

If you encounter a source of danger ...





GARDIX Accident Prevention System GX-M..



ISO 9001 ATEX

BG-PRÜFZERT - TÜV 97 ATEX 1155

- Complete System for Accident Prevention with Muting
- Safety Category 4
- Different Muting-Sensors connectable (Safety Inductive Sensors, NAMUR Inductive Sensors or Light Barriers)
- Also for applications in Ex-Zones 1 and 2
- Optimal alignment help by state indication in the receiver optic of the safety light barriers
- High EMC level

Muting with inductive sensors, Standard	GX-M-22-RV	GX-M-32-RV	GX-M-24-RV	GX-M-34-RV
Muting with inductive sensors, Ex d + Ex ib	GX-M-22i-RV	GX-M-32i-RV	GX-M-24i-RV	GX-M-34i-RV
Muting with light barriers, Standard	GX-M-22-LRV	GX-M-32-LRV	GX-M-24-LRV	GX-M-34-LRV
Muting with light barriers, Ex d + Ex ib	GX-M-22i-LRV	GX-M-32i-LRV	GX-M-24i-LRV	GX-M-34i-LRV
Muting with NAMUR-Sensors, Zone 2 (Ex d)	GX-M-2N2-RV	GX-M-3N2-RV	GX-M-2N4-RV	GX-M-3N4-RV
Restart Blocking System, add. Designation	GX-M..-RV-WAS			
System GX-M.. Controller				
Count of Safety Light Barriers	2	3	2	3
Count of Muting Sensors	2	2	4	4
Supply Voltage	24 VDC (22 to 28VDC)			
Current Consumption	1300mA (500mA System GXM + max. 800mA external muting display)			
Max. Power Dissipation	14W + max. 23W for external muting display			
Circuit Speed	30ms (worst time for switching off the safety relay contacts)			
Safety Outputs	Relay contacts, forcibly actuated 2 x NO + 2 x NC			
Max. Load of Safety Outputs	AC: 0,4 A at 250VAC - DC: 3A at U<40VDC			
Output for External Muting Display	24VDC / min. 10mA / max. 800mA			
Visualization Output	8 x Opto-coupler, galvanic insulated, shows the state of all sensors			
Max. Load of Visualization Outputs	max. 30VDC / 20mA			
Pollution Indication Output	1 x NPN / 100mA / short circuit protected			
Housing / Protection Rating	Dold / IP20 / VBG4			
Safety Light Barriers (BLS)				
Designation Safety Light Barriers, Standard	IUL-.1-SE (. = Range x 10m)			
Designation Safety Light Barriers, Ex d	IUD-.1-SE (. = Range x 10m)			
Sensing Range	10m or 30m (add. Designation ..-11 / ..-31)			
Min. Sensible Object Size	20mm			
Wavelength	880nm (Infrared)			
Radiation Pattern	max. 4°			
Housing Standard	M30, Yellow Brass nickel plated			
Housing Ex	M30, Yellow brass nickel plated, EEx d IIC T6			
Muting Light Barriers (MLS)				
Designation, Standard	GX-LS-25-SE			
Designation, Ex ib	GX-AX-25-SE			
Sensing Range	25m			
Min Sensible Object Size	20mm			
Wavelength	880nm (Infrared)			
Radiation Pattern	max. 4°			
Housing, Standard	M30, Yellow brass nickel plated			
Housing, Ex	M30, Yellow brass nickel plated, EEx ib IIC T6			
Muting Safety Inductive Sensors				
Designation, Standard	GX-IS-K..40-AP			
Designation, Ex ib	GX-IS-K..40-AP-IB			
Sensing Range	40mm			
Housing, Standard and Ex-ib	Synthetic Makrolon PC 80 x 80 x 40mm, EEx ib IIC T6			
other NAMUR Inductive Sensors				
Standard	any NAMUR Inductive Sensors with the following specs:			
Supply Voltage	EN 50227			
Function	min. 8VDC			
Circuit Speed	I <= 1mA, if an object detected			
	>= 20Hz			
General Data				
Protection Rating (all sensors)	IP 65 according to EN 60529			
Ambient Temperature T _A (all Elements)	-20°C < T _A < +50°C			
Option	<ul style="list-style-type: none"> - Standard- and Ex i-Sensors with Connector - Laser Safety Light Barriers, Cl. 2 / 30m - Opto coupler pollution output - Cable length up to 100m 			

GARDIX Accident Protection Light Barrier IUL/IUD-31-S/E to Safety Systems GXC, GXM, GXS


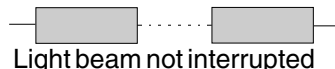
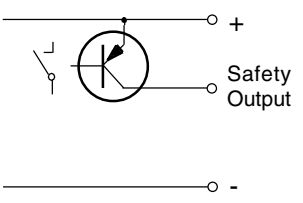
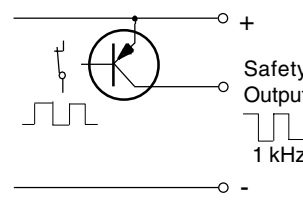
IUD-31-S/E


II 2 G EEx d IIC T6
II 1/2 D IP67 T90°C

Housing M30

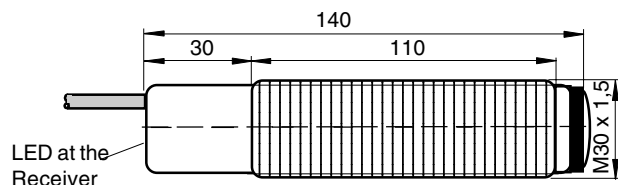
- Connectable at safety systems GXC, GXM, GXS
- Safety category 4
- Type IUD for applications in Ex zones 1, 2, 20/21, 21, 22
- High penetration capacity in polluted areas
- Optimal alignment help by state indication in the receiver optic
- Very high operational dependability (EMC)

IUL-31-S/E

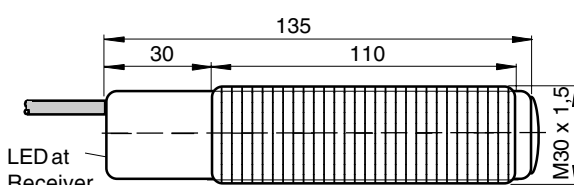

Technical Data	Type	IUL-31-S/E	IUD-31-S/E																					
Applicable in Ex zones		None	Zones 1, 2, 20/21, 21, 22																					
Type of Ex protection, Gas at 94/9/EG		None	II 2 G EEx d IIC T6																					
Type of Ex protection, Dust at 94/9/EG		None	II 1/2 D IP67 T90°C																					
Safety category at EN 954		4, connected at Safety Systems GXC, GXM																						
Safety category at EN 954		2, connected at Safety Systems GXS																						
Designation		S: Emitter / E: Receiver																						
Range		min.0,2m - max.30m																						
Minimum detectable object size		20mm / IU.-31-S/E S143 = 50mm																						
Light source		Infrared 880nm																						
Beam angle		≤ 4°																						
Output response time		dependent on the connected safety system																						
Supply voltage		12 VDC from the safety system																						
Current consumption		Receiver: 50 mA / Emitter: 10mA																						
Maximum power dissipation		Receiver: 0.6W / Emitter: 0.12W																						
Safety output		PNP / dynamic signal, connected to the safety system																						
Pollution indication output "VA"		NPN, max. 100mA																						
Housing		M30, Yellow Brass, nickel plated																						
Enclosure rating, at EN 60529		IP 65	IP67																					
Operating temperature TA		-20°C < TA < +60°C																						
Cable, emitter		3+PE x 0,5mm ² + shield / L=10m																						
Cable, receiver		4+PE x 0,5mm ² + shield / L=10m																						
Accessories		4 nuts M30 or 2 clamps optional																						
Options		- IUL/IUD-11-S/E: Reduced range 10m - IUL-31-S/E-T: Connector type (not for ex devices) - IU.-31-S/E S94: Special lense glueing (high solvent resistant) - IU.-31-S/E S143: With additional optic B52 (50mm) - Cable length up to 100m																						
LED indication Output function		 <p style="text-align: center;">Light beam interrupted LED shows red</p>	 <p style="text-align: center;">Light beam not interrupted LED shows yellow or green</p>																					
Output and connection diagram		 <p style="text-align: center;">Safety Output</p>	 <p style="text-align: center;">Safety Output 1 kHz</p>																					
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 35%; text-align: center;">Receiver</td> <td style="width: 35%; text-align: center;">Emitter</td> </tr> <tr> <td>1</td> <td style="text-align: center;">= +</td> <td style="text-align: center;">=+</td> </tr> <tr> <td>2</td> <td style="text-align: center;">= -</td> <td style="text-align: center;">= -</td> </tr> <tr> <td>3</td> <td style="text-align: center;">= Safe output</td> <td style="text-align: center;">= Test</td> </tr> <tr> <td>4</td> <td style="text-align: center;">= Pollution out</td> <td></td> </tr> <tr> <td>white</td> <td style="text-align: center;">= Shield</td> <td style="text-align: center;">= Shield</td> </tr> <tr> <td>yellow-green</td> <td style="text-align: center;">= PE</td> <td style="text-align: center;">= PE</td> </tr> </table>		Receiver	Emitter	1	= +	=+	2	= -	= -	3	= Safe output	= Test	4	= Pollution out		white	= Shield	= Shield	yellow-green	= PE	= PE			
	Receiver	Emitter																						
1	= +	=+																						
2	= -	= -																						
3	= Safe output	= Test																						
4	= Pollution out																							
white	= Shield	= Shield																						
yellow-green	= PE	= PE																						
Pollution indication output (VA)		The pollution indication output will be activated when the lenses of the emitter or receiver became dirty or the light barrier is badly adjusted and the LED shows yellow. The pollution indication output is an NPN-type and not a safety output.																						
Alignment help by LED indication		LED red: Light beam interrupted / not aligned LED yellow: Dirt on lenses / badly aligned LED green: Light beam free / well aligned LED red flashing: Disturbance																						
For mounting and operation is the operating manual necessary.																								

Dimensions:

IUL-31-S/E

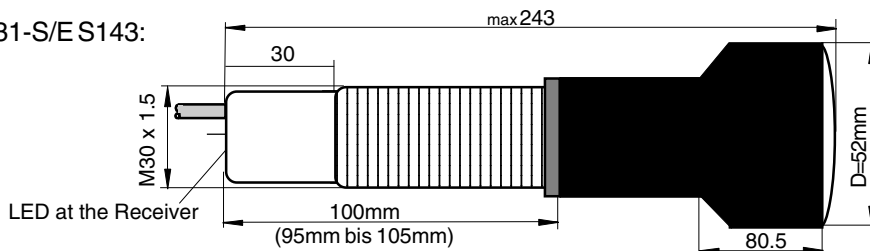


IUD-31-S/E



Same dimensions for emitter and receiver

Dimensions IUL/IUD-31-S/E S143:

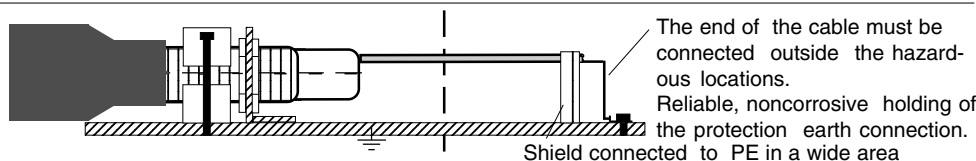


Same dimensions for emitter and receiver

Connection diagram:
(Designation at DIN 47100 / connection EN 50044)

Emitter	IUD	IUL	Receiver	IUD	IUL
+24VDC	1	1	+24VDC	1	1
0V	2	2	0V	2	2
Test	3	3	Output	3	3
NC			VA-Output	4	4
PE	yellow-green	yellow-green	PE	yellow-green	yellow-green
Shield	connect at PE or 0V		Shield	connect at PE or 0V	

Equipotential Bonding at Ex Devices:



ATEX related designations

CE 0158
Device type Ex II 2 G EEx d IIC T6, II 1/2 D IP67 T90°
Certification number: DMT 99 ATEX E 056
TA: -20° < TA < 60°
Date of construction: Numeral 4 to 7 of the serial number

Operating Manual / EC - Declaration of Conformity:

Mounting prescription
Accident protection

The detailed mounting prescription concerning safety margin, mounting height, downstream devices and general regulations about accident protection are to observe.

Ex Protection:

The type: IUD-... is applicable in Ex Zones 1 and 20/21. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21. It is necessary to take into consideration the valid international and national rules and regulations. The local equipotential bonding have to be done. The protective earth (PE) is solid connected with the housing. The cable have to be installed and protected against damages. To connect cables inside hazardous locations only use certificated Ex e housings. All cable terminals must be connected outside hazardous locations. Protect the cable against damages. Additional optical lenses are not allowed in hazardous locations.

Connection Prescriptions

Do not exceed the maximum ratings. The electrical connections must be exactly as shown in the connection diagram. The cable shield must be connected short (Inside of hazardous locations only in certificated Ex housings). The cable shield should be connected to the designated terminal at the basic safety system or to the protection earth, large-surfaced. Connection cables must not be installed parallel to high voltage cables.

Function

If the light beam between emitter and receiver is not interrupted, the safety output generates a 1kHz dynamic signal. If the light beam is interrupted, the safety output is switching off (secure state). The light barriers are built in redundant form. The Pollution Signal Output (VA) is activated by dirty optics. These inform timely about pollution.

Alignment of the Light Barrier

The three color indication in the receiver optic allows an optimal alignment.

1. The emitter must be aligned this way, that the emitter lens

is fully illuminated (By watching from the receiver at the emitter).

2. The receiver should be moved, until the LED (from the receiver) shows "green". Search the middle of the green range.

Pollution Indication Output

The Pollution signal output is activated, if the Light Barrier is not aligned properly or the intensity of the light is reduced because the lenses become dirty. (Receiver LED shows "yellow"). The Pollution signal output is a not a safety output.

Maintenance

No special maintenance is required. If the lenses becomes dirty, they should be cleaned with a non-aggressive cleaning liquid. Equipment must only be repaired by the manufacturer.

Safety information

When installing and operating with the light barrier, it is necessary to take into consideration the relevant international and other national regulations. ATEX 118a, ElexV, TRbF, TRD, UVV, EX-RL (BGR 104), BetrSichV (ATEX 137).

Standards met:

- EN 61496-1, EN 61496-2; EN 50014, EN 50018, EN 50281-1-1; EN 50081-1/-2, EN 50082-1/-2.
- Ex Protection: 94/9/EG (ATEX 100a)
- Machine directive: 98/37/EG
- Low voltage directive: 73/23/EWG, 93/68/EWG
- EMC: 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG
- RoHS: 2002/95/EG

General Notes

We reserve the right to modify our equipment. Our equipment is designed such way, that it has the least possible adverse effect on the environment. It neither emit or contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

Declaration of Conformity / Approvals:

DMT 99 ATEX E 056 / BG-PRÜFZERT No. 99117

The conformity of the devices with the EC standards and directives and the EC-type examination certificate and the observation of the Quality Safety System ISO 9001 with the ATEX module "Production", declares:

Hans Bracher, Matrix Elektronik AG

GARDIX Safety Inductive Sensors GX-IS

Muting sensors for the safety systems GX-M and GX-S



Operating Manual and Control Drawing No. OM-IS-01b

GX-IS-K.40-AP-..



ISO 9001 ATEX

- only to connect at safety systems GX-M/GX-S, Safety level 4, BG-PRÜFZERT
- Ex-protection method "Intrinsically safe" EEx ib IIC T6
- For use in Ex-zone 1, 2
- Ex-Certification of conformity: TÜV 97 ATEX 1154

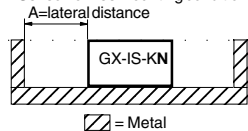
Technical Data	Types Standard	GX-IS-KN40AP(-S)	GX-IS-KB40AP(-S)
	Types EEx ib IIC T6	GX-IS-KN40AP-IB(-S)	GX-IS-KB40AP-IB(-S)
Housing		Polycarbonate PC, min 10% GF	
Mounting arrangement		free mounting	flush mounting
Operating distance s_n , (EN60947-2-5) (on steel 37, 120 x 120 x 1mm)		40mm	40mm
Safe operating distance s_a		5mm ... 38mm	5mm ... 32mm
Switching hysteresis		1-4mm	
Safety distance ($s_n \times 3$)		120mm	
System of protection		IP65 at EN 60529	
Supply voltage		12VDC / .IB 12 VDC from intrinsically safe controller GX--i [EEx ib] IIC	
Current consumption		20mA	
max. Power dissipation		800mW	
Internal inductivity / capacity		$L_i = 2,64\mu H / C_i = 0$	
Circuit speed		50ms	
Output		1x PNP (double) / short circuit protected	
Ambient temperature T_A		$-20^\circ C < T_A < +60^\circ C$	
Cable		3x AWG24(0,2mm ²) + Shield / L=5m, Ex devices blue covered	
Connector devices, designation:..-S		Binder M12 Series 713 / 09-0431-81-04 / 4 terminals	
Function and LED-display		 Object recognized, LED green	 No object recognized, LED red
Connections and output characteristics		PNP-Output, Transistor switched "ON" + brown Output black - blue	PNP-Output, Transistor switched "OFF" + brown Output black - blue Safety Condition

GX-IS-KN-40 (free mounting):

Sensors for free mounting arrangement have the highest operating distance, but a part of the parasitic lateral electromagnetic field can disturb the safe function. Lateral protection plates or other metallic objects must not influence the sensor. For safe function, a lateral free space around the sensor must be guaranteed. Lateral protection plates must not rise above the sensor. The minimal distances "A" for different material is:

Steel 37: 40mm	Stainless steel: 35mm	Copper: 20mm
Al-Foil: 40mm	Aluminium: 20mm	Synthetics: 0mm

Sensor for free mounting condition



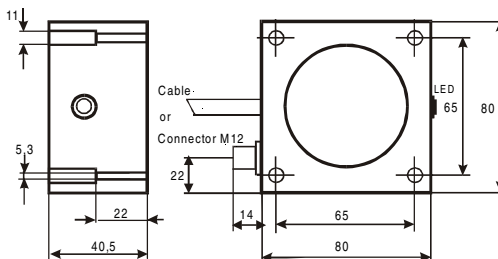
GX-IS-KB40 (flush mounting):

For flush mounting sensors no lateral free space is required (A=0). It is possible to realize a better mechanical protection and a higher immunity against spurious releasing. In a free mounting arrangement, the sensors for flush mounting reach a lower level of operating distance (s_a) then sensors for free mounting.

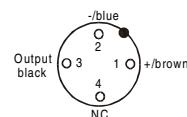
Sensor for flush mounting condition



Dimension:

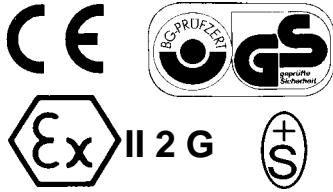


Connector layout:
(Types Typ GX-IS-...-S)





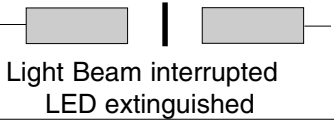
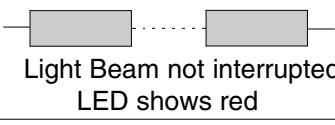
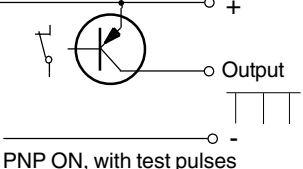
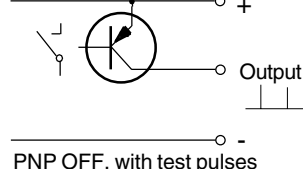
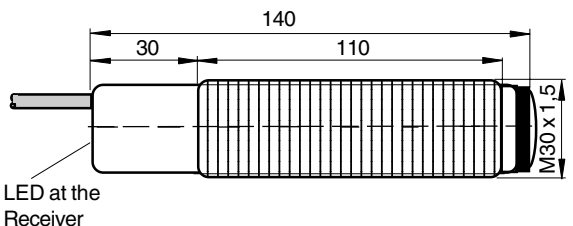
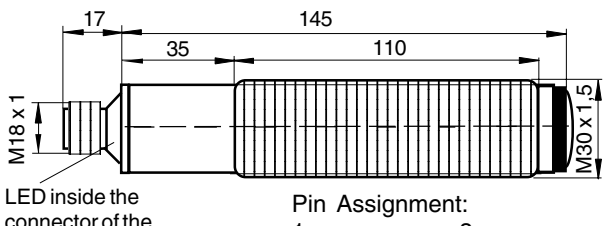
GARDIX Muting Light Barrier GX-LS- / GX-AX-25-SE

Muting Light Barriers for the Safety Systems GX-M and GXS
Operating Manual and Control Drawing No. OM-AX-01b



- Safety Category 2 or 4, when connected at Safety Systems
- Also in Intrinsically Safe - Protection Level EEx ib IIC T6
- Applicable in Zone 1
- EU Certification of Conformity PTB Ex-95.D / Ex-96.D

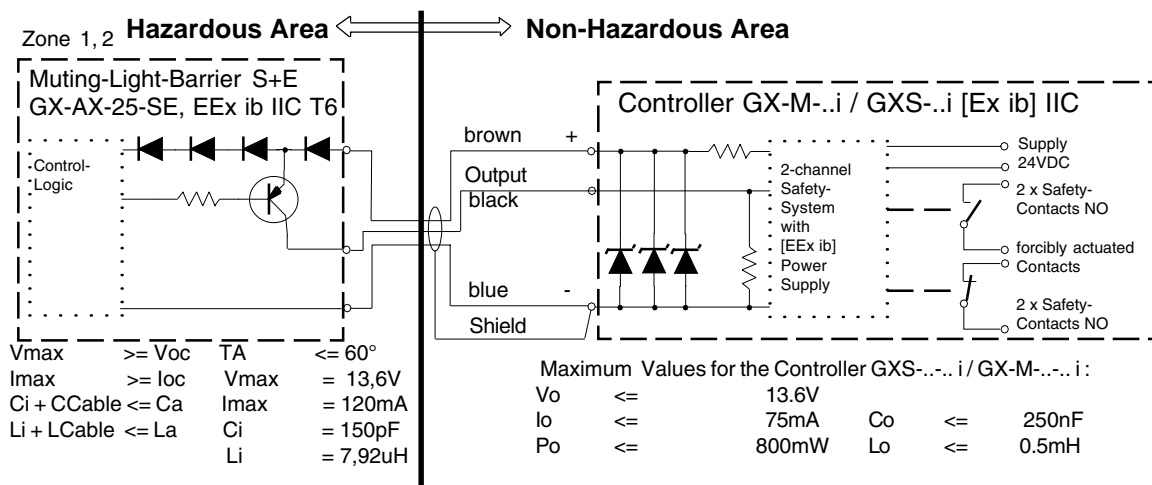
ISO 9001

Technical Data	Type Standard	GX-LS-25-SE(T)
	Type EEx ib IIC T6	GX-AX-25-SE(T) 
Designation	S: Emitter / E: Receiver	
Safety Level	only together with Safety Systems GXM (4) and GXS (2)	
Ex-Protection GX-AX-25-SE	EEx ib IIC T6	
maximum Range	25m	
minimum Detectable Object Size	20mm	
Light Source	Infrared 880nm	
Optical Angular Aperture	4°	
Output Response Time	dependent on the connected safety system	
Voltage Supply GX-LS	12 VDC from Controller GX-.-	
Voltage Supply GX-AX 	12 VDC intrinsically safe from Controller GX-.-i [EEx ib] IIC	
Current Consumption	Emitter: 13 mA / Receiver: 13mA	
maximum Power Dissipation	800mW	
effective Inductivity / Capacity	Li = 7,92uH / Ci = 150pF	
Output	PNP, dynamic Signal (to connect at the Safety System)	
Housing	M30, Yellow Brass, nickel plated	
Enclosure Rating	IP 65 at EN 60529	
Operating Temperature TA	-20°C < TA < +60°C	
Connection Cable Emitter	2x AWG24(0,2mm ²) + Shield / L=5m, Ex blue covered	
Connection Cable Receiver	3x AWG24(0,2mm ²) + Shield / L=5m, Ex blue covered	
Accessories	2 Clamps M30 (or 4 Nuts M30)	
Options	Cable length up to 100m plug-type connection, additional Designation: .../T	
LED Indication	 <p>Light Beam interrupted LED extinguished</p>	 <p>Light Beam not interrupted LED shows red</p>
Output Function, Connection	 <p>PNP ON, with test pulses</p>	 <p>PNP OFF, with test pulses</p>
Receiver	+	+
Emitter	-	-
brown:	+	+
blue:	-	-
black:	Output	
white:	Shield	Shield
Dimensions:	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>GX-LS-25- SE / GX-AX-25-SE</p>  </div> <div style="text-align: center;"> <p>GX-LS-25-SE/T / GX-AX-25-SE/T</p>  </div> </div> <p>Pin Assignment: 1 + 3 - 2 Output 4 Protection Earth</p>	
	Same dimensions for emitter and receiver	

Product-Listing:

Type	Accident-Protection	Ex-Protection Zone	Supply VDC	Cable, Connector	Range
GX-LS-25-SE	--	no	12V	Cable 5m , grey covered	25m
GX-LS-25-SE/T	--	no	12V	Connector	25m
GX-AX-25-SE	--	ib / Zone 1,2	12V [EEx ib] IIC	Cable 5m ,blue covered	25m
GX-AX-25-SE/T	--	ib / Zone 1,2	12V [EEx ib] IIC	Connector	25m

Control Drawing for Hazardous Areas:



Operating Manual, Shortform:

Accident protection

The detailed mounting prescription concerning safety margin, mounting height, downstream devices and general regulations about accident protection are to observe. When installing and operating with the muting light barrier, it is necessary to take into consideration the operating manual of the safety systems GXM or GXS.

Ex Protection:

It is necessary to take into consideration the valid international and national rules and regulations.

The electrical connections must be exactly as shown above. The sensor must only be supplied through a approved safety controller GXM or GXS, type [EEx ib], mounted out of the hazardous area.

Additional optical lenses are not allowed inside hazardous locations.

Connection Prescriptions

The maximum ratings must be observed. The electrical connections must be exactly as shown in the connection diagram. The cable shield must be connected short (Inside of hazardous locations only in certificated Ex housings). The cable shield should be connected to the designated terminal at the basic safety system or to the protection earth, large-surfaced. Connection cables must not be installed parallel to high voltage cables.

Mechanical Mounting Prescriptions

Because the optical aperture angle is less than 4° , mount the light barriers free from vibrations and shocks. If it is practicable, protect the lenses from contamination.

Function

If the light beam is interrupted, then the output will be activated (High Level). The receiver LED is extinguished and the associated control LED to the safety system GXM or GXS shows green. The muting light barrier is tested by the safety system. Disturbances will be indicated by flushing the receiver LED. A restart is only possible by resetting the safety system.

Maintenance

The light barrier do not require any special maintenance. If the lenses become dirty, they should be cleaned with a non-aggressive medium. Equipment must only be repaired or serviced by the manufacturer.

Safety information

When installing and operating with the light barrier, it is necessary to take into consideration the relevant international and other national regulations. ATEX 118a, ElexV, TRbF, TRD, UVV, EX-RL.

Standards met:

- EN 61496-1/-2, EN 50014, EN 50020, EN 60825, EN 50081-1/-2, EN 50082-1/-2,
- Ex-Protection: 76/117/EWG
- Machine Directive: 89/392/EWG, 91/368/EWG, 93/44/EWG, 93/68/EWG
- Low Voltage Directive: 73/23/EWG, 93/68/EWG
- EMC: 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG

General Notes

We reserve the right to modify our equipment. Our equipment is designed such way, that it has the least possible adverse effect on the environment. It neither emit or contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

Approvals :

BG-PRÜFZERT No. 99117, SEV 95.1.10170.01,
EU Certification of Conformity No. 99118.
PTB Ex-95.D.2214 / PTB Ex-96.D.2045

GX_Ax_e/MAR.30,00/HB

Group

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ISO 9001 ATEX

GARDIX Multichannel Accident Prevention System GX-C-..

BG PRÜFZERT / PTB Ex-Approval

- Multichannel Safety Light Barrier System for Accident Prevention with up to 6 independent Light Barriers IUD-.. or IUL-..
- Safety Category 4
- also for applications in Ex-Zones 1 and 2
- also with integrated Restart-Blocking-System available
- Optimal alignment help by state indication in the receiver optic
- High EMC level

Controllers GX-C..-R-(WAS) Specifications	Types	GX-C32-R	GX-C33-R	GX-C64-R	GX-C65-R	GX-C66-R
Restart Blocking System, add. Designation	GX-C..-R-WAS					
Safety Category	4					
Count of Light Barriers	2	3	4	5	6	
Supply Voltage	24 VDC +/- 10%					
Current Consumption	470mA (incl. 6 Light Barriers)					
Power Consumption	12.41W					
Circuit Speed	30ms (worst time to switching off the safety relay contacts)					
Safety Outputs, Type	Relay contacts forcibly actuated					
Safety Outputs, Contacts	2 x NO + 2 x NC					
maximum Load	AC: 0,4 A at 250VAC - DC: 3A at U<40VDC					
Pollution Indication Output	1 x NPN / 100mA / Short Circuit Protected					
Enclosure Rating	IP20 according to EN 60529					
Ambient Temperature TA	-20°C < TA < +50°C					
Option	Restart-Blocking-System "WAS"					
Operating Status Visualization	visualization by LED's for the operating state of all elements					
Safety Light Barrier Specifications	Standard Types	IUL-11-S/E		IUL-31-S/E		IUL-L31-S/E
Ex d Types		IUD-11-S/E-012-13	IUD-31-S/E-012-13	IUD-L31-S/E-012-13		
Designation	S: Emitter / E: Receiver					
Safety Category	4					
Ex-Protection, Types IUD-..	EEx d IIC T6					
Range	10m	30m	30m			
Light Source	IR 880nm	IR 880nm	Red Laser 650nm			
Laser Class	-	-	2			
minimum detectable Object Size	20mm					
Radiation Pattern	max. 4°					
Safety Output	Push-Pull, dynamic signal 1kHz, short circuit protected					
Housing, Standard, Types IUL-..	M30, Yellow Brass, Nickel plated					
Housing, Ex, Types IUD-..	M30, Yellow Brass, Nickel plated, EEx d IIC T6					
Enclosure Rating	IP 65 according to EN 60529					
Ambient Temperature TA	-20°C < TA < +50°C					
Cable	3/4+PE x 0,75mm ² + Shield / L=10m					
Mounting Accessories	IUL - 2 Clamps M30 / IUD - 4 Nuts M30					
Options	- Standard Safety Light Barriers with Connector: Additional designation ..-T - Cable Length up to 100m					
Receiver Operating Status Indication	Visible on the front side by the illuminated lens and on the rear side by a LED: RED: Light beam interrupted or light barrier not aligned GREEN: Light beam not interrupted, light barrier well aligned YELLOW: Dirt on lenses or light barrier bad aligned					
Emitter Operating Status Indication	Visible on the front side by the illuminated lens: GREEN: Operating, connected to the voltage supply					

CE GARDIX Accident Prevention Light Barrier USL



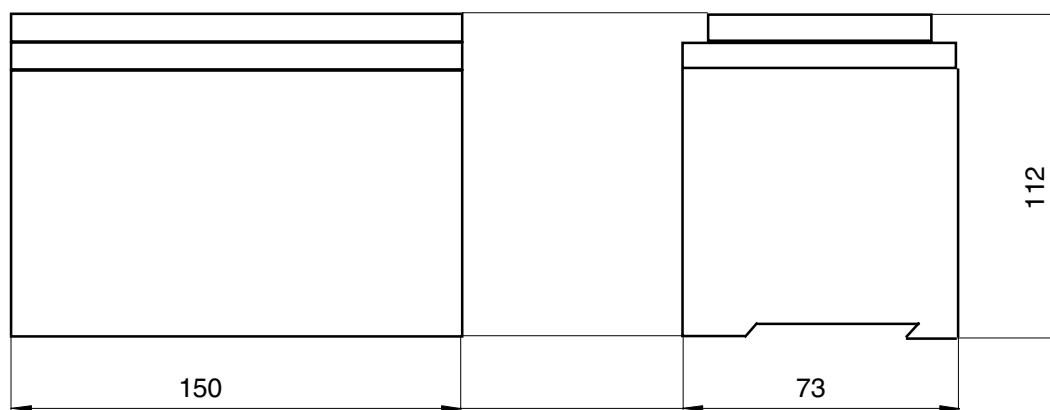
ISO 9001 ATEX

BG PRÜFZERT / PTB Ex-Approval

- Safety Light Barrier for Accident Prevention in dangerous area
- Safety Category 4
- Also for applications in Ex-Zones 1 and 2
- Optimal alignment help by state indication in the receiver optic
- High EMC level

Types	USC-S24	USC-S24A	UDC-S24A
System U.C-.. Controller			
Count of Light Barriers	1		
Supply Voltage	24 VDC +/- 10%		
Current Consumption	330mA (incl. Light Barriers)		
Power Consumption	9.24W		
Circuit Speed	30ms (worst time to switching off the safety relay contacts)		
Safety Outputs, Type	Relay contacts forcibly actuated		
Safety Outputs, Contacts	1xNO + 1xNC (internal redundancy)	2xNO + 2xNC	
max. Load	AC: 0,4 A at 250VAC - DC: 3A at U<40VDC		
Pollution Output	1 x NPN / 100mA / Short Circuit Resistant		
Enclosure Rating	IP20 according to EN 60529		
Safety Light Barrier (BLS)			
Designation: Safety Light Barrier, Standard	IUL-.0-SE-1	IUL-.0-SE-A1	IUL-.0-SE-A1
Designation: Safety Light Barrier, Ex d (Ex)	IUD-.0-SE-1	IUD-.0-SE-A1	IUD-.0-SE-A1
Sensing Range	10m or 30m (additional designation -10/30)		
min. Sensible Object Size	20mm		
Wavelength	880nm (Infrared)		
Radiation Pattern	max. 4°		
Housing, Standard	M30, Yellow Brass Nickel Plated		
Housing, Ex (Ex)	M30, Yellow Brass Nickel Plated, EEx d IIC T6		
Enclosure Rating	IP 65 according to EN 60529		
General			
Ambient Temperature T _A (all elements)	-20°C < T _A < +50°C		
Options	- Standard Safety Light Barriers with Connector ..-T - Laser Safety Light Barriers, Cl. 2 / 30m - Cable Length up to 100m		

