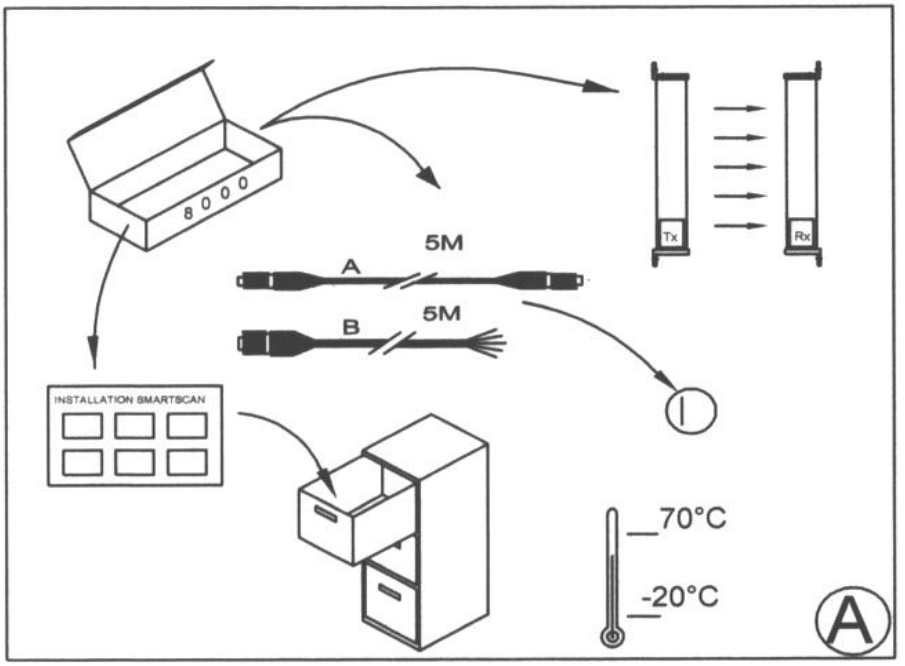
8000 Series Safety Light Curtain
Installation Sheet (CD159/030210)

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



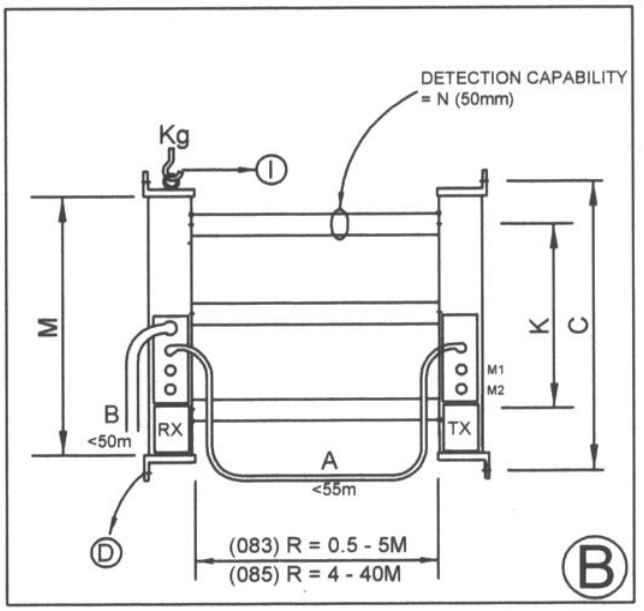
Each 8000 system supplied would normally include:

- 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 shows important light curtain parameters. These parameters are shown as C, M, K and R.



C - Light curtain column mounting centres. Use 6mm bolt for fixing
M - Length of the light curtain enclosures excluding end-caps
K - Detection height
R - Scanning range of the light curtain

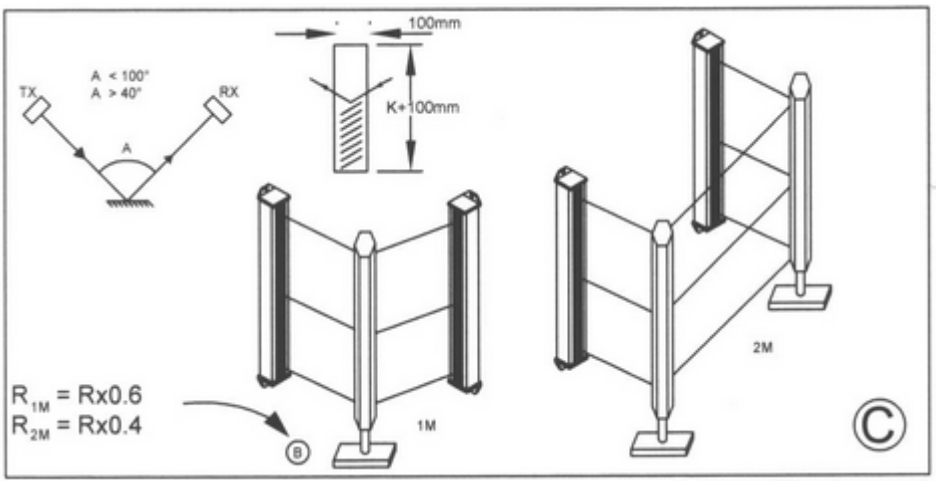
Detection zone width (K) – Must be of a suitable height for each application to prevent personnel access to the danger area, either over, under or around the light curtains detection zone.

Range (R) – Ensure the particular light curtain specification is capable of satisfying the range requirement for the application.

Fig. E also shows the connection points for the A cable between the transmitter (Tx) and the receiver (Rx), B Cable connection and mute input connections.

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

Figure C shows the use of a Perimeter 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 zone. 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 shows 8000 Series light curtain end-bracket dimensions. Use M6 bolts for the mounting brackets.

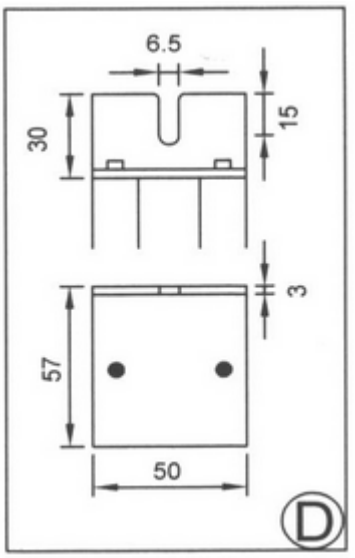
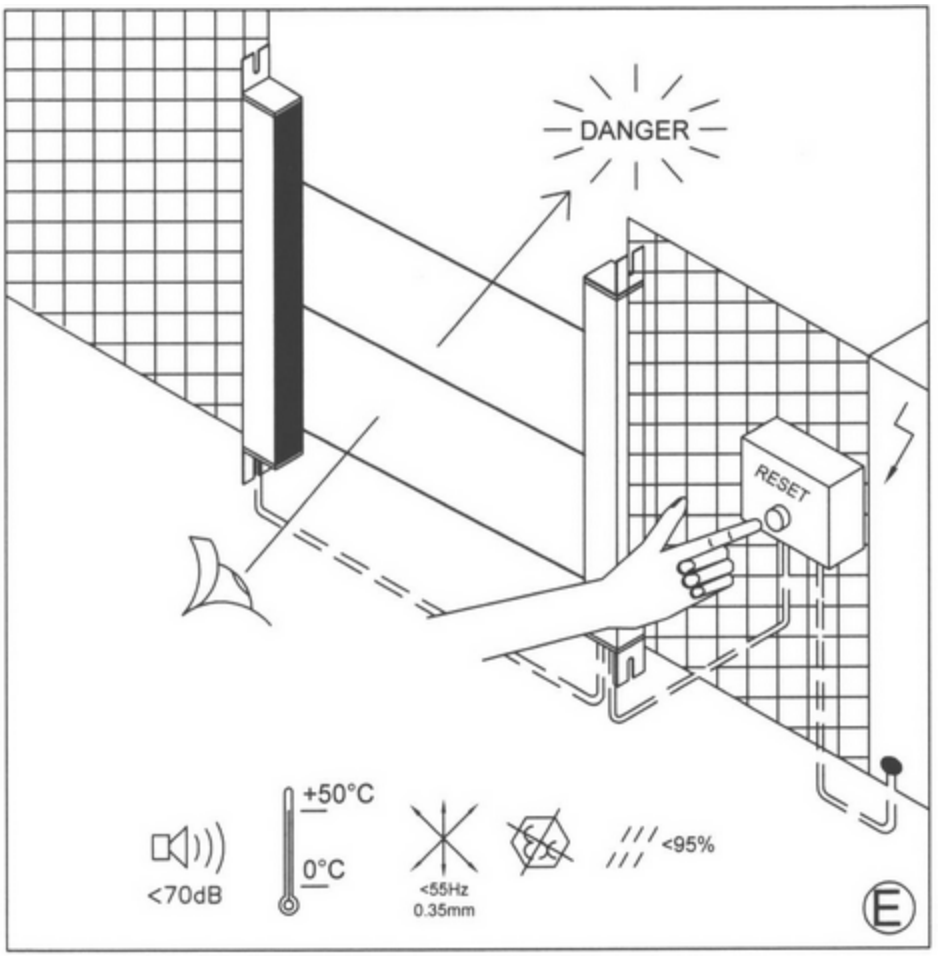


