

Infrared Single Light Barrier

Mounting Instructions **DO510 / DO530**



WARNING-Opto-Elektronik
GmbH & Co Produktions KG
Daimlerstraße 13
63303 Dreieich

Table of Contents

DECLARATION OF CONFORMITY	1
1 GENERAL INFORMATION	2
1.1 Functioning.....	2
1.2 Features.....	2
1.3 Monitoring range.....	2
2 PLANNING	3
2.1 Effective range.....	3
2.2 Optical Adjustment range.....	3
2.3 Alarm Evaluation.....	3
2.4 Extension possibilities.....	4
2.4.1 Armed/Disarmed.....	4
2.4.2 Alarm memory.....	4
2.4.3 Disqualification.....	4
2.5 Heater.....	4
3 INSTALLATION	5
3.1 Wiring of the equipment.....	5
3.1.1 Wiring diagram.....	6
3.2 Installation of the equipment.....	6
3.3 Mounting with pillars.....	6
3.3.1 Ground-plate.....	6
3.3.2 Mounting of pillars.....	7
4 ALIGNMENT	8
5 PUTTING INTO OPERATION	9
6 COMPLETION WORK	10
7 MAINTENANCE	10
8 APPENDIX	10
8.1 Technical data.....	10
8.1.1 Transmitter/Receiver.....	10
8.1.2 B-board.....	11
8.1.3 Pillars.....	11
8.2 Error Elimination.....	11

Declaration of Conformity

It is herewith certified that the following product:

Active Infrared Barrier
as a single unit or to be installed in pillars

consisting of :

?? transmitter, receiver and B-board with Alarm memory and/or disqualification as single unit or
?? transmitter, receiver and B-board with Alarm memory and/or disqualification as moulded column

meets the essential protection standards according to the guidelines of the Council for harmonisation Standards within the EEC about electromagnetic compatibility EMV (89/336/EWG) as required. The following standards for the product's judgement with regard to electromagnetic compatibility (EMV) were drawn upon:

1. EN50082-2 Immunity
2. EN50081-2 Emissions



1 General Information

1.1 Functioning



Every Active Infrared Barrier consists of one IR-Transmitter/IR-Receiver.

For to allow trouble-free monitoring disturbing influences from outside, for instance caused by sunlight or outside light, must be filtered out. This is effected by a special receiver circuit which is insensitive to direct sunlight radiation.

Extension possibilities for the Infrared Barrier

The receiver can be extended by various options. Therefore an additional PC (B-board) must be installed in the receiver:

- ?? Alarm memory for identification of the detector
- ?? armed/disarmed control input to erase blocking of the memory
- ?? disqualification in case of decreasing sight distance for instance caused by severe snowfall or fog
- ?? lens heater, in order to prevent thawing of the optical equipment in case of quickly changing temperatures

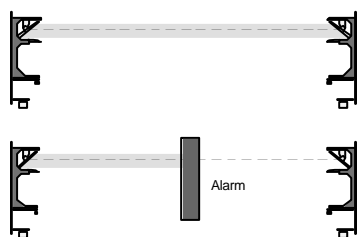


This infrared barriers which the alarm response sensibility will be modified by jumpers, can carry just B-boards and the alignment tool, with the extension "N" in their identification number and types 9.30 / 9.31T. This barrier is not compatible with former B-boards.

1.2 Features

- ?? insensitive to direct sunlight radiation
- ?? long distance ranges indoors and outdoors
- ?? potential-free alarm output
- ?? adjustable alarm
- ?? technical alarm in case of function error
- ?? reduced transmitting power at short distance ranges
- ?? high EMV-resistance
- ?? simple instalment and alignment
- ?? as individual unit for wall mounting or
- ?? as pillar-mounted unit in pillars
- ?? weather- and corrosion-proof casing

1.3 Monitoring range

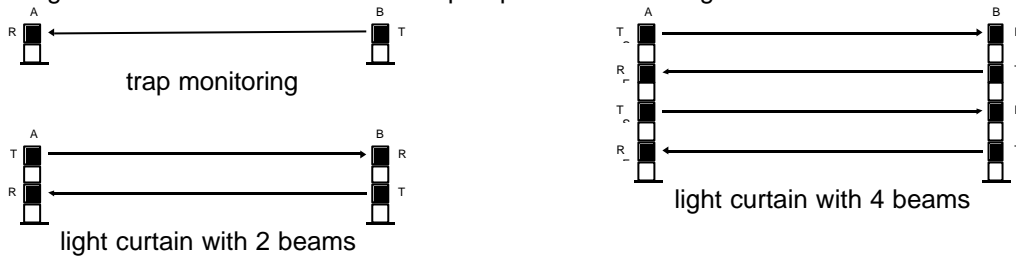


The linear range is monitored between the transmitter and receiver.

