

# Safety Light Curtains

## DESCRIPTION:

Idem's Safety Light Curtains for finger and hand protection offer the user maximum accessibility to a machine or production line by removing or complementing the requirement for mechanical guarding.

Manufacturing processes that require operator access to the dangerous area can be performed quickly and with the minimum of interruption to production flow. Machines of all sizes are well suited to guarding by light curtains since the high level of throughput requires the minimum of interruption when inserting and removing product.

Fork lift truck access to conveyor lines is also an ideal application allowing fast and efficient access whilst maintaining a high level of safety integrity.

## OPERATING PRINCIPLE:

Idem's SLC-F, SLC-H Safety Light Curtains have been designed to ensure protection of operators working in hazardous areas.

They operate with infrared beams that are evenly spaced at specific intervals.

SLC-F (finger protection) beams spaced 14mm min. sensing.

SLC-H (hand protection) beams spaced 30mm min. sensing.

When the beam detects a finger or hand entering the defined hazardous area, the protective equipment immediately stops the machine with a 14ms response, or renders it harmless.

A high reliability is achieved by implementing a fail-safe system: The devices are Type 4 and PLe/Cat4 to ISO13849-1.

Internal failure immediately deactivates the output signals as does any intrusion into the protective field.



## DESIGN FEATURES:

- Non muting function to increase productivity and safety.
- PNP or NPN selection by DIP switch.
- Smart click connectors (voltage out are from connectors).
- Advanced muting function automatically detects when a work space does not pass.
- Sensing surface fully protected due to the design feature of narrowing and recessing the exposed area.
- Fast response time of 14ms for all models regardless of number of beam channels or the number of units connected in series.

## POSITIONING OF SAFETY LIGHT CURTAINS:

The Safety Distance is the minimum distance that must be maintained between the safety sensor and the hazardous part of the machine in order to stop the machine before someone or something reaches it.

**A full risk assessment should always be carried out prior to installing a safety light curtain.**

The Safety Distance S can be calculated using the equation method provided by the standard EN999 (ISO14120).

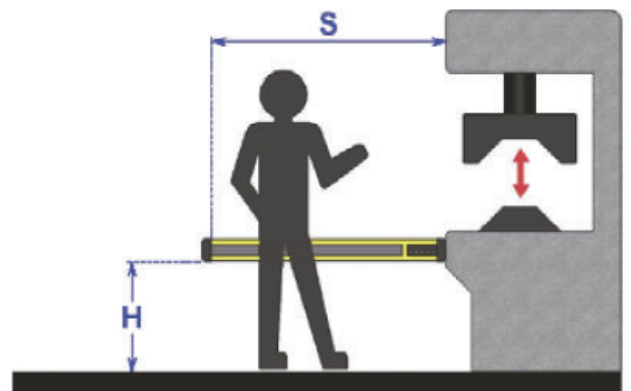
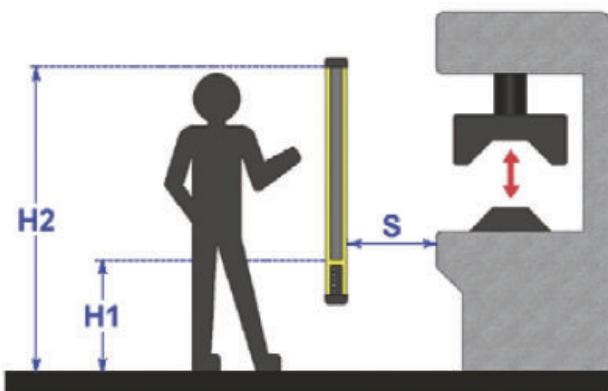
Vertical Curtain:  $S = (K \times T) + 8 \times (R-14)$  where

S is the minimum safety distance in mm from the hazardous part of the machine to the detection point of the safety sensor.

K is the approach speed of the body or parts of the body in mm/s. (2000mm/s for calculated value of  $S < 501$ mm or 1600mm/s for  $S > 500$ mm).

T is the overall stopping performance in seconds, sum of safety sensor response time and machine response time.

R is the resolution of the SLC (safety light curtain) (mm).



# Safety Light Curtains

## FEATURES:

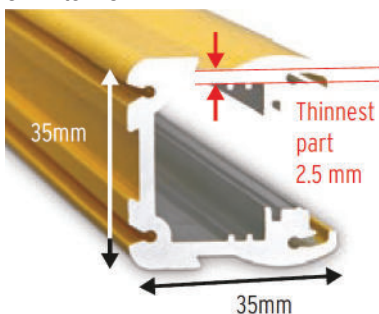


### ROBUST AND COMPACT HOUSING:

Idem's SLC-F and SLC-H Safety Light Curtains are all equipped with a robust housing that can be used in harsh environments and withstand shocks caused by sudden human contact or a dropped tool. A scratch resistant material is used for the optical surface to prevent any unexpected machine stops.

### SLIM HOUSING:

The housing structure is significantly improved to enhance resistance against shock and vibration and to reduce the thickness of the thinnest part of the housing material from 3mm to 2.5mm.