Figure E - Operating Requirements

- Humidity <95%
- Temperature range between 0 and 50 degrees C
- Vibration frequency <55Hz max. Displacement <0.35mm
- Equipment should not be used in potentially explosive atmospheres. The units are not 'EX' rated. Do not use the equipment in explosive atmospheres. For further information on explosive-proof enclosures contact Smartscan Ltd.
- Noise generated by the equipment will never exceed 70 dB



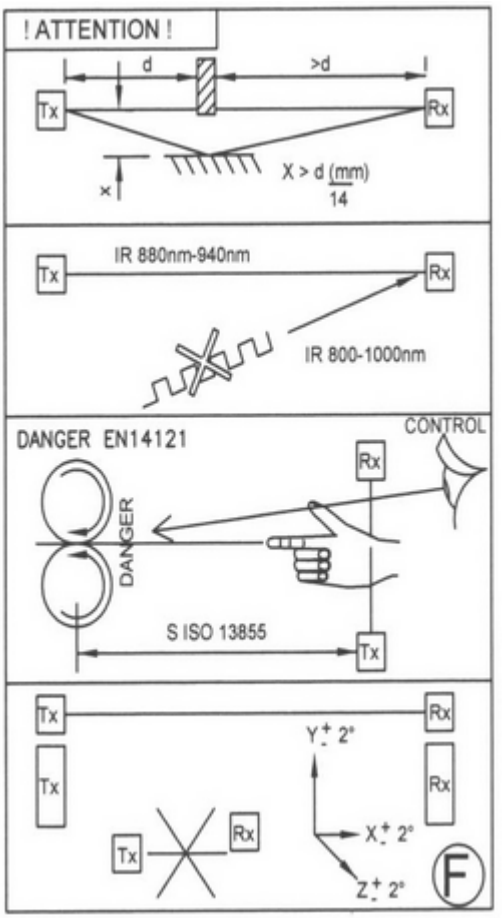
Note: Restart controls must be located such that the danger area can be seen to be clear of persons before the system is activated.

When installing a Smartscan 8000 Series light curtain your attention is drawn to the following: (**Figure F**)

1. Consider reflective surfaces that may give rise to optically 'short circuiting' the direct path of the light curtains as shown. To ensure the light curtain is mounted far enough away from reflective surfaces use the formulae provided to calculate the minimum dimension between the light curtain and reflective surface.

   X = minimum distance (mm) between reflective surface and light curtain.

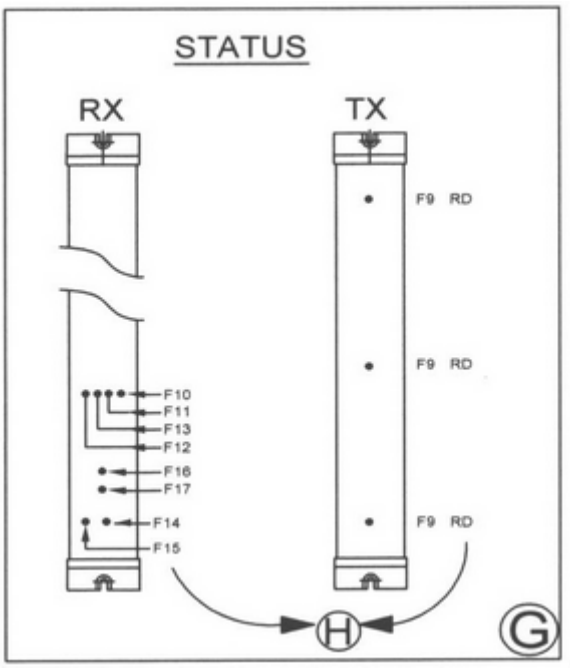
2. To prevent intermittent tripping of the light curtain ensure extraneous infra-red energy between 800 and 1000 nanometres is not directed towards the Perspex window of the receiver unit (RX). Extraneous sources would include infra-red sensors, infra-red remote controls or scanning systems.



3. Ensure the mounting position of the light curtain in respect to the nearest danger point meets the requirements of European Standard EN ISO 13855.

4. Ensure the light curtain transmitter and receiver 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.

Figure G shows colour and function of the status LED's associated with the Smartscan 8000 Series.



LED Status Indicators on the R/X

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 T/X

F9	Red	Beam(s) transmitting

Figure H defines the features found in the 8000 Series including, where appropriate, maximum power rating, ‘guard on’ and ‘guard off’,, and status of input and output connections.

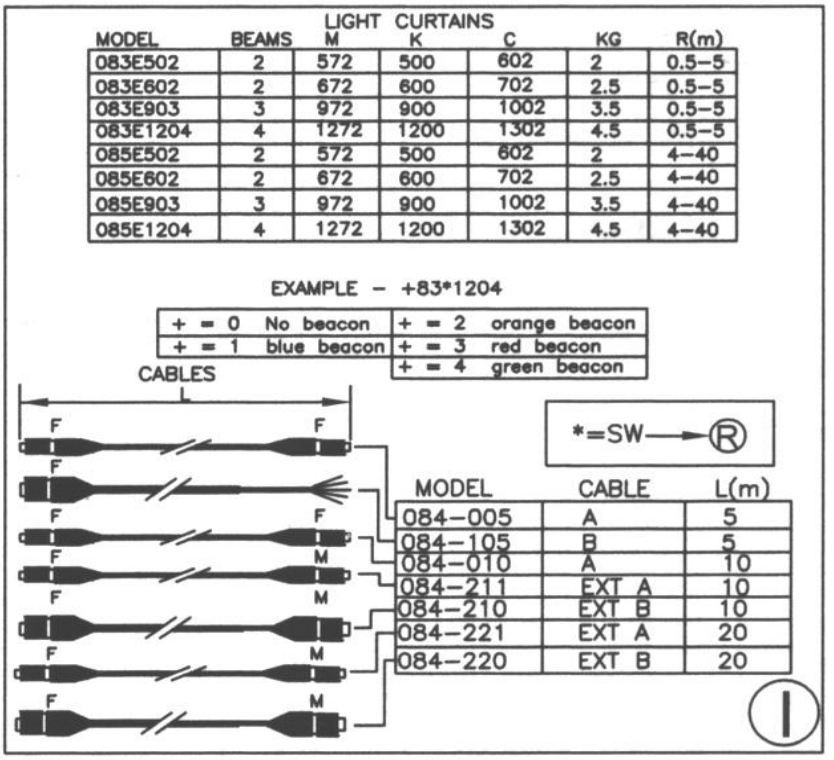
FEATURE	ON	OFF	RATING	
F1	CLOSE	OPEN	2A 110V	* SAFETY OUTPUTS
F2	24V	0V/OPEN	100mA 30V	INPUT EDM
F3	CLOSE	OPEN	1A 110V	** OUTPUT STATUS RELAY
F4	0V	OPEN	1 A	** MUTE OUTPUT /RELAY
F5	24V	0V/OPEN	10mA	
F6	24V	0V/OPEN	10mA	INPUT MUTE ENABLE
F7	24V	0V/OPEN	10mA	INPUT ACTIVATE
F8	24V	0V/OPEN	10mA	INPUT MODE
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		F2	INDICATOR SAFETY OFF
F16	YE		F3	INDICATOR STATUS OFF
F17	YE		F4	INDICATOR MUTE ON

* ELESTA SGR 2827

** BT 47W/7

(H)

Figure I shows the range of 8000 Series light curtains and cables. 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 083E903 will provide a 900mm high detection zone, 3 beam light curtain with standard software option. Model number 183E903 will provide the following, 900mm high detection zone, 3 beam light curtain with a blue integrated mute beacon and standard software option.

Figure J shows all input and output connections to and from the 8000 Series light curtain. The drawing also shows wire colour coding. Please see Appendix 2 for examples of typical 8000 Series wiring configurations.

