

SG EXTENDED

SAFETY LIGHT CURTAIN

Automotive, Metalworking,
Electronics, Woodworking

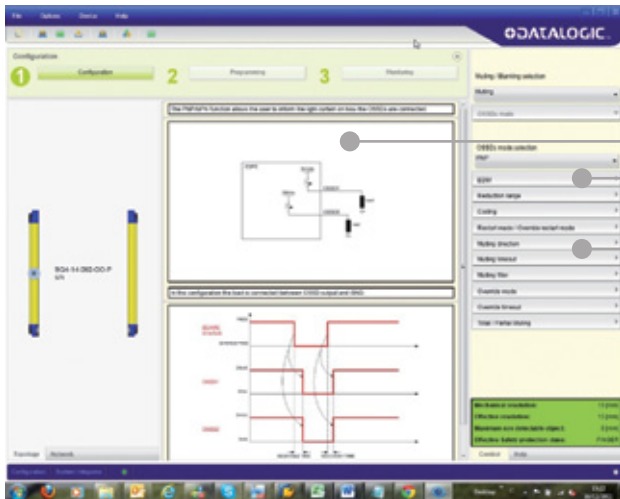
THE MOST POWERFUL SG EXTENDED

The new **SG EXTENDED** safety light curtain series represents the ultimate innovation step of SG family. SG EXTENDED are **FULLY INTEGRATED** safety light curtains that perfectly combine the SAFEasy concept with flexibility, reliability and performance.

ZERO DEAD ZONE

Is the distinctive characteristic of all the models from 300 mm to 1800 mm SG EXTENDED series guarantees full application coverage thanks to the following versions:

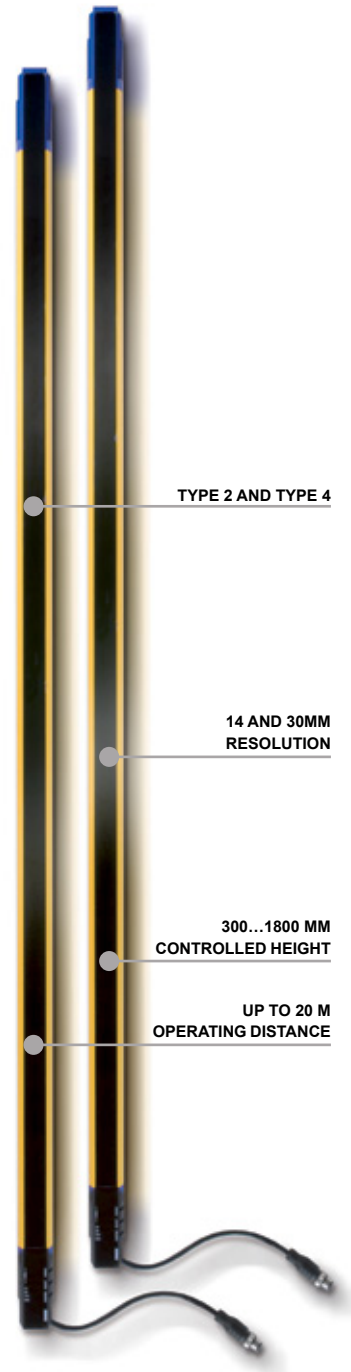
- **SG2-M 'Muting'**: Type 2 30 mm resolution with integrated Muting function for all packaging and material handling applications;
- **SG4-E 'Programmable'**: Type 4 14 and 30 mm resolution with integrated and configurable Cascade, Muting and Blanking functions all in the same part number. Integrated functions are selectable and configurable in 2 different ways:
- **Basic Configuration Mode (BCM)**: push buttons located on both TX and RX allow the user to configure the device in a very easy and quick way;
- **Advanced Configuration Mode (ACM)**: a GUI interface on PC communicate to the barrier through Ethernet and lead the customer through.



