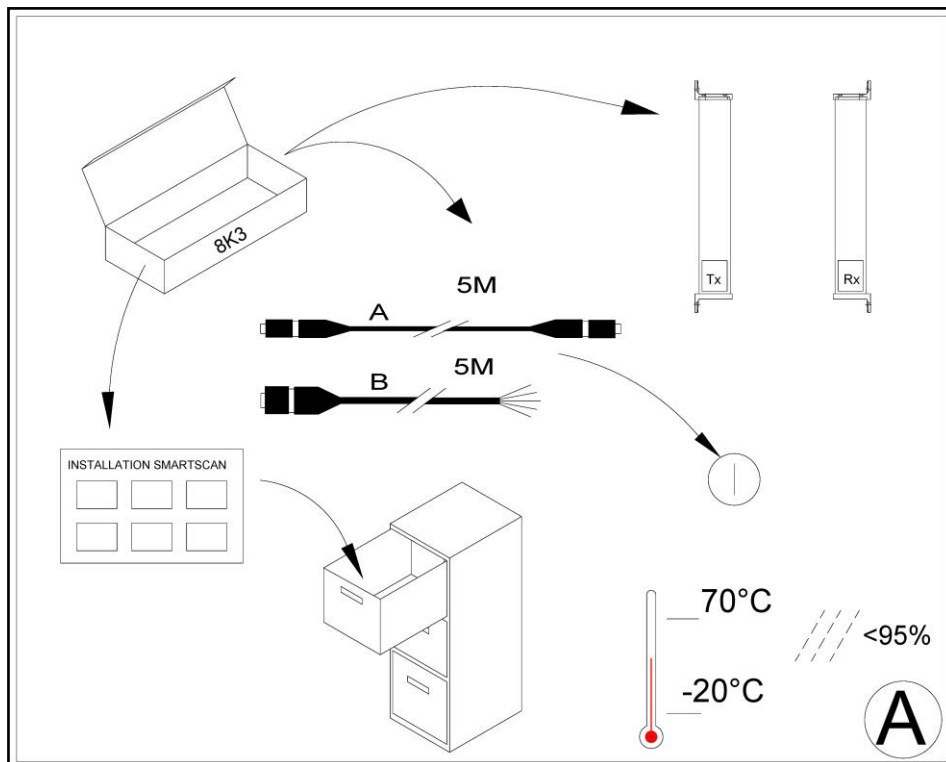
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### 8K3 Series (Model No. 087xxxxx) Safety Light Curtain Installation Sheet (CD651/011119)

#### 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

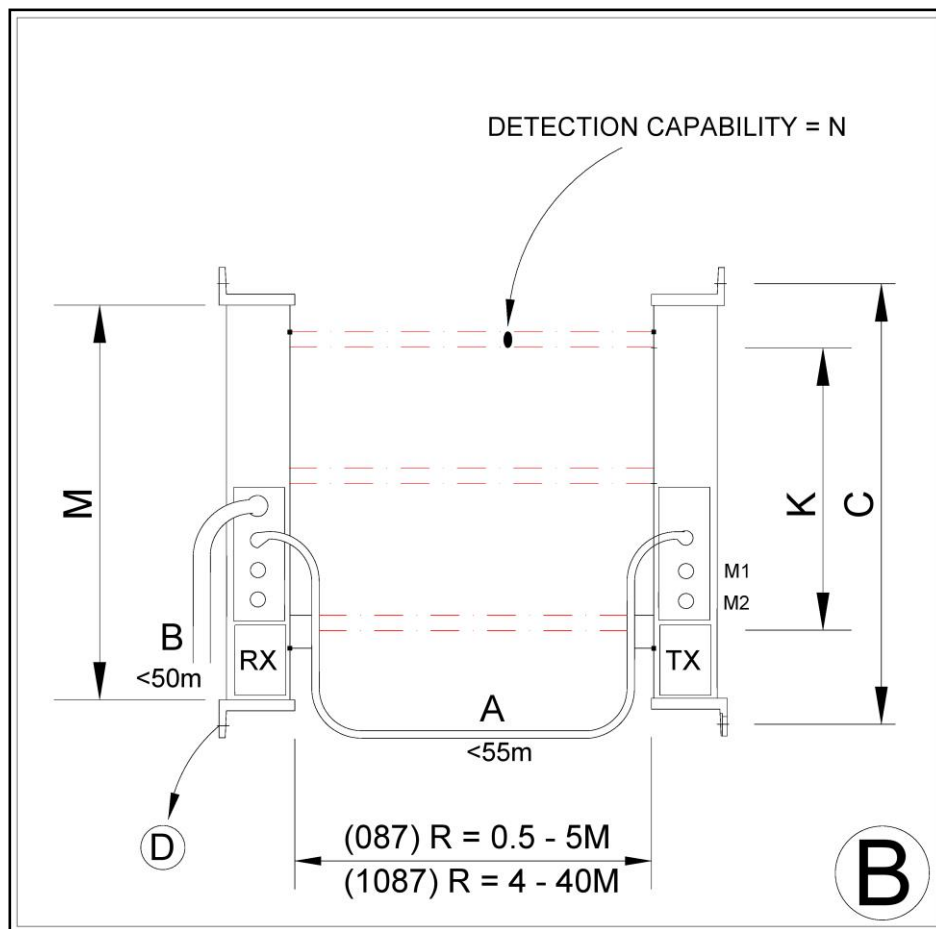


#### Each 8K3 series supplied would normally include:

- ❑ Safety Light curtain
- ❑ Cables (A) and (B)
- ❑ Installation sheet
- ❑ Service questionnaire form

#### Storage requirements:

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

**Figure B – Light Curtain Parameters****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 safety light curtains detection height.

**Range (R)**

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

**Light curtain mounting centres (C)**

Use 6mm bolt and washer for fixing.

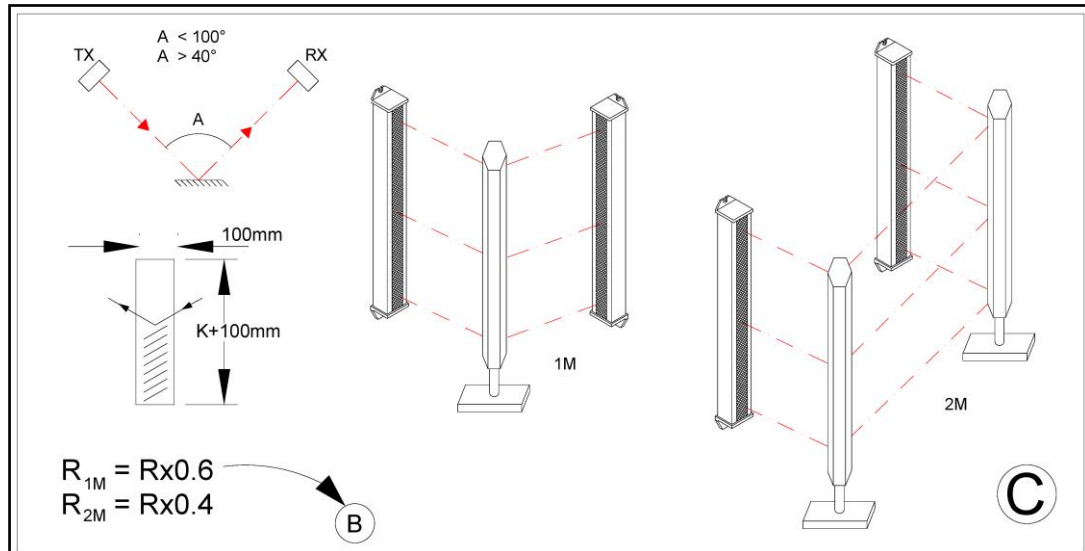
**Length of the light curtain enclosures excluding end-caps (M)**

Fig. B also shows the connection points for the A cable between the Transmitter (TX) head and the Receiver (RX) head. The mute input connections (Mute 1 and Mute 2) on the Transmitter (TX) head. The B Cable connection and mute input connections, (Mute 1 and Mute 2) on the Receiver head.

To ensure correct operation of the system the cable lengths as stated should not be exceeded: A cable = 55 metres. B cable = 50 metres.

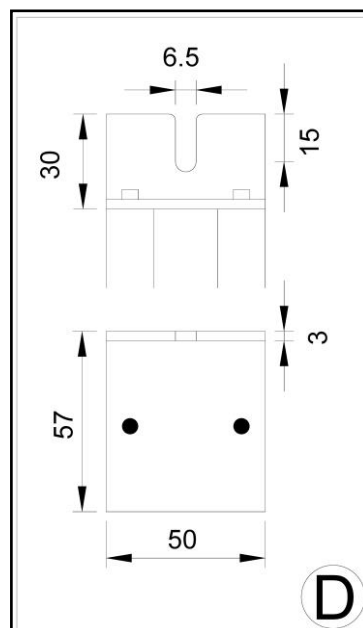
### Figure C – Light Curtain and Mirror Arrangement

A detailed explanation of the use of mirrors and safety light curtains in machine safety applications can be found in Appendix 1.