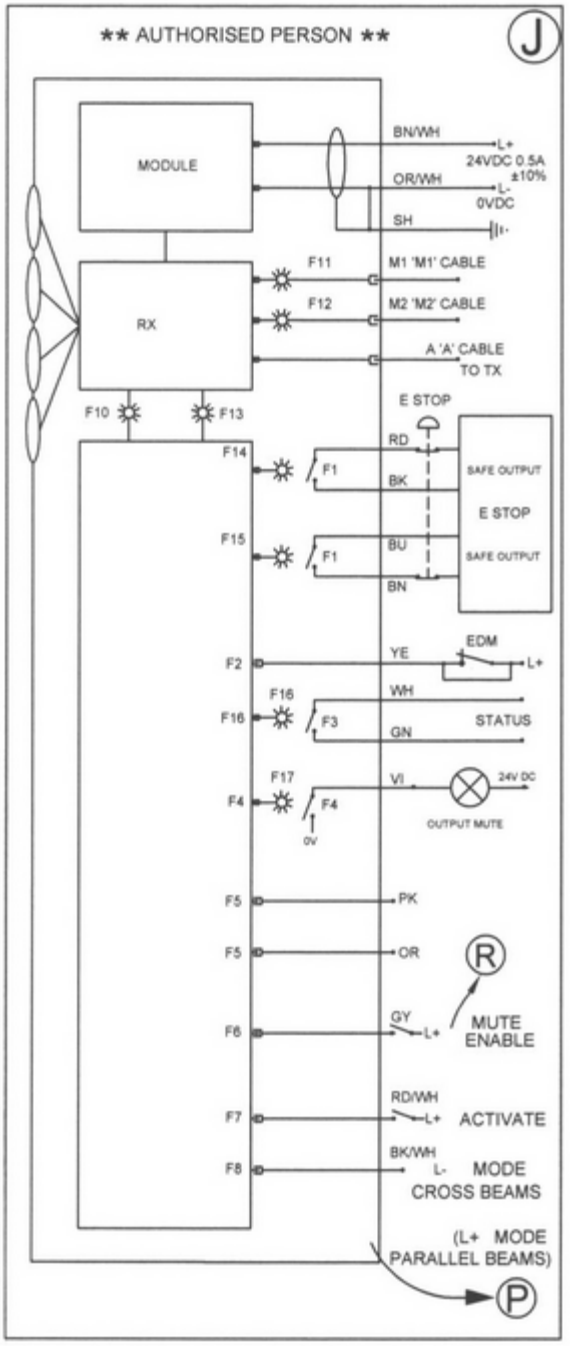


Figure K shows examples of the identification labels that are affixed to the transmitter (Tx) and receiver (Rx) columns.

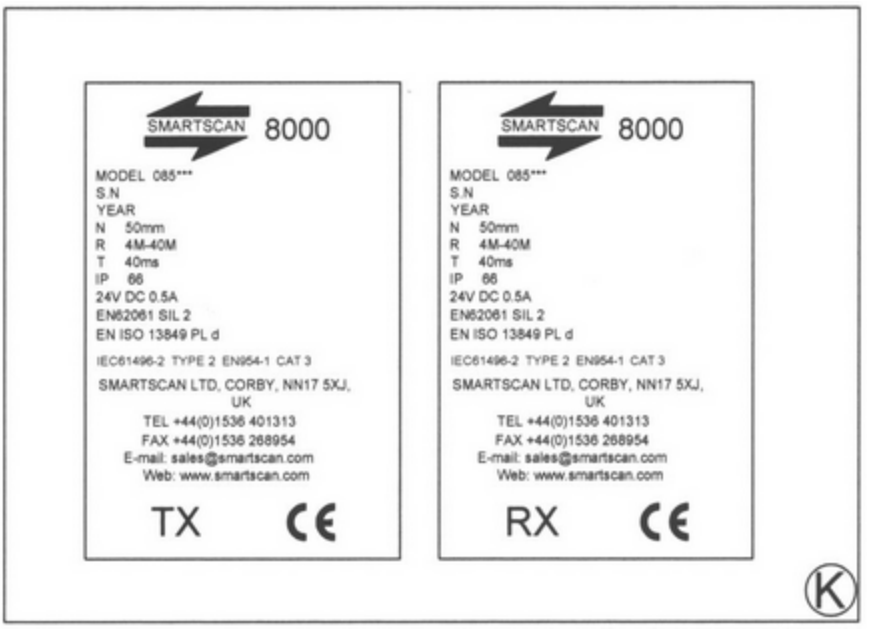


Figure L – Activate control

The ACTIVATE control has two functions.

1) **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.

2) **Override**. If the safety system trips when a pallet load is interrupting the beams in the light curtain the safety system cannot be restarted. To overcome this condition the activate switch can be used to establish the light curtain output relays to an ON state for a period of 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, normally 'spring return', must be held in the 'closed' position during the entire 3 minute mute override period.

   The activate input requires a 24V DC source voltage.

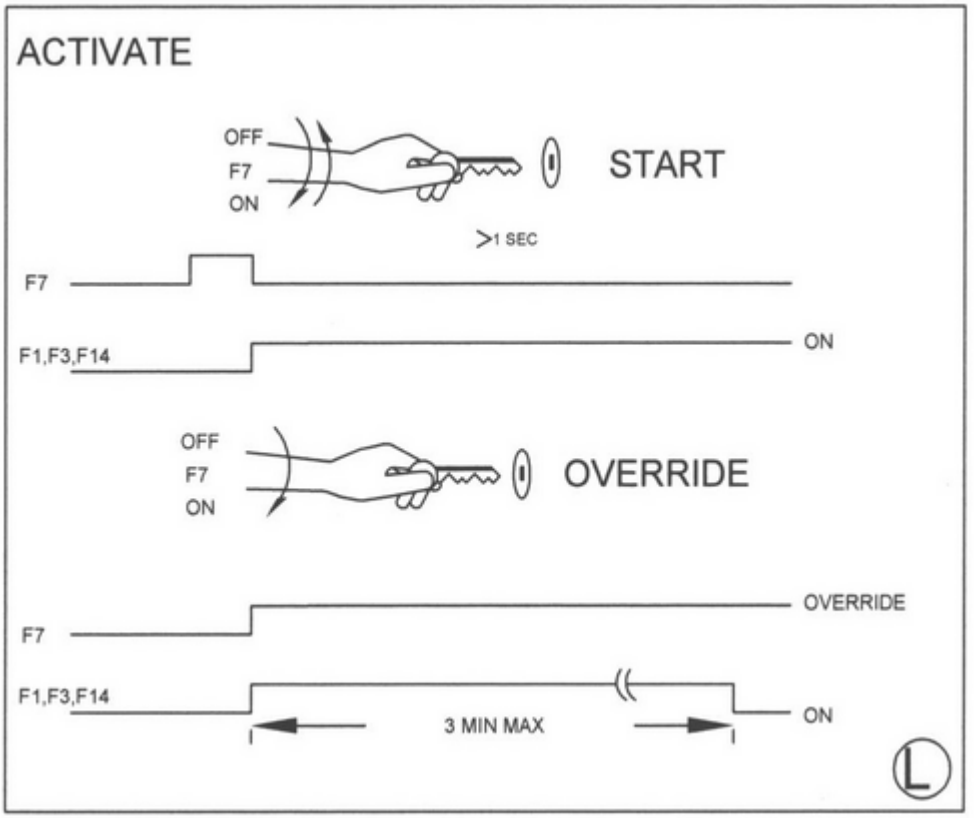


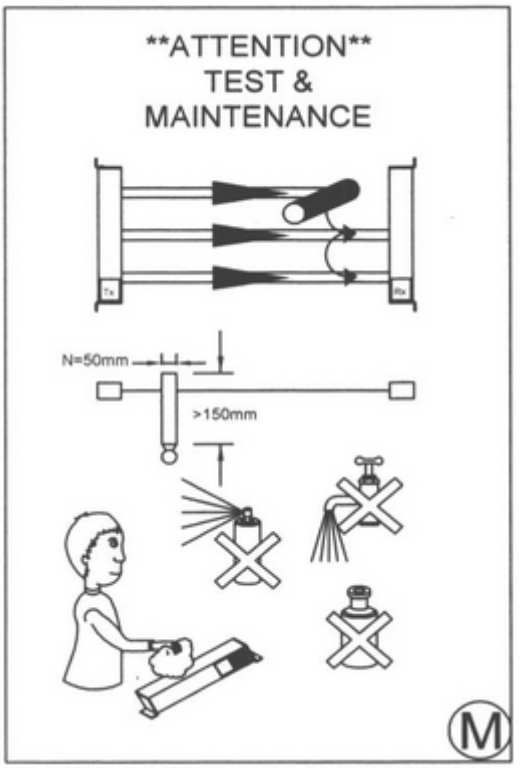
Figure M - Test and Maintenance

Power-up the light curtain and activate the output switching circuits 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.



The Transmitter (Tx) and Receiver (Rx) windows should be cleaned regularly as indicated on the Installation Sheet.

Dirt build up 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.

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

Figure N shows an operations chart for the 8000 Series.