ADVANCED CONFIGURATION MODE (ACM) THROUGH GUI

INTEGRATED BLANKING FUNCTION

INTEGRATED MUTING FUNCTION



TYPE 2 AND TYPE 4

14 AND 30MM RESOLUTION

300...1800 MM CONTROLLED HEIGHT

UP TO 20 M OPERATING DISTANCE

- ACCESSORY DONGLE FOR:
- CONFIGURATION CLONING
 - ETHERNET (TCP/IP CONNECTION)
 - REMOTE MONITORING
 - REMOTE PROGRAMMING



ZERO DEAD ZONE

BASIC CONFIGURATION MODE (BCM) THROUGH PUSH-BUTTONS

CASCADE (NO DIFFERENTIATION BETWEEN MASTER AND SLAVE MODELS)



AUTOMOTIVE



Industry: Automotive

- Industry-Segment: **Automotive**
- Task: **Hazardous point protection**
- Task in detail: **Simplified handling of a welding gun**

Safety light curtain with floating blanking function eases the use of a welding gun.

- **Task:** At some stations in automotive body assembly, spot welds are applied manually to the bodies. This activity is performed using welding guns that receive their power over a cable connected to the gun. In the past, it was this item that made it difficult both to protect the workplace and to handle the welding guns. Flexible blanking of the cable within the monitoring field for a light curtain was not possible.

- **Implementation:** It is possible to implement this application using the “Floating Blanking” function on the **SG EXTENDED** safety light curtain. The system is taught how many individual beams are to be blanked; this number is defined by the diameter of the cable. In operation this cable is detected in any position in the monitoring field. The machine only switches to emergency stop if more than the saved number of light beams are interrupted. Irrespective of how the cable for the gun penetrates the monitoring field, this area is always reliably blanked without impairing the monitoring function. The floating blanking with TOTAL PROTECTION of the object also ensures that the resolution is not unnecessarily large, as the system remains locked if the cable is not in the protective field. There are no unnecessary gaps.

- **Customer benefits:** Instead of being behind, the welding gun is now ready next to the body; this proximity makes the working process significantly more practical and more efficient. In the meantime, further manual welding stations in this area have been equipped with the new safety solution. The varying programming of the beam coding on the individual **SG EXTENDED** prevents interaction between the systems on the various stations. Thus each light curtain only has “eyes” for its cable.

Industry: Automotive

- Industry-Segment: **Automotive**
- Task: **Access Protection**
- Task in detail: **Access protection on a material gate for an engine assembly cell**

- **Task:** Automated and manual assembly stations on engine assembly lines are linked using a work piece carrier transport system. Fully automated stations, e.g. robot cells, have mechanical guards for protection. There are gates on the assembly cells so that the work piece carriers can pass the surrounding guard fence. These gates must be protected against access by persons even when the work piece carriers are passing through the gate.

- **Implementation:** It is possible to realize access protection using the **SG EXTENDED** and four inductive proximity sensors of type **IS40**. The opening in the guard is fully sealed using the safety light curtain. If the robot cell is entered or reached into, the light curtain is interrupted and the assembly process in the cell stopped. To ensure the work piece carrier does not trigger a safety stop when it enters the assembly cell, two inductive proximity sensors are arranged before and after the safety light curtain. When the work piece carrier approaches the gate, the two proximity sensors mounted in front of the photoelectric safety switch are switched by a metal rail on the work piece carrier and the signal for the deactivation of the safety light curtain given. To ensure the deactivation is maintained during the entire entry process, two further proximity sensors are fitted after the light curtain; these sensors are also switched by the work piece carrier moving past. The sensors are evaluated directly by **SG EXTENDED** thanks to its INTEGRATED MUTING FUNCTION.

- **Customer benefits:** The sensors used enable complete access protection to be provided. The individual components feature wear-free operation and easy installation.



Industry: Automotive

- Industry-Segment: **Automotive**
- Task: **Hazardous area protection**
- Task in detail: **Hazardous area and access protection for the loading and unloading area of machining cells**

- **Task:** Cylinder heads are machined on a machining center in a fully automatic process. The finished cylinder heads are picked up by the machining center’s handling system via a loading gate and placed on a transport rack. The area where the racks are positioned is designed as a circulating system. Empty racks on one side are moved under the loading gate along a U-shaped path, loaded via the gate and then moved on to the removal position. In this position, the stacker has access to the rack and can remove it for further transport. Using safety systems, the loading and unloading area is to be protected against access even during the rack change. The loading and unloading area is also to be protected against reaching in while the rack is loaded.