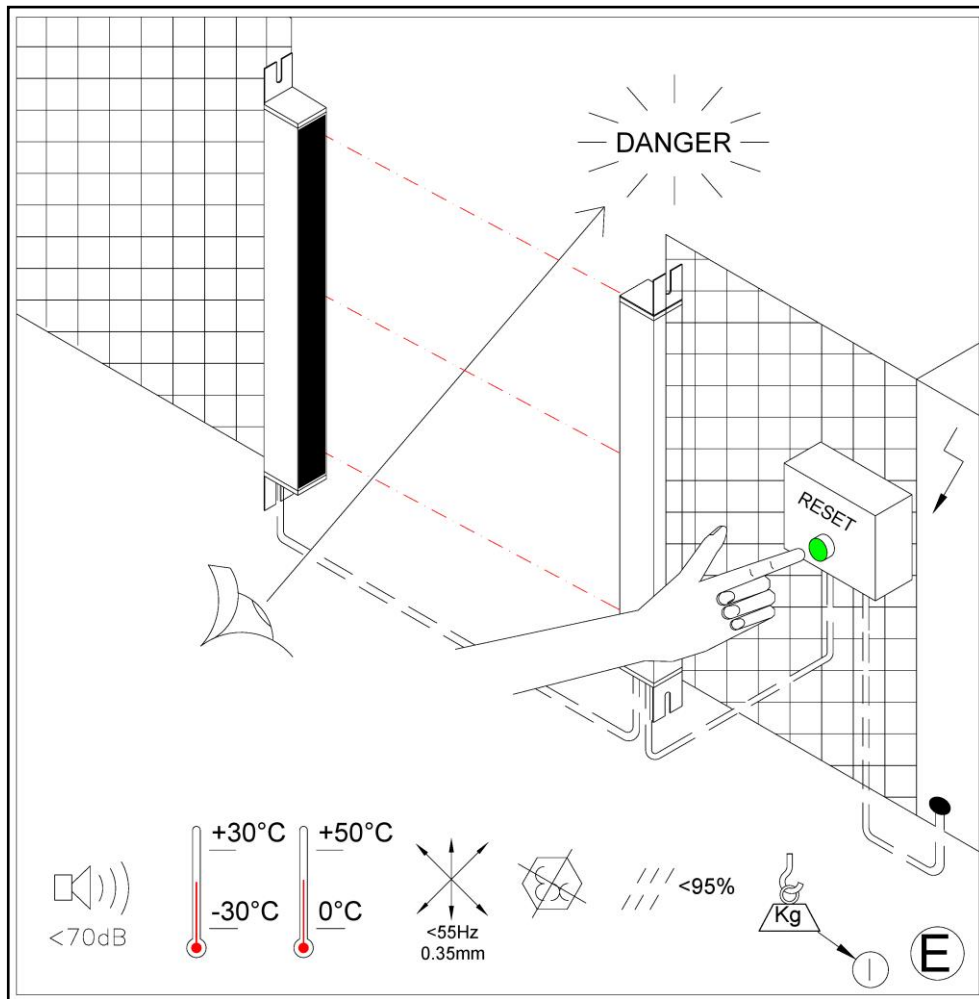


If utilising mirrors to deflect the light curtain ensure the mirror length is 100mm longer than the light curtain detection height and mounted centrally to the detection zone (DZ). To ensure reliable operation the light curtain deflection angle from the mirror must not be less than 40 degrees or greater than 100 degrees.

### Figure D – Mounting Bracket Arrangement



The 8K3 series end-bracket dimensions are shown above. Use M6 bolts for the mounting brackets.

**Figure E – 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).
- ❑ Noise generated by the equipment will never exceed 70 dB

#### 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 curtain's 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

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.

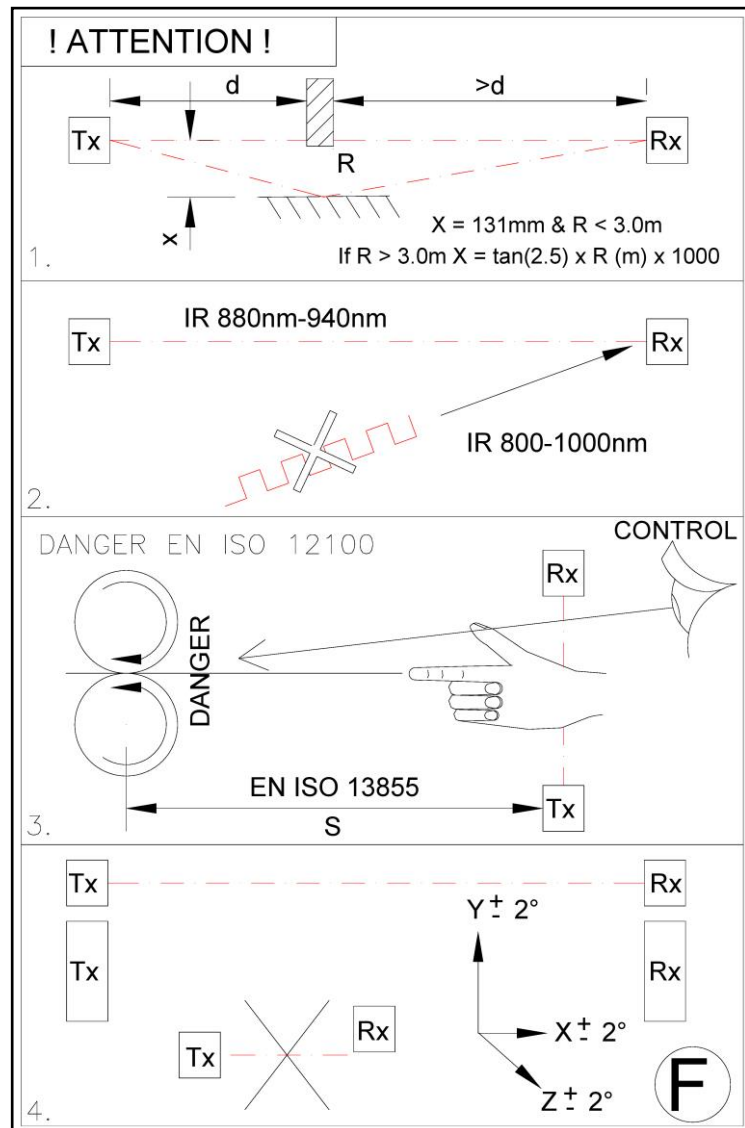
Environmental factors can affect the operation of a safety light curtain and proper consideration should be taken into account for mounting a system where fog, rain, smoke, dust, large temperature fluctuations etc is a consideration.

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. See Appendix 1.

**Figure F – 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.

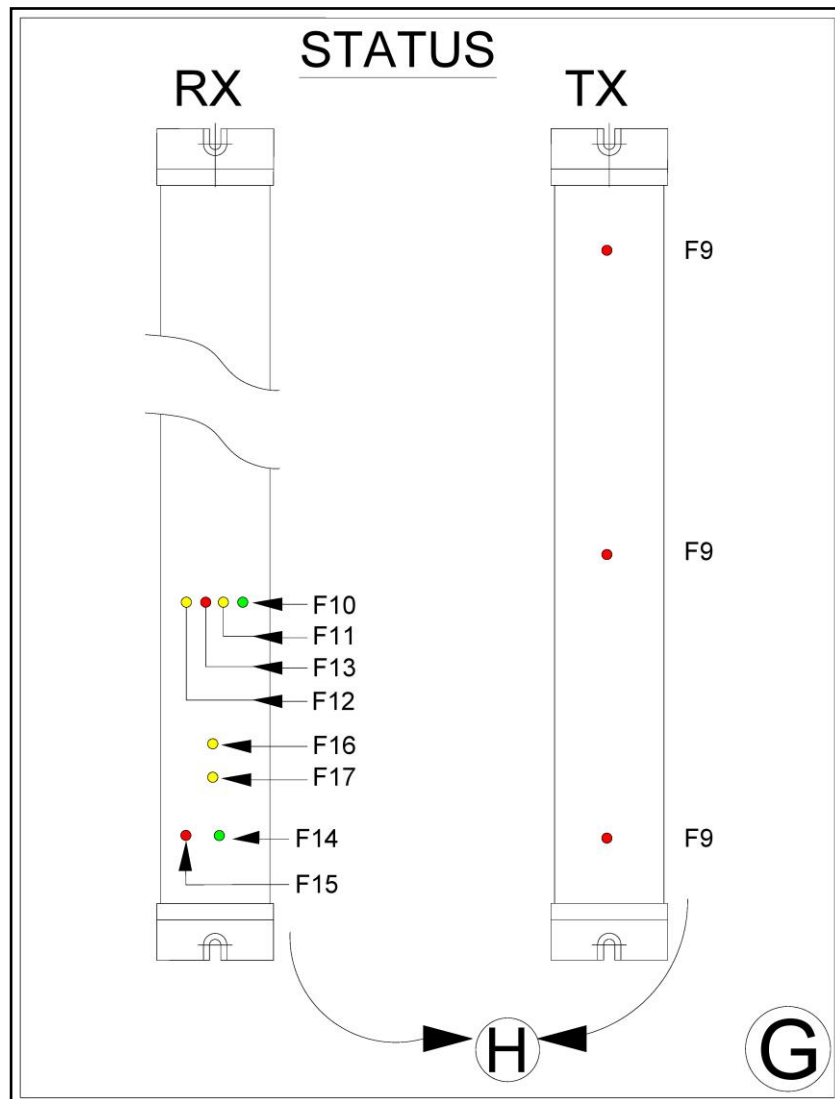
The protection afforded by the safety light curtain should correspond to the machine Risk Assessment under ISO 14121 for the machine being guarded.

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.

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.

**Figure G – Status Indicators and Function****LED Status Indicators on the RX**

F10	Green	Guard Clear
F11	Yellow	Mute 1 Clear
F12	Yellow	Mute 2 Clear
F13	Red	Guard Blocked

F16	Yellow	Status relay off (Auxiliary / Non-safety Output)
F17	Yellow	Mute on

F15	Red	Safety outputs off
F14	Green	Safety outputs on

**LED Status Indicators on the TX**

F9	Red	Beam(s) transmitting
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## Receiver (RX) Indicators

### Light curtain 'clear' indicator (F10)

A green LED indicator mounted on the receiver unit illuminates when the light curtain is clear of obstruction.