### HARSH ENVIRONMENTS:

With an increased resistance to torsion the risk of optical axis misalignment due to external forces such as vibration or aging is reduced significantly.

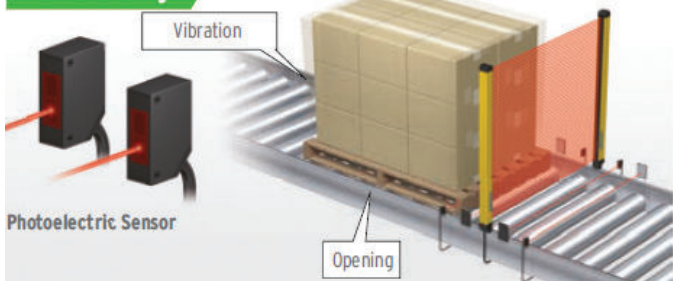
With an IP67 rating IDEM's Safety Light Curtains are suitable for use in areas that are subject to water.



### INCREASED PRODUCTIVITY AND SAFETY (Muting Function):

IDEM's Safety Light Curtains provide an advanced Muting function that detects the zone where work pieces pass or the position of a machine or robot and disable beams of the detected part. This increases both safety and productivity. By adding the smart muting actuator this provides stable operation even for the production lines where errors occur due to vibration caused by the passing work piece.

#### Previously



#### Smart Muting Actuator



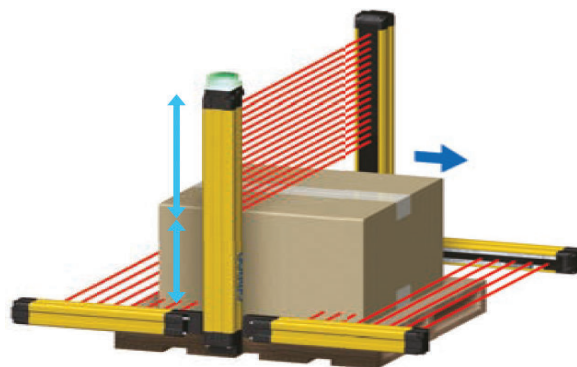
### AUTO-CONFIGURATION OF MUTING ZONE (Dynamic Muting):

When work pieces with various heights are conveyed on the same line, partial muting is automatically performed based on the height of the work piece.

This advanced muting function can automatically perform normal detection at the zone where a work piece does not pass.

The only beams interrupted by the work piece are kept muted and other beams are released from the muting state three seconds after the work piece passes through the safety light curtain. Muting is disabled after the work-piece has passed.

Monitors human entry into the zone where a work piece does not pass (see picture opposite). Keeps only the zone muted where the work piece passes through.



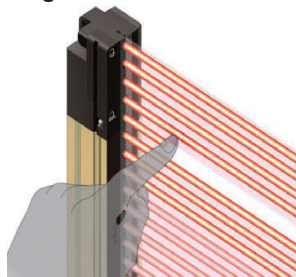
## SELECTION:

Idem's Safety Light Curtain range is perfectly suited where finger and hand protection is required close to the hazardous area (point of operation).

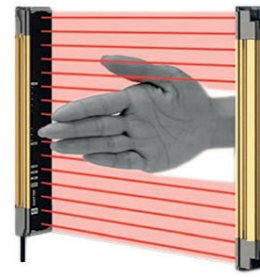
Depending on the application, a resolution of either 14 mm (finger protection) or 30 mm (hand protection) is available.

Thanks to their type 4, Cat 4, PLe safety level, Idem's devices can be used on equipment requiring high protection reliability and this includes, but is not limited to, the following applications such as machine tools, robots, hydraulic presses, automated stock management, weaving looms, etc.

### Finger Protection SLC-F:



### Hand Protection SLC-H:



# Safety Light Curtains Type: SLC-F Finger (14mm)

## FEATURES:

- Resolution: 14mm
- Protective height: 160mm to 1040mm
- Type 4 according to IEC61496-1 and -2
- Operating range: 0.3m to 10m
- Category 4, PLe according to EN/ISO13849-1
- Ingress protection IP67



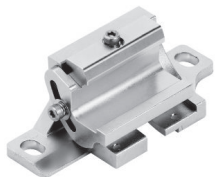
## ORDERING INFORMATION:

SALES NUMBER	NUMBER OF BEAMS	PROTECTIVE HEIGHT (mm)
SLC-F-160	15	160
SLC-F-240	23	240
SLC-F-400	39	400
SLC-F-560	55	560
SLC-F-800	79	800
SLC-F-1040	103	1040

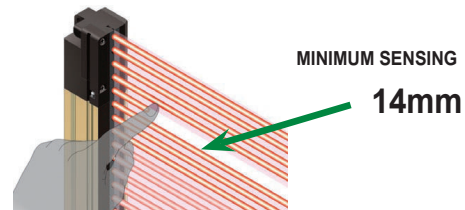
NOTE: Comes complete with SENDER, RECEIVER and STANDARD FIXING BRACKETS.