An alarm will be released only when the IR-beam has been interrupted completely.

2 Planning

The following devices are suitable for to build up trap securities and light curtains.

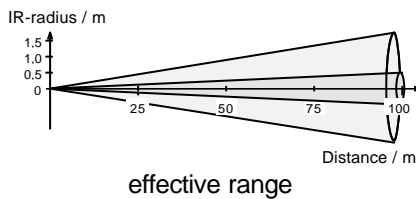


In case of planning kindly note the following:



- ?? do not exceed the recommended distance range
- ?? free sight distance communication between transmitter and receiver
- ?? optimal alignment of transmitter and receiver
- ?? use only shielded cables twisted together in pairs
- ?? avoid double exposure of one receiver caused by several transmitters
- ?? mounting of the equipment on solid ground
- ?? provide adequate number of wire leads

2.1 Effective range



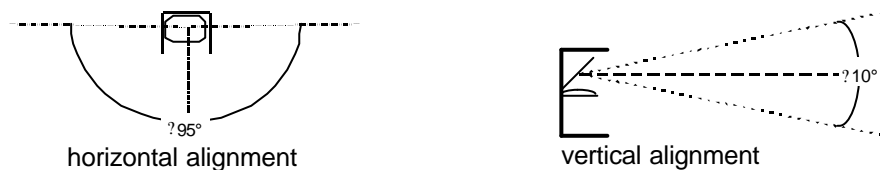
The IR-beam appears cone-shaped from the transmitter into direction of the receiver and reaches a dia. of 2.1°.

The following table is showing the relation between distance and diameter of the IR-beam.

Distance/m	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
? IR-beam/m	0,04	0,07	0,11	0,15	0,18	0,37	0,73	1,1	1,47	1,83	2,2	2,57	2,93	3,3	3,66

2.2 Optical Adjustment range

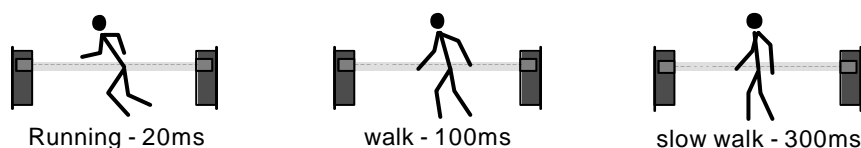
For alignment the mirrors at the devices can be adjusted horizontally around 95° and vertically 10°. Thus putting the devices (transmitter and receiver) on an axial beam becomes unnecessary.



2.3 Alarm Evaluation

An alarm message is output via a potential-free relay contact (NO-COM-NC). The single receivers only release when the IR-beam has been completely interrupted. The alarm relay, however, falls of for the time of the interruption, at least however, for 5 sec.

Due to the alarm response time which can be adjusted individually at the receivers no false alarms caused by small animals or falling leaves are possible. (see 5 *putting into operation*)



2.4 Extension possibilities

The following options are available for supplementary instalment of a B-board:

- ?? lens heater for transmitter and receiver
- ?? B-PC with alarm memory and armed/disarmed control input
- ?? B-PC with alarm memory, armed/disarmed control input, disqualification and lens heater for receiver further lens heater for transmitter

2.4.1 Armed/Disarmed

The armed/disarmed control input serves for deleting and/or blocking the Alarm memory. By selecting armed/disarmed the Alarm memory is blocked. The memory is set as soon as during an armed period a beam is interrupted.

2.4.2 Alarm memory

The Alarm memory is activated as soon as during an armed period a beam is interrupted (indicated by red LED on the B-board). For remote display an open collector output towards minus is available.