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

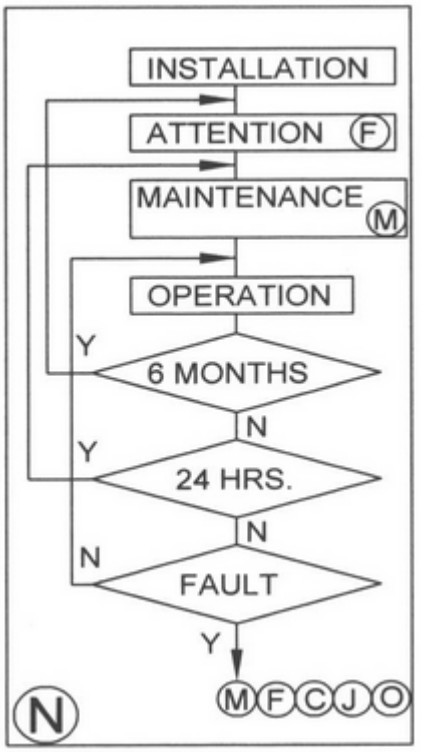
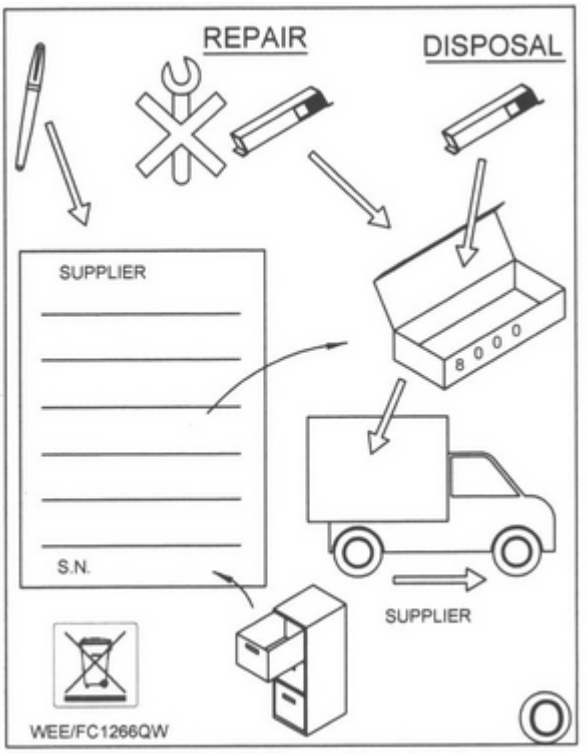


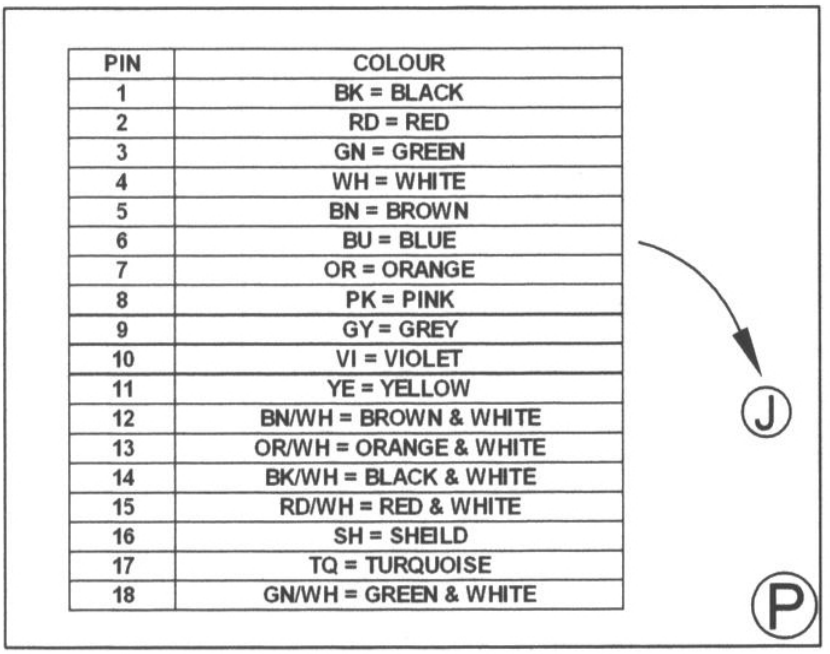
Figure O outlines the procedure for returning a Smartscan product.

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



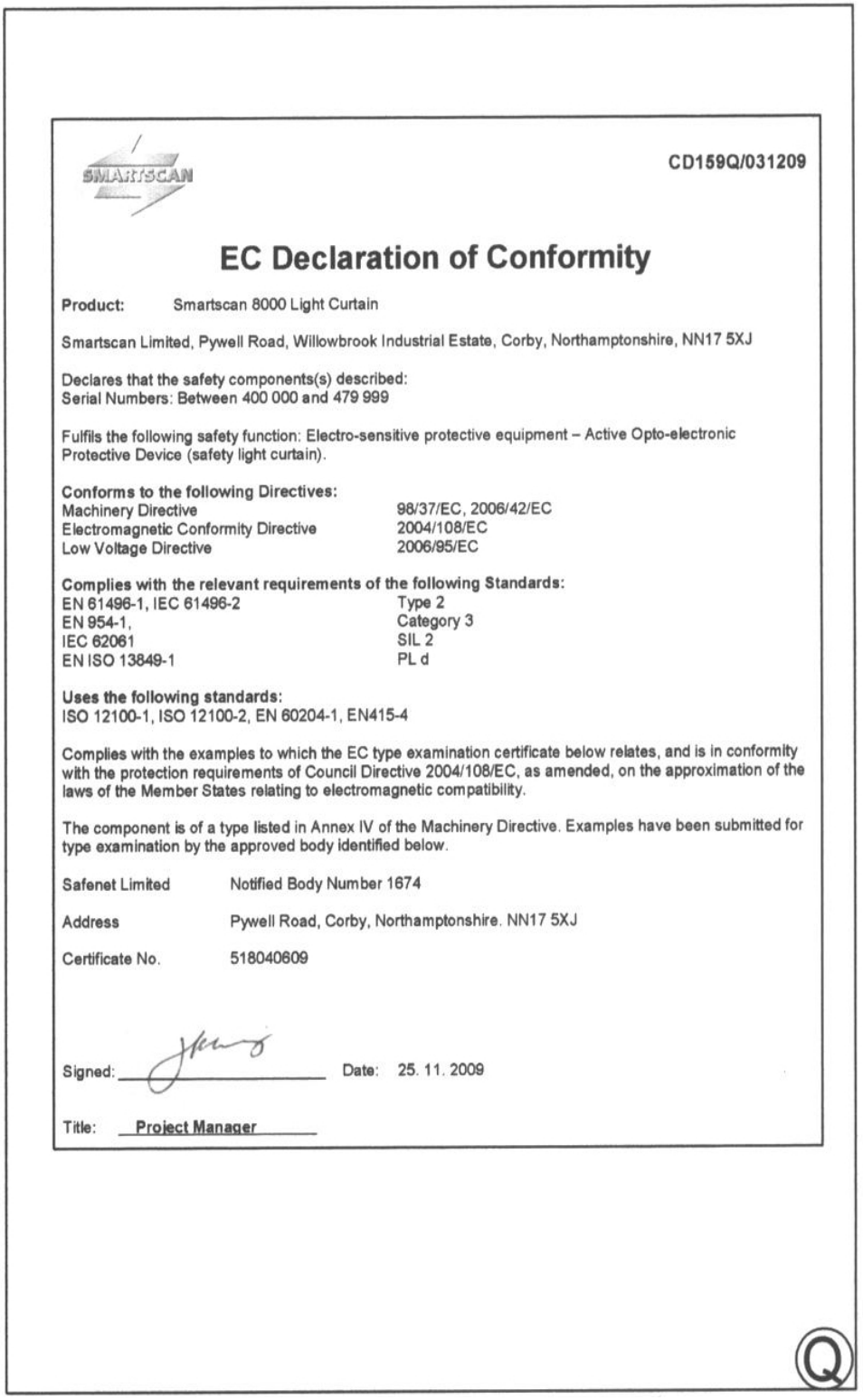
Returned guards must be matching serial number pairs. This is to ensure that the Service department can carry out a full and proper inspection of the returned light curtain system.

Figure P shows abbreviation code for 'B' cable colours. Refer to the electrical connection drawing (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 = SHEILD
17	TQ = TURQUOISE
18	GN/WH = GREEN & WHITE

Figure Q – Declaration of Conformity



CD159Q/031209

EC Declaration of Conformity

Product: Smartscan 8000 Light Curtain

Smartscan Limited, Pywell Road, Willowbrook Industrial Estate, Corby, Northamptonshire, NN17 5XJ

Declares that the safety components(s) described:
Serial Numbers: Between 400 000 and 479 999

Fulfils the following safety function: Electro-sensitive protective equipment – Active Opto-electronic Protective Device (safety light curtain).

Conforms to the following Directives:

Machinery Directive	98/37/EC, 2006/42/EC
Electromagnetic Conformity Directive	2004/108/EC
Low Voltage Directive	2006/95/EC

Complies with the relevant requirements of the following Standards:

EN 61496-1, IEC 61496-2	Type 2
EN 954-1,	Category 3
IEC 62061	SIL 2
EN ISO 13849-1	PL d

Uses the following standards:
ISO 12100-1, ISO 12100-2, EN 60204-1, EN415-4

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
Certificate No.	518040609

Signed: _____ Date: 25. 11. 2009

Title: Project Manager

Q

Figure R – shows the standard timer software (E) used in the 8000 Series for pallet entry/exit applications. The software version is shown against the corresponding part number. E.g. 083E903. The timers used in both cross-beam and parallel beam modes are shown below. Please refer to the separate document on the 8000 Series muting modules for further information.