Dimensions:



Mounting on DIN rail track 35mm x 15mm (EN 50022)

GARDIX Accident Protection Light Barrier IUL/IUD-30-S/E to Safety Controllers USC and UDC

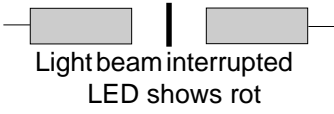
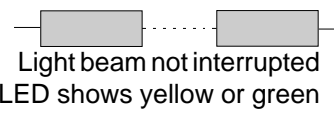
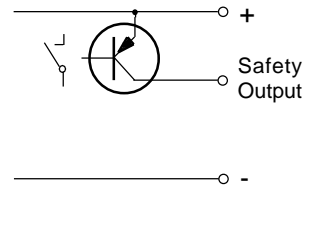
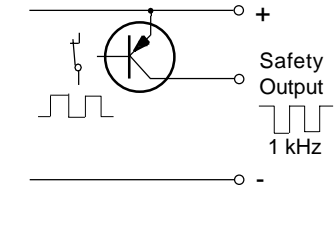
IUD-30-S/E

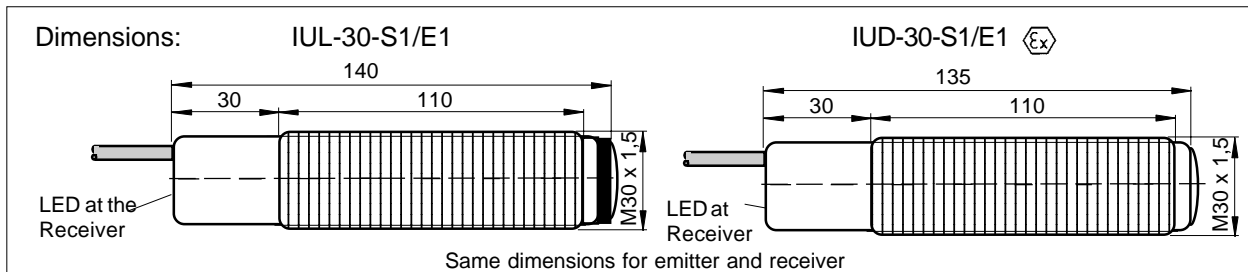

EEx d IIC T6

II 2 G
II 1/2 D IP67 T90°C
Housing M30

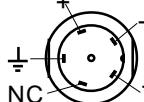
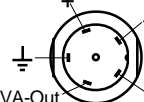
- Connectable at safety controllers USC, UDC
- Safety category 4
- Type IUD for applications in Ex zones 1, 2, 20/21, 22
- High penetration capacity in polluted areas
- Optimal alignment help by state indication in the receiver optic
- Very high operational dependability (EMC)

IUL-30-S/E

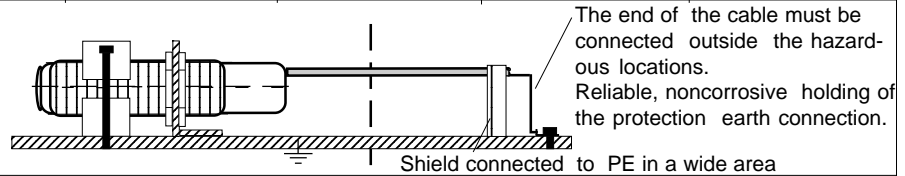

Technical Data	Type	IUL-30-S1/E1	IUD-30-S1/E1
Type of Ex protection		--	EE x d IIC T6
Applicable in Ex zones		none	Zones 1 and 20/21
Ex category		--	II 2G+II 1/2D IP67 T90°C
Safety category at EN 954		4, connected at safety controllers USC, UDC	
Designation		S: Emitter / E: Receiver	
Range		min.0,2m - max.30m	
minimum detectable object size		20mm	
Light source		Infrared 880nm	
Beam angle		<= 4°	
Output response time		dependent on the connected safety system	
Supply voltage		12 VDC from the safety system	
Current consumption		Receiver: 50 mA / Emitter: 80mA	
maximum power dissipation		Receiver: 0.6W / Emitter: 0.96W	
Safety output		PNP / dynamic signal, connected to the safety system	
Pollution indication output "VA"		NPN, max. 100mA	
Housing		M30, Yellow Brass, nickel plated	
Enclosure rating, at EN 60529		IP 65	IP67
Operating temperature TA		-20°C < TA < +60°C	
Cable, emitter		3+PE x 0,75mm ² + shield / L=10m	
Cable, receiver		4+PE x 0,75mm ² + shield / L=10m	
Accessories		4 nuts M30 or 2 clamps optional	
Options		- IUL/IUD-10-S1/E1: Reduced range 10m - IUL-30-S/E-T: Connector type (not for ex devices) - IU.-30-S1/E1 S94: Special lense glueing (high solvent resistant) - IU.-30-S/E A1: Special connection layout - Cable length up to 100m	
LED indication Output function		 <p style="text-align: center;">Light beam interrupted LED shows red</p>	 <p style="text-align: center;">Light beam not interrupted LED shows yellow or green</p>
Output and connection diagram			
Receiver Emitter 1 = + = + 2 = - = - 3 = Safe output = Test 4 = Pollution out white = Shield = Shield yellow-green = PE = PE			
Pollution indication output (VA)		The pollution indication output will be activated when the lenses of the emitter or receiver became dirty or the light barrier is badly adjusted and the LED shows yellow. The pollution indication output is an NPN-type and not a safety output.	
Alignment help by LED indication		LED red: Light beam interrupted / not aligned LED yellow: Dirt on lenses / badly aligned LED green: Light beam free / well aligned LED red flashing: Disturbance	
For mounting and operation is the operating manual necessary.			




Connection layout:

IUL/IUD-30-S1	IUL/IUD-30-E1	IUL/IUD-30-S-A1	IUL/IUD-30-E-A1	IUL/IUD-30-S-T	IUL/IUD-30-E-T
1 = +	1 = +	1 = +	1 = +	1 = +	1 = +
2 = Test	2 = Out	2 = -	2 = -	2 = -	2 = -
3 = -	3 = -	3 = Test	3 = Out	3 = Test	3 = Out
white = Shield	4 = VA-Out	white = Shield	4 = VA-Out	4 = NC	4 = VA-Out
yel-green = FE	white = Shield	yel-green = FE	white = Shield	5 = FE	5 = FE
	yel-green = FE		yel-green = FE		

Equipotential Bonding at Ex Devices:



ATEX related designations

CE 0158
 Device type  II 2 G, II 1/2 D IP67 T90°C
 Certification number: DMT 99 ATEX E 056/N1
 TA: -20° < TA < 60° Electrical data according to the chart
 Date of construction: Numeral 4 and 5 of the serial number

Operating Manual / EC - Declaration of Conformity:

Mounting prescription
 Accident protection

The detailed mounting prescription concerning safety margin, mounting height, downstream devices and general regulations about accident protection are to observe.

Ex Protection:

The type: IUD-... is applicable in Ex Zones 1 and 20/21. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21. It is necessary to take into consideration the valid international and national rules and regulations. The local equipotential bonding have to be done. The protective earth (PE) is solid connected with the housing. The cable have to be installed and protected against damages. To connect cables inside hazardous locations only use certificated Ex e housings. All cable terminals must be connected outside hazardous locations. Protect the cable against damages. Additional optical lenses are not allowed in hazardous locations.

Connection Prescriptions

Do not exceed the maximum ratings. The electrical connections must be exactly as shown in the connection diagram. The cable shield must be connected short (Inside of hazardous locations only in certificated Ex housings). The cable shield should be connected to the designated terminal at the basic safety system or to the protection earth, large-surfaced. Connection cables must not be installed parallel to high voltage cables.

Function

If the light beam between emitter and receiver is not interrupted, the safety output generates a 1kHz dynamic signal. If the light beam is interrupted, the safety output is switching off (secure state). The light barriers are built in redundant form. In case of failures the receiver switch the output off (secure state). The Pollution Signal Output (VA) is activated by dirty optics. These inform timely about pollution.

Alignment of the Light Barrier

The three color indication in the receiver optic allows an optimal alignment.

1. The emitter must be aligned this way, that the emitter lens is fully illuminated (By watching from the receiver at the emitter).
2. The receiver should be moved, until the LED (from the receiver) shows "green". Search the middle of the green range.

Pollution Indication Output

The Pollution signal output is activated, if the Light Barrier is not aligned properly or the intensity of the light is reduced because the lenses become dirty. (Receiver LED shows "yellow"). The Pollution signal output is a not a safety output.

Maintenance

No special maintenance is required. If the lenses becomes dirty, they should be cleaned with a non-aggressive cleaning liquid. Equipment must only be repaired by the manufacturer.

Safety information

When installing and operating with the light barrier, it is necessary to take into consideration the relevant international and other national regulations. ATEX 118a, ElexV, TRbF, TRD, UVV, EX-RL (BGR 104), BetrSichV (ATEX 137).

Standards met:

- EN 61496-1/-2, EN 50014, EN 50018, EN 50281-1-1; EN 61000-6-1/-2, EN 61000-6-3/4; EN 60529
- Ex Protection: 94/9/EG (ATEX 100a)
- Machine directive: 98/37/EG
- Low voltage directive: 73/23/EWG, 93/68/EWG
- EMC: 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG

General Notes

We reserve the right to modify our equipment. Our equipment is designed such way, that it has the least possible adverse effect on the environment. It neither emit or contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

Declaration of Conformity / Approvals:

- DMT 99 ATEX E 056/N1
- BG-PRÜFZERT No. 99117

The conformity of the devices with the EC standards and directives and the EC-type examination certificate and the observation of the Quality Safety System ISO 9001 with the ATEX module "Production", declares.

Hans Bracher, Matrix Elektronik AG 

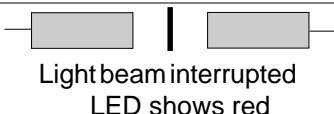
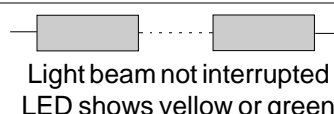
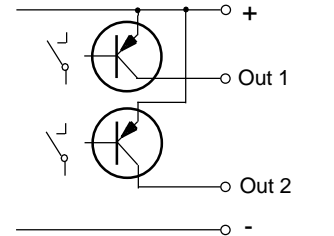
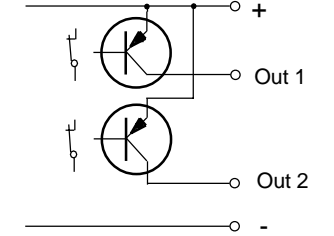
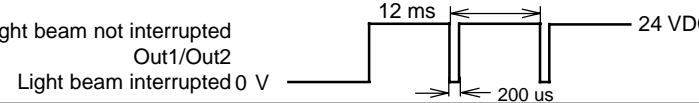
Iud30_gd_e4, OCT.23.03/HB

GARDIX Accident Protection Light Barrier GX-E/IGD-30-SE

BG proved for Accident Protection / ATEX proved for Hazardous Locations

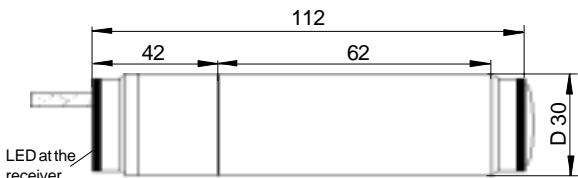


- Application for safety category 4
- Also for applications in Ex-Zones 1, 2, 20/21 and 22
- Optimal alignment help by state indication in the receiver optic
- Very high operational dependability (EMC)
- Electronic outputs

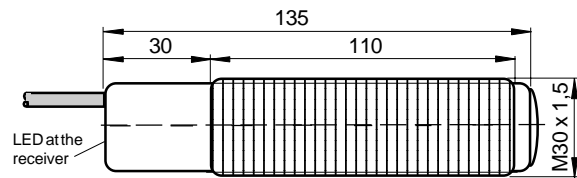
Technical Data	Type standard	GX-E-30-SE																																				
	Type EEx d IIC T6	IGD-30-SE	Ex																																			
Type of Ex protection		EEx d IIC T6																																				
Applicable in Ex Zones		Zones 1, 2, 20/21, 22																																				
Category		II 2 G + II 1/2 D IP67 T90°																																				
Denomination		S: Emitter / E: Receiver																																				
Operating Distance		min.0,5m-max.30m																																				
minimum detectable object size		20mm																																				
Light source		Infrared 880nm																																				
Beam pattern		maximum 4°																																				
Output response time		12ms (Switch off the outputs)																																				
Supply voltage		24 VDC (20 to 28VDC)																																				
Current consumption		Receiver: 30 mA / Emitter: 50mA																																				
maximum power dissipation		Receiver: 0.84W / Emitter: 1.4W																																				
Outputs		2 x PNP / max. 100mA / short circuit protected																																				
Housing GX-E-..		Aluminum, yellow anodized																																				
Housing IGD-..		M30, yellow brass, nickel plated																																				
Protection rating GX-E		IP 65 according EN 60529																																				
Protection rating IGD		IP 67 according EN 60529																																				
Operating Temperature TA		-20°C < TA < +60°C																																				
Cable GX-E		2/4(5) x AWG24 (0.2mm ²) + Shield / L=5m																																				
Cable IGD		2/4(5)+PE x 0,75mm ² + Shield / L=10m																																				
Cable IGD-..WAS or VA		Receiver: 4/5+PE x 0,5mm ² + Shield / L=10m Emitter: 2+PE x 0,75mm ² + Shield / L=10m																																				
Accessories		GX-E - 2 Clamps M30 / IGD - 4 Nuts M30																																				
Options		- also with cable length up to 100m or connector - with integrated Pollution Indication Output (VA) Type:..-30-S/E-VA - or integrated restart blocking system WAS) Type:..-30-S/E-WAS - with a range of 100m Type:....-100-S/E - Housing: Yellow brass with outside thread M30x1.5 GX-E-30-S/E-VA S114																																				
LED display Output function																																						
Output and connection layout:																																						
<table border="0"> <tr> <td></td> <td>IGD</td> <td>GX-E-</td> <td>WAS</td> <td>VA</td> </tr> <tr> <td>+24VDC</td> <td>1</td> <td>brown</td> <td>brown</td> <td>brown</td> </tr> <tr> <td>-</td> <td>2</td> <td>blue</td> <td>white</td> <td>white</td> </tr> <tr> <td>Output 1</td> <td>3</td> <td>black</td> <td>green</td> <td>green</td> </tr> <tr> <td>Output 2</td> <td>4</td> <td>grey</td> <td>grey</td> <td>grey</td> </tr> <tr> <td>Release WAS5</td> <td>--</td> <td>--</td> <td>yellow</td> <td>--</td> </tr> <tr> <td>Out VA</td> <td>5</td> <td>--</td> <td>--</td> <td>yellow</td> </tr> </table> Shield, connect to PE or Minus (-)		IGD	GX-E-	WAS	VA	+24VDC	1	brown	brown	brown	-	2	blue	white	white	Output 1	3	black	green	green	Output 2	4	grey	grey	grey	Release WAS5	--	--	yellow	--	Out VA	5	--	--	yellow			
	IGD	GX-E-	WAS	VA																																		
+24VDC	1	brown	brown	brown																																		
-	2	blue	white	white																																		
Output 1	3	black	green	green																																		
Output 2	4	grey	grey	grey																																		
Release WAS5	--	--	yellow	--																																		
Out VA	5	--	--	yellow																																		
Characteristic of output signal																																						
Alignment and controlling by LED Display		LED red: Light beam interrupted / not aligned	LED yellow: Dirt on lenses / badly aligned																																			
		LED green: Light beam free / well aligned	LED red flashing: Disturbance																																			

For mounting and operation is the operating manual necessary.

Dimensions: GX-E-30-S/E:



GX-E-30-S/E S114, IGD/N-30-S/EIGD-30-S/E:



Emitter and receiver have the same dimensions.

IGD	GX-E-	WAS	VA		IGD	GX-E-	WAS	VA
1	brown	brown	brown	+24V	1	brown	brown	brown
2	blue	blue	blue	-	2	blue	white	white
					3	black	green	green
					4	grey	grey	grey
					5	--	yellow	--
					5	--	--	yellow

Connect the shield to PE or Minus (-)

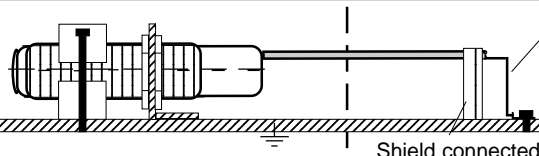
yellow-green-- -- -- FE

Connect the shield to PE or Minus (-)

PE yellow-green-- -- --

Equipotential Bonding at Ex Devices:

For Sensors without PE-Wire, the equipotential bonding is to realize by the housing with the nuts M30.



The end of the cable must be connected outside the hazardous locations. Reliable, noncorrosive holding of the protection earth connection.

ATEX related designations

CE 0158	Manufacturer with address
Device type	II 2 G, II 1/2 D IP67 T90°
Certification number:	DMT 99 ATEX E 056/N1
TA: -20° < TA < 60°	Electrical data according to the chart
Date of construction: Numeral 4 and 5 of the serial number	

Operating Manual / EC - Declaration of Conformity:

Mounting prescription
Accident protection

The detailed mounting prescription concerning safety margin, mounting height, downstream devices and general regulations about accident protection are to observe.

Ex Protection:

It is necessary to take into consideration the valid international and national rules and regulations. The local equipotential bonding have to be done. The protective earth (PE) is solid connected with the housing. The cable have to be installed and protected against damages. To connect cables inside hazardous locations only use certificated Ex e housings. All cable terminals must be connected outside hazardous locations. Protect the cable against damages. Additional optical lenses are not allowed in hazardous locations.

Type: IGD-... is applicable in Ex Zones 1, 2, 20/21 and 22. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.

General mounting prescriptions:

Do not exceed the maximum ratings. The electrical connections must be exactly as shown in the connection diagram. The cable shield must be connected short. The cable shield should be connected to 0V(-) of the supply voltage. Connection cables must not be installed parallel to high voltage cables.

Function

If the light beam between emitter and receiver is not interrupted, both security outputs are ON (+24VDC). If the light beam is interrupted, both redundant outputs are switching OFF (secure state). By receivers with Restart Blocking System (WAS) the light barrier can only be restarted by activating the "WAS" input. The input clear WAS must be connected by a contact (NC) to +24VDC. The light barrier will be restarted by opening and the following closing this contact. The light barriers are built in redundant form. In case of a failures the receiver switch the outputs off (secure state). The pollution indication output (VA) is activated by dirty optics. his function gives the possibility to a fast reaction at polluted lenses

The combination from VA-Output and the Restart Blocking System (WAS) is not possible.

Alignment of the Light Barrier

The three color indication in the receiver optic allows an optimal alignment.

1. The emitter must be aligned this way, that the emitter lens is fully illuminated (By watching from the receiver at the emitter).
2. The receiver should be moved, until the LED (from the receiver) shows "green". Search the middle of the green range.

Maintenance

No special maintenance is required. If the lenses becomes dirty, they should be cleaned with a non-aggressive cleaning liquid. Equipment must only be repaired by the manufacturer.

Safety information

When installing and operating with the light barrier, it is necessary to take into consideration the relevant international and other national regulations. ATEX 118a, ElexV, TRbF, TRD, UVV, EX-RL(BGR104), BetrSichV(ATEX137). Standards met:

- EN 50014, EN 50018, EN 50281-1-1; EN 61496-1/-2, EN 954; EN 61000-6-1/-2, EN 61000-6-3/4; EN 60529
- Ex Protection: 94/9/EG (ATEX 100a)
- Machine directive: 98/37/EG
- Low voltage directive: 73/23/EWG, 93/68/EWG
- EMC: 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG

General Notes

We reserve the right to modify our equipment. Our equipment is designed such way, that it has the least possible adverse effect on the environment. It neither emit or contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

Approvals:

- DMT 99 ATEX E 056/N1
- BG-PRÜFZERT No. 98206

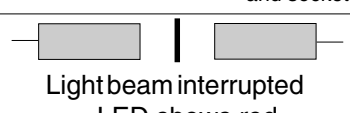
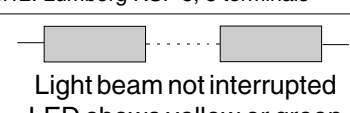
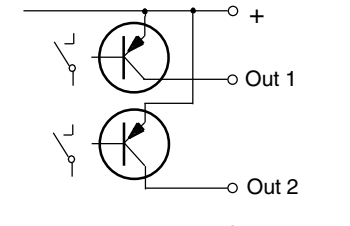
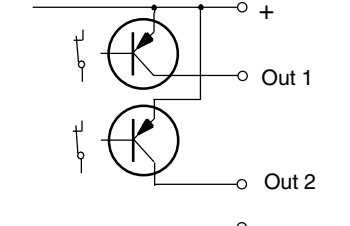
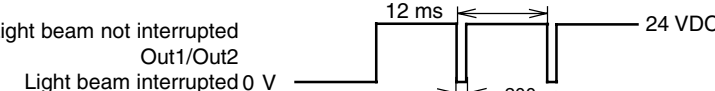
The conformity of the devices with the EC standards and directives and the EC-type examination certificate and the observation of the Quality Safety System ISO 9001 with the ATEX module "Production", declares:

Hans Bracher, Matrix Elektronik AG

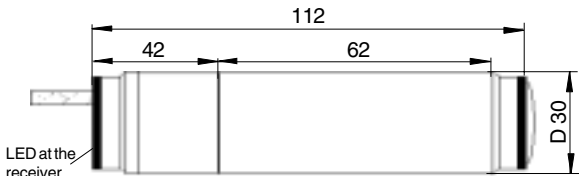
GARDIX Accident Protection Light Barrier GX-E-30-SE



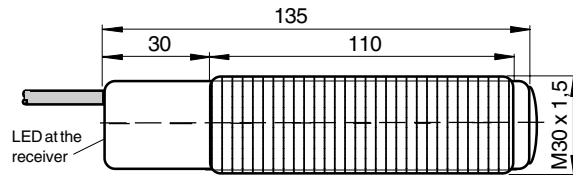
- Application for safety category 4, at EN 954
- Optimal alignment help by state indication in the receiver optic
- Optional with pollution indication output VA. Type GX-E-30-S/E-VA
- Optional with integrated restart blocking system WAS. Type GX-E-30-S/E-WAS
- Very high operational dependability (EMC)
- Electronic outputs

Technical data	Type	GX-E-30-SE																																
Denomination		S: Emitter / E: Receiver																																
Operating Distance		min.0,1m-max.30m																																
Minimum detectable object size		20mm																																
Light source		Infrared 880nm																																
Beam pattern		maximum 4°																																
Output response time		12ms (Switch off the outputs)																																
Supply voltage		24 VDC (20 to 28VDC)																																
Current consumption		Receiver: 30 mA / Emitter: 50mA																																
maximum power dissipation		Receiver: 0.84W / Emitter: 1.4W																																
Safety outputs		2 x PNP / max. 100mA / short circuit protected																																
Pollution indication output, optional		1 x PNP / max. 100mA / short circuit protected																																
Housing		Aluminum, yellow anodized																																
Enclosure protection rating		IP 65 according EN 60529																																
Operating Temperature TA		-20°C < TA < +60°C																																
Cable GX-E		2/4(5) x AWG24 (0.2mm ²) + Shield / L=5m																																
Cable GX-E-30-S/E S114		2/4+PE x 0,5mm ² + Shield / L=5m																																
Cable GX-E-S/E-VA S114		2/5+PE x 0,5mm ² + Shield / L=5m																																
Socket, type GX-E-30-S/E S99		Socket M12, Lumberg type RSF 8, 8 terminals																																
Accessories included, all types		- 2 clamps M30 / Types S90 and S114: 4 nuts M30																																
Accessories included, only GX-E-.. S99		- 1x Safety lock device, mount at the cable connection, for locking the connection. - 1x Warning plate "WARNING - Explosion Hazard - Do Not Disconnect While Circuit Is Live Unless Area Is Known To Be Non-Hazardous", self-sealing, for gluing on the cable connector. - 1x Protection cap for the sensor connector.																																
Accessories optional only type GX-E-.. S99		- Single ended cordset, straight type: RKTS 5-298/xx or right angle type: RKWTH 5-298/xx , Lumberg M12/5P																																
Options		- Also with cable length up to 100m or connector - GX-E-30-S/E-VA: With integrated Pollution Indication Output (VA) - GX-E-30-S/E-WAS: Or with integrated restart blocking system WAS - GX-E-30-S/E S99: Socket M12: Lumberg RSF 8, 8 terminals - GX-E-30-S/E-VA S114: Housing: Brass, with outside thread M30x1.5 - GX-E-30-S/E-VA S139: Housing: Brass, with outside thread M30x1.5 and socket M12: Lumberg RSF 8, 8 terminals																																
LED display Output function		<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Light beam interrupted LED shows red</p> </div> <div style="text-align: center;">  <p>Light beam not interrupted LED shows yellow or green</p> </div> </div>																																
Output and connection layout:		<table style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center;">GX-E-</td> <td style="text-align: center;">WAS</td> <td style="text-align: center;">VA</td> </tr> <tr> <td>+24VDC</td> <td style="text-align: center;">1</td> <td style="text-align: center;">brown</td> <td style="text-align: center;">brown</td> </tr> <tr> <td>-</td> <td style="text-align: center;">2</td> <td style="text-align: center;">blue</td> <td style="text-align: center;">white</td> </tr> <tr> <td>Output 1</td> <td style="text-align: center;">3</td> <td style="text-align: center;">black</td> <td style="text-align: center;">green</td> </tr> <tr> <td>Output 2</td> <td style="text-align: center;">4</td> <td style="text-align: center;">grey</td> <td style="text-align: center;">grey</td> </tr> <tr> <td>Release WAS5</td> <td style="text-align: center;">--</td> <td style="text-align: center;">yellow</td> <td style="text-align: center;">--</td> </tr> <tr> <td>Out VA</td> <td style="text-align: center;">5</td> <td style="text-align: center;">--</td> <td style="text-align: center;">yellow</td> </tr> <tr> <td colspan="4">Shield, connect to PE or Minus (-)</td> </tr> </table> <div style="display: flex; justify-content: space-around; margin-top: 10px;">   </div>		GX-E-	WAS	VA	+24VDC	1	brown	brown	-	2	blue	white	Output 1	3	black	green	Output 2	4	grey	grey	Release WAS5	--	yellow	--	Out VA	5	--	yellow	Shield, connect to PE or Minus (-)			
	GX-E-	WAS	VA																															
+24VDC	1	brown	brown																															
-	2	blue	white																															
Output 1	3	black	green																															
Output 2	4	grey	grey																															
Release WAS5	--	yellow	--																															
Out VA	5	--	yellow																															
Shield, connect to PE or Minus (-)																																		
Characteristic of output signal		 <p>Light beam not interrupted Out1/Out2 Light beam interrupted 0 V</p>																																
Alignment and controlling by LED Display		<table style="width: 100%; border-collapse: collapse;"> <tr> <td>LED red:</td> <td>Light beam interrupted / not aligned</td> </tr> <tr> <td>LED yellow:</td> <td>Dirt on lenses / badly aligned</td> </tr> <tr> <td>LED green:</td> <td>Light beam free / well aligned</td> </tr> <tr> <td>LED red flashing:</td> <td>Disturbance</td> </tr> </table>	LED red:	Light beam interrupted / not aligned	LED yellow:	Dirt on lenses / badly aligned	LED green:	Light beam free / well aligned	LED red flashing:	Disturbance																								
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LED red flashing:	Disturbance																																	
For mounting and operation is the operating manual necessary.																																		

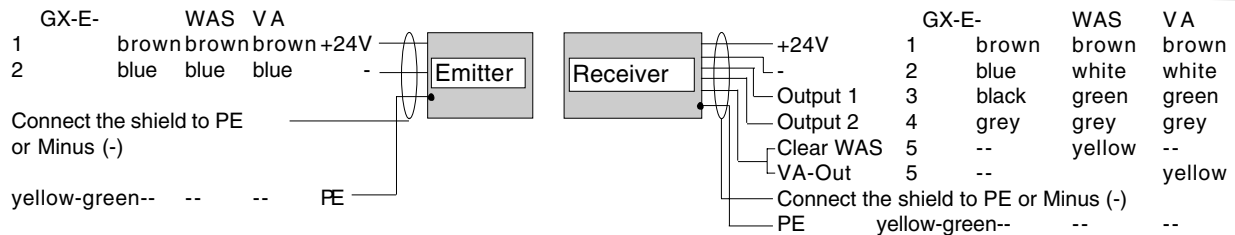
Dimensions: GX-E-30-S/E:



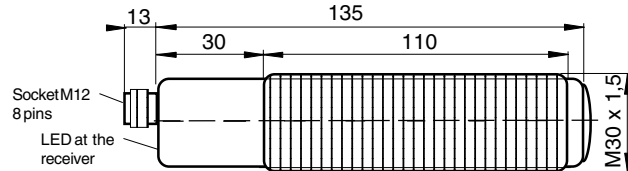
GX-E-30-S/E S114 / S139:



Emitter and receiver have the same dimensions.



Dimensions/Connection layout GX-E-30-S/E S99 / S139:



(Colors: at DIN 47100 Layout: at EN 50044)		
1 white +24VDC	5 grey VA-Output, optional	
2 brown 0V	6 rosa Input WAS, optional	
3 green Output 1	7 blue Protection earth PE \perp	
4 yellow Output 2	8 red not connected, at 0V	

Operating Manual / EC - Declaration of Conformity:

Mounting prescription

Accident protection

The detailed mounting prescription concerning safety margin, mounting height, downstream devices and general regulations about accident protection are to observe. All post-switched devices must be approved at safety level 4 (EN954-1). All connections and installations must be executed at safety fundamental rules.

General mounting prescriptions:

Do not exceed the maximum ratings. The electrical connections must be exactly as shown in the connection diagram. The cable shield must be connected short. The cable shield should be connected PE or to 0V(-) of the supply voltage. Connection cables must not be installed parallel to high voltage cables.

Function

If the light beam between emitter and receiver is not interrupted, both security outputs are ON (+24VDC). If the light beam is interrupted, both redundant outputs are switching OFF (secure state). The proofed sensors of the series GX-E built in a 2-channel different redundancy. Failures and disturbances (at EN954-1), result in outputs switching OFF and the LED is blinking red. The faulty state is the same as the light barrier is interrupted. (Output is switching OFF - Safety State). The emergency OFF state is only resettable by separating the supply voltage.

Restart-blocking-system WAS:

By receivers with Restart Blocking System (WAS) the light barrier can only be restarted by activating the "WAS" input. The input clear WAS must be connected by a contact (NC) to +24VDC. The light barrier will be restarted by opening and the following closing this contact. The Function WAS can not be combined with the pollution indication output VA.

Pollution indication output (optional)

The pollution indication output (VA) is activated by dirty optics. This function gives the possibility to a fast reaction at polluted lenses. The combination from VA-Output and the Restart Blocking System (WAS) is not possible.

Alignment of the Light Barrier

The three color indication in the receiver optic allows an optimal alignment.

1. The emitter must be aligned this way, that the emitter lens is fully illuminated (By watching from the receiver at the emitter).
2. The receiver should be moved, until the LED (from the receiver) shows "green". Search the middle of the green range.

Maintenance

No special maintenance is required. If the lenses become dirty, they should be cleaned with a non-aggressive cleaning liquid. Equipment must only be repaired by the manufacturer.

Safety information

When installing and operating with the light barrier, it is necessary to take into consideration the relevant international and other national regulations.