- **Implementation:** It is possible to realize the hazardous area and access protection with a combination of **SG EXTENDED** safety light curtain and the **SG BODY BIG** multiple light beam safety device. The safety light curtain is at the outer limits of the area where the racks are positioned, the **SG BODY BIG** at its inner limits. During loading of the rack, the safety light curtain at the outer limits of the loading and unloading process is active and protects the hazardous area. If a person reaches into the area where the racks are positioned, the loading gate is stopped.

On a rack change, the light curtain is deactivated and the **SG BODY** multiple light beam safety device at the inner limits of the area where the racks are positioned is activated. Access is then prevented to the removal area on the machining center. Once the rack has been changed, the **SG BODY** at the inner limits is deactivated, the light curtain at the outer limits is activated and the loading process continued. Thanks to the **MUTING ENABLE** function the polling logic and the communication with the machining centre's control can be done through a safety PLC.

- **Customer benefits:** The well-proven safety technology provides a reliable implementation of the hazardous area and access protection.

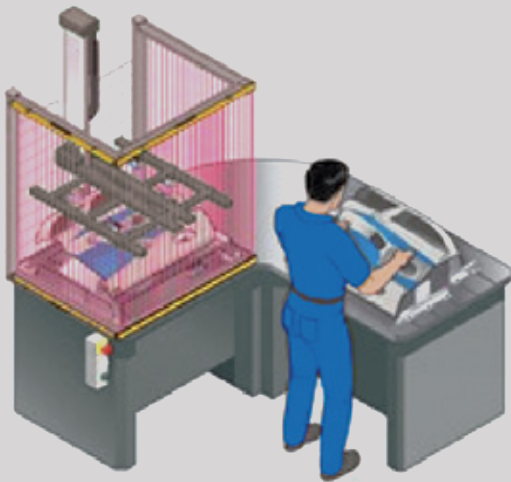
Industry: Automotive

- Industry-Segment: **Automotive**
- Task: **Hazardous area protection**
- Task in detail: **Hazardous point protection on a cylinder head handling station**

- **Task:** Along with manual assembly stations, a cylinder head assembly line also includes fully automatic assembly stations with handling robots. Their working area is to be protected against access by the workers to prevent injuries to fingers and hands. The protective device is to be designed in such a way that when the robot is at a standstill, work processes, e.g. the insertion of parts, rectification of malfunctions and setup, are not hindered.

- **Implementation:** Using the safety light curtain **SG EXTENDED** it is possible to implement hazardous point protection and protection against standing behind the protective device. To protect the assembly or handling stations, the cells are equipped with light curtains on the sides open to the workers. If a worker reaches into the cell while the robot is working, the light curtain is interrupted and the assembly or handling process stopped. As it would be possible to stand behind the vertically arranged light curtain (as shown in the figure), a further light curtain is fitted at an angle beneath the vertical safety light curtain. The safety light curtains are connected together serially. The vertical light curtain acts as a guest and the light curtain fitted beneath it is the host. As a result, the two light curtains can be connected to the robot control system via a single input.

- **Customer benefits:** The proven safety technology makes it possible to reliably implement hazardous point protection and protection against standing behind the protective device. The serial configuration (cascading), simplifies wiring and reduces the number of inputs required thus cutting the amount of space required in the control cabinet. Low cost installation is therefore possible.



Industry: Automotive

- Industry-Segment: **Automotive**
- Task: **Hazardous area protection**
- Task in detail: **Optimization of productivity based on ergonomic machine design**

