

# 8K3 Series: Installation Supplement

R2-5-20



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**8K3 Series**

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In order for machinery to be guarded by the Smartscan 8K3 light curtain system, the machinery must be capable of stopping at any point in the machine cycle. The guarded machine must be wired such that any interruption of the defined area will cause immediate arrest of the dangerous motion of the guarded machine.

Smartscans 8K3's ability to perform this function depends upon the appropriateness of the application and upon the Smartscan 8K3 's proper mechanical and electrical installation and interfacing to the machine being guarded. If all mounting, installation, interfacing and commissioning procedures are not followed properly the Smartscan 8K3 system cannot provide the protection for which is was designed. The user has the responsibility to ensure all local, state, national laws, rules, codes or regulations relating to the installation and use of this system in any particular application are satisfied.

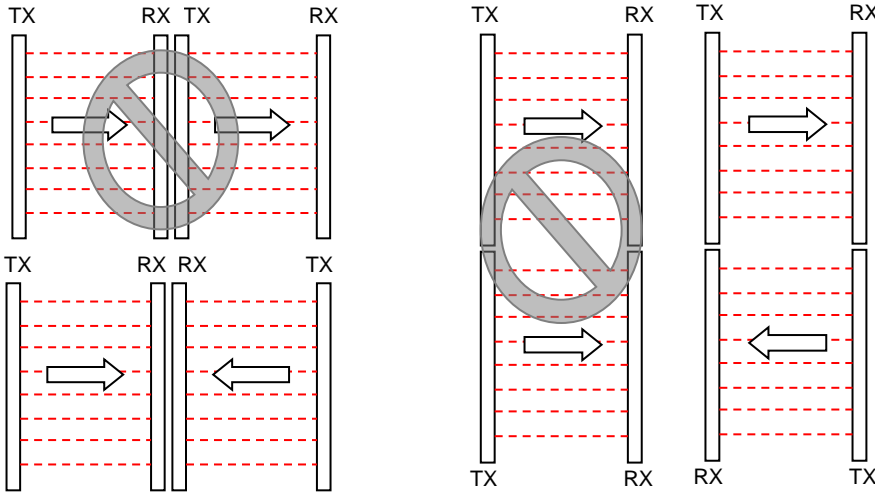
The user has the sole responsibility to ensure that the Smartscan 8K3 system is installed and interfaced to the guarded machine by "qualified persons" in accordance with this manual and applicable safety regulations. A "qualified person" is defined as " a person or persons who, by possession of a degree or certificate of professional training, or who, by extensive knowledge, training and experience has successfully demonstrated the ability to solve problems relating to this subject matter and work" (ANSI/AME B30.2-1983)

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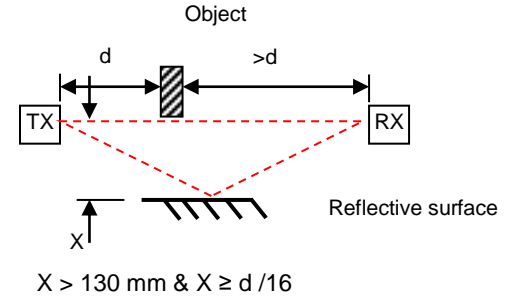
# Light Curtain Mounting Considerations

## Light Curtain Orientation

TX - Transmitter RX - Receiver

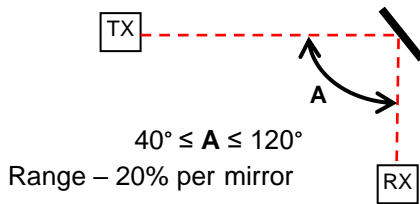


## Proximity to reflective surfaces

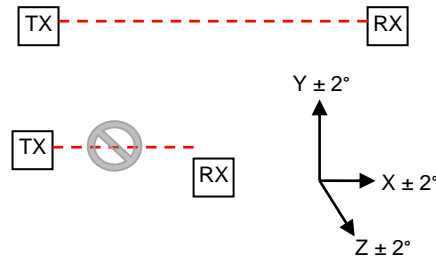


$X$  is minimum distance between the light and the reflective surface. The closest distance of TX or RX to the object approaching the light curtain is  $d$ .

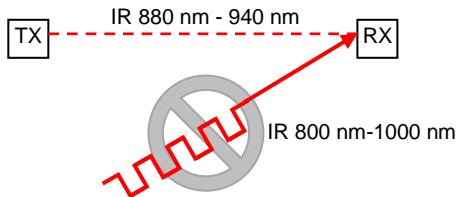
## Use with Mirrors



## Light Curtain Alignment



## Optical Short Circuit Prevention



## Light Curtain Mounting

Light curtain must be securely mounted such that the operator cannot reach the hazard without passing through the light curtain sensing region.

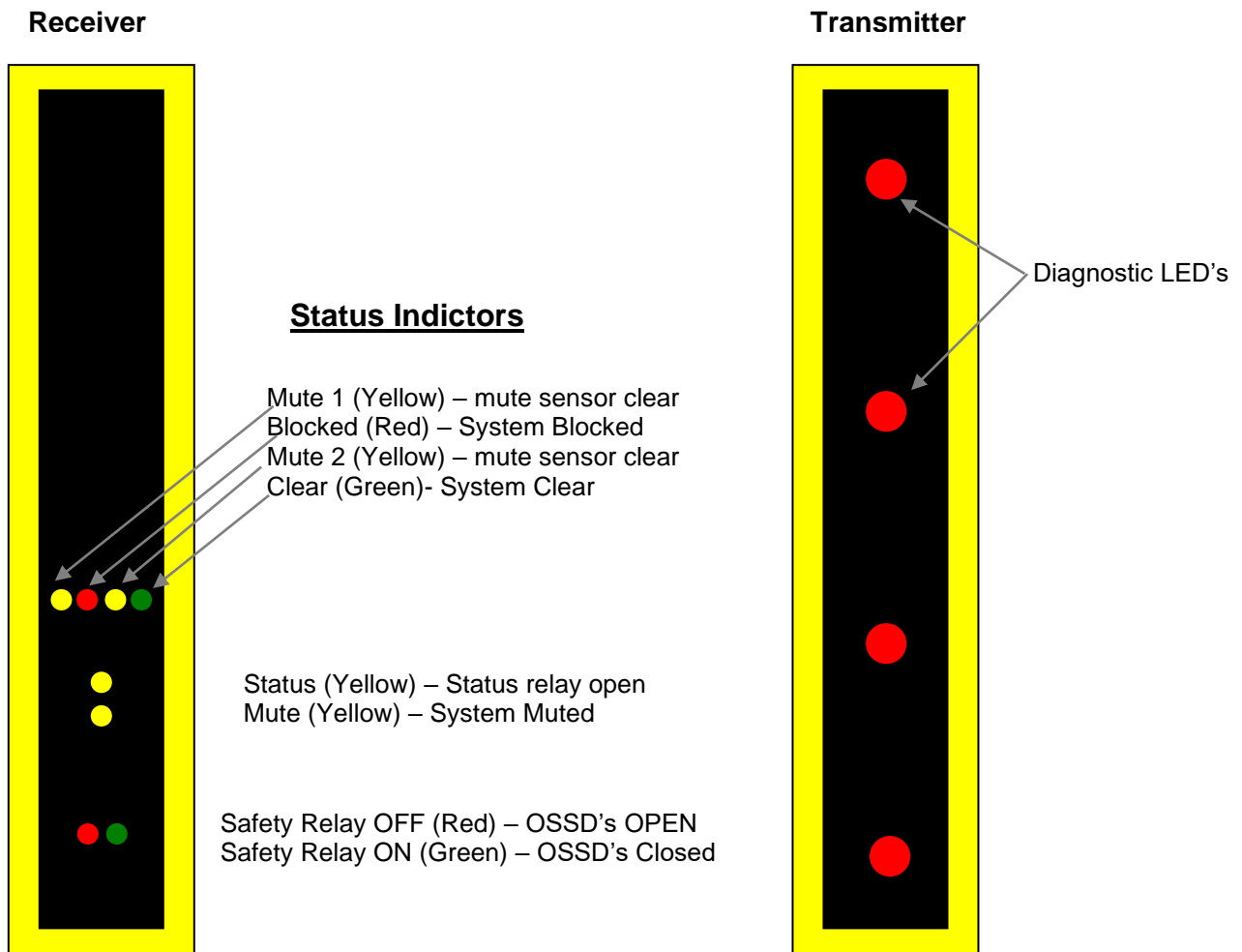
The operator should not be able to reach over, reach under or walk past the protective device without interrupting its sensing region. Additional guarding may be required to achieve this task.