Standards met:

- EN 61496-1, prEN 61496-2, EN 954-1; EN 50081-1/-2, EN 50082-1/-2; EN 60529
- Machine directive: 98/37/EG
- Low voltage directive: 73/23/EEG, 93/68/EEG
- EMC: 89/336/EEG, 91/263/EEG, 92/31/EEG, 93/68/EEG
- RoHS: 2002/95/EG

General Notes

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Declaration of Conformity / Certifications

BG-PRÜFZERT No. 98206/98207

The conformity of the devices with the EC standards and directives and the EC-type examination certificate and the observation of the Quality Safety System ISO 9001:2000 declares:

Hans Bracher, Matrix Elektronik AG

Gxe_30_e11_SEP.20.06/HB

Matrix Elektronik AG (Manufacturer)

Kirchweg 24 CH-5420 Ehrendingen
Tel.: +41 56 20400-20 Fax -29

Tippkemper - Matrix GmbH

Meegener Str. 43 D-51491 Overath
Tel.: +49 2206 9566-0 Fax -19

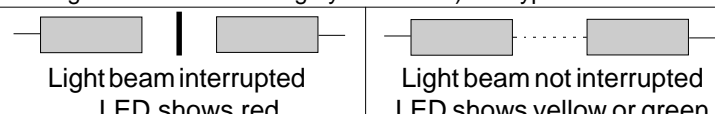
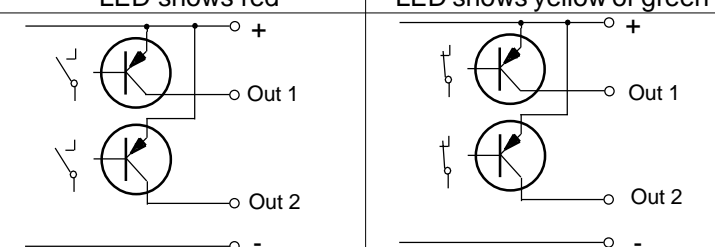
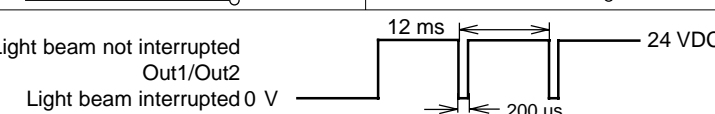
GARDIX Safety Laser Light Barrier GX-E/IGD-L30-S/E

BG approved for Accident Protection / ATEX approved for Hazardous Locations



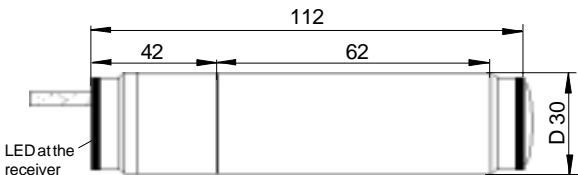
II 2 G
II 1/2 D IP67 T90°

- Safety category 4
- Laser Class 2, BG approved
- Also for applications in Ex-Zones 1, 2, 20/21 and 22
- Optimal alignment help by state indication in the receiver optic
- Very high operational dependability (EMC)
- Electronic outputs

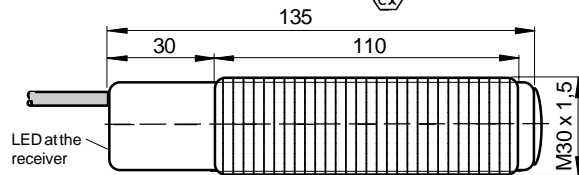
Technical Data	Type standard	GX-E-L30-S/E
	Type EEx d IIC T6	IGD-L30-S/E
Type of Ex protection		EEx d IIC T6
Applicable in Ex Zones		Zones 1, 2, 20/21, 22
Category		II 2 G + II 1/2 D IP67 T90°
Laser class / Laser output power		Class 2 / P < 1mW
Laser beam pattern		appr. 8mm at a distance of 10m
Optical radiant power		maximum 0.02mW/mm ²
Laser wave length		650nm / visible red
Denomination		S: Emitter / E: Receiver
Operating distance		min.0,5m-max.30m
minimum detectable object size		20mm
Beam pattern		maximum 4°
Output response time		12ms (Switch off the outputs)
Supply voltage		24 VDC (20 to 28VDC)
Current consumption		Receiver: 50 mA / Emitter: 54 to 70mA
maximum power dissipation		Receiver: 1.4W / Emitter: 1.96W
Outputs		2 x PNP / max. 100mA / short circuit protected
Housing GX-E-..		Aluminum, yellow anodized
Housing IGD-..		M30, yellow brass, nickel plated
Protection rating GX-E		IP 65 according EN 60529
Protection rating IGD		IP 67 according EN 60529
Operating Temperature TA		0°C < TA < +50°C
Cable GX-E		2/4(5) x AWG24 (0.2mm ²) + Shield / L=5m
Cable IGD		2/4(5)+PE x 0,75mm ² + Shield / L=10m
Cable IGD-..WAS or VA		Receiver: 4/5+PE x 0,5mm ² + Shield / L=10m Emitter: 2+PE x 0,75mm ² + Shield / L=10m
Accessories		GX-E - 2 Clamps M30 / IGD - 4 Nuts M30
Options		-also with cable length up to 100m or connector -with integrated Pollution Indication Output (VA) Type:...-L30-S/E-VA -or integrated restart blocking system WAS) Type:...-L30-S/E-WAS
LED display Output function		
Output and connection layout:		
IGD GX-E- WAS VA +24VDC 1 brown brown brown - 2 blue white white Output 1 3 black green green Output 2 4 grey grey grey Release WAS5 -- yellow -- Out VA 5 -- yellow Shield, connect to PE or Minus (-)		
Characteristic of output signal		
Alignment and controlling by LED Display		LED red: Light beam interrupted / not aligned LED yellow: Dirt on lenses / badly aligned LED green: Light beam free / well aligned LED red flashing: Disturbance

For mounting and operation is the operating manual necessary.

Dimensions: GX-E-L30-SE:



IGD-L30-SE Ex

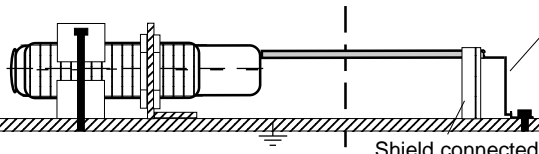


Emitter and receiver have the same dimensions.

IGD	GX-E-	WAS	VA		IGD	GX-E-	WAS	VA
1	brown	brown	brown	+24V	1	brown	brown	brown
2	blue	blue	blue	-	2	blue	white	white
Connect the shield to PE or Minus (-)					3	black	green	green
yellow-green	--	--	--	FE	4	grey	grey	grey
					5	--	yellow	--
					5	--	--	yellow
					Connect the shield to PE or Minus (-)			
					yellow-green-- -- --			

Equipotential Bonding at Ex Devices:

For Sensors without PE-Wire, the equipotential bonding is to realize by the housing with the nuts M30.



The end of the cable must be connected outside the hazardous locations. Reliable, noncorrosive holding of the protection earth connection. Shield connected to PE in a wide area

ATEX related designations

CE 0158	Manufacturer with address
Device type	II 2 G, II 1/2 D IP67 T90°
Certification number:	DMT 99 ATEX E 056/N1
TA: 0° < TA < 50°	Electrical data according to the chart
Date of construction: Numeral 4 and 5 of the serial number	

Operating Manual / EC - Declaration of Conformity:

Mounting prescription

Accident protection

The detailed mounting prescription concerning safety margin, mounting height, downstream devices and general regulations about accident protection are to observe.

Ex Protection:

It is necessary to take into consideration the valid international and national rules and regulations. The local equipotential bonding have to be done. The protective earth (PE) is solid connected with the housing. The cable have to be installed and protected against damages. To connect cables inside hazardous locations only use certificated Ex e housings. All cable terminals must be connected outside hazardous locations. Protect the cable against damages. Additional optical lenses are not allowed in hazardous locations.

Type: IGD-... is applicable in Ex Zones 1, 2, 20/21 and 22. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.

Laser Safety

Safety Notes for Laser Installations of Class 2.

- The instructions for planning and installation must be followed in accordance with EN 60825-1
- Do not stare into Laser Beam

General mounting prescriptions:

Because Lasers have a very small aperture angle, mount the light barriers free from vibrations and shocks. Do not exceed the maximum ratings. The electrical connections must be exactly as shown in the connection diagram. The cable shield must be connected short. The cable shield should be connected to 0V(-) of the supply voltage. Connection cables must not be installed parallel to high voltage cables.

Function

If the laser beam between emitter and receiver is not interrupted, both security outputs are ON (+24VDC). If the laser beam is interrupted, both redundant outputs are switching OFF (secure state). By receivers with Restart Blocking System (WAS) the light barrier can only be restarted by activating the "WAS" input. The input clear WAS must be connected by a contact (NC) to +24VDC. The light barrier will be restarted by opening and the following closing this contact. The light barriers

are built in redundant form. In case of a failures the receiver switch the outputs off (secure state). The pollution indication output (VA is activated by dirty optics his function gives the possibility to a fast reaction at polluted lenses. The combination from VA-Output and the Restart Blocking System (WAS) is not possible.

Alignment of the Light Barrier

The three color indication in the receiver optic allows an optimal alignment.

1. Adjust the emitter laser beam at the middle of the receiver lens.
2. The receiver should be moved, until the receiver LED shows "green". Search the middle of the green range.

Maintenance

No special maintenance is required. If the lenses becomes dirty, they should be cleaned with a non-aggressive cleaning liquid. Equipment must only be repaired by the manufacturer.

Safety information

When installing and operating with the light barrier, it is necessary to take into consideration the relevant international and other national regulations. ATEX 118a, ElexV, TRbF, TRD, UVV, EX-RL(BGR 104), BetrSichV(ATEX 137). Standards met:

- EN 50014, EN 50018, EN 50281-1-1; EN 61496-1/-2, EN 954; EN 61000-6-1/-2, EN 61000-6-3/4; EN 60825-1; EN 60529
- Ex Protection: 94/9/EG (ATEX 100a)
- Machine directive: 98/37/EG
- Low voltage directive: 73/23/EWG, 93/68/EWG
- EMC: 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG

General Notes

We reserve the right to modify our equipment. Our equipment is designed such way, that it has the least possible adverse effect on the environment. It neither emit or contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

Approvals:

- DMT 99 ATEX E 056/N1
- BG-PRÜFZERT No. 98206

The conformity of the devices with the EC standards and directives and the EC-type examination certificate and the observation of the Quality Safety System ISO 9001 with the ATEX module "Production", declares:

Hans Bracher, Matrix Elektronik AG

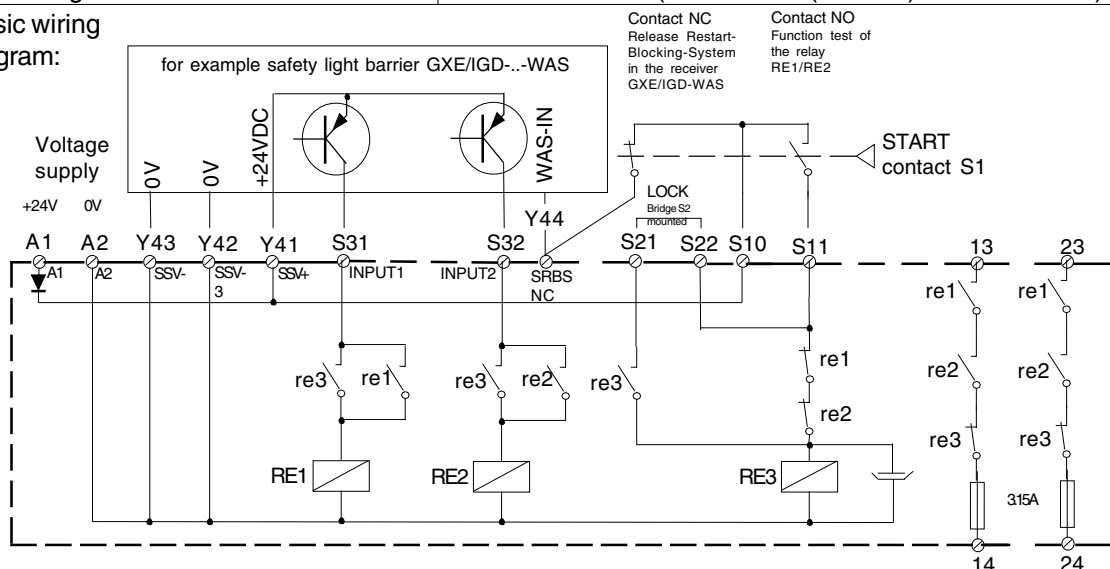
GARDIX Emergency Stop Relay GX-SR2/3



- Emergency stop switchgear and safety gate monitor
- for applications in safety circuits at EN 60204-1
- only for 2 channel emergency stop applications
- applicable as safety relay for safety light barriers type GXE/IGD and safety inductive sensors type IS2 at EN 61496-1
- EC-Approving by BG at EN 954-1, Category 4

Type	GX-SR2/3-24VDC	GX-SR2/3-12VDC
Technical Data		
Supply voltage	20VDC to 28VDC	11VDC to 15VDC
Current consumption	appr. 200mA	appr. 300mA
Power dissipation	maximum 5.6W	maximum 4.5W
Relay outputs	2 channel safety contacts, forcibly guided	
maximum load at 250VAC	750VA / 3A (3.15A/fuse)	
maximum load at 30VDC	100W / 3A (3.15A/fuse)	
Operate time	appr. 400ms	
Release time	<=50ms	
electrical life expectancy	1 x 10 ⁶ cycles at 24VDC/1A	
mechanical life expectancy	appr. 10 ⁷ cycles	
Inputs	2 x PNP compatible	
START input	for 1 x NO contact	
Status indication	2xLED for input channels 1+2 1xLED supply voltage indication 1xLED relay outputs locked	
Housing	Synthetic PC/ABS, with DIN rail mounting at EN 50022	
Protection rating, housing	IP 40 at EN 60529	
Protection rating, terminal range	IP 20 at EN 60529	
Airgap creeping	DIN VDE 0110 part 1, 04/97	
Weight	appr. 420g	
Ambient temperature range T _A	-20°C < T _A < +60°C	
Cable length	max. 100m (min. AWG24(0.2mm ²) to max. 2.5mm ²)	

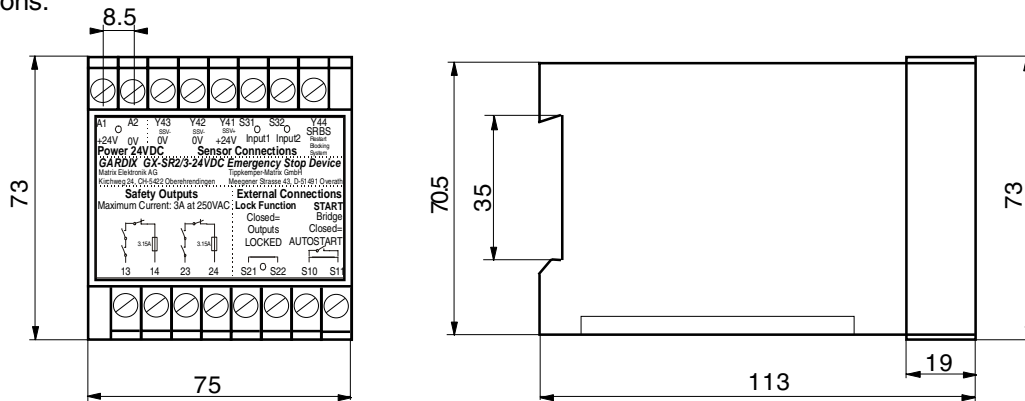
Basic wiring diagram:



Function:

Safety relay for the emergency stop function of machines and other apparatus. If one or both inputs will be interrupted, the relay switch save OFF. If the supply voltage is connected and both input circuits closed, the relay is ready for start (Power-LED shows green). After closing and reopening the start circuit both relay RE1/RE2 are operating, RE3 will be released and both output circuits will be operating. (LED's Channel 1/2 shows green. If one or both input circuits will be interrupted, the relays RE1/RE2 will be released and output circuits 13-14/23-24 are released. For ever start-up the relay RE3 checks the relay RE1/RE2 for the safe function.

Dimensions:



Terminals: for wires and stranded conductors with end splices

Applicable diameter of wires: minimum AWG24 (0.2mm²) with 4 wires/terminal
 maximum 1.5mm² with 2 wires/terminal or
 maximum 2.5mm² with 1 wire/terminal

Operating Manual / EC - Declaration of Conformity:

Operating modes:

Only 2 channel operating mode.

Simultaneity channel 1/2:

The relay can only be activated when the simultaneity of both input channels is equal or less than 200ms.

Manual Start with observation:

The bridge S2 "LOCK" between S21 and S22 must be inserted. The relay will be operating after closing and reopening the START contact.

Manual Start:

The bridge S2 "LOCK" between S21 and S22 must be removed. The relay will be operating after closing the START contact. If the START contact is permanent closed, the relay can restart automatically.

Automatically Start:

The bridge S2 "LOCK" between S21 and S22 must be removed. The START circuit will be closed permanent by inserting the bridge S1, between the terminals S10 and S11. The relay will be operating when both inputs are activated. This mode is not applicable for emergency stop function, because the relay can be activated automatically after a power down.

Supply voltage connection:

Connect the supply voltage (12VDC or 24VDC, equal to the used type) at the terminals A1(+VDC) and A2(0V).

Start circuit:

Manual Start with observing:

Insert The bridge S2 between the terminals S21-S22 is to insert. Connect the Start contact S1 (function NO) between the terminals S10 and S11. Mount the Start push-button at a location from there the dangerous area can be observed.

Sensor/Input circuitry:

Connect the supply voltage to the sensors. (Terminals Y41(SSV+) and Y42/Y43(SSV-). Both PNP output of the sensor or contacts must be connected at the inputs S31(Input 1) and S32(Input 2).

Manual Start:

Remove the bridge S1 (Push-button NO) between the terminals S10 and S11. Mount the Start push-button at a location from there the dangerous area can be observed.

Connect the supply voltage to the sensors. (Terminals Y41(SSV+) and Y42/Y43(SSV-). Both PNP output of the sensor or contacts must be connected at the inputs S31(Input 1) and S32(Input 2).

Automatically Start:

Not for emergency stop function applicable.

Remove the bridge S2 between the terminals S21 and S22. Insert the bridge S1 between the terminals S10 and S11. Connect the supply voltage to the sensors. (Terminals Y41(SSV+) and Y42/Y43(SSV-). Both PNP output of the sensor or contacts must be connected at the inputs S31 (Input 1) and S32 (Input 2).

Safety Informations

When installing and operating with the sensor, it is necessary to take into consideration the relevant international and other national regulations. The device must only be installed and mounted by educated personal. The personal must be trained for accident prevention and working safety. The personal must know the valid regulations and rules. By inductive and capacitive loads the device must be protected by an adequate protective circuitry. The device must be mounted protected against dust deposit and moisture (For example, installing inside a cabinet with enclosure rating IP54).

Standards met:

- EN 60947-5-1, EN-954-1, GS-ET-20, EN 60204-1
- EN 61000-6-1/-2, EN 61000-6-3/4
- Machine directive: 98/37EG
- Low voltage directive: 73/23/EWG, 93/68/EWG
- EMC: 89/336/EWG, 93/68/EWG
- RoHS: 2002/95/EG

General Notes

We reserve the right to modify our equipment. Our equipment is designed such way, that it has the least possible adverse effect on the environment. It neither emit or contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

Declaration of Conformity / Approval

BG-PRÜFZERT No. 03097

The conformity of the devices with the EC standards and directives and the EC-type examination certificate and the observation of the Quality Safety System ISO 9001, declares:

Hans Bracher, Matrix Elektronik AG

GxSr23_e5,JUN.28,06/HB

Multi-channel accident prevention and safety system with muting function

Gardix Type GX-M

Approvals:

- Berufsgenossenschaft (BG), Germany
Fachausschuss Eisen und Metall III
- DMT/ PTB, Germany
Ex d
- TÜV, Germany
Ex i

Manual

Group

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Gardix GX-M Accident Prevention System

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Gardix GX-M Accident Prevention System

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Fax: ++41 (0)56 / 2220563
Email: MatrixAG@cs.com

2.Approvals:

Germany + EU: BG Main Association of the Trade Association's Central Office
for Accident Prevention and Professional Medicine.
Technical Committee on „Iron and Metal III“.
BG-Approval + EU-Design Model Approval

The GARDIX System satisfies the following norms:

89/392/CEE	Machines Directives
EN 61496 Part 1	Safety of machinery. Electrosensitive protective equipment. General requirements and tests.
prEN 61496 Part 2	Safety of machinery. Electrosensitive protective equipment. Particular requirements for systems, using active photoelectric protective devices.
EN 294	Safety of machinery, Safety distances to prevent danger zones being reached by the upper limbs.
prEN 954 Part 1	Safety of machinery. Safety-related parts of control system. General principals of design
prEN 999	Safety of machinery. Hand/arm speed. Approach speed of parts of the body for the positioning of safety devices.
ZH 1/281	Safety regulations for electrosensitive protective equipment to power operated presses in the metal industry.
ZH 1/457	Safety regulations for controls to power operated presses in the metal industry
EN 50014	Electrical apparatus for potentially explosive atmospheres General requirements.
EN 50018	Electrical apparatus for potentially explosive atmospheres Flameproof enclosures „d“.
EN 50021	Electrical apparatus for potentially explosive atmospheres Intrinsically safety „i“.

3.General Information:

3.1 Application

The GARDIX GX-M multi-channel accident prevention and safety system offers personal protection for dangerous working environments. The access monitoring system functions by using safety light barriers. In order to guarantee a smooth work cycle, the GX-M system has a „Human-Device-Recognition“. The Human-Device-Recognition is realized by using inductive sensors (IS) or Muting light barriers (MLB). By using 2 or 4 inductive sensors or 2 or 4 Muting light barriers, the GX-M system is able to decipher whether a device, machine, material, pallet etc. or a person enters to the dangerous area. To optimally adapt the GX-M system to the risk level 1 to 3 safety light barriers and 2 or 4 inductive sensors/muting light barriers can be connected.

Failures and disturbances of any kind always result in the outputs switching-off. The GARDIX GX-M system should only be used as a complete system. The transmitter and receiver of one pair of sensors must be built for the same range.

3.2 Safety Notes

The GARDIX GX-M system fulfills all the required conditions with reference to personal safety and protection, in accordance with the highest level: Level 4.

In order to guarantee safety of a work installation, all the elements connected to the GARDIX system must also be tested or designed to conform with technical safety requirements (i.e. 2-channel function of the post-switched electromagnetic switch).

Gardix GX-M Accident Prevention System

By using silhouette doors or similar safety devices it must be insured that the muted safety light barrier cannot be bypassed.

Safety is only achieved, when all the following conditions regarding application, installation and maintenance are satisfied.

3.2 Different function on using safety inductive sensors to muting light barriers or NAMUR inductive sensors

GX-M systems equipped with safety inductive sensors (GX-IS-..) can also be started, when inductive sensors are activated (Muting ⇒ on). On the start-up procedure a safety light barrier can be interrupted if the the muting function is activated. (Both safety inductive sensors of a pair must be activated).

This possibility is not given on systems with muting light barriers or NAMUR inductive sensors. On the start-up (power-up) all safety light barriers must be free and the muting sensors must not be activated.

4. Types

Type	Specification	No. LB Safety Light Barriers	No. IS/MLB Muting	Range min.	max.	Supply-Voltage	Protection Type	Ex
Controller	GX-M22-R*/@	2	2 IS	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M32-R*/@	3	2 IS	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M24-R*/@	2	4 IS	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M34-R*/@	3	4 IS	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M22i-R*/@	2	2 IS	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M32i-R*/@	3	2 IS	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M24i-R*/@	2	4 IS	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M34i-R*/@	3	4 IS	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M22-LR*/@	2	2 LB	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M32-LR*/@	3	2 LB	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M24-LR*/@	2	4 LB	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M34-LR*/@	3	4 LB	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M22i-LR*/@	2	2 LB	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M32i-LR*/@	3	2 LB	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M24i-LR*/@	2	4 LB	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M34i-LR*/@	3	4 LB	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M2N2-LR*/@	2	2 NAMUR	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M3N2-LR*/@	3	2 NAMUR	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M2N4-LR*/@	2	4 NAMUR	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M3N4-LR*/@	3	4 NAMUR	--	--	24VDC +/-10%	IP20/VBG4	--
Controller	GX-M2N2i-LR*/@	2	2 NAMUR	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M3N2i-LR*/@	3	2 NAMUR	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M2N4i-LR*/@	2	4 NAMUR	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Controller	GX-M3N4i-LR*/@	3	4 NAMUR	--	--	24VDC +/-10%	IP20/VBG4	Ex ib
Transmitter	IUD-31-S	Safety-LB		0,2m	30m	12V from Controller	IP65	Ex d
Receiver	IUD-31-E	Safety-LB		0,2m	30m	12V from Controller	IP65	Ex d
Transmitter	IUL-31-S	Safety-LB		0,2m	30m	12V from Controller	IP65	no
Receiver	IUL-31-E	Safety-LB		0,2m	30m	12V from Controller	IP65	no
Inductivsensor	GX-IS-KB40AP-IB	Muting		32mm	40mm	12V from Controller	IP67	Ex ib
Inductivsensor	GX-IS-KB40AP	Muting		32mm	40mm	12V from Controller	IP67	no
Inductivsensor	GX-IS-KN40AP-IB	Muting		38mm	40mm	12V from Controller	IP67	Ex ib
Inductivsensor	GX-IS-KN40AP	Muting		38mm	40mm	12V from Controller	IP67	no
Transmitter	GX-AX-25S	Muting		0,1m	25m	12V from Controller	IP65	Ex ib
Receiver	GX-AX-25E	Muting		0,1m	25m	12V from Controller	IP65	Ex ib
Transmitter	GX-LS-25S	Muting		0,1m	25m	12V from Controller	IP65	no
Receiver	GX-LS-25E	Muting		0,1m	25m	12V from Controller	IP65	no

* **V = with visualization-output**

@ **= Range of safety light barriers in m**

Option: **All systems are also available in version „restart blocking system“ supplement denomination: GX-M..-....-WAS**

Gardix GX-M Accident Prevention System

5. Technical Data:

Wavelength of transmitter:	880nm Infrared
Optical Beam Angle:	Maximum 4°
Current Consumption: Controller GX-M34i-R:	Maximum 1300mA 500mA (incl. 3 Light barriers and 4 safety inductive sensors) plus maximum 800mA for the external muting indication
Reaction time:	Max. 30ms (=Time until switching off the relay outputs after interruption of light beam or occurrence of error)
Cable Length of Photoelectric Sensors:	Maximum 100m
Cable length of Inductive Sensors:	Maximum 100m
Permissible Operating Temperature:	
Controller GX-M..	-10° to +50°
Light Barrier IUD-...	-10° to +50°
Light Barrier IUL-...	-10° to +60°
Inductive Sensors GX-IS-..	-10° to +60°
Muting-Light-barriers GX-LS/AX-..	-10° to +60°
Storage Temperature LB/IS + Controller	-25° to +70°

Minimum Object Size: min. diameter 20mm
An approaching Object must show a minimum diameter in order to be clearly recognized. With smaller objects, the GARDIX system is unable to fulfill technical safety duty.

Minimum Object Size Inductive Sensor:
For sensing distance after data-sheet: St. 37 80x80x5 mm

Outputs:

Safety Outputs:

Switching Outputs:	2 x NO relay contacts 2 x NC relay contacts
	U _{max.} : 250 VAC
	I _{max.} AC : 0,4 A with 250VAC
	I _{max.} DC : 3A with U<40VDC
External Muting Indication Lamp:	U: 24VDC
	I _{min.} : 15mA
	I _{max.} : 800mA

This output must be loaded. If no load or too large load is connected, the controller recognizes a disturbance and switches off.

Gardix GX-M Accident Prevention System

Outputs for unsafe functions:

These outputs should not be used for safety reasons!

Pollution Output (VA):

Type: 1 x NPN (open collector)
Connection value: $U_{max.}$: 30 VDC
 $I_{max.}$: 100mA

Visualization Output:

Type: 8 x optocouplers / Collectors jointly LED.
Connection value: $U_{max.}$: 30 VDC
 $I_{max.}$: 20 mA

Connection lay-out:

Connector plug type: D-Sub 9-pin / Casing (Connector plug to GX-M)

Pin1: Light barrier 1

Pin2: Light barrier 3

Pin3: Inductive sensor IS1B / Muting-LB MLB1B

Pin4: Inductive sensor IS2B / Muting-LB MLB2B

Pin5: Common Collector

Pin6: Light barrier 2

Pin7: Inductive sensor IS1A / Muting-LB MLB1A

Pin8: Inductive sensor IS2A / Muting-LB MLB2B

Pin9: Error indication

Gardix GX-M Accident Prevention System

6. Signals and Operating Modes

The operating modes are displayed via LED's (light diodes)

The sensors have LED's which are visible from the front of the lens as well the rear of the device.

The controller gives the following display signals:

- 1 green LED switching-signal for each connected safety light barrier (Max. 3 LED's)
- 1 yellow LED pollution signal for each connected safety light barriers (Max. 3 LED's)
- 1 red LED-Alarm.
- 2 LED's which display the operating mode of controller.
- 1 LED who display the muting mode
- 1 LED for each connected muting-device. (IS or MLB max. 4 LED's)

Type	All rays free	Minimum 1 ray interrupted	Bad alignment of transmitter and receiver or polluted	Disturbance	Muting IS / MLB in pairs activated	IS / MLB not activated
Controller GX-M	All switching signals LED's = Green	Switching signals LED=off	Pollution signal LED= on (yellow)	Alarm-LED = On (Red)	IS1A/MLB1A + IS1B/MLB1B or IS2A/MLB1A + IS2B/MLB1B activated=green	Operating signal: LED: =off
Muting					Muting = red	
Operating mode	Operating modes LED=green Independent of Muting	Operating modes LED = Red when Muting active LED = Green			ext.Muting-indication = ON Operating-mode LED = Green	
Receiver IUD-E / IUL-E	Green	Red	Yellow	Flashing symmetrical red		
Transmitter IUD-S / IUL-S	Green	Green	Green			
Muting elements				Flashing symmetrical red	green	red

Systems with Restart Blocking Modus:

If a ray of a safety light barrier is interrupted, outside of Muting operation, the Restart Blocking System is activated and the Alarm-LED is blinking.

Operation with Muting Light Barriers or NAMUR inductive sensors:

To start the system, all rays of Muting Light Barriers must be free. Interrupted rays of Muting Light Barriers are indicated by green LED blinking.

7. Output Table

Output	Muting active	All rays free	Minimum 1 ray interrupted and no muting activated	Bad alignment of transmitter and receiver or polluted.	Disturbance	Short circuit at VA-Output
Relay-contact NO	closed	closed	open	closed	open	no influence
Relay-contact NC	open	open	closed	open	closed	no influence
ext. Muting-signal	closed	no influence	no influence	no influence	open	no influence
VA NPN-Output	open / High	open / High	open / High	closed / Low	open / High	open / High

8. Installation Instructions

8.1 Distance of Light Barrier from Dangerous Zone

In order to ensure a safe switch-off of the GARDIX system, there should be a minimum distance from the light barriers to the dangerous zone.

The required minimum distance can be calculated in accordance with prEN 999, by using the following formula:

$$S = K \times T + C$$

- S: Required safety distance in mm.
- K: Approach speed
- T: T1 + T2 Complete adaptability
- T1: Reaction time of the GARDIX safety system
- T2: Reaction time of the device / installation.
- C: Additional distance

whereby:

$$K = 1600 \text{ mm/s}$$
$$C = 850 \text{ mm}$$

And so:

$$S = 1600 \times T + 850\text{mm}$$

Example:

The GARDIX system, is used as a light curtain for personal safety on a dangerous working environment. In order to protect the access (prEN999) 3 light beams are used.

T2=150 ms	= 0,15 s	(Average switch-off time of an average press machine)
T1 = 30ms	= 0,03s	Reaction time of the GARDIX system
K	= 1600mm/s	Approach speed
Z	= 850mm	Additional distance
S	=	1600 (0,03 + 0,15) + 850
S	=	1600 0,18 + 850
S	=	288 + 850
S	=	1138mm

The required distance from the light barriers to the dangerous environment must be at least 1138 mm.

Gardix GX-M Accident Prevention System

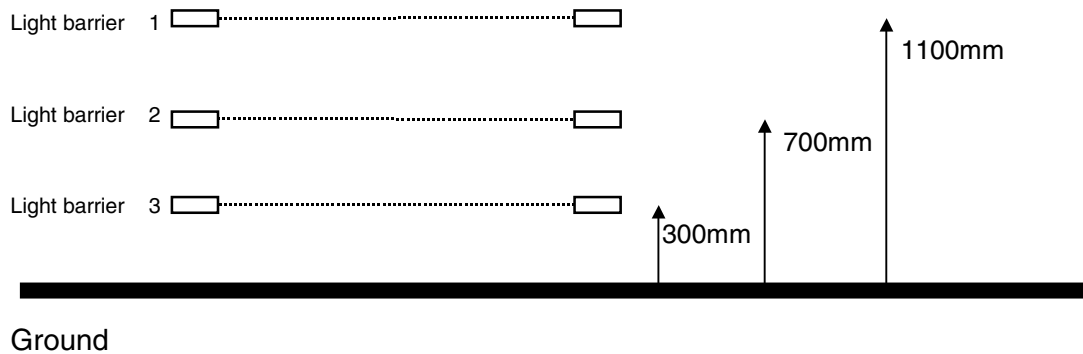
8.2 Installation of a GARDIX Protective Field

The GARDIX GX-M system can be used to install a protective field with a maximum of 3 light barriers and a Human-Device-Differentiation facility. The instructions for planning and installation must be followed in accordance with prEN 999.

8.2.1 Configuration of the safety light barriers

Example:

The GARDIX-GX-M protective field with 3 individual light beams (light barriers) for access safety.