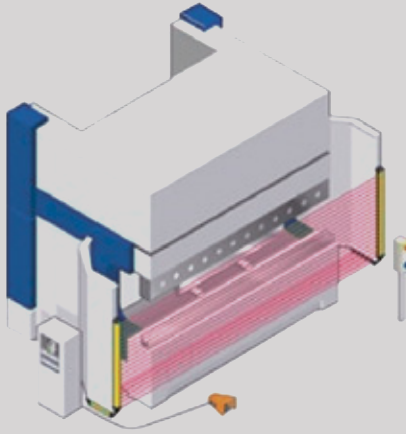
- **Task:** In the course of productivity optimization, ergonomic workstation design is becoming increasingly important. Semi-automatic production lines in particular are meeting the requirement of efficiently manufacturing rapidly decreasing batch sizes. Safety sensors need to be adapted to the design requirements brought on by these changes. In addition to this, the required integration of the sensor into the machine should increase protection against mechanical stress. The increasing use of more openly accessible designs such as the C frame allows quick access to materials. This leads not only to use of the smallest machine dimensions possible, but also places new demands on safety light curtains. Short safety distances and flexible adjustment of the protective field must be realized. As well as in installation and commissioning, there is further potential for saving in the fields of warehouse management and order processing.

- **Implementation:** Thanks to its small size and **ZERO DEAD ZONE**, the **SG EXTENDED** safety light curtain can be adapted to individual machine designs. The **SG EXTENDED** is designed in such a way that its protective field ensures short

safety distances even in critical corner positions. The standard brackets allow simple mounting without special tools, even on standard profiles. The automatic self-configuration of master and slave units replaces the need for configuration tools and explanations on how to use them during commissioning.

- **Customer benefits:** Ergonomically optimized machine access achieved via U-shaped protection is a pre-requisite for maximum machine productivity. The miniaturization follows the trend for more compact machines intended to optimize usage of valuable production space. The high resolution, even in corner areas, together with the quick response time, means that for the first time, light curtain integration is technically sound, simple and affordable. Brackets suitable for standard profiles offer an attractive alternative to in-house construction that ties up your resources. The concept of the unique order number (**NO DIFFERENTIATION BETWEEN MASTER AND SLAVE CODE**) reduces the number of system components, thus reducing the costs of the ordering, service and logistics processes. Administration costs for accessory parts are further reduced by ordering the accessory using the material number of the stick.

METALWORKING/MACHINE TOOLS



Industry: Machine Tools

- Industry-Segment: **Forming**
- Task: **Hazardous area protection**
- Task in detail: **Hazardous point and access protection on a hydraulic bending press**

- **Task:** Both the front and rear of a hydraulic press are to be protected: The dangerous tool closing movement (punch/die) is to be safely stopped on reaching in and it is to be possible to safely access the rear of the machine without the hindrance of moving guards (e.g. doors).

- **Implementation:** The hazardous point on the press is protected using the **SG EXTENDED** safety light curtain. As soon as an object that is not allowed (e.g. hand or finger) enters the light curtain's protective field, a stop signal is given. The access protection on the rear of the press brake is provided using a **MASTER SLAVE** for point-of-operation guarding. Entrance into the hazardous area stops the dangerous movement of the press.

- **Customer benefits:** The proven safety technology makes it possible to reliably implement hazardous point protection and access protection. The **SG EXTENDED** on the rear of the machine replaces moving guards. It provides a high level of safety and, with the machine switched off, quick clear access, which increases productivity.

Industry: Machine Tools

- Industry-Segment: **Forming**
- Task: **Protecting**
- Task in detail: **Protecting the loading and unloading station of a machining center**

- **Task:** A loading and unloading station before the processing line must be protected in such a way that the robot can load and unload pallets when accessed by people bringing the racks into the station or collecting them. The gantry robot should only be stopped if a person approaches the critical area.

- **Implementation:** The protection is provided by **SG EXTENDED** safety light curtains and **SG BODY** multiple light beam safety devices. They protect the loading and unloading station before the processing line against access by personnel. Both protective devices are connected together in a safety engineering circuit. If an empty rack is brought into the station or a filled rack collected, the **SG EXTENDED** light curtain is interrupted, in which case the **SG BODY** photoelectric switch takes over the protection function. During loading and unloading of the racks, the gantry robot can continue working. It is only stopped if the **SG BODY** is tripped. Inductive proximity sensors (**IS40**) report the presence of the racks in the stations.

- **Customer benefits:** Connection of the sensors allows efficient working in the loading and unloading station, which saves time and money.