SALES NUMBER	NUMBER OF BRACKETS
SLC-SB-2	2
<b>STANDARD BRACKETS (Supplied)</b>	
Side mounting and backside mounting possible. Pack of two brackets included in the SLC-F package	



SALES NUMBER	NUMBER OF BRACKETS
SLC-AB-2	2
<b>ADJUSTABLE BRACKETS (Optional extra)</b>	
Angle adjustment range is $\pm 15^\circ$ . Side mounting and backside mounting possible.	



## CONNECTOR CABLE (Single-Ended)



SENDER CABLE:  
M12 Connector  
5-Pin, 5 Wires, Grey  
RECEIVER CABLE:  
M12 Connector  
8 Pin, 8 Wires, Black

SINGLE-ENDED CONNECTOR CABLE			
EMITTER		RECEIVER	
SLC-CC-S3	3m	SLC-CC-R3	3m
SLC-CC-S10	10m	SLC-CC-R10	10m
SLC-CC-S20	20m	SLC-CC-R20	20m



## TECHNICAL SPECIFICATIONS:

	SLC-F SAFETY LIGHT CURTAINS	TECHNICAL DATA
<b>Performance:</b>		
Object Resolution (Detection Capability)	14mm diameter	
Beam Gap	10mm	
Protective Height	160mm to 1040mm (6.3 inch to 41 inch)	
Operating Range	300mm to 10.0m (1ft to 32.8ft)	
<b>Electrical:</b>		
Power Supply Voltage (Vs)	SELV/PELV 24 VDC $\pm$ 20% (ripple p-p 10% maximum)	
Supply Outputs (OSSD)	Two PNP or NPN transistor outputs (PNP or NPN is selectable by DIP Switch.) Load current of 300 mA max.,	
Output Operation Mode - Safety Output	Light-ON (Safety output is enabled when the receiver receives an emitting signal.)	
Over-voltage Category (IEC 60664-1)	II	
Protective Circuit	Output short protection, Power supply reverse polarity protection	
Insulation Resistance	20 MOhms or higher (500 VDC megger)	
Dielectric Strength	1,000 VAC, 50/60 Hz (1 min)	
<b>Functional:</b>		
Test Function	Self-test (at power-on, and during operation). External test (light emission stop function by test input)	
Safety Related Functions	Interlock External device monitoring (EDM) Pre-reset Fixed blanking/Floating blanking Reduced resolution Muting/Override Scan code selection PNP/NPN selection Response time adjustment	
<b>Environmental:</b>		
Ambient Temperature	Operating: -10 to 55°C (14 to 131°F) (non-icing) Storage: -25 to 70°C (-13 to 158°F)	
Ambient Humidity	Operating: 35% to 85% (non-condensing) Storage: 35% to 95%	
Ambient Illuminance	Incandescent lamp: 3,000 lx max. on receiver surface. Sunlight: 10,000 lx max. on receiver surface	
Degree of Protection (IEC 60529)	IP65 and IP67	
Vibration Resistance (IEC 61496-1)	10 to 55 Hz, Multiple amplitude of 0.7 mm, 20 sweeps for all 3 axes	
Shock Resistance (IEC 61496-1)	100 m/s <sup>2</sup> , 1000 shocks for all 3 axes	
Pollution Degree (IEC 60664-1)	Pollution Degree 3	
<b>Material:</b>	Housing: Aluminum Cap: PBT Front window: PMMA Cable: Oil resistant PVC Mounting Bracket: ZDC2 FE plate: SUS	
<b>Conformity:</b>		
Type of ESPE (IEC 61496-1)	Type 4	
Performance Level (PL) Safety Category	Type 4: PL e/Category 4 (EN ISO 13849-1:2008)	
PFHd	$\leq 9.9 \times 10^{-8}$ (IEC 61508)	
Proof test interval TM	Every 20 years (IEC 61508)	
SFF	99% (IEC 61508)	
HFT	1 (IEC 61508)	
Classification	Type B (IEC 61508-2)	

# Safety Light Curtains Type: SLC-H Hand (30mm)

## FEATURES:

- Resolution: 30mm
- Protective height: 270mm to 1710mm
- Type 4 according to IEC61496-1 and -2
- Operating range: 0.3m to 20m
- Category 4, PLe according to EN/ISO13849-1
- Ingress protection IP67



## ORDERING INFORMATION:

SALES NUMBER	NUMBER OF BEAMS	PROTECTIVE HEIGHT (mm)
SLC-H-270	12	270
SLC-H-430	20	430
SLC-H-750	36	750
SLC-H-1070	52	1070
SLC-H-1470	72	1470
SLC-H-1710	84	1710

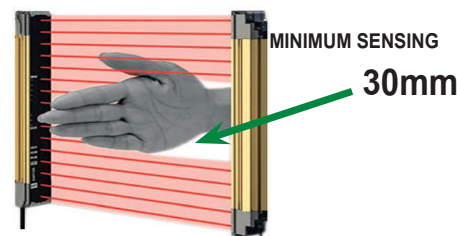
NOTE: Comes complete with SENDER, RECEIVER and STANDARD FIXING BRACKETS.