**Warning;** Physical damage to the 8K3 light curtain system could create an un-safe condition that may cause a serious injuring including death. Contact Smartsan for more information.

**Warning:** Do not repair or modify the 8K3 Light curtain. The 8K3 safety light curtain is not cite/field repairable and can only be repaired at the Smartsan.

## Principle of Operation

The Smartscan sensing unit consists of a transmitter and a receiver column that face each other across an area to be safeguarded. The transmitter contains a row of infrared, light emitting diodes that sequentially transmit parallel beams of energy to corresponding receiving diodes in the receiver column. When the control/monitoring unit detects an obstruction in the optical path of one, or more of the beams that form the sensing field, the output signal switching devices (OSSD's) will turn-OFF immediately.



## Diagnostic Indicators

For diagnostic purposes visible red LED indicators adjacent to each infrared transmitting diode are provided, in the transmitter column.

## **Status Indicators**

The physical location of these indicators can be viewed on page 2.

**Guard 'clear' indicator** - A green LED indicator located in the top cluster of the receiver unit illuminates when the light curtain is clear of obstruction.

**Guard 'block' indicator** - A red LED indicator located in the top cluster of the receiver unit illuminates when the light curtain is blocked.

**Mute 'clear' indicators M1 and M2** - Yellow LED indicators located in the top cluster of the receiver unit extinguish when mute sensors M1 and M2 are blocked.

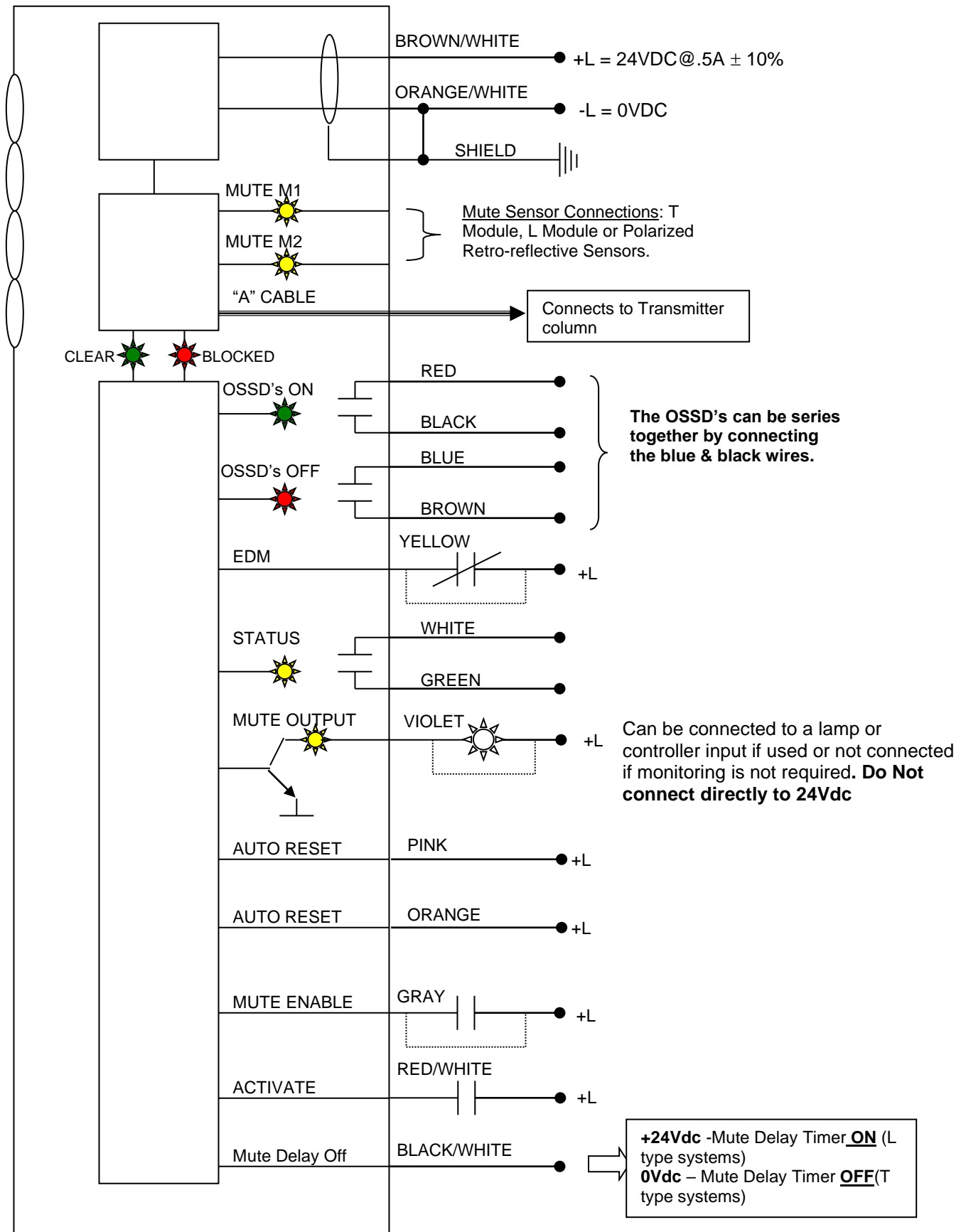
**Mute condition 'on' indicator** - Yellow LED indicator located in the center cluster of the receiver unit illuminates when the light curtain output relays are in a muted condition.

**Status output indicator** – An Yellow LED indicator located in the center cluster of the receiver unit is illuminated when the status relay is de-energized, but extinguishes when the status relay energizes.

**Safe output 'on'** - A green LED indicator located in the bottom cluster of the receiver unit illuminates when the safe output switching relays are ON (Closed).

**Safe output 'off'** - A red LED indicator mounted located in the bottom cluster of the receiver unit illuminates when the safe output switching relays are OFF (Open).

# 8K3 Series Controls Diagram



## **8K3 Series: Controls**

**Power supply** - Use a regulated supply +24V DC, 1A  $\pm$ 10%. Protect the +24V input with a .5A fuse. Connect the power supply to cable B as follows: The BROWN / WHITE wire to +24V DC and the ORANGE / WHITE wire to 0V DC. Connect the shield to ground.

**EDM (External Device Monitoring)** - This input is used to monitor external switching devices to ensure those devices respond each and every time the light curtain is interrupted.

The EDM circuit must receive +24V DC to function properly. When monitoring a switching device one side of the Normally Closed circuit will connect to the YELLOW wire (cable B) the other to +24V DC. If the EDM function is not required +24V DC must be connected to the YELLOW wire otherwise the system will remain tripped and will not reset.

**Activate (Manual Start/Restart)** - A push button or key switch is required. Turning the 'activate switch to ON (Normally open contact must close for cross beam, normally closed contact must open for parallel beam) and then releasing the switch will automatically restart the safe output relay switching contacts to an ON condition, providing the light curtain is clear of obstruction.

Connect the RED / WHITE wire (cable B) to one side of your Normally Open contact and +24VDC to the other side (for both Activate & Guard Override functions).

**Automatic Restart** - No manual reset is needed; the light curtain restarts itself once the obstruction is cleared. Connect the PINK wire and the ORANGE wire to +24VDC.

**Note:** - The reset mode of the system is set upon initial power up. Power must be cycled to change from Automatic Restart Mode to Manual Restart Mode or visa-versa.