Should there be a risk assessment, so that a protective field must be used with several individual light beams, the following installation distances must be applied:

Number of beams / Light barriers	Distances greater than the reference level e.g. floor in mm, in acc. with prEN 999
3	300, 700, 1100
2	400, 900

Gardix GX-M Accident Prevention System

8.2.2 Configuration of the Safety Inductive sensors for Muting:

Example GX-M22R:

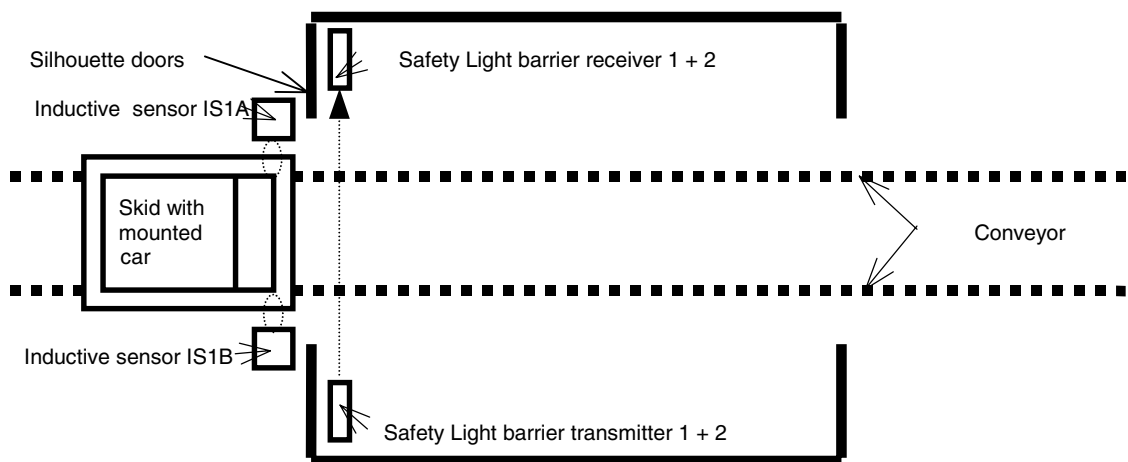
GARDIX-personal safety system with two light barriers and a simple muting system with two inductive sensors for monitoring a work environment. GX-M22-R system

Based on a risk analysis, it should be decided whether a two-ray protection system is permissible, or otherwise a protection zone with 3 rays should be installed in accordance with Paragraph 8.2.1.

Access to an dangerous zone should be monitored, so that the personal protection system is only triggered off, when a person enters the area and an approaching process object does not cause the device to cease working.

Example

Simplified diagram of a spray painting cabin without silhouette doors and other mechanical switches



If no skid is approaching, access is allowed and an interruption of the light ray results in the installation switching itself off.

Should the approaching skid now trigger of both the inductive sensors IS1A and IS1B simultaneously (in less than 1 second), the light barrier is muted inside the controller. The approaching skid therefore does not trigger any alarm signal. Should the approaching skid no longer be recognized by one of the two inductive sensors, the muting function is recognized by one of the two inductive sensors, the muting system is devided again. An interruption of the light ray results again in the device switching-off. Only after the shutdown of both the inductive sensors can a new muting function take place.

For this solution, using two inductive sensors, the distance between the inductive sensors to the light barriers must be kept as close as possible. The goods transported on the skid must not protrude from the carriage (skid), otherwise a personal alarm will sound.

Gardix Systems using four inductive sensors (GX-M4-) are most suitable for more complex problem-solving.

Our experts will be happy to advise you.

Gardix GX-M Accident Prevention System

Important:

The inductive sensors can only be installed in pairs IS1A/IS1B and IS2A/IS2B.

For activate Muting operation, both inductive sensors of a pair must be activated within 1 second.

After Muting is activated, only 1 activated inductive sensor is enough for preserve the Muting Modus.

The distance between one pair of inductive sensors should not be less than 50 cm.

The distance between one pair of inductive sensors to a sensor of another pair should not be less than 15 cm.

The inductive sensors are active technical safety elements, which are continuously monitored by the GX-M system.

The GX-M system has been adapted by Matrix, based on the versions released.

By using silhouette doors or similar safety devices, it must be ensured that the safety light barrier, muted by the inductive sensors cannot be bypassed. Reaction time and safety distances of the machine/installation and the system GX-M must be respected.

Gardix GX-M Accident Prevention System

8.2.3 Configuration of Muting-Light-Barriers

Example System GX-M22-LR:

Gardix personal safety system with two safety light barriers and a simple Muting system with 2 Muting Light Barriers for monitoring a work environment.

Based on a risk analysis, it should be decided whether a two-ray protection system is permissible, or otherwise a protection zone with 3 rays should be installed in accordance with Paragraph 8.2.1.

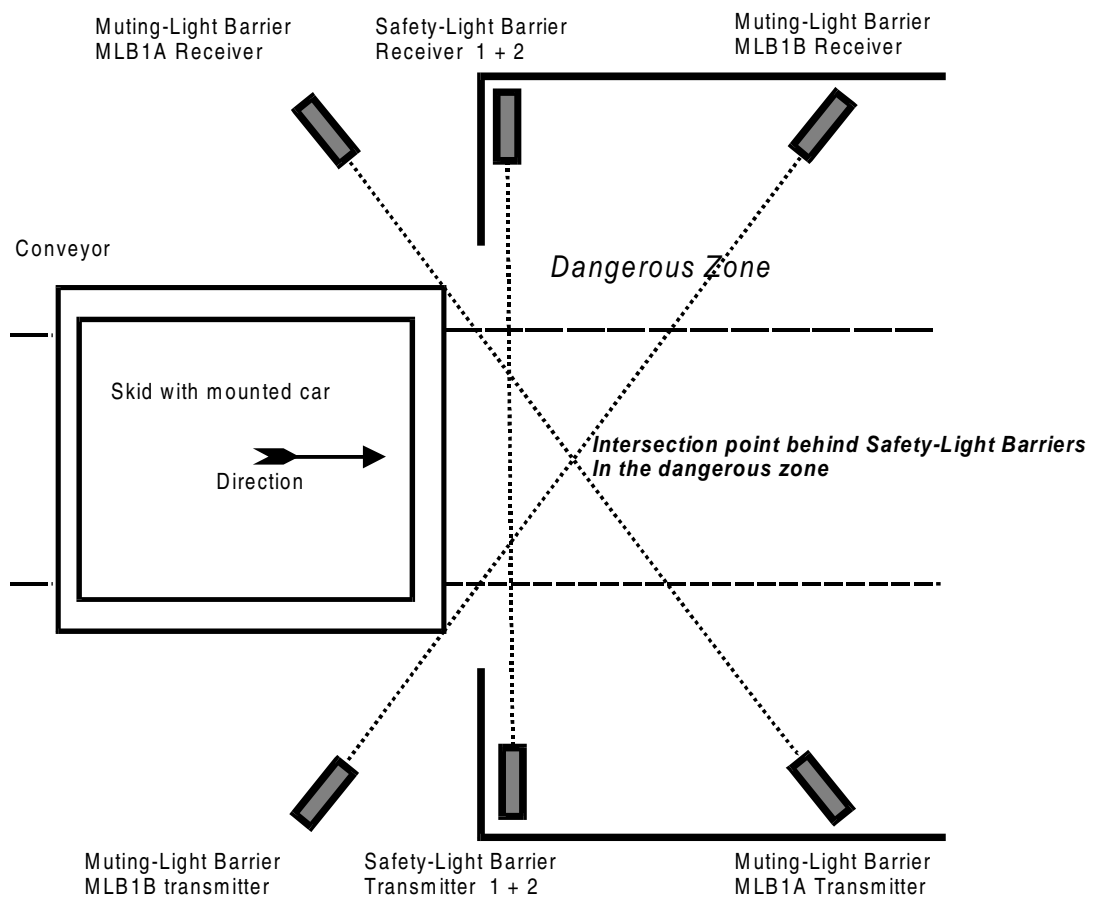
By using silhouette doors or similar safety devices, it must be ensured that the Safety Light Barriers, muted by the Muting Light Barriers cannot be bypassed

The safety distances and reaction time of machine/installation and the system GX-M must be respected.

Access to a dangerous zone must be monitored, so that the personal protection system is only triggered off, when a person enters the dangerous area. An approaching process object does not stop the device.

Example 1:

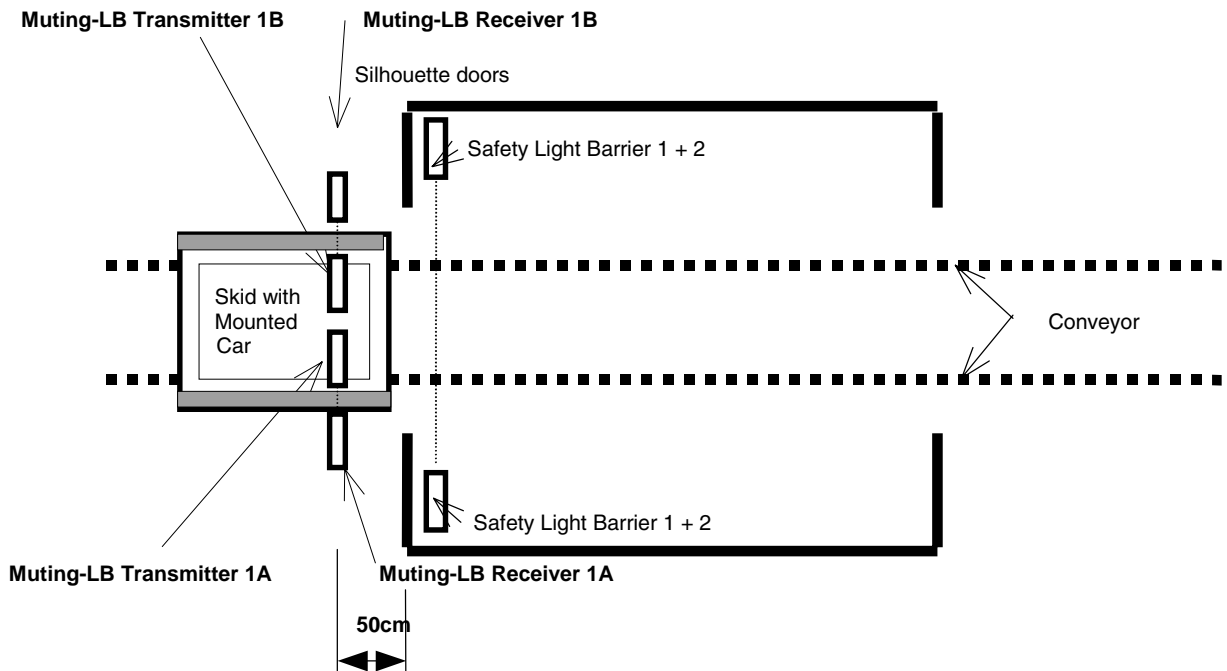
Simplified diagram of a spray painting cabin without silhouette doors and other mechanical switches.



Gardix GX-M Accident Prevention System

Example 2:

Simplified diagram of a spray painting cabin without silhouette doors and other mechanical switches.



Activating the GX-M System with Muting-Light- Barriers :

In order to activate the system, the light beams of all the muting light barriers must be free. Interrupted light beams from the muting-LB are displayed by flashing of the relevant green LED's.

In order to activate the muting, the light beams from both of the Muting Light Barriers (MLB) must be interrupted within one second.

If one of the two light beams is not interrupted again, the muting is stopped immediately. The other light beam must also be not interrupted again within 1 second. Should this not occur, the system activates an alarm and switches off the outputs. This is displayed by the illumination of the alarm-LED and by flashing of the Muting-LED. If the pair of MLB-1 light barriers trigger an alarm, then the LED-MLB1A is also activated. If the MLB2 light barriers trigger an alarm, then the MLB2A-LED is activated.

By using silhouette doors or similar safety devices, it must be ensured that the safety light barrier, muted by Muting Light Barriers cannot be bypassed. Safety distances and reaction time of machine/installation and the system GX-M must be respected.

Gardix GX-M Accident Prevention System

8.2.4 Configuration of the NAMUR Inductive sensors for Muting:

Example GX-M2N2R:

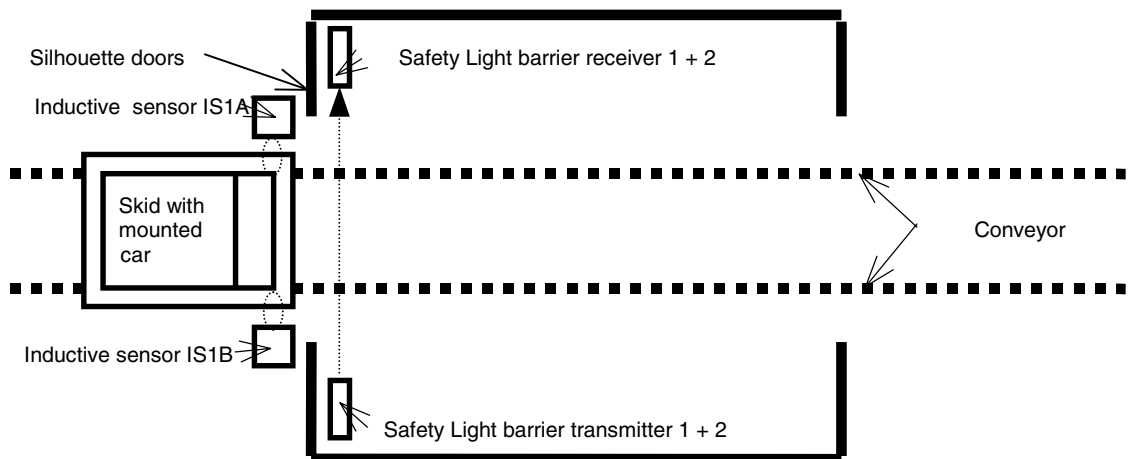
GARDIX-personal safety system with two light barriers and a simple muting system with two NAMUR inductive sensors for monitoring a work environment.

Based on a risk analysis, it should be decided whether a two-ray protection system is permissible, or otherwise a protection zone with 3 rays should be installed in accordance with Paragraph 8.2.1.

Access to an dangerous zone should be monitored, so that the personal protection system is only triggered off, when a person enters the area and an approaching process object does not cause the device to cease working.

Example

Simplified diagram of a spray painting cabin without silhouette doors and other mechanical switches



If no skid is approaching, access is allowed and an interruption of the light ray results in the installation switching itself off.

Should the approaching skid now trigger of both the inductive sensors IS1A and IS1B simultaneously (in less than 2 seconds), the light barrier is muted inside the controller. The approaching skid therefore does not trigger any alarm signal. Should the approaching skid no longer be recognized by both inductive sensors, the muting system is devided again. An interruption of the light ray results again in the device switching-off.

For this solution, using two inductive sensors, the distance between the inductive sensors to the light barriers must be kept as close as possible. The goods transported on the skid must not protrude from the carriage (skid), otherwise a personal alarm will sound.

Start-Up Procedure:

No NAMUR inductive sensor must be activated on power-up. Activated inductive sensors will be indicated by flushing the green LED on the controller.

Gardix GX-M Accident Prevention System

Important:

The inductive sensors can only be installed in pairs IS1A/IS1B and IS2A/IS2B.

For activate Muting operation, both inductive sensors of a pair must be activated within 2 second.

For holding the Muting, both NAMUR inductive sensors must be activated.

The distance between one pair of inductive sensors should not be less than 50 cm.

The distance between one pair of inductive sensors to a sensor of another pair should not be less than 15 cm.

The inductive sensors are active technical safety elements, which are continuously monitored by the GX-M system.

The GX-M system has been adapted by Matrix, based on the versions released.

By using silhouette doors or similar safety devices, it must be ensured that the safety light barrier, muted by the inductive sensors cannot be bypassed. Reaction time and safety distances of the machine/installation and the system GX-M must be respected.

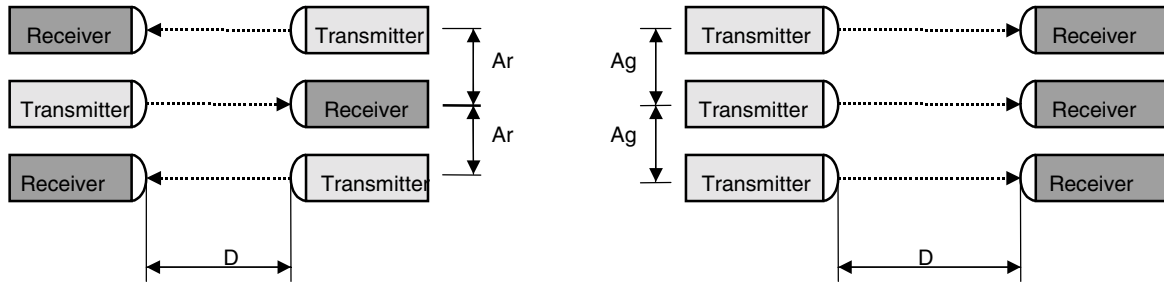
Gardix GX-M Accident Prevention System

8.3 Distances between individual Light Barriers:

In order to ensure a disturbance-free operation, there must be a minimum distance between the individual light barriers. Mutual influences of the pair of light barriers result in the GARDIX system switching-off. The distance can be reduced, by installing barriers in such a way that each time one transmitter and one receiver are next to one another. It must however be noted, that there could be a configuration in the opposite direction to undesired reflections (Proximity switch Effect). Such reflections result in the system switching-off.

Reverse-direction Configuration:

Same-direction Configuration:



The minimum distance A_g/A_r can be calculated according to the following formula:

$$A_g = \tan 2^\circ \times D = 0,035 \times D$$

$$A_r = A_g : 2$$

A_g = Minimum distance in cm
 $\tan 2^\circ = 0,035$
 D =Distance between transmitter and receiver in cm.

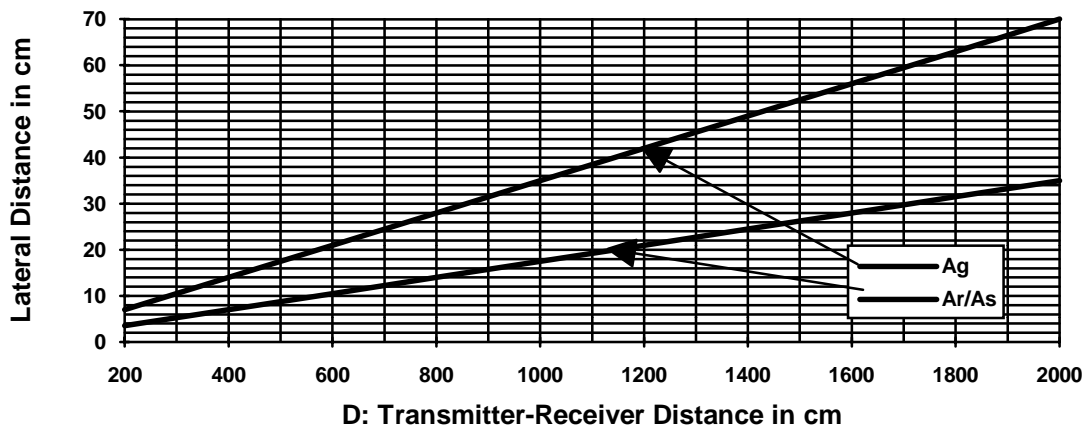
Example:

The light barrier distance is 300 cm. Two light barriers should be used. The reverse-direction configuration is effective:

$$A_r = \frac{0,035 \times 300}{2} = 5,3 \text{ cm}$$

Table of distances:

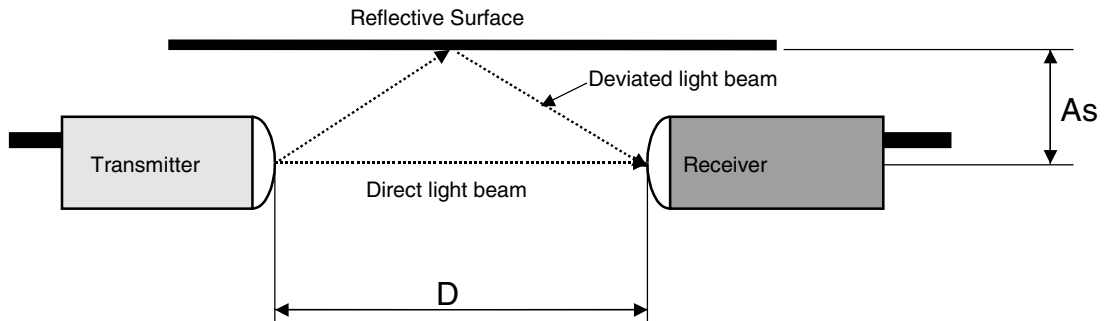
A_g :Distance between sensors with same-direction configuration
 A_r : Distance between sensors with reverse-direction configuration
 A_s :Distance between light beam and reflective surfaces



8.4. Mirror and Reflective Surfaces

8.4.1 Undesired Influence of Reflective Surfaces

Reflective surfaces can divert the light beam in such a way that there is no longer any protection from the dangerous zone. The distance of the light beam to the reflective surfaces must be ensured, in accordance with the formula below and with the Table of Distances, Paragraph 8.3.



Calculation of the A_s distance:

In order to calculate the A_s distance, the $D/2$ distance must be applied.

$$A_s = \tan 2^\circ \times D/2$$

A_s = Min distance income

$$\tan 2^\circ = 0,035$$

D =Distance between transmitter and receiver in cm

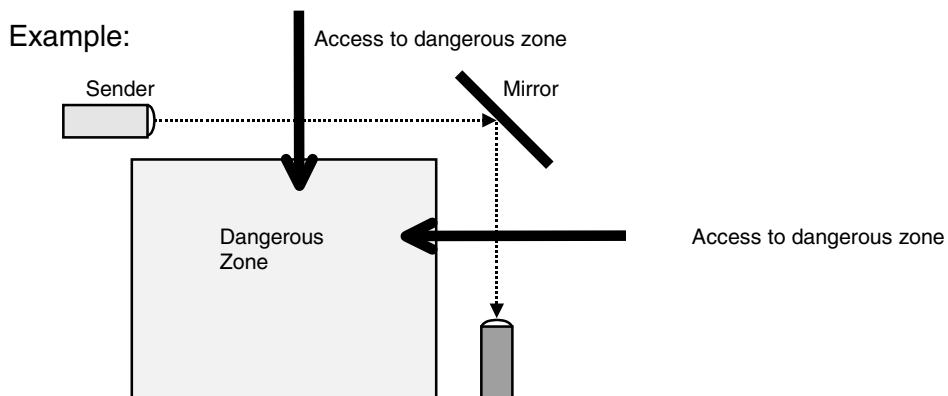
Example:

Distance $D = 500\text{cm}$

$$A_s = \tan 2^\circ \times \frac{D}{2} = 0,035 \times 250 = \mathbf{8,75\text{cm}}$$

8.4.2 Desired Application of Mirrors

The high flexibility of the GARDIX system generally enables all the safety protection duties to be performed without having to revert to the desired application mirrors. If the application of mirrors is unby-passable, light beams can certainly be diverted. The distance to the other reflective surfaces is however ensured, in accordance with Paragraph 8.4.1.



Gardix GX-M Accident Prevention System

8.5 Restart Blocking System (WAS)

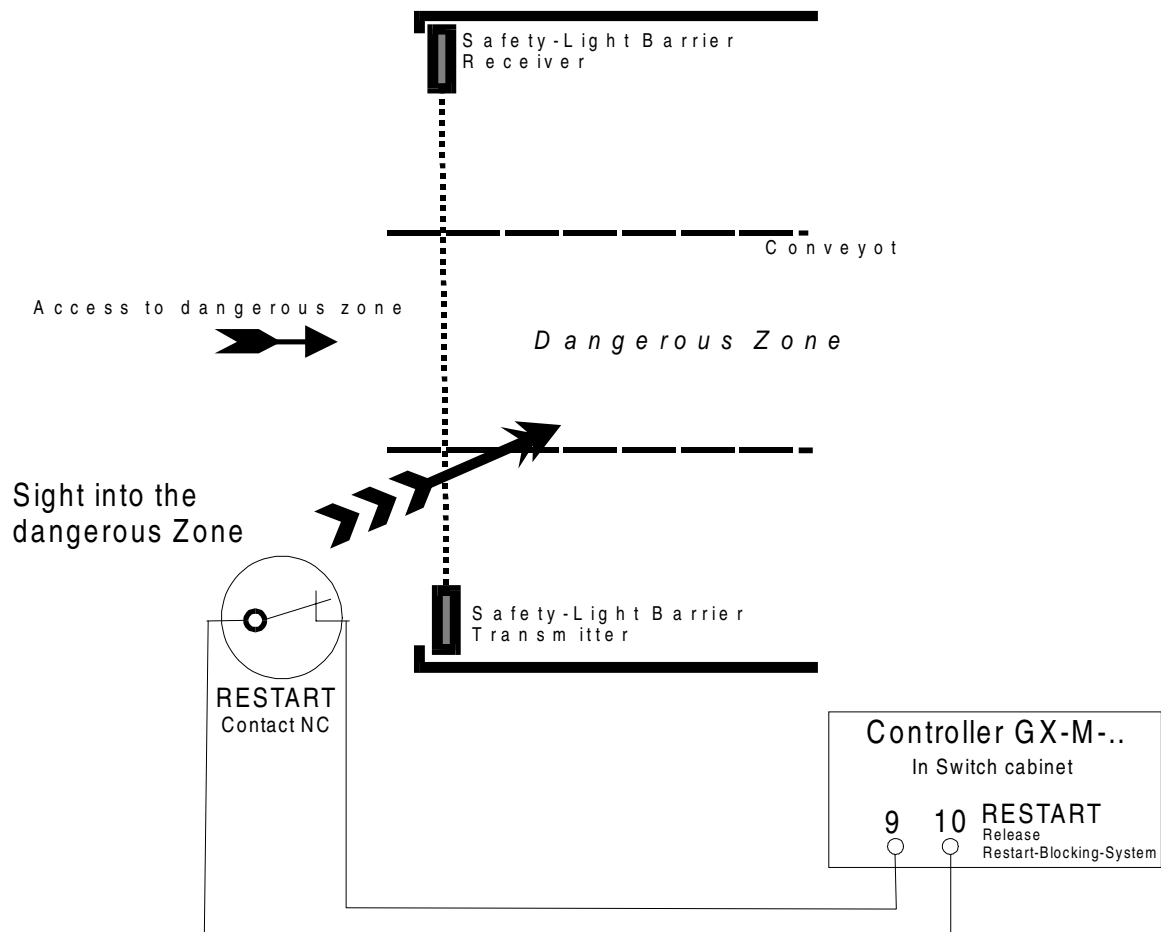
All systems are available with „Restart Blocking System“.

If the ray of the safety light barrier is interrupted outside of Muting operation, The Restart Blocking System is activated and indicated by Alarm/WAS -LED blinking.

The system can only be reactivated by „opening“ and then „closing“ the restart-contact or by pressing the RESET-button.

This procedure is only possible if the light beams are not interrupted. The restart switch must be positioned out of the dangerous area.

If the system is blocked, the output switches off. The sensors continuous in operational mode. This situation allows the alignment of all light barriers of the system. Don't forget „RESET“ of the system after installation.



8.6 Alignment of the light barriers

The optical opening angle of the sensors is only 4°. Great care should be taken when installing the sensors. A strong and permanent reinforcement is achieved by the design of the housing.

The sensor's display signal is also visible through the front of the lens, perfect alignment can easily be performed.

The transmitter lens is permanently illuminated green.

The receiver lens can display 3 colors:

Green: Light beam free and well aligned.

Yellow: Sensors badly aligned or dirt on lenses

Red: Sensors not aligned or light beam interrupted.

8.7 Connection of the GARDIX System

8.7.1 General Information

On installing and connecting all devices, the supply voltage should be interrupted. Care should be taken, when wiring up the cables in accordance with the connection lay-out. All the connections available to the sensors, including the screen and protective earth, must be connected.

8.7.2 EMC

The GARDIX system is both tested for both disturbance transmissions as well as its disturbance noise immunity and fulfills the highest requirements. In order to maintain this insensitivity towards disturbances, the following measures must be respected:

- The maximum permissible cable length must not be exceeded.
- Screens and protective earth's must be connected.
- The sensors cables must not be positioned alongside high voltage and strong current leads.
- If possible, the sensor's housing should be installed insulated from the protective earth. This insulation can be achieved using the clamps provided.

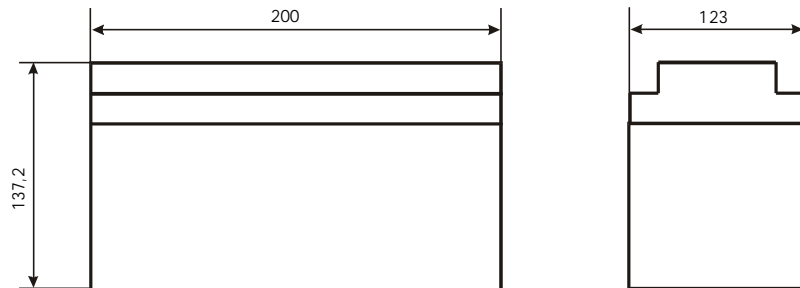
Gardix GX-M Accident Prevention System

8.7.3 Mechanical Reinforcement

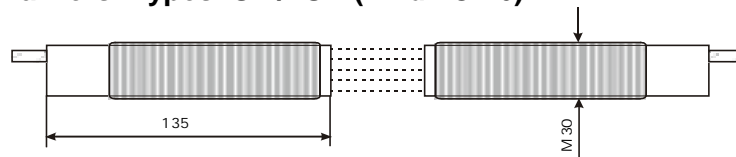
The sensors are reinforced using clamps or strong nuts. With the Ex-d sensors the instructions regarding explosion-proof protection must be followed and particular attention should be paid to the cable Lay-out.

8.7.4 Mechanical Dimensions

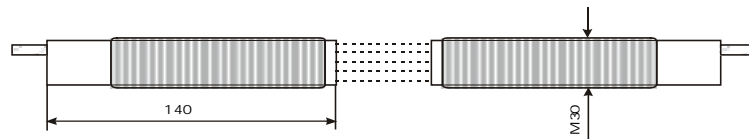
Controller GX-M



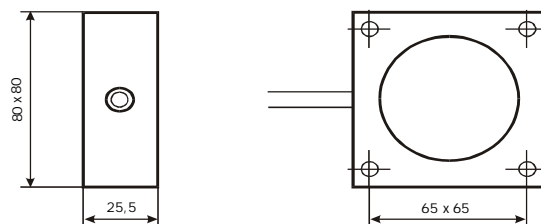
Safety Light-Barrier: Types IUL / IUD (Ex d IIC T6)



Muting Light-Barrier:



Muting Safety Inductive Sensors:

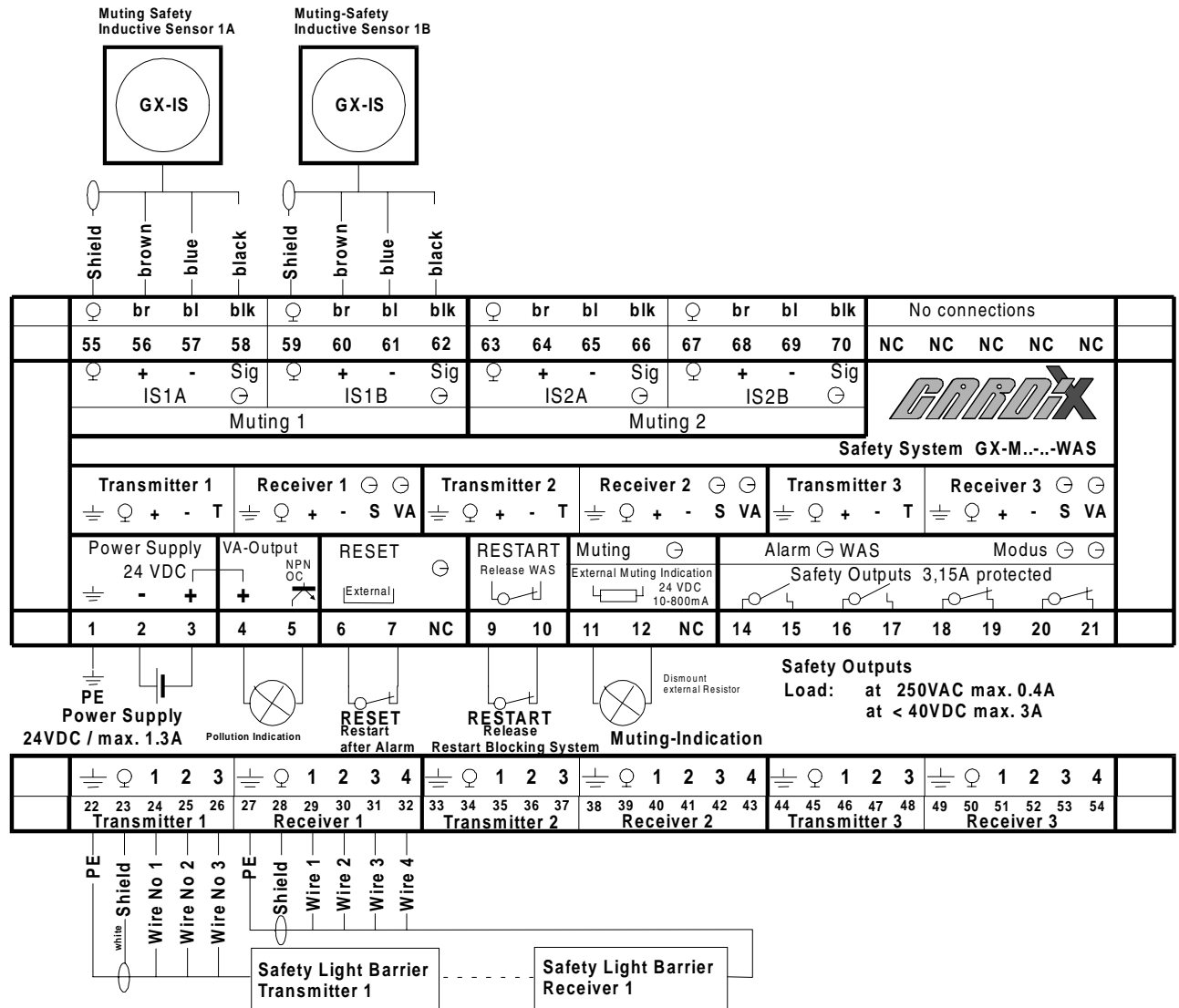


8.7.5 Post-switched Devices

Post switched devices must satisfy the technical safety conditions of level IV.