SALES NUMBER	NUMBER OF BRACKETS
SLC-SB-2	2
<b>STANDARD BRACKETS (Supplied)</b>	
Side mounting and backside mounting possible. Pack of two brackets included in the SLC-F package	



SALES NUMBER	NUMBER OF BRACKETS
SLC-AB-2	2
<b>ADJUSTABLE BRACKETS (Optional extra)</b>	
Angle adjustment range is $\pm 15^\circ$ . Side mounting and backside mounting possible.	



### CONNECTOR CABLE (Single-Ended)



SENDER CABLE:  
M12 Connector  
5-Pin, 5 Wires, Grey  
RECEIVER CABLE:  
M12 Connector  
8 Pin, 8 Wires, Black

SINGLE-ENDED CONNECTOR CABLE			
EMITTER		RECEIVER	
SLC-CC-S3	3m	SLC-CC-R3	3m
SLC-CC-S10	10m	SLC-CC-R10	10m
SLC-CC-S20	20m	SLC-CC-R20	20m



## TECHNICAL SPECIFICATIONS:

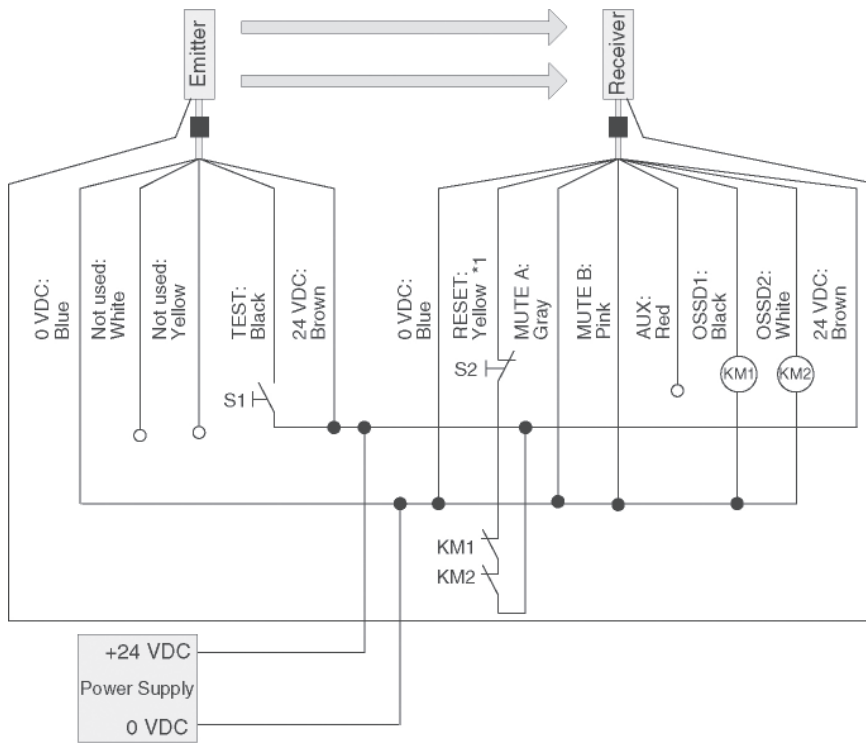
SLC-F SAFETY LIGHT CURTAINS	TECHNICAL DATA
<b>Performance:</b>	
Object Resolution (Detection Capability)	30mm diameter
Beam Gap	20mm
Protective Height	270mm to 1710mm (10.5 inch to 68 inch)
Operating Range	300mm to 20.0m (1ft to 65ft)
<b>Electrical:</b>	
Power Supply Voltage (Vs)	SELV/PELV 24 VDC $\pm$ 20% (ripple p-p 10% maximum)
Supply Outputs (OSSD)	Two PNP or NPN transistor outputs (PNP or NPN is selectable by DIP Switch.) Load current of 300 mA max.,
Output Operation Mode - Safety Output	Light-ON (Safety output is enabled when the receiver receives an emitting signal.)
Over-voltage Category (IEC 60664-1)	II
Protective Circuit	Output short protection, Power supply reverse polarity protection
Insulation Resistance	20 MOhms or higher (500 VDC megger)
Dielectric Strength	1,000 VAC, 50/60 Hz (1 min)
<b>Functional:</b>	
Test Function	Self-test (at power-on, and during operation). External test (light emission stop function by test input)
Safety Related Functions	Interlock External device monitoring (EDM) Pre-reset Fixed blanking/Floating blanking Reduced resolution Muting/Override Scan code selection PNP/NPN selection Response time adjustment
<b>Environmental:</b>	
Ambient Temperature	Operating: -10 to 55°C (14 to 131°F) (non-icing) Storage: -25 to 70°C (-13 to 158°F)
Ambient Humidity	Operating: 35% to 85% (non-condensing) Storage: 35% to 95%
Ambient Illuminance	Incandescent lamp: 3,000 lx max. on receiver surface. Sunlight: 10,000 lx max. on receiver surface
Degree of Protection (IEC 60529)	IP65 and IP67
Vibration Resistance (IEC 61496-1)	10 to 55 Hz, Multiple amplitude of 0.7 mm, 20 sweeps for all 3 axes
Shock Resistance (IEC 61496-1)	100 m/s <sup>2</sup> , 1000 shocks for all 3 axes
Pollution Degree (IEC 60664-1)	Pollution Degree 3
<b>Material:</b>	Housing: AluminumCap: PBT Front window: PMMA Cable: Oil resistant PVC Mounting Bracket: ZDC2 FE plate: SUS
<b>Conformity:</b>	
Type of ESPE (IEC 61496-1)	Type 4
Performance Level (PL) Safety Category	Type 4: PL e/Category 4 (EN ISO 13849-1:2008)
PFHd	$\leq 9.9 \times 10^{-8}$ (IEC 61508)
Proof test interval TM	Every 20 years (IEC 61508)
SFF	99% (IEC 61508)
HFT	1 (IEC 61508)
Classification	Type B (IEC 61508-2)