**Mute Dependent Override (Guard Override):** Turning and holding the activate switch in the ON state (Normally open contact must close for cross beam, normally closed contact must open for parallel beam) will automatically turn-on the safe output relay switching contacts for a period of 3 minutes, providing the light curtain is in a tripped condition e.g. with the curtain blocked by a loaded pallet. As soon as the loaded pallet clears the light curtain the safety system will automatically reactivate to a 'fully guarded' condition. Now, release the activate switch and restart the safety system in the normal manner

Connect the RED / WHITE wire (cable B) to one side of your Normally Open contact and +24VDC to the other side (for both Activate & Guard Override functions).

## **8K3 Series: Controls**

**Safety Relay Outputs (OSSD's)** – These two safety outputs respond to interruption of the light curtain (unless muted). The relays close (ON) when the curtain is clear and open (OFF) when the curtain is blocked. They are cross-monitored voltage free contacts with a maximum contact switching power 110V, 2A.

OSSD1 (Safety Output 1): RED wire & BLACK wire:

OSSD2 (Safety Output 2): BLUE wire & BROWN wire.

**Warning:** - OSSD's should be wired to prevent machine operation unless the OSSD's are in the ON state.

**Warning** - Bypassing the light curtain safety relay outputs (OSSD's) has been known to cause serious injury including death.

**Status Relay Output** – The status output is a voltage free NON-SAFETY contact that is ON (closed) when the safety relays are ON (closed) and OFF (open) when the safety relays are OFF (Open). The status contact has a maximum switching 110V, 1A.

Status Output: WHITE wire & GREEN wire

**Mute Output** - Some machines require a mute signal to indicate that the light curtain is muted. To monitor the mute status of the light curtain the VIOLET wire (cable B) must receive 24V DC. This electronic output is rated 24VDC@100mA.

**Note:** - Do not connect mute output (Violet wire) directly to +24vdc it will damage the light curtain system

**Mute delay off timer** - The delay off timer setting is required for 'L' type muting system. A 2 second delay is applied once the mute sensors are cleared allowing the product to pass through the sensing region without actuating the OSSD's.

Delay timer **OFF** (T module applications): Connect the BLACK / WHITE wire to 0V DC.

Delay timer **ON** (L module applications): Connect the BLACK / WHITE wire to +24V DC.

**Note:** - Delay off timer must be applied for L module use applications.



## 8K3 Series: Controls

**Mute Inputs (M1, M2)** - Mute inputs (M1, M2) are for connecting the L & T muting modules, or external mute sensors. The inputs are applied externally via 4 way connectors mounted on the side of the Transmitter (Tx) and Receiver (Rx) units. When both inputs are active ON, the light curtain will mute, e.g. the guard output switches will not respond to an interruption of the light curtain. There are also mute LED indicators located in the receiver column that extinguish when the mute signals are applied. How the mute inputs are applied in 9 - 11.

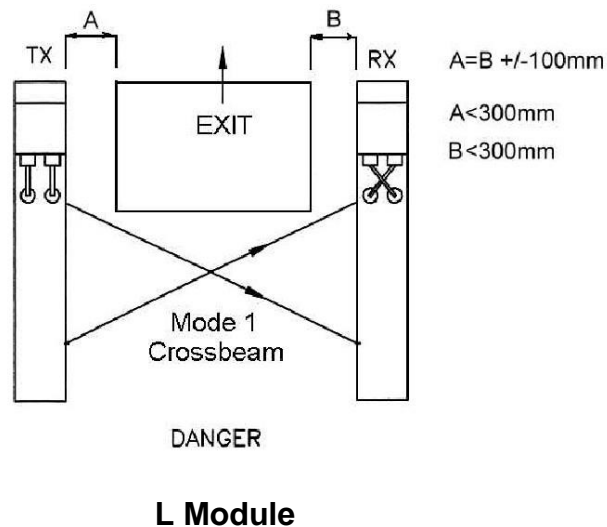
**Mute enable input** – This signal must be applied for muting to occur. It may be used as a 3<sup>rd</sup> mute signal. When self-muting light curtains are used on conveyor systems” Conveyor Run” can start the muting sequence. This technique makes deliberate bypass of the light curtain more difficult.

Mute Enable: Connect the GRAY wire (cable B) to +24V DC.

**Note:** - The ‘mute enable’ input must be connected to +24V DC. Mute enable input is connected to +24V DC or ‘conveyor run’ via switching contact, ‘closed contact’ when the conveyor is running.

## **Pallet load positioning**

Ensure that the pallet position on entering and exiting the light curtain does not have a gap greater than 300mm between the transmitter (Tx) and the edge of the pallet load on one side and the same on the receiver (Rx) side. These are marked in the diagram below, A and B. The distance for A and B should be the same +/- 100mm.



## 8K3 Series Muting: L Style System

The 'L' type module must **NOT** be used at infeed zones.

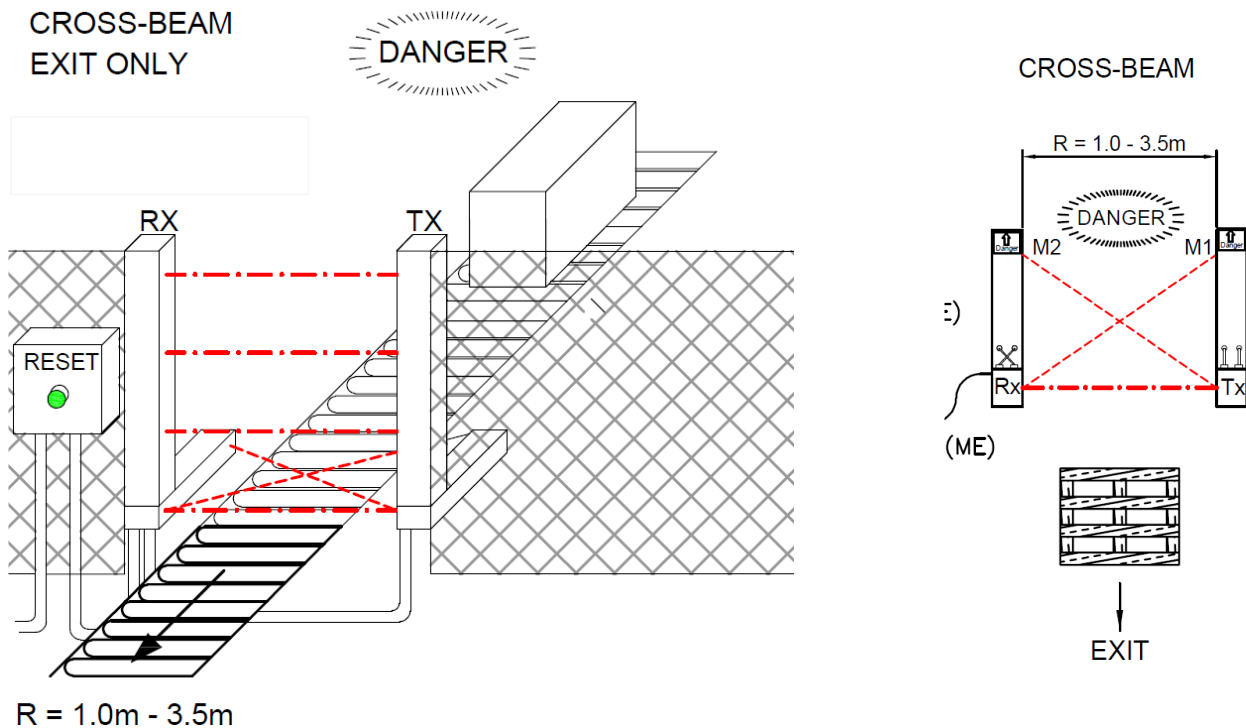
**Note:** - Delay off timer **must** be applied for L module use applications.  
Connect the BLACK / WHITE wire to +24V DC.

To ensure correct operation of the safety system both mute beams must be interrupted by a loaded pallet within 1.7 seconds of each other and both must remain interrupted during the entire period the palletized load is transferring through the light curtain.

Once both cross-beams are blocked the system will remain muted unless the mute enable signal is removed.