Industry: Machine Tools

- Industry-Segment: **Forming**
- Task: **Hazardous point protection**
- Task in detail: **Safety and ergonomics for a compact press: sensitive - yes, danger of injury - no**

- **Task:** To protect against finger injuries, a connector products manufacturer safeguarded a press with a system of safety light curtains.

- **Task in detail:** Connector sockets for speakers are manufactured. In one work step, two contact tips are placed in the socket with the help of a manually operated press and then pressed together with a sealing cover. To relieve the operator from the monotonous work, make the work space more ergonomic and optimize the manufacturing process, this work step has been shifted to an automatic press, in which the parts are manually inserted and removed. A risk analysis for the layout of the work space showed that a category 4 safety solution is needed. For operation reasons, only electro-sensitive protective equipment could be used that would help the operator to work ergonomically.

- **Implementation:** **Safety light curtains in U-cascade and a safety controller protect the operator's fingers from injury.** With the safety light curtain **SG EXTENDED**, safeguarding the work space is achieved ergonomically and process-oriented. Three systems each with finger protection resolution are placed in a **U-form** around the operating area of the press with a cascaded control system. By installing the sender/receiver above and below, three-sided safeguarding - front, left and right - is achieved, which does not hinder the insertion and removal of parts, as is usually the case with a profile or frame. As soon as an operator reaches into the monitored area after the lifting movement of the press has started, i.e. during the pressing process, the light curtains detect the movement and stops the process and starts the return stroke of the tool. Only after the error has been rectified and the protective device has been reset can the next pressing process be started manually with a start button.

• Customer benefits:

- Safety solutions prevent the risk of injury and protect against the risk of liability
- Non-contact safeguarding makes ergonomic and process-oriented operation possible
- Seamless cascading and U-form installation ensures barrier-free and thus ergonomic operation
- Secure sensor and control technology guarantees optimal system integration

With the use of **SG EXTENDED** safety light curtains ergonomic and process objectives are completely fulfilled. Compliance with the required protection level, i.e. performance level pl "e" as per EN ISO 13849-1 or SIL3 as per IEC 61508/EN 62061 guarantees the best possible protection against injury and the resulting risks of liability for providing unsafe operating equipment. The choice of electro-sensitive protective equipment and its horizontal installation ensures that no mechanical components get in the operator's way during insertion and removal of parts.

METALWORKING/MACHINE TOOLS



Industry: Electronics & Solar

• Industry-Segment: **Chip assembly**

• Task: **Hazardous point protection**

• Task in detail: **Protecting a fully automatic chip separation machine**

• **Task:** A semiconductor equipment manufacturer uses a high-speed system with 26 axes for the production and processing of semiconductors. This system performs all work steps, from the wafer to the separated chip, fully automatically. All these actions are performed with very high accuracy and speed. However, material must be supplied and removed manually such that hand and finger protection in the insertion and removal area on the front is required, as is side protection, e.g. during maintenance work.

• **Implementation:** The protection at the front can be implemented using two horizontally mounted **SG EXTENDED** safety light curtains. This safety system for the protection of hazardous points is very easy to install and operate, and can be used as hand or finger protection depending on the resolution.

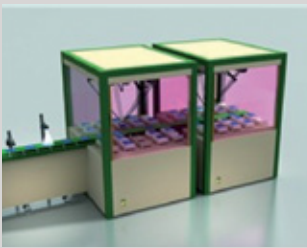
• **Customer benefits:** The quick and easy installation and operation of the devices make possible short system downtimes.

Industry: Electronics & Solar

• Industry-Segment: **Chip assembly**

• Task: **Hazardous point protection**

• Task in detail: **Protection of solar cell sorters**



• **Task:** Human operators regularly access solar cell sorting units to unload filled boxes and replace them with empty ones. The handling system must stop or safely slow when the operator reaches inside. The safety solution should insure operator safety while optimizing production, minimizing down-time and reducing equipment footprints.

• **Implementation:** Safety light curtains are ideal to protect hazardous points with frequent operator access. The time and space saved by eliminating the doors translates in significant cost savings over time. The **SG EXTENDED** is the recommended safety light curtain for solar cell sorting applications. The **SG EXTENDED** with its compact housing and with **ZERO DEAD ZONE (no blind zones)** allows it to be easily installed on the machine frame, reliably protecting the hazardous point.