# Safety Light Curtains Type: SLC-F and SLC-H

## CONNECTIONS (Basic Wiring Diagrams):



### STANDALONE SLC-F or SLC-H using PNP OUTPUTS:



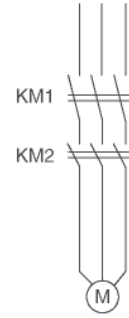
[DIP Switch settings]

Receiver:

- Manual Reset Mode
- EDM enabled
- PNP output

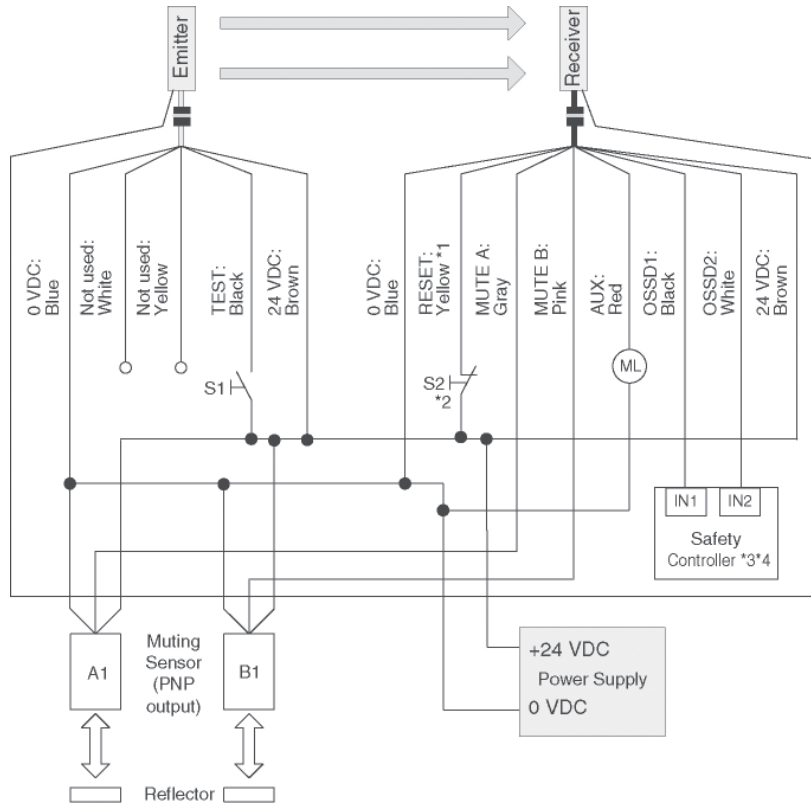
Emitter:

- 24 V Active



- S1: Test Switch  
 S2: Lockout/Interlock Reset Switch  
 KM1, KM2: Safety relay with forcibly guided contacts  
 M: 3-phase motor  
 \*1. Also used as EDM input line.

### STANDARD MUTING MODE/EXIT-ONLY MUTING MODE WITH TWO MUTING SENSORS USING PNP OUTPUTS



[DIP Switch settings]

Receiver:

- Auto Reset Mode
- EDM disabled
- PNP output

Emitter:

- 24 V Active

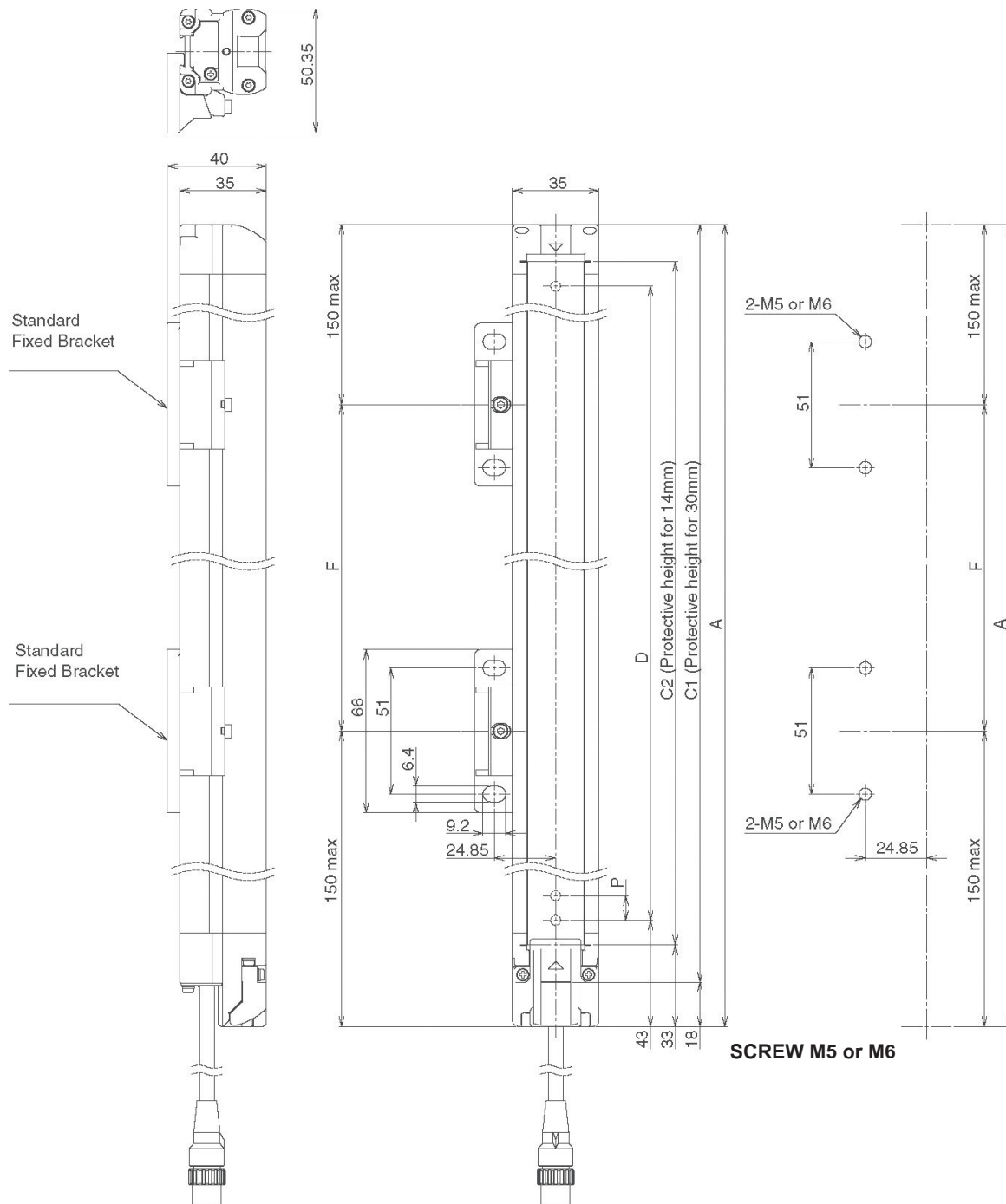
- S1: Test Switch  
 S2: Lockout/Interlock Reset Switch, Override Switch  
 or Override Cancel Switch  
 ML: Muting lamp  
 A1, B1: Muting sensor

# Safety Light Curtains Type: SLC-F and SLC-H

## DIMENSIONS:



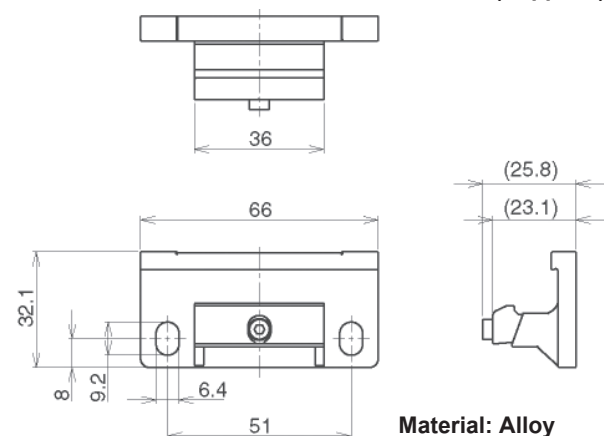
MOUNTED WITH STANDARD FIXED BRACKETS (supplied in pack) BACKSIDE MOUNTING:



### DIMENSIONS FOR SLC-H SERIES

DIMENSIONS SLC-H SERIES	
Dimension A	C1 + 18
Dimension C1	Protective Height (See pp221)
Dimension D	C1 - 50
Dimension P	20

### STANDARD FIXED BRACKET DIMENSIONS (Supplied)



### DIMENSIONS FOR SLC-F SERIES

DIMENSIONS SLC-F SERIES	
Dimension A	C2 + 48
Dimension C2	Protective Height (See p220)
Dimension D	C1 - 20
Dimension P	10