There is a short period of time when the trailing edge of a pallet load 'clears' the detection field of both mute sensors but is still interrupting the light curtain. A timer (Mute delay off timer see page 7) is incorporated within the safety control system that allows a period of 2 seconds between the pallet load 'clearing' the mute sensors and 'clearing' the light curtain. If the 2 second period is exceeded the safety system will trip.

Suitably position the light curtain to ensure a pallet load does not stop after clearing the mute beams but still interrupting the light curtain.

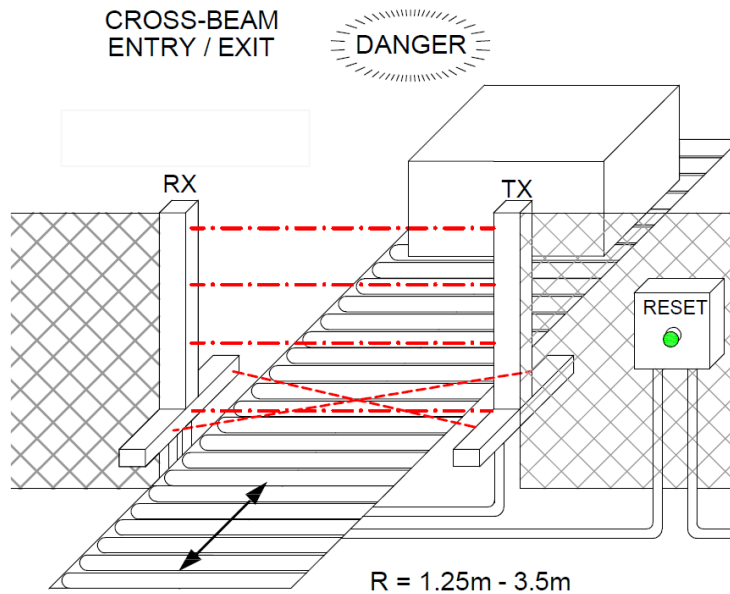


**8K3 Series: MUTING T Style or Retro-reflective Sensor Style**

**T muting module, Cross-beam muting.** To ensure correct operation of the safety system both mute beams must be interrupted by a loaded pallet within 1.7 seconds of each other and both must remain interrupted during the entire period the palletized load is transferring through the light curtain.

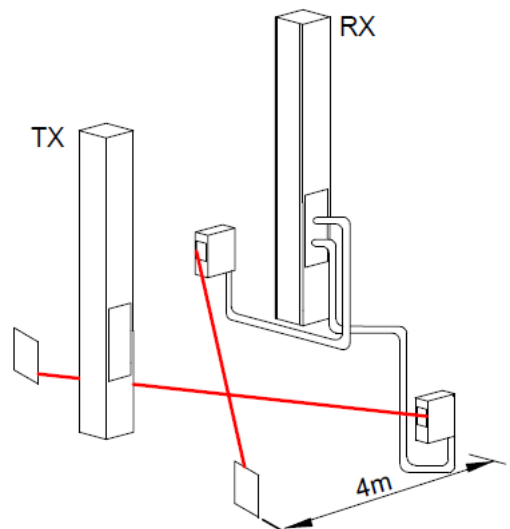
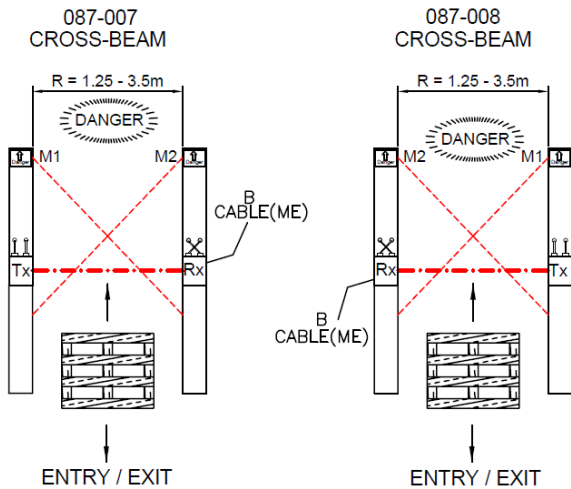
Once both cross-beams are blocked the system will remain muted unless the mute enable signal is removed.

For increased safety integrity the position of the internal mute sensors within their housing are factory-set to ensure the cross-over point of the muting beams is inside the danger zone as shown. The cross-beam muting configuration is suitable for scanning a range between 1m and 3.5m.



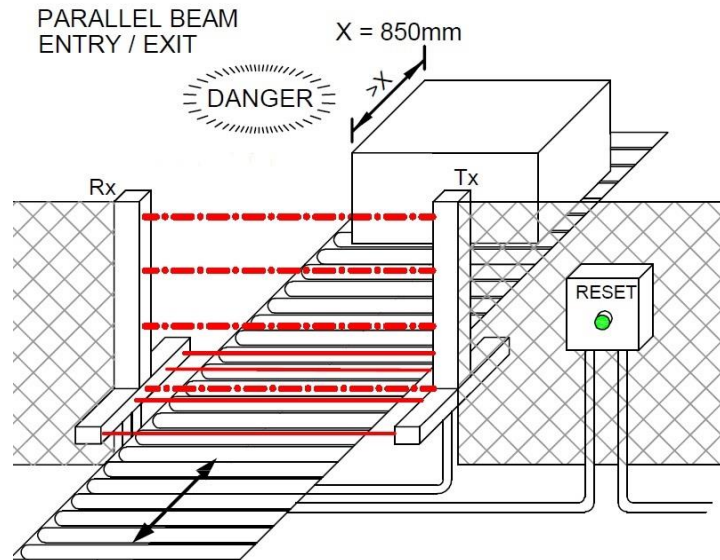
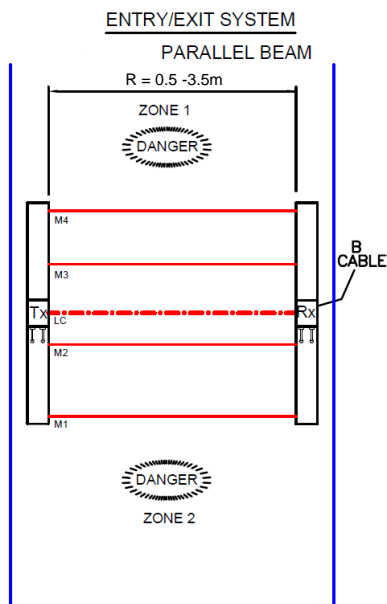
TYPE 1 - ENTRY/EXIT SYSTEM

TYPE 2 - ENTRY/EXIT SYSTEM



**Remote Sensors**

**Mode 2 - Parallel-beam muting (Parallel Module Only).** To ensure correct operation of the safety system the beams must be interrupted in the sequence below or visa versa.



Parallel Mode will **ONLY** work with a parallel beam module. Will not work with remote sensor or standard T module

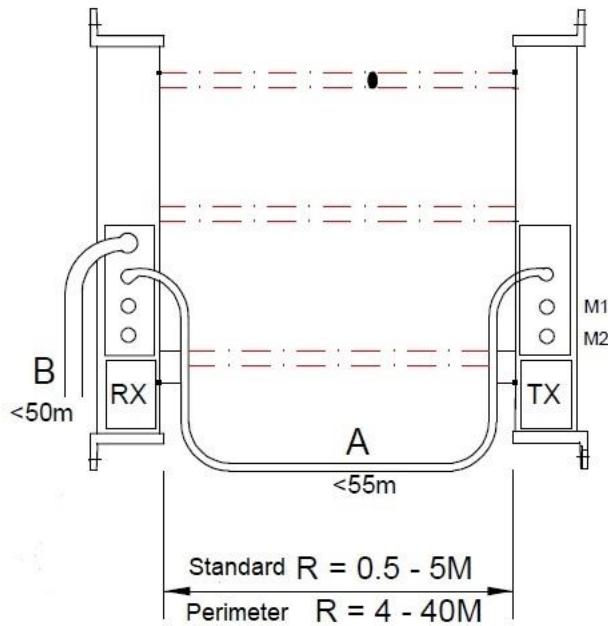
#### Parallel Beam Muting Sequence

- ❑ Initiate Mute Enable signal (ME).
- ❑ Interrupt M1 (2.5 second disparity timer starts).
- ❑ Interrupt M2 (within 2.5 seconds and disparity timer stops).
- ❑ Interrupting M1 & M2 (system is now in mute).
- ❑ Pallet load clears M3 (mute is stopped, guard active). 2.5 second disparity timer starts.
- ❑ Pallet load clears M4 within 2.5 seconds.
- ❑ Deactivate mute enable (ME).
- ❑ Timing sequence ends.