2.4.3 Disqualification

In case of slow reduction of the IR intensity at the receiver, for instance caused by severe upcoming fog, snow, dirtying of the lens system or mechanical changes the disqualification evaluation system becomes activated (indicated by yellow LED on the B-board). For remote display an open collector output towards minus is available.

The time interval until the release of a disqualification can be adjusted optionally on the B-board between 5 and 30 seconds. During all this time the receiving amplitude of the IR beam must be under a defined level. If this level is exceeded only for a short instant, the time starts running again. The alarm output can, as an option, be suppressed during disqualification.

(see 5 *putting into operation*)

2.5 Heater

To prevent the optical devices from dewing when applied outdoors or in areas exposed to sudden climate changes, transmitters and receivers must, by all means, be equipped with lens heaters. Those are to be inserted at the transmitters and receivers between lens and electronic board and must be fixed by a screw at the housing's subsoil. Finally a foil is bend carefully around the lens and then clamped between housing and PC board.

The heaters are controlled thermostatically and run by separate current supply 12 V AC or DC voltage (see 3.2 *wiring of the devices*).

For outdoor application with pillars at least one pillar heater per m column above the ground must be considered.

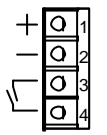
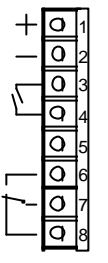
3 Installation

Installation procedure

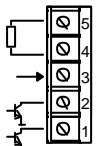
1. For installation within pillars first of all prepare ground plate and pillars (see 3.4 *installation with pillars*)
2. For outdoor application install B-boards and heaters inside of the equipment (see 2.5 *heaters*)
3. Install the equipment at provided installation position (see 3.3 *installation of the equipment*)
4. Wire the equipment (see 3.2 *wiring of the equipment*)
5. Align transmitter and receiver (see 4 *alignment*)
6. Configuration of the system (see 5 *putting into operation*)
7. Check up system's functioning (see 6 *completion work*)

3.1 Wiring of the equipment

Use only shielded cables with twisted pairs. The shields of the supply lines are to be connected as described under 3.2.1 *wiring diagram*.

Transmitter	Receiver
 <p>+ / operating voltage - / operating voltage sabotage (only for single devices) sabotage (only for single devices)</p>	 <p>+ / operating voltage - / operating voltage sabotage (only for single devices) sabotage (only for single devices) vacant (for closing resistance) NO COM NC</p>

The sabotage contact of pillars is not brought out (the clamps 3 and 4 at receiver and transmitter are not occupied).

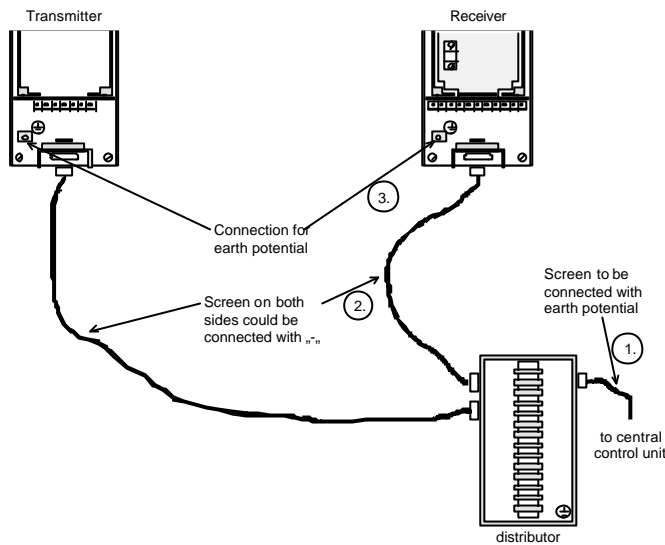
B-board for receiver	
 <p>Heater 12V AC/DC Heater 12V AC/DC Armed/Disarmed Disqualification Alarm memory</p>	

A connection for the heater is only available at the B-board provided that it has been equipped with a disqualification.