### Light curtain infrared 'blocked' indicator (F13)

A red LED indicator mounted on the receiver unit illuminates when a infrared beam of the light curtain is obstructed and in alignment.

### Safe output 'on' (F14)

A green LED indicator mounted on the receiver unit illuminates when the signal output switching relays are ON.

### Safe output 'off' (F15)

A red LED indicator mounted on the receiver unit illuminates when the signal output switching relays are OFF.

### Mute 'clear' indicators M1 (F11) and M2 (F12)

Amber LED indicators mounted on the receiver unit extinguish independently, when mute sensors M1 and M2 are blocked.

### Mute condition 'on' indicator (F17)

Amber LED indicator mounted on the receiver unit illuminates when the light curtain output relays are in a muted condition.

### Status output indicator (F16)

An amber LED indicator mounted on the receiver unit is illuminated when the status relay is de-energised, but extinguishes when the status relay is on.

## Transmitter (TX) Indicators

### Transmitter diode on indicators (F9)

A red LED corresponding to each transmitter diode is illuminated when each transmitter is operational.

**Figure H – Feature Listing**

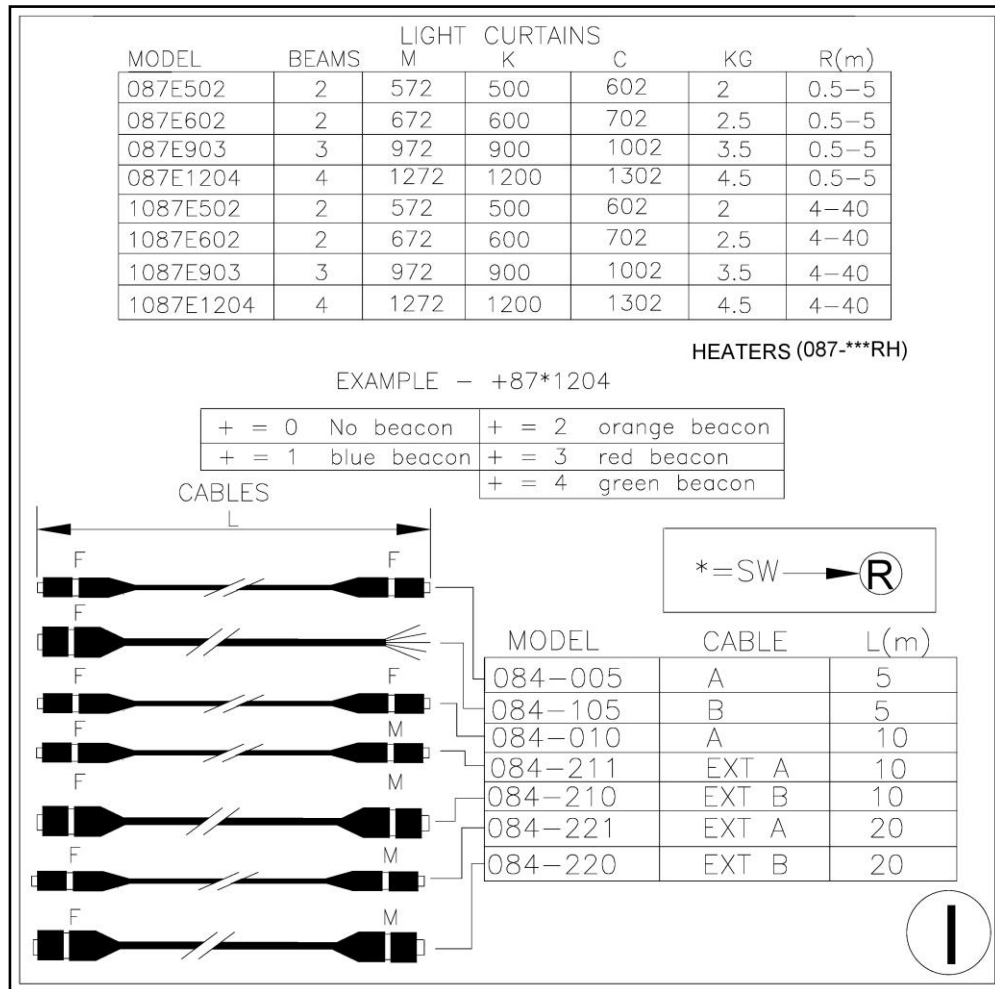
The listing below defines the features found on the 8K3 series safety light curtain.

FEATURE	ON	OFF	RATING	FUNCTION
F1	CLOSE	OPEN	2A 110V	SAFETY OUTPUTS
F2	24V	0V / OPEN	100mA / 30V	INPUT - EDM
F3	CLOSE	OPEN	1A 110V	OUTPUT STATUS RELAY
F4	24V	OPEN	1A	MUTE OUTPUT RELAY
F5	24V	0V / OPEN	10mA	
F6	24V	0V / OPEN	10mA	INPUT - MUTE ENABLE
F7	24V	0V / OPEN	10mA	INPUT - ACTIVATE
F8	N/A	N/A	N/A	N/A
F9	RD			INDICATOR TX - OK
F10	GN			INDICATOR - CLEAR
F11	YE			INDICATOR - MUTE 1 CLEAR
F12	YE			INDICATOR - MUTE 2 CLEAR
F13	RD			INDICATOR - BLOCK
F14	GN		F1	INDICATOR - SAFETY ON
F15	RD		F1	INDICATOR - SAFETY OFF
F16	YE		F3	INDICATOR - STATUS OFF
F17	YE		F4	INDICATOR - MUTE ON



**Figure I – Model List**

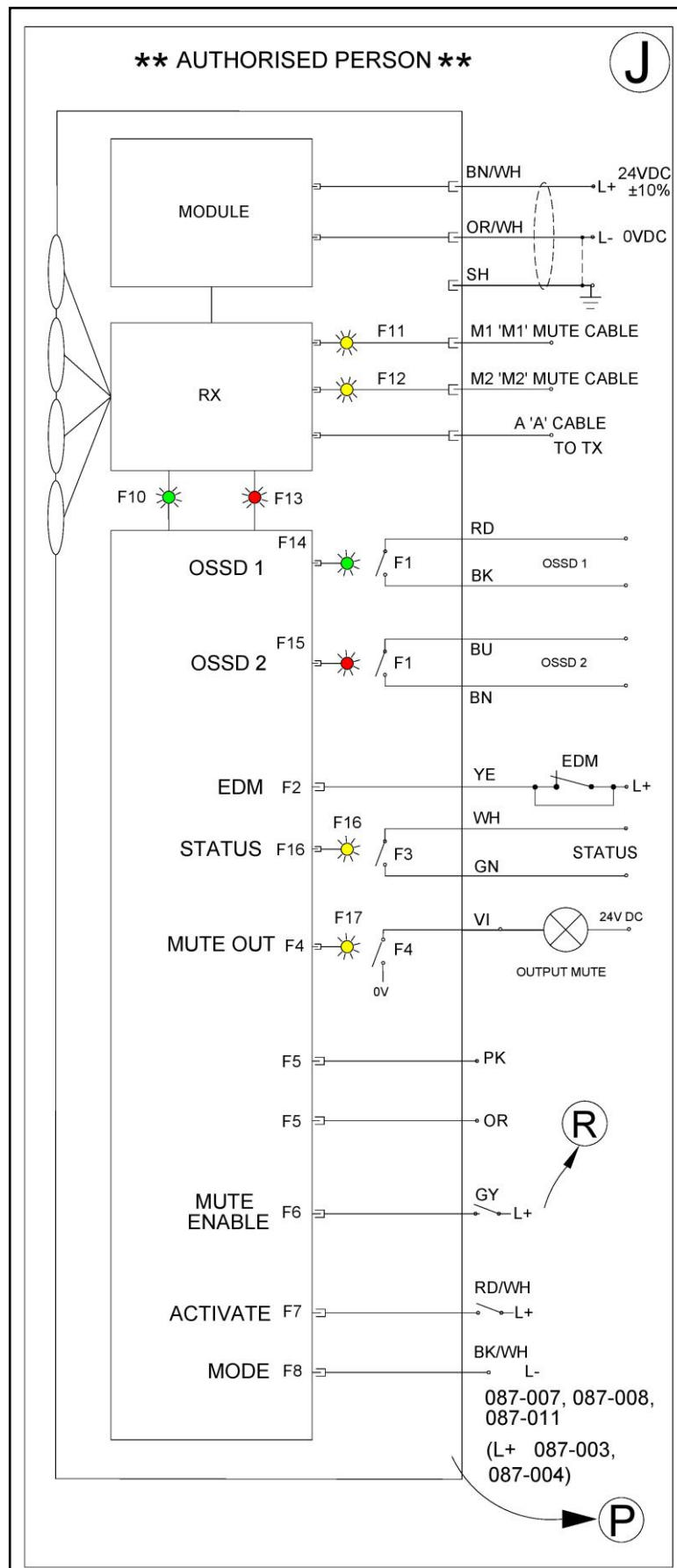
It describes model codes, number of beams, aluminium extrusion length (M), detection zone width (K), light curtain mounting centres (C) weight in (Kg) of the transmitter (Tx) and receiver (Rx) columns and the maximum scanning range (R).



For example, model number 087E903 will provide a 900mm high detection zone, 3 beam safety light curtains with the standard software option.