For increased safety integrity a third mute input is available at the light curtain safety controller. This 3<sup>rd</sup> signal is normally taken from the conveyor transport system (mute enable). Inclusion of the signal indicates to the safety control that the conveyor is transferring products towards the light curtain detection field, thus instructing the controller to activate a MUTE ON condition during a pallet transfer through the light curtain.

The parallel-beam muting configuration is suitable for scanning a range between 0.5m and 5m.

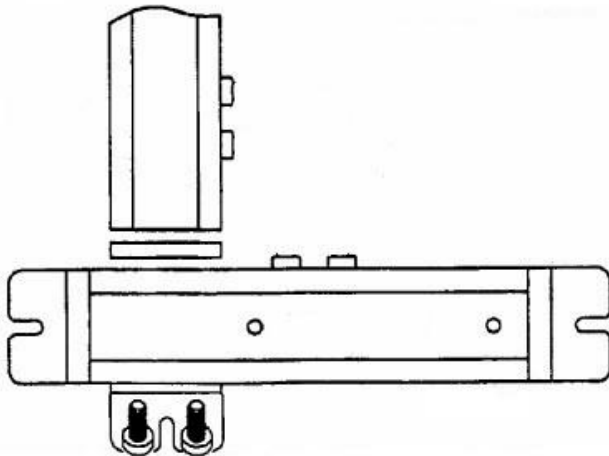
## 8K3 Series: Physical Set-up



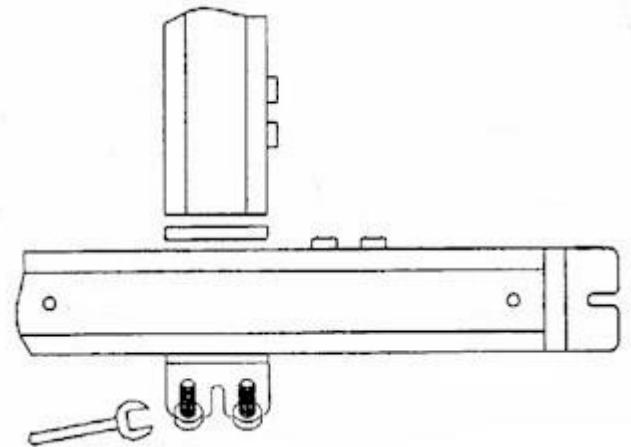
**“A” Cable** - Connects the transmitter (Tx) column to the receiver (Rx) column. It has an 8 pin circular, bayonet locking connector at each end.

**“B” Cable** - This cable connects the light curtain to the user equipment e.g. control panel. At one end it has a circular 18 pin socket enabling it to be plugged into the receiver (Rx) and the other end has open (unterminated) wires to connect to the control panel.

L Module



T Module

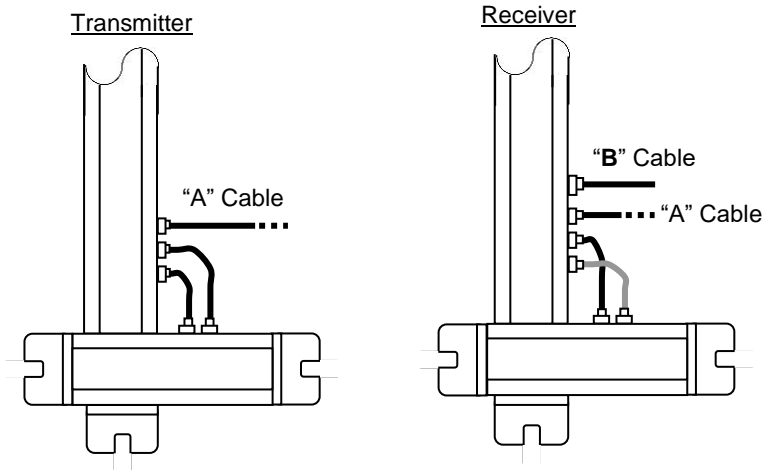


Fixing ‘L’ or ‘T’ mute modules to the main light curtain columns is very easy. Undo the fixing bolts and remove the end-cap fixing bracket and rubber seal from both the transmitter (Tx) and receiver (Rx) columns.

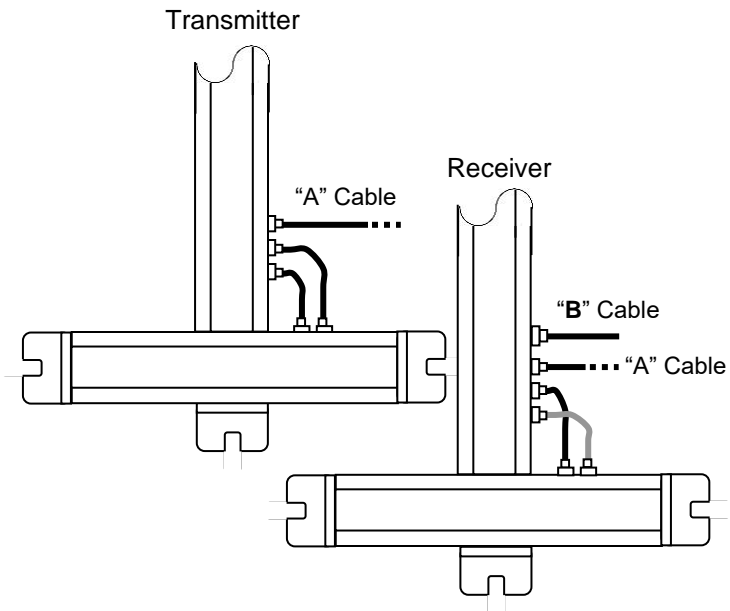
Fit the appropriate ‘L’ or ‘T’ module to the base of each column place the bottom end cap bracket using the longer bolts that are supplied with the units. Tighten the bolts enough to ensure waterproof sealing between the aluminum housings.

## 8K3 Series: Physical Set-up

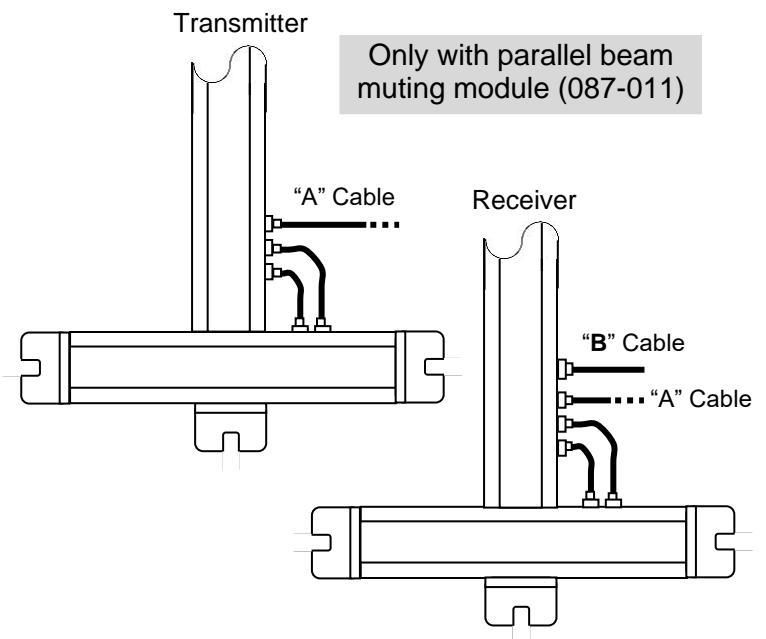
L Module: Cross-Beam Configuration only.