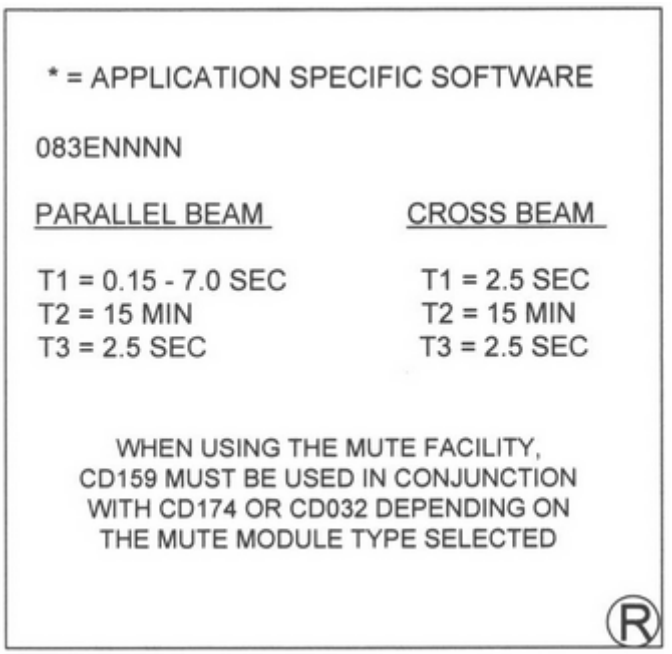
Cross Beam
T1 (Mute 1 and Mute 2 Disparity Time) = Maximum time allowed between activation of signals mute 1 (M1) and mute 2 (M2) prior to the pallet entering the light curtain.

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 or light curtain the OSSD's will de-energise thus initiating a stop condition. Providing the pallet clears the light curtain before the maximum time T2 is exceeded then automatic transfer of the pallet will continue.

T3 (Mute Off Delay Time) = A predetermined time that the light curtain will remain in a muted condition following de-activation of one or both of the mute signals.

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

Software version example
The standard 8000 Series is supplied with 'E' version software, for example 083E903 This provides the following functions for cross-beam,
T1 = 2.5 Sec T2 = 15 min T3 = 2.5 Sec.



Parallel Beam 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.

T3 (Mute Off Delay Time) = A predetermined time that the light curtain will remain in a muted condition following de-activation of one or both of the mute signals.

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

Software version example
The standard 8000 Series is supplied with 'E' version software, for example 083E903 This provides the following functions for parallel beam,
T1 = 0.15 - 7.0 Sec T2 = 15 min T3 = 2.5 Sec.

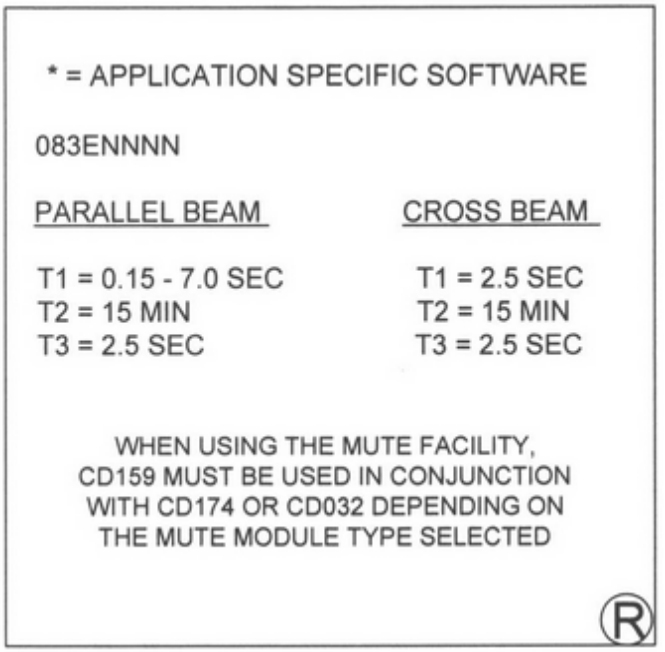
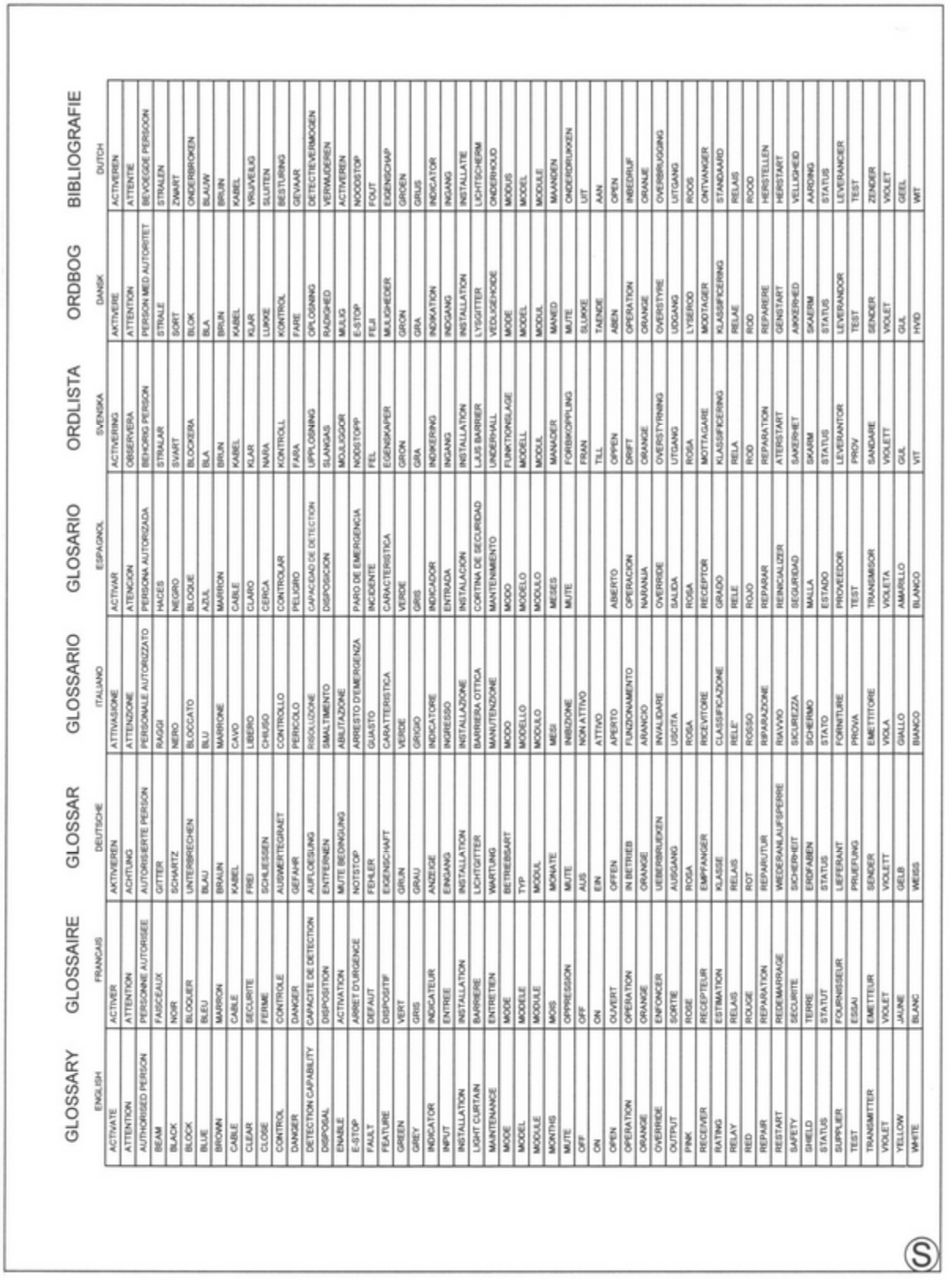


Figure S provides a glossary of words and terminology used in the Installation Sheet in a number of International languages:



GLOSSARY	GLOSSAIRE	GLOSSAR	GLOSSARIO	GLOSARIO	ORDLISTA	ORDBOG	BIBLIOGRAFIE
ENGLISH	FRANCAIS	DEUTSCHE	ITALIANO	ESPAGNOL	SVENSKA	DANSK	DUTCH
ACTIVATE	ACTIVER	AKTIVIEREN	ATTIVAZIONE	ACTIVAR	ACTIVERING	AKTIVERE	ACTIVEREN
ATTENTION	ATTENTION	ACHTUNG	ATTENZIONE	ATENCION	OBSERVERA	ATTENTION	ATTENTIE
AUTHORISED PERSON	PERSONNE AUTORISEE	AUTORISIERTE PERSON	PERSONALE AUTORIZZATO	PERSONA AUTORIZADA	BEHORIG PERSON	PERSON MED AUTORITET	BEVOEGDE PERSOON
BEAM	FAISCEAUX	GITTER	RAGGI	HACES	STRALAR	STRALE	STRALEN
BLACK	NOIR	SCHARTZ	NERO	NEGRO	SVART	SORT	ZWART
BLOCK	BLOQUER	UNTERBRECHEN	BLOCCATO	BLOQUE	BLOCKERA	BLOK	ONDERBROKEN
BLUE	BLEU	BLAU	BLU	AZUL	BLA	BLA	BLAUW
BROWN	MARRON	BRAUN	MARRONE	MARRON	BRUN	BRUN	BRUIN
CABLE	CABLE	KABEL	CAVO	CABLE	KABEL	KABEL	KABEL
CLEAR	SECURITE	FREI	LIBERO	CLARO	KLAR	KLAR	VRIJWILLIG
CLOSE	FERME	SCHLIESSEN	CHIUSO	CERCA	NARA	LUKKE	SLUITEN
CONTROL	CONTROLE	AUSWERTEGRAET	CONTROLLO	CONTROLAR	KONTROLL	KONTROL	BESTURING
DANGER	DANGER	GEFAHR	PERICOLO	PELIGRO	FARA	FARE	GEVAAR
DETECTION CAPABILITY	CAPACITE DE DETECTION	AUFLOESUNG	RISOLUZIONE	CAPACIDAD DE DETECTION	UPPLOSNING	OPLOSNING	DETECTIEVERMOGEN
DISPOSAL	DISPOSITION	ENTFERNEN	SMALTIMENTO	DISPOSICION	SLANGAS	RADGHED	VERWIJDEREN
ENABLE	ACTIVATION	MUTE BEDINGUNG	ABILITAZIONE		MOJLIGGOR	MULIG	ACTIVEREN
E-STOP	ARRET D'URGENCE	NOTSTOP	ARRESTO D'EMERGENZA	PARO DE EMERGENCIA	NODSTOPP	E-STOP	NOODSTOP
FAULT	DEFAUT	FEHLER	GUASTO	INCIDENTE	FEL	FEJL	FOUT
FEATURE	DISPOSITIF	EIGENSCHAFT	CARATTERISTICA	CARACTERISTICA	EGENSKAPER	MULIGHEDER	EIGENSCHAP
GREEN	VERT	GRUN	VERDE	VERDE	GRON	GRON	GROEN
GREY	GRIS	GRAU	GRIGIO	GRIS	GRA	GRA	GRIJS
INDICATOR	INDICATEUR	ANZEIGE	INDICATORE	INDICADOR	INDIKERING	INDIKATION	INDICATOR
INPUT	ENTREE	EINGANG	INGRESSO	ENTRADA	INGANG	INDGANG	INGANG
INSTALLATION	INSTALLATION	INSTALLATION	INSTALLAZIONE	INSTALACION	INSTALLATION	INSTALLATION	INSTALLATIE
LIGHT CURTAIN	BARRIERE	LICHTGITTER	BARRIERA OTTICA	CORTINA DE SEGURIDAD	LJUS BARRIER	LYSGITTER	LICHTSCHERM
MAINTENANCE	ENTRETIEN	WARTUNG	MANUTENZIONE	MANTENIMIENTO	UNDERHALL	VEDLIGEHOLDE	ONDERHOUD
MODE	MODE	BETRIEBSART	MODO	MODO	FUNKTIONSLAGE	MODE	MODUS
MODEL	MODELE	TYP	MODELLO	MODELO	MODELL	MODEL	MODEL
MODULE	MODULE	MODUL	MODULO	MODULO	MODUL	MODUL	MODULE
MONTHS	MOIS	MONATE	MESI	MESES	MANADER	MANED	MAANDEN
MUTE	OPPRESSION	MUTE	INIBIZIONE	MUTE	FORBIKOPPLING	MUTE	ONDERDRUKKEN
OFF	OFF	AUS	NON ATTIVO		FRAN	SLUKKE	UIT
ON	ON	EIN	ATTIVO		TILL	TAENDE	AAN
OPEN	OUVERT	OFFEN	APERTO	ABIERTO	OPPEN	ABEN	OPEN
OPERATION	OPERATION	IN BETRIEB	FUNZIONAMENTO	OPERACION	DRIFT	OPERATION	INBEDRIJF
ORANGE	ORANGE	ORANGE	ARANCIO	NARANJA	ORANGE	ORANGE	ORANJE
OVERRIDE	ENFONCER	UEBERBRUECKEN	INVALIDARE	OVERRIDE	OVERSTYRNING	OVERSTYRE	OVERBRUGGING
OUTPUT	SORTIE	AUSGANG	USCITA	SALIDA	UTGANG	UDGANG	UITGANG
PINK	ROSE	ROSA	ROSA	ROSA	ROSA	LYSEROD	ROOS
RECEIVER	RECEPTEUR	EMPFANGER	RICEVITORE	RECEPTOR	MOTTAGARE	MODTAGER	ONTVANGER
RATING	ESTIMATION	KLASSE	CLASSIFICAZIONE	GRADO	KLASSIFICERING	KLASSIFICERING	STANDAARD
RELAY	RELAIS	RELAIS	RELE'	RELE	RELA	RELAE	RELAIS
RED	ROUGE	ROT	ROSSO	ROJO	ROD	ROD	ROOD
REPAIR	REPARATION	REPARATUR	RIPARAZIONE	REPARAR	REPARATION	REPARERE	HERSTELLEN
RESTART	REDEMARRAGE	WIEDERANLAUFSPERRE	RIAVVIO	REINICIALIZER	ATERSTART	GENSTART	HERSTART
SAFETY	SECURITE	SICHERHEIT	SICUREZZA	SEGURIDAD	SAKERHET	SIKKERHED	VEILIGHEID
SHIELD	TERRE	ERDFAHEN	SCHERMO	MALLA	SKARM	SKAERM	AARDING
STATUS	STATUT	STATUS	STATO	ESTADO	STATUS	STATUS	STATUS
SUPPLIER	FOURNISSEUR	LIEFERANT	FORNITURE	PROVEEDOR	LEVERANTOR	LEVERANDOR	LEVERANCIER
TEST	ESSAI	PRUEFUNG	PROVA	TEST	PROV	TEST	TEST
TRANSMITTER	EMETTEUR	SENDER	EMETTITORE	TRANSMISOR	SANDARE	SENDER	ZENDER
VIOLET	VIOLET	VIOLETT	VIOLA	VIOLETA	VIOLETT	VIOLET	VIOLET
YELLOW	JAUNE	GELB	GIALLO	AMARILLO	GUL	GUL	GEEL
WHITE	BLANC	WEISS	BIANCO	BLANCO	VIT	HVID	WIT

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.

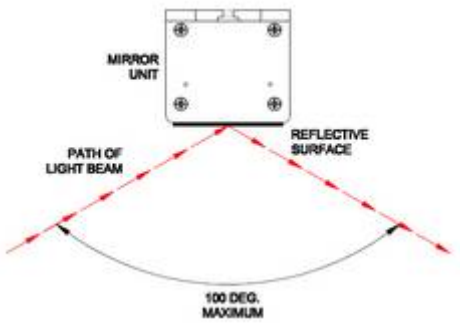
When mirrors are employed it is essential that the mounting of the transmitter unit, receiver unit and mirrors themselves are sufficiently rigid. Alignment becomes increasingly critical as the range and number of mirrors increase. Mirrors cause a reduction in optical efficiency, reducing the effective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

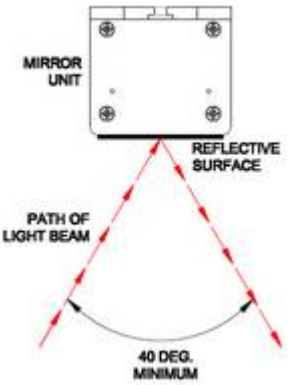
Range of the light curtain	Maximum range through 1 mirror	Maximum range through 2 mirrors
4m - 40m	30m	20m

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

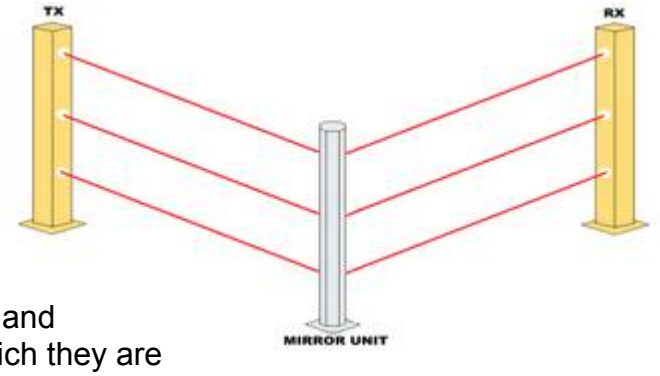
Based upon a 085 - 903

Note: The angle of the light curtain striking the reflective surface must be within defined limits.





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 sprit 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.

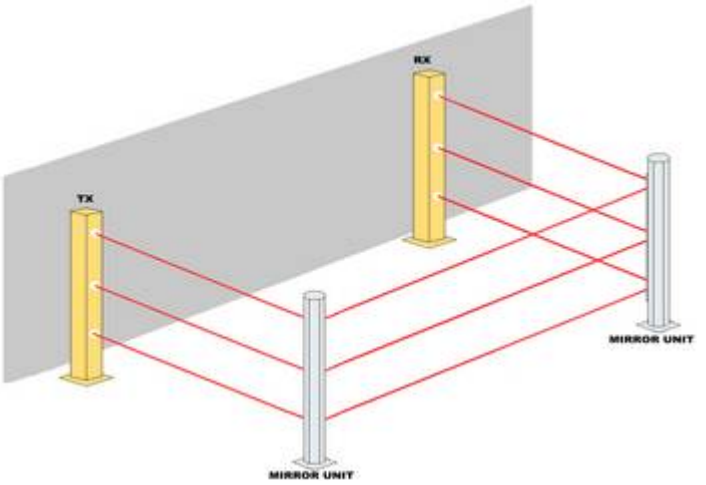
5. A second person must adjust the mirror to the left and right until the Perspex window of the transmitter unit can be seen reflected in the mirror.