Model number 187E903 will provide the following, 900mm high detection zone, 3 beam safety light curtains with a blue integrated mute beacon and standard software option.

Figure J - Electrical Connections





**Warning** Do not disconnect the cables from the Transmitter (TX) or Receiver (RX) head with the power still connected to the 8K3 series light curtain.

Any wiring or re-wiring of the light curtain must be done with the power supply disconnected.

Any input or output signals that are not being used must be terminated safe.

The machine must be disconnected during electrical installation to ensure no inadvertent start up of the machine occurs.

The connection cables must be not be routed with high-voltage cables, e.g. inverter cables or motor power supplies.

### Safety Outputs (F1)

8K3 series safety light curtains have cross-monitored output switching relays mounted inside the receiver column. The output relays (fail-safe) provide two safety 'volt free' switching contacts that are internally connected to the wires in the multi-core cable 'B' as follows: Output 1: Red (RD) and Black (BK). Output 2: Blue (BU) and Brown (BN). It has a Maximum contact switching power 24V DC, 2A or maximum 110V, 2A. When the light curtain is active and protecting the safety relay contact is closed.

### Status Output (F3)

Relay provides one non-safety 'volt free' switching contact which is internally connected to the wires in the multi-core user cable 'B', wires White (WH) and Green (GN). The switching relay contacts are 'normally open' outputs from this relay and should only be used for non-safety applications. Maximum switching power 110V, 500mA. The status relay activates when the safe output relays (F1) turn ON and de-activates when the safe outputs (F1) turn OFF.

### Mode (F8)

The mode setting has 2 options, L- (0V DC) for the cross-beam muting inverted 'T' shape and L+ (24V DC) for the cross-beam muting 'L' shape exit only light curtain where you need the mute delay-off timer to be active. The mode is configured on wire colour Black (BK) / White (WH) in cable B.

**Note** Always connect mode wire Black (BK) / White (WH) to) L- (0V DC) except for exit only application to L+ (+24V DC).

**Mute Output (F4)**

Some machine types require a mute indication to show that the light curtain is in a muted condition. Connection of a mute indicator lamp can be made between wire colour, Violet (VI) in (cable 'B'), and +24V DC.

The 8K3 series can be supplied with an integrated high reliability monitored mute beacon, employing bright light emitting diodes as the light source. It is integrated into the top of the light curtain receiver column.

**Mute Inputs M1 and M2**

Mute inputs M1 and M2 are for connecting the L & T muting modules, and Photo-electric sensors. The inputs for the L & T muting modules are via 4 way connectors mounted on the side of the Transmitter (TX) and Receiver (RX) units. In addition, Smartscan also provide retro-reflective sensors that can be plugged directly into M1 and M2 for muting on the RX only of the light curtain.

On the Transmitter (TX) mute input M1 is the connection furthest from the 8K3 Series mute module and situated below the A or interconnect cable connection. Mute input M2 is the connection directly below mute input M1.

On the Receiver (RX) the two mute inputs are situated below the B or User cable connection and the A or interconnect cable connection. Again, M1 is the connection furthest from the 8K3 Series mute module.

**Note** In **parallel beam** the mute sensors must be interrupted within the timing control logic sequence to initiate the mute condition. See Installation guide for 8K3 Parallel beam mute system.

In **cross-beam** both mute sensors must be interrupted within the disparity time to initiate the mute condition. See Installation guide for 8K3 cross-beam mute system.

**Mute Enable Input (F6)**

For connection of the 3<sup>rd</sup> mute signal, normally a 'conveyor run' signal of +24V DC is required to the light curtain from the associated conveyor system. Connection of the 3<sup>rd</sup> mute input is via the Grey (GY) wire, in cable 'B' to volt-free relay contact of conveyor-run. Contact closed when conveyor running (+24V DC signal supplied).

Normally the muting function is cancelled if the 8K3 safety light curtain remains muted for more than 15 minutes. After this time period the guard will trip and require a reset.

**Warning**

It is a control system requirement that the Mute Enable Input or 'conveyor run' signal is provided for both cross-beam and parallel beam muting, so as to maintain a high level of safety integrity.

**Activate (F7) Manual Restart / Mute Dependent Override**

A push button or key switch is required, having a Normally-open (N/O) switch contact. Connect the (Red / White) wire from cable B to one side of the switch and the other side of the switch to + 24V DC.

The activate switch performs two functions:

**Manual (Latched) Restart**

Turning the 'activate' switch to ON and then releasing the switch will automatically turn on the safety outputs (F1), providing the light curtain is clear of obstruction.

**Mute Dependent Override**

Providing the safety light curtain is in a tripped condition and the infrared beams of the safety light curtain are blocked by the pallet load then turning and holding the activate switch (spring return) to ON will automatically turn-on the safety outputs (F1), for a period of 3 minutes. However, as soon as the blockage clears the main infrared beams of the safety light curtain, within 3 minutes, then the Mute Dependent override will deactivate and the safety light curtain will automatically reactivate to a 'fully guarded' condition and the spring return switch can now be released.

**EDM (F2)**

An **External Device Monitoring** input is provided for the customer to monitor external switching devices. This is to ensure the external devices respond in unison with the safety outputs (F1) each and every time the light curtain is interrupted. The EDM input should be connected to the Yellow wire (YE) (cable B). The other side of the EDM switch contact should be connected to +24V DC. If the EDM function is not required for a particular application it is necessary to link the Yellow wire (YE) to +24V DC. If the link is not fitted the safety system will trip and it will not be possible to restart the safety light curtain.

**Power Supply**

Use a regulated supply +24V DC, 2A  $\pm 10\%$ . Protect the +24V input with a 1.5A fuse. Connect the power supply to cable B as follows: The Brown (BN) / White (WH) wire to L+ (+24V DC) and the Orange (OR) / White (WH) wire to L- (0V DC). Connect the screen to ground as shown in the wiring diagram.

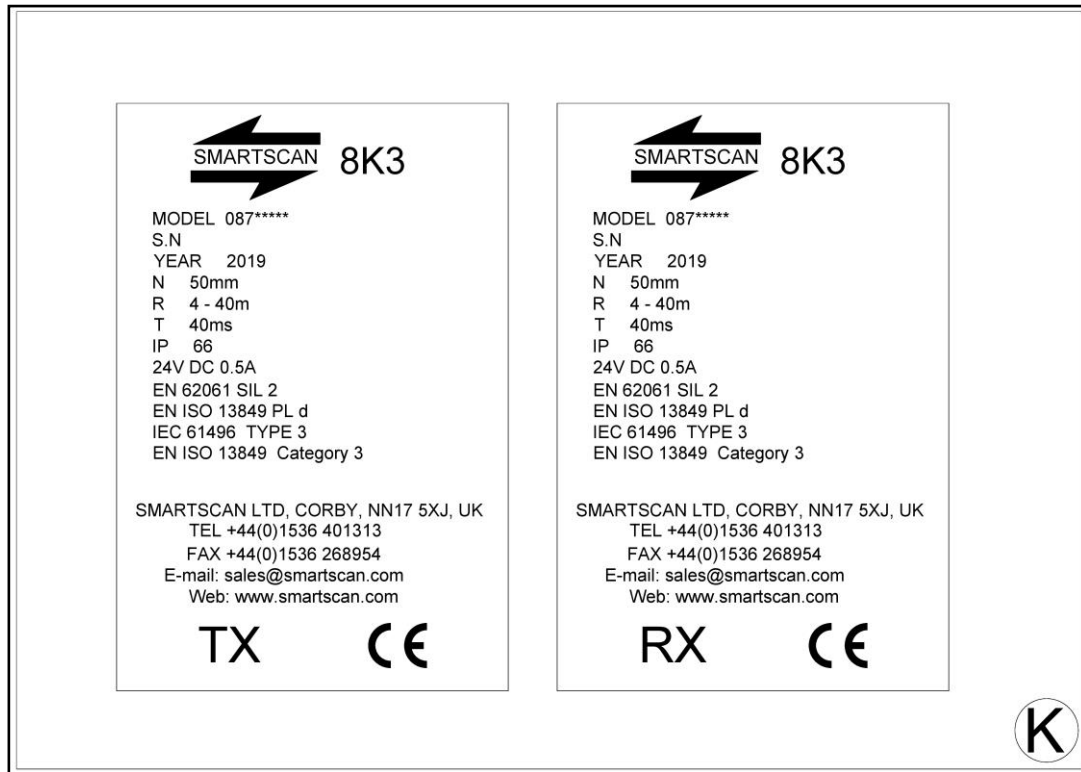
**Note:** Prior to initial power up of the light curtain check if it is connected directly to a 24V DC source supplied by the user, it must be emphasised that the supply should be regulated and suppressed to prevent transient voltages and other forms of electrical interference from affecting correct operation of the Smartscan equipment.

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

- ❑ Grey (GY) wire '**mute enable**', for self-muting applications it is a control requirement that it is connected to a 3<sup>rd</sup> mute signal e.g. conveyor run.
- ❑ Yellow (YE) wire **EDM**, must be connected to +24V DC either directly or via a feedback loop from the main E-Stop switching contactor.
- ❑ Black (BK) / white (WH) wire '**mode**', must be connected to 0V DC or, to +24V as required for the Exit only system providing necessary delay-off timer.