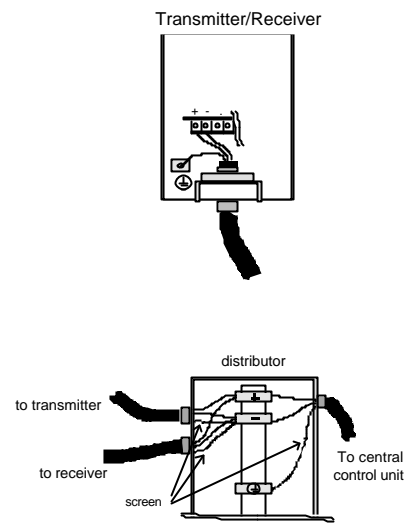
heaterboard for transmitter/receiver	
 <p>Heater 12V AC/DC Heater 12V AC/DC</p>	

The heating board can be installed in both the transmitter and receiver.

3.1.1 Wiring diagram



survey of wiring diagram



connection to supply voltage and screening

The following items are recommended for the wiring:



1. Connect screen of the supply line leading to the distributor with earth potential.
2. The screen of the supply lines must be connected from the distributor to the devices from both sides with minus potential. Never connect the screen with earth potential.
3. The housings are to be connected with earth potential.
4. No signals are allowed to be transmitted over the screens.

When inductive load is required at the output an additional protecting circuit must be provided i.e. RC-component or diode.

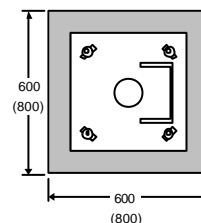
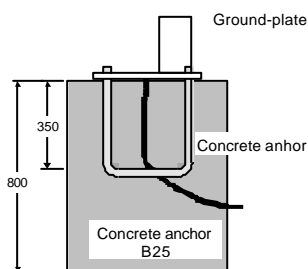
3.2 Installation of the equipment

The devices are to be installed on a solid foundation in vertical order. The swivelling optic reduces the necessity of putting the devices on a common optical axis. For to open the single units untie the screws at the housing ends and remove the cover carefully. When closing the devices put on the cover carefully and fasten screws carefully again.

3.3 Mounting with pillars

3.3.1 Ground-plate

Weather influences could effect movements of the ground-plate. Therefore they have to be fixed on a stable and solid mounting surface. Thus, the ground-plate needs stationary connection. Please pay attention to the position of the cable inlet to the ground-plate.



Column's height	Fundament surface
up to 2m	(600 x 600) mm
up to 2m	(800 x 800) mm

minimum size of the concrete fundament

The minimum size of the concrete fundament is depending on the moulded column's height. For pillars up to 2 m the fundament's surface must be (60x60) cm at least. In case of pillars exceeding 2 m the fundament surface must be at least (80x80) cm.

The fixing of the ground-plates on the concrete fundament is effected by means of 4 heavy-duty bolts (providing moulded column heights up to 2 m, length 140 mm, M16) or via 2 concrete anchors (for pillars exceeding 2, minimum depth 350 mm, dia. 16 mm).

3.3.2 Mounting of pillars

For the mounting of pillars on ground-plates the pillars need to be pre-drilled depending on the drillings on the ground-plate. Please watch the specified maximum lengths of the pillars (max. length 1.5 m or 3.0 m, each depending on the ground-plate to be used).

For the mounting of pillars at walls, at the mounting side a distance of approx. 4 mm for the roof has to be considered. Provided that the pillars are to be mounted inside of buildings a base-plate can be used instead of the roof which does not require any distance.

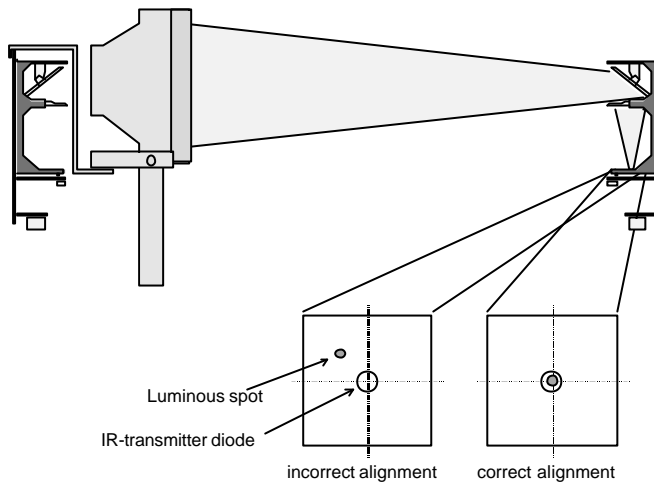
The roof and the base cover can be secured by a cover contact. For this purpose the cover contact must be inserted either at the upper or lower end of the moulded column and then to be locked.