Gardix GX-M Accident Prevention System

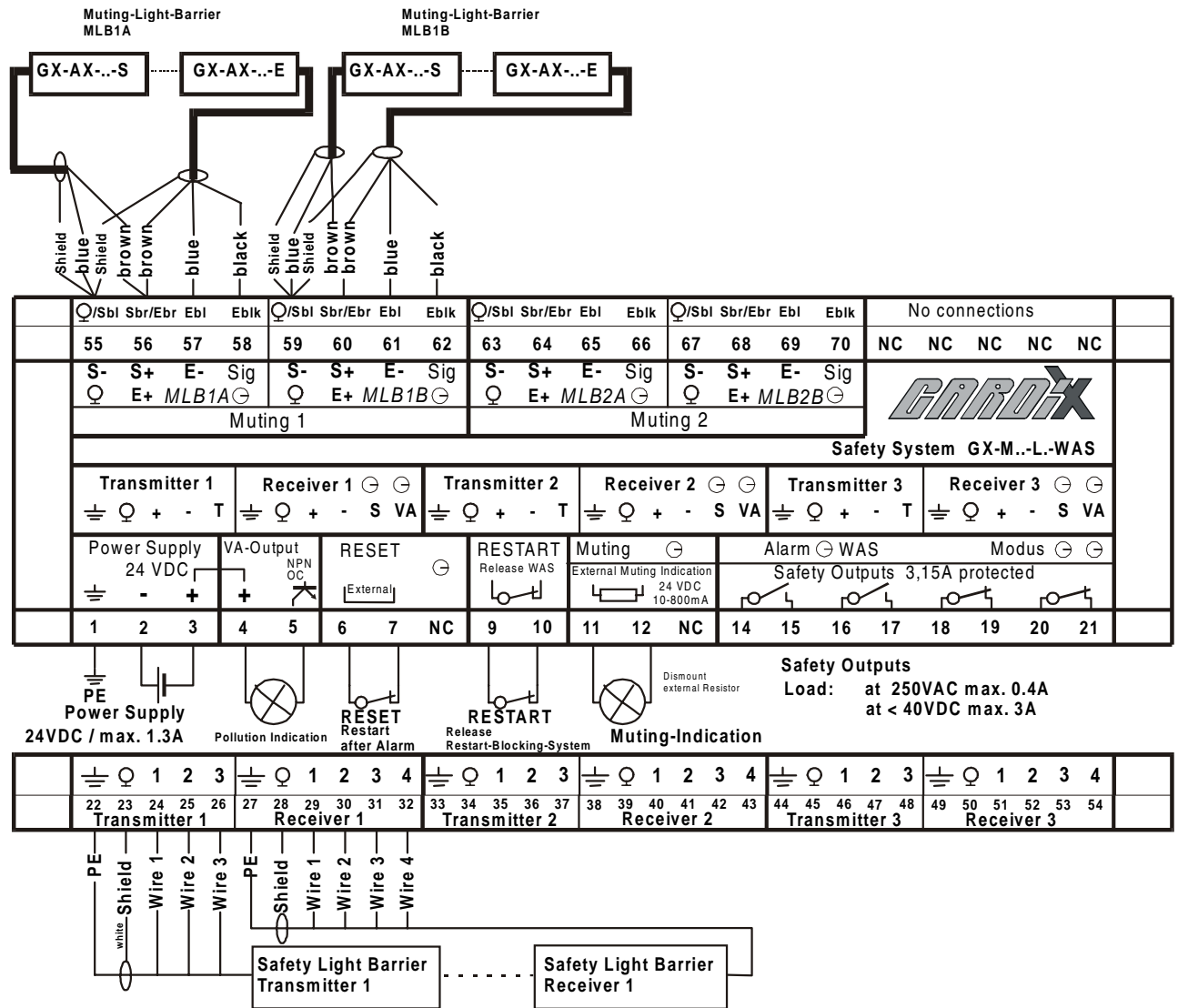
8.7.6 Connection Lay-out of the System GARDIX GX-M...(-WAS)



Pin	Connection	Pin	Connection	Pin	Connection
1	Power Supply Protection Earth	26	Safety Transmitter1 T _(Activation)	51	Safety Receiver 3 +
2	Power Supply Minus	27	Safety Receiver 1 PE	52	Safety Receiver 3 -
3	Power Supply Plus	28	Safety Receiver 1 Screen	53	Safety Receiver 3 Signal
4	VA-Pollution Signal +	29	Safety Receiver 1 +	54	Safety Receiver 3 VA
5	VA-Pollution Signal NPN	30	Safety Receiver 1 -	55	Inductive sensor IS1A Screen
6	External RESET	31	Safety Receiver 1 Signal	56	Inductive sensor IS1A +
7	External RESET	32	Safety Receiver 1 VA	57	Inductive sensor IS1A -
8	Not Connected	33	Safety Transmitter 2 PE	58	Inductive sensor IS1A Signal
9	Special Function	34	Safety Transmitter 2 Screen	59	Inductive sensor IS1B Screen
10	Special Function	35	Safety Transmitter 2 +	60	Inductive sensor IS1B +
11	External Muting Signal +	36	Safety Transmitter 2 -	61	Inductive sensor IS1B -
12	External Muting Signal -	37	Safety Transmitter 2 T _(Activation)	62	Inductive sensor IS1B Signal
13	Not Connected	38	Safety Receiver 2 PE	63	Inductive sensor IS2A Screen
14	Relay-Contact 1 NO	39	Safety Receiver 2 Screen	64	Inductive sensor IS2A +
15	Relay-Contact 1 NO	40	Safety Receiver 2 +	65	Inductive sensor IS2A -
16	Relay-Contact 2 NO	41	Safety Receiver 2 -	66	Inductive sensor IS2A Signal
17	Relay-Contact 2 NO	42	Safety Receiver 2 Signal	67	Inductive sensor IS2B Screen
18	Relay-Contact 3 NC	43	Safety Receiver 2 VA	68	Inductive sensor IS2B +
19	Relay-Contact 3 NC	44	Safety Transmitter 3 PE	69	Inductive sensor IS2B -
20	Relay-Contact 4 NC	45	Safety Transmitter 3 Screen	70	Inductive sensor IS2B Signal
21	Relay-Contact 4 NC	46	Safety Transmitter 3 +	71	Not connected
22	Safety Transmitter 1 PE	47	Safety Transmitter 3 -	72	Not connected
23	Safety Transmitter 1 Screen	48	Safety Transmitter 3 T _(Activation)	73	Not connected
24	Safety Transmitter 1 +	49	Safety Receiver 3 PE	73	Not connected
25	Safety Transmitter 1 -	50	Safety Receiver 3 Screen	75	Not connected

Gardix GX-M Accident Prevention System

8.7.7 Connection Lay-out of the System GARDIX GX-M..-L. - (WAS)

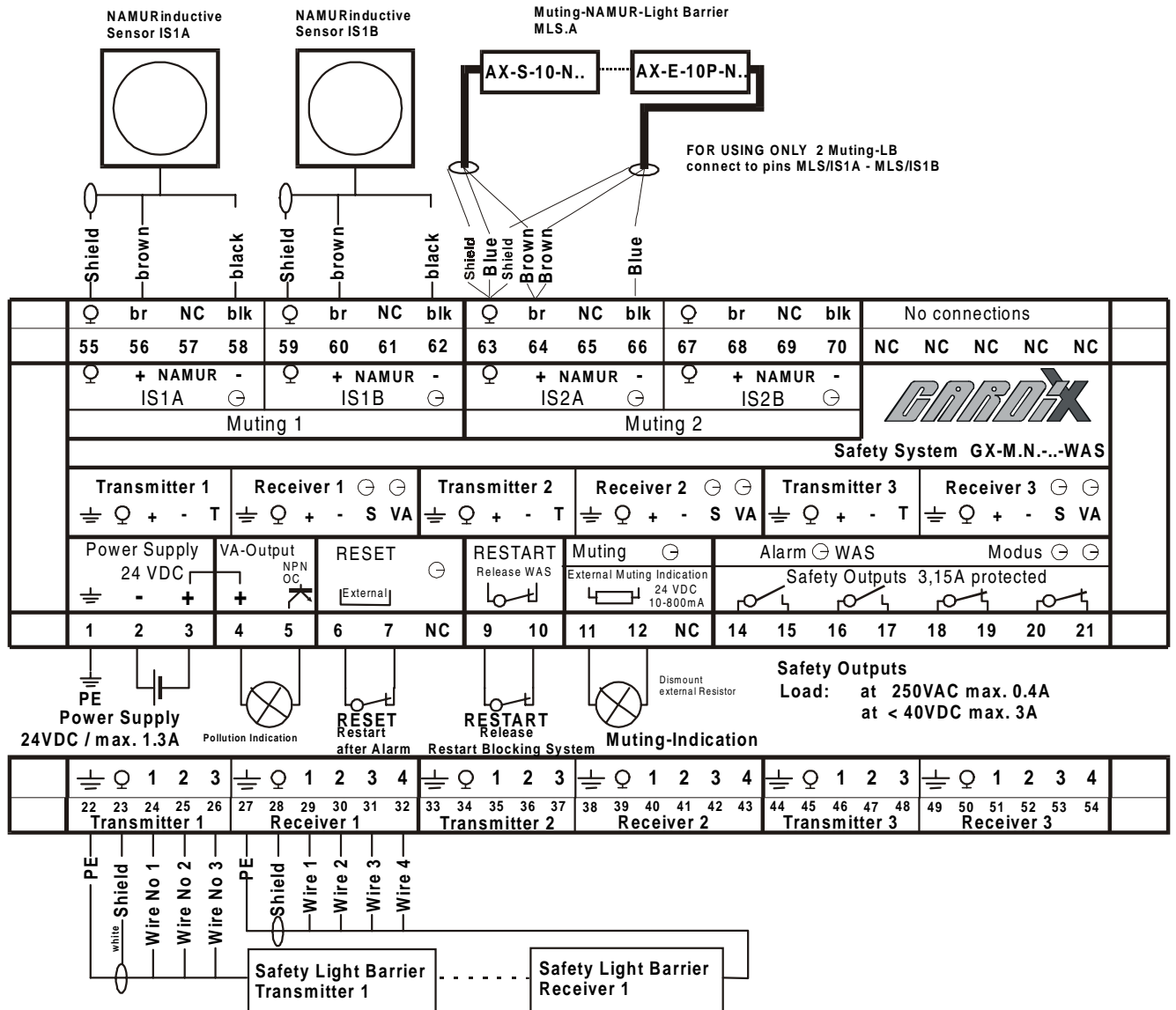


Pin	Connection	Pin	Connection	Pin	Connection
1	Power Supply PE	19	Relay-Contact 3 NC	37	Safety Transmitter 2 T(Activation)
2	Power Supply Minus	20	Relay-Contact 4 NC	38	Safety Receiver 2 PE
3	Power Supply Plus	21	Relay-Contact 4 NC	39	Safety Receiver 2 Screen
4	VA-Pollution Signal +	22	Safety Transmitter 1 PE	40	Safety Receiver 2 +
5	VA-Pollution Signal NPN	23	Safety Transmitter 1 Screen	41	Safety Receiver 2 -
6	External RESET	24	Safety Transmitter 1 +	42	Safety Receiver 2 Signal
7	External RESET	25	Safety Transmitter 1 -	43	Safety Receiver 2 VA
8	Not Connected	26	Safety Transmitter 1 T(Activation)	44	Safety Transmitter 3 PE
9	Special Function	27	Safety Receiver 1 PE	45	Safety Transmitter 3 Screen
10	Special Function	28	Safety Receiver 1 Screen	46	Safety Transmitter 3 +
11	External Muting-Signal +	29	Safety Receiver 1 +	46	Safety Transmitter 3 -
12	External Muting-Signal -	30	Safety Receiver 1 -	48	Safety Transmitter 3 T(Activation)
13	Not connected	31	Safety Receiver 1 Signal	49	Safety Receiver 3 PE
14	Relay-Contact 1 NO	32	Safety Receiver 1 VA	50	Safety Receiver 3 Screen
15	Relay-Contact 1 NO	33	Safety Transmitter 2 PE	51	Safety Receiver 3 +
16	Relay-Contact 2 NO	34	Safety Transmitter 2 Screen	52	Safety Receiver 3 -
17	Relay-Contact 2 NO	35	Safety Transmitter 2 +	53	Safety Receiver 3 Signal
18	Relay-Contact 3 NC	36	Safety Transmitter 2 -	54	Safety Receiver 3 VA

Pin	Connection	Pin	Connection	Pin	Connection	Pin	Connection
55	MLB1A Transmitter Screen	59	MLB1A Transmitter Screen	63	MLB1A Transmitter Screen	67	MLB1A Transmitter Screen
	MLB1A Transmitter Minus		MLB1A Transmitter Minus		MLB1A Transmitter Minus		MLB1A Transmitter Minus
	MLB1A Receiver Screen		MLB1A Receiver Screen		MLB1A Receiver Screen		MLB1A Receiver Screen
56	MLB1A Transmitter Plus	60	MLB1A Transmitter Plus	64	MLB1A Transmitter Plus	68	MLB1A Transmitter Plus
	MLB1A Receiver Plus		MLB1A Receiver Plus		MLB1A Receiver Plus		MLB1A Receiver Plus
57	MLB1A Receiver Minus	61	MLB1A Receiver Minus	65	MLB1A Receiver Minus	69	MLB1A Receiver Minus
58	MLB1A Receiver Signal	62	MLB1A Receiver Signal	66	MLB1A Receiver Signal	70	MLB1A Receiver Signal

Gardix GX-M Accident Prevention System

8.7.8 Connection Lay-out of the System GARDIX GX-M.N.-..(-WAS)



8.7.9 External Muting Display

Gardix GX-M Accident Prevention System

If the GX-M system has triggered off a muting function of the safety light barriers initiated by the inductive sensors, this is then displayed by an external warning light. This output is performed safely. The warning light must always be connected, otherwise the system recognizes a disturbance and switches off. The „external muting function-output“ must be loaded with a warning light with min. 250 mW and max. 19 W.

The output voltage is 20 to 28 VDC. There should be no foreign voltages.

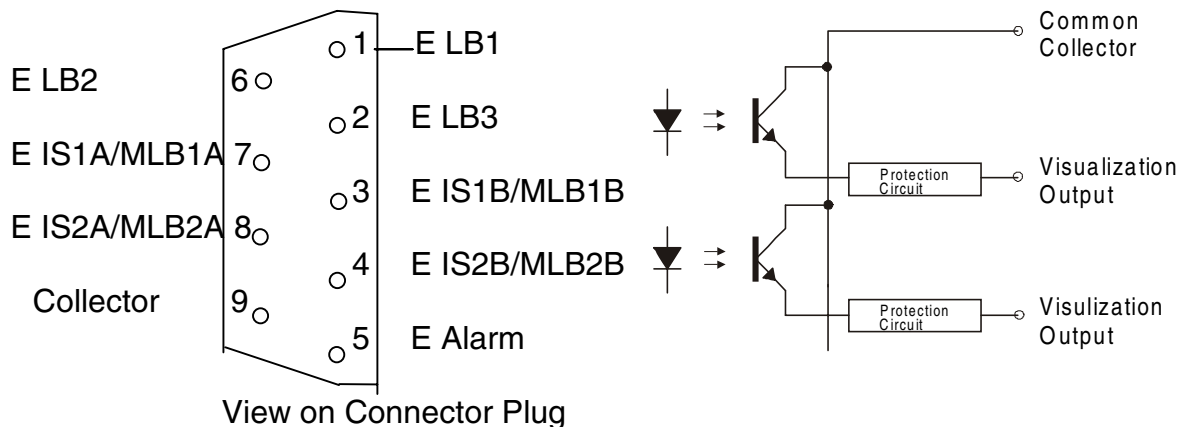
8.7.10 VA Pollution Signal

The safety light barrier's receivers recognize pollution from the transmitter or receiver lenses. In individual receivers, pollution can be detected by a yellow illuminated signal. The GARDIX- Controllers have a yellow LED- pollution-signal for each connected channel. In addition, the controller has a VA-pollution output. This output is activated, when one or more safety light barriers have recognized pollution on lenses.

The VA-output must not act as a safety function. It functions as an NPN-output with an open collector and is short-circuit-proof ($I_{max}=100mA$).

8.7.11 Visualization Output

The visualization output offers the possibilities of showing the individual modules of the system on one appropriate device. This output comes from a D-Sub-connector plug on the side of the housing.



Type: Optocoupler
 U_{max} : 30VDC
 I_{max} : 20mA

For connection, a 9-pin D-Sub-Housing is required.

The visualization-output must not act as any safety function

Gardix GX-M Accident Prevention System

9. Cleaning and Maintenance

- Each time the GARDIX system is operated, check its functionality.
- The lenses should be cleaned at regular intervals, at latest when the pollution signal is flashing
- Should a protection of the relay-output cycle cut off, only protections in accordance with the following specifications must be used:
5 x 20mm / 3,15A inert / Switch capacity 80A ©
The protection should only be used by fully qualified staff.

10. Elimination of Disturbances

10.11 Main causes for disturbances

The following sources can result in disturbances and therefore to the GARDIX System switching-off

- The external RESET-input has not been short-circuited.
- The contact RESTART „Release WAS“ / spec. Function is not closed
- The warning light for the muting signal is not connected, or is defect or shows a non-permissible load.
- Restart is only possible if the light beams of the muting light barriers are free.
- The contact „Release WAS“ is opened when Restart-Blocking-System is not activated.
- Transmitter of foreign light barriers, whose light falls on one of the receivers of the GARDIX system.
- Impulse light sources of another kind which directly or reflectively affect a GARDIX-receiver.
- Electromagnetic or electrostatic fields which affect either the sensors to whose cable it belongs or the controller
- Bad connection of the GARDIX-sensors
- Bad installation of the GARDIX-sensors e.g. transmitter 1 affects receiver 2.
- Non keeping of minimum distance between transmitters and receivers.
- Failure of a design element in the GARDIX system.

10.2 Error Elimination List

10.2.1 Controller

Should no LED in the Controller light up:

- Supply voltage has not been connected.
- Short circuit bridge „ext. Reset“ “ has not been connected
- Protection F1 (1A inert) cut off.

Device correctly connected.
Add correct „NC“contact or short-circuit bridge
Change Protection

Should muting 1 or 2 not work:

- IS or. MLB have been wrongly connected.
- Range of sensors has been exceeded.
- IS or MLB are not activated within 1 sec.

Check connections
Reduce distance between object and sensor

Display showing state of the MLB flashes

When activating the system, the light rays from all the MLB must be free.

Free light barrier or adjust MLB

Gardix GX-M Accident Prevention System

Should one or more LED channel not light up:

- Relevant light beam has been interrupted.
- Relevant light barrier has not been aligned
- Receivers have not been connected or have been wrongly connected
- Transmitters have not been connected or have been wrongly connected
- Light barriers transmitter or receiver is badly connected e.g. transmitter 1 affects receiver 2
- Too many light barriers have been connected

- Transmitter or receiver is defect

- Input switching cycle of the Controller is defect

Align LB

Check connections.

Check connections.

Check configuration.

Compare mark on type shield with connected No. e.g. GX-M32-R = 3 LB / 2

Exchange first receiver then transmitter

Exchange first receiver then transmitter, then controller

Should one or more LED pollution signals light up:

- Transmitter or receiver lens of the relevant light barrier is dirty.
- Relevant light barriers have not been aligned

Clean the lenses

Align LB.

Alarm-LED is flashing

WAS (restart blocking system) is activated

Release WAS

Should the LED alarm signal light up:

- Short-circuit bridge „Special Function“ has not been connected
- External muting signal has not been connected, or is defect or there is no permissible warning light.
- disturbance due to optical or electrical operating conditions
- Defect in the controller

Press RESET-button

Exchange controller, if error continuous after pressing RESET-button several times

Alarm-LED is on and Muting-LED is flashing

Disturbance is recognized by the MLB. The rays of MLB are not free or was not free in time

Press RESET -button

Should the relay-output not switch. LED-operating mode lights up green:

- Protection in the output cycle has been cut off.

Change protection
Note instructions in accordance with Chapter 10.

10.2.2 Receivers:

LED-Display always „red“

- Light beam has been interrupted
- Light barrier has not been aligned.
- Transmitter has not been or has been wrongly installed

Align LS.

Check connections.

LED-Display „yellow“

- Transmitter or receiver lens has become dirty
- Light barrier has not been aligned

Clean lens

Align LS.

LED-Display „green“ whilst LED channel-signal in the controller does not light up:

- Receiver has been aligned to a wrong transmitter.

Check light barrier pairing

LED-Display flashes „red“ symmetrically:

Gardix GX-M Accident Prevention System

- Disturbance because of optical or electrical operating conditions.
- If the disturbance continues, check the following influences:

Press RESET-button

- Foreign light sources.
- Connection of screen cable and protective earth.
- Check cable lay-out in accordance with Chap. 8.6.2.

- Technical defect not eliminate the disturbance,

Should the above measures

then ex-change the receiver.

10.2.3 Transmitter

LED-Display „green“ does not light up:

- Transmitter has not or has been wrongly connected

Check connections.

10.2.4 Inductive sensor

LED-Display always „red“

- Range has been exceeded.
- Reference object is not metallic or is not suitable (e.g. Aluminum)

Align device

LED-Display „green“ but is not muting:

- Both IS must be activated within one second

Check device

LED-Display flashes „red“ symmetrically

- Disturbance because of electrical operating conditions
- If the disturbance continues, check the followings influences:

Press RESET-button

- Connection of the cable screen
- Check cable lay-out in accordance with Chapter 8.6.2

- Defect not eliminate the disturbance,

Should the above measures

then exchange the sensor.

10.2.5 Muting-Light barrier

LED-Controller is blinking

- To start the system, rays of Muting-Light-Barriers may be not interrupted

- Remove object who interrupt light ray.
- Check alignment of MLB
- Restart the system

Safety Light Barriers for Accident Prevention

Gardix
IGS/IGN/IGD-30-S/E
IGS/IGN/IGD-L30-S/E
IGS/IGN/IGD-100x-II-S/E
GX-E-30-S/E
GX-E-L30-S/E
GX-E-0.1-GF-S/E

Approval accident prevention:
- Berufsgenossenschaft (BG)
Fachausschuss Eisen und Metall III

Approval ATEX:
- BVS, DMT 99 ATEX E056

Manual

Group

Tippkemper - Matrix GmbH
Meegener Str. 43 D-51491 Overath
Tel.:+49 2206 9566-0 Fax -19

Matrix Elektronik AG
Kirchweg 24 CH-5420 Ehrendingen
Tel.:+41 56 20400-20 Fax -29

Gardix Safety Light Barriers

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Gardix Safety Light Barriers

1. Manufacturer: Matrix Elektronik AG
Kirchweg 24
CH-5422 Oberehrendingen
Tel: ++41 56 2040020
Fax: ++41 56 2040029
E-mail: info@matrix-elektronik.com

2. Approvals:
Accident Prevention: BG Main Association of the Trade Association's Central Office
for Accident Prevention and Professional Medicine.
Technical Committee on „Iron and Metal III“
BG-Approval + EU-Design Model Approval
Ex-Protection: BVS / DMT

The safety light barriers GARDIX satisfies the following Norms:

98/37/EG	Machines Directive
EN 61496 Part 1	Safety of machinery.. Electrosensitive protective equipment. General requirements and tests
prEN 61496 Part 2	Safety of Machinery. Electrosensitive protective equipment. Particular requirements for systems, using active photo-electronic protective devices.
EN 294	Safety of machinery. Safety distances to prevent danger zones being reached by the upper limbs.
EN 954 Part 1	Safety of machinery. Safety-related parts of control system General principals of design
EN 999	Safety of machinery. Hand-/Arm-speed. Approach speed of parts of the body for the positioning of safety devices.
ZH 1/281	Safety regulations for electrosensitive protective equipment to power operated presses in the metal industry.
ZH 1/457	Safety regulations for controls to power operated presses in the metal industry.
EN 50014	Electrical apparatus for potentially explosive atmospheres. General requirements
EN 50018	Electrical apparatus for potentially explosive atmospheres. Flameproof enclosures „d“.
EN 50082-1/-2	EMC
EN 50081-1/-2	EMC
EN 60825-1	Safety of Laser Equipment's

Gardix Safety Light Barriers

3. Safety informations / General notes:

The GARDIX GX-E/IGS/IGN/IGD-10/30/L30-S/E and IGS/IGN/IGD-100A/B-II- S/E accident prevention and safety light barrier offers personal protection for dangerous working environments. Failures and disturbances result in the output switching-off.

The light barriers series GX-E/IGS/IGN/IGD-10/30/L30-S/E are approved as safety types 4.
The light barriers series IGS/IGN/IGD-100A/B-II-S/E are approved as safety types 2.

In order to guarantee safety of a work installation, all the elements connected to the Safety light barrier must also be tested or designed to conform to technical safety requirements (i.e. 2-channel function of the post-switched electromagnetic switch).
On connection at devices with electronic function, the maximum possible leakage current of 2mA must be observed.

By a functional installation, a bypassing of the light barrier must be avoided
The safe function of the light barrier must be tested periodically.

The installation, the maintenance and the testing must be done only by qualified personal.

Safety is only achieved, when all the following conditions regarding application, installation and maintenance are satisfied.

4. Types

	Type	Light Source	Range		Range with fibre optics	Supply voltage	Output	Ex
			min.	max				
Emitter	IGD-0.1-GF-S	Rot 670nm	--	--	0.1m	20 to 28VDC	--	EEx d
Receiver	IGD-0.1-GF-E		--	--	0.1m	20 to 28VDC	2 x PNP	EEx d
Emitter	IGD-30-S	IR 880nm	0,1m	30m	--	20 to 28VDC	--	EEx d
Receiver	IGD-30-E		0,1m	30m	--	20 to 28VDC	2 x PNP	EEx d
Emitter	IGD-100A/B-II-S	IR 880nm	0,5m	100m	--	20 to 28VDC	--	EEx d
Receiver	IGD-100 A/B - II-E		0,5m	100m	--	20 to 28VDC	2 x PNP	EEx d
Emitter	IGD-L30-S	Laser Cl. 2 650nm	0,1m	30m	--	20 to 28VDC	--	EEx d
Receiver	IGD-L30-E		0,1m	30m	--	20 to 28VDC	2 x PNP	EEx nA
Emitter	IGN-30-S	IR 880nm	0,1m	30m	--	20 to 28VDC	--	EEx nA
Receiver	IGN-30-E		0,1m	30m	--	20 to 28VDC	2 x PNP	EEx nA
Emitter	IGN-100A/B - II-S	IR 880nm	0,5m	100m	--	20 to 28VDC	--	EEx nA
Receiver	IGN-100A/B - II-E		0,5m	100m	--	20 to 28VDC	2 x PNP	EEx nA
Emitter	IGN-L30-S	Laser Cl. 2 650nm	0,1m	30m	--	20 to 28VDC	--	EEx nA
Receiver	IGN-L30-E		0,1m	30m	--	20 to 28VDC	2 x PNP	EEx nA
Emitter	GX-E-0.1-GF-S	Rot 670nm	--	--	0.1m	20 to 28VDC	--	--
Receiver	GX-E-0.1-GF-E		--	--	0.1m	20 to 28VDC	2 x PNP	--
Emitter	GX-E-30-S	IR 880nm	0,1m	30m	--	20 to 28VDC	--	--
Receiver	GX-E-30-E		0,1m	30m	--	20 to 28VDC	2 x PNP	--
Emitter	GX-E-L30-S	Laser Cl. 2 650nm	0,1m	30m	--	20 to 28VDC	--	--
Receiver	GX-E-L30-E		0,1m	30m	--	20 to 28VDC	2 x PNP	--
Emitter	IGS-100A/B - II-S	IR 880nm	0,5m	100m	--	20 to 28VDC	--	--
Receiver	IGS-100A/B - II-E		0,5m	100m	--	20 to 28VDC	2 x PNP	--

All devices are also available with Restart Blocking System “WAS” or Pollution Signal Output “VA”. (Not both functions in the same device)

Restart Blocking System: Additional denomination: GX-E/IGx-....-WAS

Pollution Signal Output: Additional denomination: GX-E/IGx-....-VA

Types for connection with fibre optics: GX-E-E/IGx-...-GF

The GF types must only be operated with connected fibre optics.

Gardix Safety Light Barriers

5. Technical Data:

Emitter wave length:

Types GX-E/IGx-30/100-S/E:	880nm Infrared
Type GX-E/IGD-0.1-GF-S/E:	640-680nm Red
Type GX-E/IGX-L30-S/E:	Laser Cl. 2, P < 1mW, 650nm

Optical beam pattern:

Types GX-E/IGx-10/30/L30:	maximum 4°
Types IGx-100A/B-II:	maximum 10°
Type: ..-0.1-GF:	maximum 15°

Current consumption:

Emitter (Infrared/Red):	30mA
Emitter (Laser):	70mA
Receiver:	50mA to 70mA

Response time:

Types GX-E/IGx-10/30/L30(-GF):	max. 12ms
Types IGx-100A/B-II:	max. 120ms (=Time until switching of relay outputs after interruption of light beam or occurrence of error)

Power-Up delay time:

<=1sec

Cable length:

up to 100m

Permissible Operating Temperature GX-E/IGx-..-S/E:

Types IGD / IGN -... :	-10°C to +50°C
Types IGS / GX-E-... :	-10°C to +60°C
Storage temperature:	-25°C to +70°C

Permissible Operating Temperature GX-E/IGx-L30-S/E:

Types IGD / IGN -L30 :	0°C to +50°C
Types IGS / GX-E-L30:	0°C to +50°C
Storage temperature:	-25°C to +70°C

Minimum detectable object size:

Types GX-E/IGx-10/30/L30:	Diameter minimum 20mm
Types IGx-100A/B-II:	Diameter minimum 50mm
Typ GX-E/IGD-0.1-GF:	Diameter minimum 1mm

An approaching object must show a minimum diameter in order to be clearly recognized.
With smaller object, the GARDIX system is unable to fulfil technical safety duty.

Outputs:

2 x Safety outputs PNP

I_{max.}: 100mA

Inductive loads must be provided with spark absorbers (recovery diodes, RC modules or other transient suppressors). In the OFF state, leakage currents up to 2mA are possible.

Pollution Output (optional):

1 x PNP

I_{max.}: 100mA

This output cannot be used for safety reason!

Gardix Safety Light Barriers

Types GX-E/IGD-0.1-GF-S/E: Fibre optics connection:

Type:	POF
Minimum length:	2m
Maximum length:	5m
Maximum core diameter:	1mm

The Safety Light Barriers series GX-E/IGD-0.1-GF-S/E-(WAS) must not be used without connected plastic optical fibres. The fibres must be mounted in an optical covered ambient.

6. Signals and Operating Mode

The operating modes, indicated by LED's, are also visible through the front lens

Type	Ray uninterrupted	Ray interrupted	Bad alignment of transmitter and receiver or polluted.	Restart Blocking System, activated	Disturbance
Receiver	Green	Red	Yellow	red or yellow or green flashing	Red or red flashing
Transmitter	Green	Green	Green	--	--

All types with integrated Restart Blocking System (WAS) available.

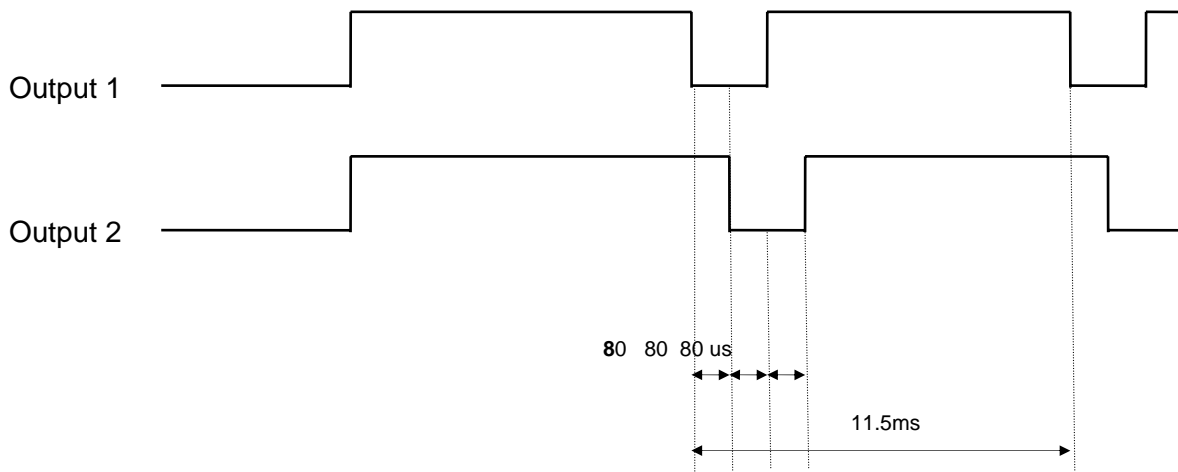
A blocked light barrier will be indicated by flashing LED's (Green, yellow or red , dependent on the switching state.)
With this indication mode an adjustment of the light barrier will be simplified.

7. Output Function

	Ray uninterrupted	Ray interrupted	Disturbance
Output1	PNP switched on	PNP switched off	PNP switched off
Output2	PNP switched on	PNP switched off	PNP switched off

At Safety Light Barriers, for function-test, the activated outputs are switched-off for a short time.