## Figure K – 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 L – Activate Control

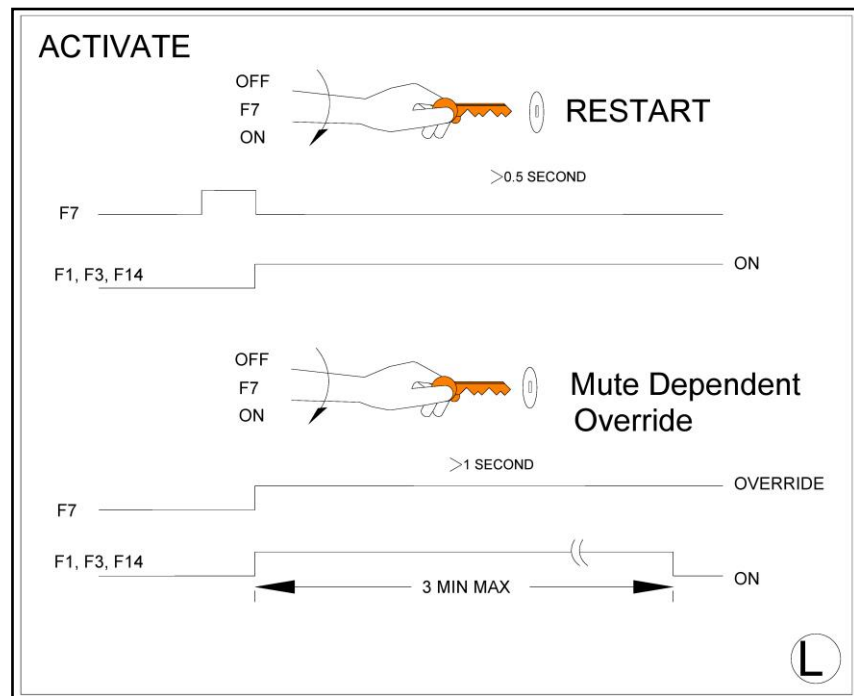
The ACTIVATE control has two functions.

### Restart

At power-up or, following a tripped condition, the activate switch is used to restart (reset) the output relays to an ON state. The switch must be activated and released to enable a restart condition.

The reset switch must be located so that the operator cannot reset the light

curtain from inside the dangerous area. In addition, the reset switch must be positioned so that the operator can see that the dangerous area is safe / free of personnel before resetting the machine.



### Mute dependent Override

If the safety system trips when a pallet load is interrupting the sensing field / beams of the light curtain the safety system cannot be restarted. In order to remove the blockage from the safety light curtain the 8K3 series provides a guard override facility.

The Mute Independent Override is achieved by activating and holding the Activate switch until the blockage has cleared the sensing field of the light curtain. The maximum time allowed to hold the output relays in an ON state is 3 minutes. This period is normally enough time for an operator to restart the machine and remove the pallet load from the detection field of the light curtain. For the output relays to remain energised the activate switch, 'spring return', must be held in the 'closed' position during the entire blockage period.

However, as soon as the blockage clears the main sensing beams of the light curtain within 3 minutes, the Mute Dependent override will deactivate and light curtain will automatically reactivate to a 'fully guarded' condition and the spring return switch can now be released.

Note, the Mute Dependent Override can only be functional during a blockage within the sensing field of the light curtain.

## Figure M – 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.

Smartscan Ltd recommends the test should be carried out daily prior to normal operation of the machine.

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

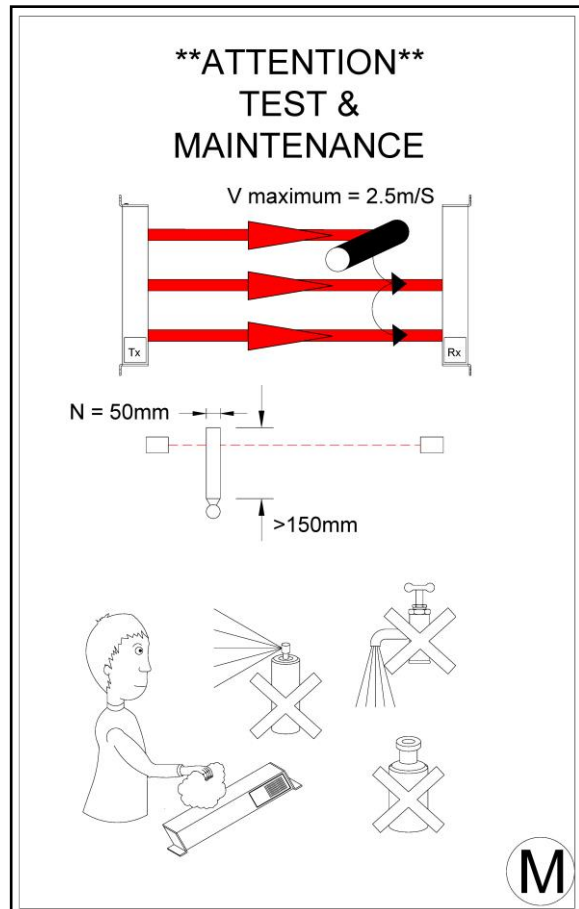
Regular function checking of the safety light curtain as well as at initial installation is required as part of the test and maintenance process.

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 top light beam, 150mm from the transmitter unit. At this point the output switches will turn OFF as the test piece totally obscures the beam. Repeat this process through each of the beams in the light curtain.

Ensure that while the test piece is obscuring each beam the output switches are OFF.



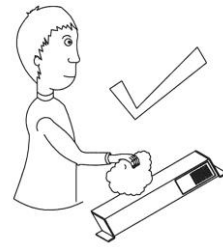
#### Warning

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

## Maintenance

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

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.

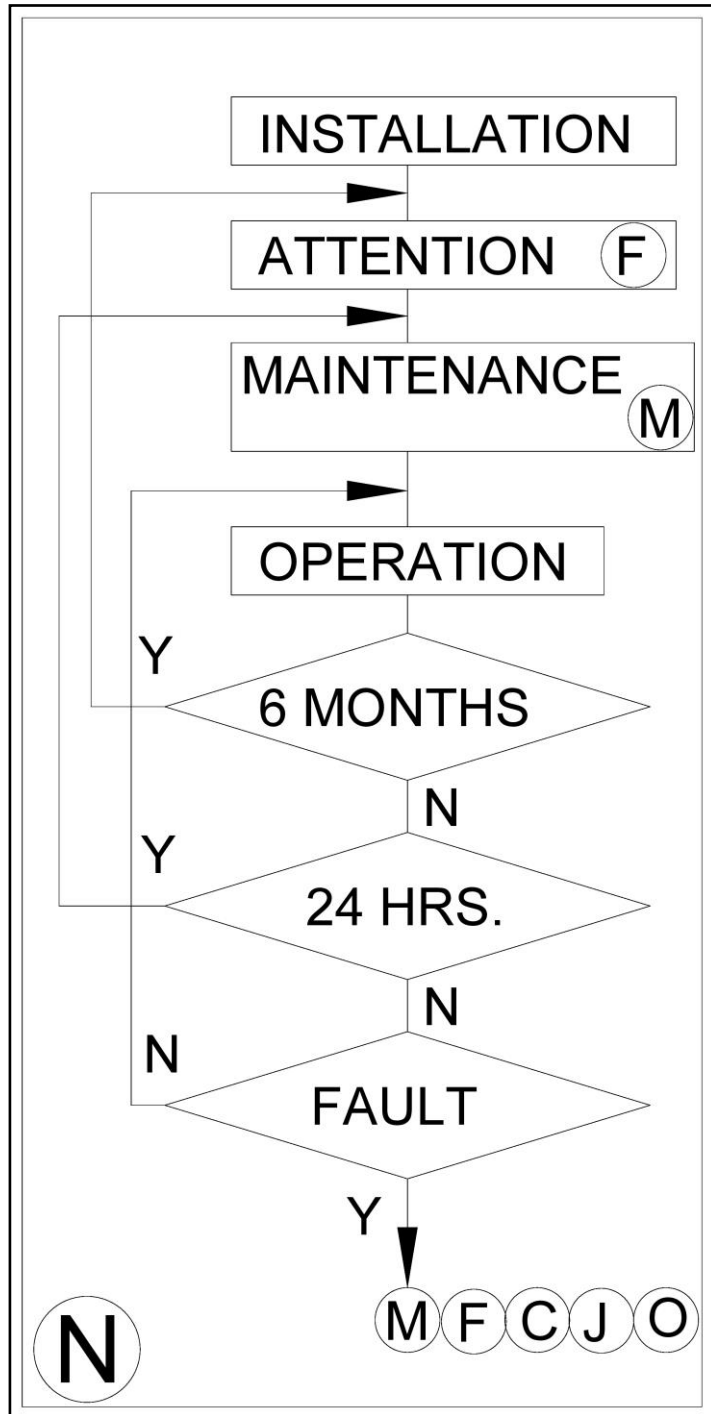


During the maintenance inspection of the safety device and the danger area checks include, damage and general wear, connection cables and the electrical connections. Check the mountings and physical extrusion, Perspex. Access to the danger point should be through the infra red field of the safety light curtain only. See also the Operation Cycle checks within this document.