T Module: Cross-beam Configuration



PAR Module: Parallel-Beam Configuration



Plug-in the two cables on the transmitter (Tx) mute module to the main light curtain transmitter (Tx) column as shown above. Unlike the receiver (Rx) module there are NO connection differences at the transmitter (Tx) between cross-beam and parallel-beam configurations.

**Note:** Both 'T' and 'L' mute modules are suitable for cross-beam configured systems whereas only the 'T' system is suitable for parallel-beam applications.

## **8K3 Series: Specifications**

### **8K3 Series Light Curtains**

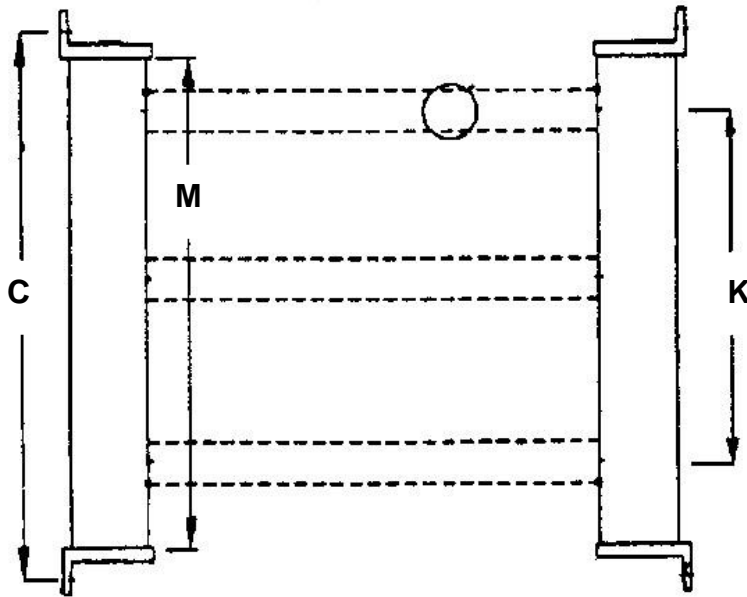
Number of beams	1- 4
Detection height	500, 600, 900 and 1200mm
Range	Standard 0.5 - 5m Perimeter 4 – 30m (Model dependant) Cross-beam muting 'T' 1.25 – 3.5m Cross-beam muting 'L' 1.25 – 3.5m Parallel-beam muting "PAR" 0.5 -3.5m
Light type	IR 880nm
Response time	40ms
Operating temperature	0°C to +50°C
Light curtain enclosure	•IP66 (HxWxD) H x 50 x 60
Power supply	24V DC 1A ±10%
Current consumption	250mA
Light curtain connection	Circular, bayonet locking IP68
Finish	Aluminum chromate treated, yellow polyester powder coated
Warranty	1 Year

- For more information about the IP or wash down rating contact Smartscan.

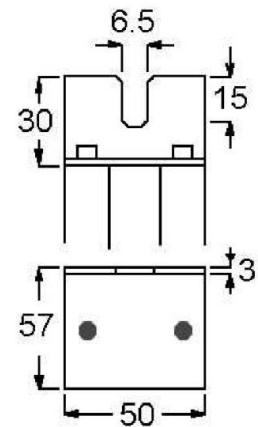
<b>OUTPUTS</b>	
Safety Outputs OSSD1 & OSSD2	2 X N/O fail-safe switching contacts each rated at 110 V 2A
Status Output Relay	1 x N/O non-safety switching contact rated at 110V 1A
Mute Output	Electronic output. MUTE ON = 0V
Status Indication	Status & condition LED's on Light Curtain

<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
Mute Delay Off Timer	2 Sec. Delay OFF = +0V DC 2 Sec. Delay ON = 24V

## 8K3 Series: Dimensions



8K3 Series Bracket



### Light Curtains

Model number	Number of beams	Detection height (K) mm	Overall length (M) mm	Centers (C) mm	Weight (TX + RX) Kg
8K3-600-24M	1	600	672	702	2.0
8K3-600-24	2	600	672	702	2.5
8K3-450-36	3	900	972	1002	3.5
8K3-400-48	4	1200	1272	1302	4.5

Range 0.5 – 5m

### Perimeter Guarding

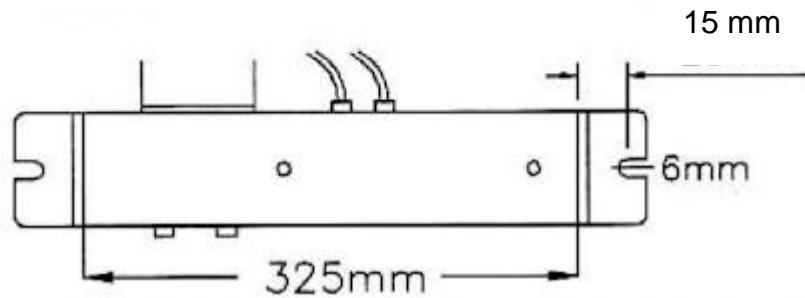
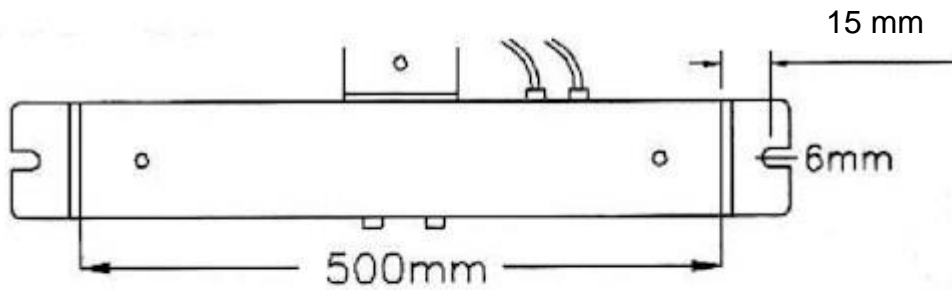
Model number	Number of beams	Detection height (C) mm	Overall length (M) mm	Centers (C) mm	Weight (TX + RX) Kg
8K3P-600-24M	1	600	672	702	2.0
8K3P-600-24	2	600	672	702	2.5
8K3P-450-36	3	900	972	1002	3.5
8K3P-400-48	4	1200	1272	1302	4.5

Range 4 - 40m

## 8K3 Series: Module Dimensions



## T Module



## L Module

**‘T’ mute module (Suitable for entry and exit applications)**

Model number	Number of beams	Overall length (M) mm	Weight (TX + RX) Kg
8K3-T1-KIT	2	500	1.8
8K3-T2-KIT	2	500	1.8

Range

Cross-beam muting 1.25 – 3.5m

**‘L’ mute module (Suitable for exit applications only)**

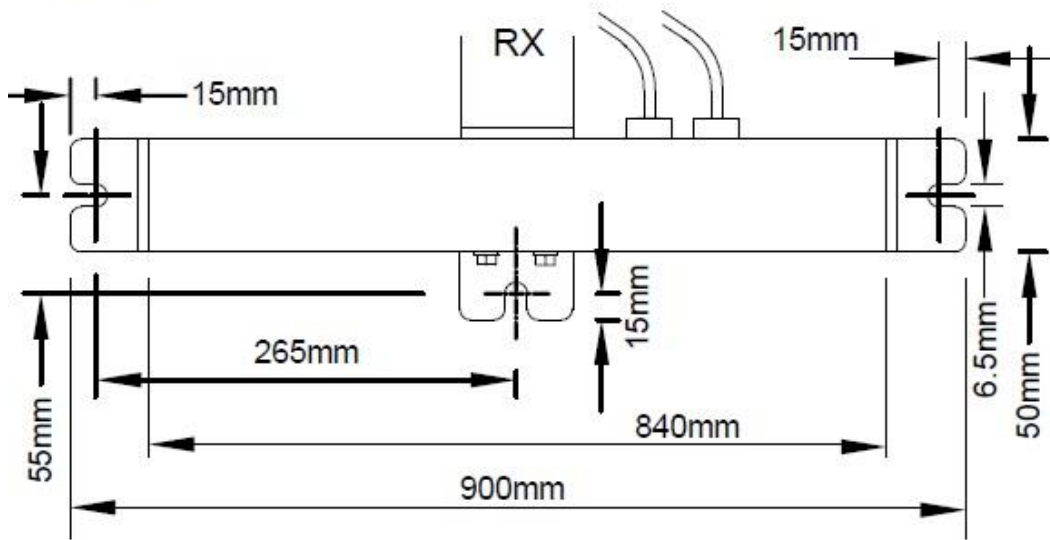
Model number	Number of beams	Overall length (M) mm	Weight (TX + RX) Kg
8K3-L-KIT	2	325	1.2