Safety-Receiver GX-E/IGx-0.1/10/30/100/L30(-GF)-E(-WAS):



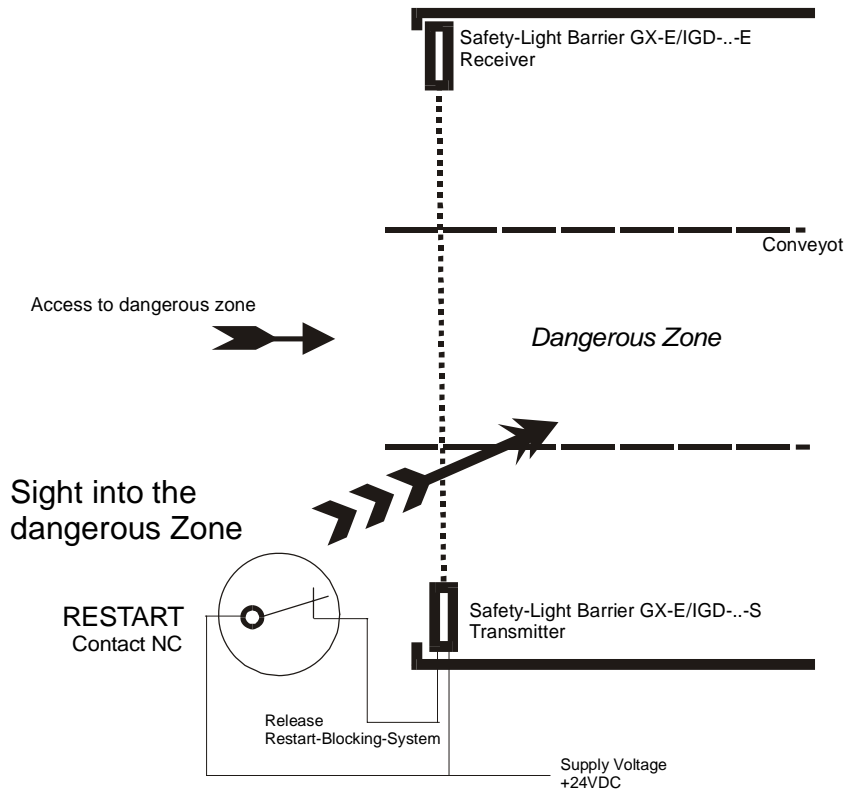
Gardix Safety Light Barriers

8. Restart Blocking System „WAS“ (optional)

All systems are available with Restart Blocking System.

If the light ray is interrupted, the Restart Blocking System is activated and the LED is flashing green, yellow or red, corresponding to the operational mode. The outputs are switched off. This allows a correct alignment of the light barriers. The restart blocking system can only switch-off when the light ray is uninterrupted. The system can only be restarted through „Open“ and then „Close“ of the contacts at the input „RS Restart“. The contact (NC) is to connect between the input RS and +24V (power supply receiver).

This procedure is only possible if the light beams are not interrupted. The restart switch must be positioned out of the dangerous area.



Gardix Safety Light Barriers

9. Installation Instructions

9.1 Distance of Light Barrier from Dangerous Zone

In order to ensure a safe switch-off of the GARDIX GX-E, there should be a minimum distance from the light barrier to the dangerous zone.

The required minimum distance can be calculated in accordance with prEN 999, by using the following formula:

$$S = K \times T + C$$

- S: Required safety distance in mm.
K: Approach speed
T: T1 + T2 Complete adaptability
T1: Reaction time of the GARDIX IGx / GX-E
T2: Reaction time of the device / installation.
C: Additional distance

whereby:

$$K = 1600 \text{ mm/s}$$

$$C = 850 \text{ mm}$$

And so:

$$S = 1600 \times T + 850 \text{ mm}$$

Example GX-E/IGx-10/30/L30:

Min. 2 GARDIX IGx/GX-E-10/30/L30 light barriers, are used for personal safety on a dangerous working environment.

The switch-off mechanism of the dangerous environment is also tested for safety by the test area.

T2 = 150 ms	= 0,15 s	(Average switch-off time of an average press machine)
T1 = 12ms	= 0,012s	Reaction time of the GARDIX GX-E / IGD
K	= 1600mm/s	Approach speed
Z	= 850mm	Additional distance

$$\begin{aligned} S &= 1600 (0,012 + 0,15) + 850 \\ S &= 1600 \quad 0,162 + 850 \\ S &= 259.2 + 850 \\ S &= \mathbf{1109.2 \text{ mm}} \end{aligned}$$

The required distance from the light barrier to the dangerous environment must be at least **1110 mm**.

Example GX-E/IGx-10/30/L30:

A GARDIX IGx-100A/B-II light barriers, is used for personal safety on a dangerous working environment.

The switch-off mechanism of the dangerous environment is also tested for safety by the test area.

T2 = 150 ms	= 0,15s	(Average switch-off time of an average press machine)
T1 = 120ms	= 0,12s	Reaction time of the GARDIX IGx-100A/B-II
K	= 1600mm/s	Approach speed
Z	= 850mm	Additional distance

$$\begin{aligned} S &= 1600 (0,12 + 0,15) + 850 \\ S &= 1600 \quad 0,27 + 850 \\ S &= 432 + 850 \\ S &= \mathbf{1282 \text{ mm}} \end{aligned}$$

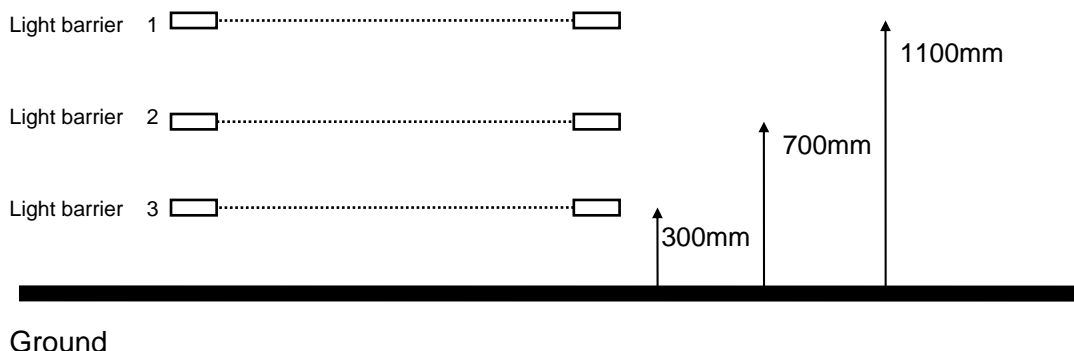
The required distance from the light barrier to the dangerous environment must be at least **1290 mm**.

Gardix Safety Light Barriers

9.2 Installation of a GARDIX Protective Field

The GARDIX GX-E can be used to install a protective field with an unlimited number of light barriers. For multichannel safety systems other Gardix systems are suitable like GX-C and GX-M. The instructions for planning and installation must be followed in accordance with prEN 999.

9.2.1 Configuration of the safety light barriers



Should there be a risk assessment, so that a protective field must be used with several individual light beams, the following installation distances must be applied:

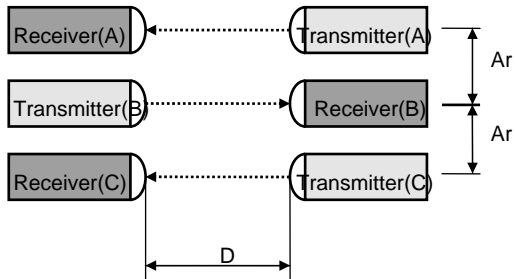
Number of beams / Light barriers	Distances greater than the reference level e.g. floor in mm, in acc. with prEN 999
3	300, 700, 1100
2	400, 900

9.3 Distances between individual Light Barriers:

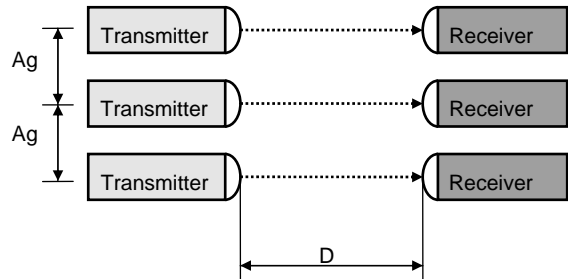
9.3.1 Types GX-E/IGx-10/30/L30, without type: GX-E/IGD-0.1-GF-S/E(-WAS)

In order to ensure a disturbance-free operation, there should be a minimum distance between the individual light barriers. Mutual influences of the pair of light barriers result in the GARDIX GX-E switching-off. The distance can be reduced, by installing barriers in such a way that each time one transmitter and one receiver are next to one another. At light barriers for object protection, use different frequency-types. (Types A to D).

Reverse-direction Configuration:



Same-direction Configuration:



The minimum distance Ag/Ar can be calculated according to the following formula:

$$Ag = \tan 2^\circ \times D = 0,035 \times D$$

$$Ar = Ag : 2$$

Ag = Minimum distance in cm
 tan 2° = 0,035
 D = Distance between transmitter and receiver in cm.

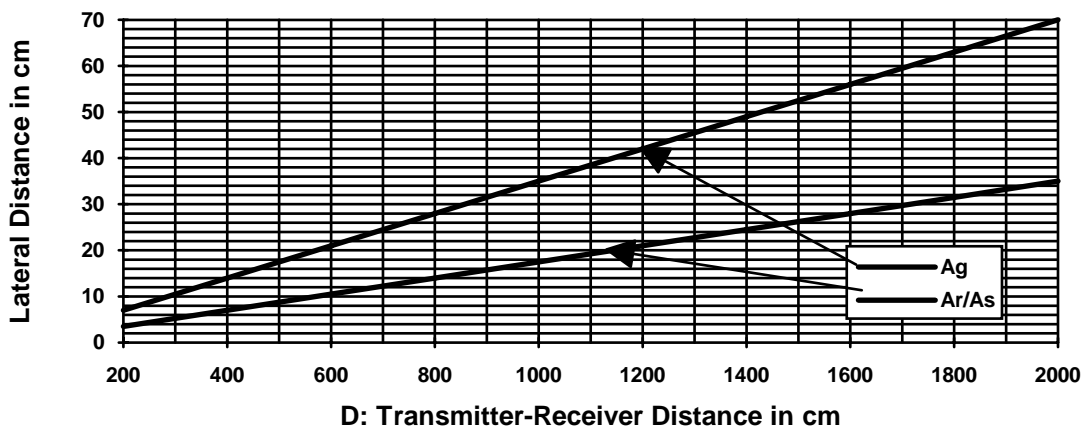
Example:

The light barrier distance is 300 cm. Two light barriers should be used. The reverse-direction configuration is effective:

$$Ar = \frac{0,035 \times 300}{2} = 5,3 \text{ cm}$$

Table of distances:

Ag: Distance between sensors with same-direction configuration
 Ar: Distance between sensors with reverse-direction configuration
 As: Distance between light beam and reflective surfaces

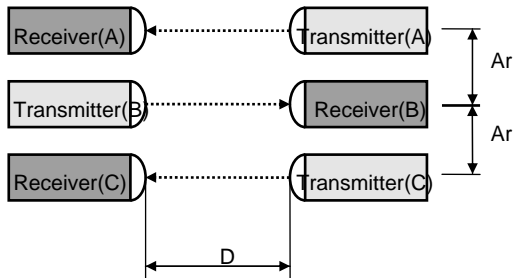


Gardix Safety Light Barriers

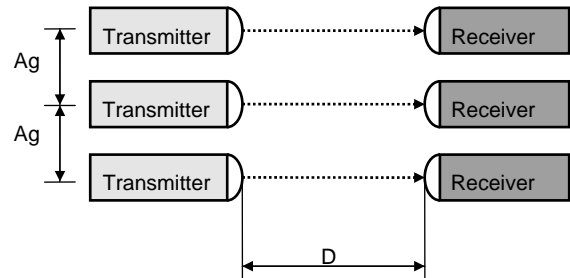
9.3.2 Types IGx-100A/B-II

In order to ensure a disturbance-free operation, there should be a minimum distance between the individual light barriers. Mutual influences of the pair of light barriers result in the GARDIX GX-E switching-off. The distance can be reduced, by installing barriers in such a way that each time one transmitter and one receiver are next to one another. At light barriers for object protection, use different frequency-types. (Types A to D).

Reverse-direction Configuration:



Same-direction Configuration:



Configuration:

The minimum distance A_g/A_r can be calculated according to the following formula:

$$A_g = \tan 5^\circ \times D = 0,087 \times D$$

$$A_r = A_g : 2$$

$$A_g = \text{Minimum distance in cm}$$

$$\tan 5^\circ = 0,087$$

$$D = \text{Distance between transmitter and receiver in cm.}$$

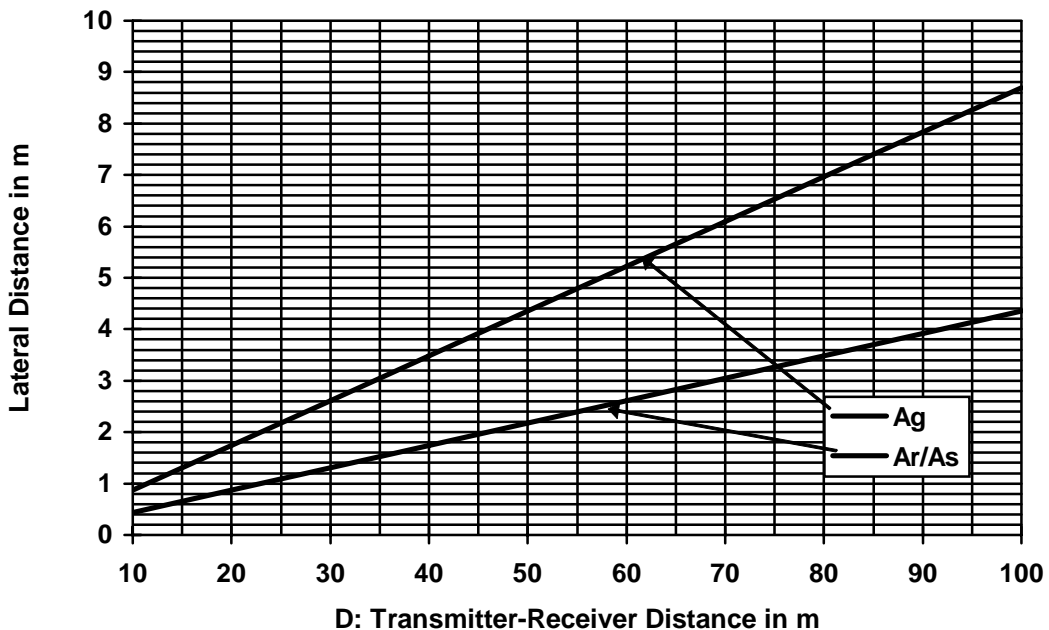
Example:

The light barrier distance is 10m. Two light barriers should be used. The reverse-direction configuration is effective:

$$A_r = \frac{0,087 \times 1000}{2} = 43.5\text{cm}$$

Table of distances:

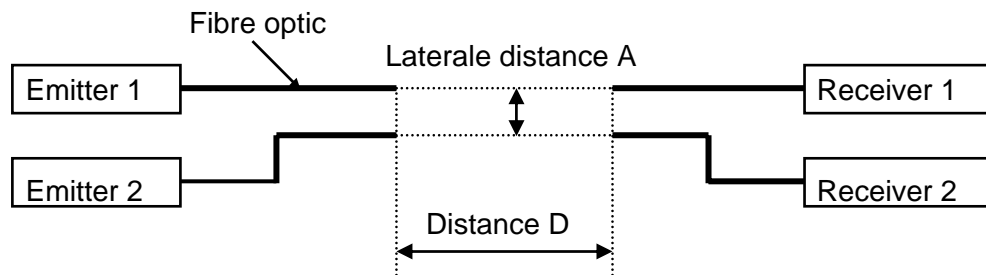
- Ag: Distance between sensors with same-direction configuration
- Ar: Distance between sensors with reverse-direction configuration
- As: Distance between light beam and reflective surfaces



Gardix Safety Light Barriers

9.3.3 Type: GX-E/IGD-0.1-GF-S/E(-WAS).

In order to ensure a disturbance-free operation, there should be a minimum distance between the individual fibre optics.



The minimum distance A can be calculated according to the following formula:

$$\begin{aligned} A_g &= \tan 20^\circ \times D = 0,364 \times D \\ A_r &= A_g : 2 \end{aligned}$$

$$\begin{aligned} A &= \text{Minimum distance in cm} \\ \tan 20^\circ &= 0,364 \\ D &= \text{Distance between transmitter} \\ &\quad \text{and receiver in cm.} \end{aligned}$$

On reverse-direction configuration the distance A can be divided by 2.

Example on same-direction configuration:

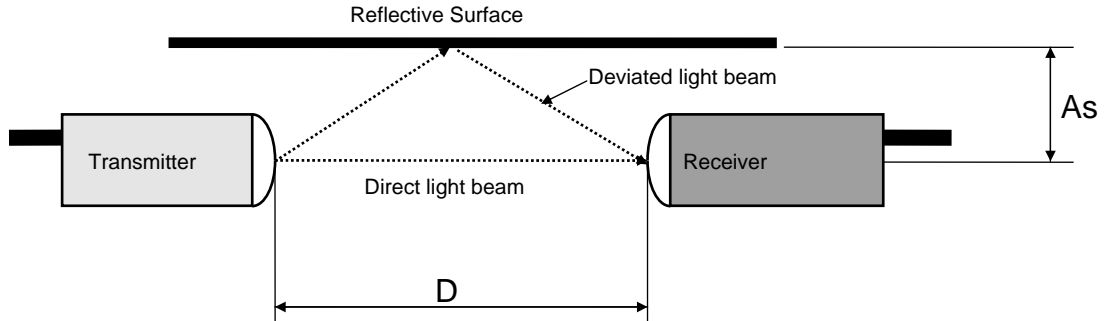
The observing distance is 5cm. Two light barriers should be used.

$$A = \tan 20^\circ \times 5\text{cm} = 0,364 \times 5 = 1,82\text{cm.}$$

9.4. Mirror and Reflective Surfaces

9.4.1 Types GX-E/IGx-10/30/L30: Undesired Influence of Reflective Surfaces

Reflective surfaces can divert the light beam in such a way that there is no longer any protection from the dangerous zone. The distance of the light beam to the reflective surfaces must be ensured, in accordance with the formula below and with the Table of Distances, Paragraph 9.3.



Calculation of the As distance:

In order to calculate the As distance, the D/2 distance must be applied.

$$As = \tan 2^\circ \times D/2$$

As = Min distance income

$$\tan 2^\circ = 0,035$$

D = Distance between transmitter and receiver in cm

Example:

Distance D = 500cm

$$As = \tan 2^\circ \times \frac{D}{2} = 0,035 \times 250 = \mathbf{8,75cm}$$

9.4.2 Type GX-E/IGx-0.1-GF-S/E: : Undesired Influence of Reflective Surfaces

Calculation of the As distance for the type GX-E/IGD-0.1-GF-SE(-WAS)

With an optical beam angle of 20°:

In order to calculate the As distance, the D/2 distance must be applied.

$$As = \tan 20^\circ \times D/2$$

As = Min distance income

$$\tan 20^\circ = 0,364$$

D = Distance between transmitter and receiver in cm

Example:

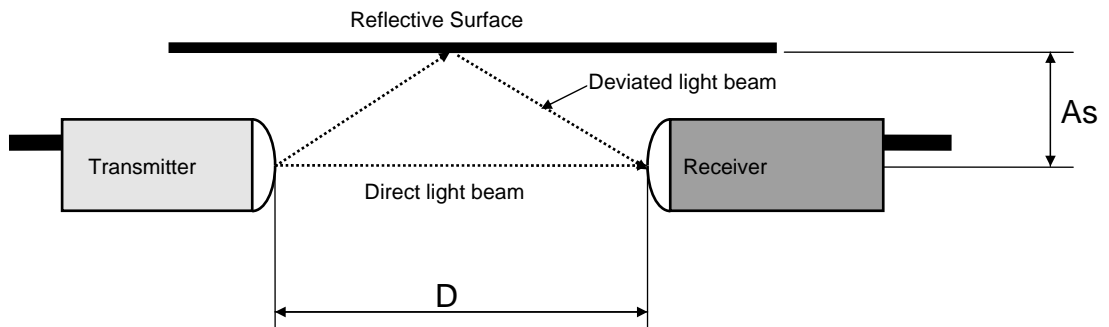
Distance D = 10cm

$$As = \tan 20^\circ \times \frac{D}{2} = 0,364 \times 5 = \mathbf{1,82cm}$$

Gardix Safety Light Barriers

9.4.3 Types IGx-100A/B-II: Undesired Influence of Reflective Surfaces

Reflective surfaces can divert the light beam in such a way that there is no longer any protection from the dangerous zone. The distance of the light beam to the reflective surfaces must be ensured, in accordance with the formula below and with the Table of Distances, Paragraph 9.3.



Calculation of the As distance:

In order to calculate the As distance, the D/2 distance must be applied.

$$As = \tan 5^\circ \times D/2$$

$$As = \text{Min distance income}$$

$$\tan 5^\circ = 0,087$$

$$D = \text{Distance between transmitter and receiver in cm}$$

Example:

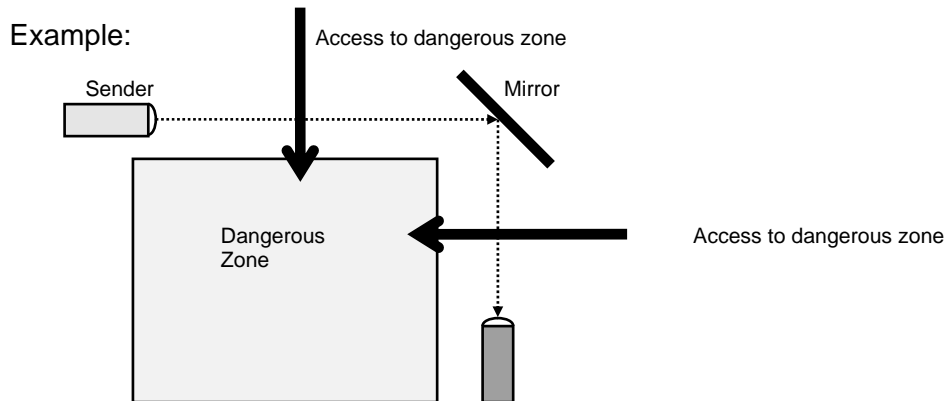
Distance D = 30m (3000cm)

$$As = \tan 5^\circ \times \frac{D}{2} = 0,087 \times 1500 = \mathbf{130.5cm}$$

Gardix Safety Light Barriers

9.4.4 Desired Application of Mirrors

The high flexibility of the GARDIX GX-E generally enables all the safety protection duties to be performed without having to revert to the desired application mirrors. If the application of mirrors is unbyassable, light beams can certainly be diverted. The distance to the other reflective surfaces is however ensured, in accordance with Paragraph 9.4.1.



9.5 Alignment of Light barrier

Since the optical opening angle of the sensors is only 4° , great care should be taken when installing the sensors. A strong and permanent reinforcement can be achieved because of the design of the housing.

Since the sensor's display signal is also visible through the front of the lens, perfect alignment can easily be performed.

The transmitter lens is permanently illuminated green.

The receiver lens can display 3 colors:

- Green: Light beam free and well aligned.
- Yellow: Sensors badly aligned or dirt on lenses
- Red: Sensors not aligned or light beam interrupted.

When the Restart Blocking System is activated, all 3 modus' are displayed by flashing LED's.

9.6 Laser-Light-Barrier GX-E-L30

9.6.1 Safety Notes

A Laser class 2 is used for the emitter GX-E-L30-S. The instructions for planning and installation must be followed in accordance with EN 60825-1 / ANSI 136.

SAFETY PRECAUTIONS:

1. Since a laser beam can be harmful to the eyes, avoid direct eye exposure.
2. Do not look directly into the laser beam output during operation.
3. Be aware that laser light, when reflected off a mirror-like surface, can also be dangerous. Terminate the laser beam to a fixed target.

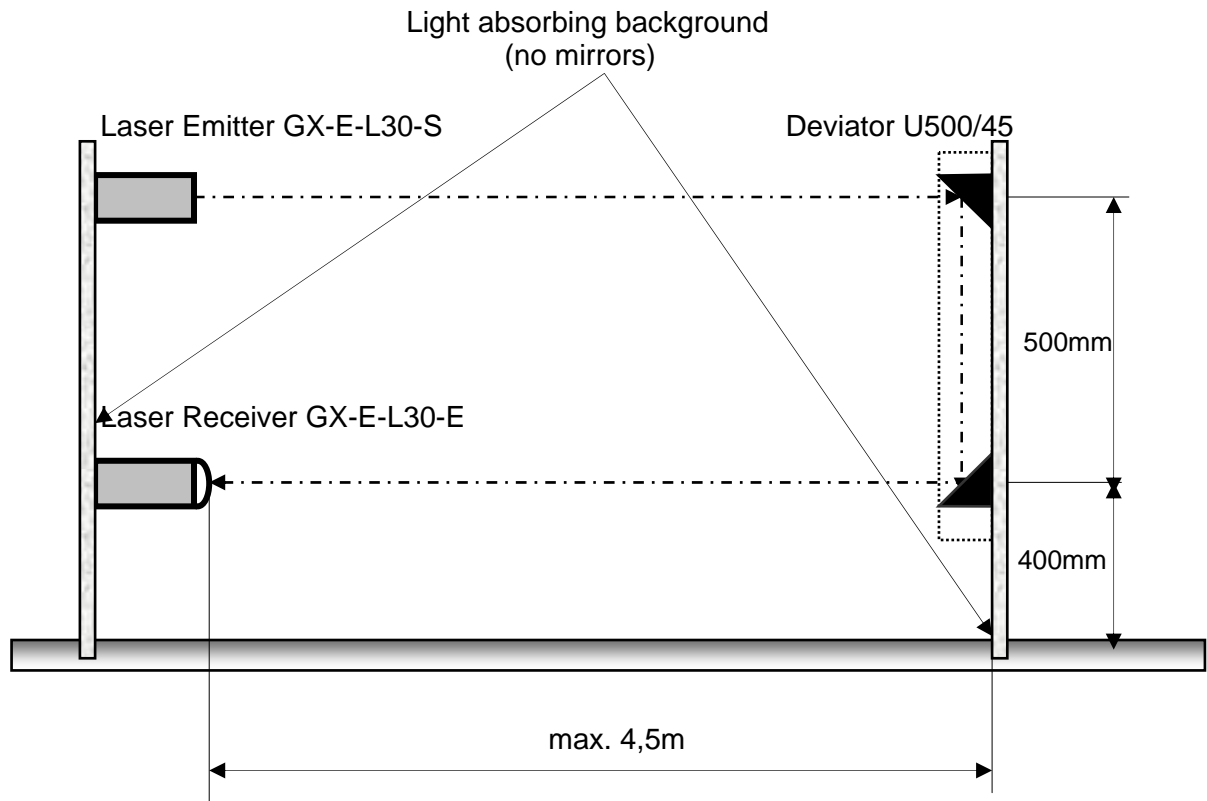
Marking:

The Laser Warning Label must be visible on the laser emitter. If the laser emitter is installed in an additional housing, the supplement laser warning label must be fitted on the additional housing.

Gardix Safety Light Barriers

9.6.2 Application with the OPTICAL DEVIATOR U500/45

Based on a risk analysis, it should be decided only a two-ray protection system is permissible. For realizing a two-ray protection field can be used one GX-E-L10/30-SE safety light barrier and an optical deviator U500/45.



Important:

- The laser beam should not leave the safety area unhindered.
- The distance of the laser beam to other reflective surfaces must be ensured, in accordance with the formula and with the Table of Distances, Paragraph 9.4.1.
- The laser warning label must be clear visible.
- The laser safety light barrier and the optical deviator must be installed stable and free from vibrations.

Gardix Safety Light Barriers

9.7 Connection prescriptions

9.7.1 General notes

On installing and connecting all devices, the supply voltage should be interrupted. Care should be taken, when wiring up the cables in accordance with the connection Lay-out. All the connections available to the sensors, including the screen and protective earth, should be connected.

9.7.2 EMC

The GARDIX GX-E/IGx is both tested for both disturbance transmissions as well as its disturbance immunity and fulfills the highest requirements. In order to maintain this insensitivity towards disturbances, the following measures must be respected:

- The maximum permissible cable length must not be exceeded.
- Screens and protective earths must be connected.
- The sensors cables must not be positioned alongside high voltage and strong current leads.

9.7.3 Mechanical reinforcement

The sensors are reinforced using clamps or strong nuts. With the Ex-d sensors the instructions regarding explosion-proof protection must be followed and particular attention should be paid to the cable Lay-out.

9.7.4 Post-switched electrical installations

Care should be taken that post switched devices satisfy the technical safety conditions. In order to be able to use the high safety standard of the GARDIX GX-E/IGx, the post switched installations must fulfil the same safety standard, like the GX-E/IGx light barrier. On connection at devices with electronic function, the maximum possible leakage current of 2mA must be observed.

9.7.5 Safety light barriers with optical fibres (GF types)

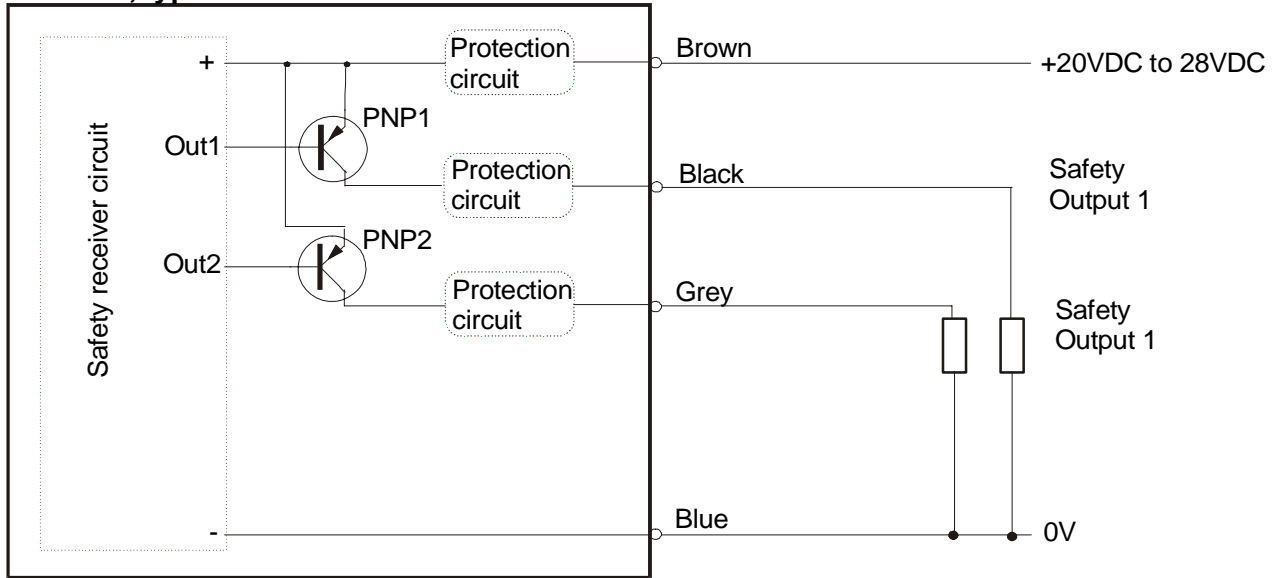
GX-E/IGD-0.1-GF-S/E(-WAS)

For safety the light barrier must only be used with connected optical fibres. Glass and plastic types are allowed. For the fibres, the same installation prescriptions are valid how for the other types of safety light barriers with integrates optics. The safety light barriers GF types must be used as light barriers and not as proximity switches. The light barriers GF types are useful for the safe detection of mechanical parts on short distances.

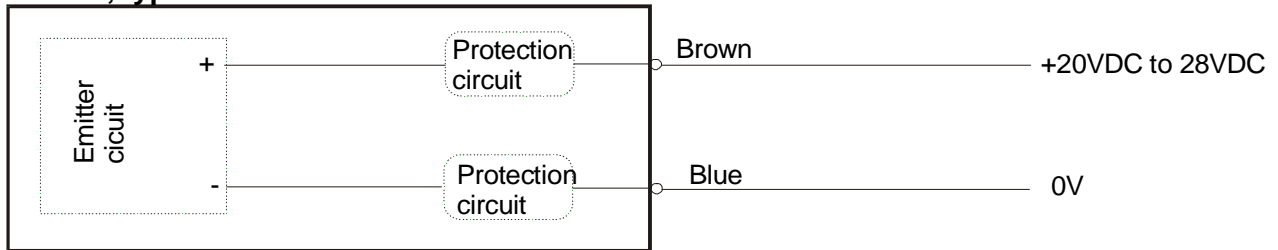
For mounting the amplifiers and emitters, the mounting prescription for Ex protection and EMC must be observed.