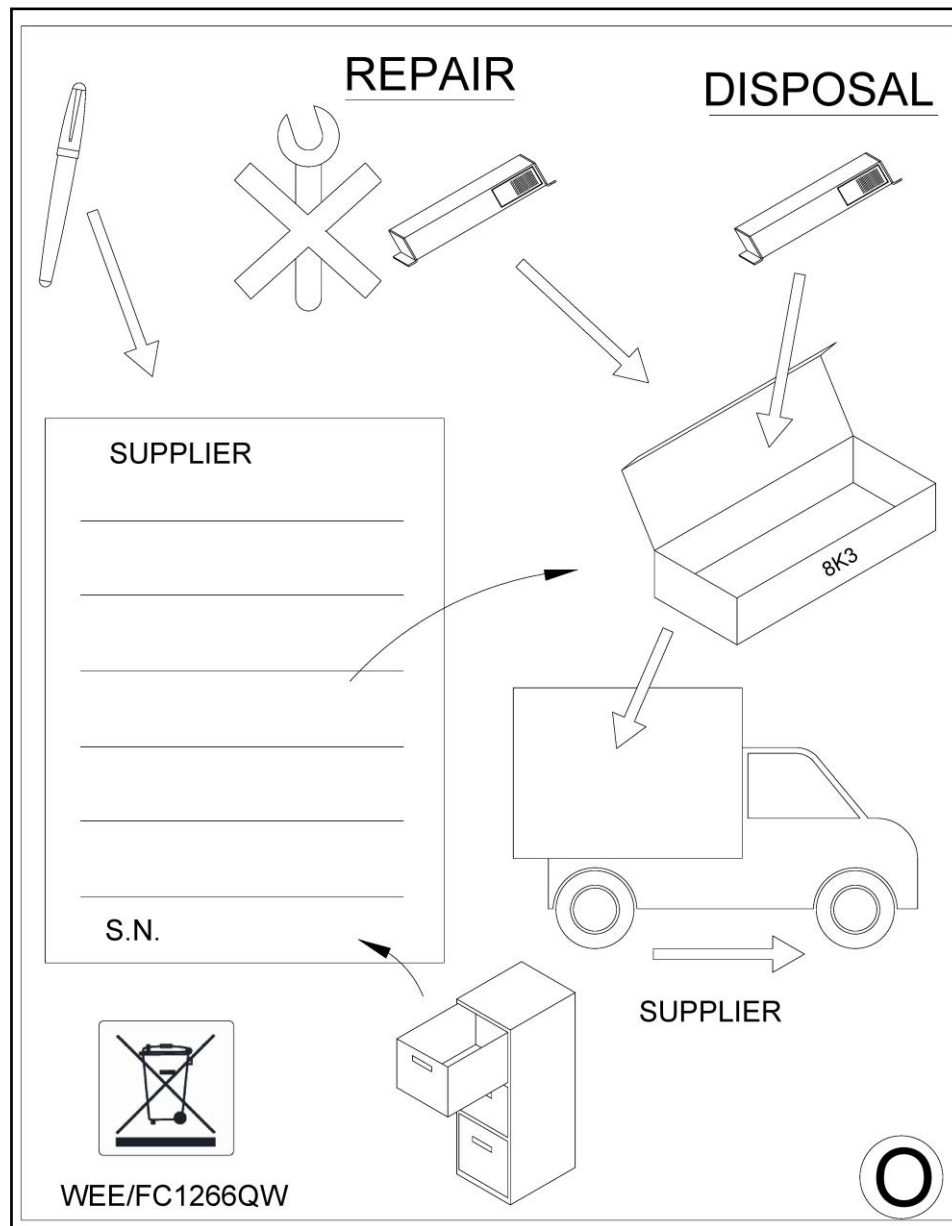
**Warning** There must not be any means of accessing the danger point without interruption to the infrared field of the safety light curtain.

**Figure N – Operation Cycle**

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





**Figure O – Product Return Procedure**

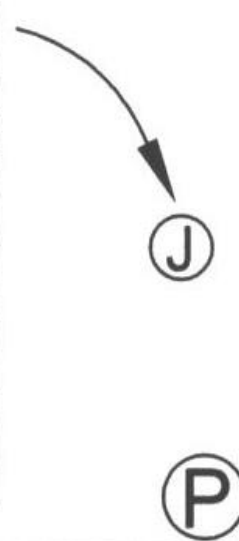
If a fault occurs that cannot be resolved or the equipment is damaged return the equipment to the nearest Smartscan distributor or Smartscan Ltd. Indicate the nature of the fault and the symptoms displayed on the form provided.

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




**Figure P – Wire Colours**

The table below shows the abbreviation code for the B cable wire colours. Please refer to the electrical connection drawing Fig. J for more detail.

PIN	COLOUR
1	BK = BLACK
2	RD = RED
3	GN = GREEN
4	WH = WHITE
5	BN = BROWN
6	BU = BLUE
7	OR = ORANGE
8	PK = PINK
9	GY = GREY
10	VI = VIOLET
11	YE = YELLOW
12	BN/WH = BROWN & WHITE
13	OR/WH = ORANGE & WHITE
14	BK/WH = BLACK & WHITE
15	RD/WH = RED & WHITE
16	SH = SHIELD
17	TQ = TURQUOISE
18	GN/WH = GREEN & WHITE



**Figure Q – Declaration of Conformity**

	<b>CD651Q/011119</b>
 <b>EC Declaration of Conformity</b> 	
<b>Product:</b> Smartscan 8K3 Light Curtain	
Smartscan Limited, Pywell Road, Willowbrook Industrial Estate, Corby, Northamptonshire, NN17 5XJ	
Declares that the safety components(s) described: Serial Numbers: Between 440 000 and 479 999	
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	2014/30/EU
Low Voltage Directive	2014/35/EU
<b>Complies with the relevant requirements of the following Standards:</b>	
EN 61496-1, EN 61496-2	Type 3
EN ISO 13849-1	Category 3
EN IEC 62061	SIL 2
EN ISO 13849-1	PL d
<b>Uses the following standards:</b>	
EN ISO 12100, EN 60204-1, EN 415-4, EN 62046	
Complies with the examples to which the EC type examination certificate below relates, and is in conformity with the protection requirements of Council Directive 2014/30/EU, 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	Denford Garage, Denford, Kettering, Northamptonshire, NN14 4EQ.
Certificate No.	XXXXXXXXXX
 Signed:  Date: 01. 11. 2019	
Title: <u>TECHNICAL DIRECTOR</u>	
	

## Figure R – Timer Functions for Cross and Parallel Beam Muting

The standard timer software supplied with the 8K3 series pallet entry / exit applications is the 'E' version. The software version is shown against the corresponding part number, e.g. 087E903.

The timers used in both cross-beam and parallel beam muting modes are shown below.

### Cross-Beam Muting Control Timers

T1 (Mute 1 and Mute 2 Disparity Time) = Maximum time allowed between activation of signals mute 1 (M1) and mute 2 (M2) prior to the pallet entering the safety light curtain.

T2 (Mute Time Out Period) = A maximum pre-determined time the safety light curtain will remain in a muted condition. Following this timed period, if the pallet is still interrupting the mute beams or infrared beams of the safety light curtain the OSSD's will de-energise thus initiating a stop condition. Providing the pallet clears the safety light curtain before the maximum time T2 is exceeded then automatic transfer of the pallet will continue.

T3 (Mute Off Delay Time) = This function is only used for the pallet exit 'L' shape system. A predetermined delay-off time that the safety light curtain will remain in a muted condition following de-activation of one or both of the mute signals.

It is assumed that the Mute enable signal is energised during the entire pallet transfer process.

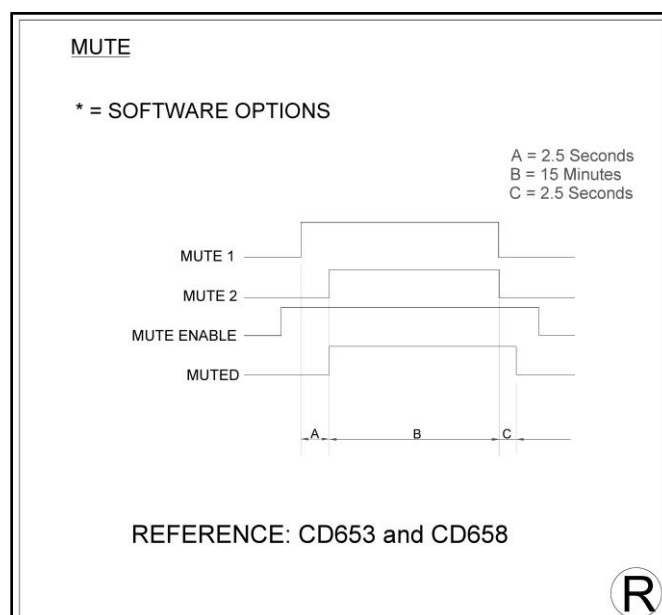
#### Software version example

087E903 provides the following functions for cross-beam muting,

T1 = 2.5 Sec

T2 = 15 min

T3 = 2.5 Sec (Exit system only).



## Parallel Beam Muting Control Timers

T1 (Pallet Transfer Time) = Minimum to maximum time during the pallet transfer between, activation of mute beam 1 (M1) and the light curtain. Then T1 is repeated again for pallet transfer between the light curtain and mute beam 2 (M2).

T2 (Mute Time Out Period) = A maximum pre-determined time the light curtain will remain in a muted condition. Following this timed period, if the pallet is still interrupting the mute beams (M1 and M2) and the light curtain then the OSSD's will de-energise thus initiating a stop condition. Providing the pallet clears the mute beams and the light curtain before the maximum time T2 is exceeded then automatic transfer of the pallet will continue.