# Safety Light Curtains Type: SLC-F and SLC-H

## INDICATOR INFORMATION:



### EMITTER:

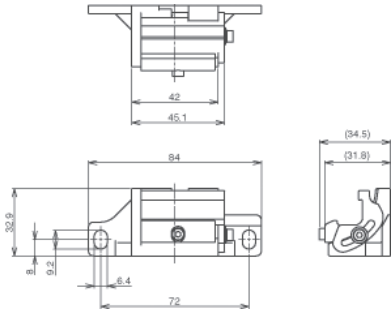
NAME OF INDICATOR	COLOUR	ILLUMINATED	BLINKING	
Test	TEST	Green	-	External test is being performed.
Operating Range	LONG	Green	Long range mode is selected by DIP Switch.	Lockout state due to DIP Switch seeing error.
Power	POWER	Green	Power is ON.	-
Lockout	LOCKOUT	Red	-	Lockout state due to error in emitter.

### RECEIVER:

NAME OF INDICATOR	COLOUR	ILLUMINATED	BLINKING	
Top-beam-state	TOP	Blue	The top beam is unblocked	Muting/Override state, or Lockout state due to Cap error or other sensor error
PNP/NPN mode	NPN	Green	NPN mode is selected by DIP Switch	-
Response time	SLOW	Green	Response Time Adjustment is enabled	-
Sequence error	SEQ	Yellow	-	Sequence error in Muting or Pre-reset mode.
Blanking	BLANK	Green	Blanking, Warning Zone or Reduced Resolution is enabled.	Teach-in mode, or Blanking Monitoring error.
Configuration	CFG	Green	-	Teach-in mode, zone measurement being performed by Dynamic Muting, or Lockout state due to Parameter error or Cascading Configuration error.
Interlock	INT-LK	Yellow	Interlock state	Pre-reset mode.
External device monitoring	EDM	Green	RESET input is in ON state	Lockout state due to EDM error.
Internal error	INTERNAL	Red	-	Lockout state due to Internal error, or error due to abnormal power supply or noise.
Lockout	LOCKOUT	Red	-	Lockout state due to error in receiver.
Stable-state	STB	Green	Incident light level is 170% or higher of ON-threshold.	Safety output is instantaneously turned OFF due to ambient light or vibration.
ON/OFF	ON/OFF	Green	Safety output is in ON state.	-
		Red	Safety output is in OFF state, or the sensor is in Setting state.	Lockout state due to Safety Output error, or error due to abnormal power supply or noise.
Communication	COM	Green	Synchronization between emitter and receiver is maintained.	Lockout state due to Communication error, or error due to abnormal power supply or noise.
Bottom-beam-state	BTM	Blue	The bottom beam is unblocked	Muting/Override state, or Lockout state due to DIP Switch setting error.

## Accessories: Brackets, Alignment Tool, Extension Cables

### ADJUSTABLE MOUNTING BRACKET:



SALES NUMBER	NUMBER OF BRACKETS
SLC-AB-2	2
<b>ADJUSTABLE BRACKETS (Optional extra)</b>	
Angle adjustment range is $\pm 15^\circ$ .	
Side mounting and backside mounting possible.	

### SMART MUTING ACTUATOR:



ACCESSORY DESCRIPTION	MUTING TRIGGER BEAM GAP	SALES NUMBER
Smart Muting Actuator - 8 beams	100mm	SLC-SMA100
Smart Muting Actuator - 20 beams	300mm	SLC-SMA300

### MUTING LAMP:



ACCESSORY DESCRIPTION	SALES NUMBER
Muting Lamp	SLC-ML1

### EXTENSION CABLES:

TECHNICAL DATA:	
Rated Voltage	60V ac/dc max.
Rated Current	4A max. per contact
Electromagnetic Protection	Shielded
Sleeve Material	PUR
Wire Structure	5 x 0.34mm <sup>2</sup>
Wire Insulation	PP
Outer Cable Diameter	6.3mm $\pm$ 5%
Temperature Range	-25C to +80C (-13F to +175F)
Degree of Protection	IP67
Certification	UL CSA



CABLE DESCRIPTION (M12 Male to Female)		SALES NUMBER
<b>EMITTER:</b>		
PUR Shielded	M12 5-pole 3m length	SLC-CE3
PUR Shielded	M12 5-pole 10m length	SLC-CE10
<b>RECEIVER:</b>		
PUR Shielded	M12 8-pole 3m length	SLC-CR3
PUR Shielded	M12 8-pole 10m length	SLC-CR10
<b>NOTE:</b> Cables are not supplied with Safety Light Curtains		

# Safety Relay Type: SCR-31P-i (for use with Safety Light Curtains)

## DESCRIPTION:

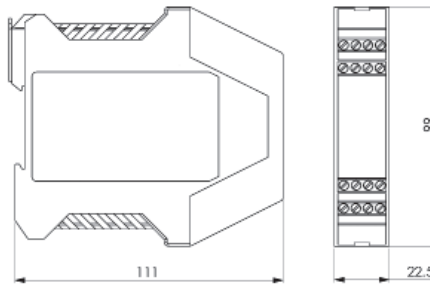
The SCR-31P-i safety relay from IDEM is designed to be compatible with devices offering OSSD outputs such as the IDEM range of safety light curtains. They offer high current switching via force guided relays.