Range

Cross-beam muting 1 – 3.5m

**8K3 Series Parallel beam muting module dimensions**

Module: 'PAR'  
087-011



**'PAR' (Parallel Beam) mute module (Suitable for entry and exit applications)**

Model number	Number of beams	Overall length mm	Weight (TX + RX) Kg
8K3-PAR-KIT	4	900	1.8

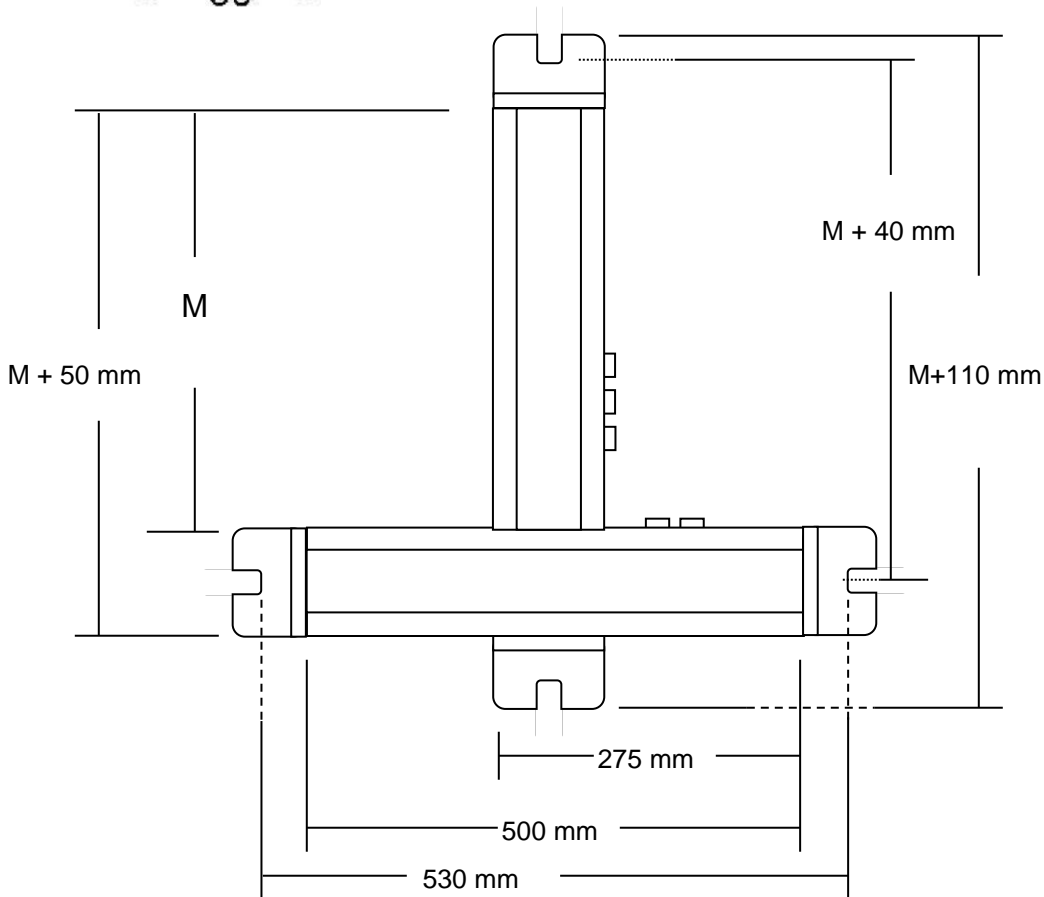
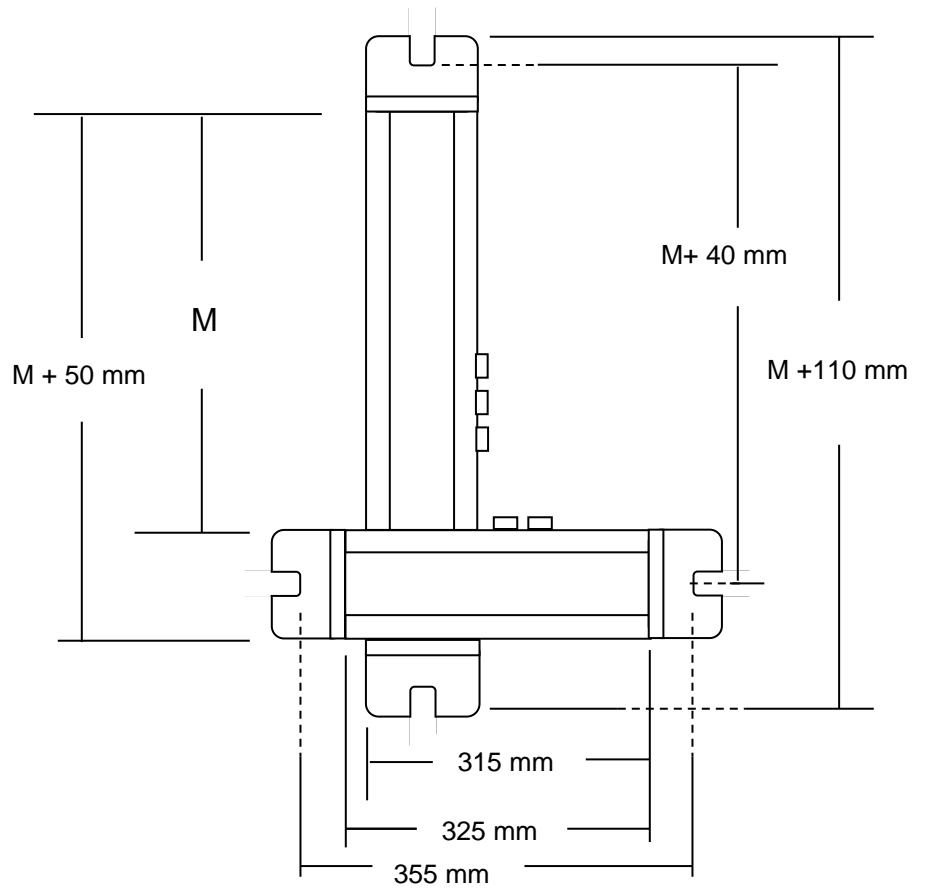
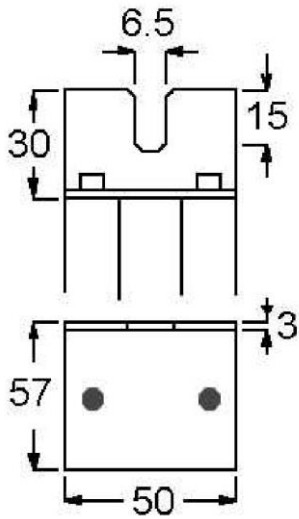
Range