The transmitter and receiver are to be inserted in the pillars at the head and will be adjusted to desired height through the screws at the upper and lower end of the housing. Before installation, please check the cable laying inside of the pillars.

Devices and pillars which had already been pre-wired and checked in the laboratory facilitate installation. Thus, only the earth cable needs to be connected on site.

4 Alignment

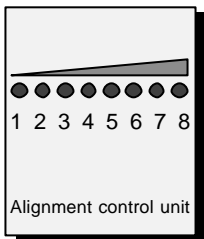
A red LED has been attached as auxiliary alignment to the receiver which extinguishes by incident IR beam. For alignment the mirrors can be adjusted horizontally approx. $\pm 95^\circ$ and vertically $\pm 10^\circ$. During the alignment procedure they have to be moved very carefully and sensitively.



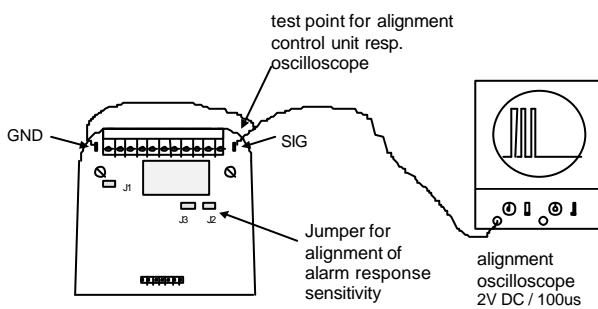
For pre-alignment of the transmitter and receiver an ordinary light source (alignment searchlight or incandescent bulb) can be applied. Therefore the light-source is fixed at the receiver resp. transmitter at the same level of the mirror and directed to the opposite side. Now the mirror at the transmitter and/or receiver can be displaced until the light-beam bundled through the lens (appearing as luminous spot on the yellow surface) arrives exactly in the middle of the IR-transmitter and/or IR-receiver diode.

alignment via alignment searchlight

For precision alignment of the receiver the alignment control device (available as accessory in a grey coloured box) or an oscilloscope can be adapted to the test points (signal and GND) provided therefore (in the yellow coloured box the connectors have to be adapted visa versa). The alignment correct as soon as a maximum of LED's appears on the alignment control unit.



LED-indicator	Evaluation of alignment indicator
1 LED	insufficient incident IR-energy (re-adjust transmitter)
2-3 LED	barely sufficient IR-energy
4-5 LED	well-sufficient IR-energy
6-8 LED	excellent IR-energy

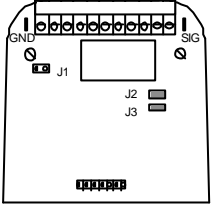
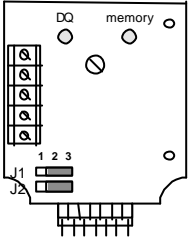





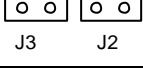
alignment with oscilloscope

The alignment can also be checked by means of oscilloscope which must be connected to the receiver at the test point (SIG) and minus potential (GND).

The number of impulses on the oscilloscope is corresponding with the number of LED's on the alignment checking device.

5 Putting into operation

Device board	jumper	jumper plugged in	jumper unplugged
 <p>receiver</p>	J1	housing is connected to minus potential (*)	housing is not connected to minus potential (*)
	J2 / J3	alarm response time (see table below)	alarm response time (see table below)
		jumper on pos. 1-2	jumper on pos. 2-3
 <p>B-board</p>	J1	Must not plugged in	Must not plugged in
	J2	DQ-alarm response time 5 sec.	DQ-alarm response time 30 sec.
		adjustments are only valid for B-boards with disqualification and Alarm memory. With plugged in B-board no alarm output during DQ.	