• **Customer benefits:** Safety light curtains save time and space in areas with frequent operator access. The **SG EXTENDED** safety light curtain is a key highlight, as its compact housing and **ZERO DEAD ZONE** allows integration with optimum use of space. The **SG EXTENDED** can be installed right into the corners of the machine, which means that there are no blind spots.

WOODWORKING

WOODWORKING



Industry: Wood

• Industry-Segment: **Sawmill industry**

• Task: **Protecting**

• Task in detail: **Hazardous point protection**

Typical requirements: When separating timber, the workers must separate the stacked boards by hand at irregular intervals. Thanks to the reduced resolution and the intelligent multi-scanning function of **SG EXTENDED** safety light curtains, the workers can reach into the beam field with their hands and arms without switching off the system - for maximum work safety and optimized productivity.

Industry: Wood

• Industry-Segment: **Wood working and furniture industry**

• Task: **Hazardous point protection**

• Task in detail: **Hazardous point-of-operation protection**

Typical requirements: Chips and other residue falling into machining center areas protected by safety light curtains do not result in the system switching off. Due to the multi-scanning function and a reduced resolution, **SG EXTENDED** offers high flexibility. This makes short set-up times and high availability possible.

FEATURES

MODEL SELECTION TABLE

SG2-M						
Description	Protected height [mm]	Beams N.	Response time [msec]	Resolution [mm]	Product code	
SG2-30-030-OO-W	300	16	13	30	957801700	
SG2-30-045-OO-W	450	24	14	30	957801710	
SG2-30-060-OO-W	600	32	15	30	957801720	
SG2-30-075-OO-W	750	40	16	30	957801730	
SG2-30-090-OO-W	900	48	17	30	957801740	
SG2-30-105-OO-W	1050	56	18	30	957801750	
SG2-30-120-OO-W	1200	64	19	30	957801760	
SG2-30-135-OO-W	1350	72	19	30	957801770	
SG2-30-150-OO-W	1500	80	20	30	957801780	
SG2-30-165-OO-W	1650	88	21	30	957801790	
SG2-30-180-OO-W	1800	96	22	30	957801800	

SG4-E 14						
Description	Protected height [mm]	Beams N.	Response time [msec]	Response time with code (msec)	Resolution [mm]	Product code
SG4-14-030-OO-P	300	32	15	20	14	957901240
SG4-14-045-OO-P	450	48	17	25	14	957901250
SG4-14-060-OO-P	600	64	19	29	14	957901260
SG4-14-075-OO-P	750	80	20	34	14	957901270
SG4-14-090-OO-P	900	96	22	38	14	957901280
SG4-14-105-OO-P	1050	112	24	43	14	957901290
SG4-14-120-OO-P	1200	128	26	47	14	957901300
SG4-14-135-OO-P	1350	144	27	52	14	957901310
SG4-14-150-OO-P	1500	160	29	56	14	957901320
SG4-14-165-OO-P	1650	176	31	61	14	957901330
SG4-14-180-OO-P	1800	192	33	65	14	957901340

SG4-E 30						
Description	Protected height [mm]	Beams N.	Response time [msec]	Response time with code (msec)	Resolution [mm]	Product code
SG4-30-030-OO-P	300	16	13	16	30	957901350
SG4-30-045-OO-P	450	24	14	18	30	957901360
SG4-30-060-OO-P	600	32	15	20	30	957901370
SG4-30-075-OO-P	750	40	16	23	30	957901380
SG4-30-090-OO-P	900	48	17	25	30	957901390
SG4-30-105-OO-P	1050	56	18	27	30	957901400
SG4-30-120-OO-P	1200	64	19	29	30	957901410
SG4-30-135-OO-P	1350	72	19	32	30	957901420
SG4-30-150-OO-P	1500	80	20	34	30	957901430
SG4-30-165-OO-P	1650	88	21	36	30	957901440
SG4-30-180-OO-P	1800	96	22	38	30	957901450

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