Gardix Safety Light Barriers

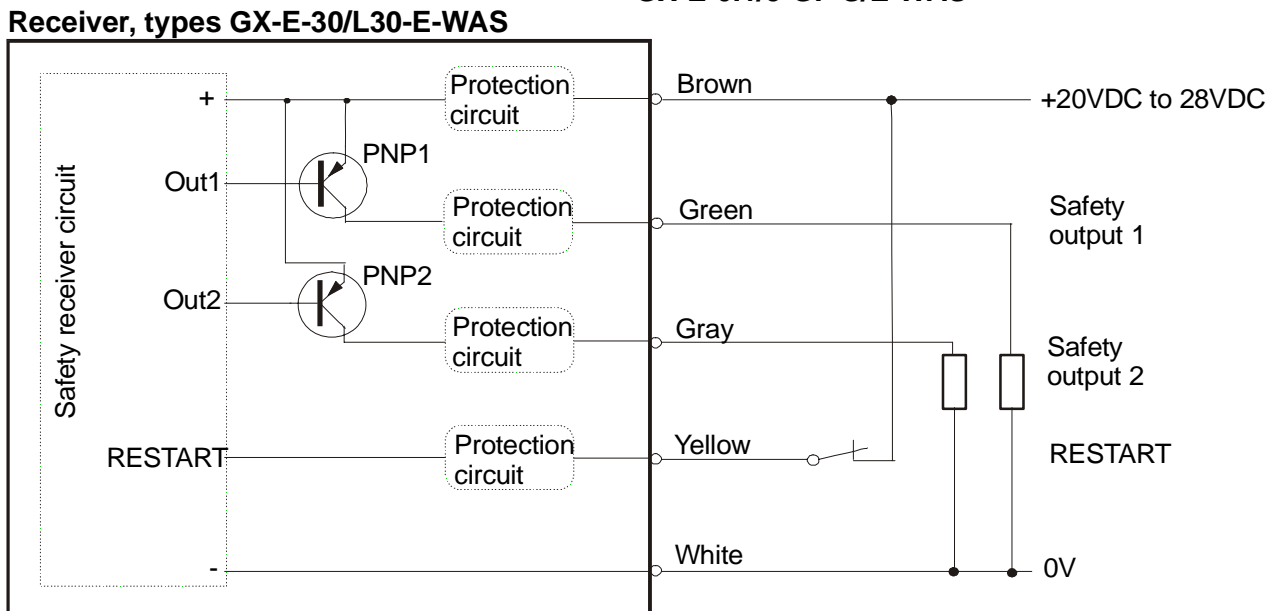
9.7.6 Connection of the Safety Light Barriers GX-E-30/L30-S/E, GX-E-0.1-GF-S/E Receiver, type GX-E-30/L30-E



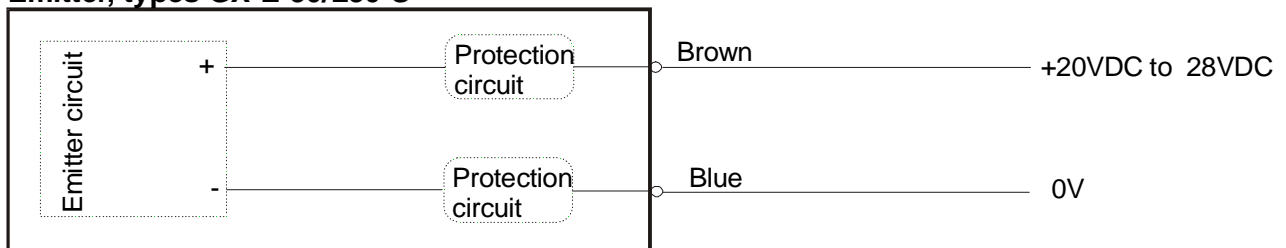
Emitter, type GX-E-30/L30-S



9.7.7 Connection of the Safety Light Barriers GX-E-30/L30-S/E-WAS, GX-E-0.1/5-GF-S/E-WAS Receiver, types GX-E-30/L30-E-WAS



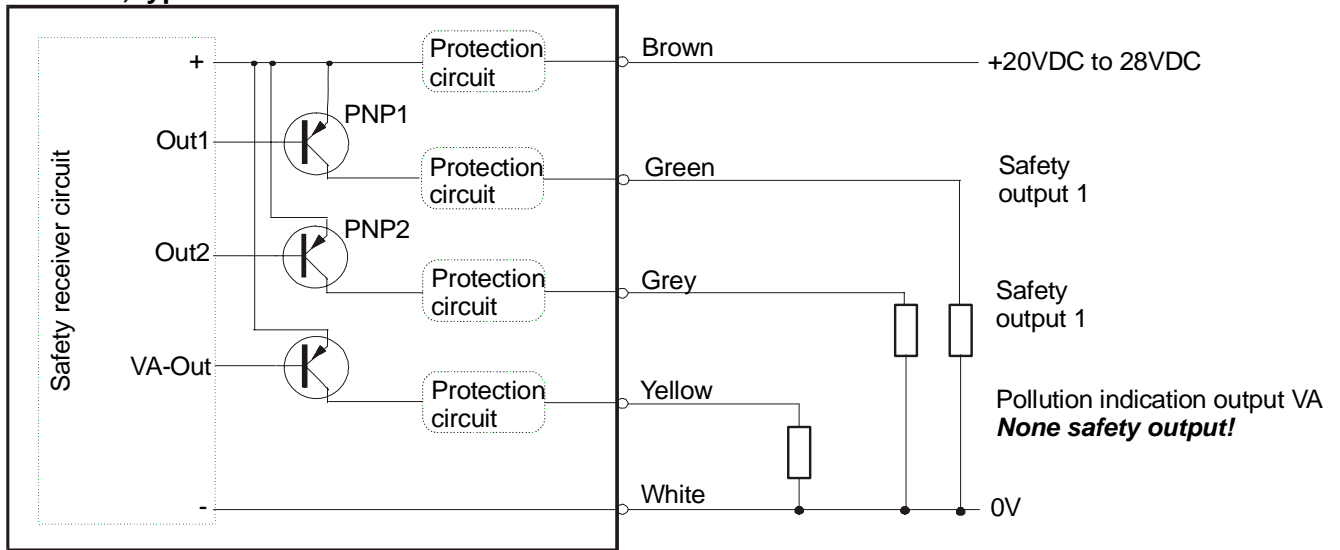
Emitter, types GX-E-30/L30-S



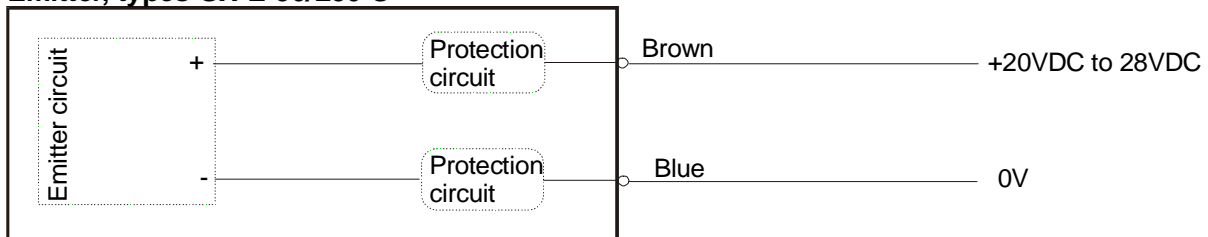
Gardix Safety Light Barriers

9.7.8 Connection of the Safety Light Barriers GX-E-30/L30-S/E-VA, GX-E-0.1-GF-S/E-VA

Receiver, types GX-E-30/L30-E-VA

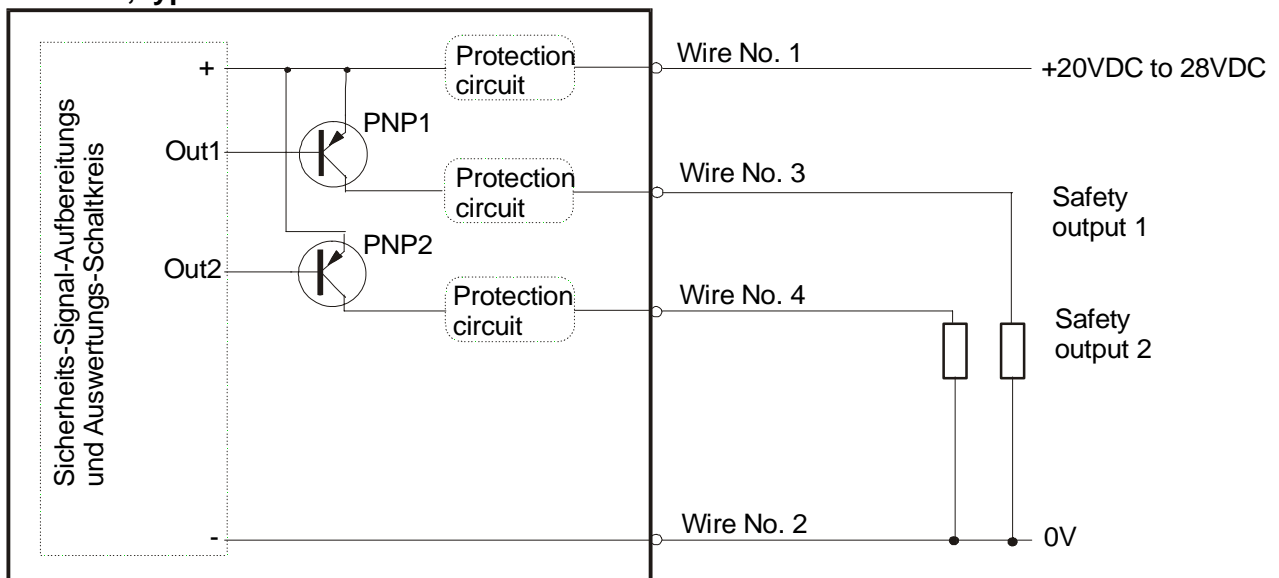


Emitter, types GX-E-30/L30-S

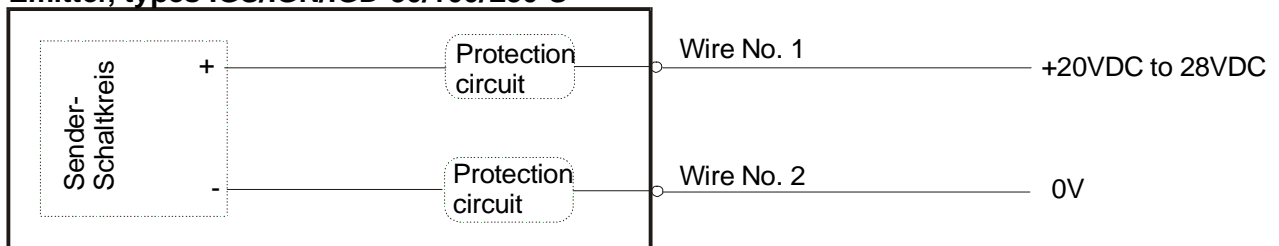


9.7.9 Connection of the Safety Light Barriers IGS/IGN/IGD-30/100/L30-S/E

Receiver, types IGS/IGN/IGD-30/100/L30-E



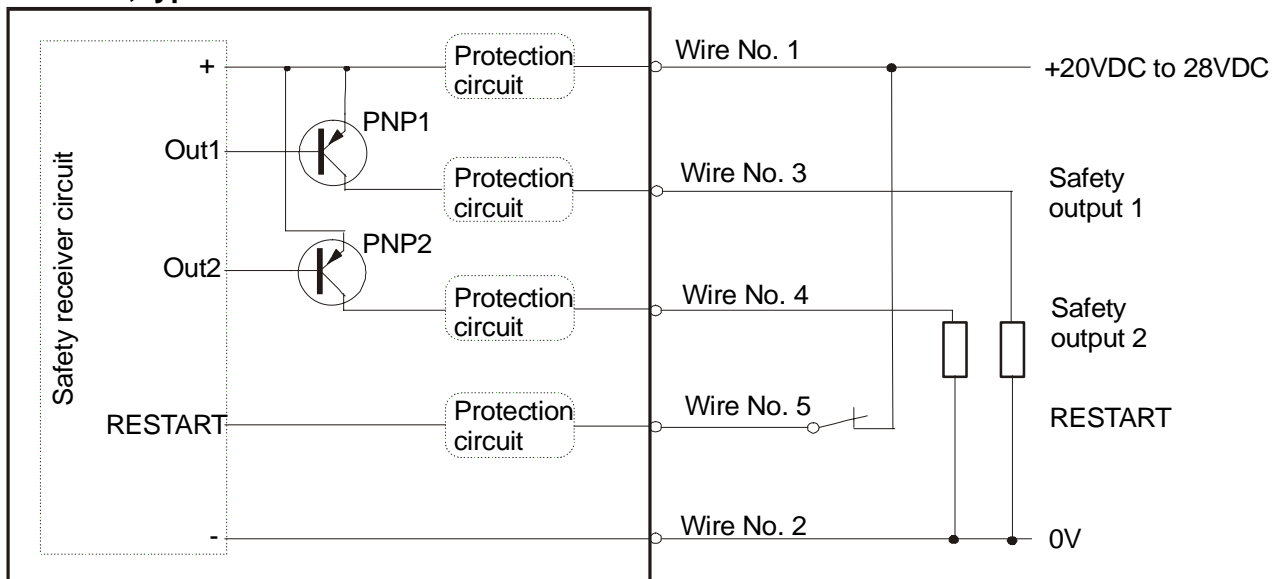
Emitter, types IGS/IGN/IGD-30/100/L30-S



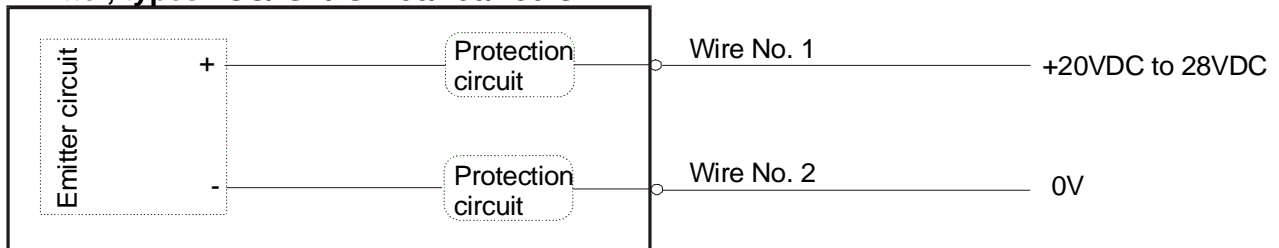
Gardix Safety Light Barriers

9.7.10 Connection of the Safety Light Barriers IGS/IGN/IGD-30/100/L30-S/E -WAS

Receiver, types IGS/IGN/IGD-30/100/L30-E-WAS

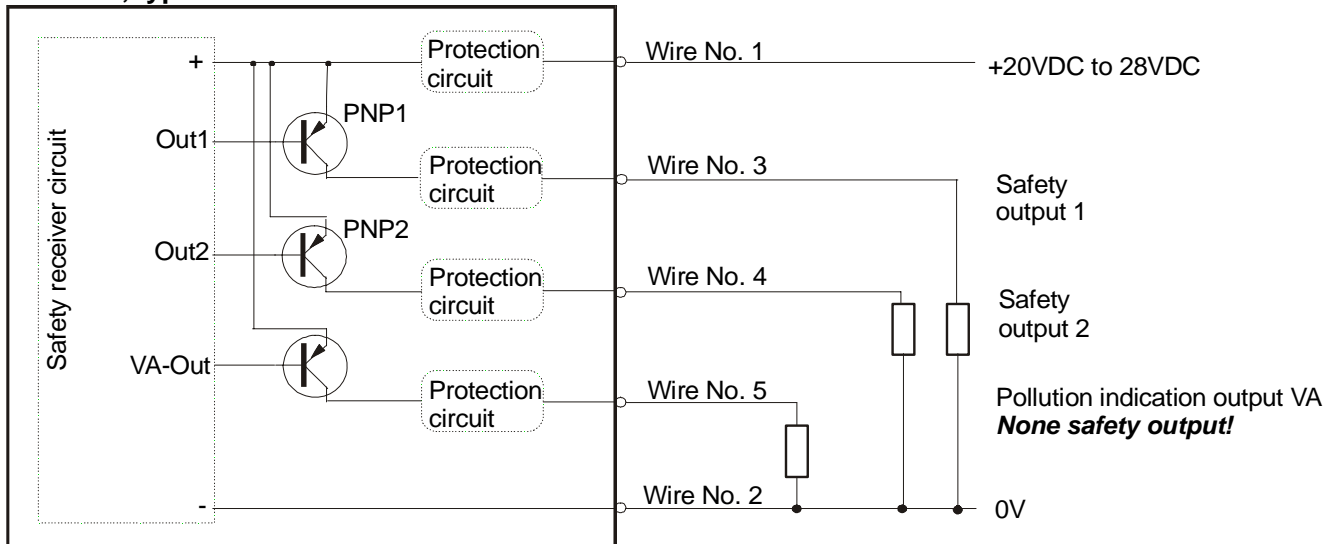


Emitter, types IGS/IGN/IGD-30/100/L30-S

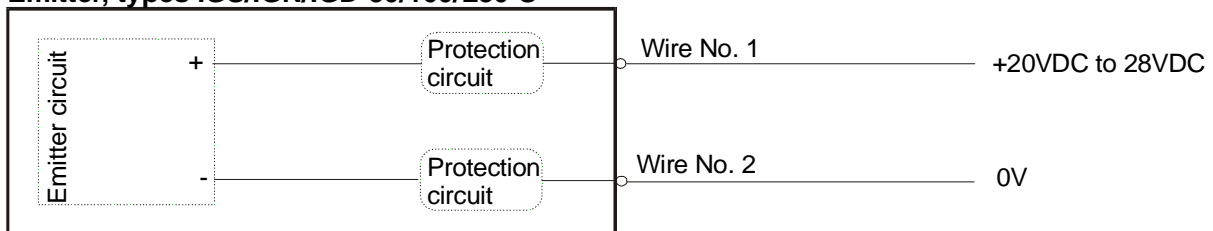


9.7.11 Connection of the Safety Light Barriers IGS/IGN/IGD-30/100/L30-S/E -VA

Receiver, types IGS/IGN/IGD-30/100/L30-E-VA



Emitter, types IGS/IGN/IGD-30/100/L30-S



Gardix Safety Light Barriers

9.7.12 Pollution indication function VA

The safety light barrier's receivers recognize pollution from the transmitter or receiver lenses. In individual receivers, pollution can be detected by a yellow illuminated signal. As option an additional pollution output can be installed.

9.8 Power-up procedure for the Safety Light Barriers GX-E / IGS / IGN / IGD

9.8.1 General notes

The Emitters GX-E/IGD-30/L30 can use 4 different frequencies and is changed at every switch-on. The corresponding receiver measures the frequency and is so adjusted to his transmitter.

For the safety light barrier GX-E/IGD-100-SE, 4 types "A" to "D" with fixed different emitter frequencies are available.

9.8.2 Switch-on

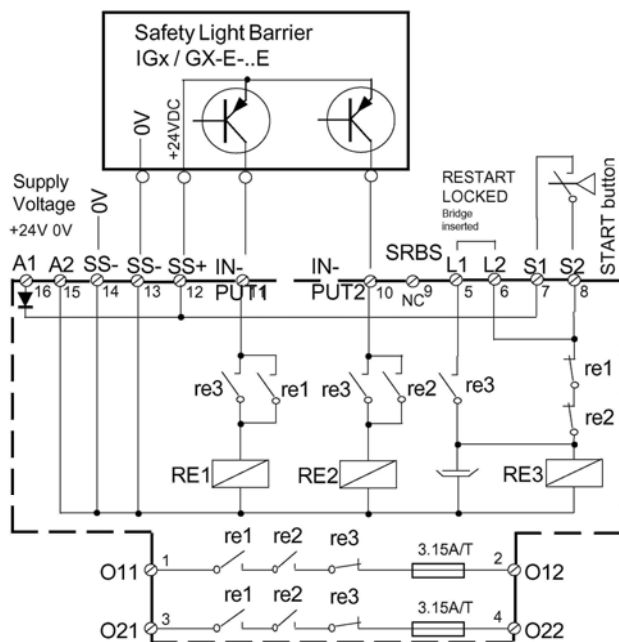
The transmitter must be switched-on simultaneously or before the receiver to the power supply.

9.8.3 Interruption of power supply

If the transmitter is switched-off during operation, the receiver recognizes no more the transmitter and switches-off too. The receiver must also be switched-off and then switched-on. Now the receiver is adjusted to his transmitter.

10. Application Samples

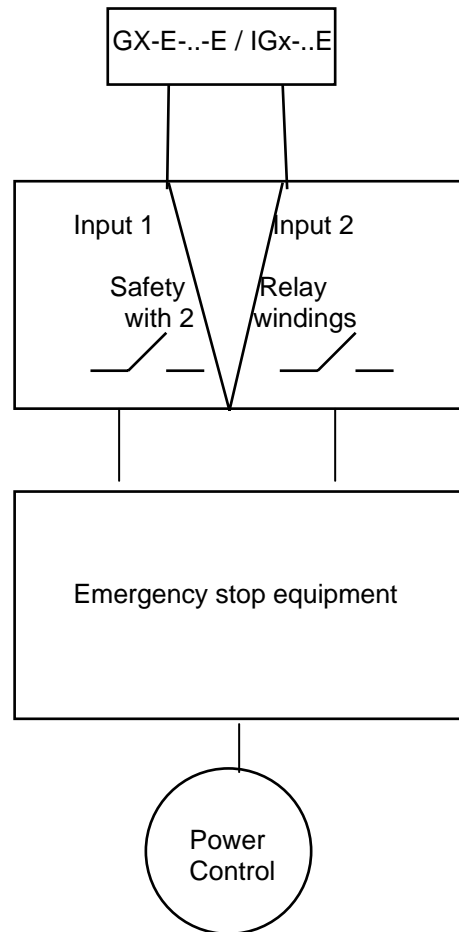
10.1 Application with Gardix-Relay GX-SR2/3-24VDC.



Gardix Safety Light Barriers

10.2 Application of a safety relay with 2 windings

If the risk analysis EN 1050 / EN 954-1 allows the possibility without a „simultaneity factor“ a safety relay with 2 coils can be used.



11. Cleaning and maintenance

- Each time the GARDIX GX-E/IGx is operated, check its functionality.
- The lenses should be cleaned at regular intervals. At the latest, when the pollution signal is flashing.

Gardix Safety Light Barriers

12. Main causes for disturbances

The following sources can result in disturbances and therefore to GX-E/IGx switching-off:

- Only transmitter was switched-off and switched-on.(Only for Safety Light Barriers)
- RESTART (release restart blocking system) works not when the light ray is interrupted.
- Transmitter of foreign light barriers, whose light falls on the receiver.
- Impulse light sources of another kind which directly or reflective affect the receiver.
- Electromagnetic or electrostatic fields which affect either the sensor to whose cable it belongs.
- Bad connection of the sensors.
- Non keeping of minimum distance between transmitter and receivers.
- Failure of a design element in the GX-E light barrier.

13. Accessories

Article	Order No.
Optical Deviator for 2-ray protection	U500/45
Relay-Module	GX-SR2/3
Receiver with Restart-Blocking-System	...-...-E-WAS
Receiver with Pollution-Output	...-...-E-VA

14. Environmental protection / Disposal

The Gardix Safety Systems are assembled non-polluting as possible.

We don't take back unserviceable or irreparable units.

For disposing observe the current local waste disposal laws and regulations.

Multi-channel accident prevention and safety system

Gardix Typ GX-C

Approvals:

- Berufsgenossenschaft (BG)
Fachausschuß Eisen und Metall III
- Physikalisch-Technische Bundesanstalt (PTB)
Ex-d

Manual

Group

Tippkemper - Matrix GmbH
Meegener Str. 43 D-51491 Overath
Tel.:+49 (0) 2206/9566-0 Fax -19

Matrix Elektronik AG
Kirchweg 24 CH-5422 Oberehrendingen
Tel.:+41 (0) 56/2220-757 Fax -563

Gardix

GX-C Safety Light Barrier

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GX-C Safety Light Barrier

1. Manufacturer: Matrix Elektronik AG
Kirchweg 24
CH-5422 Oberehrendingen
Tel: ++41 56 2220757
Fax: ++41 56 2220563

2. Approvals:

Germany + EU: BG Main Association of the Trade Association's Central Office
for Accident Prevention and Professional Medicine.
Technical Committee on „Iron and Metal III“.
BG-Approval + EU-Design Model Approval

The GARDIX System satisfies the following norms:

89/392/CEE	Machines Directives
EN 61496 Part 1	Safety of machinery. Electrosensitive protective equipment. General requirements and tests.
prEN 61496 Part 2	Safety of machinery. Electrosensitive protective equipment. Particular requirements for systems, using active opto-electronic protective devices.
EN 294	Safety of machinery, Safety distances to prevent danger zones being reached by the upper limbs.
prEN 954 Part 1	Safety of machinery. Safety-related parts of control system. General principals of design
prEN 999	Safety of machinery. Hand/arm speed. Approach speed of parts of the body for the positioning of safety devices.
ZH 1/281	Safety regulations for electrosensitive protective equipment to power operated presses in the metal industry.
ZH 1/457	Safety regulations for controls to power operated presses in the metal industry
EN 50014	Electrical apparatus for potentially explosive atmospheres General requirements.
EN 50018	Electrical apparatus for potentially explosive atmospheres Flameproof enclosures „d“.

3. General Notes:

The GARDIX GX-C multi-channel accident prevention and safety system offers personal protection for dangerous working environments.

Failures and disturbances of any kind always result in the outputs switching-off. The GARDIX GX-C system should only be used as a complete system. A unit consists of one controller and 2 to 6 pairs of light barriers. The transmitter and the receiver of one pair of sensors must be built for the same range.

Important:

The GARDIX GX-C system fulfills all the required conditions with reference to personal safety and protection, in accordance with the highest level: Level 4.

In order to guarantee safety of a work installation, all the elements connected to the GARDIX system must also be tested or designed to conform with technical safety requirements (i.e. 2-channel function of the post-switched electrical installation).

By using safety devices it must be insured that the safety light barrier cannot be bypassed.

Safety is only achieved, when all the following conditions regarding application, installation and maintenance are satisfied.

Gardix

GX-C Safety Light Barrier

4. Types

Type	Specification	No. LB	Range		Supply-Voltage	Protection Type	Exd
			min.	max.			
Controller	GX-C32-R	2	--	--	24VDC +/-10%	IP20/VBG4	No
Controller	GX-C33-R	3	--	--	24VDC +/-10%	IP20/VBG4	No
Controller	GX-C64-R	4	--	--	24VDC +/-10%	IP20/VBG4	No
Controller	GX-C65-R	5	--	--	24VDC +/-10%	IP20/VBG4	No
Controller	GX-C66-R	6	--	--	24VDC +/-10%	IP20/VBG4	No
Transmitter	IUD-11-S		0,01m	10m	12V from Controller	IP65	Yes
Receiver	IUD-11-E		0,01m	10m	12V from Controller	IP65	Yes
Transmitter	IUD-21-S		0,1m	20m	12V from Controller	IP65	Yes
Receiver	IUD-21-E		0,1m	20m	12V from Controller	IP65	Yes
Transmitter	IUD-31-S		0,2m	30m	12V from Controller	IP65	Yes
Receiver	IUD-31-E		0,2m	30m	12V from Controller	IP65	Yes
Transmitter	IUL-11-S		0,01m	10m	12V from Controller	IP65	No
Receiver	IUL-11-E		0,01m	10m	12V from Controller	IP65	No
Transmitter	IUL-21-S		0,1m	20m	12V from Controller	IP65	No
Receiver	IUL-21-E		0,1m	20m	12V from Controller	IP65	No
Transmitter	IUL-31-S		1m	30m	12V from Controller	IP65	No
Receiver	IUL-31-E		1m	30m	12V from Controller	IP65	No

**Option: All Systems are also available in version "restart blocking system".
Supplement denomination: GX-C...-....-WAS**

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GX-C Safety Light Barrier

5. Technical Data:

Wavelength of transmitter:	880nm Infra-red
Optical Beam Angle:	Max. 4°
Current Consumption:	
Controller GX-C66-R:	470mA (incl. 6 Light barriers)
Transmitter IUD-...-S / IUL-...-S:	20mA / Peak 75mA
Receiver IUD-...-E / IUL-...-E:	40mA
Reaction time:	Max. 30ms (=Time until switching of relay outputs after interruption of light beam or occurrence of error)
Cable Length of Sensors:	Max. 100m
Permissible Operating Temperature:	
Controller GX-C.	-10° to +50°
Light Barrier IUD-...	-10° to +40°
Light Barrier IUL-...	-10° to +60°
Storage Temperature LB + Controller	-25° to +70°

Minimum Object Size: min. diameter 20mm

An approaching Object must show a minimum diameter in order to be clearly recognized. With smaller objects, the GARDIX system is unable to fulfill technical safety duty.

Outputs:

Safety Outputs:	2 x NO relay contacts
	2 x NC relay contacts
	U _{max.} : 250 VAC
	I _{max.} AC : 0,4 A with 250VAC
	I _{max.} DC : 3A with U<40VDC
Pollution Output (VA)	1 x NPN (open collector)
	U _{max.} : 30 VDC / I _{max.} : 100mA

The Pollution Output must not be used for safety reasons!

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GX-C Safety Light Barrier

6. Signals and Operating Modes

The operating modes are displayed via LED's (light diodes)

The sensors have LED's which are visible from the front of the lens as well the rear of the device.

The controller gives the following display signals:

- 1 green LED switching-signal for each connected safety light barrier (Max. 6 LED's)
- 1 yellow LED pollution signal for each connected safety light barriers (Max. 6 LED's)
- 1 red LED-Alarm.
- 2 LED's which display the operating mode of controller.

Type	All rays free	Minimum 1 ray interrupted	Bad alignment of transmitter and receiver or polluted	Disturbance	Short circuit VA-Output
Controller GX-C	All switching signals LED's = green	Switching signals LED = off	Pollution signal LED = on (yellow)	Alarm-LED = red	
	Operation mode LED = green	Operating mode LED = red			
Receiver IUD-E / IUL-E	Green	Red	Yellow	Flashing symmetrical red	Flashing symmetrical red
Transmitter IUD-S / IUL-S	Green	Green	Green		

If all the Receiver-LED's and the Switching signal-LED's of the Controller indicate „green“, but the Operation mode LED of the Controller indicates „red“, the installation of the transmitters / receivers is not according to their channel number. (i. e. Transmitter 1 is aligned to Receiver 2)

Systems with Restart Blocking System:

If a ray of a safety light barrier is interrupted, outside of Muting operation, the Restart Blocking System is activated and the Alarm-LED is blinking.

7. Output Table

Output	All rays free	Minimum 1 ray interrupted and no muting activated	Bad alignment of transmitter and receiver or polluted.	Disturbance	Short circuit at VA-Output
Relay-contact NO	closed	Open	closed	open	no influence
Relay-contact NC	open	Closed	open	closed	no influence
ext. Muting-signal	no influence	no influence	no influence	open	no influence
VA NPN-Output	open / High	open / High	closed / Low	open / High	open / High

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GX-C Safety Light Barrier

8. Installation Instructions

8.1 Distance of Light Barrier to Dangerous Zone

In order to ensure a safe switch-off of the GARDIX system, there should be a minimum distance from the light barriers to the dangerous zone.

The required minimum distance can be calculated in accordance with prEN 999, by using the following formula:

$$S = K \times T + C$$

- S: Required safety distance in mm.
K: Approach speed
T: T1 + T2 Complete adaptability
T1: Reaction time of the GARDIX safety system
T2: Reaction time of the device / installation.
C: Additional distance

whereby:

$$K = 1600 \text{ mm/s}$$

$$C = 850 \text{ mm}$$

And so:

$$S = 1600 \times T + 850\text{mm}$$

Example:

The GARDIX system, is used as a light curtain for personal safety on a dangerous working environment. In order to protect the access (prEN999) 3 light beams are used.

$$T2=150 \text{ ms} \quad = 0,15 \text{ s} \quad (\text{Average switch-off time of an average press machine})$$

$$T1 = 30\text{ms} \quad = 0,03\text{s} \quad \text{Reaction time of the GARDIX system}$$

$$K \quad = 1600\text{mm/s} \quad \text{Approach speed}$$

$$Z \quad = 850\text{mm} \quad \text{Additional distance}$$

$$S \quad = \quad 1600 (0,03 + 0,15) + 850$$

$$S \quad = \quad 1600 \quad 0,18 + 850$$

$$S \quad = \quad 288 \quad + 850$$

$$S \quad = \quad \mathbf{1138\text{mm}}$$

The required distance from the light barriers to the dangerous environment must be at least 1138 mm.

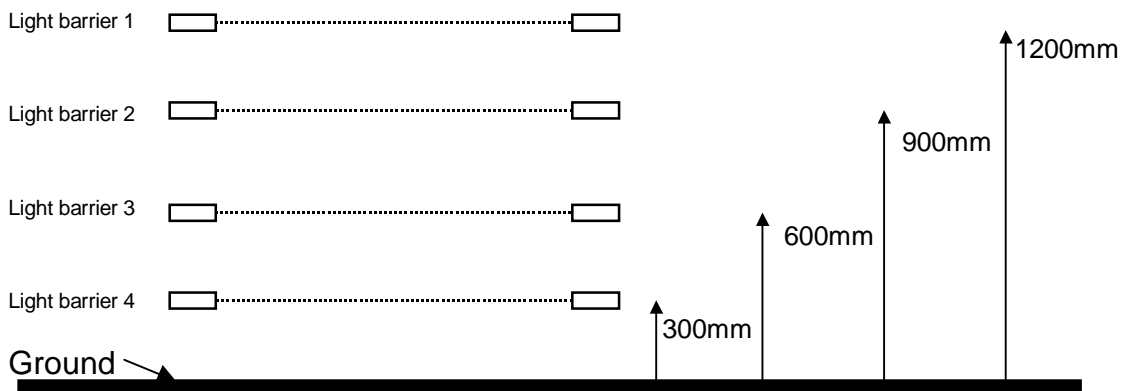
8.2 Installation of a GARDIX Protective Field

The GARDIX GX-C system can be used to install a protective field with a maximum of 6 light barriers. The instructions for planning and installation must be followed in accordance with prEN 999.

8.2.1 Configuration of Light Barriers

Example vertical placing:

GARDIX-Protective Field with 4 individual Light beams (Light barriers) for access safety.