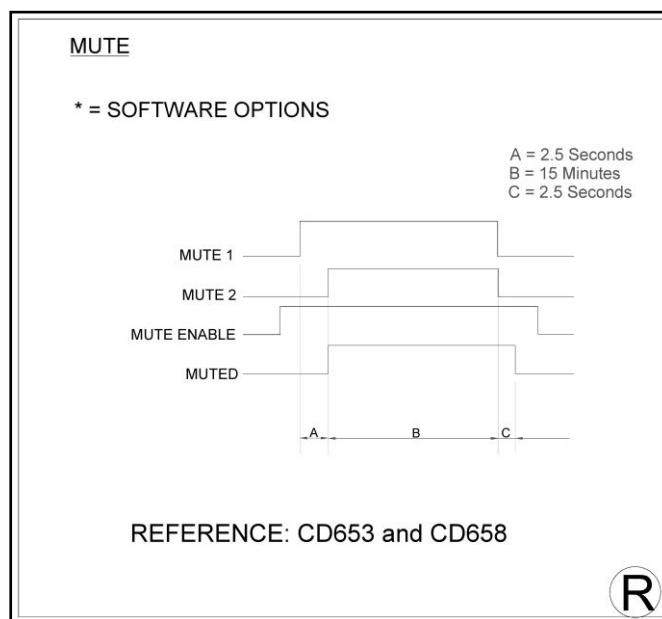
It is assumed that the Mute Enable signal is energised during the entire pallet transfer process.

### Software version example

087E903 provides the following functions for parallel beam muting,

T1 = 2.5 Sec


T2 = 15 min



Please also refer to the 8K3 series Mute Module Installation sheets for the cross-beam and parallel beam muting modules for further information on muting configurations.

Figure S – Glossary of Words and Language Translation

GLOSSARY	GLOSSAIRE	GLOSSAR	GLOSSARIO	GLOSSARIO	ORDLISTA	ORDBOG	BIBLIOGRAFIE
ENGLISH	FRANCAIS	DEUTSCHE	ITALIANO	ESPAGNOL	SVEJSKA	DANSK	DUTCH
ACTIVATE	ACTIVER	ACTIVEREN	ATTIVAZIONE	ACTIVAR	ACTIVEREN	ATTENTION	ACTIVEREN
ATTENTION	ATTENTION	ACHTUNG	ATTENZIONE	ATTENCIÓN	ATTENZIONE	ATTENTION	ATTENTIE
AUTHORISED PERSON	PERSONNE AUTORISÉE	AUTORISIERTE PERSON	PERSONALE AUTORIZZATO	PERSONA AUTORIZADA	BETÖRIG PERSON	PERSON MED AUTORITET	BEVOEGDE PERSOON
BEAM	FAISCEAUX	GITTER	RAGGI	HACES	STRÅLAR	STRÅLE	STRALEN
BLACK	NOIR	SCHWARTZ	NERO	NEGRO	NEGRO	SWART	ZWART
BLOCK	BLOQUER	UNTERBRECHEN	BLOCCATO	BLOQUE	BLOCKERA	BLOK	ONDERBROKEN
BLUE	BLEU	BLAU	BLU	AZUL	BLÅ	BLÅ	BLAUW
BROWN	MARRON	BRAUN	MARRONE	MARRON	BRUN	BRUN	BRUIN
CABLE	CÂBLE	KABEL	CAVO	CABLE	KABEL	KABEL	KABEL
CLEAR	SECURITE	FREI	LIBERO	CLARO	KLAR	KLAR	VRIJ/VELIC
CLOSE	FERME	SCHLIESSEN	CHIUSO	CERCA	NÄRA	LUKKE	SUJTEN
CONTROL	CONTROLE	ANWEISEN	CONTROLLO	CONTROLAR	KONTROLL	KONTROL	BESTURING
DAINGER	DANGER	GEFAHR	PERICOLO	PELIGRO	FARA	FARE	GEVAAR
DETECTION CAPABILITY	CAPACITE DE DETECTION	AUFSUCHUNG	RISOLUZIONE	CAPACIDAD DE DETECCION	UPPLÖSNING	OPSLÖSNING	DETECTIEVERMOGEN
DISPOSAL	DISPOSITION	ENTFERNEN	SMALTIMENTO	DISPOSICION	SLÄNGAS	RAUDESIGN	VERWUJDEREN
ENABLE	ACTIVATION	MUTE BEDINGUNG	ABILITAZIONE	PARO DE EMERGENCIA	MOLLGÖR	MILIG	ACTIVEREN
E-STOP	ARRET D'URGENCE	NOTSTOP	ARRESTO D'EMERGENZA	PARO DE EMERGENCIA	NODSTOPP	E-STOP	NODSTOP
FAULT	DEFAULT	FEHLER	GUASTO	INCIDENTE	FEL	FELI	FOUT
FEATURE	DISPOSITIF	EIGENSCHAFT	CARATTERISTICA	CARACTERISTICA	EIGENSKAPER	MULIGHEDER	EIGENSCHAP
GREEN	VERT	GRÜN	VERDE	VERDE	GRÖN	GRÖN	GRÖN
GREY	GRIS	GRAU	GRIGIO	GRIS	GRÅ	GRÅ	GRUIS
INPUT	INDICATEUR	ANZEIGE	INDICATORE	INDICADOR	INDIKERING	INDIKATOR	INDICATOR
INSTALLATION	ENTREE	ENGANG	INGRESSO	ENTRADA	INGANG	INGANG	INGANG
LIGHT CURTAIN	INSTALLATION	INSTALLATION	INSTALLAZIONE	INSTALACION	INSTALLATION	INSTALLATION	INSTALLATIE
MAINTENANCE	BARRIERE	LICHTGITTER	BARRIERA OTTICA	CORTINA DE SEGURIDAD	LYSUS BARRIER	LYSÖTTER	LICHTSCHERM
MODE	ENTRETIEN	WARTUNG	MANUTENZIONE	MANTENIMIENTO	UNDERHÅLL	VEDLIGEHOLD	ONDERHOUD
MODEL	MODE	BETRIEBSART	MODO	MODELO	FUNKTIONSLÅGE	MODE	MODUS
MODULE	MODULE	TYP	MODELLO	MODELO	MODEL	MODEL	MODEL
MONTHS	MODULO	MODUL	MODULO	MODULO	MODUL	MODUL	MODULE
MUTE	MOS	MONATE	MESI	MESES	MANDER	MANED	MANDEN
OPPRESSION	OPPRESSION	MUTE	INIBIZIONE	MUTE	FORBIDKOPPLING	MUTE	ONDERDRUKKEN
ON	OFF	AUS	NON ATTIVO	MUTE	FRÅN	SLUKKE	UIT
OPEN	ON	EN	ATTIVO	ABIERTO	TILL	TÆNDE	AAN
OPERATION	OUVERT	OFFEN	APERTO	OPERACION	ÖPPEN	ÅBEN	OPEN
ORANGE	OPERATION	IN BETRIEB	FUNZIONAMENTO	OPERACION	DRIFT	OPERATION	INBEDRIEF
OVERIDE	ORANGE	ORANGE	ARANCIO	NARANJA	ORANGE	ORANGE	ORANJE
OUTPUT	ENFONCER	ÜBERBRÜCKEN	INVALIDARE	OVERRIDE	ÖVERSTYRNING	OVERSTYRE	OVERBRUGGING
PINK	SORTIE	AUSGANG	USCITA	SAIDA	UTGANG	UDGANG	UITGANG
RECEIVER	ROSE	ROSA	ROSA	RECEPTOR	ROSA	LYSEROD	ROOS
RATING	RECEPTEUR	EMPFANGER	RICEVITORE	GRADO	MOTTAGER	MOTTAGER	ONTVANGER
RELAY	ESTIMATION	KLASSE	CLASSIFICAZIONE	KLASSIFICACION	KLASSIFIKERING	KLASSIFIKERING	STANDAARD
REPAIR	RELAIS	RELAY	RELE	RELE	RELA	RELA	RELAIS
RESTART	ROUGE	ROT	ROSSO	ROJO	ROD	ROD	ROOD
SAFETY	REPARATION	REPARATUR	RIPARAZIONE	REPARAR	REPARATION	REPARERE	HERSTELLEN
SHIELD	REDEMARRAGE	WIEDERANLAUFSPERRE	RIAVVIO	REINICIALIZER	ATERSTART	RESTART	HERSTART
STATUS	SECURITE	SICHERHEIT	SECUREZZA	SEGURIDAD	SAKERHET	AKKERHED	VEILIGHED
SUPPLIER	TERRE	ERDFAHEN	SCHERMO	MALLA	SKÄRM	ÅRNING	ÅRNING
TEST	STATUS	STATUS	STATO	ESTADO	STATUS	STATUS	STATUS
TRANSMITTER	FOURNISSEUR	LEFFERANT	FORNITORE	PROVEEDOR	LEVANTOR	LEVANDOR	LEVANCER
VIOLET	ESSAI	PRÜFUNG	PROVA	PRUEBA	PROV	TEST	TEST
WHITE	EMETTEUR	SENDER	EMETTITORE	TRANSMISOR	SANDARE	SENDER	ZENDER
	VOLET	VIOLETT	VIOLA	VIOLETA	VIOLETT	VIOLET	VIOLET
	JAUNE	GELB	GIALLO	AMARILLO	GUL	GUL	GEEL
	BLANC	WEISS	BIANCO	BLANCO	VIT	HVID	WIT





### Appendix 1 – Important Safety Information

- ❑ Ensure that the Smartscan safety light curtain is installed by a competent person using the installation information provided.
- ❑ Smartscan 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 Smartscan safety light curtain. Smartscan 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 Smartscan Product installation sheet and installation guide do not provide instruction or operation information for the machine that it is integrated to.
- ❑ The Smartscan Product Installation instructions should be kept with the safety light curtain during its entire working life.

## Appendix 2 - Certifications

### Company



ISO9001  
FM27829

Smartscan Limited has a certified quality assurance system in compliance with ISO 9001-2015. Certificate number FM27829.