Adjustment receiver	alarm response time
 <p>J3 J2</p>	20ms
 <p>J3 J2</p>	150ms
 <p>J3 J2</p>	50ms
 <p>J3 J2</p>	300ms

explanation:  jumper plugged in
 jumper unplugged

(*)If disturbances should occur during outdoor application plug in jumper J1 to transmitter and receiver.

6 Completion work

Before switching on the equipment make sure that the following conditions are fulfilled:



- ?? adjustments at the receiver are all correct
- ?? optimum alignment of transmitter and receiver
- ?? are all cables tight in the connecting terminal
- ?? check voltage supply at transmitter and receiver
- ?? in case of beam interruption LED must light up at the receiver and the alarm relay must be released for 5 sec. at least
- ?? check sabotage line, when cover has been removed sabotage line must response
- ?? attach cable release to the cable
- ?? set up cover and tighten screws

7 Maintenance

It is recommended to open the device once a year in order to check its general condition or if there are any damages.

When the optic is dirty it can be removed by a anti-static tissue. Use only mild detergents. Please re-check alignment after cleaning procedure.

8 Appendix

8.1 Technical data

8.1.1 Transmitter/Receiver

	single unit	Pillar unit
Operating voltage	10 - 18V DC max. waviness 2V _{ss}	
Current consumption	50mA ea. pair	
Range	Indoor 160 m Outdoor 100 m	
Elapse time	? 10sek.	
Alarm output	Potential-free relay contact Max. load 175 V DC, 0.25 A, max. circuit breaking capacity 3W	
Alarm response time	20 / 50 / 150 / 300ms, at coding plug adjustable to receiver/	
Operating lag	? 5sek.	
Technical alarm	Electronic exit, open-collector against minus, max. load 12 V DC, 50 mA operating lag approx. 1.5 sec.	
Tamper	Potential-free switch contact Max. load 100V DC, 0.2 A	—
Infrared beam	Wave length 940nm IR-impulse length 20us Keying ratio 1:400 Beam width 2,1°	
Alignment angle	Horizontal ? 95° Vertical ? 10°	
Environment class	II, acc. to VdS 2110	
Operating temperature	-5°C - +55°C -30°C - +55°C, with heaters	
air humidity	? 98%	
Housing	Die cast aluminium housing acc. to DIN 1725, black, alloy GD-Al Si, IR exit through black Plexiglas window	

Dimensions	(173 x 60 x 60) mm	(173 x 60 x 55) mm
Protection class	IP54	IP44 with pillar
Weight	1,0kg	0,7kg

8.1.2 B-board

	With Alarm memory	with Alarm memory and disqualification
Alarm memory	Electronic exit, open-collector against minus Max. load 12V DC, 50mA	
disqualification	—	electronic exit, open collector against minus max. load 12V DC, 50mA response time 5 or 30 sec. adjustable
armed/disarmed	Armed < 1,5V disarmed 3,5V - Ub	
heater	—	foil heating element thermostatically controlled 12V AC or DC, 160 mA

8.1.3 Pillars

pillar	pillar with one beam direction	pillar with 3 beam directions
basic area	(70 x 85) mm	(86 x 100) mm
Length	ea. Length up to max. 6 m	
Material	moulded column made of anodised aluminium, black, cover pane and base cover aluminium cast, cover panes made of Plexiglas	
Protection class	IP44	
cover protection	potential-free switch contact, max. load 100V DC, 200 mA, available as accessory	
Surmount protection	potential-free switch contact, max. load 100V DC, 200mA , available as accessory	

8.2 Error Elimination

error	reason
LED at receiver is always illuminated	?? check voltage supply at transmitter ?? check alignment ?? J1 in B-board is plugged
insufficient alignment signal	?? check if sight distance communication between transmitter and receiver partly blocked ?? check if optic of the equipment is dirty ?? new alignment of transmitter and receiver
frequent false alarms or permanent alarm	?? check if distance communication between transmitter and receiver is partly blocked ?? check if optic of the equipment is dirty ?? check wiring ?? check heaters ?? new alignment of transmitter and receiver
equipment cannot be disarmed	?? check alignment ?? check alarm relay ?? check wiring
no alarm	?? check alarm relay ?? check wiring