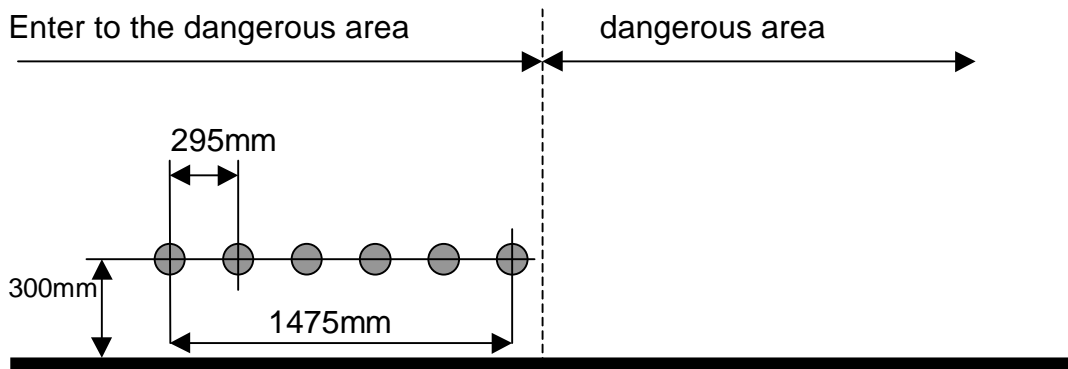
Should there be a risk assessment, so that a protective field must be used with several individual light beams, the following installation distances must be applied.

Number of beams / Light barriers	Distances greater than the reference level e.g. floor in mm in accordance with prEn999
4	300, 600, 900, 1200
3	300, 700, 1100
2	400, 900

Example of horizontal configuration:

Horizontal GARDIX-Protective Field with 6 light beams (Light barriers).

If hanging workpieces, machines, car bodies or other objects enter a dangerous area, protection can be achieved by using the Gardix GX-C without the use of additional muting sensors.



When using a horizontal configuration, the safety light barrier arrangement must not be penetrated, including from either above or below.

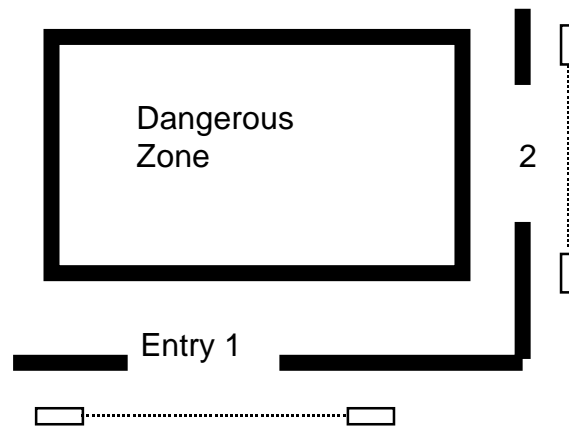
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GX-C Safety Light Barrier

8.2.2 Access monitoring with individual beams

Example:

GARDIX-Access safety with several individual beams for monitoring a dangerous zone with 2 entries:



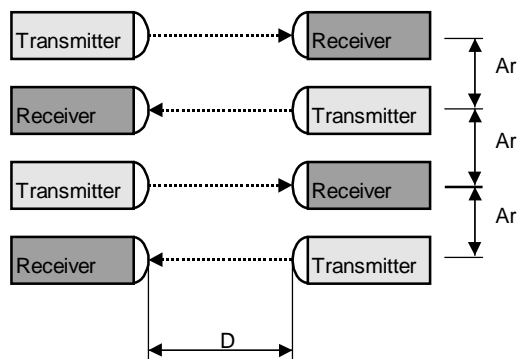
Based on a risk analysis, it should be decided whether a one-ray protection system is permissible. Otherwise a protection field should be installed in accordance with Paragraph 8.2.1.

With GARDIX GX-C System a combined solution i.e. 2 x 3 Light beams is also possible.

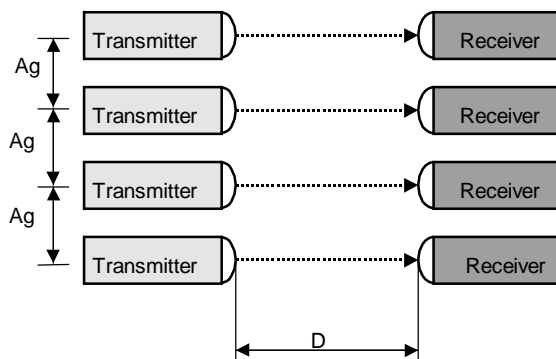
8.3 Distances between individual Light Barriers

In order to ensure a disturbance-free operation, there must be a minimum distance between the individual light barriers. Mutual influences of the pair of light barriers result in the GARDIX system switching-off. The distance can be reduced, by installing barriers in such a way that each time one transmitter and one receiver are next to one other. It must however be noted, that there could be a configuration in the opposite direction to undesired reflections (Proximity switch effect). Such reflections result in the system switching-off.

Reverse-direction Configuration:



Same-direction Configuration:



The minimum Distance A_g/A_r can be calculated according the following formula:

$$A_g = \tan 2^\circ \times D = 0,035 \times D$$

$$A_r = A_g : 2$$

$$A_g = \text{Minimum Distance in cm}$$

$$\tan 2^\circ = 0,035$$

$$D = \text{Distance between transmitter and Receiver in cm.}$$

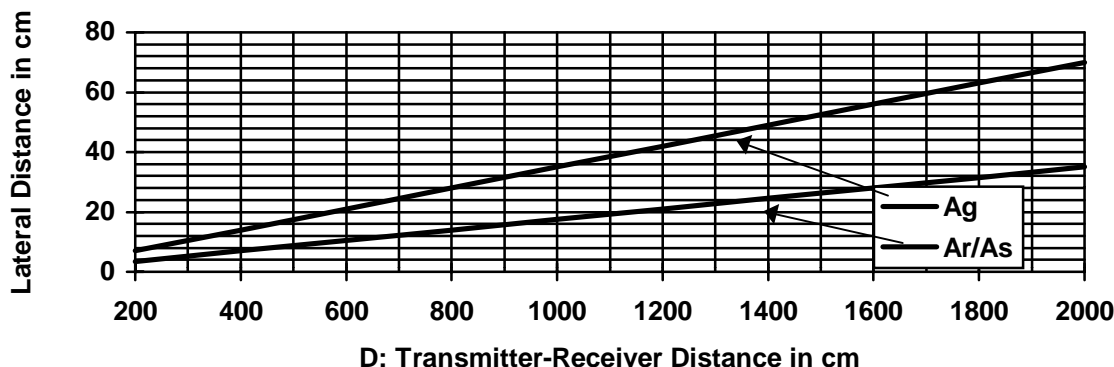
Example:

The light barrier distance is 300cm. Two light barriers should be used. The reverse-direction configuration is effective:

$$A_r = \frac{0,035 \times 300}{2} = 5,3 \text{ cm}$$

Table of distances:

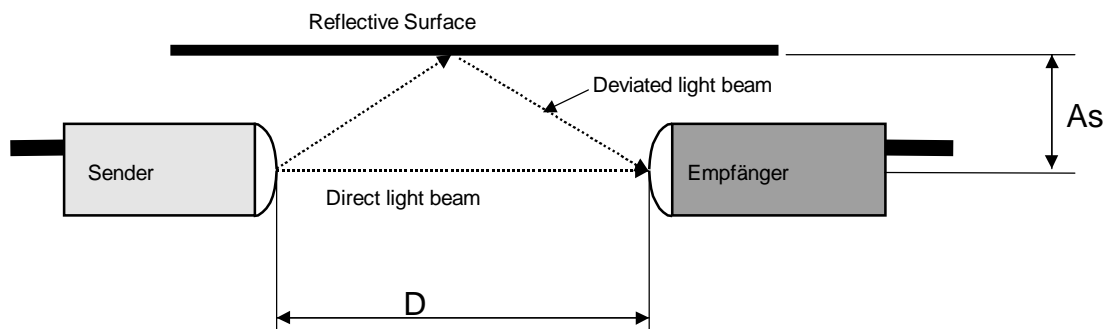
A_g : Distance between sensors with same-direction configuration
 A_r : Distance between sensors with reverse-direction configuration
 A_s : Distance between light beam and reflective surfaces



8.4 Mirror and Reflective Surfaces

8.4.1 Undesired Influence of Reflective Surfaces

Reflective surfaces can divert the light beam in such a way that there is no longer any protection from the dangerous zone. The distance of the light beam to the reflective surfaces must be ensured, in accordance with the formula below and with the Table of Distances, Paragraph 8.3.



Calculation of the A_s distance :

In order to calculate the A_s distance, the $D/2$ distance must be applied.

$$A_s = \tan 2^\circ \times D/2$$

A_s = Min. distance in cm

$$\tan 2^\circ = 0,035$$

D = Distances between transmitter and receiver in cm

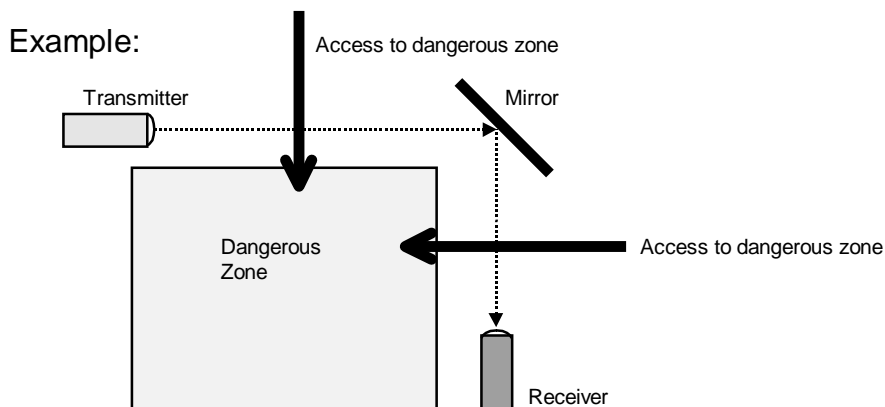
Example:

Distance $D = 500\text{cm}$

$$A_s = \tan 2^\circ \times \frac{D}{2} = 0,035 \times 250 = \mathbf{8,75\text{cm}}$$

8.4.2 Desired Application of Mirrors

The high flexibility of the GARDIX systems generally enables all the safety protection duties to be performed without having to revert to the desired application mirrors. If the application of mirrors is unby-passable, light beams can certainly be diverted. The distance to the other reflective surfaces is however ensured, in accordance with Paragraph.



8.5 Alignment of the Light Barriers

The optical opening angle of the sensors is only 4°. Great care should be taken when installing the sensors. A strong and permanent reinforcement is achieved by the design of housing.

The sensors's display signal is also visible through the front of the lens, perfect alignment can easily be performed.

The transmitter lens is permanently illuminated green.

The receiver lens can display 3 colors:

- green: Light beam free and well aligned.
- yellow: Sensors badly aligned or dirt on lenses.
- red: Sensors not aligned or light beam interrupted.

8.6 Connection of the GARDIX System

8.6.1 General Information

On installing and connecting all devices, the supply voltage should be interrupted. Care should be taken, when wiring up the cables in accordance with the connection Lay-out. All the connections available to the sensors, including the screen and protective earth, must be connected.

8.6.2 EMC

The GARDIX system is tested for both disturbance transmissions as well as its disturbance noise immunity and fulfills the highest requirements. In order to maintain this insensitivity towards disturbances, the following measures must be respected:

- The maximum permissible cable length must not be exceeded.
- Screens and protective earth's must be connected.
- The sensors cables must not be positioned alongside high voltage and strong current cables.
- If possible, the sensor's housing should be installed isolated from the protective earth. The insulation can be achieved using the clamps provided.

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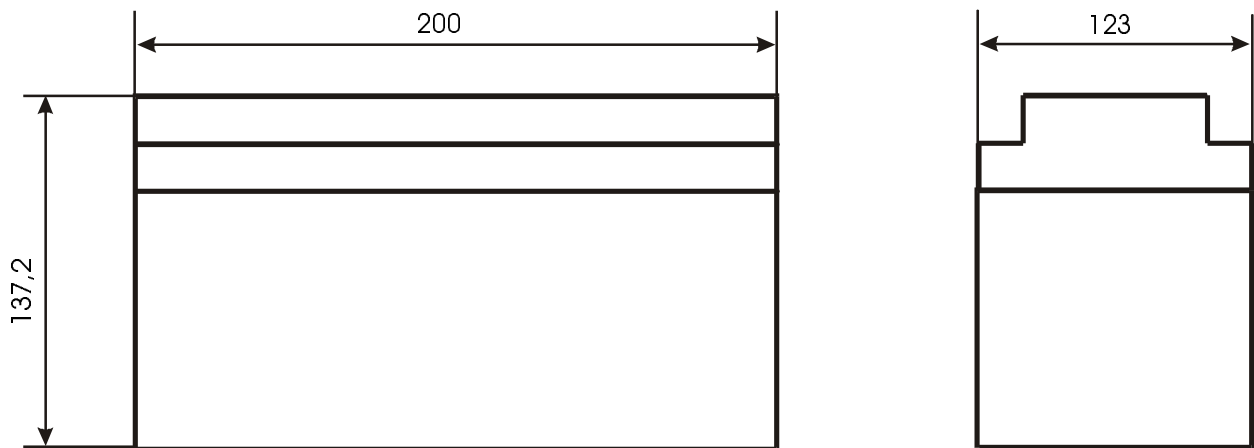
GX-C Safety Light Barrier

8.6.3 Mechanical Reinforcement

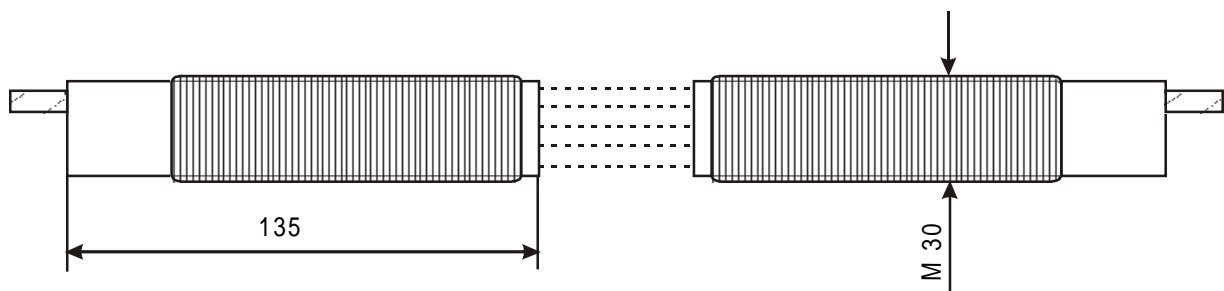
The sensors are reinforced by using clamps or strong nuts. With the Ex-d sensors the instructions regarding explosion-proof protection must be followed and particular attention should be paid to the cable Lay-out.

8.6.4 Mechanical Dimensions

Controller GX-C



Safety Light-Barrier: Types IUL / IUD (ex d IIC T6)

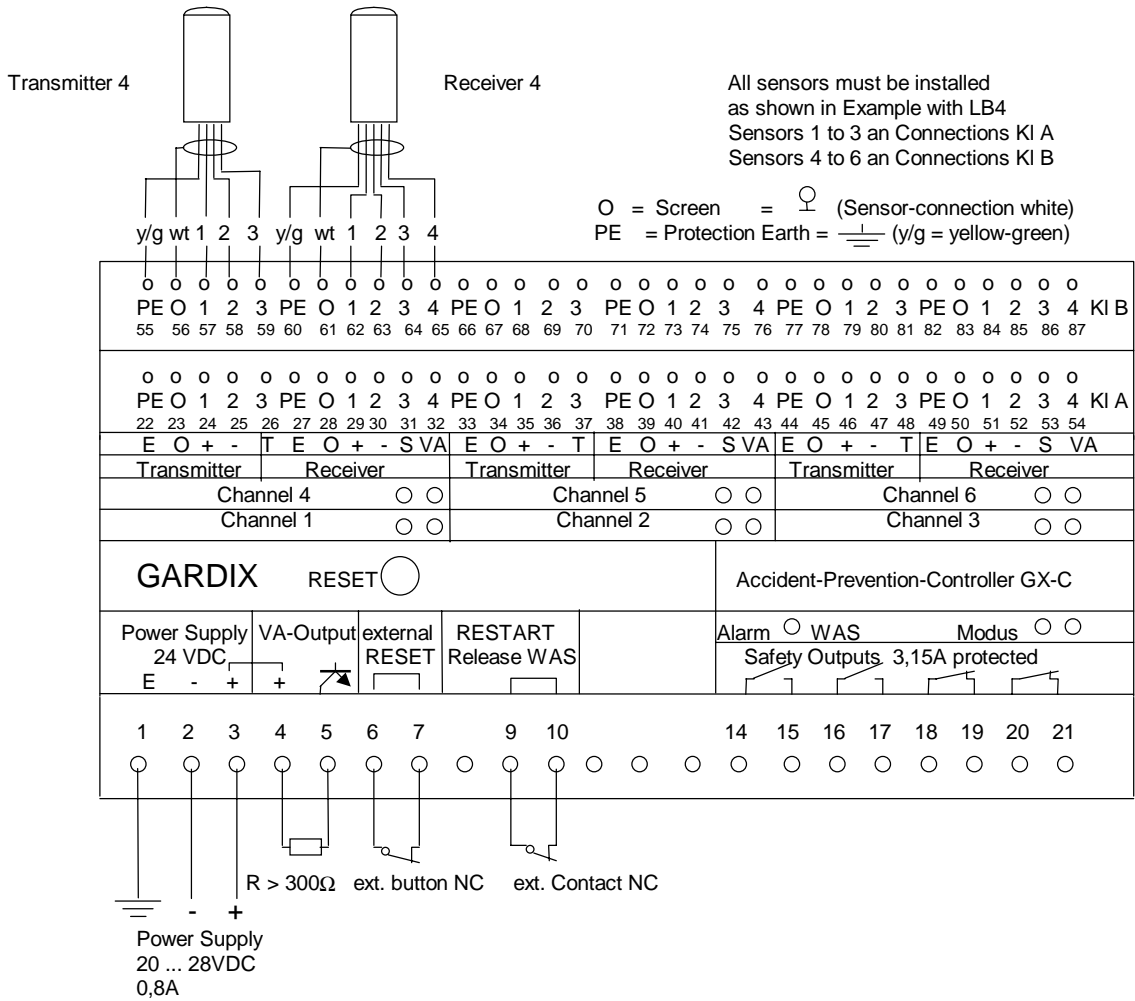


8.6.5 Post-switched Devices

Post- switched devices must satisfy the technical safety conditions of level IV.

8.6.6 Connection Lay-out of the GARDIX GX-C.. System

Connection of sensors f.e. Channel 4



Pin	Connection	Pin	Connection	Pin	Connection
1	Power Supply Protection Earth	30	Safety Receiver 1 -	59	Safety Transmitter 4 T (Activating)
2	Power Supply Minus	31	Safety Receiver 1 Sig.	60	Safety Receiver 4 PE
3	Power Supply Plus	32	Safety Receiver 1 VA	61	Safety Receiver 4 Screen
4	VA-Pollution Signal +	33	Safety Transmitter 2 PE	62	Safety Receiver 4 +
5	VA-Pollution Signal NPN	34	Safety Transmitter 2 Screen	63	Safety Receiver 4 -
6	External RESET	35	Safety Transmitter 2 +	64	Safety Receiver 4 Sig.
7	External RESET	36	Safety Transmitter 2 -	65	Safety Receiver 4 VA
8	Not Connected	37	Safety Transmitter 2 T (Activating)	66	Safety Transmitter 5 PE
9	Special Function	38	Safety Receiver 2 PE	67	Safety Transmitter 5 Schirm
10	Special Function	39	Safety Receiver 2 Screen	68	Safety Transmitter 5 +
11	Not Connected	40	Safety Receiver 2 +	69	Safety Transmitter 5 -
12	Not Connected	41	Safety Receiver 2 -	70	Safety Transmitter 5 T (Activating)
13	Not Connected	42	Safety Receiver 2 Sig.	71	Safety Receiver 5 PE
14	Relay-Contact 1 NO	43	Safety Receiver 2 VA	72	Safety Receiver 5 Screen
15	Relay-Contact 1 NO	44	Safety Transmitter 3 PE	73	Safety Receiver 5 +
16	Relay-Contact 2 NO	45	Safety Transmitter 3 Screen	74	Safety Receiver 5 -
17	Relay-Contact 2 NO	46	Safety Transmitter 3 +	75	Safety Receiver 5 Sig.
18	Relay-Contact 3 NC	46	Safety Transmitter 3 -	76	Safety Receiver 5 VA
19	Relay-Contact 3 NC	48	Safety Transmitter 3 T (Activating)	77	Safety Transmitter 6 PE
20	Relay-Contact 4 NC	49	Safety Receiver 3 PE	78	Safety Transmitter 6 Screen
21	Relay-Contact 4 NC	50	Safety Receiver 3 Screen	79	Safety Transmitter 6 +
22	Safety Transmitter 1 PE	51	Safety Receiver 3 +	80	Safety Transmitter 6 -
23	Safety Transmitter 1 Screen	52	Safety Receiver 3 -	81	Safety Transmitter 6 T (Activating)
24	Safety Transmitter 1 +	53	Safety Receiver 3 Sig.	82	Safety Receiver 6 PE
25	Safety Transmitter 1 -	54	Safety Receiver 3 VA	83	Safety Receiver 6 Screen
26	Safety Transmitter 1 T (Activating)	55	Safety Transmitter 4 PE	84	Safety Receiver 6 +
27	Safety Receiver 1 PE	56	Safety Transmitter 4 Screen	85	Safety Receiver 6 -
28	Safety Receiver 1 Screen	57	Safety Transmitter 4 +	86	Safety Receiver 6 Sig.
29	Safety Receiver 1 +	58	Safety Transmitter 4 -	87	Safety Receiver 6 VA

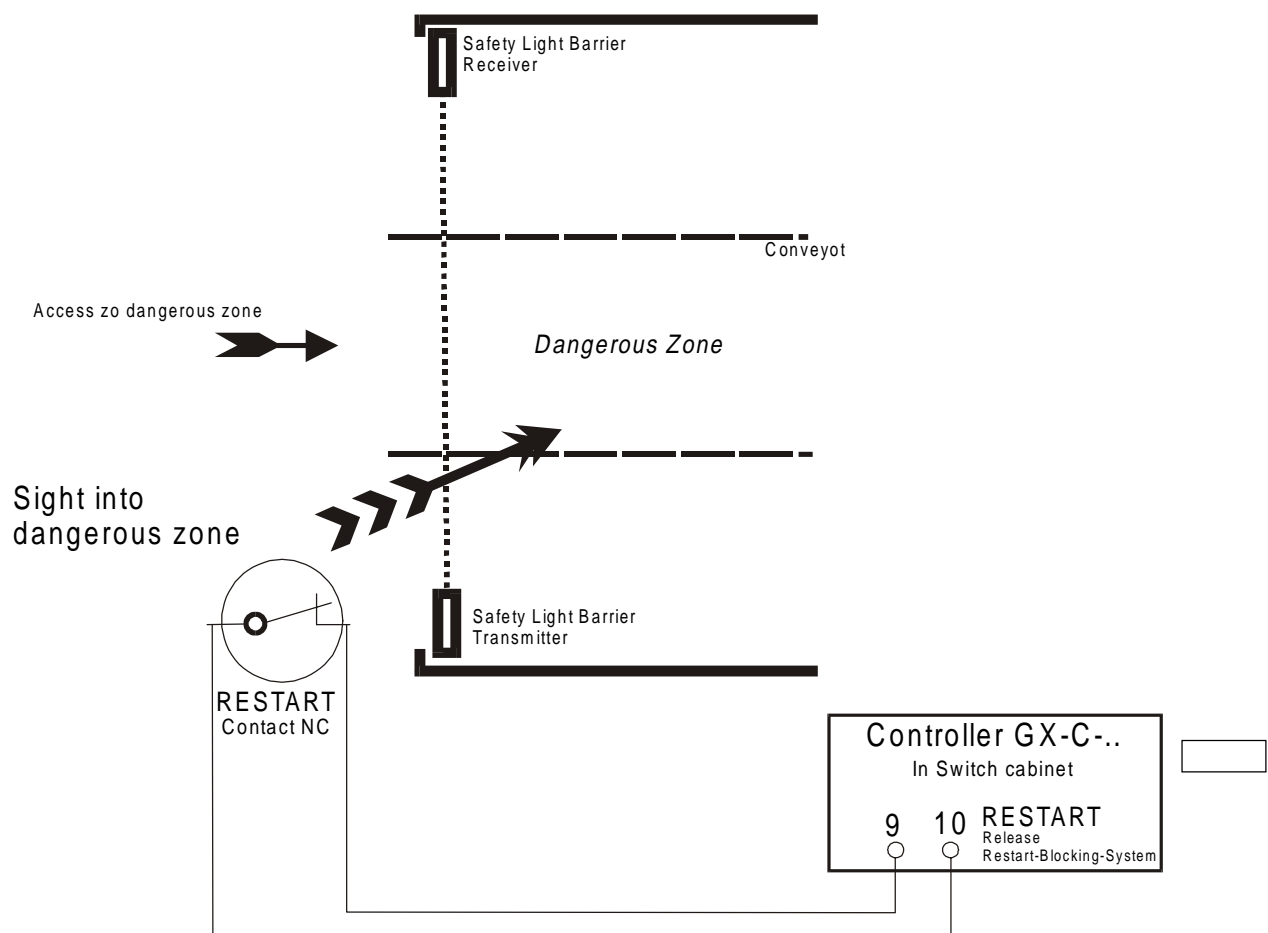
8.7 Restart Blocking System (WAS)

All Systems are available with "Restart Blocking System".

If the ray of the safety light barrier is interrupted, the Restart Blocking System is activated and indicated by Alarm/WAS-LED blinking. The system can only be reactivated by "opening" and then "closing" the restart-contact or by pressing the RESET-button.

This procedure is only possible if the light beams are not interrupted. The restart switch must be positioned out of the dangerous area.

If the system is blocked, the output switches off. The sensor continuous in operational mode. This situation allows the alignment of all light barriers of the system. Don't forget "RESET" of the system after installation.



Gardix

GX-C Safety Light Barrier

9. VA Pollution Signal

The safety light barrier's receivers recognize pollution from the transmitter or receiver lenses. In individual receivers, pollution can be detected by a yellow illuminated signal. The GARDIX-Controllers have a yellow LED-pollution-signal for each connected channel. In addition, the controller has a VA-pollution output. This output is activated, when one or more safety light barriers have recognized pollution on lenses.

The VA-output must not act as a safety function. It functions as a NPN-output with an open collector and it is short-circuit-proof ($I_{max}=100mA$).

10. Cleaning and Maintenance

- Each time the GARDIX system is operated, check its functionality.
- The lenses should be cleaned at regular intervals, at latest when pollution signal is flashing.
- Should a protection of relay-output cycle cut off, only protections in accordance with following specifications must be used:
5 x 20mm / 3,15A inert / Switch capacity 80A ©
The protection should only be used by fully qualified staff.

11. Elimination of Disturbances

11.1 Main causes for disturbances

- The external RESET-input has not been short-circuited.
- Transmitter of foreign light barriers, whose light falls on one of the receivers of the GARDIX system.
- Impulse light sources of another kind which directly or reflectively affect a GARDIX-receiver.
- Electromagnetic or electrostatic fields which affect either the sensors to whose cable it belongs or the controller.
- Bad connection of the GARDIX-sensors.
- Bad installation of the GARDIX-sensors e.g. transmitter 1 affects receiver 2.
- Non keeping of minimum distance between transmitters and receivers.
- Failure of design element in the GARDIX system.

11.2 Error Elimination List

11.2.1 Controller

Should no LED in the Controller light up:

- Supply voltage has not been connected.
- Protection F1 (1A inert) cut off.
- Short circuit bridge "ext. Reset" has not been connected

Device correctly connected.
Change protection.
Add correct "NC" contact or short-circuit bridge

Should one or more LED channel not light up:

- Relevant light beam has been interrupted.
- Relevant light barrier has not been aligned.
- Receivers have not been connected or have been wrongly connected.
- Transmitters have not been connected or have been wrongly connected.
- Light barriers transmitter or receiver is badly connected f.e. transmitter 1 affects receiver 2.
- Too many light barriers have been connected.

- Transmitter or receiver is defect

- Input switching cycle of the controller is defect.

Align LB.

Check connections.

Check connections.

Check configuration.
Compare mark on type shield f.e. GX-C32-R = 2 LB
Exchange first receiver then transmitter.
Exchange first receiver then transmitter, then controller.

Should one or more LED pollution signals light up:

- Transmitter or receiver lens of the relevant light barrier is dirty.
- Relevant light barriers have not been aligned.

Clean the lenses.
Align LB.

Alarm-LED is flashing:

WAS (restart blocking system) is activated.

Release WAS.

Should the LED alarm signal light up:

- Disturbance due to optical or electrical operating conditions.
- Tech. defect in the Controller.

Press RESET-button.
Exchange controller, if error continuous after pressing RESET-button several times

Should the relay-output not switch. Led-operating mode lights green:

- Protection in the output cycle has been cut off.

Change protection.
Note instructions in accordance with chapter.

Gardix

GX-C Safety Light Barrier

11.2.2 Receivers

LED-Display always „red“:

- Light beam has been interrupted.
- Light barrier has not been aligned.
- Transmitter has not been or has been wrongly installed.

Align LB.

Check connections

LED-Display always „yellow“:

- Transmitter or receiver lens has become dirty.
- Light barrier has not been aligned.

Clean lens.

Align LB.

LED-Display „green“ whilst LED channel-signal in the controller does not light up:

- Receiver has been aligned to wrong transmitter.

Check light barrier pairing.

LED-Display flashes „red“ symmetrically:

- Disturbance because of optical or electrical operating conditions.
- If the disturbance continues, check the following influences:

Press RESET-button

- Foreign light sources.
- Connection of screen cable and protective earth.
- Check cable lay-out in accordance with chap. 8.6.2.

- Technical defect

Should the above measures not eliminate the disturbance, then exchange the receiver.

11.2.3 Transmitter

LED-Display „green“ does not light up:

- Transmitter has not or has been wrongly connected.

Check connections.

USL

Light barrier and Safety System

The USL system is used for personal protection in dangerous working environments and has been approved in accordance with the highest level 4. USL must only be operated as a complete system and comprises a controller and a transmitter/receiver light barrier.

Controller

USC Version with safety output 2xNO / 2xNC, jointly conducted.

Type USC-S24 / 24V DC	Mounting on DIN rail track
Type USC-A24 / 24V DC	Mounting on wall fixture
Type USC-A230 / 230V AC	Mounting on wall fixture

UDC Version with safety outputs 2xNO / 2xNC, individually conducted.

Typ UDC-S24A / 24V DC	Mounting on DIN rail track
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For this version light barriers with the suffix „A“ are used
ex. IUD-10-SE-A1-012-14.

Light barriers

With an integrated optical alignment system and a pollution output signal.

Min size of objects: 20mm diameter.

Cables:	Transmitter	3+1x0,75mm ² +Screen /L=10m
	Receiver	4+1x0,75mm ² +Screen /L=10m

Standard Versions:	IUL-10-SE-1	Operating distance 1-10m
	IUL-20-SE-1	Operating distance 1-20m

Ex-d Versions:	IUD-10-SE-1-012-14	Operating distance 1-10m
	IUD-20-SE-1-012-14	Operating distance 1-20m

Ordering example for a system with „Ex“ light barriers, 10m: USC-S24-Ex-10

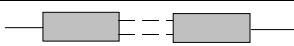

Options

- Cable lengths up to 100m on light barriers.
- Light barriers in standard version are also available with a connector plug.
- Restart Blocking: When the light ray is interrupted, the installation switches off.
Only when the „Reset“ button is pressed, can the system be reactivated.
- Test-input: Checks the function of the safety relay functions.
- Revertive Communication Input: Checks the function capacity of the post-switched installation.



ISO 9001

USL Light Barrier and Safety System

Specifications \ Type	USC-S24 Controller	UDC-S24A Controller	USC-A24 Controller	USC-A230 Controller
Voltage supply	24 VDC +/- 10%			230 VAC +6/-10%
Current consumption incl. light barriers	330 mA			60 mA
Response time	30 ms			
Operating temperature	-10°C....+60°C			
Casing material	Polycarbonate, cap ABS grey		Shock resistant polystyrene	
Mounting	On DIN railtrack EN 50022 35 x 7,5mm or with 2 Screws		Mounting hole for hang up and fixing with screw M4	
System of protection	IP 20 / DIN 40050		IP 54 / DIN 40050	
Safety outputs	1xNO / 1xNC	2xNO / 2xNC	1xNO / 1xNC	
	U max: 250 VAC eff. I max AC: 0,4A at 250 VAC I max DC 3A at U < 40 VDC			
Pollution signal output (VA) Not used for safety reasons!	1xNPN (offener Kollektor) U max: 30 VDC / I max: 100mA DC			
LED display	LED red: light beam interrupted LED green: light beam free			
Light Barriers				
Specifications \ Type	IUL-10-SE-1	IUL 20-SE-1	IUD-10-SE-1-012-14 EEx d IIC T6	IUD-20-SE-1-012-14 EEx d IIC T6
Denomination	S: Transmitter / E:Receiver Transmitter S-A1 resp. Receiver E-A1 for connection to Controller UDC-S24A			
Operating distance	0,1-10m	0,1-20m	0,1-10m	0,1-20m
Voltage supply	12 VDC from Controller			
Beam angle	max. 4°			
Output protection	Not protected against short circuit and reverse polarity			
Operating temperature	-10°C....+50°C			
Casing	M30 / nickel plated brass			
System of protection	IP 65 DIN 40 050			
Accessories	2 clamps M30 (or 4 nuts M30)			
Modus and LED Display	 Ray not interrupted LED displays yellow or green		 Ray interrupted LED displays red	
Alignment and LED Display	Receiver LED red: sensor not aligned or light beam interrupted LED yellow: sensor badly aligned or dirt on lenses LED green: light beam interrupted and sensor well aligned Transmitter LED green: operation mode			
When installing and operating the GX-C system, it is necessary to take into consideration our Operating Manual, annexed to the Controller				

Group

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