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 end backwards from the central axis of the mirror.

Alignment though 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.

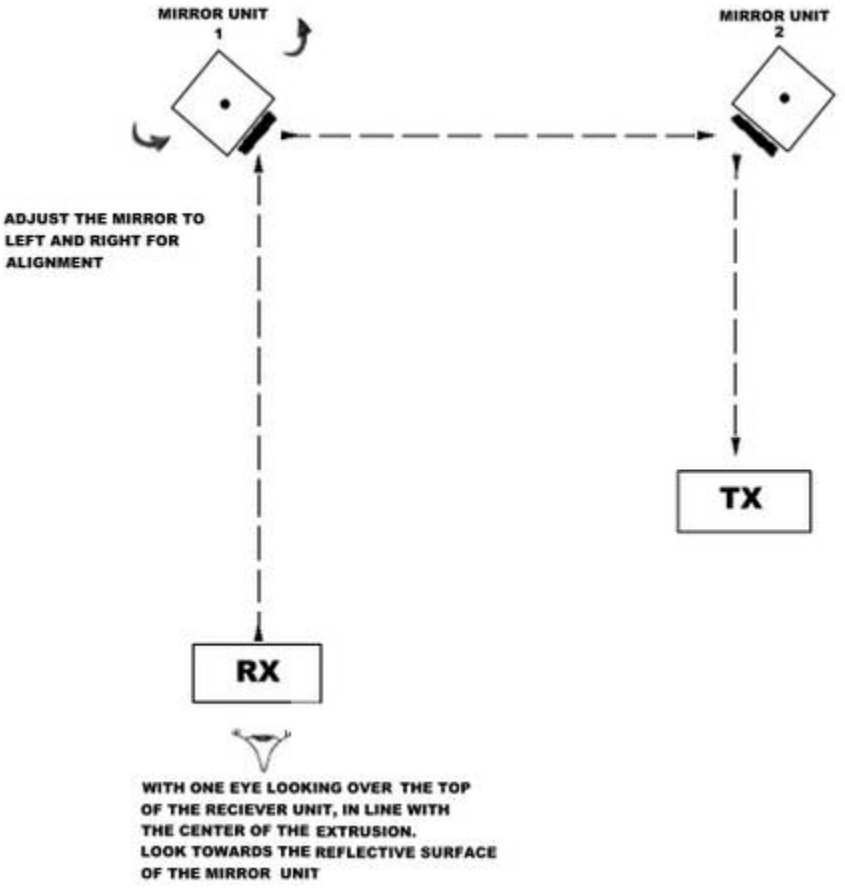
13. The second person must adjust the position of the second mirror to the left and to the right until the entire length of the transmitter unit is reflected through both the first mirror and the second mirror. If difficulties are experienced in seeing the reflection of the transmitter unit through both 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.

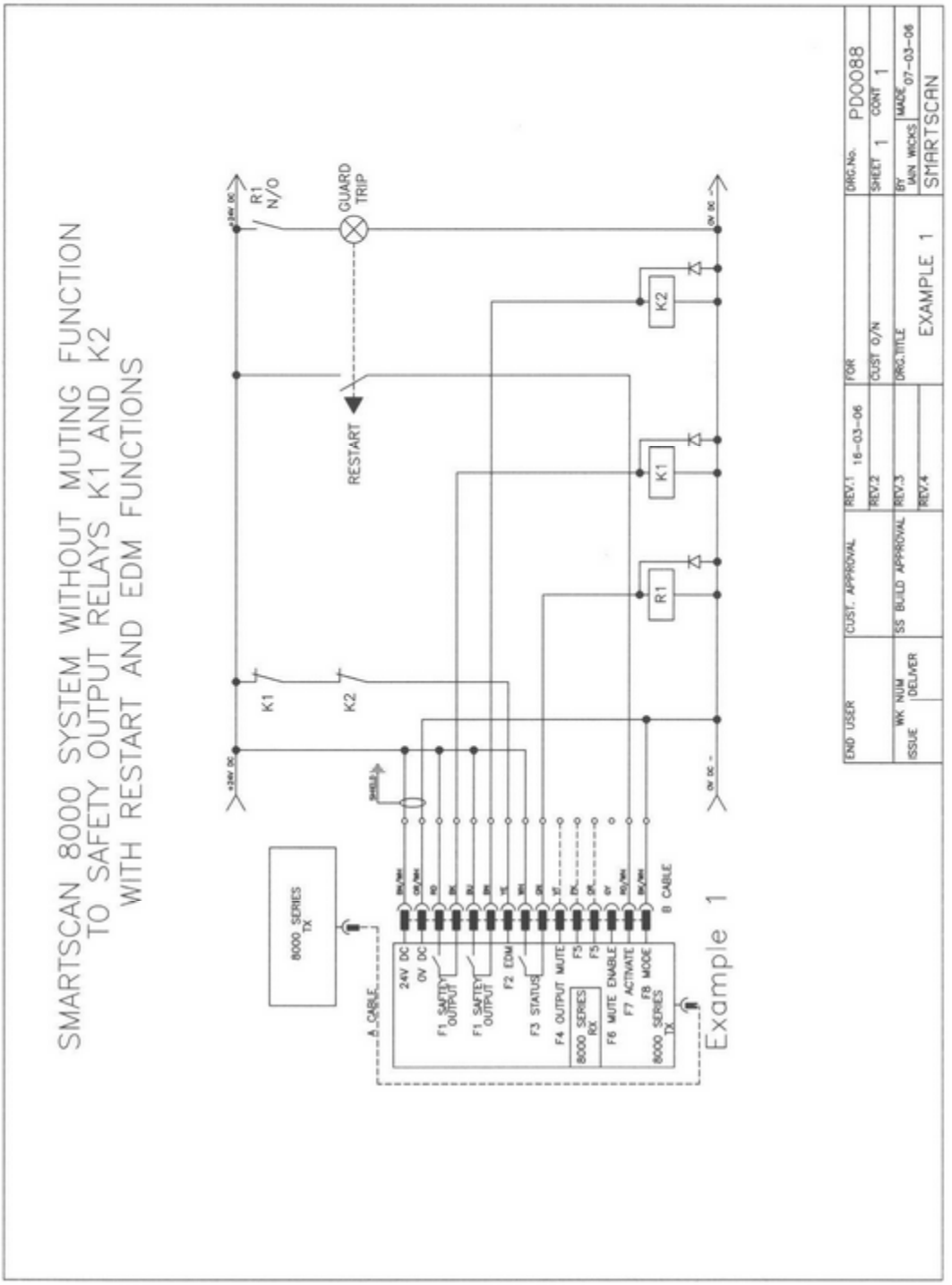
16. Now turn on the power to the light curtain and check that the green LED beam indicator, mounted on the receiver unit is ‘on’. If not, it may be necessary to finely adjust each mirror in turn to ensure the infra-red energy from the transmitter unit is being reflected through the mirror(s) to the corresponding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