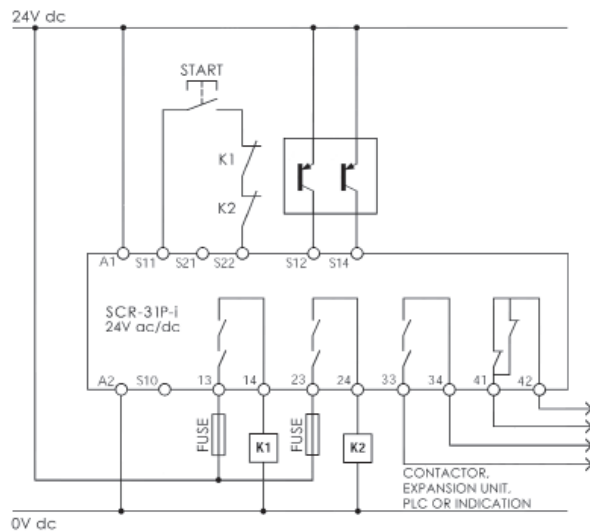
## FEATURES:

- Outputs 3NC contacts and 1NO contact.
- Feedback circuit to monitor external contacts.
- Easy diagnosis of status via visual indication of LEDs.
- Up to PLe, SILCL 3, Category 4.
- Monitored manual or automatic start.
- Up to 8A switching capability.

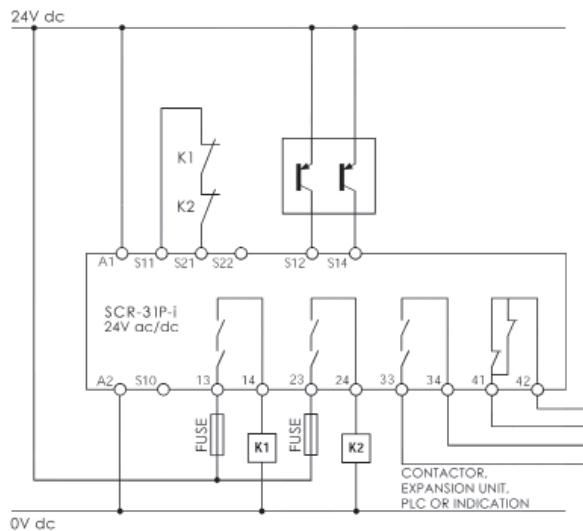
## DIMENSIONS:



## MANUAL RESTART MODE PNP INPUTS:



## AUTOMATIC RESTART MODE PNP INPUTS:



## SPECIFICATIONS:

STANDARDS	
EN ISO13849-1	EN62061 EN60204-1 EN ISO12100
POWER SUPPLY CIRCUIT	
Operating Voltage	24V AC/DC
Operating Voltage Tolerance	85-110%
Rated Supply Frequency	50Hz-60Hz
Power Consumption	2W (24V DC)
CONTROL CIRCUITS	
Rated Output Voltage	24V DC (S11)
Output Current	100mA (S11)
Response Time	100ms
Release Time	25ms
Recovery Time	90ms
OUTPUT CIRCUITS	
Rated Output Voltage	250V AC
Maximum Current per Output	6A
Maximum Total Current all Outputs	8A
Safety Contact Breaking Capacity	AC 250V, 1500V, 6A, Ohmic 230V, 4A for AC-15
	DC 24V, 30W, 1.25A, Ohmic
Minimum Contact Load	10V 10mA
Minimum Contact Fuses	4A slow blow, 6A fast blow
Contact Material	AgSnO <sub>2</sub>
Contact Service Life	10 x 10 <sup>6</sup>
GENERAL DATA	
Rated Impulse Withstand Voltage	4kV
Rated Insulation Voltage	250V
Degree of Protection	IP20
Temperature Range	-20C to +55C
Overvoltage Category	III
Weight	300gr (10.5 oz.)

SAFETY CHARACTERISTICS	
EN62061	SIL3
ISO13849-1	Ple Category 4
PFH	4.1E-10 1/h (0.4% of SIL3 (1 E-07 1/h))
PFD Av. (T=20a)	3.6E-05 (3.6% of SIL3 (1 E-03))
MTTFd	142a (High)
DC Av.	99% (High)

## LED DIAGNOSTICS:

### WHEN SAFETY RELAY IN OPERATION

- Power Power applied to device
- Reset Restart Circuit is closed.
- CH1 External OSSD Output ON.
- CH2 External OSSD Output ON.
- K1 Internal relay safety output contacts closed.
- K2 Internal relay safety output contacts closed.

## ORDERING:

SALES NUMBER	TYPE	TERMINAL TYPE	SUPPLY VOLTAGE	INPUT CIRCUITS	OUTPUT CONTACTS
280003	SCR-31P-i	Standard	24Vac/dc	2 x OSSD	3NC 1NO
280003-P	SCR-31P-i	Pluggable	24Vac/dc	2 x OSSD	3NC 1NO