Parallel-beam muting 0.5 – 3.5m

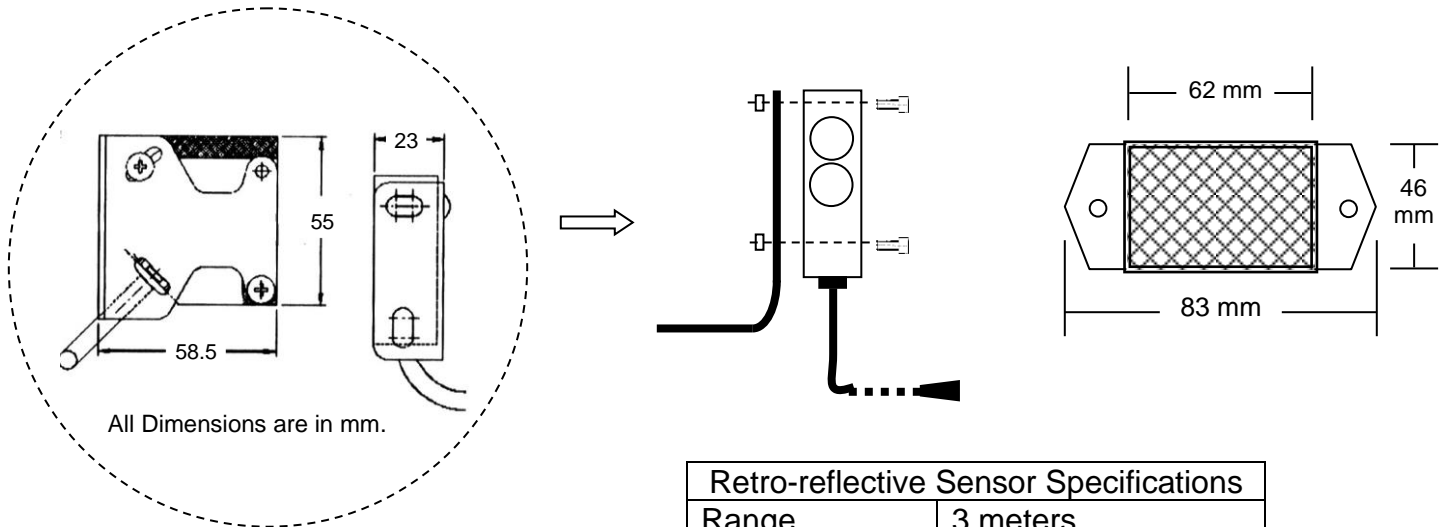
## 8K3 Series: L & T system dimensions

Model Number	Overall Length (M) mm
8K3-600-24	672
8K3-450-36	972
8K3-400-48	1272

8K3: Bracket



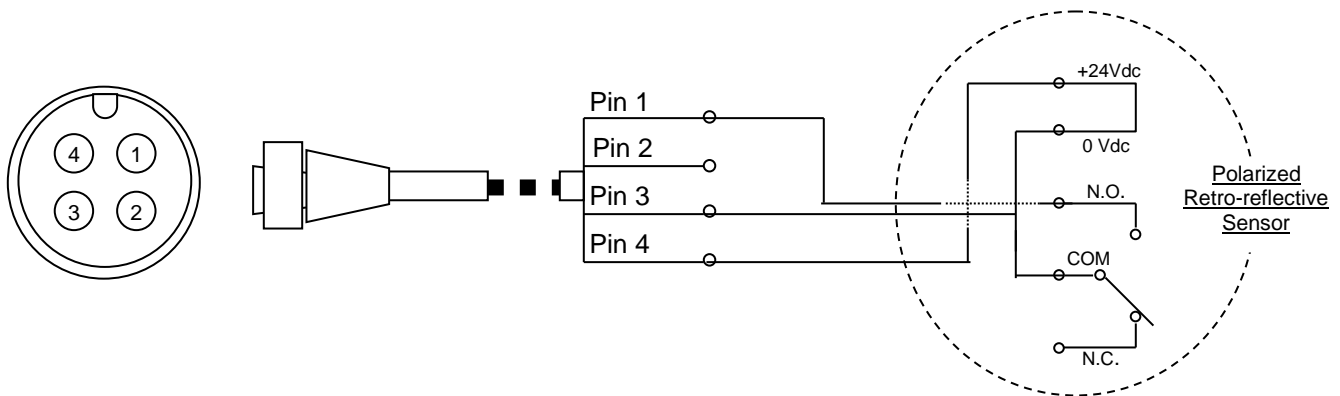
## 8K3 Series: Polarized Retro-Reflective Sensors Dimensions



Function	Sensor lead Color Code
+24Vdc	Brown
0Vdc	Blue
N.O.	Black
COM	White
N.C.	Gray

Retro-reflective Sensor Specifications	
Range	3 meters
Response time	15ms
Output	3A@250VAC N.O or N.C
Sensor enclosure	IP66
Power Supply	12-240VDC 24-240VAC
Current consumption	2VA max.
Sensor Cable	1.5 meter

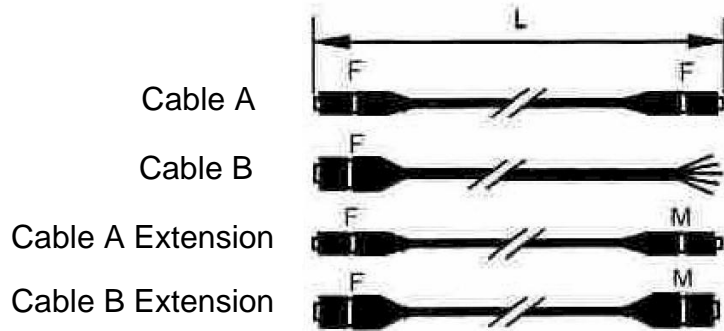
### Sensor to Connector Pin Out



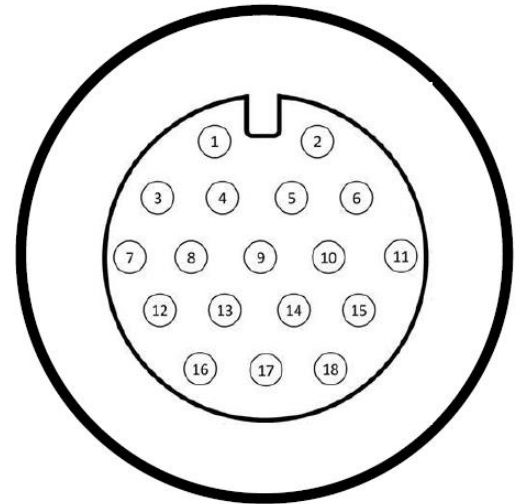
Model Number	Description
8K3-PRS-KIT	(2) Sensors per kit
8C0N	(1) Sensor connector, for use with customer supplied sensors. Two connectors are required per system.

**NOTE:** The sensors should have a gain adjustment if Smartsan Inc does not supply the sensors.

## 8K3 Series: Cables



### "B" Cable Pin Out



Model Number	Description	Overall length (L) m
8A05	Cable A	5m
8B05	Cable B	5m
8AX10	Extension (Cable A)	10m
8BX10	Extension (Cable B)	10m
8AX20	Extension (Cable A)	20m
8BX20	Extension (Cable B)	20m
8A05RH	Cable A (Heater Only)	5 m

8K3 Series, "B" Cable, Color Code				
Pin	Color	Function	Signal	I/O
1	Black	OSSD1	Safety Relay Output 1	Output
2	Red	OSSD1	Safety Relay Output 1	Output
3	Green	Status	Status Relay Output	Output
4	White	Status	Status Relay Output	Output
5	Brown	OSSD 2	Safety Relay Output 2	Output
6	Blue	OSSD 2	Safety Relay Output 2	Output
7	Orange	Auto Start	Automatic Start/Restart	Input
8	Pink	Auto Start	Automatic Start/Restart	Input
9	Gray	Mute Enable	Mute Enable	Input
10	Violet	Mute Output	Mute Status	Output
11	Yellow	EDM	External Device Monitoring	Input
12	Brown/White	+ L Volts	+24V DC	+24VDC
13	Orange/White	- L Volts	0V DC	0V DC
14	Black/White	Mute Delay Off	Mute Delay Off	Input
15	Red/ White	Activate	Manual Start/ Restart/ G.O.	Input
16	Shield	Ground/Earth		
17	Turquoise	Heater	Internal Heaters	Input
18	Green/White	Not Used		