Alignment of the light curtain using mirrors

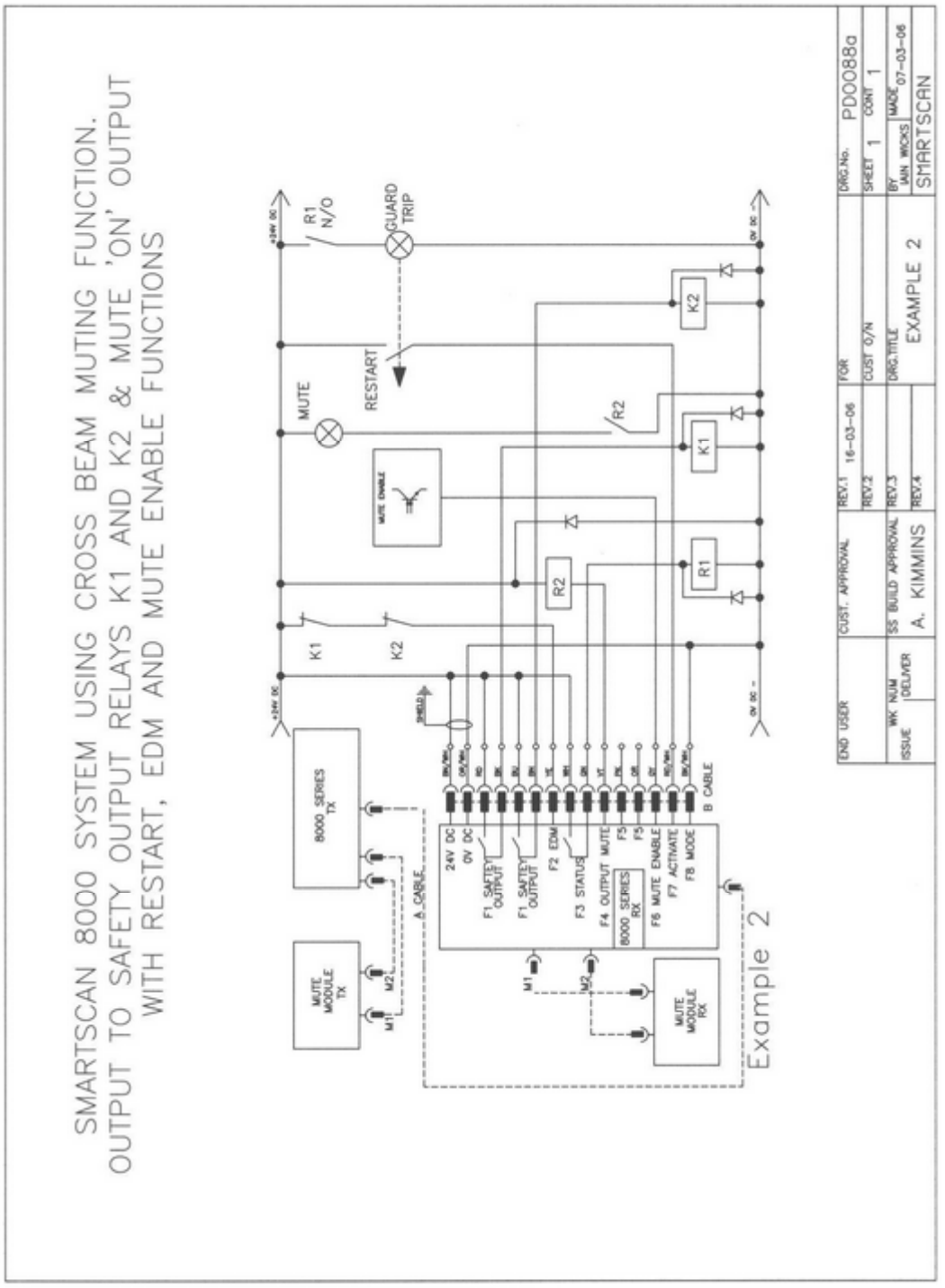


Note: The mirror length must be a minimum of 100mm longer than the overall length of the light curtain to be installed e.g. 50mm above and 50mm below either end of the light curtain

Example 1 - Smartscan 8000 system without muting function. Output to safety output relays K1 and K2



Example 2 - Smartscan 8000 system using cross beam muting. Output to safety output relays K1 and K2



Example 3 - Smartscan 8000 system using cross-beam muting. Output to dual channel E-Stop

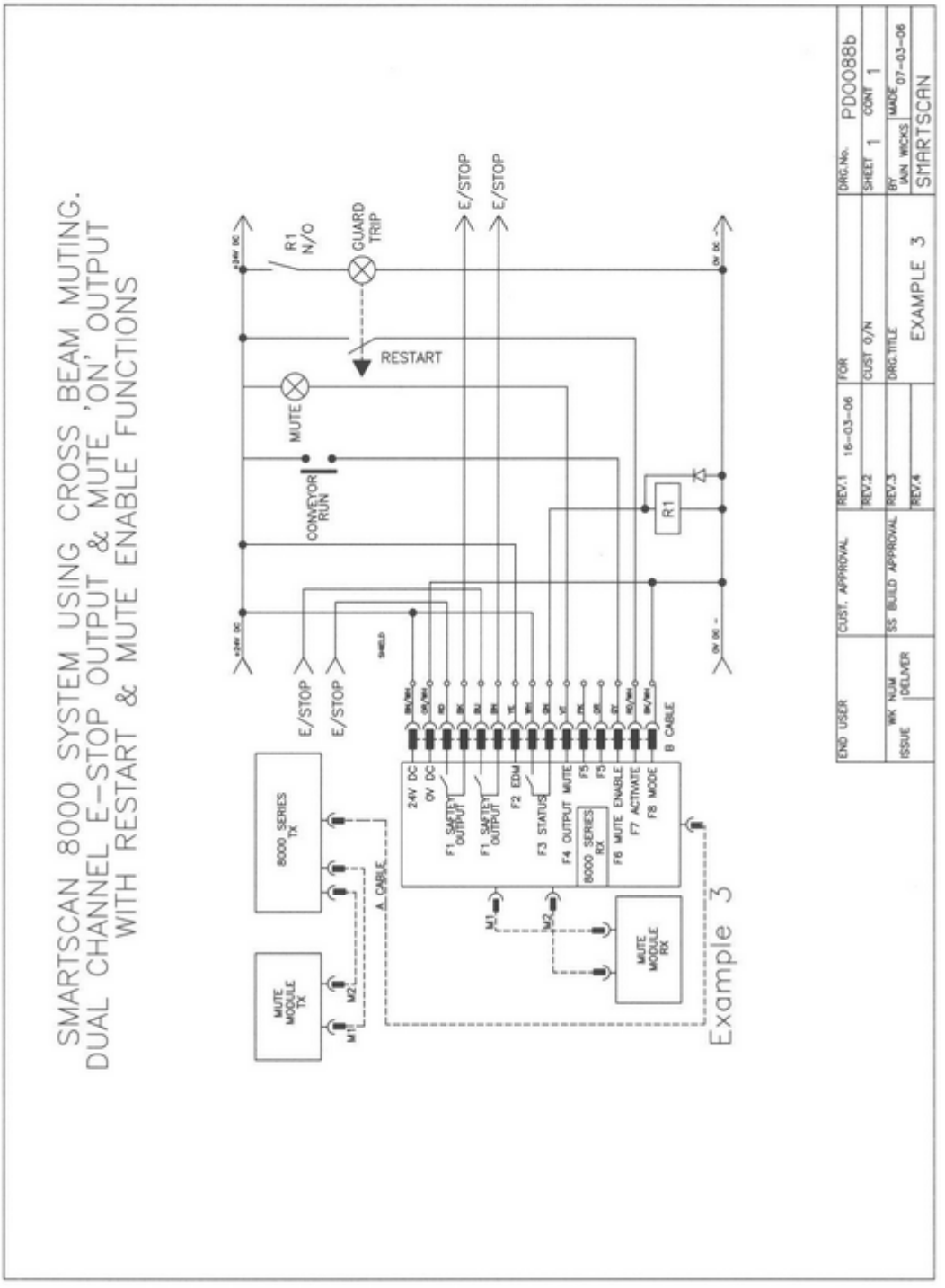
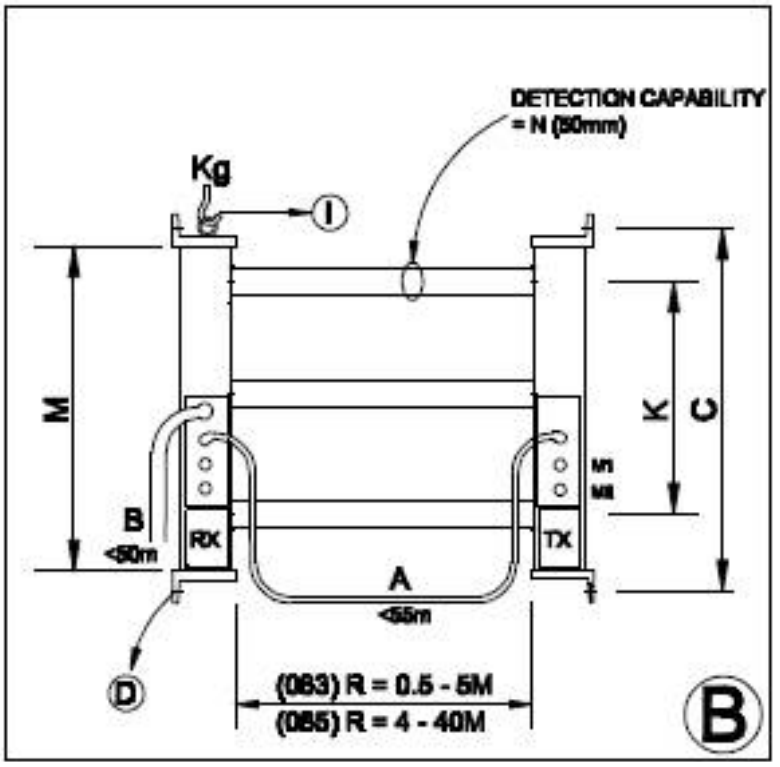


Figure B shows important light curtain parameters. These parameters are shown as C, M, K and R.



C - Light curtain column mounting centres. Use 6mm bolt for fixing
M - Length of the light curtain enclosures excluding end-caps
K - Detection height
R - Scanning range of the light curtain

Detection zone width (K) – Must be of a suitable height for each application to prevent personnel access to the danger area, either over, under or around the light curtains detection zone.

Range (R) – Ensure the particular light curtain specification is capable of satisfying the range requirement for the application.

Fig. E also shows the connection points for the A cable between the transmitter (Tx) and the receiver (Rx), B Cable connection and mute input connections.

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