### Products



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



### Appendix 3 - Mirrors

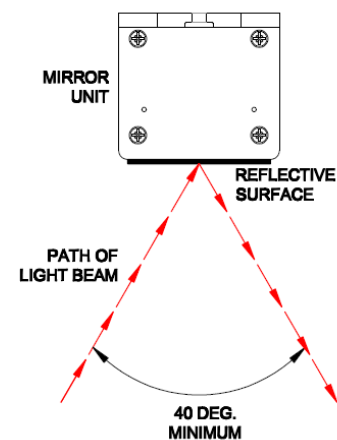
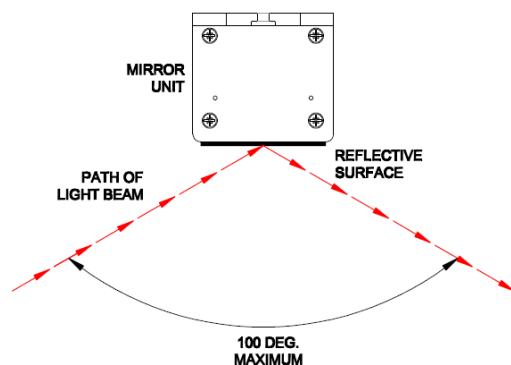
Reflector mirrors can be provided enabling two or three sides of a machine to be safeguarded with, what is effectively a single light curtain.

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
4m - 40m	30m	20m

Total Light Path	1 Mirror	2 Mirror
10m	Easy	Easy
15m	Easy	Medium
20m	Medium	Hard
30m	Hard	Not Feasible

Based upon a 1087E903

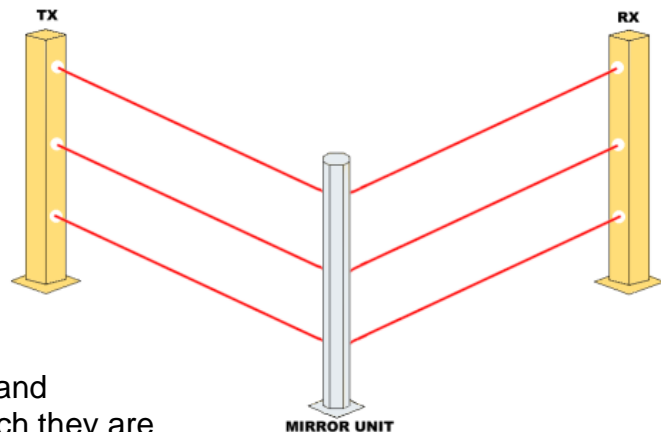


The angle of the infrared beams from the light curtain striking the reflective surface must be within defined limits as per the drawings above. See Fig. F in this guide.

**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).

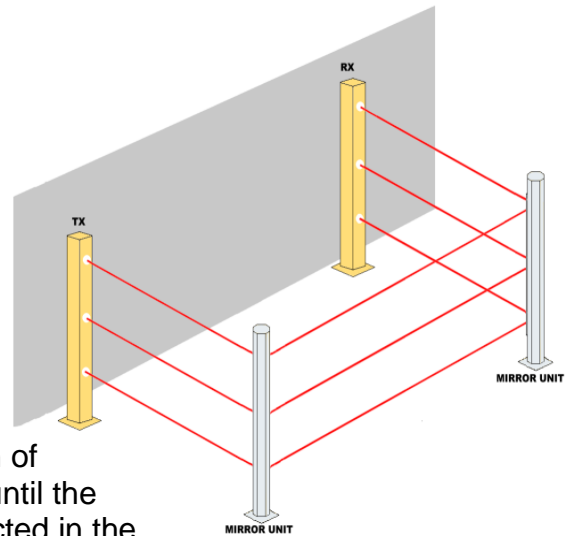
Perimeter curtains will be easier to align, curtains over 900mm may be more difficult to align. Check with the Smartscan technical department prior to ordering for a particular application, support@smartscan.com, Tel: +44 (0) 1536 401 313, Fax: +44 (0) 1536 268 954

## 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. Alternatively, a laser alignment tool can be used.
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. Alternatively, a laser alignment tool can be used. 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. Alternatively, a laser alignment tool can be used. Now repeat step 5.
8. Use shims to ensure the mirror is accurately aligned to enable the infrared 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. Alternatively, a laser alignment tool can be used.

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. Alternatively, a laser alignment tool can be used. Secure the first mirror.

12. Again, follow instructions 1 to 4.

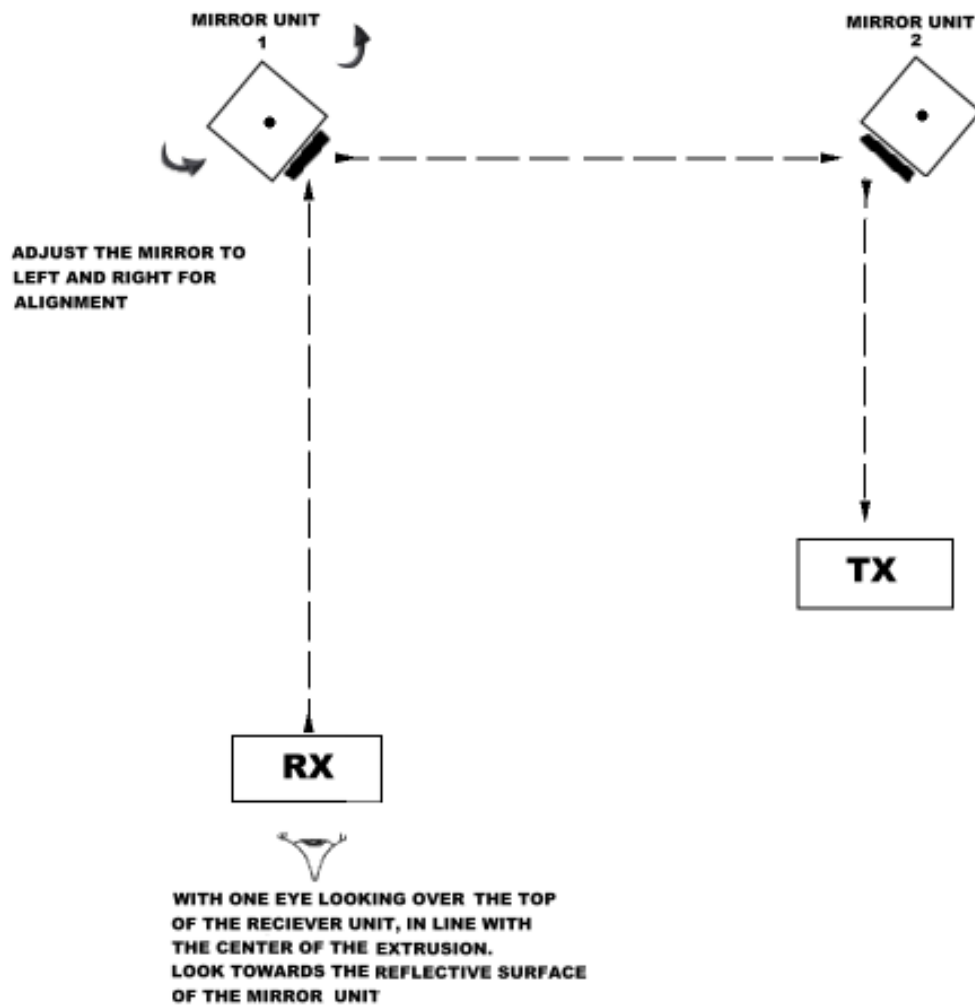
13. The second person must adjust the position of the second mirror to the left and to the right until the entire length of the transmitter unit is reflected through both the first mirror and the second mirror. If difficulties are experienced in seeing the reflection of the transmitter unit through both the first then the second mirrors then use a piece of white paper cut to size and position in front of the transmitter unit. Alternatively, a laser alignment tool can be used.

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. Alternatively, a laser alignment tool can be used. Secure the second mirror.

15. Ensure the mirrors are directly aligned thus enabling the infrared 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.

16. 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	1 - 4
Detection height	500, 600, 900 and 1200mm
Range	Perimeter guard - 0.5 – 5m Perimeter guard - 4 – 40m Cross-beam muting 'T' - 1.25 – 3.5m Cross-beam muting 'L' - 1 – 3.5m Parallel-beam muting 'T' - 0.5 – 3.5m
Light type	Infrared 880nm
Response time	40ms
Operating temperature	0°C to +50°C
Light curtain enclosure	IP66 (H x W x D) H x 50 x 50
Power supply requirement	24V DC 2A ±10%
Current consumption	250mA maximum
Light curtain connection	Circular, bayonet locking IP68
Finish	Aluminium, yellow polyester powder coated
Classification	BS EN 61496-1 Type 3 BS IEC 61496-2 Type 3 BS EN ISO 13849 – 1 PL d BS EN 62061 SIL 2 BS EN ISO 13849 – 1 Category 3  PFH d Mission Time
Warranty	1 Year

<b>INPUTS</b>	
Safety monitoring (EDM)	ON = +24V DC
Activate	Combined restart and override. ON = +24V DC
Muting M1 and M2	Two circular IP68 bayonet locking connectors. One for each independent muting channel
Mute enable	3 <sup>rd</sup> mute channel. ON = +24V DC
Mode select	Cross-beam mute. ON = 0V DC Parallel-beam mute. ON = +24V DC

<b>OUTPUTS</b>	
Safety outputs OSSD1 & OSSD2	2 x NO fail-safe switching contacts each rated at 110V, 2A
Status output relay	1 x N/O switching contact rated at 110V 1A
Mute output	Electronic output. MUTE ON = 0V
Status and mute indication	Status & condition LEDs on the light curtain

## Notes

[illegible]